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MD500-PLUS Series General-Purpose AC Drive

Software Guide

Industrial Automation

Intelligent Elevator

New Energy Vehicle

Industrial Robot

Rail Transit

Data code 19011580 A04

Preface

Introduction

The MD500-PLUS series AC drive is a general-purpose high-performance current vector control AC drive. It is designed to control and regulate the speed and torque of three-phase AC asynchronous motors and permanent magnet synchronous motors. The AC drive can be used to drive textile machines, paper machines, wire drawing machines, machine tools, packaging machines, food machines, fans, water pumps, and other automated production equipment.

This guide introduces parameters, detailed parameter functions, typical applications, and communication and fault codes of the AC drive.

More Documents

Document Name	Data Code	Description
MD500-PLUS Series General-Purpose AC Drive Quick Installation and Commissioning Guide (delivered with the product)	19011581	This guide introduces the installation, wiring, commissioning, troubleshooting, parameters, fault codes, and others.
MD500-PLUS Series General-Purpose AC Drive Hardware Guide	19011578	This guide describes the system composition, technical specifications, components, dimensions, options (installation accessories, cables, and peripheral electrical components), expansion cards, as well as product-related daily maintenance and maintenance instructions, certifications, standards, and others.
MD500-PLUS Series General-Purpose AC Drive Installation Guide	19011582	This guide introduces the installation dimensions, space design, specific installation steps, wiring requirements, routing requirements, option installation requirements, and troubleshooting of common EMC-related problems.
MD500-PLUS Series General-Purpose AC Drive Commissioning Guide	19011579	This guide introduces the commissioning tool, process, procedure, troubleshooting, fault codes, and parameters of the AC drive.
MD500-PLUS Series General-Purpose AC Drive Software Guide	19011580	This guide introduces function application, communication, fault codes, and parameters of the AC drive.

Revision History

Date	Version	Revision
November 2021	A04	Updated the software parameters.
July 2021	A03	Corrected errors.
March 2021	A02	Corrected errors.
November 2020	A01	Corrected errors.
July 2020	A00	First release.

Guide Acquisition

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1 Parameter List

1.1 List of Function Parameters

If FP-00 is set to a non-zero value (password protection is enabled), the parameter menu is accessible in parameter mode and user-modification mode only after the correct password is entered. To disable password protection, set FP-00 to 0.

The user password is used to lock operations only through the operating panel. If the user password is enabled, you need to enter the password every time you re-access the operating panel to read/write parameters. However, if you read/write parameters through communication (excluding groups FP and FF), you do not need to enter the password.

Password protection is not available for the parameter menu in user-defined mode.

Groups F and A include standard function parameters. Group U includes the monitoring parameters. The following symbols are used in the parameter table:

- Unchangeable
- At stop
- In real time

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
F0-00	0xF000	G/P type display	1: G type (constant-torque load) 2: P type (fan and pump)	1	-	At stop	*" F0-00" on page 92*
F0-01	0xF001	Motor 1 control mode	0: Sensorless vector control (SVC) 1: Feedback vector control (FVC) 2: V/f control 3: Reserved 4: Reserved 5: Speed open loop control for the synchronous motor (PMVVC)	0	-	At stop	*" F0-01" on page 92*
F0-02	0xF002	Command source selection	0: LED operating panel/LCD operating panel/Software 1: Terminal 2: Communication	0	-	At stop	*" F0-02" on page 93*

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
F0-03	0xF003	Main frequency source X selection	0: Digital setting (preset frequency (F0-08) that can be changed by pressing UP/ DOWN, non-retentive upon power failure) 1: Digital setting (preset frequency (F0-08) that can be changed by pressing UP/ DOWN, retentive at power failure) 2: AI1 3: AI2 4: AI3 5: Pulse reference (DI5) 6: Multi-reference 7: Simple PLC 8: PID 9: Communication 10: Reserved	0	-	At stop	*" F0-03" on page 94*
F0-04	0xF004	Auxiliary frequency source Y selection	0: Digital setting (preset frequency (F0-08) that can be changed by pressing UP/ DOWN, non-retentive upon power failure) 1: Digital setting (preset frequency (F0-08) that can be changed by pressing UP/ DOWN, retentive at power failure) 2: AI1 3: AI2 4: AI3 5: Pulse reference (DI5) 6: Multi-reference 7: Simple PLC 8: PID 9: Communication 10: Reserved	0	-	At stop	*" F0-04" on page 95*
F0-05	0xF005	Range selection of auxiliary frequency reference Y upon superposition	0: Relative to the maximum frequency 1: Relative to the main frequency X	0	-	In real time	*" F0-05" on page 97*
F0-06	0xF006	Range value of auxiliary frequency reference Y upon superposition	0% to 150%	100	%	In real time	*" F0-06" on page 98*

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
F0-07	0xF007	Frequency source superposition selection	Ones (position): Frequency reference selection 0: Main frequency reference X 1: Main and auxiliary operation result (based on tens position) 2: Switchover between the main frequency X and the auxiliary frequency Y 3: Switchover between the main frequency X and the main and auxiliary operation result 4: Switchover between the auxiliary frequency Y and the main and auxiliary operation result Tens (position): Main and auxiliary operation of the frequency reference 0: Main + Auxiliary 1: Main – Auxiliary 2: Max. (main, auxiliary) 3: Min. (main, auxiliary) 4: Main x Auxiliary	0	-	In real time	*" F0-07" on page 98*
F0-08	0xF008	Preset frequency	0.00 Hz to F0-10	50	Hz	In real time	*" F0-08" on page 99*
F0-09	0xF009	Running direction	0: Same as the default direction 1: Reverse to the default direction	0	-	In real time	*" F0-09" on page 100*
F0-10	0xF00A	Maximum frequency	5.00 Hz to 599.00 Hz	50	Hz	At stop	*" F0-10" on page 100*
F0-11	0xF00B	Source of frequency upper limit	0: F0-12 (Frequency upper limit) 1: AI1 2: AI2 3: AI3 4: Pulse reference (DI5) 5: Communication 6: Multi-speed reference	0	-	At stop	*" F0-11" on page 100*
F0-12	0xF00C	Frequency upper limit	F0-14 to F0-10	50	Hz	In real time	*" F0-12" on page 101*
F0-13	0xF00D	Frequency upper limit offset	0.00 Hz to F0-10	0	Hz	In real time	*" F0-13" on page 101*
F0-14	0xF00E	Frequency lower limit	0.00 Hz to F0-12	0	Hz	In real time	*" F0-14" on page 101*

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
F0-15	0xF00F	Carrier frequency	0.8 kHz to 16.0 kHz	6	kHz	In real time	" F0-15" on page 102
F0-16	0xF010	Carrier frequency adjusted with temperature	0: No 1: Yes	1	-	In real time	" F0-16" on page 102
F0-17	0xF011	Acceleration time 1	0.0s to 6500.0s	20	s	In real time	" F0-17" on page 102
F0-18	0xF012	Deceleration time 1	0.0s to 6500.0s	20	s	In real time	" F0-18" on page 103
F0-19	0xF013	Acceleration/ Deceleration time unit	0: 1s 1: 0.1s 2: 0.01s	1	-	At stop	" F0-19" on page 103
F0-21	0xF015	Offset frequency of auxiliary frequency source upon superposition	0.00 Hz to F0-10	0	Hz	In real time	" F0-21" on page 104
F0-22	0xF016	Frequency reference resolution	1: 0.1 Hz 2: 0.01 Hz	2	-	At stop	" F0-22" on page 104
F0-23	0xF017	Retention of digital setting of frequency upon stop	0: Non-retentive 1: Retentive	0	-	In real time	" F0-23" on page 104
F0-25	0xF019	Acceleration/ Deceleration time base frequency	0: Maximum frequency (F0-10) 1: Frequency reference 2: 100 Hz	0	-	At stop	" F0-25" on page 105
F0-26	0xF01A	Base frequency for UP/DOWN modification during running	0: Running frequency 1: Frequency reference	0	-	At stop	" F0-26" on page 105
F0-27	0xF01B	Main frequency coefficient	0.00% to 100.00%	10	%	In real time	" F0-27" on page 105
F0-28	0xF01C	Auxiliary frequency coefficient	0.00% to 100.00%	10	%	In real time	" F0-28" on page 106
F1-00	0xF100	Motor type selection	0: Common asynchronous motor 1: Variable frequency asynchronous motor 2: Synchronous motor	0	-	At stop	" F1-00" on page 106
F1-01	0xF101	Rated motor power	0.1–1000.0 kW	1.5	kW	At stop	" F1-01" on page 106
F1-02	0xF102	Rated motor voltage	1 V to 2000 V	380	V	At stop	" F1-02" on page 107
F1-03	0xF103	Rated motor current	0.1–6553.5 A	9	A	At stop	" F1-03" on page 107

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
F1-04	0xF104	Rated motor frequency	0.01 Hz to F0-10	50	Hz	At stop	" F1-04" on page 107
F1-05	0xF105	Rated motor speed	1–65535 RPM	1460	RPM	At stop	" F1-05" on page 108
F1-06	0xF106	Asynchronous/ Synchronous motor stator resistance	0.001 Ω to 65.535 Ω	1.204	Ω	At stop	" F1-06" on page 108
F1-07	0xF107	Asynchronous motor rotor resistance	0.001 Ω to 65.535 Ω	0.908	Ω	At stop	" F1-07" on page 108
F1-08	0xF108	Asynchronous motor leakage inductance	0.01 mH to 655.35 mH	5.28	mH	At stop	" F1-08" on page 108
F1-09	0xF109	Asynchronous motor mutual inductance	0.1 mH to 6553.5 mH	156.8	mH	At stop	" F1-09" on page 109
F1-10	0xF10A	Asynchronous motor no-load current	0.1 A to F1-03	4.2	A	At stop	" F1-10" on page 109
F1-11	0xF10B	Asynchronous motor core saturation coefficient 1	50.0% to 100.0%	86	%	In real time	" F1-11" on page 109
F1-12	0xF10C	Asynchronous motor core saturation coefficient 2	100.0% to 150.0%	130	%	In real time	" F1-12" on page 110
F1-13	0xF10D	Asynchronous motor core saturation coefficient 3	100.0% to 170.0%	140	%	In real time	" F1-13" on page 110
F1-14	0xF10E	Asynchronous motor core saturation coefficient 4	100.0% to 180.0%	150	%	In real time	" F1-14" on page 110
F1-17	0xF111	Synchronous motor axis D inductance	0.01 mH to 655.35 mH	15.86	mH	At stop	" F1-17" on page 110
F1-18	0xF112	Synchronous motor axis Q inductance	0.01 mH to 655.35 mH	15.86	mH	At stop	" F1-18" on page 111
F1-19	0xF113	Synchronous motor back EMF coefficient	0.0 V to 6553.5 V	0	V	At stop	" F1-19" on page 111
F1-20	0xF114	Filter time constant (PMVVC)	0.003–65.535	0.1	-	In real time	" F1-20" on page 111

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
F1-21	0xF115	Oscillation suppression gain (PMVVC)	0–65535	100	-	In real time	" F1-21" on page 111
F1-23	0xF117	Percentage of the frictional moment	0.00% to 100.00%	0	%	At stop	" F1-23" on page 112
F1-24	0xF118	Number of motor pole pairs	0–65535	2	-	In real time	" F1-24" on page 112
F1-26	0xF11A	Auto-tuning direction (inertia auto-tuning and synchronous motor auto-tuning)	0: Reverse run 1: Forward run	1	-	At stop	" F1-26" on page 112
F1-27	0xF11B	Encoder pulses per revolution	1–20000	1024	-	At stop	" F1-27" on page 112
F1-28	0xF11C	Encoder type	0: ABZ incremental encoder 1: 23-bit encoder 2: Resolver	0	-	At stop	" F1-28" on page 113
F1-29	0xF11D	PG signal filter	0: Non-adaptive filter 1: Adaptive filter 2: Fixed interlock 3: Automatic interlock	1	-	At stop	" F1-29" on page 113
F1-30	0xF11E	Encoder wiring flag	Ones (position): AB signal direction or rotational direction 0: Forward 1: Reverse Tens (position): Reserved	0	-	At stop	" F1-30" on page 114
F1-31	0xF11F	Encoder zero position angle	0.0° to 359.9°	0	°	At stop	" F1-31" on page 114
F1-32	0xF120	Motor gear ratio numerator	1 to 65535	1	-	At stop	" F1-32" on page 114
F1-33	0xF121	Motor gear ratio denominator	1–65535	1	-	At stop	" F1-33" on page 114
F1-34	0xF122	Number of pole pairs of resolver	1–32	1	-	At stop	" F1-34" on page 115
F1-36	0xF124	PG open circuit detection	0–11	1	-	At stop	" F1-36" on page 115

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
F1-37	0xF125	Auto-tuning selection	0: No auto-tuning 1: Static auto-tuning on partial parameters of the asynchronous motor (Rs, Rr, and L0) 2: Dynamic auto-tuning on all parameters of the asynchronous motor (with-load auto-tuning is supported) 3: Static auto-tuning on all parameters of the asynchronous motor (Rs, Rr, L0, Lm, and IO) 4: Dynamic auto-tuning 2 of the asynchronous motor (inertia auto-tuning only in FVC mode) 5: Dynamic auto-tuning 3 of the asynchronous motor (auto-tuning on mutual inductance curves requires no load, light load, or pure inertia load; supports V/f, SVC, and FVC modes) 11: Static auto-tuning on partial parameters of the synchronous motor (excluding back EMF) 12: No-load dynamic auto-tuning on all parameters of the synchronous motor 13: Static auto-tuning on all parameters of the synchronous motor (excluding the encoder installation angle) 14: Synchronous motor inertia auto-tuning (only in FVC mode)	0	-	At stop	" F1-37" on page 115
F2-00	0xF200	Low-speed speed loop Kp	1–200	30	-	In real time	" F2-00" on page 117
F2-01	0xF201	Low-speed speed loop Ti	0.001s to 10.000s	0.5	s	In real time	" F2-01" on page 117
F2-02	0xF202	Switchover frequency 1	0.00 Hz to F2-05	5	Hz	In real time	" F2-02" on page 117
F2-03	0xF203	High-speed speed loop Kp	1 to 200	20	-	In real time	" F2-03" on page 118

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
F2-04	0xF204	High-speed speed loop Ti	0.001s to 10.000s	1	s	In real time	" F2-04" on page 118
F2-05	0xF205	Switchover frequency 2	F2-02 to F0-10	10	Hz	In real time	" F2-05" on page 119
F2-06	0xF206	VC slip compensation gain	50% to 200%	100	%	In real time	" F2-06" on page 119
F2-07	0xF207	Speed feedback filter time	0.000s to 0.1s	0.004	s	In real time	" F2-07" on page 119
F2-08	0xF208	VC deceleration over-excitation gain	0 to 200	64	-	In real time	" F2-08" on page 120
F2-09	0xF209	Torque upper limit source in speed control (motoring)	0: Digital setting (F2-10) 1: AI1 2: AI2 3: AI3 4: Pulse reference (DI5) 5: Communication setting 6: Min. (AI1, AI2) 7: Max. (AI1, AI2)	0	-	In real time	" F2-09" on page 120
F2-10	0xF20A	Digital setting of torque upper limit in speed control (motoring)	0.0% to 200.0%	150	%	In real time	" F2-10" on page 121
F2-11	0xF20B	Torque upper limit source in speed control (generating)	0: Digital setting (F2-10) 1: AI1 2: AI2 3: AI3 4: Pulse reference (DI5) 5: Communication 6: Min. (AI1, AI2) 7: Max. (AI1, AI2) 8: Digital setting (F2-12)	0	-	In real time	" F2-11" on page 121
F2-12	0xF20C	Torque upper limit settings in speed control (generating)	0.0% to 200.0%	150	%	In real time	" F2-12" on page 123
F2-13	0xF20D	Low-speed current loop Kp adjustment	0.1–10.0	1	-	In real time	" F2-13" on page 123
F2-14	0xF20E	Low-speed current loop Ki adjustment	0.1–10.0	1	-	In real time	" F2-14" on page 123
F2-15	0xF20F	High-speed current loop Kp adjustment	0.1–10.0	1	-	In real time	" F2-15" on page 123

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
F2-16	0xF210	High-speed current loop Ki adjustment	0.1–10.0	1	-	In real time	" F2-16" on page 124
F2-17	0xF211	Speed loop Kp upon zero speed lock	1–100	30	-	In real time	" F2-17" on page 124
F2-18	0xF212	Speed loop Ti upon zero speed lock	0.001s to 10.000s	0.5	s	In real time	" F2-18" on page 124
F2-19	0xF213	Inertia compensation gain	1–200	1	-	In real time	" F2-19" on page 124
F2-20	0xF214	Speed loop switchover frequency upon zero speed lock	0.00 Hz to F2-02	0.05	Hz	In real time	" F2-20" on page 124
F2-21	0xF215	Maximum output voltage coefficient	100–110	100	-	In real time	" F2-21" on page 125
F2-22	0xF216	Output voltage filter time	0.000s to 0.01s	0	s	In real time	" F2-22" on page 125
F2-23	0xF217	Zero speed lock	0: Disabled 1: Enabled	0	-	At stop	" F2-23" on page 125
F2-24	0xF218	Vector overvoltage suppression Kp	0–1000	40	-	In real time	" F2-24" on page 126
F2-25	0xF219	Acceleration compensation gain	0–200	0	-	In real time	" F2-25" on page 126
F2-26	0xF21A	Acceleration compensation filter time	0–500	10	-	In real time	" F2-26" on page 126
F2-27	0xF21B	Overvoltage suppression in vector control mode	0: Disabled 1: Enabled	1	-	In real time	" F2-27" on page 126
F2-28	0xF21C	Cut-off frequency of torque filter reference	50 Hz to 1000 Hz	500	Hz	At stop	" F2-28" on page 127
F2-29	0xF21D	Synchronous motor initial angle detection current	50–180	80	-	In real time	" F2-29" on page 127
F2-30	0xF21E	Speed loop parameter auto-calculation	0: Disabled 1: Enabled	0	-	At stop	" F2-30" on page 127
F2-31	0xF21F	Expected speed loop bandwidth (high speed)	0 Hz to 3 Hz	0	Hz	At stop	" F2-31" on page 127

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
F2-32	0xF220	Expected speed loop bandwidth (low speed)	1 Hz to 10000 Hz	100	Hz	In real time	" F2-32" on page 128
F2-33	0xF221	Expected speed loop bandwidth (zero speed)	1 Hz to 10000 Hz	100	Hz	In real time	" F2-33" on page 128
F2-34	0xF222	Damping ratio of expected speed loop (unchanged generally)	0.1–65.000	1	-	In real time	" F2-34" on page 128
F2-35	0xF223	System inertia (equivalent to the start time)	0.001–50.000s	0.1	s	At stop	" F2-35" on page 128
F2-36	0xF224	Single motor inertia (kg*m^2)	0.001 kg*m^2 to 50.000 kg*m^2	0.001	kg*m^2	At stop	" F2-36" on page 129
F2-37	0xF225	Inertia auto-tuning maximum frequency	20% to 100%	80	%	At stop	" F2-37" on page 129
F2-38	0xF226	Inertia auto-tuning acceleration time	1.0s to 50.0s	10	s	At stop	" F2-38" on page 129
F2-39	0xF227	Bandwidth 1 of speed loop dynamic optimization test	1.0–200.0 Hz	5	Hz	Unchangeable	" F2-39" on page 129
F2-40	0xF228	Bandwidth 2 of speed loop dynamic optimization test	1.0–200.0 Hz	10	Hz	Unchangeable	" F2-40" on page 130
F2-41	0xF229	Bandwidth 3 of speed loop dynamic optimization test	1.0–100.0 Hz	15	Hz	Unchangeable	" F2-41" on page 130
F2-42	0xF22A	Bandwidth 4 of speed loop dynamic optimization test	1.0–200.0 Hz	20	Hz	Unchangeable	" F2-42" on page 130
F2-43	0xF22B	Inertia auto-tuning and dynamic speed reference	0–100	30	-	At stop	" F2-43" on page 130
F2-44	0xF22C	Rotor time constant check	0: Disabled 1: Enabled	0	-	Unchangeable	" F2-44" on page 131
F2-45	0xF22D	Torque amplitude of rotor time constant check	10% to 100%	30	%	Unchangeable	" F2-45" on page 131

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
F2-46	0xF22E	Number of times of rotor constant check	1–6	3	-	Unchangeable	" F2-46" on page 131
F2-47	0xF22F	Inertia auto-tuning	0: Disabled 1: Enabled	0	-	At stop	" F2-47" on page 131
F2-48	0xF230	Speed loop bandwidth during inertia auto-tuning	0.1–100.0 Hz	10	Hz	At stop	" F2-48" on page 132
F2-49	0xF231	Back EMF calculation	0: Disabled 1: Enabled	0	-	Unchangeable	" F2-49" on page 132
F2-50	0xF232	Inertia auto-tuning mode	0: Acceleration/Deceleration mode 1: Triangular wave mode	0	-	At stop	" F2-50" on page 132
F2-51	0xF233	Acceleration/ deceleration coefficient during inertia auto-tuning	0.1–10.0	1	-	At stop	" F2-51" on page 132
F2-52	0xF234	Decoupling control	0: Disabled 1: Enabled	0	-	At stop	" F2-52" on page 133
F2-53	0xF235	Power limit selection during generating	0: Disabled 1: Enabled	0	-	At stop	" F2-53" on page 133
F2-54	0xF236	Power limit during generating	0.0% to +200.0%	20	%	At stop	" F2-54" on page 133
F2-55	0xF237	Flux closed loop and torque linearity optimization in FVC mode	Ones (position): Flux closed loop in torque control mode 0: Disabled 1: Enabled Tens (position): Flux closed loop in speed control mode 0: Disabled 1: Enabled Hundreds (position): Torque upper limit and torque linearity in speed control mode 0: Disabled 1: Enabled	10	-	At stop	" F2-55" on page 133
F2-56	0xF238	AC drive output current upper limit	0.0% to 170.0%	150	%	At stop	" F2-56" on page 134

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
F3-00	0xF300	V/f curve setting	0: Linear V/f curve 1: Multi-point V/f curve 2: Square V/f curve 3: 1.2-power V/f curve 4: 1.4-power V/f curve 6: 1.6-power V/f curve 8: 1.8-power V/f curve 10: V/f complete separation mode 11: V/f half separation mode	0	-	At stop	" F3-00" on page 134
F3-01	0xF301	Torque boost	0.0% to 30.0%	0	%	In real time	" F3-01" on page 135
F3-02	0xF302	Cutoff frequency of torque boost	0.00 Hz to F0-10	50	Hz	At stop	" F3-02" on page 136
F3-03	0xF303	Multi-point V/f frequency 1	0.00 Hz to F3-05	0	Hz	At stop	" F3-03" on page 136
F3-04	0xF304	Multi-point V/f voltage 1	0.0% to 100.0%	0	%	At stop	" F3-04" on page 136
F3-05	0xF305	Multi-point V/f frequency 2	F3-03 to F3-07	0	Hz	At stop	" F3-05" on page 137
F3-06	0xF306	Multi-point V/f voltage 2	0.0% to 100.0%	0	%	At stop	" F3-06" on page 137
F3-07	0xF307	Multi-point V/f frequency 3	F3-05 to F1-04	0	Hz	At stop	" F3-07" on page 137
F3-08	0xF308	Multi-point V/f voltage 3	0.0% to 100.0%	0	%	At stop	" F3-08" on page 137
F3-09	0xF309	V/f slip compensation gain	0.0% to 200.0%	0	%	In real time	" F3-09" on page 138
F3-10	0xF30A	V/f over-excitation gain	0–200	64	-	In real time	" F3-10" on page 138
F3-11	0xF30B	V/f oscillation suppression gain	0–100	0	-	In real time	" F3-11" on page 138
F3-12	0xF30C	Oscillation suppression gain mode	0: Inactive 1: Reserved 2: Reserved 3: Active	3	-	At stop	" F3-12" on page 138
F3-13	0xF30D	Voltage source for V/f separation	0: Digital setting (F3-14) 1: AI1 2: AI2 3: AI3 4: Pulse reference (DI5) 5: Multi-reference 6: Simple PLC 7: PID 8: Communication (1000H)	0	-	In real time	" F3-13" on page 139

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
F3-14	0xF30E	Digital setting of voltage for V/f separation	0 V to F1-02	0	V	In real time	" F3-14" on page 140
F3-15	0xF30F	Voltage rise time of V/f separation	0.0s to 1000.0s	0	s	In real time	" F3-15" on page 140
F3-16	0xF310	Voltage decline time of V/f separation	0.0s to 1000.0s	0	s	In real time	" F3-16" on page 141
F3-17	0xF311	Stop mode selection for V/f separation	0: Frequency and voltage decline to 0. 1: Frequency declines to 0 after voltage declines to 0.	0	-	At stop	" F3-17" on page 141
F3-18	0xF312	V/f overcurrent stall action current	50% to 200%	150	%	At stop	" F3-18" on page 141
F3-19	0xF313	V/f overcurrent stall	0: Disabled 1: Enabled	1	-	At stop	" F3-19" on page 141
F3-20	0xF314	V/f overcurrent stall suppression gain	0–100	20	-	In real time	" F3-20" on page 142
F3-21	0xF315	Action current compensation coefficient for V/f speed overcurrent stall	50–200	50	-	At stop	" F3-21" on page 142
F3-22	0xF316	V/f overvoltage stall action voltage	200.0 V to 2000.0 V	770	V	At stop	" F3-22" on page 142
F3-23	0xF317	V/f overvoltage stall	0: Disabled 1: Enabled	1	-	At stop	" F3-23" on page 143
F3-24	0xF318	Suppression frequency gain for V/f overvoltage stall	0–100	30	-	In real time	" F3-24" on page 143
F3-25	0xF319	Suppression voltage gain for V/f overvoltage stall	0–100	30	-	In real time	" F3-25" on page 143
F3-26	0xF31A	Frequency rise threshold during overvoltage stall	0–50	5	-	At stop	" F3-26" on page 143
F3-27	0xF31B	Slip compensation time constant	0.1 Hz to 10.0 Hz	0.5	Hz	In real time	" F3-27" on page 144
F3-28	0xF31C	V/f parameter setting inertia coefficient	0.00–10.00	0.1	-	At stop	" F3-28" on page 144
F3-29	0xF31D	Minimum motoring torque current	10 to 100	50	-	At stop	" F3-29" on page 144

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
F3-30	0xF31E	Maximum generating torque current	10 to 100	20	-	At stop	" F3-30" on page 145
F3-31	0xF31F	Automatic frequency rise Kp	0–100	50	-	In real time	" F3-31" on page 145
F3-32	0xF320	Automatic frequency rise Ki	0–100	50	-	In real time	" F3-32" on page 145
F3-33	0xF321	Online torque compensation gain	80 to 150	100	-	At stop	" F3-33" on page 145
F4-00	0xF400	DI1 function selection	0: No function 1: Forward run (FWD) 2: Reverse run (REV) 3: Three-wire control 4: Forward jog (FJOG) 5: Reverse jog (RJOG) 6:Terminal (UP) 7:Terminal (DOWN) 8: Coast to stop 9: Fault reset (RESET) 10: Running pause	1	-	At stop	" F4-00" on page 146
Continued	Continued	Continued	11: NO input of external fault 12: Multi-reference terminal 1 13: Multi-reference terminal 2 14: Multi-reference terminal 3 15: Multi-reference terminal 4 16: Terminal 1 for acceleration/deceleration selection 17: Terminal 2 for acceleration/deceleration selection 18: Frequency source switchover 19: UP and DOWN setting clear (terminal, operating panel)	Continued	Continued	Continued	Continued
Continued	Continued	Continued	20: Command source switchover terminal 21: Acceleration/Deceleration inhibited 22: PID pause 23: PLC state reset 24: Wobble pause 25: Counter input (DI5) 26: Counter reset 27: Length count input (DI5) 28: Length reset	Continued	Continued	Continued	Continued

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
Continued	Continued	Continued	29: Torque control inhibited 30: Pulse input 31: Reserved 32: Immediate DC braking 33: NC input of external fault 34: Frequency modification enabled 35: PID action direction reversal 36: External stop terminal 1 37: Command source switchover terminal 2 38: PID integral pause 39: Switchover between main frequency source X and preset frequency	1	-	At stop	" F4-00" on page 146
Continued	Continued	Continued	40: Switchover between auxiliary frequency source Y and preset frequency 41: Reserved 42: Position lock enabled 43: PID parameter switchover 44: User-defined fault 1 45: User-defined fault 2 46: Speed control/Torque control switchover 47: Emergency stop 48: External stop terminal 2 49: Deceleration DC braking 50: Clear the current running time 51: Two-wire/three-wire control switchover 52: Electromagnetic shorting	Continued	Continued	Continued	Continued

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
Continued	Continued	Continued	53: Thickness overlaying 54: Roll diameter reset 55: Initial roll diameter 1 56: Initial roll diameter 2 57: Pre-charge 58: Winding/Unwinding switchover 59: Winding diameter calculation disabled 60: Exit tension control 61: Terminal tension rise 62: Thickness selection 1 63: Thickness selection 2 90: Water cooling system fault 91: Low liquid level fault 92: Revolution count reset 93: Reserved	Continued	Continued	Continued	Continued
F4-01	0xF401	DI2 function selection	0–93	4	-	At stop	" F4-01" on page 155
F4-02	0xF402	DI3 function selection	0–93	9	-	At stop	" F4-02" on page 157
F4-03	0xF403	DI4 function selection	0–93	12	-	At stop	" F4-03" on page 159
F4-04	0xF404	DI5 function selection	0–93	13	-	At stop	" F4-04" on page 161
F4-05	0xF405	DI6 function selection	0–93	0	-	At stop	" F4-05" on page 163
F4-06	0xF406	DI7 function selection	0–93	0	-	At stop	" F4-06" on page 165
F4-07	0xF407	DI8 function selection	0–93	0	-	At stop	" F4-07" on page 167
F4-08	0xF408	DI9 function selection	0–93	0	-	At stop	" F4-08" on page 169
F4-09	0xF409	DI10 function selection	0–93	0	-	At stop	" F4-09" on page 171
F4-10	0xF40A	DI filter time	0.000s to 1.000s	0.01	s	In real time	" F4-10" on page 173
F4-11	0xF40B	Terminal control mode	0: Two-wire mode 1 1: Two-wire mode 2 2: Three-wire mode 1 3: Three-wire mode 2	0	-	At stop	" F4-11" on page 174
F4-12	0xF40C	Terminal UP/ DOWN change rate	0.001 Hz/s to 65.535 Hz/s	1	Hz/s	In real time	" F4-12" on page 174
F4-13	0xF40D	AI curve 1 minimum input	-10.00 V to F4-15	-10	V	In real time	" F4-13" on page 175

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
F4-14	0xF40E	Percentage corresponding to AI curve 1 minimum input	-100.0% to 100.0%	-100	%	In real time	" F4-14" on page 175
F4-15	0xF40F	AI curve 1 maximum input	F4-13 to 10.00 V	10	V	In real time	" F4-15" on page 175
F4-16	0xF410	Percentage corresponding to AI curve 1 maximum input	-100.0% to 100.0%	100	%	In real time	" F4-16" on page 176
F4-17	0xF411	AI1 fitter time	0.00s to 10.00s	0.1	s	In real time	" F4-17" on page 176
F4-18	0xF412	AI curve 2 minimum input	–10.00 V to F4-20	-10	V	In real time	" F4-18" on page 176
F4-19	0xF413	Percentage corresponding to AI curve 2 minimum input	-100.0% to +100.0%	-100	%	In real time	" F4-19" on page 177
F4-20	0xF414	AI curve 2 maximum input	F4-18 to 10.00 V	10	V	In real time	" F4-20" on page 177
F4-21	0xF415	Percentage corresponding to AI curve 2 maximum input	-100.0% to +100.0%	100	%	In real time	" F4-21" on page 177
F4-22	0xF416	AI2 fitter time	0.00s to 10.00s	0.1	s	In real time	" F4-22" on page 177
F4-23	0xF417	AI curve 3 minimum input	–10.00 V to F4-25	-10	V	In real time	" F4-23" on page 178
F4-24	0xF418	Percentage corresponding to AI curve 3 minimum input	-100.0% to +100.0%	-100	%	In real time	" F4-24" on page 178
F4-25	0xF419	AI curve 3 maximum input	F4-23 to 10.00 V	10	V	In real time	" F4-25" on page 178
F4-26	0xF41A	Percentage corresponding to AI curve 3 maximum input	-100.0% to +100.0%	100	%	In real time	" F4-26" on page 179
F4-27	0xF41B	AI3 filter time	0.00s to 10.00s	0.1	s	In real time	" F4-27" on page 179
F4-28	0xF41C	Pulse minimum input	0.00 kHz to F4-30	0	kHz	In real time	" F4-28" on page 179

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
F4-29	0xF41D	Percentage corresponding to pulse minimum input	-100.0% to +100.0%	0	%	In real time	" F4-29" on page 180
F4-30	0xF41E	Pulse maximum input	F4-28 to 100.00 kHz	50	kHz	In real time	" F4-30" on page 180
F4-31	0xF41F	Percentage corresponding to pulse maximum input	-100.0% to +100.0%	100	%	In real time	" F4-31" on page 180
F4-32	0xF420	Pulse filter time	0.00–10.00s	0.1	s	In real time	" F4-32" on page 181
F4-33	0xF421	AI curve selection	Ones: AI1 1: Curve 1 (2 points, see F4-13 to F4-16) 2: Curve 2 (2 points, see F4-18 to F4-21) 3: Curve 3 (2 points, see F4-23 to F4-26) 4: Curve 4 (4 points, see A6-00 to A6-07) 5: Curve 5 (4 points, see A6-08 to A6-15) Tens: AI2 1: Curve 1 (2 points, see F4-13 to F4-16) 2: Curve 2 (2 points, see F4-18 to F4-21) 3: Curve 3 (2 points, see F4-23 to F4-26) 4: Curve 4 (4 points, see A6-00 to A6-07) 5: Curve 5 (4 points, see A6-08 to A6-15)	0x321	-	In real time	" F4-33" on page 181
Continued	Continued	Continued	Hundreds: AI3 1: Curve 1 (2 points, see F4-13 to F4-16) 2: Curve 2 (2 points, see F4-18 to F4-21) 3: Curve 3 (2 points, see F4-23 to F4-26) 4: Curve 4 (4 points, see A6-00 to A6-07) 5: Curve 5 (4 points, see A6-08 to A6-15)	Continued	Continued	Continued	Continued

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
F4-34	0xF422	Setting for AI lower than the minimum input	Ones (position): AI1 0: Percentage corresponding to minimum input 1: 0.0% Tens (position): AI2 0: Percentage corresponding to minimum input 1: 0.0% Hundreds (position): AI3 0: Percentage corresponding to minimum input 1: 0.0%	0	-	In real time	*" F4-34" on page 181*
F4-35	0xF423	DI1 delay	0.0s to 3600.0s	0	s	In real time	*" F4-35" on page 182*
F4-36	0xF424	DI2 delay	0.0s to 3600.0s	0	s	In real time	*" F4-36" on page 182*
F4-37	0xF425	DI3 delay	0.0s to 3600.0s	0	s	In real time	*" F4-37" on page 183*
F4-38	0xF426	DI valid mode selection 1	Ones: DI1 valid mode selection 0: Active high 1: Active low Tens: DI2 valid mode selection 0: Active high 1: Active low Hundreds: DI3 valid mode selection 0: Active high 1: Active low Thousands: DI4 valid mode selection 0: Active high 1: Active low Ten thousands: DI5 valid mode selection 0: Active high 1: Active low	0	-	At stop	*" F4-38" on page 183*

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
F4-39	0xF427	DI valid mode selection 2	Ones: DI6 valid mode selection 0: Active high 1: Active low Tens: DI7 valid mode selection 0: Active high 1: Active low Hundreds: DI8 valid mode selection 0: Active high 1: Active low Thousands: DI9 valid mode selection 0: Active high 1: Active low Ten thousands: DI10 valid mode selection 0: Active high 1: Active low	0	-	At stop	*" F4-39" on page 184*
F4-42	0xF42A	AI input range selection	0: -10 V to +10 V 1: 0 V to 10 V	0	-	In real time	*" F4-42" on page 184*
F5-01	0xF501	Expansion card relay output function selection	0: no output 1: Running 2: Fault output (stop upon fault) 3: Frequency-level detection FDT1 output 4: Frequency reached 5: Zero speed running (no output at stop) 6: Motor overload pre-warning 7: AC drive overload pre-warning 8: Set count value reached 9: Designated count value reached 10: Length reached 11: PLC cycle completed 12: Accumulative running time reached 13: Frequency limited 14: Torque limited	0	-	In real time	*" F5-01" on page 185*

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
Continued	Continued	Continued	15: Ready for RUN 16: AI1 > AI2 17: Frequency upper limit reached 18: Frequency lower limit reached (operation related) 19: Undervoltage status output 20: Communication setting 21: Reserved 22: Reserved 23: Zero-speed running 2 (at stop) 24: Accumulative power-on time reached	Continued	Continued	Continued	Continued
Continued	Continued	Continued	25: Frequency-level detection FDT2 output 26: Frequency 1 reach output 27: Frequency 2 reach output 28: Current 1 reach output 29: Current 2 reach output 30: Timing reach output 31: AI1 input limit exceeded 32: AC drive output load loss 33: Reverse running 34: Zero current status 35: Module temperature reached	Continued	Continued	Continued	Continued
Continued	Continued	Continued	36: Output current limit exceeded 37: Frequency lower limit reached (having output at stop) 38: Alarm output (direct output at fault or alarm) 39: Current over-temperature pre-warning 40: Current running time reached 41: Fault output 2 42: Fault output 3	Continued	Continued	Continued	Continued
F5-02	0xF502	Control board relay 1 function selection (T/A1-T/B1-TC1)	0–42	2	-	In real time	*" F5-02" on page 190*

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
F5-03	0xF503	Control board relay 2 function selection (T/A2-TC2)	0–42	0	-	In real time	" F5-03" on page 191
F5-04	0xF504	DO1 function selection	0–42	1	-	In real time	" F5-04" on page 193
F5-05	0xF505	Extension card DO2 output selection	0–42	4	-	In real time	" F5-05" on page 195
F5-06	0xF506	FMP output function selection	0: Running frequency 1: Frequency reference 2: Output current 3: Output torque 4: Output power 5: Output voltage 6: Pulse input (100.0% corresponds to 100.00 kHz) 7: AI1 8: AI2 9: AI3 10: Length	0	-	In real time	" F5-06" on page 197
Continued	Continued	Continued	11: Count value 12: Communication 13: Motor speed 14: Output current (100.0% corresponds to 1000.0 A) 15: Output voltage (100.0% corresponds to 1000.0 V) 16: Output torque (directional) 19: Taper output 20: Roll diameter output 21: Tension output 22: Encoder feedback frequency	Continued	Continued	Continued	Continued
F5-07	0xF507	AO1 output function selection	0: Running frequency 1: Frequency reference 2: Output current 3: Output torque 4: Output power 5: Output voltage 6: Pulse input (100.0% corresponds to 100.00 kHz) 7: AI1 8: AI2 9: AI3 10: Length	0	-	In real time	" F5-07" on page 199

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
Continued	Continued	Continued	11: Count value 12: Communication 13: Motor speed 14: Output current (100.0% corresponds to 1000.0 A) 15: Output voltage (100.0% corresponds to 1000.0 V) 16: Output torque (directional) 19: Taper output 20: Roll diameter output 21: Tension output 22: Encoder feedback frequency	Continued	Continued	Continued	Continued
F5-08	0xF508	AO2 output function selection	0: Running frequency 1: Frequency reference 2: Output current 3: Output torque 4: Output power 5: Output voltage 6: Pulse input (100.0% corresponds to 100.00 kHz) 7: AI1 8: AI2 9: AI3 10: Length	1	-	In real time	" F5-08" on page 201
Continued	Continued	Continued	11: Count value 12: Communication 13: Motor speed 14: Output current (100.0% corresponds to 1000.0 A) 15: Output voltage (100.0% corresponds to 1000.0 V) 16: Output torque (directional) 19: Taper output 20: Roll diameter output 21: Tension output 22: Encoder feedback frequency	Continued	Continued	Continued	Continued
F5-09	0xF509	Maximum FMP output frequency	0.01 kHz to 100.00 kHz	50	kHz	In real time	" F5-09" on page 203
F5-10	0xF50A	AO1 zero offset coefficient	-100.0% to +100.0%	0	%	In real time	" F5-10" on page 203
F5-11	0xF50B	AO1 gain	-10.00 to +10.00	1	-	In real time	" F5-11" on page 204
F5-12	0xF50C	AO2 zero offset coefficient	-100.0% to +100.0%	0	%	In real time	" F5-12" on page 204

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
F5-13	0xF50D	AO2 gain	-10.00 to +10.00	1	-	In real time	" F5-13" on page 205
F5-17	0xF511	Extension card relay output delay	0.0s to 3600.0s	0	s	In real time	" F5-17" on page 205
F5-18	0xF512	Control board relay 1 output delay	0.0s to 3600.0s	0	s	In real time	" F5-18" on page 205
F5-19	0xF513	Control board relay 2 output delay	0.0s to 3600.0s	0	s	In real time	" F5-19" on page 206
F5-20	0xF514	DO1 output delay	0.0s to 3600.0s	0	s	In real time	" F5-20" on page 206
F5-21	0xF515	Extension card DO2 output delay	0.0s to 3600.0s	0	s	In real time	" F5-21" on page 206
F5-22	0xF516	DO active mode selection	Ones (position): Expansion card relay 0: Positive logic 1: Negative logic Tens (position): Control board relay 1 0: Positive logic 1: Negative logic Hundreds (position): Control board relay 2 0: Positive logic 1: Negative logic	0	-	In real time	" F5-22" on page 207
Continued	Continued	Continued	Thousands (position): Control board DO1 0: Positive logic 1: Negative logic Ten thousands (position): Expansion card DO2 0: Positive logic 1: Negative logic	Continued	Continued	Continued	Continued
F6-00	0xF600	Startup mode	0: Direct startup 1: Flying start 2: Vector pre-excitation startup (asynchronous motor)	0	-	In real time	" F6-00" on page 207
F6-01	0xF601	Flying start mode	0: From stop frequency 1: From 50 Hz 2: From the maximum frequency 3: Reserved	0	-	At stop	" F6-01" on page 208
F6-02	0xF602	Speed of speed tracking	1 to 100	20	-	In real time	" F6-02" on page 209

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
F6-03	0xF603	Startup frequency	0.00 Hz to 10.00 Hz	0	Hz	In real time	" F6-03" on page 209
F6-04	0xF604	Startup frequency hold time	0.0s to 100.0s	0	s	At stop	" F6-04" on page 209
F6-05	0xF605	DC braking current at startup/Pre-excitation current	0% to 150%	0	%	At stop	" F6-05" on page 209
F6-06	0xF606	DC braking time at startup/Pre-excitation time	0.0s to 100.0s	0	s	At stop	" F6-06" on page 210
F6-07	0xF607	Acceleration/ Deceleration mode	0: Linear acceleration/ deceleration 1: S-curve acceleration/ deceleration	0	-	At stop	" F6-07" on page 210
F6-08	0xF608	Time proportion of S-curve start segment	0.0% to 70.0%	30	%	At stop	" F6-08" on page 210
F6-09	0xF609	Time proportion of S-curve end segment	0.0% to 70.0%	30	%	At stop	" F6-09" on page 211
F6-10	0xF60A	Stop mode	0: Decelerate to stop 1: Coast to stop	0	-	In real time	" F6-10" on page 211
F6-11	0xF60B	Starting frequency of DC braking at stop	0.00 Hz to F0-10	0	Hz	In real time	" F6-11" on page 211
F6-12	0xF60C	Waiting time of DC braking at stop	0.0s to 100.0s	0	s	In real time	" F6-12" on page 212
F6-13	0xF60D	DC braking current at stop	0% to 150%	0	%	In real time	" F6-13" on page 212
F6-14	0xF60E	DC braking time at stop	0.0s to 100.0s	0	s	In real time	" F6-14" on page 212
F6-15	0xF60F	Brake usage	0% to 100%	100	%	At stop	" F6-15" on page 212
F6-16	0xF610	Closed loop current Kp of speed tracking	0 to 1000	500	-	In real time	" F6-16" on page 213
F6-17	0xF611	Closed-loop current Ki of speed tracking	0–1000	800	-	In real time	" F6-17" on page 213
F6-18	0xF612	Current of speed tracking	30 to 200	100	-	In real time	" F6-18" on page 213
F6-21	0xF615	Demagnetization time	0.00s to 10.00s	1	s	In real time	" F6-21" on page 214
F6-22	0xF616	Start pre-torque setting	0.0% to 200.0%	0	%	In real time	" F6-22" on page 214

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
F6-26	0xF61A	Electromagnetic shorting current	0% to 200%	100	%	In real time	" F6-26" on page 214
F6-27	0xF61B	Electromagnetic shorting time upon startup	0.0s to 100.0s	0	s	At stop	" F6-27" on page 214
F6-28	0xF61C	Electromagnetic shorting time upon stop	0.0s to 100.0s	0	s	At stop	" F6-28" on page 215
F6-29	0xF61D	Electromagnetic shorting voltage reserve	20.0–100.0 V	20	V	At stop	" F6-29" on page 215
F6-30	0xF61E	Trial current for synchronous motor speed tracking	5.0 to 50.0	10	-	At stop	" F6-30" on page 215
F6-31	0xF61F	Minimum tracking frequency for synchronous motor speed tracking	0.0–100.0	0	-	At stop	" F6-31" on page 215
F6-32	0xF620	Angle compensation for synchronous motor speed tracking	0–360	0	-	At stop	" F6-32" on page 215
F6-33	0xF621	Proportion of synchronous motor speed tracking	0.1–10.0	1	-	At stop	" F6-33" on page 216
F6-34	0xF622	Integral of synchronous motor speed tracking	0.1–10.0	1	-	At stop	" F6-34" on page 216
F6-35	0xF623	Maximum current limit for DC braking	80% to 135%	80	%	At stop	" F6-35" on page 216
F6-36	0xF624	Speed loop feedforward	-200.0% to +200.0%	0	%	In real time	" F6-36" on page 216

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
F7-01	0xF701	MF.K key function selection	0: MF.K key disabled 1: Switchover between operating panel control and remote control (terminal or communication) 2: Switchover between forward and reverse run 3: Forward jog 4: Reverse jog	0	-	At stop	*" F7-01" on page 217*
F7-02	0xF702	STOP/RES key function	0: STOP/RESET key enabled only in operating panel control mode 1: STOP/RESET key enabled in any operating mode	0	-	In real time	*" F7-02" on page 218*
F7-03	0xF703	LED running display parameter 1	BIT00: Running frequency (Hz) BIT01: Frequency reference (Hz) BIT02: Bus voltage (V) BIT03: Output voltage (V) BIT04: Output current (A) BIT05: Output power (kW) BIT06: Output torque (%)	0x1F	-	In real time	*" F7-03" on page 218*
Continued	Continued	Continued	BIT07: DI status BIT08: DO status BIT09: AI1 voltage (V) BIT10: AI2 voltage (V) BIT11: AI3 voltage (V) BIT12: Count value BIT13: Length value BIT14: Load speed display BIT15: PID reference	Continued	Continued	Continued	Continued
F7-04	0xF704	LED running display parameter 2	BIT00: PID feedback BIT01: PLC stage BIT02: Pulse input frequency (kHz) BIT03: Running frequency 2 (Hz) BIT04: Remaining running time BIT05: AI1 voltage before correction (V) BIT06: AI2 voltage before correction (V)	0	-	In real time	*" F7-04" on page 219*

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
Continued	Continued	Continued	BIT07: AI3 voltage before correction (V) BIT08: Linear speed BIT09: Current power-on time (h) BIT10: Current running time (min.) BIT11: Pulse input frequency (Hz) BIT12: Communication setting BIT13: Encoder feedback speed (Hz) BIT14: Roll diameter (mm) BIT15: Tension after taper (N)	Continued	Continued	Continued	Continued
F7-05	0xF705	LED stop display parameter	BIT00: Frequency reference (Hz) BIT01: Bus voltage (V) BIT02: DI state BIT03: DO state BIT04: AI1 voltage (V) BIT05: AI2 voltage (V) BIT06: AI3 voltage (V)	0x33	-	In real time	" F7-05" on page 220
Continued	Continued	Continued	BIT07: Count value BIT08: Length value BIT09: PLC stage BIT10: Load speed display BIT11: PID reference BIT12: Pulse input frequency (kHz) BIT13: Roll diameter (mm) BIT14: Tension (N)	Continued	Continued	Continued	Continued
F7-06	0xF706	Load speed display coefficient	0.0000 to 6.5	1	-	In real time	" F7-06" on page 220
F7-07	0xF707	Heatsink temperature of IGBT	-20°C to +120°C	0	°C	Unchangeable	" F7-07" on page 221
F7-08	0xF708	Product SN	0–999	0	-	Unchangeable	" F7-08" on page 221
F7-09	0xF709	Accumulative running time	0 h to 65535 h	0	h	Unchangeable	" F7-09" on page 221
F7-10	0xF70A	Performance software version	-	0	-	Unchangeable	" F7-10" on page 221
F7-11	0xF70B	Function software version	-	0	-	Unchangeable	" F7-11" on page 221

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
F7-12	0xF70C	Number of decimal places for load speed display	0: 0 decimal place 1: 1 decimal place 2: 2 decimal places 3: 3 decimal places	1	-	In real time	" F7-12" on page 222
F7-13	0xF70D	Accumulative power-on time	0–65535 h	0	h	Unchangeable	" F7-13" on page 222
F7-14	0xF70E	Accumulative power consumption	0 kWh to 65535 kWh	0	kWh	Unchangeable	" F7-14" on page 222
F7-15	0xF70F	Temporary performance software version	-	0	-	Unchangeable	" F7-15" on page 223
F7-16	0xF710	Temporary function software version	-	0	-	Unchangeable	" F7-16" on page 223
F8-00	0xF800	Jog frequency	0.00 Hz to F0-10	2	Hz	In real time	" F8-00" on page 223
F8-01	0xF801	Jog acceleration time	0.0s to 6500.0s	20	s	In real time	" F8-01" on page 224
F8-02	0xF802	Jog deceleration time	0.0s to 6500.0s	20	s	In real time	" F8-02" on page 224
F8-03	0xF803	Acceleration time 2	0.0s to 6500.0s	20	s	In real time	" F8-03" on page 224
F8-04	0xF804	Deceleration time 2	0.0s to 6500.0s	20	s	In real time	" F8-04" on page 224
F8-05	0xF805	Acceleration time 3	0.0s to 6500.0s	20	s	In real time	" F8-05" on page 225
F8-06	0xF806	Deceleration time 3	0.0s to 6500.0s	20	s	In real time	" F8-06" on page 225
F8-07	0xF807	Acceleration time 4	0.0s to 6500.0s	20	s	In real time	" F8-07" on page 225
F8-08	0xF808	Deceleration time 4	0.0s to 6500.0s	20	s	In real time	" F8-08" on page 225
F8-09	0xF809	Jump frequency 1	0.00 Hz to F0-10	0	Hz	In real time	" F8-09" on page 226
F8-10	0xF80A	Jump frequency 2	0.00 Hz to F0-10	0	Hz	In real time	" F8-10" on page 226
F8-11	0xF80B	Jump frequency amplitude	0.00 Hz to 5.00 Hz	0	Hz	In real time	" F8-11" on page 226
F8-12	0xF80C	Forward/Reverse run switchover dead zone time	0.0s to 3000.0s	0	s	In real time	" F8-12" on page 227
F8-13	0xF80D	Reverse run	0: Reverse running allowed 1: Reverse running inhibited	0	-	In real time	" F8-13" on page 227

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
F8-14	0xF80E	Running mode when frequency reference is lower than frequency lower limit	0: Run at frequency lower limit 1: Stop according to F6-10 2: Run at zero speed 3: Coast to stop	0	-	In real time	" F8-14" on page 227
F8-15	0xF80F	Mechanical braking frequency	0.00 Hz to 10.00 Hz	0	Hz	In real time	" F8-15" on page 228
F8-16	0xF810	Accumulative power-on time threshold setting	0 h to 65000 h	0	h	In real time	" F8-16" on page 228
F8-17	0xF811	Accumulative running time threshold setting	0 h to 65000 h	0	h	In real time	" F8-17" on page 228
F8-18	0xF812	Startup protection	0: Disabled 1: Enabled	0	-	In real time	" F8-18" on page 229
F8-19	0xF813	Frequency detection value (FDT1)	0.00 Hz to F0-10	50	Hz	In real time	" F8-19" on page 229
F8-20	0xF814	Frequency detection hysteresis (FDT1)	0.0% to 100.0%	5	%	In real time	" F8-20" on page 229
F8-21	0xF815	Detection width for frequency reach	0.0% to 100.0%	0	%	In real time	" F8-21" on page 230
F8-22	0xF816	Jump frequency state during acceleration/ deceleration	0: Invalid 1: Valid	0	-	In real time	" F8-22" on page 230
F8-25	0xF819	Switchover frequency of acceleration time 1 and acceleration time 2	0.00 Hz to F0-10	0	Hz	In real time	" F8-25" on page 230
F8-26	0xF81A	Switchover frequency of deceleration time 1 and deceleration time 2	0.00 Hz to F0-10	0	Hz	In real time	" F8-26" on page 231
F8-27	0xF81B	Jog preferred	0: Invalid 1: Valid	0	-	In real time	" F8-27" on page 231
F8-28	0xF81C	Frequency detection value (FDT2)	0.00 Hz to F0-10	50	Hz	In real time	" F8-28" on page 231
F8-29	0xF81D	Frequency detection hysteresis (FDT2)	0.0% to 100.0%	5	%	In real time	" F8-29" on page 232

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
F8-30	0xF81E	Detection value 1 for frequency reach	0.00 Hz to F0-10	50	Hz	In real time	" F8-30" on page 232
F8-31	0xF81F	Detection width 1 of frequency reach	0.0% to 100.0%	0	%	In real time	" F8-31" on page 232
F8-32	0xF820	Detection value 2 for frequency reach	0.00 Hz to F0-10	50	Hz	In real time	" F8-32" on page 233
F8-33	0xF821	Detection width 2 of frequency reach	0.0% to 100.0%	0	%	In real time	" F8-33" on page 233
F8-34	0xF822	Zero current detection level	0.0% to 300.0%	5	%	In real time	" F8-34" on page 233
F8-35	0xF823	Zero current detection delay	0.01s to 600.00s	0.1	s	In real time	" F8-35" on page 234
F8-36	0xF824	Output overcurrent threshold	0.0% to 300.0%	200	%	In real time	" F8-36" on page 234
F8-37	0xF825	Software overcurrent detection delay	0.00s to 600.00s	0	s	In real time	" F8-37" on page 234
F8-38	0xF826	Detection level of current 1	0.0% to 300.0%	100	%	In real time	" F8-38" on page 235
F8-39	0xF827	Detection width of current 1	0.0% to 300.0%	0	%	In real time	" F8-39" on page 235
F8-40	0xF828	Detection level of current 2	0.0% to 300.0%	100	%	In real time	" F8-40" on page 235
F8-41	0xF829	Detection width of current 2	0.0% to 300.0%	0	%	In real time	" F8-41" on page 235
F8-42	0xF82A	Timing function	0: Invalid 1: Valid	0	-	At stop	" F8-42" on page 236
F8-43	0xF82B	Timing duration source	0: Set by F8-44 (Timing duration) 1: AI1 2: AI2 3: AI3	0	-	At stop	" F8-43" on page 236
F8-44	0xF82C	Timing duration	0.0 min to 6500.0 min	0	min	At stop	" F8-44" on page 236
F8-45	0xF82D	AI1 input voltage lower limit	0.00 V to F8-46	3.1	V	In real time	" F8-45" on page 237
F8-46	0xF82E	AI1 input voltage upper limit	F8-45 to 11.00 V	6.8	V	In real time	" F8-46" on page 237
F8-47	0xF82F	IGBT temperature reach	0°C to 100°C	75	°C	In real time	" F8-47" on page 237

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
F8-48	0xF830	Cooling fan working mode	0: Working during drive running 1: Working continuously	0	-	In real time	" F8-48" on page 238
F8-49	0xF831	Wakeup frequency	F8-51 to F0-10	0	Hz	In real time	" F8-49" on page 238
F8-50	0xF832	Wakeup delay	0.0s to 6500.0s	0	s	In real time	" F8-50" on page 238
F8-51	0xF833	Hibernation frequency	0.00 Hz to F8-49	0	Hz	In real time	" F8-51" on page 238
F8-52	0xF834	Hibernation delay	0.0s to 6500.0s	0	s	In real time	" F8-52" on page 239
F8-53	0xF835	Current running time threshold	0.0 min to 6500.0 min	0	min	In real time	" F8-53" on page 239
F8-55	0xF837	Emergency stop deceleration time	0.0s to 6500.0s	0	s	In real time	" F8-55" on page 239
F8-57	0xF839	Accumulative power consumption cleared	0: Disabled 1: Enabled	0	-	At stop	" F8-57" on page 240
F8-58	0xF83A	Output power correction coefficient	0.0% to 200.0%	100	%	At stop	" F8-58" on page 240
F9-00	0xF900	AC drive overload protection	0: Disabled 1: Enabled	0	-	In real time	" F9-00" on page 240
F9-01	0xF901	Motor overload protection gain	0.2 to 10.00	1	-	In real time	" F9-01" on page 241
F9-02	0xF902	Motor overload pre-warning coefficient	50% to 100%	80	%	In real time	" F9-02" on page 241
F9-04	0xF904	Overvoltage threshold	350.0–820.0 V	820	V	In real time	" F9-04" on page 242
F9-06	0xF906	Output phase loss detection before startup	0: Invalid 1: Valid	0	-	In real time	" F9-06" on page 242
F9-07	0xF907	Detection of short circuit to ground	0: No detection 1: Detection before power-on 2: Detection before running 3: Detection before power-on and running	1	-	At stop	" F9-07" on page 242
F9-08	0xF908	Braking unit action start voltage	200.0 V to 2000.0 V	760	V	In real time	" F9-08" on page 242
F9-09	0xF909	Fault auto reset times	0 to 20	0	-	In real time	" F9-09" on page 243
F9-10	0xF90A	DO action during auto fault reset	0: Disabled 1: Enabled	0	-	In real time	" F9-10" on page 243

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
F9-11	0xF90B	Automatic fault reset interval	0.1s to 100.0s	1	s	In real time	" F9-11" on page 244
F9-12	0xF90C	Input phase loss/ Contactor pickup protection	Ones (position): Input phase loss protection selection 0: Input phase loss detection inhibited 1: Input phase loss detected by software and hardware 2: Input phase loss detected by software 3: Input phase loss detected by hardware Tens (position): Contactor pickup/Fan fault protection 0: Inhibited 1: Enabled	11	-	In real time	" F9-12" on page 244
F9-13	0xF90D	Restart interval upon fault reset	0.0s to 600.0s	10	s	In real time	" F9-13" on page 245
F9-14	0xF90E	1st fault type	0 to 99	0	-	Unchangeable	" F9-14" on page 245
F9-15	0xF90F	2nd fault type	0 to 99	0	-	Unchangeable	" F9-15" on page 245
F9-16	0xF910	3rd (latest) fault type	0 to 99	0	-	Unchangeable	" F9-16" on page 245
F9-17	0xF911	Frequency upon 3rd (latest) fault	0 Hz to 65535 Hz	0	Hz	Unchangeable	" F9-17" on page 246
F9-18	0xF912	Current upon 3rd (latest) fault	0.0–6553.5 A	0	A	Unchangeable	" F9-18" on page 246
F9-19	0xF913	Bus voltage upon 3rd (latest) fault	0.0 V to 6553.5 V	0	V	Unchangeable	" F9-19" on page 246
F9-20	0xF914	Input terminal state upon 3rd (latest) fault	0 to 65535	0	-	Unchangeable	" F9-20" on page 246
F9-21	0xF915	Output terminal state upon 3rd (latest) fault	0 to 65535	0	-	Unchangeable	" F9-21" on page 247
F9-22	0xF916	AC drive state upon 3rd (latest) fault	0 to 65535	0	-	Unchangeable	" F9-22" on page 247
F9-23	0xF917	Power-on time upon 3rd (latest) fault	0 to 65535	0	-	Unchangeable	" F9-23" on page 247
F9-24	0xF918	Running time upon 3rd (latest) fault	0.0–6553.5	0	-	Unchangeable	" F9-24" on page 247

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
F9-25	0xF919	IGBT temperature upon 3rd fault (latest)	-20°C to +120°C	0	°C	Unchangeable	" F9-25" on page 248
F9-26	0xF91A	Fault subcode upon 3rd (latest) fault	0 to 65535	0	-	Unchangeable	" F9-26" on page 248
F9-27	0xF91B	Frequency upon 2nd fault	0 Hz to 65535 Hz	0	Hz	Unchangeable	" F9-27" on page 248
F9-28	0xF91C	Current upon 2nd fault	0.0–6553.5 A	0	A	Unchangeable	" F9-28" on page 248
F9-29	0xF91D	Bus voltage upon 2nd fault	0.0 V to 6553.5V	0	V	Unchangeable	" F9-29" on page 249
F9-30	0xF91E	Input terminal state upon 2nd fault	0 to 65535	0	-	Unchangeable	" F9-30" on page 249
F9-31	0xF91F	Output terminal state upon 2nd fault	0 to 65535	0	-	Unchangeable	" F9-31" on page 249
F9-32	0xF920	AC drive state upon 2nd fault	0 to 65535	0	-	Unchangeable	" F9-32" on page 249
F9-33	0xF921	Power-on time upon 2nd fault	0 to 65535	0	-	Unchangeable	" F9-33" on page 250
F9-34	0xF922	Running time upon 2nd fault	0.0–6553.5	0	-	Unchangeable	" F9-34" on page 250
F9-35	0xF923	IGBT temperature upon 2nd fault	-20°C to +120°C	0	°C	Unchangeable	" F9-35" on page 250
F9-36	0xF924	Fault subcode upon 2nd fault	0 to 65535	0	-	Unchangeable	" F9-36" on page 250
F9-37	0xF925	Frequency upon 1st fault	0 Hz to 65535 Hz	0	Hz	Unchangeable	" F9-37" on page 251
F9-38	0xF926	Current upon 1st fault	0.0–6553.5 A	0	A	Unchangeable	" F9-38" on page 251
F9-39	0xF927	Bus voltage upon 1st fault	0.0 V to 6553.5V	0	V	Unchangeable	" F9-39" on page 251
F9-40	0xF928	Input terminal state upon 1st fault	0 to 65535	0	-	Unchangeable	" F9-40" on page 251
F9-41	0xF929	Output terminal state upon 1st fault	0 to 65535	0	-	Unchangeable	" F9-41" on page 252
F9-42	0xF92A	AC drive state upon 1st fault	0 to 65535	0	-	Unchangeable	" F9-42" on page 252
F9-43	0xF92B	Power-on time upon 1st fault	0 to 65535	0	-	Unchangeable	" F9-43" on page 252

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
F9-44	0xF92C	Running time upon 1st fault	0.0 to 6553.5	0	-	Unchangeable	" F9-44" on page 252
F9-45	0xF92D	IGBT temperature upon 1st fault	-20°C to +120°C	0	°C	Unchangeable	" F9-45" on page 253
F9-46	0xF92E	Fault subcode upon 1st fault	0 to 65535	0	-	Unchangeable	" F9-46" on page 253
F9-47	0xF92F	Fault protection action selection 0	Ones (position): Value of E02, E03, and E04 0: Coast to stop 2: Restart upon fault Tens (position): Value of E05, E06, and E07 0: Coast to stop 2: Restart upon fault	0	-	At stop	" F9-47" on page 253
Continued	Continued	Continued	Hundreds (position): Value of E08 0: Coast to stop Thousands (position): Value of E09 0: Coast to stop 2: Restart upon fault Ten thousands (position): Value of E10 0: Coast to stop 2: Restart upon fault	Continued	Continued	Continued	Continued
F9-48	0xF930	Fault protection action selection 1	Ones (position): Value of E11 0: Coast to stop 1: Decelerate to stop 2: Restart upon fault 4: Warning 5: Canceled Tens (position): Value of E12 0: Coast to stop 1: Decelerate to stop 2: Restart upon fault 4: Warning 5: Canceled	0	-	At stop	" F9-48" on page 254

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
Continued	Continued	Continued	Hundreds (position): Value of E13 0: Coast to stop 1: Decelerate to stop 2: Restart upon fault 4: Warning 5: Canceled Thousands (position): Value of E14 0: Coast to stop Ten thousands (position): Value of E15 0: Coast to stop 1: Decelerate to stop 3: Electromagnetic shorting 4: Warning 5: Canceled	Continued	Continued	Continued	Continued
F9-49	0xF931	Fault protection action selection 2	Ones (position): Value of E16 0: Coast to stop 1: Decelerate to stop 4: Warning 5: Canceled Tens (position): Value of E17 0: Coast to stop 1: Decelerate to stop 4: Warning 5: Canceled	0	-	At stop	*" F9-49" on page 256*
Continued	Continued	Continued	Hundreds (position): Value of E18 0: Coast to stop Thousands (position): Value of E19 0: Coast to stop 3: Electromagnetic shorting 4: Warning 5: Canceled Ten thousands (position): Value of E20 0: Coast to stop 3: Electromagnetic shorting 4: Warning 5: Canceled	Continued	Continued	Continued	Continued

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
F9-50	0xF932	Fault protection action selection 3	Ones (position): Reserved 0: Coast to stop Tens (position): Value of E63 0: Coast to stop 1: Decelerate to stop 4: Warning 5: Canceled Hundreds (position): Value of E23 0: Coast to stop 5: Canceled	5040	-	At stop	" F9-50" on page 257
Continued	Continued	Continued	Thousands (position): Value of E24 0: Coast to stop 5: Canceled Ten thousands (position): Value of E25 0: Coast to stop 1: Decelerate to stop 4: Warning 5: Canceled	Continued	Continued	Continued	Continued
F9-51	0xF933	Fault protection action selection 4	Ones (position): Value of E26 0: Coast to stop 1: Decelerate to stop 4: Warning 5: Canceled Tens position: Value of E27 0: Coast to stop 1: Decelerate to stop 3: Electromagnetic shorting 4: Warning 5: Canceled	51111	-	At stop	" F9-51" on page 257

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
Continued	Continued	Continued	Hundreds (position): Value of E28 0: Coast to stop 1: Decelerate to stop 3: Electromagnetic shorting 4: Warning 5: Canceled Thousands (position): Value of E29 0: Coast to stop 1: Decelerate to stop 4: Warning 5: Canceled Ten thousands (position): Value of E30 0: Coast to stop 1: Decelerate to stop 4: Warning 5: Canceled	Continued	Continued	Continued	Continued
F9-52	0xF934	Fault protection action selection 5	Ones (position): Value of E31 0: Coast to stop 1: Decelerate to stop 4: Warning 5: Canceled Tens (position): Value of E40 0: Coast to stop 2: Restart upon fault Hundreds (position): Value of E41 0: Coast to stop 1: Decelerate to stop 4: Warning 5: Canceled	101	-	At stop	*" F9-52" on page 259*
Continued	Continued	Continued	Thousands (position): Value of E42 0: Coast to stop 1: Decelerate to stop 2: Restart upon fault 3: Electromagnetic shorting 4: Warning 5: Canceled Ten thousands (position): Value of E43 0: Coast to stop 1: Decelerate to stop 3: Electromagnetic shorting 4: Warning 5: Canceled	Continued	Continued	Continued	Continued

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
F9-53	0xF935	Fault protection action selection 6	Ones (position): Value of E45 0: Coast to stop 1: Decelerate to stop 4: Warning 5: Canceled Tens (position): Value of E60 0: Coast to stop 1: Decelerate to stop 4: Warning 5: Canceled	0	-	At stop	" F9-53" on page 260
Continued	Continued	Continued	Hundreds (position): Value of E61 0: Coast to stop 1: Decelerate to stop 4: Warning 5: Canceled Thousands (position): Value of E62 0: Coast to stop 5: Canceled Ten thousands (position): Reserved 5: Canceled	Continued	Continued	Continued	Continued
F9-54	0xF936	Frequency selection for continuing to run upon fault	0: Current running frequency 1: Frequency reference 2: Frequency upper limit 3: Frequency lower limit 4: Backup frequency upon abnormality	1	-	In real time	" F9-54" on page 261
F9-55	0xF937	Backup frequency reference upon abnormality	0.0% to 100.0%	100	%	In real time	" F9-55" on page 261
F9-56	0xF938	Motor temperature sensor type	0: No sensor (AI3 input) 1: PT100 2: PT1000 3: KTY84 4: PTC130	0	-	In real time	" F9-56" on page 262
F9-57	0xF939	Motor overtemperature protection threshold	0°C to 200°C	110	°C	In real time	" F9-57" on page 262
F9-58	0xF93A	Motor overtemperature pre-warning threshold	0°C to 200°C	90	°C	In real time	" F9-58" on page 262

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
F9-59	0xF93B	Selection of power dip ride-through action	0: Disabled 1: Busbar voltage constant control 2: Decelerate to stop 3: Voltage dip depression	0	-	At stop	" F9-59" on page 263
F9-60	0xF93C	Voltage to determine the pause of power dip ride-through	80% to 100%	85	%	In real time	" F9-60" on page 263
F9-61	0xF93D	Duration for judging voltage recovery from power dip ride-through	0.0–100.0s	0.5	s	In real time	" F9-61" on page 264
F9-62	0xF93E	Threshold for enabling power dip ride-through	60% to 100%	80	%	In real time	" F9-62" on page 264
F9-63	0xF93F	Runaway protection time in FVC mode	0 to 10000	0	-	At stop	" F9-63" on page 264
F9-64	0xF940	Load loss detection level	0.0% to 100.0%	10	%	In real time	" F9-64" on page 265
F9-65	0xF941	Load loss detection time	0.0s–60.0s	1	s	In real time	" F9-65" on page 265
F9-66	0xF942	Voltage dip suppression time	0.0s to 600.0s	0	s	Unchangeable	" F9-66" on page 265
F9-67	0xF943	Overspeed threshold	0.0% to 50.0%	5	%	In real time	" F9-67" on page 266
F9-68	0xF944	Overspeed detection time	0.0–60.0	1	-	In real time	" F9-68" on page 266
F9-69	0xF945	Excessive speed deviation threshold	0.0% to 50.0%	20	%	In real time	" F9-69" on page 266
F9-70	0xF946	Detection time of excessive speed deviation	0.0s to 60.0s	5	s	In real time	" F9-70" on page 267
F9-71	0xF947	Power dip ride-through gain	0 to 100	40	-	In real time	" F9-71" on page 267
F9-72	0xF948	Power dip ride-through integral	0 to 100	30	-	In real time	" F9-72" on page 267
F9-73	0xF949	Deceleration time of power dip ride-through	0.0s to 300.0s	20	s	In real time	" F9-73" on page 268

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
FA-00	0xFA00	PID reference source	0: PID digital setting (FA-01) 1: AI1 2: AI2 3: AI3 4: Pulse reference (DI5) 5: Communication setting (1000H) 6: Multi-reference	0	-	In real time	" FA-00" on page 268
FA-01	0xFA01	PID digital reference	0.0% to 100.0%	50	%	In real time	" FA-01" on page 269
FA-02	0xFA02	PID feedback source	0: AI1 1: AI2 2: AI3 3: AI1–AI2 4: Pulse reference (DI5) 5: Communication 6:AI1 + AI2 7: Max. (|AI1|, |AI2|) 8: Min. (|AI1|, |AI2|)	0	-	In real time	" FA-02" on page 269
FA-03	0xFA03	PID action direction	0: Forward 1: Reverse	0	-	In real time	" FA-03" on page 270
FA-04	0xFA04	PID reference and feedback range	0 to 65535	1000	-	In real time	" FA-04" on page 270
FA-05	0xFA05	Proportional gain Kp1	0.0 to 1000.0	20	-	In real time	" FA-05" on page 270
FA-06	0xFA06	Integral time Ti1	0.01s to 100.00s	2	s	In real time	" FA-06" on page 271
FA-07	0xFA07	Derivative time Td1	0.000s to 10.000s	0	s	In real time	" FA-07" on page 271
FA-08	0xFA08	PID cut-off frequency in reverse run	0.00 Hz to F0-10	2	Hz	In real time	" FA-08" on page 271
FA-09	0xFA09	PID deviation limit	0.0% to 100.0%	0	%	In real time	" FA-09" on page 272
FA-10	0xFA0A	PID derivative limit	0.00% to 100.00%	0.1	%	In real time	" FA-10" on page 272
FA-11	0xFA0B	PID reference change time	0.00s to 650.00s	0	s	In real time	" FA-11" on page 272
FA-12	0xFA0C	PID feedback filter time	0.00s to 60.00s	0	s	In real time	" FA-12" on page 273
FA-13	0xFA0D	PID deviation gain	0.0% to 100.0%	100	%	In real time	" FA-13" on page 273
FA-14	0xFA0E	PID optimization	0–100	0	-	In real time	" FA-14" on page 273

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
FA-15	0xFA0F	Proportional gain Kp2	0.0 to 1000.0	20	-	In real time	" FA-15" on page 273
FA-16	0xFA10	Integral time Ti2	0.01s to 100.00s	2	s	In real time	" FA-16" on page 274
FA-17	0xFA11	Derivative time Td2	0.000s to 10.000s	0	s	In real time	" FA-17" on page 274
FA-18	0xFA12	PID parameter switchover condition	0: No switchover 1: Switchover by DI 2: Automatic switchover based on deviation 3: Switchover based on running frequency 6: Automatic adjustment based on roll diameter 7: Automatic adjustment based on maximum roll diameter percentage	0	-	In real time	" FA-18" on page 274
FA-19	0xFA13	PID parameter switchover deviation 1	0.0% to FA-20	20	%	In real time	" FA-19" on page 275
FA-20	0xFA14	PID parameter switchover deviation 2	FA-19 to 100.0%	80	%	In real time	" FA-20" on page 276
FA-21	0xFA15	PID initial value	0.0% to 100.0%	0	%	In real time	" FA-21" on page 276
FA-22	0xFA16	PID initial value holding time	0.00s to 650.00s	0	s	In real time	" FA-22" on page 276
FA-23	0xFA17	Maximum deviation between two outputs in forward direction	0.00% to 100.00%	1	%	In real time	" FA-23" on page 277
FA-24	0xFA18	Maximum deviation between two PID outputs in reverse direction	0.00% to 100.00%	1	%	In real time	" FA-24" on page 277
FA-25	0xFA19	PID integral property	0: Invalid 1: Valid	0	-	In real time	" FA-25" on page 277
FA-26	0xFA1A	Detection level of PID feedback loss	0.0% to 100.0%	0	%	In real time	" FA-26" on page 277
FA-27	0xFA1B	Detection time of PID feedback loss	0.0s to 20.0s	0	s	In real time	" FA-27" on page 278
FB-00	0xFB00	Wobble setting mode	0: Relative to central frequency 1: Relative to maximum frequency	0	-	In real time	" FB-00" on page 278

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
FB-01	0xFB01	Wobble amplitude	0.0% to 100.0%	0	%	In real time	" FB-01" on page 278
FB-02	0xFB02	Jump frequency amplitude	0.0% to 50.0%	0	%	In real time	" FB-02" on page 279
FB-03	0xFB03	Wobble cycle	0.1s to 3000.0s	10	s	In real time	" FB-03" on page 279
FB-04	0xFB04	Triangular wave rising time of wobble	0.1% to 100.0%	50	%	In real time	" FB-04" on page 279
FB-05	0xFB05	Reference length	0 m to 65535 m	1000	m	In real time	" FB-05" on page 280
FB-06	0xFB06	Actual length	0 m to 65535 m	0	m	In real time	" FB-06" on page 280
FB-07	0xFB07	Number of pulses per meter	0.1 to 6553.5	100	-	In real time	" FB-07" on page 280
FB-08	0xFB08	Reference count value	1 to 65535	1000	-	In real time	" FB-08" on page 280
FB-09	0xFB09	Designated count value	1 to 65535	1000	-	In real time	" FB-09" on page 281
FB-10	0xFB0A	Revolution count reset mode	0: Rising edge triggered 1: Level triggered	0	-	In real time	" FB-10" on page 281
FB-11	0xFB0B	Revolution count reset signal	0: Disable 1: Enable	0	-	In real time	" FB-11" on page 281
FB-12	0xFB0C	Revolution count retentive at power failure	0: No 1: Yes	0	-	In real time	" FB-12" on page 282
FB-13	0xFB0D	Revolution count clear	0 to 65535	0	-	In real time	" FB-13" on page 282
FB-14	0xFB0E	Transmission ratio numerator	1 to 65535	1	-	In real time	" FB-14" on page 282
FB-15	0xFB0F	Transmission ratio denominator	1 to 65535	1	-	In real time	" FB-15" on page 282
FB-16	0xFB10	Actual running revolutions	0 to 65535	0	-	Unchangeable	" FB-16" on page 283
FB-17	0xFB11	Running revolutions	0 to 65535	0	-	Unchangeable	" FB-17" on page 283
FB-18	0xFB12	Running revolution accuracy	0: 1 revolution 1: 0.1 revolution	0	-	In real time	" FB-18" on page 283
FB-19	0xFB13	Revolution count direction	0: Forward 1: Reverse	0	-	In real time	" FB-19" on page 283
FC-00	0xFC00	Multi-reference 0	-100.0% to +100.0%	0	%	In real time	" FC-00" on page 284

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
FC-01	0xFC01	Multi-reference 1	-100.0% to +100.0%	0	%	In real time	" FC-01" on page 284
FC-02	0xFC02	Multi-reference 2	-100.0% to +100.0%	0	%	In real time	" FC-02" on page 285
FC-03	0xFC03	Multi-reference 3	-100.0% to +100.0%	0	%	In real time	" FC-03" on page 285
FC-04	0xFC04	Multi-reference 4	-100.0% to +100.0%	0	%	In real time	" FC-04" on page 285
FC-05	0xFC05	Multi-reference 5	-100.0% to +100.0%	0	%	In real time	" FC-05" on page 285
FC-06	0xFC06	Multi-reference 6	-100.0% to +100.0%	0	%	In real time	" FC-06" on page 285
FC-07	0xFC07	Multi-reference 7	-100.0% to +100.0%	0	%	In real time	" FC-07" on page 286
FC-08	0xFC08	Multi-reference 8	-100.0% to +100.0%	0	%	In real time	" FC-08" on page 286
FC-09	0xFC09	Multi-reference 9	-100.0% to +100.0%	0	%	In real time	" FC-09" on page 286
FC-10	0xFC0A	Multi-reference 10	-100.0% to +100.0%	0	%	In real time	" FC-10" on page 286
FC-11	0xFC0B	Multi-reference 11	-100.0% to +100.0%	0	%	In real time	" FC-11" on page 287
FC-12	0xFC0C	Multi-reference 12	-100.0% to +100.0%	0	%	In real time	" FC-12" on page 287
FC-13	0xFC0D	Multi-reference 13	-100.0% to +100.0%	0	%	In real time	" FC-13" on page 287
FC-14	0xFC0E	Multi-reference 14	-100.0% to +100.0%	0	%	In real time	" FC-14" on page 287
FC-15	0xFC0F	Multi-reference 15	-100.0% to +100.0%	0	%	In real time	" FC-15" on page 288
FC-16	0xFC10	Simple PLC running mode	0: Stop after running for one cycle 1: Keep final values after running for one cycle 2: Repeat after running for one cycle	0	-	In real time	" FC-16" on page 288
FC-17	0xFC11	Simple PLC retention selection upon power failure	Ones (position): Retentive upon power failure 0: No 1: Yes Tens (position): Retentive upon stop 0: No 1: Yes	0	-	In real time	" FC-17" on page 288

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
FC-18	0xFC12	Running time of PLC reference 0	0.0s (h) to 6553.5s (h)	0	s (h)	In real time	" FC-18" on page 289
FC-19	0xFC13	Acceleration/ Deceleration time of PLC reference 0	0: Group 1 acceleration/ deceleration time (F0-17 and F0-18) 1: Group 2 acceleration/ deceleration time (F8-03 and F8-04) 2: Group 3 acceleration/ deceleration time (F8-05 and F8-06) 3: Group 4 acceleration/ deceleration time (F8-07 and F8-08)	0	-	In real time	" FC-19" on page 289
FC-20	0xFC14	Running time of PLC reference 1	0.0s (h) to 6553.5s (h)	0	s (h)	In real time	" FC-20" on page 290
FC-21	0xFC15	Acceleration/ Deceleration time of PLC reference 1	0: Group 1 acceleration/ deceleration time (F0-17 and F0-18) 1: Group 2 acceleration/ deceleration time (F8-03 and F8-04) 2: Group 3 acceleration/ deceleration time (F8-05 and F8-06) 3: Group 4 acceleration/ deceleration time (F8-07 and F8-08)	0	-	In real time	" FC-21" on page 290
FC-22	0xFC16	Running time of PLC reference 2	0.0s (h) to 6553.5s (h)	0	s (h)	In real time	" FC-22" on page 291
FC-23	0xFC17	Acceleration/ Deceleration time of PLC reference 2	0: Group 1 acceleration/ deceleration time (F0-17 and F0-18) 1: Group 2 acceleration/ deceleration time (F8-03 and F8-04) 2: Group 3 acceleration/ deceleration time (F8-05 and F8-06) 3: Group 4 acceleration/ deceleration time (F8-07 and F8-08)	0	-	In real time	" FC-23" on page 291
FC-24	0xFC18	Running time of PLC reference 3	0.0s (h) to 6553.5s (h)	0	s (h)	In real time	" FC-24" on page 291

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
FC-25	0xFC19	Acceleration/ Deceleration time of PLC reference 3	0: Group 1 acceleration/ deceleration time (F0-17 and F0-18) 1: Group 2 acceleration/ deceleration time (F8-03 and F8-04) 2: Group 3 acceleration/ deceleration time (F8-05 and F8-06) 3: Group 4 acceleration/ deceleration time (F8-07 and F8-08)	0	-	In real time	" FC-25" on page 292
FC-26	0xFC1A	Running time of PLC reference 4	0.0s (h) to 6553.5s (h)	0	s (h)	In real time	" FC-26" on page 292
FC-27	0xFC1B	Acceleration/ Deceleration time of PLC reference 4	0: Group 1 acceleration/ deceleration time (F0-17 and F0-18) 1: Group 2 acceleration/ deceleration time (F8-03 and F8-04) 2: Group 3 acceleration/ deceleration time (F8-05 and F8-06) 3: Group 4 acceleration/ deceleration time (F8-07 and F8-08)	0	-	In real time	" FC-27" on page 292
FC-28	0xFC1C	Running time of PLC reference 5	0.0s (h) to 6553.5s (h)	0	s (h)	In real time	" FC-28" on page 293
FC-29	0xFC1D	Acceleration/ Deceleration time of PLC reference 5	0: Group 1 acceleration/ deceleration time (F0-17 and F0-18) 1: Group 2 acceleration/ deceleration time (F8-03 and F8-04) 2: Group 3 acceleration/ deceleration time (F8-05 and F8-06) 3: Group 4 acceleration/ deceleration time (F8-07 and F8-08)	0	-	In real time	" FC-29" on page 293
FC-30	0xFC1E	Running time of PLC reference 6	0.0s (h) to 6553.5s (h)	0	s (h)	In real time	" FC-30" on page 293

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
FC-31	0xFC1F	Acceleration/ Deceleration time of PLC reference 6	0: Group 1 acceleration/ deceleration time (F0-17 and F0-18) 1: Group 2 acceleration/ deceleration time (F8-03 and F8-04) 2: Group 3 acceleration/ deceleration time (F8-05 and F8-06) 3: Group 4 acceleration/ deceleration time (F8-07 and F8-08)	0	-	In real time	*" FC-31" on page 294*
FC-32	0xFC20	Running time of PLC reference 7	0.0s (h) to 6553.5s (h)	0	s (h)	In real time	*" FC-32" on page 294*
FC-33	0xFC21	Acceleration/ Deceleration time of PLC reference 7	0: Group 1 acceleration/ deceleration time (F0-17 and F0-18) 1: Group 2 acceleration/ deceleration time (F8-03 and F8-04) 2: Group 3 acceleration/ deceleration time (F8-05 and F8-06) 3: Group 4 acceleration/ deceleration time (F8-07 and F8-08)	0	-	In real time	*" FC-33" on page 294*
FC-34	0xFC22	Running time of PLC reference 8	0.0s (h) to 6553.5s (h)	0	s (h)	In real time	*" FC-34" on page 295*
FC-35	0xFC23	Acceleration/ Deceleration time of PLC reference 8	0: Group 1 acceleration/ deceleration time (F0-17 and F0-18) 1: Group 2 acceleration/ deceleration time (F8-03 and F8-04) 2: Group 3 acceleration/ deceleration time (F8-05 and F8-06) 3: Group 4 acceleration/ deceleration time (F8-07 and F8-08)	0	-	In real time	*" FC-35" on page 295*
FC-36	0xFC24	Running time of PLC reference 9	0.0s (h) to 6553.5s (h)	0	s (h)	In real time	*" FC-36" on page 296*

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
FC-37	0xFC25	Acceleration/ Deceleration time of PLC reference 9	0: Group 1 acceleration/ deceleration time (F0-17 and F0-18) 1: Group 2 acceleration/ deceleration time (F8-03 and F8-04) 2: Group 3 acceleration/ deceleration time (F8-05 and F8-06) 3: Group 4 acceleration/ deceleration time (F8-07 and F8-08)	0	-	In real time	*" FC-37" on page 296*
FC-38	0xFC26	Running time of PLC reference 10	0.0s (h) to 6553.5s (h)	0	s (h)	In real time	*" FC-38" on page 296*
FC-39	0xFC27	Acceleration/ Deceleration time of PLC reference 10	0: Group 1 acceleration/ deceleration time (F0-17 and F0-18) 1: Group 2 acceleration/ deceleration time (F8-03 and F8-04) 2: Group 3 acceleration/ deceleration time (F8-05 and F8-06) 3: Group 4 acceleration/ deceleration time (F8-07 and F8-08)	0	-	In real time	*" FC-39" on page 297*
FC-40	0xFC28	Running time of PLC reference 11	0.0s (h) to 6553.5s (h)	0	s (h)	In real time	*" FC-40" on page 297*
FC-41	0xFC29	Acceleration/ Deceleration time of PLC reference 11	0: Group 1 acceleration/ deceleration time (F0-17 and F0-18) 1: Group 2 acceleration/ deceleration time (F8-03 and F8-04) 2: Group 3 acceleration/ deceleration time (F8-05 and F8-06) 3: Group 4 acceleration/ deceleration time (F8-07 and F8-08)	0	-	In real time	*" FC-41" on page 297*
FC-42	0xFC2A	Running time of PLC reference 12	0.0s (h) to 6553.5s (h)	0	s (h)	In real time	*" FC-42" on page 298*

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
FC-43	0xFC2B	Acceleration/ Deceleration time of PLC reference 12	0: Group 1 acceleration/ deceleration time (F0-17 and F0-18) 1: Group 2 acceleration/ deceleration time (F8-03 and F8-04) 2: Group 3 acceleration/ deceleration time (F8-05 and F8-06) 3: Group 4 acceleration/ deceleration time (F8-07 and F8-08)	0	-	In real time	*" FC-43" on page 298*
FC-44	0xFC2C	Running time of PLC reference 13	0.0s (h) to 6553.5s (h)	0	s (h)	In real time	*" FC-44" on page 298*
FC-45	0xFC2D	Acceleration/ Deceleration time of PLC reference 13	0: Group 1 acceleration/ deceleration time (F0-17 and F0-18) 1: Group 2 acceleration/ deceleration time (F8-03 and F8-04) 2: Group 3 acceleration/ deceleration time (F8-05 and F8-06) 3: Group 4 acceleration/ deceleration time (F8-07 and F8-08)	0	-	In real time	*" FC-45" on page 299*
FC-46	0xFC2E	Running time of PLC reference 14	0.0s (h) to 6553.5s (h)	0	s (h)	In real time	*" FC-46" on page 299*
FC-47	0xFC2F	Acceleration/ Deceleration time of PLC reference 14	0: Group 1 acceleration/ deceleration time (F0-17 and F0-18) 1: Group 2 acceleration/ deceleration time (F8-03 and F8-04) 2: Group 3 acceleration/ deceleration time (F8-05 and F8-06) 3: Group 4 acceleration/ deceleration time (F8-07 and F8-08)	0	-	In real time	*" FC-47" on page 299*
FC-48	0xFC30	Running time of PLC reference 15	0.0s (h) to 6553.5s (h)	0	s (h)	In real time	*" FC-48" on page 300*

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
FC-49	0xFC31	Acceleration/ Deceleration time of PLC reference 15	0: Group 1 acceleration/ deceleration time (F0-17 and F0-18) 1: Group 2 acceleration/ deceleration time (F8-03 and F8-04) 2: Group 3 acceleration/ deceleration time (F8-05 and F8-06) 3: Group 4 acceleration/ deceleration time (F8-07 and F8-08)	0	-	In real time	" FC-49" on page 300
FC-50	0xFC32	PLC running time unit	0: s (second) 1: h (hour)	0	-	In real time	" FC-50" on page 301
FC-51	0xFC33	Multi-reference 0 source	0: Multi-reference 0 (FC-00) 1: AI1 2: AI2 3: AI3 4: Pulse reference (DI5) 5: PID 6: Preset frequency (F0-08 that can be changed by pressing UP or DOWN key)	0	-	In real time	" FC-51" on page 301
FD-00	0xFD00	Baud rate	0: 300 bit/s 1: 600 bit/s 2: 1200 bit/s 3: 2400 bit/s 4: 4800 bit/s 5: 9600 bit/s 6: 19200 bit/s 7: 38400 bit/s 8: 57600 bit/s 9: 115200 bit/s	5	-	In real time	" FD-00" on page 302
FD-01	0xFD01	Modbus data format	0: No check (8-N-2) 1: Even parity check (8-E-1) 2: Odd parity check (8-O-1) 3: No check (8-N-1)	0	-	In real time	" FD-01" on page 302
FD-02	0xFD02	Local address	1 to 247	1	-	In real time	" FD-02" on page 302
FD-03	0xFD03	Response delay	0–20 ms	2	ms	In real time	" FD-03" on page 303
FD-04	0xFD04	Modbus communication timeout time	0.0s to 60.0s	0	s	In real time	" FD-04" on page 303
FD-06	0xFD06	Communication fault reset	0: Disabled 1: Enabled	1	-	At stop	" FD-06" on page 304

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
FD-09	0xFD09	CANopen/CANlink communication state	Ones: CANopen 0: Stop 1: Initialized 2: Pre-running 8: Running Tens: CANlink 0: Stop 1: Initialized 2: Pre-running 8: Running Hundreds position: Reserved	2	-	Unchangeable	*" FD-09" on page 304*
FD-10	0xFD0A	CANopen/CANlink switchover	1: CANopen 2: CANlink	1	-	At stop	*" FD-10" on page 304*
FD-12	0xFD0C	CAN baud rate	0: 20 kbit/s 1: 50 kbit/s 2: 100 kbit/s 3: 125 kbit/s 4: 250 kbit/s 5: 500 kbit/s 6: 1 Mbit/s	5	-	At stop	*" FD-12" on page 305*
FD-13	0xFD0D	CAN station No.	1 to 127	1	-	At stop	*" FD-13" on page 305*
FD-14	0xFD0E	Number of CAN frames received per unit time	0 to 65535	0	-	Unchangeable	*" FD-14" on page 305*
FD-15	0xFD0F	Maximum value of node receiving error counter	0 to 65535	0	-	Unchangeable	*" FD-15" on page 306*
FD-16	0xFD10	Maximum value of node sending error counter	0 to 65535	0	-	Unchangeable	*" FD-16" on page 306*
FD-17	0xFD11	Bus-off count per unit time	0 to 65535	0	-	Unchangeable	*" FD-17" on page 306*
FD-19	0xFD13	CAN communication dropping coefficient	1 to 15	3	-	At stop	*" FD-19" on page 307*
FD-37	0xFD25	DHCP function	0: Disabled 1: Enabled	0	-	At stop	*" FD-37" on page 307*
FD-38	0xFD26	IP address highest byte	0 to 255	0	-	At stop	*" FD-38" on page 307*
FD-39	0xFD27	IP address second highest byte	0 to 255	0	-	At stop	*" FD-39" on page 307*
FD-40	0xFD28	IP address third highest byte	0 to 255	0	-	At stop	*" FD-40" on page 308*

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
FD-41	0xFD29	IP address lowest byte	0 to 255	0	-	At stop	" FD-41" on page 308
FD-42	0xFD2A	Subnet mask highest byte	0 to 255	0	-	At stop	" FD-42" on page 308
FD-43	0xFD2B	Subnet mask second highest byte	0 to 255	0	-	At stop	" FD-43" on page 308
FD-44	0xFD2C	Subnet mask third byte	0 to 255	0	-	At stop	" FD-44" on page 308
FD-45	0xFD2D	Subnet mask lowest byte	0 to 255	0	-	At stop	" FD-45" on page 309
FD-46	0xFD2E	Gateway highest byte	0 to 255	0	-	At stop	" FD-46" on page 309
FD-47	0xFD2F	Gateway second highest byte	0 to 255	0	-	At stop	" FD-47" on page 309
FD-48	0xFD30	Gateway third byte	0 to 255	0	-	At stop	" FD-48" on page 309
FD-49	0xFD31	Gateway lowest byte	0 to 255	0	-	At stop	" FD-49" on page 310
FD-58	0xFD3A	Internet IP expansion card error code	0 to 255	0	-	Unchangeable	" FD-58" on page 310
FD-61	0xFD3D	MAC address highest byte	0 to value of 0xFFFF	0	-	At stop	" FD-61" on page 310
FD-62	0xFD3E	MAC address middle byte	0 to value of 0xFFFF	0	-	At stop	" FD-62" on page 310
FD-63	0xFD3F	MAC address lowest byte	0 to value of 0xFFFF	0	-	At stop	" FD-63" on page 311
FD-94	0xFD5E	Modbus software version	0 to 65535	0	-	Unchangeable	" FD-94" on page 311
FD-95	0xFD5F	CANlink software version	0 to 65535	0	-	Unchangeable	" FD-95" on page 311
FD-96	0xFD60	CANopen software version	0 to 65535	0	-	Unchangeable	" FD-96" on page 311
FE-00	0xFE00	User-defined parameter 0	0 to 65535	7017	-	In real time	" FE-00" on page 312
FE-01	0xFE01	User-defined parameter 1	0 to 65535	7016	-	In real time	" FE-01" on page 312
FE-02	0xFE02	User-defined parameter 2	0 to 65535	0	-	In real time	" FE-02" on page 312
FE-03	0xFE03	User-defined parameter 3	0 to 65535	0	-	In real time	" FE-03" on page 312
FE-04	0xFE04	User-defined parameter 4	0 to 65535	0	-	In real time	" FE-04" on page 313

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
FE-05	0xFE05	User-defined parameter 5	0 to 65535	0	-	In real time	*" FE-05" on page 313*
FE-06	0xFE06	User-defined parameter 6	0 to 65535	0	-	In real time	*" FE-06" on page 313*
FE-07	0xFE07	User-defined parameter 7	0 to 65535	0	-	In real time	*" FE-07" on page 313*
FE-08	0xFE08	User-defined parameter 8	0 to 65535	0	-	In real time	*" FE-08" on page 314*
FE-09	0xFE09	User-defined parameter 9	0 to 65535	0	-	In real time	*" FE-09" on page 314*
FE-10	0xFE0A	User-defined parameter 10	0 to 65535	0	-	In real time	*" FE-10" on page 314*
FE-11	0xFE0B	User-defined parameter 11	0 to 65535	0	-	In real time	*" FE-11" on page 314*
FE-12	0xFE0C	User-defined parameter 12	0 to 65535	0	-	In real time	*" FE-12" on page 315*
FE-13	0xFE0D	User-defined parameter 13	0 to 65535	0	-	In real time	*" FE-13" on page 315*
FE-14	0xFE0E	User-defined parameter 14	0 to 65535	0	-	In real time	*" FE-14" on page 315*
FE-15	0xFE0F	User-defined parameter 15	0 to 65535	0	-	In real time	*" FE-15" on page 315*
FE-16	0xFE10	User-defined parameter 16	0 to 65535	0	-	In real time	*" FE-16" on page 316*
FE-17	0xFE11	User-defined parameter 17	0 to 65535	0	-	In real time	*" FE-17" on page 316*
FE-18	0xFE12	User-defined parameter 18	0 to 65535	0	-	In real time	*" FE-18" on page 316*
FE-19	0xFE13	User-defined parameter 19	0 to 65535	0	-	In real time	*" FE-19" on page 316*
FE-20	0xFE14	User-defined parameter 20	0 to 65535	6768	-	In real time	*" FE-20" on page 317*
FE-21	0xFE15	User-defined parameter 21	0 to 65535	6769	-	In real time	*" FE-21" on page 317*
FE-22	0xFE16	User-defined parameter 22	0 to 65535	0	-	In real time	*" FE-22" on page 317*
FE-23	0xFE17	User-defined parameter 23	0 to 65535	0	-	In real time	*" FE-23" on page 317*
FE-24	0xFE18	User-defined parameter 24	0 to 65535	0	-	In real time	*" FE-24" on page 318*
FE-25	0xFE19	User-defined parameter 25	0 to 65535	0	-	In real time	*" FE-25" on page 318*
FE-26	0xFE1A	User-defined parameter 26	0 to 65535	0	-	In real time	*" FE-26" on page 318*

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
FE-27	0xFE1B	User-defined parameter 27	0 to 65535	0	-	In real time	" FE-27" on page 318
FE-28	0xFE1C	User-defined parameter 28	0 to 65535	0	-	In real time	" FE-28" on page 319
FE-29	0xFE1D	User-defined parameter 29	0 to 65535	0	-	In real time	" FE-29" on page 319
FE-30	0xFE1E	User-defined parameter 30	0 to 65535	0	-	In real time	" FE-30" on page 319
FE-31	0xFE1F	User-defined parameter 31	0 to 65535	0	-	In real time	" FE-31" on page 319
FP-00	0x1F00	User password	0 to 65535	0	-	In real time	" FP-00" on page 320
FP-01	0x1F01	Parameter initialization	0: No action 1:Restore default settings (mode 1) 2: Clear records 4: Back up current user parameters 501: Restore user backup parameters 503:Restore default settings (mode 2)	1	-	At stop	" FP-01" on page 320
FP-02	0x1F02	Parameter group display	Ones position: Group U 0: Hide 1: Display Tens position: Group A 0: Hide 1: Display Hundreds position: Group B 0: Hide 1: Display Thousands position: Reserved	111	-	In real time	" FP-02" on page 321
FP-03	0x1F03	Individualized parameter display mode	Ones (position): Display of user-defined parameter groups 0: Hide 1: Display Tens (position): Display of user-modified parameter groups 0: Hide 1: Display	11	-	In real time	" FP-03" on page 321
FP-04	0x1F04	Parameter modification	0: Modification allowed 1: Modification prohibited	0	-	In real time	" FP-04" on page 322
A0-00	0xA000	Speed/Torque control mode	0: Speed control 1: Torque control	0	-	At stop	" A0-00" on page 322

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
A0-01	0xA001	Torque reference source	0: Digital setting (A0-03) 1: AI1 2: AI2 3: AI3 4: Pulse reference (DI5) 5: Communication setting (1000H) 6: Min. (AI1, AI2) 7: Max. (AI1, AI2)	0	-	At stop	" A0-01" on page 322
A0-03	0xA003	Torque digital setting	-200.0% to +200.0%	100	%	In real time	" A0-03" on page 323
A0-04	0xA004	Torque filter time	0.000s to 5.000s	0	s	In real time	" A0-04" on page 323
A0-05	0xA005	Speed limit digital setting	-120.0% to +120.0%	0	%	In real time	" A0-05" on page 323
A0-06	0xA006	Frequency modulation coefficient in window mode	0.0–50.0	0	-	In real time	" A0-06" on page 324
A0-07	0xA007	Torque acceleration time	0.00s to 650.00s	1	s	In real time	" A0-07" on page 324
A0-08	0xA008	Torque deceleration time	0.00s to 650.00s	1	s	In real time	" A0-08" on page 324
A0-09	0xA009	Speed limit reference source	0: Set by A0-05 1: Frequency source	0	-	In real time	" A0-09" on page 324
A0-10	0xA00A	Speed limit offset/ Windows frequency	0.00 Hz to F0-10	5	Hz	In real time	" A0-10" on page 325
A0-11	0xA00B	Effective mode of speed limit offset	0: Bidirectional offset valid 1: Unidirectional offset valid 2: Windows mode	1	-	At stop	" A0-11" on page 325
A0-12	0xA00C	Frequency acceleration time	0.0s to 6500.0s	1	s	In real time	" A0-12" on page 325
A0-13	0xA00D	Frequency deceleration time	0.0s to 6500.0s	1	s	In real time	" A0-13" on page 325
A0-14	0xA00E	Torque mode switchover	0: No switchover 1: Switched to speed control at stop 2: Target torque at stop being 0	1	-	At stop	" A0-14" on page 326
A1-00	0xA100	VDO1 function selection	Same as F4-00	0	-	At stop	" A1-00" on page 326
A1-01	0xA101	VDI2 function	Same as F4-00	0	-	At stop	" A1-01" on page 334
A1-02	0xA102	VDI3 function	Same as F4-00	0	-	At stop	" A1-02" on page 336

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
A1-03	0xA103	VDI4 function	Same as F4-00	0	-	At stop	" A1-03" on page 338
A1-04	0xA104	VDI5 function	Same as F4-00	0	-	At stop	" A1-04" on page 340
A1-05	0xA105	VDI active state source	Ones: VDI1 0: Set by A1-06 1: DO state 2: DI state Tens: VDI2 0: Set by A1-06 1: DO state 2: DI state	0	-	At stop	" A1-05" on page 342
Continued	Continued	Continued	Hundreds: VDI3 0: Set by A1-06 1: DO state 2: DI state Thousands: VDI4 0: Set by A1-06 1: DO state 2: DI state Ten thousands: VDI5 0: Set by A1-06 1: DO state 2: DI state	Continued	Continued	Continued	Continued
A1-06	0xA106	VDI state selection	Ones: VDI1 0: Invalid 1: Valid Tens: VDI2 0: Invalid 1: Valid Hundreds: VDI3 0: Invalid 1: Valid Thousands: VDI4 0: Invalid 1: Valid Ten thousands: VDI5 0: Invalid 1: Valid	0	-	In real time	" A1-06" on page 343
A1-07	0xA107	AI1 function selection (used as DI)	Same as F4-00	0	-	At stop	" A1-07" on page 344
A1-08	0xA108	AI2 function (used as DI)	Same as F4-00	0	-	At stop	" A1-08" on page 346
A1-09	0xA109	AI3 function selection (used as DI)	Same as F4-00	0	-	At stop	" A1-09" on page 348

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
A1-10	0xA10A	Active state selection for AI used as DI	Ones: AI1 0: Active high 1: Active low Tens: AI2 0: Active high 1: Active low Hundreds: AI3 0: Active high 1: Active low	0	-	At stop	"A1-10" on page 350
A5-00	0xA500	DPWM switchover frequency upper limit	0.00 Hz to F0-10	12	Hz	In real time	"A5-00" on page 351
A5-01	0xA501	PWM modulation mode	0: Asynchronous modulation 1: Synchronous modulation Synchronous modulation mode 2 Synchronous modulation mode 3	0	-	In real time	"A5-01" on page 351
A5-02	0xA502	Dead-zone compensation mode selection	0: Disabled 1: Enabled	2	-	At stop	"A5-02" on page 352
A5-03	0xA503	Random PWM depth	0 to 10	0	-	In real time	"A5-03" on page 352
A5-04	0xA504	Fast current limit	0: Disabled 1: Enabled	0	-	In real time	"A5-04" on page 353
A5-05	0xA505	Sampling delay	1 to 13	5	-	In real time	"A5-05" on page 353
A5-06	0xA506	Undervoltage threshold	150.0 V to 700.0 V	350	V	In real time	"A5-06" on page 353
A5-07	0xA507	SVC optimization selection	0: No optimization 1: Optimization mode 1 2: Optimization mode 2	1	-	At stop	"A5-07" on page 353
A5-13	0xA50D	Bus voltage in function part	100–20000	5310	-	Unchangeable	"A5-13" on page 354
A5-14	0xA50E	Temperature correction	0 to 1	0	-	At stop	"A5-14" on page 354
A5-16	0xA510	Display parameter address 1	0–100	0	-	Unchangeable	"A5-16" on page 354
A5-17	0xA511	Display parameter address 2	0–100	1	-	Unchangeable	"A5-17" on page 354
A5-18	0xA512	Display parameter address 3	0–100	2	-	Unchangeable	"A5-18" on page 355
A5-19	0xA513	Display parameter address 4	0–100	3	-	Unchangeable	"A5-19" on page 355
A5-21	0xA515	Low speed carrier frequency	0.0–16.0	0	-	In real time	"A5-21" on page 355

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
A5-22	0xA516	Dead-zone compensation auto-tuning	0: Disabled 1: Enabled	0	-	At stop	" A5-22" on page 355
A6-00	0xA600	Curve 4 minimum input	–10.00 V to A6-02	0	V	In real time	" A6-00" on page 356
A6-01	0xA601	Percentage corresponding to curve 4 minimum input	-100.0% to +100.0%	0	%	In real time	" A6-01" on page 356
A6-02	0xA602	Curve 4 inflexion point 1 input	A6-00 to A6-04	3	V	In real time	" A6-02" on page 356
A6-03	0xA603	Percentage corresponding to curve 4 inflexion point 1 input	-100.0% to +100.0%	30	%	In real time	" A6-03" on page 357
A6-04	0xA604	Curve 4 inflexion point 2 input	A6-02 to A6-06	6	V	In real time	" A6-04" on page 357
A6-05	0xA605	Percentage corresponding to curve 4 inflexion point 2 input	-100.0% to +100.0%	60	%	In real time	" A6-05" on page 357
A6-06	0xA606	Curve 4 maximum input	A6-04 to 10.00 V	10	V	In real time	" A6-06" on page 357
A6-07	0xA607	Percentage corresponding to curve 4 maximum input	-100.0% to +100.0%	100	%	In real time	" A6-07" on page 358
A6-08	0xA608	Curve 5 minimum input	-10.00 V to A6-10	-10	V	In real time	" A6-08" on page 358
A6-09	0xA609	Percentage corresponding to curve 5 minimum input	-100.0% to +100.0%	-100	%	In real time	" A6-09" on page 358
A6-10	0xA60A	Curve 5 inflexion point 1 input	A6-08 to A6-12	-3	V	In real time	" A6-10" on page 359
A6-11	0xA60B	Percentage corresponding to curve 5 inflexion point 1 input	-100.0% to +100.0%	-30	%	In real time	" A6-11" on page 359
A6-12	0xA60C	Curve 5 inflexion point 2 input	A6-10 to A6-14	3	V	In real time	" A6-12" on page 359
A6-13	0xA60D	Percentage corresponding to curve 5 inflexion point 2 input	-100.0% to +100.0%	30	%	In real time	" A6-13" on page 359

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
A6-14	0xA60E	Curve 5 maximum input	A6-12 to 10.00 V	10	V	In real time	" A6-14" on page 360
A6-15	0xA60F	Percentage corresponding to curve 5 maximum input	-100.0% to +100.0%	100	%	In real time	" A6-15" on page 360
A6-16	0xA610	AI1 gain	-10.00 to +10.00	1	-	In real time	" A6-16" on page 360
A6-17	0xA611	AI1 offset	-100.0% to +100.0%	0	%	In real time	" A6-17" on page 360
A6-18	0xA612	AI2 gain	-10.00 to +10.00	1	-	In real time	" A6-18" on page 361
A6-19	0xA613	AI2 offset	-100.0% to +100.0%	0	%	In real time	" A6-19" on page 361
A6-20	0xA614	AI3 gain	-10.00 to +10.00	1	-	In real time	" A6-20" on page 361
A6-21	0xA615	AI3 offset	-100.0% to +100.0%	0	%	In real time	" A6-21" on page 361
A6-22	0xA616	AI disconnection detection threshold	0.0% to 100.0%	0	%	In real time	" A6-22" on page 362
A6-23	0xA617	AI disconnection detection time	0.0s to 6553.5s	0	s	In real time	" A6-23" on page 362
A6-24	0xA618	Jump point of AI1 setting	-100.0% to +100.0%	0	%	In real time	" A6-24" on page 362
A6-25	0xA619	Jump amplitude set through AI1	0.0% to 100.0%	0.1	%	In real time	" A6-25" on page 362
A6-26	0xA61A	Jump point set through AI2	-100.0% to +100.0%	0	%	In real time	" A6-26" on page 363
A6-27	0xA61B	Jump amplitude set through AI2	0.0% to 100.0%	0.1	%	In real time	" A6-27" on page 363
A6-28	0xA61C	Jump point of AI3 setting	-100.0% to +100.0%	0	%	In real time	" A6-28" on page 363
A6-29	0xA61D	Jump amplitude of AI3 setting	0.0% to 100.0%	0.1	%	In real time	" A6-29" on page 363

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
A6-30	0xA61E	Analog disconnection detection	Ones position: AI1 disconnection detection 0: Disabled 1: Enabled Tens position: AI2 disconnection detection 0: Disabled 1: Enabled Hundreds position: AI3 disconnection detection 0: Disabled 1: Enabled	0	-	In real time	" A6-30" on page 364
A9-00	0xA900	Online auto-tuning on the rotor time constant of the asynchronous motor	0: Disabled 1: Enabled	0	-	In real time	" A9-00" on page 364
A9-01	0xA901	Rotor resistance gain for asynchronous motor auto-tuning in FVC mode	0–100	5	-	In real time	" A9-01" on page 365
A9-02	0xA902	Rotor resistance start frequency for asynchronous motor auto-tuning in FVC mode	2–100 Hz	7	Hz	In real time	" A9-02" on page 365
A9-03	0xA903	Magnetic field efficient for asynchronous motor observation in FVC mode	30–150	40	-	In real time	" A9-03" on page 365
A9-04	0xA904	Maximum torque limit coefficient for the asynchronous motor field-weakening range	30 to 150	80	-	In real time	" A9-04" on page 365
A9-05	0xA905	Asynchronous motor speed filter time in SVC mode	5 ms to 32 ms	15	ms	In real time	" A9-05" on page 366

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
A9-06	0xA906	Speed feedback handling in speed control of asynchronous motor in SVC mode	0: No operation 1: Minimum synchronization frequency limited based on load change 2: Fixed current output during low-speed running 3: Fixed current output during low-speed running 4: Low torque optimization	0	-	In real time	" A9-06" on page 366
A9-07	0xA907	Magnetic field regulation bandwidth of asynchronous motor in SVC mode	0.0 to 8.0	2	-	In real time	" A9-07" on page 366
A9-08	0xA908	Low-speed running current of asynchronous motor in SVC mode	30 to 170	100	-	In real time	" A9-08" on page 366
A9-09	0xA909	Switchover frequency of output fixed current of asynchronous motor in SVC mode	0.1 Hz to 1.0 Hz	0.3	Hz	At stop	" A9-09" on page 367
A9-10	0xA90A	Speed fluctuation suppression coefficient of asynchronous motor in SVC mode	80 to 100	95	-	At stop	" A9-10" on page 367
A9-11	0xA90B	Acceleration/ Deceleration time of asynchronous motor in SVC mode	10s to 3000s	200	s	At stop	" A9-11" on page 367
A9-12	0xA90C	Quick auto-tuning of stator resistance before asynchronous motor startup	0: Disabled 1: Enabled	0	-	At stop	" A9-12" on page 367

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
A9-13	0xA90D	Quick auto-tuning of stator resistance coefficient 1 of asynchronous motor	0 to 65535	10	-	At stop	" A9-13" on page 368
A9-14	0xA90E	Quick auto-tuning of stator resistance coefficient 2 of asynchronous motor	0 to 65535	10	-	At stop	" A9-14" on page 368
A9-17	0xA911	Synchronous motor real-time angle	0.0 to 359.9	0	-	Unchangeable	" A9-17" on page 368
A9-18	0xA912	Initial position angle detection of synchronous motor	0: Detected upon running 1: Not detected 2: Detected upon initial power-on	0	-	In real time	" A9-18" on page 369
A9-20	0xA914	Flux weakening mode selection	0: Automatic mode 1: Synchronous motor adjustment mode 2: Synchronous motor hybrid mode 3: Disabled	1	-	At stop	" A9-20" on page 369
A9-21	0xA915	Flux weakening gain of synchronous motor	0 to 50	5	-	In real time	" A9-21" on page 369
A9-22	0xA916	Output voltage upper limit margin of synchronous motor	0% to 50%	5	%	In real time	" A9-22" on page 369
A9-23	0xA917	Maximum force adjustment gain of synchronous motor	20% to 300%	100	%	In real time	" A9-23" on page 370
A9-24	0xA918	Exciting current adjustment gain calculated by synchronous motor	40% to 200%	100	%	In real time	" A9-24" on page 370
A9-25	0xA919	Estimated synchronous motor speed integral gain in SVC mode	5% to 1000%	30	%	In real time	" A9-25" on page 370

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
A9-26	0xA91A	Estimated synchronous motor speed proportional gain in SVC mode	5% to 300%	20	%	In real time	" A9-26" on page 370
A9-27	0xA91B	Estimated synchronous motor speed filter in SVC mode	10 to 2000	100	-	In real time	" A9-27" on page 371
A9-28	0xA91C	Minimum carrier frequency of synchronous motor in SVC mode	0.8 to F0-15.0	2	-	In real time	" A9-28" on page 371
A9-29	0xA91D	Low speed excitation current of synchronous motor in SVC mode	0% to 80%	30	%	In real time	" A9-29" on page 371
A9-30	0xA91E	Low-speed closed-loop current (for VVC)	0% to 65535%	0	%	In real time	" A9-30" on page 371
A9-31	0xA91F	Oscillation suppression damping coefficient (for VVC)	0% to 65535%	0	%	In real time	" A9-31" on page 372
A9-32	0xA920	Reserved parameter 8 for synchronous motor control	0 to 65535	0	-	In real time	" A9-32" on page 372
A9-33	0xA921	Reserved parameter 9 for synchronous motor control	0 to 5	0	-	At stop	" A9-33" on page 372
A9-34	0xA922	Reserved parameter 10 for synchronous motor control	0% to 65535%	0	%	In real time	" A9-34" on page 372
A9-35	0xA923	Performance fault subcode upon 1st fault	0 to 65535	0	-	Unchangeable	" A9-35" on page 373
A9-36	0xA924	Performance fault subcode upon 2nd fault	0 to 65535	0	-	Unchangeable	" A9-36" on page 373
A9-37	0xA925	Performance fault subcode upon 3rd fault	0 to 65535	0	-	Unchangeable	" A9-37" on page 373

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
A9-40	0xA928	Low-speed closed-loop current selection (for VVC)	0: Disabled 1: Enabled	0	-	At stop	" A9-40" on page 373
A9-41	0xA929	Low-speed closed-loop current (for VVC)	30% to 200%	50	%	At stop	" A9-41" on page 374
A9-42	0xA92A	Oscillation suppression damping coefficient (for VVC)	0% to 500%	100	%	In real time	" A9-42" on page 374
A9-43	0xA92B	Initial position compensation angle (for VVC)	0 to 5	0	-	At stop	" A9-43" on page 374
A9-44	0xA92C	Initial position compensation angle of synchronous motor	0.0 to 360.0	0	-	In real time	" A9-44" on page 374
A9-45	0xA92D	Synchronous motor low-speed handling	0: Disabled 1: Enabled	0	-	At stop	" A9-45" on page 375
A9-46	0xA92E	Switchover frequency for synchronous motor low-speed handling	0.01 to F0-10	5	-	At stop	" A9-46" on page 375
A9-47	0xA92F	Synchronous motor low-speed handling current	10 to 200	100	-	At stop	" A9-47" on page 375
A9-48	0xA930	Synchronous motor low-speed handling feedback suppression coefficient	0 to 300	32	-	At stop	" A9-48" on page 375
A9-49	0xA931	Synchronous motor energy-saving control	0: Disabled 1: Enabled	0	-	At stop	" A9-49" on page 376
A9-50	0xA932	Maximum flux weakening current limit margin	200–1000	1000	-	At stop	" A9-50" on page 376

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
A9-51	0xA933	Advanced settings for asynchronous motor parameter auto-tuning	Ones: Rotor resistance and leakage inductance DC offset 0: Standard offset 1: Large offset Tens: New rotor resistance and leakage inductance auto-tuning algorithm 0: Disabled 1: Enabled	111	-	At stop	" A9-51" on page 376
Continued	Continued	Continued	Hundreds: New mutual inductance static auto-tuning algorithm 0: Disabled 1: Enabled Thousands: Stator resistance auto-tuning algorithm 0: Current open loop 1: Current closed loop	Continued	Continued	Continued	Continued
A9-52	0xA934	U0-06 feedback torque selection	0: Motoring torque being positive and generating torque being negative 1: Torque direction being positive in the case of positive speed direction; torque direction being negative in the case of negative speed direction	1	-	In real time	" A9-52" on page 377
A9-54	0xA936	Transistor voltage drop	0 to 10000	700	-	At stop	" A9-54" on page 377
A9-55	0xA937	Dead-zone time 0	0 to 10000	352	-	At stop	" A9-55" on page 377
A9-56	0xA938	Dead-zone time 1	0 to 10000	1052	-	At stop	" A9-56" on page 377
A9-57	0xA939	Dead-zone time 2	0 to 10000	1270	-	At stop	" A9-57" on page 378
A9-58	0xA93A	Dead-zone time 3	0 to 10000	1358	-	At stop	" A9-58" on page 378
A9-59	0xA93B	Dead-zone time 4	0 to 10000	1404	-	At stop	" A9-59" on page 378
A9-60	0xA93C	Dead-zone time 5	0 to 10000	1449	-	At stop	" A9-60" on page 378
A9-61	0xA93D	Dead-zone time 6	0 to 10000	1661	-	At stop	" A9-61" on page 379
A9-62	0xA93E	Dead-zone time 7	0 to 10000	1689	-	At stop	" A9-62" on page 379

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
A9-63	0xA93F	Dead-zone compensation current 0	0 to 10000	94	-	At stop	" A9-63" on page 379
A9-64	0xA940	Dead-zone compensation current 1	0 to 10000	376	-	At stop	" A9-64" on page 379
A9-65	0xA941	Dead-zone compensation current 2	0 to 10000	658	-	At stop	" A9-65" on page 380
A9-66	0xA942	Dead-zone compensation current 3	0 to 10000	940	-	At stop	" A9-66" on page 380
A9-67	0xA943	Dead-zone compensation current 4	0 to 10000	1222	-	At stop	" A9-67" on page 380
A9-68	0xA944	Dead-zone compensation current 5	0 to 10000	1504	-	At stop	" A9-68" on page 380
A9-69	0xA945	Dead-zone compensation current 6	0 to 10000	3478	-	At stop	" A9-69" on page 380
A9-70	0xA946	Dead-zone compensation current 7	0 to 10000	5452	-	At stop	" A9-70" on page 381
A9-71	0xA944	Elastic oscillation suppression	0: Disabled 1: Self-adaptive based on the target frequency 2: Frequency reference	0	-	At stop	" A9-71" on page 381
A9-72	0xA945	Elastic oscillation suppression filter time	20 ms to 1000 ms	300	ms	In real time	" A9-72" on page 381
A9-73	0xA946	Elastic oscillation suppression gain	10 to 1000	100	-	In real time	" A9-73" on page 381
AC-00	0xAC00	AI1 measured voltage 1	-10.000 V to +10.000 V	2	V	In real time	" AC-00" on page 382
AC-01	0xAC01	AI1 displayed voltage 1	-10.000 V to +10.000 V	2	V	In real time	" AC-01" on page 382
AC-02	0xAC02	AI1 measured voltage 2	-10.000 V to +10.000 V	8	V	In real time	" AC-02" on page 382
AC-03	0xAC03	AI1 displayed voltage 2	-10.000 V to +10.000 V	8	V	In real time	" AC-03" on page 383
AC-04	0xAC04	AI2 measured voltage 1	-10.000 V to +10.000 V	2	V	In real time	" AC-04" on page 383
AC-05	0xAC05	AI2 displayed voltage 1	-10.000 V to +10.000 V	2	V	In real time	" AC-05" on page 383

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
AC-06	0xAC06	AI2 measured voltage 2	-10.000 V to +10.000 V	8	V	In real time	" AC-06" on page 384
AC-07	0xAC07	AI2 displayed voltage 2	-10.000 V to +10.000 V	8	V	In real time	" AC-07" on page 384
AC-08	0xAC08	AI3 measured voltage 1	-10.000 V to +10.000 V	2	V	In real time	" AC-08" on page 384
AC-09	0xAC09	AI3 displayed voltage 1	-10.000 V to +10.000 V	2	V	In real time	" AC-09" on page 385
AC-10	0xAC0A	AI3 measured voltage 2	-10.000 V to +10.000 V	8	V	In real time	" AC-10" on page 385
AC-11	0xAC0B	AI3 displayed voltage 2	-10.000 V to +10.000 V	8	V	In real time	" AC-11" on page 385
AC-12	0xAC0C	AO1 measured voltage 1	-10.000 V to +10.000 V	2	V	In real time	" AC-12" on page 386
AC-13	0xAC0D	AO1 target voltage 1	-10.000 V to +10.000 V	2	V	In real time	" AC-13" on page 386
AC-14	0xAC0E	AO1 measured voltage 2	-10.000 V to +10.000 V	8	V	In real time	" AC-14" on page 386
AC-15	0xAC0F	AO1 target voltage 2	-10.000 V to +10.000 V	8	V	In real time	" AC-15" on page 387
AC-16	0xAC10	AO2 measured voltage 1	-10.000 V to +10.000 V	2	V	In real time	" AC-16" on page 387
AC-17	0xAC11	AO2 target voltage 1	-10.000 V to +10.000 V	2	V	In real time	" AC-17" on page 387
AC-18	0xAC12	AO2 measured voltage 2	-10.000 V to +10.000 V	8	V	In real time	" AC-18" on page 388
AC-19	0xAC13	AO2 target voltage 2	-10.000 V to +10.000 V	8	V	In real time	" AC-19" on page 388
AC-20	0xAC14	PT100 measured voltage 1	0.000 V to 3.3 V	0.44	V	In real time	" AC-20" on page 388
AC-21	0xAC15	PT100 displayed voltage 1	0.000 V to 3.3 V	0.44	V	In real time	" AC-21" on page 389
AC-22	0xAC16	PT100 measured voltage 2	0.000 V to 3.3 V	2.16	V	In real time	" AC-22" on page 389
AC-23	0xAC17	PT100 displayed voltage 2	0.000 V to 3.3 V	2.16	V	In real time	" AC-23" on page 389
AC-24	0xAC18	PT1000 measured voltage 1	0.000 V to 3.3 V	1.136	V	In real time	" AC-24" on page 390
AC-25	0xAC19	Voltage 1 display on the PT1000	0.000 V to 3.3 V	1.136	V	In real time	" AC-25" on page 390
AC-26	0xAC1A	PT1000 measured voltage 2	0.000 V to 3.3 V	2.122	V	In real time	" AC-26" on page 390
AC-27	0xAC1B	Voltage 2 display on the PT1000	0.000 V to 3.3 V	2.122	V	In real time	" AC-27" on page 391

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
AC-28	0xAC1C	AO1 measured current 1	0.000 mA to 20.000 mA	4	mA	In real time	"AC-28" on page 391
AC-29	0xAC1D	AO1 target current 1	0.000 mA to 20.000 mA	4	mA	In real time	"AC-29" on page 391
AC-30	0xAC1E	AO1 measured current 2	0.000 mA to 20.000 mA	16	mA	In real time	"AC-30" on page 392
AC-31	0xAC1F	AO1 target current 2	0.000 mA to 20.000 mA	16	mA	In real time	"AC-31" on page 392
AF-00	0xAF00	RPDO1-SubIndex0-H	0 to value of 0xFFFF	0	-	In real time	"AF-00" on page 392
AF-01	0xAF01	RPDO1-SubIndex0-L	0 to value of 0xFFFF	0	-	In real time	"AF-01" on page 393
AF-02	0xAF02	RPDO1-SubIndex1-H	0 to value of 0xFFFF	0	-	In real time	"AF-02" on page 393
AF-03	0xAF03	RPDO1-SubIndex1-L	0 to value of 0xFFFF	0	-	In real time	"AF-03" on page 393
AF-04	0xAF04	RPDO1-SubIndex2-H	0 to value of 0xFFFF	0	-	In real time	"AF-04" on page 393
AF-05	0xAF05	RPDO1-SubIndex2-L	0 to value of 0xFFFF	0	-	In real time	"AF-05" on page 394
AF-06	0xAF06	RPDO1-SubIndex3-H	0 to value of 0xFFFF	0	-	In real time	"AF-06" on page 394
AF-07	0xAF07	RPDO1-SubIndex3-L	0 to value of 0xFFFF	0	-	In real time	"AF-07" on page 394
AF-08	0xAF08	RPDO2-SubIndex0-H	0 to value of 0xFFFF	0	-	In real time	"AF-08" on page 394
AF-09	0xAF09	RPDO2-SubIndex0-L	0 to value of 0xFFFF	0	-	In real time	"AF-09" on page 395
AF-10	0xAF0A	RPDO2-SubIndex1-H	0 to value of 0xFFFF	0	-	In real time	"AF-10" on page 395
AF-11	0xAF0B	RPDO2-SubIndex1-L	0 to value of 0xFFFF	0	-	In real time	"AF-11" on page 395
AF-12	0xAF0C	RPDO2-SubIndex2-H	0 to value of 0xFFFF	0	-	In real time	"AF-12" on page 395
AF-13	0xAF0D	RPDO2-SubIndex2-L	0 to value of 0xFFFF	0	-	In real time	"AF-13" on page 395
AF-14	0xAF0E	RPDO2-SubIndex3-H	0 to value of 0xFFFF	0	-	In real time	"AF-14" on page 396
AF-15	0xAF0F	RPDO2-SubIndex3-L	0 to value of 0xFFFF	0	-	In real time	"AF-15" on page 396
AF-16	0xAF10	RPDO3-SubIndex0-H	0 to value of 0xFFFF	0	-	In real time	"AF-16" on page 396
AF-17	0xAF11	RPDO3-SubIndex0-L	0 to value of 0xFFFF	0	-	In real time	"AF-17" on page 396

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
AF-18	0xAF12	RPDO3-SubIndex1-H	0 to value of 0xFFFF	0	-	In real time	" AF-18" on page 397
AF-19	0xAF13	RPDO3-SubIndex1-L	0 to value of 0xFFFF	0	-	In real time	" AF-19" on page 397
AF-20	0xAF14	RPDO3-SubIndex2-H	0 to value of 0xFFFF	0	-	In real time	" AF-20" on page 397
AF-21	0xAF15	RPDO3-SubIndex2-L	0 to value of 0xFFFF	0	-	In real time	" AF-21" on page 397
AF-22	0xAF16	RPDO3-SubIndex3-H	0 to value of 0xFFFF	0	-	In real time	" AF-22" on page 398
AF-23	0xAF17	RPDO3-SubIndex3-L	0 to value of 0xFFFF	0	-	In real time	" AF-23" on page 398
AF-24	0xAF18	RPDO4-SubIndex0-H	0 to value of 0xFFFF	0	-	In real time	" AF-24" on page 398
AF-25	0xAF19	RPDO4-SubIndex0-L	0 to value of 0xFFFF	0	-	In real time	" AF-25" on page 398
AF-26	0xAF1A	RPDO4-SubIndex1-H	0 to value of 0xFFFF	0	-	In real time	" AF-26" on page 399
AF-27	0xAF1B	RPDO4-SubIndex1-L	0 to value of 0xFFFF	0	-	In real time	" AF-27" on page 399
AF-28	0xAF1C	RPDO4-SubIndex2-H	0 to value of 0xFFFF	0	-	In real time	" AF-28" on page 399
AF-29	0xAF1D	RPDO4-SubIndex2-L	0 to value of 0xFFFF	0	-	In real time	" AF-29" on page 399
AF-30	0xAF1E	RPDO4-SubIndex3-H	0 to value of 0xFFFF	0	-	In real time	" AF-30" on page 400
AF-31	0xAF1F	RPDO4-SubIndex3-L	0 to value of 0xFFFF	0	-	In real time	" AF-31" on page 400
AF-32	0xAF20	TPDO1-SubIndexO-H	0 to value of 0xFFFF	0	-	In real time	" AF-32" on page 400
AF-33	0xAF21	TPDO1-SubIndexO-L	0 to value of 0xFFFF	0	-	In real time	" AF-33" on page 400
AF-34	0xAF22	TPDO1-SubIndex1-H	0 to value of 0xFFFF	0	-	In real time	" AF-34" on page 400
AF-35	0xAF23	TPDO1-SubIndex1-L	0 to value of 0xFFFF	0	-	In real time	" AF-35" on page 401
AF-36	0xAF24	TPDO1-SubIndex2-H	0 to value of 0xFFFF	0	-	In real time	" AF-36" on page 401
AF-37	0xAF25	TPDO1-SubIndex2-L	0 to value of 0xFFFF	0	-	In real time	" AF-37" on page 401
AF-38	0xAF26	TPDO1-SubIndex3-H	0 to value of 0xFFFF	0	-	In real time	" AF-38" on page 401
AF-39	0xAF27	TPDO1-SubIndex3-L	0 to value of 0xFFFF	0	-	In real time	" AF-39" on page 402

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
AF-40	0xAF28	TPDO2-SubIndex0-H	0 to value of 0xFFFF	0	-	In real time	" AF-40" on page 402
AF-41	0xAF29	TPDO2-SubIndex0-L	0 to value of 0xFFFF	0	-	In real time	" AF-41" on page 402
AF-42	0xAF2A	TPDO2-SubIndex1-H	0 to value of 0xFFFF	0	-	In real time	" AF-42" on page 402
AF-43	0xAF2B	TPDO2-SubIndex1-L	0 to value of 0xFFFF	0	-	In real time	" AF-43" on page 403
AF-44	0xAF2C	TPDO2-SubIndex2-H	0 to value of 0xFFFF	0	-	In real time	" AF-44" on page 403
AF-45	0xAF2D	TPDO2-SubIndex2-L	0 to value of 0xFFFF	0	-	In real time	" AF-45" on page 403
AF-46	0xAF2E	TPDO2-SubIndex3-H	0 to value of 0xFFFF	0	-	In real time	" AF-46" on page 403
AF-47	0xAF2F	TPDO2-SubIndex3-L	0 to value of 0xFFFF	0	-	In real time	" AF-47" on page 404
AF-48	0xAF30	TPDO3-SubIndex0-H	0 to value of 0xFFFF	0	-	In real time	" AF-48" on page 404
AF-49	0xAF31	TPDO3-SubIndex0-L	0 to value of 0xFFFF	0	-	In real time	" AF-49" on page 404
AF-50	0xAF32	TPDO3-SubIndex1-H	0 to value of 0xFFFF	0	-	In real time	" AF-50" on page 404
AF-51	0xAF33	TPDO3-SubIndex1-L	0 to value of 0xFFFF	0	-	In real time	" AF-51" on page 405
AF-52	0xAF34	TPDO3-SubIndex2-H	0 to value of 0xFFFF	0	-	In real time	" AF-52" on page 405
AF-53	0xAF35	TPDO3-SubIndex2-L	0 to value of 0xFFFF	0	-	In real time	" AF-53" on page 405
AF-54	0xAF36	TPDO3-SubIndex3-H	0 to value of 0xFFFF	0	-	In real time	" AF-54" on page 405
AF-55	0xAF37	TPDO3-SubIndex3-L	0 to value of 0xFFFF	0	-	In real time	" AF-55" on page 405
AF-56	0xAF38	TPDO4-SubIndex0-H	0 to value of 0xFFFF	0	-	In real time	" AF-56" on page 406
AF-57	0xAF39	TPDO4-SubIndex0-L	0 to value of 0xFFFF	0	-	In real time	" AF-57" on page 406
AF-58	0xAF3A	TPDO4-SubIndex1-H	0 to value of 0xFFFF	0	-	In real time	" AF-58" on page 406
AF-59	0xAF3B	TPDO4-SubIndex1-L	0 to value of 0xFFFF	0	-	In real time	" AF-59" on page 406
AF-60	0xAF3C	TPDO4-SubIndex2-H	0 to value of 0xFFFF	0	-	In real time	" AF-60" on page 407
AF-61	0xAF3D	TPDO4-SubIndex2-L	0 to value of 0xFFFF	0	-	In real time	" AF-61" on page 407

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
AF-62	0xAF3E	TPDO4-SubIndex3-H	0 to value of 0xFFFF	0	-	In real time	" AF-62" on page 407
AF-63	0xAF3F	TPDO4-SubIndex3-L	0 to value of 0xFFFF	0	-	In real time	" AF-63" on page 407
AF-66	0xAF42	Number of valid RPDOs	0 to value of 0xFFFF	0	-	Unchangeable	" AF-66" on page 408
AF-67	0xAF43	Number of valid TPDOs	0 to value of 0xFFFF	0	-	Unchangeable	" AF-67" on page 408
B0-00	0xB000	Tension control mode	0: Disabled 1: Open loop torque control 2: Closed loop speed control 3: Closed loop torque control 4: Constant linear speed control	0	-	At stop	" B0-00" on page 408
B0-01	0xB001	Winding mode	0: Winding 1: Unwinding	0	-	In real time	" B0-01" on page 409
B0-02	0xB002	Unwinding reverse tightening selection	0.0 m/min to 500.0 m/min	0	m/min	In real time	" B0-02" on page 409
B0-03	0xB003	Mechanical transmission ratio	0.01–300.00	1	-	In real time	" B0-03" on page 410
B0-04	0xB004	Linear speed input source	0: No input 1: AI1 2: AI2 3: AI3 4: Pulse input (DI5) 5: Communication setting (1000H) 6: Communication setting (731AH)	0	-	At stop	" B0-04" on page 410
B0-05	0xB005	Maximum linear speed	0.0 m/min to 6500.0 m/min	1000	m/min	In real time	" B0-05" on page 411
B0-06	0xB006	Minimum linear speed for winding diameter calculation	0.0 m/min to 6500.0 m/min	20	m/min	In real time	" B0-06" on page 411
B0-07	0xB007	Winding diameter calculation method	0: Calculated based on linear speed 1:Calculated based on accumulative thickness 2: AI1 3: AI2 4: AI3 5: Pulse input (DI5) 6: Communication 7: Specified by B0-14	0	-	At stop	" B0-07" on page 411

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
B0-08	0xB008	Maximum roll diameter	0.1–6000.0 mm	500	mm	In real time	" B0-08" on page 412
B0-09	0xB009	Reel diameter	0.1–6000.0 mm	100	mm	In real time	" B0-09" on page 413
B0-10	0xB00A	Initial roll diameter source	0: B0-11 to B0-13 setting 1: AI1 setting 2: AI2 setting 3: AI3 setting 4: Communication setting (1000H)	0	-	At stop	" B0-10" on page 413
B0-11	0xB00B	Initial roll diameter 1	0.1–6000.0 mm	100	mm	In real time	" B0-11" on page 413
B0-12	0xB00C	Initial roll diameter 2	0.1–6000.0 mm	100	mm	In real time	" B0-12" on page 414
B0-13	0xB00D	Initial roll diameter 3	0.1–6000.0 mm	100	mm	In real time	" B0-13" on page 414
B0-14	0xB00E	Current roll diameter	0.1–6000.0 mm	100	mm	In real time	" B0-14" on page 414
B0-15	0xB00F	Roll diameter filter time	0.00s to 10.00s	5	s	In real time	" B0-15" on page 414
B0-16	0xB010	Winding diameter change rate	0.0–1000.0	0	-	In real time	" B0-16" on page 415
B0-17	0xB011	Roll diameter change direction limit	0: Disabled 1: Decrease disabled during winding, and increase disabled during unwinding	0	-	In real time	" B0-17" on page 415
B0-18	0xB012	Roll diameter reset during running	0–1	0	-	In real time	" B0-18" on page 415
B0-19	0xB013	Pre-drive speed gain	-100.0% to +200.0%	0	%	In real time	" B0-19" on page 416
B0-20	0xB014	Pre-charge torque limit source	0: Set by F2-09 1: Set based on tension control torque	1	-	At stop	" B0-20" on page 416
B0-21	0xB015	Pre-drive torque correction	-100.0% to +100.0%	0	%	In real time	" B0-21" on page 416
B0-23	0xB017	Pre-drive acceleration time	0.0s to 6000.0s	20	s	In real time	" B0-23" on page 417
B0-24	0xB018	Pre-drive deceleration time	0.0s to 6000.0s	20	s	In real time	" B0-24" on page 417
B0-25	0xB019	Pre-drive winding diameter calculation	0: Disabled 1: Enabled	0	-	In real time	" B0-25" on page 417
B0-26	0xB01A	Tension frequency limit	0.0% to 100.0%	50	%	In real time	" B0-26" on page 418

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
B0-27	0xB01B	Tension frequency limit offset	0.00 Hz to 100.00 Hz	5	Hz	In real time	" B0-27" on page 418
B0-28	0xB01C	Tension frequency limit	0: Disabled 1: Enabled	0	-	In real time	" B0-28" on page 418
B0-29	0xB01D	Pulses per revolution	1–60000	1	-	In real time	" B0-29" on page 419
B0-30	0xB01E	Revolutions per layer	1 to 10000	1	-	In real time	" B0-30" on page 419
B0-31	0xB01F	Material thickness reference source	0: Digit setting 1: AI1 setting 2: AI2 setting 3: AI3	0	-	At stop	" B0-31" on page 420
B0-32	0xB020	Material thickness 0	0.01–100.00 mm	0.01	mm	In real time	" B0-32" on page 420
B0-33	0xB021	Material thickness 1	0.01–100.00 mm	0.01	mm	In real time	" B0-33" on page 420
B0-34	0xB022	Material thickness 2	0.01–100.00 mm	0.01	mm	In real time	" B0-34" on page 421
B0-35	0xB023	Material thickness 3	0.01–100.00 mm	0.01	mm	In real time	" B0-35" on page 421
B0-36	0xB024	Maximum thickness	0.01 mm to 100.00 mm	1	mm	In real time	" B0-36" on page 421
B0-37	0xB025	Winding diameter not reset upon stop	0: Disabled 1: Enabled	0	-	In real time	" B0-37" on page 421
B0-38	0xB026	Closed-loop tension torque mode selection	0: Torque calculated through PID only 1: Torque calculated through main + PID	0	-	At stop	" B0-38" on page 422
B0-40	0xB028	Minimum pre-drive torque limit	0.0% to 100.0%	0	%	In real time	" B0-40" on page 422
B0-41	0xB029	Constant linear speed source selection	0: AI1 1: AI2 2: AI3 3: Pulse setting (DI5) Communication setting (1000H) 5: Communication setting (731AH)	0	-	At stop	" B0-41" on page 422
B1-00	0xB100	Tension reference source	0: B0-01 setting 1: AI1 setting 2: AI2 setting 3: AI3 setting 4: Pulse setting (DI5) 5: Communication setting (1000H)	0	-	At stop	" B1-00" on page 423

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
B1-01	0xB101	Tension digital setting	0 N to 65000 N	50	N	In real time	*" B1-01" on page 423*
B1-02	0xB102	Maximum tension	0 N to 65000 N	500	N	In real time	*" B1-02" on page 424*
B1-03	0xB103	Zero-speed threshold	0.0% to 20.0%	0	%	In real time	*" B1-03" on page 424*
B1-04	0xB104	Zero-speed tension rise	0.0% to 100.0%	0	%	In real time	*" B1-04" on page 424*
B1-05	0xB105	Frequency acceleration time in torque control mode	0.0s to 6500.0s	0	s	In real time	*" B1-05" on page 425*
B1-06	0xB106	Frequency deceleration time in torque control mode	0.0s to 6500.0s	0	s	In real time	*" B1-06" on page 425*
B1-07	0xB107	Friction force compensation	0.0% to 50.0%	0	%	In real time	*" B1-07" on page 425*
B1-08	0xB108	Mechanical inertia compensation coefficient	0 N m^2 to 65535 N m^2	0	N•m2	In real time	*" B1-08" on page 425*
B1-09	0xB109	Correction coefficient of acceleration inertia compensation	0.0% to 200.0%	100	%	In real time	*" B1-09" on page 426*
B1-10	0xB10A	Correction coefficient of deceleration inertia compensation	0.0% to 200.0%	100	%	In real time	*" B1-10" on page 426*
B1-11	0xB10B	Material density	0 kg/m^3 to 65535 kg/m^3	0	kg/m^3	In real time	*" B1-11" on page 427*
B1-12	0xB10C	Material width	0 mm to 65535 mm	0	mm	In real time	*" B1-12" on page 427*
B1-13	0xB10D	Inertia compensation exit delay	0 ms to 1000 ms	0	ms	In real time	*" B1-13" on page 427*
B1-14	0xB10E	Transition frequency for zero speed compensation	0.00 Hz to 20.00 Hz	2	Hz	In real time	*" B1-14" on page 428*
B1-15	0xB10F	Open-loop torque reverse	0: Disabled 1: Enabled	0	-	In real time	*" B1-15" on page 428*

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
B1-16	0xB110	Tension closed-loop torque control limit	0.0% to 200.0%	100	%	In real time	" B1-16" on page 428
B1-17	0xB111	Friction force compensation correction coefficient	-50.0 to +50.0	0	-	In real time	" B1-17" on page 429
B1-18	0xB112	Friction force compensation curve	0: Frequency 1: Linear speed 2: Multi-friction compensation curve 1 3: Multi-friction compensation curve 2	0	-	At stop	" B1-18" on page 429
B1-19	0xB113	Multi-friction force compensation torque 1	0.0–50.0	0	-	In real time	" B1-19" on page 430
B1-20	0xB114	Multi-friction force compensation torque 2	0.0–50.0	0	-	In real time	" B1-20" on page 430
B1-21	0xB115	Multi-friction force compensation torque 3	0.0–50.0	0	-	In real time	" B1-21" on page 430
B1-22	0xB116	Multi-friction force compensation torque 4	0.0–50.0	0	-	In real time	" B1-22" on page 430
B1-23	0xB117	Multi-friction force compensation torque 5	0.0–50.0	0	-	In real time	" B1-23" on page 431
B1-24	0xB118	Multi-friction force compensation torque 6	0.0–50.0	0	-	In real time	" B1-24" on page 431
B1-25	0xB119	Multi-friction force compensation inflection point 1	0.00 Hz to F0-10	0	Hz	In real time	" B1-25" on page 431
B1-26	0xB11A	Multi-friction force compensation inflection point 2	0.00 Hz to F0-10	0	Hz	In real time	" B1-26" on page 432
B1-27	0xB11B	Multi-friction force compensation inflection point 3	0.00 Hz to F0-10	0	Hz	In real time	" B1-27" on page 432
B1-28	0xB11C	Multi-friction force compensation inflection point 4	0.00 Hz to F0-10	0	Hz	In real time	" B1-28" on page 432
B1-29	0xB11D	Multi-friction force compensation inflection point 5	0.00 Hz to F0-10	0	Hz	In real time	" B1-29" on page 432

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
B1-30	0xB11E	Multi-friction force compensation inflection point 6	0.00 Hz to F0-10	0	Hz	In real time	" B1-30" on page 433
B1-31	0xB11F	Tension establishment	0: Disabled 1: Enabled	0	-	At stop	" B1-31" on page 433
B1-32	0xB120	Tension establishment dead zone	0.0% to 100.0%	2	%	In real time	" B1-32" on page 433
B1-33	0xB121	Tension establishment frequency	0.00 Hz to F0-10	0.1	Hz	In real time	" B1-33" on page 434
B1-34	0xB122	Terminal torque boost proportion	0.0% to 500.0%	50	%	In real time	" B1-34" on page 434
B1-35	0xB123	Terminal torque boost cancellation time	0.0–50.0s	0	s	In real time	" B1-35" on page 434
B1-37	0xB125	Initial roll diameter auto-tuning	0: Disabled 1: Enabled	0	-	At stop	" B1-37" on page 434
B1-38	0xB126	Rod length	1 mm to 65535 mm	300	mm	At stop	" B1-38" on page 435
B1-39	0xB127	Rod angle	0.1° to 360.0°	40	°	At stop	" B1-39" on page 435
B2-00	0xB200	Taper curve	0: Curve taper 1: Multi-liner taper	0	-	At stop	" B2-00" on page 435
B2-01	0xB201	Tension taper source selection	0: B2-02 setting 1: AI1 setting 2: AI2 setting 3: AI3 setting 4: Communication setting (1000H)	0	-	At stop	" B2-01" on page 436
B2-02	0xB202	Digital setting of taper	0.0% to 100.0%	0	%	In real time	" B2-02" on page 436
B2-03	0xB203	Correction coefficient of taper compensation	0 mm to 10000 mm	0	mm	In real time	" B2-03" on page 436
B2-05	0xB205	Setting channel of external taper AO	0: B2-06 setting 1: AI1 setting 2: AI2 setting 3: AI3 setting 4: Communication setting (1000H)	0	-	At stop	" B2-05" on page 437
B2-06	0xB206	External taper setting	0.0% to 100.0%	100	%	In real time	" B2-06" on page 437

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
B2-08	0xB208	Minimum winding diameter taper	0.0% to 100.0%	100	%	In real time	*" B2-08" on page 438*
B2-09	0xB209	Linear taper switchover point 1	B0-09 to B0-08	150	mm	In real time	*" B2-09" on page 438*
B2-10	0xB20A	Taper of switchover point 1	0.0% to 100.0%	100	%	In real time	*" B2-10" on page 438*
B2-11	0xB20B	Linear taper switchover point 2	B2-09 to B0-08	200	mm	In real time	*" B2-11" on page 438*
B2-12	0xB20C	Taper of switchover point 2	0.0% to 100.0%	90	%	In real time	*" B2-12" on page 438*
B2-13	0xB20D	Linear taper switchover point 3	B2-11 to B0-08	250	mm	In real time	*" B2-13" on page 439*
B2-14	0xB20E	Taper of switchover point 3	0.0% to 100.0%	80	%	In real time	*" B2-14" on page 439*
B2-15	0xB20F	Linear taper switchover point 4	B2-13 to B0-08	300	mm	In real time	*" B2-15" on page 439*
B2-16	0xB210	Taper of switchover point 4	0.0% to 100.0%	70	%	In real time	*" B2-16" on page 439*
B2-17	0xB211	Linear taper switchover point 5	B2-15 to B0-08	400	mm	In real time	*" B2-17" on page 440*
B2-18	0xB212	Taper of switchover point 5	0.0% to 100.0%	50	%	In real time	*" B2-18" on page 440*
B2-19	0xB213	Taper at maximum roll diameter	0.0 to 100.0	30	-	In real time	*" B2-19" on page 440*
B6-00	0xB600	Source address 1	0 to value of 0xFFFF	0xE012	-	In real time	*" B6-00" on page 441*
B6-01	0xB601	Mapping address 1	0 to value of 0xFFFF	0x500E	-	In real time	*" B6-01" on page 441*
B6-02	0xB602	Write gain 1	0.00–100.00	10	-	In real time	*" B6-02" on page 441*
B6-03	0xB603	Read gain 1	0.00–100.00	0.1	-	In real time	*" B6-03" on page 441*
B6-04	0xB604	Source address 2	0 to value of 0xFFFF	0	-	In real time	*" B6-04" on page 442*
B6-05	0xB605	Mapping address 2	0 to value of 0xFFFF	0	-	In real time	*" B6-05" on page 442*
B6-06	0xB606	Write gain 2	0.00–100.00	0	-	In real time	*" B6-06" on page 442*
B6-07	0xB607	Read gain 2	0.00–100.00	0	-	In real time	*" B6-07" on page 443*
B6-08	0xB608	Source address 3	0 to value of 0xFFFF	0	-	In real time	*" B6-08" on page 443*
B6-09	0xB609	Mapping address 3	0 to value of 0xFFFF	0	-	In real time	*" B6-09" on page 443*

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
B6-10	0xB60A	Write gain 3	0.00–100.00	0	-	In real time	" B6-10" on page 443
B6-11	0xB60B	Read gain 3	0.00–100.00	0	-	In real time	" B6-11" on page 444
B6-12	0xB60C	Source address 4	0 to value of 0xFFFF	0	-	In real time	" B6-12" on page 444
B6-13	0xB60D	Mapping address 4	0 to value of 0xFFFF	0	-	In real time	" B6-13" on page 444
B6-14	0xB60E	Write gain 4	0.00–100.00	0	-	In real time	" B6-14" on page 444
B6-15	0xB60F	Read gain 4	0.00–100.00	0	-	In real time	" B6-15" on page 445
B6-16	0xB610	Source address 5	0 to value of 0xFFFF	0	-	In real time	" B6-16" on page 445
B6-17	0xB611	Mapping address 5	0 to value of 0xFFFF	0	-	In real time	" B6-17" on page 445
B6-18	0xB612	Write gain 5	0.00–100.00	0	-	In real time	" B6-18" on page 446
B6-19	0xB613	Read gain 5	0.00–100.00	0	-	In real time	" B6-19" on page 446
B6-20	0xB614	Source address 6	0 to value of 0xFFFF	0	-	In real time	" B6-20" on page 446
B6-21	0xB615	Mapping address 6	0 to value of 0xFFFF	0	-	In real time	" B6-21" on page 446
B6-22	0xB616	Write gain 6	0.00–100.00	0	-	In real time	" B6-22" on page 447
B6-23	0xB617	Read gain 6	0.00–100.00	0	-	In real time	" B6-23" on page 447
B6-24	0xB618	Source address 7	0 to value of 0xFFFF	0	-	In real time	" B6-24" on page 447
B6-25	0xB619	Mapping address 7	0 to value of 0xFFFF	0	-	In real time	" B6-25" on page 447
B6-26	0xB61A	Write gain 7	0.00–100.00	0	-	In real time	" B6-26" on page 448
B6-27	0xB61B	Read gain 7	0.00–100.00	0	-	In real time	" B6-27" on page 448
B6-28	0xB61C	Source address 8	0 to value of 0xFFFF	0	-	In real time	" B6-28" on page 448
B6-29	0xB61D	Mapping address 8	0 to value of 0xFFFF	0	-	In real time	" B6-29" on page 449
B6-30	0xB61E	Write gain 8	0.00–100.00	0	-	In real time	" B6-30" on page 449
B6-31	0xB61F	Read gain 8	0.00–100.00	0	-	In real time	" B6-31" on page 449

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
B6-32	0xB620	Source address 9	0 to value of 0xFFFF	0	-	In real time	" B6-32" on page 449
B6-33	0xB621	Mapping address 9	0 to value of 0xFFFF	0	-	In real time	" B6-33" on page 450
B6-34	0xB622	Write gain 9	0.00–100.00	0	-	In real time	" B6-34" on page 450
B6-35	0xB623	Read gain 9	0.00–100.00	0	-	In real time	" B6-35" on page 450
B6-36	0xB624	Source address 10	0 to value of 0xFFFF	0	-	In real time	" B6-36" on page 451
B6-37	0xB625	Mapping address 10	0 to value of 0xFFFF	0	-	In real time	" B6-37" on page 451
B6-38	0xB626	Write gain 10	0.00–100.00	0	-	In real time	" B6-38" on page 451
B6-39	0xB627	Read gain 10	0.00–100.00	0	-	In real time	" B6-39" on page 451
B6-40	0xB628	Source address 11	0 to value of 0xFFFF	0	-	In real time	" B6-40" on page 452
B6-41	0xB629	Mapping address 11	0 to value of 0xFFFF	0	-	In real time	" B6-41" on page 452
B6-42	0xB62A	Write gain 11	0.00–100.00	0	-	In real time	" B6-42" on page 452
B6-43	0xB62B	Read gain 11	0.00–100.00	0	-	In real time	" B6-43" on page 453
B6-44	0xB62C	Source address 12	0 to value of 0xFFFF	0	-	In real time	" B6-44" on page 453
B6-45	0xB62D	Mapping address 12	0 to value of 0xFFFF	0	-	In real time	" B6-45" on page 453
B6-46	0xB62E	Write gain 12	0.00–100.00	0	-	In real time	" B6-46" on page 453
B6-47	0xB62F	Read gain 12	0.00–100.00	0	-	In real time	" B6-47" on page 454
B6-48	0xB630	Source address 13	0 to value of 0xFFFF	0	-	In real time	" B6-48" on page 454
B6-49	0xB631	Mapping address 13	0 to value of 0xFFFF	0	-	In real time	" B6-49" on page 454
B6-50	0xB632	Write gain 13	0.00–100.00	0	-	In real time	" B6-50" on page 454
B6-51	0xB633	Read gain 13	0.00–100.00	0	-	In real time	" B6-51" on page 455
B6-52	0xB634	Source address 14	0 to value of 0xFFFF	0	-	In real time	" B6-52" on page 455
B6-53	0xB635	Mapping address 14	0 to value of 0xFFFF	0	-	In real time	" B6-53" on page 455

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
B6-54	0xB636	Write gain 14	0.00–100.00	0	-	In real time	" B6-54" on page 456
B6-55	0xB637	Read gain 14	0.00–100.00	0	-	In real time	" B6-55" on page 456
B6-56	0xB638	Source address 15	0 to value of 0xFFFF	0	-	In real time	" B6-56" on page 456
B6-57	0xB639	Mapping address 15	0 to value of 0xFFFF	0	-	In real time	" B6-57" on page 456
B6-58	0xB63A	Write gain 15	0.00–100.00	0	-	In real time	" B6-58" on page 457
B6-59	0xB63B	Read gain 15	0.00–100.00	0	-	In real time	" B6-59" on page 457
B6-60	0xB63C	Source address 16	0 to value of 0xFFFF	0	-	In real time	" B6-60" on page 457
B6-61	0xB63D	Mapping address 16	0 to value of 0xFFFF	0	-	In real time	" B6-61" on page 457
B6-62	0xB63E	Write gain 16	0.00–100.00	0	-	In real time	" B6-62" on page 458
B6-63	0xB63F	Read gain 16	0.00–100.00	0	-	In real time	" B6-63" on page 458
B6-64	0xB640	Source address 17	0 to value of 0xFFFF	0	-	In real time	" B6-64" on page 458
B6-65	0xB641	Mapping address 17	0 to value of 0xFFFF	0	-	In real time	" B6-65" on page 459
B6-66	0xB642	Write gain 17	0.00–100.00	0	-	In real time	" B6-66" on page 459
B6-67	0xB643	Read gain 17	0.00–100.00	0	-	In real time	" B6-67" on page 459
B6-68	0xB644	Source address 18	0 to value of 0xFFFF	0	-	In real time	" B6-68" on page 459
B6-69	0xB645	Mapping address 18	0 to value of 0xFFFF	0	-	In real time	" B6-69" on page 460
B6-70	0xB646	Write gain 18	0.00–100.00	0	-	In real time	" B6-70" on page 460
B6-71	0xB647	Read gain 18	0.00–100.00	0	-	In real time	" B6-71" on page 460
B6-72	0xB648	Source address 19	0 to value of 0xFFFF	0	-	In real time	" B6-72" on page 461
B6-73	0xB649	Mapping address 19	0 to value of 0xFFFF	0	-	In real time	" B6-73" on page 461
B6-74	0xB64A	Write gain 19	0.00–100.00	0	-	In real time	" B6-74" on page 461
B6-75	0xB64B	Read gain 19	0.00–100.00	0	-	In real time	" B6-75" on page 461

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
B6-76	0xB64C	Source address 20	0 to value of 0xFFFF	0	-	In real time	" B6-76" on page 462
B6-77	0xB64D	Mapping address 20	0 to value of 0xFFFF	0	-	In real time	" B6-77" on page 462
B6-78	0xB64E	Write gain 20	0.00–100.00	0	-	In real time	" B6-78" on page 462
B6-79	0xB64F	Read gain 20	0.00–100.00	0	-	In real time	" B6-79" on page 463
B6-80	0xB650	Source address 21	0 to value of 0xFFFF	0	-	In real time	" B6-80" on page 463
B6-81	0xB651	Mapping address 21	0 to value of 0xFFFF	0	-	In real time	" B6-81" on page 463
B6-82	0xB652	Write gain 21	0.00–100.00	0	-	In real time	" B6-82" on page 463
B6-83	0xB653	Read gain 21	0.00–100.00	0	-	In real time	" B6-83" on page 464
B6-84	0xB654	Source address 22	0 to value of 0xFFFF	0	-	In real time	" B6-84" on page 464
B6-85	0xB655	Mapping address 22	0 to value of 0xFFFF	0	-	In real time	" B6-85" on page 464
B6-86	0xB656	Write gain 22	0.00–100.00	0	-	In real time	" B6-86" on page 464
B6-87	0xB657	Read gain 22	0.00–100.00	0	-	In real time	" B6-87" on page 465
B6-88	0xB658	Source address 23	0 to value of 0xFFFF	0	-	In real time	" B6-88" on page 465
B6-89	0xB659	Mapping address 23	0 to value of 0xFFFF	0	-	In real time	" B6-89" on page 465
B6-90	0xB65A	Write gain 23	0.00–100.00	0	-	In real time	" B6-90" on page 466
B6-91	0xB65B	Read gain 23	0.00–100.00	0	-	In real time	" B6-91" on page 466
B6-92	0xB65C	Source address 24	0 to value of 0xFFFF	0	-	In real time	" B6-92" on page 466
B6-93	0xB65D	Mapping address 24	0 to value of 0xFFFF	0	-	In real time	" B6-93" on page 466
B6-94	0xB65E	Write gain 24	0.00–100.00	0	-	In real time	" B6-94" on page 467
B6-95	0xB65F	Read gain 24	0.00–100.00	0	-	In real time	" B6-95" on page 467
B6-96	0xB660	Source address 25	0 to value of 0xFFFF	0	-	In real time	" B6-96" on page 467
B6-97	0xB661	Mapping address 25	0 to value of 0xFFFF	0	-	In real time	" B6-97" on page 467

Parameter	Address	Name	Value Range	Default	Unit	Change Method	Page
B6-98	0xB662	Write gain 25	0.00–100.00	0	-	In real time	*" B6-98" on page 468*
B6-99	0xB663	Read gain 25	0.00–100.00	0	-	In real time	*" B6-99" on page 468*

1.2 List of Monitoring Parameters

Table 1–1 Monitoring parameters

Parameter	Name	Basic Unit	Communication Address
Group U0: basic monitoring parameters			
U0-00	Running frequency (Hz)	0.01 Hz	0x7000
U0-01	Frequency reference (Hz)	0.01 Hz	0x7001
U0-02	Bus voltage (V)	0.1 V	0x7002
U0-03	Output voltage (V)	1 V	0x7003
U0-04	Output current (A)	0.1 A	0x7004
U0-05	Output power (kW)	0.1 kW	0x7005
U0-06	Output torque (%)	0.1%	0x7006
U0-07	DI state	1	0x7007
U0-08	DO state	1	0x7008
U0-09	AI1 voltage (V)	0.01 V	0x7009
U0-10	AI2 voltage (V)	0.01 V	0x700A
U0-11	AI3 voltage (V)	0.01 V	0x700B
U0-12	Count value	1	0x700C
U0-13	Length value	1	0x700D
U0-14	Load speed display	1	0x700E
U0-15	PID reference	1	0x700F
U0-16	PID feedback	1	0x7010
U0-17	PLC stage	1	0x7011
U0-18	Pulse input reference (kHz)	0.01 kHz	0x7012
U0-19	Feedback speed (Hz)	0.01 Hz	0x7013
U0-20	Remaining running time	0.1 min	0x7014
U0-21	AI1 voltage before correction	0.001 V	0x7015
U0-22	AI2 voltage (V)/current (mA) before correction	0.001 V	0x7016
U0-23	AI3 voltage before correction	0.001 V	0x7017
U0-24	Linear speed	1 m/min	0x7018
U0-25	Current power-on time	1 min	0x7019
U0-26	Current running time	0.1 min	0x701A

Parameter	Name	Basic Unit	Communication Address
U0-27	Pulse input reference (Hz)	1Hz	0x701B
U0-28	Communication	0.01%	0x701C
U0-29	Encoder feedback speed (Hz)	0.01 Hz	0x701D
U0-30	Display of main frequency X	0.01 Hz	0x701E
U0-31	Display of auxiliary frequency Y	0.01 Hz	0x701F
U0-32	Any memory address	1	0x7020
U0-33	Synchronous motor rotor position	0.1°	0x7021
U0-34	Motor temperature	1°C	0x7022
U0-35	Target torque (%)	0.1%	0x7023
U0-36	Resolver position	1	0x7024
U0-37	Power factor angle	0.1°	0x7025
U0-38	ABZ position	1	0x7026
U0-39	Target voltage upon V/f separation	1 V	0x7027
U0-40	Output voltage upon V/f separation	1 V	0x7028
U0-41	DI state display	1	0x7029
U0-42	DO state display	1	0x702A
U0-43	DI function state display 1 (function 01 to 40)	1	0x702B
U0-44	DI function state display 2 (functions 41 to 80)	1	0x702C
U0-45	Fault information	1	0x702D
U0-46	Inverter unit temperature	1°C	0x702E
U0-47	PTC channel voltage before correction	0.001 V	0x702F
U0-48	PTC channel voltage after correction	0.001 V	0x7030
U0-49	Number of offset pulses of position lock	1	0x7031
U0-50	Roll diameter	1 mm	0x7032
U0-51	Tension (after taper setting)	1 N	0x7033
U0-58	Z signal counting	1	0x7034
U0-59	Frequency reference (%)	0.01%	0x7035
U0-60	Running frequency (%)	0.01%	0x7036
U0-61	AC drive state	1	0x7037
U0-62	Current fault code	1	0x7038
U0-63	Running frequency (after droop)	0.01 Hz	0x7039
U0-64	Back EMF	0.1 V	0x703A
U0-65	Stator resistance auto-tuning upon startup	1	0x703B
U0-66	Communication extension card model	1	0x703C
U0-67	Software version of the communication extension card	1	0x703D
U0-68	AC drive state on the communication extension card	1	0x703E
U0-69	Frequency transmitted to the communication extension card/0.01 Hz	1	0x703F

Parameter	Name	Basic Unit	Communication Address
U0-70	Speed transmitted to the communication extension card/RPM	1 RPM	0x7040
U0-71	Current specific to communication extension card (A)	1	0x7041
U0-72	Communication card error state	1	0x7042
U0-73	Target torque before filter	0.1	0x7043
U0-74	Target torque after filter	0.1	0x7044
U0-75	Torque reference after acceleration/ deceleration	0.1	0x7045
U0-76	Torque upper limit in the motoring state	0.1	0x7046
U0-77	Torque upper limit in the generating state	0.01	0x7047
U0-80	EtherCAT slave name	1	0x7048
U0-81	EtherCAT slave alias	1	0x7049
U0-82	EtherCAT ESM transmission fault code	1	0x704A
U0-83	EtherCAT XML file version	0.01	0x704B
U0-84	Times of EtherCAT synchronization loss	1	0x704C
U0-85	Maximum error value and invalid frames of EtherCAT port 0 per unit time	1	0x704D
U0-86	Maximum error value and invalid frames of EtherCAT port 1 per unit time	1	0x7050
U0-87	Maximum forwarding error of the EtherCAT port per unit time	1	0x7051
U0-88	Maximum error of the EtherCAT data frame processing unit per unit time	1	0x7058
U0-89	Maximum link loss of the EtherCAT port per unit time	1	0x7059
U0-96	No-load current of asynchronous motor vector online observation	0.1	0x7060
U0-97	Mutual inductive reactance of asynchronous motor vector online observation	0.1	0x7061
Group U1: tension control monitoring parameters			
U1-00	Linear speed	0.1 m/min	0x7100
U1-01	Current roll diameter	0.1 mm	0x7101
U1-02	Linear speed synchronous frequency	0.01 Hz	0x7102
U1-03	PID output frequency	0.01 Hz	0x7103
U1-04	Current tension reference	1 N	0x7104
U1-05	Tension reference after taper	1 N	0x7105
U1-06	Open-loop torque	0.1%	0x7106
U1-07	PID output torque	0.1%	0x7107
U1-08	Tension control mode	1	0x7108
U1-09	PID reference	0.1%	0x7109
U1-10	PID feedback	0.1%	0x710A
U1-11	Tension PID proportional gain	1	0x710B

Parameter	Name	Basic Unit	Communication Address
U1-12	Tension PID integral time Ti	1s	0x710C
U1-13	Tension PID differential time Td	1s	0x710D
U1-14	Tension time	1s	0x710E
U1-15	Winding/Unwinding mode	1	0x710F

2 Parameter Groups

2.1 F0 Basic Parameter Group

F0-00 **G/P type display**

Address:	0xF000		
Min.:	1	Unit:	-
Max.:	2	Data type:	UInt16
Default:	1	Change:	At stop

Value Range:

1: G type (constant-torque load)

2: P type (fan and pump)

Description

1: G type (constant-torque load)

The G type models typically carry constant-torque loads with large overload capacity. The overload capacity is 150% in general. Such loads include conveyor belts and cranes, for example.

2: P type (fan and pump)

The P type models typically carry variable-torque loads such as fan and water pump.

F0-01 **Motor 1 control mode**

Address:	0xF001		
Min.:	0	Unit:	-
Max.:	5	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Sensorless vector control (SVC)

1: Feedback vector control (FVC)

2: V/f control

3: Reserved

4: Reserved

5: Speed open loop control for the synchronous motor (PMVVC)

Description

0: Sensorless vector control (SVC)

It is a type of open-loop vector control applicable to high-performance control applications, where one AC drive can drive only one motor. It is used for loads such as machine tools, centrifuges, wire drawing machines, and injection molding machines.

1: Feedback vector control (FVC)
It is a type of closed-loop vector control. An encoder must be installed at the motor end, and the AC drive must be equipped with a PG card of the same type as the encoder. It is applicable to scenarios requiring high-precision speed control or torque control. One AC drive can drive only one motor. It is used for loads such as high-speed paper machines, cranes, and elevators.
2: V/f control (open loop speed control)
It is applicable to scenarios with low requirements on load control performance, such as fans and pumps. If one AC drive controls multiple motors, only the V/f control mode can be used.
3 and 4: Reserved
5: Speed open loop control for the synchronous motor (PMVVC)
It is suitable for loads with low precision requirements, such as fans and pumps.

F0-02 **Command source selection**

Address:	0xF002		
Min.:	0	Unit:	-
Max.:	2	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:
0: LED operating panel/LCD operating panel/Software
1: Terminal
2: Communication

Description
It is used to determine the input channel of the AC drive control commands, such as run, stop, forward run, reverse run, and jog operation.
0: LED operating panel/LCD operating panel/Software
Control commands are input using the RUN, STOP/RES, and MF.K keys on the operating panel or using the control panel of the software. This mode is suitable for initial commissioning.
1: Terminal
Control commands are input through the DIs of the AC drive. The DI control commands can be set according to different scenarios, such as start/stop, forward/reverse run, jog, two-wire/three-wire mode, multi-speed, and other functions. It is suitable for most applications.
2: Communication
Control commands are input through remote communication. The AC drive must be equipped with a communication card to communicate with the host controller. It is suitable for remote control or centralized control systems of multiple equipment.

F0-03 **Main frequency source X selection**

Address:	0xF003		
Min.:	0	Unit:	-
Max.:	10	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Digital setting (preset frequency (F0-08) that can be changed by pressing UP/ DOWN, non-retentive upon power failure)
1: Digital setting (preset frequency (F0-08) that can be changed by pressing UP/ DOWN, retentive at power failure)
2: AI1
3: AI2
4: AI3
5: Pulse reference (DI5)
6: Multi-reference
7: Simple PLC
8: PID
9: Communication
10: Reserved

Description

0: Digital setting (non-retentive at power failure)
The initial value of the frequency reference is the value of F0-08 (preset frequency). This value can be changed by using the ▲ and ▼ keys on the operating panel (or UP and DOWN of the multi-function input terminal). When the AC drive is powered on again after power failure, the set frequency reverts to the value of F0-08.
1: Digital setting (retentive at power failure)
The initial value of the frequency reference is the value of F0-08 (preset frequency). This value can be changed by using the ▲ and ▼ keys on the operating panel (or UP and DOWN of the multi-function input terminal). When the AC drive is powered on again after power failure, the frequency reference is that before the last power failure. The value set by pressing ▲/▼ or pressing UP/ DOWN is retained.
2: AI1
The frequency reference is input by current or voltage signal through the AI1. The frequency is calculated according to the preset AI curve.
3: AI2
The frequency reference is input by current or voltage signal through the AI2. The frequency is calculated according to the preset AI curve.
4: AI3
The frequency reference is input by current or voltage signal through the AI3. The frequency is calculated according to the preset AI curve.

5: Pulse reference (DI5)
The frequency upper limit is set through the DI5. The frequency is calculated based on the curve of the relationship between the pulse frequency and the setting frequency.
6: Multi-reference
In multi-reference control mode, different combinations of DI terminal states correspond to different frequency references. The four multi-reference terminals can provide 16 state combinations, corresponding to 16 reference values.
7: Simple PLC
Simple PLC is a multi-speed running command that can control the running time and the acceleration and deceleration time. Parameters FC-00 to FC-15 are used to set the values of each frequency. FC-18 to FC-49 are used to set the running time and the acceleration and deceleration time of each frequency. Up to 16 speeds can be set.
8: PID
PID is selected as the main frequency. PID control is a general process control method. PID control is used to form a closed-loop system in which each controlled variable is stabilized at the target level through proportional, integral, and differential calculation of the difference between the feedback signal and the target signal of the controlled variable. Generally, PID output can be used as the frequency reference for on-site closed-loop process control applications, such as closed-loop pressure control and closed-loop tension control.
9: Communication
The main frequency is set through communication. Frequency reference is input through remote communication. The AC drive must be equipped with a communication card to realize communication with the host controller. It is suitable for remote control or centralized control systems of multiple equipment.
10: Reserved

F0-04 Auxiliary frequency source Y selection

Address:	0xF004		
Min.:	0	Unit:	-
Max.:	10	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Digital setting (preset frequency (F0-08) that can be changed by pressing UP/ DOWN, non-retentive upon power failure)
1: Digital setting (preset frequency (F0-08) that can be changed by pressing UP/ DOWN, retentive at power failure)
2: AI1
3: AI2
4: AI3
5: Pulse reference (DI5)
6: Multi-reference
7: Simple PLC
8: PID
9: Communication
10: Reserved

Description

0: Digital setting (non-retentive at power failure)
The initial value of the frequency reference is the value of F0-08 (preset frequency). The value can be changed by using the ▲ and ▼ keys on the operating panel (or UP and DOWN of the multi-function input terminal). When the AC drive is powered on again after power failure, the set frequency reverts to the value of F0-08.
1: Digital setting (retentive at power failure)
The initial value of the frequency reference is the value of F0-08 (preset frequency). This value can be changed by using the ▲ and ▼ keys on the operating panel (or UP and DOWN of the multi-function input terminal). When the AC drive is powered on again after power failure, the frequency reference is that before the last power failure. The value set by pressing ▲/▼ or pressing UP/ DOWN is retained.
2: AI1
The frequency reference is input by current or voltage signal through the AI1. The frequency is calculated according to the preset AI curve.
3: AI2
The frequency reference is input by current or voltage signal through the AI2. The frequency is calculated according to the preset AI curve.
4: AI3
The frequency reference is input by current or voltage signal through the AI3 terminal. The frequency is calculated according to the preset AI curve.
5: Pulse reference (DI5)
The frequency upper limit is set through the DI5. The frequency is calculated based on the curve of the relationship between the pulse frequency and the setting frequency.

6: Multi-reference

In multi-reference control mode, different combinations of DI terminal states correspond to different frequency references. The four multi-reference terminals can provide 16 state combinations, corresponding to 16 reference values.

7: Simple PLC

Simple PLC is a multi-speed running command that can control the running time and the acceleration and deceleration time. Parameters FC-00 to FC-15 are used to set the values of each frequency. FC-18 to FC-49 are used to set the running time and the acceleration and deceleration time of each frequency. Up to 16 speeds can be set.

8: PID

PID is selected as the main frequency. PID control is a general process control method. PID control is used to form a closed-loop system in which each controlled variable is stabilized at the target level through proportional, integral, and differential calculation of the difference between the feedback signal and the target signal of the controlled variable. Generally, PID output can be used as the frequency reference for on-site closed-loop process control applications, such as closed-loop pressure control and closed-loop tension control.

9: Communication

The main frequency is set through communication. Frequency reference is input through remote communication. The AC drive must be equipped with a communication card to communicate with the host controller. It is suitable for remote control or centralized control systems of multiple equipment.

10: Reserved

F0-05 Range selection of auxiliary frequency reference Y upon superposition

Address:	0xF005		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Relative to the maximum frequency

1: Relative to the main frequency X

Description

0: Relative to the maximum frequency

The auxiliary frequency at superposition is equal to the auxiliary frequency source range (F0-06) multiplied by the maximum frequency (F0-10).

1: Relative to the main frequency X

The auxiliary frequency at superposition is equal to the auxiliary frequency source range (F0-06) multiplied by the main frequency X.

F0-06 **Range of auxiliary frequency reference Y upon superposition**

Address:	0xF006		
Min.:	0	Unit:	%
Max.:	150	Data type:	UInt16
Default:	100	Change:	In real time

Value Range:

0% to 150%

Description

F0-07 **Frequency source superposition selection**

Address:	0xF007		
Min.:	0	Unit:	-
Max.:	44	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

Ones (position): Frequency reference selection

0: Main frequency reference X

1: Main and auxiliary operation result (based on tens position)

2: Switchover between the main frequency X and the auxiliary frequency Y

3: Switchover between the main frequency X and the main and auxiliary operation result

4: Switchover between the auxiliary frequency Y and the main and auxiliary operation result

Tens (position): Main and auxiliary operation of the frequency reference

0: Main + Auxiliary

1: Main – Auxiliary

2: Max. (main, auxiliary)

3: Min. (main, auxiliary)

4: Main x Auxiliary

Description

Ones position: Frequency reference selection

0: Main frequency reference X

The running frequency of the AC drive is directly determined by the main frequency reference X.

1: Main and auxiliary operation result (based on the tens place)

The running frequency of the AC drive is the calculation result of the main and auxiliary frequencies, and the calculation method is determined by the tens position of the value of F0-07.

2: Switchover between the main frequency reference X and auxiliary frequency reference Y
The running frequency of the AC drive is selected or switched between the main frequency reference X and the auxiliary frequency reference Y through the DI. In this case, the function of the DI must be set to the frequency source switching function. For example, if the DI2 is used for switchover, set F4-01 to 18.
3: Switchover between the main frequency reference X and the main and auxiliary operation result
The running frequency of the AC drive is selected or switched between the main frequency reference X and the main and auxiliary operation result through the DI.
4: Switchover between the auxiliary frequency reference Y and the main and auxiliary operation result
The running frequency of the AC drive is selected or switched between the auxiliary frequency reference Y and the main and auxiliary operation result through the DI.
Tens (position): Frequency reference main and auxiliary operation
0: Main + Auxiliary
The main and auxiliary operation result is the main frequency X plus the auxiliary frequency Y.
1: Main – Auxiliary
The main and auxiliary operation result is the main frequency X minus the auxiliary frequency Y.
2: Maximum value
The main and auxiliary operation result is the larger value between the main frequency X and the auxiliary frequency Y.
3: Minimum value
The main and auxiliary operation result is the smaller value between the main frequency X and the auxiliary frequency Y.
4: Main x Auxiliary
The main and auxiliary operation result is the main frequency X multiplied by the auxiliary frequency Y.

F0-08 **Preset frequency**

Address:	0xF008		
Min.:	0	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	50	Change:	In real time

Value Range:
0.00 Hz to F0-10
Description
This parameter defines the target frequency.

F0-09 **Running direction**

Address:	0xF009		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Same as the default direction

1: Reverse to the default direction

Description

You can change the rotation direction of the motor by modifying this parameter without changing the motor wiring. Modifying this parameter is equivalent to exchanging any two of the motor's U, V, W wires.

F0-10 **Maximum frequency**

Address:	0xF00A		
Min.:	5	Unit:	Hz
Max.:	599	Data type:	UInt16
Default:	50	Change:	At stop

Value Range:

5.00 Hz to 599.00 Hz

Description

This parameter defines the maximum output frequency of the AC drive.

F0-11 **Source of the frequency upper limit**

Address:	0xF00B		
Min.:	0	Unit:	-
Max.:	6	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: F0-12 (Frequency upper limit)

1: AI1

2: AI2

3: AI3

4: Pulse reference (DI5)

5: Communication

6: Multi-speed reference

Description

0: F0-12 (Frequency upper limit)

The frequency upper limit is set by F0-12.

1: AI1

The frequency upper limit is input by current or voltage signal through the AI1. The frequency is calculated according to the preset AI curve.

2: AI2
The frequency upper limit is input by current or voltage signal through the AI2. The frequency is calculated according to the preset AI curve.
3: AI3
The frequency upper limit is input by current or voltage signal through the AI3. The frequency is calculated according to the preset AI curve.
4: Pulse reference (DI5)
The frequency upper limit is set through the DI5. The frequency is calculated based on the curve of the relationship between the pulse frequency and the maximum frequency.
5: Communication
The frequency upper limit is set through communication.
6: Multi-reference

F0-12 **Frequency upper limit**

Address: 0xF00C

Min.:	F0-14	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	50	Change:	In real time

Value Range:

F0-14 to F0-10

Description

This parameter defines the maximum running frequency allowed for the motor.

F0-13 **Frequency upper limit offset**

Address: 0xF00D

Min.:	0	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00 Hz to F0-10

Description

This parameter defines the offset of the frequency upper limit. It is used to adjust the output frequency upon minimum frequency reference signal when the frequency is set by an external analog signal (voltage or current).

F0-14 **Frequency lower limit**

Address: 0xF00E

Min.:	0	Unit:	Hz
Max.:	F0-12	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00 Hz to F0-12

Description

This parameter defines the minimum running frequency for the motor.

F0-15 **Carrier frequency**

Address:	0xF00F		
Min.:	0.8	Unit:	kHz
Max.:	16	Data type:	UInt16
Default:	6	Change:	In real time

Value Range:

0.8 kHz to 16.0 kHz

Description

The carrier frequency of the AC drive determines the number of times that the power switching device (such as IGBT) of the drive unit is turned on and off, so it is also called the switching frequency. It mainly affects the following aspects:

The power loss of the power module IGBT is related to the carrier frequency. As the carrier frequency increases, the power loss increases and the power module heats up, which is unfavorable to the AC drive.

When the carrier frequency is high, the waveform of the secondary current output by the AC drive is sinusoidal and smooth. In this way, the harmonic is low, but the interference is relatively strong, and the vice versa. When the carrier frequency is too low, the effective torque of the motor decreases, the loss increases, and the temperature increases. On the contrary, when the carrier frequency is too high, the loss of the AC drive itself increases, the IGBT temperature rises, and the change rate dv/dt of the output voltage increases, which has great influence on the insulation of the motor.

F0-16 **Carrier frequency change with temperature**

Address:	0xF010		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	1	Change:	In real time

Value Range:

0: No

1: Yes

Description

This parameter defines whether the carrier frequency changes with the temperature.

F0-17 **Acceleration time 1**

Address: 0xF011

Min.: 0 | Unit: s
Max.: 6500 | Data type: UInt16
Default: 20 | Change: In real time

Value Range:

0.0s to 6500.0s

Description

The acceleration time indicates the time required for the output frequency to rise from 0 to F0-25 (acceleration/deceleration base frequency). It is usually determined by the rise of the frequency reference signal. The frequency reference rise rate must be limited to prevent overcurrent during acceleration of the motor. The acceleration time must be set to ensure that the acceleration current is below the overcurrent capacity of the AC drive to avoid that the AC drive trips due to overcurrent stall.

F0-18 **Deceleration time 1**

Address: 0xF012
Min.: 0 | Unit: s
Max.: 6500 | Data type: UInt16
Default: 20 | Change: In real time

Value Range:

0.0s to 6500.0s

Description

The deceleration time indicates the time required for the output frequency to decrease from F0-25 (acceleration/deceleration base frequency) to 0. The deceleration time is usually determined by the fall of the frequency reference signal. The frequency reference drop rate must be limited to prevent overvoltage during deceleration of the motor.

The deceleration time must be set to ensure that the smoothing circuit voltage will not be excessive to avoid that the AC drive trips due to overvoltage stall.

F0-19 **Acceleration/Deceleration time unit**

Address: 0xF013
Min.: 0 | Unit: -
Max.: 2 | Data type: UInt16
Default: 1 | Change: At stop

Value Range:

0: 1s

1: 0.1s

2: 0.01s

Description

This parameter defines the acceleration/deceleration time unit.

F0-21 **Frequency offset of auxiliary frequency source upon superposition**

Address:	0xF015		
Min.:	0	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00 Hz to F0-10

Description

This parameter defines the offset of the auxiliary frequency during superposition. It is used to adjust the auxiliary frequency upon minimum frequency reference signal when the frequency is set by an external analog signal (voltage or current).

F0-22 **Frequency reference resolution**

Address:	0xF016		
Min.:	1	Unit:	-
Max.:	2	Data type:	UInt16
Default:	2	Change:	At stop

Value Range:

1: 0.1 Hz

2: 0.01 Hz

Description

This parameter defines the decimal places of the frequency reference.

F0-23 **Retention of digital setting of frequency upon stop**

Address:	0xF017		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Non-retentive

1: Retentive

Description

0: Non-retentive

F0-08 (preset frequency) is set through the operating panel and the frequency is modified by using the ▲ and ▼ keys or UP and DOWN of terminals. When the AC drive stops, the modification will be cleared.

1: Retentive

F0-08 (preset frequency) is set through the operating panel and the frequency is modified by using the ▲ and ▼ keys or UP and DOWN of terminals. When the AC drive stops, the modification will be retained.

F0-25 Acceleration/Deceleration time base frequency

Address:	0xF019		
Min.:	0	Unit:	-
Max.:	2	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Maximum frequency (F0-10)

1: Frequency reference

2: 100 Hz

Description

This parameter defines the target frequency during acceleration and the start frequency during deceleration.

F0-26 Base frequency for UP/DOWN modification during running

Address:	0xF01A		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Running frequency

1: Frequency reference

Description

This parameter defines the base frequency from which the target frequency is adjusted by using the UP/DOWN key of the operating panel during operation.

If it is set to 0 and the running frequency is 25 Hz, the target frequency will change from 25 Hz at a certain rate when the UP key is pressed.

If it is set to 1, the target frequency will change from the original target frequency when the UP key is pressed.

F0-27 Main frequency coefficient

Address:	0xF01B		
Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	10	Change:	In real time

Value Range:

0.00% to 100.00%

Description

This parameter defines the main frequency reference coefficient when the frequency superposition mode is Main x Auxiliary. The value 100.00% corresponds to the target main frequency reference.

F0-28 **Auxiliary frequency coefficient**

Address: 0xF01C

Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	10	Change:	In real time

Value Range:

0.00% to 100.00%

Description

This parameter defines the auxiliary frequency reference coefficient when the frequency superposition mode is Main x Auxiliary. The value 100.00% corresponds to the target auxiliary frequency reference.

2.2 F1 Parameters of Motor 1

F1-00 **Motor type selection**

Address: 0xF100

Min.:	0	Unit:	-
Max.:	2	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Common asynchronous motor

1: Variable frequency asynchronous motor

2: Synchronous motor

Description

A variable frequency motor can adjust its frequency and speed according to the load. Where the voltage is low, it can reduce the frequency and start reliably. Where the load is light, it can reduce the frequency, speed, and current to save electric energy.

A common asynchronous motor is suitable for applications with normal voltage but often full load. It is designed based on constant frequency and constant voltage. Therefore, it may not meet all the frequency and speed change requirements.

F1-01 **Rated motor power**

Address: 0xF101

Min.:	0.1	Unit:	kW
Max.:	1000	Data type:	UInt16
Default:	1.5	Change:	At stop

Value Range:

0.1kW to 1000.0kW

Description

This parameter indicates the power of the motor during normal operation. Its value is the motor rated voltage multiplied by the motor rated current. Select a proper motor power on the premise that the motor can meet the requirements of mechanical load. Factors such as motor heating, allowable overload capacity, and starting capacity must be considered.

F1-02 Rated motor voltage

Address: 0xF102

Min.:	1	Unit:	V
Max.:	2000	Data type:	UInt16
Default:	380	Change:	At stop

Value Range:

1 V to 2000 V

Description

The rated motor voltage indicates the voltage of the motor during normal operation, which usually refers to the line voltage.

F1-03 Rated motor current

Address: 0xF103

Min.:	0.1	Unit:	A
Max.:	6553.5	Data type:	UInt16
Default:	9	Change:	At stop

Value Range:

0.1–6553.5 A

Description

The rated motor current indicates the current of the motor during normal operation, which usually refers to the line current.

F1-04 Rated motor frequency

Address: 0xF104

Min.:	0.01	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	50	Change:	At stop

Value Range:

0.01 Hz to F0-10

Description

The rated motor frequency indicates the frequency of the power supply connected to the stator winding under the rated operation state of the motor.

F1-05 Rated motor speed

Address:	0xF105		
Min.:	1	Unit:	RPM
Max.:	65535	Data type:	UInt16
Default:	1460	Change:	At stop

Value Range:

1 RPM to 65535 RPM

Description

This is the speed of the rotor in RPM when the motor is running in rated conditions.

F1-06 Asynchronous/Synchronous motor stator resistance

Address:	0xF106		
Min.:	0.001	Unit:	Ω
Max.:	65.535	Data type:	UInt16
Default:	1.204	Change:	At stop

Value Range:

0.001 Ω to 65.535 Ω

Description

This parameter indicates the DC resistance of stator winding of asynchronous motor, which can be obtained by motor auto-tuning.

F1-07 Asynchronous motor rotor resistance

Address:	0xF107		
Min.:	0.001	Unit:	Ω
Max.:	65.535	Data type:	UInt16
Default:	0.908	Change:	At stop

Value Range:

0.001 Ω to 65.535 Ω

Description

This parameter defines the DC resistance of rotor winding of the asynchronous motor, which can be obtained by static auto-tuning or dynamic auto-tuning of the motor.

F1-08 Leakage inductive reactance of the asynchronous motor

Address:	0xF108		
Min.:	0.01	Unit:	mH
Max.:	655.35	Data type:	UInt16
Default:	5.28	Change:	At stop

Value Range:

0.01 mH to 655.35 mH

Description

The leakage inductive reactance of the asynchronous motor is caused by the leakage flux of motor winding. In the winding of the motor, when current is introduced, magnetic flux will be generated. The magnetic flux can be divided into two parts based on the path: main flux and leakage flux. The leakage flux can be described by an inductance, namely, leakage inductance. This parameter can be obtained by static auto-tuning or dynamic auto-tuning of the motor.

F1-09 Mutual inductive reactance of the asynchronous motor

Address: 0xF109

Min.:	0.1	Unit:	mH
Max.:	6553.5	Data type:	UInt16
Default:	156.8	Change:	At stop

Value Range:

0.1 mH to 6553.5 mH

Description

When the current in one coil of the motor changes, induced EMF is generated in the coil adjacent to it. This mutually induced EMF can be expressed by mutual inductance.

The mutual inductance of a motor can be roughly divided into two types. One is the interphase inductance of the stator, which is the reactance between two phases of the stator. The other is the inductance between the stator and the rotor. The former does not change with the rotation of the rotor, while the latter changes accordingly with the rotation of the rotor.

Both types of mutual inductance can be obtained through static or dynamic motor auto-tuning.

F1-10 Asynchronous motor no-load current

Address: 0xF10A

Min.:	0.1	Unit:	A
Max.:	F1-03	Data type:	UInt16
Default:	4.2	Change:	At stop

Value Range:

0.1 A to F1-03 (Rated motor current)

Description

This parameter defines the current passing through the three-phase winding of the stator when the motor is running without load. It can be obtained by dynamic auto-tuning of the motor.

F1-11 Asynchronous motor core saturation coefficient 1

Address: 0xF10B

Min.:	50	Unit:	%
Max.:	100	Data type:	UInt16
Default:	86	Change:	In real time

Value Range:

50.0% to 100.0%

Description

Asynchronous motor core saturation coefficient 1

F1-12 Asynchronous motor core saturation coefficient 2

Address: 0xF10C

Min.:	100	Unit:	%
Max.:	150	Data type:	UInt16
Default:	130	Change:	In real time

Value Range:

100.0% to 150.0%

Description

Asynchronous motor core saturation coefficient 2

F1-13 Asynchronous motor core saturation coefficient 3

Address: 0xF10D

Min.:	100	Unit:	%
Max.:	170	Data type:	UInt16
Default:	140	Change:	In real time

Value Range:

100.0% to 170.0%

Description

Asynchronous motor core saturation coefficient 3

F1-14 Asynchronous motor core saturation coefficient 4

Address: 0xF10E

Min.:	100	Unit:	%
Max.:	180	Data type:	UInt16
Default:	150	Change:	In real time

Value Range:

100.0% to 180.0%

Description

Asynchronous motor core saturation coefficient 4

F1-17 Synchronous motor axis D inductance

Address: 0xF111

Min.:	0.01	Unit:	mH

Max.:	655.35	Data type:	UInt16
Default:	15.86	Change:	At stop

Value Range:

0.01 mH to 655.35 mH

Description

This parameter defines the inductance of the main pole axis (longitudinal axis) of the synchronous motor.

F1-18 Synchronous motor axis Q inductance

Address: 0xF112

Min.:	0.01	Unit:	mH
Max.:	655.35	Data type:	UInt16
Default:	15.86	Change:	At stop

Value Range:

0.01 mH to 655.35 mH

Description

This parameter defines the inductance of the center line (quadrature axis) between the adjacent pole axes of the synchronous motor rotor.

F1-19 Synchronous motor back EMF coefficient

Address: 0xF113

Min.:	0	Unit:	V
Max.:	6553.5	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0.0 V to 6553.5V

Description

Used to set the RMS value of the motor back EMF at the rated frequency (F1-04).

F1-20 Filter time constant (PMVVC)

Address: 0xF114

Min.:	0.003	Unit:	-
Max.:	65.535	Data type:	UInt16
Default:	0.1	Change:	In real time

Value Range:

0.003 to 65.535

Description

This parameter specifies the filter time constant in PMVVC mode.

F1-21 Oscillation suppression gain (PMVVC)

Address: 0xF115

Min.: 0 | Unit: -
Max.: 65535 | Data type: UInt16
Default: 100 | Change: In real time

Value Range:
0 to 65535
Description
This parameter specifies oscillation suppression gain in PMVVC mode.

F1-23 Percentage of the frictional moment

Address: 0xF117
Min.: 0 | Unit: %
Max.: 100 | Data type: UInt16
Default: 0 | Change: At stop

Value Range:
0.00% to 100.00%
Description

F1-24 Number of motor pole pairs

Address: 0xF118
Min.: 0 | Unit: -
Max.: 65535 | Data type: UInt16
Default: 2 | Change: In real time

Value Range:
0 to 65535
Description

F1-26 Auto-tuning direction (inertia auto-tuning and synchronous motor auto-tuning)

Address: 0xF11A
Min.: 0 | Unit: -
Max.: 1 | Data type: UInt16
Default: 1 | Change: At stop

Value Range:
0: Reverse run
1: Forward run
Description

F1-27 Encoder pulses per revolution

Address: 0xF11B

Min.:	1	Unit:	-
Max.:	20000	Data type:	UInt16
Default:	1024	Change:	At stop

Value Range:

1 to 20000

Description

This is the number of pulses generated per revolution of the encoder disk. In feedback vector control (FVC) mode, an improper number of pulses may cause malfunction of the motor. Therefore, set a proper encoder pulses.

F1-28 Encoder type

Address: 0xF11C

Min.:	0	Unit:	-
Max.:	5	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: ABZ incremental encoder

1: 23-bit encoder

2: Resolver

Description

Encoders are classified into incremental encoders and absolute encoders.
An incremental encoder converts displacement into periodic electrical signals, and then converts the electrical signals into pulses that are counted. The number of pulses describes the magnitude of the displacement.

Each position of an absolute encoder corresponds to a certain digital code. Therefore, its indication is related only to the start and end positions of the measurement.

F1-29 PG signal filter

Address: 0xF11D

Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	1	Change:	At stop

Value Range:

0: Non-adaptive filter

1: Adaptive filter

2: Fixed interlock

3: Automatic interlock

Description

F1-30 **Encoder wiring flag**

Address:	0xF11E		
Min.:	0	Unit:	-
Max.:	11	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

Ones (position): AB signal direction or rotational direction

0: Forward

1: Reverse

Tens (position): Reserved

Description

F1-31 **Encoder zero position angle**

Address:	0xF11F		
Min.:	0	Unit:	°
Max.:	359.9	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0.0° to 359.9°

Description

F1-32 **Motor gear ratio numerator**

Address:	0xF120		
Min.:	1	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	1	Change:	At stop

Value Range:

1 to 65535

Description

F1-33 **Motor gear ratio denominator**

Address:	0xF121		
Min.:	1	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	1	Change:	At stop

Value Range:
1 to 65535
Description

F1-34 **Number of pole pairs of resolver**

Address:	0xF122		
Min.:	1	Unit:	-
Max.:	32	Data type:	UInt16
Default:	1	Change:	At stop

Value Range:
1 to 32
Description
A resolver is an electromagnetic transducer, also known as a synchronous resolver. It is a small AC motor used to measure angles. Consisting of stators and rotors, it is used to measure the shaft angular displacement and angular velocity of a revolving object.
This parameter indicates the number of pole pairs of a resolver. A larger number of pole pairs indicates higher accuracy.

F1-36 **PG open circuit detection**

Address:	0xF124		
Min.:	0	Unit:	-
Max.:	11	Data type:	UInt16
Default:	1	Change:	At stop

Value Range:
0 to 11
Description
Used to enable or disable the PG open circuit detection.

F1-37 **Auto-tuning selection**

Address:	0xF125		
Min.:	0	Unit:	-
Max.:	14	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: No auto-tuning
1: Static auto-tuning on partial parameters of the asynchronous motor
2: Dynamic auto-tuning on all parameters of the asynchronous motor
3: With-load auto-tuning on all parameters of the asynchronous motor
4: Asynchronous motor inertia auto-tuning (only in FVC mode)
11: Static auto-tuning on partial parameters of the synchronous motor (excluding back EMF)
12: No-load dynamic auto-tuning on all parameters of the synchronous motor
13: Static auto-tuning on all parameters of the synchronous motor (excluding the encoder installation angle)
14: Synchronous motor inertia auto-tuning (only in FVC mode)

Description

0: No auto-tuning
Auto-tuning is not performed.

1: Static auto-tuning on partial parameters of the asynchronous motor
This mode applies to scenarios where motors cannot be disconnected from the load and dynamic auto-tuning is not allowed.
Auto-tuning is performed on partial motor parameters including F1-06 (Asynchronous motor stator resistance), F1-07 (Asynchronous motor rotor resistance), and F1-08 (asynchronous motor leakage inductance).

2: Dynamic auto-tuning on all parameters of the asynchronous motor
This mode applies to scenarios where the motor can be disconnected from the load.
Auto-tuning is performed on all the motor parameters, including F1-06 (Asynchronous motor stator resistance), F1-07 (Asynchronous motor rotor resistance), F1-08 (Asynchronous motor leakage inductance), F1-09 (Asynchronous motor mutual inductance), and F1-10 (Asynchronous motor no-load current).

3: With-load auto-tuning on all parameters of asynchronous motor
This mode applies to scenarios where motors cannot be disconnected from the load and dynamic auto-tuning on all parameters is not allowed.
Auto-tuning is performed on all the motor parameters, including F1-06 (Asynchronous motor stator resistance), F1-07 (Asynchronous motor rotor resistance), F1-08 (Asynchronous motor leakage inductance), F1-09 (Asynchronous motor mutual inductance), F1-10 (Asynchronous motor no-load current),
and F1-30 (Encoder phase sequence).

4: Asynchronous motor inertia auto-tuning (only in FVC mode)
11: Static auto-tuning on partial parameters of the synchronous motor (excluding back EMF)
12: No-load dynamic auto-tuning on all parameters of the synchronous motor
13: Static auto-tuning on all parameters of the synchronous motor (excluding the encoder installation angle)
14: Synchronous motor inertia auto-tuning (only in FVC mode)

2.3 F2 Vector Control Parameters of Motor 1

F2-00 Low-speed speed loop Kp

Address: 0xF200

Min.:	1	Unit:	-
Max.:	200	Data type:	UInt16
Default:	30	Change:	In real time

Value Range:

1 to 200

Description

This parameter indicates the speed loop PID control parameter Kp, which affects the response to the motor speed. A larger Kp value indicates higher sensitivity and more intensive tuning. A smaller Kp value indicates lower sensitivity and less intensive tuning. The low-speed speed loop Kp is effective at low speed.

F2-01 Low-speed speed loop Ti

Address: 0xF201

Min.:	0.001	Unit:	s
Max.:	10	Data type:	UInt16
Default:	0.5	Change:	In real time

Value Range:

0.001s to 10.000s

Description

The reciprocal of the speed loop integral time constant is the integral gain. The speed loop integral time constant affects the steady-state speed error of the motor and the stability of the speed loop system. If the speed loop integral time constant increases, the speed loop response slows down. At this time, the proportional gain of the speed loop needs to be increased to fasten the speed loop response. The low speed loop Ti is used at low speed.

F2-02 Switchover frequency 1

Address: 0xF202

Min.:	0	Unit:	Hz
Max.:	F2-05	Data type:	UInt16
Default:	5	Change:	In real time

Value Range:

0.00 Hz to F2-05

Description

The speed loop PI parameters are divided into two groups: low speed and high speed. If the running frequency is lower than switchover frequency 1 (F2-02), the speed loop PI parameters are adjusted by F2-00 and F2-01. If the running frequency is higher than switchover frequency 2 (F2-05), the speed loop PI parameters are adjusted by F2-03 and F3-04. If the running frequency is between switchover frequency 1 and switchover frequency 2, the speed loop PI parameters switch linearly between the two groups of PI parameters. The parameter value must be lower than F2-05 (Switching frequency 2).

F2-03 High-speed speed loop Kp

Address:	0xF203		
Min.:	1	Unit:	-
Max.:	200	Data type:	UInt16
Default:	20	Change:	In real time

Value Range:

1 to 200

Description

This parameter indicates the speed loop PID control parameter Kp, which affects the response to the motor speed. A larger Kp value indicates higher sensitivity and more intensive tuning. A smaller Kp value indicates lower sensitivity and less intensive tuning. The high-speed speed loop Kp is effective at high speed.

F2-04 High-speed speed loop Ti

Address:	0xF204		
Min.:	0.001	Unit:	s
Max.:	10	Data type:	UInt16
Default:	1	Change:	In real time

Value Range:

0.001s to 10.000s

Description

The reciprocal of the speed loop integral time constant is the integral gain. The speed loop integral time constant affects the steady-state speed error of the motor and the stability of the speed loop system. If the speed loop integral time constant increases, the speed loop response slows down. At this time, the proportional gain of the speed loop needs to be increased to fasten the speed loop response. The high speed loop Ti is used at high speed.

F2-05 **Switchover frequency 2**

Address:	0xF205		
Min.:	F2-02	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	10	Change:	In real time

Value Range:

F2-02 to F0-10

Description

The speed loop PI parameters are divided into two groups: low speed and high speed. When the running frequency is lower than F2-02 (Switchover frequency 1), the speed loop PI is adjusted by F2-00 and F2-01. If the running frequency is higher than switchover frequency 2 (F2-05), the speed loop PI parameters are adjusted by F2-03 and F2-04. If the running frequency is between switchover frequency 1 and switchover frequency 2, the speed loop PI parameters switch linearly between the two groups of PI parameters. This parameter must be set to a value lower than switchover frequency 2 (F2-05).

F2-06 **VC slip compensation gain**

Address:	0xF206		
Min.:	50	Unit:	%
Max.:	200	Data type:	UInt16
Default:	100	Change:	In real time

Value Range:

50% to 200%

Description

In SVC control mode, this parameter is used to adjust the speed stability accuracy of the motor. For example, when the running frequency of the motor is lower than the output frequency of the AC drive, you can increase the value of this parameter.

In FVC mode, this parameter can be used to adjust output current of the AC drive. For example, decrease this parameter gradually when a high-power AC drive is used to control a motor with low load capacity. Generally, you do not need to change the value of this parameter.

F2-07 **Speed feedback filter time**

Address:	0xF207		
Min.:	0	Unit:	s
Max.:	0.1	Data type:	UInt16
Default:	0.004	Change:	In real time

Value Range:

0.000s to 0.1s

Description

In FVC mode (F0-01 set to 1), the speed loop feedback filter time is effective. Adjusting the parameter can improve the motor stability. A larger value indicates better motor stability but slower dynamic response, and a smaller value indicates faster dynamic response. A small value of this parameter will result in motor oscillation. Generally, the motor stability can meet requirements, and you do not need to modify this parameter.

F2-08 VC deceleration over-excitation gain

Address:	0xF208		
Min.:	0	Unit:	-
Max.:	200	Data type:	UInt16
Default:	64	Change:	In real time

Value Range:

0 to 200

Description

F2-09 Torque upper limit source in speed control (motoring)

Address:	0xF209		
Min.:	0	Unit:	-
Max.:	7	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Digital setting (F2-10)

1: AI1

2: AI2

3: AI3

4: Pulse reference (DI5)

5: Communication setting

6: Min. (AI1, AI2)

7: Max. (AI1, AI2)

Description

0: Digital setting (F2-10)

The torque upper limit in speed control mode is set by F2-10 (digital setting of torque upper limit in speed control).

1: AI1

The torque upper limit is input by current or voltage signal through the AI1. The torque is calculated according to the preset AI curve.

2: AI2

The torque upper limit is input by current or voltage signal through the AI2. The torque is calculated according to the preset AI curve.

3: AI3
The torque upper limit is input by current or voltage signal through the AI3. The torque is calculated according to the preset AI curve.
4: Pulse reference (DI5)
The torque upper limit in speed control mode is set through the DI5. The torque is calculated based on the curve of the relationship between the pulse frequency and running frequency.
5: Communication setting
The main frequency is set through communication. The running frequency is input through remote communication. The AC drive must be equipped with a communication card to communicate with the host controller. This mode applies to remote control or centralized control systems of multiple equipment.
6: MIN (AI1, AI2)
The torque upper limit in speed control mode is the smaller value between AI1 and AI2 inputs.
7: MAX (AI1, AI2)
The torque upper limit in speed control mode is the larger value between AI1 and AI2 inputs.

F2-10 **Setting of torque upper limit in speed control (motoring)**

Address: 0xF20A

Min.:	0	Unit:	%
Max.:	200	Data type:	UInt16
Default:	150	Change:	In real time

Value Range:

0.0% to 200.0%

Description

The torque upper limit under motoring state takes the rated current of the AC drive as the base value.

F2-11 **Torque upper limit source in speed control (generating)**

Address: 0xF20B

Min.:	0	Unit:	-
Max.:	8	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Digital setting (F2-10)
1: AI1
2: AI2
3: AI3
4: Pulse reference (DI5)
5: Communication
6: Min. (AI1, AI2)
7: Max. (AI1, AI2)
8: Digital setting (F2-12)

Description

0: Digital setting (F2-10)
The torque upper limit in speed control mode is set by F2-10 (digital setting of torque upper limit in speed control).
1: AI1
The torque upper limit is input by current or voltage signal through the AI1. The frequency is calculated according to the preset AI curve.
2: AI2
The torque upper limit is input by current or voltage signal through the AI2. The frequency is calculated according to the preset AI curve.
3: AI3
The torque upper limit is input by current or voltage signal through the AI3. The frequency is calculated according to the preset AI curve.
4: Pulse reference (DI5)
The torque upper limit in speed control mode is set through the DI5. The frequency is calculated based on the curve of the relationship between the pulse frequency and running frequency.
5: Communication
The main frequency is set through communication. The running frequency is input through remote communication. The AC drive must be equipped with a communication card to communicate with the host controller. This mode applies to remote control or centralized control systems of multiple equipment.
6: Min. (AI1, AI2)
The torque upper limit in speed control mode is the smaller value between AI1 and AI2 inputs.
7: Max. (AI1, AI2)
The torque upper limit in speed control mode is the larger value between AI1 and AI2 inputs.
8: Digital setting (F2-12)
The torque upper limit in speed control mode is set by F2-12 (torque upper limit reference in speed control (generating)).

F2-12 Setting of torque upper limit in speed control (generating)

Address:	0xF20C		
Min.:	0	Unit:	%
Max.:	200	Data type:	UInt16
Default:	150	Change:	In real time

Value Range:

0.0% to 200.0%

Description

The torque upper limit under generating state takes the rated current of the AC drive as the base value.

F2-13 Low-speed current loop Kp adjustment

Address:	0xF20D		
Min.:	0.1	Unit:	-
Max.:	10	Data type:	UInt16
Default:	1	Change:	In real time

Value Range:

0.1–10.0

Description

F2-14 Low-speed current loop Ki adjustment

Address:	0xF20E		
Min.:	0.1	Unit:	-
Max.:	10	Data type:	UInt16
Default:	1	Change:	In real time

Value Range:

0.1–10.0

Description

F2-15 High-speed current loop Kp adjustment

Address:	0xF20F		
Min.:	0.1	Unit:	-
Max.:	10	Data type:	UInt16
Default:	1	Change:	In real time

Value Range:

0.1–10.0

Description

F2-16 **High-speed current loop Ki adjustment**

Address:	0xF210		
Min.:	0.1	Unit:	-
Max.:	10	Data type:	UInt16
Default:	1	Change:	In real time

Value Range:

0.1–10.0

Description

F2-17 **Speed loop Kp upon zero speed lock**

Address:	0xF211		
Min.:	1	Unit:	-
Max.:	100	Data type:	UInt16
Default:	30	Change:	In real time

Value Range:

1 to 100

Description

F2-18 **Speed loop Ti upon zero speed lock**

Address:	0xF212		
Min.:	0.001	Unit:	s
Max.:	10	Data type:	UInt16
Default:	0.5	Change:	In real time

Value Range:

0.001s to 10.000s

Description

F2-19 **Inertia compensation gain**

Address:	0xF213		
Min.:	1	Unit:	-
Max.:	200	Data type:	UInt16
Default:	1	Change:	In real time

Value Range:

1 to 200

Description

F2-20 **Speed loop switchover frequency upon zero speed lock**

Address: 0xF214

Min.:	0	Unit:	Hz
Max.:	F2-02	Data type:	UInt16
Default:	0.05	Change:	In real time

Value Range:

0.00 Hz to F2-02

Description

F2-21 Maximum output voltage coefficient

Address: 0xF215

Min.:	100	Unit:	-
Max.:	110	Data type:	UInt16
Default:	100	Change:	In real time

Value Range:

100–110

Description

This parameter defines the boost capacity of the maximum output voltage of the AC drive.

Increasing F2-21 will improve the maximum loading capacity in motor field weakening area. However, this will increase motor current ripples and heat the motor. Decreasing F2-21 will lower the maximum loading capacity in motor field weakening area. However, this will reduce motor current ripples and motor heating values. Generally, this parameter needs no modification.

F2-22 Output voltage filter time

Address: 0xF216

Min.:	0	Unit:	s
Max.:	0.01	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.000s to 0.01s

Description

-

F2-23 Zero speed lock

Address: 0xF217

Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Disabled

1: Enabled

Description

-

F2-24 Vector overvoltage suppression Kp

Address:	0xF218		
Min.:	0	Unit:	-
Max.:	1000	Data type:	UInt16
Default:	40	Change:	In real time

Value Range:

0–1000

Description

-

F2-25 Acceleration compensation gain

Address:	0xF219		
Min.:	0	Unit:	-
Max.:	200	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to 200

Description

-

F2-26 Acceleration rate compensation filter time

Address:	0xF21A		
Min.:	0	Unit:	-
Max.:	500	Data type:	UInt16
Default:	10	Change:	In real time

Value Range:

0–500

Description

-

F2-27 Overvoltage suppression in vector control mode

Address:	0xF21B		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	1	Change:	In real time

Value Range:

0: Disabled

1: Enabled

Description

-

F2-28 **Cut-off frequency of torque filter**

Address:	0xF21C		
Min.:	50	Unit:	Hz
Max.:	1000	Data type:	UInt16
Default:	500	Change:	At stop

Value Range:

50 Hz to 1000 Hz

Description

-

F2-29 **Synchronous motor initial angle detection current**

Address:	0xF21D		
Min.:	50	Unit:	-
Max.:	180	Data type:	UInt16
Default:	80	Change:	In real time

Value Range:

50–180

Description

-

F2-30 **Speed loop parameter auto-calculation**

Address:	0xF21E		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Disabled

1: Enabled

Description

-

F2-31 **Expected speed loop bandwidth (high speed)**

Address:	0xF21F		
Min.:	0	Unit:	Hz
Max.:	3	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 Hz to 3 Hz

Description

-

F2-32 **Expected speed loop bandwidth (low speed)**

Address: 0xF220

Min.:	1	Unit:	Hz
Max.:	10000	Data type:	UInt16
Default:	100	Change:	In real time

Value Range:

1 Hz to 10000 Hz

Description

-

F2-33 **Expected speed loop bandwidth (zero speed)**

Address: 0xF221

Min.:	1	Unit:	Hz
Max.:	10000	Data type:	UInt16
Default:	100	Change:	In real time

Value Range:

1 Hz to 10000 Hz

Description

-

F2-34 **Expected speed loop damping ratio (unchanged generally)**

Address: 0xF222

Min.:	0.1	Unit:	-
Max.:	65	Data type:	UInt16
Default:	1	Change:	In real time

Value Range:

0.1 to 65.000

Description

-

F2-35 **System inertia (equivalent to the start time)**

Address: 0xF223

Min.:	0.001	Unit:	s
Max.:	50	Data type:	UInt16
Default:	0.1	Change:	At stop

Value Range:

0.001s to 50.000s

Description

-

F2-36 **Single motor inertia (kg*m^2)**

Address:	0xF224		
Min.:	0.001	Unit:	kg*m^2
Max.:	50	Data type:	UInt16
Default:	0.001	Change:	At stop

Value Range:

0.001 kg*m^2 to 50.000 kg*m^2

Description

-

F2-37 **Inertia auto-tuning maximum frequency**

Address:	0xF225		
Min.:	20	Unit:	%
Max.:	100	Data type:	UInt16
Default:	80	Change:	At stop

Value Range:

20% to 100%

Description

F2-38 **Inertia auto-tuning acceleration time**

Address:	0xF226		
Min.:	1	Unit:	s
Max.:	50	Data type:	UInt16
Default:	10	Change:	At stop

Value Range:

1.0s to 50.0s

Description

F2-39 **Bandwidth 1 of speed loop dynamic optimization test**

Address:	0xF227		
Min.:	1	Unit:	Hz
Max.:	200	Data type:	UInt16
Default:	5	Change:	Unchangeable

Value Range:

1.0 Hz to 200.0 Hz

Description

F2-40 **Bandwidth 2 of speed loop dynamic optimization test**

Address: 0xF228

Min.:	1	Unit:	Hz
Max.:	200	Data type:	UInt16
Default:	10	Change:	Unchangeable

Value Range:

1.0 Hz to 200.0 Hz

Description

F2-41 **Bandwidth 3 of speed loop dynamic optimization test**

Address: 0xF229

Min.:	1	Unit:	Hz
Max.:	100	Data type:	UInt16
Default:	15	Change:	Unchangeable

Value Range:

1.0 Hz to 100.0 Hz

Description

F2-42 **Bandwidth 4 of speed loop dynamic optimization test**

Address: 0xF22A

Min.:	1	Unit:	Hz
Max.:	200	Data type:	UInt16
Default:	20	Change:	Unchangeable

Value Range:

1.0 Hz to 200.0 Hz

Description

F2-43 **Inertia auto-tuning and dynamic speed reference**

Address: 0xF22B

Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	30	Change:	At stop

Value Range:

0–100

Description

F2-44 **Rotor time constant check**

Address:	0xF22C		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0: Disabled

1: Enabled

Description

F2-45 **Torque amplitude of rotor time constant check**

Address:	0xF22D		
Min.:	10	Unit:	%
Max.:	100	Data type:	UInt16
Default:	30	Change:	Unchangeable

Value Range:

10% to 100%

Description

F2-46 **Number of times of rotor time constant check**

Address:	0xF22E		
Min.:	1	Unit:	-
Max.:	6	Data type:	UInt16
Default:	3	Change:	Unchangeable

Value Range:

1 to 6

Description

F2-47 **Inertia auto-tuning**

Address:	0xF22F		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Disabled

1: Enabled

Description

F2-48 **Speed loop bandwidth during inertia auto-tuning**

Address:	0xF230		
Min.:	0.1	Unit:	Hz
Max.:	100	Data type:	UInt16
Default:	10	Change:	At stop

Value Range:

0.1 Hz to 100.0 Hz

Description

F2-49 **Back EMF calculation**

Address:	0xF231		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0: Disabled

1: Enabled

Description

F2-50 **Inertia auto-tuning mode**

Address:	0xF232		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Acceleration/Deceleration mode

1: Triangular wave mode

Description

F2-51 **Inertia auto-tuning acceleration/deceleration coefficient**

Address:	0xF233		
Min.:	0.1	Unit:	-
Max.:	10	Data type:	UInt16
Default:	1	Change:	At stop

Value Range:

0.1–10.0

Description

F2-52 **Decoupling control**

Address:	0xF234		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Disabled

1: Enabled

Description

F2-53 **Generating power limit**

Address:	0xF235		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Disabled

1: Enabled

Description

F2-54 **Power limit during generating**

Address:	0xF236		
Min.:	0	Unit:	%
Max.:	200	Data type:	UInt16
Default:	20	Change:	At stop

Value Range:

0.0% to 200.0%

Description

F2-55 **Flux closed loop and torque linearity optimization in FVC mode**

Address:	0xF237		
Min.:	0	Unit:	-
Max.:	1111	Data type:	UInt16
Default:	10	Change:	At stop

Value Range:

Ones (position): Flux closed loop in torque control mode
0: Disabled
1: Enabled
Tens (position): Flux closed loop in speed control mode
0: Disabled
1: Enabled
Hundreds (position): Torque upper limit and torque linearity in speed control mode
0: Disabled
1: Enabled

Description

F2-56 **AC drive output current upper limit**

Address:	0xF238		
Min.:	0	Unit:	%
Max.:	170	Data type:	UInt16
Default:	150	Change:	At stop

Value Range:

0.0% to 170.0%

Description

2.4 F3 V/f Control Parameters

F3-00 **V/f curve setting**

Address:	0xF300		
Min.:	0	Unit:	-
Max.:	11	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Linear V/f curve
1: Multi-point V/f curve
2: Square V/f curve
3: 1.2-power V/f curve
4: 1.4-power V/f curve
6: 1.6-power V/f curve
8: 1.8-power V/f curve
10: V/f complete separation mode
11: V/f half separation mode

Description

0: Linear V/f curve
Under the rated frequency, the output voltage of the AC drive changes linearly with the output frequency. This curve is suitable for general mechanical drive applications such as large-inertia fan acceleration, punch presses, centrifuges, and water pumps.
1: Multi-point V/f curve
The frequency ranges from 0.00 Hz to the rated motor frequency. The range of the voltage points is 0.0% to 100.0%, which corresponds to the range of 0 V to the rated motor voltage. The multi-point V/f curve references are typically determined based on load of the motor. Ensure that the following conditions are met: F3-03 ⩽ F3-05 ⩽ F3-07.
2: Square V/f curve
Under the rated frequency, the output voltage changes with the output frequency of the AC drive according to the 2-power curve. This curve is suitable for applications with light loads that seldom change, such as fans and water pumps.
3: 1.2-power V/f curve
Under the rated frequency, the output voltage changes with the output frequency of the AC drive according to the 1.2-power curve.
4: 1.4-power V/f curve
Under the rated frequency, the output voltage changes with the output frequency of the AC drive according to the 1.4-power curve.
6: 1.6-power V/f curve
Under the rated frequency, the output voltage changes with the output frequency of the AC drive according to the 1.6-power curve.
8: 1.8-power V/f curve
Under the rated frequency, the output voltage changes with the output frequency of the AC drive according to the 1.8-power curve.
10: V/f complete separation mode
The output frequency and output voltage of the AC drive are independent of each other. The output frequency is determined by the frequency source, and the output voltage is determined by voltage source for V/f separation. This curve is generally applicable to scenarios such as motor torque control.
11: V/f half separation mode
In this mode, the voltage (V) is proportional to the frequency (f). The relationship between V and f can be set by the voltage source, and it is also related to the rated motor voltage and rated motor frequency in group F1. Assume that the voltage source input is X (0 to 100%), the relationship between V and f is as follows: V/f = 2 x X x (Rated motor voltage)/(Rated motor frequency)

F3-01 **Torque boost**
Address: 0xF301

Min.:	0	Unit:	%
Max.:	30	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0% to 30.0%

Description

The torque boost function generally applies to the AC drive at low frequency. The output torque of the AC drive in V/f control mode is proportional to the frequency. Under the condition of low frequency, the torque of the motor is very low when the motor runs at low speed. This parameter is used to increase the output voltage of the AC drive, therefore increasing the current and output torque.

Set this parameter to a proper value to avoid triggering the overload protection mistakenly.

F3-02 **Cutoff frequency of torque boost**

Address: 0xF302

Min.:	0	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	50	Change:	At stop

Value Range:

0.00 Hz to F0-10

Description

When the running frequency reaches the cutoff frequency of torque boost, the torque boost function is disabled.

F3-03 **Multi-point V/f frequency 1**

Address: 0xF303

Min.:	0	Unit:	Hz
Max.:	F3-05	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0.00 Hz to F3-05

Description

This parameter defines frequency 1 in the multi-point V/f curve.

F3-04 **Multi-point V/f voltage 1**

Address: 0xF304

Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0.0% to 100.0%

Description

This parameter defines voltage 1 in the multi-point V/f curve.

F3-05 **Multi-point V/f frequency 2**

Address:	0xF305		
Min.:	F3-03	Unit:	Hz
Max.:	F3-07	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

F3-03 to F3-07

Description

This parameter defines frequency 2 in the multi-point V/f curve.

F3-06 **Multi-point V/f voltage 2**

Address:	0xF306		
Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0.0% to 100.0%

Description

This parameter defines voltage 2 in the multi-point V/f curve.

F3-07 **Multi-point V/f frequency 3**

Address:	0xF307		
Min.:	F3-05	Unit:	Hz
Max.:	F1-04	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

F3-05 to F1-04

Description

This parameter defines frequency 3 in the multi-point V/f curve.

F3-08 **Multi-point V/f voltage 3**

Address:	0xF308		
Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0.0% to 100.0%

Description

This parameter defines voltage 3 in the multi-point V/f curve.

F3-09 V/f slip compensation gain

Address:	0xF309		
Min.:	0	Unit:	%
Max.:	200	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0% to 200.0%

Description

In V/f mode, increasing the output frequency compensates for the motor speed deceleration. A higher gain indicates a higher compensation frequency. However, an excessively high gain can incur overcompensation.

F3-10 V/f over-excitation gain

Address:	0xF30A		
Min.:	0	Unit:	-
Max.:	200	Data type:	UInt16
Default:	64	Change:	In real time

Value Range:

0 to 200

Description

A larger over-excitation gain indicates better suppression effect. When a braking resistor, braking unit, or energy feedback unit is used, set this parameter to 0. Otherwise, overcurrent may occur during operation.

F3-11 V/f oscillation suppression gain

Address:	0xF30B		
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0–100

Description

A larger oscillation gain indicates better suppression effect.

F3-12 Oscillation suppression gain mode

Address:	0xF30C		
Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16

Default:	3	Change:	At stop

Value Range:

0: Inactive

1: Reserved

2: Reserved

3: Active

Description

In V/f mode, speed and current oscillation typically occurs when the motor runs at low frequency, which may lead to overcurrent of the AC drive. In this case, you can enable this function to eliminate oscillation.

F3-13 **Voltage source for V/f separation**

Address:	0xF30D		
Min.:	0	Unit:	-
Max.:	8	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Digital setting (F3-14)

1: AI1

2: AI2

3: AI3

4: Pulse reference (DI5)

5: Multi-reference

6: Simple PLC

7: PID

8: Communication (1000H)

Description

This parameter sets the target voltage in V/f separation mode.

0: Digital setting (F3-14)

The V/f separation voltage is set by F3-14 (voltage digital setting of V/f separation).

1: AI1

The V/f separation voltage is input by current or voltage signal through the AI1. The frequency is calculated according to the AI curve.

2: AI2

The V/f separation voltage is input by current or voltage signal through the AI2. The frequency is calculated according to the AI curve.

3: AI3

The V/f separation voltage is input by current or voltage signal through the AI3. The frequency is calculated according to the AI curve.

4: The Pulse reference (DI5)
The V/f separation voltage is set through the DI5. The frequency is calculated based on the curve of the relationship between the pulse frequency and running frequency.
5: Multi-reference
In multi-reference mode, different combinations of DI terminal states correspond to different reference values. The four multi-reference terminals can provide 16 state combinations, corresponding to 16 reference values (percentage x maximum frequency) of parameters in group FC.
6: Simple PLC
The V/f separation voltage is set by simple PLC. For details, see the function description of simple PLC.
7: PID
The V/f separation voltage is set by PID. For details, see the PID function description.
8: Communication
The main frequency is set through communication. The running frequency is input through remote communication. The AC drive must be equipped with a communication card to communicate with the host controller. This mode applies to remote control or centralized control systems of multiple equipment.

F3-14 **Digital setting of voltage for V/f separation**

Address: 0xF30E

Min.:	0	Unit:	V
Max.:	F1-02	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:
0 V to F1-02
Description
The reference value is from 0 V to the rated voltage.

F3-15 **Voltage rise time of V/f separation**

Address: 0xF30F

Min.:	0	Unit:	s
Max.:	1000	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:
0.0s to 1000.0s
Description
Indicates the time required for the output voltage to increase from 0 to the set V/f separation voltage.

F3-16 **Voltage decline time of V/f separation**

Address:	0xF310		
Min.:	0	Unit:	s
Max.:	1000	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s to 1000.0s

Description

Indicates the time required for the output voltage to decline from the set V/f separation voltage to 0.

F3-17 **Stop mode selection for V/f separation**

Address:	0xF311		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Frequency and voltage decline to 0.

1: Frequency declines to 0 after voltage declines to 0.

Description

0: Frequency and voltage decline to 0.

1: Frequency declines after voltage declines to 0.

F3-18 **V/f overcurrent stall action current**

Address:	0xF312		
Min.:	50	Unit:	%
Max.:	200	Data type:	UInt16
Default:	150	Change:	At stop

Value Range:

50% to 200%

Description

When the motor current reaches the value of this parameter, the AC drive starts the overcurrent stall function. The default value is 150%, indicating 1.5 times the rated current of the AC drive.

F3-19 **V/f overcurrent stall**

Address:	0xF313		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	1	Change:	At stop

Value Range:

0: Disabled
1: Enabled

Description

Determines whether the V/f overcurrent stall function is enabled.

F3-20 V/f overcurrent stall suppression gain

Address:	0xF314		
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	20	Change:	In real time

Value Range:

0–100

Description

When the current exceeds the overcurrent stall action current, the overcurrent stall suppression function is triggered, and the output frequency decreases. When the current falls below the overcurrent stall threshold, the output frequency increases to the target frequency, and the actual acceleration time prolongs automatically. A larger parameter value indicates better suppression effect.

F3-21 Action current compensation coefficient for V/f speed multiplying overcurrent stall

Address:	0xF315		
Min.:	50	Unit:	-
Max.:	200	Data type:	UInt16
Default:	50	Change:	At stop

Value Range:

50 to 200

Description

This parameter reduces the overcurrent stall action current at high speed. It is invalid when set to 50%. The recommended value for F3-18 in the flux weakening area is 100%.

F3-22 Overvoltage stall action voltage in V/f mode

Address:	0xF316		
Min.:	200	Unit:	V
Max.:	2000	Data type:	UInt16
Default:	770	Change:	At stop

Value Range:

200.0 V to 2000.0 V

Description

When the bus voltage reaches the value of this parameter, the AC drive starts overvoltage stall protection.

F3-23 **Overvoltage stall in V/f mode**

Address: 0xF317

Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	1	Change:	At stop

Value Range:

0: Disabled

1: Enabled

Description

0: Disabled

1: Enabled (default)

The function of F3-23 is the same as that of F9-04.

When a braking resistor, braking unit, or energy feedback unit is used, set this parameter to 0. Otherwise, the deceleration time may be prolonged.

F3-24 **Frequency gain for overvoltage stall suppression in V/f mode**

Address: 0xF318

Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	30	Change:	In real time

Value Range:

0–100

Description

Increasing F3-24 will improve the control effect of the bus voltage, but the output frequency will fluctuate. If the output frequency fluctuates greatly, reduce F3-24 appropriately.

F3-25 **Voltage gain for overvoltage stall suppression in V/f mode**

Address: 0xF319

Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	30	Change:	In real time

Value Range:

0–100

Description

This parameter is used to suppress the bus voltage. Increasing the parameter value reduces the overshoot of the bus voltage.

F3-26 **Frequency rise threshold during overvoltage stall**

Address: 0xF31A

Min.:	0	Unit:	-
Max.:	50	Data type:	UInt16

Default: 5 | Change: At stop

Value Range:

0–50

Description

The running frequency may increase when overvoltage stall suppression is enabled. This parameter limits the increase of the running frequency.

F3-27 Slip compensation time constant

Address: 0xF31B

Min.: 0.1 | Unit: Hz

Max.: 10 | Data type: UInt16

Default: 0.5 | Change: In real time

Value Range:

0.1 Hz to 10.0 Hz

Description

This parameter defines the time constant of the slip compensation frequency. The larger the time constant is, the more stable the frequency of the slip compensation is, and the less the frequency is affected by load disturbance and noise. However, the response to load changes will be slower.

F3-28 V/f parameter setting inertia coefficient

Address: 0xF31C

Min.: 0 | Unit: -

Max.: 10 | Data type: UInt16

Default: 0.1 | Change: At stop

Value Range:

0.00 to 10.00

Description

F3-29 Minimum motoring torque current

Address: 0xF31D

Min.: 10 | Unit: -

Max.: 100 | Data type: UInt16

Default: 50 | Change: At stop

Value Range:

10 to 100

Description

F3-30 Maximum generating torque current

Address:	0xF31E		
Min.:	10	Unit:	-
Max.:	100	Data type:	UInt16
Default:	20	Change:	At stop

Value Range:

10 to 100

Description

F3-31 Automatic frequency rise Kp

Address:	0xF31F		
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	50	Change:	In real time

Value Range:

0–100

Description

F3-32 Automatic frequency rise Ki

Address:	0xF320		
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	50	Change:	In real time

Value Range:

0–100

Description

F3-33 Online torque compensation gain

Address:	0xF321		
Min.:	80	Unit:	-
Max.:	150	Data type:	UInt16
Default:	100	Change:	At stop

Value Range:

80–150

Description

In V/f mode, F3-01 increases the output voltage of the AC drive according to a fixed curve. When F3-33 is larger than or equal to 100 or F3-01 is set to 0, the automatic torque boost compensation is an additional boost value related to the load plus the output voltage set by F3-01. The greater the F3-33, the greater the torque boost compensation. When F3-33 is smaller than 100 and F3-01 is set to a non-zero value, the automatic torque boost compensation is disabled.

2.5 F4 Input Terminal

F4-00 **DI1 function selection**

Address:	0xF400		
Min.:	0	Unit:	-
Max.:	93	Data type:	UInt16
Default:	1	Change:	At stop

Value Range:

0: No function
1: Forward run (FWD)
2: Reverse run (REV)
3: Three-wire control
4: Forward jog (FJOG)
5: Reverse jog (RJOG)
6:Terminal (UP)
7:Terminal (DOWN)
8: Coast to stop
9: Fault reset (RESET)
10: Running pause
11: NO input of external fault
12: Multi-reference terminal 1
13: Multi-reference terminal 2
14: Multi-reference terminal 3
15: Multi-reference terminal 4
16: Terminal 1 for acceleration/deceleration selection
17: Terminal 2 for acceleration/deceleration selection
18: Frequency source switchover
19: UP and DOWN setting clear (terminal, operating panel)
20: Command source switchover terminal
21: Acceleration/Deceleration inhibited
22: PID pause
23: PLC state reset
24: Wobble pause
25: Counter input (DI5)
26: Counter reset
27: Length count input (DI5)
28: Length reset
29: Torque control inhibited
30: Pulse input
31: Reserved
32: Immediate DC braking
33: NC input of external fault
34: Frequency modification enabled
35: PID action direction reversal

36: External stop terminal 1
37: Command source switchover terminal 2
38: PID integral pause
39: Switchover between main frequency source X and preset frequency
40: Switchover between auxiliary frequency source Y and preset frequency
41: Reserved
42: Position lock enabled
43: PID parameter switchover
44: User-defined fault 1
45: User-defined fault 2
46: Speed control/Torque control switchover
47: Emergency stop
48: External stop terminal 2
49: Deceleration DC braking
50: Clear the current running time
51: Two-wire/Three-wire control switchover
52: Electromagnetic shorting
53: Thickness overlaying
54: Roll diameter reset
55: Initial roll diameter 1
56: Initial roll diameter 2
57: Pre-drive
58: Winding/Unwinding switchover
59: Roll diameter calculation disabled
60: Exit tension control
61: Terminal tension rise
62: Thickness selection 1
63: Thickness selection 2
90: Water cooling system fault
91: Low liquid level fault
92: Revolution count reset
93: Reserved

Description

0: No function

The DI terminal has no function.

1: Forward run

The operation mode of the AC drive is forward run. FWD indicates forward run. In two-wire mode 1 (F4-11 = 0), activating the terminal sets the AC drive to forward run. In two-wire mode 2 (F4-11 = 1), activating the terminal gives a running command.

2: Reverse run
The operation mode of the AC drive is reverse run. REV indicates reverse run. In three-wire mode 1 (F4-11 = 2), activating the terminal sets the AC drive to reverse run. In three-wire mode 2 (F4-11 = 3), activating the terminal sets the forward/ reverse run direction.
3: Three-wire operation control
The AC drive operation mode is three-wire control mode. To set the running command through the terminal, set F4-11 (Terminal control mode) to 2 (Three-wire mode 1) or 3 (three-wire mode 2), and set this parameter to 3. The three-wire control modes include three-wire mode 1 and three-wire mode 2.
4: Forward jog (FJOG)
The terminal is used to set the AC drive to FJOG mode. In the jog mode, the AC drive runs at low speed for a short time, which is generally used for maintenance and commissioning of field equipment.
5: Reverse jog (RJOG)
The terminal is used to set the AC drive to RJOG mode.
6: Terminal UP
The terminal is used to increase the frequency when the frequency is set through the terminal. When the terminal is active, the effect is equivalent to holding down the increment key. When the terminal is inactive, the effect is equivalent to releasing the increment key.
7: Terminal DOWN
The terminal is used to decrease the frequency when the frequency is set through the terminal. When the terminal is active, the effect is equivalent to holding down the decrement key. When the terminal is inactive, the effect is equivalent to releasing the decrement key.
8: Coast to stop
Once the AC drive receives a stop command, it immediately stops output and the load then coasts to stop based on the mechanical inertia. The AC drive stops by stopping the output. At this time, the power supply of the motor is cut off and the drive system is in a free braking state. Since the stop time is determined by the inertia of the system, this is also called inertia stop.
9: Fault reset (RESET). Activating the terminal resets the AC drive upon a fault. This function is the same as that of the STOP/RES key on the operating panel. This function can remotely reset the AC drive upon a fault.
10: Running pause
With this function enabled, the AC drive decelerates to stop with all running parameters memorized (such as PLC, wobble, and PID parameters). When the terminal is inactive, the AC drive resumes its status before stop.
11: NO input of external fault
The AC drive reports Err15 upon receiving an external signal.

12-15: Multi-reference terminals 1–4
The AC drive selects the multi-reference as the main frequency. The setting of 16 speeds or 16 references can be implemented through combinations of 16 states of these four terminals. This function is applicable to applications where continuous adjustment of the AC drive running frequency is not required and only several frequency values are required.
16-17: Terminal 1 to 2 for acceleration/deceleration selection
Four groups of acceleration and deceleration time can be switched through four states of these two terminals. The acceleration time indicates the time required by the AC drive to accelerate from 0 Hz to the acceleration/deceleration base frequency (F0-25). The deceleration time indicates the time required by the AC drive to decelerate from the acceleration/deceleration base frequency (F0-25) to 0 Hz.
18: Frequency source switchover
This function enables selection of different frequency reference input mode. The frequency reference is set by F0-07 (Final frequency reference setting selection).
19: UP and DOWN setting clear
When the main frequency is set through the operating panel and this terminal is active, the frequency set through the UP/DOWN keys on the operating panel can be cleared, and the frequency will be reset to the value of F0-08.
20: Command source switchover terminal 1
When the running command is set through the terminal (F0-02=1) and this terminal is active, the control mode can be switched between the terminal and the operating panel.
When the running command is set through communication (F0-02 = 2) and this terminal is active, the control mode can be switched between the communication and the operating panel.
21: Acceleration/Deceleration inhibition
The terminal is used to keep the AC drive at the current running frequency regardless of changes of the external input frequency (unless a stop command is received).
22: PID pause
PID is invalid temporarily. The AC drive maintains the current output frequency without supporting PID adjustment of the frequency source.
23: PLC state reset
The terminal is used to restore the AC drive to the initial state of the simple PLC.
24: Wobble pause
In the wobble process, when this terminal is active, the wobble function pauses (the AC drive outputs at the center frequency).
25: Counter input
In the count process, when the terminal is active, a count pulse is input.

26: Counter reset
In the count process, when the terminal is active, the counter status is cleared.
27: Length count input
In the fixed length process, when the terminal is active, the length count is input.
28: Length reset
In the fixed length process, when the terminal is active, the length is cleared.
29: Torque control inhibited
When the terminal is active, the AC drive switches from the torque control mode to the speed control mode. When the terminal is inactive, the AC drive switches back to the
torque control mode:
30: Pulse input
When DI5 is used as the pulse input terminal, DI5 must be allocated with this function.
32: Immediate DC braking
The terminal is used to directly switch the AC drive to the DC braking state. DC braking means that the AC drive outputs DC to the stator winding of the asynchronous motor to form a static magnetic field,
enabling the motor to brake with energy consumption. In this state, the rotor cuts the static magnetic field to generate braking torque, which stops the motor quickly.
33: NC input of external fault
The AC drive reports Err15 upon receiving an external signal.
34: Frequency modification enabled
When the terminal is active, the frequency can be modified. When the terminal is inactive, the frequency cannot be modified.
35: PID action direction reversal
The PID action direction is reversed to the direction set by FA-03 (PID action direction).
36: External stop terminal 1
When the running command is set through the operating panel (F0-02 = 0), this terminal is used to stop the AC drive, which functions the same as the STOP/RES key on the operating panel.
37: Command source switchover terminal 2
This function enables the switchover between the terminal control and the communication control.
If the running command is given by terminal, the terminal being active switches the system to the communication control mode.
If the running command is given by communication, the terminal being active switches the system to the terminal control mode.

38: PID integral pause
The integral adjustment function pauses when the terminal is active. However, the proportional and derivative adjustment functions are still valid.
39: Switchover between main frequency reference X and preset frequency
This function is used to switch from main frequency reference X to F0-08 (Preset frequency).
40: Switchover between auxiliary frequency reference Y and preset frequency
This function is used to switch from auxiliary frequency reference Y to F0-08 (Preset frequency).
41: Reserved
42: Position lock enabled
When the terminal is active, the AC drive decelerates to 0 Hz and then enters the position lock state.
43: PID parameter switchover
If PID parameters are switched over through DI (FA-18 = 1), the following conditions are true. When the terminal is inactive, the PID parameters are FA-05 to FA-07 (proportional gain Kp1, integral time Ti1, and differential time Td1). When the terminal is active, the PID parameters are FA-15 to FA-17 (PID gain Kp2, integral time Ti2, and differential time Td2).
44: User-defined fault 1
When the AC drive reports Err27, the AC drive will action according to the value of F9-49 (Fault protection action selection).
45: User-defined fault 2
When the AC drive reports Err28, the AC drive will action according to the value of F9-49 (Fault protection action selection).
46: Switchover between speed control and torque control
The terminal is used to switch between the speed control mode and the torque control mode.
When A0-00 (speed/torque control mode) is set to 0, the torque control mode is used when the terminal is active, and the speed control mode is used when the terminal is inactive.
When A0-00 (speed/torque control mode) is set to 1, the speed control mode is used when the terminal is active, and
torque control mode is used when the terminal is inactive.

47: Emergency stop

When the system is in the emergency state, the AC drive decelerates according to F8-55 (Terminal deceleration time for emergency stop). When the deceleration time for emergency stop is 0s in V/f mode, the AC drive decelerates according to the minimum unit time. The input terminal does not need to be kept in the closed state. Even if it stays closed only for a short moment, the AC drive will come to an emergency stop. Different from general deceleration, if the emergency stop input terminal is opened after the deceleration time for emergency stop expires and the running signal is still active on the AC drive terminal, the AC drive will not restart. To restart the AC drive in this case, disconnect the running terminal and input the running command.

48: External stop terminal 2

The terminal is used to make the AC drive decelerate to stop in any control mode (operating panel, terminal, or communication control). In this case, the deceleration time is fixed to deceleration time 4 (F8-08).

49: Deceleration DC braking

The AC drive decelerates to F6-11 (Shutdown DC injection braking start frequency) and then enters the DC braking state.

50: Clear the current running time

The terminal is used to clear the current operation time of the AC drive. If the current running time is less than the set value (greater than 0) of F8-53 (Current running time reached), and the terminal is active, the current running timing is cleared. If the current running time is greater than the set value (greater than 0) of F8-53, and the terminal is active, the current running time is not cleared.

51: Two-wire/Three-wire control switchover

The terminal is used to switch between two-wire control and three-wire control.

When F4-11 is set to 0 (Two-wire mode 1) and the terminal is active, the AC drive switches to three-wire mode 1. When the terminal is inactive, two-wire mode 1 is used.

When F4-11 is set to 1 (Two-wire mode 2) and the terminal is active, the AC drive switches to three-wire mode 2.

When F4-11 is set to 2 (Three-wire mode 1) and the terminal is active, the AC drive switches to two-wire mode 1.

When F4-11 is set to 3 (Three-wire mode 2) and the terminal is active, the AC drive switches to two-wire mode 2.

52: Electromagnetic shorting

When the terminal is active, the AC drive enters the electromagnetic shorting state.

53 Thickness overlaying

When the roll diameter is calculated based on accumulative thickness, this terminal records the number of revolutions.

54: Roll diameter reset
When this terminal is active, the initial roll diameter is reset. The initial roll diameter must be reset when the roll is replaced in the tension mode.
55: Initial roll diameter 1
56: Initial roll diameter 2
In the tension mode, B0-11/12/13 is selected as the initial roll diameter through terminal combinations. When these two terminals are inactive, the minimum winding diameter (B0-09) is used as the initial roll diameter. When only the terminal for initial roll diameter 1 selection is active, B0-11 is used as the initial roll diameter. When only the terminal for initial roll diameter 2 selection is active, B0-12 is used as the initial roll diameter. When these two terminals are active, B0-13 is used as the initial roll diameter.
57: Pre-drive
When the terminal is active, the AC drive switches to the pre-drive speed control mode. This function is used to synchronize the linear speed for the axis that requires automatic reel replacement when the tension mode is used. When the terminal is deactivated after reel replacement, the tension control can function properly.
58: Winding/Unwinding switchover
This terminal is used for winding/unwinding switchover in the tension mode.
59: Roll diameter calculation disabled
When this terminal is active, the roll diameter calculation is disabled. In the tension mode, to avoid influence on the winding diameter calculation for automatic roll replacement and pre-drive, winding diameter calculation can be disabled.
60: Exit tension mode
This terminal is used to exit the tension control mode.
61: Terminal tension rise
When the terminal is activated, the tension torque is increased by certain ratio. After the terminal is deactivated, the boost part will be canceled gradually based on time.
62: Thickness selection 1
63: Thickness selection 2
In the tension mode, B0-32/33/34/35 is selected as the material thickness through terminal combinations. When these two terminals are inactive, B0-32 is selected as the material thickness. When only the terminal for thickness selection 1 is active, B0-33 is selected as the material thickness. When only the terminal for thickness selection 2 is active, B0-34 is selected as the material thickness. When these two terminals are active, B0-35 is selected as the material thickness.
64-89: Reserved
90: Water cooling system fault
When the water cooling system of T13 models encounters a fault, the terminal receives the signal and the AC drive reports the E64 alarm.

91: Low liquid level fault

When the liquid in the water tank of T13 models is too low, the terminal receives the signal and the AC drive reports the A63 alarm.

92: Revolution count reset

The number of revolutions counted will be cleared after this terminal is activated.

93: Reserved

F4-01 **DI2 function selection**

Address:	0xF401		
Min.:	0	Unit:	-
Max.:	93	Data type:	UInt16
Default:	4	Change:	At stop

Value Range:

0: No function
1: Forward run (FWD)
2: Reverse run (REV)
3: Three-wire control
4: Forward jog (FJOG)
5: Reverse jog (RJOG)
6:Terminal (UP)
7:Terminal (DOWN)
8: Coast to stop
9: Fault reset (RESET)
10: Running pause
11: NO input of external fault
12: Multi-reference terminal 1
13: Multi-reference terminal 2
14: Multi-reference terminal 3
15: Multi-reference terminal 4
16: Terminal 1 for acceleration/deceleration selection
17: Terminal 2 for acceleration/deceleration selection
18: Frequency source switchover
19: UP and DOWN setting clear (terminal, operating panel)
20: Command source switchover terminal
21: Acceleration/Deceleration inhibited
22: PID pause
23: PLC state reset
24: Wobble pause
25: Counter input (DI5)
26: Counter reset
27: Length count input (DI5)
28: Length reset
29: Torque control inhibited
30: Pulse input
31: Reserved
32: Immediate DC braking
33: NC input of external fault
34: Frequency modification enabled
35: PID action direction reversal

36: External stop terminal 1
37: Command source switchover terminal 2
38: PID integral pause
39: Switchover between main frequency source X and preset frequency
40: Switchover between auxiliary frequency source Y and preset frequency
41: Motor selection
42: Position lock enabled
43: PID parameter switchover
44: User-defined fault 1
45: User-defined fault 2
46: Speed control/Torque control switchover
47: Emergency stop
48: External stop terminal 2
49: Deceleration DC braking
50: Clear the current running time
51: Two-wire/three-wire control switchover
52: Electromagnetic shorting
53: Thickness overlaying
54: Roll diameter reset
55: Initial roll diameter 1
56: Initial roll diameter 2
57: Pre-drive
58: Winding/Unwinding switchover
59: Winding diameter calculation disabled
60: Exit tension control
61: Terminal tension rise
62: Thickness selection 1
63: Thickness selection 2
90: Water cooling system fault
91: Low liquid level fault
92: Revolution count reset
93: Reserved

Description

Used to set the function of DI2 terminal.
The setting is similar to that of F4-00.

F4-02 **DI3 function selection**

Address:	0xF402		
Min.:	0	Unit:	-
Max.:	93	Data type:	UInt16
Default:	9	Change:	At stop

Value Range:

0: No function
1: Forward run (FWD)
2: Reverse run (REV)
3: Three-wire control
4: Forward jog (FJOG)
5: Reverse jog (RJOG)
6:Terminal (UP)
7:Terminal (DOWN)
8: Coast to stop
9: Fault reset (RESET)
10: Running pause
11: NO input of external fault
12: Multi-reference terminal 1
13: Multi-reference terminal 2
14: Multi-reference terminal 3
15: Multi-reference terminal 4
16: Terminal 1 for acceleration/deceleration selection
17: Terminal 2 for acceleration/deceleration selection
18: Frequency source switchover
19: UP and DOWN setting clear (terminal, operating panel)
20: Command source switchover terminal
21: Acceleration/Deceleration inhibited
22: PID pause
23: PLC state reset
24: Wobble pause
25: Counter input (DI5)
26: Counter reset
27: Length count input (DI5)
28: Length reset
29: Torque control inhibited
30: Pulse input
31: Reserved
32: Immediate DC braking
33: NC input of external fault
34: Frequency modification enabled
35: PID action direction reversal

36: External stop terminal 1
37: Command source switchover terminal 2
38: PID integral pause
39: Switchover between main frequency source X and preset frequency
40: Switchover between auxiliary frequency source Y and preset frequency
41: Motor selection
42: Position lock enabled
43: PID parameter switchover
44: User-defined fault 1
45: User-defined fault 2
46: Speed control/Torque control switchover
47: Emergency stop
48: External stop terminal 2
49: Deceleration DC braking
50: Clear the current running time
51: Two-wire/three-wire control switchover
52: Electromagnetic shorting
53: Thickness overlaying
54: Roll diameter reset
55: Initial roll diameter 1
56: Initial roll diameter 2
57: Pre-drive
58: Winding/Unwinding switchover
59: Winding diameter calculation disabled
60: Exit tension control
61: Terminal tension rise
62: Thickness selection 1
63: Thickness selection 2
90: Water cooling system fault
91: Low liquid level fault
92: Revolution count reset
93: Reserved

Description

Used to set the function of DI3 terminal.
The setting is similar to that of F4-00.

F4-03 **DI4 function selection**

Address: 0xF403

Min.:	0	Unit:	-
Max.:	93	Data type:	UInt16
Default:	12	Change:	At stop

Value Range:

0: No function
1: Forward run (FWD)
2: Reverse run (REV)
3: Three-wire control
4: Forward jog (FJOG)
5: Reverse jog (RJOG)
6:Terminal (UP)
7:Terminal (DOWN)
8: Coast to stop
9: Fault reset (RESET)
10: Running pause
11: NO input of external fault
12: Multi-reference terminal 1
13: Multi-reference terminal 2
14: Multi-reference terminal 3
15: Multi-reference terminal 4
16: Terminal 1 for acceleration/deceleration selection
17: Terminal 2 for acceleration/deceleration selection
18: Frequency source switchover
19: UP and DOWN setting clear (terminal, operating panel)
20: Command source switchover terminal
21: Acceleration/Deceleration inhibited
22: PID pause
23: PLC state reset
24: Wobble pause
25: Counter input (DI5)
26: Counter reset
27: Length count input (DI5)
28: Length reset
29: Torque control inhibited
30: Pulse input
31: Reserved
32: Immediate DC braking
33: NC input of external fault
34: Frequency modification enabled
35: PID action direction reversal

36: External stop terminal 1
37: Command source switchover terminal 2
38: PID integral pause
39: Switchover between main frequency source X and preset frequency
40: Switchover between auxiliary frequency source Y and preset frequency
41: Motor selection
42: Position lock enabled
43: PID parameter switchover
44: User-defined fault 1
45: User-defined fault 2
46: Speed control/Torque control switchover
47: Emergency stop
48: External stop terminal 2
49: Deceleration DC braking
50: Clear the current running time
51: Two-wire/three-wire control switchover
52: Electromagnetic shorting
53: Thickness overlaying
54: Roll diameter reset
55: Initial roll diameter 1
56: Initial roll diameter 2
57: Pre-drive
58: Winding/Unwinding switchover
59: Winding diameter calculation disabled
60: Exit tension control
61: Terminal tension rise
62: Thickness selection 1
63: Thickness selection 2
90: Water cooling system fault
91: Low liquid level fault
92: Revolution count reset
93: Reserved

Description

Used to set the function of DI4 terminal.
The setting is similar to that of F4-00.

F4-04 **DI5 function selection**

Address: 0xF404

Min.:	0	Unit:	-
Max.:	93	Data type:	UInt16
Default:	13	Change:	At stop

Value Range:

0: No function
1: Forward run (FWD)
2: Reverse run (REV)
3: Three-wire control
4: Forward jog (FJOG)
5: Reverse jog (RJOG)
6:Terminal (UP)
7:Terminal (DOWN)
8: Coast to stop
9: Fault reset (RESET)
10: Running pause
11: NO input of external fault
12: Multi-reference terminal 1
13: Multi-reference terminal 2
14: Multi-reference terminal 3
15: Multi-reference terminal 4
16: Terminal 1 for acceleration/deceleration selection
17: Terminal 2 for acceleration/deceleration selection
18: Frequency source switchover
19: UP and DOWN setting clear (terminal, operating panel)
20: Command source switchover terminal
21: Acceleration/Deceleration inhibited
22: PID pause
23: PLC state reset
24: Wobble pause
25: Counter input (DI5)
26: Counter reset
27: Length count input (DI5)
28: Length reset
29: Torque control inhibited
30: Pulse input
31: Reserved
32: Immediate DC braking
33: NC input of external fault
34: Frequency modification enabled
35: PID action direction reversal

36: External stop terminal 1
37: Command source switchover terminal 2
38: PID integral pause
39: Switchover between main frequency source X and preset frequency
40: Switchover between auxiliary frequency source Y and preset frequency
41: Motor selection
42: Position lock enabled
43: PID parameter switchover
44: User-defined fault 1
45: User-defined fault 2
46: Speed control/Torque control switchover
47: Emergency stop
48: External stop terminal 2
49: Deceleration DC braking
50: Clear the current running time
51: Two-wire/three-wire control switchover
52: Electromagnetic shorting
53: Thickness overlaying
54: Roll diameter reset
55: Initial roll diameter 1
56: Initial roll diameter 2
57: Pre-drive
58: Winding/Unwinding switchover
59: Winding diameter calculation disabled
60: Exit tension control
61: Terminal tension rise
62: Thickness selection 1
63: Thickness selection 2
90: Water cooling system fault
91: Low liquid level fault
92: Revolution count reset
93: Reserved

Description

Used to set the function of DI5 terminal.
The setting is similar to that of F4-00.

F4-05 **DI6 function selection**

Address: 0xF405

Min.:	0	Unit:	-
Max.:	93	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: No function
1: Forward run (FWD)
2: Reverse run (REV)
3: Three-wire control
4: Forward jog (FJOG)
5: Reverse jog (RJOG)
6:Terminal (UP)
7:Terminal (DOWN)
8: Coast to stop
9: Fault reset (RESET)
10: Running pause
11: NO input of external fault
12: Multi-reference terminal 1
13: Multi-reference terminal 2
14: Multi-reference terminal 3
15: Multi-reference terminal 4
16: Terminal 1 for acceleration/deceleration selection
17: Terminal 2 for acceleration/deceleration selection
18: Frequency source switchover
19: UP and DOWN setting clear (terminal, operating panel)
20: Command source switchover terminal
21: Acceleration/Deceleration inhibited
22: PID pause
23: PLC state reset
24: Wobble pause
25: Counter input (DI5)
26: Counter reset
27: Length count input (DI5)
28: Length reset
29: Torque control inhibited
30: Pulse input
31: Reserved
32: Immediate DC braking
33: NC input of external fault
34: Frequency modification enabled
35: PID action direction reversal

36: External stop terminal 1
37: Command source switchover terminal 2
38: PID integral pause
39: Switchover between main frequency source X and preset frequency
40: Switchover between auxiliary frequency source Y and preset frequency
41: Motor selection
42: Position lock enabled
43: PID parameter switchover
44: User-defined fault 1
45: User-defined fault 2
46: Speed control/Torque control switchover
47: Emergency stop
48: External stop terminal 2
49: Deceleration DC braking
50: Clear the current running time
51: Two-wire/three-wire control switchover
52: Electromagnetic shorting
53: Thickness overlaying
54: Roll diameter reset
55: Initial roll diameter 1
56: Initial roll diameter 2
57: Pre-drive
58: Winding/Unwinding switchover
59: Winding diameter calculation disabled
60: Exit tension control
61: Terminal tension rise
62: Thickness selection 1
63: Thickness selection 2
90: Water cooling system fault
91: Low liquid level fault
92: Revolution count reset
93: Reserved

Description

Used to set the function of DI6 terminal.
The setting is similar to that of F4-00.

F4-06 **DI7 function selection**

Address:	0xF406		
Min.:	0	Unit:	-
Max.:	93	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: No function
1: Forward run (FWD)
2: Reverse run (REV)
3: Three-wire control
4: Forward jog (FJOG)
5: Reverse jog (RJOG)
6:Terminal (UP)
7:Terminal (DOWN)
8: Coast to stop
9: Fault reset (RESET)
10: Running pause
11: NO input of external fault
12: Multi-reference terminal 1
13: Multi-reference terminal 2
14: Multi-reference terminal 3
15: Multi-reference terminal 4
16: Terminal 1 for acceleration/deceleration selection
17: Terminal 2 for acceleration/deceleration selection
18: Frequency source switchover
19: UP and DOWN setting clear (terminal, operating panel)
20: Command source switchover terminal
21: Acceleration/Deceleration inhibited
22: PID pause
23: PLC state reset
24: Wobble pause
25: Counter input (DI5)
26: Counter reset
27: Length count input (DI5)
28: Length reset
29: Torque control inhibited
30: Pulse input
31: Reserved
32: Immediate DC braking
33: NC input of external fault
34: Frequency modification enabled
35: PID action direction reversal

36: External stop terminal 1
37: Command source switchover terminal 2
38: PID integral pause
39: Switchover between main frequency source X and preset frequency
40: Switchover between auxiliary frequency source Y and preset frequency
41: Motor selection
42: Position lock enabled
43: PID parameter switchover
44: User-defined fault 1
45: User-defined fault 2
46: Speed control/Torque control switchover
47: Emergency stop
48: External stop terminal 2
49: Deceleration DC braking
50: Clear the current running time
51: Two-wire/three-wire control switchover
52: Electromagnetic shorting
53: Thickness overlaying
54: Roll diameter reset
55: Initial roll diameter 1
56: Initial roll diameter 2
57: Pre-drive
58: Winding/Unwinding switchover
59: Winding diameter calculation disabled
60: Exit tension control
61: Terminal tension rise
62: Thickness selection 1
63: Thickness selection 2
90: Water cooling system fault
91: Low liquid level fault
92: Revolution count reset
93: Reserved

Description

Used to set the function of DI7 terminal.
The setting is similar to that of F4-00.

F4-07 **DI8 function selection**

Address:	0xF407		
Min.:	0	Unit:	-
Max.:	93	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: No function
1: Forward run (FWD)
2: Reverse run (REV)
3: Three-wire control
4: Forward jog (FJOG)
5: Reverse jog (RJOG)
6:Terminal (UP)
7:Terminal (DOWN)
8: Coast to stop
9: Fault reset (RESET)
10: Running pause
11: NO input of external fault
12: Multi-reference terminal 1
13: Multi-reference terminal 2
14: Multi-reference terminal 3
15: Multi-reference terminal 4
16: Terminal 1 for acceleration/deceleration selection
17: Terminal 2 for acceleration/deceleration selection
18: Frequency source switchover
19: UP and DOWN setting clear (terminal, operating panel)
20: Command source switchover terminal
21: Acceleration/Deceleration inhibited
22: PID pause
23: PLC state reset
24: Wobble pause
25: Counter input (DI5)
26: Counter reset
27: Length count input (DI5)
28: Length reset
29: Torque control inhibited
30: Pulse input
31: Reserved
32: Immediate DC braking
33: NC input of external fault
34: Frequency modification enabled
35: PID action direction reversal

36: External stop terminal 1
37: Command source switchover terminal 2
38: PID integral pause
39: Switchover between main frequency source X and preset frequency
40: Switchover between auxiliary frequency source Y and preset frequency
41: Motor selection
42: Position lock enabled
43: PID parameter switchover
44: User-defined fault 1
45: User-defined fault 2
46: Speed control/Torque control switchover
47: Emergency stop
48: External stop terminal 2
49: Deceleration DC braking
50: Clear the current running time
51: Two-wire/three-wire control switchover
52: Electromagnetic shorting
53: Thickness overlaying
54: Roll diameter reset
55: Initial roll diameter 1
56: Initial roll diameter 2
57: Pre-drive
58: Winding/Unwinding switchover
59: Winding diameter calculation disabled
60: Exit tension control
61: Terminal tension rise
62: Thickness selection 1
63: Thickness selection 2
90: Water cooling system fault
91: Low liquid level fault
92: Revolution count reset
93: Reserved

Description

Used to set the function of DI8 terminal.
The setting is similar to that of F4-00.

F4-08 **DI9 function selection**

Address: 0xF408

Min.:	0	Unit:	-
Max.:	93	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: No function
1: Forward run (FWD)
2: Reverse run (REV)
3: Three-wire control
4: Forward jog (FJOG)
5: Reverse jog (RJOG)
6:Terminal (UP)
7:Terminal (DOWN)
8: Coast to stop
9: Fault reset (RESET)
10: Running pause
11:NO input of external fault
12: Multi-reference terminal 1
13: Multi-reference terminal 2
14: Multi-reference terminal 3
15: Multi-reference terminal 4
16:Terminal 1 for acceleration/deceleration selection
17: Terminal 2 for acceleration/deceleration selection
18: Frequency source switchover
19: UP and DOWN setting clear (terminal, operating panel)
20: Command source switchover terminal
21: Acceleration/Deceleration inhibited
22: PID pause
23: PLC state reset
24: Wobble pause
25:Counter input (DI5)
26: Counter reset
27: Length count input (DI5)
28: Length reset
29: Torque control inhibited
30: Pulse input
31: Reserved
32: Immediate DC braking
33: NC input of external fault
34: Frequency modification enable
35: PID action direction reversal

36: External stop terminal 1
37: Command source switchover terminal 2
38: PID integral pause
39: Switchover between main frequency source X and preset frequency
40: Switchover between auxiliary frequency source Y and preset frequency
41: Motor selection
42: Position lock enabled
43: PID parameter switchover
44: User-defined fault 1
45: User-defined fault 2
46: Speed control/Torque control switchover
47: Emergency stop
48: External stop terminal 2
49: Deceleration DC braking
50: Clear the current running time
51: Two-wire/three-wire control switchover
52: Electromagnetic shorting
53: Thickness overlaying
54: Roll diameter reset
55: Initial roll diameter 1
56: Initial roll diameter 2
57: Pre-drive
58: Winding/Unwinding switchover59: Winding diameter calculation disabled
60: Exit tension control
61: Terminal tension rise
62: Thickness selection 1
63: Thickness selection 2
90: Water cooling system fault
91: Low liquid level fault
92: Revolution count reset
93: Reserved

Description

Used to set the function of DI9.
The setting is similar to that of F4-00.

F4-09 **DI10 function selection**

Address: 0xF409

Min.:	0	Unit:	-
Max.:	93	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: No function
1: Forward run (FWD)
2: Reverse run (REV)
3: Three-wire control
4: Forward jog (FJOG)
5: Reverse jog (RJOG)
6:Terminal (UP)
7:Terminal (DOWN)
8: Coast to stop
9: Fault reset (RESET)
10: Running pause
11: NO input of external fault
12: Multi-reference terminal 1
13: Multi-reference terminal 2
14: Multi-reference terminal 3
15: Multi-reference terminal 4
16: Terminal 1 for acceleration/deceleration selection
17: Terminal 2 for acceleration/deceleration selection
18: Frequency source switchover
19: UP and DOWN setting clear (terminal, operating panel)
20: Command source switchover terminal
21: Acceleration/Deceleration inhibited
22: PID pause
23: PLC state reset
24: Wobble pause
25: Counter input (DI5)
26: Counter reset
27: Length count input (DI5)
28: Length reset
29: Torque control inhibited
30: Pulse input
31: Reserved
32: Immediate DC braking
33: NC input of external fault
34: Frequency modification enabled
35: PID action direction reversal

36: External stop terminal 1
37: Command source switchover terminal 2
38: PID integral pause
39: Switchover between main frequency source X and preset frequency
40: Switchover between auxiliary frequency source Y and preset frequency
41: Motor selection
42: Position lock enabled
43: PID parameter switchover
44: User-defined fault 1
45: User-defined fault 2
46: Speed control/Torque control switchover
47: Emergency stop
48: External stop terminal 2
49: Deceleration DC braking
50: Clear the current running time
51: Two-wire/three-wire control switchover
52: Electromagnetic shorting
53: Thickness overlaying
54: Roll diameter reset
55: Initial roll diameter 1
56: Initial roll diameter 2
57: Pre-drive
58: Winding/Unwinding switchover
59: Winding diameter calculation disabled
60: Exit tension control
61: Terminal tension rise
62: Thickness selection 1
63: Thickness selection 2
90: Water cooling system fault
91: Low liquid level fault
92: Revolution count reset
93: Reserved

Description

Used to set the function of DI10.
The setting is similar to that of F4-00.

F4-10 **DI filter time**

Address:	0xF40A		
Min.:	0	Unit:	s
Max.:	1	Data type:	UInt16
Default:	0.01	Change:	In real time

Value Range:

0.000s to 1.000s

Description

It is used to set the software filter time of DI terminal status. If DI terminals are liable to be interfered, which may cause malfunction, increase the value of this parameter to enhance the anti-interference capability. However, increasing the DI filter time will slow the response of DI terminals.

F4-11 **Terminal control mode**

Address:	0xF40B		
Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Two-wire mode 1

1: Two-wire mode 2

2: Three-wire mode 1

3: Three-wire mode 2

Description

This parameter defines the mode in which the AC drive is controlled by external terminals.

0: Two-wire mode 1

Two DI terminals are connected. One is used to start/stop the AC drive in forward run mode, and the other is used to start/stop the AC drive in reverse run mode.

1: Two-wire mode 2

Two DI terminals are connected. One is used to start/stop the AC drive, and the other is used to control the running direction.

2: Three-wire mode 1

Three DI terminals are connected. One is used to start/stop the AC drive, and the other two are used to control the running direction.

3: Three-wire mode 2

Three DI terminals are connected. One is used to start the AC drive, one is used to stop the AC drive, and the last one is used to control the running direction.

F4-12 **Terminal UP/DOWN change rate**

Address:	0xF40C		
Min.:	0.001	Unit:	Hz/s
Max.:	65.535	Data type:	UInt16
Default:	1	Change:	In real time

Value Range:

0.001 Hz/s to 65.535 Hz/s

Description

This parameter defines the change rate when the frequency is adjusted through terminal UP/DOWN.
When the DI terminal function is set to the function of terminal UP or DOWN, this parameter must be set (values of F4-00 to F4-09 are 6 or 7).

F4-13 AI curve 1 minimum input

Address:	0xF40D		
Min.:	-10	Unit:	V
Max.:	F4-15	Data type:	Int16
Default:	-10	Change:	In real time

Value Range:

-10.00 V to F4-15

Description

When the main frequency is set by analog input, the AI terminals are used as frequency sources. Five types of AI curves can be set for each AI terminal. The AI curve is used to set the mapping between the analog input voltage (or current) and the percentage corresponding to the maximum frequency (F0-10). The x axis of the AI curve represents the analog input voltage or current. The y axis represents the set value corresponding to the analog input, that is, the percentage corresponding to the maximum frequency (F0-10). Five AI curves are provided. Curves 1 to 3 are two-point curves, and their relevant parameters are F4-13 to F4-27. Curves 4 and 5 are four-point curves, and their relevant parameters are A6-00 to A6-15. The two points on curves 1 to 3 are the minimum input point and the maximum input point. F4-13 corresponds to the x axis of the AI curve 1 minimum input, that is, the minimum analog input voltage or current.

F4-14 Percentage corresponding to AI curve 1 minimum input

Address:	0xF40E		
Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	-100	Change:	In real time

Value Range:

-100.0% to +100.0%

Description

F4-14 corresponds to the y axis of the AI curve 1 minimum input, that is, the set value corresponding to the minimum analog input.

F4-15 AI curve 1 maximum input

Address:	0xF40F		
Min.:	F4-13	Unit:	V
Max.:	10	Data type:	Int16

Default: 10 Change: In real time

Value Range:

F4-13 to 10.00 V

Description

F4-15 corresponds to the x axis of AI curve 1 maximum input, that is, the maximum analog input voltage or current.

F4-16 Percentage corresponding to AI curve 1 maximum input

Address: 0xF410

Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	100	Change:	In real time

Value Range:

-100.0% to +100.0%

Description

F4-16 corresponds to the y axis of the AI curve 1 maximum input, that is, the set value corresponding to the maximum analog input.

F4-17 AI1 fitter time

Address: 0xF411

Min.:	0	Unit:	s
Max.:	10	Data type:	UInt16
Default:	0.1	Change:	In real time

Value Range:

0.00s to 10.00s

Description

Indicates the software filter time of AI1.

The longer the AI filter time, the stronger the anti-interference ability and the slower the response speed to the analog detection. The shorter the AI filter time, the weaker the anti-interference ability and the faster the response speed to analog detection.

When the field analog signal is easy to be interfered, the stability of the analog signal can be enhanced by increasing the AI filtering time.

F4-18 AI curve 2 minimum input

Address: 0xF412

Min.:	-10	Unit:	V
Max.:	F4-20	Data type:	Int16
Default:	-10	Change:	In real time

Value Range:

-10.00 V to F4-20

Description

F4-18 corresponds to the x axis of the AI curve 2 minimum input, that is, the minimum analog input voltage or current.

F4-19 **Percentage corresponding to AI curve 2 minimum input**

Address:	0xF413		
Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	-100	Change:	In real time

Value Range:

-100.0% to +100.0%

Description

F4-19 corresponds to the y axis of the AI curve 2 minimum input, that is, the set value corresponding to the minimum analog input.

F4-20 **AI curve 2 maximum input**

Address:	0xF414		
Min.:	F4-18	Unit:	V
Max.:	10	Data type:	Int16
Default:	10	Change:	In real time

Value Range:

F4-18 to 10.00 V

Description

F4-20 corresponds to the x axis of the AI curve 2 maximum input, that is, the maximum analog input voltage or current.

F4-21 **Percentage corresponding to AI curve 2 maximum input**

Address:	0xF415		
Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	100	Change:	In real time

Value Range:

-100.0% to 100.0%

Description

F4-21 corresponds to the y axis of AI curve 2 maximum input, that is, the set value corresponding to the maximum analog input.

F4-22 **AI2 fitter time**

Address:	0xF416		
Min.:	0	Unit:	s
Max.:	10	Data type:	UInt16

Default:	0.1	Change:	In real time

Value Range:

0.00s to 10.00s

Description

Indicates the software filter time of AI2.

The longer the AI filter time, the stronger the anti-interference ability and the slower the response speed to the analog detection. The shorter the AI filter time, the weaker the anti-interference ability and the faster the response speed to analog detection.

When the field analog signal is easy to be interfered, the stability of the analog signal can be enhanced by increasing the AI filtering time.

F4-23 AI curve 3 minimum input

Address:	0xF417		
Min.:	-10	Unit:	V
Max.:	F4-25	Data type:	Int16
Default:	-10	Change:	In real time

Value Range:

-10.00 V to F4-25

Description

F4-23 corresponds to the x axis of the AI curve 3 minimum input, that is, the minimum analog input voltage or current.

F4-24 Percentage corresponding to AI curve 3 minimum input

Address:	0xF418		
Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	-100	Change:	In real time

Value Range:

-100.0% to +100.0%

Description

F4-24 corresponds to the y axis of AI curve 3 minimum input, that is, the set value corresponding to the minimum analog input.

F4-25 AI curve 3 maximum input

Address:	0xF419		
Min.:	F4-23	Unit:	V
Max.:	10	Data type:	Int16
Default:	10	Change:	In real time

Value Range:

F4-23 to 10.00 V

Description

F4-25 corresponds to the x axis of AI curve 3 maximum input, that is, the maximum analog input voltage or current.

F4-26 **Percentage corresponding to AI curve 3 maximum input**

Address:	0xF41A		
Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	100	Change:	In real time

Value Range:

-100.0% to +100.0%

Description

F4-26 corresponds to the y axis of AI curve 3 maximum input, that is, the set value corresponding to the maximum analog input.

F4-27 **AI3 filter time**

Address:	0xF41B		
Min.:	0	Unit:	s
Max.:	10	Data type:	UInt16
Default:	0.1	Change:	In real time

Value Range:

0.00s to 10.00s

Description

Indicates the software filter time of AI3.

The longer the AI filter time, the stronger the anti-interference ability and the slower the response speed to the analog detection. The shorter the AI filter time, the weaker the anti-interference ability and the faster the response speed to analog detection.

When the field analog signal is easy to be interfered, the stability of the analog signal can be enhanced by increasing the AI filtering time.

F4-28 **Pulse minimum input**

Address:	0xF41C		
Min.:	0	Unit:	kHz
Max.:	F4-30	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00 kHz to F4-30

Description

When the DI5 high-speed pulse is used to set the main frequency, the relationship curve between the pulse frequency and the frequency reference must be defined. The frequency reference is the percentage corresponding to the maximum frequency (F0-10). The x axis of the curve represents the DI5 pulse frequency and the y axis represents the percentage corresponding to the maximum frequency (F0-10). The curve is a two-point curve, which includes the minimum pulse input and maximum pulse input points.
F4-28 corresponds to the x axis of the minimum pulse input, that is, the minimum input frequency of the pulse.

F4-29 Percentage corresponding to pulse minimum input

Address: 0xF41D

Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	0	Change:	In real time

Value Range:

-100.0% to +100.0%

Description

F4-29 corresponds to the y axis of the minimum pulse input, that is, the set value corresponding to the minimum pulse input.

F4-30 Pulse maximum input

Address: 0xF41E

Min.:	F4-28	Unit:	kHz
Max.:	100	Data type:	UInt16
Default:	50	Change:	In real time

Value Range:

F4-28 to 100.00 kHz

Description

F4-30 corresponds to the x axis of the maximum pulse input, that is, the maximum input frequency of the pulse.

F4-31 Percentage corresponding to pulse maximum input

Address: 0xF41F

Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	100	Change:	In real time

Value Range:

-100.0% to +100.0%

Description

F4-31 corresponds to the y axis of the maximum pulse input, that is, the set value corresponding to the maximum pulse input.

F4-32 **Pulse filter time**

Address:	0xF420		
Min.:	0	Unit:	s
Max.:	10	Data type:	UInt16
Default:	0.1	Change:	In real time

Value Range:

0.00s to 10.00s

Description

Indicates the filter time of the frequency reference.

F4-33 **AI curve selection**

Address:	0xF421		
Min.:	0x111	Unit:	-
Max.:	0x555	Data type:	UInt16
Default:	0x321	Change:	In real time

Value Range:

Ones: AI1

1: Curve 1 (2 points, see F4-13 to F4-16)

2: Curve 2 (2 points, see F4-18 to F4-21)

3: Curve 3 (2 points, see F4-23 to F4-26)

4: Curve 4 (4 points, see A6-00 to A6-07)

5: Curve 5 (4 points, see A6-08 to A6-15)

Tens: AI2

1: Curve 1 (2 points, see F4-13 to F4-16)

2: Curve 2 (2 points, see F4-18 to F4-21)

3: Curve 3 (2 points, see F4-23 to F4-26)

4: Curve 4 (4 points, see A6-00 to A6-07)

5: Curve 5 (4 points, see A6-08 to A6-15)

Hundreds: AI3

1: Curve 1 (2 points, see F4-13 to F4-16)

2: Curve 2 (2 points, see F4-18 to F4-21)

3: Curve 3 (2 points, see F4-23 to F4-26)

4: Curve 4 (4 points, see A6-00 to A6-07)

5: Curve 5 (4 points, see A6-08 to A6-15)

Description

The curves for AI1 to AI3 are set through the ones, tens, and hundreds positions of this parameter. The three AI terminals can be allocated with any of the five curves. When the main frequency is set by analog input, the AI terminals are used as frequency sources. Five types of different AI curves can be set for each AI terminal.

F4-34 **Selection of AI smaller than the minimum input setting**

Address:	0xF422

Min.:	0	Unit:	-
Max.:	0x111	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

Ones (position): AI1
0: Percentage corresponding to minimum input
1: 0.0%
Tens (position): AI2
0: Percentage corresponding to minimum input
1: 0.0%
Hundreds (position): AI3
0: Percentage corresponding to minimum input
1: 0.0%

Description

The settings for AI1 to AI3 less than minimum input are set through the ones, tens, and hundreds positions of this parameter. When the analog input voltage is less than the minimum input set by F4-13, the corresponding setting value is calculated according to the minimum input or 0.0% defined by this parameter.

F4-35 DI1 delay

Address: 0xF423

Min.:	0	Unit:	s
Max.:	3600	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s to 3600.0s

Description

This parameter defines the delay of the DI state change. The delay setting function is available only for DI1, DI2, and DI3 currently.

F4-36 DI2 delay

Address: 0xF424

Min.:	0	Unit:	s
Max.:	3600	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s to 3600.0s

Description

This parameter defines the delay of the DI state change. The delay setting function is available only for DI1, DI2, and DI3 currently.

F4-37 **DI3 delay**

Address: 0xF425

Min.:	0	Unit:	s
Max.:	3600	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s to 3600.0s

Description

This parameter defines the delay of the DI state change. The delay setting function is available only for DI1, DI2, and DI3 currently.

F4-38 **DI valid mode selection 1**

Address: 0xF426

Min.:	0	Unit:	-
Max.:	11111	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

Ones: DI1 valid mode selection
0: Active high
1: Active low
Tens: DI2 valid mode selection
0: Active high
1: Active low
Hundreds: DI3 valid mode selection
0: Active high
1: Active low
Thousands: DI4 valid mode selection
0: Active high
1: Active low
Ten thousands: DI5 valid mode selection
0: Active high
1: Active low

Description

The active mode for terminals DI1 to DI5 are set by ones, tens, hundreds, thousands, and ten thousands of this parameter.

0: Active high

The DI terminals (DI1 to DI5) are active when connected to COM and inactive when disconnected from COM.

1: Active low

The DI terminals (DI1 to DI5) are inactive when connected to COM and active when disconnected from COM.

F4-39 DI valid mode selection 2

Address:	0xF427		
Min.:	0	Unit:	-
Max.:	11111	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

Ones: DI6 valid mode selection
0: Active high
1: Active low
Tens: DI7 valid mode selection
0: Active high
1: Active low
Hundreds: DI8 valid mode selection
0: Active high
1: Active low
Thousands: DI9 valid mode selection
0: Active high
1: Active low
Ten thousands: DI10 valid mode selection
0: Active high
1: Active low

Description

The active mode for terminals DI6 to DI10 are set by ones, tens, hundreds, thousands, and ten thousands of this parameter.

0: Active high

The DI terminals (DI6 to DI10) are active when connected to COM and inactive when disconnected from COM.

1: Active low

The DI terminals (DI6 to DI10) are inactive when connected to COM and active when disconnected from COM.

F4-42 AI input range selection

Address:	0xF42A		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: -10 V to +10 V
1: 0 V to 10 V

Description

0: -10 V to +10 V, applicable to new control boards
1: 0 V to 10 V, applicable to old control boards

2.6 F5 Output Terminal

F5-01 **Expansion card relay output function selection**

Address:	0xF501		
Min.:	0	Unit:	-
Max.:	51	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: No output
1: Running
2: Fault output (stop upon fault)
3: Frequency-level detection FDT1 output
4: Frequency reached
5: Zero speed running (no output at stop)
6: Motor overload pre-warning
7: AC drive overload pre-warning
8: Set count value reached
9: Designated count value reached
10: Length reached
11: PLC cycle completed
12: Accumulative running time reached
13: Frequency limited
14: Torque limited
15: Ready for run

16: AI1 > AI2
17: Frequency upper limit reached
18: Frequency lower limit reached (operation related)
19: Undervoltage status output
20: Communication setting
21: Reserved
22: Reserved
23: Zero-speed running 2 (at stop)
24: Accumulative power-on time reached
25: Frequency-level detection FDT2 output
26: Frequency 1 reach output
27: Frequency 2 reach output
28: Current 1 reach output
29: Current 2 reach output
30: Timing reach output
31: AI1 input limit exceeded
32: AC drive output load loss
33: Reverse running
34: Zero current status
35: Module temperature reached
36: Output current limit exceeded
37: Frequency lower limit reached (having output at stop)
38: Alarm output (direct output at fault or alarm)
39: Current over-temperature pre-warning
40: Current running time reached
41: Fault output 2
42: Fault output 3

Description

This parameter is used to set the relay terminal function of the expansion card.

0: No output

The output terminal has no function.

1: Running

When the AC drive is running with output frequency (can be 0), the terminal outputs an active signal.

2: Fault output (stop upon fault)

When the AC drive stops upon fault, an active signal is output.

3: Frequency-level detection FDT1 output

When the running frequency is higher than the detected value, the DO outputs an active signal. When the running frequency is lower than the result of the detected value minus the FDT hysteresis value (F8-19 x F8-20), the active signal is canceled.

4: Frequency reached
When the running frequency of the AC drive is within a certain range (target frequency ± F8-21 x maximum frequency), the DO outputs an active signal.
5: Zero speed running (no output at stop)
When the output frequency is 0 during AC drive running, an active signal is output. When the AC drive is in the stop state, the signal is inactive.
6: Motor overload pre-warning
The AC drive determines whether the motor load exceeds the overload pre-warning threshold according to the overload pre-warning coefficient (F9-02) before performing the protection action. The terminal outputs an active signal when the overload pre-warning threshold is exceeded.
7: AC drive overload pre-warning
The terminal outputs an active signal 10s before the AC drive performs overload protection.
8: Set count value reached
The terminal outputs an active signal when the count value reaches the value of FB-08.
9: Designated count value reached
The terminal outputs an active signal when the count value reaches the value of FB-09.
10: Length reached
The terminal outputs an active signal when the detected actual length exceeds the value of FB-05.
11: Simple PLC cycle completed
The terminal outputs a pulse signal with the width of 250 ms when the simple PLC completes one cycle.
12: Accumulative running time reached
The terminal outputs an active signal when the accumulative running time of the AC drive exceeds the value of F8-17 (Accumulative power-on time threshold).
13: Frequency limited
The terminal outputs an active signal when the frequency reference exceeds the frequency upper or lower limit, and the output frequency of AC drive reaches the upper or lower limit.
14: Torque limited
The terminal outputs an active signal when the output torque of the AC drive reaches the toque limit in speed control mode.
15: Ready to run
The terminal outputs an active signal when the AC drive is ready for running without any fault after power-on.
16: AI1 > AI2
The terminal outputs an active signal when the AI1 input is higher than the AI2 input.

17: Frequency upper limit reached
The terminal outputs an active signal when the running frequency reaches the frequency upper limit (F0-12).
18: Frequency lower limit reached (no output at stop)
If F8-14 (running mode when frequency reference lower than lower limit) is set to 1 (stop), the terminal outputs an inactive signal no matter whether the running frequency reaches the frequency lower limit.
When F8-14 is set to 0 (run at the lower limit frequency) or 2 (run at zero speed) and the running frequency reaches the lower limit, the terminal outputs an active signal.
19: Undervoltage state
The terminal outputs an active signal when undervoltage occurs on the AC drive.
20: Communication setting
Whether the terminal is active or inactive is determined by communication address 0x2001.
21: Reserved
22: Reserved
23: Zero-speed running 2 (at stop)
When the output frequency is 0 during AC drive running, an active signal is output. When the AC drive stops, the active signal is retained.
24: Accumulative power-on time reached
The terminal outputs an active signal when the accumulative power-on time of the AC drive (F7-13) exceeds the value of F8-16 (Accumulative power-on time threshold).
25: Frequency-level detection FDT2 output
When the running frequency is higher than the detected value, the DO outputs an active signal. When the running frequency is lower than the result of the detected value minus the frequency detection hysteresis value (F8-28 x F8-29), the active signal is canceled.
26: Frequency 1 reached
When the running frequency of the AC drive is within the detection range of F8-30 (Frequency detection value 1), the DO outputs an active signal.
Frequency detection range: F8-30 - F8-31 x F0-10 (Maximum frequency) to F8-30 + F8-31 x F0-10
27: Frequency 2 reached
When the running frequency of the AC drive is within the detection range of F8-32 (Frequency detection value 2), the DO outputs an active signal.
Frequency detection range: F8-32 - F8-33 x F0-10 (Maximum frequency) to F8-32 + F8-33 x F0-10
28: Current 1 reached
When the output current of the AC drive is within the detection range of F8-38 (Detection level of current 1), the DO outputs an active signal.

Current detection range = F8-38 - F8-39 x F1-03 (Rated motor current) to F8-38 + F8-39 x F1 03.
29: Current 2 reached
When the output current of the AC drive is within the detection range of F8-40 (Detection level of current 2), the DO outputs an active signal.
Current detection range = F8-40 - F8-41 x F1-03 (Rated motor current) to F8-40 + F8-41 x F1 03.
30: Timing reached
With the timing function (F8-42) enabled, when the current running time of the AC drive reaches the set time, the terminal outputs an active signal. The timing duration is set by F8-43 and F8-44.
31: AI1 input limit exceeded
The terminal outputs an active signal when AI1 input is higher than the value of F8-46 (AI1 input voltage upper limit) or lower than the value of F8-45 (AI1 input voltage lower limit).
32: AC drive output load loss
The terminal outputs an active signal when load loss occurs.
33: Reverse running
The terminal outputs an active signal when the AC drive runs in the reverse direction.
34: Zero current state
When the output current of the AC drive is within the zero-current range for a time exceeding F8-35 (Zero current detection delay), the DO outputs an active signal.
Zero current detection range = 0 to F8-34 x F1-03
35: Module temperature reached
The terminal outputs an active signal when the inverter heatsink temperature (F7-07) reaches the value of F8-47 (IGBT temperature reach).
36: Output current limit exceeded
When the output current of the AC drive is greater than F8-36 (Output overcurrent threshold) for a time exceeding F8-37 (Output overcurrent detection delay), the DO outputs an active signal.
37: Frequency lower limit reached (having output at stop)
The terminal outputs an active signal when the running frequency reaches the frequency lower limit (F0-14). The terminal also outputs the active signal when the AC drive stops.
38: Alarm output (direct output at fault or alarm)
If a fault occurs on the AC drive and the AC drive continues to run upon fault, the DO outputs an active signal.
For details about the fault protection action, see F9-47 to F9-50.

39: Motor overtemperature
The terminal outputs an active signal when the motor temperature reaches the value of F9-58 (Motor overtemperature pre-warning threshold). You can check the motor temperature using U0-34.
40: Current running time reached
The terminal outputs an active signal when the current operation time of the AC drive is longer than the value of F8-53 (current running time threshold).
41: Fault output 2
When a fault occurs on the AC drive (undervoltage excluded), the DO terminal outputs an active signal.
42: Fault output 3
When a fault occurs on the AC drive, the DO terminal outputs an active signal.
43 to 51: Reserved

F5-02 **Control board relay 1 function selection (T/A1-T/B1-TC1)**

Address: 0xF502

Min.:	0	Unit:	-
Max.:	51	Data type:	UInt16
Default:	2	Change:	In real time

Value Range:
0: No output
1: Running
2: Fault output (stop upon fault)
3: Frequency-level detection FDT1 output
4: Frequency reached
5: Zero speed running (no output at stop)
6: Motor overload pre-warning
7: AC drive overload pre-warning
8: Set count value reached
9: Designated count value reached
10: Length reached
11: PLC cycle completed
12: Accumulative running time reached
13: Frequency limited
14: Torque limited
15: Ready for run

16: AI1 > AI2
17: Frequency upper limit reached
18: Frequency lower limit reached (operation related)
19: Undervoltage status output
20: Communication setting
21: Reserved
22: Reserved
23: Zero-speed running 2 (at stop)
24: Accumulative power-on time reached
25: Frequency-level detection FDT2 output
26: Frequency 1 reach output
27: Frequency 2 reach output
28: Current 1 reach output
29: Current 2 reach output
30: Timing reach output
31: AI1 input limit exceeded
32: AC drive output load loss
33: Reverse running
34: Zero current status
35: Module temperature reached
36: Output current limit exceeded
37: Frequency lower limit reached (having output at stop)
38: Alarm output (direct output at fault or alarm)
39: Current over-temperature pre-warning
40: Current running time reached
41: Fault output 2
42: Fault output 3

Description

Used to set the terminal function of the control board relay (T/A1-T/B1-T/C1). The setting is similar to that of F5-01.

F5-03 **Control board relay 2 function selection (T/A2-TC2)**

Address: 0xF503

Min.:	0	Unit:	-
Max.:	51	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: No output
1: Running
2: Fault output (stop upon fault)
3: Frequency-level detection FDT1 output
4: Frequency reached
5: Zero speed running (no output at stop)
6: Motor overload pre-warning
7: AC drive overload pre-warning
8: Set count value reached
9: Designated count value reached
10: Length reached
11: PLC cycle completed
12: Accumulative running time reached
13: Frequency limited
14: Torque limited
15: Ready for run

16: AI1 > AI2
17: Frequency upper limit reached
18: Frequency lower limit reached (operation related)
19: Undervoltage status output
20: Communication setting
21: Reserved
22: Reserved
23: Zero-speed running 2 (at stop)
24: Accumulative power-on time reached
25: Frequency-level detection FDT2 output
26: Frequency 1 reach output
27: Frequency 2 reach output
28: Current 1 reach output
29: Current 2 reach output
30: Timing reach output
31: AI1 input limit exceeded
32: AC drive output load loss
33: Reverse running
34: Zero current status
35: Module temperature reached
36: Output current limit exceeded
37: Frequency lower limit reached (having output at stop)
38: Alarm output (direct output at fault or alarm)
39: Current over-temperature pre-warning
40: Current running time reached
41: Fault output 2
42: Fault output 3

Description

Used to set the terminal function of the control board relay (T/A2-T/C2). The setting is similar to that of F5-01.

F5-04 **DO1 function selection**

Address:	0xF504		
Min.:	0	Unit:	-
Max.:	51	Data type:	UInt16
Default:	1	Change:	In real time

Value Range:

0: No output
1: Running
2: Fault output (stop upon fault)
3: Frequency-level detection FDT1 output
4: Frequency reached
5: Zero speed running (no output at stop)
6: Motor overload pre-warning
7: AC drive overload pre-warning
8: Set count value reached
9: Designated count value reached
10: Length reached
11: PLC cycle completed
12: Accumulative running time reached
13: Frequency limited
14: Torque limited
15: Ready for run

16: AI1 > AI2
17: Frequency upper limit reached
18: Frequency lower limit reached (operation related)
19: Undervoltage status output
20: Communication setting
21: Reserved
22: Reserved
23: Zero-speed running 2 (at stop)
24: Accumulative power-on time reached
25: Frequency-level detection FDT2 output
26: Frequency 1 reach output
27: Frequency 2 reach output
28: Current 1 reach output
29: Current 2 reach output
30: Timing reach output
31: AI1 input limit exceeded
32: AC drive output load loss
33: Reverse running
34: Zero current status
35: Module temperature reached
36: Output current limit exceeded
37: Frequency lower limit reached (having output at stop)
38: Alarm output (direct output at fault or alarm)
39: Current over-temperature pre-warning
40: Current running time reached
41: Fault output 2
42: Fault output 3

Description

Used to set the function of DO1.
The setting is similar to that of F5-01.

F5-05 **Expansion card DO2 output selection**

Address: 0xF505

Min.:	0	Unit:	-
Max.:	51	Data type:	UInt16
Default:	4	Change:	In real time

Value Range:

0: No output
1: Running
2: Fault output (stop upon fault)
3: Frequency-level detection FDT1 output
4: Frequency reached
5: Zero speed running (no output at stop)
6: Motor overload pre-warning
7: AC drive overload pre-warning
8: Set count value reached
9: Designated count value reached
10: Length reached
11: PLC cycle completed
12: Accumulative running time reached
13: Frequency limited
14: Torque limited
15: Ready for run

16: AI1 > AI2
17: Frequency upper limit reached
18: Frequency lower limit reached (operation related)
19: Undervoltage status output
20: Communication setting
21: Reserved
22: Reserved
23: Zero-speed running 2 (at stop)
24: Accumulative power-on time reached
25: Frequency-level detection FDT2 output
26: Frequency 1 reach output
27: Frequency 2 reach output
28: Current 1 reach output
29: Current 2 reach output
30: Timing reach output
31: AI1 input limit exceeded
32: AC drive output load loss
33: Reverse running
34: Zero current status
35: Module temperature reached
36: Output current limit exceeded
37: Frequency lower limit reached (having output at stop)
38: Alarm output (direct output at fault or alarm)
39: Current over-temperature pre-warning
40: Current running time reached
41: Fault output 2
42: Fault output 3

Description

Used to set the function of DO2 on the expansion card.
The setting is similar to that of F5-01.

F5-06 **FMP output function selection**

Address:	0xF506		
Min.:	0	Unit:	-
Max.:	22	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Running frequency
1: Frequency reference
2: Output current
3: Output torque
4: Output power
5: Output voltage
6: Pulse input (100.0% corresponds to 100.00 kHz)
7: AI1
8: AI2
9: AI3
10: Length
11: Count value
12: Communication
13: Motor speed
14: Output current (100.0% corresponds to 1000.0 A)
15: Output voltage (100.0% corresponds to 1000.0 V)
16: Output torque (directional)
19: Taper output
20: Roll diameter output
21: Tension output
22: Encoder feedback frequency

Description

This parameter takes effect only when F4-41 is set to 1.

0: Running frequency (100.0% corresponding to the maximum frequency F0-10)
1: Frequency reference
2: Output current (100.0% corresponding to 2 times the rated motor current)
3: Motor output torque (100.0% corresponding to 2 times the rated motor torque) (absolute value, percentage of the rated motor torque)
4: Output power (100.0% corresponding to 2 times the rated motor power)
5: Output voltage (100.0% corresponding to 1.2 times the rated motor voltage)
6: Pulse input (100.0% corresponding to 100.0 kHz)
7: AI1 (100.0% corresponding to 10 V)
8: AI2 (100.0% corresponding to 10 V)
9: AI3 (100.0% corresponding to 10 V)
10: Length (100.0% corresponding to FB-05)
11: Count value (100.0% corresponding to FB-08)
12: Communication setting (100.0% corresponding to the AO communication setting)
13: Motor speed (100.0% corresponding to the maximum frequency F0-10)
14: Output current (100.0% corresponding to 1000.0 A)
15: Output voltage (100.0% corresponding to 1000.0 V)
16: Motor output torque (100.0% corresponding to 2 times the rated motor torque in one direction; 50% corresponding to 2 times the rated motor torque in the other direction)
(actual value, percentage of the rated motor torque)
19: Taper output
20: Roll diameter output (100.0% corresponding to the maximum roll diameter B0-08)
21: Tension output (100.0% corresponding to the maximum tension B1-02)
22: Encoder feedback frequency (100.0% corresponding to the maximum frequency F0-10)

F5-07 **AO1 function selection**

Address:	0xF507		
Min.:	0	Unit:	-
Max.:	22	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Running frequency
1: Frequency reference
2: Output current
3: Output torque
4: Output power
5: Output voltage
6: Pulse input (100.0% corresponds to 100.00 kHz)
7: AI1
8: AI2
9: AI3
10: Length
11: Count value
12: Communication
13: Motor speed
14: Output current (100.0% corresponds to 1000.0 A)
15: Output voltage (100.0% corresponds to 1000.0 V)
16: Output torque (directional)
19: Taper output
20: Roll diameter output
21: Tension output
22: Encoder feedback frequency

Description

0: Running frequency (100.0% corresponding to the maximum frequency F0-10)
1: Frequency reference
2: Output current (100.0% corresponding to 2 times the rated motor current)
3: Motor output torque (100.0% corresponding to 2 times the rated motor torque) (absolute value, percentage of the rated motor torque)
4: Output power (100.0% corresponding to 2 times the rated motor power)
5: Output voltage (100.0% corresponding to 1.2 times the rated motor voltage)
6: Pulse input (100.0% corresponding to 100.0 kHz)
7: AI1 (100.0% corresponding to 10 V)
8: AI2 (100.0% corresponding to 10 V)
9: AI3 (100.0% corresponding to 10 V)
10: Length (100.0% corresponding to FB-05)
11: Count value (100.0% corresponding to FB-08)
12: Communication setting (100.0% corresponding to the AO communication setting)
13: Motor speed (100.0% corresponding to the maximum frequency F0-10)
14: Output current (100.0% corresponding to 1000.0 A)
15: Output voltage (100.0% corresponding to 1000.0 V)
16: Motor output torque (100.0% corresponding to 2 times the rated motor torque in one direction; 50% corresponding to 2 times the rated motor torque in the other direction)
(actual value, percentage of the rated motor torque)
19: Taper output
20: Roll diameter output (100.0% corresponding to the maximum roll diameter B0-08)
21: Tension output (100.0% corresponding to the maximum tension B1-02)
22: Encoder feedback frequency (100.0% corresponding to the maximum frequency F0-10)

F5-08 **AO2 output selection**

Address:	0xF508		
Min.:	0	Unit:	-
Max.:	22	Data type:	UInt16
Default:	1	Change:	In real time

Value Range:

0: Running frequency
1: Frequency reference
2: Output current
3: Output torque
4: Output power
5: Output voltage
6: Pulse input (100.0% corresponds to 100.00 kHz)
7: AI1
8: AI2
9: AI3
10: Length
11: Count value
12: Communication
13: Motor speed
14: Output current (100.0% corresponds to 1000.0 A)
15: Output voltage (100.0% corresponds to 1000.0 V)
16: Output torque (directional)
19: Taper output
20: Roll diameter output
21: Tension output
22: Encoder feedback frequency

Description

0: Running frequency (100.0% corresponding to the maximum frequency F0-10)
1: Frequency reference
2: Output current (100.0% corresponding to 2 times the rated motor current)
3: Motor output torque (100.0% corresponding to 2 times the rated motor torque) (absolute value, percentage of the rated motor torque)
4: Output power (100.0% corresponding to 2 times the rated motor power)
5: Output voltage (100.0% corresponding to 1.2 times the rated motor voltage)
6: Pulse input (100.0% corresponding to 100.0 kHz)
7: AI1 (100.0% corresponding to 10 V)
8: AI2 (100.0% corresponding to 10 V)
9: AI3 (100.0% corresponding to 10 V)
10: Length (100.0% corresponding to FB-05)
11: Count value (100.0% corresponding to FB-08)
12: Communication setting (100.0% corresponding to the AO communication setting)
13: Motor speed (100.0% corresponding to the maximum frequency F0-10)
14: Output current (100.0% corresponding to 1000.0 A)
15: Output voltage (100.0% corresponding to 1000.0 V)
16: Motor output torque (100.0% corresponding to 2 times the rated motor torque in one direction; 50% corresponding to 2 times the rated motor torque in the other direction)
(actual value, percentage of the rated motor torque)
19: Taper output
20: Roll diameter output (100.0% corresponding to the maximum roll diameter B0-08)
21: Tension output (100.0% corresponding to the maximum tension B1-02)
22: Encoder feedback frequency (100.0% corresponding to the maximum frequency F0-10)

F5-09 **Maximum FMP output frequency**

Address:	0xF509		
Min.:	0.01	Unit:	kHz
Max.:	100	Data type:	UInt16
Default:	50	Change:	In real time

Value Range:

0.01 kHz to 100.00 kHz

Description

This parameter indicates the maximum frequency (0.01 kHz to 100.00 kHz) of the FMP terminal output pulse.

F5-10 **AO1 zero offset coefficient**

Address: 0xF50A

Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	0	Change:	In real time

Value Range:

-100.0% to 100.0%

Description

On the AO curve, if b indicates zero offset, k indicates gain, and X indicates standard output, the actual output Y is kX plus b (Y = kX + b). The zero offset coefficient 100% of AO1 and AO2 corresponds to 10 V (or 20 mA). The standard output refers to the value corresponding to the analog output of 0 to 10 V (or 0 to 20 mA) with no zero offset or gain adjustment.

Zero offset = Zero offset coefficient x 10 V (20 mA)

The AC drive supports two AOs, namely, AO1 and AO2. AO1 and AO2 can be used to indicate the internal running parameters in the analog mode. The indicated parameters are defined by F5-07 and F5-08.

F5-11 **AO1 gain**

Address: 0xF50B

Min.:	-10	Unit:	-
Max.:	10	Data type:	Int16
Default:	1	Change:	In real time

Value Range:

–10.00 to +10.00

Description

On the AO curve, if b indicates zero offset, k indicates gain, and X indicates standard output, the actual output Y is kX plus b (Y = kX + b). The zero offset coefficient 100% of AO1 and AO2 corresponds to 10 V (or 20 mA). The standard output refers to the value corresponding to the analog output of 0 to 10 V (or 0 to 20 mA) with no zero offset or gain adjustment.

Zero offset = Zero offset coefficient x 10 V (20 mA)

The AC drive supports two AOs, namely, AO1 and AO2. AO1 and AO2 can be used to indicate the internal running parameters in the analog mode. The indicated parameters are defined by F5-07 and F5-08.

F5-12 **AO2 zero offset coefficient**

Address: 0xF50C

Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	0	Change:	In real time

Value Range:

-100.0% to +100.0%

Description

On the AO curve, if b indicates zero offset, k indicates gain, and X indicates standard output, the actual output Y is kX plus b (Y = kX + b). The zero offset coefficient 100% of AO1 and AO2 corresponds to 10 V (or 20 mA). The standard output refers to the value corresponding to the analog output of 0 to 10 V (or 0 to 20 mA) with no zero offset or gain adjustment.

Zero offset = Zero offset coefficient x 10 V (20 mA)

The AC drive supports two AOs, namely, AO1 and AO2. AO1 and AO2 can be used to indicate the internal running parameters in the analog mode. The indicated parameters are defined by F5-07 and F5-09.

F5-13 AO2 gain

Address:	0xF50D		
Min.:	-10	Unit:	-
Max.:	10	Data type:	Int16
Default:	1	Change:	In real time

Value Range:

–10.00 to +10.00

Description

On the AO curve, if b indicates zero offset, k indicates gain, and X indicates standard output, the actual output Y is kX plus b (Y = kX + b). The zero offset coefficient 100% of AO1 and AO2 corresponds to 10 V (or 20 mA). The standard output refers to the value corresponding to the analog output of 0 to 10 V (or 0 to 20 mA) with no zero offset or gain adjustment.

Zero offset = Zero offset coefficient x 10 V (20 mA)

The AC drive supports two AOs, namely, AO1 and AO2. AO1 and AO2 can be used to indicate the internal running parameters in the analog mode. The indicated parameters are defined by F5-07 and F5-10.

F5-17 Expansion card relay output delay

Address:	0xF511		
Min.:	0	Unit:	s
Max.:	3600	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s to 3600.0s

Description

This parameter indicates the output delay of relay on the expansion card. F5-01 outputs an active signal after the set delay.

F5-18 Control board relay 1 output delay

Address: 0xF512

Min.:	0	Unit:	s
Max.:	3600	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s to 3600.0s

Description

This parameter indicates the output delay of relay 1 on the control board. F5-02 outputs an active signal after the set delay.

F5-19 Control board relay 2 output delay

Address: 0xF513

Min.:	0	Unit:	s
Max.:	3600	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s to 3600.0s

Description

This parameter indicates the output delay of relay 2 on the control board. F5-03 outputs an active signal after the set delay.

F5-20 DO1 output delay

Address: 0xF514

Min.:	0	Unit:	s
Max.:	3600	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s to 3600.0s

Description

This parameter indicates the delay of DO1 output. F5-04 outputs an active signal after the set delay.

F5-21 Expansion card DO2 output delay

Address: 0xF515

Min.:	0	Unit:	s
Max.:	3600	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s to 3600.0s

Description

This parameter indicates the expansion card DO2 output delay. F5-05 outputs an active signal after the set delay.

F5-22 **DO active mode selection**

Address:	0xF516		
Min.:	0	Unit:	-
Max.:	11111	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

Ones (position): Expansion card relay
0: Positive logic
1: Negative logic
Tens (position): Control board relay 1
0: Positive logic
1: Negative logic
Hundreds (position): Control board relay 2
0: Positive logic
1: Negative logic
Thousands (position): Control board DO1
0: Positive logic
1: Negative logic
Ten thousands (position): Extension card DO2
0: Positive logic
1: Negative logic

Description

The ones, tens, hundreds, thousands, and ten thousands positions of this parameter are used to set the DOs to which F5-01 to F5-05 correspond.
0: Positive logic (same as NO contact)
Active state: The DO and the COM/ CME terminal are internally connected.
Inactive state: The DO terminal is disconnected from the COM/CME terminal.
1: Negative logic (same as NC contact)
Active state The DO terminal is disconnected from the COM/CME terminal.
Inactive state: The DO terminal and the COM/CME terminal are internally connected.

2.7 F6 Start/Stop Control

F6-00 **Start mode**

Address:	0xF600		
Min.:	0	Unit:	-
Max.:	2	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Direct startup
1: Flying start
2: Vector pre-excitation startup (asynchronous motor)

Description

0: Direct start

This mode is applicable to most loads. Startup with the startup frequency is applicable to load hoisting applications such as elevators and cranes.

1: Flying start

In some applications, the motor rotates before the AC drive is started. With this setting, the AC drive can automatically follow the motor speed and direction, which realizes smooth startup of the spinning motor without impact. For example, during the operation of the AC drive, due to the instantaneous power failure of the power grid, the AC drive is powered down and restarted. Due to inertia, the motor is in a rotating state. In this case, to recover control on the asynchronous motor, the AC drive must detect the current speed of the motor to avoid overcurrent, overvoltage, and even burn-out of the power transistor of the AC drive.

2: Pre-excitation start (asynchronous motor)

This mode applies only to asynchronous motors in SVC or FVC mode. Performing pre-excitation on the motor before start improves the responsiveness of the motor and reduces the starting current. The time sequence of the pre-excitation start is the same as that of the DC braking restart.

F6-01 **Flying start mode**

Address:	0xF601		
Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: From stop frequency
1: From 50 Hz
2: From the maximum frequency
3: Reserved

Description

In different modes, the initial frequency of flying start is different upon restart. The motor running direction cannot be searched upon flying start. Therefore, the motor running direction in the current startup command must be the same as that upon the previous motor stop. If the direction is different, the flying start fails.

The search mode from the stop frequency is to search for a speed of 0 Hz from the previous stop frequency. If an external force drives the motor to a higher speed than the stop speed, this mode is not applicable.

F6-02 **Flying start speed**

Address:	0xF602		
Min.:	1	Unit:	-
Max.:	100	Data type:	UInt16
Default:	20	Change:	In real time

Value Range:

1 to 100

Description

F6-03 **Startup frequency**

Address:	0xF603		
Min.:	0	Unit:	Hz
Max.:	10	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00 Hz to 10.00 Hz

Description

This parameter defines the startup frequency for direct start of the AC drive. When the startup frequency is higher than the frequency reference, the AC drive will not start but stay standby.

F6-04 **Startup frequency hold time**

Address:	0xF604		
Min.:	0	Unit:	s
Max.:	100	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0.0s to 100.0s

Description

This parameter defines the hold time during which the output frequency remains at the startup frequency. After this hold time elapses, the AC drive will accelerate to the reference frequency.

F6-05 **DC braking current/Pre-excitation current at startup**

Address:	0xF605		
Min.:	0	Unit:	%
Max.:	150	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0% to 150%

Description

When startup with DC braking is enabled, the AC drive starts only after DC braking upon receiving the start command. A greater DC braking current indicates greater braking force. 100% corresponds to the rated motor current. The upper limit of the current is 80% of the rated current of the AC drive.
The current upper limit can be set through F6-34, and the upper current limit can be set to 135% of the rated current of the AC drive.

F6-06 **Startup DC braking time/pre-excitation time**

Address: 0xF606

Min.:	0	Unit:	s
Max.:	100	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0.0s to 100.0s

Description

This parameter defines the time for DC braking at startup, which is valid only when the startup mode is direct start.

F6-07 **Acceleration/Deceleration mode**

Address: 0xF607

Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Linear acceleration/deceleration

1: S-curve acceleration/deceleration

Description

This parameter defines the frequency change mode during the AC drive start and stop process.

0: The output frequency increases or decreases linearly.

1: The output frequency increases or decreases according to the S-curve when the target frequency changes dynamically. This mode is applicable to applications requiring supreme riding comfort and real-time fast response.

F6-08 **Time proportion of S-curve start segment**

Address: 0xF608

Min.:	0	Unit:	%
Max.:	70	Data type:	UInt16
Default:	30	Change:	At stop

Value Range:

0.0% to 70.0%

Description

The sum of F6-08 (Time proportion of S-curve start segment) and F6-09 (Time proportion of S-curve end segment) must be less than or equal to 100%.

F6-09 Time proportion of S-curve end segment

Address: 0xF609

Min.:	0	Unit:	%
Max.:	70	Data type:	UInt16
Default:	30	Change:	At stop

Value Range:

0.0% to 70.0%

Description

The sum of F6-08 (Time proportion of S-curve start segment) and F6-09 (Time proportion of S-curve end segment) must be less than or equal to 100%.

F6-10 Stop mode

Address: 0xF60A

Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Decelerate to stop

1: Coast to stop

Description

0: Decelerate to stop

Upon receiving the stop command, the AC drive decreases the output frequency to 0 based on the deceleration time and then stops.

1: Coast to stop

Upon receiving the stop command, the AC drive immediately stops output. The motor then coasts to stop according to the mechanical inertia.

F6-11 Starting frequency of DC braking at stop

Address: 0xF60B

Min.:	0	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00 Hz to value of F0-10

Description

The AC drive starts DC braking when the running frequency decreases to the value of this parameter during deceleration to stop.

F6-12 **Waiting time of DC braking at stop**

Address: 0xF60C

Min.:	0	Unit:	s
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s to 100.0s

Description

When the running frequency decreases to the start frequency of DC braking at stop, the AC drive stops output for a period of time and then starts DC braking. Such delay is intended to prevent faults such as overcurrent from occurring when DC braking starts at a high speed.

F6-13 **DC braking current at stop**

Address: 0xF60D

Min.:	0	Unit:	%
Max.:	150	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0% to 150%

Description

When startup with DC braking is enabled, the AC drive starts only after DC braking upon receiving the start command. A greater DC braking current indicates greater braking force. 100% corresponds to the rated motor current. The upper limit of the current is 80% of the rated current of the AC drive.

The current upper limit can be set through F6-34, and the upper current limit can be set to 135% of the rated current of the AC drive.

F6-14 **DC braking time at stop**

Address: 0xF60E

Min.:	0	Unit:	s
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s to 100.0s

Description

This parameter indicates the hold time of DC braking. If this parameter is set to 0, DC braking is disabled.

F6-15 **Brake usage rate**

Address: 0xF60F

Min.:	0	Unit:	%

Max.:	100	Data type:	UInt16
Default:	100	Change:	At stop

Value Range:

0% to 100%

Description

Indicates the braking usage rate.

F6-16 **Closed loop current Kp of flying start**

Address: 0xF610

Min.:	0	Unit:	-
Max.:	1000	Data type:	UInt16
Default:	500	Change:	In real time

Value Range:

0–1000

Description

This parameter defines the proportional gain of the current suppression PI regulator during speed tracking of flying start. It is valid when F6-01 is set to 0, 1, or 2.

F6-17 **Closed-loop current Ki of torque tracking**

Address: 0xF611

Min.:	0	Unit:	-
Max.:	1000	Data type:	UInt16
Default:	800	Change:	In real time

Value Range:

0–1000

Description

This parameter defines the integral gain of the current suppression PI regulator during speed tracking of flying start. It is valid when F6-01 is set to 0, 1, or 2.

F6-18 **Flying start current**

Address: 0xF612

Min.:	30	Unit:	-
Max.:	200	Data type:	UInt16
Default:	100	Change:	In real time

Value Range:

30 to 200

Description

Overcurrent may occur on the asynchronous motor during flying start due to large slip. The current must be limited for preventing overcurrent. This parameter defines the motor current to be suppressed during speed tracking of flying start.

F6-21 **Demagnetization time**

Address:	0xF615		
Min.:	0	Unit:	s
Max.:	10	Data type:	UInt16
Default:	1	Change:	In real time

Value Range:

0.00s to 10.00s

Description

In the vector mode, when flying start is enabled (F6-00 = 1), the AC drive cannot be started when the motor has residual magnetism. The AC drive can only be started after the voltage output of the AC drive is disconnected for at least the demagnetization time set by F6-21.

F6-22 **Startup pre-torque setting**

Address:	0xF616		
Min.:	0	Unit:	%
Max.:	200	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0% to 200.0%

Description

F6-26 **Electromagnetic shorting current**

Address:	0xF61A		
Min.:	0	Unit:	%
Max.:	200	Data type:	UInt16
Default:	100	Change:	In real time

Value Range:

0% to 200%

Description

F6-27 **Electromagnetic shorting time upon startup**

Address:	0xF61B		
Min.:	0	Unit:	s
Max.:	100	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0.0s to 100.0s

Description

F6-28 **Electromagnetic shorting time upon stop**

Address: 0xF61C

Min.:	0	Unit:	s
Max.:	100	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0.0s to 100.0s

Description

F6-29 **Electromagnetic shorting voltage reserve**

Address: 0xF61D

Min.:	20	Unit:	V
Max.:	100	Data type:	UInt16
Default:	20	Change:	At stop

Value Range:

20.0 V to 100.0 V

Description

F6-30 **Trial current for synchronous motor speed tracking**

Address: 0xF61E

Min.:	5	Unit:	-
Max.:	50	Data type:	UInt16
Default:	10	Change:	At stop

Value Range:

5.0 to 50.0

Description

F6-31 **Minimum tracking frequency for synchronous motor speed tracking**

Address: 0xF61F

Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0.0–100.0

Description

F6-32 **Angle compensation for synchronous motor speed tracking**

Address: 0xF620

Min.:	0	Unit:	-
Max.:	360	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0–360

Description

F6-33 Proportion of synchronous motor speed tracking

Address: 0xF621

Min.:	0.1	Unit:	-
Max.:	10	Data type:	UInt16
Default:	1	Change:	At stop

Value Range:

0.1–10.0

Description

F6-34 Integral of synchronous motor speed tracking

Address: 0xF622

Min.:	0.1	Unit:	-
Max.:	10	Data type:	UInt16
Default:	1	Change:	At stop

Value Range:

0.1–10.0

Description

F6-35 Maximum current limit for DC braking

Address: 0xF623

Min.:	80	Unit:	%
Max.:	135	Data type:	UInt16
Default:	80	Change:	At stop

Value Range:

80% to 135%

Description

The base value is the rated current of the AC drive. The DC braking current set by F6-05 and F6-13 is restricted by this parameter.

F6-36 Speed loop feedforward

Address: 0xF624

Min.:	-200	Unit:	%
Max.:	200	Data type:	Int16
Default:	0	Change:	In real time

Value Range:
-200.0% to +200.0%
Description

2.8 F7 Key and Display

F7-01 **MF.K key function selection**

Address: 0xF701

Min.:	0	Unit:	-
Max.:	4	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:
0: MF.K key disabled
1: Switchover between operating panel control and remote control (terminal or communication)
2: Switchover between forward and reverse run
3: Forward jog
4: Reverse jog
Description
The MF.K key is a multi-functional key. This parameter is used to set the function of the MF.K key.
0: MF.K key disabled
The MF.K key does not work.
1: Switchover between remote control (terminal or communication) and operating panel control. When F0-02 is set to 0 (operating panel), the MF.K does not work. When F0-02 is set to 1 (terminal), the MF.K key is used for switchover between the terminal control and operating panel control. When F0-02 is set to 2 (communication), the MF.K key is used for switchover between the communication control and operating panel control.
2: Switchover between forward and reverse run
The MF.K key is used for changing the direction of the frequency reference. This function is valid only when the operating panel is set as the command source.

3: Forward jog
The MF.K key is used for enabling forward jog (FJOG). This function is valid only when the operating panel is set as the command source.
4: Reverse jog
The MF.K key is used for enabling reverse jog (RJOG). This function is available only when the operating panel is set as the command source.

F7-02 **STOP/RES key function**

Address:	0xF702		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:
0: STOP/RESET key enabled only in operating panel control mode
1: STOP/RESET key enabled in any operating mode

Description
The STOP/RESET key on the operating panel is used for stop/reset. This parameter is used for setting the function of this key.
0: STOP/RESET key enabled only in operating panel control mode
The STOP/RESET key is valid only in operating panel control mode.
1: STOP/RESET key enabled in any operating mode
The STOP/RESET key is valid in any operating mode.

F7-03 **LED running display parameter 1**

Address:	0xF703		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0x1F	Change:	In real time

Value Range:

Bit00: Running frequency (Hz)
Bit01: Frequency reference (Hz)
Bit02: Bus voltage (V)
Bit03: Output voltage (V)
Bit04: Output current (A)
Bit05: Output power (kW)
Bit06: Output torque (%)
Bit07: DI status
Bit08: DO status
Bit09: AI1 voltage (V)
Bit10: AI2 voltage (V)
Bit11: AI3 voltage (V)
Bit12: Count value
Bit13: Length value
Bit14: Load speed display
Bit15: PID reference

Description

If a parameter needs to be displayed during running, set its corresponding bit to 1. After converting this binary number to a hexadecimal number, set it in F7-03.

F7-04 **LED running display parameter 2**

Address:	0xF704		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

Bit00: PID feedback
Bit01: PLC stage
Bit02: Pulse input reference (kHz)
Bit03: Running frequency 2 (Hz)
Bit04: Remaining running time
Bit05: AI1 voltage before correction (V)
Bit06: AI2 voltage before correction (V)
Bit07: AI3 voltage before correction (V)
Bit08: Linear speed
Bit09: Current power-on time (h)
Bit10: Current running time (min.)
Bit11: Pulse input reference (Hz)
Bit12: Communication setting
Bit13: Encoder feedback speed (Hz)
Bit14: Roll diameter (mm)
Bit15: Tension after taper (N)

Description

If a parameter needs to be displayed during running, set its corresponding bit to 1. After converting this binary number to a hexadecimal number, set it in F7-04

F7-05 LED stop display parameter

Address:	0xF705		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0x33	Change:	In real time

Value Range:

Bit00: Frequency reference (Hz)
Bit01: Bus voltage (V)
Bit02: DI state
Bit03: DO state
Bit04: AI1 voltage (V)
Bit05: AI2 voltage (V)
Bit06: AI3 voltage (V)
Bit07: Count value
Bit08: Length value
Bit09: PLC stage
Bit10: Load speed display
Bit11: PID reference
Bit12: Pulse input frequency (kHz)
Bit13: Roll diameter (mm)
Bit14: Tension (N)

Description

If a parameter needs to be displayed when the AC drive stops, set its corresponding bit to 1. After converting this binary number to a hexadecimal number, set it in F7-05.

F7-06 Load speed display coefficient

Address:	0xF706		
Min.:	0	Unit:	-
Max.:	6.5	Data type:	UInt16
Default:	1	Change:	In real time

Value Range:

0.0000 to 6.5

Description

This parameter defines the ratio of the actual speed with load to motor speed.

F7-07 **Inverter heatsink temperature**

Address: 0xF707

Min.:	-20	Unit:	°C
Max.:	120	Data type:	Int16
Default:	0	Change:	Unchangeable

Value Range:

-20°C to +120°C

Description

Indicates the inverter heatsink temperature.

F7-08 **Product No.**

Address: 0xF708

Min.:	0	Unit:	-
Max.:	999	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0–999

Description

This parameter shows the product No. of the AC drive.

F7-09 **Accumulative running time**

Address: 0xF709

Min.:	0	Unit:	h
Max.:	65535	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 h to 65535 h

Description

This parameter shows the accumulative running time of the AC drive.

F7-10 **Performance software version**

Address: 0xF70A

Min.:	0	Unit:	-
Max.:	0	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0.00 to 0.00

Description

Indicates the performance software version of the AC drive.

F7-11 **Function software version**

Address: 0xF70B

Min.:	0	Unit:	-
Max.:	0	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0.00 to 0.00

Description

Indicates the function software version of the AC drive.

F7-12 Number of decimal places for load speed display

Address: 0xF70C

Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	1	Change:	In real time

Value Range:

0: 0 decimal place

1: 1 decimal place

2: 2 decimal places

3: 3 decimal places

Description

This parameter is used to set the number of decimal places of U0-14 (Load speed).

0: 0 decimal places

No decimal places are retained.

1: 1 decimal place

One decimal place is retained after the decimal point.

2: 2 decimal places

Two decimal places are retained after the decimal point.

3: 3 decimal places

Three decimal places are retained after the decimal point.

F7-13 Accumulative power-on time

Address: 0xF70D

Min.:	0	Unit:	h
Max.:	65535	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 h to 65535 h

Description

This parameter shows the accumulative power-on duration of the AC drive.

F7-14 Accumulative power consumption

Address: 0xF70E

Min.:	0	Unit:	kWh
Max.:	65535	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 kWh to 65535 kWh

Description

This parameter shows the accumulative power consumption of the AC drive.

F7-15 Temporary performance software version

Address: 0xF70F

Min.:	0	Unit:	-
Max.:	0	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0.00 to 0.00

Description

Indicates the temporary performance software version of the AC drive.

F7-16 Temporary function software version

Address: 0xF710

Min.:	0	Unit:	-
Max.:	0	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0.00 to 0.00

Description

Indicates the temporary function software version of the AC drive.

2.9 F8 Auxilliary Function

F8-00 Jog frequency

Address: 0xF800

Min.:	0	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	2	Change:	In real time

Value Range:

0.00 Hz to value of F0-10

Description

This parameter defines the running frequency of the AC drive in the jogging mode.

F8-01 **Jog acceleration time**

Address: 0xF801

Min.:	0	Unit:	s
Max.:	6500	Data type:	UInt16
Default:	20	Change:	In real time

Value Range:

0.0s to 6500.0s

Description

This parameter defines the acceleration time of the AC drive in the jogging mode.

F8-02 **Jog deceleration time**

Address: 0xF802

Min.:	0	Unit:	s
Max.:	6500	Data type:	UInt16
Default:	20	Change:	In real time

Value Range:

0.0s to 6500.0s

Description

This parameter defines the deceleration time of the AC drive in the jogging mode.

F8-03 **Acceleration time 2**

Address: 0xF803

Min.:	0	Unit:	s
Max.:	6500	Data type:	UInt16
Default:	20	Change:	In real time

Value Range:

0.0s to 6500.0s

Description

The AC drive provides four groups of acceleration time, which can be switched by using the DI. This parameter defines the second group of acceleration time.

F8-04 **Deceleration time 2**

Address: 0xF804

Min.:	0	Unit:	s
Max.:	6500	Data type:	UInt16
Default:	20	Change:	In real time

Value Range:

0.0s to 6500.0s

Description

The AC drive provides four groups of deceleration time, which can be switched by using the DI. This parameter defines the second group of deceleration time.

F8-05 **Acceleration time 3**

Address:	0xF805		
Min.:	0	Unit:	s
Max.:	6500	Data type:	UInt16
Default:	20	Change:	In real time

Value Range:

0.0s to 6500.0s

Description

The AC drive provides four groups of acceleration time, which can be switched by using the DI. This parameter defines the third group of acceleration time.

F8-06 **Deceleration time 3**

Address:	0xF806		
Min.:	0	Unit:	s
Max.:	6500	Data type:	UInt16
Default:	20	Change:	In real time

Value Range:

0.0s to 6500.0s

Description

The AC drive provides four groups of deceleration time, which can be switched by using the DI. This parameter defines the third group of deceleration time.

F8-07 **Acceleration time 4**

Address:	0xF807		
Min.:	0	Unit:	s
Max.:	6500	Data type:	UInt16
Default:	20	Change:	In real time

Value Range:

0.0s to 6500.0s

Description

The AC drive provides four groups of acceleration time, which can be switched by using the DI. This parameter defines the fourth group of acceleration time.

F8-08 **Deceleration time 4**

Address:	0xF808		
Min.:	0	Unit:	s
Max.:	6500	Data type:	UInt16
Default:	20	Change:	In real time

Value Range:

0.0s to 6500.0s

Description

The AC drive provides four groups of deceleration time, which can be switched by using the DI. This parameter defines the fourth group of deceleration time.

F8-09 Jump frequency 1

Address:	0xF809		
Min.:	0	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00 Hz to value of F0-10

Description

The jump frequency enables the AC drive to avoid any frequency at which a mechanical resonance may occur. This parameter defines the first jump frequency. If it is set to 0, the first jump frequency is canceled.

F8-10 Jump frequency 2

Address:	0xF80A		
Min.:	0	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00 Hz to value of F0-10

Description

The jump frequency enables the AC drive to avoid any frequency at which a mechanical resonance may occur. This parameter defines the second jump frequency. If it is set to 0, the second jump frequency function is disabled.

F8-11 Jump frequency amplitude

Address:	0xF80B		
Min.:	0	Unit:	Hz
Max.:	5	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00 Hz to 5.00 Hz

Description

When the running frequency approaches the jump frequency during acceleration, the AC drive runs for a period at the current running frequency and then jumps over the jump frequency. The jump amplitude is twice the value of F8-11 (jump frequency amplitude).
When the running frequency decelerates to the value close to the jump frequency during deceleration, the AC drive runs for a period at the current running frequency and then jumps over the jump frequency. The jump amplitude is twice the value of F8-11 (jump frequency amplitude).

F8-12 Dead-zone time of forward/reverse run

Address: 0xF80C

Min.:	0	Unit:	s
Max.:	3,000	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s to 3000.0s

Description

This parameter defines the transition time at 0 Hz output during transition between forward running and reverse running.

F8-13 Reverse run control

Address: 0xF80D

Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Reverse running allowed

1: Reverse running inhibited

Description

When F8-13 is valid, the motor runs at zero frequency after a reverse command is input to the AC drive.

F8-14 Running mode when frequency reference is lower than frequency lower limit

Address: 0xF80E

Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Run at frequency lower limit

1: Stop according to F6-10

2: Run at zero speed

3: Coast to stop

Description

0: Run at frequency lower limit

If the frequency reference is lower than the frequency lower limit, the AC drive runs at the frequency lower limit.

1: Stop according to F6-10

If the frequency reference is lower than the frequency lower limit, the AC drive stops in the mode set by F6-10.

2: Run at zero speed

If the frequency reference is lower than the frequency lower limit, the AC drive runs at zero speed.

3: Coast to stop

If the frequency reference is lower than the frequency lower limit, the AC drive coasts to stop.

F8-15 Mechanical braking frequency

Address: 0xF80F

Min.:	0	Unit:	Hz
Max.:	10	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00 Hz to 10.00Hz

Description

F8-16 Accumulative power-on time threshold

Address: 0xF810

Min.:	0	Unit:	h
Max.:	65000	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0–65000 h

Description

This parameter is used to set the accumulative power-on time threshold of the AC drive. When F7-13 (Accumulative power-on time threshold) exceeds F8-16 (Accumulative power-on time threshold), the DO outputs an active signal.

F8-17 Accumulative running time threshold

Address: 0xF811

Min.:	0	Unit:	h
Max.:	65000	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0–65000 h

Description

This parameter is used to set the accumulative running time threshold of the AC drive. When F7-09 (Accumulative running time) exceeds F8-20 (Accumulative running time threshold), the DO outputs an active signal.

F8-18 **Protection upon start**

Address: 0xF812

Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Disabled

1: Enabled

Description

The AC drive is equipped with the startup protection function to prevent the motor from responding to commands upon unexpected power-on or fault reset.

F8-19 **Frequency detection value (FDT1)**

Address: 0xF813

Min.:	0	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	50	Change:	In real time

Value Range:

0.00 Hz to value of F0-10

Description

When the running frequency is higher than the frequency detection value (FDT1), the DO outputs an active signal. When the running frequency is lower than the result of frequency detection value (FDT1) minus frequency detection hysteresis (FDT1), the DO outputs an inactive signal. The valid range is from 0.00 Hz to F0-10 (Maximum frequency).

F8-20 **Frequency detection hysteresis (FDT1)**

Address: 0xF814

Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	5	Change:	In real time

Value Range:

0.0% to 100.0%

Description

Frequency detection hysteresis (FDT1) = F8-19 x F8-20 When the running frequency is higher than F8-19, the DO outputs an active signal. When the running frequency is lower than a specific value (F8-19 - F8-19 x F8-20), the DO outputs an inactive signal.

F8-21 Detection width for frequency reach

Address:	0xF815		
Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0% to 100.0%

Description

Detection width for frequency reach = F8-21 (Detection width of frequency reach) x F0-10 (Maximum frequency) The DO outputs an active signal when the running frequency of the AC drive is in the specific range (Frequency reference ± F0-10 x F8-21).

F8-22 Jump frequency state during acceleration/deceleration

Address:	0xF816		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Inactive

1: Active

Description

Used to enable or disable the jump frequency function during acceleration/deceleration.

0: Inactive

During acceleration and deceleration, if the running frequency reaches the jump frequency boundary, the AC drive will continue to run at the running frequency.

1: Active

During acceleration or deceleration, upon the moment that the running frequency reaches the jump frequency, the AC drive will jump over the jump frequency with the amplitude twice the value of F8-11 (jump frequency amplitude).

F8-25 Switchover frequency of acceleration time 1 and acceleration time 2

Address:	0xF819		
Min.:	0	Unit:	Hz

Max.: F0-10 Data type: UInt16
Default: 0 Change: In real time

Value Range:

0.00 Hz to value of F0-10

Description

This function is used to switch the acceleration/deceleration time based on the running frequency range when the AC drive is running. This function is active when the DI is not allocated with function 16 (acceleration/deceleration time selection terminal 1) or 17 (acceleration/deceleration time selection terminal 2). The valid range is from 0.00 Hz to F0-10 (Maximum frequency).

F8-26 Switchover frequency of deceleration time 1 and deceleration time 2

Address: 0xF81A
Min.: 0 Unit: Hz
Max.: F0-10 Data type: UInt16
Default: 0 Change: In real time

Value Range:

0.00 Hz to value of F0-10

Description

This function is used to switch the acceleration/deceleration time based on the running frequency range when the AC drive is running. This function is active when the DI is not allocated with function 16 (acceleration/deceleration time selection terminal 1) or 17 (acceleration/deceleration time selection terminal 2). The valid range is from 0.00 Hz to F0-10 (Maximum frequency).

F8-27 Set highest priority to jog function

Address: 0xF81B
Min.: 0 Unit: -
Max.: 1 Data type: UInt16
Default: 0 Change: In real time

Value Range:

0: Disabled

1: Enabled

Description

This parameter defines whether to set the highest priority to the terminal jog function. When F8-27 is set to 1, and any of F4-00 to F4-09 is set to 4 (forward jog) or 5 (reverse jog), the AC drive enters the jog running status immediately.

F8-28 Frequency detection value (FDT2)

Address: 0xF81C
Min.: 0 Unit: Hz

Max.: F0-10 Data type: UInt16
Default: 50 Change: In real time

Value Range:

0.00 Hz to value of F0-10

Description

When the running frequency is higher than the frequency detection value (FDT2), the DO outputs an active signal. When the running frequency is lower than the result of frequency detection value (FDT2) minus frequency detection hysteresis (FDT2), the DO outputs an inactive signal. The valid range is from 0.00 Hz to F0-10 (Maximum frequency).

F8-29 Frequency detection hysteresis (FDT2)

Address: 0xF81D
Min.: 0 Unit: %
Max.: 100 Data type: UInt16
Default: 5 Change: In real time

Value Range:

0.0% to 100.0%

Description

Frequency detection hysteresis (FDT2) = F8-28 x F8-29 When the running frequency is higher than F8-28, the DO outputs an active signal. When the running frequency is lower than a specific value (F8-28 - F8-28 x F8-29), the DO outputs an inactive signal.

F8-30 Detection value 1 for frequency reach

Address: 0xF81E
Min.: 0 Unit: Hz
Max.: F0-10 Data type: UInt16
Default: 50 Change: In real time

Value Range:

0.00 Hz to value of F0-10

Description

When the running frequency of the AC drive is in the frequency detection range, the DO outputs an active signal. The valid range is 0.00 Hz to F0-10 (Maximum frequency).

F8-31 Detection width 1 of frequency reach

Address: 0xF81F
Min.: 0 Unit: %
Max.: 100 Data type: UInt16
Default: 0 Change: In real time

Value Range:

0.0% to 100.0%

Description

Detection width 1 of frequency reach = F0-10 (Maximum frequency) x F8-31; Frequency detection range = F8-30 (Detection value 1 of frequency reach) - F8-31 (Detection width 1 of frequency reach) x F0-10 (Maximum frequency) to F8-30 (Detection value 1 of frequency reach) + F8-31 (Detection width 1 of frequency reach) x F0-10 (Maximum frequency)

F8-32 **Detection value 2 for frequency reach**

Address:	0xF820		
Min.:	0	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	50	Change:	In real time

Value Range:

0.00 Hz to value of F0-10

Description

When the running frequency of the AC drive is in the frequency detection range, the DO outputs an active signal. The valid range is from 0.00 Hz to F0-10 (Maximum frequency).

F8-33 **Detection width 2 of frequency reach**

Address:	0xF821		
Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0% to 100.0%

Description

Detection width 2 of frequency reach = F0-10 (Maximum frequency) x F8-33; Frequency detection range = F8-32 (Detection value 2 of frequency reach) - F8-33 (Detection width 2 of frequency reach) x F0-10 to F8-32 (Detection value 2 of frequency reach) + F8-33 (Detection width 2 of frequency reach) x F0-10

F8-34 **Zero current detection level**

Address:	0xF822		
Min.:	0	Unit:	%
Max.:	300	Data type:	UInt16
Default:	5	Change:	In real time

Value Range:

0.0% to 300.0%

Description

When the output current of the AC drive is lower than or equal to F8-34 (Zero current detection level) for a period exceeding F8-35 (Zero current detection delay), the DO outputs an active signal.

F8-35 **Zero current detection delay**

Address:	0xF823		
Min.:	0.01	Unit:	s
Max.:	600	Data type:	UInt16
Default:	0.1	Change:	In real time

Value Range:

0.01s to 600.00s

Description

When the output current of the AC drive is lower than or equal to F8-34 (Zero current detection level) for a period exceeding F8-35 (Zero current detection delay), the DO outputs an active signal.

F8-36 **Output overcurrent threshold**

Address:	0xF824		
Min.:	0	Unit:	%
Max.:	300	Data type:	UInt16
Default:	200	Change:	In real time

Value Range:

0.0% to 300.0%

Description

When the output current of the AC drive is higher than F8-36 (Output current threshold) for a period exceeding F8-37 (Output overcurrent detection delay), the DO outputs an active signal.

F8-37 **Software overcurrent detection delay**

Address:	0xF825		
Min.:	0	Unit:	s
Max.:	600	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00s to 600.00s

Description

When the output current of the AC drive is higher than F8-36 (Output current threshold) for a period exceeding F8-37 (Output overcurrent detection delay), the DO outputs an active signal.

F8-38 **Detection level of current 1**

Address: 0xF826

Min.:	0	Unit:	%
Max.:	300	Data type:	UInt16
Default:	100	Change:	In real time

Value Range:

0.0% to 300.0%

Description

When the output current of the AC drive is in the range of F8-38 (Detection level of current 1) ± F8-39 (Detection width of current 1) x F1-03 (Rated motor current), the DO outputs an active signal.

F8-39 **Detection width of current 1**

Address: 0xF827

Min.:	0	Unit:	%
Max.:	300	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0% to 300.0%

Description

Detection width of current 1 = F8-39 (detection width of current 1) x F1-03 (Rated motor current)

F8-40 **Detection level of current 2**

Address: 0xF828

Min.:	0	Unit:	%
Max.:	300	Data type:	UInt16
Default:	100	Change:	In real time

Value Range:

0.0% to 300.0%

Description

When the output current of the AC drive is in the range of F8-40 (Detection level of current 2) ± F8-41 (Detection width of current 2) x F1-03 (Rated motor current), the DO outputs an active signal.

F8-41 **Detection width of current 2**

Address: 0xF829

Min.:	0	Unit:	%
Max.:	300	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0% to 300.0%

Description

Detection width of current 2 = F8-41 (detection width of current 2) x F1-03 (Rated motor current)

F8-42 Timing function

Address:	0xF82A		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Disabled

1: Enabled

Description

When F8-42 is set to 1 and the current running of the AC drive reaches the specified timing duration, the DO outputs an active signal. The timing duration is set by F8-43 and F8-44.

F8-43 Scheduled running time selection

Address:	0xF82B		
Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Set by F8-44 (Timing duration)

1: AI1

2: AI2

3: AI3

Description

When this parameter is set to 0, the scheduled running time is set by F8-44.

When this parameter is set to 1, the scheduled running time equals to the result of (AI1 voltage/10 V) x F8-44. 100% of analog input corresponds to the value of F8-44.

When this parameter is set to 2, the scheduled running time equals to the result of (AI2 voltage/10 V) x F8-44 100% of analog input corresponds to the value of F8-44.

F8-44 Scheduled running time

Address:	0xF82C		
Min.:	0	Unit:	min
Max.:	6500	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0.0 min to 6500.0 min

Description

The scheduled running time is set by F8-43 and F8-44.

F8-45 AI1 input voltage lower limit

Address:	0xF82D		
Min.:	0	Unit:	V
Max.:	F8-46	Data type:	UInt16
Default:	3.1	Change:	In real time

Value Range:

0.00 V to F8-46

Description

When the AI1 input is higher than F8-46 (AI1 input voltage upper limit) or lower than F8-45 (AI1 input voltage lower limit), the DO outputs an "AI1 input limit exceeded" active signal to indicate whether the AI1 input voltage is in the setting range.

F8-46 AI1 input voltage upper limit

Address:	0xF82E		
Min.:	F8-45	Unit:	V
Max.:	11	Data type:	UInt16
Default:	6.8	Change:	In real time

Value Range:

F8-45 to 11.00 V

Description

When the AI1 input is higher than F8-46 (AI1 input voltage upper limit) or lower than F8-45 (AI1 input voltage lower limit), the DO outputs an "AI1 input limit exceeded" active signal to indicate whether the AI1 input voltage is in the set range.

F8-47 Module temperature reached

Address:	0xF82F		
Min.:	0	Unit:	°C
Max.:	100	Data type:	UInt16
Default:	75	Change:	In real time

Value Range:

0°C to 100°C

Description

When the heatsink temperature reaches the value of F8-47, the DO outputs an active signal.

F8-48 **Cooling Fan control**

Address:	0xF830		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Working during drive running

1: Working continuously

Description

When this parameter is set to 0, the fan works when the AC drive is running. When the AC drive stops, the fan works if the heatsink temperature is higher than 40°C and stops if the heatsink temperature is lower than 40°C.

When this parameter is set to 1, the fan keeps working after power-on.

F8-49 **Wakeup frequency**

Address:	0xF831		
Min.:	F8-51	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

F8-51 to F0-10

Description

In hibernating state, when the frequency reference is equal to or larger than F8-49 (Wakeup frequency) and the current running command is valid, the AC drive wakes up after the time set by F8-50 (Wakeup delay) expires.

F8-50 **Wakeup delay**

Address:	0xF832		
Min.:	0	Unit:	s
Max.:	6500	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s to 6500.0s

Description

In hibernating state, when the frequency reference is equal to or larger than F8-49 (Wakeup frequency) and the current running command is valid, the AC drive wakes up after the time set by F8-50 (Wakeup delay) expires.

F8-51 **Hibernation frequency**

Address:	0xF833		
Min.:	0	Unit:	Hz

Max.:	F8-49	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00 Hz to value of F8-49

Description

During AC drive running, when the frequency reference is lower than or equal to F8-51 (Hibernating frequency), the AC drive enters the hibernating state and coasts to stop after the time set by F8-52 (Hibernating delay) expires.

F8-52 Hibernation delay time

Address: 0xF834

Min.:	0	Unit:	s
Max.:	6500	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s to 6500.0s

Description

During AC drive running, when the frequency reference is lower than or equal to F8-51 (Hibernating frequency), the AC drive enters the hibernating state and coasts to stop after the time set by F8-52 (Hibernating delay) expires.

F8-53 Current running time reached

Address: 0xF835

Min.:	0	Unit:	min
Max.:	6500	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0 min to 6500.0 min

Description

When the current running time reaches the value of F8-53, the DO outputs an active signal. It is valid only for the current AC drive running. The previous running time is not added.

F8-55 Deceleration time for emergency stop

Address: 0xF837

Min.:	0	Unit:	s
Max.:	6500	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s to 6500.0s

Description

This parameter defines the deceleration time for emergency stop.

F8-57 **Accumulative power consumption cleared**

Address:	0xF839		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Disabled

1: Enabled

Description

When this parameter is set to 1, the accumulative output power consumption of the AC drive will be cleared.

F8-58 **Output power correction coefficient**

Address:	-		
Min.:	0	Unit:	%
Max.:	200	Data type:	UInt16
Default:	100	Change:	At stop

Value Range:

0.0% to +200.0%

Description

When the output power (U0-05) is not equal to expected value, perform linear correction on the output power via this parameter.

2.10 F9 Fault and Protection

F9-00 **AC drive overload suppression**

Address:	0xF900		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Disabled

1: Enabled

Description

This parameter indicates the troubleshooting when the AC drive overloads. When this parameter is set to 0, the AC drive will report a fault upon overload and the output will be blocked. When this parameter is set to 1, in case that the drive is about to be overloaded, the AC drive automatically lowers down the output current to about the rated current. This can avoid overload; however, the running speed may be reduced or block may occur.
For lifting load, set this parameter to 0.

F9-01 **Motor overload protection gain**

Address:	0xF901		
Min.:	0.2	Unit:	-
Max.:	10	Data type:	UInt16
Default:	1	Change:	In real time

Value Range:

0.2 to 10.00

Description

The motor overload protection gain is calculated according to the percentage of time during which the motor runs continuously at a certain overload threshold without reporting an overload fault.
This parameter is used to adjust the actual overload fault report time of the AC drive when motor overload occurs.

F9-02 **Motor overload pre-warning coefficient**

Address:	0xF902		
Min.:	50	Unit:	%
Max.:	100	Data type:	UInt16
Default:	80	Change:	In real time

Value Range:

50% to 100%

Description

The motor overload pre-warning coefficient is calculated according to the percentage of time during which the motor runs continuously at a certain overload threshold without reporting overload pre-warning. This function is used to give a pre-warning signal to the control system through DO before motor overload protection.
This signal is used to determine how long in advance to send the pre-warning signal before the motor overload protection is triggered. A larger coefficient means later transmission of the pre-warning signal.
When the accumulative output current of the AC drive is higher than the value of the overload time (value Y of motor overload protection inverse time-lag curve) multiplied by F9-02 (Motor overload pre-warning coefficient), the multi-functional DO of the AC drive outputs a motor overload pre-warning signal.

F9-04 **Overvoltage threshold**

Address: 0xF904

Min.:	350	Unit:	V
Max.:	820	Data type:	UInt16
Default:	820	Change:	In real time

Value Range:

350.0 V to 820.0 V

Description

When the bus voltage is higher than the value of F9-04, the AC drive reports E05.00 to E07.00.

F9-06 **Output phase loss detection before startup**

Address: 0xF906

Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Disabled

1: Enabled

Description

It takes about several seconds to detect output phase loss during running. For low-frequency running applications or applications where risks exist during startup, this function enables quick detection of output phase loss during startup. However, it is not suitable for applications that have strict requirements on startup time.

F9-07 **Detection of software short-circuited to ground**

Address: 0xF907

Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	1	Change:	At stop

Value Range:

0: No detection

1: Detection before power-on

2: Detection before running

3: Detection before power-on and running

Description

F9-08 **Braking unit applied voltage**

Address: 0xF908

Min.:	200	Unit:	V

Max.: 2000 Data type: UInt16
Default: 760 Change: In real time

Value Range:

200.0 V to 2000.0 V

Description

Used to adjust the energy consumption efficiency of the braking resistor. When the motor is in the power generation state, the voltage of the DC bus in the AC drive will rise. The braking unit can be used to control the voltage of the DC bus to consume the regenerative electric energy generated by the motor through the braking resistor or send back the regenerative electric energy to the power supply.

Application scenarios:

In the V/f control mode, if the actual deceleration time of the motor is far longer than the set deceleration time, the motor decelerates too slowly. To enable the motor to decelerate quickly by enhancing the energy consumption of the braking resistor, you can set F9-08 (Braking unit applied voltage) to 690 V if the following conditions are met: The AC drive is equipped with a braking resistor or an energy feedback unit; The input voltage of the AC drive is 360 V to 420 V.

F9-09 Fault automatic reset times

Address: 0xF909
Min.: 0 Unit: -
Max.: 20 Data type: UInt16
Default: 0 Change: In real time

Value Range:

0–20

Description

This parameter defines the number of auto fault reset attempts of the AC drive. If the number of reset attempts exceeds the value of this parameter, the AC drive will remain in the faulty state.

F9-10 DO action during auto fault reset

Address: 0xF90A
Min.: 0 Unit: -
Max.: 1 Data type: UInt16
Default: 0 Change: In real time

Value Range:

0: Not act

1: Act

Description

Used to determine whether the fault output function of the DO takes effect during the automatic fault reset of the AC drive. The fault output function of the DO is defined by setting F5-04 to 2.

F9-11 **Fault auto reset interval**

Address:	0xF90B		
Min.:	0.1	Unit:	s
Max.:	100	Data type:	UInt16
Default:	1	Change:	In real time

Value Range:

0.1s to 100.0s

Description

This parameter defines the delay of auto fault reset after the AC drive reports a fault.

F9-12 **Input phase loss/Contactor pickup protection**

Address:	0xF90C		
Min.:	0	Unit:	-
Max.:	13	Data type:	UInt16
Default:	11	Change:	In real time

Value Range:

Ones (position): Input phase loss protection selection

0: Input phase loss detection inhibited

1: Input phase loss detected by software and hardware

2: Input phase loss detected by software

3: Input phase loss detected by hardware

Tens (position): Contactor pickup/Fan fault protection

0: Inhibited

1: Enabled

Description

This function parameter determines whether to perform input phase loss or contactor pickup protection through the ones and tens position.

After the input phase loss protection function is enabled, if the three-phase input power supply is abnormal, or the driver board, lightning protection board, main control board, or rectifier bridge is abnormal, the AC drive will report E12.00 (input phase loss).

For models of 450 kW and below, the tens position is used to set the contactor pickup protection function. For for models of 500 kW and above, the tens position is used to set the fan fault selection.

F9-13 **Restart interval upon fault reset**

Address: 0xF90D

Min.:	0	Unit:	s
Max.:	600	Data type:	UInt16
Default:	10	Change:	In real time

Value Range:

0.0s to 600.0s

Description

Restart interval upon fault reset

F9-14 **1st fault type**

Address: 0xF90E

Min.:	0	Unit:	-
Max.:	99	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0–99

Description

This parameter shows the fault codes of the latest three (1st, 2nd, and 3rd (latest)) faults. The host controller reads the communication address to obtain the fault code of the AC drive and triggers the AC drive to report the fault. The fault code can be viewed on the operating panel.

F9-15 **2nd fault type**

Address: 0xF90F

Min.:	0	Unit:	-
Max.:	99	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0–99

Description

This parameter shows the fault codes of the latest three (1st, 2nd, and 3rd (latest)) faults. The host controller reads the communication address to obtain the fault code of the AC drive and triggers the AC drive to report the fault. The fault code can be viewed on the operating panel.

F9-16 **3rd (latest) fault type**

Address: 0xF910

Min.:	0	Unit:	-
Max.:	99	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0–99

Description

This parameter shows the fault codes of the latest three (1st, 2nd, and 3rd (latest)) faults. The host controller reads the communication address to obtain the fault code of the AC drive and triggers the AC drive to report the fault. The fault code can be viewed on the operating panel.

F9-17 **Frequency upon the 3rd fault (latest)**

Address:	0xF911		
Min.:	0	Unit:	Hz
Max.:	65535	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 Hz to 65535 Hz

Description

This parameter shows the frequency of the AC drive upon the latest fault.

F9-18 **Current upon the 3rd fault (latest)**

Address:	0xF912		
Min.:	0	Unit:	A
Max.:	6553.5	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0.0 A to 6553.5 A

Description

This parameter shows the current of the AC drive upon the latest fault.

F9-19 **Bus voltage upon 3rd fault (latest)**

Address:	0xF913		
Min.:	0	Unit:	V
Max.:	6553.5	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0.0 V to 6553.5V

Description

This parameter shows the bus voltage of the AC drive upon the latest fault.

F9-20 **Input terminal state upon the 3rd fault (latest)**

Address:	0xF914		
Min.:	0	Unit:	-

Max.:	65535	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

This parameter shows the input terminal state of the AC drive upon the latest fault.

F9-21 Output terminal state upon the 3rd fault (latest)

Address: 0xF915

Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

This parameter shows the output terminal state of the AC drive upon the latest fault.

F9-22 AC drive state upon the 3rd fault (latest)

Address: 0xF916

Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

This parameter shows the state of the AC drive upon the latest fault.

F9-23 Power-on time upon the 3rd fault (latest)

Address: 0xF917

Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

This parameter shows the power-on duration of the AC drive upon the latest fault.

F9-24 Running time upon the 3rd fault (latest)

Address: 0xF918

Min.:	0	Unit:	-
Max.:	6553.5	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0.0–6553.5

Description

This parameter shows the operation time of the AC drive upon the latest fault.

F9-25 **IGBT temperature upon the 3rd fault (latest)**

Address: 0xF919

Min.:	-20	Unit:	°C
Max.:	120	Data type:	Int16
Default:	0	Change:	Unchangeable

Value Range:

-20°C to +120°C

Description

This parameter shows the IGBT temperature of the AC drive upon the latest fault.

F9-26 **Fault subcode upon the 3rd fault (latest)**

Address: 0xF91A

Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

F9-27 **Frequency upon the 2nd fault**

Address: 0xF91B

Min.:	0	Unit:	Hz
Max.:	65535	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 Hz to 65535 Hz

Description

This parameter shows the frequency of the AC drive upon the second fault.

F9-28 **Current upon the 2nd fault**

Address: 0xF91C

Min.:	0	Unit:	A

Max.: 6553.5 | Data type: UInt16
Default: 0 | Change: Unchangeable

Value Range:
0.0 A to 6553.5 A

Description
This parameter shows the current of the AC drive upon the second fault.

F9-29 Bus voltage upon the 2nd fault
Address: 0xF91D
Min.: 0 | Unit: V
Max.: 6553.5 | Data type: UInt16
Default: 0 | Change: Unchangeable

Value Range:
0.0 V to 6553.5V

Description
This parameter shows the bus voltage of the AC drive upon the second fault.

F9-30 Input terminal state upon the 2nd fault
Address: 0xF91E
Min.: 0 | Unit: -
Max.: 65535 | Data type: UInt16
Default: 0 | Change: Unchangeable

Value Range:
0 to 65535

Description
This parameter shows the input terminal state of the AC drive upon the second fault.

F9-31 Output terminal state upon the 2nd fault
Address: 0xF91F
Min.: 0 | Unit: -
Max.: 65535 | Data type: UInt16
Default: 0 | Change: Unchangeable

Value Range:
0 to 65535

Description
This parameter show the output terminal state of the AC drive upon the second fault.

F9-32 AC drive state upon 2nd fault
Address: 0xF920

Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

This parameter shows the state of the AC drive upon the second fault.

F9-33 **Power-on time upon the 2nd fault**

Address: 0xF921

Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

This parameter shows the power-on duration of the AC drive upon the second fault.

F9-34 **Running time upon the 2nd fault**

Address: 0xF922

Min.:	0	Unit:	-
Max.:	6553.5	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0.0–6553.5

Description

This parameter shows the operation time of the AC drive upon the second fault.

F9-35 **IGBT temperature upon the 2nd fault**

Address: 0xF923

Min.:	-20	Unit:	°C
Max.:	120	Data type:	Int16
Default:	0	Change:	Unchangeable

Value Range:

-20°C to +120°C

Description

This parameter shows the IGBT temperature of the AC drive upon the second fault.

F9-36 **Fault subcode upon the 2nd fault**

Address: 0xF924

Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

F9-37 **Frequency upon the 1st fault**

Address: 0xF925

Min.:	0	Unit:	Hz
Max.:	65535	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 Hz to 65535 Hz

Description

This parameter shows the frequency of the AC drive upon the first fault.

F9-38 **Current upon the 1st fault**

Address: 0xF926

Min.:	0	Unit:	A
Max.:	6553.5	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0.0 A to 6553.5 A

Description

This parameter shows the current of the AC drive upon the first fault.

F9-39 **Bus voltage upon the 1st fault**

Address: 0xF927

Min.:	0	Unit:	V
Max.:	6553.5	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0.0 V to 6553.5V

Description

This parameter shows the bus voltage of the AC drive upon the first fault.

F9-40 **Input terminal state upon the 1st fault**

Address: 0xF928

Min.:	0	Unit:	-

Max.:	65535	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

This parameter shows the input terminal state of the AC drive upon the first fault.

F9-41 **Output terminal state upon the 1st fault**

Address: 0xF929

Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

This parameter shows the output terminal state of the AC drive upon the first fault.

F9-42 **AC drive state upon the 1st fault**

Address: 0xF92A

Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

This parameter shows the state of the AC drive upon the first fault.

F9-43 **Power-on time upon the 1st fault**

Address: 0xF92B

Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

This parameter shows the power-on duration of the AC drive upon the first fault.

F9-44 **Running time upon the 1st fault**

Address: 0xF92C

Min.:	0	Unit:	-

Max.:	6553.5	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0.0–6553.5

Description

This parameter shows the operation time of the AC drive upon the first fault.

F9-45 IGBT temperature upon the 1st fault

Address: 0xF92D

Min.:	-20	Unit:	°C
Max.:	120	Data type:	Int16
Default:	0	Change:	Unchangeable

Value Range:

-20°C to +120°C

Description

This parameter shows the IGBT temperature of the AC drive upon the first fault.

F9-46 Fault subcode upon the 1st fault

Address: 0xF92E

Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

F9-47 Fault protection action selection 0

Address: 0xF92F

Min.:	0	Unit:	-
Max.:	22022	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

Ones (position): Value of E02, E03, and E04
0: Coast to stop
2: Restart upon fault
Tens (position): Value of E05, E06, and E07
0: Coast to stop
2: Restart upon fault
Hundreds (position): Value of E08
0: Coast to stop
Thousands (position): Value of E09
0: Coast to stop
2: Restart upon fault
Ten thousands (position): Value of E10
0: Coast to stop
2: Restart upon fault

Description

The fault protection actions are set by the ones, tens, hundreds, thousands, and ten thousands places of this parameter.
0: Coast to stop
The AC drive coasts to stop.
2: Restart upon fault
The AC drive will restart upon faults.

F9-48 Fault protection action selection 1

Address:	0xF930		
Min.:	0	Unit:	-
Max.:	50555	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

Ones (position): Value of E11
0: Coast to stop
1: Decelerate to stop
2: Restart upon fault
4: Warning
5: Canceled
Tens (position): Value of E12
0: Coast to stop
1: Decelerate to stop
2: Restart upon fault
4: Warning
5: Canceled
Hundreds (position): Value of E13
0: Coast to stop
1: Decelerate to stop
2: Restart upon fault
4: Warning
5: Canceled
Thousands (position): Value of E14
0: Coast to stop
Ten thousands (position): Value of E15
0: Coast to stop
1: Decelerate to stop
3: Electromagnetic shorting
4: Warning
5: Canceled

Description

The fault protection actions are set by the ones, tens, hundreds, thousands, and ten thousands places of this parameter.
0: Coast to stop
The AC drive coasts to stop.
1: Decelerate to stop
The AC drive decelerates to stop.
2: Restart upon fault
The AC drive will restart upon faults.
3: Electromagnetic shorting
The AC drive enters the electromagnetic shorting state.
4: Warning
The AC drive continues to run.
5: Disabled
Fault detection is disabled.

F9-49 **Fault protection action selection 2**

Address:	0xF931		
Min.:	0	Unit:	-
Max.:	55055	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

Ones (position): Value of E16
0: Coast to stop
1: Decelerate to stop
4: Warning
5: Canceled
Tens (position): Value of E17
0: Coast to stop
1: Decelerate to stop
4: Warning
5: Canceled
Hundreds (position): Value of E18
0: Coast to stop
Thousands (position): Value of E19
0: Coast to stop
3: Electromagnetic shorting
4: Warning
5: Canceled
Ten thousands (position): Value of E20
0: Coast to stop
3: Electromagnetic shorting
4: Warning
5: Canceled

Description

The fault protection actions are set by the ones, tens, hundreds, thousands, and ten thousands places of this parameter.
0: Coast to stop
The AC drive coasts to stop.
1: Decelerate to stop
The AC drive decelerates to stop.
2: Restart upon fault
The AC drive will restart upon faults.
3: Electromagnetic shorting
The AC drive enters the electromagnetic shorting state.
4: Warning
The AC drive continues to run.
5: Disabled
Fault detection is disabled.

F9-50 **Fault protection action selection 3**

Address: 0xF932

Min.:	0	Unit:	-
Max.:	55550	Data type:	UInt16
Default:	5040	Change:	At stop

Value Range:

Ones (position): Reserved
0: Coast to stop
Tens (position): Value of E63
0: Coast to stop
1: Decelerate to stop
4: Warning
5: Canceled
Hundreds (position): Value of E23
0: Coast to stop
5: Canceled
Thousands (position): Value of E24
0: Coast to stop
5: Canceled
Ten thousands (position): Value of E25
0: Coast to stop
1: Decelerate to stop
4: Warning
5: Canceled

Description

The fault protection actions are set by the ones, tens, hundreds, thousands, and ten thousands places of this parameter.

0: Coast to stop
The AC drive coasts to stop.
1: Decelerate to stop
The AC drive decelerates to stop.
2: Restart upon fault
The AC drive will restart upon faults.
3: Electromagnetic shorting
The AC drive enters the electromagnetic shorting state.
4: Warning
The AC drive continues to run.
5: Disabled
Fault detection is disabled.

F9-51 **Fault protection action selection 4**

Address: 0xF933

Min.:	0	Unit:	-
Max.:	55555	Data type:	UInt16
Default:	51111	Change:	At stop

Value Range:

Ones (position): Value of E26
0: Coast to stop
1: Decelerate to stop
4: Warning
5: Canceled
Tens position: Value of E27
0: Coast to stop
1: Decelerate to stop
3: Electromagnetic shorting
4: Warning
5: Canceled
Hundreds (position): Value of E28
0: Coast to stop
1: Decelerate to stop
3: Electromagnetic shorting
4: Warning
5: Canceled
Thousands (position): Value of E29
0: Coast to stop
1: Decelerate to stop
4: Warning
5: Canceled
Ten thousands (position): Value of E30
0: Coast to stop
1: Decelerate to stop
4: Warning
5: Canceled

Description

The fault protection actions are set by the ones, tens, hundreds, thousands, and ten thousands places of this parameter.

0: Coast to stop
The AC drive coasts to stop.
1: Decelerate to stop
The AC drive decelerates to stop.
2: Restart upon fault
The AC drive will restart upon faults.
3: Electromagnetic shorting
The AC drive enters the electromagnetic shorting state.

4: Warning
The AC drive continues to run.
5: Disabled
Fault detection is disabled.

F9-52 **Fault protection action selection 5**

Address:	0xF934		
Min.:	0	Unit:	-
Max.:	55525	Data type:	UInt16
Default:	101	Change:	At stop

Value Range:

Ones (position): Value of E31
0: Coast to stop
1: Decelerate to stop
4: Warning
5: Canceled
Tens (position): Value of E40
0: Coast to stop
2: Restart upon fault
Hundreds (position): Value of E41
0: Coast to stop
1: Decelerate to stop
4: Warning
5: Canceled
Thousands (position): Value of E42
0: Coast to stop
1: Decelerate to stop
2: Restart upon fault
3: Electromagnetic shorting
4: Warning
5: Canceled
Ten thousands (position): Value of E43
0: Coast to stop
1: Decelerate to stop
3: Electromagnetic shorting
4: Warning
5: Canceled

Description

The fault protection actions are set by the ones, tens, hundreds, thousands, and ten thousands places of this parameter.
0: Coast to stop
The AC drive coasts to stop.

1: Decelerate to stop
The AC drive decelerates to stop.
2: Restart upon fault
The AC drive will restart upon faults.
3: Electromagnetic shorting
The AC drive enters the electromagnetic shorting state.
4: Warning
The AC drive continues to run.
5: Disabled
Fault detection is disabled.

F9-53 **Fault protection action selection 6**

Address:	0xF935		
Min.:	0	Unit:	-
Max.:	55555	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:
Ones (position): Value of E45
0: Coast to stop
1: Decelerate to stop
4: Warning
5: Canceled
Tens (position): Value of E60
0: Coast to stop
1: Decelerate to stop
4: Warning
5: Canceled
Hundreds (position): Value of E61
0: Coast to stop
1: Decelerate to stop
4: Warning
5: Canceled
Thousands (position): Value of E62
0: Coast to stop
5: Canceled
Ten thousands (position): Reserved
5: Canceled
Description
The fault protection actions are set by the ones, tens, hundreds, thousands, and ten thousands places of this parameter.
0: Coast to stop
The AC drive coasts to stop.

1: Decelerate to stop
The AC drive decelerates to stop.
2: Restart upon fault
The AC drive will restart upon faults.
3: Electromagnetic shorting
The AC drive enters the electromagnetic shorting state.
4: Warning
The AC drive continues to run.
5: Disabled
Fault detection is disabled.

F9-54 **Frequency for continuing to run upon fault**

Address: 0xF936

Min.:	0	Unit:	-
Max.:	4	Data type:	UInt16
Default:	1	Change:	In real time

Value Range:

0: Current running frequency
1: Frequency reference
2: Frequency upper limit
3: Frequency lower limit
4: Alternative frequency upon exception

Description

This parameter defines the frequency at which the AC drive continues to run when it is faulty. If a fault occurs during the running of the AC drive and the fault protection action is set to "Continue to run", the AC drive displays A** and continues to run at the frequency set by F9-54.

F9-55 **Backup frequency upon fault**

Address: 0xF937

Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	100	Change:	In real time

Value Range:

0.0% to 100.0%

Description

This parameter defines the alternative frequency of the AC drive upon fault. If a fault occurs during running and the fault protection action is to run at the alternative frequency upon error (F9-54 = 4), the AC drive displays A** and continues running at the alternative frequency.

F9-56 **Motor temperature sensor type**

Address: 0xF938

Min.:	0	Unit:	-
Max.:	4	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: No sensor (AI3 input)

1: PT100

2: PT1000

3:KTY84

4:PTC130

Description

AI3 can be used to for input of the motor temperature sensor. Four sensors, including PT100, PT1000, PTC130, and KTY84 are supported. The sensor is connected to the AI3 and GND terminals. To use the sensor, set the sensor type correctly. The motor temperature is displayed by U0-34.

F9-57 **Motor overtemperature protection threshold**

Address: 0xF939

Min.:	0	Unit:	°C
Max.:	200	Data type:	UInt16
Default:	110	Change:	In real time

Value Range:

0°C to 200°C

Description

Used to set the motor overtemperature protection threshold. When the motor temperature exceeds the value of F9-57 (Motor overheat protection threshold), the AC drive reports a motor overheat fault (Err45) and acts as selected by F9-48.

F9-58 **Motor overtemperature pre-warning threshold**

Address: 0xF93A

Min.:	0	Unit:	°C
Max.:	200	Data type:	UInt16
Default:	90	Change:	In real time

Value Range:

0°C to 200°C

Description

Used to set the motor overtemperature pre-warning threshold. When the motor temperature exceeds the value of F9-58 (Motor overheat pre-waring threshold), the DO allocated with function 39 (Motor overheat) outputs an active signal.

F9-59 **Selection of power dip ride-through action**

Address:	0xF93B		
Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Disabled

1: Decelerate

2: Decelerate to stop

3: Voltage dip suppression

Description

This parameter defines whether the AC drive runs continuously upon instantaneous power failure. When instantaneous power failure occurs, the AC drive keeps the motor in the power generating state to keep the bus voltage at a value around the "voltage threshold for enabling power dip ride-through". This prevents the AC drive from stopping due to undervoltage.

0: Disabled

The power dip ride-through function is disabled.

1: Decelerate

When power failure occurs, the bus voltage stays at a value around the "voltage threshold for enabling power dip ride-through". In this mode, when the grid voltage recovers, the AC drive accelerates to the target frequency based on the acceleration time.

2: Decelerate to stop

When power failure occurs, the AC drive decelerates to stop. In this mode, when the grid voltage recovers, the AC drive decelerates to 0 Hz and stops. The AC drive will start again only when a new startup command is received.

3: Voltage dip suppression

In this mode, the AC drive will not stop due to undervoltage caused by voltage dip. The voltage dip suppression time is set by F9-66.

F9-60 **Voltage to determine the pause of power dip ride-through**

Address:	0xF93C		
Min.:	80	Unit:	%
Max.:	100	Data type:	UInt16
Default:	85	Change:	In real time

Value Range:

80% to 100%

Description

This parameter defines the voltage threshold for recovering from power dip ride-through. 100% corresponds to 540 V. This value is slightly lower than the bus voltage before power failure.
Upon power loss, the bus voltage is maintained at about F9-62 (Threshold of power dip ride-through function enabled). When the power supply recovers, the bus voltage rises from F9-62 (Threshold of power dip ride-through function enabled) to F9-60 (Threshold of power dip ride-through function disabled). During this period, the output frequency of the AC drive keeps decreasing until the bus voltage reaches F9-60 (Threshold of power dip ride-through function disabled).

F9-61 **Duration for judging voltage recovery from power dip ride-through**

Address: 0xF93D

Min.:	0	Unit:	s
Max.:	100	Data type:	UInt16
Default:	0.5	Change:	In real time

Value Range:

0.0s to 100.0s

Description

Used to set the time required for the bus voltage to rise from F9-60 (Threshold of power dip ride-through function disabled) to the voltage before power loss.

F9-62 **Voltage to determine the action of power dip ride-through**

Address: 0xF93E

Min.:	60	Unit:	%
Max.:	100	Data type:	UInt16
Default:	80	Change:	In real time

Value Range:

60% to 100%

Description

This parameter defines the bus voltage level upon power failure. When a power loss occurs, the bus voltage is retained at a value around F9-62 (Threshold of power dip ride-through function enabled).

F9-63 **Runaway protection time in FVC mode**

Address: 0xF93F

Min.:	0	Unit:	-
Max.:	10000	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to 10000

Description

F9-64 **Load loss detection level**

Address:	0xF940		
Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	10	Change:	In real time

Value Range:

0.0% to 100.0%

Description

When the output current of the AC drive falls below F9-64 (Load loss detection level) for longer than the time set by F9-65 (Load loss detection time), the AC drive performs load loss protection action (selected through F9-49, coast to stop by default).

Once the load recovers during protection, the AC drive will restore to run at the frequency reference.

F9-65 **Load loss detection time**

Address:	0xF941		
Min.:	0	Unit:	s
Max.:	60	Data type:	UInt16
Default:	1	Change:	In real time

Value Range:

0.0s–60.0s

Description

When the output current of the AC drive falls below F9-64 (Load loss detection level) for longer than the time set by F9-65 (Load loss detection time), the AC drive performs load loss protection action (selected through F9-49, coast to stop by default).

Once the load recovers during protection, the AC drive will restore to run at the frequency reference.

F9-66 **Voltage dip suppression time**

Address:	0xF942		
Min.:	0	Unit:	s
Max.:	600	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0.0s to 600.0s

Description

F9-67 **Overspeed detection level**

Address:	0xF943		
Min.:	0	Unit:	%
Max.:	50	Data type:	UInt16
Default:	5	Change:	In real time

Value Range:

0.0% to 50.0%

Description

During overspeed protection, when the detected motor speed exceeds F0-10 (Maximum frequency) for a percentage higher than F9-67 (Overspeed detection level) and for longer than the time set by F9-68 (Overspeed detection time), the AC drive reports a motor overspeed fault (Err43) and acts as selected by F9-50 (Fault protection action selection 4).

When F9-68 (Overspeed detection time) is set to 0.0s, the overspeed detection function is disabled.

The overspeed protection is valid only in the FVC mode (F0-01 = 1).

F9-68 **Overspeed detection time**

Address:	0xF944		
Min.:	0	Unit:	-
Max.:	60	Data type:	UInt16
Default:	1	Change:	In real time

Value Range:

0.0–60.0

Description

During overspeed protection, when the detected motor speed exceeds F0-10 (Maximum frequency) for a percentage higher than F9-67 (Overspeed detection level) and for longer than the time set by F9-68 (Overspeed detection time), the AC drive reports a motor overspeed fault (Err43) and acts as selected by F9-50 (Fault protection action selection 4).

When F9-68 (Overspeed detection time) is set to 0.0s, the overspeed detection function is disabled.

The overspeed protection is valid only in the FVC mode (F0-01 = 1).

F9-69 **Excessive speed deviation threshold**

Address:	0xF945		
Min.:	0	Unit:	%
Max.:	50	Data type:	UInt16
Default:	20	Change:	In real time

Value Range:

0.0% to 50.0%

Description

When the detected motor speed is larger than the value of F9-69 (Detection level of speed error) for longer than the time set by F9-70 (Detection time of speed error), the AC drive reports the excessive speed deviation fault (E42.00) and acts as selected by F9-50 (Fault protection action selection 4).

If F9-70 (Detection time of speed error) is set to 0.0s, the excessive speed deviation detection function is s disabled.

The excessive speed deviation detection function is valid only in the FVC mode.

F9-70 **Excessive speed deviation detection time**

Address: 0xF946

Min.:	0	Unit:	s
Max.:	60	Data type:	UInt16
Default:	5	Change:	In real time

Value Range:

0.0s–60.0s

Description

When the detected motor speed is larger than the value of F9-69 (Detection level of speed error) for longer than the time set by F9-70 (Detection time of speed error), the AC drive reports the excessive speed deviation fault (E42.00) and acts as selected by F9-50 (Fault protection action selection 4).

If F9-70 (Detection time of speed error) is set to 0.0s, the excessive speed deviation detection function is disabled.

The excessive speed deviation detection function is valid only in the FVC mode.

F9-71 **Power dip ride-through gain**

Address: 0xF947

Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	40	Change:	In real time

Value Range:

0–100

Description

This parameter is valid only in the "keep bus voltage constant" mode (F9-59 = 1).

If undervoltage occurs frequently during power dip ride-through, increase the power dip ride-through gain and integral coefficient.

F9-72 **Power dip ride-through integral**

Address: 0xF948

Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	30	Change:	In real time

Value Range:

0–100

Description

This parameter is valid only in the "keep bus voltage constant" mode (F9-59 = 2).
If undervoltage occurs frequently during power dip ride-through, increase the power dip ride-through gain and integral coefficient.

F9-73 **Deceleration time of power dip ride-through**

Address:	0xF949		
Min.:	0	Unit:	s
Max.:	300	Data type:	UInt16
Default:	20	Change:	In real time

Value Range:

0.0s to 300.0s

Description

This parameter is valid only in the "decelerate to stop" mode (F9-59 = 2).
When the bus voltage is lower than the value of F9-62, the AC drive decelerates to stop. The deceleration time is determined by this parameter instead of F0-18.

2.11 FA Process Control PID

FA-00 **PID reference source**

Address:	0xFA00		
Min.:	0	Unit:	-
Max.:	6	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: PID digital setting (FA-01)
1: AI1
2: AI2
3: AI3
4: Pulse reference (DI5)
5: Communication setting (1000H)
6: Multi-reference

Description

This parameter specifies the PID reference source. The PID reference source is a relative value. The value 100% corresponds to 100% of the feedback signal of the controlled system.

0: PID digital setting of (FA-01)

The PID reference source is set by FA-01 (PID reference value).

1: AI1
The PID reference source is set by AI1.
2: AI2
The PID reference source is set by AI2.
3: AI3
The PID reference source is set by AI3.
4: Pulse reference (DI5)
The PID reference is set by the pulse frequency through the DI5. The frequency is calculated according to the corresponding relationship curve between the pulse frequency and running frequency.
5: Communication setting (1000H)
The PID reference source is set by remote communication.
6: Multi-reference
In the multi-reference mode, different combinations of DI states correspond to different frequency references. The four multi-reference terminals provide 16 state combinations, corresponding to 16 target frequency values. Note: When FA-00 is set to 6 (Multi-reference), FC-51 (Reference 0 source) cannot be set to 5 (PID reference).

FA-01 **PID digital reference**

Address:	0xFA01		
Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	50	Change:	In real time

Value Range:

0.0% to 100.0%

Description

When FA-00 (PID reference setting channel) is set to 0, this parameter must be set. When the parameter value is set to 100%, it corresponds to the maximum feedback value.

FA-02 **PID feedback source**

Address:	0xFA02		
Min.:	0	Unit:	-
Max.:	8	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: AI1
1: AI2
2: AI3
3: AI1 – AI2
4: Pulse reference (DI5)
5: Communication
6:AI1 + AI2
7: Max. (|AI1|, |AI2|)
8: Min. (|AI1|, |AI2|)

Description

This parameter defines the PID feedback source.

FA-03 **PID action direction**

Address:	0xFA03		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Forward
1: Reverse

Description

0: Forward
When the feedback value is lower than the PID reference, the output frequency of the AC drive increases.
1: Reverse
When the feedback value is lower than the PID reference, the output frequency of the AC drive decreases.

FA-04 **PID reference and feedback range**

Address:	0xFA04		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	1000	Change:	In real time

Value Range:

0 to 65535

Description

This parameter is used for display of the PID reference and feedback, which are dimensionless. For example, if this parameter is set to 1000, the PID reference (0% to 100%) corresponds linearly to the feedback value (0 to 1000).

FA-05 **Proportional gain Kp1**

Address: 0xFA05

Min.:	0	Unit:	-
Max.:	1000	Data type:	UInt16
Default:	20	Change:	In real time

Value Range:

0.0–1000.0

Description

This parameter defines the proportional gain Kp in PID control. The deviation reduction speed depends on the proportional coefficient Kp. A larger Kp value tends to reduce the deviation faster, but may cause system oscillation, especially at large hysteresis. A smaller Kp value indicates lower possibility of oscillation but also slower deviation reduction.

FA-06 Integral time Ti1

Address: 0xFA06

Min.:	0.01	Unit:	s
Max.:	100	Data type:	UInt16
Default:	2	Change:	In real time

Value Range:

0.01s to 100.00s

Description

This parameter defines the integral time Ti in PID control. It determines the integral adjustment intensity of the PID controller. Shorter integral time indicates greater adjustment intensity.

FA-07 Derivative time Td1

Address: 0xFA07

Min.:	0	Unit:	s
Max.:	10	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.000s to 10.000s

Description

This parameter defines the derivative time Td in PID control. It determines the deviation variation adjustment intensity of the PID controller. Longer derivative time indicates greater adjustment intensity.

FA-08 PID cut-off frequency in reverse run

Address: 0xFA08

Min.:	0	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	2	Change:	In real time

Value Range:

0.00 Hz to value of F0-10

Description

When the frequency source is only the PID, the PID cut-off frequency in reverse direction is the minimum value of the current PID output. When the frequency source is main frequency + PID, FA-08 acts on the main frequency + PID and outputs the minimum frequency value after "main frequency + PID" operation.

FA-09 **PID deviation limit**

Address:	0xFA09		
Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0% to 100.0%

Description

When the deviation is within the PID deviation limit, no adjustment is required. This parameter helps balance the accuracy and stability of the system output.

FA-10 **PID differential limit**

Address:	0xFA0A		
Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	0.1	Change:	In real time

Value Range:

0.00% to 100.00%

Description

It is used to set the PID differential output range. In PID control, the differential operation may easily cause system oscillation. Therefore, the PID differential regulation is restricted to a small range.

FA-11 **PID reference change time**

Address:	0xFA0B		
Min.:	0	Unit:	s
Max.:	650	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00s to 650.00s

Description

This parameter defines the time required for the PID reference to change from 0.0% to 100.0%.

FA-12 **PID feedback filter time**

Address:	0xFA0C		
Min.:	0	Unit:	s
Max.:	60	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00s to 60.00s

Description

This parameter defines the filter time of PID feedback. The filter helps to reduce interference on the feedback but degrades the responsiveness of the process closed-loop system.

FA-13 **PID deviation gain**

Address:	0xFA0D		
Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	100	Change:	In real time

Value Range:

0.0% to 100.0%

Description

FA-14 **PID optimization**

Address:	0xFA0E		
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0–100

Description

FA-15 **Proportional gain Kp2**

Address:	0xFA0F		
Min.:	0	Unit:	-
Max.:	1000	Data type:	UInt16
Default:	20	Change:	In real time

Value Range:

0.0–1000.0

Description

This parameter defines the proportional gain Kp in PID control. The deviation reduction speed depends on the proportional coefficient Kp. A larger Kp tends to reduce the deviation faster, but may cause system oscillation, especially at large hysteresis. A smaller Kp indicates lower possibility of oscillation but also slower deviation reduction.

FA-16 **Integral time Ti2**

Address:	0xFA10		
Min.:	0.01	Unit:	s
Max.:	100	Data type:	UInt16
Default:	2	Change:	In real time

Value Range:

0.01s to 100.00s

Description

This parameter defines the integral time Ti in PID control. It determines the integral adjustment intensity of the PID controller. Shorter integral time indicates greater adjustment intensity.

FA-17 **Derivative time Td2**

Address:	0xFA11		
Min.:	0	Unit:	s
Max.:	10	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.000s to 10.000s

Description

This parameter defines the derivative time Td in PID control. It determines the deviation variation adjustment intensity of the PID controller. Longer derivative time indicates greater adjustment intensity.

FA-18 **PID parameter switchover condition**

Address:	0xFA12		
Min.:	0	Unit:	-
Max.:	7	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: No switchover
1: Switchover by DI
2: Automatic switchover based on deviation
3: Switchover based on running frequency
6: Automatic adjustment based on roll diameter
7: Automatic adjustment based on maximum roll diameter percentage

Description

This parameter defines the switchover between two groups of PID parameters.

0: No switchover

No switchover is performed.

1: Switchover by DI

To use this function, the DI must be assigned with function 43 (PID parameter switchover). If the DI is inactive, parameter group 1 (FA-05 to FA-07) is selected. If the DI is active, parameter group 2 (FA-15 to FA-17) is selected.

2: Auto switchover based on deviation

If the absolute value of the deviation between the setting and the feedback is less than FA-19 (PID parameter switchover deviation 1), parameter group 1 is selected. If the absolute value of the deviation between the setting and the feedback is greater than FA-20 (PID parameter switchover deviation 2), parameter group 2 is selected. If the absolute value of the deviation between the setting and the feedback is between FA-19 (PID parameter switchover deviation 1) and FA-20 (PID parameter switchover deviation 2), the PID parameters are linear interpolation values of the two sets of PID parameters.

3: Switchover based on running frequency

PID parameters are switched automatically based on the running frequency of the AC drive.

6: Automatic adjustment based on roll diameter

When the current roll diameter changes between the maximum roll diameter (B0-08) and the minimum roll diameter (B0-09), the PID parameters are the linear interpolation values of the two sets of PID parameters. The minimum roll diameter corresponds to parameter group 1 (FA-05 to FA-07), and the maximum roll diameter corresponds to parameter group 2 (FA-15 to FA-17).

7: Automatic adjustment based on maximum roll diameter percentage

When the current roll diameter changes between the maximum roll diameter (B0-08) x FA-20 and the maximum roll diameter (B0-08) x FA-19, the PID parameters are the linear interpolation values of the two sets of PID parameters.

FA-19 PID parameter switchover deviation 1

Address:	0xFA13		
Min.:	0	Unit:	%
Max.:	FA-20	Data type:	UInt16
Default:	20	Change:	In real time

Value Range:

0.0% to FA-20

Description

The value 100% corresponds to the maximum deviation between the reference and feedback. The setting range is 0.0% to FA-20 (PID parameter switchover deviation 2).

FA-20 PID parameter switchover deviation 2

Address:	0xFA14		
Min.:	FA-19	Unit:	%
Max.:	100	Data type:	UInt16
Default:	80	Change:	In real time

Value Range:

FA-19 to 100.0%

Description

The value 100% corresponds to the maximum deviation between the reference and feedback. The setting range is FA-19 (PID parameter switchover deviation 1) to 100.0%.

FA-21 PID initial value

Address:	0xFA15		
Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0% to 100.0%

Description

When the AC drive starts up, the PID starts closed-loop algorithm only after the PID output is fixed to the PID initial value (FA-21) and lasts the time longer than the value of FA-22 (PID initial value active time).

FA-22 PID initial value holding time

Address:	0xFA16		
Min.:	0	Unit:	s
Max.:	650	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00s to 650.00s

Description

When the AC drive starts up, the PID starts closed-loop algorithm only after the PID output is fixed to the PID initial value (FA-21) and lasts the time longer than the value of FA-22 (PID initial value active time).

FA-23 Maximum deviation between two PID outputs in forward direction

Address:	0xFA17		
Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	1	Change:	In real time

Value Range:

0.00% to 100.00%

Description

FA-24 Maximum deviation between two PID outputs in reverse direction

Address:	0xFA18		
Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	1	Change:	In real time

Value Range:

0.00% to 100.00%

Description

FA-25 PID integral property

Address:	0xFA19		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Disabled

1: Enabled

Description

0: Disabled. When the integral pause is disabled, it remains inactive no matter whether the multi-functional DI is active.

1: Enabled. When the integral pause is enabled and the DI allocated with the PID integral pause function is active (F4-00 = 22), the PID integral operation stops. In this case, only proportional and differential operations take effect.

FA-26 Detection level of PID feedback loss

Address:	0xFA1A		
Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0% to 100.0%

Description

This parameter is used to determine whether the PID feedback is lost. If the PID feedback is lower than the value of FA-26 (Detection level of PID feedback loss) and the lasting time exceeds the value of FA-27 (Detection time of PID feedback loss), the AC drive reports E31.00.

When this parameter is set to 0, feedback loss detection is disabled.

FA-27 Detection time of PID feedback loss

Address:	0xFA1B		
Min.:	0	Unit:	s
Max.:	20	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s to 20.0s

Description

This parameter is used to determine whether the PID feedback is lost. If the PID feedback is lower than the value of FA-26 (Detection level of PID feedback loss) and the lasting time exceeds the value of FA-27 (Detection time of PID feedback loss), the AC drive reports E31.00.

2.12 FB Wobble, Fixed Length, and Count

FB-00 Wobble setting mode

Address:	0xFB00		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Relative to the center frequency

1: Relative to the maximum frequency

Description

0: Relative to the central frequency (F0-07, frequency reference superposition). It is a variable wobble system and the wobble changes with the central frequency (frequency reference).

1: Relative to the maximum frequency (F0-10, maximum frequency). It is a fixed wobble system, and the wobble is calculated based on the maximum frequency.

FB-01 Wobble amplitude

Address:	0xFB01		
Min.:	0	Unit:	%

Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0% to 100.0%

Description

When FB-01 is set to 0, the wobble amplitude is 0 and the wobble function does not work. When the wobble is related to the central frequency (FB-00 = 0), the wobble is calculated based on the following formula: wobble = F0-07 x FB-01. When the wobble is related to the maximum frequency (FB-00 = 1), the wobble is calculated based on the following formula: wobble = F0-10 x FB-01.

FB-02 Jump frequency amplitude

Address: 0xFB02

Min.:	0	Unit:	%
Max.:	50	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0% to 50.0%

Description

This parameter and the wobble are used to define the jump frequency, namely, jump frequency = wobble x FB-02. The wobble running frequency is limited by the frequency upper limit and frequency lower limit.

FB-03 Wobble cycle

Address: 0xFB03

Min.:	0.1	Unit:	s
Max.:	3,000	Data type:	UInt16
Default:	10	Change:	In real time

Value Range:

0.1s to 3000.0s

Description

This parameter defines the time of a complete wobble cycle.

FB-04 Triangular wave rising time coefficient

Address: 0xFB04

Min.:	0.1	Unit:	%
Max.:	100	Data type:	UInt16
Default:	50	Change:	In real time

Value Range:

0.1% to 100.0%

Description

It is the percentage of triangular wave rising time to FB-03 (Wobble cycle).

FB-05 **Set length**

Address:	0xFB05		
Min.:	0	Unit:	m
Max.:	65535	Data type:	UInt16
Default:	1000	Change:	In real time

Value Range:

0 m to 65535 m

Description

This parameter specifies the length value to be controlled in fixed length control mode.

FB-06 **Actual length**

Address:	0xFB06		
Min.:	0	Unit:	m
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 m to 65535 m

Description

The actual length is a monitored value. Actual length (FB-06) = Number of pulses sampled by terminal/Number of pulses each meter (FB-07)

FB-07 **Number of pulses per meter**

Address:	0xFB07		
Min.:	0.1	Unit:	-
Max.:	6553.5	Data type:	UInt16
Default:	100	Change:	In real time

Value Range:

0.1–6553.5

Description

Indicates the number of pulses output per 1 m. The length pulse is sampled by DI5. DI5 must be allocated with the length count input function (F4-04 = 27).

FB-08 **Set count value**

Address:	0xFB08		
Min.:	1	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	1000	Change:	In real time

Value Range:

1 to 65535

Description

When the count value reaches FB-08, the DO outputs an active signal indicating that the count value has reached.

FB-09 **Designated count value**

Address:	0xFB09		
Min.:	1	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	1000	Change:	In real time

Value Range:

1 to 65535

Description

When the count value reaches FB-09, the DO outputs an active signal indicating that the designated count value has reached. FB-09 must be lower than or equal to FB-08 (Set count value).

FB-10 **Revolution count reset mode**

Address:	0xFB0A		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Rising edge triggered

1: Level triggered

Description

Used to set the revolution counting reset mode.

0: Rising edge triggered

1: Level triggered

FB-11 **Revolution count reset signal**

Address:	0xFB0B		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Disable

1: Enable

Description

Clear the number of revolutions. When this parameter is set to 1, the number of revolutions is cleared.

FB-12 **Revolution count retention upon power failure**

Address: 0xFB0C

Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: No

1: Yes

Description

When this parameter is set to 0, the number of revolutions is not retentive upon power failure. When this parameter is set to 1, the number of revolutions is retentive upon power failure.

FB-13 **Revolution count clear**

Address: 0xFB0D

Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to 65535

Description

Indicates the original value of resolution count.

FB-14 **Transmission ratio numerator**

Address: 0xFB0E

Min.:	1	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	1	Change:	In real time

Value Range:

1 to 65535

Description

FB-15 **Transmission ratio denominator**

Address: 0xFB0F

Min.:	1	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	1	Change:	In real time

Value Range:

1 to 65535

Description

FB-16 **Actual running revolutions**

Address:	0xFB10		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

Indicates the number of revolutions after FB-13 is superposed.

FB-17 **Running revolutions**

Address:	0xFB11		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

Indicates the number of running resolutions upon last count reset.

FB-18 **Running revolution accuracy**

Address:	0xFB12		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: 1 revolution

1: 0.1 revolution

Description

0 indicates that the unit of revolution count is 1, and 1 indicates that the unit of revolution count is 0.1.

FB-19 **Revolution count direction**

Address:	0xFB13		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Forward

1: Reverse

Description

0 indicates that the directions are consistent, and 1 indicates that the directions are reverse.

2.13 FC Multi-reference and Simple PLC

FC-00 Multi-reference 0

Address:	0xFC00		
Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	0	Change:	In real time

Value Range:

-100.0% to +100.0%

Description

This parameter indicates the frequency reference of each speed. FC-00 to FC-15 correspond to 16 (from 0 to 15) frequency setting values. The frequency setting values are calculated as percentages corresponding to the maximum frequency. The value 100% corresponds to F0-10 (Maximum frequency). The AC drive provides four multi-reference terminals, which have 16 state combinations, corresponding to 16 frequency setting values.

When the simple PLC is used as the main frequency source, you need to set parameters in group FC. In some industrial applications, the AC motor is only used to realize the functions of start/stop, time- and segment-based speed regulation, and simple automatic forward and reverse run. A PLC is required for other control functions. However, the simple PLC is able to provide the control functions without a PLC. Simple PLCs are typically used in industrial equipment such as mixture mixing and industrial washing machines. When the simple PLC is used as the main frequency (F0-03 = 7),

the parameters in group FC need to be set.

FC-01 Multi-reference 1

Address:	0xFC01		
Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	0	Change:	In real time

Value Range:

-100.0% to +100.0%

Description

Same as FC-00

FC-02 **Multi-reference 2**

Address:	0xFC02		
Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	0	Change:	In real time

Value Range:

-100.0% to +100.0%

Description

Same as FC-00

FC-03 **Multi-reference 3**

Address:	0xFC03		
Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	0	Change:	In real time

Value Range:

-100.0% to +100.0%

Description

Same as FC-00

FC-04 **Multi-reference 4**

Address:	0xFC04		
Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	0	Change:	In real time

Value Range:

-100.0% to +100.0%

Description

Same as FC-00

FC-05 **Multi-reference 5**

Address:	0xFC05		
Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	0	Change:	In real time

Value Range:

-100.0% to +100.0%

Description

Same as FC-00

FC-06 **Multi-reference 6**

Address: 0xFC06

Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	0	Change:	In real time

Value Range:

-100.0% to +100.0%

Description

Same as FC-00

FC-07 Multi-reference 7

Address: 0xFC07

Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	0	Change:	In real time

Value Range:

-100.0% to +100.0%

Description

Same as FC-00

FC-08 Multi-reference 8

Address: 0xFC08

Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	0	Change:	In real time

Value Range:

-100.0% to +100.0%

Description

Same as FC-00

FC-09 Multi-reference 9

Address: 0xFC09

Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	0	Change:	In real time

Value Range:

-100.0% to +100.0%

Description

Same as FC-00

FC-10 Multi-reference 10

Address: 0xFC0A

Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16

Default: 0 | Change: In real time

Value Range:

-100.0% to +100.0%

Description

Same as FC-00

FC-11 Multi-reference 11

Address: 0xFC0B

Min.: -100 | Unit: %

Max.: 100 | Data type: Int16

Default: 0 | Change: In real time

Value Range:

-100.0% to +100.0%

Description

Same as FC-00

FC-12 Multi-reference 12

Address: 0xFC0C

Min.: -100 | Unit: %

Max.: 100 | Data type: Int16

Default: 0 | Change: In real time

Value Range:

-100.0% to +100.0%

Description

Same as FC-00

FC-13 Multi-reference 13

Address: 0xFC0D

Min.: -100 | Unit: %

Max.: 100 | Data type: Int16

Default: 0 | Change: In real time

Value Range:

-100.0% to +100.0%

Description

Same as FC-00

FC-14 Multi-reference 14

Address: 0xFC0E

Min.: -100 | Unit: %

Max.: 100 | Data type: Int16

Default: 0 | Change: In real time

Value Range:

-100.0% to +100.0%

Description

Same as FC-00

FC-15 **Multi-reference 15**

Address:	0xFC0F		
Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	0	Change:	In real time

Value Range:

-100.0% to +100.0%

Description

Same as FC-00

FC-16 **Simple PLC running mode**

Address:	0xFC10		
Min.:	0	Unit:	-
Max.:	2	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Stop after running for one cycle

1: Keep final values after running for one cycle

2: Repeat after running for one cycle

Description

When the simple PLC is used as the main frequency source, the running mode of the simple PLC is set by FC-16. FC-17 is used to determine whether the running stage and running frequency of the PLC before power failure are memorized upon power failure or shutdown.

0: Stop after running for one cycle

The AC drive stops automatically after running for one cycle and starts again only after receiving a running command.

1: Keep the final value after running for one cycle

The AC drive keeps the final running frequency and direction after running for one cycle and starts to run from the initial PLC state upon restart.

2: Repeat after running for one cycle

The AC drive automatically starts another cycle after running for one cycle and stops only after receiving a stop command.

FC-17 **Simple PLC retention selection upon power failure**

Address:	0xFC11		
Min.:	0	Unit:	-

Max.:	11	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

Ones (position): Retention selection upon power failure
0: No
1: Yes
Tens (position): Retention selection upon stop
0: No
1: Yes

Description

When the simple PLC is used as the main frequency, the running mode of the simple PLC is set by FC-16.
FC-17 is used to determine whether the running stage and running frequency of the PLC before power failure are memorized upon power failure or shutdown.
Ones (position): Retention selection upon power failure
This parameter defines whether the PLC process starts all over again upon power-on. When it is set to 1, the AC drive retains the PLC running stage and running frequency before power failure and continues to run from the retained values after the drive is powered on again.
Tens: Retention selection upon stop
This parameter defines whether the PLC process starts all over again upon startup. When it is set to 1, the AC drive retains the PLC running stage and running frequency before stop and continues to run from the retained values after the drive is started again.

FC-18 Running time of speed reference 0 set by simple PLC

Address: 0xFC12

Min.:	0	Unit:	s (h)
Max.:	6553.5	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s (h) to 6553.5s (h)

Description

FC-18 to FC-49 respectively define the running time and acceleration and deceleration time of each of the 16 multi-speed references. The running time of each reference is the sum of acceleration or deceleration time and running time at constant speed and target frequency.

FC-19 Acceleration/deceleration time of speed reference 0 set by simple PLC

Address: 0xFC13

Min.:	0	Unit:	-

Max.: 3 | Data type: UInt16

Default: 0 | Change: In real time

Value Range:

0: Group 1 acceleration/deceleration time (F0-17 and F0-18)
1: Group 2 acceleration/deceleration time (F8-03 and F8-04)
2: Group 3 acceleration/deceleration time (F8-05 and F8-06)
3: Group 4 acceleration/deceleration time (F8-07 and F8-08)

Description

FC-18 to FC-49 respectively define the running time and acceleration and deceleration time of each of the 16 multi-speed references. The running time of each reference is the sum of acceleration or deceleration time and running time at constant speed and target frequency.

FC-20 Running time of speed reference 1 by simple PLC

Address: 0xFC14

Min.: 0 | Unit: s (h)

Max.: 6553.5 | Data type: UInt16

Default: 0 | Change: In real time

Value Range:

0.0s (h) to 6553.5s (h)

Description

FC-18 to FC-49 respectively define the running time and acceleration and deceleration time of each of the 16 multi-speed references. The running time of each reference is the sum of acceleration or deceleration time and running time at constant speed and target frequency.

FC-21 Acceleration/deceleration time of speed reference 1 set by simple PLC

Address: 0xFC15

Min.: 0 | Unit: -

Max.: 3 | Data type: UInt16

Default: 0 | Change: In real time

Value Range:

0: Group 1 acceleration/deceleration time (F0-17 and F0-18)
1: Group 2 acceleration/deceleration time (F8-03 and F8-04)
2: Group 3 acceleration/deceleration time (F8-05 and F8-06)
3: Group 4 acceleration/deceleration time (F8-07 and F8-08)

Description

FC-18 to FC-49 respectively define the running time and acceleration and deceleration time of each of the 16 multi-speed references. The running time of each reference is the sum of acceleration or deceleration time and running time at constant speed and target frequency.

FC-22 **Running time of speed reference 2 by simple PLC**

Address: 0xFC16

Min.:	0	Unit:	s (h)
Max.:	6553.5	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s (h) to 6553.5s (h)

Description

FC-18 to FC-49 respectively define the running time and acceleration and deceleration time of each of the 16 multi-speed references. The running time of each reference is the sum of acceleration or deceleration time and running time at constant speed and target frequency.

FC-23 **Acceleration/deceleration time of speed reference 2 set by simple PLC**

Address: 0xFC17

Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Group 1 acceleration/deceleration time (F0-17 and F0-18)
1: Group 2 acceleration/deceleration time (F8-03 and F8-04)
2: Group 3 acceleration/deceleration time (F8-05 and F8-06)
3: Group 4 acceleration/deceleration time (F8-07 and F8-08)

Description

FC-18 to FC-49 respectively define the running time and acceleration and deceleration time of each of the 16 multi-speed references. The running time of each reference is the sum of acceleration or deceleration time and running time at constant speed and target frequency.

FC-24 **Running time of speed reference 3 by simple PLC**

Address: 0xFC18

Min.:	0	Unit:	s (h)
Max.:	6553.5	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s (h) to 6553.5s (h)

Description

FC-18 to FC-49 respectively define the running time and acceleration and deceleration time of each of the 16 multi-speed references. The running time of each reference is the sum of acceleration or deceleration time and running time at constant speed and target frequency.

FC-25 Acceleration/deceleration time of speed reference 3 set by simple PLC

Address:	0xFC19		
Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Group 1 acceleration/deceleration time (F0-17 and F0-18)
1: Group 2 acceleration/deceleration time (F8-03 and F8-04)
2: Group 3 acceleration/deceleration time (F8-05 and F8-06)
3: Group 4 acceleration/deceleration time (F8-07 and F8-08)

Description

FC-18 to FC-49 respectively define the running time and acceleration and deceleration time of each of the 16 multi-speed references. The running time of each reference is the sum of acceleration or deceleration time and running time at constant speed and target frequency.

FC-26 Running time of speed reference 4 by simple PLC

Address:	0xFC1A		
Min.:	0	Unit:	s (h)
Max.:	6553.5	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s (h) to 6553.5s (h)

Description

FC-18 to FC-49 respectively define the running time and acceleration and deceleration time of each of the 16 multi-speed references. The running time of each reference is the sum of acceleration or deceleration time and running time at constant speed and target frequency.

FC-27 Acceleration/deceleration time of speed reference 4 set by simple PLC

Address:	0xFC1B		
Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Group 1 acceleration/deceleration time (F0-17 and F0-18)
1: Group 2 acceleration/deceleration time (F8-03 and F8-04)
2: Group 3 acceleration/deceleration time (F8-05 and F8-06)
3: Group 4 acceleration/deceleration time (F8-07 and F8-08)

Description

FC-18 to FC-49 respectively define the running time and acceleration and deceleration time of each of the 16 multi-speed references. The running time of each reference is the sum of acceleration or deceleration time and running time at constant speed and target frequency.

FC-28 Running time of speed reference 5 by simple PLC

Address: 0xFC1C

Min.:	0	Unit:	s (h)
Max.:	6553.5	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s (h) to 6553.5s (h)

Description

FC-18 to FC-49 respectively define the running time and acceleration and deceleration time of each of the 16 multi-speed references. The running time of each reference is the sum of acceleration or deceleration time and running time at constant speed and target frequency.

FC-29 Acceleration/deceleration time of speed reference 5 set by simple PLC

Address: 0xFC1D

Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Group 1 acceleration/deceleration time (F0-17 and F0-18)

1: Group 2 acceleration/deceleration time (F8-03 and F8-04)

2: Group 3 acceleration/deceleration time (F8-05 and F8-06)

3: Group 4 acceleration/deceleration time (F8-07 and F8-08)

Description

FC-18 to FC-49 respectively define the running time and acceleration and deceleration time of each of the 16 multi-speed references. The running time of each reference is the sum of acceleration or deceleration time and running time at constant speed and target frequency.

FC-30 Running time of speed reference 6 set by simple PLC

Address: 0xFC1E

Min.:	0	Unit:	s (h)
Max.:	6553.5	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s (h) to 6553.5s (h)

Description

FC-18 to FC-49 respectively define the running time and acceleration and deceleration time of each of the 16 multi-speed references. The running time of each reference is the sum of acceleration or deceleration time and running time at constant speed and target frequency.

FC-31 Acceleration/deceleration time of speed reference 6 set by simple PLC

Address: 0xFC1F

Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Group 1 acceleration/deceleration time (F0-17 and F0-18)
1: Group 2 acceleration/deceleration time (F8-03 and F8-04)
2: Group 3 acceleration/deceleration time (F8-05 and F8-06)
3: Group 4 acceleration/deceleration time (F8-07 and F8-08)

Description

FC-18 to FC-49 respectively define the running time and acceleration and deceleration time of each of the 16 multi-speed references. The running time of each reference is the sum of acceleration or deceleration time and running time at constant speed and target frequency.

FC-32 Running time of speed reference 7 set by simple PLC

Address: 0xFC20

Min.:	0	Unit:	s (h)
Max.:	6553.5	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s (h) to 6553.5s (h)

Description

FC-18 to FC-49 respectively define the running time and acceleration and deceleration time of each of the 16 multi-speed references. The running time of each reference is the sum of acceleration or deceleration time and running time at constant speed and target frequency.

FC-33 Acceleration/deceleration time of speed reference 7 set by simple PLC

Address: 0xFC21

Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Group 1 acceleration/deceleration time (F0-17 and F0-18)
1: Group 2 acceleration/deceleration time (F8-03 and F8-04)
2: Group 3 acceleration/deceleration time (F8-05 and F8-06)
3: Group 4 acceleration/deceleration time (F8-07 and F8-08)

Description

FC-18 to FC-49 respectively define the running time and acceleration and deceleration time of each of the 16 multi-speed references. The running time of each reference is the sum of acceleration or deceleration time and running time at constant speed and target frequency.

FC-34 Running time of speed reference 8 set by simple PLC

Address: 0xFC22

Min.:	0	Unit:	s (h)
Max.:	6553.5	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s (h) to 6553.5s (h)

Description

FC-18 to FC-49 respectively define the running time and acceleration and deceleration time of each of the 16 multi-speed references. The running time of each reference is the sum of acceleration or deceleration time and running time at constant speed and target frequency.

FC-35 Acceleration/deceleration time of speed reference 8 set by simple PLC

Address: 0xFC23

Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Group 1 acceleration/deceleration time (F0-17 and F0-18)
1: Group 2 acceleration/deceleration time (F8-03 and F8-04)
2: Group 3 acceleration/deceleration time (F8-05 and F8-06)
3: Group 4 acceleration/deceleration time (F8-07 and F8-08)

Description

FC-18 to FC-49 respectively define the running time and acceleration and deceleration time of each of the 16 multi-speed references. The running time of each reference is the sum of acceleration or deceleration time and running time at constant speed and target frequency.

FC-36 Running time of speed reference 9 set by simple PLC

Address: 0xFC24

Min.:	0	Unit:	s (h)
Max.:	6553.5	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s (h) to 6553.5s (h)

Description

FC-18 to FC-49 respectively define the running time and acceleration and deceleration time of each of the 16 multi-speed references. The running time of each reference is the sum of acceleration or deceleration time and running time at constant speed and target frequency.

FC-37 Acceleration/deceleration time of speed reference 9 set by simple PLC

Address: 0xFC25

Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Group 1 acceleration/deceleration time (F0-17 and F0-18)
1: Group 2 acceleration/deceleration time (F8-03 and F8-04)
2: Group 3 acceleration/deceleration time (F8-05 and F8-06)
3: Group 4 acceleration/deceleration time (F8-07 and F8-08)

Description

FC-18 to FC-49 respectively define the running time and acceleration and deceleration time of each of the 16 multi-speed references. The running time of each reference is the sum of acceleration or deceleration time and running time at constant speed and target frequency.

FC-38 Running time of speed reference 10 set by simple PLC

Address: 0xFC26

Min.:	0	Unit:	s (h)
Max.:	6553.5	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s (h) to 6553.5s (h)

Description

FC-18 to FC-49 respectively define the running time and acceleration and deceleration time of each of the 16 multi-speed references. The running time of each reference is the sum of acceleration or deceleration time and running time at constant speed and target frequency.

FC-39 **Acceleration/deceleration time of speed reference 10 set by simple PLC**

Address:	0xFC27		
Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Group 1 acceleration/deceleration time (F0-17 and F0-18)
1: Group 2 acceleration/deceleration time (F8-03 and F8-04)
2: Group 3 acceleration/deceleration time (F8-05 and F8-06)
3: Group 4 acceleration/deceleration time (F8-07 and F8-08)

Description

FC-18 to FC-49 respectively define the running time and acceleration and deceleration time of each of the 16 multi-speed references. The running time of each reference is the sum of acceleration or deceleration time and running time at constant speed and target frequency.

FC-40 **Running time of speed reference 11 set by simple PLC**

Address:	0xFC28		
Min.:	0	Unit:	s (h)
Max.:	6553.5	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s (h) to 6553.5s (h)

Description

FC-18 to FC-49 respectively define the running time and acceleration and deceleration time of each of the 16 multi-speed references. The running time of each reference is the sum of acceleration or deceleration time and running time at constant speed and target frequency.

FC-41 **Acceleration/deceleration time of speed reference 11 set by simple PLC**

Address:	0xFC29		
Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Group 1 acceleration/deceleration time (F0-17 and F0-18)
1: Group 2 acceleration/deceleration time (F8-03 and F8-04)
2: Group 3 acceleration/deceleration time (F8-05 and F8-06)
3: Group 4 acceleration/deceleration time (F8-07 and F8-08)

Description

FC-18 to FC-49 respectively define the running time and acceleration and deceleration time of each of the 16 multi-speed references. The running time of each reference is the sum of acceleration or deceleration time and running time at constant speed and target frequency.

FC-42 Running time of speed reference 12 set by simple PLC

Address:	0xFC2A		
Min.:	0	Unit:	s (h)
Max.:	6553.5	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s (h) to 6553.5s (h)

Description

FC-18 to FC-49 respectively define the running time and acceleration and deceleration time of each of the 16 multi-speed references. The running time of each reference is the sum of acceleration or deceleration time and running time at constant speed and target frequency.

FC-43 Acceleration/deceleration time of speed reference 12 set by simple PLC

Address:	0xFC2B		
Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Group 1 acceleration/deceleration time (F0-17 and F0-18)

1: Group 2 acceleration/deceleration time (F8-03 and F8-04)

2: Group 3 acceleration/deceleration time (F8-05 and F8-06)

3: Group 4 acceleration/deceleration time (F8-07 and F8-08)

Description

FC-18 to FC-49 respectively define the running time and acceleration and deceleration time of each of the 16 multi-speed references. The running time of each reference is the sum of acceleration or deceleration time and running time at constant speed and target frequency.

FC-44 Running time of speed reference 13 set by simple PLC

Address:	0xFC2C		
Min.:	0	Unit:	s (h)
Max.:	6553.5	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s (h) to 6553.5s (h)

Description

FC-18 to FC-49 respectively define the running time and acceleration and deceleration time of each of the 16 multi-speed references. The running time of each reference is the sum of acceleration or deceleration time and running time at constant speed and target frequency.

FC-45 Acceleration/deceleration time of speed reference 13 set by simple PLC

Address: 0xFC2D

Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Group 1 acceleration/deceleration time (F0-17 and F0-18)
1: Group 2 acceleration/deceleration time (F8-03 and F8-04)
2: Group 3 acceleration/deceleration time (F8-05 and F8-06)
3: Group 4 acceleration/deceleration time (F8-07 and F8-08)

Description

FC-18 to FC-49 respectively define the running time and acceleration and deceleration time of each of the 16 multi-speed references. The running time of each reference is the sum of acceleration or deceleration time and running time at constant speed and target frequency.

FC-46 Running time of speed reference 14 set by simple PLC

Address: 0xFC2E

Min.:	0	Unit:	s (h)
Max.:	6553.5	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s (h) to 6553.5s (h)

Description

FC-18 to FC-49 respectively define the running time and acceleration and deceleration time of each of the 16 multi-speed references. The running time of each reference is the sum of acceleration or deceleration time and running time at constant speed and target frequency.

FC-47 Acceleration/deceleration time of speed reference 14 set by simple PLC

Address: 0xFC2F

Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Group 1 acceleration/deceleration time (F0-17 and F0-18)
1: Group 2 acceleration/deceleration time (F8-03 and F8-04)
2: Group 3 acceleration/deceleration time (F8-05 and F8-06)
3: Group 4 acceleration/deceleration time (F8-07 and F8-08)

Description

FC-18 to FC-49 respectively define the running time and acceleration and deceleration time of each of the 16 multi-speed references. The running time of each reference is the sum of acceleration or deceleration time and running time at constant speed and target frequency.

FC-48 Running time of the 15th speed reference set by simple PLC

Address: 0xFC30

Min.:	0	Unit:	s (h)
Max.:	6553.5	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s (h) to 6553.5s (h)

Description

FC-18 to FC-49 respectively define the running time and acceleration and deceleration time of each of the 16 multi-speed references. The running time of each reference is the sum of acceleration or deceleration time and running time at constant speed and target frequency.

FC-49 Acceleration/deceleration time of speed reference 15 set by simple PLC

Address: 0xFC31

Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Group 1 acceleration/deceleration time (F0-17 and F0-18)
1: Group 2 acceleration/deceleration time (F8-03 and F8-04)
2: Group 3 acceleration/deceleration time (F8-05 and F8-06)
3: Group 4 acceleration/deceleration time (F8-07 and F8-08)

Description

FC-18 to FC-49 respectively define the running time and acceleration and deceleration time of each of 16 multi-speed references. The running time of each speed reference is the sum of acceleration or deceleration time and running time at constant speed and target frequency.

FC-50 **PLC running time unit**

Address: 0xFC32

Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: s (second)

1: h (hour)

Description

This parameter defines the unit of the PLC running time for each speed.

FC-51 **Multi-reference 0 setting mode**

Address: 0xFC33

Min.:	0	Unit:	-
Max.:	6	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Multi-reference 0 (FC-00)

1: AI1

2: AI2

3: AI3

4: Pulse reference (DI5)

5: PID

6: Preset frequency (F0-08 that can be changed by pressing UP or DOWN key)

Description

Multi-reference 0 can be selected through seven ways, including digital setting, analog input, pulse frequency, PID, and preset frequency.

0: Multi-reference 0 (FC-00)

The frequency reference of multi-reference 0 is set by FC-00.

1: AI1

The frequency reference of multi-reference 0 is set by AI1.

2: AI2

The frequency reference of multi-reference 0 is set by AI2.

3: AI3

The frequency reference of multi-reference 0 is set by AI3 input.

4: Pulse reference (DI5)

The frequency reference of multi-reference 0 is set by pulse frequency.

5: PID

The frequency reference of multi-reference 0 is set by PID.

6: Preset frequency (F0-08)

The frequency reference of multi-reference 0 is set by F0-08 (preset frequency).

2.14 FD Communication Parameters

FD-00 **Baud rate**

Address:	0xFD00		
Min.:	0	Unit:	-
Max.:	9	Data type:	UInt16
Default:	5	Change:	In real time

Value Range:

0: 300 bit/s
1: 600 bit/s
2: 1200 bit/s
3: 2400 bit/s
4: 4800 bit/s
5: 9600 bit/s
6: 19200 bit/s
7: 38400 bit/s
8: 57600 bit/s
9: 115200 bit/s

Description

This parameter defines the speed of data transmission between the host controller and the AC drive. A higher baud rate indicates faster communication. Note that the baud rate of the host controller must be the same as that of the AC drive. Otherwise, communication will fail.

FD-01 **Modbus data format**

Address:	0xFD01		
Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: No check (8-N-2) 1: Even parity check (8-E-1)
2: Odd parity check (8-O-1)
3: No check (8-N-1)

Description

This parameter defines the format of Modbus data transmitted between the host controller and the AC drive. The data format set in the host controller must be the same as that set in the AC drive. Otherwise, communication will fail.

FD-02 **Local address**

Address:	0xFD02		
Min.:	1	Unit:	-

Max.:	247	Data type:	UInt16
Default:	1	Change:	In real time

Value Range:

1 to 247

Description

When the local address is set to 0 (broadcast address), host controller broadcast is enabled.

The local address must be unique in the range of 1 to 247, which is the basis for point-point communication between the AC drive and the host controller.

FD-03 Response delay

Address:	0xFD03		
Min.:	0	Unit:	ms
Max.:	20	Data type:	UInt16
Default:	2	Change:	In real time

Value Range:

0 ms to 20 ms

Description

This parameter defines the interval from the end of data receiving by the AC drive to the start of data transmission to the host controller.

If the response delay is shorter than the system processing time, the system processing time prevails, which means the system sends data to the host controller immediately after data processing is completed. If the response delay is longer than the system processing time, the AC drive sends data to the host controller only after the response delay elapses.

FD-04 Modbus communication timeout time

Address:	0xFD04		
Min.:	0	Unit:	s
Max.:	60	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s–60.0s

Description

When it is set to 0.0s, the Modbus communication timeout time is invalid. It is set to 0.0s under normal circumstances. This parameter is used to monitor communication status in a system with continuous communication.

When it is set to an effective value, if the time interval between the current communication and the next communication exceeds Fd-04 (Modbus communication interruption detection time), the system reports a communication fault (Err16).

FD-06 **Communication fault reset**

Address:	0xFD06		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	1	Change:	At stop

Value Range:

0: Disabled

1: Enabled

Description

This parameter defines whether to reset the communication fault.

FD-09 **CANopen/CANlink communication state**

Address:	0xFD09		
Min.:	0	Unit:	-
Max.:	999	Data type:	UInt16
Default:	2	Change:	Unchangeable

Value Range:

Ones: CANopen

0: Stop

1: Initialized

2: Pre-running

8: Running

Tens: CANlink

0: Stop

1: Initialized

2: Pre-running

8: Running

Hundreds position: Reserved

Description

This read-only parameter is used to monitor the communication status.

FD-10 **CANopen/CANlink switchover**

Address:	0xFD0A		
Min.:	1	Unit:	-
Max.:	2	Data type:	UInt16
Default:	1	Change:	At stop

Value Range:

1: CANopen

2: CANlink

Description

Used to select the CAN communication protocol for the CANlink expansion card.

If it is set to 1, CANopen communication is selected.
If it is set to 2, CANlink communication is selected.

FD-12 **CAN baud rate**

Address: 0xFD0C

Min.:	0	Unit:	-
Max.:	6	Data type:	UInt16
Default:	5	Change:	At stop

Value Range:

0: 20 kbit/s
1: 50 kbit/s
2: 100 kbit/s
3: 125 kbit/s
4: 250 kbit/s
5: 500 kbit/s
6: 1 Mbit/s

Description

This parameter defines the baud rate for CAN communication, including CANlink and CANopen communication. In the same network, baud rates of all stations must be consistent. Otherwise, communication will fail.
It is valid only for the CANlink communication expansion card.

FD-13 **CAN station number**

Address: 0xFD0D

Min.:	1	Unit:	-
Max.:	127	Data type:	UInt16
Default:	1	Change:	At stop

Value Range:

1 to 127

Description

This parameter defines the CAN station number, including station numbers for CANlink and CANopen communication. In the same network, all station numbers must be unique. Otherwise, communication will fail.
It is valid only for the CANlink communication expansion card.

FD-14 **Number of CAN frames received per unit of time**

Address: 0xFD0E

Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

This parameter is used to monitor the bus load. It defines the number of CAN frames received by the station per second.

It is valid only for the CANlink communication expansion card.

FD-15 **Maximum value of error counters received by the node**

Address: 0xFD0F

Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

This parameter is used to monitor bus errors. It defines the maximum value of error counters received by the node through CAN.

It is valid only for the CANlink communication expansion card.

FD-16 **Maximum value of error counters sent by the node**

Address: 0xFD10

Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

This parameter is used to monitor bus errors. This parameter defines the maximum value of error counters sent by the node through CAN.

It is valid only for the CANlink communication expansion card.

FD-17 **Bus disconnection times per unit of time**

Address: 0xFD11

Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

This parameter is used to monitor bus errors. This parameter defines the CAN bus disconnection times of the node.

It is valid only for the CANlink communication expansion card.

FD-19 **CAN communication disconnection coefficient**

Address: 0xFD13

Min.:	1	Unit:	-
Max.:	15	Data type:	UInt16
Default:	3	Change:	At stop

Value Range:

1 to 15

Description

FD-37 **DHCP function**

Address: 0xFD25

Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Disabled

1: Enabled

Description

FD-38 **IP address highest byte**

Address: 0xFD26

Min.:	0	Unit:	-
Max.:	255	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to 255

Description

FD-39 **IP address second highest byte**

Address: 0xFD27

Min.:	0	Unit:	-
Max.:	255	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to 255

Description

FD-40 **IP address third byte**

Address: 0xFD28

Min.:	0	Unit:	-
Max.:	255	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to 255

Description

FD-41 **IP address lowest byte**

Address: 0xFD29

Min.:	0	Unit:	-
Max.:	255	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to 255

Description

FD-42 **Subnet mask highest byte**

Address: 0xFD2A

Min.:	0	Unit:	-
Max.:	255	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to 255

Description

FD-43 **Subnet mask second highest byte**

Address: 0xFD2B

Min.:	0	Unit:	-
Max.:	255	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to 255

Description

FD-44 **Subnet mask third byte**

Address: 0xFD2C

Min.:	0	Unit:	-
Max.:	255	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to 255

Description

FD-45 Subnet mask lowest byte

Address: 0xFD2D

Min.:	0	Unit:	-
Max.:	255	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to 255

Description

FD-46 Gateway highest byte

Address: 0xFD2E

Min.:	0	Unit:	-
Max.:	255	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to 255

Description

FD-47 Gateway second highest byte

Address: 0xFD2F

Min.:	0	Unit:	-
Max.:	255	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to 255

Description

FD-48 Gateway third highest byte

Address: 0xFD30

Min.:	0	Unit:	-

Max.:	255	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to 255

Description

FD-49 Gateway lowest byte

Address:	0xFD31		
Min.:	0	Unit:	-
Max.:	255	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to 255

Description

FD-58 Internet IP extension card error code

Address:	0xFD3A		
Min.:	0	Unit:	-
Max.:	255	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 255

Description

FD-61 MAC address high byte

Address:	0xFD3D		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to value of 0xFFFF

Description

FD-62 MAC address middle byte

Address:	0xFD3E		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to value of 0xFFFF

Description

FD-63 MAC address low byte

Address: 0xFD3F

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0 to value of 0xFFFF

Description

FD-94 Modbus software version

Address: 0xFD5E

Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

FD-95 CANlink software version

Address: 0xFD5F

Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

FD-96 CANopen software version

Address: 0xFD60

Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

2.15 FE User-defined Parameters

FE-00 **User-defined parameter 0**

Address: 0xFE00

Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	7017	Change:	In real time

Value Range:

0 to 65535

Description

Group FE consists of user-defined parameters. Users can add commonly used parameters to group FE for easier check and modification.

FE-01 **User-defined parameter 1**

Address: 0xFE01

Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	7016	Change:	In real time

Value Range:

0 to 65535

Description

Same as FE-00

FE-02 **User-defined parameter 2**

Address: 0xFE02

Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to 65535

Description

Same as FE-00

FE-03 **User-defined parameter 3**

Address: 0xFE03

Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16

Default:	0	Change:	In real time

Value Range:

0 to 65535

Description

Same as FE-00

FE-04 **User-defined parameter 4**

Address:	0xFE04		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to 65535

Description

Same as FE-00

FE-05 **User-defined parameter 5**

Address:	0xFE05		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to 65535

Description

Same as FE-00

FE-06 **User-defined parameter 6**

Address:	0xFE06		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to 65535

Description

Same as FE-00

FE-07 **User-defined parameter 7**

Address:	0xFE07		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to 65535

Description

Same as FE-00

FE-08 **User-defined parameter 8**

Address:	0xFE08		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to 65535

Description

Same as FE-00

FE-09 **User-defined parameter 9**

Address:	0xFE09		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to 65535

Description

Same as FE-00

FE-10 **User-defined parameter 10**

Address:	0xFE0A		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to 65535

Description

Same as FE-00

FE-11 **User-defined parameter 11**

Address:	0xFE0B		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to 65535

Description

Same as FE-00

FE-12 User-defined parameter 12

Address:	0xFE0C		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to 65535

Description

Same as FE-00

FE-13 User-defined parameter 13

Address:	0xFE0D		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to 65535

Description

Same as FE-00

FE-14 User-defined parameter 14

Address:	0xFE0E		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to 65535

Description

Same as FE-00

FE-15 User-defined parameter 15

Address:	0xFE0F		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to 65535

Description

Same as FE-00

FE-16 **User-defined parameter 16**

Address:	0xFE10		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to 65535

Description

Same as FE-00

FE-17 **User-defined parameter 17**

Address:	0xFE11		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to 65535

Description

Same as FE-00

FE-18 **User-defined parameter 18**

Address:	0xFE12		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to 65535

Description

Same as FE-00

FE-19 **User-defined parameter 19**

Address:	0xFE13		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to 65535

Description

Same as FE-00

FE-20 **User-defined parameter 20**

Address:	0xFE14		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	6768	Change:	In real time

Value Range:

0 to 65535

Description

Same as FE-00

FE-21 **User-defined parameter 21**

Address:	0xFE15		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	6769	Change:	In real time

Value Range:

0 to 65535

Description

Same as FE-00

FE-22 **User-defined parameter 22**

Address:	0xFE16		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to 65535

Description

Same as FE-00

FE-23 **User-defined parameter 23**

Address:	0xFE17		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to 65535

Description

Same as FE-00

FE-24 **User-defined parameter 24**

Address:	0xFE18		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to 65535

Description

Same as FE-00

FE-25 **User-defined parameter 25**

Address:	0xFE19		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to 65535

Description

Same as FE-00

FE-26 **User-defined parameter 26**

Address:	0xFE1A		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to 65535

Description

Same as FE-00

FE-27 **User-defined parameter 27**

Address:	0xFE1B		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to 65535

Description

Same as FE-00

FE-28 **User-defined parameter 28**

Address:	0xFE1C		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to 65535

Description

Same as FE-00

FE-29 **User-defined parameter 29**

Address:	0xFE1D		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to 65535

Description

Same as FE-00

FE-30 **User-defined parameter 30**

Address:	0xFE1E		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to 65535

Description

Same as FE-00

FE-31 **User-defined parameter 31**

Address:	0xFE1F		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to 65535

Description

Same as FE-00

2.16 FP User Parameters

FP-00 **User password**

Address:	0x1F00		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to 65535

Description

Used to set the user password.

FP-01 **Parameter initialization**

Address:	0x1F01		
Min.:	0	Unit:	-
Max.:	503	Data type:	UInt16
Default:	1	Change:	At stop

Value Range:

0: No operation

1: Restore to factory parameter mode 1

2: Clear records

4: Recover user backup parameters

501: Back up current user parameters

503: Restore to factory parameter mode 2

Description

This parameter is used to set the corresponding action upon parameter initialization of the AC drive.

0: No operation

The AC drive does not perform any operation.

1: Restore to factory parameter mode 1

Most of the AC drive parameters are restored to factory settings. However, motor parameters, F0-22 (decimal places of frequency reference), fault records, F7-09 (accumulative running time), F7-13 (accumulative power-on time), F7-14 (accumulative power consumption), and F7-07 (IGBT heatsink temperature) are not restored.

2: Clear records

The fault records, F7-09 (accumulative running time), F7-13 (accumulative power-on time), and F7-14 (accumulative power consumption) are cleared.

4: Back up current user parameters
The current parameter settings are backed up.
501: Restore user backup parameters
Parameters backed up by setting FP-01 to 4 are restored.
503: Restore to factory parameter mode 2
All AC drive parameters, excluding manufacturer parameters in group FF, FP-00, and FP-01, are restore to default settings.

FP-02 Parameter display selection

Address: 0x1F02

Min.:	0	Unit:	-
Max.:	1111	Data type:	UInt16
Default:	111	Change:	In real time

Value Range:
Ones position: Group U
0: Hide
1: Display
Tens position: Group A
0: Hide
1: Display
Hundreds position: Group B
0: Hide
1: Display
Thousands position: Reserved

Description
This parameter is used to determine whether the parameters of groups U, A, B, and C are displayed on the operating panel.

FP-03 Display selection of customized parameters

Address: 0x1F03

Min.:	0	Unit:	-
Max.:	11	Data type:	UInt16
Default:	11	Change:	In real time

Value Range:
Ones (position): Display of user-defined parameter groups
0: Hide
1: Display
Tens (position): Display of user-modified parameter groups
0: Hide
1: Display

Description

This parameter is used to determine whether the user-customized parameter group and the user-modified parameter group are displayed on the operating panel.

FP-04 Parameter modification property

Address:	0x1F04		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Modification allowed

1: Modification prohibited

Description

Used to determine whether the parameters can be modified.

2.17 A0 Torque Control and Restricting Parameters

A0-00 Speed/Torque control mode

Address:	0xA000		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Speed control

1: Torque control

Description

Two control modes, speed control and torque control, are provided under vector control (FVC or SVC).

A0-01 Torque setting source selection

Address:	0xA001		
Min.:	0	Unit:	-
Max.:	7	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Digital setting (A0-03)
1: AI1
2: AI2
3: AI3
4: Pulse reference (DI5)
5: Communication setting (1000H)
6: Min. (AI1, AI2)
7: Max. (AI1, AI2)

Description

This parameter is used to set the torque setting source. Eight torque setting sources are available.

A0-03 Torque digital setting

Address: 0xA003

Min.:	-200	Unit:	%
Max.:	200	Data type:	Int16
Default:	100	Change:	In real time

Value Range:

-200.0% to +200.0%

Description

This parameter defines digital setting of the torque in torque control mode. The torque reference is a relative value. The value 100.0% corresponds to the rated motor torque. Check U0-06 to obtain the motor output torque, and the value 100% corresponds to the rated motor torque. The value ranges from- 200.0% to +200.0%.

When the parameter value is positive, the AC drive runs in the forward direction. When the parameter value is negative, the AC drive runs in the reverse direction.

A0-04 Torque filter time

Address: 0xA004

Min.:	0	Unit:	s
Max.:	5	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.000s to 5.000s

Description

This parameter specifies the torque filter time.

A0-05 Speed limit digital setting

Address: 0xA005

Min.:	-120	Unit:	%

Max.:	120	Data type:	Int16
Default:	0	Change:	In real time

Value Range:

-120.0% to +120.0%

Description

A0-06 Frequency modulation coefficient in window mode

Address: 0xA006

Min.:	0	Unit:	-
Max.:	50	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0–50.0

Description

A0-07 Torque acceleration time

Address: 0xA007

Min.:	0	Unit:	s
Max.:	650	Data type:	UInt16
Default:	1	Change:	In real time

Value Range:

0.00s to 650.00s

Description

A0-08 Torque deceleration time

Address: 0xA008

Min.:	0	Unit:	s
Max.:	650	Data type:	UInt16
Default:	1	Change:	In real time

Value Range:

0.00s to 650.00s

Description

A0-09 Speed limit reference source

Address: 0xA009

Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16

Default: 0 | Change: In real time

Value Range:

0: A0-05

1: Frequency source

Description

A0-10 Speed limit offset/Windows frequency

Address: 0xA00A

Min.: 0 | Unit: Hz

Max.: F0-10 | Data type: UInt16

Default: 5 | Change: In real time

Value Range:

0.00 Hz to value of F0-10

Description

A0-11 Effective mode of speed limit offset

Address: 0xA00B

Min.: 0 | Unit: -

Max.: 2 | Data type: UInt16

Default: 1 | Change: At stop

Value Range:

0: Bidirectional offset valid

1: Unidirectional offset valid

2: Windows mode

Description

A0-12 Frequency acceleration time

Address: 0xA00C

Min.: 0 | Unit: s

Max.: 6500 | Data type: UInt16

Default: 1 | Change: In real time

Value Range:

0.0s to 6500.0s

Description

A0-13 Frequency deceleration time

Address: 0xA00D

Min.:	0	Unit:	s
Max.:	6500	Data type:	UInt16
Default:	1	Change:	In real time

Value Range:

0.0s to 6500.0s

Description

A0-14 **Torque mode switchover**

Address: 0xA00E

Min.:	0	Unit:	-
Max.:	2	Data type:	UInt16
Default:	1	Change:	At stop

Value Range:

0: Not switched

1: Switched to speed mode upon stop

2: Target torque changed to 0 upon stop

Description

2.18 A1 Virtual DI and DO Parameters

A1-00 **VDI1 function selection**

Address: 0xA100

Min.:	0	Unit:	-
Max.:	93	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: No function
1: Forward run (FWD)
2: Reverse run (REV)
3: Three-wire control
4: Forward jog (FJOG)
5: Reverse jog (RJOG)
6:Terminal (UP)
7:Terminal (DOWN)
8: Coast to stop
9: Fault reset (RESET)
10: Running pause
11: NO input of external fault
12: Multi-reference terminal 1
13: Multi-reference terminal 2
14: Multi-reference terminal 3
15: Multi-reference terminal 4
16: Terminal 1 for acceleration/deceleration selection
17: Terminal 2 for acceleration/deceleration selection
18: Frequency source switchover
19: UP and DOWN setting clear (terminal, operating panel)
20: Command source switchover terminal
21: Acceleration/Deceleration inhibited
22: PID pause
23: PLC state reset
24: Wobble pause
25: Counter input (DI5)
26: Counter reset
27: Length count input (DI5)
28: Length reset
29: Torque control inhibited
30: Pulse input
31: Reserved
32: Immediate DC braking
33: NC input of external fault
34: Frequency modification enabled
35: PID action direction reversal

36: External stop terminal 1
37: Command source switchover terminal 2
38: PID integral pause
39: Switchover between main frequency source X and preset frequency
40: Switchover between auxiliary frequency source Y and preset frequency
41: Reserved
42: Position lock enabled
43: PID parameter switchover
44: User-defined fault 1
45: User-defined fault 2
46: Speed control/Torque control switchover
47: Emergency stop
48: External stop terminal 2
49: Deceleration DC braking
50: Clear the current running time
51: Two-wire/Three-wire control switchover
52: Electromagnetic shorting
53: Thickness overlaying
54: Roll diameter reset
55: Initial roll diameter 1
56: Initial roll diameter 2
57: Pre-drive
58: Winding/Unwinding switchover
59: Roll diameter calculation disabled
60: Exit tension control
61: Terminal tension rise
62: Thickness selection 1
63: Thickness selection 2
90: Water cooling system fault
91: Low liquid level fault
92: Revolution count reset
93: Reserved

Description

Used to set the function of VDI1.

0: No function

The DI terminal has no function.

1: Forward run

The operation mode of the AC drive is forward run. FWD indicates forward run. In two-wire mode 1 (F4-11=0), activating the terminal sets the AC drive to forward run. In two-wire mode 2 (F4-11=1), activating the terminal gives a running command.

2: Reverse run

The operation mode of the AC drive is reverse run. REV indicates reverse run. In three-wire mode 1 (F4-11=2), activating the terminal sets the AC drive to reversely run. In three-wire mode 2 (F4-11=3), activating the terminal sets the forward/ reverse run direction.

3: Three-wire operation control

The AC drive operation mode is three-wire control mode. To set the running command through the terminal, set F4-11 (Terminal control mode) to 2 (Three-wire mode 1) or 3 (three-wire mode 2), and set this parameter to 3. The three-wire control modes include three-wire mode 1 and three-wire mode 2.

4: Forward jog (FJOG)

The terminal is used to set the AC drive to FJOG mode. In the jog mode, the AC drive runs at low speed for a short time, which is generally used for maintenance and commissioning of field equipment.

5: Reverse jog (RJOG)

The terminal is used to set the AC drive to RJOG mode.

6: Terminal UP

The terminal is used to increase the frequency when the frequency is set through the terminal. When this terminal is active, it works as if the increment key is pressed and held. When this terminal is inactive, it works as if the increment key is released.

7: Terminal DOWN

The terminal is used to decrease the frequency when the frequency is set through the terminal. When this terminal is active, it works as if the decrement key is pressed and held. When this terminal is inactive, it works as if the decrement key is released.

8: Coast to stop

Once the AC drive receives a stop command, it immediately stops output and the load then coasts to stop based on the mechanical inertia. The AC drive stops by stopping the output. At this time, the power supply of the motor is cut off and the drive system is in a free braking state. Since the stop time is determined by the inertia of the system, this is also called inertia stop.

9: Fault reset (RESET). Used to reset the fault of the AC drive, which functions the same as the STOP/RES key on the operating panel. This function can remotely reset the AC drive upon a fault.

10: Running pause

By selecting this function, the AC drive decelerates to stop with all running parameters memorized (such as PLC, wobble, and PID parameters). When the terminal is inactive, the AC drive resumes its status before stop.

11: NO input of external fault

The AC drive reports Err15 upon receiving an external signal.

12-15: Multi-reference terminals 1–4
The AC drive selects the multi-reference as the main frequency. The settings of 16 speeds or 16 references can be implemented through combinations of 16 states of these four terminals. It is suitable for applications where the running frequency of the AC drive does not require continuous adjustment, and only several frequency values need to be used.
16-17: Terminal 1 to 2 for acceleration/deceleration selection
Four groups of acceleration and deceleration time can be switched through four states of these two terminals. The acceleration time indicates the time required by the AC drive to accelerate from 0 Hz to the acceleration/deceleration time base frequency (F0-25). The deceleration time indicates the time required by the AC drive to decelerate from the acceleration/deceleration base frequency (F0-25) to 0 Hz.
18: Frequency source switchover
Used to select the frequency reference input mode. The frequency reference is set by F0-07 (Final frequency reference setting selection).
19: UP and DOWN setting clear
When the main frequency is set through the operating panel and this terminal is active, the frequency (set through the increment/decrement keys on the operating panel) can be cleared, and the frequency will be reset to the value of F0-08.
20: Command source switchover terminal 1
When the running command is set through the terminal (F0-02=1) and this terminal is active, the control mode can be switched between the terminal and the operating panel.
When the running command is set through communication (F0-02=2) and this terminal is active, the control mode can be switched between the communication and the operating panel.
21: Acceleration/Deceleration inhibited
The terminal is used to maintain the current running frequency of the AC drive regardless of changes of the external input frequency (unless a stop command is received).
22: PID pause
PID is invalid temporarily. The AC drive maintains the current output frequency without supporting PID adjustment of frequency source.
23: PLC state reset
The terminal is used to restore the AC drive to the initial state of the simple PLC.
24: Wobble pause
In the wobble process, when this terminal is active, the wobble function pauses (the AC drive outputs at the center frequency).
25: Counter input
In the count process, when the terminal is active, a count pulse is input.

26: Counter reset
In the count process, when the terminal is active, the counter status is cleared.
27: Length count input
In the fixed length process, when the terminal is active, the length count is input.
28: Length reset
In the fixed length process, when the terminal is active, the length is cleared.
29: Torque control prohibited
When the terminal is active, the AC drive switches from the torque control mode to the speed control mode. When the terminal is inactive, the AC drive switches back to the torque control mode.

30: Pulse input
When DI5 is used as the pulse input terminal, DI5 must be allocated with this function.
32: Immediate DC braking
The terminal is used to directly switch the AC drive to the DC braking state. DC braking means that the AC drive outputs DC to the stator winding of the asynchronous motor to form a static magnetic field to enable the motor to brake with energy consumption. In this state, the rotor cuts the static magnetic field to generate braking torque, which stops the motor quickly.

33: NC input of external fault
The AC drive reports Err15 upon receiving an external signal.
34: Frequency modification enabled
When the terminal is active, the frequency can be modified. When the terminal is inactive, the frequency cannot be modified.
35: PID action direction reversal
The PID action direction is reversed to the direction set by FA-03 (PID action direction).
36: External stop terminal 1
When the running command is set through the operating panel (F0-02 = 0), this terminal is used to stop the AC drive, which functions the same as the STOP/RES key on the operating panel.
37: Command source switchover terminal 2
Used for switchover between terminal control and communication control.
If the command source is set to terminal control, the terminal being active switches the system to communication control.
If the command source is set to communication control, the terminal being active switches the system to terminal control.
38: PID integral pause
The integral adjustment function pauses when the terminal is active. However, the proportional and derivative adjustment functions are still valid.

39: Switchover between main frequency reference X and preset frequency
Used to switch from main frequency reference X to F0-08 (Preset frequency).
40: Switchover between auxiliary frequency reference Y and preset frequency
Used to switch from auxiliary frequency reference Y to F0-08 (Preset frequency).
41: Reserved
42: Position lock enabled
When the terminal is active, the AC drive decelerates to 0 Hz and then enters the position lock state.
43: PID parameter switchover
If PID parameters are switched over through the DI terminal (FA-18 = 1), the following conditions are true. When the terminal is inactive, the PID parameters are FA-05 to FA-07 (proportional gain Kp1, integral time Ti1, and differential time Td1). When the terminal is active, the PID parameters are FA-15 to FA-17 (PID gain Kp2, integral time Ti2, and differential time Td2).
44: User-defined fault 1
When the AC drive reports Err27, the AC drive will take measures according to the value of F9-49 (Fault protection action selection).
45: User-defined fault 2
When the AC drive reports Err28, the AC drive will take measures according to the value of F9-49 (Fault protection action selection).
46: Speed control/Torque control switchover
The terminal is used to switch between speed control and torque control.
When A0-00 (speed/torque control mode) is set to 0, the torque control mode is used when the terminal is active, and the speed control mode is used when the terminal is inactive.
When A0-00 (speed/torque control mode) is set to 1, the speed control mode is used when the terminal is active, and the torque control mode is used when the terminal is inactive.

47: Emergency stop
When the system is in the emergency state, the AC drive decelerates according to F8-55 (Terminal deceleration time for emergency stop). When the deceleration time for emergency stop is 0s in V/f mode, the AC drive decelerates according to the minimum unit time. The terminal does not need to be kept in the closed state. Even if it stays closed only for a short moment, the AC drive will come to an emergency stop. Different from general deceleration, if the emergency stop input terminal is opened after the deceleration time for emergency stop expires and the running signal is still active on the AC drive terminal, the AC drive will not restart. To restart the AC drive in this case, disconnect the running terminal and input the running command.

48: External stop terminal 2
The terminal is used to make the AC drive decelerate to stop in any control mode (operating panel, terminal, or communication control). In this case, the deceleration time is fixed to deceleration time 4 (F8-08).
49: Deceleration DC braking
The AC drive decelerates to F6-11 (Shutdown DC injection braking start frequency) and then enters the DC braking state.
50: Clear the current running time
The terminal is used to clear the current running time of the AC drive. If the current running time is shorter than the set value (greater than 0) of F8-53 (Current running time reached) and the terminal is active, the current running timing is cleared. If the current running time is longer than the set value (greater than 0) of F8-53 and the terminal is active, and the current running time is not cleared.
51: Two-wire/Three-wire control switchover
Used to switch between two-wire and three-wire control.
When F4-11 is set to 0 (Two-wire mode 1) and the terminal is active, the AC drive switches to three-wire mode 1. When the terminal is inactive, two-wire mode 1 is used.
When F4-11 is set to 1 (Two-wire mode 2) and the terminal is active, the AC drive switches to three-wire mode 2.
When F4-11 is set to 2 (Three-wire mode 1) and the terminal is active, the AC drive switches to two-wire mode 1.
When F4-11 is set to 3 (Three-wire mode 2) and the terminal is active, the AC drive switches to two-wire mode 2.
52: Electromagnetic shorting
When the terminal is active, the AC drive enters the electromagnetic shorting state.
53 Thickness overlaying
When the roll diameter is calculated based on accumulative thickness, this terminal records the number of revolutions.
54: Roll diameter reset
When this terminal is active, the initial roll diameter is reset. When the roll is replaced in the tension mode, the initial roll diameter must be reset.
55: Initial roll diameter 1
56: Initial roll diameter 2
In the tension mode, B0-11/12/13 is selected as the initial roll diameter through terminal combinations. When these two terminals are inactive, the minimum roll diameter (B0-09) is used as the initial roll diameter. When only the terminal for initial roll diameter 1 selection is active, B0-11 is used as the initial roll diameter. When only the terminal for initial roll diameter 2 selection is active, B0-12 is used as the initial roll diameter. When these two terminals are active, B0-13 is used as the initial roll diameter.

57: Pre-drive
When the terminal is active, the AC drive switches to the pre-drive speed control mode. This function is used to synchronize the linear speed for the axis that requires automatic reel replacement when the tension mode is used. When the terminal is deactivated after reel replacement, the tension control can function properly.
58: Winding/Unwinding switchover
This terminal is used for winding/unwinding switchover in the tension mode.
59: Roll diameter calculation disabled
When this terminal is active, the roll diameter calculation is disabled. In the tension mode, if automatic roll replacement and pre-drive are required, winding diameter calculation can be disabled to avoid influence on the winding diameter calculation.
60: Exit tension mode
Used to exit the tension control mode.
61: Terminal tension rise
When the terminal is activated, the tension torque is increased by certain ratio. After the DI terminal is deactivated, the boost part will be canceled gradually based on time.
62: Thickness selection 1
63: Thickness selection 2
In the tension mode, B0-32/33/34/35 is selected as the material thickness through terminal combinations. When these two terminals are inactive, B0-32 is selected as the material thickness. When only the terminal for thickness selection 1 is active, B0-33 is selected as the material thickness. When only the terminal for thickness selection 2 is active, B0-34 is selected as the initial roll diameter. When these two terminals are active, B0-35 is selected as the material thickness.
64-89: Reserved
90: Water cooling system fault
When the water cooling system of T13 models encounters a fault, the terminal receives the signal and the AC drive reports the E64 alarm.
91: Low liquid level fault
When the liquid in the water tank of T13 models is too low, the terminal receives the signal and the AC drive reports the A63 alarm.
92: Revolution count reset
The number of revolutions counted will be cleared after this terminal is activated.
93: Reserved

A1-01 **VDI2 function**

Address: 0xA101

Min.:	0	Unit:	-
Max.:	93	Data type:	UInt16

Default: 0 Change: At stop

Value Range:

0: No function
1: Forward run (FWD)
2: Reverse run (REV)
3: Three-wire control
4: Forward jog (FJOG)
5: Reverse jog (RJOG)
6:Terminal (UP)
7:Terminal (DOWN)
8: Coast to stop
9: Fault reset (RESET)
10: Running pause
11: NO input of external fault
12: Multi-reference terminal 1
13: Multi-reference terminal 2
14: Multi-reference terminal 3
15: Multi-reference terminal 4
16: Terminal 1 for acceleration/deceleration selection
17: Terminal 2 for acceleration/deceleration selection
18: Frequency source switchover
19: UP and DOWN setting clear (terminal, operating panel)
20: Command source switchover terminal
21: Acceleration/Deceleration inhibited
22: PID pause
23: PLC state reset
24: Wobble pause
25: Counter input (DI5)
26: Counter reset
27: Length count input (DI5)
28: Length reset
29: Torque control inhibited
30: Pulse input
31: Reserved
32: Immediate DC braking
33: NC input of external fault
34: Frequency modification enabled
35: PID action direction reversal

36: External stop terminal 1
37: Command source switchover terminal 2
38: PID integral pause
39: Switchover between main frequency source X and preset frequency
40: Switchover between auxiliary frequency source Y and preset frequency
41: Reserved
42: Position lock enabled
43: PID parameter switchover
44: User-defined fault 1
45: User-defined fault 2
46: Speed control/Torque control switchover
47: Emergency stop
48: External stop terminal 2
49: Deceleration DC braking
50: Clear the current running time
51: Two-wire/three-wire control switchover
52: Electromagnetic shorting
53: Thickness overlaying
54: Roll diameter reset
55: Initial roll diameter 1
56: Initial roll diameter 2
57: Pre-drive
58: Winding/Unwinding switchover
59: Roll diameter calculation disabled
60: Exit tension control
61: Terminal tension rise
62: Thickness selection 1
63: Thickness selection 2
90: Water cooling system fault
91: Low liquid level fault
92: Revolution count reset
93: Reserved

Description

Used to set the function of VDI2 terminal. The setting is similar to that of A1-00.

A1-02 **VDI3 function selection**

Address: 0xA102

Min.:	0	Unit:	-
Max.:	93	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: No function
1: Forward run (FWD)
2: Reverse run (REV)
3: Three-wire control
4: Forward jog (FJOG)
5: Reverse jog (RJOG)
6:Terminal (UP)
7:Terminal (DOWN)
8: Coast to stop
9: Fault reset (RESET)
10: Running pause
11: NO input of external fault
12: Multi-reference terminal 1
13: Multi-reference terminal 2
14: Multi-reference terminal 3
15: Multi-reference terminal 4
16: Terminal 1 for acceleration/deceleration selection
17: Terminal 2 for acceleration/deceleration selection
18: Frequency source switchover
19: UP and DOWN setting clear (terminal, operating panel)
20: Command source switchover terminal
21: Acceleration/Deceleration inhibited
22: PID pause
23: PLC state reset
24: Wobble pause
25: Counter input (DI5)
26: Counter reset
27: Length count input (DI5)
28: Length reset
29: Torque control inhibited
30: Pulse input
31: Reserved
32: Immediate DC braking
33: NC input of external fault
34: Frequency modification enabled
35: PID action direction reversal

36: External stop terminal 1
37: Command source switchover terminal 2
38: PID integral pause
39: Switchover between main frequency source X and preset frequency
40: Switchover between auxiliary frequency source Y and preset frequency
41: Reserved
42: Position lock enabled
43: PID parameter switchover
44: User-defined fault 1
45: User-defined fault 2
46: Speed control/Torque control switchover
47: Emergency stop
48: External stop terminal 2
49: Deceleration DC braking
50: Clear the current running time
51: Two-wire/three-wire control switchover
52: Electromagnetic shorting
53: Thickness overlaying
54: Roll diameter reset
55: Initial roll diameter 1
56: Initial roll diameter 2
57: Pre-drive
58: Winding/Unwinding switchover
59: Roll diameter calculation disabled
60: Exit tension control
61: Terminal tension rise
62: Thickness selection 1
63: Thickness selection 2
90: Water cooling system fault
91: Low liquid level fault
92: Revolution count reset
93: Reserved

Description

Used to set the function of VDI3 terminal. The setting is similar to that of A1-00.

A1-03 **VDI4 function**

Address: 0xA103

Min.:	0	Unit:	-
Max.:	93	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: No function
1: Forward run (FWD)
2: Reverse run (REV)
3: Three-wire control
4: Forward jog (FJOG)
5: Reverse jog (RJOG)
6:Terminal (UP)
7:Terminal (DOWN)
8: Coast to stop
9: Fault reset (RESET)
10: Running pause
11: NO input of external fault
12: Multi-reference terminal 1
13: Multi-reference terminal 2
14: Multi-reference terminal 3
15: Multi-reference terminal 4
16: Terminal 1 for acceleration/deceleration selection
17: Terminal 2 for acceleration/deceleration selection
18: Frequency source switchover
19: UP and DOWN setting clear (terminal, operating panel)
20: Command source switchover terminal
21: Acceleration/Deceleration inhibited
22: PID pause
23: PLC state reset
24: Wobble pause
25: Counter input (DI5)
26: Counter reset27: Length count input (DI5)
28: Length reset
29: Torque control inhibited
30: Pulse input
31: Reserved
32: Immediate DC braking
33: NC input of external fault
34: Frequency modification enabled
35: PID action direction reversal

36: External stop terminal 1
37: Command source switchover terminal 2
38: PID integral pause
39: Switchover between main frequency source X and preset frequency
40: Switchover between auxiliary frequency source Y and preset frequency
41: Reserved
42: Position lock enabled
43: PID parameter switchover
44: User-defined fault 1
45: User-defined fault 2
46: Speed control/Torque control switchover
47: Emergency stop
48: External stop terminal 2
49: Deceleration DC braking
50: Clear the current running time
51: Two-wire/three-wire control switchover
52: Electromagnetic shorting
53: Thickness overlaying
54: Roll diameter reset
55: Initial roll diameter 1
56: Initial roll diameter 2
57: Pre-drive
58: Winding/Unwinding switchover
59: Roll diameter calculation disabled
60: Exit tension control
61: Terminal tension rise
62: Thickness selection 1
63: Thickness selection 2
90: Water cooling system fault
91: Low liquid level fault
92: Revolution count reset
93: Reserved

Description

Used to set the function of VDI4 terminal. The setting is similar to that of A1-00.

A1-04 VDI5 function selection

Address:	0xA104		
Min.:	0	Unit:	-
Max.:	93	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: No function
1: Forward run (FWD)
2: Reverse run (REV)
3: Three-wire control
4: Forward jog (FJOG)
5: Reverse jog (RJOG)
6:Terminal (UP)
7:Terminal (DOWN)
8: Coast to stop
9: Fault reset (RESET)
10: Running pause
11: NO input of external fault
12: Multi-reference terminal 1
13: Multi-reference terminal 2
14: Multi-reference terminal 3
15: Multi-reference terminal 4
16: Terminal 1 for acceleration/deceleration selection
17: Terminal 2 for acceleration/deceleration selection
18: Frequency source switchover
19: UP and DOWN setting clear (terminal, operating panel)
20: Command source switchover terminal
21: Acceleration/Deceleration inhibited
22: PID pause
23: PLC state reset
24: Wobble pause
25: Counter input (DI5)
26: Counter reset
27: Length count input (DI5)
28: Length reset
29: Torque control inhibited
30: Pulse input
31: Reserved
32: Immediate DC braking
33: NC input of external fault
34: Frequency modification enabled
35: PID action direction reversal

36: External stop terminal 1
37: Command source switchover terminal 2
38: PID integral pause
39: Switchover between main frequency source X and preset frequency
40: Switchover between auxiliary frequency source Y and preset frequency
41: Reserved
42: Position lock enabled
43: PID parameter switchover
44: User-defined fault 1
45: User-defined fault 2
46: Speed control/Torque control switchover
47: Emergency stop
48: External stop terminal 2
49: Deceleration DC braking
50: Clear the current running time
51: Two-wire/three-wire control switchover
52: Electromagnetic shorting
53: Thickness overlaying
54: Roll diameter reset
55: Initial roll diameter 1
56: Initial roll diameter 2
57: Pre-drive
58: Winding/Unwinding switchover
59: Roll diameter calculation disabled
60: Exit tension control
61: Terminal tension rise
62: Thickness selection 1
63: Thickness selection 2
90: Water cooling system fault
91: Low liquid level fault
92: Revolution count reset
93: Reserved

Description

Used to set the function of VDI5 terminal. The setting is similar to that of A1-00.

A1-05 **VDI state setting mode**

Address:	0xA105		
Min.:	0	Unit:	-
Max.:	22222	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

Ones: VDI1
0: Set by A1-06
1: DO state
2: DI state
Tens: VDI2
0: Set by A1-06
1: DO state
2: DI state
Hundreds: VDI3
0: Set by A1-06
1: DO state
2: DI state
Thousands: VDI4
0: Set by A1-06
1: DO state
2: DI state
Ten thousands: VDI5
0: Set by A1-06
1: DO state
2: DI state

Description

The VDI state can be set in two modes, which is selected in A1-05.
When A1-05 is set to 0, the VDI state is determined by the state of the VDO and VDIx is uniquely bound to VDOx (x ranges from 1 to 5).
When A1-05 is set to 1, the VDI state is determined by the binary bit of A1-06.

A1-06 VDI state selection

Address: 0xA106

Min.:	0	Unit:	-
Max.:	11111	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

Ones: VDI1
0: Invalid
1: Valid
Tens: VDI2
0: Invalid
1: Valid
Hundreds: VDI3
0: Invalid
1: Valid
Thousands: VDI4
0: Invalid
1: Valid
Ten thousands: VDI5
0: Invalid
1: Valid

Description

This parameter defines whether VDIx (x ranges from 1 to 5) is active or inactive.

A1-07 AI1 function selection (used as DI)

Address:	0xA107		
Min.:	0	Unit:	-
Max.:	93	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: No function
1: Forward run (FWD)
2: Reverse run (REV)
3: Three-wire control
4: Forward jog (FJOG)
5: Reverse jog (RJOG)
6:Terminal (UP)
7:Terminal (DOWN)
8: Coast to stop
9: Fault reset (RESET)
10: Running pause
11: NO input of external fault
12: Multi-reference terminal 1
13: Multi-reference terminal 2
14: Multi-reference terminal 3
15: Multi-reference terminal 4
16: Terminal 1 for acceleration/deceleration selection
17: Terminal 2 for acceleration/deceleration selection
18: Frequency source switchover
19: UP and DOWN setting clear (terminal, operating panel)
20: Command source switchover terminal
21: Acceleration/Deceleration inhibited
22: PID pause
23: PLC state reset
24: Wobble pause
25: Counter input (DI5)
26: Counter reset
27: Length count input (DI5)
28: Length reset
29: Torque control inhibited
30: Pulse input
31: Reserved
32: Immediate DC braking
33: NC input of external fault
34: Frequency modification enabled
35: PID action direction reversal

36: External stop terminal 1
37: Command source switchover terminal 2
38: PID integral pause
39: Switchover between main frequency source X and preset frequency
40: Switchover between auxiliary frequency source Y and preset frequency
41: Reserved
42: Position lock enabled
43: PID parameter switchover
44: User-defined fault 1
45: User-defined fault 2
46: Speed control/Torque control switchover
47: Emergency stop
48: External stop terminal 2
49: Deceleration DC braking
50: Clear the current running time
51: Two-wire/three-wire control switchover
52: Electromagnetic shorting
53: Thickness overlaying
54: Roll diameter reset
55: Initial roll diameter 1
56: Initial roll diameter 2
57: Pre-drive
58: Winding/Unwinding switchover
59: Roll diameter calculation disabled
60: Exit tension control
61: Terminal tension rise
62: Thickness selection 163: Thickness selection 2
90: Water cooling system fault
91: Low liquid level fault
92: Revolution count reset
93: Reserved

Description

Same as F4-00

A1-08 AI2 function selection (used as DI)

Address:	0xA108		
Min.:	0	Unit:	-
Max.:	93	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: No function
1: Forward run (FWD)
2: Reverse run (REV)
3: Three-wire control
4: Forward jog (FJOG)
5: Reverse jog (RJOG)
6:Terminal (UP)
7:Terminal (DOWN)
8: Coast to stop
9: Fault reset (RESET)
10: Running pause
11: NO input of external fault
12: Multi-reference terminal 1
13: Multi-reference terminal 2
14: Multi-reference terminal 3
15: Multi-reference terminal 4
16: Terminal 1 for acceleration/deceleration selection
17: Terminal 2 for acceleration/deceleration selection
18: Frequency source switchover
19: UP and DOWN setting clear (terminal, operating panel)
20: Command source switchover terminal
21: Acceleration/Deceleration inhibited
22: PID pause
23: PLC state reset
24: Wobble pause
25: Counter input (DI5)
26: Counter reset
27: Length count input (DI5)
28: Length reset
29: Torque control inhibited
30: Pulse input
31: Reserved
32: Immediate DC braking
33: NC input of external fault
34: Frequency modification enabled
35: PID action direction reversal

36: External stop terminal 1
37: Command source switchover terminal 2
38: PID integral pause
39: Switchover between main frequency source X and preset frequency
40: Switchover between auxiliary frequency source Y and preset frequency
41: Reserved
42: Position lock enabled
43: PID parameter switchover
44: User-defined fault 1
45: User-defined fault 2
46: Speed control/Torque control switchover
47: Emergency stop
48: External stop terminal 2
49: Deceleration DC braking
50: Clear the current running time
51: Two-wire/three-wire control switchover
52: Electromagnetic shorting
53: Thickness overlaying
54: Roll diameter reset
55: Initial roll diameter 1
56: Initial roll diameter 2
57: Pre-drive
58: Winding/Unwinding switchover
59: Roll diameter calculation disabled
60: Exit tension control
61: Terminal tension rise
62: Thickness selection 1
63: Thickness selection 2
90: Water cooling system fault
91: Low liquid level fault
92: Revolution count reset
93: Reserved

Description

Same as F4-00

A1-09 **AI3 function selection (used as DI)**

Address:	0xA109		
Min.:	0	Unit:	-
Max.:	93	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: No function
1: Forward run (FWD)
2: Reverse run (REV)
3: Three-wire control
4: Forward jog (FJOG)
5: Reverse jog (RJOG)
6:Terminal (UP)
7:Terminal (DOWN)
8: Coast to stop
9: Fault reset (RESET)
10: Running pause
11: NO input of external fault
12: Multi-reference terminal 1
13: Multi-reference terminal 2
14: Multi-reference terminal 3
15: Multi-reference terminal 4
16: Terminal 1 for acceleration/deceleration selection
17: Terminal 2 for acceleration/deceleration selection
18: Frequency source switchover
19: UP and DOWN setting clear (terminal, operating panel)
20: Command source switchover terminal
21: Acceleration/Deceleration inhibited
22: PID pause
23: PLC state reset
24: Wobble pause
25: Counter input (DI5)
26: Counter reset
27: Length count input (DI5)
28: Length reset
29: Torque control inhibited
30: Pulse input
31: Reserved
32: Immediate DC braking
33: NC input of external fault
34: Frequency modification enabled
35: PID action direction reversal

36: External stop terminal 1
37: Command source switchover terminal 2
38: PID integral pause
39: Switchover between main frequency source X and preset frequency
40: Switchover between auxiliary frequency source Y and preset frequency
41: Reserved
42: Position lock enabled
43: PID parameter switchover
44: User-defined fault 1
45: User-defined fault 2
46: Speed control/Torque control switchover
47: Emergency stop
48: External stop terminal 2
49: Deceleration DC braking
50: Clear the current running time
51: Two-wire/three-wire control switchover
52: Electromagnetic shorting
53: Thickness overlaying
54: Roll diameter reset
55: Initial roll diameter 1
56: Initial roll diameter 2
57: Pre-drive
58: Winding/Unwinding switchover
59: Roll diameter calculation disabled
60: Exit tension control
61: Terminal tension rise
62: Thickness selection 1
63: Thickness selection 2
90: Water cooling system fault
91: Low liquid level fault
92: Revolution count reset
93: Reserved

Description

Same as F4-00

A1-10 Active state selection for AI used as DI

Address: 0xA10A

Min.:	0	Unit:	-
Max.:	111	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

Ones: AI1
0: Active high
1: Active low
Tens: AI2
0: Active high
1: Active low
Hundreds: AI3
0: Active high
1: Active low

Description

0: Active high
If the AI terminal is a high level terminal, this terminal is active when the value of the corresponding bit of A1-10 is set to 0 and inactive when set to 1.
0: Active low
If the AI terminal is a low level terminal, this terminal is inactive when the value of the corresponding bit of A1-10 is set to 0 and active when set to 1.

2.19 A5 Control Optimization Parameters

A5-00 DPWM switchover frequency upper limit

Address: 0xA500

Min.:	0	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	12	Change:	In real time

Value Range:

0.00 Hz to value of F0-10

Description

The AC drive has two PWM modes, including CPWM and DPWM. When the running frequency is higher than A5-00 (Switchover frequency), the DPWM mode is used. When the running frequency is lower than A5-00 (Switchover frequency), the CPWM mode is used. The DPWM mode is used to improve the AC drive efficiency, and the CPWM mode is used to reduce the motor noise.
Increasing A5-00 to the maximum frequency will reduce the motor noise.

A5-01 PWM modulation mode

Address: 0xA501

Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Asynchronous modulation
1: Synchronous modulation
Synchronous modulation mode 2
Synchronous modulation mode 3

Description

When the result of the carrier frequency divided by the running frequency is smaller than 10, output current oscillation or large current harmonic waves may occur. To address the problem, set this parameter to 1 (synchronous modulation).

0: Asynchronous modulation

In this mode, the carrier frequency and signal wave frequency are not synchronized. Usually, the carrier frequency keeps unchanged. When the signal wave frequency changes, the carrier ratio will change accordingly.

2: Synchronous modulation mode 2

3: Synchronous modulation mode 3

A5-02 Dead zone compensation mode selection

Address:	0xA502		
Min.:	0	Unit:	-
Max.:	2	Data type:	UInt16
Default:	2	Change:	At stop

Value Range:

0: Disabled
1: Enabled

Description

A dead zone must be reserved for the switch signals of the upper and lower switch transistors on the same bridge arm of the AC drive. Dead zone compensation can improve the current waveform when the motor runs at low frequency.

A5-03 Random PWM depth

Address:	0xA503		
Min.:	0	Unit:	-
Max.:	10	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0–10

Description

If the motor noise is loud, setting A5-03 to a non-zero value can improve the motor noise. The higher the value, the better the effect. However, if the value is too high, the motor control may be affected. Therefore, set this parameter to 1 first during commissioning and then increase it by 1 each time according to the field application.

A5-04 **Fast current limit**

Address: 0xA504

Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Disabled

1: Enabled

Description

This function is used to minimize the possibility of overcurrent faults, ensuring normal operation of the AC drive.

Disable this function in hoist applications such as cranes.

A5-05 **Sampling delay**

Address: 0xA505

Min.:	1	Unit:	-
Max.:	13	Data type:	UInt16
Default:	5	Change:	In real time

Value Range:

1 to 13

Description

A5-06 **Undervoltage threshold**

Address: 0xA506

Min.:	150	Unit:	V
Max.:	700	Data type:	UInt16
Default:	350	Change:	In real time

Value Range:

150.0V to 700.0V

Description

When the bus voltage is lower than the value set by A5-06, the AC drive reports E09.00.

A5-07 **SVC optimization selection**

Address: 0xA507

Min.:	0	Unit:	-
Max.:	2	Data type:	UInt16
Default:	1	Change:	At stop

Value Range:

0: No optimization
1: Optimization mode 1
2: Optimization mode 2

Description

A5-13 **Bus voltage in function part**

Address:	0xA50D		
Min.:	100	Unit:	-
Max.:	20000	Data type:	UInt16
Default:	5310	Change:	Unchangeable

Value Range:

100 to 20000

Description

A5-14 **Temperature correction**

Address:	0xA50E		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0–1

Description

A5-16 **Display parameter address 1**

Address:	0xA510		
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0–100

Description

A5-17 **Display parameter address 2**

Address:	0xA511		
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	1	Change:	Unchangeable

Value Range:
0–100
Description

A5-18 **Display parameter address 3**

Address:	0xA512		
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	2	Change:	Unchangeable

Value Range:
0–100
Description

A5-19 **Display parameter address 4**

Address:	0xA513		
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	3	Change:	Unchangeable

Value Range:
0–100
Description

A5-21 **Low speed carrier frequency**

Address:	0xA515		
Min.:	0	Unit:	-
Max.:	16	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:
0.0–16.0
Description
This parameter is used to set the carrier frequency of the motor at low speed to lower the motor noise in the V/f or FVC mode. The carrier frequency is the smaller one between F0-15 and A5-21. When the value of A5-21 is greater than or equal to 4 kHz, the value of A5-21 is active. When the value of A5-21 is lower than 4 kHz, 4 kHz is used.

A5-22 **Dead-zone compensation auto-tuning**

Address: 0xA516

Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Disabled

1: Enabled

Description

2.20 A6 AI Curve

A6-00 Curve 4 minimum input

Address: 0xA600

Min.:	-10	Unit:	V
Max.:	A6-02	Data type:	Int16
Default:	0	Change:	In real time

Value Range:

-10.00 V to A6-02

Description

This parameter defines the x axis of the minimum input point on AI curve 4, that is, the minimum analog input voltage or current.

A6-01 Percentage corresponding to curve 4 minimum input

Address: 0xA601

Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	0	Change:	In real time

Value Range:

-100.0% to +100.0%

Description

This parameter defines the y axis of the minimum input point on AI curve 4, that is, the setting value that the AI minimum input corresponds.

A6-02 Curve 4 inflexion 1 input

Address: 0xA602

Min.:	A6-00	Unit:	V
Max.:	A6-04	Data type:	Int16
Default:	3	Change:	In real time

Value Range:

Value of A6-00 to value of A6-04

Description

This parameter defines the x axis of inflexion 1 on AI curve 4, that is, the analog input voltage or current at inflexion 1.

A6-03 Percentage corresponding to curve 4 inflexion point 1 input

Address:	0xA603		
Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	30	Change:	In real time

Value Range:

-100.0% to +100.0%

Description

This parameter defines the y axis of inflexion 1 on AI curve 4, that is, the setting value at inflexion 1.

A6-04 Curve 4 inflexion 2 input

Address:	0xA604		
Min.:	A6-02	Unit:	V
Max.:	A6-06	Data type:	Int16
Default:	6	Change:	In real time

Value Range:

A6-02 to A6-06

Description

This parameter defines the x axis of inflexion 2 on AI curve 4, that is, the analog input voltage or current at inflexion 2.

A6-05 Corresponding setting of curve 4 inflexion 2 input

Address:	0xA605		
Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	60	Change:	In real time

Value Range:

-100.0% to +100.0%

Description

This parameter defines the y axis of inflexion 2 on AI curve 4, that is, the setting value at inflexion 2.

A6-06 Curve 4 maximum input

Address:	0xA606		
Min.:	A6-04	Unit:	V
Max.:	10	Data type:	Int16

Default:	10	Change:	In real time

Value Range:

A6-04 to 10.00 V

Description

This parameter defines the x axis of the maximum input point on AI curve 4, that is, the maximum analog input voltage or current.

A6-07 Percentage corresponding to curve 4 maximum input

Address:	0xA607		
Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	100	Change:	In real time

Value Range:

-100.0% to +100.0%

Description

This parameter defines the y axis of the maximum input point on AI curve 4, that is, the setting value that the AI maximum input corresponds.

A6-08 Curve 5 minimum input

Address:	0xA608		
Min.:	-10	Unit:	V
Max.:	A6-10	Data type:	Int16
Default:	-10	Change:	In real time

Value Range:

-10.00 V to A6-10

Description

This parameter defines the x axis of the minimum input on AI curve 5, that is, the minimum analog input voltage or current.

A6-09 Percentage corresponding to curve 5 minimum input

Address:	0xA609		
Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	-100	Change:	In real time

Value Range:

-100.0% to +100.0%

Description

This parameter defines the y axis of the minimum input point on AI curve 5, that is, the setting value that the AI minimum input corresponds.

A6-10 **Curve 5 inflexion 1 input**

Address: 0xA60A

Min.:	A6-08	Unit:	V
Max.:	A6-12	Data type:	Int16
Default:	-3	Change:	In real time

Value Range:

A6-08 to A6-12

Description

This parameter defines the x axis of inflexion 1 on AI curve 5, that is, the analog input voltage or current at inflexion 1.

A6-11 **Corresponding setting of curve 5 inflexion 1 input**

Address: 0xA60B

Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	-30	Change:	In real time

Value Range:

-100.0% to +100.0%

Description

This parameter defines the y axis of inflexion 1 on AI curve 5, that is, the setting value at inflexion 1.

A6-12 **Curve 5 inflexion 2 input**

Address: 0xA60C

Min.:	A6-10	Unit:	V
Max.:	A6-14	Data type:	Int16
Default:	3	Change:	In real time

Value Range:

A6-10 to A6-14

Description

This parameter defines the x axis of inflexion 2 on AI curve 5, that is, the analog input voltage or current at inflexion 2.

A6-13 **Corresponding setting of curve 5 inflexion 2 input**

Address: 0xA60D

Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	30	Change:	In real time

Value Range:

-100.0% to +100.0%

Description

This parameter defines the y axis of inflexion 2 on AI curve 5, that is, the setting value at inflexion 2.

A6-14 Curve 5 maximum input

Address: 0xA60E

Min.:	A6-12	Unit:	V
Max.:	10	Data type:	Int16
Default:	10	Change:	In real time

Value Range:

A6-12 to 10.00 V

Description

This parameter defines the x axis of the maximum input point on AI curve 5, that is, the maximum analog input voltage or current.

A6-15 Percentage corresponding to curve 5 maximum input

Address: 0xA60F

Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	100	Change:	In real time

Value Range:

-100.0% to +100.0%

Description

This parameter defines the y axis of the maximum input point on AI curve 5, that is, the setting value that the AI maximum input value corresponds.

A6-16 AI1 gain

Address: 0xA610

Min.:	-10	Unit:	-
Max.:	10	Data type:	Int16
Default:	1	Change:	In real time

Value Range:

–10.00 to +10.00

Description

This parameter defines the AI1 voltage correction gain.

A6-17 AI1 offset

Address: 0xA611

Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	0	Change:	In real time

Value Range:

-100.0% to +100.0%

Description

This parameter defines the zero offset coefficient for AI1 voltage correction.

A6-18 **AI2 gain**

Address:	0xA612		
Min.:	-10	Unit:	-
Max.:	10	Data type:	Int16
Default:	1	Change:	In real time

Value Range:

–10.00 to +10.00

Description

This parameter defines the AI2 voltage correction gain.

A6-19 **AI2 offset**

Address:	0xA613		
Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	0	Change:	In real time

Value Range:

-100.0% to +100.0%

Description

This parameter defines the zero offset coefficient for AI2 voltage correction.

A6-20 **AI3 gain**

Address:	0xA614		
Min.:	-10	Unit:	-
Max.:	10	Data type:	Int16
Default:	1	Change:	In real time

Value Range:

–10.00 to +10.00

Description

This parameter defines the AI3 voltage correction gain.

A6-21 **AI3 offset**

Address:	0xA615		
Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	0	Change:	In real time

Value Range:

-100.0% to +100.0%

Description

This parameter defines the zero offset coefficient for AI3 voltage correction.

A6-22 **AI disconnection detection threshold**

Address: 0xA616

Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0% to 100.0%

Description

This parameter indicates the AI disconnection detection threshold. 100% corresponds to 10 V.

A6-23 **AI disconnection detection time**

Address: 0xA617

Min.:	0	Unit:	s
Max.:	6553.5	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s to 6553.5s

Description

This parameter indicates the AI disconnection detection time in the unit of 0.1s.

A6-24 **Jump point set through AI1**

Address: 0xA618

Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	0	Change:	In real time

Value Range:

-100.0% to +100.0%

Description

This parameter defines the jump point set through AI1.

A6-25 **Jump amplitude set through AI1**

Address: 0xA619

Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	0.1	Change:	In real time

Value Range:

0.0% to 100.0%

Description

This parameter defines the jump amplitude set through AI1.

A6-26 **Jump point set through AI2**

Address:	0xA61A		
Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	0	Change:	In real time

Value Range:

-100.0% to +100.0%

Description

This parameter defines the jump point set through AI2.

A6-27 **Jump amplitude set through AI2**

Address:	0xA61B		
Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	0.1	Change:	In real time

Value Range:

0.0% to 100.0%

Description

This parameter defines the jump amplitude set through AI2.

A6-28 **Jump point set through AI3**

Address:	0xA61C		
Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	0	Change:	In real time

Value Range:

-100.0% to +100.0%

Description

This parameter defines the jump point set through AI3.

A6-29 **Jump amplitude set through AI3**

Address:	0xA61D		
Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	0.1	Change:	In real time

Value Range:

0.0% to 100.0%

Description

This parameter defines the jump amplitude set through AI3.

A6-30 **Analog disconnection detection**

Address:	0xA61E		
Min.:	0	Unit:	-
Max.:	111	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

Ones position: AI1 disconnection detection

0: Disabled

1: Enabled

Tens position: AI2 disconnection detection

0: Disabled

1: Enabled

Hundreds position: AI3 disconnection detection

0: Disabled

1: Enabled

Description

After AI1 disconnection detection is enabled, when the voltage detected at AI1 is lower than the threshold set by A6-22 for over the time set by A6-23, the AC drive reports fault E48.01.

After AI2 disconnection detection is enabled, when the voltage detected at AI2 is lower than the threshold set by A6-22 for over the time set by A6-23, the AC drive reports fault E48.02.

After AI3 disconnection detection is enabled, when the voltage detected at AI3 is lower than the threshold set by A6-22 for over the time set by A6-23, the AC drive reports fault E48.03.

2.21 A9 Vector Control Supplementary Parameters

A9-00 **Online auto-tuning of rotor time constant for asynchronous motors**

Address:	0xA900		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Disabled

1: Enabled

Description

A9-01 **Auto-tuning of rotor resistance gain for asynchronous motors in FVC mode**

Address: 0xA901

Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	5	Change:	In real time

Value Range:

0–100

Description

A9-02 **Start frequency auto-tuning of the rotor resistance for asynchronous motors in FVC mode**

Address: 0xA902

Min.:	2	Unit:	Hz
Max.:	100	Data type:	UInt16
Default:	7	Change:	In real time

Value Range:

2 Hz to 100 Hz

Description

A9-03 **Observed magnetic field coefficient of asynchronous motors in FVC mode**

Address: 0xA903

Min.:	30	Unit:	-
Max.:	150	Data type:	UInt16
Default:	40	Change:	In real time

Value Range:

30 to 150

Description

A9-04 **Maximum torque limit coefficient in the field-weakening range for asynchronous motors**

Address: 0xA904

Min.:	30	Unit:	-
Max.:	150	Data type:	UInt16
Default:	80	Change:	In real time

Value Range:

30 to 150

Description

A9-05 **Speed filter time of asynchronous motor in SVC mode**

Address:	0xA905		
Min.:	5	Unit:	ms
Max.:	32	Data type:	UInt16
Default:	15	Change:	In real time

Value Range:

5 ms to 32 ms

Description

A9-06 **Speed feedback handling in speed control of asynchronous motor in SVC mode**

Address:	0xA906		
Min.:	0	Unit:	-
Max.:	4	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: No operation

1: Minimum synchronization frequency limited based on load change

2: Fixed current output during low-speed running

3: Fixed current output during low-speed running and light load

4: Low torque optimization

Description

A9-07 **Magnetic field regulation bandwidth of asynchronous motor in SVC mode**

Address:	0xA907		
Min.:	0	Unit:	-
Max.:	8	Data type:	UInt16
Default:	2	Change:	In real time

Value Range:

0.0–8.0

Description

A9-08 **Low-speed running current of asynchronous motor in SVC mode**

Address: 0xA908

Min.:	30	Unit:	-
Max.:	170	Data type:	UInt16
Default:	100	Change:	In real time

Value Range:

30–170

Description

A9-09 **Switchover frequency of output fixed current for asynchronous motor in SVC mode**

Address: 0xA909

Min.:	0.1	Unit:	Hz
Max.:	1	Data type:	UInt16
Default:	0.3	Change:	At stop

Value Range:

0.1 Hz to 1.0 Hz

Description

A9-10 **Speed fluctuation suppression coefficient of asynchronous motor in SVC mode**

Address: 0xA90A

Min.:	80	Unit:	-
Max.:	100	Data type:	UInt16
Default:	95	Change:	At stop

Value Range:

80 to 100

Description

A9-11 **Acceleration/Deceleration time of asynchronous motor in SVC mode**

Address: 0xA90B

Min.:	10	Unit:	s
Max.:	3000	Data type:	UInt16
Default:	200	Change:	At stop

Value Range:

10s to 3000s

Description

A9-12 **Quick auto-tuning of stator resistance before asynchronous motor startup**

Address: 0xA90C

Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Disabled

1: Enabled

Description

A9-13 Quick auto-tuning of stator resistance coefficient 1 for the asynchronous motor

Address: 0xA90D

Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	10	Change:	At stop

Value Range:

0 to 65535

Description

A9-14 Quick auto-tuning of stator resistance coefficient 2 for the asynchronous motor

Address: 0xA90E

Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	10	Change:	At stop

Value Range:

0 to 65535

Description

A9-17 Synchronous motor real-time angle

Address: 0xA911

Min.:	0	Unit:	-
Max.:	359.9	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0.0–359.9

Description

A9-18 **Initial position angle detection of synchronous motor**

Address:	0xA912		
Min.:	0	Unit:	-
Max.:	2	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Detected upon running

1: Not detected

2: Detected upon initial running after power-on

Description

A9-20 **Flux weakening mode**

Address:	0xA914		
Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	1	Change:	At stop

Value Range:

0: Automatic mode

1: Synchronous motor adjustment mode

2: Synchronous motor hybrid mode

3: Disabled

Description

A9-21 **Flux weakening gain of synchronous motor**

Address:	0xA915		
Min.:	0	Unit:	-
Max.:	50	Data type:	UInt16
Default:	5	Change:	In real time

Value Range:

0–50

Description

A9-22 **Upper limit margin of synchronous motor output voltage**

Address:	0xA916		
Min.:	0	Unit:	%
Max.:	50	Data type:	UInt16
Default:	5	Change:	In real time

Value Range:

0% to 50%

Description

A9-23 **Maximum force adjustment gain of synchronous motor**

Address:	0xA917		
Min.:	20	Unit:	%
Max.:	300	Data type:	UInt16
Default:	100	Change:	In real time

Value Range:

20% to 300%

Description

A9-24 **Exciting current adjustment gain calculated by synchronous motor**

Address:	0xA918		
Min.:	40	Unit:	%
Max.:	200	Data type:	UInt16
Default:	100	Change:	In real time

Value Range:

40% to 200%

Description

A9-25 **Estimated speed integral gain of synchronous motor in SVC mode**

Address:	0xA919		
Min.:	5	Unit:	%
Max.:	1000	Data type:	UInt16
Default:	30	Change:	In real time

Value Range:

5% to 1000%

Description

A9-26 **Estimated speed proportional gain of synchronous motor in SVC mode**

Address:	0xA91A		
Min.:	5	Unit:	%
Max.:	300	Data type:	UInt16
Default:	20	Change:	In real time

Value Range:

5% to 300%

Description

A9-27 **Estimated synchronous motor speed filter in SVC mode**

Address:	0xA91B		
Min.:	10	Unit:	-
Max.:	2000	Data type:	UInt16
Default:	100	Change:	In real time

Value Range:

10–2000

Description

A9-28 **Minimum carrier frequency of synchronous motor in SVC mode**

Address:	0xA91C		
Min.:	0.8	Unit:	-
Max.:	F0-15	Data type:	UInt16
Default:	2	Change:	In real time

Value Range:

0.8 to F0-15

Description

A9-29 **Low speed excitation current of synchronous motor in SVC mode**

Address:	0xA91D		
Min.:	0	Unit:	%
Max.:	80	Data type:	UInt16
Default:	30	Change:	In real time

Value Range:

0% to 80%

Description

A9-30 **Low-speed closed-loop current (for VVC)**

Address:	0xA91E		
Min.:	0	Unit:	%
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0% to 65535%

Description

A9-31 **Oscillation suppression damping coefficient (for VVC)**

Address:	0xA91F		
Min.:	0	Unit:	%
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0% to 65535%

Description

A9-32 **Reserved parameter 8 for synchronous motor control**

Address:	0xA920		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to 65535

Description

A9-33 **Reserved parameter 9 for synchronous motor control**

Address:	0xA921		
Min.:	0	Unit:	-
Max.:	5	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0–5

Description

A9-34 **Reserved parameter 10 for synchronous motor control**

Address:	0xA922		
Min.:	0	Unit:	%
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0% to 65535%

Description

A9-35 **Performance fault subcode upon 1st fault**

Address:	0xA923		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

A9-36 **Performance fault subcode upon 2nd fault**

Address:	0xA924		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

A9-37 **Performance fault subcode upon 3rd fault**

Address:	0xA925		
Min.:	0	Unit:	-
Max.:	65535	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to 65535

Description

A9-40 **Low-speed closed-loop current selection (for VVC)**

Address:	0xA928		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Disabled

1: Enabled

Description

A9-41 **Low-speed closed-loop current (for VVC)**

Address:	0xA929		
Min.:	30	Unit:	%
Max.:	200	Data type:	UInt16
Default:	50	Change:	At stop

Value Range:

30% to 200%

Description

A9-42 **Oscillation suppression damping coefficient (for VVC)**

Address:	0xA92A		
Min.:	0	Unit:	%
Max.:	500	Data type:	UInt16
Default:	100	Change:	In real time

Value Range:

0% to 500%

Description

A9-43 **Initial position compensation angle (for VVC)**

Address:	0xA92B		
Min.:	0	Unit:	-
Max.:	5	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0–5

Description

A9-44 **Initial position compensation angle of synchronous motor**

Address:	0xA92C		
Min.:	0	Unit:	-
Max.:	360	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0–360.0

Description

A9-45 **Synchronous motor low-speed handling**

Address: 0xA92D

Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Disabled

1: Enabled

Description

A9-46 **Switchover frequency for synchronous motor low-speed handling**

Address: 0xA92E

Min.:	0.01	Unit:	-
Max.:	F0-10	Data type:	UInt16
Default:	5	Change:	At stop

Value Range:

0.01 to value of F0-10

Description

A9-47 **Synchronous motor low-speed handling current**

Address: 0xA92F

Min.:	10	Unit:	-
Max.:	200	Data type:	UInt16
Default:	100	Change:	At stop

Value Range:

10 to 200

Description

A9-48 **Synchronous motor low-speed handling feedback suppression coefficient**

Address: 0xA930

Min.:	0	Unit:	-
Max.:	300	Data type:	UInt16
Default:	32	Change:	At stop

Value Range:

0–300

Description

A9-49 **Synchronous motor energy-saving control**

Address:	0xA931		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Disabled

1: Enabled

Description

A9-50 **Maximum flux weakening current limit margin**

Address:	0xA932		
Min.:	200	Unit:	-
Max.:	1000	Data type:	UInt16
Default:	1000	Change:	At stop

Value Range:

200 to 1000

Description

A9-51 **Advanced settings for asynchronous motor parameter auto-tuning**

Address:	0xA933		
Min.:	0	Unit:	-
Max.:	1111	Data type:	UInt16
Default:	111	Change:	At stop

Value Range:

Ones: Rotor resistance and leakage inductance DC offset

0: Standard offset

1: Large offset

Tens: New rotor resistance and leakage inductance auto-tuning algorithm

0: Disabled

1: Enabled

Hundreds: New mutual inductance static auto-tuning algorithm

0: Disabled

1: Enabled

Thousands: Stator resistance auto-tuning algorithm

0: Current open loop

1: Current closed loop

Description

A9-52 **U0-06 feedback torque selection**

Address: 0xA934

Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	1	Change:	In real time

Value Range:

0: Motoring torque being positive and generating torque being negative

1: Torque direction being positive in the case of positive speed direction; torque direction being negative in the case of negative speed direction

Description

A9-54 **Transistor voltage drop**

Address: 0xA936

Min.:	0	Unit:	-
Max.:	10000	Data type:	UInt16
Default:	700	Change:	At stop

Value Range:

0 to 10000

Description

A9-55 **Dead-zone time 0**

Address: 0xA937

Min.:	0	Unit:	-
Max.:	10000	Data type:	UInt16
Default:	352	Change:	At stop

Value Range:

0 to 10000

Description

A9-56 **Dead-zone time 1**

Address: 0xA938

Min.:	0	Unit:	-
Max.:	10000	Data type:	UInt16
Default:	1052	Change:	At stop

Value Range:

0 to 10000

Description

A9-57 **Dead-zone time 2**

Address: 0xA939

Min.:	0	Unit:	-
Max.:	10000	Data type:	UInt16
Default:	1270	Change:	At stop

Value Range:

0 to 10000

Description

A9-58 **Dead-zone time 3**

Address: 0xA93A

Min.:	0	Unit:	-
Max.:	10000	Data type:	UInt16
Default:	1358	Change:	At stop

Value Range:

0 to 10000

Description

A9-59 **Dead-zone time 4**

Address: 0xA93B

Min.:	0	Unit:	-
Max.:	10000	Data type:	UInt16
Default:	1404	Change:	At stop

Value Range:

0 to 10000

Description

A9-60 **Dead-zone time 5**

Address: 0xA93C

Min.:	0	Unit:	-
Max.:	10000	Data type:	UInt16
Default:	1449	Change:	At stop

Value Range:

0 to 10000

Description

A9-61 **Dead-zone time 6**

Address:	0xA93D		
Min.:	0	Unit:	-
Max.:	10000	Data type:	UInt16
Default:	1661	Change:	At stop

Value Range:

0 to 10000

Description

A9-62 **Dead-zone time 7**

Address:	0xA93E		
Min.:	0	Unit:	-
Max.:	10000	Data type:	UInt16
Default:	1689	Change:	At stop

Value Range:

0 to 10000

Description

A9-63 **Dead-zone compensation current 0**

Address:	0xA93F		
Min.:	0	Unit:	-
Max.:	10000	Data type:	UInt16
Default:	94	Change:	At stop

Value Range:

0 to 10000

Description

A9-64 **Dead-zone compensation current 1**

Address:	0xA940		
Min.:	0	Unit:	-
Max.:	10000	Data type:	UInt16
Default:	376	Change:	At stop

Value Range:

0 to 10000

Description

A9-65 **Dead-zone compensation current 2**

Address:	0xA941		
Min.:	0	Unit:	-
Max.:	10000	Data type:	UInt16
Default:	658	Change:	At stop

Value Range:

0 to 10000

Description

A9-66 **Dead-zone compensation current 3**

Address:	0xA942		
Min.:	0	Unit:	-
Max.:	10000	Data type:	UInt16
Default:	940	Change:	At stop

Value Range:

0 to 10000

Description

A9-67 **Dead-zone compensation current 4**

Address:	0xA943		
Min.:	0	Unit:	-
Max.:	10000	Data type:	UInt16
Default:	1222	Change:	At stop

Value Range:

0 to 10000

Description

A9-68 **Dead-zone compensation current 5**

Address:	0xA944		
Min.:	0	Unit:	-
Max.:	10000	Data type:	UInt16
Default:	1504	Change:	At stop

Value Range:

0 to 10000

Description

A9-69 **Dead-zone compensation current 6**

Address: 0xA945

Min.:	0	Unit:	-
Max.:	10000	Data type:	UInt16
Default:	3478	Change:	At stop

Value Range:

0 to 10000

Description

A9-70 Dead-zone compensation current 7

Address: 0xA946

Min.:	0	Unit:	-
Max.:	10000	Data type:	UInt16
Default:	5452	Change:	At stop

Value Range:

0 to 10000

Description

A9-71 Elastic oscillation suppression

Address: 0xA944

Min.:	0	Unit:	-
Max.:	2	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Disabled

1: Self-adaptive based on the target frequency

2: Frequency reference

Description

A9-72 Elastic oscillation suppression filter time

Address: 0xA945

Min.:	20	Unit:	ms
Max.:	1000	Data type:	UInt16
Default:	300	Change:	In real time

Value Range:

20 ms to 1000 ms

Description

A9-73 Elastic oscillation suppression gain

Address: 0xA946

Min.:	10	Unit:	-
Max.:	1000	Data type:	UInt16
Default:	100	Change:	In real time

Value Range:

10 to 1000

Description

2.22 AC AI/AO Correction

AC-00 **AI1 measured voltage 1**

Address:	0xAC00		
Min.:	-10	Unit:	V
Max.:	10	Data type:	Int16
Default:	2	Change:	In real time

Value Range:

-10.000 V to +10.000 V

Description

When analog voltage correction is conducted on AI1, a correction curve is obtained based on two points. Each point corresponds to a measured voltage and a displayed voltage. The measured voltage is the voltage measured using a meter, and the displayed voltage is the AI1 voltage before correction (U0-21).

AC-01 **AI1 displayed voltage 1**

Address:	0xAC01		
Min.:	-10	Unit:	V
Max.:	10	Data type:	Int16
Default:	2	Change:	In real time

Value Range:

-10.000 V to +10.000 V

Description

When analog voltage correction is conducted on AI1, a correction curve is obtained based on two points. Each point corresponds to a measured voltage and a displayed voltage. The measured voltage is the voltage measured using a meter, and the displayed voltage is the AI1 voltage before correction (U0-21).

AC-02 **AI1 measured voltage 2**

Address:	0xAC02		
Min.:	-10	Unit:	V
Max.:	10	Data type:	Int16

Default: 8 | Change: In real time

Value Range:

-10.000 V to +10.000 V

Description

When analog voltage correction is conducted on AI1, a correction curve is obtained based on two points. Each point corresponds to a measured voltage and a displayed voltage. The measured voltage is the voltage measured using a meter, and the displayed voltage is the AI1 voltage before correction (U0-21).

AC-03 **AI1 displayed voltage 2**

Address: 0xAC03

Min.:	-10	Unit:	V
Max.:	10	Data type:	Int16
Default:	8	Change:	In real time

Value Range:

-10.000 V to +10.000 V

Description

When analog voltage correction is conducted on AI1, a correction curve is obtained based on two points. Each point corresponds to a measured voltage and a displayed voltage. The measured voltage is the voltage measured using a meter, and the displayed voltage is the AI1 voltage before correction (U0-21).

AC-04 **AI2 measured voltage 1**

Address: 0xAC04

Min.:	-10	Unit:	V
Max.:	10	Data type:	Int16
Default:	2	Change:	In real time

Value Range:

-10.000 V to 10.000 V

Description

When analog voltage correction is conducted on AI2, a correction curve is obtained based on two points. Each point corresponds to a measured voltage and a displayed voltage. The measured voltage is the voltage measured using a meter, and the displayed voltage is the AI2 voltage before correction (U0-22).

AC-05 **AI2 displayed voltage 1**

Address: 0xAC05

Min.:	-10	Unit:	V
Max.:	10	Data type:	Int16
Default:	2	Change:	In real time

Value Range:

-10.000 V to +10.000 V

Description

When analog voltage correction is conducted on AI2, a correction curve is obtained based on two points. Each point corresponds to a measured voltage and a displayed voltage. The measured voltage is the voltage measured using a meter, and the displayed voltage is the AI2 voltage before correction (U0-22).

AC-06 AI2 measured voltage 2

Address: 0xAC06

Min.:	-10	Unit:	V
Max.:	10	Data type:	Int16
Default:	8	Change:	In real time

Value Range:

-10.000 V to +10.000 V

Description

When analog voltage correction is conducted on AI2, a correction curve is obtained based on two points. Each point corresponds to a measured voltage and a displayed voltage. The measured voltage is the voltage measured using a meter, and the displayed voltage is the AI2 voltage before correction (U0-22).

AC-07 AI2 displayed voltage 2

Address: 0xAC07

Min.:	-10	Unit:	V
Max.:	10	Data type:	Int16
Default:	8	Change:	In real time

Value Range:

-10.000 V to +10.000 V

Description

When analog voltage correction is conducted on AI2, a correction curve is obtained based on two points. Each point corresponds to a measured voltage and a displayed voltage. The measured voltage is the voltage measured using a meter, and the displayed voltage is the AI2 voltage before correction (U0-22).

AC-08 AI3 measured voltage 1

Address: 0xAC08

Min.:	-10	Unit:	V
Max.:	10	Data type:	Int16
Default:	2	Change:	In real time

Value Range:

-10.000 V to +10.000 V

Description

When analog voltage correction is conducted on AI3, a correction curve is obtained based on two points. Each point corresponds to a measured voltage and a displayed voltage. The measured voltage is the voltage measured using a meter, and the displayed voltage is the AI3 voltage before correction (U0-23).

AC-09 AI3 displayed voltage 1

Address:	0xAC09		
Min.:	-10	Unit:	V
Max.:	10	Data type:	Int16
Default:	2	Change:	In real time

Value Range:

-10.000 V to +10.000 V

Description

When analog voltage correction is conducted on AI3, a correction curve is obtained based on two points. Each point corresponds to a measured voltage and a displayed voltage. The measured voltage is the voltage measured using a meter, and the displayed voltage is the AI3 voltage before correction (U0-23).

AC-10 AI3 measured voltage 2

Address:	0xAC0A		
Min.:	-10	Unit:	V
Max.:	10	Data type:	Int16
Default:	8	Change:	In real time

Value Range:

-10.000 V to +10.000 V

Description

When analog voltage correction is conducted on AI3, a correction curve is obtained based on two points. Each point corresponds to a measured voltage and a displayed voltage. The measured voltage is the voltage measured using a meter, and the displayed voltage is the AI3 voltage before correction (U0-23).

AC-11 AI3 displayed voltage 2

Address:	0xAC0B		
Min.:	-10	Unit:	V
Max.:	10	Data type:	Int16
Default:	8	Change:	In real time

Value Range:

-10.000 V to +10.000 V

Description

When analog voltage correction is conducted on AI3, a correction curve is obtained based on two points. Each point corresponds to a measured voltage and a displayed voltage. The measured voltage is the voltage measured using a meter, and the displayed voltage is the AI3 voltage before correction (U0-23).

AC-12 AO1 measured voltage 1

Address: 0xAC0C

Min.:	-10	Unit:	V
Max.:	10	Data type:	Int16
Default:	2	Change:	In real time

Value Range:

-10.000 V to +10.000 V

Description

When analog voltage correction is carried out on the AO1 terminal, a correction curve is formed through two points. Each point corresponds to a target voltage and a measured voltage. The target voltage is the expected output voltage, and the measured voltage is the output voltage actually measured.

AC-13 AO1 target voltage 1

Address: 0xAC0D

Min.:	-10	Unit:	V
Max.:	10	Data type:	Int16
Default:	2	Change:	In real time

Value Range:

-10.000 V to +10.000 V

Description

When analog voltage correction is carried out on the AO1 terminal, a correction curve is formed through two points. Each point corresponds to a target voltage and a measured voltage. The target voltage is the expected output voltage, and the measured voltage is the output voltage actually measured.

AC-14 AO1 measured voltage 2

Address: 0xAC0E

Min.:	-10	Unit:	V
Max.:	10	Data type:	Int16
Default:	8	Change:	In real time

Value Range:

-10.000 V to +10.000 V

Description

When analog voltage correction is carried out on the AO1 terminal, a correction curve is formed through two points. Each point corresponds to a target voltage and a measured voltage. The target voltage is the expected output voltage, and the measured voltage is the output voltage actually measured.

AC-15 **AO1 target voltage 2**

Address:	0xAC0F		
Min.:	-10	Unit:	V
Max.:	10	Data type:	Int16
Default:	8	Change:	In real time

Value Range:

-10.000 V to +10.000 V

Description

When analog voltage correction is carried out on the AO1 terminal, a correction curve is formed through two points. Each point corresponds to a target voltage and a measured voltage. The target voltage is the expected output voltage, and the measured voltage is the output voltage actually measured.

AC-16 **AO2 measured voltage 1**

Address:	0xAC10		
Min.:	-10	Unit:	V
Max.:	10	Data type:	Int16
Default:	2	Change:	In real time

Value Range:

-10.000 V to +10.000 V

Description

When analog voltage correction is carried out on the AO2 terminal, a correction curve is formed through two points, and each point corresponds to a target voltage and a measured voltage. The target voltage is the expected output voltage, and the measured voltage is the output voltage actually measured.

AC-17 **AO2 target voltage 1**

Address:	0xAC11		
Min.:	-10	Unit:	V
Max.:	10	Data type:	Int16
Default:	2	Change:	In real time

Value Range:

-10.000 V to +10.000 V

Description

When analog voltage correction is carried out on the AO2 terminal, a correction curve is formed through two points, and each point corresponds
to a target voltage and a measured voltage. The target voltage is the expected output voltage, and the measured voltage is the output voltage actually measured.

AC-18 **AO2 measured voltage 2**

Address: 0xAC12

Min.:	-10	Unit:	V
Max.:	10	Data type:	Int16
Default:	8	Change:	In real time

Value Range:

-10.000 V to +10.000 V

Description

When analog voltage correction is carried out on the AO2 terminal, a correction curve is formed through two points, and each point corresponds
to a target voltage and a measured voltage. The target voltage is the expected output voltage, and the measured voltage is the output voltage actually measured.

AC-19 **AO2 target voltage 2**

Address: 0xAC13

Min.:	-10	Unit:	V
Max.:	10	Data type:	Int16
Default:	8	Change:	In real time

Value Range:

-10.000 V to +10.000 V

Description

When analog voltage correction is carried out on the AO2 terminal, a correction curve is formed through two points, and each point corresponds
to a target voltage and a measured voltage. The target voltage is the expected output voltage, and the measured voltage is the output voltage actually measured.

AC-20 **PT100 measured voltage 1**

Address: 0xAC14

Min.:	0	Unit:	V
Max.:	3.3	Data type:	Int16
Default:	0.44	Change:	In real time

Value Range:

0.000 V to 3.3 V

Description

When PT100 analog voltage correction is carried out on AI3, a correction curve is formed through two points. Each point corresponds to a measured voltage and a displayed voltage. The measured voltage is the voltage measured using a meter, and the displayed voltage is the PTC voltage before correction (U0-47).

AC-21 PT100 displayed voltage 1

Address: 0xAC15

Min.:	0	Unit:	V
Max.:	3.3	Data type:	Int16
Default:	0.44	Change:	In real time

Value Range:

0.000 V to 3.3 V

Description

When PT100 analog voltage correction is carried out on AI3, a correction curve is formed through two points. Each point corresponds to a measured voltage and a displayed voltage. The measured voltage is the voltage measured using a meter, and the displayed voltage is the PTC voltage before correction (U0-47).

AC-22 PT100 measured voltage 2

Address: 0xAC16

Min.:	0	Unit:	V
Max.:	3.3	Data type:	Int16
Default:	2.16	Change:	In real time

Value Range:

0.000 V to 3.3 V

Description

When PT100 analog voltage correction is carried out on AI3, a correction curve is formed through two points. Each point corresponds to a measured voltage and a displayed voltage. The measured voltage is the voltage measured using a meter, and the displayed voltage is the PTC voltage before correction (U0-47).

AC-23 PT100 displayed voltage 2

Address: 0xAC17

Min.:	0	Unit:	V
Max.:	3.3	Data type:	Int16
Default:	2.16	Change:	In real time

Value Range:

0.000 V to 3.3 V

Description

When PT100 analog voltage correction is carried out on AI3, a correction curve is formed through two points. Each point corresponds to a measured voltage and a displayed voltage. The measured voltage is the voltage measured using a meter, and the displayed voltage is the PTC voltage before correction (U0-47).

AC-24 PT1000 measured voltage 1

Address:	0xAC18		
Min.:	0	Unit:	V
Max.:	3.3	Data type:	Int16
Default:	0.44	Change:	In real time

Value Range:

0.000 V to 3.3 V

Description

When PT1000 analog voltage correction is carried out on AI3, a correction curve is formed through two points. Each point corresponds to a measured voltage and a displayed voltage. The measured voltage is the voltage measured using a meter, and the displayed voltage is the PTC voltage before correction (U0-47).

AC-25 Voltage 1 display on the PT1000

Address:	0xAC19		
Min.:	0	Unit:	V
Max.:	3.3	Data type:	Int16
Default:	0.44	Change:	In real time

Value Range:

0.000 V to 3.3 V

Description

When PT1000 analog voltage correction is carried out on AI3, a correction curve is formed through two points. Each point corresponds to a measured voltage and a displayed voltage. The measured voltage is the voltage measured using a meter, and the displayed voltage is the PTC voltage before correction (U0-47).

AC-26 PT1000 measured voltage 2

Address:	0xAC1A		
Min.:	0	Unit:	V
Max.:	3.3	Data type:	Int16
Default:	2.16	Change:	In real time

Value Range:

0.000 V to 3.3 V

Description

When PT1000 analog voltage correction is carried out on AI3, a correction curve is formed through two points. Each point corresponds to a measured voltage and a displayed voltage. The measured voltage is the voltage measured using a meter, and the displayed voltage is the PTC voltage before correction (U0-47).

AC-27 PT1000 displayed voltage 2

Address: 0xAC1B

Min.:	0	Unit:	V
Max.:	3.3	Data type:	Int16
Default:	2.16	Change:	In real time

Value Range:

0.000 V to 3.3 V

Description

When PT1000 analog voltage correction is carried out on AI3, a correction curve is formed through two points. Each point corresponds to a measured voltage and a displayed voltage. The measured voltage is the voltage measured using a meter, and the displayed voltage is the PTC voltage before correction (U0-47).

AC-28 AO1 measured current 1

Address: 0xAC1C

Min.:	0	Unit:	mA
Max.:	20	Data type:	UInt16
Default:	4	Change:	In real time

Value Range:

0.000 mA to 20.000 mA

Description

When analog current correction is carried out on the AO1, a correction curve is formed through two points. Each point corresponds to a target voltage and a measured current. The target current is the expected output current, and the measured voltage is the output current actually measured.

AC-29 AO1 target current 1

Address: 0xAC1D

Min.:	0	Unit:	mA
Max.:	20	Data type:	UInt16
Default:	4	Change:	In real time

Value Range:

0.000 mA to 20.000 mA

Description

When analog current correction is carried out on the AO1, a correction curve is formed through two points. Each point corresponds to a target voltage and a measured current. The target current is the expected output current, and the measured voltage is the output current actually measured.

AC-30 **AO1 measured current 2**

Address:	0xAC1E		
Min.:	0	Unit:	mA
Max.:	20	Data type:	UInt16
Default:	16	Change:	In real time

Value Range:

0.000 mA to 20.000 mA

Description

When analog current correction is carried out on the AO1, a correction curve is formed through two points. Each point corresponds to a target voltage and a measured current. The target current is the expected output current, and the measured voltage is the output current actually measured.

AC-31 **AO1 target current 2**

Address:	0xAC1F		
Min.:	0	Unit:	mA
Max.:	20	Data type:	UInt16
Default:	16	Change:	In real time

Value Range:

0.000 mA to 20.000 mA

Description

When analog current correction is carried out on the AO1, a correction curve is formed through two points. Each point corresponds to a target voltage and a measured current. The target current is the expected output current, and the measured voltage is the output current actually measured.

2.23 AF Process Data Address Mapping Parameters

AF-00 **RPDO1-SubIndex0-H**

Address:	0xAF00		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-01 **RPDO1-SubIndex0-L**

Address:	0xAF01		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-02 **RPDO1-SubIndex1-H**

Address:	0xAF02		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-03 **RPDO1-SubIndex1-L**

Address:	0xAF03		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-04 **RPDO1-SubIndex2-H**

Address:	0xAF04		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-05 **RPDO1-SubIndex2-L**

Address:	0xAF05		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-06 **RPDO1-SubIndex3-H**

Address:	0xAF06		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-07 **RPDO1-SubIndex3-L**

Address:	0xAF07		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-08 **RPDO2-SubIndex0-H**

Address:	0xAF08		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-09 **RPDO2-SubIndex0-L**

Address:	0xAF09		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-10 **RPDO2-SubIndex1-H**

Address:	0xAF0A		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-11 **RPDO2-SubIndex1-L**

Address:	0xAF0B		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-12 **RPDO2-SubIndex2-H**

Address:	0xAF0C		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-13 **RPDO2-SubIndex2-L**

Address: 0xAF0D

Min.: 0 | Unit: -
Max.: 0xFFFF | Data type: UInt16
Default: 0 | Change: In real time

Value Range:

0 to value of 0xFFFF

Description

AF-14 RPDO2-SubIndex3-H

Address: 0xAF0E
Min.: 0 | Unit: -
Max.: 0xFFFF | Data type: UInt16
Default: 0 | Change: In real time

Value Range:

0 to value of 0xFFFF

Description

AF-15 RPDO2-SubIndex3-L

Address: 0xAF0F
Min.: 0 | Unit: -
Max.: 0xFFFF | Data type: UInt16
Default: 0 | Change: In real time

Value Range:

0 to value of 0xFFFF

Description

AF-16 RPDO3-SubIndex0-H

Address: 0xAF10
Min.: 0 | Unit: -
Max.: 0xFFFF | Data type: UInt16
Default: 0 | Change: In real time

Value Range:

0 to value of 0xFFFF

Description

AF-17 RPDO3-SubIndex0-L

Address: 0xAF11
Min.: 0 | Unit: -
Max.: 0xFFFF | Data type: UInt16

Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-18 **RPDO3-SubIndex1-H**

Address:	0xAF12		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-19 **RPDO3-SubIndex1-L**

Address:	0xAF13		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-20 **RPDO3-SubIndex2-H**

Address:	0xAF14		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-21 **RPDO3-SubIndex2-L**

Address:	0xAF15		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-22 **RPDO3-SubIndex3-H**

Address:	0xAF16		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-23 **RPDO3-SubIndex3-L**

Address:	0xAF17		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-24 **RPDO4-SubIndex0-H**

Address:	0xAF18		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-25 **RPDO4-SubIndex0-L**

Address:	0xAF19		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-26 **RPDO4-SubIndex1-H**

Address: 0xAF1A

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-27 **RPDO4-SubIndex1-L**

Address: 0xAF1B

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-28 **RPDO4-SubIndex2-H**

Address: 0xAF1C

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-29 **RPDO4-SubIndex2-L**

Address: 0xAF1D

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-30 **RPDO4-SubIndex3-H**

Address:	0xAF1E		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-31 **RPDO4-SubIndex3-L**

Address:	0xAF1F		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-32 **TPDO1-SubIndexO-H**

Address:	0xAF20		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-33 **TPDO1-SubIndexO-L**

Address:	0xAF21		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-34 **TPDO1-SubIndex1-H**

Address: 0xAF22

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-35 TPDO1-SubIndex1-L

Address: 0xAF23

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-36 TPDO1-SubIndex2-H

Address: 0xAF24

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-37 TPDO1-SubIndex2-L

Address: 0xAF25

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-38 TPDO1-SubIndex3-H

Address: 0xAF26

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16

Default: 0 | Change: In real time

Value Range:

0 to value of 0xFFFF

Description

AF-39 TPDO1-SubIndex3-L

Address: 0xAF27

Min.: 0 | Unit: -

Max.: 0xFFFF | Data type: UInt16

Default: 0 | Change: In real time

Value Range:

0 to value of 0xFFFF

Description

AF-40 TPDO2-SubIndex0-H

Address: 0xAF28

Min.: 0 | Unit: -

Max.: 0xFFFF | Data type: UInt16

Default: 0 | Change: In real time

Value Range:

0 to value of 0xFFFF

Description

AF-41 TPDO2-SubIndex0-L

Address: 0xAF29

Min.: 0 | Unit: -

Max.: 0xFFFF | Data type: UInt16

Default: 0 | Change: In real time

Value Range:

0 to value of 0xFFFF

Description

AF-42 TPDO2-SubIndex1-H

Address: 0xAF2A

Min.: 0 | Unit: -

Max.: 0xFFFF | Data type: UInt16

Default: 0 | Change: In real time

Value Range:

0 to value of 0xFFFF

Description

AF-43 TPDO2-SubIndex1-L

Address: 0xAF2B

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-44 TPDO2-SubIndex2-H

Address: 0xAF2C

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-45 TPDO2-SubIndex2-L

Address: 0xAF2D

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-46 TPDO2-SubIndex3-H

Address: 0xAF2E

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-47 **TPDO2-SubIndex3-L**

Address: 0xAF2F

Min.: 0 | Unit: -

Max.: 0xFFFF | Data type: UInt16

Default: 0 | Change: In real time

Value Range:

0 to value of 0xFFFF

Description

AF-48 **TPDO3-SubIndex0-H**

Address: 0xAF30

Min.: 0 | Unit: -

Max.: 0xFFFF | Data type: UInt16

Default: 0 | Change: In real time

Value Range:

0 to value of 0xFFFF

Description

AF-49 **TPDO3-SubIndex0-L**

Address: 0xAF31

Min.: 0 | Unit: -

Max.: 0xFFFF | Data type: UInt16

Default: 0 | Change: In real time

Value Range:

0 to value of 0xFFFF

Description

AF-50 **TPDO3-SubIndex1-H**

Address: 0xAF32

Min.: 0 | Unit: -

Max.: 0xFFFF | Data type: UInt16

Default: 0 | Change: In real time

Value Range:

0 to value of 0xFFFF

Description

AF-51 **TPDO3-SubIndex1-L**

Address: 0xAF33

Min.: 0 | Unit: -

Max.: 0xFFFF | Data type: UInt16

Default: 0 | Change: In real time

Value Range:

0 to value of 0xFFFF

Description

AF-52 **TPDO3-SubIndex2-H**

Address: 0xAF34

Min.: 0 | Unit: -

Max.: 0xFFFF | Data type: UInt16

Default: 0 | Change: In real time

Value Range:

0 to value of 0xFFFF

Description

AF-53 **TPDO3-SubIndex2-L**

Address: 0xAF35

Min.: 0 | Unit: -

Max.: 0xFFFF | Data type: UInt16

Default: 0 | Change: In real time

Value Range:

0 to value of 0xFFFF

Description

AF-54 **TPDO3-SubIndex3-H**

Address: 0xAF36

Min.: 0 | Unit: -

Max.: 0xFFFF | Data type: UInt16

Default: 0 | Change: In real time

Value Range:

0 to value of 0xFFFF

Description

AF-55 **TPDO3-SubIndex3-L**

Address: 0xAF37

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-56 TPDO4-SubIndex0-H

Address: 0xAF38

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-57 TPDO4-SubIndex0-L

Address: 0xAF39

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-58 TPDO4-SubIndex1-H

Address: 0xAF3A

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

AF-59 TPDO4-SubIndex1-L

Address: 0xAF3B

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16

Default: 0 Change: In real time

Value Range:

0 to value of 0xFFFF

Description

AF-60 TPDO4-SubIndex2-H

Address: 0xAF3C

Min.: 0 Unit: -

Max.: 0xFFFF Data type: UInt16

Default: 0 Change: In real time

Value Range:

0 to value of 0xFFFF

Description

AF-61 TPDO4-SubIndex2-L

Address: 0xAF3D

Min.: 0 Unit: -

Max.: 0xFFFF Data type: UInt16

Default: 0 Change: In real time

Value Range:

0 to value of 0xFFFF

Description

AF-62 TPDO4-SubIndex3-H

Address: 0xAF3E

Min.: 0 Unit: -

Max.: 0xFFFF Data type: UInt16

Default: 0 Change: In real time

Value Range:

0 to value of 0xFFFF

Description

AF-63 TPDO4-SubIndex3-L

Address: 0xAF3F

Min.: 0 Unit: -

Max.: 0xFFFF Data type: UInt16

Default: 0 Change: In real time

Value Range:

0 to value of 0xFFFF

Description

AF-66 **Number of valid RPDOs**

Address:	0xAF42		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to value of 0xFFFF

Description

AF-67 **Number of valid TPDOs**

Address:	0xAF43		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	Unchangeable

Value Range:

0 to value of 0xFFFF

Description

2.24 B0 Control Mode, Linear Speed, and Roll Diameter Parameters

B0-00 **Tension control mode**

Address:	0xB000		
Min.:	0	Unit:	-
Max.:	4	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Disabled

1: Open loop torque control

2: Closed loop speed control

3: Closed loop torque control

4: Constant linear speed control

Description

Used to select the tension control mode.

0: Disabled
Used for direction judgment and parameter auto-tuning.
1: Open-loop torque control
Tension/position detection and feedback are not required in the torque mode. The AC drive controls the output torque and tension on the material. The FVC mode is recommended to achieve better control effect.
2: Closed-loop speed control
Tension/position detection and feedback are required in the speed mode. Based on the given main frequency calculated from linear speed and winding diameter, the AC drive adjusts the output frequency by superposing the PID closed-loop operation to achieve stable tension or position. The SVC, V/f control, or FVC mode can be used.
3: Closed-loop torque control
Tension/position detection and feedback are required in the torque mode. Based on the given torque in the open-loop torque control mode, the AC drive controls the output torque to obtain the required tension by superposing the PID closed-loop operation. Use FVC to achieve optimal control effect.
4: Constant linear speed control
In the speed mode, the AC drive adjusts its own operating frequency according to the change of winding diameter to ensure that the system runs at a constant linear speed. The SVC, V/f control, or FVC mode can be used.

B0-01 **Winding mode**

Address:	0xB001		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:
0: Winding
1: Unwinding

Description
Used with the DI function 58 (winding/unwinding switchover terminal) to determine the winding mode. When the terminal assigned with function 58 is inactive, the winding mode is consistent with that set by this parameter. When the terminal assigned with function 58 is active, the winding mode is reverse to that set by this parameter.

B0-02 **Unwinding reverse tightening selection**

Address:	0xB002		
Min.:	0	Unit:	m/min
Max.:	500	Data type:	UInt16

Default:	0	Change:	In real time

Value Range:

0.0 m/min to 500.0 m/min

Description

When B0-02 is set to 0, at zero material speed, the unwinding reel has no output and the material is not tightened. When B0-02 is set to a value between 0.1 m/min to 500.0 m/min, under no-load conditions or if the material is in loose state, the unwinding reel runs at the set linear speed in the reverse direction; at zero material speed, the unwinding real maintains output and the material is tightened.

B0-03 Mechanical transmission ratio

Address:	0xB003		
Min.:	0.01	Unit:	-
Max.:	300	Data type:	UInt16
Default:	1	Change:	In real time

Value Range:

0.01 to 300.00

Description

This parameter specifies the ratio of motor speed to reel speed. Set B0-03 based on the mechanical transmission structure. When the roll diameter is calculated based on linear speed (B0-07 is set to 0), a larger value of B0-03 means a larger roll diameter, and vice versa. According to this rule, the parameter can be corrected according to the deviation between the calculated roll diameter and the actual value.

B0-04 Linear speed input source

Address:	0xB004		
Min.:	0	Unit:	-
Max.:	6	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: No input

1: AI1

2: AI2

3: AI3

4: Pulse input (DI5)

5: Communication setting (1000H)

6: Communication setting (731AH)

Description

1: No input

1–6: When the linear speed is input through the preceding channels, the maximum linear speed (B0-05) must be set according to the per unit relationship. The 1000H address is set according to the percentage. The 731AH address is directly set by digit, and the digital setting range is from 0 to B0-05.

B0-05 Maximum linear speed

Address:	0xB005		
Min.:	0	Unit:	m/min
Max.:	6500	Data type:	UInt16
Default:	1000	Change:	In real time

Value Range:

0.0 m/min to 6500.0 m/min

Description

Used to set the maximum linear speed.

It corresponds to the actual linear speed when 100.0% is input for channel 1 to 5 of B0-04. (It differs from the maximum linear speed required by production. Verify them during settings.) When the linear speed is used to calculate the winding diameter (B0-07 = 0), the larger the parameter is, the larger the calculated winding diameter is, and vice versa. According to this rule, the parameter can be corrected according to the deviation between the calculated roll diameter and the actual value.

B0-06 Minimum linear speed for winding diameter calculation

Address:	0xB006		
Min.:	0	Unit:	m/min
Max.:	6500	Data type:	UInt16
Default:	20	Change:	In real time

Value Range:

0.0 m/min to 6500.0 m/min

Description

This parameter takes effect only when B0-07 is set to 0.

When the linear speed is lower than the value of B0-06, the current roll diameter is maintained. When the linear speed is higher than the value of B0-06, the roll diameter is calculated. This parameter can be used to address inaccurate roll diameter calculation for low-frequency operation and acceleration.

B0-07 Winding diameter calculation method

Address:	0xB007		
Min.:	0	Unit:	-

Max.:	7	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Calculated based on linear speed
1:Calculated based on accumulative thickness
2: AI1
3: AI2
4: AI3
5: Pulse input (DI5)
6: Communication
7: Specified by B0-14

Description

0: Calculated based on linear speed
This mode is irrelevant with the material thickness. The winding diameter is calculated in real time based on the linear speed and running frequency and the error is not accumulated.
1: Calculated based on the accumulative thickness
The linear speed is not required in this mode. The winding diameter is calculated based on the material thickness and revolution count signal accumulation. The calculation result is stable, but the error is accumulated.
2–6: The winding diameter can be obtained through channels 2 to 6 to meet the situation that the winding diameter is directly measured by sensors or the winding diameter operation is performed outside the AC drive. When the preceding calculation methods are used, the maximum roll diameter (B0-08) must be set correctly based on the per-unit relationship. When AI1 is enabled (B0-07 is set to 2), 100.0% AI1 input must correspond to the maximum roll diameter (B0-08).
7: Set by B0-14
When the winding diameter channel is set to 7, the winding diameter is set directly by B0-14, which can be used as an additional communication address or used when the winding diameter is manually set during commissioning.

B0-08 Maximum roll diameter

Address:	0xB008		
Min.:	0.1	Unit:	mm
Max.:	6000	Data type:	UInt16
Default:	500	Change:	In real time

Value Range:

0.1 mm to 6000.0 mm

Description

Actual full roll diameter

B0-09 **Reel diameter**

Address: 0xB009

Min.:	0.1	Unit:	mm
Max.:	6000	Data type:	UInt16
Default:	100	Change:	In real time

Value Range:

0.1 mm to 6000.0 mm

Description

Actual reel diameter

B0-10 **Initial roll diameter source**

Address: 0xB00A

Min.:	0	Unit:	-
Max.:	4	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: B0-11 to B0-13 setting
1: AI1 setting
2: AI2 setting
3: AI3 setting
4: Communication setting (1000H)

Description

This parameter is used to select the input channel of the initial roll diameter. The source of initial roll diameter is dependent on functions 55 and 56 (initial roll diameter selection terminal) of the DI and related to the winding mode.

0: B0-11 to B0-13

By default, the initial roll diameter source is determined to be B0-08 or B0-09 based on the winding mode.

1 to 4: The initial roll diameter can be obtained through channels 1 to 4. When using the preceding channels, the maximum roll diameter (B0-08) must be set correctly according to the per unit relationship.

B0-11 **Initial roll diameter 1**

Address: 0xB00B

Min.:	0.1	Unit:	mm
Max.:	6000	Data type:	UInt16
Default:	100	Change:	In real time

Value Range:

0.1 mm to 6000.0 mm

Description

For details about initial roll diameters 1 to 3, see B0-10.

B0-12 **Initial roll diameter 2**

Address: 0xB00C

Min.:	0.1	Unit:	mm
Max.:	6000	Data type:	UInt16
Default:	100	Change:	In real time

Value Range:

0.1 mm to 6000.0 mm

Description

For details about initial roll diameters 1 to 3, see B0-10.

B0-13 **Initial roll diameter 3**

Address: 0xB00D

Min.:	0.1	Unit:	mm
Max.:	6000	Data type:	UInt16
Default:	100	Change:	In real time

Value Range:

0.1 mm to 6000.0 mm

Description

For details about initial roll diameters 1 to 3, see B0-10.

B0-14 **Current roll diameter**

Address: 0xB00E

Min.:	0.1	Unit:	mm
Max.:	6000	Data type:	UInt16
Default:	100	Change:	In real time

Value Range:

0.1 mm to 6000.0 mm

Description

This parameter shows the current roll diameter in real time. Modifying this parameter can modify the current roll diameter, and the result of roll diameter calculation will override this parameter (except B0-07 = 7). It can also be used as a way to reset the roll diameter.

B0-15 **Roll diameter filter time**

Address: 0xB00F

Min.:	0	Unit:	s
Max.:	10	Data type:	UInt16
Default:	5	Change:	In real time

Value Range:

0.00s to 10.00s

Description

This parameter takes effect only when B0-07 is set to 0.
You can set B0-15 to filter roll diameter calculation results and suppress roll diameter jitter. A larger value of B0-15 means smoother calculated roll diameter and longer delay in roll diameter changes. Rule: When the roll diameter changes linearly, the time that the calculated roll diameter lags behind the actual roll diameter is basically equal to this parameter value.

B0-16 **Winding diameter change rate**

Address: 0xB010

Min.:	0	Unit:	-
Max.:	1000	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0–1000.0

Description

This parameter takes effect only when B0-07 is set to 0.
You can set B0-16 to a non-zero value to limit the change of roll diameter per unit of time and prevent abnormal fast change. An excessively low roll diameter change rate may result in large delay in roll diameter calculation. Set the change rate properly based on the actual conditions, for example, based on the maximum change rate corresponding to the linear speed of 100.0 m/min.

B0-17 **Roll diameter change direction limit**

Address: 0xB011

Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Disabled
1: Decrease disabled during winding, and increase disabled during unwinding

Description

This parameter takes effect only when B0-07 is set to 0.
Set this parameter to limit the direction change of the roll diameter. Use it under the condition of setting B0-16 reasonably. Otherwise, if there is abnormal fluctuation of roll diameter, excessive deviation of winding diameter calculation result will be caused.

B0-18 **Roll diameter reset during running**

Address: 0xB012

Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16

Default: 0 | Change: In real time

Value Range:

0–1

Description

This parameter can be used to enable roll diameter reset during operation.

B0-19 Pre-drive speed gain

Address: 0xB013

Min.:	-100	Unit:	%
Max.:	200	Data type:	Int16
Default:	0	Change:	In real time

Value Range:

-100.0% to +200.0%

Description

For pre-drive, the running frequency is automatically calculated based on the linear speed and roll diameter to ensure matching with the linear speed of the material. For small deviation of linear speed, set B0-19 to increase or decrease the running frequency during pre-drive, ensuring accurate linear speed matching.

B0-20 Pre-drive torque limit source

Address: 0xB014

Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	1	Change:	At stop

Value Range:

0: Set by F2-09

1: Set based on tension control torque

Description

In the torque control tension mode, the target torque is automatically generated to meet the material tension demand. In the normal operation mode, the target torque can also be set according to the channel selected by F2-09. This parameter provides the preceding options for the source of the target torque in the pre-drive mode. You can set it as required. 0: The target torque is set by the channel selected by F2-09. 1: The target torque is set according to the tension control open-loop torque (for mode 1 and mode 3 only).

B0-21 Pre-drive torque correction

Address: 0xB015

Min.:	-100	Unit:	%
Max.:	100	Data type:	Int16
Default:	0	Change:	In real time

Value Range:

-100.0% to +100.0%

Description

The parameter takes effect when B0-20 is set to 1 and is used to correct the tension control torque in pre-drive mode. To avoid too slow pre-drive acceleration due to low torque limit when B0-20 is set to 1, the minimum torque limit in pre-drive mode can be limited.

B0-23 Pre-drive acceleration time

Address:	0xB017		
Min.:	0	Unit:	s
Max.:	6000	Data type:	UInt16
Default:	20	Change:	In real time

Value Range:

0.0s to 6000.0s

Description

B0-23, B0-24, and B0-40 are used to set the time as a group. B0-23 and B0-40 correspond to the acceleration and deceleration time when the winding diameter is the minimum winding diameter. With the increase of winding diameter, the acceleration and deceleration time increase in proportion to avoid the impact caused by excessive acceleration and deceleration in large winding.

B0-24 Pre-drive deceleration time

Address:	0xB018		
Min.:	0	Unit:	s
Max.:	6000	Data type:	UInt16
Default:	20	Change:	In real time

Value Range:

0.0s to 6000.0s

Description

B0-23, B0-24, and B0-40 are used to set the time as a group. B0-23 and B0-24 correspond to the acceleration and deceleration time when the winding diameter is the minimum winding diameter. With the increase of winding diameter, the acceleration and deceleration time increase in proportion to avoid the impact caused by excessive acceleration and deceleration in large winding.

B0-25 Pre-drive winding diameter calculation function

Address:	0xB019		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Disabled

1: Enabled

Description

This parameter takes effect only when B0-07 is set to 1.

When the winding diameter is calculated by thickness accumulation, the winding diameter increases/decreases with the number of revolutions of the reel. At this time, this parameter can be set to 1 to avoid the cumulative error caused by the failure of winding diameter calculation during pre-driving. You can set this parameter according to the actual operations.

B0-26 Tension frequency limit

Address: 0xB01A

Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	50	Change:	In real time

Value Range:

0.0% to 100.0%

Description

Limit percentage (a percentage of the linear speed synchronous frequency)

B0-27 Tension frequency limit offset

Address: 0xB01B

Min.:	0	Unit:	Hz
Max.:	100	Data type:	UInt16
Default:	5	Change:	In real time

Value Range:

0.00 Hz to 100.00 Hz

Description

Limit offset (fixed frequency)

B0-28 Tension frequency limit

Address: 0xB01C

Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Disabled

1: Enabled

Description

B0-00=2: B0-28 is used to enable the speed closed-loop PID adjustment limit.

B0-00=0: Limit the tension frequency according to B0-26 and B0-27 (limited by upper limit frequency)
B0-00=1: Limit the tension frequency to the fixed frequency set by B0-27.
In speed mode, when open-loop reference and closed-loop adjustment are used, closed-loop adjustment must be limited to avoid system shock and ensure system stability. For this reason, in the speed closed-loop adjustment, based on the synchronization frequency (the running frequency that the rewinder matches the current linear speed) and the speed closed-loop limiter offset, the closed-loop adjustment frequency upper limit can be obtained according to the following formula by default (B0-28=0).
Closed-loop adjustment frequency upper limit = synchronous frequency x B0-26 + B0-27
When B0-28 is set to 1, the upper limit of the closed-loop adjustment frequency is the fixed frequency B0-27.
B0-00≠2: B0-28 is used to limit the speed limit (effective for winding).
0: No limit (limited by the upper limit frequency)
1: Limit the frequency according to B0-26 and B0-27.
In the torque mode, by default (B0-28=0), the upper limit of the winding frequency is not limited. To prevent material breaking and runaway, the above parameters can be set to limit the upper limit of the winding frequency. When B0-28 is set to 1, the upper limit of the winding frequency is obtained according to the following formula based on the synchronization frequency (the running frequency that the rewinder matches the current linear speed) and the frequency limit offset.
Winding frequency upper limit = Synchronous frequency x (1 + B0-26) + B0-27

B0-29 **Pulses per revolution**

Address: 0xB01D

Min.:	1	Unit:	-
Max.:	60000	Data type:	UInt16
Default:	1	Change:	In real time

Value Range:

1 to 60000

Description

This parameter specifies the number of pulses per revolution of the reel.

B0-30 **Revolutions per layer**

Address: 0xB01E

Min.:	1	Unit:	-
Max.:	10000	Data type:	UInt16
Default:	1	Change:	In real time

Value Range:

1 to 10000

Description

This parameter specifies the number of revolutions for each layer of winded materials, generally used for wire rods. For wire rods, set B0-30 to 1.

B0-31 **Material thickness reference source**

Address:	0xB01F		
Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Digital setting

1: AI1

2: AI2

3: AI3

Description

You can set B0-31 to select an input channel of material thickness.

0: Digital setting

The material thickness is affected by the DI functions 62 and 63 (material thickness selection terminal).

1 to 3: The initial roll diameter can be obtained through channels 1 to 3. When the preceding channels are used, the maximum material thickness (B0-36) must be set correctly based on the per-unit relationship.

B0-32 **Material thickness 0**

Address:	0xB020		
Min.:	0.01	Unit:	mm
Max.:	100	Data type:	UInt16
Default:	0.01	Change:	In real time

Value Range:

0.01 mm to 100.00 mm

Description

For details about the material thickness 0 to 3, see B0-31.

B0-33 **Material thickness 1**

Address:	0xB021		
Min.:	0.01	Unit:	mm
Max.:	100	Data type:	UInt16
Default:	0.01	Change:	In real time

Value Range:

0.01 mm to 100.00 mm

Description

For details about the material thickness 0 to 3, see B0-31.

B0-34 **Material thickness 2**

Address: 0xB022

Min.:	0.01	Unit:	mm
Max.:	100	Data type:	UInt16
Default:	0.01	Change:	In real time

Value Range:

0.01 mm to 100.00 mm

Description

For details about the material thickness 0 to 3, see B0-31.

B0-35 **Material thickness 3**

Address: 0xB023

Min.:	0.01	Unit:	mm
Max.:	100	Data type:	UInt16
Default:	0.01	Change:	In real time

Value Range:

0.01 mm to 100.00 mm

Description

For details about the material thickness 0 to 3, see B0-31.

B0-36 **Maximum thickness**

Address: 0xB024

Min.:	0.01	Unit:	mm
Max.:	100	Data type:	UInt16
Default:	1	Change:	In real time

Value Range:

0.01 mm to 100.00 mm

Description

For details about the material thickness, see B0-31.

B0-37 **Winding diameter not reset upon stop**

Address: 0xB025

Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Disabled

1: Enabled

Description

When this parameter is set to 1, the roll diameter is automatically reset to the initial roll diameter upon stop, which is similar to the function 54 of the DI.

B0-38 **Closed-loop tension torque mode selection**

Address: 0xB026

Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Torque calculated only through PID

1: Torque calculated through main + PID

Description

The main torque is the torque calculated when B0-00 is set to 1.

In pure PID mode, the set friction and inertia compensation are still valid, but the tension torque is invalid.

When the main + PID mode is used, accurately configure the tension corresponding to 100.0% of PID feedback value, and set parameter B1-02.

B0-40 **Minimum pre-drive torque limit**

Address: 0xB028

Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0% to 100.0%

Description

B0-23, B0-24, and B0-40 are used to set the time as a group. B0-23 and B0-24 correspond to the acceleration and deceleration time when the winding diameter is the minimum winding diameter. With the increase of winding diameter, the acceleration and deceleration time increase in proportion to avoid the impact caused by excessive acceleration and deceleration in large winding.

B0-41 **Constant linear speed source selection**

Address: 0xB029

Min.:	0	Unit:	-
Max.:	5	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: AI1
1: AI2
2: AI3
3: Pulse setting (DI5)
Communication setting (1000H)
5: Communication setting (731AH)

Description

0 to 2: AI channel
3: Pulse
4: Communication address (1000H); set by percentage
5: Communication address (731AH); set by digital with the range from 0 to B0-05

2.25 B1 Tension Settings

B1-00 **Tension reference source**

Address:	0xB100		
Min.:	0	Unit:	-
Max.:	5	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: B0-01 setting
1: AI1 setting
2: AI2 setting
AI3 setting
4: Pulse setting (DI5)
5: Communication setting (1000H)

Description

0: Set by B1-01
1–5: These channel inputs indicate the percentage of the target tension relative to the maximum tension, and the maximum tension (B1-02) must be set correctly according to the per unit relationship.

B1-01 **Tension digital setting**

Address:	0xB101		
Min.:	0	Unit:	N
Max.:	65000	Data type:	UInt16
Default:	50	Change:	In real time

Value Range:

0 N to 65000 N

Description

See channel 0 of B1-00.

B1-02 **Maximum tension**

Address:	0xB102		
Min.:	0	Unit:	N
Max.:	65000	Data type:	UInt16
Default:	500	Change:	In real time

Value Range:

0 N to 65000 N

Description

Used to set the maximum tension, corresponding to the tension value when 100.0% is input for channels 1 to 5 of B1-00. When the actual tension does not meet requirements, corrections can be performed by editing this parameter without changing AI, pulse input signals, or curves.

B1-03 **Zero-speed threshold**

Address:	0xB103		
Min.:	0	Unit:	%
Max.:	20	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0% to 20.0%

Description

If the running frequency is lower than the value of this parameter, startup friction tension compensation will be carried out according to B1-04. If the running frequency is higher than the value of this parameter, startup friction tension compensation will not be carried out.

B1-04 **Zero-speed tension rise**

Address:	0xB104		
Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0% to 100.0%

Description

This parameter corresponds to the percentage of tension reference and must be set properly according to the range of allowable material tension. Set this parameter to a possible minimal value on the premise of ensuring normal startup.

B1-05 **Frequency acceleration time in torque control mode**

Address: 0xB105

Min.:	0	Unit:	s
Max.:	6500	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s to 6500.0s

Description

Set B1-05 and B1-06 to change the slope of the frequency upper limit with time. In tension mode, the frequency upper limit affects the motor output. Generally, it does not need to be set. In special cases, B1-05 and B1-06 can be set according to output requirements.

B1-06 **Frequency deceleration time in torque control mode**

Address: 0xB106

Min.:	0	Unit:	s
Max.:	6500	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s to 6500.0s

Description

Set B1-05 and B1-06 to change the slope of the frequency upper limit with time. In tension mode, the frequency upper limit affects the motor output. Generally, it does not need to be set. In special cases, B1-05 and B1-06 can be set according to output requirements.

B1-07 **Friction force compensation**

Address: 0xB107

Min.:	0	Unit:	%
Max.:	50	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0% to 50.0%

Description

In tension control mode, the AC drive automatically sets the target torque according to the tension reference and roll diameter. The target torque is increased (winding)/decreased (unwinding) according to B1-07 to offset the effect of friction on material tension. This parameter corresponds to the percentage of rated torque of the AC drive.

B1-08 **Mechanical inertia compensation coefficient**

Address: 0xB108

Min.:	0	Unit:	N•m2
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 N m^2 to 65535 N m^2

Description

Set B1-08 based on the actual mechanical flywheel inertia. For general cylindrical mechanical reels, the theoretical value of mechanical flywheel inertia can be obtained according to the following formula: GD_m^2=πg/(8i^2) γb (D^4-D_0^4), where g is gravity acceleration 9.8 m/ M4, γ is mechanical material density, b is mechanical shaft length, D is mechanical shaft outer diameter, D0 is mechanical shaft inner diameter (0 for solid shaft), I is transmission ratio, and the unit refers to international system of units. The setting value can be adjusted according to the actual change of material tension during acceleration or deceleration.

B1-09 **Correction coefficient of acceleration inertia compensation**

Address: 0xB109

Min.:	0	Unit:	%
Max.:	200	Data type:	UInt16
Default:	100	Change:	In real time

Value Range:

0.0% to 200.0%

Description

An inevitable deviation exists between the theoretical inertia and the actual inertia, so the inertia compensation effect may not be ideal even after the inertia parameters are set. To address this, set B1-09 and B1-10 for fine tuning to optimize the control effect. Taking the winding acceleration as an example, if the material tension is small, B1-09 can be increased to strengthen the compensation effect, otherwise, the parameter can be reduced. It works the same for deceleration. This set of parameters facilitates commissioning.

B1-10 **Correction coefficient of deceleration inertia compensation**

Address: 0xB10A

Min.:	0	Unit:	%
Max.:	200	Data type:	UInt16
Default:	100	Change:	In real time

Value Range:

0.0% to +200.0%

Description

An inevitable deviation exists between the theoretical inertia and the actual inertia, so the inertia compensation effect may not be ideal even after the inertia parameters are set. To address this, set B1-09 and B1-10 for fine tuning to optimize the control effect. Take the winding acceleration as an example. If the material tension is small, B1-09 can be increased to strengthen the compensation effect, otherwise, the parameter can be reduced. It works the same for deceleration. This set of parameters facilitates commissioning.

B1-11 **Material density**

Address: 0xB10B

Min.:	0	Unit:	kg/m^3
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 kg/m^3 to 65535 kg/m^3

Description

Set this set of parameters with reference to the actual material properties, and set the exact mechanical transmission ratio (B0-03) at the same time. The AC drive automatically calculates the flywheel inertia according to the material density, material width, reel diameter, and material roll diameter.

B1-12 **Material width**

Address: 0xB10C

Min.:	0	Unit:	mm
Max.:	65535	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 mm to 65535 mm

Description

Set this set of parameters with reference to the actual material properties, and set the exact mechanical transmission ratio (B0-03) at the same time. The AC drive automatically calculates the flywheel inertia according to the material density, material width, reel diameter, and material roll diameter.

B1-13 **Inertia compensation exit delay**

Address: 0xB10D

Min.:	0	Unit:	ms
Max.:	1000	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 ms to 1000 ms

Description

Used to set the inertia compensation exit delay.

B1-14 **Transition frequency for zero speed compensation**

Address:	0xB10E		
Min.:	0	Unit:	Hz
Max.:	20	Data type:	UInt16
Default:	2	Change:	In real time

Value Range:

0.00 Hz to 20.00Hz

Description

This parameter supports smooth switchover of zero-speed tension rise at the threshold.

B1-15 **Open-loop torque reverse**

Address:	0xB10F		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0: Disabled

1: Enabled

Description

This parameter takes effect only when B0-00 is set to 1 or 3.

When friction compensation and inertia compensation are added, the calculated torque value is likely to be negative. You can set B1-15 to select the solution for reverse torque. Torque direction is controlled by default. You can set B1-15 to 1 to enable reverse torque.

B1-16 **Tension closed-loop torque control limit**

Address:	0xB110		
Min.:	0	Unit:	%
Max.:	200	Data type:	UInt16
Default:	100	Change:	In real time

Value Range:

0.0% to 200.0%

Description

Used to limit the ratio (in percentage) of the closed-loop torque control value to the open-loop control torque reference in the closed-loop torque control mode (B0-00 is set to 3).

B1-17 **Friction force compensation correction coefficient**

Address: 0xB111

Min.:	-50	Unit:	-
Max.:	50	Data type:	Int16
Default:	0	Change:	In real time

Value Range:

-50.0 to 50.0

Description

In most scenarios, friction may vary with running frequency. Using B1-07 may not achieve ideal friction compensation effect, so it can be used with this parameter. See B1-18 for details. This parameter corresponds to the percentage of rated torque of the AC drive.

B1-18 **Friction force compensation curve**

Address: 0xB112

Min.:	0	Unit:	-
Max.:	3	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Frequency

1: Linear speed

2: Multi-friction compensation curve 1

3: Multi-friction compensation curve 2

Description

Five friction compensation modes are available to meet the complex friction change rule.

0: Compensation is performed according to the running frequency. In some cases, the friction force will change with the running frequency of the system. When this mode is set, the friction force compensation value is determined by the following formula: Friction compensation torque = B1-07 x (1 + Linear speed conversion frequency/Maximum frequency x B1-17).

1: Compensation is performed according to the linear speed, which is similar to Mode 0. The compensation correction is based on the linear speed, and the value of friction compensation is determined by the following formula: Friction compensation torque = B1-07 x (1 + Linear speed/Maximum linear speed x B1-17).

2. Multi-friction force compensation curve 1. In some cases, the friction force does not change linearly with frequency. At this time, the frequency can be converted based on the linear speed in the multi-section curve to obtain dynamic friction force compensation. For details, see B1-19 to B1-24.

3. Multi-friction compensation curve 2. Compared with the compensation curve 1, the compensation curve 2 is more flexible, but more parameters need to be set. For details, see B1-19 to B1-30.

B1-19 **Multi-friction force compensation torque 1**

Address:	0xB113		
Min.:	0	Unit:	-
Max.:	50	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0–50.0

Description

Used for multi-section friction force compensation curves 1 and 2.

When B1-18 is set to 2, parameters B1-19 to B1-24 take effect. When B1-18 is set to 3, B1-19 to B1-30 take effect.

B1-20 **Multi-friction force compensation torque 2**

Address:	0xB114		
Min.:	0	Unit:	-
Max.:	50	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0–50.0

Description

Used for multi-section friction force compensation curves 1 and 2.

When B1-18 is set to 2, parameters B1-19 to B1-24 take effect. When B1-18 is set to 3, B1-19 to B1-30 take effect.

B1-21 **Multi-friction force compensation torque 3**

Address:	0xB115		
Min.:	0	Unit:	-
Max.:	50	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0–50.0

Description

Used for multi-section friction force compensation curves 1 and 2.

When B1-18 is set to 2, parameters B1-19 to B1-24 take effect. When B1-18 is set to 3, B1-19 to B1-30 take effect.

B1-22 **Multi-friction force compensation torque 4**

Address:	0xB116		
Min.:	0	Unit:	-
Max.:	50	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0–50.0

Description

Used for multi-section friction force compensation curves 1 and 2.

When B1-18 is set to 2, parameters B1-19 to B1-24 take effect. When B1-18 is set to 3, B1-19 to B1-30 take effect.

B1-23 Multi-friction force compensation torque 5

Address: 0xB117

Min.:	0	Unit:	-
Max.:	50	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0–50.0

Description

Used for multi-section friction force compensation curves 1 and 2.

When B1-18 is set to 2, parameters B1-19 to B1-24 take effect. When B1-18 is set to 3, B1-19 to B1-30 take effect.

B1-24 Multi-friction force compensation torque 6

Address: 0xB118

Min.:	0	Unit:	-
Max.:	50	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0–50.0

Description

Used for multi-section friction force compensation curves 1 and 2.

When B1-18 is set to 2, parameters B1-19 to B1-24 take effect. When B1-18 is set to 3, B1-19 to B1-30 take effect.

B1-25 Multi-friction force compensation inflection point 1

Address: 0xB119

Min.:	0	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00 Hz to value of F0-10

Description

Used for multi-section friction force compensation curves 1 and 2.

When B1-18 is set to 2, parameters B1-19 to B1-24 take effect. When B1-18 is set to 3, B1-19 to B1-30 take effect.

B1-26 **Multi-friction force compensation inflection point 2**

Address: 0xB11A

Min.:	0	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00 Hz to value of F0-10

Description

Used for multi-section friction force compensation curves 1 and 2.

When B1-18 is set to 2, parameters B1-19 to B1-24 take effect. When B1-18 is set to 3, B1-19 to B1-30 take effect.

B1-27 **Multi-friction force compensation inflection point 3**

Address: 0xB11B

Min.:	0	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00 Hz to value of F0-10

Description

Used for multi-section friction force compensation curves 1 and 2.

When B1-18 is set to 2, parameters B1-19 to B1-24 take effect. When B1-18 is set to 3, B1-19 to B1-30 take effect.

B1-28 **Multi-friction force compensation inflection point 4**

Address: 0xB11C

Min.:	0	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00 Hz to value of F0-10

Description

Used for multi-section friction force compensation curves 1 and 2.

When B1-18 is set to 2, parameters B1-19 to B1-24 take effect. When B1-18 is set to 3, B1-19 to B1-30 take effect.

B1-29 **Multi-friction force compensation inflection point 5**

Address: 0xB11D

Min.:	0	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00 Hz to value of F0-10

Description

Used for multi-section friction force compensation curves 1 and 2.

When B1-18 is set to 2, parameters B1-19 to B1-24 take effect. When B1-18 is set to 3, B1-19 to B1-30 take effect.

B1-30 Multi-friction force compensation inflection point 6

Address:	0xB11E		
Min.:	0	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00 Hz to value of F0-10

Description

Used for multi-section friction force compensation curves 1 and 2.

When B1-18 is set to 2, parameters B1-19 to b1-24 take effect. When B1-18 is set to 3, B1-19 to B1-30 take effect.

B1-31 Tension establishment

Address:	0xB11F		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Disabled

1: Enabled

Description

In closed-loop control mode, when B1-31 is set to 0, the pre-speed tensioning function is disabled. When B1-31 is set to 1, the pre-speed tensioning function is enabled.

B1-32 Tension establishment dead zone

Address:	0xB120		
Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	2	Change:	In real time

Value Range:

0.0% to 100.0%

Description

The PID operation stops when the pre-speed tensioning function is enabled and the PID feedback is lower than the value of B1-32.

B1-33 **Tension establishment frequency**

Address: 0xB121

Min.:	0	Unit:	Hz
Max.:	F0-10	Data type:	UInt16
Default:	0.1	Change:	In real time

Value Range:

0.00 Hz to value of F0-10

Description

Used to set the running frequency in scenarios where the tension setup at pre-speed function is enabled but the system is not in the tension setup dead zone.

B1-34 **Terminal torque boost proportion**

Address: 0xB122

Min.:	0	Unit:	%
Max.:	500	Data type:	UInt16
Default:	50	Change:	In real time

Value Range:

0.0% to 500.0%

Description

When the DI terminal (assigned with function 61) is activated, the tension torque is boosted by certain ratio. After the DI terminal is deactivated, the boost part is canceled gradually.

B1-35 **Terminal torque boost cancel time**

Address: 0xB123

Min.:	0	Unit:	s
Max.:	50	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.0s to 50.0s

Description

When the DI terminal (assigned with function 61) is activated, the tension torque is boosted by certain ratio. After the DI terminal is deactivated, the boost part is canceled gradually.

B1-37 **Initial roll diameter auto-tuning selection**

Address: 0xB125

Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: Disabled
1: Enabled
Description
When the tension setup at pre-speed function is enabled, you can also enable the initial roll diameter auto-tuning function for the AC drive to automatically tune the initial roll diameter. This function is applicable to rod control only. This function is enabled when B1-37 is set to 1, and disabled when B1-37 is set to 0.

B1-38 **Rod length**

Address:	0xB126		
Min.:	1	Unit:	mm
Max.:	65535	Data type:	UInt16
Default:	300	Change:	At stop

Value Range:
1mm to 65535mm
Description
Rod length after the initial roll diameter is auto-tuned.

B1-39 **Rod angle**

Address:	0xB127		
Min.:	0.1	Unit:	°
Max.:	360	Data type:	UInt16
Default:	40	Change:	At stop

Value Range:
0.1° to 360.0°
Description
Rod angle after the initial roll diameter is auto-tuned.

2.26 B2 Taper

B2-00 **Taper curve**

Address:	0xB200		
Min.:	0	Unit:	-
Max.:	1	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:
0: Curve taper
1: Multi-liner taper
Description
Used to select the taper curve generation mode.

0: The taper curve is generated based on the taper setting and the correction coefficient of taper compensation (B2-03). For details, see B2-03.
1: For details of the multi-linear taper, see descriptions of B2-08 to B2-19.

B2-01 Tension taper source selection

Address:	0xB201		
Min.:	0	Unit:	-
Max.:	4	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:
0: B2-02 setting
1: AI1 setting
2: AI2 setting
3: AI3 setting
4: Communication setting (1000H)
Description
0: Set by B2-02
1–3: Set by analog channels 1 to 3
4: Communication setting (1000H)

B2-02 Digital setting of taper

Address:	0xB202		
Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:
0.0% to 100.0%
Description
Used to set the taper through digital setting. For details, see value 0 of B2-01.

B2-03 Correction coefficient of taper compensation

Address:	0xB203		
Min.:	0	Unit:	mm
Max.:	10000	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:
0mm to 10000mm
Description

Used to set the correction coefficient of taper compensation. This parameter and the taper setting can be used to set the curve taper. The taper value can be determined by using the following formula (multiple modes are available and the following gives a typical example): F=F_0*{1-K*[1-(D_0+D_1)/(D+D_1)]}.
Where, F is the tension after taper is set; F_0 is the tension before taper is set, determined by B1-00; K is the taper value, determined by B2-01; D_0 is the reel diameter set by B0-09; D is the current roll diameter set by B0-14; D1 is the correction coefficient of taper compensation.

B2-05 **Setting channel of external taper AO**

Address:	0xB205		
Min.:	0	Unit:	-
Max.:	4	Data type:	UInt16
Default:	0	Change:	At stop

Value Range:

0: B2-06 setting
1: AI1 setting
2: AI2 setting
AI3 setting
4: Communication setting (1000H)

Description

In some scenarios, material tension is determined by external actuators. The external taper output function can be use to control the external actuators to achieve proper tension taper. The maximum external taper value determines the maximum taper output value when the external taper output (DO function 19) is selected for FMP or AO (F5-06 to F5-08), that is, the corresponding output value when the roll is empty. Its value setting channel is determined by this parameter.
0: Set by b2-06
1–3: Set by analog channels 1 to 3
4: Communication setting (1000H)

B2-06 **External taper setting**

Address:	0xB206		
Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	100	Change:	In real time

Value Range:

0.0% to 100.0%

Description

Used to set the maximum external taper (digital setting). For details, see value 0 of B2-05.

B2-08 **Minimum winding diameter taper**

Address: 0xB208

Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	100	Change:	In real time

Value Range:

0.0% to 100.0%

Description

Taper corresponding to the minimum winding diameter

B2-09 **Linear taper switchover point 1**

Address: 0xB209

Min.:	B0-09	Unit:	mm
Max.:	B0-08	Data type:	UInt16
Default:	150	Change:	In real time

Value Range:

B0-09 to B0-08

Description

Winding diameter 1 set by multi-point linear taper curve

B2-10 **Taper of switchover point 1**

Address: 0xB20A

Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	100	Change:	In real time

Value Range:

0.0% to 100.0%

Description

Taper 1 set by multi-point linear taper curve

B2-11 **Linear taper switchover point 2**

Address: 0xB20B

Min.:	B2-09	Unit:	mm
Max.:	B0-08	Data type:	UInt16
Default:	200	Change:	In real time

Value Range:

B2-09 to B0-08

Description

Winding diameter 2 set by multi-point linear taper curve

B2-12 **Taper of switchover point 2**

Address: 0xB20C

Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	90	Change:	In real time

Value Range:

0.0% to 100.0%

Description

Taper 2 set by multi-point linear taper curve

B2-13 Linear taper switchover point 3

Address: 0xB20D

Min.:	B2-11	Unit:	mm
Max.:	B0-08	Data type:	UInt16
Default:	250	Change:	In real time

Value Range:

B2-11 to B0-08

Description

Winding diameter 3 set by multi-point linear taper curve

B2-14 Taper of switchover point 3

Address: 0xB20E

Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	80	Change:	In real time

Value Range:

0.0% to 100.0%

Description

Taper 3 set by multi-point linear taper curve

B2-15 Linear taper switchover point 4

Address: 0xB20F

Min.:	B2-13	Unit:	mm
Max.:	B0-08	Data type:	UInt16
Default:	300	Change:	In real time

Value Range:

B2-13 to B0-08

Description

Winding diameter 4 set by multi-point linear taper curve

B2-16 Taper of switchover point 4

Address: 0xB210

Min.:	0	Unit:	%

Max.:	100	Data type:	UInt16
Default:	70	Change:	In real time

Value Range:

0.0% to 100.0%

Description

Taper 4 set by multi-point linear taper curve

B2-17 Linear taper switchover point 5

Address: 0xB211

Min.:	B2-15	Unit:	mm
Max.:	B0-08	Data type:	UInt16
Default:	400	Change:	In real time

Value Range:

B2-15 to B0-08

Description

Winding diameter 5 set by multi-point linear taper curve

B2-18 Taper of switchover point 5

Address: 0xB212

Min.:	0	Unit:	%
Max.:	100	Data type:	UInt16
Default:	50	Change:	In real time

Value Range:

0.0% to 100.0%

Description

Taper 5 set by multi-point linear taper curve

B2-19 Taper at maximum roll diameter

Address: 0xB213

Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	30	Change:	In real time

Value Range:

0.0–100.0

Description

Taper corresponding to the maximum roll diameter.

2.27 B6 Communication Free Mapping Configuration Parameters

B6-00 **Source address 1**

Address:	0xB600		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0xE012	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping source address 1.

B6-01 **Mapping address 1**

Address:	0xB601		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0x500E	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping target address 1.

B6-02 **Write gain 1**

Address:	0xB602		
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	10	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the write coefficient 1 for communication free mapping.

When this parameter is set to 10.00, the write coefficient will be magnified 10 times.

When this parameter is set to 0.10, the write coefficient will be reduced by 10%.

B6-03 **Read gain 1**

Address:	0xB603		
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0.1	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the read coefficient 1 for communication free mapping.

When this parameter is set to 10.00, the read coefficient will be magnified 10 times the original read coefficient.

When this parameter is set to 0.10, the read coefficient will be reduced to 10% of the original read coefficient.

B6-04 **Source address 2**

Address:	0xB604		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping source address 2.

B6-05 **Mapping address 2**

Address:	0xB605		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping target address 2.

B6-06 **Write gain 2**

Address:	0xB606		
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the write coefficient 2 for communication free mapping.

When this parameter is set to 10.00, the write coefficient will be magnified 10 times.

When this parameter is set to 0.10, the write coefficient will be reduced by 10%.

B6-07 **Read gain 2**

Address: 0xB607

Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the read coefficient 2 for communication free mapping.

When this parameter is set to 10.00, the read coefficient will be magnified 10 times.

When this parameter is set to 0.10, the read coefficient will be reduced by 10%.

B6-08 **Source address 3**

Address: 0xB608

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping source address 3.

B6-09 **Mapping address 3**

Address: 0xB609

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping target address 3.

B6-10 **Write gain 3**

Address: 0xB60A

Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the write coefficient 3 for communication free mapping.

When this parameter is set to 10.00, the write coefficient will be magnified 10 times.
When this parameter is set to 0.10, the write coefficient will be reduced by 10%.

B6-11 **Read gain 3**

Address: 0xB60B

Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the read coefficient 3 for communication free mapping.

When this parameter is set to 10.00, the read coefficient will be magnified 10 times.
When this parameter is set to 0.10, the read coefficient will be reduced by 10%.

B6-12 **Source address 4**

Address: 0xB60C

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping source address 4.

B6-13 **Mapping address 4**

Address: 0xB60D

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping target address 4.

B6-14 **Write gain 4**

Address: 0xB60E

Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16

Default: 0 Change: In real time

Value Range:

0.00–100.00

Description

Indicates the write coefficient 4 for communication free mapping.

When this parameter is set to 10.00, the write coefficient will be magnified 10 times.

When this parameter is set to 0.10, the write coefficient will be reduced by 10%.

B6-15 Read gain 4

Address:	0xB60F		
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the read coefficient 4 for communication free mapping.

When this parameter is set to 10.00, the read coefficient will be magnified 10 times.

When this parameter is set to 0.10, the read coefficient will be reduced by 10%.

B6-16 Source address 5

Address:	0xB610		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping source address 5.

B6-17 Mapping address 5

Address:	0xB611		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping target address 5.

B6-18 **Write gain 5**

Address:	0xB612		
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the write coefficient 5 for communication free mapping.

When this parameter is set to 10.00, the write coefficient will be magnified 10 times.

When this parameter is set to 0.10, the write coefficient will be reduced by 10%.

B6-19 **Read gain 5**

Address:	0xB613		
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the read coefficient 5 for communication free mapping.

When this parameter is set to 10.00, the read coefficient will be magnified 10 times.

When this parameter is set to 0.10, the read coefficient will be reduced by 10%.

B6-20 **Source address 6**

Address:	0xB614		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping source address 6.

B6-21 **Mapping address 6**

Address:	0xB615		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping target address 6.

B6-22 Write gain 6

Address: 0xB616

Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the write coefficient 6 for communication free mapping.

When this parameter is set to 10.00, the write coefficient will be magnified 10 times.

When this parameter is set to 0.10, the write coefficient will be reduced by 10%.

B6-23 Read gain 6

Address: 0xB617

Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the read coefficient 6 for communication free mapping.

When this parameter is set to 10.00, the read coefficient will be magnified 10 times.

When this parameter is set to 0.10, the read coefficient will be reduced by 10%.

B6-24 Source address 7

Address: 0xB618

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping source address 7.

B6-25 Mapping address 7

Address: 0xB619

Min.: 0 Unit: -
Max.: 0xFFFF Data type: UInt16
Default: 0 Change: In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping target address 7.

B6-26 Write gain 7

Address: 0xB61A
Min.: 0 Unit: -
Max.: 100 Data type: UInt16
Default: 0 Change: In real time

Value Range:

0.00–100.00

Description

Indicates the write coefficient 7 for communication free mapping.

When this parameter is set to 10.00, the write coefficient will be magnified 10 times.

When this parameter is set to 0.10, the write coefficient will be reduced by 10%.

B6-27 Read gain 7

Address: 0xB61B
Min.: 0 Unit: -
Max.: 100 Data type: UInt16
Default: 0 Change: In real time

Value Range:

0.00–100.00

Description

Indicates the read coefficient 7 for communication free mapping.

When this parameter is set to 10.00, the read coefficient will be magnified 10 times.

When this parameter is set to 0.10, the read coefficient will be reduced by 10%.

B6-28 Source address 8

Address: 0xB61C
Min.: 0 Unit: -
Max.: 0xFFFF Data type: UInt16
Default: 0 Change: In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping source address 8.

B6-29 **Mapping address 8**

Address:	0xB61D		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping target address 8.

B6-30 **Write gain 8**

Address:	0xB61E		
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the write coefficient 8 for communication free mapping.

When this parameter is set to 10.00, the write coefficient will be magnified 10 times.

When this parameter is set to 0.10, the write coefficient will be reduced by 10%.

B6-31 **Read gain 8**

Address:	0xB61F		
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the read coefficient 8 for communication free mapping.

When this parameter is set to 10.00, the read coefficient will be magnified 10 times.

When this parameter is set to 0.10, the read coefficient will be reduced by 10%.

B6-32 **Source address 9**

Address: 0xB620

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping source address 9.

B6-33 **Mapping address 9**

Address: 0xB621

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping target address 9.

B6-34 **Write gain 9**

Address: 0xB622

Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the write coefficient 9 for communication free mapping.

When this parameter is set to 10.00, the write coefficient will be magnified 10 times.

When this parameter is set to 0.10, the write coefficient will be reduced by 10%.

B6-35 **Read gain 9**

Address: 0xB623

Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the read coefficient 9 for communication free mapping.

When this parameter is set to 10.00, the read coefficient will be magnified 10 times.
When this parameter is set to 0.10, the read coefficient will be reduced by 10%.

B6-36 **Source address 10**

Address: 0xB624

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping source address 10.

B6-37 **Mapping address 10**

Address: 0xB625

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping target address 10.

B6-38 **Write gain 10**

Address: 0xB626

Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the write coefficient 10 for communication free mapping.

When this parameter is set to 10.00, the write coefficient will be magnified 10 times.
When this parameter is set to 0.10, the write coefficient will be reduced by 10%.

B6-39 **Read gain 10**

Address: 0xB627

Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16

Default: 0 | Change: In real time

Value Range:

0.00–100.00

Description

Indicates the read coefficient 10 for communication free mapping.

When this parameter is set to 10.00, the read coefficient will be magnified 10 times.

When this parameter is set to 0.10, the read coefficient will be reduced by 10%.

B6-40 Source address 11

Address: 0xB628

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping source address 11.

B6-41 Mapping address 11

Address: 0xB629

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping target address 11.

B6-42 Write gain 11

Address: 0xB62A

Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the write coefficient 11 for communication free mapping.

When this parameter is set to 10.00, the write coefficient will be magnified 10 times.

When this parameter is set to 0.10, the write coefficient will be reduced by 10%.

B6-43 **Read gain 11**

Address:	0xB62B		
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the read coefficient 11 for communication free mapping.

When this parameter is set to 10.00, the read coefficient will be magnified 10 times.

When this parameter is set to 0.10, the read coefficient will be reduced by 10%.

B6-44 **Source address 12**

Address:	0xB62C		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping source address 12.

B6-45 **Mapping address 12**

Address:	0xB62D		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping target address 12.

B6-46 **Write gain 12**

Address:	0xB62E		
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the write coefficient 12 for communication free mapping.

When this parameter is set to 10.00, the write coefficient will be magnified 10 times.
When this parameter is set to 0.10, the write coefficient will be reduced by 10%.

B6-47 **Read gain 12**

Address:	0xB62F		
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the read coefficient 12 for communication free mapping.

When this parameter is set to 10.00, the read coefficient will be magnified 10 times.
When this parameter is set to 0.10, the read coefficient will be reduced by 10%.

B6-48 **Source address 13**

Address:	0xB630		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping source address 13.

B6-49 **Mapping address 13**

Address:	0xB631		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping target address 13.

B6-50 **Write gain 13**

Address:	0xB632		
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16

Default: 0 | Change: In real time

Value Range:

0.00–100.00

Description

Indicates the write coefficient 13 for communication free mapping.

When this parameter is set to 10.00, the write coefficient will be magnified 10 times.

When this parameter is set to 0.10, the write coefficient will be reduced by 10%.

B6-51 Read gain 13

Address: 0xB633
Min.: 0 | Unit: -
Max.: 100 | Data type: UInt16
Default: 0 | Change: In real time

Value Range:

0.00–100.00

Description

Indicates the read coefficient 13 for communication free mapping.

When this parameter is set to 10.00, the read coefficient will be magnified 10 times.

When this parameter is set to 0.10, the read coefficient will be reduced by 10%.

B6-52 Source address 14

Address: 0xB634
Min.: 0 | Unit: -
Max.: 0xFFFF | Data type: UInt16
Default: 0 | Change: In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping source address 14.

B6-53 Mapping address 14

Address: 0xB635
Min.: 0 | Unit: -
Max.: 0xFFFF | Data type: UInt16
Default: 0 | Change: In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping target address 14.

B6-54 **Write gain 14**

Address: 0xB636

Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the write coefficient 14 for communication free mapping.

When this parameter is set to 10.00, the write coefficient will be magnified 10 times.

When this parameter is set to 0.10, the write coefficient will be reduced by 10%.

B6-55 **Read gain 14**

Address: 0xB637

Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the read coefficient 14 for communication free mapping.

When this parameter is set to 10.00, the read coefficient will be magnified 10 times.

When this parameter is set to 0.10, the read coefficient will be reduced by 10%.

B6-56 **Source address 15**

Address: 0xB638

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping source address 15.

B6-57 **Mapping address 15**

Address: 0xB639

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping target address 15.

B6-58 **Write gain 15**

Address: 0xB63A

Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the write coefficient 15 for communication free mapping.

When this parameter is set to 10.00, the write coefficient will be magnified 10 times.

When this parameter is set to 0.10, the write coefficient will be reduced by 10%.

B6-59 **Read gain 15**

Address: 0xB63B

Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the read coefficient 15 for communication free mapping.

When this parameter is set to 10.00, the read coefficient will be magnified 10 times.

When this parameter is set to 0.10, the read coefficient will be reduced by 10%.

B6-60 **Source address 16**

Address: 0xB63C

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping source address 16.

B6-61 **Mapping address 16**

Address: 0xB63D

Min.: 0 | Unit: -
Max.: 0xFFFF | Data type: UInt16
Default: 0 | Change: In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping target address 16.

B6-62 Write gain 16

Address: 0xB63E
Min.: 0 | Unit: -
Max.: 100 | Data type: UInt16
Default: 0 | Change: In real time

Value Range:

0.00–100.00

Description

Indicates the write coefficient 16 for communication free mapping.

When this parameter is set to 10.00, the write coefficient will be magnified 10 times.

When this parameter is set to 0.10, the write coefficient will be reduced by 10%.

B6-63 Read gain 16

Address: 0xB63F
Min.: 0 | Unit: -
Max.: 100 | Data type: UInt16
Default: 0 | Change: In real time

Value Range:

0.00–100.00

Description

Indicates the read coefficient 16 for communication free mapping.

When this parameter is set to 10.00, the read coefficient will be magnified 10 times.

When this parameter is set to 0.10, the read coefficient will be reduced by 10%.

B6-64 Source address 17

Address: 0xB640
Min.: 0 | Unit: -
Max.: 0xFFFF | Data type: UInt16
Default: 0 | Change: In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping source address 17.

B6-65 **Mapping address 17**

Address:	0xB641		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping target address 17.

B6-66 **Write gain 17**

Address:	0xB642		
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the write coefficient 17 for communication free mapping.

When this parameter is set to 10.00, the write coefficient will be magnified 10 times.

When this parameter is set to 0.10, the write coefficient will be reduced by 10%.

B6-67 **Read gain 17**

Address:	0xB643		
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the read coefficient 17 for communication free mapping.

When this parameter is set to 10.00, the read coefficient will be magnified 10 times.

When this parameter is set to 0.10, the read coefficient will be reduced by 10%.

B6-68 **Source address 18**

Address: 0xB644

Min.: 0 Unit: -
Max.: 0xFFFF Data type: UInt16
Default: 0 Change: In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping source address 18.

B6-69 **Mapping address 18**

Address: 0xB645
Min.: 0 Unit: -
Max.: 0xFFFF Data type: UInt16
Default: 0 Change: In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping target address 18.

B6-70 **Write gain 18**

Address: 0xB646
Min.: 0 Unit: -
Max.: 100 Data type: UInt16
Default: 0 Change: In real time

Value Range:

0.00–100.00

Description

Indicates the write coefficient 18 for communication free mapping.

When this parameter is set to 10.00, the write coefficient will be magnified 10 times.

When this parameter is set to 0.10, the write coefficient will be reduced by 10%.

B6-71 **Read gain 18**

Address: 0xB647
Min.: 0 Unit: -
Max.: 100 Data type: UInt16
Default: 0 Change: In real time

Value Range:

0.00–100.00

Description

Indicates the read coefficient 18 for communication free mapping.

When this parameter is set to 10.00, the read coefficient will be magnified 10 times.
When this parameter is set to 0.10, the read coefficient will be reduced by 10%.

B6-72 **Source address 19**

Address:	0xB648		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping source address 19.

B6-73 **Mapping address 19**

Address:	0xB649		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping target address 19.

B6-74 **Write gain 19**

Address:	0xB64A		
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the write coefficient 19 for communication free mapping.

When this parameter is set to 10.00, the write coefficient will be magnified 10 times.
When this parameter is set to 0.10, the write coefficient will be reduced by 10%.

B6-75 **Read gain 19**

Address:	0xB64B		
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16

Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the read coefficient 19 for communication free mapping.

When this parameter is set to 10.00, the read coefficient will be magnified 10 times.

When this parameter is set to 0.10, the read coefficient will be reduced by 10%.

B6-76 Source address 20

Address: 0xB64C

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping source address 20.

B6-77 Mapping address 20

Address: 0xB64D

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping target address 20.

B6-78 Write gain 20

Address: 0xB64E

Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the write coefficient 20 for communication free mapping.

When this parameter is set to 10.00, the write coefficient will be magnified 10 times.

When this parameter is set to 0.10, the write coefficient will be reduced by 10%.

B6-79 **Read gain 20**

Address: 0xB64F

Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the read coefficient 20 for communication free mapping.

When this parameter is set to 10.00, the read coefficient will be magnified 10 times.

When this parameter is set to 0.10, the read coefficient will be reduced by 10%.

B6-80 **Source address 21**

Address: 0xB650

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping source address 21.

B6-81 **Mapping address 21**

Address: 0xB651

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping target address 21.

B6-82 **Write gain 21**

Address: 0xB652

Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the write coefficient 21 for communication free mapping.

When this parameter is set to 10.00, the write coefficient will be magnified 10 times.
When this parameter is set to 0.10, the write coefficient will be reduced by 10%.

B6-83 **Read gain 21**

Address: 0xB653

Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the read coefficient 21 for communication free mapping.

When this parameter is set to 10.00, the read coefficient will be magnified 10 times.
When this parameter is set to 0.10, the read coefficient will be reduced by 10%.

B6-84 **Source address 22**

Address: 0xB654

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping source address 22.

B6-85 **Mapping address 22**

Address: 0xB655

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping target address 22.

B6-86 **Write gain 22**

Address: 0xB656

Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16

Default: 0 Change: In real time

Value Range:

0.00–100.00

Description

Indicates the write coefficient 22 for communication free mapping.

When this parameter is set to 10.00, the write coefficient will be magnified 10 times.

When this parameter is set to 0.10, the write coefficient will be reduced by 10%.

B6-87 Read gain 22

Address: 0xB657

Min.: 0 Unit: -

Max.: 100 Data type: UInt16

Default: 0 Change: In real time

Value Range:

0.00–100.00

Description

Indicates the read coefficient 22 for communication free mapping.

When this parameter is set to 10.00, the read coefficient will be magnified 10 times.

When this parameter is set to 0.10, the read coefficient will be reduced by 10%.

B6-88 Source address 23

Address: 0xB658

Min.: 0 Unit: -

Max.: 0xFFFF Data type: UInt16

Default: 0 Change: In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping source address 23.

B6-89 Mapping address 23

Address: 0xB659

Min.: 0 Unit: -

Max.: 0xFFFF Data type: UInt16

Default: 0 Change: In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping target address 23.

B6-90 **Write gain 23**

Address: 0xB65A

Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the write coefficient 23 for communication free mapping.

When this parameter is set to 10.00, the write coefficient will be magnified 10 times.

When this parameter is set to 0.10, the write coefficient will be reduced by 10%.

B6-91 **Read gain 23**

Address: 0xB65B

Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the read coefficient 23 for communication free mapping.

When this parameter is set to 10.00, the read coefficient will be magnified 10 times.

When this parameter is set to 0.10, the read coefficient will be reduced by 10%.

B6-92 **Source address 24**

Address: 0xB65C

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping source address 24.

B6-93 **Mapping address 24**

Address: 0xB65D

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping target address 24.

B6-94 **Write gain 24**

Address:	0xB65E		
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the write coefficient 24 for communication free mapping.

When this parameter is set to 10.00, the write coefficient will be magnified 10 times.

When this parameter is set to 0.10, the write coefficient will be reduced by 10%.

B6-95 **Read gain 24**

Address:	0xB65F		
Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the read coefficient 24 for communication free mapping.

When this parameter is set to 10.00, the read coefficient will be magnified 10 times.

When this parameter is set to 0.10, the read coefficient will be reduced by 10%.

B6-96 **Source address 25**

Address:	0xB660		
Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping source address 25.

B6-97 **Mapping address 25**

Address: 0xB661

Min.:	0	Unit:	-
Max.:	0xFFFF	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0 to value of 0xFFFF

Description

Indicates the communication free mapping target address 25.

B6-98 **Write gain 25**

Address: 0xB662

Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the write coefficient 25 for communication free mapping.

When this parameter is set to 10.00, the write coefficient will be magnified 10 times.

When this parameter is set to 0.10, the write coefficient will be reduced by 10%.

B6-99 **Read gain 25**

Address: 0xB663

Min.:	0	Unit:	-
Max.:	100	Data type:	UInt16
Default:	0	Change:	In real time

Value Range:

0.00–100.00

Description

Indicates the read coefficient 25 for communication free mapping.

When this parameter is set to 10.00, the read coefficient will be magnified 10 times.

When this parameter is set to 0.10, the read coefficient will be reduced by 10%.

2.28 U0 Basic Monitoring Parameters

U0-00 **Running frequency**

Address: 0x7000

Min.:	-	Unit:	Hz
Max.:	-	Data type:	UInt16

Default:	-	Change:	Unchangeable

Value Range:

-

Description

This parameter shows the running frequency (Hz) of the AC drive.

U0-01 **Frequency reference**

Address:	0x7001		
Min.:	-	Unit:	Hz
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

This parameter shows the frequency reference (Hz) of the AC drive.

U0-02 **Bus voltage**

Address:	0x7002		
Min.:	-	Unit:	V
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

This parameter defines the bus voltage (V) of the AC drive.

U0-03 **Output voltage**

Address:	0x7003		
Min.:	-	Unit:	V
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

This parameter shows the output voltage (V) of the AC drive.

U0-04 **Output current**

Address:	0x7004		
Min.:	-	Unit:	A
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

This parameter shows the output current (A) of the AC drive.

U0-05 Output power

Address: 0x7005

Min.:	-	Unit:	kW
Max.:	-	Data type:	Int16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

This parameter shows the output power (kW) of the AC drive.

U0-06 Output torque

Address: 0x7006

Min.:	-	Unit:	%
Max.:	-	Data type:	Int16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

This parameter shows the output torque (%) of the AC drive.

U0-07 DI state

Address: 0x7007

Min.:	-	Unit:	-
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-08 DO state

Address: 0x7008

Min.:	-	Unit:	-
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-09 **AI1 voltage**

Address: 0x7009

Min.:	-	Unit:	V
Max.:	-	Data type:	Int16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-10 **AI2 voltage**

Address: 0x700A

Min.:	-	Unit:	V
Max.:	-	Data type:	Int16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-11 **AI3 voltage**

Address: 0x700B

Min.:	-	Unit:	V
Max.:	-	Data type:	Int16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-12 **Count value**

Address: 0x700C

Min.:	-	Unit:	-
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-13 **Length value**

Address:	0x700D		
Min.:	-	Unit:	-
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-14 **Load speed display**

Address:	0x700E		
Min.:	-	Unit:	Hz
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-15 **PID reference**

Address:	0x700F		
Min.:	-	Unit:	%
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-16 **PID feedback**

Address:	0x7010		
Min.:	-	Unit:	%
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-17 **PLC stage**

Address: 0x7011

Min.:	-	Unit:	-
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-18 **Pulse input frequency**

Address: 0x7012

Min.:	-	Unit:	kHz
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-19 **Feedback speed**

Address: 0x7013

Min.:	-	Unit:	Hz
Max.:	-	Data type:	Int16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-20 **Remaining running time**

Address: 0x7014

Min.:	-	Unit:	min
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-21 **AI1 voltage before correction**

Address: 0x7015

Min.:	-	Unit:	V
Max.:	-	Data type:	Int16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-22 **AI2 voltage before correction**

Address: 0x7016

Min.:	-	Unit:	V
Max.:	-	Data type:	Int16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-23 **AI3 voltage before correction**

Address: 0x7017

Min.:	-	Unit:	V
Max.:	-	Data type:	Int16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-24 **Linear speed**

Address: 0x7018

Min.:	-	Unit:	m/min
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-25 **Current power-on time**

Address: 0x7019

Min.:	-	Unit:	min

Max.: - Data type: UInt16
Default: - Change: Unchangeable

Value Range:

-

Description

U0-26 **Current running time**

Address: 0x701A

Min.: - Unit: min
Max.: - Data type: UInt16
Default: - Change: Unchangeable

Value Range:

-

Description

U0-27 **Pulse input frequency**

Address: 0x701B

Min.: - Unit: Hz
Max.: - Data type: UInt16
Default: - Change: Unchangeable

Value Range:

-

Description

U0-28 **Reference value set through communication**

Address: 0x701C

Min.: - Unit: %
Max.: - Data type: Int16
Default: - Change: Unchangeable

Value Range:

-

Description

U0-29 **Encoder feedback speed**

Address: 0x701D

Min.: - Unit: Hz
Max.: - Data type: Int16

Default: - Change: Unchangeable

Value Range:

-

Description

U0-30 **Display of main frequency X**

Address: 0x701E

Min.: - Unit: Hz

Max.: - Data type: Int16

Default: - Change: Unchangeable

Value Range:

-

Description

U0-31 **Display of auxiliary frequency Y**

Address: 0x701F

Min.: - Unit: Hz

Max.: - Data type: Int16

Default: - Change: Unchangeable

Value Range:

-

Description

U0-32 **Check of any memory address**

Address: 0x7020

Min.: - Unit: -

Max.: - Data type: UInt16

Default: - Change: Unchangeable

Value Range:

-

Description

U0-33 **Synchronous motor rotor position**

Address: 0x7021

Min.: - Unit: °

Max.: - Data type: UInt16

Default: - Change: Unchangeable

Value Range:

-

Description

U0-34 Motor temperature

Address: 0x7022

Min.:	-	Unit:	°C
Max.:	-	Data type:	Int16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-35 Target torque

Address: 0x7023

Min.:	-	Unit:	%
Max.:	-	Data type:	Int16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-36 Resolver position

Address: 0x7024

Min.:	-	Unit:	-
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-37 Power factor angle

Address: 0x7025

Min.:	-	Unit:	°
Max.:	-	Data type:	Int16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-38 ABZ position

Address:	0x7026		
Min.:	-	Unit:	-
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-39 Target voltage upon V/f separation

Address:	0x7027		
Min.:	-	Unit:	V
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-40 Output voltage upon V/f separation

Address:	0x7028		
Min.:	-	Unit:	V
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-41 DI state display

Address:	0x7029		
Min.:	-	Unit:	-
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-42 **DO state display**

Address: 0x702A

Min.:	-	Unit:	-
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-43 **DI state display**

Address: 0x702B

Min.:	-	Unit:	-
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-44 **DO function state display**

Address: 0x702C

Min.:	-	Unit:	-
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-45 **Fault subcode**

Address: 0x702D

Min.:	-	Unit:	-
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-46 Inverter unit temperature

Address: 0x702E

Min.:	-	Unit:	°C
Max.:	-	Data type:	Int16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-47 PTC channel voltage before correction

Address: 0x702F

Min.:	-	Unit:	V
Max.:	-	Data type:	Int16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-48 PTC channel voltage after correction

Address: 0x7030

Min.:	-	Unit:	V
Max.:	-	Data type:	Int16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-49 Number of offset pulses of position lock

Address: 0x7031

Min.:	-	Unit:	-
Max.:	-	Data type:	Int16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-50 Roll diameter

Address: 0x7032

Min.:	-	Unit:	mm
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-51 Tension (after taper setting)

Address: 0x7033

Min.:	-	Unit:	N
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-58 Z signal counting

Address: 0x703A

Min.:	-	Unit:	-
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-59 Frequency reference (%)

Address: 0x703B

Min.:	-	Unit:	-
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-60 Running frequency (%)

Address: 0x703C

Min.:	-	Unit:	-

Max.: - Data type: UInt16
Default: - Change: Unchangeable

Value Range:

-

Description

U0-61 AC drive state

Address: 0x703D

Min.: - Unit: -
Max.: - Data type: UInt16
Default: - Change: Unchangeable

Value Range:

-

Description

U0-62 Current fault code

Address: 0x703E

Min.: - Unit: -
Max.: - Data type: UInt16
Default: - Change: Unchangeable

Value Range:

-

Description

U0-63 Running frequency (after droop)

Address: 0x703F

Min.: - Unit: Hz
Max.: - Data type: Int16
Default: - Change: Unchangeable

Value Range:

-

Description

U0-64 Back EMF

Address: 0x7040

Min.: - Unit: V
Max.: - Data type: UInt16
Default: - Change: Unchangeable

Value Range:

-

Description

U0-65 Stator resistance auto-tuning upon startup

Address: 0x7041

Min.:	-	Unit:	-
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-66 Communication expansion card model

Address: 0x7042

Min.:	-	Unit:	-
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-67 Communication expansion card version

Address: 0x7043

Min.:	-	Unit:	-
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-68 AC drive state

Address: 0x7044

Min.:	-	Unit:	-
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-69 Motor running frequency/0.01 Hz

Address: 0x7045

Min.:	-	Unit:	Hz
Max.:	-	Data type:	Int16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-70 Motor speed/RPM

Address: 0x7046

Min.:	-	Unit:	RPM
Max.:	-	Data type:	Int16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-71 Current display for communication card

Address: 0x7047

Min.:	-	Unit:	A
Max.:	-	Data type:	Int16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-72 Communication card error state

Address: 0x7048

Min.:	-	Unit:	-
Max.:	-	Data type:	Int16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-73 **Target torque before filter**

Address: 0x7049

Min.:	-	Unit:	%
Max.:	-	Data type:	Int16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-74 **Target torque after filter**

Address: 0x704A

Min.:	-	Unit:	%
Max.:	-	Data type:	Int16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-75 **Torque reference after acceleration/deceleration**

Address: 0x704B

Min.:	-	Unit:	%
Max.:	-	Data type:	Int16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-76 **Torque upper limit in the motoring state**

Address: 0x704C

Min.:	-	Unit:	%
Max.:	-	Data type:	Int16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U0-77 **Torque upper limit in the generating state**

Address: 0x704D

Min.: -
Max.: -
Default: -
Unit: %
Data type: Int16
Change: Unchangeable

Value Range:

-

Description

U0-80 **EtherCAT slave name**

Address: 0x7050
Min.: -
Max.: -
Default: -
Unit: -
Data type: UInt16
Change: Unchangeable

Value Range:

-

Description

U0-81 **EtherCAT slave alias**

Address: 0x7051
Min.: -
Max.: -
Default: -
Unit: -
Data type: UInt16
Change: Unchangeable

Value Range:

-

Description

U0-82 **EtherCAT ESM transmission fault code**

Address: 0x7052
Min.: -
Max.: -
Default: -
Unit: -
Data type: UInt16
Change: Unchangeable

Value Range:

-

Description

U0-83 **EtherCAT XML file version**

Address: 0x7053
Min.: -
Max.: -
Unit: -
Data type: UInt16

Default: - Change: Unchangeable

Value Range:

-

Description

U0-84 Times of EtherCAT synchronization loss

Address: 0x7054

Min.: - Unit: -

Max.: - Data type: UInt16

Default: - Change: Unchangeable

Value Range:

-

Description

U0-85 Maximum error value and invalid frames of EtherCAT port 0 per unit time

Address: 0x7055

Min.: - Unit: -

Max.: - Data type: UInt16

Default: - Change: Unchangeable

Value Range:

-

Description

U0-86 Maximum error value and invalid frames of EtherCAT port 1 per unit time

Address: 0x7056

Min.: - Unit: -

Max.: - Data type: UInt16

Default: - Change: Unchangeable

Value Range:

-

Description

U0-87 Maximum forwarding error of EtherCAT port per unit time

Address: 0x7057

Min.: 0 Unit: -

Max.: 0 Data type: UInt16

Default: 0 Change: Unchangeable

Value Range:
0 to 0
Description

U0-88 Maximum EtherCAT data frame processing unit error per unit time

Address:	0x7058		
Min.:	-	Unit:	-
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:
-
Description

U0-89 Maximum link loss of EtherCAT port per unit time

Address:	0x7059		
Min.:	-	Unit:	-
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:
-
Description

U0-96 No-load current of asynchronous motor vector online observation

Address:	0x7060		
Min.:	-	Unit:	A
Max.:	-	Data type:	Int16
Default:	-	Change:	Unchangeable

Value Range:
-
Description

U0-97 Mutual inductance of asynchronous motor vector online observation

Address:	0x7061		
Min.:	-	Unit:	mH
Max.:	-	Data type:	Int16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

2.29 U1 Tension Control Monitoring Parameters

U1-00 **Linear speed**

Address: 0x7100

Min.:	-	Unit:	m/min
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U1-01 **Current roll diameter**

Address: 0x7101

Min.:	-	Unit:	mm
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U1-02 **Linear speed synchronous frequency**

Address: 0x7102

Min.:	-	Unit:	Hz
Max.:	-	Data type:	Int16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U1-03 **PID output frequency**

Address: 0x7103

Min.:	-	Unit:	Hz
Max.:	-	Data type:	Int16

Default: - Change: Unchangeable

Value Range:

-

Description

U1-04 Current tension reference

Address: 0x7104

Min.: - Unit: N

Max.: - Data type: UInt16

Default: - Change: Unchangeable

Value Range:

-

Description

U1-05 Tension reference after taper setting

Address: 0x7105

Min.: - Unit: N

Max.: - Data type: UInt16

Default: - Change: Unchangeable

Value Range:

-

Description

U1-06 Torque reference in tension control

Address: 0x7106

Min.: - Unit: %

Max.: - Data type: Int16

Default: - Change: Unchangeable

Value Range:

-

Description

U1-07 PID output torque

Address: 0x7107

Min.: - Unit: %

Max.: - Data type: Int16

Default: - Change: Unchangeable

Value Range:

-

Description

U1-08 **Tension control mode**

Address:	0x7108		
Min.:	-	Unit:	-
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U1-09 **Tension PID setting**

Address:	0x7109		
Min.:	-	Unit:	%
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U1-10 **Tension PID feedback**

Address:	0x710A		
Min.:	-	Unit:	%
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U1-11 **Tension PID proportional gain**

Address:	0x710B		
Min.:	-	Unit:	-
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U1-12 Tension PID integral time Ti

Address: 0x710C

Min.:	-	Unit:	s
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U1-13 Tension PID differential time Td

Address: 0x710D

Min.:	-	Unit:	s
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U1-14 Tension time

Address: 0x710E

Min.:	-	Unit:	s
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

U1-15 Winding mode

Address: 0x710F

Min.:	-	Unit:	-
Max.:	-	Data type:	UInt16
Default:	-	Change:	Unchangeable

Value Range:

-

Description

3 Function Application

3.1 Drive Configuration

3.1.1 Command Sources

3.1.1.1 Setting Command Sources

Commands are used to control operations of the AC drive, such as start, stop, forward run, reverse run, and jogging. Command sources include the operating panel, terminals, and communication. You can select the command source through F0-02.

Para. No.	Function	Default	Value Range	Description
F0-02	Command source selection	0	0: Operating panel 1: Terminal 2: Communication	Defines the source of control commands, including start/stop, forward run, reverse run, and jog. 0: Operating panel Control commands are input using the RUN, STOP/RES, and MF.K keys on the operating panel. This mode is suitable for initial commissioning. 1: Terminal Control commands are input through DI terminals of the AC drive. This mode is suitable for most applications. 2: Communication Control commands are input through remote communication. The AC drive must be equipped with a communication card to communicate with the host controller. This mode is suitable for remote control and centralized control on multiple devices or systems.

3.1.1.2 Setting Commands Through the Operating Panel

Set F0-02 to 0 and use the RUN and STOP/RES keys on the operating panel to control the AC drive.

- Press RUN to start the AC drive (the RUN indicator is on).
- When the AC drive is running, press STOP/RES to stop the AC drive (the RUN indicator is off).

3.1.1.3 Setting Commands Through Communication

You can set F0-02 to 2 to select communication as the command source for controlling start/stop of the AC drive.

The AC drive can communicate with the host controller through six protocols: Modbus, PROFIBUS-DP, CANopen, CANlink, PROFINET, and EtherCAT. Only one communication protocol is supported at a time. To enable communication as the command source, you must install a communication card. The AC drive supports six optional communication cards. If Modbus, PROFIBUS-DP, CANopen, PROFINET, or EtherCAT is used, set F0-28 (communication protocol selection) to select an applicable serial communication protocol. The CANlink protocol is valid all the time.

When the AC drive is controlled through serial communication, the host controller must send a write command to the AC drive. The following description takes the Modbus protocol as an example to illustrate the process of giving commands through communication.

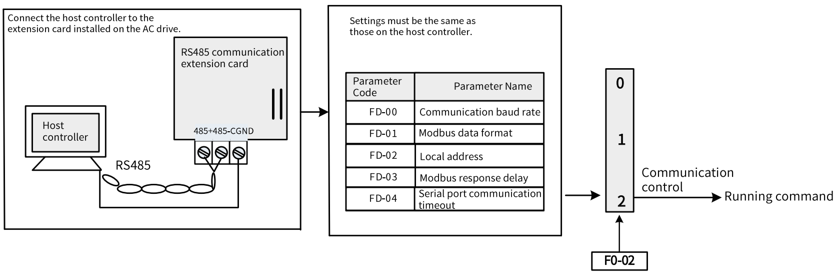


Figure 3-1 Setting commands through communication

To make the AC drive run in reverse direction, the host controller sends the write command 01 06 20 00 00 02 03 CB. The following table shows the meaning of each byte in the command. The command is in hexadecimal format. For other communication addresses and control commands, see "Appendix B: Communication Data Address Definition and Modbus Protocol".

Command	Meaning
01H (editable)	AC drive address
06H	Write command
2000H	Control command communication address
02H (reverse run)	Control command
03CBH	CRC check

The following table shows the relationship between master commands and slave responses:

Master Command		Slave Response	
ADDR	01H	ADDR	01H
CMD	06H	CMD	06H
Parameter address high-order bits	20H	Parameter address high-order bits	20H
Parameter address low-order bits	00H	Parameter address low bits	00H
Data content high-order bits	00H	Data content high bits	00H
Data content low-order bits	02H	Data content low bits	02H
CRC high-order bits	03H	CRC high-order bits	03H
CRC low-order bits	CBH	CRC low-order bits	CBH

3.1.1.4 Setting Commands Through Terminals

Set F0-02 to 1 to use terminals to start and stop the AC drive.

Set F4-11 to select a terminal control mode. The AC drive supports four terminal control modes: two-wire mode 1, two-wire mode 2, three-wire mode 1, and three-wire mode 2.

Para.	Function	Default	Value Range	Description
F4-11	Terminal control mode	0	0: Two-wire mode 1 1: Two-wire mode 2 2: Three-wire mode 1 3: Three-wire mode 2	Four modes to control the AC drive operation by using external terminals

You can use any one of multi-functional input terminals DI1 to DI10 as external input terminals. That is, set parameters F4-00 to F4-09 to select functions for input terminals DI1 to DI10. For details about function definitions, see "F4-00 (DI1) to F4-09 (DI10) Terminal Function" in *"1.1 List of Function Parameters" on page 7*.

Two-wire mode 1

Set F4-11 to 0. This is the most commonly used two-wire mode.

For example, DI1 is assigned with the forward run function, and DI2 is assigned with the reverse run function. Connect the forward run switch to DI1 and the reverse run switch to DI2.

Para.	Name	Value	Description
F4-11	Terminal control mode	0	Two-wire mode 1
F4-00	DI1 function selection	1	Forward run (FWD)
F4-01	DI2 function selection	2	Reverse run (REV)

In this mode, When SW1 is closed and SW2 is open, the motor runs in the forward direction. When SW1 is open and SW2 is closed, the motor runs in the reverse direction. When SW1 and SW2 are both open or closed, the motor stops, as shown in the following figure.

SW1	SW2	Command
1	0	Forward
0	1	Reverse
1	1	Stop
0	0	Stop

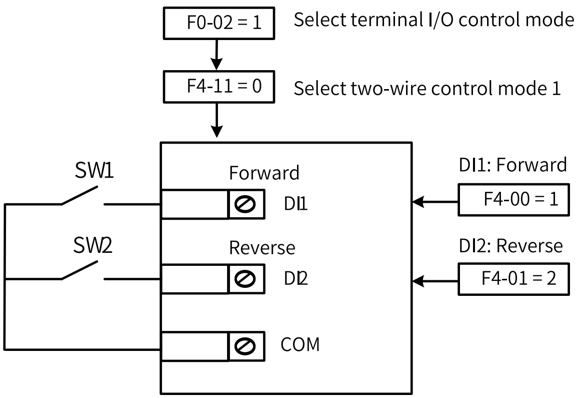


Figure 3-2 Wiring and parameter settings for two-wire mode 1

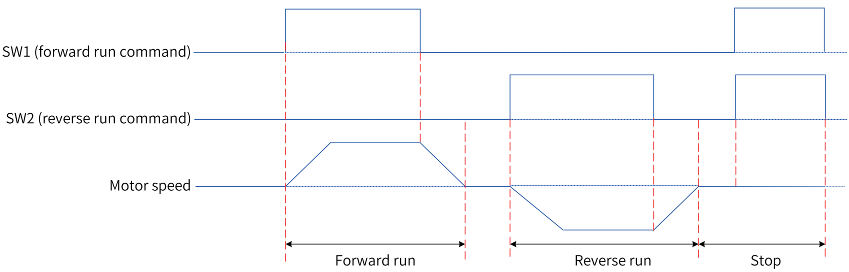


Figure 3-3 Timing diagram of two-wire mode 1 (normal condition)

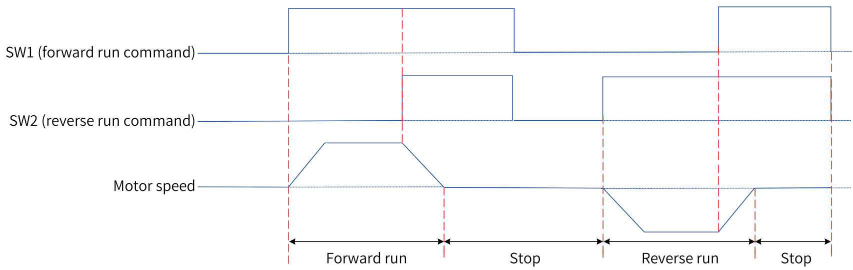


Figure 3-4 Timing diagram of two-wire mode 1 (abnormal condition)

Two-wire mode 2

For example, DI1 is assigned with the command function, and DI2 is assigned with the forward/reverse run switchover function. Use and set the parameters according to the following table.

Para.	Name	Value	Description
F4-11	Terminal control mode	1	Two-wire mode 2
F4-00	DI1 function selection	1	Command
F4-01	DI2 function selection	2	Forward/Reverse run

In this mode, when SW1 is closed, the motor runs. When SW2 is open, the motor runs in the forward direction. When SW2 is closed, the motor runs in the reverse direction. When SW1 is open, the motor stops no matter whether SW2 is open. as shown in the following figure.

SW1	SW2	Command
1	0	Forward
1	1	Reverse
0	0	Stop
0	1	Stop

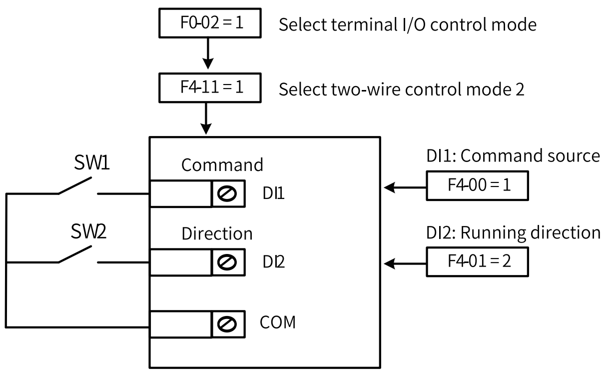


Figure 3-5 Wiring and parameter settings for two-wire mode 2

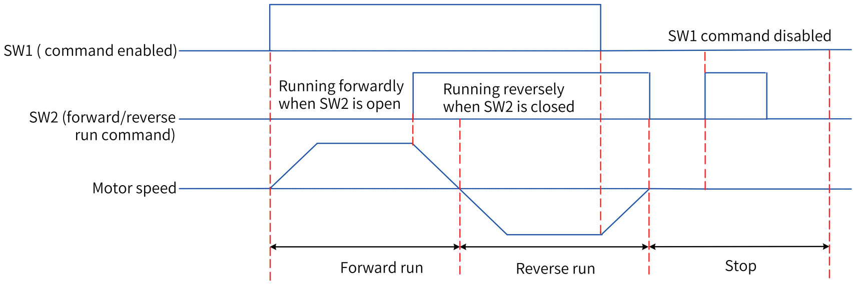


Figure 3-6 Timing diagram of two-wire mode 2

Three-Wire Mode 1

For example, DI3 is assigned with the three-wire operation control function, DI1 is assigned with the forward run function, and DI2 is assigned with the reverse run function. In this control mode, start and stop of the AC drive must be controlled by using keys on the AC drive. Connect the start/stop key to DI3, the forward run key to DI1, and the reverse run key to DI2. The parameters are set as below.

Para.	Name	Value	Description
F4-11	Terminal control mode	2	Three-wire mode 1
F4-00	DI1 function selection	1	Forward run (FWD)
F4-01	DI2 function selection	2	Reverse run (REV)
F4-02	DI3 function selection	3	Three-wire operation control

SW3 is a normally-closed key and SW1 and SW2 are normally-open keys. When SW3 is closed, the motor rotates in the forward direction if SW1 is pressed, and in the reverse direction if SW2 is pressed. The motor stops immediately after SW3 is open. SW3 must remain closed when the AC drive starts or is running. Commands from SW1 or SW2 take effect immediately after SW1 or SW2 is closed.

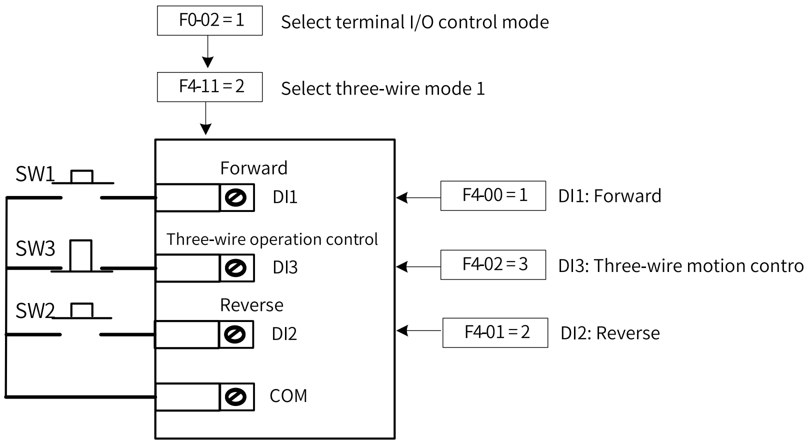


Figure 3-7 Wiring and parameter settings for three-wire mode 1

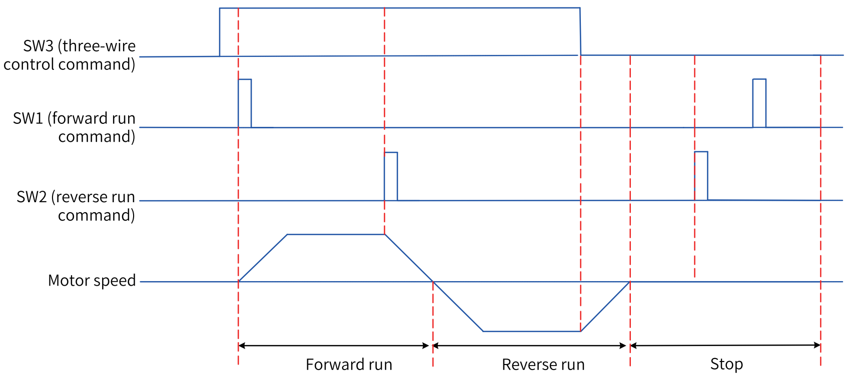


Figure 3-8 Timing diagram of three-wire mode 1

Three-Wire Mode 2

For example, DI3 is assigned with the three-wire operation control function, DI1 is assigned with the command function, and DI2 is assigned with the forward/reverse run switchover function. Connect the start/stop key to DI3, the run key to DI1, and the forward/reverse run key to DI2. The parameters are set as below:

Para.	Name	Value	Description
F4-11	Terminal control mode	3	Three-wire mode 2
F4-00	DI1 function selection	1	Command

Para.	Name	Value	Description
F4-01	DI2 function selection	2	Forward/Reverse run
F4-02	DI3 function selection	3	Three-wire operation control

When SW3 is closed and SW1 is pressed, the AC drive runs. If SW2 is open, the AC drive runs in the forward direction. If SW2 is closed, the AC drive runs in the reverse direction. The motor stops immediately after SW3 is open. SW3 must remain closed when the AC drive starts or is running. Commands from SW1 take effect immediately after SW1 is closed.

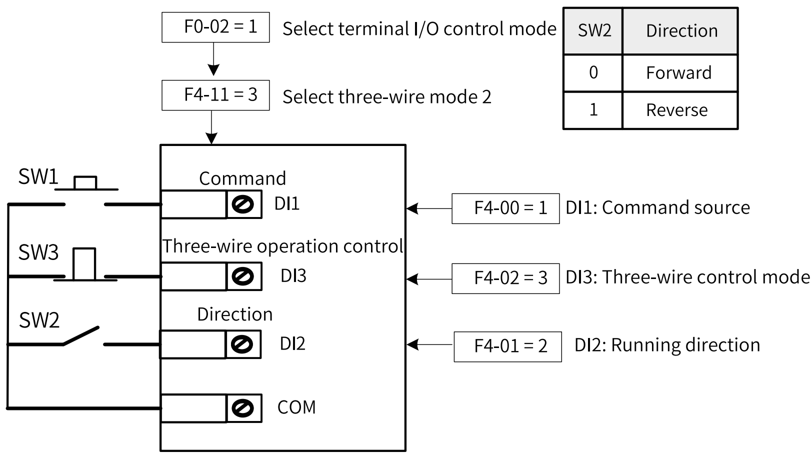


Figure 3-9 Wiring and parameter settings for three-wire mode 2

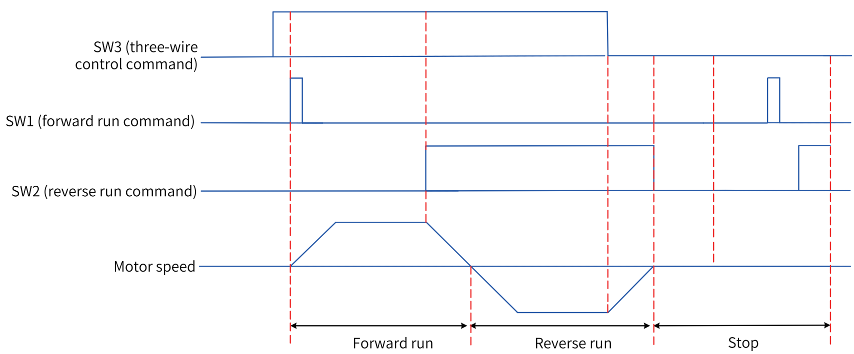


Figure 3-10 Timing diagram of three-wire mode 2

3.1.2 Frequency Sources

3.1.2.1 Frequency Reference Input Mode

The AC drive supports three frequency reference input modes: main frequency reference, auxiliary frequency reference, and superposition of main and auxiliary frequencies.

3.1.2.2 Selecting a Main Frequency Source

The AC drive supports ten sources of main frequency reference: digital setting (non-retentive at power failure), digital setting (retentive at power failure), AI1, AI2, AI3, pulse input, multi-reference, simple PLC, PID, and communication. You can set F0-03 to a value from 0 to 9 to select a source.

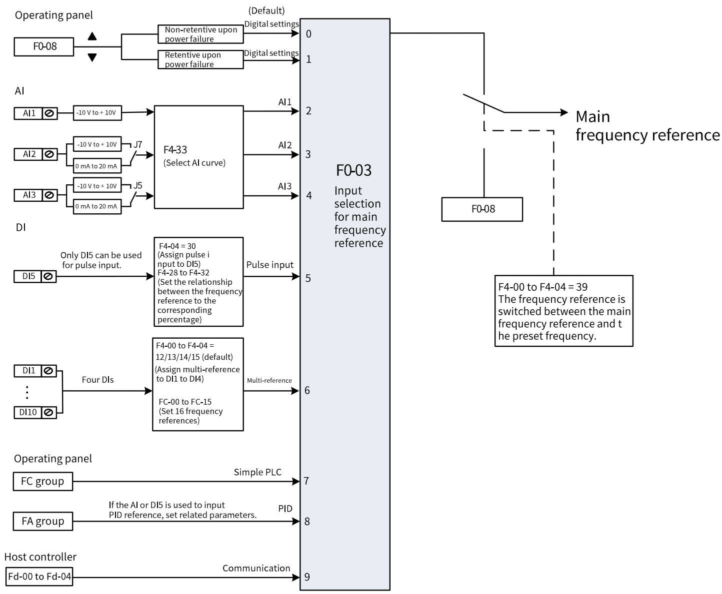


Figure 3-11 Selecting a main frequency source

Para.	Parameter Name	Value Range	Default
F0-03	Main frequency source X selection	0: Digital setting (preset frequency (F0-08) that can be changed by pressing UP/DOWN; non-retentive upon power failure) 1: Digital setting (preset frequency (F0-08) that can be changed by pressing UP/DOWN; retentive at power failure) 2: AI1 3: AI2 4: AI3 5: Pulse reference (DI5) 6: Multi-reference 7: Simple PLC 8: PID 9: Communication 10: Reserved	0

3.1.2.3 Setting the Main Frequency Through the Operating Panel

The main frequency can be set through the operating panel in two modes:

- F0-23 = 0 (non-retentive at power failure): When the AC drive is powered on again after stop or power failure, the frequency value reverts to the preset value (F0-08).

  F0-08 (preset frequency) can be changed by pressing the  or  key on the operating panel or by using the UP/DOWN terminals. However, in this mode, changes made to the frequency value will be cleared after the AC drive stops.
- F0-23 = 1 (retentive at power failure): When the AC drive is powered on again after power failure, the frequency reverts to the value set before power failure. F0-08

  (preset frequency) can be changed by pressing the  or  key on the operating panel or by using the UP/DOWN terminals. In this mode, changes made to the frequency value will be retained after the AC drive stops.
  For example, assume that F0-08 is set to 40 Hz and then increased to 45 Hz by

  using the  key on the operating panel. If F0-23 is set to 0 (non-retentive), the target frequency reverts to 40 Hz (value of F0-08) after the AC drive stops. If F0-23 is set to 1 (retentive), the target frequency is still 45 Hz after the AC drive stops.

Note

Distinguish this parameter from F0-23 (Retentive memory of digital setting frequency upon stop). F0-23 determines whether the frequency setting is retained or cleared after the AC drive stops. F0-23 is related only to the stop state of the AC drive, rather than power failure.

Related parameters:

Para. No.	Function	Default	Value Range
F0-08	Preset frequency	50.00 Hz	0.00 Hz to max. frequency (F0-10)
F0-10	Max. frequency	50.00 Hz	50.00 Hz to 600.00 Hz

Para. No.	Function	Default	Value Range
F0-23	Retentive memory of digital setting frequency upon stop	0	0: Non-retentive 1: Retentive

3.1.2.4 Setting the Main Frequency Through AIs

The main frequency can be set by using three analog input (AI) terminals: AI1, AI2, and AI3. If F0-03 is set to 2, AI1 is used to set the main frequency. If F0-03 is set to 3, AI2 is used to set the main frequency. If F0-03 is set to 4, AI3 is used to set the main frequency.

As a frequency source, each AI terminal supports five types of AI curves. The AI curve is used to define the relationship between the analog input voltage (or current) and the corresponding settings.

Procedure	Para.	Description
(Step 1) Set AI curves. Set the relationship between voltage/current input over the AI and the preset values.	F4-13 to F4-16	Curve 1 settings
	F4-18 to F4-21	Curve 2 settings
	F4-23 to F4-27	Curve 3 settings
	A6-00 to A6-07	Curve 4 settings
	A6-08 to A6-15	Curve 5 settings
	F4-34	Setting for the AI lower than the minimum input (When an AI is used as the main frequency source, 100.0% of the voltage/current input corresponds to the maximum frequency F0-10.)
(Step 2) Select AI curves for the AIs. Select AI curves and set the filter time.	F4-33	AI curve selection. You can select any AI curve for an AI. Generally, use the default value (F4-33 is set to 321), indicating curve 1 for AI1, curve 2 for AI2, and curve 3 for AI3.
	F4-17, F4-22, F4-27	Filter time of AI1 to AI3
(Step 3) Select an AI as the frequency source. Select an AI as the source of the frequency reference based on terminal characteristics.	F0-03 (main frequency source selection)	Set F0-03 to 2. AI1 is used as the source.
		Set F0-03 to 3. AI2 is used as the source. In this case, voltage input or current input can be selected by using the jumper cap J7 on the control board.
		Set F0-03 to 4. AI3 is used as the source. In this case, voltage input or current input can be selected by using the jumper cap J5 on the control board.

Setting AI Curves

Five types of AI curves are available, among which curve 1, curve 2, and curve 3 are two-point curves that are set through parameters F4-13 to F4-27. Curve 4 and curve 5 are four-point curves that are set through parameters of group A6.

In the following example, AI curve 1 is selected and set through F4-13 to F4-16.

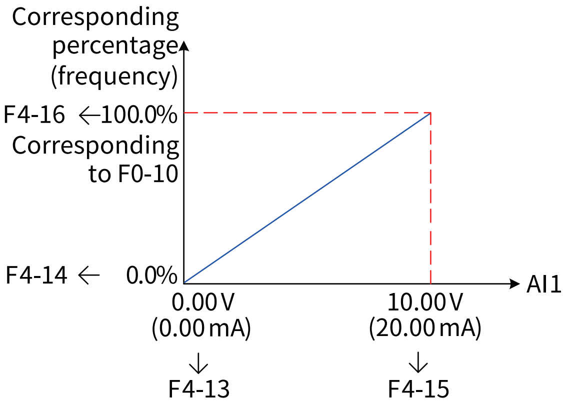


Figure 3-12 Settings of AI curve 1

When an AI is used as the main frequency source, the voltage/current input value of 100% indicates the percentage of the maximum frequency (F0-10). When analog input current is used as frequency reference, 1 mA current corresponds to 0.5 V voltage, and 0 mA to 20 mA current corresponds to 0 V to 10 V.

Curve 2 and curve 3 are set in the same way as curve 1. Parameters F4-18 to F4-21 are used to set curve 2, and parameters F4-23 to F4-26 are used to set curve 3.

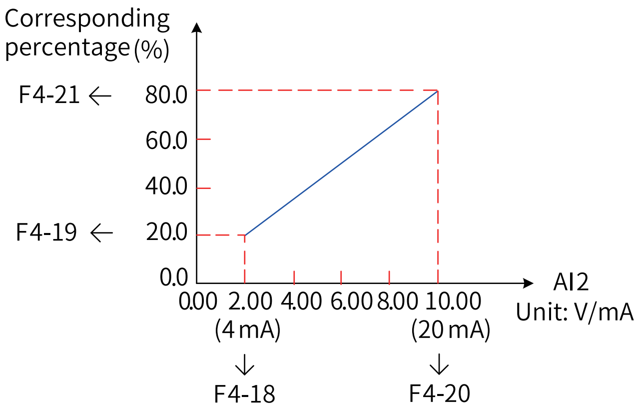


Figure 3-13 Settings of AI curve 2

Curve 4 and curve 5 provide functions similar to those of curves 1 to 3, except that curves 1 to 3 are straight lines, whereas curve 4 and curve 5 are four-point curves allowing more flexible relationship. The x axis of AI curves 4 and 5 represents the analog input voltage (or current), and the y axis represents the set value corresponding to the analog input, that is, the percentage of the maximum frequency (F0-10). Curve 4 or 5 includes four points: the minimum input point, inflexion point 1, inflexion point 2, and the maximum input point. A6-00 corresponds to the x axis of the minimum input, that is, the minimum analog input voltage or current.

When setting curve 4 and curve 5, ensure that the minimum input voltage, inflexion point 1 voltage, inflexion point 2 voltage, and maximum input voltage are set in ascending order. Parameters A6-00 to A6-07 are used to set curve 4, and parameters A6-08 to A6-15 are used to set curve 5.

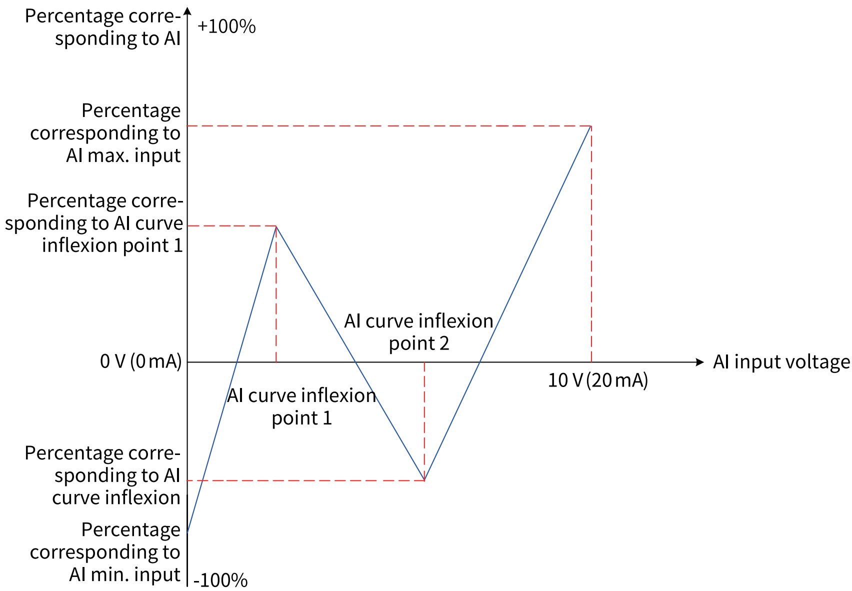


Figure 3-14 Settings of curve 4 and curve 5

Selecting AI curves for AI terminals

The curves of AI1 and AI2 are determined by the ones and tens positions of F4-33 respectively. The two Ais can use any of the five curves.

A longer AI filter time enhances the anti-interference capability but slows down response to frequency adjustment. A shorter filter time enables faster response to frequency adjustment but weakens the anti-interference capability. When analog input is subject to interference, increase the filter time to stabilize the analog value detected. However, a long filter time slows down the response to analog input detection. Therefore, set the filter time appropriately based on the actual application environment.

Setting an AI as the main frequency source

The control board provides three AI terminals: AI1 to AI3. AI1 provides voltage input of –10 V to +10 V. AI2 and AI3 provide voltage input of –10 V to +10 V or current input of 0 mA to 20 mA. Jumpers J7 and J5 on the control board can be used to switch between voltage input and current input for AI2 and AI3, respectively. For details, see chapter 3 Installation and Wiring. The following describes how to set each AI as the main frequency source.

For example, assume that curve 1 is selected for AI1 (the ones position of F4-33 is set to 1), AI1 voltage input is selected as the main frequency source, and the input voltage range of 2 V to 10 V must correspond to frequency range of 10 Hz to 40 Hz. In this case, set the parameters according to the following figure.

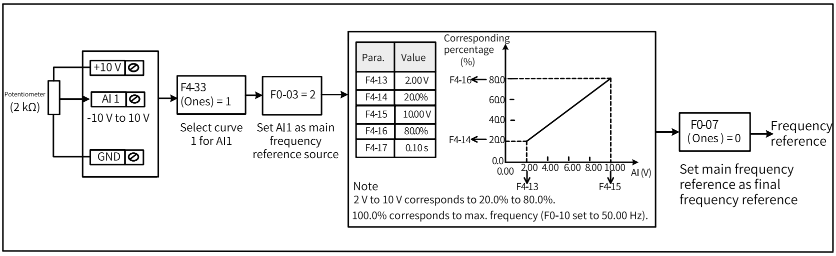


Figure 3-15 Parameter settings for AI1 voltage input as the main frequency source

AI2 can provide analog voltage input (–10 V to 10 V) or analog current input (0 mA to 20 mA).

When AI2 provides analog current input of 0 mA to 20 mA, the corresponding input voltage ranges from 0V to 10 V. If the input current ranges from 4 mA to 20 mA, current of 4 mA corresponds to voltage of 2 V, and current of 20 mA corresponds to voltage of 10 V.

For example, assume that curve 2 is selected for AI2 (the tens position of F4-33 is set to 2), AI2 current input is selected as the main frequency source, and the input current range of 4 mA to 20 mA must correspond to frequency range of 0 Hz to 50 Hz. In this case, set the parameters according to the following figure.

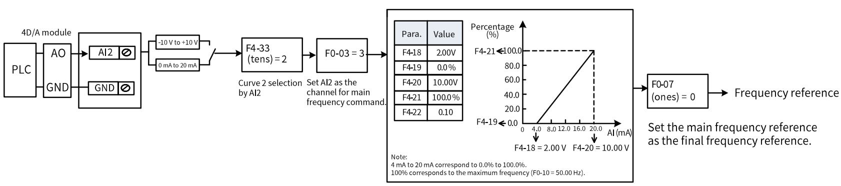


Figure 3-16 Parameter settings for AI2 current input as the main frequency source

3.1.2.5 Setting the Main Frequency Through Multi-Reference

When F0-03 is set to 6, multi-reference is selected as the main frequency source. This mode is applicable to scenarios where only several running frequencies are needed instead of continuous frequency adjustment.

The AC drive supports up to 16 running frequencies, which can be set through combinations of input signals from the four DIs. You can also use fewer than four DI terminals as the multi-reference source. In this case, missing digits are populated with 0s.

The relationship between the reference quantity and DI quantity is as follows:

- Two references: one DI terminal K1
- Three to four references: two DI terminals K1 and K2
- Five to eight references: three DI terminals K1, K2, and K3
- Nine to sixteen references: four DI terminals K1, K2, K3, and K4

The required frequency references are set by using parameters of the FC group, as listed in the following table.

Para.	Function	Default	Value Range	Description
FC-00	Multi-reference 0	0.00%	-100.0% to +100.0%	A reference is a relative value expressed in percentage related to the maximum frequency. The positive and negative values determine the running direction of the AC drive. A negative value indicates reverse running. The default acceleration time and deceleration time are the values of F0-17 and F0-18, respectively.
FC-01	Multi-reference 1	0.00%	-100.0% to +100.0%	
FC-02	Multi-reference 2	0.00%	-100.0% to +100.0%	
FC-03	Multi-reference 3	0.00%	-100.0% to +100.0%	
FC-04	Multi-reference 4	0.00%	-100.0% to +100.0%	
FC-05	Multi-reference 5	0.00%	-100.0% to +100.0%	
FC-06	Multi-reference 6	0.00%	-100.0% to +100.0%	
FC-07	Multi-reference 7	0.00%	-100.0% to +100.0%	
FC-08	Multi-reference 8	0.00%	-100.0% to 100.0%	
FC-09	Multi-reference 9	0.00%	-100.0% to +100.0%	
FC-10	Multi-reference 10	0.00%	-100.0% to +100.0%	
FC-11	Multi-reference 11	0.00%	-100.0% to +100.0%	
FC-12	Multi-reference 12	0.00%	-100.0% to +100.0%	
FC-13	Multi-reference 13	0.00%	-100.0% to +100.0%	
FC-14	Multi-reference 14	0.00%	-100.0% to +100.0%	
FC-15	Multi-reference 15	0.00%	-100.0% to +100.0%	
FC-51	Multi-reference 0 setting mode	0	0 to 6	0: FC-00 1: AI1 2: AI2 3: AI3 4: Pulse setting (DI5) 5: PID 6: Set through preset frequency (F0-08), modified through terminal UP/DOWN

When using multi-reference as the main frequency source, set the DI function to values of 12 to 15 to select the input terminals.

Para.	Parameter Name	Value	Description
F4-01	DI2 function selection	12	Multi-reference terminal 1
F4-03	DI4 function selection	13	Multi-reference terminal 2
F4-06	DI7 function selection	14	Multi-reference terminal 3
F4-07	DI8 function selection	15	Multi-reference terminal 4

Example

In the following figure, terminals DI2, DI4, DI7, and DI8 are used as multi-reference input terminals. They each contribute one bit to a 4-bit binary value, and different combinations of the bits represent different frequencies. When values of (DI2, DI4, DI7, DI8) are (0, 0, 1, 0), they constitute a value of 2. In this case, the frequency value set through FC-02 is selected. (See Table 6-1 for details about frequency selection.) Then, the target running frequency is calculated automatically by using the formula (FC-02) x (F0-10). The following figure shows the frequency setting.

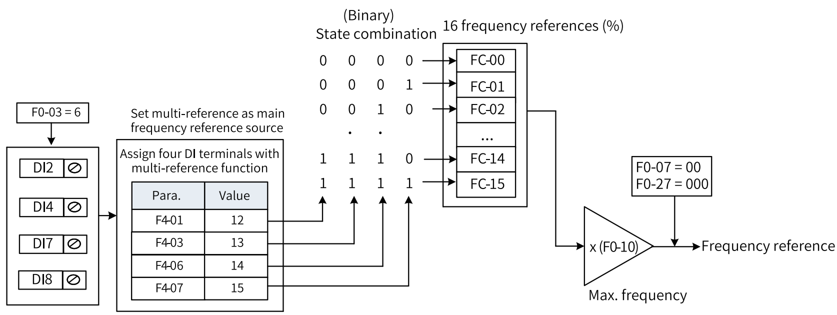


Figure 3-17 Frequency setting in multi-speed mode

The four multi-reference terminals can make up 16 state combinations, corresponding to 16 frequency reference values, as listed in the following table.

Table 3–1 Multi-reference function description

K4	K3	K2	K1	Reference	Corresponding Parameter
OFF	OFF	OFF	OFF	Multi-reference 0	FC-00 (FC-51 = 0)
OFF	OFF	OFF	ON	Multi-reference 1	FC-01

K4	K3	K2	K1	Reference	Corresponding Parameter
OFF	OFF	ON	OFF	Multi-reference 2	FC-02
OFF	OFF	ON	ON	Multi-reference 3	FC-03
OFF	ON	OFF	OFF	Multi-reference 4	FC-04
OFF	ON	OFF	ON	Multi-reference 5	FC-05
OFF	ON	ON	OFF	Multi-reference 6	FC-06
OFF	ON	ON	ON	Multi-reference 7	FC-07
ON	OFF	OFF	OFF	Multi-reference 8	FC-08
ON	OFF	OFF	ON	Multi-reference 9	FC-09
ON	OFF	ON	OFF	Multi-reference 10	FC-10
ON	OFF	ON	ON	Multi-reference 11	FC-11
ON	ON	OFF	OFF	Multi-reference 12	FC-12
ON	ON	OFF	ON	Multi-reference 13	FC-13
ON	ON	ON	OFF	Multi-reference 14	FC-14
ON	ON	ON	ON	Multi-reference 15	FC-15

3.1.2.6 Setting the Main Frequency Through Simple PLC

Step 1: Set F0-03 to 7 to select simple PLC as the main frequency reference.

Step 2: Set parameters FC-00...FC-15 and FC-18...FC-49 to define the running time and acceleration/deceleration time for each reference.

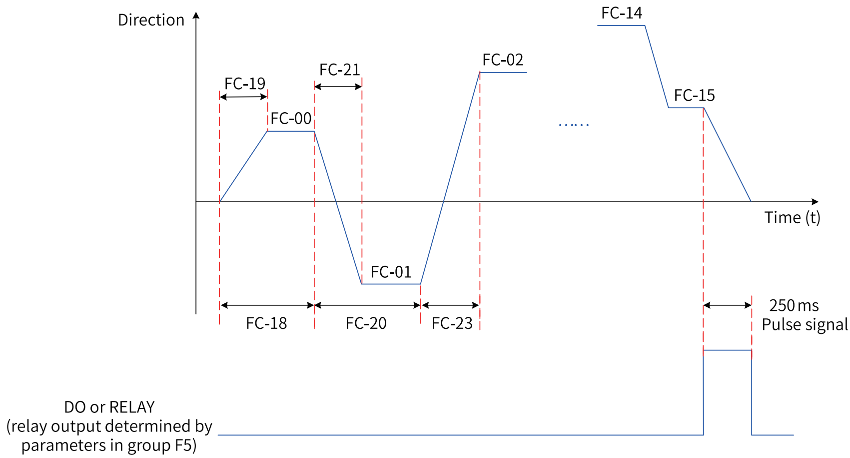


Figure 3-18 Simple PLC as the main frequency source

Step 3: Set FC-16 to select the simple PLC operation mode.

Step 4: Set FC-17 to determine whether to retain the PLC operation stage and operating frequency upon power failure or stop.

3.1.2.7 Setting the Main Frequency Through PID

PID control is a common process control method, which calculates the proportion, integral, and derivative of the difference between feedback signals and target signals of the controlled variable, and adjusts the output frequency of the AC drive accordingly to create a closed-loop system to stabilize the controlled variable at the target value. Generally, PID output can be used as the running frequency for on-site closed-loop process control applications, such as closed-loop pressure control and closed-loop tension control.

- Proportional gain Kp: When there is a deviation between the PID input and output, the PID regulator adjusts the output to reduce the deviation of the controlled variable. The deviation reduction speed depends on the proportionality coefficient Kp. A greater Kp value means faster deviation reduction. However, a large Kp value often causes oscillation, especially in the case of long hysteresis. A smaller Kp value means lower probability of oscillation. However, a small Kp value leads to slow adjustment. (Proportional gain of 100.0 means that the PID regulator adjusts the output frequency reference at an amplitude of the maximum frequency when the deviation between the PID feedback value and preset value is 100.0%.)
- Integral time Ti: Ti determines the intensity of integral adjustment by the PID regulator. A shorter integral time means stronger integral adjustment by the PID

regulator. (The integral time refers to the amount of time that the integral regulator spends on continuous adjustment at an amplitude of the maximum frequency when the deviation between the PID feedback value and preset value is 100.0%.)

- Derivative time Td: Td determines the intensity of deviation change rate adjustment by the PID regulator. A longer derivative time means stronger deviation change rate adjustment by the PID regulator. (The derivative time refers to the period during which the feedback value changes by 100.0%, and the differential regulator adjusts the output frequency reference at an amplitude of the maximum frequency.)

Example

Step 1: Set both F0-03 and F0-04 to 8 to use PID as the main and auxiliary frequency input sources.

Step 2: Set FA-00 to select the source of PID target reference. When FA-00 is set to 0, you need to set FA-01 (PID digital setting). The value 100% of this parameter corresponds to the maximum PID feedback.

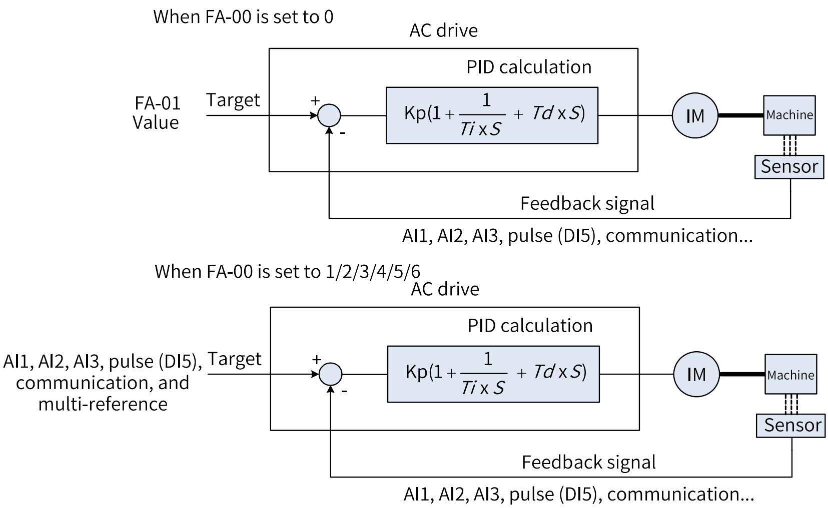


Figure 3-19 Block diagram of process PID control

Step 3: Set FA-02 to select the PID feedback source.

Step 4: Set FA-03 to select the PID action direction.

The following figure shows the logic of the PID control parameter setting.

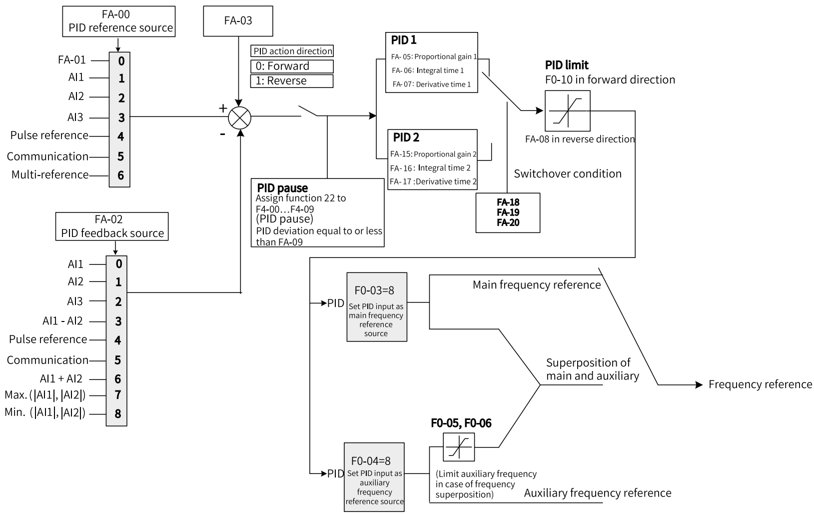


Figure 3-20 Block diagram of process PID control parameter settings

The upper limit, lower limit, and range of the output frequency are as follows when PID is used as the main frequency reference (for example, PID alone or main and PID together used as the frequency source).

When the reverse cut-off frequency is 0 or reverse running is inhibited (that is, in one of the following three conditions):

(1) FA-08 = 0, F8-13 = 0; (2) FA-08 = 0, F8-13 = 1; (3) FA-08 ≠ 0, F8-13 = 1

Output upper limit = Frequency upper limit

Output lower limit = Frequency lower limit

Output range = Frequency lower limit to frequency upper limit (F0-14 to F0-12)

When the reverse cut-off frequency is not 0 and reverse running is allowed (FA-08 ≠ 0, F8-13 = 0):

Output upper limit = Frequency upper limit Output lower limit = Frequency lower limit: -Reverse cut-off frequency

Output range = -Reverse cut-off frequency to +frequency upper limit (-FA-08 to +F0-12)

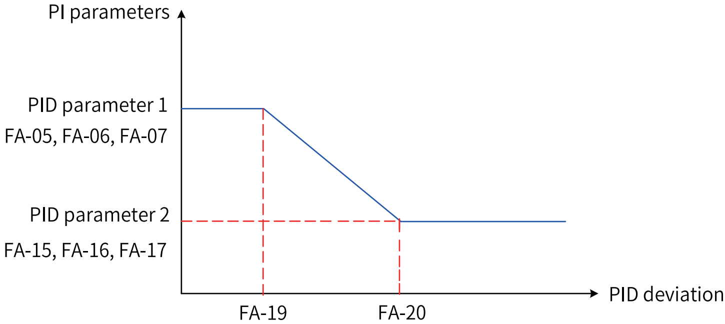


Figure 3-21 PID parameter switchover

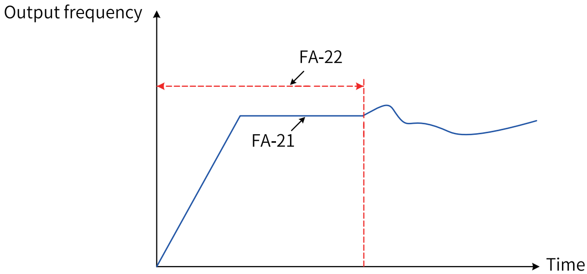


Figure 3-22 PID initial value function

3.1.2.8 Setting the Main Frequency Through Communication

The AC drive supports seven communication protocols, including Modbus, PROFIBUS DP, CANopen, CANlink, PROFINET, EtherCAT, and EtherNet/IP.

- When PROFIBUS DP, PROFINET, EtherCAT, EtherNet/IP, or CANopen (CANopen extension card) is selected, set FD-00 to 9 and set FD-01 to 3.
- When a CANlink card is used for CANopen communication, set FD-10 to 1. Use FD-12 to set the CAN communication baud rate and FD-13 to set the CAN station number.
- When a CANlink card is used for CANlink communication, set FD-10 to 2. Use FD-12 to set the CAN communication baud rate and FD-13 to set the CAN station number.
- When Modbus is used for communication, set FD-00 (baud rate), FD-01 (data format), and FD-02 (station number).

Example

Step 1: Set F0-03 to 9 to select communication as the main frequency source.

Step 2: Use the host controller to send a write command to the AC drive.

The following description takes Modbus as an example to illustrate how to set the main frequency through communication. For example, to set the frequency reference to 10000 through communication, send the write command 01 06 10 00 27 10 97 36.

The following table shows the meaning of each byte in the command.

Byte	Meaning
01H (editable)	AC drive address
06H	Write command
1000H	Frequency reference address
2710H (10000 in decimal)	Target frequency
9736H	CRC check

Similarly, to set the frequency reference to –10000 through communication, send the write command 01 06 10 00 D8 F0 D7 4E. In this command, D8F0 is the lowest four bits of the hexadecimal number converted from –10000.

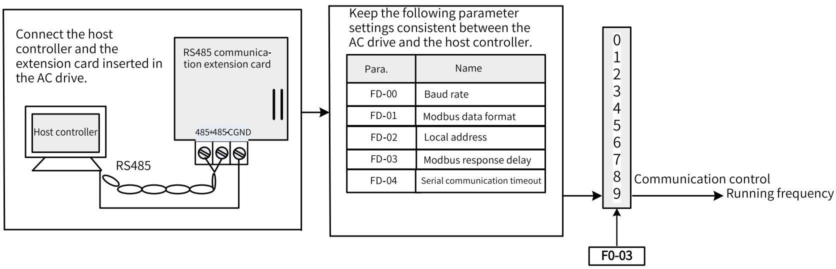


Figure 3-23 Parameter settings when the main frequency is set through communication

Table 3–2 Relationship between master commands and slave responses

Master Command		Slave Response	
ADDR	01H	ADDR	01H
CMD	06H	CMD	06H
Parameter address high bits	10H	Parameter address high bits	10H
Parameter address low bits	00H	Parameter address low bits	00H
Data content high bits	27H	Data content high bits	27H
Data content low bits	10H	Data content low bits	10H
CRC high bits	97H	CRC high bits	97H
CRC low bits	36H	CRC low bits	36H

The frequency reference range set through communication is –10000 to +10000 (in decimal), corresponding to –100.00% (negative max. frequency) to +100.00% (positive max. frequency). Suppose that F0-10 (maximum frequency) is set to 50 Hz. In this case, if the frequency reference in write command is 2710H, which is 10000 in decimal, the frequency reference that is written is 50 x 100% = 50 Hz.

3.1.2.9 Selecting an Auxiliary Frequency Source

The AC drive supports ten sources for the auxiliary frequency reference, including digital setting (non-retentive upon power failure), digital setting (retentive at power failure), AI1, AI2, AI3, pulse input, multi-reference, simple PLC, PID, and communication. You can set F0-04 to a value ranging from 0 to 9 to select a source.

When the auxiliary frequency reference is used independently for frequency setting, it is set in the same way as the main frequency reference. The following figure shows the logic block diagram. When the auxiliary frequency reference is used together with the main frequency reference for frequency setting, see "Setting the Frequency Based on Main and Auxiliary Frequency References".

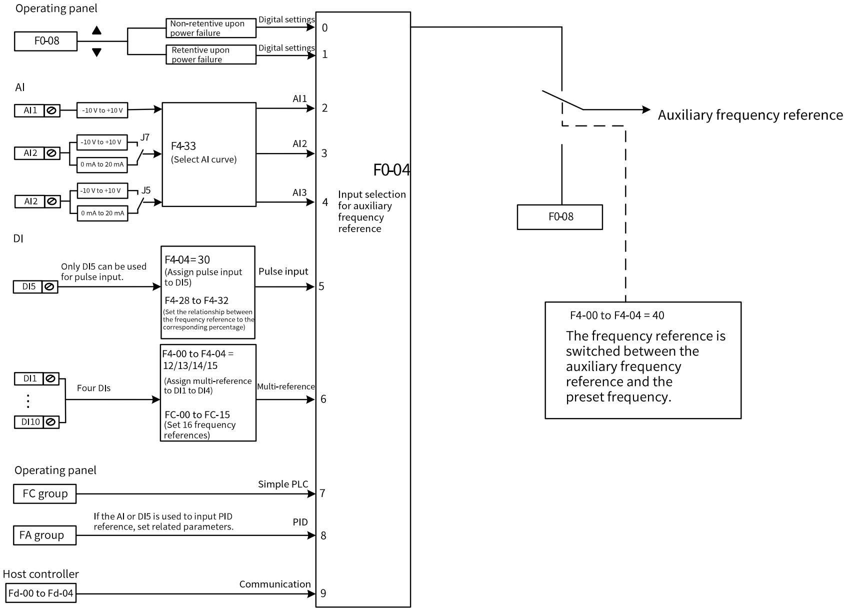


Figure 3-24 Selecting an auxiliary frequency source

Para.	Parameter Name	Value Range	Default
F0-04	Auxiliary frequency source Y	0: Digital setting (preset frequency (F0-08) that can be changed by pressing UP/DOWN; non-retentive upon power failure) 1: Digital setting (preset frequency (F0-08) that can be changed by pressing UP/DOWN; retentive at power failure) 2: AI1 3: AI2 4: AI3 5: Pulse reference (DI5) 6: Multi-reference 7: Simple PLC 8: PID 9: Communication 10: Reserved	0

3.1.2.10 Selecting Frequency Superposition Input Mode

The main and auxiliary frequency references can be used together for frequency setting. You can use F0-07 to set the relationship between the target frequency and the main and auxiliary frequency references. The following four kinds of relationship are available.

Table 3–3 Relationship between the target frequency and the main and auxiliary frequency references

No.	Relationship Between the Target Frequency and the Main and Auxiliary Frequency References	
1	Main frequency reference	The main frequency reference is used as the target frequency reference.
2	Auxiliary frequency reference	The auxiliary frequency reference is used as the target frequency reference.
3	Calculation of main and auxiliary frequencies	Four calculation methods are supported: Main frequency + Auxiliary frequency, Main frequency - Auxiliary frequency, Max. (main frequency, auxiliary frequency), and Min. (main frequency, auxiliary frequency).
4	Frequency switchover	The final frequency reference is selected from or switched among the preceding three references through DI terminal. In this mode, assign DI function 18 (Frequency source switchover) to the DI terminal.

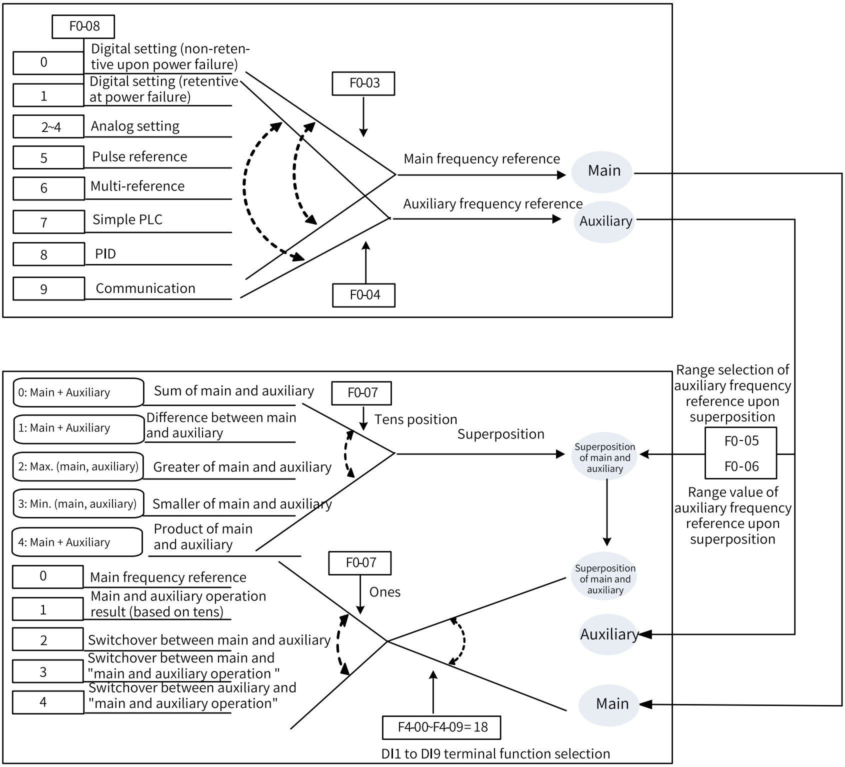


Figure 3-25 Superposition of main and auxiliary frequency references

Table 3–4 Superposition of main and auxiliary frequency references

Calculation Method	Main Frequency Source Selection	Auxiliary Frequency Source Selection	Description
+	Digital setting	AI, pulse reference, multi-reference, simple PLC, or communication	1. UP/DOWN adjustment is invalid. 2. Output range: F0-08 + Auxiliary frequency reference
	AI, pulse reference, multi-reference, simple PLC, or communication	Digital setting	1. UP/DOWN adjustment is valid. 2. Output range: Main frequency reference + UP/DOWN
	Digital setting	PID	1. UP/DOWN adjustment is invalid. 2. Digital setting is 0. 3. Output range: Auxiliary frequency reference
	PID	Digital setting	1. UP/DOWN adjustment is invalid. 2. Digital setting is 0. Output range: Main frequency reference
	AI, multi-reference, simple PLC, or communication	PID	1. UP/DOWN adjustment is invalid. 2. The frequency lower limit is invalid. 3. Output range: Main frequency reference + Auxiliary frequency reference
	PID	AI, pulse reference, multi-reference, simple PLC, or communication	1. UP/DOWN adjustment is invalid. 2. Output: Auxiliary frequency reference
-/x/Max/Min	Digital setting	Digital setting	1. UP/DOWN adjustment is valid. 2. Output range: Main frequency reference + UP/DOWN adjustment, same as digital setting in single frequency source mode

Calculation Method	Main Frequency Source Selection	Auxiliary Frequency Source Selection	Description
Single frequency source	Any	Any	1. When digital setting is used, UP/DOWN adjustment is invalid, and the initial frequency value is F0-08. 2. PID is invalid if used. 3. Simple PLC is invalid if used. 4. When digital setting is used for both main and auxiliary frequency references, the main frequency reference is valid, the auxiliary reference is invalid, and UP/DOWN adjustment is valid.
	Digital setting	-	1. UP/DOWN adjustment is valid. 2. Output: Main frequency value + UP/DOWN adjustment 3. UP/DOWN adjustment range: (Frequency upper limit - Main frequency) to (Frequency lower limit - Main frequency) 4. UP/DOWN adjustment cannot reverse the frequency direction.
	PID	-	1. The frequency lower limit is invalid. 2. PID output range: PID output lower limit to frequency upper limit 3. When reverse running is inhibited and the PID output lower limit is set to a negative value, 0 is the PID output lower limit.
	Other sources		None

Para. No.	Function	Default	Value Range
F0-05	Range selection of auxiliary frequency source Y upon superposition	0	0: Relative to max. frequency 1: Relative to main frequency reference
F0-06	Range value of auxiliary frequency reference Y upon superposition	100%	0% to 150%

These two parameters are used to limit the range of the auxiliary frequency and active only when “Main frequency + Auxiliary frequency” applies.

Para. No.	Function	Default	Value Range
F0-27	Main frequency coefficient	10.00%	0.00% to 100.00%
F0-28	Auxiliary frequency coefficient	10.00%	0.00% to 100.00%

These two parameters are used only in calculation of Main frequency x Auxiliary frequency. Assume that the main frequency is Frq1, and the auxiliary frequency is Frq2, the target frequency is calculated as follows:

Frq = (Frq1 x F0-27) x (Frq2 x F0-28)

3.1.2.11 Setting the Frequency Reference Limits

Frequency upper limit is used to control the maximum frequency if the motor is not allowed to run at a frequency above a specific value.

Frequency lower limit is used to control the minimum frequency if the motor is not allowed to run at a frequency below a specific value.

Maximum frequency is used to control the Max. output frequency.

Source of frequency reference upper limit is used to select the source of the frequency upper limit.

Frequency upper limit offset is used to set the offset of the frequency upper limit. This parameter takes effect only when the source of the frequency upper limit is AI.

Para. No.	Function	Default	Value Range
F0-10	Max. frequency	50.00 Hz	50.00 Hz to 600.00 Hz
F0-11	Source of frequency upper limit	0	0: F0-12 (Frequency upper limit) 1: AI1 2: AI2 3: AI3 4: Pulse reference (DI5) 5: Communication 6: Multi-reference
F0-12	Frequency upper limit	50.00 Hz	Frequency lower limit (F0-14) to max. frequency (F0-10)
F0-13	Frequency upper limit offset	0.00 Hz	0.00 Hz to max. frequency (F0-10)
F0-14	Frequency lower limit	0.00 Hz	0.00 Hz to frequency upper limit (F0-12)

3.1.2.12 SOperation at Frequencies lower Than the Lower Limit

Frequency lower limit indicates the minimum frequency at which the motor is allowed to run.

If the frequency of the AC drive is set to a value below the frequency lower limit (F0-14), set F8-14 to select the action of the AC drive. Four actions are supported: run at frequency lower limit, stop, run at zero speed, and coast to stop.

- 0: Frequency lower limit
  If the running frequency is below the frequency lower limit, the AC drive runs at the frequency lower limit.
- 1: Stop
  If the running frequency is below the frequency lower limit, the AC drive stops.
- 2: Run at zero speed
  If the running frequency is below the frequency lower limit, the AC drive runs at zero speed.

- 3: Coast to stop
  If the running frequency is below the frequency lower limit, the AC drive coasts to stop.

Para. No.	Function	Default	Value Range	Description
F8-14	Action when frequency is below the lower limit	0	0: Run at frequency lower limit 1: Stop 2: Run at zero speed 3: Coast to stop	-

3.1.2.13 Setting the Main Frequency Through Pulse Reference

When F0-03 is set to 5, pulse reference is selected as the main frequency source. When the main frequency source is set to pulse reference (DI5), the pulse reference must be obtained from multi-functional input terminal DI5. The pulse reference signal specifications are: voltage of 9 V to 30 V and frequency of 0 Hz to 100 KHz.

Procedure:

Step 1: Set F0-03 to 5 to select "pulse reference" as the main frequency source. In this mode, the pulse reference must be obtained from multi-functional input terminal DI5.

Step 2: Set F4-04 to 30 to assign DI5 with the "pulse frequency input" function.

Step 3: Set F0-07 to 00 to select "main frequency reference" as the frequency reference superposition.

Step 4: Set the pulse reference curve. Set F4-28 to F4-31 to determine the curve relationship between the pulse frequency input from DI5 and the corresponding percentage. The relationship is shown as a two-point straight line.

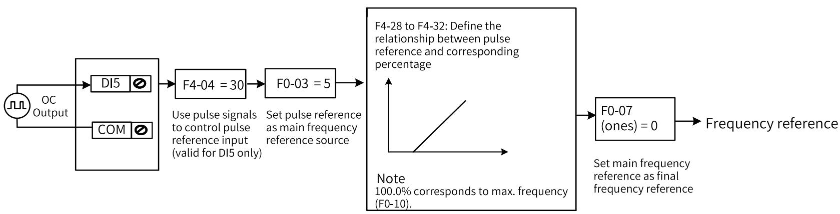


Figure 3-26 Parameter settings for pulse input as the main frequency source

Step 5: Set F4-32 to select the filter time of pulse frequency.

Set this parameter to balance the response speed and the anti-interference capability. If quick response is required, reduce the parameter value. If the onsite interference is high, increase the parameter value.

A large value of this parameter enhances the anti-interference capability, but slows down the response to adjustments. A small value of this parameter speeds up the response to adjustments, but weakens the anti-interference capability. When onsite pulse signal is subject to interference, increase the filter time to stabilize the detected pulse signals. However, long filter time slows down the response to pulse signal detection. Therefore, set the filter time based on the actual application environment.

3.1.3 Start/Stop Mode

3.1.3.1 Startup Modes

The AC drive supports three start modes: direct start, flying start, and pre-excitation start. Set F6-00 to select a start mode for the AC drive.

Direct Start

When F6-00 is set to 0, the AC drive uses the direct start mode. This mode is applicable to most loads.

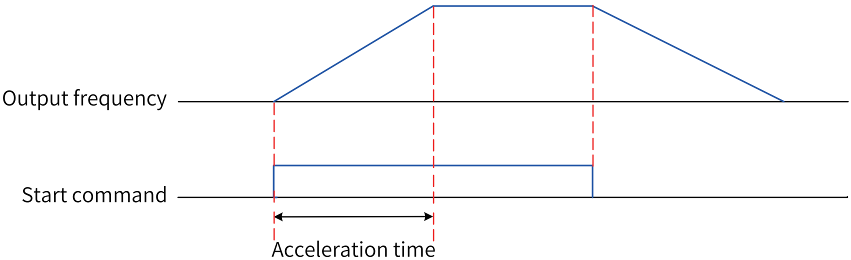


Figure 3-27 Timing diagram of direct start

Start with the startup frequency is applicable to lifting loads, such as elevators and cranes.

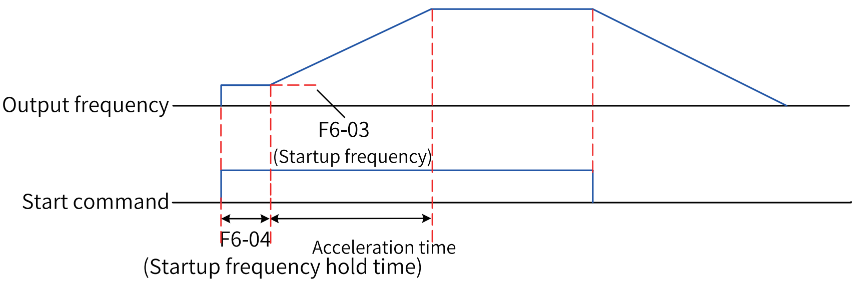


Figure 3-28 Timing diagram of start with the startup frequency

Start with DC braking is applicable to scenarios where the motor may rotate upon start of the AC drive.

If the DC braking time is set to 0, the AC drive starts running at the startup frequency. If the DC braking start time is not 0, the AC drive performs DC braking first and then starts to run at the startup frequency. This mode is applicable to most low-inertia loads and scenarios where the motor may rotate upon start of the AC drive.

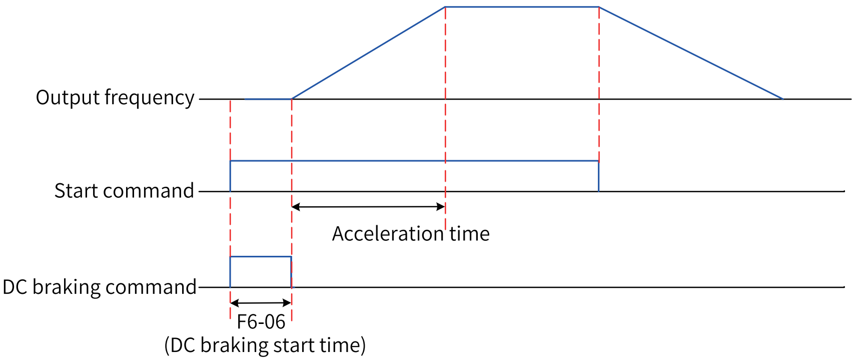
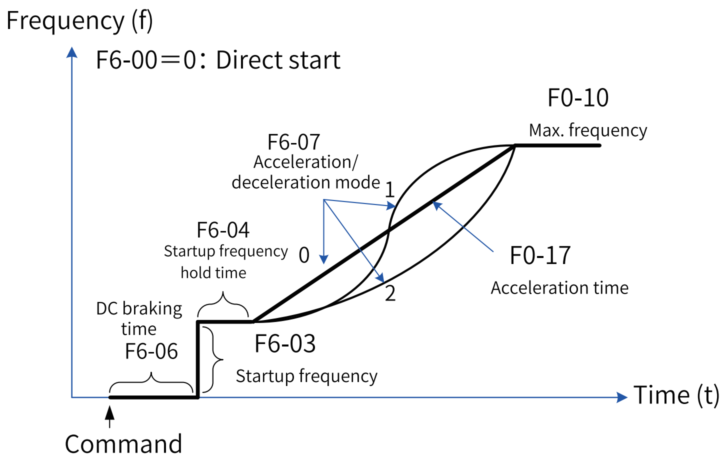


Figure 3-29 Timing diagram of start with DC braking

Start after DC braking is suitable for driving loads such as elevators and lifting machines. Start after reaching startup frequency hold time is suitable for driving equipment that requires a starting torque, for example, cement mixers. The following figure shows the frequency curve during startup.



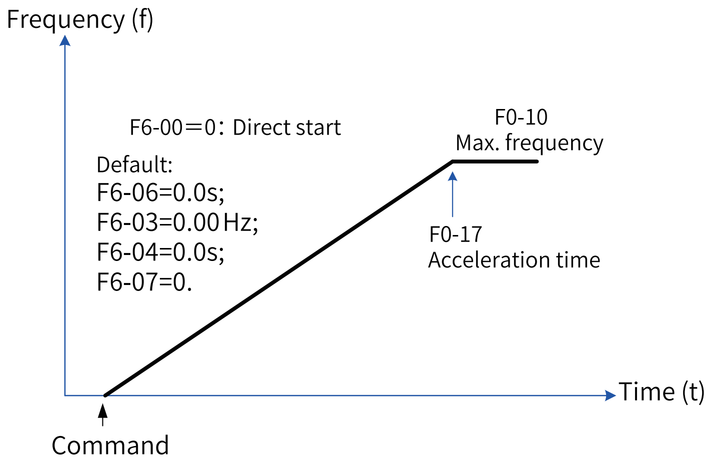


Figure 3-30 Direct start

Flying start

When F6-00 is set to 1, the AC drive uses the flying start mode. In this mode, the AC drive first determines the motor rotation speed and direction, and then starts at the detected frequency of the motor. This mode is applicable to high-inertia mechanical loads.

If the motor is still rotating due to inertia upon restart of the AC drive, this start mode can prevent overcurrent upon startup. The following figure shows the frequency curve during startup.

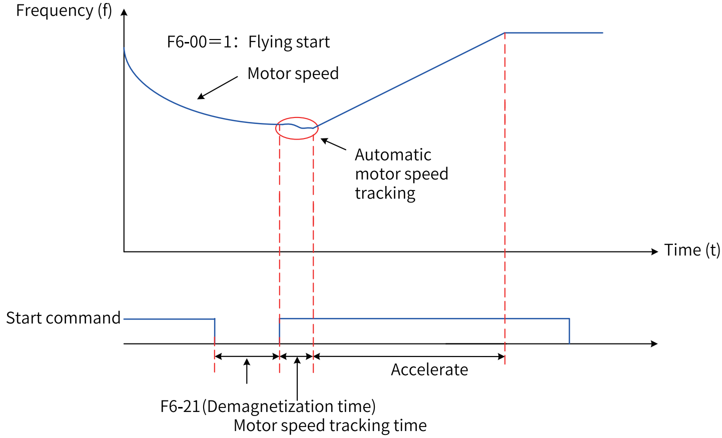


Figure 3-31 Flying start

Pre-excitation start

When F6-00 is set to 2, the AC drive uses the pre-excitation start mode. This mode is applicable only to the SVC and FVC control modes of asynchronous motors. In this mode, the motor is pre-excited before AC drive startup, which speeds up response of the motor and reduces the startup current. The timing diagram of this mode is the same as that of start after DC braking. It is recommended that the pre-excitation current be set to 1.5 times the no-load current (F1-10), but in no case exceeds the rated motor current. If the pre-excitation current equals the no-load current (F1-10), the optimal pre-excitation time is 3 times the rotor time constant. The rotor time constant is calculated using the following formula: Mutual inductance (F1-09) + Leakage inductance (F1-08)/Rotor resistance (F1-07). The unit of mutual inductance and leakage inductance is L, and the unit of resistance is Ω. If the pre-excitation current is greater than the no-load current, the pre-excitation time can be reduced proportionally. If the pre-excitation current is less than the no-load current, the pre-excitation time can be increased proportionally.

3.1.3.2 Stop Modes

The AC drive supports two stop modes: decelerate to stop and coast to stop. You can set F6-10 to select a stop mode as needed.

Para.	Function	Default	Value Range	Description
F6-10	Stop mode	0	0: Decelerate to stop 1: Coast to stop	0: Decelerate to stop After the stop command takes effect, the AC drive decreases the output frequency to 0 based on the deceleration time and stops. 1: Coast to stop After the stop command takes effect, the AC drive immediately stops output. Then, the motor coasts to stop following mechanical inertia.
F6-11	Start frequency of DC braking at stop	0.00 Hz	0.00 Hz to F0-10 (Maximum frequency)	In a decelerate-to-stop process, the AC drive starts DC braking when the running frequency drops to this frequency.
F6-12	Waiting time of DC braking at stop	0.0s	0.0s to 100.0s	When the running frequency decreases to the start frequency of DC braking at stop, the AC drive stops output for a period of time and then starts DC braking. Such delay is intended to prevent faults such as overcurrent from occurring when DC braking starts at a high speed.
F6-13	DC braking current at stop	0%	0% to 150%	A greater DC braking current at stop indicates a greater braking force. 100% corresponds to the rated motor current. The upper limit of the DC braking current is 80% the rated current of the AC drive by default. The maximum upper limit can be set to 135% of the rated current of the AC drive by F6-35.
F6-14	DC braking time at stop	0.0s	0.0s to 100.0s	This parameter specifies the hold time of DC braking. If this parameter is set to 0, DC braking is disabled.

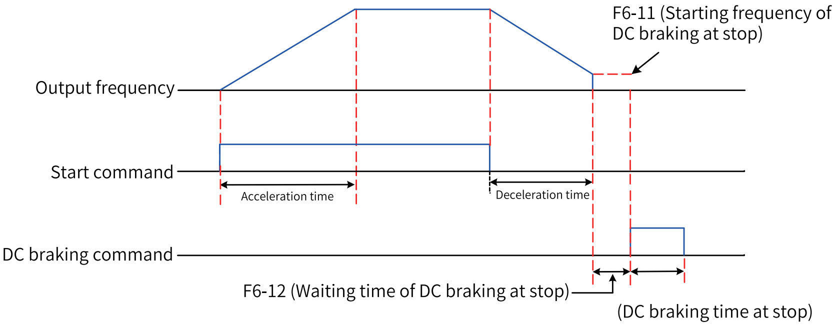


Figure 3-32 Timing diagram of DC braking at stop

Decelerate to stop

When F6-10 is set to 0, the AC drive decelerates to stop. After the stop command takes effect, the AC drive decreases the output frequency to 0 based on the deceleration time and stops.

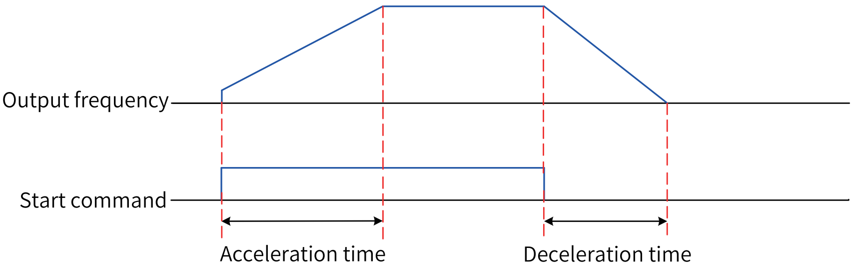


Figure 3-33 Timing diagram of decelerating to stop

Coast to stop

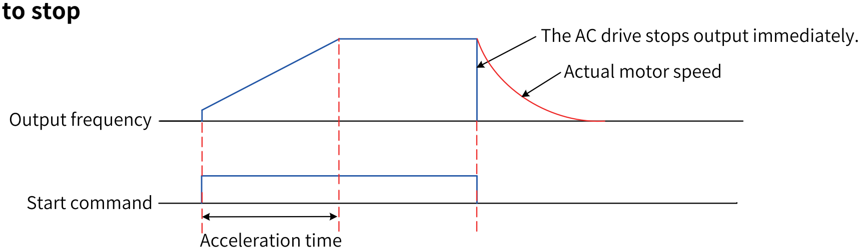


Figure 3-34 Timing diagram of coasting to stop

3.1.3.3 Acceleration/Deceleration Time Setting

Acceleration time is the time that an AC drive needs to accelerate from zero frequency to the acceleration/deceleration time base frequency (F0-25). Deceleration time is the time that an AC drive needs to decelerate from the acceleration/deceleration time base frequency (F0-25) to zero frequency.

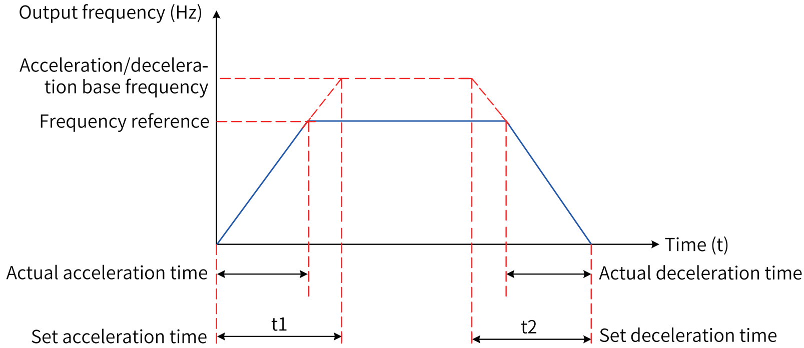


Figure 3-35 Acceleration/deceleration time

The AC drive provides four groups of acceleration/deceleration time, which can be selected by using DI terminal functions 16 and 17. The four groups of time is set through the following parameters:

Group 1: F0-17 and F0-18

Group 2: F8-03 and F8-04

Group 3: F8-05 and F8-06

Group 4: F8-07 and F8-08

Example

In the following example, DI7 and DI8 are used to switch among different groups of acceleration/deceleration time.

1. Set F4-06 and F4-07 to use DI7 and DI8 for switchover.

Para. No.	Name	Value	Description
F4-06	DI7 function	16	Acceleration/Deceleration time selection terminal 1
F4-07	DI8 function	17	Acceleration/Deceleration time selection terminal 2

2. Set four groups of acceleration/deceleration time parameters to set the acceleration/deceleration time.

DI8 State	DI7 State	Acceleration/Deceleration Time Selection
OFF	OFF	Group 1: F0-17 and F0-18 (Acceleration time 1)
OFF	ON	Group 2: F8-03 and F8-04 (Acceleration time 2. For details, see F0-17 and F0-18.)
ON	OFF	Group 3: F8-05, F8-06 (Acceleration time 3. For details, see F0-17 and F0-18.)
ON	ON	Group 4: F8-07 and F8-08 (Acceleration time 4. For details, see F0-17 and F0-18.)

3. Set F0-19 to select the acceleration/deceleration time unit. When the value of F0–19 changes, the decimal places in the four groups of acceleration/deceleration time change, and the corresponding acceleration/deceleration time also changes.
4. Set F6-07 (Acceleration/Deceleration mode). F6–07is used to set the frequency change mode during start/stop of the AC drive.
   - 0: The output frequency increases or decreases linearly.
   - 1: The output frequency increases or decreases following the S-curve in real time when the target frequency changes. Details must be set through F6-08 and F6-09. This mode is applicable to scenarios requiring supreme riding comfort and real-time response.
5. Set F6-08 and F6-09 to select the time proportion of S-curve at start and time proportion of S-curve at end. The values of F6-08 and F6-09 must meet the following condition: F6-08 + F6-09 ⩽ 100.0%

3.2 Motor Configuration

3.2.1 Asynchronous Motor Auto-Tuning

Motor auto-tuning is an operation that the AC drive obtains motor parameters.

Motor auto-tuning includes static auto-tuning on partial parameters of the asynchronous motor, dynamic auto-tuning on all parameters of the asynchronous motor, and with-load auto-tuning on all parameters of the asynchronous motor.

Para.	Function	Default	Value Range	Description
F1-37	Auto-tuning selection	0	0: No auto-tuning	Auto-tuning is not performed.
			1: Static auto-tuning on partial parameters of the asynchronous motor (Rs, Rr, and L0)	This method is applicable to scenarios where the motor cannot be disconnected from the load and dynamic auto-tuning is not allowed. Auto-tuning is performed on partial motor parameters including F1-06 (Asynchronous motor stator resistance), F1-07 (Asynchronous motor rotor resistance), and F1-08 (Asynchronous motor leakage inductance). For other parameters, use their default values.
			2: Dynamic auto-tuning of the asynchronous motor (auto-tuning with load is supported)	This method is applicable to scenarios with high-speed revolution. Auto-tuning with no load, light load (below 50% load), or pure inertia load is supported. Auto-tuning is performed on all the motor parameters, including F1-06 (Asynchronous motor stator resistance), F1-07 (Asynchronous motor rotor resistance), F1-08 (Asynchronous motor leakage inductance), F1-09 (Asynchronous motor mutual inductance), F1-10 (Asynchronous motor no-load current), and F1-30 (Encoder phase sequence).
Contin ued	Continued	Contin ued	3: Static auto-tuning on all parameters of the asynchronous motor (Rs, Rr, L0, Lm, and IO)	This method is applicable to scenarios where the motor cannot be disconnected from the load and dynamic auto-tuning on all parameters is not allowed. Auto-tuning is performed on all the motor parameters, including F1-06 (Asynchronous motor stator resistance), F1-07 (Asynchronous motor rotor resistance), F1-08 (Asynchronous motor leakage inductance), F1-09 (Asynchronous motor mutual inductance), and F1-10 (Asynchronous motor no-load current).
Contin ued	Continued	Contin ued	4: Dynamic auto-tuning 2 of the asynchronous motor (inertia auto-tuning only in FVC)	This method is applicable to scenarios with high-speed revolution. Auto-tuning with no load, light load (below 80% load), or pure inertia load is supported. Auto-tuning is performed on all the motor parameters, including F1-06 (Asynchronous motor stator resistance), F1-07 (Asynchronous motor rotor resistance), F1-08 (Asynchronous motor leakage inductance), F1-09 (Asynchronous motor mutual inductance), F1-10 (Asynchronous motor no-load current), F1-30 (Encoder phase sequence), and F2-35 (System inertia).

Para.	Function	Default	Value Range	Description
Continued	Continued	Continued	5: Dynamic auto-tuning 3 of the asynchronous motor (Auto-tuning on mutual inductance curve requires no load, light load, or pure inertia load; V/f, SVC, and FVC modes are supported)	This method is applicable to scenarios with high-speed revolution. Auto-tuning with no load, light load (below 10% load), or pure inertia load is supported. Auto-tuning is performed on all the motor parameters, including F1-06 (Asynchronous motor stator resistance), F1-07 (Asynchronous motor rotor resistance), F1-08 (Asynchronous motor leakage inductance), F1-09 (Asynchronous motor mutual inductance), F1-10 (Asynchronous motor no-load current), and F1-30 (Encoder phase sequence).
Continued	Continued	Continued	11: Static auto-tuning on partial parameters of the synchronous motor (excluding back EMF)	It is applicable to auto-tuning of the synchronous motor with load and to scenarios where the motor cannot be disconnected from the load. Auto-tuning is performed on the following motor parameters in the FVC mode: F1-06 (Motor stator resistance), F1-17 (Synchronous motor d-axis inductance), F1-18 (Synchronous motor q-axis inductance), F1-20 (Filter time constant), F1-21 (Oscillation suppression gain), F1-30 (Encoder phase sequence), and F1-31 (Encoder zero position angle). Auto-tuning is performed on the following motor parameters in other modes: F1-06 (Motor stator resistance), F1-17 (Synchronous motor d-axis inductance), F1-18 (Synchronous motor q-axis inductance), F1-20 (Filter time constant), and F1-21 (Oscillation suppression gain).

Para.	Function	Default	Value Range	Description
Contin ued	Continued	Contin ued	12: No-load dynamic auto-tuning on all parameters of the synchronous motor	It is applicable to scenarios where the motor can be disconnected from the load. Auto-tuning is performed on the following motor parameters in the FVC mode: F1-06 (Motor stator resistance), F1-17 (Synchronous motor d-axis inductance), F1-18 (Synchronous motor q-axis inductance), F1-19 (Synchronous motor back EMF), F1-20 (Filter time constant), F1-21 (Oscillation suppression gain), F1-30 (Encoder phase sequence), and F1-31 (Encoder zero position angle). Auto-tuning is performed on the following motor parameters in other modes: F1-06 (Motor stator resistance), F1-17 (Synchronous motor d-axis inductance), F1-18 (Synchronous motor q-axis inductance), F1-19 (Synchronous motor back EMF), F1-20 (Filter time constant), and F1-21 (Oscillation suppression gain).
			13: Static auto-tuning on all parameters of the synchronous motor (excluding the encoder installation angle)	This method is applicable to scenarios where the motor cannot be disconnected from the load and dynamic auto-tuning on all parameters is not allowed. Auto-tuning is performed on the motor parameters including F1-06 (Motor stator resistance), F1-17 (Synchronous motor d-axis inductance), F1-18 (Synchronous motor q-axis inductance), F1-20 (Filter time constant), and F1-21 (Oscillation suppression gain).
			14: Synchronous motor inertia auto-tuning (only in FVC)	This method is applicable to scenarios that requires fast dynamic response and that the load must be connected during auto-tuning. Auto-tuning is performed on the motor parameters including F2-35 (System inertia) and F2-36 (Motor and load inertia).

The following table compares the effects of these motor auto-tuning methods.

Table 3–5 Motor auto-tuning methods

Auto-tuning Method	Applicable Scenario	Effect
Static auto-tuning on partial parameters of the asynchronous motor (Rs, Rr, and L0)	The motor cannot be disconnected from the load and dynamic auto-tuning is not allowed.	Good
Dynamic auto-tuning of the asynchronous motor (auto-tuning with load is supported)	The system requires high-speed revolution.	Best

Auto-tuning Method	Applicable Scenario	Effect
Static auto-tuning on all parameters of the asynchronous motor (Rs, Rr, L0, Lm, and IO)	The motor cannot be disconnected from the load and dynamic auto-tuning on all parameters is not allowed.	Better
Dynamic auto-tuning 2 of the asynchronous motor (inertia auto-tuning only in FVC)	The motor and the system require high-speed revolution. Auto-tuning with no load, light load (below 80% load), or pure inertia load is supported.	-
Dynamic auto-tuning 3 of the asynchronous motor (Auto-tuning on mutual inductance curve requires no load, light load, or pure inertia load; V/f, SVC, and FVC modes are supported)	The motor and the system require high-speed revolution. Auto-tuning with no load, light load (below 10% load), or pure inertia load is supported.	-
Static auto-tuning on partial parameters of the synchronous motor (excluding back EMF)	It is applicable to auto-tuning of the synchronous motor with load and to scenarios where the motor cannot be disconnected from the load.	-
No-load dynamic auto-tuning on all parameters of synchronous motor	The motor can be disconnected from the load.	-
Static auto-tuning on all parameters of the synchronous motor (excluding the encoder installation angle)	The motor cannot be disconnected from the load and dynamic auto-tuning on all parameters is not allowed.	-
Synchronous motor inertia auto-tuning (only in FVC)	This method is applicable to scenarios that requires fast dynamic response and that the load must be connected during auto-tuning.	-

In addition to the above 10 auto-tuning methods, you can also manually enter motor parameters.

You can perform motor auto-tuning either through commands from the operating panel or communication commands. You can set F0-02 to select commands.

For the Modbus, PROFIBUS, and CANopen protocols, the PKW parameters support auto-tuning but the PZD parameters do not. To use communication control for motor auto-tuning, set F1-37 or A2-37 to select an auto-tuning mode, and then enter the command.

Example

In the following example, parameters of motor 1 (F0-24 is set to 0, indicating that motor parameter group 1 is selected) are used to illustrate motor auto-tuning methods. For auto-tuning on motor 2, set F0-24 to 1 (motor parameter group 2) and follow the steps of auto-tuning on motor 1. For parameter settings, see settings of the A2 group parameters.

- Procedure of static auto-tuning on partial parameters of the asynchronous motor

Table 3–6 Procedure of static auto-tuning on partial parameters of the asynchronous motor

Step	Description
1	Power on the AC drive, and then set F0-02 to 0 to select the operating panel as the command source.
2	Enter motor parameters (F1-00 to F1-05) according to its nameplate.
3	Set F1-37 to 1 (static auto-tuning on partial parameters of the asynchronous motor) and press **ENTER** on the operating panel. The display on the panel is as follows. 
4	Press the **RUN** key on the operating panel for more than three seconds to start motor auto-tuning. The RUN indicator is steady on. The TUNE/TC indicator blinks. The motor does not rotate but the AC drive energizes the motor. When the preceding display disappears and the operating panel displays parameters, auto-tuning is completed. Parameters F1-06 to F1-08 are obtained.

- Procedure of dynamic auto-tuning on all parameters of the asynchronous motor
  When the AC drive is connected to a motor with constant output or used in a scenario requiring high precision, use dynamic complete auto-tuning after disconnecting the motor from the load. This can achieve the best auto-tuning effect.

Table 3–7 Procedure of dynamic auto-tuning on all parameters of the asynchronous motor

Step	Description
1	Power on the AC drive, and then set F0-02 to 0 to select the operating panel as the command source.
2	Enter motor parameters (F1-00 to F1-05) according to its nameplate.
3	If F0-01 is set to 1 (feedback vector control, FVC), enter encoder parameters (F1-27, F1-28, and F1-30).
4	Set F1-37 to 2 (dynamic auto-tuning on all parameters of the asynchronous motor) and press **ENTER** on the operating panel. The display on the panel is as follows. 
5	Press the **RUN** key on the operating panel for more than three seconds to start motor auto-tuning. The RUN indicator is steady on. The TUNE/TC indicator blinks. The AC drive drives the motor to accelerate/decelerate and run in the forward/reverse direction, and performs auto-tuning. When the preceding display disappears and the operating panel displays parameters, auto-tuning is completed. Parameters F1-06 to F1-10 and F1-30 are obtained.

- With-load auto-tuning on all parameters of the asynchronous motor

Use with-load auto-tuning on all parameters of the asynchronous motor when the motor cannot be disconnected from the load.

Table 3–8 Procedure of static auto-tuning on all parameters of the asynchronous motor

Step	Description
1	Power on the AC drive, and then set F0-02 to 0 to select the operating panel as the command source.
2	Enter motor parameters (F1-00 to F1-05) according to its nameplate.
3	Set F1-37 to 3 (static auto-tuning on all parameters of the asynchronous motor) and press **ENTER** on the operating panel. The display on the panel is as follows. 
4	Press the **RUN** key on the operating panel for more than three seconds to start motor auto-tuning. The RUN indicator is steady on. The TUNE/TC indicator blinks. The motor does not rotate but the AC drive energizes the motor. When the preceding display disappears and the operating panel displays parameters, auto-tuning is completed. Parameters F1-06 to F1-10 are obtained.

3.2.2 Synchronous Motor Auto-Tuning

Motor auto-tuning is used to obtain motor parameters.

Synchronous motor auto-tuning includes static auto-tuning on partial parameters of synchronous motor (back EMF is not auto-tuned), no-load dynamic auto-tuning on all parameters of synchronous motor, and static auto-tuning on all parameters of synchronous motor.

Para. No.	Function	Default	Value Range	Description
F1-37	Auto-tuning selection	0	0: No auto-tuning	Motor auto-tuning is disabled.
			11: Static auto-tuning on partial parameters of synchronous motor (back EMF is not auto-tuned)	SVC and PMVVC: Auto-tuning is performed on partial motor parameters, including stator resistance and DQ shaft inductance. The motor does not rotate during auto-tuning. FVC: Auto-tuning is performed on partial motor parameters, including stator resistance, DQ shaft inductance, and encoder zero position angle. If a resolver or 23-bit encoder is used, the motor does not rotate during auto-tuning. If an ABZ encoder is used, the motor rotates for a short period of time during auto-tuning.
			12: No-load dynamic auto-tuning on all parameters of synchronous motor	The motor must be disconnected from load during auto-tuning. SVC and PMVVC: Auto-tuning is performed on all motor parameters, including stator resistance, DQ shaft inductance, and back EMF. The motor rotates during auto-tuning. FVC: Auto-tuning is performed on all motor parameters, including stator resistance, DQ shaft inductance, back EMF, encoder zero position angle, and encoder phase sequence. The motor rotates during auto-tuning.
			13: Static auto-tuning on all parameters of synchronous motor	SVC, PMVVC and FVC: Auto-tuning is performed on partial motor parameters, including stator resistance and DQ shaft inductance. The motor does not rotate during auto-tuning.

The following table compares the effects of these motor auto-tuning methods.

Table 3–9 Motor auto-tuning methods

Auto-tuning Method	Applicable Scenario	Effect
Static auto-tuning on partial parameters of synchronous motor	The motor cannot be disconnected from load and dynamic auto-tuning is not allowed. After auto-tuning, manually set the back EMF (SVC and PMVVC) and encoder phase sequence.	Better
No-load dynamic auto-tuning on all parameters of synchronous motor	This method is applicable to scenarios where the motor can be easily disconnected from the application system.	Best
Static auto-tuning on all parameters of synchronous motor	The motor cannot be disconnected from load and motor rotation is not allowed. After auto-tuning, manually set the back EMF (SVC and PMVVC), encoder zero position angle (FVC), and encoder phase sequence (FVC).	Good

In addition to the preceding three auto-tuning methods, you can also input motor parameters manually.

In addition to using the LED panel as the command source for motor auto-tuning, you can also use an external LCD panel (set F0-02 to 0), DI terminals (set F0-02 to 1) or communication control (set F0-02 to 2) as the command source for motor auto-tuning.

For the Modbus, PROFIBUS, and CANopen protocols, the PKW parameters support auto-tuning but the PZD parameters do not. To use communication control for motor auto-tuning, set F1-37 to select an auto-tuning mode, and then enter the command.

Example

- Procedure of static auto-tuning on partial parameters of synchronous motor

Table 3–10 Procedure of static auto-tuning on partial parameters of synchronous motor

Step	Description
1	Power on the AC drive, and then set F0-02 to 0 to select the operating panel as command source.
2	Enter motor parameters (F1-00 to F1-05) according to its nameplate.
3	Set F1-37 to 11 (static auto-tuning on partial parameters of synchronous motor) and press "ENTER" on the operating panel. The display on the panel is: 
4	Press and hold the RUN key for longer than 3s. The motor auto-tuning starts. The RUN indicator is steady on, the TUNE/TC indicator blinks, and the AC drive energizes the motor. When the preceding display disappears and the operating panel returns to normal parameter display state, auto-tuning is completed. Parameters F1-06, F1-17, F1-18, and F1-31 (FVC) are obtained. Manually set F1-19 (SVC and PMVVC) and F1-30 (FVC).

- Procedure of no-load dynamic auto-tuning on all parameters of synchronous motor

  When the AC drive is connected to a motor with constant output or used in a scenario requiring high precision, use dynamic complete auto-tuning after separating the motor from the load, to achieve the best auto-tuning effect.

Table 3–11 Procedure of dynamic auto-tuning on all parameters of synchronous motor

Step	Description
1	Power on the AC drive, and then set F0-02 to 0 to select the operating panel as command source.
2	Enter motor parameters (F1-00 to F1-05) according to its nameplate.
3	If F0-01 is set to 1 (feedback vector control, FVC), enter encoder parameters (F1-27 and F1-28).
4	Set F1-37 to 12 (no-load dynamic auto-tuning on all parameters of synchronous motor) and press "ENTER" on the operating panel. The display on the panel is: 
5	Press and hold the RUN key for longer than 3s. The motor auto-tuning starts. The RUN indicator is steady on, the TUNE/TC indicator blinks, and the AC drive energizes the motor. When the preceding display disappears and the operating panel returns to normal parameter display state, auto-tuning is completed. Parameters F1-06, F1-17, F1-18, F1-19, F1-30 (FVC), and F1-31 (FVC) are obtained.

- Procedure of static auto-tuning on all parameters of synchronous motor

Use this auto-tuning method when the motor is not allowed to rotate during auto-tuning.

Table 3–12 Procedure of static auto-tuning on all parameters of synchronous motor

Step	Description
1	Power on the AC drive, and then set F0-02 to 0 to select the operating panel as command source.
2	Enter motor parameters (F1-00 to F1-05) according to its nameplate.
3	Set F1-37 to 13 (static auto-tuning on all parameters of synchronous motor) and press "ENTER" on the operating panel. The display on the panel is: 
4	Press and hold the RUN key for longer than 3s. The motor auto-tuning starts. The RUN indicator is steady on, the TUNE/TC indicator blinks, and the AC drive energizes the motor. When the preceding display disappears and the operating panel returns to normal parameter display state, auto-tuning is completed. Parameters F1-06, F1-17, and F1-18 are obtained. Manually set F1-19 (SVC and PMVVC), F1-31 (FVC), and F1-30 (FVC).

3.3 Control Terminal

3.3.1 DI Functions

The AC drive supports a number of multi-functional DIs (DI5 can be used as the pulse input terminal). You can select any DI function for each DI.

Table 3–13 Parameters

Para.	Function	Default	Value Range	Description
F4-00	DI1 function selection	1	0–93	See *"Table 3–14 DI functions" on page 543*.
F4-01	DI2 function selection	4		
F4-02	DI3 function selection	9		
F4-03	DI4 function selection	12		
F4-04	DI5 function selection	13		
F4-05	DI6 function selection	0		
F4-06	DI7 function selection	0		
F4-07	DI8 function selection	0		
F4-08	DI9 function selection	0		
F4-09	DI10 function selection	0		
F4-10	DI filter time	0.010s	0.000s to 1.000s	Set the delay time of the AC drive when the status of the DI changes. Only DI1 and DI2 support delay time setting.

Para.	Function	Default	Value Range	Description
F4-38	DI valid mode selection 1	00000	Ones: DI1 active mode 0: Active high 1: Active low Tens: DI2 active mode (0 or 1, the options are the same as those of DI1). Hundreds: DI3 active mode (0 or 1, the options are the same as those of DI1). Thousands: DI4 active mode (0 or 1, the options are the same as those of DI1). Ten thousands: DI5 active mode (0 or 1, the options are the same as those of DI1).	The active mode for terminals DI1 to DI5 is set through the ones, tens, hundreds, thousands, and ten thousands positions of this parameter, respectively. 0: Active high. The DI (DI1 to DI5) is active when connected to the COM terminal and inactive when disconnected from the COM terminal. 1: Active low. The DI (DI1 to DI5) is inactive when connected to the COM terminal and active when disconnected from the COM terminal.
F4-39	DI valid mode selection 2	00000		

Table 3–14 DI functions

Value	Function	Detailed Description
0	No function	Set 0 to disable the terminal to avoid malfunction.
1	Forward run	The AC drive runs in the forward direction. FWD indicates forward run. In two-wire mode 1 (F4-11 set to 0), activating the terminal sets the AC drive to forwardly run. In two-wire mode 2 (F4-11 set to 1), activating the terminal gives a running command.
2	Reverse run	The AC drive runs in the reverse direction. REV indicates reverse run. In three-wire mode 1 (F4-11 set to 2), activating the terminal sets the AC drive to reversely run. In three-wire mode 2 (F4-11 set to 3), activating the terminal sets the forward/reverse run direction.

Value	Function	Detailed Description
3	Three-wire operation control	The AC drive runs in three-wire control mode. To set the running command through the terminal, set F4-11 (terminal control mode) to 2 (three-wire mode 1) or 3 (three-wire mode 2), and set this parameter to 3. The three-wire control modes include three-wire mode 1 and three-wire mode 2.
4	Forward jog (FJOG)	The terminal is used to set the AC drive to FJOG mode. In jog mode, the AC drive runs at low speed for a short time, which is typically used for maintenance and commissioning of field equipment.
5	Reverse jog (RJOG)	The terminal is used to set the AC drive to RJOG mode.
6	Terminal UP	The terminal is used to increase the frequency when the frequency is set through the terminal. If the terminal is active, the effect is equivalent to holding down the  key. If the terminal is inactive, the effect is equivalent to releasing the  key.
7	Terminal DOWN	The terminal is used to decrease the frequency when the frequency is set through the terminal. If the terminal is active, the effect is equivalent to holding down the  key. If the terminal is inactive, the effect is equivalent to releasing the  key.
8	Coast to stop	Once the AC drive receives a stop command, it immediately stops output and the load then coasts to stop based on the mechanical inertia. When the AC drive stops output, the motor is powered off, and the system enters free braking. Since the stop time is determined by the inertia of the system, this is also called inertia stop.
9	Fault reset (RESET)	The terminal is used to reset a faulty AC drive. The terminal has the same function as that of the **STOP/RES** key on the operating panel. This function can remotely reset the AC drive upon a fault.
10	RUN pause	When the terminal is active with this function, the AC drive decelerates to stop, and the settings of all the running parameters, such as the PLC, wobble, and PID parameters, are saved. When the terminal is inactive, the AC drive resumes its running state as recorded.
11	Normally open (NO) input of external fault	When the terminal is active, the AC drive reports the Err15 alarm upon receiving an external signal.

Value	Function	Detailed Description
12	Multi-reference terminal 1	Multi-reference is selected as the main frequency source. You can set the 16 states of the four terminals to 16 speeds or 16 references. This function is applicable to scenarios where continuous adjustment of the AC drive running frequency is not required and only several frequency values are required.
13	Multi-reference terminal 2	
14	Multi-reference terminal 3	
15	Multi-reference terminal 4	
16	Terminal 1 for acceleration/ deceleration time selection	Four groups of acceleration/deceleration time can be selected through combinations of four states of these two terminals. The acceleration time is the time required by the AC drive to accelerate from zero frequency to the acceleration/deceleration base frequency (F0-25). The deceleration time is the time required by the AC drive to decelerate from the acceleration/deceleration base frequency (F0-25) to zero frequency.
17	Terminal 2 for acceleration/ deceleration time selection	
18	Frequency source switchover	The terminal is used to switch between input methods of the frequency reference. The frequency reference is set through F0-07 (final frequency reference setting selection).
19	UP and DOWN setting clear	When the operating panel is used as the main frequency source, this terminal function can be used to clear the frequency change made through the  or  key on the operating panel or the terminal UP or DOWN functions (6 or 7) and resume the main frequency to the value specified by the F0-08 parameter.
20	Running command switchover terminal 1	When the running command is set through the terminal (F0-02=1) and this terminal is active, the control mode can be switched between the terminal and the operating panel. When the running command is set through communication (F0-02 = 2) and this terminal is active, the control mode can be switched between the communication and the operating panel.
21	Acceleration/ Deceleration disabled	The terminal is used to keep the AC drive at the current running frequency regardless of the changes of the external input frequency unless a stop command is received.
22	PID pause	The terminal is used to suspend PID control temporarily, so that the AC drive keeps the current output frequency with no more PID tuning on the frequency source.

Value	Function	Detailed Description
23	PLC state reset	The terminal is used to reset the AC drive to the initial state of simple PLC.
24	Wobble pause	In the wobble process, the terminal being active suspends the wobble function, so that the AC drive outputs at the central frequency.
25	Counter input	In the counting process, the terminal being active inputs the pulses counted by the counter.
26	Counter reset	In a counting process, the terminal being active resets the counter.
27	Length count input	In a fixed length process, the terminal being active inputs the length count.
28	Length reset	In a fixed length process, the terminal being active resets the length.
29	Torque control inhibited	When the terminal is active, the AC drive is switched from the torque control mode to the speed control mode. When the terminal is inactive, the AC drive resumes the torque control mode.
30	Pulse input	This function must be selected when DI5 is used for pulse input.
32	Immediate DC braking	The terminal is used to set the AC drive to the immediate DC braking state. DC braking means that the AC drive outputs DC to the stator winding of the asynchronous motor to form a static magnetic field to enable the motor to brake with energy consumption. In this state, the rotor cuts the static magnetic field to generate braking torque, which stops the motor quickly.
33	Normally closed (NC) input of external fault	When the terminal is active, the AC drive reports the Err15 alarm upon receiving an external signal.
34	Frequency modification	When the terminal is active, the frequency can be modified. When the terminal is inactive, the frequency cannot be modified.
35	PID action direction reversal	The PID action direction is opposite to the direction set by FA-03 (PID action direction).
36	External stop terminal 1	If the command source is set to operating panel control (F0-02 is set to 0), the terminal is used to stop the AC drive. This function is the same as that of the STOP/RES key on the operating panel.

Value	Function	Detailed Description
37	Control command switchover terminal 2	The terminal is used to switch the AC drive between terminal control and communication control. If the running command source is set to terminal control, the system switches to communication control when this terminal is active. If the running command source is set to communication control, the system switches to terminal control when this terminal is active.
38	PID integral pause	The PID integral adjustment function is paused. However, the PID proportion adjustment and differential adjustment functions are still available.
39	Switchover between main frequency and preset frequency	This parameter is used to switch from the main frequency to the preset frequency (F0-08).
40	Switchover between auxiliary frequency and preset frequency	This parameter is used to switch from the auxiliary frequency to the preset frequency (F0-08).
41	Motor selection	The terminal is used for motor selection. When the terminal is active, motor 2 is selected. When the terminal is inactive, motor 1 is selected.
42	Position lock	When the terminal is active, the AC drive decelerates to 0 Hz and then enters the position lock state.
43	PID parameter switchover	With the PID parameter switchover condition set to "switchover by DI" (FA-18 = 1), when the terminal is inactive, the PID parameters are FA-05 to FA-07 (proportional gain Kp1, integral time Ti1, and derivative time Td1). When terminal is active, the PID parameters are FA-15 to FA-17 (proportional gain Kp2, integral time Ti2, and derivative time Td2).
44	User-defined fault 1	The AC drive reports the E27.00 alarm and proceeds according to the value of F9-49 (fault protection action selection).
45	User-defined fault 2	The AC drive reports the E28.0 alarm and proceeds according to the value of F9-49 (fault protection action selection).
46	Speed control/ torque control switchover	The AC drive is switched between the speed control mode and the torque control mode. If A0-00 (speed/torque control mode) is set to 0, the torque control mode is used when the terminal is active, and the speed control mode is used when the terminal is inactive. If A0-00 (speed/torque control mode) is set to 1, the speed control mode is used when the terminal is active, and the torque control mode is used when the terminal is inactive.

Value	Function	Detailed Description
47	Emergency stop	Upon an emergency, the AC drive decelerates to stop within the deceleration time for emergency stop specified by F8-55. In V/f control mode, if the deceleration time for emergency stop is 0s, the AC drive decelerates to stop within the minimum unit time. The terminal does not need to be kept in the closed state. Even if it stays closed only for a short moment, the AC drive will come to an emergency stop. Different from general deceleration, if the emergency stop input terminal is opened after the deceleration time for emergency stop expires and the running signal is still active on the AC drive terminal, the AC drive will not restart. To restart the AC drive in this case, disconnect the running terminal and input the running command.
48	External stop terminal 2	The AC drive decelerates to stop regardless of the command source (operation panel, terminal, or communication). In this mode, the deceleration time is fixed to deceleration time 4 (F8-08).
49	Deceleration DC braking	The AC drive decelerates to the DC braking start frequency upon stop (F6-11) before starting DC braking.
50	Clear the current running time	The terminal is used to clear the current running time of the AC drive. If the current running time is less than the set value (greater than 0) of F8-53 (Current running time reached), and the terminal is active, the current running timing is cleared. If the current running time is greater than the set value (greater than 0) of F8-53, and the terminal is active, the current running time is not cleared.
51	Two-wire/three-wire control switchover	The terminal is used to switch the AC drive between the two-wire control mode and three-wire control mode. When F4-11 is set to 0 (Two-wire mode 1) and the terminal is active, the AC drive switches to three-wire mode 1. When the terminal is inactive, two-wire mode 1 is used. When F4-11 is set to 1 (Two-wire mode 2) and the terminal is active, the AC drive switches to three-wire mode 2. When F4-11 is set to 2 (Three-wire mode 1) and the terminal is active, the AC drive switches to two-wire mode 1. When F4-11 is set to 3 (Three-wire mode 2) and the terminal is active, the AC drive switches to two-wire mode 2.
52	Electromagnetic shorting	When the terminal is active, the AC drive enters the electromagnetic shorting state.

Value	Function	Detailed Description
53	Thickness accumulation	When the roll diameter is calculated based on accumulative thickness, the terminal is used to record the number of revolutions.
54	Roll diameter reset	When the terminal is active, the initial roll diameter is reset. The initial roll diameter is reset upon reel replacement when the tension mode is used.
55	Initial roll diameter 1	In the tension mode, you can combine terminals to select the initial roll diameter B0-11/12/13. When terminals of both initial roll diameter 1 and initial roll diameter 2 are inactive, the minimum roll diameter B0-09 is used as the initial roll diameter. When only the terminal of initial roll diameter 1 is active, B0-11 is used as the initial roll diameter. When only the terminal of initial roll diameter 2 is active, B0-12 is used as the initial roll diameter. When terminals of both initial roll diameter 1 and initial roll diameter 2 are active, B0-13 is used as the initial roll diameter.
56	Initial roll diameter 2	
57	Pre-drive	When the terminal is active, the AC drive switches to the pre-drive speed control mode. This function is used to synchronize the linear speed for the axis that requires automatic reel replacement when the tension mode is used. When the terminal is inactive after reel replacement, the tension control can function properly.
58	Winding/unwinding switchover	This function is used to switch between winding and unwinding when the tension mode is used.
59	Roll diameter calculation disabled	When the terminal is activated, the roll diameter calculation is disabled. This function is used to disable roll diameter calculation to prevent automatic reel replacement and pre-drive from affecting roll diameter calculation when the tension mode is used.
60	Exiting tension mode	This function is used to exit the tension control mode.
61	Terminal tension rise	When the terminal is activated, the tension torque is increased by certain ratio. After the DI terminal is deactivated, the boost part will be canceled gradually based on time.

Value	Function	Detailed Description
62	Thickness selection 1	In tension mode, you can combine terminals to select the thickness B0-32/33/34/35. When terminals of both thickness selection 1 and thickness selection 2 are inactive, B0-32 is selected as the thickness. When only the terminal of thickness selection 1 is active, B0-33 is selected as the thickness. When only the terminal of thickness selection 2 is active, B0-34 is selected as the thickness. When terminals of both thickness selection 1 and thickness selection 2 are active, B0-35 is selected as the thickness.
63	Thickness selection 2	
90	Water cooling system fault	When the water cooling system of T13 models has a fault, the terminal receives the signal and the AC drive reports the E64 alarm.
91	Low liquid level fault	When the liquid in the water tank of T13 models is too low, the terminal receives the signal and the AC drive reports the A63 alarm.
92	Revolution number reset	The number of revolutions counted will be cleared after this terminal is activated.

3.3.2 DO Functions

Table 3–15 Parameters

Para.	Function	Default	Value Range	Description
F5-01	Extension card relay output function selection	0	0 to 42	See *"Table 3–16 DO functions" on page 552*.
F5-02	Control board relay function selection (T/A1-T/B1-TC1)	2		
F5-03	Control board relay function selection (T/A2-TC2)	0		
F5-04	DO1 function selection	0		
F5-05	Extension card DO2 output selection	4		
F5-17	Extension card relay output delay	0.0s	0.0s to 3600.0s	Indicates the output delay of relay on the extension card. F5-01 outputs the active signal only after the set delay time expires.
F5-18	Relay 1 output delay	0.0s	0.0s to 3600.0s	Indicates the delay of relay 1 on the control board. F5-02 outputs the active signal only after the set delay time expires.
F5-19	Relay 2 output delay	0.0	0.0 to 3600.0	Indicates the delay of relay 2 on the control board. F5-03 outputs the active signal only after the set delay time expires.
F5-20	DO1 output delay	0.0s	0.0s to 3600.0s	Indicates the delay of DO1 output. F5-04 outputs the active signal only after the set delay time expires.
F5-21	Extension card DO2 output delay	0.0s	0.0s to 3600.0s	Indicates the delay of DO2 output on the extension card. F5-05 outputs the active signal only after the set delay time expires.

Para.	Function	Default	Value Range	Description
F5-22	DO active mode selection	0	Ones: Extension card relay 0: Positive logic 1: Negative logic Tens: Control board relay 1 0: Positive logic 1: Negative logic	The active mode for DOs is set through the ones, tens, hundreds, thousands, and ten thousands positions of F5-01 to F5-05. 0: Positive logic (equivalent to a normally open contact) Active: The DO and the COM/CME terminal are connected inside the AC drive. Inactive: The DO and the COM/CME terminal are disconnected. 1: Negative logic (equivalent to a normally closed contact) Active: The DO and the COM/CME terminal are disconnected. Inactive: The DO and the COM/CME terminal are connected inside the AC drive.
Continued	Continued	Continued	Hundreds: Control board relay 2 0: Positive logic 1: Negative logic Thousands: Control board DO1 0: Positive logic 1: Negative logic Ten thousands: Control board DO2 0: Positive logic 1: Negative logic	Continued

Table 3–16 DO functions

Value	Function	Description
0	No output	The DO has no function.
1	AC drive running	The DO outputs the active signal when the AC drive is in the running state with an output frequency, which can be zero.

Value	Function	Description
2	Fault output (coast-to-stop fault)	The DO outputs the active signal when the AC drive stops due to a fault.
3	Frequency level detection 1	The DO outputs the active signal when the running frequency exceeds the frequency detection value. The DO stops outputting the active signal when the running frequency is lower than the result of the detection value minus the frequency detection hysteresis (FDT, which equals the result of F8-19 multiplied by F8-20).
4	Frequency reach	The DO outputs the active signal when the running frequency of the AC drive is within a particular range (Target frequency±Result of the value of F8-21 multiplied by the maximum frequency).
5	Zero-speed running (no output at stop)	The DO outputs the active signal when the AC drive is running with the output frequency being 0. The DO outputs the inactive signal when the AC drive is stopped.
6	Motor overload pre-warning	Before performing the protection action, the AC drive determines whether the motor load exceeds the overload pre-warning threshold according to the overload pre-warning coefficient (F9-02). When the AC drive determines that the overload pre-warning threshold is exceeded, he terminal outputs an active signal.
7	AC drive overload pre-warning	The DO outputs the active signal 10 seconds before AC drive overload protection is performed.
8	Set count value reach	In a counting process, the DO outputs the active signal when the count reaches the value of FB-08.
9	Designated count value reach	In a counting process, the DO outputs the active signal when the count reaches the value of FB-09.
10	Length reach	The DO outputs the active signal when the detected length exceeds the value of FB-05 in the fixed length function.
11	Simple PLC cycle completed	The DO outputs a pulse signal with the width of 250 ms when simple PLC completes one cycle.
12	Accumulative running time reach	The DO outputs the active signal when the accumulative running time of the AC drive exceeds the value of F8-17 (accumulative running time threshold).
13	Frequency limited	The DO outputs the active signal when the frequency reference exceeds the upper limit or lower limit and the output frequency of the AC drive reaches the upper limit or lower limit.
14	Torque limited	The DO outputs the active signal when the output torque reaches the torque limit in speed control mode.
15	Ready to run	The DO outputs the active signal if no exception occurs after the AC drive is powered on.
16	AI1 > AI2	The DO outputs the active signal when the value of AI1 is greater than that of AI2.

Value	Function	Description
17	Frequency upper limit reach	The DO outputs the active signal when the running frequency reaches the upper limit (F0-12).
18	Frequency lower limit reach (no output at stop)	The DO outputs the inactive signal regardless of whether the running frequency has reached the lower limit when F8-14 is set to 1 (stop). F8-14 specifies the running mode when the frequency reference is lower than the lower limit. When F8-14 is set to 0 (run at the lower limit frequency) or 2 (run at zero speed) and the running frequency reaches the lower limit, the DO outputs the active signal.
19	Undervoltage state	The DO outputs the active signal when the AC drive is in undervoltage state.
20	Communication	The DO state is controlled through the communication address 0x2001.
21	Positioning completed	The DO outputs the active signal when positioning is completed.
22	Proximity	The DO outputs the active signal upon proximity.
23	Zero-speed running 2 (having output at stop)	The DO outputs the active signal when the AC drive is running with the output frequency being 0. The DO outputs the active signal when the AC drive is stopped.
24	Accumulative power-on time reach	The DO outputs the active signal when the accumulative power-on time (F7-13) of the AC drive exceeds the accumulative power-on time threshold (F8-16).
25	Frequency level detection 2	The DO outputs the active signal when the running frequency exceeds the frequency detection value. The DO stops outputting the active signal when the running frequency is lower than the result of the threshold minus the frequency detection hysteresis, which equals the result of the value of F8-28 multiplied by the value of F8-29.
26	Frequency 1 reach	The DO outputs the active signal when the running frequency of the AC drive is within the frequency detection range of F8-30 (detection value for frequency reach 1). Frequency detection range: F8-30 – F8-31 x F0-10 (maximum frequency) to F8-30 + F8-31 x F0-10
27	Frequency 2 reach	The DO outputs the active signal when the running frequency of the AC drive is within the frequency detection range of F8-32 (detection value for frequency reach 2). Frequency detection range: F8-32 – F8-33 x F0-10 (maximum frequency) to F8-32 + F8-33 x F0-10
28	Current 1 reach	The DO outputs the active signal when the output current of the AC drive is within the current detection range of F8-38 (detection level of current 1). Current detection range: F8-38 – F8-39 x F1-03 (rated motor current) to F8-38 + F8-39 x F1-03

Value	Function	Description
29	Current 2 reach	The DO outputs the active signal when the output current of the AC drive is within the current detection range of F8-40 (detection level of current 2). Current detection range: F8-40 – F8-41 x F1-03 (rated motor current) to F8-40 + F8-41 x F1-03
30	Timing reach	With the timing function (F8-42) enabled, the DO outputs the active signal when the current running time of the AC drive reaches the set time. The timing duration is set through F8-43 and F8-44.
31	AI1 input limit exceeded	The DO outputs the active signal when the value of AI1 is above F8-46 (AI1 input voltage upper limit) or below F8-45 (AI1 input voltage lower limit).
32	Load lost	The DO outputs the active signal when the AC drive is in load lost state.
33	Reverse running	The DO outputs the active signal when the AC drive is in reverse running state.
34	Zero current state	The DO outputs the active signal when the output current of the AC drive remains in the zero current range for a period longer than the value of F8-35 (zero current detection delay). Zero current detection range: 0 to F8-34 x F1-03
35	IGBT temperature reach	The DO outputs the active signal when the IGBT module temperature (F7-07) reaches the temperature threshold (F8-47).
36	Output current limit violation	The DO outputs the active signal when the output current of the AC drive remains higher than the value of F8-36 (output overcurrent threshold) for a period longer than the value of F8-37 (output overcurrent detection delay).
37	Frequency lower limit reach (having output at stop)	The DO outputs the active signal when the running frequency reaches the lower limit (F0-14). The DO also outputs the active signal when the AC drive is stopped.
38	Alarm (all faults)	The DO outputs the active signal when the AC drive is faulty, and the fault protection action is "continue to run". For details about fault protection actions, see the description of parameters F9-47 to F9-50.
39	Motor overtemperature	The DO outputs the active signal when the motor temperature reaches the value of F9-58 (motor overtemperature pre-warning threshold). You can check the motor temperature using U0-34.
40	Current running time reach	The DO outputs the active signal when the current running time of the AC drive exceeds the value of F8-53 (current running time threshold).

Value	Function	Description
41	Fault output 2	The DO outputs the active signal when an AC drive fault (except the undervoltage fault) occurs.
42	Fault output 3	The DO outputs the active signal when an AC drive fault occurs.

3.3.3 VDI Terminal

The virtual digital input (VDI) terminals, having the same functions as DIs on the control board, can be used as multi-functional digital input terminals.

There are three VDI terminal sources.

- A1-06: Set A1-06 to make the DI take effect. The DI is used in communication scenarios, where physical DIs are not used. The relationship between the digits of A1-06 and the VDIs are as follows: the ones position of A1-06 corresponds to VDI1... the ten thousands position of A1-06 corresponds to VDI5.
- DO state: There are two DOs, namely, DO1 and DO2. DO1 corresponds to VDI1, and DO2 corresponds to VDI2.
- DI state: The relationship between the DIs and the VDIs are as follows: DI1 - VDI1, DI2 - VDI2, DO1 - VDI4, and DO2 - VDI5.

Example

The following examples show how to use VDIs:

- Example 1: Assume that A1-05 (VDI active state source) is set to 00001 (DO state is the source). To enable the AC drive to generate an alarm and stop when the AI1 input exceeds the upper limit or lower limit, do as follows:

Step	Parameter Setting
1	Set the VDI1 function to "user-defined fault 1" (set A1-00 to 44).
2	Set the DO1 function to "AI input limit exceeded" (set F5-04 to 31).
3	Set the VDI1 state source to DO state (set A1-05 to 00001).

After the preceding steps, DO1 output is in ON state, and the VDI1 input terminal is active when AI1 input exceeds the upper limit or lower limit. After VDI1 of the AC drive receives user-defined fault 1, the AC drive generates the alarm E27.00 and stops.

- Example 2: In a communication scenario, implement emergency stop through the VDI without using physical DI.

Step	Parameter Setting
1	Set the VDI1 function to "emergency stop" (set A1-00 to 47).
2	Set the VDI1 active state source to parameters (set A1-05 to 00000).
3	Modify the ones position of A1-06 through communication.

After the preceding steps, emergency stop can be implemented by setting the ones position of A1-06 to 1.

Parameters

Para.	Function	Default	Value Range	Description
A1-00	VDI1 function	0	0–93	Same as F4-00
A1-01	VDI2 function	0		
A1-02	VDI3 function	0		
A1-03	VDI4 function	0		
A1-04	VDI5 function	0		
A1-05	VDI state source	00000	Ones: 0: Parameter setting (A1-06) 1: DO state 2: DI state Tens: 0: Parameter setting (A1-06) 1: DO state 2: DI state	The VDIx (x ranges from 1 to 5) state is set through the ones to ten thousands positions of this parameter. 0: Decided by the state of VDOx. The state of VDI depends on the state of VDO. VDI1 is bound to VDO1, VDI2 is bound to VDO2, and VDOx is bound to VDOx (x ranges from 1 to 5). 1: Decided by A1-06. The state of VDIx (x ranges from 1 to 5) is set through the binary bits of A1-06.

Para.	Function	Default	Value Range	Description
Continued	Continued	Continued	Hundreds: 0: Parameter setting (A1-06) 1: DO state 2: DI state Thousands 0: Parameter setting (A1-06) 1: DO state 2: DI state Ten thousands 0: Parameter setting (A1-06) 1: DO state 2: DI state	Continued
A1-06	VDI state	00000	Ones: 0: Disabled 1: Enabled Tens: 0: Disabled 1: Enabled Hundreds: 0: Disabled 1: Enabled Thousands 0: Disabled 1: Enabled Ten thousands 0: Disabled 1: Enabled	The VDIx (x ranges from 1 to 5) state is set through the ones to ten thousands positions of this parameter.

3.3.4 AI

The AC drive is equipped with three multi-functional analog input (AI) terminals by default. To use AIs as DIs, the following parameters need to be set. When AI input voltage is higher than 7 V, AI is in high level state. When AI input voltage is lower than 3 V, AI is in low level state. AI is in hysteresis state when AI input voltage is between 3 V and 7 V. The following figure shows the relationship between AI input voltage and DI state.

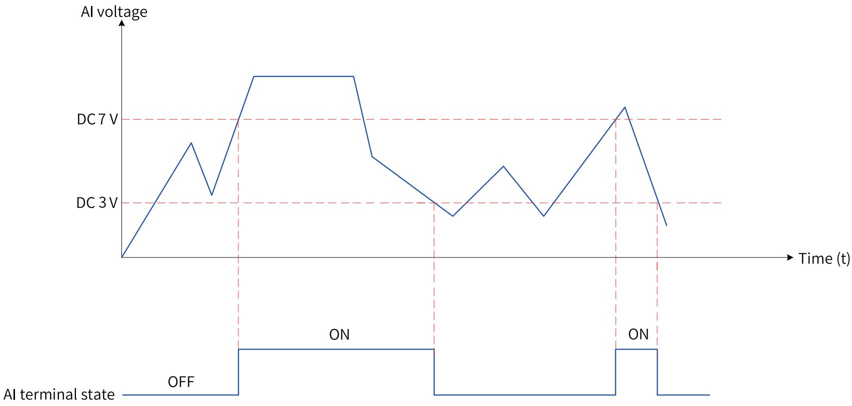


Figure 3-36 Relationship between AI input voltage and DI state

Table 3–17 Related parameters

Para. No.	Function	Default	Value Range	Description
A1-07	Function selection for AI1 used as DI	0	0 to 93	Same as F4-00
A1-08	Function selection for AI2 used as DI	0		
A1-09	Function selection for AI3 used as DI	0		
A1-10	Active state selection for AI used as DI	00	Ones: AI1 0: Active high 1: Active low Tens: AI2 (0 or 1, the options are the same as that of the ones position) Hundreds: AI3 (0 or 1, the options are the same as that of the ones position)	When the AI terminal level is high, the AI terminal is active if the corresponding digit of A1-10 is set to 0, and inactive if the corresponding digit of A1-10 is set to 1. When the AI terminal level is low, the AI terminal is active if the corresponding digit of A1-10 is set to 0, and inactive if the corresponding digit of A1-10 is set to 1.

3.3.5 AO

The AC drive is equipped with two analog output (AO) terminals by default. The following parameters are used to rectify the zero drift of analog output and the deviation of output amplitude. They can also be used to customize AO output curves.

Table 3–18 Parameters

Para.	Function	Default	Value Range	Description
F5-07	AO1 function selection	0	0: Running frequency 1: Set frequency 2: Output current 3: Output torque 4: Output power 5: Output voltage 6: Pulse input (100.0% corresponds to 100.0 kHz) 7: AI1 8: AI2 9: AI3	For details, see *"Table 3–19 Relationship between pulse output/ analog output functions and ranges" on page 562*.
F5-08	AO2 function selection	1		
Continued	Continued	Continued	10: Length 11: Count value 12: Communication setting 13: Motor speed 14: Output current (100.0% corresponds to 1000.0 A) 15: Output voltage (100.0% corresponds to 1000.0 V) 16: Output torque (directional) 19: Taper output 20: Roll diameter output 21: Tension output 22: Encoder feedback frequency	Continued

Para.	Function	Default	Value Range	Description
F5-10	AO1 zero offset coefficient	0.0%	-100.0% to +100.0%	On the AO curve, if b indicates zero offset, k indicates gain, and X indicates standard output, the actual output Y is as follows: Y = kX + b. The zero offset coefficient 100% of AO1 and AO2 corresponds to 10 V (or 20 mA). The standard output refers to the value corresponding to the analog output of 0 V to 10 V (or 0 mA to 20 mA) with no zero offset or gain adjustment. Zero offset = Zero offset coefficient x 10 V (or 20 mA) The AC drive supports two AOs, namely, AO1 and AO2. AO1 and AO2 can be used to indicate the internal running parameters in the analog mode. The indicated parameters are defined by F5-07 and F5--08.
F5-11	AO1 gain	1.00	–10.00 to +10.00	
F5-12	AO2 zero offset coefficient	0.0%	-100.0% to +100.0%	On the AO curve, if b indicates zero offset, k indicates gain, and X indicates standard output, the actual output Y is as follows: Y = kX + b. The zero offset coefficient 100% of AO1 and AO2 corresponds to 10 V (or 20 mA). The standard output refers to the value corresponding to the analog output of 0 V to 10 V (or 0 mA to 20 mA) with no zero offset or gain adjustment. Zero offset = Zero offset coefficient x 10 V (or 20 mA) The AC drive supports two AOs, namely, AO1 and AO2. AO1 and AO2 can be used to indicate the internal running parameters in the analog mode. The indicated parameters are defined by F5-07 and F5--08.

Para.	Function	Default	Value Range	Description
F5-13	AO2 gain	1.00	–10.00 to +10.00	On the AO curve, if b indicates zero offset, k indicates gain, and X indicates standard output, the actual output Y is as follows: Y = kX + b. The zero offset coefficient 100% of AO1 and AO2 corresponds to 10 V (or 20 mA). The standard output refers to the value corresponding to the analog output of 0 V to 10 V (or 0 mA to 20 mA) with no zero offset or gain adjustment. Zero offset = Zero offset coefficient x 10 V (or 20 mA) The AC drive supports two AOs, namely, AO1 and AO2. AO1 and AO2 can be used to indicate the internal running parameters in the analog mode. The indicated parameters are defined by F5-07 and F5--08.

The AO ranges from 0 V to 10 V (0% to 100%). When the AO output function is set to 1 (frequency setting), and the AC drive frequency is set to 50% of the maximum frequency, the output voltage of the AO is 5 V (50% x 10 V).

Table 3–19 Relationship between pulse output/analog output functions and ranges

Value	Function	Value Range
0	Running frequency	0% to 100.0% (maximum output frequency set by F0-10)
1	Frequency reference	0 to maximum output frequency
2	Output current	0% to 100% (twice the rated motor current)
3	Motor output torque	0% to 100% (twice the rated motor torque; absolute value, a percentage of the rated motor torque)
4	Output power	0% to 100% (twice the rated motor power)
5	Output voltage	0% to 100% (1.2 times the rated motor voltage)
6	Pulse input	0.01 kHz to 100.00 kHz. 100% corresponds to 100.00 kHz.
7	AI1	–10 V to +10 V. 100% corresponds to +10 V.
8	AI2	–10 V to +10 V (or 0 mA to 20 mA). 100% corresponds to +10 V.
9	AI3	0 V to +10 V (or 0 mA to 20 mA). 100% corresponds to +10 V.

Value	Function	Value Range
10	Length	0% to 100.0% (maximum length set by FB-05)
11	Count value	0% to 100.0% (maximum count value set by FB-08)
12	Communication	0.0% to 100.0% (AO communication)
13	Motor speed	0.0% to 100.0% (maximum output frequency F0-10)
14	Output current	0.0 A to 1000.0 A. 100.0% corresponds to 1000.0 A.
15	Output voltage	0.0 V to 1000.0 V. 100% corresponds to 1000.0 V.
16	Output torque of the motor (actual value, a percentage of the rated motor torque)	0% (twice the rated motor torque in reverse direction) to 100% (twice the rated motor torque in forward direction). 50% corresponds to 0.
19	Taper output	-
20	Roll diameter output	100.0% corresponds to B0-08 which specifies the maximum roll diameter.
21	Tension output	100.0% corresponds to B1-02 which specifies the maximum tension.
22	Encoder feedback frequency	100.0% corresponds to the value of F0-10 which specifies the maximum frequency.

The following is an example of how to calculate the AO zero offset coefficient (F5-10) and AO gain (F5-11):

Assume that the AO outputs the running frequency, and the rectified output needs to be 8 V (Y1) when frequency is 0 Hz (X1) and 4 V (Y2) when frequency is 40 Hz (X2).

Gain formula:

$$K = \frac{(Y1\text{-}Y2) \text{ x } Xmax}{(X1\text{-}X2) \text{ x } Ymax}$$

Zero offset coefficient formula:

$$b= \frac{(X1 \text{ x } Y2)(\text{-}X2 \text{ x } Y1)}{(X1\text{-}X2) \text{ x } Ymax} \times 100\%$$

Xmax (Max. output frequency) is 50 Hz (assuming that the maximum frequency F0-10 is 50 Hz), and Ymax (voltage) is 10 V.

In this case, AO gain (F5-11) is –0.5 and AO zero offset coefficient (F5-10) is 80%.

Table 3–20 Relationship between AO signal types and maximum values (Ymax)

Output Signal	Corresponding Max. Output (Ymax)
Voltage	10 V
Current	20 mA

Table 3–21 Relationship between AO contents and maximum values (Xmax)

AO Content	Corresponding Max. Output (Xmax)
Running frequency	Max. output frequency
Frequency reference	Max. output frequency
Output current	Twice the rated motor current
Output torque (absolute value)	Twice the rated motor torque
Output power	Twice the rated power
Output voltage	1.2 times the rated AC drive voltage
Pulse input	100.00 kHz
AI1	10 V
AI2	10 V or 20 mA
AI3	10 V or 20 mA
Length	Maximum set length
Count value	Maximum count value
Communication	100.0%
Motor speed	Rotation speed corresponding to the maximum output frequency
Output current	1000.0 A
Output voltage	1000.0 V
Output torque (actual value)	Twice the rated motor torque

3.4 Control Performance

3.4.1 Setting the V/f Curve

Table 3–22 Setting parameters of linear, multi-point, and square V/f curves

Para.	Function	Default	Value Range	Description
F3-00	V/f curve setting	0	0: Linear V/f curve 1: Multi-point V/f curve 2: Square V/f curve 3: 1.2-power V/f curve 4: 1.4-power V/f curve 6: 1.6-power V/f curve 8: 1.8-power V/f curve 10: V/f complete separation mode 11: V/f half separation mode	0: Linear V/f curve Below the rated frequency, the relationship between the output voltage and output frequency of the AC drive changes linearly. This curve is applicable to common mechanical drive scenarios such as large inertia fan acceleration, punch presses, centrifuges, and water pumps. 1: Multi-point V/f curve The frequency points range from 0.00 Hz to the rated motor frequency. The voltage points range from 0.0% to 100.0%, corresponding to the voltage range from 0 V to the rated motor voltage. Generally, the multi-point V/f curve is set based on load characteristics of the motor. Ensure the following conditions are met: F3-03 ⩽ F3-05 ⩽ F3-07.

Para.	Function	Default	Value Range	Description
Continued	Continued	Continued	Continued	2: Square V/f curve Below the rated frequency, the relationship between the output voltage and the output frequency of the AC drive changes according to the square curve. This curve is applicable to scenarios with light loads that seldom change, such as fans and water pumps. 3: 1.2-power V/f curve Below the rated motor frequency, the relationship between the output voltage and the output frequency of the AC drive changes according to the 1.2-power curve. 4: 1.4-power V/f curve Below the rated motor frequency, the relationship between the output voltage and the output frequency of the AC drive changes according to the 1.4-power curve. 6: 1.6-power V/f curve Below the rated motor frequency, the relationship between the output voltage and the output frequency of the AC drive changes according to the 1.6-power curve.

Para.	Function	Default	Value Range	Description
Continued	Continued	Continued	Continued	8: 1.8-power V/f curve Below the rated motor frequency, the relationship between the output voltage and the output frequency of the AC drive changes according to the 1.8-power curve. 10: V/f complete separation mode The output frequency of the AC drive is independent from its output voltage. The output frequency is determined by the frequency source, and the output voltage is determined by the voltage source for V/f separation. This mode is typically applicable to scenarios such as motor torque control. 11: V/f half separation mode In this mode, the voltage is proportional to the frequency. The proportional relationship can be set through the voltage source, and the relationship between the voltage and the frequency is also related to the rated motor voltage and the rated motor frequency in group 1. If the voltage source input is X (0 to -100%), the relationship between the voltage and the frequency is as follows: V/f = 2 x X x (Rated motor voltage)/(Rated motor frequency)
F3-01	Torque boost	Model dependent	0.0 to 30.0 0.0%: Automatic torque boost	The torque boost function is generally applicable to the AC drive at low frequency. In V/f control mode, the output torque of the AC drive is proportional to the frequency. Under the condition of low frequency, the torque of the motor is very low when the motor runs at low speed. The output voltage of the AC drive can be increased through this parameter, thereby increasing the current and output torque. Set this parameter to a moderate level to avoid triggering the overload protection.
F3-02	Cutoff frequency of torque boost	50.00 Hz	0.00 Hz to the maximum frequency	When the running frequency reaches the cutoff frequency of torque boost, the torque boost function is disabled.

Para.	Function	Default	Value Range	Description
F3-03	Multi-point V/f frequency 1	0.00 Hz	0.00 Hz to F3-05	-
F3-04	Multi-point V/f voltage 1	0.0%	0.0% to 100.0%	
F3-05	Multi-point V/f frequency 2	0.00 Hz	F3-03 to F3-07	
F3-06	Multi-point V/f voltage 2	0.0%	0.0% to 100.0%	
F3-07	Multi-point V/f frequency 3	0.00 Hz	F3-05 to rated motor frequency (F1-04)	
F3-08	Multi-point V/f voltage 3	0.0%	0.0% to 100.0%	

Linear V/f curve

The following figure shows a general constant-torque linear V/f curve.

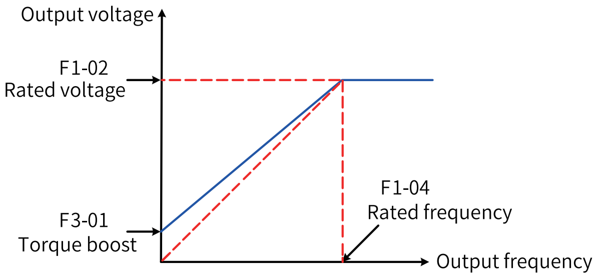


Figure 3-37 General constant-torque linear V/f curve

When the frequency is below the rated level, the output voltage changes linearly with the output frequency. This curve is applicable to general mechanical drive scenarios such as large-inertia fan acceleration, punch presses, centrifuges, and pumps.

Multi-point V/f Curve

The following figure shows a user-defined multi-point V/f curve.

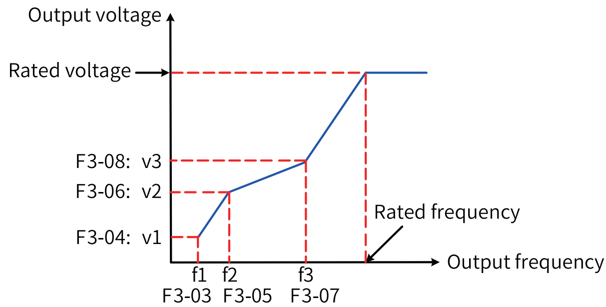


Figure 3-38 User-defined multi-point V/f curve

Parameters F3-03 to F3-08 are used to define a multi-point V/f curve. In this case, frequency points range from 0.00 Hz to the rated motor frequency. The voltage points range from 0.0% to 100%, corresponding to the voltage range from 0 V to the rated motor voltage. Generally, the multi-point V/f curve is set based on load characteristics of the motor. Ensure the following conditions are met: F3-03 ⩽ F3-05 ⩽ F3-07. To ensure correct setting, the AC drive restricts the relationship of F3-03, F3-05, and F3-07. Set F3-07 first, then F3-05, and finally F3-03.

Square V/f curve

The following figure shows a variable torque square V/f curve.

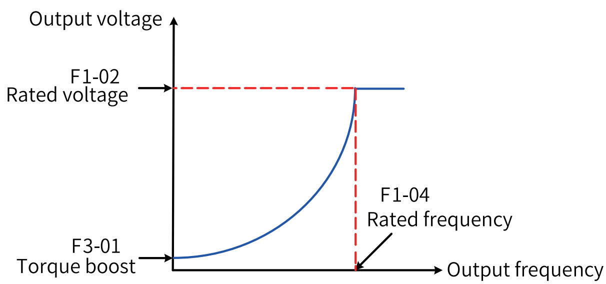


Figure 3-39 Variable torque square V/f curve

Below the rated frequency, the relationship between the output voltage and the output frequency of the AC drive changes according to the 2-power curve. This curve is applicable to scenarios with light loads that seldom change, such as fans and water pumps.

Table 3–23 Parameters of V/f separation curve

Para.	Function	Default	Value Range	Description
F3-13	Voltage source for V/f separation	0	0: Digital setting (F3-14) 1: AI1 2: AI2 3: AI3 4: Pulse reference (DI5) 5: Multi-reference 6: Simple PLC 7: PID 8: Communication Note: The value of 100.0% corresponds to the rated motor voltage.	This parameter is used to set the target voltage in the voltage and frequency separation mode. 0: Digital setting (F3-14) F3-14 (voltage digital setting for V/f separation) can be used to set the V/f separation voltage. 1: AI1 The V/f separation voltage is input through AI1 by current or voltage signal. The frequency is calculated according to the set AI curve. 2: AI2 The V/f separation voltage is input through AI2 by current or voltage signal. The frequency is calculated according to the set AI curve. 3: AI3 The V/f separation voltage is input through AI3 by current or voltage signal. The frequency is calculated according to the set AI curve.
Continued	Continued	Continued	Continued	4: Pulse reference (DI5) The V/f separation voltage is set through DI5. The frequency is calculated based on the curve of relationship between the pulse frequency and running frequency. 5: Multi-reference When multi-reference is configured as the source for V/f separation voltage, setpoints can be configured by grouping different DI states. The four multi-reference terminals can provide 16 state combinations, corresponding to 16 reference values (percentage x maximum frequency) of parameters in group FC.

Para.	Function	Default	Value Range	Description
Continued	Continued	Continued	Continued	6: Simple PLC The V/f separation voltage is set by simple PLC. For details, see the function description of simple PLC. 7: PID The V/f separation voltage is set through PID. For details, see descriptions of the PID function. 9: Communication The main frequency value is set through communication. The running frequency is input through remote communication. The AC drive must be equipped with a communication card to communicate with the host controller. This mode is suitable for remote control or centralized control on multiple devices or systems.
F3-14	Voltage digital setting for V/f separation	0 V	0 V to rated motor voltage (F1-02)	The reference value is from 0 V to the rated voltage.
F3-15	Voltage rise time of V/f separation	0.0s	0.0s to 1000.0s Note: This parameter indicates the time required for the voltage to change from 0 V to the rated motor voltage.	This parameter indicates the time required for the voltage to change from 0 V to the rated motor voltage.

Para.	Function	Default	Value Range	Description
F3-16	Voltage decline time of V/f separation	0.0s	0.0s to 1000.0s Note: This parameter indicates the time required for the voltage to change from 0 V to the rated motor voltage.	This parameter indicates the time required for the output voltage to decline from the set V/f separation voltage to 0.
F3-17	Stop mode selection for V/f separation	0	0: Frequency and voltage decline to 0 independently. 1: Frequency declines after voltage declines to 0.	0: Frequency and voltage decline to 0 independently. 1: Frequency declines after voltage declines to 0.

The voltage rise time of V/f separation is the time required for the output voltage to increase from 0 to the rated motor voltage. It is t1 in the following figure.

The voltage decline time of V/f separation is the time required for the output voltage to decline from the rated motor voltage to 0. It is t2 in the following figure.

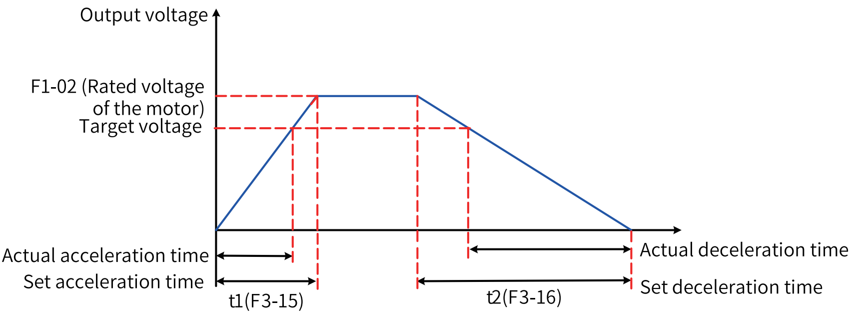


Figure 3-40 V/f separation curve

3.4.2 Output Current (Torque) Limit

During acceleration, operation at constant speed, or deceleration, if the current exceeds the overcurrent stall action current (default: 150%, indicating 1.5 times the rated AC drive current), the current limit mechanism is activated. In this case, the output frequency decreases until the current drops below the overcurrent stall action current. Then, the output frequency increases toward the target frequency. Therefore, the acceleration is prolonged. If the actual acceleration time cannot meet your requirement, increase the value of overcurrent stall action current (F3-18) accordingly.

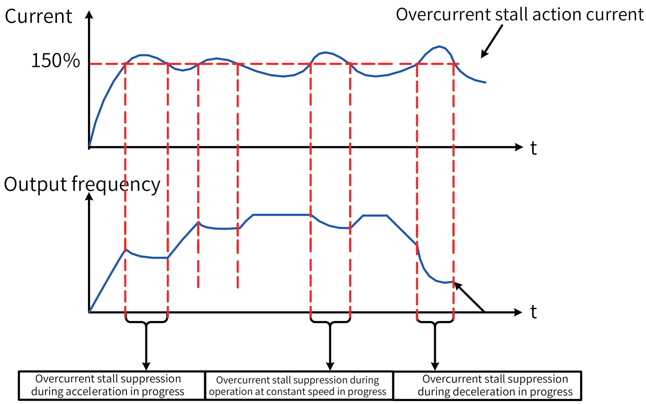


Figure 3-41 Overcurrent stall action

Table 3–24 Related parameters

Para. No.	Function	Default	Value Range	Description
F3-18	V/f overcurrent stall action current	150%	50% to 200%	When the motor current reaches this value, the AC drive starts the overcurrent stall function. The default value is 150%, corresponding to 1.5 times the rated current of the AC drive.
F3-19	V/f overcurrent stall selection	1	0: Disabled 1: Enabled	Used to enable/disable the V/f overcurrent stall function.
F3-20	V/f overcurrent stall suppression gain	20	0 to 100	When the current exceeds the overcurrent stall action current, the overcurrent stall function is enabled and the output frequency decreases. After the current falls below the overcurrent stall action current, the output frequency increases to the target frequency, which prolongs the actual acceleration automatically. A greater value of this parameter means better suppression effect.
F3-21	Compensation coefficient of V/f speed multiplying overcurrent stall action current	50%	50% to 200%	This parameter is used to reduce the overcurrent stall action current during high-speed operation. It is invalid when set to 50%. The recommended value for F3-18 in the field-weakening range is 100%.

When the frequency is high, motor drive current is small, and overcurrent stall action current can result in greater motor speed dip compared with situations when the frequency is below the rated level. To improve motor running performance, lower the overcurrent stall action current for situations when the frequency is above the rated level. This helps to improve acceleration performance and prevent motor stall in high-frequency applications with large load inertia multiple field weakening requirements, such as centrifuges.

When the frequency is above the rated level, overcurrent stall action current = (fn/fs) x k x LimitCur

In the formula, fs is the running frequency, fn is the rated motor frequency, k is the value of F3-21 (compensation coefficient of speed multiplying overcurrent stall action current), and LimitCur is the value of F3-18 (overcurrent stall action current).

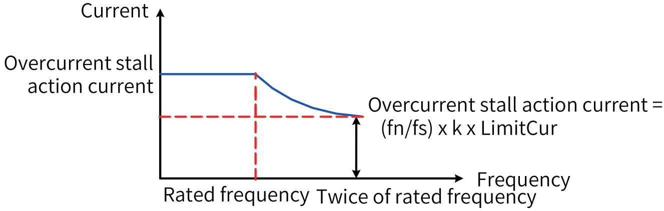


Figure 3-42 Speed multiplying overcurrent stall action current

Note

For high-power motors with carrier frequency below 2 kHz, lower the overcurrent stall action current. Otherwise, the pulse-by-pulse current limit function is enabled before the overcurrent stall prevention function as ripple current increases, resulting in insufficient torque output.

3.4.3 Overvoltage Stall Suppression

When the bus voltage exceeds the overvoltage stall suppression action voltage (F3-22), the motor becomes regenerative (motor speed > output frequency). In this case, overvoltage stall suppression is triggered to prevent overvoltage trips by adjusting the output frequency to extend the deceleration time. If the actual deceleration time cannot satisfy the requirement, increase the overexcitation gain as appropriate.

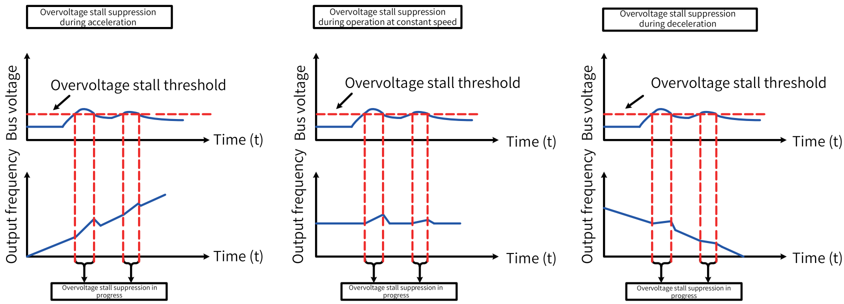


Figure 3-43 Overvoltage stall suppression action

Para. No.	Name	Default	Value Range	Description
F3-22	V/f overvoltage stall suppression action voltage	770.0 V	200.0 V to 2000.0 V	The function of F3-22 is similar to that of F9-04.
F3-23	V/f overvoltage stall suppression	1	0: Disabled 1: Enabled	0: Disabled 1: Enabled (default)
F3-24	Frequency gain for V/f overvoltage stall suppression	30	0 to 100	Increasing F3-24 will improve the bus voltage control effect, but the output frequency will fluctuate. If the output frequency fluctuates greatly, reduce F3-24 as appropriate.
F3-25	Voltage gain for V/f overvoltage stall suppression	30	0 to 100	This parameter is used to suppress the bus voltage. Increasing the parameter value reduces the overshoot of the bus voltage.
F3-26	Frequency rise threshold during overvoltage stall suppression	5 Hz	0 Hz to 50 Hz	The running frequency may increase when overvoltage stall suppression is enabled. This parameter limits the rise of the running frequency.
F3-10	V/f overexcitation gain	64	0 to 200	A larger overexcitation gain indicates better suppression effect. When a braking resistor, braking unit, or energy feedback unit is used, set this parameter to 0. Otherwise, overcurrent may occur during operation.
F3-11	V/f oscillation suppression gain	Model depend ent	0 to 100	A larger oscillation gain indicates better suppression effect.

Note

Observe the following requirements when using the braking resistor or energy feedback unit.

- Set F3–10 (Overexcitation gain) to 0. Failure to comply may lead to overcurrent during operation.
- Set F3–23 (Overvoltage stall selection) to 0. Failure to comply may prolong the deceleration time.

3.4.4 Speed Loop

The speed loop PI parameters are divided into two groups: low speed and high speed. When the running frequency is lower than F2-02 (Switchover frequency 1), the speed loop PI parameters are adjusted by F2-00 and F2-01. When the running frequency is higher than F2-05 (Switchover frequency 2), the speed loop PI parameters are adjusted by F2-03 and F2-04. If the running frequency is between switchover frequency 1 and switchover frequency 2, the speed loop PI parameters switch linearly between the two groups of PI parameters.

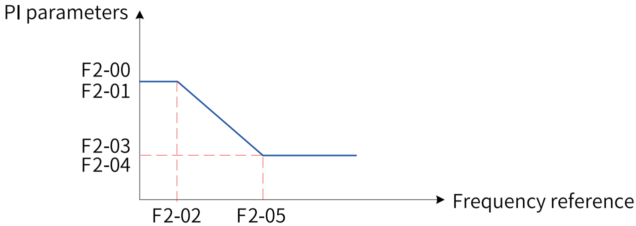


Figure 3-44 Switchover of speed loop PI parameters

You can adjust the dynamic speed response characteristic of vector control by setting the proportional factor and integral time of the speed regulator.

Increasing the proportional gain or shortening the integral time can speed up dynamic response of the speed loop. However, excessively large proportional gain or excessively short integral time may cause system oscillation.

If the factory settings cannot meet your requirements, increase the proportional gain first to ensure that the system does not oscillate, and then reduce the integral time to ensure quick system response and small overshoot.

Note

Improper PI parameter settings may lead to a high overshoot. Even worse, overvoltage may occur when overshoot drops.

Increasing the value of F2-07 can improve motor stability, but slows down dynamic response. Reducing the value of F2-07 can speed up dynamic response, but may cause motor oscillation. The default settings are applicable in most cases.

Para.	Function	Default	Value Range	Description
F2-00	Low-speed speed loop Kp	30	1 to 200	This is the PID control parameter Kp for the speed loop, which affects the response speed of the motor speed. A larger Kp value indicates higher sensitivity and more intensive tuning. A smaller Kp value indicates lower sensitivity and less intensive tuning. The low-speed speed loop Kp is effective at low speed.
F2-01	Low-speed speed loop Ti	0.500s	0.001s to 10.000s	The reciprocal of the speed loop integral time constant is the integral gain. The speed loop integral time constant affects the steady-state speed error of the motor and the stability of the speed loop system. If the speed loop integral time constant increases, the speed loop response slows down. For quicker response, a larger speed loop proportional gain is required. The low-speed speed loop Ti is effective at low speed.
F2-02	Switch over frequency 1	5.00 Hz	0.00 to F2-05	Speed loop PI parameters are divided into low-speed and high-speed groups. If the running frequency is lower than switchover frequency 1 (F2-02), the speed loop PI parameters are adjusted by F2-00 and F2-01. If the running frequency is higher than switchover frequency 2 (F2-05), the speed loop PI parameters are adjusted by F2-03 and F3-04. If the running frequency is between switchover frequency 1 and switchover frequency 2, the speed loop PI parameters switch linearly between the two groups of PI parameters. This parameter must be set to a value lower than switchover frequency 2 (F2-05).

Para.	Function	Default	Value Range	Description
F2-03	High-speed speed loop Kp	20	1 to 200	This is the PID control parameter Kp for the speed loop, which affects the response speed of the motor speed. A larger Kp value indicates higher sensitivity and more intensive tuning. A smaller Kp value indicates lower sensitivity and less intensive tuning. The high-speed speed loop Kp is effective at high speed.
F2-04	High-speed speed loop Ti	1.00s	0.01s to 10.00s	The reciprocal of the speed loop integral time constant is the integral gain. The speed loop integral time constant affects the steady-state speed error of the motor and the stability of the speed loop system. If the speed loop integral time constant increases, the speed loop response slows down. For quicker response, a larger speed loop proportional gain is required. The high-speed speed loop Ti is effective at high speed.
F2-05	Switch over frequency 2	10.00 Hz	F2-02 to F0-10	Speed loop PI parameters are divided into low-speed and high-speed groups. If the running frequency is lower than switchover frequency 1 (F2-02), the speed loop PI parameters are adjusted by F2-00 and F2-01. If the running frequency is higher than switchover frequency 2 (F2-05), the speed loop PI parameters are adjusted by F2-03 and F3-04. If the running frequency is between switchover frequency 1 and switchover frequency 2, the speed loop PI parameters switch linearly between the two groups of PI parameters. This parameter must be set to a value lower than switchover frequency 2 (F2-05).
F2-07	Speed feedback filter time	0.004s	0.000s to 0.100s	In FVC mode (F0-01 set to 1), the speed loop feedback filter time is effective. Adjusting the parameter can improve the motor stability. A larger value indicates better motor stability but slower dynamic response, and a smaller value indicates faster dynamic response. An excessively small parameter value may lead to motor oscillation. Generally, the motor stability can meet requirements, and you do not need to modify this parameter.

3.4.5 Slip Adjustment in Vector Control Mode

In vector control mode (F0-01 is set to 0 or 1), this parameter can be used to adjust the speed stability accuracy. For example, increase this parameter when the running frequency of the motor is lower than the output frequency of the AC drive.

In FVC (F0-01 is set to 1) mode, this parameter can be used to adjust output current of the AC drive. For example, decrease this parameter gradually when a high-rate AC drive is used to control a motor with low load capacity. Note: The default settings is applicable in most cases.

Para. No.	Function	Default	Value Range	Description
F2-06	VC slip compensation gain	100%	50% to 200%	In SVC mode, this parameter can be used to adjust the speed stability accuracy. For example, increase this parameter when the running frequency of the motor is lower than the output frequency of the AC drive. In FVC mode, this parameter can be used to adjust output current of the AC drive. For example, decrease this parameter gradually when a high-rate AC drive is used to control a motor with low load capacity. You do not need to change the value of this parameter in most cases.

3.4.6 Over-Excitation in Vector Control Mode

For high-inertia loads, vector control over-excitation can speed up the motor deceleration. A larger over-excitation gain means better improvement. However, vector control over-excitation increases the output current of the AC drive.

Para. No.	Function	Default	Value Range	Description
F2-08	VC deceleration over-excitation gain	64	0 to 200	-

3.4.7 Torque Upper Limit

The following table describes the torque upper limit settings for vector control (FVC or SVC).

Para. No.	Function	Default	Value Range	Description
F2-09	Torque upper limit source in speed control (motoring)	0	0: Digital setting (F2-10) 1: AI1 2: AI2 3: AI3 4: Pulse reference (DI5) 5: Communication 6: Min. (AI1, AI2) 7: Max. (AI1, AI2)	0: Digital setting (F2-10) The torque upper limit in speed control is input through digital terminals and the value is determined by F2-10 (digital setting of torque upper limit in speed control). 1: AI1 The torque upper limit in speed control is input through AI1. The frequency is calculated based on the current or voltage signal input through AI1 according to the set AI curve. 2: AI2 The torque upper limit in speed control is input through AI2. The frequency is calculated based on the current or voltage signal input through AI2 according to the set AI curve. 3: AI3 The torque upper limit in speed control is input through AI3. The frequency is calculated based on the current or voltage signal input through AI3 according to the set AI curve. 4: Pulse reference (DI5) The torque upper limit in speed control is input through DI5 (pulse frequency). The frequency is calculated based on the curve of relationship between the pulse frequency and running frequency. 5: Communication The main frequency value is set through communication. The running frequency is input through remote communication. The AC drive must be equipped with a communication card to communicate with the host controller. This channel is applicable to remote control and centralized control of multiple devices or systems. 6: Min. (AI1, AI2) The torque upper limit is the minimum input through AI1 and AI2. 7: Max. (AI1, AI2) The torque upper limit is the maximum input through AI1 and AI2.
F2-10	Digital setting of torque upper limit in speed control (motoring)	150.0%	0.0% to 200.0%	The torque upper limit under the motoring state takes the rated current of AC drive as the base value.

Para. No.	Function	Default	Value Range	Description
F2-11	Torque upper limit source in speed control (generating)	0	0: Digital setting (F2-10) 1: AI1 2: AI2 3: AI3 4: Pulse reference (DI5) 5: Communication 6: Min. (AI1, AI2) 7: Max. (AI1, AI2) 8: Digital setting (F2-12)	0: Digital setting (F2-10) The torque upper limit in speed control is input through digital terminals and the value is determined by F2-10 (digital setting of torque upper limit in speed control). 1: AI1 The torque upper limit in speed control is input through AI1. The frequency is calculated based on the current or voltage signal input through AI1 according to the set AI curve. 2: AI2 The torque upper limit in speed control is input through AI2. The frequency is calculated based on the current or voltage signal input through AI2 according to the set AI curve. 3: AI3 The torque upper limit in speed control is input through AI3. The frequency is calculated based on the current or voltage signal input through AI3 according to the set AI curve. 4: Pulse reference (DI5) The torque upper limit in speed control is input through DI5 (pulse frequency). The frequency is calculated based on the curve of relationship between the pulse frequency and running frequency. 5: Communication The main frequency value is set through communication. The running frequency is input through remote communication. The AC drive must be equipped with a communication card to communicate with the host controller. This channel is applicable to remote control and centralized control of multiple devices or systems. 6: Min. (AI1, AI2) The torque upper limit is the minimum input through AI1 and AI2. 7: Max. (AI1, AI2) The torque upper limit is the maximum input through AI1 and AI2. 8: Digital setting (F2-12) When F2-12 is set to 8, the torque upper limit in speed control is input through digital terminals.
F2-12	Torque upper limit settings in speed control (generating)	150.0%	0.0% to 200.0%	The torque upper limit under the generating state takes the rated current of AC drive as the base value.

Eight torque upper limit sources are available in speed control mode. In motoring state, the torque upper limit source is selected through F2-09; in generating state, the torque upper limit source is selected through F2-11.

In speed control mode, if F2-11 is set to 1 to 8, the torque upper limit is distinguished between the motoring state and generating state. In motoring state, the full range of torque upper limit is set through F2-10. In generating state, the full range of torque upper limit is set through F2-12.

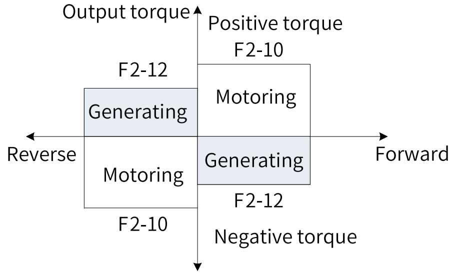


Figure 3-45 Torque upper limit in speed control mode

Para. No.	Function	Default	Value Range	Description
F2-53	Power limit selection during generating	0	0: Disabled 1: Enabled	-
F2-54	Power upper limit during generating	Model dependent	0.0% to 200.0%	-

In applications such as cam, quick acceleration/deceleration and sudden unloading without using a braking resistor, enable the power limit during generating to reduce bus voltage overshoot during motor braking so as to prevent overvoltage. F2-54 (power upper limit during generating) is a percentage to the rated motor power. If overvoltage still occurs after power limit during generating is enabled, decrease F2-54.

3.4.8 Torque Control

Para.	Function	Default	Value Range	Description
A0-00	Speed/Torque control mode	0	0: Speed control 1: Torque control	In FVC or SVC mode, speed control and torque control modes are available.
A0-01	Torque reference source	0	0: Digital setting (A0-03) 1: AI1 2: AI2 3: AI3 4: Pulse reference 5: Communication (1000H) 6: Min. (AI1, AI2) 7: Max. (AI1, AI2)	This parameter is used to set the torque setting command source. Eight torque setting channels are available.

Para.	Function	Default	Value Range	Description
A0-03	Torque digital setting	100.0%	-200.0% to +200.0%	Digital setting in the torque control mode The torque reference is a relative value. The value 100.0% corresponds to the rated motor torque. Check U0-06 to obtain the motor output torque. The torque value range is –200.0% to +200.0%, which means that the maximum torque of the AC drive is twice the rated motor torque. When the parameter value is positive, the AC drive runs in the forward direction. When the parameter value is negative, the AC drive runs in the reverse direction.
A0-04	Torque filter time	0.000s	0s to 5.000s	Torque filter time
A0-05	Speed limit digital setting	0.0%	-120.0% to +120.0%	-
A0-07	Torque acceleration time	1.00s	0.00s to 650.00s	-
A0-08	Torque deceleration time	1.00s	0.00s to 650.00s	-
A0-09	Speed limit reference source	0	0: Set through A0-05 1: Frequency source setting	-
A0-10	Speed limit offset	5.00	0 to max. frequency (F0-10)	-
A0-11	Effective mode of speed limit offset	1	0: Bidirectional offset effective 1: Unidirectional offset effective 2: Window mode	-
A0-12	Frequency acceleration time	1.0s	0.0s to 6500.0s	-

Para.	Function	Default	Value Range	Description
A0-13	Frequency deceleration time	1.0s	0.0s to 6500.0s	-
A0-14	Torque mode switchover	1	0: No switchover 1: Switchover to speed control at stop 2: Target torque at stop being 0	-

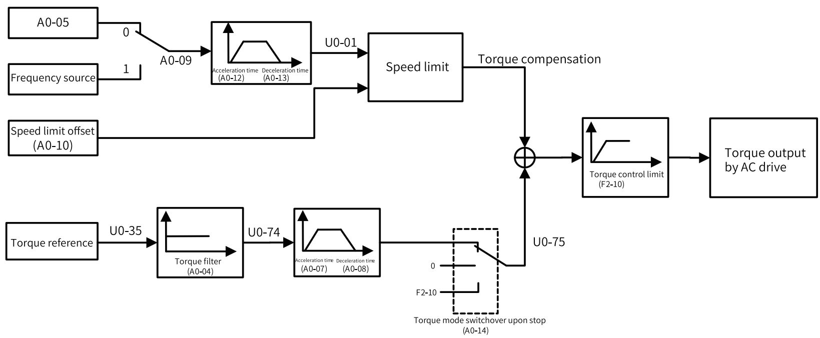


Figure 3-46 Torque control system

1. Selecting speed/torque control mode (A0-00)
   Parameter A0-00 determines whether the AC drive is in speed control or torque control mode.

   Multi-functional DIs provide two torque control functions: torque control disabling (function 29) and speed/torque control switchover (function 46). The two terminals must be used together with parameter A0-00 for switchover between speed control and torque control.

   When the speed control/torque control terminal (function 46) is disabled, the control mode is determined by A0-00. When the terminal is enabled, the control mode is reverse to that set by A0-00.

   When the torque control disabling terminal is enabled, the AC drive works in speed control mode.

2. Setting the torque reference in torque control (A0-01, A0-03)
   A0-01 is used to select a torque reference source from eight supported sources.

   The torque reference is a relative value. The value 100.0% corresponds to the rated motor torque. Check U0-06 to obtain the motor output torque. The torque value range is –200.0% to +200.0%, which means that the maximum torque of the AC drive is twice the rated motor torque.

3. Setting the frequency upper limit in torque control (A0-05, A0-09, A0-10, and A0-11)
   In torque control mode, the frequency upper limit can be set through A0-05 or the frequency source, depending on the value of A0-09.

4. Setting the frequency upper limit acceleration time (A0-12) and deceleration time (A0-13)
   In torque control mode, if the load torque is lower than the motor output torque, the motor speed keeps increasing. To prevent runaway or other incidents of the mechanical system, limit the maximum motor speed in torque control mode. That is, set the frequency upper limit in torque control.

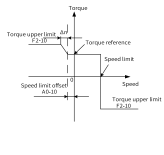
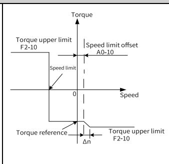
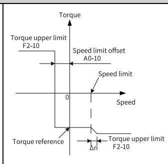
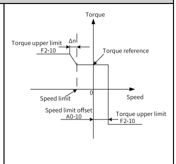
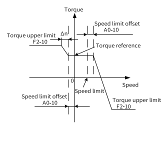
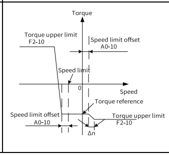
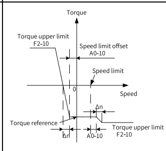
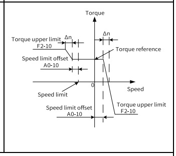
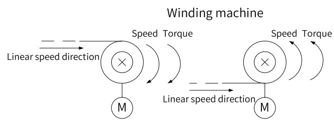
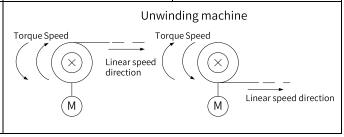
5. Setting the torque acceleration/deceleration time (A0-07, A0-08)
   In torque control, the difference between the motor output torque and the load torque determines the speed change rate of the motor and load. Therefore, the motor rotational speed may change sharply, resulting in noise or excessive mechanical stress. Setting an appropriate torque acceleration/deceleration time can ensure stable change of the motor rotational speed. The torque acceleration time is the time required for the output torque to increase from 0 to A0-03, and the torque deceleration time is the time required for the output torque to decrease from A0-03 to 0.

   For torque control with low startup torque, do not set the torque acceleration/deceleration time. In a scenario requiring fast torque change, set the torque acceleration/deceleration time to 0.00s.

   For example, assume that one load is driven by two motors. To balance the load of the two motors, set one drive as the master in speed control and set the other one as the slave in torque control. The slave will follow the output torque of the master as its torque reference, which requires quick response to the master output torque. In this case, set acceleration/deceleration time of the slave in torque control to 0.00s.

Table 3–25 Speed limit/Speed limit offset

Item	Operating Condition			
Command	Forward	Forward	Forward	Forward
Torque reference direction	+	-	-	+
Speed limit direction	+	-	+	-
Normal operation direction	Forward	Reverse	Forward	Reverse

Item	Operating Condition			
Unidirectional speed limit offset (A0-11 is set to 1)				
Bidirectional speed limit offset (A0-11 is set to 0)				
Example				

3.4.9 Current Loop

Current loop PI parameters for vector control are divided into low-speed and high-speed groups. These parameters can be automatically obtained through auto-tuning on all parameters of asynchronous motor and generally do not need to be modified.

The dimension of the current loop integral regulator is integral gain rather than integral time. A large current loop PI gain may result in oscillation of the entire control loop. In the case of severe current oscillation or torque fluctuation, manually reduce the PI proportional gain or integral gain.

Para. No.	Function	Default	Value Range	Description
F2-13	Low-speed current loop Kp adjustment	1.0	0.1 to 10.0	The value is obtained automatically through motor auto-tuning.
F2-14	Low-speed current loop Ki adjustment	1.0	0.1 to 10.0	
F2-15	High-speed current loop Kp adjustment	1.0	0.1 to 10.0	
F2-16	High-speed current loop Ki adjustment	1.0	0.1 to 10.0	

3.4.10Improving Performance of Field-Weakening Range

Para. No.	Function	Default	Value Range	Description
F2-21	Maximum output voltage coefficient	105%	100% to 110%	Indicates the boost capacity on the basis of maximum voltage of the AC drive. Increasing F2-21 improves the maximum loading capacity in motor field-weakening range, but increases motor current ripple and motor temperature. Decreasing F2-21 weakens the maximum loading capacity in motor field-weakening range, but reduces motor current ripple and motor temperature. Generally, this parameter needs no adjustment.

3.4.11FVC Running and Performance Improvement

Table 3–26 Brief procedure for setting the speed control mode in FVC mode

Procedure	Para.	Description
Check the AC drive wiring.	-	If the AC drive reports E19.00 during motor auto-tuning, check whether the AC drive wiring and motor parameter settings are correct.
Set motor parameters.	F1-01, F1-02, F1-03, F1-04, F1-05	
Set the encoder type and pulses per revolution.	F1-27, F1-28	If the AC drive reports E20.00, check whether the encoder and PG card are working properly.
Select a control mode.	F0-01	-
Perform the motor auto-tuning.	F1-37	Dynamic auto-tuning on all parameters of the asynchronous motor takes some time. Wait until this process is completed before proceeding to the next step. Dynamic auto-tuning on all parameters of the asynchronous motor is recommended (set F1-37 to 2). Before performing auto-tuning, remove the load from the motor so that the motor can reach a high speed. If the load cannot be removed from the motor (for example, motor of a crane), use static auto-tuning on all motor parameters (set F1-37 to 3).
Set the command source and frequency reference source.	F0-02, F0-03	-
Perform a trial run.	A0-00 = 0	-

Table 3–27 Brief procedure of setting the torque control mode in FVC mode

Procedure	Para.	Description
Check the AC drive wiring.	-	If the AC drive reports E19.00 during motor auto-tuning, check whether the AC drive wiring and motor parameter settings are correct.
Set motor parameters.	F1-01, F1-02, F1-03, F1-04, F1-05	
Set the encoder type and pulses per revolution.	F1-27, F1-28	If the AC drive reports E20.00, check whether the encoder and PG card are working properly.
Select a control mode.	F0-01	-
Perform the motor auto-tuning.	F1-37	Dynamic auto-tuning on all parameters of the asynchronous motor takes some time. Wait until this process is completed before proceeding to the next step. Dynamic auto-tuning on all parameters of the asynchronous motor is recommended (set F1-37 to 2). Before performing auto-tuning, remove the load from the motor so that the motor can reach a high speed. If the load cannot be removed from the motor (for example, motor of a crane), use static auto-tuning on all motor parameters (set F1-37 to 3).
Set the command source.	F0-02	-
Set the torque control parameters.	A0-00, A0-01, A0-03, A0-05	-
Perform a trial run.	-	-

Speed loop settings

If the motor oscillates or generates abnormal noise when running below the rated frequency, the speed loop gains are set too high. In this case, reduce the speed loop gains by reducing the values of F2-00 and F2-03 and increasing the values of F2-01 and F2-04.

If the system speed overshoot is high during rapid acceleration, increase the speed loop proportional gain Kp by increasing the values of F2-00 and F2-03 and reduce the speed loop integral gain Ki by increasing the values of F2-01 and F2-04.

In a winding/unwinding scenario, the roll diameter changes in inverse proportion to the motor speed. Therefore, when the roll diameter is large, increase the speed loop gain (by increasing the value of F2-00 and reducing the value of F2-01) at low speed to ensure dynamic response of the system.

For a load running at an extremely low speed (for example, a milling machine running at 0.01 Hz), ensure smooth running by increasing the speed loop gains, especially the integral gain (by increasing the value of F2-00 and reducing the value of F2-01).

Note

In scenarios with poor encoder feedback signals, the speed loop gains cannot be too high. Otherwise, the dynamic response speed of the system is affected. In this case, first take measures to improve the quality of encoder feedback signals (for example, separate power cables of the motor from signal cables of the encoder, and ensure good grounding of the system). Otherwise, directly reducing the speed loop gains will slow down dynamic response of the system, degrading the system operation performance.

Current loop settings

Current loop parameters can be automatically obtained after auto-tuning on all parameters of the asynchronous motor and generally do not need to be modified. However, you can fine tune these parameters in the following conditions:

When a motor running in FVC mode oscillates or generates abnormal noise, and this problem persists after values of the speed loop parameters are reduced, moderately reduce values of the current loop parameters (F2-13, F2-14, F2-15, and F2-16).

If the system requires a low overshoot, values of the speed loop parameters cannot be too small. In this case, if the motor oscillates or generates abnormal noise when running in FVC mode, moderately reduce values of the current loop parameters (F2-13, F2-14, F2-15, and F2-16).

Solutions to exceptions during high-speed running in FVC

FVC oscillation or running exceptions may occur when a motor runs at a high frequency (for example, above 200 Hz). In this case, use the V/f control mode at the same frequency and check whether the feedback frequency (U0-29) is the same as the frequency reference. If there is a large difference (greater than 4 Hz) between the two frequencies, the cause may be encoder signal distortion (non-orthogonal or abnormal duty cycle) or signal filtering on the PG card. Take the following measures:

Replace the encoder. Check whether the original encoder is damaged or installed incorrectly, and whether the encoder model supports the current pulse frequency.

If measures have been taken to prevent encoder signal distortion during high-speed operation, high filter capacitance of the PG card may cause a failure in receiving signals. In this case, set F1-29 properly for PG signal filtering.

Changing acceleration/deceleration time in FVC control mode

During rapid acceleration/deceleration, the actual acceleration/deceleration time is longer than the preset value. To shorten the acceleration/deceleration time, take the following measures:

To shorten the motor acceleration time, increase the torque upper limit in FVC control (moderately increase the value of F2-10, but in no case greater than 180%). Although increasing the torque upper limit can shorten the motor acceleration time, this operation leads to an increase of the motor current, which is more likely to cause faults such as overload.

Use appropriate braking resistors to shorten the deceleration time.

Limiting bus voltage to prevent overvoltage in FVC control mode

In high inertia or rapid deceleration scenarios, overvoltage often occurs during deceleration. The optimization measures are the same as those used in V/f control mode. The same parameters are used in the two modes.

3.4.12Auxiliary Control

Para. No.	Function	Default	Value Range	Description
A5-00	DPWM switchover frequency upper limit	12.00 Hz	0 to max. frequency (F0-10)	The AC drive supports two PWM modes: CPWM and DPWM. When the running frequency is higher than A5-00 (switchover frequency), the DPWM mode is used. When the running frequency is lower than A5-00 (switchover frequency), the CPWM mode is used. The DPWM mode can improve the AC drive efficiency, whereas the CPWM mode can reduce motor noise. Increasing parameter A5-00 to max. frequency will reduce motor noise.
A5-01	PWM modulation mode	0	0: Asynchronous modulation 1: Synchronous modulation 2: Synchronous modulation mode 2 3: Synchronous modulation mode 3	When the result of the carrier frequency divided by the running frequency is less than 10, output current oscillation or large current harmonic may occur. To reduce the current harmonic, set this parameter to 1 (synchronous modulation). 0: Asynchronous modulation This mode is used when the carrier frequency is not synchronized with the signal wave frequency. Usually, the carrier frequency is kept unchanged, and the carrier ratio changes with the signal wave frequency. 1: Synchronous modulation This mode is used when the carrier frequency is synchronized with the signal wave frequency. Usually, the carrier frequency and signal frequency change simultaneously, and therefore the carrier ratio remains unchanged. In this case, a set number of transverse SPWM pulses are generated in a given period, leading to good symmetry of the equivalent sine wave. 2: Synchronous modulation mode 2 3: Synchronous modulation mode 3
A5-03	Random PWM depth	0	0: Random PWM invalid 1 to 10: Random PWM depth	To reduce motor noise, set A5-03 to a value other than 0. A large value means better effect of noise reduction. However, an excessively-large value may affect motor control. Therefore, set this parameter to 1 first during commissioning and then increase it by 1 each time based on the field application.

3.4.13Encoder Signal Processing

The PG card of the AC drive supports programmable filtering of encoder signals.

Para. No.	Function	Default	Value Range	Description
F1-29	PG signal filter	1	0 to 3	This parameter is used to set the filter mode.

- 0: Non-adaptive filter
  The filter coefficient of the PG card is fixed and small. This filter mode is applicable to scenarios with low or no interference, or high-speed applications.
- 1: Adaptive filter
  The filter coefficient of the PG card can be adjusted automatically. This filter mode has a strong interference-resistant capability, especially when the encoder feedback frequency is lower than 100 kHz. This mode is suitable for scenarios with high interference. This mode is enabled by default.
- 2: Fixed interlock
  This mode adds the capability to eliminate encoder feedback signal edge jitter on the basis of adaptive filter. It is applicable to scenarios where encoder feedback signals have jitter at the edge.
- 3: Automatic interlock
  The PG card automatically switches between adaptive filter and fixed interlock to adapt to zero-speed running and non-zero-speed running. This mode prevents the fixed interlock function from mistakenly recognizing and eliminating valid signals as edge jitter during zero-speed running.

Table 3–28 Encoder disconnection detection

Para. No.	Function	Default	Value Range	Description
F1-36	PG open circuit detection	0	0: Disabled 1: Enabled	-

The PG card of the MD500-PLUS series AC drive supports encoder disconnection detection. This function is valid only for encoders with differential interfaces, and can be used to detect signals of phase A, phase B, and phase Z. If the PG card is connected only to phase A and phase B, the AC drive reports E20.00. In this case, disable encoder disconnection detection. Otherwise, the AC drive keeps reporting this error.

3.4.14Synchronous Motor in PMVVC Mode

Parameter	Name	Value Range	Default	Description
F0-01	Motor 1 control mode	0: Sensorless vector control (SVC)	0	This is open-loop vector control applied to high-performance control scenarios. One AC drive can drive only one motor. It is used for loads such as machine tools, centrifuges, wire drawing machines, and injection molding machines.
		1: Feedback vector control (FVC)		This is closed-loop vector control. An encoder must be installed at the motor end, and the AC drive must be equipped with a PG card of the same type as the encoder. It is applicable to scenarios requiring high-precision speed control or torque control. One AC drive can drive only one motor. It is used for loads such as high-speed paper machines, cranes, and elevators.
		2: Voltage/ frequency (V/f) control		This is open-loop speed control applicable to scenarios with low requirements on load control performance, such as fans and pumps. If one AC drive controls multiple motors, only the V/f control mode can be used.
		5: Open-loop speed control of synchronous motors (PMVVC)		It is suitable for loads with low precision requirements, such as fans and pumps.
F1-20	Filter time constant (for VVC)	0.003 V to 65.535 V	0.100 V	This parameter specifies the filter time constant in VVC mode.
F1-21	Oscillation suppression gain (for VVC)	0 to 65535	100	This parameter specifies oscillation suppression gain in VVC mode.

Parameter	Name	Value Range	Default	Description
F1-24	Number of motor pole pairs	0 to 65535	2	-
F3-01	Torque boost	0.0%: Automatic torque boost 0.1% to 30.0%	Model dependent	The torque boost function is generally applicable to the AC drive at low frequency. The output torque of the AC drive in V/f control mode is proportional to the frequency. Under the condition of low frequency, the torque of the motor is very low when the motor runs at low speed. The output voltage of the AC drive can be increased through this parameter, thereby increasing the current and output torque. Set this parameter to a moderate level to avoid triggering the overload protection.
A9-40	Low-speed closed-loop current selection (for VVC)	0: Disabled 1: Enabled	0	-
A9-41	Low-speed closed-loop current (for VVC)	30% to 200% (rated motor current as the base value)	50%	-
A9-42	Oscillation suppression damping coefficient (for VVC)	0 to 500	100%	-
A9-43	Initial position compensation angle (for VVC)	0 to 5	0	-

3.4.15 Synchronous Motor Electromagnetic Shorting

Electromagnetic Shorting at Start/Stop

The time sequence of start and stop signals for the "decelerate to stop" or "coast to stop" mode is shown in the following figure.

- Set the "electromagnetic shorting time at stop" to a non-zero value to enable the electromagnetic shorting function. In this case, electromagnetic shorting is performed with the maximum current limit (relative to the rated peak current of the motor) defined by F6-26 after the motor decelerates to the frequency defined by F6-11. The electromagnetic shorting function is also limited by the rated peak current of the AC drive.
- DC braking is not available. Only electromagnetic shorting is available for braking of synchronous motors.

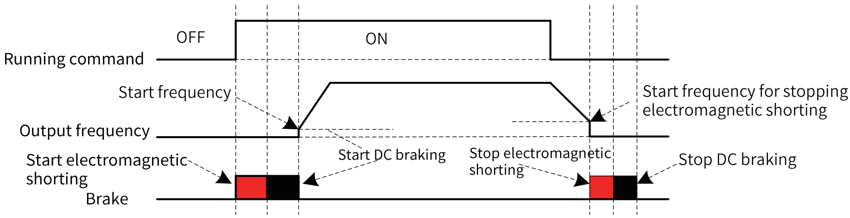


Figure 3-47 Timing diagram of start/stop function

DI terminal electromagnetic shorting

The time sequence of the electromagnetic shorting signals of DI terminals for the "decelerate to stop" or "coast to stop" mode is shown in the following figure.

Note

When electromagnetic shorting is selected for the DI, avoid electromagnetic shorting upon start/stop.

The priority of electromagnetic shorting/DC braking state is lower than that of the start signal.

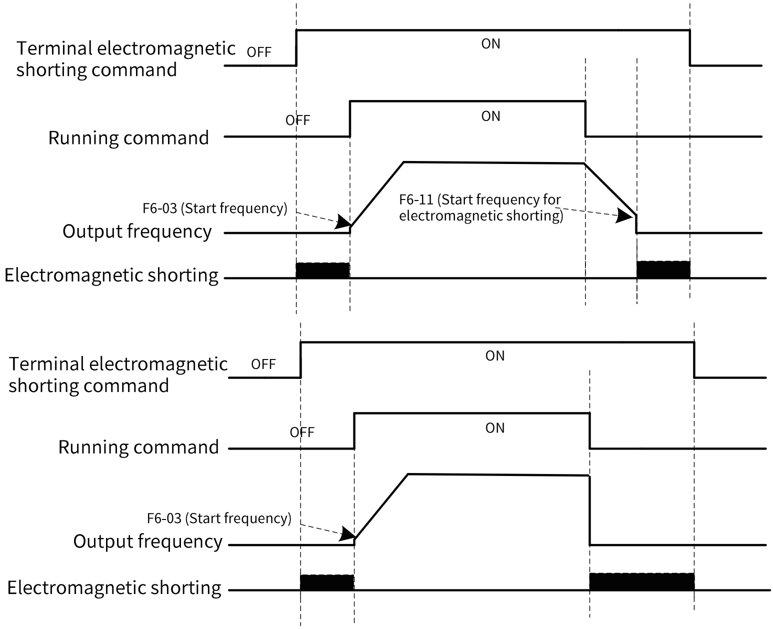


Figure 3-48 Timing diagram of DI terminal electromagnetic shorting

Electromagnetic shorting triggered by faults

Actions upon occurrence of the following faults can be set to "stop at electromagnetic shorting" (for synchronous motor only).

- E11 external fault
- E19 auto-tuning fault
- E20 encoder disk fault
- E27 and E28 user-defined faults
- E42 excessive speed deviation fault
- E43 overspeed fault

Method: Take the external fault as an example. Set the ten thousands position of F9-48 to 3 to enable electromagnetic shorting E11 fault.

This function is applicable to scenarios where a synchronous motor, such as a wire drawing machine, requires fast stop protection.

Parameters

Para.	Name	Value Range	Default
F6-26	Electromagnetic shorting current	0% to 200%	100%
F6-27	Electromagnetic shorting time upon startup	0.0s to 100.0s	0.0s
F6-28	Electromagnetic shorting time upon stop	0.0s to 100.0s	0.0s
F6-11	Start frequency of DC braking at stop	0.00 Hz to F0-10 (Maximum frequency)	0.00 Hz

3.4.16Wobble Control Function

The wobble function means the output frequency wobbles up and down around the frequency reference (set through F0-07). This function is applicable to textile industry and chemical fiber industry, as well as scenarios where horizontal movement and winding are required.

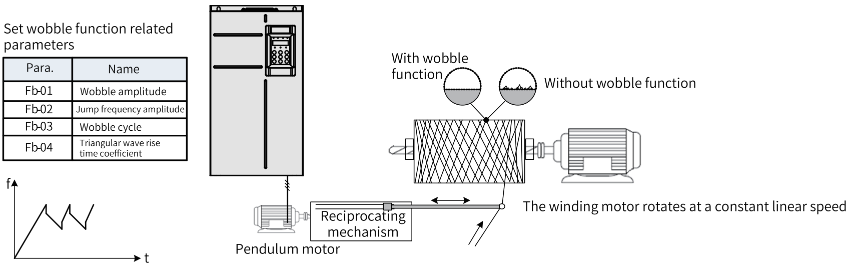


Figure 3-49 Wobble application

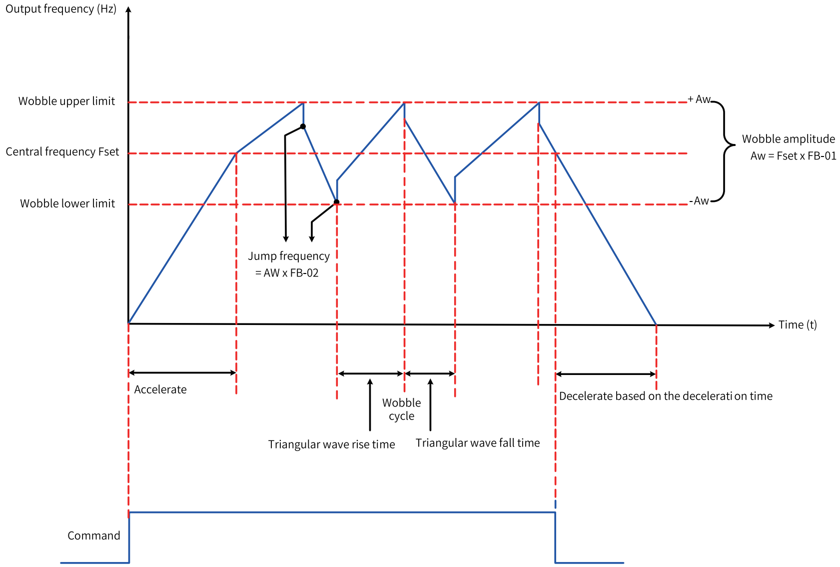


Figure 3-50 Working principle of wobble

Table 3–29 Related parameters

Para. No.	Function	Default	Value Range	Description
Fb-00	Wobble setting mode	0	0: Relative to central frequency 1: Relative to max. frequency	0: Relative to central frequency (F0-07: final frequency reference setting selection): It is a variable wobble system and the wobble changes with the central frequency (frequency reference). 1: Relative to max. frequency (F0-10: max. frequency): It is a fixed wobble system and the wobble is calculated based on the maximum frequency.
Fb-01	Wobble amplitude	0.0%	0.0% to 100.0%	When Fb-01 is set to 0, the wobble function is disabled.
Fb-02	Jump frequency amplitude	0.0%	0.0% to 50.0%	Used to determine the wobble amplitude and jump frequency. The wobble running frequency is limited by the frequency upper limit and frequency lower limit.
Fb-03	Wobble cycle	10.0s	0.1s to 3000.0s	Time of a complete wobble cycle.
Fb-04	Triangular wave rise time coefficient	50.0%	0.1% to 100.0%	Ratio (in percentage) of triangular wave rise time to wobble cycle (Fb-03)

1. Wobble amplitude calculation

   When Fb-00 is set to 0 (relative to central frequency), wobble amplitude AW is calculated according to the following formula: AW = Frequency reference source (F0-07) x Wobble amplitude (Fb-01).

When Fb-00 is set to 1 (relative to max. frequency), wobble amplitude AW is calculated according to the following formula: AW = Max. frequency (F0-10) x Wobble amplitude (Fb-01).

2. Jump frequency calculation
   In the wobble mode, the jump frequency is a value relative to AW, namely, Jump frequency = AW x Jump frequency amplitude (Fb-02).

   When Fb-00 is set to 0 (relative to central frequency), the jump frequency is a variable value.

   When Fb-00 is set to 1 (relative to max. frequency), the jump frequency is a fixed value.

3. Triangular wave rise/fall time calculation
   Triangular wave rise time = Fb-03 (Wobble cycle) x Fb-04 (Triangular wave rise time coefficient, unit: s)

   Triangular wave fall time = Fb-03 (Wobble cycle) x (1 - Fb-04 (Triangular wave rise time coefficient, unit: s))

   (Wobble cycle = Triangular wave rise time + Triangular wave fall time)

3.4.17Fixed Length Control Function

The AC drive supports fixed length control in which the length pulses can be collected by DI5 only, which requires DI5 to be assigned with function 27 (length count input).

Para. No.	Function	Default	Value Range	Description
Fb-05	Set length	1000 m	0 m to 65535 m	Used to set the length value to be controlled in the fixed length control mode.
Fb-06	Actual length	0 m	0 m to 65535 m	The actual length is a monitored value. Actual length (Fb-06) = Number of pulses sampled by DI/Number of pulses per meter (Fb-07)
Fb-07	Number of pulses per meter	100.0	0.1 to 6553.5	The number of pulses output per meter. The length pulses can be sampled by DI5 if DI5 is assigned with function 27 (length count input) (set F4-04 to 27).

In the following figure, actual length is a monitored value. Actual length (Fb-06) = Number of pulses sampled by DI/Number of pulses per meter (Fb-07). When actual length (Fb-06) exceeds the set length (Fb-05), the relay or DO terminal assigned with function 10 outputs a "length reach" active signal. Length reset can be implemented through the multi-functional DI terminal assigned with function 28 (length reset). The following figure shows how to set the parameters for this function.

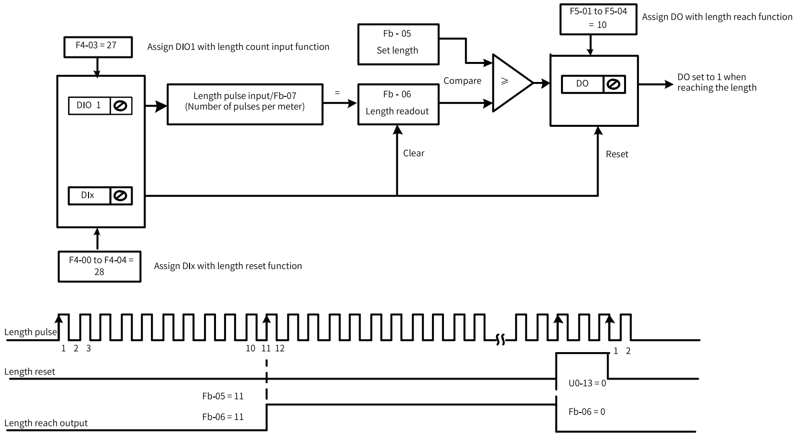


Figure 3-51 Fixed length

Para. No.	Name	Value	Description
F4-04	DI5 function selection	27	Length count input
F4-00 to F4-09 (any one)	DI1 to DI10 function selection (any one)	28	Length reset
F5-01 to F5-05 (any one)	Terminal output function selection (any one)	10	Length reach

In the fixed length control mode, direction cannot be obtained, and only length can be calculated according the number of pulses. An automatic stop system can be implemented by feeding the output length reach T/A-T/B signal from relay to the stop input terminal of the AC drive.

3.4.18Count Function

A DI terminal is needed to collect the count value (a DI5 terminal must be used in case of high pulse frequency). Assign the DI terminal with function 25 (counter input).

Para. No.	Function	Default	Value Range	Description
Fb-08	Set count value	1000	1 to 65535	When the count value reaches Fb-08, the multi-functional DO terminal outputs a "set count value reach" active signal.
Fb-09	Designated count value	1000	1 to 65535	When the count value reaches Fb-09, the multi-functional DO terminal outputs a "designated count value reach" active signal. Fb-09 must be lower than or equal to Fb-08 (set count value).

As shown in the following figure, a DI terminal is needed to collect the count value. Assign the DI terminal with function 25 (counter input). When the count value reaches

Fb-08 (set count value), the multi-functional DO terminal outputs a "set count value reach" active signal. When the count value reaches Fb-09, the multi-functional DO outputs a "designated count value reach" active signal.

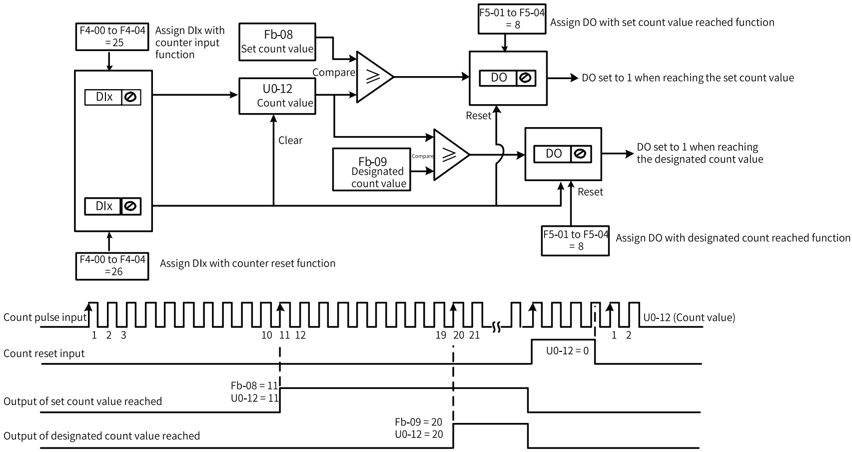


Figure 3-52 Count function

Para. No.	Name	Value	Description
F4-00 to F4-09 (any one)	DI1 to DI10 function selection (any one)	25	Counter input
F4-00 to F4-09 (any one)	DI1 to DI10 function selection (any one)	26	Counting reset
F5-01 to F5-04 (any one)	Terminal output function selection (any one)	8	Set count value reach
F5-01 to F5-04 (any one)	Terminal output function selection (any one)	9	Designated count value reach

- A DI5 terminal must be used in the case of high pulse frequency.
- One DO terminal can be assigned with either the "set count value reach" function or the "designated count value reach" function.
- When the AC drive is in RUN/STOP state, the counter keeps counting till reaching the "set count value".
- The count value is retentive at power failure.
- An automatic stop system can be implemented by feeding the output count value reach signal from DO to the stop input terminal of the AC drive.

3.4.19PID Adjustment Methods

This section describes general rules for PID parameter adjustment, which can be used as reference for adjusting closed-loop control PID parameters (FA-05 to FA-07, and FA-15 to FA-17) and speed loop PI parameters (F2-00, F2-01, F2-03, and F2-04).

1. In case of slow response, increase Kp.

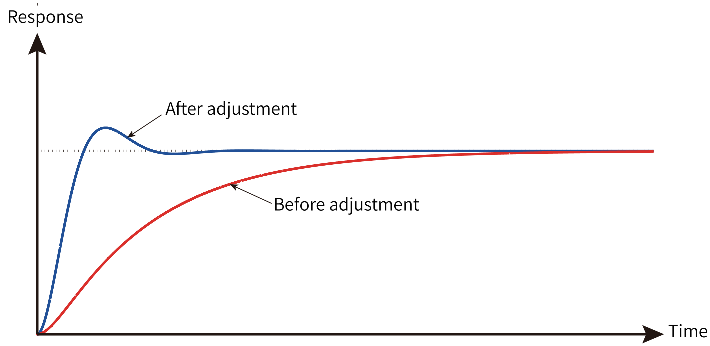


Figure 3-53 Response-time trend after increasing Kp

2. In case of frequent oscillation, reduce Kp.

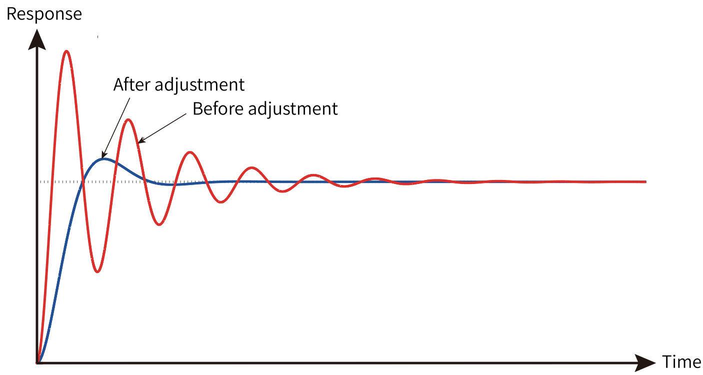


Figure 3-54 Response-time trend after decreasing Kp

3. In case of large overshoot and slow fluctuation, increase Ti.

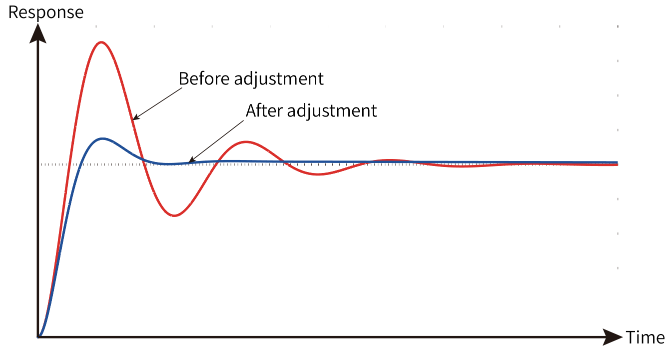


Figure 3-55 Response-time trend after increasing Ti

4. In case of large static difference and slow response at load fluctuation, increase Kp or decrease Ti.

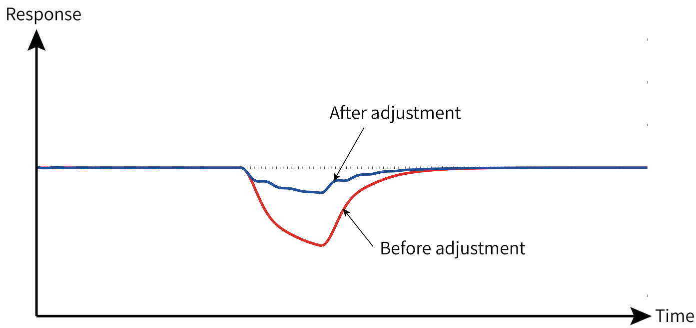


Figure 3-56 Response-time trend after increasing Kp at load fluctuation

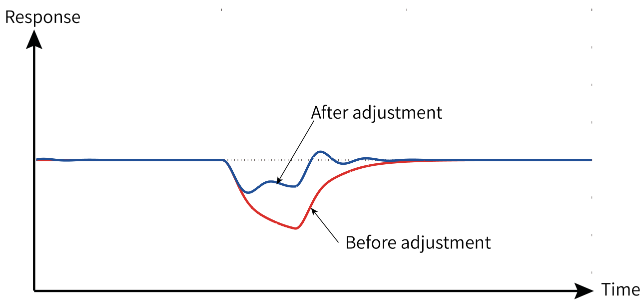


Figure 3-57 Response-time trend after decreasing Ti at load fluctuation

5. The system stability can be improved by incorporating derivative time Td properly (excessive proportion may cause interference and oscillation).

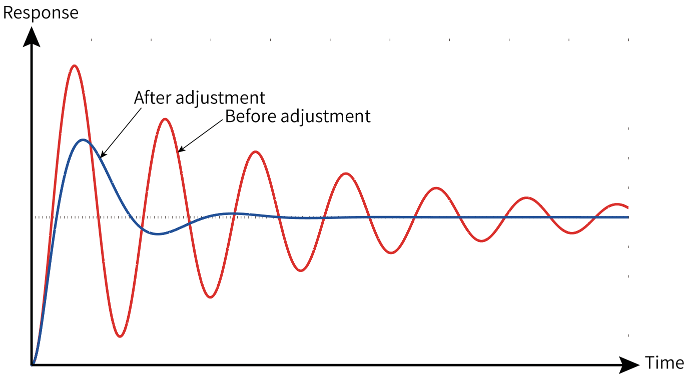


Figure 3-58 Response-time trend after incorporating Td

3.5 Application Control

3.5.1 Jog Running

In some scenarios, the AC drive needs to run in jog mode for device testing. In jog running mode, the startup mode is direct startup (F6-00 is set to 0), and the stop mode is decelerate to stop (F6-10 is set 0). The following figure shows the relationship between output frequency and acceleration/deceleration time in jog running mode.

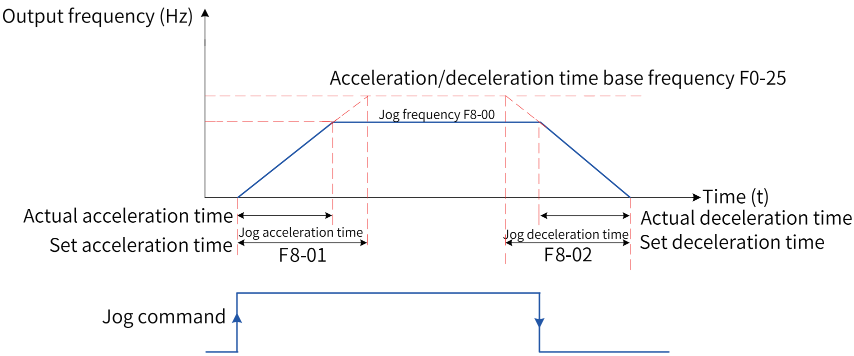


Figure 3-59 Jog running

Parameters

Para.	Function	Default	Value Range	Description
F0-02	Command source selection	0	0: Operating panel control 1: Terminal I/O control 2: Communication control	-
F0-25	Acceleration/ Deceleration time base frequency	1	0: Max. frequency (F0-10) 1: Target frequency 2: 100 Hz	-
F7-01	MF.K key function selection	0	0: MF.K key disabled 1: Switchover between operating panel control and remote control (terminal I/O control or communication control) 2: Switchover between forward and reverse run 3: Forward jog 4: Reverse jog	-
F8-00	Jog frequency	2.00 Hz	0 to the maximum frequency (F0-10)	-
F8-01	Jog acceleration time	20.0s	0.0s to 6500.0s	-
F8-02	Jog deceleration time	20.0s	0.0s to 6500.0s	-
F8-13	Reverse run control	0	0: Reverse running allowed 1: Reverse running inhibited	-
F8-27	Set highest priority to jog function	0	0: Disabled 1: Enabled	-

Example

In the following example, the operating panel is used as the jog command source to illustrate how to set the parameters for jog running.

Table 3–30 Parameter settings for jog running through the LED operation panel

Step	Forward jog	Reverse jog
1	Set F7-01 to 3 to assign the MF.K key with forward jog.	Set F7-01 to 4 to assign the MF.K key with reverse jog. Set F8-13 (reverse run control) to 0 to allow reverse run.
2	Set F0-02 (command source selection) to 0 to select the operating panel as the command source.	Set F0-02 (command source selection) to 0 to select the operating panel as the command source.

Step	Forward jog	Reverse jog
3	Set F8-00 (jog frequency), F8-01 (jog acceleration time), and F8-02 (jog deceleration time) properly.	Set F8-00 (jog frequency), F8-01 (jog acceleration time), and F8-02 (jog deceleration time) properly.
4	In stop status, when the MF.K key is pressed down, the AC drive starts to jog in the forward direction. When the MF.K key is released, the AC drive decelerates to stop.	In stop status, when the MF.K key is pressed down, the AC drive starts to jog in the forward direction. When the MF.K key is released, the AC drive decelerates to stop.

3.5.2 Frequency Detection

3.5.2.1 Multi-Speed Reference

In multi-reference mode, combinations of different DI terminal states correspond to different frequency references.

Table 3–31 Procedure of configuring multi-speed as frequency reference

Procedure	Para.	Description
Step 1: Select multi-speed as the frequency reference.	F0-03	Set F0-03 to 6.
Step 2: Set the quantity of references.	None.	A maximum of 16 references are supported, requiring four DI terminals. The relationship between the reference quantity and DI terminal quantity is as follows: Two references: one DI terminal K1 Three to four references: two DI terminals K1 and K2 Five to eight references: three DI terminals K1, K2, and K3 Nine to sixteen references: four DI terminals K1, K2, K3, and K4
Step 3: Set the multi-speed function for DI terminals.	F4-00 to F4-09	Multi-reference terminal K1: Set to 12
		Multi-reference terminal K2: Set to 13
		Multi-reference terminal K3: Set to 14
		Multi-reference terminal K4: Set to 15
Step 4: Set the frequency for each reference[Note]	FC-00 to FC-15	Set the frequency for each reference, in percentage. 100% corresponds to max. frequency F0-10.
	F0-10	When frequency reference is set to multi-speed, 100% of the parameters FC-00 to FC-15 corresponds to max. frequency F0-10.

[Note] The four multi-reference terminals can make up 16 state combinations, corresponding to 16 frequency reference values, as listed in the following table.

Table 3–32 Combinations of multi-speed terminals

K4	K3	K2	K1	Reference	Max. Frequency (%)
OFF	OFF	OFF	OFF	Multi-reference 0	FC-00
OFF	OFF	OFF	ON	Multi-reference 1	FC-01

K4	K3	K2	K1	Reference	Max. Frequency (%)
OFF	OFF	ON	OFF	Multi-reference 2	FC-02
OFF	OFF	ON	ON	Multi-reference 3	FC-03
OFF	ON	OFF	OFF	Multi-reference 4	FC-04
OFF	ON	OFF	ON	Multi-reference 5	FC-05
OFF	ON	ON	OFF	Multi-reference 6	FC-06
OFF	ON	ON	ON	Multi-reference 7	FC-07
ON	OFF	OFF	OFF	Multi-reference 8	FC-08
ON	OFF	OFF	ON	Multi-reference 9	FC-09
ON	OFF	ON	OFF	Multi-reference 10	FC-10
ON	OFF	ON	ON	Multi-reference 11	FC-11
ON	ON	OFF	OFF	Multi-reference 12	FC-12
ON	ON	OFF	ON	Multi-reference 13	FC-13
ON	ON	ON	OFF	Multi-reference 14	FC-14
ON	ON	ON	ON	Multi-reference 15	FC-15

3.5.2.2 Frequency Detection (FDT)

This function is used to set detection thresholds of output frequency and sets hysteresis for the frequency detection function. The hysteresis is effective only in deceleration. Detection hysteresis is not supported in acceleration. The following figure shows the FDT function.

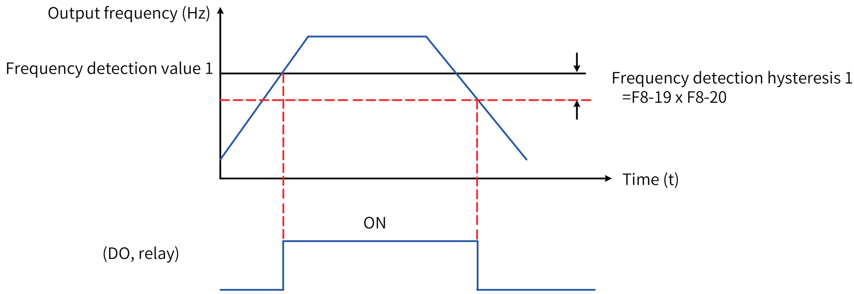


Figure 3-60 FDT

Table 3–33 FDT

Para. No.	Function	Default	Value Range	Description
F8-19	Frequency detection value (FDT1)	50.00 Hz	0 to max. frequency (F0-10)	When the running frequency is above the frequency detection value (FDT1), the DO terminal outputs the active signal. When the running frequency is below the result of the frequency detection value (FDT1) minus the frequency detection hysteresis (FDT1), the DO terminal outputs the inactive signal. The valid range is 0.00 Hz to F0-10 (max. frequency).
F8-20	Frequency detection hysteresis (FDT1)	5.0%	0.0% to 100.0%	Frequency detection hysteresis (FDT1) = F8-19 x F8-20 When the running frequency is above F8-19, the DO terminal outputs the active signal. When the running frequency is below a specific value (F8-19 - F8-19 x F8-20), the DO terminal outputs the inactive signal.
F8-28	Frequency detection value (FDT2)	50.00 Hz	0 to max. frequency (F0-10)	When the running frequency is above the frequency detection value (FDT2), the DO terminal outputs the active signal. When the running frequency is below the result of the frequency detection value(FDT2) minus the frequency detection hysteresis (FDT2), the DO terminal outputs the inactive signal. The valid range is 0.00 Hz to F0-10 (max. frequency).
F8-29	Frequency detection hysteresis (FDT2)	5.0%	0.0% to 100.0%	Frequency detection hysteresis (FDT2) = F8-28 x F8-29 When the running frequency is above F8-28, the DO terminal outputs the active signal. When the running frequency is below a specific value (F8-28 - F8-28 x F8-29), the DO terminal outputs the inactive signal.

3.5.2.3 Jump Frequency

You can set the jump frequency to enable the AC drive to avoid mechanical resonance point of load. The AC drive supports two jump frequencies. If both of them are set to 0, the jump frequency function is disabled.

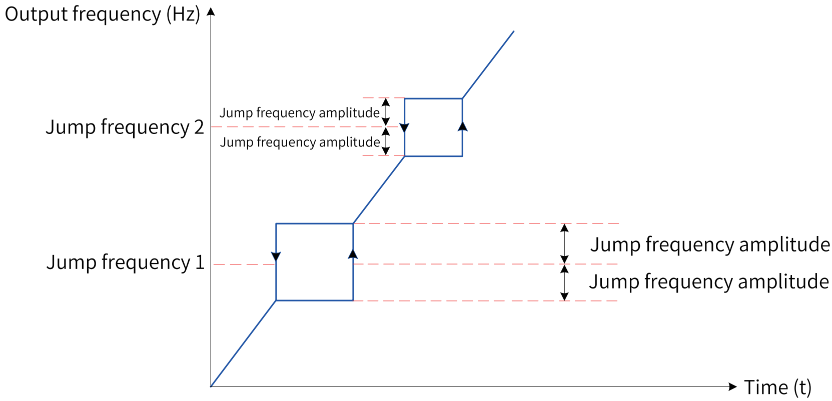


Figure 3-61 Jump frequency

In the preceding figure, when the running frequency approaches the jump frequency during acceleration, the AC drive runs for a period at the current running frequency and then jumps over the jump frequency. The jump range is twice F8-11 (jump frequency amplitude).

When the running frequency approaches the jump frequency during deceleration, the AC drive runs for a period at the current running frequency and then jumps over the jump frequency. The jump range is twice F8-11 (jump frequency amplitude).

Related parameters

Para. No.	Function	Default	Value Range	Description
F8-09	Jump frequency 1	0.00 Hz	0.00 to max. frequency (F0-10)	You can set the jump frequency to enable the AC drive to avoid mechanical resonance point of load. This parameter specifies the first jump frequency. If it is set to 0, the first frequency jump function is disabled.
F8-10	Jump frequency 2	0.00 Hz	0.00 to max. frequency (F0-10)	You can set the jump frequency to enable the AC drive to avoid mechanical resonance point of load. This parameter specifies the second jump frequency. If it is set to 0, the second frequency jump function is disabled.

Para. No.	Function	Default	Value Range	Description
F8-11	Jump frequency amplitude	0.00 Hz	0.00 Hz to 5.00 Hz	When the running frequency approaches the jump frequency during acceleration, the AC drive runs for a period at the current running frequency and then jumps over the jump frequency. The jump range is twice F8-11 (jump frequency amplitude). When the running frequency approaches the jump frequency during deceleration, the AC drive runs for a period at the current running frequency and then jumps over the jump frequency. The jump range is twice F8-11 (jump frequency amplitude).
F8-22	Enabling/ Disabling the jump frequency during acceleration and deceleration	0	0: Disabled 1: Enabled	Used to enable or disable the jump frequency function during acceleration/deceleration. If this parameter is set to 0, when the running frequency approaches the jump frequency during acceleration/ deceleration, the AC drive continues running at the current frequency. If this parameter is set to 1, when the running frequency approaches the jump frequency during acceleration/ deceleration, the AC drive jumps over the jump frequency. The jump range is twice F8-11 (jump frequency amplitude).

3.5.2.4 Reverse Frequency Inhibition

You can set F8-13 to disable reverse frequency. The following figure shows the diagram of disabling reverse frequency.

The motor rotation direction is set through F0-09. By editing F0-09, you can change the motor rotation direction without changing motor wiring. Editing this parameter is equivalent to exchanging any two of the motor U, V, W cables.

Note

After the parameter is initialized, the original rotation direction of the motor is resumed. Exercise cautions when using this function if motor rotation direction change is prohibited after system commissioning is complete.

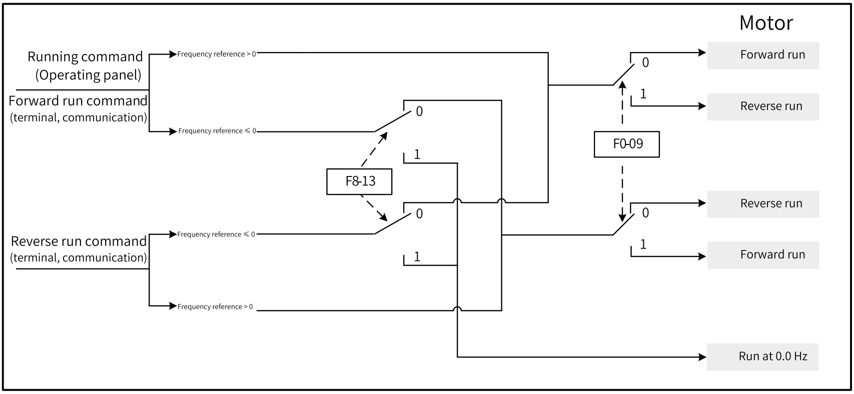


Figure 3-62 Reverse frequency inhibition

Related parameters

Para. No.	Function	Default	Value Range	Description
F8-13	Reverse run enable	0	0: Reverse running allowed 1: Reverse running inhibited	When F8-13 is set to 0, enter a reverse command to the AC drive and the motor will run at zero frequency.
F0-09	Running direction selection	0	0: Default direction 1: Opposite to the default direction	You can change the rotation direction of the motor by editing this parameter without changing the motor wiring. Editing this parameter is equivalent to changing any two of the motor's U, V, W wires.

3.5.2.5 Detection Width for Frequency Reach

You can use F8-21 to set the detection width for frequency reach. The following figure shows the timing diagram of this function.

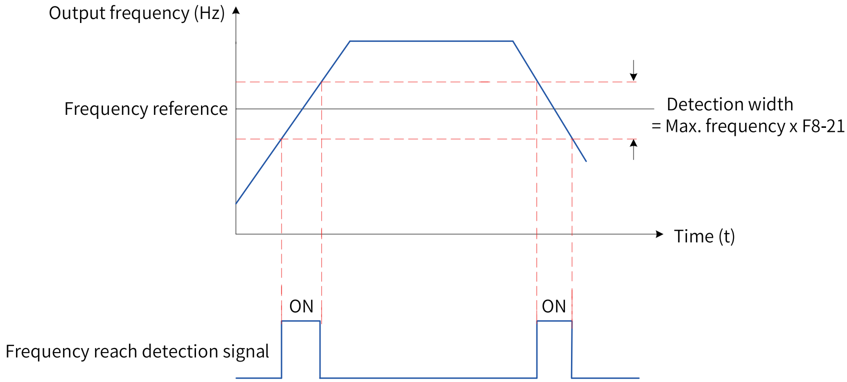


Figure 3-63 Sequence of detection width for frequency reach

Related parameter

Para. No.	Function	Default	Value Range	Description
F8-21	Detection Width for Frequency Reach	0.00%	0.00% to 100.00% (max. frequency)	Numeric value of detection width for frequency reach = F8-21 (detection width for frequency reach) x F0-10 (max. frequency). The DO terminal outputs the active signal when the running frequency of the AC drive is in the specific range (Frequency reference±F0-10 x F8-21).

3.5.2.6 Switchover Frequency of Acceleration/Deceleration Time

This function is used to switch the acceleration/deceleration time based on the running frequency range when the AC drive is running.

The following figure shows acceleration/deceleration time switchover. During acceleration, acceleration time 2 is selected if the running frequency is below F8-25, and acceleration time 1 is selected if the running frequency is above F8-25. During deceleration, deceleration time 1 is selected if the running frequency is above F8-26, and deceleration time 2 is selected if the running frequency is below F8-26.

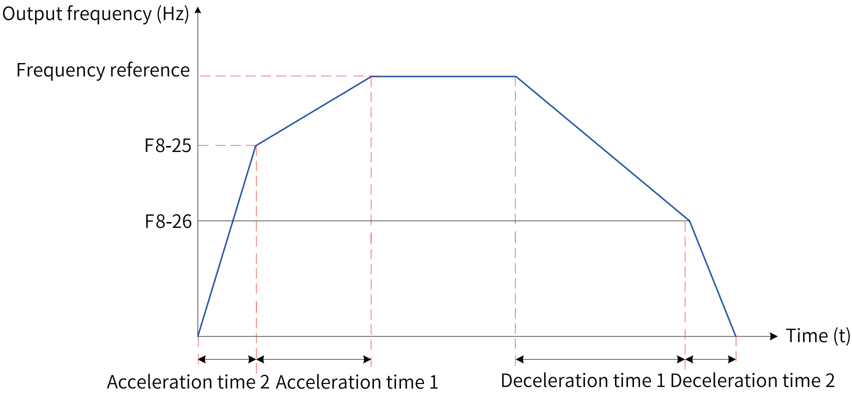


Figure 3-64 Switchover of acceleration/deceleration time

This function is active when the DI is not allocated with function 16 (acceleration/deceleration time selection terminal 1) or 17 (acceleration/deceleration time selection terminal 2).

Parameters

Para.	Parameter Name	Default	Value Range	Description
F8-25	Switchover frequency of acceleration time 1 and acceleration time 2	0.00Hz	0 to the maximum frequency (F0-10)	This function is used to switch the acceleration/deceleration time based on the running frequency range when the AC drive is running. This function is active when the DI is not allocated with function 16 (acceleration/deceleration time selection terminal 1) or 17 (acceleration/deceleration time selection terminal 2). The valid range is from 0.00 Hz to the maximum frequency (F0-10).
F8-26	Switchover frequency of deceleration time 1 and deceleration time 2	0.00Hz	0 to the maximum frequency (F0-10)	

3.5.2.7 Detection Value for Frequency Reach

The DO terminal outputs the active signal when the running frequency of the AC drive is within the range of the detection value for frequency reach plus or minus the detection width for frequency reach.

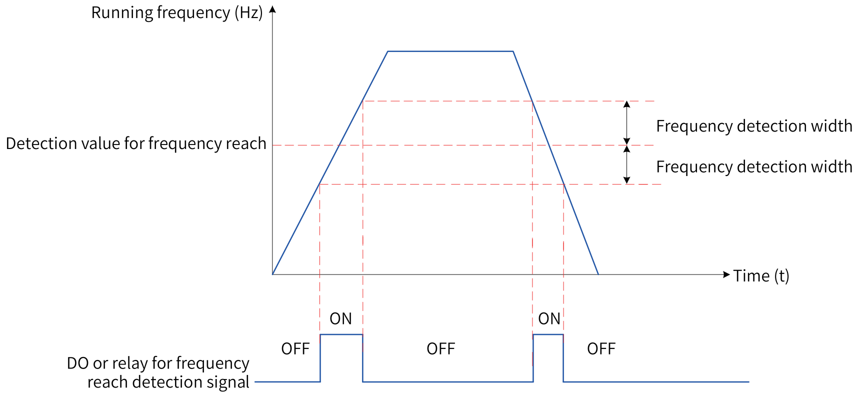


Figure 3-65 Detection of frequency reach

Related parameters

Para. No.	Function	Default	Value Range	Description
F8-30	Detection value for frequency reach 1	50.00 Hz	0 to max. frequency (F0-10)	When the running frequency is in the frequency detection range, the DO terminal outputs the active signal. The valid range is 0.00 Hz to F0-10 (max. frequency).
F8-31	Detection width for frequency reach 1	0.0%	0.0% to 100.0%	Numeric value of detection width for frequency reach 1 = F0-10 (max. frequency) x F8-31 Frequency detection range = F8-30 (detection value for frequency reach 1)±F8-31 (detection width for frequency reach 1) x F0-10 (max. frequency)
F8-32	Detection value for frequency reach 2	50.00 Hz	0 to max. frequency (F0-10)	When the running frequency is in the frequency detection range, the DO terminal outputs the active signal. The valid range is 0.00 Hz to F0-10 (max. frequency).
F8-33	Detection width for frequency reach 2	0.0%	0.0% to 100.0%	Numeric value of detection width for frequency reach 2 = F0-10 (max. frequency) x F8-33 Frequency detection range = F8-32 (detection value for frequency reach 2)±F8-33 (detection width for frequency reach 2) x F0-10 (max. frequency)

3.5.3 Current Detection

3.5.3.1 Zero Current Detection

The DO outputs the active signal when the output current of the AC drive remains at or below F8-34 (zero current detection level) for a period greater than the value of F8-35 (zero current detection delay).

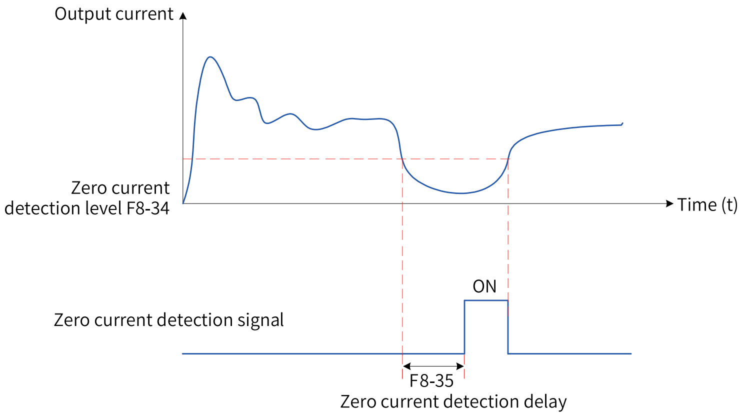


Figure 3-66 Zero current detection

Related parameters

Para. No.	Function	Default	Value Range	Description
F8-34	Zero current detection level	5.0%	0.0% to 300.0% (rated motor current)	The DO outputs the active signal when the output current of the AC drive remains at or below F8-34 (zero current detection level) for a period greater than the value of F8-35 (zero current detection delay).
F8-35	Zero current detection delay	0.10s	0.00s to 600.00s	

3.5.3.2 Output Current Limit Violation

The DO terminal outputs the active signal when the output current of the AC drive remains above F8-36 (output limit violation threshold) for a period greater than the value of F8-37 (output overcurrent detection delay).

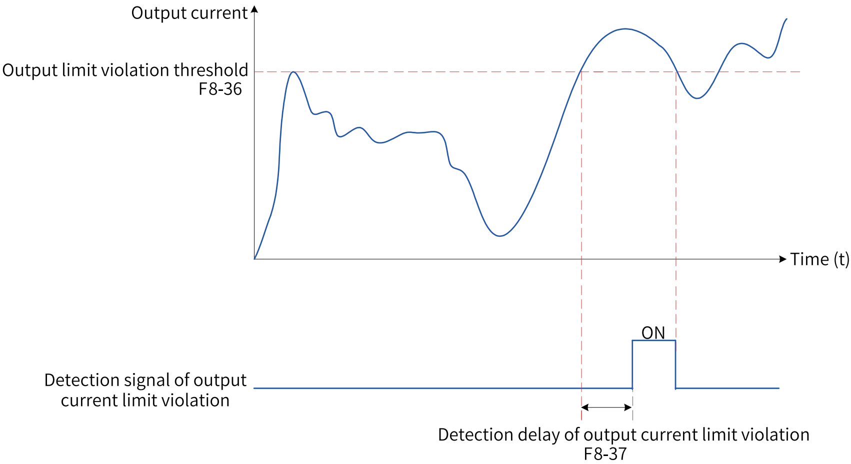


Figure 3-67 Detection of output current limit violation

Related parameters

Para. No.	Function	Default	Value Range	Description
F8-36	Output overcurrent threshold	200.0%	0.0% (no detection) 0.1% to 300.0% (rated motor current)	The DO terminal outputs the active signal when the output current of the AC drive remains above F8-36 (output current threshold) for a period greater than the value of F8-37 (output overcurrent detection delay).
F8-37	Output overcurrent detection delay	0.00s	0.00s to 600.00s	

3.5.3.3 Detection Level of Current

The DO terminal outputs the active signal when the output current of the AC drive is within the range of "Detection level of current 1±Detection width of current 1 x Rated motor current".

The AC drive supports two sets of current detection levels and current detection widths. The following figure shows the function.

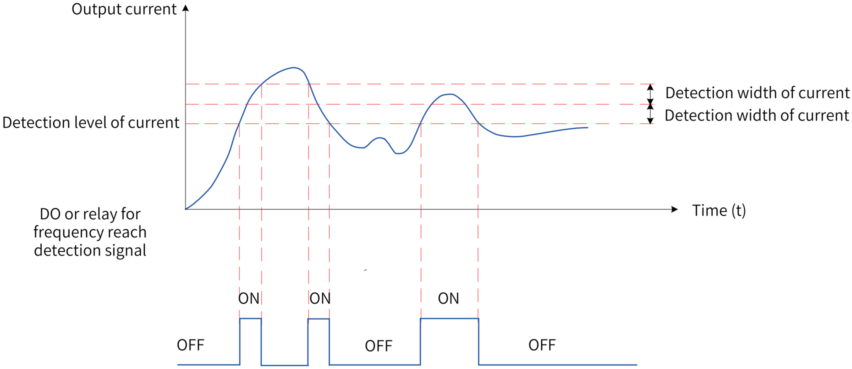


Figure 3-68 Timing diagram of detection level of current

Related parameters

Para. No.	Function	Default	Value Range	Description
F8-38	Detection level of current 1	100.0%	0.0% to 300.0% (rated motor current)	The DO terminal outputs the active signal when the output current of the AC drive is in the range of F8-38±F8-39 x F1-03, where F8-38 is detection level of current 1, F8-39 is detection width of current 1, and F1-03 is rated motor current.
F8-39	Detection width of current 1	0.0%	0.0% to 300.0% (rated motor current)	Numeric value of detection width of current 1 = F8-39 (detection width of current 1) x F1-03 (rated motor current)
F8-40	Detection level of current 2	100.0%	0.0% to 300.0% (rated motor current)	The DO terminal outputs the active signal when the output current of the AC drive is in the range of (F8-40±F8-39) x F1-03, where F8-40 is detection level of current 2, F8-39 is detection width of current 1, and F1-03 is rated motor current.
F8-41	Detection width of current 2	0.0%	0.0% to 300.0% (rated motor current)	Numeric value of detection width of current 2 = F8-41 (detection width of current 2) x F1-03 (rated motor current)

3.5.4 Forward/Reverse Run Switchover Dead Zone Time

This function is used to specify the transition period when the output is 0 Hz during forward/reverse run switchover of the AC drive. The transition period is called forward/reverse run switchover dead zone time, which can be set through F8-12.

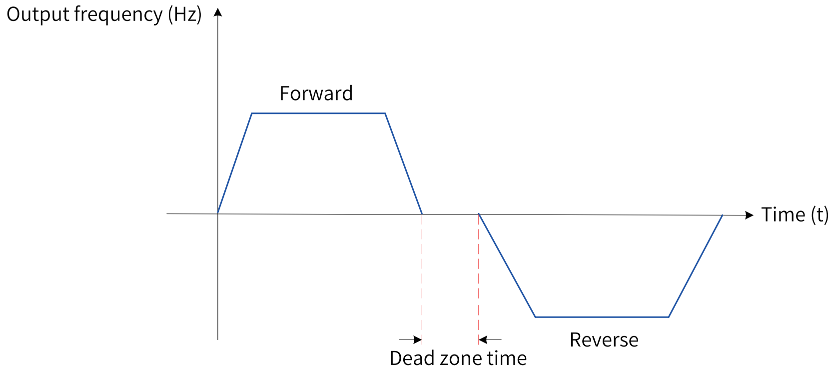


Figure 3-69 Forward/reverse run switchover dead zone time

Related parameter

Para. No.	Function	Default	Value Range	Description
F8-12	Forward/Reverse run switchover dead zone time	0.0s	0.0s to 3000.0s	Used to set the transition period when the output is 0 Hz during forward/reverse run switchover of the AC drive.

3.5.5 Timing Function

The timer starts from 0 upon startup of the AC drive. When the timing duration (F8-44) expires, the AC drive automatically stops, and the DO outputs the active signal. You can use U0-20 to view the remaining running time.

- The DO outputs the active signal when the accumulative power-on time (F7-13) of the AC drive exceeds the accumulative power-on time threshold (F8-16).
- The DO outputs the active signal when the accumulative running time (F7-09) of the AC drive exceeds the accumulative running time threshold (F8-17).

Parameters

Para.	Function	Default	Value Range	Description
F8-42	Timing function	0	0: Disabled 1: Enabled	When F8-42 (timing function) is set to 1 and the running time of the AC drive reaches the specified timing duration, the DO outputs the active signal. The timing duration is set through F8-43 and F8-44.
F8-43	Scheduled running time selection	0	0: F8-44 1: AI1 2: AI2	If this parameter is set to 0, the timing duration is determined by F8-44. If this parameter is set to 1, the timing duration can be calculated through the following formula: Timing duration = (AI1 voltage/10 V) x F8-44. 100% of the analog input range corresponds to the value of F8-44. If this parameter is set to 2, the timing duration can be calculated through the following formula: Timing duration = (AI2 voltage/10 V) x F8-44. 100% of the analog input range corresponds to the value of F8-44.
F8-44	Scheduled running time	0.0 min	0.0 min to 6500.0 min	The timing duration is set through F8-43 and F8-44.

Table 3–34 Power-on time threshold

Para.	Function	Default	Value Range	Description
F8-16	Accumulative power-on time threshold	0 h	0 h to 65000 h	This parameter is used to set the accumulative power-on time threshold of the AC drive. When F7-13 (accumulative power-on time) exceeds F8-16 (accumulative power-on time threshold), the DO outputs the active signal.

Table 3–35 Running time reach

Para.	Function	Default	Value Range	Description
F8-17	Accumula tive running time threshold	0 h	0 h to 65000 h	This parameter is used to set the accumulative running time threshold of the AC drive. When F7-09 (accumulative running time) exceeds F8-17 (accumulative running time threshold), the DO outputs the active signal.

3.5.6 Upper and Lower Limits of AI1 Voltage Protection

Para. No.	Function	Default	Value Range	Description
F8-45	AI1 input voltage lower limit	3.10 V	0.00 V to F8-46	If AI1 input is above F8-46 or below F8-45, the DO terminal of the AC drive outputs the active signal of "AI1 input limit exceeded".
F8-46	AI1 input voltage upper limit	6.80 V	F8-45 to 10.00 V	

3.5.7 IGBT Temperature

Para. No.	Function	Default	Value Range	Description
F8-47	IGBT temperature threshold	75°C	0°C to 100°C	The DO terminal outputs the active signal when the heatsink temperature of the IGBT reaches F8-47.
F7-07	Heatsink temperature of IGBT	-	0.0°C to 99.9°C	Used to indicate the heatsink temperature of the IGBT.

3.5.8 Cooling Fan Working Mode

Para. No.	Function	Default	Value Range	Description
F8-48	Cooling fan working mode	0	0: Working during drive operation	When this parameter is set to 0, the fan works during operation of the AC drive. When the AC drive stops, the fan works if heatsink temperature is above 40°C and stops if heatsink temperature is below 40°C.
			1: Working continuously	When this parameter is set to 1, the fan keeps working after power-on.

3.6 Tension Control

3.6.1 Selecting a Control Mode

Select a proper tension control mode and winding mode based on actual situations. Settings of a correct running direction can ensure proper tension control.

Para.	Name	Default	Value Range	Description
B0-00	Tension control mode	0	0: Disabled	Similar to general functions of the AC drive. Basic operations such as parameter auto-tuning and direction judgment must be performed in this mode.
			1: Open-loop torque control	Tension/position detection and feedback are not required. In torque control mode, the AC drive calculates the target torque to control the tension on materials. Use FVC to achieve optimal control effect.
			2: Closed-loop speed control	Tension/position detection and feedback are required. In speed control mode, the AC drive calculates the synchronous frequency of the linear speed based on the linear speed and roll diameter and superposes PID closed-loop operation frequency. In this way, the target frequency is updated in real time to realize stable tension or position. SVC, V/f, or FVC can be selected.
			3: Closed-loop torque control	Tension detection and feedback are required. In torque control mode, the target torque can be calculated based on PID adjustment or main + PID adjustment to implement tension control. Use FVC to achieve optimal control effect.
			4: Constant linear speed control	In speed control mode, the AC drive adjusts its running frequency according to the change in roll diameter to ensure constant linear speed of the system. SVC, V/f, or FVC can be selected.

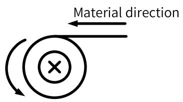
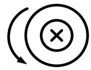
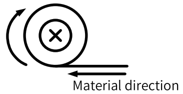
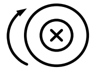
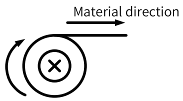
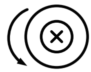
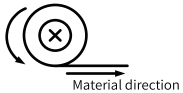
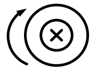
When the DI allocated with function 60 (exit tension control) is activated, settings of the preceding modes become invalid and the AC drive exits the tension control mode.

Para.	Name	Default	Value Range	Description
B0-01	Winding mode	0	0: Winding 1: Unwinding	This parameter is used together with function 58 of the DI (winding/unwinding switchover terminal) to determine the winding mode. When the winding/ unwinding switchover terminal is disabled, the winding mode is the same as that set by this parameter. When the winding/ unwinding switchover terminal is enabled, the winding mode is opposite to that set by this parameter.

Para.	Name	Default	Value Range	Description
F0-09	Running direction selection	0	0: Default direction 1: Reverse of the default direction	Set this parameter properly to ensure normal winding/ unwinding. Determine the direction as follows.

Judging the running direction

When B0-00 is set to 1 (tension control mode disabled), the AC drive runs in speed control mode and its running direction should be the same as the target winding direction (opposite to the target unwinding direction). Otherwise, change the parameter to correct the direction. Check the running direction according to the following figure.

Winding Mode	With-load Running Direction	No-load Running Direction (Speed Control Mode)
Winding		
		
Unwinding		
		

Note

For the first run, determine the running direction and set the parameter properly. When the switchover between winding and unwinding is required, modify B0-01 directly, or change the state of the winding/unwinding switching terminal without modifying B0-01 (otherwise, misfunction may occur).

3.6.2 Open-Loop Torque Control

In this mode, no swing rod (floating roller) or tension sensor is required, no closed tension loop is formed, but the tension accuracy is slightly poor. This control mode is applicable to scenarios where tension accuracy is not critical.

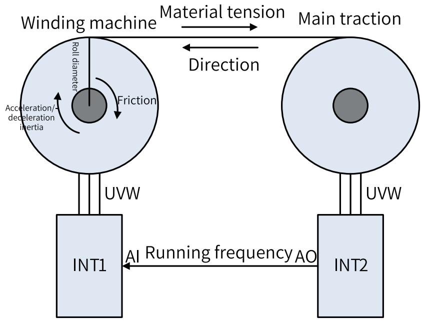


Figure 3-70 Application of open-loop torque control

In the preceding figure, the winding machine runs in open-loop torque control mode. The roll diameter is calculated based on the linear speed and the target torque is updated based on the set material tension and current roll diameter. You can set the friction compensation torque and dynamic inertia compensation torque as needed to improve the tension control effect.

3.6.3 Closed-Loop Torque Control

In this mode, a tension sensor is used to upload the material tension and the target frequency is regulated in closed-loop mode to ensure constant tension.

The main + PID mode or pure PID mode can be configured as needed. The main + PID mode incorporates the operation torque in tension open-loop torque mode based on the closed-loop regulation, whereas the pure PID mode achieves constant tension control through torque adjustment by pure PID. To optimize dynamic response, enable friction and inertia compensation. This mode is applicable to materials with regular elasticity or scenarios with small speed adjustment margin.

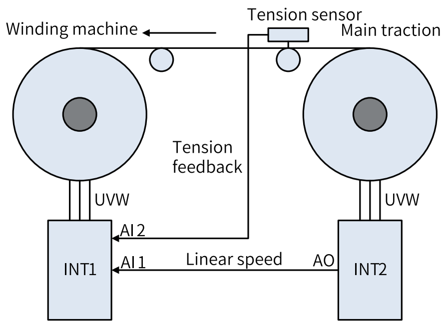


Figure 3-71 Application of closed-loop torque control

In the preceding figure, when the winding machine works in closed-loop torque control mode, two AI signal channels receive tension sensor signals and running frequency signals of the main traction motor, respectively. When the open-loop tension reference and tension sensor closed-loop regulation mode is used, the torque of friction and inertia compensation can be set as needed.

When a tension sensor is used to control tension of elastic materials, the closed-loop tension control mode can also be used.

3.6.4 Closed-loop Speed Control

In this mode, a swing rod (floating roller) or tension sensor is used to upload material tension. The output frequency of the AC drive is regulated in the closed-loop mode to ensure stable swing rod position or constant tension. The tension is controlled by linear speed synchronous frequency and PID closed-loop frequency. This mode is applicable to scenarios where the speed can be adjusted, such as the scenario where the system has an swing rod for pre-charge or the material can be pulled and stretched.

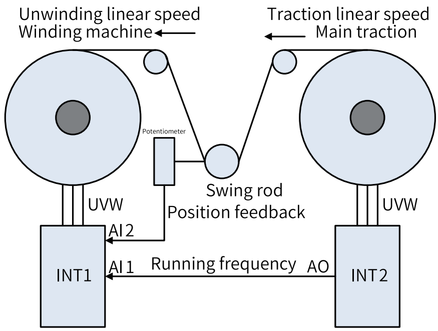


Figure 3-72 Application of closed-loop speed control

As shown in the preceding figure, when the winding machine works in closed-loop speed control mode, two AI signal channels receive potentiometer signals of the swing rod position and running frequency signals of the main traction motor, respectively. The roll diameter is calculated based on linear speed mode. The target frequency is updated according to the following: the linear speed synchronous frequency calculated based on the linear speed and the roll diameter, and the frequency regulated based on the feedback closed loop of swing rod position.

The general-purpose AC drive supports main frequency + PID as the frequency source. In tension control mode, the roll diameter is calculated in real time to facilitate matching between the main frequency and linear speed. Therefore, the tension control stability and speed are improved.

3.6.5 Roll Diameter Calculation

Roll diameter is a required parameter in any tension control mode. Select a proper calculation method and set the related parameters correctly to ensure accuracy of the roll diameter. Otherwise, the tension control function may fail.

Para. No.	Name	Default	Value Range	Description
B0-07	Roll diameter calculation method	0	0: Calculated based on linear speed	This calculation method is independent of material thickness. The roll diameter is calculated based on linear speed and running frequency in real time, so the error is not accumulated. Note: This calculation method is applicable to central winding/unwinding instead of surface winding/ unwinding. *"Figure 3–73 Surface winding/unwinding" on page 627* is a diagram of typical surface winding/ unwinding, where the AC drive shaft is not coaxial with the winding/winding shaft, so the roll diameter cannot be calculated based on linear speed.
			1: Calculated based on accumulative thickness	This calculation method does not require linear speed. The roll diameter is calculated based on the accumulative material thickness and revolution calculation signals. The calculation result is stable, but the error is accumulated. Set the following parameters for this application: ● Material thickness: B0-31 to B0-36 ● Revolution calculation signal source: Function 61 of the DI terminal (revolution count signal) ● Operation relationship: B0-29 (number of pulses per revolution) and B0-30 (revolutions per layer, for wire rods)
			2: AI1	The roll diameter can be obtained through one of methods 2 to 6. These methods can be used in scenarios where the roll diameter is directly measured by using a sensor or calculated outside the AC drive. When the preceding calculation methods are used, the maximum roll diameter (B0-08) must be set correctly based on the per-unit relationship. When AI1 is enabled (B0-07 is set to 2), 100.0% AI1 input must correspond to the maximum roll diameter (B0-08).
			3: AI2	
			4: AI3	
			5: Pulse input (DI5)	
			6: Communication (1000H)	
			7: Digital setting (B0-14)	When calculation method 7 is used, the roll diameter is directly set through B0-14 and used for additional communication address or manual roll diameter setting.

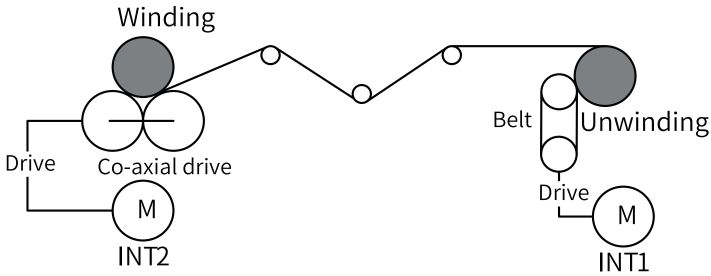


Figure 3-73 Surface winding/unwinding

Para. No.	Name	Default	Value Range	Description
B0-08	Maximum roll diameter	500.0 mm	0.1 mm to 6000.0 mm	The actual full roll diameter. In the tension control mode, this parameter provides the following functions: 1. Setting the upper limit for roll diameter calculation; 2. Calibrating values related to roll diameter(see B0-07 and B0-10); 3. Resetting the optional unwinding roll diameter (see B0-10).

Para. No.	Name	Default	Value Range	Description
B0-09	Reel diameter	100.0 mm	0.1 mm to 6000.0 mm	The actual reel diameter. In the tension control mode, this parameter provides the following functions: 1. Setting the lower limit for roll diameter calculation; 2. Resetting the optional winding roll diameter (see B0-10).

<table>
<tr><th>Para. No.</th><th>Name</th><th>Default</th><th>Value Range</th><th>Description</th></tr>
<tr><td rowspan="5">B0-10</td><td rowspan="5">Initial roll diameter source</td><td rowspan="5">0</td><td>0: B0-11 to B0-13</td><td>Parameter B0-10 is used to select an input channel of the initial roll diameter. When B0-10 is set to 0, the source of initial roll diameter is dependent on functions 55 and 56 (initial roll diameter selection terminal) of the DI terminal and related to the winding mode.
By default, the source of initial roll diameter is set to B0-08 or B0-09, depending on the winding mode. For the relationship between the initial winding sources and settings, see "Table 3–36 Relationship between the initial winding sources and settings" on page 628.</td></tr>
<tr><td>1: AI1</td><td rowspan="4">The initial roll diameter can be obtained through calculation methods 1 to 4. When the preceding calculation methods are used, the maximum roll diameter (B0-08) must be set correctly based on the per-unit relationship.</td></tr>
<tr><td>2: AI2</td></tr>
<tr><td>3: AI3</td></tr>
<tr><td>4: Communication (1000H)</td></tr>
</table>

Table 3–36 Relationship between the initial winding sources and settings

DI2	DI1	Initial roll diameter source
0	0	B0-09 (winding) or B0-08 (unwinding)
0	1	B0-11
1	0	B0-12
1	1	B0-13

Note

When the system is shut down due to reel replacement, running faults, or other reasons, the roll diameter often changes. To ensure accurate roll diameter during startup of the system, roll diameter reset must be performed by enabling the function 54 of the DI terminal (roll diameter reset).

Para. No.	Name	Default	Value Range	Description
B0-11	Initial roll diameter 1	100.0 mm	0.1 mm to 6000.0 mm	Initial roll diameters 1 to 3. See B0-10.
B0-12	Initial roll diameter 2	100.0 mm	0.1 mm to 6000.0 mm	
B0-13	Initial roll diameter 3	100.0 mm	0.1 mm to 6000.0 mm	
B0-14	Current roll diameter	100.0 mm	0.1 mm to 6000.0 mm	This parameter shows the current roll diameter in real time. The current roll diameter can be modified by editing this parameter, and the roll diameter calculation result will overwrite this parameter (unless B0-07 is set to 7). This method can also be used to reset the roll diameter.
B0-18	Roll diameter reset during running	0	0: Disabled 1: Enabled	This parameter can be used to enable roll diameter reset during operation.

Table 3–37 Parameters for roll diameter calculation based on linear speed (they affect roll diameter calculation only when B0-07 is set to 0)

Para. No.	Name	Default	Value Range	Description
B0-03	Mechanical transmission ratio	1.00	0.01 to 300.00	This parameter specifies the ratio of motor speed to reel speed. Set B0-03 based on the mechanical transmission structure. When the roll diameter is calculated based on linear speed (B0-07 is set to 0), a larger value of B0-03 means a larger roll diameter, and vice versa. According to this rule, the parameter can be corrected according to the deviation between the calculated roll diameter and the actual value.
B0-06	Minimum linear speed for roll diameter calculation	20.0 m/min	0.1 m/min to 6500.0 m/min	This parameter is enabled only when B0-07 is set to 0. When the linear speed is lower than the value of B0-06, the current roll diameter is maintained. When the linear speed is higher than the value of B0-06, the roll diameter is re-calculated. This parameter can be used to address inaccurate roll diameter calculation for low-frequency operation and acceleration.

Para. No.	Name	Default	Value Range	Description
B0-15	Roll diameter filter time	5.00s	0.00s to 10.00s	This parameter is enabled only when B0-07 is set to 0. You can set B0-15 to filter roll diameter calculation results and suppress roll diameter jitter. A larger value of B0-15 means smoother calculated roll diameter and longer delay in roll diameter changes. Rule: When the roll diameter changes linearly, the time that the calculated roll diameter lags behind the actual roll diameter is basically equal to this parameter value.
B0-16	Roll diameter change rate	0	0: Disabled 0.1 mm/s to 1000.0 mm/s	This parameter is enabled only when B0-07 is set to 0. You can set B0-16 to a non-zero value to limit the change of roll diameter per unit of time and prevent abnormally fast change. An excessively low roll diameter change rate may result in large delay in roll diameter calculation. Set the change rate properly based on the actual conditions, for example, based on the maximum change rate corresponding to the linear speed of 100.0 m/min.
B0-17	Roll diameter change direction limit	0	0: Disabled 1: Decrease inhibited during winding, and increase inhibited during unwinding	This parameter is enabled only when B0-07 is set to 0. You can set B0-17 to limit the roll diameter change direction. Use this function only when B0-16 is set properly; otherwise, abnormal roll diameter fluctuation may occur and result in a large deviation of the roll diameter calculation result.

Table 3–38 Parameters for roll diameter calculation based on accumulative thickness (they affect roll diameter calculation only when B0-07 is set to 1)

Para.	Name	Default	Value Range	Description
B0-29	Number of pulses per revolution	1	1 to 60000	This parameter specifies the number of pulses per revolution of the reel.
B0-30	Revolutions per layer	1	1 to 10000	This parameter specifies the number of revolutions for each layer of winded materials, generally used for wire rods. For wire rods, set B0-30 to 1.

Para.	Name	Default	Value Range	Description
B0-31	Material thickness reference source	0	0: Digital setting 1: AI1 2: AI2 3: AI3	You can set B0-31 to select a source of material thickness. 0: Digital setting When B0-31 is set to 0, the material thickness is affected by DI terminal functions 62 and 63 (the material thickness selection terminals). Example: When B0-31 is set to 0, set DI1 to DI terminal function 62 and DI2 to DI terminal function 63. For material thickness, see *"Table 3–39 Material thickness" on page 631*. The initial roll diameter can be obtained through calculation methods 1 to 3. When the preceding calculation methods are used, the maximum material thickness (B0-36) must be set correctly based on the per-unit relationship.
B0-32	Material thickness 0	0.01 mm	0.00 mm to 100.00 mm	Material thickness 0 to 3. See B0-31.
B0-33	Material thickness 1	0.01 mm	0.00 mm to 100.00 mm	
B0-34	Material thickness 2	0.01 mm	0.00 mm to 100.00 mm	
B0-35	Material thickness 3	0.01 mm	0.00 mm to 100.00 mm	
B0-36	Maximum material thickness	1.00 mm	0.00 mm to 100.00 mm	Maximum material thickness. See B0-31.

Table 3–39 Material thickness

DI2	DI1	Initial Roll Diameter Source
0	0	Depending on B0-32
0	1	Depending on B0-33
1	0	Depending on B0-34
1	1	Depending on B0-35

3.6.6 Linear Speed

In closed-loop speed control mode, the linear speed can be used to calculate the winding synchronous frequency reference and the roll diameter. In addition, the linear speed can also be used for pre-drive, inertia compensation, friction compensation, and other functions. Therefore, linear speed is an important part of tension control.

Para.	Name	Default	Value Range	Description
B0-04	Linear speed input source	0	0: No input 1: AI1 2: AI2 3: AI3 4: Pulse input (DI5) 5: Communication (1000H) 6: Communication (731AH)	0: No input 1–6: When the linear speed is input through the preceding channels, the maximum linear speed (B0-05) must be set according to the per unit relationship. The 1000H address is set according to the percentage. The 731AH address is directly set by digit, and the digital setting range is from 0 to B0-05.
B0-05	Maximum linear speed	1000.0 m/min	0.0 m/min to 6500.0 m/min	This parameter is used to set the maximum linear speed. It corresponds to the actual linear speed when 100.0% is input for channels 1 to 5 of B0-04. This value may differ from the maximum linear speed required by production. Verify them during settings. When the linear speed is used to calculate the winding diameter (B0-07 = 0), the larger the parameter is, the larger the calculated winding diameter is, and vice versa. According to this rule, the parameter can be corrected according to the deviation between the calculated roll diameter and the actual value.
B0-41	Source of constant linear speed	0	0: AI1 1: AI2 2: AI3 3: Pulse reference (DI5) 4: Communication (1000H) 5: Communication (731AH)	0 to 2: AI channel 3: Pulse input 4: Communication address (1000H); set by percentage 5: Communication address (731AH); set by digital with the range from 0 to B0-05

3.6.7 Constant Linear Speed Control

Different from preceding modes, this mode is applicable to scenarios where no specific traction is used to directly control the material tension; instead, the winding or unwinding machine runs at a constant linear speed and serves as the traction motor, and the material tension is controlled by the winding/unwinding operation.

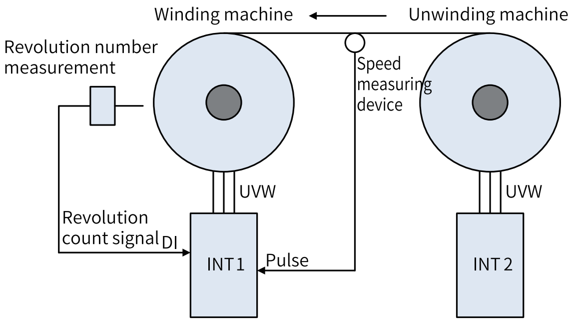


Figure 3-74 Application of constant linear speed control

In the preceding figure, the winding machine serves as the traction motor. To make the system run at a constant linear speed, the roll diameter must be calculated in either of the following two modes:

1. Assign the DI terminal with the revolution count signal function to calculate the roll diameter in thickness overlying mode based on revolution count signals.
2. Install a speed measuring device to measure the material linear speed and calculate the roll diameter based on the measured linear speed. Update the target frequency based on the target linear speed and current roll diameter to make the system run at a constant linear speed.

Note: the preceding typical applications are only given to describe the applicable scenarios of the four tension control modes. Other modes may be selected based on the actual conditions if the basic conditions are met.

3.6.8 Application Restrictions

Table 3–40 Required conditions for tension control modes

Function/Restriction	Roll Diameter[Note 1]	Linear Speed	Control Feedback
1. Tension open-loop torque control	Required	Not required[Note 2]	Not required
2. Tension closed-loop speed control	Required	Required	Required

Function/Restriction	Roll Diameter[Note 1]	Linear Speed	Control Feedback
3. Tension closed-loop torque control	Required	Not required	Required
4. Constant linear speed control	Required	Not required	Not required

Note 1: If the roll diameter is calculated based on linear speed control (B0-07 is set to 0), the linear speed is required.

Note 2: Inertia and friction compensation is associated with linear speed, so the linear speed is required in such applications.

3.6.9 Tension Setting

In either open-loop torque control mode (B0-00 is set to 1) or closed-loop torque control mode (B0-00 is set to 3), tension control is implemented by controlling the output torque. Therefore, a target tension must be set based on material characteristics and production requirements.

Para. No.	Name	Default	Value Range	Description
B1-00	Tension setting source	0	0: B1-01 1: AI1 2: AI2 3: AI3 4: Pulse reference (DI5) 5: Communication (1000H)	0: B1-01 (digital setting) 1 to 5: Indicates the ratio (in percentage) of the target tension to the maximum tension. The maximum tension (B1-02) must be set properly based on the per-unit relationship.
B1-01	Digital setting of tension	50 N	0 N to 65000 N	Used to set the tension through digital setting. For details, see mode 0 of B1-00.
B1-02	Maximum tension	200 N	0 N to 65000 N	Used to select the maximum tension. B1-02 corresponds to the tension when B1-00 is set to 1, 2, 3, 4 or 5 (100.0% input). When the actual tension does not meet requirements, corrections can be performed by editing this parameter without changing AI, pulse input signals or curves.

3.6.10PID Closed-Loop Adjustment

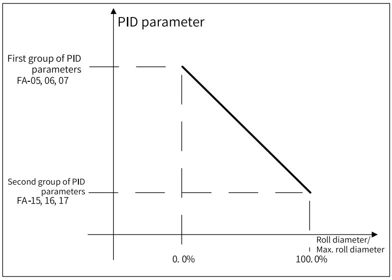
In closed-loop speed control mode (B0-00 is set to 2) and closed-loop torque control mode (B0-00 is set to 3), PID closed-loop control based on the open-loop reference is important to ensure control accuracy. Therefore, the parameters for PID closed-loop control must be set properly.

When B0-00 is set to 2 or 3, Group FA parameters required for closed-loop control, such as PID reference source, PID feedback source, PID direction, and PID proportional and integral parameters, need to be set properly based on actual conditions.

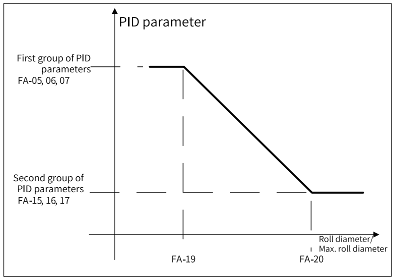
Only some particular PID parameters are introduced here. For details of standard parameters, see descriptions of Group FA parameters.

The roll diameter based PID parameter switchover function is added for the tension control mode.

Para. No.	Name	Default	Value Range	Description
FA-18	PID parameter switchover condition	0	0: No switchover 1: Switchover by DI 2: Automatic switchover based on deviation 3: Switchover based on running frequency 6: Automatic adjustment based on roll diameter 7: Adjustment based on percentage of max. roll diameter	Used for switchover between two groups of PID parameters. 0: No switchover Switchover is disabled. 1: Switchover by DI Assign the DI terminal with function 43 (PID parameter switchover). When this terminal is disabled, parameter group 1 (FA-05 to FA-07) is used. When this terminal is enabled, parameter group 2 (FA-15 to FA-17) is used. 2: Automatic switchover based on deviation When the absolute value of the deviation between the reference and feedback values is less than FA-19 (PID parameter switchover deviation 1), parameter group 1 is used for PID control. When the absolute value of the deviation between the reference and feedback values is greater than FA-20 (PID parameter switchover deviation 2), parameter group 2 is used for PID control. When the absolute value of the deviation between the reference and feedback values is between FA-19 and FA-20, the linear interpolated values of the two groups of PID parameters are used. 3: Switchover based on running frequency Auto switchover is implemented based on the running frequency of the AC drive. 6: Automatic adjustment based on roll diameter In this automatic switchover mode, when the current roll diameter changes between the maximum roll diameter (B0-08) and minimum roll diameter (B0-09), the linear interpolated values of the two groups of PID parameters are used. The minimum roll diameter corresponds to the first group of parameters (FA-05 to FA-07), and the maximum roll diameter corresponds to the second group of parameters (FA-15 to FA-17). 7: Adjustment based on percentage of max. roll diameter In this automatic switchover mode, when the current roll diameter changes between the result of the maximum roll diameter (B0-08) multiplied by FA-20 and the result of the maximum roll diameter (B0-08) multiplied by FA-19, the linear interpolated values of the two groups of PID parameters are used.



6: Automatic adjustment 1 based on roll diameter



7: Automatic adjustment 2 based on roll diameter

Figure 3-75 Automatic adjustment based on roll diameter

3.6.11Winding Speed Limit and Unwinding Reverse Tightening

These parameters are valid only in torque mode (B0-00 is set to 1 or 3).

No.	Scenario	Description
1	Winding scenarios where the winding speed is not limited (subject to the frequency upper limit)	B0-28 = 0 The winding speed is subject to the frequency upper limit. B0-00 = 2: B0-28 is used to enable the PID adjustment limit function in speed closed-loop mode. When B0-28 is set to 0, the speed is limited by B0-26 and B0-27 (limited by upper limit frequency). When B0-28 is set to 1, the speed is fixed to the value set by B0-27. When open-loop reference and closed-loop adjustment are used, closed-loop adjustment must be limited to avoid system shock and ensure system stability. For this reason, in the speed closed-loop adjustment, based on the synchronization frequency (the running frequency that the rewinder matches the current linear speed) and the speed closed-loop limiter offset, the upper limit of the closed-loop adjustment frequency can be obtained according to the following formula by default (B0-28=0). Upper limit of the closed-loop adjustment frequency = synchronous frequency x B0-26 + B0-27
2	Winding scenarios where the winding speed is limited	B0-28 = 1 When B0-28 is set to 1, the upper limit of the closed-loop adjustment frequency is the fixed frequency B0-27. B0-00 ≠ 2: B0-28 is used to enable the speed limit function. When B0-28 is set to 0, the speed is not limited (limited by the upper limit frequency). When B0-28 is set to 1, the speed is limited according to B0-26 and B0-27. In the torque mode, by default (B0-28=0), the upper limit of the winding frequency is not limited. To prevent material breaking and runaway, the above parameters can be set to limit the upper limit of the winding frequency. Based on the synchronization frequency (the running frequency that the rewinder matches the current linear speed) and the frequency limit offset, the upper limit of the winding frequency is obtained according to the following formula: Winding frequency upper limit = Synchronous frequency x (1 + B0-26) + B0-27 See *"Table 3–41 Parameters" on page 639*.

No.	Scenario	Description
3	Unwinding scenarios where reverse tightening is disabled	B0-02 = 0
4	Unwinding scenarios where reverse tightening is enabled	Reverse tightening at fixed linear speed can be enabled through B0-02. See *"Table 3–41 Parameters" on page 639*.

Table 3–41 Parameters

Para.	Name	De fault	Value Range	Description
B0-26	Tension frequency limit	50.0%	0.0% to 100.0%	Limit percentage (corresponding to the linear speed synchronous frequency)
B0-27	Tension frequency limit offset	5.00 Hz	0.00 Hz to 100.00 Hz	Limit offset (fixed frequency)
B0-02	Unwinding reverse tightening	0	0: Disabled 0.1 to 500.0 m/min	When B0-02 is set to 0, at zero material speed, the unwinding reel has no output and the material is not tightened. When B0-02 is set to a value between 0.1 m/min to 500.0 m/min, under no-load conditions or if the material is in loose state, the unwinding reel runs at the set linear speed in the reverse direction. At zero material speed, the unwinding real maintains output and the material is tightened.

3.6.12PID Adjustment Limit

This function is valid only in closed-loop mode (B0-00 is set to 2 or 3).

No.	Scenario	Description
1	The closed-loop speed control mode is used and the closed-loop limit is associated with the synchronous frequency.	B0-28 = 0 Closed-loop adjustment limit = Linear speed synchronous frequency x B0-26 + B0-27
2	The closed-loop speed control mode is used and the closed-loop limit is set to a fixed frequency.	B0-28 = 1 Closed-loop adjustment limit = B0-27 See *"Table 3–42 Parameters" on page 640*.
3	The closed-loop torque control mode is used and the closed-loop limit is set to a fixed torque.	The limit is set through B1-16 and the value is a percentage of the motor rated torque. See *"Table 3–42 Parameters" on page 640*.

Table 3–42 Parameters

Para.	Name	Default	Value Range	Description
B0-26	Winding frequency limit	50.0%	0.0% to 100.0%	Limit percentage (a percentage of the linear speed synchronous frequency)
B0-27	Winding frequency limit offset	5.00 Hz	0.00 Hz to 100.00 Hz	Limit offset (fixed frequency)
B1-16	Tension closed-loop torque control limit	100.0%	0.0% to 200.0%	Used to limit the ratio (in percentage) of the closed-loop torque control value to the open-loop control torque reference in the closed-loop torque control mode (B0-00 is set to 3).

3.6.13 Tension Torque Compensation

This function is only applicable to the torque control mode. Setting parameters related to this function properly can optimize the tension control effect, improve the tension stability, and optimize the system response speed.

It is recommended that you set the parameters for the open-loop torque control mode (B0-00 = 1). Generally, for the closed-loop torque control mode (B0-00 = 3), do not set the parameters.

Running friction compensation parameters

When the motor runs stably, the output torque is used for material tension and consumed by rotation friction. If the rotation friction consumes large output torque, compensation for the output torque is required.

Para.	Name	Default	Value Range	Description
B1-07	Friction force compensation coefficient	0.0%	0.0% to 50.0%	In tension control mode, the AC drive automatically sets the target torque according to the tension reference and roll diameter. The target torque is increased (winding)/decreased (unwinding) according to B1-07 to offset the effect of friction on material tension. This parameter corresponds to the percentage of the rated torque of the AC drive.
B1-17	Friction force compensation correction coefficient	0.0%	-50.0% to +50.0%	In most scenarios, friction may vary with running frequency. Using B1-07 may not achieve ideal friction compensation effect. To achieve better effect, use B1-07 together with B1-18. See B1-18 for details. This parameter corresponds to the percentage of the rated torque of the AC drive.

Para.	Name	Default	Value Range	Description
B1-18	Friction force compensation curve	0	0: Running frequency 1: Linear speed 2: Multi-friction compensation curve 1 3: Multi-friction compensation curve 2	Five friction compensation modes are available to meet the requirements of complex friction changes. 0: Running frequency In some scenarios, the friction changes with the system running frequency. When B1-18 is set to 0, the friction compensation value is determined using the following formula: Friction compensation torque = B1-07 x (1 + Frequency converted based on the linear speed/ Maximum frequency x B1-17)
Continued	Continued	Continued	Continued	1: Linear speed This mode is similar to mode 0. The friction compensation is based on the linear speed and the friction compensation value is determined using the following formula: Friction compensation torque = B1-07 x (1 + Linear speed/Maximum linear speed x B1-17) 2: Multi-friction compensation curve 1 In some scenarios, the friction does not change linearly with the running frequency. Based on the frequency converted from the linear speed, the dynamic friction compensation value can be obtained through the multi-friction compensation curve mode. For details, see B1-19 to B1-24. 3: Multi-friction compensation curve 2 Compared with compensation curve 1, compensation curve 2 is more flexible but requires more parameters to be set. For details, see B1-19 to B1-30 in *"Figure 3–79 DI torque boost function" on page 649*.

Para.	Name	Default	Value Range	Description
B1-19	Multi-friction compensation torque 1	0.0%	0.0% to 50.0%	-
B1-20	Multi-friction compensation torque 2	0.0%	0.0% to 50.0%	-
B1-21	Multi-friction compensation torque 3	0.0%	0.0% to 50.0%	-
B1-22	Multi-friction compensation torque 4	0.0%	0.0% to 50.0%	-
B1-23	Multi-friction compensation torque 5	0.0%	0.0% to 50.0%	-
B1-24	Multi-friction compensation torque 6	0.0%	0.0% to 50.0%	-
B1-25	Multi-friction compensation inflexion point 1	0.00 Hz	0.00 Hz to the maximum frequency	-
B1-26	Multi-friction compensation inflexion point 2	0.00 Hz	0.00 Hz to the maximum frequency	-
B1-27	Multi-friction compensation inflexion point 3	0.00 Hz	0.00 Hz to the maximum frequency	-
B1-28	Multi-friction compensation inflexion point 4	0.00Hz	0.00 Hz to the maximum frequency	-
B1-29	Multi-friction compensation inflexion point 5	0.00Hz	0.00 Hz to the maximum frequency	-
B1-30	Multi-friction compensation inflexion point 6	0.00Hz	0.00 Hz to the maximum frequency	-

The preceding parameters are used for multi-friction compensation curves 1 and 2.

When B1-18 is set to 2, parameters B1-19 to b1-24 take effect. When B1-18 is set to 3, B1-19 to B1-30 take effect.

The change curves of friction compensation values are shown in the following two figures. You can set B1-18 based on actual conditions.

When B1-18 is set to 2, friction compensation curve 1 is as follows.

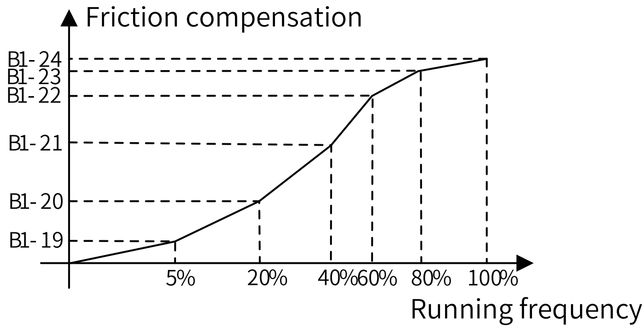


Figure 3-76 Friction compensation curve 1

When B1-18 is set to 3, friction compensation curve 2 is as follows.

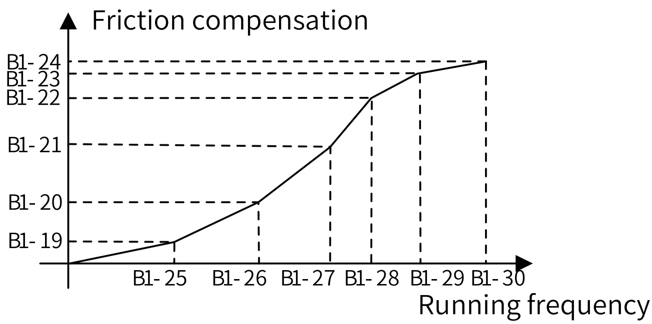


Figure 3-77 Friction compensation curve 2

Startup friction compensation parameters

In some scenarios, the reel is subject to large startup friction, which makes system startup difficult. In this case, torque compensation can be provided during startup and canceled once the system runs properly to ensure constant tension.

Para.	Name	De fault	Value Range	Description
B1-03	Zero-speed threshold	0.0%	0.0% to 20.0%	If the running frequency is lower than the value of this parameter, startup friction tension compensation will be carried out according to B1-04. If the running frequency is higher than the value of this parameter, startup friction tension compensation will not be carried out.
B1-04	Zero-speed tension rise	0.0%	0.0% to 100.0%	This parameter corresponds to the percentage of the tension reference and must be set properly according to the range of allowable material tension. Set this parameter to a value as small as possible on the premise of ensuring normal startup.
B1-14	Transition frequency for zero speed compensation	2.00 Hz	0.00–200.00 Hz	This parameter supports smooth switchover of zero speed tension rise at the threshold.

The preceding three parameters can be used together for static compensation, as shown below.

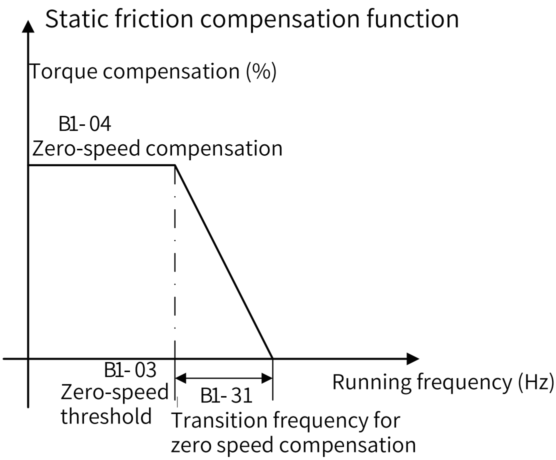


Figure 3-78 Static friction compensation

Inertia compensation parameters

In the open-loop torque control mode, the output torque is used for material tension and consumed by rotation inertia of the system during acceleration or deceleration.

In any of the following cases, inertia compensation is required:

1. Small material tension during acceleration of winding
2. Large material tension during deceleration of winding
3. Large material tension during acceleration of unwinding
4. Small material tension during deceleration of unwinding

The inertia of a winding/unwinding system consists of mechanical inertia and material inertia. The parameter can be set according to the mapping between mechanical inertia and material inertia. If the material is heavy and the reel is light, the parameters related only to material inertia need to be set, and the vice versa.

Note

Accurate linear speed is required for inertia compensation.

Para.	Name	Default	Value Range	Description
B1-08	Mechanical flywheel inertia	0 NM^2	0 NM^2 to 65535 NM^2	Set B1-08 based on the actual mechanical flywheel inertia. For general cylindrical mechanical reels, the theoretical value of mechanical flywheel inertia can be obtained using the following formula: $GD_m^2=\frac{\pi g}{8i^2}\gamma b(D^4-D_0^4)$ g is the gravitational acceleration (9.8 m/s^2), γ is the density of machine materials, b is the length of the mechanical reel, D and D_0 are the outer diameter and inner diameter (0 for a solid reel) of the mechanical reel respectively, and i is the transmission ratio. The international units are applied. The setting value can be adjusted according to the actual change of material tension during acceleration or deceleration.
B1-11	Material density	0 kg/m^3	0 kg/m^3 to 65535 kg/m^3	Set this group of parameters with reference to the actual material properties, and set the mechanical transmission ratio (B0-03) accurately at the same time. The AC drive automatically calculates the flywheel inertia according to the material density, material width, reel diameter, and material roll diameter.
B1-12	Material width	0 mm	0 mm to 65535 mm	

Para.	Name	De fault	Value Range	Description
B1-09	Acceleration inertia compensation gain	100.0 %	0.0% to 200.0%	An inevitable deviation exists between the theoretical inertia and the actual inertia, so the inertia compensation effect may not be ideal even after the inertia parameters are set. To address this, set B1-09 and B1-10 for fine tuning to optimize the control effect. Take the winding acceleration as an example. If the material tension is small, increase B1-09 to strengthen the compensation effect; otherwise, decrease this parameter to weaken the effect. This process works the same for deceleration. This set of parameters facilitates commissioning.
B1-10	Deceleration inertia compensation gain	100.0 %	0.0% to 200.0%	

Terminal tension rise

In some scenarios, customized torque boost is required.

When the DI (assigned with function 61) is activated, the tension torque is boosted. After the DI terminal is deactivated, the boost part is canceled gradually.

Para.	Name	De fault	Value Range	Description
B1-34	Terminal tension rise ratio	50.0%	0.0% to 500.0%	-
B1-35	Rise cancellation transition time	0.0s	0.0s to 50.0s	-

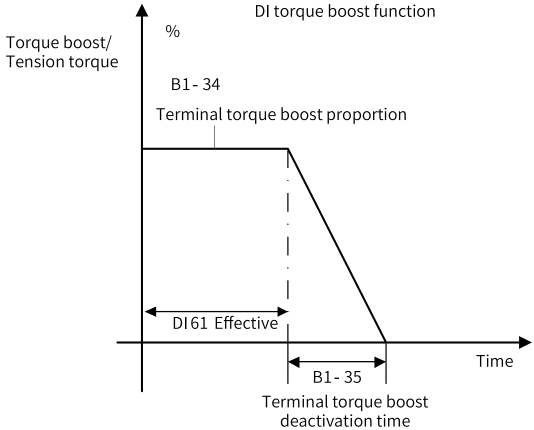


Figure 3-79 DI torque boost function

Torque direction control parameters

Para.	Name	Default	Value Range	Description
B1-15	Open-loop torque reverse	0	0: Disabled 1: Enabled	This parameter takes effect only when B0-00 is set to 1 or 3. When friction compensation and inertia compensation are added, the calculated torque value is likely to be negative. You can set B1-15 to select the solution for reverse torque. Reverse torque is disabled by default. You can set B1-15 to 1 to enable reverse torque.

3.6.14Taper

In some scenarios, the tension should be reduced with the increase of the roll diameter to ensure smooth winding. For this purpose, set taper parameters properly. This group of parameters is valid only in the winding mode (B0-01 is set to 0).

Para. No.	Name	Default	Value Range	Description
B2-00	Taper curve selection	0	0: Curve 1: Multi-taper	Used to select the taper curve generation mode. 0: Curve The taper curve is generated based on the taper setting and the correction coefficient of taper compensation (B2-03). For details, see B2-03. 1: Multi taper For details, see B2-08 to B2-19.
B2-01	Tension taper source	0	0: B2-02 1: AI1 2: AI2 3: AI3 4: Communication (1000H)	0: B2-02 (digital setting) 1 to 3: Set based on AI1 to AI3. 4: Set through the communication address 1000H.
B2-02	Digital setting of taper	0.0%	0.0% to 100.0%	Used to set the taper through digital setting. For details, see mode 0 of B2-01.
B2-03	Correction coefficient of taper compensation	0 mm	0 mm to 10000 mm	Used to set the correction coefficient of taper compensation. You can set the preceding parameters to set the curve taper based on the taper setting. The taper value can be determined by using the following formula (multiple modes are available and the following gives a typical example): $F = F_0 \times \{1 - K \times [1 - (D_0 + D_1)/(D + D_1)]\}$ Where, F is the tension after taper is set; F_0 is the tension before taper is set, determined by B1-00; K is the taper value, determined by B2-01; D_0 is the reel diameter set through B0-09; D is the current roll diameter set through B0-14; D_1 is the correction coefficient of taper compensation.
B2-05	Maximum external taper source	0	0: B2-06 1: AI1 2: AI2 3: AI3 4: Communication	In some scenarios, material tension is determined by external actuators. The external taper output function can be use to control the external actuators to achieve proper the tension taper. The maximum external taper determines FMP or AO (F5-06 to F5-08). For the external taper output (function 19), the maximum taper output is the value obtained under no-load conditions. The source of external taper is set through this parameter. 0: B2-06 (digital setting) 1 to 3: Set based on AI1 to AI3. 4: Set through the communication address 1000H.
B2-06	Maximum external taper setting	100.0%	0.0% to 100.0%	Used to set the maximum external taper (digital setting). For details, see mode 0 of B2-05.
B2-08	Taper at minimum roll diameter	100.0%	0.0% to 100.0%	-
B2-09	Linear taper switchover point 1	150.0 mm	B0-09 to B0-08	-
B2-10	Taper of switchover point 1	100.0%	0.0% to 100.0%	-

Para. No.	Name	Default	Value Range	Description
B2-11	Linear taper switchover point 2	200.0 mm	B2-09 to B0-08	-
B2-12	Taper of switchover point 2	90.0%	0.0% to 100.0%	-
B2-13	Linear taper switchover point 3	250.0 mm	B2-11 to B0-08	-
B2-14	Taper of switchover point 3	80.0%	0.0% to 100.0%	-
B2-15	Linear taper switchover point 4	300.0 mm	B2-13 to B0-08	-
B2-16	Taper of switchover point 4	70.0%	0.0% to 100.0%	-
B2-17	Linear taper switchover point 5	400.0 mm	B0-15 to B0-08	-
B2-18	Taper of switchover point 5	50.0%	0.0% to 100.0%	-
B2-19	Taper at maximum roll diameter	30.0%	0.0% to 100.0%	-

The following figure shows a multi-point linear taper curve, where the ordinate represents the ratio of tension after taper is set to original tension, and the abscissa represents the roll diameter. You can set the preceding parameters to obtain a multi-liner taper curve.

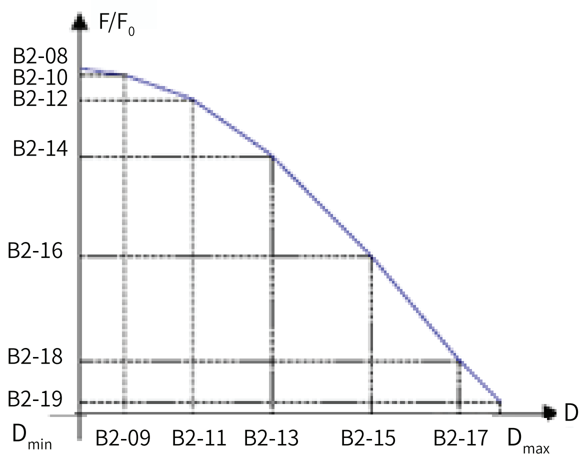


Figure 3-80 Multi-point linear taper curve

3.6.15Pre-drive

The pre-drive function is applied to automatic reel replacement scenarios. To achieve a shockless roll change, ensure that the linear speed of the new roll matches that of the material when replacing a full roll with a new roll. For this purpose, enable function 57 (Pre-drive terminal) of the DI terminal and set the pre-drive parameters properly.

Accurate linear speed and roll diameter are required for this function.

Para. No.	Name	Default	Value Range	Description
B0-19	Pre-drive frequency gain	0.0%	–100.0% to +100.0%	For pre-drive, the running frequency is automatically calculated based on the linear speed and roll diameter to ensure matching with the linear speed of the material. For small deviation of linear speed, set B0-19 to increase or decrease the running frequency during pre-drive, ensuring accurate linear speed matching.
B0-20	Pre-drive torque limit source	0	0: F2-09 1: Based on tension control torque	In torque control mode, the system automatically calculates the target torque to meet the requirements on material tension. In regular mode, set the target torque through F2-09. This parameter provides the preceding sources of target torque in the pre-drive mode. You can select one according to your needs. 0: Set the target torque based on F2-09. 1: Set the target torque based on the open-loop torque control mode (for mode 1 and mode 3 only).
B0-21	Pre-drive torque correction	0.0%	–100.0% to +100.0%	This function is activated when B0-20 is set to 1, and is used to correct the tension control torque in the pre-drive mode. To prevent slow pre-drive acceleration due to a small torque limit when B0-20 is set to 1, set a lower torque limit in pre-drive mode.
B0-40	Minimum torque limit in pre-drive mode	0.0%	0.0% to 100.0%	Settings of these functions correspond to the acceleration/deceleration time at minimum roll diameter. When the roll diameter increases, increase the acceleration/deceleration time proportionally to avoid impact caused by excessively quick acceleration/deceleration at a large roll diameter.
B0-23	Pre-drive acceleration time	0.0%	0.0s to 6500.0s	
B0-24	Pre-drive deceleration time	1.0s	0.0s to 6500.0s	

Para. No.	Name	Default	Value Range	Description
B0-25	Pre-drive roll diameter calculation function	0	0: Disabled 1: Enabled	This parameter is valid only when B0-07 is set to 1. When the roll diameter is calculated based on accumulative thickness, the roll diameter increases/decreases with the number of revolutions. Set B0-25 to 1 to avoid accumulative error caused by invalid roll diameter calculation in the pre-drive mode. You can set this parameter according to the actual operations.

3.6.16Constant Linear Speed Mode

In this mode, the running frequency for winding and unwinding is automatically calculated based on the set target linear speed.

Para.	Name	Default	Value Range	Description
B0-41	Constant linear speed input source	0	0: AI1 1: AI2 2: AI3 3: Pulse reference (DI5) 4: Communication (1000H) 5: Communication (731AH)	0 to 2: AI channel 3: Pulse reference 4: Communication address (1000H); set by percentage 5: Communication address (731AH); set by digital with the range from 0 to B0-05
B0-19	Pre-drive frequency gain	0.0%	–100.0% to +100.0%	For pre-drive, the running frequency is automatically calculated based on the linear speed and roll diameter to ensure matching with the linear speed of the material. For small deviation of linear speed, set B0-19 to increase or decrease the running frequency during pre-drive, ensuring accurate linear speed matching.

3.6.17Optimization Parameters for Control Mode

Parameters for tension setup at zero speed in closed-Loop control mode

Generally, the AC drive can run without the need for additional configuration of closed-loop control.

Configure the following parameters in scenarios demanding accurate tension setup at zero speed or roll diameter auto-tuning during tension setup at zero speed.

Para. No.	Name	Default	Value Range	Description
B1-31	Tension setup at pre-speed	0	0: Disabled 1: Enabled	In closed-loop control mode, if B1-31 is set to 0, the tension setup at pre-speed function is disabled. If B1-31 is set to 1, the tension setup at pre-speed function is enabled.
B1-32	Tension setup dead zone	2.0%	0.0% to 100.0%	When the tension setup at pre-speed function is enabled and PID feedback is below B1-32, PID calculation stops.
B1-33	Pre-speed of tension setup	0.10 Hz	0.00 Hz to F0-10	Used to set the running frequency in scenarios where the tension setup at pre-speed function is enabled but the system is not in the tension setup dead zone.

For details about tension setup at zero speed, see *"Figure 3–81 Diagram of tension setup at zero speed" on page 655*. You can set B1-31 to 1 to enable the tension setup at pre-speed function and set B1-32 to define the tension setup dead zone.

When PID feedback is below the tension setup dead zone, PID calculation stops and the reel runs at a fixed frequency to slowly wind the material.

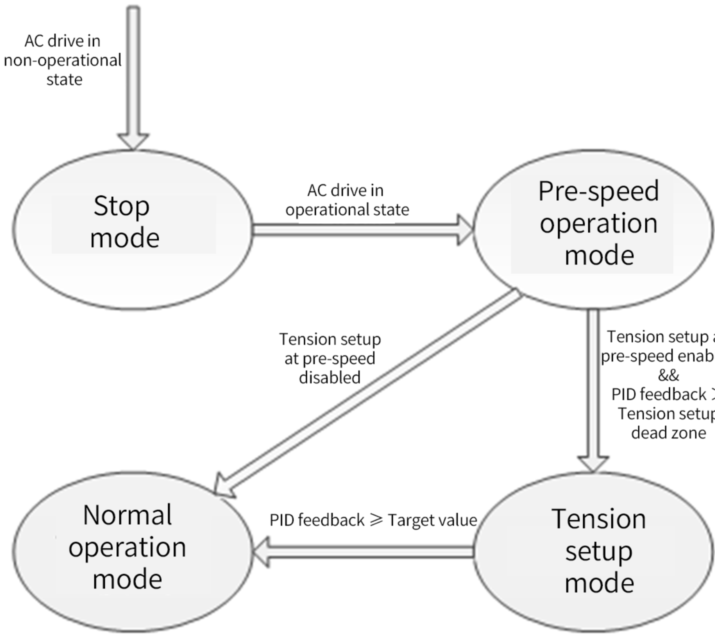


Figure 3-81 Diagram of tension setup at zero speed

Parameters for initial roll diameter auto-tuning

When the tension setup at pre-speed function is enabled, you can also enable the initial roll diameter auto-tuning function. During tension setup, the AC drive auto-tunes the initial roll diameter to remove the need for roll diameter reset or initial roll diameter input (for tension setup at zero speed in FVC mode only).

Para. No.	Name	Default	Value Range	Description
B1-37	Initial roll diameter auto-tuning selection	0	0: Disabled 1: Enabled	When the tension setup at pre-speed function is enabled, you can also enable the initial roll diameter auto-tuning function for the AC drive to auto-tune the initial roll diameter. This function is applicable to rod control only. This function is enabled when B1-37 is set to 1, and disabled when B1-37 is set to 0.
B1-38	Rod length	300 mm	1 mm to 65535 mm	The rod length after the initial roll diameter is auto-tuned.
B1-39	Rod angle	40°	0.1° to 360.0°	The rod angle after the initial roll diameter is auto-tuned.

Parameters for tension closed-loop torque control mode

You can set the tenson in closed-loop torque control mode by using PID alone or main torque + PID.

Para. No.	Name	Default	Value Range	Description
B0-38	Closed-loop speed control limit selection	0	0: Torque calculated through pure PID 1: Torque calculated through main + PID	The main torque is the torque calculated when B0-00 is set to 1. In pure PID mode, the set friction and inertia compensation are still valid, but the tension torque is invalid. In main + PID mode, set the tension corresponding to the condition that the PID feedback value indicates 100.0% and input B1-02.

3.6.18Related I/O Functions

Functions of DI terminals

You can select DI functions by using parameters F4-00 to F4-09 or virtual DI terminals.

1. DI function 53: Revolution count signal
   When roll diameter is calculated based on accumulative thickness, set this function for the DI terminal to input revolution count signals from the terminal.
2. DI function 54: Roll diameter reset
   Roll diameter reset during reel replacement is necessary for tension control. It ensures accurate roll diameter at the moment when the system is started after reel replacement, and also ensures normal system startup and proper material tension.
3. DI functions 55 and 56: Initial roll diameter selection terminals 1 and 2
   These functions provide initial roll diameter switchover modes to meet different requirements for different reels or materials. For details of use, see B0-10.
4. DI function 57: Pre-charge input terminal
   When the terminal is activated, the AC drive is switched to the pre-charge speed control mode. When the terminal is deactivated after reel replacement, the tension control can function properly.
5. DI function 58: Winding/unwinding switchover
   Winding/unwinding switchover is performed without modifying the parameter, greatly facilitating the operation. For details of use, see B0-01.
6. DI function 59: Roll diameter calculation disabled
   When the terminal is activated, the roll diameter calculation is disabled.
7. DI function 60: Tension control mode disabled

When the terminal is activated, the system exits the tension control mode and the AC drive restores general AC drive functions (the frequency source and torque source are enabled based on the general AC drive functions).

8. DI function 61: Terminal tension rise
   When the terminal is activated, the tension torque is increased by a certain ratio. After the DI terminal is deactivated, the boost part will be canceled gradually based on time.

9. DI functions 62 and 63: Thickness selection terminals 1 and 2
   These functions provide material thickness switchover modes to meet different requirements for materials with different thickness. For details of use, see B0-31.

AO/Pulse output functions

In addition to the AC drive, PLC or actuators also affect the tension control function. The AC drive supports output of variables related to tension control, enriching means to realize the tension control function.

You can select AO/pulse output functions by setting F5-06 to F5-08.

1. Output function 19: External taper output
   When the tension taper control is required and the material tension is determined by the external actuator, you can enable this function to output taper.

2. Output function 20: Roll diameter output
   When the roll diameter is calculated in the AC drive and the calculation result needs to be output, you can enable this function to output the result.

3. Output function 21: Tension output
   You can enable this function to output the tension reference of the AC drive. The actual valid tension after taper calculation is calibrated based on the maximum tension (B1-02).

3.6.19Monitoring

You can set F7-04 and F7-05 to enable the display of the roll diameter or tension at stop or during operation.

Para.	Name	Value Range	Description
F7-03	LED running display parame ter 1	BIT00: Running frequency (Hz) BIT01: Frequency reference (Hz) BIT02: Bus voltage (V) BIT03: Output voltage (V) BIT04: Output Current (A) BIT05: Output power (kW) BIT06: Output torque (%)	If a parameter needs to be displayed during running, set its corresponding bit to 1. After converting this binary number to a hexadecimal number, set it in F7-03.
Continued	Contin ued	BIT07: DI state BIT08: DO state BIT09: AI1 voltage (V) BIT10: AI2 voltage (V) BIT11: AI3 voltage (V) BIT12: Count value BIT13: Length value BIT14: Load speed display BIT15: PID setting	Continued
F7-04	LED running display parame ter 2	BIT00: PID feedback BIT01: PLC stage BIT02: Pulse setting frequency (kHz) BIT03: Running frequency 2 (Hz) BIT04: Remaining running time BIT05: AI1 voltage before correction (V)	If a parameter needs to be displayed during running, set its corresponding bit to 1. After converting this binary number to a hexadecimal number, set it in F7-04.
Continued	Contin ued	BIT06: AI2 voltage before correction (V) BIT07: AI2 voltage before correction (V) BIT08: Linear speed BIT09: Current power-on time (hour) BIT10: Current running time (min) BIT11: Pulse input frequency (Hz) BIT12: Communication setting value BIT13: Encoder feedback speed (Hz) BIT14: Roll diameter (mm) BIT15: Tension reference after taper setting (N)	Continued

Para.	Name	Value Range	Description
F7-05	LED stop display parame ter	BIT00: Frequency reference (Hz) BIT01: Bus voltage (V) BIT02: DI state BIT03: DO state BIT04: AI1 voltage (V) BIT05: AI2 voltage (V)	If a parameter needs to be displayed when the AC drive stops, set its corresponding bit to 1. After converting this binary number to a hexadecimal number, set it in F7-05.
Continued	Contin ued	BIT06: AI3 voltage (V) BIT07: Count value BIT08: Length value BIT09: PLC stage BIT10: Load speed display BIT11: PID setting BIT12: Pulse input frequency (kHz) BIT14: Roll diameter (mm) BIT15: Tension reference after taper setting (N)	Continued

The following table lists monitoring parameters, which can be monitored on the operating panel or in the background in real time.

Table 3–43 Monitoring parameters

Para.	Name	Minimum Unit	Description
U1-00	Linear speed	0.1m/min	
U1-01	Current roll diameter	0.1 mm	
U1-02	Linear speed synchronous frequency	0.01 Hz	
U1-03	PID output frequency	0.01 Hz	
U1-04	Current tension reference	1 N	
U1-05	Tension reference after taper	1 N	
U1-06	Open-loop torque	0.1%	
U1-07	PID output torque	0.1%	

Para.	Name	Minimum Unit	Description
U1-08	Tension control mode	1	Tens position of U1-08: Used to specify the tension control mode of the system. 0: Non-tension control mode 1: Tension open-loop torque control 2: Tension closed-loop speed control 3: Tension closed-loop torque control 4: Constant linear speed control 5: Pre-charge
U1-09	PID reference	0.1%	
U1-10	PID feedback	0.1%	
U1-11	Kp output	1	
U1-12	Ki output	1s	
U1-13	Kd output	1s	
U1-14	Tension time	1s	
U1-15	Winding/Unwinding mode	1	Used to specify the tension control mode of the system. 0: Winding 1: Unwinding

Note

For better control effect, conduct commissioning based on the measurements obtained using a speed measuring device or tape and comparison between such measurements with related monitoring parameters.

3.7 Fault and Protection

3.7.1 Startup Protection

When F8-18 is set to 1, startup protection is enabled to prevent the motor from responding to a command upon power-on or fault reset of the AC drive.

The startup protection works in the following two scenarios:

- If a command is issued upon power-on of the AC drive (for example, the terminals used as the command source are ON before power-on), the AC drive does not respond to the command. Instead, the AC drive responds only after the command is canceled and re-issued.
- If a command is issued upon fault reset of the AC drive, the AC drive does not respond to the command. Instead, the AC drive responds only after the command is canceled and re-issued.

Related parameter

Para. No.	Function	Default	Value Range	Description
F8-18	Startup protection selection	0	0: Disabled 1: Enabled	The AC drive comes with startup protection. This helps to avoid unexpected motor running at power-on or fault reset.

3.7.2 Undervoltage and Overvoltage Thresholds and Fast Current Limit Protection

When the bus voltage falls below A5-06 or exceeds A5-09, the AC drive generates an alarm.

Related parameters

Para. No.	Function	Default	Value Range	Description
A5-06	Undervoltage threshold	350.0 V	150.0 V to 700.0 V	When the bus voltage falls below A5-06, the AC drive generates an alarm (E05.00 to E07.00, or E09.00).
F9-04	Overvoltage threshold	820 V	350.0 V to 820.0 V	When the bus voltage exceeds F9-04, the AC drive generates an alarm (E05.00 to E07.00).
A5-04	Fast current limit	1	0: Disabled 1: Enabled	This function is used to minimize the overcurrent faults, ensuring normal operation of the AC drive. Disable this function in hoist applications such as cranes.

3.7.3 Phase Loss Protection

Para.	Function	Default	Value Range	Description
F9-06	Output phase loss detection before startup	0	0: Disabled 1: Enabled	It takes about several seconds to detect output phase loss during running. For low-frequency running applications or applications where risks exist in start with phase loss, this function enables quick detection of output phase loss during startup. However, it does not apply to applications that have strict requirements on startup time.
F9-48	Fault protection action selection 1	10050	Ones: E11 0: Coast to stop 1: Decelerate to stop 2: Fault reset 4: Warning 5: Canceled Tens: E12 0: Coast to stop 1: Decelerate to stop 2: Fault reset 4: Warning 5: Canceled	The fault protection actions are set through the ones, tens, hundreds, thousands, and ten thousands positions of this parameter. 0: Coast to stop The AC drive coasts to stop. 1: Decelerate to stop The AC drive decelerates to stop. 2: Fault reset The AC drive will be restarted upon a fault. 3: Electromagnetic shorting The AC drive enters the electromagnetic shorting state. 4: Warning The AC drive continues to run. 5: Canceled The fault is ignored.

Para.	Function	Default	Value Range	Description
Continued	Continued	Continued	Hundreds: E13 0: Coast to stop 1: Decelerate to stop 2: Fault reset 4: Warning 5: Canceled Thousands: E14 0: Coast to stop Ten thousands: E15 0: Coast to stop 1: Decelerate to stop 3: Electromagnetic shorting 4: Warning 5: Canceled	Continued

3.7.4 Overtemperature Protection

Related parameters

Para. No.	Function	Default	Value Range	Description
F9-57	Motor overtemperature protection threshold	110°C	0°C to 200°C	Used to set the motor overtemperature protection threshold. When the motor temperature exceeds the value of F9-57 (motor overtemperature protection threshold), the AC drive generates the motor overtemperature alarm (E45.00) and responds based on the fault protection action selection 2 (F9-48).
F9-58	Motor overtemperature pre-warning threshold	90°C	0°C to 200°C	Used to set the motor overtemperature pre-warning threshold. When the motor temperature exceeds the value of F9-58 (motor overtemperature pre-waring threshold), the DO terminal assigned with function 39 (motor overtemperature) outputs the active signal.

3.7.5 Overload Protection

To provide effective protection for motors with different loads, set the motor overload protection gain properly based on the overload capacity of a motor. The motor overload protection curve is an inverse time lag curve, as shown in the following figure.

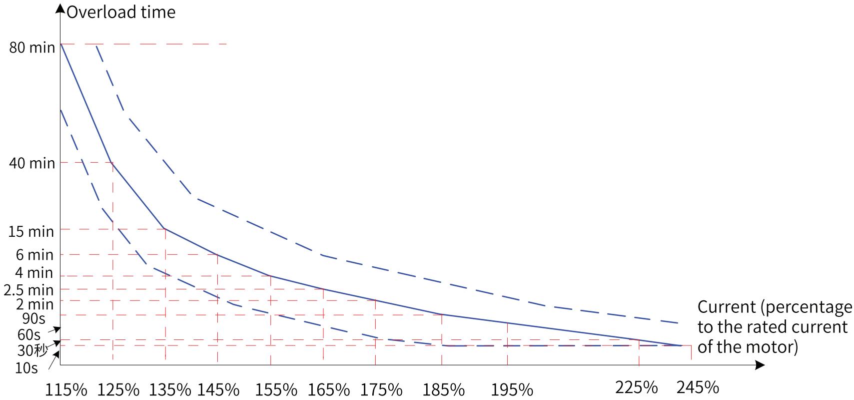


Figure 3-82 Inverse time lag curve of motor overload protection

When the motor running current reaches 175% of the rated motor current and lasts for 2 minutes, E11.00 (motor overload) is reported. When the motor running current reaches 115% of the rated motor current and lasts for 80 minutes, E11.00 is reported.

1. Example 1

- Assume that the rated motor current is 100 A. If F9-01 is set to 1.00, according to the preceding figure, the AC drive reports a motor overload alarm (E11.00) after the motor runs at 125% of 100 A (125 A) continuously for 40 minutes.
- If F9-01 is set to 1.20, according to the preceding figure, the AC drive reports a motor overload alarm (E11.00) after the motor runs at 125% of 100 A (125 A) continuously for 48 minutes (40 x 1.2).

Note

The maximum overload time is 80 minutes and the minimum overload time is 10 seconds.

2. Example 2

Assume that the application requires an overload alarm when the motor runs at 150% of rated motor current for 2 minutes. According to the motor overload protection curve, 150% (I) of the rated motor current is between 145% (I1) and 155% (I2) of the rated motor current. As the overload time is 6 minutes (T1) at the

145% point and 4 minutes (T2) at the 155% point, the overload time at 150% of the rated motor current is 5 minutes under the default settings. The overload time is calculated using the following formula:

T = T1 + (T2 - T1) x (I - I1)/(I2 - I1) = 4 + (6 - 4) x (150% - 145%)/(155% - 145%) = 5 minutes

Therefore, to have an overload alarm reported when the motor runs at 150% of rated motor current for 2 minutes, set the motor overload protection gain (F9-01) to 0.4 (2/5 = 0.4).

Caution

Set F9–01 properly based on the actual overload capacity of the motor. Note that setting F9–01 to an excessively high value may easily result in motor damage caused by overtemperature without warning.

Motor overload pre-warning coefficient: When the motor overload detection level reaches the value of this parameter, the corresponding multi-functional output terminal (DO) or fault relay outputs a motor overload pre-warning signal. The value of this parameter is a percentage of the time during which the motor runs continuously at an overload point without triggering an overload alarm.

On the condition that F9-01 (motor overload protection gain) is set to 1.00 and F9-02 (motor overload pre-warning coefficient) is set to 80%, when the motor running current reaches 145% of the rated motor current and the motor runs at this level for 4.8 minutes (80% x 6), the multi-functional DO terminal or fault relay outputs a motor overload pre-warning signal.

The motor overload pre-warning function enables the control system to receive a pre-warning signal from a DO terminal before motor overload protection is triggered. The pre-warning coefficient determines how long in advance the AC drive triggers a pre-warning ahead of motor overload protection. A larger coefficient means later transmission of the pre-warning signal. When the accumulative output current of the AC drive exceeds the product of overload time (value Y on the inverse time lag curve of motor overload protection) multiplied by the motor overload pre-warning coefficient (F9-02), the multi-functional DO terminal of the AC drive outputs a motor overload pre-warning signal. When F9-02 is set to 100%, the motor overload pre-warning signal is transmitted the same time when overload protection is triggered.

Related parameters

Para. No.	Function	Default	Value Range	Description
F9-00	AC drive overload protection	0	0: Disabled 1: Enabled	Used to enable or disable the motor overload protection function. The AC drive judges whether the motor is overloaded based on the inverse time-lag curve. When motor overload is detected, the AC drive reports an overload fault. 0: Disabled Motor overload protection is disabled. When this parameter is set to 0, install a thermal relay upstream the motor for protection. 1: Enabled Motor overload protection is enabled.
F9-01	Motor overload protection gain	1.00	0.20 to 10.00	The value of motor overload protection gain is calculated according to the percentage of time during which the motor runs continuously at a certain overload point without reporting an overload fault. This parameter is used to adjust the actual overload fault report time of the AC drive when motor overload occurs.
F9-02	Motor overload pre-warning coefficient	80%	50% to 100%	The value of motor overload pre-warning coefficient is calculated according to the percentage of time during which the motor runs continuously at a certain overload point without reporting overload pre-warning. This function is used to send a pre-warning signal to the control system through a DO terminal before the motor overload protection is triggered. This signal is used to determine how long in advance to send the pre-warning signal before the motor overload protection is triggered. A larger coefficient means later transmission of the pre-warning signal. When the accumulative output current of the AC drive exceeds the product of overload time (value Y on the inverse time lag curve of motor overload protection) multiplied by the motor overload pre-warning coefficient (F9-02), the multi-functional DO terminal of the AC drive outputs a motor overload pre-warning signal.

3.7.6 Load Loss Protection

You can set the ten thousands position of F9-51 to enable load loss detection. The AC drive takes the load loss protection action after running at an output current below the load loss detection level (F9-64) continuously for a period of the load loss detection time (F9-65). Once the load recovers during protection, the AC drive accelerates to the frequency reference.

Para. No.	Function	Default	Value Range	Description
F9-51	Fault protection action 4	51111	-	-
F9-64	Load loss detection level	10.0%	0.0% to 100.0%	
F9-65	Load loss detection time	1.0s	0.1s to 60.0s	

3.7.7 Overspeed Protection

The overspeed protection is valid only when the FVC mode is selected for the AC drive (F0-01 is set to 1).

When this protection is enabled, if detected motor speed exceeds the maximum frequency (F0-10) and the excess is greater than the value of F9-67 (overspeed threshold) for a period longer than the time set in F9-68 (overspeed detection time), the AC drive reports an alarm (E43.00) and acts according to F9-50 (overspeed protection action).

When F9-68 (overspeed detection time) is set to 0.0s, the overspeed detection function is disabled.

Related parameters

Para. No.	Function	Default	Value Range	Description
F9-67	Overspeed threshold	20.0%	0.0% to 50.0% (max. frequency)	-
F9-68	Overspeed detection time	1.0s	0.0s to 60.0s	

3.7.8 Excessive Speed Deviation Protection

The excessive speed deviation protection function is valid only when the FVC mode is selected for the AC drive (F0-01 is set to 1).

When this protection is enabled, if the AC drive detects that the deviation between the actual motor running frequency and the frequency reference stays above the excessive speed deviation threshold (F9-69) for a period longer than the detection time of excessive speed deviation (F9-70), the AC drive generates an alarm of E42.00 (excessive speed deviation) and takes an action based on the setting of fault protection action selection (F9-50).

If F9-70 (detection time of excessive speed deviation) is set to 0.0s, the excessive speed deviation detection function is disabled.

Related parameters

Para.	Function	Default	Value Range	Description
F9-69	Excessive speed deviation threshold	20.0%	0.0% to 50.0% (max. frequency)	-
F9-70	Detection time of excessive speed deviation	5.0s	0.0s to 60.0s	

3.7.9 Power Dip Ride-Through

The power dip ride-through function ensures continuous system running upon instantaneous power failure. When the system encounters a power failure, the AC drive makes the motor work in the generating state to keep the bus voltage around the "threshold for enabling power dip ride-through". This function prevents the AC drive from stopping due to input undervoltage, as shown in the following figure.

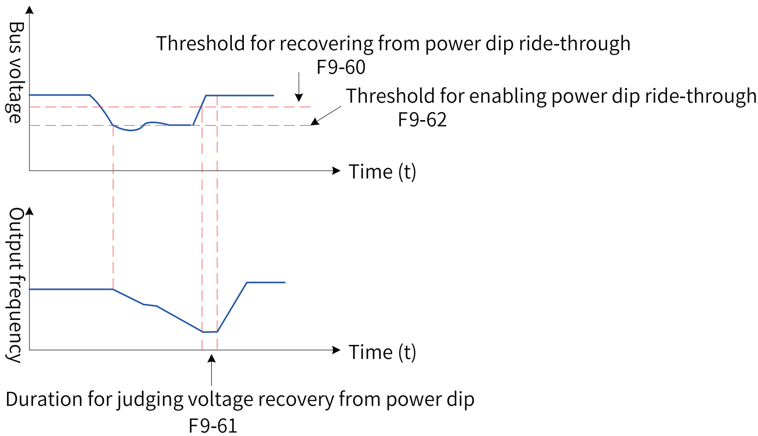


Figure 3-83 Power dip ride-through

In the "bus voltage constant control" mode, when the grid resumes power supply, the AC drive restores the target output frequency based on the acceleration time. In the "decelerate to stop mode", when the grid resumes power supply, the AC drive decelerates to 0 Hz and stops, and will restart only after receiving a start command.

Parameters

Para.	Function	Default	Value Range	Description
F9-59	Power dip ride-through function selection	0	0: Disabled 1: Bus voltage constant control 2: Decelerate to stop 3: Voltage dip depres sion	The function enables the AC drive to keep running at occurrence of instantaneous power failure. When the system encounters a power failure, the AC drive makes the motor work in the generating state to keep the bus voltage around the "threshold for enabling power dip ride-through". This function prevents the AC drive from stopping due to input undervoltage. 0: Disabled Power dip ride-through is disabled. 1: Bus voltage constant control When the system encounters a power failure, the AC drive keeps the bus voltage around the "threshold for enabling power dip ride-through". In this mode, when the grid voltage recovers, the AC drive restores the target output frequency based on the acceleration time.
Contin ued	Continued	Continued	Continued	2: Decelerate to stop When the system encounters a power failure, the AC drive decelerates to stop. In this mode, when the power grid resumes power supply, the AC drive continues decelerating to 0 Hz and stops, and will restart only after receiving a start command. 3: Voltage dip depression This function prevents AC drive stop caused by undervoltage when instantaneous power failure occurs due to voltage dip. You can use F9-66 to set the voltage dip suppression time.

Para.	Function	Default	Value Range	Description
F9-60	Threshold for recovering from power dip ride-through	85%	80% to 100%	This parameter is used to set the threshold for recovering from power dip ride-through for the AC drive. 100% corresponds to 540 V. This value is slightly lower than the bus voltage before power failure. Upon grid power failure, the bus voltage is maintained around F9-62 (threshold for enabling power dip ride-through). When the power supply recovers, the bus voltage rises from F9-62 (threshold for enabling power dip ride-through) to F9-60 (threshold for recovering from power dip ride-through). During this period, the output frequency of the AC drive keeps decreasing until the bus voltage reaches F9-60 (threshold for recovering from power dip ride-through).
F9-61	Duration for judging voltage recovery from instantaneous power failure	0.5s	0.0s to 100.0s	This parameter is used to set the time required for the bus voltage to rise from F9-60 (threshold for recovering from power dip ride-through) to the voltage before power failure.
F9-62	Threshold for enabling power dip ride-through	80%	60% to 100%	This parameter is used to set the voltage level at which the bus voltage is maintained upon power failure. Upon power failure, the bus voltage is maintained around F9-62 (threshold for enabling power dip ride-through).
F9-71	Power dip ride-through gain	0 to 100	40	This parameter is valid only in the "bus voltage constant control" (F9-59 is set to 1) mode. If undervoltage is likely to occur during power dip ride-through, increase the power dip ride-through gain and the power dip ride-through integral coefficient.
F9-72	Power dip ride-through integral coefficient	0 to 100	30	

Para.	Function	Default	Value Range	Description
F9-73	Deceleration time of power dip ride-through	0.0s to 300.0s	20.0s	This parameter is valid only in the "decelerate to stop" (F9-59 is set to 2) mode. When the bus voltage is below F9-62, the AC drive decelerates to stop. The deceleration time is determined by this parameter instead of F0-18.

3.7.10Fault Reset

In the case of an undervoltage fault (E09.00), the AC drive resets automatically when the bus voltage restores to the normal range. This reset is not counted in the number of fault auto reset times. In the case of a short circuit to ground (E23.00), the AC drive AC does not support automatic or manual reset, and you need to reset the AC drive by powering it off and then powering it on again. Fault protection action selection is required when the number of fault auto reset times is reached.

Related parameters

Para. No.	Function	Default	Value Range	Description
F9-09	Fault auto rehset times	0	0 to 20	This parameter is used to set the number of automatic resets for the AC drive if the fault protection action is set to automatic reset. If the fault persists after the specified number of automatic resets, the AC drive retains the fault state.
F9-10	DO action during auto fault reset	1	0: Not act 1: Act	If the AC drive is enabled to reset automatically upon faults, F9-10 can be used to determine whether the DO terminal (function 2) acts during an automatic reset.
F9-11	Auto fault reset interval	1.0s	0.1s to 100.0s	This parameter is used to set the delay of auto reset after the AC drive detects a fault.

3.7.11Fault Protection Action Selection

Four fault protection actions are defined for the AC drive: coast to stop, decelerate to stop, warning, and canceled, listed in descending order of fault severity.

When the fault protection action is set to "warning", the operating panel displays Axx. xx upon fault occurrence, for example, 

.

When the fault protection action is set to "canceled", the operating panel does not display any message upon fault occurrence. Exercise caution when setting this action.

Parameters

Para.	Function	Default	Value Range	Description
F9-48	Fault protection action selection 1	10050	Ones position: E11 0: Coast to stop 1: Decelerate to stop 2: Fault reset 4: Alarm 5: Canceled Tens position: E12 (same as the ones) Hundreds position: E13 (same as the ones) Thousands position: E14 0: Coast to stop Ten thousands position: E15 0: Coast to stop 1: Decelerate to stop 3: Electromagnetic shorting 4: Alarm 5: Canceled	The fault protection actions are set through the ones, tens, hundreds, thousands, and ten thousands positions of this parameter. 0: Coast to stop The AC drive coasts to stop. 1: Decelerate to stop The AC drive decelerates to stop. 2: Fault reset The AC drive will be restarted upon a fault. 3: Electromagnetic shorting The AC drive enters the electromagnetic shorting state. 4: Alarm The AC drive continues to run. 5: Canceled The fault is ignored.
F9-49	Fault protection action selection 2	00050	Ones position: E16 0: Coast to stop 1: Decelerate to stop 4: Alarm 5: Canceled Tens position: E17 (same as the ones) Hundreds position: E18 0: Coast to stop Thousands position: E19 0: Coast to stop 3: Electromagnetic shorting 4: Alarm 5: Canceled Ten thousands: E20 (same as the thousands)	Same as F9-48

Para.	Function	Default	Value Range	Description
F9-50	Fault protection action selection 3	25000	Ones position: Reserved 0: Coast to stop Tens position: E63 0: Coast to stop 1: Decelerate to stop 4: Alarm 5: Canceled Hundreds position: E23 0: Coast to stop 5: Canceled Thousands position: E24 0: Coast to stop 5: Canceled Ten thousands position: E25 0: Coast to stop 1: Decelerate to stop 4: Alarm 5: Canceled	Same as F9-48
F9-51	Fault protection action selection 4	51111	Ones position: E26 0: Coast to stop 1: Decelerate to stop 4: Alarm 5: Canceled Tens position: E27 0: Coast to stop 1: Decelerate to stop 3: Electromagnetic shorting 4: Alarm 5: Canceled Hundreds position: E28 (same as the tens) Thousands position: E29 (same as the ones) Ten thousands position: E30 (same as the ones)	Same as F9-48

Para.	Function	Default	Value Range	Description
F9-52	Fault protection action selection 5	00101	Ones position: E31 0: Coast to stop 1: Decelerate to stop 4: Alarm 5: Canceled Tens position: E40 0: Coast to stop 2: Fault reset Hundreds position: E41 (same as the ones) Thousands position: E42 0: Coast to stop 1: Decelerate to stop 2: Fault reset 3: Electromagnetic shorting 4: Alarm 5: Canceled Ten thousands position: E43 0: Coast to stop 1: Decelerate to stop 3: Electromagnetic shorting 4: Alarm 5: Canceled	Same as F9-48
F9-53	Fault protection action selection 6	05500	Ones position: E45 0: Coast to stop 1: Decelerate to stop 4: Alarm 5: Canceled Tens position: E60 (same as the ones) Hundreds position: E61 (same as the ones) Thousands position: E62 0: Coast to stop 5: Canceled Ten thousands: Reserved 5: Canceled	Same as F9-48

Para.	Function	Default	Value Range	Description
F9-54	Frequency for continuing to run upon fault	0	0: Current running frequency 1: Frequency reference 2: Frequency upper limit 3: Frequency lower limit 4: Backup frequency upon abnormality	This parameter is used to select the frequency when the AC drive is faulty. If a fault occurs during the operation of the AC drive and the fault protection action is set to "continue to run", the AC drive displays A** and continues to run at the frequency set through F9-54.
F9-55	Backup frequency upon abnormality	100.0%	0.0% to 100.0% (maximum frequency F0-10)	This parameter is used to set the backup frequency of the AC drive upon fault. If a fault occurs during the operation of the AC drive and the fault protection action is set to "run at the backup frequency" (F9-54 is set to 4), the AC drive displays A** and continues to run at the backup frequency.

3.7.12Detection of Short-Circuit to Ground

Para. No.	Function	Default	Value Range	Description
F9-07	Detection of short-circuit to ground	1	0: No detection 1: Detection upon power-on 2: Detection before running 3: Detection upon power-on and before running	-

3.8 Monitoring

The monitoring function enables you to view the AC drive state in the LED display area on the operating panel. You can monitor the AC drive state in the following two ways:

1. In the stop or running state, multiple state parameters can be displayed by pressing on the operating panel to switch over every byte of F7-03, F7-04 and F7-05.
   In the running state, 32 running state parameters are available. Select whether to show a parameter corresponding to every bit according to binary F7-03 (Running display parameter 1) and F7-04 (Running display parameter 2). In the stop sate, 13 stop state parameters are available. Select whether to show a parameter

corresponding to every bit according to binary F7-05 (Stop state display parameter).

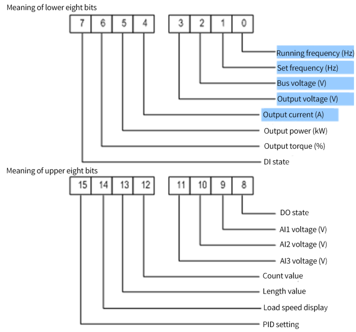
For example, to view a running state parameter (such as running frequency, bus voltage, output voltage, output current, output power, and PID reference) on the panel, do the following:

Set the byte of F7-03 (LED display of parameters during operation 1) corresponding to that parameter to 1. Convert the binary number to the hexadecimal equivalent, and set F7-03 to the hexadecimal number. For details about the conversion method, see *"Table 3–45 Binary-to-hexadecimal conversion" on page 679*. Press the key on the operating panel to switch between bytes of F7-03 to view parameter settings.

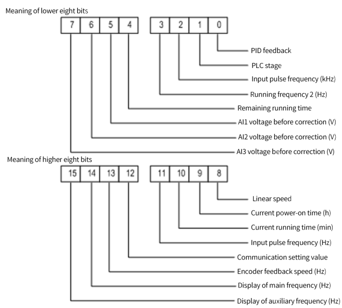
You can view other monitoring parameters in the same way. Relationship between monitoring parameters and bytes of F7-03, F7-04, and F7-05 is summarized in the following table.

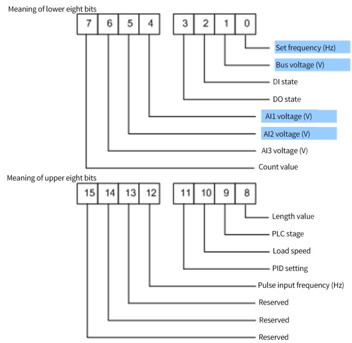
Table 3–44 Relationship between monitoring parameters and bytes of F7-03, F7-04, and F7-05

<table>
<tr><th>Parameter</th><th>Function</th><th>Default</th><th>Value Range</th><th>Description</th></tr>
<tr><td>F7-03</td><td>LED running display parameter 1</td><td>0x1F</td><td>0000 to the value of 0xFFFF</td><td>If a parameter needs to be displayed during running, set its corresponding bit to 1. After converting this binary number to a hexadecimal number, set F7-03 to this hexadecimal number.



Note: Shaded parameters are displayed by default.</td></tr>
<tr><td>F7-04</td><td>LED running display parameter 2</td><td>0</td><td>0000 to value of 0xFFFF</td><td>If a parameter needs to be displayed during running, set its corresponding bit to 1. After converting this binary number to a hexadecimal number, set F7-04 to this hexadecimal number.


</td></tr>
</table>

Parameter	Function	Default	Value Range	Description
F7-05	LED stop display parameter	0x33	0000 to the value of 0xFFFF	If a parameter needs to be displayed when the AC drive stops, set its corresponding bit to 1. After converting this binary number to a hexadecimal number, set F7-05 to this hexadecimal number.  Note: Shaded parameters are displayed by default.

Note

When the AC drive is powered on again after power-off, the parameters selected before power-off are displayed.

The monitoring parameters corresponding to each bit in F7-03, F7-04, and F7-05 do not completely correspond to all the monitoring parameters in group U0. If parameters to be monitored cannot be found in F7-03, F7-04 and F7-05, view them in group U0.

Convert a binary number to a hexadecimal number in the following way:

From right to left, every four binary digits corresponds to one hexadecimal digit. If the highest bit is not the fourth bit, fill up it with 0. Then, convert the every divided group of four binary digits into the decimal equivalent. 0000 to 1111 correspond to 0 to 15 in decimal and 0 to F in hexadecimal. Convert each decimal number to a hexadecimal one according to the following decimal-to-hexadecimal conversion table.

For example, the binary number 011 1101 1111 1001 is turned into 0011 1101 1111 1001 by adding a leading zero, and then converted to 3DF9 according to the following table.

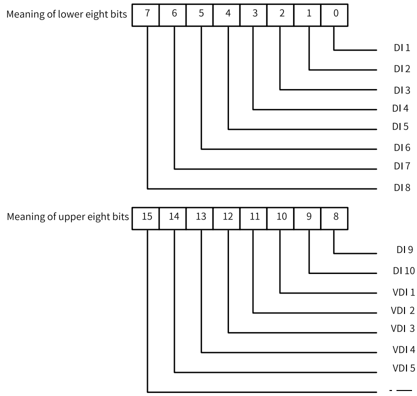
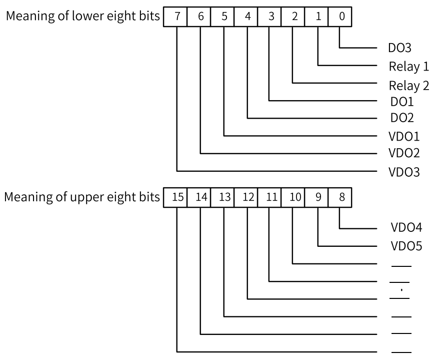
Table 3–45 Binary-to-hexadecimal conversion

Binary	1111	1110	1101	1100	1011	1010	1001	1000	0111	0110	0101	0100	0011	0010	0001	0000
Decimal	15	14	13	12	11	10	9	8	7	6	5	4	3	2	1	0
Hexadecimal	F	E	D	C	B	A	9	8	7	6	5	4	3	2	1	0

2. Select group U0 directly on the operating panel to view related monitoring parameters. Monitoring parameters in *"Table 3–46 Monitoring parameters in group U0" on page 679* are read only.

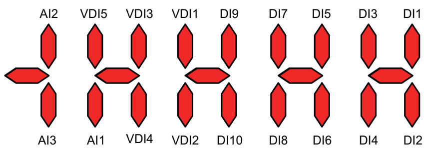
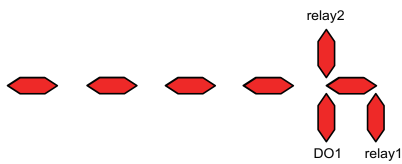
Table 3–46 Monitoring parameters in group U0

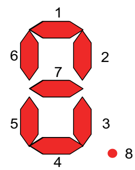
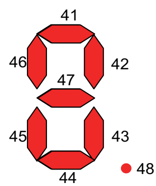
Para.	Function	Basic Unit	Description
U0-00	Running frequency (Hz)	0.01 Hz	This parameter indicates the absolute value of the running frequency of the AC drive.
U0-01	Frequency reference (Hz)	0.01 Hz	This parameter indicates the absolute value of the frequency reference of the AC drive.
U0-02	Bus voltage (V)	0.1 V	This parameter indicates the bus voltage of the AC drive.
U0-03	Output voltage (V)	1 V	This parameter indicates the output voltage of the AC drive during operation.
U0-04	Output current (A)	0.01 A	This parameter indicates the output current of the AC drive during operation.
U0-05	Output power (kW)	0.1 kW	This parameter indicates the output power of the AC drive during operation.
U0-06	Output torque (%)	0.10%	This parameter indicates the output torque of the AC drive during operation. The value is a percentage of the rated motor torque.

<table>
<tr><th>Para.</th><th>Function</th><th>Basic Unit</th><th>Description</th></tr>
<tr><td>U0-07</td><td>DI state</td><td>1</td><td>This parameter indicates the current state of the DI. Each bit of the binary number converted from this value corresponds to one DI signal. The value 1 indicates that the input is high level. The value 0 indicates that the input is low level. Each bit corresponds to an input terminal in the following pattern.

</td></tr>
<tr><td>U0-08</td><td>DO state</td><td>1</td><td>This parameter indicates the current state of the DO. Each bit of the binary number converted from this value corresponds to one DO signal. The value 1 indicates that the output is high level. The value 0 indicates that the output is low level. Each bit corresponds to an output terminal in the following pattern.

</td></tr>
<tr><td>U0-09</td><td>AI1 voltage (V)</td><td>0.01 V</td><td>-</td></tr>
<tr><td>U0-10</td><td>AI2 voltage (V)</td><td>0.01 V/0.01 mA</td><td>-</td></tr>
</table>

Para.	Function	Basic Unit	Description
U0-11	AI3 voltage (V)	0.01 V	-
U0-12	Count value	1	This parameter indicates the count value in the counting function.
U0-13	Length value	1	This parameter indicates the length in the fixed-length function.
U0-14	Load speed display	This parameter is determined by the ones position of F7-12.	This parameter indicates the load speed.
U0-15	PID reference	1	PID reference value = PID reference (percentage) x FA-04 (PID reference feedback range)
U0-16	PID feedback	1	PID feedback = PID feedback (percentage) x FA-04 (PID reference feedback range)
U0-17	PLC stage	1	There are a total of 16 stages.
U0-18	Pulse input reference (kHz)	0.01 kHz	This parameter indicates the high-speed pulse sampling frequency of DI5.
U0-19	Feedback speed (Hz)	0.01 Hz	When the tens position of F7-12 (number of decimal places for load speed display) is set to 1, U0-19 has one decimal place and the displayed value range is –500.0 Hz to +500.0 Hz. When the tens position of F7-12 is set to 2, U0-19 has two decimal places and the displayed value range is -320.00 Hz to +320.00 Hz.
U0-20	Remaining running time	0.1 min	This parameter indicates remaining running time during operation.
U0-21	AI1 voltage before correction	0.001 V	This parameter indicates the actual AI sampling voltage/current value. Linear correction is performed to reduce the deviation between the sampling voltage/current and the actual voltage/current. For voltage/current after correction, see U0-09 and U0-10.
U0-22	AI2 voltage (V)/ current (mA) before correction	0.001 V/ 0.01 mA	
U0-23	AI3 voltage before correction	0.001 V	
U0-24	Linear speed	1 m/min	
U0-25	Current power-on time	1 min	-
U0-26	Current running time	0.1 min	-

Para.	Function	Basic Unit	Description
U0-27	Pulse input reference (Hz)	1 Hz	This parameter indicates the DI5 high-speed pulse sampling frequency. It is the same as U0-18, except for difference in units.
U0-28	Communication	0.01%	This parameter indicates the data written by the communication address 0x1000. The base value of the percentage is determined by the value of communication address 0x1000.
U0-29	Encoder feedback speed (Hz)	0.01 Hz	This parameter indicates the motor running frequency measured by the encoder.
U0-30	Display of main frequency X	0.01 Hz	This parameter indicates the main frequency reference.
U0-31	Display of auxiliary frequency Y	0.01 Hz	This parameter indicates the auxiliary frequency reference.
U0-32	Any memory address	1	-
U0-33	Synchronous motor rotor position	0.1	-
U0-34	Motor temperature	1°C	This parameter indicates the motor temperature sampled through AI3. For details about motor temperature measurement, see the description of F9-56 (type of motor temperature sensor).
U0-35	Target torque (%)	0.10%	This parameter indicates the current torque upper limit reference, which is a percentage of the rated motor torque.
U0-36	Resolver position	1	-
U0-37	Power factor angle	0.1°	This parameter indicates the current power factor angle.

Para.	Function	Basic Unit	Description
U0-38	ABZ position	1	This parameter indicates the number of phase-A and phase-B pulses of the ABZ encoder. This value is four times the number of pulses that the encoder runs. For example, if the display is 4000, the actual number of pulses that the encoder runs is 4000/4 = 1000. The value increases when encoder rotates in forward direction and decreases when encoder rotates in reverse direction. After increasing to 65535, the value will be counted and increased from 0 again. After decreasing to 0, the value be counted and decreased from 65535 again. You can check whether the encoder is correctly installed by viewing this parameter.
U0-39	Target voltage upon V/f separation	1 V	This parameter indicates the target output voltage when the AC drive runs in the VF/f separation state.
U0-40	Output voltage upon V/f separation	1 V	This parameter indicates the actual output voltage when the AC drive runs in the V/f separation state.
U0-41	DI state display	1	DI state display: ON indicates high level; OFF indicates low level. 
U0-42	DO state display	1	DO state display: ON indicates high level; OFF indicates low level. 

Para.	Function	Basic Unit	Description
U0-43	DI function state display 1 (function 01-40)	1	This parameter indicates whether terminal functions 1 to 40 are valid. There are five LEDs on the operating panel, representing the following functions from right to left: functions 1 to 8, 9 to 16, 17 to 24, 25 to 32, and 33 to 40. Each LED corresponds to eight functions, as shown in the following figure. The LEDs indicate states of DI functions. ON indicates high level, and OFF indicates low level. 
U0-44	DI function state display 2 (functions 41 to 80)	1	This parameter indicates whether terminal functions 41 to 59 are valid. There are five LEDs on the operating panel, representing the following functions from right to left: functions 41 to 48, 49 to 56, and 57 to 59. Each LED corresponds to eight functions, as shown in the following figure. The LEDs indicate states of DI functions. ON indicates high level, and OFF indicates low level. 
U0-45	Fault subcode	1	This parameter indicates fault subcodes.
U0-46	Inverter unit temperature	1°C	This parameter indicates the inverter heatsink temperature.
U0-47	PTC channel voltage before correction	0.001	-
U0-48	PTC channel voltage after correction	0.001	-
U0-49	Number of offset pulses of position lock	1	Pulse difference between the initial position of position lock and the current position
U0-50	Roll diameter	1 mm	Current roll diameter

Para.	Function	Basic Unit	Description
U0-51	Tension (after taper setting)	1 N	Tension reference after taper setting
U0-58	Z signal counting	1	This parameter indicates the phase-Z counting of the current ABZ or UVW encoder. The value increases or decreases by 1 every time the encoder rotates one revolution forwardly or reversely. You can check whether the encoder is correctly installed by viewing this parameter.
U0-59	Frequency reference	0.01%	This parameter indicates the current frequency reference. The value is a percentage of the maximum frequency (F0-10) of the AC drive.
U0-60	Running frequency (%)	0.01%	This parameter indicates the current running frequency reference. The value is a percentage of the maximum frequency (F0-10) of the AC drive.
U0-61	AC drive state	1	0: Stop; 1: Forward; 2: Reverse
			0: Constant; 1: Accelerate; 2: Decelerate
			0: Bus voltage normal; 1: Undervoltage
U0-62	Current fault code	1	-
U0-63	Running frequency (after droop)	0.01 Hz	-
U0-64	Back EMF	0.1 V	Back EMF of the motor
U0-65	Stator resistance auto-tuning upon startup	1	-
U0-66	Communication extension card model	1	-
U0-67	Software version of the communication extension card	1	-

Para.	Function	Basic Unit	Description
U0-68	AC drive state on the communication extension card	1	0: Stop; 1: Run
			0: Forward run; 1: Reverse run
			This parameter indicates whether any fault occurs to the AC drive. 0: No fault 1: Fault
			This parameter indicates whether the running frequency reaches the frequency reference. 0: The running frequency does not reach the frequency reference. 1: The running frequency has reached the frequency reference.
			This parameter indicates whether DP communication is normal. 0: Normal 1: Abnormal
			Communication control as the reference source for the AC drive
			Communication control as the command source for the AC drive
			Speed control/torque control
			Fault code (main code). See specific fault description.
U0-69	Frequency transmitted to the communication extension card/ 0.01 Hz	1	-
U0-70	Speed transmitted to the communication extension card/ RPM	1	-
U0-71	Current specific to the communication extension card (A)	1	-
U0-72	Communication card error state	1	-
U0-73	Target torque before filter	0.1	Target torque not filtered in torque control mode
U0-74	Target torque after filter	0.1%	Target torque filtered in torque control mode

Para.	Function	Basic Unit	Description
U0-75	Torque reference after acceleration/ deceleration	0.1%	Torque reference after acceleration/ deceleration in torque control mode
U0-76	Torque upper limit in the motoring state	0.1%	The torque upper limit under the motoring state takes the rated current of the AC drive as the base value.
U0-77	Torque upper limit in the generating state	0.01%	The torque upper limit under the generating state takes the rated current of the AC drive as the base value.

3.9 User Settings

3.9.1 User-Defined Parameters

Group FE consisting of parameters FE-00 to FE-29) is used to define frequently-used parameters to facilitate operations such as viewing and modification. Up to 30 user-defined parameters can be set.

- If the displayed value is F0-00, no parameter is defined. In the user-defined parameter mode, you can use FE-00 to FE-31 in sequence to define which parameters to display and skip any parameter by setting the value to F0-00.
- Displayed values U3-17 and U3-16 indicate PZD1 (AC drive command word) in communication control and PZD2 (AC drive target frequency) in communication control, respectively.

Parameters

Para.	Function	Default	Value Range	Description
FP-03	Display of user-defined parameter groups	11	Ones: Display of user-defined parameter groups 0: Not displayed 1: Display Tens: Display of user-modified parameter groups 0: Not displayed 1: Display	-
FE-00	User parameter 0	U3-17	F0-00 to FP-xx A0-00 to Ax-xx U0-xx to U0-xx U3-00 to U3-xx	-
FE-01	User parameter 1	U3-16		-
FE-02	User parameter 2	F0-00		-
FE-03	User parameter 3	F0-00		-
FE-04	User parameter 4	F0-00		-
FE-05	User parameter 5	F0-00		-
FE-06	User parameter 6	F0-00		-
FE-07	User parameter 7	F0-00		-
FE-08	User parameter 8	F0-00		-
FE-09	User parameter 9	F0-00		-
FE-10	User parameter 10	F0-00		-
FE-11	User parameter 11	F0-00		-
FE-12	User parameter 12	F0-00		-
FE-13	User parameter 13	F0-00		-
FE-14	User parameter 14	F0-00		-
FE-15	User parameter 15	F0-00		-
FE-16	User parameter 16	F0-00		-
FE-17	User parameter 17	F0-00		-
FE-18	User parameter 18	F0-00		-
FE-19	User parameter 19	F0-00		-
FE-20	User parameter 20	U0-68		-
FE-21	User parameter 21	U0-69		-
FE-22	User parameter 22	F0-00		-
FE-23	User parameter 23	F0-00		-
FE-24	User parameter 24	F0-00		-
FE-25	User parameter 25	F0-00		-
FE-26	User parameter 26	F0-00		-
FE-27	User parameter 27	F0-00		-
FE-28	User parameter 28	F0-00		-
FE-29	User parameter 29	F0-00		-
FE-30	User parameter 30	F0-00		-
FE-31	User parameter 31	F0-00		-

3.9.2 Sleep and Wakeup

Sleep is also known as hibernation. Any time period within 24 hours can be set as a sleep period, during which the AC drive stops running and sleeps.

Wakeup is a process that the AC drive wakes up from the sleep state and starts to run.

To use the sleep and wakeup functions, set the wakeup frequency, sleep frequency, and sleep duration. Generally, set the wakeup frequency (F8-49) equal to or greater than the sleep frequency (F8-51). If the wakeup frequency and the sleep frequency are both 0.00 Hz, the sleep and wakeup functions are disabled.

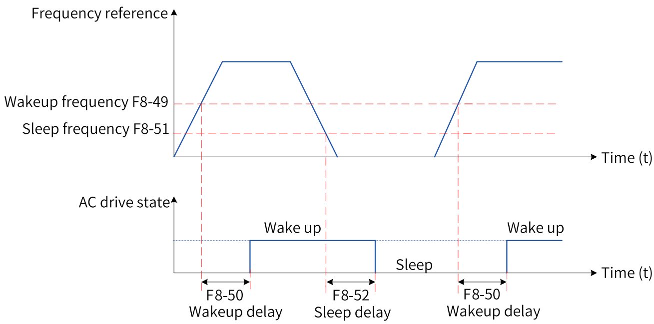


Figure 3-84 Sleep and wakeup function setting

Note

When sleep is enabled during PID operation, you can set FA-28 (selection of PID operation at stop) to 1 to continue the PID operation or to 0 to stop PID operation.

Related parameters

Para. No.	Function	Default	Value Range	Description
F8-49	Wakeup frequency	0.00 Hz	Sleep frequency (F8-51) to max. frequency (F0-10)	If the AC drive is in the sleep state and can respond to a command, when the frequency reference is equal to or higher than F8-49 (wakeup frequency), the AC drive wakes up after a period defined by F8-50 (wakeup delay).
F8-50	Wakeup delay	0.0s	0.0s to 6500.0s	
F8-51	Sleep frequency	0.00 Hz	0.00 Hz to wakeup frequency (F8-49)	During AC drive running, when the frequency reference is equal to or lower than F8-51 (sleep frequency), the AC drive enters the sleep state and decelerates to stop after a period defined by F8-52 (sleep delay).
F8-52	Sleep delay	0.0s	0.0s to 6500.0s	

3.9.3 Current Running Time Threshold

Para.	Function	Default	Value Range	Description
F8-53	Current running time threshold	0.0 min	0.0 min to 6500.0 min	The DO terminal outputs the active signal when the current running time reaches the value of F8-53. This parameter is valid only for the current AC drive running. Previous running time is not accumulated.
F8-55	Deceleration time for emergency stop	Model dependent	0.0s to 6500.0s	The F8-55 parameter specifies the deceleration time for emergency stop of the terminal. The emergency stop function enables the AC drive to decelerate within the specified deceleration time. In the V/f mode, when the deceleration time is 0s, the AC drive decelerates within the minimum unit time.

4 Communication

4.1 Parameter Communication Address

4.1.1 Parameter Introduction

The AC drive supports six communication protocols: Modbus-RTU, CANopen, CANlink, PROFIBUS-DP, PROFINET, and EtherCAT. The user-programmable card and point-to-point communication are derived from the CANlink protocol. The host controller enables users to control, monitor, and change parameters of the AC drive through these protocols. The communication data is classified into parameter data and non-parameter data. The non-parameter data includes operation commands, operation status, operation parameters, and alarm information.

Parameter data

Para. Data	Group F (read/write)	F0, F1, F2, F3, F4, F5, F6, F7, F8, F9, FA, FB, FC, FD, FE, FF
	Group A (read/write)	A0, A1, A2, A3, A4, A5, A6, A7, A8, A9, AA, AB, AC, AD, AE, AF
	Group B (read/write)	B0, B1, B2, B6

The definition of parameter data communication address is as follows:

1. Parameter data read through communication
   For groups F0 to FF and A0 to AF, the high-order 8 bits of the communication address indicate the group number and the low-order 8 bits indicate the parameter number.

   Example:

   A communication address of F0-16 is F010H, where F0H represents group F0 and 10H is the hexadecimal data format of serial number 16 in the group.

   A communication address of AC-08 is AC08, where ACH represents group AC and 08H is the hexadecimal data format of serial number 8 in the group.

2. Parameter data written through communication
   For groups F0 to FF, the high-order 8 bits in the communication address are 00 to 0F or F0 to FF, which is decided by whether the high-order 8 bits are written to EEPROM. The low-order 8 bits indicate the parameter number in the group.

   Take writing F0-16 as an example.

   If it is not written to EEPROM, the communication address is 0010H.

   If it is written to EEPROM, the communication address is F010H.

For groups A0 to AF, the high-order 8 bits in the communication address are 40 to 4F or A0 to AF, which is decided by whether the high-order 8 bits are written to EEPROM. The low-order 8 bits indicate the parameter number in the group.

Take writing AC-08 as an example.

If it is not be written to EEPROM, the communication address is 4C08H.

If it is written to EEPROM, the communication address is AC08H.

Non-parameter data

Non-Parameter Data	Status data (read-only)	Group U (monitoring parameters), AC drive fault description, and AC drive operation status
	Control parameter (write-only)	Control commands, communication references, DO control, AO1 control, AO2 control, high-speed pulse (FMP) output control, and parameter initialization

1. Status data

   Status data includes group U (monitoring parameters), AC drive fault description, and AC drive operation status.

   - Group U (monitoring parameters)
     For U0 to UF, the high-order 8 bits in its communication address is 70 to 7F, and the low-order 8 bits indicate the parameter number in the group. For example, the communication address of U0-11 is 700BH.

   - AC drive fault description
     When the AC drive fault description is read via communication, the communication address is 8000H. The host controller can obtain the current fault code of the AC drive by reading the address. For the fault code description, see the definition of F9-14.

   - AC drive operation status
     When the AC drive running status is read via communication, the communication address is 3000H. The host controller can obtain the current operation status of the AC drive by reading the address. The operation status is defined in the following table.

Communication Address of the AC Drive's Operation Status	Status Definition
3000H	1: Forward run
	2: Reverse run
	3: Stop

2. Control parameters

Control parameters include control commands, communication references, DO control, AO1 control, AO2 control, and parameter initialization

- Control command

  When F0-02 (command source) is set to 2 (communication control), the host controller can control the AC drive such as starting/stopping it by using the communication address. The control commands are defined in the following table.

Communication Address of the AC Drive's Operation Status	Status Definition
2000H	1: Forward run 2: Reverse run 3: Forward jog 4: Reverse jog 5. Coast to stop 6: Decelerate to stop 7: Fault reset

- Communication reference

  The communication references apply to the data setting through communication, such as the frequency, torque upper limit, V/f separation voltage, PID reference, and PID feedback. If the communication address is 1000H, its range is -10000 to +10000 and the corresponding value range is -100.00% to +100.00%.

- DO control

  When a DO is assigned with function 20 (communication), the host controller can control the DO of the AC drive through the communication address. Control on the DO of the AC drive is defined as follows.

Communication Address of the DO Control	Command Content
2001H	Bit0: DO1 output control Bit1: DO2 output control Bit2: RELAY1 output control Bit3: RELAY2 output control Bit4: FMR output control

- AO1, AO2, high-speed pulse (FMP) output control

  When AO1, AO2, and FMP are assigned with function 12 (communication), the host controller can control the AO and high-speed pulse output terminal through the communication addresses. The definition is described in the following table.

Communication Address of the Output Control		Command Content
AO1	2002H	0 to 7FFF indicates 0% to 100%.
AO2	2003H	
FMP	2004H	

- Parameter initialization
  This function is required when you need to initialize parameters of the drive by using the host controller.

  If FP-00 (user password) is set to a non-zero value, password verification is required. The host controller performs parameter initialization within 30s after successful password verification.

  The communication address of password verification through communication is 1F00H. Directly write the correct user password to this address to perform password verification. The communication address of parameter initialization through communication is 1F01H, as defined in the following table.

Communication Address of Parameter Initialization	Command Definition
1F01H	0: No operation 1: Restore default settings (mode 1) 2: Clear records 4: Back up current user parameters 501: Restore user backup parameters 503: Restore default settings (mode 2)

4.1.2 Modbus Communication Protocol

Overview

The AC drive provides RS485 communication interfaces and supports the Modbus-RTU slave communication protocol. You can implement centralized control, such as setting commands, modifying parameters, and reading running state and fault information of the AC drive, by using a computer or PLC.

This protocol defines the content and format of transmitted messages during serial communication, including master polling (or broadcasting) format and master coding method (parameters for action requirements, transmission data, and error check). Slave response uses the same structure and includes action confirmation, returned data, and error check. If an error occurs when the slave receives a message, or the slave cannot complete the action required by the master, the slave returns a fault message as a response to the master.

Application

The AC drive is connected to a "single-master multi-slave" PC or PLC control network with RS485 bus.

Hardware interface

The RS485 extension card MD38TX1 must be inserted into the AC drive.

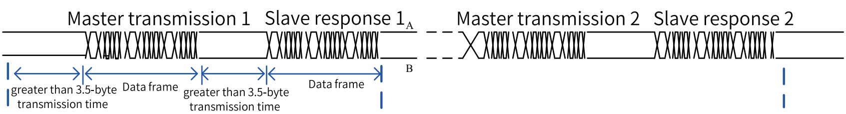
Topology

The system consists of a single master and multiple slaves. In the network, each communication device has a unique slave address. One of the devices (usually a PC host controller, a PLC, or an HMI) is the master and initiates communication to perform parameter read or write operations on slaves. Other devices (slaves) provide data to respond to query or operations from the master. Only one device is allowed to transmit data at a time, whereas other devices should be in data receiving status.

The address range of the slaves is 1 to 247, and 0 is a broadcast address. A slave must have a unique address in the network.

Communication transmission mode

The asynchronous serial and half-duplex transmission mode is used. During asynchronous serial communication, data is sent frame by frame in the form of message. According to the Modbus-RTU protocol, an interval of at least 3.5-byte transmission time marks the end of the previous message. A new message starts to be sent after this interval.



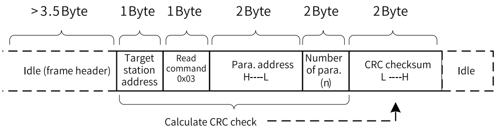
The communication protocol used by the AC drive is the Modbus-RTU slave communication protocol, which allows the AC drive to provide data to respond to "query/command" from the master or execute actions according to "query/ command" from the master.

The master can be a PC, an industrial control device, or a PLC. The master can communicate with a single slave or send broadcast messages to all slaves. When the master communicates with a single slave, the slave needs to return a message (response) to "query/command" from the master. For a broadcast message sent by the master, the slaves need not return a response.

4.1.3 Communication Data Frame Structure

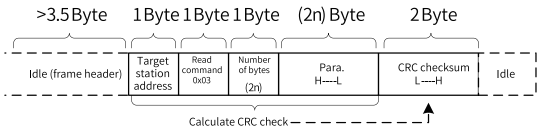
The following figure shows the Modbus-RTU communication date. The AC drive supports read and write of word-type parameters only. The read command is 0x03, the write command is 0x06, and the multi-write command is 0x10. The AC drive does not support read and write of bytes or bits.

Frame of read command from the master

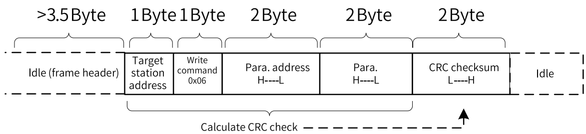


Theoretically, the host controller can read multiple continuous parameters at a time (that is, n is up to 12). Do not stride over the last parameter in this parameter group; otherwise, an error will be returned.

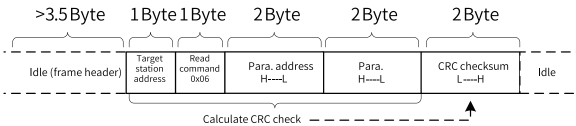
Frame of slave response to read command



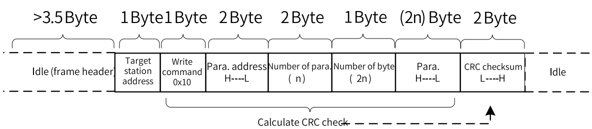
Frame of write command from the master



Frame of slave response to write command

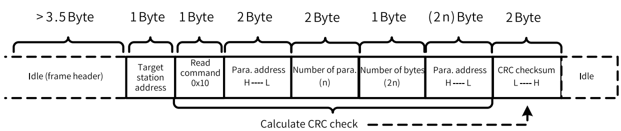


Frame of multi-write command from the master



Multi-write is the same as multi-read and up to 12 parameters can be continuously written.

Frame of slave response to multi-write command



If the slave detects a communication frame error or read/write failure due to other causes, the slave returns a frame of error.

Note

No response is returned for CRC check error.

A read error returned from the slave is 0x83. A write error returned from the slave is 0x86. A multi-write error returned from the slave is 0x90.

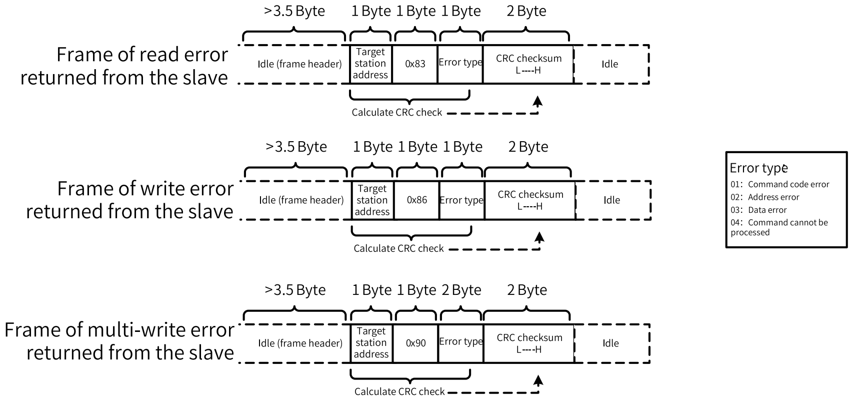


Table 4–1 Data frame fields

Frame header (START)	Idle time greater than 3.5-byte transmission time
Slave address (ADR)	Communication address range: 1 to 247; 0 = Broadcast
Command code (CMD)	03: Read slave parameters; 06: Write slave parameters; 10: Multi-write slave parameters
Parameter address (H)	Internal parameter address of the AC drive, expressed in hexadecimal. Parameters are divided into parameter type and non-parameter type (for example, operation status parameters and operation commands). See the definition of addresses. Low-order bytes follow high-order bytes during transmission.
Parameter address (L)	
Parameter count (H)	Number of parameters read in this frame. The value 1 indicates reading one parameter. Low-order bytes follow high-order bytes during transmission. According to this protocol, only one parameter can be rewritten at a time without this field.
Parameter count (L)	
Data bytes	The data length, which is twice the number of parameters
Data (H)	Response data or data to be written. Low-order bytes follow high-order bytes during transmission.
Data (L)	
CRC low bit	Detection value: CRC16 check value. High-order bytes follow low-order bytes during transmission. For details of the calculation method, see the description of CRC in this section.
CRC high bit	

END	3.5-byte transmission time

CRC check:

Cyclical Redundancy Check (CRC) uses the RTU frame format. A Modbus message includes a CRC-based error check field. The CRC field is used to check content of the entire message. The CRC field contains two bytes, making up a 16-bit binary value. The CRC field is calculated by the transmitting device, and then added to the message. The receiving device recalculates a CRC value after receiving the message, and compares the calculated value with the CRC value in the received CRC field. If the two CRC values are unequal, a transmission error occurs.

The CRC is first stored to 0xFFFF. Then a procedure is invoked to process the successive 8-bit bytes in the message and the value in the register. Only the eight bits in each character are used for the CRC. The start bit, stop bit, and the parity bit do not apply to the CRC.

During generation of the CRC, each eight-bit character is in exclusive-OR (XOR) with the content in the register. Then, the result is shifted in the direction of the least significant bit (LSB), with a zero filled into the most significant bit (MSB) position. The LSB is extracted and examined. If the LSB is 1, the register then performs XOR with a preset value. If the LSB is 0, no XOR is performed. This process is repeated until eight shifts have been performed. After the last (eighth) shift, the next eight-bit byte is in XOR with the register's current value, and the process repeats for another eight shifts as described above. The final value of the register, after all the bytes of the message have been applied, is the CRC value.

When CRC is added in a message, high-order bytes follow low-order bytes. The CRC simple function is as follows:

```
unsigned int crc_chk_value (unsigned char *data_value,unsigned char length)
{
unsigned int crc_value=0xFFFF;
int i;
while (length–)
{
crc_value^=*data_value++;
for (i=0;i<8;i++)
{
if (crc_value&0x0001)
{
crc_value= (crc_value>>1) ^0xa001;
}
```

```
else
{
crc_value=crc_value>>1;
}
}
}
return (crc_value);
 }
```

Definition of communication parameter addresses:

R/W parameter (some parameters cannot be modified as they are manufacturer-specific parameters or for monitoring purpose only.)

4.1.4 Parameter Address Expression Rules

The parameter group number and parameter number are used to express a parameter address.

High-order bytes: F0 to FF (group F), A0 to AF (group A), and 70 to 7F (group U)

Low-order bytes: 00 to FF

For example, the communication address of F3-12 is expressed as 0xF30C.

Group FF: Parameters cannot be read or modified. Group U: Parameters are ready-only and cannot be modified.

Some parameters cannot be modified when the AC drive is running. Some parameters cannot be modified regardless of the status of the AC drive. Modify a parameter according to its range, unit, and description.

Parameter Group No.	Communication Access Address	Modified RAM Parameter Address Through Communication
F0 to FE	0xF000 to 0xFEFF	0x0000 to 0x0EFF
A0 to AC	0xA000 to 0xACFF	0x4000 to 0x4CFF
U0	0x7000 to 0x70FF	
B0 to B6	0xB000 to 0xB6FF	0x5000 to 0x56FF

Note

Frequent storage to the EEPROM reduces its service life. Therefore, in communication mode, change values of certain parameters in RAM rather than storing the setting.

To implement the function of the parameter in group F, change the high-order F of the parameter address to 0. To implement the function of the parameter in group A, change the high-order A of the parameter address to 4.

The parameter addresses are expressed as follows:

High-order bytes: 00 to 0F (group F) and 40 to 4F (group A)

Low-order bytes: 00 to FF

Example:

If parameter F3-12 is not stored into EEPROM, the address is expressed as 030C. If parameter A0-05 is not stored into EEPROM, the address is expressed as 4005. This address indicates that the parameter can only be written to RAM, and is invalid when being read.

The following table lists some stop/run parameters.

Para. Address	Description	Para. Address	Description
1000H	*Communication (decimal) -10000 to +10000	1010H	PID reference
1001H	Running frequency	1011H	PID feedback
1002H	Bus voltage	1012H	PLC process
1003H	Output voltage	1013H	Pulse input frequency (basic unit: 0.01 kHz)
1004H	Output current	1014H	Feedback speed (basic unit: 0.1 Hz)
1005H	Output power	1015H	Remaining running time
1006H	Output torque	1016H	AI1 voltage before correction
1007H	Running speed	1017H	AI2 voltage before correction
1008H	DI input indication	1018H	AI3 voltage before correction
1009H	DO output indication	1019H	Linear speed
100AH	AI1 voltage	101AH	Current power-on time
100BH	AI2 voltage	101BH	Current running time
100CH	AI3 voltage	101CH	Pulse input frequency (basic unit: 1 Hz)
100DH	Count value input	101DH	Current communication (read-only)
100EH	Length value input	101EH	Actual feedback speed
100FH	Load speed	101FH	Display of main frequency X
–	–	1020H	Display of auxiliary frequency Y

Note

A communication reference is a percentage expressed as a fraction of the maximum frequency (F0-10). +10000 and –10000 correspond to +100.00% and –100.00% respectively. For torque dimension data, this percentage is F2-10 or A2-48 (digital setting of torque upper limit of the first or second motor).

Input of control commands to the AC drive (write-only)

Command Word Address	Command Definition
2000H	0001: Forward running
	0002: Reverse running
	0003: Forward jogging
	0004: Reverse jogging
	0005: Coast to stop
	0006: Decelerate to stop
	0007: Fault reset

Reading AC drive state (read-only)

State Word Address	State Word Function
3000H	0001: Forward running
	0002: Reverse running
	0003: Stop

Parameter locking password check: If an actual password is returned, password check succeeds. If no password is set, namely, the password is 0, 0000H is returned.

Password Address	Password Content
1F00H	*****

DO control (write-only)

Command Address	Command Content
2001H	BIT0: DO1 control BIT1: DO2 control BIT2: RELAY1 output control BIT3: RELAY2 output control BIT4: FMR output control BIT5: VDO1 BIT6: VDO2 BIT7: VDO3 BIT8: VDO4 BIT9: VDO5

AO1 control (write-only)

Command Address	Command Content
2002H	0 to 7FFF indicates 0% to 100%.

AO2 control (write-only)

Command Address	Command Content
2003H	0 to 7FFF indicates 0% to 100%.

Pulse output control (write-only)

Command Address	Command Content
2004H	0 to 7FFF indicates 0% to 100%.

AC drive fault description

AC Drive Fault Address	AC Drive Fault Information	
8000H	0000: No fault 0001: Reserved 0002: Overcurrent during acceleration 0003: Overcurrent during deceleration 0004: Overcurrent during operation at constant speed 0005: Overvoltage during acceleration 0006: Overvoltage during deceleration 0007: Overvoltage during operation at constant speed 0008: Snubber resistor overload 0009: Undervoltage fault 000A: AC drive overload 000B: Motor overload 000C: Input phase loss 000D: Output phase loss 000E: IGBT overtemperature 000F: External fault 0010: Communication fault 0011: Contactor fault 0012: Current detection fault 0013: Motor auto-tuning fault 0014: Encoder/PG card fault	0015: Parameter read-write error 0016: AC drive hardware fault 0017: Motor short circuit to ground 0018: Reserved 0019: Reserved 001A: Running time reach 001B: User-defined fault 1 001C: User-defined fault 2 001D: Power-on time reach 001E: Load lost 001F: PID feedback loss during operation 0028: Fast current limit timeout 0029: Motor switchover fault during operation 002A: Excessive speed deviation 002B: Motor overspeed 002D: Motor overtemperature 005A: Encoder PPR reference error 005B: Encoder not connected 005C: Initial position error 005E: Speed feedback error

4.1.5 Group Fd: Communication Parameters

Parameter Fd-00 is used to set a data transmission rate between the host controller and the AC drive. Note that the baud rate of the host controller must be consistent with that of the AC drive. Otherwise, communication will fail. A high baud rate means faster communication speed.

Para. No.	Name	Default	Value Range
Fd-00	Baud rate	5005	Ones (Modbus) 0: 300 bps 1: 600 bps 2: 1200 bps 3: 2400 bps 4: 4800 bps 5: 9600 bps 6: 19200 bps 7: 38400 bps 8: 57600 bps 9: 115200 bps

The data format of the host controller must be consistent with that of the AC drive. Otherwise, communication will fail.

Para. No.	Name	Default	Value Range
Fd-01	Data format	0	0: No check <8,N,2> 1: Even parity check <8,E,1> 2: Odd parity check <8,O,1> 3: No check <8,N,1>

When the local address is set to 0 (broadcast address), the broadcasting function of the host controller is implemented. The local address is unique (except the broadcast address) and is the precondition to implementing point-to-point communication between the host controller and the AC drive.

Para. No.	Name	Default	Value Range
Fd-02	Local address	1	1 to 247 0: Broadcast address

Response delay: Indicates the interval from the end of data receiving by the AC drive to the start of data transmission to the host controller. If the response delay is shorter than the system processing time, the former is subject to the latter. Otherwise, after the system finishes data processing, the system waits until the response delay time expires before sending the data to the host controller.

Para. No.	Name	Default	Value Range
Fd-03	Response delay	2 ms	0 ms to 20 ms

When this parameter is set to 0.0s, the system does not detect communication timeout.

When the interval between communication messages exceeds the communication timeout time, the system reports a communication fault (Err16). The parameter is generally set to invalid. In applications with continuous communication, you can use this parameter to monitor the communication state.

Para. No.	Name	Default	Value Range
Fd-04	Communication timeout time	0.0s	0.0s (invalid) 0.1s to 60.0s

5 Fault Codes

5.1 List of Fault Codes

The following faults may occur during the use of the AC drive. Troubleshoot and rectify faults by taking actions described in the following table.

Table 5–1 Fault codes

Fault Name	Display	Possible Cause	Action
Overcurrent during acceleration	E02.00	Grounded or short-circuited output circuit of the AC drive	Check whether the motor or relay contactor is short-circuited.
		Auto-tuning is not performed in SVC or FVC control mode.	Set motor parameters according to the motor nameplate and perform motor auto-tuning.
		Excessively short acceleration time	Increase the acceleration time (F0-17).
		Inappropriate overcurrent stall suppression	Ensure that overcurrent stall suppression (F3-19) is enabled. If the value of F3-18 (overcurrent stall suppression level) is too large, adjust it to a level between 120% and 160%. If the value of F3-20 (overcurrent stall suppression gain) is too small, adjust it to a level between 20 and 40.
		Inappropriate customized torque boost or V/f curve	Adjust the customized torque boost or V/f curve.
		Startup of a running motor	Use flying start or restart the motor after the motor stops.
		External interference to the AC drive	View the fault records to check whether the fault current has ever reached the overcurrent suppression level (F3-18). If not, check for external interference source. If no external interference source is found, the driver board or Hall device might be damaged. Contact Inovance for replacement.

Fault Name	Display	Possible Cause	Action
Overcurrent during deceleration	E03.00	Grounded or short-circuited output circuit of the AC drive	Check whether the motor is short-circuited or open-circuited.
		Auto-tuning is not performed in SVC or FVC control mode.	Set motor parameters according to the motor nameplate and perform motor auto-tuning.
		Excessively short deceleration time	Increase the deceleration time (F0-18).
		Inappropriate overcurrent stall suppression	Ensure that overcurrent stall suppression (F3-19) is enabled. If the value of F3-18 (overcurrent stall suppression level) is too large, adjust it to a level between 120% and 150%. If the value of F3-20 (overcurrent stall suppression gain) is too small, adjust it to a level between 20 and 40.
		The braking unit and braking resistor are not installed.	Install a braking unit and a braking resistor.
		External interference to the AC drive	View the fault records to check whether the fault current has ever reached the overcurrent suppression level (F3-18). If not, check for external interference source. If no external interference source is found, the driver board or Hall device might be damaged. Contact Inovance for replacement.
Overcurrent during operation at constant speed	E04.00	Grounded or short-circuited output circuit of the AC drive	Check whether the motor is short-circuited or open-circuited.
		Auto-tuning is not performed in SVC or FVC control mode.	Set motor parameters according to the motor nameplate and perform motor auto-tuning.
		Inappropriate overcurrent stall suppression	Ensure that overcurrent stall suppression (F3-19) is enabled. If the value of F3-18 (overcurrent stall suppression level) is too large, adjust it to a level between 120% and 150%. If the value of F3-20 (overcurrent stall suppression gain) is too small, adjust it to a level between 20 and 40.
		Inadequate power rating of the AC drive	If the running current exceeds the rated motor current or rated output current of the AC drive during stable running, select an AC drive with a higher power rating.
		External interference to the AC drive	View the fault records to check whether the fault current has ever reached the overcurrent suppression level (F3-18). If not, check for external interference source. If no external interference source is found, the driver board or Hall device might be damaged. Contact Inovance for replacement.

Fault Name	Display	Possible Cause	Action
Overvoltage during acceleration	E05.00	High input grid voltage	Adjust the voltage to the normal range.
		External force driving the motor during acceleration	Cancel the external force or install a braking resistor. If the value of F3-26 (frequency rise threshold during overvoltage suppression) is too small, adjust it to a level between 5 Hz to 15 Hz when an external force drives the motor.
		Inappropriate overvoltage suppression	Ensure that overvoltage suppression (F3-23) is enabled. If the value of F3-22 (overvoltage suppression) is too large, adjust it to a level between 700 V and 770 V. If the value of F3-24 (frequency gain for overvoltage suppression) is too small, adjust it to a level between 30 and 50.
		The braking unit and braking resistor are not installed.	Install a braking unit and a braking resistor.
		Excessively short acceleration time	Increase the acceleration time.
Overvoltage during deceleration	E06.00	Inappropriate overvoltage suppression	Ensure that overvoltage suppression (F3-23) is enabled. If the value of F3-22 (overvoltage suppression) is too large, adjust it to a level between 700 V and 770 V. If the value of F3-24 (frequency gain for overvoltage suppression) is too small, adjust it to a level between 30 and 50.
		External force driving the motor during deceleration	Cancel the external force or install a braking resistor. If the value of F3-26 (frequency rise threshold during overvoltage suppression) is too small, adjust it to a level between 5 Hz to 15 Hz when an external force drives the motor.
		Excessively short deceleration time	Increase the deceleration time.
		The braking unit and braking resistor are not installed.	Install a braking unit and a braking resistor.

Fault Name	Display	Possible Cause	Action
Overvoltage during operation at constant speed	E07.00	Inappropriate overvoltage suppression	Ensure that overvoltage suppression (F3-23) is enabled. If the value of F3-22 (overvoltage suppression) is too large, adjust it to a level between 700 V and 770 V. If the value of F3-24 (frequency gain for overvoltage suppression) is too small, adjust it to a level between 30 and 50.
		External force driving the motor during operation	Cancel the external force or install a braking resistor. If the value of F3-26 (frequency rise threshold during overvoltage suppression) is too small, adjust it to a level between 5 Hz to 15 Hz when an external force drives the motor.
Undervoltage	E09.00	Instantaneous power failure	Enable the power dip ride-through function (F9-59).
		AC drive input voltage out of range	Adjust the voltage to a value within the normal range.
		Abnormal bus voltage	Contact Inovance for technical support.
		Abnormal rectifier, IGBT driver board, or IGBT control board	Contact Inovance for technical support.
AC drive overload	E10.00	Excessively heavy load or stalled motor	Reduce the load and check the motor and mechanical conditions.
		Inadequate power rating of the AC drive	Use an AC drive with a higher power rating.
		Auto-tuning is not performed in SVC or FVC control mode.	Set motor parameters according to the motor nameplate and perform motor auto-tuning.
		Excessively high torque boost (F3-01) in V/f control mode	Decrease the value of F3-01 by 1.0% each time or set F3-01 to 0 (automatic torque boost).
		Output phase loss on the AC drive	Check the output wiring of the AC drive.
Motor overload	E11.00	Inappropriate F9-01 (motor overload protection gain) setting.	Increase the value of F9-01 to prolong the motor overload time.
		Excessively heavy load or stalled motor	Reduce the load and check the motor and mechanical conditions.
Input phase loss	E12.00	Input phase loss	Ensure proper input RST cables and three-phase input voltage.
Output phase loss	E13.00	Motor fault	Check whether the motor is disconnected.
		Abnormal lead wire connecting the AC drive to the motor	Rectify external faults.
		Unbalanced three-phase output of the AC drive during motor operation	Ensure proper functioning of the motor three-phase winding.
		Abnormal driver board or IGBT	Contact the agent or Inovance for technical support.

Fault Name	Display	Possible Cause	Action
IGBT overtemperature	E14.00	High ambient temperature	Lower the ambient temperature.
		Blocked air filter	Clean the air filter.
		Damaged fan	Replace the damaged fan.
		Damaged thermistor of the IGBT	Contact the agent or Inovance for technical support.
		Damaged IGBT	Contact the agent or Inovance for technical support.
External fault	E15.01	External fault signal input to the multi-function DI terminal (normally open)	Rectify the external fault, and ensure that the mechanical condition allows restart (F8-18).
	E15.02	External fault signal input to the multi-function DI terminal (normally closed)	Rectify the external fault, and ensure that the mechanical condition allows restart (F8-18).
Communication fault	E16.01	Modbus communication timeout	Ensure proper wiring of the RS485 communication cable. Ensure proper settings of FD-04 and PLC communication cycle.
	E16.11	CANopen communication timeout	Ensure proper connection of the CAN communication cable. Check the values of FD-15 to FD-17 and eliminate interference.
	E16.12	Inconsistency between the configured CANopen-based PDO mapping and the actual mapping	Check the PDO mapping of parameters in group AF.
	E16.21	CANlink heartbeat timeout	Ensure proper connection of the CAN communication cable. Check the values of FD-15 to FD-17 and eliminate interference.
	E16.22	CANlink station number conflict	Change the value of FD-13 to make CANlink station numbers different from each other.
Contactor fault	E17.00	Abnormal driver board and power supply	Replace the driver board or power supply board.
		Abnormal contactor	Replace the contactor.
		Abnormal lightning protection board	Replace the lightning protection board.
Damaged current sampling circuit	E18.00	Abnormal AC drive current sampling	Power on the main circuit.
			If the Hall sensor or sampling current circuit is damaged, contact Inovance.

Fault Name	Display	Possible Cause	Action
Motor auto-tuning fault	E19.02	Fault in auto-tuning on the magnetic pole position angle of the synchronous motor	Ensure that the motor is connected and there is no output phase loss.
	E19.06 E19.07 E19.08	Fault in auto-tuning on the stator resistance	Ensure that the motor is connected. Set F1-03 (rated motor current) according to the motor nameplate.
	E19.09 E19.10	Fault in auto-tuning on the transient leakage inductance of the asynchronous motor	Check whether the motor is connected or output phase is normal without loss. Ensure that the motor is connected properly.
	E19.11	Inertia auto-tuning fault	Set F1-03 (rated motor current) according to the motor nameplate. Increase the value of F2-43 (inertia auto-tuning and dynamic speed reference).
	E19.20	Timeout of auto-tuning on the no-load zero position angle of the synchronous motor	Check the Z feedback signal.
	E19.23	Fault in auto-tuning on the magnetic pole position of the synchronous motor	Set F1-03 (rated motor current) according to the motor nameplate. Decrease the value of F2-29 (synchronous motor initial angle detection current).
	E19.24	Errors in auto-tuning on the transient leakage inductance of the asynchronous motor	Check whether the power rating of the AC drive is low. If yes, use an AC drive with a proper power rating matching the motor power.

Fault Name	Display	Possible Cause	Action
Encoder fault	E20.00	Encoder disconnected	Restore the connection. Ensure proper wiring of the PG cable. Ensure proper wiring of the PG cable and power supply. Ensure consistency between the encoder pulses per revolution and the value of F1-27. Ensure proper wiring of the AB signal cable.
	E20.01	Encoder fault	
	E20.02	Encoder disconnected	
	E20.03	Encoder fault during no-load auto-tuning of the synchronous motor	
	E20.04	Encoder fault during no-load auto-tuning of the synchronous motor	
	E20.06	Encoder fault during with-load auto-tuning of the synchronous motor	
	E20.07	Encoder fault during no-load auto-tuning of the synchronous motor	
	E20.08	Encoder fault during no-load auto-tuning of the synchronous motor	
	E20.09	Encoder fault during auto-tuning of the synchronous motor	Check the encoder Z signal and wiring of the PG card.
	E20.10	Synchronous motor encoder fault	
	E20.11	The encoder is faulty during FVC no-load auto-tuning of the asynchronous motor.	Ensure that the encoder is properly connected. Ensure consistency between the encoder pulses per revolution and the value of F1-27.
	E20.12	Excessive deviation between the encoder feedback speed and the speed estimated by SVC	Check for encoder disconnection. Ensure proper setting of motor parameters. Ensure that motor auto-tuning is performed.
	E20.13	Resolver encoder disconnected	Check the wiring of the encoder.
	E20.17	23-bit encoder disconnected	Check the wiring of the 23-bit encoder.
EEPROM read/write fault	E21.01	EEPROM read/write abnormality	For communication write parameters, check the RAM addresses and the RAM address mapping of the parameters. For details, see 6.2.4 Parameter Address Rules. If the EEPROM chip is damaged, contact Inovance to replace the control board.
	E21.02		
	E21.03		
	E21.04		

Fault Name	Display	Possible Cause	Action
Motor auto-tuning error	E22.00	Auto-tuned stator resistance out of range	Correctly set F1-02 (rated motor voltage) and F1-03 (rated motor current) in group F1 according to the motor nameplate.
	E22.01	Auto-tuned rotor resistance of the asynchronous motor out of range	Ensure that auto-tuning is performed after the motor stops.
	E22.02	The no-load current and mutual inductance of the asynchronous motor obtained through auto-tuning exceed the allowed range. If this alarm is reported, the AC drive calculates the mutual inductance and no-load current values based on known motor parameters. The calculated values may not be the optimal values.	Set motor parameters in group F1 according to the motor nameplate. Ensure that the motor has no load before auto-tuning.
	E22.03	Auto-tuned back EMF of the synchronous motor out of range.	Set F1-02 (rated motor voltage) according to the motor nameplate. Ensure that the motor has no load before auto-tuning.
	E22.04	Inertia auto-tuning fault	Set F1-03 (rated motor current) according to the motor nameplate.
Short circuit to ground	E23.00	Motor shorted to the ground	Check and replace the motor cables and motor if necessary.
Motor inter-phase short circuit	E24.00	Motor inter-phase short circuit	Check whether a two-phase short circuit occurs on the output UVW.
Rectifier fault	E25.00	Rectifier fault	Rectify corresponding faults, such as input phase loss and overtemperature. 1: Operation enabled 2: Incoming circuit breaker feedback 3: Auxiliary circuit breaker feedback 4: Leakage protection switch feedback. If there is no feedback signal, an alarm is reported. 6: Inverter unit operation inhibited 7: Inverter unit coast-to-stop 8: User-defined inverter unit stop. If the terminal is active, an alarm is reported.
Accumulative running time reach	E26.00	The accumulative running time has reached the reference value.	Clear the record through parameter initialization.
User-defined fault 1	E27.00	The user-defined fault 1 signal is input via the DI.	Perform a reset.
		The user-defined fault 1 signal is input through the virtual I/O function.	Perform a reset.

Fault Name	Display	Possible Cause	Action
User-defined fault 2	E28.00	The user-defined fault 2 signal is input via the DI.	Perform a reset.
		The user-defined fault 2 signal is input through the virtual I/O function.	Perform a reset.
Accumulative power-on time reach	E29.00	The accumulative power-on time has reached the reference value.	Clear the record through parameter initialization.
Load lost	E30.00	Running current of the AC drive less than the value of F9-64	Check for load disconnection and mismatching between the values of F9-64 and F9-65 and actual working conditions.
PID feedback loss during operation	E31.00	PID feedback less than the value of FA-26	Check the PID feedback signals or set FA-26 to a proper value.
Pulse-by-pulse current limit fault	E40.00	Excessively heavy load or stalled motor	Reduce the load and check the motor and mechanical conditions.
		Inadequate power rating of the AC drive	Use an AC drive with a higher power rating.
Excessive speed deviation	E42.00	Incorrect setting of encoder parameters	Set encoder parameters properly.
		Auto-tuning is not performed on parameters.	Perform motor parameter auto-tuning.
		Inappropriate setting of F9-69 and F9-70	Set the parameters correctly based on actual conditions.
Motor overspeed	E43.00	Incorrect setting of encoder parameters	Set encoder parameters properly.
		Auto-tuning is not performed on parameters.	Perform motor parameter auto-tuning.
		Inappropriate setting of F9-67 and F9-68	Set the parameters correctly based on actual conditions.
Motor overtemperature	E45.00	Temperature sensor loosely connected	Check the wiring of the temperature sensor.
		High motor temperature	Increase the carrier frequency or take other heat dissipation measures to cool the motor.
		Excessively low value of F9-57 (motor overtemperature protection threshold)	Adjust the threshold to a level between 90°C and 100°C.
AC drive overtemperature	E60.00	High internal temperature of the AC drive	Replace the fan in the AC drive.
			Contact Inovance.
Braking transistor overload	E61.00	Excessively low resistance of the braking resistor	Use a braking resistor with higher resistance.
Braking transistor short circuit	E62.00	Braking transistor short circuit	Ensure proper functioning of the braking transistor.
			Check whether an external braking resistor is installed.
Low liquid level alarm	E63.00	Low liquid level of the water tank	Add coolant.

Fault Name	Display	Possible Cause	Action
Water cooling system fault	E64.00	Water-cooling system control unit fault	Perform a reset.
			Replace the control unit.

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