Inovance

inovA automation Monarch

MD290 AC Drive

Quick Start Guide

V0.0

Data Code: 19010376

Contents

Safety Information and Precautions

This guide is packaged together with the MD290 AC drive. It contains basic information for quick start of the drive. For safety and more information, please refer to the MD290 AC Drive High Performance User Manual, which can be downloaded on the website http://www.inovance.cn.

■ Electrical Safety

Extreme care must be taken at all times when working with the AC Drive or within the area of the AC Drive. The voltages used in the AC Drive can cause severe electrical shock or burns and is potentially lethal. Only authorized and qualified personnel should be allowed to work on AC Drives.

■ Machine/System Design and Safety of Personnel

Machine/system design, installation, commissioning startups and maintenance must be carried out by personnel who have the necessary training and experience. They must read this safety information and the contents of this manual. If incorrectly installed, the AC Drive may present a safety hazard.

The AC Drive uses high voltages and currents (including DC), carries a high level of stored electrical energy in the DC bus capacitors even after power OFF. These high voltages are potentially lethal.

The AC Drive is NOT intended to be used for safety related applications/functions. The electronic “STOP & START” control circuits within the AC Drive must not be relied upon for the safety of personnel. Such control circuits do not isolate mains power voltages from the output of the AC Drive. The mains power supply must be disconnected by an electrical safety isolation device before accessing the internal parts of the AC Drive.

Safety risk assessments of the machine or process system which uses an AC Drive must be undertaken by the user and or by their systems integrator/designer. In particular the safety assessment/design must take into consideration the consequences of the AC Drive failing or tripping out during normal operation and whether this leads to a safe stop position without damaging machine, adjacent equipment and machine operators/users. This responsibility lies with the user or their machine/process system integrator.

System integrator/designer must ensure the complete system is safe and designed according to the relevant safety standards. Inovance Technology and Authorized Distributors can provide recommendations related to the AC drive to ensure long term safe operation.

■ Electrical Installation - Safety

Electrical shock risk is always present within an AC Drive including the output cable leading to the motor terminals. Where dynamic brake resistors are fitted external to the AC Drive, care must be taken with regards to live contact with the brake resistors, terminals which are at high DC voltage and potentially lethal. Cables from the AC Drive to the dynamic brake resistors should be double insulated as DC voltages are typically 600 to 700 VDC.

Mains power supply isolation switch should be fitted to the AC Drive. The mains power supply must be disconnected via the isolation switch before any cover of the AC Drive can be removed or before any servicing work is undertaken stored charge in the DC bus capacitors of the PWM inverter is potentially lethal after the AC supply has been disconnected. The AC supply must be isolated at least 10 minutes before any work can be undertaken as the stored charge will have been discharged through the internal bleed resistor fitted across the DC bus capacitors.

Whenever possible, it is good practice to check DC bus voltage with a VDC meter before accessing the inverter bridge. Where the AC Drive input is connected to the mains supply with a plug and socket, then upon disconnecting the plug and socket, be aware that the plug pins may be exposed and internally connected to DC bus capacitors (via the internal bridge rectifier in reversed bias). Wait 10 minutes to allow stored charge in the DC bus capacitors to be dissipated by the bleed resistors before commencing work on the AC Drive.

■ Electrical Shock Hazard

Ensure the protective earthing conductor complies with technical standards and local safety regulations. Because the leakage current exceeds 3.5 mA in all models, IEC 61800-5-1 states that either the power supply must be automatically disconnected in case of discontinuity of the protective earthing conductor or a protective earthing conductor with a cross-section of at least 10 mm2 (Cu) or 16 mm2 (Al) must be used. Failure to comply may result in death or serious injury.

When using an earth leakage circuit breaker, use a residual current operated protective device (RCD) of type B (breaker which can detect both AC and DC). Leakage current can cause unprotected components to operate incorrectly. If this is a problem, lower the carrier frequency, replace the components in question with parts protected against harmonic current, or increase the sensitivity amperage of the leakage breaker to at least 200 mA per drive.

Factors in determining leakage current:

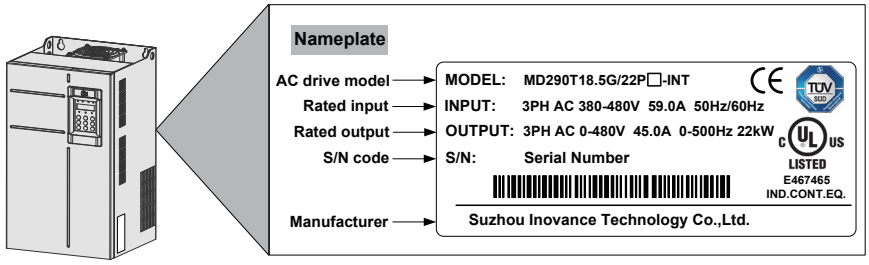
- Size of the AC drive
- AC drive carrier frequency
- Motor cable type and length
- EMI/RFI filter

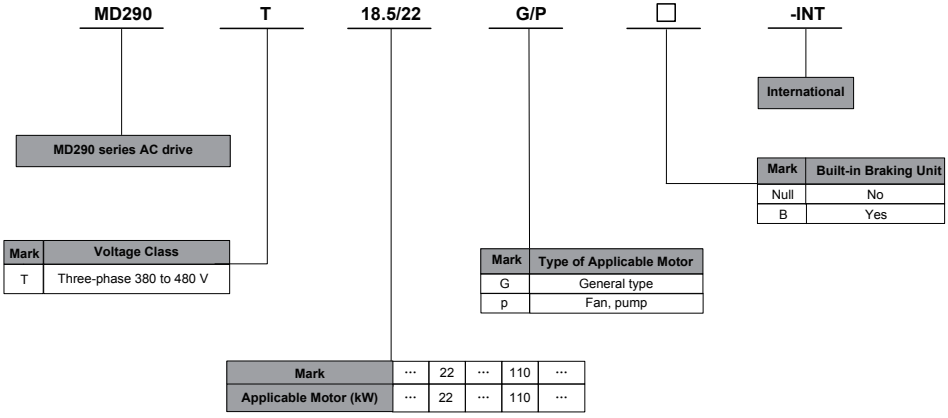
The maximum altitude is 3000 m.

The drive is designed to be used in TN or TT (grounded neutral point) system. If installing the drive in other types of grounded systems, contact Inovance for instructions.

1. Product Information

1.1 Nameplate and Designation Rule





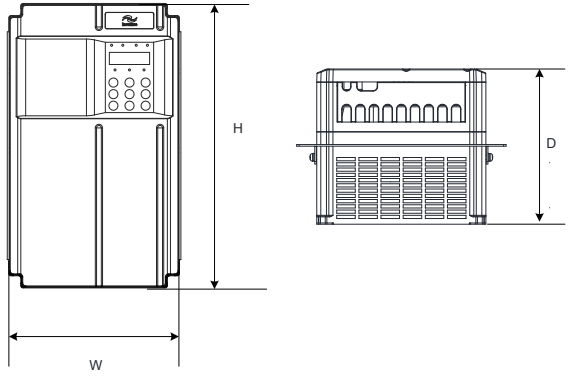
1.2 General Specifications

Voltage class			380 to 480VAC										
Model: MD290TxxG/xxP(B[(1)])-INT			18.5G /22P	22G /30P	30G /37P	37G /45P	45G /55P	55G /75P	75G /90P	90G /110P	110G /132P	132G /160P	160G /200P
Dimension[(2)]		Height Width Depth	[H]: 350 mm [W]: 210 mm [D]: 192 mm		[H]: 400 mm [W]: 250 mm [D]: 220 mm		[H]: 540 mm [W]: 300 mm [D]: 275 mm		[H]: 576 mm [W]: 338 mm [D]: 315 mm			[H]: 915 mm [W]: 400 mm [D]: 320 mm	
Mounting Hole, [mm]			Φ6		Φ7		Φ10		Φ10			Φ10	
Drive Input	Rated Input Voltage		Three-phase 380 to 480 V, -15% to +10% (323 to 528 VAC)										
	Rated Input Current, [A]	G type	49.5	59	57	69	89	106	139	164	196	240	287
		P type	59	65.8	71	86	111	143	167	198	239	295	359
	Rated Input Frequency		50/60 Hz, ±5% (47.5 to 63 Hz)										
	Power Capacity, [kVA]	G type	45	54	52	63	81	97	127	150	179	220	263
		P type	54	60	65	79	102	131	153	181	219	270	328
Drive Output	Applicable Motor [kW]	G type	18.5	22	30	37	45	55	75	90	110	132	160
		P type	22	30	37	45	55	75	90	110	132	160	200
	Output Current, [A]	G type	37	45	60	75	91	112	150	176	210	253	304
		P type	45	60	75	91	112	150	176	210	253	304	377
	Default Carrier Frequency, [kHz]		6	6	6	5	5	4	3	3	3	3	3
	Overload Capacity		G type: 150% for 60 Sec P type: 110% for 60 Sec										
	Max. Output Voltage		Three-phase 380 to 480 VAC (proportional to input voltage)										
	Max. Output Frequency		50 to 500 Hz										
Braking Resistor	Recommended Power, [kW]		4	4.5	6	7	9	11	15	18	22	26	32
	Recommended Resistance, Min. [Ω]		24	24	19.2	14.8	12.8	9.6	6.8	5.3	5.3	3.5	3.5
Enclosure			IP20										

Note

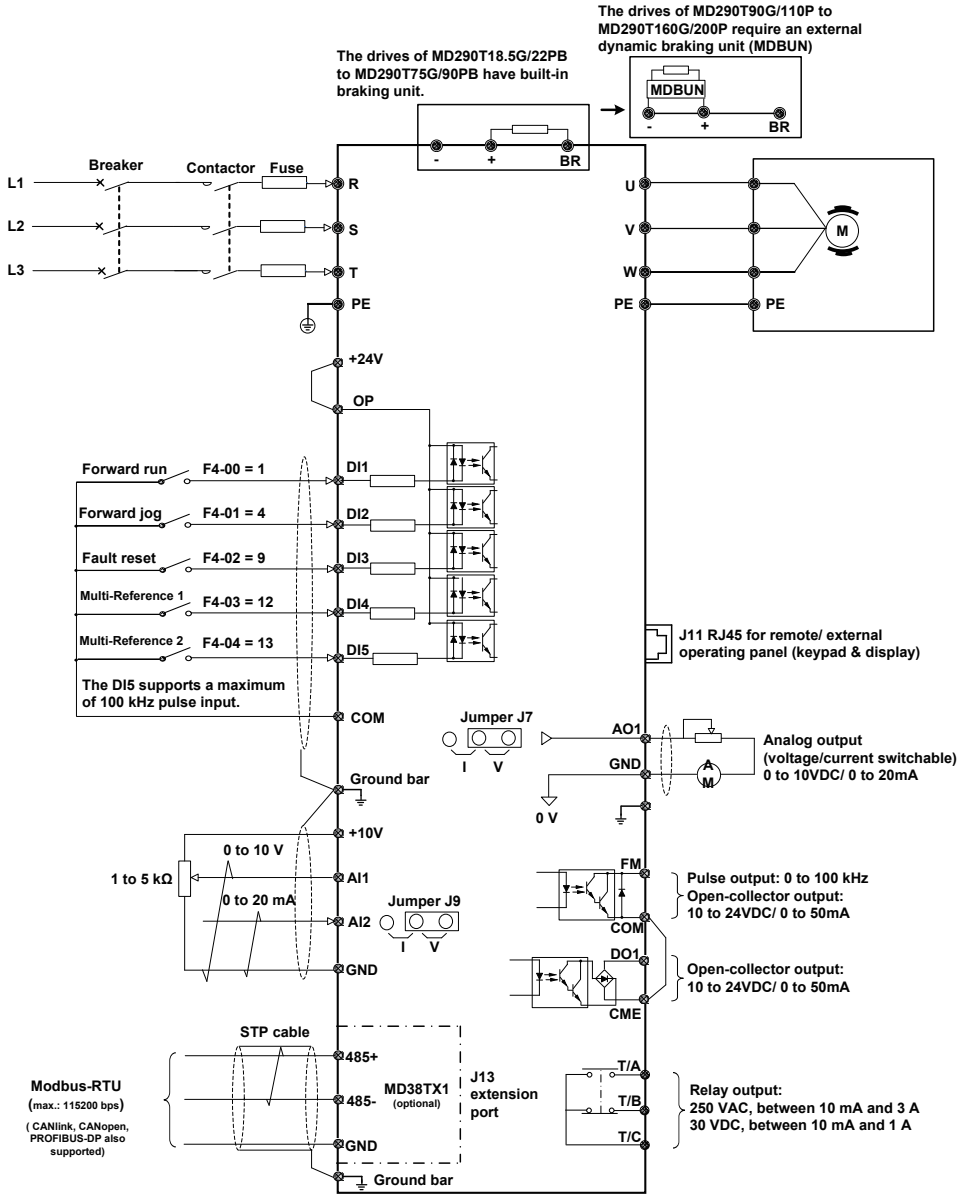
(1): "B" denotes build-in brake function for MD290T18.5G/22P to MD290 75G/90P.

(2): The dimensions are shown as below:



2 Wiring

2.1 Typical System Connection



2.2 Terminal Description

■ Terminals of Main Circuit

Figure 2-1 Main circuit terminals of MD290 of plastic housing

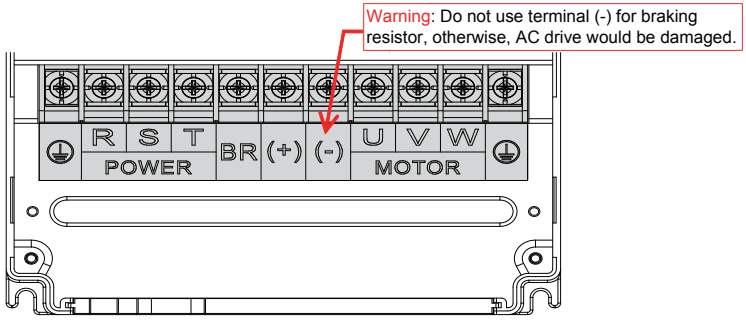
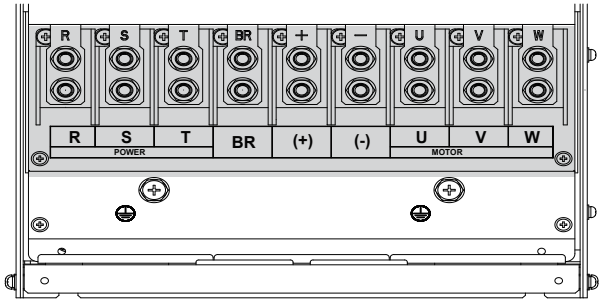
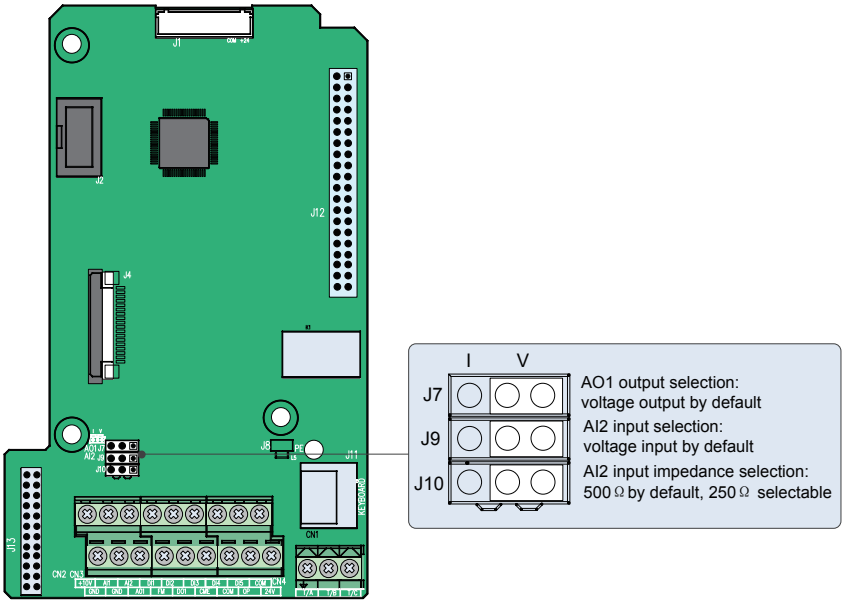


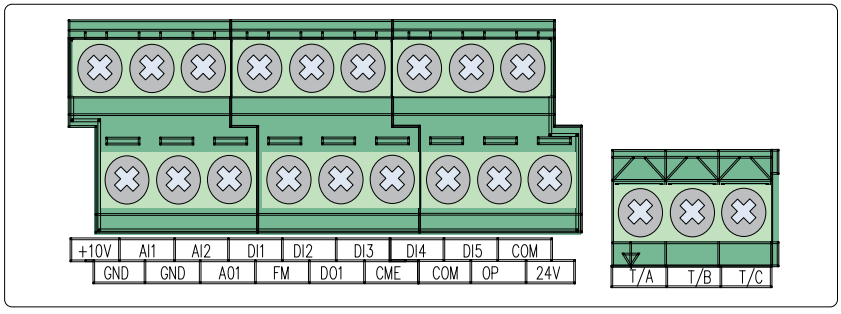
Figure 2-2 Main circuit terminals of MD290 of sheet metal housing



Terminal	Terminal Name	Description
R, S, T	Three-phase supply input	Connect to the three-phase AC power supply.
(-), (+)	DC bus terminals	Connected to external braking unit (MDBUN) with AC drive units of 90 kW and above.
BR, (+)	Braking resistor connection	Connected to external braking resistor for AC drive units of 75 kW and below.
U, V, W	Output terminals	Connect to a three-phase motor.
⏚	Ground (PE)	Grounding connection.

■ Terminals of Main Control Board





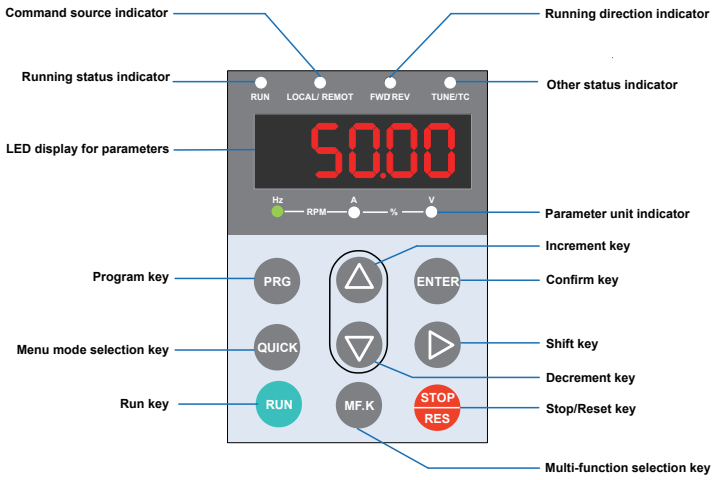
Terminal	Terminal Name	Description
+10V-GND	+10 VDC power supply	Provides +10 V power supply to an external unit. Generally used to supply an external potentiometer of 1 to 5 kΩ. Max. output current: 10 mA
+24V-COM	+24 VDC power supply	Provides +24 V power supply to an external unit. Generally used to supply the DI/DO terminals and external sensors. Max. output current: 170 mA.
OP	Input terminal for external power supply	Connected to +24 V by default. When DI1 to DI5 need to be driven by external signals, OP must be disconnected from + 24 V and connected to an external power supply.
AI1-GND	Analog input 1	Voltage range of inputs: 0 to 10 VDC; Input impedance: 22 kΩ

Terminal	Terminal Name	Description
AI2-GND	Analog input 2	Either a voltage or a current input, determined by jumper J9; Input voltage range: 0 to 10 VDC Input current range: 0 to 20 mA Input impedance: 22 kΩ (voltage input), 500 Ω or 250 Ω (current input) decided by J10
DI1-COM	Digital input 1	Optically-coupled isolation compatible with dual-polarity inputs Input impedance: 1.39 kΩ Voltage range for inputs: 9 to 30 V
DI2-COM	Digital input 2	
DI3-COM	Digital input 3	
DI4-COM	Digital input 4	
DI5-COM	High-speed pulse input	In addition to having the same features as DI1 to DI4, DI5 can also be used for high-speed pulse inputs. Max. input frequency: 100 kHz Input impedance: 1.03 kΩ
AO1-GND	Analog output 1	Either a voltage or a current output, determined by jumper J7. Output voltage range: 0 to 10 V Output current range: 0 to 20 mA.
DO1-CME	Digital output 1	Optically-coupled isolation, dual-polarity open-collector output. Output voltage range: 0 to 24 V Output current range: 0 to 50 mA. Note that CME and COM are internally insulated, but are shorted externally by a jumper. In this case, DO1 is driven by +24 V by default. Remove the jumper link if you need to apply external power to DO1
FM-COM	High-speed pulse output	Controlled by F5-00 (FM terminal output selection). Max. output frequency: 100 kHz. When used as an open-collector output, the specification is the same as for DO1.
T/A-T/B	Normally closed terminal	Contact driving capacity: 250 VAC, 3 A, Cos f = 0.4, 30 VDC, 1 A. Applies to overvoltage Category II circuit
T/A-T/C	Normally open terminal	
Auxiliary interfaces		
J13	Extension card interface	Interface for the 28-core terminal and optional cards (I/O extension card, PLC card and various bus cards)
J11	External operating panel interface	Connected to an external operating panel.
Jumpers		
J7	AO1 output selection	Either a voltage or a current output, voltage output by default
J9	AI2 input selection	Either a voltage or a current input, voltage input by default.
J10	AI2 input resistance selection	Either 500 Ω or 250 Ω input, 500 Ω input by default

3 Operation Panel (Keypad & Display)

3.1 Get Familiar with Operating Panel

■ Overview



■ Status Indicators

There are four red LED status indicators at the top of the operating panel.

Indicator	Indication
○ RUN	OFF indicates the STOP status.
	ON indicates the RUNNING status.
○ LOCAL/REMOT	OFF indicates under operating panel control.
	ON indicates under terminal control.
	FLASHING indicates under serial communication control.
○ FWD/REV	OFF indicates reverse motor rotation.
	ON indicates forward motor rotation.
○ TUNE/TC	ON indicates torque control mode.
	FLASHING SLOWLY (once a second) indicates auto-tuning status.
	FLASHING QUICKLY (four times a second) indicates a fault condition.

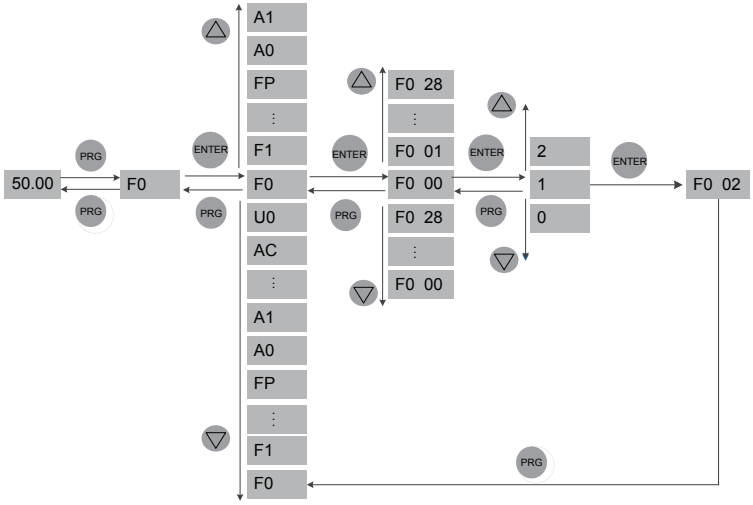
■ Parameter Unit Indicator

Indicator appearance	Meaning
Hz ● RPM A ○ % V ○	Hz for frequency
Hz ○ RPM A ● % V ○	A for current
Hz ○ RPM A ○ % V ●	V for voltage
Hz ● RPM A ● % V ○	RPM for motor speed
Hz ○ RPM A ● % V ●	Percentage

■ Keys on Operation Panel

Key	Key Name	Function
PRG	Programming	Enter or exit Level I menu. Return to the previous menu.
ENTER	Confirm	Enter each level of menu interface. Confirm displayed parameter setting.
△	Increment	When navigating a menu, it moves the selection up through the screens available. When editing a parameter value, it increases the displayed value. When the AC drive is in RUN mode, it increases the speed.
▽	Decrement	When navigating a menu, it moves the selection down through the screens available. When editing a parameter value, it decreases the displayed value. When the AC drive is in RUNNING mode, it decreases the speed.
▷	Shift	Select the displayed parameter in the STOP or RUNNING status. Select the digit to be modified when modifying a parameter value
RUN	RUN	Start the AC drive when using the operating panel control mode. It is inactive when using the terminal or communication control mode.
STOP RES	Stop/Reset	Stop the AC drive when the drive is in the RUNNING status. Perform a reset operation when the drive is in the FAULT status. Note: The functions of this key can be restricted by using function F7-02.
MF.K	Multifunction	Perform a function switchover as defined by the setting of F7-01, for example to quickly switch command source or direction.
QUICK	Menu mode selection	Press it to switch over between menu modes as defined by the setting of FP-03.

■ Operations of Parameters

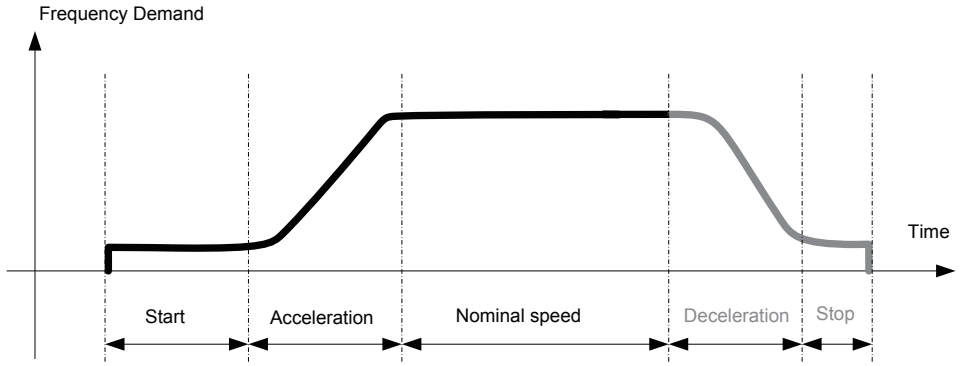


■ Parameter arrangement

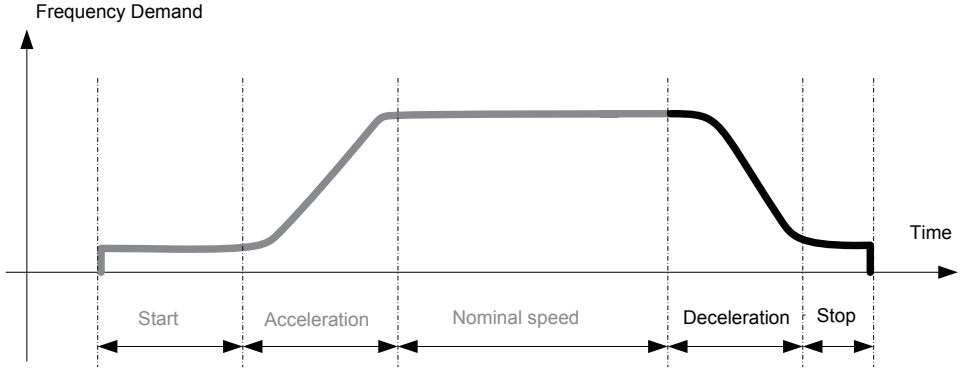
Function Code Group	Description	Remark
F0 to FF	Standard function code group	Standard function parameters
A0 to AC	Advanced function code group	AI/AO correction
U0 to U3	RUNNING status function code group	Display of basic parameters

4 Quick Setup

4.1 Performance Fine Tuning

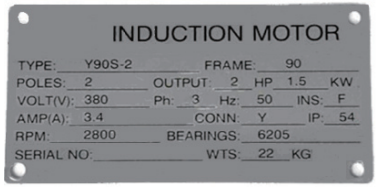


Stage	Symptom	Diagnostics	Remedies
Start	Rollback	Start frequency is too low	Increase F6-03, ranging 0 to10Hz
		Torque output is insufficient	Make sure F3-00 = 0, F3-01 = 0
	Starting jerk	Start frequency is too high	Decrease F6-03, ranging 0 to 10Hz
Acceleration	Jerk when acceleration starts	Too fast acceleration at this section	Increase F6-08, ranging 0 to (100-(F6-09))% Or increase F0-17, ranging 0 to 650s
	Jerk when acceleration end	Too fast acceleration at this section	Increase F6-09, ranging 0 to (100-(F6-08))% Or increase F0-17, ranging 0 to 650s
	Vibration	Current limit protection occurring	It reaches current limit.



Stage	Symptom	Diagnostics	Remedies
Deceleration	Vibration	Current limit protection occurring	It reaches current limit.
Stop	Jerk	Too strong DC injection at stop	Decrease F6-13, ranging 0 to 100%.
	Slip	Too short DC injection active time at stop	Increase F6-14,ranging 0 to 100s.
		Too weak DC injection at stop	Increase F6-13, ranging 0 to 100%.
		Braking device applies too late	Check the timing of braking device.

4.2 Setup flowchart

START	Para.	Parameter name	Default	Commission
Before power on				
Install and wire the drive		Install and wire the drive as explained in chapters 1 to 3 of the MD290 AC Drive High Performance User Manual.		
Check wirings of power supply and AC drive outputs		-		
Restore parameters	FP-01	Parameter initialization	0	
		0: No operation 1: Restore default settings except motor parameters 2: Clear records including errors 4: Back up parameters 501: Restore user's backup parameters NOTE: It is recommended to "Restore default settings" prior to commissioning the AC drive.		
Set motor parameters		Motor Nameplate		
				
	F1-01	Rated motor power	model dependent	1.5
		Unit: kW		
	F1-02	Rated motor voltage	model dependent	380
		Unit: V		
	F1-03	Rated motor current	model dependent	3.4
		Unit: A		
	F1-04	Rated motor frequency	model dependent	50
		Unit: Hz		
	F1-05	Rated motor speed	model dependent	2800
		Unit: rpm.		

CONTINUE	Para.	Parameter name	Default	Commission

CONTINUE	Para.	Parameter name	Default	Commission
Perform motor auto tuning	F1-37	Auto-tuning selection	0	
		0: No auto-tuning 1: Static auto-tuning 1 2: Dynamic auto-tuning 3: Static auto-tuning 2 NOTE: Motor won't rotate at this stage. Steps of auto-tuning: 1. Make sure the UVW connection between inverter and motor is not cut off by output contactor; if it is cut off, then manually handle with the output contactor. 3. Set F1-37 = 3, press ENTER, then LED on panel will display letters "TUNE". 4. Press the RUN key on panel, then motor starts auto-tuning, it usually takes about 30 seconds to finish this auto-tuning, wait until LED stops displaying "TUNE". 5. Restore F0-02 to the default value 1.		
If AI2 is frequency reference				
Set AI2	F4-18	AI curve 2 minimum input	0.00	
		0 V to F4-20;		
	F4-19	Corresponding percentage of AI2 minimum input	0.0	
		-100.0% to 100.0%		
	F4-20	AI2 maximum input	10.00	
		F4-18 to 10.00 V		
	F4-21	Corresponding percentage of AI2 maximum input	100.0	
If AI3 is frequency reference		-100.0% to 100.0%		
Set AI3	F4-23	AI curve 3 minimum input	0.00	
		0 V to F4-25;		
	F4-24	Corresponding percentage of AI3 minimum input	0.0	
		-100.0% to 100.0%		
	F4-25	AI3 maximum input	10.00	
		F4-23 to 10.00 V		
	F4-26	Corresponding percentage of AI3 maximum input	100.0	
If multi-reference is frequency reference		-100.0% to 100.0%		
Set multi-reference	FC-00	Reference 0	0.0	
		0.0 to 100.0%.		
	FC-01 to FC-15	Reference 1-15	0.0	
		0.0 to 100.0%.		

CONTINUE	Para.	Parameter name	Default	Commission

CONTINUE

If any digital input is used

Set DI function

Para.	Parameter name	Default	Commission
F4-00	DI1 function selection	1	

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: RUN pause
11: External fault normally open (NO) input
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 time selection
17: Terminal 2 for acceleration/deceleration time selection
18: Frequency source switchover
19: UP and DOWN setting clear (terminal, keypad)
20: Command source switchover terminal 1
21: Acceleration/Deceleration prohibited
22: PID pause
23: PLC status reset
24: Swing pause
25: Counter input
26: Counter reset
27: Length count input
28: Length reset
29: Torque control prohibited
30: Pulse input (enabled only for DI5)
31: Reserved
32: Immediate DC injection braking
33: External fault normally closed (NC) input
34: Frequency modification forbidden
35: PID action direction reverse
36: External STOP terminal 1
37: Command source switchover terminal 2
38: PID integral disabled
39: Switchover between main frequency source X and preset frequency
40: Switchover between auxiliary frequency source Y and preset frequency
41: Motor selection terminal 1
42: Motor selection terminal 2
43: PID parameter switchover

CONTINUE

Para.	Parameter name	Default	Commission

CONTINUE

Para.	Parameter name	Default	Commission
F4-00	DI1 function selection	1	
	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 injection braking 50: Clear the current running time 51–59: Reserved Setting range:0 to 59;		
F4-01	DI2 function selection	4	
	Setting range same as DI1.		
F4-02	DI3 function selection	9	
	Setting range same as DI1.		
F4-03	DI4 function selection	12	
	Setting range same as DI1.		
F4-04	DI5 function selection	13	
	Setting range same as DI1;		
F4-05	DI6 function selection	0	
	Setting range same as DI1;		
F4-06	DI7 function selection	0	
	Setting range same as DI1;		
F4-07	DI8 function selection	0	
	Setting range same as DI1		
F4-08	DI9 function selection	0	
	Setting range same as DI1.		
F4-09	DI10 function selection	0	
	Setting range same as DI1;		

If any digital output is used

Set DO function

F5-00	FM output mode selection	0	
	0: FM terminal outputs pulses, the frequency of which represents the value of variable which is assigned by F5-06. 1: FM terminal outputs switch signal, the value of which represents the status of variable which is assigned by F5-01		
F5-01	FM (switch signal) function selection	0	
	0: No output 1: AC Drive running 2: Fault output 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		

CONTINUE

Para.	Parameter name	Default	Commission

CONTINUE	Para.	Parameter name	Default	Commission
Set DO function	F5-01	FM (switch signal) function selection	0	
		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: Reserved 17: Frequency upper limit reached 18: Frequency lower limit reached (no output at stop) 19: Undervoltage status output 20: Communication setting 21,22: Reserved 23: Zero-speed running 2 (having output at stop) 24: Accumulative power-on time reached 25: Frequency level detection FDT2 output 26: Frequency 1 reached 27: Frequency 2 reached 28: Current 1 reached 29: Current 2 reached 30: Timing duration reached 31: AI1 input limit exceeded 32: Load lost 33: Reverse running 34: Zero current status 35: Module temperature reached 36:Software current limit exceeded 37: Frequency lower limit reached (having output at stop) 38: Alarm output 39: Motor overheat warning 40: Current running time reached 41: Fault output (no output at undervoltage)		
	F5-02	Relay function selection(T/A-T/B-T/C)	2	
		Setting range same as FM;		
	F5-03	Relay function selection (P/A-P/B-P/C)	0	
		Setting range same as FM; the relay P/A-P/B-P/C is on extension I/O card.		
	F5-04	DO1 function selection	1	
		Setting range same as FM		
	F5-05	Extension card DO2 function selection	4	
		Setting range same as FM		

CONTINUE	Para.	Parameter name	Default	Commission

CONTINUE	Para.	Parameter name	Default	Commission
	F5-06	FM (pulse signal) function selection	0	
		0: Running frequency 1: Set frequency 2: Output current 3: Reserved 4: Output power 5: Output voltage 6: Pulse input 7: AI1 8: AI2 9: AI3 10: Length 11: Count value 12: Communication setting 13: Motor rotational speed 14: Output current 15: Output voltage 16: Reserved		
if an analog output is used				
Set AO function	F5-07	AO1 function selection	0	
		Setting range same as F5-06		
	F5-08	AO2 function selection	1	
		Setting range same as F5-06; AO2 is on extension card.		
Set accel/decel time	F0-17	Acceleration time 1	model dependent	
		0.00 to 650.00s (if F0-19=2) 0.0 to 6500.0s (if F0-19=1) 0 to 65000s (if F0-19=0)		
	F0-18	Deceleration time 1	model dependent	
If smooth accel/decel is requested		0.00 to 650.00s (if F0-19=2) 0.0 to 6500.0s (if F0-19=1) 0 to 65000s (if F0-19=0)		
Set S-curve	F6-07	Acceleration/Deceleration mode	0	
		0 : Linear acceleration/deceleration 1: Static S-curve acceleration/deceleration 2: Dynamic S-curve acceleration/deceleration		
	F6-08	Time proportion of S-curve at Accel start	30.0	
		0.0% to (100.0% - F6-09)		
	F6-09	Time proportion of S-curve at Accel end	30.0	
		0.0% to (100.0% - F6-08)		

CONTINUE	Para.	Parameter name	Default	Commission

CONTINUE	Para.	Parameter name	Default	Commission
Set VF parameters	F3-00	V/F curve selection	0	
		0: Linear V/F 1: Multi-point V/F 2: Square V/F 3: 1.2-power V/F 4: 1.4-power V/F 6: 1.6-power V/F 8: 1.8-power V/F 9: Reserved 10: V/F complete separation 11: V/F half separation SETTING RANGE: 0 to 11		
	F3-01	Torque boost	0.0	
		0.0 to 30.0 %; NOTE: if it is 0, then fixed torque boost is activated, and it is recommended to use fixed torque boost.		
	F3-02	Frequency limit of torque boost	50.00	
		0.00 Hz to maximum output frequency		
	F3-03	Multi-point V/F frequency 1	0.00	
		0.00 Hz to F3-05		
	F3-04	Multi-point V/F voltage 1	0.0	
		0.0 to 100.0 V		
	F3-05	Multi-point V/F frequency 2	0.00	
		F3-03 to F3-07, Hz		
	F3-06	Multi-point V/F voltage 2	0.0	
		0.0 to 100.0 V		
	F3-07	Multi-point V/F frequency 3	0.00	
		F3-05 to rated motor frequency F1-04, Hz		
	F3-08	Multi-point V/F voltage 3	0.0	
		0.0 to 100.0 V		
Trial RUN		Use operating panel, or digital input terminal, or serial communication control, to start inverter, check if the running performance satisfies your application. If yes, then go forward to next step, if NO, then go back to check.		
Finish				

5 Parameter Table

5.1 Introduction

Groups F and A include standard function parameters. Group U includes the monitoring function parameters and extension card communication parameters.

The parameter description tables in this chapter use the following symbols. The symbols in the parameter table are described as follows:

Symbol	Meaning
☆	It is possible to modify the parameter with the drive in the stop or in the Run status.
★	It is not possible to modify the parameter with the drive in the Run status.
●	The parameter is the actual measured value and cannot be modified.
*	The parameter is a factory parameter and can be set only by the manufacturer.

5.2 Standard Parameters

Function Code	Parameter name	Setting Range	Default	Property
Group F0: Standard Parameters				
F0-00	G/P type display	1 : G type 2: P type	2	★
F0-01	Motor 1 control mode	2: V/F control	2	★
F0-02	Command source selection	0: Operating panel (keypad & display) (LED off) 1: Terminal I/O control (LED on) 2: Serial comms. (LED flashing)	0	☆
F0-03	Main frequency reference setting channel selection	0: Digital setting (non-retentive at power down) 1: Digital setting (retentive at power down) 2: AI1 3: AI2 4: AI3 5: Pulse reference 6: Multi-reference 7: Simple PLC 8: PID reference 9: Serial comms.	0	★
F0-04	Auxiliary frequency reference setting channel selection	0: Digital setting (non-retentive at power down) 1: Digital setting (retentive at power down) 2: AI1 3: AI2 4: AI3 5: Pulse reference 6: Multi-reference 7: Simple PLC 8: PID reference 9: Serial comms.	0	★
F0-05	Base value of range of auxiliary frequency reference for Main and auxiliary calculation	0: Relative to maximum frequency 1: Relative to main frequency reference	0	☆
F0-06	Range of auxiliary frequency reference for main and auxiliary calculation	0% to 150%	100%	☆
F0-07	Final Frequency reference setting selection	00 to 34	00	☆
F0-08	Preset frequency	0.00 to max. frequency (F0-10)	50.00 Hz	☆

Function Code	Parameter name	Setting Range	Default	Property
F0-09	Running direction	0: Run in the default direction 1: Run in the direction reverse to the default direction	0	☆
F0-10	Max. frequency	50.00 to 500.00 Hz	50.00 Hz	★
F0-11	Setting channel of frequency upper limit	0: Set by F0-12 1: AI1 2: AI2 3: AI3 4: Pulse reference (DI5) 5: Communication reference	0	★
F0-12	Frequency reference upper limit	F0-14 to F0-10	50.00 Hz	☆
F0-13	Frequency reference upper limit offset	0.00 Hz to max. frequency (F0-10)	0.00 Hz	☆
F0-14	Frequency reference lower limit	0.00 Hz to frequency upper limit (F0-12)	0.00 Hz	☆
F0-15	Carrier frequency	Model dependent	Model dependent	☆
F0-16	Carrier frequency adjusted with temperature	0: Disabled 1: Enabled	1	☆
F0-17	Acceleration time 1	0.00s to 650.00s (F0-19 = 2) 0.0s to 6500.0s (F0-19 = 1) 0s to 65000s (F0-19 = 0)	Model dependent	☆
F0-18	Deceleration time 1	0.00s to 650.00s (F0-19 = 2) 0.0s to 6500.0s (F0-19 = 1) 0s to 65000s (F0-19 = 0)	Model dependent	☆
F0-19	Acceleration/Deceleration time unit	0: 1s 1: 0.1s 2: 0.01s	1	★
F0-21	Frequency offset of Auxiliary frequency setting channel for main and auxiliary calculation	0.00 Hz to max. frequency (F0-10)	0.00 Hz	☆
F0-22	Frequency reference resolution	2	2	★
F0-23	Retentive of digital setting frequency upon stop	0: Not retentive 1: Retentive	0	☆
F0-24	Motor parameter group selection	0: Motor parameter group 1 1: Motor parameter group 2	0	★
F0-25	Acceleration/Deceleration time base frequency	0: Maximum frequency (F0-10) 1: Frequency reference 2: 100 Hz	0	★
F0-26	Base frequency for UP/DOWN modification during running	0: Running frequency 1: Frequency Reference	0	★
F0-27	Command source + frequency source	000 to 999	000	☆
F0-28	Serial port comms. protocol	0: Modbus protocol 1: PROFIBUS-DP protocol or CANopen protocol	0	★
Group F1: Motor 1 Parameters				
F1-00	Motor type selection	0: Common asynchronous motor 1: Variable frequency asynchronous motor	0	★
F1-01	Rated motor power	0.1 to 1000.0 kW	Model dependent	★

Function Code	Parameter name	Setting Range	Default	Property
F1-02	Rated motor voltage	1 to 2000 V	Model dependent	★
F1-03	Rated motor current	0.01 to 655.35 A (AC drive power ≤ 55 kW) 0.1 to 6553.5 A (AC drive power > 55 kW)	Model dependent	★
F1-04	Rated motor frequency	0.01 Hz to max. frequency	Model dependent	★
F1-05	Rated motor speed	1 to 65535 rpm	Model dependent	★
F1-06	Stator resistance	0.001 to 65.535 Ω (AC drive power ≤ 55 kW) 0.0001 to 6.5535 Ω (AC drive power > 55 kW)	Auto-tuning dependent	★
F1-07	Rotor resistance	0.001 to 65.535 Ω (AC drive power ≤ 55 kW) 0.0001 to 6.5535 Ω (AC drive power > 55 kW)	Auto-tuning dependent	★
F1-08	Leakage inductive reactance	0.01 to 655.35 mH (AC drive power ≤ 55 kW) 0.001 to 65.535 mH (AC drive power > 55 kW)	Auto-tuning dependent	★
F1-09	Mutual inductive reactance	0.1 to 6553.5 mH (AC drive power ≤ 55 kW) 0.01 to 655.35 mH (AC drive power > 55 kW)	Auto-tuning dependent	★
F1-10	No-load current	0.01 A to F1-03 (AC drive power ≤ 55 kW) 0.1 A to F1-03 (AC drive power > 55 kW)	Auto-tuning dependent	★
F1-37	Motor auto-tuning method selection	0: No auto-tuning 1: Static auto-tuning 1 2: Dynamic auto-tuning 3: Static auto-tuning 2	0	★
Group F3: V/F Control Parameters				
F3-00	V/F curve setting	0: Linear V/F 1: Multi-point V/F 2: Square V/F 3: 1.2-power V/F 4: 1.4-power V/F 6: 1.6-power V/F 8: 1.8-power V/F 9: Reserved 10: V/F complete separation 11: V/F half separation	0	★
F3-01	Torque boost	0.0%: fixed torque boost 0.1% to 30%	Model dependent	☆
F3-02	Cut-off frequency of torque boost	0.00 Hz to max. frequency	50.00 Hz	★
F3-03	Multi-point V/F frequency 1	0.00 Hz to F3-05	0.00 Hz	★
F3-04	Multi-point V/F voltage 1	0.0% to 100.0%	0.0%	★
F3-05	Multi-point V/F frequency 2	F3-03 to F3-07	0.00 Hz	★
F3-06	Multi-point V/F voltage 2	0.0% to 100.0%	0.0%	★
F3-07	Multi-point V/F frequency 3	F3-05 to rated motor frequency (F1-04)	0.00 Hz	★
F3-08	Multi-point V/F voltage 3	0.0% to 100.0%	0.0%	★
F3-09	Slip compensation gain	0.0% to 200.0%	0.0%	★
F3-10	V/F over-excitation gain	0 to 200	64	☆
F3-11	V/F oscillation suppression gain	0 to 100	40	☆

Function Code	Parameter name	Setting Range	Default	Property
F3-13	Voltage source for V/F separation	0: Set by F3-14 1: AI1 2: AI2 3: AI3 4: Pulse reference (DI5) 5: Multi-reference 6: Simple PLC 7: PID reference 8: Serial comms. 100.0% corresponds to the rated motor voltage (F1-02, A2-02).	0	☆
F3-14	Digital setting of voltage for V/F separation	0 V to rated motor voltage	0 V	☆
F3-15	Voltage rise time of V/F separation	0.0s to 1000.0s	0.0s	☆
F3-16	Voltage decline time of V/F separation	0.0s to 1000.0s	0.0s	☆
F3-17	Stop mode selection for V/F separation	0: Frequency and voltage declining to 0 independently 1: Frequency declining after voltage declines to 0	0	☆
F3-18	Current limit level	50% to 200%	150%	★
F3-19	Current limit selection	0: Disabled 1: Enabled	1	★
F3-20	Current limit gain	0 to 100	20	☆
F3-21	Compensation factor of speed multiplying current limit level	50% to 200%	50%	★
F3-22	Voltage limit	650 to 800 V	770 V	★
F3-23	Voltage limit selection	0: Disabled 1: Enabled	1	★
F3-24	Frequency gain for voltage limit	0 to 100	30	☆
F3-25	Voltage gain for voltage limit	0 to 100	30	☆
F3-26	Frequency rise threshold during voltage limit	0 to 50 Hz	5 Hz	★
Group F4: Input Terminals				
F4-00	DI1 function selection	0: No function 1: Forward run (FWD) 2: Reverser 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: RUN disabled 11: External fault NO input 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 time selection	1	★

Function Code	Parameter name	Setting Range	Default	Property
F4-00	DI1 function selection	17: Terminal 2 for acceleration/deceleration time selection 18: Frequency reference setting channel switchover 19: UP and DOWN setting clear (terminal, operation panel) 20: Command source switchover 1 21: Acceleration/Deceleration prohibited 22: PID disabled 23: PLC state reset 24: Wobble disabled 25: Counter input 26: Counter reset 27: Length signal pulses count 28: Length reset 29: Reserved 30: Pulse input as frequency reference (valid only for DI5) 31: Reserved 32: Immediate DC injection braking 33: External fault NC input 34: Frequency modification enabled 35: PID operation direction reverse 36: External stop 1 37: Command source switchover 2 38: PID integral disabled 39: Switchover between main frequency reference and preset frequency 40: Switchover between auxiliary frequency reference and preset frequency 41: Motor selection 42: Reserved 43: PID parameter switchover 44: User-defined fault 1 45: User-defined fault 2 46: Reserved 47: Emergency stop (ES) 48: External stop 2 49: Deceleration DC injection braking 50: Clear running time this time 51: Two-wire control/ Three-wire control 52: Reverse running prohibited 53 to 59: Reserved	4	★
F4-01	DI2 function selection		9	★
F4-02	DI3 function selection		12	★
F4-03	DI4 function selection		13	★
F4-04	DI5 function selection		0	★
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	0.000s to 1.000s	0.010s	☆
F4-11	Terminal I/O control mode	0 to 3	0	★
F4-12	Terminal UP/DOWN rate	0.001 to 65.535 Hz/s	1.000 Hz/s	☆
F4-13	AI curve 1 min. input	0.00 V to F4-15	0.00 V	☆
F4-14	Corresponding percentage of AI curve 1 min. input	-100.00% to 100.0%	0.0%	☆
F4-15	AI curve 1 max. input	F4-13 to 10.00 V	10.00 V	☆
F4-16	Corresponding percentage of AI curve 1 max. input	-100.00% to 100.0%	100.0%	☆

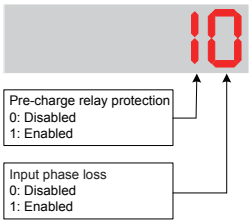
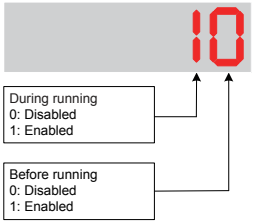
Function Code	Parameter name	Setting Range	Default	Property
F4-17	AI1 filter time	0.00s to 10.00s	0.10s	☆
F4-18	AI curve 2 min. input	0.00 V to F4-20	0.00 V	☆
F4-19	Corresponding percentage of AI curve 2 min. input	-100.00% to 100.0%	0.0%	☆
F4-20	AI curve 2 max. input	F4-18 to 10.00 V	10.00 V	☆
F4-21	Corresponding percentage of AI curve 2 max. input	-100.00% to 100.0%	100.0%	☆
F4-22	AI2 filter time	0.00s to 10.00s	0.10s	☆
F4-23	AI3 curve min. input	-10.00 V to F4-25	0.00 V	☆
F4-24	Corresponding percentage of AI curve 3 min. input	-100.00% to 100.0%	0.0%	☆
F4-25	AI curve 3 max. input	F4-23 to 10.00 V	10.00 V	☆
F4-26	Corresponding percentage of AI curve 3 max. input	-100.00% to 100.0%	100.0%	☆
F4-27	AI3 filter time	0.00s to 10.00s	0.10s	☆
F4-28	Pulse min. input	0.00 kHz to F4-30	0.00 kHz	☆
F4-29	Corresponding percentage of pulse min. input	-100.00% to 100.0%	0.0%	☆
F4-30	Pulse max. input	F4-28 to 100.00 kHz	50.00 kHz	☆
F4-31	Corresponding percentage of pulse max. input	-100.00% to 100.0%	100.0%	☆
F4-32	Pulse filter time	0.00s to 10.00s	0.10s	☆
F4-33	AI curve selection	111 to 555	321	☆
F4-34	Setting selection when AI less than min. input	000 to 111	000	☆
F4-35	DI1 delay	0.0s to 3600.0s	0.0s	☆
F4-36	DI2 delay	0.0s to 3600.0s	0.0s	★
F4-37	DI3 delay	0.0s to 3600.0s	0.0s	★
F4-38	DI active mode selection 1	00000 to 11111	00000	★
F4-39	DI active mode selection 2	00000 to 11111	00000	★
Group F5: Output Terminals				
F5-00	FM terminal output mode	0: Pulse output (FMP) 1: Digital output (FMR)	0	☆
F5-01	FMR function selectio	0: No output 1: AC drive running 2: Fault output 3: Frequency level detection 1 output 4: Frequency reached 5: Zero-speed running (no output at stop) 6: Motor overload pending 7: AC drive overload pending 8: Set count value reached 9: Designated count value reached 10: Length reached 11: PLC cycle completed	0	☆

Function Code	Parameter name	Setting Range	Default	Property
F5-02	Relay (T/A-T/B-T/C) function selection	12: Accumulative running time reached 13: Frequency limited 14: Reserved 15: Ready for RUN 16: AI1 > AI2 17: Frequency upper limit reached 18: Frequency lower limit reached (no output at stop) 19: Undervoltage 20: Communication setting 21: Reserved 22: Reserved 23: Zero-speed running 2 (having output at stop) 24: Accumulative power-on time reached 25: Frequency level detection 2 26: Frequency 1 reached 27: Frequency 2 reached 28: Current 1 reached 29: Current 2 reached 30: Timing reached 31: AI1 input exceeding limit 32: Load lost 33: Reverse running 34: Zero current 35: IGBT temperature reached 36: Output current exceeding limit 37: Frequency lower limit reached (having output at stop) 38: Alarm output 39: Motor overheat pending 40: Current running time reached 41: Fault output	2	☆
F5-03	Extension card relay (P/A-P/ B-P/C) function selection		0	☆
F5-04	DO1 function selection		1	☆
F5-05	Extension card DO2 function selection		4	☆
F5-06	FMP function selection	0: Running frequency 1: Frequency reference 2: Output current 3: Reserved 4: Output power 5: Output voltage 6: Pulse input 7: AI1 8: AI2 9: AI3 10: Length 11: Counting value 12: Communication reference 13: Motor speed 14: Output current 15: Output voltage 16: Reserved	0	☆
F5-07	AO1 function selection		0	☆
F5-08	AO2 function selection		1	☆
F5-09	Max. FMP output frequency	0.01 to 100.00 kHz	50.00 kHz	☆
F5-10	AO1 zero offset coefficient	-100.0% to 100.0%	0.0%	☆
F5-11	AO1 gain	-10.00 to 10.00	1.00	☆

Function Code	Parameter name	Setting Range	Default	Property
F5-12	AO2 zero offset coefficient	-100.0% to 100.0%	0.00%	☆
F5-13	AO2 gain	-10.00 to 10.00	1.00	☆
F5-17	FMR output delay	0.0s to 3600.0s	0.0s	☆
F5-18	Relay 1 output delay	0.0s to 3600.0s	0.0s	☆
F5-19	Relay 2 output delay	0.0s to 3600.0s	0.0s	☆
F5-20	DO1 output delay	0.0s to 3600.0s	0.0s	☆
F5-21	DO2 output delay	0.0s to 3600.0s	0.0s	☆
F5-22	DI active mode selection 1	00000 to 11111	00000	☆
Group F6: Start/Stop Control				
F6-00	Start mode	0: Direct start 1: Catching a spinning motor 2: Pre-excited start	0	☆
F6-01	Mode of catching a spinning motor	0: From stop frequency 1: From mains frequency 2: From max. frequency 3: Reserved 4: Catching a spinning motor in field-orientated control (requiring static auto-tuning, F1-37 = 1)	0	★
F6-02	Speed of catching a spinning motor	1 to 100	20	☆
F6-03	Start frequency	0.00 to 10.00 Hz	0.00 Hz	☆
F6-04	Start frequency holding time	0.0s to 100.0s	0.0s	★
F6-05	DC injection braking 1 level/Pre- excitation level	0% to 100%	50%	★
F6-06	DC injection braking 1 active time /Pre-excitation active time	0.0s to 100.0s	0.0s	★
F6-07	Acceleration/Deceleration mode	0: Linear acceleration/deceleration 1: Static S-curve acceleration/deceleration 2: Dynamic S-curve acceleration/deceleration	0	★
F6-08	Time proportion of S-curve start segment	0.0% to (100.0% – F6-09)	30.0%	★
F6-09	Time proportion of S-curve end segment	0.0% to (100.0% – F6-08)	30.0%	★
F6-10	Stop mode	0: Decelerate to stop 1: Coast to stop	0	☆
F6-11	DC injection braking 2 start frequency	0.00 Hz to maximum frequency	0.00 Hz	☆
F6-12	DC injection braking 2 delay time	0.0 to 100.0s	0.0s	☆
F6-13	DC injection braking 2 level	0% to 100%	50%	☆
F6-14	DC injection braking 2 active time	0.0s to 100.0s	0.0s	☆
F6-15	Braking use ratio	0% to 100%	100%	☆
F6-18	Catching a spinning motor current limit	30% to 200%	Model dependent	★
F6-21	Demagnetization time	0.00s to 5.00s	Model dependent	☆
Group F7: Keypad Operation and LED Display				
F7-00	LED default display check	0, 1	0	★
F7-01	MF.K key function selection	0 to 4	0	☆
F7-02	STOP/RESET key function	0, 1	1	☆

Function Code	Parameter name	Setting Range	Default	Property
F7-03	LED display running parameters 1	0000 to FFFF	1F	☆
F7-04	LED display running parameters 2	0000 to FFFF	0	☆
F7-05	LED display stop parameters	0000 to FFFF	33	☆
F7-06	Load speed display coefficient	0.0001 to 6.5000	1.0000	☆
F7-07	Heatsink temperature of inverter module	-20°C to 120°C	-	●
F7-08	Product series	-	-	●
F7-09	Accumulative running time	0 to 65535 h	-	●
F7-10	Performance software version	-	-	●
F7-11	Function software version	-	-	●
F7-12	Number of decimal places for load speed display	10 to 23	21	☆
F7-13	Accumulative power-on time	0 to 65535 h	-	●
F7-14	Accumulative power consumption	0 to 65535 kWh	-	●
Group F8: Auxiliary Functions				
F8-00	Jog frequency reference	0.00 Hz to max. frequency	2.00 Hz	☆
F8-01	Jog acceleration time	0.0s to 6500.0s	20.0s	☆
F8-02	Jog deceleration time	0.0s to 6500.0s	20.0s	☆
F8-03	Acceleration time 2	0.0s to 6500.0s	Model dependent	☆
F8-04	Deceleration time 2	0.0s to 6500.0s	Model dependent	☆
F8-05	Acceleration time 3	0.0s to 6500.0s	Model dependent	☆
F8-06	Deceleration time 3	0.0s to 6500.0s	Model dependent	☆
F8-07	Acceleration time 4	0.0s to 6500.0s	0.0s	☆
F8-08	Deceleration time 4	0.0s to 6500.0s	0.0s	☆
F8-09	Frequency jump 1	0.00 Hz to max. frequency	0.00 Hz	☆
F8-10	Frequency jump 2	0.00 Hz to max. frequency	0.00 Hz	☆
F8-11	Frequency jump band	0.00 Hz to max. frequency	0.00 Hz	☆
F8-12	Forward/Reverse run switchover dead-zone time	0.0s to 3000.0s	0.0s	☆
F8-13	Reverse RUN selection	0, 1	0	☆
F8-14	Running mode when frequency reference lower than frequency lower limit	0 to 2	0	☆
F8-15	Droop rate	0.00% to 100.00%	0.00%	☆
F8-16	Accumulative power-on time threshold	0 to 65000 h	0 h	☆
F8-17	Accumulative running time threshold	0 to 65000 h	0 h	☆
F8-18	Startup protection selection	0, 1	0	☆
F8-19	Frequency detection value 1	0.00 Hz to max. frequency	50.00 Hz	☆
F8-20	Frequency detection hysteresis 1	0.0% to 100.0%	5.0%	☆
F8-21	Detection width of target frequency reached	0.0% to 100.0%	0.0%	☆
F8-22	Jump frequency function	0, 1	0	☆

Function Code	Parameter name	Setting Range	Default	Property
F8-25	Switchover frequency of accel time 1 and accel time 2	0.00 Hz to max. frequency	0.00 Hz	☆
F8-26	Switchover frequency of decel time 1 and decel time 2	0.00 Hz to max. frequency	0.00 Hz	☆
F8-27	Set highest priority to terminal JOG function	0, 1	0	☆
F8-28	Frequency detection value 2	0.00 Hz to max. frequency	50.00 Hz	☆
F8-29	Frequency detection hysteresis 2	0.0% to 100.0%	5.0%	☆
F8-30	Detection of frequency 1	0.00 Hz to max. frequency	50.00 Hz	☆
F8-31	Detection width of frequency 1	0.0% to 100.0% (max. frequency)	0.0%	☆
F8-32	Detection of frequency 2	0.00 Hz to max. frequency	50.00 Hz	☆
F8-33	Detection width of frequency 2	0.0% to 100.0% (max. frequency)	0.0%	☆
F8-34	Zero current detection level	0.0% to 300.0% (rated motor current)	5.0%	☆
F8-35	Zero current detection delay	0.01s to 600.00s	0.10s	☆
F8-36	Output overcurrent threshold	0.0% (no detection) 0.1% to 300.0% (rated motor current)	200.0%	☆
F8-37	Output overcurrent detection delay	0.00s to 600.00s	0.00s	☆
F8-38	Detection level of current 1	0.0% to 300.0% (rated motor current)	100.0%	☆
F8-39	Detection width of current 1	0.0% to 300.0% (rated motor current)	0.0%	☆
F8-40	Detection level of current 2	0.0% to 300.0% (rated motor current)	100.0%	☆
F8-41	Detection width of current 2	0.0% to 300.0% (rated motor current)	0.0%	☆
F8-42	Timing function	0, 1	0	★
F8-43	Running time setting channel	0 to 3	0	★
F8-44	Running time	0.0 to 6500.0 min	0.0 min	★
F8-45	AI1 input voltage lower limit	0.00 V to F8-46	3.10 V	☆
F8-46	AI1 input voltage upper limit	F8-45 to 10.00 V	6.80 V	☆
F8-47	Module temperature threshold	0°C to 100°C	75°C	☆
F8-48	Cooling fan working mode	0, 1	0	☆
F8-49	Wakeup frequency	F8-51 to max. frequency (F0-10)	0.00 Hz	☆
F8-50	Wakeup delay time	0.0s to 6500.0s	0.0s	☆
F8-51	Hibernating frequency	0.00 Hz to wakeup frequency (F8-49)	0.00 Hz	☆
F8-52	Hibernating delay time	0.0s to 6500.0s	0.0s	☆
F8-53	Running time threshold this time	0.0 to 6500.0 min	0.0 min	☆
F8-54	Output power correction coefficient	0.0% to 200.0%	100.0%	☆
Group F9: Fault and Protection				
F9-00	Motor overload protection	0: Disabled 1: Enabled	1	☆
F9-01	Motor overload protection gain	0.20 to 10.00	1.00	☆
F9-02	Motor overload pre-warning coefficient	50% to 100%	80%	☆
F9-03	Overvoltage protection gain	0 (no overvoltage stall) to 100	30	☆
F9-04	Overvoltage protection voltage	650 to 800 V	770 V	☆

Function Code	Parameter name	Setting Range	Default	Property
F9-07	Detection of short-circuit to ground upon power-on	00 to 11	01	☆
F9-08	Braking unit applied voltage	650 to 800 V	760 V	★
F9-09	Auto reset times	0 to 20	0	☆
F9-10	Selection of DO action during auto reset	0: Not act 1: Act	0	☆
F9-11	Delay of auto reset	0.1s to 100.0s	1.0s	☆
F9-12	Input phase loss/pre-charge relay protection		11	☆
F9-13	Output phase loss protection		01	☆
F9-14	1st fault type	0 to 55	-	●
F9-15	2nd fault type	0 to 55	-	●
F9-16	3rd (latest) fault type	0 to 55	-	●
F9-17	Frequency upon 3rd fault	-	-	●
F9-18	Current upon 3rd fault	-	-	●
F9-19	Bus voltage upon 3rd fault	-	-	●
F9-20	DI state upon 3rd fault	-	-	●
F9-21	DO state upon 3rd fault	-	-	●
F9-22	AC drive state upon 3rd fault	-	-	●
F9-23	Power-on time upon 3rd fault	-	-	●
F9-24	Running time upon 3rd fault	-	-	●
F9-27	Frequency upon 2nd fault	-	-	●
F9-28	Current upon 2nd fault	-	-	●
F9-29	Bus voltage upon 2nd fault	-	-	●
F9-30	DI state upon 2nd fault	-	-	●
F9-31	DO state upon 2nd fault	-	-	●
F9-32	AC drive state upon 2nd fault	-	-	●
F9-33	Power-on time upon 2nd fault	-	-	●
F9-34	Running time upon 2nd fault	-	-	●
F9-37	Frequency upon 1st fault	-	-	●
F9-38	Current upon 1st fault	-	-	●
F9-39	Bus voltage upon 1st fault	-	-	●

Function Code	Parameter name	Setting Range	Default	Property
F9-40	DI state upon 1st fault	-	-	●
F9-41	DO state upon 1st fault	-	-	●
F9-42	AC drive state upon 1st fault	-	-	●
F9-43	Power-on time upon 1st fault	-	-	●
F9-44	Running time upon 1st fault	-	-	●
F9-47	Fault protection action selection 1	00000 to 22222	00000	☆
F9-48	Fault protection action selection 2	00000 to 11111	00000	☆
F9-49	Fault protection action selection 3	00000 to 22222	00000	☆
F9-54	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	0	☆
F9-55	Backup frequency upon fault	0.0% to 100.0% (max.frequency)	100.0%	☆
F9-56	Type of motor temperature sensor	0: No temperature sensor 1: PT100 2: PT1000	0	☆
F9-57	Motor overheat protection threshold	0°C to 200°C	110°C	☆
F9-58	Motor overheat pre-warning threshold	0°C to 200°C	90°C	☆
F9-59	Power dip ride-through function selection	0: Disabled 1: Bus voltage constant control 2: Decelerate to stop	0	★
F9-60	Threshold of power dip ride- through function disabled	80% to 100%	85%	★
F9-61	Judging time of bus voltage recovering from power dip	0.0s to 100.0s	0.5s	★
F9-62	Threshold of power dip ride- through function enabled	60% to 100%	80%	★
F9-63	Load lost protection	0: Disabled 1: Enabled	0	☆
F9-64	Load lost detection level	0.0% to 100.0%	10.0%	☆
F9-65	Load lost detection time	0.0s to 60.0s	1.0s	☆
F9-71	Power dip ride-through gain Kp	0 to 100	40	☆
F9-72	Power dip ride-through integral coefficient	0 to 100	30	☆
F9-73	Deceleration time of power dip ride-through	0.0s to 300.0s	20.0s	★
Group FA: PID Function				
FA-00	PID reference setting channel	0 to 6	0	☆
FA-01	PID digital setting	0.0% to 100.0%	50.0%	☆
FA-02	PID feedback setting channel	0 to 8	0	☆
FA-03	PID operation direction	0, 1	0	☆
FA-04	PID reference and feedback range	0 to 65535	1000	☆
FA-05	Proportional gain Kp1	0.0 to 1000.0	20.0	☆
FA-06	Integral time Ti1	0.01s to 10.00s	2.00s	☆
FA-07	Differential time Td1	0.000s to 10.000s	0.000s	☆
FA-08	PID output limit in reverse direction	0.00 Hz to max. frequency	0.00 Hz	★

Function Code	Parameter name	Setting Range	Default	Property
FA-09	PID error limit	0.0% to 100.0%	0.0%	☆
FA-10	PID differential limit	0.00% to 100.00%	0.10%	☆
FA-11	PID reference change time	0.00s to 650.00s	0.00s	☆
FA-12	PID feedback filter time	0.00s to 60.00s	0.00s	☆
FA-13	PID output filter time	0.00s to 60.00s	0.00s	☆
FA-14	Reserved	-	-	☆
FA-15	Proportional gain Kp2	0.0 to 1000.0	20.0	☆
FA-16	Integral time Ti2	0.01s to 10.00s	2.00s	☆
FA-17	Differential time Td2	0.000s to 10.000s	0.000s	☆
FA-18	PID parameter switchover condition	0 to 3	0	☆
FA-19	PID error 1 for auto switchover	0.0% to FA-20	20.0%	☆
FA-20	PID error 2 for auto switchover	FA-19 to 100.0%	80.0%	☆
FA-21	PID initial value	0.0% to 100.0%	0.0%	☆
FA-22	PID initial value active time	0.00s to 650.00s	0.00s	☆
FA-23	Reserved	-	-	-
FA-24	Reserved	-	-	-
FA-25	PID integral property	00 to 11	00	☆
FA-26	Detection level of PID feedback loss	0.0%: No detection 0.1% to 100.0%	0.0%	☆
FA-27	Detection time of PID feedback loss	0.0s to 20.0s	0.0s	☆
FA-28	Selection of PID operation at stop	0, 1	0	☆
Group Fb: Wobble Function, Fixed Length and Count				
Fb-00	Wobble setting mode	0, 1	0	☆
Fb-01	Wobble amplitude	0.0% to 100.0%	0.0%	☆
Fb-02	Wobble step	0.0% to 50.0%	0.0%	☆
Fb-03	Wobble cycle	0.0s to 3000.0s	10.0s	☆
Fb-04	Triangular wave rising time coefficient	0.0% to 100.0%	50.0%	☆
Fb-05	Set length	0 to 65535 m	1000 m	☆
Fb-06	Actual length	0 to 65535 m	0 m	☆
Fb-07	Number of pulses per meter	0.1 to 6553.5	100.0	☆
Fb-08	Set count value	1 to 65535	1000	☆
Fb-09	Designated count value	1 to 65535	1000	☆
Group Fc: Multi-Reference and Simple PLC Function				
FC-00	Reference 0	-100.0% to 100.0%	0.0%	☆
FC-01	Reference 1	-100.0% to 100.0%	0.0%	☆
FC-02	Reference 2	-100.0% to 100.0%	0.0%	☆
FC-03	Reference 3	-100.0% to 100.0%	0.0%	☆
FC-04	Reference 4	-100.0% to 100.0%	0.0%	☆
FC-05	Reference 5	-100.0% to 100.0%	0.0%	☆
FC-06	Reference 6	-100.0% to 100.0%	0.0%	☆
FC-07	Reference 7	-100.0% to 100.0%	0.0%	☆
FC-08	Reference 8	-100.0% to 100.0%	0.0%	☆

Function Code	Parameter name	Setting Range	Default	Property
FC-09	Reference 9	-100.0% to 100.0%	0.0%	☆
FC-10	Reference 10	-100.0% to 100.0%	0.0%	☆
FC-11	Reference 11	-100.0% to 100.0%	0.0%	☆
FC-12	Reference 12	-100.0% to 100.0%	0.0%	☆
FC-13	Reference 13	-100.0% to 100.0%	0.0%	☆
FC-14	Reference 14	-100.0% to 100.0%	0.0%	☆
FC-15	Reference 15	-100.0% to 100.0%	0.0%	☆
FC-16	Simple PLC running mode	0: Stop after running one cycle 1: Keep final values after running one cycle 2: Repeat after running one cycle	0	☆
FC-17	Simple PLC retentive selection	00 to 11	00	☆
FC-18	Running time of simple PLC reference 0	0.0s (h) to 6553.5s (h)	0.0s (h)	☆
FC-19	Acceleration/deceleration time of simple PLC reference 0	0 to 3	0	☆
FC-20	Running time of simple PLC reference 1	0.0s (h) to 6553.5s (h)	0.0s (h)	☆
FC-21	Acceleration/deceleration time of simple PLC reference 1	0 to 3	0	☆
FC-22	Running time of simple PLC reference 2	0.0s (h) to 6553.5s (h)	0.0s (h)	☆
FC-23	Acceleration/deceleration time of simple PLC reference 2	0 to 3	0	☆
FC-24	Running time of simple PLC reference 3	0.0s (h) to 6553.5s (h)	0.0s (h)	☆
FC-25	Acceleration/deceleration time of simple PLC reference 3	0 to 3	0	☆
FC-26	Running time of simple PLC reference 4	0.0s (h) to 6553.5s (h)	0.0s (h)	☆
FC-27	Acceleration/deceleration time of simple PLC reference 4	0 to 3	0	☆
FC-28	Running time of simple PLC reference 5	0.0s (h) to 6553.5s (h)	0.0s (h)	☆
FC-29	Acceleration/deceleration time of simple PLC reference 5	0 to 3	0	☆
FC-30	Running time of simple PLC reference 6	0.0s (h) to 6553.5s (h)	0.0s (h)	☆
FC-31	Acceleration/deceleration time of simple PLC reference 6	0 to 3	0	☆
FC-32	Running time of simple PLC reference 7	0.0s (h) to 6553.5s (h)	0.0s (h)	☆
FC-33	Acceleration/deceleration time of simple PLC reference 7	0 to 3	0	☆
FC-34	Running time of simple PLC reference 8	0.0s (h) to 6553.5s (h)	0.0s (h)	☆
FC-35	Acceleration/deceleration time of simple PLC reference 8	0 to 3	0	☆
FC-36	Running time of simple PLC reference 9	0.0s (h) to 6553.5s (h)	0.0s (h)	☆
FC-37	Acceleration/deceleration time of simple PLC reference 9	0 to 3	0	☆
FC-38	Running time of simple PLC reference 10	0.0s (h) to 6553.5s (h)	0.0s (h)	☆
FC-39	Acceleration/deceleration time of simple PLC reference 10	0 to 3	0	☆
FC-40	Running time of simple PLC reference 11	0.0s (h) to 6553.5s (h)	0.0s (h)	☆

Function Code	Parameter name	Setting Range	Default	Property
FC-41	Acceleration/deceleration time of simple PLC reference 11	0 to 3	0	☆
FC-42	Running time of simple PLC reference 12	0.0s (h) to 6553.5s (h)	0.0s (h)	☆
FC-43	Acceleration/deceleration time of simple PLC reference 12	0 to 3	0	☆
FC-44	Running time of simple PLC reference 13	0.0s (h) to 6553.5s (h)	0.0s (h)	☆
FC-45	Acceleration/deceleration time of simple PLC reference 13	0 to 3	0	☆
FC-46	Running time of simple PLC reference 14	0.0s (h) to 6553.5s (h)	0.0s (h)	☆
FC-47	Acceleration/deceleration time of simple PLC reference 14	0 to 3	0	☆
FC-48	Running time of simple PLC reference 15	0.0s (h) to 6553.5s (h)	0.0s (h)	☆
FC-49	Acceleration/deceleration time of simple PLC reference 15	0 to 3	0	☆
FC-50	Time unit of simple PLC running	0, 1	0	☆
FC-51	Reference 0 source	0 to 6	0	☆
Group Fd: Communication				
Fd-00	Baud rate	0000 to 6039	5005	☆
Fd-01	Data format symbol	0 to 3	0	☆
Fd-02	Local address	0: Broadcast address; 1 to 247	1	☆
Fd-03	Response delay	0 to 20 ms	2	☆
Fd-04	Communication timeout	0.0: invalid 0.1s to 60.0s	0.0s	☆
Fd-05	Modbus protocol selection and PROFIBUS-DP data frame	00 to 31	30	☆
Fd-06	Current resolution read by communication	0: 0.01 1: 0.1	0	☆
Fd-08	CANlink communication timeout time	0.0 (Invalid) 0.1 to 60.0	0	☆
Group FE: User-Defined Parameters				
FE-00	User-defined parameter 0	F0-00 to FP-xx, A0-00 to Ax-xx, U0-00 to U0-xx, U3- 00 to U3-xx	F0-00	☆
FE-01	User-defined parameter 1	Same as FE-00	F0-02	☆
FE-02	User-defined parameter 2	Same as FE-00	F0-03	☆
FE-03	User-defined parameter 3	Same as FE-00	F0-07	☆
FE-04	User-defined parameter 4	Same as FE-00	F0-08	☆
FE-05	User-defined parameter 5	Same as FE-00	F0-17	☆
FE-06	User-defined parameter 6	Same as FE-00	F0-18	☆
FE-07	User-defined parameter 7	Same as FE-00	F3-00	☆
FE-08	User-defined parameter 8	Same as FE-00	F3-01	☆
FE-09	User-defined parameter 9	Same as FE-00	F4-00	☆
FE-10	User-defined parameter 10	Same as FE-00	F4-01	☆
FE-11	User-defined parameter 11	Same as FE-00	F4-02	☆
FE-12	User-defined parameter 12	Same as FE-00	F5-04	☆

Function Code	Parameter name	Setting Range	Default	Property
FE-13	User-defined parameter 13	Same as FE-00	F5-07	☆
FE-14	User-defined parameter 14	Same as FE-00	F6-00	☆
FE-15	User-defined parameter 15	Same as FE-00	F6-10	☆
FE-16	User-defined parameter 16	Same as FE-00	F0-00	☆
FE-17	User-defined parameter 17			
FE-18	User-defined parameter 18	Same as FE-00	F0-00	☆
FE-19	User-defined parameter 19	Same as FE-00	F0-00	☆
FE-20	User-defined parameter 20	Same as FE-00	F0-00	☆
FE-21	User-defined parameter 21	Same as FE-00	F0-00	☆
FE-22	User-defined parameter 22	Same as FE-00	F0-00	☆
FE-23	User-defined parameter 23	Same as FE-00	F0-00	☆
FE-24	User-defined parameter 24	Same as FE-00	F0-00	☆
FE-25	User-defined parameter 25	Same as FE-00	F0-00	☆
FE-26	User-defined parameter 26	Same as FE-00	F0-00	☆
FE-27	User-defined parameter 27	Same as FE-00	F0-00	☆
FE-28	User-defined parameter 28	Same as FE-00	F0-00	☆
FE-29	User-defined parameter 29	Same as FE-00	F0-00	☆
Group FF: Manufacturer Parameters, Access Denied				
Group FP: Function Parameter Management				
FP-00	User password	0 to 65535	0	☆
FP-01	Parameter initialization	0: No operation 1: Restore factory parameters except motor parameters 2: Clear records 4: Back up current user parameters 501: Restore user backup parameters	0	★
FP-02	Parameter display property	00 to 11	11	★
FP-03	Selection of individualized parameter display	00 to 11	00	☆
FP-04	Selection of parameter modification	0, 1	0	☆
Group A1: Virtual DI/DO				
A1-00	VDI1 function selection	0 to 59 Same with F4-00 to F4-09	0	★
A1-01	VDI2 function selection		0	★
A1-02	VDI3 function selection		0	★
A1-03	VDI4 function selection		0	★
A1-04	VDI5 function selection		0	★
A1-05	VDI active state setting mode	00000 to 11111	00000	★
A1-06	Selection of VDI active state	00000 to 11111	00000	★
A1-07	Function selection for AI1 used as DI	0 to 59	0	★
A1-08	Function selection for AI2 used as DI	0 to 59	0	★
A1-09	Function selection for AI3 used as DI	0 to 59	0	★
A1-10	Active state selection for AI used as DI	000 to 111	000	☆

Function Code	Parameter name	Setting Range	Default	Property
A1-11	VDO1 function selection	0 to 41	0	☆
A1-12	VDO2 function selection	0 to 41	0	☆
A1-13	VDO3 function selection	0 to 41	0	☆
A1-14	VDO4 function selection	0 to 41	0	☆
A1-15	VDO5 function selection	0 to 41	0	☆
A1-16	VDO1 output delay	0.0s to 3600.0s	0.0s	☆
A1-17	VDO2 output delay	0.0s to 3600.0s	0.0s	☆
A1-18	VDO3 output delay	0.0s to 3600.0s	0.0s	☆
A1-19	VDO4 output delay	0.0s to 3600.0s	0.0s	☆
A1-20	VDO5 output delay	0.0s to 3600.0s	0.0s	☆
A1-21	VDO active mode selection	00000 to 11111	00000	☆
Group A2: Motor 2 Parameters				
A2-00	Motor type selection	0 to 1	0	☆
A2-01	Rated motor power	0.1 to 1000.0 kW	Model dependent	☆
A2-02	Rated motor voltage	1 to 2000 V	Model dependent	☆
A2-03	Rated motor current	0.01 to 655.35 A (AC drive power ≤ 55 kW) 0.1 to 6553.5 A (AC drive power > 55 kW)	Model dependent	☆
A2-04	Rated motor frequency	0.01 Hz to max. frequency	Model dependent	☆
A2-05	Rated motor speed	1 to 65535 rpm	Model dependent	☆
A2-06	Stator resistance	0.001 to 65.535 Ω (AC drive power ≤ 55 kW) 0.0001 to 6.5535 Ω (AC drive power > 55 kW)	Auto-tuning dependent	☆
A2-07	Rotor resistance	0.001 to 65.535 Ω (AC drive power ≤ 55 kW) 0.0001 to 6.5535 Ω (AC drive power > 55 kW)	Auto-tuning dependent	☆
A2-08	Leakage inductive reactance	0.01 to 655.35 mH (AC drive power ≤ 55 kW) 0.001 to 65.535 mH (AC drive power > 55 kW)	Auto-tuning dependent	☆
A2-09	Mutual inductive reactance	0.1 to 6553.5 mH (AC drive power ≤ 55 kW) 0.01 to 655.35 mH (AC drive power > 55 kW)	Auto-tuning dependent	☆
A2-10	No-load current	0.01 A to A2-03 (AC drive power ≤ 55 kW) 0.1 A to A2-03 (AC drive power > 55 kW)	Auto-tuning dependent	☆
A2-37	Auto-tuning selection	0 to 3	0	☆
A2-62	Motor 2 control mode	0 to 2	0	☆
A2-63	Motor 2 acceleration/deceleration time selection	0 to 4	0	☆
A2-64	Motor 2 torque boost	0.0%: Ineffective 0.1% to 30.0%	Model dependent	☆
A2-66	Motor 2 oscillation suppression gain	0 to 100	40	☆
Group A5: Control Optimization				
A5-00	DPWM switchover frequency upper limit	5.00 Hz to max. frequency	8.00 Hz	☆
A5-01	PWM modulation pattern	0, 1	0	☆
A5-02	Dead zone compensation mode selection	0, 1	1	☆
A5-03	Random PWM depth	0 to 10	0	☆

Function Code	Parameter name	Setting Range	Default	Property
A5-04	Overcurrent fast prevention	0, 1	1	☆
A5-05	Max. output voltage coefficient	100% to 110%	105%	☆
A5-06	Undervoltage threshold	210 to 420 V	350 V	☆
A5-08	Dead-zone time adjustment	100% to 200%	150%	★
A5-09	Overvoltage threshold	200.0 to 2500.0 V	Model dependent	★
A5-10	Energy saving control	0: Disabled 1: Enabled	0	★
Group A6: AI Curve Setting				
A6-00	AI curve 4 min. input	-10.00 V to A6-02	0.00 V	☆
A6-01	Corresponding percentage of AI curve 4 min. input	-100.0% to 100.0%	0.0%	☆
A6-02	AI curve 4 inflexion 1 input	A6-00 to A6-04	3.00 V	☆
A6-03	Corresponding percentage of AI curve 4 inflexion 1 input	-100.0% to 100.0%	30.0%	☆
A6-04	AI curve 4 inflexion 2 input	A6-02 to A6-06	6.00 V	☆
A6-05	Corresponding percentage of AI curve 4 inflexion 2 input	-100.0% to 100.0%	60.0%	☆
A6-06	AI curve 4 max. input	A6-04 to 10.00 V	10.00 V	☆
A6-07	Corresponding percentage of AI curve 4 max. input	-100.0% to 100.0%	100.0%	☆
A6-08	AI curve 5 min. input	-10.00 V to A6-10	-10.00 V	☆
A6-09	Corresponding percentage of AI curve 5 min. input	-100.0% to 100.0%	-100.0%	☆
A6-10	AI curve 5 inflexion 1 input	A6-08 to A6-12	-3.00 V	☆
A6-11	Corresponding percentage of AI curve 5 inflexion 1 input	-100.0% to 100.0%	-30.0%	☆
A6-12	AI curve 5 inflexion 2 input	A6-10 to A6-14	3.00 V	☆
A6-13	Corresponding percentage of AI curve 5 inflexion 2 input	-100.0% to 100.0%	30.0%	☆
A6-14	AI curve 5 max. input	A6-12 to 10.00 V	10.00 V	☆
A6-15	Corresponding percentage of AI curve 5 max. input	-100.0% to 100.0%	100.0%	☆
A6-24	Jump point of AI1 input corresponding setting	-100.0% to 100.0%	0.0%	☆
A6-25	Jump amplitude of AI1 input corresponding setting	0.0% to 100.0%	0.5%	☆
A6-26	Jump point of AI2 input corresponding setting	-100.0% to 100.0%	0.0%	☆
A6-27	Jump amplitude of AI2 input corresponding setting	0.0% to 100.0%	0.5%	☆
A6-28	Jump point of AI3 input corresponding setting	-100.0% to 100.0%	0.0%	☆
A6-29	Jump amplitude of AI3 input corresponding setting	0.0% to 100.0%	0.5%	☆

Function Code	Parameter name	Setting Range	Default	Property
Group A7: User Programmable Card				
A7-00	User programmable function selection	0: Disabled 1: Enabled	0	★
A7-01	AC drive output terminal control source selection	00000 to 11111	00000	★
A7-02	User programmable card AI3 and AO2 function selection	0 to 7	0	★
A7-03	PLC program controls the FMP output	0.0% to 100.0%	0.0%	☆
A7-04	PLC program controls the AO1 output	0.0% to 100.0%	0.0%	☆
A7-05	Selection of PLC program controlling digital output	000 to 111	000	☆
A7-06	Setting frequency reference via the user programmable card	-100.00% to 100.00%	0.00%	☆
A7-08	Setting running command via the user programmable card	0 to 7	0	☆
A7-09	Setting torque reference via the user programmable card	0: No fault 80 to 89: User defined fault code	0	☆
Group A8: Point-point Communication				
A8-00	Point-point communication	0: Disabled 1: Enabled	0	☆
A8-01	Master or slave selection	0: Master 1: Slave	0	☆
A8-02	Selection of action of the slave in point-point communication	000 to 111	011	★
A8-03	The slave received data	0: Output frequency 1: Frequency reference	0	☆
A8-04	Zero offset of received data	-100.00 to 100.00	0.00	☆
A8-05	Gain of received data	-10.00 to 10.00	1.00	☆
A8-06	Point-point communication interruption detection time	0.0s to 10.0s	1.0s	☆
A8-07	Master data sending cycle in point-point communication	0.001s to 10.000s	0.001s	☆
A8-11	Window width	0.20 to 10.00 Hz	0.50 Hz	☆
Group AC: AI/AO Correction				
AC-00	AI1 measured voltage 1	-10.00 to 10.000 V	Factory-corrected	☆
AC-01	AI1 displayed voltage 1	-10.00 to 10.000 V	Factory-corrected	☆
AC-02	AI1 measured voltage 2	-10.00 to 10.000 V	Factory-corrected	☆
AC-03	AI1 displayed voltage 2	-10.00 to 10.000 V	Factory-corrected	☆
AC-04	AI2 measured voltage 1	-10.00 to 10.000 V	Factory-corrected	☆
AC-05	AI2 displayed voltage 1	-10.00 to 10.000 V	Factory-corrected	☆
AC-06	AI2 measured voltage 2	-10.00 to 10.000 V	Factory-corrected	☆

Function Code	Parameter name	Setting Range	Default	Property
AC-07	AI2 displayed voltage 2	-10.00 to 10.000 V	Factory-corrected	☆
AC-08	AI3 measured voltage 1	-10.00 to 10.000 V	Factory-corrected	☆
AC-09	AI3 displayed voltage 1	-10.00 to 10.000 V	Factory-corrected	☆
AC-10	AI3 measured voltage 2	-10.00 to 10.000 V	Factory-corrected	☆
AC-11	AI3 displayed voltage 2	-10.00 to 10.000 V	Factory-corrected	☆
AC-12	AO1 target voltage 1	-10.00 to 10.000 V	Factory-corrected	☆
AC-13	AO1 measured voltage 1	-10.00 to 10.000 V	Factory-corrected	☆
AC-14	AO1 target voltage 2	-10.00 to 10.000 V	Factory-corrected	☆
AC-15	AO1 measured voltage 2	-10.00 to 10.000 V	Factory-corrected	☆
AC-16	AO2 target voltage 1	-10.00 to 10.000 V	Factory-corrected	☆
AC-17	AO2 measured voltage 1	-10.00 to 10.000 V	Factory-corrected	☆
AC-18	AO2 target voltage 2	-10.00 to 10.000 V	Factory-corrected	☆
AC-19	AO2 measured voltage 2	-10.00 to 10.000 V	Factory-corrected	☆

5.3 Monitoring Function Code

Parameter No.	Parameter Name	Min. Unit
Group U0: Monitoring Parameters		
U0-00	Running frequency	0.01Hz
U0-01	Frequency reference	0.01Hz
U0-02	Bus voltage	0.1V
U0-03	Output voltage	1V
U0-04	Output current	0.01A
U0-05	Output power	0.1kW
U0-06	Reserved	-
U0-07	DI state	1
U0-08	DO state	1
U0-09	AI1 voltage	0.01V
U0-10	AI2 voltage/current	0.01V/0.01mA
U0-11	AI3 voltage	0.01V
U0-12	Count value	1
U0-13	length value	1
U0-14	Load speed display	1
U0-15	PID reference	1
U0-16	PID feedback	1

Parameter No.	Parameter Name	Min. Unit
U0-17	PLC stage	1
U0-18	Pulse reference	0.01kHz
U0-19	Feedback speed	0.01Hz
U0-20	Remaining running time	0.1Min
U0-21	AI1 voltage before correction	0.001V
U0-22	AI2 voltage (V)/ current (mA) before correction	0.001V/0.01mA
U0-23	AI3 voltage before correction	0.001V
U0-24	Motor speed	1m/Min
U0-25	Accumulative power-on time	1Min
U0-26	Accumulative running time	0.1Min
U0-27	Pulse reference	1Hz
U0-28	Communication reference	0.01%
U0-30	Main frequency reference	0.01Hz
U0-31	Auxiliary frequency reference	1
U0-32	Viewing any register address value	1□
U0-34	Motor temperature	-
U0-37	Power factor angle	1
U0-39	Target voltage upon V/F separation	1V
U0-40	Output voltage upon V/F separation	1
U0-41	DI state display	1
U0-42	DO state display	1
U0-43	DI set for function state display 1	1
U0-44	DI set for function state display 2	1
U0-45	Fault information	0.01%
U0-59	Frequency Reference	0.01%
U0-60	Running frequency	1
U0-61	AC drive state	1
U0-62	Current fault code	0.01%
U0-64	Number of slaves	0.01Hz
U0-66	Communication extension card type	100: CANopen 200: PROFIBUS-DP 300: CANlink
U0-67	Communication extension card version	-
U0-68	AC drive status read via DP card	-
U0-69	Speed of transmitting DP	0.00 Hz to max. frequency
U0-70	Motor speed of transmitting DP	0 to rated motor
U0-71	Communication card current display	-
U0-72	Communication card faulty state	-
U0-73	Motor SN	0: Motor 1 1: Motor 2
U0-76	Low bits of accumulative power consumption	0.0 to 999.0 (min. unit: 0.1°)
U0-77	High bits of accumulative power consumption	0 to 65535 (min. unit: 1°)
U0-78	Linear speed	0 to 65535

6 Troubleshooting

6.1 AC Drive Fault Codes

Display	Fault Name	Possible Causes	Solutions
Err02	Overcurrent during acceleration	Ground fault or short circuit exists in the output circuit.	Check whether short-circuit occurs on the motor, motor cable or contactor.
		Motor parameters are incorrect.	Set motor parameters correctly.
		Acceleration time is too short.	Increase acceleration time.
		The current limit parameters are set improperly.	Ensure that current limit is enabled (F3-19 = 1). The setting of current limit level (F3-18) is too large. Adjust it between 120% and 150%. The setting of current limit gain (F3-20) is too small. Adjust it between 20 and 40.
		Customized torque boost or V/F curve is not appropriate.	Adjust the customized torque boost or V/F curve.
		The spinning motor is started.	Enable the catching a spinning motor function or start the motor after it stops.
		The AC drive suffers external interference.	View historical fault records. If the current value is far from the overcurrent level, find interference source. If external interference does not exist, it is the drive board or hall device problem.
Err03	Overcurrent during deceleration	Ground fault or short circuit exists in the output circuit.	Check whether short-circuit occurs on the motor, motor cable or contactor.
		Motor parameters are incorrect.	Set motor parameters correctly.
		Acceleration time is too short.	Increase acceleration time.
		The current limit parameters are set improperly.	Ensure that current limit is enabled (F3-19 = 1). The setting of current limit level (F3-18) is too large. Adjust it between 120% and 150%. The setting of the current limit gain (F3-20) is too small. Adjust it between 20 and 40.
		Braking unit and braking resistor are not installed.	Install braking unit and braking resistor.
		The AC drive suffers external interference.	View historical fault records. If the current value is far from the overcurrent level, find interference source. If external interference does not exist, it is the drive board or hall device problem.
Err04	Overcurrent at constant speed	Ground fault or short circuit exists in the output circuit.	Check whether short-circuit occurs on the motor, motor cable or contactor.
		Motor parameters are incorrect.	Set motor parameters correctly.
		The current limit parameters are set improperly.	Ensure that current limit is enabled (F3-19 = 1). The setting of current limit level (F3-18) is too large. Adjust it between 120% and 150%. The setting of current limit gain (F3-20) is too small. Adjust it between 20 and 40.
		The AC drive power class is small.	If output current exceeds rated motor current or rated output current of the AC drive during stable running, replace a drive of larger power class.
		The AC drive suffers external interference.	View historical fault records. If the current value is far from the overcurrent level, find interference source. If external interference does not exist, it is the drive board or hall device problem.

Display	Fault Name	Possible Causes	Solutions
Err05	Overvoltage during acceleration	Input voltage is too high.	Adjust input voltage to normal range.
		An external force drives motor during acceleration.	Cancel the external force or install a braking resistor.
		The voltage limit parameters are set improperly.	Ensure that the voltage limit function is enabled (F3-23 = 1). The setting of voltage limit (F3-22) is too large. Adjust it between 700 V and 770 V. The setting of frequency gain for voltage limit (F3-24) is too small. Adjust it between 30 and 50.
		Braking unit and braking resistor are not installed.	Install braking unit and braking resistor.
		Acceleration time is too short.	Increase acceleration time.
Err06	Overvoltage during deceleration	The voltage limit parameters are set improperly.	Ensure that the voltage limit function is enabled (F3-23 = 1). The setting of voltage limit (F3-22) is too large. Adjust it between 700 V and 770 V. The setting of frequency gain for voltage limit (F3-24) is too small. Adjust it between 30 and 50.
		An external force drives motor during deceleration.	Cancel the external force or install braking resistor.
		Deceleration time is too short.	Increase deceleration time.
		Braking unit and braking resistor are not installed.	Install braking unit and braking resistor.
Err07	Overvoltage at constant speed	The voltage limit parameters are set improperly.	Ensure that the voltage limit function is enabled (F3-23 = 1). The setting of voltage limit (F3-22) is too large. Adjust it between 700 V and 770 V. The setting of frequency gain for voltage limit (F3-24) is too small. Adjust it between 30 and 50. The setting of frequency rise threshold during voltage limit (F3-26) is too small. Adjust it between 5 Hz and 20 Hz.
		An external force drives motor during running.	Cancel the external force or install a braking resistor
Err08	Pre-charge resistor fault	Bus voltage fluctuates around undervoltage threshold continuously.	Contact the agent or Inovance.
Err09	Undervoltage	Instantaneous power failure occurs	Enable power dip ride through function (F9-59 ≠ 0).
		The AC drive's input voltage is not within the permissible range.	Adjust the voltage to normal range.
		The bus voltage is abnormal.	Contact the agent or Inovance.
		The rectifier bridge, buffer resistor, the drive board or the control board are abnormal.	Contact the agent or Inovance.
Err 10	Drive overload	Load is too heavy or locked-rotor occurs on motor.	Reduce load or check motor and mechanical conditions.
		The AC drive power class is small.	Replace a drive of larger power class.
Err 11	Motor overload	F9-01 (Motor overload protection gain) is set improperly.	Set F9-01 correctly.
		Load is too heavy or locked-rotor occurs on motor.	Reduce load or check motor and mechanical conditions.
Err 12	Power input phase loss	Input phase loss occurs.	Eliminate faults in external circuitry.
		Drive board, lightning protection board, control board, or rectifier bridge is abnormal.	Contact the agent or Inovance.

Display	Fault Name	Possible Causes	Solutions
Err 13	One drive output phase loss	Motor winding is damaged.	Check resistance between motor wires. Replace motor is winding is damaged.
		The cable connecting the AC drive and the motor is abnormal.	Check for wiring errors and ensure the output cable is connected properly.
		The AC drive's three-phase outputs are unbalanced when the motor is running.	Check whether the motor three-phase winding is normal.
		The drive board or the IGBT module is abnormal.	Contact the agent or Inovance.
Err 14	IGBT overheat	The ambient temperature is too high.	Lower the ambient temperature.
		The ventilation is clogged.	Clean the ventilation.
		The fan is damaged.	Replace the cooling fan.
Err 14	IGBT overheat	Thermally sensitive resistor of IGBT is damaged.	Replace the damaged thermally sensitive resistor.
		The inverter IGBT is damaged.	Replace the inverter IGBT.
Err 15	External equipment fault	External fault signal is input via DI.	Confirm that the mechanical condition allows restart (F8-18) and reset the operation.
		External fault signal is input via virtual I/O.	Confirm that the virtual I/O parameters in group A1 are set correctly and reset the operation.
Err 16	Comms. fault	Host computer is in abnormal state.	Check the cable of host computer.
		Communication cable is abnormal.	Check the communication cables.
		The serial port communication protocol (F0-28) of extension communication card is set improperly.	Set F0-28 of extension communication card correctly.
		Communication parameters in group Fd are set improperly.	Set communication parameters in group Fd properly.
		After all the preceding checkings are done but the fault still exists, restore the default settings.	
Err 17	Contactor fault	Drive board and power supply are abnormal.	Replace drive board or power supply board.
		Contactor is abnormal.	Replace contactor.
		The lightning protection board is abnormal.	Replace the lightning protection board.
Err 18	Current detection fault	The hall is abnormal.	Replace the hall .
		The drive board is abnormal.	Replace the drive board.
Err 19	Motor tuning fault	Motor parameters are not set according to nameplate.	Set motor parameters correctly according to nameplate.
		Motor auto-tuning times out.	Check the cable connecting AC drive and motor.
		The encoder is abnormal.	Check whether F1-27 (encoder pulses per revolution) is set correctly. Check whether signal lines of encoder are connected correctly and securely.
Err21	EEPROM read-write fault	The EEPROM chip is damaged.	Replace the main control board.
Err23	Short circuit to ground	Motor is short circuited to the ground.	Replace cable or motor.
Err26	Accumulative running time reached	Accumulative running time reaches the setting value.	Clear the record through parameter initialization.
Err27	User-defined fault 1	User-defined fault 1 is input via DI.	Reset the operation.
		User-defined fault 1 is input via virtual I/O.	
Err28	User-defined fault 2	User-defined fault 2 is input via DI.	Reset the operation.
		User-defined fault 2 is input via virtual I/O.	

Display	Fault Name	Possible Causes	Solutions
Err29	Accumulative power-on time reached	Accumulative power-on time reaches the setting value.	Clear the record through parameter initialization.
Err30	Off load fault	The output current of AC drive is smaller than F9-64 (load loss detection level).	Check whether load is disconnected or the setting of F9-64 and F9-65 (load lost detection time) satisfies actual running condition.
Err31	PID feedback lost during running	PID feedback is smaller than the setting value of FA-26 (detection level of PID feedback loss).	Check PID feedback or set FA-26 properly.
Err40	Quick current limit	Load is too heavy or locked-rotor occurs on motor.	Reduce load or check motor and mechanical conditions.
		The AC drive power class is small.	Replace a drive of larger power class.
Err41	Motor switchover fault during running	Motor switchover via terminal during drive running of the AC drive.	Perform motor switchover after the AC drive stops.
Err45	Motor overtemp.	Cable connection of temperature sensor becomes loose	Check cable connection of temperature sensor.
		The motor temperature is too high.	Decrease carrier frequency or take other measures to cool the motor.
Err61	Two or three drive output phases loss	Resistance of braking resistor is too small.	Replace a braking resistor of larger resistance.
Err62	Short-circuit of braking circuit	Braking module is abnormal.	Contact the agent or Inovance.

6.2 AC Drive Common Symptoms and Diagnostics

Fault Name	Possible Causes	Solutions
There is no display at power-on.	The mains voltage is not input or too low.	Check the power supply.
	The switching power supply on drive board of the AC drive is faulty.	Check bus voltage. Check that the 24V output and +10V output on the control board are normal.
	Wires between control board and drive board and between control board and operating panel break.	Re-connect the 8-pin wire and 40-pin wire.
	Pre-charge resistor of the AC drive is damaged.	Contact the agent or Inovance.
	Control board or operating panel is faulty.	
	Rectifier bridge is damaged.	
HC is displayed at power-on.	Wire between drive board and control board is in poor contact.	Re-connect the 8-pin wire and 28-pin wire.
	Related components on control board are damaged	Contact the agent or Inovance.
	The motor or motor cable is short circuited to ground.	
	The hall is damaged.	
	The mains voltage is too low.	

Fault Name	Possible Causes	Solutions
 The display is normal upon power-on, but "HC" is displayed after start and the motor stops immediately.	The cooling fan is damaged or locked-rotor occurs.	Replace the fan.
	Short circuit exists in wiring of control terminals.	Eliminate short circuit fault in control circuit wiring.
 (IGBT overheat) is detected frequently.	The setting of carrier frequency is too high.	Reduce carrier frequency (F0-15).
	The cooling fan is damaged, or ventilation is clogged.	Replace the fan or clean the ventilation.
	Components inside the AC drive are damaged (thermistor or others).	Contact the agent or Inovance.
 is detected upon power-on or running.	The pre-charge relay or contactor is not closed.	Check whether the relay or contactor cable is loose.
		Check whether the relay or contactor is faulty.
		Check whether 24 V power supply of the contactor is faulty.
		Contact the agent or Inovance.
 is displayed at power-on.	Motor or motor output cable is short circuited to ground.	Use a megger to measure insulation resistance of motor and motor cable.
	The AC drive is damaged.	Contact the agent or Inovance.
The motor does not rotate after the AC drive runs.	It is motor or motor cable problem.	Check that wiring between AC drive and motor is normal.
	Related AC drive and motor parameters are set improperly.	Restore the factory parameters and re-set the following parameters properly: Encoder parameters Motor ratings, such as rate motor frequency and rated motor speed Motor 1 control mode (F0-01) and command source selection (F0-02) F3-01 (torque boost) in V/F control under heavy-load start.
	Cable connection between drive board and control board is in poor contact.	Re-connect wirings and ensure secure connection.
	The drive board is faulty.	Contact the agent or Inovance.
The DI terminals are disabled.	Related parameters are set incorrectly.	Check and set parameters in group F4 again.
	External signals are incorrect.	Re-connect external signal cables.
	Jumper across OP and +24 V becomes loose.	Re-confirm the jumper bar across OP and +24 V.
	The control board is faulty.	Contact the agent or Inovance.
The AC drive detects overcurrent and overvoltage frequently.	Motor parameters are set improperly.	Set motor parameters or perform motor auto-tuning again.
	Acceleration/deceleration time is improper.	Set proper acceleration/deceleration time.
	Load fluctuates.	Contact the agent or Inovance.
The motor coasts to stop or there is no braking capacity during deceleration or deceleration to stop	Voltage limit is enabled.	If braking resistor has been configured, it is necessary to set the voltage limit function to disabled (F3-23 = 0).

Revision History

Revision	Date	Revising Author	Description
0.0	27th NOV'2015	Jason Hu	Related firmware version: F7-10 = U29.06 and F7-11 = U29.15

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