Inovance

inovA automation Monarch

Quick Start Guide

MD210 AC Drives

General Purpose

V/F Control

V1.0
Data Code: 19010207

Contents

Safety Information and Precautions

This guide is packaged together with the product for MD210 AC Drive. It contains basic information for quick start of the drive.

■ 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.

The 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 the 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 the 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 across-section of at least 10 mm^2 (Cu) or 16 mm^2 (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 100 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

1. Product Information

1.1 Designation

MD210 X X.X X

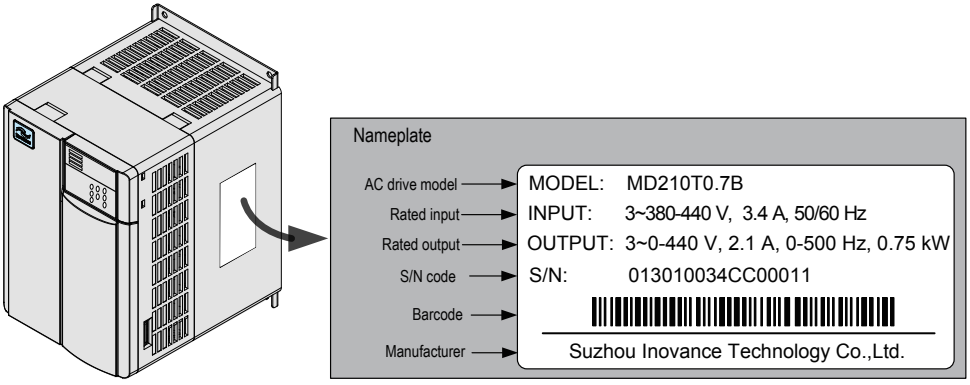
MD210 series AC drive

Mark	Voltage Class
S	Single-phase 220 V
2T	Three-phase 220 V
T	Three-phase 380 V

Mark	0.4	0.7	1.5	2.2
Applicable motor, [kW]	0.4	0.75	1.5	2.2

Mark	Built-in Braking Unit
B	Yes

1.2 Nameplate



1.3 General Specifications

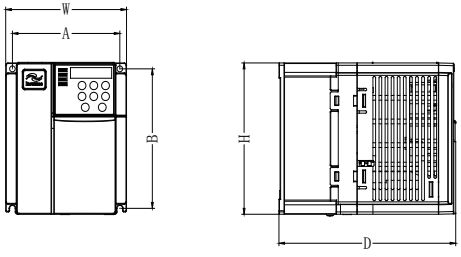
Voltage Class			Single-phase 220 VAC[1]				Three-phase 220 VAC[1]				Three-phase 380 VAC			
Drive Model			MD210 S0.4B	MD210 S0.7B	MD210 S1.5B	MD210 S2.2B	MD210 2T0.4B	MD210 2T0.7B	MD210 2T1.5B	MD210 2T2.2B	MD210 T0.4B	MD210 T0.7B	MD210 T1.5B	MD210 T2.2B
Frame Size			1		2	-	1		2	-	1		2	
Dimension[3]		H [mm]	128											
		W [mm]	108											
		D [mm]	148		158	-	148		158	-	148		158	
		A [mm]	96											
		B [mm]	119											
Drive Input	Rated Input Voltage		Single-phase 220 VAC, -15% to 20%				Three-phase 220 VAC, -15% to 20%				Three-phase 380 to 440 VAC, -15% to 20%			
	Rated Input Current [A]		5.4	8.2	14.0	23.0	3.4	5.0	5.8	10.5	1.9	3.4	5.0	5.8
	Rated input frequency		0/60 Hz, ±5% (47.5 to 63Hz)											
Drive Output	Applicable Motor	[kW]	0.4	0.75	1.5	2.2	0.4	0.75	1.5	2.2	0.4	0.75	1.5	2.2
		[HP]	0.5	1	2	3	0.5	1	2	3	0.5	1	2	3
	Output Current, [A]		2.3	4.0	7.0	9.6	2.1	3.8	5.1	9.0	1.5	2.1	3.8	5.1
	Power Capacity, [kVA]		1.0	1.5	3.0	4.0	1.0	3.0	4.0	5.9	1.2	1.5	3.0	4.0
	Overload Capacity[2]		120% for 1 h & 150% for 60 sec & 180% for 2 sec											
	Max. output voltage		Three-phase 220 VAC (proportional to input voltage)				Three-phase 220 VAC (proportional to input voltage)				Three-phase 380 VAC (proportional to input voltage)			
	Max. output frequency		500 Hz											
Braking Resistor	Recommended Power, [kW]		≥ 0.08	≥ 0.08	≥ 0.1	-	≥ 0.15	≥ 0.15	≥ 0.25	-	≥ 0.15	≥ 0.15	≥ 0.15	≥ 0.25
	Recommended Resistance, min. [Ω]		≥ 200	≥ 150	≥ 100	-	≥ 150	≥ 110	≥ 100	-	≥ 300	≥ 300	≥ 220	≥ 200
Cooling Method			Air		Fan		Air		Fan		Air		Fan	

Note

(1): Drives of 220 VAC power supply (both single-phase and three-phase) are being developed.

(2): At 6 kHz carrier frequency without derating

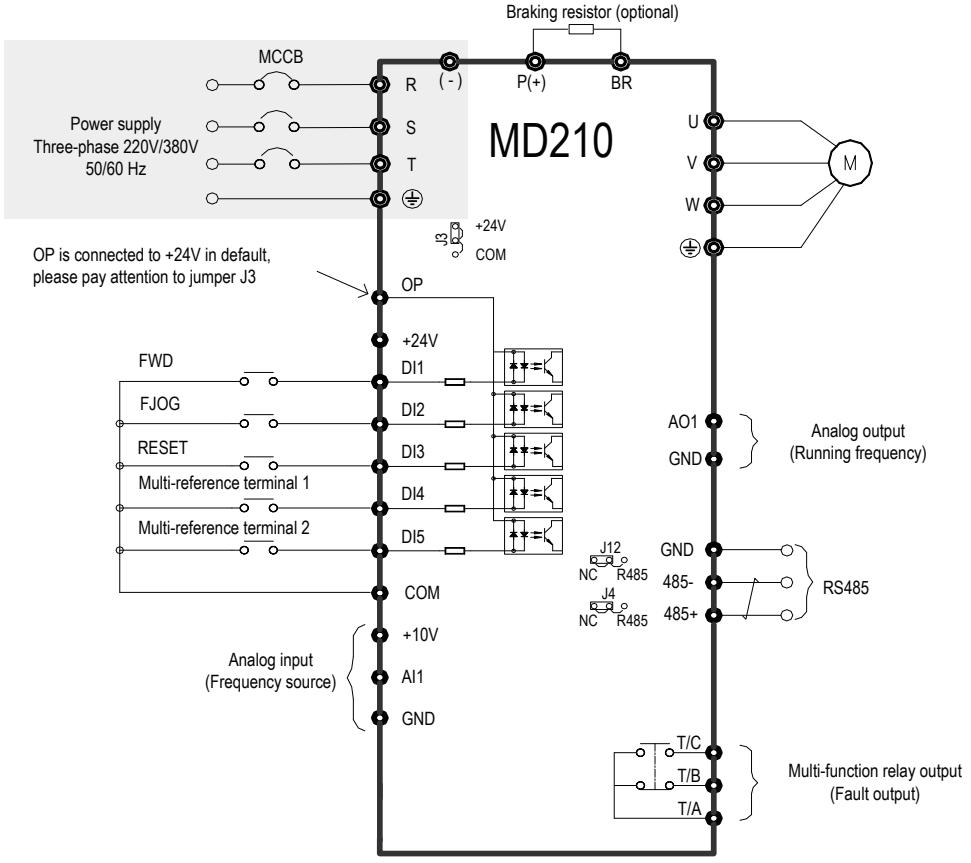
(3): Dimensions are shown as below:



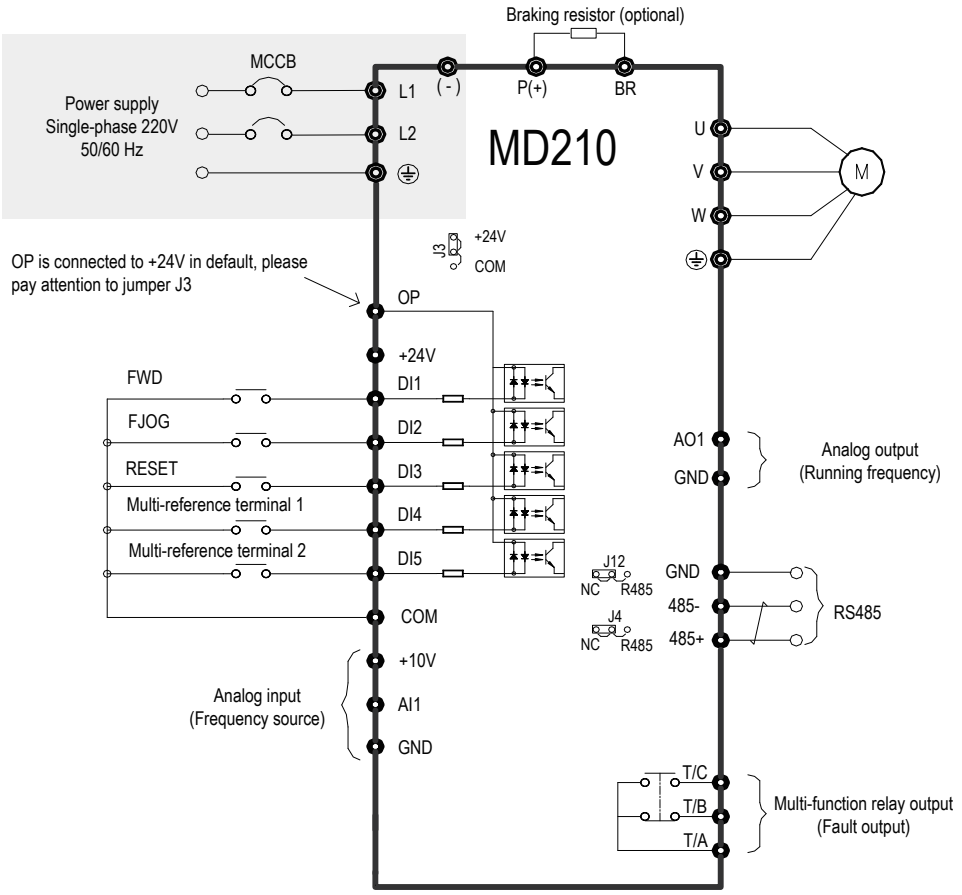
2 Wiring

2.1 Typical Wiring

■ Wiring of Three-phase 220/380 VAC Power Supply



■ Wiring of Single-phase 220 VAC Power Supply



2.2 Terminals

■ Terminals of Main Circuit

Table 2-1: Main circuit terminals of single-phase

Terminal	Terminal Name	Description
L1, L2	Single-phase power supply input terminals	Connect to the single-phase 220 VAC power supply.
P(+), (-)	Positive and negative terminals of DC bus	Common DC bus input point.
P(+), BR	Connecting terminals of braking resistor	Connect to a braking resistor.
U, V, W	Output terminals	Connect to a three-phase motor.
⏚	Grounding terminal	Must be grounded.

Table 2-2: Main circuit terminals of three-phase

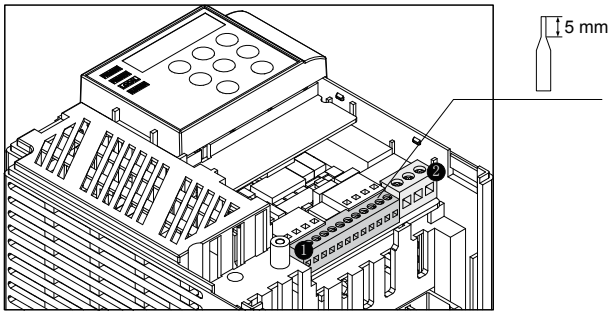
Terminal	Terminal Name	Description
R, S, T	Three-phase power supply input terminals	Connect to the three-phase AC power supply.
P(+), (-)	Positive and negative terminals of DC bus	Common DC bus input point.
P(+), BR	Connecting terminals of braking resistor	Connect to a braking resistor.
U, V, W	Output terminals	Connect to a three-phase motor.
⏚	Grounding terminal	Must be grounded.

■ Terminals of Control Circuit

Terminal	Terminal Name	Description
+10V-GND	+10 VDC power supply	Provide +10 VDC power supply externally. Usually, it provides power supply to the external potentiometer with resistance range of 1 to 5 kΩ. Max. output current: 10 mA.
+24V-COM	+24 VDC power supply	Provide +24 VDC power supply externally. Usually, it provides power supply to DI/DO terminals and external sensors. Max. output current: 200 mA.
OP	Input terminal of external power supply	Connect to +24 VDC by default. Whether it connects to +24 V or COM is decided by jumper J3. When DI1 to DI5 need to be driven by the external signal, OP needs to be connected to the external power supply and be disconnected from +24 VDC.
AI1-GND	Analog input 1	AI1 input voltage range: 0 to 10 VDC. Impedance: 22 kΩ.
DI1-COM	Digital input 1	Optical coupling isolation, compatible with dual-polarity input. Impedance: 2.4 kΩ. Input voltage range: 9 to 30 VDC.
DI2-COM	Digital input 2	
DI3-COM	Digital input 3	
DI4-COM	Digital input 4	
DI5-COM	High-speed pulse input	Besides features of DI1 to DI4, it can be used for high-speed pulse input. Max. input frequency: 20 kHz.
AO1-GND	Analog output 1	Output voltage range: 0 to 10 VDC.
485+-485-	Communication terminal	Modbus protocol (baud rate: 300 to 115200 bps) Max. nodes: 32. Terminal resistance jumpers: J4 and J12.
T/A-T/B	Normally closed terminal	Contact driving capacity: 250 VAC, 0.2 A; 30 VDC, 1 A.
T/A-T/C	Normally open terminal	

2.3 Control Circuit Wire Size and Torque Specification

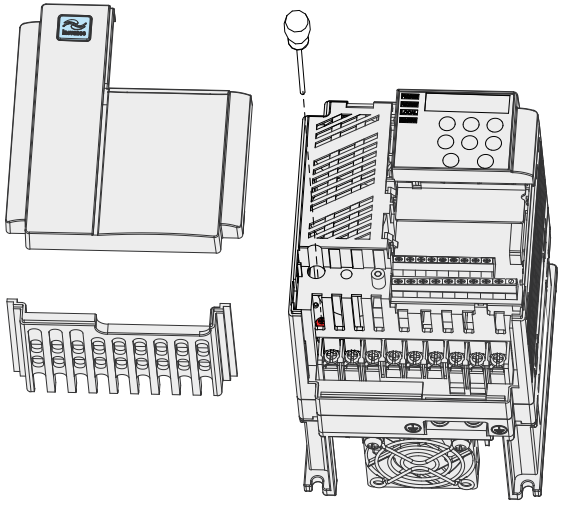
Please use a ferrule-type terminal with insulated sleeves. Prepare wire ends with insulated sleeves before connecting to the drive. See the following figure for ferrule dimensions.



Terminal Block		Single Wire (AWG/mm^2)	Twisted Wire (AWG/mm^2)	Tightening Torque (N·m)
Control circuit	1	AWG 24 to 18 (0.2 to 0.75 mm^2)		0.2
	2	AWG 24 to 18 (0.2 to 0.75 mm^2)		0.51

2.4 Grid System Requirement

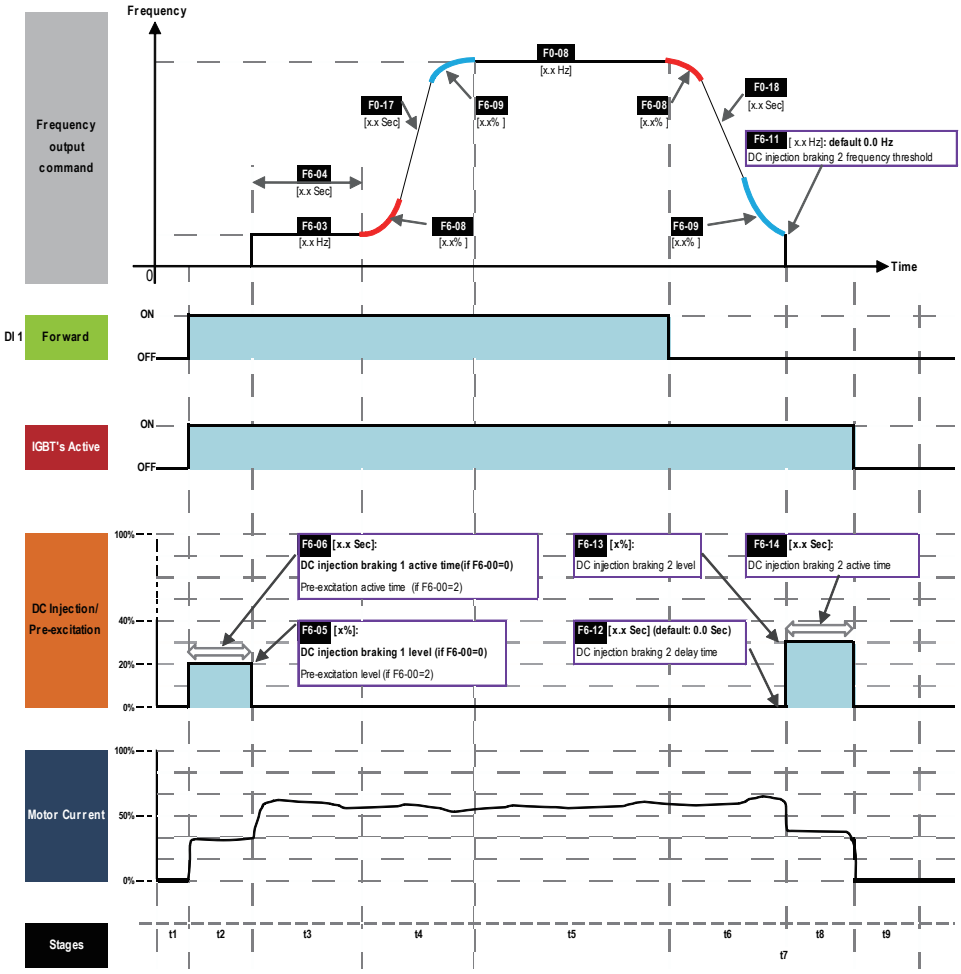
The drive is applicable to system with neutral point grounded. If the drive is used in an IT power system (neutral point not grounded), remove the screw that connects both VDR and safety capacitor to PE, as shown in the following figure.



3 Easy Setup

3.1 Logic of Control

■ Complete Timing Diagram

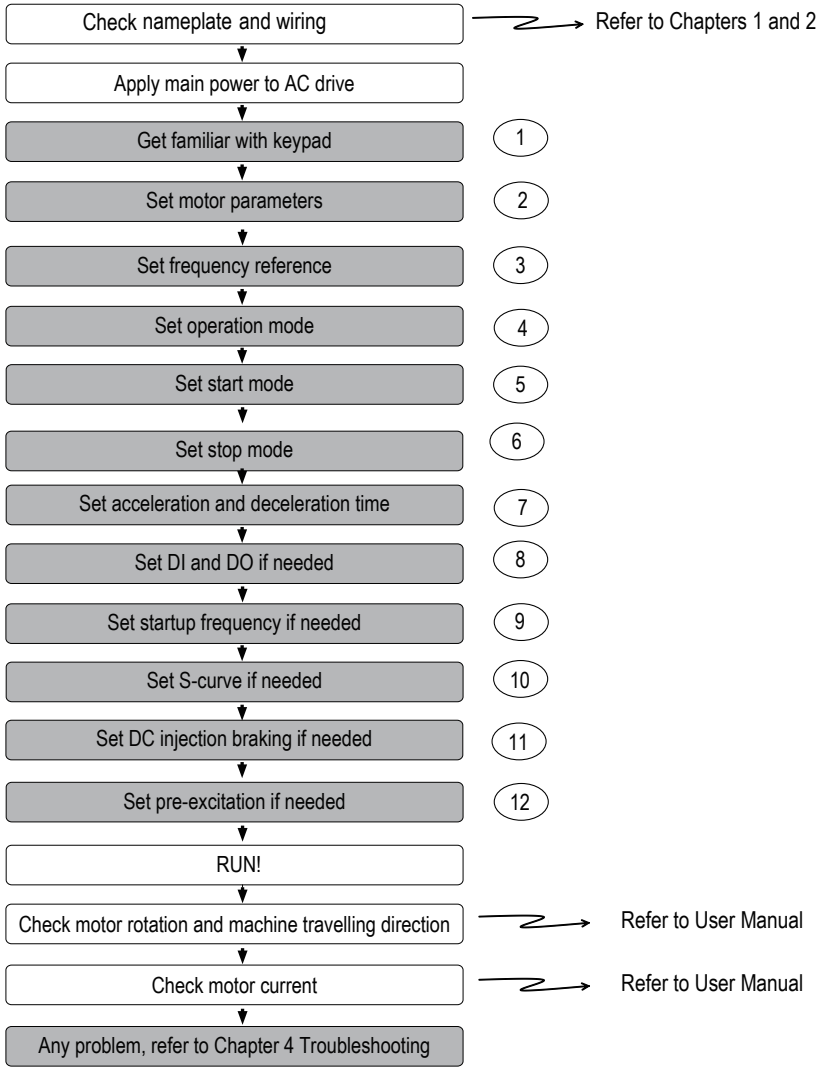


■ Timing Diagram Description

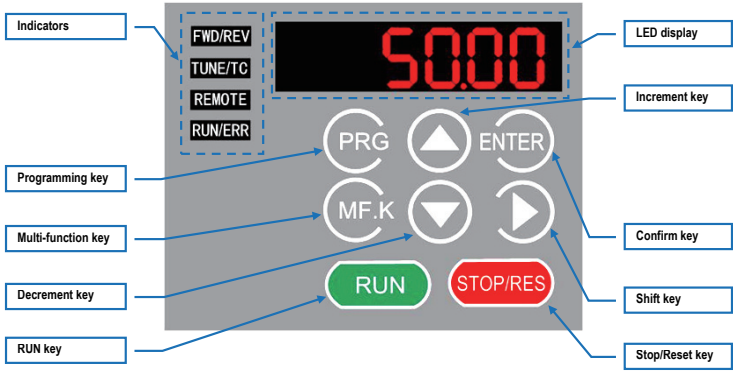
Event	Description	Para. No.	Status
t1	-The AC drive waits for the RUN signal.	-	Inhabit
t2	-The AC drive receives the Forward RUN command.	-	RUN
	-The IGBT becomes active.	-	
	-DC injection braking 1/Pre-excitation is enabled if F6-06 > 0.	F6-05	
	(if F6-00 = 0, it is "DC injection braking 1"; if F6-00 = 2, it is "Pre-excitation")	F6-06	
t3	-DC injection braking 1/Pre-excitation is disabled.	-	RUN
	-The startup frequency becomes active if F6-04 > 0.	F6-03 F6-04	
t4	-The startup frequency becomes inactive.	-	RUN
	- The motor ramps up to the expected frequency.	F0-17	
	- S-curve active	F6-08 F6-09	
t5	-Motor runs at expected frequency.	F0-08	RUN
t6	-The Forward RUN command is cancelled.	-	RUN
	-The motor ramps down to zero frequency.	F0-18	
	-S-curve active	F6-08 F6-09	
t7	-The frequency output command reaches the DC injection braking 2 frequency threshold.	F6-11	RUN (if F6-12 = 0) Inhabit (if F6-12 > 0)
	-The IGBT shall become inactive if DC injection braking 2 delay time is not zero.	F6-12	
	-After the delay time set in F6-12, the IGBT becomes active again	-	
t8	-DC injection braking 2 is enabled if F6-14 > 0	F6-13 F6-14	RUN
t9	-DC injection braking 2 is disabled.	-	Inhabit
	-The IGBT turns inactive.	-	

3.2 Step By Step Setup

■ Setup Flowchart



Step 1: Get Familiar With Keypad



■ Indicators

FWD/REV : It indicates forward or reverse rotation.
OFF indicates forward rotation and ON indicates reverse rotation.

TUNE/TC : ON indicates torque control mode, blinking slowly indicates auto-tuning state, blinking quickly indicates fault state.

REMOTE : It indicates whether the AC drive is operated by means of keypad, terminals or communication.
OFF indicates keypad control, ON indicates terminal control, and blinking indicates communication control.

RUN/ERR : It indicates the state of the AC drive.
OFF indicates the stop state, ON (green) indicates the running state, and ON (red) indicates the faulty state.

■ LED Display

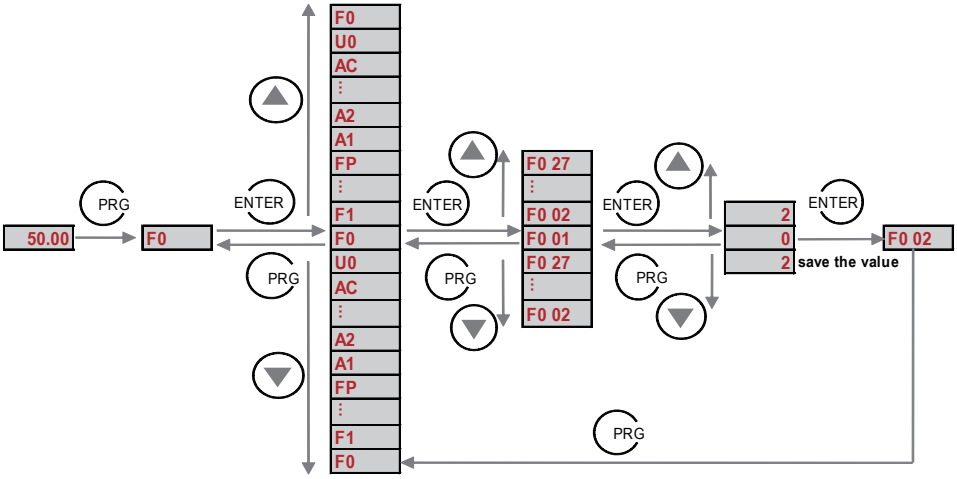
The 5-digit LED display is able to display the frequency reference, output frequency, monitoring data and fault codes.

■ Keys On Keypad

Key	Key Name	Function
PRG	Programming	Enter or exit Level I menu.
ENTER	Confirm	Enter the menu interfaces level by level, and confirm the parameter setting.
▲	Increment	Increase data or Para. No..
▼	Decrement	Decrease data or Para. No..
▶	Shift	Select the displayed parameters in turn in the stop or running state, and select the digit to be modified when modifying parameters.
RUN	RUN	Start the AC drive in the keypad operation mode.
STOP/RES	Stop/Reset	Stop the AC drive when it is in the running state and perform the reset operation when it is in the faulty state. The functions of this key are restricted by F7-02.
MF.K	Multifunction	Perform function switchover (such as quick switchover of command source or direction) according to the setting of F7-01.

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
F7-01	MF.K key function selection	0: MF.K key disabled 1: Switchover from remote control (terminal or communication) to keypad control 2: Switchover between forward rotation and reverse rotation 3: Forward jog 4: Reverse jog 5: Individualized parameter display	N.A.	0	
F7-02	STOP/RESET key function	0: STOP/RESET key enabled only in keypad control 1: STOP/RESET key enabled in any operation mode	N.A.	1	

■ Keypad Operation



■ Para. No. Arrangement

Para. Group	Description	Remark
F0 to FP	Standard parameter group	Standard function parameters
A0 to AC	Advanced parameter group	AI/AO correction
U0	Running state parameter group	Display of basic parameters

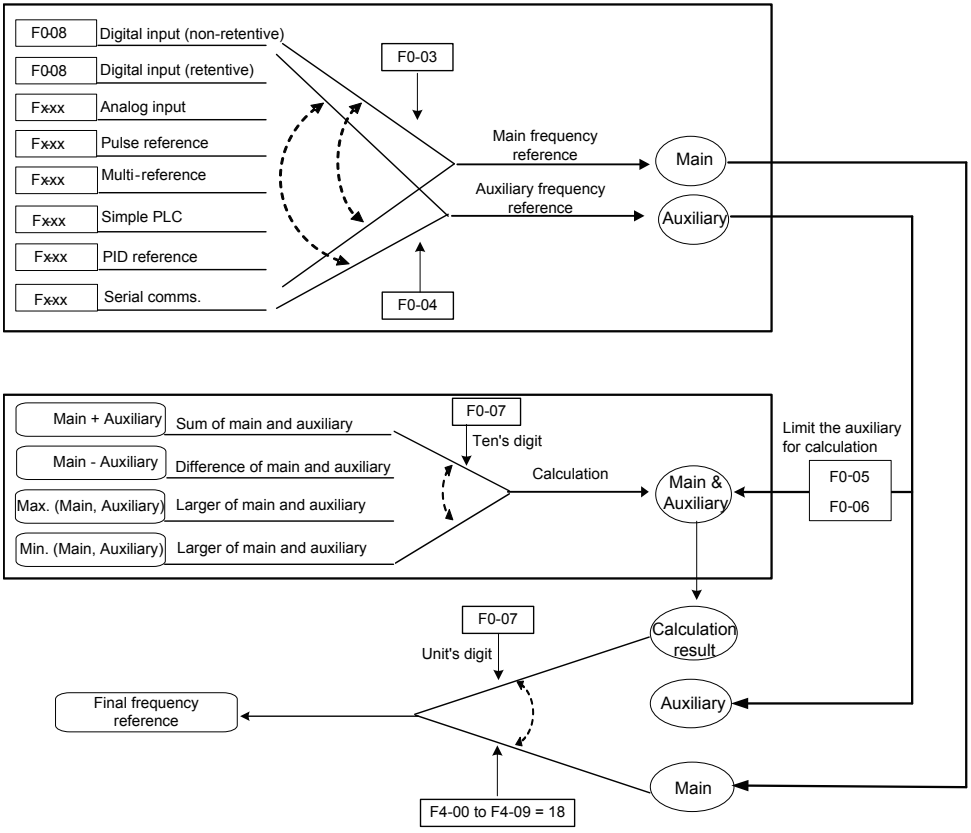
Step 2: Set Motor Parameters

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
F1-00	Motor type selection	0: Common asynchronous motor 1: Variable-frequency asynchronous motor	N.A.	0	
F1-01	Rated motor power	0.1 to 7.5	kW	Model dependent	
F1-02	Rated motor voltage	1 to 1000	V	Model dependent	
F1-03	Rated motor current	0.01 to 655.35	A	Model dependent	
F1-04	Rated motor frequency	0.01 to max frequency	Hz	Model dependent	
F1-05	Rated motor speed	1 to 65535	RPM	Model dependent	

Step 3: Set Frequency Reference

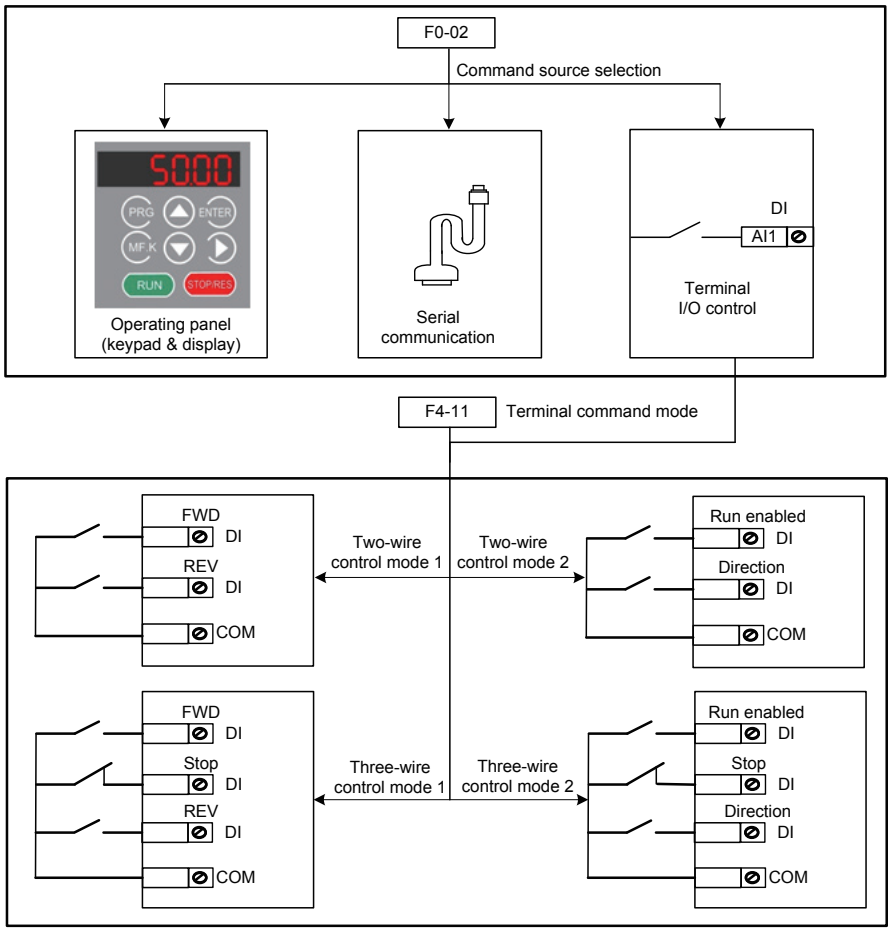
Para. No.	Para. Name	Setting Range	Unit	Default	Commission
F0-03	Main frequency source X selection	0: Digital setting F0-08 (non-retentive at power down) 1: Digital setting F0-08 (retentive at power down) 2: AI1 3: AI2 4: Reserved 5: Pulse reference (DI5) 6: Multi-reference 7: Simple PLC 8: PID 9: Communication reference	N.A.	0	
F0-04	Auxiliary frequency source Y selection	The same as F0-03 (Main frequency source X selection)	N.A.	0	

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
F0-07	Frequency source superposition selection	00 Main and auxiliary calculation relationship 0: Main + Auxiliary 1: Main - Auxiliary 2: Maximum of main and auxiliary 3: Minimum of main and auxiliary Frequency reference setting channel selection 0: Main frequency reference setting channel 1: Main + auxiliary operation 2: Switchover between main and auxiliary 3: Switchover between main and main + auxiliary calculation 4: Switchover between auxiliary and main + auxiliary calculation	N.A.	00	
F0-08	Preset frequency	0.00 to max frequency	Hz	50.00	



Step 4: Select Operation Mode

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
F0-02	Command source selection	0: Keypad control 1: Terminal control 2: Communication control	N.A.	0	
F4-11	Terminal command mode	0: Two-wire control mode 1 1: Two-wire control mode 2 2: Three-wire control mode 1 3: Three-wire control mode 2	N.A.	0	



Step 5: Set Start Mode

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
F6-00	Start mode	0: Direct startup 1: Reserved 2: Pre-excited startup	N.A.	0	

Step 6: Stop Mode

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
F6-10	Stop mode	0: Decelerate to stop 1: Coast to stop	N.A.	0	

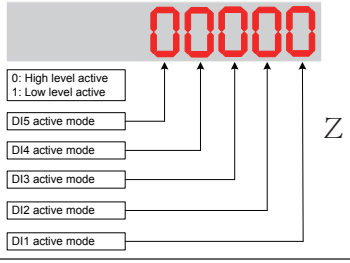
Step 7: Set Acceleration and Deceleration Parameters

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
F0-17	Acceleration time 1	0.00 to 650.00 (if F0-19 = 2) 0.0 to 6500.0 (if F0-19 = 1) 0 to 65000 (if F0-19 = 0)	s	Model dependent	
F0-18	Deceleration time 1	0.00 to 650.00 (if F0-19 = 2) 0.0 to 6500.0 (if F0-19 = 1) 0 to 65000 (if F0-19 = 0)	s	Model dependent	
F0-19	Acceleration/ Deceleration time unit	0: 1s 1: 0.1s 2: 0.01s	N.A.	1	
F6-07	Acceleration/ Deceleration mode	0: Linear mode 1: S-curve mode A 2: S-curve mode B	N.A.	0	

Step 8: Set DI And DO If Needed

■ DI Setting

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
F4-00	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	N.A.	1 FWD	
F4-01	DI2 function selection	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	N.A.	4 FJOG	
F4-02	DI3 function selection	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)	N.A.	9 RESET	

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
F4-03	DI4 function selection	20: Command source switchover terminal 1 21: Acceleration/Deceleration prohibited 22: PID pause 23: PLC status reset 24: Wobble pause 25: Counter input 26: Counter reset 27: Length count input	N.A.	12 Multi-reference terminal 1	
F4-04	DI5 function selection	28: Length reset 29: Torque control prohibited 30: Pulse input (enabled only for DI5) 31: Reserved 32: Immediate DC injection braking 33: Normally closed (NC) input of external fault 34: Frequency modification enable 35: Reverse PID action direction 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 and 42: Reserved 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 injection braking 50: Clear the current running time 51: Two-wire/Tree-wire switchover 52: Reverse frequency prohibited 53–59: Reserved	N.A.	13 Multi-reference terminal 2	
F4-10	DI filter time	0.000 to 1.000	s	0.010	
F4-35	DI1 delay	0.0 to 3600.0	s	0.0	
F4-36	DI2 delay	0.0 to 3600.0	s	0.0	
F4-37	DI3 delay	0.0 to 3600.0	s	0.0	
F4-38	DI active mode selection 1		N.A.	00000	

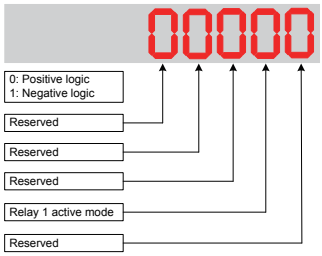
Note

High level active means that, if a high level voltage is applied to DI terminal, the DI signal will be seen as active.

Low level active means that, if a low level voltage is applied to DI terminal, the DI signal will be seen as active.

■ DO Setting

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
F5-02	Relay function (T/A-T/B-T/C) selection	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 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: Reserved 15: Ready for RUN 16: Reserved 17: Frequency upper limit reached 18: Frequency lower limit reached (no output at stop) 19: Undervoltage state output 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 FDT2 output 26: Frequency 1 reached 27: Frequency 2 reached 28: Current 1 reached 29: Current 2 reached 30: Timing reached 31: AI1 input limit exceeded 32: Load lost 33: Reverse running 34: Zero current state 35: Module temperature reached 36: Software current limit exceeded 37: Frequency lower limit reached (having output at stop) 38: Alarm output 39: Reserved 40: Running time reached this time 41: Fault output (there is no output if undervoltage occurs.)	N.A.	2 Fault output	
F5-18	Relay 1 output delay time	0.0 to 3600.0	1	0.0	

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
F5-22	DO active mode selection		N.A.	00000	

Note

Positive logic means that, DO output terminal is normally the default state.

Negative logic means the opposite situation.

However, no matter the logic is positive or negative, when power off, T/A-T/B is always normally closed, and T/A-T/C is always normally open. F5-22 only changes the state of relay when power on.

Please pay particular attention to the switching of relay if F5-22 = 1.

Step 9: Set Startup Frequency If Needed

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
F6-03	Startup frequency	0.00 to 10.00	Hz	0.00	
F6-04	Startup frequency active time	0.0 to 100.0	s	0.0	

Step 10: Set S-Curve If Needed

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
F6-07	Acceleration/ Deceleration mode	0: Linear mode 1: S-curve mode A 2: S-curve mode B	N.A.	0	1
F6-08	Time proportion of S-curve start segment	0.0 to [100.0 minus F6-09]	%	30.0	
F6-09	Time proportion of S-curve end segment	0.0 to [100.0 minus F6-08]	%	30.0	

Step 11: Set DC Injection Braking If Needed

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
F6-00	Start mode	0: Direct startup 1: Reserved 2: Pre-excited startup	N.A.	0	
F6-05	DC injection braking 1 level	0 to 100	%	50	
F6-06	DC injection braking 1 active time	0.0 to 100.0	s	0.0	
F6-11	DC injection braking 2 frequency threshold	0.00 to max frequency	Hz	0.00	
F6-12	DC injection braking 2 delay time	0.0 to 100.0	s	0.0	
F6-13	DC injection braking 2 level	0 to 100	%	50	
F6-14	DC injection braking 2 active time	0.0 to 100.0	s	0.0	

Note

Only when F6-00 = 0, parameters F6-05 and F6-06 are related to DC injection braking 1.

Step 12: Set Pre-excitation If Needed

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
F6-00	Start mode	0: Direct startup 1: Reserved 2: Pre-excited startup (asynchronous motor)	N.A.	0	2
F6-05	Pre-excitation level	0 to 100	%	50	
F6-06	Pre-excitation active time	0.0 to 100.0	s	0.0	

Note

Only when F6-00 = 2, parameters F6-05 and F6-06 are related to pre-excitation.

4 Troubleshooting

4.1 Faults and Solutions

Display	Fault Name	Possible Causes	Solutions
Err02	Overcurrent during acceleration	1. The output circuit is short circuited. 2. The acceleration time is too short. 3. Manual torque boost or V/F curve is not appropriate. 4. The power supply is too low. 5. The startup operation is performed on the rotating motor. 6. A sudden load is added during acceleration. 7. The AC drive model is of too small power class.	1: Eliminate short circuit. 2: Increase the acceleration time. 3: Adjust the manual torque boost or V/F curve. 4: Check that the power supply is normal. 5: Select speed tracking restart or start the motor after it stops. 6: Remove the added load. 7: Select a drive of higher power class.
Err03	Overcurrent during deceleration	1. The output circuit is short circuited. 2. The deceleration time is too short. 3. The power supply is too low. 4. A sudden load is added during deceleration. 5. The braking resistor is not installed.	1: Eliminate short circuit. 2: Increase the deceleration time. 3: Check the power supply, and ensure it is normal. 4: Remove the added load. 5: Install the braking resistor.
Err04	Overcurrent at constant speed	1. The output circuit is short circuited. 2. The power supply is too low. 3. A sudden load is added during operation. 4. The AC drive model is of too small power class.	1: Eliminate short circuit. 2: Adjust power supply to normal range. 3: Remove the added load. 4: Select a drive of higher power class.
Err05	Overvoltage during acceleration	1. The DC bus voltage is too high. 2. An external force drives the motor during acceleration. 3. The acceleration time is too short. 4. The braking resistor is not installed.	1: Replace with a proper braking resistor. 2: Cancel the external force or install braking resistor. 3: Increase the acceleration time. 4: Install a braking resistor.
Err06	Overvoltage during deceleration	1. The DC bus voltage is too high. 2. An external force drives the motor during deceleration. 3. The deceleration time is too short. 4. The braking resistor is not installed.	1: Replace with a proper braking resistor. 2: Cancel the external force or install braking resistor. 3: Increase the deceleration time. 4: Install the braking resistor
Err07	Overvoltage at constant speed	1. The DC bus voltage is too high. 2. An external force drives the motor during deceleration.	1: Replace with a proper braking resistor. 2: Cancel the external force.

Voltage thresholds

Voltage Class	DC Bus Overvoltage	DC Bus Undervoltage	Braking Unit Operation Level
Single-phase 220 V	400V	200V	381V
Three-phase 220 V	400V	200V	381V
Three-phase 380 V	810V	350V	700V

Err08	Control power fault	The input voltage exceeds the allowed range.	Adjust the input voltage to within the allowed range.
Err09	Undervoltage	1. Instantaneous power failure occurs. 2. The DC bus voltage is too low. 3. The rectifier bridge and buffer resistor are faulty. 4. The drive board is faulty. 5. The control board is faulty.	1: Reset the fault. 2: Check the DC bus. 3 to 6: Seek for maintenance.

Display	Fault Name	Possible Causes	Solutions
Err10	Drive overload	1. The load is too heavy or the rotor is locked. 2. The drive is of too small power class.	1: Reduce the load, or check the motor, or check the machine whether it is locking the rotor. 2: Select a drive of higher power class.
Err11	Motor overload	1. F9-01 is too small. 2. The load is too heavy or the rotor is locked. 3. The drive is of too small power class.	1: Set F9-01 correctly. 2: Reduce the load, or check the motor, or check the machine whether it is locking the rotor. 3: Select a drive of larger power class.
Err12	Power input phase loss	1. The three-phase power supply is abnormal. 2. The drive board is faulty. 3. The lightening protection board is faulty. 4. The control board is faulty.	1: Check the power supply. 2 to 4: Seek for maintenance.
Err13	Power output phase loss	1. The cable between drive and motor is faulty. 2. The drive's three-phase output is unbalanced when the motor is running. 3. The drive board is faulty 4. The IGBT is faulty.	1: Check the cable. 2: Check the motor windings. 3 to 4: Seek for maintenance.
Err14	IGBT overheat	1. The ambient temperature is too high. 2. The air filter is blocked. 3. The cooling fan is damaged. 4. The thermal sensor of IGBT is damaged. 5.The IGBT is damaged.	1: Reduce the ambient temperature. 2: Clean the air filter. 3 to 5: Seek for maintenance.
Err15	External equipment fault	1. External fault signal is input via DI. 2. External fault signal is input via VDI.	Reset the fault.
Err16	Communication fault	1. The host computer is abnormal. 2. The communication cable is faulty. 3. The communication parameters in group FD are set improperly.	1: Check cabling of the host computer. 2: Check the communication cabling. 3: Set the communication parameters properly.
Err18	Current detection fault	1. The HALL is faulty. 2. The drive board is faulty.	Seek for maintenance
Err21	EEPROM read-write fault	The EEPROM chip is damaged.	Seek for maintenance.
Err26	Beyond the accumulative running time limit	The accumulative running time reaches the setting of F8-17.	Clear the record by performing parameter initialization (set FP-01 to 2).
Err27	User-defined fault 1	1. The user-defined fault 1 signal is input via DI. 2. User-defined fault 1 signal is input via VDI.	Reset the fault.
Err28	User-defined fault 2	1. The user-defined fault 2 signal is input via DI 2. The user-defined fault 2 signal is input via VDI.	Reset the fault.
Err29	Beyond the accumulative power-on time limit	The accumulative power-on time reaches the setting of F8-16.	Clear the record by performing parameter initialization (set FP-01 to 2).
Err30	Off load fault	The running current is lower than F9-64.	Check that the load is disconnected or the setting of F9-64 and F9-65 is correct.
Err31	PID feedback lost during running	The PID feedback is lower than FA-26.	Check the PID feedback signal or set FA-26 to a proper value.
Err40	Beyond a particular current limit for times	1: The load is too heavy or the rotor is locked. 2: The drive is of too small power class.	1: Reduce the load, or check the motor, or check the machine whether it is locking the rotor. 2: Select a drive of higher power class.

4.2 Common Symptoms And Diagnostics

Fault Name	Possible Causes	Solutions
There is no display at power-on.	1. There is no power supply or the power supply is too low. 2. The switching power supply on the drive board is faulty. 3. The rectifier bridge is damaged. 4. The buffer resistor of the drive is damaged. 5. The control board or the keypad is faulty. 6. The cable between the control board and the drive board or keypad breaks.	1: Check the power supply. 2 to 5: Seek for maintenance. 6: Re-connect the 4-core and 28-core flat cables, or seek for maintenance.
"HC" is displayed at power-on.	1. The cable between the drive board and the control board is in poor contact. 2. The control board is damaged. 3. The motor winding or the motor cable is short-circuited to the ground. 4. The power supply is too low.	1: Re-connect the 4-core and 28-core flat cables, or seek for maintenance. 2: Seek for maintenance. 3: Check the motor or replace it, and check the motor cable. 4. Check the power supply according to charpter1.3.
The display is normal upon power-on, but "HC" is displayed after startup and the motor stops immediately.	1. The cooling fan is damaged or the rotor is locked. 2. A certain terminal is short-circuited.	1: Replace cooling fan, or check the machine whether it is locking the rotor. 2: Eliminate short circuit.
Err14 is reported frequently.	1. The carrier frequency is set too high. 2. The cooling fan is damaged, or the air filter is blocked. 3. Components (thermal coupler or others) inside the drive are damaged.	1: Reduce F0-15. 2: Replace the fan and clean the air filter. 3: Seek for maintenance.
The motor does not rotate after the AC drive outputs a non-zero reference.	1. The motor or motor cable is damaged. 2. The motor parameters are set improperly. 3. The cable between the drive board and the control board is in poor contact. 4. The drive board is faulty. 5. The rotor is locked.	1: Check the motor, or check the cable between the drive and the motor. 2: Check and re-set motor parameters. 3: Re-connect the 4-core and 28-core flat cables, or seek for maintenance. 4: Seek for maintenance. 5: Check the machine whether it is locking the rotor.
The DI terminals are disabled.	1. The DI parameters are set incorrectly. 2. The input signal is incorrect. 3. The wire jumper between OP and +24V is in poor contact. 4. The control board is faulty.	1: Check and reset DI parameters in group F4. 2: Check the input signals, or check the input cable. 3: Check the jumper between OP and +24 V. 4: Seek for maintenance.
The drive reports overcurrent and overvoltage frequently.	1. The motor parameters are set improperly. 2. The acceleration/deceleration time is too small. 3. The load fluctuates.	1: Reset motor parameters. 2: Set proper acceleration/deceleration time. 3: Check the machine, or seek for maintenance.
Err17 is reported at power-on or during running.	The soft start contactor is not closed.	1. Check whether the contactor wiring becomes loose 2. Check whether the contactor is faulty. 3. Check whether 24 V power supply of the contactor is faulty. 4. Seek for maintenance
Display at power-on	Related device on the control board is damaged.	Seek for maintenance.

5 Parameter Table

5.1 General Parameters

■ Group F0: Standard

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
F0-01	Motor control mode	2: Voltage/Frequency control (V/F)	N.A.	2	
F0-02	Command source selection	0 to 2	N.A.	0	
F0-03	Main frequency source X selection	0 to 9	N.A.	0	
F0-04	Auxiliary frequency source Y selection	The same as F0-03 (Main frequency source X selection)	N.A.	0	
F0-05	Range base of auxiliary frequency Y for X and Y superposition	0: Relative to Max. frequency 1: Relative to main frequency X	N.A.	0	
F0-06	Range of auxiliary frequency Y for X and Y superposition	0 to150	%	100	
F0-07	Frequency source superposition selection	00 to 34	N.A.	00	
F0-08	Preset frequency	0.00 to Max. frequency	N.A.	50.00	
F0-09	Rotation direction	0: Same direction 1: Reverse direction	N.A.	0	
F0-10	Max. frequency	50.00 to 600.00	Hz	50.00	
F0-11	Source of frequency upper limit	0 to 5	N.A.	0	
F0-12	Frequency upper limit	Frequency lower limit (F0-14) to Max. frequency (F0-10)	Hz	50.00	
F0-13	Frequency upper limit offset	0.00 to Max. frequency (F0-10)	Hz	0.00	
F0-14	Frequency lower limit	0.00 to frequency upper limit (F0-12)	Hz	0.00	
F0-15	Carrier frequency	0.5 to 16.0	kHz	Model dependent	
F0-16	Carrier frequency adjustment with temperature	0: No 1: Yes	N.A.	1	
F0-17	Acceleration time 1	0.00 to 650.00 (if F0-19 = 2) 0.0 to 6500.0 (if F0-19 = 1) 0 to 65000 (if F0-19 = 0)	s	Model dependent	
F0-18	Deceleration time 1	0.00 to 650.00 (if F0-19 = 2) 0.0 to 6500.0 (if F0-19 = 1) 0 to 65000 (if F0-19 = 0)	s	Model dependent	
F0-19	Acceleration/ Deceleration time unit	0: 1 1: 0.1 2: 0.01	s	1	
F0-21	Frequency offset of auxiliary frequency source for X and Y superposition	0.00 to Max. frequency (F0-10)	Hz	0.00	

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
F0-22	Frequency reference resolution	1: 0.1 2: 0.01	Hz	2	
F0-23	Retentive of digital setting frequency upon stop	0: Not retentive 1: Retentive	N.A.	2	
F0-25	Acceleration/ Deceleration time base frequency	0: Max. frequency (F0-10) 1: Frequency reference 2: 100	N.A.	0	
F0-26	Base frequency for UP/ DOWN modification during running	0: Running frequency 1: Frequency reference	N.A.	0	
F0-27	Binding command source to frequency source	0000 to 9999	N.A.	0000	

■ Group F1: Motor Parameters

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
F1-00	Motor type selection	0: Common asynchronous motor 1: Variable frequency asynchronous motor	N.A.	0	
F1-01	Rated motor power	0.1 to 7.5	kW	Model dependent	
F1-02	Rated motor voltage	1 to 1000	V	Model dependent	
F1-03	Rated motor current	0.01 to 655.35	A	Model dependent	
F1-04	Rated motor frequency	0.01 to Max. frequency	Hz	Model dependent	
F1-05	Rated motor speed	1 to 65535	RPM	Model dependent	
F1-06	Stator resistance (asynchronous motor)	0.001 to 65.535	Ω	Model dependent	
F1-07 to F1-09	Reserved	N.A.	N.A.	N.A.	N.A.
F1-10	No-load current (asynchronous motor)	0.01 to F1-03	A	Model dependent	

■ Group F3: V/F Control

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
F3-00	V/F curve setting	0 to 8	N.A.	0	
F3-01	Torque boost	0.0 to 30.0	%	Model dependent	
F3-02	Cut-off frequency of torque boost	0.00 to Max. output frequency	Hz	50.00	
F3-03	Multi-point V/F frequency 1	0.00 to F3-05	Hz	0.00	
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	Hz	0.00	
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)	Hz	0.00	
F3-08	Multi-point V/F voltage 3	0.0 to 100.0	%	0.0	
F3-09	V/F slip compensation gain	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 to100	%	Model dependent	
F3-12	Oscillation suppression mode selection	0 to 4	N.A.	3	
F3-18	Current limit level	50 to 200	%	150	
F3-19	Current limit selection	0: Disabled 1: Enabled	N.A.	1	
F3-20	Current limit gain	0 to 100	N.A.	20	
F3-21	Compensation factor of speed multiplying current limit level	0 to 200	%	50	
F3-22	Voltage limit	200.0 to 810.0	V	760.0	
F3-23	Voltage limit selection	0: Disabled 1: Enabled	N.A.	1	
F3-24	Frequency gain for voltage limit	0 to 100	N.A.	30	
F3-25	Voltage gain for voltage limit	0 to 100	N.A.	30	
F3-26	Frequency rise threshold during voltage limit	0 to 50	Hz	5	
F3-27	Slip compensation time constant	0.1 to 10.0	s	0.5	

■ Group F4: Input Terminals

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
F4-00	DI1 function selection	0 to 59	N.A.	1	
F4-01	DI2 function selection	0 to 59	N.A.	4	
F4-02	DI3 function selection	0 to 59	N.A.	9	
F4-03	DI4 function selection	0 to 59	N.A.	12	
F4-04	DI5 function selection	0 to 59	N.A.	13	
F4-10	DI filter time	0.000 to 1.000	s	0.010	
F4-11	Terminal command mode	0: Two-wire control mode 1 1: Two- wire control mode 2 2: Three- wire control mode 1 3: Three- wire control mode 2	N.A.	0	
F4-12	Terminal UP/DOWN rate	0.001 to 65.535	Hz/s	1.000	
F4-13	AI curve 1 minimum input	0.00 to F4-15	V	0.00	
F4-14	Corresponding setting of AI curve1 minimum input	-100.0 to100.0	%	0.0	
F4-15	AI curve 1 Max. input	F4-13 to 10.00	V	10.00	
F4-16	Corresponding setting of AI curve1 Max. input	-100.0 to 100.0	%	100.0	
F4-17	AI1 filter time	0.00 to 10.00	s	0.10	
F4-18	AI curve 2 minimum input	0.00 to F4-20	V	0.00	
F4-19	Corresponding setting of AI curve2 minimum input	-100.0 to 100.0	%	0.0	
F4-20	AI curve 2 Max. input	F4-18 to 10.00	V	10.00	
F4-21	Corresponding setting of AI curve2 Max. input	-100.0 to 100.0	%	100.0	
F4-23	AI curve 3 minimum input	-10.00 to F4-25	V	-10.00	
F4-24	Corresponding setting of AI curve3 minimum input	-100.0 to100.0	%	-100.0	
F4-25	AI curve 3 Max. input	F4-23 to 10.00	V	10.00	
F4-26	Corresponding setting of AI curve3 Max. input	-100.0 to 100.0	%	100.0	
F4-28	Pulse minimum input	0.00 to F4-30	kHz	0.00	
F4-29	Corresponding setting of pulse minimum input	-100.0 to100.0	%	0.0	
F4-30	Pulse Max. input	F4-28 to 20.00	kHz	20.00	
F4-31	Corresponding setting of pulse Max. input	-100.0 to 100.0	%	100.0	
F4-32	Pulse filter time	0.00 to10.00	s	0.10	
F4-33	AI curve selection	111 to 555	N.A.	321	
F4-34	Setting for AI less than minimum input	000 to 111	N.A.	000	
F4-35	DI1 delay time	0.0 to 3600.0	s	0.0	
F4-36	DI2 delay time	0.0 to 3600.0	s	0.0	
F4-37	DI3 delay time	0.0 to 3600.0	s	0.0	
F4-38	DI active mode selection	00000 to 11111	N.A.	00000	

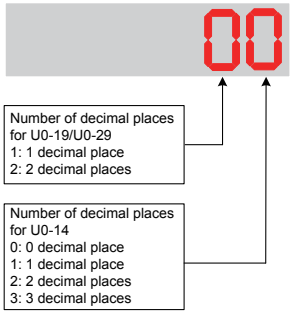
■ Group F5: Output Terminals

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
F5-02	Relay function (T/A-T/B-T/C)	0 to 41	N.A.	2	
F5-07	AO1 function selection	0 to 16	N.A.	0	
F5-10	AO1 zero offset coefficient	-100.0 to 100.0	%	0.0	
F5-11	AO1 gain	-10.00 to10.00	N.A.	1.00	
F5-18	Relay 1 output delay time	0.0 to 3600.0	s	0.0	
F5-22	DO active mode selection	00000 to 11111	N.A.	00000	

■ Group F6: Start/Stop Control

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
F6-00	Start mode	0: Direct startup 1: Reserved 2: Pre-excited startup (asynchronous motor)	N.A.	0	
F6-01	Mode of catching a spinning motor	0: From stop frequency 1: From zero speed 2: From max. frequency	N.A.	0	
F6-02	Speed of catching a spinning motor	1 to 100	N.A.	20	
F6-03	Startup frequency	0.00 to 10.00	Hz	0.5	
F6-04	Startup frequency active time	0.0 to 100.0	s	0.0	
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	0.0 to 100.0	s	0.0	
F6-07	Acceleration/ Deceleration mode	0: Linear mode 1: S-curve mode A 2: S-curve mode B	N.A.	0	
F6-08	Time proportion of S-curve start segment	0.0 to (100.0 minus F6-09)	%	30.0	
F6-09	Time proportion of S-curve end segment	0.0 to (100.0 minus F6-08)	%	30.0	
F6-10	Stop mode	0: Decelerate to stop 1: Coast to stop	N.A.	0	
F6-11	DC Injection Braking 2 frequency threshold	0.00 to 10.00	Hz	0.00	
F6-12	DC Injection Braking 2 delay time	0.0 to 100.0	s	0.0	
F6-13	DC Injection Braking 2 level	0 to 100	%	0	
F6-14	DC Injection Braking 2 active time	0.0 to 36.0	s	0.0	
F6-15	Reserved	-	-	-	-
F6-18	Catching a spinning motor current limit	30 to 200	%	Model dependent	
F6-21	Demagnetization time	0.00 to 5.00	s	Model dependent	
F6-22	Min. output frequency	0.00 to F6-11	Hz	0.00	
F6-23	Factory reserved	1 to 100	N.A.	10	

■ Group F7: Keypad Operation And LED Display

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
F7-01	MF.K Key function selection	0 to 5	N.A.	5	
F7-02	STOP/RESET key function	0 to 1	N.A.	1	
F7-03	LED display running parameters 1	0000 to FFFF	N.A.	1F	
F7-04	LED display running parameters 2	0000 to FFFF	N.A.	0	
F7-05	LED display stop parameters	0000 to FFFF	N.A.	33	
F7-06	Load speed display coefficient	0.0001 to 6.5000	N.A.	1.0000	
F7-07	Heatsink temperature of inverter module	0 to 100	°C	N.A.	
F7-08	Product number	N.A.	N.A.	N.A.	
F7-09	Accumulative running time	0 to 65535	h	N.A.	
F7-10	Performance software version	N.A.	N.A.	N.A.	
F7-11	Functional software version	N.A.	N.A.	N.A.	
F7-12	Number of decimal places for load speed display		N.A.	21	
F7-13	Accumulative power-on time	0 to 65535	h	N.A.	
F7-14	Accumulative power consumption	0 to 65535	kWh	N.A.	
F7-15	Temporary performance software version	N.A.	N.A.	N.A.	
F7-16	Temporary functional software version	N.A.	N.A.	N.A.	

■ Group F8: Auxiliary Functions

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
F8-00	JOG running frequency	0.00 to Max. frequency	Hz	2.00	
F8-01	JOG acceleration time	0.0 to 6500.0	s	20.0	
F8-02	JOG deceleration time	0.0 to 6500.0	s	20.0	
F8-03	Acceleration time 2	0.0 to 6500.0	s	Model dependent	
F8-04	Deceleration time 2	0.0 to 6500.0	s	Model dependent	
F8-05	Acceleration time 3	0.0 to 6500.0	s	Model dependent	
F8-06	Deceleration time 3	0.0 to 6500.0	s	Model dependent	
F8-07	Acceleration time 4	0.0 to 6500.0	s	Model dependent	
F8-08	Deceleration time 4	0.0 to 6500.0	s	Model dependent	
F8-09	Frequency Jump 1	0.00 to Max. frequency	Hz	0.00	
F8-10	Frequency Jump 2	0.00 to Max. frequency	Hz	0.00	
F8-11	Frequency jump amplitude	0.00 to Max. frequency	Hz	0.00	
F8-12	Forward/Reverse rotation dead-zone time	0.0 to 3000.0	s	0.0	
F8-13	Reverse control	0: Enabled 1: Disabled	N.A.	0	
F8-14	Running mode when set frequency lower than frequency lower limit	0: Run at frequency lower limit 1: Stop 2: Run at zero speed	N.A.	0	
F8-15	Droop control	0.00 to 10.00	Hz	0.00	
F8-16	Accumulative power-on time threshold	0 to 65000	h	0	
F8-17	Accumulative running time threshold	0 to 65000	h	0	
F8-18	Startup protection	0: No 1: Yes	N.A.	0	
F8-19	Frequency detection value (FDT1)	0.00 to Max. frequency	Hz	50.00	
F8-20	Frequency detection hysteresis (FDT1hysteresis)	0.0 to 100.0 (FDT1 level)	%	5.0	
F8-21	Detection range of frequency reached	0.00 to 100 (Max. frequency)	%	0.0	
F8-22	Frequency Jump during acceleration/ deceleration	0: Disabled 1: Enabled	N.A.	0	
F8-27	Terminal JOG preferred	0: Disabled 1: Enabled	N.A.	0	
F8-28	Frequency detection value (FDT2)	0.00 to Max. frequency	N.A.	50.00	
F8-29	Frequency detection hysteresis (FDT2)	0.0 to 100.0 (FDT2 level)	%	5.0	
F8-30	Detection value 1 of any frequency reaching	0.00 to Max. frequency	Hz	50.00	

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
F8-31	Detection amplitude 1 of any frequency reaching	0.0 to 100.0 (Max. frequency)	%	0.0	
F8-32	Detection value 2 of any frequency reaching	0.00 to Max. frequency	Hz	50.00	
F8-33	Detection amplitude 2 of any frequency reaching	0.0 to 100.0 (Max. frequency)	%	0.0	
F8-34	Zero current detection level	0.0 to 300.0 (rated motor current as 100%)	%	5.0	
F8-35	Zero current detection delay	0.01 to 600.00	s	0.10	
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	0.00 to 600.00	s	0.00	
F8-38	Detection value 1 of any current reached	0.0 to 300.0 (rated motor current)	%	100.0	
F8-39	Detection amplitude 1 of any current reached	0.0 to 300.0 (rated motor current)	%	0.0	
F8-40	Detection value 2 of any current reached	0.0 to 300.0 (rated motor current)	%	100.0	
F8-41	Detection amplitude 2 of any current reached	0.0 to 300.0 (rated motor current)	%	0.0	
F8-42	Timing function	0: Disabled 1: Enabled	N.A.	0	
F8-43	Timing duration source	0 to 3	N.A.	0	
F8-44	Timing duration	0.0 to 6500.0	min	0.0	
F8-45	AI1 input voltage lower limit	-11.00 to F8-46	V	3.10	
F8-46	AI1 input voltage upper limit	F8-45 to 11.00	V	6.80	
F8-47	Module temperature threshold	0 to 100	°C	75	
F8-48	Cooling fan working mode	0: Fan working during running 1: Fan working continuously	N.A.	0	
F8-49	Wakeup frequency	Dormant frequency (F8-51) to max. frequency (F0-10)	Hz	0.00	
F8-50	Wakeup delay	0.0 to 6500.0	s	0.0	
F8-51	Hibernating frequency	0.00 to wakeup frequency (F8-49)	Hz	0.00	
F8-52	Hibernating delay	0.0 to 6500.0	s	0.0	
F8-53	Current running time reached	0.0 to 6500.0	min	0.0	
F8-54	Output power correction coefficient	0.0 to 200.0	%	100.0	
F8-55	Deceleration time for emergency stop	0.00 to 650.00 (F0-19 = 2) 0.0 to 6500.0 (F0-19 = 1) 0 to 65000 (F0-19 = 0)	s	0.1	

■ Group F9: Fault And Protection

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
F9-00	Motor overload protection	0: Disabled 1: Enabled	N.A.	1	
F9-01	Motor overload protection gain	0.20 to 10.00	N.A.	1.00	
F9-02	Motor overload pre-warning coefficient	50 to 100	%	80	
F9-07	Short-circuit to ground upon power-on	0: Disabled 1: Enabled	N.A.	1	
F9-08	Braking unit applied voltage	200.0 to 810.0	V	Model dependent 220 V: 360 V 380 V: 700 V	
F9-09	Auto reset times	0 to 20	N.A.	0	
F9-10	DO action during fault auto reset	0: Not act 1: Act	N.A.	0	
F9-11	Delay of fault auto reset	0.1 to 100.0	s	1.0	
F9-12	Power input phase loss protection	0: Disabled 1: Enabled	N.A.	0	
F9-13	Power output phase loss protection	0: Disabled 1: Enabled	N.A.	1	
F9-14	1st fault type	0 to 51	N.A.	N.A.	
F9-15	2nd fault type	0 to 51	N.A.	N.A.	
F9-16	3rd (latest) fault type	0 to 51	N.A.	N.A.	
F9-17	Frequency upon 3rd fault	N.A.	N.A.	N.A.	
F9-18	Current upon 3rd fault	N.A.	N.A.	N.A.	
F9-19	Bus voltage upon 3rd fault	N.A.	N.A.	N.A.	
F9-20	Input terminal status upon 3rd fault	N.A.	N.A.	N.A.	
F9-21	Output terminal status upon 3rd fault	N.A.	N.A.	N.A.	
F9-22	AC drive status upon 3rd fault	N.A.	N.A.	N.A.	
F9-23	Power-on time upon 3rd fault	N.A.	N.A.	N.A.	
F9-24	Running time upon 3rd fault	N.A.	N.A.	N.A.	
F9-27	Frequency upon 2nd fault	N.A.	N.A.	N.A.	
F9-28	Current upon 2nd fault	N.A.	N.A.	N.A.	
F9-29	Bus voltage upon 2nd fault	N.A.	N.A.	N.A.	
F9-30	Input terminal status upon 2nd fault	N.A.	N.A.	N.A.	
F9-31	Output terminal status upon 2nd fault	N.A.	N.A.	N.A.	
F9-32	Frequency upon 2nd fault	N.A.	N.A.	N.A.	
F9-33	Current upon 2nd fault	N.A.	N.A.	N.A.	
F9-34	Bus voltage upon 2nd fault	N.A.	N.A.	N.A.	
F9-37	Input terminal status upon 1st fault	N.A.	N.A.	N.A.	
F9-38	Output terminal status upon 1st fault	N.A.	N.A.	N.A.	

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
F9-39	Frequency upon 1st fault	N.A.	N.A.	N.A.	
F9-40	Current upon 1st fault	N.A.	N.A.	N.A.	
F9-41	Bus voltage upon 3rd fault	N.A.	N.A.	N.A.	
F9-42	Input terminal status upon 1st fault	N.A.	N.A.	N.A.	
F9-43	Output terminal status upon 1st fault	N.A.	N.A.	N.A.	
F9-44	Frequency upon 1st fault	N.A.	N.A.	N.A.	
F9-47	Fault protection action selection 1	00000 to 22222	N.A.	0000	
F9-48	Fault protection action selection 2	00000 to 21111	N.A.	0000	
F9-49	Fault protection action selection 3	00000 to 22222	N.A.	0000	
F9-54	Frequency selection for continuing to run upon fault	0 to 4	N.A.	0	
F9-55	Backup frequency upon abnormality	0.0 to 100.0 (Max. frequency)	Hz	100.0	
F9-59	Action selection at instantaneous power failure	0: Invalid 1: Decelerate 2: Decelerate to stop	N.A.	0	
F9-60	Pause judging voltage at instantaneous power failure	80 to 100	%	85	
F9-61	Voltage recovery judging time at instantaneous power failure	0.0 to 100.0	s	0.5	
F9-62	Judging voltage at instantaneous power failure	60 to F9-60 (standard bus voltage)	%	80	
F9-63	Protection upon load lost	0: Disabled 1: Enabled	N.A.	0	
F9-64	Load lost detection level	0.0 to 100.0	%	10.0	
F9-65	Load lost detection time	0.0 to 60.0	s	1.0	
F9-66	Min. PID error 2	0.0 to 100.0	%	0.0	
F9-71	Power dip ride-through gain Kp	0 to 100	N.A.	40	
F9-72	Power dip ride-through integral coefficient	0 to 100	N.A.	30	
F9-73	Deceleration time of power dip ride-through	0.0 to 300.0	s	20.0	

■ Group FA: Process Control And PID Function

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
FA-00	PID reference source	0 to 6	N.A.	0	
FA-01	PID digital reference	0.0 to 100.0	%	50.0	
FA-02	PID feedback source	0 to 8	N.A.	0	
FA-03	PID action direction	0: Forward action 1: Reverse action	N.A.	0	
FA-04	PID setting feedback range	0 to 65535	N.A.	1000	
FA-05	Proportional gain Kp1	0.0 to 100.0	N.A.	20.0	
FA-06	Integral time Ti1	0.01 to 10.00	s	2.00	
FA-07	Differential time Td1	0.00 to 10.000	s	0.000	
FA-08	Cut-off frequency of PID reverse rotation	0.00 to Max. frequency	Hz	2.00	
FA-09	PID deviation limit	0.0 to 100.0	%	0.0	
FA-10	PID differential limit	0.00 to 100.00	%	0.10	
FA-11	PID setting change time	0.00 to 650.00	s	0.00	
FA-12	PID feedback filter time	0.00 to 60.00	s	0.00	
FA-13	PID output filter time	0.00 to 60.00	s	0.00	
FA-14	Min. PID operation frequency	0.00 to 10.00	Hz	0.00	
FA-15	Proportional gain Kp2	0.0 to 100.0	N.A.	20.0	
FA-16	Integral time Ti2	0.01 to 10.00	s	2.00	
FA-17	Differential time Td2	0.000 to 10.000	s	0.000	
FA-18	PID parameter switchover condition	0 to 3	N.A.	0	
FA-19	PID parameter switchover deviation 1	0.0 to FA-20	%	20.0	
FA-20	PID parameter switchover deviation 2	FA-19 to 100.0	%	80.0	
FA-21	PID initial value	0.0 to 100.0	%	0.0	
FA-22	PID initial value holding time	0.00 to 650.00	s	0.00	
FA-23	Max. deviation between two PID outputs in forward direction	0.00 to 100.00	%	1.00	
FA-24	Max. deviation between two PID outputs in reverse direction	0.00 to 100.00	%	1.00	
FA-25	PID integral property	00 to 11	N.A.	00	
FA-26	Detection value of PID feedback loss	0.0: Not judging feedback loss 0.1 to 100.0	%	0.0	
FA-27	Detection time of PID feedback loss	0.0 to 20.0	s	0.0	
FA-28	PID operation at stop	0: No PID operation at stop 1: PID operation at stop	N.A.	0	

■ Group FB: Wobble, Fixed Length And Count

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
FB-00	Wobble setting mode	0: Relative to the central frequency 1: Relative to max. frequency	N.A.	0	
FB-01	Wobble frequency amplitude	0.0 to 100.0	%	0.0	
FB-02	Wobble step	0.0 to 50.0	%	0.0	
FB-03	Wobble cycle	0.0 to 3000.0	s	10.0	
FB-04	Triangular wave rising time coefficient	0.0 to 100.0	%	50.0	
FB-05	Set length	0 to 65535	m	1000	
FB-06	Actual length	0 to 65535	m	-	
FB-07	Number of pulses per meter	0.1 to 6553.5	N.A.	100.0	
FB-08	Set count value	1 to 65535	N.A.	1000	
FB-09	Designated count value	1 to 65535	N.A.	1000	

■ Group FC: Multi-Reference And Simple PLC Function

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
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	
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 to 2	N.A.	0	
FC-17	Simple PLC retentive selection	00 to 11	N.A.	00	
FC-18	Running time of simple PLC reference 0	0.0 to 6553.5	s or h	0.0	
FC-19	Acceleration/deceleration time of simple PLC reference 0	0 to 3	N.A.	0	
FC-20	Running time of simple PLC reference 1	0.0 to 6553.5	s or h	0.0	
FC-21	Acceleration/deceleration time of simple PLC reference 1	0 to 3	N.A.	0	
FC-22	Running time of simple PLC reference 2	0.0 to 6553.5	s or h	0.0	
FC-23	Acceleration/deceleration time of simple PLC reference 2	0 to 3	N.A.	0	
FC-24	Running time of simple PLC reference 3	0.0 to 6553.5	s or h	0.0	

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
FC-25	Acceleration/deceleration time of simple PLC reference 3	0 to 3	N.A.	0	
FC-26	Running time of simple PLC reference 4	0.0 to 6553.5	s or h	0.0	
FC-27	Acceleration/deceleration time of simple PLC reference 4	0 to 3	N.A.	0	
FC-28	Running time of simple PLC reference 5	0.0 to 6553.5	s or h	0.0	
FC-29	Acceleration/deceleration time of simple PLC reference 5	0 to 3	N.A.	0	
FC-30	Running time of simple PLC reference 6	0.0 to 6553.5	s or h	0.0	
FC-31	Acceleration/deceleration time of simple PLC reference 6	0 to 3	N.A.	0	
FC-32	Running time of simple PLC reference 7	0.0 to 6553.5	s or h	0.0	
FC-33	Acceleration/deceleration time of simple PLC reference 7	0 to 3	N.A.	0	
FC-34	Running time of simple PLC reference 8	0.0 to 6553.5	s or h	0.0	
FC-35	Acceleration/deceleration time of simple PLC reference 8	0 to 3	N.A.	0	
FC-36	Running time of simple PLC reference 9	0.0 to 6553.5	s or h	0.0	
FC-37	Acceleration/deceleration time of simple PLC reference 9	0 to 3	N.A.	0	
FC-38	Running time of simple PLC reference 10	0.0 to 6553.5	s or h	0.0	
FC-39	Acceleration/deceleration time of simple PLC reference 10	0 to 3	N.A.	0	
FC-40	Running time of simple PLC reference 11	0.0 to 6553.5	s or h	0.0	
FC-41	Acceleration/deceleration time of simple PLC reference 11	0 to 3	N.A.	0	
FC-42	Running time of simple PLC reference 12	0.0 to 6553.5	s or h	0.0	
FC-43	Acceleration/deceleration time of simple PLC reference 12	0 to 3	N.A.	0	
FC-44	Running time of simple PLC reference 13	0.0 to 6553.5	s or h	0.0	
FC-45	Acceleration/deceleration time of simple PLC reference 13	0 to 3	N.A.	0	
FC-46	Running time of simple PLC reference 14	0.0 to 6553.5	s or h	0.0	
FC-47	Acceleration/deceleration time of simple PLC reference 14	0 to 3	N.A.	0	
FC-48	Running time of simple PLC reference 15	0.0 to 6553.5	s or h	0.0	
FC-49	Acceleration/deceleration time of simple PLC reference 15	0 to 3	N.A.	0	
FC-50	Time unit of simple PLC running	0: s (second); 1: h (hour)	N.A.	0	
FC-51	Reference 0 source	0 to 6	N.A.	0	

■ Group FD: Communication

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
FD-00	Baud rate	0000 to 9999	N.A.	6005	
FD-01	Data format symbol	0 to 3	N.A.	0	
FD-02	Local address	0: Broadcast address; 1 to 247	N.A.	1	
FD-03	Response delay	0 to 20	ms	2	
FD-04	Communication timeout	0.0 (invalid); 0.1 to 60.0	s	0.0	
FD-05	Communication protocol	30 to 31	N.A.	31	
FD-06	Current resolution read by communication	0: 0.01 1: 0.1	A	0	

■ Group FP: Function Code Management

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
FP-00	User password	0 to 65535	N.A.	0	
FP-01	Parameter initialization	0: No operation 01: Restore factory settings except motor parameters 02: Clear records 04: Restore user backup parameters 501: Back up current user parameters 20: Initialization of mechanical movement (vertical, horizontal, arm swing) industry parameters 21: Initialization of inertia industry (fan) parameters 23: Initialization of quick start/stop industry (printing machine) parameters	N.A.	0	
FP-02	AC drive parameter display property	00 to 11	N.A.	11	
FP-03	Individualized parameter display property	00 to 11	N.A.	00	
FP-04	Parameter modification property	0: Modifiable 1: Not modifiable	N.A.	0	

■ Group A1: Virtual DI/DO

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
A1-00	VDI1 function selection	0 to 59	N.A.	0	
A1-01	VDI2 function selection	0 to 59	N.A.	0	
A1-02	VDI3 function selection	0 to 59	N.A.	0	
A1-03	VDI4 function selection	0 to 59	N.A.	0	
A1-04	VDI5 function selection	0 to 59	N.A.	0	
A1-05	VDI state setting mode	00000 to 11111	N.A.	00000	
A1-06	VDI state selection	00000 to 11111	N.A.	00000	
A1-07	Function selection for AI1 used as DI	0 to 59	N.A.	0	
A1-10	State selection for AI used as DI	000 to 111	N.A.	000	
A1-11	VDO1 function selection	0 to 41	N.A.	0	
A1-12	VDO2 function selection	0 to 41	N.A.	0	
A1-13	VDO3 function selection	0 to 41.	N.A.	0	
A1-14	VDO4 function selection	0 to 41	N.A.	0	
A1-15	VDO5 function selection	0 to 41	N.A.	0	
A1-16	VDO1 output delay	0.0 to 3600.0	s	0.0	
A1-17	VDO2 output delay	0.0 to 3600.0	s	0.0	
A1-18	VDO3 output delay	0.0 to 3600.0	s	0.0	
A1-19	VDO4 output delay	0.0 to 3600.0	s	0.0	
A1-20	VDO5 output delay	0.0 to 3600.0	s	0.0	
A1-21	VDO state selection	00000 to 11111	N.A.	00000	

■ Group A5: Control Optimization

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
A5-00	DPWM switchover frequency upper limit	0.00 to max. frequency	Hz	Model dependent	
A5-01	PWM modulation mode	0: Asynchronous modulation 1: Synchronous modulation	N.A.	0	
A5-02	Dead zone compensation mode selection	0: No compensation 1: Compensation	N.A.	1	
A5-03	Random PWM depth	0 to 10	N.A.	0	
A5-04	Fast current limit	0: Disabled 1: Enabled	N.A.	1	
A5-05	Max output voltage coefficient	100 to 110	%	105	
A5-06	Undervoltage threshold	100.0 to 600.0	%	Model dependent	
A5-08	Factory reserved	0.0: Invalid 0.1 to 6.0	kHz	0.0	
A5-09	Overvoltage threshold	200.0 to 900.0	V	Model dependent	

■ Group A6: AI Curve Setting

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
A6-00	AI curve 4 minimum input	-10.00 to A6-02	V	0.00	
A6-01	Corresponding setting of AI curve 4 minimum input	-100.0 to 100.0	%	0.0	
A6-02	AI curve 4 inflexion 1 input	A6-00 to A6-04	V	3.00	
A6-03	Corresponding setting of AI curve 4 inflexion 1 input	-100.0 to 100.0	%	30.0	
A6-04	AI curve 4 inflexion 1 input	A6-02 to A6-06	V	6.00	
A6-05	Corresponding setting of AI curve 4 inflexion 1 input	-100.0 to 100.0	%	60.0	
A6-06	AI curve 4 Max. input	A6-06 to 10.00	V	10.00	
A6-07	Corresponding setting of AI curve 4 Max. input	-100.0 to 100.0	%	100.0	
A6-08	AI curve 5 minimum input	-10.00 to A6-10	V	-10.00	
A6-09	Corresponding setting of AI curve 5 minimum input	-100.0 to 100.0	%	-100.0	
A6-10	AI curve 5 inflexion 1 input	A6-08 to A6-12	V	-3.00	
A6-11	Corresponding setting of AI curve 5 inflexion 1 input	-100.0 to 100.0	%	-30.0	
A6-12	AI curve 5 inflexion 1 input	A6-10 to A6-14	V	3.00	
A6-13	Corresponding setting of AI curve 5 inflexion 1 input	-100.0 to 100.0	%	30.0	
A6-14	AI curve 5 Max. input	A6-12 to 10.00	V	10.00	
A6-15	Corresponding setting 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	

■ Group AC: AI/AO Correction

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
AC-00	AI1 measured voltage 1	-10.000 to 10.000	V	Factory corrected	
AC-01	AI1 displayed voltage 1	-10.000 to 10.000	V	Factory corrected	
AC-02	AI1 measured voltage 2	-10.000 to 10.000	V	Factory corrected	
AC-03	AI1 displayed voltage 2	-10.000 to 10.000	V	Factory corrected	
AC-12	AO1 target voltage 1	-10.000 to 10.000	V	Factory corrected	
AC-13	AO1 measured voltage 1	-10.000 to 10.000	V	Factory corrected	
AC-14	AO1 target voltage 2	-10.000 to 10.000	V	Factory corrected	
AC-15	AO1 measured voltage 2	-10.000 to 10.000	V	Factory corrected	

5.2 Monitoring Function Codes

■ Group U0: Monitoring

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
U0-00	Running frequency	N.A.	Hz	N.A.	
U0-01	Set frequency	N.A.	Hz	N.A.	
U0-02	Bus voltage	N.A.	V	N.A.	
U0-03	Output voltage	N.A.	V	N.A.	
U0-04	Output current	N.A.	A	N.A.	
U0-05	Output power	N.A.	kW	N.A.	
U0-06	Output torque	N.A.	%	N.A.	
U0-07	DI state	N.A.	N.A.	N.A.	
U0-08	DO state	N.A.	N.A.	N.A.	
U0-09	AI1 voltage	N.A.	V	N.A.	
U0-10	Reserved	N.A.	N.A.	N.A.	
U0-11	Reserved	N.A.	N.A.	N.A.	
U0-12	Count value	N.A.	N.A.	N.A.	
U0-13	Length value	N.A.	N.A.	N.A.	
U0-14	Load speed	N.A.	N.A.	N.A.	
U0-15	PID setting	N.A.	N.A.	N.A.	
U0-16	PID feedback	N.A.	N.A.	N.A.	
U0-17	PLC stage	N.A.	N.A.	N.A.	
U0-18	Input pulse frequency	N.A.	kHz	N.A.	
U0-19	Feedback speed	N.A.	Hz	N.A.	
U0-20	Remaining running time	N.A.	Min	N.A.	
U0-21	AI1 voltage before correction	N.A.	V	N.A.	
U0-22	Reserved	N.A.	N.A.	N.A.	
U0-23	Reserved	N.A.	N.A.	N.A.	
U0-24	Linear speed	N.A.	m/Min	N.A.	
U0-25	Accumulative power-on time	N.A.	Min	N.A.	
U0-26	Accumulative running time	N.A.	Min	N.A.	
U0-27	Pulse input frequency	N.A.	Hz	N.A.	
U0-28	Communication setting value	N.A.	%	N.A.	
U0-29	Reserved	N.A.	N.A.	N.A.	
U0-30	Main frequency X	N.A.	Hz	N.A.	
U0-31	Auxiliary frequency Y	N.A.	Hz	N.A.	
U0-32	Viewing any register address value	N.A.	N.A.	N.A.	
U0-33	Reserved	N.A.	N.A.	N.A.	
U0-34	Motor temperature	N.A.	°C	N.A.	
U0-35	Target torque	N.A.	%	N.A.	
U0-36	Reserved	N.A.	N.A.	N.A.	
U0-37	Power factor angle	N.A.	°	N.A.	
U0-38	Reserved	N.A.	N.A.	N.A.	
U0-39	Reserved	N.A.	N.A.	N.A.	

Para. No.	Para. Name	Setting Range	Unit	Default	Commission
U0-40	Reserved	N.A.	N.A.	N.A.	
U0-41	DI state visual display	N.A.	N.A.	N.A.	
U0-42	DO state visual display	N.A.	N.A.	N.A.	
U0-43	DI function state visual display 1	N.A.	N.A.	N.A.	
U0-44	DI function state visual display 2	N.A.	N.A.	N.A.	
U0-61	AC drive status	N.A.	N.A.	N.A.	

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