BENSHAW POWERPRO™

BENSHAW POWERPRO™ MICRO — GENERAL PURPOSE DRIVES

POWERPRO MICRO 230 AND 460

Manual Number: 890052-00-00

PREFACE

Thank you for purchasing the Benshaw PowerPro™ Micro General Purpose Drive. The Benshaw PowerPro™ Micro Drive series is a powerful general-purpose single-phase and three-phase AC drive. It features a compact book-shelf design to maximize power density and minimize mounting footprint. The drive supports both 150% overload for 60 seconds and 180% overloads for 2 seconds. Using advanced sensorless vector and V/F control technology, the Micro AC Drive delivers superb speed control and stability. It provides a wide range of user-programmable features, including integrated PLC and wide range of diagnostic and protection parameters. The single-phase drives have a standard built-in C3 filter to meet the EN61800-3 C2 transmission requirement of CE certification. They can be used for control of fans, pumps, small compressors and other types of automated applications.

FIRST USE

Read this manual carefully if you are using the Benshaw PowerPro™ Micro General Purpose Drive for the first time. If you have questions about its functions or performance, please contact our technicians for help.

APPROVALS

Certification marks on the product nameplate indicate compliance with the corresponding certificates and standards.

Certification	Mark	Directive Name		Standard
CE	CE	EMC directives	2014/30/EU	EN 61800-3
		LVD directives	2014/35/EU	EN 61800-5-1
		RoHS directives	2011/65/EU	EN 50581
TUV	TUV	—		EN 61800-5-1

Notes:

The above EMC directives are complied with only when the EMC electric installation requirements are strictly observed.

Machines and devices used in combination with this drive must also be CE certified and marked. The integrator who integrates the drive with the CE mark into other devices has the responsibility of ensuring compliance with CE standards and verifying that conditions meet European standards.

The installer of the drive is responsible for complying with all relevant regulations for wiring, circuit fuse protection, earthing, accident prevention and electromagnetic (EMC) regulations. In particular, fault discrimination for preventing fire risk and solid earthing practices must be adhered to for electrical safety (also for good EMC practices).

For more information on certification, consult our distributor or sales representative.

REVISION HISTORY

Date	Version	Change Description
Mar 2019	V0.0	N/A

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SAFETY INFORMATION

SAFETY PRECAUTIONS

Read and follow the safety precautions when installing, operating and maintaining the product.

To ensure your safety and prevent damage to equipment, follow the marks on the product and safety precautions in this manual when installing, operating and maintaining the product.

1. "CAUTION", "WARNING" and "DANGER" items in the manual do not indicate all safety precautions that need to be followed; instead, they supplement the safety precautions.
2. Use this product in environment meeting the design and specification requirements; otherwise, a fault may occur. Noncompliance-caused malfunction or damage to parts are not covered in the product quality warranty.
3. Benshaw is not legally responsible for any personal safety accident or property losses caused by improper operation of this product.

SAFETY GRADE AND DEFINITION

DANGER "DANGER" indicates a safety precaution that will result in death or serious injury if not followed.

WARNING "WARNING" indicates a safety precaution that may result in death or serious injury if not followed.

CAUTION "CAUTION" indicates a safety precaution that may result in minor injury or equipment damage if not followed.

UNPACKING AND CHECKING

CAUTION

- Before unpacking, check whether the outer package is intact, damaged, wet, damp or deformed.
- Open the package in sequence. During unpacking, check whether the product and its accessories have any damage, corrosion or dents on the surface.
- Check the quantity of the product and accessories to ensure that it matches the packing list.

WARNING

- Do not install the product and/or its accessories if you find that the product and/or its accessories have any damage or corrosion.
- Do not install the product if there is water inside the product or any of its parts are missing or damaged.
- Do not install the product if the product name is inconsistent with that on the packing list.

DURING STORAGE AND TRANSPORTATION

CAUTION

- Store and transport the product according to its storage and transportation conditions. The storage temperature and humidity shall meet relevant requirements.
- Do not store or transport the product in places with direct sunlight, strong electric field, strong magnetic field or strong vibration or places that are wet from rain or splashing water.
- Do not store the product for more than one year. Capacitors will need to be "reformed" if they have not been used in more than a year. Take stricter prevention measures and perform the necessary inspection if the storage time is extensive.
- Pack the product properly before transportation. The product must be placed in a sealed box for long-distance transportation.
- Do not transport the product together with any equipment or articles that may affect or impair the product.

⚠ WARNING

- Be sure to use professional loading and unloading equipment to move large or heavy equipment and products.
- When moving the product by hand, grip the product case tightly to avoid dropping product parts, causing damage.
- Be sure to move the product carefully, paying attention to your step to prevent trip or fall and risk of injury to you or damage to the product.
- When the equipment is lifted by lifting gear, do not stand in the area below the lifting area.

DURING INSTALLATION

⚠ WARNING

- Before installation, carefully read the product manual and safety precautions.
- Do not modify the product.
- Do not unscrew the fixing bolts or bolts with red marks.
- Do not install this product in a place with a strong electric field or strong electromagnetic interference.
- When the product is installed in a cabinet or terminal equipment, the cabinet or terminal equipment shall be provided with the corresponding protective devices such as fireproof enclosure, electrical enclosure and mechanical enclosure. The protection grade shall comply with relevant UL/IEC standards and local laws and regulations.

⚠ CAUTION

- Product instalation, wiring, maintenance, inspection and component replacement should only be performed by professionals trained in electrical equipment and having knowledge of electrical equipment.
- Installers must be familiar with product installation requirements and related technical data.
- When you need to install equipment creating strong electromagnetic interference, such as transformers, install the shield protection device to prevent the product from malfunction.

DURING WIRING

⚠ DANGER

- Non-professionals are strictly prohibited from equipment installation, wiring, maintenance, inspection or component replacement.
- Do not perform wiring while the power is turned on. Failure to comply may result in electric shock.
- Before wiring, cut off the power to all equipment. Residual voltage remains in the internal capacitor of the equipment after the power is cut off. Wait for at least 10 minutes before wiring and other operations.
- Be sure equipment and the product are properly grounded. Failure to comply may result in electric shock.

SAFETY INFORMATION

DURING WIRING (CONTINUED)

CAUTION

- Follow the electro-static discharge (ESD) precautions and wear an ESD wrist strap to avoid damage to the equipment or circuit inside the product.
- It is prohibited to connect the input power to the output terminal of the equipment or product; otherwise, the equipment may be damaged or fire may occur.
- When connecting the drive to the motor, be sure that the phase sequence of the drive and the motor terminal are consistent, so as to avoid reverse rotation of the motor.
- The cables used for wiring must meet relevant diameter and shielding requirements, and the shielding layer of the shielding cables must be reliably grounded at a single terminal.
- After wiring is complete, be sure there are no screws or bar cables left inside the equipment and product.

DURING POWER-ON

DANGER

- Before power-on, make sure the equipment and product are installed properly, the wiring is securely connected and the motor unit is allowed to restart.
- Before power-on, make sure the power supply meets the equipment requirements to avoid damage to the equipment or fire.
- During power-on, mechanical devices of the equipment or product may suddenly move. Stay away from the mechanical devices.
- After power-on, do not open the equipment cabinet door or product protection cover; to avoid the danger of electric shock.
- It is prohibited to touch any terminal of the equipment when power is on; otherwise, there is danger of electric shock.
- It is prohibited to dismantle any device or parts of the equipment and product when the power is on; otherwise, there is danger of electric shock.

DURING RUNNING

DANGER

- It is prohibited to touch any terminal of the equipment when it is running; otherwise, there is danger of electric shock.
- It is prohibited to dismantle any device or parts of the equipment and product when the equipment is running; otherwise, there is danger of electric shock.
- It is prohibited to touch the equipment closure, fan or resistor to check the temperature; otherwise, there is danger of burns.
- Non-professional technicians are prohibited from monitoring signals when the equipment is running; otherwise, there is danger of personal injury or damage to the equipment.

WARNING

- When the equipment is running, do not drop other articles or metals into the equipment; otherwise, the equipment may be damaged.
- Do not start or stop the equipment by turning on or off the connector; otherwise, the equipment may be damaged.

DURING MAINTENANCE

DANGER

- Non-professionals are strictly prohibited from equipment installation, wiring, maintenance, inspection or component replacement.
- It is prohibited to maintain the equipment when power is on; otherwise, there is danger of electric shock.
- After the equipment power is cut off, wait for at least 10 minutes before maintaining the equipment or performing other operations.

⚠ WARNING

- Follow the equipment maintenance and repair requirements for routine and regular inspection and maintenance of the product and equipment, and maintain maintenance records.

DURING REPAIR

⚠ DANGER

- Follow Lock Out/Tag Out procedures.
- Non-professionals are strictly prohibited from equipment installation, wiring, maintenance, inspection or component replacement.
- It is prohibited to repair the equipment when power is on; otherwise, there is danger of electric shock.
- After the equipment power is cut off, wait for at least 10 minutes before inspecting or repairing the equipment or performing other operations.

⚠ CAUTION

- Repair the equipment according to the product warranty agreement.
- When the equipment has a fault or is damaged, troubleshoot and repair the equipment and product follow guidance by professionals, and maintain repair records.
- Replace the product's wearing components under the guidance of professionals.
- Do not continue to use damaged machines; otherwise, greater damage may occur.
- After replacing the equipment, recheck the equipment wiring and parameter settings again.

DURING SCRAPPING

⚠ CAUTION

- Scrap the equipment and product according to government regulations and standards to avoid property loss or personal injury.
- Recycle scrapped equipment and product according to industrial waste processing standards to avoid pollution to the environment.

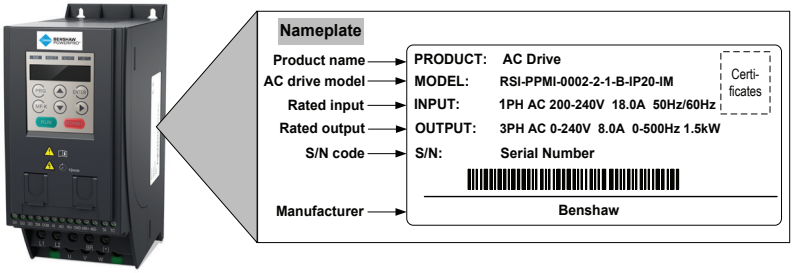
SAFETY MARKS

For safe operation and maintenance of the equipment, be sure to observe the safety marks affixed to the equipment and product. Do not damage, destroy or peel off the safety marks. Safety marks are described as follows:

- Read the user manual before installing and running the equipment; otherwise, there is danger of electric shock.
- Do not dismantle the cover within 10 minutes after the power is turned off.
- After cutting off the power at the input and output terminals, wait for 10 minutes until the power indicator turns off before maintaining, inspecting or wiring the equipment.

1. PRODUCT INFORMATION

1.1 NAMEPLATE AND DESIGNATION RULE



RSI - PPMI - 0001 - 2 - 1 - B - IP20 - IM

Prefex
Ready Start Inverter

Series
Micro Drive

Size	HP
00H5	½
0001	1
01H5	1½
0002	2
0003	3
0004	4
0005	5

Voltage	
4	460 V
2	230 V

Number of Phase	
3	Three-phase
1	Single-phase

Brake	
B	Dynamic Brake

Drive Enclosure	
IP20	Finger-Safe Open Chassis

Motor Type	
IM	Induction Motor

1.2 GENERAL SPECIFICATIONS

Voltage class			200 VAC to 240 VAC			
Model: RSI-PPMI-XXXX-2-1-B-IP20-IM			00H5	0001	0002	0003
Dimension(2)	Height, Width, Depth		[H]: 180 mm, [W]: 75 mm, [D]: 145 mm			
Mounting Hole, [mm]			Φ5.0			
Drive Input	Rated Input voltage		1 PH, 200 VAC to 240 VAC , -15% to +10%			
	Rated input current, [A]		6.5	11.0	18.0	27.0
	Rated input frequency		50/60 Hz, ±5%			
	Power capacity, [kVA]		1.7	3.0	4.8	7.1
Drive Output	Applicable motor	[kW]	0.4	0.75	1.5	2.2
		[HP]	0.5	1	2	3
	Output current, [A]		2.6	4.6	8.0	11.0
	Default carrier frequency, [kHz]		6	6	6	6
	Overload capacity		150% for 60 Sec			
	Max. output voltage		3 PH, 0 to 240 VAC			
	Max. output frequency		50 to 500 Hz			
Braking Resistor	Recommended power, [W]		80	80	100	100
	Recommended resistance, min. [Ω]		200	150	100	70
Weight, [kg]			1.1			

Voltage class			380 VAC to 480 VAC				
Model: RSI-PPMI-XXXX-4-3-B-IP20-IM			00H5	0001	0002	0003	0005
Dimension(2)	Height, Width, Depth		[H] : 160 mm, [W] : 75 mm, [D] : 145 mm				
Mounting Hole [mm]			Φ5.0				
Drive Input	Rated Input Voltage		3 PH 380 to 480 VAC, -15% to +10%				
	Rated Input Current, [A]		2.6	4.5	5.5	6.5	11.0
	Rated input frequency		50/60 Hz, ±5%				
	Power Capacity, [kVA]		1	1.5	3.0	4.0	5.9
Drive Output	Applicable motor	[kW]	0.4	0.75	1.5	2.2	3.7
		[HP]	0.5	1	2	3	5
	Output Current, [A]		2.6	3.4	4.7	5.4	9.4
	Default carrier frequency, [kHz]		6	6	6	6	4
	Overload capacity		150% for 60 Sec				
	Max. output voltage		3 PH, 0 to 480 VAC				
	Max. output frequency		50 to 500 Hz				
Braking Resistor	Recommended power, [W]		150	150	250	300	400
	Recommended resistance, min. [Ω]		300	300	220	200	130
Mass, [kg]			1.1				

1. PRODUCT INFORMATION

1.3 TECHNICAL SPECIFICATIONS

Items		Specification
Common functions	Highest frequency	V/F control: 0 to 500 Hz, SVC control: 0 to 500 Hz (only for three-phase models)
	Carrier frequency	0.8 kHz to 12 kHz, and able to automatically adjust carrier frequency based on load characteristics
	Input frequency resolution	Digital settings: 0.01 Hz; analog setting: highest frequency x 0.025%
	Control mode	V/F control
	Overload capacity	150% rated current 60s, 180% rated current 2s
	Torque lifting	Automatic torque lifting, manual torque lifting, 0.1%~30.0%
	V/F curve	Two ways: linear type; multi-point type
	Acceleration and deceleration curve	Linear acceleration and deceleration mode, dynamic S curve. 2 types of acceleration and deceleration time, acceleration and deceleration time range 0.0~6500.0s
	DC braking	DC braking frequency: 0.00 Hz to 10 Hz; braking time: 0.0s~100.0s current value for braking action: 0% to 100%
	Jogging control	Jogging frequency range: 0.00 Hz to 50.00 Hz; jogging and acceleration time 0.0s~6500.0s
	Multiple speed section operation	Achieve a maximum of 8 speed sections operation via control terminal
	Built-in PID	Able to achieve a closed loop control system of process control
	Automatic voltage regulation (AVR)	Automatically maintains constant output voltage when voltage changes in the power grid
	Overvoltage and overcurrent stall control	Automatically limit the current and voltage during operation to prevent frequent over flow and voltage tripping
	Fast current limiting function	Minimize overcurrent faults and protect drive normal operation
	Instantaneous stop prevention	Use load feedback power to compensate for the reduction of voltage in case of instantaneous power cut, and maintain the drive running in a short time; the RUN indicator on the panel will flash
	Fast current limiting	Minimize overcurrent faults of drive unit
	Timing control	Timing control function: set time range to 0.0 min ~ 6500.0 min
	Communication bus	Support field bus: RS485, CANlink (can be customized)
Operation	Command source	Operating panel, control terminal, serial communication port, and can be switched in many ways
	Frequency source	5 frequency sources: Digital, analog voltage, analog current, pulse (DI4), serial port, and can be switched in many ways
	Auxiliary frequency sources	5 auxiliary frequency sources can flexibly realize auxiliary frequency trimming and frequency synthesis
	Input terminals	4 digital input terminals, 1 supports the highest 20 kHz high speed pulse input; 1 analog input terminal, supports 0 ~ 10V/0 ~ 20mA input/ output terminal
	Output terminals	1 relay output terminal, 1 analog output terminal, supports 0 ~ 10V voltage output
	Input/output terminal	1 input/output terminal DIO, supports selecting DI and DO function via DIP switch; details, see figure 2-2, DO common terminal is COM
	Communication terminals	1 line 485, communication
Display & keyboard operation (format)	LED display	Display and keyboard operation
	Keyboard lock and function selection	Achieve keyboard partial or full lock, define the function of some keys to prevent misuse
	Protection function	Short circuit detection of electric motor, input and output phase loss protection, overcurrent protection, overvoltage protection, undervoltage protection, overheating protection, overload protection

1.4 ENVIRONMENT

Environment conditions	Indoor, keep away from direct sunlight, no dust, corrosive gas, flammable gas, oil mist, water vapor, water or salt.
Altitude	Use below 1000 m. The drive power derates 1% at every 100 m altitude increase. The highest allowed attitude is 3000 m.
Storage Temperature	-20°C to +60°C
Operating Temperature	-10°C to +50°C. When the temperature is between 40°C to 50°C, the drive current derates 1.5% at every 1°C increase. The highest allowed working temperature is 50°C.
Max. Humidity	≤ 95% RH, non-condensing
Vibration	≤ 5.9 g/s2 (0.6 g)
Pollution Degree	PD2
Over-Voltage Category	OVC III
Power Supply System	TT/TN
	IT (Remove the screws of VDR and EMC filter according to section 2.3.)
Enclosure	IP20

1.5 EMC FILTER

1.5.1 Internal Filter

The single-phase model's standard built-in filter is able to meet the EN61800-3 C3 transmission requirement of CE certification. C3 filter is built in the drive.

1.5.2 External Filter

The single-phase model's standard built-in filter is able to meet the EN61800-3 C2 transmission requirement of CE certification.

Notes:

Keep the connection cable between the filter and drive as short as possible (shorter than 30 cm).

Ensure that the filter and drive are connected to the same grounding surface.

The grounding of the filter output terminal should be connected to the input ground terminal of the drive.

The filter must be reliably grounded; failure to comply may result in filter malfunction.

Drive model	Power capacity kVA	Input current A
Single-phase power: 200 V to 240 V, 50/60 Hz range: -15% to 10%		
RSI-PPMI-00H5-2-1-B-IP20-IM	1.7	6.5
RSI-PPMI-0001-2-1-B-IP20-IM	3.0	11.0
RSI-PPMI-0002-2-1-B-IP20-IM	4.8	18.0
RSI-PPMI-0003-2-1-B-IP20-IM	7.1	27.0

1. PRODUCT INFORMATION

Drive model	Power capacity kVA	Input current A
Three-phase power: 380 V to 480 V, 50/60 Hz range: -15% to 10%		
RSI-PPMI-00H5-4-3-B-IP20-IM	1	2.6
RSI-PPMI-0001-4-3-B-IP20-IM	1.5	4.5
RSI-PPMI-0002-4-3-B-IP20-IM	3.0	5.5
RSI-PPMI-0003-4-3-B-IP20-IM	4.0	6.5
RSI-PPMI-0005-4-3-B-IP20-IM	5.9	11.0

1.5.3 Input AC Reactor

It is recommended to use an input line reactor with a Benshaw PowerPro™ Micro General Purpose Drive for sizes above 2 HP to reduce the current harmonics.

The minimum size of a single-phase AC reactor should be greater than 8 mH to meet the IEC 61000-3-12 standard.

The minimum size of a three-phase AC reactor should be greater than 5 mH to meet the IEC 61000-3-12 standard .

1.5.4 Output Reactor

When the motor output cable is longer than 10 meters, the rising edge of pulse wave generates a reflected voltage at the motor terminals due to the mismatch of characteristic impedance of motor and cable. The reflected voltage is imposed on the high voltage square wave pulse, bringing impact for stator winding insulation, which causes sustained impact of greater heat loss and more partial discharge pulse due to high frequency harmonics, resulting in a rapid failure of motor insulation in PWM under pulse voltage.

Therefore, when the motor output cable is longer than 10 meters, it is recommended that you install a reactor at the output terminal.

1) Recommended reactor inductance

Drive model	Power capacity kVA	Input current A	Output reactor inductance mH	Motor cable length after installation of reactor m
Single-phase power: 200 V to 240 V, 50/60 Hz range: -15% to 10%				
RSI-PPMI-00H5-2-1-B-IP20-IM	1.7	2.6	1.47	150
RSI-PPMI-0001-2-1-B-IP20-IM	3.0	4.6	0.754	150
RSI-PPMI-0002-2-1-B-IP20-IM	4.8	8.0	0.588	150
RSI-PPMI-0003-2-1-B-IP20-IM	7.1	11.0	0.42	150
Three-phase power: 380 V to 480 V, 50/60 Hz range: -15% to 10%				
RSI-PPMI-00H5-4-3-B-IP20-IM	1.5	4.5	0.754	150
RSI-PPMI-0001-4-3-B-IP20-IM	1.5	4.5	0.754	150
RSI-PPMI-0002-4-3-B-IP20-IM	3.0	5.5	0.754	150
RSI-PPMI-0003-4-3-B-IP20-IM	4.0	6.5	0.754	150
RSI-PPMI-0005-4-3-B-IP20-IM	5.9	11.0	0.42	150

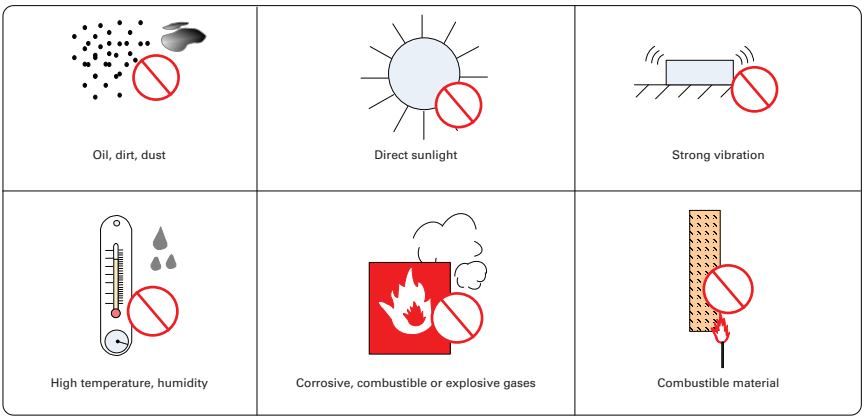
2. MECHANICAL INSTALLATION AND WIRING

2.1 MECHANICAL INSTALLATION

The AC drive must be installed in a noncombustible cabinet that provides effective electrical and mechanical protection for CE requirements. Installation must conform to local and regional laws and regulations, and to relevant IEC requirements.

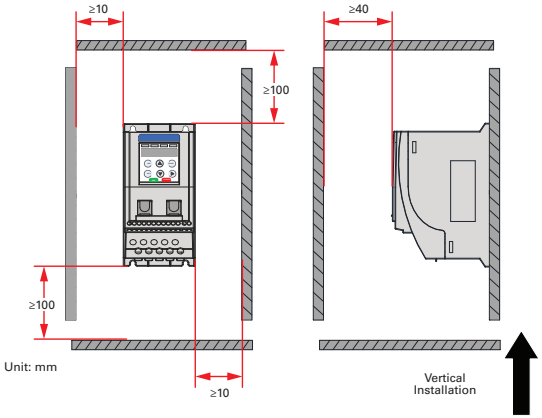
2.1.1 Installation Environment

Item	Requirements
Cooling and ventilation	Install the AC drive on a backplate, and ensure there is sufficient space around the enclosure to allow for efficient heat dissipation.
Mounting location	Ensure the mounting location is: Away from direct sunlight, in an area where humidity is 95% RH or less with no condensation, protected against corrosive, combustible or explosive gases and vapours, and free from oil, dirt, dust or metallic powders.
Vibration	Ensure the mounting location is not affected by levels of vibration that exceeds 0.6 G. Avoid installing the enclosure near punching machines or other mechanical machinery that generates high levels of vibration or mechanical shock.
Protective enclosure	The AC drive must be installed in a noncombustible cabinet that provides effective electrical and mechanical protection for CE requirements. Installation must conform to local and regional laws and regulations, and to relevant IEC requirements.

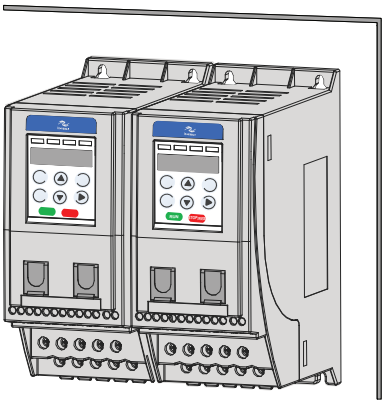


2. MECHANICAL INSTALLATION AND WIRING

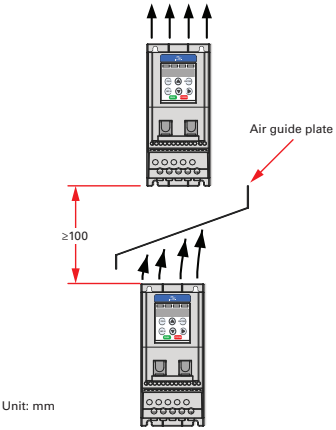
2.1.2 Cabinet Layout



Installing a single drive

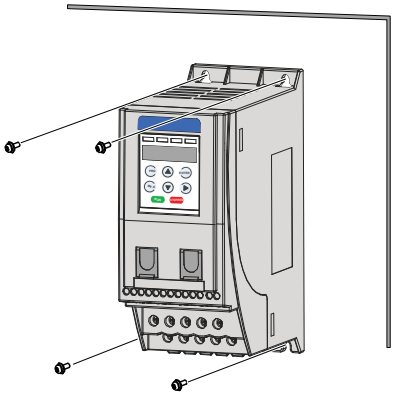


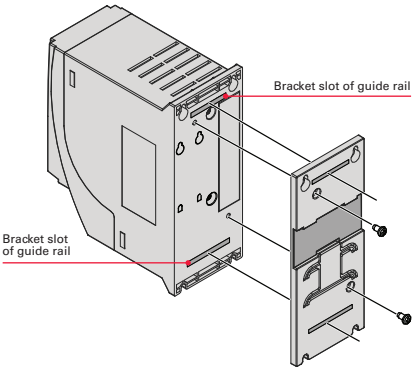
Installing drive side by side

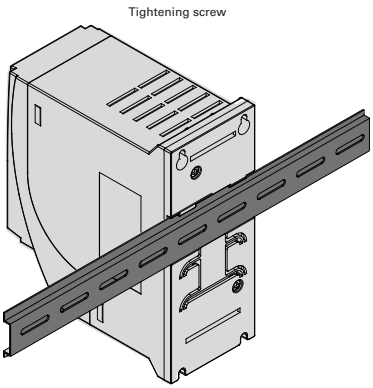


Installing one drive above another

2.1.3 Installation Method







Note:

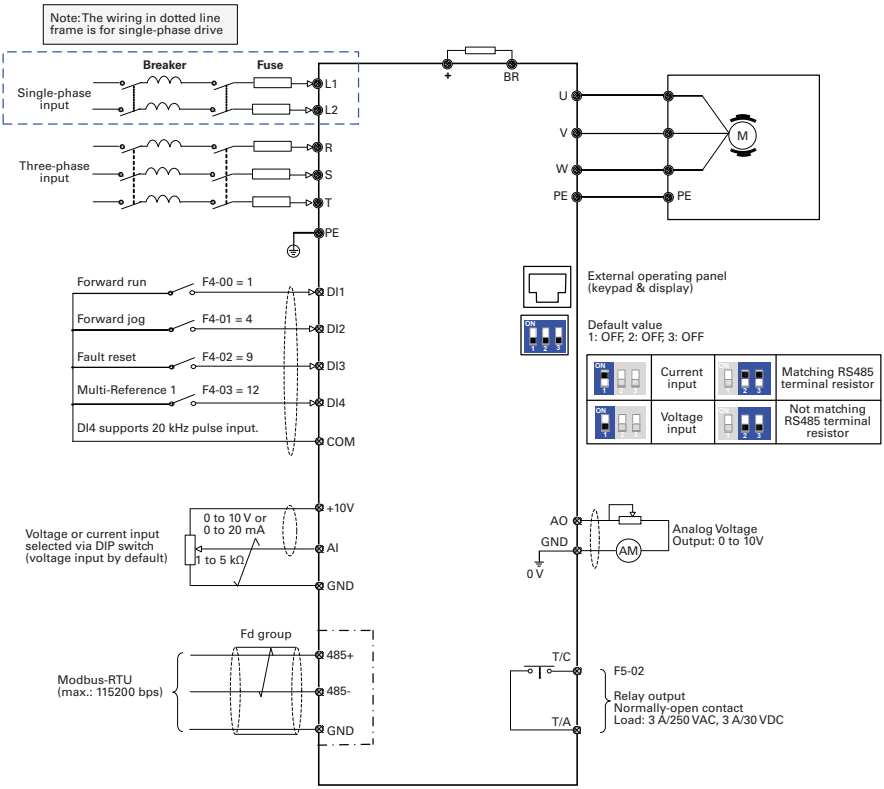
Tighten all screws based on the specified tightening torque.

2. MECHANICAL INSTALLATION AND WIRING

2.2 WIRING

2.2.1 Typical System Connection

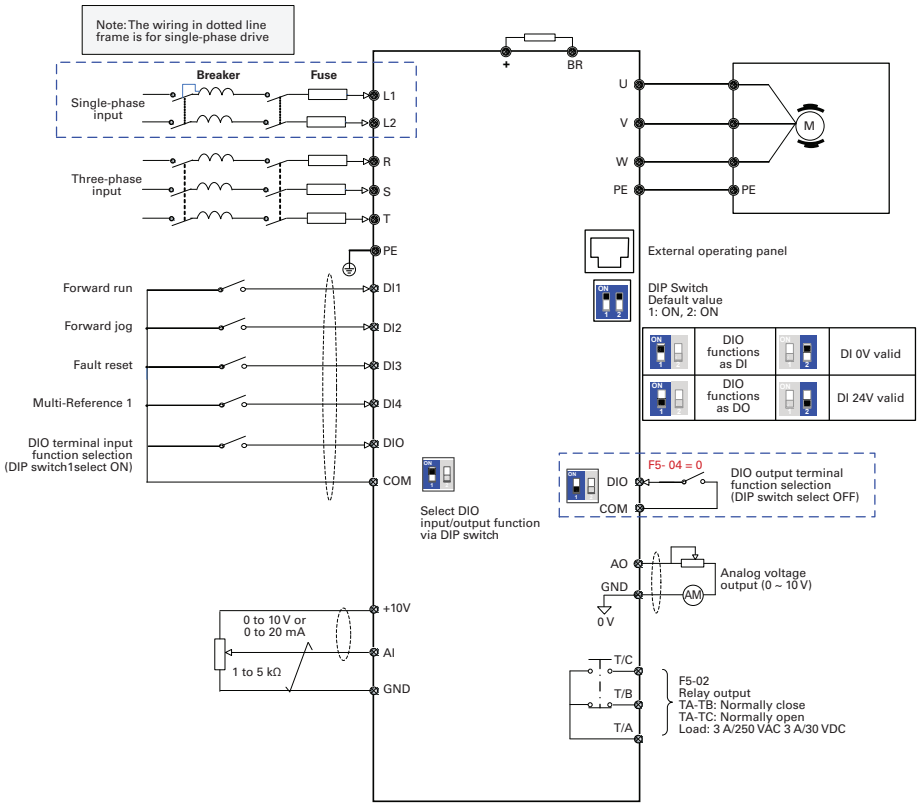
RSI-PPMI terminal wiring diagram



Note:

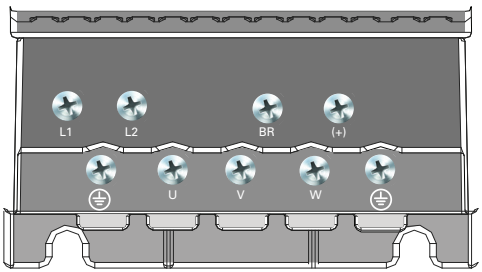
For the DI terminals, low level is valid and valid level is < 5 V, input resistance is 3.6 K, DI1 to DI3 satisfies 100 Hz frequency input, and DI4 satisfies 20 kHz frequency input. The requirement for pulse duty cycle is 30% to 70%.

RSI-PPMI with no communication interface terminal wiring diagram



2.2.2 Terminal Description

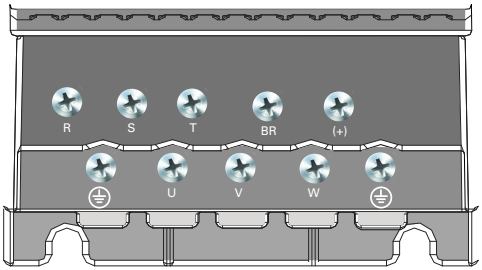
Terminals of main circuit



Terminal	Terminal Name	Description
L1, L2	Single-phase supply input	Connect to the single-phase AC power supply.
BR, (+)	Braking resistor connection	Connected to external braking resistor.
U, V, W	Output terminals	Connect to a three-phase motor.
⏚	Ground (PE)	Grounding connection.

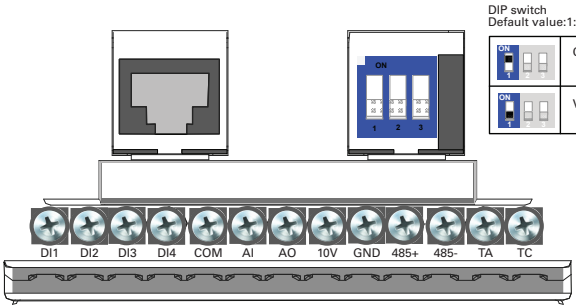
2. MECHANICAL INSTALLATION AND WIRING

2.2.2 Terminal Description



Terminal	Terminal Name	Description
R, S, T	Three-phase supply input	Connect to the three-phase AC power supply.
BR, (+)	Braking resistor connection	Connected to external braking resistor.
U, V, W	Output terminals	Connect to a three-phase motor.
⏚	Ground (PE)	Grounding connection.

RSI-PPMI main control board terminals

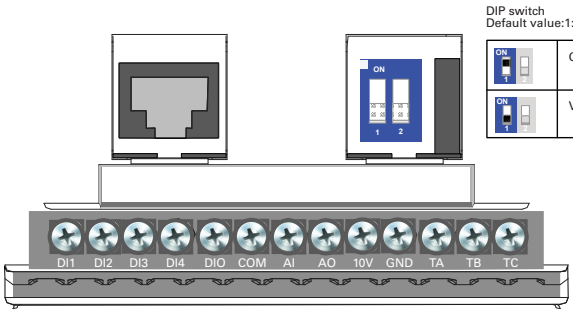


DIP switch
Default value:1: OFF, 2: OFF, 3: OFF

ON 1	Current input	2 3	Matching RS485 terminal resistor
ON 1	Voltage input	2 3	Not matching RS485 terminal resistor

Terminal	Terminal Name	Function	
DI1-DI4	Digital input	Multi-functional input terminal	Low effective, valid level < 5 V, DI-DI3 is low speed DI, frequency < 100 Hz, DI4 is high speed pulse input, highest can support 20 kHz frequency
COM	24 V grounded power supply	24 V grounded power supply	Internal isolation from COM
+10 V	Analog input/ output	10 V analog voltage output	10V ± 10%, up to 10 mA
GND		Analog ground	Internal isolation from COM
AI		Analog input signal channel 1 at one end	(0 to 10V) / (0 to 20 mA) input, 12 bit resolution, with calibrated accuracy of 0.5%, response time is less than 8 ms
AO		Analog output 1	AO: 0 to 10 V, with calibrated accuracy of 100 mV, 10 bit resolution, with calibrated accuracy of 1%
T/A-T/C	Relay output	Relay output	TA-TC: Normally open; Load: 3 A/250 VAC 3 A/30 VDC
GND	Communication	Common ground with 10 V	
485+		RS485 positive communication signal	Half-duplex RS485 communication, with the highest baud rate of 115200, can support up to 64 nodes. Note: 485 communication function can only be used on standard RSI-PPMI models.
485-		RS485 negative communication signal	

RSI-PPMI with no communication interface main control board terminals



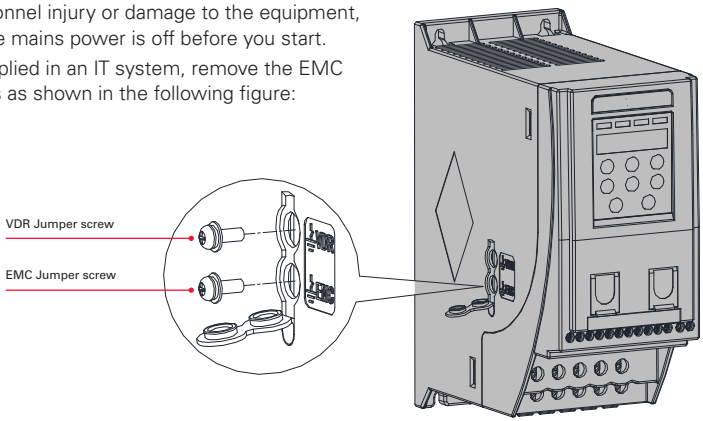
Terminal	Terminal Name	Function	
DI1-DI4	Digital input	Multi-functional input terminal	Low effective, valid level < 5 V, DI-DI3 is low speed DI, frequency < 100 HZ, DI4 is high speed pulse input, highest can support 20 kHz frequency
DIO	Digital input/ output	Multi-functional digital input/output terminal	Use DIP switch to select DI/DO function; for details, see figure 2-2, DO common terminal is COM.
COM	24 V grounded power supply	24 V grounded power supply	Internal isolation from COM
+10 V	Analog input/ output	10 V analog voltage output	10 V ± 10%, up to 10 mA
GND		Analog ground	Internal isolation from COM
AI		Analog input signal channel 1 at one end	(0 to 10 V) / (0 to 20 mA) input, 12 bit resolution, with calibrated accuracy of 0.5%, response time is less than 8ms
AO		Analog output 1	AO: 0 to 10 V, with calibrated accuracy of 100 mV, 10 bit resolution, with calibrated accuracy of 1%
T/A-T/C, T/ A-T/B	Relay output	Relay output	TA-TC: Normally open; TA-TB: Normally closed Load: 3 A/250 VAC 3 A/30 VDC Note: TA-TB is only used on models with no communication interface

2.2.3 Remove the EMC and VDR Screws

⚠ WARNING

To prevent personnel injury or damage to the equipment, you must ensure mains power is off before you start.

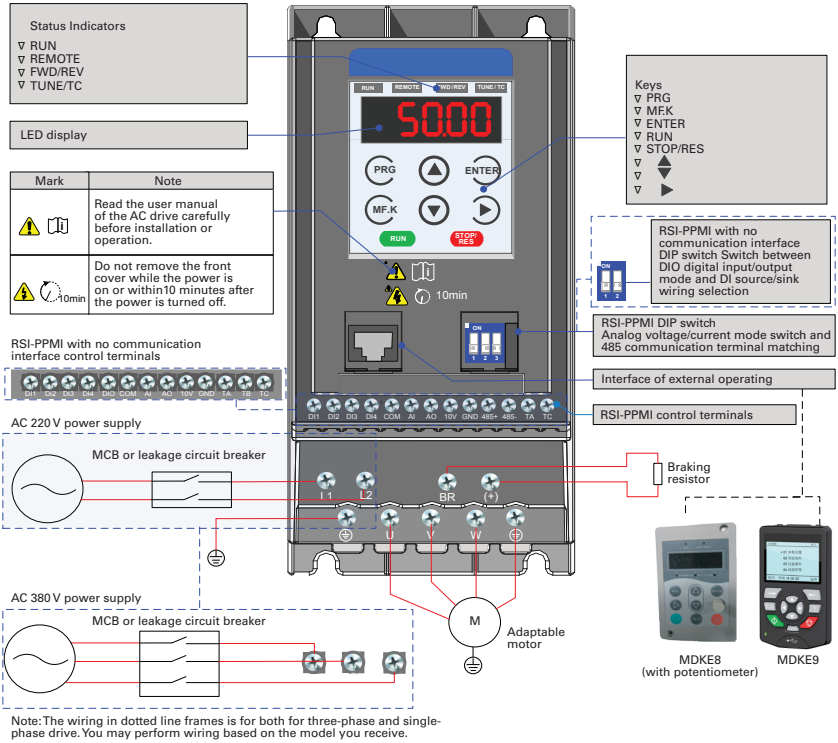
If the drive is applied in an IT system, remove the EMC and VDR screws as shown in the following figure:



3. OPERATING PANEL

3.1 FAMILIARIZE YOURSELF WITH THE OPERATING PANEL

Overview



Note: The wiring in dotted line frames is for both for three-phase and single-phase drive. You may perform wiring based on the model you receive.

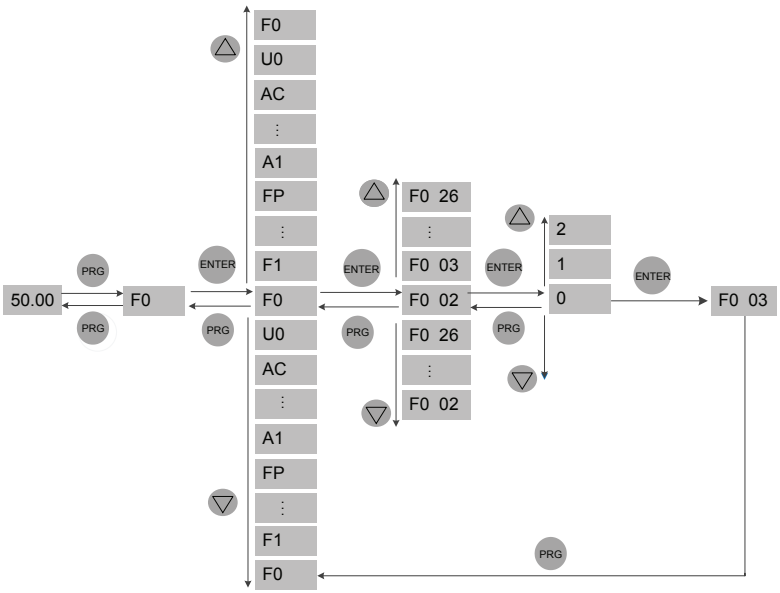
Key	Key Name	Function
PRG	Programming	Enter or exit Level I menu. Return to the previous menu.
ENTER	Confirm	Enter each level of the menu interface. Confirm displayed parameter setting.
△	Increment	When navigating a menu, move the selection up through the screens available.
▽	Decrement	When navigating a menu, move the selection down through the screens available.
▷	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. This function 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 to switch between menu modes as defined by the setting of FP-03.

Status Indicators

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

Indicator	Indication
RUN	ON indicates the RUNNING status.
	FLASHING indicates power dip ride-through.
	OFF indicates the STOP status.
REMOTE	ON indicates under terminal control.
	FLASHING indicates under remote control.
	OFF indicates under operating panel control.
FWD/REV	ON indicates reverse motor rotation.
	OFF indicates forward motor rotation.
TUNE/TC	FLASHING indicates a fault condition on AC drive.
	OFF indicates a normal condition on AC drive.

Operations of Parameters

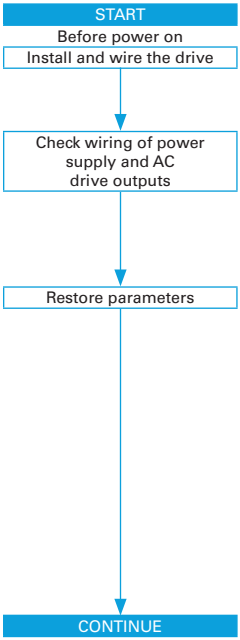


Parameter Arrangement

Parameter Group	Description	Remark
F0 to FF	Standard parameter group	Standard function parameters
A1 to AE	Advanced parameter group	AI/AO correction
U0	RUNNING status parameter group	Display of basic parameters

4. QUICK SETUP

4.1 SETUP FLOWCHART



Para.	Parameter Name	Default	Commission
	Install and wire the drive as explained in chapters 1 to 3 of the PowerPro Micro General Purpose Drives User Manual.		
	—		
FP-01	Parameter initialization 0: No operation 01: Restore default settings except motor parameters 02: Clear records including errors 03: Reserved 04: Back up parameters 05 to 19: Reserved 20: Mechanical movement industry (conveying belt) 21: Inertia industry (fan) 22 to 500: Reserved 501: Restore user's backup parameters NOTE: It is recommended to "Restore default settings" prior to commissioning the AC drive.	0	

Para.	Parameter Name	Default	Commission

START

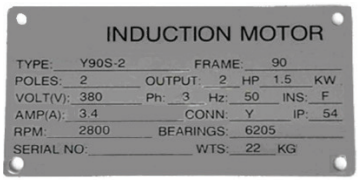
Set motor parameters

Perform motor auto-tuning

Select command source

Select frequency reference setting channel

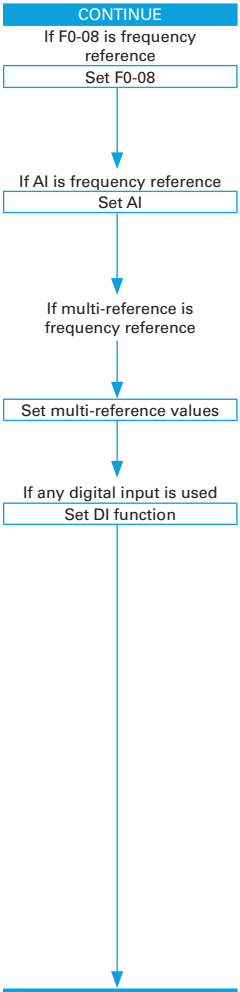
CONTINUE

Para.	Parameter Name	Default	Commission
	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.		
F1-37	Auto-tuning selection	0	1
	0: No auto-tuning 1: Static auto-tuning Steps for auto-tuning: 1. Ensure the UVW connection between the AC drive and motor is not cut off by output contactor; if it is cut off, then manually move the output contactor. 2. Set F0-02 = 0 (operating panel), so that the key RUN can start the tuning procedure. 3. Set F1-37 = 1, press ENTER, then LED on panel will display letters "TUNE". 4. Press the key RUN on panel, and motor starts auto-tuning; it usually takes about 30 seconds to finish auto-tuning. Wait until LED stops displaying "TUNE."		
F0-02	Command source selection	1	
	0: Operating panel (keypad & display) 1: Terminal I/O control 2: Serial comms		
F0-03	Main frequency reference setting channel selection	0	
	0: Digital setting F0-08 (pressing △ or ▽ can change F0-08 easily, and the revised value won't be cleared even after power off) 1: Digital setting F0-08 (pressing △ or ▽ can change F0-08 easily, but the revised value will be cleared after power off) 2: AI 5: Pulse setting (DI4) 6: Multi-reference setting 7: Simple PLC 8: PID 9: Communication setting		

Para. | Parameter Name | Default | Commission

4. QUICK SETUP

4.1 SETUP FLOWCHART



Para.	Parameter Name	Default	Commission
F0-08	Preset frequency	50.00	
	0 Hz to F0-10		
F4-13	AI curve minimum input	0.00	
	0 V to F4-15;		
F4-14	Corresponding percentage of AI minimum input	0.0	
	-100.0% to 100.0%		
F4-15	AI maximum input	10.00	
	F4-13 to 10.00 V		
F4-16	Corresponding percentage of AI maximum input	100.0	
	-100.0% to 100.0%		
FC-00	Reference 0	0.0	
	0.0% to 100.0%		
FC-01 to FC-07	Reference 1 to reference 7	0.0	
	0.0% to 100.0%		
F4-00	DI1 function selection	1	
	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 normally open 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 18: Frequency reference setting channel switchover 19: UP and DOWN setting clear (terminal, operation panel) 20: Command source switchover 21: Acceleration/deceleration prohibited 22: PID disabled 23: PLC state reset		

| Para. | Parameter Name | Default | Commission |

CONTINUE

Para.	Parameter Name	Default	Commission
F4-00	DI1 function selection	1	
	30: Pulse input as frequency reference (valid only for DI4) 32: Immediate DC injection braking 33: External fault normally closed 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 43: PID parameter switchover 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		
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.		

If any digital output is used

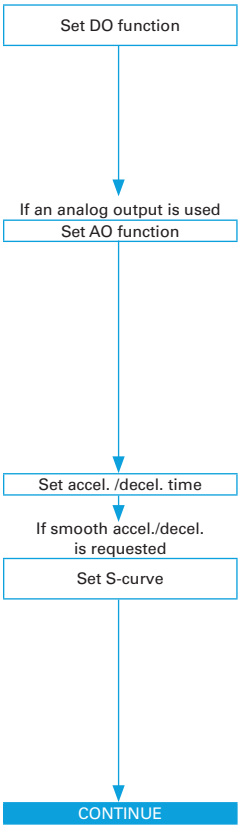
Set DO function

Para.	Parameter Name	Default	Commission
F5-02	Relay function selection (T/A-T/C)	0	
	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 11: PLC cycle completed 12: Accumulative running time reached 13: Frequency limited 15: Ready for RUN 17: Frequency upper limit reached 18: Frequency lower limit reached (no output at stop) 19: Undervoltage 20: Communication setting 24: Accumulative power-on time reached 26: Frequency 1 reached 28: Current 1 reached 30: Timing reached		

CONTINUE

4. QUICK SETUP

4.1 SETUP FLOWCHART



Para.	Parameter Name	Default	Commission
F5-02	Relay function selection (T/A-T/C)	0	
	31: AI input exceeding limit 32: Load lost 33: Reverse running 34: Zero current 36: Output current exceeding limit 37: Frequency lower limit reached (having output at stop) 38: Alarm output 40: Current running time reached 41: Fault output		
F5-07	AO function selection	0	
	0: Running frequency 1: Set frequency 2: Output current 3: Output torque 4: Output power 5: Output voltage 6: Pulse input (100% corresponding to 20 kHz) 7: AI 12: Communication setting 13: Motor rotational speed 14: Output current (100% corresponding to 100 A) 15: Output voltage (100% corresponding to 1000 V)		
F0-17	Acceleration time 1	Model dependent	
	0.0 to 6500.0s		
F0-18	Deceleration time 1	Model dependent	
	0.0 to 6500.0s		
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

Set VF parameters

Trial RUN

Finish

Para.	Parameter Name	Default	Commission
F3-00	V/F curve selection	0	
	0: Linear V/F 1: Multi-point V/F		
F3-01	Torque boost	0.0	
	0.0 to 30.0%; NOTE: If it is 0, then auto torque boost is activated, and it is recommended to use auto 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		
	Use operating panel, digital input terminal or serial communication control to start AC drive, and check to determine if the running performance satisfies your application. If yes, then go forward to next step. If NO, then go back to adjust parameters as needed.		

5. PARAMETER TABLE

5.1 INTRODUCTION

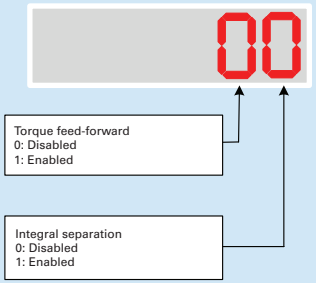
Groups F and A include standard function parameters. Group U includes the monitoring function parameters and extension card communication parameters.

5.2 STANDARD PARAMETERS

Para. No.	Para. Name	Setting Range	Default	Comms. Address
Group F0: Standard Parameters				
F0-01	Motor 1 control mode	1: Feedback vector control (FVC) 2: V/F control	2	0xF001/0x0001
F0-02	Command source selection	0: Operating panel 1: Terminal I/O control 2: Serial comms.	0	0xF002/0x0002
F0-03	Main frequency reference setting channel selection	0: Digital setting (non-retentive at power down) 1: Digital setting (retentive at power down) 2: AI 5: Pulse reference (DI4) 6: Multi-reference 7: Simple PLC 8: PID reference 9: Serial comms.	0	0xF003/0x0003
F0-04	Auxiliary frequency reference setting channel selection	Same with F0-03	0	0xF004/0x0004
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	0xF005/0x0005
F0-06	Range of auxiliary frequency reference for main and auxiliary calculation	0% to 150%	100%	0xF006/0x0006
F0-07	Final frequency reference setting selection	00 to 34	00	0xF007/0x0007
F0-08	Preset frequency	0.00 to max. frequency (F0-10)	50.00 Hz	0xF008/0x0008
F0-09	Running direction	0: Run in the default direction 1: Run in the direction reverse to the default direction	0	0xF009/0x0009
F0-10	Max. frequency	50.00 to 500.00 Hz	50.00 Hz	0xF00A/0x000A
F0-11	Setting channel of frequency upper limit	0: Set by F0-12 1: AI 2: External operating panel 4: Pulse reference (DI4) 5: Communication reference	0	0xF00B/0x000B
F0-12	Frequency reference upper limit	F0-14 to F0-10	50.00 Hz	0xF00C/0x000C
F0-14	Frequency reference lower limit	0.00 Hz to frequency upper limit (F0-12)	0.00 Hz	0xF00E/0x000E
F0-15	Carrier frequency	0.8 to 12.0 kHz	Model dependent	0xF00F/0x000F
F0-16	Carrier frequency adjusted with temperature	0: Disabled 1: Enabled	1	0xF010/0x0010
F0-17	Acceleration time1	0.00 to 650.00s (F0-19=2) 0.0 to 6500.0s (F0-19=1) 0 to 65000s (F0-19=0)	Model dependent	0xF011/0x0011

Para. No.	Para. Name	Setting Range	Default	Comms. Address
F0-18	Deceleration time 1	0.00 to 650.00s (F0-19=2) 0.0 to 6500.0s (F0-19=1) 0 to 65000s (F0-19=0)	Model dependent	0xF012/0x0012
F0-19	Acceleration/deceleration time unit	0: 1s 1: 0.1s 2: 0.01s	1	0xF012/0x0013
F0-23	Retentive of digital setting frequency upon stop	0: Not retentive 1: Retentive	0	0xF017/0x0017
F0-25	Acceleration/deceleration time base frequency	0: Maximum frequency (F0-10) 1: Frequency reference 2: 100 Hz	0	0xF019/0x0019
F0-26	Base frequency for UP/DOWN modification during running	0: Running frequency 1: Frequency reference	0	0xF01A/0x001A
Group F1: Motor 1 Parameters				
F1-01	Rated motor power	0.1 to 5.5 kW	Model dependent	0xF101/0x0101
F1-02	Rated motor voltage	1 to 600 V	Model dependent	0xF102/0x0102
F1-03	Rated motor current	0.01 to 30.00 A	Model dependent	0xF103/0x0103
F1-04	Rated motor frequency	0.01 Hz to max. frequency	Model dependent	0xF104/0x0104
F1-05	Rated motor speed	1 to 65535 rpm	Model dependent	0xF105/0x0105
F1-06	Asynchronous motor stator resistance	0.001 to 65.535 ohm	Auto-tuning dependent	0xF106/0x0106
F1-07	Asynchronous motor rotor resistance	0.001 to 65.535 ohm	Auto-tuning dependent	0xF107/0x0107
F1-08	Asynchronous motor leakage inductive reactance	0.001 to 65.535 mH	Auto-tuning dependent	0xF108/0x0108
F1-09	Asynchronous motor mutual inductive reactance	0.001 to 65.535 mH	Auto-tuning dependent	0xF109/0x0109
F1-10	Asynchronous motor no-load current	0.01A to F0-03	Auto-tuning dependent	0xF109/0x010A
F1-37	Motor auto-tuning method selection	0: No auto-tuning 1: Static auto-tuning 1 2: Complete auto-tuning	0	0xF125/0x0125
Group F2: Vector Control Parameters				
F2-00	Speed loop proportional gain 1	1 to 100	30	0xF200/0x0200
F2-01	Speed loop integral time 1	0.01 to 10.00s	0.50s	0xF201/0x0201
F2-02	Switchover frequency 1	0.00 to F2-05	5.00 Hz	0xF202/0x0202
F2-03	Speed loop proportional gain 2	1 to 100	20	0xF203/0x0203
F2-04	Speed loop integral time 2	0.01 to 10.00s	1.00s	0xF204/0x0204
F2-05	Switchover frequency 2	F2-02 to max. frequency	10.00 Hz	0xF205/0x0205
F2-06	SVC/FVC slip compensation gain	50% to 200%	100%	0xF206/0x0206
F2-07	SVC speed feedback filter time	0.000 to 0.100s	0.050s	0xF207/0x0207
F2-08	Vector control over-excitation gain	0 to 200	0	0xF208/0x0208

5. PARAMETER TABLE

Para. No.	Para. Name	Setting Range	Default	Comms. Address
F2-09	Torque limit source in speed control	0: F2-10 1: AI 2: External operating panel 4: Pulse reference (DI5) 5: Serial comms. 6: Min. (AI1, AI2) 7: Max. (AI1, AI2)	0	0xF209/0x0209
F2-10	Digital setting of torque limit in speed control	0.0% to 200.0%	150.0%	0xF20A/0x020A
F2-11	Torque limit source in speed control (in regenerative state)	0: F2-10 1: AI 2: External operating panel 4: Pulse reference (DI5) 5: Communication reference 6: Min. (AI1, AI2) 7: Max. (AI1, AI2) 8: F2-12	0	0xF20B/0x020B
F2-12	Digital setting of torque limit in speed control (in regenerative state)	0.0% to 200.0%	150.0%	0xF20B/0x020B
F2-13	Excitation adjustment proportional gain	0 to 60000	10	0xF20D/0x020D
F2-14	Excitation adjustment integral gain	0 to 60000	10	0xF20E/0x020E
F2-15	Torque adjustment proportional gain	0 to 60000	10	0xF20F/0x020F
F2-16	Torque adjustment integral gain	0 to 60000	10	0xF210/0x0210
F2-17	Speed loop property		00	0xF211/0x0211
F2-18	Torque feed-forward gain	20 to 100	80	0xF212/0x0212
F2-19	Torque feed-forward filter time	10 to 200	50	0xF213/0x0213
F2-21	Max. torque coefficient of field weakening area	50% to 200%	80%	0xF215/0x0215
F2-22	Regenerative power limit	0.0%: no limit 0.1% to 200.0%	0.0%	0xF216/0x0216

Para. No.	Para. Name	Setting Range	Default	Comms. Address
Group F3: V/F Control Parameters				
F3-00	V/F curve setting	0: Linear V/F 1: Multi-point V/F 10: V/F complete separation 11: V/F half separation	0	0xF300/0x0300
F3-01	Torque boost	0.0%: automatic boost 0.1% to 30%	0.0%	0xF301/0x0301
F3-02	Cut-off frequency of torque boost	0.00 Hz to max. frequency	50.00 Hz	0xF302/0x0302
F3-03	Multi-point V/F frequency 1	0.00 Hz to F3-05	0.00 Hz	0xF303/0x0303
F3-04	Multi-point V/F voltage 1	0.0% to 100.0%	0.0%	0xF304/0x0304
F3-05	Multi-point V/F frequency 2	F3-03 to F3-07	0.00 Hz	0xF305/0x0305
F3-06	Multi-point V/F voltage 2	0.0% to 100.0%	0.0%	0xF306/0x0306
F3-07	Multi-point V/F frequency 3	F3-05 to rated motor frequency (F1-04)	0.00 Hz	0xF307/0x0307
F3-08	Multi-point V/F voltage 3	0.0% to 100.0%	0.0%	0xF308/0x0308
F3-09	Slip compensation gain	0.0% to 200.0%	0.0%	0xF309/0x0309
F3-10	V/F over-excitation gain	0 to 200	64	0xF30A/0x030A
F3-13	Voltage source for V/F separation	0: Set by F3-14 1: AI 2: External operating panel 4: Pulse reference (DI4) 5: Multi-reference 6: Simple PLC 7: PID reference 8: Serial comms. 100.0% corresponds to the rated motor voltage.	0	0xF30D/0x030D
F3-14	Digital setting of voltage for V/F separation	0 V to rated motor voltage	0 V	0xF30E/0x030E
F3-15	Voltage rise time of V/F separation	0.0 to 1000.0s	0.0s	0xF30F/0x030F
F3-16	Voltage decline time of V/F separation	0.0 to 1000.0s	0.0s	0xF310/0x0310
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	0xF311/0x0311
F3-18	Current limit level	50% to 200%	150%	0xF312/0x0312
F3-19	Current limit selection	0: Disabled 1: Enabled	1	0xF313/0x0313
F3-20	Current limit gain	0 to 100	20	0xF314/0x0314
F3-21	Compensation factor of speed multiplying current limit level	0 to 200%	50%	0xF315/0x0315

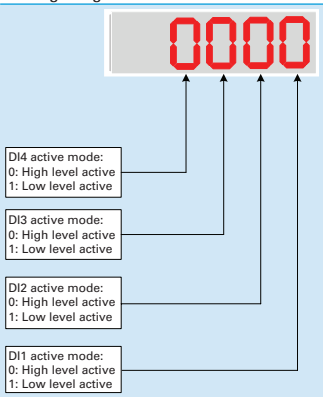
5. PARAMETER TABLE

Para. No.	Para. Name	Setting Range	Default	Comms. Address
F3-22	Voltage limit	330.0 to 800.0 V	Single phase: 390.0 V Three phase: 760.0 V	0xF316/0x0316
F3-23	Voltage limit selection	0: Disabled 1: Enabled	1	0xF318/0x0317
F3-24	Frequency gain for voltage limit	0 to 100	50	0xF318/0x0318
F3-25	Voltage gain for voltage limit	0 to 100	30	0xF319/0x0319
F3-26	Frequency rise threshold during voltage limit	0 to 50 Hz	5 Hz	0xF31A/0x031A
F3-27	Slip compensation time constant	0.1 to 10.0s	0.5	0xF31B/0x031B
Group F4: Input Terminals				
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 8: Coast to stop 9: Fault reset (RESET) 10: RUN disabled 11: External fault normally open 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 18: Frequency reference setting channel switchover 19: UP and DOWN setting clear (terminal, operation panel) 20: Command source switchover 21: Acceleration/deceleration prohibited 22: PID disabled 23: PLC state reset 30: Pulse input as frequency reference (On standard RSI-PPMI models, it is valid for DI4 terminal; on RSI-PPMI models with no communication interface, it is valid for DIO terminal) (Continued on following page)	1	0xF400/0x0400
F4-01	DI2 function selection		4	0xF401/0x0401

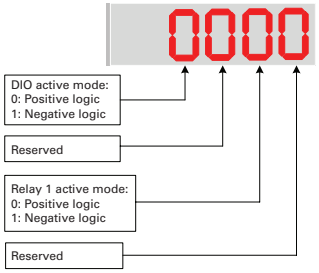
Para. No.	Para. Name	Setting Range	Default	Comms. Address
F4-02	DI3 function selection	32: Immediate DC injection braking 33: External fault normally closed input 34: Frequency modification enabled 35: PID operation direction reverse 36: External stop 1 37: Command source switchover 2 38: PID integral disabled 39: Switchover between main frequency reference and preset frequency 40: Switchover between auxiliary frequency reference and preset frequency 43: PID parameter switchover 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 (End)	9	0xF402/0x0402
F4-03	DI4 function selection		12	0xF403/0x0403
F4-04	DIO terminal input function selection (only used on RSI-PPMI models with no communication interface)			
F4-10	DI filter time	0.000s to 1.000s	0.010s	0xF40A/0x040A
F4-11	Terminal I/O control 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	0	0xF40B/0x040B
F4-12	Terminal UP/DOWN rate	0.001 to 65.535 Hz/s	1.000 Hz/s	0xF40C/0x040C
F4-13	AI curve 1 min. input	0.00 V to F4-15	0.00 V	0xF40D/0x040D
F4-14	Corresponding percentage of AI curve 1 min. input	-100.00% to 100.0%	0.0%	0xF40E/0x040E
F4-15	AI curve 1 max. input	F4-13 to 10.00 V	10.00 V	0xF40F/0x040F
F4-16	Corresponding percentage of AI curve 1 max. input	-100.00% to 100.0%	100.0%	0xF410/0x0410
F4-17	AI1 filter time	0.00s to 10.00s	0.10s	0xF411/0x0411
F4-18	AI curve 2 min. input	0.00 V to F4-20	0.00 V	0xF412/0x0412
F4-19	Corresponding percentage of AI curve 2 min. input	-100.00% to 100.0%	0.0%	0xF413/0x0413
F4-20	AI curve 2 max. input	F4-18 to 10.00 V	10.00 V	0xF414/0x0414
F4-21	Corresponding percentage of AI curve 2 max. input	-100.00% to 100.0%	100.0%	0xF415/0x0415
F4-22	External operating panel potentiometer filter time	0.00 to 10.00s	0.10s	0xF416/0x0416
F4-28	Pulse min. input	0.00 kHz to F4-30	0.00 kHz	0xF41C/0x041C
F4-29	Corresponding percentage of pulse min. input	-100.00% to 100.0%	0.0%	0xF41D/0x041D
F4-30	Pulse max. input	F4-28 to 20.00 kHz	50.00 kHz	0xF41E/0x041E
F4-31	Corresponding percentage of pulse max. input	-100.00% to 100.0%	100.0%	0xF41F/0x041F
F4-32	Pulse filter time	0.00s to 10.00s	0.10s	0xF420/0x0420

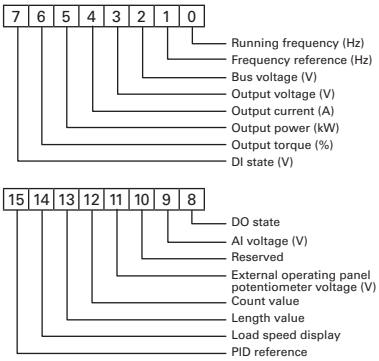
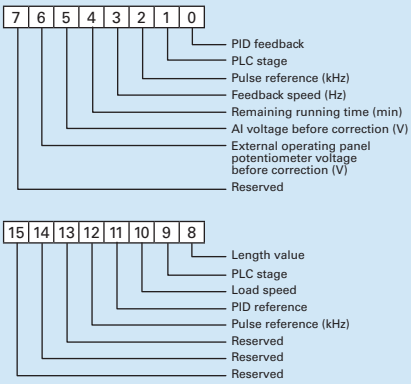
5. PARAMETER TABLE

Para. No.	Para. Name	Setting Range	Default	Comms. Address
F4-33	AI curve selection	 External operating panel potentiometer curve selection 1: Curve 1 (two-point, see F4-13 to F4-16) 2: Curve 2 (two-point, see F4-18 to F4-21) AI curve selection 1: Curve 1 (two-point, see F4-13 to F4-16) 2: Curve 2 (two-point, see F4-18 to F4-21)	21	0xF421/0x0421
F4-34	Setting selection when AI is less than min. input	 Setting selection when external operating panel potentiometer less than min. input 0: Corresponding percentage of min. input 1: 0.0% Setting selection when AI less than min. input 0: Corresponding percentage of min. input 1: 0.0%	00	0xF422/0x0422
F4-35	DI1 delay	0.0 to 3600.0s	0.0s	0xF423/0x0423
F4-36	DI2 delay	0.0 to 3600.0s	0.0s	0xF424/0x0424
F4-37	DI3 delay	0.0 to 3600.0s	0.0s	0xF425/0x0425

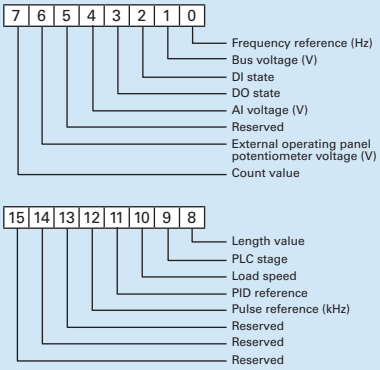
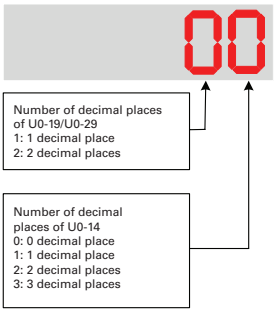
Para. No.	Para. Name	Setting Range	Default	Comms. Address
F4-38	DI active mode selection 1		00000	0xF426/0x0426
F4-41	DIO terminal type	0: DI/Pulse input 1: DO	0	0xF429/0x0429
Group F5: Output Terminals				
F5-02	Relay (T/A-T/C) function selection	0: No output 1: AC drive running 2: Fault output 3: Frequency level detection 1 output 4: Frequency reached 5: Zero-speed running (no output at stop) 6: Motor overload pending 7: AC drive overload pending 11: PLC cycle completed 12: Accumulative running time reached 13: Frequency limited 15: Ready for RUN 17: Frequency upper limit reached 18: Frequency lower limit reached (no output at stop) 19: Undervoltage 20: Communication setting 24: Accumulative power-on time reached 26: Frequency 1 reached 28: Current 1 reached 30: Timing reached 31: AI input exceeding limit 32: Load lost 33: Reverse running 34: Zero current 36: Output current exceeding limit 37: Frequency lower limit reached (having output at stop) 38: Alarm output 40: Current running time reached 41: Fault output	2	0xF502/0x0502
F5-04	DIO terminal output function selection (only used on RSI-PPMI models with no communication interface)		0	0xF504/0x0504

5. PARAMETER TABLE

Para. No.	Para. Name	Setting Range	Default	Comms. Address
F5-07	AO function selection	0: Running frequency 1: Frequency reference 2: Output current 3: Output torque 4: Output power 5: Output voltage 6: Pulse input 7: AI 8: External operating panel potentiometer 10: Length 11: Count value 12: Communication reference 13: Motor speed 14: Output current 15: Output voltage 16: Motor output torque (actual value)	0	0xF507/0x0507
F5-10	AO zero offset coefficient	-100.0% to 100.0%	0.0%	0xF50A/0x050A
F5-11	AO gain	-10.00 to 10.00	1.00	0xF50B/0x050B
F5-18	Relay 1 output delay	0.0 to 3600.0s	0.0s	0xF512/0x0512
F5-20	DIO output delay	0.0 to 3600.0s	0.0s	0xF514/0x0514
F5-22	DO active mode selection 1		0000	0xF516/0x0516
Group F6: Start/Stop Control				
F6-00	Start mode	0: Direct start 1: Catching a spinning motor	0	0xF600/0x0600
F6-01	Mode of catching a spinning motor	0: From stop frequency 1: From 50 Hz 2: From max. frequency	0	0xF601/0x0601
F6-03	Start frequency	0.00 to10.00 Hz	0.00 Hz	0xF603/0x0603
F6-04	Start frequency holding time	0.0 to 100.0s	0.0s	0xF604/0x0604
F6-07	Acceleration/deceleration mode	0: Linear acceleration/deceleration 1: Static S-curve acceleration/deceleration 2: Dynamic S-curve acceleration/ deceleration	0	0xF607/0x0607
F6-08	Time proportion of S-curve start segment	0.0% to (100.0% –F6-09)	30.0%	0xF608/0x0608
F6-09	Time proportion of S-curve end segment	0.0% to (100.0% –F6-08)	30.0%	0xF609/0x0609
F6-10	Stop mode	0: Decelerate to stop 1: Coast to stop	0	0xF60A/0x060A
F6-11	DC injection braking 2 start frequency	0.00 Hz to maximum frequency	0.00 Hz	0xF60B/0x060B
F6-12	DC injection braking 2 delay time	0.0 to 100.0s	0.0s	0xF60C/0x060C
F6-13	DC injection braking 2 level	0% to 100%	50%	0xF60D/0x060D
F6-14	DC injection braking 2 active time	0.0 to 100.0s	0.0s	0xF60E/0x060E
F6-21	Demagnetization time	0.00s to 5.00s	0.5s	0xF615/0x0615
F6-22	Min. output frequency	0.00 Hz to F6-11	0.00 Hz	0xF616/0x0616
F6-23	Reserved by manufacturer	1 to 100	10	0xF617/0x0617

Para. No.	Para. Name	Setting Range	Default	Comms. Address
Group F7: Keypad Operation and LED Display				
F7-00	LED default display check	0: Disabled 1: Enabled	0	0xF700/0x0700
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: Parameter display mode switchover	0	0xF701/0x0701
F7-02	STOP/RESET key function	0: STOP/RESET key enabled only in keypad control 1: STOP/RESET key enabled in any operation mode	1	0xF702/0x0702
F7-03	LED display running parameters 1	0000 to FFFF 	001F	0xF703/0x0703
F7-04	LED display running parameters 2	0000 to FFFF 	0000	0xF704/0x0704

5. PARAMETER TABLE

Para. No.	Para. Name	Setting Range	Default	Comms. Address
F7-05	LED display stop parameters	0000 to 1FFF 	0033	0xF705/0x0705
F7-06	Load speed display coefficient	0.0001 to 65.000	1.0000	0xF706/0x0706
F7-07	Heatsink temperature of IGBT	0°C to 100°C	-	0xF707/0x0707
F7-08	Product series	200	-	0xF708/0x0708
F7-09	Accumulative running time	0 to 65535 h	-	0xF709/0x0709
F7-10	Performance software version	-	-	0xF70A/0x070A
F7-11	Function software version	-	-	0xF70B/0x070B
F7-12	Number of decimal places for load speed display	10 to 23 	21	0xF70C/0x070C
F7-13	Accumulative power-on time	0 to 65535 h	-	0xF70D/0x070D

Para. No.	Para. Name	Setting Range	Default	Comms. Address
F7-14	Accumulative power consumption	0 to 65535 kWh	-	0xF70E/0x070E
Group F8: Auxiliary Functions				
F8-00	Jog frequency reference	0.00 Hz to max. frequency	2.00 Hz	0xF800/0x0800
F8-01	Jog acceleration time	0.0 to 6500.0s	20.0s	0xF801/0x0801
F8-02	Jog deceleration time	0.0 to 6500.0s	20.0s	0xF802/0x0802
F8-03	Acceleration time 2	0.0 to 6500.0s	20.0s	0xF803/0x0803
F8-04	Deceleration time 2	0.0 to 6500.0s	20.0s	0xF804/0x0804
F8-07	Acceleration time 4	0.0 to 6500.0s	0.0s	0xF807/0x0807
F8-08	Deceleration time 4	0.0 to 6500.0s	0.0s	0xF808/0x0808
F8-12	Forward/reverse run switchover dead-zone time	0.0 to 3000.0s	0.0s	0xF80C/0x080C
F8-13	Reverse RUN selection	0: Disabled 1: Enabled	0	0xF80D/0x080D
F8-14	Running mode when frequency reference is lower than frequency lower limit	0: Run at frequency reference lower limit 1: Stop 2: Run at zero speed	0	0xF80E/0x080E
F8-16	Accumulative power-on time threshold	0 to 65000 h	0h	0xF810/0x0810
F8-17	Accumulative running time threshold	0 to 65000 h	0h	0xF811/0x0811
F8-18	Startup protection selection	0: Disabled 1: Enabled	0	0xF812/0x0812
F8-19	Frequency detection value 1	0.00 Hz to max. frequency	50.00 Hz	0xF813/0x0813
F8-20	Frequency detection hysteresis 1	0.0% to 100.0%	5.0%	0xF814/0x0814
F8-21	Detection width of target frequency reached	0.0% to 100.0%	0.0%	0xF815/0x0815
F8-25	Switchover frequency of accel. time 1 and accel. time 2	0.00 Hz to max. frequency	0.00 Hz	0xF819/0x0819
F8-26	Switchover frequency of decel. time 1 and decel. time 2	0.00 Hz to max. frequency	0.00 Hz	0xF81A/0x081A
F8-27	Set highest priority to terminal JOG function	0: Disabled 1: Enabled	0	0xF81B/0x081B
F8-30	Detection of frequency 1	0.00 Hz to max. frequency	50.00 Hz	0xF81E/0x081E
F8-31	Detection width of frequency 1	0.0% to 100.0% (max. frequency)	0.0%	0xF81F/0x081F
F8-34	Zero current detection level	0.0% to 300.0% (rated motor current)	5.0%	0xF822/0x0822
F8-35	Zero current detection delay	0.01s to 600.00s	0.10s	0xF823/0x0823
F8-36	Output overcurrent threshold	0.0% (no detection) 0.1% to 300.0% (rated motor current)	200.0%	0xF824/0x0824
F8-37	Output overcurrent detection delay	0.00s to 600.00s	0.00s	0xF825/0x0825
F8-38	Detection level of current 1	0.0% to 300.0% (rated motor current)	100.0%	0xF826/0x0826
F8-39	Detection width of current 1	0.0% to 300.0% (rated motor current)	0.0%	0xF827/0x0827
F8-42	Timing function	0: Disabled 1: Enabled	0	0xF82A/0x082A
F8-43	Running time setting channel	0: Set by F8-44 1: AI	0	0xF82B/0x082B

5. PARAMETER TABLE

Para. No.	Para. Name	Setting Range	Default	Comms. Address
F8-44	Running time	0.0 to 6500.0 min	0.0 min	0xF82C/0x082C
F8-45	AI input voltage lower limit	0.00 V to F8-46	3.10 V	0xF82D/0x082D
F8-46	AI input voltage upper limit	F8-45 to 10.00 V	6.80 V	0xF82E/0x082E
F8-48	Cooling fan working mode	0: Working during drive running 1: Working continuously 2: Working when temperature reached	0	0xF830/0x0830
F8-49	Wakeup frequency	F8-51 to max. frequency (F0-10)	0.00 Hz	0xF831/0x0831
F8-50	Wakeup delay time	0.0 to 6500.0s	0.0s	0xF832/0x0832
F8-51	Hibernating frequency	0.00 Hz to wakeup frequency (F8-49)	0.00 Hz	0xF833/0x0833
F8-52	Hibernating delay time	0.0 to 6500.0s	0.0s	0xF834/0x0834
F8-53	Running time threshold this time	0.0 to 6500.0 min	0.0 min	0xF835/0x0835
F8-54	Output power correction coefficient	0.0% to 200.0%	100.0%	0xF836/0x0836
F8-55	Emergency deceleration time	0.0 to 6500.0s	10.0s	0xF837/0x0837
F8-57	Speed synchronous control selection	0: Disabled 1: Enabled	0	0xF839/0x0839
This parameter selects whether to enable the speed synchronous control function. This function involves bidirectional data communication between two or more AC drives via CANlink, implementing target frequency of one or more slaves to be synchronized to that of the master. When this function is enabled, CANlink communication addresses of the master and slaves are matched automatically. The baud rate in speed synchronous control is set in Fd-00.				
F8-58	Master and slave selection in synchronous control	0: Master 1: Slave	0	0xF83A/0x083A
This parameter is used to select whether the AC drive is master or slave. When the AC drive is slave, set F0-03 = 9 to set frequency reference via communication.				
Group F9: Fault and Protection				
F9-00	Motor overload protection	0: Disabled 1: Enabled	1	0xF900/0x0900
F9-01	Motor overload protection gain	0.20 to 10.00	1.0	0xF901/0x0901
F9-02	Motor overload pre-warning coefficient	50% to 100%	80%	0xF902/0x0902
F9-07	Detection of short-circuit to ground upon power-on	0: Disabled 1: Enabled	1	0xF907/0x0907
F9-08	Braking unit applied voltage	310.0 V to 800.0 V	Single phase: 378.0 V Three phase: 700.0 V	0xF908/0x0908
F9-09	Auto reset times	0 to 20	0	0xF909/0x0909
F9-10	Selection of DO action during auto reset	0: Not act 1: Act	0	0xF90A/0x090A
F9-11	Delay of auto reset	0.1s to 100.0s	1.0s	0xF90B/0x090B
F9-13	Output phase loss protection	0: Disabled 1: Enabled	1	0xF90D/0x090D

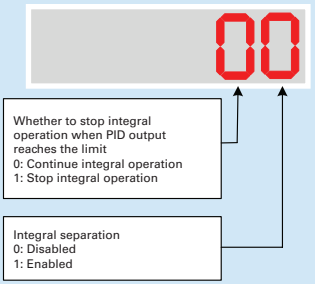
Para. No.	Para. Name	Setting Range	Default	Comms. Address
F9-14	1st fault type	0: No fault 1: Reserved 2: Overcurrent during acceleration 3: Overcurrent during deceleration 4: Overcurrent at constant speed 5: Overvoltage during acceleration 6: Overvoltage during deceleration 7: Overvoltage at constant speed 8: Pre-charge resistor overloaded 9: Undervoltage 10: AC drive overloaded 11: Motor overloaded	-	0xF90E/0x090E
F9-15	2nd fault type	12: Input phase loss 13: Output phase loss 14: IGBT overheat 15: External fault 16: Communication abnormal 17: Reserved 18: Current detection abnormal 19: Motor auto-tuning abnormal 20: Reserved 21: Parameter read-write abnormal 22: Reserved 23: Motor short circuited to ground 24: Reserved	-	0xF90F/0x090F
F9-16	3rd (latest) fault type	25: Reserved 26: Accumulative running time reached 29: Accumulative power-on time reached 30: Load lost 31: PID feedback lost during running 40: Overcurrent fast prevention timeout 41: Reserved 42: Excessive speed deviation 43: Reserved 45: Reserved 51: Reserved 55: Slave fault in speed synchronous	-	0xF910/0x0910
F9-17	Frequency upon 3rd fault	-	-	0xF911/0x0911
F9-18	Current upon 3rd fault	-	-	0xF912/0x0912
F9-19	Bus voltage upon 3rd fault	-	-	0xF913/0x0913
F9-20	DI state upon 3rd fault	-	-	0xF914/0x0914
F9-21	DO state upon 3rd fault	-	-	0xF915/0x0915
F9-22	AC drive state upon 3rd fault	-	-	0xF916/0x0916
F9-23	Power-on time upon 3rd fault	-	-	0xF917/0x0917
F9-24	Running time upon 3rd fault	-	-	0xF918/0x0918
F9-27	Frequency upon 2nd fault	-	-	0xF91B/0x081B
F9-28	Current upon 2nd fault	-	-	0xF91C/0x091C
F9-29	Bus voltage upon 2nd fault	-	-	0xF91D/0x091D
F9-30	DI state upon 2nd fault	-	-	0xF91E/0x091E
F9-31	DO state upon 2nd fault	-	-	0xF91F/0x091F

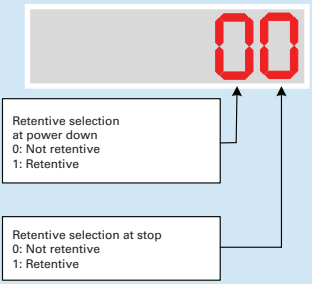
5. PARAMETER TABLE

Para. No.	Para. Name	Setting Range	Default	Comms. Address
F9-32	AC drive state upon 2nd fault	-	-	0xF920/0x0920
F9-33	Power-on time upon 2nd fault	-	-	0xF921/0x0921
F9-34	Running time upon 2nd fault	-	-	0xF922/0x0922
F9-37	Frequency upon 1st fault	-	-	0xF925/0x0925
F9-38	Current upon 1st fault	-	-	0xF926/0x0926
F9-39	Bus voltage upon 1st fault	-	-	0xF927/0x0927
F9-40	DI state upon 1st fault	-	-	0xF928/0x0928
F9-41	DO state upon 1st fault	-	-	0xF929/0x0929
F9-42	AC drive state upon 1st fault	-	-	0xF92A/0x092A
F9-43	Power-on time upon 1st fault	-	-	0xF92B/0x092B
F9-44	Running time upon 1st fault	-	-	0xF92C/0x092C
F9-47	Fault protection action selection 1	00000 to 22222	00000	0xF92F/0x092F
F9-48	Fault protection action selection 2	00000 to 11111	00000	0xF930/0x0930
F9-49	Fault protection action selection 3	00000 to 22222	00000	0xF931/0x0931
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	0xF936/0x0936
F9-55	Backup frequency upon fault	0.0% to 100.0% (max. frequency)	100.0%	0xF937/0x0937
F9-59	Power dip ride-through function selection	0: Disabled 1: Bus voltage constant control 2: Decelerate to stop	0	0xF93B/0x093B
F9-60	Threshold of power dip ride-through function disabled	80% to F9-60	85%	0xF93C/0x093C
F9-61	Judging time of bus voltage recovering from power dip	0.0 to 100.0s	0.5s	0xF93D/0x093D
F9-62	Threshold of power dip ride-through function enabled	60% to 100%	80%	0xF93E/0x093E
F9-63	Load lost protection	0: Disabled 1: Enabled	0	0xF93F/0x093F
F9-64	Load lost detection level	0.0% to 100.0%	10.0%	0xF940/0x0940
F9-65	Load lost detection time	0.0 to 60.0s	1.0s	0xF941/0x0941
F9-71	Power dip ride-through gain Kp	0 to 100	40	0xF947/0x0947
F9-72	Power dip ride-through integral coefficient	0 to 100	30	0xF948/0x0948
F9-73	Deceleration time of power dip ride-through	0.0 to 300.0s	20.0s	0xF949/0x0949
F9-74	Restart mode after fault reset	0: Normal 1: Catching a spinning motor	0	0xF94A/0x094A
Group FA: PID Function				
FA-00	PID reference setting channel	0: Set by FA-01 1: AI 2: External operating panel potentiometer 4: Pulse reference (DI4) 5: Via communication 6: Multi-reference	0	0xFA00/0x0A00

Para. No.	Para. Name	Setting Range	Default	Comms. Address
FA-01	PID digital setting	0.0% to 100.0%	50.0%	0xFA01/0x0A01
FA-02	PID feedback setting channel	0: AI 1: External operating panel potentiometer 3: AI - external operating panel potentiometer 4: PULSE reference (DI4) 5: Via communication 6: AI + external operating panel potentiometer 7: Max. (|AI|, |external operating panel potentiometer|) 8: Min. (|AI1|, |external operating panel potentiometer|)	0	0xFA02/0x0A02
FA-03	PID operation direction	0: Forward 1: Reverse	0	0xFA03/0x0A03
FA-04	PID reference and feedback range	0 to 65535	1000	0xFA04/0x0A04
FA-05	Proportional gain Kp1	0.0 to 1000.0	20.0	0xFA05/0x0A05
FA-06	Integral time Ti1	0.01s to 10.00s	2.00s	0xFA06/0x0A06
FA-07	Differential time Td1	0.000s to 10.000s	0.000s	0xFA07/0x0A07
FA-08	PID output limit in reverse direction	0.00 Hz to max. frequency	0.00 Hz	0xFA08/0x0A08
FA-09	PID error limit	0.0% to 100.0%	0.0%	0xFA09/0x0A09
FA-10	PID differential limit	0.00% to 100.00%	0.10%	0xFA0A/0x0A0A
FA-11	PID reference change time	0.00s to 650.00s	0.00s	0xFA0B/0x0A0B
FA-12	PID feedback filter time	0.00s to 60.00s	0.00s	0xFA0C/0x0A0C
FA-13	PID output filter time	0.00s to 60.00s	0.00s	0xFA0D/0x0A0D
FA-15	Proportional gain Kp2	0.0 to 1000.0	20.0	0xFA0F/0x0A0F
FA-16	Integral time Ti2	0.01s to 10.00s	2.00s	0xFA10/0x0A10
FA-17	Differential time Td2	0.000s to 10.000s	0.000s	0xFA11/0x0A11
FA-18	PID parameter switchover condition	0: Not switched over 1: Switched over via DI 2: Switched over automatically according to error 3: Switched over automatically according to running frequency	0	0xFA12/0x0A12
FA-19	PID error 1 for auto switchover	0.0% to FA-20	20.0%	0xFA13/0x0A13
FA-20	PID error 2 for auto switchover	FA-19 to 100.0%	80.0%	0xFA14/0x0A14
FA-21	PID initial value	0.0% to 100.0%	0.0%	0xFA15/0x0A15
FA-22	PID initial value active time	0.00s to 650.00s	0.00s	0xFA16/0x0A16
FA-23	Max. value of two outputs error in forward direction	0.00% to 100.00%	1.00%	0xFA17/0x0A17
FA-24	Max. value of two outputs error in reverse direction	0.00% to 100.00%	1.00%	0xFA18/0x0A18

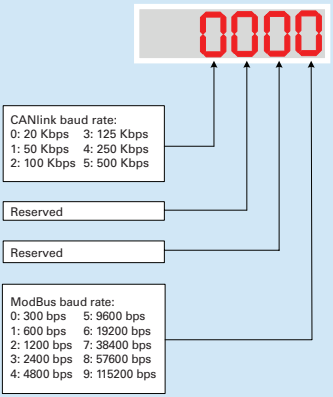
5. PARAMETER TABLE

Para. No.	Para. Name	Setting Range	Default	Comms. Address
FA-25	PID integral property	00 to 11 	00	0xFA19/0x0A19
FA-26	Detection level of PID feedback loss	0%: No detection 0.1% to 100.0%	0.0%	0xFA1A/0x0A1A
FA-27	Detection time of PID feedback loss	0.0 to 20.0s	0.0s	0xFA1B/0x0A1B
FA-28	Selection of PID operation at stop	0: Disabled 1: Enabled	0	0xFA1C/0x0A1C
Group Fb: Wobble Function, Fixed Length and Count				
Fb-00	Wobble setting mode	0: Relative to the frequency reference 1: Relative to the max. frequency	0	0xFB00/0x0B00
Fb-01	Wobble amplitude	0.0% to 100.0%	0.0%	0xFB01/0x0B01
Fb-02	Wobble step	0.0% to 50.0%	0.0%	0xFB02/0x0B02
Fb-03	Wobble cycle	0.1 to 3000.0s	10.0s	0xFB03/0x0B03
Fb-04	Triangular wave rising time coefficient	0.1% to 100.0%	50.0%	0xFB04/0x0B04
Fb-05	Set length	0 to 65535 m	1000 m	0xFB05/0x0B05
Fb-06	Actual length	0 to 65535 m	0 m	0xFB06/0x0B06
Fb-07	Number of pulses per meter	0.1 to 6553.5	100.0	0xFB07/0x0B07
Fb-08	Set count value	1 to 65535	1000	0xFB08/0x0B08
Group FC: Multi-Reference and Simple PLC Function				
FC-00	Reference0	-100.0% to 100.0%	0.0%	0xFC00/0x0C00
FC-01	Reference1	-100.0% to 100.0%	0.0%	0xFC01/0x0C01
FC-02	Reference2	-100.0% to 100.0%	0.0%	0xFC02/0x0C02
FC-03	Reference3	-100.0% to 100.0%	0.0%	0xFC03/0x0C03
FC-04	Reference4	-100.0% to 100.0%	0.0%	0xFC04/0x0C04
FC-05	Reference5	-100.0% to 100.0%	0.0%	0xFC05/0x0C05
FC-06	Reference6	-100.0% to 100.0%	0.0%	0xFC06/0x0C06
FC-07	Reference7	-100.0% to 100.0%	0.0%	0xFC07/0x0C07
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	0xFC10/0x0C10

Para. No.	Para. Name	Setting Range	Default	Comms. Address
FC-17	Simple PLC retentive selection	00 to 11 	00	0xFC11/0x0C11
FC-18	Running time of simple PLC reference 0	0.0s (h) to 6500.0s (h)	0.0s (h)	0xFC12/0x0C12
FC-19	Acceleration/deceleration time of simple PLC reference 0	0 to 1	0	0xFC13/0x0C13
FC-20	Running time of simple PLC reference 1	0.0s (h) to 6500.0s (h)	0.0s (h)	0xFC14/0x0C14
FC-21	Acceleration/deceleration time of simple PLC reference 1	0 to 1	0	0xFC15/0x0C15
FC-22	Running time of simple PLC reference 2	0.0s (h) to 6500.0s (h)	0.0s (h)	0xFC16/0x0C16
FC-23	Acceleration/deceleration time of simple PLC reference 2	0 to 1	0	0xFC17/0x0C17
FC-24	Running time of simple PLC reference 3	0.0s (h) to 6500.0s (h)	0.0s (h)	0xFC18/0x0C18
FC-25	Acceleration/deceleration time of simple PLC reference 3	0 to 1	0	0xFC19/0x0C19
FC-26	Running time of simple PLC reference 4	0.0s (h) to 6500.0s (h)	0.0s (h)	0xFC1A/0x0C1A
FC-27	Acceleration/deceleration time of simple PLC reference 4	0 to 1	0	0xFC1B/0x0C1B
FC-28	Running time of simple PLC reference 5	0.0s (h) to 6500.0s (h)	0.0s (h)	0xFC1C/0x0C1C
FC-29	Acceleration/deceleration time of simple PLC reference 5	0 to1	0	0xFC1D/0x0C1D
FC-30	Running time of simple PLC reference 6	0.0s (h) to 6500.0s (h)	0.0s (h)	0xFC1E/0x0C1E
FC-31	Acceleration/deceleration time of simple PLC reference 6	0 to 1	0	0xFC1F/0x0C1F

5. PARAMETER TABLE

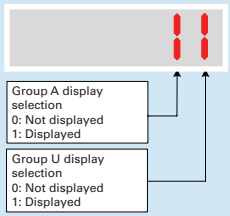
Para. No.	Para. Name	Setting Range	Default	Comms. Address
FC-32	Running time of simple PLC reference 7	0.0s (h) to 6500.0s (h)	0.0s (h)	0xFC20/0x0C20
FC-33	Acceleration/ deceleration time of simple PLC reference 7	0 to 1	0	0xFC21/0x0C21
FC-50	Time unit of simple PLC running	0: s 1: h	0	0xFC32/0x0C32
FC-51	Reference 0 source	0: Set by FC-00 1: AI 2: External operating panel potentiometer 4: PULSE reference 5: PID 6: Set by F0-08 and modified via UP/DOWN	0	0xFC33/0x0C33
Group Fd: Communication				
Fd-00	Baud rate	0000 to 5009	5005	0xFD00/0x0D00
Fd-01	Data format symbol	0: No check (8-N-2) 1: Even parity check (8-E-1) 2: Odd parity check (8-O-1) 3: No check (8-N-1) (Valid for ModBus)	0	0xFD01/0x0D01
Fd-02	Local address	0: Broadcast address 1 to 247	1	0xFD02/0x0D02
Fd-03	Response delay	0 to 20ms	2	0xFD03/0x0D03
Fd-04	Communication timeout	0.0: Invalid 0.1s to 60.0s	0.0s	0xFD04/0x0D04
Fd-05	ModBus protocol selection and PROFIBUS-DP data frame	0: Non-standard ModBus protocol 1: Standard ModBus protocol	1	0xFD05/0x0D05
Fd-06	Current resolution read by communication	0: 0.01 A 1: 0.1 A	0	0xFD06/0x0D06
Fd-07	PC software selection	0: Disabled 1: Enabled	1	0xFD07/0x0D07

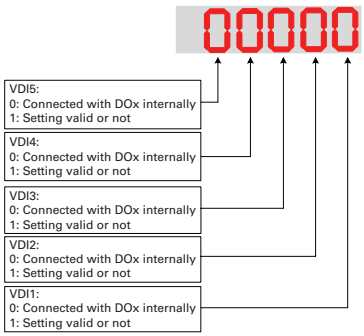


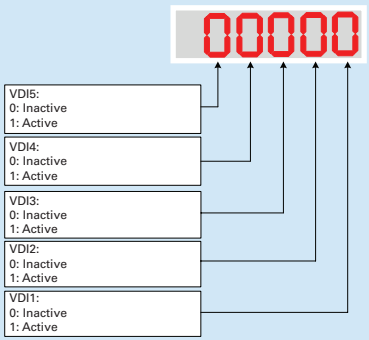
Para. No.	Para. Name	Setting Range	Default	Comms. Address
Group FE: User-defined Parameters				
FE-00	User-defined parameter 0	F0.00 to FP.xx A0.00 to Ax.xx U0.00 to U0.xx	F0.00	0xFE00/0x0E00
FE-01	User-defined parameter 1		F0.00	0xFE01/0x0E01
FE-02	User-defined parameter 2		F0.00	0xFE02/0x0E02
FE-03	User-defined parameter 3		F0.00	0xFE03/0x0E03
FE-04	User-defined parameter 4		F0.00	0xFE04/0x0E04
FE-05	User-defined parameter 5		F0.00	0xFE05/0x0E05
FE-06	User-defined parameter 6		F0.00	0xFE06/0x0E06
FE-07	User-defined parameter 7		F0.00	0xFE07/0x0E07
FE-08	User-defined parameter 8		F0.00	0xFE08/0x0E08
FE-09	User-defined parameter 9		F0.00	0xFE09/0x0E09
FE-10	User-defined parameter 10		F0.00	0xFE0A/0x0E0A
FE-11	User-defined parameter 11		F0.00	0xFE0B/0x0E0B
FE-12	User-defined parameter 12		F0.00	0xFE0C/0x0E0C
FE-13	User-defined parameter 13		F0.00	0xFE0D/0x0E0D
FE-14	User-defined parameter 14		F0.00	0xFE0E/0x0E0E
FE-15	User-defined parameter 15		F0.00	0xFE0F/0x0E0F
FE-16	User-defined parameter 16		F0.00	0xFE10/0x0E10
FE-17	User-defined parameter 17		F0.00	0xFE11/0x0E11
FE-18	User-defined parameter 18		F0.00	0xFE12/0x0E12
FE-19	User-defined parameter 19		F0.00	0xFE13/0x0E13
FE-20	User-defined parameter 20		F0.00	0xFE14/0x0E14
FE-21	User-defined parameter 21		F0.00	0xFE15/0x0E15
FE-22	User-defined parameter 22		F0.00	0xFE16/0x0E16
FE-23	User-defined parameter 23		F0.00	0xFE17/0x0E17
FE-24	User-defined parameter 24		F0.00	0xFE18/0x0E18
FE-25	User-defined parameter 25		F0.00	0xFE19/0x0E19
FE-26	User-defined parameter 26		F0.00	0xFE1A/0x0E1A
FE-27	User-defined parameter 27		F0.00	0xFE1B/0x0E1B
FE-28	User-defined parameter 28		F0.00	0xFE1C/0x0E1C
FE-29	User-defined parameter 29		F0.00	0xFE1D/0x0E1D
FE-30	User-defined parameter 30		F0.00	0xFE1E/0x0E1E
FE-31	User-defined parameter 31		F0.00	0xFE1F/0x0E1F
Group FP: Function Parameter Management				
FP-00	User password	0 to 65535	0	0x1F00
FP-01	Industry macro	0: No operation 01: Restore factory parameters except motor parameters 02: Clear records 03: Reserved 04: Back up current user parameters 05 to 19: Reserved 20: Mechanical movement industry (conveying belt) 21: Inertia industry (fan) 22 to 500: Reserved 501: Restore user backup parameters	0	0x1F01

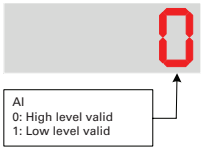
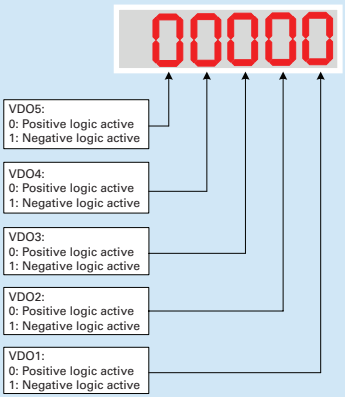
5. PARAMETER TABLE

Para. No.	Para. Name	Setting Range	Default	Comms. Address
FP-02	Parameter display property	00 to 11	11	0x1F02
FP-04	Parameter modification property	0: Modifiable 1: Unmodifiable	0	0x1F04
Group A1: Virtual DI/DO				
A1-00	VDI1 function selection	0 to 59	0	0xA100/0x4100
A1-01	VDI2 function selection	0 to 59	0	0xA101/0x4101
A1-02	VDI3 function selection	0 to 59	0	0xA102/0x4102
A1-03	VDI4 function selection	0 to 59	0	0xA103/0x4103
A1-04	VDI5 function selection	0 to 59	0	0xA104/0x4104
A1-05	VDI active state setting mode	00000 to 11111	00000	0xA105/0x4105
A1-06	Selection of VDI active state	00000 to 11111	00000	0xA106/0x4106







Para. No.	Para. Name	Setting Range	Default	Comms. Address
A1-07	Function selection for AI used as DI	Same as F4-00	0	0xA107/0x4107
A1-10	Active state selection for AI used as DI		0	0xA10A/0x410A
A1-11	VDO1 function selection	0: Connected with DIx internally 1 to 41: same as F5-04	0	0xA10B/0x410B
A1-12	VDO2 function selection	0: Connected with DIx internally 1 to 41: same as F5-04	0	0xA10C/0x410C
A1-13	VDO3 function selection	0: Connected with DIx internally 1 to 41: same as F5-04	0	0xA10D/0x410D
A1-14	VDO4 function selection	0: Connected with DIx internally 1 to 41: same as F5-04	0	0xA10E/0x410E
A1-15	VDO5 function selection	0: Connected with DIx internally 1 to 41: same as F5-04	0	0xA10F/0x410F
A1-16	VDO1 output delay	0.0 to 3600.0s	0.0s	0xA110/0x4110
A1-17	VDO2 output delay	0.0 to 3600.0s	0.0s	0xA111/0x4111
A1-18	VDO3 output delay	0.0 to 3600.0s	0.0s	0xA112/0x4112
A1-19	VDO4 output delay	0.0 to 3600.0s	0.0s	0xA113/0x4113
A1-20	VDO5 output delay	0.0 to 3600.0s	0.0s	0xA114/0x4114
A1-21	VDO active mode selection	00000 to 11111 	00000	0xA115/0x4115
Group A5: Control Optimization				
A5-00	DPWM switchover frequency upper limit	0.00 Hz to max. frequency	12.00 Hz	0xA500/0x4500
A5-02	Dead zone compensation mode selection	0: No compensation 1: Compensation mode 1	1	0xA502/0x4502
A5-03	Random PWM depth	0: Random PWM invalid 1 to 10: PWM carrier frequency random depth	3	0xA503/0x4503
A5-04	Overcurrent fast prevention	0: Disabled 1: Enabled	1	0xA504/0x4504

5. PARAMETER TABLE

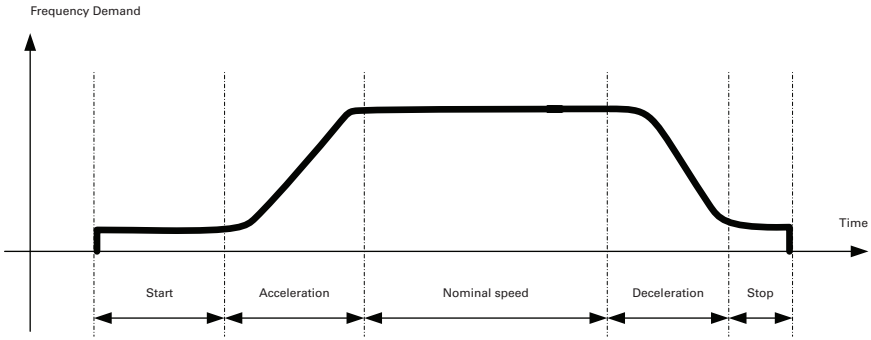
Para. No.	Para. Name	Setting Range	Default	Comms. Address
A5-05	Max. output voltage coefficient	100% to 110%	103%	0xA505/0x4505
A5-06	Undervoltage threshold	140.0 to 420.0 V	Single phase: 200.0 V Three phase: 350.0 V	0xA600/0x4600
A5-08	Low speed carrier frequency upper limit	0.0 to 6.0 kHz	0.0	0xA508/0x4508
A5-09	Overvoltage threshold	200.0 to 820.0 V	Single phase: 410.0 V Three phase: 820.0 V	0xA509/0x4509
Group A6: AI Curve Setting				
A6-24	Jump point of AI1 input corresponding setting	-100.0% to 100.0%	0.0%	0xA618/0x4618
A6-25	Jump amplitude of AI1 input corresponding setting	0.0% to 100.0%	0.5%	0xA619/0x4619
A6-26	Jump point of AI2 input corresponding setting	-100.0% to 100.0%	0.0%	0xA61A/0x461A
A6-27	Jump amplitude of AI2 input corresponding setting	0.0% to 100.0%	0.5%	0xA61B/0x461B
Group AA: FVC/SVC Extension Parameters				
AA-05	SVC speed filter	5 to 32ms	15 ms	0xAA05/0x4A05
AA-06	SVC speed feedback method	0 to 3	0	0xAA06/0x4A06
AA-07	SVC magnetic field adjustment bandwidth	0.5 to 8.0 Hz	4.0 Hz	0xAA07/0x4A07
AA-08	SVC magnetic field open loop control low speed current	30% to 150%	100	0xAA08/0x4A08
AA-09	Open loop control switchover frequency	2.0 to 100.0 Hz	4.0 Hz	0xAA07/0x4A07
AA-10	Open loop control deceleration speed fluctuation coefficient	0 to 6	3	0xAA0A/0x4A0A
AA-11	Open loop control acceleration/ deceleration time	0.1 to 1000.0s	50.0s	0xAA0B/0x4A0B
AA-12	Resistance identification upon startup	0: Disabled 1: Enabled	0	0xAA0C/0x4A0C
AA-13	Stator resistance coefficient 1 identification before startup	0 to 65535	Auto-tuning parameter	0xAA0D/0x4A0D
AA-14	Stator resistance coefficient 2 identification before startup	0 to 65535	Auto-tuning parameter	0xAA0E/0x4A0E
AA-15	Stator resistance coefficient 3 identification before startup	0 to 65535	Auto-tuning parameter	0xAA0F/0x4A0F
Group AC: AI/AO Correction				
AC-00	AI measured voltage 1	-10.00 to 10.000 V	350.0 V	0xAC00/0x4C00
AC-01	AI displayed voltage 1	-10.00 to 10.000 V	Factory-corrected	0xAC01/0x4C01
AC-02	AI measured voltage 2	-10.00 to 10.000 V	Factory-corrected	0xAC02/0x4C02
AC-03	AI displayed voltage 2	-10.00 to 10.000 V	Factory-corrected	0xAC03/0x4C03
AC-12	AO target voltage 1	-10.00 to 10.000 V	Factory-corrected	0xAC0C/0x4C0C
AC-13	AO measured voltage 1	-10.00 to 10.000 V	Factory-corrected	0xAC0D/0x4C0D
AC-14	AO target voltage 2	-10.00 to 10.000 V	Factory-corrected	0xAC0E/0x4C0E
AC-15	AO measured voltage 2	-10.00 to 10.000 V	Factory- corrected	0xAC0F/0x4C0F
Note: Parameters in groups A1 and A5 are not displayed by default. They can be displayed by setting FP-02.				
Group AE: AI/AO Manufacturer Correction Value				
AE-00	AI1 measured voltage 1	-9.999 to 4.000 V	2.000 V	0xAE00/0x4E00
AE-01	AI1 sampled voltage 1	-9.999 to 4.000 V	2.000 V	0xAE01/0x4E01
AE-02	AI1 measured voltage 2	-9.999 to 9.999 V	8.000 V	0xAE02/0x4E02
AE-03	AI1 sampled voltage 2	-9.999 to 9.999 V	8.000 V	0xAE03/0x4E03
AE-12	AO1 ideal voltage 1	0.500 to 4.000 V	2.000 V	0xAE0C/0x4E0C
AE-13	AO1 measured voltage 1	0.500 to 4.000 V	2.000 V	0xAE0D/0x4E0D
AE-14	AO1 ideal voltage 2	6.000 to 9.999 V	8.000 V	0xAE0E/0x4E0E
AE-15	AO1 measured voltage 2	6.000 to 9.999 V	8.000 V	0xAE0E/0x4E0E

5.3 MONITORING PARAMETERS

Para. No	Para. Name	Comms. Address
Group U0: Monitoring Parameters		
U0-00	Running frequency	0x7000
U0-01	Frequency reference	0x7001
U0-02	Bus voltage	0x7002
U0-03	Output voltage	0x7003
U0-04	Output current	0x7004
U0-05	Output power	0x7005
U0-06	Output torque	0x7006
U0-07	DI state	0x7007
U0-08	DO state	0x7008
U0-09	AI voltage	0x7009
U0-10	Communication protocol	0x700A
U0-11	External operating panel potentiometer voltage	0x700B
U0-12	Count value	0x700C
U0-13	Length value	0x700D
U0-14	Load speed display	0x700E
U0-15	PID reference	0x700F
U0-16	PID feedback	0x7010
U0-17	PLC stage	0x7011
U0-18	Pulse reference	0x7012
U0-19	Feedback speed	0x7013
U0-20	Remaining running time	0x7014
U0-21	AI voltage before correction	0x7015
U0-22	External operating panel potentiometer voltage	0x7016
U0-24	Motor speed	0x7018
U0-25	Accumulative power-on time	0x7019
U0-26	Accumulative running time	0x701A
U0-27	Pulse reference	0x701B
U0-28	Communication reference	0x701C
U0-30	Main frequency reference	0x701E
U0-31	Auxiliary frequency reference	0x701F
U0-32	Viewing any register address value	0x7020
U0-35	Target torque	0x7023
U0-37	Power factor angle	0x7025
U0-39	Target voltage upon V/F separation	0x7027
U0-40	Output voltage upon V/F separation	0x7028
U0-41	DI state display	0x7029
U0-42	DO state display	0x702A
U0-45	Fault information	0x702D
U0-59	Reserved	0x703B
U0-60	Reserved	0x703C
U0-61	AC drive state	0x703D
U0-62	Current fault code	0x703E
U0-63	Reserved	0x703F
U0-64	Number of slaves	0x7040
U0-65	Torque upper limit	0x7041
U0-69	Speed of transmitting DP	0x7045
U0-71	Communication card current display	0X7047
U0-78	Linear speed	0X704E

6. TROUBLESHOOTING

6.1 AC DRIVE PERFORMANCE FINE TUNING



Stage	Symptom	Diagnostics	Remedies
Start	Rollback	Start frequency is too low	Increase F6-03, ranging 0 to10 Hz
		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 10 Hz
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 6500s
	Jerk when acceleration ends	Too fast acceleration at this section	Increase F6-09, ranging 0 to (100-(F6-08))% or increase F0-17, ranging 0 to 6500s
	Vibration	Overcurrent stall prevention occurs	Decrease load to reduce current demand
Nominal speed	Vibration	Too large current loop PI gains	Double check the motor parameters and then perform motor auto-tuning once more
Deceleration	Vibration	Overcurrent stall prevention occurs	Decrease load to reduce current demand
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

6.2 FAULT CODES AND TROUBLESHOOTING

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 motor, motor cable or contactor.
		Acceleration time is too short.	Increase acceleration time.
		Customized torque boost or V/F curve is not appropriate.	Adjust the customized torque boost or V/F curve.
		The voltage is too low.	Adjust the voltage to normal range.
		The spinning motor is started.	Enable the catching a spinning motor function or start the motor after it stops.
		A load is added suddenly during acceleration.	Cancel the suddenly added load.
		The AC drive power class is too low.	Replace with a drive of a higher power class.
		The braking resistor resistance is low. The braking resistor is short circuited.	Replace with a new braking resistor.
Err03	Overcurrent during deceleration	Ground fault or short circuit exists in the output circuit.	Check whether short-circuit occurs on motor, motor cable or contactor.
		Acceleration time is too short.	Increase acceleration time.
		The voltage is too low.	Adjust the voltage to normal range.
		A load is added suddenly during deceleration.	Cancel the suddenly added load.
		Braking unit and braking resistor are not installed.	Install braking unit and braking resistor.
		The braking resistor resistance is small. The braking resistor is short circuited.	Replace a new braking resistor.
Err04	Overcurrent at constant speed	Ground fault or short circuit exists in the output circuit.	Check whether short circuit occurs on motor, motor cable or contactor.
		The voltage is too low.	Adjust the voltage to normal range.
		A load is added suddenly during running.	Cancel the suddenly added load.
		The AC drive power class is too low.	Replace with a drive of a higher power class.
		The braking resistor resistance is low. The braking resistor is short circuited.	Replace with a new braking resistor.
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.
		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	Input voltage is too high.	Adjust input voltage to normal range.
		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	Input voltage is too high.	Adjust input voltage to normal range.
		An external force drives motor during running.	Cancel the external force or install a braking resistor
Err08	Control power fault	Input voltage is not within the permissible range.	Adjust the input voltage to within the permissible range.

6. TROUBLESHOOTING

6.2 FAULT CODES AND TROUBLESHOOTING

Display	Fault Name	Possible Causes	Solutions
Err09	Undervoltage	Instantaneous power failure occurs.	Reset the fault.
		The AC drive's input voltage is not within the permissible range.	Adjust the voltage to within normal range.
		The bus voltage is abnormal.	Replace the AC drive.
		The rectifier bridge, the pre-charge resistor, the drive board or the control board are abnormal.	Replace the AC drive.
Err10	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 too low.	Replace with a drive of a higher power class.
Err11	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.
		The AC drive power class is too low.	Replace with a drive of a higher power class.
Err12	Input phase loss	Three phase input is abnormal.	Eliminate faults in external circuitry.
		Drive board is abnormal.	Eliminate faults in external circuitry.
		Lightning protection board is abnormal.	Contact the agent or Benshaw.
		Control board is abnormal.	Contact the agent or Benshaw.
Err13	Output phase loss	Motor winding is damaged.	Check resistance between motor cables. Replace motor winding that 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 is abnormal.	Replace the AC drive.
Err14	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.
		Thermally sensitive resistor of IGBT is damaged.	Replace the AC drive.
		The AC drive IGBT is damaged.	Replace the AC drive.
Err15	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.
Err16	Communication fault	Host computer is in abnormal state.	Check the cable of host computer.
		Communication cable is abnormal.	Check the communication cables.
		Communication parameters in Group Fd are set improperly.	Set communication parameters in Group Fd properly.
		If, after checking all the preceding, the fault still exists, restore the default settings.	
Err18	Current detection fault	The drive board is abnormal.	Replace the AC drive.
Err21	EEPROM read- write fault	EEPROM chip is damaged	Replace the AC drive.
Err23	Short circuit to ground	Motor is short circuited to the ground.	Replace cable or motor.
		Top tube of the AC drive is damaged. Ask professional to check.	Replace the AC drive.

Display	Fault Name	Possible Causes	Solutions
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.	Reset the operation.
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.	Reset the operation.
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 lower 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 lower 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 too low.	Replace with a drive of a higher power class.
Err55	Slave faulty in speed synchronous	When speed synchronous is enabled, the master receives CAN communication data but does not detect the slave. Then Err55 is reported.	1. Check the slave CAN communication cable connection. 2. Check whether CAN communication of the slave is normal.

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 AC drive is damaged.	Replace the AC drive.
HC is displayed at power-on.	Cable between drive board and control board is in poor contact.	Re-connect the 4-pin cable and 28-pin cable.
	Control board is damaged	Replace the AC drive.
	The motor or motor cable is short circuited to ground.	Check whether short circuit occurs on motor, motor cable or contactor.
	The mains voltage is too low.	Check the power supply.
Err14 (IGBT overheat) is detected frequently.	The carrier frequency setting 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).	Replace the AC drive.
The motor does not rotate after the AC drive runs.	There is a 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 motor parameters properly.
	The drive board is faulty.	Replace the AC drive.
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.
	The control board is damaged.	Replace the AC drive.
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 Benshaw.

BENSHAW POWERPRO™

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