INR-SI47-2392b-E

3rd Edition, May 2022

Instruction Manual

FRENIC-MEGA series
FRN□□□□G2□－□G

Thank you for purchasing our FRENIC-MEGA series of inverters.
The purpose of this instruction manual is to provide handing information in handling, setting up and operating of the FRENIC-MEGA series of inverters.
Do not use this product until you have full knowledge of the product, safety information and instructions from Instruction Manual (Detailed Version) and Related documents.

[Related Documents]

Instruction Manual (Detailed Version)	INR-SI47-2395□-E
User's Manual	24A7-E-0162□
RS-485 Communication User's Manual	24A7-E-0082□

This manuals can be downloaded in PDF form from QR code in right figure.

Instruction manual QR code

https://www.fujielectric.com/products/inverter/frenic-megag2/download/_pr/

Fuji Electric Co., Ltd.

Please feel free to send your comments regarding any errors or omissions you may have found, or any suggestions you may have for generally improving the manual.
In no event will Fuji Electric Co., Ltd. be liable for any direct or indirect damages resulting from the application of the information in this manual.

⚠CAUTION

Thank you for purchasing our FRENIC-MEGA series of inverters.
- This product is designed to drive a three-phase induction motor and three-phase permanent magnet synchronous motor. Read through this instruction manual and be familiar with the handling procedure for correct use.
- Improper handling might result in incorrect operation, a short life, or even a failure of this product as well as the motor.
- Deliver this manual to the end user of this product.
- Keep this manual in a safe place until this product is discarded.
- For instructions on how to use an optional device, refer to the instruction and installation manuals for that optional device.
- Drawings in this manual may be illustrated without covers or safety shields for explanation of detail parts. Restore the covers and shields in the original state and observe the description in the manual before starting operation.

⚠WARNING⚠

Application
- The FRENIC-MEGA is a piece of equipment used to run three-phase motors. It cannot be used for single-phase motors or other applications.
  Failure to observe this could result in fire or an accident.
- The FRENIC-MEGA cannot be used as is for applications which may have a direct effect on the human body such as life support machines.
- Strict quality control has been observed in the manufacture of this product, however, safety devices should be installed when the product is used for equipment which may result in a serious accident or loss in the event of failure.
  Failure to observe this could result in an accident.

Installation
- Install on noncombustibles such as metal.
- Do not install near combustibles.
  Failure to observe this could result in fire.
- If using an optional DC reactor, there is a possibility of users coming into contact with main circuit terminal block parts (live parts). In such cases, take measures such as installing the product in a location where it will not easily come into contact with people.
  Failure to observe this could result in electric shock or injury.

Wiring
- If no zero-phase current (earth leakage current) detective device such as a ground-fault relay is installed in the upstream power supply line in order to avoid the entire power supply system's shutdown undesirable to factory operation, install a residual-current-operated protective device (RCD) / earth leakage circuit breaker (ELCB) individually to inverters to break the individual inverter power supply lines only.
- Connect to the power supply via a molded case circuit breaker or earth leakage circuit breaker (with overcurrent protection function) for each inverter. Use the recommended molded case circuit breaker or earth leakage circuit breaker, and do not use devices that exceed the recommended capacity.
- Be sure to use the specified wire size.
- Tighten terminals with the prescribed tightening torque.
- If there are multiple inverter and motor combinations, do not use multi-core cables for the purpose of bundling and storing wiring for multiple combinations.
- Do not install a surge suppressor to the inverter output side (secondary side).
- Be sure to connect an optional DC reactor (DCR) when the capacity of the power supply transformer exceeds 500 kVA, and is at least 10 times the inverter rated capacity.
  Failure to observe this could result in fire.
- Ground the inverter in compliance with the national or local electric code.
- Be sure to ground the inverter ground terminal [⏚G] grounding wire.
  Failure to observe this could result in electric shock or fire.
- Wiring work should be carried out by qualified professionals.
- Carry out wiring work after ensuring that the power has been turned OFF.
  Failure to observe this could result in electric shock.
- Always carry out wiring after installing the unit.
  Failure to observe this could result in electric shock or injury.
- Ensure that the number of phases and rated voltage of the product input power supply matches that for the connected power supply.
- Do not connect the power lines to the inverter output terminals (U, V, W).
- When connecting a DC braking resistor (DBR), never connect it to terminals other than terminals P(+) and DB.
  Failure to observe this could result in fire or an accident.
- Control signal lines generally do not have a reinforced insulation coating, and therefore if control signal lines come into contact with live parts of the main circuit, the insulation coating may be damaged for some reason. In such a case, there is a danger that high voltage from the main circuit will be applied to the control signal lines, and therefore care should be taken to ensure that they do not come into contact with live parts of the main circuit.
  Failure to observe this could result in an accident or electric shock.
- Switch all switches after first waiting for at least 5 minutes for FRN0115G2S-2G / FRN0060G2□-4G or lower inverters, or 10 minutes for FRN0146G2S-2G / FRN0075G2□-4G or higher inverters, ensuring that the LED monitor and charge lamp are off, and using a device such as a tester to ensure that the DC intermediate circuit voltage across main circuit terminals P and N has dropped to a safe level (+25 VDC or less).
  Failure to observe this could result in electric shock.

Operation
- Be sure to attach the inverter surface cover before turning the power ON. Do not remove the surface cover while the power is ON.
- Do not operate the unit with wet hands.
  Failure to observe this could result in electric shock.
- If the product stops after being tripped when the retry function is selected, depending on the cause of the trip, the product will restart automatically, and the motor will rotate. Design the machinery so that human body and peripheral equipment safety is ensured even when the auto-resetting succeeds. Design machines in such a way as to ensure the safety of the human body and surrounding area even when operation is resumed.
- There may be times when the stall prevention function (torque limiting) causes the product to run at an acceleration / deceleration time or speed different from the set values. Design machines in such a way that safety is ensured even at such times.
  Failure to observe this could result in an accident.
- The keypad (STOP) key is enabled only when keypad operation is selected with function code F02. Please prepare a separate EMERGENCY STOP button. When function code H96 has been set to “0” or “2”, the (STOP) key will be disabled if the operation command method is changed from operation command with the keypad by selecting link operation "LE".
- If any of the protective functions has been activated, first remove the cause. Then, after checking that all run commands are set to OFF, release the alarm. If the alarm is released while any run command is set to ON, the inverter may supply the power to the motor, running the motor.
  Failure to observe this could result in an accident.
- By selecting the momentary power failure resume operation (F14 = 3 to 5), operation will resume automatically following recovery. Design machines in such a way as to ensure operator safety even when operation is resumed.
- Set function codes after ensuring a sufficient understanding of this Instruction Manual. If operation is performed after recklessly changing function code data, the motor may rotate at a torque and speed at which the machine is unable to tolerate.
- When auto tuning is started, the motor rotates. Conduct a sufficient check to ensure that there is no danger even when the motor rotates.
  Failure to observe this could result in an accident or injury.
- Even if the inverter cuts off the supply of power to the motor, if voltage is being applied to main power supply input terminals L1/R, L2/S, and L3/T, voltage may be output to inverter output terminals U, V and W.
- Even if the motor is stopped by DC braking operation or pre-excitation operation, voltage will be output to the inverter output U, V and W terminals.
  Failure to observe this could result in electric shock.
- Inverter high-speed operation settings can be specified easily. If settings are changed, use the product after sufficiently checking the motor and machine specification.
  Failure to observe this could result in injury.

Maintenance and inspection, part replacement
- Carry out inspection after waiting at least 5 minutes for FRN0115G2S-2G / FRN0060G2□-4G or lower inverters, or 10 minutes for FRN0146G2S-2G / FRN0075G2□-4G or higher inverters after turning OFF the power. Furthermore, ensure that the LED monitor and charge lamp are OFF, and use a device such as a tester to ensure that the DC intermediate circuit voltage across main circuit terminals P (+) and N (-) has dropped to a safe level (+25 VDC or less).
  Failure to observe this could result in electric shock.
- Be sure to perform the daily inspection and periodic inspection described in the instruction manual. Lengthy use of the product without inspection could result in inverter failure and damage, or accident and fire.
- A periodic inspection cycle of 1 to 2 years is recommended, however, the cycle may be shortened depending on the usage conditions.
- It is recommended that parts for periodic replacement be replaced after the standard number of years indicated in the instruction manual. Lengthy use of the product without replacing parts could result in inverter failure and damage, or accident and fire.
- Contact outputs [30A/B/C] and [Y5A/C] use relays, and may remain ON or OFF, or in an indefinite state when the life is reached. In the interests of safety, equip the product with an external protection function.
  Failure to observe this could result in fire or an accident.
- Maintenance and inspection, and part replacement should only be carried out by the authorized personnel.
- Remove all metal objects (watches, rings, etc.) before beginning work.
- Be sure to use insulated tools.
- Never modify the product.
  Failure to observe this could result in electric shock or injury.

⚠CAUTION

Installation
- Do not hold the surface cover when transporting the product.
  Failure to observe this could result in injury if the product is dropped.
- Take measures to prevent foreign material such as lint, wastepaper, wood shavings, dust, or metal scraps getting into the inverter, or adhering to the cooling fan.
- Use the specified screws for changing the mounting base.
  Failure to observe this could result in fire or an accident.
- Do not install or run inverters with damaged external or internal parts.
  Failure to observe this could result in fire, an accident, or injury.

Wiring
- The inverter, motor and wiring generate electric noise, which may cause nearby sensors and devices to malfunction. Employ noise countermeasures to prevent malfunction.
  Failure to observe this could result in an accident.

Operation
- The cooling fans and braking resistors become very hot. Do not touch.
  Failure to observe this could result in burns.
- Mechanical holding is not possible with the inverter brake function.
  Failure to observe this could result in injury.
- The digital input terminals are equipped with a function used to start and stop operation or change the speed command with the "FWD" operation command or "BX" free-run command and so on. Depending on the digital input terminal status, operation may start suddenly, or the speed may change significantly simply by changing the function code settings. Make changes to function code settings after sufficiently ensuring safety.
- With digital input, functions ("SS1, SS2, SS4, SS8", "Hz2/Hz1", "Hz/PID", "IVS", "LE", etc.) used to change the operation procedure for operation commands or command procedure for speed commands can be assigned. Depending on the conditions, changes to these signals may result in operation being started suddenly or the speed changing suddenly.
- Ensure safety before modifying customizable logic related function code settings (U codes and related function codes) or turning ON the "Cancel customizable logic" terminal command CLC. Depending upon the settings, such modification or cancellation of the customizable logic may change the operation sequence to cause a sudden motor start or an unexpected motor operation. Carry out a sufficient safety check beforehand.
  Failure to observe this could result in an accident or injury.

Disposal
- If disposing of the FRENIC-MEGA, handle as industrial waste.
  Failure to observe this could result in injury.

Chapter 1 BEFORE USE

1.1 Acceptance Inspection (Nameplate and Inverter Type)

Unpack the package and check the following:
(1) Ensure that the package contains both the inverter unit and instruction manual (this manual), and that the product has suffered no damage (breakage, dents, parts that have fallen off) during transport.
(2) The (a) Main Nameplate and (b) Sub Nameplate shown in Figure 1-1 are affixed to the inverter. Ensure that the product is the same as the one ordered.

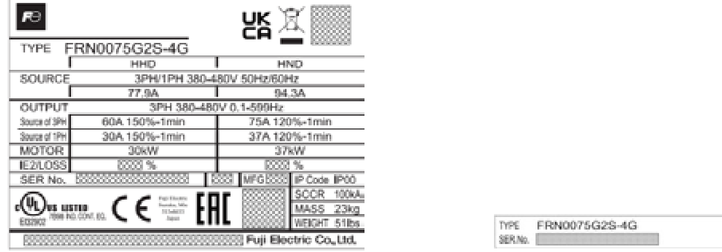


Figure 1-1 (a) Main Nameplate (b) Sub Nameplate

TYPE: Type of inverter

FRN 0003 G 2 S - 2 G

Code	Series name
FRN	FRENIC series

3-phase 200 V series

Code	Applicable motor rating	
	HHD kW (HP)	HND kW (HP)
0003	0.4 (1/2)	-
0005	0.75 (1)	-
≀	≀	-
0018	3.7 (5)	-
0032	5.5 (7.5)	7.5 (10)
0059	11 (15)	15 (20)
≀	≀	≀
0346	75 (100)	90 (125)
0432	90 (125)	110 (150)

3-phase 400 V series

Code	Applicable motor rating	
	HHD kW (HP)	HND kW (HP)
0002	0.4 (1/2)	-
0003	0.75 (1)	-
≀	≀	-
0009	3.7 (5)	-
0018	5.5 (7.5)	7.5 (10)
0031	11 (15)	15 (20)
≀	≀	≀
1170	500 (800)	630 (900)
1386	630 (900)	710 (1000)

Code	Destination/Manual
G	Global/English

Code	Input power source
2	3-phase 200V
4	3-phase 400V

Code	Enclosure
S	Standard (basic type)(IP20/IP00)
E	EMC filter built-in type

Code	Order of development
2	2

Code	Applicable range
G	High performance, multifunctional type

SER.No.: Product number Production year and week
T31 A 1 2 3 A 0 5 7 9 E AA 3 0 1
Production week: This indicates the week number that is numbered from 1st week of January. The 1st week of January is indicated as '01'.
Production year: Last digit of year
Product version

If you suspect the product is not working properly or if you have any questions about your product, contact your Fuji Electric representative.

Chapter 2 INSTALLATION AND WIRING

2.1 Operating Environment

Install the inverter in an environment that satisfies the requirements listed inTable 2-1.

Table 2-1 Operating environment

<table>
<tr><th>Item</th><th colspan="5">Specifications</th></tr>
<tr><td>Site location</td><td colspan="5">Indoors Environmental conditions: IEC60721-3-3:3C2</td></tr>
<tr><td>Ambient temperature</td><td colspan="5">-10 to +55 °C (14 to 131ºF) (Current derating is necessary in the +50 to +55 ºC (122 to 131ºF) range.)
When installed closely side-by-side (FRN0115G2S-2G / FRN0060G2□-4G or lower): -10 to +40 °C (14 to 104ºF)</td></tr>
<tr><td>Relative humidity</td><td colspan="5">5 to 95% RH (there should be no condensation)</td></tr>
<tr><td>Atmosphere</td><td colspan="5">The inverter must not be exposed to dust, direct sunlight, corrosive gases, flammable gases, oil mist, vapor or water droplets.
(Pollution degree 2 (IEC60664-1)) (Note 1)
The atmosphere can contain a small amount of salt (0.01 mg/cm^2 or less per year).
The inverter must not be subjected to sudden changes in temperature that will cause condensation to form.</td></tr>
<tr><td>Altitude</td><td colspan="5">1,000 m (3,300 ft) max. (Note 2)</td></tr>
<tr><td>Atmospheric pressure</td><td colspan="5">86 to 106 kPa</td></tr>
<tr><td rowspan="4">Vibration</td><td>Type of inverter</td><td>2 to less than 9 Hz</td><td>9 to less than 20 Hz</td><td>20 to less than 55 Hz</td><td>55 to less than 200 Hz</td></tr>
<tr><td>FRN0115G2S-2G or lower,
FRN0060G2□-4G or lower</td><td rowspan="3">3 mm
(max. amplitude)</td><td rowspan="2">9.8 m/s^2</td><td>5.9 m/s^2</td><td rowspan="3">1 m/s^2</td></tr>
<tr><td>FRN0288G2S-2G or lower,
FRN0180G2□-4G or lower</td><td rowspan="2">2 m/s^2</td></tr>
<tr><td>FRN0346G2S-2G or higher,
FRN0216G2□-4G or higher</td><td>2 m/s^2</td></tr>
</table>

(Note 1) Do not install the inverter in an environment where it may be exposed to lint, cotton waste or moist dust or dirt which will clog the heat sink of the inverter. If the inverter is to be used in such an environment, install it in cabinet to prevent lint, etc. getting in.
(Note 2) If you use the inverter in an altitude above 1,000 m (3,300 ft), you should apply an output current derating factor as listed in Table 2-2

Table 2-2 Output Current Derating Factor in Relation to Altitude

Altitude	Output current derating factor
1,000 m (3,300 ft) or less	1.00
1,000 to 1500 m (3,300 to 4,900 ft)	0.97
1,500 to 2,000 m (4,900 to 6,500 ft)	0.95
2,000 to 2,500 m (6,500 to 8,200 ft)	0.91
2,500 to 3,000 m (8,200 to 9,800 ft)	0.88

Fuji Electric strongly recommends installing inverters in a panel for safety reasons, in particular, when installing the ones whose enclosure rating is IP00.
When installing the inverter in a place out of the specified environmental requirements, it is necessary to derate the inverter or consider the panel engineering design suitable for the special environment or the panel installation location.

2.2 Installation

2.2.1 Installation Surface

Please install the inverter on noncombustibles such as metal. Also, do not mount it upside down or horizontally.

2.2.2 Surrounding Space

Secure the surrounding space shown in Figure 2-1 and Table 2-3. If enclosing the product in a cabinet and so on, be sure to provide adequate ventilation to the cabinet, as the ambient temperature may rise. Do not contain it in small enclosures with low heat dissipation capacity.

■ Installation of Multiple Inverters
If installing two or more units inside the same equipment or cabinet, they must be installed side by side as a rule. If vertical installation is unavoidable, install partitions to prevent heat dissipation from inverters below affecting those above.
With FRN0115G2S-2G / FRN0060G2□-4G or lower inverters, only in the case of an ambient temperature of 40°C (104°F) or below is it possible to install inverters and converters closely together horizontally.

Table 2-3 Surrounding space mm (inch)

Type of Inverter		A	B	C
FRN□□□□ G2S-2G	FRN□□□□ G2□-4G			
0003 to 0008	0002 to 0004	50 (1.97)	100 (3.9)	0 (0)
0011 to 0115	0006 to 0060	10 (0.39)		
0146 to 0432	0075 to 0520	50 (1.97)		100 (3.9)
—	0650 to 1386		150 (5.9)	150 (5.9)

C: Space in front of the inverter unit

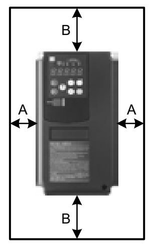
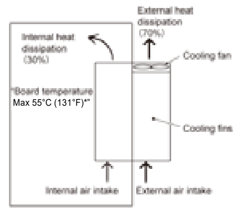


Figure 2-1 Installation direction



* Current derating is necessary in the +50 to +55°C (122 to 131°F) range.

Figure 2-2 External cooling installation method

■ Installation with External Cooling
The external cooling installation reduces the generated heat inside the panel by dissipating approximately 70% of the total heat generated (total heat loss) by mounting the cooling fins protruding outside the equipment or cabinet. The external cooling unit body has a protective construction of IP55.
Installation with external cooling is possible for inverters FRN0115G2S-2G / FRN0060G2□-4G or lower with the addition of an external cooling attachment (option), and for FRN0146G2S-2G / FRN0075G2□-4G or higher inverters by moving the mounting base. (For external cooling attachment (option) external drawings, refer to Chapter 11 section 11.16 in the User's Manual, and for details on the installation method for FRN0146G2S-2G / FRN0075G2□-4G inverters or higher, refer to Chapter 2 section 2.1 in the same manual.)
Take measures to prevent foreign material such as lint, wastepaper, wood shavings, dust, or metal scraps getting into the inverter, or adhering to the cooling fan.

2.2.3 Removal and Attachment of the Front Cover and the Wiring Guide

Carry out wiring work in the following order (The descriptions assume that the inverter has already been installed). If using the RS-485 communication cable for such purposes as remotely operating the keypad, always remove the RS-485 communication cable from the RJ-45 connector before removing the front cover.

(1) FRN0115G2S-2G / FRN0060G2□-4G or lower inverters
1) Loosen the screws of the front cover. Hold both sides of the front cover with the hands, slide the cover downward, and pull. Then remove it to the upward direction.
2) Push the wiring guide upward and pull. Let the wiring guide slide and remove it.
3) After routing the wires, attach the wiring guide and the front cover reversing the steps above.

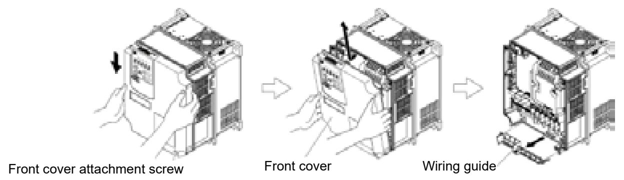


Figure 2-3 Removal of front cover and wiring guide (for FRN0031G2S-4G)

(2) FRN0146G2S-2G / FRN0075G2□-4G or higher inverters
1) Loosen the screws of the front cover. Hold both sides of the front cover by hand, and slide the cover upward to remove.
2) After carrying out wiring work, align the top of the front cover with the hole on the cover, and reattach using the opposite procedure to that in Figure 2-4.
Open the keypad case to expose the control PCB.

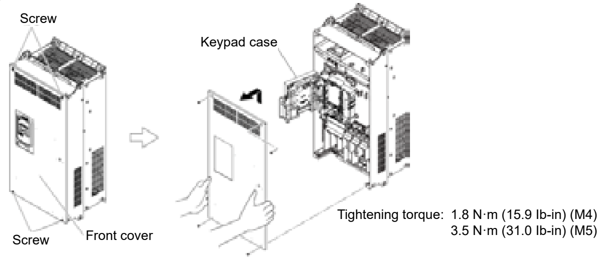


Figure 2-4 Removal of the front cover (for FRN0075G2S-4G)

2.2.4 Terminal Layout and Screw Specifications

2.2.4.1 Screw Specifications and Recommended Wire Size (Main Circuit Terminals)

The specifications for the screws used in the main circuit wiring and the wire sizes are shown below. Exercise caution as the terminal position varies depending on inverter capacity. The two ground terminals [⏚G] are not differentiated for the input side (primary side) and the output side (secondary side).
Also, use crimped terminals with insulating sleeves compatible for main circuit or terminals with insulating tubes. The recommended wire sizes are shown depending on cabinet temperature and wire type.

Table 2-4 Screw specifications

Inverter type		Screw specification					
Three-phase 200 V	Three-phase 400 V	Main circuit		Grounding		Control power auxiliary input [R0, T0]	
		Screw size (driver size)	Tightening torque N•m (lb-in)	Screw size (driver size)	Tightening torque N•m (lb-in)	Screw size	Tightening torque N•m (lb-in)
FRN0003G2S-2G	FRN0002G2□-4G	M3.5	1.2 (10.6)	M3.5	1.2 (10.6)	—	—
FRN0005G2S-2G	FRN0003G2□-4G						
FRN0008G2S-2G	FRN0004G2□-4G	M4	1.8 (15.9)	M4	1.8 (15.9)	M3.5	1.2 (10.6)
FRN0011G2S-2G	FRN0006G2□-4G						
FRN0018G2S-2G	FRN0009G2□-4G						
FRN0032G2S-2G	FRN0018G2□-4G	M5	3.5 (31.0)	M5	3.5 (31.0)		
FRN0046G2S-2G	FRN0023G2□-4G						
FRN0059G2S-2G	FRN0031G2□-4G						
FRN0075G2S-2G	FRN0038G2□-4G	M6 (No.3)	5.8 (51.3)	M6 (No.3)	5.8 (51.3)		
FRN0088G2S-2G	FRN0045G2□-4G						
FRN0115G2S-2G	FRN0060G2□-4G						
FRN0146G2S-2G	FRN0075G2□-4G	M8	13.5 (119)	M8	13.5 (119)		
	FRN0091G2□-4G						
	FRN0112G2□-4G						
	FRN0150G2□-4G						
FRN0180G2S-2G	FRN0180G2□-4G	M10	27 (239)				
FRN0215G2S-2G							
FRN0288G2S-2G							
—	FRN0216G2□-4G						
—	FRN0260G2□-4G						
FRN0346G2S-2G	—	M12	48 (425)	M10	27 (239)		
—	FRN0325G2□-4G						
—	FRN0377G2□-4G						
FRN0432G2S-2G	FRN0432G2□-4G						
	FRN0520G2□-4G						
—	FRN0650G2□-4G						
—	FRN0740G2□-4G						
—	FRN0960G2□-4G						
—	FRN1040G2□-4G						
—	FRN1170G2□-4G						
—	FRN1386G2□-4G						

2.2.4.2 Terminal Layout Diagrams (Main Circuit Terminals)

Refer to Chapter 2 section 2.2.5 [2] in the User's Manual for the main circuit terminal layout.

The following terminals will have high voltage when power is ON. **Failure to observe this could result in electric shock.**

Main circuit: L1/R, L2/S, L3/T, P1, P(+), N(-), DB, U, V, W, R0, T0, AUX-contact (30A, 30B, 30C, Y5A, Y5C)
Insulation level
Main circuit - casing : Basic insulation (overvoltage category III, pollution degree 2)
Main circuit - control circuit : Reinforced insulation (overvoltage category III, pollution degree 2)
Contact output - control circuit : Reinforced insulation (overvoltage category II, pollution degree 2)

2.2.5 Recommended Wire Size

Table 2-5 shows recommended wire sizes. The examples of recommended wire sizes for main circuit terminals are based on the use of single HIV wires at ambient temperature of 50ºC (122ºF).
Refer to Chapter 2 in the User's Manual for conditions other than these.

Table 2-5 Recommended wire sizes (panel internal temperature: 50ºC (122ºF) or less, wire type: 75ºC (167ºF) wire)

Power system	Standard applicable motor (kW)	Inverter type (Note 1)		Recommended wire size (mm^2)							
				Main power supply input [L1/R, L2/S, L3/T]		For DC reactor connection [P1, P(+)]	For braking resistor connection [P(+), DB] (Note 2)		For inverter grounding [⏚G]	Inverter output [U, V, W]	
				DC reactor (DCR)			HHD	HND		HHD	HND
		HHD specification	HND specification	With	Without						
Three-phase 200 V	0.4	FRN0003G2S-2G	—	2.0	2.0	2.0	2.0	—	2.0	2.0	—
	0.75	FRN0005G2S-2G		2.0	2.0	2.0	2.0		2.0	2.0	
	1.5	FRN0008G2S-2G		2.0	2.0	2.0	2.0		2.0	2.0	
	2.2	FRN0011G2S-2G		2.0	2.0	2.0	2.0		2.0	2.0	
	3.7	FRN0018G2S-2G		2.0	2.0	2.0	2.0		2.0	2.0	
	5.5	FRN0032G2S-2G		2.0	3.5	3.5	2.0		3.5	3.5	
	7.5	FRN0046G2S-2G	FRN0032G2S-2G	3.5	5.5	5.5	2.0	2.0	5.5	5.5	3.5
	11	FRN0059G2S-2G	FRN0046G2S-2G	5.5	14	8.0	2.0	2.0	5.5	8.0	8.0
	15	FRN0075G2S-2G	FRN0059G2S-2G	14	14	14.0	2.0	2.0	8 *3	14	14.0
	18.5	FRN0088G2S-2G	FRN0075G2S-2G	14	22	22.0	2.0	2.0	8 *3	14	14.0
	22	FRN0115G2S-2G	FRN0088G2S-2G	22	38 *1	22.0	2.0	2.0	14	22	22.0
	30	—	FRN0115G2S-2G	38 *1	60 *2	38 *1	—	2.0	14	38	38 *1
	30	FRN0146G2S-2G	—	38	60	38	2	—	14	38	—
	37	—	FRN0146G2S-2G	38	60	60	—	2	22	—	38
		FRN0180G2S-2G	—	38	60	60	3.5	—	22	38	—
	45	FRN0215G2S-2G	FRN0180G2S-2G	60	100	100	3.5	3.5	22	60	60
	55	FRN0288G2S-2G	FRN0215G2S-2G	100	100	100	5.5	3.5	22	100	100
	75	—	FRN0288G2S-2G	150	—	150	—	5.5	22	—	150
		FRN0346G2S-2G	—	150		150	8	—	22	150	—
	90	—	FRN0346G2S-2G	150		200	—	8	22	—	150
		FRN0432G2S-2G	—	150		200	14	—	22	150	—
	110	—	FRN0432G2S-2G	200		250	—	14	38	—	250
Three-phase 400 V	0.4	FRN0002G2□-4G	—	2.0	2.0	2.0	2.0	—	2.0	2.0	—
	0.75	FRN0003G2□-4G		2.0	2.0	2.0	2.0		2.0	2.0	
	1.5	FRN0004G2□-4G		2.0	2.0	2.0	2.0		2.0	2.0	
	2.2	FRN0006G2□-4G		2.0	2.0	2.0	2.0		2.0	2.0	
	3.7	FRN0009G2□-4G		2.0	2.0	2.0	2.0		2.0	2.0	
	5.5	FRN0018G2□-4G		2.0	2.0	2.0	2.0		2.0	2.0	
	7.5	FRN0023G2□-4G	FRN0018G2□-4G	2.0	2.0	2.0	2.0	2.0	3.5	2.0	2.0
	11	FRN0031G2□-4G	FRN0023G2□-4G	2.0	3.5	3.5	2.0	2.0	3.5	3.5	2.0
	15	FRN0038G2□-4G	FRN0031G2□-4G	3.5	5.5	5.5	2.0	2.0	5.5	3.5	3.5
	18.5	FRN0045G2□-4G	FRN0038G2□-4G	5.5	8 *3	5.5	2.0	2.0	5.5	5.5	5.5
	22	FRN0060G2□-4G	FRN0045G2□-4G	5.5	14	8 *3	2.0	2.0	5.5	8 *3	8 *3
	30	—	FRN0060G2□-4G	14	14	14	—	2.0	8 *3	14	14
	30	FRN0075G2□-4G	—	14	14	14	2	—	8	14	14
	37	FRN0091G2□-4G	FRN0075G2□-4G	14	22	22	2	2	8	14	14
	45	FRN0112G2□-4G	FRN0091G2□-4G	22	38	22	2	2	8	22	22
	55	FRN0150G2□-4G	FRN0112G2□-4G	22	38	38	2	2	14	38	38
	75	—	FRN0150G2□-4G	38	—	60	—	2	14	—	60
	75	FRN0180G2□-4G	—	38		60	2	—	14	60	—
	90	FRN0216G2□-4G	FRN0180G2□-4G	60		100	3.5	2	14	60	60
	110	FRN0260G2□-4G	FRN0216G2□-4G	100		100	5.5	3.5	22	100	100
	132	—	FRN0260G2□-4G	100		150	—	5.5	22	—	100
	132	FRN0325G2□-4G	—	100		150	5.5	—	22	100	—
	160	FRN0377G2□-4G	FRN0325G2□-4G	150		150	8	5.5	22	150	150
	200	FRN0432G2□-4G	FRN0377G2□-4G	150		250	14	8	38	200	200
	220	FRN0520G2□-4G	FRN0432G2□-4G	200		250	14	14	38	250	250
	280	FRN0650G2□-4G	FRN0520G2□-4G	250		2x200	22	14	38	325	325
	315	FRN0740G2□-4G	—	325		2x200	22	—	60	325	—
	355	FRN0960G2□-4G	FRN0650G2□-4G	2x200		2x250	38	22	60	2x200	2x200
	400	FRN1040G2□-4G	FRN0740G2□-4G	2x200		2x325	38	38	60	2x250	2x250
	500	—	FRN0960G2□-4G	2x325		3x325	—	38	100	—	2x325
	500	FRN1170G2□-4G	—	2x325		3x325	60	—	100	2x325	—
	560	—	FRN1040G2□-4G	3x250		3x325	—	38	100	—	3x250
	630	FRN1386G2□-4G	FRN1170G2□-4G	3x325		4x325	100	60	150	3x325	3x325
	710	—	FRN1386G2□-4G	4x250		5x325	—	100	150	—	4x325

(Note 1) The □ is replaced by a letter of the alphabet indicating the type (S: standard type, E: type with built-in EMC filter).
(Note 2) A braking unit (BU) (option) is necessary for FRN0346G2S-2G and above / FRN0216G2□-4G and above.
*1 For compatible crimped terminals, please use model 38-6 by JST Mfg. Co., Ltd. or equivalent.
*2 For compatible crimped terminals, please use model 60-6 by JST Mfg. Co., Ltd. or equivalent.
*3 For compatible crimped terminals, please use model 8-L6 by JST Mfg. Co., Ltd. or equivalent.

2.2.5.1 Screw Specifications and Recommended Wire Size (Control Circuit Terminals)

The specifications for the screws used in the control circuit wiring and the wire sizes are shown below.

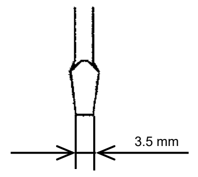
Table 2-6 Screw specifications and recommended wire sizes

Common terminal	Screw specification		Permissible wire size mm^2 (AWG)	Recommended wire size mm^2 (AWG)	Driver (shape of tip)	Wire coating removal size	Rod terminal *1 Terminal block opening dimension
	Size	Tightening torque N·m (lb-in)					
Control circuit terminal	M3	0.5 to 0.6 (4.43 to 5.31)	0.14 to 1.5 (26 to 16)	0.3 to 0.75 (22 to 18)	Minus (0.6 mm × 3.5 mm) (0.02 in × 0.14 in)	6 mm (0.24 in)	A1 *2 (2.75mm ×1.95mm) (0.11 in × 0.08 in)

*1 Recommended rod terminal: Phoenix Contact. Refer to Table 2-7 for more information.
*2 Based on IEC/EN 60947-1.

Table 2-7 Recommended rod terminals

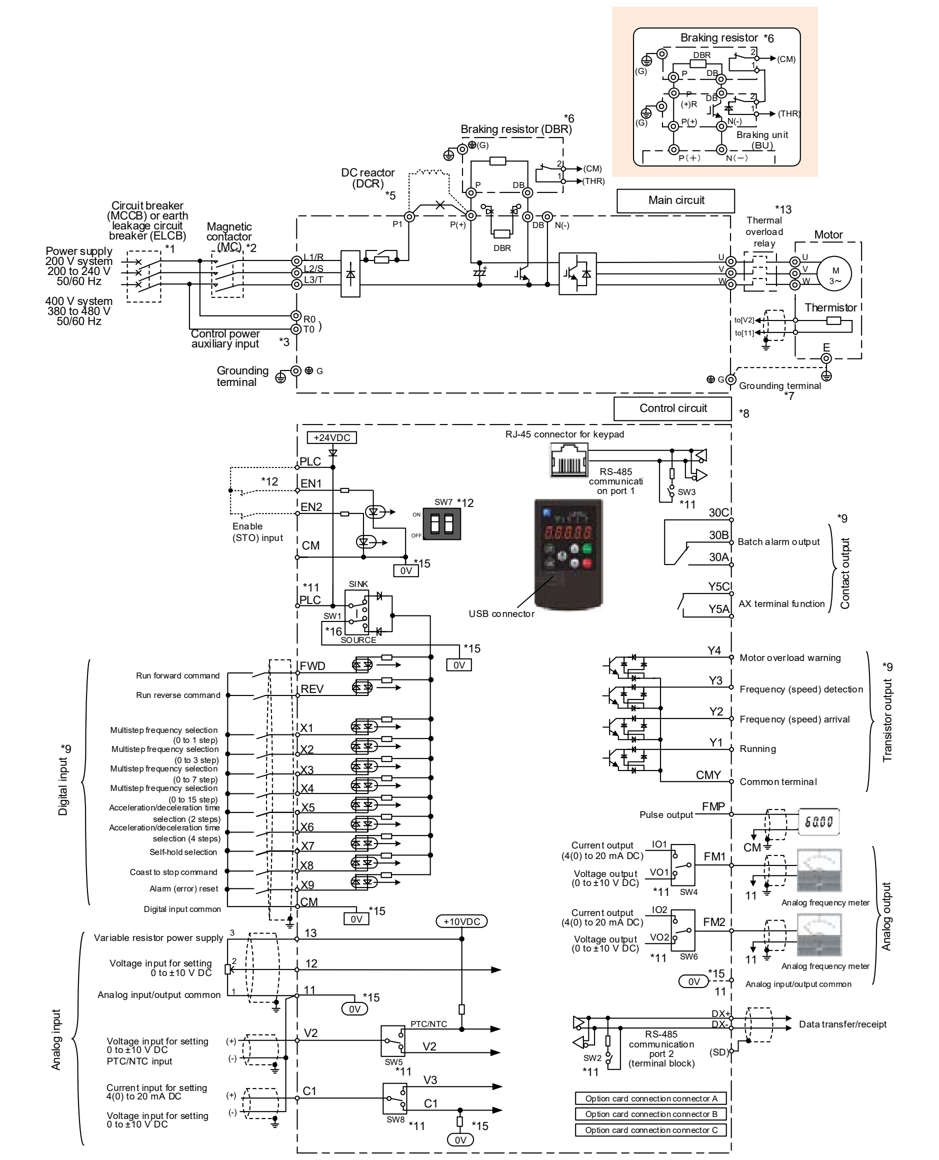
Wire size	Type	
	With insulating collar	Without insulating collar
0.34 mm^2 (AWG22)	AI 0.34-6 TQ	A 0.34-7
0.5 mm^2 (AWG20)	AI 0.5-6 WH	A 0.5-6
0.75 mm^2 (AWG18)	AI 0.75-6 GY	A 0.75-6
1.25 mm^2 (AWG16)	AI 1.5-6-BK	A 1.5-7



Tip thickness: 0.6 mm
Driver tip shape

Note) Depending on the wire type, coil diameter, and number of wires, the inverter cover may be pushed will be necessary to change the wire type or coil diameter, etc.

2.2.6 Basic Connection Diagram



(*1) Install the molded case circuit breaker (MCCB) or earth leakage circuit breaker (ELCB) (with overcurrent protection function) recommended for each inverter on the inverter input side (primary side) to protect wiring. Do not use a circuit breaker that exceeds the recommended rated current.
(*2) An MCCB or ELCB is also used if isolating the inverter from the power supply, and therefore the magnetic contactor (MC) recommended for each inverter should be installed if required. Please note that if installing a coil such as an MC or solenoid near the inverter, connect a surge absorber in parallel.
(*3) If wishing to retain the integrated alarm signal issued if the protective function is triggered even when the inverter main power supply is cut off, or to constantly display the keypad, connect these terminals to the power supply. (on FRN0008G2S-2G or higher / FRN0008G2□-4G or higher)
The inverter can be run even without inputting the power supply to these terminals.
(*5) Remove the shorting bar between the inverter main circuit terminals P1 and P(+) before connecting the DC reactor (DCR) (option). Be sure to connect the DC reactor in the case of FRN0288G2S-2G / FRN0150G2□-4G HND specification and FRN0346G2S-2G or higher / FRN0180G2□-4G or higher inverters. Use a DC reactor (DCR) when the capacity of the power supply transformer is 500 kVA or more and is 10 times or more the inverter rated capacity, or when there are “thyristor-driven” loads.
(*6) FRN0288G2S-2G or lower / FRN0180G2□-4G or lower inverters are equipped with a built-in braking transistor, allowing direct connection of braking resistors between P(+) and DB.
If connecting a braking resistor (DB) (option) to FRN0346G2S-2G or higher / FRN0216G2□-4G or higher inverters, a braking unit (BU) (option) is necessary. A built-in braking resistor is connected between terminals P(+) and DB on FRN0046G2S-2G or lower / FRN0023G2□-4G or lower inverters. If connecting a braking resistor (DB), be sure to disconnect the built-in braking resistor.
(*7) This terminal is used for grounding the motor. Connect if required.
(*8) Use twisted wire or shielded wire for control signal lines.
Shielded wires are generally grounded, however, if subject to significant induction noise from outside, it may be possible to suppress the effect of the noise by connecting wires to [CM]. Isolate control signal lines from the main circuit wiring as best as possible, and do not run inside the same duct (a distance of 10 cm or greater is recommended.) If lines intersect, ensure that they do so almost perpendicularly to the main circuit wiring.
(*9) Each of the functions described for terminals [FWD] and [REV], terminals [X1] to [X9] (digital input), terminals [Y1] to [Y4] (transistor output), terminal [Y5A/C], and terminal [30A/B/C] (contact output) indicate functions assigned by factory default.
(*11) These are the switches on control PCBs, and are used to specify settings for inverter operation. Refer to the User’s Manual, “2.2.7 Switching switches” for details.
(*12) Safety function terminals [EN1] and [EN2] are disabled with SW7 (2-pole switch) on the control PCB by factory default. If using this terminal function, be sure to change the respective SW7 switches to the OFF position and connect.
(*13) Install a thermal relay if necessary. Make the circuit breakers (MCCB) or the magnetic contactors (MC) trip by the thermal relay auxiliary contacts (manual recovery).
(*15) 0V and (0V) are separated and insulated.
(*16) The factory default setting for SW1 of FRN****G2E-4G is “SOURCE”.

2.2.7 Terminal Function Description

2.2.7.1 Main Circuit Terminal

Table 2-8 Description of main circuit terminal functions

Classification	Terminal symbol	Terminal command	Detailed specification
Main circuit	L1/R, L2/S, L3/T	Main power supply input	Connect a three-phase power supply.
	U, V, W	Inverter output	Terminals to connect three-phase motors.
	P(+), P1	For DC reactor connection	Connect a DC reactor (DCR) (option). Be sure to connect if using motors with output of 75 kW or higher.
	P(+), N(-)	For direct current bus connection	Used for connection to direct current intermediate circuits of other inverters and PWM converters.
	P(+), DB	For direct current bus connection	Connect braking resistor (DB) (option) terminal (+) and DB (wiring length: 5 meters (16.4 ft) or shorter).
	⏚ G	For inverter chassis (case) grounding	This is the grounding terminal for the inverter chassis (casing) and motor. Ground to the earth at one end, and connect to the motor grounding terminal at the other end. Two of these terminals have been provided.
	R0, T0	Control power auxiliary input	If wishing to retain the integrated alarm signal issued if the protective function is triggered even when the inverter main power supply is cut off, or to constantly display the keypad, connect this terminal to the power supply (FRN0008G2S-2G or higher / FRN0004G2□-4G or higher only).

2.2.7.2 Control Circuit Terminal

A description of control circuit terminal functions is shown in Table 2-9. The control circuit terminal connection method differs based on function code settings to suit the purpose for which the inverter is used.
Wire appropriately to minimize the effect of noise from main circuit wiring.

Table 2-9 Description of control circuit terminal functions

Classifi-cation	Terminal symbol	Terminal command	Function description
Analog input	[13]	Power supply for variable resistor	The terminal is used for the power supply (+10 VDC) for the external frequency setter (variable resistor: 1 to 5 kΩ). Connect variable resistors larger than 1/2 W.
	[12]	Analog setting voltage input	(1) Frequency is set up according to the external analog voltage input command value. • 0 to ±10 VDC / 0 to ±100(%) (normal operation), • +10 to 0 VDC / 0 to 100(%) (inverse operation) (2) Other than frequency settings, this terminal can be assigned to PID commands, PID control feedback signals, frequency auxiliary settings, ratio settings, torque limit value settings, torque command values / torque current command values, speed limit values, and analog input monitors with analog input. (3) Hardware specifications • Input impedance: 22 (kΩ) • Up to ±15 VDC can be input. However, input exceeding ±10 VDC will be recognized as ±10 VDC. • To input bipolar (0 to ±10 VDC) analog setting voltage at terminal [12], set function code C35 to “0”.
	[C1]	Analog setting current input (C1 function)	(1) Frequency is set up according to the external analog current input command value. • 4 to 20 mA DC / 0 to 100(%), 0 to 20 mA DC / 0 to 100(%) (normal operation) • 20 to 4 mA DC / 0 to 100(%), 20 to 0 mA DC / 0 to 100(%) (inverse operation) (2) Other than frequency settings, this terminal can be assigned to PID commands, PID control feedback signals, frequency auxiliary settings, ratio settings, torque limit value settings, torque command values / torque current command values, speed limit values, and analog input monitors with analog input. (3) Hardware specifications • Input impedance: 250 (Ω) • Up to 30 mA DC can be input. However, input exceeding 20 mA DC will be recognized as 20 mA DC.
		Analog setting voltage input (V3 function)	(1) Frequency is set up according to the external analog voltage input command value. • 0 to ±10 VDC / 0 to ±100(%) (normal operation) • 10 to 0 VDC / 0 to 100(%) (inverse operation) (2) Other than frequency settings, this terminal can be assigned to PID commands, PID control feedback signals, frequency auxiliary settings, ratio settings, torque limit value settings, torque command values / torque current command values, speed limit values, and analog input monitors with analog input. (3) Hardware specifications • Input impedance: 22 (kΩ) • Up to ±15 VDC can be input. However, input exceeding ±10 VDC will be recognized as ±10 VDC. • To input bipolar (0 to ±10 VDC) analog setting voltage at terminal [V3], set function code C78 to “0”.

Classification	Terminal symbol	Terminal command	Function description
Analog input	[V2]	Analog setting voltage input (V2 function)	(1) Frequency is set up according to the external analog voltage input command value. • 0 to ±10 VDC / 0 to ±100(%) (normal operation) • 10 to ±0 VDC / 0 to ±100(%) (inverse operation) (2) Other than frequency settings, this terminal can be assigned to PID commands, PID control feedback signals, frequency auxiliary settings, ratio settings, torque limit value settings, torque command values / torque current command values, speed limit values, and analog input monitors with analog input. (3) Hardware specifications * Input impedance: 22 (kΩ) * Up to ±15 VDC can be input. However, input exceeding ±10 VDC will be recognized as ±10 VDC. * To input bipolar (0 to ±10 VDC) analog setting voltage at terminal [V2], set function code C45 to "0".
		PTC / NTC thermistor input (PTC / NTC function)	PTC (Positive Temperature Coefficient) / NTC (Negative Temperature Coefficient) thermistors for motor protection can be connected. SW5 on the PCB must be switched to the PTC / NTC side.
	[11]	Analog common	The terminal is the common terminal for analog input signals (terminals [13], [12], [C1], [V2], [FM1], and [FM2]). The terminal is insulated from terminals [CM], [CMY].
Digital input	[X1] [X2] [X3] [X4] [X5] [X6] [X7] [X8] [X9]	Digital input 1 to 9	(1) Various signals (coast to stop command, external alarm, multi-speed selection, etc.) can be set with function codes E01 to E09, E98, E99. Refer to the User's Manual, Chapter 5 "FUNCTION CODES" for details. (2) The input mode and SINK / SOURCE can be switched using SW1. (3) The operating mode between each digital input terminal and terminal [CM] can be switched to "ON when shorted (active ON)" or "OFF when shorted (active OFF)". (4) Digital input terminals [X6] and [X7] can be set up as a pulse train input terminal by changing the function code Maximum wire length: 20 m Maximum input pulse: 30 kHz: When connected to open collector output pulse generator (A pull-up resistor and pull-down resistor are required.) 100 kHz: When connected to complementary output pulse generator Refer to the User's Manual, Chapter 5 "FUNCTION CODES" for details on function code settings. Refer to the User's Manual, Chapter 2 section "2.2.6 Control circuit terminals" for details on digital input circuit specifications.
	[FWD]	Forward rotation run/stop command input	
	[REV]	Reverse rotation run / stop command input	
	[EN1] [EN2]	Enable input	(1) When terminals [EN1]-[PLC] or terminals [EN2]-[PLC] are OFF, the inverter output transistors stop switching (safe torque off: STO). Be sure to operate terminals [EN1] and [EN2] simultaneously; otherwise an ECF alarm is issued and the operation of the inverter will be disabled. (2) The input mode for terminals [EN1] and [EN2] is fixed to source. The mode cannot be switched to sink. (3) This function can be enabled and disabled with SW7. If using this function, set the respective SW7 switches to the OFF side. Refer to the User's Manual, Chapter 2 section "2.2.6 Control circuit terminals" for details on terminal [EN1] and [EN2] circuit specifications.
	[PLC]	Programmable controller signal power supply	(1) Connect the output signal power supply for the programmable controller. (Rated voltage +24 VDC (power supply voltage fluctuation range: 20 to +27 VDC), maximum 100 mA) (2) The terminal can also be used as the power supply for loads connected to transistor outputs. Refer to the "Transistor output" section for details.
	[CM]	Digital common	This is a common terminal for digital input signals. The terminal is insulated from terminals [11], [CMY].
Analog output	[FM1] [FM2]	Analog monitor (FMA function)	These terminals output analog DC voltage of 0 to ±10 VDC, and analog DC voltage current of 4 to 20 mA DC or 0 to 20 mA DC monitor signals. The [FM1] output form (VO1 / IO1) can be switched using SW4 on the PCB and function code F29. The signal content is selected from the following by setting function code F31 data. The [FM2] output form (VO2 / IO2) can be switched using SW6 on the PCB and function code F32. The signal content is selected from the following by setting function code F61 data. * Allowable impedance for connection: Min. 5 kΩ (with output of 0 to ±10 VDC) (up to two analog voltmeters (0 to 10 VDC, input impedance 10 kΩ) can be connected.) * Allowable impedance for connection: Max. 500 Ω (with output of 4 to 20 mA DC) * Gain adjustable range: 0 to 300%
	[11]	Analog common	This is a common terminal for analog input / output signals. The terminal is insulated from terminals [CM], [CMY].
Pulse output	[FMP]	Pulse monitor (FMP function)	This terminal outputs a pulse signal. The signal content is selected in the same way as that as for the FM1 / 2 function by setting function code F35 data. * Allowable impedance for connection: Min. 5 kΩ (up to two analog voltmeters (0 to 10 VDC, input impedance 10 kΩ) can be connected.) (Set F34 to between 1 and 300% if using as average voltage output.) * Pulse duty: Approx. 50%, pulse rate: 25 to 6000 p/s (at full scale)
	[CM]	Digital common	This is a common terminal for digital input signals and terminal [FMP]. The terminal is insulated from terminals [11], [CMY]. This is the same terminal as terminal [CM] for digital input.
Transistor output	[Y1] [Y2] [Y3] [Y4]	Transistor output 1to 4	(1) Various signals (running signal, frequency reached signal, overload forecast signal, etc.) set up by function code E20 to E24 can be output. Refer to the User's Manual, "Chapter 5 FUNCTION CODES" for details. (2) The operating mode between transistor output terminals [Y1] to [Y4] and terminal [CMY] can be switched to "ON when signal output (active ON)" or "OFF when signal output (active OFF)". * Maximum voltage for pull-up power supply: 48 V, maximum load current when ON: 50 mA
	[CMY]	Transistor output common	This is a common terminal for transistor output signals. The terminal is insulated from terminals [CM], [11].
Contact output	[Y5A] [Y5C]	General-purpose relay output	(1) The same signals as those of terminals [Y1] to [Y4] can be selected and output as multi-purpose relay outputs. Contact capacity: 250 VAC 0.3 A cosφ = 0.3, 48 VDC 0.5 A (2) It is possible to switch between a "short circuit between terminals [Y5A] to [Y5C] when an ON signal is output (excitation: active ON)" or an "open circuit between terminals [Y5A] and [Y5C] when an ON signal is output (non-excitation: active OFF)".
	[30A] [30B] [30C]	Integrated alarm output	(1) When the inverter stops with an alarm, an integrated alarm is output at the relay contact (1C). Contact capacity: 250 VAC 0.3 A cosφ = 0.3, 48 VDC 0.5 A (2) The same signals as those of terminals [Y1] to [Y4] can be selected and output. (3) It is possible to switch between a "short circuit between terminals [30A] and [30C] when an ON signal is output (excitation: active ON)" or an "open circuit between terminals [30A] and [30C] when an ON signal is output (non-excitation: active OFF)".
Communication	[DX+] [DX-] [SD]	Via RS-485 communications link port 2	This is an input / output terminal used to connect a computer or programmable controller, etc. by RS-485 communication. (Refer to the User's Manual Chapter 2, "2.2.7 Switching switches" for details on terminating resistance). With a multi-drop (cross-wire) connection, use the recommended rod terminal. (Refer to "Table 2-7 Recommended rod terminals" in section "2.2.5.1 Screw Specifications and Recommended Wire Size (Control Circuit Terminals)" for details on recommended rod terminals).
	RJ-45 connector for keypad connection	RS-485 communication port 1 (for keypad connection)	(1) This is used as a connector for connecting the keypad. The keypad power is supplied from the inverter via an extension cable for remote operation. If using an extension cable, turn ON the SW3 terminating resistor. (2) This is used to connect a computer or programmable controller, etc. by RS-485 communication after disconnecting the keypad. (Refer to the User's Manual Chapter 2, "2.2.7 Switching switches" for details on terminating resistance). • Pins 1, 2, 7, and 8 are assigned as the power supply source for the keypad. When connecting this RJ-45 connector to other devices, do not use these pins. Do not connect the PC LAN ports, Ethernet hubs, or telephone lines to the RJ-45 connector. The inverter and the connected device may be damaged. **Failure to observe this could result in fire.**
	USB connector	USB port (keypad)	This is a USB connector (miniB specification) for connecting to a computer. Function codes can be edited, transferred, and verified, an inverter test run can be performed, and all states can be monitored using the inverter support loader (FRENIC Loader)*. *: Refer to the User's Manual, Chapter 9 "9.2 FRENIC Loader Overview" for details.

Chapter 3 OPERATION USING THE KEYPAD

Refer to the User's Manual, Chapter 3 "OPERATION USING THE KEYPAD" for details.

3.1 Names and Functions of Keypad Components

The keypad allows you to run and stop the inverter, display various data, configure function code data, monitor I/O signal states, and display maintenance information and alarm information.

If using the multi-function keypad (TP-A2SW), refer to the instruction manual for the multi-function keypad.

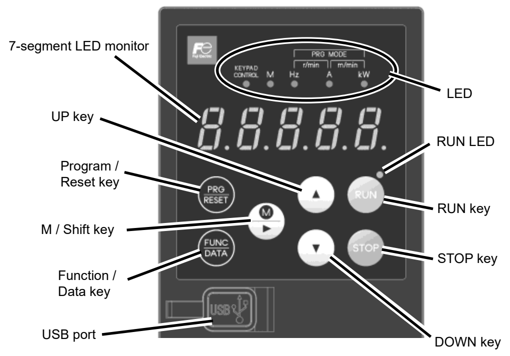
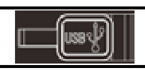


Table 3-1 Names of each keypad part and overview of functions

Item	Display and keys	Function overview
LED monitor	8.8.8.8.8.	Five-digit, 7-segment LED monitor which displays the following content based on the operation mode. ■ In Running mode: Running status information (e.g., output frequency, current, and voltage) Changes to the status display when not in the normal running status. Changes to the light alarm display when a light alarm occurs. ■ In Programming mode : Menus, function codes and their data ■ In Alarm mode : Alarm code, which identifies the alarm factor that has activated the protective function.
Operation keys	PRG/RESET	Program / Reset key which switches the operation modes of the inverter. ■ In Running mode : Pressing this key switches the inverter to Programming mode. ■ In Programming mode : Pressing this key switches the inverter to Running mode. ■ In Alarm mode : Pressing this key after removing the alarm factor resets the alarm and switches back to Running mode.
	FUNC/DATA	Function / Data key which switches the operations you want to do in each mode as follows: ■ In Running mode : Pressing this key switches the information to be displayed concerning the status of the inverter (output frequency (Hz), output current (A), output voltage (V), etc.) ■ In Programming mode : Pressing this key displays the function code or establishes data. ■ In Alarm mode : Pressing this key displays the details of the problem indicated by the alarm code that has come up on the LED monitor.
	RUN	Press to run the motor (when performing keypad operation).
	STOP	Press to stop the motor (when performing keypad operation).
	▲/▼	Press these keys to select the setting items and change the function code data displayed on the LED monitor.
	M/▶	■ In Running mode : Functions assigned with function code E70 can be used. Hold down (for 1 second) to turn the function ON and OFF. The function is always OFF when the power is turned ON. Refer to the User's Manual, "3.3.8 Switching between local and remote modes" for details. ■ In Programming mode While menu displayed : Jumps to the next menu number. While function code displayed : Jumps to the displayed number +10. While setting numerical values : Moves the cursor digit to the right. ■ In Alarm mode : The alarm detailed information number shifts +10.
LED indicators	RUN (green)	Lights when running with a run command entered by the RUN key, by terminal command "FWD" or "REV", or through the communications link.
	KEYPAD CONTROL (green)	Lights up when the keypad RUN key is valid as a run command. In Programming and Alarm modes, however, pressing this key cannot run the inverter even if this indicator lights. The LED blinks every second while in local mode.
	M (blue)	Indicates the signal selected with function code E71. Refer to the User's Manual, Chapter 5 "5.3.2 E codes (terminal functions)" for details.
	Unit LEDs (3 red LEDs)	Hz, A, kW, r/min, m/min : These three LED indicators identify the unit of numeral displayed on the LED monitor in Running mode by combination of lit and unlit states of them. Refer to the User's Manual, "3.3.1 Operating State Monitor" for details. PRG. MODE : While the inverter is in Programming mode, the 2 LEDs on the left and right light up. (● Hz ○ A ● kW)
USB port		The inverter and PC can be connected with a USB cable. The connector shape at the inverter side is a miniB type.

3.2 Destination Setting

For inverter type FRN****G2□-□G (Global Model), the destination must be set first after the initial power supply. Without setting the destination, the function code cannot be changed. The inverter cannot be operated either. By setting the destination, basic function codes such as rated voltage, rated frequency, etc. are initialized to general values in each region (Table 3-2). If the destination value setting is changed after the initial destination setting, it can be changed with 8.dESt in the program mode menu or function code H101. If the destination is reset by 8.dESt, all function codes are initialized to the factory defaults. If the destination is set by H101, only the function codes in Table 3-2 are initialized to the values in Table 3-2. The destination can be selected from the regions of Japan, Asia, China, Europe, Americas and East Asia.
If the function code set including the destination setting function code (H101) is copied with the data copy function or the FRENIC loader, manual destination setting is not required. Set the initial destination as shown below.

(1) 8.dESt appears when turning ON the power for the first time. If this appears, press the FUNC/DATA key.
(2) AS iA (Asian region) is displayed first. For other regions, Press ▲ key or ▼ key to select the destination.
(3) After selecting the destination, SAUE is displayed by pressing FUNC/DATA key and the destination setting is completed. Then, 0.00 is displayed.

Note: If the inverter is not equipped with a keypad, please purchase either TP-E2 or TP-A2SW before carrying out the above procedure. (The above description is based on the use of TP-E2.)

Table 3-2 Initial value for each destination

Destination	Asia	China	Europe	Americas	East Asia	Japan
LED display	AS iA	CHn	Eu	AMEr	EStA	JPn
H101:Destination	2	3	4	5	6	1
F02: Operation method	2	2	2	0	2	2
F03/A01/b01/r01: Maximum output frequency 1 to 4	60.0Hz (200V) 50.0Hz (400V)	50.0Hz	50.0Hz	60.0Hz	60.0Hz	60.0Hz
F04/A02/b02/r02: Base frequency 1 to 4						50.0Hz
F05/A03/b03/r03: Rated voltage at base frequency 1 to 4	220/415V	380V	400V	230/460V	200/400V	200/400V
F06/A04/b04/r04: Maximum output voltage 1 to 4						
F09/A05/b05/r05: Torque boost 1 to 4	Fuji IE3 motor Standard value			HP rating motors	Fuji IE3 motor Standard value	
F11/A07/b07/r07: Electronic thermal 1 to 4 (Overload detection level)						
F14: Restart mode after momentary power failure (Mode selection)	1	1	0	0	1	1
F80: Switching between HND and HHD drive modes	HHD	HHD	HND	HND	HHD	HHD
E31/E36/E54: Frequency detection 1 to 3 (Level)	60.0Hz (200V) 50.0Hz (400V)	50.0Hz	50.0Hz	60.0Hz	60.0Hz	60.0Hz
E34/E37/E55: Overload early warning / Current detection 1 to 3 (Level)	Fuji IE3 motor Standard value			HP rating motors	Fuji IE3 motor Standard value	
P02/A16/b16/r16: Motor 1 to 4 (Rated capacity)	kW	kW	kW	HP	kW	kW
P03/A17/b17/r17: Motor 1 to 4 (Rated current)	Fuji IE3 motor Standard value			HP rating motors	Fuji IE3 motor Standard value	
P06/A20/b20/r20: Motor 1 to 4 (No-load current)						
P07/A21/b21/r21: Motor 1 to 4 (%R1)						
P08/A22/b22/r22: Motor 1 to 4 (%X)						
P12/A26/b26/r26: Motor 1 to 4 (Rated slip frequency)						
P55/A55/b55/r55: Motor 1 to 4 (Torque current under vector control)						
P99/A39/b39/r39: Motor 1 to 4 selection	5	5	5	1	5	5
H96: STOP key priority / Start check function	0	0	0	3	0	0
K01: Multifunction keypad TP-A2SW (Language selection)	1	6	1	1	1	0

Chapter 4 FUNCTION CODES

The PDF manual can be downloaded from below QR code
For more information of Function codes list

https://www.fujielectric.com/products/inverter/frenic-megag2/download/_pr1/

Chapter 5 ALARM CODES

The PDF manual can be downloaded from below QR code
For more information of Alarm codes list

https://www.fujielectric.com/products/inverter/frenic-megag2/download/_pr2/

Function codes (excerpt)

Function code	Name	Data setting range
F01	Frequency setting 1	0: Keypad key operation (▲ / ▼ keys) 1: Analog voltage input (Terminal [12]) (from 0 to ±10 VDC) 2: Analog current input (Terminal [C1] (4 to 20 mA DC) 3: Analog voltage input (Terminal [12]) + analog current input (Terminal [C1]) 5: Analog voltage input (Terminal [V2]) (from 0 to ±10 VDC) 6: Analog voltage input (Terminal [V3]) (from 0 to ±10 VDC) 7: UP/DOWN control 8: Keypad key operation (▲ / ▼ keys) (with balanceless bumpless) 10: Pattern operation 11: Digital input interface card OPC-DI (option) 12: Pulse train input
F02	Operation method	0: Keypad operation (Rotation direction input: terminal block) 1: External signal (digital input) 2: Keypad operation (forward rotation) 3: Keypad operation (reverse rotation)
F03	Maximum output frequency 1	5.0 to 599.0 Hz
F04	Base frequency 1	5.0 to 599.0 Hz
F05	Rated voltage at base frequency 1	0 : AVR disable (output voltage proportional to power voltage) 80 to 240V : AVR operation (200V series) 160 to 500V : AVR operation (400 V series)
F06	Maximum output voltage 1	80 to 240V : AVR operation (200V series) 160 to 500V : AVR operation (400 V series)
F07	Acceleration time 1	0.00 to 6000s * 0.00 is for acceleration and deceleration time cancel (when performing soft-start and stop externally)
F08	Deceleration time 1	
F09	Torque boost 1	0.0 to 20.0% (% value against base frequency voltage 1)
F10	Electronic thermal overload protection for motor 1 (Select motor characteristics)	1: Enable (for a general-purpose motor with self-cooling fan) 2: Enable (for an inverter-driven motor with separately powered cooling fan)
F11	(Operation level)	0.00 A (disable), current value of 1 to 135% of inverter rated current set with A unit (Inverter rated current dependent on F80)
F14	Restart mode after momentary power failure (operation selection)	0: Trip immediately 1: Trip after a recovery from power failure 2: Trip after momentary deceleration is stopped 3: Continue to run (for heavy inertia load or general load) 4: Restart from frequency at power failure (for general load) 5: Restart from starting frequency
F16	Frequency limiter (Lower limit)	0.0 to 599.0Hz
F26	Motor sound (Carrier frequency)	HHD specification: FRN****G2S-2G / FRN****G2□-4G; HND specification: FRN****G2S-2G / FRN****G2□-4G 0.75 to 16kHz : 0003 to 0288 / 0002 to 0150; 0032 to 0075 / 0018 to 0038 0.75 to 10kHz : 0346 to 0432 / 0180 to 1386; 0082 to 0215 / 0045 to 0150 0.75 to 6kHz : — / —; 0288 to 0432 / 0180 to 1386
P02	Motor 1 (Rated capacity)	0.01 to 1000 kW (At P99 = 0 or 2 to 5, 20 to 23) 0.01 to 1000 HP (At P99 = 1)
P03	(Rated current)	0.00 to 2000 A
P04	(Auto-tuning)	0: Disable 1: Stop tuning 2: Rotation tuning 4: Synchronous motor magnetic pole position offset tuning 5: Stop tuning (%R1, %X only)
P99	Motor 1 selection	0: Motor characteristics 0 (Fuji standard IM, 8-series) 1: Motor characteristics 1 (HP rating IMs) 2: Motor characteristics 2 (Fuji dedicated motors for vector control) 3: Motor characteristics 0 (Refer to replacement material when using Fuji standard IM, 6-series) 4: Other IMs 5: Motor characteristics 5 (Fuji premium efficiency motors) 20: Other (synchronous motors) 21: Motor characteristics (Fuji synchronous motor (GNB2 series)) 22: Motor characteristics (Fuji synchronous motor (GNF2 series)) 23: Motor characteristics (Fuji synchronous motor (GNP1 series))

Chapter 6 MAINTENANCE AND INSPECTION

6.1 Inquiries about Product and Guarantee

6.1.1 When Making an Iinquiry

Upon breakage of the product, uncertainties, failure or inquiries, inform your Fuji Electric representative of the following information.

1) Inverter type. Refer to Chapter 1 "1.1 Acceptance Inspection (Nameplates and Inverter Type)".
2) SER No. (serial number of equipment). Refer to Chapter 1 "1.1 Acceptance Inspection (Nameplates and Inverter Type)".
3) Function codes and their data that you changed. Refer tothe FRENIC-MEGA User's Manual, Chapter 3 "3.4.2 Checking changed function codes "Data Checking: 2.rEP.
4) ROM version. Refer to the maintenance item 5_14 in the FRENIC-MEGA User's Manual, Chapter 3 "3.4.5 Reading maintenance information "Maintenance Information: 5.CHE.
5) Date of purchase
6) Inquiries (for example, point and extent of breakage, uncertainties, failure phenomena, and other circumstances)

6.1.2 Product Warranty

To all our customers who purchase Fuji Electric products included in this documentation:

Please take the following items into consideration when placing your order.

When requesting an estimate and placing your orders for the products included in these materials, please be aware that any items such as specifications which are not specifically mentioned in the contract, catalog, specifications or other materials will be as mentioned below.
In addition, the products included in these materials are limited in the use they are put to and the place where they can be used, etc., and may require periodic inspection. Please confirm these points with your sales representative or directly with this company.
Furthermore, regarding purchased products and delivered products, we request that you take adequate consideration of the necessity of rapid receiving inspections and of product management and maintenance even before receiving your products.

6.1.2.1 Free of Charge Warranty Period and Warranty Range

(1) Free of charge warranty period

1) The product warranty period is "1 year from the date of purchase" or 24 months from the manufacturing date imprinted on the name place, whichever date is earlier.
2) However, in cases where the use environment, conditions of use, use frequency and times used, etc., have an effect on product life, this warranty period may not apply.
3) Furthermore, the warranty period for parts restored by Fuji Electric's Service Department is "6 months from the date that repairs are completed."

(2) Warranty range

1) In the event that breakdown occurs during the product's warranty period which is the responsibility of Fuji Electric, Fuji Electric will replace or repair the part of the product that has broken down free of charge at the place where the product was purchased or where it was delivered. However, if the following cases are applicable, the terms of this warranty may not apply.
   ① The breakdown was caused by inappropriate conditions, environment, handling or use methods, etc. which are not specified in the catalog, operation manual, specifications or other relevant documents.
   ② The breakdown was caused by the product other than the purchased or delivered Fuji's product.
   ③ The breakdown was caused by the product other than Fuji's product, such as the customer's equipment or software design, etc.
   ④ Concerning the Fuji's programmable products, the breakdown was caused by a program other than a program supplied by this company, or the results from using such a program.
   ⑤ The breakdown was caused by disassembly, modifications or repairs affected by a party other than Fuji Electric.
   ⑥ The breakdown was caused by improper maintenance or replacement using consumables, etc. specified in the operation manual or catalog, etc.
   ⑦ The breakdown was caused by a science or technical problem that was not foreseen when making practical application of the product at the time it was purchased or delivered.
   ⑧ The product was not used in the manner the product was originally intended to be used.
   ⑨ The breakdown was caused by a reason which is not this company's responsibility, such as lightning or other disaster.
2) Furthermore, the warranty specified herein shall be limited to the purchased or delivered product alone.
3) The upper limit for the warranty range shall be as specified in item (1) above and any damages (damage to or loss of machinery or equipment, or lost profits from the same, etc.) consequent to or resulting from breakdown of the purchased or delivered product shall be excluded from coverage by this warranty.

(3) Trouble diagnosis

As a rule, the customer is requested to carry out a preliminary trouble diagnosis. However, at the customer's request, this company or its service network can perform the trouble diagnosis on a chargeable basis. In this case, the customer is asked to assume the burden for charges levied in accordance with this company's fee schedule.

6.1.2.2 Exclusion of Liability for Loss of pportunity, etc.

Regardless of whether a breakdown occurs during or after the free of charge warranty period, this company shall not be liable for any loss of opportunity, loss of profits, or damages arising from special circumstances, secondary damages, accident compensation to another company, or damages to products other than this company's products, whether foreseen or not by this company, which this company is not be responsible for causing.

6.1.2.3 Repair Period after Production Stop, Spare Parts Supply Period (Holding Period)

Concerning models (products) which have gone out of production, this company will perform repairs for a period of 7 years after production stop, counting from the month and year when the production stop occurs. In addition, we will continue to supply the spare parts required for repairs for a period of 7 years, counting from the month and year when the production stop occurs. However, if it is estimated that the life cycle of certain electronic and other parts is short and it will be difficult to procure or produce those parts, there may be cases where it is difficult to provide repairs or supply spare parts even within this 7-year period. For details, please confirm at our company's business office or our service office.

6.1.2.4 Transfer Rights

In the case of standard products which do not include settings or adjustments in an application program, the products shall be transported to and transferred to the customer and this company shall not be responsible for local adjustments or trial operation.

6.1.2.5 Service Contents

The cost of purchased and delivered products does not include the cost of dispatching engineers or service costs. Depending on the request, these can be discussed separately.

6.1.2.6 Applicable Scope of Service

Above contents shall be assumed to apply to transactions and use of the country where you purchased the products.
Consult the local supplier or Fuji Electric for details separately.

Chapter 7 CONFORMITY WITH STANDARDS

7.1 Compliance with European Standards (CE)

The CE marking on Fuji products indicates that they comply with the essential requirements of the Electromagnetic Compatibility (EMC) Directive, Low Voltage Directive, and Machinery Directive issued by the Council of the European Communities.
CAUTION: Ensure an ambient temperature of 50 ºC (122 ºF) or less to comply with European Standards. Products with no standards indicated do not comply with European Standards.

Table 7-1 Compliance standards

EMC Directive Note1	EN61800-3 Immunity : Second environment (Industrial) Emission : Category C2 or C3 (Refer to the User's Manual "APPENDIX G" Table G-2. Applicable only when an optional EMC-compliant filter is attached.) : Category C3 (Applicable only to the EMC filter built-in type of inverters)
Low Voltage Directive	Adjustable speed electrical power drive systems. Part 5-1: Safety requirements. Electrical, thermal and energy EN61800-5-1
Machine Directives Note 2	EN ISO 13849-1 : Cat.3 / PL : e EN60204-1 : Stop Categoly 0 EN61800-5-2 : SIL3(Functional Safety : STO) EN62061 : SIL3

Note 1: A basic type inverter (FRN□□□□G2S-□G) that does not have a built-in EMC filter complies with the EMC Directive by combining it with an external filter dedicated to Fuji.
Category C2 : In a domestic environment this product may cause radio interference in which case supplementary mitigation measures may be required.
Category C3 : This type of PDS is not intended to be used on a low-voltage public network which supplies domestic premises ; radio frequency interference is expected if used on such a network.
Category C2 and C3 : It has a risk about other equipment malfunction or breakdown by radiated electric field strength out of frequency range that is defined EN 61800-3: 2004 + A1: 2012 2nd Environment and EN/IEC 61800-3: 2018 2nd Environment.
Note 2: Refer to the User's Manual, "APPENDIX G" for details on the Machinery Directive.
Note 3: Compatibility with revised emc directive and low voltage directive
In the revised EMC Directive (2014/30/EU) and Low Voltage Directive (2014/35/EU), it is necessary to clearly state the name and the address of manufacturers and importers to enhance traceability. Importers shall be indicated as follows when exporting products from Fuji Electric to Europe.

Manufacturer	Importer in Europe
Fuji Electric Co., Ltd. 5520, Minami Tamagaki-cho, Suzuka-city, Mie 513-8633, Japan	Fuji Electric Europe GmbH Goethering 58 , 63067 Offenbach am Main, Germany

<Precaution when exporting to Europe>
- Not all Fuji Electric products in Europe are necessarily imported by the above importer. If any Fuji Electric products are exported to Europe via another importer, please ensure that the importer is clearly stated by the customer.

7.2 Compliance with UL Standards and Canadian Standards (cUL certification)

7.2.1 General comments

UL Standards (Underwriters Laboratories Inc. standards) are North American safety standards used to prevent fire and other such accidents, and offer protection to users, service technicians, and the general public.
cUL indicates that products which comply with CSA standards are certified by UL. cUL certified products are as effective as those certified as complying with CSA standards.

7.2.2 UL Standards and Canadian Standards (cUL Certification) Compatibility

Compatibility with UL Standards and Canadian Standards (cUL certification) is ensured by installing inverters with UL / cUL marking in accordance with the following. (Products with no standards indicated do not comply with UL Standards and Canadian Standards.)

UL Standards and Canadian Standards (cUL Certification) Compatibility

⚠WARNING

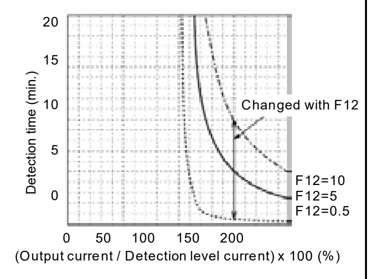
High available fault current – damage warning:

The opening of the branch-circuit protective device may be an indication that a fault current has been interrupted. To reduce the risk of fire or electric shock, current-carrying parts and other components of the controller should be examined and replaced if damaged. If burnout of the current element of an overload relay occurs, the complete overload relay must be replaced.

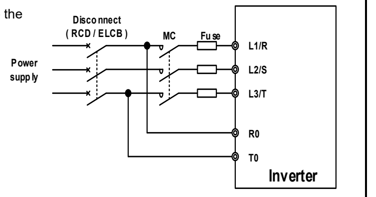
⚠CAUTION

1. Solid state motor overload protection (motor protection by electronic thermal overload relay) is provided in each model.
Use function codes F10 to F12 to set the protection level. Refer to the description below.

F10	Electronic thermal overload protection for motor 1 (Select motor characteristics)	1: Enable (For a general-purpose motor with selfcooling fan) 2: Enable (For an inverter-driven motor with separately powered cooling fan)
F11	(Overload detection level)	0.00 (disable), current value of 1 to 135% of inverter rated current (Inverter rated current dependent on F80)
F12	(Thermal time constant)	0.5 to 75.0 min, Refer to the graph below.



2. Use Cu wire only.
3. Use Class 1 wire only for control circuits.
4. Short circuit rating
"Suitable For Use On A Circuit Of Delivering Not More Than 100,000 rms Symmetrical Amperes, 240 Volts Maximum for 200 V class input when protected by Semiconductor Protection Fuse having an interrupting rating not less than 100,000 rms Symmetrical Amperes, 240 Volts Maximum." Models FRN; rated for 200V class input.
"Suitable For Use On A Circuit Of Delivering Not More Than 100,000 rms Symmetrical Amperes, 480 Volts Maximum when protected by Semiconductor Protection Fuse having an interrupting rating not less than 100,000 rms Symmetrical Amperes, 480 Volts Maximum." Models FRN; rated for 400V class input.
"Integral solid state short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance with the National Electrical Code and any additional local codes."
5 Field wiring connections must be made by a UL Listed and CSA Certified closed-loop terminal connector sized for the wire gauge involved. Connector must be fixed using the crimp tool specified by the connector manufacturer.
6. All circuits with terminals L1/R, L2/S, L3/T, R0, T0 must have a common disconnect and be connected to the same pole of the disconnect if the terminals are connected to the power supply.



7 Environmental Requirements
- Surrounding/ambient temperature: Maximum temperature shall be lower than 50°C (122ºF).
- Atmosphere: For use in pollution degree 2 environments (for Open-Type models).

8. Install UL certified fuses between the power supply and the inverter, referring to the table below.

Power supply voltage	Nominal applied motor	Inverter type	HHD / HND mode	Semiconductor Protection Fuse Cat No. Manufacturer: Mersen / Bussmann (Eaton)	Required torque lb-in (N・m): Main terminal	Required torque lb-in (N・m): Aux. control power supply	Wire size AWG (mm²) Main terminal Cu Wire L1/R, L2/S, L3/T: 60°C (140°F) Cu Wire	L1/R, L2/S, L3/T: 75°C (167°F) Cu Wire	L1/R, L2/S, L3/T: Remarks	U, V, W: 60°C (140°F) Cu Wire	U, V, W: 75°C (167°F) Cu Wire	U, V, W: Remarks	Aux. control power supply
Three-phase 200V	0.4	FRN0003G2S-2G	HHD	PC30UD69V50□ /170M3458	10.6 (1.2)	—	14 (2.1)	14 (2.1)	*1	14 (2.1)	14 (2.1)	*1	—
	0.75	FRN0005G2S-2G		PC30UD69V50□ /170M3460									
	1.5	FRN0008G2S-2G		PC30UD69V80□ /170M3462	15.9 (1.8)	10.6 (1.2)							14 (2.1) *1 *2
	2.2	FRN0011G2S-2G		PC30UD69V125□ /170M3462									
	3.7	FRN0018G2S-2G		PC30UD69V125□ /170M3463			10 (5.3)	10 (5.3)		12 (3.3)	12 (3.3)		
	5.5	FRN0032G2S-2G	HHD	PC30UD69V160□ /170M3464	30.9 (3.5)		—	8 (8.4)	*1 *2 *3	—	8 (8.4)	*1 *2 *3	
	7.5		HND										
		FRN0046G2S-2G	HHD	PC30UD69V200□ /170M3465									
	11		HND					6 (13.3)	*2 *3				
		FRN0059G2S-2G	HHD	PC30UD69V200□ /170M3465									
	15		HND					4 (21.2)	—		6 (13.3)	*2 *3	
		FRN0075G2S-2G	HHD	PC30UD69V250□ /170M3466	51.3 (5.8)		3 (26.7)			4 (21.2)			
	18.5		HND				1 (42.4)	3 (26.7)		3 (26.7)	4 (21.2)	—	
		FRN0088G2S-2G	HHD	PC30UD69V250□ /170M3466									
	22		HND				—	2 (33.6)	*2 *3	2 (33.6)	3 (26.7)		
		FRN0115G2S-2G	HHD	PC30UD69V315□ /170M3467						—			
	30		HND					2/0 (67.4)			2 (33.6)	*2 *3	
		FRN0146G2S-2G	HHD	PC30UD69V450□ /170M3469	119.4 (13.5)						1 (42.4)		
	37		HND					3/0 (85)			1/0 (53.5)		
		FRN0180G2S-2G	HHD	PC30UD69V500□ /170M3470	238.9 (27)								
	45		HND					4/0 (107.2)			3/0 (85)		
		FRN0215G2S-2G	HHD	PC30UD69V550□ /170M3472									
	55		HND					2/0×2 (67.4×2)			4/0 (107.2)		
		FRN0288G2S-2G	HHD	PC30UD69V550□ /170M3473									
	75		HND					3/0×2 (85×2)			3/0×2 (85×2)		
		FRN0346G2S-2G	HHD	PC30UD69V550□ /170M3473	424.7 (48)								
	90		HND					4/0×2 (107.2×2)			4/0×2 (107.2×2)		
		FRN0432G2S-2G	HHD	PC31UD69V700□ /170M4467									
	110		HND					300×2 (152×2)			300×2 (152×2)		

⚠CAUTION

Power supply voltage	Nominal applied motor	Inverter type	HHD / HND mode	Semiconductor Protection Fuse Cat No. Manufacturer: Mersen / Bussmann (Eaton)	Required torque lb-in (N・m): Main terminal	Required torque lb-in (N・m): Aux. control power supply	Wire size AWG (mm²) Main terminal Cu Wire L1/R, L2/S, L3/T: 60°C (140°F) Cu Wire	L1/R, L2/S, L3/T: 75°C (167°F) Cu Wire	L1/R, L2/S, L3/T: Remarks	U, V, W: 60°C (140°F) Cu Wire	U, V, W: 75°C (167°F) Cu Wire	U, V, W: Remarks	Aux. control power supply
Three-phase 400 V	0.4	FRN0002G2□-4G	HHD	PC30UD69V50□ /170M3458	10.6 (1.2)	—	14 (2.1)	14 (2.1)	*1	14 (2.1)	14 (2.1)	*1	—
	0.75	FRN0003G2□-4G											
	1.5	FRN0004G2□-4G		PC30UD69V50□ /170M3459	15.9 (1.8)	10.6 (1.2)							14 (2.1) *1 *2
	2.2	FRN0006G2□-4G		PC30UD69V63□ /170M3460									
	3.7	FRN0009G2□-4G		PC30UD69V63□ /170M3461									
	5.5	FRN0018G2□-4G	HHD	PC30UD69V100□ /170M3462	30.9 (3.5)		—	12 (3.3)	*1 *2 *3	—	12 (3.3)	*1 *2 *3	
	7.5		HND					10 (5.3)					
		FRN0023G2□-4G	HHD	PC30UD69V100□ /170M3462									
	11		HND					8 (8.4)			10 (5.3)		
		FRN0031G2□-4G	HHD	PC30UD69V125□ /170M3463									
	15		HND								8 (8.4)		
		FRN0038G2□-4G	HHD	PC30UD69V160□ /170M3464	51.3 (5.8)		6 (13.3)	6 (13.3)	*3	6 (13.3)	6 (13.3)	*3	
	18.5		HND										
		FRN0045G2□-4G	HHD	PC30UD69V160□ /170M3464									
	22		HND				4 (21.2)						
		FRN0060G2□-4G	HHD	PC30UD69V200□ /170M3465									
	30		HND				3 (26.7)	4 (21.2)		4 (21.2)			
		FRN0075G2□-4G	HHD	PC30UD69V315□ /170M3467	119.4 (13.5)								
	37		HND				2 (33.6)	3 (26.7)		3 (26.7)	4 (21.2)		
		FRN0091G2□-4G	HHD	PC30UD69V315□ /170M3468									
	45		HND				—	2 (33.6)	*2 *3	2 (33.6)	3 (26.7)		
		FRN0112G2□-4G	HHD	PC30UD69V350□ /170M3469									
	55		HND					1/0 (53.5)		—	2 (33.6)	*2 *3	
		FRN0150G2□-4G	HHD	PC30UD69V400□ /170M3469									
	75		HND								1/0 (53.5)		
		FRN0180G2□-4G	HHD	PC30UD69V350□ /170M3469	238.9 (27)			2/0 (67.4)			3/0 (85)		
	90		HND										
		FRN0216G2□-4G	HHD	PC30UD69V350□ /170M3469									
	110		HND					4/0 (107.2)			1/0×2 (53.5×2)		
		FRN0260G2□-4G	HHD	PC30UD69V400□ /170M3470									
	132		HND								2/0×2 (67.4×2)		
		FRN0325G2□-4G	HHD	PC30UD69V500□ /170M3472	424.7 (48)			1/0×2 (53.5×2)					
	160		HND					3/0×2 (85×2)			4/0×2 (107.2×2)		
		FRN0377G2□-4G	HHD	PC30UD69V550□ /170M3473									
	200		HND					4/0×2 (107.2×2)			250×2 (127×2)		
		FRN0432G2□-4G	HHD	PC31UD69V700□ /170M4467									
	220		HND					250×2 (127×2)			300×2 (152×2)		
		FRN0520G2□-4G	HHD	PC31UD69V800□ /170M4468									
			HND					400×2 (203×2)			400×2 (203×2)		
	280	FRN0650G2□-4G	HHD	PC32UD69V1000□ /170M5466				250×2 (127×2)	*2 *4		300×2 (152×2)	*2 *4	
	315	FRN0740G2□-4G	HHD	PC32UD60V1100□ /170M5467				300×2 (152×2)			350×2 (177×2)		
	355	FRN0650G2□-4G	HND	PC32UD69V1000□ /170M5466				400×2 (203×2)			400×2 (203×2)		
		FRN0960G2□-4G	HHD	PC33UD69V1250□ /170M5468									
	400	FRN0740G2□-4G	HND	PC32UD60V1100□ /170M5467				500×2 (253×2)			500×2 (253×2)		
		FRN1040G2□-4G	HHD	PC33UD60V1500□ /170M5468									
	500	FRN0960G2□-4G	HND	PC33UD69V1250□ /-				350×3 (177×3)			400×3 (203×3)		
		FRN1170G2□-4G	HHD	PC33UD55V2000□ /170M6469									
	560	FRN1040G2□-4G	HND	PC33UD60V1500□ /-				400×3 (203×3)			500×3 (253×3)		
	630	FRN1170G2□-4G	HND	PC33UD55V2000□ /-				500×3 (253×3)			600×3 (304×3)		
		FRN1386G2□-4G	HHD										
	710		HND					600×3 (304×3)			500×4 (253×4)		

*1 No terminal end treatment is required for connection.
*2 Use 75 °C Cu wire only.
*3 The wire size of UL Open Type and Enclosed Type are common. Please contact us if UL Open Type exclusive wire is necessary.
*4 It is showing the wire size for UL Open Type.See additional material INR-SI47-1365 for UL Enclosed Type (Pack with TYPE1 kit).