

Instruction Manual

FRENIC-MEGA series

FRN□□□□G2□-□GU

Thank you for purchasing our FRENIC-MEGA series of inverters.
The purpose of this instruction manual is to provide handling 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 User's Manual and Related documents.

- [Related Documents]
- User's Manual 24A7-E-0162□
 - Multi-Function Keypad (TP-A25W) Instruction Manual INR-SI47-2442□-E
 - RS-485 Communication User's Manual 24A7-E-0382□-E
 - FRENIC-MEGA(G2)Series "UL Enclosed - Type 12 ready (Heatbreak out)" INR-SI47-2592□-JE
 - Alternative parts list for UL Standards and Canadian Standards (cUL Certification) Compatibility INR-SI47-2587□-JEC
 - UL Enclosed - Type 1 Kit for FRENIC-MEGA(G2)Series INR-SI47-2433□-JE
- This manuals can be downloaded in PDF form from QR code in right figure.
- https://americas.fujielectric.com/products/ul-ivders-ac-drives/frenic-mega-g2-start-up/

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 user of the 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 cover safety 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 a piece of 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.**
- When using the DC reactor (DCR), there is a possibility of users coming into contact with main circuit terminal block (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

- In a zero-phase current (earth leakage current) detection 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 the 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 (BG) 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 control input power supply matches that for the connected power supply.
- Do not connect the power lines to the inverter output terminals (U, V, W).
- The following terminals will have high voltage when power is ON. **Failure to observe this could result in electric shock.**
- The atmosphere can contain a small amount of salt (0.1 mg/cm³ or less per year). The inverter must not be subjected to sudden changes in temperature that will cause condensation to form.

Altitude

3,300 ft (1,000 m) max. (Note 2)

Atmospheric pressure

88 to 106 kPa

Vibration

Type of inverter	0.12inch (3 mm) (max. amplitude)	0.1G (1 m/s ²)
FRN0003 to 0115G2□-2GU, FRN0002 to 0060G2□-4GU, FRN0146 to 0288G2□-2GU, FRN0085 to 0217G2□-4GU, FRN0346, 0432G2□-2GU, FRN0281 to 1480G2□-4GU	0.12inch (3 mm) (max. amplitude)	0.1G (1 m/s ²)
FRN0003 to 0115G2□-2GU, FRN0002 to 0060G2□-4GU, FRN0146 to 0288G2□-2GU, FRN0085 to 0217G2□-4GU, FRN0346, 0432G2□-2GU, FRN0281 to 1480G2□-4GU	0.2G (2 m/s ²)	0.1G (1 m/s ²)

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-restarting occurs. 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 as to ensure safety at such times.
- Failure to observe this could result in an accident.**
- The keypad (key) key is enabled only when the keypad operation is selected with function code F02. Please prepare a separate EMERGENCY STOP button. When function code H06 has been set to "0" or "2", the key will be disabled if the operation command method is changed from operation command with the keypad by selecting input 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 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] and [V].
- 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 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.**

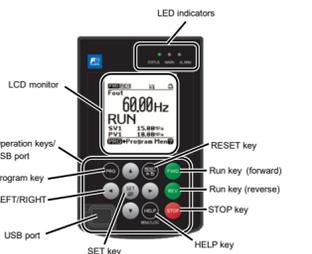
Maintenance and inspection, part replacement

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- Carry out inspection after waiting at least 5 minutes for FRN0003 to 0115G2□-2GU / FRN0002 to 0060G2□-4GU, or 10 minutes for FRN146 to 0432G2□-2GU / FRN0085 to 1480G2□-4GU 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).
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- Failure to observe this could result in electric shock or injury.**
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- Failure to observe**

Classification	Terminal symbol	Terminal command	Function description
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 E08, 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 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 (A pull-up resistor and pull-down resistor are required.) 100 kHz when connected to open collector output pulse generator 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.
	[FWD]	Forward rotation run/stop command input	Refer to the User's Manual, Chapter 2 section "2.2.6 Control circuit terminals" for details on digital input circuit specifications.
	[REV]	Reverse rotation run/stop command input	Refer to the User's Manual, Chapter 2 section "2.2.6 Control circuit terminals" for details on digital input circuit specifications.
	[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 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.
Analog output	[CMV] [FM1] [FM2]	Digital common Analog monitor (FMA function)	This is a common terminal for digital input signals. The terminal is insulated from terminals [11], [CMV]. 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 I/O1) 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 I/O2) can be switched using SW5 on the PCB and function code F32. The signal content is selected from the following by setting function code F81 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], [CMV].
Pulse output	[FMP]	Pulse monitor (FMP function)	This terminal outputs a pulse signal. The signal content is selected in the same way as that 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], [CMV]. This is the same terminal as terminal [CM] for digital input.
Transistor output	[Y1] [Y2] [Y3] [Y4]	Transistor output 1 to 4	(1) Various signals (running signal, frequency reaching signal, overload forecast signal, etc.) set up with terminal 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 [CMV] 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
	[CMV]	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 cosp = 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 cosp = 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 communication 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 terminal. (Refer to "Table 2-6 Recommended terminal terminals" in section "2.2.5.1 Screw Specifications and Recommended Wire Size (Control Circuit Terminals)" for details on recommended terminal 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, 7, and 8 are assigned as the power supply 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 connector device may be damaged. Failure to observe this could result in fire.
USB connector	USB port (keypad)	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 (FRNRC Loader). * Refer to the User's Manual, Chapter 9 "9.2 FRENC Loader Overview" for details.

Chapter 3 OPERATION USING THE KEYPAD

Refer to the Multi-function Keypad (TP-A25W) Instruction Manual.



3.1 Destination Setting

For inverter type FRN***G□□□□□□, 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.

- Install the multi-function keypad and turn ON the power.
- Destination "1.Japan" is displayed. Press the \square key and \square key simultaneously to select "5.Americas", and press the \square key.
- The keypad display will turn OFF briefly, and then "STOP 0.0 Hz" will appear for the run mode.

Chapter 4 FUNCTION CODES

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

Chapter 5 ALARM CODES

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



Chapter 6 MAINTENANCE AND INSPECTION

6.1 Inquiries about Product and Guarantee

6.1.1 When Making an Inquiry

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

- Inverter type. Refer to Chapter 1 "1.1 Acceptance Inspection (Nameplates and Inverter Type)".
- SER No. (serial number of equipment). Refer to Chapter 1 "1.1 Acceptance Inspection (Nameplates and Inverter Type)".
- Function codes and their data that you changed. Refer to the Multi-function Keypad Instruction Manual, Chapter 3 "3.4.4.3 Checking changed data".
- RCR-2-3 (Changed Data)
- ROM version. Refer to the Multi-function Keypad Instruction Manual, Chapter 3 "3.4.5 Inverter Information" PFC>3-5 (Unit Info)
- Date of purchase
- 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 way 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 distributor.
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 plate, 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 loss of 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 opportunity, 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 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 these 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 122 °F (50 °C) 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	EN1800-3	Immunity - Second environment (Industrial)
Low Voltage Directive	EN60950-1	Adjustable speed electrical power drive systems Part 5-1: Safety requirements. Electrical, thermal and energy EN61800-5-1
Machine Directives	EN ISO 13849-1; Cat. 3 / PL, e EN60204-1; Stop Category 0 EN61800-5-2; SIL3/Functional Safety: STO EN62061; SIL3	EN61800-3; 2004 / A1; 2012; 2nd Environment and ENIEC 81800-3; 2018 2nd Environment.

Note 1: A basic type inverter (FRN***G□□□□□□) that does not have a built-in EMC filter complies with the EMC Directive by combining it with an external filter expected to be used on such a network.
Note 2: This type of PDS is not intended to be used on a low-voltage public network which supplements domestic premises; radio frequency interference is expected in Category C2 and C3. It has a risk of 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.
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:
Fuji Electric Co., Ltd.
5650, Minami Tamagaki-cho, Suzuka-city, Mie 518-8633, Japan
<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.
Fuji Electric Europe GmbH
Geitelweg 58, 63067 Offenbach am Main, Germany

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

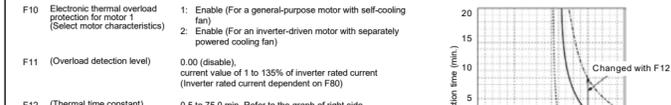
Compatibility with UL Standards and Canadian Standards (cUL certification) is ensured by installing inverters with UL / cUL marking in accordance with the following. (Products with no standards indicated do not comply with UL Standards and Canadian Standards.)

UL Standards and Canadian Standards (cUL Certification) Compatibility

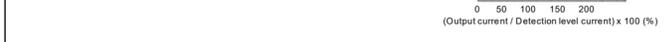
High available fault current - damage warning:
The opening of the branch-circuit protective device may be an indication that a fault current has been interrupted. To reduce the risk of fire or electric shock, current-carrying parts and other components of the controller shall be examined and replaced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

CAUTION

- 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.
- Use Class 1 wire only for control circuits.
- Short circuit current rating
230 volt class models are suitable for use on a circuit of delivering not more than 100,000 rms symmetrical amperes, 240 volts maximum when protected by appropriate protection device (refer to the below tables of 8.) having the short circuit current rating (SCCR) not less than 100,000 rms symmetrical amperes, 240 volts maximum.
480 volt class models are suitable for use on a circuit of delivering not more than 100,000 rms symmetrical amperes, 480 volts maximum when protected by appropriate protection device (refer to the below tables of 8.) having the short circuit current rating (SCCR) not less than 100,000 rms symmetrical amperes, 480 Volts Maximum.
If the branch circuit protection devices with less than the short circuit current rating 100,000 A is used, the short circuit current rating will be limited to the short circuit current rating of the branch circuit protection devices. 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, L2, L3, L3/T, R1, R2, R3, R3/T must have a common disconnect and be connected to the same pole of the disconnect if the terminals are connected to the power supply.



- Use Cu wire only.
- Use Class 1 wire only for control circuits.
- Short circuit current rating
230 volt class models are suitable for use on a circuit of delivering not more than 100,000 rms symmetrical amperes, 240 volts maximum when protected by appropriate protection device (refer to the below tables of 8.) having the short circuit current rating (SCCR) not less than 100,000 rms symmetrical amperes, 240 volts maximum.
480 volt class models are suitable for use on a circuit of delivering not more than 100,000 rms symmetrical amperes, 480 volts maximum when protected by appropriate protection device (refer to the below tables of 8.) having the short circuit current rating (SCCR) not less than 100,000 rms symmetrical amperes, 480 Volts Maximum.
If the branch circuit protection devices with less than the short circuit current rating 100,000 A is used, the short circuit current rating will be limited to the short circuit current rating of the branch circuit protection devices. 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, L2, L3, L3/T, R1, R2, R3, R3/T must have a common disconnect and be connected to the same pole of the disconnect if the terminals are connected to the power supply.



- Environmental Requirements
* Surrounding ambient temperature: Maximum temperature shall be lower than 122°F (50°C).
* Atmosphere: For use in pollution degree 2 environments (for Open-Type models).
- Install UL certified protection devices between the power supply and the inverter, referring to the table below.

Power supply voltage	Inverter type	H/D/H/D/H/D mode	SCCR 100 kA	
			Class CC, J, T, L fuse	Inverse time circuit breaker
Three-phase 200V	1/2 1/4	FRN003G2S-2GU	10.6 (1.2)	—
	1 1/2	FRN005G2S-2GU	14	14
	2 1	FRN008G2S-2GU	(2.1)	(2.1)
	3 1.5	FRN011G2S-2GU	(2.1)	(2.1)
	5 3	FRN018G2S-2GU	(1.8)	10 (5.3)
	7.5 3	FRN032G2S-2GU	H/D	12 (8.4)
	10 5	FRN046G2S-2GU	H/D	14 (13.3)
	15 7.5	FRN059G2S-2GU	H/D	6 (3.3)
	20 10	FRN075G2S-2GU	H/D	4 (21.2)
	25 10	FRN088G2S-2GU	H/D	3 (26.7)
	30 15	FRN115G2S-2GU	H/D	2 (33.6)
	40 20	FRN146G2S-2GU	H/D	20 (67.4)
	50 25	FRN180G2S-2GU	H/D	30 (85)
	60 30	FRN215G2S-2GU	H/D	30 (107.2)
	75 30	FRN286G2W-2GU	H/D	20 (67.4)
100 40	FRN346G2W-2GU	H/D	30 (85)	
125 40	FRN432G2W-2GU	H/D	40 (107.2)	
150 50	FRN003G2S-2GU	H/D	10.6 (1.2)	
Three-phase 400V	1/2 1/4	FRN003G2S-4GU	10.6 (1.2)	—
	1 1/2	FRN005G2S-4GU	14	14
	2 1	FRN008G2S-4GU	(2.1)	(2.1)
	3 1.5	FRN011G2S-4GU	(1.8)	12 (8.4)
	5 3	FRN018G2S-4GU	H/D	10 (5.3)
	7.5 3	FRN032G2S-4GU	H/D	12 (8.4)
	10 5	FRN046G2S-4GU	H/D	14 (13.3)
	15 7.5	FRN059G2S-4GU	H/D	6 (3.3)
	20 10	FRN075G2S-4GU	H/D	4 (21.2)
	25 10	FRN088G2S-4GU	H/D	3 (26.7)
	30 15	FRN115G2S-4GU	H/D	2 (33.6)
	40 20	FRN146G2S-4GU	H/D	20 (67.4)
	50 25	FRN180G2S-4GU	H/D	30 (85)
	60 30	FRN215G2S-4GU	H/D	30 (107.2)
	75 30	FRN286G2W-2GU	H/D	20 (67.4)
100 40	FRN346G2W-2GU	H/D	30 (85)	
125 40	FRN432G2W-2GU	H/D	40 (107.2)	
150 50	FRN003G2S-4GU	H/D	10.6 (1.2)	
Three-phase 600V	1/2 1/4	FRN003G2S-6GU	10.6 (1.2)	—
	1 1/2	FRN005G2S-6GU	14	14
	2 1	FRN008G2S-6GU	(2.1)	(2.1)
	3 1.5	FRN011G2S-6GU	(1.8)	12 (8.4)
	5 3	FRN018G2S-6GU	H/D	10 (5.3)
	7.5 3	FRN032G2S-6GU	H/D	12 (8.4)
	10 5	FRN046G2S-6GU	H/D	14 (13.3)
	15 7.5	FRN059G2S-6GU	H/D	6 (3.3)
	20 10	FRN075G2S-6GU	H/D	4 (21.2)
	25 10	FRN088G2S-6GU	H/D	3 (26.7)
	30 15	FRN115G2S-6GU	H/D	2 (33.6)
	40 20	FRN146G2S-6GU	H/D	20 (67.4)
	50 25	FRN180G2S-6GU	H/D	30 (85)
	60 30	FRN215G2S-6GU	H/D	30 (107.2)
	75 30	FRN286G2W-2GU	H/D	20 (67.4)
100 40	FRN346G2W-2GU	H/D	30 (85)	
125 40	FRN432G2W-2GU	H/D	40 (107.2)	
150 50	FRN003G2S-6GU	H/D	10.6 (1.2)	

CAUTION

Power supply voltage	Inverter type	H/D/H/D/H/D mode	SCCR 100 kA	
			Class CC, J, T, L fuse	Inverse time circuit breaker
Three-phase 200V	1/2 1/4	FRN003G2S-2GU	10.6 (1.2)	—
	1 1/2	FRN005G2S-2GU	14	14
	2 1	FRN008G2S-2GU	(2.1)	(2.1)
	3 1.5	FRN011G2S-2GU	(1.8)	10 (5.3)
	5 3	FRN018G2S-2GU	H/D	12 (8.4)
	7.5 3	FRN032G2S-2GU	H/D	14 (13.3)
	10 5	FRN046G2S-2GU	H/D	6 (3.3)
	15 7.5	FRN059G2S-2GU	H/D	4 (21.2)
	20 10	FRN075G2S-2GU	H/D	3 (26.7)
	25 10			