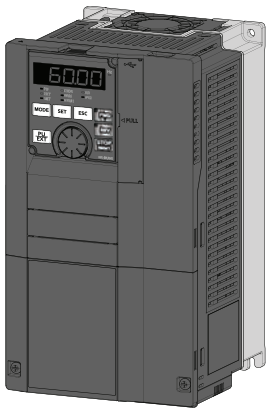
Troubleshooting Guide

Packaged Rooftop Air Conditioners
Precedent™ eFlex™

Variable Speed Compressor Inverter
6 to 10 Tons, 60 Hz

T/YZC072F3,4,W
T/YZC102F3,4,W
T/YZC090F3,4,W
T/YZC120F3,4,W



⚠ SAFETY WARNING

Only qualified personnel should install and service the equipment. The installation, starting up, and servicing of heating, ventilating, and air-conditioning equipment can be hazardous and requires specific knowledge and training. Improperly installed, adjusted or altered equipment by an unqualified person could result in death or serious injury. When working on the equipment, observe all precautions in the literature and on the tags, stickers, and labels that are attached to the equipment.

April 2017

RT-SVD008B-EN

Ingersoll Rand

Introduction

Read this manual thoroughly before operating or servicing this unit.

Warnings, Cautions, and Notices

Safety advisories appear throughout this manual as required. Your personal safety and the proper operation of this machine depend upon the strict observance of these precautions.

The three types of advisories are defined as follows:

⚠WARNING	Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.
⚠CAUTION	Indicates a potentially hazardous situation which, if not avoided, could result in minor or moderate injury. It could also be used to alert against unsafe practices.
NOTICE	Indicates a situation that could result in equipment or property-damage only accidents.

Important Environmental Concerns

Scientific research has shown that certain man-made chemicals can affect the earth's naturally occurring stratospheric ozone layer when released to the atmosphere. In particular, several of the identified chemicals that may affect the ozone layer are refrigerants that contain Chlorine, Fluorine and Carbon (CFCs) and those containing Hydrogen, Chlorine, Fluorine and Carbon (HCFCs). Not all refrigerants containing these compounds have the same potential impact to the environment. Trane advocates the responsible handling of all refrigerants-including industry replacements for CFCs and HCFCs such as saturated or unsaturated HFCs and HCFCs.

Important Responsible Refrigerant Practices

Trane believes that responsible refrigerant practices are important to the environment, our customers, and the air conditioning industry. All technicians who handle refrigerants must be certified according to local rules. For the USA, the Federal Clean Air Act (Section 608) sets forth the requirements for handling, reclaiming, recovering and recycling of certain refrigerants and the equipment that is used in these service procedures. In addition, some states or municipalities may have additional requirements that must also be adhered to for responsible management of refrigerants. Know the applicable laws and follow them.

⚠ WARNING

Proper Field Wiring and Grounding Required!

Failure to follow code could result in death or serious injury.
All field wiring MUST be performed by qualified personnel. Improperly installed and grounded field wiring poses FIRE and ELECTROCUTION hazards. To avoid these hazards, you MUST follow requirements for field wiring installation and grounding as described in NEC and your local/ state/national electrical codes.

⚠ WARNING

Personal Protective Equipment (PPE) Required!

Failure to wear proper PPE for the job being undertaken could result in death or serious injury. Technicians, in order to protect themselves from potential electrical, mechanical, and chemical hazards, MUST follow precautions in this manual and on the tags, stickers, and labels, as well as the instructions below:

- **Before installing/servicing this unit, technicians MUST put on all PPE required for the work being undertaken (Examples; cut resistant gloves/sleeves, butyl gloves, safety glasses, hard hat/bump cap, fall protection, electrical PPE and arc flash clothing). ALWAYS refer to appropriate Material Safety Data Sheets (MSDS)/Safety Data Sheets (SDS) and OSHA guidelines for proper PPE.**
- **When working with or around hazardous chemicals, ALWAYS refer to the appropriate MSDS/SDS and OSHA/GHS (Global Harmonized System of Classification and Labelling of Chemicals) guidelines for information on allowable personal exposure levels, proper respiratory protection and handling instructions.**
- **If there is a risk of energized electrical contact, arc, or flash, technicians MUST put on all PPE in accordance with OSHA, NFPA 70E, or other country-specific requirements for arc flash protection, PRIOR to servicing the unit. NEVER PERFORM ANY SWITCHING, DISCONNECTING, OR VOLTAGE TESTING WITHOUT PROPER ELECTRICAL PPE AND ARC FLASH CLOTHING. ENSURE ELECTRICAL METERS AND EQUIPMENT ARE PROPERLY RATED FOR INTENDED VOLTAGE.**

⚠ WARNING

Follow EHS Policies!

Failure to follow instructions below could result in death or serious injury.

- **All Ingersoll Rand personnel must follow Ingersoll Rand Environmental, Health and Safety (EHS) policies when performing work such as hot work, electrical, fall protection, lockout/tagout, refrigerant handling, etc. All policies can be found on the BOS site. Where local regulations are more stringent than these policies, those regulations supersede these policies.**
- **Non-Ingersoll Rand personnel should always follow local regulations.**

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Trademarks

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Revision History

RT-SVD008B-EN:

- Updated the system wiring diagram.

Table of Contents

Introduction

Each eFlex™ system is equipped with an electric inverter whose main function is to control the variable speed compressor.

Important: *Each inverter is programmed specifically for the variable speed compressor in the system and any change to the parameter values without the manufacturer's authorization could result in permanent damage to the compressor or system.*

Product Checking and Accessories

Unpack the product and check the rating plate and the capacity plate of the inverter to ensure that the model agrees with the order and the product is intact.

Important: *Current is based upon SLD rating of the inverter. In this example. 4.6A is the SLD rating of the inverter, but Pr.570 is set for the ND rating which is 3A.*

Inverter Model

Unpack the product and check the rating plate and the capacity plate of the inverter to ensure that the model agrees with the order and the product is intact.

Important: *Current is based on the SLD rating of the inverter. In this example, 4.6A is the SLD rating of the inverter, but Pr.570 is set for the ND rating which is 3A.*

FR-A840-00046-1-TR

Digit 1, 2— Standard prefix

FR = Freqrol

Digit 4, 5 — Drive series

A8 = Drive series

Digit 6 — Voltage class

2 = 200V class

4 = 400V class

6 = 600V class

Digit 7 — Structure, functionality

0 = Standard model

2 = Separated converter type

6 = IP55 compatible model

Digit 9, 10, 11, 12, 13— Rated current

00046 = 4.6 Amps

Important: *Current is based on SLD rating of the inverter. In this example, 4.6A is the SLD rating of the inverter, but Pr.570 is set for the ND rating, which is 3A.*

Digit 15 — Type

1 = FM

2 = CA

Note: *Specification differs by the type. Major differences are shown in* *Table 1, p. 8**.*

Digit 17, 18 — Circuit board coating, plate conductor, and UL type

Symbol	Circuit Board Coating	Plated Conductor	UL Type
Not used	No	No	No
60	Yes	No	No
06	Yes	Yes	No
N6	Yes	No	Yes
TR	Yes	No	Yes

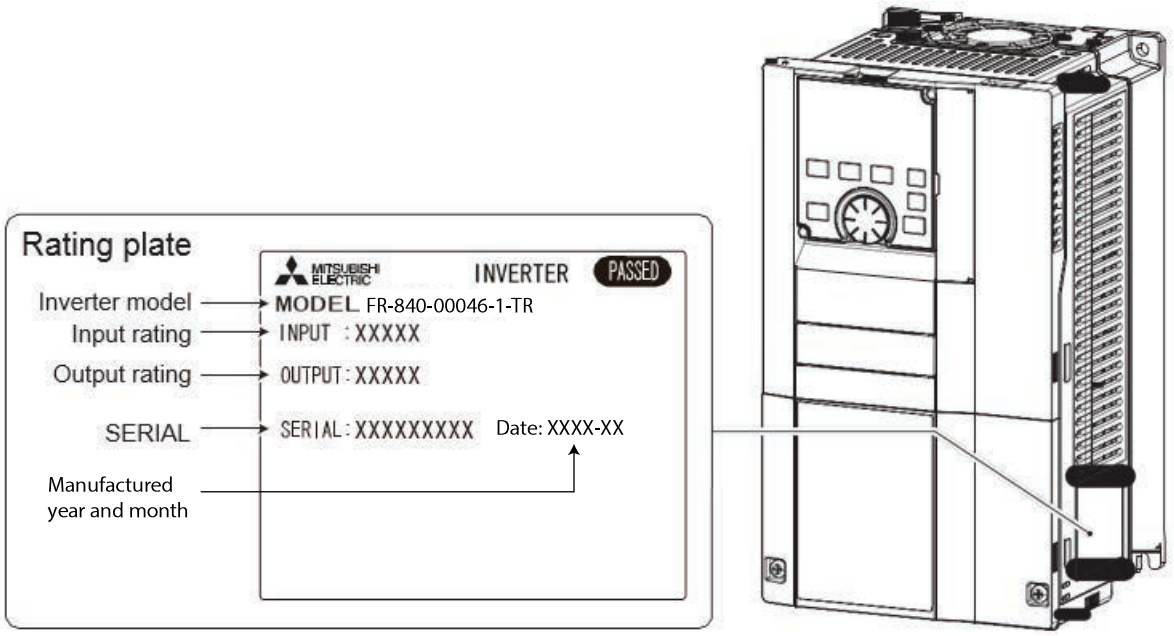


Table 1. Major type differences

Type	Monitor output	Initial setting			
		Built-in EMC filter	Control logic	Rated frequency	Pr.19 Base frequency voltage
FM (terminal FM equipped model)	Terminal FM (pulse train output) Terminal AM (analog voltage output (0 to ±10 VDC))	OFF	Sink logic	60 Hz	9999 (same as the power supply voltage)
CA (terminal CA equipped model)	Terminal CA (analog current output (0 to 20 mADC)) Terminal AM (analog voltage output (0 to ±10 VDC))	ON	Source logic	50 Hz	8888 (95% of the power supply voltage)

Notes:

- *Specification differs by the type. Major differences are shown in the table above.*
- *Conforming to IEC60721-3-3 3C2/3S2*
- *Applicable for the FR-A820-00340(5.5K) or higher, and the FR-A840-00170(5.5K) or higher.*

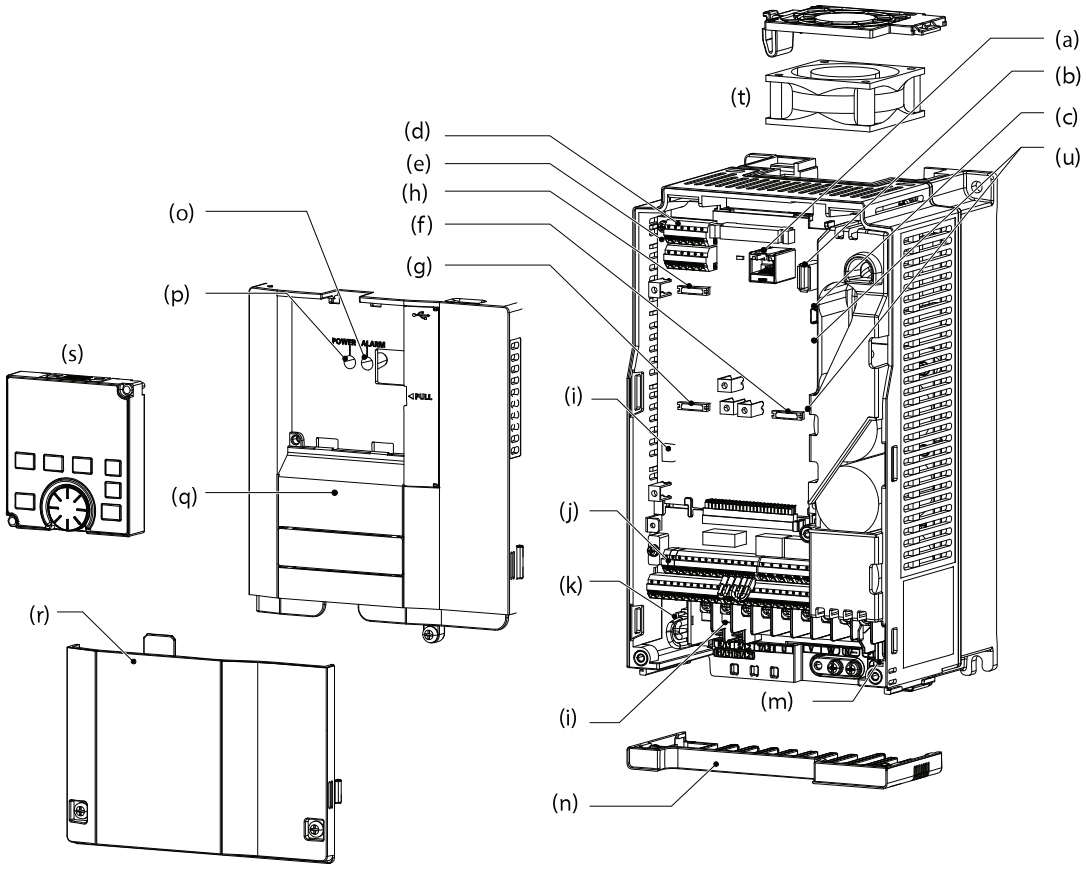
Notes:

- *In this Instruction Manual, the inverter model name consists of the applicable motor capacity and the rated current. (Example) FR-A820-00046(0.4K)*
- *Rated current is based on factory default duty cycle*
- *Applications must use "-TR" type inverters due to special programming*

Important: *For replacement parts, customers must purchase inverters from authorized dealers due to special application programming.*

Component Names

Figure 1. A820 and A840 models



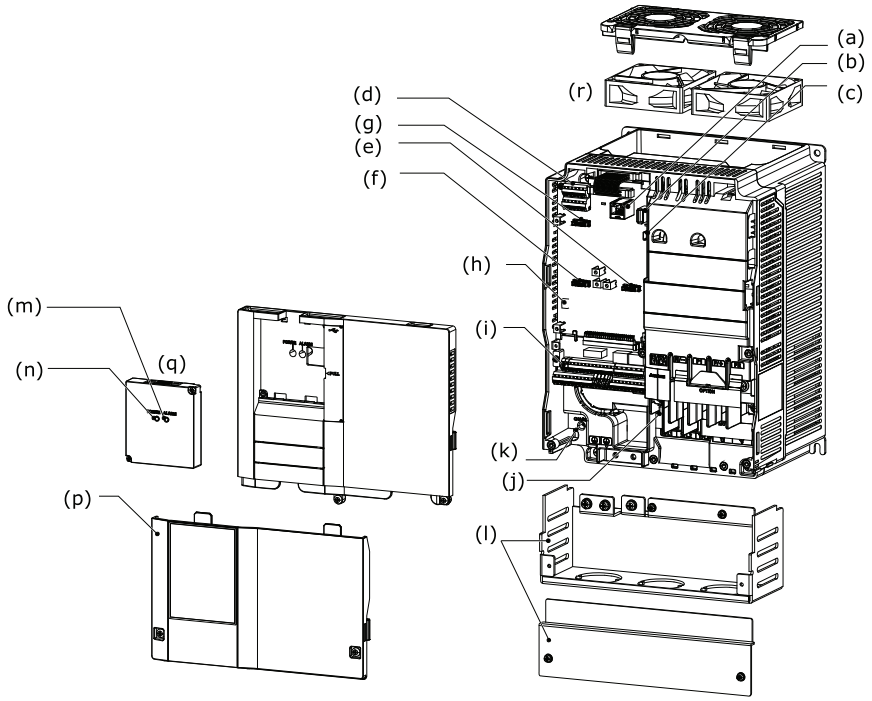
Symbol	Name	Description
a	PU connector	Connects the operation panel or the parameter unit. This connector also enables the RS-485 communication.
b	USB A connector	Connects a USB memory device
c	USB mini B connector	Connects a personal computer and enables communication with FR Configurator2.
d	RS-485 terminals	Enables RS-485, MODBUS RTU communication
e	Terminating resistor selection switch (SW1)	Select whether or not to use the terminating resistor for RS-485 communication.
f	Plug-in option connector1	Connects a plug-in option or a communication option.
g	Plug-in option connector2	
h	Plug-in option connector3	

Symbol	Name	Description
i	Voltage/current input switch (SW2)	Selects between voltage and current for the terminal 2 and 4 inputs.
j	Control circuit terminal block	Connects cables for the control circuit.
k	EMC filter ON/OFF connector	Turns ON/OFF the EMC filter.
l	Main circuit terminal block	Connects cables for the main circuit.
m	Charge lamp	Stays ON while the power is supplied to the main circuit.
n	Wiring cover	This cover is removable without unplugging cables. (FR-A820-01250 (22K) or lower, FR-A840-00620 (22K) or lower).
o	Alarm lamp	Turns ON when the protective function of the inverter is activated.

Symbol	Name	Description
p	Power lamp	Stays ON while the power is supplied to the control circuit (R1/L11, S1/L21).
q	Front cover (upper side)	Remove this cover for the installation of the product, installation of a plug-in option, RS-485 terminal wiring, switching of the voltage/current input switch, etc. (The FR-A800-GF has a front cover with an LED display cover.)

Symbol	Name	Description
r	Front cover (lower side)	Remove this cover for wiring.
s	Operation panel (FR-DU08)	Operates and monitors the inverter.
t	Cooling fan	Cools the inverter. (FR-A820-00105 (1.5K) or higher, FR-A840-00083(2.2K) or higher.)
u	Switches for manufacturer setting (SW3 and SW4)	Do not change the initial setting (OFF).

Figure 2. A860 models



Symbol	Name	Description
a	PU connector	Connects the operation panel or the parameter unit. This connector also enables the RS-485 communication.
b	USB A connector	Connects a USB memory device
c	USB mini B connector	Connects a personal computer and enables communication with FR Configurator2.
d	RS-485 terminals	Enables RS-485, MODBUS RTU communication
e	Terminating resistor selection switch (SW1)	Select whether or not to use the terminating resistor for RS-485 communication.
f	Plug-in option connector1	Connects a plug-in option or a communication option. (For the FR-A800-GF, a CC-Link IE Field Network communication circuit board is installed to the connector 1.
g	Plug-in option connector2	
h	Plug-in option connector3	
I	Voltage/current input switch (SW2)	Selects between voltage and current for the terminal 2 and 4 inputs.
j	Control circuit terminal block	Connects cables for the control circuit.

Symbol	Name	Description
k	EMC filter ON/OFF connector	Turns ON/OFF the EMC filter.
l	Main circuit terminal block	Connects cables for the main circuit.
m	Charge lamp	Stays ON while the power is supplied to the main circuit.
n	Wiring cover	This cover is removable without unplugging cables. (FR-A820-01250(22K) or lower, FR-A840-00620(22K) or lower).
o	Alarm lamp	Turns ON when the protective function of the inverter is activated.
p	Power lamp	Stays ON while the power is supplied to the control circuit (R1/L11, S1/L21).
q	Front cover (upper side)	Remove this cover for the installation of the product, installation of a plug-in option, RS-485 terminal wiring, switching of the voltage/current input switch, etc. (The FR-A800-GF has a front cover with an LED display cover.)
r	Front cover (lower side)	Remove this cover for wiring.

Symbol	Name	Description
s	Operation panel (FR-DU08)	Operates and monitors the inverter.
t	Cooling fan	Cools the inverter. (FR-A820-00105 (1.5K) or higher, FR-A840-00083(2.2K) or higher.)

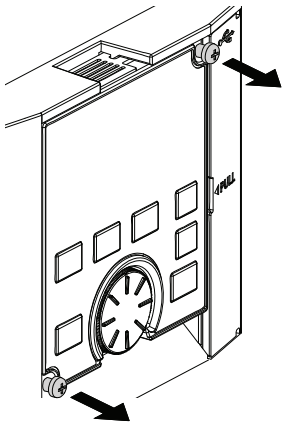
Symbol	Name	Description
u	Switches for manufacturer setting (SW3 and SW4)	Do not change the initial setting (OFF).

Installation and Wiring

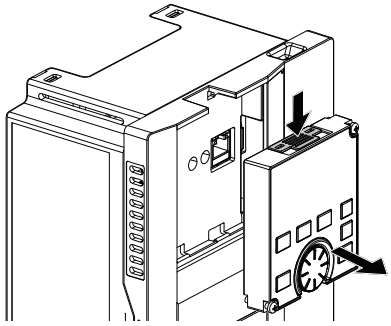
Removal and Reinstallation of the Operation Panel and Front Covers

Removal and Reinstallation of Operation Panel

1. Loosen the two screws on the operation panel.
   (These screws cannot be removed.)



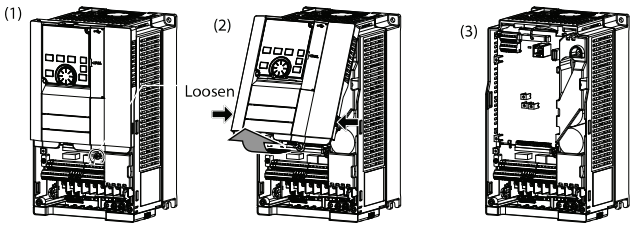
2. Press the upper edge of the operation panel while pulling out the operation panel.



To reinstall the operation panel, align its connector on the back with the PU connector of the inverter, and insert the operation panel. After confirming that the operation panel is fit securely, tighten the screws. (Tighten torque: 0.04 to 0.45 N m)

Removal and Reinstallation of Front Cover

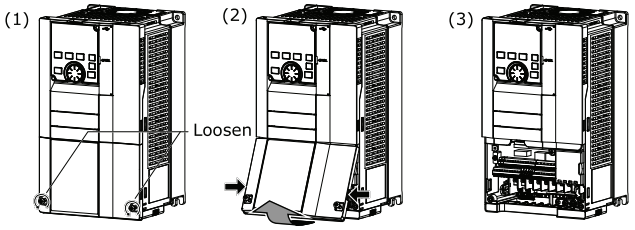
Removal of the Front Cover (upper side) (FR-A820-01540(30K) or lower, FR-A840-00770 (30K) or lower)



1. With the front cover (lower side) removed, loosen the mounting screw(s) on the front cover (upper side). (The screw(s) cannot be removed.)

   (FR-A820-00340(5.5K) to FR-A820-01540(30K) and FR-A840-00170(5.5K) to FR-A840-00770(30K) have two mounting screws.)
2. While holding the areas around the installation hooks on the sides of the front cover (upper side), pull out the cover using its upper side as a support.
3. With the front cover (upper side) removed, wiring of the RS-485 terminals and installation of the plug-in option can be performed.

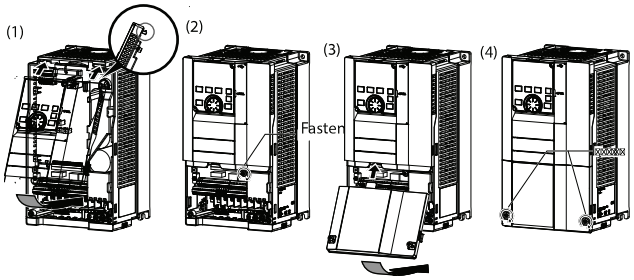
Removal of the Front Cover (lower side) (FR-A820-01540(30K) or lower, FR-A840-00770 (30K) or lower)



1. Loosen the screws on the front cover (lower side). (These screws cannot be removed.)

   (FR-A820-00340(5.5K) to FR-A820-01540(30K) and FR-A840-00170(5.5K) to FR-A840-00770(30K) have two mounting screws.)
2. While holding the areas around the installation hooks on the sides of the front cover (lower side), pull out the cover using its upper side as a support.
3. With the front cover (lower side) removed, wiring of the main circuit terminals and control circuit terminals can be performed.

Reinstallation of the Front Covers (FR-A820-01540(30K) or lower, FR-A840-00770(30K) or lower)



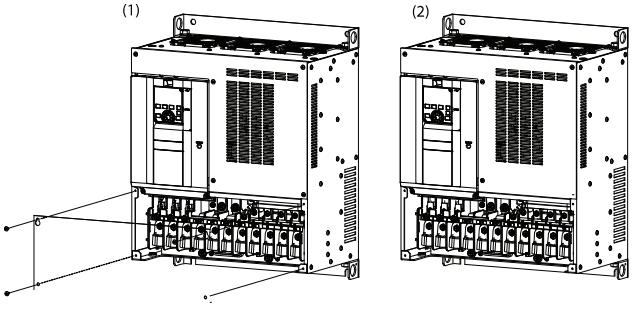
1. Insert the upper hooks of the front cover (upper side) into the sockets of the inverter.

   Securely install the front cover (upper side) to the inverter by fixing the hooks on the sides of the cover into place.
2. Tighten the mounting screw(s) at the lower part of the front cover (upper side).

   (FR-A820-00340(5.5K) to FR-A820-01540(30K) and FR-A840-00170(5.5K) to FR-A840-00770(30K) have two mounting screws.)
3. Install the front cover (lower side) by inserting the upper hook into the socket of the front cover (upper side).
4. Tighten the mounting screws at the lower part of the front cover (lower side).

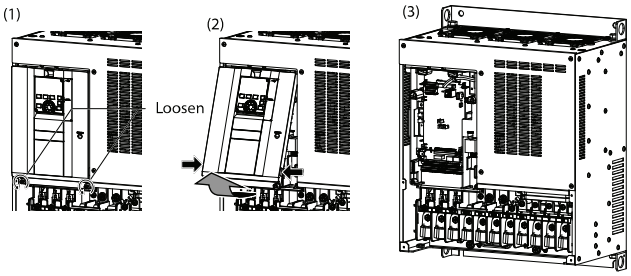
Note: *When installing the front cover (upper side), fit the connector of the operation panel securely along the guides of the PU connector.*

Removal of the Front Cover (lower side) (FR-A820-01870 (37K) or higher, FR-A840-00930 (37K) or higher)



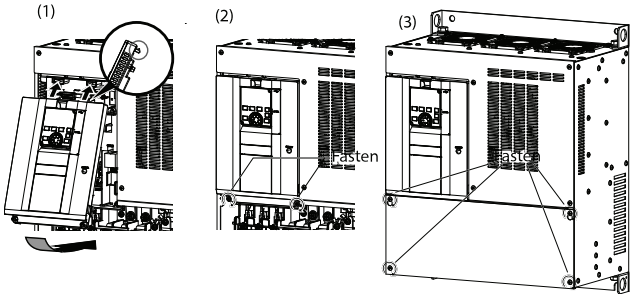
1. When the mounting screws are removed, the front cover (lower side) can be removed.
2. With the front cover (lower side) removed, wiring of the main circuit terminals can be performed.

Removal of the front cover (upper side) (FR-A820-01870 (37K) or higher, FR-A840-00930 (37K) or higher)



1. With the front cover (lower side) removed, loosen the mounting screws on the front cover (upper side). (These screws cannot be removed.)
2. Holding the areas around the installation hooks on the sides of the front cover (upper side), pull out the cover using its upper side as a support.
3. With the front cover (upper side) removed, wiring of the RS-485 terminals and installation of the plug-in option can be performed.

Reinstallation of the Front Covers (FR-A820-01870 (37K) or higher, FR- A840-00930 (37K) or higher)

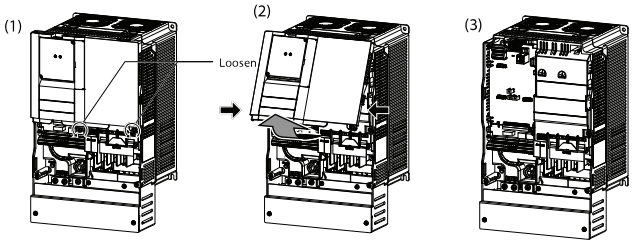


1. Insert the upper hooks of the front cover (upper side) into the sockets of the inverter.

   Securely install the front cover (upper side) to the inverter by fixing the hooks on the sides of the cover into place.
2. Tighten the mounting screw(s) at the lower part of the front cover (upper side).
3. Fasten the front cover (lower side) with the mounting screws.

Note: *Fully make sure that the front covers are installed securely. Always tighten the mounting screws of the front covers.*

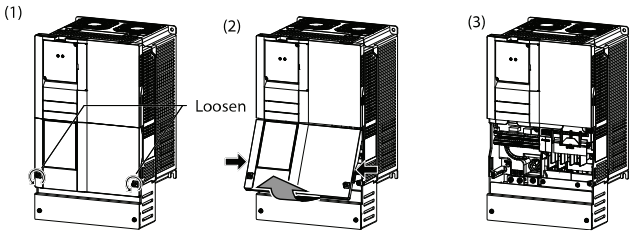
Removal of the front cover (upper side) (FR-A860-00450 or lower)



1. With the front cover (lower side) removed, loosen the mounting screw(s) on the front cover (upper side). (The screw(s) cannot be removed.)

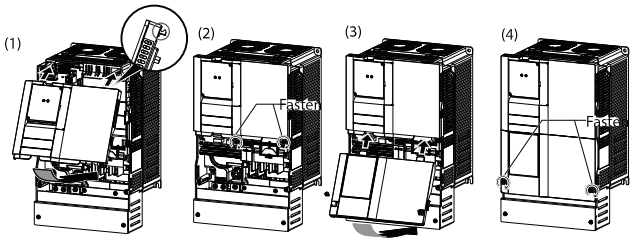
   (FR-A860-00170 to 00450 have two mounting screws.)
2. While holding the areas around the installation hooks on the sides of the front cover (upper side), pull out the cover using its upper side as a support.
3. With the front cover (upper side) removed, wiring of the RS-485 terminals and installation of the plug-in option can be performed.

Removal of the Front Cover (lower side) (FR-A860-00450 or lower)



1. Loosen the screws on the front cover (lower side). (These screws cannot be removed.)
2. While holding the areas around the installation hooks on the sides of the front cover (lower side), pull out the front cover (lower side) using its upper side as a support.
3. With the front cover (lower side) removed, wiring of the main circuit terminals and control circuit terminals can be performed.

Reinstallation of the Front Covers (FR-A860-00450 or lower)



1. Insert the upper hooks of the front cover (upper side) into the sockets of the inverter.

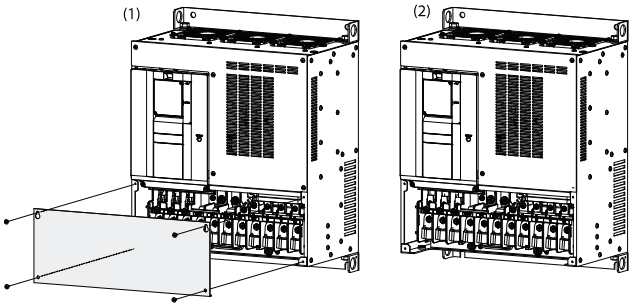
   Securely install the front cover (upper side) to the inverter by fixing the hooks on the sides of the cover into place.
2. Tighten the mounting screw(s) at the lower part of the front cover (upper side).

   (FR-A860-00170 to 00450 have two mounting screws.)
3. Install the front cover (lower side) by inserting the upper hook into the socket of the front cover (upper side).
4. Tighten the mounting screws at the lower part of the front cover (lower side).

Note: *When installing the front cover (upper side), fit the connector of the operation panel securely along the guides of the PU*

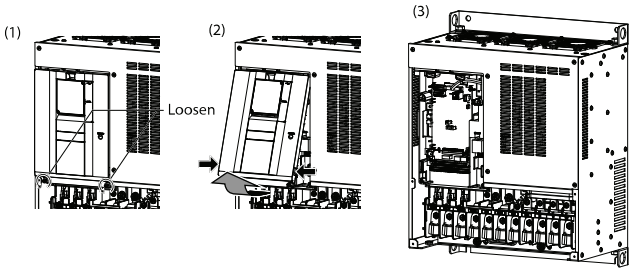
connector.

Removal of the Front Cover (lower side) (FR-A860-00680 or higher)



1. When the mounting screws are removed, the front cover (lower side) can be removed.
2. With the front cover (lower side) removed, wiring of the main circuit terminals can be performed.

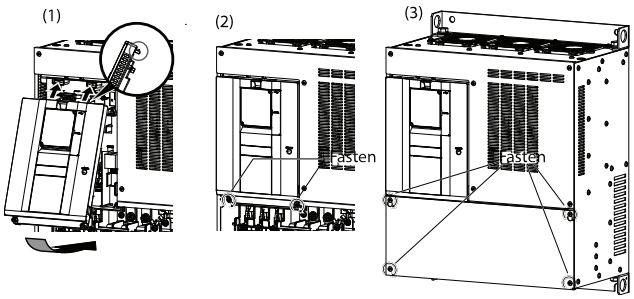
Removal of the Front Cover (upper side) (FR-A860-00680 or higher)



1. With the front cover (lower side) removed, loosen the mounting screws on the front cover (upper side). (These screws cannot be removed.)
2. Holding the areas around the installation hooks on the sides of the front cover (upper side), pull out the cover using its upper side as a support.

3. With the front cover (upper side) removed, wiring of the RS-485 terminals and installation of the plug-in option can be performed.

Reinstallation of the Front Covers (FR-A860-00680 or Higher)



1. Insert the upper hooks of the front cover (upper side) into the sockets of the inverter.

   Securely install the front cover (upper side) to the inverter by fixing the hooks on the sides of the cover into place.
2. Tighten the mounting screw(s) at the lower part of the front cover (upper side).
3. Fasten the front cover (lower side) with the mounting screws.

Note: *Fully make sure that the front covers are installed securely. Always tighten the mounting screws of the front covers.*

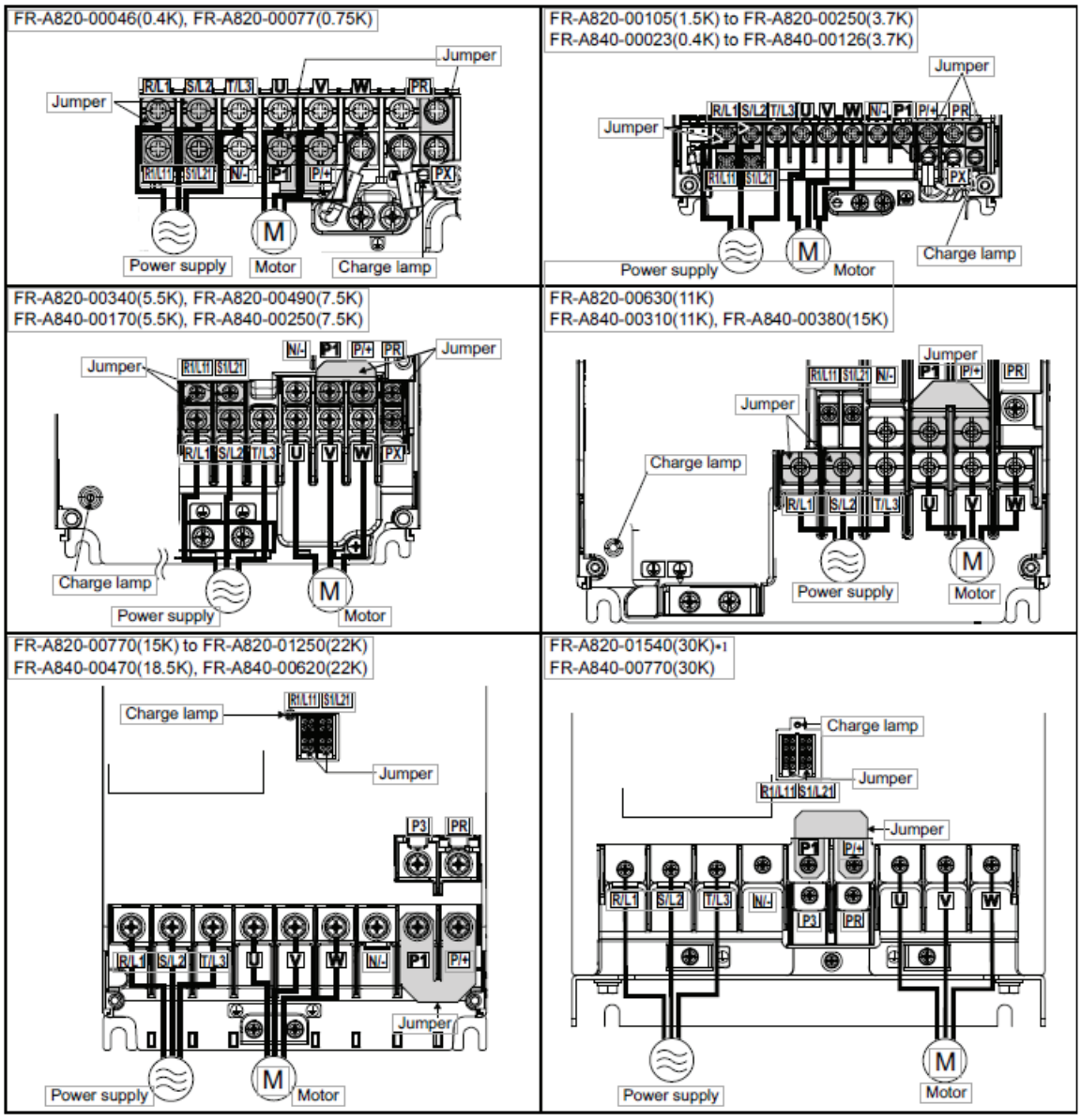
Main Circuit Terminals

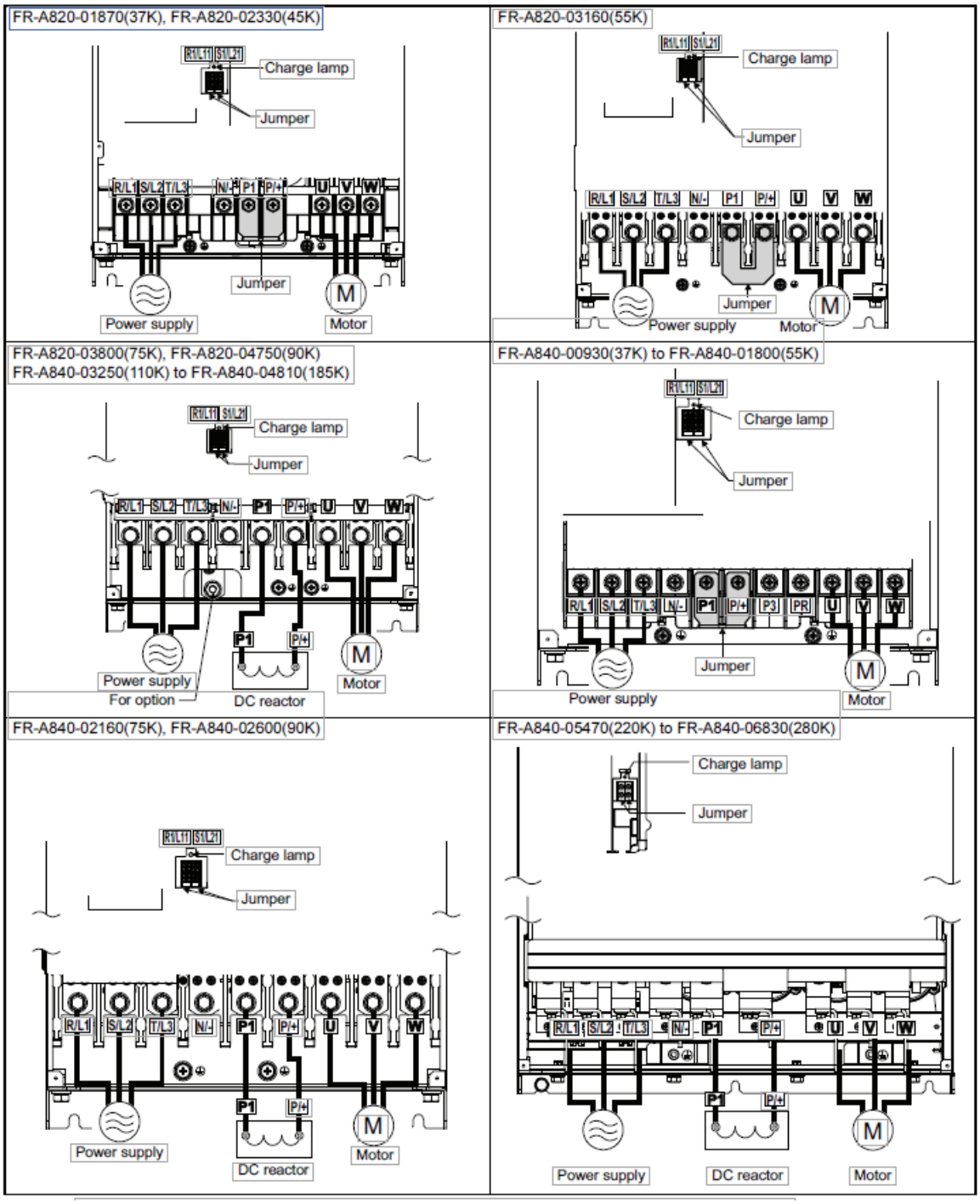
Details on the Main Circuit Terminals

Terminal symbol	Terminal name	Terminal function description
R/L1, S/L2, T/L3	AC power input	Connect these terminals to the commercial power supply. (FR-HC2) or the power regeneration common converter (FR-CV).
U, V, W	Inverter output	Connect these terminals to a three-phase squirrel cage motor or a PM motor.
R1/L11, S1/L21	Power supply for the control circuit	Connected to the AC power supply terminals R/L1 and S/L2. To retain the fault display and fault output, remove the jumpers across terminals R/L1 and R1/L11 and across S/L2 and S1/L21, and supply external power to these terminals. The power capacity necessary when separate power is supplied from R1/ L11 and S1/L21 differs according to the inverter capacity. FR-A860-00170 or lower 60 VA, FR-860-00170 or lower 60 VA 80 VA, FR-A860-00320 or higher
P/+, PR	Brake resistor connection FR-A820-00630(11K) or lower FR-A840-00380(15K) or lower A860-00320	Connect an optional brake resistor (FR-ABR) across the terminals P/+ and PR. Remove the jumper across the terminals PR and PX for the inverter capacity that has the terminal PX. Connecting a brake resistor increases the regenerative braking capability.
P3, PR	Brake resistor connection FR-A820-00770(15K) to 01250 (22K) FR-A840-00470 (18.5K) to 01800 (55K) A860-00027 to 00170 860-00540 to 01080	Connect an optional brake resistor across the terminals P3 and PR. Connecting a brake resistor increases the regenerative braking capability.
P/+, N/-	Brake unit connection	Connect the brake unit (FR-BU2, FR-BU, BU), power regeneration common converter (FR-CV), power regeneration converter (MT-RC), high power factor converter (FR-HC2), or DC power supply (under DC feeding mode) When connecting multiple inverters, FR-A820-00770(15K) to 01250(22K) or FR-A840-00470 (18.5K) to 01800(55K), in parallel using the FR-CV, or FR-HC2, always use either terminal P/+ or P3 for the connection. (Do not use the terminals P/+ and P3 together.) Do not connect the DC power supply between terminals P3 and N/-. Use terminals P/+ and N/- for DC feeding.
P3, N/-	Brake unit connection FR-A820-00770(15K) to 01250(22K)FR-A840-00470(18.5K) to 01800(55K)	
P/+, P1	DC reactor connection FR-A820-03160(55K) or lower FR-A840-01800(55K) or lower A860-01080 or lower	Remove the jumper across terminals P/+ and P1, and connect a DC reactor. When a DC reactor is not connected, the jumper across terminals P/+ and P1 should not be removed. When using a motor with a capacity of 75 kW or higher, always connect a DC reactor, which is available as an option
	DC reactor connection FR-A820-03800(75K) or higher FR-A840-02160(75K) or higher A860-01440 or lower	Always connect a DC reactor.
PR, PX	Built-in brake circuit connection (FR-A820 & FR-A840 Models Only)	When the jumper is connected across terminals PX and PR (initial status), the built-in brake circuit is valid. The built-in brake circuit is equipped in the FR-A820-00490(7.5K) or lower and FR-A840-00250 (7.5K) or lower.
⏚	Earth (ground)	For earthing (grounding) the inverter chassis. This must be earthed (grounded).

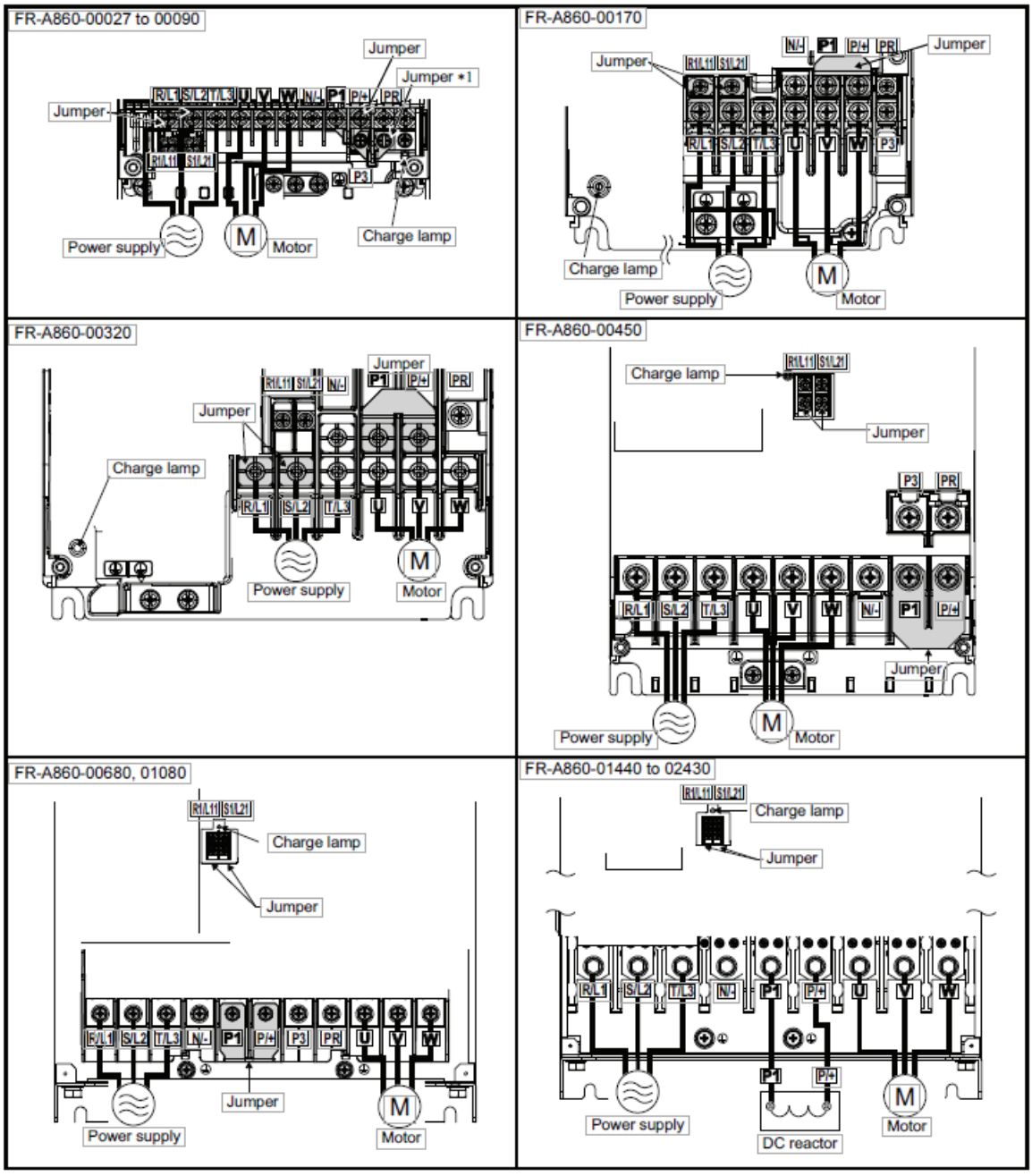
Note: *When connecting an optional brake resistor (FR-ABR) or a brake unit (FR-BU2, FR-BU, BU), remove the jumpers across the terminals PR and PX.*

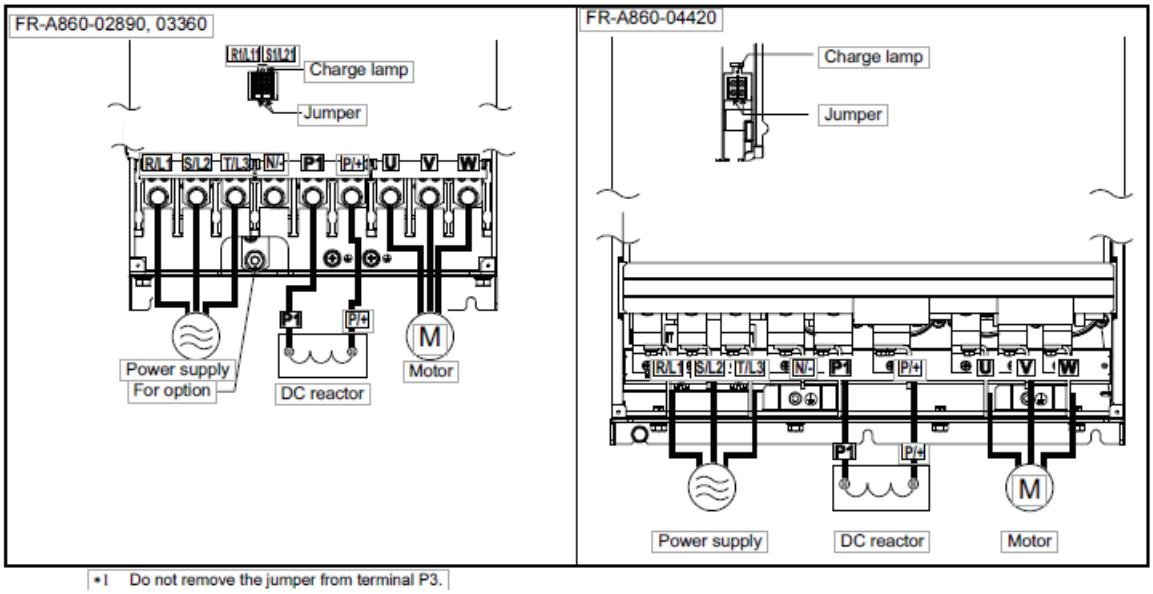
Terminal Layout of the Main Circuit Terminals, Wiring of Power Supply and the Motor





* Terminals P3 and PR of the FR-820-30K(01540) are not provided with a screw. Do not connect anything to this.

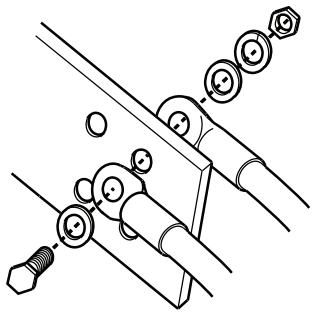

FR-A860-00027 to 00090
Jumper
Jumper *1
Jumper
Power supply
Motor
Charge lamp
FR-A860-00170
Jumper
Jumper
Charge lamp
Power supply
Motor
FR-A860-00320
Jumper
Jumper
Charge lamp
Power supply
Motor
FR-A860-00450
Charge lamp
Jumper
Jumper
Power supply
Motor
FR-A860-00680, 01080
Charge lamp
Jumper
Jumper
Power supply
Motor
FR-A860-01440 to 02430
Charge lamp
Jumper
Power supply
DC reactor
Motor



*1 Do not remove the jumper from terminal P3.

Notes:

- *Make sure the power cables are connected to the R/L1, S/L2 and T/L3. (Phase need not be matched.) Never connect the power cable to the U, V, and W of the inverter. Doing so will damage the inverter.*
- *Connect the motor to U, V, and W. The phase need to be matched.*
- *When wiring the inverter main circuit conductor of the FR-A860–04420, tighten a net from the right side of the conductor. (Refer to the following illustration.) For wiring, use bolts (nuts) provided with the inverter.*



Control Circuit

Details on the Control Circuit Terminals

Input signal function of the terminals (marked in gray in the following table) can be selected by setting Pr.178 to Pr.196 (I/O terminal function selection).

Table 2. Input signal

Type	Terminal symbol	Terminal name	Terminal function description		Rated specification
Contact input	STF	Forward rotation start	Turn ON the STF signal to start forward rotation and turn it OFF to stop	When the STF and STR signals are turned ON simultaneously, the stop command is given.	Input resistance 4.7 kΩ Voltage when contacts are open: 12 to 27 VDC When contacts are short-circuited, 4 to 6 mADC.
	STR	Reverse rotation start	Turn ON the STR signal to start reverse rotation and turn it OFF to stop.		
	STP (STOP)	Start self-holding selection	Multi-speed can be selected according to the combination of RH, RM and RL signals		
	RH, RM, RL	Multi-speed selection	Multi-speed can be selected according to the combination of RH, RM and RL signals.		
	JOG	Jog mode selection	Turn ON the JOG signal to enable JOG operation (initial setting) and turn ON the start signal (STF or STR) to start JOG operation.		
		Pulse train input	Terminal JOG is also used as a pulse train input terminal. To use as a pulse train input terminal, change the Pr.291 setting. (maximum input pulse: 100k pulses/s)		Input resistance 2 kΩ When contacts are short-circuited: 8 to 13 mADC
	RT	Second function selection	Turn ON the RT signal to enable the second function. When the second function such as "second torque boost" and "second V/F (base frequency)" is set, turning ON the RT signal enables the selected function.		Input resistance 4.7 kΩ Voltage when contacts are open: 21 to 27 VDC When contacts are short-circuited: 4 to 6 mADC
	MRS	Output stop	Turn ON the MRS signal (20 ms or more) to stop the inverter output. Use this signal to shut off the inverter output when stopping the motor with an electromagnetic brake.		
	RES	Reset	Use this signal to reset a fault output provided when a protective function is activated. Turn ON the RES signal for 0.1 s or longer, then turn it OFF		
	AU	Terminal 4 input selection	The terminal 4 function is available only when the AU signal is turned ON. Turning the AU signal ON makes terminal 2 invalid.		
	CS	Selection of automatic restart after instantaneous power failure.	When the CS signal is left ON, the inverter restarts automatically at power restoration. Note that restart setting is necessary for this operation. In the initial setting, a restart is disabled.		
	SD	Contact input common (sink)[(a)]	Common terminal for the contact input terminal (sink logic), terminal FM		—

Table 2. Input signal (continued)

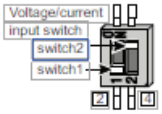
Type	Terminal symbol	Terminal name	Terminal function description	Rated specification
External transistor common (source)[b]			Connect this terminal to the power supply common terminal of a transistor output (open collector output) device, such as a programmable controller, in the source logic to avoid malfunction by undesirable current.	
24 VDC power supply common			Common terminal for the 24 VDC power supply (terminal PC, terminal +24) Isolated from terminals 5 and SE.	
PC	External transistor common (sink)[a]		Connect this terminal to the power supply common terminal of a transistor output (open collector output) device, such as a programmable controller, in the sink logic to avoid malfunction by undesirable currents.	Power supply voltage range 19.2 to 28.8 VDC Permissible load current 100 mA.
	Contact input common (source)[b]		Common terminal for contact input terminal (source logic).	
	24 VDC power supply		Can be used as a 24 VDC 0.1 A power supply.	
Frequency setting	10E	Frequency setting power supply	When connecting the frequency setting potentiometer at an initial status, connect it to the terminal 10. Change the input specifications of the terminal 2 using Pr.73 when connecting it to the terminal 10E	10 VDC ±0.4 V Permissible load current 10 mA.
	10			5 VDC ±0.5 V Permissible load current 10 mA
	2	Frequency setting (voltage)	Inputting 0 to 5 VDC (or 0 to 10 V, 0 to 20 mA) provides the maximum output frequency at 5 V (10 V, 20 mA) and makes input proportional. This input signal is valid only when the AU signal is ON (terminal 2 input is invalid). Use Pr.267 to switch among input 4 to 20 mA (initial setting), 0 to 5 VDC, and 0 to 10 VDC. Set the voltage/current input switch in the OFF position to select voltage input (0 to 5 V/0 to 10 V). [c] devices. Use Pr.858 to switch terminal functions.	When voltage is input: Input resistance 10 kΩ ±1 kΩ Maximum permissible voltage 20 VDC When current is input: Input resistance 245 Ω ±5 Ω Permissible maximum current 30 mA. 
	4	Frequency setting (current)	Inputting 4 to 20 mADC (or 0 to 5 V, 0 to 10 V) provides the maximum output frequency at 20 mA and makes input and output proportional. This input signal is valid only when the AU signal is ON (terminal 2 input is invalid). Use Pr.267 to switch among input 4 to 20 mA (initial setting), 0 to 5 VDC, and 0 to 10 VDC. Set the voltage/current input switch in the OFF position to select voltage input (0 to 5 V/0 to 10 V).[c] Use Pr.858 to switch terminal functions.	
	1	Frequency setting auxiliary	Inputting 0 to ±5 VDC or 0 to ±10 VDC adds this signal to terminal 2 or 4 frequency setting signal. Use Pr. 73 to switch between input 0 to ±5 VDC and 0 to ±10 VDC (initial setting). Use PR. 868 to switch terminal functions.	Input resistance 10 kΩ ±1 kΩ Permissible maximum voltage ±20 VDC
	5	Frequency setting common	Common terminal for frequency setting signal (terminal 2, 1 or 4) and analog output terminal AM, CA. Do not earth (ground).	—

Table 2. Input signal (continued)

Type	Terminal symbol	Terminal name	Terminal function description	Rated specification
Thermistor	10 2	PTC thermistor input	For receiving PTC thermistor outputs. When PTC thermistor is valid (Pr.561 ≠ "9999), the terminal 2 is not available for frequency setting.	Applicable PTC thermistor specification. Overheat detection resistance: 0.5 to 30 kΩ (Set by Pr.561).
External power supply input	+24	24 V external power supply input	For connecting a 24 V external power supply. If a 24 V external power supply is connected, power is supplied to the control circuit while the main power circuit is OFF.	Input voltage 23 to 25.5 VDC. Input current 1.4 A 56 or less

(a) Sink logic is initially set for the FM-type inverter.
(b) Source logic is initially set for the CA-type inverter.
(c) Set Pr.73, Pr.267, and the voltage/current input switch correctly, then input an analog signal in accordance with the setting. Applying a voltage with the voltage/current input switch ON (current input is selected) or a current with the switch OFF (voltage input is selected) could cause component damage of the inverter or analog circuits of output

Table 3. Output signal

Type	Terminal symbol	Terminal name	Terminal function description		Rated specification
Relay	A1, B1, C1	Relay output 1 (fault output)	1 changeover contact output that indicates that an inverter's protective function has been activated and the outputs are stopped. protective function has been activated and the outputs are stopped.		Contact capacity 230 VAC 0.3 A (power factor = 0.4) 30 VDC 0.3 A
	A2, B2, C2	Relay output 2	1 changeover contact output		
Open collector	RUN	Inverter running	Switched to LOW when the inverter output frequency is equal to or higher than the starting frequency (initial value 0.5 Hz). Switched to HIGH during stop or DC injection brake operation.		Permissible load 24 VDC (maximum 27 VDC) 0.1 A (The voltage drop is 2.8 V at maximum while the signal is ON.) LOW is when the open collector output transistor is ON (conducted). HIGH is when the transistor is OFF (not conducted).
	SU	Up to frequency	Switched to LOW when the output frequency is within the set frequency range ±10% (initial value). Switched to HIGH during acceleration/ deceleration and at a stop.	Fault code (4 bits) output.	
	OL	Overload warning	Switched to LOW when stall prevention is activated by the stall prevention function. Switched to HIGH when stall prevention is canceled.		
	IPF	Instantaneous power failure	Switched to LOW when an instantaneous power failure occurs or when the undervoltage protection is activated.		
	FU	Frequency detection	Switched to LOW when the inverter output frequency is equal to or higher than the preset detection frequency, and to HIGH when it is less than the preset detection frequency.		
	SE	Open collector output common	Common terminal for terminals RUN, SU, OL, IPF, FU		—

Table 3. Output signal (continued)

Type	Terminal symbol	Terminal name	Terminal function description		Rated specification
Pulse	FM[a]	For meter	Outputs a selected monitored item (such as output frequency) among several monitored items. The signal is not output during an inverter reset. The output signal is proportional to the magnitude of the corresponding monitoring item. Use Pr.55, Pr.56, and Pr.866 to set full scales for the monitored output frequency, output current, and torque.	Output item: Output frequency (initial setting)	Permissible load current 2 mA For full scale 1440 pulses/s
		NPN open collector output		This terminal can be used for open collector outputs by setting Pr.291.	Maximum output pulse 50k pulses/s Permissible load current 80 mA
Analog	AM	Analog voltage output		Output item: Output frequency (initial setting)	Output signal 0 to ±10 VDC, Permissible load current 1 mA (load impedance 10 kΩ or more) Resolution 8 bits
	CA[b]	Analog current output			Load impedance 200 Ω to 450 Ω Output signal Ω to 20 mADC

[a] Terminal FM is provided in the FM-type inverter.
[b] Terminal CA is provided in the CA-type inverter.

Table 4. Communication

Type	Terminal Symbol		Terminal name	Terminal Function description	
RS-485	—		PU connector	With the PU connector, communication can be made through RS-485. (For connection on a 1:1 basis only) Conforming standard: EIA-485 (RS-485) Transmission format: Multidrop link Communication speed: 4800 to 115200 bps Wiring length: 500 m	
	RS-485 terminals	TXD+	Inverter transmission terminal	The RS-485 terminals enables the communication by RS-485. Conforming standard: EIA-485 (RS-485) Transmission format: Multidrop link Communication speed: 300 to 115200 bps Overall length: 500 m	
		TXD-			
		RXD+	Inverter reception terminal		
		RXD-			
		GND (SG)	Earthing (grounding)		
USB	—		USB A connector	A connector (receptacle) A USB memory device enables parameter copies and the trace function.	Interface: Conforms to USB1.1 (USB2.0 full-speed compatible) Transmission speed: 12 Mbps
			USB B connector	Mini B connector (receptacle) Connected to a personal computer via USB to enable setting, monitoring, test operations of the inverter by FR Configurator2.	

Table 5. Safety stop signal

Terminal symbol	Terminal name	Terminal function description	Rated specification
S1	Safety stop input (Channel 1)	The terminals S1 and S2 are used for the safety stop input signal for the safety relay module. The terminals S1 and S2 are used at the same time (dual channel). Inverter output is shutoff by shortening/ opening between terminals S1 and SIC, or between S2 and SIC. In the initial status, terminals S1 and S2 are shorted with the terminal PC by shorting wires. The terminal SIC is shorted with the terminal SD. Remove the shorting wires and connect the safety relay module when using the safety stop function.	Input resistance 4.7 kΩ Input current 4 to 6 mADC (with 24 VDC input)
S2	Safety stop input (Channel 2)		
SIC	Safety stop input terminal common	Common terminal for terminals S1 and S2.	—
SO	Safety monitor output (open collector output)	Indicates the safety stop input signal status. Switched to LOW when the status is other than the internal safety circuit failure. Switched to HIGH during the internal safety circuit failure status. (LOW is when the open collector output transistor is ON (conducted). HIGH is when the transistor is OFF (not conducted).) Refer to the Safety stop function instruction manual (BCN- A23228-001) when the signal is switched to HIGH while both terminals S1 and S2 are open. (Please contact your sales representative for the manual.)	Permissible load D24 VDC (27 VDC at maximum), 0.1 A (The voltage drop is 3.4 V at maximum while the signal is ON.) (The voltage drop is 3.4 V at maximum while the signal is ON.)
SOC	Safety monitor output terminal common	Common terminal for terminal SO.	—

Control Logic (sink/source) Change

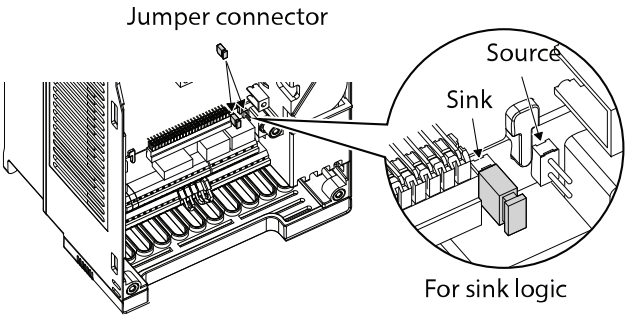
Change the control logic of input signals as necessary.

To change the control logic, change the jumper connector position on the control circuit board.

The control logic of input signals is initially set to the sink logic (SINK) for the FM type and all manufacturing application inverters.

The control logic of input signals is initially set to the source logic (SOURCE) for the CA type.

(The output signals may be used in either the sink or source logic independently of the jumper connector position.)



Notes:

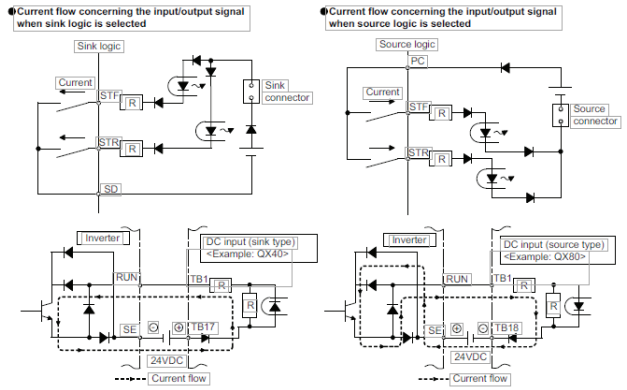
- *Make sure that the jumper connector is installed correctly.*
- *Never change the control logic while power in ON.*

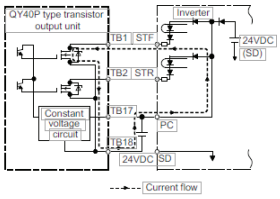
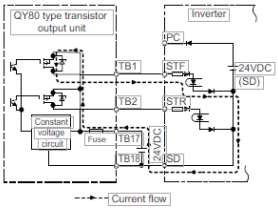
Sink Logic and Source Logic

In the sink logic, a signal switches ON when a current flows from the corresponding signal input terminal.

Terminal SD is common to the contact input signals. Terminal SE is common to the open collector output signals.

In the source logic, a signal switches ON when a current flows into the corresponding signal input terminal. Terminal PC is common to the contact input signals. Terminal SE is common to the open collector output signals.

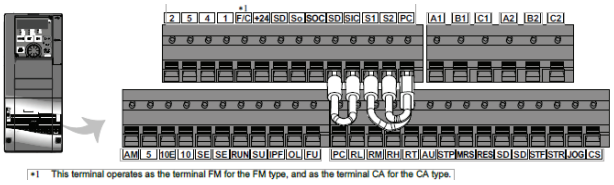


Sink logic	Source logic
Use the terminal PC as a common terminal, and perform wiring as shown below. (Do not connect terminal SD of the inverter with the terminal 0 V of the external power supply. When using terminals PC-SD as a 24 VDC power supply, do not install an external power supply in parallel with the inverter. Doing so may cause a malfunction in the inverter due to undesirable currents.)	Use the terminal SD as a common terminal, and perform wiring as shown below. (Do not connect terminal PC of the inverter with the terminal +24 V of the external power supply. When using terminals PC-SD as a 24 VDC power supply, do not install an external power supply in parallel with the inverter. Doing so may cause a malfunction in the inverter due to undesirable currents.)
	

Wiring of Control Circuit

Control Circuit Terminal Layout

Recommended cable gauge: 0.3 to 0.75 mm^2.



Wiring Method

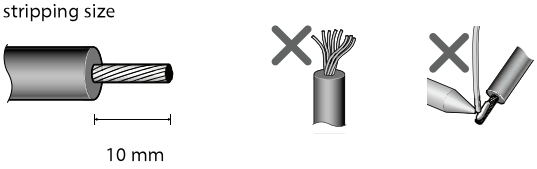
Power Supply Connection

For the control circuit wiring, strip off the sheath of a cable, and use it with a blade terminal. For a single wire, strip off the sheath of the wire and apply directly.

Insert the blade terminal or the single wire into a socket of the terminal.

1. Strip off the sheath for the below length. If the length of the sheath peeled is too long, a short circuit may occur with neighboring wires. If the length is too short, wires might come off. Wire the stripped cable after twisting it to prevent it from becoming loose. In addition, do not solder it.

Cable stripping size



2. Crimp the blade terminal.

   Insert wires to a blade terminal, and check that the wires come out for about 0 to 0.5 mm from a sleeve.

   Check the condition of the blade terminal after crimping. Do not use a blade terminal of which the crimping is inappropriate, or the face is damaged.

Table 6. Phoenix contact col., Ltd

Cable gauge (mm^2)	Ferrule terminal model			Crimping Tool name
	With insulation sleeve	Without insulation sleeve	For UL Wires[a]	
0.3	AI 0.5–10WH	—	—	CRIMPFOX 6
0.5	AI 0.5–10WH	—	AI 0,5–10WH-GB	
0.75	AI 0.75–10GY	A 0,75–10	AI 0.75–10GY-GB	
1	AI 1–10RD	A 1–10	AI1–10RD/1000GB	
1.25	AI 1.5–10BK	A 1,5–10	AI 1.5–10BK/1000GB [b]	
0.75 (for two wires)	AI TWIN 2 x 0.75–10GY	—	—	
0.3 to 0.75	BT 0.75–11	VC 0.75		

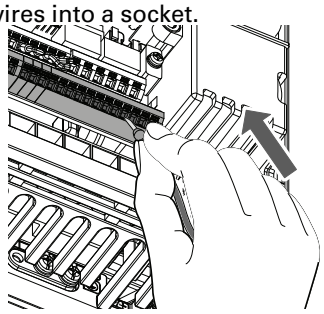
[a] A ferrule terminal with an insulation sleeve compatible with the MTW wire which has a thick wire insulation

[b] Applicable for the terminal A1, B1, C1, A2, B2, C2.

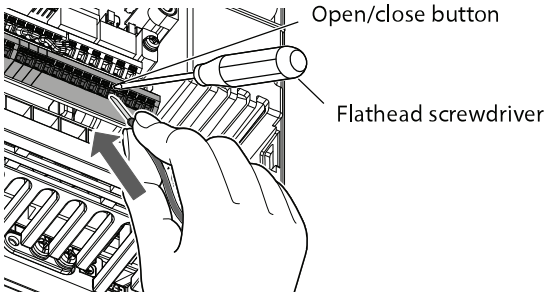
Table 7. NICHIFU Co., Ltd

Cable gauge (mm^2)	Blade terminal product number	Insulation product number	Crimping tool product number
0.3 to 0.75	BT 0.75–11	VC 0.75	NH 69

3. Insert the wires into a socket.



When using a single wire or stranded wires without a blade terminal, push the open/close button all the way down with a flathead screwdriver, and insert the wire.

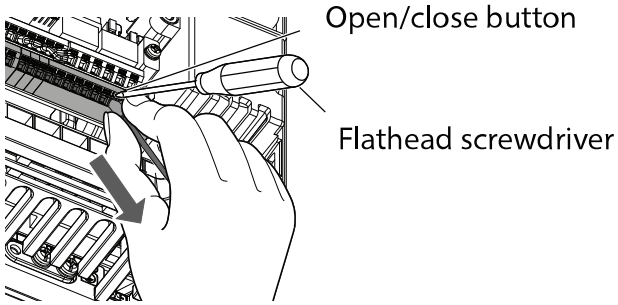


Notes:

- *When using stranded wires without a blade terminal, twist enough to avoid short circuit with nearby terminals or wires.*
- *Place the flathead screwdriver vertical to the open/close button. In case the blade tip slips, it may cause inverter damage or injury.*

Wired Removal

Pull the wire while pushing the open/close button all the way down firmly with a flathead screwdriver.



Notes:

- *Pulling out the wire forcefully without pushing the open/close button all the way down may damage the terminal block.*
- *Use a small flathead screwdriver (tip thickness: 0.4 mm/tip with: 2.5 mm).*

  If a flathead screwdriver with a narrow tip is used, terminal block may be damaged.

Name	***Model***	***Manufacturer***
Driver	*SZF 0– 0.4 x 2.5*	*Phoenix Contact Co., Ltd.*

Place the flathead screwdriver vertical to the open/close button. In case the blade tip slips, it may cause inverter damage or injury.

Common Terminals of the Control Circuit (SD, PC, 5, SE)

Terminals SD (sink logic), PC (source logic), 5, and SE are common terminals (0V) for I/O signals. (All common terminals are isolated from each other.) Do not earth (ground) these terminals. Avoid connecting the terminal SD (sink logic) with 5, the terminal PC (source logic) with 5, and the terminal SE with 5.

In the sink logic, terminal SD is a common terminal for the contact input terminals (STF, STR, STP (STOP), RH, RM, RL, JOG, RT, MRS, RES, AU, CS) and the pulse train output terminal (FM[1]). The open collector circuit is isolated from the internal control circuit by photocoupler.

In the source logic, terminal PC is a common terminal for the contact input terminals (STF, STR, STP (STOP), RH, RM, RL, JOG, RT, MRS, RES, AU, CS). The open collector circuit is isolated from the internal control circuit by photocoupler.

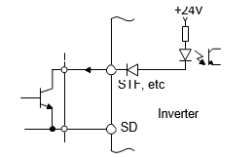
Terminal 5 is a common terminal for the frequency setting terminals (2, 1 or 4) and the analog output terminals (AM, CA[2]). It should be protected from external noise using a shielded or twisted cable.

Terminal SE is a common terminal for the open collector output terminals (RUN, SU, OL, IPF, FU). The contact input circuit is isolated from the internal control circuit by photocoupler.

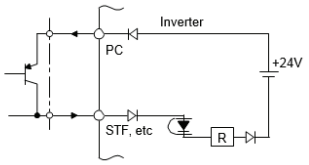
Signal Inputs by Contactless Switches

The contact input terminals of the inverter (STF, STR, STP (STOP), RH, RM, RL, JOG, RT, MRS, RES, AU, CS) can be controlled using a transistor instead of a contact switch as shown below.

1. *Terminal FM is provided in the FM-type inverter.*
2. *Terminal CA is provided in the CA-type inverter.*



External signal input using transistor (sink logic)

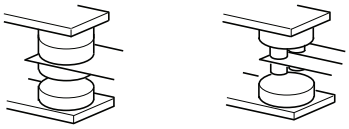


External signal input using transistor (source logic)

Wiring Precautions

It is recommended to use a cable of 0.3 to 0.75 mm^2 for the connection to the control circuit terminals.

The wiring length should be 30 m (200 m for the terminal FM) at the maximum.


Micro signal contacts Twin contacts

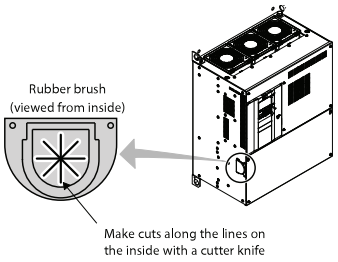
Use two or more parallel micro-signal contacts or twin contacts to prevent contact faults when using contact inputs since the control circuit input signals are micro-currents.

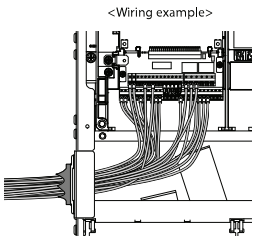
To suppress EMI, use shielded or twisted cables for the control circuit terminals and run them away from the main and power circuits (including the 200 V relay sequence circuit). For the cables connected to the control circuit terminals, connect their shields to the common terminal of the connected control circuit terminal. When connecting an external power supply to the terminal PC, however, connect the shield of the power supply cable to the negative side of the external power supply. Do not directly earth (ground) the shield to the enclosure, etc.

Always apply a voltage to the fault output terminals (A1, B1, C1, A2, B2, C2) via a relay coil, lamp, etc.

For the FR-A820-03160(55K) or higher and FR-A840-02160(75K) or higher and FR-A860–01440 or higher, separate the wiring of the control circuit away from the wiring of the main circuit.

Make cuts in rubber bush of the inverter side and lead the wires through.





When Using Separate Power Supplies for the Control and the Main Circuit

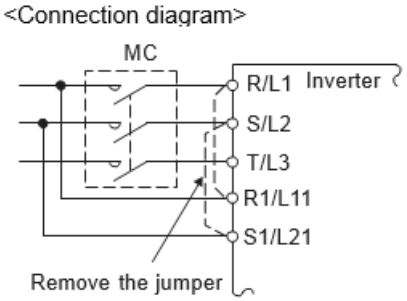
Cable Size for the Control Circuit Power Supply (Terminals R1/L11 and S1/ L21)

Terminal screw size: M4.

Cable gauge: 0.75 mm^2 to 2 mm^2.

Tightening torque: 1.5 N m

Connection Method

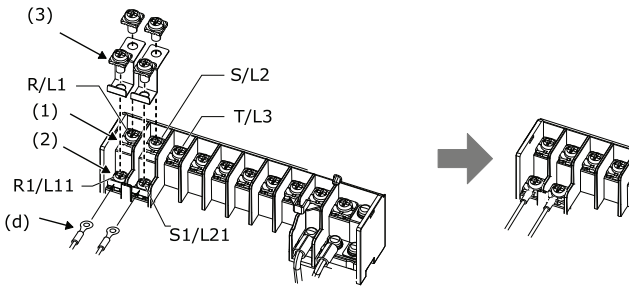


When a fault occurs, opening of the electromagnetic contactor (MC) on the inverter power supply side results in power loss in the control circuit, disabling the fault output signal retention. Terminals R1/L11 and S1/ L21 are provided to hold a fault signal. In this case, connect the power supply terminals R1/L11 and S1/L21

of the control circuit to the input side of the MC.

Do not connect the power cable to incorrect terminals. Doing so may damage the inverter.

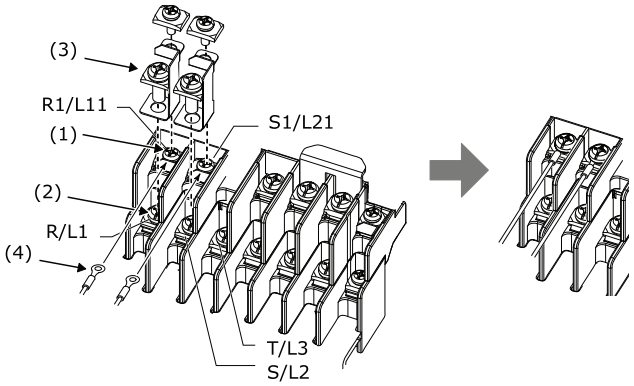
FR-A820-00250(3.7K) or lower, FR-A840-00126(3.7K) or lower, FR-A860–00090 or lower



Main circuit terminal block

1. Remove the upper screws.
2. Remove the lower screws.
3. Remove the jumper.
4. Connect the separate power supply cable for the control circuit to the lower terminals (R1/L11, S1/ L21).

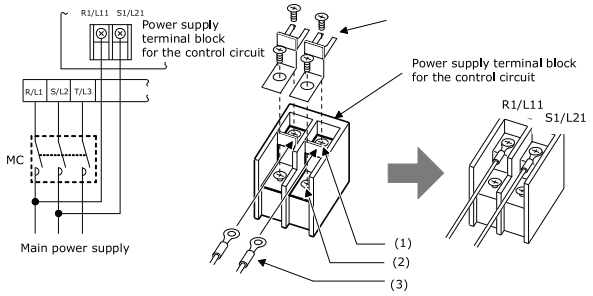
FR-A820-00340(5.5K) to FR-A820-00630(11K), FR-A840-00170(5.5K) to FR-A840-00380(15K), FR-A860–00170 and 00320

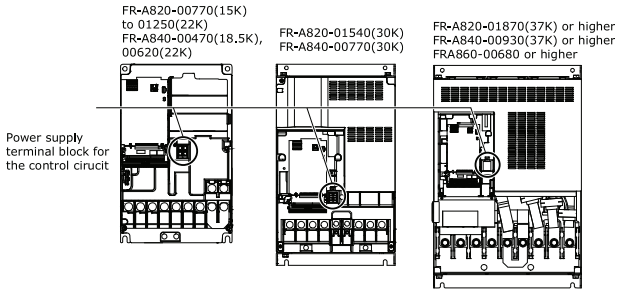


Main circuit terminal block

1. Remove the upper screws.
2. Remove the lower screws.
3. Remove the jumper.
4. Connect the separate power supply cable for the control circuit to the lower terminals (R1/L11, S1/L21).

FR-A820-00770(15K) or higher, FR-A840-00470(18.5K) or higher, FR-A860–00450 or higher





1. Remove the upper screws.
2. Remove the lower screws.
3. Pull the jumper toward you.
4. Connect the separate power supply cable for the control circuit to the upper terminals (R1/L11, S1/L21).

Notes:

- *When using separate power supplies, always remove the jumpers across terminals R/L1 and R1/L11 and across S/L2 and S1/L21. The inverter may be damaged if the jumpers are not removed.*
- *The voltage should be the same as that of the main control circuit when the control circuit power is supplied from other than the input side of the MC.*
- *The power capacity necessary when separate power is supplied from R1/L11 and S1/L21 differs according to the inverter capacity.*

Inverter	***Power supply capacity***
FR-A820-00630(11K) or lower FR-A840-00380(15K) or lower FR-A860–00170 or lower	*60 VA*
FR-A820-00770(15K) or higher FR-A840-00470(18.5K) or higher FR-A860–00320 or higher	*80 VA*

- *If the main circuit power is switched OFF (for 0.1 s or more) then ON again, the inverter is reset and a fault output will not be held.*

Supplying 24 V External Power to the Control Circuit

Connect a 24 V external power supply across terminals +24 and SD. Connecting a 24 V external power supply enables I/O terminal ON/OFF operation, operation panel displays, control functions, and communication during communication operation even at power-OFF of inverter's main circuit power supply. When the main circuit power supply is turned ON, the power supply source changes from the 24 V external power supply to the main circuit power supply.

Specification of the Applicable 24 V External Power Supply

Item	Rated specification
Input voltage	23 to 25.5 VDC
Input current	1.4 A or less

Model	Manufacturer
S8JX-N05024C [a] Specifications: Capacity 50 W, output voltage (DC) 24 V, output current 2.1 A Installation method: Front installation with cover or S8VS-06024 [a] Specifications: Capacity 60W, output voltage (DC) 24 V, output current 2.5 A Installation method: DIN rail installation	OMRON Corporation

[a] For the latest information about OMRON power supply, contact OMRON corporation.

Starting and Stopping the 24 V External Power Supply Operation

Supplying 24 V external power while the main circuit power is OFF starts the 24 V external power supply operation. Likewise, turning OFF the main circuit power while supplying 24 V external power starts the 24 V external power supply operation.

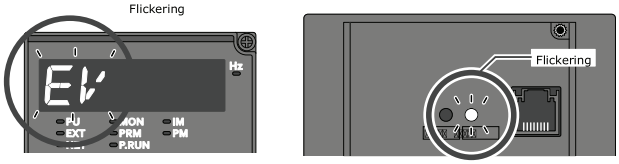
Turning ON the main circuit power stops the 24 V external power supply operation and enables the normal operation.

Notes:

- *When the 24 V external power is supplied while the main circuit power supply is OFF, the inverter operation is disabled.*
- *In the initial setting, when the main power supply is turned ON during the 24 V external power supply operation, a reset is performed in the inverter, then the power supply changes to the main circuit power supply. (The reset can be disabled using Pr.30.*

Confirming the 24 V External Power Supply Input

During the 24 V external power supply operation, "EV" flickers on the operation panel. The alarm lamp also flickers. Thus, the 24 V external power supply operation can be confirmed even when the operation panel is removed.



During the 24 V external power supply operation, the 24 V external power supply operation signal (EV) is output. To use the EV signal, set "68 (positive logic) or 168 (negative logic)" in one of Pr.190 to Pr.196 (output terminal function selection) to assign function to an output terminal.

Operation while the 24 V External Power is Supplied

Faults history and parameters can be read and parameters can be written (when the parameter write from the operation panel is enabled) using the operation panel keys

The safety stop function is invalid during the 24 V external power supply operation.

During the 24 V external power supply operation, monitored items and signals related to inputs to main circuit power supply, such as output current, converter output voltage, and IPF signal, are invalid.

The faults, which have occurred when the main circuit power supply is ON, continue to be output after the power supply is changed to the 24 V external power supply. Perform the inverter reset or turn OFF then ON the power to reset the faults.

The retry function is invalid for all faults during the 24 V external power supply.

If the power supply changes from the main circuit power supply to the 24 V external power supply while measuring the main circuit capacitor's life, the measurement completes after the power supply changes back to the main circuit power supply (Pr.259 = "3").

The output data is retained when "1 or 11" is set in Pr.495 Remote output selection.

Notes:

- *Inrush current equal to or higher than the 24 V external power supply specification may flow at power-ON. Confirm that the power supply and other devices are not affected by the inrush current and the voltage drop caused by it. Depending on the power supply, the inrush current protection may be activated to disable the power supply. Select the power supply and capacity carefully.*
- *When the wiring length between the external power supply and the inverter is long, the voltage often drops. Select the appropriate wiring size and length to keep the voltage in the rated input voltage range.*
- *In a serial connection of several inverters, the current increases when it flows through the inverter wiring near the power supply. The increase of the current causes voltage to drop further. When connecting different inverters to different power supplies, use the inverters after confirming that the input voltage of each inverter is within the rated input voltage range. Depending on the power supply, the inrush current protection may be activated to disable the power supply. Select the power supply and capacity carefully.*
- *"E.SAF or E.P24" may appear when the start-up time of the 24 V power supply is too long (less than 1.5 V/s) in the 24 V external power supply operation.*
- *Do not touch the control circuit terminal block (circuit board) during the 24 V power supply operation (when conducted). Otherwise you may get an electric shock or burn.*

Safety Stop Function

Function Description

The terminals related to the safety stop function are shown below.

<table>
<tr><th>Terminal symbol</th><th colspan="2">Terminal function description</th></tr>
<tr><td>S1[a]</td><td>For input of the safety stop channel 1.</td><td rowspan="2">Between S1 and SIC, S2 and SIC
Open: In safety stop mode
Short: Other than the safety stop mode.</td></tr>
<tr><td>S2[a]</td><td>For input of the safety stop channel 2.</td></tr>
<tr><td>SIC[a]</td><td colspan="2">Common terminal for S1 and S2.</td></tr>
<tr><td>SO</td><td>Outputs when an alarm or failure is detected.
The signal is output when no internal safety circuit failure [b] exists.</td><td></td></tr>
<tr><td>SOC</td><td colspan="2">Open collector output (terminal SO) common.</td></tr>
</table>

[a] In the initial status, terminals S1 and PC, S2 and PC, and SIC and SD are respectively shorted with shorting wires. To use the safety stop function, remove all the shortening wires, and then connect to the safety relay module as shown in the following connection diagram.

[b] At an internal safety circuit failure, the operation panel displays one of the faults shown on the next page.

Note: *Use the terminal SO to output a fault and to prevent restarting of the inverter. The signal cannot be used as safety stop input terminal to other devices.*

Safety Stop Function Operation

Input power	Internal safety circuit status	Input terminal[a] [b]		Output terminal	Inverter running status	Operation panel indication	
		S1	S2	SO		E.SAF[c]	SA[d]
OFF	—	—	—	OFF	Output shutoff (Safe state)	Not displayed	Not displayed
ON	Normal	ON	ON	ON[e]	Drive enabled	Not displayed	Not displayed
	Normal	ON	OFF	OFF[f]	Output shutoff (Safe state)	Displayed	Displayed
	Normal	OFF	ON	OFF[f]	Output shutoff (Safe state)	Displayed	Displayed
	Normal	OFF	OFF	ON[e]	Output shutoff (Safe state)	Not displayed	Displayed
	Fault	ON	ON	OFF	Output shutoff (Safe state)	Displayed	Not displayed [g]
	Fault	ON	OFF	OFF	Output shutoff (Safe state)	Displayed	Displayed
	Fault	OFF	ON	OFF	Output shutoff (Safe state)	Displayed	Displayed
	Fault	OFF	OFF	OFF	Output shutoff (Safe state)	Displayed	Displayed

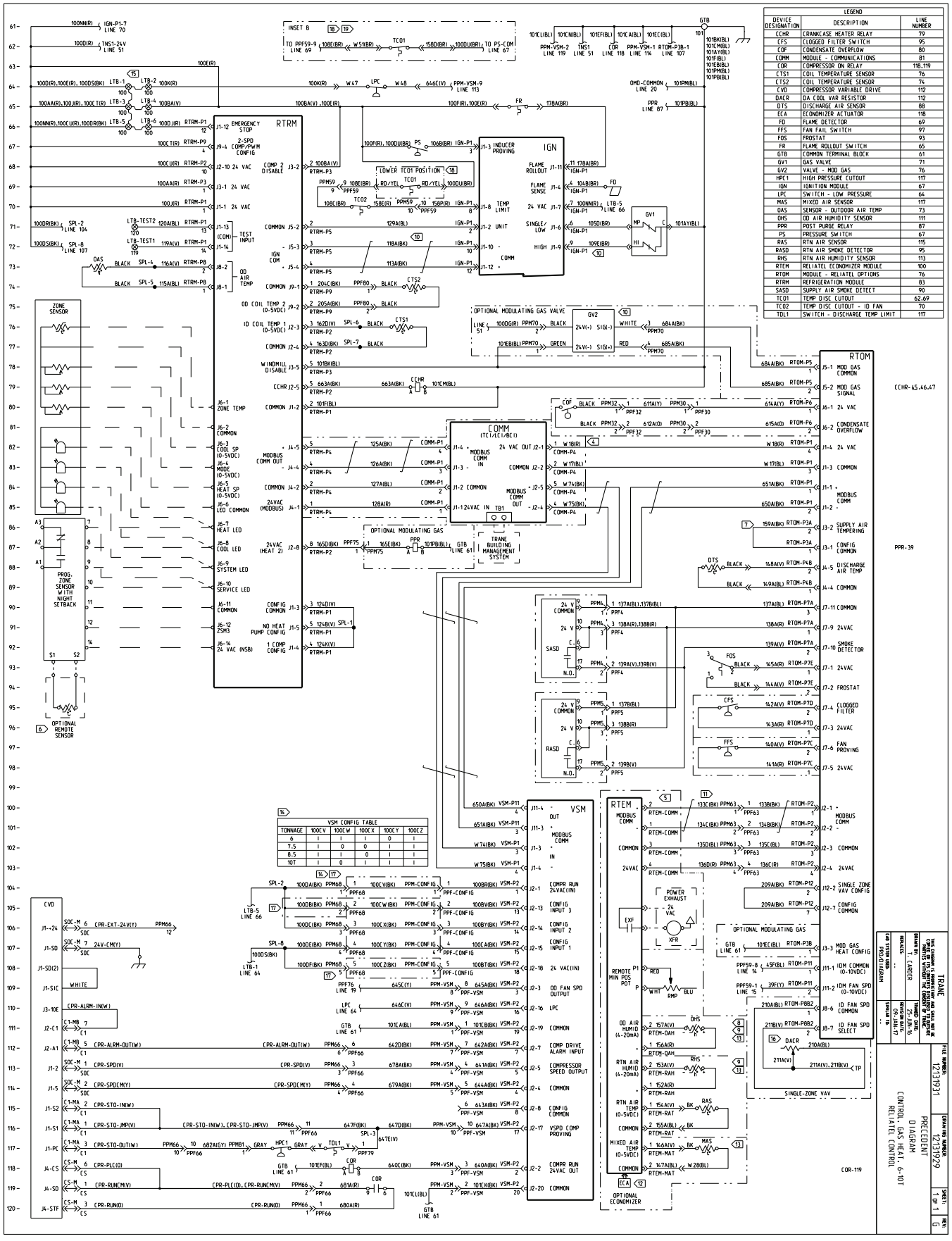
[a] ON: The transistor is conducted. OFF: The transistor is not conducted.
[b] When not using the safety stop function, short across terminals S1 and PC, S2 and PC, and SIC and SD to use the inverter. (In the initial status,
[c] If another fault occurs at the same time as E.SAF, the other fault can be displayed
[d] If another warning occurs at the same time as SA, the other warning can be displayed.
[e] If any of the protective functions shown in the following table is activated, the terminal SO turns OFF.
[f] If the internal safety circuit is operated normally, the terminal SO remains ON until E.SAF is displayed, and the terminal SO turns OFF when E.SAF is displayed.
[g] SA is displayed when the terminals S1 and S2 are identified as OFF due to the internal safety circuit failure.

Fault record	Operation panel indication
Option fault	E.OPT
Communication option fault	E.OP1
Parameter storage device fault	E.PE
Retry count excess	E.RET
Parameter storage device fault	E.PE2
Operation panel power supply short circuit/ RS-485 terminals power supply short circuit	E.CTE
24 VDC power fault	E.P24
Safety circuit fault	E.SAF
Overspeed occurrence	E.OS
Speed deviation excess detection	E.OSD

Fault record	Operation panel indication
Signal loss detection	E.ECT
Excessive position fault	E.OD
Brake sequence fault	E.MB1 to E.MB7
Encoder phase fault	E.EP
CPU fault	E.CPU
Internal circuit fault	E.13

System Wiring

Boxed section of diagram below shows inverter (CVD) controls wiring scheme for eFlex™ applications. Note: Diagram shown below is only for 6-10 Ton eFlex™ gas heat units. Please refer to system specific controls diagrams for troubleshooting purposes.


LEGEND
DEVICE DESIGNATION | DESCRIPTION | LINE NUMBER
CCHR | CRANKCASE HEATER RELAY | 79
CFS | CLOGGED FILTER SWITCH | 95
COF | CONDENSATE OVERFLOW | 80
COMM | MODULE - COMMUNICATIONS | 81
COR | COMPRESSOR ON RELAY | 118,119
CTS1 | COIL TEMPERATURE SENSOR | 76
CTS2 | COIL TEMPERATURE SENSOR | 74
CVD | COMPRESSOR VARIABLE DRIVE | 112
DACR | DA COOL VAR RESISTOR | 112
DTS | DISCHARGE AIR SENSOR | 88
ECA | ECONOMIZER ACTUATOR | 118
FD | FLAME DETECTOR | 69
FFS | FAN FAIL SWITCH | 97
FOS | FROSTAT | 93
FR | FLAME ROLLOUT SWITCH | 65
GTB | COMMON TERMINAL BLOCK | 61
GV1 | GAS VALVE | 71
GV2 | VALVE - MOD GAS | 76
HPC1 | HIGH PRESSURE CUTOUT | 117
IGN | IGNITION MODULE | 67
LPC | SWITCH - LOW PRESSURE | 64
MAS | MIXED AIR SENSOR | 117
OAS | SENSOR - OUTDOOR AIR TEMP | 73
OHS | OD AIR HUMIDITY SENSOR | 111
PPR | POST PURGE RELAY | 87
PS | PRESSURE SWITCH | 67
RAS | RTN AIR SENSOR | 115
RASD | RTN AIR SMOKE DETECTOR | 95
RHS | RTN AIR HUMIDITY SENSOR | 113
RTEM | RELIATEL ECONOMIZER MODULE | 100
RTOM | MODULE - RELIATEL OPTIONS | 76
RTRM | REFRIGERATION MODULE | 83
SASD | SUPPLY AIR SMOKE DETECT | 90
TCO1 | TEMP DISC CUTOUT | 62,69
TCO2 | TEMP DISC CUTOUT - ID FAN | 70
TDL1 | SWITCH - DISCHARGE TEMP LIMIT | 117
RTRM
RTOM
IGN
COMM (TC1/2C1/8C1)
VSM
RTEM
CVD
ZONE SENSOR
PROG. ZONE SENSOR WITH NIGHT SETBACK
OPTIONAL REMOTE SENSOR
OPTIONAL MODULATING GAS VALVE
OPTIONAL MODULATING GAS
TRANE BUILDING MANAGEMENT SYSTEM
POWER EXHAUST
OPTIONAL ECONOMIZER
SINGLE-ZONE VAV
VSM CONFIG TABLE
TONNAGE | 100CV | 100CW | 100CX | 100CY | 100CZ
6 | I | I | I | 0 | I
7.5 | I | 0 | 0 | I | I
8.5 | I | I | 0 | I | I
10T | I | 0 | I | I | I
TRANE
PRECEDENT DIAGRAM
CONTROL, GAS HEAT, 6-10T RELIATEL CONTROL
DRAWING NUMBER 12339929
FILE NUMBER 12339931
SHEET 1 OF 1
REV G
COR-119
CCHR-45,46,47
PPR-39

Communication Connectors and Terminals

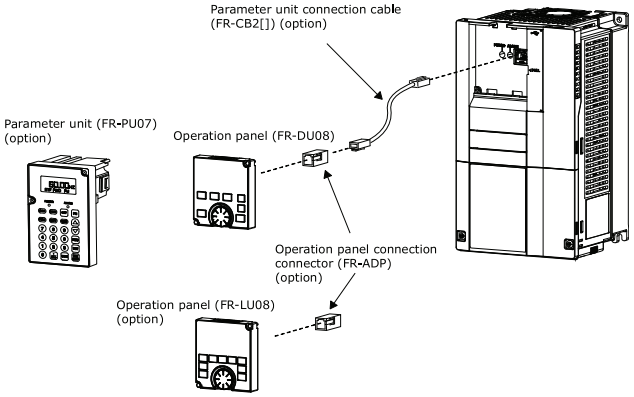
PU Connector

Mounting the Operation Panel or the Parameter Unit on the Enclosure Surface

Having an operation panel or a parameter unit on the enclosure surface is convenient. With a connection cable, the operation panel or the parameter unit can be mounted to the enclosure surface and connected to the inverter. Use the option FR-CB2[ ], or connectors and cables available on the market.

(To mount the operation panel, the optional connector (FR-ADP) is required.)

Securely insert one end of the connection cable until the stoppers are fixed.



Note: *Refer to the following table when fabricating the cable on the user side. Keep the total cable length within 20 m.*

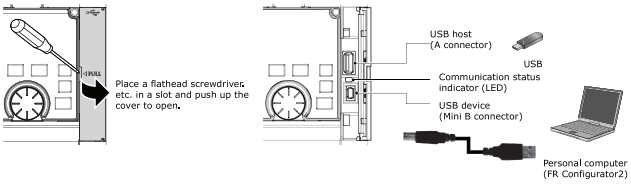
Name	Model	Manufacturer
Communication cable	SGLPEV-T (Cat5e/ 300 m) 24AWG × 4P	Mitsubishi Cable Industries, Ltd.
RJ-45 connector	5-554720-3	Tyco Electronics

Communication Operation

Using the PU connector enables communication operation from a personal computer, etc. When the PU connector is connected with a personal, FA or other computer by a communication cable, a user program can run to monitor the inverter or read and write parameters.

Communication can be performed with the inverter protocol (computer link operation).

USB Connector



USB Host Communication

Interface		Conforms to USB1.1
Transmission speed		12 Mbps
Wiring length		Maximum 5 m
Connector		USB A connector (receptacle)
Compatible USB memory	Format	FAT32
	Capacity	1 GB or more (used in the recorder mode of the trace function)
	Encryption function	Not available

Different inverter data can be saved in a USB memory device.

The USB host communication enables the following functions.

Function	Description
Parameter copy	Copies the parameter setting from the inverter to the USB memory device. A maximum of 99 parameter setting files can be saved in a USB memory device. The parameter setting data copied in the USB memory device can be copied to other inverters. This function is useful in backing up the parameter setting or for sharing the parameter setting among multiple inverters. The parameter setting file can be copied onto a personal computer from the USB memory device and edited using FR Configurator2.
Trace	The monitored data and output status of the signals can be saved in a USB memory device. The saved data can be imported to FR Configurator2 to diagnose the operating status of the inverter.
PLC function data copy	This function copies the PLC function project data to a USB memory device when the PLC function is used. The PLC function project data copied in the USB memory device can be copied to other inverters. This function is useful in backing up the parameter setting and for allowing multiple inverters to operate by the same sequence programs.

When the inverter recognizes the USB memory device without any problem, USb-A is briefly displayed on the operation panel.

When the USB memory device is removed, USb- is briefly displayed on the operation panel.

The operating status of the USB host can be checked on the LED display of the inverter.

LED display status	Operating status
OFF	No USB connection.
ON	The communication is established between the inverter and the USB device.
Flickering rapidly	The USB memory device being accessed. (Do not remove the USB memory device.)
Flickering slowly	Error in the USB connection.

When a device such as a USB battery charger is connected to the USB connector and an excessive current (500 mA or more) flows, USB host error UF (UF warning) is displayed on the operation panel.

When the UF warning appears, the USB error can be canceled by removing the USB device and setting Pr.1049 = "1". (The UF warning can also be canceled by resetting the inverter power or resetting with the RES signal.)

Notes:

- *Do not connect devices other than a USB memory device to the inverter.*
- *If a USB device is connected to the inverter via a USB hub, the inverter cannot recognize the USB memory device properly.*

USB Device Communication

The inverter can be connected to a personal computer with a USB (Ver. 1.1) cable.

Parameter setting and monitoring can be performed by FR Configurator2.

Interface	Conforms to USB1.1
Transmission speed	12 Mbps
Wiring length	maximum 5 m
Connector	USB mini B connector (receptacle)
Power supply	Self-powered

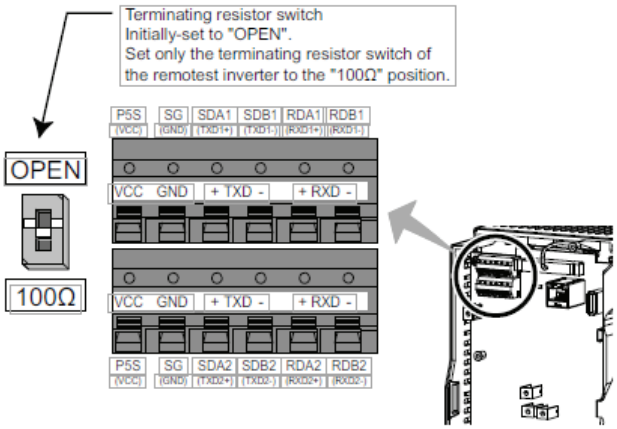
RS-485 Terminal Block

Communication Operation

Conforming standard	EIA-485 (RS-485)
Transmission format	Multidrop link
Communication speed	Maximum 115200 bps
Overall length	500 m
Connection cable	Twisted pair cable (4 pairs)

The RS-485 terminals enable communication operation from a personal computer, etc. When the PU connector is connected with a personal, FA or other computer by a communication cable, a user program can run to monitor the inverter or read and write parameters.

Communication can be performed with the inverter protocol (computer link operation) and MODBUS RTU protocol.


Terminating resistor switch
Initially-set to "OPEN".
Set only the terminating resistor switch of
the remotest inverter to the "100Ω" position.
OPEN
100Ω
P5S
SG
SDA1
SDB1
RDA1
RDB1
VCC
GND
+ TXD -
+ RXD -
P5S
SG
SDA2
SDB2
RDA2
RDB2

Precautions for Use of the Inverter

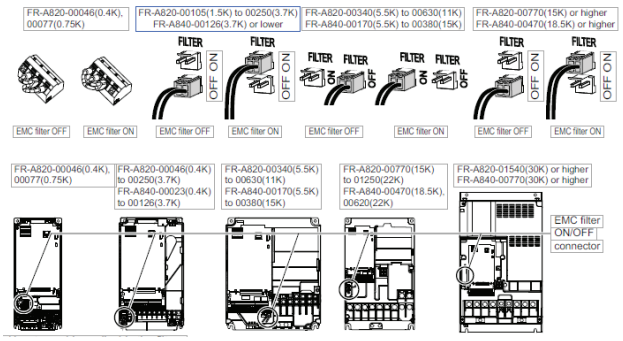
Electro-magnetic Interference (EMI) and Leakage Currents

Built-in EMC Filter

This inverter is equipped with a built-in EMC filter (capacitive filter) and a common mode choke. These filters are effective in reducing air-propagated noise on the input side of the inverter.

To enable the EMC filter, fit the EMC filter ON/OFF connector to the ON position. The FM type is initially set to "disabled" (OFF), and the CA type to "enabled" (ON).

The input side common mode choke, which is built in the FR-A820-03160(55K) or lower and FR-A840-01800 (55K) or lower inverter, is always enabled regardless of the EMC filter ON/OFF connector setting.

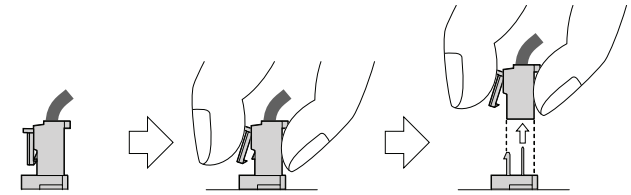


Before removing a front cover, check to make sure that the indication of the inverter operation panel is OFF, wait for at least 10 minutes after the power supply has been switched OFF, and check that there is no residual voltage using a tester.

For FR-A820–00105(1.5K) or higher and FR-A840–00023 (0.4K) or higher

- When disconnecting the connector, push the fixing tab and pull the connector straight without pulling the cable or forcibly pulling the connector with the tab fixed.

  When installing the connector, also engage the fixing table securely.
- (If it is difficult to disconnect the connector, use a pair of needle-nose pliers, etc.)



EMC filter ON/OFF connector (Side view)

Disengage connector fixing tab

With tab disengaged, pull up the connector straight.

For FR-A820–00077(0.75K) or lower

- Remove the control circuit terminal block.
- Connect the shorting wire to the corresponding terminal to enable or disable the filter. Connect the wire to the terminal in the same way as general wiring of the control circuit terminal block.
- After switching, reinstall the control circuit terminal block as it was.

Notes:

- *Fit the connector or shorting wire to either ON or OFF position.*
- *Enabling (turning ON) the EMC*

⚠ WARNING

Hazardous Voltage!

Failure to follow instructions below could result in death or serious injury.

Power down the outdoor unit before making contact with the inverter circuit board. Follow proper lockout/ tagout procedures to ensure the power cannot be inadvertently energized. Wait for at least 15 minutes to allow the unit to fully discharge high DC voltage. Confirm the unit is fully discharged with an appropriate voltmeter.

Power Supply Harmonics

The inverter may generate power supply harmonics from its converter circuit to affect the power generator, power factor correction capacitor etc. Power supply harmonics are different from noise and leakage currents in source, frequency band and transmission path. Take the following countermeasure suppression techniques.

Table 8. The difference between harmonics and noises

Item	Harmonics	Noise
Frequency	Normally 40th to 50th degrees or less (3 kHz or less).	High frequency (several 10 kHz to 1 GHz order).
Location	To-electric channel, power impedance.	To-space, distance, wiring path,

Table 8. The difference between harmonics and noises (continued)

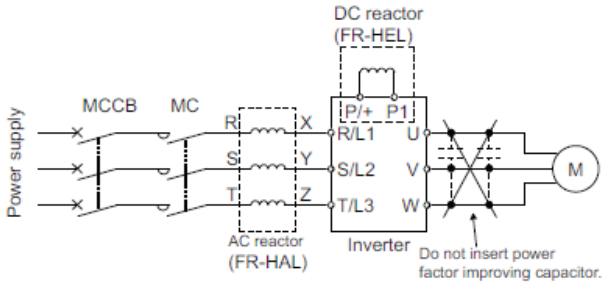
Item	Harmonics	Noise
Quantitative understanding	Theoretical calculation possible.	Random occurrence, quantitative grasping difficult.
Generated amount	Nearly proportional to the load capacity.	Changes with the current variation ratio. (Gets larger as switching speed increases.)
Affected equipment immunity	Specified by standards per equipment.	Different depending on maker's equipment specifications.
Countermeasure	Provide a reactor.	Increase distance.

Countermeasures

The harmonic current generated from the inverter to the input side differs according to various conditions such as the wiring impedance, whether a reactor is used or not, and output frequency and output current on the load side.

For the output frequency and output current, we understand that this should be calculated in the conditions under the rated load at the maximum operating frequency.

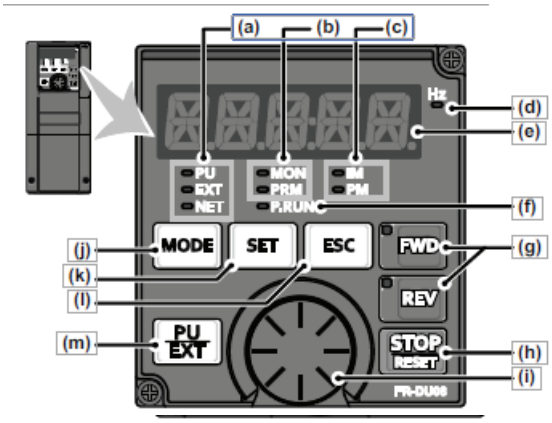
Note: *The power factor improving capacitor and surge suppressor on the inverter output side may be overheated or damaged by the harmonic components of the inverter output. Also, since an excessive current flows in the inverter to activate overcurrent protection, do not provide a capacitor and surge suppressor on the inverter output side when the motor is driven by the inverter. For power factor improvement, install a reactor on the inverter input side or in the DC circuit.*



Basic Operation

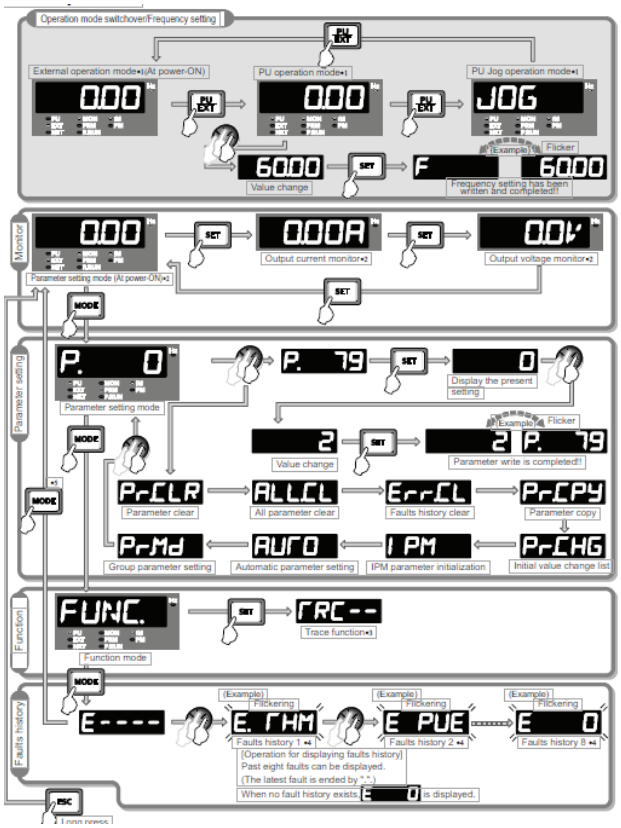
Operation Panel (FR-DU08)

Components of the Operation Panel (FR-DU08)



No.	Component	Name	Description
(a)	PU EXT NET	Operation mode indicator	PU: ON to indicate the PU operation mode. EXT: ON to indicate the External operation mode. (ON at power-ON in the initial setting.) NET: ON to indicate the Network operation mode. PU and EXT: ON to indicate the External/PU combined operation mode 1 or 2.
(b)	MON PRM	Operation panel status indicator	MON: ON to indicate the monitoring mode. Quickly flickers twice intermittently while the protective function is activated. Slowly flickers in the display-off mode. PRM: ON to indicate the parameter setting mode.
(c)	IM PM	Control motor indicator	IM: ON to indicate the induction motor control. PM: ON to indicate the PM sensorless vector control. The indicator flickers when test operation is selected.
(d)	Hz	Frequency unit indicator	ON to indicate frequency. (Flickers when the set frequency is displayed in the monitor.)
(e)	5.0.0.0.0.	Monitor (5-digit LED)	Shows the frequency, parameter number, etc. (Using **Pr.52, Pr.774 to Pr.776**, the monitored item can be changed.)
(f)	P.RUN	PLC function indicator	ON to indicate that the sequence program can be executed.
(g)	FWD REV	FWD key, REV key	FWD key: Starts forward rotation. The LED is on during forward operation. REV key: Starts reverse rotation. The LED is on during reverse operation. The LED flickers under the following conditions. • When the frequency command is not given even if the forward/reverse command is given. • When the frequency command is the starting frequency or lower. • When the MRS signal is being input.
(h)	STOP RESET	STOP/RESET key	Stops the operation commands. Resets the inverter when the protection function is activated.
(i)		Setting dial	The setting dial of the Mitsubishi inverters. The setting dial is used to change the frequency and parameter settings. Press the setting dial to perform the following operations: • To display a set frequency in the monitoring mode (the setting can be changed using **Pr.992**.) • To display the present setting during calibration • To display a fault history number in the faults history mode
(j)	MODE	MODE key	Switches to different modes. Switches to the easy setting mode by pressing simultaneously with PU EXT. Holding this key for 2 seconds locks the operation. The key lock is invalid when **Pr.161**="0 (initial setting)".
(k)	SET	SET key	Enters each setting. If pressed during operation, the monitored item changes. When the initial setting is set: Output frequency → Output current → Output voltage (Using **Pr.52, Pr.774 to Pr.776**, the monitored item can be changed.)
(l)	ESC	ESC key	Goes back to the previous display. Holding this key for a longer time changes the mode back to the monitor mode.
(m)	PU EXT	PU/EXT key	Switches between the PU operation mode, the PUJOG operation mode, and the External operation mode. Switches to the easy setting mode by pressing simultaneously with MODE. Cancels the PU stop also.

Basic Operation



Important:

1. *Monitored items can be changed.*
2. *The USB memory mode will appear if a USB memory device is connected.*

Parameter Setting Mode

In the parameter setting mode, inverter functions (parameters) are set.

The following table explains the indications in the parameter setting mode.

Operation panel indication	Function name	Description
P.	Parameter setting mode	Under this mode, the set value of the displayed parameter number is read or changed.
PrCLR	Parameter clear	Clears and resets parameter settings to the initial values. Calibration parameters and offline auto tuning parameters are not cleared. The communication parameters are not cleared.
ALLCL	Parameter all clear	Clears and resets parameter settings to the initial values. Calibration parameters and the offline auto tuning parameters are also cleared. The communication parameters are not cleared.
ErrCL	Faults history clear	Deletes the faults history.
PrCPY	Parameter copy	Copies the parameter settings saved in the inverter to the operation panel. The parameters copied to the operation panel can be also copied to other inverters.
PrCHG	Initial value change list	Identifies the parameters that have been changed from their initial settings.
IPM	IPM initialization	Changes the parameters to the settings required to drive an IPM motor (MM-CF) as a batch. Also changes the parameters back to the settings required to drive an induction motor.
AUTO	Automatic parameter setting	Changes parameter settings as a batch. The target parameters include communication parameters for the human machine interface (GOT) connection and the parameters for the rated frequency settings of 50 Hz/60 Hz.
PrMd	Group parameter setting	Displays parameter numbers by function groups.

Correspondences between Digital and Actual Characters

There are the following correspondences between the actual alphanumeric characters and the digital characters displayed on the operation panel:

0	1	2	3	4	5	6	7	8	9	A	B(b)	C	c	D(d)
0	1	2	3	4	5	6	7	8	9	A	b	C	c	d
E(e)	F(f)	G(g)	H(h)	I(i)	J(j)	K(k)	L(l)	M(m)	N	n	O	o	P(p)	Q(q)
E	F	G	H	I	J	K	L	M	N	n	O	o	P	Q
R	r	S(s)	T(t)	U	u	V	v	W	w	X(x)	Y(y)	Z(z)		
R	r	S	T	U	u	V	v	W	w	X	Y	Z		

Changing the Parameter Setting Value

Changing Example: the PR.1 Maximum Frequency

1. Screen at power-ON.

   The monitor display appears.

2. Changing the operation mode.

   Press **PU/EXT** to choose the PU operation mode. **[PU]** indicator is on.

3. Parameter setting mode.

   Press **MODE** to choose the parameter setting mode. (The parameter number read previously appears.)

4. Selecting the parameter number.

   Turn the dial until **P. 1** (Pr.1) appears. Press **SET** to read the present set value.

   "**120.00**" (initial value) appears.

5. Changing the setting value

   Turn the dial to change the set value to "60.00". Press SET to enter the setting.

   "**60.00**" and "**P. 1**" flicker alternately.

   - Turn **DIAL** to read another parameter.
   - Press **SET** to show the setting again.
   - Press **SET** twice to show the next parameter.
   - Press **MODE** three times to return to the monitor display of the frequency.

Notes:

- *Er1 to ER4 are displayed ... Why?*
- *Er1 appears ...Write disable error*
- *Er2 appears... Write error during operation*
- *Er3 appears ... Calibration error*
- *Er4 appears... Mode designation error*

Important: *When Pr.77 Parameter write selection = "0 (initial setting)", the parameter setting change is only available while the inverter is stopped under the PU operation mode.*

To enable the parameter setting change while the inverter is running or under the operation mode other than PU operation mode, change the Pr.77 setting.

Monitoring the Inverter Status

Monitoring of Output Current and Output Voltage

Important: *Pressing **SET** in the monitor switches the monitored item to output frequency, output current, and then to output voltage.*

1. Press **MODE** during operation to monitor the output frequency. [Hz] indicator turns ON.
2. Press **SET** to monitor the output current. This operation is valid during running or stopping under any operation. mode. [A] appears.
3. Press **SET** to monitor the output voltage. [V] appears.

Note: *Other monitored items, such as output voltage and set frequency, are also available. use **PR.52** to change the setting.*

First Monitored Item

The first monitored item to be displayed in the monitor mode is selectable.

To set a monitored item as the first monitored item, display a monitored item, and press **SET** for a while.

Changing Example

Set the output current as the first monitored item.

1. Select the monitor mode, and select the output current.
2. Press **SET** for a while (1 s). The output current is set as the first monitored item.
3. When the monitor mode is selected next time, the output current is monitored first.

Note: *Use Pr.52 Operation panel main monitor selection, or Pr.774 to Pr.776 Operation panel monitor selection 1 to 3 to change the setting.*

Displaying the Set Frequency

In the PU operation mode or in the External/PU combined operation mode 1 (Pr.79 Operation mode selection = "3"), select the monitor mode, and then press the **Setting Dial**. The present set frequency is displayed.

Note: *Use **Pr.992** Operation panel setting dial push monitor selection to change the displayed indication.*

Easy Operation Mode Setting (easy setting mode)

A required combination of a start command and a frequency command can be easily selected using **Pr.79** Operation mode selection.

Changing Example

Operation with the external (**STF/STR**) start command and frequency command.

1. Press **PU/EXT** and **MODE** for 0.5 s.

2. Turn until "**79 - - 3**" (External/PU combined operation mode 1) appears. (For other settings, refer to the table below.)

3. Press **SET** to enter the setting. External/PU combined operation mode. 1 (**Pr.79 = "3"**) is set.

Operation panel indication	Operation method		Operation mode
	Start command	Frequency command	
			PU operation mode
	External (STF, STR)	Analog voltage input	External operation mode
	External (STF, STR)		External/PU combined operation mode 1
		Analog voltage input	External/PU combined operation mode 2

Notes:

- ***Er1** is displayed ... Why?*
- ***PR.79** may not be included I the user group set by Pr.160 User group read selection = "1".*
- ***Er2** is displayed ... Why?*
  - *Setting cannot be changed during operation. Turn the start command (**FWD** or **REV**, **STF** or **STR**) OFF.*
- *If **MODE** is pressed before pressing **SET**, the easy setting mode is terminated and the display goes back to the monitor display. If the easy setting mode is terminated while **Pr.79** = "0 (initial value)", the operation mode switches between the PU operation mode and the External operation mode. Check the operation mode.*
- *Reset by **STOP/RESET** is enabled.*
- *The priorities of the frequency commands when **Pr.79** = "3" are "Multi-speed operation (RL/RM/RH/REX) > PID control (X14) > terminal 4 analog input (AU) > digital input from the operation panel".*

Basic Operation Procedure (PU Operation)

Operating at a Set Frequency (example: operating at 30 Hz)

***Important:** Use the operation panel (FR-DU08) to give a start command and a frequency command.*

Operation Example: Operate at 30 Hz

1. Screen at power-ON

   The monitor display appears.

2. Changing the operation mode.

   Press **PU/EXT** to choose the PU operation mode. [**PU**] indicator is on.

   Setting the Frequency

3. Setting the frequency.

   Turn the dial until the target frequency, "**30.00**" (30.00 Hz), appears. The frequency flickers for about 5 s.

   While the value is flickering, press **SET** to enter the frequency. "**F**" and "**30.00**" flicker alternately. After about 3 s of flickering, the indication goes back to "**0.00**" (monitor display).

   If SET is not pressed, the indication of the value goes back to "000" (0.00 Hz) after about 5 s of flickering. In that case, turn the dial again and set the frequency.

4. Start —> acceleration —> constant speed

   Press **FWD** or **REV** to start running. The frequency value on the indication increases in **Pr.7 Acceleration time**. and "**30.00**" (30.00 Hz) appears.

5. Deceleration —> stop

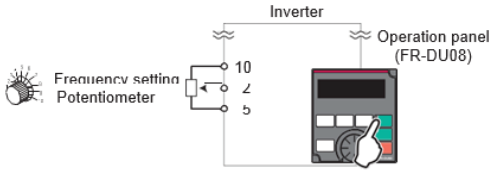
   Press **STOP/RESET** to stop. The frequency value on the indication decreases in **Pr.8 Deceleration time,** and the motor stops rotating with "**0.00**" (0.00 Hz) displayed.

Setting the Frequency Using an Analog Signal (voltage input)

Important:

- *Use **FWD** or **REV** on the operation panel (FR-DU08) to give a start command.*
- *Use the frequency setting potentiometer to give a frequency command (by connecting it across terminals 2 and 5 (for voltage input)).*
- *Set **Pr.79 Operation** mode selection = "4" (External/PU combination operation mode 2).*

[Connection diagram] (The inverter supplies 5 V power to the frequency setting potentiometer (terminal 10).)



Operation Example: operate at 60 Hz

1. Turning **ON** the power of the inverter.

   The monitor display turns **ON**.

2. Changing the operation mode.

   Set "**4**" in **Pr.79**. [**PU**] and [**EXT**] indicators turn **ON**.

3. Start.

   Press **FWD** or **REV**, indicator flickers as no frequency command is given.

4. Acceleration —> Constant speed

Turn the frequency setting potentiometer clockwise slowly to full. The frequency value indicated on the display increases for

the time set in **Pr.7 Acceleration time**, and is fixed at "**60.00**" (60.00 Hz).

5. Deceleration

   Turn the frequency setting potentiometer counterclockwise slowly to full. The frequency value indicated on the display decreases for the time set in **Pr.8 Deceleration time**, and the motor stops rotating at "**0.00**" (0.00 Hz). [**FWD**] or [**REV**] indicators flicker.

6. Stop

   Press **STOP/RESET [FWD]** or **[REV]** indicator turns off.

Notes:

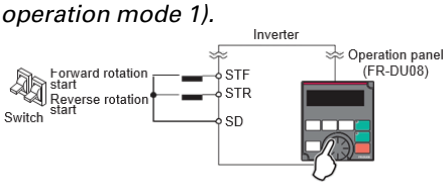
- *To change the frequency (60 Hz) at the maximum voltage input (initial value 5 V), adjust Pr.125 Terminal 2 frequency setting gain frequency.*
- *To change the frequency (0 Hz) at the minimum voltage input (initial value 0 V), adjust the calibration parameter C2 Terminal 2 frequency setting bias frequency.*

Basic Operation Procedure (External Operation)

Using the Frequency Set by the Operation Panel

Important:

- *Switch **ON** the **STF** (**STR**) signal to give a start command.*
- *Use the operation panel (FR-DU08) to give a start command.*
- *Set **Pr.79** = "3" (External/PU combined operation mode 1).*



Operation Example: Operate at 30 Hz

1. Changing the operation mode.

   Set "3" in **Pr.79** [**PU**] and [**EXT**] indicators turn **ON**.

2. Setting the frequency.

   Turn the dial to the target frequency, "**30.00**" Hz), appears. The frequency flickers for about 5 s.

   While the value is flickering, press **SET** to enter the frequency. "**F**" and "**30.00**" flicker alternately. After about 3 s of flickering, the indication goes back to "**0.00**" (monitor display).

   If **SET** is not pressed, the indication of the value goes back to "**0.00**" (0.00 Hz) after about 5 s of flickering. In that case, turn the dial again and set the frequency.

3. Turn **ON** the start switch (**STF** or **STR**). The frequency value on the indication increases in **PR7 Acceleration time**, and "**30.00**" (30.00 Hz) appears. [**FWD**] indicator is on during the forward rotation, and [**REV**] indicator is on during the reverse rotation.

   (To change the set frequency, perform the operation in Step . The previously set frequency appears.)

4. Deceleration —>

   Turn **OFF** the start switch (**STF** or **STR**). The frequency value on the indication decreases in **Pr.8 Deceleration time**, and the motor stops rotating with "**0.00**" (0.00 Hz) displayed.

Notes:

- *When both the forward rotation switch (**STF**) and the reverse rotation switch (**STR**) are **ON**, the motor cannot be started. If both are turned **ON** while the inverter is running, the inverter decelerates to a stop.*
- ***PR.178 STF terminal function selection** must be set to "**60**" (or **Pr.179 STR terminal function selection** must be set to "**61**"). (All are initial values.)*
- *If stopped using **STOP/RESET** on the operation panel during the External operation, the inverter enters the PU stop status.*

  *(**P5** appears on the operation panel.)*

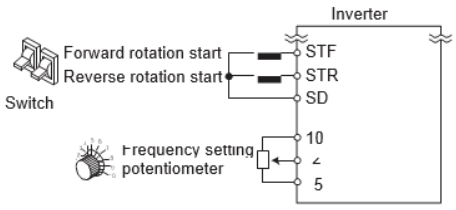
  *To reset the PU stop status, turn **OFF** the start switch (**STF** or **STR**), and then press **PU/EXT**.*

-

Setting the Frequency with Analog Signals (voltage input)

Important:

- *Switch **ON** the **STF** (**STR**) signal to give a start command.*
- *Use the potentiometer (frequency setting potentiometer) to give a frequency command. (by connecting it across terminals 2 and 5 (voltage input)).*



Operation Example: Operate at 60 Hz

1. Screen at power **ON**.

   The monitor display appears.

2. Start.

   Turn **ON** the start switch (**STF** or **STR**). [**FWD**] or [**REV**] flickers as no frequency command is given.

3. Acceleration —> constant speed

   Turn the potentiometer (frequency setting potentiometer) clockwise slowly to full. The frequency value on the indication increases in **Pr.7 Acceleration time**, and "**60.00**" (60.00 Hz) appears. [**FWD**] indicator is on during the forward rotation, and [**REV**] indicator is on during the reverse rotation.

4. Deceleration

   Turn the potentiometer (frequency setting potentiometer) counterclockwise slowly to full. The frequency value on the indication decreases in **PR.8 Deceleration time**, and the motor stops rotation with "**0.00**" (0.00 Hz) displayed.

5. Stop

   Turn **OFF** the start switch (**STF** or **STR**). [**FWD**] or [**REV**] indicator turns **OFF**.

Notes:

- *When both the forward rotation switch (**STF**) and the reverse rotation switch (**STR**) are **ON**, the motor cannot be started. If both are turned **ON** while the inverter is running, the inverter decelerates to a stop.*
- ***PR.178 STF terminal function selection** must be set to "**60**" (or **Pr.179 STR terminal function selection** must be set to "**61**". (All the initial values.)*

Parameters

Application-Specific Parameters

Each inverter is programmed specifically for the variable speed compressor in the system and any change to the parameter values without manufacturing authorization could result in permanent damage to the compressor or the system.

The tables below show the list of parameters that need to be changed from their default values for specific combination of inverter model, compressor model, and system tonnage. These parameters will be pre-set from factory per their respective application.

Table 9. Compressor parameters for ZPV0382-2E9/ ZPV038C-2E9 and ZPV066-5E9

Compressor Model No.			ZPV0382-2E9/ ZPV038C-2E9			ZPV066-5E9		
Drive Voltage			240VAC	480VAC	600VAC	240VAC		
Drive Model No.			FR-A820-00250-1-TR	FR-A840-00250-1-TR	FR-A860-00320-1-TR	FR-A820-00630-1-TR		
Trane Part Number			X13171806002	X13171806009	X13171806014	X13171806005		
Unit Tonnage			6 Ton	6 Ton	6 Ton	7.5 Ton	8.5 Ton	10 Ton
Parameter		Unit						
No.	Description							
570	Multiple rating setting		1	1	1	111		
71	Applied motor		8090	8090	8090	8090		
80	Motor capacity	kW	6	6.2	6.2	15.03		
81	Number of motor poles		6	6	6	6		
144	Speed setting switch over	RPM	106	106	106	106		
7	Acceleration time	Seconds	7.2	7.2	7.2	7.2		
8	Deceleration time	Seconds	36	36	36	36		
9	Electronic thermal O/L relay (Rated motor current)	Amps	22.6	18.8	18.9	30.8	31.5	36.8
13	Starting frequency	RPM	0	0	0	0		
18	High speed maximum frequency	RPM	7200	7200	7200	7200		
20	Acceleration/ deceleration reference	RPM	7200	7200	7200	7200		
22	Stall prevention operation level (Torque limit level)	%	120	120	120	120		
44	Second acceleration/ deceleration time	Seconds	36	36	36	36		
45	Second deceleration time	Seconds	36	36	36	36		
67	Number of retries at fault occurrence		110	110	110	110		
68	Retry waiting time		60	60	60	60		

Table 9. Compressor parameters for ZPV0382-2E9/ ZPV038C-2E9 and ZPV066-5E9 (continued)

Compressor Model No.			ZPV0382-2E9/ ZPV038C-2E9			ZPV066-5E9		
Drive Voltage			240VAC	480VAC	600VAC	240VAC		
Drive Model No.			FR-A820-00250-1-TR	FR-A840-00250-1-TR	FR-A860-00320-1-TR	FR-A820-00630-1-TR		
Trane Part Number			X13171806002	X13171806009	X13171806014	X13171806005		
Unit Tonnage			6 Ton	6 Ton	6 Ton	7.5 Ton	8.5 Ton	10 Ton
Parameter		Unit						
No.	Description							
72	PWM switching Freq		6	6	6	6		
73	Analog Input Selection		0	0	0	0		
78	Reverse rotation prevention selection		1	1	1	1		
83	Rated motor voltage	Volts	162	162	162	240		
84	Rated motor frequency	RPM	4500	4500	4500	6000		
90	Motor constant (R1)	Ohms	0.101	0.101	0.101	0.138		
92	Motor constant (L1)/ d-axis inductance (Ld)	mH	2.4	2.4	2.4	1.4		
93	Motor constant (L2)/ q-axis inductance (Lq)	mH	4	4	4	1.89		
125	Terminal 2 frequency setting gain frequency	RPM	7200	7200	7200	7200		
186	CS terminal function		50	50	50	50		
250	Stop selection	Seconds	0	0	0	0		
374	Overspeed detection level	RPM	7400	7400	7400	7400		
414	PLC function operation selection		2	2	2	2		
702	Maximum motor frequency	RPM	7200	7200	7200	7200		
706	Induced voltage constant	mV/Rad/ sec	342	342	342	382		
707	Motor inertia (integer)	KgM2	242	242	242	896		
711	Motor Ld Decay ratio	%	100	100	100	100		

Table 9. Compressor parameters for ZPV0382-2E9/ ZPV038C-2E9 and ZPV066-5E9 (continued)

Compressor Model No.			ZPV0382-2E9 / ZPV038C-2E9			ZPV066-5E9		
Drive Voltage			240VAC	480VAC	600VAC	240VAC		
Drive Model No.			FR-A820-00250-1-TR	FR-A840-00250-1-TR	FR-A860-00320-1-TR	FR-A820-00630-1-TR		
Trane Part Number			X13171806002	X13171806009	X13171806014	X13171806005		
Unit Tonnage			6 Ton	6 Ton	6 Ton	7.5 Ton	8.5 Ton	10 Ton
Parameter		Unit						
No.	Description							
712	Motor Lq Decay Ratio	%	76.6	71.3	82.4	78.5		
717	Starting Resistance Tuning Compensation	%	96.6	105.9	125.5	96.7		
721	Starting magnetic pole position detection pulse width	MicoSec-onds	330	180	114	340		
724	Motor inertia (exponent)		5	5	5	5		
725	Motor protection current level	%	200	200	200	200		
800	Control method selection		110	110	110	110		
859	Torque Current/Rated PM motor current		19.5	20	20	40		
872	Input phase loss protection selection		1	1	1	1		
1150	PLC function user parameter 1 (Speed Threshold for Accel)	RPM	2700	2700	2700	2700		
1151	PLC function user parameter 2 (Time Delay for Accel Change)	Seconds	600	600	600	600		

Table 9. Compressor parameters for ZPV0382-2E9/ ZPV038C-2E9 and ZPV066-5E9 (continued)

Compressor Model No.			ZPV0382-2E9 / ZPV038C-2E9			ZPV066-5E9		
Drive Voltage			240VAC	480VAC	600VAC	240VAC		
Drive Model No.			FR-A820-00250-1-TR	FR-A840-00250-1-TR	FR-A860-00320-1-TR	FR-A820-00630-1-TR		
Trane Part Number			X13171806002	X13171806009	X13171806014	X13171806005		
Unit Tonnage			6 Ton	6 Ton	6 Ton	7.5 Ton	8.5 Ton	10 Ton
Parameter		Unit						
No.	Description							
77	Parameter write selection		1	1	1	1		

Notes:

- *The inverter must be in "PU" mode to change parameters. Press "PU/EXT" button to enter PU mode and PU indicator light will turn ON. Once all parameters are setup, Press "PU/EXT" button to exit PU mode for EXT control.*
- *To enable parameter writing, set parameter 77 to value of 0, and to lock/disable parameter writing, set parameter 77 to value of 1.*
- *To save parameters to the drive operation panel, set "Pr.CPY" to "1.RD" (operation may take up to 30 seconds)*
- *To reset all parameters to saved parameter values, set "Pr.CPY" to "2.WR" (operation may take up to 60 seconds)*

Table 10. Compressor parameters for ZPV066-7E9

Compressor Model No.			ZPV066-7E9					
Drive Voltage			480VAC			600VAC		
Drive Model No.			FR-A840-00310-1-TR			FR-A860-00320-1-TR		
Trane Part Number			X13171806010			X13171806014		
Unit Tonnage			7.5 Ton	8.5 Ton	10 Ton	7.5 Ton	8.5 Ton	10 Ton
Parameter		Unit						
No.	Description							
570	Multiple rating setting		1			1		
71	Applied motor		8090			8090		
80	Motor capacity	kW	14.99			14.16		
81	Number of motor poles		6			6		
144	Speed setting switchover	RPM	106			106		
7	Acceleration time	Seconds	7.2			7.2		
8	Deceleration time	Seconds	36			36		
9	Eletronic thermal O/L relay (Rated motor current)	Amps	15	15.5	16.7	15.6	16.2	16.2
13	Starting frequency	RPM	0			0		
18	High speed maximum frequency	RPM	7200			7200		
20	Acceleration/deceleration reference	RPM	7200			7200		
22	Stall prevention operation level (Torque limit level)	%	120			120		
44	Second acceleration/deceleration time	Seconds	36			36		
45	Second deceleration time	Seconds	36			36		
67	Number of retries at fault occurrence		110			110		
68	Retry waiting time		60			60		
72	PWM switching Freq		6			6		
73	Analog Input Selection		0			0		
78	Reverse rotation prevention selection		1			1		
83	Rated motor voltage	Volts	480			480		
84	Rated motor frequency	RPM	6000			6000		
90	Motor constant (R1)	Ohms	0.52			0.52		
92	Motor constant (L1)/ d-axis inductance (Ld)	mH	5.55			5.55		
93	Motor constant (L2)/ q-axis inductance (Lq)	mH	7.49			7.49		
125	Terminal 2 frequency setting gain frequency	RPM	7200			7200		
186	CS terminal function		50			50		
250	Stop selection	Seconds	0			0		
374	Overspeed detection level	RPM	7400			7400		
414	PLC function operation selection		2			2		
702	Maximum motor frequency	RPM	7200			7200		

Table 10. Compressor parameters for ZPV066-7E9 (continued)

Compressor Model No.			ZPV066-7E9					
Drive Voltage			480VAC			600VAC		
Drive Model No.			FR-A840-00310-1-TR			FR-A860-00320-1-TR		
Trane Part Number			X13171806010			X13171806014		
Unit Tonnage			7.5 Ton	8.5 Ton	10 Ton	7.5 Ton	8.5 Ton	10 Ton
Parameter		Unit						
No.	Description							
706	Induced voltage constant	mV/Rad/sec	764			764		
707	Motor inertia (integer)	KgM2	896			896		
711	Motor Ld Decay ratio	%	100			100		
712	Motor Lq Decay Ratio	%	82.5			92.6		
717	Starting Resistance Tuning Compensation	%	101.9			125.3		
721	Starting magnetic pole position detection pulse width	MicoSec-onds	300			210		
724	Motor inertia (exponent)		5			5		
725	Motor protection current level	%	200			200		
800	Control method selection		110			110		
859	Torque Current/Rated PM motor current		20			16		
872	Input phase loss protection selection		1			1		
1150	PLC function user parameter 1 (Speed Threshold for Accel)	RPM	2700			2700		
1151	PLC function user parameter 2 (Time Delay for Accel Change)	Seconds	600			600		
77	Parameter write selection		1			1		

Notes:

- *The inverter must be in "PU" mode to change parameters. Press "PU/EXT" button to enter PU mode and PU indicator light will turn ON. Once all parameters are setup, Press "PU/EXT" button to exit PU mode for EXT control.*
- *To enable parameter writing, set parameter 77 to value of 0, and to lock/disable parameter writing, set parameter 77 to value of 1.*
- *To save parameters to the drive operation panel, set "Pr.CPY" to "1.RD" (operation may take up to 30 seconds)*
- *To reset all parameters to saved parameter values, set "Pr.CPY" to "2.WR" (operation may take up to 60 seconds)*

Environment Specific Parameters

Parameter Write Selection

Whether to enable the writing to various parameters or not can be selected. Use this function to prevent parameter values from being rewritten by misoperation.

Pr.	Name	Initial value	Set-ting range	Description
77 E400	Parameter write selection	0	0	Writing is enabled only during stop.
			1	Parameter writing is disabled.
			2	Parameter writing is enabled in any operation mode regardless of the operation status.

Note: *Pr.77 can be set at any time regardless of the operation mode or operation status. (Setting through communication is unavailable.)*

Writing Parameters Only During Stop (Pr.77 = "0" initial value)

Parameters can be written only during a stop in the PU operation mode.

The following parameters can always be written regardless of the operation mode or operation status.

Pr.	Name
4 to 6	(Multi-speed setting high-speed, middle- speed, low-speed)
22	Stall prevention operation level
24 to 27	(Multi-speed setting speed 4 to speed 7)
52	Operation panel main monitor selection
54	FM/CA terminal function selection
55	Frequency monitoring reference
56	Current monitoring reference
72[a]	PWM frequency selection
75	Reset selection/disconnected PU detection/ PU stop selection
77	Parameter write selection
79[b]	Operation mode selection
129	PID proportional band
130	PID integral time
133	PID action set point
134	PID differential time
158	AM terminal function selection
160	User group read selection
232 to 239	(Multi-speed setting speed 8 to speed 15)
240	Soft-PWM operation selection
241	Analog input display unit switchover
268	Monitor decimal digits selection
271	High-speed setting maximum current
272	Middle-speed setting minimum current
273	Current averaging range
274	Current averaging filter time constant
275[a]	Stop-on contact excitation current low-speed multiplying factor
290	Monitor negative output selection
295	Frequency change increment amount setting
296, 297	(Password setting)
306	Analog output signal selection
310	Analog meter voltage output selection
340[b]	Communication startup mode selection
345, 346	(DeviceNet communication)
416, 417	(PLC function)
434, 435	(CC-Link communication)
496, 497	(Remote output)
498	PLC function flash memory clear
550[b]	NET mode operation command source selection
551[b]	PU mode operation command source selection
555 to 557	(Current average value monitor)
656 to 659	(Analog remote output)
663	Control circuit temperature signal output level
750, 751	(Motor thermistor interface)
755 to 758	(Second PID control)
759	PID unit selection
774 to 776	(PU/DU monitor selection)
805	Torque command value (RAM)
806	Torque command value (RAM, EEPROM)
838	DA1 terminal function selection
866	Torque monitoring reference
888, 889	(Free parameter)
891 to 899	(Energy saving monitor)
C0 (900)	FM/CA terminal calibration
C1 (901)	AM terminal calibration
C8 (930)	Current output bias signal
C9 (930)	Current output bias current
C10 (931)	Current output gain signal
C11 (931)	Current output gain current

Pr.	Name
990	PU buzzer control
991	PU contrast adjustment
992	Operation panel setting dial push monitor selection
997	Fault initiation
998[b]	PM parameter initialization
999[b]	Automatic parameter setting
1006	Clock (year)
1007	Clock (month, day)
1008	Clock (hour, minute)
1018	Monitor with sign selection
1019	Analog meter voltage negative output selection
1048	Display-off waiting time
1142	Second PID unit selection
1150 to 1199	(PLC function user parameters)
1283	Home position return speed
1284	Home position return creep speed

[a] Writing during operation is enabled in PU operation mode, but disabled in External operation mode.
[b] Writing during operation is disabled. To change the parameter setting value, stop the operation.

Disabling Parameter Write (Pr.77="1")

Parameter write, parameter clear and all parameter clear are disabled. (Parameter read is enabled.)

The following parameters can be written even if Pr.77= "1".

Pr.	Name
22	Stall prevention operation level
75	Reset selection/disconnected PU detection/ PU stop selection
77	Parameter write selection
79[a]	Operation mode selection
160	User group read selection
296	Password lock level
297	Password lock/unlock
345, 346	(DeviceNet communication)
496, 497	(Remote output)
656 to 659	(Analog remote output)
805	Torque command value (RAM)
806	Torque command value (RAM, EEPROM)
997	Fault initiation

[a] Writing during operation is disabled. To change the parameter setting value, stop the operation.

Writing Parameters During Operation (Pr.77= "2")

These parameters can always be written.

The following parameters cannot be written during operation if Pr.77="2". To change the parameter setting value, stop the operation.

Pr.	Name
23	Stall prevention operation level compensation factor at double speed
48	Second stall prevention operation level
49	Second stall prevention operation frequency
60	Energy saving control selection
61	Reference current
66	Stall prevention operation reduction starting frequency
71	Applied motor
79	Operation mode selection
80	Motor capacity
81	Number of motor poles
82	Motor excitation current
83	Rated motor voltage
84	Rated motor frequency
90 to 94	(Motor constant)
95	Online auto tuning selection
96	Auto tuning setting/status
135 to 139	(Electronic bypass sequence parameter)
178 to 196	(Input and output terminal function selection)
248	Self power management selection
254	Main circuit power OFF waiting time
261	Power failure stop selection
289	Inverter output terminal filter
291	Pulse train I/O selection
292	Automatic acceleration/deceleration
293	Acceleration/deceleration separate selection
298	Frequency search gain

Pr.	Name
313 to 322	(Extended output terminal function selection)
329	Digital input unit selection
373	Resolver position tuning setting/status
406	High resolution analog input selection
414	PLC function operation selection
415	Inverter operation lock mode setting
418	Extension output terminal filter
419	Position command source selection
420, 421	(Electronic gear)
450	Second applied motor
451	Second motor control method selection
453	Second motor capacity
454	Number of second motor poles
455	Second motor excitation current
456	Rated second motor voltage
457	Rated second motor frequency
458 to 462	(Second motor constant)
463	Second motor auto tuning setting/status
541	Frequency command sign selection
560	Second frequency search gain
561	PTC thermistor protection level
570	Multiple rating setting
574	Second motor online auto tuning
598	Under voltage level
606	Power failure stop external signal input selection
639, 640	(Brake sequence)
641, 650, 651	(Second brake sequence)
660 to 662	(Increased magnetic excitation deceleration)
673	SF-PR slip amount adjustment operation selection
699	Input terminal filter
702	Maximum motor frequency
706, 707, 711, 712, 717, 721, 724, 725	(PM motor tuning)
738 to 746	(Second PM motor tuning)
747	Second motor low-speed range torque characteristic selection
788	Low speed range torque characteristic selection
800	Control method selection
819	Easy gain tuning selection
858	Terminal 4 function assignment
859	Torque current/Rated PM motor current
860	Second motor torque current/Rated PM motor current
862	Encoder option selection
868	Terminal 1 function assignment
977	Input voltage mode selection
998	PM parameter initialization
999	Automatic parameter setting
1002	Lq tuning target current adjustment coefficient
1103	Deceleration time at emergency stop
1105	Resolver magnetic pole position offset
1292	Position control terminal input selection
1293	Roll feeding mode selection

Password Function

Registering a 4-digit password can restrict parameter reading/writing.

Pr.	Name	Initial value	Setting range	Description
296 E410	Password lock level	9999	0 to 6, 99, 100 to 106, 199	Select restriction level of parameter reading/ writing when a password is registered.
			9999	No password lock
297 E411	Password lock/ unlock	9999	1000 to 9998	Register a 4-digit password
			(0 to 5)[a]	Displays password unlock error count. (Reading only) (Valid when Pr.296 = "100 to 106, or 199")
			9999[a] *1	No password lock

Pr.	Name	Initial value	Setting range	Description

Note: *The above parameters can be set when Pr.160 User group read selection = "0". However, when Pr.296 ≠ 9999 (password lock is set), Pr.297 can always be set, regardless of the setting in Pr.160*

[a] When Pr.297 = "0, 9999", writing is always enabled, but setting is disabled. (The display cannot be changed.)

Parameter Reading/Writing Restriction Level (Pr.296)

The level of the reading/writing restriction using the PU/Network (NET) operation mode operation command can be selected with Pr.296.

Pr.296 setting	PU operation mode operation command[a]		NET operation mode operation command[b]			
			RS-485 terminals / PLC function [c]		Communication option	
	Read[d]	Write[e]	Read	Write	Read	Write
9999	0	0	0	0	0	0
0, 100[f]	X	X	X	X	X	X
1, 101	0	X	0	X	0	X
2, 102	0	X	0	0	0	0
3, 103	0	0	0	X	0	X
4, 104	X	X	X	X	0	X
5, 105	X	X	0	0	0	0
6, 106	0	0	X	X	0	X
99 to 199	Only the parameters registered in the user group can be read/written.[g] (For the parameters not registered in the user group, same restriction level as "4, 104" applies.)					

(a) This restricts parameter access from the command source that can write a parameter under the PU operation mode (initially the operation panel(FR-DU08) or the parameter unit). (For the PU operation mode command source selection,

(b) This restricts parameter access from the command source that can write a parameter under the Network operation mode (initially the RS-485 terminals or a communication option). (For the NET operation mode command source selection

(c) The PLC function user parameters (Pr.1150 to Pr.1199) can be written and read by the PLC function regardless of the Pr.296 setting

(d) If the parameter reading is restricted by the Pr.160 User group read selection setting, those parameters are unavailable for reading even when "0" is indicated.

(e) If the parameter writing is restricted by the Pr.77 Parameter write selection setting, those parameters are unavailable for writing even when "0" is indicated.

(f) If a communication option is installed, an option fault Option fault (E.OPT) occurs, and the inverter output shuts off.

(g) Read/write is enabled only for the simple mode parameters registered in the user group when Pr.160="9999". Pr.296 and Pr.297 are always read/write enabled whether registered to a user group or not.

Registering a Password (Pr.296, Pr.297)

The following section describes how to register a password.

1. Set the parameter reading/writing restriction level (Pr.296 not equal to “9999”)

Pr.296 setting	Password unlock error restriction	Pr.297 display
0 to 6, 99	No restriction	Always displays 0
100 to 106, 199[a] *1	Restricted at fifth error	Displays the error count (0 to 5)

(a) During Pr.296 = any of "100 to 106, 199", if password unlock error has occurred 5 times, correct password will not unlock the restriction. All parameter clear can unlock the restriction. (In this case, the parameters are returned to their initial values.)

2. Write a four-digit number (1000 to 9998) in Pr.297 as a password. (Writing is disabled when Pr.296= "9999".) When a password is registered, parameter reading/writing is restricted with the restriction level set in Pr.296 until unlocking.

Notes:

- *After registering a password, the read value of Pr.297 is always one of "0 to 5".*
- ***LOCd** appears when a password restricted parameter is read/written.*
- *Even if a password is registered, the parameters, which the inverter itself writes, such as inverter parts life are overwritten as needed.*
- *Even if a password is registered, reading/ writing is enabled for Pr.991 PU contrast adjustment when the parameter unit (FR-PU07) is connected.*

Unlocking a password (Pr.296, Pr.297)

There are two ways of unlocking the password.

Enter the password in Pr.297. If the password matches, it unlocks. If the password does not match, an error occurs and the password does not unlock. When any of "100 to 106, or 199" is set in Pr.296 and a password unlock error occurs five times, the restriction will not be

unlocked even if the correct password is subsequently input. (Password lock in operation.)

Perform all parameter clear.

Notes:

- *If the password is forgotten, it can be unlocked with all parameter clear, but doing so will also clear the other parameters.*
- *All parameter clear cannot be performed during the operation.*
- *During the conditions where parameter reading is disabled (Pr.296 = any of "0, 4, 5, 99, 100, 104, 105, or 199"), do not use FR Configurator2. It may not operate correctly.*
- *The password unlocking method differs between the operation panel, parameter unit, RS-485 communication, and communication option.*

	Operation panel/ parameter unit	***RS-485 communication***	***Communication option***
All parameter clear	*0*	*0*	*0*
Parameter clear	*X*	*X*	*0*

- *For the parameter clear and parameter all clear methods for the communication option and parameter unit, refer to the Instruction Manual of each option.*

Parameter Operations During Password Locking/Unlocking

Operation		**Password unlocked**		**Password locked**	**Password lock in operation**
		Pr.296 = 9999 **Pr.297 = 9999**	**Pr.296 ≠ 9999** **Pr.297 = 9999**	**Pr.296 ≠ 9999** **Pr.297 = 0 to 4 (read value)**	**Pr.296 = 100 to 106, 199** **Pr.297 = 5 (read value)**
Pr.296	Read	0[a]	0	0	0
	Write	0[a]	0[a]	X	X
Pr.297	Read	0[a]	0	0	0
	Write	X	0	0	0[b]
Parameter clear execution		0	0	X[c]	X[c]
All parameter clear execution		0	0	0[d]	0[d]
Parameter copy execution		0	0	X	X

[a] Reading/writing is disabled if reading is restricted by the Pr.160 setting. (Reading is available in the Network operation mode regardless of thePr.160 setting.)
[b] Correct password will not unlock the restriction.
[c] Parameter clear can only be performed from the communication option.
[d] All parameter clear cannot be performed during the operation.

Notes:

- *When Pr.296 = "4, 5, 104, or 105" (password lock), the setting screen for PU JOG frequency is not displayed in the parameter unit (FR-PU07).*
- *When the password is being locked, parameter copy using the operation panel, parameter unit, and USB memory is not enabled.*

Multiple Rating Setting

Four rating types of different rated current and permissible load can be selected. The optimal inverter rating can be chosen in accordance with the application, enabling equipment size to be reduced.

Pr.	Name	Initial value	Setting range	Description (overload current rating, surrounding air temperature)
570 E301	Multiple rating setting	2	0[(a)]	SLD rating 110% 60 s, 120% 3 s (inverse-time characteristics) Surrounding air temperature 40°C
			1	LD rating 120% 60 s, 150% 3 s (inverse-time characteristics) Surrounding air temperature 50°C
			2	ND rating 150% 60 s, 200% 3 s (inverse-time characteristics) Surrounding air temperature 50°C
			3[(a)]	HD rating 200% 60 s, 250% 3 s (inverse-time characteristics) Surrounding air temperature 50°C

[(a)] Not compatible with the IP55 compatible mode.

Changing the Parameter Initial Values and Setting Ranges

When inverter reset and all parameter clear are performed after setting Pr.570, the parameter initial values are changed according to each rating, as shown below.

Pr.	Name	Pr.570 setting			
		0	1	2 (Initial value)	3
0	Torque boost	[(a)]	*1	*1	*1
7	Acceleration time	*1	*1	*1	*1
8	Deceleration time	*1	*1	*1	*1
9	Electronic thermal O/L relay	SLD rated current[(b)]	LD rated current	ND rated current*[(a)]*2 [(c)]	HD rated current[(a)]*2[(a)]
12	DC injection brake operation voltage	*1	*1	*1	*1
22	Stall prevention operation level	110%	120%	150%	200%
48	Second stall prevention operation level	110%	120%	150%	200%
56	Current monitoring reference	SLD rated current[(a)]*2	LD rated current[(a)]*2	ND rated current[(a)]*2	HD rated current[(a)]*2
114	Third stall prevention operation level	110%	120%	150%	200%
148	Stall prevention level at 0 V input	110%	120%	150%	200%
149	Stall prevention level at 10 V input	120%	150%	200%	250%
150	Output current detection level	110%	120%	150%	200%

Pr.	Name	Pr.570 setting			
		0	1	2 (Initial value)	3
165	Stall prevention operation level for restart	110%	120%	150%	200%
557	Current average value monitor signal output reference current	SLD rated current(a)*2	LD rated current(a)*2	ND rated current(a)*2	HD rated current(a)*2
874	OLT level setting	110%	120%	150%	200%
893	Energy saving monitor reference (motor capacity)	SLD rated motor capacity(a)*2	LD rated motor capacity(a)*2	ND rated motor capacity(a)*2	HD rated motor capacity(a)*2

(a) Initial values differ depending on the rating found in the following table.
(b) The rated current and motor capacity differ depending on the inverter capacity.
(c) The initial value for the FR-A820-00077(0.75K) or lower and FR-A840-00038(0.75K) or lower is set to the 85% of the rated inverter current.

Pr.	Pr.570 setting	200V class FR-A820-[]																
		000-46 (0.4-K)	000-77 (0.7-5K)	001-05 (1.5-K)	001-67 (2.2-K)	002-50 (3.7-K)	003-40 (5.5-K)	004-90 (7.5-K)	006-30 (11K-)	007-70 (15K-)	009-30 (18.-5K)	012-50 (22K-)	015-40 (30K-)	018-70 (37K-)	023-30 (45K-)	031-60 (55K-)	038-00 (75K-)	047-50 (90K-)
		400V class FR-A840-[]																
		000-23 (0.4-K)	000-38 (0.7-5K)	000-52 (1.5-K)	000-83 (2.2-K)	001-26 (3.7-K)	001-70 (5.5-K)	002-50 (7.5-K)	003-10 (11K-)	003-80 (15K-)	004-70 (18.-5K)	006-20 (22K-)	007-70 (30K-)	009-30 (37K-)	011-60 (45K-)	018-00 (55K-)	021-60 (75K-)	026-00 (90K-) or higher
0 (%)	0, 1	6	4	4	4	3	3	2	2	2	2	2	2	1.5	1.5	1	1	1
	2	6	6	4	4	4	3	3	2	2	2	2	2	2	2	2	1	1
	3	6	6	6	4	4	4	3	3	2	2	2	2	2	2	2	2	1
7 (s)	0, 1	5	5	5	5	5	5	15	15	15	15	15	15	15	15	15	15	15
	2	5	5	5	5	5	5	5	15	15	15	15	15	15	15	15	15	15
	3	5	5	5	5	5	5	5	5	15	15	15	15	15	15	15	15	15
8 (s)	0, 1	10	10	10	10	10	10	30	30	30	30	30	30	30	30	30	30	30
	2	5	5	5	5	5	5	5	15	15	15	15	15	15	15	15	15	15
	3	5	5	5	5	5	5	5	5	15	15	15	15	15	15	15	15	15
12 (%)	0, 1	4	4	4	4	4	4	2	2	2	2	2	2	2	2	1	1	1
	2	4	4	4	4	4	4	4	2	2	2	2	2	2	2	2	1	1
	3	4	4	4	4	4	4	4	4	2	2	2	2	2	2	2	2	1

Operation Command and Frequency Command

Operation Mode Selection

Select the operation mode of the inverter.

The mode can be changed among operations using external signals (External operation), operation by the operation panel or the parameter unit (PU operation), combined operation of PU operation and External operation (External/PU combined operation), and Network operation (when RS-485 terminals or a communication option is used).

Pr.: 79 D000.

Name: Operation mode selection.

Initial value: 0.

Setting range: 0 to 5, 6, 7.

Description: Selects the operation mode.

Pr.79 setting	Description			Operation panel display
0 (initial value)	Use the External/PU switchover mode to switch between the PU and External operation mode. At power ON, the inverter is in the External operation mode.			PU operation mode [PU] External operation mode [EXT] NET operation mode [NET]
	Operation mode	Frequency command	Start command	
1	PU operation mode fixed	Operation panel or parameter unit	**EXT** or **REV** on operation panel or parameter unit.	PU operation mode [PU]
2	External operation mode fixed. The operation can be performed by switching between the External and NET operation modes.	External signal input (terminal 2 and 4, JOG, multi-speed selection, etc.)	External signal input (terminal STF, STR)	External operation mode [EXT] NET operation mode [NET]
3	External/PU combined operation mode 1	Operation panel/ parameter unit or external signal input multi-speed setting, terminal 4) (a)	External signal input (terminal STF, STR)	External/PU combined operation mode [PU+E]
4	External/PU combined operation mode 2	External signal input (terminal 2 and 4, JOG, multi-speed selection, etc.)	or on operation panel or parameter unit	
6	Switchover mode Switching of PU, External, and NET operation modes can be performed during operation.			PU operation mode External operation mode [EXT] NET operation mode [NET]
7	External operation mode (PU operation interlock) X12 signal ON: Switchover to PU operation mode enabled (during External operation, output shutoff) X12 signal OFF: Switchover to PU operation mode disabled			

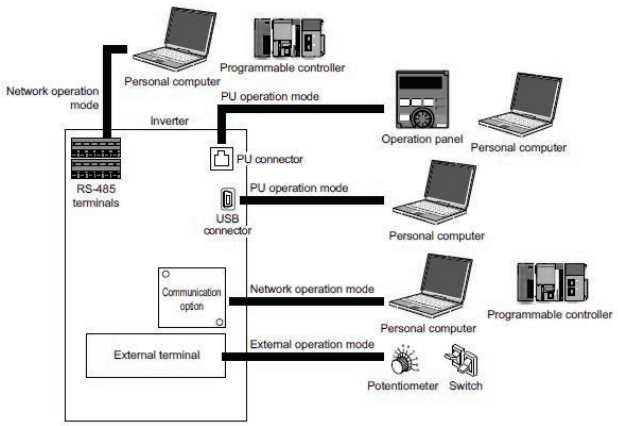
(a) The priority of frequency commands when Pr.79 = "3" is "multi-speed operation (RL/RM/RH/REX) > PID control (X14) > terminal 4 analog input (AU) > digital input by operation panel".

Operation Mode Basics

The operation mode specifies the source of the start command and the frequency command for the inverter.

Basically, there are following operation modes.

- **External operation mode:** For inputting a start command and a frequency command with an external potentiometer and switches which are connected to the control circuit terminal.
- **PU operation mode:** For inputting a start command and a frequency command with the operation panel, parameter unit, or RS-485 communication via the PU connector.
- **Network operation mode (NET operation mode):** For inputting a start command and a frequency command using the RS-485 terminals or communication option.

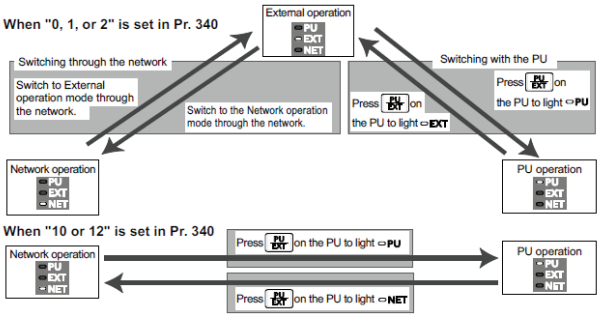


The operation mode can be selected from the operation panel or with the communication instruction code.

Notes:

- *There are two settings of "3" and "4" with PU/External combined operation. The startup method differs according to the setting value.*
- *In the initial setting, the stop function (PU stop selection) by the operation panel or the parameter unit STOP/RESET is effective in modes other than the PU operation mode.*

Operation Mode Switching Method



Protective Function Parameter

Motor Overheat Protection (electronic thermal O/L relay)

Set the current of the electronic thermal O/L relay function to protect the motor from overheating. Such settings will provide the optimum protective characteristic considering the low cooling capability of the motor during low-speed operation.

Pr.	Name	Initial value	Setting range	Description
9 H000	Electronic thermal O/L relay	Inverter rated current[a]	0 to 500 A[b]	Set the rated motor current.
			0 to 3600 A[c]	
600 H001	First free thermal reduction frequency 1	9999	0 to 590 Hz	The electronic thermal O/L relay operation level can be changed to match the motor temperature characteristics with the combination of these three points (Pr.600, Pr.601), (Pr.602, Pr.603), (Pr.604, Pr.9). 9999: Free thermal O/L relay invalid
			9999	
601 H002	First free thermal reduction ratio 1	100%	1 to 100%	
			9999	
602 H003	First free thermal reduction frequency 2	9999	0 to 590 Hz	
			9999	
603 H004	First free thermal reduction ratio 2	100%	1 to 100%	
			9999	
604 H005	First free thermal reduction frequency 3	9999	0 to 590 Hz	
			9999	
607 H006	Motor permissible load level	150%	110 to 250%	Set the permissible load according to the motor characteristics.
51 H010	Second electronic thermal O/L relay	9999	0 to 500 A	Enabled when the RT signal is ON. Set the rated motor current.
			0 to 3600 A	
			9999	Second electronic thermal O/L relay invalid

Pr.	Name	Initial value	Setting range	Description
692 H011	Second free thermal reduction frequency 1	9999	0 to 590 Hz	The electronic thermal O/L relay operation level can be changed to match the second motor temperature characteristics with the combination of these three points (Pr.692, Pr.693), (Pr.694, Pr.695), (Pr.696, Pr.51). 9999: Second free thermal O/L relay invalid
			9999	
693 H012	Second free thermal reduction ratio 1	100%	1 to 100%	
			9999	
694 H013	Second free thermal reduction frequency 2	9999	0 to 590 Hz	
			9999	
695 H014	Second free thermal reduction ratio 2	100%	1 to 100%	
			9999	
696 H015	Second free thermal reduction frequency 3	9999	0 to 590 Hz	
			9999	
608 H016	Second motor permissible load level	9999	110 to 250%	Set the permissible load when the RT signal is ON.
			9999	The Pr.607 setting is applied even when the RT signal is ON.
561 H020	PTC thermistor protection level	9999	0.5 to 30 kΩ	Set the PTC thermistor protection level (resistance).
			9999	PTC thermistor protection disabled
1016 H021	PTC thermistor protection detection time	0 s	0 to 60 s	Set the time from when the resistance of the PTC thermistor reaches the protection level until the protective function is activated.
876 H022	Thermal protector input	1	0	Terminal OH of the control terminal option (FR-A8TP) is invalid.
			1	Terminal OH of the control terminal option (FR-A8TP) is valid.

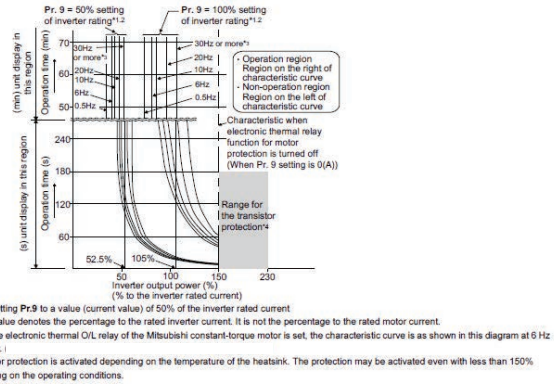
(a) The initial value for the FR-A860-00027 is set to the 85% of the inverter rated current.
(b) The setting range for FR-A860-01080 or lower. The minimum setting increment is "0.01 A".
(c) The setting range for FR-A860-01440 or higher. The minimum setting increment is "0.1 A".

Electronic Thermal O/L Relay Operation Characteristic for Induction Motor (Pr.9, E. THM)

This function detects the overload (overheat) of the motor and trips the inverter by stopping the operation of the transistor at the inverter output side.

Set the rated current (A) of the motor in Pr.9. (If the motor has both 50 Hz and 60 Hz ratings and the Pr.3 Base frequency is set to 60 Hz, set to 1.1 times the 60 Hz rated motor current.)

Set "0" in Pr.9 to avoid activating the electronic thermal O/L relay function; for example, when using an external thermal relay for the motor. (Note that the output transistor protection of the inverter is activated. (E.THT)



*1 When setting Pr.9 to a value (current value) of 50% of the inverter rated current
*2 The % value denotes the percentage to the rated inverter current. It is not the percentage to the rated motor current.
*3 When the electronic thermal O/L relay of the Mitsubishi constant-torque motor is set, the characteristic curve is as shown in this diagram at 6 Hz or higher.
*4 Transistor protection is activated depending on the temperature of the heatsink. The protection may be activated even with less than 150% depending on the operating conditions.

Notes:

- *The internal accumulated heat value of the electronic thermal relay function is reset to the initial value by the inverter's power reset and reset signal input. Avoid unnecessary reset and power-OFF.*
- *Install an external thermal relay (OCR) between the inverter and motors to operate several motors, a multi-pole motor or a dedicated motor with one inverter. When setting an external thermal relay, note that the current indicated on the motor rating plate is affected by the line-to-line leakage current. The cooling effect of the motor drops during low-speed operation. Use a thermal protector or a motor with built-in thermistor.*
- *The protective characteristic of the electronic thermal O/L relay is degraded when there is a large difference in capacity between the inverter and motor, and when the set value is small. In such case, use an external thermal relay.*
- *A dedicated motor cannot be protected by an electronic thermal O/L relay. Use an external thermal relay.*
- *The transistor protection thermal O/L relay is activated early when the Pr.72 PWM frequency selection setting is increased.*
- *When using a PM motor, set the free thermal parameters (Pr.600 to Pr.604) in accordance with the motor characteristic.*

Electronic Thermal O/L Relay When Using IPM Motor (Pr.9, E.THM)

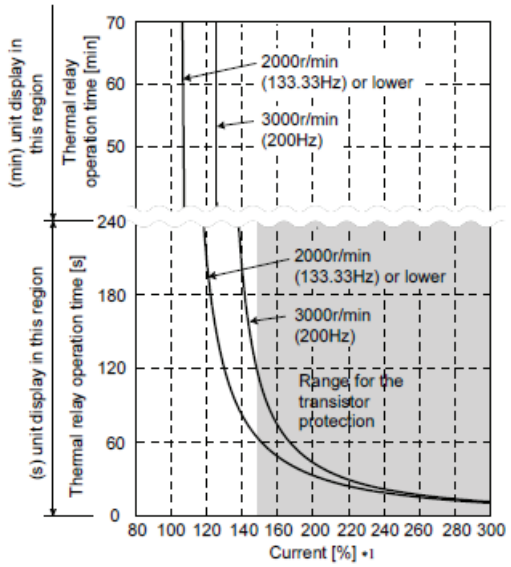
This function detects the overload (overheat) of the motor and trips the inverter by stopping the operation of the transistor at the inverter output side. (The operation characteristic is shown below.)

Set the rated current (A) of the motor in Pr.9. Performing IPM parameter initialization automatically sets the rated current of the IPM motor.

Set "0" in Pr.9 to avoid activating the electronic thermal O/L relay function; for example, when using an external thermal relay for the motor.

Note: *the output transistor protection of the inverter is activated. (E.THT))*

MM-CF



Notes:

- *The internal accumulated heat value of the electronic thermal relay function is reset to the initial value by the inverter's power reset and reset signal input. Avoid unnecessary reset and power-OFF.*
- *When using a PM motor other than MM-CF, set the free thermal parameters (Pr.600 to Pr.604) in accordance with the motor characteristic.*
- *The transistor protection thermal O/L relay is activated early when the Pr.72 PWM frequency selection setting is increased.*

Retry Function

This function allows the inverter to reset itself and restart at activation of the protective function (fault indication). The retry generating protective functions can be also selected.

When the automatic restart after instantaneous power failure function is selected (Pr.57 Restart coasting time ≠ 9999), the restart operation is also performed after a retry operation as well as after an instantaneous power failure.

Pr.	Name	Initial value	Setting range	Description
65 H300	Retry selection	0	0 to 5	A retry-making fault can be selected. (Refer to the table on the next page.)
67 H301	Number of retries at fault occurrence	0	0	No retry function
			1 to 10	Set the number of retries at a fault occurrence. A fault output is not provided during the retry operation.
			101 to 110	Set the number of retries at a fault occurrence. (The setting value minus 100 is the number of retries.) A fault output is provided during the retry operation.
68 H302	Retry waiting time	1 s	0.1 to 600 s	Set the waiting time from a fault occurrence to a retry.
69 H303	Retry count display erase	0	0	Clears the number of successful restarts made by retries.

Setting the Retry Function (Pr.67, Pr.68)

When the inverter protective function is operating (fault indication), the retry function automatically cancels (resets) the protective function after the time set in Pr.68. The retry function then restarts the operation from the starting frequency.

Retry operation is enabled when Pr.67 ≠ "0". For Pr.67, set the number of retries at activation of the protective function.

Pr.67 setting	Fault output during retry operation	Retry count
0	—	No retry function
1 to 10	Not provided	1 to 10 times
101 to 110	Provided	1 to 10 times

When retries fail consecutively more than the number of times set in Pr.67, a retry count excess (E.RET) occurs, resulting in an inverter retries. (Refer to the retry failure example.)

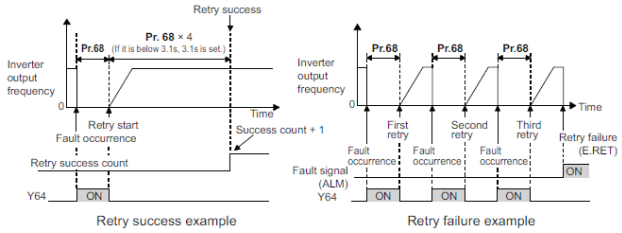
Use Pr.68 to set the waiting time from a protective function activation to a retry in the range of 0.1 to 600 s.

During retry operation, the during retry (Y64) signal is ON. For the Y64 signal, set "64 (positive logic)" or "164 (negative logic)" in any of Pr.190 to Pr.196 (output terminal function selection) to assign the function.

Retry count check (Pr.69)

Reading the **Pr.69** value provides the cumulative number of successful restart times made by retries. The cumulative count in **Pr.69** increases by 1 when a retry is successful. Retry is regarded as successful when normal operation continues without a fault for the **Pr.68** setting multiplied by four or longer (3.1 s at the shortest). (When retry is successful, the cumulative number of retry failures is cleared.)

Writing "0" in **Pr.69** clears the cumulative count.



Multi-Function Input Terminal Parameters

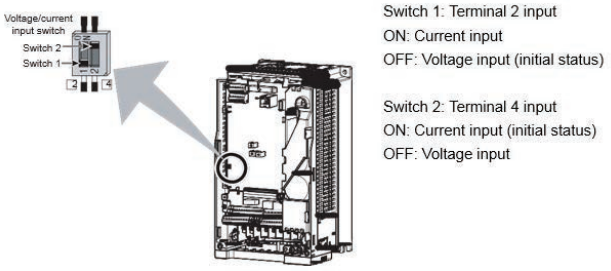
Analog Input Selection

The functions to switch the analog input terminal specifications, override function, forward/reverse rotation by the input signal polarity are selectable.

Pr.	Name	Initial value	Setting range		Description
73 T000	Analog input selection	1	0 to 5, 10 to 15	Switch 1 - OFF (initial status)	The terminal 2 input specification (0 to 5 V, 0 to 10 V, 0 to 20 mA) and terminal 1 input specification (0 to ±5 V, 0 to ±10 V) are selectable.
			6, 7, 16, 17	Switch 1 - ON	Also the override and reversible operation settings are selectable.
267 T001	Terminal 4 input selection	0	0	Switch 2 - ON (initial status)	Terminal 4 input, 4 to 20 mA
			1	Switch 2 - OFF	Terminal 4 input, 0 to 5 V
			2		Terminal 4 input, 0 to 10 V

Analog Input Specification Selection

Concerning the terminals 2 and 4 used for analog input, the voltage input (0 to 5 V, 0 to 10 V) and current input (0 to 20 mA) are selectable. To change the input specification, change the parameters (Pr.73, Pr.267) and voltage/current input switch settings (switches 1, 2).



The terminal 2/4 rating specifications change depending on the voltage/current input switch settings.

- Voltage input: input resistance 10 kΩ ±1 kΩ, permissible maximum voltage 20 VDC
- Current input: input resistance 245 Ω ±5 Ω, permissible maximum current 30 mA

Correctly set Pr.73, Pr.267 and voltage/current input switch settings so that the analog signal appropriate for the settings is input. The incorrect settings shown in the table below cause a failure. Other incorrect settings result in an incorrect operation.

Setting causing a failure		Operation
Switch setting	Terminal input	
ON (current input)	Voltage input	Causes an analog signal output circuit failure in an external device (due to increased loads on the signal output circuit of the external device).
OFF (voltage input)	Current input	Causes an input circuit failure in the inverter (due to an increased output power in the analog signal output circuit of an external device).

Note: *Check the voltage/current input switch number indication before setting, because it is different from the FR-A700 series switch number indication.*

Set the Pr.73 and voltage/current input switch settings according to the table below. (indicates the main speed setting.)

Pr.73 setting	Terminal 2 input	Switch 1	Terminal 1 input	Compensation input terminal compensation method	Polarity reversible
0	0 to 10 V	OFF	0 to ±10 V	Terminal 1 Addition compensation	Not applied (state in which a negative polarity frequency command signal is not accepted)
1 (initial value)	0 to 5 V	OFF	0 to ±10 V		
2	0 to 10 V	OFF	0 to ±5 V		
3	0 to 5 V	OFF	0 to ±5 V		
4	0 to 10 V	OFF	0 to ±10 V	Terminal 2 Override	
5	0 to 5 V	OFF	0 to ±5 V		
6	0 to 20 mA	ON	0 to ±10 V	Terminal 1 Addition compensation	
7	0 to 20 mA	ON	0 to ±5 V		
10	0 to 10 V	OFF	0 to ±10 V		Applied
11	0 to 5 V	OFF	0 to ±10 V		
12	0 to 10 V	OFF	0 to ±5 V		
13	0 to 5 V	OFF	0 to ±5 V		
14	0 to 10 V	OFF	0 to ±10 V	Terminal 2 Override	
15	0 to 5 V	OFF	0 to ±5 V		
16	0 to 20 mA	ON	0 to ±10 V	Terminal 1 Addition compensation	
16	0 to 20 mA	ON	0 to 5 V		

Turning the Terminal 4 input selection(AU) signal ON sets terminal 4 to the main speed. With this setting, the main speed setting terminal is invalidated.

Set the Pr.267 and voltage/current input switch setting according to the table below.

Pr.267 setting	Terminal 4 input	Switch 2
0 (initial value)	4 to 20 mA	ON
1	0 to 5 V	OFF
2	0 to 10 V	OFF

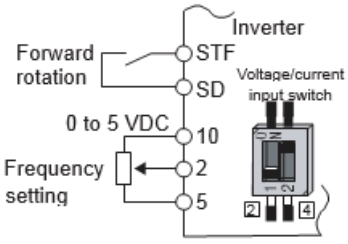
Notes:

- *To enable the terminal 4, turn the AU signal ON.*
- *Set the parameters and the switch settings so that they agree. Incorrect setting may cause a fault, failure or malfunction.*
- *Terminal 1 (frequency setting auxiliary input) is added to the terminal 2 or 4 main speed setting signal.*
- *When the override setting is selected, terminal 1 or 4 is set to the main speed setting, and terminal 2 is set to the override signal (0 to 5 V or 0 to 10 V, and 50% to 150%). (If the main speed of terminal 1 or 4 is not input, the compensation by terminal 2 is disabled.)*
- *Use Pr.125 (Pr.126) (frequency setting gain) to change the maximum output frequency at the input of the maximum output frequency command voltage (current). At this time, the command voltage (current) need not be input.*
- *The acceleration/deceleration time inclines up/down to the acceleration/deceleration reference frequency, so it is not affected by change of Pr.73.*
- *When Pr.858 Terminal 4 function assignment and Pr.868 Terminal 1 function assignment = "4", the terminal 1 and terminal 4 values are set to the stall prevention operation level.*
- *After the voltage/current input signal is switched with Pr.73, Pr.267, and voltage/ current input switches, be sure to let calibration performed.*
- *When Pr.561 PTC thermistor protection level ≠ "9999", terminal 2 does not function as an analog frequency command.*

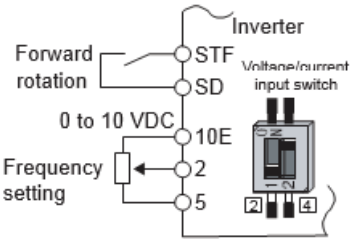
To Run with an Analog Input Voltage

Concerning the frequency setting signal, input 0 to 5 VDC (or 0 to 10 VDC) to terminals 2 and 5. The 5 V (10 V) input is the maximum output frequency.

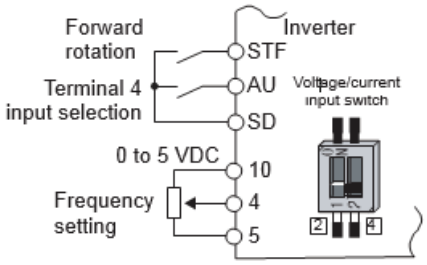
The power supply 5 V (10 V) can be input by either using the internal power supply or preparing an external power supply. The internal power source is 5 VDC output between terminals 10 and 5, and 10 VDC output between terminals 10E and 5.



Connection diagram using terminal 2 (0 to 5 VDC)



Connection diagram using terminal 2 (0 to 10 VDC)



Connection diagram using terminal 4 (0 to 5 VDC)

Terminal	Inverter internal power source voltage	Frequency setting resolution	Pr.73 (terminal 2 input voltage)
10	5 VDC	0.030 Hz/60 Hz	0 to 5 VDC input
10E	10 VDC	0.015 Hz/60 Hz	0 to 10 VDC input

To supply the 10 VDC input to terminal 2, set "0, 2, 4, 10, 12, or 14" in Pr.73. (The initial value is 0 to 5 V.)

Setting "1 (0 to 5 VDC)" or "2 (0 to 10 VDC)" in Pr.267 and turning the voltage/ Connection diagram using terminal 2 (0 to 10 VDC) current input switches OFF sets the terminal 4 to the voltage input specification. Turning ON the AU signal activates terminal 4 input.

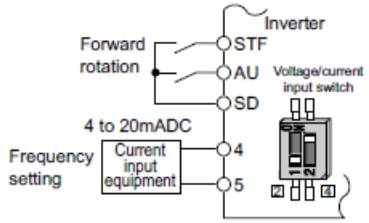
Note: *The wiring length of the terminal 10, 2, 5 should be 30 m at maximum.*

Running with Analog Input Current

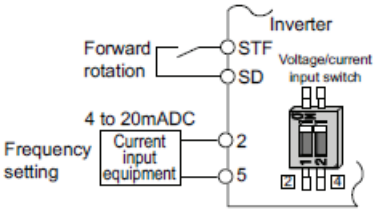
For constant pressure or temperature control with fans, pumps, or other devices, automatic operation is

available by setting the regulator output signal 4 to 20 mADC to between terminals 4 and 5.

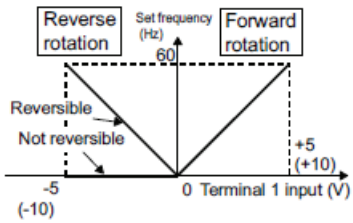
To use the terminal 4, the AU signal needs to be turned ON.



Connection diagram using terminal 4 (4 to 20mADC)



Connection diagram using terminal 2 (4 to 20mADC)



Compensation input characteristics when STF is ON

Setting "6, 7, 16, or 17" in Pr.73 and turning the voltage/current input switches ON sets terminal 2 to the current input specification. Concerning the settings, Forward STF Voltage/current rotation SD input switch the AU signal does not need to be turned ON.

To Perform Forward/Reverse Rotation with the Analog Input (Polarity Reversible Operation)

Setting Pr.73 to a value of "10 to 17" enables the polarity reversible operation.

Setting ±input (0 to ±5 V or 0 to ±10 V) to the terminal 1 allows the operation of forward/reverse rotation by the polarity.

Application Parameters

PLC Function

The inverter can be run in accordance with a sequence program.

In accordance with the machine specifications, a user can set various operation patterns: inverter movements at signal inputs, signal outputs at particular inverter statuses, and monitor outputs, etc.

Pr.	Name	Initial value	Setting range	Description	
414 A800	PLC function operation selection	0	0	PLC function disabled	
			1	PLC function enabled	The SQ signal is enabled by input from a command source (external input terminal/ communication).
			2		The SQ signal is enabled by input from an external input terminal.
415 A801	Inverter operation lock mode setting	0	0	The inverter start command is enabled regardless of the operating status of the sequence program.	
			1	The inverter start command is enabled only while the sequence program is running.	

<table>
<tr><th>Pr.</th><th>Name</th><th>Initial value</th><th>Setting range</th><th colspan="3">Description</th></tr>
<tr><td rowspan="7">416
A802</td><td rowspan="7">Pre-scale function selection</td><td rowspan="7">0</td><td rowspan="7">0 to 5</td><td>Unit scale factor</td><td colspan="2"></td></tr>
<tr><td>0: No function</td><td colspan="2" rowspan="6">When the pulse train is input from terminal JOG, the number of sampled pulses can be converted. The result of conversion is stored to SD1236. "Number of sampled pulses" = "input pulse value per count cycle" ´ "pre-scale setting value (Pr.417)" ´ "unit scale factor (Pr.416)"</td></tr>
<tr><td>1: ´1</td></tr>
<tr><td>2: ´0.1</td></tr>
<tr><td>3: ´0.01</td></tr>
<tr><td>4: ´0.001</td></tr>
<tr><td>5: ´0.0001</td></tr>
<tr><td>417
A803</td><td>Pre-scale setting value</td><td>1</td><td>0 to 32767</td><td>Pre-scale setting value</td><td colspan="2"></td></tr>
<tr><td rowspan="8">498
A804</td><td rowspan="8">PLC function flash memory clear</td><td rowspan="8">0</td><td rowspan="8">0, 9696 (0 to 9999)</td><td colspan="2">0: Clears the flash memory fault display (no operation after writing while the flash memory is in normal operation).</td><td rowspan="3">Write</td></tr>
<tr><td colspan="2">9696: Clears the flash memory (no operation Write after writing during flash memory fault).</td></tr>
<tr><td colspan="2">Other than 0 and 9696: Outside of the setting range</td></tr>
<tr><td colspan="2">0: Normal display</td><td rowspan="5">Read</td></tr>
<tr><td colspan="2">1: The flash memory has not been cleared because the</td></tr>
<tr><td colspan="2">PLC function is enabled.</td></tr>
<tr><td colspan="2">9696: During flash memory clearing operation or flash memory fault</td></tr>
<tr><td>1150 to 1199
A810 to A859</td><td>User parameters 1toUser parameters 50</td><td>0</td><td>0 to 65535</td><td colspan="4">Desired values can be set.

Because devices D206 to D255 used by the PLC function can be mutually accessed, the values set to Pr.1150 to Pr.1199 can be used by the sequence program. The result of performing calculation by a sequence program can also be monitored by Pr.1150 to Pr.1199.</td></tr>
</table>

Outline of PLC Function

To enable the PLC function, set "1" or "2" in **Pr.414** PLC function operation selection. When "2" is set in **Pr.414**, the sequence startup (SQ) signal from the external input terminal is valid regardless of the setting of the **Pr.338** Communication operation command source. (The **Pr.414** setting change becomes valid after inverter reset.)

Switch the execution key (RUN/STOP) of the sequence program by turning the SQ signal ON/OFF. The sequence program can be executed by turning the SQ signal ON. To input the SQ signal, set "50" in any of **Pr.178** to **Pr.189** (input terminal function selection) to assign the function to a terminal.

When "1" is set in **Pr.415** Inverter operation lock mode setting, the inverter can be operated only when the sequence program is running. By changing the PLC program status from RUN to STOP during inverter operation, the motor decelerates to stop.

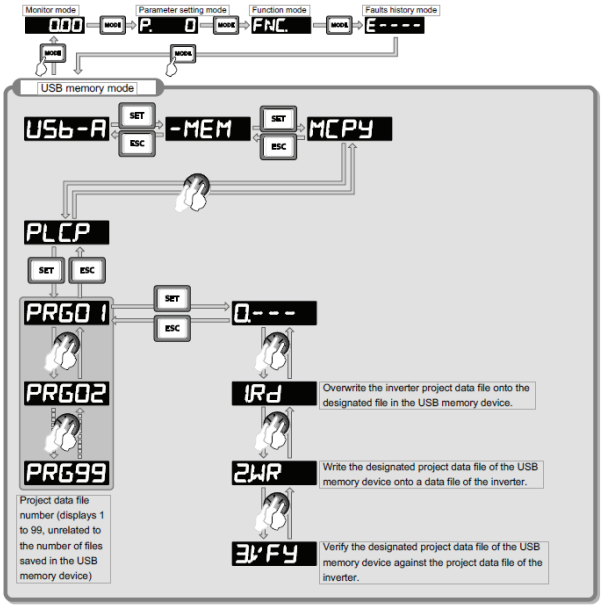
To stop the inverter operation at the STOP status of the PLC program while performing auto operation using SD1148 (or SM1200 to 1211) of the PLC program, set **Pr.415** = "1".

For reading or writing sequence programs, use FR Configurator2 on the personal computer connected to the inverter via RS- 485 communication or USB. (When **Pr.414** □"0", sequence programs can be read from or written to FR Configurator2.)

Note: *For the details of the PLC function, refer to the PLC Function Programming Manual and the Instruction Manual of FR Configurator2.*

Copying the PLC Function Project Data to USB Memory

This function copies the PLC function project data to a USB memory device. The PLC function project data copied in the USB memory device can be copied to other inverters. This function is useful in backing up the parameter setting and for allowing multiple inverters to operate by the same sequence programs.



The following data can be copied by copying the project data via USB memory.

Extension	File type	Copy from inverter to USB memory	Copy from USB memory to inverter
.QPA	Parameter file	Supported	Supported
.QPG	Program file	Supported	Supported
.C32	Function block source information	Supported	Supported
.QCD	Global text comment information	Supported	Supported
.DAT	Project management information	Supported	Not available
.TXT	Copy information	Supported	Not available

Note: *If the project data of the PLC function is locked with a password using FR Configurator 2, copying to the USB memory device and verification are disabled. Also if set to write-disabled, writing to the inverter is disabled. For the details of the PLC function, refer to the PLC Function Programming Manual and the Instruction Manual of FR Configurator 2.*

Trace Function

The operating status of the inverter can be traced and saved on a USB memory device.

Saved data can be monitored by FR Configurator 2, and the status of the inverter cam be analyzed.

Pr.	Name	Initial value	Setting range	Description
1020 A900	Trace operation selection	0	0	Without trace operation
			1	Sampling start
			2	Forced trigger
			3	Sampling stop
			4	Transfer of data to USB memory device
1021 A901	Trace mode selection	0	0	Memory mode
			1	Memory mode (automatic transfer)
			2	Recorder mode
1022 A902	Sampling cycle	2	0 to 9	Set the sampling cycle. 0: 0.125 ms, 1: 0.252 ms, 2: 1 ms, 3: 2 ms, 4: 5 ms, 5: 10 ms, 6: 50 ms, 7: 100 ms, 8: 500 ms, 9: 1 s (Regarding the setting value "0 and 1", the cycle varies by the control mode.)
1023 A903	Number of analog channels	4	1 to 8	Select the number of analog channels to be sampled.

Pr.	Name	Initial value	Setting range	Description
1024 A904	Sampling auto start	0	0	Manual sampling start
			1	Sampling starts automatically when the power supply is turned ON or at a reset
1025 A905	Trigger mode selection	0	0	Fault trigger
			1	Analog trigger
			2	Digital trigger
			3	Analog or digital trigger (OR logic)
			4	Both analog and digital trigger (AND logic)
1026 A906	Number of sampling before trigger	90%	0 to 100%	Set the percentage of the pre-trigger sampling time with respect to the overall sampling time.
1027 A910	Analog source selection (1ch)	201	1 to 3, 5 to 14, 17 to 20, 22 to 24, 32 to 36, 40 to 42, 46, 52 to 54, 61, 62, 64, 67, 71 to 74, 87 to 98, 201 to 213, 222 to 227, 230 to 232, 235 to 238	Select the analog data (monitor) to be sampled on each channel.
1028 A911	Analog source selection (2ch)	202		
1029 A912	Analog source selection (3ch)	203		
A1030 A913	Analog source selection (4ch)	204		
1031 A914	Analog source selection (5ch)	205		
1032 A915	Analog source selection (6ch)	206		
1033 A916	Analog source selection (7ch)	207		
1034 A917	Analog source selection (8ch)	208		
1035 A918	Analog trigger channel	1	1 to 8	Select the analog channel to be the trigger.
1036 A919	Analog trigger operation selection	0	0	Sampling starts when the value of the analog monitor exceeds the value set at the trigger level (Pr.1037)
			1	Sampling starts when the value of the analog monitor falls below the value set at the trigger level (Pr.1037)
1037 A920	Analog trigger level	1000	600 to 1400	Set the level at which the analog trigger turns ON. The trigger level is the value obtained by subtracting 1000 from the set value.

Pr.	Name	Initial value	Setting range	Description
1038 A930	Digital source selection (1ch)	1	1 to 255	Select the digital data (I/O signal) to be sampled on each channel.
1039 A931	Digital source selection (2ch)	2		
1040 A932	Digital source selection (3ch)	3		
1041 A933	Digital source selection (4ch)	4		
1042 A934	Digital source selection (5ch)	5		
1043 A935	Digital source selection (6ch)	6		
1044 A936	Digital source selection (7ch)	7		
1045 A937	Digital source selection (8ch)	8		
1046 A938	Digital trigger channel	1	1 to 8	Select the digital channel to be the trigger.
1047 A939	Digital trigger operation selection	0	0	Trace starts when the signal turns ON
			1	Trace starts when the signal turns OFF

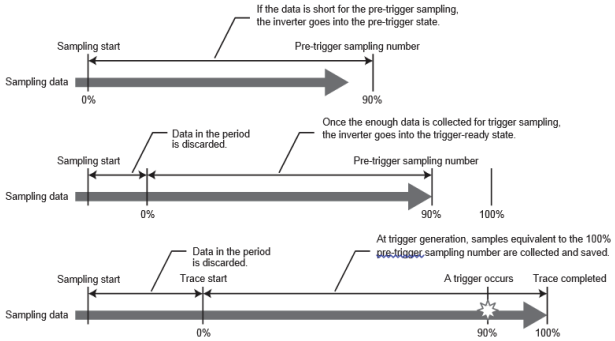
Operation Outline

This function samples the status (analog monitor and digital monitor) of the inverter, traces the sampling data when a trigger (trace start condition) is generated, and saves the resulting trace data.

When the trace function is set enabled, samplings are collected and the inverter goes into the pre-trigger status.

In the pre-trigger status, samples are collected, and the trigger standby status is entered when sufficient samples for the number of pre-trigger samples have been collected.

When the trigger is generated in the trigger standby status, the trace is started and the trace data is saved.



Selection of Trace Mode (Pr.1021)

Select how to save the trace data which results from sampling the inverter status.

There are two trace data save methods, memory mode and recorder mode.

Pr.1021 setting	Mode	Description
0	Memory mode	In this mode, trace data is saved sequentially to internal RAM on the inverter. If automatic transfer is set, the trace data in internal RAM is transferred to USB memory device when the trigger is being generated. Data can be transferred to a USB memory device as long as data is held in internal RAM. Trace data in internal RAM is cleared when the power supply is turned OFF or when the inverter is reset.
1	Memory mode (automatic transfer)	
2	Recorder mode	In this mode, trace data is saved directly to USB memory device. Sampling data is fixed at eight analog channels and eight digital channels. The sampling cycle in this mode is longer than in the memory mode. (1 ms or longer)

Notes:

- *When the trace function is used in the recorder mode, use a USB memory device having at least 1 GB of free space.*
- *Data transferred to USB is saved in the "TRC" folder under the "FR_INV" folder.*
- *Up to 99 sets of trace data can be saved in the USB memory device. When data transfer to USB memory device reaches 99 sets of trace data, data is successively overwritten starting with the older data.*

Setting of Sampling Cycle (interval) and Number of Sampling Channels

Set the sampling cycle (interval). The shortest cycle in the recorder mode is 1 ms. When the recorder mode is set, sampling is performed at a sampling cycle of 1 ms even if "0, 1" is set to Pr.1022 Sampling cycle.

When the memory mode is set, the number of analog channels to sample can be set in the Pr.1023 Number of analog channels. Start setting from the smaller channel number. Up to eight channels can be set. The sampling time becomes shorter the more channels are set. The number of channels is always 8 when the recorder mode is used or when digital channels are used.

The sampling time differs according to the sampling cycle and number of sampling channels.

Number of channels	Memory mode sampling time	
	Minimum (Pr.1022 = "0")	Maximum (Pr.1022 = "9")
1	213 ms	1704 s
2	160 ms	1280 s
3	128 ms	1024 s
4	106.5 ms	852 s
5	91.8 ms	728 s
6	80.0 ms	640 s
7	71.8 ms	568 s
8	60 ms	512 s

Analog Source (monitored item) Selection

Select the analog sources (monitored items) to be set to **Pr.1027** to **Pr.1034** from the table below.

Setting value	Monitored item[a]	Minus sign display[b]	Trigger level criterion[c]
1	Output frequency /speed		[d]
2	Output current		
3	Output voltage		
5	Frequency setting value/ speed setting		
6	Running speed		
7	Motor torque		
8	Converter output voltage		
9[e]	Regenerative brake duty		
10	Electronic thermal O/L relay load factor		
11	Output current peak value		
12	Converter output voltage peak value		
13	Input power		
14	Output power		
17	Load meter		
18	Motor excitation current		
19	Position pulse		65535
20	Cumulative energization time		65535
22	Orientation status		65535
23	Actual operation time		65535
24	Motor load factor		
32	Torque command		
33	Torque current command		
34	Motor output		
35	Feedback pulse		65535
36	Torque monitor (power driving/ regenerative driving polarity switching)	0	
40	PLC function user monitor 1	0	
41	PLC function user monitor 2	0	
42	PLC function user monitor 3	0	

Setting value	Monitored item[a]	Minus sign display[b]	Trigger level criterion[c]
46	Motor temperature	0	
52	PID set point		
53	PID measured value		
54	PID deviation	0	
61	Motor thermal load factor		
	Cumulative pulse overflow times		
74	(control terminal option)	0	
87	Remote output value 1	0	
88	Remote output value 2	0	
89	Remote output value 3	0	
90	Remote output value 4	0	
91	PID manipulated variable	0	
92	Second PID set point		
93	Second PID measured value		
94	Second PID deviation	0	
95	Second PID measured value 2		
96	Second PID manipulated variable	0	
97	Dancer main speed setting		
98	Control circuit temperature	0	
201	*Output frequency		Pr.84
202	*U Phase Output Current	0	ND rated current
203	*V Phase Output Current	0	ND rated current
204	*W Phase Output Current	0	ND rated current
205	*Converter Output Voltage		400 V/800 V

Setting value	Monitored item[a]	Minus sign display[b]	Trigger level criterion[c]
206	*Output Current (all three phases)		ND rated current
207	*Excitation Current(A)		ND rated current
208	*Torque Current(A)		ND rated current
209	Terminal 2		100%
210	Terminal 4		100%
211	Terminal 1	0	100%
212	*Excitation Current (%)	0	100%
213	*Torque Current (%)	0	100%
222	Position command		65535
223	Position command (upper digits)	0	65535
224	Current position		65535
225	Current position (upper digits)	0	65535
226	Droop pulse		65535
227	Droop pulse (upper digits)	0	65535
230	*Output Frequency (signed)	0	Pr.84
231	*Motor Speed	0	[f]
232	*Speed Command	0	[f]
235	*Torque Command	0	100%
236	*Motor Torque	0	100%
237	*Excitation Current Command	0	100%
238	*Torque Current Command	0	100%
62	Inverter thermal load factor		
64	PTC thermistor resistance		Pr.561
67	PID measured value 2		
71	Cumulative pulse	0	

Setting value	Monitored item[a]	Minus sign display[b]	Trigger level criterion[c]
72	Cumulative pulse overflow times	0	
73	Cumulative pulse (control terminal option)	0	

(a) "*" shows a monitored item with a high-speed sampling cycle.
(b) "0" shows that the display with a minus sign is available.
(c) Indicates a criterion at 100% when the analog trigger is set.
(d) Refer to Terminal FM, CA, AM Full-scale value
(e) Monitoring is available only for standard models
(f) Rated motor frequency × 120 / number of motor poles

Digital Source (monitored item) Selection

Select the digital sources (input/output signals) to be set to **Pr.1038** to **Pr.1045** from the table below. When a value other than the below, 0 (OFF) is applied for display.

Setting value	Signal name	Remarks
0	—	—
1	STF	—
2	STR	
3	AU	
4	RT	
5	RL	
6	RM	
7	RH	
8	JOG	
9	MRS	
10	STP (STOP)	
11	RES	
12	CS	
21	X0	For the details of the signals, refer to the Instruction Manual of FR-A8AX (option).
22	X1	
23	X2	
24	X3	
25	X4	
26	X5	
27	X6	
28	X7	
29	X8	
30	X9	
31	X10	
32	X11	
33	X12	
34	X13	
35	X14	
36	X15	
37	DY	
101	RUN	—
102	SU	
103	IPF	
104	OL	
105	FU	
106	ABC1	
107	ABC2	
121	DO0	For the details of the signals, refer to the Instruction Manual of FR-A8AY (option).
122	DO1	
123	DO2	
124	DO3	
125	DO4	
126	DO5	
127	DO6	
128	RA1	For the details of the signals, refer to the Instruction Manual of FR-A8AR (option).
129	RA2	
130	RA3	

Trigger Setting (Pr.1025, Pr.1035 to Pr.1037, Pr.1046, Pr.1047)

Set the trigger generating conditions and trigger target channels.

P-r.1025 setting	Trigger generating conditions	Selection of trigger target channel
0	Trace starts when inverter enters an fault status (protective function activated)	—
1	Trace starts when analog monitor satisfies trigger conditions	Pr.1035
2	Trace starts when digital monitor satisfies trigger conditions	Pr.1046
3	Trace starts when either of analog or digital monitor satisfies trigger conditions (OR)	Pr.1035, Pr.1046
4	Trace starts when both of analog or digital monitor satisfies trigger conditions (AND)	Pr.1035, Pr.1046

Pr.1036 setting	Trigger generation conditions	Trigger level setting
0	Sampling starts when the analog data targeted for the trigger exceeds the value specified at the trigger level	Set the trigger level by Pr.1037 (-400% to 400%)*1
1	Sampling starts when the analog data targeted for the trigger has fallen below the value specified at the trigger level	

Pr.1047 setting	Trigger generation conditions
0	Trace starts when the digital data targeted for the trigger turns ON
1	Trace starts when the digital data targeted for the trigger turns OFF

Start Sampling and Copying of Data (Pr.1020, Pr.1024)

Set the trace operation. The trace operation is set by one of two ways, by setting Pr.1020 Trace operation selection and by setting in the trace mode on the operation panel.

When "1" is set in Pr.1020, sampling is started.

When "2" is set in Pr.1020, a trigger is regarded as having been generated (for instance, a forced trigger), sampling is stopped and the trace is started.

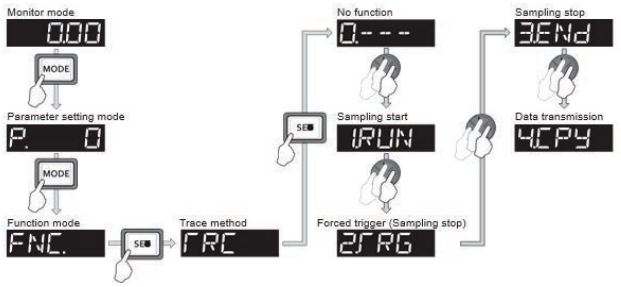
When "3" is set in Pr.1020, sampling is stopped.

When "4" is set in Pr.1020, the trace data in internal RAM is transferred to a USB memory device. (Trace data cannot be transferred during sampling.)

To automatically start sampling when the power supply is turned ON or at a recovery after an inverter reset, set "1" to Pr.1024 Sampling auto start.

Pr.1020 setting	Setting by trace mode	Operation
0	0---	Sampling standby
1	iRUN	Sampling start
2	2rRG	Forced trigger (sampling stop)
3	3End	Sampling stop
4	4CPy	Data transmission

Note: *Trace operation can also be set in the trace mode on the operation panel.*



Selection of Trace Operation by Input Terminal (TRG signal, TRC signal)

Trace operation can be selected by signal inputs.

A forced trigger can be applied when the Trace trigger input (TRG) signal is ON.

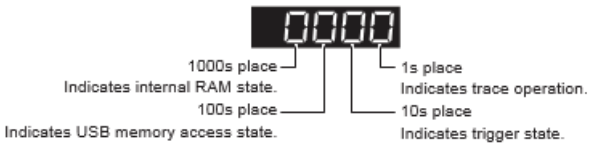
Sampling is started and stopped by the Trace sampling start/end (TRC) signal turning ON and OFF, respectively.

To input the TRG signal, set "46" in any of **Pr.178** to **Pr.189** (input terminal function selection), and to input the TRC signal, set "47" to assign the function to a terminal.

Note: *Changing the terminal assignment using **Pr.178** to **Pr.189** (input terminal function selection) may affect the other functions. Set parameters after confirming the function of each terminal.*

Monitoring the Trace Status

The trace status can be monitored on the operation panel by setting "38" in **Pr.52** Operation panel main monitor selection, **Pr.774** to **Pr.776** (Operation panel monitor selection), or **Pr.992** Operation panel setting dial push monitor selection.



Monitor value	Trace status			
	1000s place	100s place	10s place	1s place
0 or no display (a)	No trace data in internal RAM	USB memory not accessed	Trigger not detected	Trace stopped
1	Trace data in internal RAM	USB memory being accessed	Trigger detected	Trace operation
2	—	USB memory transfer error	—	—
3	—	USB buffer overrun	—	—

(a)
The "0(s)" to the left of the leftmost non-zero digit is(are) not shown in the monitor display.
For example, if no trace data is in internal RAM, the USB memory is not accessed, no trigger is detected, and the trace operation is performed, "1" appears (not "0001").

When copying the traced data to a USB memory device, the operating status of the USB host can be checked with the inverter LED.

LED status	Operating Status
OFF	No USB connection.
ON	The communication is established between the inverter and the USB device.
Flickering rapidly	Traced data is being transmitted. (In the memory mode, transmission command is being issued. In the recorder mode, sampling is being performed.)
Flickering slowly	Error in the USB connection.

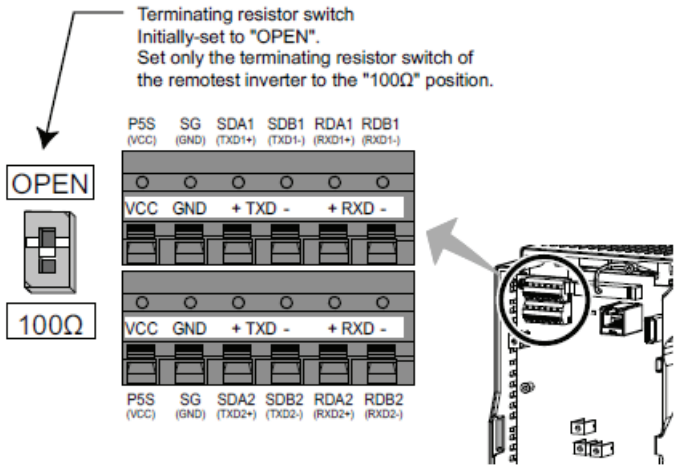
During trace operation, the trace status signal (Y40) can be output. To use the Y40 signal, set "40 (positive logic) or 140 (negative logic)" in any of **Pr.190** to **Pr.196** (output terminal function selection) to assign the function to the output terminal.

Note: *Changing the terminal assignment using* ***Pr.190*** *to* ***Pr.196*** *(output terminal function selection) may affect the other functions. Set parameters after confirming the function of each terminal.*

Operation via Communication and its Settings

Wiring and Configuration of RS-485 Terminals

RS-485 Terminal Layout



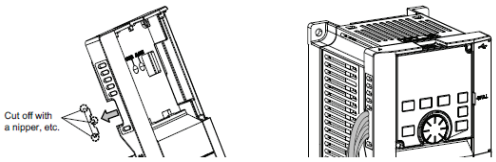
Name	Description
RDA1 (RXD1+)	Inverter receive +
RDB1 (RXD1-)	Inverter receive -
RDA2 (RXD2+)	Inverter receive + (for branch)
RDB2 (RXD2-)	Inverter receive - (for branch)
SDA1 (TXD1+)	Inverter send +
SDB1 (TXD1-)	Inverter send -
SDA2 (TXD2+)	Inverter send + (for branch)
SDB2 (TXD2-)	Inverter send - (for branch)
P5S (VCC)	5V Permissible load current 100 mA
SG (GND)	Earthing (grounding) (connected to terminal SD)

Connection of RS-485 Terminals and Wires

The size of RS-485 terminal block is the same as the control circuit terminal block.

Notes:

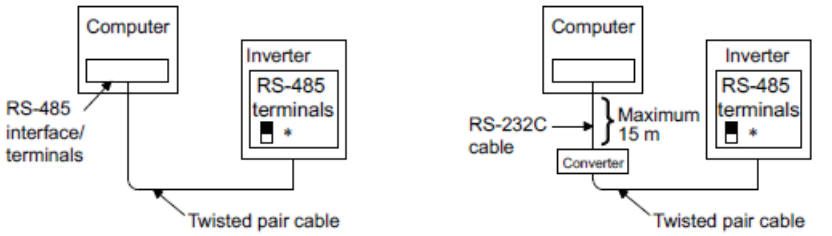
- *To avoid malfunction, keep the RS-485 terminal wires away from the control circuit board.*
- *When the FR-A820-01250(22K) or lower, or the FR-A840-00620(22K) or lower is used with a plug-in option, lead the wires through the hole on the side face of the front cover for wiring of the RS-485 terminals.*



- *When the FR-A820-01540(30K) of higher, or the FR-A840-00770(30K) or higher is used with a plug-in option, lead the wires on the left side of the plug-in option for wiring of the RS-485 terminals.*

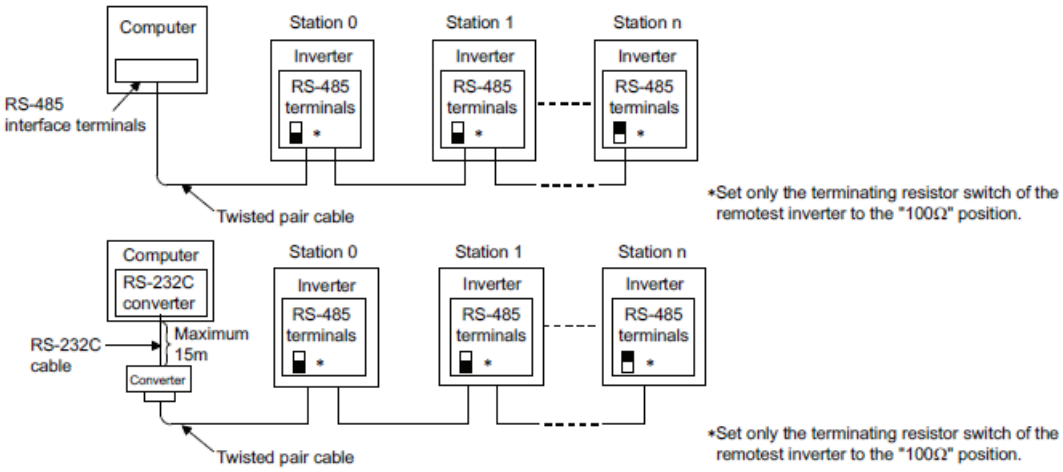
System Configuration of RS-485 Terminals

• Computer and inverter connection (1:1)



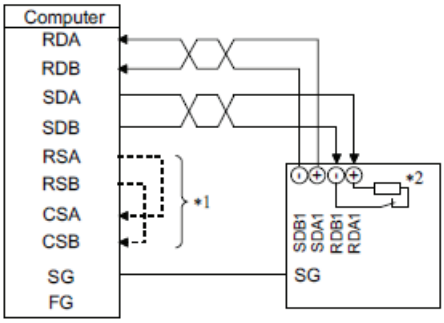
*Set the terminating resistor switch to the "100Ω" position.

• Combination of computer and multiple inverters (1:n)

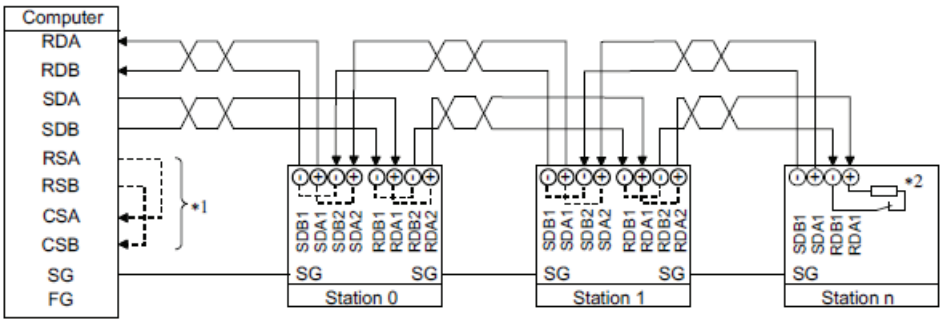


How to Wire RS-485 Terminals

- 1 inverter and 1 computer with RS-485 terminals



- Multiple inverters and 1 computer with RS-485 terminals

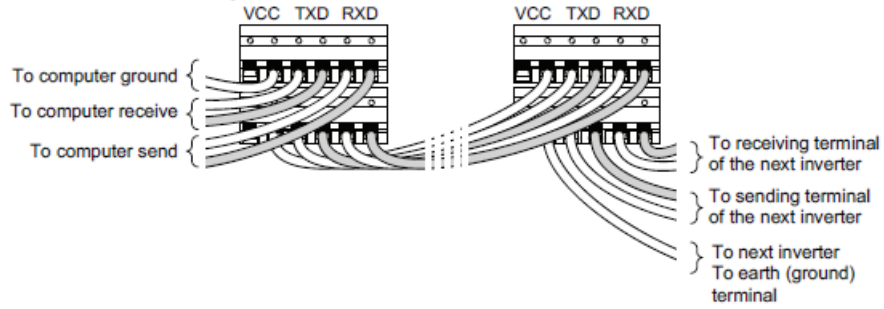


*1 Make connection in accordance with the Instruction Manual of the computer to be used with. Fully check the terminal numbers of the computer since they vary with the model.

*2 For the inverter farthest from the computer, set the terminating resistor switch to ON (100 Ω side).

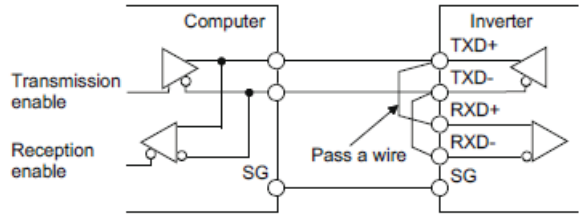
NOTE

- For branching, connect the wires as shown below.



Two-Wire Type Connection

If the computer is 2-wire type, a connection from the inverter can be changed to 2-wire type by passing wires across 5 reception terminals and transmission terminals of the RS-485 terminals.



Note: *A program should be created so that transmission is disabled (receiving state) when the computer is not sending and reception is disabled (sending state) during sending to prevent the computer from receiving its own data.*

USB Device Communication

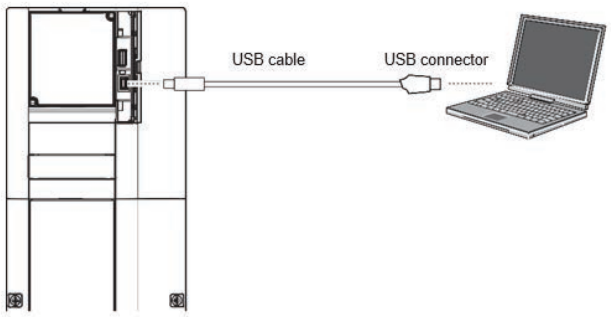
The inverter can be connected simply to a personal computer by a USB cable,

Pr.	Name	Initial value	Setting range	Description
547[a] N040	USB communication station number	0	0 to 31	Inverter station number specification
548[a] N041	USB communication check time interval	9999	0	USB communication is possible, however the inverter will trip (E.USB) when the mode changes to the PU operation mode.
			0.1 to 999.8 s	Set the communication check time interval. If a no-communication state persists for longer than the permissible time, the inverter will trip (E.USB).
			9999	No communication check

[a] Changed setting value becomes valid at power ON or the inverter reset.

USB Communication Specifications

Interface	Conforms to USB1.1 (USB2.0 full speed)
Transmission speed	12 Mbps
Wiring length	Maximum 5 m
Connector	USB mini B connector (receptacle)
Power supply	Self-powered
Recommended USB cable	MR-J3USBCBL3M (cable length 3 m)



At the initial setting (**Pr.551** PU mode operation command source selection = "9999"), communication with personal computer can be made in the PU operation mode simply by connecting a USB cable. To fix the command source to the USB connector in the PU operation mode, set "3" to **Pr.551**.

Parameter setting and monitoring can be performed by FR Configurator2. For details, refer to the Instruction Manual of FR Configurator2.

Copying and Verifying Parameters on the Operation Panel

Pr.CPY setting value	Description
0.—	Initial display
1.RD	Copy the source parameters to the operation panel.
2.WR	Write the parameters copied to the operation panel to the destination inverter.
3.VFY	Verify parameters in the inverter and operation panel. (Refer to page 655.)

Notes:

- *When the destination inverter is other than the FR-A800 series or when parameter copy is attempted after the parameter copy reading was stopped, "model error (**rE4)**" appears.*
- *When the power is turned OFF or an operation panel is disconnected, etc. during parameter copy writing, write again or check the setting values by parameter verification.*
- *When parameters are copied from a different-capacity inverter, there are parameters with different initial values depending on the inverter capacity, so the setting values of some parameters will be automatically changed. After performing a parameter copy from a different-capacity inverter, check all the parameter settings.*
- *During password lock, parameter copy and parameter verification cannot be performed.*
- *If parameters are copied from an older inverter to a newer inverter that has additional parameters, out-of-range setting values may be written in some parameters. In that case, those parameters operate as if they were set to their initial values.*

Parameter Copy

Inverter parameter settings can be copied to other inverters.

Reading the Parameter Settings of the Inverter to the Operation Panel

1. Connect the operation panel to the source inverter.
2. Parameter setting mode.

   Press MODE to choose the parameter setting mode. (The parameter number read previously appears.)
3. Selecting the parameter number.

   Turn the dial to "**PrCPY**" (parameter copy), and press **SET**. "**0– — —**" appears.
4. Reading to operation panel.

   Turn the dial to change the set value to "**I.Rd**". Press **SET** to start reading of the inverter parameter settings by the operation panel. (it takes about 30 seconds to read all the settings. During reading, "**I. Rd**" flickers.)
5. End reading.

   "**I.Rd**" and "**PrCPY**" flicker alternately after settings are read.

Note: *"rE1" appears...Why?*

Parameter read error. Perform the operation from step 3 again.

Copying Parameter Settings read to the Operation Panel to the Inverter

1. Connect the operation panel to the destination inverter.
2. Parameter setting mode.

   Press MODE to choose the parameter setting mode. (The parameter number read previously appears.)
3. Selecting the parameter number.

   Turn the dial to "**Pr.CPY**" (parameter copy), and press **SET**.

   "**0.— — —**" appears.
4. Selecting parameter copy.

   Turn the dial to change the setting value to "**2.WR**" and press **SET**.

   "**2. ALL**" appears.
5. Copying to the inverter.

   Press **SET** to start copying to the inverter. (It takes about 60 seconds to copy all the settings. During copying, the selected parameter group flickers.)

   Perform this step while the inverter is stopped. (Parameter settings cannot be copied during operation.)
6. Ending copying

   "**2.WR**" and "**Pr.CPY**" flicker alternately after copying ends.
7. When parameters are written to the destination inverter, reset the inverter before operation by, for example, turning the power supply OFF.

Notes:

- *"**rE2**" appears...Why? Parameter write error. Perform the operation from step 3 again.*
- *"CP" and "0.00" are displayed alternately.*

  Appears when parameter copy is performed between inverters FR-A820-03160(55K) or lower or inverters FR-A820-

  03160(55K) or lower and inverters FR-A820-03800(75K) or higher or FR-A840-02160(75K) or higher.

  *When CP and 0.00 flicker alternately, set the **Pr.989** Parameter copy alarm release as shown below (initial value).*

Pr.989 setting	***Operation***
10	*Cancels the alarm of FR-A820-03160(55K) or lower and FR-A840-01800(55K) or lower.*
100	*Cancels the alarm of FR-A820-03800(75K) or higher and FR-A840-02160(75K) or higher.*

  *After setting Pr.989, perform setting of **Pr.9, Pr.30, Pr.51, Pr.56, Pr.57, Pr.61, Pr.70, Pr.72, Pr.80, Pr.82, Pr.90** to **Pr.94, Pr.453, Pr.455, Pr.458 to Pr.462, Pr.557, Pr.859, Pr.860,** and **Pr.893** again.*
-

Parameter Verification

Whether the parameter settings of inverters are the same or not can be checked.

1. Copy the parameter settings of the verification source inverter to operation panel.
2. Move the operation panel to the inverter to be verified.
3. Turning ON the power of the inverter.

   The monitor display turns ON.
4. Parameter setting mode.

   Press **MODE** to choose the parameter setting mode. (The parameter number read previously appears.)
5. Selecting the parameter number.

   Turn the dial to "**Pr.CPY**" (parameter copy) and press **SET**.

   "**0.— — —**" appears.
6. Parameter verification.

Turn the dial to change setting value "**3.vFY**" (parameter copy verification mode.)

Press **SET** Verification of the parameter settings copied to the operation panel and the parameter settings of the verification destination inverter is started. (It takes about 60 seconds to verify all the settings. During verification, "**3.VFY**" flickers.)

- If there are different parameters, the different number and "**rE3**" flicker.
- To continue verification, press **SET**.
- "**Pr.CPY**" and "**3.VFY**" flicker alternately after verification ends.

Note: *"rE3" flickers...Why?*

*The set frequency may be incorrect. To continue verification, press **SET**.*

Copying and Verifying Parameters using USB Memory

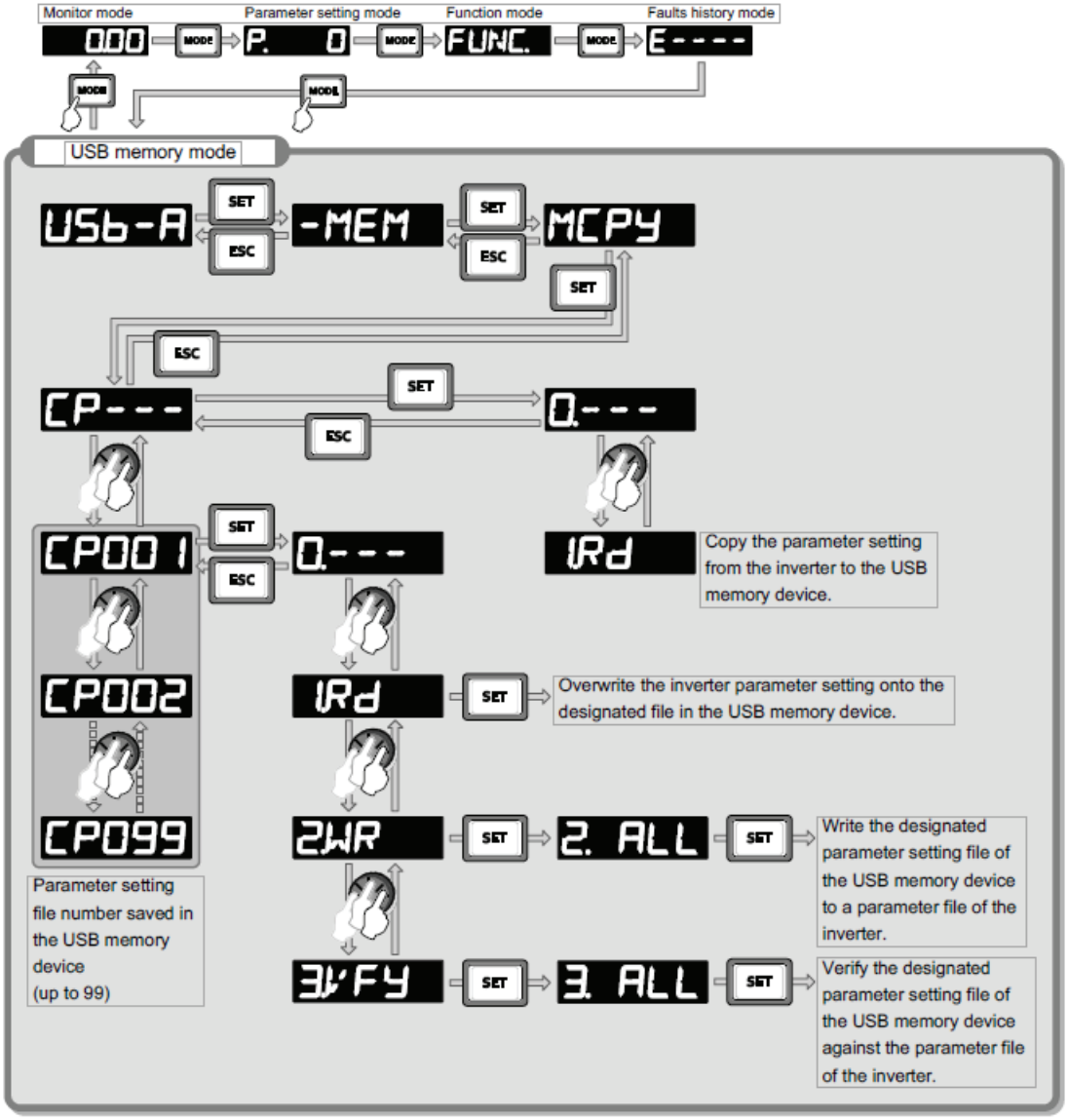
Inverter parameter settings can be copied to USB memory.

Parameter setting data copied to USB memory can be copied to other inverters or verified to see if they differ from the parameter settings of other inverters.

Parameter settings can also be imported to a personal computer and edited in FR Configurator 2.

Changes in USB Memory Copy Operation States

Insert the USB memory in the inverter. The USB memory mode is displayed and USB memory operations are possible.



Notes:

- *When parameter settings are copied to USB memory without specifying a parameter setting file number in USB memory, numbers are automatically assigned.*
- *Up to 99 files can be saved on USB memory. When the USB memory device already has 99 files, attempting copying of another file to the USB memory device causes the file quantity error (rE7).*
- *Refer to the FR Configurator 2 instruction manual for details on importing files to FR Configurator 2.*
- *During password lock, parameter copy and parameter verification cannot be performed.*

Procedure for Copying Parameters to USB Memory

1. Insert the USB memory into the copy source inverter.
2. USB memory mode.

   Press **MODE** to change to the USB memory mode.
3. Press **SET** three times to display "**CP— — —**" (file selection screen) and press **SET**. (To overwrite files on the USB memory, display the file selection screen, turn the dial to select the file number. and press **SET**.
4. Turn the dial to change to "i.Rd". Press SET to copy the parameter settings at the copy source to USB memory. (it takes about 15 seconds to copy all the settings. During copy, "I.Rd" flickers.)

   "**I.Rd**" and "file number when the parameter file was copied to USB memory?" flicker after copying ends.

Procedure for Copying Parameters from USB Memory to Inverter

1. Insert the USB memory into the destination inverter.
2. USB memory mode.

   Press **MODE** to change to the USB memory mode.
3. Displaying the file selection screen.

   Press SET three times to display "**CP — — —**" (file selection screen.)
4. Selecting the file number.

   Turn the dial to select the file number to copy to the inverter, press **SET**.
5. Turn the dial to display "**2.WR**" and press **SET**.

   "**2.ALL**" appears.
6. Writing to the inverter.

   Press **SET** to write the parameters copied to the USB memory to the destination inverter. (It takes about 15 seconds to copy all the settings. During copying, "**2.ALL**" flickers.)

   "**2.ALL**" and "**copied file number**" flicker after copying ends.

   Perform this step wile the inverter is stopped.
7. When parameters are written to the destination inverter, reset the inverter before operation by, for example, turning the power

   supply OFF.

Notes:

- *"**rE1**" or "**rE2**" appears... Why?*

  A fault occurred on USB memory. Check the USB memory connection, then retry.
- *"CP" and "0.00" are displayed alternately.*
- *Appears when parameter copy is performed between inverters FR-A820-03160(55K) or lower or inverters FR-A840- 01800(55K) or lower and inverters FR-A820-03800(75K) or higher or FR-A840-02160(75K) or higher.*
- *When "CP" and "0.00" flicker alternately, set the Pr.989 Parameter copy alarm release as shown below (initial value).*

Pr.989 setting	***Operation***
10	*Cancels the alarm of FR-A820-03160 (55K) or lower and FR-A840-01800 (55K) or lower.*
100	*Cancels the alarm of FR-A820-03800 (75K) or higher and FR-A840-02160 (75K) or higher.*

  After setting Pr.989, perform setting of Pr.9, Pr.30, Pr.51, Pr.56, Pr.57, Pr.61, Pr.70, Pr.72, Pr.80, Pr.82, Pr.90 to Pr.94, Pr.453, Pr.455, Pr.458 to Pr.462, Pr.557, Pr.859, Pr.860, and Pr.893 again.
- *When the destination inverter is other than the FR-A800 series or when parameter copy is attempted after the parameter copy reading was stopped, "model error "(**rE4**)" appears.*
-
- *When the power is turned OFF or an operation panel is disconnected, etc. during parameter copy writing, write again or check the setting values by parameter verification.*
- *When parameters are copied from a different-capacity inverter, there are parameters with different initial values depending on the inverter capacity, so the setting values of some parameters will be automatically changed. After performing a parameter copy from a different-capacity inverter, check all the parameter settings.*

Procedure for Verifying Parameters in USB Memory

1. Copy the parameter settings of the verification source inverter to USB memory
2. Move the USB memory to the inverter to be verified.
3. Turning ON the power of the inverter.

   The monitor display turns ON.
4. USB memory mode.

   Press **MODE** to change the USB memory mode.
5. Displaying the file selection screen.

   press SET three times to display "**CP — — —**" (file selection screen.)
6. Selecting the file number.

   Turn the dial to select the file number to be verified, and press **SET**.
7. Press SET. Verification of the parameter settings copied to the USB memory and the parameter settings of the verification destination inverter is started. (It takes about 15 seconds to verify all the settings. During verification, "**3. ALL**" flickers.)
   - If there are different parameters, the different parameter number and " **rE3**" flicker.
   - To continue verification, press **SET**.
8. "Verified file number" and "**3.ALL**" flicker after verification ends.

Note: *"**rE3**" flickers...Why?*

*The set frequency may be incorrect. To continue verification, press **SET**.*

Checking Parameters Changed from their Initial Values (initial value change list)

Parameters changed from their initial values can be displayed.

1. Turning ON the power of the inverter.

   The monitor display turns ON.
2. Parameter setting mode.

   Press **MODE** to choose the parameter setting mode. (The parameter number read previously appears.)
3. Selecting the parameter number.

   Turn the dial to "**PrCHG**" (initial value change list), and press **SET**.

   "**P.— — —**" appears.
4. Checking the initial value change list.

   Turn the dial. The numbers that have been changed from their initial value appear in order.

   If SET is pressed with parameters that have been changed, the parameter settings can be changed as they are. (Parameter numbers are no longer displayed in the list when they are returned to their initial values.)

   Other changed parameters appear by turning the dial.

   "**P — — —**" is returned to when the last changed parameter is displayed.

Notes:

- *The calibration parameters (C0 (Pr.900) to C7 (Pr.905), C42 (Pr.934) to C45 (Pr.935)) are not displayed even when these are changed from the initial settings.*
- *Only the simple mode parameters are displayed when the simple mode is set (Pr.160 = "9999").*
- *Only user groups are displayed when user groups are set (Pr.160 = "1").*
- *Pr.160 is displayed independently of whether the setting value is changed or not.*
- *Parameter setting using the initial value change list is also possible.*

Protective Functions

Inverter Fault and Alarm Indications

When a problem arises with the inverter, it be diagnosed with the instructions outlined in this section. If the problem cannot be solved by the manufacturing product support team and instructions outline in this section, please contact the inverter manufacturer directly at 1–800–950–7781. Hours of operation: 8 AM to 6 PM CST Monday through Friday (except US holidays). Priority access code for Trane: 7052350.

For inverter replacement, contact Trane's after market parts office.

When the inverter detects a fault, depending on the nature of the fault, the operation panel displays an error message or warning, or a protective function activates to trip the inverter.

Item	Description
Fault output signal	Opening the magnetic contactor (MC) provided on the input side of the inverter at a fault occurrence shuts off the control power to the inverter, therefore, the fault output will not be retained.
Fault or alarm indication	When a protective function activates, the operation panel displays a fault indication.
Operation restart method	While a protective function is activated, the inverter output is kept shutoff. Reset the inverter to restart the operation.

When any fault occurs, take an appropriate corrective action, then reset the inverter, and resume the operation. Restarting the operation without a reset may break or damage the inverter.

When a protective function activates, note the following points.

Inverter fault or alarm indications are categorized as below.

Displayed item	Description
Error message	A message regarding an operational fault and setting fault by the operation panel and the parameter unit. The inverter does not trip.
Warning	The inverter does not trip even when a warning. However, failure to take appropriate measures will lead to a fault.
Alarm	The inverter does not trip. An Alarm (LF) signal can also be output with a parameter setting.
Fault	A protective function activates to trip the inverter and output a Fault (ALM) signal.

Note: *The past eight faults can be displayed on the operation panel. (Faults history)*

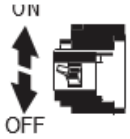
Reset Method for the Protective Functions

Reset the inverter by performing any of the following operations. Note that the accumulated heat value of the electronic thermal relay function and the number of retries are cleared (erased) by resetting the inverter. The inverter recovers about 1 s after the reset is released.

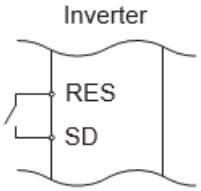
- On the operation panel, press STOP/RESET to reset the inverter.

  (This may only be performed when a fault occurs.)

- Switch the power OFF once, then switch it ON again.



- Turn ON the reset signal (RES) for 0.1 s or more. (If the RES signal is kept ON, "Err" appears (flickers) to indicate that the inverter is in a reset status.)

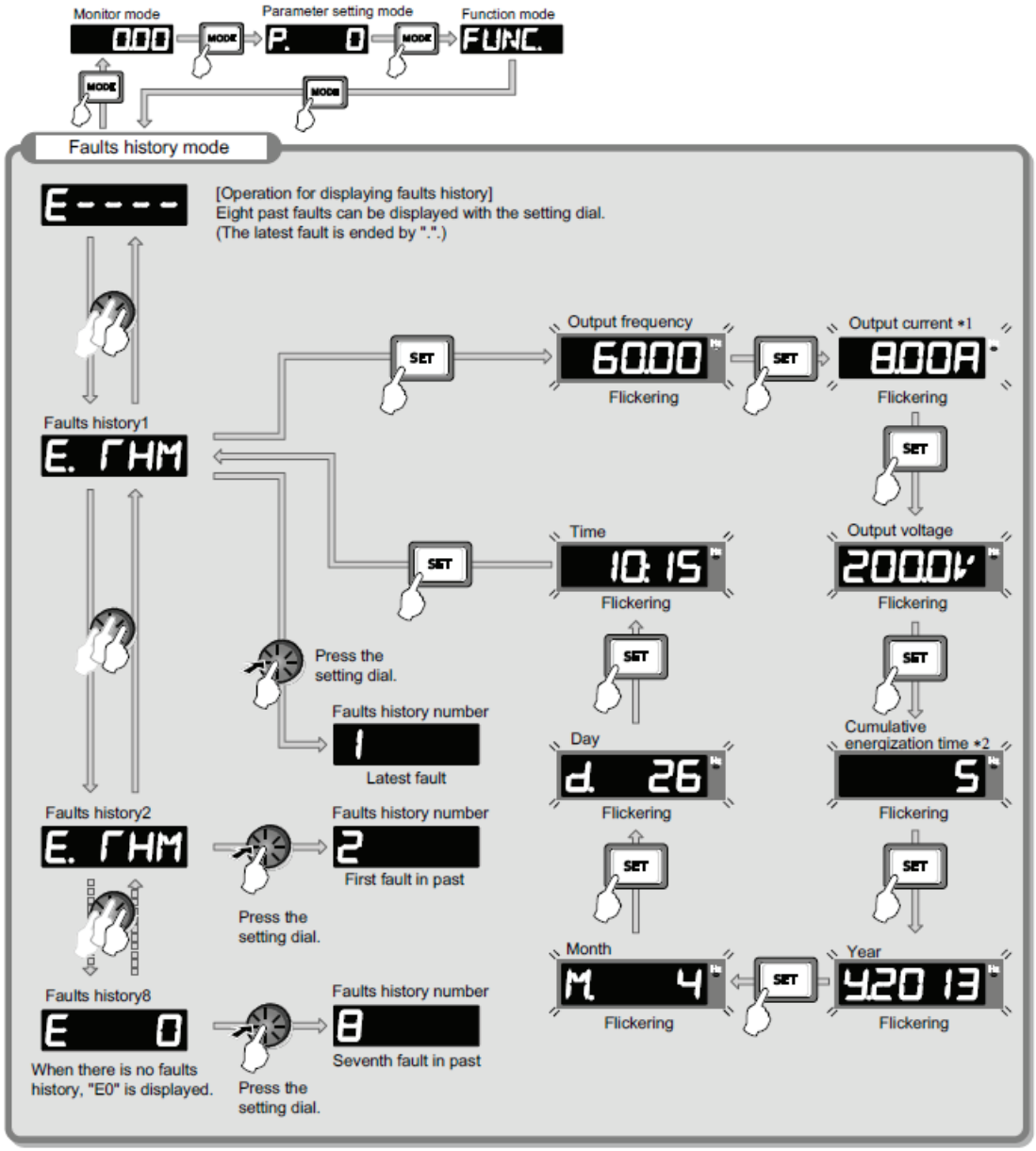


Note: *OFF status of the start signal must be confirmed before resetting the inverter fault. Resetting an inverter fault with the start signal ON restarts the motor suddenly.*

Check and Clear of the Faults History

The operation panel stores the fault indications which appears when a protective function is activated to display the fault record for the past eight faults. (Faults history)

Check for the Faults History



*1 When an overcurrent trip occurs by an instantaneous overcurrent, the monitored current value saved in the faults history may be lower than the actual current that has flowed.

*2 The cumulative energization time and actual operation time are accumulated from 0 to 65535 hours, then cleared, and accumulated again from 0.

Faults History Clearing Procedure

Important: *Set Err.CL Fault history clear = "1" to clear the faults history.*

1. Turning ON the power of the inverter.

   The monitor display turns ON.

2. Parameter setting mode.

   Press **MODE** to choose the parameter setting mode. (The parameter number read previously appears.)

3. Selecting the parameter number.

   Turn the dial until **Err.CL** (faults history clear) appears. Press **SET** to read the present set value. "**0**" (initial value) appears.

4. Faults history clear.

   Turn the dial to change the set value to "**1**". Press **SET** to start clear.

   " **1**" and "**Err.CL**" flicker alternately after parameters are cleared.

   - Turn the dial to read another parameter.

- Press **SET** to show the setting again.
- Press **SET** twice to show the next parameter.

List of Fault Displays

If the displayed message does not correspond to any of the following or if you have any other problem, please contact your sales representative.

Error Message

A message regarding operational fault and setting fault by the operation panel and the parameter unit is displayed. The inverter does not trip.

Operation panel indication	Name
E — — — —	Faults history
HOLd	Operation panel lock
LOCd	Password locked
Er1 to **Er4** **Er8**	Parameter write error
rE1 to **Er4** **Er6** **RE8**	Copy operation error
Err.	Error

Warning

The inverter does not trip even when a warning is displayed. However, failure to take appropriate measures will lead to a fault.

Operation panel indication	Name
OL	Stall prevention (overcurrent)
oL	Stall prevention (overvoltage)
Rb	Regenerative brake pre-alarm
rH	Electronic thermal relay function pre-alarm
PS	PU stop
SL	Speed limit indication
CP	Parameter copy
SA	Safety stop
Mr 1 to **Mr 3**	Maintenance signal output
UF	USB host error
HP 1	Home position return setting error
HP 2	Home position return uncompleted
HP 3	Home position return parameter setting error
Ev	24 V external power supply operation

Alarm

The inverter does not trip. An Alarm (LF) signal can also be output with a parameter setting.

Operation panel indication	Name
FN	Fan alarm
FN2	Internal fan alarm

Fault

A protective function trips the inverter and outputs a Fault (ALM) signal.

The data code is used for checking the fault detail via communication or with Pr.997 Fault initiation.

Operation panel indication	Name	Data code
E. OC 1	Overcurrent trip during acceleration	16 (H10)
E. OC 2	Overcurrent trip during constant speed	17 (H11)
E. OC 3	Overcurrent trip during deceleration or stop	18 (H12)
E.OV 1	Regenerative overvoltage trip during acceleration	32 (H20)
E. OV 2	Regenerative overvoltage trip during constant speed	33 (H21)
E. OV 3	Regenerative overvoltage trip during deceleration or stop	34 (H22)
E. rHr	Inverter overload trip (electronic thermal relay function)	48 (H30)
E. rHM	Motor overload trip (electronic thermal relay function)	49 (H31)
E. F1 N	Heatsink overheat	64 (H40)
E. 1 PF	Instantaneous power failure	80 (H50)
E. Uvr	Undervoltage	81 (H51)
E. 1 LF	Input phase loss	82 (H52)
E. OLr	Stall prevention stop	96 (H60)

Operation panel indication	Name	Data code
E. SOr	Loss of synchronism detection	97 (H61)
E. bE	Brake transistor alarm detection	112 (H70)
E. GF	Output side earth (ground) fault overcurrent	128 (H80)
E. LF	Output phase loss	129 (H81)
E. OHr	External thermal relay operation	144 (H90)
E. Prc	PTC thermistor operation	145 (H91)
E. OPr	Option fault	160 (HA0)
E. OP1	Communication option fault	161 (HA1)
E. OP2		162 (HA2)
E. OP3		163 (Ha3)
E. 16	User definition error by the PLC function	164 (HA4)
E. 17		165 (HA5)
E, 18		166 (HA6)
E, 19		167 (HA7)
E. 20		168 (HA8)
E. PE	Parameter storage device fault	176 (HB0)
E. PUE	PU disconnect	177 (HB1)
E. REr	Retry count excess	178 (HB2)
E. PE2	Parameter storage device fault	179 (HB3)
E. CPU	CPU fault	192 (HC0)
E. 5		245 (HF5)
E. 6		246 (HF6)
E. 7		247 (HF7)
E. CrE	Operation panel power supply short circuit/RS-485 terminals power supply short circuit	193 (HC1)

Operation panel indication	Name	Data code
E.P24	24 Vdc power fault	194 (HC2)
P. Cd0	Abnormal output current detection	196 (HC4)
E. 10H	Inrush current limit circuit fault	197 (HC5)
E. SER	Communication fault (inverter)	198 (HC6)
E. A1 E	Analog input fault	199 (HC7)
E. USb	USB communication fault	200 (HC8)
E. SAF	Safety circuit fault	201 (HC9)
E. Pbr	Internal circuit fault	202 (HCA)
E. 13		253 (HFD)
E. 05	Overspeed occurrence	208 (HD0)
E. 05d	Speed deviation excess detection	209 (HD1)
E. ECr	Single loss detection	210 (HD2)
E. 0d	Excessive position fault	211 (Hd3)
E. Mb 1	Brake sequence fault	213 (HD5)
E. Mb 2		214 (HD6)
E. Mb 3		215 (HD7)
E. Mb 4		216 (HD8)
E. Mb 5		217 (HD9)
E. Mb 6		218 (HDA)
E. Mb 7		219 (HDB)
E. EP	Encoder phase fault	220 (HDC)
E. MP	Magnetic pole position unknown	222 (HDE)
E. 1 AH	Abnormal internal temperature	225 (HE1)
E. LC1	4 mA input fault	228 (HE4)
E. PCH	Pre-charge fault	229 (HE5)

Operation panel indication	Name	Data code
E. PI d	PID signal fault	230 (HE6)
E. 1	Option fault	241 (HF1)
E. 2		242 (HF2)
E. 3		243 (HF3)
E. 11	Internal circuit fault	251 (HFB)

If faults other than the above appear, contact your sales representative.

Causes and Corrective Actions

Error Message

A message regarding operational troubles is displayed. Output is not shut off.

Operation panel indication	HOLD	HOLd
Name	Operation panel lock	
Description	Operation lock is set. Operation other than **STOP/RESET** is invalid.	
Check point	————	
Corrective action	Press **MODE** for 2 s to release the lock.	

Operation panel indication	LOCD	LOCd
Name	Password locked	
Description	Password function is active. Display and setting of parameters are restricted.	
Check point	————	
Corrective action	Enter the password in Pr.297 Password lock/ unlock to unlock the password function before operating.	

Operation panel indication	Er1	Er 1
Name	Parameter write error	
Description	• Parameter setting was attempted while Pr.77 Parameter write selection is set to disable parameter write. • Overlapping range has been set for the frequency jump. • Overlapping range has been set for the adjustable 5 points V/F. • The PU and inverter cannot make normal communication. • IPM parameter initialization was attempted while Pr.72 = "25".	
Check point	• Check the Pr.77 Parameter write selection setting. (Refer to page 281.) • Check the settings of Pr.31 to Pr.36 (frequency jump). (Refer to page 361.) • Check the settings of Pr.100 to Pr.109 (adjustable 5 points V/F). • Check the connection of PU and the inverter. • Check the Pr.72 PWM frequency selection setting. A sine wave filter cannot be used under PM sensorless vector control.	

Operation panel indication	Er2	Er2
Name	Write error during operation	
Description	Parameter write was attempted while Pr.77 = "0".	
Check point	Check that the inverter is stopped.	
Corrective action	• After stopping the operation, make parameter setting. • When setting Pr.77 = "2", parameter write is enabled during operation.	

Operation panel indication	Er3	Er3
Name	Calibration error	
Description	Analog input bias and gain calibration values have been set too close.	
Check point	Check the settings of the calibration parameters C3, C4, C6 and C7 (calibration functions).	

Operation panel indication	Er4	Er4
Name	Mode designation error	
Description	• Parameter setting was attempted in the External or NET operation mode while Pr.77 = "1". • Parameter write was attempted when the command source is not at the operation panel (FR-DU08).	
Check point	• Check that operation mode is PU operation mode. • Check that the Pr.551 setting is correct.	
Corrective action	• After setting the operation mode to the "PU operation mode", make parameter setting. (Refer to page 321.) • When Pr.77 = "2", parameter write is enabled regardless of the operation mode. (Refer to page 281.) • Set Pr.551 = "2".	

Operation panel indication	Er8	Er8
Name	USB memory device operation error	
Description	• An operation command was given during the USB memory device operation. • copy operation (writing) was performed while the PLC function was in the RUN state. • copy operation was attempted for a password locked project.	
Check point	• Check if the USB memory device is operating. • Check if the PLC function is in the RUN state. • Check if the project data is locked with a password.	
Corrective action	• Perform the operation after the USB memory device operation is completed. • Stop the PLC function. (Refer to page 565 and the PLC function programming manual.) • Unlock the password of the project data using FR Configurator2.	

Operation panel indication	rE1	rE1
Name	Parameter read error	
Description	• failure has occurred at the operation panel side EEPROM while reading the copied parameters. • failure has occurred in the USB memory device while copying the parameters or reading the PLC function project data.	

Operation panel indication	rE1	rE1
Check point	————	
Corrective action	• Perform parameter copy again. • Perform PLC function project data copy again. • The USB memory device may be faulty. Replace the USB memory device. • The operation panel (FR-DU08) may be faulty. Please contact your sales representative.	

Operation panel indication	rE2	rE2
Name	Parameter write error	
Description	• Parameter copy from the operation panel to the inverter was attempted during operation. • failure has occurred at the operation panel side EEPROM while writing the copied parameters. • failure has occurred in the USB memory device while writing the copied parameters or PLC function project data.	
Check point	Check that the inverter is stopped.	
Corrective action	• After stopping the operation, perform parameter copy again. • The operation panel (FR-DU08) may be faulty. Please contact your sales representative. • Perform parameter copy or PLC project data copy again. • The USB memory device may be faulty. Replace the USB memory device.	

Operation panel indication	rE3	rE3
Name	Parameter verification error	
Description	• The data in the inverter are different from the data in the operation panel. • failure has occurred at the operation panel side EEPROM during parameter verification. • failure has occurred in the USB memory device during parameter verification. • The data in the inverter are different from the data in the USB memory device or the personal computer (FR Configurator2)	

Operation panel indication	rE3	rE3
Check point	Check the parameter setting of the source inverter against the setting of the destination inverter.	
Corrective action	• Continue the verification by pressing **SET**. • Perform parameter verification again. • The operation panel (FR-DU08) may be faulty. Please contact your sales representative. • The USB memory device may be faulty. Replace the USB memory device. • Verify the PLC function project data again.	

Operation panel indication	rE4	rE4
Name	Model error	
Description	• different model was used when parameter copy from the operation panel or parameter verification was performed. • The data in the operation panel were not correct when parameter copy from the operation panel or • parameter verification was performed.	
Check point	• Check that the parameter copy or verification source inverter is of the same model. • Check that parameter copy to the operation panel was not interrupted by switching OFF the power or by disconnecting the operation panel.	
Corrective action	• Perform parameter copy and parameter verification between inverters of the same model (FR-A800 series). • Perform parameter copy to the operation panel from the inverter again.	

Operation panel indication	rE6	rE6
Name	File error	
Description	• The parameter copy file in the USB memory device cannot be recognized. • An error has occurred in the file system during transfer of the PLC function data or writing to RAM.	
Check point	————	
Corrective action	• Perform parameter copy again. • Copy the PLC function project data again.	

Operation panel indication	rE7	rE7
Name	File quantity error	
Description	A parameter copy was attempted to the USB memory device in which the copy files from 001 to 099 had already been saved.	
Check point	Check if the number of copy files in the USB memory device has reached 99.	
Corrective action	Delete the copy file in the USB memory device and perform parameter copy again	

Operation panel indication	rE8	rE8
Name	No PLC function project file	
Description	The specified PLC function project file does not exist in the USB memory device.	
Check point	• Check that the file exists in the USB memory device. • Check that the folder name and the file name in the USB memory device is correct.	
Corrective action	The data in the USB memory device may be damaged.	

Operation panel indication	Err.	Err.
Description	• The RES signal is turned ON. • The operation panel and inverter cannot make normal communication (contact faults of the connector). • This error may occur when the voltage at the input side of the inverter drops. • When using a separate power source for the control circuit power (R1/L11, S1/L21) from the main circuit power (R/L1, S/L2, T/L3), this error may appear at turning ON of the main circuit. It is not a fault.	
Corrective action	• Turn OFF the RES signal. • Check the connection between the operation panel and the inverter. • Check the voltage on the input side of the inverter.	

Warning

Output is not shut off when a protective function activates

Operation panel indication	OL		FR-LU08	OL
Name	Stall prevention (overcurrent)			
Description	• When the output current of the inverter increases, the stall prevention (overcurrent) function activates. • The following section explains about the stall prevention (overcurrent) function.			
	During acceleration	When the output current (output torque under Real sensorless vector control or vector control) of the inverter exceeds the stall prevention level (Pr.22 Stall prevention operation level, etc.), this function stops the increase in frequency until the overload current decreases to prevent the inverter from resulting in overcurrent trip. When the overload current has reduced below stall prevention operation level, this function increases the frequency again.		
	During constant-speed operation	When the output current (output torque under Real sensorless vector control or vector control) of the inverter exceeds the stall prevention level (Pr.22 Stall prevention operation level, etc.), this function reduces frequency until the overload current decreases to prevent the inverter from resulting in overcurrent trip. When the overload current has reduced below stall prevention operation level, this function increases the frequency up to the set value.		
	During deceleration	When the output current (output torque under Real sensorless vector control or vector control) of the inverter exceeds the stall prevention level (Pr.22 Stall prevention operation level, etc.), this function stops the decrease in frequency until the overload current decreases to prevent the inverter from resulting in overcurrent trip. When the overload current has decreased below stall prevention operation level, this function decreases the frequency again.		
Check point	• Check that the Pr.0 Torque boost setting is not too large. • The Pr.7 Acceleration time and Pr.8 Deceleration time settings may be too short. • Check that the load is not too heavy. • Check for any failures in peripheral devices. • Check that the Pr.13 Starting frequency is not too large. • Check that Pr.22 Stall prevention operation level is appropriate.			
Corrective action	• Set a larger value in Pr.7 Acceleration time and Pr.8 Deceleration time. • Reduce the load. • The stall prevention operation current can be set in Pr.22 Stall prevention operation level. The acceleration/deceleration time may change. Increase the stall prevention operation level with Pr.22 Stall prevention operation level. •			

Operation panel indication	oL		FR-LU08	oL
Name	Stall prevention (overvoltage)			
Description	• When the output voltage of the inverter increases, the stall prevention (overvoltage) function activates. • The regeneration avoidance function activates due to excessive regenerative power of the motor. • The following section explains the stall prevention (overvoltage) function.			
	During deceleration	If the regenerative power of the motor becomes excessive to exceed the regenerative power consumption capability, this function stops decreasing the frequency to prevent overvoltage trip. As soon as the regenerative power has reduced, deceleration resumes.		
Check point	• Check for sudden speed reduction. • Check if the regeneration avoidance function (Pr.882 to Pr.886) is being used.			
Corrective action	The deceleration time may change. Increase the deceleration time using Pr.8 Deceleration time.			

Operation panel indication	RB	Rb	FR-LU08	RB
Name	Regenerative brake pre-alarm (Standard models only)			
Description	Appears if the regenerative brake duty reaches or exceeds 85% of the Pr.70 Special regenerative brake duty value. If the regenerative brake duty reaches 100%, a regenerative overvoltage (E. OV[ ]) occurs.			
Check point	• Check if the brake resistor duty is not too high. • Check that the Pr.30 Regenerative function selection and Pr.70 settings are correct.			
Corrective action	• Set the deceleration time longer. • Check the Pr.30 and Pr.70 settings.			

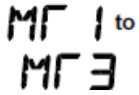
Operation panel indication	TH	TH	FR-LU08	TH
Name	Electronic thermal relay function pre-alarm			
Description	Appears if the cumulative value of the electronic thermal O/L relay reaches or exceeds 85% of the preset level of Pr.9 Electronic thermal O/L relay. If the value reaches 100% of Pr.9 setting, motor overload trip (E.THM) occurs.			
Check point	• Check for large load or sudden acceleration. • Check that the Pr.9 setting is appropriate.			
Corrective action	• Reduce the load and frequency of operation. • Set an appropriate value in Pr.9.			

Operation panel indication	PS	PS	FR-LU08	PS
Name	PU stop			
Description	• The motor is stopped using **STOP/RESET** under the mode other than the PU operation mode. To enable **STOP/RESET** under the mode other than the PU operation mode, set Pr.75 Reset selection/disconnected PU detection/PU stop selection. • The motor is stopped by the emergency stop function.			
Check point	• Check for a stop made by pressing **STOP/RESET** of the operation panel. • Check for whether the X92 signal is OFF.			
Corrective action	• Turn the start signal OFF and release with **PU/EXT**. • Turn ON the X92 signal and OFF the start signal for release.			

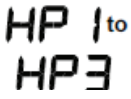
Operation panel indication	SL	SL	FR-LU08	SL
Name	Speed limit indication			
Description	Output if the speed limit level is exceeded during torque control.			
Check point	• Check that the torque command is not larger than required. • Check if the speed limit level is set too low.			
Corrective action	• Decrease the torque command value. • Increase the speed limit level.			

Operation panel indication	CP		FR-LU08	CP
Name	Parameter copy			
Description	Appears when parameter copy is performed between inverters FR-A820-03160(55K) or lower, FR-A840-			
	01800(55K) or lower, FR-A820-03800(75K) or higher and FR-A840-02160(75K) or higher			
Check point	Resetting of Pr.9, Pr.30, Pr.51, Pr.56, Pr.57, Pr.61, Pr.70, Pr.72, Pr.80, Pr.82, Pr.90 to Pr.94, Pr.453, Pr.455, Pr.458 to Pr.462, Pr.557, Pr.859, Pr.860 and Pr.893 is necessary.			
Corrective action	Set the initial value in Pr.989 Parameter copy alarm release.			

Operation panel indication	SA		FR-LU08	—
Name	Safety stop			
Description	Appears when safety stop function is activated (during output shutoff).			
Check point	• Check if an emergency stop device is activated. • Check if the wire between S1 and PC or between S2 and PC is open.			
Corrective action	• An emergency stop device is active when using the safety stop function. Identify the cause of emergency stop, ensure the safety and restart the system. • If **SA** is indicated when wires across S1 and SIC and across S2 and SIC are both conducted while using the safety stop function (drive enabled), internal failure might be the cause. Check the wiring of terminals S1, S2 and SIC and contact your sales representative if the wiring has no fault.			

Operation panel indication	MT1 to MT3		FR-LU08	MT1 to MT3
Name	Maintenance signal output 1 to 3			
Description	Appears when the inverter's cumulative energization time reaches or exceeds the parameter set value. Set the time until the MT is displayed using Pr.504 Maintenance timer 1 warning output set time (MT1), Pr.687 Maintenance timer 2 warning output set time (MT2), and Pr.689 Maintenance timer 3 warning output set time (MT3). MT does not appear when the settings of Pr.504, Pr.687, and Pr.689 are initial values (9999).			
Check point	The set time of maintenance timer has been exceeded. (Refer to page 297.)			
Corrective action	Take appropriate countermeasures according to the purpose of the maintenance timer setting. Setting "0" in Pr.503 Maintenance timer 1, Pr.686 Maintenance timer 2, and Pr.688 Maintenance timer 3 clears the indication.			

Operation panel indication	UF		FR-LU08	UF
Name	USB host error			
Description	Appears when an excessive current flows into the USB A connector.			
Check point	Check if a USB device other than a USB memory device is connected to the USB A connector.			
Corrective action	• If a device other than a USB memory device is connected to the USB A connector, remove the device. • Setting Pr.1049 USB host reset = "1" or inverter reset clears the UF indication.			

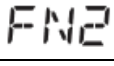
Operation panel indication	HP1 to HP3		FR-LU08	HP1 to HP3
Name	Home position return error			
Description	Appears when an error occurs during the home position return operation under position control.			
Check point	Identify the cause of the error occurrence.			
Corrective action	Check the parameter setting, and check that the input signal is correct.			

Operation panel indication	EV		FR-LU08	—
Name	24 V external power supply operation			
Description	Flickers when the main circuit power supply is off and the 24 V external power supply is being input.			
Check point	Power is supplied from a 24 V external power supply.			
Corrective action	• Turning ON the power supply (main circuit) of the inverter clears the indication. • If the indication is still displayed after turning ON of the power supply (main circuit) of the inverter, the power supply voltage may be low, or the jumper between the terminals P/+ and P1 may be disconnected.			

Alarm

Output is not shut off when a protective function activates. An alarm can also be output with a parameter setting. (Set "98" in Pr.190 to Pr.196 (output terminal function selection).

Operation panel indication	FN		FR-LU08	FN
Name	Fan alarm			
Description	For the inverter that contains a cooling fan, FN appears on the operation panel when the cooling fan stops due to a fault, low rotation speed or different operation from the setting of Pr.244 Cooling fan operation selection.			
Check point	Check the cooling fan for a failure.			
Corrective action	The fan may be faulty. Please contact your sales representative.			

Operation panel indication	FN2		FR-LU08	FN2
Name	Internal fan alarm (IP55 compatible models only)			
Description	FN2 appears on the operation panel when the internal air circulation fan stops due to a fault or low rotation speed.			
Check point	Check the internal air circulation fan for a failure.			
Corrective action	The fan may be faulty. Please contact your sales representative.			

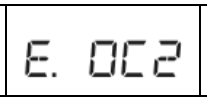
Fault

When a protective function activates, the inverter trips and a fault signal is output.

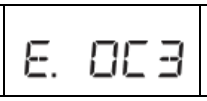
Operation panel indication	E.OC1	E. OC 1	FR-LU08	OC During Acc
Name	Overcurrent trip during acceleration			
Description	When the inverter output current reaches or exceeds approximately 235%[a] of the rated current during acceleration, the protection circuit is activated and the inverter trips.			
Check point	• Check for sudden speed acceleration. • Check for output short-circuit. • Check if the stall prevention operation level is set too high. Check if the fast-response current limit operation is disabled. • Check that the regenerative driving is not performed frequently. (Check if the output voltage becomes larger than the V/F reference voltage at regenerative driving and overcurrent occurs due to increase in the motor current.) • Check that the power supply for RS-485 terminal is not shorted (under vector control). • Check that the encoder wiring and the specifications (encoder power supply, resolution, differential/complementary) are correct. Check also that the motor wiring (U, V, W) is correct (under vector control). • Check that the rotation direction is not switched from forward to reverse rotation (or from reverse to forward) during torque control under Real sensorless vector control. • • Check that the inverter capacity matches with the motor capacity. (PM sensorless vector control) • Check if a start command is given to the inverter while the motor is coasting. (PM sensorless vector control)			
Corrective action	• If "E.OC1" always appears at start, disconnect the motor once and restart the inverter. If "E.OC1" still appears, contact your sales representative. • Check the wiring to make sure that output short circuit does not occur. • Set the base voltage (rated voltage of the motor, etc.) in Pr.19 Base frequency voltage. • Check RS-485 terminal connection (under vector control). • Prevent the motor from switching the rotation direction from forward to reverse (or from reverse to forward) • during torque control under Real sensorless vector control. • Choose inverter and motor capacities that match. (PM sensorless vector control) • Input a start command after the motor stops. Alternatively, use the automatic restart after instantaneous power failure/flying start function. (IPM sensorless vector control)			

[a] Differs according to ratings. The rating can be changed using Pr.570 Multiple rating setting..148% for SLD rate, 170% for LD rating, 235% for ND rating (initial setting), and 280% for HD rating.

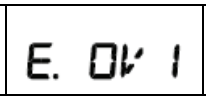
Operation panel indication	E.OC2	E. OC2	FR-LU08	Stedy Spd OC
Name	Overcurrent trip during constant speed			
Description	When the inverter output current reaches or exceeds approximately 235%[a] of the rated current during constant-speed operation, the protection circuit is activated and the inverter trips.			

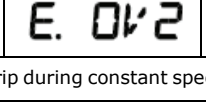
Operation panel indication	E.OC2		FR-LU08	Stedy Spd OC
Check point	• Check for sudden load change. • Check for output short-circuit. • Check if the stall prevention operation level is set too high. Check if the fast-response current limit operation is disabled. • Check that the power supply for RS-485 terminal is not shorted (under vector control). • Check that the rotation direction is not switched from forward to reverse rotation (or from reverse to forward) during torque control under Real sensorless vector control. • • Check that the inverter capacity matches with the motor capacity. (PM sensorless vector control) • Check if a start command is given to the inverter while the motor is coasting. (PM sensorless vector control)			
Corrective action	• Keep the load stable. • Check the wiring to make sure that output short circuit does not occur. • Lower the stall prevention operation level. Activate the fast-response current limit operation. • Check RS-485 terminal connection (under vector control). • Prevent the motor from switching the rotation direction from forward to reverse (or from reverse to forward) • during torque control under Real sensorless vector control. • Choose inverter and motor capacities that match. (PM sensorless vector control) • Input a start command after the motor stops. Alternatively, use the automatic restart after instantaneous power failure/flying start function. (PM sensorless vector control)			

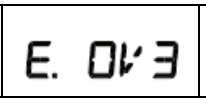
(a) Differs according to ratings. The rating can be changed using Pr.570 Multiple rating setting. 148% for SLD rating, 170% for LD rating, 235% for ND rating (initial setting), and 280% for HD rating.

Operation panel indication	E.OC3		FR-LU08	OC During Dec
Name	Overcurrent trip during deceleration or stop			
Description	When the inverter output current reaches or exceeds approximately 235%(a) of the rated current during deceleration (other than acceleration or constant speed), the protection circuit is activated and the inverter trips.			
Check point	• Check for sudden speed reduction. • Check for output short-circuit. • Check for too fast operation of the motor's mechanical brake. • Check if the stall prevention operation level is set too high. Check if the fast-response current limit operation is disabled. • Check that the power supply for RS-485 terminal is not shorted (under vector control). • Check that the rotation direction is not switched from forward to reverse rotation (or from reverse to forward) during torque control under Real sensorless vector control. • Check that the inverter capacity matches with the motor capacity. (PM sensorless vector control) • Check if a start command is given to the inverter while the motor is coasting. (PM sensorless vector control)			
Corrective action	• Set the deceleration time longer. • Check the wiring to make sure that output short circuit does not occur. • Check the mechanical brake operation. • Lower the stall prevention operation level. Activate the fast-response current limit operation. • • Check RS-485 terminal connection (under vector control). • Prevent the motor from switching the rotation direction from forward to reverse (or from reverse to forward) • during torque control under Real sensorless vector control. • Choose inverter and motor capacities that match. (PM sensorless vector control) • Input a start command after the motor stops. Alternatively, use the automatic restart after instantaneous power failure/flying start function. (PM sensorless vector control)			

(a) Differs according to ratings. The rating can be changed using Pr.570 Multiple rating setting. 148% for SLD rating, 170% for LD rating, 235% for ND rating (initial setting), and 280% for HD rating.

Operation panel indication	**E.OV1**		**FR-LU08**	**OV During Acc**
Name	Regenerative overvoltage trip during acceleration			
Description	If regenerative power causes the inverter's internal main circuit DC voltage to reach or exceed the specified value, the protection circuit is activated to stop the inverter output. The circuit may also be activated by a surge voltage produced in the power supply system.			
Check point	• Check for too slow acceleration. • Check that the Pr.22 Stall prevention operation level is not set correctly. • Check if the stall prevention operation is frequently activated in an application with a large load inertia.			
Corrective action	• Set the acceleration time shorter. • Set Pr.154 Voltage reduction selection during stall prevention operation = "10, 11".			

Operation panel indication	**E.OV2**		**FR-LU08**	**Stedy Spd OV**
Name	Regenerative overvoltage trip during constant speed			
Description	If regenerative power causes the inverter's internal main circuit DC voltage to reach or exceed the specified value, the protection circuit is activated to stop the inverter output. The circuit may also be activated by a surge voltage produced in the power supply system.			
Check point	• Check for sudden load change. • Check that the Pr.22 Stall prevention operation level is not set correctly. • Check if the stall prevention operation is frequently activated in an application with a large load inertia. • Check that acceleration/deceleration time is not too short.			
Corrective action	• Keep the load stable. • Set a value larger than the no load current in Pr.22. • Set Pr.154 Voltage reduction selection during stall prevention operation = "10, 11". • Set the acceleration/deceleration time longer. (Under vector control or Advanced magnetic flux vector control, the output torque can be increased. However, sudden acceleration may cause an overshoot in speed, resulting in an occurrence of overvoltage.)			

Operation panel indication	**E.OV3**		**FR-LU08**	**OV During Dec**
Name	Regenerative overvoltage trip during deceleration or stop			
Description	If regenerative power causes the inverter's internal main circuit DC voltage to reach or exceed the specified value, the protection circuit is activated to stop the inverter output. The circuit may also be activated by a surge voltage produced in the power supply system.			
Check point	• Check for sudden speed reduction. • Check if the stall prevention operation is frequently activated in an application with a large load inertia.			
Corrective action	• Set the deceleration time longer. (Set the deceleration time which matches the moment of inertia of the load.) • Use the regeneration avoidance function (Pr.882 to Pr.886). • Set Pr.154 Voltage reduction selection during stall prevention operation = "10, 11". •			

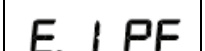
Operation panel indication	E.THT	E. THT	FR-LU08	Inv. Overload
Name	Inverter overload trip[a]			
Description	When the temperature of the output transistor element exceeds the protection level while a current flows at the rated output current level or higher without causing an overcurrent trip (E.OC[]), the inverter output is stopped. (Permissible overload capacity 150% 60 s).			
Check point	• Check that acceleration/deceleration time is not too short. • Check that torque boost setting is not too large (small). • Check that load pattern selection setting is appropriate for the load pattern of the using machine. • Check the motor for the use under overload. • Check that the encoder wiring and the specifications (encoder power supply, resolution, differential/ • complementary) are correct. Check also that the motor wiring (U, V, W) is correct (under vector control).			
Corrective action	• Set the acceleration/deceleration time longer. • Adjust the torque boost setting. • Set the load pattern selection setting according to the load pattern of the using machine. • Reduce the load. • Check the wiring and specifications of the encoder and the motor. Perform the setting according to the specifications of the encoder and the motor (under vector control).			

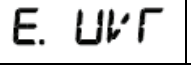
[a] Resetting the inverter initializes the internal cumulative heat value of the electronic thermal O/L relay function.

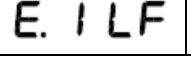
Operation panel indication	E.THM	E. THM	FR-LU08	Motor Ovrload
Name	Motor overload trip[a]			
Description	The electronic thermal O/L relay function in the inverter detects motor overheat, which is caused by overload or reduced cooling capability during low-speed operation. When the cumulative heat value reaches 85% of the Pr.9 Electronic thermal O/L relay setting, pre-alarm (TH) is output. When the accumulated value reaches the specified value, the protection circuit is activated to stop the inverter output.			
Check point	• Check the motor for the use under overload. • Check that the setting of Pr.71 Applied motor for motor selection is correct. • Check that the stall prevention operation setting is correct.			
Corrective action	• Reduce the load. • For a constant-torque motor, set the constant-torque motor in Pr.71. • Set the stall prevention operation level accordingly.			

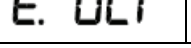
[a] Resetting the inverter initializes the internal cumulative heat value of the electronic thermal O/L relay function.

Operation panel indication	E.FIN	E. FIN	FR-LU08	H/Sink O/Temp
Name	Heatsink overheat			
Description	When the heatsink overheats, the temperature sensor activates, and the inverter output is stopped. The FIN signal can be output when the temperature becomes approximately 85% of the heatsink overheat protection operation temperature.			
Check point	• Check for too high surrounding air temperature. • Check for heatsink clogging. • Check that the cooling fan is not stopped. (Check that FN is not displayed on the operation panel.)			
Corrective action	• Set the surrounding air temperature to within the specifications. • Clean the heatsink. • Replace the cooling fan.			

Operation panel indication	E.IPF		FR-LU08	Inst. Pwr. Loss
Name	Instantaneous power failure (Standard models and IP55 compatible models only)			
Description	If a power failure occurs for longer than 15 ms∗6 (this also applies to inverter input shut-off), the instantaneous power failure protective function is activated to trip the inverter in order to prevent the control circuit from malfunctioning. If a power failure persists for 100 ms or longer, the fault warning output is not provided, and the inverter restarts if the start signal is ON upon power restoration. (The inverter continues operating if an instantaneous power failure is within 15 ms∗6.) In some operating status (load magnitude, acceleration/ deceleration time setting, etc.), overcurrent or other protection may be activated upon power restoration. When instantaneous power failure protection is activated, the IPF signal is output. 552.)			
Check point	Find the cause of instantaneous power failure occurrence.			
Corrective action	• Remedy the instantaneous power failure. • Prepare a backup power supply for instantaneous power failure. • Set the function of automatic restart after instantaneous power failure (Pr. 57).			

Operation panel indication	E.UVT		FR-LU08	Under Voltage
Name	Undervoltage (Standard models and IP55 compatible models only)			
Description	If the power supply voltage of the inverter decreases, the control circuit will not perform normal functions. In addition, the motor torque will be insufficient and/or heat generation will increase. To prevent this, if the power supply voltage decreases to about 150 VAC (300 VAC for the 400 V class) or below, this function shuts off the inverter output. When a jumper is not connected across P/+ and P1, the undervoltage protective function is activated. When undervoltage protection is activated, the IPF signal is output.			
Check point	• Check if a high-capacity motor is driven. • Check if the jumper is connected across terminals P/+ and P1.			
Corrective action	• Check the power supply system equipment such as the power supply. • Do not remove the jumper across terminals P/+ and P1 except when connecting a DC reactor. • If the problem still persists after taking the above measure, contact your sales representative.			

Operation panel indication	E.ILF		FR-LU08	Input phase loss
Name	Input phase loss (Standard models and IP55 compatible models only)			
Description	When Pr.872 Input phase loss protection selection is enabled ("1") and one of the three-phase power input is lost, the inverter output is shut off. This protective function is not available when Pr.872 is set to the initial value (Pr.872 = "0").			
Check point	Check for a break in the cable for the three-phase power supply input.			
Corrective action	• Wire the cables properly. • Repair a break portion in the cable.			

Operation panel indication	E.OLT		FR-LU08	Stll Prev STP
Name	Stall prevention stop			
Description	If the output frequency has fallen to 0.5 Hz by stall prevention operation and remains for 3 s, a fault (E.OLT) appears and the inverter trips. OL appears while stall prevention is being activated. When speed control is performed, a fault (E.OLT) appears and the inverter trips if frequency drops to the Pr.865 Low speed detection (initial value is 1.5 Hz) setting by torque limit operation and the output torque exceeds the Pr.874 OLT level setting (initial value is 150%) setting and remains 3 s.			

Operation panel indication	E.OLT	E. OLr	FR-LU08	Stll Prev STP
Check point	• Check the motor for the use under overload. • Check that the Pr.865 and Pr.874 values are correct. • (Check the Pr.22 Stall prevention operation level setting under V/F control and Advanced magnetic flux vector control.) • Check if a motor is connected under PM sensorless vector control.			
Corrective action	• Reduce the load. • Change the Pr.22, Pr.865, and Pr.874 values. (Check the Pr.22 setting under V/F control and Advanced magnetic flux vector control.) • For a test run without connecting a motor, select the PM sensorless vector control test operation. • Also check that the stall prevention (overcurrent) warning (OL) or the stall prevention (overvoltage) warning (oL) countermeasure is taken.			

Operation panel indication	E.SOT	E. SOr	FR-LU08	Motor Step Out
Name	Loss of synchronism detection			
Description	The inverter trips when the motor operation is not synchronized. (This function is only available under PM sensorless vector control.)			
Check point	• Check that the PM motor is not driven overloaded. • Check if a start command is given to the inverter while the PM motor is coasting. • Check if a motor is connected under PM sensorless vector control. • Check if a PM motor other than the MM-CF series is driven.			
Corrective action	• Reduce the load. • Check the connection of the IPM motor. • For a test run without connecting a motor, select the PM sensorless vector control test operation. •			

Operation panel indication	E.BE	E. bE	FR-LU08	Br. Cct. Fault
Name	Brake transistor alarm detection			
Description	The inverter trips if a fault due to damage of the brake transistor and such occurs in the brake circuit. In such a case, the power supply to the inverter must be shut off immediately. Appears when an internal circuit fault occurred for separated converter types and IP55 compatible models.			
Check point	• Reduce the load inertia. • Check that the brake duty is proper.			
Corrective action	Replace the inverter.			

Operation panel indication	E.GF	E. GF	FR-LU08	Ground Fault
Name	Output side earth (ground) fault overcurrent			
Description	The inverter trips if an earth (ground) fault overcurrent flows due to an earth (ground) fault that occurred on the inverter's output side (load side).			
Check point	Check for an earth (ground) fault in the motor and connection cable.			
Corrective action	Remedy the earth (ground) fault portion.			

Operation panel indication	E.LF	E. LF	FR-LU08	Output phase loss
Name	Output phase loss			
Description	The inverter trips if one of the three phases (U, V, W) on the inverter's output side (load side) is lost.			
Check point	• Check the wiring. (Check that the motor is normally operating.) • Check that the capacity of the motor used is not smaller than that of the inverter. • Check if a start command is given to the inverter while the motor is coasting. (PM sensorless vector control)			
Corrective action	• Wire the cables properly. • Input a start command after the motor stops. Alternatively, use the automatic restart after instantaneous power failure/ flying start function. (PM sensorless vector control)			

Operation panel indication	E.OHT	E. OHr	FR-LU08	OH Fault
Name	External thermal relay operation			
Description	The inverter trips if the external thermal relay provided for motor overheat protection or the internally mounted thermal relay in the motor, etc. switches ON (contacts open). This function is available when "7" (OH signal) is set in any of Pr.178 to Pr.189 (input terminal function selection). This protective function is not available in the initial status. (OH signal is not assigned.)			
Check point	• Check for motor overheating. • Check that the value "7" (OH signal) is set correctly to any of Pr.178 to Pr.189 (input terminal function selection).			
Corrective action	• Reduce the load and operation duty. • Even if the relay contacts are reset automatically, the inverter will not restart unless it is reset.			

Operation panel indication	E.PTC	E. PTC	FR-LU08	PTC activated
Name	PTC thermistor operation.			
Description	The inverter trips if resistance of the PTC thermistor connected between the terminal 2 and terminal 10 is equal to or higher than the Pr.561 PTC thermistor protection level setting for a continuous time equal to or longer than the setting value in Pr.1016 PTC thermistor protection detection time. When the initial value (Pr.561 = "9999") is set, this protective function is not available.			
Check point	• Check the connection with the PTC thermistor. • Check the Pr.561 and Pr.1016 settings. • Check the motor for operation under overload.			
Corrective action	Reduce the load.			

Operation panel indication	E.OPT	E. OPT	FR-LU08	Option Fault
Name	Option fault			
Description	• Appears when the AC power supply is connected to the terminal R/L1, S/L2, or T/L3 accidentally when a high power factor converter (FR-HC2) or power regeneration common converter (FR-CV) is connected (when Pr.30 Regenerative function selection = "2"). • Appears when torque command by the plug-in option is selected using Pr.804 Torque command source selection and no plug-in option is mounted. This function is available under torque control. • Appears when either one of a plug-in option (FR-A8AP or FR-A8APR) or a control terminal option (FR- A8TP) is not installed. • Appears when the switch for manufacturer setting of the plug-in option is changed. • Appears when a communication option is connected while Pr.296 Password lock level = "0 or 100".			

Operation panel indication	E.OPT	E. OPT	FR-LU08	Option Fault
Check point	• Check that the AC power supply is not connected to the terminal R/L1, S/L2, or T/L3 when a high power factor converter (FR-HC2) or power regeneration common converter (FR-CV) is connected (when Pr.30 = "2"). • Check that the plug-in option for torque command setting is connected. • Check that the plug-in option (FR-A8AP or FR-A8APR) and the control terminal option (FR-A8TP) are installed correctly. Check that the settings of Pr.393 Orientation selection and Pr.862 Encoder option selection are correct. • Check for the password lock with a setting of Pr.296 = "0, 100".			
Corrective action	• Check the Pr.30 setting and wiring. • The inverter may be damaged if the AC power supply is connected to the terminal R/L1, S/L2, or T/L3 when a high power factor converter is connected. Please contact your sales representative. • Check for connection of the plug-in option. Check the Pr.804 setting. • Install the plug-in option (FR-A8AP or FR-A8APR) and the control terminal option (FR-A8TP) are installed correctly. Set Pr.393 and Pr.862 correctly. • Set the switch on the plug-in option, which is for manufacturer setting, back to the initial setting. (Refer to the • Instruction Manual of each option.) • To apply the password lock when installing a communication option, set Pr.296 ≠ "0, 100".			

Operation panel indication	E.OP1 to E.OP3	E. OP1 to E. OP3	FR-LU08	Option1 Fault to Option3 Fault
Name	Communication option fault			
Description	• The inverter trips if a communication line error occurs in the communication option. • This function stops the inverter output when a communication line error occurs on the CC-Link IE Field • Network communication circuit board of the FR-A800-GF. • When the FR-A8APR is installed to the inverter and a motor with a resolver is used, the inverter trips if the • FR-A8APR fails or the wiring of the resolver is not properly connected.			
Check point	• Check for an incorrect option function setting and operation. • Check that the plug-in option is plugged into the connector properly. • For the FR-A800-GF, check that the CC-Link IE Field Network communication circuit board is securely installed to the connector of the inverter control circuit board. • Check for a break in the communication cable. • Check that the terminating resistor is fitted properly. • Check that the wiring of the resolver is correct. (When the FR-A8APR is used)			
Corrective action	• Check the option function setting, etc. • Connect the plug-in option securely. • Connect the CC-Link IE Field Network communication circuit board of the FR-A800-GF securely. • Check the connection of communication cable. • Check the wiring of the resolver. (When the FR-A8APR is used) • If the fault occurs again when the inverter is reset, contact your sales representative.			

Operation panel indication	E.16 to E.20	E. 16 to E. 20	FR-LU08	Fault 16 to Fault 20
Name	User definition error by the PLC function			
Description	The protective function is activated by setting "16 to 20" in the special register SD1214 for the PLC function. The inverter trips when the protective function is activated. The protective function is activated when the PLC function is enabled. This protective function is not available in the initial setting (Pr.414 = "0"). Any character string can be displayed on FR-LU08 or FR-PU07 by sequence programs.			

Operation panel indication	E.16 to E.20	E. 16 to E. 20	FR-LU08	Fault 16 to Fault 20
Check point	Check if "16 to 20" is set in the special register SD1214.			
Corrective action	Set a value other than "16 to 20" in the special register SD1214.			

Operation panel indication	E.PE	E. PE	FR-LU08	Corrupt Memory
Name	Parameter storage device fault (control circuit board)			
Description	The inverter trips if a fault occurs in the parameter stored. (EEPROM failure)			
Check point	Check for too many number of parameter write times.			
Corrective action	Please contact your sales representative. Set "1" in Pr.342 Communication EEPROM write selection(write to RAM) for the operation which requires frequent parameter writing via communication, etc. Note that writing to RAM goes back to the initial status at power OFF.			

Operation panel indication	E.PUE	E. PUE	FR-LU08	PU Leave Out
Name	PU disconnection			
Description	• The inverter trips if communication between the inverter and PU is suspended, e.g. the operation panel or parameter unit is disconnected, when the disconnected PU disconnection function is valid in Pr.75 Reset selection/disconnected PU detection/PU stop selection . • The inverter trips if communication errors occurred consecutively for more than permissible number of retries when Pr.121 Number of PU communication retries ≠ "9999" during the RS-485 communication. • The inverter trips if communication is broken within the period of time set in Pr.122 PU communication check time interval during the RS-485 communication via the PU connector.			
Check point	• Check that the operation panel or the parameter unit is connected properly. • Check the Pr.75 setting.			
Corrective action	Fit the operation panel or the parameter unit securely.			

Operation panel indication	E.RET	E. RET	FR-LU08	Retry No Over
Name	Retry count excess			
Description	The inverter trips if the operation cannot be resumed properly within the number of retries set in Pr.67 Number of retries at fault occurrence.			
Check point	Find the cause of the fault occurrence.			
Corrective action	Eliminate the cause of the error preceding this error indication.			

Operation panel indication	E.PE2	E. PE2	FR-LU08	PR Storage Alarm
Name	Parameter storage device faultParameter storage device fault (main circuit board)			
Description	The inverter trips if a fault occurs in the parameter stored. (EEPROM failure)			
Check point	— — —			
Corrective action	Please contact your sales representative.			

Operation panel indication	E.CPU	E. CPU	FR-LU08	CPU Fault
	E.5	E. 5		Fault 5
	E.6	E. 6		Fault 6
	E.7	E. 7		Fault 7
Name	CPU fault			
Description	The inverter trips if the communication fault of the built-in CPU occurs.			
Check point	Check for devices producing excess electrical noises around the inverter.			
Corrective action	• Take measures against noises if there are devices producing excess electrical noises around the inverter. • Please contact your sales representative.			

Operation panel indication	E.CTE	E. CTE	FR-LU08	Circuit fault
Name	Operation panel power supply short circuit/RS-485 terminals power supply short circuit			
Description	• When the power supply for the operation panel (PU connector) is shorted, the power output is shutoff and the inverter trips. The use of the operation panel (parameter unit) and the RS-485 communication via the PU connector are disabled. To reset, enter the RES signal from the terminal, reset via communication through the RS-485 terminals, or switch power OFF then ON again. • When the power supply for the RS-485 terminals are short circuited, this function shuts off the power output. • At this time, communication from the RS-485 terminals cannot be made. To reset, use **Stop/Reset** of the operation panel, enter the RES signal, or switch power OFF then ON again.			
Check point	• Check that the PU connector cable is not shorted. • Check that the RS-485 terminals are connected correctly.			
Corrective action	• Check PU and the cable. • Check the connection of the RS-485 terminals.			

Operation panel indication	E.P24	E. P24	FR-LU08	24 VDC power fault
Name	24 VDC power fault			
Description	When the 24 VDC power output from the PC terminal is shorted, this function shuts off the power output. At this time, all external contact inputs switch OFF. The inverter cannot be reset by entering the RES signal. To reset it, use the operation panel, or switch power OFF, then ON again.			
Check point	• Check for a short circuit in the PC terminal output. • Check that the 24 V external power supply voltage is correct.			
Corrective action	• Repair the short-circuited portion. • Supply the power at 24 V. (If the power at insufficient voltage is supplied to the 24V input circuit for a long time, the inverter internal circuit may heat up. Input power at correct voltage although it will not damage the inverter.)			

Operation panel indication	E.CDO	E. CdO	FR-LU08	OC detect level
Name	Abnormal output current detection			
Description	The inverter trips if the output current exceeds the Pr.150 Output current detection level setting. This functions is available when Pr.167 Output current detection operation selection is set to "1". When the initial value (Pr.167 = "0") is set, this protective function is not available.			

Operation panel indication	E.CDO	E. CdO	FR-LU08	OC detect level
Check point	Check the settings of Pr.150, Pr.151 Output current detection signal delay time, Pr.166 Output current detection signal retention time, and Pr.167.			

Operation panel indication	E.IOH	E. 1OH	FR-LU08	Inrush overheat
Name	Inrush current limit circuit fault (Standard models and IP55 compatible models only)			
Description	The inverter trips when the resistor of the inrush current limit circuit is overheated. The inrush current limit circuit failure			
Check point	• Check that frequent power ON/OFF is not repeated. • Check if the input side fuse (5A) in the power supply circuit of the inrush current limit circuit contactor (FR- A840-03250 (110K) or higher) is blown. • Check that the power supply circuit of inrush current limit circuit contactor is not damaged.			
Corrective action	Configure a circuit where frequent power ON/OFF is not repeated. If the situation does not improve after taking the above measure, please contact your sales representative.			

Operation panel indication	E.SER	E. SER	FR-LU08	VFD Comm error
Name	Communication fault (inverter)			
Description	The inverter trips when communication error occurs consecutively for the permissible number of retries or more when Pr.335 RS-485 communication retry count ≠ "9999" during RS-485 communication from the RS-485 terminals. The inverter also trips if communication is broken for the period of time set in Pr.336 RS-485 communication check time interval.			
Check point	Check the RS-485 terminal wiring.			
Corrective action	Perform wiring of the RS-485 terminals properly.			

Operation panel indication	E. AIE	E. AI E	FR-LU08	Analog in error
Name	Analog input fault			
Description	The inverter trips when a 30 mA or higher current or a 7.5 V or higher voltage is input to terminal 2 while the current input is selected by Pr.73 Analog input selection, or to terminal 4 while the current input is selected by Pr.267 Terminal 4 input selection.			
Check point	Check the Pr.73, Pr.267, and the voltage/current input switch settings.			
Corrective action	Either give a current less than 30 mA, or set Pr.73, Pr.267, and the voltage/current input switch to the voltage input and input a voltage.			

Operation panel indication	E.USB	E. USb	FR-LU08	USB comm error
Name	USB communication fault			
Description	The inverter trips when the communication is cut off for the time set in Pr.548 USB communication check time interval.			
Check point	Check that the USB communication cable is connected securely.			
Corrective action	• Check the Pr.548 setting. • Connect the USB communication cable securely. • Increase the Pr.548 setting or set "9999."			

Operation panel indication	E.SAF	E. SAF	FR-LU08	Safety circuit fault
Name	Safety circuit fault			
Description	• The inverter trips when a safety circuit fault occurs. • The inverter trips if the either of the wire between S1 and SIC or S2 and SIC becomes non-conductive while using the safety stop function. • When not using the safety stop function, the inverter trips when the shorting wire between terminals S1 and • PC or across S2 and PC is disconnected.			
Check point	• Check that the safety relay module or the connection has no fault when using the safety stop function. • Check if the shorting wire between S1 and PC or between S2 and PC is disconnected when not using the safety stop function.			
Corrective action	• When using the safety stop function, check that wiring of terminal S1, S2 and SIC is correct and the safety stop input signal source such as a safety relay module is operating properly. Refer to the Safety stop function instruction manual for causes and countermeasures. (Please contact your sales representative for the manual.) • When not using the safety stop function, short across terminals S1 and PC and across S2 and PC with • shorting wires.			

Operation panel indication	E.PBT	E. PbF	FR-LU08	PBT fault
	E.13	E. 13		Fault 13
Name	Internal circuit fault			
Description	The inverter trips when an internal circuit fault occurs.			
Corrective action	Please contact your sales representative.			

Operation panel indication	E.OS	E. 05	FR-LU08	Overspeed occurrence
Name	Overspeed occurrence			
Description	The inverter trips when the motor speed exceeds the Pr.374 Overspeed detection level under encoder feedback control, Real sensorless vector control, vector control, and PM sensorless vector control. This protective function is not available in the initial status.			
Check point	• Check that the Pr.374 setting is correct. • Check that the number of encoder pulses does not differ from the actual number of Pr.369 (Pr.851) Number of encoder pulses (under encoder feedback control or vector control).			
Corrective action	• Set the Pr.374 correctly. • Set the Pr.369 (Pr.851) correctly (under encoder feedback control or vector control).			

Operation panel indication	E.OSD Vector	E. 05d	FR-LU08	Sped deviation fault
Name	Speed deviation excess detection			
Description	• The inverter trips if the motor speed is increased or decreased under the influence of the load etc. during vector control with Pr.285 Speed deviation excess detection frequency set and cannot be controlled in accordance with the speed command value. • If the motor is accelerated against the stop command accidentally, the deceleration check function (Pr.690) • is activated to stop the inverter output.			

Operation panel indication	E.OSD Vector	E. OSd	FR-LU08	Sped deviation fault
Check point	• Check that the values of Pr.285 and Pr.853 Speed deviation time are correct. • Check for sudden load change. • Check that the number of encoder pulses does not differ from the actual number of Pr.369 (Pr.851) Number of encoder pulses.			
Corrective action	• Set Pr.285 and Pr.853 correctly. • Keep the load stable. • Set Pr.369 (Pr.851) correctly.			

Operation panel indication	E.ECT	E. ECr	FR-LU08	Encoder signal loss
Name	Signal loss detection			
Description	The inverter trips when the encoder signal is shut off under orientation control, encoder feedback control or vector control. This protective function is not available in the initial status.			
Check point	• Check for the encoder signal loss. • Check that the encoder specifications are correct. • Check for a loose connector. • Check that the switch setting of a vector control compatible option is correct. • Check that the power is supplied to the encoder. Alternatively, check that the power is not supplied to the encoder later than the inverter. • Check that the voltage of the power supplied to the encoder is the same as the encoder output voltage.			
Corrective action	• Remedy the signal loss. • Use an encoder that meets the specifications. • Make connection securely. • Make a switch setting of a vector control compatible option correctly. • Supply the power to the encoder. Or supply the power to the encoder at the same time when the power is supplied to the inverter. • If the power is supplied to the encoder after sent to the inverter, check that the encoder signal is properly sent and set "0 (initial value)" in Pr.376 Encoder signal loss detection enable/disable selection to disable signal loss detection. • Make the voltage of the power supplied to the encoder the same as the encoder output voltage.			

Operation panel indication	E.OD	E. Od	FR-LU08	Position fault
Name	Excessive position fault			
Description	The inverter trips when the difference between the position command and position feedback exceeds Pr.427 Excessive level error under position control.			
Check point	• Check that the position detecting encoder mounting orientation matches the parameter. • Check that the load is not large. • Check that the Pr.427, Pr.369 (Pr.851) Number of encoder pulses settings are correct.			
Corrective action	• Check the parameters. • Reduce the load. • Set Pr.427, Pr.369 (Pr.851) correctly.			

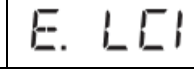
Operation panel indication	E.MB1 to 7	E. MB 1 to E. MB7	FR-LU08	E.MB1 Fault to E.MB7 Fault
Name	Brake sequence fault			
Description	The inverter trips when a sequence error occurs during use of the brake sequence function (Pr.278 to Pr.285). This protective function is not available in the initial status. (The brake sequence function is invalid.)			
Check point	Find the cause of the fault occurrence.			
Corrective action	Check the set parameters and perform wiring properly.			

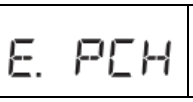
Operation panel indication	E.EP	E. EP	FR-LU08	Encoder wiring
Name	Encoder phase fault			
Description	The inverter trips when the rotation command of the inverter differs from the actual motor rotation direction detected from the encoder during offline auto tuning. This protective function is not available in the initial status.			
Check point	• Check for mis-wiring of the encoder cable. • Check if the Pr.359 (Pr.852) Encoder rotation direction setting is incorrect.			
Corrective action	• Perform connection and wiring securely. • Change the Pr.359 (Pr.852) setting.			

Operation panel indication	E.MP	E. MP	FR-LU08	— —
Name	Magnetic pole position unknown			
Description	The inverter trips when the rotation command of the inverter differs from the actual motor rotation direction detected from the encoder during offline auto tuning. This protective function is not available in the initial status.			
Check point	• Check for mis-wiring of the encoder cable. • Check if the Pr.359 Encoder rotation direction setting is incorrect.			
Corrective action	• Perform connection and wiring securely. • Change the Pr.359 setting.			

Operation panel indication	E.IAH	E. IAH	FR-LU08	Abnormal Intnl Temp
Name	Abnormal internal temperature (IP55 compatible models only)			
Description	The inverter trips when the inverter internal temperature reaches the specified value or higher.			
Check point	• Check for too high surrounding air temperature. • Check if the internal air circulation fan or the cooling fan stops due to a fault.			
Corrective action	• Install an inverter suitable for the installation environment. (Refer to the Instruction Manual (Hardware) of the FR-A806.) • Replace the internal air circulation fan or the cooling fan.			

Operation panel indication	E.LCI	E. LCI	FR-LU08	Lost mA Input
Name	4 mA input fault			
Description	The inverter trips when the analog input current is 2 mA or less for the time set in Pr.778 4 mA input check filter. This function is available when Pr.573 4 mA input check selection = "2 or 3". This function is not available in the initial status.			

Operation panel indication	E.LCI		FR-LU08	Lost mA Input
Check point	• Check for a break in the wiring for the analog current input. • Check that the Pr.778 setting is not too short.			
Corrective action	• Check the wiring for the analog current input. • Set the Pr.778 setting larger.			

Operation panel indication	E.PCH		FR-LU08	Precharge Error
Name	Pre-charge fault			
Description	• The inverter trips when the pre-charge time exceeds Pr.764 Pre-charge time limit. • The inverter trips when the measured value exceeds Pr.763 Pre-charge upper detection level during pre- charging. • This function is available when Pr.764 and Pr.763 are set. This protective function is not available in the initial status.			
Check point	• Check that the Pr.764 setting is not too short. • Check that the Pr.763 setting is not too small. • Check that the Pr.127 PID control automatic switchover frequency setting is not too low. • Check for a break in the connection to the pump			
Corrective action	• Set the Pr.764 setting longer. • Set the Pr.763 setting larger. • Set the Pr.127 setting higher. • Check the connection to the pump.			

Operation panel indication	E.PID		FR-LU08	PID Signal Error
Name	PID signal fault			
Description	The inverter trips if the measured value exceeds the PID upper limit or PID lower limit parameter setting, or the absolute deviation value exceeds the PID deviation parameter setting during PID control. Set this function in Pr.131 PID upper limit, Pr.132 PID lower limit, Pr.553 PID deviation limit, and Pr.554 PID signal operation selection. (Refer to page 519.) This protective function is not available in the initial status.			
Check point	• Check the meter for a failure or break. • Check that the parameter settings are correct.			
Corrective action	• Check that the meter has no failure or break. • Set the parameters correctly.			

Operation panel indication	E.1 to E.3		FR-LU08	Fault 1 to Fault 3
Name	Option fault			
Description	• The inverter trips when a contact fault is found between the inverter and the plug-in option, or when the communication option is not connected to the connector 1. • For the FR-A800-GF, the inverter output is shut off when a connector contact fault or the like occurs between the CC-Link IE Field Network communication circuit board and the inverter control circuit board. • Appears when the switch for manufacturer setting of the plug-in option is changed.			

Operation panel indication	E.1 to E.3		FR-LU08	Fault 1 to Fault 3
Check point	• Check that the plug-in option is plugged into the connector properly. (1 to 3 indicate connector numbers for connection of options.) • For the FR-A800-GF, check that the CC-Link IE Field Network communication circuit board is securely installed to the connector of the inverter control circuit board. • Check for excessive noise around the inverter. • Check if the communication option is connected to the connector 2 or 3.			
Corrective action	• Connect the plug-in option securely. • Connect the CC-Link IE Field Network communication circuit board of the FR-A800-GF securely. • Take measures against noises if there are devices producing excess electrical noises around the inverter. • If the situation does not improve after taking the above measure, please contact your sales representative. • Connect the communication option to the connector 1. • Set the switch on the plug-in option, which is for manufacturer setting, back to the initial setting. (Refer to the • Instruction Manual of each option.)			

Operation panel indication	E.11		FR-LU08	Fault 11
Name	Internal circuit fault			
Description	The speed may not decelerate during low speed operation if the rotation direction of the speed command and the estimated speed differ when the rotation is changing from forward to reverse or from reverse to forward during torque control under Real sensorless vector control. The inverter trips when overload occurs due to the un-switched rotation direction. This protective function is not available in the initial status (V/F control). (This function is only available under Real sensorless vector control.)			
Check point	Check that the rotation direction is not switched from forward to reverse rotation (or from reverse to forward) during torque control under Real sensorless vector control.			
Corrective action	• Prevent the motor from switching the rotation direction from forward to reverse (or from reverse to forward) • during torque control under Real sensorless vector control. • Please contact your sales representative.			

Notes:

- *If protective functions with indication of "Fault" are activated when using the FR-PU07, "ERR" appears in the faults history of FR-PU07.*
- *If faults other than the above appear, contact your sales representative.*

Cable Size for the Control Circuit Power Supply (Terminals R1/L11 and S1/ L21)

Terminal screw size: M4.

Cable gauge: 0.75 mm^2 to 2 mm^2.

Tightening torque: 1.5 N m

Check First When you Have Trouble

Note: *If the cause is still unknown after every check, it is recommended to initialize the parameters, set the required parameter values and check again.*

Motor does not Start

Check points	Possible cause	Countermeasure
Main circuit	Appropriate power supply voltage is not applied. (Operation panel display is not provided.)	Power on a molded case circuit breaker (MCCB), an earth leakage circuit breaker (ELB), or a magnetic contactor (MC).
		Check for the decreased input voltage, input phase loss, and wiring.
		If only the control power is ON when using a separate power source for the control circuit, turn ON the main circuit power.
	Motor is not connected properly.	Check the wiring between the inverter and the motor. If the electronic bypass function is active, check the wiring of the magnetic contactor (MC) between the inverter and the motor.
	The jumper across P/+ to P1 is disconnected. A DC reactor (FR-HEL) is not connected.	Securely fit a jumper across P/+ and P1. When using a DC reactor (FR-HEL), remove the jumper across P/+ to P1, and then connect the DC reactor. Connect the DC reactor securely when required according to the capacity.

Check points	Possible cause	Countermeasure
Input signal	Start signal is not input.	Check the start command source, and input a start signal. PU operation mode: **FWD/REV** External operation mode: STF/STR signal
	Both the forward and reverse rotation start signals (STF, STR) are input simultaneously.	Turn ON only one of the forward and reverse rotation start signals (STF or STR). When the STF and STR signals are turned ON simultaneously in the initial setting, a stop command is given.
	Frequency command is zero. (FWD or REV LED on the operation panel is flickering.)	Check the frequency command source and enter a frequency command.
	AU signal is not ON when terminal 4 is used for frequency setting. (FWD or REV LED on the operation panel is flickering.)	Turn ON the AU signal. Turning ON the AU signal activates terminal 4 input.
	Output stop signal (MRS) or reset signal (RES) is ON. (FWD or REV LED on the operation panel is flickering.)	Turn MRS or RES signal OFF. Inverter starts the operation with a given start command and a frequency command after turning OFF MRS or RES signal. Before turning OFF, ensure the safety.
	CS signal is OFF while the automatic restart after instantaneous power failure function is selected (Pr.57 Restart coasting time ¹ 9999). (FWD or REV LED on the operation panel is flickering.)	Turn ON the automatic restart after instantaneous power failure/flying start (CS) signal. When the CS signal is assigned to an input terminal, automatic restart operation is enabled when the CS signal is turned ON.
	Jumper connector of sink - source is incorrectly selected. (FWD or REV LED on the operation panel is flickering.)	Check that the control logic switchover jumper connector is correctly installed. If it is not installed correctly, input signal is not recognized.
	Wiring of encoder is incorrect. (Under encoder feedback control or vector control)	Check the wiring of encoder.
	Voltage/current input switch is not correctly set for analog input signal (0 to 5 V/0 to 10 V, 4 to 20 mA). (FWD or REV LED on the operation panel is flickering.)	Set Pr.73 Analog input selection, Pr.267 Terminal 4 input selection, and a voltage/current input switch correctly, then input an analog signal in accordance with the setting.
	STOP/RESET was pressed. (Operation panel indication is **PS**.	During the External operation mode, check the method of restarting from a **STOP/RESET** nput stop from PU.
	For the separated converter type, terminals RDA and SE of the converter unit are not connected to terminals MRS (X10 signal) and SD (PC for source logic) of the inverter respectively.	Check for the wiring.
	Two-wire or three-wire type connection is incorrect.	Check the wiring. Use the Start self-holding selection (STP (STOP)) signal when the three-wire type is used.

Check points	Possible cause	Countermeasure
	Under V/F control, Pr.0 Torque boost setting is improper.	Increase the Pr.0 setting by 0.5% increments while observing the rotation of a motor. If that makes no difference, decrease the setting.
	Pr.78 Reverse rotation prevention selection is set.	Check the Pr.78 setting. Set Pr.78 when you want to limit the motor rotation to only one direction.
	Pr.79 Operation mode selection setting is incorrect.	Select the operation mode which corresponds with input methods of start command and frequency command.
	Bias and gain (calibration parameters C2 to C7) settings are improper.	Check the bias and gain (calibration parameters C2 to C7) settings.
	Pr.13 Starting frequency setting is greater than the running frequency.	Set running frequency higher than Pr.13. The inverter does not start if the frequency setting signal is less than the value set in Pr.13.
	Frequency settings of various running frequency (such as multi-speed operation) are zero. Especially, Pr.1 Maximum frequency is zero.	Set the frequency command according to the application. Set Pr.1 higher than the actual frequency used.
	Pr.15 Jog frequency is lower than Pr.13 Starting frequency for JOG operation.	Set Pr.15 higher than Pr.13.
	The Pr.359 (Pr.852) Encoder rotation direction setting is incorrect under encoder feedback control or under vector control.	If the "REV" on the operation panel is lit even though the forward-rotation command is given, set Pr.359 (Pr.852) = "1".
	When a vector control option is used, the option to be used and parameter settings do not match.	Correctly set Pr.862 Encoder option selection according to the option to be used.
	Operation mode and a writing device do not correspond.	Check Pr.79 Operation mode selection, Pr.338 Communication operation command source, Pr.339 Communication speed command source, Pr.550 NET mode operation command source selection and Pr.551 PU mode operation command source selection, and select an operation mode suitable for the purpose.
	Start signal operation selection is set by Pr.250 Stop selection.	Check the Pr.250 setting and the connection of STF and STR signals.
	The motor has decelerated to a stop when power failure deceleration stop function is selected.	When power is restored, ensure the safety, and turn OFF the start signal once, then turn ON again to restart. When Pr.261 Power failure stop selection = "2 or 12", the motor automatically restarts after the power is restored.
	Performing auto tuning.	When offline auto tuning ends, press **STOP/RESET** of the operation panel for the PU operation. For the External operation, turn OFF the start signal (STF or STR). This operation resets the offline auto tuning, and the PU's monitor display returns to the normal indication. (Without this operation, next operation cannot be started.)
	The automatic restart after instantaneous power failure function or power failure stop function has been activated. (Performing overload operation during input phase loss may cause voltage insufficiency, and that may result in detection of power failure.)	Set Pr.872 Input phase loss protection selection ="1" (input phase failure protection active). Disable the automatic restart after instantaneous power failure function and power failure stop function. Reduce the load. Increase the acceleration time if the function was activated during acceleration.
	The motor test operation is selected under vector control or PM sensorless vector control.	Check the Pr.800 Control method selection setting.

Check points	Possible cause	Countermeasure
When the FR-HC2, FR-CV, or FR-CC2 is used, the input logic setting of the X10 signal is incorrect.	Set Pr.599="0" (initial value for standard models and IP55 compatible models) to use the X10 signal with the NO contact input specification, and Pr.599="1" (initial value for separated converter types) to use the X10 signal with the NC contact input specification.	
Load	Load is too heavy.	Reduce the load.
	Shaft is locked.	Inspect the machine (motor).

Motor or Machine is Making Abnormal Noise

Check points	Possible cause	Countermeasure
Input signal	Disturbance due to EMI when frequency or torque command is given from analog input (terminal 1, 2, 4).	Take countermeasures against EMI.
Parameter setting		Increase the Pr.74 Input filter time constant if steady operation cannot be performed due to EMI.
	No carrier frequency noises (metallic noises) are generated.	In the initial setting, Pr.240 Soft-PWM operation selection is enabled to change motor noise to an unoffending complex tone. Therefore, no carrier frequency noises (metallic noises) are generated. Set Pr.240 = "0" to disable this function.
	The motor noise increases due to activation of the carrier frequency automatic reduction function when the motor is driven overloaded.	Reduce the load.
		Disable the automatic reduction function by setting Pr.260 PWM frequency automatic switchover = "0".
	Resonance occurs. (output frequency)	Set Pr.31 to Pr.36, Pr.552 (Frequency jump). When it is desired to avoid resonance attributable to the natural frequency of a mechanical system, these parameters allow resonant frequencies to be jumped.
	Resonance occurs. (carrier frequency)	Change Pr.72 PWM frequency selection setting.
		Changing the PWM carrier frequency produces an effect on avoiding the resonance frequency of a mechanical system or a motor.
		Set a notch filter.
	Auto tuning is not performed under Advanced magnetic flux vector control, Real sensorless vector control, or vector control.	Perform offline auto tuning.
	Gain adjustment during PID control is insufficient.	To stabilize the measured value, change the proportional band (Pr.129) to a larger value, the integral time (Pr.130) to a slightly longer time, and the differential time (Pr.134) to a slightly shorter time.
		Check the calibration of set point and measured value.
	The gain is too high under Real sensorless vector control, vector control, or PM sensorless vector control.	During speed control, check the setting of Pr.820 Speed control P gain 2. During torque control, check the setting of Pr.824 Torque control P gain 2.
Others	Mechanical looseness	Adjust machine/equipment so that there is no mechanical looseness.
	Contact the motor manufacturer.	
Motor	Operating with output phase loss	Check the motor wiring.

Motor Generates Heat Abnormally

Check points	Possible cause	Countermeasure
Motor	Motor fan is not working (Dust is accumulated.)	Clean the motor fan. Improve the environment.
	Phase to phase insulation of the motor is insufficient.	Check the insulation of the motor.
Main circuit	The inverter output voltage (U, V, W) are unbalanced.	Check the output voltage of the inverter. Check the insulation of the motor.
Parameter setting	Pr.71 Applied motor setting is incorrect.	Check the Pr.71 Applied motor setting.
—	Motor current is large.	Refer to "6.6.11 Motor current is too large".

Motor Rotates in Opposite Direction

Check points	Possible cause	Countermeasure
Main circuit	Phase sequence of output terminals U, V and W is incorrect.	Connect phase sequence of the output cables (terminal U, V, W) to the motor correctly.
Input signal	The start signals (forward rotation, reverse rotation) are connected improperly.	Check the wiring. (STF: forward rotation, STR: reverse rotation)
	The polarity of the frequency command is negative during the polarity reversible operation set by Pr.73 Analog input selection.	Check the polarity of the frequency command.
Input signal	Torque command is negative during torque control under vector control.	Check the torque command value.
Parameter Setting		

Speed Greatly Differs from Setting

Check points	Possible cause	Countermeasure
Input signal	Frequency setting signal is incorrectly input.	Measure the input signal level.
	The input signal lines are affected by external EMI.	Take countermeasures against EMI, such as using shielded wires for input signal lines.
Parameter setting	Pr.1 Maximum frequency, Pr.2 Minimum frequency, Pr.18 High speed maximum frequency, and the calibration parameters C2 to C7 settings are improper.	Check the settings of Pr.1, Pr.2, and Pr.18.
		Check the calibration parameters C2 to C7 settings.
	Pr.31 to Pr.36, Pr.552 (frequency jump) settings are improper.	Narrow down the range of frequency jump.
Load	Stall prevention (torque limit) function is activated due to a heavy load.	Reduce the load weight.
Parameter setting		Set Pr.22 Stall prevention operation level (torque limit level) higher according to the load. (If Pr.22 is set too high, an overcurrent trip (E. OC[]) is likely to occur.)
Motor		Check the capacities of the inverter and the motor.

Acceleration/Deceleration is not Smooth

Check points	Possible cause	Countermeasure
Parameter setting	Acceleration/deceleration time is too short.	Increase the acceleration/deceleration time.
	Torque boost (Pr.0, Pr.46, Pr.112) setting is improper under V/F control, so the stall prevention function is activated.	Increase/decrease the Pr.0 Torque boost setting value by 0.5% increments so that stall prevention does not occur.
		Under V/F control, set Pr.3 Base frequency, Pr.47 Second V/
	The base frequency does not match the motor characteristics.	F (base frequency), and Pr.113 Third V/F (base frequency).
		Under vector control, set Pr.84 Rated motor frequency.
	Regeneration avoidance operation is performed	If the frequency becomes unstable during regeneration avoidance operation, decrease the setting of Pr.886 Regeneration avoidance voltage gain.
Load	Stall prevention (torque limit) function is activated due to a heavy load.	Reduce the load weight.
Parameter setting		Set Pr.22 Stall prevention operation level (torque limit level) higher according to the load. (If Pr.22 is set too high, an overcurrent trip (E. OC[]) is likely to occur.)
Motor		Check the capacities of the inverter and the motor.

Speed Varies During Operation

Under Advanced magnetic flux vector control, Real sensorless vector control, vector control, and encoder feedback control, the output frequency varies between 0 and 2 Hz as the load fluctuates. This is a normal operation and not a fault.

Check points	Possible cause	Countermeasure
Load	Load varies during an operation.	Select Advanced magnetic flux vector control, Real sensorless vector control, vector control, or encoder feedback control.
Input signal	Frequency setting signal is varying.	Check the frequency setting signal.
	The frequency setting signal is affected by EMI.	Set filter to the analog input terminal using Pr.74 Input filter time constant , Pr.822 Speed setting filter 1.
		Take countermeasures against EMI, such as using shielded wires for input signal lines.
	Malfunction is occurring due to the undesirable current generated when the transistor output unit is connected.	Use terminal PC (terminal SD when source logic) as a common terminal to prevent a malfunction caused by undesirable current.
	Multi-speed command signal is chattering.	Take countermeasures to suppress chattering.
	Feedback signal from the encoder is affected by EMI.	Place the encoder cable far from the EMI source such as main circuit and power supply voltage. Earth (ground) the shield of the encoder cable to the enclosure using a metal P-clip or U-clip.

Check points	Possible cause	Countermeasure
Parameter setting	Fluctuation of power supply voltage is too large.	Under V/F control, change the Pr.19 Base frequency voltage setting (approximately by 3%).
	Pr.80 Motor capacity and Pr.81 Number of motor poles are not appropriate for the motor capacity under Advanced magnetic flux vector control, Real sensorless vector control, vector control, or PM sensorless vector control.	Check the settings of Pr.80 and Pr.81.
	Wiring length exceeds 30 m when Advanced magnetic flux vector control, Real sensorless vector control, vector control, or PM sensorless vector control is selected.	Perform offline auto tuning.
	Under V/F control, wiring is too long and a voltage drop occurs.	In the low-speed range, set 0.5% in Pr.0 Torque boost.
		Change the control method to Advanced magnetic flux vector control or Real sensorless vector control.
	Hunting occurs by the generated vibration, for example, when structural rigidity at load side is insufficient.	Disable automatic control functions, such as the energy saving operation, fast-response current limit operation, torque limit, regeneration avoidance function, Advanced magnetic flux vector control, Real sensorless vector control, vector control, encoder feedback control, droop control, stall prevention, online auto tuning, notch filter, and orientation control. Under PID control, set smaller values to Pr.129 PID proportional band and Pr.130 PID integral time. Adjust so that the control gain decreases and the level of safety increases.
		Change Pr.72 PWM frequency selection setting.

Operation Mode is not Changed Properly

Check points	Possible cause	Countermeasure
Input signal	Start signal (STF or STR) is ON.	Check that the STF and STR signals are off. When either is ON, the operation mode cannot be changed.
Parameter setting	Pr.79 Operation mode selection setting is improper.	When the Pr.79 is set to "0 (initial value)", the operation mode is the External operation mode at power ON. To switch to the PU operation mode, press **PU/EXT** on the operation panel (press **PU** on the parameter unit (FR-PU07)). At other settings (1 to 4, 6, 7), the operation mode is limited accordingly.
	Operation mode and a writing device do not correspond.	Check Pr.79 Operation mode selection, Pr.338 Communication operation command source, Pr.339 Communication speed command source, Pr.550 NET mode operation command source selection and Pr.551 PU mode operation command source selection, and select an operation mode suitable for the purpose.

Operation Panel (FR-DU08) Display is not Operating

Check points	Possible cause	Countermeasure
Main circuit	Power is not input.	Input the power.
Control circuit		
Front cover	Operation panel is not properly connected to the inverter.	Check if the inverter front cover is installed securely.

Motor Current is too Large

Check points	Possible cause	Countermeasure
Parameter setting	Torque boost (Pr.0, Pr.46, Pr.112) setting is improper under V/F control, so the stall prevention function is activated.	Increase/decrease the Pr.0 Torque boost setting value by 0.5% increments so that stall prevention does not occur.
	V/F pattern is improper when V/F control is performed. (Pr.3, Pr.14, Pr.19)	Set rated frequency of the motor to Pr.3 Base frequency. Use Pr.19 Base frequency voltage to set the base voltage (for example, rated motor voltage).
		Change Pr.14 Load pattern selection according to the load characteristic.
	Stall prevention (torque limit) function is activated due to a heavy load.	Reduce the load weight.
		Set Pr.22 Stall prevention operation level (Torque limit level) higher according to the load. (If Pr.22 is set too high, an overcurrent trip (E. OC[]) is likely to occur.)
		Check the capacities of the inverter and the motor.
	Offline auto tuning is not performed under Advanced magnetic flux vector control, Real sensorless vector control, or vector control.	Perform offline auto tuning.
	When PM sensorless vector control is selected for an IPM motor other than MM-CF, and offline auto tuning is not performed.	Perform offline auto tuning for an IPM motor.

Speed does not Accelerate

Check points	Possible cause	Countermeasure
Input signal	Start command and frequency command are chattering.	Check if the start command and the frequency command are correct.
	The wiring length used for analog frequency command is too long, and it is causing a voltage (current) drop.	Perform Analog input bias/gain calibration.
	The input signal lines are affected by external EMI.	Take countermeasures against EMI, such as using shielded wires for input signal lines.
Parameter setting	Pr.1 Maximum frequency, Pr.2 Minimum frequency, Pr.18 High speed maximum frequency, and the calibration parameters C2 to C7 settings are improper.	Check the settings of Pr.1 and Pr.2 and set Pr.18.
		Check the calibration parameters C2 to C7 settings.
	The maximum voltage (current) input value is not set during the External operation. (Pr.125, Pr.126, Pr.18)	Check the settings of Pr.125 Terminal 2 frequency setting gain frequency and Pr.126 Terminal 4 frequency setting gain frequency. To operate at 120 Hz or higher, set Pr.18 High speed maximum frequency.
	Torque boost (Pr.0, Pr.46, Pr.112) setting is improper under V/F control, so the stall prevention function is activated.	Increase/decrease the Pr.0 Torque boost setting value by 0.5% increments so that stall prevention does not occur.
	V/F pattern is improper when V/F control is performed. (Pr.3, Pr.14, Pr.19)	Set rated frequency of the motor to Pr.3 Base frequency. Use Pr.19 Base frequency voltage to set the base voltage (for example, rated motor voltage).
		Change Pr.14 Load pattern selection according to the load characteristic.
	Stall prevention (torque limit) function is activated due to a heavy load.	Reduce the load weight.
		Set Pr.22 Stall prevention operation level (torque limit level) higher according to the load. (If Pr.22 is set too high, an overcurrent trip (E. OC[]) is likely to occur.)
		Check the capacities of the inverter and the motor.
	Auto tuning is not performed under Advanced magnetic flux vector control, Real sensorless vector control, or vector control.	Perform offline auto tuning.
	The setting of pulse train input is improper.	Check the specification of the pulse generator (open collector output or complementary output) and check the adjustment of the pulse train and frequency (Pr.385 Frequency for zero input pulse and Pr.386 Frequency for maximum input pulse).
	During PID control, output frequency is automatically controlled to make measured value = set point.	
Main circuit	Brake resistor is connected across terminals P/+ and P1 or across P1 and PR by mistake.	Connect an optional brake resistor (FR-ABR) across terminals P/+ and PR.

Unable to Write Parameter Setting

Check points	Possible cause	Countermeasure
Input signal	Operation is being performed (signal STF or STR is ON).	Stop the operation. When Pr.77 Parameter write selection = "0" (initial value), write is enabled only during a stop.
Parameter setting	You are attempting to set the parameter in the External operation mode.	Choose the PU operation mode. Or, set Pr.77 Parameter write selection = "2" to enable parameter write regardless of the operation mode.
	Parameter write is disabled by the Pr.77 Parameter write selection setting.	Check the Pr.77 setting.
	Key lock mode is enabled by the Pr.161 Frequency setting/key lock operation selection setting.	Check the Pr.161 setting.
	Operation mode and a writing device do not correspond.	Check Pr.79, Pr.338, Pr.339, Pr.550 and Pr.551, and select an operation mode suitable for the purpose.
	Pr.72 PWM frequency selection was attempted to be set to "25".Alternatively, PM sensorless vector control was attempted while Pr.72 = "25".	Pr.72 = "25" cannot be set under PM sensorless vector control. (A sine wave filter (MT-BSL/BSC) cannot be used under PM sensorless vector control.)

Power Lamp is not Lit

Check points	Possible Cause	Countermeasure
Main Circuit Control Circuit	Wiring or installation is improper.	Check for the wiring and the installation. Power lamp is lit when power is supplied to the control circuit (R1/L11, S1/L21).

Precautions for Maintenance and Inspection

The inverter is a static unit mainly consisting of semiconductor devices. Daily inspection must be performed to prevent any fault from occurring due to the adverse effects of the operating environment, such as temperature, humidity, dust, dirt and vibration, changes in the parts with time, service life, and other factors.

- Precautions for maintenance and inspection

  When accessing the inverter for inspection, wait for at least 10 minutes after the power supply has been switched OFF, and then make sure that the voltage across the main circuit terminals P/+ and N/- of the inverter is not more than 30 VDC using a tester, etc.

Inspection Item

Daily Inspection

Basically, check for the following faults during operation.

- Motor operation fault
- Improper installation environment
- Cooling system fault
- Abnormal vibration, abnormal noise
- Abnormal overheat, discoloration

Periodic Inspection

Check the areas inaccessible during operation and requiring periodic inspection.

Consult us for periodic inspection.

- Check and clean the cooling system. Clean the air filter, etc.
- Check the tightening and retighten. The screws and bolts may become loose due to vibration, temperature changes, etc. Check and tighten them. Tighten them according to the specified tightening torque.
- Check the conductors and insulating materials for corrosion and damage.
- Measure the insulation resistance.
- Check and change the cooling fan and relay.

Note: *When using the safety stop function, periodic inspection is required to confirm that safety function of the safety system operates correctly.*

Daily and Periodic Inspection

Area of inspection	Inspection item	Description	Inspection Interval		Corrective action at fault occurrence	Check by the user
			Daily	Periodic (a)		
General	Surrounding environment	Check the surrounding air temperature, humidity, dirt, corrosive gas, oil mist, etc.	O		Improve the environment.	
	Overall unit	Check for unusual vibration and noise.	O		Check fault location and retighten	
		Check for dirt, oil, and other foreign material.(b)	O		Clean.	
	Power supply voltage	Check that the main circuit voltages and control voltages are normal.(c)	O		Inspect the power supply.	

Area of inspection	Inspection item		Description	Inspection Interval		Corrective action at fault occurrence	Check by the user
				Daily	Periodic (a)		
Main circuit	General		(1) Check with megger (across main circuit terminals and earth (ground) terminal). (2) Check for loose screws and bolts. (3) Check for overheat traces on the parts. (4) Check for stain.		O O O O	Contact the manufacturer. Retighten. Contact the manufacturer. Clean.	
	Conductors, cables		(1) Check conductors for distortion.		O	Contact the manufacturer.	
			(2) Check cable sheaths for breakage and deterioration (crack, discoloration, etc.).		O	Contact the manufacturer.	
	Transformer/ reactor		Check for unusual odor and abnormal increase of whining sound.	O		Stop the equipment and contact the manufacturer.	
	Terminal block		Check for a damage.		O	Stop the equipment and contact the manufacturer.	
	Smoothing aluminum electrolytic capacitor		(1) Check for liquid leakage. (2) Check for safety valve projection and bulge. (3)Visual check and judge by the life check of the main circuit capacitor.		O O O	Contact the manufacturer.	
	Relay/contactor		Check that the operation is normal and no chattering sound is heard.		O	Contact the manufacturer.	
	Resistor		(1) Check for crack in resistor insulation.		O	Contact the manufacturer.	
			(2) Check for a break in the cable.		O	Contact the manufacturer.	
Control circuit, protective circuit	Operation check		(1)Check that the output voltages across phases are balanced while operating the inverter alone.		O	Contact the manufacturer.	
			(2)Check that no fault is found in protective and display circuits in a sequence protective operation test.		O	Contact the manufacturer.	
	Compo-nents check	Overall	(1) Check for unusual odor and discoloration. (2) Check for serious rust development.		O O	Stop the equipment and contact the manufacturer. Contact the manufacturer.	
		Alumi-num electro-lytic capaci-tor	(1) Check for liquid leakage in a capacitor and deformation trace. (2) Visual check and judge by the life check of the control circuit capacitor.		O O	Contact the manufacturer.	

Area of inspection	Inspection item	Description	Inspection Interval		Corrective action at fault occurrence	Check by the user
			Daily	Periodic (a)		
Cooling system	Cooling fan	(1) Check for unusual vibration and noise. (2) Check for loose screws and bolts. (3) Check for stain.	O	 O O	Replace the fan. Fix with the fan cover fixing screws Clean.	
	Heatsink	(1) Check for clogging. (2) Check for stain.		O O	Clean. Clean.	
Display	Indication	(1) Check that display is normal. (2) Check for stain.	O	O	Contact the manufacturer. Clean.	
	Meter	Check that reading is normal.	O		Stop the equipment and contact the manufacturer	
Load motor	Operation check	Check for vibration and abnormal increase in operation noise.	O		Stop the equipment and contact the manufacturer.	

(a) One to two years of periodic inspection cycle is recommended. However, it differs according to the installation environment. Consult us for periodic inspection.
(b) Oil component of the heat dissipation grease used inside the inverter may leak out. The oil component, however, is not flammable, corrosive, nor conductive and is not harmful to humans. Wipe off such oil component.
(c) It is recommended to install a voltage monitoring device for checking the voltage of the power supplied to the inverter.

Note: *Continuous use of a leaked, deformed, or degraded smoothing aluminum electrolytic capacitor (as shown in the table above) may lead to a burst, breakage or fire. Replace such a capacitor without delay.*

Checking the Inverter and Converter Modules

Preparation

Disconnect the external power supply cables (R/L1, S/L2, T/L3) and motor cables (U, V, W).

Prepare a tester. (For the resistance measurement, use the 100 Ω range.)

Checking Method

Change the polarity of the tester alternately at the inverter terminals R/L1, S/L2, T/L3, U, V, W, P/+, and N/- and check the electric continuity.

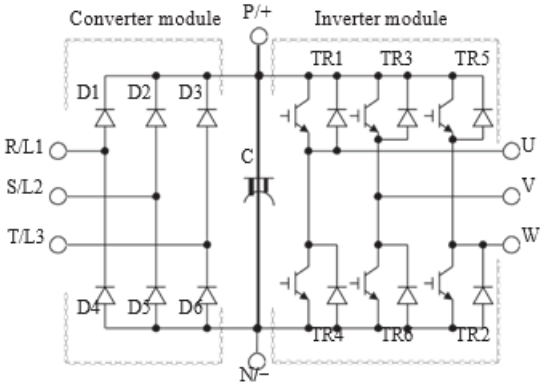
Notes:

- *Before measurement, check that the smoothing capacitor is discharged.*
- *At the time of electric discontinuity, the measured value is almost infinity. When there is an instantaneous electric continuity, due to the smoothing capacitor, the tester may not indicate infinity. At the time of electric continuity, the measured value is several Ω to several tens of Ω. If all measured values are almost the same, although these values are not constant depending on the module type and tester type, the modules are without fault.*

Module Device Numbers and Terminals to be Checked

		Tester polarity ⊕	Tester polarity ⊖	Result		Tester polarity ⊕	Tester polarity ⊖	Result
Converter module	D1	R/L1	P/+	Discontinuity	D4	R/L1	N/-	Continuity
		P/+	R/L1	Continuity		N/-	R/L1	Discontinuity
	D2	S/L2	P/+	Discontinuity	D5	S/L2	N/-	Continuity
		P/+	S/L2	Continuity		N/-	S/L2	Discontinuity
	D3	T/L3	P/+	Discontinuity	D6	T/L3	N/-	Continuity
		P/+	T/L3	Continuity		N/-	T/L3	Discontinuity
Inverter module	TR1	U	P/+	Discontinuity	TR4	U	N/-	Continuity
		P/+	U	Continuity		N/-	U	Discontinuity
	TR3	V	P/+	Discontinuity	TR6	V	N/-	Continuity
		P/+	V	Continuity		N/-	V	Discontinuity
	TR5	W	P/+	Discontinuity	TR2	W	N/-	Continuity
		P/+	W	Continuity		N/-	W	Discontinuity

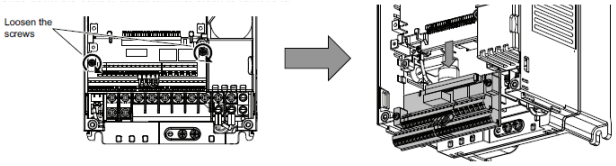
(Assumes the use of an analog meter.)



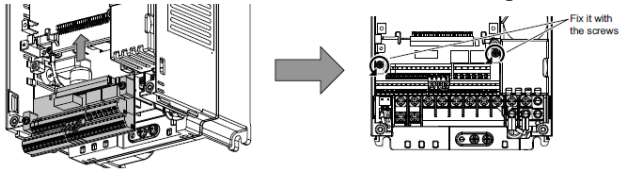
Inverter Replacement

The inverter can be replaced with the control circuit wiring kept connected. Before replacement, remove the wiring cover of the inverter.

1. Loosen the two mounting screws at the both side of the control circuit terminal block. (These screws cannot be removed.) Slide down the control circuit terminal block to remove it.



2. Be careful not to bend the pins of the inverter's control circuit connector, reinstall the control circuit terminal block and fix it with the mounting screws.



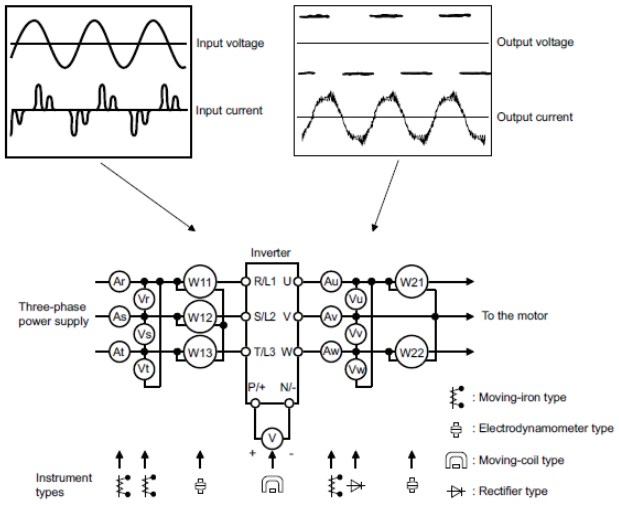
Note: *Before starting inverter replacement, switch power OFF, wait for at least 10 minutes, and then check the voltage with a tester and such to ensure safety.*

Measurement of Main Circuit Voltages, Currents and Powers

Since the voltages and currents on the inverter power supply and output sides include harmonics, measurement data depends on the instruments used and circuits measured. When instruments for commercial frequency are used for measurement, measure the following circuits with the instruments given on the next page.

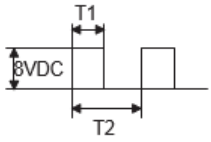
Note: *When installing meters etc. on the inverter output side When the inverter-to-motor wiring length is large, small-capacity models, the meters and CTs may generate heat due to line-to-line leakage current. Therefore, choose the equipment which has enough allowance for the current rating. To measure and display the output voltage and output current of the inverter, it is recommended to use the terminal AM and FM output functions of the inverter.*

Examples of Measuring Points and Instruments



Measuring Points and Instruments

Item	Measuring point	Measuring instrument	Remarks (reference measured value)
Power supply voltage V1	Across R/L1 and S/L2, S/L2 and T/L3, T/L3 and R/L1	Moving-iron type AC voltmeter[a]	Commercial power supply Within permissible AC voltage fluctuation
Power supply side current I1	R/L1, S/L2, T/L3 line current	Moving-iron type AC ammeter	
Power supply side power P1	R/L1, S/L2, T/L3 and Across R/L1 and S/L2, S/L2 and T/L3, T/L3 and R/L1	Digital power meter (for inverter) or electrodynamic type single-phase wattmeter	P1 = W11 + W12 + W13 (3-wattmeter method)
Power supply side power factor Pf1	Calculate after measuring power supply voltage, power supply side current and power supply side power. $Pf_1 = \frac{P_1}{\sqrt{3}V_1 \times I_1} \times 100\ \%$		
Output side voltage V2	Across U and V, V and W, and W and U	Rectifier type AC voltage meter[b] (moving-iron type cannot measure.)	Difference between the phases is within 1% of the maximum output voltage.
Output side current I2	U, V and W line currents	Moving-iron type AC ammeter[c]	Difference between the phases is 10% or lower of the inverter rated current.
Output side power P2	U, V, W and across U and V, V and W	Digital power meter (for inverter) or electrodynamic type single-phase wattmeter	P2 = W21 + W22 2-wattmeter method (or 3-wattmeter method)
Output side power factor Pf2	Calculate in similar manner to power supply side power factor. $Pf_2 = \frac{P_2}{\sqrt{3}V_2 \times I_2} \times 100\ \%$		
Converter output	Across P/+ and N/-	Moving-coil type (such as tester)	Inverter LED is lit. 1.35 ´ V1

Item	Measuring point	Measuring instrument	Remarks (reference measured value)	
Frequency setting signal	Across 2, 4(+) and 5	Moving-coil type (tester and such may be used.) (internal resistance 50 kΩ or more) Moving-coil type (such as tester)	0 to 10 VDC, 4 to 20 mA	"5" is common
	Across 1(+) and 5		0 to ±5 VDC and 0 to ±10 VDC	
Frequency setting power supply	Across 10(+) and 5		5.2 VDC	
	Across 10E(+) and 5		10 VDC	
Frequency meter signal	Across AM(+) and 5		Approximately 10 VDC at maximum frequency (without frequency meter)	
	Across CA(+) and 5			
	Across FM(+) and SD		Approximately 20 mADC at maximum frequency	
			Approximately 5 VDC at maximum frequency(without frequency meter)  Pulse width T1: Adjust with Pr.900. Pulse cycle T2: Set with Pr.55. (frequency monitor only)	"SD" is common
Start signal Select signal Reset signal Output stop signal	Across STF, STR, RH, RM, RL, JOG, RT, AU, STP (STOP), CS, RES, MRS(+) and SD (for sink logic)		When open 20 to 30 VDC ON voltage: 1 V or less	
Fault signal	Across A1 and C1 Across B1 and C1		Continuity check(d) [Normal] / [Fault] Across A1 and C1: Discontinuity / Continuity Across B1 and C1: Continuity / Discontinuity	

(a) A digital power meter (designed for inverter) can also be used to measure.
(b) Use an FFT to measure the output voltage accurately. A tester or general measuring instrument cannot measure accurately.
(c) When the carrier frequency exceeds 5 kHz, do not use this instrument since using it may increase eddy current losses produced in metal parts inside the instrument, leading to burnout. In this case, use an approximate-effective value type.
(d) When the setting of Pr.195 ABC1 terminal function selection is the positive logic

Measurement of Powers

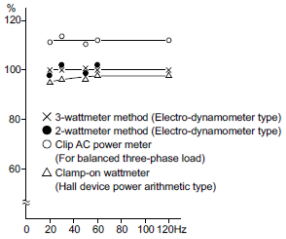
Use digital power meters (for inverter) for the both of inverter input and output side. Alternatively, measure using electrodynamic type single-phase wattmeters for the both of inverter input and output side in two-wattmeter or three- wattmeter method. As the current is liable to be imbalanced especially in the input side, it is recommended to use the three- wattmeter method.

Examples of measured value differences produced by different measuring meters are shown below.

An error will be produced by difference between measuring instruments, e.g. power calculation type and two- or three- wattmeter type three-phase wattmeter. When a CT is used in the current measuring side or when the meter contains a PT on the voltage measurement side, an error will also be produced due to the frequency characteristics of the CT and PT.

Measurement conditions

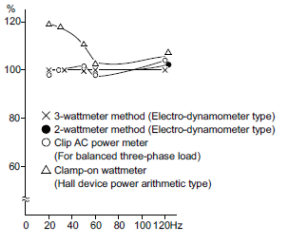
Constant output of 60 Hz or more frequency with a constant- torque (100%). The value obtained by the 3-wattmeter method with a 4-pole 3.7 kW induction motor is assumed to be 100%.



Example of measuring inverter input power

Measurement Conditions

Constant output of 60 Hz or more frequency with a constant- torque (100%). The value obtained by the 3-wattmeter method with a 4-pole 3.7 kW induction motor is assumed to be 100%.



Example of measuring inverter output power

Measurement of Voltages and Use of PT

Inverter Input Side

As the input side voltage has a sine wave and it is extremely small in distortion, accurate measurement can be made with an ordinary AC meter.

Inverter Output Side

Since the output side voltage has a PWM-controlled rectangular wave, always use a rectifier type voltmeter. A needle type tester cannot be used to measure the output side voltage as it indicates a value much greater than the actual value. A moving- iron type meter indicates an effective value which includes harmonics and therefore the value is larger than that of the fundamental wave. The value monitored on the operation panel is the inverter-controlled voltage itself. Hence, that value is accurate and it is recommended to monitor values (analog output) using the operation panel.

PT

No PT can be used in the output side of the inverter. Use a direct-reading meter. A PT can be used in the input side of the inverter.

Measurement of Currents

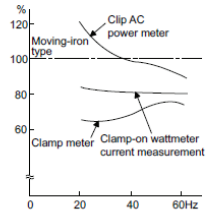
Use moving-iron type meters on both the input and output sides of the inverter. However, if the carrier frequency exceeds 5 kHz, do not use that meter since an overcurrent losses produced in the internal metal parts of the meter will increase and the meter may burn out. In this case, use an approximate-effective value type.

Since current on the inverter input side tends to be unbalanced, measurement of three phases is recommended. Correct value cannot be obtained by measuring only one or two phases. On the other hand, the unbalanced ratio of each phase of the output side current should be within 10%.

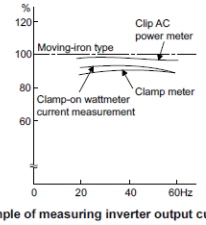
When a clamp ammeter is used, always use an effective value detection type. A mean value detection type produces a large error and may indicate an extremely smaller value than the actual value. The value monitored on the operation panel is accurate if the output frequency varies, and it is recommended to monitor values (provide analog output) using the operation panel.

Examples of measured value differences produced by different measuring meters are shown below.

Measurement conditions[a]



Example of measuring inverter input current



Example of measuring inverter output current

[a] Indicated value of the moving-iron type ammeter is 100%.

Use of CT and Transducer

A CT may be used in both the input and output sides of the inverter. Use the one with the largest possible VA ability because an error will increase if the frequency gets lower.

When using a transducer, use the effective value calculation type which is immune to harmonics

Measurement of Inverter Input Power Factor

Calculate using effective power and apparent power. A power-factor meter cannot indicate an exact value.

$$\text{Total power factor of the inverter} = \frac{\text{Effective power}}{\text{Apparent power}} = \frac{\text{Three-phase input power found by the 3-wattmeter method}}{\sqrt{3} \times \text{V (power supply voltage)} \times \text{I (input current effective value)}}$$

Measurement of Converter Output Voltage (across terminals P and N)

The output voltage of the converter is output across terminals P and N and can be measured with a moving-coil type meter (tester). Although the voltage varies according to the power supply voltage, approximately 800 VDC to 900 VDC is output when no load is connected and voltage decreases during driving load operation. When energy is regenerated from the motor during deceleration, for example, the converter output voltage rises to nearly 1100 VDC to 1300 VDC maximum.

Measurement of Inverter Output Frequency

In the initial setting, a pulse train proportional to the output frequency is output across the pulse train output terminals FM and SD of the inverter. This pulse train output can be counted by a frequency counter, or a meter (moving-coil type voltmeter) can be used to read the mean value of the pulse train output voltage. When a meter is used to measure the output frequency, approximately 5 VDC is indicated at the maximum frequency.

In the initial setting of the CA-type inverter, a pulse train proportional to the output frequency is output

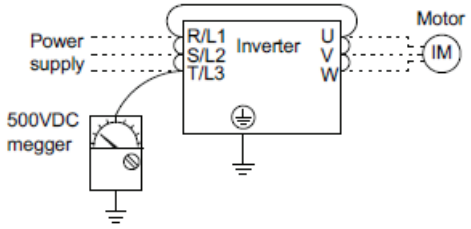
across the analog current output terminals CA and 5 of the inverter. Measure the current using an ammeter or tester.

Insulation Resistance Test Using Megger

For the inverter, conduct the insulation resistance test on the main circuit only as shown below and do not perform the test on the control circuit. (Use a 500 VDC megger.)

Notes:

- *Before performing the insulation resistance test on the external circuit, disconnect the cables from all terminals of the inverter so that the test voltage is not applied to the inverter.*
- *For the continuity test of the control circuit, use a tester (high resistance range) and do not use the megger or buzzer.*



Pressure Test

Do not conduct a pressure test. Deterioration may occur.

Specification

Inverter Rating

200 V Class

Model FR-A820-[ ]			00046	00077	00105	00167	00250	00340	00490	00630	00770	00930	01250	01540	01870	02330	03160	03800	04750
			0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K
Applicable motor capacity (kW) *1		SLD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90/110	132
		LD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110
		ND (initial setting)	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90
		HD	0.2*2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75
Output	Rated capacity (kVA) *3	SLD	1.8	2.9	4	6.4	10	13	19	24	29	35	48	59	71	89	120	145	181
		LD	1.6	2.7	3.7	5.8	8.8	12	17	22	27	32	43	53	65	81	110	132	165
		ND (initial setting)	1.1	1.9	3	4.2	6.7	9.1	13	18	23	29	34	44	55	67	82	110	132
		HD	0.6	1.1	1.9	3	4.2	6.7	9.1	13	18	23	29	34	44	55	67	82	110
	Rated current (A)	SLD	4.6	7.7	10.5	16.7	25	34	49	63	77	93	125	154	187	233	316	380	475
		LD	4.2	7	9.6	15.2	23	31	45	58	70.5	85	114	140	170	212	288	346	432
		ND (initial setting)	3	5	8	11	17.5	24	33	46	61	76	90	115	145	175	215	288	346
		HD	1.5	3	5	8	11	17.5	24	33	46	61	76	90	115	145	175	215	288
	Overload current rating *4	SLD	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature 40°C																
		LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature 50°C																
		ND (initial setting)	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature 50°C																
		HD	200% 60 s, 250% 3 s (inverse-time characteristics) at surrounding air temperature 50°C																
	Rated voltage *5		Three-phase 200 to 240 V																
	Regenerative braking	Brake transistor	Built-in											FR-BU2 (Option)					
		Maximum brake torque*7	150% torque/3%ED *6			100% torque/ 3%ED *6		100% torque/ 2%ED *6		20% torque/continuous								10% torque/ continuous	
		FR-ABR (when the option is used)	150% torque/ 10%ED		100% torque/10%ED					100% torque/6%ED				—	—	—	—	—	—
Power supply	Rated input AC voltage/frequency		Three-phase 200 to 240 V 50 Hz/60 Hz																
	Permissible AC voltage fluctuation		170 to 264 V 50 Hz/60 Hz																
	Permissible frequency fluctuation		±5%																
	Rated input current (A) *8	SLD	5.3	8.9	13.2	19.7	31.3	45.1	62.8	80.6	96.7	115	151	185	221	269	316	380	475
		LD	5	8.3	12.2	18.3	28.5	41.6	58.2	74.8	90.9	106	139	178	207	255	288	346	432
		ND (initial setting)	3.9	6.3	10.6	14.1	22.6	33.4	44.2	60.9	80	96.3	113	150	181	216	266	288	346
		HD	2.3	3.9	6.3	10.6	14.1	22.6	33.4	44.2	60.9	80	96.3	113	150	181	216	215	288
	Power supply capacity (kVA) *9	SLD	2	3.4	5	7.5	12	17	24	31	37	44	58	70	84	103	120	145	181
		LD	1.9	3.2	4.7	7	11	16	22	29	35	41	53	68	79	97	110	132	165
		ND (initial setting)	1.5	2.4	4	5.4	8.6	13	17	23	30	37	43	57	69	82	101	110	132
		HD	0.9	1.5	2.4	4	5.4	8.6	13	17	23	30	37	43	57	69	82	82	110
Protective structure (IEC 60529) *10			Enclose type (IP20)											Open type (IP00)					
Cooling system			Self-cooling		Forced air cooling														
Approx. mass (kg)			2.0	2.2	3.3	3.3	3.3	6.7	6.7	8.3	15	15	15	22	42	42	54	74	74

*1 The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2 The 0.2 kW motor capacity is applicable under V/F control only.
*3 The rated output capacity indicated assumes that the output voltage is 220 V for 200 V class.
*4 The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
*5 The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.
*6 Value for the built-in brake resistor
*7 Value for the ND rating
*8 The rated input current indicates a value at a rated output voltage. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
*9 The power supply capacity is the value when at the rated output current. It varies by the impedance at the power supply side (including those of the input reactor and cables).
*10 FR-DU08: IP40 (except for the PU connector section)

400 V Class

Model FR-A840-[ ]			00023	00038	00052	00083	00126	00170	00250	00310	00380	00470	00620	00770	00930	01160	01800	02160	02600	03250	03610	04320	04810	05470	06100	06830
			0.4K	0.75K	1.5K	2.2K	3.7K	5.5K	7.5K	11K	15K	18.5K	22K	30K	37K	45K	55K	75K	90K	110K	132K	160K	185K	220K	250K	280K
Applicable motor capacity (kW) *1		SLD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75/90	110	132	160	185	220	250	280	315	355
		LD	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	185	220	250	280	315
		ND (initial setting)	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	185	220	250	280
		HD	0.2*2	0.4	0.75	1.5	2.2	3.7	5.5	7.5	11	15	18.5	22	30	37	45	55	75	90	110	132	160	185	220	250
Output	Rated capacity (kVA) *3	SLD	1.8	2.9	4	6.3	10	13	19	24	29	36	47	59	71	88	137	165	198	248	275	329	367	417	465	521
		LD	1.6	2.7	3.7	5.8	8.8	12	18	22	27	33	43	53	65	81	110	137	165	198	248	275	329	367	417	465
		ND (initial setting)	1.1	1.9	3	4.6	6.9	9.1	13	18	24	29	34	43	54	66	84	110	137	165	198	248	275	329	367	417
		HD	0.6	1.1	1.9	3	4.6	6.9	9.1	13	18	24	29	34	43	54	66	84	110	137	165	198	248	275	329	367
	Rated current (A)	SLD	2.3	3.8	5.2	8.3	12.6	17	25	31	38	47	62	77	93	116	180	216	260	325	361	432	481	547	610	683
		LD	2.1	3.5	4.8	7.6	11.5	16	23	29	35	43	57	70	85	106	144	180	216	260	325	361	432	481	547	610
		ND (initial setting)	1.5	2.5	4	6	9	12	17	23	31	38	44	57	71	86	110	144	180	216	260	325	361	432	481	547
		HD	0.8	1.5	2.5	4	6	9	12	17	23	31	38	44	57	71	86	110	144	180	216	260	325	361	432	481
	Overload current rating *4	SLD	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature 40°C																							
		LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature 50°C																							
		ND (initial setting)	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature 50°C																							
		HD	200% 60 s, 250% 3 s (inverse-time characteristics) at surrounding air temperature 50°C																							
	Rated voltage *5		Three-phase 380 to 500 V																							
	Regenerative braking	Brake transistor	Built-in															FR-BU2(Option)								
		Maximum brake torque *7	100% torque/2%ED *6							20% torque/continuous								10% torque/continuous								
		FR-ABR (when the option is used)	100% torque/10%ED							100% torque/6%ED				— *12				—	—	—	—	—	—	—	—	—
Power supply	Rated input AC voltage/frequency		Three-phase 380 to 500 V 50 Hz/60 Hz *11																							
	Permissible AC voltage fluctuation		323 to 550 V 50 Hz/60 Hz																							
	Permissible frequency fluctuation		±5%																							
	Rated input current (A) *8	SLD	3.2	5.4	7.8	10.9	16.4	22.5	31.7	40.3	48.2	58.4	76.8	97.6	115	141	180	216	260	325	361	432	481	547	610	683
		LD	3	4.9	7.3	10.1	15.1	22.3	31	38.2	44.9	53.9	75.1	89.7	106	130	144	180	216	260	325	361	432	481	547	610
		ND (initial setting)	2.3	3.7	6.2	8.3	12.3	17.4	22.5	31	40.3	48.2	56.5	75.1	91	108	134	144	180	216	260	325	361	432	481	547
		HD	1.4	2.3	3.7	6.2	8.3	12.3	17.4	22.5	31	40.3	48.2	56.5	75.1	91	108	110	144	180	216	260	325	361	432	481
	Power supply capacity (kVA) *9	SLD	2.5	4.1	5.9	8.3	12	17	24	31	37	44	59	74	88	107	137	165	198	248	275	329	367	417	465	521
		LD	2.3	3.7	5.5	7.7	12	17	24	29	34	41	57	68	81	99	110	137	165	198	248	275	329	367	417	465
		ND (initial setting)	1.7	2.8	4.7	6.3	9.4	13	17	24	31	37	43	57	69	83	102	110	137	165	198	248	275	329	367	417
		HD	1.1	1.7	2.8	4.7	6.3	9.4	13	17	24	31	37	43	57	69	83	84	110	137	165	198	248	275	329	367
Protective structure (IEC 60529) *10			Enclose type (IP20)											Open type (IP00)												
Cooling system			Self-cooling			Forced air cooling																				
Approx. mass (kg)			2.8	2.8	2.8	3.3	3.3	6.7	6.7	8.3	8.3	15	15	23	41	41	43	52	55	71	78	117	117	166	166	166

*1 The applicable motor capacity indicated is the maximum capacity applicable for use of the Mitsubishi 4-pole standard motor.
*2 The 0.2 kW motor capacity is applicable under V/F control only.
*3 The rated output capacity indicated assumes that the output voltage is 440 V for 400 V class.
*4 The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
*5 The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.
*6 Value for the built-in brake resistor
*7 Value for the ND rating
*8 The rated input current indicates a value at a rated output voltage. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
*9 The power supply capacity is the value when at the rated output current. It varies by the impedance at the power supply side (including those of the input reactor and cables).
*10 FR-DU08: IP40 (except for the PU connector section)
*11 For the power voltage exceeding 480 V, set **Pr.977 Input voltage mode selection**.
*12 The braking capability of the inverter built-in brake can be improved with a commercial brake resistor. For the details, please contact your sales representative.

600 V Class

FR-A860–00450 or Lower

Model FR-A860-[ ]-N6			00027	00061	00090	00170	00320	00450
Applicable motor capacity (kW) *1		SLD	1.5	3.7	5.5	11	18.5	30
		LD	1.5	3.7	5.5	11	18.5	30
		ND (initial setting)	0.75	2.2	3.7	7.5	15	22
		HD	0.4	1.5	2.2	5.5	11	18.5
Output	Rated capacity (kVA) *2	SLD	2.7	6.1	9	17	32	45
		LD	2.5	5.6	8.2	16	27	41
		ND (initial setting)	1.7	4	6.1	12	22	33
		HD	1	2.7	4	9	16	24
	Rated current (A) *3	SLD	2.7 (2.3)	6.1 (5.2)	9 (7.65)	17 (14.4)	32 (27.2)	45 (38.2)
		LD	2.5 (2.1)	5.6 (4.8)	8.2 (7)	16 (13.6)	27 (22.9)	41 (34.8)
		ND (initial setting)	1.7	4	6.1	12	22	33
		HD	1.0	2.7	4	9	16	24
	Overload current rating *4	SLD	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature 30°C			110% 60 s, 120% 3 s (inverse-time characteristics) at ambient temperature 40°C		
		LD	120% 60 s, 150% 3 s (inverse-time characteristics) at ambient temperature 40°C					
		ND (initial setting)	150% 60 s, 200% 3 s (inverse-time characteristics) at ambient temperature 40°C					
		HD	200% 60 s, 250% 3 s, 280% 0.5 s (inverse-time characteristics) at ambient temperature 40°C					
	Rated voltage *5		Three-phase 525 to 600 V					
	Regenerative braking	Brake transistor	Built-in					
		Maximum brake torque *6	20% torque/continuous					
Power supply	Rated input AC voltage/frequency		Three-phase 525 to 600 V 60 Hz					
	Permissible AC voltage fluctuation		472 to 660 V 60 Hz					
	Permissible frequency fluctuation		±5%					
	Rated input current (A) *7	SLD	4.7	11	15	27	43	61
		LD	4.4	9.8	14	25	36	55
		ND (initial setting)	3.0	7.0	10	19	29	44
		HD	1.8	4.7	6.8	14	21	32
	Power supply capacity (kVA) *8	SLD	4.7	10.6	15	26.7	42.4	60.6
		LD	4.4	9.8	13.8	25.2	35.8	54.4
		ND (initial setting)	3	7	10.3	18.9	29.2	43.8
		HD	1.8	4.7	6.7	14.2	21.2	31.9
Protective structure (IEC 60529)			Enclosed type (UL type 1 plenum rated) *9, *10			Enclosed type (UL type 1 plenum rated) *9		
Cooling system			Self-cooling	Forced air cooling				
Approx. mass (kg)			5.3	5.8	5.8	7	9	17

*1 The applicable motor capacity indicated is the maximum capacity applicable for use of the 4-pole standard motor.
*2 The rated output capacity indicated assumes that the output voltage is 575 V.
*3 When an operation is performed with the carrier frequency set to 3 kHz or more, and the inverter output current reaches the value indicated in the parenthesis, the carries frequency is automatically lowered. The motor noise becomes louder accordingly.
*4 The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.
*5 The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.
*6 Value for the ND rating
*7 The rated input current indicates a value at a rated output voltage. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.
*8 The power supply capacity is the value when at the rated output current. It varies by the impedance at the power supply side (including those of the input reactor and cables).
*9 UL Type 1 Enclosure - Suitable for Installation in a Compartment Handling Conditioned Air (Plenum)
*10 When an provided brake resister is used, the protective structure is open type (NEMA 1).

FR-A860–00680 or Higher

Model FR-A860-[ ]			00680	01080	01440	01670	02430	02890	03360	04420
Applicable motor capacity (kW) *1		SLD	45	75	90	110	132	160	220	250
		LD	45	75	90	110	132	160	220	250
		ND (initial setting)	37	55	75	90	110	132	185	220
		HD	30	45	55	75	90	110	160	185
Output	Rated capacity (kVA) *2	SLD	68	108	144	167	242	288	335	441
		LD	62	99	131	152	221	254	303	401
		ND (initial setting)	55	84	104	131	152	221	254	303
		HD	41	63	84	104	131	152	202	254
	Rated current (A) *3	SLD	68 (57.8)	108 (91.8)	144 (122)	167 (141)	243 (206)	289 (245)	336 (285)	442 (375)
		LD	62 (52.7)	99 (84.1)	131 (111)	152 (129)	221 (187)	255 (216)	304 (258)	402 (341)
		ND (initial setting)	55	84	104 (88)	131 (111)	152 (129)	221 (187)	255 (216)	304 (258)
		HD	41	63	84 (71)	104 (88)	131 (111)	152 (129)	202 (171)	255 (216)
	Overload current rating *4	SLD	110% 60 s, 120% 3 s (inverse-time characteristics) at surrounding air temperature 40°C							
		LD	120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature 40°C		120% 60 s, 150% 3 s (inverse-time characteristics) at surrounding air temperature 50°C					
		ND (initial setting)	150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature 40°C		150% 60 s, 200% 3 s (inverse-time characteristics) at surrounding air temperature 50°C					
		HD	200% 60 s, 250% 3 s, 280% 0.5 s (inverse-time characteristics) at surrounding air temperature 40°C							
	Rated voltage *5		Three-phase 525 to 600 V							
	Regenerative braking	Brake transistor	Built-in		Not included					
		Maximum brake torque *6	20% torque/continuous		—	—	—	—	—	—
Power supply	Rated input AC voltage/frequency		Three-phase 525 to 600 V 60 Hz							
	Permissible AC voltage fluctuation		472 to 660 V 60 Hz							
	Permissible frequency fluctuation		±5%							
	Rated input current (A) *7	SLD	87	108	144	167	243	289	336	442
		LD	79	99	131	152	221	255	304	402
		ND (initial setting)	70.5	108	104	131	152	221	255	304
		HD	53	81	84	104	131	152	202	255
	Power supply capacity (kVA) *8	SLD	86.8	107.6	143	166	242	288	335	440
		LD	79.1	98.6	130	151	220	254	303	400
		ND (initial setting)	70.2	107.6	104	130	151	220	254	303
		HD	52.3	80.7	84	104	130	151	201	254
Protective structure (IEC 60529)			Open type (IP00)							
Cooling system			Forced air cooling							
Approx. mass (kg)			36	41	52	52	55	112	115	153

*1 The applicable motor capacity indicated is the maximum capacity applicable for use of the 4-pole standard motor.

*2 The rated output capacity indicated assumes that the output voltage is 575 V.

*3 When an operation is performed with the carrier frequency set to 3 kHz or more, and the inverter output current reaches the value indicated in the parenthesis, the carries frequency is automatically lowered. The motor noise becomes louder accordingly.

*4 The % value of the overload current rating indicated is the ratio of the overload current to the inverter's rated output current. For repeated duty, allow time for the inverter and motor to return to or below the temperatures under 100% load.

*5 The maximum output voltage does not exceed the power supply voltage. The maximum output voltage can be changed within the setting range. However, the maximum point of the voltage waveform at the inverter output side is the power supply voltage multiplied by about $\sqrt{2}$.

*6 Value for the ND rating

*7 The rated input current indicates a value at a rated output voltage. The impedance at the power supply side (including those of the input reactor and cables) affects the rated input current.

*8 The power supply capacity is the value when at the rated output current. It varies by the impedance at the power supply side (including those of the input reactor and cables).

Common Specifications

Control specification	Control method		Soft-PWM control, high carrier frequency PWM control (selectable among V/F control, Advanced magnetic flux vector control, Real sensorless vector control), vector control[b], and PM sensorless vector control
	Output frequency range		0.2 to 590 Hz (The upper-limit frequency is 400 Hz under Advanced magnetic flux vector control, Real sensorless vector control, vector control[b], and PM sensorless vector control.)
	Frequency setting resolution	Analog input	0.015 Hz/60 Hz (0 to 10 V/12 bits for terminals 2 and 4) 0.03 Hz/60 Hz (0 to 5 V/11 bits or 0 to 20 mA/approx. 11 bits for terminals 2 and 4, 0 to ±10 V/12 bits for terminal 1) 0.06 Hz/60 Hz (0 to ±5 V/11 bits for terminal 1)
		Digital input	0.01 Hz
	Frequency accuracy	Analog input	Within ±0.2% of the max. output frequency (25°C ± 10°C)
		Digital input	Within 0.01% of the set output frequency
	Voltage/frequency characteristics		Base frequency can be set from 0 to 590 Hz. Constant-torque/variable-torque pattern or adjustable 5 points V/F can be selected.
	Starting torque		SLD rating: 120% 0.3 Hz, LD rating: 150% 0.3 Hz, ND rating: 200%[a] 0.3 Hz, HD rating: 250% 0.3 Hz (under Real sensorless vector control or vector control[b]
	Torque boost		Manual torque boost
	Acceleration/deceleration time setting		0 to 3600 s (acceleration and deceleration can be set individually), linear or S-pattern acceleration/deceleration mode, backlash countermeasures acceleration/deceleration can be selected.
	DC injection brake (induction motor)		Operation frequency (0 to 120 Hz), operation time (0 to 10 s), operation voltage (0 to 30%) variable
	Stall prevention operation level		Activation range of stall prevention operation (SLD rating: 0 to 120%, LD rating: 0 to 150%, ND rating: 0 to 220%, HD rating: 0 to 280%). Whether to use the stall prevention or not can be selected (V/F control, Advanced magnetic flux vector control)
	Torque limit level		Torque limit value can be set (0 to 400% variable). (Real sensorless vector control, vector control [b], PM sensorless vector control).

Operation specific	Frequency setting signal	Analog input	Terminals 2 and 4: 0 to 10 V, 0 to 5 V, 4 to 20 mA (0 to 20 mA) are available. Terminal 1: -10 to +10 V, -5 to +5 V are available.
		Digital input	Input using the setting dial of the operation panel or parameter unit
			Four-digit BCD or 16-bit binary (when used with option FR-A8AX)
	Start signal		Forward and reverse rotation or start signal automatic self-holding input (3-wire input) can be selected.
	Input signals (twelve terminals)		Low-speed operation command, Middle-speed operation command, High-speed operation command,
			Second function selection, Terminal 4 input selection, Jog operation selection, Selection of automatic restart after instantaneous power failure, flying start, Output stop, Start self-holding selection, Forward rotation command, Reverse rotation command, Inverter reset
	Pulse train input		100 kpps
	Operational functions		Maximum and minimum frequency settings, multi-speed operation, acceleration/deceleration pattern, thermal protection, DC injection brake, starting frequency, JOG operation, output stop (MRS), stall prevention, regeneration avoidance, increased magnetic excitation deceleration, DC feeding(c) , frequency jump, rotation display, automatic restart after instantaneous power failure, electronic bypass sequence, remote setting, automatic acceleration/deceleration, intelligent mode, retry function, carrier frequency selection, fast-response current limit, forward/reverse rotation prevention, operation mode selection, slip compensation, droop control, load torque high-speed frequency control, speed smoothing control, traverse, auto tuning, applied motor selection, gain tuning, machine analyzer(b), RS-485 communication, PID control, PID pre-charge function, easy dancer control, cooling fan operation selection, stop selection (deceleration stop/ coasting), power-failure deceleration stop function(c), stop-on-contact control, PLC function, life diagnosis, maintenance timer, current average monitor, multiple rating, orientation control(b), speed control, torque control, position control, pre-excitation, torque limit, test run, 24 V power supply input for control circuit, safety stop function, swinging suppression control, CC-Link IE Field Network communication(d)
	Output signal Open collector output (five terminals) Relay output (two terminals)		Inverter running, Up to frequency, Instantaneous power failure/undervoltage(c), Overload warning, Output frequency detection, Fault Fault codes of the inverter can be output (4 bits) from the open collector.
	Pulse train output		50 kpps
Indication	For meter	Pulse train output (FM type)	Max. 2.4 kHz: one terminal (output frequency) The monitored item can be changed using Pr.54 FM/CA terminal function selection.
		Current output (CA type)	Max. 20 mADC: one terminal (output current) The monitored item can be changed using Pr.54 FM/CA terminal function selection.
		Voltage output	Max. 10 VDC: one terminal (output voltage) The monitored item can be changed using Pr.158 AM terminal function selection.
	Operation panel (FR-DU08)	Operating status	Output frequency, Output current, Output voltage, Frequency setting value The monitored item can be changed using Pr.52 Operation panel main monitor selection.
		Fault record	Fault record is displayed when a fault occurs. Past 8 fault records and the conditions immediately before the fault (output voltage/current/frequency/cumulative energization time/year/month/date/time) are saved.

Protective/ warning function	Protective function	Overcurrent trip during acceleration, Overcurrent trip during constant speed, Overcurrent trip during deceleration or stop, Regenerative overvoltage trip during acceleration, Regenerative overvoltage trip during constant speed, Regenerative overvoltage trip during deceleration or stop, Inverter overload trip, Motor overload trip, Heatsink overheat, Instantaneous power failure(c), Undervoltage(c), Input phase loss(c)(e) , Stall prevention stop, Loss of synchronism detection(e), Brake transistor alarm detection(f) , Output side earth (ground) fault overcurrent, Output short circuit, Output phase loss, External thermal relay operation(e), PTC thermistor operation(e), Option fault, Communication option fault, Parameter storage device fault, PU disconnection, Retry count excess(e), Parameter storage device fault, CPU fault, Operation panel power supply short circuit/RS-485 terminals power supply short circuit, 24 VDC power fault, Abnormal output current detection(e), Inrush current limit circuit fault(c), Communication fault (inverter), Analog input fault, USB communication fault, Safety circuit fault, Overspeed occurrence(e), Speed deviation excess detection(b)(e), Signal loss detection(b)(e), Excessive position fault(b)(e), Brake sequence fault(e), Encoder phase fault(b)(e), 4 mA input fault, Pre-charge fault, PID signal fault, Option fault, Internal circuit fault, Internal circuit fault, Abnormal internal temperature(g) , Magnetic pole position unknown
	Warning function	Fan alarm, Stall prevention (overcurrent), Stall prevention (overvoltage), Regenerative brake pre-alarm(e)(f), Electronic thermal relay function pre-alarm, PU stop, Speed limit indication(e), Parameter copy, Safety stop, Maintenance signal output(e), USB host error, Home position return setting error(e), Home position return uncompleted(e), Home position return parameter setting error(e), Operation panel lock(e), Password locked(e), Parameter write error, Copy operation error, 24 V external power supply operation, Internal fan alarm (g).
Environment	Surrounding air temperature	-10°C to +50°C (0°C to +50°C for the FR-A800-GF) (non-freezing) (LD, ND, HD ratings) -10°C to +40°C (0°C to +40°C for the FR-A800-GF) (non-freezing) (SLD rating, IP55 compatible models)
	Surrounding air humidity	95% RH or less (non-condensing) (With circuit board coating (conforming to IEC60721-3-3 3C2/3S2), IP55 compatible models) 90% RH or less (non-condensing) (Without circuit board coating)
	Storage temperature(h)	-20°C to +65°C
	Atmosphere	Indoors (without corrosive gas, flammable gas, oil mist, dust and dirt, etc.)
	Altitude/vibration	Maximum 1000 m above sea level(i) , 5.9 m/s^2 or less(j) at 10 to 55 Hz (directions of X, Y, Z axes)

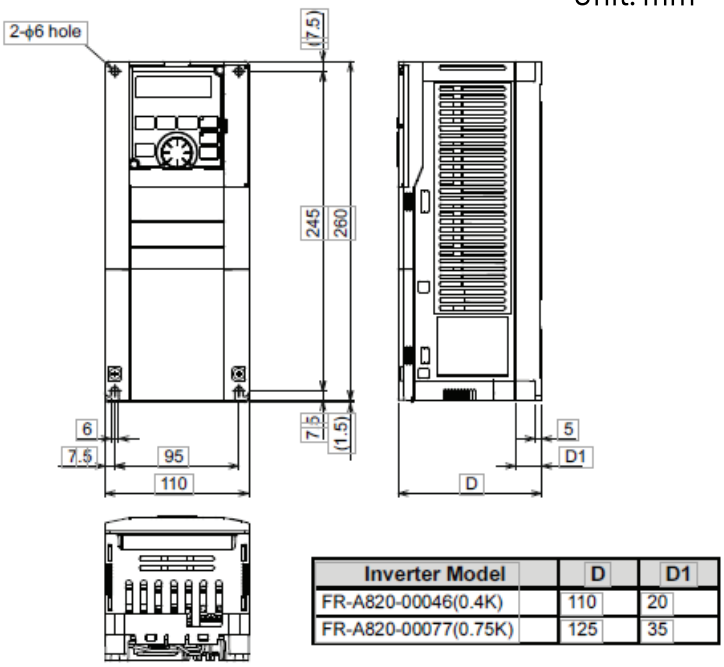
(a) In the initial setting for the FR-A820-00340(5.5K) or higher and the FR-A840-00170(5.5K) or higher, the starting torque is limited to 150% by the torque limit level.
(b) Available only when a vector control compatible option is mounted.
(c) Available only for the standard model and the IP55 compatible model.
(d) Available only for the FR-A800-GF series.
(e) This protective function is not available in the initial status.
(f) Available only for the standard model.
(g) Available only for the IP55 compatible model.
(h) Temperature applicable for a short time, e.g. in transit.
(i) For the installation at an altitude above 1,000 m up to 2,500 m, derate the rated current 3% per 500 m.
(j) 2.9 m/s^2 or less for the FR-A840-04320(160K) or higher.

Outline Dimension Drawings

Inverter Outline Dimension Drawings

FR-A820-00046(0.4K), FR-A820-00077(0.75K)

Unit: mm

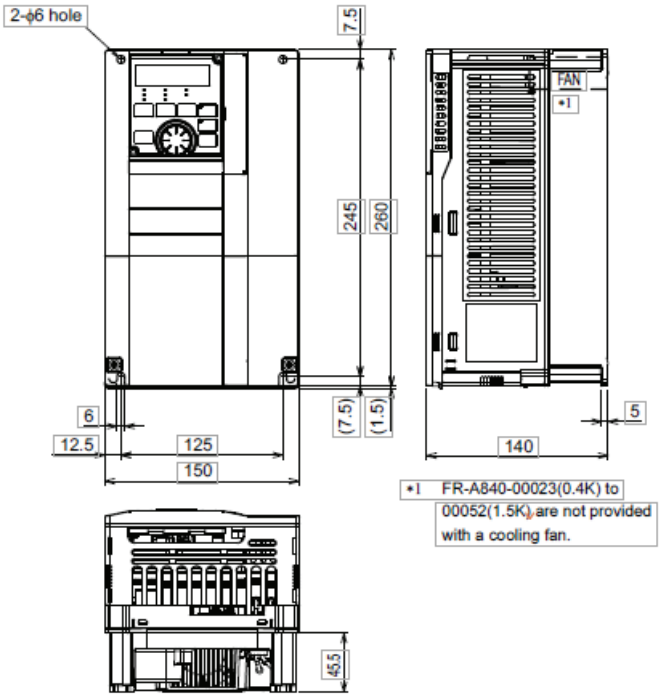


Inverter Model	D	D1
FR-A820-00046(0.4K)	110	20
FR-A820-00077(0.75K)	125	35

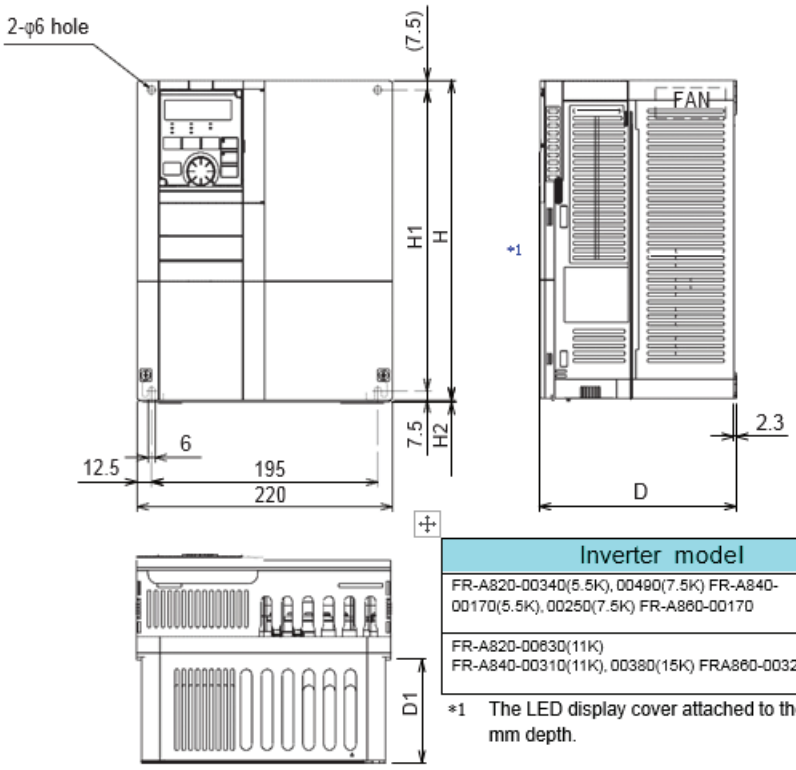
FR-A820-00105(1.5K), 00167(2.2K), 00250(3.7K)

FR-A860–00027, 0061, 00090, FR-A840-00023(0.4K), 00038(0.75K),00052(1.5K), 00083(2.2K), 00126(3.7K)

Unit: mm



FR-A820-00340(5.5K), 00490(7.5K), 00630(11K)



Inverter model	H	H1	H2	D	D1
FR-A820-00340(5.5K), 00490(7.5K) FR-A840-00170(5.5K), 00250(7.5K) FR-A860-00170	260	245	1.5	170	84
FR-A820-00630(11K) FR-A840-00310(11K), 00380(15K) FRA860-00320	300	285	3	190	101.5

*1 The LED display cover attached to the FR-A800-GF in this position has an additional 2.1 mm depth.

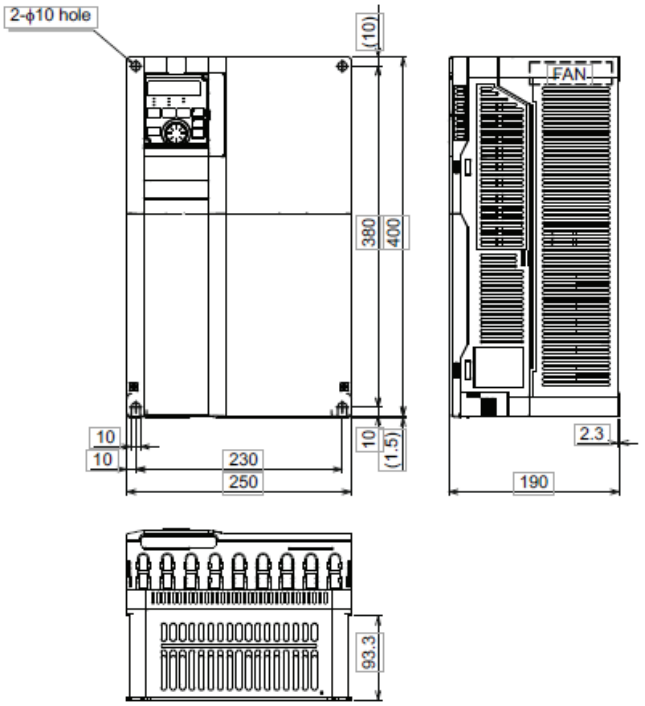
(Unit: mm)

FR-A860–00170, 00320, FR-A840-00170(5.5K), 00250 (7.5K), 00310(11K), 00380(15K)

FR-A820-00770(15K), 00930(18.5K), 01250(22K)

FR-A860–00450, FR-A840-00470(18.5K), 00620(22K)

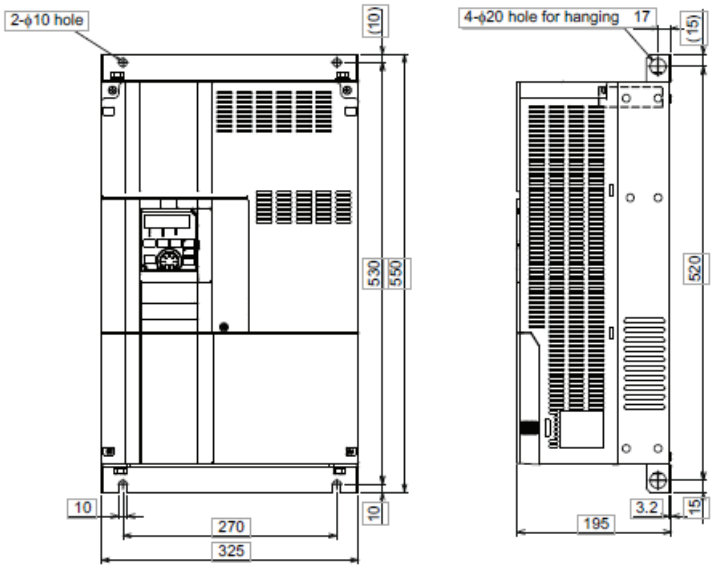
Unit: mm



FR-A820-01540(30K)

FR-A840-00770(30K)

Unit: mm

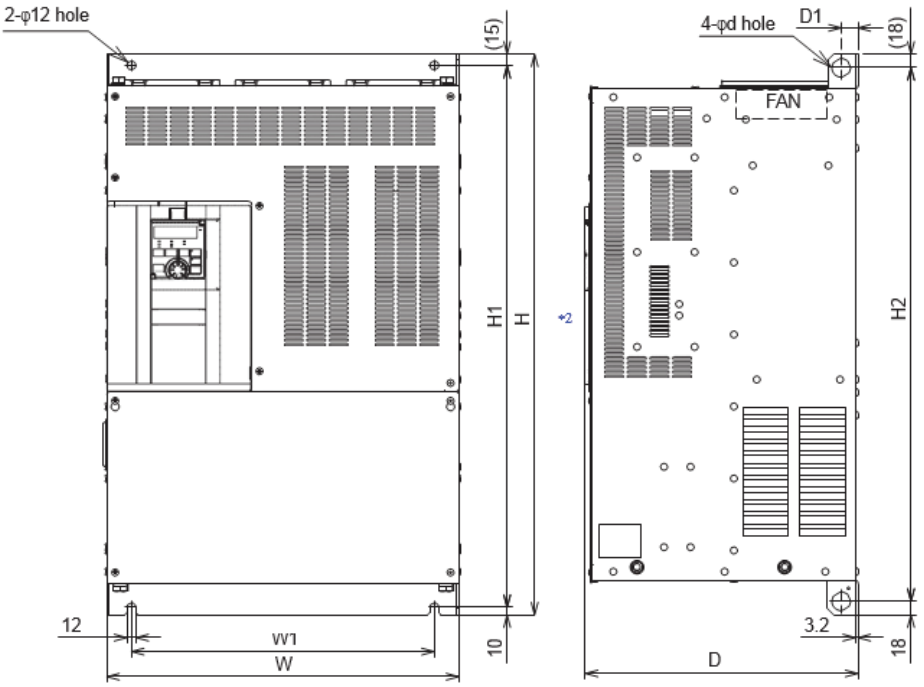


FR-A820-01870(37K), 02330(45K), 03160(55K), 03800(75K), 04750(90K)

FR-A860–00680, 0180, 01440, 01670, 02430

FR-A840-00930(37K), 01160(45K), 01800(55K), 02160(75K), 02600(90K), 03250(110K), 03610(132K)

Unit: mm



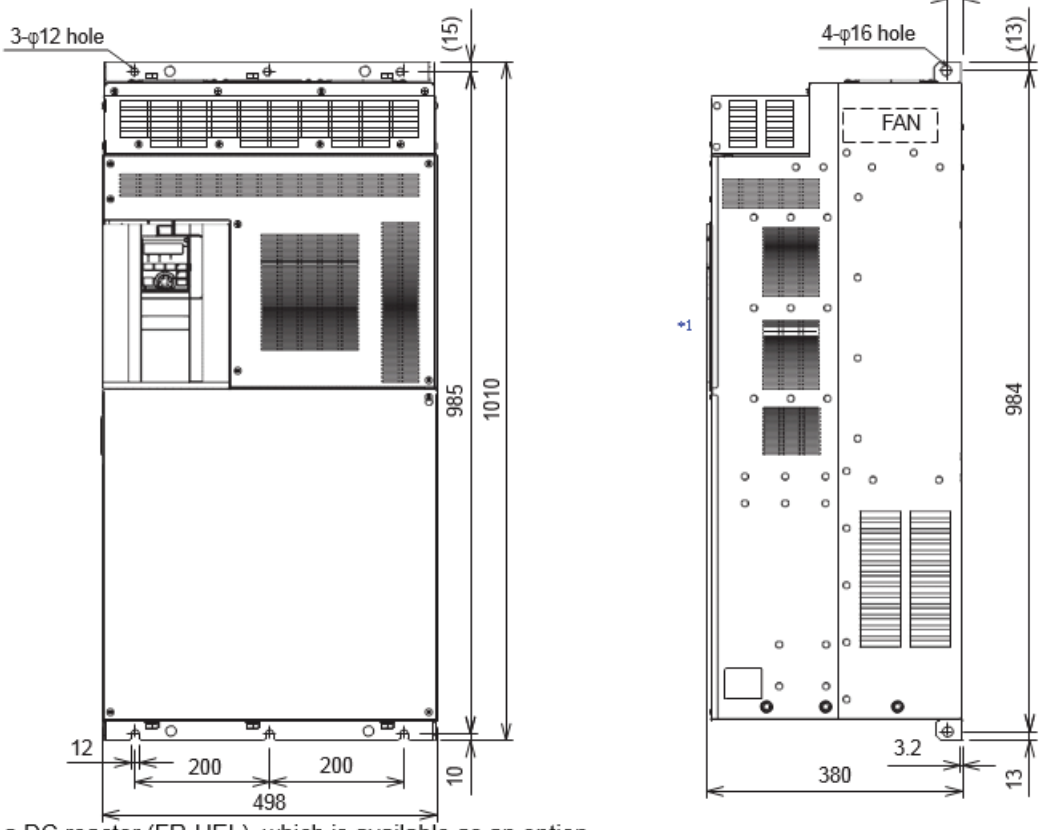
Inverter model	W	W1	H	H1	H2	d	D	D1
FR-A820-01870(37K), 02330(45K) FR-A840-00930(37K), 01160(45K), 01800(55K)*1 FR-A860-00680, 0180	435	380	550	525	514	25	250	24
FR-A820-03160(55K)*1	465	410	700	675	664	25	250	22
FR-A820-03800(75K)*1, 04750(90K)*1	465	400	740	715	704	24	360	22
FR-A840-02160(75K)*1, 02600(90K)*1 FR-A860-01140, 01670, 02430	465	400	620	595	584	24	300	22
FR-A840-03250(110K)*1, 03610(132K)*1	465	400	740	715	704	25	360	22

*1 When using a motor with a capacity of 75 kW or higher, always connect a DC reactor (FR-HEL), which is available as an option.

*2 The LED display cover attached to the FR-A800-GF in this position has an additional 2.1 mm depth.

FR-A860–02890, 03360, FR-A840-04320(160K), 04810(185K)

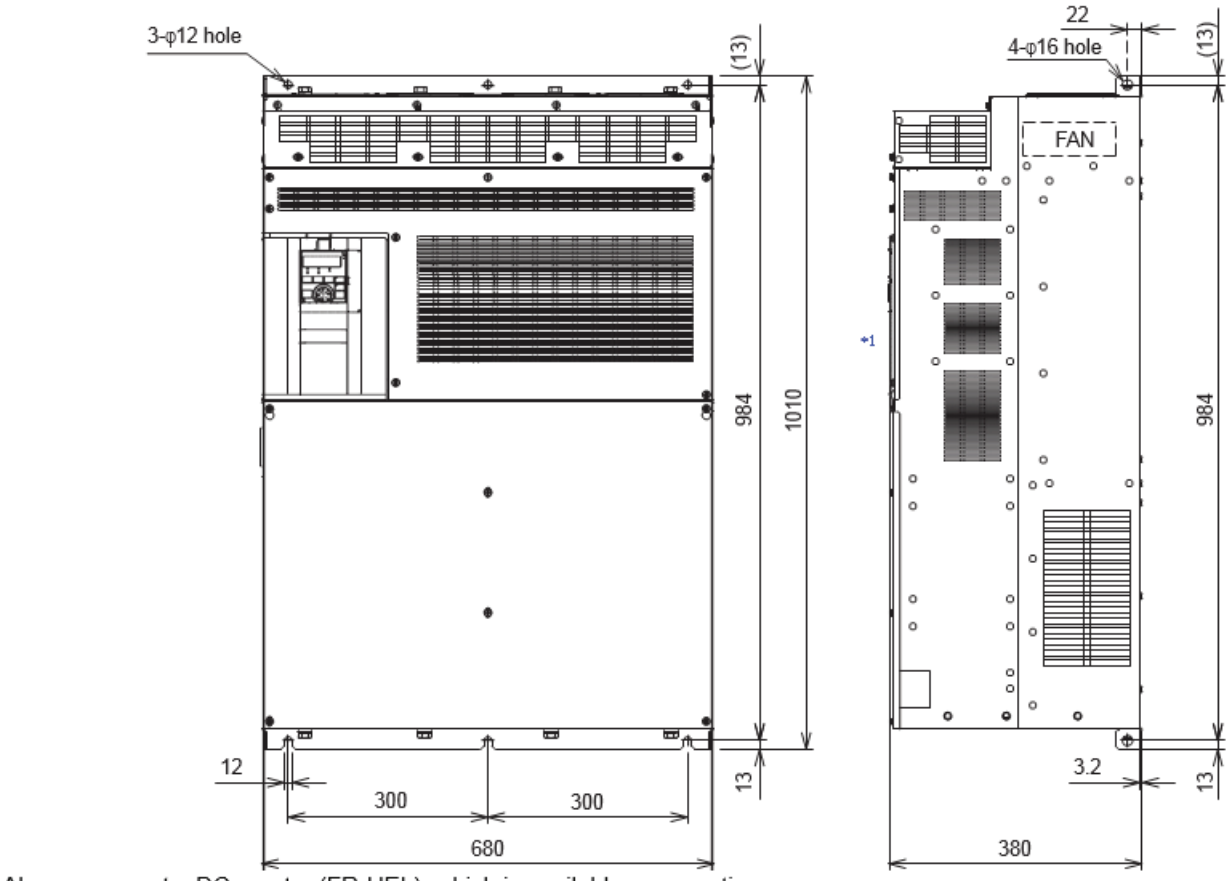
Unit: mm



Always connect a DC reactor (FR-HEL), which is available as an option.

FR-0860–04420, FR-A840-05470(220K), 06100 (250K), 06830(280K)

Unit: mm

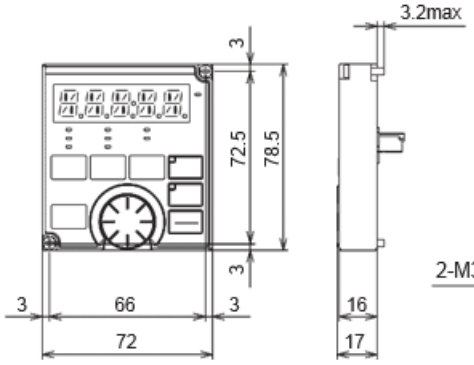


Always connect a DC reactor (FR-HEL), which is available as an option.

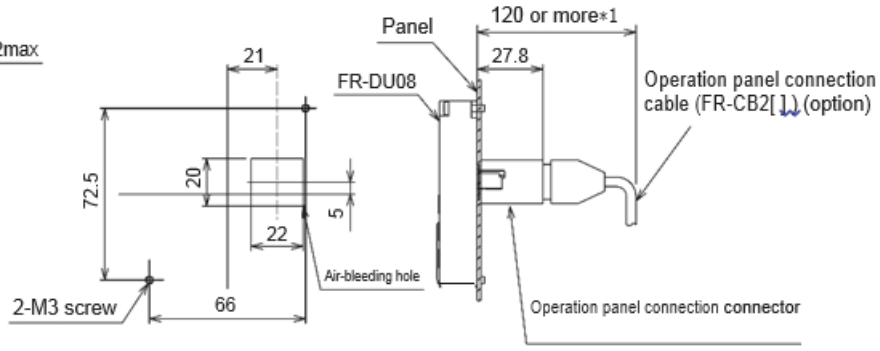
Operation panel (FR-DU08)

Unit: mm

<Outline drawing>



<Panel cutting dimension drawing>



*1 Denotes the space required to connect an optional parameter unit connection cable (FR-CB2[ ]). When using another cable, leave the space required for the cable specification.

Appendix A. Relevant Manuals and Hardware

Relevant Manuals

- A800
  - IB(NA)-0600503-G — A800 Instruction Manual (detailed)
  - IB(NA)-0600493-E — A800 Installation Manual (detailed)
  - BC(NA)-23228001-BE —A800 F800 Safety Stop Function Instruction Manual
  - IB(NA)-0600492-C — A800 PLC Function Programming Manual
- Optional keypad
  - IB(NA)-0600539-A — FR-A800 FR-LU08 LCD Keypad
- Optional Manual
  - IB(NA)-0600559-A — FR-A8AC 120 VAC Input Instruction Manual
  - IB(NA)-0600561-A — FR-A8AN Isolated Current Input/Output Function Instruction Manual
  - IB(NA)-0600495-A — FR-A8AX 16 bit Digital Input Instruction Manual
  - IB(NA)-0600497-A — FR-A8AY Analog/Digital Output Instruction Manual
  - IB(NA)-0600499-A — FR-A8AR Relay Output Instruction Manual
  - IB(NA)-0600501-A — FR-A8NC CC-Link Instruction Manual
  - IB(NA)-0600505-A — FR-A8AP PLG/Encoder Instruction Manual
  - IB(NA)-0600509-A — FR-A8NCE CC-Link IE Field Instruction Manual
  - IB(NA)-0600511-A — FR-A8ND DeviceNet Instruction Manual
- Software manual
  - IB(NA)-0600516-C — FR Configurator2 Instruction Manual

List of Required Training Hardware

- VFD-A800-DEMO-2 — one per two students
- VFD-MOTOR-DEMO — one per VFD-A800–DEMO-2
- Laptop computer
  - One per two students
  - FR-Configurator2 installed
  - Adobe Reader Installed
  - IB(NA)-0600503-F — A800 Instruction Manual installed
  - IB(NA)-0600493-C — A800 Installation Manual
- MR-J3USBCBL3M — one per laptop
- LED-Switch-Analog Pot demo box — one per VFD-A800–DEMO2

Notes

Notes

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RT-SVD008B-EN 27 Apr 2017
Supersedes RT-SVD008A-EN (January 2017)