[Related Documents]

Instruction Manual (Detailed Version) INR-SI47-1733 -E User's Manual 24A7-E-0043 RS-485 Communication User's Manual 24A7-E-0099

Thank you for purchasing our FRENIC-Ace series of inverters.

stallation Install the inverter on a nonflammable material such as metal.

capacity. Otherwise, a fire could occur. Ground the inverter in compliance with the national or local electric code. Be sure to ground the inverter's grounding terminals G. Otherwise, an electric shock or a fire could occur. Qualified electricians should carry out wiring.

Qualified electricians should carry out wiring. Be sure to perform wiring after turning the power OFF. Otherwise, an electric shock could occur. Be sure to perform wiring after installing the inverter unit.

Otherwise, an electric shock or injuries could occu

Otherwise fire could occur. Do not place flammable matter nearby.

Fuji Electric Co., Ltd.

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Instruction Manual

Instruction manual QR code

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

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

This product is designed to drive a three-phase induction motor and three-phase permanent magnet synchronous motor. Read through this instruction manual and be familiar with the handling procedure for correct use.

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

FRENIC-Ace may not be used for a life-support system or other purposes directly related to the human safety.
 Though FRENIC-Ace is manufactured under strict quality control, install safety devices for applications where serious accidents or material losses are foreseen in
 relation to the failure of it.
 An accident could occur.
 Jatallation

Do flot pade infinitiants indust indust. Indust is a set of the part of the pade infinitiant indust is a set of the main circuit terminal block. Inverters FRN008528=43CI or above, whose protective structure is IP00, involve a possibility that a human body may touch the live conductors of the main circuit terminal block. Inverters to which an optional DC reactor is connected also involve the same. Install such inverters in an inaccessible place. Otherwise, electric shock or injuries could occur.

Wring
If the zero-phase current (earth leakage current) detective device such as a ground-fault relay is installed in the upstream power supply line, in order to avoid the entire power supply system's shutdown undesirable to factory operation, install a residual-current-operated protective device (RCD)/earth leakage circuit breaker (ELCB) individually to inverters to break the individual inverter power supply lines only. When wiring the inverter to the power source, inset a recommended molded case circuit breaker (MCCB) or residual-current-operated protective device (RCD)/earth leakage circuit breaker (ELCB) (with overcurrent protection) in the path of each pair of power lines to inverters. Use the recommended devices within the recommended current capacity.
Use wires in the specified size.
Use wires in the specified size.
Tighten terminals with specified reque.
When wirrin is with specified reque.

Do not connect a surge killer to the inverter's output (secondary) circuit. Be sure to connect an optional DC reactor (DCR) when the capacity of the power supply transformer exceeds 500 kVA and is 10 times or more the inverter rated

insure that the number of input phases and the rated voltage of the product match the number of phases and the voltage of the AC power supply to which the product

Doing so could cause fire or an accident. In general, sheaths of the control signal wires are not specifically designed to withstand a high voltage (i.e., reinforced insulation is not applied). Therefore, if a control signal wire comes into direct contract with a live conductor of the main circuit, the insulation of the sheath might break down, which would expose the signal wire to a high voltage of the main circuit. The sure that the control signal wires will not come into contact with live conductors of the main circuit. The sure sheath control signal wire to a high voltage of the main circuit. The sure that the control signal wire will not come into contact with live conductors of the main circuit. Before changing the switches or touching the control circuit triminal symbol plate, turn OFF the power and wait at least five minutes for inverters FRN0115E2■-2□ / FRN007E2■-4□ / FRN00115E2■-7□ or below, or at least ten minutes for inverters FRN0085E2■-4□ or above. Make sure that the LED monitor and charging lamp are turned OFF. Further, make sure, using a multimeter or a similar instrument, that the DC link bus voltage between the terminals P(+) and N(-) has dropped to the safe level (+25 VDC or below). Otherwise, an electric shock could occur.

Do not operate switches with wet hands. **Doing so could cause electric shock.** If the auto-reset function has been selected, the inverter may automatically restart and drive the motor depending on the cause of tripping. Design the machinery or equipment so that human safety is ensured at the time of restarting. **Otherwise, an accident could occur.** If the stall prevention function (current limiter), automatic deceleration (anti-regenerative control), or overload prevention control has been selected, the inverter may operate with acceleration/deceleration or frequency different from the commanded ones. Design the machines to that safety is ensured even in such cases. When the knowled operation is disabled

The 📾 key on the keypad is effective only when the keypad operation is enabled with function code F02 (= 0, 2 or 3). When the keypad operation is disabled

prepare an emergency stop switch separately for safe operations. Switching the run command source from keypad (local) to external equipment (remote) by turning ON the "Enable communications link" command LE disables the

If any of the protective functions have been activated, first remove the cause. Then, after checking that the all run commands are set to OFF, release the alarm. If the alarm is released while any run commands are set to ON, the inverter may supply the power to the motor, running the motor.

alarm is released while any run commands are set to ON, the inverter may supply the power to the motor, running the motor. Otherwise, an accident could occur. If you enable the "Restart mode after momentary power failure" (Function code F14 = 3 to 5), then the inverter automatically restarts running the motor when the

power is recovered. Design the machinery or equipment so that human safety is ensured after restarting. If the user configures the function codes wrongly without completely understanding the User's Manual, the motor may rotate with a torque or at a speed not permitte

for the machine. Starting auto-tuning involves motor rotation. Sufficiently check that motor rotation brings no danger beforehand. An accident or injuries could occur. Even if the inverter has interrupted power to the motor, if the voltage is applied to the main circuit input terminals L1/R, L2/S, L3/T, L1/L and L2/N, voltage may be output to inverter output terminals U, Y, and W. Even if the motor is stopped due to DC braking or preliminary excitation, voltage is output to inverter output terminals U, V, and W.

The inverter can easily accept high-speed operation. When changing the speed setting, carefully check the specifications of motors or equipment beforehand. Otherwise, injuries could occur.

and inspection, and parts replacement • Before proceeding to the maintenance/inspection jobs, turn OFF the power and wait at least five minutes for inverters FRN0115E2∎-2□ / FRN007E2E∎-4□ / FRN001E2B→T□ or below, or at least ten minutes for inverters FRN0085E2∎ 4□ or above. Make sure that the LED monitor and charging lamp are turned OFF. Further, make sure, using a multimeter or a similar instrument, that the DC link bus voltage between the terminals P(+) and N(-) has dropped to the safe level (+25

Always carry out the daily and periodic inspections described in the instruction/user's manual. Use of the inverter for long periods of time without carrying out regular inspections could result in mafunction or damage, and an accident or fire could occur. It is recommended that periodic inspections be carryout every one to two years, however, they should be carried out more frequently depending on the usage $\frac{1}{2}$

conditions. It is recommended that parts for periodic replacement be replaced in accordance with the standard replacement frequency indicated in the user's manual. Use of the product for long periods of time without replacement could result in malfunction or damage, and an accident or fire could occur. Contact outputs [30A/B/C] use relays, and may remain ON, OFF, or undetermined when their lifetime is reached. In the interests of safety, equip the inverter with an

Application

 FRENIC-Ace is designed to drive a three-phase induction motor. Do not use it for single-phase motors or for other purposes.

is to be connected. Otherwise, a fire or an accident could occur. Do not connect the power supply wires to output terminals (U, V, and W). When connecting a DC braking resistor (DBR), never connect it to terminals other than terminals P(+) and DB. Doing so could cause fire or an accident.

peration Be sure to mount the front cover before turning the power ON. Do not remove the cover when the inverter power is ON. Otherwise, an electric shock could occur. Do not operate switches with wet hands.

(To enable the (To enable the (To key for an emergency stop, select the STOP key priority with function code H96 (= 1 or 3).

FRENIC-Ace series FRNDDDDE2D-DD

https://www.fujielectric.com/products/ac_drives_lv/frenic-ace/download/_pr/

First Edition, October 2020 INR-SI47-2364-E

In case of storing this product for certain period of time, review the environmental conditions and follow the guidance described in Instruction Manual (Detailed Version

Chapter 1 BEFORE USING THE INVERTER

1.1 Acceptance Inspection

sposal Treat the inverter as an industrial waste when disposing of it Otherwise injuries could occur.

Unpack the package and check the following

An inverter and the following accessories are contained in the package. An inverter and the following accessories are contained in the package. Accessories
DC reactor (for ND-mode inverters of FRN0139E2=4G_ or above, HD/HND-mode inverters of FRN0168E2=4G_ or above, and HHD-mode inverters of FRN0203E2=4G_ or above) (Not included with the FRN****E2=4C(china model) Keypad rear cover (with three screws for securing the keypad) Instruction manual

ACAUTION



Product number Manufacturing date T31A123A0579E A

 Production week: This indicates the week number that is numbered from 1st week of January.
 The 1st week of January is indicated as '01'.
 Production year: Last digit of year Product version

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

Chapter 2 INSTALLATION AND WIRING

2.1 Usage environment

	Table 2.1-1 Usage Envir	onment		
Item	5	Specifications		
Site location	Indoors	Indoors		
Ambient temperature	Standard (Open Type) • 10 to +50°C (14 to 122°F) (HHD/HND spec.) (Note 1), -10 NEMA/UL Type1 • 10 to +40°C (14 to 104°F) (HHD/HND spec.) -10 to +30°C	Standard (Open Type) • 10 to +50°C (14 to 122°F) (HHD/HND spec.) (Note 1), -10 to +40°C (14 to 104°F) (HD/ND spec.) NEMA/UL Type1		
Relative humidity	5 to 95% RH (No condensation)			
Atmosphere	The inverter must not be exposed to dust, direct sunlight, corrosive gases, flammable gases, oil mist, vapor or water drops. Pollution degree 2 (IEC60664-1) (Note 2) The atmosphere can contain a small amount of salt (0.01 mg/cm ² or less per year). The inverter must not be subjected to sudden changes in temperature that will cause condensation to form.			
Altitude	1,000 m (3,300 ft) max. (Note 3)			
Atmospheric pressure	86 to 106 kPa			
Vibration	FRN0115E2=-2 or below, FRN0203E2=-4 or below FRN0011E2=-7 or below	FRN0240E2∎-4□ or above		
	3 mm (Max. amplitude), 2 to less than 9 Hz 9.8 m/s ² 9 to less than 20 Hz 2 m/s ² 20 to less than 55 Hz 4 m/s ² 55 to leas than 200 Hz	3 mm (Max. amplitude), 2 to less than 9 Hz 2 m/s ² 9 to less than 55 Hz 1 m/s ² 55 to less than 200 Hz		

(Note 2) Do not install the inverter in an environment where it may be exposed to lint, cotton waste or moist dust or dirt which will cloa the heat sink of the inverter. If the inverter is to be used in such an environment, install it in a dustproof panel of your system. (Note 3) If you use the inverter in an altitude above 1,000 m (3,300 ft), you should apply an output current derating factor as listed in Table 2.1-2. Table 2.1-2 Output Current Derating Factor in Relation to Altitude

· · · · ·	5
Altitude	Output current derating factor
1,000 m or lower (3,300 ft or lower)	1.00
1,000 to 1500 m (3,300 to 4,900 ft)	0.97
1,500 to 2,000 m (4,900 to 6,600 ft)	0.95
2,000 to 2,500 m (6,600 to 8,200 ft)	0.91
2,500 to 3,000 m (8,200 to 9,800 ft)	0.88

2.2 Installation 2.2.1 Installation Surface

Please install the inverter on non

Install on non-combustible matter such as metals. Risk of fire exists

2.2.2 Surrounding Space Secure the space shown in Figure 2.2-1 and Table 2.2-1. When enclosing FRENIC-Ace in cabinets, be sure to provide adequate ventilation to the cabinet, as the surrounding

stible matter such as metals. Also, do not mount it upside down or horizontally

temperature may rise. Do not contain it in small enclosures with low heat dissipation capacity.

 Installation of Multiple Inverters
 When installing 2 or more units in the same equipment or cabinet, generally mount them to the side of each other, not above each other. When the inverters are mounted above each other, attach partitioning boards to prevent that the heat dissipated from the lower inverter affects the upper inverter. For types FRN0072E2:..40, FRN0115E2:..20, FRN0011E2:..70 or below and for ambient temperature below 40°C only, the units can be installed side by side without any spacing between them. (30°C or lower for ND and HD) Table 2.2-1 Surrounding Space mm (inch) A B



Internal heat dissipation (30%) 10% Internal air intake Figure 2.2-2 Installation with

External Cooline



Figure A

Figure C

external protective function. Otherwise, an accident or fire could occur. Maintenance, inspection, and parts replacement should be made only by qualified persons. Take off the watch, rings and other metallic objects before starting work.

Use insulated tools. Otherwise, an electric shock or injuries could occur. Never modify the inverter. Doing so could cause an electric shock or injuries.

Otherwise, an electric shock could occur

for the machine

VDC or below

Installation
• Do not support the inverter by its front cover during transportation.
Doing so could cause a drop of the inverter and injuries.
• Prevent link, paper fibers, sawdust, dust, metallic chips, or other foreign materials from getting into the inverter or from accumulating on the heat sink.
• When changing the positions of the top and bottom mounting bases for external cooling, use only the specified screws.

Otherwise, a fire or an accident might result. Do not install or operate an inverter that is damaged or lacking parts. Doing so could cause fire, an accident or injuries.

iring The inverter, motor and wiring generate electric noise. Be careful about malfunction of the nearby sensors and devices. To prevent them from malfunctioning, implement noise control measures. Otherwise an accident could occur.

Jperation
 On not touch the heat sink and braking resistor because they become very hot.
 Doing so could cause burns.
 The DC brake function of the inverter does not provide any holding mechanism.

Injuries could occur

Injuries could occur. Ensure safety before modifying the function code settings. Run commands (e.g., "Run forward" *FWD*), stop commands (e.g., "Coast to a stop" *BX*), and frequency change commands can be assigned to digital input terminals. Depending upon the assignment states of those terminals, modifying the function code setting may cause a sudden motor start or an abrupt change in speed. When the inverter is controlled with the digital input signals, switching run or frequency command sources with the related terminal commands (e.g., *SS1*, *SS2*, *SS4*, *SS8*, *Hz2Hz1*, *HzPID*, *IVS*, and *LE*) may cause a sudden motor start or an abrupt change in speed. Ensure safety before modifying customizable logic related function code settings (U codes and related function codes) or turning ON the "Cancel customizable logic" terminal command *CLC*. Depending upon the settings, such modification or cancellation of the customizable logic may change the operation sequence to cause a sudden motor start or an unexpected motor operation. An accident or injuries could occur.

C. Space in hold of the invertee unit
 Country
 Country

2.2.3 Removal and attachment of the front cover/ terminal cover and wiring guide

Always remove the RS-485 communication cable from the RJ-45 connector before removing the front cover. Risk of fire and risk of accidents exist.

(1) Types FRN0020E2a-2□/ FRN0012E2a-4□/ FRN0011E2a-7□ or below 1) Loosen the screws of the terminal cover. To remove the terminal cover, put your finger in the dimple of the terminal cover and then pull it up toward you. 2) Pull out the wiring guide toward you. 3) After routing the wires, attach the wiring guide and the terminal cover reversing the steps above.



 (2) Types FRN0030E2=-2□ to FRN0069E2=-2□ and FRN0022E2=-4□ to FRN0044 E2=-4□
 1 Loosen the screws of the terminal cover. To remove the terminal cover, put your finger in the dimple of the term
 Pull out the wiring guide toward you.
 After routing the wires, attach the wiring guide and the terminal cover reversing the steps above. rminal cover and then pull it up toward you



Figure 2.2-4 Removal of the Terminal Cover and the Wiring Guide (for FRN0069E2=-2□) (3) Types FRN0088E2∎-2□/ FRN0115E2∎-2□/ FRN0072E2∎-4□/ FRN0085E2∎-4□ Loosen the screws of the front cover. Hold both sides of the front cover with the hands, slide the cover downward, and pull. Then remove it to the upward direction. Push the wiring guide upward and pull. Let the wiring guide slide and remove it. After routing the wires, attach the wiring guide and the front cover reversing the steps above.



Front cover Wiring guide Let the guide slide Figure 2.2-5 Removal of the Front Cover and the Wiring Guide (for FRN0072E2=-4□)

Single-phas 200 V

Single-pha



ree-phas 200 V

Three-phas 400 V

Three-phas 400 V





2.2.4 Terminal arrangement and screw specifications 2.2.4.1 Arrangement of the main circuit terminals

(4) Types FRN0085E2∎-4□ or above

specifications for the screws used in the main circuit wiring and the wire sizes are shown below. Exercise caution as the terminal position varies depending on inverter city. In the diagram in *2.2.4.2 Terminal layout diagram (main circuit terminal), the two ground terminals (GG) are not differentiated for the input side (primary side) and utput tief dependent wields). The specifica ne output side (se Also, use citizenal state, in the state of t cabinet temperature and wire type.

Table 2.2-2 Screw Specifications

						Screw specing	cations				
		Secitor	Main circuit		Grounding		Auxiliary power input for control (R0, T0)		Auxiliary power input		
Power System	Inverter type	2.2.4.2	Tightening		<u> </u>	Tiahtenina	Tightening		IOFTAIL	Tightening	
			(driver size)	torque	(driver size)	torque	Screw size	torque	Screw size	torque	
	FRN0001E2S-2			IN•m (ID-In)		IN•m (ID-IN)		N•m (ID-In)		N•m (ID-In)	
	FRN0002E2S-2□	Fig. a	M3 5	0.8	M2.5	1.2					
	FRN0004E2S-2□	riy. a	1010.0	(7.1)	1010.0	(10.6)					
	FRN0006E2S-2										
	FRN0010E2S-2	Fig. b	M4	1.2	M4	1.8	_	_			
Three-phase 200 V	FRN0020E2S-2	Fig. c		(10.6)		(15.9)			_	_	
200 4	FRN0030E2S-2□	Fig. A	M5	3.0	M5	3.0					
-	FRN0040E2S-2			(26.6)		(26.6)					
	FRN0050E2S-2	Fig. B	(No.3)	(51.3)	(No.3)	5.8 (51.3)					
	FRN0088E2S-2□	Fig. C	M6	5.8	M6	5.8	M2 5	1.2			
	FRN0115E2S-2□	Fig. C	(No.3)	(51.3)	(No.3)	(51.3)	1013.5	1.2			
	FRN0001E2E-2										
	FRN0002E2E-2	Fig. a	M3.5	0.8 (7.1)	M3.5	1.2 (10.6)					
	FRN0006E2E-2			. ,		,					
	FRN0010E2E-2□			12		1.8					
Three-phase	FRN0012E2E-2	Fig. h	M4	(10.6)	M4	(15.9)	-	-			
200 V	FRN0020E2E-2		Input: M4	Input: 1.8 (15.9)		3.0			_	_	
	FRN0040E2E-2□	Fig. i	Other: M5	Other: 3.0 (26.6)	M5	(26.6)					
	FRN0056E2E-2□	Fig. i	M6	Input: 8.1 (71.7)	M6	5.8					
	FRN0069E2E-2		(No.3)	Other: 5.8 (51.3)	(No.3)	(51.3)					
	FRN0115E2E-2	Fig. C	(No.3)	5.8 (51.3)	(No.3)	5.8 (51.3)	M3.5	1.2			
	FRN0002E2S-4		. ,			. ,					
	FRN0004E2S-4	Fig. b		1.2 (10.6)		1.8					
	FRN0006E2S-4	· ·g· 2	M4		M4	(15.9)		1			
	FRN0007E2S-4	Fig. c					_	_	-		
	FRN0022E2S-4	Fig. A	ME	3.0	ME	3.0					
	FRN0029E2S-4	Fig. A	GM	(26.6)	CIVI	(26.6)	-				
	FRN0037E2S-4	Fig. B	M6 (No. 3)	5.8	M6 (No.3)	5.8 (51.3)				-	
Three-phase	FRN0044E2S-4		(NO. 5)	5.8	(NO.5)	5.8			-		
	FRN0072E2S-4	Fig. C	(No. 3)	(51.3)	(No.3)	(51.3)					
400 V	FRN0085E2S-4										
	FRN0105E2S-4	Fig. D	M8	13.5 (119) 27 (239) 48 (425)				1.2 (10.6)			
	FRN0168E2S-4				M8 M10	13.5 (119)	M3.5		M3.5		
	FRN0203E2S-4	Fig. E									
	FRN0240E2S-4	Fig. F	M10								
	FRN0290E2S-4	•				27 (239)				1.2	
	FRN0415E2S-4	Fig. G	M12							(10.6)	
	FRN0520E2S-4	Fig. H									
	FRN0590E2S-4										
	FRN0002E2E-4			M4 1.2 (10.6)	M4	1.8 (15.9)					
	FRN0006E2E-4	Fig. g	M4								
	FRN0007E2E-4□										
	FRN0012E2E-4	Fig. h						-			
	FRN0022E2E-4	Fig. i	Input M4 Output M5	Input: 1.8 (15.9) Other: 3.0 (26.6)	M5	3.0 (26.6)					
	FRN0037E2E-4	Eig i	Input M4	Input: 1.8 (15.9)	M6	5.8				-	
	FRN0044E2E-4□	Fig. j	Output M6	Other: 5.8 (51.3)	(No.3)	(51.3)					
Three shoes	FRN0059E2E-4	Fig. C	M6 (No. 3)	5.8	M6 (No.3)	5.8 (51.3)					
400 V	FRN0072E2E-4		(110.0)	(01.0)	(110.0)	(01.0)					
	FRN0105E2E-4□	Fig. D	M8	13.5							
	FRN0139E2E-4	r ig. D	mo	(119)		13.5					
	FRN0168E2E-4	Fig. F			M8	(119)	M3 5	1.2			
	FRN0240E2E-4	Fig. E	M10	27				(10.6)			
	FRN0290E2E-4	FIG. F		(200)						12	
	FRN0361E2E-4	Fig. G		40		07			M3.5	(10.6)	
	FRN0520E2E-4		M12	48 (425)	M10	(239)					
	FRN0590E2E-4□	Fig. H									
	FRN0001E2S-7										
0	FRN0002E2S-7	Fig. k	M3.5	0.8	M3.5	1.2					
Single-phase 200 V	FRN0005E2S-7			(7.1)		(10.0)	-			-	
	FRN0008E2S-7	Fig. I	M4		M4	1.8					
	FRN0011E2S-7	Fig. m	11/14	(10.6)	1914	(15.9)					
	FRN0001E2E-7			0.9		10					
Single-phase	FRN0003E2E-7	Fig. k	M3.5	(7.1)	M3.5	(10.6)					
200 V	FRN0005E2E-7									—	
	FRN0008E2E-7	Fig. n	M4	1.2	M4	1.8					
	FRINUUTIEZE-/L	rig. n		(10.0)		(13.9)					

2.2.4.2 Terminal layout diagram (main circuit terminal)

The following terminals will have high voltage when power is ON. Main circuit: L1/R, L2/S, L3/T, L1/L, L2/N, P1, P(+), N(-), DB, U, V, W, R0, T0, R1, T1

: Basic insulation (overvoltage category III, degree of contamination 2) : Enhanced insulation (overvoltage category III, degree of contamination 2) Risk of electric shock exists







The recommended wire sizes for the main circuit terminals assume using 75°C 600 V HIV wire.

For compatible crimped terminals, please use model 8-L6 by JST Mfg. Co., Ltd. or equivalent. For compatible crimped terminals, please use model CB 150-10 by JST Mfg. Co., Ltd. or equivalent. For compatible crimped terminals, please use model 38-6 by JST Mfg. Co., Ltd. or equivalent.

2.2.6 Screw specifications and recommended wire size (control circuit terminals)

The screw specifications and wire sizes to be used for control circuit wiring are shown below. The control circuit terminal board differs depending on the destination.

Table 2.2-4 Screw Specifications and Recommended Wire Sizes

Terminal	Screw specification		Allowable wire sizes	Driver (shape of tip)	Removal size of wire cover	Gauge size
symbol	Size	Tightening torque		Differ (enape of ap)	. <i>l</i> .	insert wire
30A, 30B, 30C EN1, EN2	M3	0.5 N·m (4.43 lb-in)	0.14 to 1.5 mm ² (AWG26 to 16)	Minus (0.6mm×3.5mm)	6 mm (0.24 in)	A1 *1
Others	M2	0.19 N·m (1.68 lb-in)	0.25 to 1 mm ² (AWG24 to 18)	Minus (0.4mm×2.5mm)	5 mm (0.20 in)	φ1.6
* Recommended rod terminal: Phoenix Contact			Refer to Table 2.2-5 for details.	*1 Defi	ned according to IEC/EN 60947-	1.

Table 2.2-5 Recommended Rod Terminals

Ser	ow size	Wire size	Туре			
Screw size		VVIIC 3126	With insulating collar	Without insulating collar		
		0.25 mm ² (AWG24)	AI 0.25-6 BU	A 0.25-7		
	M2	0.34 mm ² (AWG22)	AI 0.34-6 TQ	A 0.34-7		
142		0. 5 mm ² (AWG20)	AI 0.5-6 WH	A 0.5-6		
IVI3		0.75 mm ² (AWG18)	AI 0.75-6 GY	A 0.75-6		
	Г	1 mm ² (AWG18)	AI 1-6 RD	A 1-6		
Ī		1.5 mm ² (AWG16)	AI 1.5-6 BK	A 1.5-7		



Figure 2.2-7 Standard Terminal Block Board (with CAN)

(Note 1) Install recommended circuit breakers (MCCB) or residual-current-operated protective device (RCD)/ earth leakage breakers (ELCB) (with overcurrent protective function) on the inputs of each inverter (primary side) for wiring protection. Do not use breakers which exceed the recommended rated current.
 (Note 2) Install recommended magnetic contactors (MC) as necessary on each inverter as these will be used to disconnect the inverter from the power supply separately from the MCCB or RCD / the ELCB. Additionally, when installing coils such as MC or solenoid close to the inverter. Instell recommended magnetic contactors (MC) as necessary on each inverter as these will be used to disconnect the inverter from the power supply separately from the MCCB or RCD / the ELCB. Additionally, when installing coils such as MC or solenoid close to the inverter. Interest such as been will be used to disconnect such as borbers in parallel.
 (Note 3) When it is desired to retain the alarm signal for the activation of the protective function even inverter main power supply is shut off, or when it is desired continuous display of the keypad, connect this terminal to the power supply. The inverter can be operated without connecting power to this terminal (applicable for types FRN0059E2=4-0 FRN0008E2=-20 or above)
 (Note 4) The terminal does not need to be connected. Use this terminal when operating in combination with a high power factor regenerative PWM converter (RHC series). Applicable for types FRN2052=-40 or above)

- The terminal description of the connected Lise this terminal when operating in combination with a high power factor regenerative PWM of Applicable for types FRN0203E2**e**-4 or above) Remove the shorting bar between the inverter main circuit terminals P1-P(+) before connecting the direct current reactor (DCR) (option).

 Note of provide the shorting par between the inverter main circuit terminals P1-P(+) before connecting the direct current reactor (DCR) (option). It must be connected in the following cases:
 ND mode: Types FRN0192 E2=4.Cl or above, H// ND mode: Types FRN0168E2=4.Cl or above, HHD mode: Types FRN0203E2=4.Cl or above. Use the direct current reactor (option) when the power supply transformer capacity is above 500 kVA and the transformer capacity is over 10 times the rated capacity of the inverter, or when 'thyristor load exists' in the same power system.
 (Note 6) Types FRN01152=-CI/FRN01152=-CI/FRN0172E2=4Cl or below have built-in braking transistors, allowing direct connection of braking resistors between P(+)_DB. P(+)-DB.
 (Note 7) When connecting braking resistors to types FRN0085E2=4 - or above, always add the braking unit (option). Connect the braking unit (option) between P(+)-N(-). Auxiliary terminals (1] and [2] have polarity. Please connect as shown in the diagram.
 (Note 8) This terminal is used for grounding the motor. Grounding the motor using this terminal is recommended in order to suppress inverter noise.
 (Note 9) The twisted lines or shielded lines for the control signals.

- Senerally, the shielded line requires grounding, but when the effect of externally induced noise is large, connecting to [CM] may suppress the effect of noise. Separate the line from the main circuit wiring and do not enclose in the same duct. (Separation distance of over 10 cm is recommended.) When crossing the main
- Separate the line from the main circuit wring and do not enclose in the same duct. (Separation distance of over 10 cm is recommended.) When crossing the main circuit wring, make the intersection perpendicular. (Note 10) The various functions listed for terminals[X1] to [X5](digital inputs), terminals [Y1] to [Y2](transistor output), and terminal [FM] (monitor output) show the functions assigned as factory default. (Note 11) These are connectors for switching the main circuit. (Note 12) The side switches on the control printed circuit board define the settings for the inverter operation. (Note 13) Make the circuit breakers (MCCB) or the magnetic contactors (MC) trip by the thermal relay auxiliary contacts (manual recovery). (Note 14) Shorting bars are connected between the safety function terminals [EN1], [EN2], and [PLC] as factory default. Remove the shorting bars when using this function. (Note 16) Charge lamp does not exist in the inverters FRN0069E2=-2□/FRN0044E2=-4□/FRN0011E2e-7□ or below.

2.2.8 Description of terminal functions 2.2.8.1 Main circuit termina

Table 2.2-6 Eunctional Description of Main circuit terminals

Classifi cation	Terminal symbol Terminal name		Specification				
	L1/R, L2/S, L3/T	Main power input	Terminals to connect Three-phase power source.				
	L1/L, L2/N	Main power input	Terminals to connect Single-phase power source.				
	U, V, W	Inverter output	Terminals to connect Three-phase motors.				
Main	P (+), P1	For direct current reactor connection	Terminals to connect DC reactor (DCR) for power factor enhancement. It must be connected in the following cases: ND mode: Types FRN0139E2∎-4⊟ or above. HD/HND mode: Types FRN0168E2∎-4⊟ or above. HHD mode: Types FRN028E2∎-4⊟ or above.				
circuit	P (+), N (-)	For direct current bus onnection	Terminals to connect direct current intermediate circuit of other inverters and PWM converters.				
	P (+), DB	For braking resistor connection	Terminals to connect a braking resistor (optional). Wiring length: Below 5 meters. (Types FRN0115E2∎-2□/FRN0072E2∎-4□/ FRN0011E2∎-7□ or below)				
	📮 G	For inverter chassis (case) grounding	Grounding terminal for inverter chassis (case).				
	R0, T0	Auxiliary power input for control circuit	When it is desired to retain the alarm signal for the activation of the protective function even inverter main power supply shut off or when continuous display of the keypad is desired, connect this terminal to the power supply. (Types FRN0088E2=4-dL)rFRN0058E2=4-dL or above)				

2.2.8.2 Control circuit terminal

Table 2.2-7 shows the functional explanations for the control circuit terminals. The connection method of the control circuit terminals differs depending on the functional code setting matching the purpose of inverter operation. Properly wire such that the impact of noise generated by the main circuit wiring is reduced. Table 2.2-7 Functional Description of Control circuit terminals

Classifi- cation	Terminal symbol	Terminal name	Specification
	[13]	Power supply for the otentiometer	The terminal is used for the power supply (DC+10 V 10 mA Max) for the external frequency command potentiometer (variable resistor: 1 to 5 kΩ). Connect variable resistors larger than 1/2 W.
Analog input	[12]	Analog setup voltage input	 (1) Frequency is set up according to the external analog voltage input command value. Normal operation DC0 to +10 V/0 to 100(%) (DC0 to +5 V/0 to 100%) DC0 to ±10 V/0 to 100(%) (DC0 to ±5 V/0 to ±100%) Reverse operation DC+10 to 0V/0 to 100(%) (DC+5 to 0 V/0 to 100%) DC+10 to 0V/0 to 100(%) (DC+5 to 0V/0 to ±100%) DC+10 to 0V/0 to ±100(%) (DC+5 to 0V/0 to ±100%) (2) The terminal can be assigned to PID command, feedback signal of PID control, auxiliary frequency setup, ratio setup, torque limit setup, and analog input monitor aside from the frequency setup by analog input. (3) Hardware specification. * Up to DC+15 V can be input. However, input exceeding DC±10 V will be recognized as DC±10 V.
	[C1]	Analog setup current input (C1 function)	 Frequency is set up according to the external analog current input command value. Normal operation DC4 to 20 mA/0 to 100(%)/-100% to 0 to 100% DC0 to 20 mA/0 to 100(%)/-100% to 0 to 100% DC20 to 4 mA/0 to 100(%)/-100% to 0 to 100% DC20 to 4 mA/0 to 100(%)/-100% to 0 to 100% DC20 to 4 mA/0 to 100(%)/-100% to 0 to 100% C220 to 4 mA/0 to 100(%)/-100% to 0 to 100% C20 to 4 mA/0 to 100(%)/-100% to 0 to 100% C20 to 4 mA/0 to 100(%)/-100% to 0 to 100% C20 to 4 mA/0 to 100(%)/-100% to 0 to 100% C20 to 4 mA/0 to 100(%)/-100% to 0 to 100% (2) The terminal can be assigned to PID command, feedback signal of PID control, auxiliary frequency setup, ratio setup, torque limit setup, and analog input monitor aside from the frequency setup by analog input. (3) Hardware specification Input impedance: 250 (Ω), Up to DC 30 mA can be input. However, input exceeding DC 20 mA will be recognized as DC 20 mA.
		Analog setup voltage input (V2 function)	 (1) Frequency is set up according to the external analog voltage input command value. SW3 must be switched on the printed circuit board. Normal operation DC0 to +10 V/0 to 100(%) (DC0 to +5 V/0 to 100%) DC0 to +10 V/0 to 100(%) (DC0 to +5 V/-100 to 0 to 100%) Reverse operation DC+10 to 0 V/0 to 100(%) (DC +5 V to 0 V/0 to 100%) DC+10 to 0 V/10 to 100(%) (DC +5 V to 0 V/0 to 100%) DC+10 to 0 V/10 to 100 (%) (DC +5 to 0 V/-100 to 0 to 100%) (2) The terminal can be assigned to PID command, feedback signal of PID control, auxiliary frequency setup, ratio setup, torque limit setup, and analog input monitor aside from the frequency setup by analog input. (3) Hardware specification. * Input impedance: 22(kt2), Up to DC+15 V can be input. However, input exceeding DC+10 V will be recognized as DC+10 V.
		PTC thermistor input (PTC function)	PTC (Positive Temperature Coefficient) thermistor for motor protection can be connected. SW3 (C1/V2 Switch) and SW4 (PTC /AI Switch) must be switched on the printed circuit board.
		Analog input monitor (AI function)	The analog input monitor can be used to monitor the status of peripheral instruments using communication by inputting the analog signals of various sensors such as temperature sensors. Data can be converted to physical property values such as temperature and pressure by using display factors and shown on the keyped display.
	[11]	Analog input common	The terminal is the common terminal for analog input signals (terminals [12], [13], [C1]). The terminal is insulated from terminals [CM], [CMY].
	[X1]	Digital input 1	(1) Various signals (coast to a stop command, external alarm, multi-speed selection, etc) set up by function codes E01 to E05_E08_E09 can be set up
	[X2]	Digital input 2	(2) Input mode, sink/source can be switched using SW1.
	[X3]	Digital input 3	(3) The operating mode of the various digital input terminals when connected with terminal CM (sink mode) / PLC (source mode) can be switched to "ON when shorted with CM/PLC (active ON)" or "OFF when shorted with CM/PLC
	[X4] [X5]	Digital input 4 Digital input 5/pulse	(active OFF)" (4) Digital input terminal [X5] can be set up as a pulse train input terminal by changing the function code Maximum wiring length 20 meters
-	[FWD]	Run forward command	Maximum input pulse 30 kHz: When connected to open collector output pulse generator
Indu	[REV]	Run reversecommand	100 kHz: When connected to complementary output pulse generator
Digital ir	[EN1] [EN2]	Enable input	 When terminals [EN1]-[PLC] or terminals [EN2]-[PLC] are OFF, the inverter output transistors stop switching (safe torque off: STO). Be sure to operate terminals [EN1] and [EN2] simultaneously; otherwise an ecf alarm is issued and the operation of the inverter will be disabled. To enable the Enable function, remove the short bar. The input mode for terminals [EN1] and [EN2] is fixed to source. The mode cannot be switched to sink. Short terminals [EN1]-[PLC] and [EN2] - [PLC] using shorting bars when the enable input function is not used (Keep the shorting bar connected).
	[PLC]	Programmable controller signal power source	(1) The terminal is used for connecting the output signal power source of the programmable controller (rated voltage DC +24 V (power supply voltage fluctuation range: DC +22 to +27 V) maximum 100 mA). (2) The terminal can also be used for the power source for the load connected to the transistor outputs. For details, refer to the page on "Transistor outputs".
1	[CM]	Digital common	This terminal is the common terminal for digital input signals. This terminal is insulated from terminals [11] and [CMY].

Classifi- cation	Terminal symbol	Terminal name	Specification			
g output/ pulse output	[FM]	Analog monitor FMV function FMI function	This terminal outputs analog direct current voltage DC0 to 10 V or analog direct current DC4 to 20 mA / DC0 to 20mA monitor signal. The output form (FMV/FMI) can be switched using SW5 on the printed circuit board and function code F29. The signal content can be chosen in the function code F31 data setting among the following items. • Output frequency 1 (before silp compensation) • Output frequency 2 (after silp compensation) • Output current • Output voltage- Output torque + Load factor • Input power • PID feedback value • Actual speed/estimated speed • DC link bus voltage- Universal A0 • Motor output • Calibration (+) • PID command (SV) • PID output (MV) • Position error in master-follower operation• Inverter heat sink temperature • PC feedback value • Allowable impedance for connection: Min 5 Ω (at DC to 10 V output) (up to 2 analog volt meters (DC0 to 10 V, input impedance 10 kC1) can be connected.) • Allowable impedance for connection: Max 500 Ω (at DC4 to 20 mA/DC0 to 20 mA) • Gain adjustable range: 0 to 300%			
Analog		Pulse monitor FMP function	The terminal outputs pulse signal. Signal content can be chosen same as for the FMV function by function code F31 setting. The output form (FMP) can be switched using SW5 on the printed circuit board and function code F29. *Allowable impedance for connection: Min. S kΩ (at DC to 10 V output) (up to 2 analog volt meters (DC0 to 10 V, input impedance 10 kΩ) can be connected.) *Pulse duty: Approximately 50%, pulse rate: 25 to 32000 p/s (at full scale)			
	[11]	Analog output common terminal	This terminal is the common terminal for analog input and analog/pulse output signals. The terminal is insulated from terminals [CM] and [CMY].			
ansistor utputs	[Y1] [Y2]	Transistor output 1 Transistor output 2	 Various signals (running signal, frequency reached signal, overload forecast signal, etc) set up by function code E20, E21 can be output. The operating mode of the transistor output terminals [Y1], [Y2] can be switched to "ON (active ON) at signal output" or "OFF (active OFF) at signal output". 			
o Tra	[CMY]	Transistor output common	This terminal is the common terminal for transistor output signals. This terminal is insulated from terminals [CM] and [11].			
to the product of th		 When the inverter stops with an alarm, output is generated on the relay contact (1C). Contact rating: AC250 V 0.3 A cosb = 0.3, DC48 V 0.5 A Terminals can be switched to "Terminals [30A to 30C] shorted (excitation: active ON) at ON signal output" or "Terminals [30A to 30C] open (non-excitation: active OFF) at ON signal output" 				
unication	RJ-45 connector for keypad connection	RJ-45 connector for keypad connection RS-485 communication port 1	 Used to connect the keypad. The power to the keypad will be supplied from the inverter through this connector. Also can be used to connect a computer, programmable controller, etc by RS-485 communication, after removing the keypad. Pins 1, 2, 7, and 8 are assigned as power supply source for the keypad. When connecting this RJ-45 connector to other devices, do not use these pins. 			
Comm	RJ-45 connector for RS-485 /CANopen communica-tion	RS-485 communication port 2 CANopen communication port	 Can be used to connect a computer, programmable controller, etc by RS-485 communication. Also can be used to connect a computer, programmable controller, etc by CANopen communication. 			

Chapter 3 OPERATION USING THE KEYPAD

NIC-Ace User's Manual, Chapter 3 for details of the keypad

3.1 Names and Functions of Keypad Components The keypad allows you to run and stop the motor, display various data, configure function code data, and monitor I/O signal states, maintenance information and alarm

> -segment LED monito UP kev

> > Table 3.1-1 Overview of Keypad Functions

Item	LED Monitor, Keys, and LED Indicators	Functions					
LED Monitor	<i>5000</i>	Four-digit, 7-segment LED monitor which displays the followings according to the operation modes. In Running mode: Running status information (e.g., output frequency, current, and voltage) When a light alarm occurs, I-al is displayed. In Programming mode: Mann code, which identifies the alarm factor that has activated the protective function.					
	PRG	Program/Reset key which switches the operation modes of the inverter. In Running mode: Pressing this key switches the inverter to Programming mode. In Programming mode: Pressing this key switches the inverter to Running mode. Pressing this key after removing the alarm factor resets the alarm and switches back to Running mode.					
peration Keys	FUNC	Function/Data key which switches the operations you want to do in each mode as follows: In Running mode: Pressing this key switches the information to be displayed concerning the status of the inverter (output frequency (Hz), output voltage (V), etc.). When a light alarm is displayed, holding down this key resets the light alarm and switches back to Running mode. In Programming mode: Pressing this key displays the function code or establishes the data entered with Pressing this key displays the details of the problem indicated by the alarm code that has come up on the LED monitor.					
	RUN	RUN key. Press this key to run the motor.					
	STOP	STOP key. Press this key to stop the motor.					
	\otimes / \otimes	UP and DOWN keys. Press these keys to select the setting items and change the function code data displayed on the LED monitor.					
	\gg	Shift key. Press this key to shift the cursor to the right for entry of a numerical value.					
	RUN LED	Lights when running with a run command entered by the Θ key, by terminal command FWD or REV, or through the communications link.					
	KEYPAD CONTROL LED	Lights when the inverter is ready to run with a run command entered by the 😁 key (F02 = 0, 2, or 3). In Programming and Alarm modes, however, pressing the 😁 key cannot run the inverter even if this indicator lights.					
LED idicators	Unit LEDs (3 LEDs)	These three LED indicators identify the unit of numeral displayed on the LED monitor in Running mode by combination of lit and unit states of them. Unit: Hz, A, KW, r/min and m/min Refer to the FRENIC-Ace User's Manual, "3.3.1 Monitoring the running status" for details.					
		While the inverter is in Programming mode, the LEDs of Hz and kW light.(■Hz □A ■kW)					
	x10 LED	Lights when the data to display exceeds 9999. When this LED lights, the "displayed value x 10" is the actual value.					

		x10 LED
32	Dosti	nation setting

5.2 Destination setting For inverter type FRN****E2S/E2E-2G_/4G_/7G_ (FRENIC-Ace Global Model), the destination must be set first after the initial power supply. Without setting the destination, the function code cannot be changed. The inverter cannot be operated either. By setting the destination, basic function codes such as rated voltage, rated frequency, etc. are initialized to general values in each region (Table 3.2-1). If the destination value setting is changed after the initial destination setting, it can be changed with (des in the program mode menu or function code H101. If the destination is reset by (des, all function codes are initialized to the factory defaults. If the destination is by H101, only the function codes in Table 3.2-1 are initialized to the values in Table 3.2-1. The destination can be selected from the regions of Japan, Asia, China, Europe, Americas and Comment. If the function code set including the destination setting function code (H101) is copied with the data copy function or the FRENIC loader, manual destination setting is not

required. Set the initial destination as shown below

With (des displayed, press ⁽→) key first.
 asia (Asian region) is displayed first. For other regions, while pressing ⁽→) key and press ⁽→) key or ⁽→) key to select the destination.
 After selecting the destination, saue is displayed by pressing ⁽→) key and the destination setting is completed. Then, *.00 is displayed.

	Table 3.2-1	Initial value for eac	ch destination				
Destination	Asia	China	Europe	Americas	Korea	Japan	
LED display	asia	chn	eU	amer	kor	jpn	
H101:Destination	2	3	4	5	7	1	
F03:Maximum output frequency 1	60.0Hz (200V)	50 0H-	50.0H-	60.047	60.047	60.0Hz	
F04:Base frequency 1	50.0Hz (400V)	50.0HZ	50.0HZ	00.0HZ	00.0HZ	50.0Hz	
F05:Rated voltage at base frequency 1	220/4151/	200/2801/	200/400\/	220/460\/	220/2801/	200/400\/	
F06:Maximum output voltage 1	220/4150	200/380 v	200/4000	230/4000	220/380 V	200/4000	
F14:Restart mode after momentary power failure (Mode selection)	1	1	0	0	1	1	
F44:Current limiter (Level)	130%	130%	130%	130%	130%	180/160%	
E31:Frequency detection 1 (Level)	00 01 I= (000) ()					60 0H-	
E36:Frequency detection 2 (Level)	50.0Hz (200V)	50.0Hz	50.0Hz	60.0Hz	60.0Hz	00.0HZ	
E54:Frequency detection 3 (Level)	00.0112 (40047)					50.0Hz	
P99:Motor 1 selection	0	0	0	1	0	0	
H96:STOP key priority/ Start check function	0	0	0	3	0	0	
A01:Maximum output frequency 2	60.0Hz (200V)	50 OH-	50 0H-	60.04	60 0H-	60.0Hz	
A02:Base frequency 2	50.0Hz (400V)	50.0HZ	50.0HZ	00.0HZ	00.0HZ	50.0Hz	
A03:Rated voltage at base frequency 2	220/4151/	200/2801/	200/400\/	220/460\/	220/2801/	200/400\/	
A04:Maximum output voltage 2	220/4150	200/380 v	200/4000	230/400 v	220/300 v	200/400V	
A39:Motor 2 selection	0	0	0	1	0	0	
K01:Multifunction keypad TP-A1 (Language selection)	1	6	1	1	1	0	

Chapter 4 FUNCTION CODES The PDF manual can be downloaded from below QR code For more information of Function codes list Chapter 5 ALARM CODES The PDF manual can be downloaded from below QR code For more information of Alarm codes list



		· · · · · · · · · · · · · · · · · · ·
de	Name	Data setting range
1	Frequency setting 1	0: Keypad key operation (CMXkey), 1: Analog voltage input (Terminal [12]) (from 0 to ±10 VDC) 2: Analog current input (Terminal [C1] (C1 function)) (4 to 20mA DC, 0 to 20mA DC) 3: Analog voltage input (Terminal [C1] + Analog current input (Terminal [C1] (C1 function)) 5: Analog voltage input (Terminal [C1] + Analog current input (Terminal [C1] (C1 function)) 7: UP/DOWN control, 8: Keypad key operation (CMXkey) (With balanceless bumpless) 10: Pattern operation, 11: Digital input/output interface card (option) *5 12: Pattern operation, 11: Digital input/output interface card (option) *5
2	Operation method	0: Keypad operation (rotation direction input: terminal block) 1: External signal (digital input) 2: Keypad operation (forward rotation), 3:Keypad operation (Reverse rotation)
3	Maximum output frequency 1	25.0 to 500.0 Hz
4	Base frequency 1	25.0 to 500.0Hz
5	Rated voltage at base frequency 1	0 : AVR disable (output voltage proportional to power voltage) 80 to 240 V : AVR operation (200V class) 160 to 500V : AVR operation (400V class)
6	Maximum output voltage 1	80 to 240V : AVR operation (200V class) 160 to 500V : AVR operation (400V class)
7	Acceleration time1	0.00 to 6000 s
8	Deceleration time1	 0.00 is for acceleration and deceleration time cancel (when performing soft-start and stop externally)
9	Torque boost 1	0.0 to 20.0% (% value against base frequency voltage 1)
0	Electronic thermal overload protection for motor 1 (Select motor characteristics)	Enable (For a general-purpose motor with self-cooling fan) Enable (For an inverter-driven motor (FV) with separately powered cooling fan)
1	(Overload detection level)	0.00 (disable), current value of 1 to 135% of inverter rated current (Inverter rated current dependent on F80)
4	Restart mode after momentary power failure (Mode selection)	0: Trip immediately 1: Trip after a recovery from power failure 2: Trip after momentary deceleration is stopped 3: Continue to run (for heavy inertia load or general load) 4: Restart from frequency at power failure (for general load) 5: Restart from starting frequency
6	(Lower limit)	0.0 to 500.0Hz





Atmosphere For use in pollution degree 2 environments(for Open-Type models). 8.2 Type FRN0020E2■-2□/FRN0012E2■-4□/ FRN0011E2■-7□ or below

EMC Dire

Name	Data setting range									
Motor sound (Carrier frequ	ND mode 0.75 to 10 kHz (FRN0002 to 0059E2∎-4□) • 0.75 to 6 kHz (FRN0072E2∎-4□ or above) HD/HND mode (FRN001 to 0088E2∎-4□, FRN0002 to 0059E2∎-4□, FRN0001 to 0012E2∎-7□) • 0.75 to 10 kHz (FRN0072 to 01688E2∎-4□, FRN0115E2∎-2□) • 0.75 to 10 kHz (FRN0072 to 01688E2∎-4□, FRN0115E2∎-2□) • 0.75 to 10 kHz (FRN0072 to 0168E2∎-4□, FRN0115E2∎-2□) • 0.75 to 10 kHz (FRN0072 to 0168E2∎-4□, FRN0115E2∎-2□) • 0.75 to 10 kHz (FRN0072 to 0168E2∎-4□, FRN0115E2∎-2□) • 0.75 to 10 kHz (FRN0011 to 011E2□, 2□)									
	0.75 to10 kHz (FRN0203E2∎-4□ or above)									
Keypad (Menu display n	vde) [0: Function code data setting mode (Menu 0, Menu1, and Menu 7) 1: Function code data check mode (Menu 2 and Menu 7) 2: Fuil-menu mode									
(Rated cap	0.01 to 1000 kW (At P99 = 0 or 4, 15), 0.01 to 1000 HP (At P99 = 1)									
(Rated cu	0.00 to 2000A									
(Auto-tu	0: Disable, 1: Stop tuning, 2: Rotation tuning, 5: Stop tuning(%R1, %X)									
Motor 1 selection	0: Motor characteristics 0 (Fuji standard IM, 8-series) 1: Motor characteristics 1 (HP rating IMs) 4: Other IMs, 20: Other motors (PMSMs), 21: Motor characteristics (Fuji PMSM GNB2 series)									
	En motor onardotonolog (r djr motor or be obnog)									

Chapter 6 MAINTENANCE AND INSPECTION

6.1 Inquiries about Product and Guarantee 6.1.1 When making an inquiry

6.1.1 When making an inquiry
Upon breakage of the product, uncertainties, failure or inquiries, inform your Fuji Electric representative of the following information.
1) Inverter type, Refer to Chaptert 1*1.1 Acceptance Inspection (Nameplates and Inverter Type).
2) SER No. (serial number of equipment). Refer to Chapter 1*1.1 Acceptance Inspection (Nameplates and Inverter Type).
3) Function codes and their data that you changed. Refer tothe FRENIC-Ace User's Manual, Chapter 3*3.4.2 Checking changed function codes "Data Checking: "rep ".
4) ROM version. Refer to the maintenance item 5_14 in the FRENIC-Ace User's Manual, Chapter 3 *3.4.5 Reading maintenance information "Maintenance Information: %che".
5) Date of purchase
6) Inquiries (for example, point and extent of breakage, uncertainties, failure phenomena, and other circumstances)

6.1.2 Product warranty

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

6.1.2.1 Free of charge warranty period and warranty range

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

(2) Warranty range 1) In the event that breakdown occurs during the product's warranty period which is the responsibility of Fuji Electric. Fuji Electric will replace or repair the part of the product that has broken down free of charge at the place where the product was purchased or where it was delivered. However, if the following cases are applicable, the terms

that has broken down free of charge at the place where the product was purchased or where it was derivered. However, it the fundowing cases are applicable, we remain of this warranty may not apply. The breakdown was caused by inappropriate conditions, environment, handling or use methods, etc. which are not specified in the catalog, operation manual, specifications or other relevant documents. The breakdown was caused by the product other than the purchased or delivered Fuji's product. The breakdown was caused by the product other than Fuji's product, such as the customer's equipment or software design, etc. Concerning the Fuji's programmable products, the breakdown was caused by a program other than a program supplied by this company, or the results from using such a rowram.

Concerning the rule s program.
 The breakdown was caused by disassembly, modifications or replairs affected by a party other than Fuji Electric.
 The breakdown was caused by improper maintenance or replacement using consumables, etc. specified in the operation manual or catalog, etc.
 The breakdown was caused by a science or technical problem that was not foreseen when making practical application of the product at the time it was purchased or

delivered. The product was not used in the manner the product was originally intended to be used. The product was not used in the manner the product was originally intended to be used. The breakdown was caused by a reason which is not this company's responsibility, such as lightning or other disaster. 2) Furthermore, the warranty specified herein shall be limited to the purchased or delivered product alone. 3) The upper limit for the warranty range shall be as pecified in item (1) above and any damages (damage to or loss of machinery or equipment, or lost profits from the same, etc.) consequent to or resulting from breakdown of the purchased or delivered product shall be excluded from coverage by this warranty.

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

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

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

6.1.2.4 Transfer rights

In the case of standard products which do not include settings or adjustments in an application program, the products shall be transported to and transferred to the customer and this company shall not be responsible for local adjustments or trial operation. 6.1.2.5 Service contents The cost of purchased and delivered products does not include the cost of dispatching engineers or service costs. Depending on the request, these can be discussed

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

Chapter 7 COMPLIANCE WITH STANDARDS

7.1 Compliance with European Standards

The CE marking on Fuji products indicates that they comply with the essential requirements of the Electromagnetic Compatibility (EMC) Directive issued by the Council of the European Communities and Low Voltage Directive. Inverters that bear a CE marking are compliant with the Low Voltage Directive. Table 7.1-1 Conformity with Standards

EMC Directives	IEC/EN61800-3 : 2004/A1 Immunity : Second environment (Industrial) Emission : Applicable only when an optional EMC-compliant filter is attached : Category C Applicable only to the EMC filter built-in type of Inverters Type of FRN0012E2E-4□ or below : Category C2 (Radiated emission : With Ferritecore at the input wiring) Type of FRN0112E2F-7□, 0008E2E-7□ : Category C2, Type of FRN0006E2E-2□or7□ or below : (Conducted emission : With Ferritecore at the output wiring) (Radiated emission : With Ferritecore at the input wiring) Type of FRN0022E2E-4□ or above : Category C3										
Low Voltage Directive	IEC/EN61800-5-1										
Low voltage Directive											
Machinery Directive	EN ISO13849-1 : Cat 3/PL:e IEC/EN0204-1 : Stop Categoly 0 IEC/EN01508-1 to -7 : SIL3 IEC/EN01800-5-2 : SIL3(Functional Safety:STO) IEC/EN02061 : SIL3										
The EMC filter built-in type of the interfere with the operations of the operations of the operations of the operations of the operation operation operation operations of the operation o	FRENIC-Ace inverters is categorized as "Category C3" of the EN61800-3. It is not designed for use in a domestic environment. It may ome appliances or office equipment due to noise emitted from it.										

Maximum Surrounding Air Temperature / Maximum ambient temperature The ambient temperature shall be lower than the values in the table below

Atmosphere For use in pollution degree 2 environments(for Open-Type models).

7.1.1 Compatibility with Revised EMC Directive and Low Voltage Directive In the revised EMC Directive (2014/30/EU) and Low Voltage Directive (2014/35/EU), it is necessary to clearly state the name and the address of manufacturers and importers to enhance traceability. Importers shall be indicated as follows when exporting products from Fuji Electric to Europe.

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

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

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

Originally, the UL standards were established by Underwriters Laboratories, Inc. as private criteria for inspections/investigations pertaining to fire/accident insurance in the USA. Later, these standards were authorized as the official standards to protect operators, service personnel and the general populace from fires and other accidents in the USA. Later, Ucertification no means that UL has given certification for products to clear CSA Standards. CUL certificate drotucts are equivalent to those compliant with CSA.

standards. The inverter that UL/UL mark is displayed are subject to the regulations set forth by the UL standards and CSA standards (cUL-listed for Canada) by installation within The inverter that UL/UL mark is displayed are subject to the regulations set forth by the UL standards and CSA standards (cUL-listed for Canada) by installation within

Integral solid state short circuit protection does not provide branch circuit protection. Branch circuit protection must be provided in accordance with the National Electrical Code and any additional local codes. Solid state motor overload protection (motor protection by electronic thermal overload relay) is provided in each model.
 F10
 Electronic thermal overload protection for motor 1 (Select motor characteristics)
 1: Enable (For a general-purpose motor with self-cooling fan)

 2:
 Enable (For an inverter-driven motor with separately powered cooling fan)
 Changed with F F11 (Overload detection level) 0.00 (disable) current value of 1 to 135% of inverter rated current(Inverter rated current dependent on F80) F12 (Thermal time constant) 0.5 to 75.0 min, Refer to the graph below. Use Cu wire only.
 Use Class 1 wire only for control circuits.
 Short circuit rating Short circuit rating For Models FRN0001 to 0006E2 =-2::, FRN0088 to 0115E2 =-2:: and FRN0001 to 0005E2 =-7:: "Suitable For Use On A Circuit Of Delivering Not More Than 100,000 rms Symmetrical Amperes, 240 Volts Maximum when Protected by a Class J or Class CC Fuses or a Circuit Breaker Having An Interrupting Rating Not Less Than 100,000 rms Symmetrical Amperes, 240 Volts Minimum." For Models FRN0010 to 0069E2 =-2: and FRN0008 to 0011E2 =-7:: "Suitable For Use On A Circuit Of Delivering Not More Than 100,000 rms Symmetrical Amperes, 240 Volts Maximum when protected by Class J or Class CC Fuses.". May be provided on the instruction manual. For Models FRN0002 to 0044E2 = 4:: on Volta More Than 100,000 rms Symmetrical Amperes, 240 Volts Maximum when protected by Class J or Class CC Fuses.". May be provided on the instruction manual. For Models FRN002 to 0044E2 = 4.0.: "Suitable For Use On A Circuit Of Delivering Not More Than 100,000 rms Symmetrical Amperes, 480 Volts Maximum when protected by Class J or Class CC Fuses." For Models FRN0059E2 = 4.0 or above: "Suitable For Use On A Circuit Of Delivering Not More Than 100,000 rms Symmetrical Amperes, 480 Volts Maximum when protected by Class J or Class CC Fuses." For Models FRN0059E2 = 4.0 or above: "Suitable For Use On A Circuit Of Delivering Not More Than 100,000 rms Symmetrical Amperes, 480 Volts Maximum when protected by Class J or Class CC Fuses or a Circuit Freaker Having An Interrupting Rating Not Less Than 100,000 rms Symmetrical Amperes, 480 Volts Minimum." Field wiring connections must be made by a UL Listed and CSA Certified closed-loop terminal connector sized for the wire gauge involved. Connector must be fixed using the crimp tool specified by the connector manufacturer. Field wiring connections must be made by a UL Listed and CSA Certified closed-loop terminal connector sized for the wire gauge involved. Connector must be fixed using the criming tool specified by the connector manufacturer. All circuits with terminals L1/R, L2/S, L3/T, L1/L, L2/N, R0, T0, R1, T1 must have a common disconnect and be connected to the same pole of the disconnect if the terminals are connected to the power supply. Connection diagram of the three phase input type. A diagram of the three phases input system Discorred (MCB 0000 MCB (MCB) 00 FRN0020E2■-2□ or below, FRN0012E2■-4□ or below Connection diagram of the single phase input type. FRN0030E2■-2□ or above, FRN0022E2■-4□ or above Disconnect (MCCB or RCD/ELCB, etc.) MC Power Invereter FRN0011E2■-7□ or below . Environmental Requirements 1 Type FRN0030E2 ■-2□/FRN0022E2 ■-4□ or above • Maximum Surrounding Air Temperature / Maximum ambient temperature The ambient temperature shall be lower than the values in the table below. Enclosure Type Open Type 40 deg C 40 deg C 50 deg C 40 deg C Enclosed Type

 Enclosure Type
 ND/HD
 HND/HHD

 Open Type
 40 deg C
 50 deg C

40 deg C

Enclosed Type

50 deg C 50 deg C(HHD) 40 deg C(HND)

C	ontact output	[30A/B/C]	Inte	egrated rm outp	ut	When Conta	n the inv act capa	erter sto icitance	ops with : AC250	n an alar) V 0.3A	m, output .cosφ=1,	is gen DC30	erated o V 0.5 A	on the re	lay con	tact (1C	:).	
2. All gro	models rated ound rated sy	I 380-480 V input vo stem voltage is limit	oltage ratin ted to 300\	gs shall / maxin	be con num.	nected to T	N-C sys	stem po	wer sou	rce, i.e.	3-phase,	4-wire	, wye (4	80Y/277	'V), so t	hat the	phase-	to-
3. Install UL certified fuses or circuit breaker between the power supply and the inverter referring to the table below.																		
age	75		9	4		Re	equired lb-in (N	torque •m)		Wire size AWG (mm ²)								
y volt	() [HP		e ND/N	A) *4	eaker (A) *5	lal	" D	P d	wer	L1/	Main R.L2/S.L3	termin 3/T	al Cu W	/ire U. V. W		₿G	ol Vld	wer
lddns	or (kV	Inverter type	H/DH pom	size	size	termi	erter's	Contr er sup	an po Ipply	5	J.	rks S	٦ ۵	3	rks	er's ding	Contr er sup	lddr od ub
ower	Non		ЧHD	Cla	trip	Main	gro	Aux. powi	Aux. F	30° C wire	75° C wir	Rema	50° C wir	75° C wire	Rema	Invert	Aux. powi	Aux. f sı
Pc	0.1 [1/8]	FRN0001E2=-20	HHD	3	5	7.1 (0.8)	10.6 (1.2)		`	•	1-		•	1-		- 0,		
	0.2 [1/4]	FRN0002E2=-2 FRN0002E2=-2	HHD HND	6								14 (2.1) 12 - (<u>3.3)</u> 10 (5.3)				14		
	0.75 [1]	FRN0004E2=-2 FRN0004E2=-2	HHD HND	10							14			14 (2.1)		(2.1)	-	
	1.1 [1.5]	FRN0006E2=-20 FRN0006E2=-20	HHD HND	15							(2.1)					12		
	1.5 [2]	FRN0010E2=-2 FRN0010E2=-2	HHD HND	20		10.6 (1.2)	15.9 (1.8)									(3.3)		
	3.0 [4]	FRN0012E2=-2 FRN0012E2=-2	HHD HND	30 30							12					10		
	3.7 [5]	FRN0020E2=-2□	HHD	40							(5.3) (5.3)			12	-	(0.0)		
200	5.5 [7.5]	FRN0020E2=-2 FRN0030E2S-2	HND HHD	50 60	-	07	07				8			10		8		
Three-phase	7.5 [10]	FRN0030E2S-2 FRN0040E2S-2 FRN0040E2S-2	HHD	75	150	(3.0)	(3.0)			-	6	*3	-	8		(0.4)	14 (2.1) *1 *2	-
	11 [15]	FRN0056E2S-2 FRN0056E2S-2	HHD HND	100		51.3					(13.3)			(8.4)				
-	18.5 [25]	FRN0069E2S-2 FRN0069E2S-2 FRN0088E2= 2	HHD	175			51.3				(21.2)			(13.3)		6 (13.3)		
	22 [30]	FRN0088E2=-20 FRN0115E2=-20	HND HHD	200	175	(5.8)	(5.8)				2 (33.6)			3 (26.7)				
	30 [40]	FRN0115E2=-20	HND	250	200	lagest 5.0					2/0 (67.4)			2 (33.6)		3 (26.7)		
	7.5 [10]	FRN0030E2E-2 FRN0040E2E-2	HND HHD	75		(1.8) Other 27	27 (3.0)		-		8 (8.4)			(5.3)	-	8 (8.4)		
	11 [15]	FRN0040E2E-2 FRN0056E2E-2	HND HHD	100		(3.0)					6 (13.3)			(8.4)				
	15 [20]	FRN00569E2E-20	HHD	150		(8.1) Other 1.3	51.3 (5.8)				(21.2) 3			(13.3) 4		(13.3)		
	0.4 [1/2]	FRN0009E2E-2	HND	3		(0.8)					(26.7)			(21.2)				
	0.75 [1]	FRN0002E2=-4 FRN0004E2=-4	/ND HHD	6		10.6 (1.2)			-				-			14		
	1.1 [1.5] 1.5 [2]	FRN0004E2 - 4□ FRN0004E2 - 4□	HD/HND ND	10			15.9 (1.8)				14	-				(2.1)		-
	2.2 [3]	FRN0006E2 = -4	HD/HND /ND	15							(2.1)			14 (2.1)		12	-	
	3.0 [4]	FRN0007E2=-4 FRN0007E2=-4	HHD ND/HD													(3.3)		
	3.7 [5]	FRN0012E2=-4 FRN0012E2=-4 FRN0012E2=-4	HHD ND HD	20	_						12					10		
	7.5 [10]	FRN0022E2=-4□ FRN0022E2=-4□	HHD HD/HND	30 40		27	27				(3.3)			12		(5.3)		
		FRN0029E2=-4 FRN0022E2=-4 FRN0029E2=-4	ND HD/HND			(3.0)	(3.0) 51.3 (5.8) 27 (3.0)				(5.3)			(3.3)				
	11 [15]	FRN0037E2 = -4	HHD	60		51.3 (5.8)								10 (5.3)				
	45 (00)	FRN0029E2=-4	ND	70		(3.0)					(8.4)			8		(8.4)		
	15 [20]	FRN0037E2=-4	HHD	70										(8.4) 10 (5.3)				
	18.5 [25]	FRN0037E2=-4□ FRN0044E2=-4□	ND HD/HND	90	75	51.3	51.3			6				(5.3)	*3			
	00,1001	FRN0059E2=-4 FRN0044E2=-4	HHD ND	400		(5.8) 119.4 (13.5) 119.4 (13.5)	(5.8)		10.6 (1.2)	(13.3)	6 (13.3)		6 (13.3)					
	22 [30]	FRN0059E2=-4 FRN0072E2=-4 FRN0059E2=-4	HD/HND HHD ND	100	100					(21.2)		*3	- 4 (21.2)	(13.3)				
	30 [40]	FRN0072E2=-4 FRN0085E2=-4	HD/HND HHD	125			119.4 (13.5)			3 (26.7)	4 (21.2)					6 (13.3)		
	37 [50]	FRN0072E2=-4□	ND HD/HND	175	125					2	3		-	4	-			
		FRN0105E2=-4□ FRN0085E2=-4□	HHD ND							(33.6)	(26.7)		(26.7) (33.6)	(21.2)))))			
_	45 [60]	FRN0105E2 - 4 FRN0139E2 - 4	HD/HND HHD	200	150						(33.6)			3 (26.7)				
e 400\	55 [75]	FRN0105E2 = -4 FRN0139E2 = -4	ND HD/HND		200 175		238.9 (27) 119.4 (13.5)				1/0 (53.5)		(42.4)	2 (33.6)				
-phase		FRN0168E2=-4 FRN0139E2=-4 FRN0168E2=-4	HHD ND HD/HND	250												4 (21.2)		
Three	75 [100]	FRN0203E2=-4	HHD			238.9 (27)		10.6 (1.2)						1/0 (53.5)				14 (2.1) *1*2 -
		FRN0168E2 = -4□	ND			119.4								2/0 (67.4)			14	
	90 [125]	FRN0203E2 = -4□	HD/HND	300	200	(13.5)					(67.4)			3/0 (85)			(2.1) *1 *2	
	110 [150]	FRN0203E2=-4	ND	350	250	238.9					4/0			4/0 (107. <u>2)</u>		3	2	
		FRN0240E2=-4 FRN0290E2=-4	HD/HND HHD			(27)					(107.2)	*2		1/0x2 (53.5)		(∠0.7)		
	132 [200]	FRN0290E2=-4		400	300	424.7	238.9			-	1/0x2 (53.5)	*3		2/0x2	*2			
		FRN0290E2=-4	ND			(48) 238.9 (27)	(27) 119.4				3/00		-	3/0-2	*3			
	160 [250]	FRN0361E2=-4 FRN0415E2=-4	HD/HND HHD	500	350	(27)	(13.3)		10.6		(85)			(85)		(33.6)		14 (2.1)
	200 [300]	FRN0361E2 = -4□	ND	D 600 35	350				(1.∠)		4/0x2			4/0x2 (107. 2)				*1*2
	200 [300]	FRN0415E2 = -4□ FRN0520E2 = -4□	HD/HND HHD	000	350				-		(107.2)			250x2 (127)		1/0		
	220 [350]	FRN0415E2=-4 FRN0520E2=-4 ERN0520E2=-4	ND HD/HND	700	500	424.7 (48)	238.9 (27)			-	250x2 (127)			300x2 (177))		
	250 [400]	FRN0590E2 = -4	HD	800	600						300x2 (152)			350x2 (177)				
	280 [450]	FRN0520E2=-4 FRN0590E2=-4	ND HND	1000	000						400x2 (203)			400x2 (203)		2/0		
	315 [500]	FRN0590E2=-4	ND HHD	30	800						(253)			(253)		(07.4)		
	7.5 [10]	FRN0022E2E-4	HND	40		(1.8) Other 27	27 (3.0)				(3.3) 10 (5.3)		(2.1)	_	10 (5.3)		-	
	11 [15]	FRN0029E2E-4 FRN0037E2E-4	HND	60	-	(3.0) Input 5.9 (1.8) Other 1.3 (5.8)					(0.0)		10 (5.3)					
	15 [20]	FRN0037E2E-4	HND	70			51.3 (5.8)				8 (8.4)			8 (8.4)	-	8 (8.4)		-
	18.5 [25]	FRN0044E2E-4	HHD	90							6			(5.3)		(3.1)		
2	0.1 [1/8]	FRN0001E2=-7	HHD	6	5						(13.3)	-+		(13.3)		14	┢─┤	
se 20(0.2 [1/4]	FRN0003E2	HHD	10	10	7.1 (0.8)	10.6 (1.2)				14 (2.1)			14		(2.1)		
le-pha:	0.75 [1]	FRN0005E2=-7	HHD	20 30	15			-	-	-	12	-	-	(2.1)	-	(3.3)	-	-
Singl	2.2 [3]	FRN0011E2=-7	HHD	50	-	10.6 (1.2)	15.9 (1.8)				(3.3) 10 (5.3)					10 (5.3)		
ote: (Control circui	t terminals M2 tighte	ening torqu	ie: 1.7 ll	o-in (0.1	9 N·m) ±10	1%				(0.0)							

Variation

Standard

EMC Filter

FRN0030 to 0115E2F-2 FRN0022 to 0590E2F-4

oltage category II such as control circuit or secondar

Recommended wire size: AWG26 to 18 (0.14 to 1 mm²) M3 tightening torque: 4.4 to 5.3 lb-in (0.5 to 0.6 N·m), recommended wire size: AWG26 to 16 (0.14 to 1.5 mm²) Note: A box (■) in the above table replaces S (Basic type) or E (EMC filter built-in type) depending on the enclo A box (□) in the above table replaces GA, GB, A, E, U, K or C depending on the model.

A box (□) in the above table replaces GA, GB, A, E, U, K or C depending on the model. *1 No terminal end treatment is required for connection. *2 Use 75°C (167°F) Cu wire only. *3 The wire size of UL Open Type and Enclosed Type are common. Please contact us if UL Open Type exclusive wire is necessary. *4 6 ms Amperes for aux. control power supply. There is no aux. control power supply in FRN0020E2■-2□ /FRN0022E2■-4□//FRN0011E2■-7□ or below. *5 5 ms Amperes for aux. control power supply. There is no aux. control power supply in FRN0020E2■-2□ /FRN0022E2■-4□//FRN0011E2■-7□ or below.

7.2.1 Compliance with the Radio Waves Act (South Korea) (

UL Enclosure Type UL Enclosed Type formats are shown in the table below.

Classifica-tion Terminal Syn ntact output

Plenum rated drives UL Enclosed Type is Suitable for installation in a compartment handling conditioned air. Functional Description of Control Circuit Terminals A power source for connection to the Integrated alarm output (30A, 30B, 30C) should be limite winding of power transformer.

7.2.1 Compliance will the real wates AL (obtainment (N) 한국 전과법 대응 통재품은 한국전과법에 적합한 제품입니다. 한국에서 사용시는 아래에 주의하여 주시될 바랍니다. "이 기기는 업무용(A급) 전자과 적합기기로서 판매자 또는 사용자는 이점을 구의하시기 바라며, 가장외의 지역에서 사용하는 것을 목적 으로 합니다. 해당제품은 형식 FRN스스스E2■-□GA/GB/A/E/U/K/C 의 제품만 대상이 됩니다. (△는 인버터용량, □는 전압시리즈를 표시하는 숫자 2 또는 4 가 표기됩니다.)

Compliance with the Radio Waves Act (South Korea)

This product complex with the Radio Waves Act (South Korea) This product complex with the Radio Waves Act (South Korea) Note the following when using the product in South Korea (The product is for business-use (Class A) and meets the electromagnetic compatibility requirement. The seller and the user must note the above point, and use the product in a place except for home.)

Only the following type of the products is applicable to this certification. Type: FRNA△△E2∎-□GA/GB/A/E/U/K/C (∆: indicates inverter output power and □: indicates if the power supply voltage 2 or 4 is.)