| | July 2024, third edition | Chapter 1 B 1.1 Acceptance | | ting Plate and Inverter Type | a) | | | |
|--|--|---|---|---|----------------------------|--|--|--------------------------------------|
| | Instruction Manual | Unpack the product | t and check the following | • | | and that the product has suffered | no domogo (brookos | ra danta parta that |
| Fuji Electric | FRENIC-Ace Series | have fallen off) |) during transport. | nameplate shown in Figure 1-1 are | | | | |
| | FRN===E3===G | (a) Main nameplate | anopiato ana (b) oub | nameplate shown in Figure 1-1 are | | FRN0072E3S-4G | SER. No. | |
| | | namepiate | | | | | Y/220-480Y/277V 50/60 | |
| Thank you for purchasing Fuji Electric's FRENIC-Ace series. This instruction manual | | | PC ND 3PH/1 | D HD HND HHD PH 380Y/220-480Y/277V 50/60Hz / | | 94.3A 77.9/ OUTPUT 3PH 38 Source of 3PH 72A 120%-1min 60A 150% | 0-480V 0.1-599Hz | 60.6A |
| read the Instruction Manual (Detailed Edition) carefully, and ensure an understanding c [Related documents] | f the safety related content prior to use. Instruction Manual QR Code | | SOURCE 11.3 OUTPUT Source of 6.9 | A 11.3A 11.3A 8.2A 3PH 380-480V 0.1-599Hz A 6.3A 6.9A 5.5A/3A | | Source of 1PH | - 23/ | 3A 150%-1min |
| User's Manual 24A7-E-0173 | | | 3PH/1PH 120%- MOTOR E2/LOSS 2.1 | 1min 150%-1min 120%-1min 150%-1min % 2.2% 1.8% 1.9% | IND.CONT.EQ. 7898 | | 5 1.7% S10kg WENGHT 22NDs | 1.7% MFG 2023 |
| RS-485 Communication User's Manual 24A7-E-0082 Refer to the Fuji Electric website for details on the above documents. | | | SCCR 100kA P Cod | | | | | 3888 |
| Refer to the Full Electric website for details on the above documents. | Source to the second seco | | Designed by Fuji Electric, Japan | Assertied in Thelend TH Fugil Electric Co., Ltd. | | | | hej Hachic Stolk, Me |
| | ■ 【 《 A B A C C A C A C A C A C A C A C A C A | | | | | CE IND.COM | | Suzuka, Mite SLI 1633 Japan |
| Fuji Electric Co., Ltd. | | (b) Sub | | [] | | Designed by Fuji Electric, Japan Assembled in | | ctric Co., Ltd. |
| Please feel free to send your comments regarding any errors or omissions you may ha In no event will Fuji Electric Co., Ltd. be liable for any direct or indirect damages resulti | | nameplate | | TYPE FRN0007E3S-4G SER.No. | | TYPE FRN0072E3S- SER.No. | | |
| This instruction manual may be subject to change without prior notice. | | | FRN000 | 01 to 0040E3::-2G,FRN0002 to 002 | 9E3n-4G. | | | |
| | ITION | | 1141000 | FRN0001 to 0012E30-7G | | FRN0056 to 0115E3 -2G | ,FRN0037 to 0072E3 | J⊡-4G |
| Thank you for purchasing Fuji Electric' FRENIC-Ace series of high-performance, mu | ulti-function inverters. | | | | Fig. 1- | 1 | | |
| This product is designed to drive three-phase induction motors and synchronous n to gain an understanding of how to handle the product and ensure correct use. | | TYPE: Inverter typ | Je | EDN OC | 01 E 2 | s | | |
| Incorrect handling may hinder normal operation, or result in a shortening of the pi - Deliver this manual to the end user of this product. Store this instruction manual in a safe location until the inverter is disposed of. | oduct life or failure. | Code | Series | | <u>001 E 3</u> - | | Destination | /Manual |
| This instruction manual does not describe how to use options. Please refer to the All of the drawings in this instruction manual are used to provide detailed description | | Three-phase 20 | FRENIC | series | | G | Global/En | nglish |
| When running the product, do so as described in the instruction manual only after | | Code | Standard applicable HHD HND | HD ND | | Code 2 4 | Input power Three-phas Three-phas | se 200V se 400V |
| ∆ WAR | NINGA | 0001 2 0115 | 0.1 0.2 2 2 30 | | | 7 Code | Single-phas Construc | |
| Application | | Three-phase 40 | | motor output [[W]] | | S E | Basic t EMC filter bui Ethernet buil | type ilt-in type |
| The FRENIC-Ace is a piece of equipment used to run three-phase induction mo applications. | tors and synchronous motors. It cannot be used for single-phase motors or other | Code 5 | HHD HND | HD ND 0. 75 0. 75 | | N N | | |
| Failure to observe this could result in fire or an accident. • The FRENIC-Ace cannot be used as is for applications which may have a direct | reffect on the human hody such as life support machines | 0072 | 22 30 | 2 2 30 37 | | Code 3 | Development 3 | series |
| Strict quality control has been observed in the manufacture of this product, how which may result in a serious accident or loss in the event of failure. | | | 200 V Standard applicable | | | Code E | Applicable High-performanc | |
| Failure to observe this could result in an accident. | | 0001 2 | HHD HND 0.1 0.2 ≥ ≥ | HD ND | | | | |
| Installation Install on noncombustibles such a metal. | | 0012 | 2.2 3.0 | | | | | |
| Do not install near combustibles. Failure to observe this could result in fire. | | | al number A 1 2 3 A 0 0 0 1 <u>A A</u> | Production year and week | | | | |
| If using an optional DC reactor, there is a possibility of users coming into contac such as installing the product in a location where it will not easily come into cont Failure to observe this could result in electric shock or injury. | | | | Week of manufactur numbered from 1st w | | anuary is indicated as '01'. This | indicates the week | a number that is |
| Failure to observe this could result in electric shock or injury. Wiring | | | | | : Last digit of calendar | year | | |
| If no device for detecting zero-phase current (earth leakage current) such as a g the entire power supply system's shutdown undesirable to factory operation, ins | | | | Product version | | | | |
| breaker (ELCB) individually to inverters to break the individual inverter power su • Connect to the power supply via a molded case circuit breaker (MCCB) or earth | leakage circuit breaker (ELCB) (with overcurrent protection function) for each | If there is anything a | about the product of w | hich you are unsure, please contac | t your dealer or neares | st Fuji Electric sales office. | | |
| inverter. Use the recommended molded case circuit breaker or earth leakage circuit • Be sure to use the specified wire size. | cuit breaker, and do not use devices that exceed the recommended capacity. | Chapter 2 IN | NSTALLATION | AND WIRING | | | | |
| Tighten terminals with the prescribed tightening torque. If there are multiple inverter and motor combinations, do not use multi-core cabl Do not install a surce suoressor at the inverter output side (secondary side). | es for the purpose of bundling and storing wiring for multiple combinations. | 2.1 Operating | • | onment that satisfies the conditions | listed in Table 2-1 Ope | erating environment. | | |
| Do not install a surge suppressor at the inverter output side (secondary side). Be sure to connect an optional DC reactor (DCR) when the capacity of the power capacity. | er supply transformer exceeds 500 kVA, and is at least 10 times the inverter rated | | in an operating entite | Table 2-1 Operating environ | | and any orthogonal | | utput current derating |
| Failure to observe this could result in fire. • Carry out class C or class D grounding work based on the inverter input voltage | system | Item | | Specificati | | | factor in re Altitude | relation to altitude Output curre |
| Be sure to ground the inverter ground terminal [GG] grounding wire. Failure to observe this could result in electric shock or fire. | | Location Indoors | 5 | Specificati | ons | | 1,000 m or lo | derating fact |
| Wiring work should be carried out by qualified professionals. Carry out wiring work after ensuring that the power has been turned off. | | | | N-E3E (EMC filter built-in type)] 10 to +55 °C (Current derating neces | ssarv in +50 to +55 °C | range) | 1,000 to 1,50 (3.300 to 4.90 | 00 m 0.07 |
| Risk of electric shock Be sure to carry out wiring after installing the unit. | | HND |) specification (FRN00 | 12 to 0020E3-2G,FRN0007 to 00 +50 °C (Current derating necessar | 12E3-4G, FRN0004 t | o 0012E3□-7G) | 1,500 to 2,00 (4,900 to 6,50 | 00 m 0.05 |
| Failure to observe this could result in electric shock or injury. Ensure that the number of phases and rated voltage of the product input power Do not connect the power lines to the inverter output terminals (U, V, W). | supply matches that for the connected power supply. | When in | installed closely side-b | | ary in +40 to +50 °C ran | ige.) | 2,000 to 2,50 | 00 m 0.91 |
| Do not connect the power lines to the inverter output terminals (0, v, v). When connecting a DC braking resistor (DBR), never connect it to terminals oth Failure to observe this could result in fire or an accident. | er than terminals P(+) and DB. | | | 12 to 0020E3 -2G, FRN0007 to 00 | 12E3□-4G, FRN0004 t | o 0012E3□-7G) | (6,500 to 8,20 2,500 to 3,00 | 00 m 0.88 |
| Control signal lines generally do not have a reinforced insulation coating, and the the insulation coating may be damaged for some reason. In such a case, there is | | HD/N | -10 to : ND specification: -10 to | o +30 ℃ o +30 ℃ | | | (8,200 to 9,80 | JO ft) |
| signal lines, and therefore care should be taken to ensure that they do not come Failure to observe this could result in an accident or electric shock. | | Ambient 5 to 959 humidity | i% RH (there should be | e no condensation) | | |] | |
| Switch all switches after first waiting for at least 5 minutes after turning OFF the device such as a tester to ensure that the DC intermediate circuit voltage across | | droplets | IS. | osed to dust, direct sunlight, corros | sive gases, flammable g | gases, oil mist, vapor or water | 1 | |
| less). Risk of electric shock | | (Pollutio The atn | ion degree 2 (IEC6066 mosphere can contain | a small amount of salt (0.01 mg/cn | | | | |
| Operation | | | should be no condensa m (3,300 ft) max. (Note | ation as a result of sudden tempera e 2) | ature changes. | | - | |
| Be sure to attach the inverter surface cover before turning the power on. Do not Do not operate the product with wet hands. Risk of electric shock | remove the surface cover while the power is on. | Atmospheric 86 to 10 pressure | 06 kPa | · | | | 1 | |
| If the product stops after being tripped when the retry function is selected, deper will rotate. Design machines in such a way as to ensure the safety of the human | | | | 2 to less than 9 Hz 9 to less than | 20 Hz 20 to less the | an 55 Hz 55 to 200 Hz | - | |
| There may be times when the stall prevention function (torque limiting) causes t set values. Design machines in such a way that safety is ensured even at such | he product to run at an acceleration/deceleration time or speed different from the | FRN00 | 001 to 0115E3□-2G 002 to 0072E3□-4G | 3 mm (max. amplitude) 9.8 m/s | ² 5.9 m | /s ² 1 m/s ² | | |
| Failure to observe this could result in an accident. The keypad from key is enabled only when keypad operation is selected with full | nction code F02. Please prepare a separate EMERGENCY STOP button. When | | 001 to 0012E3 -7G | environment where lint or moist dus | t, etc. may adhere to th | he cooling fins. If the inverter is to | be used in such an (| environment, install |
| function code H96 has been set to "0" or "2", the me key will be disabled if the by selecting link operation "LE". | operation command method is changed from operation command with the keypad | it in a cabi | inet to prevent lint, etc. | | - | - | | |
| After eliminating the cause of the protective function being triggered, ensure tha the operation command ON may result in power being supplied to the motor by | | recommen | nds installing inverters | in a panel for safety reasons, in pa vironmental requirements, it is nece | articular, when installing | the ones whose enclosure ratin | g is IP00. When insta | alling the inverter in |
| Failure to observe this could result in an accident. By selecting the momentary power failure resume operation (F14 = 3 to 5), oper | ation will resume automatically following recovery. Design machines in such a | | ent or the panel installa a inverters closelv side | ation location. le-by-side, they may bump against | t one another due to v | ibrations or impact. They should | therefore be installe | ed taking mounting |
| way as to ensure operator safety even when operation is resumed. Set function codes after ensuring a sufficient understanding of this instruction m | | tolerance i | into consideration. | the alphabet indicating the type (S: | | | | 5 5 |
| motor may rotate at a torque and speed at which the machine is unable to tolera When auto tuning is started, the motor rotates. Conduct a sufficient check to ensibility of the started of the started in an accident or injury. | | | | no aprazot maloa ng alo typo (o. | otandara (jpo, t. t into | 55 (Jp6, 2. 2.110 inter bank in (Jp) | <i>p</i> - | |
| Even though the inverter has interrupted power to the motor, if the voltage is app L2/N (single-phase), voltage may be output to inverter output terminals U, V, and | | 2.2 INSTALLA 2.2.1 Installat | | | | | | |
| Even if the motor is stopped by DC braking operation or pre-excitation operation Risk of electric shock | | Please install the inv | verter on noncombust | ibles such as metal. Also, do not m | ount it upside down or | horizontally. | | |
| Inverter high-speed operation settings can be specified easily. If settings are cha specifications. | anged, use the product after sufficiently checking the motor and machine | 2.2.2 Surroun | 0.1 | Fig. 2-1 and Table 2-3. If enclosing | the product | | Evter | mal heat |
| Failure to observe this could result in injury. Maintenance and inspection, part replacement | | in a cabinet and so | o on, be sure to provid | de adequate ventilation to the cabi contain it in small enclosures wit | inet, as the | | ernal heat | pation |
| Carry out inspection after turning OFF the power and waiting at least 5 minutes. | | dissipation capacity. | r. | | in low near | B dis 30 ■ 8888 | ipation 1 | Cooling fan |
| device such as a tester to ensure that the DC intermediate circuit voltage across less). Risk of electric shock | , main circuit terminals P(+) and N(-) has dropped to a safe level (+25 VDC or | Installation of mu If installing two or mu | | ame equipment or cabinet, they mu | sthe | Board Board | d temperature lax 55° C 31° F)*" | |
| Be sure to perform the daily inspection and periodic inspection described in the inverter failure and damage. or accident and fire. | instruction manual. Lengthy use of the product without inspection could result in | installed side by side | le as a rule. If vertical i | installation is unavoidable, install pa low affecting those above. | | | | Cooling fins |
| A periodic inspection cycle of 1 to 2 years is recommended, however, the cycle is the second s | | | an ambient temperatur erters closely together l | re of 40 °C or below is it possible to horizontally. | o install | | 1 | |
| product without replacing parts could result in inverter failure and damage, or ac Contact outputs [30A/B/C] use relays, and may remain ON or OFF, or in an index | ccident and fire. | | | ounding space (mm) | | | | mal air intake |
| with an external protection function. Failure to observe this could result in fire or an accident. | | FRN00 | plicable capacity 001 to 0115E30-2G | A B | С | | urrent derating necessary ir ange. | |
| Maintenance and inspection, and part replacement should only be carried out by Remove all metal objects (watches, rings, etc.) before beginning work. | / the specified individuals. | FRN00 | 002 to 0072E3□-4G 001 to 0012E3□-7G | 10 100 | 0 | ↓ [□] 1 | <pre>kternal cooling cannot be in ype,EMC filter built-in type</pre> | and inverters up to |
| Be sure to use insulated tools. Never modify the product. Failure to observe this could result in electric shock or injury. | | If connec | - | unit nsure sufficient space for the cable. | | | RN0020E3::-2G,FRN0012 G,FRN0012E3::-7G or low | |
| | | Installation with end of the external cooling | | es the generated heat inside the | | -1 Installation direction Fig. 2 | 2 External cooling ins | stallation method |
| | TION | dissipating approxim | mately 70% of the total | I heat generated (total heat loss) by le with the addition of an external of | / mounting the cooling | | nent or cabinet. | |
| Installation | | | | 3a) for details on external cooling at al such as lint, wastepaper, wood sh | | scraps getting into the inverter, o | r adhering to the cool | ling fan. |
| Do not hold the surface cover when transporting the product. Failure to observe this could result in injury if the product is dropped. | | 2.2.3 Remova | al and Attachmen | t of the Front Cover and Wi | ring Guide | | | |
| Take measures to prevent foreign material such as lint, wastepaper, wood shavi Use the specified screws for changing the mounting base. | ngs, dust, or metal scraps getting into the inverter, or adhering to the cooling fan. | | - | er (The descriptions assume that the , and remove by pulling it toward yo | - | been installed). | | |
| Failure to observe this could result in fire or an accident. • Do not install or run inverters with damaged external or internal parts. Failure to observe this could result in fire, an accident, or injury. | | Slide the wiri | ring guide upward to re | | | ove. | | |
| Failure to observe this could result in fire, an accident, or injury. Wiring | | , | | m | , | Dan . | m. | |
| The inverter, motor and wiring generate electric noise, which may cause nearby malfunction. | sensors and devices to malfunction. Employ noise countermeasures to prevent | | | | | | | |
| Failure to observe this could result in an accident. Operation | | | | | | 1 | | |
| The cooling fans and braking resistors become very hot. Do not touch. | | | | | × ,5 m | | | |
| Failure to observe this could result in burns. • Mechanical holding is not possible with the inverter brake function. | | Scre | - 5 | | | | Wiring guide | |
| Failure to observe this could result in injury. • The digital input terminals are equipped with a function used to start and stop of "BX" free-run command and so on. Denoding on the digital input terminal statu | peration or change the speed command with the "FWD" operation command or is, operation may start suddenly, or the speed may change significantly simply by | | ~ « i li | Terminal o | cover - | K JB | ******9 Aqide | |
| "BX" free-run command and so on. Depending on the digital input terminal statu changing the function code settings. Make changes to function code settings aft With digital input, functions ("SS1, SS2, SS4, SS8", "Hz2/Hz1", "Hz/PID", "IVS", | er sufficiently ensuring safety. | | | Fig. 2-3 Front cover and | d wiring guide removal | (FRN0006E3S-2G) | | |
| command procedure for speed commands can be assigned. Depending on the suddenly or the speed changing suddenly. | conditions, changes to these signals may result in operation being started | | terminal cover screws iring guide upward to re | , pull the terminal cover down, and emove. | then pull it down towar | rd you. | | |
| Ensure safety before modifying customizable logic related function code settings 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. Fully ensure it is Failure to observe this could result in an accident or injury. | | | | | | | | |
| Disposal If disposing of the FRENIC-Ace, handle as industrial waste. | | | | | | | | |
| Follows to obcome this could require in inter- | | | | | | | | |

INR-SI47-2550B-E

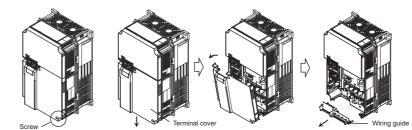


Fig. 2-4 Front cover and wiring guide removal (FRN0115E3S-2G)

2.2.4 Terminal Layout and Screw Specifications 2.2.4.1 Screw Specifications and Tightening Torque (Main Circuit Terminals)

The specifications for the screws used in the main circuit winnig and the wire sizes are shown below. Exercise caution as the terminal position varies depending on inverter capacity. There is no difference between the input side (primary side) and output side (secondary side) for the two ground terminals (**G**]. Also, use crimped terminals with insulating sleeves compatible for main circuit or terminals with insulating tubes. The recommended wire sizes are shown depending on cabinet temperature and wire type. Table 2-4 Screw specifications

| | | | Table 2-4 Ourew spee | inoduono | | | | |
|------------------|------------------|--------------------------------|-----------------------------|-------------------------------|-----------------------------|-------------------------------|---------------|-------------------------------|
| | Inverter type | | | | Screw specification | 1 | | |
| | | | Main circu | it | Groun | ding | | ver auxiliary R0, T0] |
| Three-phase 200V | Three-phase 400V | Single-phase 200V | Screw size (driver size) | Tightening torque (N·m) | Screw size (driver size) | Tightening torque (N·m) | Screw size | Tightening torque (N·m) |
| FRN0001E3 -2G | | FRN0001E3 -7G | | | | | | |
| FRN0002E3 -2G | | FRN0002E3 -7G | | | | | | |
| FRN0004E3 -2G | - | FRN0004E3 -7G FRN0003E3E-7G | M3.5 (No.2) | 0.8 | M3.5 (No.2) | 1.2 | | |
| FRN0006E3 -2G | | FRN0006E3 -7G FRN0005E3E-7G | | | | | | |
| | FRN0002E3 -4G | | | | | | 1 | |
| FRN0010E3 -2G | FRN0004E3 -4G | FRN0010E30-7G | | | | | | |
| FRN0012E3 -2G | FRN0006E3 -4G | FRN0008E3E-7G | M4 (No.2) | 1.2 | M4 (No.2) | 1.8 | | |
| | FRN0007E3 -4G |] | 1014 (140.2) | 1.2 | 1014 (100.2) | 1.0 | | |
| FRN0020E3 -2G | FRN0012E3-4G | FRN0012E3 -7G FRN0011E3E-7G | | | | | - | - |
| FRN0030E3S-2G | FRN0022E3 -4G | | M5 (No.2) | 3.0 | M5 (No.2) | 3.0 | | |
| FRN0040E3S-2G | FRN0029E3 -4G |] | IND (INO.2) | 3.0 | NI5 (NO.2) | 3.0 | | |
| | FRN0022E3E-4G |] | INPUT M4(Φ4.5 No2) | INPUT 1.2 | INPUT M6NUT | INPUT 4.0 | | |
| - | FRN0029E3E-4G |] | Other M5 (No.2) | Other 3.0 | Other M5 | OUTPUT 3.0 | | |
| FRN0056E3S-2G | FRN0037E3 -4G | | M6 (No.3) | 3.0 | M6 (No.3) | 3.0 | | |
| FRN0069E3S-2G | FRN0044E3 -4G |] - | IVIO (IVO.3) | 3.0 | WO (NO.3) | 3.0 | | |
| | FRN0037E3E-4G |] | INPUT M4(Ф4.5 No2) | INPUT 1.8 | INPUT M6NUT | INPUT 4.0 | | |
| - | FRN0044E3E-4G |] | Other M6 (No.3) | Other 3.0 | Other M6 | OUTPUT 3.0 | | |
| FRN0088E3S-2G | FRN0059E3 -4G |] | M6 (No.3) | 5.8 | M6 (No.3) | 5.8 | M3.5 | 1.2 |
| ERN0115E3S-2G | ERN0072E30-4G | 1 | 1010 (100.3) | 3.0 | 1010 (100.3) | 3.0 | 1113.5 | 1.2 |

FRN0115E3S-2G FRN0U72E3C-4G (Note 1) The D is replaced by a letter of the alphabet indicating the type (S: Basic type, E: EMC filter built-in type). 2.2.4.2 Terminal Layout Diagrams (Main Circuit Terminals)

 Refer to the User's Manual (24A7-E-0173c) for the main circuit terminal layout The following terminals will have high voltage when power is ON. Risk of electric shock

 Main circuit: L1/R, L2/S, L3/T, L1/L, L2/N, P1, P(+), N(-), DB, U, V, W, R0, T0, AUX contact (30A,30B,30C)

 Insulation level

 Main circuit - control circuit:

 Basic insulation (overvoltage category III, pollution degree 2)

 Main circuit - control circuit:

 Reinforced insulation (overvoltage category III, pollution degree 2)

 Contact output - control circuit:

2.2.5 Recommended Wire Size

| Refer to the User's Manual (24A7-E-0173) for conditions other than these. Table 2-5 Recommended wire sizes/ambient temperature inside panel: 50 °C) | Fable 2-5 shows recommended wire sizes. The examples of recommended wire sizes for main circuit terminals are based on the use at ambient temperature of 50 °C. |
|---|---|
| Table 2-5 Recommended wire sizes(ambient temperature inside panel: 50 °C) | Refer to the User's Manual (24A7-E-0173) for conditions other than these. |
| | Table 2-5 Recommended wire sizes(ambient temperature inside panel: 50 °C) |

| | | | | Table | | | | | | nt temp eavy-d | | | | 0 °C) | | | | | | |
|-----------------|----------------------|--------------------------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-----------------|-------------------|-----------------|-----------------|-----------------|-----------------|-----------------|--------------------|-----------------|-----------------|--------------------|--------------------|
| | | | | | | | | | * | Recom | | | | ²) | | | | | | |
| | ple | | Main p | ower s | upply in | put [L1/ | R, L2/S | 5, L3/T] | | | | | Inverte | r | | For DC | | F | or braki | |
| | applicable - (kW) | | With | n DC rea | actor | Witho | ut DC r | eactor | Grour | nding te | rminal | | output | 1 | | reactor onnecti | | | resisto onnecti | |
| Power system | d apı or (k | Inverter type | | (DCR) | | | (DCR) | | | | | | [U, V, W | /] | | P1, P(+ | | | P(+), D | |
| system | Standard a motor | | | ermissit | | | ermissit | | | ermissit | | | ermissi | | | ermissil | | | ermissi | |
| | Star | | <u> </u> | rature (I | | <u> </u> | rature (| <u> </u> | <u> </u> | rature (I | · · · · | <u> </u> | rature (| · · · · | <u> </u> | rature (| <u> </u> | <u> </u> | rature (| |
| | | | 60 °C 140 °F | 75 °C 167 °F | 90 °C 194 °F | 60 °C 140 °F | 75 °C 167 °F | 90 °C 194 °F | 60 °C 140 °F | 75 °C 167 °F | 90 °C 194 °F | 60 °C 140 °F | 75 °C 167 °F | 90 °C 194 °F | 60 °C 140 °F | 75 °C 167 °F | 90 °C 194 °F | 60 °C 140 °F | 75 °C 167 °F | 90 °C 194 °F |
| | 0.1 | FRN0001E3□-2G | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | 0.2 | FRN0002E3□-2G | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | 0.4 | FRN0004E3□-2G | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | 0.75 | FRN0006E3□-2G | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | 1.5 | FRN0010E3□-2G FRN0012E3□-2G | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Three- phase | 3.7 | FRN0012E3[]-2G | 2 | 2 | 2 | ∠ 5.5 | 2 | 2 | 2 | 2 | 2 | 3.5 | 2 | 2 | 3.5 | 2 | 2 | 2 | 2 | 2 |
| 200 V | 5.5 | FRN0030E3S-2G | 5.5 | 2 | 2 | 8 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 5.5 | 3.5 | 2 | 5.5 | 3.5 | 2 | 2 | 2 | 2 |
| | 7.5 | FRN0040E3S-2G | 8 | 3.5 | 2 | 14 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 8 | 3.5 | 3.5 | 14 | 5.5 | 3.5 | 2 | 2 | 2 |
| | 11 | FRN0056E3S-2G | 14 | 5.5 | 5.5 | 22 | 14 | 8 | 5.5 | 5.5 | 5.5 | 14 | 8 | 5.5 | 22 | 8 | 5.5 | 2 | 2 | 2 |
| | 15 | FRN0069E3S-2G | 22 | 14 | 8 | 38*4 | 14 | 14 | 5.5 | 5.5 | 5.5 | 22 | 14 | 8 | 38*4 | 14 | 14 | 2 | 2 | 2 |
| | 18.5 | FRN0088E3S-2G | 38*7 | 14 | 14 | 60*8 | 22 | 14 | 8*1 | 8*1 | 8*1 | 38*7 | 14 | 14 | 38*7 | 22 | 14 | 2 | 2 | 2 |
| | 22 | FRN0115E3S-2G | 38*7 | 22 | 14 | 60*8 | 38*7 | 22 | 8*1 | 8*1 | 8*1 | 38*7 | 22 | 14 | 60*8 | 22 | 22 | 2 | 2 | 2 |
| | 0.4 | FRN0002E3□-4G FRN0004E3□-4G | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | 1.5 | FRN0004E30-4G | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | 2.2 | FRN0007E3□-4G | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Three- | 3.7 | FRN0012E3□-4G | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| phase | 5.5 | FRN0022E3□-4G | 2 | 2 | 2 | 3.5 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 400V | 7.5 | FRN0029E3□-4G | 2 | 2 | 2 | 5.5 | 2 | 2 | 2 | 2 | 2 | 3.5 | 2 | 2 | 3.5 | 2 | 2 | 2 | 2 | 2 |
| | 11 | FRN0037E3□-4G | 5.5 | 2 | 2 | 8 | 3.5*6 | 3.5*6 | 3.5*6 | 3.5*6 | 3.5*6 | 5.5 | 2 | 2 | 5.5 | 3.5*6 | 2 | 2 | 2 | 2 |
| | 15 18.5 | FRN0044E3 -4G | 8 | 3.5*6 5.5 | 2 3.5*6 | 14 22 | 5.5 8*1 | 5.5 5.5 | 5.5 5.5 | 5.5 | 5.5 5.5 | 8 14 | 3.5*6 | 2 3.5*6 | 14 14 | 5.5 | 3.5*6 5.5 | 2 | 2 | 2 |
| | 22 | FRN0059E3□-4G FRN0072E3□-4G | 14 14 | 5.5 | 5.5 | 22 | 14 | 8*1 | 5.5 | 5.5 5.5 | 5.5 | 14 | 5.5 8*1 | 5.5 | 22 | 5.5 8*1 | 5.5 | 2 | 2 | 2 |
| | 0.1 | FRN0001E3□-7G | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | 0.2 | FRN0002E3□-7G | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | 0.4 | FRN0004E30-7G | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Single- | | FRN0003E3E-7G FRN0006E3□-7G | | | | | | | | | | | | | | | <u> </u> | | | $\left - \right $ |
| phase 200 V | 0.75 | FRN0005E3E-7G | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | 1.5 | FRN0010E3□-7G FRN0008E3E-7G | 2 | 2 | 2 | 3.5 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | | FRN0012E3□-7G | | | | | _ | | | | | | | | | | | | | |
| | 2.2 | FRN0011E3E-7G | 3.5 | 2 | 2 | 5.5 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 3.5 | 2 | 2 | 2 | 2 | 2 |
| <u> </u> | | | | | | <u> </u> | | | ř | rmal-d | <u>, , ,</u> | i – | | | - | | | | | |
| | 0.2 | FRN0001E3□-2G FRN0002E3□-2G | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | 0.75 | FRN0004E3□-2G | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | 1.1 | FRN0006E3□-2G | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | 2.2 | FRN0010E3□-2G | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Three- | 3.0 | FRN0012E3□-2G | 2 | 2 | 2 | 3.5 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| phase 200V | 5.5 | FRN0020E3□-2G | 3.5 | 2 | 2 | 8 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 2 | 2 | 5.5 | 3.5 | 2 | 2 | 2 | 2 |
| 2000 | 7.5 | FRN0030E3S-2G | 8 | 3.5 | 2 | 14 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 8 | 3.5 | 2 | 14 | 5.5 | 3.5 | 2 | 2 | 2 |
| | 11 15 | FRN0040E3S-2G FRN0056E3S-2G | 14 22 | 5.5 14 | 5.5 8 | 22*3 38*4 | 14 14 | 8 14 | 5.5 5.5 | 5.5 5.5 | 5.5 5.5 | 14 22 | 5.5 14 | 3.5 5.5 | 22*3 38*4 | 8 14 | 5.5 14 | 2 | 2 | 2 |
| | 18.5 | FRN0050E35-2G | 38*4 | 14 | 0 14 | 60*5 | 22 | 14 | 8 | 8 | 8 | 38*4 | 14 | 8 | 38*4 | 22 | 14 | 2 | 2 | 2 |
| | 22 | FRN0088E3S-2G | 38*7 | 22 | 14 | 60*8 | 38*7 | 22 | 8*1 | 8*1 | 8*1 | 38*7 | 22 | 14 | 60*8 | 22 | 22 | 2 | 2 | 2 |
| | 30 | FRN0115E3S-2G | 60*8 | 38*7 | 22 | 100*9 | 60*8 | 38*7 | 14 | 14 | 14 | 60*8 | 38*7 | 22 | 100*9 | 38*7 | 38*7 | 2 | 2 | 2 |
| | 0.75 | FRN0002E3□-4G | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | 1.1 | FRN0004E3□-4G | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | 2.2 3.0 | FRN0006E3□-4G FRN0007E3□-4G | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | 5.5 | FRN0012E30-4G | 2 | 2 | 2 | 3.5 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | 7.5 | FRN0022E3□-4G | 2 | 2 | 2 | 5.5 | 2 | 2 | 2 | 2 | 2 | 3.5 | 2 | 2 | 3.5 | 2 | 2 | 2 | 2 | 2 |
| Three- phase | 11 | FRN0029E3□-4G | 5.5 | 2 | 2 | 8 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 5.5 | 2 | 2 | 5.5 | 3.5 | 2 | 2 | 2 | 2 |
| 400V | | FRN0029E3E-4G | 5.5 | 2 | 2 | 6 | 3.5 | 3.5 | 3.5 | 3.5 | 3.5 | 5.5 | 2 | 2 | 5.5 | 3.5 | 2 | 2 | 2 | 2 |
| | 15 | FRN0037E3□-4G | 8 | 3.5*6 | 2 | 14 | 5.5 | 5.5 | 3.5*6 | 3.5*6 | 3.5*6 | 8 | 5.5 | 3.5*6 | 14 | 5.5 | 3.5*6 | 2 | 2 | 2 |
| | | FRN0037E3E-4G FRN0044E3□-4G | 8 14 | 3.5 5.5 | 2 3.5*6 | 10 22 | 5.5 8 | 5.5 5.5 | 3.5*6 5.5 | 3.5*6 5.5 | 3.5*6 5.5 | 8 14 | 5.5 5.5 | 3.5*6 3.5*6 | 14 14 | 5.5 5.5 | 3.5*6 5.5 | 2 | 2 | 2 |
| | 18.5 | FRN0044E3E-4G | 14 | 5.5 | 3.5 0 | 10 | 8 | 5.5 | 5.5 | 5.5 | 5.5 | 14 | 5.5 | 3.5*6 | 14 | 5.5 | 5.5 | 2 | 2 | 2 |
| | 22 | FRN0059E3□-4G | 14 | 5.5 | 5.5 | 22 | 14 | 8*1 | 5.5 | 5.5 | 5.5 | 14 | 8*1 | 5.5 | 22 | 8*1 | 5.5 | 2 | 2 | 2 |
| | 30 | FRN0072E3□-4G | 22 | 14 | 8*1 | 38*7 | 14 | 14 | 8*1 | 8*1 | 8*1 | 22 | 14 | 8*1 | 38*7 | 14 | 8*1 | 2 | 2 | 2 |
| | 0.2 | FRN0001E3□-7G | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Single- | 0.4 | FRN0002E3□-7G | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| phase | 0.55 | FRN0004E3□-7G FRN0006E3□-7G | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| 200 V | 2.2 | FRN0010E3[]-7G | 3.5 | 2 | 2 | 3.5 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 5.5 | 2 | 2 | 2 | 2 | 2 |
| | 3.0 | FRN0012E3□-7G | 5.5 | 3.5 | 2 | 5.5 | 3.5 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 8 | 3.5 | 2 | 2 | 2 | 2 |
| | | | | | | | | | | | | | | | | | | | | |

| | | | | | | HD s | pecific | cation: | Heav | y-duty | applic | ations | | | | | | | | |
|-----------------|------|---------------|-------|-------|-------|------|---------|---------|-------|---------|--------|--------|-------|-------|-----|-------|-------|---|---|---|
| | 0.75 | FRN0002E3□-4G | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | 1.1 | FRN0004E3□-4G | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | 2.2 | FRN0006E3□-4G | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | 3.0 | FRN0007E3□-4G | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | 5.5 | FRN0012E3□-4G | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| Three- | 7.5 | FRN0022E3□-4G | 2 | 2 | 2 | 3.5 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| phase 400V | 11 | FRN0029E3□-4G | 2 | 2 | 2 | 5.5 | 3.5 | 2 | 3.5 | 3.5 | 3.5 | 3.5 | 2 | 2 | 3.5 | 2 | 2 | 2 | 2 | 2 |
| | 15 | FRN0037E3□-4G | 3.5*6 | 2 | 2 | 8 | 5.5 | 3.5*6 | 5.5 | 5.5 | 5.5 | 5.5 | 3.5*6 | 3.5*6 | 5.5 | 3.5*6 | 3.5*6 | 2 | 2 | 2 |
| | 18.5 | FRN0044E3□-4G | 5.5 | 3.5*6 | 3.5*6 | 14 | 8 | 5.5 | 5.5 | 5.5 | 5.5 | 8 | 5.5 | 3.5*6 | 8 | 5.5 | 3.5*6 | 2 | 2 | 2 |
| | 10.D | FRN0044E3E-4G | 5.5 | 3.5 | 3.5 | 10 | 8 | 5.5 | 5.5 | 5.5 | 5.5 | 8 | 5.5 | 3.5*6 | 8 | 5.5 | 3.5*6 | 2 | 2 | 2 |
| | 22 | FRN0059E3□-4G | 8*1 | 5.5 | 3.5*6 | 14 | 8*1 | 5.5 | 5.5 | 5.5 | 5.5 | 8*1 | 5.5 | 3.5*6 | 14 | 5.5 | 5.5 | 2 | 2 | 2 |
| | 30 | FRN0072E3□-4G | 14 | 8*1 | 5.5 | 22 | 14 | 8*1 | 8*1 | 8*1 | 8*1 | 14 | 8*1 | 5.5 | 14 | 14 | 8*1 | 2 | 2 | 2 |
| | | | | | | ND s | pecific | ation: | Norma | al-duty | applic | ations | \$ | | | | | | | |
| | 0.75 | FRN0002E3□-4G | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | 1.5 | FRN0004E3□-4G | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | 2.2 | FRN0006E3□-4G | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | 3.0 | FRN0007E3□-4G | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| | 5.5 | FRN0012E3□-4G | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 | 2 |
| _ | 11 | FRN0022E3□-4G | 2 | 2 | 2 | 5.5 | 3.5 | 2 | 3.5 | 3.5 | 3.5 | 2 | 2 | 2 | 3.5 | 2 | 2 | 2 | 2 | 2 |
| Three- phase | 15 | FRN0029E3□-4G | 3.5 | 2 | 2 | 8 | 5.5 | 3.5 | 5.5 | 5.5 | 5.5 | 3.5 | 2 | 2 | 5.5 | 3.5 | 3.5 | 2 | 2 | 2 |
| 400V | 15 | FRN0029E3E-4G | 3.5 | 2 | 2 | 6 | 5.5 | 3.5 | 5.5 | 5.5 | 5.5 | 3.5 | 2 | 2 | 5.5 | 3.5 | 3.5 | 2 | 2 | 2 |
| | 18.5 | FRN0037E3□-4G | 5.5 | 3.5*6 | 3.5*6 | 14 | 8 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 3.5*6 | 3.5*6 | 8 | 5.5 | 3.5*6 | 2 | 2 | 2 |
| | 10.0 | FRN0037E3E-4G | 5.5 | 3.5 | 3.5 | 10 | 8 | 5.5 | 5.5 | 5.5 | 5.5 | 5.5 | 3.5*6 | 3.5*6 | 8 | 5.5 | 3.5*6 | 2 | 2 | 2 |
| | 22 | FRN0044E3□-4G | 8 | 5.5 | 3.5*6 | 14 | 8 | 5.5 | 5.5 | 5.5 | 5.5 | 8 | 5.5 | 3.5*6 | 14 | 5.5 | 5.5 | 2 | 2 | 2 |
| | 22 | FRN0044E3E-4G | 8 | 5.5 | 3.5 | 10 | 8 | 5.5 | 5.5 | 5.5 | 5.5 | 8 | 5.5 | 3.5*6 | 14 | 5.5 | 5.5 | 2 | 2 | 2 |
| | 30 | FRN0059E3□-4G | 14 | 8*1 | 5.5 | 22 | 14 | 8*1 | 8*1 | 8*1 | 8*1 | 14 | 8*1 | 5.5 | 14 | 14 | 8*1 | 2 | 2 | 2 |
| | 37 | FRN0072E3□-4G | 14 | 14 | 8*1 | 38*7 | 14 | 14 | 8*1 | 8*1 | 8*1 | 14 | 14 | 8*1 | 22 | 14 | 14 | 2 | 2 | 2 |

 (Note 1) The □ is replaced by a letter of the alphabet indicating the type (S: Basic type, E:EMC filter built-*1

 *1 For compatible crimped terminals, please use model 22-55 by JST Mfg. Co., Ltd. or equivalent.

 *3 For compatible crimped terminals, please use model 22-55 by JST Mfg. Co., Ltd. or equivalent.

 *4 For compatible crimped terminals, please use model 32-55 by JST Mfg. Co., Ltd. or equivalent.

 *5 For compatible crimped terminals, please use model 38-56 by JST Mfg. Co., Ltd. or equivalent.

 *6 For compatible crimped terminals, please use model C860-56 by JST Mfg. Co., Ltd. or equivalent.

 *7 For compatible crimped terminals, please use model 75.5-6 by JST Mfg. Co., Ltd. or equivalent.

 *8 For compatible crimped terminals, please use model 85.5-6 by JST Mfg. Co., Ltd. or equivalent.

 *8 For compatible crimped terminals, please use model 80-6 by JST Mfg. Co., Ltd. or equivalent.

 *9 For compatible crimped terminals, please use model 80-6 by JST Mfg. Co., Ltd. or equivalent.

 *9 For compatible crimped terminals, please use model 80-6 by JST Mfg. Co., Ltd. or equivalent.

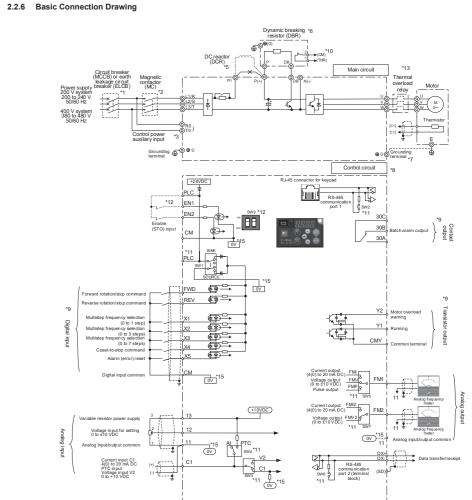
 *9 For compatible crimped terminals, please use model 80-6 by JST Mfg. Co., Ltd. or equivalent.

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

The specifications for the screws used in the control circuit wiring and the wire sizes are shown below. Table 2-6 Screw specifications and recommended wire sizes

| Terminal name | Permissible wire size mm² (AWG) | Recommended wire size mm² (AWG) | d | Driver⊡ (shape of tip) | Wire coating removal size | | Н |
|-----------------------------|---------------------------------------|---------------------------------------|---------|-----------------------------|------------------------------|---|---|
| Control circuit terminal | 0.25 to 1.5 (26 to 16) | 0.25 to 0.75 (24 to | o 18) | Minus⊡ (0.5 mm x 3.0 mm) | 8 m | m | 3.0 mm |
| Table 2-7 Recomme | nded rod terminals | | | | | | Tip thickness: 0.5 mm Driver tip shape |
| Wire size | | Туре | е | | | | Driver Lip snape |
| mm ² (AWG |) With i | nsulating collar | Wi | thout insulating collar | | | |
| 0.25 (24) | A | 0.25-8 YE | | - | | | |
| 0.34 (22) | A | I 0.34-8 TQ | | - | | | |
| 0.5 (20) | A | I 0.5-8 WH | | A0.5-8 | | | |
| 0.75 (18) | | 0.75-8 GY | | A0.75-8 | | | |
| *1: Recommended r | od terminal: Phoenix Co | ontact *2: Use Phoenix | Contact | CRIMPEOX 6 crimping plier | s | | |

Note) Depending on the wire type, coil diameter, and number of wires, the inverter surface cover may rise up. If this happens, it will be necessary to change the wire type or coil diameter, etc.



- (*1) Install the molded case circuit breaker (MCCB) or earth leakage circuit breaker (ELCB) (with overcurrent protection function) recommended for each inverter on the inverter input side (primary side) to protect wiring. Do not use a circuit breaker that exceeds the recommended rated current.
 (*2) An MCCB or ELCB is also used if isolating the inverter from the power supply, and therefore the magnetic contactor (MC) recommended for each inverter should be installed if required. Please note that if installing a coil such as an MC or solenoid near the inverter, connect a surge absorber in parallel.
 (*3) If wishing to related alarm signal issued if the protective function is triggered even when the inverter main power supply is cut off, or to constantly display the keypad, connect these terminals to the power supply. The inverter can be run even without inputting the power supply to these terminals (on FRN0088 to 0115E3:-226,FRN0059 to 00725:33-46).
 (*5) Remove the shorting bar between the inverter main circuit terminals P1 and P(+) before connecting the direct current reactor (DCR) (option). Use a DC reactor (DCR) when the capacity of the power supply transformer is 500 kVA or more and is 10 times or more the inverter rated capacity, or when there are "thyristor-driven" loads.
 (*6) FRENIC-Ace series inverters are equipped with built-in braining transitors, allowing direct connection of braining resistors between P(+) and DB.
 (*7) This terminal is used for grounding the motor. Connect if required. Grounding the motor using this terminal is recommended in order to suppress inverter noise.
 (*8) be twisted wire or shielded wires isonalise is incommended. If it inse interesect, ensure that they do so almost perpendicularly to the main circuit wiring.
 (*9) Eact distance of 10 cm or greater is recommended. If it insect interesect, ensure that they do so almost perpendicularly to the main circuit wiring.
 (*9) Eact do the functions described

2.2.7 Terminal Function Description 2.2.7.1 Main Circuit Terminals

| | | Table 2-8 Descripti | ion of main circuit terminal functions |
|--------------------|------------------|-----------------------------------|--|
| Classif ication | lerminal symbol | Terminal name | Detailed specifications |
| | L1/R, L2/S, L3/T | Main power supply input | Connect a three-phase power supply. (three-phase models only) |
| | L1/L, L2/N | Main power supply input | Connect a single-phase power supply. (single-phase models only) |
| | U, V, W | Inverter output | Connect a three-phase motor. |
| | P(+), P1 | For DC reactor connection | Connect a DC reactor (DCR) (option). |
| Main | P(+), N(-) | For direct current bus connection | Used for connection to direct current intermediate circuits of other inverters and PWM converters. |
| circuit | P(+), DB | For direct current bus connection | Connect the braking resistor(option) P(+) and DB terminals (wiring length: 5 m or less). |
| | ₿G | For inverter case grounding | Grounding terminal for inverter case and motor |
| | R0, T0 | Control power auxiliary input | If wishing to retain the integrated alarm signal issued if the protective function is triggered even when the inverter main power supply is cut off, or to constantly display the keypad, connect this terminal to the power supply (FRN0088E3::-2G or Above, FRN0059E3::-4G or Above). |

2.2.7.2 Control Circuit Terminals

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

Table 2-9 Description of control circuit terminal functions Terminal symbol Function description The terminal is used for the power supply (+10 VDC) for the external frequency setter (variable resistor: 1 to 5 k Ω). Connect variable resistors larger than 1/2 W. [13] Power supply Analog setting voltage input [12] If the Values, and enables, the Values of the Values of Frequency is set up according to the external analog current input command value. It is necessary to switch SW3 and SW4 (see User's Manual (24A7-E-0173a)) on the PCB.
 4 to 20 mA Dc/0 to 100(%), 20 to 20 mA Dc/0 to 100(%) (normal operation)
 20 to 4 mA Dc/0 to 100(%), 20 to 0 mA Dc/0 to 100(%) (inverse operation)
 (2) Other than frequency settings, this terminal can be assigned to PID command values *1,*2/torque current command values *1,*2/torq [C1] Analog setting function 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. (b) b b o b man beinger, index to write index to write a second g b b b man be received as b b b man.
(c) Frequency is set up according to the external analog voltage input command value. It is necessary to switch SW3 and SW12 (see User's Manual (24A7-E-0173::)) on the PCB.
• 0 to ±10 VDC/0 to ±100(%) (normal operation)
• 10 to ±0 VDC/0 to ±100(%) (inverse operation)
(c) Other than frequency settings, this terminal can be assigned to PID commands, PID control feedback signals, frequency auxiliary settings, ratio settings, tract settings, ratio settings, ratio settings, tract settings, torque command values/ torque current command values, speed limit values, and analog input monitors with analog input. Analog setting /oltage input V2 function) Hardware specifications Input impedance 22 (kΩ) Up to +15 VDC can be input. However, input exceeding +10 VDC will be recognized as ±10 VDC. (1) PTC (Positive Temperature Coefficient)/NTC (Negative Temperature Coefficient) thermistors for motor protection can be connected. It is necessary to switch SW3 and SW4 (see User's Manual (24A7-E-0173
)) on the PCB. PTC thermis (PTC function his is a common terminal for the analog input/output signal terminals ([13], [12], [C1], [FM1], and [FM2]). his terminal is insulated from terminals [CM] and [CMY]. [11] Analog cor Digital input Various signals (coast to stop command, external alarm, multi-speed selection, etc.) can be set with function codes E01 to E05, E98, E99. Refer to the User's Manual (24A7-E-0173
) for details. [X1] [X2] [X3] [X4] [X5] c) The input mode and SINK/SOURCE can be switched using SW1.
(b) The operating mode between each digital input terminal and terminal [CM] can be switched to "ON when shorted (active ON)" or "OFF when shorted factive OFF)". Digital input terminal [X5] can be set up as a pulse train input terminal by changing the function code [FWD] Forward rotation Maximum wire length: 20 m Maximum input pulse 30 kHz: When connected to open collector output pulse generator (pull-up and pull-down resistor) run/stop 100 kHz: When connected to complementary output pulse generator Refer to the User's Manual (24A7-E-0173□) for details on function code settings. [REV] Reverse rotation Refer to the User's Manual (24A7-E-0173
) for digital input circuit specifications. When terminals [EN1]-[PLC] or terminals [EN2]-[PLC] are OFF, the inverter output transistors stop switching (safe torque off: STO) Enable input [EN1] [EN2] sure to operate terminals [EN1] and [EN2] simultaneously; otherwise an EEF alarm is issued and inverter operation is The input mode for terminals [EN1] and [EN2] is fixed to SOURCE. The mode cannot be changed to SINK. This function can be enabled and disabled with SW9. If using this function, set the respective SW9 switches to the OFF side. fer to the User's Manual (24A7-E-0173c) for the terminal [EN1] and [EN2] circuit specifications. Connect the output signal power supply for the programmable controller.
 Rated voltage +24 VDC (power supply voltage fluctuation range: +20.4 to +27 VDC), maximum 100 mA)
 The terminal can also be used as the power supply for loads connected to transistor outputs. Refer to the "Transistor output" section for details. [PLC] Programmab logic controlle signal power This is a common terminal for digital input signals. The terminal is insulated from terminals [11], [CMY]. [CM] Digital common This terminal outputs analog DC voltage of 10 + 10 VDC, or analog DC current of 4 to 20mA/0 to 20mA monitor signals. The [FM1] output form (FMV/FMI) can be switched using SWS on the PCB and function code F29. The signal content is selected by setting function code F31 data. Allowable impedance for connection: Min. 5 kΩ (at 0 to +10 VDC output) (up to 2 analog volt meters (0 to 10 VDC, input impedance 10 kΩ) can be connected.) Allowable impedance for connection: Max. 500 Ω (with output of 4 to 20 mA DC) Can adjustment range: 0 to 300% Analog monitor (FMV function) (FMI function) [FM1] This terminal outputs a pulse signal. The signal content is selected in the same way as that as for the FM1 function by setting function code F31 data. The [FM1] output form (FMP) can be switched using SW5 on the PCB and function code F29. * Allowable impedance for connection: Min. 5 k Ω (up to two analog voltmeters (0 to 10 VDC, input impedance 10 k Ω) can be Pulse monitor (FMP function) (Set F34 to between 1 and 300% if using as average voltage output.) Pulse duty: Approx. 50%, pulse rate: 25 to 6000 p/s (at full scale) Analog monitor This terminal outputs analog DC voltage of 0 to +10 VDC, or analog DC current of 4 to 20mA/0 to 20mA monitor signals. (FMV2 function) The [FM2] output form (FMV2/FMI2) can be switched using SW7 on the PCB and function code F32. [FM2] MI2 function The signal content is selected by setting function code F35 data.
Allowable impedance for connection: Min. 5 kΩ (at 0 to +10 VDC output) (up to 2 analog volt meters (0 to 10 VDC, input Allowable impedance for connection: Max. 500 Ω (with output of 4 to 20 mA DC) Gain adjustment range: 0 to 300% [11] Analog comm This is a common terminal for analog input/output signals. The terminal is insulated from terminals [CM], [CMY]. Various signals (running signal, frequency reached signal, overload forecast signal, etc.) set with function codes E20 and E21 can be output. Refer to the User's Manual (24A7-E-0173
) for details. [Y1] [Y2] output 1 to 2) The operating mode between transistor output terminals [Y1] and [Y2] and terminal CMY can be changed to "ON when signal output (active ON)" or "OFF when signal output (active OFF)". Maximum voltage for pull-up power supply: 48 V, maximum load current when ON: 50 mA [CMY] This is a common terminal for transistor output signals. The terminal is insulated from terminals [CM], [11]. Transistor output common When the inverter stops with an alarm, an integrated alarm is output at the relay contact (1C). Contact capacity: 250 VAC 0.3A cos¢ = 0.3, 48 VDC 0.5 A
 The same signals as those of terminals [Y1] to [Y2] can be selected and output.
 It is possible to switch between a "short circuit between terminals [30A] and [30C] when an ON signal is output (excita active ON)" or an "open circuit between terminals [30A] and [30C] when an ON signal is output (non-excitation: active Integrated□ alarm output [30A] [30B] [30C] tion: active OFF This is an input/output terminal used to connect a computer or programmable controller, etc. by RS-485 communication. (Refer to the User's Manual (24A7-E-0173
) for details on terminating resistance.) [DX+] [DX-] [SD] RS-485 port 2 Refer to User's Manual (24A7-E-0173
) for details on recommended rod terminals.) (1) This is used as a connector for connecting the keypad. The keypad power is supplied from the inverter via an extension cable for remote operation. If using an extension cable, turn ON the SW2 terminating resistor.
 (2) This is used to connect a computer or programmable controller, etc. by RS-485 communication after disconnecting the keypad. (Refer to the User's Manual (24A7-E-0173:.) for details on terminating resistance.)
 (3) If connecting an extension cable for remote operation, a keypad relay adapter (option) is necessary.
 Pins 1, 2, 7, and 8 are assigned as the power supply source for the keypad. When connecting this RJ-45 connector to other devices, do not use these pins. For keypad RS-485 RJ-45 loss, do not use these pins. not connect the PC LAN ports, Ethernet hubs, or telephone lines to the RJ-45 connector. The inverter and the connected device may be damaged. Failure to observe this could result in fire. This is a USB connector (miniB specification) for connecting to a computer. Function codes can be edited, transferred, and verified, an inverter test run can be performed, and all states can be monitored using the inverter support loader (FRENIC USB connector USB port Loader)*. * Refer to the , User's Manual (24A7-E-0173) for details.

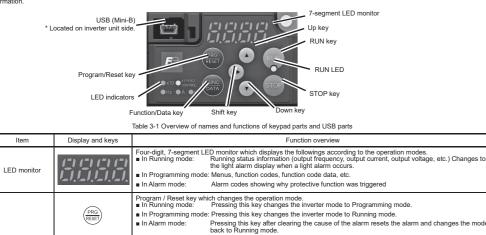
Chapter 3 OPERATION USING THE KEYPAD

In Alarm mode:

Refer to the User's Manual for details.

3.1 Name and Function of Each Keypad Part

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



Function/Data key which performs the following operations: a In Running mode: Nessing this key changes the information to be displayed concerning the status of the inverte (output frequency (Hz), output voltage (V), etc.)

Pressing this key displays details of the problem indicated by the alarm code displayed on th LED monitor.

In Programming mode: Pressing this key displays the function code or finalizes the data setting.

| | RUN | Press to run the motor (when performing keypad operation). |
|----------------|---------------------------|---|
| | STOP | Press to stop the motor. (when performing keypad operation). |
| | () / () | Up and down keys: Press these keys to select the setting items and change the function code data displayed on th LED monitor. |
| | | Shift key: Press this key to shift the cursor to the right for entry of a numerical value. |
| | RUN (green) | Lights when running with a run command entered by the is key, by terminal command FWD or REV, or through the communications link. |
| | KEYPAD CONTROL (green) | Lights up when the inverter is ready to run with a run command entered with the keypad (m) key. In Programming and Alarm modes, however, pressing the key cannot run the inverter even if this indicator lights up. The LED blinks once every second while in local mode. |
| LED indicators | Unit LEDs (3 red LEDs) | Hz, A, KW, x10: These three LED indicators identify the unit of numeral displayed on the LED monitor in Running mode by combination of fit and unit states of them. Refer to the User's Manual (24A7-E-0173c) for details. |
| | | PRG. MODE: By changing to Programming mode, the 2 LEDs on the left and right light up. (• Hz O A • kW) |
| | X 10 LED | Lights up when the displayed data exceeds 9999. When this LED lights up, the "displayed value x 10" is the actual value. |
| USB port | | The inverter and PC can be connected with a USB cable. The connector shape at the inverter side is a miniB type. Use a USB cable with thickness of 12 mm or less by 8.2 mm or less. |
| | | |

| | | LED monitor. |
|----------------|---------------------------|---|
| | | Shift key: Press this key to shift the cursor to the right for entry of a numerical value. |
| | RUN (green) | Lights when running with a run command entered by the and key, by terminal command FWD or REV, or through the communications link. |
| | KEYPAD CONTROL (green) | Lights up when the inverter is ready to run with a run command entered with the keypad (a) key. In Programming and Alarm modes, however, pressing the key cannot run the inverter even if this indicator lights up. The LED blinks once every second while in local mode. |
| LED indicators | Unit LEDs (3 red LEDs) | Hz, A, kW, x10: These three LED indicators identify the unit of numeral displayed on the LED monitor in Running mode by combination of lit and unlit states of them. Refer to the User's Manual (24A7-E-0173c) for details. PRG. MODE: By changing to Programming mode, the 2 LEDs on the left and right light up. (• Hz O A • kW) |
| | X 10 LED | Lights up when the displayed data exceeds 9999. When this LED lights up, the "displayed value x 10" is the actual value. |
| USB port | | The inverter and PC can be connected with a USB cable. The connector shape at the inverter side is a miniB type. Use a USB cable with thickness of 12 mm or less by 8.2 mm or less. |
| Destination | | |

| | (3 red LEDs) | combination of it and unit states of them. Refer to the User's Manual (24Ar-E-01751) for details. |
|-------------|--------------|---|
| | l ` ´ | PRG. MODE: By changing to Programming mode, the 2 LEDs on the left and right light up. (• Hz O A • kW) |
| | X 10 LED | Lights up when the displayed data exceeds 9999. When this LED lights up, the "displayed value x 10" is the actual value. |
| USB port | | The inverter and PC can be connected with a USB cable. The connector shape at the inverter side is a miniß type. Use a USB cable with thickness of 12 mm or less by 8.2 mm or less. |
| Destination | setting | |
| | | ENIC-Ace Global Model), the destination must be set first after the initial power supply. Without setting the destination, the cannot be operated neither. By setting the destination, basic function codes such as rated voltage, rated frequency, etc. are |

Initialized to general values in each region (Table 3-2). If the destination value setting is changed after the initial activation code such as failed voltage, failed inequality, and the destination value setting is changed after the initial activation is reserved by $g_d \xi_s$ in the program mode menu or function code H101. If the destination is reset by $g_d \xi_s$ all function codes are initialized to the factory defaults. If the destination is set by H101, only the function codes in Table 3-2 are initialized to the values in the table. The destination can be selected from the regions of Japan, Asia, China, Europe, Americas and Marco Americas and Korea. 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

Set the initial destination as shown below. Refer to Table 3-2. With 8.d £ 5 displayed, press 🛲 key first.

R5 rR (Asian region) is displayed first. For other regions, press 🌢 key or 💽 key to select the destination. (2)

(3) After selecting the destination, *SRUE* is displayed by pressing ⊕ key and the destination setting is completed. Then, *QQQ* is displayed. Table 3-2 Initial value for each destination

| | | Table 3-2 Initia | I value for each de | sunauon | | | |
|-----------------------|---|------------------|----------------------|----------------------------------|--------------|----------------|-----------------|
| | Destination | Asia | China | Europe | Americas | Korea | Japan |
| | LED Display | 85 18 | [Hn | ξυ | ЯПЕ г | Por | JPn |
| H101 | Destination | 2 | 3 | 4 | 5 | 7 | 1 |
| F03/A01 | Maximum output frequency 1, 2 | 60.0Hz | | | | | 60.0Hz |
| E31/E36/E54 | Frequency detection 1 to 3 (Level) | (200V) | 50.0Hz | 50.0Hz | 60.0Hz | 60.0Hz | 00.0112 |
| F04/A02 | Base frequency 1, 2 | 50.0Hz (400V) | | | | | 50.0Hz |
| F05/A03 | Rated voltage at base frequency 1, 2 | 220/415V | 200/380V | 230/400V | 230/460V | 200/400V | 200/400V |
| F06/A04 | Maximum output voltage 1, 2 | 220/4131 | 200/300 V | 230/400 v | 230/400 v | 200/4000 | 200/4000 |
| F14 | Restart mode after momentary power failure | 1 | 1 | 0 | 0 | 1 | 1 |
| 544 | (Mode selection) | | | 100% | | | 4000/ |
| F44 | Current limiter (Level) | | | 130% | | | 160% |
| F80 | ND/HD/HND/HHD mode selection | | ND | HND (3Ph200V) (1Ph200V, 3Ph40 | 0V) | | HHD |
| P02/A16 | Motor 1, 2 (Rated capacity) | | Set in kW | | Set in HP | Set i | n kW |
| P99/A39 | Motor 1, 2 selection | | 5 | | 1 | | 5 |
| H96 | STOP key priority / Start check function | 0 | 0 | 0 | 3 | 0 | 0 |
| K01 | Multifunction keypad TP-A2SW (Language selection) | 1 | 6 | 1 | 1 | 1 | 0 |
| F09/A05 | Torque boost 1, 2 | | | | 0.00% | | |
| F11/A07 | Electronic thermal 1, 2 (Overload detection level) | | | | | | |
| E34/E37/E55 | Overload early warning/Current detection 1 to 3 | | | | | | |
| P03/A17 | Motor 1, 2 (Rated current) | | | | | | |
| P06/A20 | Motor 1, 2 (No-load current) | | | | | | |
| P07/A21 | Motor 1, 2 (%R1) | | | | | | |
| P08/A22 | Motor 1, 2 (%X) | | | | Standard | Standard value | ue for Fuji IE3 |
| P12/A26 | Motor 1, 2 (Rated slip frequency) | Standa | rd value for Fuji IE | 3 motor | value for HP | | otor |
| P13/A27 | Motor 1, 2 (Iron loss factor 1) | | | | rating | | |
| P16/A30 to P20/A34 | Motor 1, 2 (Magnetic saturation factor 1 to 5) | | | | motor | | |
| P55/A55 | Motor 1, 2 (Torque current under vector control) | | | | | | |
| P56/A56 | Motor 1, 2 (Induced voltage factor under vector control) | | | | | | |

Chapter 4 FUNCTION CODES Function codes can be viewed and downloaded by accessing the QR Code below. The alarm display can be viewed and downloaded by accessing the QR Code below

Motor 1, 2 (For adjustment by

P57/A57





Chapter 5 ALARM DISPLAY

| unction code | Name | Data setting range |
|--------------|---|---|
| F01 | Frequency setting 1 | 0: Keypad key operation (()() keys) 1: Analog voltage input (terminal [12]) (0 to ±10 VDC) 2: Analog current input (terminal [12]) (4 to 20 mA DC) 3: Analog voltage input (terminal [12]) + analog current input (terminal [C1]) 5: Analog voltage input (terminal [C1]) (0 to 10 VDC) 7: UP/DOWN control 8: Keypad key operation (()() () keys) (with balanceless bumpless) 10: Pattern operation 11: Digital input/output interface card (option) 12: Pulse train input |
| F02 | Operation method | Keypad operation (rotation direction input: terminal block) External signal (digital input) Zekeypad operation (roward rotation) Keypad operation (roverse rotation) |
| F03 | Maximum output frequency 1 | 5.0 to 599.0 Hz |
| F04 | Base frequency 1 | 5.0 to 599.0 Hz |
| F05 | Rated voltage at base frequency 1 | 0: VR disable (outputs voltage proportional to power supply voltage) 80 to 240 V: AVR enable (200V series) 160 to 500 V: AVR enable (400V series) |
| F06 | Maximum output voltage 1 | 80 to 240 V: AVR enable (200V series) 160 to 500 V: AVR enable (400V series) |
| F07 | Acceleration time 1 | 0.00 to 6000 s * 0.00 is for acceleration and deceleration time cancel (when performing soft-start and stop externally) |
| F08 | Deceleration time 1 | |
| F09 | Torque boost 1 | 0.0 to 20.0% (% value against base frequency voltage 1) |
| F10 | Electronic thermal overload protection for motor 1 (Motor characteristics selection) | Enable (for general-purpose motors with self-cooling fan) Enable (for inverter-driven (FV) motors with separately excited fan) |
| F11 | (Operation level) | 0.00 (disable), current value of 1 to 135% of inverter rated current set with A unit (Inverter rated current is dependent on F80.) |
| F14 | Restart mode after momentary power failure (operation selection) | 0: Trip immediately 1: Trip after a recovery from power failure 2: Trip after a recovery from power failure 2: Trip after momentary deceleration is stopped 3: Continue to run (for heavy inertia load or general load) 4: Restart from frequency at power failure (for general load) 5: Restart from starting frequency |
| F16 | Frequency limiter (Low) | 0.0 to 599.0 Hz |
| F26 | Motor sound (Carrier frequency) | [FRN-E33 (Basic type)] [FRN-E38 (EMC filter built-in type)] • Inverter type: FRN***ESSE-2G 0.75 to 16 kHz; HHD specification= 0001 to 011, HND specification= 0001 to 0010, 0030 to 0088 0.75 to 16 kHz; HHD specification= 0012 to 0020, 0115 • Inverter type: FRN***ESSE-4G 0.75 to 16 kHz; HHD specification= 0022 to 0072, HND/HD specification= 0002 to 0059 0.75 to 16 kHz; HHD specification= 0072, ND specification= 0002 to 0059 0.75 to 16 kHz; HND specification= 0072, ND specification= 0002 to 0059 0.75 to 16 kHz; HHD specification= 0072, ND specification= 0002 to 0059 0.75 to 16 kHz; HHD specification= 0072, ND specification= 0002 to 0059 0.75 to 16 kHz; HHD specification= 0072, ND specification= 0002 to 0059 0.75 to 16 kHz; HHD specification= 0072, ND specification= 0002 to 0059 0.75 to 16 kHz; HHD specification= 0072, ND specification= 0001 to 0012(FRN-E38), 0001 to 0011(FRN-E38), 0.75 |
| P02 | Motor 1 (capacity) | 0.01 to 1000 kW (when P99 = 0 or 4, 15) 0.01 to 1000 HP (when P99 = 1) |
| P03 | (Rated current) | 0.00 to 2000 A |
| P04 | (Auto-tuning) | 0: Disable 1: Stop tuning 2: Rotation tuning 4: Synchronous motor magnetic pole position offset tuning 5: Stop tuning (%R1, %X only) |
| P99 | Motor 1 selection | 0: Motor characteristics 0 (Fuji standard IM, 8-series) 1: Motor characteristics 1 (HP rating IMs) 3: Motor characteristics 0 (Refer to replacement material when using Fuji IM, 6-series.) 4: Other IMs 5: Motor characteristics 5 (Fuji premium efficiency motors) 20: Other (synchronous motors) 21: Motor characteristics (Fuji synchronous motor (GNP1 series)) 23: Motor characteristics (Fuji synchronous motor (GNP1 series)) |

Chapter 6 MAINTENANCE AND INSPECTION

6.1 Product Inquiries and Warranty

6.1.1 Inquiry Request

In induity Request recessary to make an inquiry relating to such aspects as product failure or damage, or anything that is in doubt, please notify Fuji Electric of the following. Inverter type. Refer to Chapter 1 *1.1 Acceptance Inspection (Nameplates and Inverter Type)". SER No. (serial number of equipment). Refer to Chapter 1 *1.1 Acceptance Inspection (Nameplates and Inverter Type)". Any function code data that has been changed from the factory default values (See User's Manual (24A7-E-0173c)). ROM version (See User's Manual (24A7-E-0173c)). Date of purchase Inquiries (for example, point and extent of breakage, uncertainties, failure phenomena, and other circumstances)

6.1.2 Product Warranty

To all our customers who purchase Fuji Electric products included in this documentation: Please take the following into consideration when placing your order.

These take the bioloming into consideration men placing your order. When requesting an estimate and placing your orders for the products included in these materials, please be aware that any items such as specifications which are not specifically mentioned in the contract, catalog, specifications or other materials will be as mentioned below. In addition, the products included in these materials are limited in the use they are put to and the place where they can be used, etc., and may require periodic inspection. Please confirm these points with your sales representative or directly with this company. Furthemore, regarding purchased products and ellivered 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 Scope (1) Free of charge warranty period

 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.
 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. b) 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 scope

- (1) In the event that breakdown occurs during the product's warranty period which is the responsibility of Fuji Electric, Fuji Electric will replace or repair the part of the product that has broken down free of charge at the place where the product was purchased or where it was delivered. However, if the following cases are applicable, the terms of this warranty may not apply.
 (1) The failure was caused by inappropriate conditions, environment, handling or usage methods, etc., which are not specified in the catalog, instruction manual, specifications, or other relevant documents.
 (2) The failure was caused by some reason other than the purchased or delivered Fuji Electric product.
 (3) The failure was caused by running a program other than that supplied by Fuji Electric for a programmable Fuji Electric product, such as a problem with the design of the customer's equipment or software.
 (4) The failure was caused by running a program other than that supplied by Fuji Electric for a programmable Fuji Electric product, or as a result of using such a program.

- program.
 j The failure was caused by disassembly, modifications, or repairs carried out by a party other than Fuji Electric.
 j) The failure was caused by a failure to properly maintain or replace the consumable parts, etc. specified in the Instruction Manual (Detailed Edition).
 j) The failure was caused by a scientific or technical problem that was not foreseen when making practical application of the product at the time it was purchased
- (7) The failure was caused by a scientific or recriminant protocon that are used.
 (8) The product was not used in the manner in which it was originally intended to be used.
 (9) The failure was caused by a reason for which Fuji Electric holds no responsibility, such as natural or other disaster.
 (9) Furthermore, the warranty specified herein shall be limited solely to the purchased or delivered product.
 (3) The upper limit for the warranty scope shall be as specified in item (1) above, and any damages (damage to or loss of machinery or equipment, or lost profits from the same, etc.) consequent to or resulting from a failure 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, Fuji Electric or its service network can perform the trouble diagnosis for a fee. In this case, the customer is asked to assume the burden for charges levied in accordance with Fuji Electric's fee regulations.

6.1.2.2 Exclusion of Liability for Loss of Opportunity, etc.

Regardless of whether a failure occurs during or after the free of charge warranty period, Fuji Electric 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 Fuji Electric's products, whether foreseen or not, which Fuji Electric is not exponsible for causing.

6.1.2.3 Repair period after production stoppage, spare parts supply period (maintenance period)

With regards to models (products) which have gone out of production, Fuji Electric shall carry out repairs for a period of 7 years following production stoppage, from the month and year when the production stoppage occurs. In addition, Fuji Electric shall continue to supply the spare parts required for repairs for a period of 7 years, from the month and year when the production stoppage occurs. In eaddition, Fuji Electric shall continue to supply the spare parts required for repairs is short and it will be difficult to proceed 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 with the Fuji Electric uses office or ur service office.

6.1.2.4 Delivery conditions

The product delivered and handed over to the customer shall be the standard product for which no settings have been specified, or adjustments made with an application, and Fuji Electric accepts no responsibility for any on-site adjustments or test operation.

6.1.2.5 Service description The price of the purchased or delivered product does not include service costs such as those required for dispatching technicians and so on. Fuji Electric will be more than happy to discuss this further upon request.

6.1.2.6 Applicable scope of service

The above content applies to transactions and use within Japan. Please consult your dealer or Fuji Electric regarding transactions or use outside Japan.

Chapter 7 STANDARDS COMPLIANCE

7.1 European Standards Compatibility (

The CE marking on Fuji products indicates that they comply with the essential requirements of the Electromagnetic Compatibility (EMC) Directive, Low Voltage Directive, and Machinery Directive issued by the Council of the European Communities. Note: Keep the ambient temperature at 50 °C or less to comply with European standards. This does not apply to products with no standard indication.

| | Table 7-1 Compliance standards |
|-----------------------------------|--|
| EMC Directive Note 1 | EN61800-3 Immunity: Second environment (Industrial) Emission: Category C2 (Applicable only when an optional EMC-compliant filter is attached.) Category C2 (FRN0012E3E-4G or below, FRN0011E3E-7G or below) Category C3 (FRN0022E3E-4G or above) (Applicable only to the EMC filter built-in type of inverters) |
| Low Voltage Directive | Adjustable speed electrical power drive systems. Part 5-1: Safety requirements. Electrical, thermal and energy EN61800-5-1 |
| Machine Directives Note 2 | EN ISO 13849-1: Cat.3 / PL:e EN 60204-1: Stop Category 0 EN 61800-5-2: SIL3 (Functional Safety: O) EN 62061: SIL3 |
| | MC Directive for inverters with no built-in EMC filter (FRNDDDE3S-DG) is achieved in combination with a dedicated Fuji external filter. |
| | s not have a built-in EMC filter complies with the EMC Directive by combining it with an external filter dedicated to Fuji. |
| Category C2: In a domes | tic environment this product may cause radio interference in which case supplementary mitigation measures may be required. |
| Category C3: This type o | f PDS is not intended to be used on a low-voltage public network which supplies domestic premises ; radio frequency interference is |
| expected if | used on such a network |
| | as a risk about other equipment malfunction or breakdown by radiated electric field strength out of frequency range that is defined. 3: 2004 + A1: 2012 2nd Environment and EN/IEC 61800-3: 2018 2nd Environment. |
| Note 2: Refer to the User's Man | nual (24A7-E-0173c) for details on the Machinery Directive. |
| Note 3: Compatibility with revise | ed 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 shall be indicated as follows when exporting products from Fuji Electric to Europe. Importer in Europ

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

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

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

7.2.1 General Comments

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

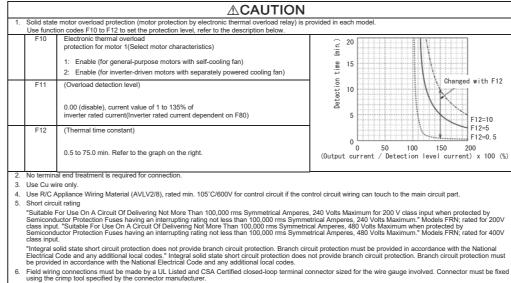
7.2.2 UL Standards and Canadian Standards (cUL Certification) Compatibility

Compatibility with UL Standards (UL61800-5-10) and Canadian Standards (cUL certification: C22.2 No.274-17) is ensured by installing inverters with UL / cUL marking in accordance with the following.

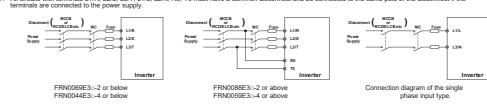
UL Standards and Canadian Standards (cUL Certification) Compatibility

High available fault current – damage warning:

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



All circuits with terminals L1/R, L2/S, L3/T, L1/L, L2/N, R0, T0 must have a common disconnect and be connected to the same pole of the disconnect if the terminals are connected to the nower supply



The table below applies to FRN△△△E3□-O.

| (∆: Indicates in | nverter ca | pacity, 🗆: | Indicates | type S,E | 0: | Indicates the series 2, | 4, or 7) | | | | | | | | | | |
|------------------|--------------------------|----------------|----------------|----------------|----|-------------------------|----------------|----------------|---------------|---------------|----------------|----------------|---------------|---------------|--|--|--|
| | Open type Enclosed type* | | | | | Open type | | | | | | Enclosed type* | | | | | |
| Туре | HHD °C (°F) | HND °C (°F) | HHD °C (°F) | HND °C (°F) | | Туре | HHD °C (°F) | HND °C (°F) | HD °C (°F) | ND °C (°F) | HHD °C (°F) | HND °C (°F) | HD °C (°F) | ND °C (°F) | | | |
| FRN0001E3 -2 | 50(122) | 50(122) | 40(104) | 40(104) | | FRN0002E3 -4 | 50(122) | 50(122) | 40(104) | 40(104) | 40(104) | 40(104) | 30(86) | 30(86) | | | |
| FRN0002E30-2 | 50(122) | 50(122) | 40(104) | 40(104) | | FRN0004E3 -4 | 50(122) | 50(122) | 40(104) | 40 (104) | 40(104) | 40(104) | 30(86) | 30(86) | | | |
| FRN0004E30-2 | 50(122) | 50(122) | 40(104) | 40(104) | | FRN0006E30-4 | 50(122) | 50(122) | 40(104) | 40(104) | 40(104) | 40(104) | 30(86) | 30(86) | | | |
| FRN0006E30-2 | 50(122) | 50(122) | 40(104) | 40(104) | | FRN0007E3 -4 | 50(122) | 40(104) | 40(104) | 40(104) | 40(104) | 30(86) | 30(86) | 30(86) | | | |
| FRN0010E30-2 | 50(122) | 50(122) | 40(104) | 40(104) | | FRN0012E3 -4 | 50(122) | 40(104) | 40(104) | 40(104) | 40(104) | 30(86) | 30(86) | 30(86) | | | |
| FRN0012E30-2 | 50(122) | 40(104) | 40(104) | 30(86) | | FRN0022E3 -4 | 50(122) | 50(122) | 40(104) | 40(104) | 40(104) | 40(104) | 30(86) | 30(86) | | | |
| FRN0020E3 -2 | 50(122) | 40(104) | 40(104) | 30(86) | | FRN0029E3 -4 | 50(122) | 50(122) | 40(104) | 40(104) | 40(104) | 40(104) | 30(86) | 30(86) | | | |
| FRN0030E3S-2 | 50(122) | 50(122) | 40(104) | 40(104) | | FRN0037E3-4 | 50(122) | 50(122) | 40(104) | 40(104) | 40(104) | 40(104) | 30(86) | 30(86) | | | |
| FRN0040E3S-2 | 50(122) | 50(122) | 40(104) | 40(104) | | FRN0044E3 -4 | 50(122) | 50(122) | 40(104) | 40(104) | 40(104) | 40(104) | 30(86) | 30(86) | | | |
| FRN0056E3S-2 | 50(122) | 50(122) | 40(104) | 40(104) | | FRN0059E30-4 | 50(122) | 50(122) | 40(104) | 40(104) | 40(104) | 40(104) | 30(86) | 30(86) | | | |
| FRN0069E3S-2 | 50(122) | 50(122) | 40(104) | 40(104) | | FRN0072E3 -4 | 50(122) | 50(122) | 40(104) | 40(104) | 40(104) | 40(104) | 30(86) | 30(86) | | | |
| FRN0088E3S-2 | 50(122) | 50(122) | 40(104) | 40(104) | | | • | • | | | | | | | | | |
| FRN0115E3S-2 | 50(122) | 50(122) | 40(104) | 40(104) | | | | | | | | | | | | | |

Open type Enclosed type* Type Type (°F) (°F) (°F) (°F) (°F) (°F) (°F) (°F RN0001E3D-7 50(122) 50(122) 40(104) 40(104) RN0002E3D-7 50(122) 50(122) 40(104) 40(104) FRN0001E3E-7 FRN0002E3E-7 50(122)
 N000425::-7
 50(122)
 10(104)
 40(104)
 FN000253:-7
 50(122)

 8N00045::-7
 50(122)
 40(104)
 40(104)
 60(104)
 50(122)

 8N00045::-7
 50(122)
 40(104)
 40(104)
 30(86)
 FRN0005253:-7
 50(122)
 RN0010E3-7 50(122) 40(104) 40(104) 30(86) FRN008E3E-7 50(122) N0012E3⊡-7 50(122) 40(104) 40(104) 30(86) FRN0011E3E-7 50(122) Atmosphere For use in pollution degree 2 environments, (for Open-Type model)

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

*There is no Enclosed type for FRNAAAE3E-O. . Storage and Transport Environments

| Item | Spe | cifications | | | | | |
|---------------------------|--|--|--|--|--|--|--|
| Storage temperature | During transport: -25 to +70°C (-13 to +158°F) | Discourse to a biostand to a biostation and the share and | | | | | |
| | During storage: -25 to +65°C (-13 to +153°F) | Places not subjected to abrupt temperature changes or condensation or freezing | | | | | |
| Relative humidity | 5 to 95% RH *1 | condensation of neezing | | | | | |
| Atmosphere | The inverter must not be exposed to dust, direct sunlight, corros atmosphere must contain only a low level of salt. (0.01 mg/cm ² of | sive or flammable gases, oil mist, vapor, water drops or vibration. The or less per year) | | | | | |
| Atmospheric pressure | 86 to 106 kPa (during storage) | | | | | | |
| | 70 to 106 kPa (during transportation) | | | | | | |
| 1 Even if the humidity is | within the specified requirements, avoid such places where the inv | erter will be subjected to sudden changes in temperature that will cause | | | | | |

condensation or freezing

| | ۲. | | | 5 C | Requi | ed torque lb | Wire size AWG (mm ²) | | | | | | | |
|--------------------|------------------|-----------------------------|-----------------------|---|--------------------|--------------------|--|-----------------------|----------------------|---------|----------------------|---------------------|---------|------------------------------|
| ge | not | | | ction | | | ILA . | Main terminal Cu wire | | | | | | |
| supply voltage | applicable motor | | HHD/HND/HD/ND mode | Semiconductor Protection Euse Cat No. Manufacturer: Mersen/Bussmann(Eaton) | inal | 6 | Aux. control power supply Control power auxiliary input | L | 1/L, L2/N | | | U, V, W | | Aux. control power supply |
| lddr | ppli | Inverter type | HND/H mode | a Ca Lacon Lacon Ssm *4 | termina | Grounding | pply wer put | u wire | | S | u wire | | ş | pply |
| er si | qa | | E L | -use /Bu | Main 1 | Grou | Aux. control supply ontrol power input | °C (| ပိုင်။ | Remarks | ° 0 0 | ο Ω Ω | Remarks | cor |
| Power | Standard | | 王 | Sen Z F | ž | 0 | ux. | 60 (1° | 7 °F | Rer | 60 °F) | 7 °F) | Rer | XI. |
| ۵. | Star | | | Sen | | | Cor A | (140 | (167 | | (140 | . (167 | | < |
| | 0.1 | FRN0001E3-2 | HHD HND | PC30UD69V50 /170M3458 | | | | | | | | | | |
| (| 0.2 | FRN0002E30-2 | HHD | PC30UD69V50 | | | | | | | | | | |
| | 0.4 | | HND HHD | /170M3458 PC30UD69V50□ | 7.1(0.8) | 10.6(1.2) | | | | | | | | |
| | 0.75 | FRN0004E30-2 | HND HHD | /170M3458 PC30UD69V50 | | | | 14(2.1) | 14(2.1) | | 14(2.1) | 14(2.1) | | |
| | 1.1 | FRN0006E30-2 | HND | /170M3460 | | | | | | | | | | |
| > | 1.5 | FRN0010E3 -2 | HHD HND | PC30UD69V80 /170M3462 | | | | | | | | | | |
| 200 | 2.2 | FRN0012E3 -2 | HHD HND | PC30UD69V125 /170M3462 | 10.6(1.2) | 15.9(1.8) | - | 10(2.2) | 40/2.2) | *3 | | | | - |
| ase | 3.7 | FRN0020E3-2 | HHD | PC30UD69V125 | | , í | | 12(3.3) 10(5.3) | 12(3.3) 10(5.3) | -3 | 12(3.3) | 12(3.3) | | |
| Three-phase | 5.5 | | HND HHD | /170M3463 PC30UD69V160 | | | | 8(8.4) | 10(5.3) | | | | | |
| hree | 7.5 | FRN0030E3S-2 | HND | /170M3464 | 27(3.0) | 27(3.0) | | 6(13.3) | 8(8.4) | | 10(5.3) | 10(5.3) | | |
| - | 11 | FRN0040E3S-2 | HHD HND | PC30UD69V200 /170M3465 | | . , | | | 6(42.2) | | 8(8.4) | 8(8.4) | | |
| | | FRN0056E3S-2 | HHD HND | PC30UD69V200 /170M3465 | | | | 4(21.2) | 6(13.3) | | 6(13.3) | | | |
| | 15 | FRN0069E3 -2 | HHD | PC30UD69V250 | 1 | | | 3(26.7) | 4(21.2) | | 4(21.2) | 6(13.3) | | |
| | 18.5 | | HND HHD | /170M3466 PC30UD69V250 | 51.3(5.8) | 51.3(5.8) | | 1(42.4) | 3(26.7) | | 3(26.7) | 4(21.2) | | |
| | 22 | FRN0088E3S-2 | HND HHD | /170M3466 PC30UD69V315 | | | 10.6 (1.2) | | 2(33.6) | *2 *3 | 2(33.6) | 3(26.7) | | 14(2.1 *1*2 |
| | 30 | FRN0115E3S-2 | HND | /170M3467 | | | (1.2) | - | 2/0(67.4) | 2 3 | - | 2(33.6) | *2*3 | 12 |
| 0.4 0.75 1.1 | | FRN0002E30-4 | HHD HND/HD/ND | PC30UD69V50 /170M3458 | | | | | | | | | | |
| | | FR10004F0 4 | HHD | PC30UD69V50 | 1 | | | | | | | | | |
| | 1.1 | FRN0004E30-4 | HND/HD ND | /170M3458 | | | | | 11/0 1) | | | | | |
| | | FRN0006E3-4 | HHD HND/HD/ND | PC30UD69V50 /170M3459 | 10.6(1.2) | 15.9 (1.8) | | 14 (2.1) | 14 (2.1) | | 14 (2.1) | 14 (2.1) | | |
| | 2.2 | FRN0007E3-4 | HHD | PC30UD69V63 | 1 | | | | | | | | | |
| | 3.7 | | HND/HD/ND HHD | /170M3460 PC30UD69V63□ | 1 | | | | | | | | | |
| ≥ | 5.5 | FRN0012E30-4 | HND/HD/ND | /170M3461 | | | | 12 (3.3) | 12 (3.3) | | | | | |
| Three-phase 400\ | 7.5 | FRN0022E3-4 | HHD HND/HD | PC30UD69V100 /170M3462 | | | - | 10 (5.3) | 10 (5.3) | | 12 (3.3) | 12 (3.3) | | - |
| lase | 11 7.5 | | ND HHD | | 27(3.0) | 27(3.0) | | 8 (8.4) | | | | | | |
| e-pr | 11 | FRN0029E30-4 | HND/HD | PC30UD69V125 /170M3463 | | | | | 8 (8.4) | | 10 (5.3) | 10 (5.3) | | |
| Thre | 15 11 | | ND HHD | DC2011D60\/125- | | | | 6 (13.3) 8 (8.4) | . , | | | | | |
| F | 15 18.5 | FRN0037E3-4 | HND/HD ND | PC30UD69V125 /170M3464 | | | | | 6 (13.3) | | 8 (8.4) 6 (13.3) | 8 (8.4) 6 (13.3) | | |
| | 15 | | HHD | PC30UD69V160 | 1 | | | 6 (13.3) | 8 (8.4) | *3 | 8 (8.4) | 8 (8.4) | *3 | |
| | 18.5 22 | FRN0044E3-4 | HND/HD ND | /170M3464 | E4 2/E 0) | E4 2/E 0) | | 4 (21.2) | 6 (42.2) | | 6 | • (••••) | | |
| | 18.5 22 | FRN0059E3-4 | HHD HND/HD | PC30UD69V160 | 51.3(5.8) | 51.3(5.8) | | 6 (13.3) 4 (21.2) | 6 (13.3) | | (13.3) | | | |
| | 30 | FRN0059E30-4 | ND | /170M3464 | | | 10.6(1.2) | 3 (26.7) | 4 (21.2) | | 4 (21.2) | 6 (13.3) | | 14 (2.1 *1 *2 |
| | 22 30 | FRN0072E3 -4 | HHD HND/HD | PC30UD69V200 | | | 10.0(1.2) | 4 (21.2) 3 (26.7) | 6 (13.3) 4 (21.2) | | 6 (13.3) 4 (21.2) | | | 1 2 |
| | 37 | | ND | /170M3465 | | | | 2 (33.6) | 3 (26.7) | | 3 (26.7) | 4 (21.2) | | |
| | 5.5 | FRN0022E3E-4 | HHD HND/HD | PC30UD69V100 /170M3462 | INPUT | INPUT | | 12 | 12 10 | | 14 12 | 14 12 | - | |
| Noc | 11 7.5 | | ND HHD | | 10.6(1.2) Other | 35.4(4.0) Other | | 8 10 | 8 10 | | 10 12 | 10 12 | | |
| Three-phase 400\ | 11 | FRN0029E3E-4 | HND/HD | PC30UD69V125 /170M3463 | 27(3.0) | 27(3.0) | | 8 | | | | | | |
| ohas | 15 11 | | ND HHD | | | | - | 6 8 | 8 | | 10 | 10 | | - |
| t-ee- | 15 18.5 | FRN0037E3E-4 | HND/HD ND | PC30UD69V125 /170M3464 | INPUT | INPUT 35.4(4.0) | | | 6 | | 8 | | | |
| ЧĻ | 15 | | HHD | PC30UD69V160 | 15.9(1.8) Other | 35.4(4.0) Other | | 6 | 8 | | ° | 8 | | |
| | 18.5 22 | FRN0044E3E-4 | HND/HD ND | /170M3464 | 27(3.0) | 27(3.0) | | 4 | 6 | | 6 | | | |
| | 0.1 | FRN0001E3-7 | HHD | PC30UD69V50 /170M3458 | | | | | | | | | | |
| | 0.2 | | HHD | PC30UD69V50 | 1 | | | | | | | | | |
| > | 0.4 | FRN0002E3-7 FRN0003E3E-7 | HND HHD | /170M3458 | | | | | | | | | | |
| se 200 | | FRN0003E3E-7 | HHD | PC30UD69V50 /170M3459 | 7.1(0.8) | 10.6(1.2) | | 14 (2.1) | 14 (2.1) | | | | | |
| | 0.55 | FRN0005E3E-7 | HND HHD | | { | | | | | *0 | | 11/0 1 | *0 | |
| -pha | 0.75 | FRN0006E30-7 | HHD | PC30UD69V80 /170M3462 | | | - | | | *3 | 14 (2.1) | 14 (2.1) | *3 | - |
| -albr | 1.1 | FRN0008E3E-7 | HND HHD | | <u> </u> | | | | | | | | | |
| Sir | 1.5 | FRN0010E3-7 | HHD | PC30UD69V125 /170M3463 | | | | 12 (3.3) | 12 (3.3) | | | | | |
| | 2.2 | FRN0011E3E-7 | HND HHD | PC30UD69V125 | 10.6(1.2) | 15.9(1.8) | | | | | | | | |
| ļ | 3 | FRN0012E30-7 | HHD HND | /170M3463 | | | | 10 (5.3) | 10 (5.3) | | | | | |
| | | | | | | | | | | | | | | |

No terminal end treatment is required for connection Use 75 °C (167 F) Cu wire only. Use copper wire with maximum permissible temperature of 75 °C.

The wire size of UL Open Type and Enclosed Type are common. Please contact us if UL Open Type exclusive wire is necessary. *4 The fuses listed are representative parts.Refer to additional material (INR-SI47-2587) for the alternative parts.

7.3 Radio Waves Act (South Korea)

Compliance with the Radio Waves Act (South Koreal

Comparison with the Radio Waves AC (South Roles) User guidance This product has undergone a conformity assessment for the purpose of use in work environments, and is intended for use in areas outside the home. Only the following product types are applicable to this certification. Type: FRNAALE3S-::G, FRNAALE3E-::G

A: Replaced with the inverter capacity □: Replaced with the number 2, 4, or 7 indicating the inverter series)

(Products without standard indication k are not applicable.)

Applicant: Fuji Electric Korea Equipment name: Inverter Country of origin: Indicated on nameplate Date of manufacture: Indicated on nameplate Manufacturer: Fuji Electric Co., Ltd.