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User manual OMRON RX
User guide OMRON RX
Operating instructions OMRON RX
Instructions for use OMRON RX
Instruction manual OMRON RX

Cat. No. I56E12-01X



RX

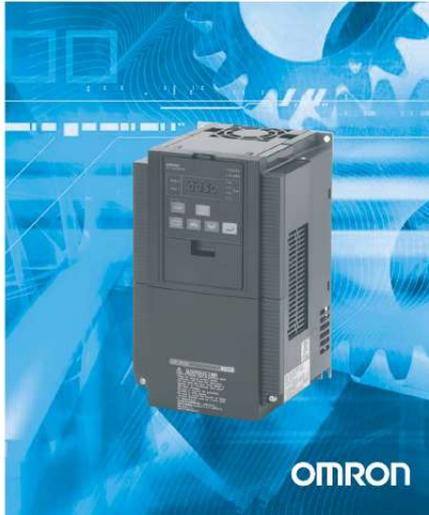
Customised to your machine

Model: RX

200 V Class Three-Phase Input 0.4 to 55 kW

400 V Class Three-Phase Input 0.4 to 132 kW

USER'S MANUAL



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Manual abstract:

No. @@@@After reading this manual, keep it handy for future reference. @@You should assume that anything not described in this manual is not possible with the product. Intended readers This manual is intended for: Those with knowledge of the workings of electricity (qualified electric engineers or the equivalent), and also in charge of: · Introducing the control equipment · Designing the control system · Installing and/or connecting the control equipment · Field management 1 Read and Understand this Manual Read and Understand this Manual Please read and understand this manual before using the product. Please consult your OMRON representative if you have any questions or comments. Warranty and Limitations of Liability WARRANTY OMRON's exclusive warranty is that the products are free from defects in materials and workmanship for a period of one year (or other period if specified) from date of sale by OMRON. OMRON MAKES NO WARRANTY OR REPRESENTATION, EXPRESS OR IMPLIED, REGARDING NON-INFRINGEMENT, MERCHANTABILITY, OR FITNESS FOR PARTICULAR PURPOSE OF THE PRODUCTS. ANY BUYER OR USER ACKNOWLEDGES THAT THE BUYER OR USER ALONE HAS DETERMINED THAT THE PRODUCTS WILL SUITABLY MEET THE REQUIREMENTS OF THEIR INTENDED USE. OMRON DISCLAIMS ALL OTHER WARRANTIES, EXPRESS OR IMPLIED. LIMITATIONS OF LIABILITY OMRON SHALL NOT BE RESPONSIBLE FOR SPECIAL, INDIRECT, OR CONSEQUENTIAL DAMAGES, LOSS OF PROFITS OR COMMERCIAL LOSS IN ANY WAY CONNECTED WITH THE PRODUCTS, WHETHER SUCH CLAIM IS BASED ON CONTRACT, WARRANTY, NEGLIGENCE, OR STRICT LIABILITY.

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The following are some examples of applications for which particular attention must be given. This is not intended to be an exhaustive list of all possible uses of the products, nor is it intended to imply that the uses listed may be suitable for the products: · Outdoor use, uses involving potential chemical contamination or electrical interference, or conditions or uses not described in this manual. · Nuclear energy control systems, combustion systems, railroad systems, aviation systems, medical equipment, amusement machines, vehicles, safety equipment, and installations subject to separate industry or government regulations. · Systems, machines, and equipment that could present a risk to life or property. Please know and observe all prohibitions of use applicable to the products. NEVER USE THE PRODUCTS FOR AN APPLICATION INVOLVING SERIOUS RISK TO LIFE OR PROPERTY WITHOUT ENSURING THAT THE SYSTEM AS A WHOLE HAS BEEN DESIGNED TO ADDRESS THE RISKS, AND THAT THE OMRON PRODUCTS ARE PROPERLY RATED AND INSTALLED FOR THE INTENDED USE WITHIN THE OVERALL EQUIPMENT OR SYSTEM. PROGRAMMABLE PRODUCTS OMRON shall not be responsible for the user's programming of a programmable product, or any consequence thereof. 3 Read and Understand this Manual Disclaimers CHANGE IN SPECIFICATIONS Product specifications and accessories may be changed at any time based on improvements and other reasons. It is our practice to change model numbers when published ratings or features are changed, or when significant construction changes are made. However, some specifications of the products may be changed without any notice. When in doubt, special model numbers may be assigned to fix or establish key specifications for your application on your request. Please consult with your OMRON representative at any time to confirm actual specifications of purchased products. DIMENSIONS AND WEIGHTS Dimensions and weights are nominal and are not to be used for manufacturing purposes, even when tolerances are shown. PERFORMANCE DATA Performance data given in this manual is provided as a guide for the user in determining suitability and does not constitute a warranty. It may represent the result of OMRON's test conditions, and the users must correlate it to actual application requirements.

Actual performance is subject to the OMRON Warranty and Limitations of Liability. ERRORS AND OMISSIONS The information in this manual has been carefully checked and is believed to be accurate; however, no responsibility is assumed for clerical, typographical, or proofreading errors, or omissions. 4 Safety Precautions Safety Precautions Indications and Meanings of Safety Information In this user's manual, the following precautions and signal words are used to provide information to ensure the safe use of the RX Inverter. The information provided here is vital to safety. Strictly observe the precautions provided. Meanings of Signal Words WARNING CAUTION Alert Symbols in this Document Indicates an imminently hazardous situation which, if not avoided, is likely to result in serious injury or may result in death. Additionally there may be severe property damage. Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury or in property damage. WARNING Turn off the power supply and implement wiring correctly. Not doing so may result in a serious injury due to an electric shock.

Wiring work must be carried out only by qualified personnel. Not doing so may result in a serious injury due to an electric shock. Do not change wiring and slide switches (SW1), put on or take off Digital Operator and optional devices, replace cooling fans while the input power is being supplied. Doing so may result in a serious injury due to an electric shock. Be sure to ground the unit.

Not doing so may result in a serious injury due to an electric shock or fire. (200-V class: type-D grounding, 400-V class: type-C grounding) Do not remove the terminal block cover during the power supply and 10 minutes after the power shutdown. Doing so may result in a serious injury due to an electric shock. Do not operate the Digital Operator or switches with wet hands. Doing so may result in a serious injury due to an electric shock.

Inspection of the Inverter must be conducted after the power supply has been turned off.



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Not doing so may result in a serious injury due to an electric shock. The main power supply is not necessarily shut off even if the emergency shutoff function is activated. 5 Safety Precautions CAUTION Do not connect resistors to the terminals (PD/+1, P/+, N/-) directly. Doing so might result in a smallscale fire, heat generation or damage to the unit. Install a stop motion device to ensure safety. Not doing so might result in a minor injury. (A holding brake is not a stop motion device designed to ensure safety.) Be sure to use a specified type of braking resistor/regenerative braking unit. In case of a braking resistor, install a thermal relay that monitors the temperature of the resistor.

Not doing so might result in a moderate burn due to the heat generated in the braking resistor/regenerative braking unit. Configure a sequence that enables the Inverter power to turn off when unusual overheating is detected in the braking resistor/regenerative braking unit. The Inverter has high voltage parts inside which, if short-circuited, might cause damage to itself or other property. Place covers on the openings or take other precautions to make sure that no metal objects such as cutting bits or lead wire scraps go inside when installing and wiring. Do not touch the Inverter fins, braking resistors and the motor, which become too hot during the power supply and for some time after the power shutoff. Doing so may result in a burn. Take safety precautions such as setting up a molded-case circuit breaker (MCCB) that matches the Inverter capacity on the power supply side. Not doing so might result in damage to property due to the short circuit of the load. Do not dismantle, repair or modify this product. Doing so may result in an injury.

6 Precautions for Safe Use Precautions for Safe Use Installation and Storage Do not store or use the product in the following places. ·Locations subject to direct sunlight. ·Locations subject to ambient temperature exceeding the specifications. ·Locations subject to relative humidity exceeding the specifications. ·Locations subject to condensation due to severe temperature fluctuations.

·Locations subject to corrosive or flammable gases. ·Locations subject to exposure to combustibles. ·Locations subject to dust (especially iron dust) or salts. ·Locations subject to exposure to water, oil, or chemicals. ·Locations subject to shock or vibration.

Transporting, Installation, and Wiring ·Do not drop or apply strong impact on the product. Doing so may result in damaged parts or malfunction. ·Do not hold by the front cover and terminal block cover, but hold by the fins during transportation. ·Do not connect an AC power supply voltage to the control input/output terminals. Doing so may result in damage to the product. ·Be sure to tighten the screws on the terminal block securely. Wiring work must be done after installing the unit body. ·Do not connect any load other than a three-phase inductive motor to the U, V, and W output terminals. ·Take sufficient shielding measures when using the product in the following locations. Not doing so may result in damage to the product.

Locations subject to static electricity or other forms of noise. Locations subject to strong magnetic fields. Locations close to power lines. Operation and Adjustment ·Be sure to confirm the permissible range of motors and machines before operation because the Inverter speed can be changed easily from low to high. ·Provide a separate holding brake if necessary. Maintenance and Inspection ·Be sure to confirm safety before conducting maintenance, inspection or parts replacement. 7 Precautions for Correct Use Precautions for Correct Use Installation ·Mount the product vertically on a wall with the product's longer sides upright. The material of the wall has to be nonflammable such as a metal plate. Main Circuit Power Supply ·Confirm that the rated input voltage of the Inverter is the same as AC power supply voltage. Error Retry Function ·Do not come close to the machine when using the error retry function because the machine may abruptly start when stopped by an alarm.

·Be sure to confirm the RUN signal is turned off before resetting the alarm because the machine may abruptly start. Non-Stop Function at Momentary Power Interruption ·Do not come close to the machine when selecting restart in the non-stop function at momentary power interruption selection (b050) because the machine may abruptly start after the power is turned on. Operation Stop Command ·Provide a separate emergency stop switch because the STOP key on the Digital Operator is valid only when function settings are performed. ·When checking a signal during the power supply and the voltage is erroneously applied to the control input terminals, the motor may start abruptly. Be sure to confirm safety before checking a signal.

Product Disposal ·Comply with the local ordinance and regulations when disposing of the product. 8 Precautions for

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4 kW 0.75 kW 1.5 kW 2.2 kW 3.7 kW 5.

5 kW 7.5 kW 3-phase 200 V AC 11 kW 15 kW 18.5 kW 22 kW 30 kW 37 kW 45 kW IP20 55 kW 0.4 kW 0.75 kW 1.5 kW 2.2 kW 4.0 kW 5.5 kW 7.5 kW 11 kW 15
kW 3-phase 400 V AC 18.

5 kW 22 kW 30 kW 37 kW 45 kW 55 kW 75 kW 90 kW IP00 110 kW 132 kW RX-A2004 RX-A2007 RX-A2015 RX-A2022 RX-A2037 RX-A2055 RX-A2075 RX-
A2110 RX-A2150 RX-A2185 RX-A2220 RX-A2300 RX-A2370 RX-A2450 RX-A2550 RX-A4004 RX-A4007 RX-A4015 RX-A4022 RX-A4040 RX-A4055 RX-
A4075 RX-A4110 RX-A4150 RX-A4185 RX-A4220 RX-A4300 RX-A4370 RX-A4450 RX-A4550 RX-B4750 RX-B4900 RX-B411K RX-B413K Model Overview
1-1 1-1 Functions International Standards Models (EC Directives and UL/cUL Standards) The RX Inverter meets the EC Directives and UL/cUL standard
requirements for worldwide use. Classification EC Directives EMC Directive Low-voltage Directive UL/cUL Standards Applicable standard EN61800-3:
2004 1 Overview EN61800-5-1: 2003 UL508C Human-/Environment-friendly, High-performance, General-purpose Inverters Suitable for Various Advanced
Applications High Performance High Starting Torque With the vector control and auto-tuning functions, the RX Series has achieved high starting torque in
excess of 200% at 0.



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3 Hz. Trip Suppression This Inverter features two trip suppression functions: "Overcurrent trip suppression function" to suppress overcurrent trip during acceleration, and "Overvoltage suppression function during deceleration" to suppress overvoltage trip during deceleration. Therefore, the RX Series provides tough operational capabilities regardless of the severe time setting of acceleration and deceleration. Various Applications Sensor-less Vector Control at 0 Hz The RX Series provides sensor-less vector control, which is useful for up/down applications. It can provide a high torque of 150%, even at a speed reference of 0 Hz (150% torque is available when the Inverter capacity is increased by one rank). This function contributes to simplification of control programs and extension of the service life of the brake. Emergency Shutoff Function By switching the dedicated switch (SW1) this function enables you to change the multi-function input (input 3) to the emergency shutoff input. You can directly turn off a motor control power module without operating the software.

This function simplifies construction of safety applications. Built-in Braking Circuit (up to 22 kW) The Inverter models with 22 kW or lower capacity incorporate a braking transistor, enabling spacesaving configuration for applications that need rapid acceleration and stop. Restart Speed Search Function

For a free-running motor (e.g. a fan motor), this function checks the direction of rotation and frequency, enabling smooth restart of the motor. High-torque Multi-operation The RX Series enables balanced torque control for the whole system, in proportion to multiple motor loads. Deceleration Stop During Power Failure During a power failure or momentary power interruption, the RX Series can decelerate and stop a motor by using the motor braking energy. 1-2 1-1 Functions Human-/Environment-friendly Features 1 More Simplified Parameter Settings and View -Only parameters that have been changed from the default settings can be viewed. -With the user setting function, only 12 parameters for frequent use can be viewed. Overview Compliance With Safety Standards The RX Series meets the requirements of the CE and UL/cUL and complies with various standards.

The RoHS Directive The standard model meets the requirements of the RoHS Directive. Easily Meets the Requirements Specified by the Ministry of Land, Infrastructure and Transport of Japan The RX Series incorporates a zero-phase reactor (radio noise filter) as a standard specification. When an optional DC reactor is added, the RX Series meets the requirements specified by the Ministry of Land, Infrastructure and Transport of Japan. 1-3 1-2 Appearance and Names of Parts 1-2 Appearance and Names of Parts When the product is unpacked, it appears as below. (Example of RX-A2150/A4150 to A2220/A4220) 1

Overview Front cover Digital Operator Spacer cover Terminal block cover Open the terminal block cover and you can connect cables to the main circuit terminal block, as well as the control circuit terminal block. Also, open the front cover and you can mount the optional board. Position for installing optional board 1 Position for installing optional board 2 Control circuit terminal block Main circuit terminal block Backing plate 1-4 Chapter 2 Design 2-1

Installation

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..... 2-6 2-1 Installation 2 Design 2-1 Installation 2 WARNING Turn off the power supply and implement wiring correctly. Not doing so may result in a serious injury due to an electric shock. Wiring work must be carried out only by qualified personnel. Not doing so may result in a serious injury due to an electric shock.

Do not change wiring and slide switches (SW1), put on or take off Digital Operator and optional devices, replace cooling fans while the input power is being supplied. Doing so may result in a serious injury due to an electric shock. Be sure to ground the unit. Not doing so may result in a serious injury due to an electric shock or fire. (200-V class: type-D grounding, 400-V class: type-C grounding) Design CAUTION Do not connect resistors to the terminals (PD/+1, P/+ , N/-) directly. Doing so might result in a smallscale fire, heat generation or damage to the unit. Install a stop motion device to ensure safety. Not doing so might result in a minor injury. (A holding brake is not a stop motion device designed to ensure safety.) Be sure to use a specified type of braking resistor/regenerative braking unit.

In case of a braking resistor, install a thermal relay that monitors the temperature of the resistor. Not doing so might result in a moderate burn due to the heat generated in the braking resistor/regenerative braking unit. Configure a sequence that enables the Inverter power to turn off when unusual overheating is detected in the braking resistor/regenerative braking unit. The Inverter has high voltage parts inside which, if short-circuited, might cause damage to itself or other property. Place covers on the openings or take other precautions to make sure that no metal objects such as cutting bits or lead wire scraps go inside when installing and wiring.

2-1 2-1 Installation Safety Information Installation and Storage Do not store or use the product in the following places. -Locations subject to direct sunlight. -Locations subject to ambient temperature exceeding the specifications. -Locations subject to relative humidity exceeding the specifications. -Locations subject to condensation due to severe temperature fluctuations.

-Locations subject to corrosive or flammable gases. -Locations subject to exposure to combustibles. -Locations subject to dust (especially iron dust) or salts. -Locations subject to exposure to water, oil, or chemicals. -Locations subject to shock or vibration. 2 Design Transporting, Installation, and Wiring -Do not drop or apply strong impact on the product. Doing so may result in damaged parts or malfunction. -Do not hold by the front cover and terminal block cover, but hold by the fins during transportation. -Do not connect an AC power supply voltage to the control input/output terminals. Doing so may result in damage to the product.

-Be sure to tighten the screws on the terminal block securely. Wiring work must be done after installing the unit body. -Do not connect any load other than a

three-phase inductive motor to the U, V, and W output terminals. Take sufficient shielding measures when using the product in the following locations. Not doing so may result in damage to the product. Locations subject to static electricity or other forms of noise. Locations subject to strong magnetic fields. Locations close to power lines. Precautions for Use Installation -Install the Inverter vertically on the wall. Install the Inverter on a nonflammable wall surface material, like metal.



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Position for installing a screw Main Circuit Power Supply -Confirm that the rated input voltage of the Inverter matches the AC power supply voltage. 2-2 2-1 Installation Environment -Increased ambient temperatures will shorten the life of the Inverter. -Keep the Inverter away from heating elements (such as a braking resistor, DC reactor, etc.). If the Inverter is installed in an enclosure, keep the ambient temperature within the range of the specifications, taking dimensions and ventilation into consideration.

2 Airflow *1 Design Inverter 5 cm min. 5 cm min. Inverter Save enough space to prevent the upper and lower wiring ducts from blocking cooling airflow. *1 10 cm min. *2 10 cm min.

Note that replacing the smoothing capacitor Wall requires 22 cm or more. *2 -When several RX models are installed in an enclosure and a ventilation fan is mounted in the enclosure, be careful about the layout of the Inverters and the air intake apertures. Depending on the internal layout of the panel, the Inverter's cooling effect may deteriorate, resulting in an increase in ambient temperature. Also, use thorough caution in making sure that the Inverter's ambient temperature is within the allowable operating temperature range. Ventilation fan Ventilation fan Inverter Inverter (Correct example) (Incorrect example) -Before installing the Inverter, place a cover over all the ventilation openings to shield them from foreign objects. After completing the installation process, be sure to remove the covers from the Inverter before operation. -Below is the heat radiation according to the Inverter capacity. Inverter capacity (kw) Load with 70% loss (W) Load with 100% loss (W) Efficiency at rated output (%) Inverter capacity (kw) Load with 70% loss (W) Load with 100% loss (W) Efficiency at rated output (%) 0.4 64 70 85.1 22 820 1150 95.

0 0.75 76 88 89.5 30 1100 1550 95.0 1.5 102 125 92.3 37 1345 1900 95.1 2.2 127 160 93.2 45 1625 2300 95.1 3.

7 179 235 94.0 55 1975 2800 95.1 5.5 242 325 94.4 75 2675 3800 95.

2 7.5 312 425 94.6 90 3375 4800 95.2 11 435 600 94.8 110 3900 5550 95.

2 15 575 800 94.9 132 4670 6650 95.2 18.5 698 975 95.0 2-3 2-1 Installation -To raise the carrier frequency, reduce the output current (or derate the rated current) as shown in the graph below. Voltage Capacity 0.4 kW 0.75 kW 1.5 kW 2.2 kW 3.

7 kW 5.5 kW 7.5 kW 11 kW 15 kW 18.5 kW 22 kW 30 kW 37 kW 45 kW 55 kW 75 kW 90 kW 110 kW 132 kW Max. fc (kHz) 15 15 15 15 15 15 15 12 12 10 7 5 10 5 5 ----200-V class Derating at fc = 15 kHz 100% 100% 100% 100% 100% 100% 100% 100% 90% (41.4 max.) 95% (60.8 A max.) 90% (68.4 A max.) 70% (66.5 A max.) 80% (96.8 A max.) 75% (108.

7 A max.) 70% (127.4 A max.) 70% (154 A max.) ----Max.

fc (kHz) 15 15 15 15 15 15 15 14 10 6 10 8 9 6 4 6 3 400-V class Derating at fc = 15 kHz 100% 100% 100% 2 Design 100% 100% 100% 100% 95% (30.4 A max.) 90% (34.2 A max.) 75% (36.0 A max.) 75% (43.5 A max.) 80% (60.0 A max.

) 75% (68.2 A max.) 60% (67.2 A max.) 85%(126.7 A max.) 75% (132.0 A max.) 70% (151.9 A max.

) 60% (156.0 A max.) 200-V class 100 95 90 85 80 75 70 65 60 55 0.5 2 22 kW 18.5 kW 400-V class 11 kW 15 kW Output current derating 45,55 kW 30 kW 37 kW 4 6 8 10 12 14 15 100 95 90 85 80 75 70 65 60 55 0.

5 2 90 kW 75 kW 45 kW 30 kW 15 kW 18.5 kW 37 kW 132 kW 22 kW 55 kW 10 12 14 15 Output current derating 110 kW 4 6 8 Carrier frequency (kHz)

Carrier frequency (kHz) 2-4 2-1 Installation Backing Plate Inverter with 22 kW or Lower Capacity When running cables, cut the points between the backing plate and unnecessary portions with nippers or a wire cutter, and remove. Connecting points 2 Design Unnecessary portion Inverter with 30 kW or Higher Capacity For Connection Without Cable Conduit Make a cut in the rubber bushing of the backing plate with nippers or a wire cutter, and insert a cable. Backing plate Rubber bushing For Connection With Cable Conduit Remove the rubber bushing from the conduit connecting portions, and connect the cable conduit. * Do not remove the rubber bushing unless you connect a cable conduit.

Otherwise, the cable sheath may be damaged by the inner edge of the backing plate, resulting in short-circuit or ground fault. 2-5 2-2 Wiring 2-2 Wiring Standard Connection Diagram DC reactor (optional) PD/+1 R/L1 S/L2 T/L3 3-phase 200 V AC 3-phase 400 V AC Short-circuit wire J51 RT Ro To AL1 AL2 AL0 P24 11 CM1 12 FW Multi-function input 1 Multi-function input 2 Multi-function input 3 Multi-function input 4 Multi-function input 5 Multi-function input 6 Multi-function input 7 Multi-function input 8 Sequence input common Thermistor TH AM AMI Frequency setting unit 500 to 2 k Frequency reference power supply Frequency reference input (voltage) Frequency reference auxiliary input (voltage) Frequency reference input (current) Frequency reference common H O O2 OI L Option 1 Option 1 FM 1 2 3 4 5 6 7 8 RP PLC SN SP SN RS485 communication For termination resistors Analog monitor output (voltage output) Analog monitor output (current output) Digital monitor output (PWM output) 14 15 CM2 Multi-function output 4 Multi-function output 5 Multi-function output common 13 Multi-function output 2 Multi-function output 3 Multi-function output 1 Relay output *1 Common P/+ N/RB U/T1 V/T2 W/T3 M Braking resistor (optional) 2 Design To wire the control circuit power supply and main circuit power supply separately, be sure to remove the J51 connector Control circuit wire first. power supply 2-6 2-2 Wiring Main Circuit Terminals Terminal symbol R/L1, S/L2, T/L3 Terminal name Main power supply input terminal Inverter output terminal External DC reactor terminal Braking resistor connection terminals Regenerative braking unit connection terminal Ground terminal Description Connect the input power supply. Connect to the 3-phase motor. Remove the short-circuit bar between terminals "PD/+1" and "P/+", and connect the optional power factor improvement DC reactor. Connect optional external braking resistors. (The RB terminal is provided for the Inverters with 22 kW or lower capacity.) Connect optional regenerative braking units. Inverter case ground terminal. Connect this terminal to the ground.

type-D (200-V class), type-C (400-V class) 2 U/T1, V/T2, W/T3 PD/+1, P/+ Design P/+, RB P/+, N/G Control Circuit Terminal Terminal symbol H O Terminal name Frequency reference power supply output Frequency reference input (Voltage) Auxiliary frequency reference input (Voltage) Description +10 V DC power supply for the O terminal. With a 0 to 10 V DC voltage input, the frequency reaches the maximum at 10 V. Set at A014 if the maximum frequency needs to be achieved at lower than 10 V. With a 0 to ±10 V DC voltage input, the O2 signal is added to the frequency reference signal of the O or OI terminal. By changing the setting, the frequency reference can be input even with the O2 terminal independently.



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With a 4 to 20 mA DC current input, the maximum frequency is set at 20 mA. The OI signal is only active when the AT terminal is ON. Allocate the AT function to the multifunction input terminal. Common terminal for the frequency setting signals (O, O2 and OI) and the analog output terminals (AM and AMI). Do not connect this terminal to the ground.

Specifications Allowable load current: 20 mA max. Input impedance 10 k Allowable input voltage range: -0.3 to +12 V DC Input impedance 10 k Allowable input voltage range: 0 to ± 12 V DC Frequency reference input O2 Analog OI Frequency reference input (Current) Input impedance 100 Allowable max. current: 24 mA L Frequency reference common Continued to the next page 2-7 2-2 Wiring Terminal symbol AM Terminal name Multi-function analog output (Voltage) Description This terminal outputs a signal selected from the "0 to 10 V DC Voltage Output" monitor items: Output frequency, Output current, Output torque (with/without sign), Output voltage, Input power, Electronic thermal load rate, LAD frequency, Motor temperature, and Fin temperature. This terminal outputs a signal selected from the "4 to 20 mA DC Current Output" monitor items: Output frequency, Output current, Output torque (without sign), Output voltage, Input power, Electronic thermal load rate, LAD frequency, Motor temperature, and Fin temperature.

This terminal outputs a signal selected from the "0 to 10 V DC Voltage Output (PWM)" monitor items: Output frequency, Output current, Output torque (without sign), Output voltage, Input power, Electronic thermal load rate, LAD frequency, Motor temperature, Fin temperature, Digital output frequency, and Digital current monitor. "Digital output frequency", and "Digital current monitor" output a digital pulse at 0/10 V DC pulse voltage and 50% duty ratio. 24 V DC power supply for contact input signal. When the source logic is selected, this terminal functions as the contact input common terminal. Common terminal for the interface power supply P24 terminal, thermistor input TH terminal and digital monitor FM terminal.

When the sink logic is selected, this terminal functions as the contact input common terminal. Do not connect this terminal to the ground. Specifications Allowable max. current: 2 mA 2 Monitor output Analog AMI Multi-function analog output (Current) Allowable load impedance: 250 max. Design FM Multi-function digital output Digital (contact) Monitor output Allowable max. current: 1.2 mA Max. frequency: 3.6 kHz P24 Internal 24 V DC Allowable max. output current: 100 mA Power supply PLC Input common Continued to the next page 2-8 2-2 Wiring Terminal symbol RUN command FW Terminal name Forward rotation command terminal Description When the FW signal is ON, the motor runs forward.

When it is OFF, the motor decelerates and stops. Specifications [Contact input ON condition] Voltage between each input terminal and the CM1 terminal : 18 V DC or more Input impedance between each input terminal and the CM1 terminal: 4.7 k Allowable max. voltage: Voltage between each input terminal and the CM1 terminal: 27 V DC Load current at 27 V DC power supply voltage: Approx. 5.6 mA 2 Contact input 1 2 3 4 5 6 7 8 Function / Selection Design Multi-function input Select 8 functions from among the 61 functions and allocate them to terminals 1 to 8. Note: Only terminals 1 and 3 can be used for the emergency shutoff function. For details, refer to "Emergency Shutoff Function" (page 2-10). Digital (contact) CM1 Multi-function input common The sink and source logic for contact input can be switched by connecting a short-circuit bar on the control terminal block. Short-circuiting P24 and PLC Sink logic, Short-circuiting PLC and CM1 Source logic To activate contact input via an external power supply, remove the short-circuit bar and connect CM1 terminal to the external interface circuit.

Select 5 functions from among 45, and allocate them to terminals 11 through 15. If an alarm code is selected in C062, terminals 11 to 13, or terminals 11 to 14 always output an alarm factor code (e.g. Inverter trip). The signal between each terminal and CM2 always corresponds to the sink or source logic.

Common terminals for multi-function output terminals 11 to 15. Select the desired functions from among 45 functions, and allocate them. SPDT contact output. By factory default, the relay output (AL2, AL1) contact selection (C036) is set at NC contact between AL2-AL0, and NO contact between AL1-AL0.

Between each terminal and CM2 Voltage drop 4 V max.

at power-on Max. allowable voltage: 27 V DC Max. allowable current: 50 mA Contact max. capacity AL2-AL0 250 V AC, 2 A (Resistance) 0.2 A (Induction) AL1-AL0 250 V AC, 1 A (Resistance) 0.2 A (Induction) Contact min. capacity 100 V AC, 10 mA 5 V DC, 100 mA Open collector output Status / Factor 11 12 13 14 15 Multi-function output CM2 Multi-function output common Relay output AL2 AL1 Status, alarm, etc. Digital (contact) Relay output AL0 Relay output common Continued to the next page 2-9 2-2 Wiring Terminal symbol TH Analog input Terminal name External thermistor input Terminal Description Connect an external thermistor to this terminal, to trip the Inverter when a temperature error occurs. The PLC terminal functions as the common terminal. [Recommended thermistor characteristics] Allowable rated power: 100 mW min.

Impedance at temperature error: 3 k Temperature error detection level is adjustable between 0 and 9999. Specifications Allowable input voltage range 0 to 8 V DC [Input circuit] 8 V DC 10 k TH Thermistor PLC 1 k Sensor Analog 2 Design Slide Switch (SW1) Settings The built-in slide switch is used to enable or disable the emergency shutoff function. (Factory Default: Disabled) * For the location of the slide switch, refer to (page 2-12). Emergency Shutoff Function (Factory Default: Disabled) This function is intended to turn off the Inverter output (stop switching the main element) via only the multi-function input terminal of the hardware circuit without going through the CPU software. * This function stops switching of the main element. The circuit is not electrically turned off. While the power supply is ON, do not touch the Inverter terminals and power cable (e.g. motor cable). Doing so may result in electric shock, injury or ground fault.

When this function is enabled, the multi-function input terminals 1 and 3 are exclusively used for this function. No other function can be allocated to these terminals. If another function has been allocated, it will automatically be disabled, and terminals 1 and 3 are changed to the emergency shutoff terminals. Function of multi-function input terminal 1 Reset signal (RS) / NO contact (Fixed) This signal is used to reset the Inverter, and to reset the emergency shutoff trip [E37.



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*].

Function of multi-function input terminal 3 Emergency shutoff signal (EMR) / NC contact (Fixed) This signal is used to turn off the Inverter output without using the built-in CPU. With this signal input, the Inverter activates an emergency shutoff trip [E37. *]. * If multi-function input terminal 3 has not been connected or disconnected, or if the signal logic is not matched, the Inverter activates an emergency shutoff trip [E37. *].

After checking the cable connection and the signal logic, input the reset signal (RS). Emergency shutoff trip [E37. *] can be reset only by the reset signal (RS) via multi-function input terminal 1. (It cannot be reset with the Digital Operator.) ·To enable this function, set the slide switch SW1 lever in the Inverter to [ON]. (With the factory default setting, slide switch SW1 is [OFF]. [This function is disabled.]) 2-10 2-2 Wiring * Before operating slide switch SW1, make sure that the input power supply is OFF. Slide switch SW1 setting and status of multi-function input terminals 1 and 3 Slide switch (SW1) setting Multi-function input terminal 1 Multi-function input 1 selection [C001] [Can be selected randomly] *4 Factory default 01 (RV) Multi-function input 1 operation selection [C011]*1 [Can be selected randomly] *4 Factory default 00 (NO) Multi-function input terminal 3 Multi-function input 3 selection [C003] [Can be selected randomly] *4 Factory default 12 (EXT) Multi-function input 3 operation selection [C013]*1 *2 [Can be selected randomly] *4 Factory default 00 (NO) 2 Design SW1 OFF Emergency shutoff: Disabled (factory default) SW1 ON Emergency shutoff: Enabled *5 Automatic allocation to multi-function input terminals 1 and 3, and the input terminal with 18 (RS) setting *3 Fixed function (Cannot be changed) 18 (RS) Fixed function (Cannot be changed) 00 (NO) Fixed function (Cannot be changed) 64 (EMR) Fixed function (Cannot be changed) 01 (NC) Turning SW1 on, and then off Emergency shutoff: Disabled *3 *5 [Can be selected randomly] *4 Holds setting while SW1 is ON. 18 (RS) [Can be selected randomly] *4 Holds setting while SW1 is ON.

00 (NO) [Can be selected randomly] *4 Emergency shutoff function: Reset no (no allocation) [Can be selected randomly] *4 Holds setting while SW1 is ON. 01 (NC) *1. With the terminal with input terminal selection [18 (RS)], NO/NC selection is fixed to [00 (NO)]. *2. When [C003] is [64 (EMR)], [C013] is fixed to [01 (NC)]. *3. If [18 (RS)] has been allocated to a multi-function input terminal (except for 3) other than terminal 1 before switch SW1 is set to "ON", the input terminal selection for the relevant terminal will be automatically changed to "no (no allocation)" by setting SW1 to "ON". This is done in order to prevent duplicated allocation of this function. Then, even if SW1 is reset to [OFF], the initial allocation cannot be restored. The User should Re-allocate the terminal function.

Example) When the multi-function input terminal 2 [C002] is [18 (RS)], setting SW1 to [ON] changes the [C002] setting to [no (no allocation)]. [18 (RS)] will be allocated to the multi-function input terminal 1 [C001]. Then, even if SW1 is reset to [OFF], the multi-function input terminal 2 [C002] setting is [no (no allocation)], and the multi-function input terminal 1 [C001] setting is [18 (RS)]. *4. Input terminal selection [64 (EMR)] cannot be selected with the Digital Operator.

When slide switch SW1 is set to [ON], this function will be automatically allocated. 2-11 2-2 Wiring *5. Once slide switch SW1 is set to [ON], allocation of multi-function input terminals 1 and 3 will not be restored, even if SW1 is reset to [OFF] afterward. Re-allocate the terminal function. 2 Design Slide switch SW1 Slide lever (factory default: OFF) OFF ON Wiring the Main Circuit Terminals Main Power Supply Input Terminals (R/L1, S/L2, T/L3) · Use an earth leakage breaker for circuit (wiring) protection between the power supply and the main power supply terminals (R/L1, S/L2, T/L3). · An earth leakage breaker may malfunction due to the effect of high frequency. Use an earth leakage breaker with a large high-frequency sensitivity current rating. · If the Inverter protection function is activated, a malfunction or accident may have occurred to your system. Connect a magnetic contactor to turn off the Inverter power supply. · Do not start or stop the Inverter by switching ON/OFF the magnetic contactor connected on the Inverter power supply input (primary) side and output (secondary) side. To start or stop the Inverter via an external signal, use the operation command (FW or RV) on the control circuit terminal block. · This Inverter uses a 3-phase power supply. A single-phase power supply cannot be used. · Do not use this Inverter with a phase loss power input. Doing so may damage the Inverter.

By factory default, the phase loss input protection is disabled. If a phase of power supply input is interrupted, the Inverter reverts to the following status: R/L1-phase or T/L3-phase is interrupted: The Inverter does not operate. S/L2-phase is interrupted: The Inverter reverts to single-phase operation, causing a trip (due to undervoltage, overcurrent, etc.) or damage to the Inverter. Even if the power input is under a phase loss condition, the internal capacitor is charged with voltage, causing an electric shock or injury. When changing the cable connections, refer to the instructions on page 2-1. ON 2-12 2-2 Wiring · In the following cases, the internal converter module may be damaged. Use caution to avoid them: Imbalance of power supply voltage is 3% or more. Power supply capacity is ten times or more than the Inverter capacity, and also 500 kVA or more. Rapid change in power supply voltage.

2 Example) When several Inverters are connected with a short bus. When the phase advance capacitor is turned on/off. · Do not turn power on/off more than once every 3 minutes. Doing so may damage the Inverter. Design Inverter Output Terminals (U/T1, V/T2, W/T3) · For connection of the output terminal, use the applicable cable or a cable with a larger diameter.

Otherwise, the output voltage between the Inverter and the motor may drop. Particularly during low-frequency output, a voltage drop occurs with the cable, resulting in motor torque reduction. · Do not mount a phase advance capacitor or surge absorber. These devices cause the Inverter to trip, or may cause damage to the capacitor or surge absorber. · If the cable length exceeds 20 m (particularly, with 400-V class), a surge voltage may be generated at the motor terminal due to stray capacitance or inductance of the cable, causing the motor to burn out.

· To connect several motors, provide a thermal relay for each. · The RC value of each thermal relay should be 1.1 times of the motor rated current. The relay may trip easily depending on the cable length.



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In this case, connect an AC reactor to the Inverter output. DC Reactor Connection Terminal (PD/+1, P/+) · This terminal is used to connect the optional DC reactor for power factor improvement. By factory default, a short-circuit bar has been connected between the terminals PD/+1 and P/+. Before connecting the DC reactor, remove this short-circuit bar. · The length of the DC reactor connection cable should be 5 m or less. If the DC reactor is not used, do not remove the short-circuit bar.

If you remove the short-circuit bar without connecting the DC reactor, no power is supplied to the Inverter main circuit, disabling operation. External Braking Resistor Connection Terminal (P/+, RB)/Regenerative Braking Unit Connection Terminal (P/+, N/-) · The Inverters with 22 kW or lower capacity incorporate a regenerative braking circuit. To improve braking capability, mount the optional external braking resistor to this terminal. Do not mount a resistor whose resistance is lower than the specified value. Doing so may damage the regenerative braking circuit. · The Inverters with 30 kW or higher capacity do not incorporate a regenerative braking circuit. To improve braking capability, the optional regenerative braking unit and braking resistor are required. In this case, connect the regenerative braking unit terminals (+, -) to the Inverter terminals (P/+, N/-). · The cable length should be 5 m or less.

Twist the two wires.

· Do not connect any device other than the optional regenerative braking unit or external braking resistor to this terminal. 2-13 2-2 Wiring Ground Terminal (G) · To prevent electric shock, be sure to ground the Inverter and the motor. · According to the Electric Apparatus Engineering Regulations, the 200-V class Inverter should be connected to the grounding electrodes under type-D grounding conditions (conventional type 3 grounding: ground resistance 100 or less), the 400-V class Inverter should be connected to the grounding electrodes under type-C grounding conditions (conventional special type 3 grounding: ground resistance 10 or less). · For the ground cable, use the applicable cable or a cable with a larger diameter. Make the cable length as short as possible.

· When several Inverters are connected, the ground cable must not be connected across several Inverters, and must not be looped. Otherwise, the Inverters may malfunction. 2 Design Inverter Inverter Inverter Inverter Your ground bolt Inverter Installing Screws in the Main Circuit Terminal Block · For the main circuit terminal blocks of RX-A2055/A2075/A4055/A4075, be sure to install the terminal block screw washers with their grooved sides aligned vertically, as shown below. Not doing so may result in a contact failure or fire. (Intended terminals: R/L1, S/L2, T/L3, PD/+1, P/+, N/-, U/T1, V/T2, W/T3, RB) Terminal block screw washer 2-14 2-2 Wiring Arrangement of Main Circuit Terminals The terminal arrangement on the Inverter main circuit terminal block is shown below.

Terminal arrangement Applicable model 2 Ro To R/L1 S/L2 T/L3 U/T1 V/T2 G W/T3 G PD/+1 P/+ N/- RB Design CHARGE LED indicator PD/+1 - P/+ short-circuit bar When not using the DC reactor, keep the PD/+1 - P/+ short-circuit bar attached. [EMC filter function switching method] Dummy plug (green) In order to enable the EMC filter function, set up the plug inserted into the filter enable pin (J61) and filter disable pin (J62) as shown in the table below. Confirm that electrical power has been disconnected before performing this setup. Not doing so may result in electric shock. Also, use with the plug inserted. RX-A2004 to A2037 RX-A4004 to A4037 Ro,To: M4 Ground terminal: M4 Filter enable pin (J61) Short plug Filter disable pin (J62) EMC filter disabled EMC filter enabled (factory default) Filter enable pin (J61) Dummy plug (green) Short plug Filter disable pin (J62) Short plug Dummy plug (green) Ro To CHARGE LED indicator RB R/L1 S/L2 T/L3 PD/+1 P/+ N/- U/T1 V/T2 W/T3 RX-A2055, A2075 RX-A4055, A4075 G PD/+1 - P/+ short-circuit bar G Ro,To: M4 Ground terminal: M5 Others: M5 Ground terminal with short-circuit bar (shaded area) for EMC filter function switching When not using the DC reactor, keep the PD/+1 - P/+ short-circuit bar attached. [EMC filter function switching method] RX-A2110 RX-A4110 Ro,To: M4 Ground terminal: M6 Others: M5 EMC filter enabled (factory default) EMC filter disabled 2-15 2-2 Wiring Terminal arrangement Ro To RB Applicable model CHARGE LED indicator R/L1 S/L2 T/L3 PD/+1 P/+ N/- U/T1 V/T2 W/T3 RX-A2150 to A2185 RX-A4150 to A4220 2 G Ground terminal with short-circuit bar (shaded area) for EMC filter function switching PD/+1 - P/+ short-circuit bar When not using the DC reactor, keep the PD/+1 - P/+ short-circuit bar attached. G Ro,To: M4 Ground terminal: M6 Others: M6 Design [EMC filter function switching method] RX-A2220 Ro,To: M4 Ground terminal: M6 Others: M8 EMC filter enabled (factory default) EMC filter disabled CHARGE LED indicator G R/L1 S/L2 T/L3 PD/+1 P/+ N/- Ro To RX-A2300 G U/T1 V/T2 W/T3 Ro, To: M4 Ground terminal: M6 Others: M8 Ground terminal with short-circuit bar (shaded area) for EMC filter function switching PD/+1 - P/+ short-circuit bar When not using the DC reactor, keep the PD/+1 - P/+ short-circuit bar attached. RX-A4300 [EMC filter function switching method] Ro,To: M4 Ground terminal: M6 Others: M6 RX-A2370 RX-A4370 EMC filter enabled (factory default) EMC filter disabled Ro,To: M4 Ground terminal: M8 Others: M8 2-16 2-2 Wiring Terminal arrangement Ro To Applicable model CHARGE LED indicator 2 G R/L1 S/L2 T/L3 PD/+1 P/+ N/U/T1 V/T2 W/T3 Design G PD/+1-P/+ short-circuit bar When not using the DC reactor, keep the PD/+1-P/+ short-circuit bar attached. G Ground terminal with short-circuit bar (shaded area) for EMC filter function switching RX-A2450 RX-A4450 RX-A4550 [EMC filter function switching method] Ro,To: M4 Ground terminal: M8 Others: M8 EMC filter enabled (factory default) EMC filter disabled CHARGE LED indicator Ro To G R/L1 S/L2 T/L3 PD/+1 P/+ N/- U/T1 V/T2 W/T3 G PD/+1 - P/+ short-circuit bar When not using the DC reactor, keep the PD/+1 - P/+ short-circuit bar attached.

Ground terminal with short-circuit bar (shaded area) for EMC filter function switching G RX-A2550 [EMC filter function switching method] Ro,To: M4 Ground terminal: M8 Others: M10 EMC filter enabled (factory default) EMC filter disabled 2-17 2-2 Wiring Recommended Cable Size, Wiring Device and Crimp Terminal For Inverter wiring, crimp terminal and terminal screw tightening torque, refer to the table below.



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Motor output (kW) 0.4 0.75 1.5 2.2 3.7 5.5 7.5 11 15 18.5 22 30 37 45 55 Applicable Inverter model RX-A2004 RX-A2007 RX-A2015 RX-A2022 RX-A2037 RX-A2055 RX-A2075 RX-A2110 RX-A2150 RX-A2185 RX-A2220 RX-A2300 RX-A2370 RX-A2450 RX-A2550 Power cable (mm2) R, S, T, U, V, W, PD/+1, P/+, N/I.

25 1.25 2 2 3.5 5.5 8 14 22 30 38 60 (22 × 2) 100 (38 × 2) 100 (38 × 2) 150 (60 × 2) External Ground Terminal braking resistor cable screw between PD/+1 (mm2) size 2) and RB (mm 1.25 1.

25 2 2 3.5 5.5 8 14 22 22 30 30 38 38 60 1.25 1.25 2 2 3.

5 5.5 8 14 22 30 38 M4 M4 M4 M4 M4 M5 M5 M6 M6 M6 M8 M8 M8 *1 M8 *1 M10 Tightening torque N·m 1.2 (max.1.8) 1.2 (max.1.8) 1.2 (max.1.

8) 1.2 (max.1.8) 1.2 (max.1.8) 2.4 (4.0 max.) 2.

4 (4.0 max.) 4.0 (4.4 max.

) 4.5 (4.9 max.) 4.5 (4.

9 max.) 8.1 (8.8 max.) 8.1 (8.8 max.) 8.1 (20.0 max.

) 8.1 (20.0 max.) 20.0 (22.0 max.) Applicable device Earth leakage breaker (ELB) 5A 10 A 15 A 20 A 30 A 50 A 60 A 75 A 100 A 100 A 150 A 200 A 225 A 225 A 350 A Crimp terminal 2 1.25-4 1.25-4 2-4 2-4 3.5-4 R5.

5-5 R8-5 R14-6 22-6 38-6 38-8 60-8 100-8 100-8 150-10 Design 200-V class 2-18 2-2 Wiring Motor output (kW) Applicable Inverter model RX-A4004 RX-A4007 RX-A4015 RX-A4022 RX-A4037 RX-A4055 RX-A4075 RX-A4110 RX-A4150 RX-A4185 RX-A4220 RX-A4300 RX-A4370 RX-A4450 RX-A4550 RX-B4750 RX-B4900 RXB411K RXB413K Power cable (mm2) R, S, T, U, V, W, PD/+1, P/+, N/I. 1.25 1.25 2 2 2 3.5 3.5 5.

5 8 14 14 22 38 38 60 100 (38 x 2) 100 (38 x 2) 150 (38 x 2) 80 x 2 External Ground Terminal braking resistor cable screw between PD/+1 (mm2) size 2) and RB (mm 1.25 1.25 2 2 2 3.5 3.5 5.

5 8 14 14 22 22 30 38 38 60 80 1.25 1.25 2 2 2 3.5 3.5 5 8 14 14 M4 M4 M4 M4 M4 M5 M5 M6 M6 M6 M6 M6 M8 *1 M8 *1 M8 *1 M10 *1 M10 *1 M10 *1 M10 *1 Crimp terminal Tightening torque N·m 1.2 (max.1.8) 1.2 (max.

1.8) 1.2 (max.1.8) 1.2 (max.1.8) 1.2 (max.1.

8) 2.4 (4.0 max.) 2.4 (4.

0 max.) 4.5 (4.4 max.) 4.

5 (4.9 max.) 4.5 (4.9 max.) 4.5 (4.9 max.) 4.5 (4.

9 max.) 8.1 (20.0 max.) 8.1 (20.0 max.) 8.1 (20.0 max.

) 20.0 (22.0 max.) 20.0 (22.

0 max.) 20.0 (35.0 max.) 20.

0 (35.0 max.) Applicable device Earth leakage breaker (ELB) 5A 5A 10 A 10 A 15 A 30 A 30 A 50 A 60 A 60 A 75 A 100 A 100 A 150 A 175 A 225 A 225 A 350 A 350 A 2 0.4 0.75 1.25-4 1.25-4 2-4 2-4 2-4 R2-5 3.5-5 R5.5-6 8-6 14-6 14-6 22-6 38-8 38-8 R60-8 100-10 100-10 150-10 80-10 Design 1.5 2.

2 3.7 5.5 7.5 11 15 18.5 22 30 37 45 55 75 90 110 132 *1. When the cable is connected without using the crimp terminal (bare wires), use the square washer included with the product. Note: The cable size is based on the HIV cable (75°C heat resistance). 2-19 400-V class 2-2 Wiring Connection for Separating Inverter Control Circuit Power Supply from Main Power Supply If the Inverter protection circuit is activated to turn off the magnetic contactor of the Inverter input power supply, the power to the Inverter control circuit is also turned off, and the alarm signal cannot be kept on. If the alarm signal must be kept on, use control circuit power supply terminals Ro and To. Connect control circuit power supply terminals Ro and To to the primary circuit of the magnetic contactor according to the following procedure.

(Connection method) Incoming electricity specifications 200-V class: 200 to 240 V (+10%, -15%) 50, 60 Hz ±5% (282 to 339 V DC) 400-V class: 380 to 480 V (+10%, -15%) 50, 60 Hz ±5% (537 to 678 V DC) 2 Design (1) Disconnect the connected wire. (2) Disconnect the J51 connector. (3) Connect the control circuit power cable to the control circuit power supply terminal block. * To separate the control circuit power supply (Ro, To) from the main circuit power supply (R/L1, S/L2, T/L3), observe the following instructions: · For wiring between terminals Ro and To (terminal screw size: M4), use a cable of 1.25 mm2 or more.

· Connect a 3 A fuse to the control circuit power supply cable. · If the control circuit power supply (Ro, To) is turned on before the main circuit power supply (R/L1, S/L2, T/L3), ground fault detection at power-on is disabled. · To use a DC power supply for the control circuit power supply (Ro, To), set the multi-function output terminal contact selection (C031 to C036) for the multi-function output terminals (11 to 15) and relay output terminals (AL2, AL1, AL0) to "00". If the multi-function output terminal contact selection is set to "01", the output signal may chatter when the DC power supply is turned off. · Tightening torque for terminals Ro and To M4: 1.

2 N·m (1.4 max.) 2-20 2-2 Wiring Wiring Control Circuit Terminals · Terminals L and PLC are insulated from each other via the input and output signal common terminals. Do not short-circuit or ground these common terminals. Do not ground these common terminals via external equipment. (Check the external equipment ground conditions.) · For wiring the control circuit terminals, use twisted shielded cables (recommended size: 0.75 mm2), and connect the shielded cable to each common terminal. 2 Design · The control circuit terminal connection cables should be 20 m or less. · Separate the control circuit terminal connection cables from the main circuit cable (power cable) and the relay control circuit cable.

· For the connection of the TH (thermistor input) terminal, twist cables with the terminal PLC individually, and separate them from other PLC common cables. Since a weak current flows through the thermistor, the thermistor connection cable must be separated from the main circuit cable (power cable). The thermistor connection cable should be 20 m or less. TH FW 8 CM1 7 6 5 4 PLC PLC CM1 Thermistor · To use a relay for the multi-function output terminal, connect a surge-absorbing diode in parallel with the coil. · Do not short-circuit the analog power supply terminals (between H and L) and/or the interface power supply terminals (between P24 and PLC). Doing so may result in failure of the Inverter. Arrangement of the Control Circuit Terminal Block H L O O2 OI AM AMI FM P24 TH PLC FW CM1 8 7 CM1 6 5 4 3 2 1 15 14 CM2 13 12 11 AL0 AL1 AL2 Terminal screw size M3 Tightening torque 0.7 N·m (0.8 max.)

Selecting the Input Control Logic By factory default the terminal FW and the multi-function input terminal are set to sink logic (NPN).

To change the input control logic to source logic (PNP), remove the short-circuit bar between the terminals P24 and CM1 on the control circuit terminal block, and connect it between the terminals CM1 and PLC. 2-21 2-2 Wiring Selecting the Sequence Input Method (Sink/Source Logic) When the Inverter's internal interface power supply is used When external power supply is used (Remove the short-circuit bar from the control terminal block.) +V P24 CM1 PLC FW 8 DC24V Inverter 24 V DC +V Short-circuit bar P24 CM1 PLC FW 24 V DC 2 Sink logic Design 8 COM Output unit etc. Inverter Output unit etc.



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. 3-12 3-7 Parameter List

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. 3-18 3 Operation WARNING Do not change wiring and slide switches (SW1), put on or take off Digital Operator and optional devices, replace cooling fans while the input power is being supplied. Doing so may result in a serious injury due to an electric shock. 3 Do not remove the terminal block cover during the power supply and 10 minutes after the power shutoff. Doing so may result in a serious injury due to an electric shock. Do not operate the Digital Operator or switches with wet hands. Doing so may result in a serious injury due to an electric shock. Inspection of the Inverter must be conducted after the power supply has been turned off. Not doing so may result in a serious injury due to an electric shock. The main power supply is not necessarily shut off even if the emergency shutoff function is activated.

Operation CAUTION Do not touch the Inverter fins, braking resistors and the motor, which become too hot during the power supply and for some time after the power shutoff. Doing so may result in a burn. Take safety precautions such as setting up a molded-case circuit breaker (MCCB) that matches the Inverter capacity on the power supply side. Not doing so might result in damage to property due to the short circuit of the load. Safety Information Operation and Adjustment ·Be sure to confirm the permissible range of motors and machines before operation because the Inverter speed can be changed easily from low to high. ·Provide a separate holding brake if necessary. 3-1 Precautions for Use Error Retry Function ·Do not come close to the machine when using the error retry function because the machine may abruptly start when stopped by an alarm. ·Be sure to confirm the RUN signal is turned off before resetting the alarm because the machine may abruptly start. Non-Stop Function at Momentary Power Interruption ·Do not come close to the machine when selecting restart in the non-stop function at momentary power interruption selection (b050) because the machine may abruptly start after the power is turned on. 3 Operation Operation Stop Command ·Provide a separate emergency stop switch because the STOP key on the Digital Operator is valid only when function settings are performed.

·When checking a signal with the main power supply applied, if a signal voltage is erroneously applied to the control input terminals, the motor may start abruptly. Be sure to confirm safety before checking a signal. 3-2 3-1 Operation Method 3-1 Operation Method This Inverter has the following operation methods that are selected by the RUN command/frequency reference settings. The features and the requirements for each operation method are also given below: 3 To enter the RUN command/frequency reference via the Digital Operator This action operates the Inverter via a key sequence of the standard or optional Digital Operator. When operating the Inverter only via the Digital Operator, the Inverter does not need to be connected to the control circuit terminal block.

Operation Digital Operator To enter the RUN command/frequency reference from the control circuit terminal block This action operates the Inverter by connecting the external signals (from the frequency setting device, starting switch, etc.) to the control circuit terminal block. The operation starts by turning ON the RUN command (FW, RV) while the input power supply is turned ON. Note: that the frequency can be set using a voltage signal or a current signal from the control circuit terminal block, which can be selected according to the system. For details, refer to "Control Circuit Terminal" (page 2-7). (Requirements for operation) ·RUN command: Switch, Relay etc.



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