



# **TOSHIBA**

Toshiba RUAGP Series Original Owner's Manual

Air-cooled chiller



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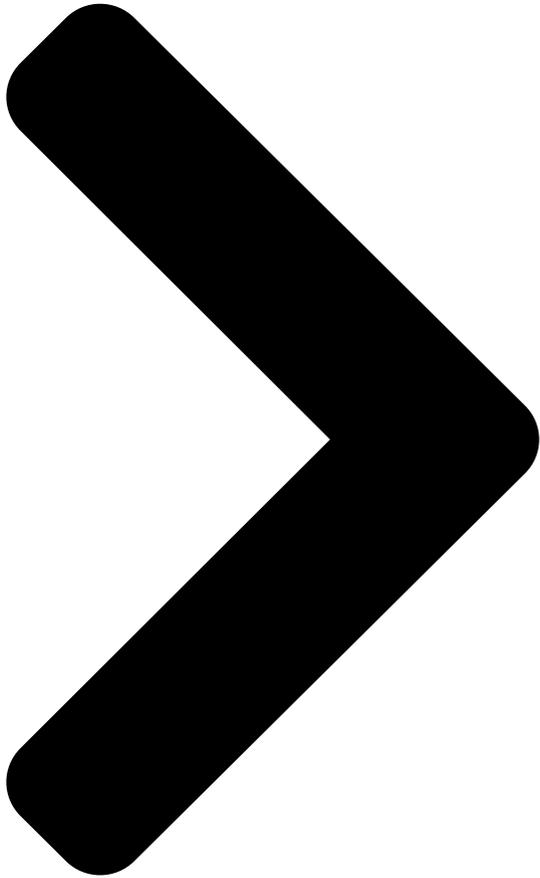
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## Model Name: RUAGP Series

Thank you very much for purchasing this Toshiba heat pump unit.

Please read the instruction manual carefully before using the unit. Be sure to obtain

the "Instruction manual" and "Installation manual" from constructor or dealer. Request to constructor or dealer; Please clearly explain the contents of this instruction manual and hand over it.

This unit is not intended for use by person (including children) with reduced physical, sensory or mental capabilities, or lack of experience and knowledge, unless they have been given supervision or instruction concerning use of the

**TOSHIBA**

**Universal Smart X**  
**Safety Precautions**

unit

by a person responsible for their safety.

Fluorocarbon must be recovered in accordance with the local laws and regulations

when the product is repaired or thrown away. Type and volume of refrigerant and

conversion values for CO

Keep this manual after you finish reading it.

Please read carefully through these instructions that contain important information

which complies with the "Machinery Directive 2006/42/EC", and ensure that you

understand them.

This unit is only for industrial uses. And this unit is not usable in residential use.

# TOSHIBA

## Universal Smart X

### Safety Precautions

#### Original Owner's Manual

## Universal Smart

### Safety Precautions

#### Original Owner's Manual

### Air-Cooled Chiller

## Air-Cooled Chiller Model Name: RUAGP S

are listed.

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Original instructions

30KQA060-01ISE

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# Summary of Contents for Toshiba RUAGP Series

[Page 1](#) Air-Cooled Chiller Model Name: RUAGP Series □ Thank you very much for purchasing this Toshiba heat pump unit. Please read this instruction manual carefully before using the unit. Be sure to obtain the “Instruction manual” and “Installation manual” from constructor or dealer.

## [Page 2: Table Of Contents](#)

Contents Safety Precautions .....4 List of Equipment • Configuration of Heat Pump ..... 9 Dimensional drawings (Integrated inverter pump, pumpless) ..... 11 Control box layout diagram .....14 High EER Type Drainage .....15 Module Controller .....18 Unit Controller .....35 Unit Controller (with pressure display function) .....

[Page 3](#) The qualified installer is a person who installs, maintains and removes the □ units made by Toshiba Carrier Corporation. He or she has been trained to install, maintain and remove the units made by Toshiba Carrier Corporation or, alternatively, he or she has been instructed in such operations by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to these operations.

[Page 4](#) Toshiba Carrier Corporation or, alternatively, he or she has been instructed in such matters by an individual or individuals who have been trained and is thus thoroughly acquainted with the knowledge related to this work.

[Page 5](#) Warning indications on the heat pump unit  
Warning indication Description  
WARNING ELECTRICAL SHOCK HAZARD ELECTRICAL SHOCK HAZARD Disconnect all remote electric power supplies before servicing.  
WARNING WARNING Moving parts. Do not operate unit with grille removed.

## [Page 6: Safety Precautions](#)

Safety Precautions The manufacturer shall not assume any liability for the damage caused by not observing the description of this manual. WARNING General • Carefully read Instruction Manual before starting the unit. There are many important things to keep in mind for daily operation. Otherwise, falling down of the unit may occur, or the unit may cause noise, vibration or water leakage.

[Page 7](#) • When storing or transporting the unit, heed the precautions written on the packages. Failure to heed the precautions may cause the unit to be damaged. • You shall ensure that the unit is transported in stable condition. If you find any part of the product broken, contact your dealer.

[Page 8](#) • When a water supply pipe is connected to the system, relevant local ordinances and standards must be followed. The improper pipe connection may cause water leakage, etc. Ask a qualified installer (\*1) or qualified service person (\*1) to carry out the water piping work.  
Operation •...

[Page 9](#) Removal • Do not relocate the unit because this unit is one component part installed in the specified fixed equipment as an interpretation of the EMC Directive. • When the unit is to be removed, do not remove it yourself but contact a qualified installer or a qualified service person.

[Page 10](#) • To make the unit operate in its original performance, operate it within the range of the operating temperature specified in the instructions. Otherwise it may cause a malfunction. • Do not wash the unit. Doing so may result in electric shock. •...

## [Page 11: List Of Equipment • Configuration Of Heat Pump](#)

List of Equipment • Configuration of Heat Pump List of Equipment (standard line-up and capacities) (common to integrated inverter pump and pumpless) Item Unit Number of modules Horse power Cooling Capacity Heat pump Standard type Heating 1050 1200 1350 1500 1650...

[Page 12](#) High High EER Brine Resistance code resistance type specifications to salt to salt ●



position and press to switch the screen to the next level. [When confirming on the "MC operation switching" screen, "Remote switching" screen, "MC pattern switching" screen, "Solenoid valve for spray operation" screen] •...

[Page 25](#) Home screen [About the display] • 1, 2, 3, 6, 7 in the figure below are buttons. Select with the cursor and press . See the table below for the destination. Refer to the table below for the display of 1 to 7. Classification Display Description...

[Page 26](#) MC operation switching screen • Use the cursor to select "Run" or "Stop" of "MC Operation". Also, select either "Enable" or "Disable" for "System A operation" and "System B operation". If "Disable" is selected, the corresponding system will not operate even if "MC operation"...

[Page 27](#) MC Failure history screen Date and Indicates the date and time of occurrence. (The year is the Time last 2 digits of the Western calendar year) Displays a 5-digit code. The left 2 digits indicate the UC Code number and the right 3 digits indicate the failure code. Displays the failure content.

[Page 28](#) System information screen • Use the buttons to switch the displayed system. • Use the buttons to switch the displayed information item. Refer to the table below for the items and content of display information. Item Unit Description System – Displays "MC-A"...

[Page 29](#) UC information screen • Use the buttons to switch the UC ("1 to 4", "5 to 8", "9 to 12", or "13 to 16") displayed. • Use the buttons to switch the displayed information item. Refer to the table below for the items and content of display information.

[Page 30](#) Circuit information screen • Use the buttons to switch the UC ("1 to 16") displayed. • Each time you press , you can switch the displayed circuit (A→B→C→D). Use the buttons to switch the displayed information item. Refer to the table below for the items and content of display information. Item Unit Description...

[Page 31](#) Operate solenoid valve for spray screen • You can select system A or system B with • Press to switch between "OFF" and "ON". • If you do not wish to make a change, select and press to return to the " Information/Operation" screen without making a change.

[Page 32](#) Basic settings screen • Press and enter the password on the password input screen. The following screen appears. If the password is incorrect, the password error screen appears. If you press , the functions will be restricted. If the password is correct, the Basic settings screen that allows selection of 8 items appears.

[Page 33](#) 01. MC operation pattern setting screen • Select "01. MC operation pattern setting" from . The screen on the left appears. • You can change the item with • Select pattern 1 and press to move to the screen on the left (01\_1.

[Page 34](#) • The factory default is to log "System data 1" at an interval of "1 min". Old log entries are overwritten after one month. It is also possible to suppress the overwriting (Contact Toshiba Carrier for details). Keep in mind that logging is disabled when the storage area becomes full.

[Page 35](#) The following tables show the data that is stored by each storage item. Group Data 1  
UC Data 1 Stored data Symbol Description Stored data Symbol 0\_REMOTE Operating pattern \*\_REMOTE Unit/Remote MC data 0\_PTNO Operation pattern \*\_RUN Run/Stop 0\_SYSNO\* System number (0 to 15) \*\_THMCMD Thermo instruction 0\_RUN\*...

[Page 36](#) 06 . Password setting screen • Select "06. Password setting" from . The screen on the left appears. • The password must be 4 digits. Choose a number between 0000 and 9999. • You can change the digits with • You can change the numeric value with •...

## [Page 37: Unit Controller](#)

Unit Controller Explanation of the various display lamps and button for module independent operation of the unit controller LIMITED CAPACITY lamp POWER lamp (green) ALARM lamp (yellow) ALERT lamp (green) (green) Lights up when the heat Flashes/lights up Flashes/lights up when Lights up when limiting the pump is powered.

[Page 38](#) (1) Unit Controller display panel buttons - Setting modification buttons (UP/DOWN), confirmation button (ENTER) and the return button (BACK). The operation buttons (UP/DOWN and ENTER) and the 5-digit LED display on the unit controller (UC) display panel can be used for operations such as; setting the temperature set-point, monitoring the operational state and displaying the error log for the corresponding module.

[Page 39](#) (3) Various display items and display titles LED display Item Display title Details Display content COOL/HEAT Indicates that the operation mode is cooling/heating and that stopped. C□□□/H□□□ Indicates that the operation mode is cooling/heating and □ indicates the capacity [%] during operation. Indicates that a circuit has experienced a minor fault and is stopped.

[Page 40](#) ♦Various display item operation examples □ Example to change the display title You can use UP or DOWN to change the display title. Example) 0. StAt → UP → 1. Set □ Example to change the setting value of a detailed item After changing the display title, you can touch ENTER to display the detailed item and then display the setting value.

### [Page 41: Unit Controller \(With Pressure Display Function\)](#)

Unit Controller (with pressure display function) Unit Controller (with pressure display function) A unit controller with pressure display function supports only the factory default. This section explains the unit controller's various display lamps, button for single-module operation, and operation state. POWER lamp (green) REMOTE monitor ALERT monitor...

[Page 42](#) Setting modification buttons (UP, DOWN), confirmation button (ENTER), return button (BACK) The operation buttons (UP, DOWN, and ENTER) and LED display on the operation panel (unit controller with pressure display function) can be used for operations such as setting the temperature setpoint, monitoring the operation state, and displaying the error log for the corresponding module.

[Page 43](#) (3) Numerical display 2 Pressure data Display the current high and low pressures of each circuit. Note 1: Graph scale interval, maximum value, minimum value of bar graph display can be changed. Note 2: Operating range display can be changed. Note 3: When the power supply is turned off, the pressure values will not be displayed.

### [Page 44: Main Functions](#)

Main Functions 1. Automatic control functions Cooling and heating operations This heat pump starts a refrigeration cycle using compressors and optimizes the cycle to produce chilled or warm water by controlling the opening of electric expansion valves and the speed of fans. It adjusts the number of compressors to be activated and their operation frequency to make the leaving water temperature close to a setpoint.

[Page 45](#) Protection control for risk distribution Risk diversification on the heat pump means that the unit controller can determine whether the module can continue to operate based on the state of the protective devices and various sensors. If any given circuit in a module has stopped due to a protection device activating, one of the other circuits in that module will automatically operate to initiate the circuit back up operation.

[Page 46](#) Approximate capacity and power consumption display \* Available only with the group controller. => See the Group Controller Instruction Manual. The optional group controller shows on the LCD screen the capacity and power consumption of the product of instantaneous capacity multiplied by instantaneous input both estimated from the current, etc. within the group controller.

[Page 47](#) Run/Stop You can run and stop the heat pump on the LCD screen of the module controller. You can also run and stop the heat pump externally if you connect a wire (continuous signal) to the specified input port. This input port can be configured to accept a pulse signal (with a width of 500 ms or longer).

[Page 48](#) 4. Functions of group controller (sold separately) Function items Item Status display Operation display, warning, operation pattern display, operation mode display, operation capacity display, simple capacity display, simple input display, simple thermal energy and integrated power display Output display Operation output, fault output, operation pattern output, (\*1) Operation mode output , operation capacity output, simple capacity output,...

## [Page 49: Control Flow](#)

Control Flow 1. Group of modules control The module controller provides group control over multiple modules. (1) Controlling the number of modules by detecting the flow rate The module controller detects the flow rate required by the load side to determine how many modules need to be operated.

[Page 50](#) (2) Controlling the compressors and pumps of a single module Control the unit controller that has received operational commands from the module controller as follows. [Compressors] The unit controller controls the number of compressors and operation frequency in such a way as to make the leaving water temperature close to the setpoint.

[Page 51](#) (3) Capacity control over group of modules [Capacity control at low loads] At low loads, the module controller increases or decreases the number of active modules to maintain the balance between high-efficiency operation using as many heat exchangers as possible and the flow rates of the modules for pump control.

[Page 52](#) 2. Defrosting operation control In the Heating mode, the unit controller predicts frost formation on the air heat exchanger of each circuit and starts defrosting as necessary. (1) Control to prohibit simultaneous defrosting Each module independently performs defrosting. One circuit is defrosted at a time in a given module. Note: The unit controller provides no control over simultaneous defrosting by multiple modules.

[Page 53](#) Note: If you are using peripheral equipment, it may be necessary to implement measures, such as using an external signal to run the pump to prevent it from freezing if there is a large drop in temperature in equipment other than the heat pump. For details, contact Toshiba Carrier. - 51 -...

[Page 54](#) (3) Group control over external pumps When pump group control is selected, the heat pump and the external chilled (warm) water pump are grouped together. As shown below, the external pump starts at least 15 seconds before the compressor and continues running for at least 15 seconds after the compressor has stopped. (Start) (Stop) External chilled...

[Page 55](#) 5. Fan control DC motors control fans to make them turn at 100 to 900 rpm. In Cooling mode, the fan speed is controlled in such a way that the condensing temperature will be equal to the setpoint according to the compressor frequency. In the Heating mode, the fan speed is controlled according to the compressor frequency and the outdoor air temperature.

[Page 56](#) (\*5) For continually high-load applications such as computer cooling, the pump may be customized to shorten this period. (For details, contact Toshiba Carrier.) (\*6) Minimum periods taken for compressors to reach the maximum operation frequency after start-up (May be longer depending on leaving water temperature.) (\*7) The remaining operation time of the internal pump depends on the low-pressure states of each circuit (up to 180 seconds).

[Page 57](#) (\*4) The number of simultaneously activated circuits depends on the leaving water temp. of each module. (If the leaving water temp. is much lower than the setpoint, other circuits are activated at the same time.) (\*5) For continually high-load applications such as computer cooling, the pump may be customized to shorten this period. (For details, contact Toshiba Carrier.) (\*6) Minimum periods taken for compressors to reach the maximum operation frequency after start-up (May be longer depending on leaving water temperature.)

[Page 58](#) 8. Demand control Demand control is possible by applying a no-voltage a-contact continuous signal to the module controller. Demand control can applied to "Electric current: A", "Capacity: %", "Rated power ratio: %", "Power consumption ratio: %" or "Power: kW". Demand control limits the total of all modules in the system to no greater than the demand control value programmed in the module controller.

[Page 59](#) (When a Continuous signal is used, this custom option is not available since the unit keeps track of the ON/OFF state of the make signal.) Times from 2 sec. to 10 min. can be selected for auto recovery from power failure. For details, contact Toshiba Carrier. <If recovery from power failures does not support customization>...

[Page 60](#) 10. Protection control for risk distribution The protection control feature of the module controller stops a module operation if it determines that the module cannot continue to operate any longer, based on the states of the protective devices and sensors. If a given circuit

in a module has failed, another circuit in that module automatically initiates backup operation unless all the circuits in it fails.

[Page 61](#) Unit. After you fix the cause of the fault, set it back to External or Remote. \* A custom option is available for supporting a fault reset using an external or remote stop signal. For details, contact Toshiba Carrier. (c) Resetting a fault using the optional group controller If the current operating mode is External or Remote, a stop signal from an external device (e.g., a central...

[Page 62](#) List of error codes In the event of a fault, the error log of the module controller and the LED display on unit controller provide a description of the fault. The LED display on the operation panel (unit controller) shows the fault code and the name of the fault-causing circuit.

[Page 63](#) Error code Circuit name Item Description Stop process (Hexadecimal) displayed During operation, low pressure of 0.45 MPa or less is sustained for one Name of applicable 61(Note3) Low pressure error 1 (Note 6) Applicable circuit only minute, or low pressure is 0.12 MPa or less circuit During operation, the state of evaporation temperature of -6°C or lower (changes depending on chilled/warm water outlet water temperature)

### [Page 64: Refrigerant Piping Drawings](#)

Refrigerant piping drawings 1. Heat pump Cooling Refrigerant piping system diagram operation Heating Check valve Check valve operation Check Check Solenoid Solenoid Electric Electric valve valve valve valve Circuit B Circuit A expansion valve expansion valve Electric Electric Solenoid Solenoid expansion valve expansion valve CGTA1...

[Page 65](#) 2. Cooling only Refrigerant piping system diagram Check valve Check valve Cooling Solenoid Solenoid Electric operation Electric Circuit A valve Circuit B valve expansion valve expansion valve Electric Electric expansion valve expansion valve Air heat exchanger Air heat exchanger Service Service Air heat exchanger Air heat exchanger...

### [Page 66: Operating Standard And Operating Range](#)

Operating Standard and Operating Range Follow the usage standards below. Item Description Power Voltage fluctuation Within  $\pm 10\%$  Phase balance Within  $\pm 2\%$  (maximum voltage - average voltage) / average voltage  $\times 100$  Frequency fluctuations Within  $\pm 2\%$  Chilled Water Model with integrated inverter pump 0.7 MPa or less (warm) pressure Pumpless model...

[Page 67](#) (Note1) Use the equipment within the operating range below. Model 50HP (Powerful heating type), 50HP, 60HP 70HP 60HP (Powerful heating type) Item Within  $\pm 10\%$  of rated voltage Power voltage (Note 2) L/min 150 to 600 150 to 600 150 to 650 Flow rate range 4 to 30 Cooling...

[Page 68](#) ■ Large temperature difference specification (Customized Option) (Note1) \* Water outlet/inlet temperature difference: 10°C to 16°C Model 50HP (Powerful heating type), 50HP, 60HP 70HP 60HP (Powerful heating type) Item Within  $\pm 10\%$  of rated voltage Power voltage (Note 2) L/min 150 to 300 150 to 300 150 to 325 Flow rate range...

### [Page 69: Component Rating](#)

Component Rating Heat Pump Standard Specification 50HP 60HP 50HP 60HP 70HP (Powerful heating type) (Powerful heating type) Std. 9.0  $\times$  4 9.0  $\times$  4 11.2  $\times$  4 12.5  $\times$  4 13.3  $\times$  4 with pump High-EER 9.0  $\times$  4 9.0  $\times$  4 11.1  $\times$ ...

### [Page 70: High Eer Type](#)

High EER Type A water spray system, that sprays water onto the air heat exchanger surface (evaporative condenser), is installed on the chiller for all high EER USX EDGE model codes. Water is sprayed onto the heat exchanger when operation start temperature and the compressor capacity is greater than preset values for these parameters. Operation start/end temperature and operation start/end capacity can be adjusted.

[Page 71](#) Note on use of high EER type Water piping work is to be carried out in accordance with the laws and regulations of the installed location. 1. In terms of water quality standards, be sure to satisfy the condition of once-through water in cooling water system as stipulated by "Water Quality Guidelines for Cooling and Air Conditioning Devices"...

[Page 72](#) 4. As shown below, a manual flow rate adjustment valve is installed on the sprinkler inlet of each module. Adjust the flow rate so that the amount of water sprinkled on each module is almost uniform. If sufficient water pressure cannot be obtained, install a pressure pump (procured locally). Sprinkler inlet structure Water supply pipe connection port...

### [Page 73: Maintenance And Inspection](#)

Toshiba Carrier representative. ● To optimize your heat pump The quality of maintenance greatly affects the life and performance of your Heat Pump. Toshiba Carrier is ready to provide convenient, at-cost maintenance to users of our Heat Pump.

[Page 74](#) The list below is provided for reference only. Inspection items and cycles need to be judged depending on the actual condition of the product. Contact our sales department for details. Inspection method Criteria Maintenance cycle Inspection Inspection Part name Maintenance item description cycle Note 1)

[Page 75](#) Note 3) Water System Maintenance The appropriate water processing should be carried out to ensure the prevention of corrosion, water scaling and also the pipework/equipment from freezing during the winter period. When draining the complete system, pipework, water heat exchanger and intend to stop the unit for a long period of time, the use of nitrogen gas to prevent internal corrosion is advised.

[Page 76](#) Ask a fluorocarbon recovery company when disposing of the unit in accordance with said Act. Note 14) Relocation of heat pump Ask your original dealer or local Toshiba Carrier representative for relocation work. Inadequate installation may cause malfunction, electric shock or fire.

### [Page 77: Water Heat Exchanger Maintenance](#)

Water Heat Exchanger Maintenance Scales can cause a drop in water heat exchanger capacity and a drop in the flow rate, which can lead to fracturing due to freezing. Because of this, regularly scheduled maintenance is required to prevent scaling. (1) Perform the checks described below before entering the operational season.

### [Page 78: Pump Maintenance](#)

Pump Maintenance The following daily maintenance should be carried out for the water pump.  
1. Check for any water leaks from the mechanical seals. (Mechanical seals lubricate a sliding surface with only a small amount of water leaks. However, water leaks are usually not found in visual inspection.)  
2.

### [Page 79: Water Quality Management](#)

Water Quality Management A brazing plate water heat exchanger is built in a way that does not allow dismantling and cleaning or component replacement. Care must be exercised concerning the quality of the water used in a water heat exchanger in order to prevent corrosion and scaling.

### [Page 80: Precautions When Operation Is Stopped](#)

Precautions When Operation Is Stopped Short term break Heat source is not in operation daily or up to a week. (1) Press the RUN/STOP button on the module controller to stop the chiller units operation. (2) When external water pumps are used and are controlled by group input / output signals, the water pump will begin its stopping process automatically Note (For water pumps not using group input /...

### [Page 81: Troubleshooting](#)

(Note 2) in the tables applies to the heat pump module only. □ (Note 3) in the tables applies to the powerful heating type only. Repairs require specialized technical expertise. Do not repair the equipment by yourself but contact your dealer or local Toshiba Carrier representative. - 79 -  
...

[Page 82](#) Error code causes and solutions. - part 1 Error code Description Cause Required action (Hexadecimal) Normal Open circuit condition or loose connection in power Repair power wiring. supply wiring. Open-phase failure PWM board error Replace PWM board. Abnormal output volt EEV board error or blown fuse.

[Page 83](#) Error code causes and solutions. - part 2 Error code Description Cause Required action (Hexadecimal) Thermistor error (compressor suction Same as "Thermistor problem (chilled (warm) water inlet Same as "Thermistor problem (chilled (warm) water temperature)" inlet temperature)" gas temperature) Thermistor error (compressor suction Same as "Thermistor problem (chilled (warm) water inlet Same as "Thermistor problem (chilled (warm) water gas temperature)

[Page 84](#) Error code causes and solutions. - part 3 Error code Description Cause Required action (Hexadecimal) The air heat exchanger is dirty (cooling mode) Clean the air heat exchanger. The water heat exchanger is dirty (heating mode) Clean the water heat exchanger (chemical cleaning). Abnormal DGT Overcharge of refrigerant after maintenance Charge unit to specified refrigerant amount.

[Page 85](#) Error code causes and solutions. - part 4 Error code Description Cause Required action (Hexadecimal) PWM board error Replace PWM board The power supply's voltage or frequency is outside the Operate the unit within the specified working range. specified working range. COMP detct crcit err Open circuit condition or loose connection in control Repair the control wiring.

[Page 86](#) Error code causes and solutions. - part 5 Error code Description Cause Required action (Hexadecimal) Fan motor error Replace fan motor. The power supply's voltage or frequency is outside the Operate the unit within the specified working range. specified working range. Open circuit condition or loose connection in control FAN overload Repair the control wiring.

[Page 87](#) Manufacturer: Toshiba Carrier Corporation 1300-3 Kamo, Kikugawa-shi, Shizuoka-ken, 439-0031 JAPAN Authorized None Representative/ Toshiba EMEA Engineering Director TCF holder: Toshiba Carrier UK Ltd. Porsham Close, Belliver Industrial Estate PLYMOUTH, Devon, PL6 7DB United Kingdom Hereby declares that the machinery described below:...

[Page 88](#) TOSHIBA CARRIER CORPORATION 1300-3 Kamo, Kikugawa-shi, Shizuoka-ken (Address, city, country) 439-0031 JAPAN (Name of the importer / Distributor in EU) Toshiba Carrier UK Ltd. Porsham Close, Belliver Industrial Estate, PLYMOUTH, (Address, city, country) Devon, PL6 7DB United Kingdom - 86 -...

This manual is also suitable for:

[Ruagp511hlzg3tr](#)