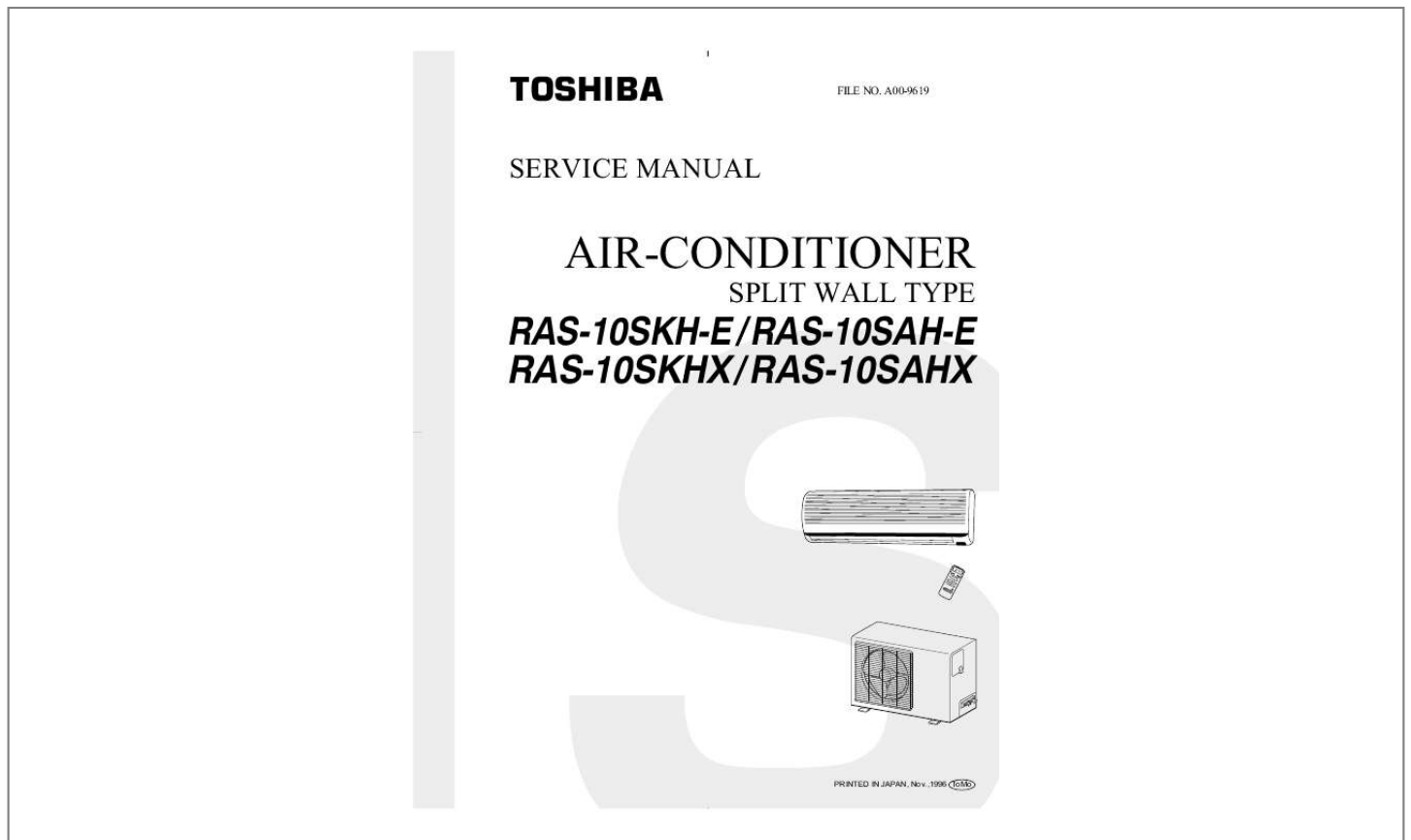




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User manual TOSHIBA RAS-10SKH-E
User guide TOSHIBA RAS-10SKH-E
Operating instructions TOSHIBA RAS-10SKH-E
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.. 61 3 1. SPECIFICATIONS Model Item Capacity *1 kW Phase V Hz kW % A Indoor/Outdoor A lit/h dB dB kg mm mm m 220V 2.65 RAS-10SKH-E/10SAH-E, RAS-10SKHX/10SAHX COOLING 230V 2.

68 240V 2.70 220V 3.00 HEATING 230V 3.05 240V 3.10 Power source Power consumption Power factor Running current Starting current Moisture removal Noise Refrigerant Refrigerant control Gas side size Connection type Liquid side size Connection type Maximum length (of one way) Maximur 10 Drain hose (0.

54m) 50 Knock out system Wireless remote control 10 50 46 20 2.5 20 55 Minimum distance to wall 16 Minimum distance to wall 120 or more 265 120 or more Remote control holder 17 37 20 40.5 3.5 Hanger Center line 76 319 790 Hanger Installation plate outline 269 126 40.5 59.6 60.5 6 112.8 5 136 2-2. Outdoor Unit RAS-10SAH-E RAS-10SAHX A Detail Drawing 600 36 50 R10 A 230 216 36 600 111 ø25 Drain hole 85 Gas side (flare ø9.52) 230 216 25 30 Liquid side (flare ø6.

35) ø6 Hole 50 8-ø6 Holes (For fixing the outdoor unit) Fan guard 4-ø11x14 Long holes (For anchor Heating Cooling Compressor PH120T1-4C Accumulator Dryer Condenser Capillary tube ø1.7x1400 Cooling Heating Propeller fan Outdoor unit Refrigerant R-22 0.74kg Mark()means check points of Gas Leak Fig. 5-1 Table 5-1 Standard pressure Surface temp. of heat P exchanger interchanging (kg/cm²G) pipe T1 (°C) 10SKH-E 10SKH-E 10SKHX Standard Heating High temperature 1 Low temperature Standard Cooling High temperature Low temperature 15.0 10SKHX 40.0 52.0 ~ 59.0 35.0 12. 0 15.0 2.0 High Low High High High Low Ambient temp. conditions DB/WB Fan speed (°C) (indoor) Indoor 20/ 27/ 20/ 27/19 32/23 21/15 Outdoor 7/6 21/15 10/10 35/24 43/26 21/15 50Hz * 19 ~ 23 12.5 6.

0 6.5 4.0 Note : · Measure the heat exchanger temperature at the center of U-bend. (By means of TC sensor.) *1 · During heating overload, the high temperature limit control operation is included.

10 Main Unit Control Panel C. P. U Functions · Lower Control · 3-minute Delay at Restart for Compressor ECONO. Sign Display Initializing Circuit · Motor Revolution Control · Processing (Temperature Processing) · Timer Clock Frequency Oscillator Circuit Operation Display Timer Display Heat Exchanger Sensor Thermo Sensor Current Sensor (Compressor Current) Infrared Rays Signal Receiver Infrared Rays Remote Control PRE-DEF. Sign Display Operation (START/STOP) Indoor Fan Motor Operation Mode Selection AUTO, COOL, DRY, HEAT, FAN ONLY Power Supply Circuit Compressor ON/OFF Signal Outdoor Fan ON/OFF Signal 4-Way Valve ON/OFF Signal Louver ON/OFF Signal 6. MICRO-COMPUTER BLOCK DIAGRAM 11 Noise Filter Relay RY01 Relay RY02 Compressor Thermo Setting Fan Speed Selection Relay Driver, Louver Driver ON TIMER Setting Relay RY03 Relay RY04 Louver Motor OFF TIMER Setting Louver AUTO Swing Louver Direction Setting ECONO. AC220/230/240V ~ 50Hz Outdoor Fan Motor 4-Way Valve 7. OPERATION DESCRIPTIONS 7-1. FAN ONLY Operation (MODE of the remote control : FAN ONLY) (1) During this mode, the relay RY01 is always turned off so that only the indoor fan is operated. RY02 is always turned on.

1) When the FAN is set to AUTO, the indoor fan motor operates as shown in Fig 7-1-1. 2) When the FAN is set to LOW, MED, or HIGH, the indoor fan motor operates with a constant in volume as listed in Table 7-1-1. 7-2. COOL Operation (MODE of the remote control : COOL) (1) Compressor 4-way valve, outdoor fan and operation display are controlled as shown in Fig. 7-2-1. (Room temp. Set temp.) ON +1 ON OFF OFF ON ON OFF (Room temp. Set temp.) 28 27 26 25 24 LOW LOW HIGH MED LOW(+) Fig.

7-2-1 (2) Relays RY01 and RY02 are turned on to energize the outdoor unit, and a cool operation is carried out. 1) When the FAN is set to AUTO, the indoor fan motor operates as shown in Fig 7-2-2. 2) When the FAN is set to LOW, MED, or HIGH, the indoor fan motor operates with a constant in volume as listed in Table 7-1-1.



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Set temp. Fig.

7-1-1 Auto setting of air volume Table 7-1-1 Manual setting of FAN SPEED Indication of FAN SPEED LOW MED HIGH HIGH Air volume (m³/n) 400 (Room temp. Set temp.) 500 600 +4 MED +3 +2 +1 0 RY01 OFF According LOW(+) to the set position LOW LOW (continuous) (2) Once the setting is made, the operation mode is memorized in the microcomputer so that the same operation can be effected thereafter simply by pushing the START/STOP button. Set temp. Fig.

7-2-2 (3) Once the setting is made, the operation mode is memorized in the microcomputer so that the same operation can be effected thereafter simply by pushing the START/STOP button. 12 Compressor (RY01) Common relay (RY02) 4-way valve (RY04) Outdoor fan (RY03) OPERATION display FAN AUTO HIGH Manual Set 0 temp. 7-2-1. Louver Control (1) By pushing the SET button of the remote control during the operation, the louver can be set to the desired position. And the louver position is stored in the microcomputer, the louvers will be set to the position automatically at the next operation. (2) When the AUTO button is pushed, the louver vertically swings within range of 25deg. 7-3. DRY Operation (MODE of the remote control : DRY) (1) Compressor 4-way valve, outdoor fan and operation display are controlled as shown in Fig. 7-3-1. ON:6min.

OFF:4min. ON:6min. OFF:4min. (Room temp. Set temp.) +3 +2 +1 ON:5min. OFF:5min. ON OFF ON:5min. OFF:5min. ON OFF OFF Fig.

7-3-1 · The microprocessor turns the compressor on and off at regular intervals (4 to 6 minutes on and/or off). During the compressor off, the indoor fan will operate in the super low position. The indoor fan will operate in the AUTO position. (2) The pattern of operation depending on the relation between room temperature and set temperature is shown below: Room temp. Set temp.

+1 Set temp. Compressor Outdoor fan ON ON OFF Indoor fan OFF L. *S.L. L.

S.L. *Super Low Fig. 7-3-2 13 Compressor (RY01) Common relay (RY02) 4-way valve (RY04) Outdoor fan (RY03) OPERATION display ON ON OFF L. S.L. L. Set 0 temp. 7-4. HEAT Operation (MODE of the remote control : HEAT) (1) Relays, 4-way valve, outdoor fan and operation display are controlled as shown in Fig.

7-4-1. 7-4-1. Louver Control (1) By pushing the SET button of the remote control during the operation, the louver can be set to the desired position. (2) When the AUTO button is pushed, the louver vertically swings within range of 25deg. (Room temp. Set temp.) 0 And the louver position is stored in the microcomputer, and at the next operation, the louvers will be set to the stored position automatically at the next operation. OFF ON ON OFF ON 7-4-2. Cool Airflow Control (1) If the indoor heat-exchanger temperature detected by the indoor heat-exchanger sensor is 20°C or below, the indoor fan stops and if the temperature rises to 25°C or above, the fan is restarted. Details are in 7-10.

1 ON ON Fig. 7-4-1 (2) Relays RY01 and RY02 are turned on to energize the outdoor unit, and a heat operation is carried out. The indoor fan motor operates as shown in Fig. 7-4-2, when the FAN is set to AUTO. The motor operates with a constant air volume as listed in Table 7-1-1, when the FAN is set to LOW, MED, or HIGH.

RY01 OFF Set temp. 0 -1 LOW -2 -3 -4 MED According LOW(+) to the set position MED(-) (Room temp. Set temp.) Fig. 7-4-2 (3) Once the setting is made, the operation mode is memorized in the microcomputer so that the same operation can be effected thereafter simply by pushing the START/STOP button.

Compressor (RY01) Common relay (RY02) 4-way valve (RY04) Outdoor fan (RY03) OPERATION display FAN AUTO Manual 14 7-5. AUTO Operation (MODE of the remote control : AUTO) (1) One of the 3 modes, Cooling, Fan only and Heating is selected according to room temperature at which operation is to start, as shown in Fig. 7-5-1. The Fan mode will continue until room temperature reaches a level at which another mode is selected. 7-5-1. Temporary Auto When the TEMPORARY button is pushed, the set temperature is fixed at 24°C and controlled in accordance with the chart shown in Fig. 7-5-1. (Room temp. Set temp.) Cooling mode +4 Cooling mode +1 (The same cooling mode as the room temperature control is set at set temp.

1°C) The Louver moved downward. (The same cooling mode as the room temperature control is set at set temp. 1°C) Fan only mode (Only the indoor fan operates at Low speed) 1 Heating mode (The same heating mode as the room temperature control is set at set temp. +1°C) Fig. 7-5-1 15 7-6. ECONO. Mode When the ECONO. button is pushed, during COOL, HEAT and AUTO operation, the OPERATION display is turned off and the ECONO. display is lit and the indoor unit operates quietly and mildly with controlling airflow. 7-7.

Current Limit Control The microprocessor detects the input current so as to prevent it exceeds a specified value by means of controlling the outdoor fan control as described in (1) and (2). (1) Current limit control (Cooling) Control is performed as shown below by detecting the compressor operation current with a current sensor (C.T). 7-6-1. Cooling (1) In the ECONO.

mode, the set temp. by the remote control is changed automatically as shown in Fig. 7-6-1. (2) Fan speed LOW (°C) Set temp. is changed +2 Set temp. is changed +1 Compressor Input current 10A I4 9A I3 Outdoor fan More than I4 continues for 3 seconds OFF More than I3 continues for 5 minutes OFF ON Set temp. 0H 1H 2H TIME Fig. 7-7-1 (2) Current limit control (Heating) Control is performed as shown in Fig. 7-7-2. ECONO. button is pushed Fig. 7-6-1 Compressor Outdoor fan Input current 10A I4 9A I3 8A I2 7.5A I1 ECONO. button is pushed 0H Set temp. 1H 2H TIME 7-6-2.

Heating (1) In the ECONO. mode, the set temp. by the remote control is changed automatically as shown in Fig. 7-6-2. (2) Fan speed LOW More than I4 continues for 3 seconds OFF More than I3 continues for 5 minutes OFF ON OFF ON Fig. 7-7-2 -1 Set temp. is changed -2 Set temp. is changed (°C) Fig. 7-6-2 16 7-8. High-Temperature Limit Control (Heating Operation) The microprocessor detects the indoor heat exchanger temperature so as to prevent exceeding the condensate pressure.

Control is performed as shown in Fig. 7-8-1. 7-10. Cool Airflow Prevention Control (Heating Operation) (1) During the heating operation, the indoor fan speed is controlled automatically in accordance with the indoor heat exchanger temperature to prevent blowing the cool air. Control is performed as shown in Fig.

7-10-1. Heat exchanger temperature (°C) 60 53 52 Compressor, Outdoor fan Heat exchanger temperature *1 OFF (°C) 30 25 Indoor fan speed According to the set position U.L. (Ultra Low) ON 20 Room temp.



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Room temp.

Set temp. Set temp. OFF S.L (Super Low) < > *1 Only outdoor fan is turned off. Fig. 7-8-1 Fig. 7-10-1 7-9. Low-Temperature Limit Control (Cooling Operation) The microprocessor detects the indoor heat exchanger temperature so as to prevent freezing up the indoor heat exchanger. Control is performed as shown in Fig. 7-9-1.

(2) As soon as the defrost operation starts, the indoor fan stops. Heat exchanger temperature Compressor Outdoor fan ON Less than 5°C continues for 5 minutes OFF (°C) 7 5 Fig. 7-9-1 17 7-11. Defrost Operation During the heating operation, the outdoor heat exchanger temperature goes down and sometimes it is frozen. In this case, the air conditioner stops the heating operation and starts the defrost operation to melt ice. minutes 40 minutes 40 minutes 40 minutes 40 Heating Heating Heating Heating Defrost Defrost Defrost 7-11-1. Condition to Start the Defrost Operation The defrost operation starts whichever below conditions are specified. (1) When the cumulative compressor operation time is longer than 40 or 90 minutes and difference between the indoor heat exchanger temperature and the room temperature is less than the specified value. (This value is decided by the microprocessor.) (Control example is shown in Fig.

7-11-1. In case of B or C, the defrost operation starts.) (2) When the current limit control or the high temperature limit control is performed for total of 90 minutes. Max 6 minutes 10 minutes 1 cycle Fig. 7-11-2 <In case of C> (1) The heating operation is performed for at least 90 minutes.

(2) The defrost operation time is 10 minutes. 7-11-3. Ending Condition at Defrost Operation (1) When the compressor current becomes 7.5A or more during defrost operation, the defrost operation stops and the heat operation restarts. (The current sensor detects the compressor current.

) (2) The defrost operation continues for at most 6 minutes or 10 minutes. Indoor heat exchanger temp. Room temp. (°C) D 19 10 A B C 40 90 (min.) Cumulative compressor operation time DEFROST LAMP : · During defrost operation, the PRE-DEF. lamp is on and the indoor and outdoor fans are off. · The compressor start protection timer is interlocked with the PRE-DEF. lamp. So the PREDEF. lamp is off (the fans stop) for about 3 minutes after the START/STOP button is turned on.

When the compressor is turned on, the PRE-DEF. lamp comes on. After the heat exchanger is preheated to about 30°C or higher, the PRE-DEF. lamp goes off, and the indoor fan starts. Fig. 7-11-1 (Indoor fan speed : M) 7-11-2. Defrost Operation Time Control <In case of B> (1) The heating operation is performed for at least 40 minutes. (2) The maximum defrost operation time is 6 minutes. The defrost operation time for the 4th cycle is 10 minutes. (When the outdoor temperature is very low, however, the defrost operation time is 10 minutes.

) 18 Defrost 7-12. Auto Restart Function This unit is equipped with an Automatic restarting facility which allows the unit to restart and resume the set operating conditions in the event of a power supply shutdown without the use of the hand control. The operation will resume without warning three minutes after the power is restored. The Auto Restart function is set not to work on shipment from the factory, and so it is necessary to set it to function as required. 7-12-1.

How to Set the Auto Restart To set the Auto Restart function, proceed as follows: Access the TEMPORARY button located in the lower right hand corner beneath the hinged front panel of the indoor unit (please refer to section on PARTS NAME). The power supply to the unit must be on the function will not be set if the power is off. To enable the Auto Restart function, press the TEMPORARY button continuously for three seconds. The unit will acknowledge the setting and beep three times. The system will now restart automatically.

The above Auto Restart settings can be carried out: · When the system is stand-by (not running) OPERATION Press the TEMPORARY button continuously more than three seconds. Stand-by The system starts to operate. The unit beeps three times. The system is operating. MOTION 0 3S The green light will be lit. about three seconds after The orange light will be lit. The orange light is lighting. TEMPORARY If the system is not required to run at this time, press the TEMPORARY button once more or use the remote control and the unit will stop. · When the system is operating OPERATION Press the TEMPORARY button continuously more than three seconds. Operating The system stops to operate.

The unit beeps three times. The system stops. MOTION The green light is lit. The green light is turned off. about three seconds after 0 3S TEMPORARY If the system is not required to stop at this time, use the remote control and to restart. During subsequent operation, the orange light is lit. · The Auto Restart function will not accept an instruction if timer operation with the remote control is selected. (Please refer to the section on setting the timer or setting the louver.) · During louver swing (AUTO) operation, after restart by the Auto Restart function the louver swing stops. 19 7-12-2.

How to Cancel the Auto Restart To cancel the Auto Restart function, proceed as follows: Repeat the setting procedure: the unit will acknowledge the instruction and beep three times. · When the system is stand-by (not running) OPERATION Press the TEMPORARY button continuously more than three seconds. The system will now be required to manually restart with the remote control after the main supply is turned off. Cancellation is carried out: MOTION Stand-by The system starts to operate. The unit beeps three times.

The system is operating. 0 3S The orange light will be lit. about three seconds after The green light will be lit. TEMPORARY If the system is not required to run at this time, press the TEMPORARY button once more or use the remote control and the unit will stop. · When the system is operating OPERATION Press the TEMPORARY button continuously more than three seconds.

Operating The system stops to operate. The unit beeps three times. The system stops. MOTION The orange light is lit. The orange light is turned off. about three seconds after 0 3S TEMPORARY If the system is not required to stop at this time, use the remote control and to restart. During subsequent operation, the green light is lighting. 7-12-3. In Case of Power Failure during the Timer Operation (1) If ON-TIMER operation is reserved with setting of Auto Restart operation, it is cancelled with power failure. (The OPERATION lamp on the main unit goes on and off to inform of power failure.

) In that case, try to reserve ON-TIMER operation once again. (2) If OFF-TIMER operation is reserved without setting of Auto Restart operation, the reservation is cancelled with power failure.



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(The OPERATION lamp on the main unit goes on and off to inform of power failure.) In that case, try to reserve OFFTIMER operation. When Auto Restart operation is set, OFF-TIMER reservation is also cancelled with power failure. 20 8. INSTALLATION PROCEDURE 8-1. Safety Cautions For general public use Power supply cord of parts of appliance for Outdoor use shall be more than polychloroprene sheathed flexible cord (design H05 RN-F), or cord designation 245 IEC 57. CAUTION TO DISCONNECT THE APPLIANCE FROM THE MAINS SUPPLY. This appliance must be connected to the mains by means of a circuit breaker or a switch with a contact separation of at least 3 mm.

If this is not possible, a power supply plug with earth must be used. This plug must be easily accessible after installation. The plug must be disconnected from the power supply socket in order to disconnect the appliance completely from the mains. DANGER `FOR USE BY QUALIFIED PERSONS ONLY. `TURN OFF MAIN POWER SUPPLY AND BREAKER BEFORE ATTEMPTING ANY ELECTRICAL WORK.

MAKE SURE ALL POWER SWITCHES AND BREAKER TURN OFF. FAILURE TO DO SO MAY CAUSE ELECTRICAL SHOCK. `CONNECT THE CONNECTING CABLE CORRECTLY. IF THE CONNECTING CABLE IS CONNECTED BY WRONG WAY, ELECTRIC PARTS MAY BE DAMAGED. `CHECK THE EARTH WIRE IS NOT BROKEN OR DISCONNECTED BEFORE INSTALLATION.

`DO NOT INSTALL NEAR CONCENTRATIONS OF COMBUSTIBLE GAS OF GAS VAPORS. FAILURE TO FOLLOW THIS INSTRUCTION CAN RESULT IN FIRE OR EXPLOSION. `TO PREVENT OVERHEATING THE INDOOR UNIT AND CAUSING A FIRE HAZARD, PLACE THE UNIT WELL AWAY (MORE THAN 2M.) FROM HEAT SOURCES SUCH AS RADIATORS, HEAT RESISTORS, FURNACE, STOVES, ETC.. `WHEN MOVING THE AIR-CONDITIONER FOR INSTALLING IT IN ANOTHER PLACE AGAIN, BE VERY CAREFUL NOT TO GET THE SPECIFIED REFRIGERANT (R-22) WITH ANY OTHER GASEOUS BODY INTO THE REFRIGERATION CYCLE. IF AIR OR ANY OTHER GAS IS MIXED IN THE REFRIGERANT, THE GAS PRESSURE IN THE REFRIGERATION CYCLE BECOMES ABNORMALLY HIGH AND IT RESULTINGLY CAUSES BURST OF THE PIPE AND INJURIES ON PERSONS. `IN THE EVENT THAT THE REFRIGERANT GAS LEAKS OUT OF THE PIPE DURING THE INSTALLATION WORK, IMMEDIATELY LET FRESH AIR INTO THE ROOM. IF THE REFRIGERANT GAS IS HEATED BY FIRE OR SOMETHING ELSE, IT CAUSES GENERATION OF POISONOUS GAS. WARNING · Never modify this unit by removing any of the safety guards of by by-passing any of the safety interlock switches.

· Do not install in a place which cannot bear the weight of the unit. Personal injury and property damage can result if the unit falls. · Before doing the electrical work, attach an approved plug to the power supply cord. And make sure the equipment to be earthed. · Appliance shall be installed in accordance with national wiring regulations. If you detect any damage, do not install the unit. Contact your Toshiba dealer immediately. 21 CAUTION · Exposure of unit or water or other moisture before installation will result in an electrical short. Do not store in a wet basement or expose to rain or water. · After unpacking the unit, examine it carefully for possible damage.

· Do not install in a place that can increase the vibration of the unit. Do not install in a place that can amplify the noise level of unit or where noise and discharged air might disturb user's neighbors. · To avoid personal injury, be careful when handling parts with sharp edges. · Please read the installation manual carefully before installing the unit. It contains further important instructions for proper installation.

UK Plugs and Sockets etc (Safety) Regulations 1994 SI Number 1768 With regard to Schedule 3, Item 7 of the above UK Regulations, this appliance must be permanently connected to the fixed wiring of the main electrical supply by means other than the use of an approved 13 Amp plug-top as outlined in the Regulations. Electrical work must be carried by suitably qualified persons and in accordance with all relevant safety standards and codes of practice. We recommend that the power supply for this appliance is derived from a suitably protected dedicated circuit. (for U.K.

only) For to comply with the specification 61000-3-3 the local power authority has to be conducted for permit of operation. The installation condition has to be done as following : · Installation only by authorized installer · This product has to be connected to the mains supply via a separate connection to the main distribution box (circuit breaker box). 22 8-2. Installation Diagram of Indoor and Outdoor Units For installation of the indoor unit, use the paper pattern on the back. 3 Clip anchor Hook Front cabinet Front panel 66 mm or more For the rear and left piping Wall 120 mm or m Hook ore 1 Installation plate Insert the remote control holder cushion between the indoor unit and wall, and lift indoor unit to make work easier. Do not allow the drain hose to get slack. Hook 120 m or m m ore 8 Mounting screw Air (At tac filte r Cut the piping hole sloped slightly ht 11 Filter frame ot he 5 Shield pipe ba ck sid e.) 6 Pan head wood screw (At tac ht ot Make sure to run the drain hose sloped downward. The auxiliary piping can be connected the left, rear left, rear, right or bottom. he 9 Deodorizing filter 10 Purifying filter ba ck sid e.

) 4 Remote control holder 600 mm or more 2 Wireless remote control Right Before install the wireless remote control 100 mm or m ore re r mo mo 5m 4 Rear Rear left Bottom Left · With the remote control cover open, load the batteries supplied correctly, observing their polarity. 2 Wireless remote control re r mo mo 0m 40 Extension drain hose (Option: RB-821SW) 600 mm or m ore Insulation of refrigerant pipes insulates the pipes separately, not together. 7 Batteries Cover Electric parts cover Loop the connective cable (about 100 mm in diameter and 300~350 mm long). 6 mm thick heat resisting polyethylene foam 23 8-3. Installation 8-3-1. Optional Parts <Drainage> ø25 Part code A Bottom plate Parts name Refrigerant piping Liquid side : ø6.35 mm Gas side : ø9.52 mm Pipe insulating material (polyethylene foam, 6 mm thick) Putty, PVC tapes Q'ty 12 Drain nipple Each one Drain hose sold separately or one on the market. B C 1 Each one Fig 8-3-2 · Install the provided drain nipple in the hole of the bottom plate of the outdoor unit. (See the above figure.

) · Perform proper drainage processing using a drain hose sold separately or one on the market. (Inner diameter : 16 mm) · Do not use an ordinary hose on the market, because it tends to get flat and as a result, it prevents water from draining. <Anchor bolt arrangement of outdoor unit> 600mm Air inlet 111mm 230mm 30mm 12 Drain nipple Air outlet Fig 8-3-1 Air outlet · Secure the outdoor unit with the anchor bolts if the unit is likely to be exposed to a strong wind.



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50 mm or more Do not put the drain hose end into water. Do not put the drain hose end in the drainage ditch. Hook here 1 Installation plate (2) Fig. 8-4-17 (2) Put water in the drain pan and make sure that the water is drained outdoors. (3) When connecting extension drain hose, insulate the connecting part of extension drain hose with 5 shield pipe. 5 Shield pipe Hook Push Fig. 8-4-15 · For detaching the indoor unit from the installation plate pull the indoor unit toward you while pushing its bottom up by the specified parts.

Drain hose Inside the room Extension drain hose Fig. 8-4-18 CAUTION Push Push Arrange the drain pipe for proper drainage from the unit. Improper drainage can result in damage to property. This air conditioner has the structure designed to drain water collected from dew, which forms on the back of the indoor unit, to the drain pan. Therefore, do not store the power cord and other parts at a height above the drain guide.

Wall Drain guide Fig. 8-4-16 Space for pipes Fig. 8-4-19 31 8-5. Outdoor Unit t Installation place · A place which provides the spaces around the outdoor unit as shown in the diagram in page 23. · A place which can bear the weight of the outdoor unit and does not allow an increase in noise level and vibration.

· A place where the operation noise and discharged air do not disturb your neighbors. · A place which is not exposed to a strong wind. · A place free of a leakage of combustible gases. · A place which does not block a passage. · When the outdoor unit is to be installed in an elevated position, be sure to secure its feet. · An allowable length of the connecting pipe is up to 10 m. · An allowable head level is up to 5 m. · A place where the drain water does not raise any problem. CAUTION Installation in the following places may result in trouble. Do not install the unit in such places.

· A place full of machine oil. · A saline place such as coast. · A place full of sulfide gas. · A place where high-frequency waves are likely to be generated as from radio equipment, welders, and medical equipment. CAUTION (1) Install the outdoor unit without anything blocking the air discharging. (2) When the outdoor unit is installed in a place exposed always to a strong wind like a coast or on a high story of a building, secure the normal fan operation using a duct or a wind shield. (3) Specially in windy area, install the unit to prevent the admission of wind. Strong wind Fig. 8-5-1 32 8-5-1. Refrigerant Piping Connection <Flaring> (1) Cut the pipe with a pipe cutter.

8-5-2. Vacuum Pumping AIR PURGE Evacuate the air in the connecting pipes and in the indoor unit using vacuum pump. 90° Obliquity Roughness Warp Do not use the refrigerant in the outdoor unit. For details, see the manual of vacuum pump. Fig.

8-5-2 (2) Insert a flare nut into the pipe, and flare the pipe. A (mm) Imperial Rigid <Use of vacuum pump> (1) Connect the charge hose (A) from the manifold valve to the charge inlet of the gas side packed valve. (2) Connect the charge hose (B) to the port of vacuum pump. (3) Open fully the low pressure side handle of the manifold valve. (4) Operate the vacuum pump.

(5) Close the low pressure side handle of manifold valve after vacuumizing and stop the vacuum pump. Continue vacuumizing more than 15 minutes and check the pressure gauge indicates 76 cmHg. (6) Open the stems of packed valves A and B all the way. (7) Securely tighten the stem cap to each of the packed valve stems. A Outer diam. 6.35 mm 1.3 mm 0.7 mm Die Pipe 9.52 mm 1.

6 mm 1.0 mm Fig. 8-5-3 <Tightening connection> Align the centers of the connecting pipes and tighten the flare nut as far as possible with your fingers. Then tighten the nut with a spanner and torque wrench as shown in the figure. CAUTION · Do not apply excess torque. Otherwise, the nut may crack depending on the installation conditions. (Unit : N·m) Outer diam. 6.35 mm 9.52 mm Tightening torque 15.

7 (1.6 kgf·m) 29.4 (3.0 kgf·m) Additional tightening torque 19.6 (2.

0 kgf·m) 34.3 (3.5 kgf·m) Pressure gage Low pressure side handle Charge hose (A) Manifold valve High pressure side handle Lo Hi Outdoor unit Indoor unit Gas (ø9.52) C A Service port Charge hose (B) Half union or packed valve Flare nut VP B Liquid (ø6.35) Packed valve Externally threaded side Use a wrench to secure.

Internally threaded side Use a torque wrench to tighten. D Fig. 8-5-4 Fig. 8-5-5 33 8-5-3. Wiring Connection CAUTION · KEEP IMPORTANT 4 POINTS FOR INSTALLATION (PIPING WORK) (1) Take away dust and moisture (Inside of the connecting pipes.) (2) Tight connection (between pipes and unit) (3) Evacuate the air in the connecting pipes using VACUUM PUMP. (4) Check gas leak (connected points) (1) Remove the electric parts cover from the outdoor unit. (1 screw) (2) Connect the connecting cable to the terminals as identified with their respective matched numbers on the terminal block of indoor and outdoor units. (Strip the sheath of connecting cable with following stripping length to and insert into the terminal block.) (3) When connecting the connecting cable to outdoor unit terminal, make a loop as shown in the installation diagram of indoor and outdoor unit, to prevent water coming in the outdoor unit.

(4) Insulate the unused cords (conductors) with water coming in the outdoor unit. Process them so that they do not touch any electrical or metal parts. <Packed Valve Handling Precautions> · Open the valve stem all the way out; so not try to open it beyond the stopper. · Securely tighten the valve stem cap with the wrench or like. · Valve stem cap tightening torque is as follows; Gas pipes side (ø9.52) : 29.4 N·m (3.0 kgf·m) Liquid pipe side (ø6.35) : 16.2 N·m (1.

7 kgf·m) <Stripping length of connecting cable> Terminal block 70mm Terminal Earth line 10mm screw 4 3 2 1 1 2 3 4 <A5 mm hexagon wrench is required.> Screw Flare nut 10mm 60mm Connecting cable Cord clamp Valve body Valve stem Valve stem cap 5m m Stopper Fig. 8-5-7 CAUTION · Wrong wiring connections may cause some electrical parts to burn out. · Be sure to comply with local code on running the wire from the indoor unit to outdoor unit. (size of wire and wiring method etc.

) · Every wire must be connected firmly. NOTE : · Wipe type : More than H05 RN-F Fig. 8-5-6 34 8-6. Others 8-6-1. Gas Leak Test Flare nut connections (Indoor unit) Flare nut connections (indoor unit) C D 8-6-3.

Auto Restart Setting This product is designed so that, after a power failure, it can restart automatically in the same operating mode as before the power failure.



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Information The product was shipped with Auto Restart function in the off position. Turn it on as required. Electric parts cover <How to set the Auto Restart> · Press and hold down the TEMPORARY button for about 3 seconds. After 3 seconds, the electronic beeper makes three short beeps to tell you the Auto Restart has been selected. · To cancel the Auto Restart, follow the steps described in the section Auto Restart Function of the User's Manual. Flare nut connections (Outdoor unit) B Valve stem cap connection A Valve stem cap connection Service cap connection Fig. 8-6-1 · Check the flare nut connections, valve stem cap connections and service cap connections for gas leak with a leak detector or soap water. 8-6-2. Test Operation To switch the TEST RUN (COOL) mode, press TEMPORARY button for 10 sec.

(The beeper will make a short beep.) TEMPORARY Fig. 8-6-2 35 9. TROUBLESHOOTING CHART TROUBLESHOOTING PROCEDURES : · Following details of "What to be pre-checked first", make sure of the basic items. · When there is no trouble corresponding to above, check in detail the faulty parts following "How to judge faulty parts by symptoms" later. 9-1. What to be Prechecked First 9-1-1. Power Supply Voltage The line voltage must be AC 220/230/240V. If the line voltage is not within this range, this air conditioner may not work normally. 9-1-2.

Incorrect Cable Connection between Indoor and Outdoor Units The indoor unit is connected to the outdoor unit with 5 cables. Make certain that the indoor and outdoor units have been connected properly, with terminals assigned the same numbers wired to each other. If the connectors are not connected as specified, the outdoor unit will not operate normally, or OPERATION lamp and TIMER lamp will flash (5Hz). 36 9-1-3. Misleading but Good Operations (Program Controlled Operation) The microcomputer performs the operations listed in Table 9-1-1 to control the air conditioner.

If a claim is made on the operation, check whether it corresponds to the contents in the Table 9-1-1. If it does, it is an indispensable operation for the control and maintenance of the air conditioner: it is not a failure of the unit. Table 9-1-1 No. 1 Operation of air-conditioner When the power plug or the power cord of the indoor unit is inserted, the OPERATION lamp on the setting indication part flashes. Description The OPERATION lamp flashes, indicating that power is turned on.

If this happens, push the START/STOP button once to cause the lamp to stop flashing. A power outage also causes the lamp to flash. 2 Fan speed remains unchanged in the dry Fan speed is automatically controlled in the dry mode. mode. Room temperature is in the range under The compressor will not stop while the compressor on hold timer which the compressor is turned off, but (3-minutes timer) is actuated. the compressor will not stop. The compressor will not switch on or off In the dry mode, the compressor goes on and off at regular even when the thermo control is operated intervals, independent of the thermo control. in the dry operation. The PRE-DEF. lamp comes on when the The PRE-DEF.

lamp comes on during defrost operation and when the indoor heat exchanger temperature is low when the heating heating operation is started. operation is started. At this time, the indoor fan is stopped to prevent cold air from drifting into the room. The outdoor fan stops once in the while · When the indoor heat exchanger temperature is high, the during the heating operation. outdoor fan may be stopped by the high-temperature limit control operation. · When the compressor current is large, the outdoor fan may be stopped by the current limit control operation. Compressor does not work though room Compressor does not work while the compressor restart delay temperature is in the range of turning the (3-min.) timer is active. The same is true after power is turned compressor on. on, as the time is still active.

During automatic operation, the After selection of the cooling and heating operation, the operation operation mode changes. mode is selected again when the compressor off mode continues for 15 min. according to the room temperature. During automatic operation mode, the When the room temperature is within setting temperature $\pm 1^{\circ}\text{C}$ fan only operation continues. the fan only mode is selected.

3 4 5 6 7 8 9 10 When the power is turned on, the When the auto restart controlling is selected, the operation is operation starts automatically. performed automatically in the previous operation mode after the power supply has been turned on. 37 9-2. Primary Judgement of Trouble Sources 9-2-1. Role of Indoor Unit Controller The indoor unit controller receives the operation commands from the remote control and assumes the following functions. · Measurement of the draft air temperature of the indoor heat exchanger by using the thermo sensor (TA). · Lower motor control · Control of the indoor fan motor operation · Control of the LED display · Control of the outdoor unit compressor, 4WAYVALVE and the outdoor fan motor. 9-2-2. Display of Abnormalities and Judgement of the Abnormal Spots The indoor unit of this machine observes the operation condition of the air conditioner and displays the contents of the self-diagnosis as block displays on the display panel of the indoor unit. Table 9-2-1 Block display A B C D E F G OPERATION display flashing (1 Hz) OPERATION display flashing (5 Hz) OPERATION display flashing (5 Hz) OPERATION display flashing (5 Hz) OPERATION display flashing (5 Hz) OPERATION and TIMER display flashing (5 Hz) OPERATION, TIMER and PRE-DEF. display flashing (5 Hz) OPERATION, TIMER and PRE-DEF. display flashing (5 Hz) Block display Power failure (when power is ON) Thermo sensor (TA) short/break Heat exchanger sensor (TC) short/break Indoor fan lock, abnormality of indoor fan Indoor PC board failure Wrong wiring of connecting cable Thermal fuse is blown · Gas shortage, other refrigerant cycle trouble · Heat exchanger sensor open/break/short · Overload relay trouble Compressor trouble H (1) Judgement from defective operation or abnormal operation Table 9-2-2 Symptom No reaction on remote control operation Check Turn off the power once, turn it on again and try to operate the remote control again. Remote control is not possible. Remote control is possible. Primary judgement The indoor part (including the remote control) is defective.

OK. The outdoor part is defective. (outdoor fan motor) The inside part is defective. The outdoor fan does not rotate The compressor operates. The compressor does not operate. 38 (2) Self-diagnosis with remote control With the indoor unit control, self-diagnosis of protective circuit action can be done by turning the remote control operation into service mode, operating the remote control, observing the remote control indicators and checking whether TIMER lamp flashes (5 Hz).



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Note : · To perform this self-diagnosis, the remote control with the service code of 43069666 is required. 2) Selecting ordinary mode Push the all clear button (ACL) on the rear bottom of the wireless remote control with a tip of pencil for more than 3 seconds. Make sure the operation mode display, wind volume display, clock display and setting temperature display are turned on and " : " of the clock display is flashing. <Cautions when doing service> 1) After completion of servicing, always push the all clear (ACL) button to return the operation mode to the normal mode.

2) After completion of servicing by the check code, turn off the power once and then turn on the power to reset memorized contents of the microcomputer to the initial status. <How to select remote control operation mode> 1) Selecting service mode Push the switch button provided on rear bottom of the wireless remote control with a tip of pencil for more than 3 seconds. Make sure the setting temperature " " is displayed on the display and other display is turned off.

All clear button Switch for selecting service mode ACL CLOCK ACL CLOCK Rear bottom cover (Rear bottom of remote control) Fig. 9-2-1 39 <Self-diagnosis by check codes> 1) The self-diagnosis by the check codes is conducted under the block displays of item B-H in Table 9-2-1.

2) Remote control key operation under the service mode is conducted by ON/OFF or TEMP. The remote control display by each key operation is varied as shown below. Two digit number is displayed in a hexadecimal number. 3) The self-diagnosis by the check codes is conducted with procedures shown below. a) Enter the service mode and make sure the off timer display of the remote control shows c) At the same time, also make sure the operation lamp is also flashing.

This shows that the protection circuit on the indoor PC board is working. d) Operate the TEMP. key and make sure the remote control display shows " " and flashing of the operation lamp. If the operation lamp is flashing, it shows the protection circuits for connecting cable is working or thermal fuse is blown. e) In the same way, operate the TEMP. key so that the display is increased one by one to continue checks by the self-diagnosis as shown in the next table. From " " up to " " check operations of protection circuits for each block, and " " to " " check operations of the typical protection circuits. " ". b) Operate the "ON/OFF" key and make sure the timer lamp on the display section is flashing (5 Hz). Table 9-2-3 Operating key Indication after operation " ON/OFF " TEMP.

(Up) 1 is added to data before operation. (Example) " "" © " TEMP. (Down) 1 is subtracted from data before operation. (Example) " "" © " "AUTO" LOUVER 10 is subtracted from data before operation. (Example) " "" © © " "SET" LOUVER Data before operation is directly transferred. (Example) " "" "

40 Table 9-2-4 Block level Check code Block Indoor PC board Check code Diagnosis function Symptom Thermo sensor short/break. Air Conditioner status Judgment and action Condition Continued Indicated when 1. Check thermo sensor. operation detected abnormal 2. If it is OK, check PC board.

Heat exchanger Continued Indicated when 1. Check heat exchanger sensor short/break. operation detected abnormal sensor. 2. If it is OK, check PC board.

Indoor fan lock, abnormality of indoor fan. All off Indicated when 1. Disconnect the power plug detected abnormal from AC outlet, and pull out the connector (CN10) for the motor, then connect the plug of AC power cord again and turn the power on. 2. Check the voltage between pin 1 and 2 of the connector (CN10).

3. If the output voltage is 35V, PC board is OK, check motor. Replace PC board. Indicated when detected abnormal Abnormality of All off other indoor unit PC board. Cable connection/ Thermal fuse Refrigerant system 1) Wrong wiring or All off disconnection of connective cable. 2) Thermal fuse cut off. 1) Gas shortage. All off (gas leak) 2) Other refrigerant cycle trouble. 3) Heat exchanger sensor off/break/ short. 4) Overload relay or thermostat for compressor break.

1. Check connective cable Indicated when correct if wiring is wrong. detected abnormal 2. Check thermal fuse and Terminal blocks. 3. If it is OK, check PC board. 1. Check gas quantity. Indicated when (check gas leakage) detected abnormal 2. If it is OK, check heat exchanger sensor.

3. If heat exchanger sensor is OK. check overload relay and thermostat for compressor. 4. If overload relay and thermostat for compressor are OK, check refrigerant cycle.

5. If refrigerant cycle is OK, check PC board. 1. Check compressor. Indicated when detected abnormal 2.

If it is OK, check PC board. Compressor break down. All off Contents detected by the check codes " " to " " are stored in memory of the microcomputer even if the power supply is turned off. Therefore, contents of operations in the past are all displayed. 41 9-3. Troubleshooting Flowcharts 9-3-1. Power can not be Turned on (No Operation at All) <Preliminary checks> (1) Is the supply voltage normal? (2) Is the connection to the AC output OK.? Operation Check Items Main cause Shut off the power supply from AC outlet once and turn it on after 5 seconds. Countermeasure Symptom NO Does the OPERATION lamp flash?

YES Does the power turn on by pushing the [START/STOP] button of the remote control? YES (No problem) Does the transmission indicator of remote control flash normally and transmit certainly? YES Replace the remote control. NO NO Remote control is defective.

Does the fuse (F01) blow? NO Does the thermal fuse blow? (Under PF. Terminal) NO NO Is the indication voltage (DC12V or 5V) of main PC board correct? YES YES Parts (R21, R109, SG01, C15, C01, DB01, C02, IC01, T01) are defective. YES Wrong wiring of AC cord or connecting cable is defective.

Replace the thermal fuse set. Check connection. PC board is defective. Is the voltage NO across C02 measured DC310V~340V? YES Shut off the power Is the secondary voltage of SW trans- NO supply once, and turn it on again after disformer (T01) measured connecting the motor DC35V, DC12V, connector CN10 . and DC7V ? YES Is the secondary voltage of SW NO transformer measured DC35V, DC12V, and DC7V? YES Refer to the paragraph "Pre-check", or defective circuit before power PC board block. Replace the main PC board. * SW transformer (T01) or IC (IC01) for power supply is defective.

Replace the main PC board. Motor is defective. * Be sure to disconnect the motor connector CN10 after shut off the power supply, or it will be a cause of damage of the motor. 42 9-3-2.



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Power can not be Turned on after Replacing Indoor PC Board <Checking Procedure> Connect the AC plug.

Return the wiring of the power relay is returned to the normal procedure. Does the OPERATION lamp flash? YES NO Is it wired as shown in Figure below?
YES NO To the paragraph of "No Power turns on". Black White Blue Brown C02 1 2 3 4 NL Power terminal block RY01 PC board RY02 Double winding T02
Indoor terminal block 9-3-3. Outdoor Unit does not Operate Shut off the power supply from AC outlet once and turn it on after 5 seconds. NO Does the
OPERATION lamp flash? YES Does the power turn on by pushing the [START/STOP] button of the remote control? YES Is AC220/230/240V supplied
between terminal block 1 - 2 , 3 - 2 1, 4 - 2 ? YES See "Power can not be turned on".

NO See "Power can not be turned on". NO * Relays (RY01, RY02, RY03, RY04) or IC31 or IC30 is failure. Replace the PC board. *1 Only Heating mode NO
Correct cabling between indoor and outdoor units. Is cable connection between indoor and outdoor units correct? YES Check items as following procedure in
9-3-4, 9-3-5, 9-3-6. 43 9-3-4. Only Compressor does not Operate Shut off the power supply from AC outlet once and turn it on after 5 seconds. Does the
OPERATION lamp flash? YES Does the power turn on by pushing the [START/STOP] button of the remote control? YES Is the voltage across the terminal (1
- 2) 220/230/240 VAC? YES Is cable connection between indoor and outdoor units correct? YES Is the voltage across the terminal (1 - 2) 220/230/240
VAC? YES Are all the cords for compressor normal? YES Is the compressor motor winding normal? (Check the winding resistor.) YES Is the capacitor for
compressor normal? YES Is the overload relay normal? YES Does the compressor start? YES Compressor starts but it stops after a while? YES Is the gas
quantity normal? (Check the pressure) YES Compressor is defective NO See "Power can not be turned on". NO See "Power can not be turned on".

NO Relays (RY01, RY02) or IC31 or IC30 is failure. Replace the PC board. NO Correct cabling between indoor and outdoor units. NO Cables between
indoor and outdoor units are defective. NO Re-wire or replace the defective cords. NO Compressor is defective. NO Capacitor is defective. NO Overload
relay is defective. NO Compressor is defective. NO Gas shortage (Gas leakage) 44 9-3-5.

Only Outdoor Fan does not Operate Shut off the power supply from AC outlet once and turn it on after 5 seconds. Does the OPERATION lamp flash? YES
Does the power turn on by pushing the [START/STOP] button of the remote control? YES Is the voltage across the terminal (2 - 4) 220/230/240 VAC? YES
Is cable connection between indoor and outdoor units correct? YES Is the voltage across the terminal (2 - 4) 220/230/240 VAC? YES Are all the cords for
outdoor fan motor normal? YES Is the outdoor fan motor winding normal? (Check the winding resistance) YES Is the capacitor for compressor normal? YES
Outdoor fan motor is defective. NO See "Power can not be turned on". NO See "Power can not be turned on". NO Relays (RY02, RY03) or IC31 or IC30 is
failure.

Replace the PC board. NO Correct cabling between indoor and outdoor units. NO Cables between indoor and outdoor units are defective. NO Correct the
wire or replace the defective cords. NO Outdoor fan motor is defective.

NO Capacitor for outdoor fan motor is defective. 45 9-3-6. Only 4-Way Valve does not Operate (During Heating Operation) Shut off the power supply from
AC outlet once and turn it on after 5 seconds. Does the OPERATION lamp flash? YES Does the power turn on by pushing the [START/STOP] button of the
remote control? YES Is the voltage across the terminal (2 - 3) 220/230/240 VAC? YES Is cable connection between indoor and outdoor units correct? YES Is
the voltage across the terminal (2 - 3) 220/230/240 VAC? YES Is the wiring of solenoid coil for 4-way valve normal? YES 4-way valve is defective. NO See
"Power can not be turned on". NO See "Power can not be turned on". NO Relays (RY02, RY04) or IC31 or IC30 is failure. Replace the PC board. NO Correct
cabling between indoor and outdoor units. NO Cables between indoor and outdoor units are defective.

NO Solenoid coil is defective. 46 9-3-7. Only the Indoor Fan does not Operate < Preliminary checks > Does it neither work in COOL or FAN ONLY
operation? < Check procedure > Shut off the power supply once. Turn the power supply. Does the fan stop in no operating status? YES Start the operation
with low fan setting in cool operation. NO Control PC board is defective. Replace the PC board. Does the fan rotate? YES NO Is the voltage measured
DC35V between 1 (red lead wire, +) NO and 2 (black lead wire,) of the motor connector (CN10) ? YES Shut off the power supply. Shut off the power supply,
and turn it on after disconnecting the motor connector (CN10) from the PC board. * Change the setting of cooling to high fan.

Does the cross flow fan rotate normally? YES NO Repair the bearing of the drain fan. Turn on the power supply. Does the fan speed become higher? YES NO
Operation stops Is the rotation signal (DC+5V-0V) output between 4 (blue lead wire) and 2 (black lead wire) of the motor connector (CN10) when rotating
the cross flow fan by hand in no operating status ? (2 pulses/one turn) YES Replace the control PC board. Is the voltage of DC35V measured between 1 (red
lead wire, +) NO and 2 (black lead wire,) of the motor connector (CN10) ? YES NO Replace the PC board. Normal Replace the fan motor.

* Be sure to disconnect the motor connector CN10 after shut off the power supply, or it will be a cause of damage of the motor. 47 9-4. How to Check the
Remote Control (Including the Indoor PC Board) There is no beep from the indoor unit. The operation lamp of the air conditioner main unit does not light.
Push the START/STOP button.

Does the transmission indicator flash? YES NO Is there direct sunlight on the receptor of the air conditioner? YES NO Short-circuit the metal terminal at the
side of the battery compartment (all-clear terminal) with a pencil. (wait about 10 seconds) Is there any thyristor fluorescent light near by? YES NO NO Is
operation possible when the transmitter is moved nearer to the infrared signal receiver of the air conditioner? YES Battery life Push the START/ STOP button
NO Is operation possible when setting the temporary switch of the air conditioner main unit to "TEST RUN" or "TEMPORARY AUTO"? YES NO Does the
transmission indicator light? YES NO Is there any beep and operation? YES Can any signal tone be heard in a transistor radio when transmitting within 5cm
distance from the radio? YES NO PC Board is failure.



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