
TOSHIBA
DAISEIKAI

Toshiba RAS-13SKV-E Service Manual

Split type indoor/outdoor unit

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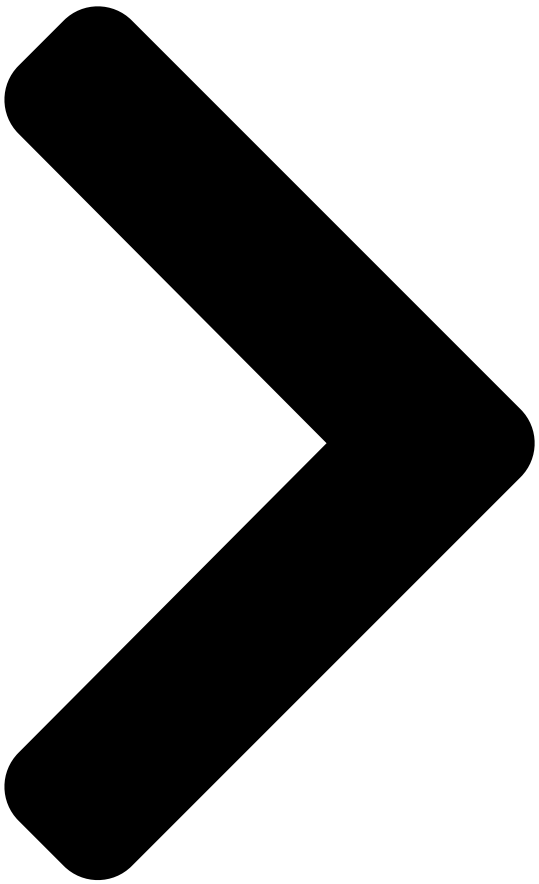

SERVICE MANUAL

Indoor Unit TOSHIBA

<High Wall, Heat Pump Type>

RAS-13SKV-E

RAS-16SKV-E

RAS-10SKVR-E

AIR CONDIT

RAS-13SKVR-E

RAS-16SKVR-E

TOSHIBA

R410A

FILE NO. SVM-07036-1

SPLIT TYPE

Outdoor Unit

<Heat Pump Type>

RAS-13SAV-E

RAS-16SAV-E

RAS-10SAVR-E

RAS-13SAVR-E

RAS-16SAVR-E

AIR-CONDITI

Revised March, 2007

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Chapters

Related Manuals for Toshiba RAS-13SKV-E

Air Conditioner Toshiba RAS-13SKV-E Service Manual

Indoor/outdoor unit, split type air conditioner (120 pages)

Air Conditioner Toshiba RAS-B10SKVP-E Owner's Manual

Split type; for general public use (31 pages)

Air Conditioner Toshiba RAS-B10SKVP-E Service Manual

Split type air conditioner (119 pages)

Air Conditioner Toshiba RAS-10SAVP-E Service Manual

(119 pages)

Air Conditioner Toshiba RAS-10SKVP-ND Owner's Manual

(61 pages)

Air Conditioner Toshiba RAS-16SKVP-ND Owner's Manual

(230 pages)

Air Conditioner Toshiba RAS-10 SKV Series Owner's Manual

Air conditioner (split type) (4 pages)

Air Conditioner Toshiba RAS-M14GAV-E Installation Manual

Split type (12 pages)

Air Conditioner Toshiba RAS-13SKHP-E Service Manual

Split wall type air conditioner (70 pages)

Air Conditioner Toshiba RAS-13SKV2-E Service Manual

Split type (111 pages)

Air Conditioner Toshiba RAS-13SK-E Service Manual

Air conditioner split wall type (56 pages)

Air Conditioner Toshiba RAS-07SKHP Owner's Manual

Split type indoor unit outdoor unit ras-07, 10, 13 skhp series, ras-07, 10, 13 s2ah series (4 pages)

Air Conditioner Toshiba RAS-10SKVP2-E Service Manual

Split type indoor unit high wall, heat pump type outdoor unit heat pump type (111 pages)

Air Conditioner Toshiba RAS-10S3KHS-EE Installation Manual

(20 pages)

Air Conditioner Toshiba RAS-24S3KHS-EE Owner's Manual

(8 pages)

Air Conditioner Toshiba RAS-10SKP Series Owner's Manual

(8 pages)

Summary of Contents for Toshiba RAS-13SKV-E

Page 1: Service Manual

FILE NO. SVM-07036-1 SERVICE MANUAL SPLIT TYPE Indoor Unit Outdoor Unit <High Wall, Heat Pump Type> <Heat Pump Type> RAS-13SKV-E RAS-13SAV-E RAS-16SKV-E RAS-16SAV-E

RAS-10SKVR-E RAS-10SAVR-E RAS-13SKVR-E RAS-13SAVR-E RAS-16SKVR-E RAS-16SAVR-E R410A Revised March, 2007...

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Page 3: Safety Precautions

Revised-1 1. SAFETY PRECAUTIONS For general public use Power supply cord of outdoor unit shall be more than 1.5 mm (H07RN-F or 60245IEC66) polychloroprene sheathed flexible cord. • Read this “SAFETY PRECAUTIONS” carefully before servicing. • The precautions described below include the important items regarding safety. Observe them without fail. •...

Page 4 • DO NOT INSTALL NEAR CONCENTRATIONS OF COMBUSTIBLE GAS OR GAS VAPORS. FAILURE TO FOLLOW THIS INSTRUCTION CAN RESULT IN FIRE OR EXPLOSION. • TO PREVENT THE INDOOR UNIT FROM OVERHEATING AND CAUSING A FIRE HAZARD, PLACE THE UNIT WELL AWAY (MORE THAN 2 M) FROM HEAT SOURCES SUCH AS RADIATORS, HEAT REGISTORS, FURNACE, STOVES, ETC.

Page 5 Revised-1 – 5 –...

Page 6 Revised-1 – 5-1 –...

Page 7 <Cooling> <Heating> RAS-16SKVR-E RAS-16SKVR-E RAS-16SKV-E RAS-16SKV-E RAS-13SKVR-E RAS-10SKVR-E RAS-13SKVR-E RAS-13SKV-E RAS-13SKV-E RAS-10SKVR-E 10 20 30 40 50 60 70 80 90 100 110 120 Compressor speed (rps) Compressor speed (rps) 2-3. Capacity Variation Ratio According to Temperature <Heating> <Cooling> RAS-10SKVR-E...

Page 8: Refrigerant R410A

3. REFRIGERANT R410A This air conditioner adopts the new refrigerant HFC 6. When an air conditioning system charged with a (R410A) which does not damage the ozone layer. large volume of refrigerant is installed in a small room, it is necessary to exercise care so that, The working pressure of the new refrigerant R410A even when refrigerant leaks, its concentration is 1.6 times higher than conventional refrigerant...

Page 9 Table 3-2-1 Thicknesses of annealed copper pipes Thickness (mm) Nominal diameter Outer diameter (mm) R410A 6.35 0.80 0.80 9.52 0.80 0.80 12.70 0.80 0.80 15.88 1.00 1.00 2. Joints For copper pipes, flare joints or socket joints are used. Prior to use, be sure to remove all contaminants. a) Flare Joints Flare joints used to connect the copper pipes cannot be used for pipings whose outer diameter exceeds 20 mm.

Page 10 d) Flare Processing Make certain that a clamp bar and copper pipe have been cleaned. ØD By means of the clamp bar, perform the flare processing correctly. Use either a flare tool for R410A or conven- tional flare tool. Flare processing dimensions differ according to the type of flare tool.

Page 11 Table 3-2-6 Flare and flare nut dimensions for R22 Dimension (mm) Nominal Outer diameter Thickness Flare nut width diameter (mm) (mm) (mm) 6.35 9.52 13.0 13.5 12.70 16.2 16.0 12.9 15.88 19.7 19.0 16.0 19.05 23.3 24.0 19.2 Fig. 3-2-2 Relations between flare nut and flare seal surface 2.

Page 12 3-3. Tools 3-3-1. Required Tools The service port diameter of packed valve of the outdoor unit in the air-water heat pump using R410A is changed to prevent mixing of other refrigerant. To reinforce the pressure-resisting strength, flare processing dimensions and opposite side dimension of flare nut (For Ø12.7 copper pipe) of the refrigerant piping are lengthened.

Page 13: Recharging Of Refrigerant

3-4. Recharging of Refrigerant When it is necessary to recharge refrigerant, charge the specified amount of new refrigerant according to the following steps. Recover the refrigerant, and check no refrigerant remains in the equipment. When the compound gauge’s pointer has indicated

–0.1 Mpa (–76 cmHg), place the handle Low in the fully closed position, and turn off the vacuum pump’s power switch.

Page 14 1. Be sure to make setting so that liquid can be charged. 2. When using a cylinder equipped with a siphon, liquid can be charged without turning it upside down. It is necessary for charging refrigerant under condition of liquid because R410A is mixed type of refrigerant. Accordingly, when charging refrigerant from the refrigerant cylinder to the equipment, charge it turning the cylinder upside down if cylinder is not equipped with siphon.

Page 15 3-5-3. Brazing 2. Characteristics required for flux • Activated temperature of flux coincides with the As brazing work requires sophisticated techniques, brazing temperature. experiences based upon a theoretical knowledge, it must be performed by a person qualified. • Due to a wide effective temperature range, flux is hard to carbonize.

Page 16: Construction Views

Revised-1 4. CONSTRUCTION VIEWS 4-1. Indoor Unit RAS-10SKVR-E RAS-13SKVR-E RAS-16SKVR-E Air inlet Plasma air purifier Air filter Front panel Heat exchanger Air ionizer Knock out system Knock out system Installation plate hanger Wireless remote controller Installation plate hanger Drain hose (0.50m) Connecting pipe (0.35m) Connecting pipe (0.40m) (For 10, 13 series;...

Page 17: Indoor Unit

Revised-1 4-2. Indoor Unit RAS-13SKV-E RAS-16SKV-E Air inlet Air filter Front panel Heat exchanger Knock out system Knock out system Installation plate hanger Wireless remote controller Installation plate hanger Drain hose (0.50m) Connecting pipe (0.35m) Connecting pipe (0.40m) (For 13 series; Flare 9.52mm)

Page 18: Outdoor Unit

Revised-1 4-3. Outdoor Unit Ø6 hole R5.5 Ø6 hole Ø11x14 hole A detail Drawing (Back leg) Ø 11 x 14 Hole 25 Drain outlet Ø B Detail Drawing (Front leg) (For 8 - 10 anchor bolt) Ø Ø FAN-GUARD Ø 436 COVER-PV Electrical part cover Liquid side...

Page 19: Wiring Diagram

Revised-1 5. WIRING DIAGRAM 5-1. RAS-13SKV-E / RAS-13SAV-E RAS-10SKVR-E / RAS-10SAVR-E, RAS-13SKVR-E / RAS-13SAVR-E – 18 –...

Page 20 5-2. RAS-16SKV-E / RAS-16SAV-E RAS-16SKVR-E / RAS-16SAVR-E – 19 –...

Page 21: Specifications Of Electrical Parts

6. SPECIFICATIONS OF ELECTRICAL PARTS 6-1. Indoor Unit Parts name Type Specifications MMF-240-20-4B AC240/220V, 20W 13SKV-E Fan motor AFS-220-20-4AR AC240V, 20W 10SKVR-E,13SKVR-E (for indoor) ICF-340-30-2B 16SKV-E, 16SKVR-E DC 340V, 30W (−) Ω Room temp. sensor (TA-sensor) at 25°C −...

Page 22: Refrigerant Cycle Diagram

7. REFRIGERANT CYCLE DIAGRAM 7-1. Refrigerant Cycle Diagram RAS-10SKVR-E / RAS-10SAVR-E RAS-13SKV-E / RAS-13SAV-E Temp. measurement INDOOR UNIT Indoor heat exchanger Cross flow fan Max. : 20m Min. : 1m Pressure measurement Chargeless : 15m Deoxidized copper pipe Gauge attaching port Outer dia.

Page 23 RAS-13SKVR-E / RAS-13SAVR-E RAS-16SKV-E / RAS-16SAV-E Temp. measurement INDOOR UNIT Indoor heat exchanger Cross flow fan Max. : 20m Min. : 1m Pressure measurement Chargeless : 15m Deoxidized copper pipe Gauge attaching port Charge : 20g/m Outer dia. : 6.35mm Vacuum pump connecting port Thickness : 0.8mm (16 to 20m)

Page 24 RAS-16SKVR-E / RAS-16SAVR-E Temp. measurement INDOOR UNIT Indoor heat exchanger Cross flow fan Max. : 20m Min. : 1m Pressure measurement Chargeless : 15m Deoxidized copper pipe Gauge attaching port Outer dia. : 6.35mm Charge : 20g/m Vacuum pump connecting port Thickness : 0.8mm (16 to 20m) Sectional shape...

Page 25 7-2. Operation Data <Cooling> Tempeature Model name Standard Heat exchanger Indoor Outdoor Compressor condition(°C) RAS- pressure pipe temp. fan mode fan mode revolution Indoor Outdoor P (MPa) T1 (°C) T2 (°C) (rps) 27/19 35/- 10SKVR-E 0.9 to 1.1 12 to 14

37 to 39 High High...

Page 26: Control Block Diagram

Revised-1 8. CONTROL BLOCK DIAGRAM 8-1. Indoor Unit RAS-13SKV-E Indoor Unit Control Unit M.C.U. Louver Functions Motor Heat Exchanger Sensor (Tc) • Cold draft preventing Function Room Temperature Sensor (Ta) Louver Motor • 3-minute Delay at Restart for Compressor Drive Control Infrared Rays Signal Receiver •...

Page 27 Revised-1 RAS-16SKV-E Indoor Unit Control Unit M.C.U. Louver Functions Motor • Cold draft preventing Function Room Temperature Sensor (Ta) Louver Motor • 3-minute Delay at Restart for Compressor Drive Control Infrared Rays Signal Receiver • Fan Motor Starting Control and Indication Indoor Fan Motor Control •...

Page 28 Revised-1 RAS-10SKVR-E, RAS-13SKVR-E Indoor Unit Control Unit M.C.U. Louver Functions Motor Heat Exchanger Sensor (Tc) • Cold draft preventing Function Room Temperature Sensor (Ta) Louver Motor • 3-minute Delay at Restart for Compressor Drive Control Infrared Rays Signal Receiver • Fan Motor Starting Control and Indication Indoor Fan Motor Control...

Page 29 Revised-1 RAS-16SKVR-E Indoor Unit Control Unit M.C.U. Louver Functions Motor Heat Exchanger Sensor (Tc) • Cold draft preventing Function Room Temperature Sensor (Ta) Louver Motor • 3-minute Delay at Restart for Compressor Drive Control Infrared Rays Signal Receiver • Fan Motor Starting Control and Indication Indoor Fan Motor Control...

Page 30 8-2. Outdoor Unit (Inverter Assembly) – 29 –...

Page 31: Operation Description

9. OPERATION DESCRIPTION • Detection of inverter input current and current 9-1. Outline of Air Conditioner Control release operation This air conditioner is a capacity-variable type air • Over-current detection and prevention operation conditioner, which uses AC or DC motor for the indoor to IGBT module (Compressor stop function) for motor and the outdoor fan motor.

Page 32 9-2. Operation Description 1. Basic operation .....32 1. Operation control .....32 2. Cooling/Heating operation .....33 3. AUTO operation ..... 33 4. DRY operation .....33 2. Indoor fan motor control ..... 34 3. Outdoor fan motor control ..... 36 4.

Page 33: Basic Operation

Revised-1 Item Operation flow and applicable data, etc. Description 1. Basic 1. Operation control operation Receiving the user’s operation condition setup, the operation statuses of indoor/outdoor units are controlled. 1) The operation conditions are selected by the remote controller as shown in the below. 2) A signal is sent by ON button of the remote controller.

Page 34: Cooling/Heating Operation

Revised-1 Item Operation flow and applicable data, etc. Description 1. Basic 2. Cooling/Heating operation operation The operations are performed in the following parts by controls according to cooling/heating conditions. 1) Receiving the operation ON signal of the remote controller, the cooling or heating operation signal starts being transferred form the indoor controller to the outdoor unit.

Page 35: Indoor Fan Motor Control

*5 : Fan speed = (M + –L) x 1/4 + L +1.0 +0.5 (Linear approximation L(W6) from M+ and L) (Table 1) Indoor fan air flow rate Fan speed RAS-10SKVR-E RAS-13SKV-E RAS-13SKVR-E RAS-16SKV-E RAS-16SKVR-E level COOL HEAT DRY Fan speed Air flow rate Fan speed...

Page 36 Revised-1 Item Operation flow and applicable data, etc. Description 1) When setting the fan speed to L, 2. Indoor fan <In heating operation> L+, M, M+ or H on the remote motor control controller, the operation is per- formed with the constant speed HEAT ON shown in Fig.

Page 37: Outdoor Fan Motor Control

Item Operation flow and applicable data, etc. Description The blowing air volume at the outdoor unit side is controlled. 1) The operation command sent 3. Outdoor fan from the remote

controller is motor control Receiving the operation command from the controller of processed by the indoor unit indoor unit, the controller of outdoor unit controls fan speed.

Page 38: Capacity Control

Item Operation flow and applicable data, etc. Description The cooling or heating capacity depending on the load is 1) The difference between set 4. Capacity adjusted. temperature on remote controller control (Ts) and room temperature (Ta) According to difference between the setup value of tempera- is calculated.

Page 39: Release Protective Control By Temperature Of Indoor Heat Exchanger

Item Operation flow and applicable data, etc. Description 1) When temperature of the indoor 6. Release protective <In cooling/dry operation> heat exchanger drops below 5°C, control by tempera- (Prevent-freezing control for indoor heat exchanger) the compressor speed is ture of indoor heat In cooling/dry operation, the sensor of indoor heat reduced.

Page 40: Defrost Control (Only In Heating Operation)

Item Operation flow and applicable data, etc. Description (This function removes frost adhered to the outdoor The necessity of defrost operation is 7. Defrost control heat exchanger.) detected by the outdoor heat exchanger (Only in heating temperature. The conditions to detect the operation) The temperature sensor of the outdoor heat ex- necessity of defrost operation differ in A,...

Page 41: Louver Control

Item Operation flow and applicable data, etc. Description This function controls the air direction of the indoor unit. 8. Louver control 1) Louver • The position is automatically controlled according to the operation position mode (COOL/HEAT). • The set louver position is stored in memory by the microcomputer, and the louver returns to the stored position when the next operation is performed.

Page 42: Eco Operation

Revised-1 Item Operation flow and applicable data, etc. Description 9. ECO When pressing [ECO] button on the remote controller, a <Cooling operation> operation Economic operation is performed. 1) The control target temperature <Cooling operation> increase 0.5ºC per hour up to 2ºC This function operates the air conditioner with the difference starting from the set temperature between the set and the room temperature as shown in the...

Page 43: Temporary Operation

Item Operation flow and applicable data, etc. Description Pressing [RESET] button starts the temporary opera- 1) When pressing [RESET] button, the 10. Temporary tion of [AUTO] operation. When keeping [RESET] temporary [AUTO] operation starts. operation button pressed for 10 seconds or more, the temporary 2) When keeping [RESET] button pressed [COOL] operation is performed.

Page 44: Discharge Temperature Control

Item Operation flow and applicable data, etc. Description 11. Air purifying control [Detection of abnormality] 1. Purpose The air purifying control function is to alert the user to trouble in the ionizing or Purifying operation air purifying operation. 2. Description Trouble is determined to have occurred Total operation (indicated by the FILTER indicator) in the...

Page 45: Pulse Modulating Valve (P.m.v.) Control

Item Operation flow and applicable data, etc. Description This function controls throttle amount of the 1) When starting the operation, move the 13. Pulse refrigerant in the refrigerating cycle. valve once until it fits to the stopper. Modulating (Initialize) valve (P.M.V.) According to operating status of the air conditioner, control this function also controls the open degree of valve...

Page 46: Self-Cleaning Function

Revised-1 Item Operation flow and applicable data, etc. Description 14. Self-Cleaning 1. Purpose function The Self-Cleaning operation is to minimize the growth of mold, bacteria etc. by running the fan and drying so as to keep the inside of the air conditioner clean. Unit now performing

cooling or dry operation Self-Cleaning operation When the cooling or dry operation shuts...

Page 47: Selt-Cleaning Function Release

Revised-1 Item Operation flow and applicable data, etc. Description • Self-Cleaning diagram 14. Self-Cleaning function Operation display FCU fan rpm is depend on presetting. (500RPM) FCU louver OPEN OPEN (12.7º) CLOSE ON or OFF ON or OFF Timer display depend on presetting of timer function. depend on presetting of timer function.

Page 48: Remote-A Or B Selection

Item Operation flow and applicable data, etc. Description 16. Remote-A or B 1. Purpose Setting the remote controller selection To separate using of remote control for each indoor This operation is to operate only one unit in case of 2 air conditioner are installed nearly. indoor unit using one remote controller.

Page 49: Quiet Mode

Item Operation flow and applicable data, etc. Description When the [QUIET] button is pressed, the fan of the 17. QUIET mode Quiet mode is the system which, control the indoor unit will be restricted the revolving speed at revolving speed of indoor fan to work −...

Page 50: One-Touch Comfort

Item Operation flow and applicable data, etc. Description 20. One-Touch One touch comfort is the fully automated operation Operation condition for model to Europe Comfort that is set according to the preferable condition in market a region. When an indoor unit receives "One Touch Comfort Signal"...

Page 51: Auto Restart Function

9-3. Auto Restart Function This indoor unit is equipped with an automatic restarting function which allows the unit to restart operating with the set operating conditions in the event of a power supply being accidentally shut down. The operation will resume without warning three minutes after power is restored. This function is not set to work when shipped from the factory.

Page 52: How To Cancel The Auto Restart Function

9-3-2. How to Cancel the Auto Restart Function To cancel auto restart function, proceed as follows : Repeat the setting procedure : the unit receives the signal and beeps three times. The unit will be required to be turned on with the remote controller after the main power supply is turned off. •...

Page 53: Remote Controller And Its Fuctions

9-4. Remote control 9-4-1. Remote control and its functions 1 1 1 1 Infrared signal emitter Start/Stop button Mode select button (MODE) Temperature button (TEMP) Fan speed button (FAN Swing louver button (SWING) Set louver button (FIX) On timer button (ON) Off timer button (OFF) Sleep timer button (SLEEP) 19 11...

Page 54

4. DRY OPERATION (COOLING ONLY) For dehumidification, a moderate cooling performance is controlled automatically. 1. Press MODE : Select Dry 2. Press MODE : Set the desired temperature. 5. AIR PURIFYING OPERATION (RAS-10,13,16SKVR-E Only) During air conditioner operation Press PURE to start and air ionizer operation. The plasma air purifier and air ionizer can be activated or deactivated during air conditioner is stopped and the air ionizer starts in conjunction with plasma air purifier operation.

Page 55

Note: · Keep the remote control in accessible transmission to the indoor unit; otherwise, the time lag of up to 15 minutes will occur. · The setting will be saved for the next same operation. 10. PRESET OPERATION Set your preferred operation for future use. The setting will be memorized by the unit for future operation (except air flow direction).

Page 56: Name And Functions Of Indications On Remote Controller

9-4-3. Name and Functions of Indications on Remote Controller [Display] All indications, except for the clock time indicator, are displayed by pressing the button. Transmission mark TIMER and clock time indicator This transmission mark indicates when the The time setting for timer operation or the clock remote controller transmits signals to the indoor time is indicated.

Page 57: Installation Procedure

10. INSTALLATION PROCEDURE 10-1. Installation Diagram of Indoor and Outdoor Units Before installing the wireless remote controller • Loading Batteries 1. Remove the battery cover. 2. Insert 2 new batteries (AAA type) following the (+) and (−) positions. 3 Batteries 2 Wireless remote controller –...

Page 58 10-2. Optional Parts, Accessories and Tools 10-2-1. Optional Installation Parts Part Code Parts name Q'ty Refrigerant piping Indoor unit name Liquid side (Outer diameter) Gas side (Outer diameter) 1 ea. 6.35 mm 9.52 mm RAS-10SKVR-E, 13SKV-E, 13SKVR-E 6.35 mm 12.7 mm RAS-16SKV-E, 16SKVR-E Shield pipe (for extension drain hose) (polyethylene foam, 6 mm thick) Attachment bolt arrangement of outdoor unit...

Page 59 10-2-3. Installation/Servicing Tools Changes in the product and components In the case of an air conditioner using R410A, in order to prevent any other refrigerant from being charged accidentally, the service port diameter of the outdoor unit control valve (3 way valve) has been changed. (1/2 UNF 20 threads per inch) •...

Page 60 10-3. Indoor Unit 10-3-2. Drilling a Hole and Mounting Instal- lation Plate 10-3-1. Installation Place • A place which provides enough spaces around the Drilling a hole indoor unit as shown in the diagram. When install the refrigerant pipes from the rear. •...

Page 61 Revised-1 10-3-3. Electrical Work When the installation plate is directly mounted on the wall 1. The supply voltage must be the same as the rated voltage of the air conditioner. 1. Securely fit the installation plate onto the wall by 2.

Page 62 Revised-1 10-3-5. Piping and Drain Hose Installation CAUTION CAUTION • Be sure to refer to the wiring system diagram Piping and drain hose forming labeled inside the front panel. • Since condensation results in machine trouble, • Check local electrical regulations for any make sure to insulate both the connecting pipes specific wiring instructions or limitations.

Page 63 How to attach the drain cap In case of bottom right or bottom left piping 1. Insert hexagonal wrench (4 mm). • After making slits on the front panel with a knife or similar tool, cut them out with a pair of nippers or an equivalent tool.

Page 64 10-3-7. Drainage CAUTION 1. Run the drain hose at a downward sloped angle. • Bind the auxiliary pipes (two) and connecting cable with facing tape tightly. NOTE : In case of leftward piping and rear-leftward • Hole should be made at a slight downward slant piping, bind the auxiliary pipes (two) only with on the outdoor side.

Page 65 10-4. Outdoor Unit Precautions for adding refrigerant 10-4-1. Installation Place • Use a scale having a precision with at least 10 g per index line when adding the refrigerant. • A place which provides enough space around the outdoor unit as shown in the diagram. Do not use a bathroom scale or similar instrument.

Page 66 10-4-2. Draining the Water 10-4-3. Refrigerant Piping Connection • Holes are provided on the base plate of the Flaring outdoor unit to ensure that the defrost water produced during heating operations is drained off 1. Cut the pipe with a pipe cutter. efficiently.

Page 67 Tightening Connection Use a vacuum pump Align the centers of the connecting pipes and tighten Be sure to use a vacuum pump with counter-flow the flare nut as much as possible with your fingers. prevention function so that oil inside the pump does Then tighten the nut with a wrench and torque not flow back into the air conditioner pipes when the wrench as shown in the figure.

Page 68 Revised Packed Valve handling precautions • Open the valve stem all the way; but do not try to 1 2 3 open it beyond the stopper. • Securely tighten the valve stem cap with torque in the following table: Gas side (Ø12.7 mm) 50 to 62 N•m (5.0 to 6.2 kgf•m) Gas side (Ø9.52 mm) 33 to 42 N•m (3.3 to 4.2 kgf•m)

Page 69: Test Operation

10-5. Test Operation 10-5-4. Remote Controller A or B Selection Setting 10-5-1. Gas Leak Test When two indoor units are installed in the separated rooms, it • Check the flare nut connections for gas leaks with is not necessary to change the selector switches. a gas leak detector and/or

soapy water.

Page 70: How To Diagnose The Trouble

11. HOW TO DIAGNOSE THE TROUBLE The pulse motor circuits are mounted to both indoor and outdoor units. Therefore, diagnose troubles according to the trouble diagnosis procedure as described below. (Refer to the check points in servicing written on the wiring diagrams attached to the indoor/outdoor units.) Table 11-1 Troubleshooting Procedure...

Page 71 CAUTION A high voltage (equivalent to the supply voltage) is also energized to ground through the sensors, PMV and other low-voltage circuits. The sensor leads and other wires are covered with insulated tubes for protection. Nevertheless, care must be taken to ensure that these wires are not pinched.

Page 72 11-1. First Confirmation 11-1-1. Confirmation of Power Supply Confirm that the power breaker operates (ON) normally. 11-1-2. Confirmation of Power Voltage Confirm that power voltage is AC 220–230–240 ± 10%. If power voltage is not in this range, the unit may not operate normally. 11-1-3.

Page 73: Primary Judgment

11-2. Primary Judgment To diagnose the troubles, use the following methods. 1) Judgment by flashing LED of indoor unit 2) Self-diagnosis by service check remote controller 3) Judgment of trouble by every symptom Firstly use the method 1) for diagnosis. Then, use the method 2) or 3) to diagnose the details of troubles. 11-3.

Page 74 11-4. Self-Diagnosis by Remote Controller (Check Code) 1. If the lamps are indicated as shown B to E in Table 11-3-1, execute the self-diagnosis by the remote controller. 2. When the remote controller is set to the service mode, the indoor controller diagnoses the operation condi- tion and indicates the information of the self-diagnosis on the display of the remote controller with the check codes.

Page 75 11-4-2. Caution at Servicing 1. After servicing, press the START/STOP button to return to the normal mode. 2. After servicing by the check code, turn off breaker of the power supply, and turn on breaker of the power supply again so that memory in the microcomputer returns the initial status. However, the check codes are not deleted even if the power supply is turned off because they are stored in the fixed memory.

Page 76 Block distinction Operation of diagnosis function Judgment and action Check Check Block Cause of operation conditioner Remarks code code status Outdoor P.C. Inverter over-current All off Displayed when Even if trying operation again, all board protective circuit error is detected. operations stop immediately.

Page 77: Judgment Of Trouble By Every Symptom

11-5. Judgment of Trouble by Every Symptom 11-5-1. Indoor Unit (Including Remote Controller) (1) Power is not turned on (Does not operate entirely) <Primary check> 1. Is the supply voltage normal? 2. Is the normal voltage provided to the outdoor unit? 3.

Page 78 Rdvised (RAS-16 Series) Operation Check Item Considerable principle cause Turn off power supply once, and Measures 5 second later, turn it on again. Item by symptoms Is OPERATION indicator flashing? Is it possible to turn on Does transmission mark power supply by pushing on remote controller flash Remote controller is defective.

Page 79 (3) Only the indoor motor fan does not operate <Primary check> 1. Is it possible to detect the power supply voltage (AC220–240V) between on the terminal block? 2. Does the indoor fan motor operate in cooling operation? (In heating operation, the indoor fan motor does not operate for approximately 10 minutes after it is turned on, to prevent a cold air from blowing in.) (RAS-10,13 Series) Turn off power...

Page 80 Revised-1 (RAS-16 Series) Turn off power supply once, and turn it on again. Is it possible to detect DC 1V or more between Does fan motor + and – of continue to operate? Peplace indoor motor connector (CN31). fan motor.

Page 81 (4) Indoor fan motor automatically starts to rotate by turning on power supply (For DC fan motor in RAS-16SKV-E, RAS-16SKVR-E) <Cause> The IC is built in the indoor fan motor.

Therefore the P.C. board is also mounted to inside of the motor. If the P .C.

Page 82 (For AC fan motor in RAS-10,13SKV-E, RAS-10,13SKVR-E) <Inspection procedure> 1. Remove the front panel. (Remove 2 screws.) 2. Remove the cover of the fan motor lead wires. 3. Check AC voltage with CN31 connector while the fan motor is rotating. NOTE : •...

Page 83 (5) Troubleshooting for remote controller <Primary check> Check that A or B selected on the main unit is matched with A or B selected on the remote controller. The unit does not beep at all. Push the START/STOP button. Operation lamp on indoor unit is not indicated.

Page 84 11-5-2. Wiring Failure (Interconnecting and Serial Signal Wire) (1) Outdoor unit does not operate 1) Is the voltage between of the indoor terminal block varied? Confirm that transmission from indoor unit to outdoor unit is correctly performed based upon the follow- ing diagram.

Page 85 11-6. Check Code 1C (Miswiring in indoor/outdoor units) and 1E <Check procedure> Gas leakage, Discharge temp. error, disconnection of TS/TC gas leakage sensors (Check code 02, 1C) (Check code 03, 1E) Valve drive check Is coil of the pulse motor valve Set it correctly.

Page 86: Troubleshooting

Revised-1 11-7. Troubleshooting 11-7-1. How to Check Whether the Air Purifier is Good or Not Turn off the power breaker once, and turn on again after 10 seconds. Does the OPERATION indicator flash? To item “Power supply is not turned on” Turn off the power breaker and remove CN41 (Micro switch connector).

Page 87 Revised-1 11-7-2. How to Check Whether the Minus Ion Generator is Good or Not Turn off the power breaker once, and turn on again after 10 seconds. Does the OPERATION indicator flash? To item “Power supply is not turned on” Turn off the power breaker and remove CN41 (Micro switch connector).

Page 88: How To Diagnose Trouble In Outdoor Unit

Revised-1 11-8. How to Diagnose Trouble in Outdoor Unit 11-8-1. Summarized Inner Diagnosis of Inverter Assembly Table 11-8-1 Diagnosis/Process flowchart Item Contents Summary Preparation Turn “OFF” the power supply breaker, and remove 3P Remove connector connector which connects of compressor. inverter and compressor.

Page 89: How To Check Simply The Main Parts

Diagnosis/Process flowchart Item Contents Summary Check Check winding resistance between phases of compres- sor, and resistance between outdoor frames by using a tester. • Is not grounded. → OK if 10MΩ or more Replace control board assembly. ⎫ → OK if 0.51Ω → 0.57Ω •...

Page 90 (3) Check procedures (RAS-10,13 Series) Table 11-9-1 Procedure Check points Causes Turn off the power supply breaker Check whether or not the fuse (F01) Impulse voltage was applied or the and remove the P.C. board is blown. indoor fan motor short-circuited. assembly from electronic parts base.

Page 91 Revised-1 (RAS-16 Series) Table 11-9-1 Procedure Check points Causes Turn off the power supply breaker Check whether or not the fuse (F01) Impulse voltage was applied or the and remove the P.C. board is blown. indoor fan motor short-circuited. assembly from electronic parts base.

Page 92 11-9-2. P .C . Board Layout (RAS-10, 13 Series) +12V [1] Sensor characteristic table TD : Discharge temp. sensor TA : Room temp. sensor TC : Heat exchanger temp. sensor TO : Outdoor temp. sensor TA, TC, TO, TE, TS TE : Outdoor heat exchanger temp.

Page 93 Revised-1 (RAS-16 Series) +12V [1] Sensor characteristic table TD : Discharge temp. sensor TA : Room temp. sensor TC : Heat exchanger temp. sensor TO : Outdoor temp. sensor TA, TC, TO, TE, TS TE : Outdoor heat exchanger temp. sensor TS : Suction temp.

Page 94 11-9-3. Indoor Unit (Other Parts) Part name Checking procedure Room temp. (TA) sensor Disconnect the connector and measure the resistance value with tester. Heat exchanger (TC) sensor (Normal temp.) Temperature 10°C 20°C 25°C 30°C 40°C Sensor TA, TC (kΩ) 20.7

12.6 10.0 Remote controller...

Page 95 Revised-1 11-9-5. Checking Method for Each Part Part name Checking procedure Electrolytic capacitor 1. Turn OFF the power supply breaker. (For boost, smoothing) 2. Discharge all three capacitors completely. 3. Check that safety valve at the bottom of capacitor is not broken. 4.

Page 96: How To Simply Judge Whether Outdoor Fan Motor Is Good Or Bad

11-10. How to Simply Judge Whether Outdoor Fan Motor is Good or Bad 1. Symptom • Outdoor fan motor does not rotate. • Outdoor fan motor stops within several tens seconds though it started rotating. • Outdoor fan motor rotates or does not rotate according to the position where the fan stopped, etc. Remote controller check code “02 : Outdoor block, 1A : Outdoor fan drive system error”...

Page 97: How To Replace The Main Parts

12. HOW TO REPLACE THE MAIN PARTS WARNING • Since high voltages pass through the electrical parts, turn off the power without fail before proceeding with the repairs. Electric shocks may occur if the power plug is not disconnected. • After the repairs have been completed (after the front panel and cabinet have been installed), perform a test run, and check for smoking, unusual sounds and other abnormalities.

Page 98 Part name Procedures Remarks Front panel 4) Press "PUSH" part under the front panel and remove hooks of the front panel from Installation plate the installation plate. Front panel Press 5) Remove the front panel fixing screws. (2 pcs.) 6) Take off three hooks of panel from rear side.

Page 99 Part name Procedures Remarks   High voltage 1) Follow to the procedure in the item generator 2) To remove the air ionizer from the back body, (only in model pull it toward you. RAS-10,13,16 SKVR-E) 3) Disconnect the connectors of the high voltage generator.

Page 100 Part name Procedures Remarks   Electric parts 1) Follow the procedure up to 3) in above. box assembly 2) Remove screw of earth lead attached to the end plate of the evaporator. 3) Remove the lead wire cover, and remove connector for the fan motor and connec- tor for the louver motor from the electric parts box assembly.

Page 101 Part name Procedures Remarks Horizontal louver 1) Remove shaft of the horizontal louver from the back body. (First remove the left shaft, and then remove other shafts while sliding the horizontal louver leftward.)   Evaporator 1) Follow to the procedure in the item (Heat exchanger) 2) Remove the pipe holder from the rear side of the main unit.

Page 102 Part name Procedures Remarks Bearing 1) Follow to the procedure in the item 2) Remove the two screws used to secure the bearing base. Two screws 3) Remove the bearing base. <Caution at assembling> • If the bearing is out from the housing, push it into the specified position and then incorporate it in the main body.

Page 103 Part name Procedures Remarks Fan motor 1) Follow to the procedure till item 2) Loosen the set screw of the cross flow fan. 3) Remove two fixing screws of the motor cover and them remove the motor cover. 4) Remove two more fixing screws of the motor band and remove the motor band.

Page 104 Part name Procedures Remarks Cross flow fan <Caution at reassembling> 5 mm 1) To incorporate the fan motor, remove the fan motor rubber (at shaft core side), incorporate the motor into the position in the following figure, and then install the fan motor. •...

Page 105 12-2. Microcomputer Part name Procedure Remarks Common procedure 1) Turn the power supply off to stop the Replace terminal block, operation of air-conditioner. microcomputer ass’y and the P .C. board ass’y. 2) Remove the front panel. • Remove the 2 fixing screws. 3) Remove the electrical part base.

Page 106 (RAS-16 Series) L01 C01 CN23 FUSE CN10 DB01 IC01 IC03 – 105 –...

Page 107 12-3. Outdoor Unit Part name Procedure Remarks Common 1. Detachment

procedure NOTE Upper cabinet Wear gloves for this job. Otherwise, you may injure your hands on the parts, etc. Waterproof cover 1) Stop operation of the air conditioner, and turn off the main switch of the breaker for air conditioner.

Page 108 Revised-1 Part name Procedure Remarks □ Front cabinet 1. Detachment □ 1) Perform step 1 in 2) Remove the fixing screws (ST1TØ4 × 10L 2 pcs.) used to secure the front cabinet and inverter cover, the screws (ST1TØ4 × 10L 4 pcs.) used to secure the front cabinet at the bottom, and the fixing screws (ST1TØ4 ×...

Page 109 Part name Procedure Remarks □ □ Inverter 1) Perform work of item 1 in Inverter cover assembly 2) Remove screw (ST1TØ4 × 10L 2 pcs.) of the upper part of the front cabinet. P.C. board (Soldered surface) • If removing the inverter cover in this condition, P .C.

Page 110 Revised-1 Part name Procedure Remarks □ Control board 1. Disconnect the leads and connectors connected to assembly the other parts from the control board assembly. 1) Leads • 3 leads (black, white, orange) connected to CN603 terminal block. CN601 CN600 CN701 •...

Page 111 Part name Procedure Remarks □ Side cabinet 1. Side cabinet (right) □ 1) Perform step 1 in and all the steps in □ 2) Remove the fixing screw (ST1TØ4 × 10L 4 pcs.) used for securing the side cabinet to the bottom plate and valve fixing panel.

Page 112 Revised-1 Part name Procedure Remarks □ □ □ □ □ Compressor 1) Perform work of item 1 of □ 2) Extract refrigerant gas. 3) Remove the partition board. (ST1TØ4 × 10L 3 pcs.) 4) Remove the sound-insulation material. 5) Remove terminal cover of the compressor, and disconnect lead wire of the compressor Partition board...

Page 113 Part name Procedure Remarks □ Electronic 1. Detachment expansion valve □ □ 1) Perform step 1 in , all the steps in coil □ and 1 in Lead 2) Remove the coil by rotating it at 90° connecting part toward either direction. Notch Coil fixing 2.

Page 114 Part name Procedure Remarks TE sensor (outdoor heat exchanging temperature sensor) • Attachment Install the sensor onto the straight pipe part of the condenser output pipe. Arrow D Detail B Detail C Detail A Detail C for RAS-10SAVR-E, Detail C for RAS-13-16SAVR-E, 13SAV-E 16SAV-E TS sensor (Suction pipe temperature sensor)

Page 115 Part name Procedure Remarks Replacement of 1) Cut the sensor 100 mm longer than old temperature sensor one. Cutting here Thermal for servicing only Connector sensor part 2) Cut the protective tube after pulling out it (200 mm). Common service 3) Move the protective tube toward the Cutting here parts of sensor TO,...

Page 116: Exploded Views And Parts List

Description 43T21397 LOUVER MOTOR 43T79313 DRAIN CAP 43T21371 FAN MOTOR (RAS-16SKV-E,SKVR-E) 43T44402 REFRIGERANT CYCLE ASSEMBLY 43T21393 FAN MOTOR (RAS-10,13SKVR-E) (RAS-13SKV-E, 10,13SKVR-E) 43T21399 FAN MOTOR ASSEMBLY 43T44403 REFRIGERANT CYCLE ASSEMBLY (RAS-13SKV-E) (RAS-16SKV-E,SKVR-E) 43T22312 MOLD BEARING ASSEMBLY 43T00488 PANEL SERVICE ASSEMBLY 43T70313...

Page 117 Indoor Unit (2) Location Part Location Part Description Description 43T69319 TEMPERATURE SENSOR 43T69651 PC BOARD (FOR 16SKV-E) 43T60002 TERMINAL BLOCK; 3P 43T69652 PC BOARD (FOR 16SKVR-E) 43T50318 TEMPERATURE SENSOR 43T69653 PC BOARD (FOR 13SKV-E) 43T62003 CORD CLAMP 43T69654 PC BOARD (FOR 10SKVR-E) 43T69650 PC BOARD ASSY,WRS-LED 43T69655...

Page 118 13-2. Outdoor Unit 10,12 24,25 11,13 For model RAS-10SAVR-E, For model RAS-13SAVR-E, RAS-13SAV-E RAS-16SAV-E,RAS-16SAVR-E 19 : BIMETAL THERMO 29 : DRAIN NIPPLE 31 : HOLDER,SENSOR(TE) (FOR PIPE O.D. 6.35) 32 : HOLDER,SENSOR(TD) (FOR PIPE O.D. 8.0) 33 : HOLDER,SENSOR(TS) (FOR PIPE O.D. 9.52) –...

Page 119 Location Part Location Part Description Description 43T00468 FRONT CABINET 43T47333 BONNET, 12.7 DIA 43T00459 LEFT CABINET (FOR 16SAVR-E, 16SAV-E) 43T42336 ASM-BASE 43T00448 FIXING PLATE VALVE 43T00452 UPPER CABINET 43T00451 RIGHT CABINET ASSEMBLY 43T19329 FAN GUARD 43T46342 BODY-PMV 43T19330 PACKED VALVE COVER

43T63314 COIL-PMV 43T62325...

Page 120 Revised-1 13-3. P.C. Board Layout Location Part Location Part Description Description 43T62320 HEATSINK (FOR 10,13SAVR-E, 13SAV-E) 43T69657 PC BOARD (FOR 16SAV-E) 43T62321 HEATSINK (FOR 16SAVR-E, SAV-E) 43T60384 TERMINAL BLOCK,6P 43T69630 PC BOARD (FOR 10SAVR-E) 43T60326 FUSE 43T69631 PC BOARD (FOR 13SAVR-E) 43T60377 TEMPERATURE SENSOR 43T69632...

Page 121 FILE NO. SVM-03005 TOSHIBA CARRIER (THAILAND) CO.,LTD. 144/9 MOO 5, BANGKADI INDUSTRIAL PARK, TIVANON ROAD, TAMBOL BANGKADI, AMPHUR MUANG, PATHUMTHANI 12000, THAILAND. – 56 –...

This manual is also suitable for:

Ras-16skv-eRas-10skvr-eRas-13skvr-eRas-13sav-eRas-16sav-eRas-16skvr-e ... Show all