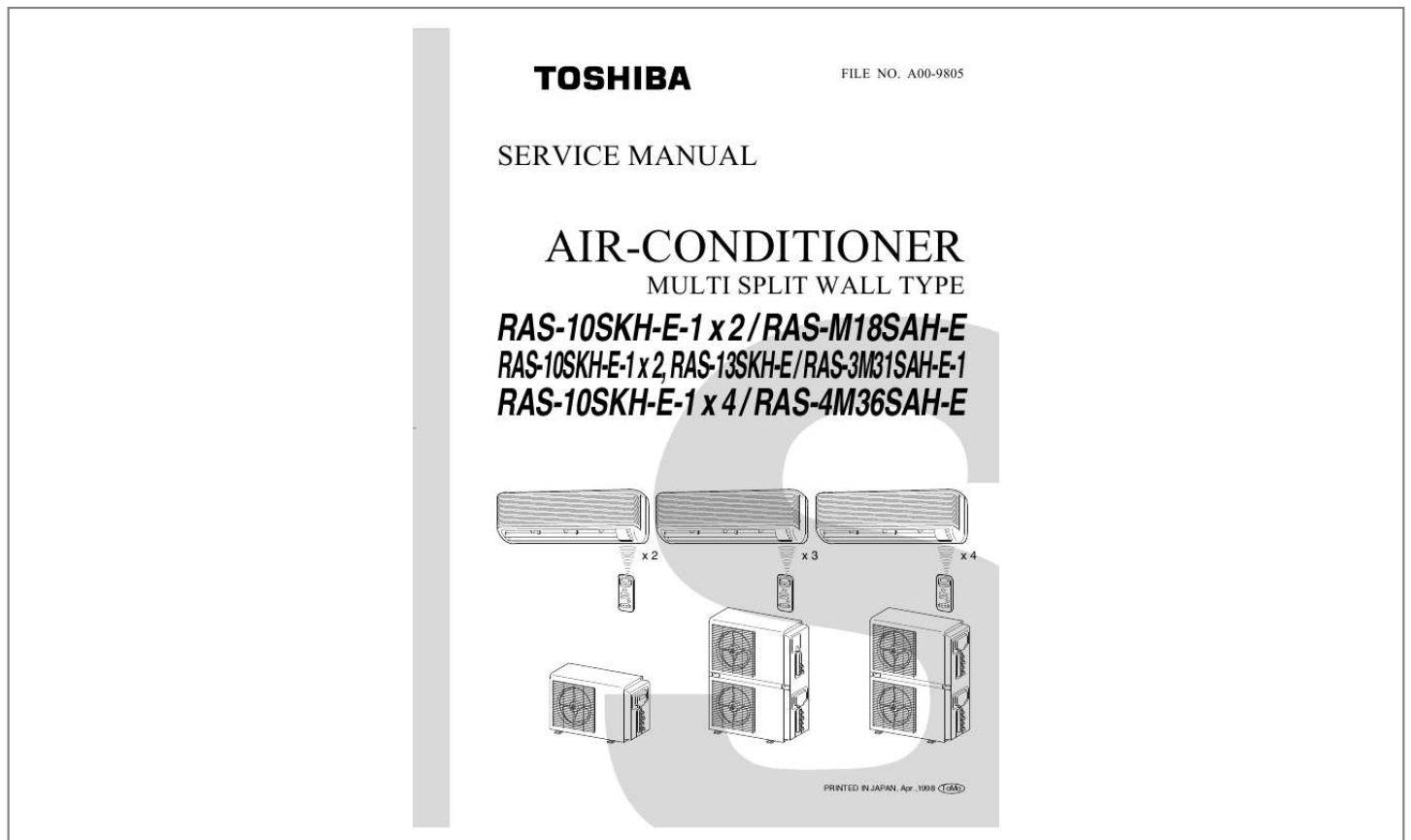




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You can read the recommendations in the user guide, the technical guide or the installation guide for TOSHIBA RAS-10SKH-E-1. You'll find the answers to all your questions on the TOSHIBA RAS-10SKH-E-1 in the user manual (information, specifications, safety advice, size, accessories, etc.). Detailed instructions for use are in the User's Guide.

User manual TOSHIBA RAS-10SKH-E-1
User guide TOSHIBA RAS-10SKH-E-1
Operating instructions TOSHIBA RAS-10SKH-E-1
Instructions for use TOSHIBA RAS-10SKH-E-1
Instruction manual TOSHIBA RAS-10SKH-E-1



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Manual abstract:

@@@3 2. @@4 3. @@11 3-1. @@11 3-2. @@12 4. REFRIGERANT CYCLE DIAGRAMS

.....
.....
.....

.....
.....
.....

.....
.....
.....

. 14 5. WIRING DIAGRAM

.....
.....
.....

.....
.....
.....

.....
.....
.....

..... 17 6. @@19 6-1. @@19 6-2. @@20 7.

@@21 8. OPERATION DESCRIPTIONS

.....
.....

.....
.....
.....

.....
.....
.....

..... 23 8-1. 8-2.

8-3. 8-4. 8-5. 8-6. 8-7.

8-8. 8-9. 8-10. 8-11. 8-12.

8-13. FAN ONLY Operation

.....
.....
.....

.....
.....
.....

.....
.....
.....

.....
.. 23 COOL Operation ...

.....
.....

.....
.....
.....

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.....
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. 23 DRY Operation

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.....

.....
.....
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.....
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.....
... 24 HEAT Operation ..

.....
.....

.....
.....
.....

.....
.....
.....

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.....
.....

.....
... 25 AUTO Operation ..

.....
.....

.....
.....

.....
28 Low-Temperature Limit Control (Cooling Operation)

.....
.....
.....
.....
.....

..... 28 Cool Airflow Prevention Control (Heating Operation) ..

.....
.....
.....
.....
.....

..... 29 Defrost Operation

.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
.....
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.....
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.. 29 Auto Restart Function

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.....
.....
.....
.....
.....
.....
.....

. 31 Operation Control of Following Outdoor Unit

.....
.....
.....
.....
.....

.....
.....
.....

.. 33 9. TROUBLESHOOTING CHART

.....
.....
.....

.....
.....
.....
.....

.....
.....
.....

..... 34 9-1.

9-2. 9-3. 9-4. What to be Prechecked First

.....
.....
.....

.....
.....
.....
.....

.....
.....
.....
.....

.. 34 Primary Judgement of Trouble Sources ...

.....
.....

.....
.....
.....
.....

.....
.....
.....
.....

.. 36 Troubleshooting Flowcharts

.....
.....
.....

.....
.....
.....
.....

.....
.....
.....
.....

. 40 How to Check the Remote Control (Including the Indoor P.C. Board) ..

.....

.....

.....
.... 47 10.

PART REPLACEMENT

.....

.....

.....

.....

.....

.....

.....

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.....

.....

... 52 10-1. @@52 10-2. *Microcomputer*

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

.....

..... 54 10-3. @@55 11. *CAUTIONS ON REPLACEMENT OF P.C.*

BOARD ASSEMBLY

.....

.....

.....

..... 64 12. *EXPLODED VIEWS AND PARTS LIST*

.....

.....

.....

.....

.....

.....

.....

.....

.....

.... 65 12-1.

Indoor Unit (1)

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(Washable) OUTDOOR UNIT RAS-M18SAH-E Height mm 538 Dimensions Width mm 830 Depth mm 300 Net weight kg 55 Condenser type Finned tube Outdoor fan type Propeller Airflow volume (220/230/240V) m³/h 1830/1920/2010 Fan motor output W 28 Compressor Model PH120T1-4C x 2 Output W 750W x 2 Safety device Fuse, Overload relay Auto louver Yes Usable outdoor temperature range °C 21 ~ 43 5 ~ 21 Specifications are subject to change without notice. 4 Model Item Capacity *1 kW Phase Power source Power consumption Power factor Running current V Hz kW % A Indoor/Outdoor 220V 0,11/4,77 230V 2,50 240V 2,50 RAS-10SKH-E-1 / RAS-M18SAH-E Cooling 240V 2,50 Single 220/230/240 50 1,02/1,05/1,09 95/92/89 230V 0,11/4,85 240V 0,11/4,98 220V 0,11/4,19 0,89/0,93/0,98 94/91/87 230V 0,11/4,33 240V 0,11/4,58 220V 2,80 Heating 230V 2,80 240V 2,80 5 RAS-10SKH-E-1 x 2, RAS-13SKH-E / RAS-3M31SAH-E-1 Model Item Capacity *1 kW Phase V Hz kW % 220V 8,45 RAS-10SKH-E-1 x 2, RAS-13SKH-E / RAS-3M31SAH-E-1 Cooling 230V 8,50 240V 220V 8,50 9,60 Single 220/230/240 50 Heating 230V 9,65 240V 9,70 Power source Power consumption Power factor 3,30/3,38/3,48 2,97/3,09/3,23 96/93/90 94/93/89 220V 230V 240V 220V 230V 240V A Running current Indoor/Outdoor 0,37/15,24 0,37/15,36 0,37/15,71 0,37/13,92 0,37/14,14 0,37/14,70 Starting current A 19+19+25 Moisture removal lit/h 1,2+1,2+2,0 Indoor (H/M/L) dB RAS-10SKH-E-1 : 41/36/31 RAS-13SKH-E : 44/39/36 Noise Outdoor (220/230/240V) dB 52/53/54 Name of refrigerant R-22 Refrigerant Rated volume kg 2,28 (0,7+0,7+0,88) Refrigerant control Capillary tube Gas side size mm RAS-10SKH-E-1 : 9,52 RAS-13SKH-E : 12,7 Connection type Flare connection Liquid side size mm 6,35 Connection type Flare connection Interconnection pipe Maximum length (One way) m *2 15 Maximum height difference Indoor unit RAS-10SKH-E-1 : 5 RAS-13SKH-E : 6 m Outdoor unit Condensate drain pipe Outer diameter mm 16 INDOOR UNIT RAS-10SKH-E-1 RAS-13SKH-E Height mm 265 Dimensions Width mm 790 Depth mm 174 Net weight kg 8 Evaporator type Finned tube Indoor fan type Cross flow fan High fan m³/h 600 650 Air volume Medium fan m³/h 500 560 Low fan m³/h 400 510 Fan motor output W 19 Air filter Polypropylene net filter (Washable) OUTDOOR UNIT RAS-3M31SAH-E-1 Height mm 1125 Dimensions Width mm 830 Depth mm 300 Net weight kg 106 Condenser type Finned tube Outdoor fan type Propeller Airflow volume (220/230/240V) m³/h 1830/1920/2010 Fan motor output W 28 Compressor Model PH120T1-4C x 2 + PH170T2-4L2 Output W 750W x 2 + 1100W x 1 Safety device Fuse, Overload relay Auto louver Yes Usable outdoor temperature range °C 21 ~ 43 5 ~ 21 Specifications are subject to change without notice. 6 Model Item Capacity *1 kW Phase Power source Power consumption Power factor Running current V Hz kW % A Indoor/Outdoor Model Item Capacity *1 kW Phase Power source Power consumption Power factor Running current V Hz kW % A Indoor/Outdoor 220V 0,11/4,77 220V 2,50 220V 0,15/5,70 220V 3,45 220V 0,22/9,54 220V 5,0 220V 0,26/10,47 220V 5,95 RAS-10SKH-E-1, RAS-13SKH-E / RAS-3M31SAH-E-1 Cooling 230V 6,00 240V 6,00 Single 220/230/240 50 2,28/2,33/2,39 97/94/91 230V 0,26/10,51 Cooling 230V 5,0 240V 5,0 Single 220/230/240 50 2,04/2,10/2,18 95/92/89 230V 0,22/9,70 Cooling 230V 3,50 240V 3,50 Single 220/230/240 50 1,26/1,28/1,30 98/96/92 230V 0,15/5,66 Cooling 230V 2,50 240V 2,50 Single 220/230/240 50 1,02/1,05/1,09 95/92/89 230V 0,11/4,85 240V 0,11/4,98 220V 0,11/4,19 0,89/0,93/0,98 94/91/87 230V 0,11/4,33 240V 0,11/4,58 220V 2,80 240V 0,15/5,75 220V 0,15/5,54 1,19/1,23/1,27 95/95/93 230V 0,15/5,48 Heating 230V 2,80 240V 2,80 240V 0,15/5,54 220V 4,00 240V 0,22/9,96 220V 0,22/8,38 1,78/1,86/1,96 94/91/87 230V 0,22/8,66 Heating 230V 4,05 240V 4,10 240V 0,22/9,16 220V 5,6 240V 0,26/10,73 220V 0,26/9,73 2,08/2,16/2,25 95/93/90 230V 0,26/9,81 Heating 230V 5,6 240V 0,26/10,12 220V 6,80 Heating 230V 6,85 240V 6,90 RAS-10SKH-E-1 x 2 / RAS-3M31SAH-E-1 RAS-13SKH-E / RAS-3M31SAH-E-1 RAS-10SKH-E-1 / RAS-3M31SAH-E-1 7 RAS-10SKH-E-1 x 4 / RAS-4M36SAH-E Model Item Capacity *1 kW Phase V Hz kW % 220V 10,0 RAS-10SKH-E-1 x 4 / RAS-4M36SAH-E Cooling 230V 10,0 240V 220V 10,0 11,2 Single 220/230/240 50 Heating 230V 11,2 240V 11,2 Power source Power consumption Power factor 4,08/4,20/4,36 3,56/3,72/3,92 95/92/89 94/91/87 220V 230V 240V 220V 230V 240V A Running current Indoor/Outdoor 0,44/19,08 0,44/19,4 0,44/19,92 0,44/16,76 0,44/17,32 0,44/18,32 Starting current A 19+19+19+19 Moisture removal lit/h 1,2+1,2+1,2+1,2 Indoor (H/M/L) dB 41/36/31 Noise Outdoor (220/230/240V) dB 54/55/56 55/56/57 Name of refrigerant R-22 Refrigerant Rated volume kg 2,8 (0,7+0,7+0,7+0,7) Refrigerant control Capillary tube Gas side size mm 9,52 Connection type Flare connection Liquid side size mm 6,35 Connection type Flare connection Interconnection pipe Maximum length (One way) m *2 15 Maximum height difference Indoor unit 5 m Outdoor unit Condensate drain pipe Outer diameter mm 16 INDOOR UNIT RAS-10SKH-E-1 Height mm 265 Dimensions Width mm 790 Depth mm 174 Net weight kg 8 Evaporator type Finned tube Indoor fan type Cross flow fan High fan m³/h 600 Air volume Medium fan m³/h 500 Low fan m³/h 400 Fan motor output W 19 Air filter Polypropylene net filter (Washable) OUTDOOR UNIT RAS-4M36SAH-E Height mm 1125 Dimensions Width mm 830 Depth mm 300 Net w,,,,,,,,,,,,,,,,,,,,,,,,,,,,, @@@@ PPPPPP ,,,,, @@@@ PPPPPP ,,,,, @@@@ PPPPPP 265 47 Air outlet Knock out system 790 Front panel Back body 232 326 Hanger 232 47 50 321 Connecting pipe (0,49m) (Flare ø6,35) Hanger Connecting pipe (0,39m) 13SKH-E : (Flare ø12,7) 10SKH-E-1: (Flare ø9,52) 6 Propeller fan Refrigerant R-22 0,88kg Outdoor heat exchanger Cooling Heating Outdoor Unit Mark () means check points of Gas Leak Outdoor Unit 50Hz Standard pressure Surface temp.



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of heat P exchanger interchanging (kg/cm²G) pipe T1 (°C) 13SKH-E 10SKH-E-1 13SKH-E 43,0 10SKH-E-1 40,0 Fan speed (indoor) High Low High Ambient temp. conditions DB/WB (°C) Indoor 20/ 27/ 20/ 27/19 32/23 21/15 Outdoor 7/6 21/15 10/10 35/24 43/26 21/15 Standard Heating High temperature 1 Low temperature Standard Cooling High temperature Low temperature 5,0 6,0 15,0 * 19 ~ 23 12,5 6,0 6,5 4,0 52,0 ~ 59,0 35,0 10,0 14,0 2,0 12,0 15,0 High High Low Note : *1 · Measure the heat exchanger temperature at the center of U-bend.

(By means of TC sensor.) · During heating overload, the high temperature limit control operation is included. 15 RAS-10SKH-E-1 x 4 / RAS-4M36SAH-E (Upper and Lower Unit) Indoor Unit Indoor heat exchanger A T1 Indoor Unit Indoor heat exchanger A T1 Indoor heat exchanger B Indoor heat exchanger B P Packed valve (3/8) 4-way valve Packed valve (1/4) P Packed valve (3/8) 4-way valve Packed valve (1/4) Check valve Capillary for heating ø1,7x300 Check valve Capillary for heating ø1,7x300 PHI20T1-4C PHI20T1-4C PHI20T1-4C Compressor Compressor Accumulator Dryer Accumulator Capillary for cooling & heating ø1,7x800 Compressor PHI20T1-4C Compressor Capillary for cooling & heating ø1,7x800 Dryer Outdoor heat exchanger Cooling Heating Outdoor heat exchanger Cooling Heating Outdoor Unit Outdoor Unit 50Hz Standard pressure Surface temp. of heat P exchanger interchanging (kg/cm²G) pipe T1 (°C) 10SKH-E-1 10SKH-E-1 15,0 40,0 52,0 ~ 59,0 35,0 12,0 15,0 2,0 Ambient temp. Fan speed conditions DB/WB (°C) (indoor) Indoor High Low High High Low 20/ 27/ 20/ 27/19 32/23 21/15 Outdoor 7/6 21/15 10/10 35/24 43/26 21/15 Standard Heating High temperature 1 Low temperature Standard Cooling High temperature Low temperature * 19 ~ 23 12,5 6,0 6,5 4,0 Note : *1 · Measure the heat exchanger temperature at the center of U-bend.

(By means of TC sensor.) · During heating overload, the high temperature limit control operation is included. 16 5. WIRING DIAGRAM INDOOR UNIT RAS-13SKH-E / RAS-3M31SAH-E-1 (Upper Unit) THERMAL FUSE 77°C x 2 LOUVER MOTOR DC MOTOR BLU PNK YEL ORN RED BRW FAN MOTOR OUTDOOR UNIT GRY GRY 1 1 BLK GRN&YEL SG01 R109 3 3 CN04 R116 654321 CN07 6 5 4 3 2 1 P04 DSA BRW BLU VARISTOR F01 FUSE T3,15A 250V 3 3 R21 RY01 4 4 BLK C15 IC04 R01 C01 L01 DB01 C02 T01 DC 35V DC 12V WHI BLU YEL BLK RED FUSE 54321 5 4 3 2 1 CN10 MAIN P.C. BOARD MCC-713 L N POWER TERMINAL BLOCK INDOOR UNIT 1 2 3 4 RY02 T02 C.T. WHI DC 7V DC 0V C06 IC IC01 123456789 BLK WHI RED BLU GRN&YEL INDOOR TERMINAL BLOCK IC02 RY03 RY04 BLU BLU BLU BLU BLU BLU BLU PNK BLK WHI CR01 11 2 3 44 COLOR IDENTIFICATION BRW : BROWN RED : RED WHI : WHITE YEL : YELLOW BLU : BLUE BLK : BLACK GRY : GRAY PNK : PINK ORN : ORANGE GRN&YEL : GREEN & YELLOW TERMINALS 1 2 3 4 BLK OVERLOAD RELAY THERMOSTAT FOR COMPRESSOR BLK BLK RED COMPRESSOR PNK SOLENOID CAPACITOR COIL RED WHI BLK FAN MOTOR BRW BRW GRN & YEL CHASSIS CN13 1 2 CN03 12 1 2 CN01 12 BLK BLK CR02 123456789 1 2 3 4 5 6 7 8 9 CN25 CN27 INFRARED RAYS RECEIVE AND INDICATION PARTS THERMO SENSOR (TA) BLK BLK CAPACITOR RED WHI HEAT EXCHANGER SENSOR (TC) DSA : Surge absorbor C.T : Current trans RAS-10SKH-E-1x2/RAS-M18SAH-E RAS-10SKH-E-1x2/RAS-3M31SAH-E-1 (Lower Unit) RAS-10SKH-E-1x2/RAS-4M36SAH-E (Upper and Lower Unit) LOUVER MOTOR THERMAL FUSE 77°C x 2 DC MOTOR BLU PNK YEL ORN RED BRW FAN MOTOR 1 2 3 4 BLK RED WHI BLK 11 4 3 OVERLOAD RELAY BLK CAPACITOR WHI PNK RY01 CN09 COMPRESSOR RED DSA : Surge absorbor C.T : Current trans LOUVER MOTOR THERMAL FUSE 77°C x 2 TERMINALS 33 DC MOTOR BLU PNK YEL ORN RED BRW FAN MOTOR 1 2 3 4 CN04 OVERLOAD RELAY BLK BLK RED WHI BLK 11 4 3 CAPACITOR WHI PNK GRY GRY GRY WHI BLU YEL BLK RED GRY WHI BLU YEL BLK RED RY02 CN10 3 3 CN05 1 1 BLK GRN&YEL SG01 R109 3 3 CN04 R116 654321 CN07 6 5 4 3 2 1 54321 5 4 3 2 1 CN10 1 1 BLK GRN&YEL SG01 R109 3 3 CN04 R116 654321 CN07 6 5 4 3 2 1 54321 5 4 3 2 1 CN10 COMPRESSOR RED TERMINALS P04 DSA BRW BLU VARISTOR F01 FUSE T3,15A 250V 3 3 R21 RY01 4 4 BLK C15 MAIN P.C. BOARD MCC-713 R01 C01 L01 DB01 C02 T01 DC35V DC12V IC04 P04 DSA BRW BLU VARISTOR F01 FUSE T3,15A 250V 3 3 R21 RY01 4 4 BLK C15 MAIN P.C. BOARD MCC-713 R01 C01 L01 DB01 C02 T01 DC35V DC12V L BLK N RED IC04 55 33 L N L N MAIN P.C.

BOARD (MCC-738) F01 Fuse R01 CN11 1 2 3 4 5 6 7 8 POWER TERMINAL BLOCK RY02 T02 C.T. WHI GRN & YEL POWER TERMINAL BLOCK YEL & GRN RY02 T02 C.T. WHI GRN & YEL SG01 300V 11 CN01 CN02 R02 C01 C02 DC7V DC0V C06 IC IC01 123456789 DC7V DC0V C06 IC IC01 123456789 RED 1 1 WHI 3 3 TRANSFORMER RY06 RY04 RY03 RY04 IC02 RY03 RY04 IC02 BLU 1 1 CN YEL 2 2 03 ORN 3 3 CN08 5 5 3 3 CR04 CR02 CR01 11 2 33 CN12 BLK BLK HEAT EXCHANGER SENSOR (TE) HEAT EXCHANGER SENSOR (TE) CR01 11 2 3 44 BLU BLU BLU BLU BLU BLU PNK BLK WHI BLK BLK BLK BLK BLK BLK BLK CR02 CR02 BLU BLU BLU BLU BLU BLU PNK BLK WHI CN13 1 2 CN03 12 1 2 CN01 12 CR01 11 2 3 44 CN13 1 2 CN03 12 1 2 CN01 12 CN07 1 1 CN06 3 1 3 11 2 33 CN13 BLK BLK 1 BLK HEAT EXCHANGER SENSOR (TC) RED 12 BLK BLK BLK WHI RED BLU CN27 123456789 1 2 3 4 5 6 7 8 9 CN25 BLK WHI RED BLU INDOOR TERMINAL 1 2 3 4 BLOCK INFRARED RAYS RECEIVE AND INDICATION PARTS THERMO SENSOR (TA) HEAT EXCHANGER SENSOR (TC) CN27 123456789 1 2 3 4 5 6 7 8 9 CN25 INFRARED RAYS RECEIVE AND INDICATION PARTS 1234 THERMO SENSOR (TA) BLK RED WHI FAN MOTOR RED UNIT B UNIT A COIL FOR COIL FOR 4 WAY 4 WAY VALVE VALVE CAPACITOR 17 18 6. SPECIFICATIONS OF ELECTRICAL PARTS 6-1. Indoor Unit RAS-10SKH-E-1 RAS-13SKH-E No. 1 Parts name Fan motor (for indoor) Thermo. sensor (TA-sensor) DC-DC transformer (T01) Microcomputer Power relay (RY01), Common relay (RY02) Heat exchanger sensor (TC-sensor) Line filter (L01) Diode (DB01) Capacitor (C02) Fuse (F01) Relay (for outdoor fan motor, solenoid coil) (RY03, RY04) Power supply IC (IC01) Varistor (R21, R109) Resistor (R01) Current trans (T02) Louver motor Type ICF-35-19-3 or TICF-35-19-3 (microprocessor) SWT-34 TMP87CK40F D11U (microprocessor) RF-103YOR6 RBV-406 CEAUF2W101M20 MT3 AJQ1341 MA2830-FJ 15G561K ERF-5TK5R6 CT422920S-01 MP35EA7 Output (Rated) 2W, 10 poles, 1 phase DC 12V Coil : DC12V 75mA, Rated AC250V 20A 10k at 25°C 10mH, AC 0,6A 4A, 600V 100µF, 450V T3,15A, 250V Coil DC12V, 33mA, Rated 1A 250V AC 4A, 600V 560V 5,6 , 5W DC 35V, 19W Specifications 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 10k at 25°C DC390V, Secondary DC35V, 12V, 7V 19 6-2.



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Outdoor Unit RAS-3M31SAH-E-1 (Upper Unit) No.

Parts name Type Specifications Output (Rated) 1100W, 2 pole, 1 phase, 220/230/240V, 50Hz 1 Compressor PH170T2-4L2 Winding resistance () (at 20°C) Red-Black 2,22 White-Black 3,04 Output (Rated) 28W, 6 pole, 1 phase, 220/230/240V, 50Hz 2 Fan motor (for outdoor) AF-230-28P Winding resistance () (at 20°C) 500V AC, 1,5µF 400V AC, 35µF AC : 200/240V Red-Black 198 White-Black 160 3 4 5 6 7 Running capacitor (for fan motor) Running capacitor (for compressor) Solenoid coil (for 4-way valve) Overload relay Thermostat for Compressor SK-50FMP SK-40CMP35U1 LB60012 J-MRA99257-9200 UT 8,0A (80°C), OPEN 145±5°C, CLOSE 75±11°C CS-7 130°C OFF, 70°C ON RAS-M18SAH-E RAS-3M31SAH-E-1 (Lower Unit) RAS-4M36SAH-E (Upper and Lower Unit) No. Parts name Type Specifications Output (Rated) 750W, 2 pole, 1 phase, 220/230/240V, 50Hz 1 Compressor PH120T1-4C Winding resistance () (at 20°C) Red-Black 4,53 White-Black 8,73 Output (Rated) 28W, 6 pole, 1 phase, 220/230/240V, 50Hz 2 Fan motor (for outdoor) AF-230-28P Winding resistance () (at 20°C) 450V AC, 2µF 400V AC, 30µF AC : 200/240V Red-Black 198 White-Black 160 3 4 5 6 7 8 9 Running capacitor (for fan motor) Running capacitor (for compressor) Solenoid coil (for 4-way valve) Overload relay Transformer Outdoor P.C. board Heat exchanger sensor (TE-sensor) SK-45FMP SK-40CMP30U1 LB60012 J-MRA99269-9200 U/T 6,8A (90°C), OPEN 135±5°C, CLOSE 69±11°C FT-70 MCC-738 (microprocessor) 10k at 25°C AC : 220/240V 20 Main Unit Control Panel Functions · Louver Control Timer Display · 3-minutes Delay at Restart for Compressor ECONO. Sign Display Initializing Circuit · Motor Revolution Control Infrared Rays Clock Frequency Oscillator Circuit · Processing (Temperature Processing) · Timer Operation Display C.

P. U Heat Exchanger Sensor Thermo. Sensor Current Sensor (Compressor Current) Infrared Rays Signal Receiver PRE-DEF. Sign Display Remote Control RAS-13SKH-E / RAS-3M31SAH-E-1 (Upper Unit) Operation (START/STOP) Indoor Fan Motor 7. MICROCOMPUTER BLOCK DIAGRAMS 21 Power Supply Circuit Compressor ON/OFF Signal Outdoor Fan ON/OFF Signal 4-Way Valve ON/OFF Signal Noise Filter Relay Driver, Lower Driver Relay RY01 Relay RY03 Relay RY02 Operation Mode Selection AUTO, COOL, DRY, HEAT, FAN ONLY Thermo.

Setting Lower ON/OFF Signal Fan Speed Selection ON TIMER Setting Relay RY04 Louver Motor OFF TIMER Setting Louver AUTO Swing Louver Direction Setting ECONO. AC220/230/240V ~ 50Hz Compressor Outdoor Fan Motor 4-Way Valve C. P. U Heat Exchanger Sensor (A) Compressor (A) ON/OFF Signal Heat Exchanger Sensor (B) Compressor (A) ON/OFF Signal Compressor (B) ON/OFF Signal Relay 4-Way Valve (A) ON/OFF Signal Relay Driver RY03 4-Way Valve (A) Relay RY01 Compressor (A) 4-Way Valve (A) ON/OFF Signal 4-Way Valve (B) ON/OFF Signal Relay RY04 Outdoor Fan ON/OFF Signal Outdoor Fan ON/OFF Signal Indoor Unit (A) 4-Way Valve (B) RAS-10SKH-E-1 / RAS-M18SAH-E RAS-10SKH-E-1 / RAS-3M31SAH-E-1 (Lower Unit) RAS-10SKH-E-1 / RAS-4M36SAH-E (Upper and Lower Unit) 22 Compressor (B) ON/OFF Signal Relay RY02 4-Way Valve (B) ON/OFF Signal Outdoor Fan ON/OFF Signal · Compressor (A), (B) Control · 4-Way Valve (A), (B) Control · Outdoor Fan Control · Defrost Control Relay RY06 Outdoor Fan Motor Compressor (B) Initializing Circuit Clock Frequency Oscillator Circuit Power Supply Circuit Indoor Unit (B) Note: Transformer AC 220/230/240V 50Hz If unit (A) and (B) operation modes are different (as Cool, Heater Auto), operating priority is given for "Heat" mode unit, and "Cool" mode unit will be stopped due to overload relay actuate. 8. OPERATION DESCRIPTIONS 8-1. 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. 8-1-1.

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 8-1-1. 8-2. COOL Operation (MODE of the remote control : COOL) (1) Compressor, 4-way valve, outdoor fan and operation display are controlled as shown in Fig. 8-2-1. (Room temp. Set temp.) ON +1 ON OFF OFF ON ON OFF Room temp. 28 27 26 25 24 LOW LOW HIGH MED LOW(+) Fig. 8-2-1 (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. 8-2-2. 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 8-1-1. FAN (Room temp. Set temp.) Fig.

8-1-1 Auto setting of air volume Table 8-1-1 Manual setting of FAN SPEED Indication of FAN SPEED LOW MED HIGH HIGH Air volume (m/h) 13SKH-E 510 560 650 10SKH-E-1 400 500 600 3 +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. 8-2-2 (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. 23 Compressor (RY01) Common relay (RY02) 4-way valve (RY04) Outdoor fan (RY03) OPERATION display Set 0 temp.

AUTO HIGH Manual 8-2-1. 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. 8-3. DRY Operation (MODE of the remote control : DRY) (1) Compressor, 4-way valve, outdoor fan and operation display are controlled as shown in Fig. 8-3-1. ON:6min. OFF:4min. ON:6min.

OFF:4min. ON:5min. OFF:5min. (Room temp. Set temp.) +3 +2 +1 ON:5min. OFF:5min. ON OFF ON OFF OFF Fig. 8-3-1 · 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.



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S.L.

*Super Low Fig. 8-3-2 24 Compressor (RY01) Common relay (RY02) 4-way valve (RY04) Outdoor fan (RY03) OPERATION display Set 0 temp. ON ON OFF L. S.L. L. 8-4. HEAT Operation (MODE of the remote control : HEAT) (1) Compressor, 4-way valve, outdoor fan and operation display are controlled as shown in Fig. 8-4-1. 8-4-1.

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. 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 (Room temp. Set temp.) 0 8-4-2. 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 8-10. 1 ON ON Fig. 8-4-1 (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. 8-4-2, when the FAN is set to AUTO. The motor operates with a constant air volume as listed in Table 8-1-1, when the FAN is set to LOW, MED, or HIGH. RY01 OFF Set temp. (Room temp.

Set temp.) 0 -1 LOW -2 -3 -4 MED According LOW(+) to the set position MED(-) Fig. 8-4-2 (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 25 8-5. 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. 8-5-1. The Fan mode will continue until room temperature reaches a level at which another mode is selected. 8-5-1. 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. 8-5-1. (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. 8-5-1 26 8-6. 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. 8-7. 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). 8-6-1. Cooling (1) In the ECONO. mode, the set temp. by the remote control is changed automatically as shown in Fig.

8-6-1. (2) Fan speed LOW (°C) Set temp. is changed +2 Set temp. is changed +1 Input current 13SKH: 13,5A 14 10SKH: 10,0A 13SKH: 12,5A 13 10SKH: 9,0A Compressor Outdoor fan More than 14 continues for 3 seconds OFF More than 13 continues for 5 minutes OFF ON Fig. 8-7-1 Set temp.

0H 1H 2H TIME ECONO. button is pushed (2) Current limit control (Heating) Control is performed as shown in Fig. 8-7-2. Fig. 8-6-1 Input current 13SKH: 13,5A 14 10SKH: 10,0A 13SKH: 12,5A 13 10SKH: 9,0A 13SKH: 10,0A 12 10SKH: 8,0A 13SKH: 9,0A 11 10SKH: 7,5A Compressor Outdoor fan More than 14 continues for 3 seconds OFF More than 13 continues for 5 minutes OFF ON OFF 8-6-2. Heating (1) In the ECONO. mode, the set temp. by the remote control is changed automatically as shown in Fig. 8-6-2. (2) Fan speed LOW ECONO.

button is pushed 0H Set temp. 1H 2H TIME ON Fig. 8-7-2 -1 Set temp. is changed -2 Set temp. is changed (°C) Fig. 8-6-2 27 8-8. High-Temperature Limit Control 8-8-1. Heating Operation (Indoor Unit) The microprocessor detects the indoor heat exchanger temperature so as to prevent exceeding the condensate pressure. Control is performed as shown in Fig. 8-8-1.

8-9. 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. 8-9-1 and 8-9-2. <RAS-13SKH-E> Heat exchanger temperature (°C) 60 53 52 Compressor, Outdoor fan *1 OFF Heat exchanger temperature Compressor Outdoor fan (°C) 6 ON ON Less than 2°C continues for 5 minutes OFF 2 *1 Only outdoor fan is turned off.

Fig. 8-8-1 <RAS-10SKH-E-1> Fig. 8-9-1 8-8-2. Cooling, Heating and Dry Operation (Outdoor Unit) The microprocessor detects the outdoor heat exchanger temperature so as to prevent exceeding the condensate pressure. Control is performed as shown in Fig.

8-8-2. Heat exchanger temperature Compressor Outdoor fan (°C) 7 5 ON Less than 5°C continues for 5 minutes OFF Heat exchanger temperature (°C) 58 Outdoor fan Fig. 8-9-2 Forced OFF 51 Normal ON Fig. 8-8-2 28 8-10. 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. 8-10-1 and 8-10-2. <RAS-13SKH-E> Heat exchanger temperature 8-11. 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.

8-11-1. 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. 8-11-1. 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. (°C) 35 32 30 20 Indoor fan speed According to the set position U.L.

(Ultra Low) Room temp. Room temp. Set temp. Set temp. OFF S.



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L (Super Low) < > Fig. 8-10-1 < RAS-10SKH-E-1 > (°C) 30 25 20 Indoor heat exchanger temp. Room temp. Heat exchanger temperature Indoor fan speed According to the set position U.L.

(Ultra Low) Room temp. Room temp. Set temp. Set temp. OFF S.L (Super Low) < > (°C) D 19 10 A B C 40 90 (min.) Cumulative compressor operation time Fig. 8-10-2 (2) As soon as the defrost operation starts, the indoor fan stops. Fig. 8-11-1 (Indoor fan speed : M) 29 8-11-2.

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.) 8-11-3. **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. **DEFROST LAMP** : minutes 40 minutes 40 minutes 40 minutes 40 · 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. **Defrost Heating Heating Heating Max 6 minutes 10 minutes 1 cycle** Fig. 8-11-2 <In case of C> (1) The heating operation is performed for at least 90 minutes.

(2) The defrost operation time is 10 minutes. **Heating Defrost Defrost Defrost 30 8-12. 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. 8-12-1. **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.

31 8-12-2. **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. 8-12-3. **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. (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. 32 8-13. **Operation Control of Following Outdoor Unit RAS-M18SAH-E RAS-3M31SAH-E-1 (Lower Unit) RAS-4M36SAH-E (Upper and Lower Unit)** 8-13-1. **In Case of Operation in a Single Room** The outdoor unit operates by instruction from the indoor unit. (3) **Control in defrost operation** 1) When either one of the indoor units performs the defrost operation, the other unit also controls the defrost operation.

2) Turn off immediately the 4-way valve of the indoor unit which received the Defrost signal, and after 12 sec. later, also turn off the outdoor fan and the 4-way valve in the other room. 3) The concurrent defrost control time is 3 minutes and 50 seconds in the unit which did not receive the Defrost signal, and after then, control is performed according to the instruction from the indoor unit.



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In this case, the outdoor fan is turned on if the operation signal is output from one of two indoor units though the other unit continues the defrost operation. 8-13-2. In Case of Concurrent Operation in Two Rooms Heat exchanger of outdoor unit is common use for two indoor units. · Unit (A) and (B) cannot operate on different mode (as (A) unit for Cool, (B) unit for Heat) at the same time. · If Cool operation and Heat operation are concurrently performed, the priority is given to Heat operation, and Cool operation is exchanged to Fan operation. (1) Control in normal operation The outdoor fan is turned on when ON signal is output from either one of the indoor units in two rooms. (2) Control of heating high-temperature releasing and current releasing 1) When either one of the indoor units controls the outdoor fan OFF zone of heating high-temperature release/current release, stop the outdoor fan.

2) When either one of the indoor units controls the Comp. OFF zone of heating high-temperature release/current release, follow the outdoor fan signal from the other indoor unit. @@@@What to be Prechecked First 9-1-1. @@@@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 blinks. Description The OPERATION lamp blinks, indicating that power is turned on. If this happens, push the START/STOP button once to cause the lamp to stop blinking. A power outage also causes the lamp to blink. 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 intervals, independent of the thermo. control. operated in the dry operation.

The PRE-DEF. lamp comes on when the The PRE-DEF. lamp comes on during defrost operation and when heating operation is started. the indoor heat exchanger temperature is low when the heating operation is started. @@@@The same is true after power is turned compressor on. on, as the time is still active. @@@@according to the room temperature. @@@@Primary Judgement of Trouble Sources 9-2-1. @@@@sensor (TA). @@@@sensor (TC). @@@@sensor (TE). @@@@Remote control is not possible. Remote control is possible. @@@@OK. The outdoor part is defective.

@@@@The compressor does not operate. 36 (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 blinks (5 Hz). 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 blinking. <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 37 <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 . "" b) Operate the "ON/OFF" key and make sure the timer lamp on the display section is blinking (5 Hz). c) At the same time, also make sure the operation lamp is also blinking. This shows that the protection circuit on the indoor P.C.

board is working. d) Operate the TEMP . key and make sure the remote control display shows " " and blinking of the operation lamp. If the operation lamp is blinking, it shows the protection circuits for connecting cable is working or thermal fuse is blown. e) In the same way, operate the TEMP . @@@@board Symptom Thermo. sensor (TA) short/break. Continued Indicated when 1. Check thermo. sensor.

operation detected abnormal 2. If it is OK, check P.C. board. Indoor heat exchanger sensor (TC) short/break. @@Check heat exchanger operation detected abnormal sensor. 2. If it is OK, check P.C. board.

All off Indicated when 1. @@2. Check the voltage between pin 1 and 2 of the connector (CN10). 3. If the output voltage is 35V, P.C. board is OK, check motor. Abnormality of other indoor unit P.C. board.

Cable connection All off Indicated when Replace P.C. board. @@@@Check connective cable detected abnormal correct if wiring is wrong. 2. @@Check compressor. Indicated when detected abnormal 2. If it is OK, check P.C. board.

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. 39 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 blink? 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 blink 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 P.C.

board correct? YES YES Parts (R21, R109, SG01, C15, C01, DB01, C02, IC01, T01) are defective.



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YES Wrong wiring of AC cord or connecting cable is defective. Replace the thermal fuse set. Check connection. P.

C. 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 P.C. board block. Replace the main P.C. board. * SW transformer (T01) or IC (IC01) for power supply is defective. Replace the main P.C. 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.

40 9-3-2. Power can not be Turned on after Replacing Indoor P.C. Board <Checking Procedure> Connect the AC plug. Return the wiring of the power relay is returned to the normal procedure. Does the OPERATION lamp blink? 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 P.C. board RY02 Indoor terminal block T02 9-3-3. Outdoor Unit does not Operate RAS-13SKH-E / RAS-3M31SAH-E-1 (Upper Unit) Shut off the power supply from AC outlet once and turn it on after 5 seconds.

NO Does the OPERATION lamp blink? 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 P.C.

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. 41 RAS-10SKH-E-1 x 2 / RAS-M18SAH-E RAS-10SKH-E-1 x 2 / RAS-3M31SAH-E-1 (Lower Unit) RAS-10SKH-E-1 x 4 / RAS-4M36SAH-E Shut off the power supply from AC outlet once and turn it on after 5 seconds. NO Does the OPERATION lamp blink? 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 P.C. board. *1 Only Heating mode NO Correct cabling between indoor and outdoor units. Is cable connection between indoor and outdoor units correct? YES Is outdoor heat exchanger sensor (TE) normal? YES MCC-738 MAIN P.C. board CN09-RY01 3 , and/or, CN010-RY02 3 220/230/240 VAC? YES Check items as following procedure in 9-3-4, 9-3-5, 9-3-6. NO Replace sensor NO MCC-738 is defective.

42 9-3-4. Only Compressor does not Operate Shut off the power supply from AC outlet once and turn it on after 5 seconds. NO Does the OPERATION lamp blink? YES Does the power turn on by pushing the [START/STOP] button of the remote control? YES Is the voltage across the indoor terminal (1 - 2) 220/230/240 VAC? YES Is cable connection between indoor and outdoor units correct? YES Is the voltage across the outdoor terminal (1 - 2) 220/230/240 VAC? YES Is the voltage across the outdoor terminal (L - N) 220/230/240 VAC? YES MCC-738 MAIN P.C. board (CN09-RY01 3 , and/or CN10-RY02 3) 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 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 P.C.

board. NO Correct cabling between indoor and outdoor units. NO Cables between indoor and outdoor units are defective. NO Check the power supply, and correct cabling. NO MCC-738 is 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) 43 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 blink? YES Does the power turn on by pushing the [START/STOP] button of the remote control? YES Is the voltage across the indoor terminal (1 - 2) 220/230/240 VAC? YES Is cable connection between indoor and outdoor units correct? YES Is the voltage across the outdoor terminal (1 - 2) 220/230/240 VAC? YES Is the voltage across the outdoor terminal (L - N) 220/230/240 VAC? YES MAIN P.C. board (CN08 1 - 2) 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 outdoor fan motor 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 (RY01, RY02) or IC31 or IC30 is failure. Replace the P.C.

board. NO Correct cabling between indoor and outdoor units. NO Cables between indoor and outdoor units are defective. NO Check the power supply, and correct cabling. NO MCC-738 is defective. NO Correct the wire or replace the defective cords. NO Outdoor fan motor is defective. NO Capacitor for outdoor fan motor is defective. 44 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 blink? YES Does the power turn on by pushing the [START/STOP] button of the remote control? YES Is the voltage across the indoor terminal (2 - 3) 220/230/240 VAC? YES Is cable connection between indoor and outdoor units correct? YES Is the voltage across the outdoor 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 P.

C. board. NO Correct cabling between indoor and outdoor units. NO Cables between indoor and outdoor units are defective. NO Solenoid coil is defective.

45 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.



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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 P.C. board is defective. Replace the P.C. 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 P.C. board. * Change the setting of cooling to high fan. Does the cross flow fan rotate normally? YES NO Repair the bearing of the cross flow. 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 P.C. 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 P.C. 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.

46 9-4. How to Check the Remote Control (Including the Indoor P.C. 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 blink? 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 P.C. board is failure. Keep the air conditioner away from thyristor fluorescent light. Remote control is failure. Avoid direct sunlight. Replace P.C.

board. Replace the batteries Normal Replace remote control. Note: After battery replacement, shortcircuit the metal terminal at the side of the battery compartment (all-clear terminal) with a pencil. 47 9-4-1. How to Check the P.C. Board (1) Operating precautions 1) When removing the front panel or the P.C. board, be sure to shut off the power supply. 2) When removing the P board, hold the edge .

C. of the P board and do not apply force to the .C. parts. 3) When connecting or disconnecting the connectors on the P board, hold the whole housing. .C. Do not pull at the lead wire. (2) Inspection procedures 1) When a P.C.

board is judged to be defective, check for disconnection, burning, or discoloration of the copper foil pattern or this P board. .C. 2) The P board consists of the following 2 parts .C. a. Main P.C. board part: Power relay, indoor fan motor drive circuit and control circuit, C.P and peripheral cir.

U cuits, buzzer drive circuit and buzzer. b. Infrared rays receive and indication parts: Infrared rays receive unit and LED. Table 9-4-1 Approximate value of the sensor (thermistor) resistance (TA, TC, TE) (= k) Temperature Sensor Thermo. sensor 0°C 35,8 10°C 20,7 20°C 12,6 25°C 10,0 30°C 7,92 9-4-2. How to Reduce the Operation Time of the Anti-Restart Timer · Attach the diode (1S1555 or equivalent) to the rivet inside the unit through holes on the rear of the wireless remote control unit. · Push the START/STOP button to start operation with the diode attached. Wireless remote control Timer short diode Fig. 9-4-1 48 (3) Checking procedure Table 9-4-2 No. 1 Procedure Shut off the power supply and remove the P.

C. board assembly from the electronic parts base. Remove the connecting cable from the terminal block. Remove the connector for the motor, and turn the power on. If the OPERATION lamp blinks (0.

5 sec. :ON, 0.5 sec. :OFF) when the power turning on, the checking points described as 1-5 of right column are not necessary to perform. Check point (Symptom) 1.

Is the fuse blown? Causes 1. * Application of shock voltage. * Overload by short-circuit of the parts. 2 Voltage check 1. Between TP1 and TP2 (220/230/240V AC) 2. Between TP2 and pin 1 of CN04 (220/230/240V AC) 3. Between TP2 and pin 3 of CN04 (220/230/240V AC) 4. Between + and - of C02 (310 ~ 340V DC) 5. Between 35V and GND 6. Between 12V and GND 7.

Between 5 V and GND Voltage check 1. Voltage of relay coil. (DC 12V) Between pin 10 of IC31 and GND Between pin 11 of IC31 and GND 2. Between No. 1 and 2 of connecting cable terminal block. (220/230/240V AC) 1. All indicators light for 3 sec. 2. Indicators do not indicate normally after approximate 3 sec. 1.

* AC power cord is defective. * Poor contact of the terminal plate. * Miss wiring of the power relay. 2. Fuse is defective.

3. Operation of the thermal fuse. 4. * Capacitor (C01, C15) is defective. * Line filter (L01) is defective.

* Resistor (R01) is defective. * Diode (DB01) is defective. 5. IC01, IC02, T01 are defective. 6. IC01, IC02, T01, F03 are defective. 7. IC01, IC02, T01, F02, Q29, IC03 are defective. 1. Breaking wire of the relay coil, defective relay driver.

(IC31) 2. Poor contact of relay. 3 Make the operation status by pushing once the START/STOP button, except the status of [FAN ONLY], [ON TIMER]. 4 Start the operation with the system which the time of the restart delay timer is shortened. Defective indicator, or poor housing assembly. (CN13) 5 Make the operation status by pressing 1. Compressor does not operate. 2. OPERATION lamp blinks. once the START/STOP button.

1. The time of the restart delay timer is shortened. 2. Cool operation 3. Air volume [AUTO] 4.

Make the setting temperature lower enough than room temperature. 5. Continuous operation. The status of No. 5 is continued, and 1.

Compressor does not operate. make the following condition. 2. OPERATION lamp blinks. 1. Heat operation 2. Make the setting temperature higher enough than room temperature. 1. The temperature of the indoor heat exchanger is abnormally lower. 2.

Poor contact of the heat exchanger sensor. (The connector is disconnected,) (CN01) 3. Heat exchanger sensor, main P.C. board are defective. (Refer to Table 9-4-1 for the judgment of defective resistance values.) 4. Main P.C.

board is defective. 1. The temperature of the heat exchanger is abnormally high. 2. The heat exchanger sensor connector has short-circuit. (CN01) 3. The heat exchanger sensor is defective. (Refer to Table 9-4-1 for the judgment of defective resistance values.)



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) 4. P.

C. board is defective. 6 7 1. Indoor fan motor is defective. 1. The voltage of DC 35V is not Turn the power on after connecting (Protecting operation on the P.C. measured between the red and the motor connector. board.) black of the motor terminals.

Start the operation with the following 2. Poor contact of the motor 2. Motor does not rotate. condition. connector. (The key operation is accepted.) 1. Operation [Cooling] 3. The motor rotates, but it vibrates too 3. P.

C. board is defective. 2. Airflow [High fan] much. 3.

Continuous operation 49 9-4-3. P.C. Board Layout (Indoor Unit) Top View Bottom View 50 9-4-4. P.

C. Board Layout (Outdoor Unit) Top View Bottom View 51 10. PART REPLACEMENT 10-1. Indoor Unit RAS-13SKH-E, RAS-10SKH-E-1 No. Part name Front panel Procedure 1) After stopping the operation of the air conditioner, be sure to turn off the circuit breaker or disconnect the power plug from the AC wall socket. 2) Open the screw caps and remove the two screws fixing the front panel. 3) Close the screw caps as they were. 4) Open the horizontal louver right below by your finger. 5) Open the lower side of front panel until it touches the horizontal louver, and remove it from the indoor unit by turning it. <To assemble the front panel> 1) Fix the two screws to secure the front panel.

2) Close the screw caps as they were. 3) Press four places where are the center, right end, left end and lower portions of the air outlet. 4) Check the gap between the front panel and the main unit. If cooling or drying operation is performed without pressing the center of the air outlet, the surface of the front panel may be covered with frost and have a waterdrop. Remarks ·, Electrical part assembly 1) Perform the process · above. 2) Remove the screw securing the shield metal plate. 3) Remove the electrical part cover by pressing the nail located on upper portion of the electrical part cover. 4) Remove the drain guide. 5) Remove the screw securing to the end plate of the heat exchanger. 6) Remove the connector (5p) for the fan motor and the connector (6p) for the louver motor from the microcomputer assembly.

7) After unhooking the electrical part base by pressing the fixing nail located on its lower portion, draw the electrical part base out toward you to remove it from the main unit. 8) Pull the TC sensor out from the holder of the heat exchanger. 9) Dress the connecting cable securely as shown in the right illustration. (Improper dressing will cause water leakage.) 1) Perform the process , above.

2) Remove the drain-pan by pressing the four hooks downwards. (Keep it with the drain hose.) Drain-pan assembly 52 No. Part name Horizontal grille Note: The horizontal grille can not be removed without removing the louver motor. Procedure 1) Perform the process ,

2) Remove the screw fixing the louver motor, and remove the louver motor. 3) Remove the shaft of the horizontal grille from the drain-pan. Remarks , ... Heat exchanger 1) Perform the process . 2) Remove the pipe holder from the rear side of main unit by removing the screw. 3) Unhook the hooks fixing the left side of the heat exchanger and remove the screw fixing it, then remove the right side of the end plate from the rib fixing the main unit by sliding the heat exchanger slightly to the right side. Cross flow fan 1) Perform the process . 2) Loosen the set screw of the cross flow fan.

3) Remove the screw fixing the shaft bearing base. 4) Lift slightly up the left side of the heat exchanger, and pull the shaft bearing base out left downwards. When assembling it, fix it with the set screw on the position where the gap between the rear plate surface and the left end surface of the cross flow fan is 6 ~ 7mm. Shaft bearing 1) Perform the process above. 2) Remove the shaft bearing from the shaft bearing base. <Caution for assembling> · If a part of the shaft bearing is protruded from the housing, assemble it after pushing its portion into the correct position in the housing. ^ Fan motor 1) 2) 3) 4) Perform the process ... above.

Perform the process -2) above. Remove the left and right motor bands. Remove the fan motor after pulling the cross flow fan out sliding it left and right. 53 10-2. Microcomputer RAS-13SKH-E, RAS-10SKH-E-1 No.

Part name Common procedure Procedure 1) Turn the power supply off to stop the operation of airconditioner, and disconnect the power cord from the AC supply. 2) Remove the front panel. · Remove the two fixing screws. (4 x 14) 3) Remove the electrical part base. 1) Perform the process · above.

2) Remove terminal cover (Up), (Down). 3) Disconnect the terminal blocks connected with the connecting cable, and the power cord from base Eparts by removing the screws. 4) Remove the thermal fuse (77°C) from base E-parts. Remarks Replace the thermal fuse, terminal block, power cord, microcomputer ass'y and the power supply P.C. board ass'y. ·, Thermal fuse replacement 54 10-3. Outdoor Unit RAS-M18SAH-E No. Part name Common procedure Procedure 1) After stopping the operation of the air conditioner, be sure to turn off main power supply switch and breaker of outdoor unit and indoor unit. 2) Remove the electric parts cover.

(4 screws) 3) Remove the cord clamps (6 screws). 4) Remove the connecting cables and the power cord after loosening 7 screws of terminal block. 5) Remove the front cabinet. (8 screws) · Pull the front lower portion toward you, and remove it pulling out upward. Remarks ·, Back cabinet Side cabinet 1) Remove the back cabinet and side cabinet. (12 screws) Back cabinet Side cabinet P.C. board 1) Remove the connector. (16 portions) assembly 2) Remove the P.C. board supports (4 portions), and (For outdoor unit) take out the P.C. board assembly. Connector P.C.

board support 55 No. Part name Capacitor for compressor Procedure 1) Remove the capacitor band. (Each 1 screw) 2) Disconnect the lead wire from the capacitor terminal. Remarks , ..

· Capacitor for fan motor 1) Remove the electrical parts cover. (1 screw) 2) Remove the capacitor band. (2 screws) 3) Disconnect the lead wire from the capacitor terminal. Connector Transformer for outdoor unit 1) Remove the electrical parts cover. (1 screw) 2) Remove the transformer. (2 screws) 3) Disconnect the connector from the P.C. board assembly. 1) Perform the process , above.

2) Remove the terminal cover of compressor. 3) Remove OL holder and pull overload relay up. 4) Disconnect the lead wire from the overload relay terminal. P.C.board support Overload relay Terminal cover OL holder Parts position Compressor (For unit B) Fan motor Compressor (For unit A) 56

RAS-3M31SAH-E-1 No. @ @2) Remove the L-shape holder (Right). (8 screws) 3) Remove the L-shape holder (Left). (5 screws) 4) Remove the front cover.



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