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You can read the recommendations in the user guide, the technical guide or the installation guide for TOSHIBA RAV-SM2244AT8Z-E. You'll find the answers to all your questions on the TOSHIBA RAV-SM2244AT8Z-E in the user manual (information, specifications, safety advice, size, accessories, etc.). Detailed instructions for use are in the User's Guide.

User manual TOSHIBA RAV-SM2244AT8Z-E
User guide TOSHIBA RAV-SM2244AT8Z-E
Operating instructions TOSHIBA RAV-SM2244AT8Z-E
Instructions for use TOSHIBA RAV-SM2244AT8Z-E
Instruction manual TOSHIBA RAV-SM2244AT8Z-E



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... 124 126 128 130 3 SAFETY CAUTION The important contents concerned to the safety are described on the product itself and on this Service Manual. Please read this Service Manual after understanding the described items thoroughly in the following contents (Indications/Illustrated marks), and keep them. [Explanation of indications] Indication Explanation Indicates contents assumed that an imminent danger causing a death or serious injury of the repair engineers and the third parties when an incorrect work has been executed. Indicates possibilities assumed that a danger causing a death or serious injury of the repair engineers, the third parties, and the users due to troubles of the product after work when an incorrect work has been executed. Indicates contents assumed that an injury or property damage () may be caused on the repair engineers, the third parties, and the users due to troubles of the product after work when an incorrect work has been executed. DANGER WARNING CAUTION Property damage : Enlarged damage concerned to property, furniture, and domestic animal/pet [Explanation of illustrated marks] Mark Explanation Indicates prohibited items (Forbidden items to do) The sentences near an illustrated mark describe the concrete prohibited contents. Indicates mandatory items (Compulsory items to do) The sentences near an illustrated mark describe the concrete mandatory contents. Indicates cautions (Including danger/warning) The sentences or illustration near or in an illustrated mark describe the concrete cautious contents. [Confirmation of warning label on the main unit] Confirm that labels are indicated on the specified positions (Refer to the Parts disassembly diagram (Outdoor unit).) If removing the label during parts replace, stick it as the original. DANGER Turn "OFF" the breaker before removing the front panel and cabinet, otherwise an electric shock is caused by high voltage resulted in a death or injury. During operation, a high voltage with 400V or higher of circuit () at secondary circuit of the high-voltage transformer is applied.

If touching a high voltage with the naked hands or body, an electric shock is caused even if using an electric insulator. · Attach a plate indicating "WORKING" or others on the breaker so that you don't accidentally turn on the breaker during work. : For details, refer to the electric wiring diagram. When removing the front panel or cabinet, execute short-circuit and discharge between high-voltage capacitor terminals. If discharge is not executed, an electric shock is caused by high voltage resulted in a death or injury. After turning off the breaker, high voltage also keeps to apply to the high-voltage capacitor. Do not turn on the breaker under condition that the front panel and cabinet are removed. An electric shock is caused by high voltage resulted in a death or injury.

Prohibition Turn off breaker. Execute discharge between terminals.

4 WARNING Before troubleshooting or repair work, check the earth wire is connected to the earth terminals of the main unit, otherwise an electric shock is caused when a leak occurs. If the earth wire is not correctly connected, contact an electric engineer for rework. Do not modify the products. Do not also disassemble or modify the parts. It may cause a fire, electric shock or injury.

Prohibition of modification. Check earth wires. Use specified parts. For spare parts, use those specified (). If unspecified parts are used, a fire or electric

shock may be caused.

: For details, refer to the parts list. Before troubleshooting or repair work, do not bring a third party (a child, etc.) except the repair engineers close to the equipment. It causes an injury with tools or disassembled parts. Please inform the users so that the third party (a child, etc.) does not approach the equipment. Connect the cut-off lead wires with crimp contact, etc, put the closed end side upward and then apply a water-cut method, otherwise a leak or production of fire is caused at the users' side. Do not bring a child close to the equipment. Insulating measures No fire When repairing the refrigerating cycle, take the following measures. 1) Be attentive to fire around the cycle.

When using a gas stove, etc, be sure to put out fire before work; otherwise the oil mixed with refrigerant gas may catch fire. 2) Do not use a welder in the closed room. When using it without ventilation, carbon monoxide poisoning may be caused. 3) Do not bring inflammables close to the refrigerant cycle, otherwise fire of the welder may catch the inflammables. Check the used refrigerant name and use tools and materials of the parts which match with it. For the products which use R410A refrigerant, the refrigerant name is indicated at a position on the outdoor unit where is easy to see. To prevent miss-charging, the route of the service port is changed from one of the former R22. For an air conditioner which uses R410A, never use other refrigerant than R410A. For an air conditioner which uses other refrigerant (R22, etc.), never use R410A.

If different types of refrigerant are mixed, abnormal high pressure generates in the refrigerating cycle and an injury due to breakage may be caused. Do not charge refrigerant additionally. If charging refrigerant additionally when refrigerant gas leaks, the refrigerant composition in the refrigerating cycle changes resulted in change of air conditioner characteristics or refrigerant over the specified standard amount is charged and an abnormal high pressure is applied to the inside of the refrigerating cycle resulted in cause of breakage or injury.



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Therefore if the refrigerant gas leaks, recover the refrigerant in the air conditioner, execute vacuuming, and then newly recharge the specified amount of liquid refrigerant. In this time, never charge the refrigerant over the specified amount.

When recharging the refrigerant in the refrigerating cycle, do not mix the refrigerant or air other than R410A into the specified refrigerant. If air or others is mixed with the refrigerant, abnormal high pressure generates in the refrigerating cycle resulted in cause of injury due to breakage. After installation work, check the refrigerant gas does not leak. If the refrigerant gas leaks in the room, poisonous gas generates when gas touches to fire such as fan heater, stove or cooking stove though the refrigerant gas itself is innocuous. Never recover the refrigerant into the outdoor unit.

When the equipment is moved or repaired, be sure to recover the refrigerant with recovering device. The refrigerant cannot be recovered in the outdoor unit; otherwise a serious accident such as breakage or injury is caused. After repair work, surely assemble the disassembled parts, and connect and lead the removed wires as before. Perform the work so that the cabinet or panel does not catch the inner wires. If incorrect assembly or refrigerating oil. For the tools exclusive to R410A, shapes of all the joints including the service port differ from those of the former refrigerant in order to prevent mixture of them. 2) As the use pressure of the new refrigerant is high, use material thickness of the pipe and tools which are specified for R410A. 3) In the installation time, use clean pipe materials and work with great attention so that water and others do not mix in because pipes are affected by impurities such as water, oxide scales, oil, etc. Use the clean pipes. Be sure to brazing with flowing nitrogen gas.

(Never use gas other than nitrogen gas.) 4) For the earth protection, use a vacuum pump for air purge. 5) R410A refrigerant is azeotropic mixture type refrigerant. Therefore use liquid type to charge the refrigerant. (If using gas for charging, composition of the refrigerant changes and then characteristics of the air conditioner change.) 3. Pipe Materials For the refrigerant pipes, copper pipe and joints are mainly used. It is necessary to select the most appropriate pipes to conform to the standard. Use clean material in wh-E RAV-SM562BT-E RAV-SM562BT-E RAV-SM562BT-E Ceiling type RAV-SM562CT-E RAV-SM562CT-E RAV-SM562CT-E RAV-SM562CT-E High wall type (2 series) RAV-SM562KRT-E RAV-SM562KRT-E RAV-SM562KRT-E RAV-SM562KRT-E <RAV-SM2804AT series> Simultaneous twin 4-way air discharge cassette type RAV-SM1404UT-E RAV-SM1404UT-E Concealed duct type RAV-SM1402BT-E RAV-SM1402BT-E Ceiling type RAV-SM1402CT-E RAV-SM1402CT-E Simultaneous triple 4-way air discharge cassette type RAV-SM804UT-E RAV-SM804UT-E RAV-SM804UT-E Concealed duct type RAV-SM802BT-E RAV-SM802BT-E RAV-SM802BT-E Ceiling type RAV-SM802CT-E RAV-SM802CT-E RAV-SM802CT-E High wall type (2 series) RAV-SM802KRT-E RAV-SM802KRT-E RAV-SM802KRT-E Simultaneous double twin 4-way air discharge cassette type RAV-SM804UT-E RAV-SM804UT-E RAV-SM804UT-E RAV-SM804UT-E Concealed duct type RAV-SM802BT-E RAV-SM802BT-E RAV-SM802BT-E RAV-SM802BT-E Ceiling type RAV-SM802CT-E RAV-SM802CT-E RAV-SM802CT-E RAV-SM802CT-E High wall type (2 series) RAV-SM802KRT-E RAV-SM802KRT-E RAV-SM802KRT-E RAV-SM802KRT-E 9 RAV-SM2244AT series Slimultaneous twin SM110 -- SM110 Branch kit RBC-TWP101E Simultaneous triple SM80 -- SM80 -- SM80 RBC-TRP100E Simultaneous double twin SM56 -- SM56 -- SM56 -- SM56 RBC-DTWP101E RAV-SM2804AT series Slimultaneous twin SM140 -- SM140 Branch kit RBC-TWP101E Simultaneous triple SM80 -- SM80 -- SM80 RBC-TRP100E Simultaneous double twin SM80 -- SM80 -- SM80 -- SM80 RBC-DTWP101E 10 1. SPECIFICATIONS 1-1.

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9 15.9 15.9 (mm) 12.7 12.7 12.7 12.7 (m³/min.) (W) (mm) (m) 30 Propeller fan 133 100 + 100 28.6 30 Propeller fan 133 100 + 100 28.6 30 Propeller fan 133 100 + 100 28.6

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Propeller fan 133 100 + 100 28.6 (m) 30 30 30 30 (m) (m) 70 7.5 70 7.5 70 7.

5 70 7.5 (A) (A) (kW) (%) (A) (kW) (%) 11.51 10.54 15.44 14.13 7.12 94 2.81 C 10.34 9.47 6.
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0 RAV-SM RAV-SM 804UT-E 804UT-E 804UT-E 804UT-E 804UT-E 804UT-E 804UT-E 804UT-E 3 phase 380 415V 50Hz 3 phase 380V 60Hz
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5/16.0/13.5 20 35 / 31 / 28 50 / 46 / 43 20 35 / 31 / 28 50 / 46 / 43 20 35 / 31 / 28 50 / 46 / 43 20 35 / 31 / 28 50 / 46 / 43 : IEC standard 14 1-1-5. Duct Type
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80 11.72 7.92 94 3.41 B 22 Centrifugal 11.51 7.

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) (W) (dB-A) (dB-A) Outdoor unit Max. total length Min. length Outer dimension Outdoor lower Height difference Outdoor high Fan Fan unit Standard air flow high Motor Gas side Outdoor unit Pipe branch Liquid side Connecting pipe Gas side Pipe branch Indoor unit Liquid side Sound pressure level Sound power level Cooling / Heating Cooling / Heating (mm) (dB-A) (dB-A) 9.
5 56 / 57 72 / 74 9.5 57 / 58 74 / 75 9.5 56 / 57 72 / 74 9.5 57 / 58 74 / 75 (mm) 15.9 15.9 15.9 15.9 (mm) 12.7 12.7 12.

7 12.7 (m³/min.) (W) (mm) (m) 30 Propeller fan 133 100 + 100 28.6 30 Propeller fan 133 100 + 100 28.6 30 Propeller fan 133 100 + 100 28.6 30 Propeller fan 133 100 + 100 28.6 (m) 30 30 30 30 (m) (m) 70 7.5 70 7.5 70 7.5 70 7.
5 (A) (A) (kW) (%) (A) (kW) (%) 11.51 10.54 15.44 14.13 7.
12 94 2.81 C 10.34 9.47 6.40 94 3.
50 B 18 Centrifugal 9.55 94 2.41 E 12.80 11.72 7.92 94 3.41 B 22 Centrifugal 11.51 7.12 94 2.81 -- 10.

34 6.40 94 3.50 -- 18 Centrifugal 15.44 9.55 94 2.41 -- 12.80 7.92 94 3.41 -- 22 Centrifugal RAV-SM RAV-SM (kW) (kW) 802CT-E 2244AT8-E 20.0 22.4
4 802CT-E 2804AT8-E 23.0 27.0 802CT-E 2244AT7 20.0 22.4 802CT-E 2804AT7 23.
0 27.0 RAV-SM RAV-SM 802CT-E 802CT-E 802CT-E 802CT-E 802CT-E 802CT-E 802CT-E 802CT-E 3 phase 380 415V 50Hz 3 phase 380V 60Hz
18.5/16.7/14.6 18.

5/16.7/14.6 18.5/16.7/14.6 60 38 / 36 / 33 53 / 51 / 48 60 38 / 36 / 33 53 / 51 / 48 60 38 / 36 / 33 53 / 51 / 48 60 38 / 36 / 33 53 / 51 / 48 : IEC standard 16 1-1-7. High Wall Type <Triple type> Indoor unit 1 Indoor unit 2 Model Indoor unit 3 Outdoor unit Cooling capacity Heating capacity Power supply Indoor unit Running current Power consumption Cooling Power factor EER Energy efficiency class Electrical characteristics Running current Power consumption Heating Power factor COP Energy efficiency class Maximum current Fan Fan unit Standard air flow Motor Sound pressure level Sound power level H/M/L H/M/L H/M/L (m³/min.)

) (W) (dB-A) (dB-A) Outdoor unit Max. total length Min. length Outer dimension Outdoor lower Height difference Outdoor high Fan Fan unit Standard air flow high Motor Gas side Outdoor unit Pipe branch Liquid side Connecting pipe Gas side Pipe branch Indoor unit Liquid side Sound pressure level Sound power level Cooling / Heating Cooling / Heating (mm) (dB-A) (dB-A) 9.5 56 / 57 72 / 74 9.5 57 / 58 74 / 75 9.5 56 / 57 72 / 74 9.5 57 / 58 74 / 75 (mm) 15.9 15.9 15.9 15.9.
9 (mm) 12.7 12.7 12.7 12.7 (m³/min.)

) (W) (mm) (m) 30 Propeller fan 133 100 + 100 28.6 30 Propeller fan 133 100 + 100 28.6 30 Propeller fan 133 100 + 100 28.6 30 Propeller fan 133 100 + 100 28.6 (m) 30 30 30 30 (m) (m) 70 7.
5 70 7.5 70 7.5 70 7.5 (A) (A) (kW) (%) (A) (kW) (%) 11.51 10.54 15.44 14.13 7.12 94 2.81 C 10.

34 9.47 6.40 94 3.50 B 18 9.55 94 2.41 E 12.80 11.72 7.92 94 3.41 B 22 11.
51 7.12 94 2.81 -- 10.34 6.40 94 3.
50 -- 18 15.44 9.55 94 2.41 -- 12.80 7.

92 94 3.41 -- 22 RAV-SM RAV-SM (kW) (kW) 802KRT-E 2244AT8-E 20.0 22.4 802KRT-E 2804AT8-E 23.0 27.0 802KRT-E 2244AT7 20.0 22.4 802KRT-E 2804AT7 23.0 27.0 RAV-SM RAV-SM 802KRT-E 802KRT-E 802KRT-E 802KRT-E 802KRT-E 802KRT-E 802KRT-E 802KRT-E 3 phase 380 415V 50Hz 3 phase 380V 60Hz Cross flow fan Cross flow fan Cross flow fan Cross flow fan 18.

5/14.6/12.2 18.5/14.6/12.2 18.5/14.6/12.2 18.5/14.
6/12.2 30 45 / 41 / 36 60 / 56 / 51 30 45 / 41 / 36 60 / 56 / 51 30 45 / 41 / 36 60 / 56 / 51 30 45 / 41 / 36 60 / 56 / 51 : IEC standard 17 1-1-8. 4-Way Cassette Type <Double twin type> Indoor unit 1 Indoor unit 2 Model Indoor unit 3 Indoor unit 4 Outdoor unit Cooling capacity Heating capacity Power supply Indoor unit Running current Power consumption Cooling Power factor EER Energy efficiency class Electrical characteristics Running current Power consumption Heating Power factor COP Energy efficiency class Maximum current Fan Fan unit Standard air flow Motor Sound pressure level Sound power level H/M/L H/M/L H/M/L (m³/min.) (W) (dB-A) (dB-A) Outdoor unit Max. total length Min.

length Outer dimension Outdoor lower Height difference Outdoor high Fan Fan unit Standard air flow high Motor Gas side Outdoor unit Pipe branch Liquid side Connecting pipe Gas side Pipe branch Indoor unit Liquid side Sound pressure level Sound power level Cooling / Heating Cooling / Heating (mm) (dB-A) (dB-A) 9.5 56 / 57 72 / 74 9.5 57 / 58 74 / 75 9.5 56 / 57 72 / 74 9.5 57 / 58 74 / 75 (mm) 15.
9 15.9 15.9 15.9 (mm) 12.7 12.7 12.7 12.7 (m³/min.) (W) (mm) (m) 30 Propeller fan 133 100 + 100 28.6 30 Propeller fan 133 100 + 100 28.

6 30 Propeller fan 133 100 + 100 28.6 30 Propeller fan 133 100 + 100 28.6 (m) 30 30 30 30 (m) (m) 70 7.5 70 7.5 70 7.5 70 7.5 (A) (A) (kW) (%) (A) (kW) (%) 11.51 10.54 15.44 14.
13 7.12 94 2.81 C 10.34 9.47 6.
40 94 3.50 B 18 Turbo fan 9.55 94 2.41 E 12.80 11.
72 7.92 94 3.41 B 22 Turbo fan 11.51 7.12 94 2.81 -- 10.34 6.40 94 3.50 -- 18 Turbo fan 15.44 9.

55 94 2.41 -- 12.80 7.92 94 3.41 -- 22 Turbo fan RAV-SM RAV-SM RAV-SM RAV-SM RAV-SM (kW) (kW) 564UT-E 564UT-E 564UT-E 564UT-E 2244AT8-E 20.0 22.4 804UT-E 804UT-E 804UT-E 804UT-E 2804AT8-E 23.0 27.0 564UT-E 564UT-E 564UT-E 564UT-E 2244AT7 20.0 22.4 804UT-E 804UT-E 804UT-E 804UT-E 2804AT7 23.0 27.0 3 phase 380 415V 50Hz 3 phase 380V 60Hz 17.5/14.5/13.
0 20.5/16.0/13.5 17.5/14.

5/13.0 20.5/16.0/13.5 14 32 / 29 / 28 47 / 44 / 43 20 35 / 31 / 28 50 / 46 / 43 14 32 / 29 / 28 47 / 44 / 43 20 35 / 31 / 28 50 / 46 / 43 : IEC standard 18 1-1-9. Compact 4-Way Cassette (600 × 600) Type <Double twin type> Indoor unit 1 Indoor unit 2 Model Indoor unit 3 Indoor unit 4 Outdoor unit Cooling capacity Heating capacity Power supply Indoor unit Running current Power consumption Cooling Power factor EER Energy efficiency class Electrical characteristics Running current Power consumption Heating Power factor COP Energy efficiency class Maximum current Fan Fan unit Standard air flow Motor Sound pressure level Sound power level H/M/L H/M/L H/M/L (m³/min.) (W) (dB-A) (dB-A) Outdoor unit Max. total length Min. length Outer dimension Outdoor lower Height difference Outdoor high Fan Fan unit Standard air flow high Motor Outdoor unit First pipe branch Connecting pipe First pipe branch Second pipe branch Second pipe branch Indoor unit Sound pressure level Sound power level Gas side Liquid side Gas side Liquid side Gas side Liquid side (m³/min.) (W) (mm) (mm) (mm) (mm) (mm) (mm) (dB-A) (dB-A) (m) 30 Propeller fan 133 100 + 100 28.

6 12.7 15.9 9.5 12.7 6.4 56 / 57 72 / 74 30 Propeller fan 133 100 + 100 28.6 12.7 15.9 9.5 12.
7 6.4 56 / 57 72 / 74 (m) 30 30 (m) (m) 70 7.5 70 7.5 (A) (A) (kW) (%) (A) (kW) (%) 11.51 10.
54 7.12 94 2.81 C 10.34 9.47 6.
40 94 3.50 B 18 Turbo fan 13.3 / 11.2 / 9.1 60 43 / 39 / 34 58 / 54 / 49 11.51 7.12 94 2.81 -- 10.34 6.40 94 3.

50 -- 18 Turbo fan 13.3 / 11.2 / 9.1 60 43 / 39 / 34 58 / 54 / 49 (kW) (kW) RAV-SM562MUT-E RAV-SM562MUT-E RAV-SM562MUT-E RAV-SM562MUT-E
RAV-SM2244AT8-E 20.0 22.



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4 3 phase 380 415V 50Hz RAV-SM562MUT-E RAV-SM562MUT-E RAV-SM562MUT-E RAV-SM562MUT-E RAV-SM2244AT7 20.0 22.4 3 phase 380V 60Hz Cooling / Heating Cooling / Heating : IEC standard 19 1-1-10. Slim Duct Type <Double twin type> Indoor unit 1 Indoor unit 2 Model Indoor unit 3 Indoor unit 4 Outdoor unit Cooling capacity Heating capacity Power supply Indoor unit Running current Power consumption Cooling Power factor EER Energy efficiency class Electrical characteristics Heating Running current Power consumption Power factor COP Energy efficiency class Maximum current Fan Fan unit Standard air flow Fan unit Motor External static pressure Sound pressure level Standard (at shipment) Set up for tap exchange H/M/L H/M/L H/M/L H/M/L H/M/L (m³/min.) (W) (Pa) (Pa) (dB-A) (dB-A) (dB-A) (dB-A) Outdoor unit Max.

total length Outer dimension Min. length Height difference Fan Fan unit Standard air flow high Motor Outdoor unit First pipe branch Connecting pipe First pipe branch Second pipe branch Second pipe branch Indoor unit Sound pressure level Sound power level Gas side (m³/min.) (W) (mm) Liquid side Gas side Liquid side Gas side Liquid side (mm) (mm) (mm) (mm) (dB-A) (dB-A) Outdoor lower Outdoor high (m) (m) (m) (m) 70 7.5 30 30 Propeller fan 133 100 + 100 28.6 (mm) 15.

9 9.5 12.7 6.4 56 / 57 72 / 74 70 7.5 30 30 Propeller fan 133 100 + 100 28.
6 12.7 12.7 15.9 9.5 12.7 6.4 56 / 57 72 / 74 (A) (A) (kW) (%) (A) (kW) (%) 11.51 10.54 7.12 94 2.

81 C 10.34 9.47 6.40 94 3.50 B 18 Centrifugal fan 13.0 / 11.3 / 9.7 60 10 10 / 20 / 35 / 50 45 / 40 / 36 33 / 31 / 28 60 / 55 / 51 48 / 46 / 43 11.51 7.12 94 2.
81 -- 10.34 6.40 94 3.50 -- 18 Centrifugal fan 13.0 / 11.

3 / 9.7 60 10 10 / 20 / 35 / 50 45 / 40 / 36 33 / 31 / 28 60 / 55 / 51 48 / 46 / 43 (kW) (kW) RAV-SM564SDT-E RAV-SM564SDT-E RAV-SM564SDT-E RAV-SM564SDT-E RAV-SM2244AT8-E 20.0 22.4 3 phase 380 415V 50Hz RAV-SM564SDT-E RAV-SM564SDT-E RAV-SM564SDT-E RAV-SM564SDT-E RAV-SM2244AT7 20.0 22.

4 3 phase 380V 60Hz Under air inlet Back air inlet Sound power level Under air inlet Back air inlet Cooling / Heating Cooling / Heating : IEC standard 20 1-1-11. Duct Type <Double twin type> Indoor unit 1 Indoor unit 2 Model Indoor unit 3 Indoor unit 4 Outdoor unit Cooling capacity Heating capacity Power supply Indoor unit Running current Power consumption Cooling Power factor EER Energy efficiency class Electrical characteristics Running current Power consumption Heating Power factor COP Energy efficiency class Maximum current Fan Fan unit Standard air flow Motor Sound pressure level Sound power level H/M/L H/M/L H/M/L (m³/min.) (W) (dB-A) (dB-A) Outdoor unit Max. total length Min. length Outer dimension Outdoor lower Height difference Outdoor high Fan Fan unit Standard air flow high Motor Outdoor unit First pipe branch Connecting pipe First pipe branch Second pipe branch Second pipe branch - Indoor unit Sound pressure level Sound power level Gas side Liquid side Gas side Liquid side Gas side Liquid side (m³/min.) (W) (mm) (mm) (mm) (mm) (mm) (mm) (dB-A) (dB-A) (m) 30 Propeller fan 133 100 + 100 28.6 12.7 15.9 9.5 12.

7 6.4 56 / 57 72 / 74 30 Propeller fan 133 100 + 100 28.6 12.7 15.9 9.5 15.9 9.5 57 / 58 74 / 75 30 Propeller fan 133 100 + 100 28.6 12.7 15.
9 9.5 12.7 6.4 56 / 57 72 / 74 30 Propeller fan 133 100 + 100 28.6 12.
7 15.9 9.5 15.9 9.5 57 / 58 74 / 75 (m) 30 30 30 30 (m) (m) 70 7.
5 70 7.5 70 7.5 70 7.5 (A) (A) (kW) (%) (A) (kW) (%) 11.51 10.54 15.44 14.13 7.12 94 2.81 C 10.

34 9.47 6.40 94 3.50 B 18 Centrifugal 9.55 94 2.41 E 12.80 11.72 7.92 94 3.41 B 22 Centrifugal 11.
51 7.12 94 2.81 -- 10.34 6.40 94 3.
50 -- 18 Centrifugal 15.44 9.55 94 2.41 -- 12.80 7.

92 94 3.41 -- 22 Centrifugal RAV-SM RAV-SM RAV-SM RAV-SM RAV-SM (kW) (kW) 562BT-E 562BT-E 562BT-E 2244AT8-E 20.0 22.4 802BT-E 802BT-E 802BT-E 2804AT8-E 23.0 27.0 562BT-E 562BT-E 562BT-E 2244AT7 20.0 22.4 802BT-E 802BT-E 802BT-E 802BT-E 2804AT7 23.0 27.0 3 phase 380 415V 50Hz 3 phase 380V 60Hz 13.

0/11.9/9.8 19.0/16.2/13.3 13.0/11.9/9.8 19.0/16.

2/13.3 120 40 / 37 / 33 55 / 52 / 48 120 40 / 37 / 34 55 / 52 / 49 120 40 / 37 / 33 55 / 52 / 48 120 40 / 37 / 34 55 / 52 / 49 Cooling / Heating Cooling / Heating : IEC standard 21 1-1-12. Ceiling Type <Double twin type> Indoor unit 1 Indoor unit 2 Model Indoor unit 3 Indoor unit 4 Outdoor unit Cooling capacity Heating capacity Power supply Indoor unit Running current Power consumption Cooling Power factor EER Energy efficiency class Electrical characteristics Running current Power consumption Heating Power factor COP Energy efficiency class Maximum current Fan Fan unit Standard air flow Motor Sound pressure level Sound power level H/M/L H/M/L H/M/L (m³/min.) (W) (dB-A) (dB-A) Outdoor unit Max. total length Min.

length Outer dimension Outdoor lower Height difference Outdoor high Fan Fan unit Standard air flow high Motor Outdoor unit First pipe branch Connecting pipe First pipe branch Second pipe branch Second pipe branch Indoor unit Sound pressure level Sound power level Gas side Liquid side Gas side Liquid side Gas side Liquid side (m³/min.) (W) (mm) (mm) (mm) (mm) (mm) (mm) (dB-A) (dB-A) (m) 30 Propeller fan 133 100 + 100 28.6 12.7 15.9 9.5 5 12.7 6.4 56 / 57 72 / 74 30 Propeller fan 133 100 + 100 28.6 12.7 15.9 9.5 15.9 9.5 57 / 58 74 / 75 30 Propeller fan 133 100 + 100 28.6 12.

7 15.9 9.5 12.7 6.4 56 / 57 72 / 74 30 Propeller fan 133 100 + 100 28.6 12.7 15.9 9.5 15.9 9.
5 57 / 58 74 / 75 (m) 30 30 30 30 (m) (m) 70 7.5 70 7.5 70 7.5 70 7.5 (A) (A) (kW) (%) (A) (kW) (%) 11.
51 10.54 15.44 14.13 7.12 94 2.

81 C 10.34 9.47 6.40 94 3.50 B 18 Centrifugal 9.55 94 2.41 E 12.80 11.72 7.92 94 3.

41 B 22 Centrifugal 11.51 7.12 94 2.81 -- 10.34 6.40 94 3.50 -- 18 Centrifugal 15.44 9.55 94 2.41 -- 12.
80 7.92 94 3.41 -- 22 Centrifugal RAV-SM RAV-SM RAV-SM RAV-SM RAV-SM (kW) (kW) 562CT-E 562CT-E 562CT-E 562CT-E 2244AT8-E 20.0 22.4 802CT-E 802CT-E 802CT-E 802CT-E 2804AT8-E 23.

0 27.0 562CT-E 562CT-E 562CT-E 562CT-E 2244AT7 20.0 22.4 802CT-E 802CT-E 802CT-E 802CT-E 2804AT7 23.0 27.
0 3 phase 380 415V 50Hz 3 phase 380V 60Hz 13.0/11.2/10.0 18.5/16.7/14.6 13.0/11.2/10.0 18.

5/16.7/14.6 60 36 / 33 / 30 51 / 48 / 45 60 38 / 36 / 33 53 / 51 / 48 60 36 / 33 / 30 51 / 48 / 45 60 38 / 36 / 33 53 / 51 / 48 Cooling / Heating Cooling / Heating : IEC standard 22 1-1-12. High Wall Type <Double twin type> Indoor unit 1 Indoor unit 2 Model Indoor unit 3 Indoor unit 4 Outdoor unit Cooling capacity Heating capacity Power supply Indoor unit Running current Power consumption Cooling Power factor EER Energy efficiency class Electrical characteristics Running current Power consumption Heating Power factor COP Energy efficiency class Maximum current Fan Fan unit Standard air flow Motor Sound pressure level Sound power level H/M/L H/M/L H/M/L (m³/min.) (W) (dB-A) (dB-A) Outdoor unit Max.



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total length Min. length Outer dimension Outdoor lower Height difference Outdoor high Fan Fan unit Standard air flow high Motor Outdoor unit First pipe
branch Connecting pipe First pipe branch Second pipe branch Second pipe branch Indoor unit Sound pressure level Sound power level Gas side Liquid side
Gas side Liquid side Gas side Liquid side (m³/min.) (W) (mm) (mm) (mm) (mm) (mm) (dB-A) (dB-A) (m) 30 Propeller fan 133 100 + 100 28.6 12.7 15.
9 9.5 12.7 6.4 56 / 57 72 / 74 30 Propeller fan 133 100 + 100 28.6 12.
7 15.9 9.5 12.7 9.5 57 / 58 74 / 75 30 Propeller fan 133 100 + 100 28.
6 12.7 15.9 9.5 12.7 6.4 56 / 57 72 / 74 30 Propeller fan 133 100 + 100 28.6 12.7 15.9 9.5 12.

7 9.5 57 / 58 74 / 75 (m) 30 30 30 30 (m) (m) 70 7.5 70 7.5 70 7.5 70 7.5 (A) (A) (kW) (%) (A) (kW) (%) 11.51 10.54 15.44 14.13 7.
12 94 2.81 C 10.34 9.47 6.40 94 3.
50 B 18 9.55 94 2.41 E 12.80 11.72 7.
92 94 3.41 B 22 11.51 7.12 94 2.81 -- 10.34 6.40 94 3.50 -- 18 15.44 9.55 94 2.

41 -- 12.80 7.92 94 3.41 -- 22 RAV-SM RAV-SM RAV-SM RAV-SM RAV-SM (kW) (kW) 562KRT-E 562KRT-E 562KRT-E 562KRT-E 2244AT8-E 20.0 22.4
802KRT-E 802KRT-E 802KRT-E 802KRT-E 2804AT8-E 23.0 27.0 562KRT-E 562KRT-E 562KRT-E 562KRT-E 2244AT7 20.0 22.4 802KRT-E 802KRT-E
802KRT-E 802KRT-E 2804AT7 23.

0 27.0 3 phase 380 415V 50Hz 3 phase 380V 60Hz Cross flow fan Cross flow fan Cross flow fan Cross flow fan 14.0/12.5/10.7 18.
5/14.6/12.2 14.0/12.5/10.

7 18.5/14.6/12.2 30 39 / 36 / 33 54 / 51 / 48 30 45 / 41 / 36 60 / 56 / 51 30 39 / 36 / 33 54 / 51 / 48 30 45 / 41 / 36 60 / 56 / 51 Cooling / Heating Cooling /
Heating : IEC standard 23 1-2. Outdoor Unit Model Power supply Type Compressor Motor Pole Refrigerant charged Refrigerant control Max. total length
Min. length Pipe Outdoor lower Height difference Outdoor higher Height Outer dimension Width Depth Appearance Total weight Heat exchanger Fan Fan
unit Standard air flow Motor Connecting pipe (Outdoor unit side) Sound pressure level Sound power level Gas side Liquid side Cooling/Heating
Cooling/Heating (m³/min.) (W) (mm) (mm) (dB-A) (dB-A) (°C) (°C) (kg) (m) (mm) (mm) (mm) 30 1540 900 320 30 1540 900 320 30 1540 900 320 30 1540
900 320 (m) 30 30 30 30 (m) (m) (kg) (kW) Outdoor unit RAV-SM 2244AT8-E 2804AT8-E 2244AT7 2804AT7 1 phase 380 415V 50Hz 1 phase 380V 60Hz
(Power exclusive to outdoor is required.) Hermetic compressor 3.75 4 5.

9 3.75 4 5.9 Hermetic compressor 3.75 4 5.9 3.75 4 5.9 Pulse motor valve 70 7.5 70 7.5 Pulse motor valve 70 7.5 70 7.

5 Silky shade (Muncel 1Y8.5/0.5) 134 134 Silky shade (Muncel 1Y8.5/0.5) 134 134 Finned tube Propeller fan 133 100 + 100 19.

1 12.7 56 / 57 72 / 74 133 100 + 100 19.1 12.7 57 / 58 74 / 75 Finned tube Propeller fan 133 100 + 100 19.1 12.

7 56 / 57 72 / 74 133 100 + 100 19.1 12.7 57 / 58 74 / 75 Outside air temperature, Cooling Outside air temperature, Heating 46 to 15°C 15 to 20°C 46 to -
15°C 15 to 20°C 24 1-3. Operation Characteristic Curve · Operation characteristic curve <Digital Inverter> RAV-SM2244AT8 (Z) (ZG) -E, RAV-
SM2804AT8 (Z) (ZG) -E <Cooling> 18 16 14 12 <Heating> 18 16 SM280 SM280 14 12 Current (A) 10 8 6 4 2 0 Current (A) 10 SM224 8 6 4 2 0 SM224 ·
Conditions Indoor : DB27°C/WB19°C Outdoor : DB35°C Air flow : High Pipe length : 7.5m 400V, 50Hz (3 phase) · Conditions Indoor : DB20°C Outdoor :
DB7°C/WB6°C Air flow : High Pipe length : 7.5m 400V, 50Hz (3 phase) 0 20 40 60 80 100 0 20 40 60 80 100 Compressor speed (rps) Compressor speed
(rps) RAV-SM2244AT7 (Z) (ZG), RAV-SM2804AT7 (Z) (ZG) <Cooling> 18 16 14 12 <Heating> 18 16 SM280 SM280 14 12 Current (A) Current (A) 10 8 6 4
2 0 10 8 6 4 2 0 SM224 SM224 · Conditions Indoor : DB27°C/WB19°C Outdoor : DB35°C Air flow : High Pipe length : 7.5m 380V, 60Hz (3 phase) ·
Conditions Indoor : DB20°C Outdoor : DB7°C/WB6°C Air flow : High Pipe length : 7.5m 380V, 60Hz (3 phase) 0 20 40 60 80 100 0 20 40 60 80 100
Compressor speed (rps) Compressor speed (rps) 25 · Capacity variation ratio according to temperature RAV-SM2244AT8 (Z) (ZG) -E, RAV-SM2804AT8 (Z)
(ZG) -E RAV-SM2244AT7 (Z) (ZG), RAV-SM2804AT7 (Z) (ZG) <Cooling> 105 100 95 90 <Heating> 120 110 100 90 Capacity ratio (%) 85 80 75 70 65 60
55 · Conditions Indoor : DB27°C/WB19°C Indoor air flow : High Pipe length : 7.5m Capacity ratio (%) 80 70 60 50 40 30 20 10 0 -20 -18 -16 -14 -12 -10 -8
-6 -4 -2 0 2 4 6 8 10 · Conditions Indoor : DB20°C Indoor air flow : High Pipe length : 7.5m 50 32 33 34 35 36 37 38 39 40 41 42 43 44 45 46 Outdoor temp.

(°C) Outdoor temp. (°C) 26 2. CONSTRUCTION VIEWS (EXTERNAL VIEWS) 2-1. Outdoor Unit 27 RBC-DTWP101E (Simultaneous Double Twin)

<Branch pipe> <Joint pipe> Inner diameter ØC Outer diameter Ø25.4 Inner diameter ØD B Inner diameter ØD 24 A 22 Inner diameter Ø28.6 1 pc. Model
A 74 Gas side 42 43 B 37 23 23 18 14 14 C 25.4 15.9 15.9 12.

7 9.5 9.5 D 15.9 15.9 12.

7 9.5 9.5 6.4 Q'ty 1 2 2 1 2 2 RBC-DTWP101E 35 Liquid side 34 36 28 54 RBC-TRP100E (Simultaneous Triple) <Gas side> Header assembly 300 100
Inner diameter Ø25.4 80 80 Inner diameter Ø15.

9 1 pc. <Liquid side> Branch pipe assembly 100 Inner diameter Ø12.7 35 80 80 Inner diameter Ø9.52 1 pc. Insulator Gas side socket Outer diameter Ø25.4
Liquid side socket Ø15.9 Ø12.7 12 10 Ø6.4 24 54 6 24 26 9 28 46 Ø15.9 (External diameter) Ø25.

4 (External diameter) Inner diameter Ø28.6 22 Ø9.5 (External diameter) 100 Ø9.5 Ø12.7 (External diameter) 3 pcs. 1 pc. 1 pc. 3 pcs. 1 pc. 29 100 RBC-
TWP101E (Simultaneous Twin) <Branch pipe> <Joint pipe> Inner diameter ØC Outer diameter Ø25.

4 Inner diameter ØD B Inner diameter ØD 24 A 22 Inner diameter Ø28.6 1 pc. Model Gas side RBC-TWP101E Liquid side A 74 35 B 37 18 C 25.4 12.7 D
15.

9 9.5 Q'ty 1 1 30 54 3. OUTDOOR UNIT REFRIGERANTING CYCLE DIAGRAM RAV-SM2244AT8 (Z) (ZG) -E, RAV-SM2804AT8 (Z) (ZG) -E RAV-
SM2244AT7 (Z) (ZG), RAV-SM2804AT7 (Z) (ZG) Solenoid valve Check joint High-pressure side TO sensor Muffler Ø45 × 230 L Check valve P Pressure
switch TL sensor 4-way valve Check joint Low-pressure side TD sensor P Pressure sensor Heat exchanger Ø8, 2 rows, 60 stages + Ø9.5, 1 row, 60 stages
13-13 pass + under cool pass TS sensor TE sensor Distributor Liquid tank Ø45 × 420 L Accumulator (8500cc) Ø161.



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6 PMV 1 Packed valve Ø12.

7 PMV 2 Compressor DA550A3F-11M : Cooling : Heating : Strainer Ball valve Ø19.1 31 Systematic diagram of refrigerating cycle RAV-SM2244 series Pressure (MPa) Pd Standard Cooling Overload Low load Standard Heating Overload Low load 3.14 3.54 1.65 2.60 3.24 2.05 Ps 0.88 1.14 0.

65 0.67 1.08 0.31 (kg/cm²g) Pd 32.0 36.1 16.8 26.5 33.1 20.9 Ps 9.
0 11.6 6.6 6.8 11.0 3.

2 Discharge (TD) 84 88 41 73 77 76 Pipe surface temperature (°C) Suction (TS) 14 17 7 2 14 12 Indoor heat exchanger (TC) 10 16 5 42 52 34 Compressor Outdoor heat drive revolution frequency exchanger (rps) (TE) Indoor fan Indoor/Outdoor temp. conditions (DB/WB) (°C) Indoor HIGH HIGH LOW HIGH LOW HIGH 27/19 32/24 18/15.5 20/ 30/ 15/ Outdoor 35/ 43/ 15/ 7/6 24/18 10/(70%) 37 46 0 2 13 11 64 62 36 66 36 75 This compressor has a 4-pole motor. The value when compressor frequency (Hz) is measured by a clamp meter is twice the compressor revolution number (rps). This data is cycle data obtained by combining a four-way ceiling cassette simultaneous twin at a target pipe length.

Data will change depending on the mounted pipe length or combination with the indoor unit. RAV-SM2804 series Pressure (MPa) Pd Standard Cooling Overload Low load Standard Heating Overload Low load 3.15 3.62 1.66 2.85 3.26 2.05 Ps 0.79 1.12 0.

64 0.63 1.06 0.29 (kg/cm²g) Pd 32.1 36.9 16.9 29.1 33.3 20.9 Ps 8.
1 11.4 6.5 6.4 10.8 3.

0 Discharge (TD) 87 89 42 80 78 81 Pipe surface temperature (°C) Suction (TS) 11 18 6 1 14 13 Indoor heat exchanger (TC) 9 16 5 47 53 33 Compressor Outdoor heat drive revolution frequency exchanger (rps) (TE) Indoor fan Indoor/Outdoor temp. conditions (DB/WB) (°C) Indoor HIGH HIGH LOW HIGH LOW HIGH 27/19 32/24 18/15.5 20/ 30/ 15/ Outdoor 35/ 43/ 15/ 7/6 24/18 10/(70%) 41 48 0 2 12 12 80 64 36 80 36 96 This compressor has a 4-pole motor. The value when compressor frequency (Hz) is measured by a clamp meter is twice the compressor revolution number (rps). This data is cycle data obtained by combining a four-way ceiling cassette simultaneous twin at a target pipe length.

Data will change depending on the mounted pipe length or combination with the indoor unit. 32 4. WIRING DIAGRAM 4-1. Outdoor Unit RAV-SM2244AT8 (Z) (ZG) -E, RAV-SM2804AT8 (Z) (ZG) -E RAV-SM2244AT7 (Z) (ZG), RAV-SM2804AT7 (Z) (ZG) Noise Filter P.C. board MCC-1600 Compressor IPDU board MCC-1596 Fan IPDU board MCC-1597 Interface (CDB) P.C. board MCC-1599 MCC-1436 33 5. SPECIFICATIONS OF ELECTRICAL PARTS 5-1. Outdoor Unit RAV-SM2244AT8 (Z) (ZG) -E, RAV-SM2804AT8 (Z) (ZG) -E RAV-SM2244AT7 (Z) (ZG), RAV-SM2804AT7 (Z) (ZG) No.

1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20 21 22 23 24 25 26 27 28 29 30 31 Compressor Outdoor fan motor 4-way valve coil 4-way valve coil (for AT7) 2-way valve coil 2-way valve coil (for AT7) PMV coil High pressure switch Reactor Reactor Reactor P board (Compressor drive) .C. P board (Fan motor drive) .C. P board (Control) .C. P board (Noise filter) .C. P board (Fan extension) .C.

Outdoor temp. sensor (TO sensor) Discharge temp. sensor (TD sensor) Suction temp. sensor (TS sensor) Heat exchanger sensor (TE sensor) Heat exchanger mid. temp.

sensor (TL sensor) Fuse Fuse (Mounted on P.C. board, MCC-1596) Fuse (Mounted on P.C. board, MCC-1596) Fuse (Mounted on P.

C. board, MCC-1597) Fuse (Mounted on P.C. board, MCC-1597) Fuse (Mounted on P.C. board, MCC-1599) Fuse (Mounted on P.C. board, MCC-1600)

Relay Posistor Compressor thermo. Parts name Type DA550A3F-11M ICF-280-A100-1 STF-01AJ502E1 VHV-01AH553A1 VPV-MOAJ524C0 VPV-MOAH551B1 UKV-25D22 ACB-4UB83W CH-44 CH-68 CH-56 MCC-1596 MCC-1597 MCC-1599 MCC-1600 MCC-1436 --- --- --- --- --- TLC 25A GAC1 31.5A SCT 31.

5A GDM 250V 15A SCT 31.5A FJL 250V 31.5A ET 6.3A EL200/240A2-F(M) ZPR0YCE 101A 500 US-622 10 k at 25°C 50 k at 25°C 10 k at 25°C 10 k at 25°C 25 A, 250 V T3.15 A, AC 250 V 15 A, 250 V T3.15 A, AC 250 V T3.15 A, AC 250 V T6.3 A, AC 250 V Contact : AC 480 V, 20A 100 , 500 V OFF : 125 ± 4 °C, ON : 60 ± 5 °C Specifications -- DC 280 V, 100 W AC 220 240 V, 50 Hz AC 220 240 V, 60 Hz AC 220 240 V, 50 Hz AC 220 V, 60 Hz DC 12 V OFF : 4.15 MPa l.

4 mH, 25 A 18 mH, 5 A 5.8 mH, 18.5 A --- --- --- --- --- 34 6. REFRIGERANT R410A This air conditioner adopts the new refrigerant HFC (R410A) which does not damage the ozone layer. The working pressure of the new refrigerant R410A is 1.

6 times higher than conventional refrigerant (R22). The refrigerating oil is also changed in accordance with change of refrigerant, so be careful that water, dust, and existing refrigerant or refrigerating oil are not entered in the refrigerant cycle of the air conditioner using the new refrigerant during installation work or servicing time. The next section describes the precautions for air conditioner using the new refrigerant. Conforming to contents of the next section together with the general cautions included in this manual, perform the correct and safe work. 6.

When an air conditioning system charged with a large volume of refrigerant is installed in a small room, it is necessary to exercise care so that, even when refrigerant leaks, its concentration does not exceed the marginal level. If the refrigerant gas leakage occurs and its concentration exceeds the marginal level, an oxygen starvation accident may result. 7. Be sure to carry out installation or removal according to the installation manual. Improper installation may cause refrigeration trouble, water leakage, electric shock, fire, etc. 8. Unauthorized modifications to the air conditioner may be dangerous. If a breakdown occurs please call a qualified air conditioner technician or electrician. Improper repair may result in water leakage, electric shock and fire, etc. 6-1.

Safety During Installation/Service As R410A's pressure is about 1.6 times higher than that of R22, improper installation/service may cause a serious trouble. By using tools and materials exclusive for R410A, it is necessary to carry out installation/service safely while taking the following precautions into consideration. 1. Never use refrigerant other than R410A in an air conditioner which is designed to operate with R410A. If other refrigerant than R410A is mixed, pressure in the refrigeration cycle becomes abnormally high, and it may cause personal injury, etc. by a rupture. 2. Confirm the used refrigerant name, and use tools and materials exclusive for the refrigerant R410A. The refrigerant name R410A is indicated on the visible place of the outdoor unit of the air conditioner using R410A as refrigerant.

To prevent mischarging, the diameter of the service port differs from that of R22. 3. If a refrigeration gas leakage occurs during installation/service, be sure to ventilate fully. If the refrigerant gas comes into contact with fire, a poisonous gas may occur.



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When installing or removing an air conditioner, do not allow air or moisture to remain in the refrigeration cycle. Otherwise, pressure in the refrigeration cycle may become abnormally high so that a rupture or personal injury may be caused. 5. After completion of installation work, check to make sure that there is no refrigeration gas leakage. If the refrigerant gas leaks into the room, coming into contact with fire in the fan-driven heater, space heater, etc., a poisonous gas may occur. 6-2. Refrigerant Piping Installation 6-2-1. Piping Materials and Joints Used For the refrigerant piping installation, copper pipes and joints are mainly used. Copper pipes and joints suitable for the refrigerant must be chosen and installed. Furthermore, it is necessary to use clean copper pipes and joints whose interior surfaces are less affected by contaminants. 1. Copper Pipes It is necessary to use seamless copper pipes which are made of either copper or copper alloy and it is desirable that the amount of residual oil is less than 40 mg/10 m. Do not use copper pipes having a collapsed, deformed or discolored portion (especially on the interior surface). Otherwise, the expansion valve or capillary tube may become blocked with contaminants.

As an air conditioner using R410A incurs pressure higher than when using R22, it is necessary to choose adequate materials. Thicknesses of copper pipes used with R410A are as shown in Table 6-2-1. Never use copper pipes thinner than 0.8mm even when it is available on the market. NOTE Refer to the "6-6. Instructions for Re-use Piping of R22 or R407C".

Table 6-2-1 Thicknesses of annealed copper pipes	Thickness (mm)	Nominal diameter			
1/4	3/8	1/2	5/8		
Outer diameter (mm)	6.4	9.5	12.7	15.	
9 R410A	0.80	0.80	0.80	1.00	R22 0.

80 0.80 0.80 1.00 1. 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. In such a case, socket joints can be used. Sizes of flare pipe ends, flare joint ends and flare nuts are as shown in Tables 6-2-3 to 6-2-5 below. b) Socket Joints Socket joints are such that they are brazed for connections, and used mainly for thick pipings whose diameter is larger than 20 mm. Thicknesses of socket joints are as shown in Table 6-2-2. Table 6-2-2 Minimum thicknesses of socket joints

Nominal diameter	1/4	3/8	1/2	5/8	Reference
outer diameter of copper pipe jointed (mm)	6.4	9.5	12.7	15.	

9 Minimum joint thickness (mm) 0.50 0.60 0.70 0.80 6-2-2. Processing of Piping Materials When performing the refrigerant piping installation, care should be taken to ensure that water or dust does not enter the pipe interior, that no other oil other than lubricating oils used in the installed air conditioner is used, and that refrigerant does not leak. When using lubricating oils in the piping processing, use such lubricating oils whose water content has been removed. When stored, be sure to seal the container with an airtight cap or any other cover. 1. Flare Processing Procedures and Precautions a) Cutting the Pipe By means of a pipe cutter, slowly cut the pipe so that it is not deformed.

b) Removing Burrs and Chips If the flared section has chips or burrs, refrigerant leakage may occur. Carefully remove all burrs and clean the cut surface before installation. 36 c) Insertion of Flare Nut d) Flare Processing Make certain that a clamp bar and copper pipe have been cleaned. By means of the clamp bar, perform the flare processing correctly. Use either a flare tool for R410A or conventional flare tool.

Flare processing dimensions differ according to the type of flare tool. When using a conventional flare tool, be sure to secure "dimension A" by using a gauge for size adjustment. ØD A Fig. 6-2-1 Flare processing dimensions Table 6-2-3 Dimensions related to flare processing for R410A / R22

A (mm)	Nominal diameter	Outer diameter (mm)	Thickness (mm)	Flare tool for R410A, R22	Clutch type
0 to 0.5	0 to 0.5	0 to 0.5	0 to 0.5	Conventional flare tool (R410A)	Clutch type 1.0 to 1.5
1.0 to 1.5	1.0 to 1.5	1.0 to 1.5	1.0 to 1.5	Wing nut type	1.5 to 2.0
2.0 to 2.5	2.0 to 2.5	2.0 to 2.5	2.0 to 2.5	Conventional flare tool (R22)	Clutch type 0.5 to 1.0
0.5 to 1.0	0.5 to 1.0	0.5 to 1.0	0.5 to 1.0	Wing nut type	1.0 to 1.5
1.5 to 2.0	1.5 to 2.0	1.5 to 2.0	1.5 to 2.0	Wing nut type	1.5 to 2.0

5 to 1.0 -- Wing nut type 1.0 to 1.5 1.0 to 1.5 1.5 to 2.0 1.5 to 2.0 -- 1/4 3/8 1/2 5/8 3/4 6.

4 9.5 12.7 15.9 19.1 0.8 0.8 0.8 1.0 1.2 Table 6-2-4 Flare and flare nut dimensions for R410A

Nominal diameter	1/4	3/8	1/2	5/8	3/4	Outer diameter (mm)
6.	4	9.5	12.7	15.9	19.1	Thickness (mm) 0.
8	0.8	0.8	1.0	1.2	Dimension (mm) A	9.
1	13.2	16.6	19.7	24.0	B	9.2 13.5 16.0 19.0 -- C 6.5 9.

7 12.9 16.0 19.2 D 13 20 23 25 28 Flare nut width (mm) 17 22 26 29 36 Table 6-2-5 Flare and flare nut dimensions for R22

Nominal diameter	1/4	3/8	1/2	5/8	3/4	Outer diameter (mm)
6.4	9.5	12.7	15.9	19.1	Thickness (mm) 0.8 0.	
8	0.8	1.0	1.0	Dimension (mm) A	9.1 13.	
0	16.2	19.4	23.3	B	9.2 13.	

5 16.0 19.0 24.0 C 6.5 9.7 12.9 16.0 19.2 D 13 20 20 23 34 Flare nut width (mm) 17 22 24 27 36 37 45° to 4 6° A B C D 43° to 4 5° Fig. 6-2-2 Relations between flare nut and flare seal surface 2.

Flare Connecting Procedures and Precautions a) Make sure that the flare and union portions do not have any scar or dust, etc. b) Correctly align the processed flare surface with the union axis. c) Tighten the flare with designated torque by means of a torque wrench. The tightening torque for R410A is the same as that for conventional R22. Incidentally, when the torque is weak, the gas leakage may occur. When it is strong, the flare nut may crack and may be made non-removable. When choosing the tightening torque, comply with values designated by manufacturers. Table 6-2-6 shows reference values. NOTE When applying oil to the flare surface, be sure to use oil designated by the manufacturer. If any other oil is used, the lubricating oils may deteriorate and cause the compressor to burn out.

Table 6-2-6 Tightening torque of flare for R410A [Reference values]

Nominal diameter	1/4	3/8	1/2	5/8	3/4	Outer diameter (mm)
6.4	9.5	12.7	15.9	19.	1	Tightening torque N·m (kgf·m) 14 to 18 (1.4 to 1.8) 33 to 42 (3.3 to 4.2) 50 to 62 (5.0 to 6.2) 63 to 77 (6.3 to 7.7) 100 to 120 (10.0 to 12.0)
Tightening torque of torque wrenches available on the market	N·m (kgf·m) 16 (1.6), 18 (1.8) 42 (4.2) 55 (5.5) 65 (6.					

5) ---- 38 6-3. Tools 6-3-1. Required Tools Refer to the "4. Tools" (Page 8) 6-4. 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. Connect the charge hose to packed valve service port at the outdoor unit's gas side. 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.



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Connect the charge hose of the vacuum pump adapter.

Keep the status as it is for 1 to 2 minutes, and ensure that the compound gauge's pointer does not return. Open fully both packed valves at liquid and gas sides. Set the refrigerant cylinder to the electronic balance, connect the connecting hose to the cylinder and the connecting port of the electronic balance, and charge liquid refrigerant. (For refrigerant charging, see the figure below.) Place the handle of the gauge manifold Low in the fully opened position, and turn on the vacuum pump's power switch.

Then, evacuating the refrigerant in the cycle. 1) Never charge refrigerant exceeding the specified amount. 2) If the specified amount of refrigerant cannot be charged, charge refrigerant bit by bit in COOL mode. 3) Do not carry out additional charging. When additional charging is carried out if refrigerant leaks, the refrigerant composition changes in the refrigeration cycle, that is characteristics of the air conditioner changes, refrigerant exceeding the specified amount is charged, and working pressure in the refrigeration cycle becomes abnormally high pressure, and may cause a rupture or personal injury.

(INDOOR unit) (Liquid side) (OUTDOOR unit) Opened (Gas side) Refrigerant cylinder (With siphon pipe) Check valve Closed Open/Close valve for charging Service port Electronic balance for refrigerant charging Fig. 6-4-1 Configuration of refrigerant charging 39 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. [Cylinder with siphon] Gauge manifold OUTDOOR unit [Cylinder without siphon] Gauge manifold OUTDOOR unit Refrigerant cylinder Electronic balance R410A refrigerant is HFC mixed refrigerant. Therefore, if it is charged with gas, the composition of the charged refrigerant changes and the characteristics of the equipment varies. Fig. 6-4-2 6-5. Brazing of Pipes 6-5-1.

Materials for Brazing 1. Silver brazing filler Silver brazing filler is an alloy mainly composed of silver and copper. It is used to join iron, copper or copper alloy, and is relatively expensive though it excels in solderability. 1) Phosphor bronze brazing filler tends to react with sulfur and produce a fragile compound water solution, which may cause a gas leakage. Therefore, use any other type of brazing filler at a hot spring resort, etc., and coat the surface with a paint. 2) When performing brazing again at time of servicing, use the same type of brazing filler. 2. Phosphor bronze brazing filler Phosphor bronze brazing filler is generally used to join copper or copper alloy. 6-5-2.

Flux 1. Reason why flux is necessary · By removing the oxide film and any foreign matter on the metal surface, it assists the flow of brazing filler. · In the brazing process, it prevents the metal surface from being oxidized. · By reducing the brazing filler's surface tension, the brazing filler adheres better to the treated metal. 3.

Low temperature brazing filler Low temperature brazing filler is generally called solder, and is an alloy of tin and lead. Since it is weak in adhesive strength, do not use it for refrigerant pipes. 40 Refrigerant cylinder Electronic balance Siphon 2. Characteristics required for flux · Activated temperature of flux coincides with the brazing temperature. · Due to a wide effective temperature range, flux is hard to carbonize.

· It is easy to remove slag after brazing. · The corrosive action to the treated metal and brazing filler is minimum. · It excels in coating performance and is harmless to the human body. As the flux works in a complicated manner as described above, it is necessary to select an adequate type of flux according to the type and shape of treated metal, type of brazing filler and brazing method, etc. 6-5-3. Brazing As brazing work requires sophisticated techniques, experiences based upon a theoretical knowledge, it must be performed by a person qualified. In order to prevent the oxide film from occurring in the pipe interior during brazing, it is effective to proceed with brazing while letting dry Nitrogen gas flow. Never use gas other than Nitrogen gas. 1. Brazing method to prevent oxidation 1) Attach a reducing valve and a flow-meter to the Nitrogen gas cylinder.

2) Use a copper pipe to direct the piping material, and attach a flow-meter to the cylinder. 3) Apply a seal onto the clearance between the piping material and inserted copper pipe for Nitrogen in order to prevent backflow of the Nitrogen gas. 4) When the Nitrogen gas is flowing, be sure to keep the piping end open. 5) Adjust the flow rate of Nitrogen gas so that it is lower than 0.05 m³/Hr or 0.02 MPa (0.2kgf/cm²) by means of the reducing valve. 6) After performing the steps above, keep the Nitrogen gas flowing until the pipe cools down to a certain extent (temperature at which pipes are touchable with hands). 7) Remove the flux completely after brazing. 3.

Types of flux · Noncorrosive flux Generally, it is a compound of borax and boric acid. It is effective in case where the brazing temperature is higher than 800°C. · Activated flux Most of fluxes generally used for silver brazing are this type. It features an increased oxide film removing capability due to the addition of compounds such as potassium fluoride, potassium chloride and sodium fluoride to the borax-boric acid compound. 4.

Piping materials for brazing and used brazing filler/flux Piping material Copper - Copper Copper - Iron Iron - Iron Used brazing filler Phosphor copper Silver Silver Used flux Do not use Paste flux Vapor flux M Flow meter Stop valve Nitrogen gas cylinder From Nitrogen cylinder 1) Do not enter flux into the refrigeration cycle. 2) When chlorine contained in the flux remains within the pipe, the lubricating oil deteriorates. Therefore, use a flux which does not contain chlorine. 3) When adding water to the flux, use water which does not contain chlorine (e.g. distilled water or ion-exchange water). 4) Remove the flux after brazing. Pipe Nitrogen gas Rubber plug Fig. 6-5-1 Prevention of oxidation during brazing 41 6-6. Instructions for Re-use Piping of R22 or R407C Instruction of Works: The existing R22 and R407C piping can be reused for our digital inverter R410A products installations. 5. A dryer on the market is attached to the existing pipes. · There is possibility that copper green rust generated. 6. Check the oil when the existing air conditioner was removed after refrigerant had been recovered.



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