TECHNICAL DATA & SERVICE MANUAL

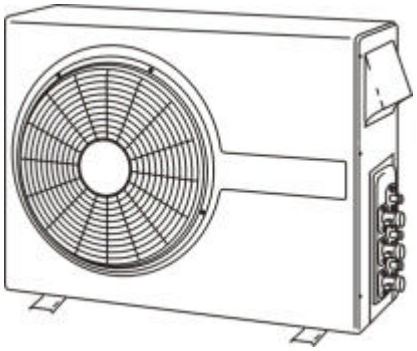
Outdoor Unit
AER522QC

Dual System Kit
DKR-5555C

Euro-Line®

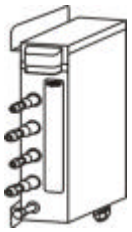
MULTI-SPLIT SYSTEM AIR CONDITIONER

Outdoor Unit



AER522QC

Dual System Kit



DKR-5555C

0.8180.130.0 02/2001

Important!

Please Read Before Starting

This air conditioning system meets strict safety and operating standards. As the installer or service person, it is an important part of your job to install or service the system so it operates safely and efficiently.

For safe installation and trouble-free operation, you must:

- Carefully read this instruction booklet before beginning.
- Follow each installation or repair step exactly as shown.
- Observe all local, state, and national electrical codes.
- Pay close attention to all warning and caution notices given in this manual.

WARNING **This symbol refers to a hazard or unsafe practice which can result in severe personal injury or death.**

CAUTION **This symbol refers to a hazard or unsafe practice which can result in personal injury or product or property damage.**

If Necessary, Get Help

These instructions are all you need for most installation sites and maintenance conditions. If you require help for a special problem, contact our sales/service outlet or your certified dealer for additional instructions.

In Case of Improper Installation

The manufacturer shall in no way be responsible for improper installation or maintenance service, including failure to follow the instructions in this document.

Special Precautions

WARNING When Wiring

ELECTRICAL SHOCK CAN CAUSE SEVERE PERSONAL INJURY OR DEATH. ONLY A QUALIFIED, EXPERIENCED ELECTRICIAN SHOULD ATTEMPT TO WIRE THIS SYSTEM.

- Do not supply power to the unit until all wiring and tubing are completed or reconnected and checked.
- Highly dangerous electrical voltages are used in this system. Carefully refer to the wiring diagram and these instructions when wiring. Improper connections and inadequate grounding can cause accidental injury or death.
- Ground the unit following local electrical codes.
- Connect all wiring tightly. Loose wiring may cause overheating at connection points and a possible fire hazard.

When Transporting

Be careful when picking up and moving the indoor and outdoor units. Get a partner to help, and bend your knees when lifting to reduce strain on your back. Sharp edges or thin aluminum fins on the air conditioner can cut your fingers.

When Installing…

…In a Ceiling or Wall

Make sure the ceiling/wall is strong enough to hold the unit's weight. It may be necessary to construct a strong wood or metal frame to provide added support.

…In a Room

Properly insulate any tubing run inside a room to prevent "sweating" that can cause dripping and water damage to walls and floors.

…In Moist or Uneven Locations

Use a raised concrete pad or concrete blocks to provide a solid, level foundation for the outdoor unit. This prevents water damage and abnormal vibration.

…In an Area with High Winds

Securely anchor the outdoor unit down with bolts and a metal frame. Provide a suitable air baffle.

…In a Snowy Area (for Heat Pump-type Systems)

Install the outdoor unit on a raised platform that is higher than drifting snow. Provide snow vents.

When Connecting Refrigerant Tubing

- Use the flare method for connecting tubing.
- Apply refrigerant lubricant to the matching surfaces of the flare and union tubes before connecting them, then tighten the nut with a torque wrench for a leak-free connection.
- Check carefully for leaks before starting the test run.

When Servicing

- Turn the power off at the main power box (mains) before opening the unit to check or repair electrical parts and wiring.
- Keep your fingers and clothing away from any moving parts.
- Clean up the site after you finish, remembering to check that no metal scraps or bits of wiring have been left inside the unit being serviced.

Others

CAUTION

- Ventilate any enclosed areas when installing or testing the refrigeration system. Escaped refrigerant gas, on contact with fire or heat, can produce dangerously toxic gas.
- Confirm upon completing installation that no refrigerant gas is leaking. If escaped gas comes in contact with a stove, gas water heater, electric room heater or other heat source, it can produce dangerously toxic gas.

Table of Contents

■ Unit Combination

Combine indoor and outdoor units only as listed below.

Outdoor Unit	Dual System Kit (Option)	Indoor Unit	Symbol of Indoor Unit	Refer to
AER522QC	—	AWR509CL	A	Fig.1
		AWR509CL	B	
	NON	AWR509CL	C	
	—	AWR509CL	A	Fig.2
		AWR509CL	B	
	DKR-5555C	AWR509CL	C1	
		AWR509CL	C2	

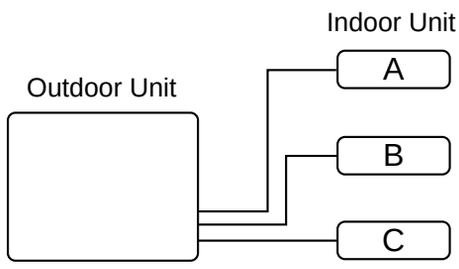


Fig.1

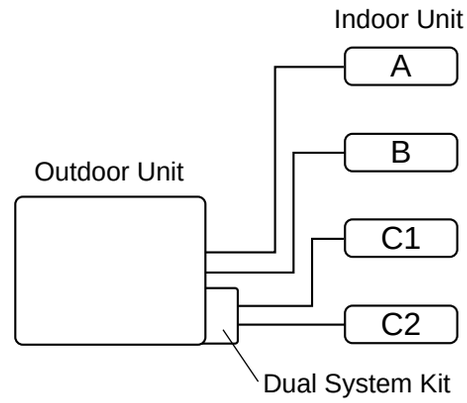


Fig.2

1. OPERATING RANGE

	Temperature	Indoor Air Intake Temp.	Outdoor Air Intake Temp.
Cooling	Maximum	32°C D.B. / 23°C W.B.	43°C D.B.
	Minimum	19°C D.B. / 14°C W.B.	19°C D.B.

2. SPECIFICATIONS

2-1. Unit Specifications

Outdoor Unit AER522QC

Symbol of indoor unit				A , B , C : AWR509CL		
Power Source				220 – 240 V ~ 50 Hz		
Performance				Cooling		
	Max.Capacity		kW	5.5		
			BTU/h	20,000		
	Indoor unit(s)			A + B	C	A + B + C
	Capacity		kW	3	2.5	5.5
			BTU/h	10,900	9,000	20,000
Electrical Rating	Voltage rating		V	230		
	Available voltage range		V	198 to 264		
	Running amperes		A	5.0	4.2	9.2
	Power input		W	1,100	1,000	2000
	Power factor		%	95	95	95
	C.O.P.		W/ W	2.7	2.5	2.8
	Compressor locked rotor amperes		A	24	24	48
Features	Fan speed			1		
	Compressor			Rotary (Hermetic)		
	Refrigerant / Amount charged at shipment		g	R407c / A + B : 950 C : 950		
	Refrigerant control			Capillary tube		
	Operation sound		dB-A	54		
	Refrigerant tubing connections			Flare type		
	Max. allowable tubing length at shipment		m	A + B : 15 C : 7.5		
	Refrigerant tube diameter	Narrow tube	mm (in.)	A , B , C : 6.35 (1/4)		
		Wide tube	mm (in.)	A , B , C : 9.52 (3/8)		
	Refrigerant tube kit			Optional		
	Dual system kit			Non		
Dimensions & Weight				AER522QC		
	Unit dimensions	Height	mm	630		
		Width	mm	830		
		Depth	mm	305		
	Package dimensions	Height	mm	713		
		Width	mm	994		
		Depth	mm	413		
	Weight	Net	kg	61.0		
		Shipping	kg	66.0		
	Shipping volume		m^3	0.29		

DATA SUBJECT TO CHANGE WITHOUT NOTICE.

Remarks: Rating conditions are:
Indoor air temperature 27°C D.B. / 19°C W.B.
Outdoor air temperature 35°C D.B. / 24°C W.B.

Outdoor Unit AER522QC with DKR-5555C(Option)

Symbol of indoor unit				A , B , C1 , C2 : AWR509CL		
Power Source				220 – 240 V ~ 50 Hz		
Performance				Cooling		
	Max.Capacity		kW	5.6		
			BTU/h	20000		
	Indoor unit(s)			A + B	C1 + C2	A + B + C1 + C2
	Capacity		kW	3	2.85	5.60
			BTU/h	10900	10000	20000
Electrical Rating	Voltage rating		V	230		
	Available voltage range		V	198 to 264		
	Running amperes		A	5	5	9.6
	Power input		W	1100	1100	2100
	Power factor		%	95	95	95
	C.O.P.		W/W	2.7	2.6	2.7
	Compressor locked rotor amperes		A	24	24	48
Features	Fan speed			1		
	Compressor			Rotary (Hermetic)		
	Refrigerant / Amount charged at shipment		g	R407c / A + B :950 C1 + C2 :950		
	Refrigerant control			Capillary tube		
	Operation sound		dB-A	54		
	Refrigerant tubing connections			Flare type		
	Max. allowable tubing length at shipment		m	A + B : 15 C1 + C2 : 15		
	Refrigerant tube diameter	Narrow tube	mm (in.)	A , B , C1 , C2 : 6.35 (1/4)		
		Wide tube	mm (in.)	A , B , C1 , C2 : 9.52 (3/8)		
	Refrigerant tube kit			Optional		
	Dual system kit			Optional (DKR-5555C)		
Dimensions & Weight				AER522QC	DKR-5555C	
	Unit dimensions	Height	mm	630	414	
		Width	mm	830	213	
		Depth	mm	305	118	
	Package dimensions	Height	mm	713	170	
		Width	mm	994	340	
		Depth	mm	413	528	
	Weight	Net	kg	61.0	5.0	
		Shipping	kg	66.0	6.0	
	Shipping volume		m^3	0.29	0.031	

DATA SUBJECT TO CHANGE WITHOUT NOTICE.

Remarks: Rating conditions are:

Indoor air temperature 27°C D.B. / 19°C W.B.

Outdoor air temperature 35°C D.B. / 24°C W.B.

2-2. Major Component Specifications

Outdoor Unit AER522QC

Symbol of indoor unit					A, B : AWR509CL C : AWR509CL or C1, C2 : AWR509CL	
Compressor	Type				Rotary (Hermetic)	
	Compressor	Model name ... Q'ty			C-RN80H5A ... 2 (CM1,CM2)	
		Code No.			80228245-G	
	Nominal output			W	800	
	Compressor oil			cc	470 x 2	
	Coil resistance (Ambient temp. 25°C)			Ω	C – R :3.07 C – S : 7.97	
	Safety devices	Type			External protector	External protector
		Overload relay ... Q'ty			MRA38066-3229(OLR1,3)	CS–7C115 (OLR2,4)
		Operating temp.	Open	°C	145 ± 5	115±5
			Close	°C	69 ± 11	95 ± 10
		Operating amp.(Ambient temp. 25°C)			Trip in 6 to 16 sec. at 16.5A	—
	Run capacitor ... Q'ty			µF	22.5 ... 2	
				VAC	450 ... 2	
Fan & Fan Motor	Type				Propeller	
	Q'ty ... Dia.			mm	1 ... ø400	
	Fan motor model ... Q'ty				19TFB6047 ... 1	
	No. of poles ... rpm (230V, High)				6 ... 910	
	Nominal output			W	50	
	Coil resistance (Ambient temp. 20°C)			Ω	WHT – BRN : 83.4 WHT – PNK : 218.7	
	Safety devices	Type			Internal protector	
		Operating temp.	Open	°C	130 ± 5	
			Close		Automatic reclosing	
	Run capacitor			µF	2.0	
				VAC	400	
Heat Exch. Coil	Coil				Aluminum plate fin / Copper tube	
	Rows				2	
	Fin pitch			mm	1.8	
	Face area			m^2	0.473	
External Finish					Acrylic baked-on enamel finish	

DATA SUBJECT TO CHANGE WITHOUT NOTICE.

2-3. Other Component Specifications

Outdoor Unit AER522QC

Relay : AER522QC(R1,2)		**MCS24A2F1**
Coil rating		AC 240V
Coil resistance	kΩ (at 20°C)	15.5 ± 15%
Contact rating		AC 250V, 5A

Power Relay (PR1,PR2)		**G7L-2A-TUB**
Coil rating		AC 220/230/240V, Single Phase 50Hz
Coil resistance	Ω (at 23°C)	21 ± 15%
Contact rating		AC 220V, 25A

Timer (T)	**H3Y-2**
Rating	AC 220V, 50/60Hz
Operating time	3 minutes

Solenoid Valve : AER522QC(SVA,B)		**NEV-MOAJ503B0 (Coil), NEV202DXF (Valve)**
Rating		AC 240V, 50/60Hz
		7/6W, 45/35mA
Coil resistance	kΩ (at 20°C)	1.15 ± 7%

Dual System Kit DKR-5555C

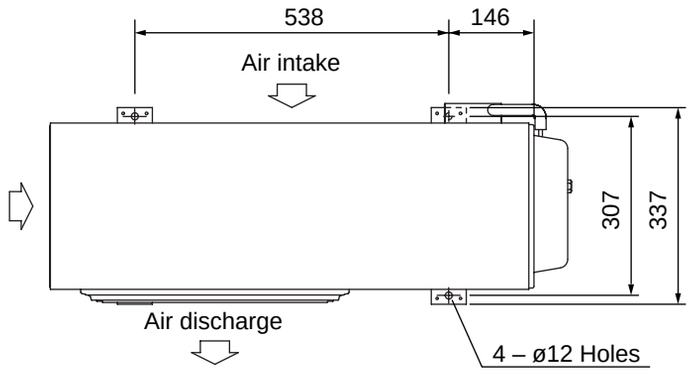
Relay (R1, R2)		**MY2-02-US-TS**
Coil rating		AC 240V
Coil resistance	Ω (at 20°C)	650 ± 15%
Contact rating		AC 240V, 4.4A

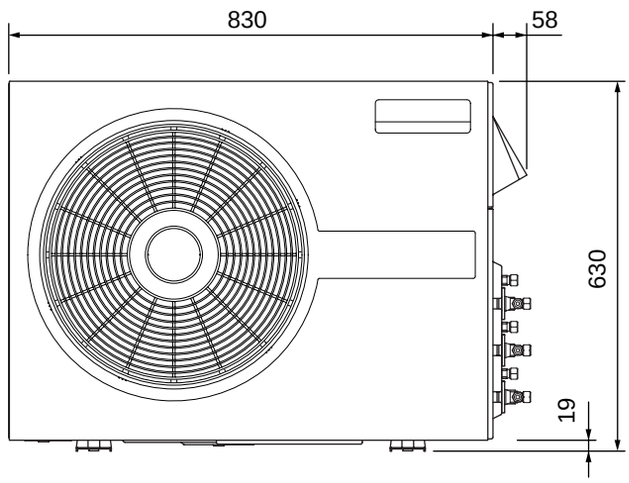
Solenoid Valve (SVC1,C2)		**NEV-MOAJ503B0 (Coil), NEV202DXF (Valve)**
Rating		AC 240V, 50/60Hz
		7/6W, 45/35mA
Coil resistance	kΩ (at 20°C)	1.15 ± 7%

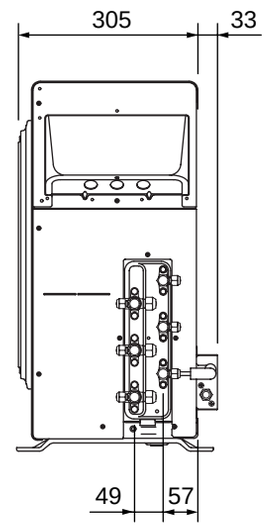
Timer (T)	**H3Y-2-0**
Rating	AC 200–230V, 50/60Hz
Operating time	3 minutes

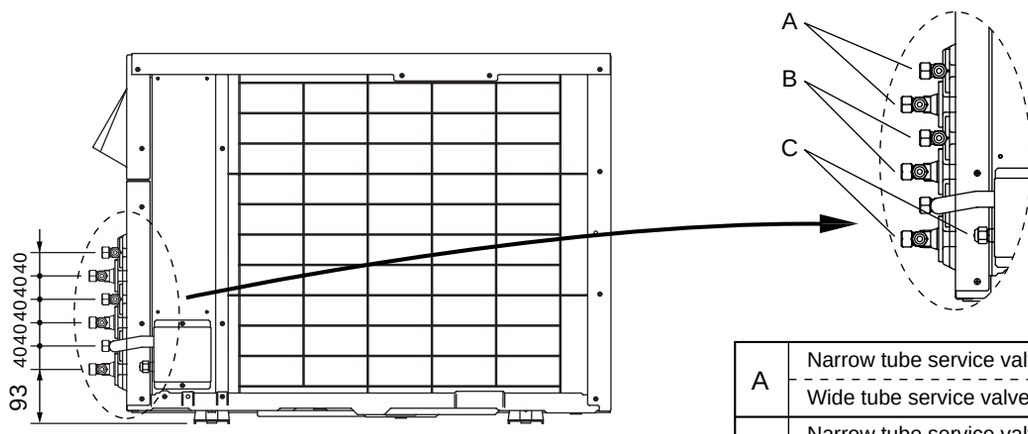
3. DIMENSIONAL DATA

Outdoor Unit **AER522QC**





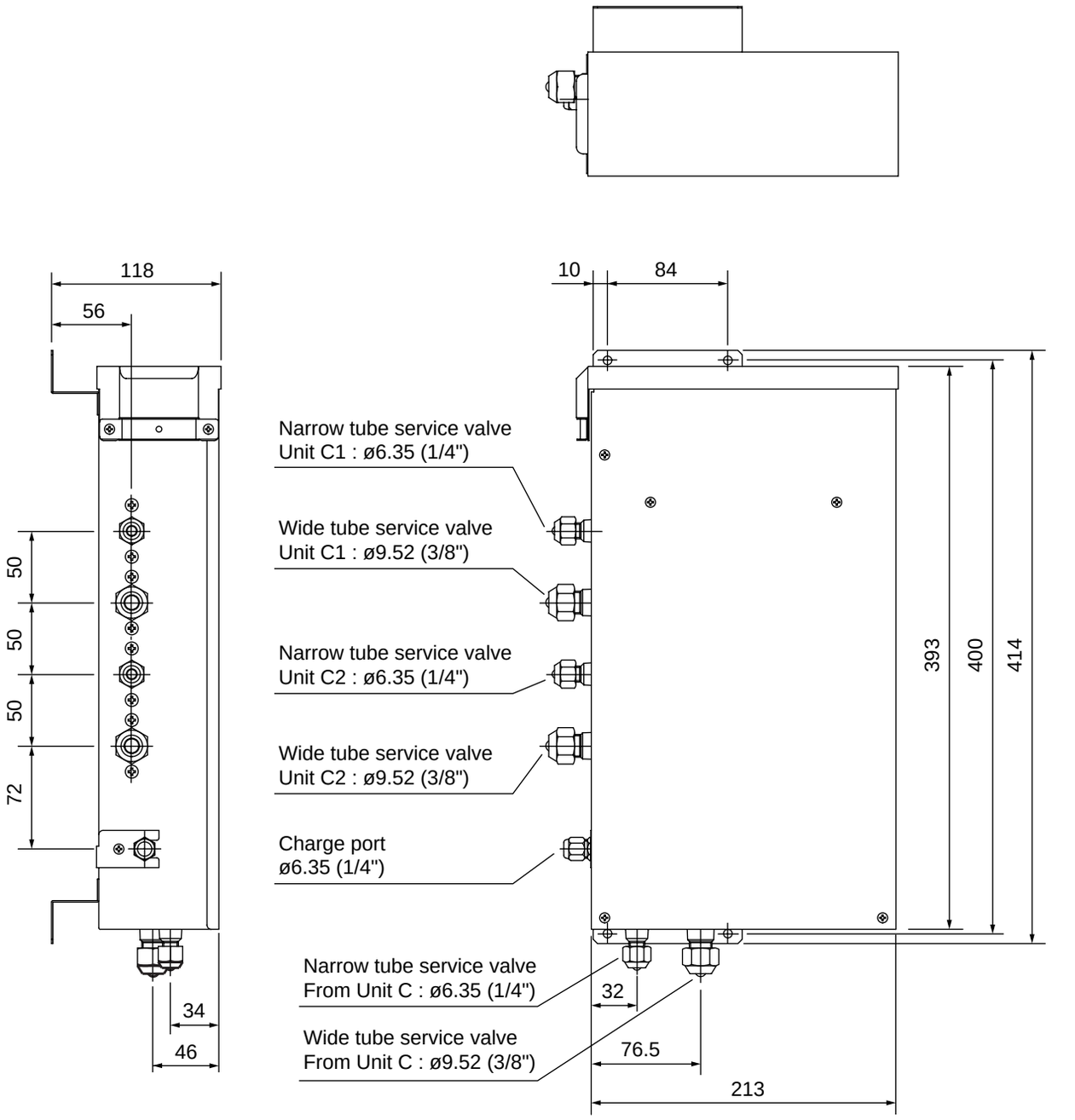




A	Narrow tube service valve : ø6.35 (1/4")
	Wide tube service valve : ø9.52 (3/8")
B	Narrow tube service valve : ø6.35 (1/4")
	Wide tube service valve : ø9.52 (3/8")
C	Narrow tube service valve : ø6.35 (1/4")
	Wide tube service valve : ø9.52 (3/8")

Unit : mm

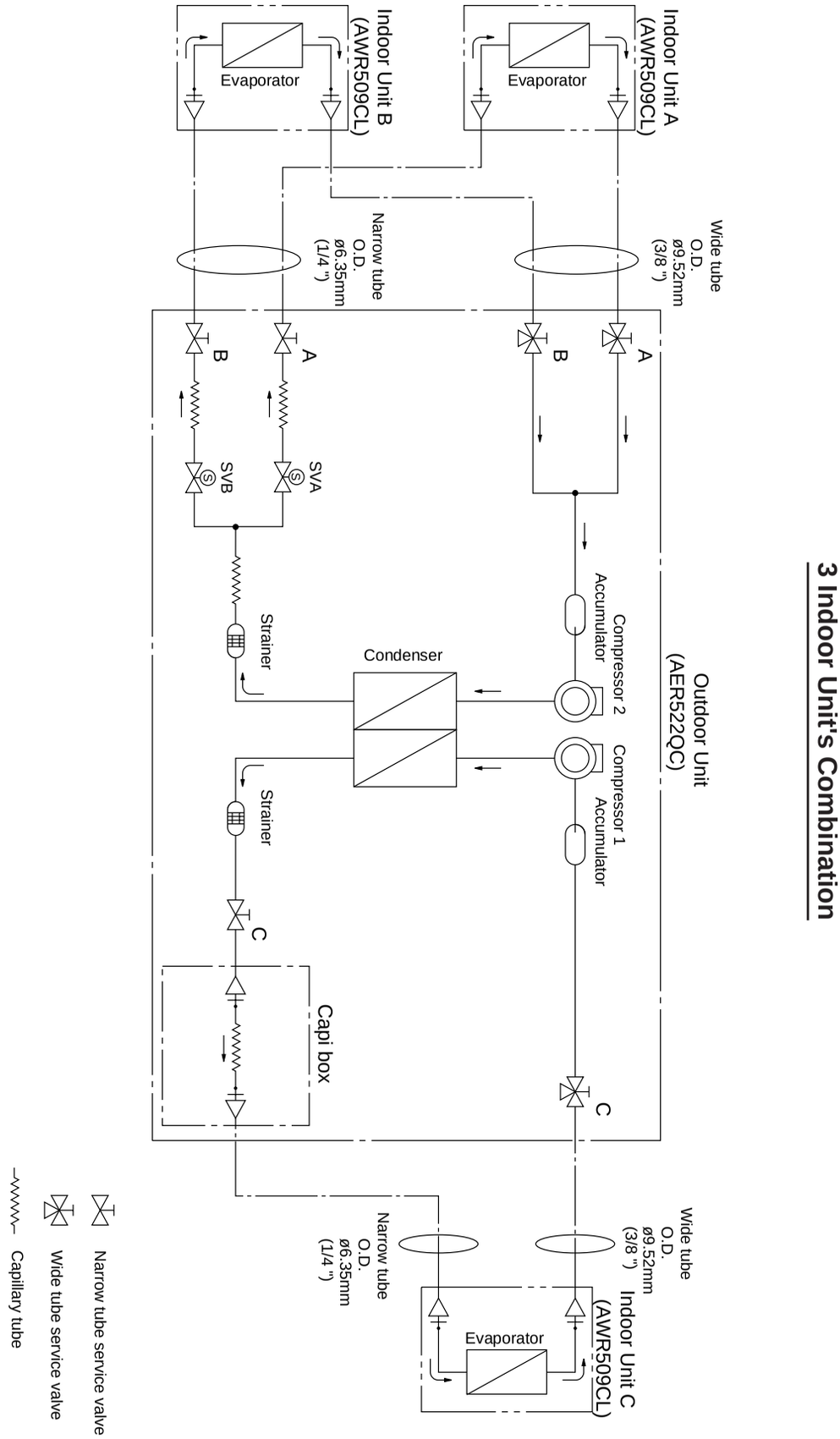
Dual System Kit **DKR-5555C**



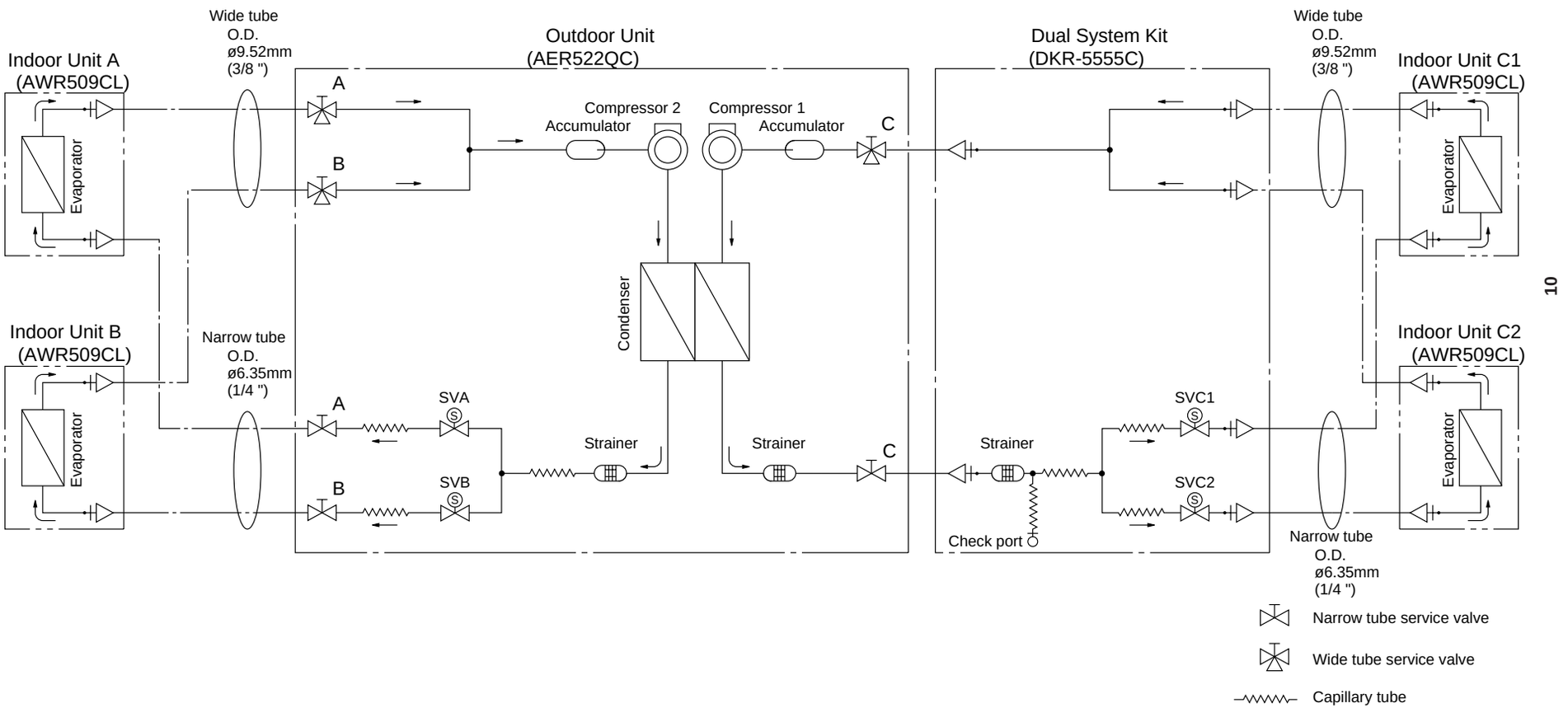
Unit : mm

4. REFRIGERANT FLOW DIAGRAM

Outdoor Unit **AER522QC**



4 Indoor Unit's Combination with Dual System Kit



5. ELECTRICAL DATA

5-1. Electrical Characteristics

NOTE

The values in the table below indicate the sum of indoor units which are in running condition.

Outdoor Unit **AER522QC**

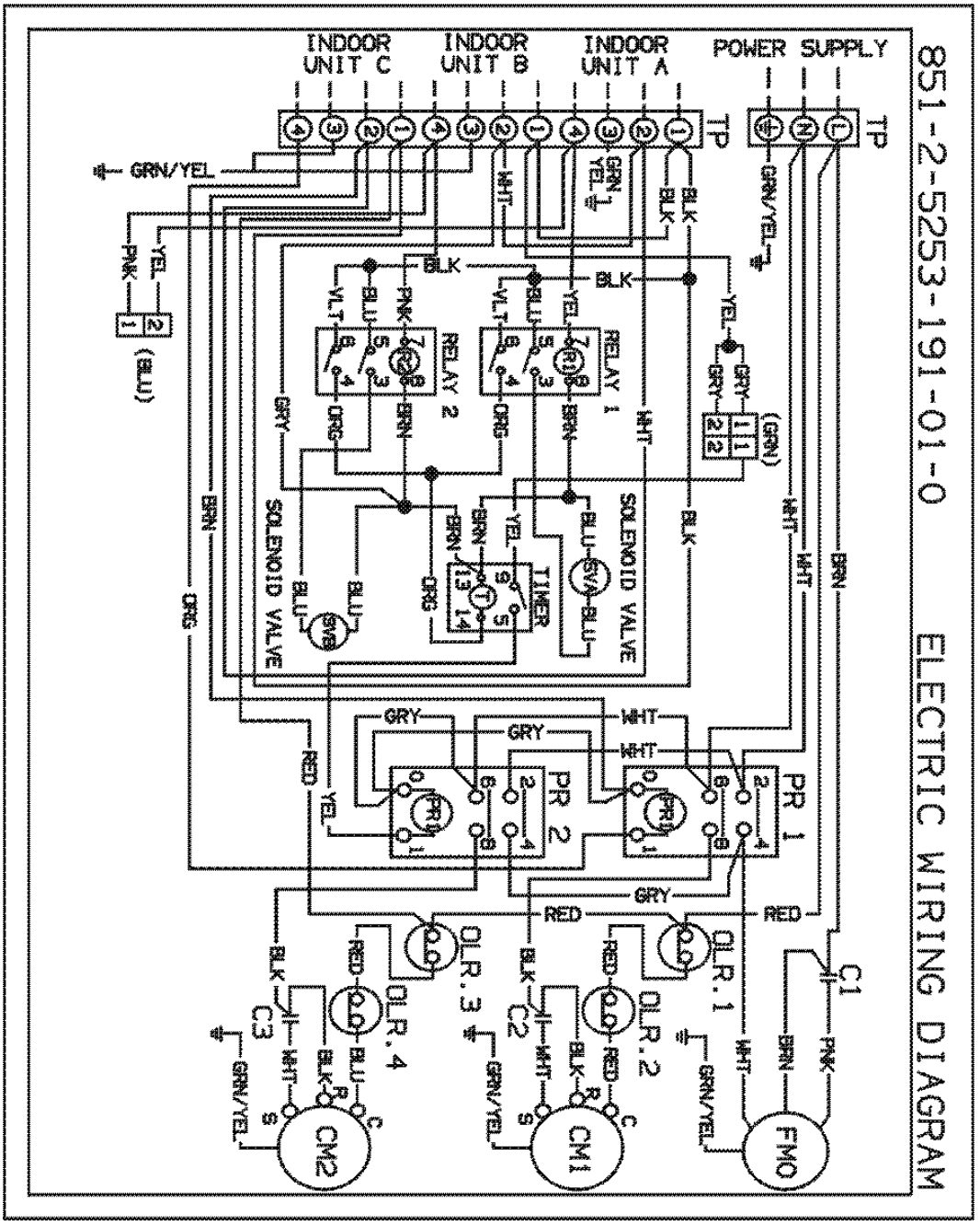
230V Single phase 50 Hz

Number of indoor unit			**3 - Units** (A + B + C)	**4 - Units** (A + B + C1 + C2)
Rating Conditions	Running amp.	A	9.2	9.6
	Power input	kW	2.00	2.10
Full Load Conditions	Running amp.	A	10.0	11.0
	Power input	kW	2.33	2.35

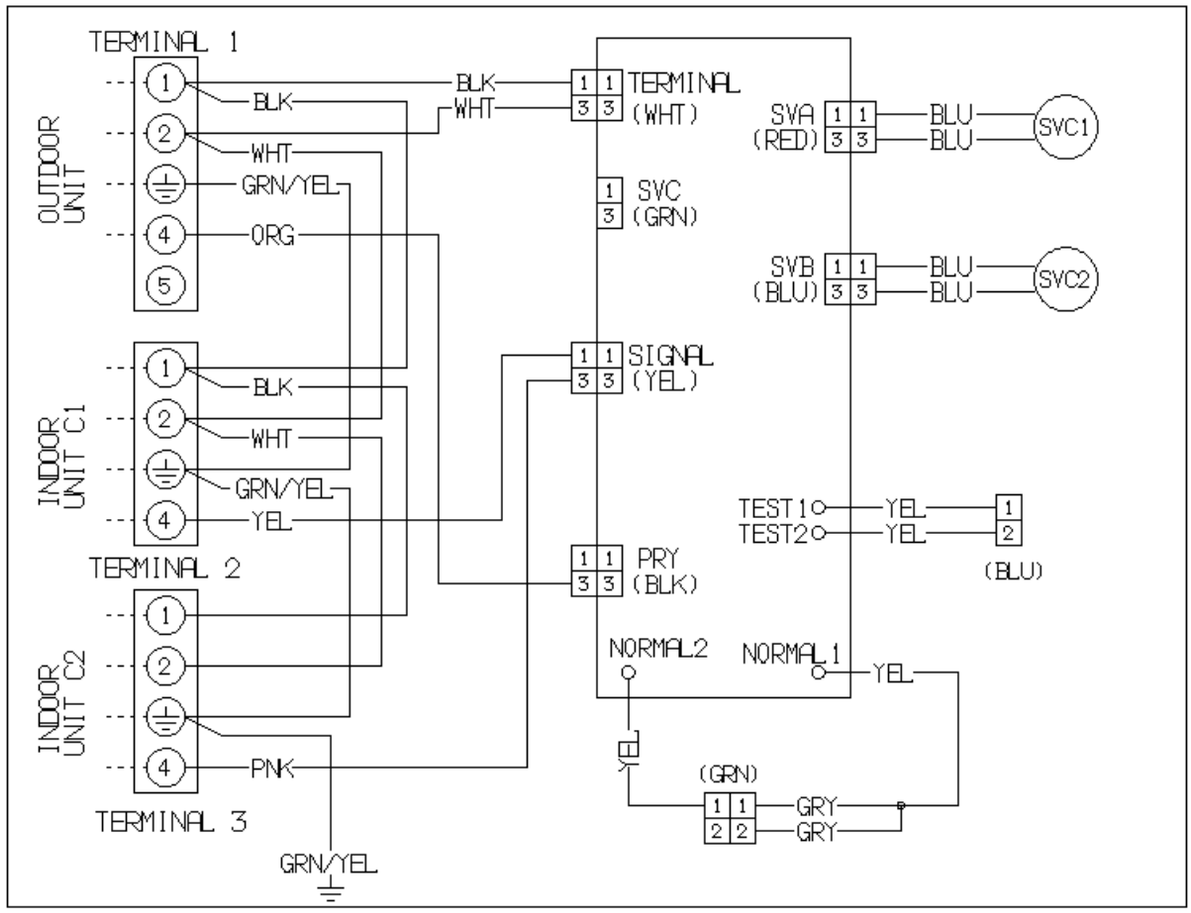
Rating Conditions: Indoor Air Temperature 27°C D.B. / 19°C W.B.
Outdoor Air Temperature 35°C D.B.
Full Load Conditions: Indoor Air Temperature 32°C D.B. / 23°C W.B.
Outdoor Air Temperature 43°C D.B.

5-2. Electric Wiring Diagram

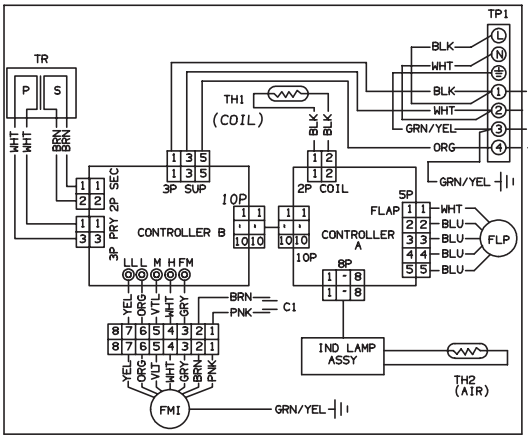
Outdoor unit **AER522QC**



Outdoor Unit **DKR-5555C**



AWR509CL



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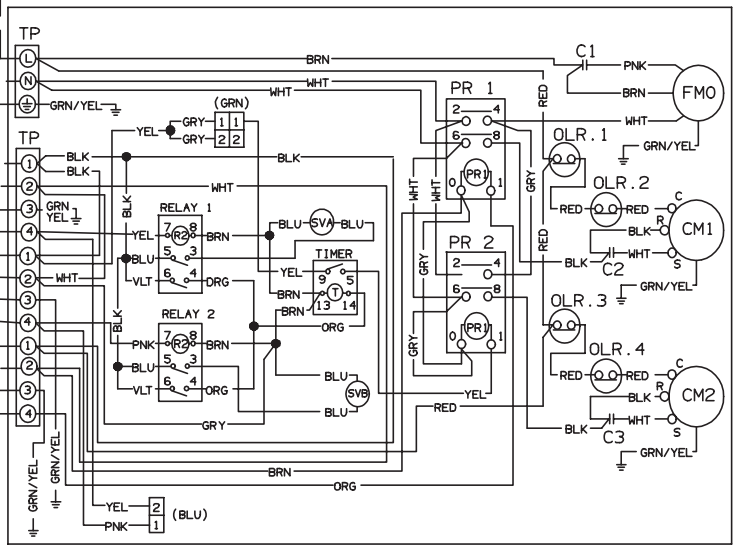

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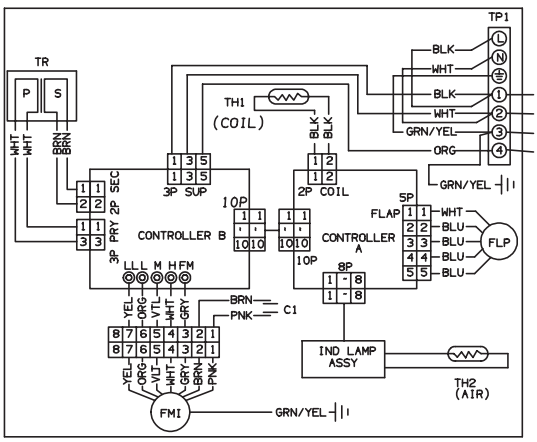
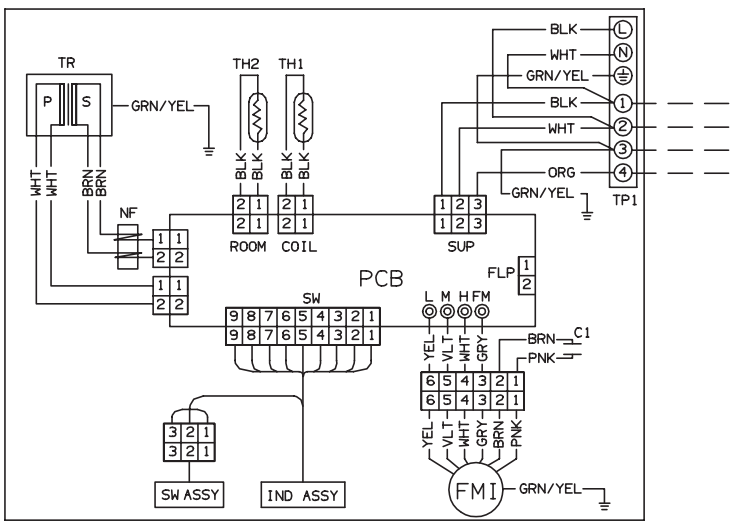


AFR509CL



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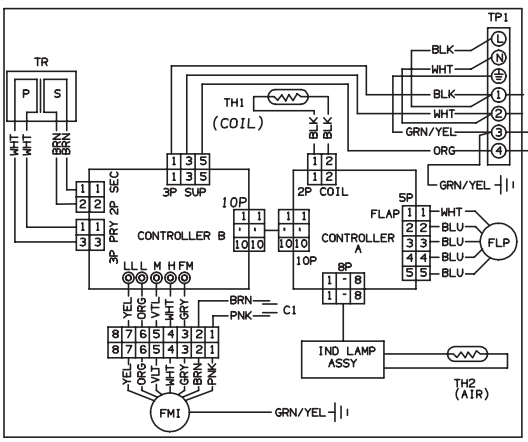

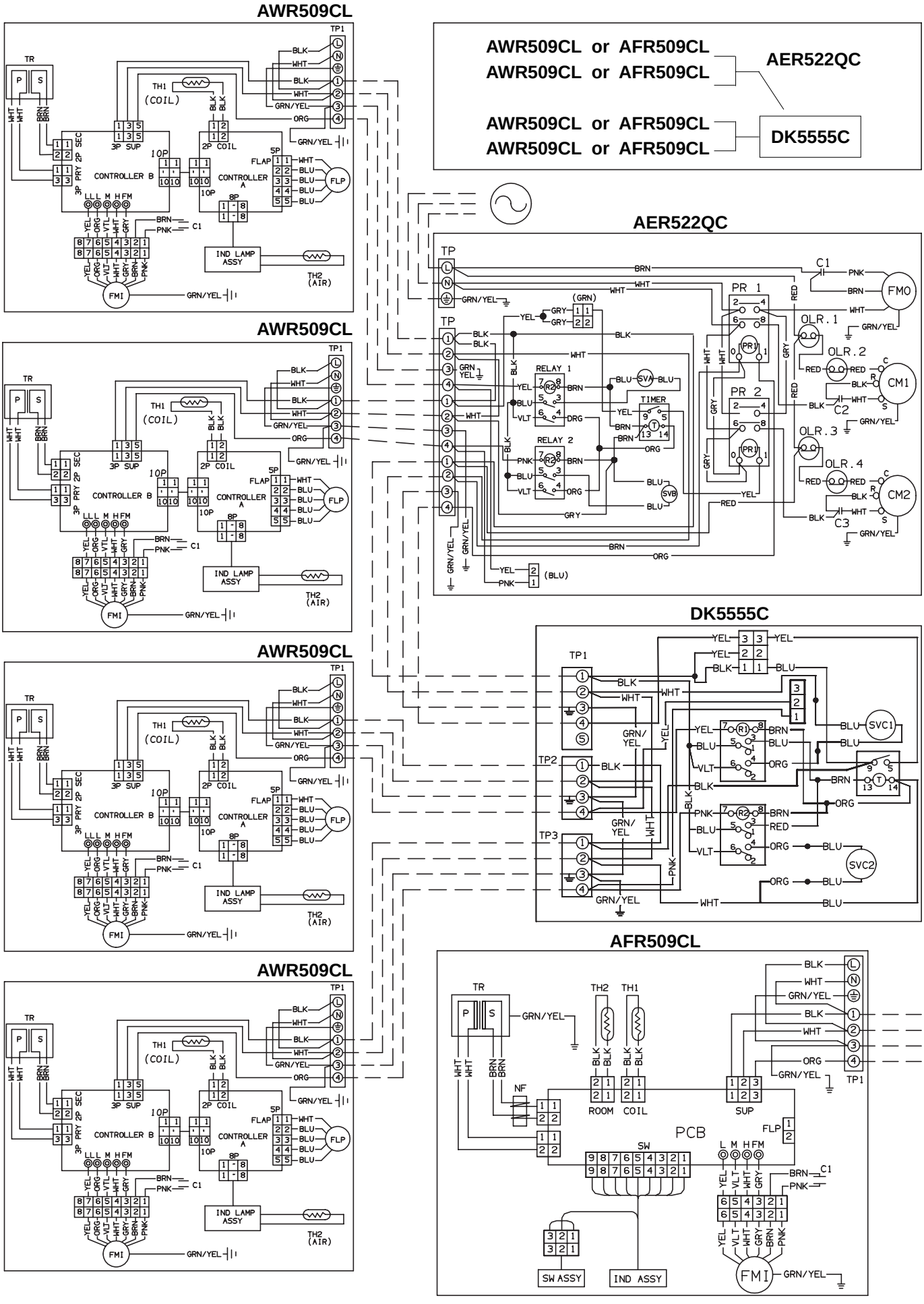
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DK5555C
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AWR509CL
AWR509CL
DK5555C
AWR509CL
AFR509CL
AWR509CL
TR
TH1
(COIL)
TH2
(AIR)
IND LAMP ASSY
CONTROLLER B
CONTROLLER A
3P SUP
2P COIL
FLAP
FLP
FMI
GRN/YEL
C1
RELAY 1
RELAY 2
TIMER
PR 1
PR 2
OLR.1
OLR.2
OLR.3
OLR.4
FMO
CM1
CM2
C2
C3
SVA
SVB
SVC1
SVC2
TP1
TP2
TP3
ROOM COIL
SUP
NF
PCB
SW
SW ASSY
IND ASSY

6. INSTALLATION INSTRUCTIONS

6-1. Installation Site Selection

Maximum Allowable Tubing Length and Elevation Difference(H).

The Multi-Split System outdoor unit should be installed as close to the indoor units as possible. Maximum allowable length of the refrigerant tubing and elevation difference between outdoor and 3 indoor units are shown in Table 6-1 and Fig.6-2 while outdoor and 4 indoor units are shown in Table 6-2 and Fig.6-3.

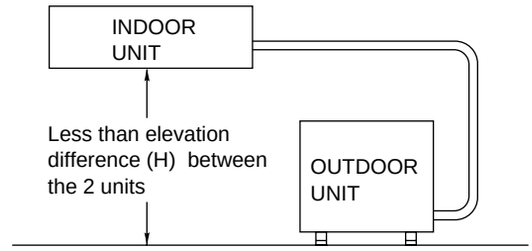


Fig. 6-1

Table 6-1 **3 indoor unit's combination**

Combination			Max allowable tubing length at shipment.(m)	Limit of tubing length.(m)	Limit of elevation difference(H). (m)	Required amount of additional refrigerant.*(g/m)
Outdoor Unit	Indoor Unit					
AER522QC	A : AWR509CL	L1	15	20	7	15
	B : AWR509CL					
	C :AWR509CL	L2	7.5	15	7	15

* If total tubing length becomes between "Max allowable tubing length" and "Limit of tubing length, charge additional refrigerant (R407c).
No additional change of compressor oil is necessary.

Table 6-2 **4 indoor unit's combination with dual system kit**

Combination			Max allowable tubing length at shipment.(m)	Limit of tubing length.(m)	Limit of elevation difference(H). (m)	Required amount of additional refrigerant.*(g/m)
Outdoor Unit	Indoor Unit					
AER522QC with DKR-5555C	A.: AWR509CL	L1	15	20	7	15
	B : AWR509CL	L1				
AER522QC with DKR-5555C	C1 : AWR509CL	L3	15	20	7	15
	C2 : AWR509CL	L3				

* If total tubing length becomes between "Max allowable tubing length" and "Limit of tubing length, charge additional refrigerant (R407c).
No additional change of compressor oil is necessary.

$L1 = L_A + L_B$
$L2 = L_C$

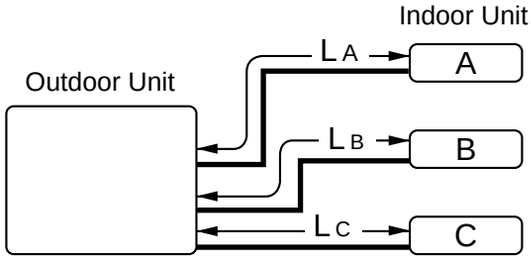


Fig.6-2

$L1 = L_A + L_B$
$L3 = L_{C1} + L_{C2}$

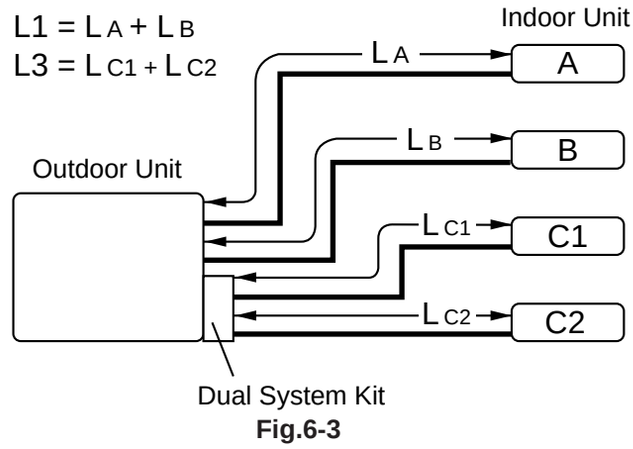


Fig.6-3

6-2. Place and Space for Installation

- Choose a place as cool as possible. The place should be well ventilated, and the intake air should not be hotter than the outside temperature. (max. 45°C)
- Avoid the vicinity of heat sources, exhaust fans, etc. (Fig. 6-4)
- Avoid direct sunlight, provide awning if necessary.
- Required space around the outdoor unit for free air flow and servicing is given in Figs. 6-5a, and 6-5c.

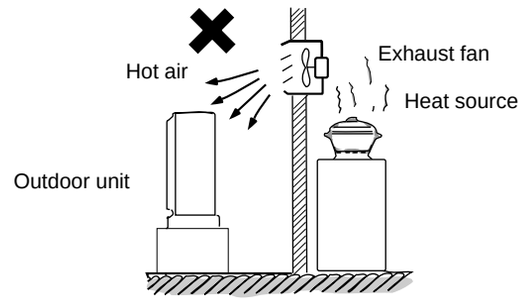


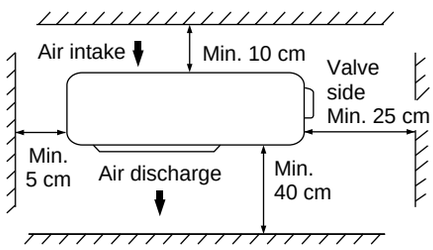
Fig.6-4

The avoid the effects of humidity and ground moisture, the unit should be placed on concrete blocks or slab at least 10 cm high above ground level.
(Figs. 6-6a)

The unit must be level and be anchored securely to its base with anchor bolts or the like. An unsteady foundation will cause abnormal noise and vibration.

Required space around the unit.

AER522QC



Top view

Fig.6-5a

AER522QC

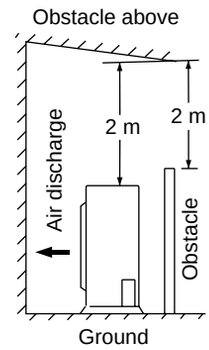


Fig.6-5c

AER522QC

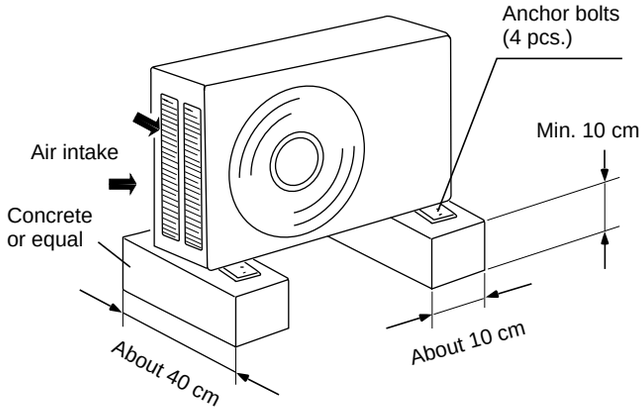


Fig.6-6a

6-3. Installation with Dual System Kit

- The Dual System Kit splits the refrigerant circuit into two circuits, enabling two-room air conditioning with a single outdoor unit.
- When using the Dual System Kit, two indoor units (four units in total) can be connected to a single outdoor unit.

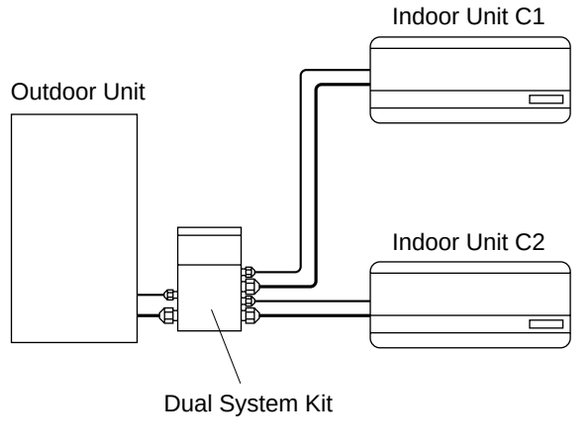


Fig.6-7

(1) **First, remove the capi box to install the Dual System Kit.**

(2) **Connect the supplied connecting pipe to the Dual System Kit.**

(3) Affix the Dual System Kit on the rear surface of the outdoor unit with the supplied tapping screws (4 pcs.) and connect the Dual System Kit to the service valves of the outdoor unit as shown below. (Figs. 6-8a)

NOTE

The tubing work for Indoor Units A and B have to be carried out after completion of Dual System Kit installation, air purging and a leak test.

AER522QC

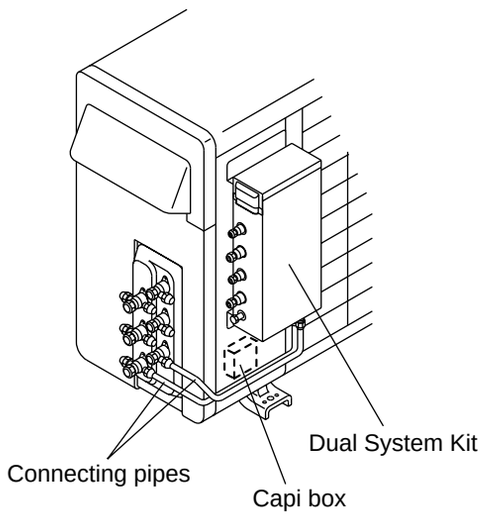


Fig.6-8a

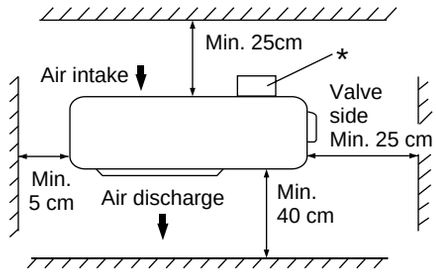
Space for Dual System Kit

NOTE

When using the Dual System Kit, be sure to keep a separation of 25 cm as minimum between the air intake of the outdoor unit (rear surface) and wall or fence for maintenance work (Fig.6-9a).

∗ : Dual System Kit

AER522QC with DKR-5555C



Top view

Fig.6-9a

6-4. Wiring Instructions

6-4-1. General Precautions on Wiring

- Check the rated voltage on the unit's name plate before wiring according to the wiring diagram.
- Provide a power outlet to be used exclusively for each unit, with a power supply disconnect and a circuit breaker for overcurrent protection provided in the exclusive line.
- To prevent possible hazards due to insulation failure, the unit must be grounded.
- Each wire must be connected firmly.
- No wire should be allowed to touch refrigerant tubing, the compressor or any moving parts of fan motors.

Regulations on wire diameters differ according to national and local requirements.For field wiring regulations, please refer to the LOCAL ELECTRICAL CODES before starting, and carefully follow the regulations as you do the installation.

WARNING

- **Do not supply power to the system until all wiring and refrigerant tubing connections are completed and checked.**
- **Wiring should only be done by an experienced, qualified electrician.**
- **This appliance must be grounded.**

Table 6-3 and 6-4 lists recommended wire lengths and diameters for power supply systems.

6-4-2. Recommend Wire Length and Size

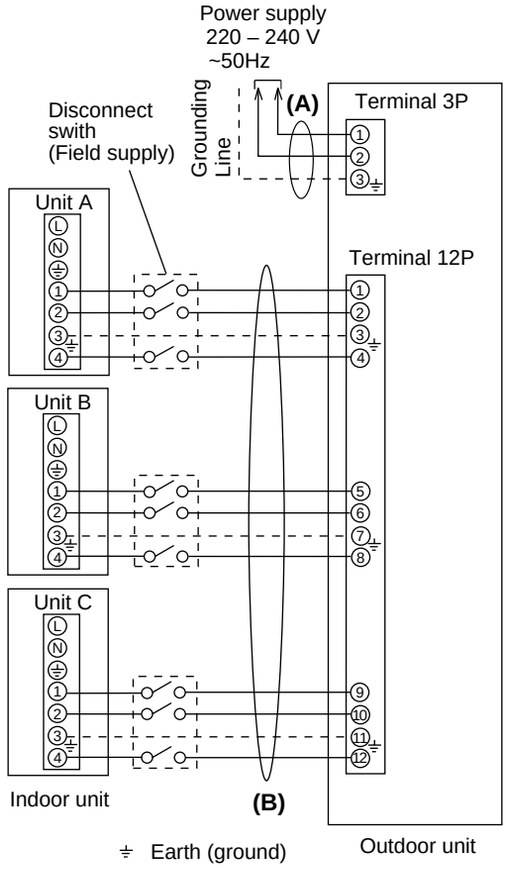
Table 6-3

Model :AER522QC	Power Supply Line Length (A)		Inter Line Length (B)	Inter Kit Line Length (C) + (D)	Fuse or Circuit Capacitor
Cross-Sectional Aria (mm^2)	2 mm^2	3.5 mm^2	2 mm^2	2 mm^2	
Maximum Length (m)	13 m	20 m	20 m	20 m	20 A

NOTE Refer to the WIRING SYSTEM DIAGRAM for meaning of "A", "B", "C" and "D" in table 6-3.

— Wiring System Diagram —

Outdoor Unit : AER522QC



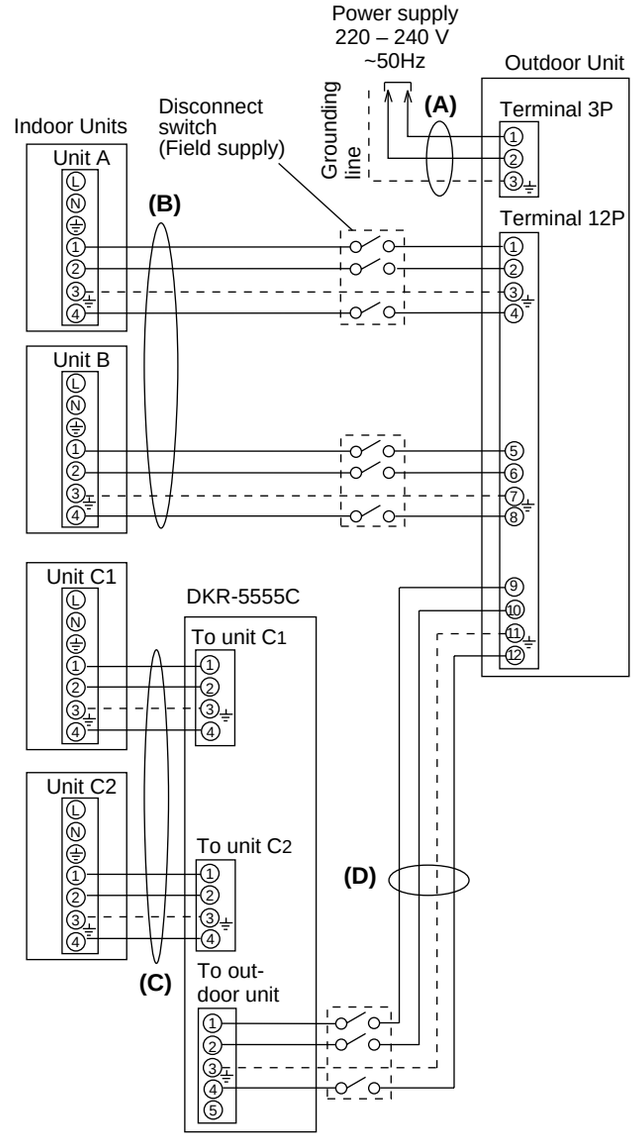
NOTE

Unit A, B : AWR509CL

Unit C : AWR509CL

Outdoor Unit : AER522QC

Dual System Kit : DKR-5555C



NOTE

Unit A, B : AWR509CL

Unit C1, C2 : AWR509CL

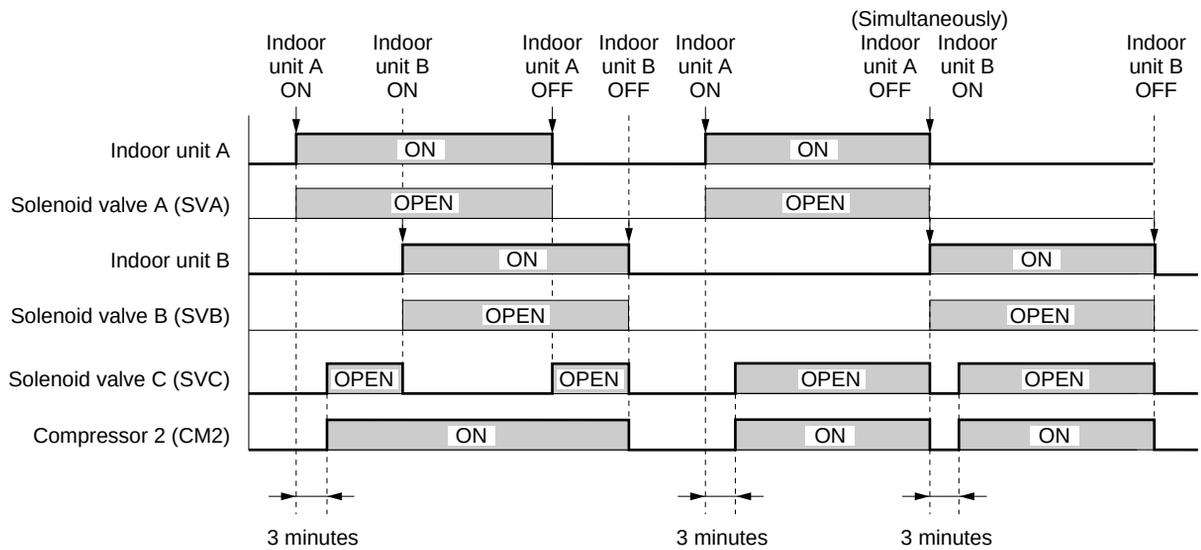
7. FUNCTION

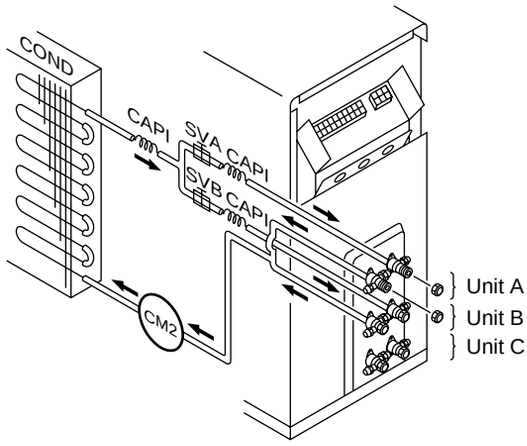
Solenoid Valve Operation

- In the refrigeration circuit containing compressor 2 (CM2), the operation of the two solenoid valves (SVA and SVB) are synchronized and controlled by the thermo. ON signal of the indoor units.
- Opening both of these solenoid valves (SVA and SVB) makes the two indoor units (indoor unit A and B) operate. Opening just one solenoid valve makes only one indoor unit run (either indoor unit A or B).
- 3 minutes timer controlling the operation of compressor 2 (CM2), starts counting as soon as the thermo. ON signal is generated by indoor unit A or B.
- Compressor 2 (CM2) stops only under the condition when both indoor unit A and B have been stopped.
- Once the compressor stops, it will not start running again for at least 3 minutes even there has been an ON signal from one of the indoor units.
- In order to save compressor power, solenoid valve C (SVC), which is used as a bypass valve, opens only when either of indoor unit A or B is operating while it closes when both indoor unit A and B are operating.

NOTE

Model AER522QC is not provided with solenoid valve C (SVC).





‹ AER522QC ›

8. TROUBLESHOOTING

8-1. Check before and after troubleshooting.

WARNING

Hazardous voltage can cause ELECTRIC SHOCK or DEATH. Disconnect power or turn off circuit breaker before you start checking or servicing.

8-1-1. Check power supply wiring.

- Check that power supply wires are correctly connected to terminals No. 1 and No. 2 on the 3P terminal plate in the outdoor unit.

8-1-2. Check inter-unit wiring.

- Check that inter-unit wiring is correctly connected to the indoor units from the outdoor unit.

8-1-3. Check power supply.

- Check that voltage is in specified range (±10% of the rating).
- Check that power is being supplied.

8-1-4. Check lead wires and connectors.

- Check that coating of lead wires is not damaged.
- Check that lead wires and connectors are firmly connected.
- Check that wiring is correct.

8-2. Air conditioner does not operate.

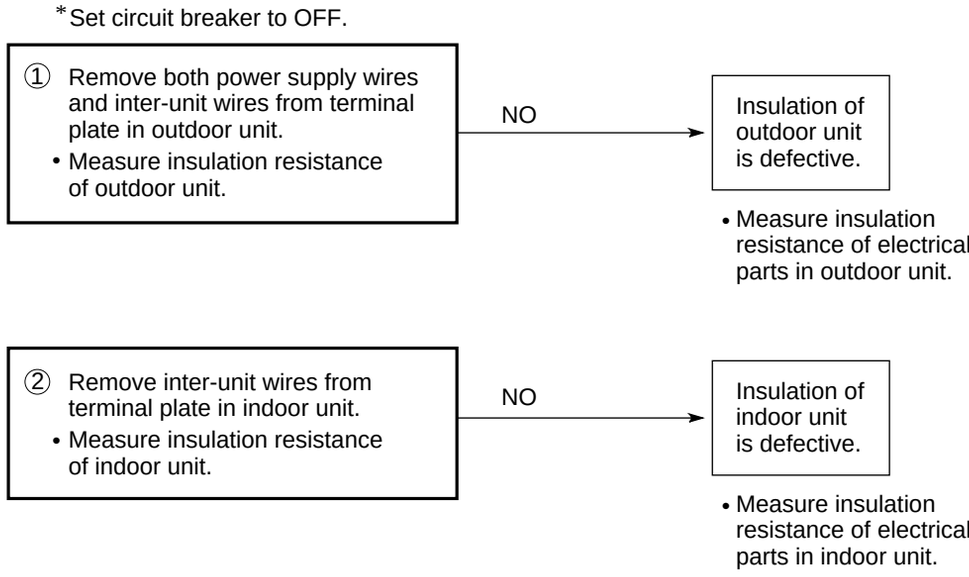
8-2-1. Circuit breaker trips (or fuse blows).

A. When the circuit breaker is set to ON, it is tripped soon. (Resetting is not possible.)

● There is a possibility of ground fault.

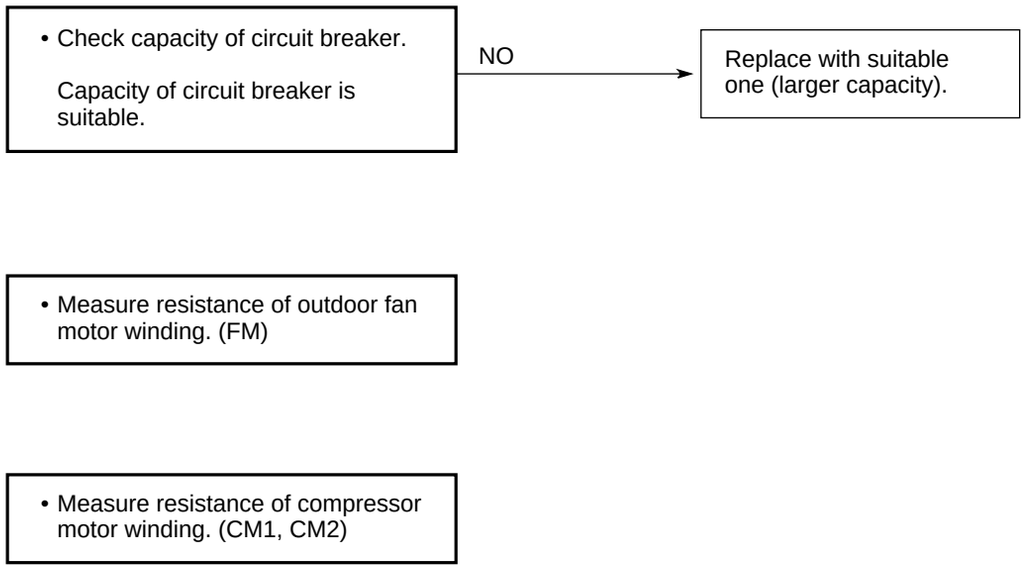
● Check insulation resistance.

If resistance value is 1MΩ or less, insulation is defective (“NO”).



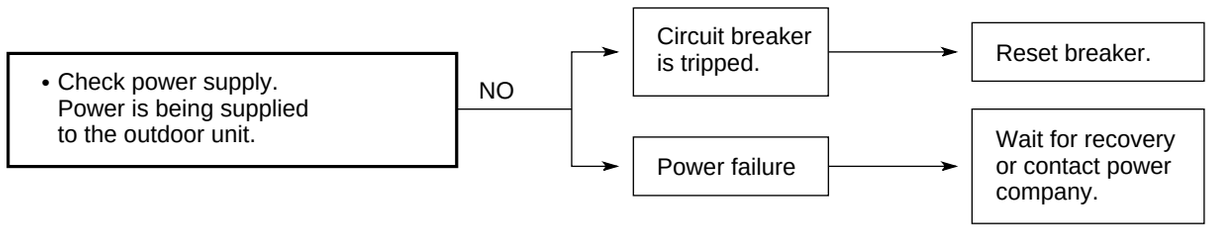
B. Circuit breaker trips in several minutes after turning the air conditioner on.

● There is a possibility of short circuit.



8-2-2. Neither indoor nor outdoor unit runs.

Power is not supplied.



8-2-3. Only outdoor unit does not run.

Check power relay in outdoor unit.

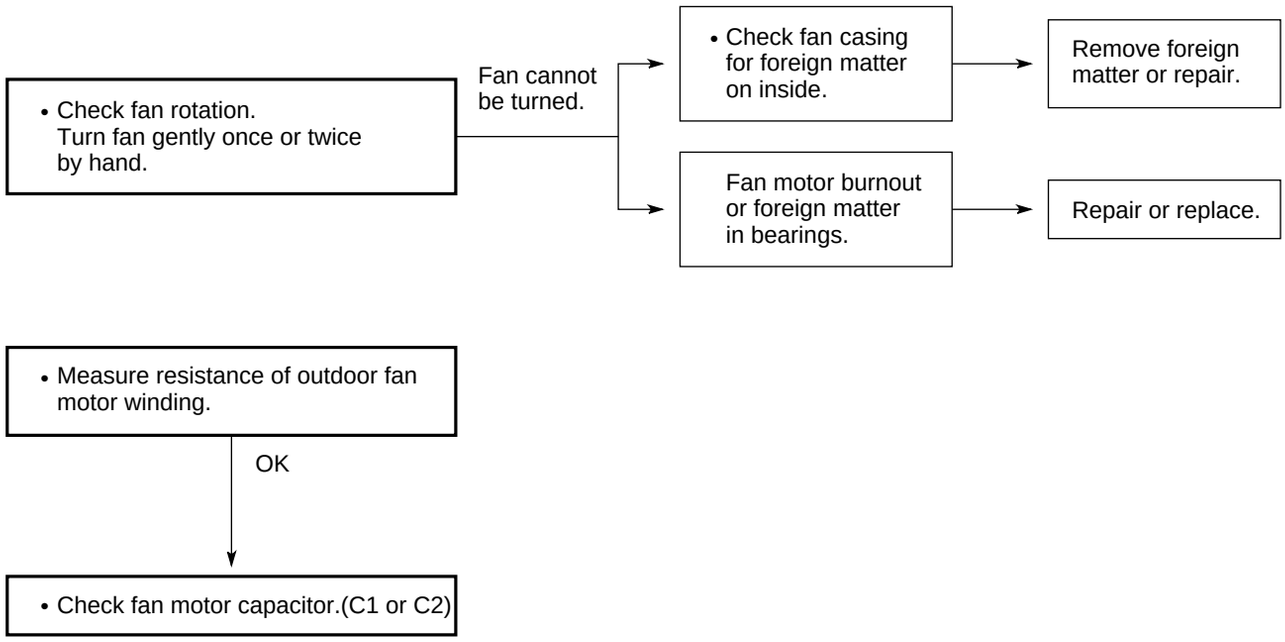
Measure coil resistance of power relay (PR1, PR2)

Check connectors in outdoor unit.

NOTE **Refer to " 9-6 Reattaching green connectors for operation".**

8-3. Some part of air conditioner does not operate.

8-3-1. Only outdoor fan does not run.



8-3-2. Only compressor does not run.

- Check compressor motor capacitor. (C2,C3 or C3,C4)

Overload relay is working. (OLR 1 to 4)

YES

- Measure resistance of compressor motor winding.

Temperature of compressor is abnormally high.

YES

Refrigerant gas shortage. YES → Charge refrigerant gas (R407C).

NO

Rotor may be locked up.

Check Timer in outdoor unit

Operate either indoor unit A or B.

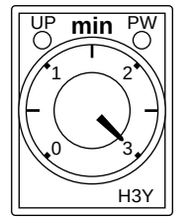
- Check to see if the lamp " PW " is on. NO → Replace the timer.

YES

- Check to see if the other lamp " UP " lights up as well.

YES

- Confirm that the timer dial has been set to " 3 min " as shown in figure right.



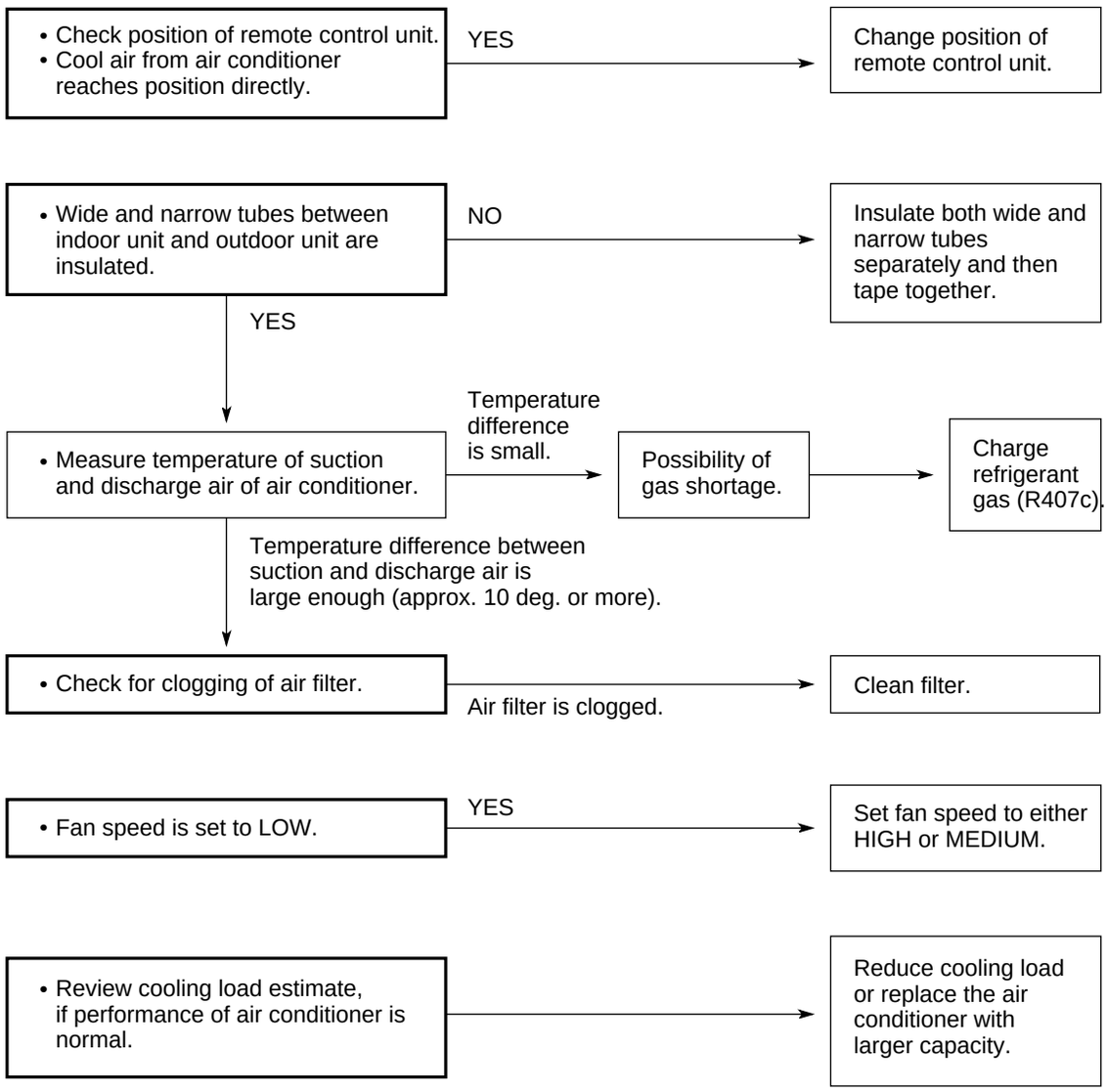
8-4. Air conditioner operates, but abnormalities are observed.

8-4-1. Indoor unit operates, but there is no cooling.

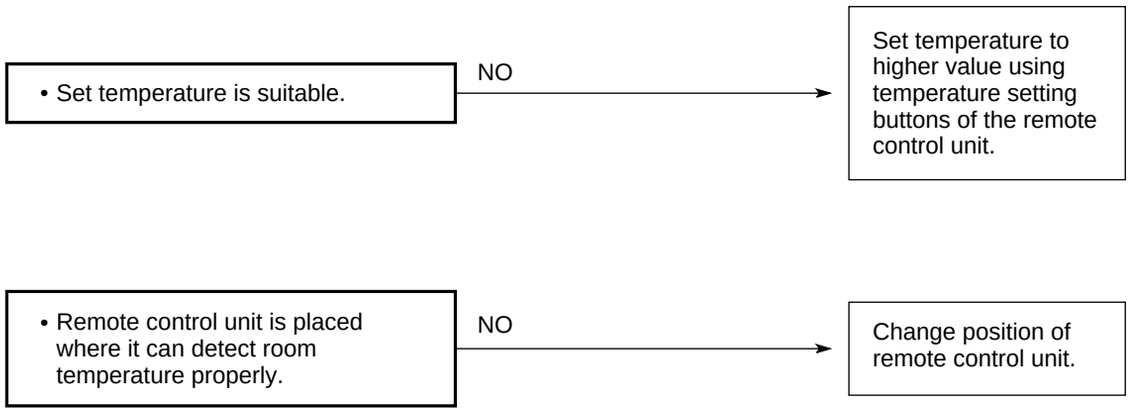
Check solenoid valve in outdoor unit.

- Measure coil resistance of solenoid valve (SVA , SVB)

8-4-2. Poor cooling.



8-4-3. Excessive cooling.



9. SPECIAL PRECAUTIONS WHEN SERVICING THE UNIT

Model : AER522QC

IMPORTANT!

For your personal safety, be sure to read and understand the following precautions before servicing.

WARNING

Injuries can occur from burns or inhalation of toxic gas if servicing is performed while refrigerant remains in the refrigeration circuit. This servicing includes disassembling brazed tubing connections and removing any refrigeration parts or components.

- To avoid risk of injury when servicing the outdoor unit (for instance, when replacing the compressor or repairing a refrigerant leak), follow the procedure below for the **refrigerant circuits of unit A and unit B.**

— Procedure —

9-1. Blue/green connector attachment for servicing

9-1-1. Confirm mains power is switched OFF, then disconnect the connectors (GRN/GRN) to separate A and B. Then connect A connector (GRN) with connector C (BLU). (Fig.9-1)

9-1-2. Provide a disconnect switch to the 3p terminal plate. (Figs.9-2 and 9-3)

9-1-3. Turn the disconnect switch ON to supply power (single-phase, 220-240 V) to the outdoor unit. This makes it possible to force open two solenoid valves (SVA and SVB) in the refrigeration circuit. (Figs.9-2 and 9-3)

IMPORTANT!

The procedure given in "9-2" to "9-5" below must be carried out with the two solenoid valves SVA and SVB open.

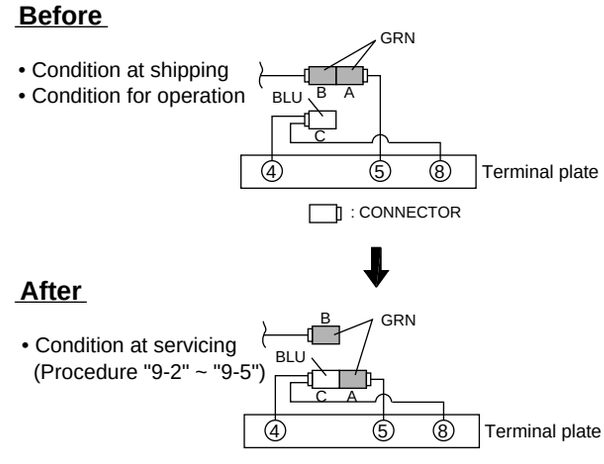


Fig.9-1

9-2. Refrigerant recovery

9-2-1. Open the service valve to recover refrigerant into refrigerant recovery unit.

CAUTION

Refrigerant released into the air contributes to destruction of our planet's ozone layer. You should always use the refrigerant recovery unit to help protect the environment.

9-3. Service on outdoor unit

9-3-1. After making sure that the refrigerant in the circuit has been completely discharged, perform the required servicing, such as replacing the compressor or repairing refrigerant leaks.

9-3-2. Before going on to the next step, leak test all joints where welding has been done.

NOTE

Nitrogen gas is best when pressurizing the system for a leak test. However, if it is necessary to instead test with refrigerant gas, be sure to recover all gas into the refrigerant recovery unit after completing the leak test.

9-4. Evacuation using vacuum pump

9-4-1. Using a hex wrench, set the valve stems of both the narrow and wide tube service valves as indicated in table below.

	Service Valve	Valve Position
Unit A	Narrow	Position –c–
	Wide	
Unit B	Narrow	Position –a–
	Wide	

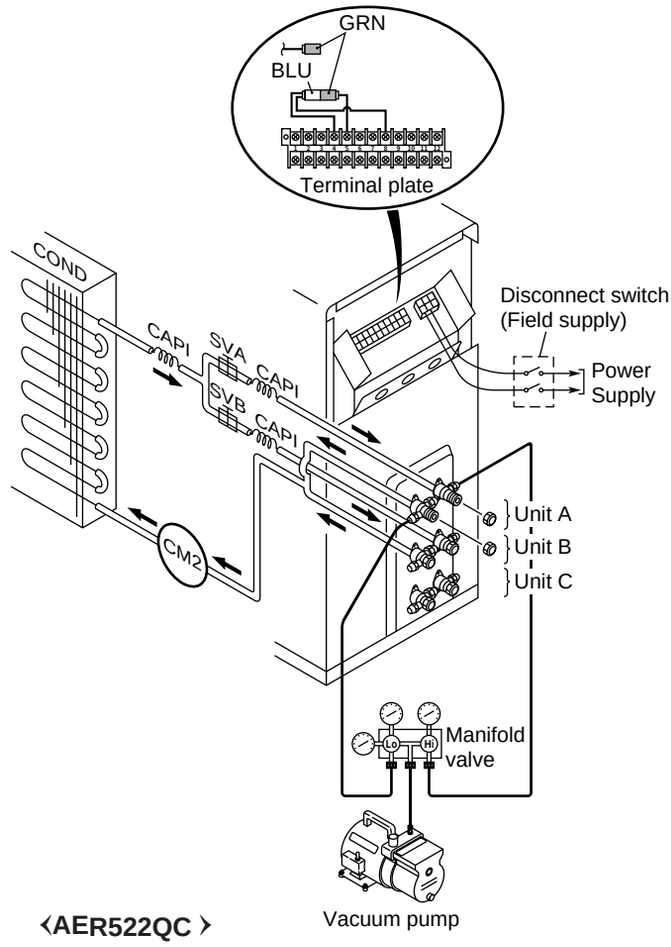
NOTE

Refer to "■ Service Valve Construction "shown later

9-4-2. Connect the vacuum pump and a manifold valve as shown in either Fig.9-2 , depending upon the model. Confirm that all connections are correctly made.

NOTE

In order to withstand negative suction pressure during evacuation, the manifold valve should be equipped with a Hi / Lo compound gauge with a minimum scale reading of –76cmHg.



〈AER522QC〉

Fig.9-2

9-4-3. Install (first by hand-tightening, then securely with a wrench) flare nuts and bonnets at all service valves in the refrigeration circuit where evacuation will take place. **This process is highly important to completely evacuate the system.**

9-4-4. Check that the blue/green connector is properly attached. (Figs.9-2)

9-4-5. Turn the disconnect switch ON (if it has been OFF) to open the two solenoid valves (SVA and SVB). (Figs.9-2)

9-4-6. With both the " Lo " and " Hi " knobs of the manifold valve open, run the vacuum pump. The operation time varies with the capacity of the pump. (Run the pump at least 30 minutes.) Evacuation is successful if the vacuum gauge reading remains –75 cmHg or more for at least 10 seconds after closing both the " Lo " and " Hi " knobs of the manifold valve.

9-4-7. With the vacuum pump still running, turn both the narrow and wide service valves all the way in to close the valves (position -a-).
Then stop the pump.

9-4-8. After removing the vacuum hoses from the service valves, replace the flare nuts and bonnets on the valves. The refrigerant circuit is now ready for charging.

9-5. Refrigerant charging

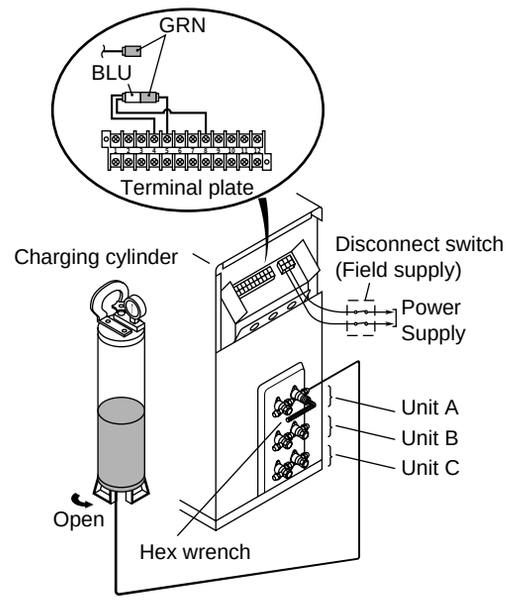
9-5-1. After evacuation is completed, charge the circuit with the proper amount of refrigerant.

NOTE

The proper amount of refrigerant is specified on the nameplate of the outdoor unit and in Section "2-1. Unit Specifications" in the service manual.

9-5-2. Use a hose to connect the narrow tube service valve to the liquid port of the charging cylinder. (Figs.9-3and 9-4)

9-5-3. Purge air from the hose. Do this by opening the charging cylinder valve, then slightly loosening the connection to the narrow tube service valve. Wait a few moments, then retighten the connection.



〈 AER522QC 〉

Fig.9-3

9-5-4. With a hex wrench, open the service valve little by little to let liquid refrigerant enter the circuit. (Figs.9-3)

NOTE

- **Write down the gradation levels on the charging cylinder before and after the charging. This allows you to calculate the charging volume.**

Charging volume = Gradation level before charging − Gradation level after charging

9-5-5. If it is not possible to completely charge the unit with the proper amount of refrigerant, you can do a additional charging after installing the units. At that time, refrigerant should be recharged in the liquid state a little at a time using the wide tube service port, and the air conditioner should be operating in COOLING mode during the entire charging process.

NOTE

- **Charging the unit with a large amount of refrigerant at once may damage the compressor. Always charge the unit at a constant charging rate of about 100 g.**

9-6. Reattaching green connectors for operation

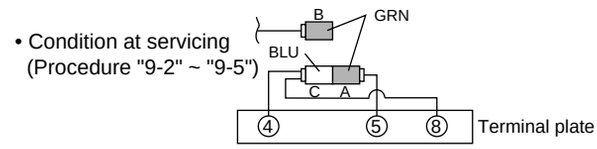
9-6-1. Turn off the power source.

9-6-2. Connect the two green connectors to each other as in the original state. (Fig.9-4)

CAUTION

Remember to reattach the green connectors in the original position. Otherwise, the system will not operate correctly and damage may occur.

Before



After

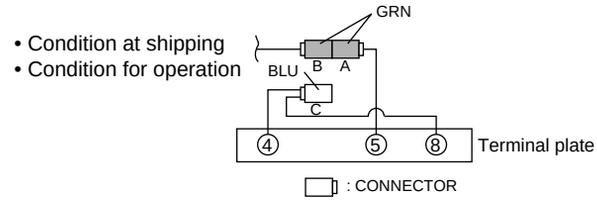


Fig.9-4

■ Service Valve Construction

● **Valve Position -a-**

The valve stems of both the wide and narrow tubes are turned all the way in. The unit is shipped from the factory in this position. (Fig.9-5a)

● **Valve Position -b-**

The valve stems of both the wide and narrow tubes are turned all the way out ("BACK SEAT" position). This is the normal operating position. (Fig.9-5b)

● **Valve Position -c-**

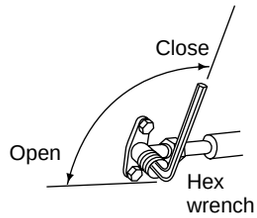
With the narrow tube valve kept at BACK SEAT, only the wide tube valve stem is turned to the halfway-down position. This position is used when refrigerant circuit evacuation is required from both narrow and wide tube valves at the same time. This position is also used when additional refrigerant charging is required in the field with both the indoor and outdoor units installed.(Fig.9-5c)

● **Valve Position -d-**

With the valve stem of the wide tube turned all the way in, only the narrow tube valve stem is turned to the halfway-down position. This position is used for refrigerant charging for only the outdoor unit. (Fig.9-5d).

CAUTION

When opening or closing the service valve stem, use the supplied accessory hex wrench. Be sure to fully seat the wrench before turning the valve.



Wide Tube **Narrow Tube**

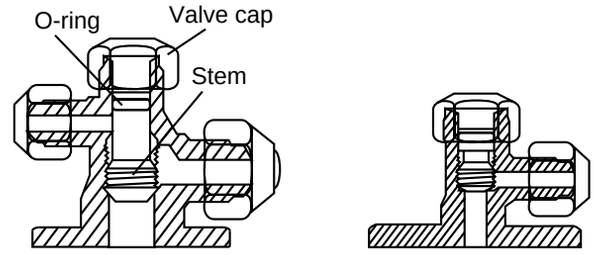


Fig.9-5a

• Condition at Shipping (-a-)

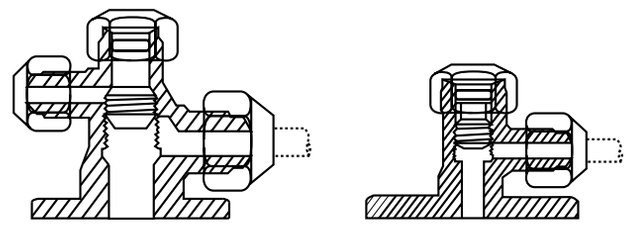


Fig.9-5b

• Condition at Operation (-b-)

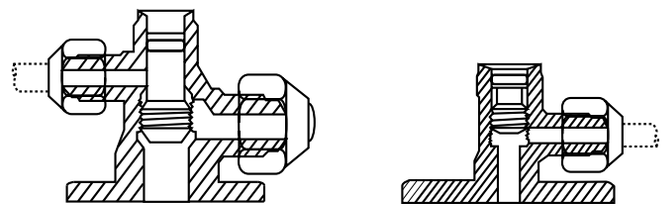


Fig.9-5c

• Condition at Evacuation

• Condition at Charging in the Field.(-c-)

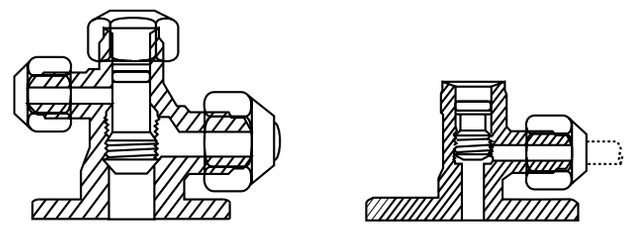


Fig.9-5d

• Condition at Charging with Only Outdoor Unit (-d-)

10. REFRIGERANT R407C : SPECIAL PRECAUTIONS WHEN SERVICING UNIT

10-1. Characteristics of new refrigerant R407C

10-1-1. What is new refrigerant R407C

R407C is a new refrigerant that contains three types of non-azeotropy-type mixed refrigerant which does not adversely affect the Earth's ozone layer. Its refrigeration capacity and energy efficiency are about the same level as the conventional refrigerant R22

10-1-2. Components (mixing proportions)

HFC32 (23%) / HFC125 (25%) / HFC134a (52%)

10-1-3. Characteristics

- Less toxic, more chemically stable refrigerant.
- Composition of refrigerant R407C changes whether it is in gaseous phase or liquid phase. Thus, when there is a refrigerant leak the basic performance of the air conditioner may be degraded because of a change in composition of the remaining refrigerant. ***Therefore, do not add new refrigerant.*** Instead, recover the remaining refrigerant with the refrigerant recovery unit. Then, after evacuation, totally recharge the specified amount of refrigerant with the new refrigerant at its normal mixed composition state (liquid phase).
- When refrigerant R407C is used, the composition will differ depending on whether it is in gaseous or liquid phase, and the basic performance of the air conditioner will be degraded if it is charged while the refrigerant is in gaseous state. ***Thus, always charge the refrigerant while it is in the liquid phase.***

- **Ether-type oil is used for the compressor oil for R407C-type units, which is different from the mineral oil used for R22. Thus more attention to moisture prevention and faster replacement work compared with conventional models are required.**

10-2. Checklist before servicing

- **Tubing precautions**
  Refrigerant R407C is more easily affected by dust or moisture compared with R22, thus be sure to temporarily cover the ends of the tubing with caps or tape prior to installation.
- **No addition of compressor oil for R407C**
  No additional charge of compressor oil is permitted.
- **No use of refrigerant other than R407C**
  Never use a refrigerant other than R407C.
- **If refrigerant R407C is exposed to fire**
  Through welding, etc., toxic gas may be released when R407C refrigerant is exposed to fire. Therefore, be sure to provide ample ventilation during installation work.
- **Caution in case of R407C leak**
  Check for possible leak points with the special leak detector for R407C. If a leak occurs inside the room, immediately provide thorough ventilation.

10-3. Tools specifically for R407C

● For servicing, use the following tools for R407C

Tool Distinction	Tool Name
Tools specifically for R407C	• Gauge manifold • Charging hose • Gas leak detector • Refrigerant cylinder • Charging cylinder • Refrigerant recovery unit • Vacuum pump with anti-reverse flow **(✻1)** (Solenoid valve-installed type, which prevents oil from flowing back into the unit when the power is off, is recommended.) • Vacuum pump **(✻2)** ..... can be used if the following adapter is attached. • Vacuum pump adapter (reverse-flow prevention adapter) **(✻3)**. (Solenoid valve-installed adapter attached to a conventional vacuum pump.) • Electronic scale for charging refrigerant • Flare tool
Tools which can be commonly used for R22 and R407C	• Bender • Torque wrench • Cutter, Reamer • Welding machine, nitrogen gas cylinder

CAUTION

- **The above tools specifically for R407C must not be used for R22. Doing so will cause malfunction of the unit.**
- **For the above vacuum pump (✻1, ✻2) and vacuum pump adapter (✻3) , those for R22-type units can be used for R407C-type. However, they must be used exclusively for R407C and never alternately with R22.**

10-4. For tubing installation procedures

- When the tubes are connected, ***always apply HAB oil on the flare portions to improve the sealing of tubing.***

The following is the **HAB oil** generally used:
Esso: ZERICE S32

NOTE For details on tubing installation procedures, refer to the installation manuals attached to the indoor unit and outdoor unit.

10-5. In case of compressor malfunction

CAUTION

- **Should the compressor malfunction, be sure to replace compressor as quickly as possible.**
- **Use only the tools indicated exclusively for R407C. → See "10-3. Tools specifically for R407C".**

10-5-1.Procedure for replacing compressor

(1) **Recovering refrigerant**

- Any remaining refrigerant inside the unit should not be released to the atmosphere, but recovered using the refrigerant recovery unit for R407C.
- Do not reuse the recovered refrigerant, since will contain impurities.

(2) **Replacing compressor**

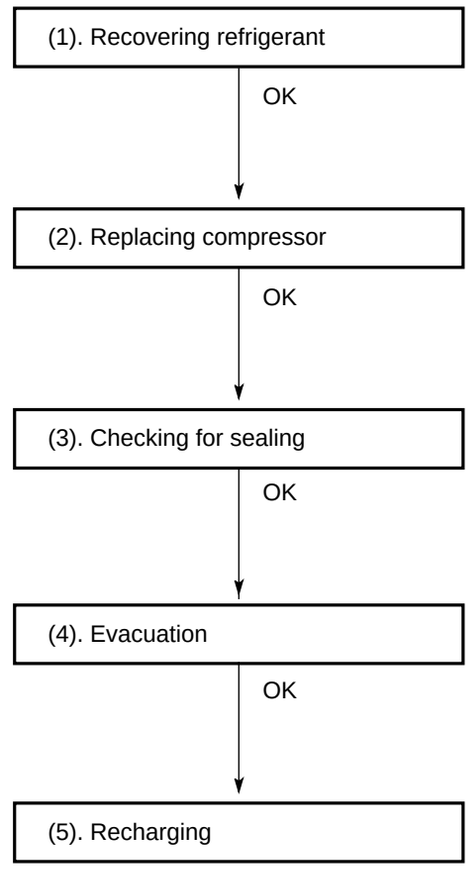
- Soon after removing pinched pipes of both discharge and suction tubes of the new compressor, replace it quickly.

(3) **Checking for sealing**

- Use nitrogen gas for the pressurized gas, and never use a refrigerant other than R407C. Also do not use oxygen or any flammable gas.

(4) **Evacuation**

- ***Use a solenoid valve-installed vacuum pump*** so that even if power is cut off in the middle of evacuation of air due to a power interruption, the valve will prevent the pump oil from flowing back.
- The equipment may be damaged if moisture remains in the tubing, thus carry out the evacuation thoroughly.
- When using a vacuum pump with exhaust air volume more than 25L/min. and ultimate vacuum pressure rate of 0.05Torr:



Standard time of evacuation

Length of tubing	Less than 10 m	More than 10 m
Time	More than 10 min.	More than 15 min.

(5) **Recharging**

- ***Be sure to charge the specified amount of refrigerant in liquid state*** using the service port of wide tube service valve. The proper amount is listed on the unit's nameplate.

  When the entire amount cannot be charged all at once, charge gradually while operating the unit in Cooling Operation.

CAUTION

- **Never charge a large amount of liquid refrigerant at once to the unit. This may cause damage to the compressor.**

- When charged with a refrigerant cylinder, use the electronic scale for charging refrigerant. In this case, if the volume of refrigerant in the cylinder becomes less than 20% of the fully-charged amount, the composition of the refrigerant starts to change. Thus, ***do not use the refrigerant if the amount in the refrigerant cylinder is less than 20%.***

  Also, charge the minimum necessary amount to the cylinder before using it for charging the air conditioning unit.

  Example:
  In case of charging refrigerant to a unit requiring 0.76Kg using a capacity of 10Kg-cylinder, the minimum necessary amount for the cylinder is:

  0.76 + 10 x 0.20 = 2.76Kg

  For the remaining refrigerant, refer to the instructions of the refrigerant manufacturer.

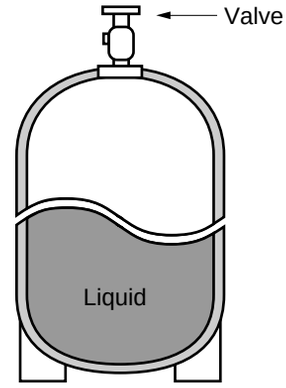
- If using a charging cylinder, transfer the specified amount of liquid refrigerant from the refrigerant cylinder to the charging cylinder.

  Prepare an evacuated charging cylinder beforehand.

CAUTION

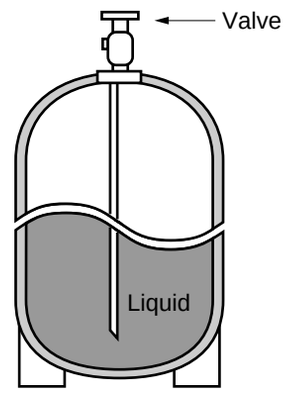
- **To prevent the composition of R407C from changing, never bleed the refrigerant gas into the atmosphere while transferring the refrigerant. (Fig. 3)**

Do not use the refrigerant if the amount in the charging cylinder is less than 20%.



Single valve
Charge the liquid refrigerant with the cylinder in the up-side-down position.

Fig. 1



Single valve (with siphon tube)
Charge with the cylinder in the normal position.

Fig. 2

Configurations and characteristics of cylinders

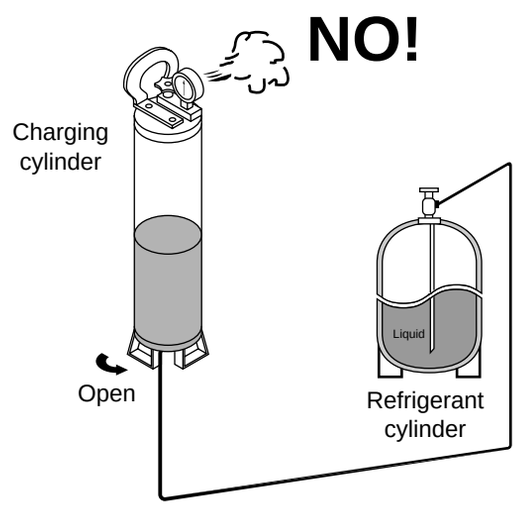


Fig.3

10-6. In case refrigerant is leaking

CAUTION

● **Never attempt to charge additional refrigerant when refrigerant has been leaking from the unit. Follow the procedure described below to locate points of leaks and carry out repairs, then recharge the refrigerant.**

(1) **Detecting Leaks**

- Use the detector for R407C to locate refrigerant leak points.

(2) **Recovering refrigerant**

- Never release the gas to the atmosphere, recover residual refrigerant using the refrigerant recovery unit for R407C, instead.
- Do not reuse the recovered refrigerant because its composition will have been altered.

(3) **Welding leaking points**

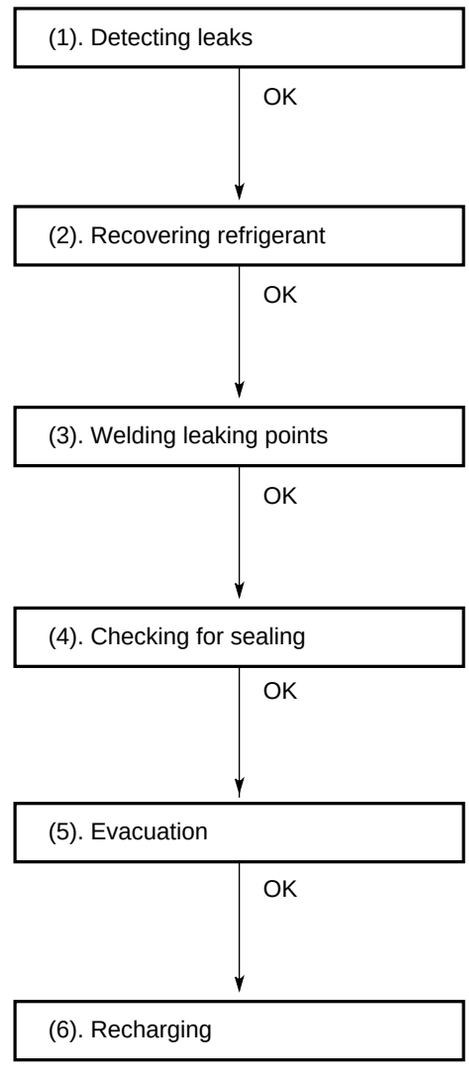
- Confirm again that no residual refrigerant exists in the unit before starting welding.
- Weld securely using flux and wax for R407C.
- Prevent oxide film from forming inside the tubes utilizing substitution with nitrogen (N2) in the refrigerant circuit of the unit. Leave ends of tubes open during welding.

(4) **Checking for sealing**

- Use nitrogen gas for the pressurized gas, and never use a refrigerant other than R407C. Also do not use oxygen or any flammable gas.

(5) **Evacuation**

- ***Use a solenoid valve-installed vacuum pump*** so that even if power is cut off in the middle of evacuation of air due to a power interruption, the valve will prevent the pump oil from flowing back.
- The equipment may be damaged if moisture remains in the tubing, thus carry out the evacuation thoroughly.
- When using a vacuum pump with exhaust air volume more than 25L/min. and ultimate vacuum pressure rate of 0.05Torr:



Standard time of evacuation

Length of tubing	Less than 10 m	More than 10 m
Time	More than 10 min.	More than 15 min.

(6) **Recharging**

- ***Be sure to charge the specified amount of refrigerant in liquid state*** using the service port of wide tube service valve. The proper amount is listed on the unit's nameplate.

  When the entire amount cannot be charged all at once, charge gradually while operating the unit in Cooling Operation.

CAUTION

- **Never charge a large amount of liquid refrigerant at once to the unit. This may cause damage to the compressor.**

- When charged with a refrigerant cylinder, use the electronic scale for charging refrigerant. In this case, if the volume of refrigerant in the cylinder becomes less than 20% of the fully-charged amount, the composition of the refrigerant starts to change. Thus, ***do not use the refrigerant if the amount in the refrigerant cylinder is less than 20%.***

Also, charge the minimum necessary amount to the cylinder before using it for charging the air conditioning unit.

Example:
In case of charging refrigerant to a unit requiring 0.76Kg using a capacity of 10Kg-cylinder, the minimum necessary amount for the cylinder is:

0.76 + 10 x 0.20 = 2.76Kg

For the remaining refrigerant, refer to the instructions of the refrigerant manufacturer.

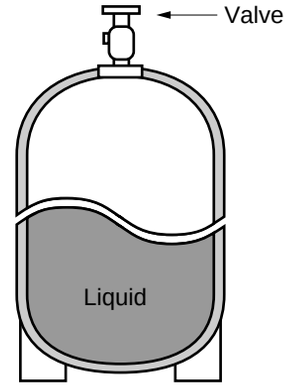
- If using a charging cylinder, transfer the specified amount of liquid refrigerant from the refrigerant cylinder to the charging cylinder.

  Prepare an evacuated charging cylinder beforehand.

CAUTION

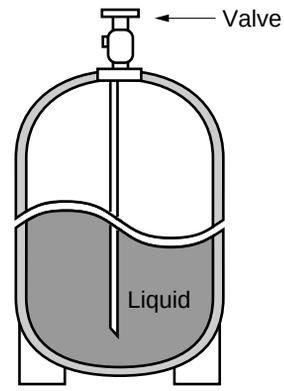
- **To prevent the composition of R407C from changing, never bleed the refrigerant gas into the atmosphere while transferring the refrigerant. (Fig. 6)**

Do not use the refrigerant if the amount in the charging cylinder is less than 20%.



Single valve
Charge the liquid refrigerant with the cylinder in the up-side-down position.

Fig. 4



Single valve (with siphon tube)
Charge with the cylinder in the normal position.

Fig. 5

Configurations and characteristics of cylinders

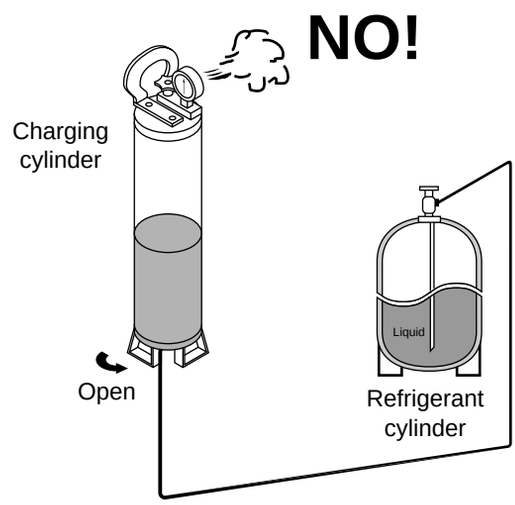


Fig. 6

10-7. Charging additional refrigerant

10-7-1.When tubes are extended

• Observe the proper amount of refrigerant as stated in this service manual or the installation manual that came with the indoor unit. ***Charge additional refrigerant in liquid state.***

● **Never charge additional refrigerant if refrigerant is leaking from the unit. Follow instructions given in "10-6. In case refrigerant is leaking" and completely carry out repairs. Only then should you recharge the refrigerant.**

10-8. Retro-fitting existing systems

10-8-1 Use of existing units

• ***Never use new refrigerant R407C for existing units which use R22.*** This will cause the air conditioner to operate improperly and may result in a hazardous condition.

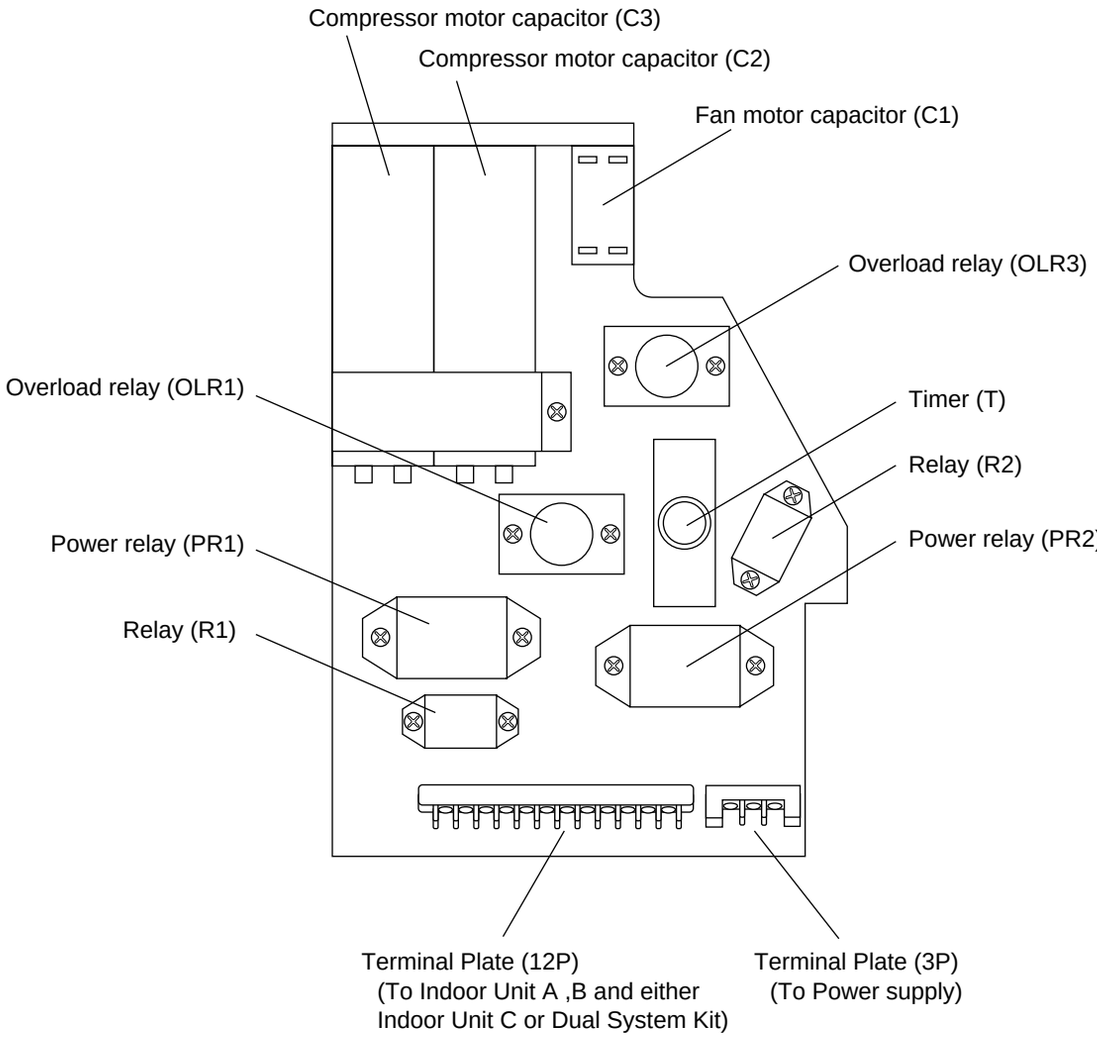
10-8-2 Use of existing tubing

• If replacing an older unit that used refrigerant R22 with a R407C unit, ***do not use its existing tubing.*** Instead, completely new tubing must be used.

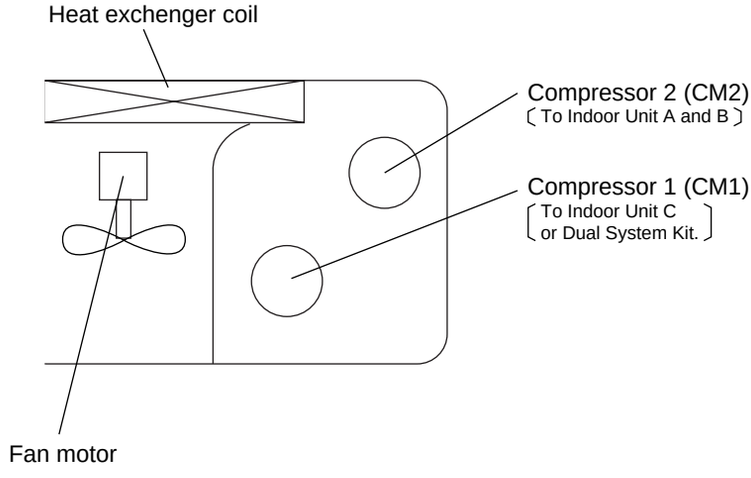
11.ARRANGEMENT OF ELECTRICAL COMPONENTS

Outdoor Unit **AER522QC**

● **Electric Parts**

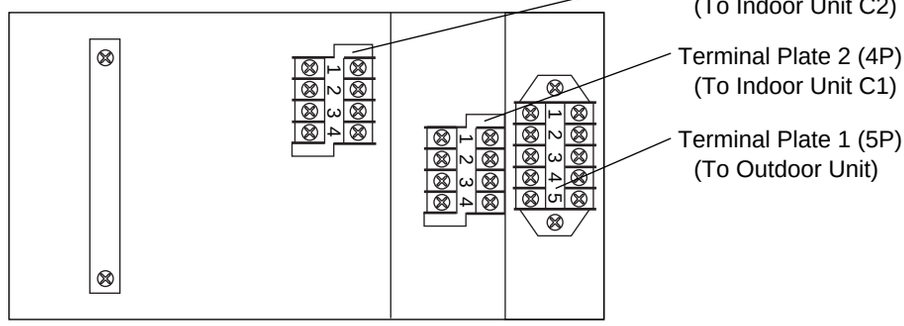


● **Parts Layout in Unit**

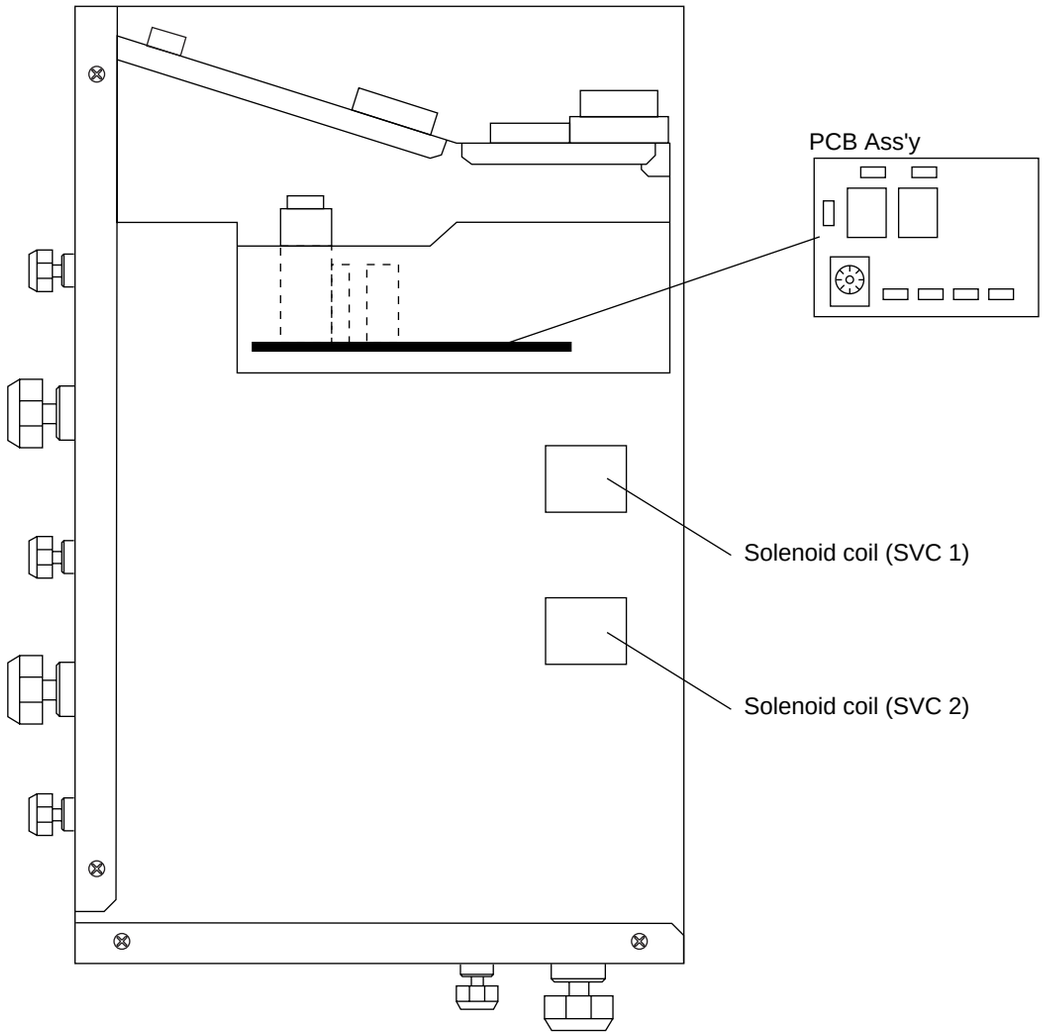


Dual System Kit **DKR-5555C**

● Terminal Plate



● Electric Parts



12. CHECKING ELECTRICAL COMPONENTS

12-1. Measurement of Insulation Resistance

- The insulation is in good condition if the resistance exceeds 1MΩ.

12-1-1. Power Supply Wires

Clamp the ground wire of the power supply wires with the lead clip of the insulation resistance tester and measure the resistance by placing a probe on either of the power wires. (Fig.12-1)

Then measure the resistance between the ground wire and the other power wire. (Fig.12-1)

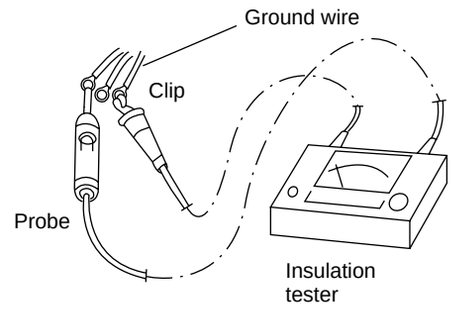


Fig.12-1

12-1-2. Outdoor Unit

Clamp a metallic part of the unit with the lead clip of the insulation resistance tester and measure the resistance by placing a probe on each terminal screw where power supply lines are connected on the terminal plate. (Fig.12-2)

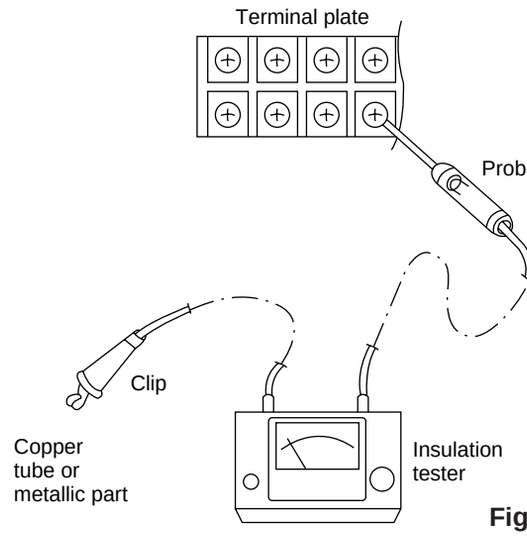


Fig.12-2

12-1-3. Measurement of Insulation Resistance for Electrical Parts

Disconnect the lead wires of the desired electric part from terminal plate, capacitor, etc. Similarly disconnect the connector. Then measure the insulation resistance. (Figs.12-3 and 12-4)

NOTE Refer to Electric Wiring Diagram.

If the probe cannot enter the poles because the hole is too narrow then use a probe with a thinner pin.

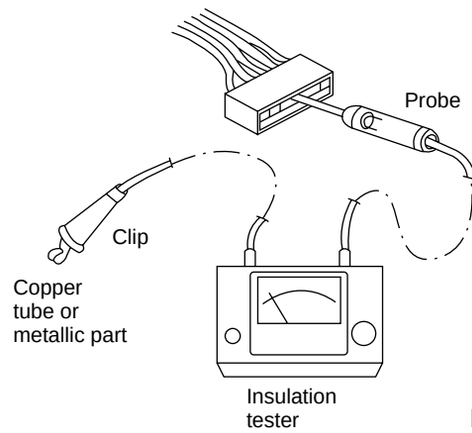


Fig.12-3

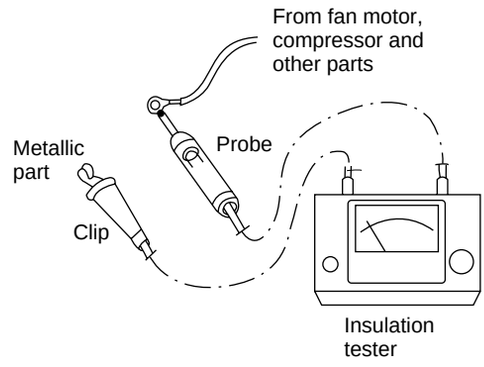


Fig.12-4

12-2. Checking Motor Capacitor

Remove the lead wires from the capacitor terminals, and then place a probe on the capacitor terminals as shown in Fig.12-5. Observe the deflection of the pointer, setting the resistance measuring range of the multimeter to the maximum value.

The capacitor is “good” if the pointer bounces to a great extent and then gradually returns to its original position.

The range of deflection and deflection time differ according to the capacity of the capacitor.

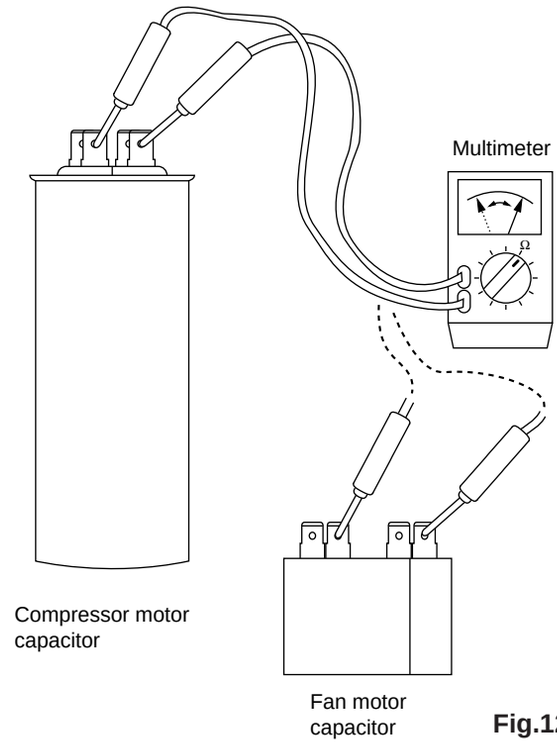


Fig.12-5

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