DENSO

Service Manual

MOVINCOOL®

SPOT COOLING SYSTEMS

10SFE • 15SFE • 15SFE-1

FOREWORD

This manual has been published to service the MovinCool 10SFE, 15SFE and 15SFE-1. The purpose of this manual is making up for the previous manual (GMZR-03A and GMZR-06) in modifying specification. Please use this service manual in servicing (maintenance, inspection, repair, etc.) the unit.

TABLE OF CONTENTS

CONSTRUCTION & OPERATION

REPAIR

CONSTRUCTION AND OPERATION

1. CONSTRUCTION

Spot cooling system (MovinCool) have the following features;

(1) Compact Design

The innovative design of spot cooling systems has resulted in one compact design, replacing the two separate units.

(2) Easy Transportation and Installation

With the whole cooling system built into one compact unit, the spot cooling system requires no pipe work and can be transported and installed easily.

(3) Energy Conservation

The spot cooling system is economical. Because it cools only the area or object needed to be cooled.

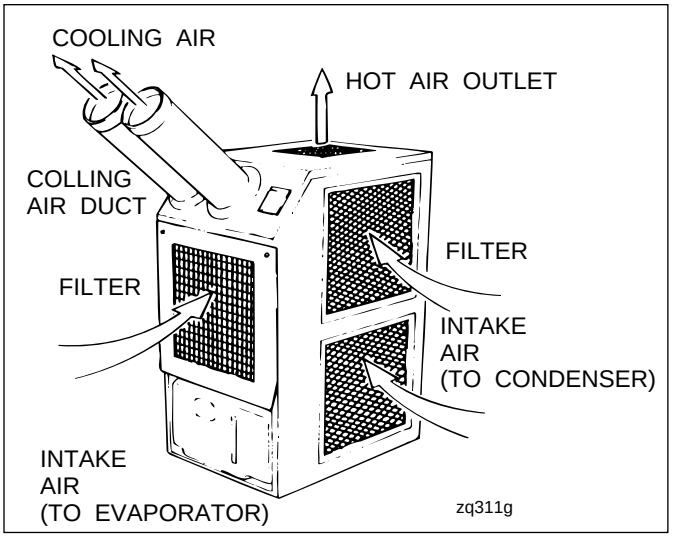


Fig.1 Air Flow of Spot Cooling System

2. MODEL AND SPECIFICATIONS

MODEL - 15 S F E - 1

- 1: With Temperature Control
No mark: Without Temperature Control

European Spec.

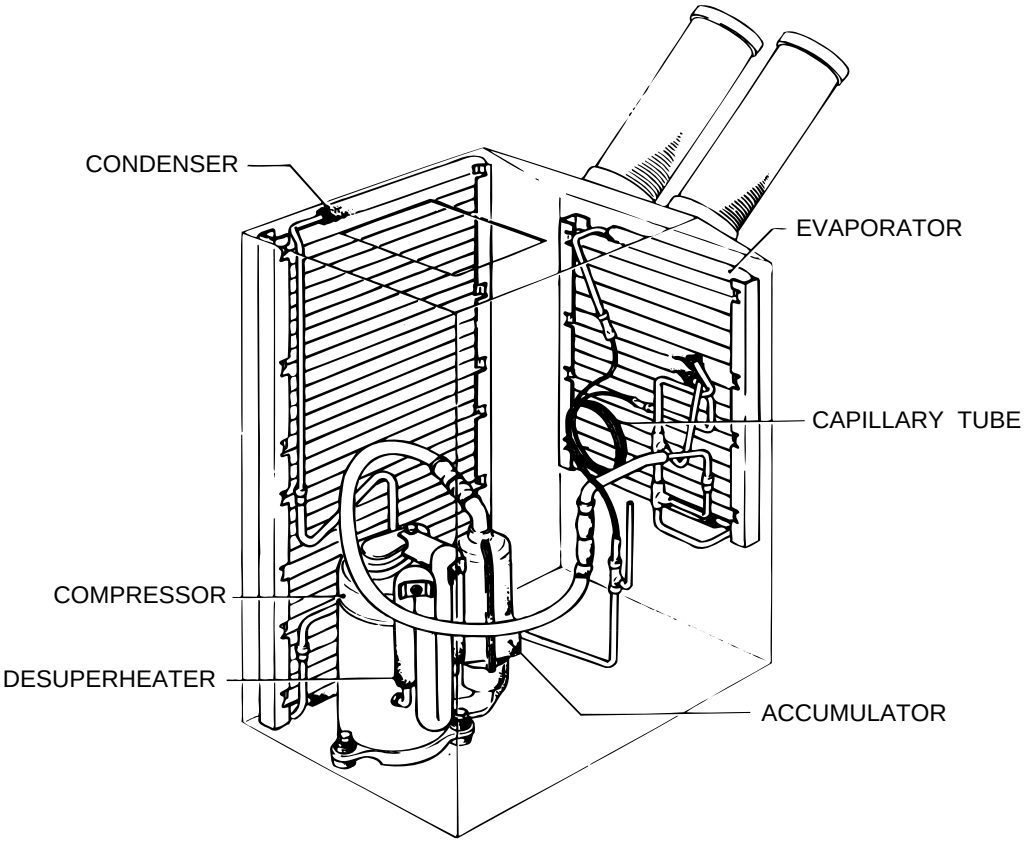
Floor Type

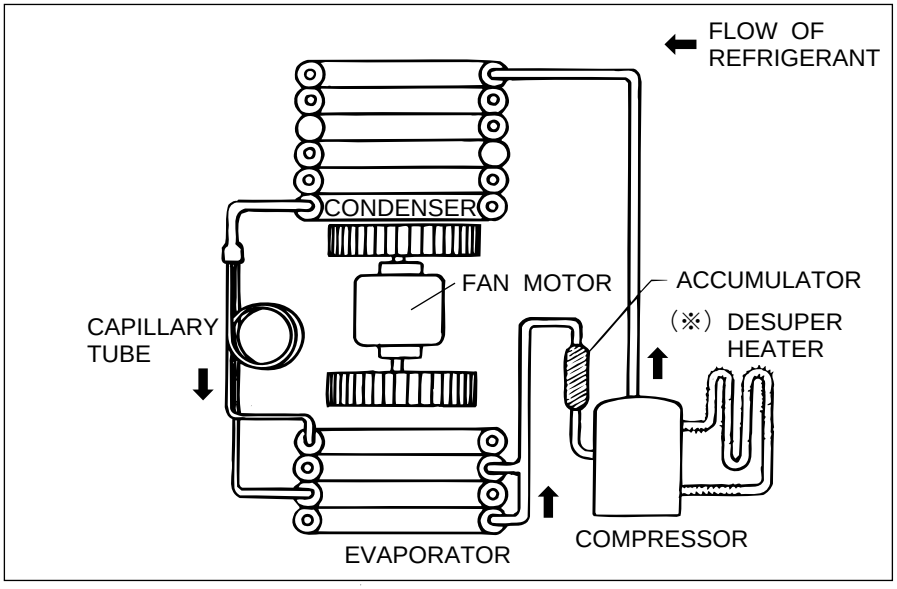
Shows Thermal Allowable Load
S: 40℃, 50%
H: 45℃, 50%

Compressor Output
10: 1HP
15: 1.5HP

The refrigeration cycle of 15SFE and 15SFE-1 are as shown below. Model 10SFE is almost same refrigeration cycle.

[REFRIGERANT CYCLE]





※Except 10SFE Model

Fig.2 Refrigeration Cycle of Model 15SFE & 15SFE-1

2-1 COMPRESSOR

The compressor used is a hermetic rotary type. The compressor and the compressor motor are in one casing.

(1) Construction

The construction of the rotary type compressor is divided into two mechanisms that are the drive mechanism and compression mechanism. When the rotor shaft of the motor turns, the roller of the compressor rotates to absorb and compress the refrigerant.

The main parts are the rotor (drive mechanism), cylinder, roller and the lubricator.

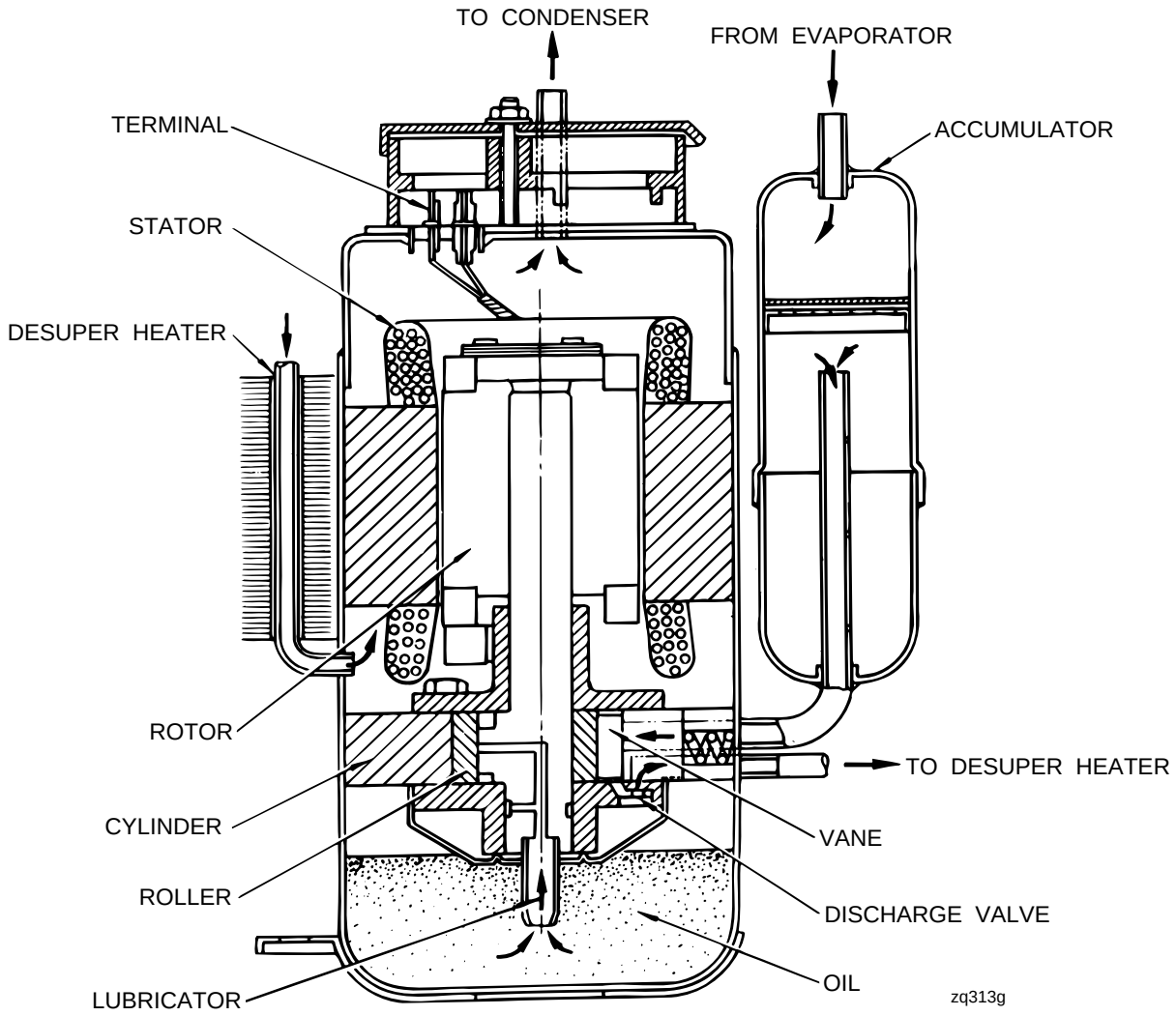


Fig.3 Construction of Hermetic Rotary Compressor

(2) Compressor Motor

The compressor motor is a single phase motor and is built in the compressor.

2-2 CONDENSER

The condenser of model 15SFE & 15SFE-1 are a heat exchanger using spain fins and tubes. The condenser of Model 10SFE is a heat exchanger using plate fins and tubes. The condenser is used for the purpose of cooling and robbing the heat from the refrigerant gas, which has been compressed by the compressor into high temperature, high pressure gas, so as to change this gas into liquid refrigerant.

2-3 EVAPORATOR

The evaporator of Model 15SFE & 15SEF-1 are a heat exchanger using spain fins and tubes. The evaporator of Model 10SFE is a heat exchanger using plate fins and tubes. It is mounted at the front face of the unit, located on the suction side of the blower.

The purpose of the evaporator is just opposite to that of the condenser. The state of the refrigerant immediately before the capillary tube is completely liquid. As soon as the liquid pressure drops, it starts to boil, and in doing so, absorbed heat from the air passing over the cooling fins of the evaporator, cooling air.

2-4 CAPILLARY TUBE

The capillary tube causes the high pressure, high temperature liquid refrigerant sent from the condenser to evaporator as the refrigerant is sprayed out through the fixed orifice in the capillary tube. As a result, the temperature and state of the refrigerant become low and mist-like, and therefore it evaporates easily.

Model	Qty	Inner Dia.(mm)	Length(mm)
10SFE	1	1.4±0.02	390
15SFE	2	1.6±0.02	1300
15SFE-1			

2-5 ACCUMULATOR

The accumulator is mounted on the suction pipe between the evaporator and the compressor.

The accumulator separates the liquid refrigerant from the gas refrigerant.

This allows only gas refrigerant to enter the compressor.

In the accumulator, the refrigerant gas flows to the inside of the cylindrical body and flow speed of the gas decreases inside it.

This separates the liquid refrigerant within the gas refrigerant due to the difference in specific weight, causing the liquid refrigerant to accumulate at the bottom of the accumulator. This protects the compressor from possible damage caused by the compression of the liquid refrigerant.

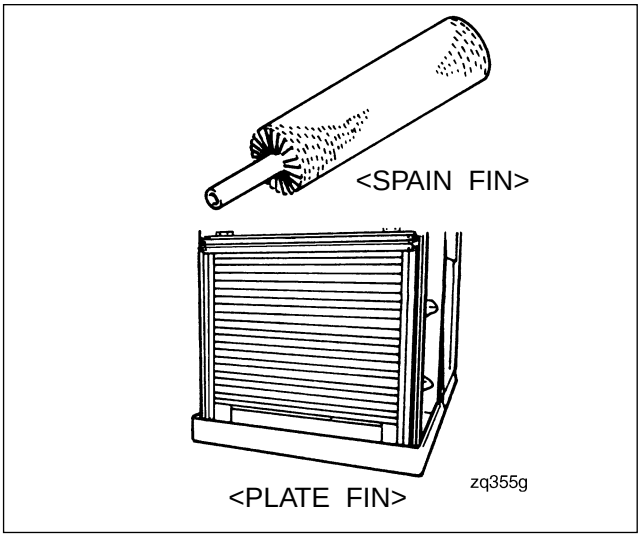


Fig.4 Spain Fin & Plate Fin

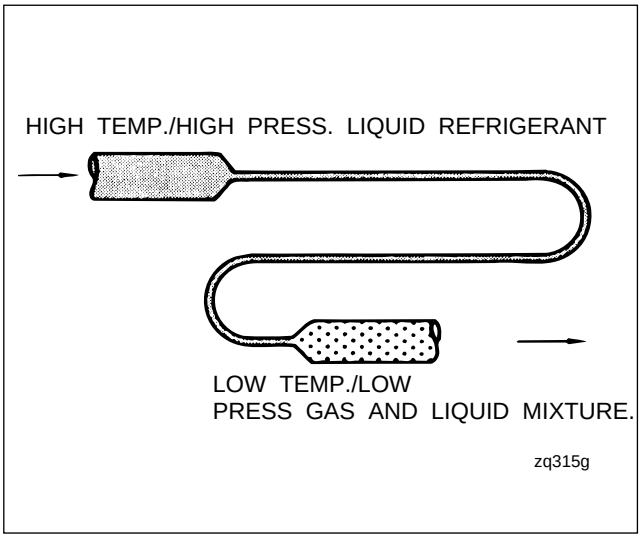


Fig.5 Capillary Tube

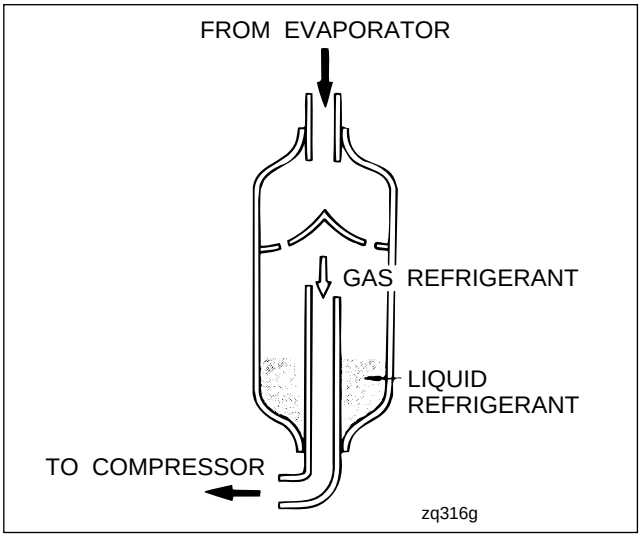


Fig.6 Accumulator

3. PIPING LAYOUT

All parts of the refrigeration cycle are connected by copper pipe with brazed joints (indicated by circled areas below). The refrigeration cycle for 15SFE and 15SFE-1 are as follows. Model 10SFE is almost same refrigeration cycle.

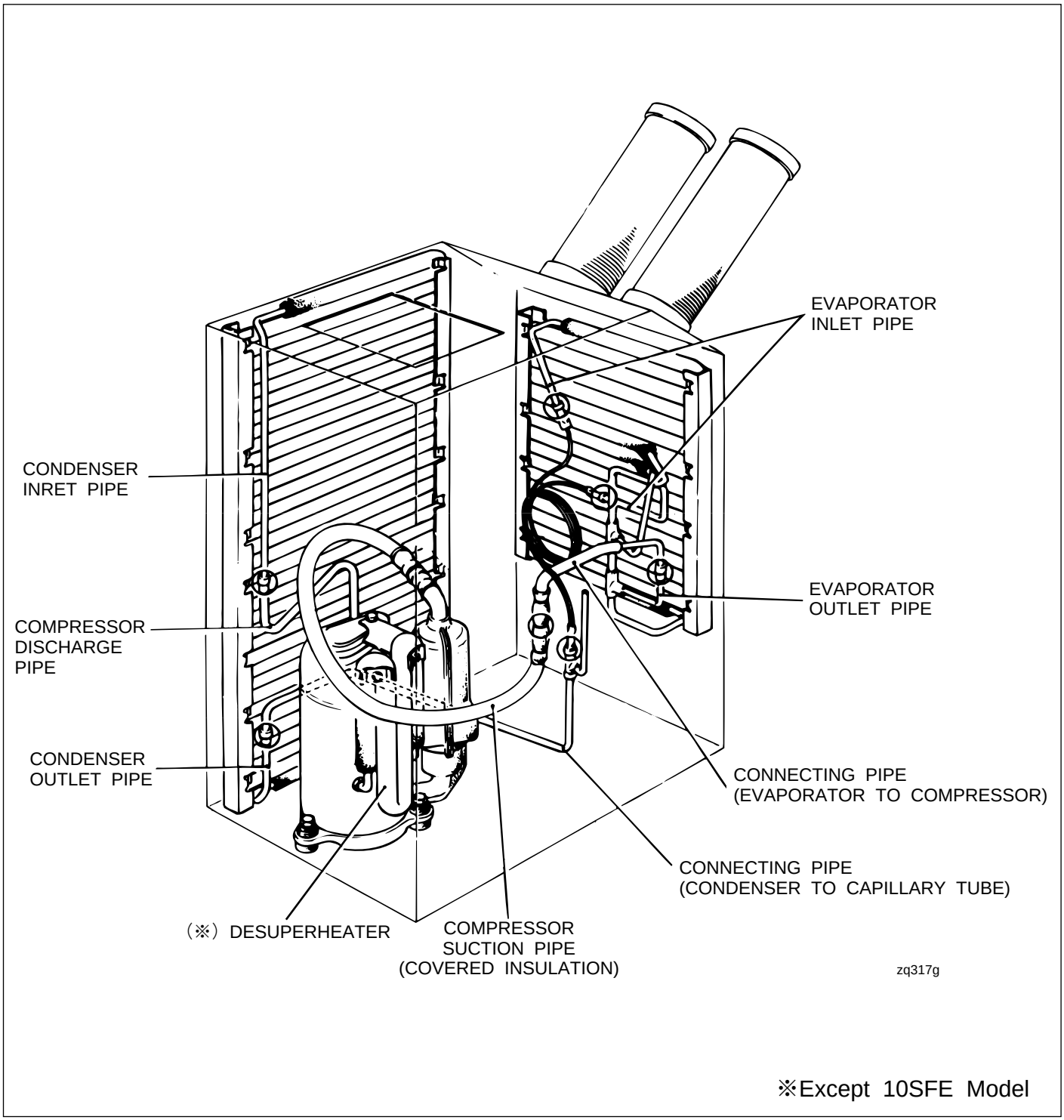
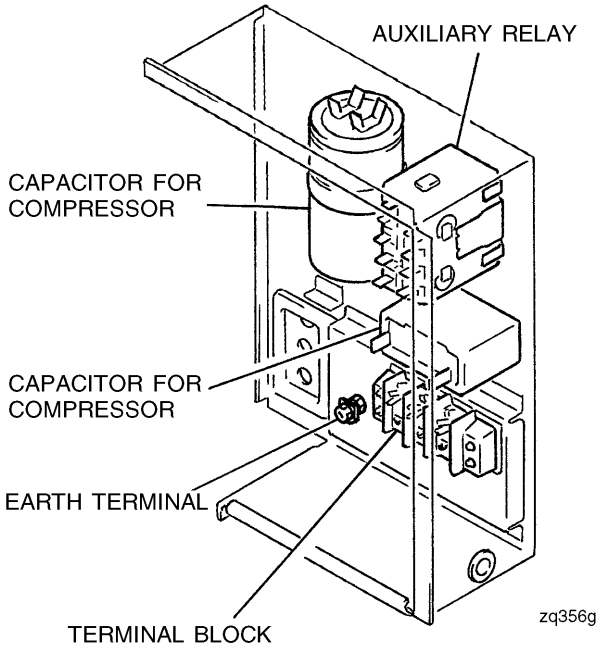


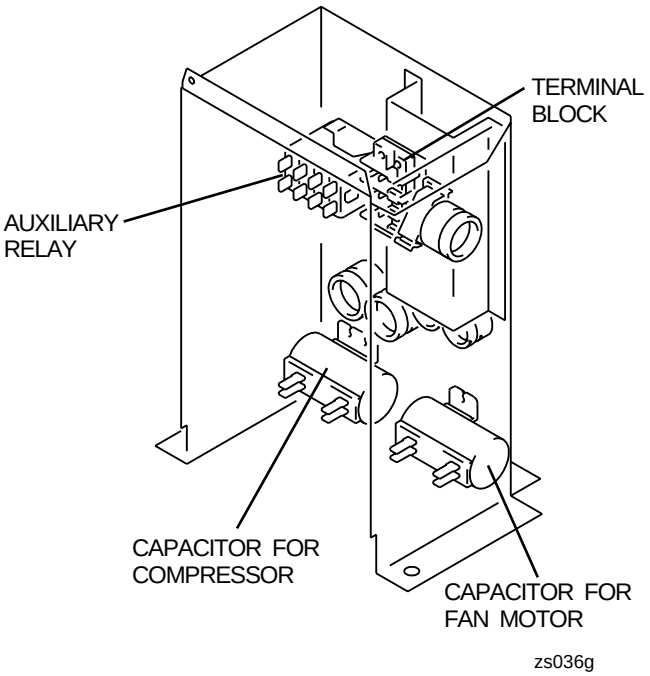
Fig.7 Refrigeration Cycle of Model 15SFE & 15SFE-1

4. CONTROL BOX

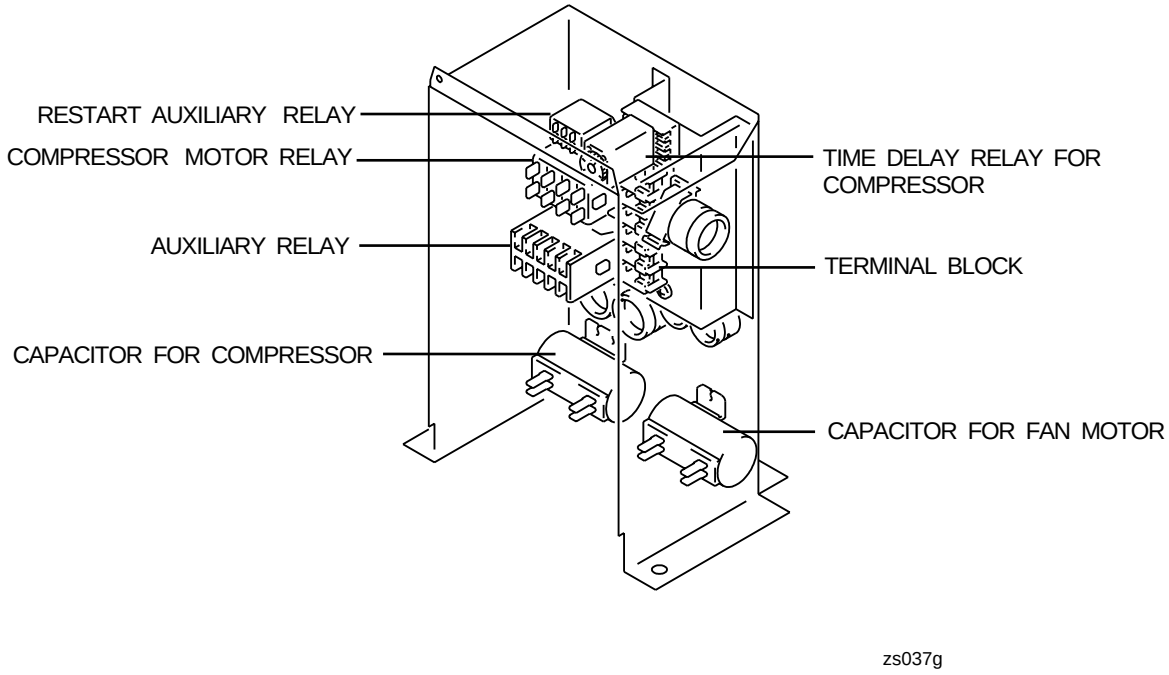
The interior of the control box is shown in the figure below.



[CONTROL BOX FOR MODEL 10SFE]



[CONTROL BOX FOR MODEL 15SFE]



[CONTROL BOX FOR MODEL 15SFE-1]

Fig.8

5. SYSTEM COMPONENTS AND FUNCTIONS

The application of each components for 10SFE, 15SFE, 15SFE-1 are as follows.

COMPONENTS \ APPLICATION	10SFE	15SFE	15SFE-1
(1) CAPACITOR (FOR COMPRESSOR AND FAN MOTOR)	○	○	○
(2) AUXILIARY RELAY	○	○	○
(3) COMPRESSOR RELAY	×	×	○
(4) OVERLOAD RELAY (PROTECTOR FOR COMPRESSOR)	○	○	○
(5) THERMOSTAT (ANTI-FREEZING)	○	○	○
(6) FAN MOTOR	○	○	○
(7) CONTROL SWITCH	○	○	○
(8) DRAIN WARNING SWITCH	○	○	○
(9) TEMPERATURE CONTROL (ROOM THERMOSTAT)	×	×	○
(10) RESTART AUXILIARY RELAY	×	×	○
(11) TIME DELAY RELAY	×	×	○

5-1 CAPACITOR

The capacitor is used to improve the rotary power of the fan motor and the compressor at first. The specifications of each capacitor are shown below.

Model	Capacitor		
	Application	Rated Voltage (volt)	Capacitance (μf)
10SFE	For fan motor	440	5
	For compressor	400	15
15SFE 15SFE-1	For fan motor	400	10
	For compressor	400	25

5-2 AUXILIARY RELAY

When the current flows through the relay coil, this creates excitation in the coil and causes it to attract three or four contacts, resulting in continuity between terminals 11 and 12, 13 and 14, 15 and 16, 19 and 20. These contacts remain attracted in all operation modes (I/FAN or II/COOL modes).

In the following case, the flow of current to the relay coil is cut off.

(1) Drain warning switch turns on.
(2) The drain tank is full of the condensate water.

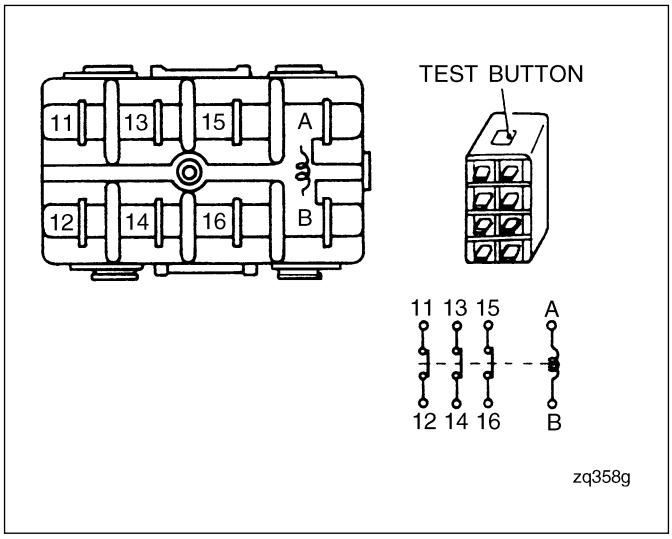


Fig.9 Auxiliary Relay for 10SFE, 15SFE

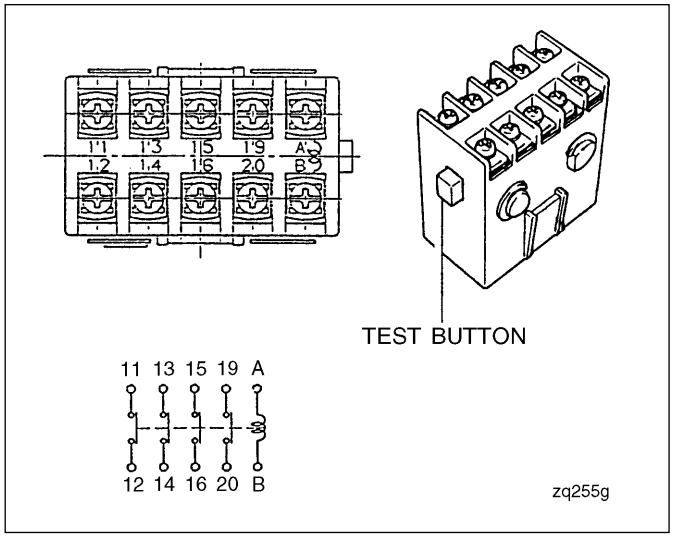


Fig.10 Auxiliary Relay for 15SFE-1

5-3 COMPRESSOR RELAY [15SFE-1 ONLY]

This compressor relay turns on only when the unit is operating in Ⅱ/COOL mode, and supplies power to the compressor. In the following case, the relay turns off and cut the power to the compressor.

(1) When the evaporator is frozen (when turning off by Anti-freezing thermostat.)
(2) When the auxiliary relay turns off by the drain warning switch
(3) When intake air temperature is dropped, after that room thermostat turns on.

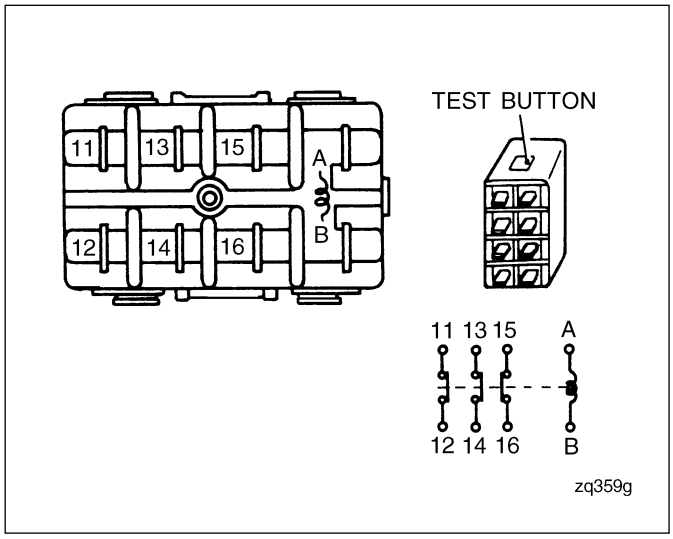


Fig.11 Compressor Relay for Model 15SFE-1

5-4 OVERLOAD RELAY (PROTECTOR)

An overload relay is used for protecting the compressor. This protector cuts off the flow of current to the compressor motor when an overcurrent flows or became abnormally high temperature in the compressor.

This overload relay is attached on the compressor.

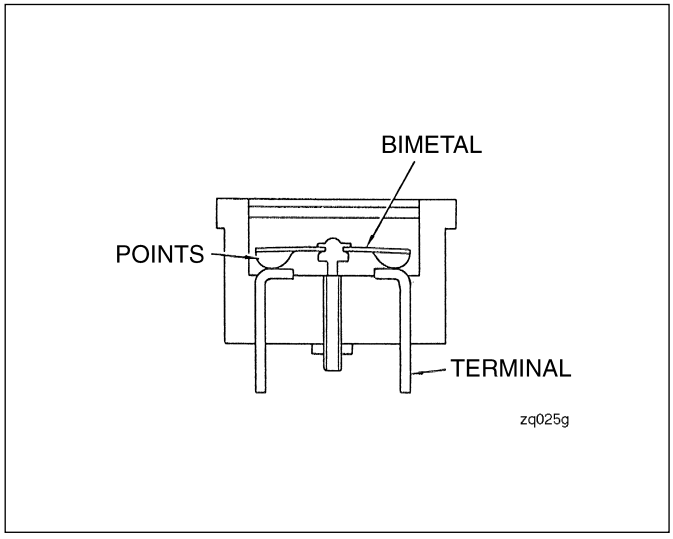


Fig.12 Overload Relay

5-5 THERMOSTAT (ANTI-FREEZING)

The heat sensing tube of thermostat is mounted at the outlet tube of the evaporator, and detects the evaporator temperature.

When the evaporator temperature reaches freezing, the thermostat switch opens, and then the current for the compressor is interrupted. (The compressor stops working)

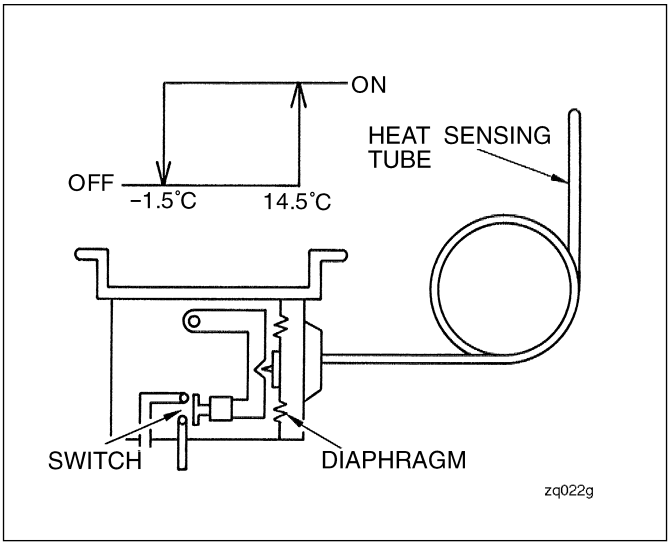


Fig.13 Thermostat

5-6 FAN MOTOR

The fan motor is single phase induction motor. When the control switch is set to the Ⅰ/FAN, Ⅱ/COOL position, the fan motor is activated.

The overload relay is built in the fan motor. When the coil became abnormally high temperature, the overload relay operate. So, the fan motor stops operation.

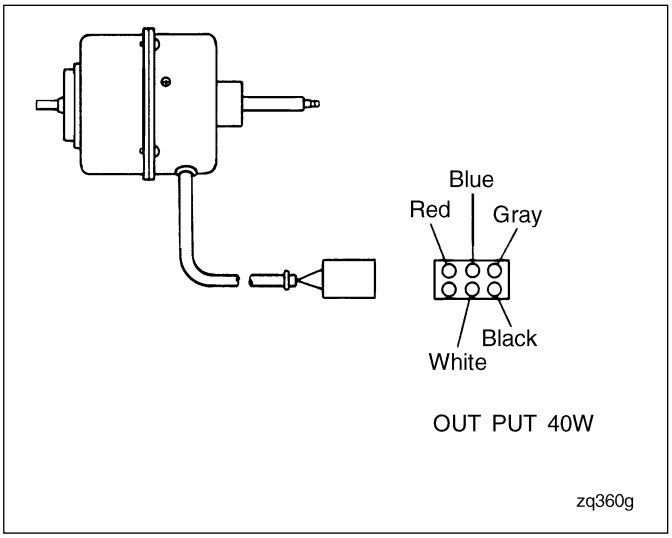


Fig.14 Fan Motor for 10SFE

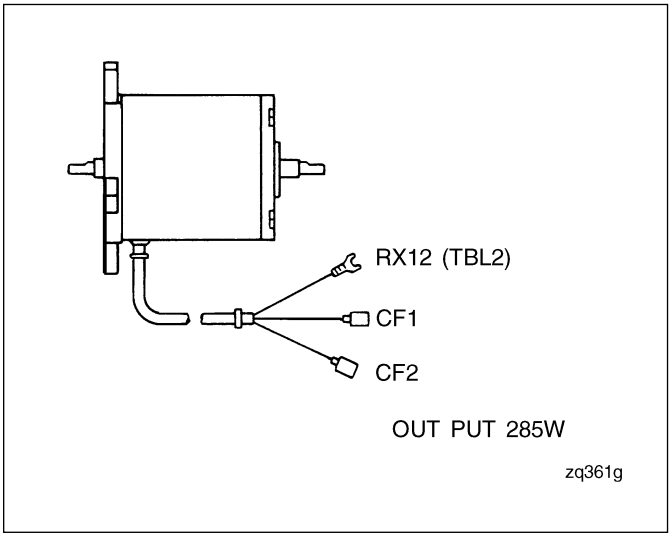


Fig.15 Fan Motor for 15SFE & 15SFE-1

5-7 CONTROL SWITCH

The control switch is used to start or to stop the operation. There are two switch positions such as 0/OFF and Ⅰ/COOL for models 15SFE and 15SFE-1.

There are five switch positions such as 0/OFF, Ⅰ/LOW FAN, Ⅱ/HI. FAN, Ⅲ/LOW COOL and Ⅳ/HI. COOL for model 10SFE.

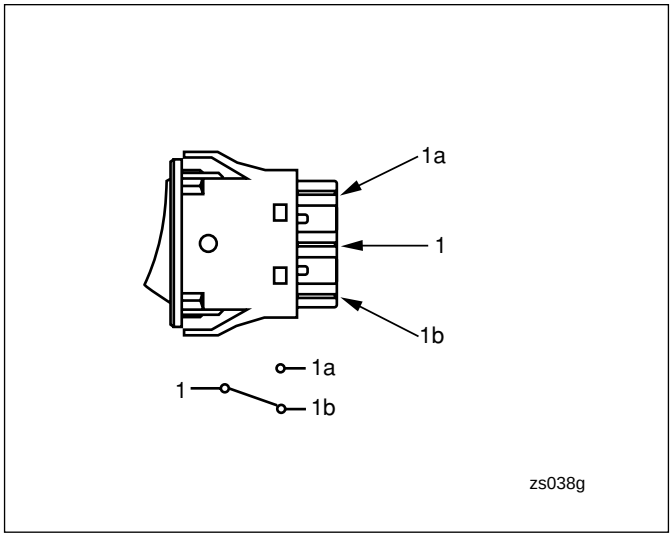
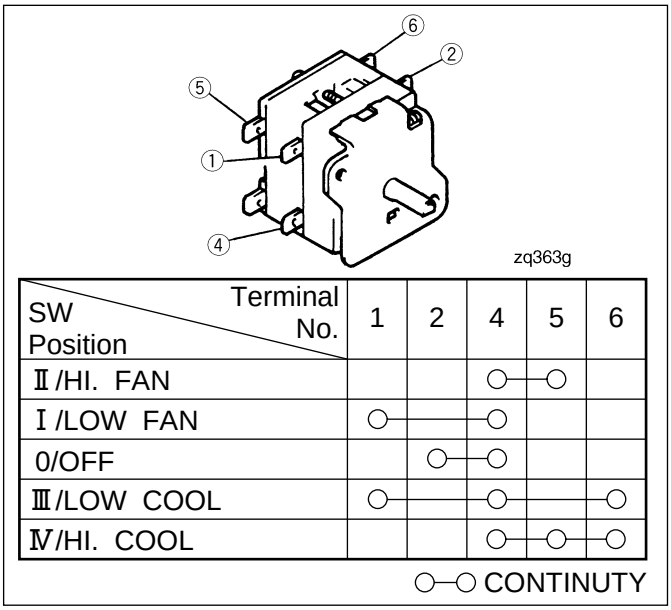


Fig.16 Control Switch for 15SFE & 15SFE-1



SW Position \ Terminal No.	1	2	4	5	6
Ⅱ/HI. FAN			○	○	
Ⅰ/LOW FAN	○		○		
0/OFF		○	○		
Ⅲ/LOW COOL	○		○		○
Ⅳ/HI. COOL			○	○	○

○—○ CONTINUTY

Fig.17 Control Switch for 10SFE

5-8 CONDENSATE PUMP [DRAIN PUMP] (OPTION)

A condensate pump is available for three Models. This pump can drain the condensate water automatically.

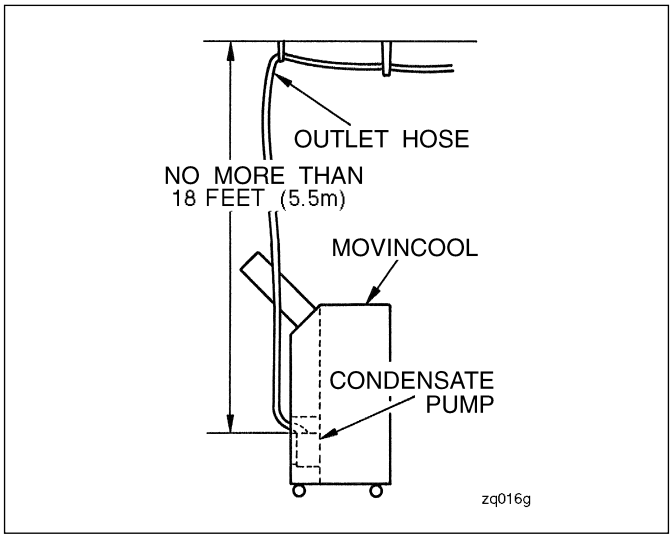


Fig.18 Layout for Condensate Pump

5-11 DRAIN WARNING SWITCH

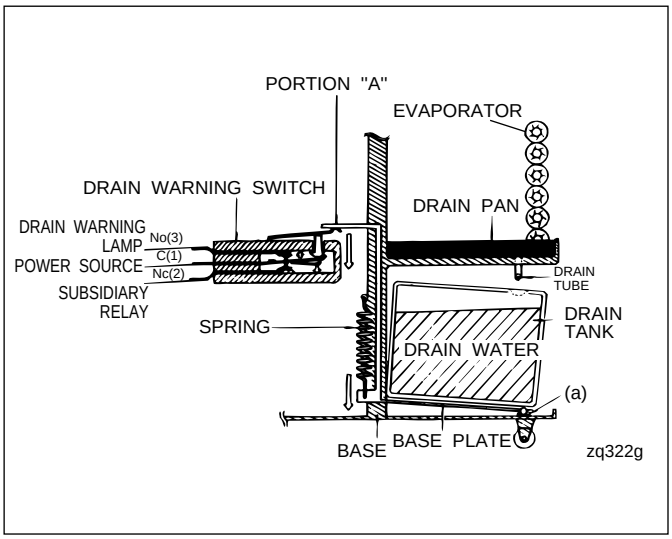


Fig.19 Operational Principle Drain Switch

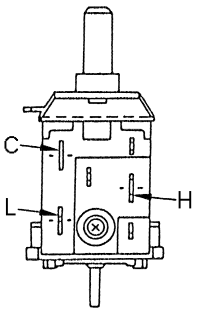
The drain switch cuts off the flow of current to both the compressor motor and the fan motors circuit when the drain water accumulates approx. 16 liters in the drain tank. At the same time, it lights the drain warning lamp on the operation panel and stops the operation. This system adopts a 240V, 3A rating micro switch for this function. When drain water accumulates approx. 16 liters in the drain tank, the drain tank base plate, which is supported at its fulcrum (a), is pushed down in the arrow direction as shown in the figure. When the drain tank base plate is forced down, "portion A" located at the top of the drain tank base plate turns off contacts (1)-(2) of the micro switch. Since this breaks the auxiliary relay (RX) circuit, the auxiliary relay contacts are turned off to break the compressor circuit and the fan motor circuit. At the same time, the contacts (1)-(3) are turned on to light the drain warning lamp.

When the drain tank is removed (or the water in the drain tank is drained), portion "A" of the drain tank base plate returns to its original position by the elasticity of the coil spring. Then contacts (1)-(3) turn off, extinguishing the drain warning lamp. At the same time, the contacts (1)-(2) turn on. Under this condition, turn the control switch to ◦ /FAN or ⌈ /COOL position to start operation.

5-12 TEMPERATURE CONTROL (ROOM THERMOSTAT) [15SFE-1 ONLY]

Outlet air temperature is controlled by the thermostat which is installed in front of the evaporator. This thermostat consists of heat sensing tube, bellows, contact, dial and spring. Inside of the heat sensing tube, the gas is contained. The internal diaphragm is operated by the thermal expansion of the gas, and makes the contact turn ON (or OFF).

This thermostat can be set to appropriate temperatures by means of the thermostat dial, located below the control switch.



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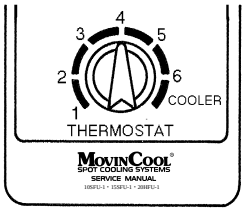
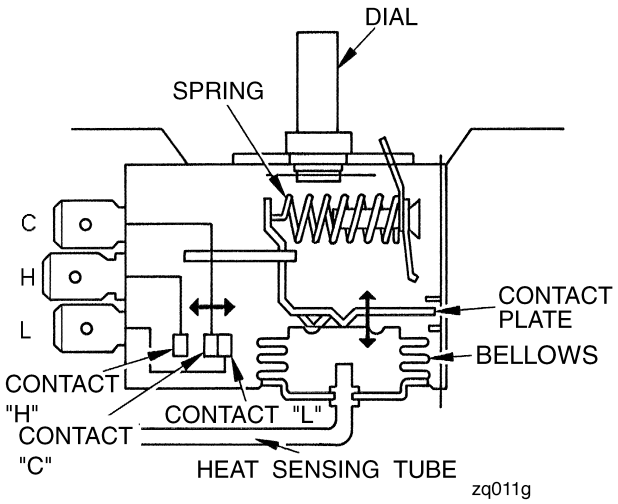


ZS039g

DIAL SETTING		1	2	3	4	5	6
RETRUN AIR TEMPERATURE (APPROX.)	℃	32	29	27	24	21	18
	°F	90	85	80	75	70	65



zq011g

Fig. 20 Thermostat

(1) When the Intake Air Temperature is Higher than Setting Temperature

The contact plate is pressed down onto the bellows by spring force. When the intake air temperature is higher than setting temperature, internal pressure forces the bellows up, therefore raising the contact plate, and consequently "C" contacts with "L". (Compressor is ON)

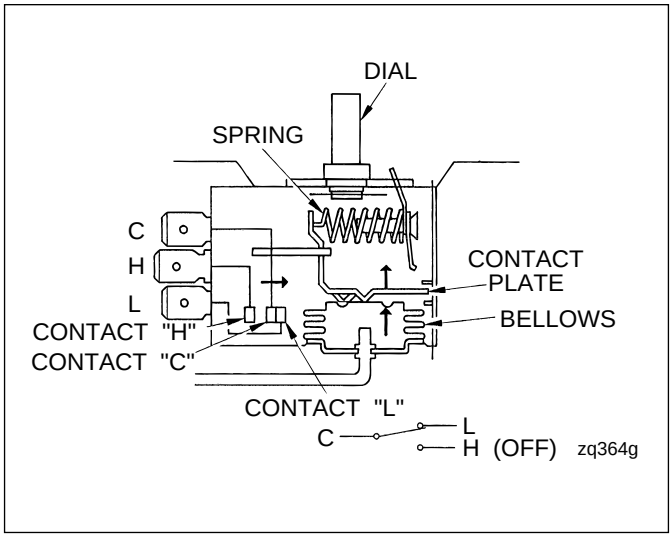


Fig.21 Thermostat Operation 1

(2) When the Intake Air Temperature is Lower than Setting Temperature

The internal pressure of the bellows, thus the contact plate moves down by spring force and "C" contacts with "H". (Compressor is OFF)

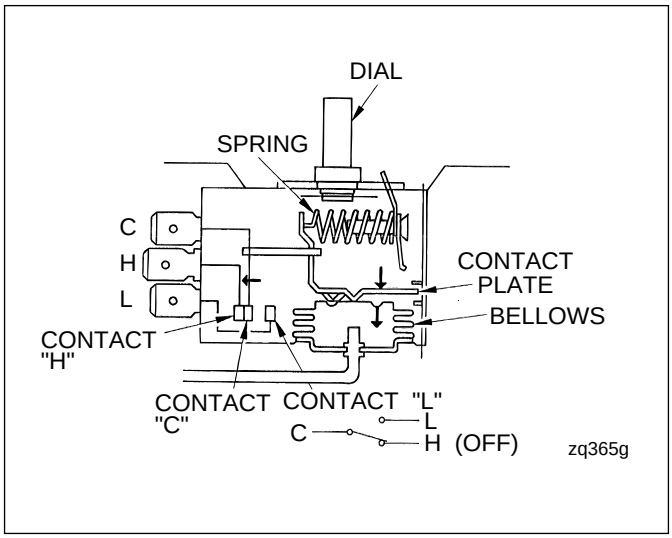


Fig.22 Thermostat Operation 2

5-13 COMPRESSOR OPERATION DELAY CIRCUIT [15SFE-1 ONLY]

A time delay relay for the compressor and circuit has been added to the electrical system to prevent a heavy load from being applied on the compressor motor when restarting the system.

This is due to the difference in pressure between the high and low pressure sides of the system. High pressure remains after stopping operation, thus a heavy load is applied to the compressor motor when restarting.

(1) Time delay Relay

The time delay relay consists of a relay (coil and contacts) and a time delay circuit (omitted from the figure below.)

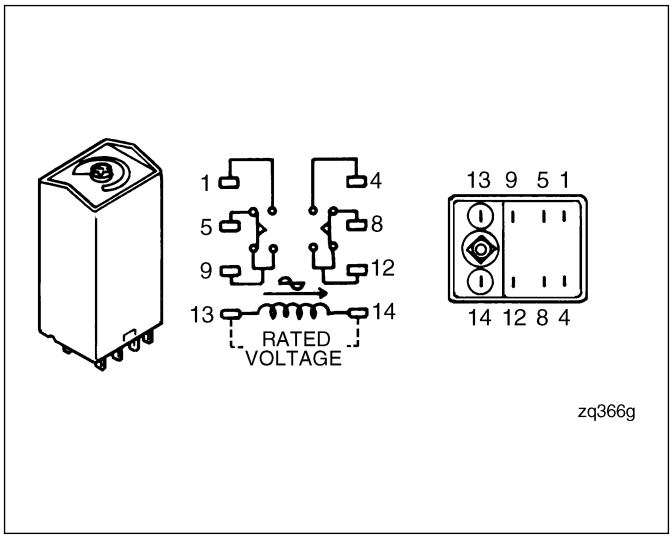


Fig.23 Time Delay Relay

(2) Restart auxiliary relay

The restart auxiliary relay is used for sending ON signal from the time delay relay to the compressor relay.

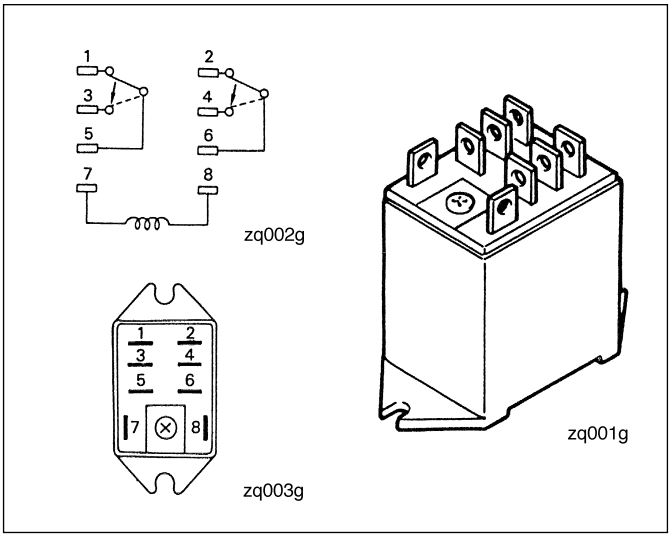


Fig.24 Restart Auxiliary Relay

(3) Operation

When the control switch is turned to the "COOL" position, current flows first to the time delay circuit and, after 75 seconds flows through the relay coil.

Then two contacts are moved by the electromagnetic force.

Terminals 5 and 9; and 8 and 12 are conductive, allowing current to flow to the compressor motor by activating the restart relay and compressor relay.

Delay Time: 75±15 seconds

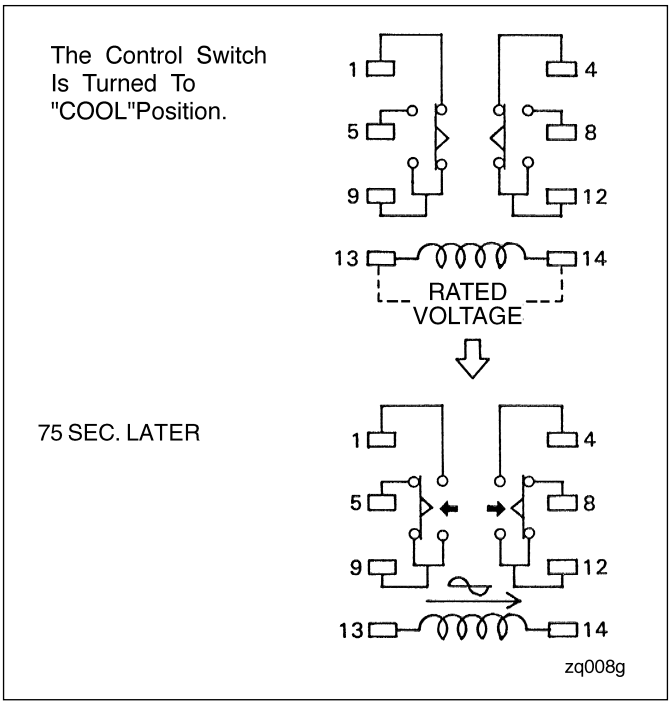
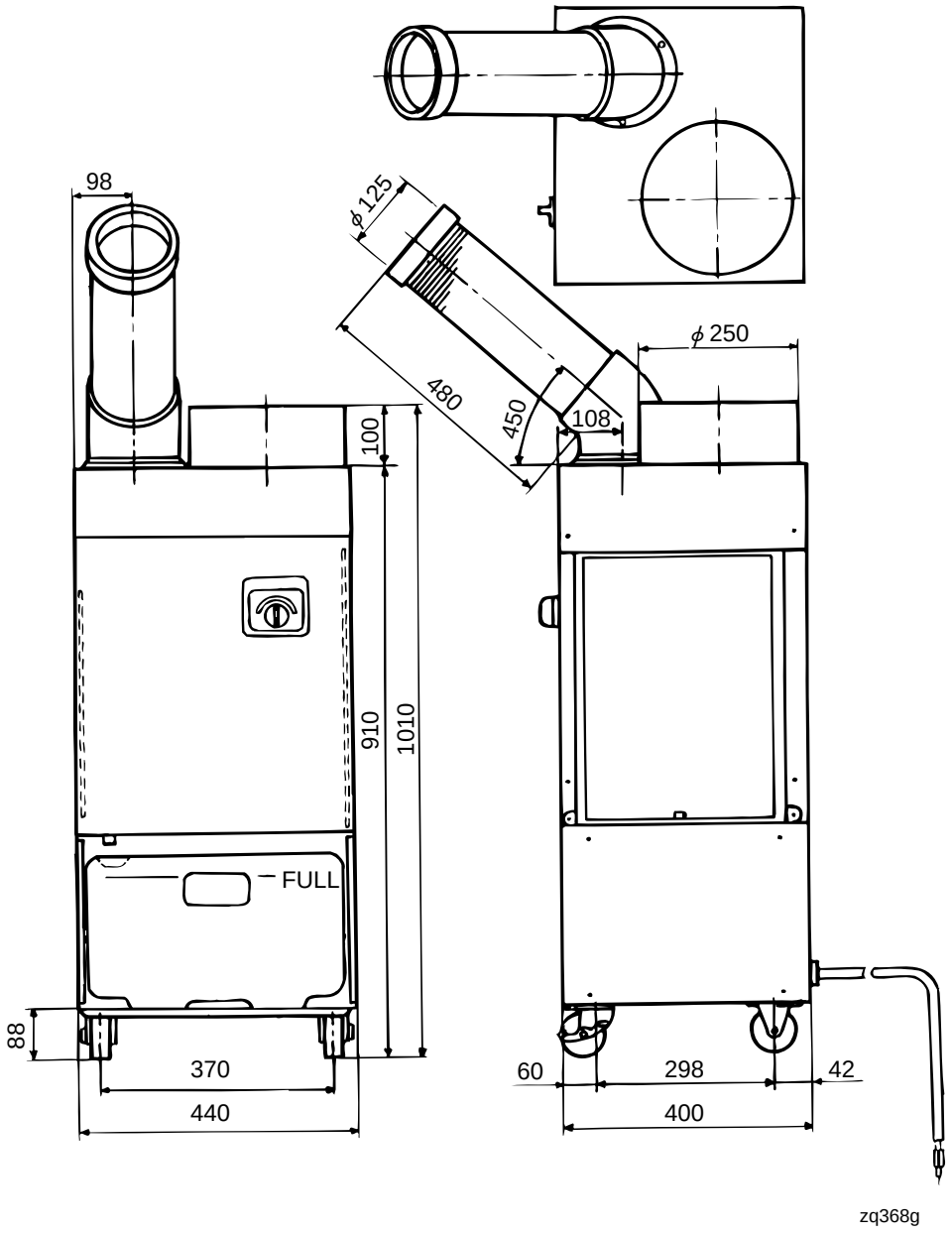


Fig.25 Restart Auxiliary Relay Operation

6. SPECIFICATIONS

6-1. EXTERIOR DIMENSIONS

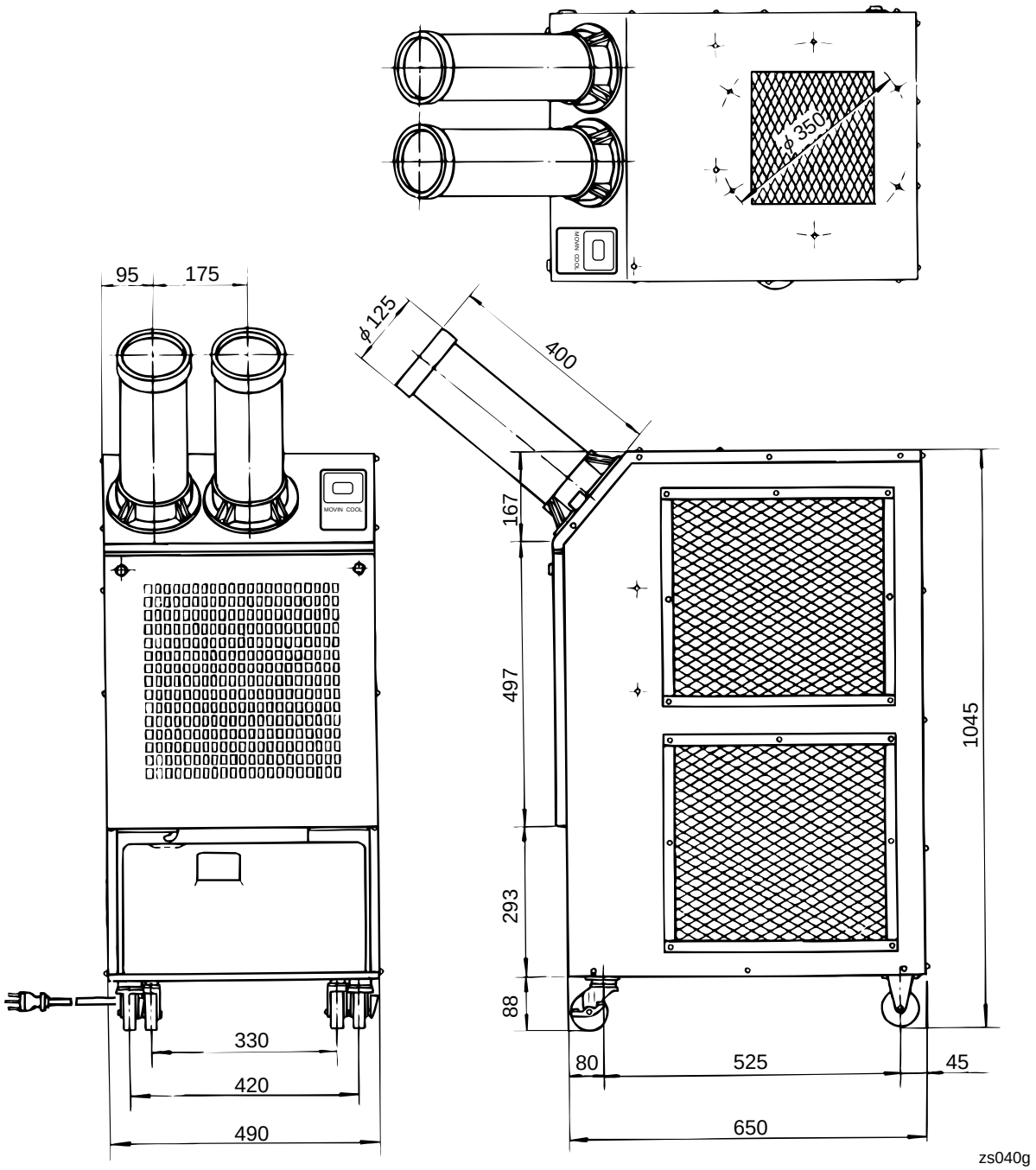
[MODEL 10SFE]



unit : mm

Fig.26 Exterior Dimensions of MODEL 10SFE

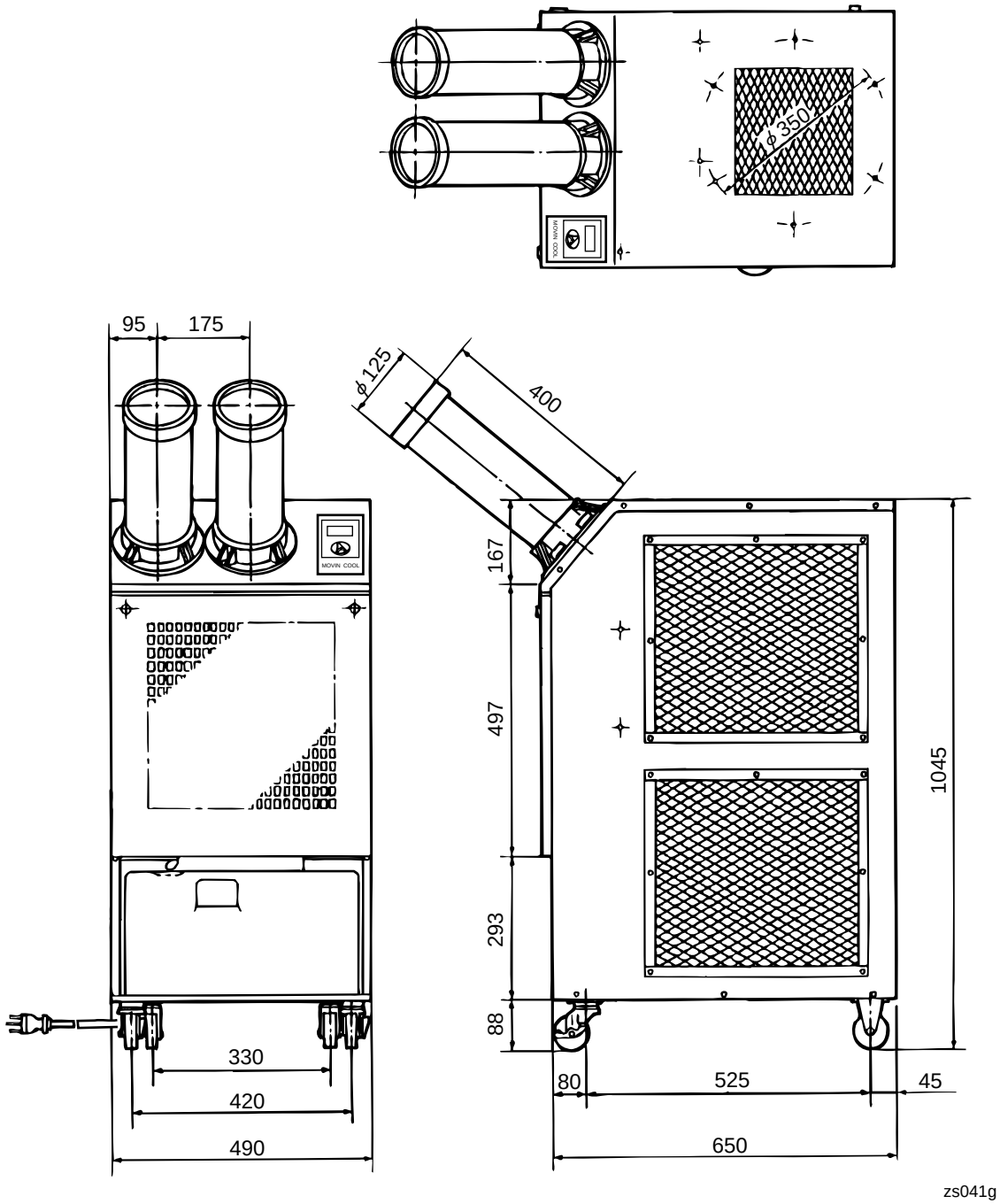
[MODEL 15SFE]



unit : mm

Fig.27 Exterior Dimensions of MODEL 15SFE

[MODEL 15SFE-1]



unit : mm

Fig.28 Exterior Dimensions of MODEL 15SFE-1

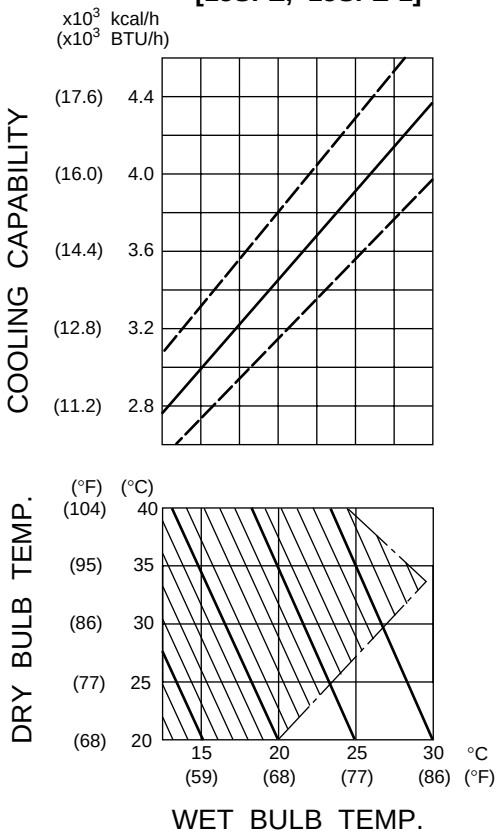
6-2. SPECIFICATIONS

Item / Model		10SFE	15SFE	15SFE-1
[Rating Condition]		DB 35℃ 95°F WB 28.2 ℃ 83°F (60%)	DB 35℃ 95°F WB 28.2 ℃ 83°F (60%)	DB 35℃ 95°F WB 28.2 ℃ 83°F (60%)
[Features]				
Power frequency	(Hz)	50	50	50
Line Voltage	(Volt)	Single phase 230	Single phase 230	Single phase 230
Power consumption	(kw)	0.84	1.7	1.7
Current consumption	(Amp)	3.9	8.2	8.2
Power factor	(%)	94	90	90
Starting current	(Amp)	14	32	32
Power wiring	(mm^2)	1.00	1.00	1.00
[Cooling Unit]				
Cooling capability	(kcal/h)	2000	3800	3800
	(Btu/h)	8000	15200	15200
Cooling system		Direct expansion	Direct expansion	Direct expansion
[Blower]				
Type of fan		Centrifugal fan	Centrifugal fan	Centrifugal fan
Air volume	(m^3/h)	360	800	800
	(ft^3/min)	210	470	470
Motor output	(w)	40	350	350
[Compressor]				
Type		Hermetic rotary type	Hermetic rotary type	Hermetic rotary type
Output	(kw)	0.6	1.10	1.10
Refrigerant		R-22	R-22	R-22
Packed amount of refrigerant	(kg)	0.42	0.68	0.68
	(1bs)	0.93	1.50	1.50
[Saftey Device]				
Compressor overload relay		With	With	With
Fan motor protector		With	With	With
Drain warning switch		With	With	With
Anti-freezing thermostat		With	With	With
Temperature control		Without	Without	With
Compressor delay circuit		Without	Without	With
[Dimensions and Weight]				
W x D x H	(mm)	440 x 400 x 1010	490 x 670x 1045	490 x 670x 1045
	(inch)	17.3 x 15.7 x 39.8	19.3 x 26.4 x 41.1	19.3 x 26.4x 41.1
Weight	(kg)	46	76	76
	(1bs)	101	168	168
[Operating Conditions]				
Intake air temperature range	(MAX)	35℃ (95°F) (60%RH)	40℃ (104°F) (50%RH)	40℃ (104°F) (50%RH)
	(MIN)	20℃ (68°F) (50%RH)	20℃ (68°F) (50%RH)	20℃ (68°F) (50%RH)

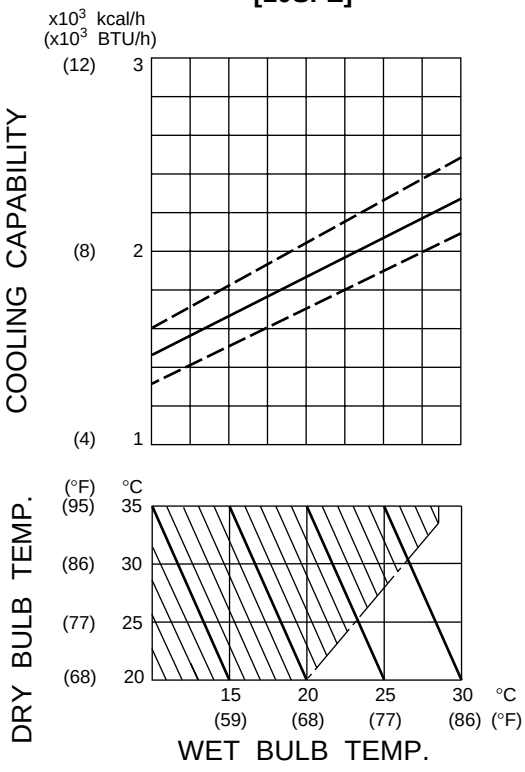
6-3. COOLING CAPABILITY CHARACTERISTICS

(1) Cooling Capability Curve

[15SFE, 15SFE-1]



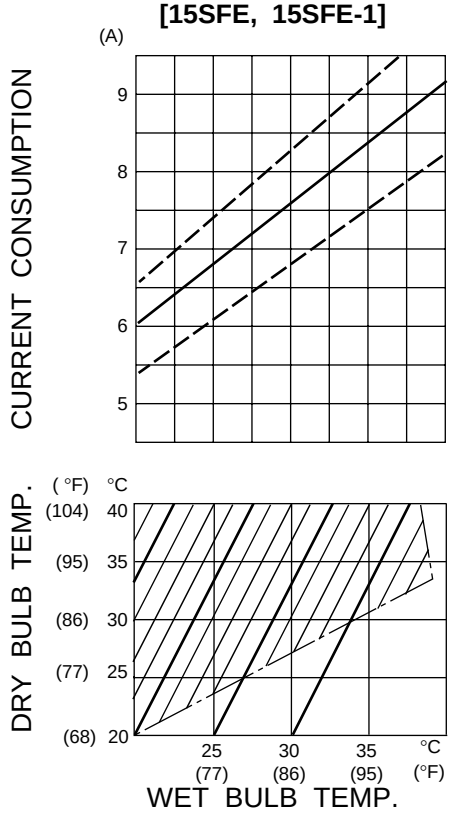
[10SFE]



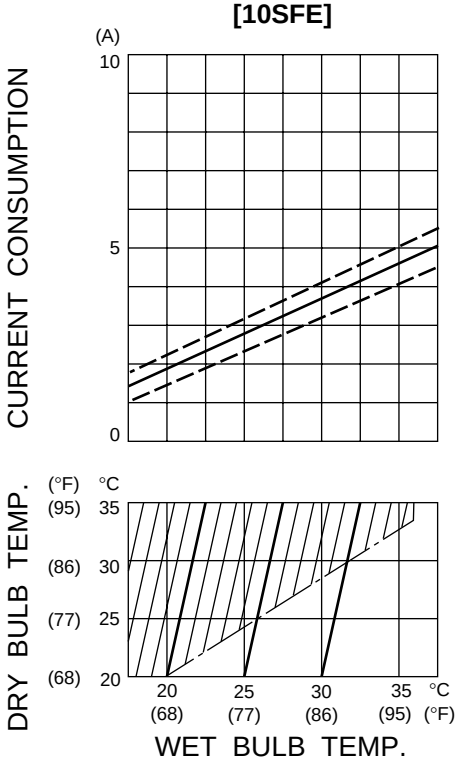
※ Control Switch Position: IV/HI. COOL

(2) Current Consumption Curve

[15SFE, 15SFE-1]



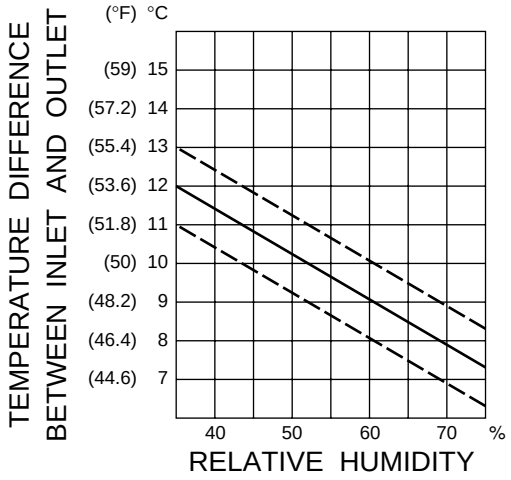
[10SFE]



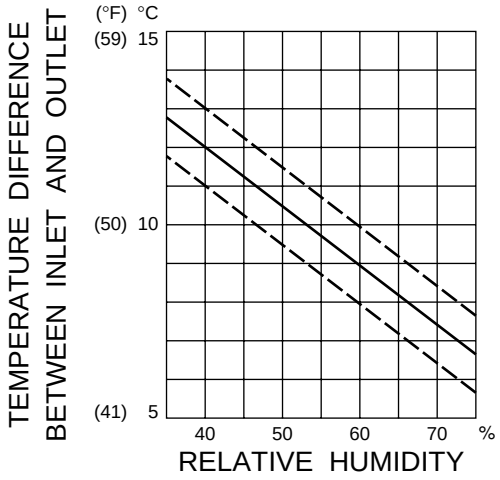
※ Control Switch Position: IV/HI. COOL

(3) Cool Air Temperature Difference Curve

[15SFE, 15SFE-1]



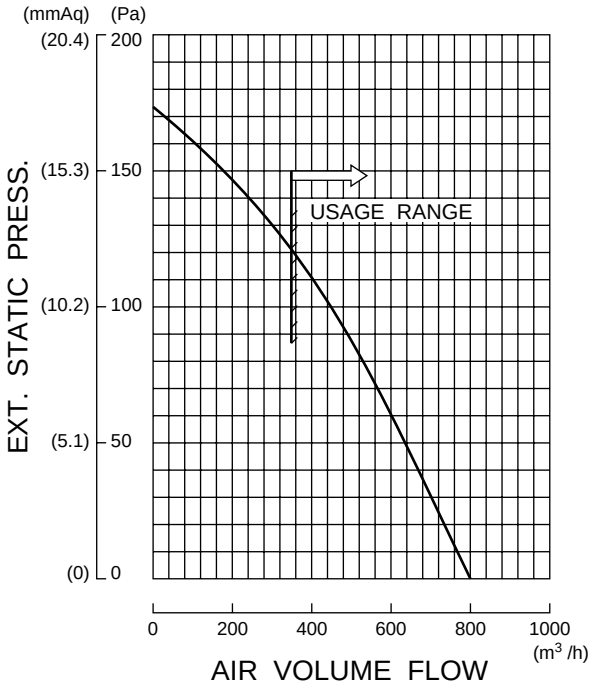
[10SFE]



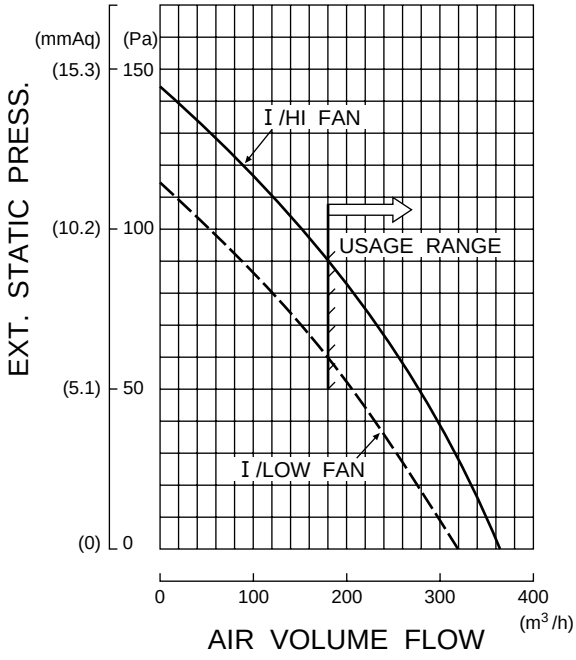
※ Control Switch Position: IV/HI. COOL

(4) External Static Pressure And Air Volume Curve

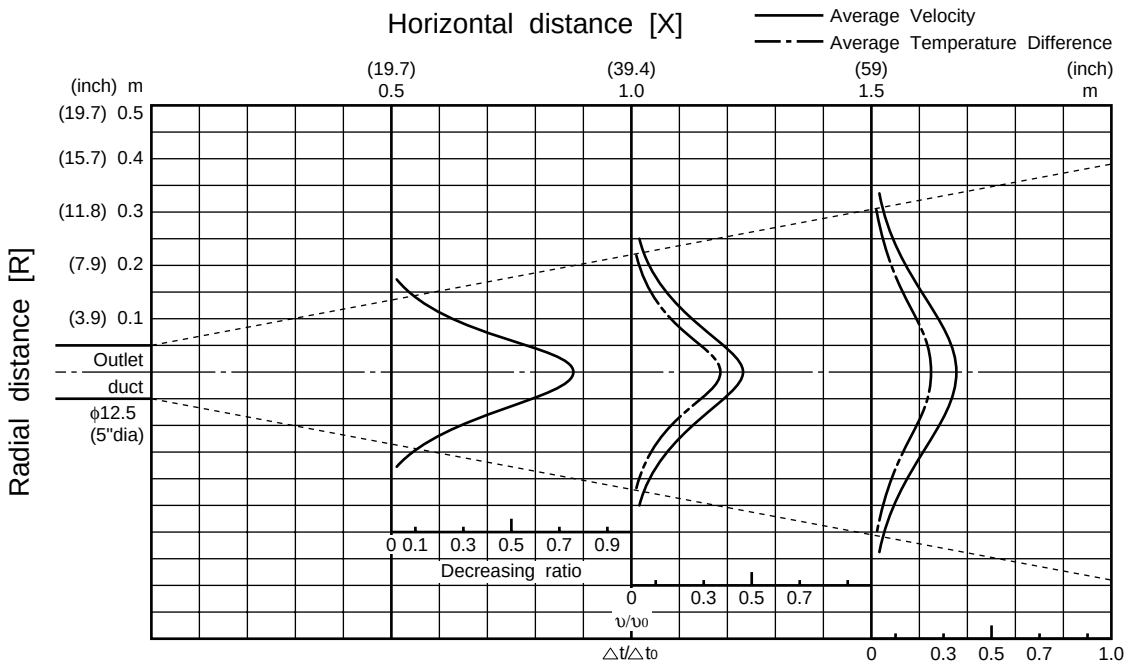
[15SFE, 15SFE-1]



[10SFE]



(5) Cool Air Velocity And Temperature Difference Decreasing Diagram



Model	υ_0	$\triangle t_0$	Number of outlet
10SFE	8.5m/s	9°C	1
15SFE, 15SFE-1	9m/s	9°C	2

(At the rating condition)

υ_0 : Average velocity at outlet.
υ : Average velocify at point (X, R)
$\triangle t_0$: Average temperature difference at outlet.
$\triangle t$: Average temperature difference at point (X, R)

[MEMO]

REPAIR

1. TROUBLESHOOTING

If trouble occurs, it is extremely important to first get a concrete grasp on the nature of the problem. This will facilitate accurate and speedy troubleshooting.
To do so, carefully confirm the nature of the trouble with the customer to begin troubleshooting.
It can classify the customer complaints as follows.

·Poor cooling.
·Unit does not start (operate).
·Overflow of drain water.
·Abnormal noise or vibrations.
·Others

1-1. POOR COOLING

Complaints about insufficient cooling include those where the problem lies with the cooling unit and problems involving matters other than the cooling unit, that is, the environment in which the unit is used. If the cooling unit is malfunctioning, there are cases where this has an electrical cause such as the fan motor and compressor, and cases where the cause is mechanical such as the control switch or the blower motor.

NOTE

1. There is a possibility of insufficient cooling due to clogging of the air filter. So be sure to first check if the air filter is clogged or not.
2. Check the power supply because of the possibility of power source failure.

Phenomenon		Checking Area	Cause	Counter measure
Air volume normal	Compressor operates.	1. Usage conditions. (high temperature)	Operation near usage limits.	Review the installation place.
		2. Dirt in condenser or evaporator.	Poor heat exchange.	Clean fins.
		3. Frost in refrigeration cycle.	Clogging at the frost section.	Replace clogged section.
		4. No temperature difference between evaporator and condenser.	Insufficient refrigerant.	Check the leaking part, then repair and charge refrigerant.
	Compressor does not operate.	1. Coil resistance. (0Ω or ∞Ω)	Short or open circuit.	Replace compressor. (In case of short, check the compressor relay)
		2. Compressor relay. (15SFE-1 ONLY)	Open circuit or poor contact.	Replace compressor relay.
		3. Capacitor for compressor motor.	Capacitor malfunction.	Replace capacitor.
		4. Anti-freezing thermostat.	Gas leakage from the temperature sensing section Contact failure.	Thermostat exchange.
		5. Compressor overload relay.	Overload relay fault.	Exchange.
		6. Room thermostat. (15SFE-1 ONLY)	Gas leakage from the temperature sensing section Contact failure. The set temperature is high.	Thermostat exchange. Correct the setting.
		7. Compressor delay relay and restart auxiliary relay. (15SFE-1 ONLY)	Wire disconnection, ground failure.	Exchange. (Note) Start the compressor 75 seconds after it is set to Ⅱ/COOL.
Insufficient air volume	No air.	1. Coil resistance of fan motor. (0Ω or ∞Ω)	Short or open circuit.	Replace motor.
		2. Fan motor.	Open circuit or poor contact of IOLF.	Replace compressor relay.
		3. Capacitor for fan motor.	Capacitor malfunction.	Replace capacitor.
		4. Operation switch.	Grounding failure.	Exchange.

Phenomenon		Checking Area	Cause	Counter measure
Insufficient air volume	Insufficient air volume.	1. Air filter.	Clogged air filter.	Clean air filter.
		2. Evaporator.	Clogged evaporator or crushed fins.	Repair and clean fins or replace it.
		3. Duct connection state.	Improper connection.	Repair duct connection.
		4. Fan motor.	Poor rotation.	Replace motor.
			Reverse rotation.	Change any 2 wires out of 3. (Power source)

1-2. UNIT DOES NOT START (OPERATE)

NOTE

In this case, there is a possibility of safety devise operating due to the clogged air filter. So be sure to first clean the air filter and then start up again to confirm if the problem lies with the air filter.

Phenomenon		Checking Area	Cause	Counter measure
Does not operate at all	Power indicator lamp turns off.	1. Voltage.	Power failure.	Repair power indicator.
		2. Earth leakage breaker.	Earth leakage or defective earth leakage breaker.	Repair earth leakage section.
				Replace earth leakage breaker.
		3. Fuse.	Fuse blown (shorting).	Repair shorting section. Replace fuse.
	Power indicator lamp turns on.	1. Continuity of operation switch.	Defective Control switch.	Replace control switch.
		2. Auxiliary relay (RX).	Open circuit or poor contact.	Replace auxiliary switch.
		3. Drain tank.	Drain tank is fill with the drain water.	Discharge the drain water.
		4. Drain warning switch.	Open circuit or poor contact.	Replace drain warning switch.
Stops immediately after starting.	Warning indicator lamp turns off.	1. Compressor insulation resistance.	Insulation failure on compressor motor.	Replace compressor. (Be sure to check the compressor relay).
		2. Fan motor insulation resistance.	Insulation failure on fan motor.	Replace fan motor.
	Power indicator lamp and warning indicator lamp turn on dimly.	Voltage.	Low voltage.	Repair power indicator.
Stops after running a while.	Warning indicator lamp turns on.	1. Coil resistance of fan motor.	Defective fan motor.	Replace fan motor.
		2. Temperature of compressor (abnormally high).	Operation of safety device (OLC) due to compressor malfunction.	Replace compressor. Service dirty areas.
			Insufficient refrigerant or gas leakage.	Repair and charge refrigerant.
		3. Dirt on air filter or condenser.	Insufficient cooling of condenser.	Clean condenser.

1-3. OVERFLOW OF DRAIN WATER

Phenomenon	Checking Area	Cause	Counter measure
Overflow flom the unit.	1. Drain pan.	Cracks in drain pan.	Check and repair.
	2. Water level in drain pan.	Clogged drain hose.	Check and replace.
	3. Drain hole.	Reversed air flow from drain hole.	Insert a trap.
	4. Clogged air filter.	Reversed air flow from drain hole due to the excessive negative pressure inside of the unit.	Clean air filter.

1-4. ABNORMAL NOISE OR VIBRATION

To deal with abnormal noise or vibration, carefully determine the source of the problem and come up with proper countermeasures to solve the problem so that it does not occur again.

Phenomenon	Checking Area	Cause	Counter measure
Abnormal noise or vibration.	1. Fan.	Fan interference.	Repair interfering section.
		Fan transformation.	Replace fan.
	2. Compressor fixing nut.	Looseness of nuts.	Tighten nuts further.
	3. Piping.	Pipe interference.	Repair interfering section.
	4. Panel fixing screws.	Looseness of screws.	Tighten screws further.

2. PREINSPECTION

In case of trouble, perform the following inspection before disassembly.

2-1. INSPECT THE AIR FILTER

Remove the air filter and check if it is clogged with dusts or not.
If it is dirty and clogged with dusts, clean it using a vacuum cleaner and then rinse it with cold or lukewarm water.

NOTE

If the air filter is extremely dirty, use a neutral detergent to wash it.

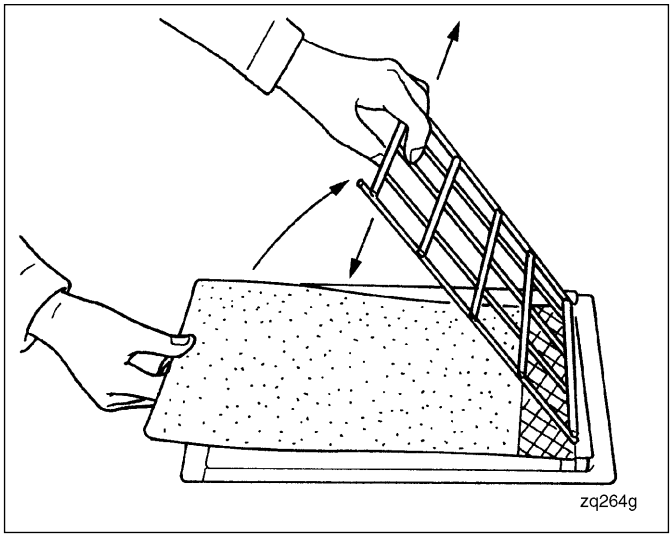


Fig.29 Removing The Air Filter

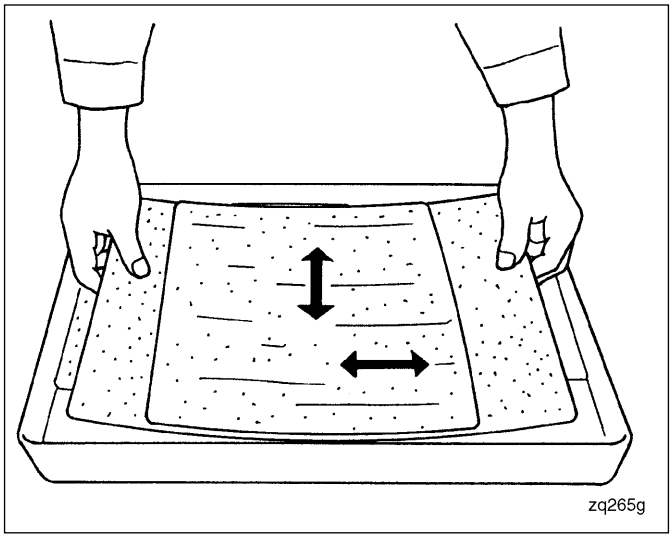


Fig.30 Washing The Air Filter

2-2. INSPECT THE COOLING CAPACITY

Measure the difference in temperature between the intake air temperature and the outlet air temperature.
If the difference is out of the range given in the graph (page 18), inspect the related parts.

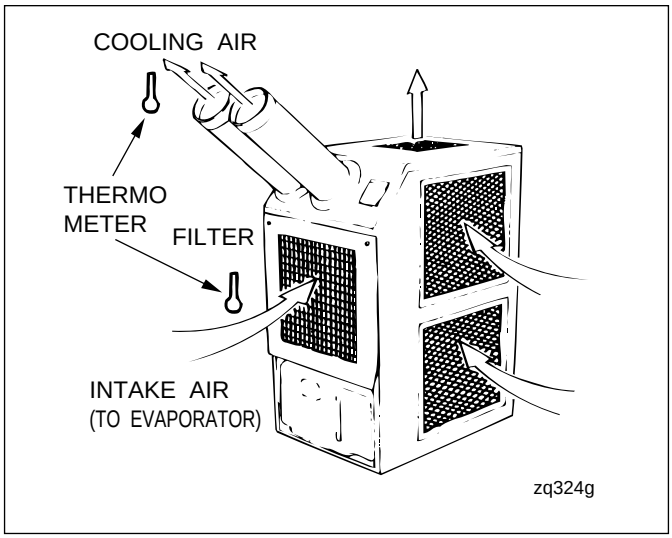


Fig.31 Inspection of Cooling Capacity

2-3. CHECK THE ENVIRONMENTAL CONDITIONS

The temperature range of each model is as follows.

15SFE 15SFE-1	40℃(104°F), 50%RH(MAX) 20℃(68°F), 50%RH(MIN)
10SFE	35℃(95°F), 60%RH(MAX) 20℃(68°F), 50%RH(MIN)

※RH:Relative humidity

If the unit operated at a higher conditions than above, change the location of installation.
If the unit is used in an area where this condition (temperature and humidity range) is exceeded, the protection device may activate. For example, the unit might stop running or the compressor might not operate correctly.

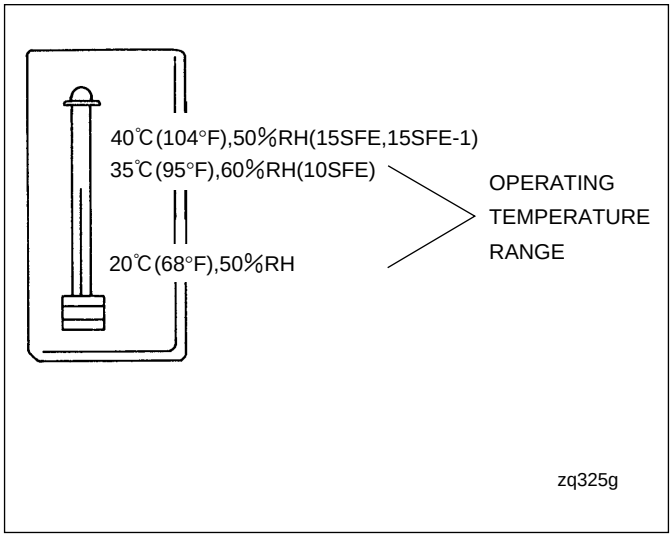


Fig.32 Environmental Conditions

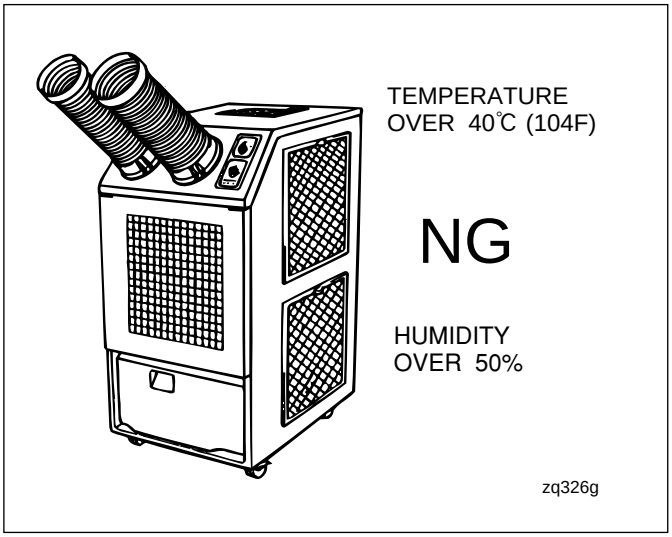


Fig.33

2-4. INSPECT THE HEAT EXCHANGERS

Check the evaporator and the condenser for dirt and clogging. If they are dirty or clogged, wash them with high pressure washer.

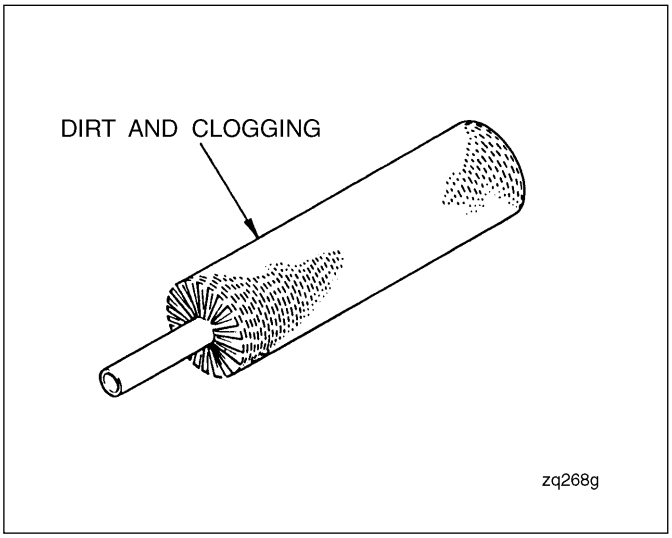


Fig.34

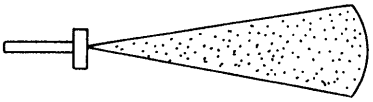
WASHING PROCEDURE

(1) Washing Method

Wash it with a high pressure washer (Use a neutral detergent if the fins are dirty enough to require it.)

Spine fin or plate fin washing effective conditions

1. Spray pressure ..... Approx. 60 kgf/cm^2 (20 to 80 kgf/cm^2)
2. Spray volume ..... Approx. 8 ℓ/min. (6 to 9 ℓ/min.)
3. Nozzles ..... Fan-shaped pattern; place at right angle with the heat exchanger surface
4. Distance ..... The distance between the nozzles and the spine fin is 0.3 to 0.5m.
5. Detergent ..... Use a 3% concentration neutral detergent.
6. Cleaning procedure ..... ① Wash once simply with detergent.
   ② Then, wash with water.
   ③ Dry. (Do not use compressed air).
7. Spray pattern

Spray pattern	Usage results
Spray type  zq269g	The high pressure is convenient for washing outer plates and plate fin. (Such pressure can bend spine fins.)
Mist type  zq270g	Used for cleaning the spine fins. Place at right angle with the heat exchanger surface.

NOTE

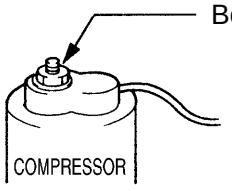
Be careful with the spine fins. They are easily crushed. As cleaning with compressed air crushes the fins, never use it.

(2) Cautions and Check Points

Item	
Before washing	· In principle, it prohibits to wash the indoor-only models (floor types etc.) with water. (These models are not designed to withstand rain and water.) However, the heat exchangers may only be washed with water if the following precautions are observed.
	· Never clean the heat exchangers (spine fins) with an air blower (because this can easily crush fins).
	· Before applying water to difficult to remove parts, such as the fan or fan casing, wipe off and vacuum up any dust.
	· Either wash in a part where splashed water will not matter or cover the surroundings with a vinyl sheet (with a radius at a little more than 3 meters).
	· For units using a drain hose (such as hanging types), disconnect the drain hose (to prevent clogging by dirt and dirty water).
	· Prevent watr infiltration into electrical control part by masking them beforehand with cardboard, plastic bags, rubber tape, or the like. (Observe the following precautions.)
	· Remove the removable parts for the fan, fan casing, etc. and then wash it.
	· Check for drain water effluence (to avoid damaging the surrounding environment).
After washing	· Never dry the heat exchangers (spine fins) with an air blower. (This can easily crush the fins).
	· Check that no water has been left in any electrical control part, wiring, or connector. (If there is any water, wipe it up with a cloth.)
	· To prevent rust and corrosion, always dry the part where water can build up easily, in particular for indoor-only models.
	· Also wipe away any water in the fan casing (because of the danger of water containing detergent being blown out during operations checking).
Checks	· Check the heat exchangers (fins) for crushing and clogging.
	· Make sure there is no water left in any electrical control part before switching on the power. (In particular, water easily builds up in the electrode sections of the condensers.)
	· Run the machine and check for abnormal noises.
	· Measure the running current and cool air temperature after drying.

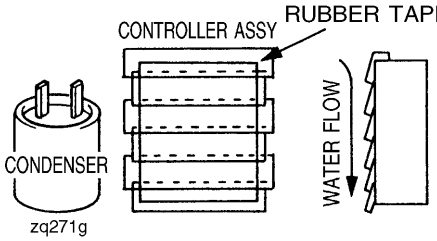
⚠ Cautions for electrical control parts during washing

1) Models with bolts and nuts at the top of the compressor (in particular, floor models)
   Use rubber tape or the like to keep water from reaching the terminal section through gaps at the bolt thread section.



Bolts···Hanging models are sealed so that rain can not get in, but floor models are not sealed.

2) Controller Assy
   Watch out for water in the indentation at the top of the condenser, where water remains easily.



Tape the control box with the top wrap overlaying the wrap below to prevent water from getting in.

3) Cover the drain warning switch and the anti-freezing thermostat with a plastic bag and rubber tape.

3. DISASSEMBLE

10SFE MODEL

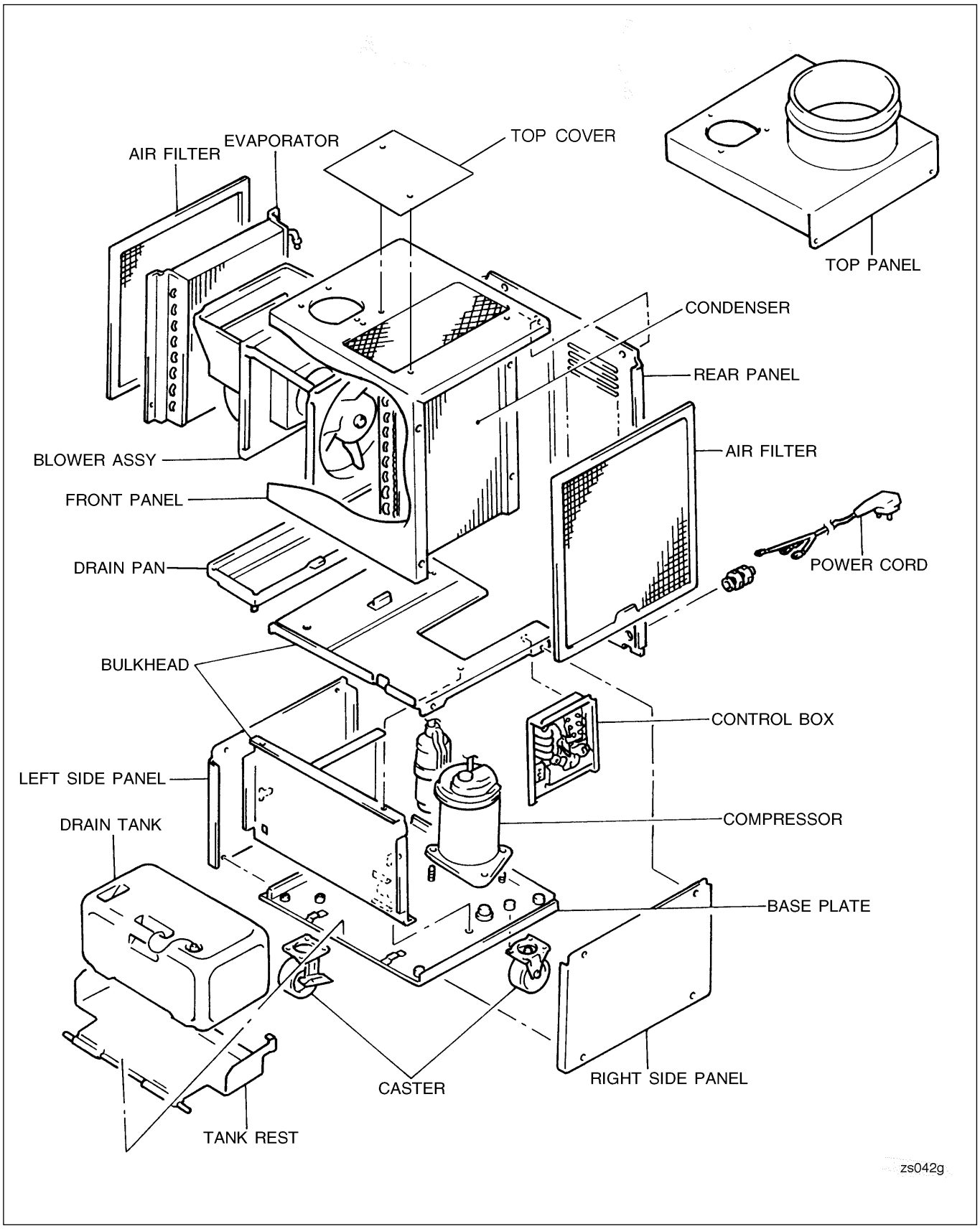


Fig.35 Disassembly of MODEL 10SFE

15SFE MODEL

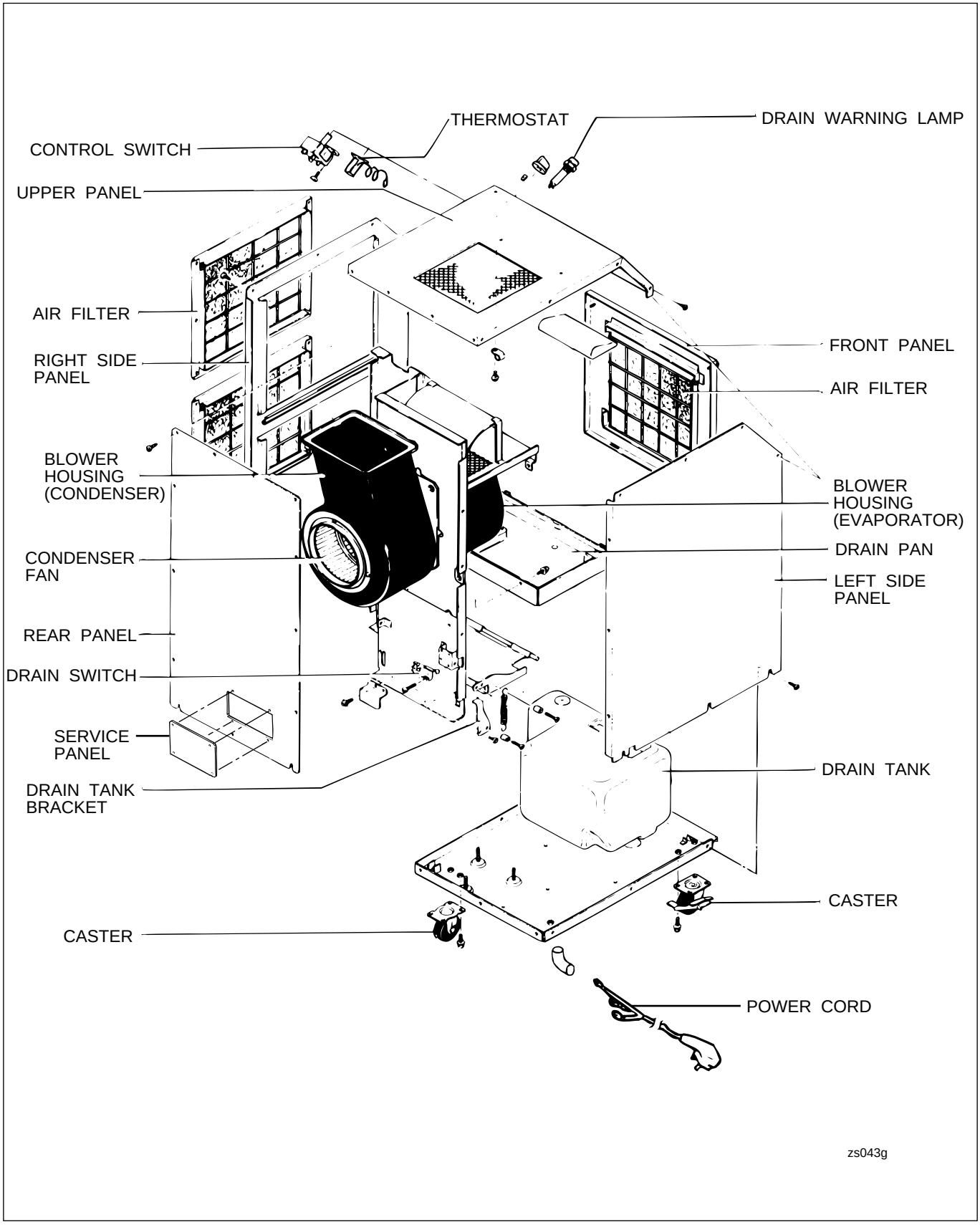


Fig.36 Disassembly of MODEL 15SFE

15SFE-1 MODEL

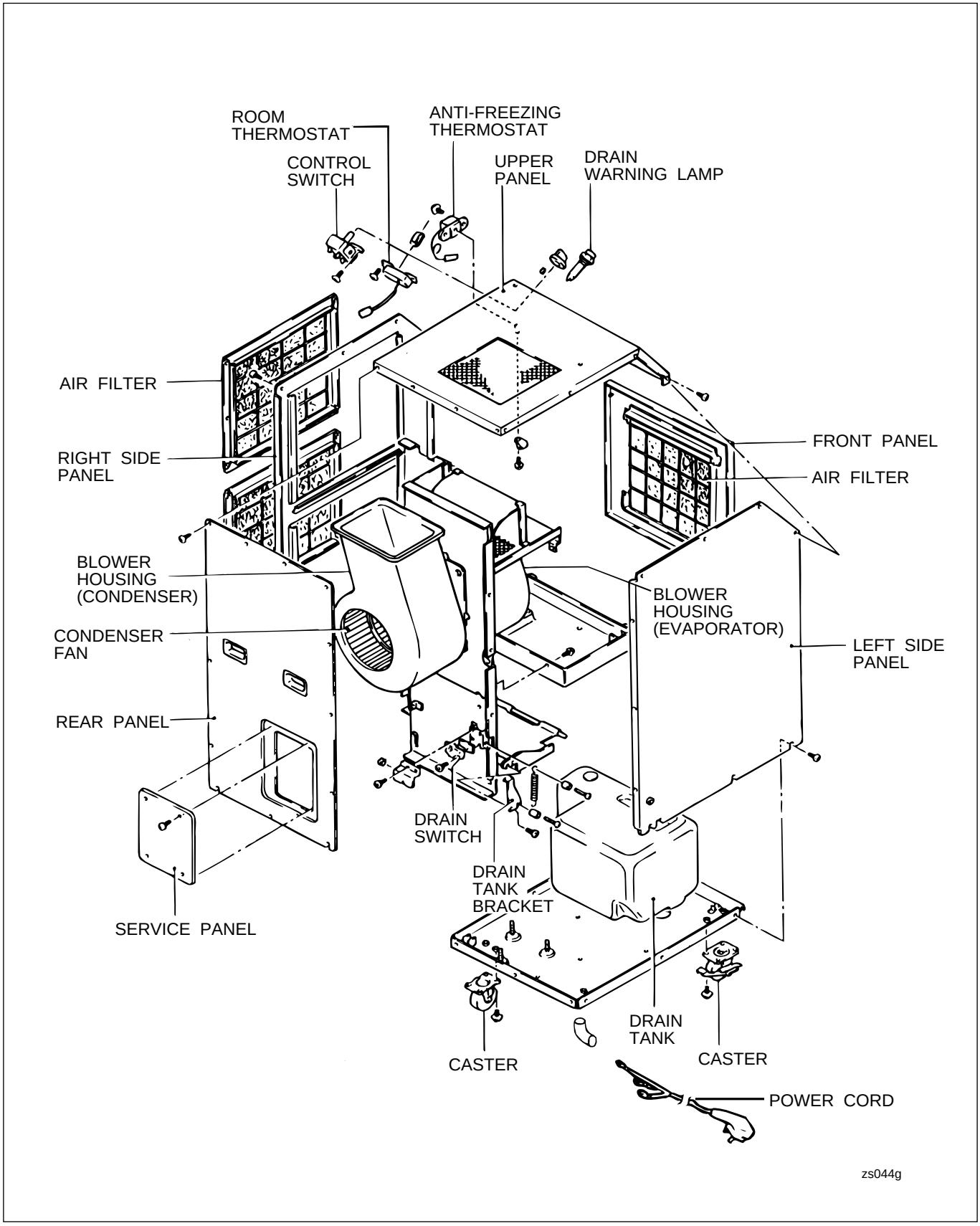


Fig.37 Disassembly of MODEL 15SFE-1

3-1. REMOVAL OF OUTER PANELS

(1) Remove the following parts.
 1) Air filter
 2) Cooling air duct
 3) Drain tank
 4) Front panel
 5) Left side panel (refer to Fig.39)
 6) Service panel (refer to Fig.39)

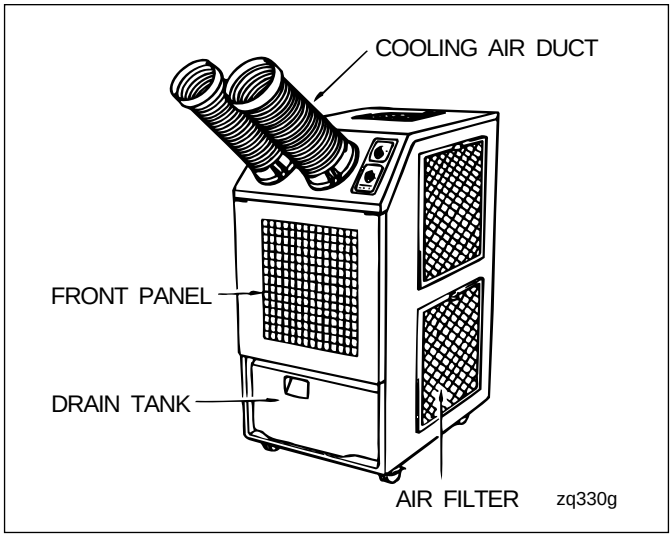


Fig.38 Removal Panels for 15SFE-1

(2) Remove the three lead wires of the power wire from the control box. Loosen the two screws fixing the conduit and disconnect the power cord.

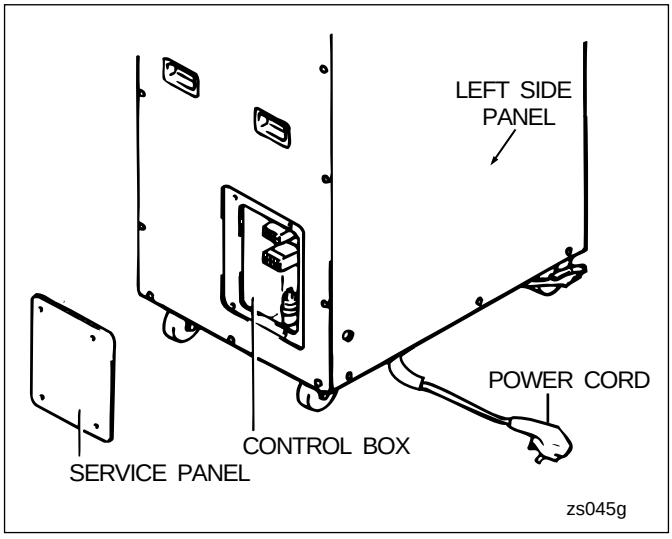


Fig.39 Removal of Power Wire

3-2. REMOVAL OF ELECTRICAL PARTS

(1) Remove the electrical parts in the control box.

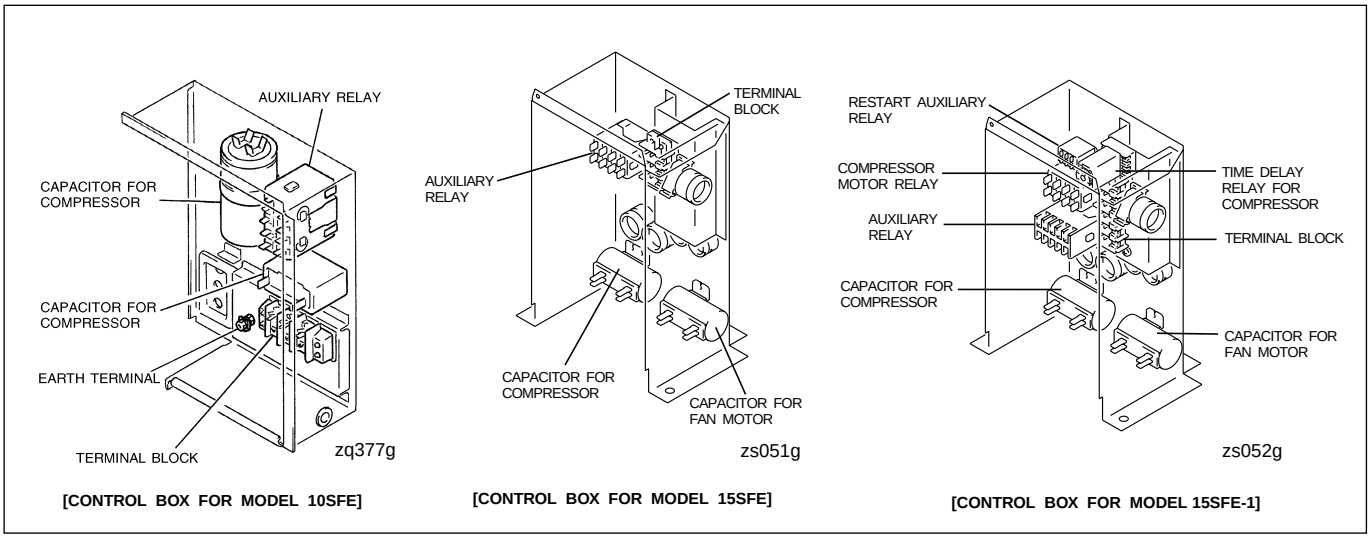
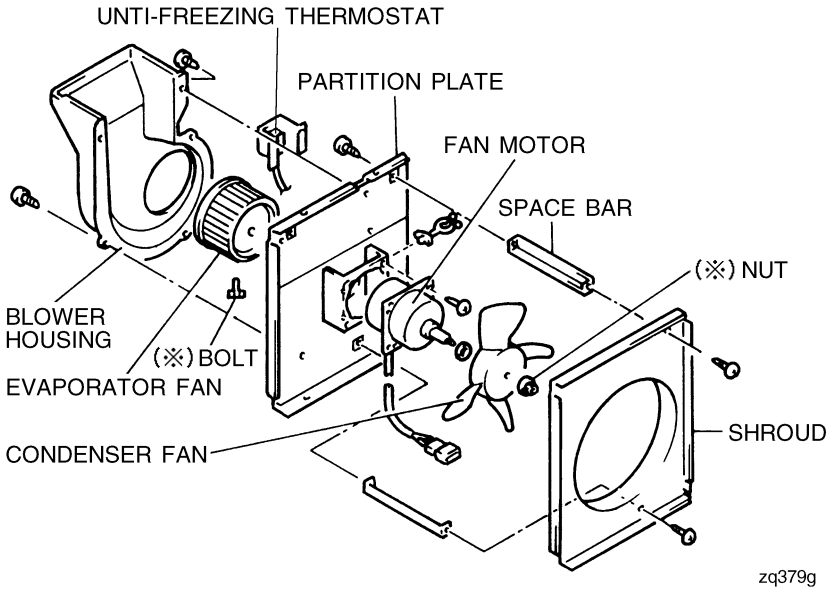


Fig.40 Control Boxs for Models 10SFE,15SFE and 15SFE-1

3-3. REMOVAL OF BLOWER ASSEMBLY.

[10SFE]

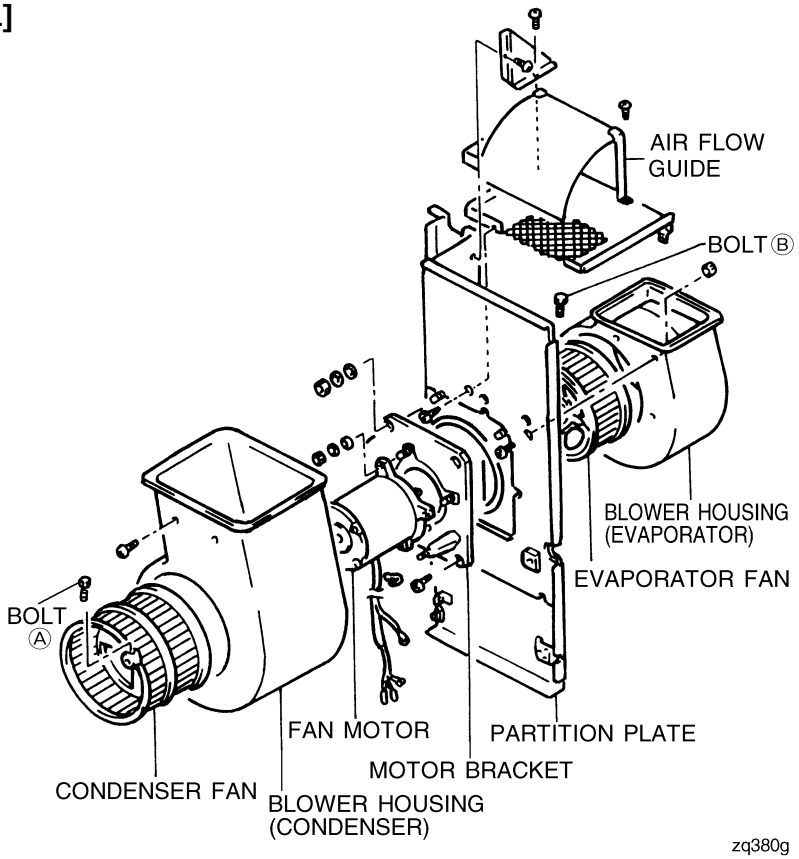


Tightening Torque:

NUT: 45 ± 5 kgf·cm [4.4 ± 0.5 N·m, 3.3 ± 0.4 ft·lbf]

BOLT: 120 ± 20 kgf·cm [11.8 ± 2.0 N·m, 8.8 ± 1.4 ft·lbf]

[15SFE, 15SFE-1]



Tightening Torque:

BOLTⒶ, BOLTⒷ: 150 ± 30 kgf·cm [14.7 ± 2.9 N·m, 10.8 ± 2.2 ft·lbf]

Fig.41 Removal of Blower Assembly

4. INSPECTION OF THE ELECTRICAL PARTS

(1) Control Switch

Check the continuity between the following terminals at each position of the control switch.

[15SFE, 15SFE-1]

Terminals	Switch position	
	0/OFF	Ⅰ/COOL
1-1a	No Continuity	Continuity
1-1b	Continuity	No Continuity

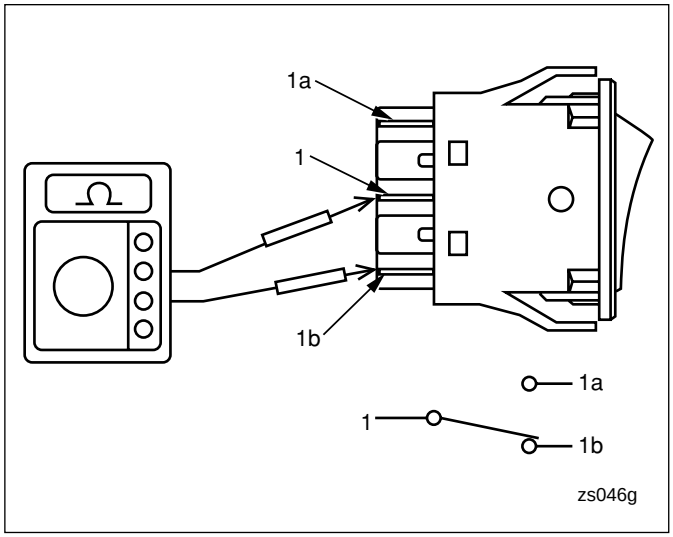


Fig.42 Inspection of Control Switch for 15SFE, 15SFE-1

[10SFE]

Termi-nals	Switch position				
	Ⅱ/HI. FAN	Ⅰ/LOW. FAN	0/OFF	Ⅲ/LOW. COOL	Ⅳ/HI. COOL
4-1	No Continuity	Continuity	No Continuity	Continuity	No Continuity
4-2	No Continuity	No Continuity	Continuity	No Continuity	No Continuity
4-5	Continuity	No Continuity	No Continuity	No Continuity	Continuity
4-6	No Continuity	No Continuity	No Continuity	Continuity	Continuity

If there is no continuity, replace the control switch.

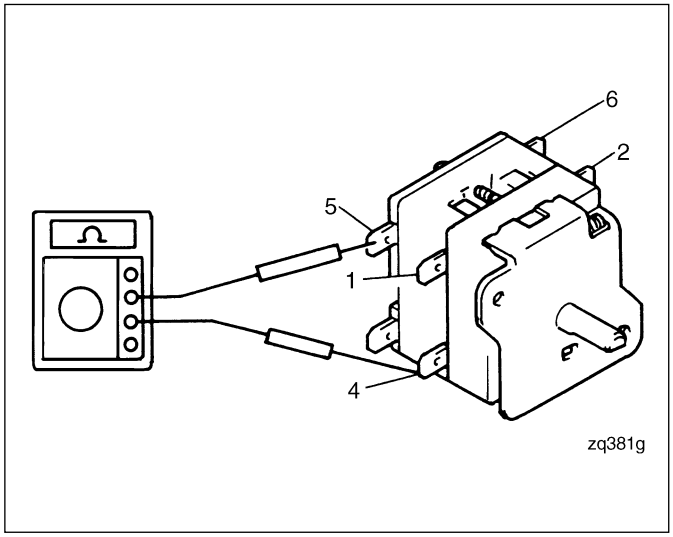


Fig.43 Inspection of control switch for 10SFE

(2) Fan Motor (Condenser & Compressor)

Measure the resistance between each terminal of the fan motor. The resistance for 10SFE are as follows.

Terminal	Resistance
White-Black	30.6Ω
Black-Blue	15.7Ω
Blue-Red	3.7Ω

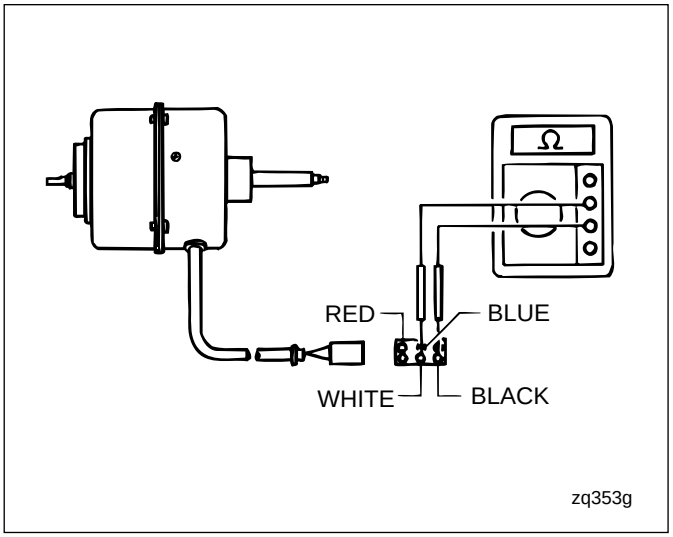


Fig.44 Inspection of Fan Motor for 10SFE

The resistance for 15SFE, 15SFE-1 are as follows.

Terminal	Resistance
CF1-RX12 (TBL2)	14.4Ω
CF2-RX12 (TBL2)	12.0Ω

※ ( ) is for 15SFE

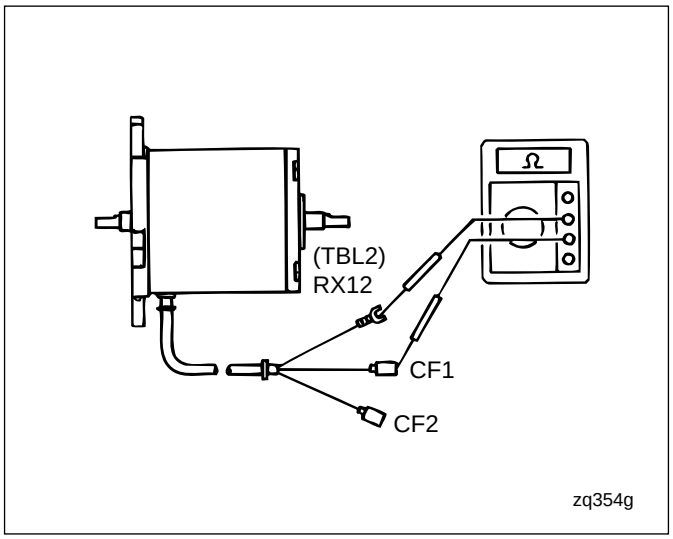


Fig.45 Inspection of Fan Motor for 15SFE, 15SFE-1

(3) Thermostat (Anti-Freezing)

Check the continuity between two terminals at normal temperature (17°C or higher). If there is no continuity, replace the thermostat.

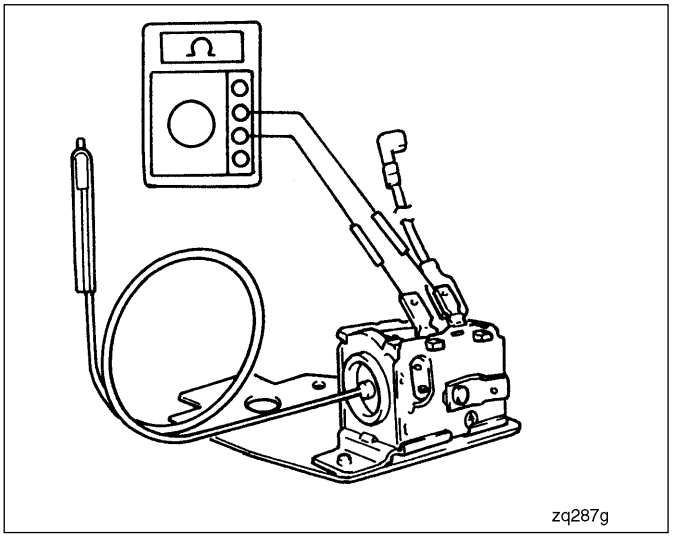


Fig.46 Inspection of Thermostat

(4) Drain Warning Switch

Depress the switch to check for continuity.
If there is no continuity, replace the switch.

Terminals	Conditions	
	Normal	Depress
1-2	Continuity	No Continuity
1-3	No Continuity	Continuity

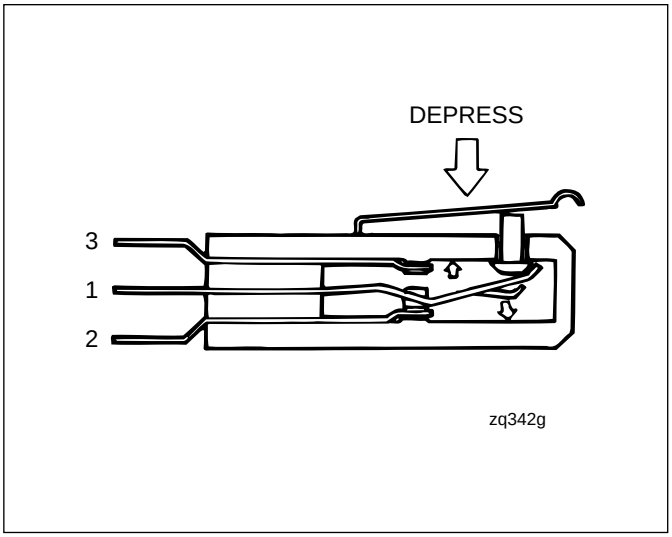


Fig.47 Inspection of Drain Switch

(5) Overload Relay

Check for continuity across two terminals of the overload relay.

Model	Specifications	
	OFF (Open Contact)	ON (Open Contact)
10SFE	130±5°C	61±11°C
15SFE	150±5°C	69±10°C
15SFE-1		

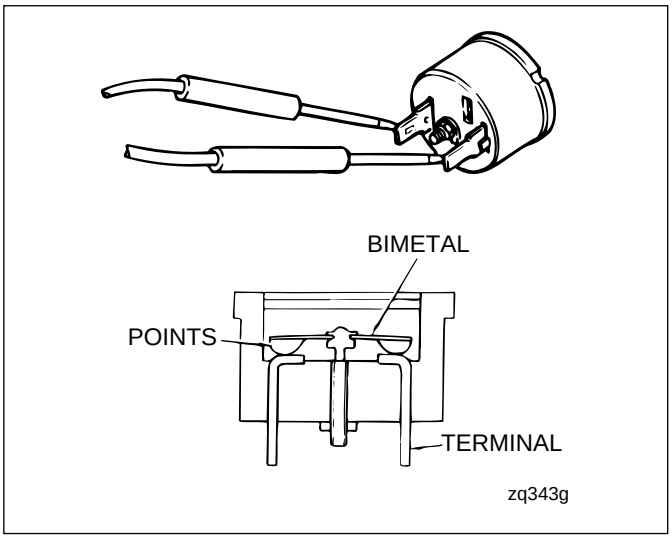


Fig.48 Inspection of Overload Relay

(6) Compressor Motor

Measure the resistance between the terminals of the compressor motor. The resistance are as follows. (At 20°C)

Model Terminals	10SFE	15SFE 15SFE-1
R-C	Approx. 5.4Ω	Approx. 1.97Ω
C-S	Approx. 8.8Ω	Approx. 7.15Ω

When the resistance is not comparable to the above standard values, replace the compressor.

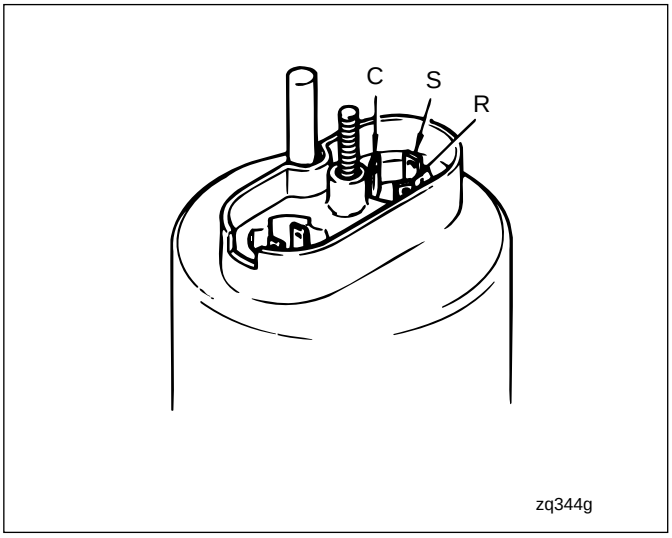


Fig.49 Inspection of Compressor Motor

(7) Restart Auxiliary Relay [15SFE Only]

1) Check the continuity between the each pair terminals shown in the right figure.

2) Measure the resistance between the terminals 7 and 8.

Resistance	Approx. 14~16kΩ (at 20°C)

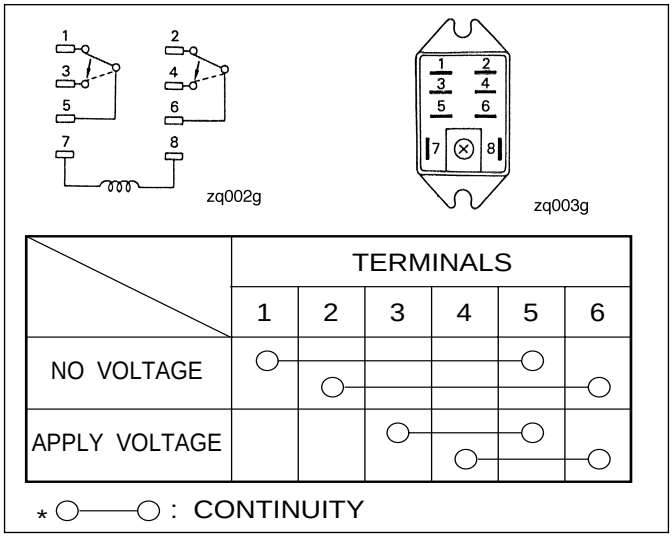


Fig.50 Inspection of Restart Auxiliary Relay

(8) Compressor Relay [15SFE-1 Only]

1) Check the continuity between the terminals.

① When the test button is depressed.
There is a continuity between 11 and 12, 13 and 14, terminals and a no continuity between 15 and 16 shown in the right figure.

② When the test button is released.
There is no continuity between the pair terminals shown in the right figure.

2) Measure the resistance between the terminals A and B.

Resistance	Approx. 1~2kΩ (at 20°C)

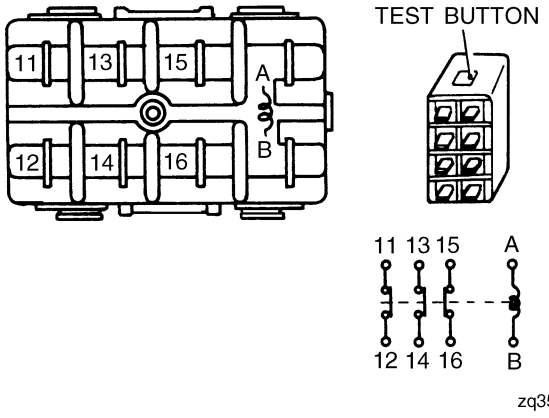


Fig.51 Inspection of Compressor Relay

(9) Auxiliary Relay

1) Check the continuity between the terminals.

① When the test button is depressed.
There is a continuity between the pair terminals shown in the right figure.

② When the test button is released
There is no continuity between the pair terminals shown in the right figure.

2) Measure the resistance between the terminals A and B.

Resistance	Approx. 1~2kΩ (at 20°C)

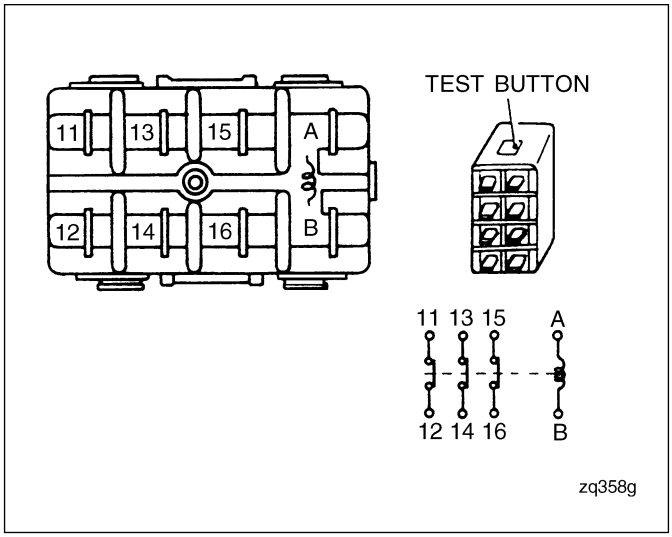


Fig.52 Inspection of Auxiliary Relay for 10SFE, 15SFE

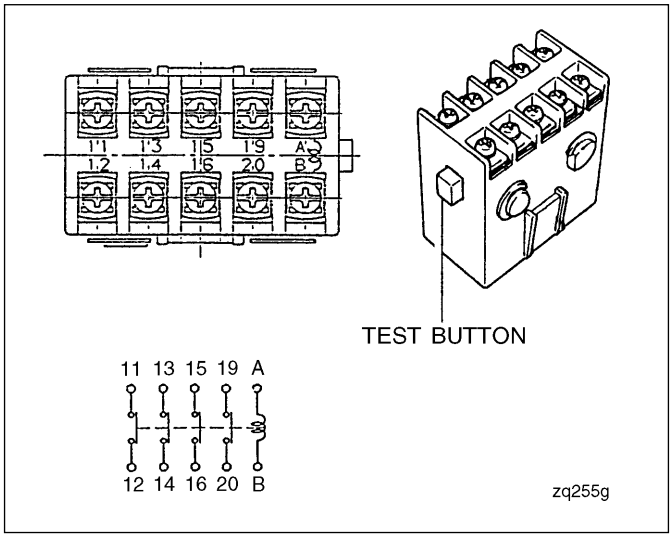


Fig.53 Inspection of Auxiliary Relay for 15SFE-1

(10) Room Thermostat [15SFE-1 Model Only]

Check for continuity between the terminals C and L. Turn the shaft anti-clockwise gradually from the "MAXIMUM COOL" position at normal temperature (22-28℃). The continuity will be broken (i.e. the contact is closed first, then opened as the shaft is turned). If no such change in continuity occurs, replace the thermostat.

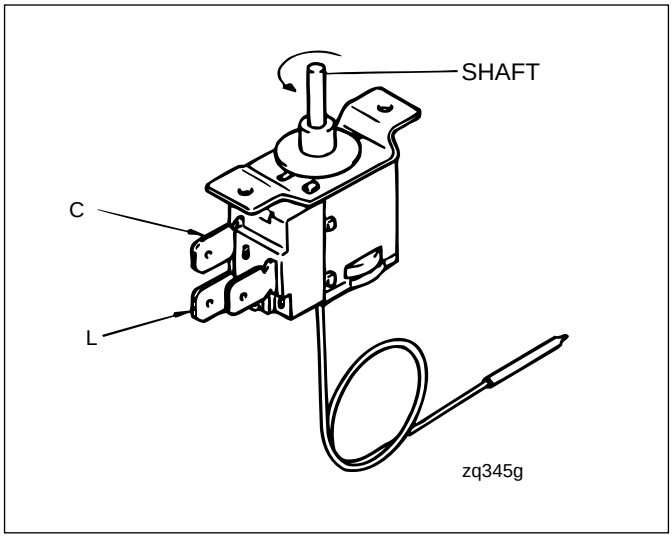


Fig.54 Inspection of Room Thermostat

(11) Time Delay Relay.

1) Check the continuity between the terminals 1 and 9, 4 and 12.

Terminal	Condition
1 and 9	Continuity
4 and 12	Continuity

If the check results do not match the above table, replace the time delay relay.

2) Apply a voltage of 230 VAC between terminals 13 and 14. Then, after 75±15 seconds, check continuity between terminals 1 and 9, 4 and 12, 5 and 9, then 8 and 12.

Terminal	Condition
1 and 9	No Continuity
4 and 12	No Continuity
5 and 9	Continuity
8 and 12	Continuity

If the check results do not match the above table, replace the time delay relay.

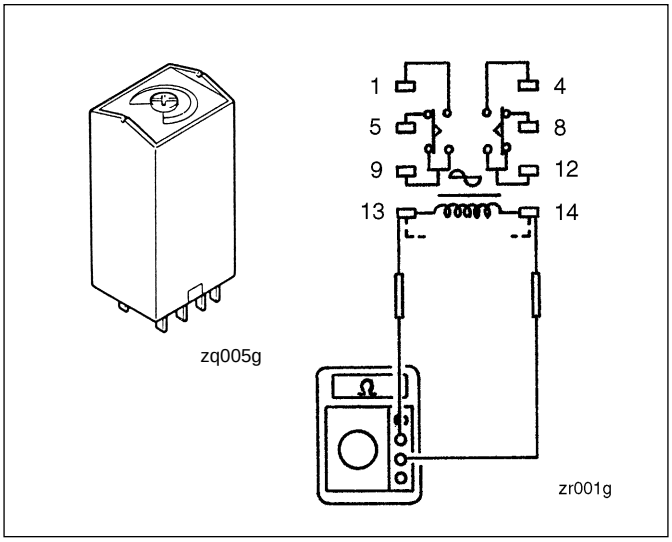


Fig.55 Inspection of Time Delay Relay

5. INSPECTION OF REFRIGERATION CYCLE

When something abnormal happens with the refrigeration cycle, it will fail the cooling capacity. Possible causes are clogging, leakage or insufficient refrigerant. In such a case, carry out the following inspection.

5-1. INSPECTION OF CLOGGING PARTS

Check for clogging parts of the refrigeration cycle. The clogged parts of the refrigeration cycle can be detected by the appearance of frost in the affected area. In this case, replace the affected parts.

5-2. INSPECTION OF REFRIGERANT LEAKAGE

Carefully check all connections and each component for refrigerant leakage, using the gas leak detector.
If you find refrigerant leakage, repair (or replace) the affected part and then charge the refrigerant.

6. REPAIR OF REFRIGERATION CYCLE

As all the components of the refrigeration cycle have been connected by brazing, it should be brazed whenever repairing or replacing these parts.

6-1. CORRECT BRAZING WORK

It is desirable to use a slightly reduced flame. Oxy-acetylene is often used, as it is easy to judge and adjust the condition of the flame. Unlike gas welding, a secondary flame is used for brazing.
It is necessary to preheat the base metal properly depending on the shape, size or thermal conductivity of the brazed fitting.

NOTE

The most important point in flame brazing is to bring the whole brazed fitting to a proper brazing temperature. It is also important to take care not to cause overflow of brazing filler metal, oxidization of brazing filler metal, or deterioration due to the overheating of flux.

(1) Proper Fitting and its Clearance

In general, the strength of brazing filler metal is lower than that of the base metal. So, the shape and clearance of the brazed fitting is very important.

As for the shape of the brazed fitting, it is necessary to maximize its adhesive area. The clearance of the brazed fitting must be minimized to pour brazing filler metal into it by using the capillary attraction.

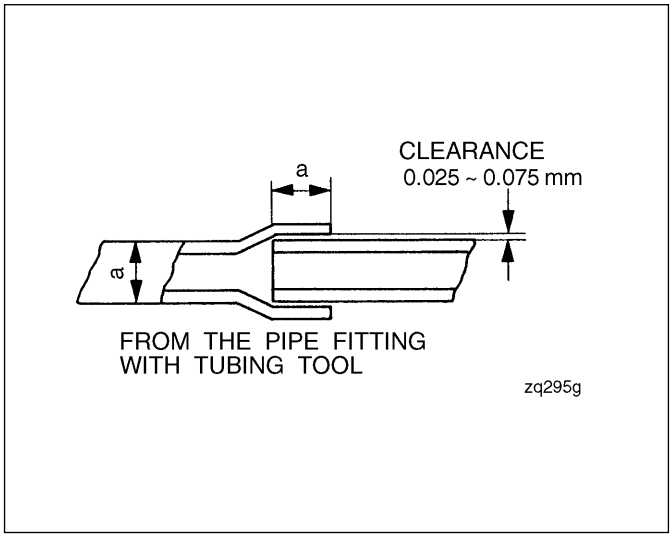


Fig.56 Brazed Fitting and Its Clearance

(2) Cleaning of Brazing Filler Metal and Pipe

When a joint has been removed, brazing filler metal may be found sticking to the inside and outside of the pipe. Brazing filler metal may also be compounded with oxygen in the air to form oxide film. Fats and oils may stick to the pipe.

In such conditions, complete brazing cannot be made. It is necessary to eliminate the brazing filler metal completely by using sand paper or a solvent such as trichlene.

(3) Use of Dry Nitrogen Gas

During brazing, the inside of the pipe undergoes an oxidative reaction due to the brazing flame. Conduct dry nitrogen gas (1 ℓ/min ; adjust with the flow regulator) through the pinch-off tube of the refrigeration cycle to prevent oxidization.

(4) Take care not to allow dirt, water, oil, etc. to enter into the pipe.

(5) Vertical Joint

Heat the whole brazed fitting to a proper brazing temperature. Make the brazing filler metal contact with the fitting so that the brazing filler metal starts flowing by itself. Stop heating the fitting as soon as the brazing filler metal has flown into the clearance. Since the brazing filler metal flows easily into the portion heated to a proper temperature, it is essential to keep the whole fitting at a proper brazing temperature.

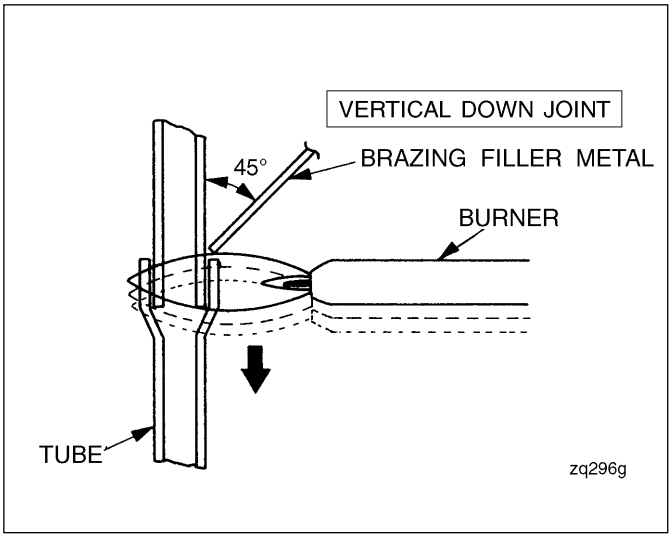


Fig.57 Vertical Down Joint

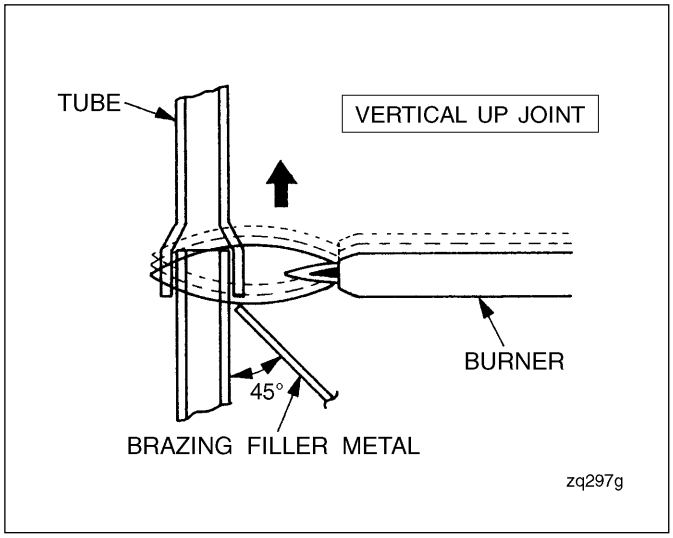


Fig.58 Vertical Up Joint

6-2. REMOVAL OF RELATIVES COMPONENTS

This section shows which portions to be removed when replacing the parts.

【Portions to be removed when replacing major parts.】

Replacement Part	Portions To Be Removed
Compressor	Ⓐ, Ⓑ
Condenser	Ⓐ, Ⓒ
Capillary tube	Ⓔ, Ⓓ
Evaporator	Ⓓ, Ⓔ

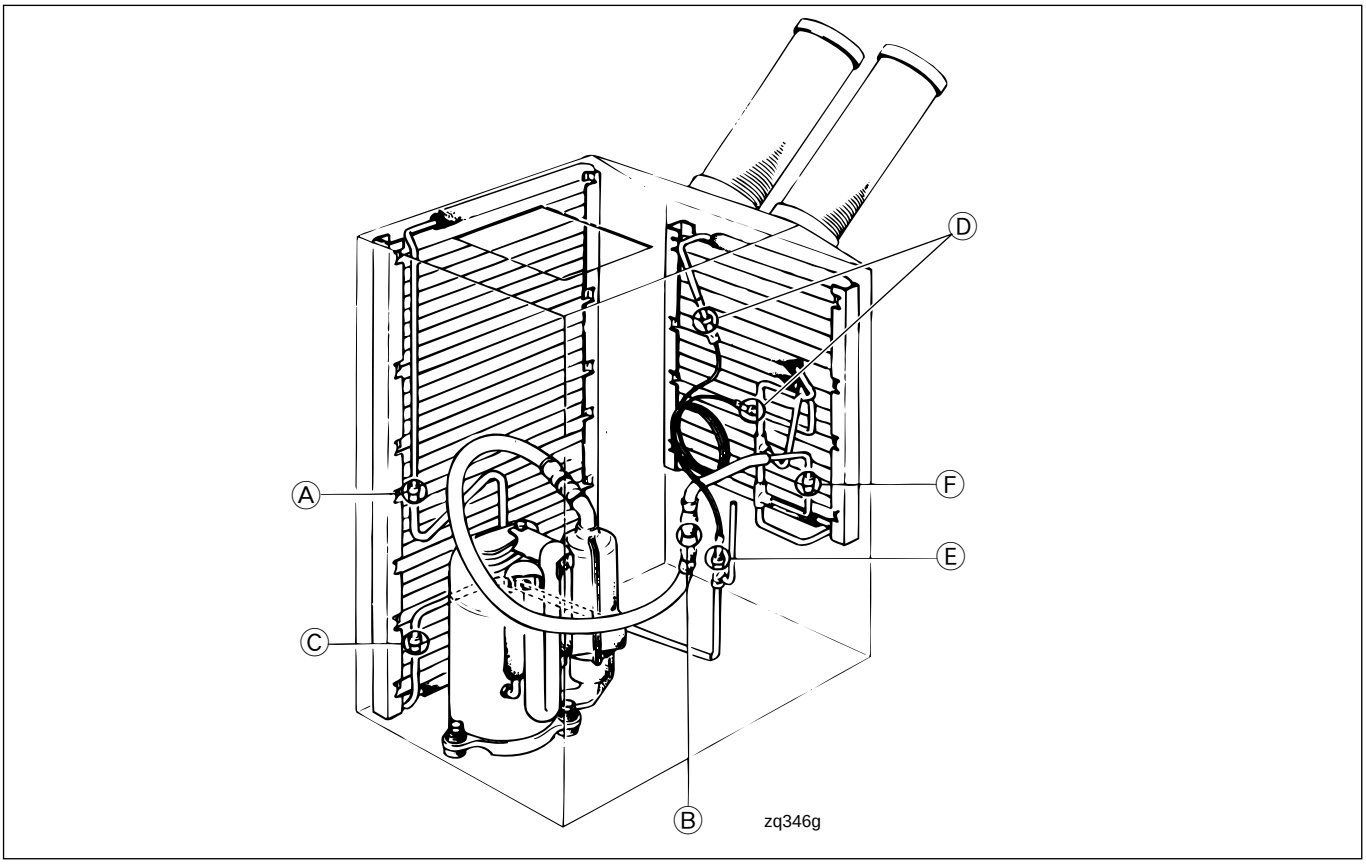


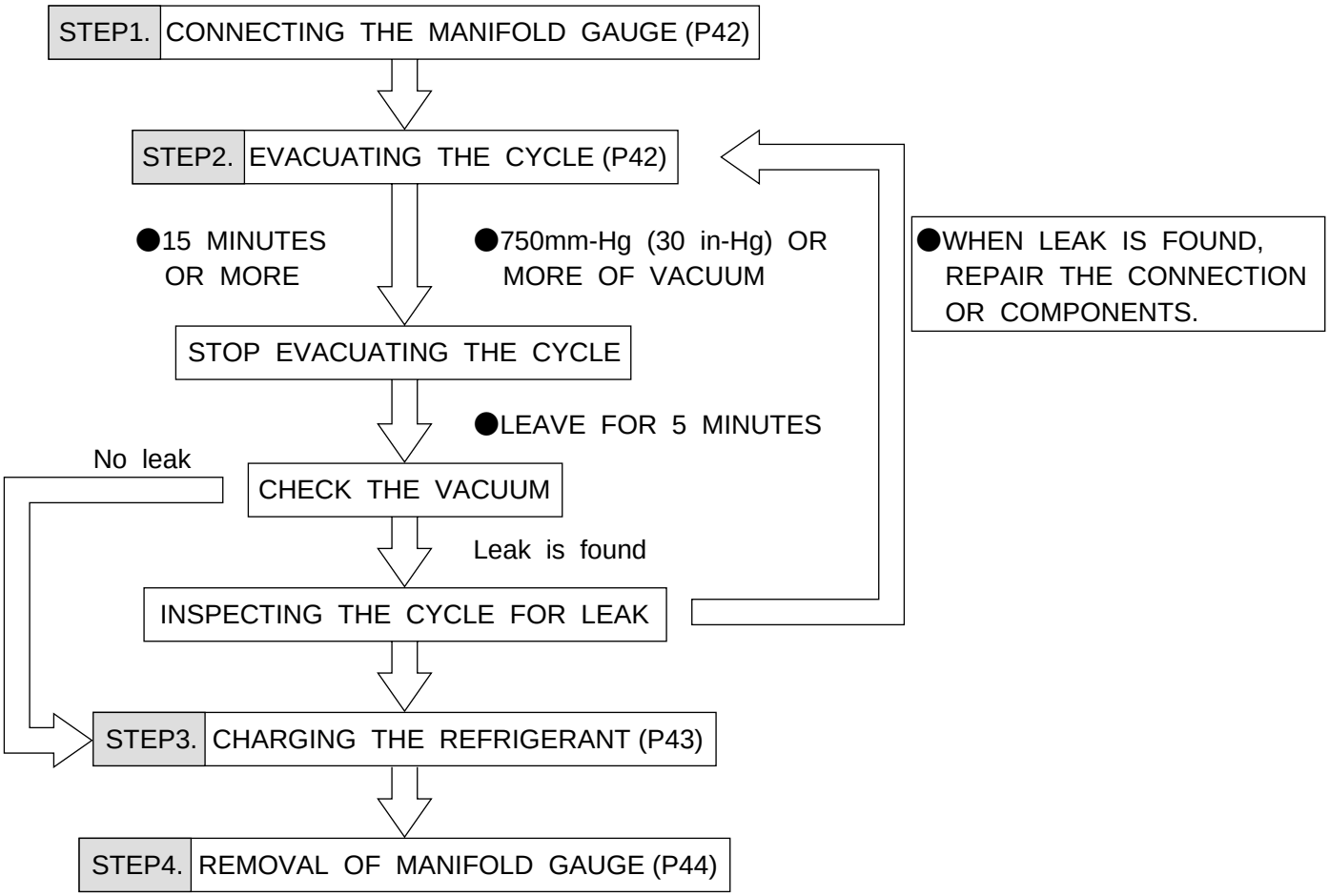
Fig.59 Refrigerant Component of MODEL 15SFE

NOTE

1. **This is the 15SFE model. The other model (10SFE, 15SFE-1) are almost same.**
2. **Before removing a brazed portion, protect the other parts from the flame with a steel plate, etc.**
3. **Before removing the brazed portion from the refrigeration cycle, be sure to cut off the end of the pinch-off tube and release the refrigerant gas from the cycle.**
4. **When removing a brazed portion, conduct dry nitrogen gas through the pinch-off tube of the refrigeration cycle to prevent oxidization.**

7. EVACUATING AND CHARGING

Be sure to evacuate the cycle and charge the cycle with HCFC22 refrigerant to the specified amount as follows:



⚠ Cautions for Handling the Refrigerant

1. When handling refrigerant, the following precautions must be observed.
   (1) Always wear eye protection.
   (2) The refrigerant cylinder should never be heated.
   Store the refrigerant cylinder below 40°C (104°F).
   (3) Do not handle refrigerant in an enclosed area where it is exposed to an open flame.
   (4) Care must be taken to protect eyes and skin from refrigerant.

2. If refrigerant strikes eyes or skin.
   (1) Do not rub the affected areas.
   (2) Splash large quantities of cool water on eyes or skin.
   (3) Do not attempt to treat the patient by yourself, rush the patient to a doctor or hospital for immediate professional treatment.

3. Pay special attention not to release the refrigerant into the atomosphere when handling the refrigerant.

(1) Connect the Manifold Gauge

① Cut off the crushed end of the pinch-off tube at the high pressure side and the low pressure side with a pipe cutter.

② Fit the process tube fitting to the pinch-off tube on both sides.

③ Connect the charging hoses of the manifold gauge to the process tube fittings.

Red hose: Connect to the high pressure side

Blue hose: Connect to the low pressure side

⚠CAUTION

Do not to connect the high pressure hose to the low pressure side and vice versa.

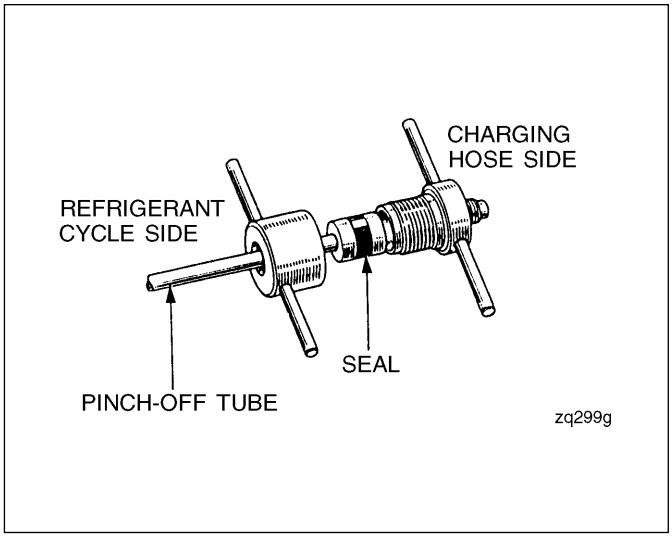


Fig.60 Mounting of Process Tube Fitting

4) Connect the green hose of manifold gauge to the vacuum pump.

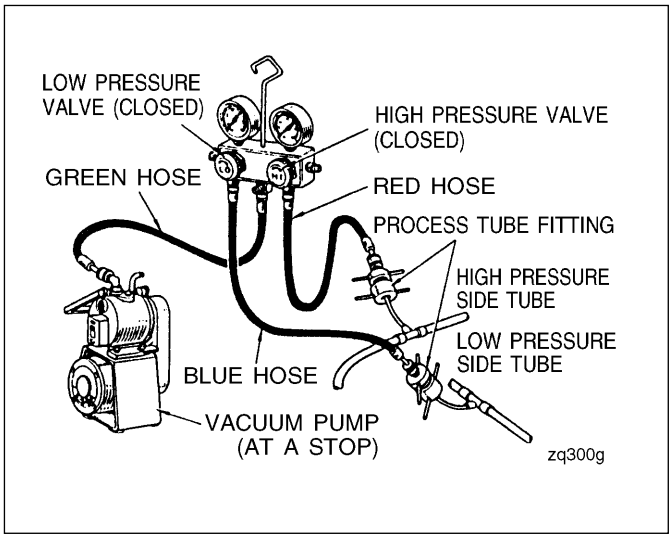


Fig.61 Connection of Manifold Gauge

(2) Evacuate the Refrigeration Cycle

① Open both the high and low pressure valves and operate the vacuum pump.

② After about 15 minutes, check that the low pressure gauge indicates more than 750 mmHg (99.98 kPa, 29.53 in.Hg) in vacuum.

③ If the reading is more than 750 mmHg (99.98 kPa, 29.53 in.Hg) in vacuum, close both valves and stop the vacuum pump.

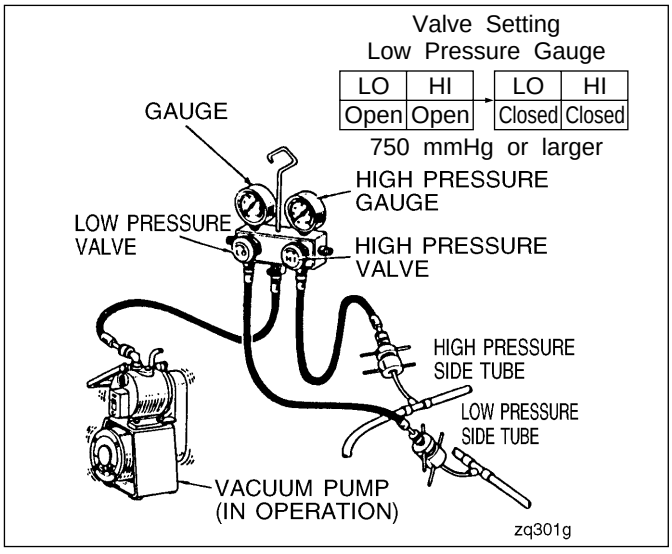


Fig.62 Evacuation

④ If the reading is not more than 750 mmHg (99.98 kPa, 29.53 in.Hg) in vacuum or the gauge pointer on the low pressure gauge side returns to zero, there is a leak somewhere in the cycle.
Locate the joints that are leaking and re-braze them.
Continue evacuating the air in the cycle until the low pressure gauge indicates a vacuum of 750 mmHg (99.98 kPa, 29.53 in.Hg).

⑤ Close both the high and low pressure hand valves and stop the vacuum pump, then leave the cycle in this condition for five minutes or longer and check that there is no change in the gauge reading.

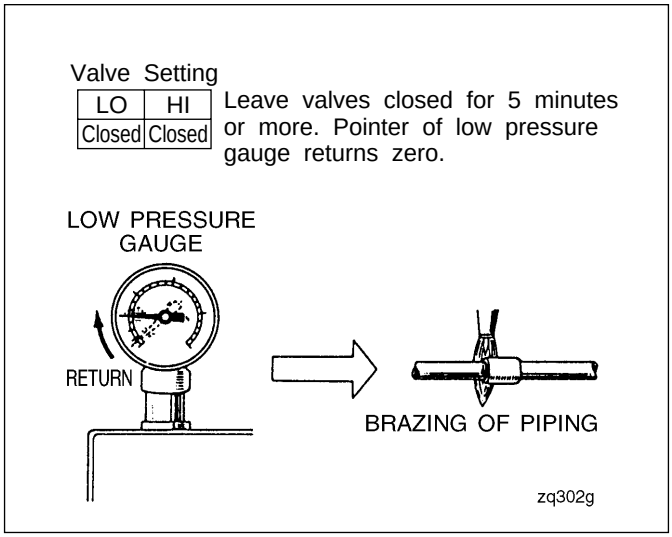


Fig.63 Checking Air-tightness

NOTE

When the gauge reading changes, there is a leakage in the refrigerant cycle. In this case, inspect the refrigerant cycle and repair the leakage part.

(3) Charge Refrigerant

① If the cycle is evacuated in step 3)-f, remove the charging hose (green) from the vacuum pump, connect it to the refrigerant cylinder and purge air from the charging hose.

② Place the refrigerant cylinder on a scale. (weight capacity 30 kg (70 lbs) in 5g (0.2 oz) graduation)

③ Open the high pressure valve on the manifold gauge and the valve of the refrigerant cylinder.

④ Charge the cycle with refrigerant to the specified amount while looking at the scale.

Charging amount of refrigerant.

10SFE	420^{+20}_{0} g ($0.93lbs^{+0.7}_{-0}$ OZ)
15STE 15SFE-1	680^{+20}_{0} g ($1.5lbs^{+0.7}_{0}$ OZ)

⑤ Close both the high pressure valve on the manifold gauge and the valve on the refrigerant cylinder.

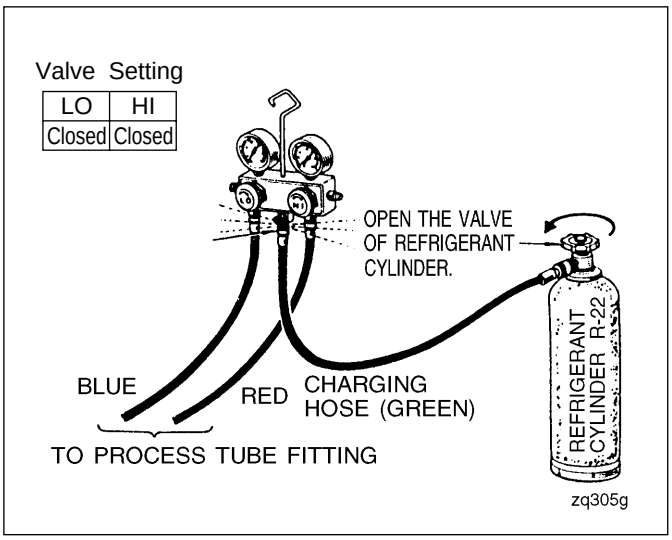


Fig.64 Purging Air inside Charging Hose

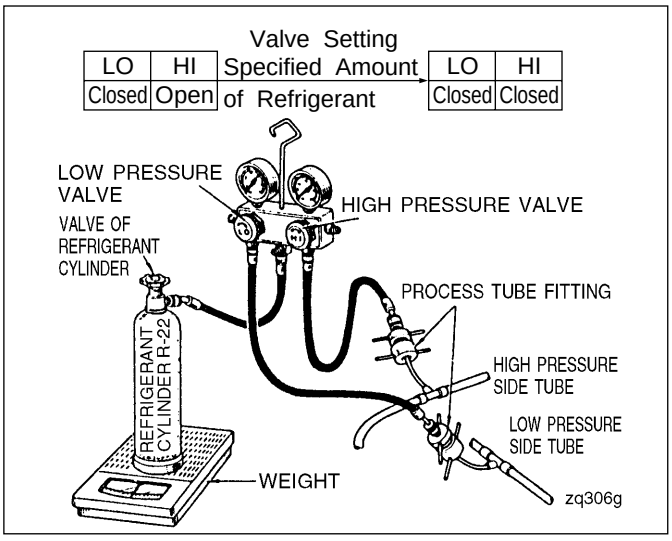


Fig.65 Charging with Refrigerant

NOTE

If the cycle cannot be charge with specified amount of refrigerant under these conditions, follow the steps below.

1. **Close the high pressure valve on the manifold gauge.**
2. **Operate the unit.**
3. **Slowly open the low pressure valve while looking at the scale reading.**
4. **When the scale reads the specified amount, immediately close the low pressure valve.**
5. **Stop the unit.**

⚠CAUTION

1. **The amount of refrigerant has a great effect on the cooling capacity of the cooler. Charge to the correct amount by always looking at the scale graduation.**
2. **When charging the refrigerant by above procedure written in the note, do not open the high pressure valve while operating the unit.**

(4) Remove the Manifold Gauge

① Pinch off the pinch-off tube with a pinch-off tool.

② Remove the manifold gauge and the process tube fitting. Crush the end of the pinch-off tube.

③ Braze the end of the pinch-off tube.

④ Make sure that a gas leak is not detected at the crushed end of the pinch-off tube.

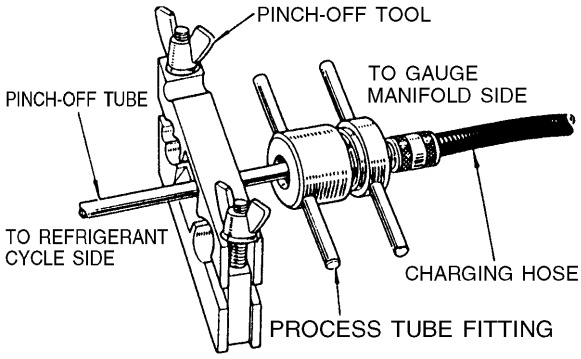
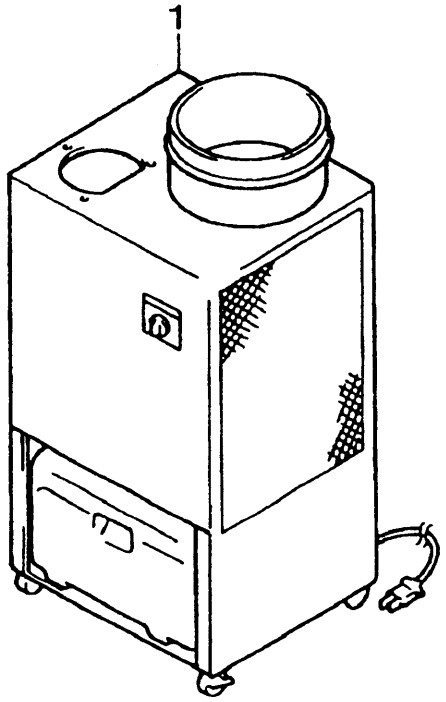


Fig.66 Removal of Manifold Gauge

8. PARTS CATALOG

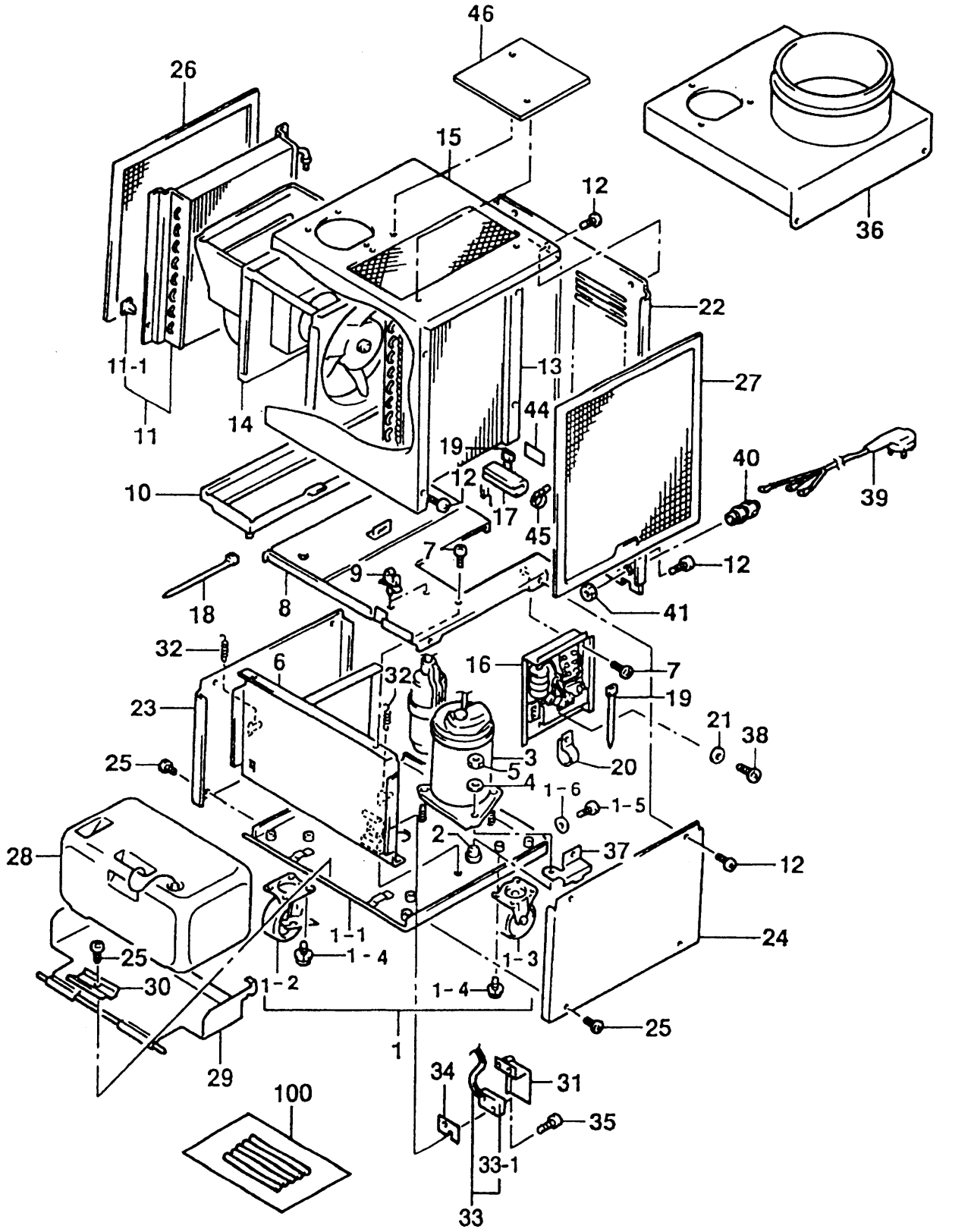
AIRCONDITIONER ASSY (10SFE)	484000-2050



OM0059

ILLUSTRATION NUMBER	DENSO NUMBER	MANUFACTURER NUMBER	DESCRIPTION	QTY	MODIFICATION DATE	REMARKS
* 0	484000-2050		AIRCONDITIONER ASSY	1		10SFE
* 1	484100-1690		UNIT ASSY	1		SEE-P.50

UNIT ASSY (10SFE)	484100-1690



UNIT ASSY **484100-1690**

ILLUSTRATION NUMBER	DENSO NUMBER	MANUFACTURER NUMBER	DESCRIPTION	QTY	MODIFICATION DATE	REMARKS
* 0	484100-1690		UNIT ASSY	1		10SFE
1	484300-0730		FRAME ASSY	1		
1-1	484310-1540		FRAME SUB-ASSY	1		
1-2	484702-0240		ROLLER	2		W/ROCK
1-3	484702-0250		ROLLER	2		
1-4	91510-08141		BOLT, W/WASHER	8		M8,L14
1-5	90051-06120		SCREW, CROSSRECESS PAN	1		M6,L12,FOR EARTH
1-6	90201-06400		WASHER, PLATE	1		FOR EARTH
2	484921-0060		SPACER	3		
3	484650-1220		COMPRESSOR ASSY	1		SEE-P.60
4	949011-5330		WASHER, STEEL PLATE	3		
5	90190-08651		NUT, HEXAGON	3		M8
6	484310-1681		FRAME SUB-ASSY	1		
7	949006-3130		SCREW	15		M4,L10
8	484310-1320		FRAME SUB-ASSY	1		
9	484917-0200		CLIP	1		
10	484430-0171		PAN ASSY, DRAIN	1		
11	484600-1300		CORE ASSY	1		EVA.W/CAPILLARY
11-1	484926-0190		GROMMET	4		
12	949001-1570		SCREW, TAPPING	13		D4,L10
13	484600-0710		CORE ASSY	1		CONDENSER
14	484200-0430		BLOWER ASSY	1		SEE-P.54
15	484410-3980		PANEL ASSY	1		SEE-P.56
* 16	484500-1580		CONTROLLER ASSY	1		SEE-P.58
17	484901-4700		PACKING	1		
18	480841-0010		CLIP	2		L100
19	481951-0020		CLIP	4		L185
20	481902-0030		CLAMP	1		
21	484311-1710		PLATE	1		
22	484410-3990		PANEL ASSY	1		
23	484410-4000		PANEL ASSY	1		
24	484410-4860		PANEL ASSY	1		
25	949006-5850		SCREW	9		M4,L10
26	484401-0590		FILTER	1		HR-13, FOR EVA.
27	484401-0600		FILTER	1		HR-13, FOR CON.
28	484731-0052		TANK	1		
29	484310-1472		FRAME SUB-ASSY	1		
30	484927-0510		HOLDER	1		
31	484390-0520		COVER SUB-ASSY	1		
32	949171-3050		SPRING, TENSION COIL	2		
33	484560-1230		SWITCH ASSY	1		
33-1	484502-0110		SWITCH	1		

ILLUSTRATION NUMBER	DENSO NUMBER	MANUFACTURER NUMBER	DESCRIPTION	QTY	MODIFICATION DATE	REMARKS
34	484311-0870		PLATE	1		
35	91310-03161		SCREW, W/WASHER	2		M3,L16
36	484410-2271		PANEL ASSY	1		
37	484331-4710		STAY	1		
38	91051-04100		SCREW, CROSSRECESS PAN	1		M4,L10
39	484930-4221		WIRE ASSY	1		
40	484926-0450		GROMMET	1		
41	484919-0070		NUT, HOLDER	1		
44	484311-1320		PLATE	1		
45	484927-0660		HOLDER	1		
46	484311-1980		PLATE	1		
100	484800-0440		PIPE ASSY	1		CHARGING

[MEMO]

BLOWER ASSY (10SFE) 484200-0430

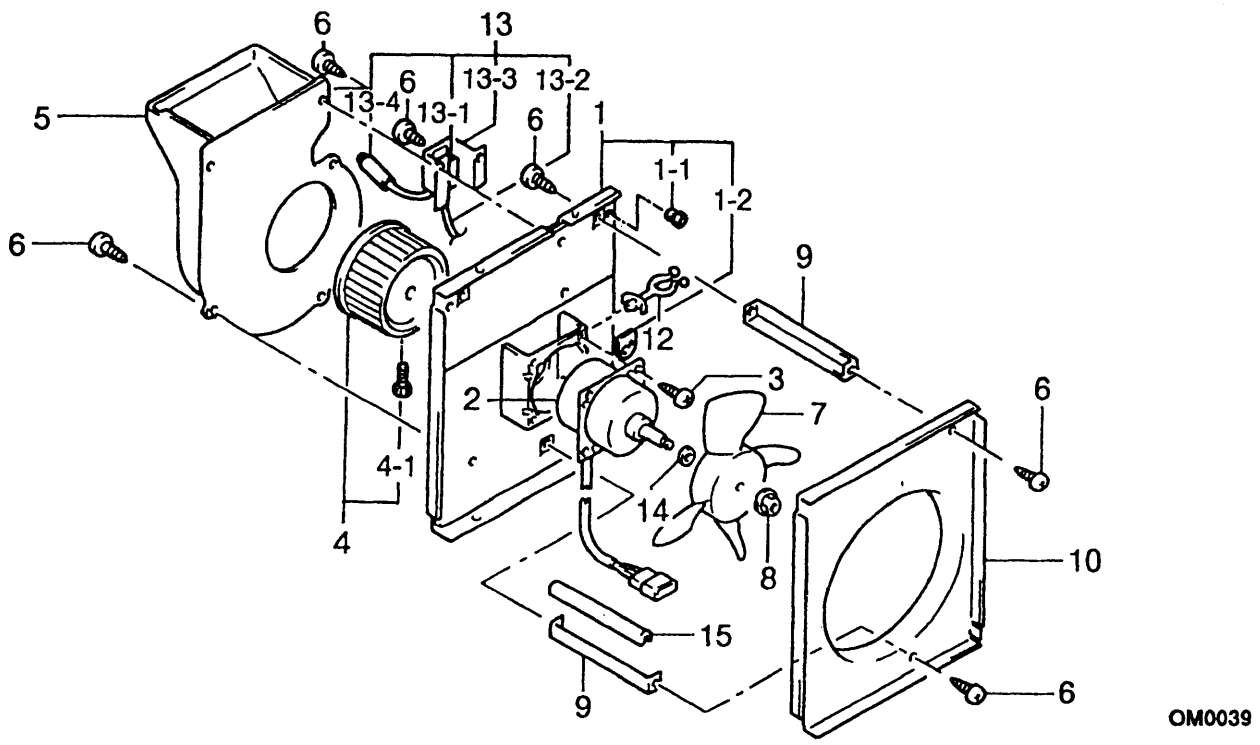
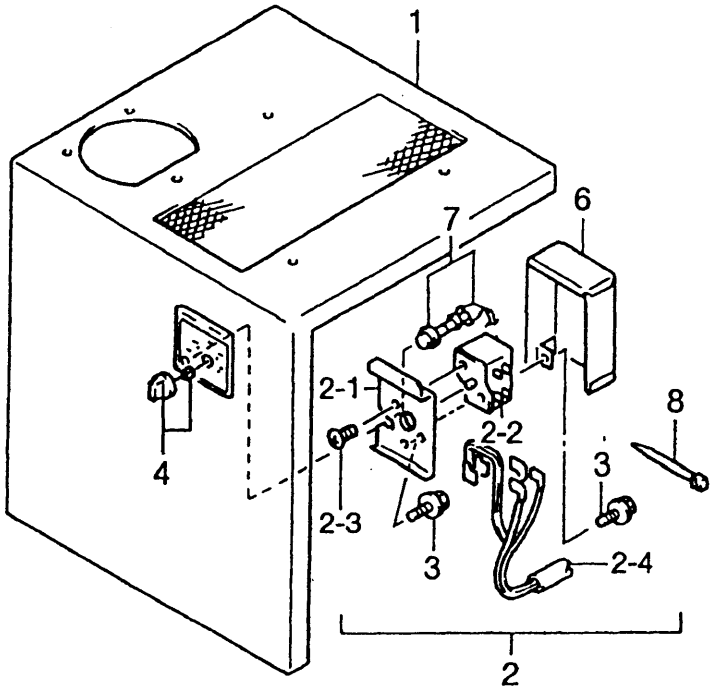


ILLUSTRATION NUMBER	DENSO NUMBER	MANUFACTURER NUMBER	DESCRIPTION	QTY	MODIFICATION DATE	REMARKS
* 0	484200-0430		BLOWER ASSY	1		10SFE
1	484310-1331		FRAME SUB-ASSY	1		
1-1	949321-3000		GROMMET	1		
1-2	484926-0120		GROMMET	1		
2	484211-0730		MOTOR	1		
3	90050-06101		SCREW, CROSSRECESS PAN	4		M6,L10
4	484221-0131		FAN	1		
4-1	949040-6180		BOLT, HEXAGON	1		M6,L14.5
5	484261-0171		CASING	1		
6	949006-3130		SCREW	13		M4,L10
7	022770-0880		FAN ASSY	1		
8	949056-2230		NUT	1		M5,W/WASHER
9	484331-4050		STAY	3		
10	484301-1082		FRAME	1		
12	473459-0160		CLAMP	2		
13	484320-0330		BRACKET SUB-ASSY	1		
13-1	484504-0080		THERMOSTAT	1		
13-2	484930-2341		WIRE ASSY	1		

ILLUSTRATION NUMBER	DENSO NUMBER	MANUFACTURER NUMBER	DESCRIPTION	QTY	MODIFICATION DATE	REMARKS
13-3	484321-1010		BRACKET	1		
13-4	484922-0080		CAP	1		
14	949013-5350		WASHER, PLATE, SK	1		T0.8
15	484926-0330		GROMMET	1		

PANEL ASSY (10SFE) 484410-3980



OM0043

ILLUSTRATION NUMBER	DENSO NUMBER	MANUFACTURER NUMBER	DESCRIPTION	QTY	MODIFICATION DATE	REMARKS
0	484410-3980		PANEL ASSY	1		10SFE
1	484470-1800		PANEL SUB-ASSY	1		
2	484560-0470		SWITCH ASSY	1		
2-1	484321-1020		BRACKET	1		
2-2	484502-0170		SWITCH	1		
2-3	949006-3330		SCREW	2		M4,L6
2-4	484930-2352		WIRE ASSY	1		
3	949006-3130		SCREW	3		M4,L10
4	484923-0190		KNOB	1		
6	484391-0911		COVER	1		
7	484933-0150		LAMP	1		
8	480841-0010		CLIP	1		L100

[MEMO]

CONTROLLER ASSY (10SFE) 484500-1580

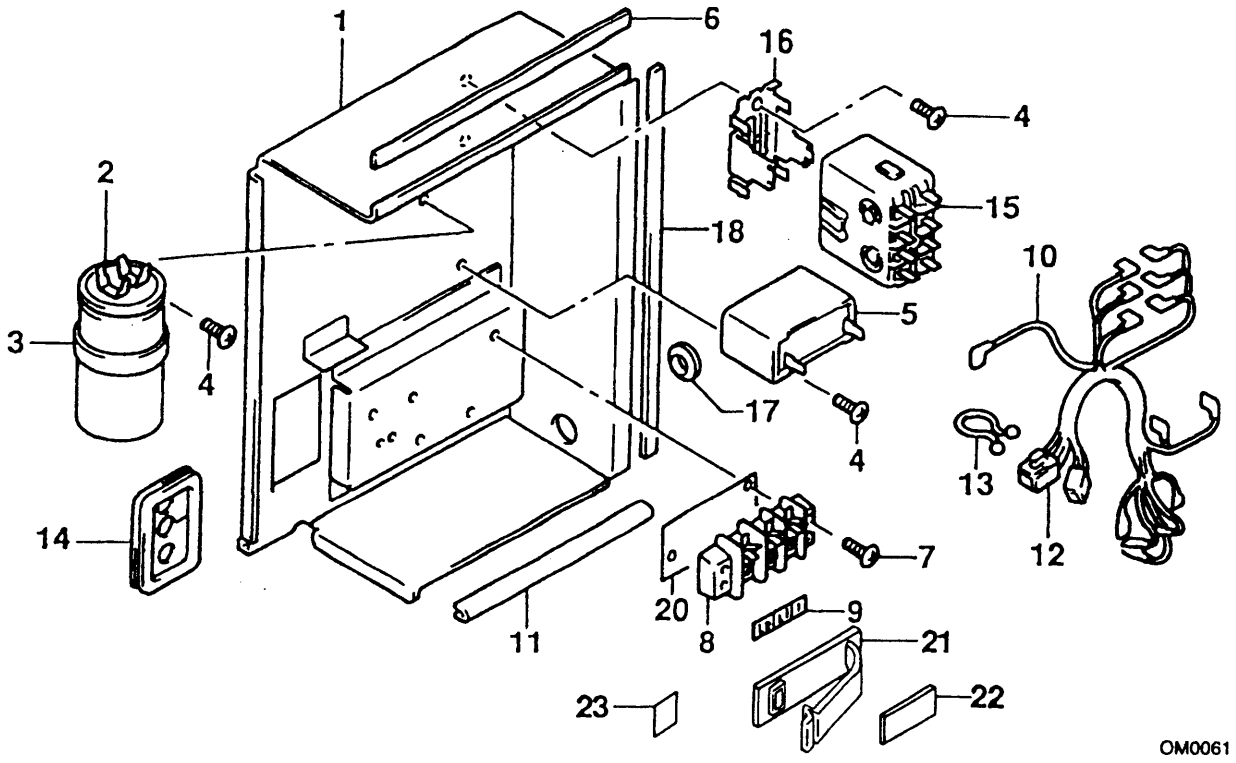
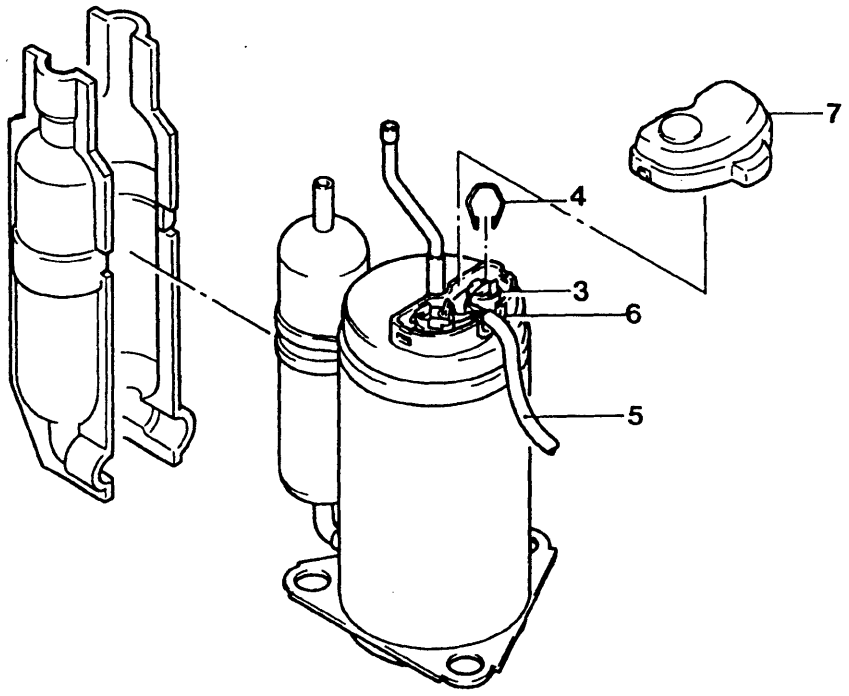


ILLUSTRATION NUMBER	DENSO NUMBER	MANUFACTURER NUMBER	DESCRIPTION	QTY	MODIFICATION DATE	REMARKS
* 0	484500-1580		CONTROLLER ASSY	1		10SFE
1	484520-0610		BOX SUB-ASSY	1		
2	484507-0070		CONDENSER	1		15μF,400V
3	484927-0620		HOLDER	1		
4	949006-3130		SCREW	4		M4,L10
5	484507-0320		CONDENSER	1		5μF,440V
6	484901-5300		PACKING	1		
7	949006-3280		SCREW	2		M4,L18
8	484503-0430		TERMINAL	1		
9	484003-0460		PLATE, ORNAMENT	1		
10	484930-4380		WIRE ASSY	1		
11	484901-5360		PACKING	1		
12	484930-4390		WIRE ASSY	1		
13	479848-0150		CLAMP	2		
14	484926-0270		GROMMET	1		
15	484531-0150		RELAY	1		
16	185642-0090		HOLDER	1		
17	949320-2380		GROMMET	1		

CONTROLLER ASSY — 484500-1580

ILLUSTRATION NUMBER	DENSO NUMBER	MANUFACTURER NUMBER	DESCRIPTION	QTY	MODIFICATION DATE	REMARKS
18	484901-5040		PACKING	2		
20	484311-1680		PLATE	1		
21	484927-0840		CLAMP	1		
22	484901-8170		PACKING	1		
23	484004-1370		PLATE, CAUTION	1		

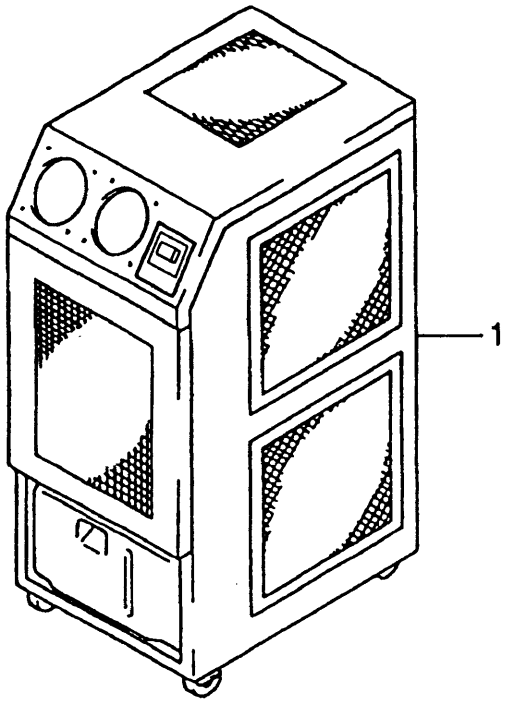
COMPRESSOR ASSY (10SFE) 484650-1220



IM0006

ILLUSTRATION NUMBER	DENSO NUMBER	MANUFACTURER NUMBER	DESCRIPTION	QTY	MODIFICATION DATE	REMARKS
0	484650-1220		COMPRESSOR ASSY	1		10SFE
3	484501-0160		RELAY, OVERLOAD	1		
4	484927-0450		HOLDER	1		
5	484930-4330		WIRE ASSY	1		
6	484926-0160		GROMMET	1		
7	484391-0980		COVER	1		

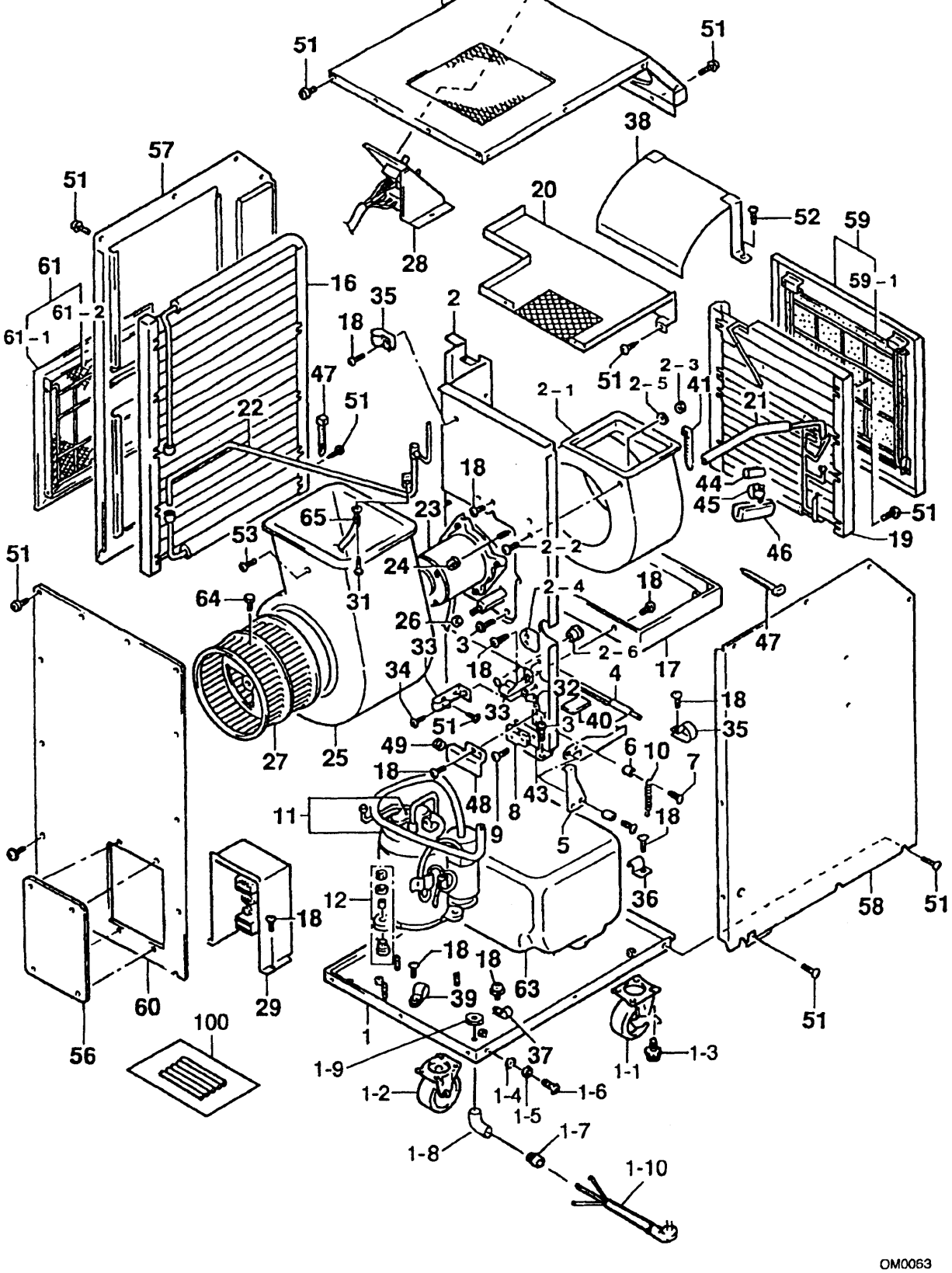
AIRCONDITIONER ASSY (15SFE) 484000-2060



OM0062

ILLUSTRATION NUMBER	DENSO NUMBER	MANUFACTURER NUMBER	DESCRIPTION	QTY	MODIFICATION DATE	REMARKS
* 0	484000-2060		AIRCONDITIONER ASSY	1		15SFE
* 1	484100-1660		UNIT ASSY	1		SEE-P.62

UNIT ASSY (15SFE)	484100-1660

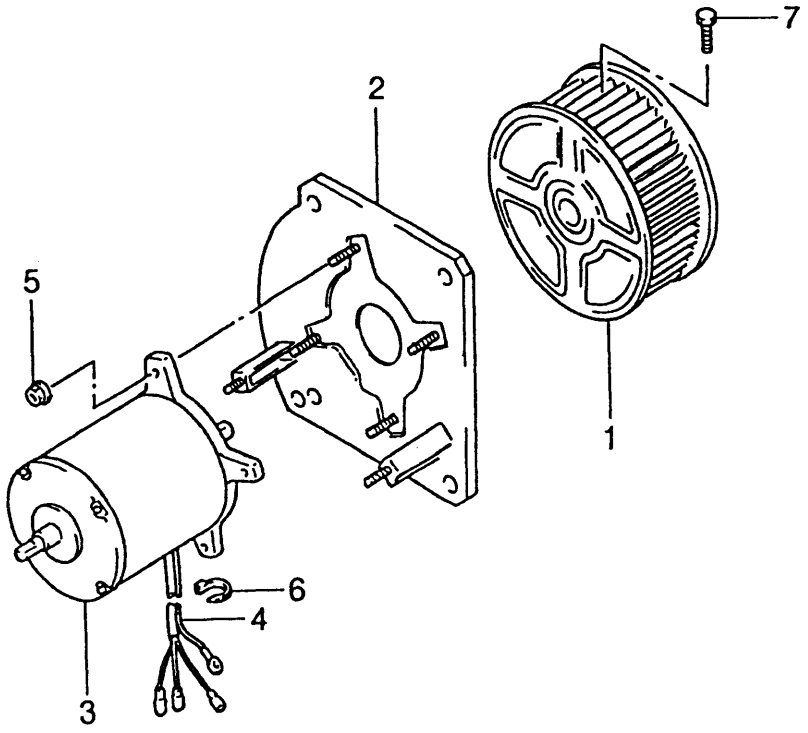


OM0063

ILLUSTRATION NUMBER	DENSO NUMBER	MANUFACTURER NUMBER	DESCRIPTION	QTY	MODIFICATION DATE	REMARKS
* 0	484100-1660		UNIT ASSY	1		15SFE
1	484300-1300		FRAME SUB-ASSY	1		
1-1	484702-0240		ROLLER	2		W/ROCK
1-2	484702-0250		ROLLER	2		
1-3	91510-08141		BOLT, W/WASHER	8		M8,L14
1-4	949016-0120		WASHER, TOOTHED	1		ID6.4
1-5	90201-06400		WASHER, PLATE	1		FOR EARTH
1-6	90051-06120		SCREW, CROSSRECESS PAN	1		M6,L12
1-7	484926-0450		GROMMET	1		
1-8	484926-0520		GROMMET	1		
1-9	484919-0070		NUT, HOLDER	1		
1-10	484930-4221		WIRE ASSY	1		POWER CORD
2	484300-0850		FRAME ASSY	1		
2-1	484261-0010		CASING	1		
2-2	91370-06161		SCREW, W/WASHER	4		M6,L16
2-3	90160-06051		NUT, HEXAGON	4		M6
2-4	484926-0120		GROMMET	1		
2-5	90200-06711		WASHER, PLATE	4		T2.0
2-6	949321-3000		GROMMET	1		
3	91370-06121		SCREW, W/WASHER	5		M6,L12
4	484310-0541		FRAME SUB-ASSY	1		
5	484321-0510		BRACKET	1		
6	480837-0030		SOCKET	4		
7	91060-04161		SCREW, CROSSRECESS COUNTERSUNK	4		M4,L16
8	484502-0110		SWITCH	1		
9	91310-03161		SCREW, W/WASHER	2		M3,L16
10	949171-2090		SPRING, TENSION COIL	2		
11	484650-1200		COMPRESSOR ASSY	1		SEE-P.69
12	481799-0170		ACCESSORY KIT, SERVICE	1		
16	484600-0400		CORE ASSY	1		CONDENSER
17	484430-0120		PAN ASSY, DRAIN	1		
18	949006-5850		SCREW	27		M4,L10
19	484600-0300		CORE ASSY	1		EVA.W/CAPILLARY
20	484340-2101		STAY SUB-ASSY	1		
21	484800-2160		PIPE ASSY	1		
22	484800-0910		PIPE ASSY	1		
* 23	484200-0710		BLOWER ASSY	1		SEE-P.65
24	92150-06061		NUT, FLANGE	2		M6
25	484261-0070		CASING	1		
26	949056-1430		NUT	2		M6,W/WASHER
27	484221-0122		FAN	1		
28	484560-0731		SWITCH ASSY	1		SEE-P.68

ILLUSTRATION NUMBER	DENSO NUMBER	MANUFACTURER NUMBER	DESCRIPTION	QTY	MODIFICATION DATE	REMARKS
* 29	484500-1730		CONTROLLER ASSY	1		SEE-P.66
30	484311-1710		PLATE	1		
31	91051-04100		SCREW, CROSSRECESS PAN	3		M4,L10,FOR EARTH
32	481902-0020		CLAMP	1		
33	484927-0151		HOLDER	2		
34	949006-6140		SCREW	1		
35	473459-0370		CLAMP	3		
36	484927-0160		HOLDER	1		
37	481902-0030		CLAMP	1		
38	484340-0920		STAY SUB-ASSY	1		
39	949350-3030		CLIP, CORD	1		D15.2
40	484901-3150		PACKING	1		
41	480841-0010		CLIP	4		L100
43	484311-0870		PLATE	1		
44	484311-1320		PLATE	1		
45	484927-0660		HOLDER	1		
46	484901-4700		PACKING	1		
47	481951-0020		CLIP	10		L185
48	484391-0560		COVER	1		
49	949321-3000		GROMMET	1		
50	484410-3931		PANEL ASSY	1		
51	949001-1570		SCREW, TAPPING	46		D4,L10
52	146690-1920		CLAMP	2		M4,L10
53	949007-3600		SCREW, W/WASHER	2		M4,L14
54	91060-04101		SCREW, CROSSRECESS COUNTERSUNK	2		M4,L10
56	484450-1980		PANEL SUB-ASSY	1		
57	484410-3941		PANEL ASSY	1		
58	484410-4820		PANEL ASSY	1		
59	484410-2590		PANEL ASSY	1		W/FILTER
59-1	484401-0230		FILTER	1		HR-13 *1
60	484411-2510		PANEL	1		REAR
* 61	484400-0060		FILTER ASSY	2		
61-1	484300-0260		FRAME ASSY	2		
61-2	484401-0230		FILTER	2		HR-13 *1
63	484731-0021		TANK	1		
64	949040-6150		BOLT, HEXAGON	1		M8,L18.5
65	484930-0910		WIRE ASSY	1		
66	481902-0080		CLAMP	1		
100	484800-0440		PIPE ASSY	1		CHARGING

BLOWER ASSY (15SFE) 484200-0710



OM0045

ILLUSTRATION NUMBER	DENSO NUMBER	MANUFACTURER NUMBER	DESCRIPTION	QTY	MODIFICATION DATE	REMARKS
* 0	484200-0710		BLOWER ASSY	1		15SFE
1	484221-0112		FAN	1		
2	484330-0340		STAY ASSY	1		
3	484211-1000		MOTOR	1		
4	484930-0900		WIRE ASSY	1		
5	92150-06061		NUT, FLANGE	4		M6
6	480841-0010		CLIP	2		L100
7	949040-6150		BOLT, HEXAGON	1		M8,L18.5

CONTROLLER ASSY (15SFE) 484500-1730

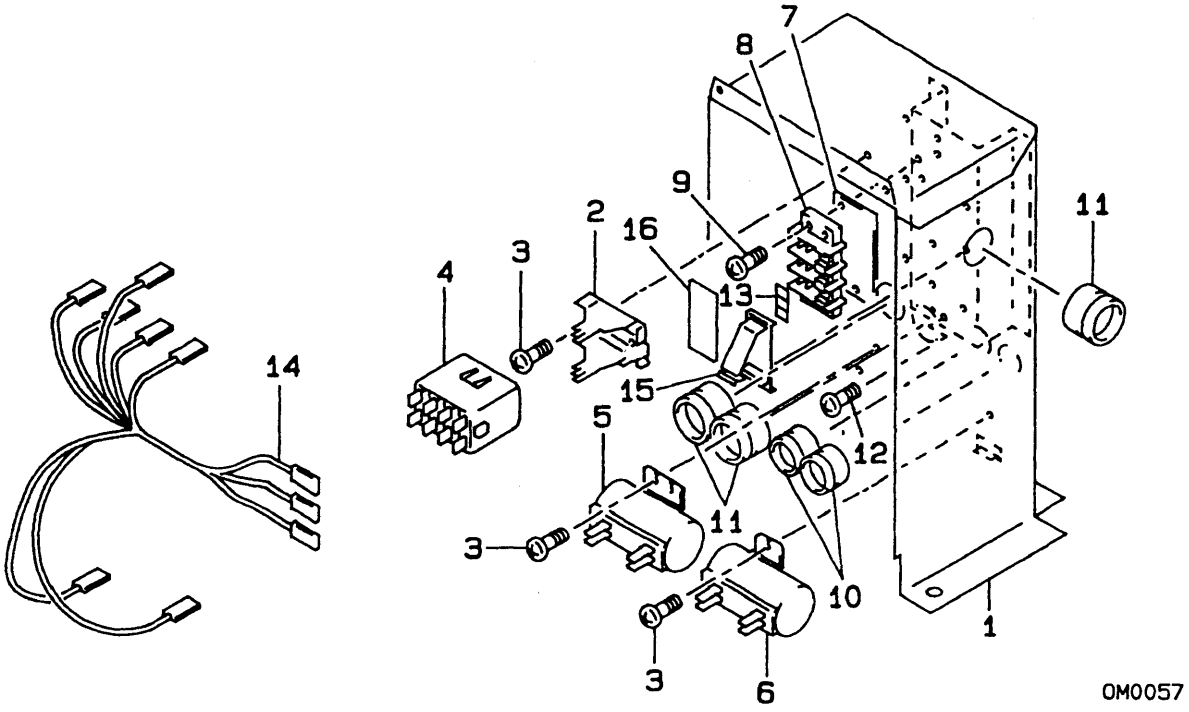
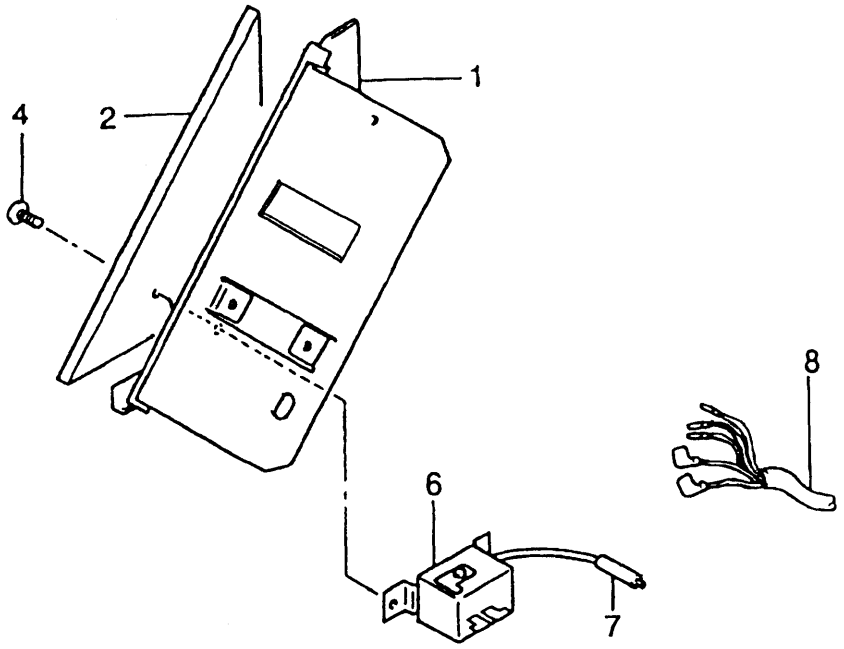


ILLUSTRATION NUMBER	DENSO NUMBER	MANUFACTURER NUMBER	DESCRIPTION	QTY	MODIFICATION DATE	REMARKS
* 0	484500-1730		CONTROLLER ASSY	1		15SFE
1	484520-0670		BOX SUB-ASSY	1		
2	185642-0090		HOLDER	1		
3	949006-3250		SCREW	5		M4,L10
4	484531-0150		RELAY	1		RX
5	484507-0460		CONDENSER	1		25μF
6	484507-0470		CONDENSER	1		10μF
7	484311-1680		PLATE	1		
8	484503-0430		TERMINAL	1		
9	949006-3280		SCREW	2		M4,L18
10	949321-3000		GROMMET	2		
11	949321-3010		GROMMET	3		
12	91051-04100		SCREW, CROSSRECESS PAN	1		
13	484003-0440		PLATE, ORNAMENT	1		
14	484930-4740		WIRE ASSY	1		
15	484927-0840		HOLDER	1		
16	484901-8170		PACKING	1		

[MEMO]

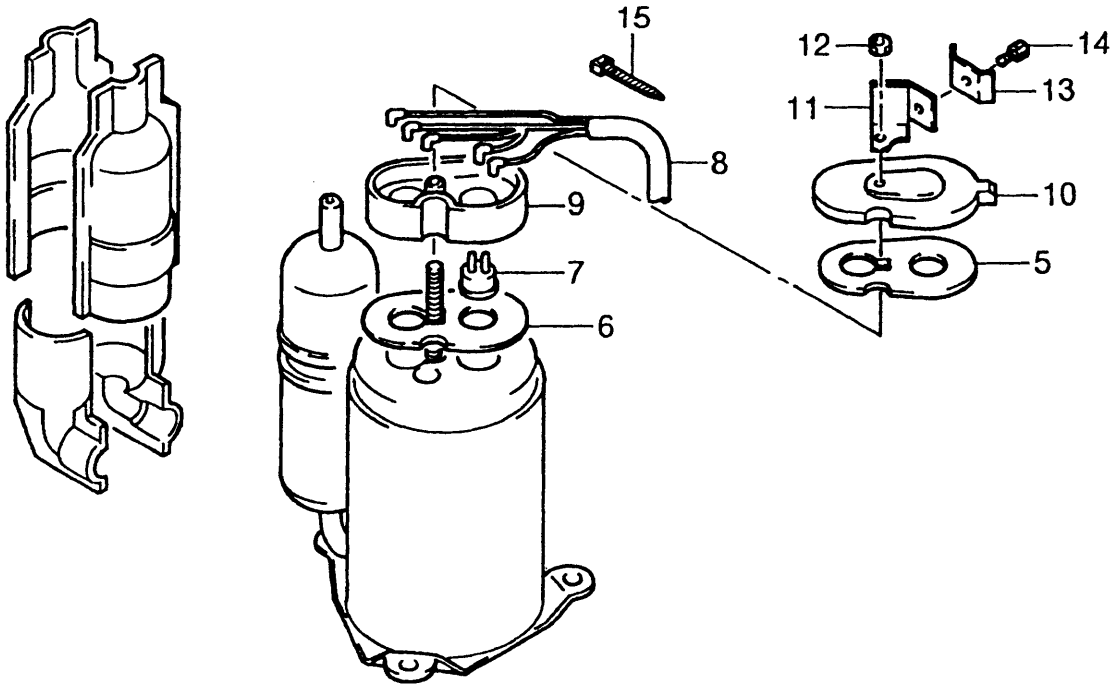
SWITCH ASSY (15SFE)	484560-0731



OM0064

ILLUSTRATION NUMBER	DENSO NUMBER	MANUFACTURER NUMBER	DESCRIPTION	QTY	MODIFICATION DATE	REMARKS
0	484560-0731		SWITCH ASSY	1		15SFE
1	484390-0720		COVER SUB-ASSY	1		
2	484901-3990		PACKING	1		
4	91050-04061		SCREW, CROSSRECESS PAN	2		M4,L6
6	484504-0020		THERMOSTAT	1		FOR ANTIFREEZING
7	484922-0080		CAP	1		
8	484930-4730		WIRE ASSY	1		

COMPRESSOR ASSY (15SFE) 484650-1200

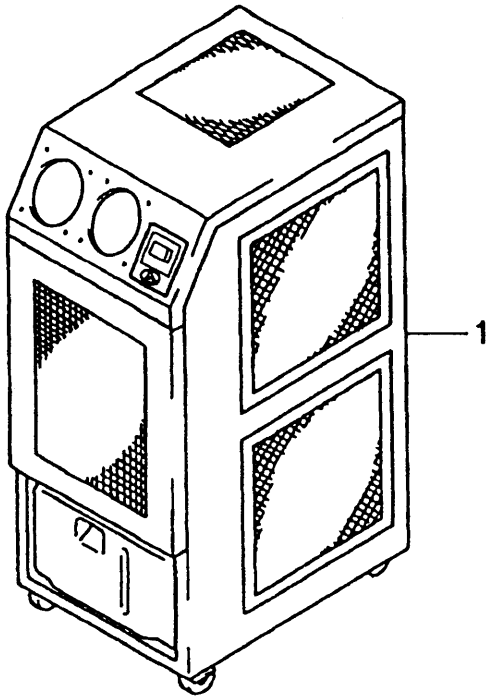


OM0046

ILLUSTRATION NUMBER	DENSO NUMBER	MANUFACTURER NUMBER	DESCRIPTION	QTY	MODIFICATION DATE	REMARKS
0	484650-1200		COMPRESSOR ASSY	1		15SFE
5	484903-0090		PLATE, RUBBER	1		
6	484903-0020		PLATE, RUBBER	1		
7	484501-0110		RELAY, OVERLOAD	1		
8	484930-4260		WIRE ASSY	1		
9	484391-0820		COVER	1		
10	484922-0050		CAP	1		
11	484321-0340		BRACKET	1		
12	949056-1520		NUT	1		
13	484321-0180		BRACKET	2		
14	90910-04301		SCREW, BINDING TAPPING	2		M4,L30
15	480841-0010		CLIP	1		

[MEMO]

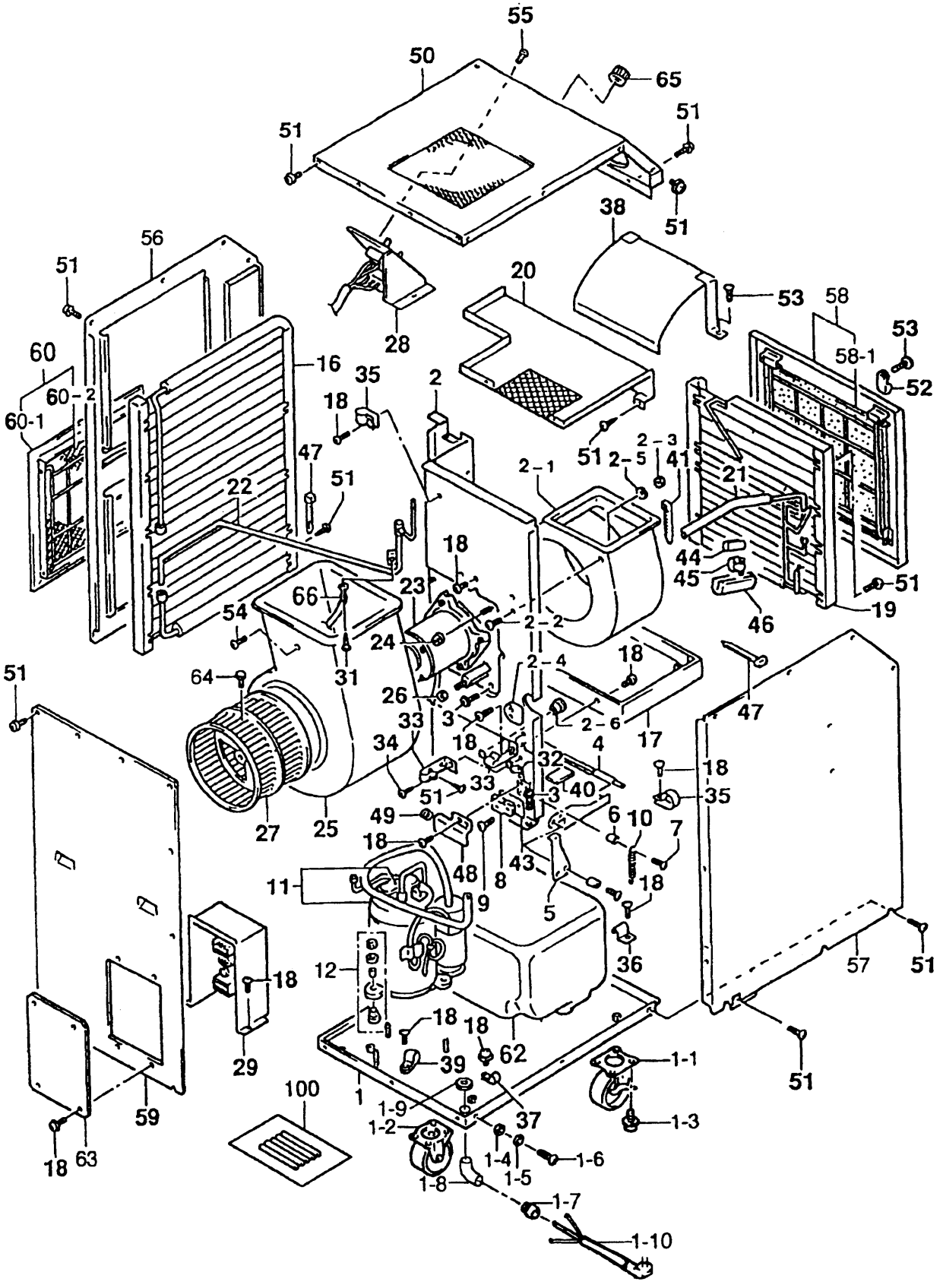
AIRCONDITIONER ASSY (15SFE-1) 484000-2070



OM0065

ILLUSTRATION NUMBER	DENSO NUMBER	MANUFACTURER NUMBER	DESCRIPTION	QTY	MODIFICATION DATE	REMARKS
* 0	484000-2070		AIRCONDITIONER ASSY	1		15SFE-1
* 1	484100-1680		UNIT ASSY	1		SEE-P.72

UNIT ASSY (15SFE-1)	484100-1680

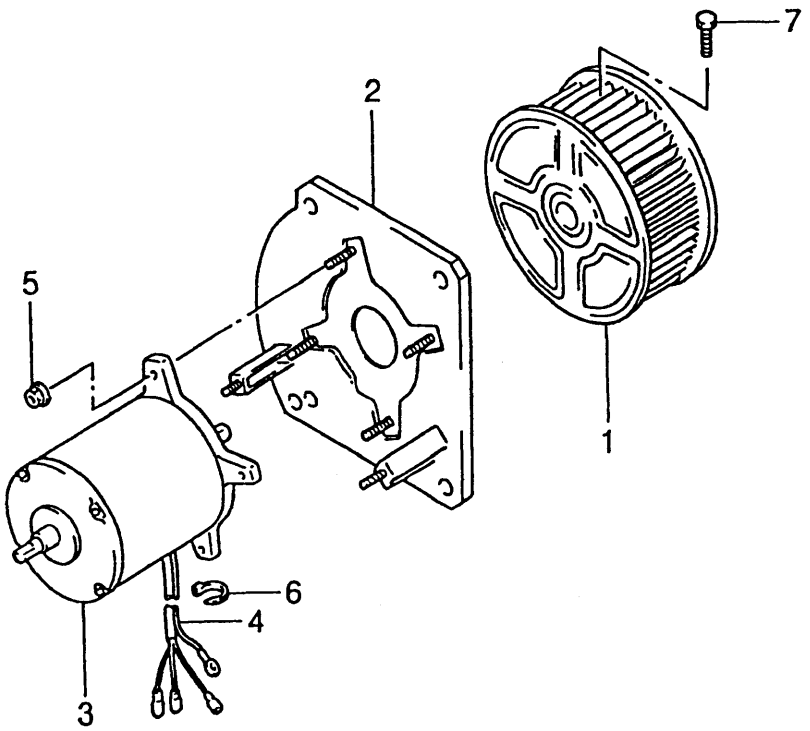


OM0066

ILLUSTRATION NUMBER	DENSO NUMBER	MANUFACTURER NUMBER	DESCRIPTION	QTY	MODIFICATION DATE	REMARKS
* 0	484100-1680		UNIT ASSY	1		15SFE-1
1	484310-1300		FRAME SUB-ASSY	1		
1-1	484702-0240		ROLLER	2		W/ROCK
1-2	484702-0250		ROLLER	2		
1-3	91510-08141		BOLT, W/WASHER	8		M8,L14
1-4	949016-0120		WASHER, TOOTHED	1		ID6.4
1-5	90201-06400		WASHER, PLATE	1		FOR EARTH
1-6	90051-06120		SCREW, CROSSRECESS PAN	1		M6,L12
1-7	484926-0450		GROMMET	1		
1-8	484926-0520		GROMMET	1		
1-9	484919-0070		NUT, HOLDER	1		
1-10	484930-4221		WIRE ASSY	1		POWER CORD
2	484300-0850		FRAME ASSY	1		
2-1	484261-0010		CASING	1		
2-2	91370-06161		SCREW, W/WASHER	4		M6,L16
2-3	90160-06051		NUT, HEXAGON	4		M6
2-4	484926-0120		GROMMET	1		
2-5	90200-06711		WASHER, PLATE	4		T2.0
2-6	949321-3000		GROMMET	1		
3	91370-06121		SCREW, W/WASHER	5		M6,L12
4	484310-0541		FRAME SUB-ASSY	1		
5	484321-0510		BRACKET	1		
6	480837-0030		SOCKET	4		
7	91060-04161		SCREW, CROSSRECESS COUNTERSUNK	4		M4,L16
8	484502-0110		SWITCH	1		
9	91310-03161		SCREW, W/WASHER	2		M3,L16
10	949171-2090		SPRING, TENSION COIL	2		
11	484650-1200		COMPRESSOR ASSY	1		SEE-P.79
12	481799-0170		ACCESSORY KIT, SERVICE	1		
16	484600-0400		CORE ASSY	1		
17	484430-0120		PAN ASSY, DRAIN	1		
18	949006-5850		SCREW	31		M4,L10
19	484600-0300		CORE ASSY	1		EVA.W/CAPILLARY
20	484340-2101		STAY SUB-ASSY	1		
21	484800-2160		PIPE ASSY	1		
22	484800-0910		PIPE ASSY	1		
* 23	484200-0720		BLOWER ASSY	1		SEE-P.75
24	92150-06061		NUT, FLANGE	2		M6
25	484261-0070		CASING	1		
26	949056-1430		NUT	2		M6,W/WASHER
27	484221-0122		FAN	1		
28	484560-0741		SWITCH ASSY	1		SEE-P.78

ILLUSTRATION NUMBER	DENSO NUMBER	MANUFACTURER NUMBER	DESCRIPTION	QTY	MODIFICATION DATE	REMARKS
* 29	484500-1740		CONTROLLER ASSY	1		SEE-P.76
30	484311-1710		PLATE	1		T0.8
31	91051-04100		SCREW, CROSSRECESS PAN	3		M4,L10,FOR EARTH
32	481902-0020		CLAMP	1		
33	484927-0151		HOLDER	2		
34	949006-6140		SCREW	1		
35	473459-0370		CLAMP	3		
36	484927-0160		HOLDER	1		
37	481902-0030		CLAMP	1		
38	484340-0920		STAY SUB-ASSY	1		
39	949350-3030		CLIP, CORD	1		D15.2
40	484901-3150		PACKING	1		
41	480841-0010		CLIP	4		L100
43	484311-0870		PLATE	1		
44	484311-1320		PLATE	1		
45	484927-0660		HOLDER	1		
46	484901-4700		PACKING	1		
47	481951-0020		CLIP	10		L185
48	484391-0560		COVER	1		
49	949321-3000		GROMMET	1		
50	484410-3961		PANEL ASSY	1		
51	949001-1570		SCREW, TAPPING	44		D4,L10
52	472818-0030		CLIP, CORD	2		
53	91370-04101		SCREW, W/WASHER	2		M4,L10
54	949007-3600		SCREW, W/WASHER	2		M4,L14
55	91060-04101		SCREW, CROSSRECESS COUNTERSUNK	2		
56	484410-3941		PANEL ASSY	1		
57	484410-4840		PANEL ASSY	1		
58	484410-2590		PANEL ASSY	1		W/FILTER
58-1	484401-0230		FILTER	1		HR-13 *1
59	484411-2510		PANEL	1		
* 60	484400-0060		FILTER ASSY	2		
60-1	484300-0260		FRAME ASSY	2		
60-2	484401-0230		FILTER	2		HR-13 *1
62	484731-0021		TANK	1		
63	484470-1781		PANEL SUB-ASSY	1		
64	949040-6150		BOLT, HEXAGON	1		M8,L18.5
65	484923-0060		KNOB	1		
66	484930-0910		WIRE ASSY	1		
67	146690-1920		CLAMP	2		
68	481902-0080		CLAMP	1		
100	484800-0440		PIPE ASSY	1		CHARGING

BLOWER ASSY (15SFE-1) 484200-0720



OM0045

ILLUSTRATION NUMBER	DENSO NUMBER	MANUFACTURER NUMBER	DESCRIPTION	QTY	MODIFICATION DATE	REMARKS
0	484200-0720		BLOWER ASSY	1		15SFE-1
1	484221-0112		FAN	1		
2	484330-0340		STAY ASSY	1		
3	484211-1010		MOTOR	1		
4	484930-0900		WIRE ASSY	1		
5	92150-06061		NUT, FLANGE	4		M6
6	480841-0010		CLIP	2		L100
7	949040-6150		BOLT, HEXAGON	1		M8,L18.5

CONTROLLER ASSY (15SFE-1) 484500-1740

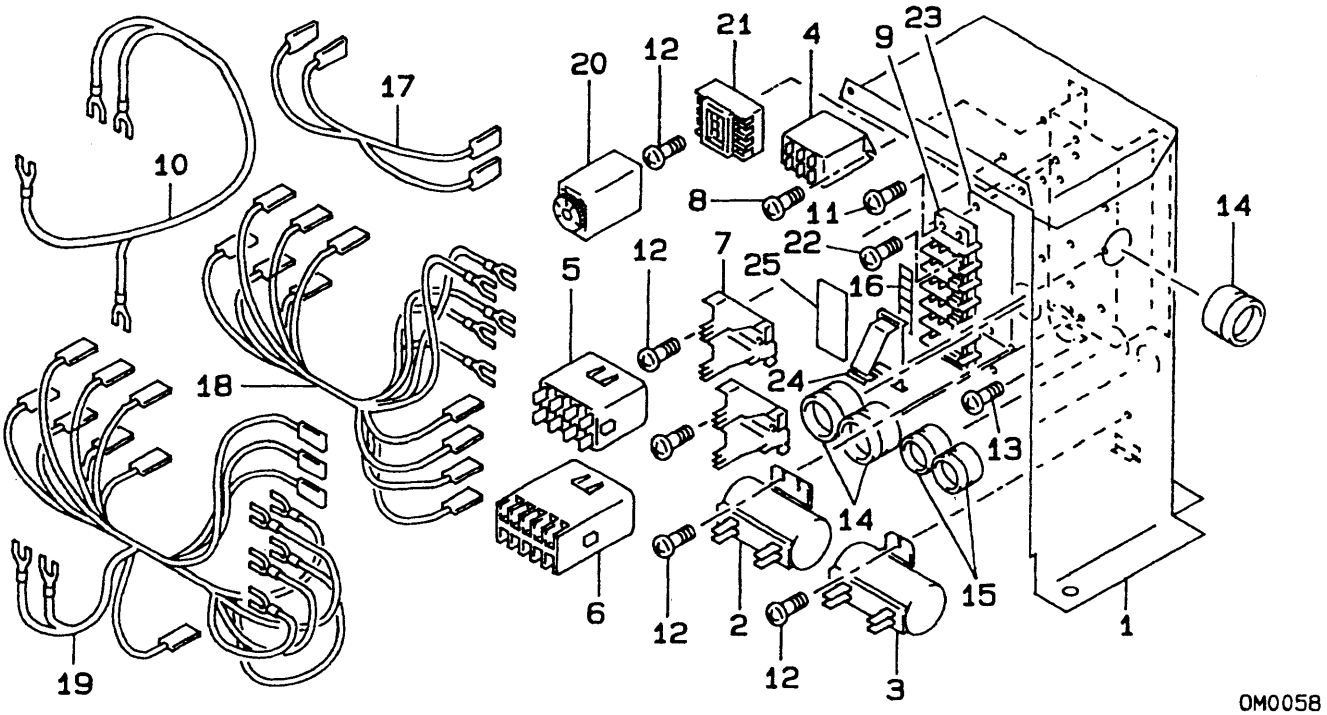
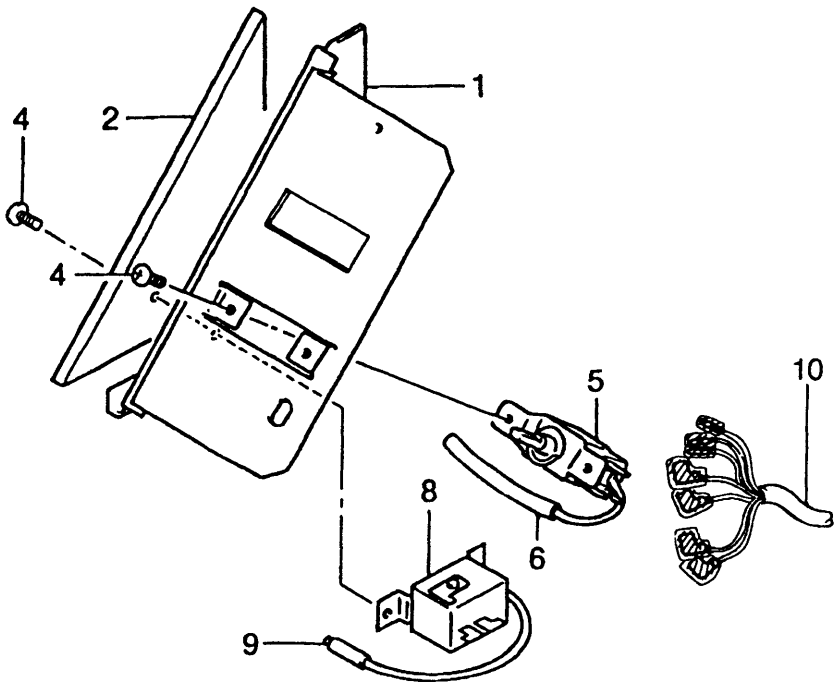


ILLUSTRATION NUMBER	DENSO NUMBER	MANUFACTURER NUMBER	DESCRIPTION	QTY	MODIFICATION DATE	REMARKS
* 0	484500-1740		CONTROLLER ASSY	1		15SFE-1
1	484520-0670		BOX SUB-ASSY	1		
2	484507-0460		CONDENSER	1		25μF
3	484507-0470		CONDENSER	1		10μF
4	484531-0170		RELAY	1		RRX
5	484531-0340		RELAY	1		MCC
6	484531-0160		RELAY	1		RX
7	185642-0090		HOLDER	2		
8	92100-03081		SCREW, FLANGE	1		
9	484503-0250		TERMINAL	1		
10	484930-2960		WIRE ASSY	1		
11	949006-3280		SCREW	2		
12	949006-3250		SCREW	9		
13	91051-04100		SCREW, CROSSRECESS PAN	1		
14	949321-3010		GROMMET	3		
15	949321-3000		GROMMET	2		
16	484003-0450		PLATE, ORNAMENT	1		
17	484930-2980		WIRE ASSY	1		

ILLUSTRATION NUMBER	DENSO NUMBER	MANUFACTURER NUMBER	DESCRIPTION	QTY	MODIFICATION DATE	REMARKS
18	484930-4300		WIRE ASSY	1		
19	484930-4310		WIRE ASSY	1		
20	484531-0251		RELAY	1		CTD
21	484503-0170		TERMINAL	1		
22	480919-0190		BOLT	2		
23	484311-1700		PLATE	1		
24	484927-0840		HOLDER	1		
25	484901-8170		PACKING	1		

SWITCH ASSY (15SFE-1) 484560-0741



OM0067

ILLUSTRATION NUMBER	DENSO NUMBER	MANUFACTURER NUMBER	DESCRIPTION	QTY	MODIFICATION DATE	REMARKS
0	484560-0741		SWITCH ASSY	1		15SFE-1
1	484390-0720		COVER SUB-ASSY	1		
2	484901-3990		PACKING	1		
4	91050-04061		SCREW, CROSSRECESS PAN	5		M4,L6
5	484504-0030		THERMOSTAT	1		
6	7151-253308		TUBE, VINYL	1		
8	484504-0020		THERMOSTAT	1		FOR ANTIFREEZING
9	484922-0080		CAP	1		
10	484930-4820		WIRE ASSY	1		

COMPRESSOR ASSY (15SFE-1) 484650-1200

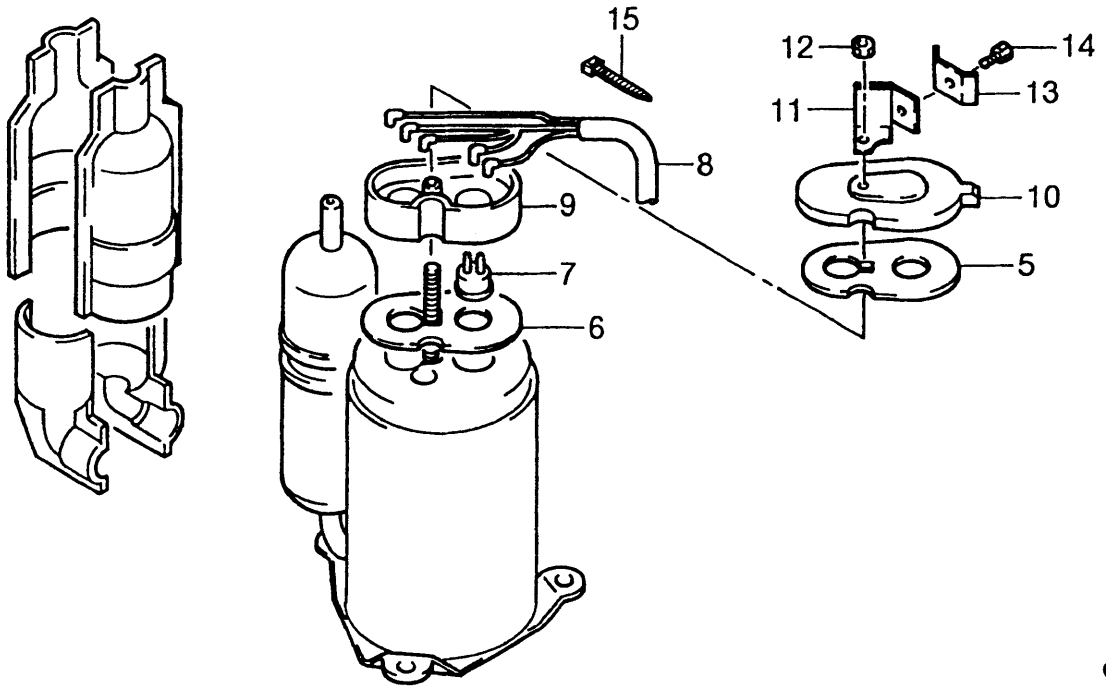
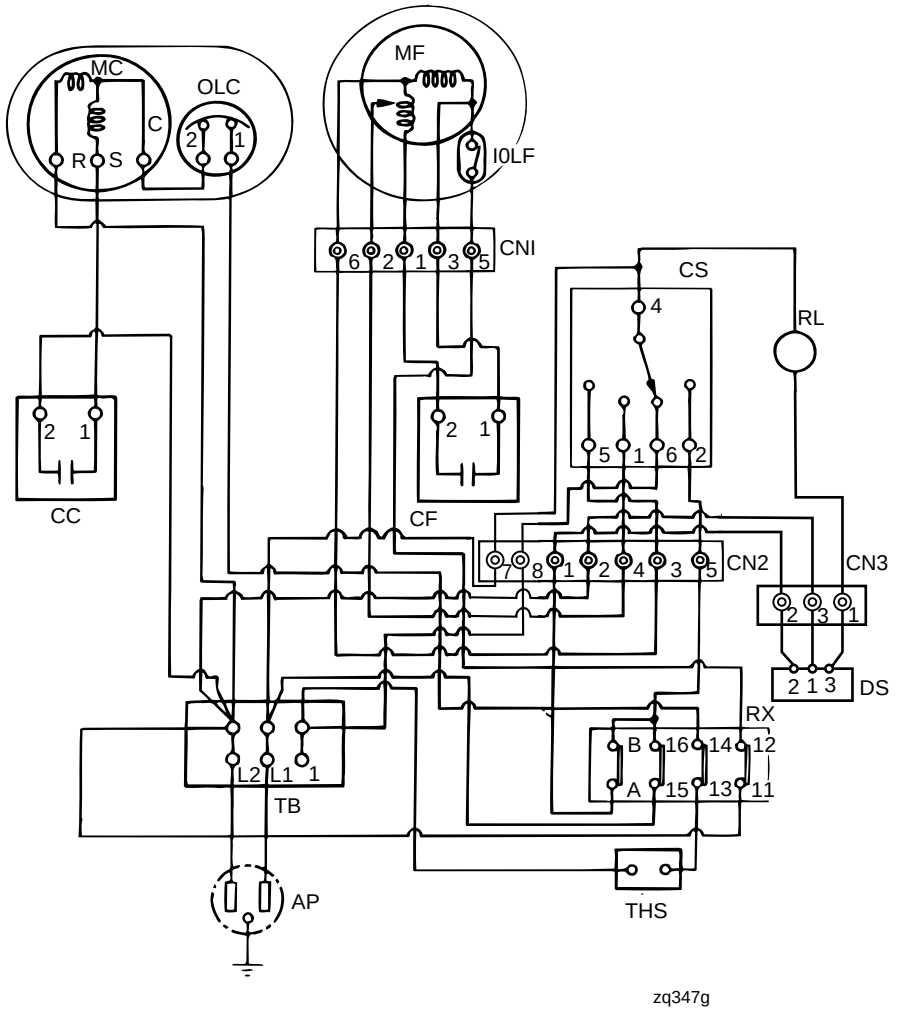


ILLUSTRATION NUMBER	DENSO NUMBER	MANUFACTURER NUMBER	DESCRIPTION	QTY	MODIFICATION DATE	REMARKS
0	484650-1200		COMPRESSOR ASSY	1		15SFE-1
5	484903-0090		PLATE, RUBBER	1		
6	484903-0020		PLATE, RUBBER	1		
7	484501-0110		RELAY, OVERLOAD	1		
8	484930-4260		WIRE ASSY	1		
9	484391-0820		COVER	1		
10	484922-0050		CAP	1		
11	484321-0340		BRACKET	1		
12	949056-1520		NUT	1		
13	484321-0180		BRACKET	2		
14	90910-04301		SCREW, BINDING TAPPING	2		M4,L30
15	480841-0010		CLIP	1		

9. WIRING DIAGRAM

9-1 10SFE MODEL

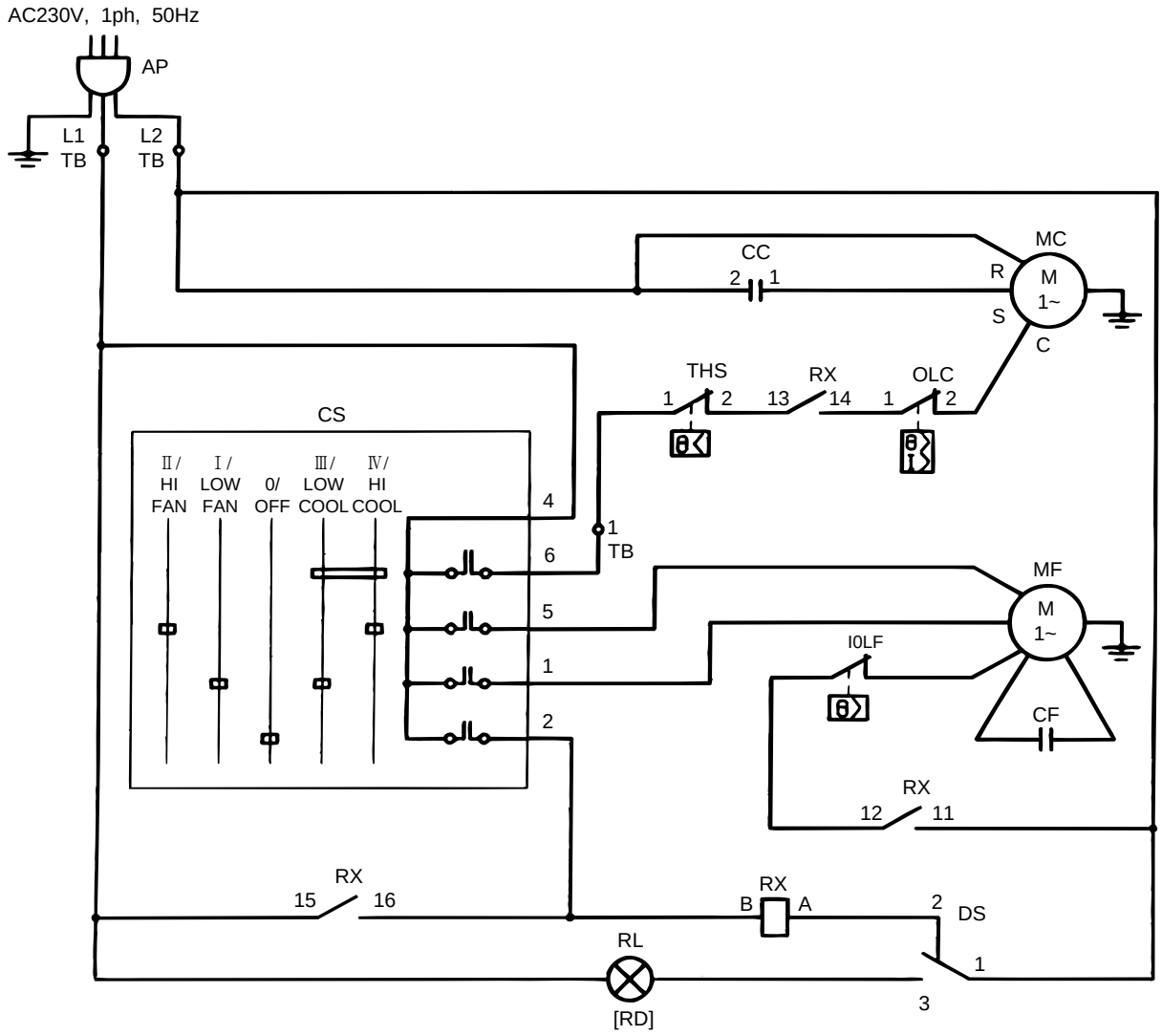
MODEL:10SFE



SYMBOL	PART
AP	Attachment Plug
TB	Terminal Block
CS	Control Switch
MF	Fan Motor
MC	Compressor Motor
CF	Capacitor for Fan
CC	Capacitor for Compressor
OLC	Overload Relay for Compressor
IOLF	Internal Overload Relay of Fan Motor
RX	Auxiliary Relay
DS	Drain Warning Switch
THS	Anti-freezing Thermostat
RL	Drain Warning Lamp

Fig.67 Wiring Diagram for MODEL 10SFE

MODEL:10SFE

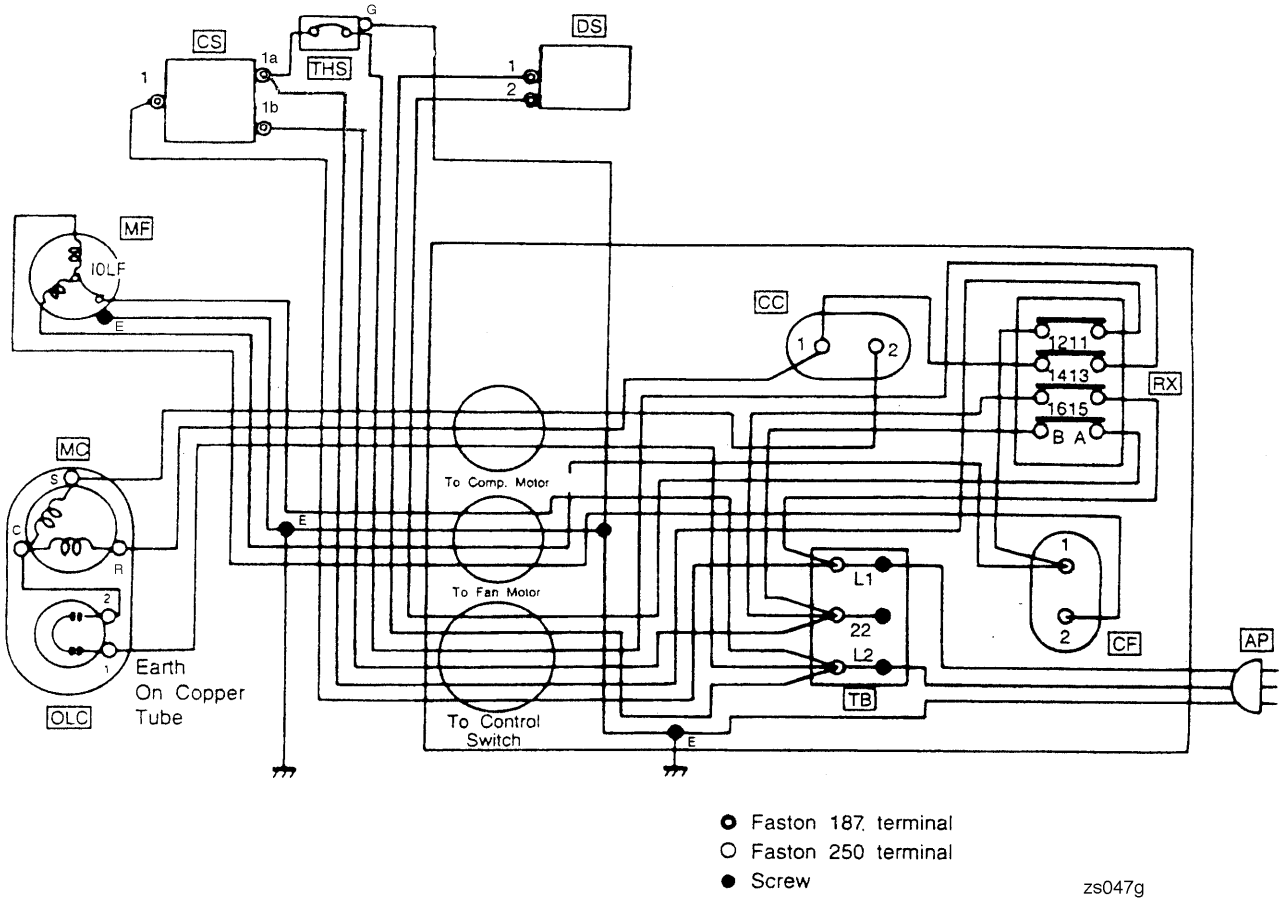


SYMBOL	PART
AP	Attachment Plug
TB	Terminal Block
CS	Control Switch
MF	Fan Motor
MC	Compressor Motor
CF	Capacitor for Fan
CC	Capacitor for Compressor
OLC	Overload Relay for Compressor
IOLF	Internal Overload Relay of Fan Motor
RX	Auxiliary Relay
DS	Drain Warning Switch
THS	Anti-freezing Thermostat
RL	Drain Warning Lamp

Fig.68 Wiring Diagram for MODEL 10SFE

9-2 15SFE MODEL

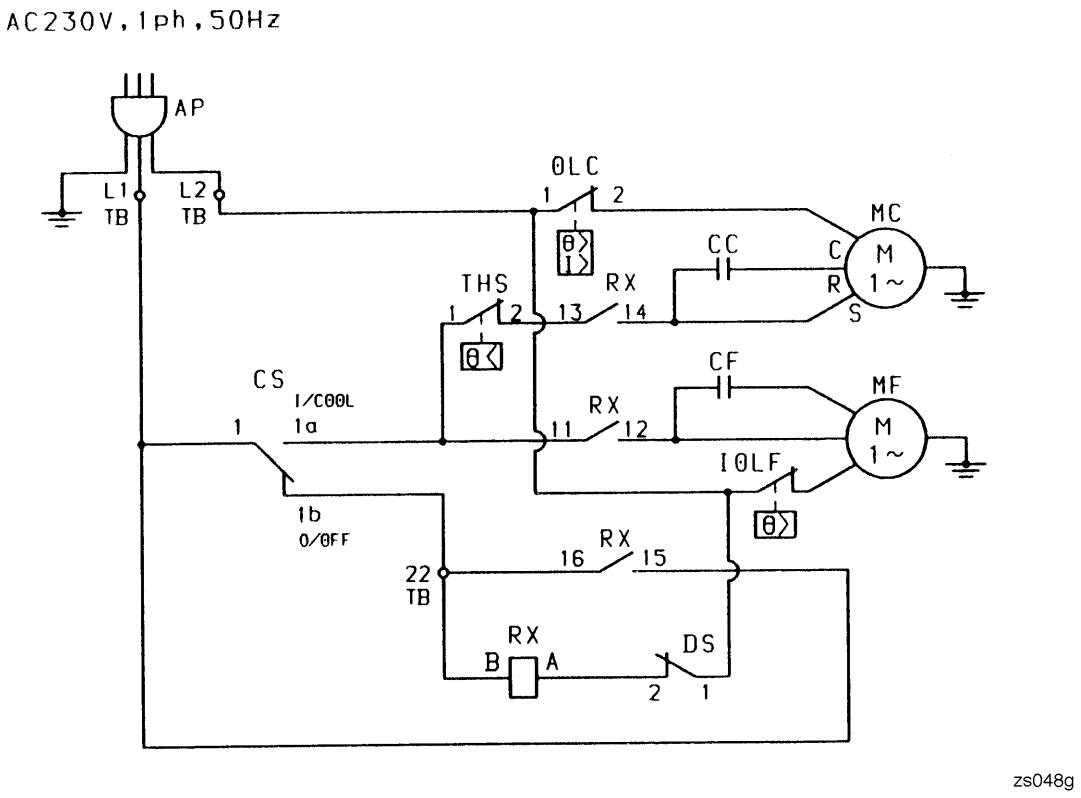
MODEL:15SFE



SYMBOL	PART
AP	Attachment Plug
TB	Terminal Block
CS	Control Switch
MF	Fan Motor
MC	Compressor Motor
CF	Capacitor for Fan
CC	Capacitor for Compressor
OLC	Overload Relay for Compressor
IOLF	Internal Overload Relay of Fan Motor
RX	Auxiliary Relay
DS	Drain Warning Switch
THS	Anty-freezing Thermostat

Fig.69 Wiring Diagram for MODEL 15SFE

MODEL:15SFE

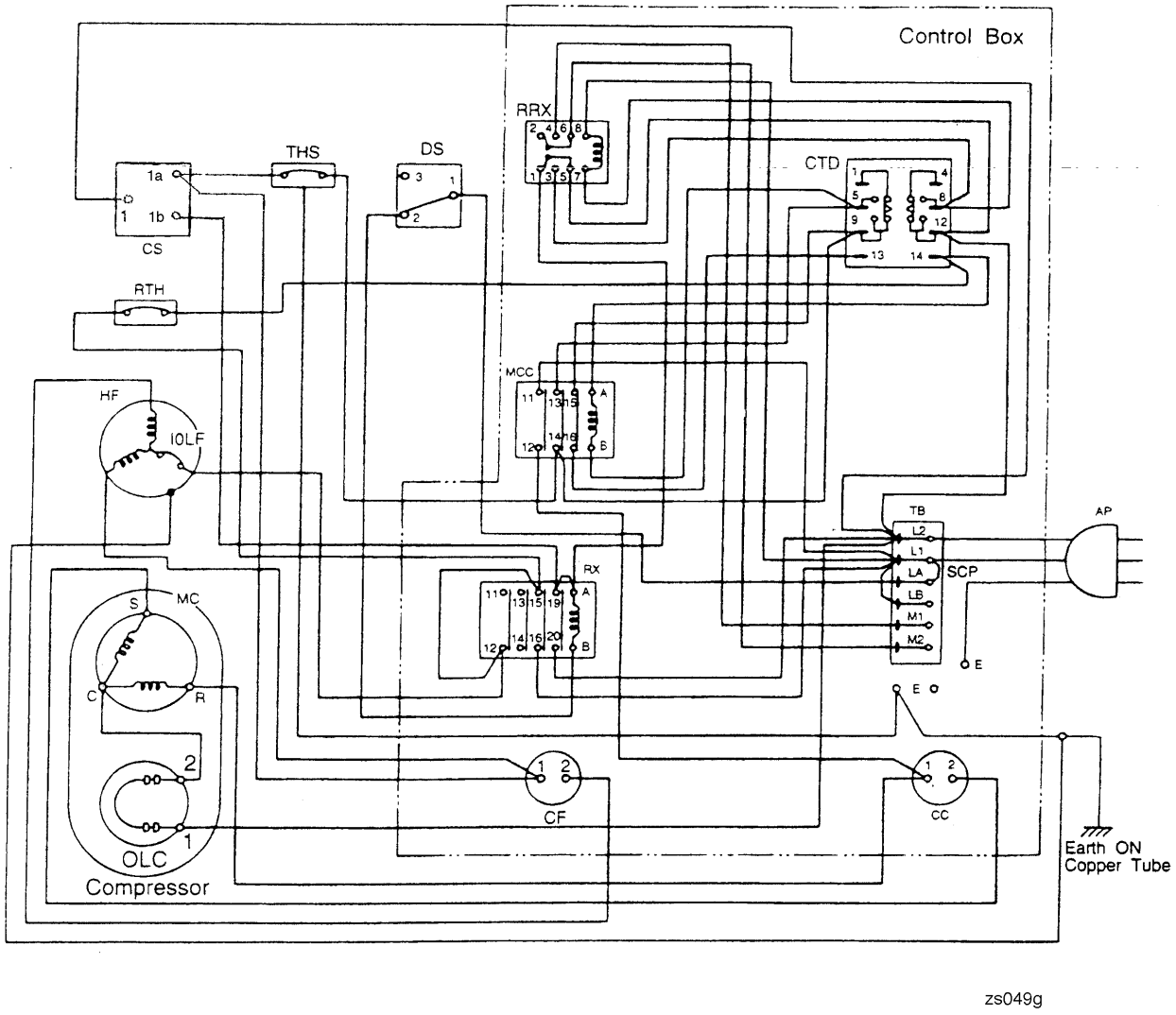


SYMBOL	PART
AP	Attachment Plug
TB	Terminal Block
CS	Control Switch
MF	Fan Motor
MC	Compressor Motor
CF	Capacitor for Fan
CC	Capacitor for Compressor
OLC	Overload Relay for Compressor
IOLF	Internal Overload Relay of Fan Motor
RX	Auxiliary Relay
DS	Drain Warning Switch
THS	Anty-freezing Thermostat

Fig.70 Wiring Diagram for MODEL 15SFE

9-3 15SFE-1 MODEL

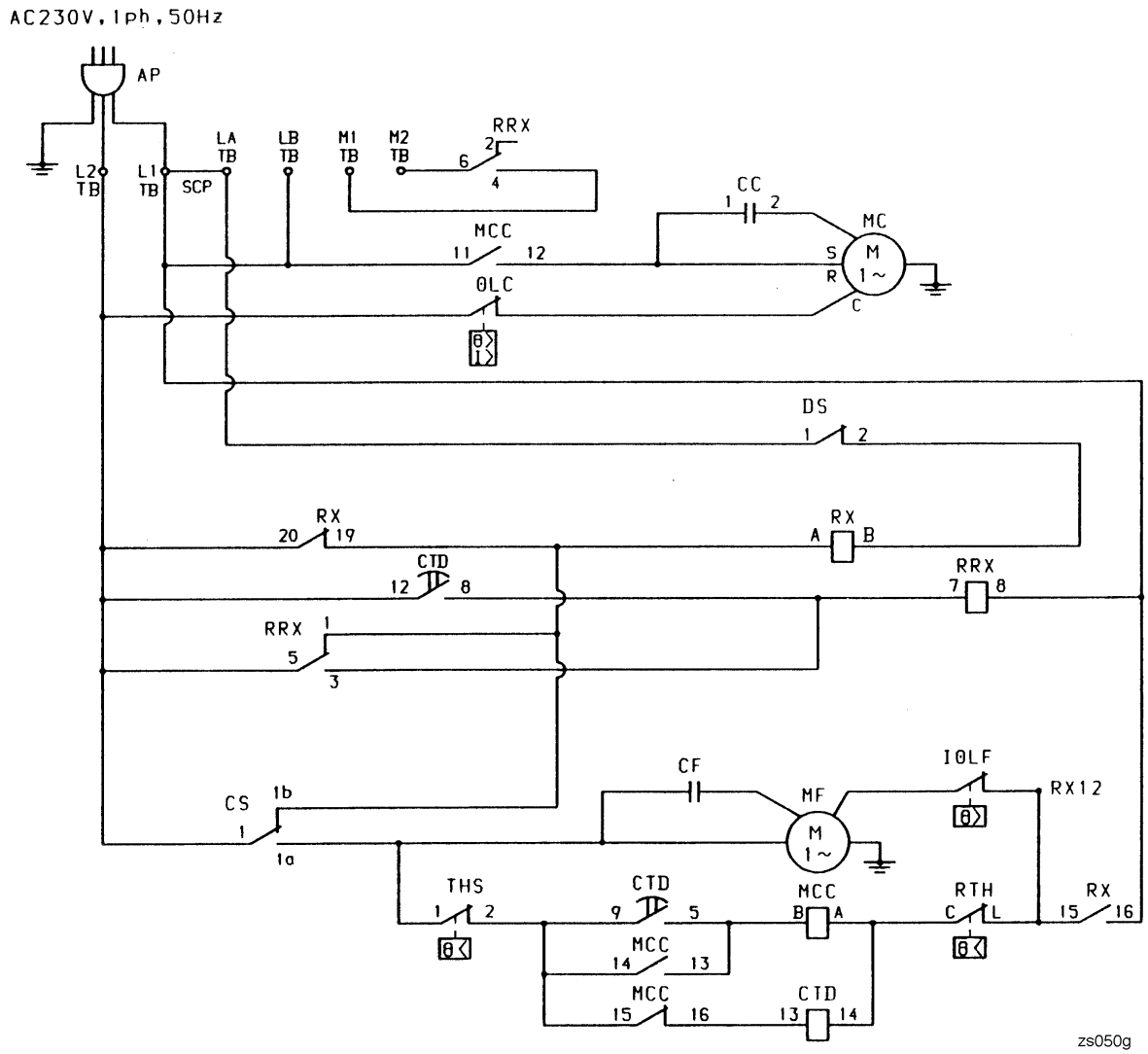
MODEL : 15SFE-1



SYMBOL	PART
AP	Attachment Plug
TB	Terminal Block
CS	Control Switch
MF	Fan Motor
MC	Compressor Motor
CF	Capacitor for Fan
CC	Capacitor for Compressor
OLC	Overload Relay for Compressor
IOLF	Internal Overload Relay of Fan Motor
MCC	Compressor Motor Relay
RX	Auxiliary Relay
RRX	Restart Auxiliary Relay for Compressor
CTD	Time Delay Relay
DS	Drain Warning Switch
THS	Anti-freezing Thermostat
RTH	Room Thermostat
SCP	Short-circuit Plate

Fig.71 Wiring Diagram for MODEL 15SFE-1

MODEL : 15SFE -1



SYMBOL	PART
AP	Attachment Plug
TB	Terminal Block
CS	Control Switch
MF	Fan Motor
MC	Compressor Motor
CF	Capacitor for Fan
CC	Capacitor for Compressor
OLC	Overload Relay for Compressor
IOLF	Internal Overload Relay of Fan Motor
MCC	Compressor Motor Relay
RX	Auxiliary Relay
RRX	Restart Auxiliary Relay for Compressor
CTD	Time Delay Relay
DS	Drain Warning Switch
THS	Anti-freezing Thermostat
RTH	Room Thermostat
SCP	Short-circuit Plate

Fig.72 Wiring Diagram for MODEL 15SFE-1

[MEMO]

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