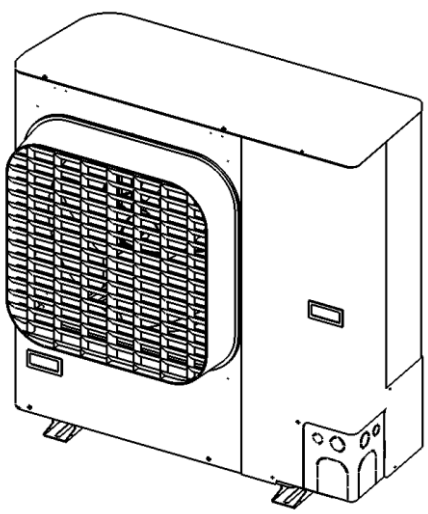
Panasonic

Outdoor Type Refrigeration Unit (Non-fluorocarbon Refrigeration Unit with CO_2 Refrigerant) Engineering Service Manual

Model No. OCU-CR200VF5 / OCU-CR200VF5SL



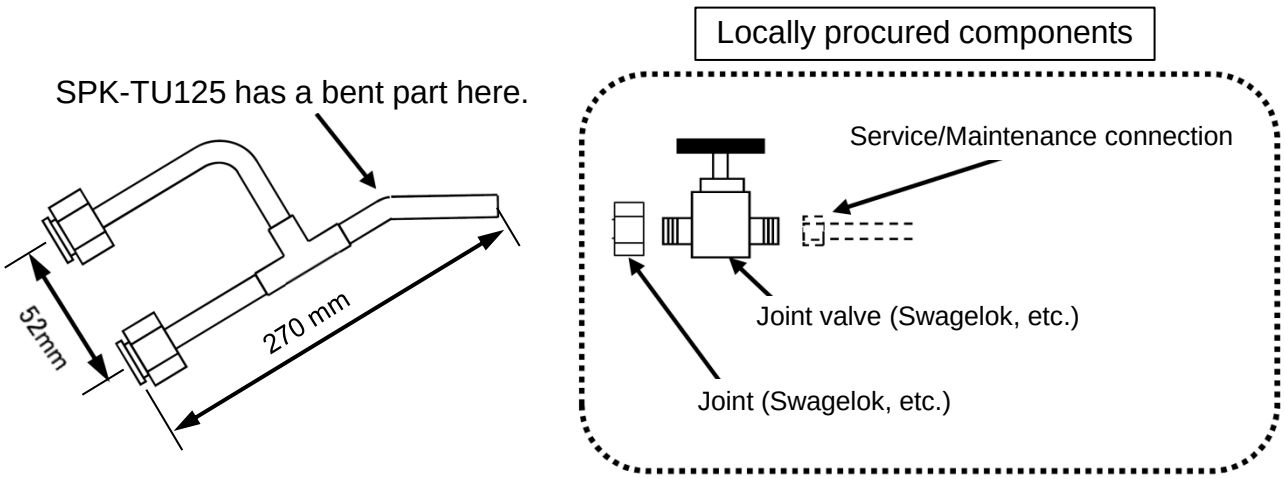
1.02

Table of Contents

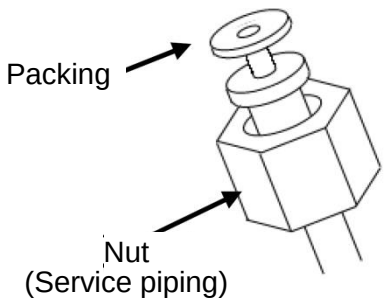
Service Piping (Separately sold components)

Service piping components are required when connecting the refrigeration unit and vacuum pump, gas cylinder, etc. during installation.
Use these components to connect to locally procured components.

Service piping (SPK-TU125)



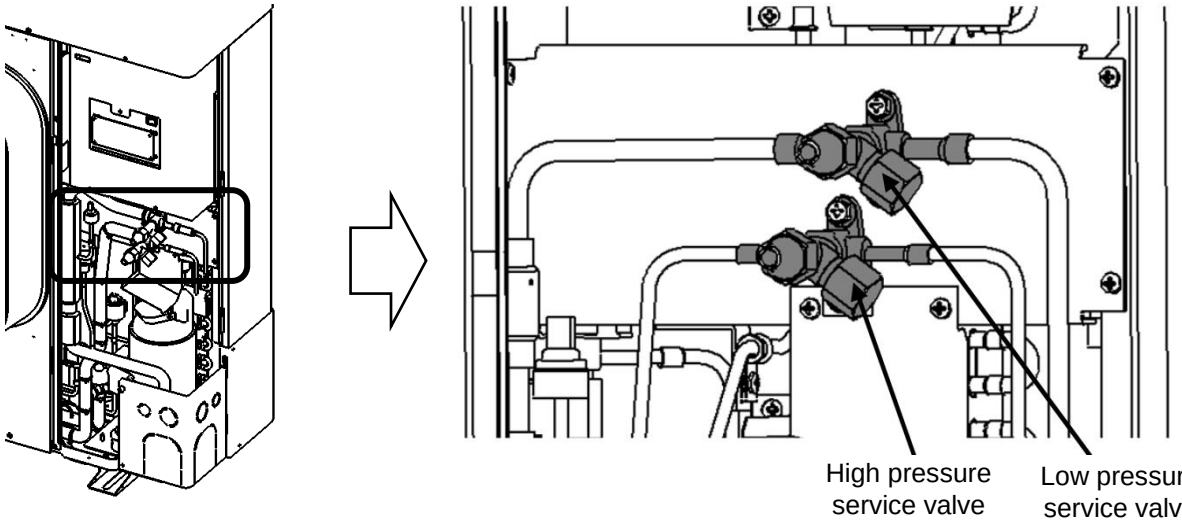
Service piping (Packing attachment)



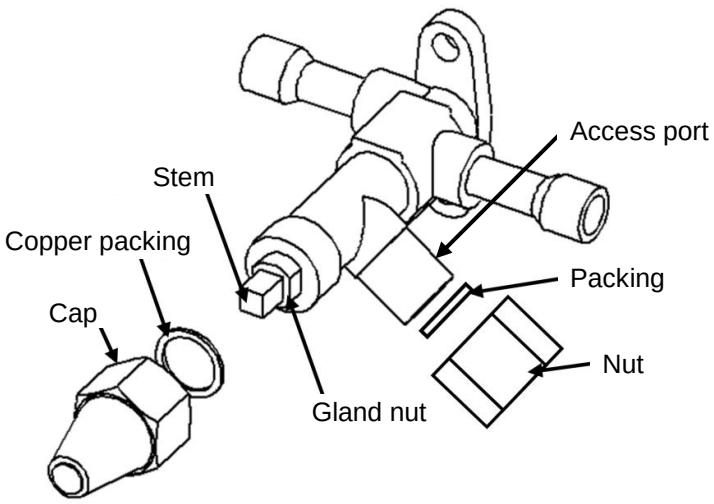
Note: 1. Install the packing by avoiding the adherence of dust.
2. Fasten the nut with fastening torque of 13 ± 1 N·m.

Service Valve Operation Method

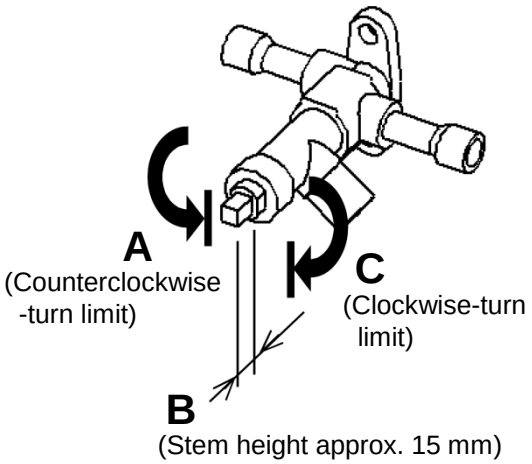
1. Location of Service Valves



2. Method of Operating Service Valves



Operation of each seat position

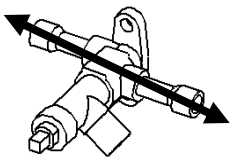
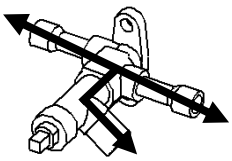
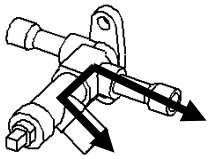


Note: 1. Copper packing, Cap and Nut must be installed after the work. (Gas leak prevention)

2. Check Gland nut loosening of the service valves, and fasten them if any looseness exists.

3. Fastening torques are as follows.
Cap: 30 ± 5 N･m, **Nut:** 13 ± 1 N･m, **Gland Nut:** 10 ± 1 N･m

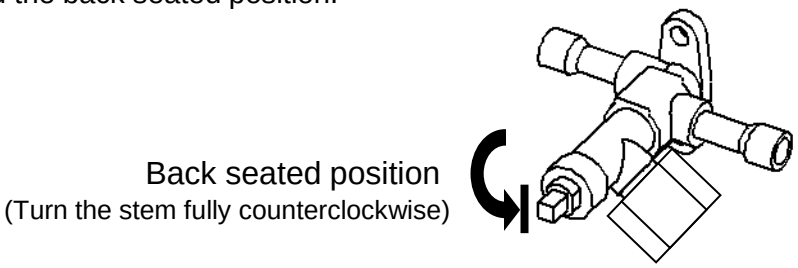
Explanation of each Seat Position

A: Back seated position (Turn the stem fully counter-clockwise)	**B**: Mid-position (Stem height approx. 15mm)	**C**: Front seated position (Turn the stem fully clockwise)
	• High pressure side Approx. 3 and a half turns • Low pressure side Approx. 3 turns 	

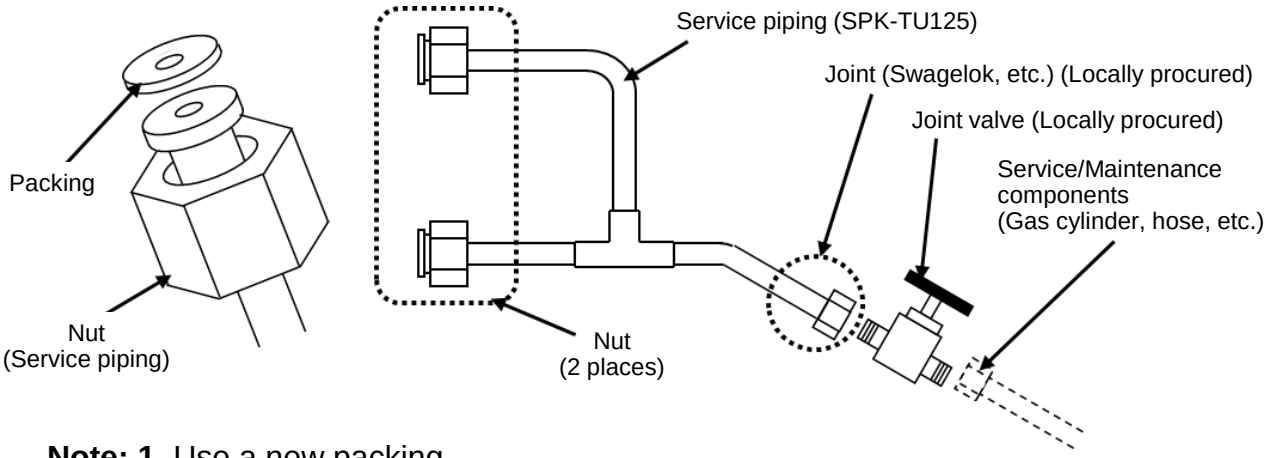
Service Pipe Connection/Disconnection Method

1. Preparation before attachment of the service piping

1) Turn the stem of the high pressure and low pressure service valves (2 places) to open it toward the back seated position.



2) Attach a packing to the service piping (2 places)



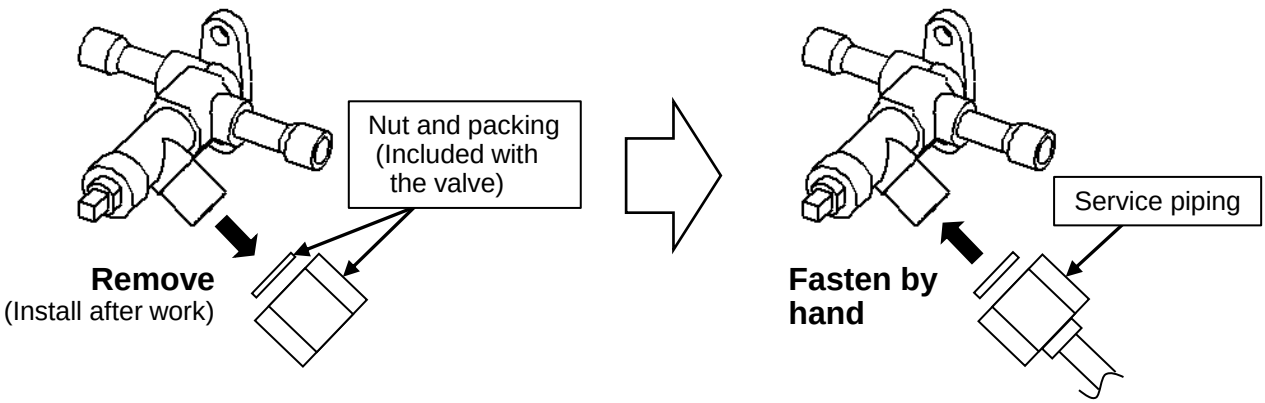
Note: 1. Use a new packing.

2. Check that there is no adhering foreign objects.

2. Service piping attachment

1) Remove the nut and packing included with the service valve (2 places).

2) Assemble the service piping.
First, turn the nut by hand until the packing needs to be fastened with a tool.
If it is difficult to fasten, loosen it slightly and try to make the nut parallel with the male thread of the service valve, and then fasten it gradually.



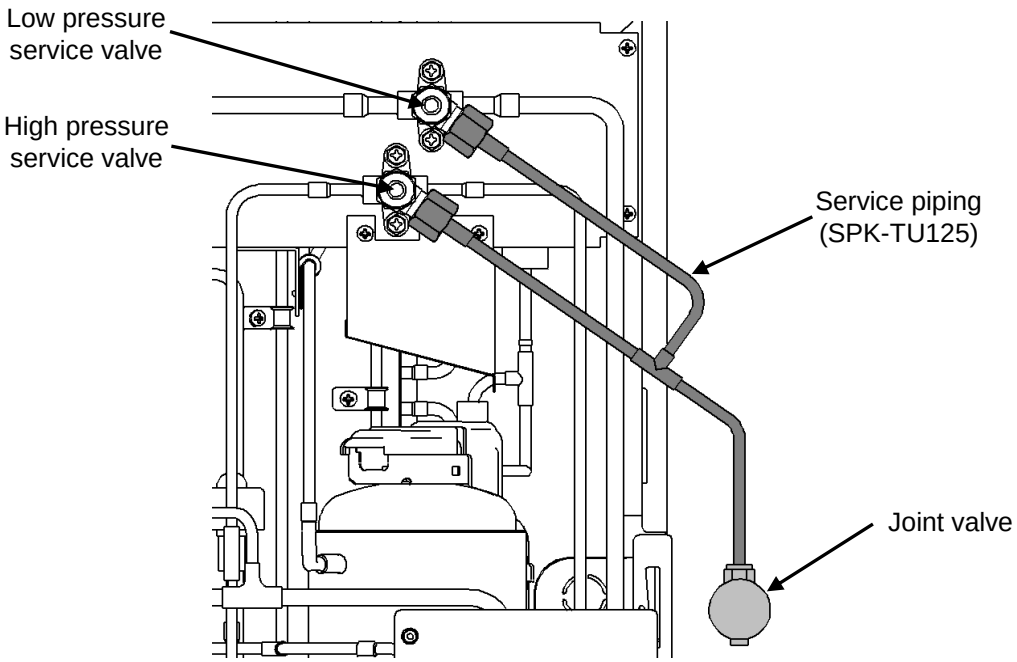
Note: Fastening the nut with a tool while the threads are not fully aligned would break the thread and lead to a gas leak.

Service Pipe Connection/Disconnection Method

3. Fastening the service piping

Fasten the nuts by hand up to the condition shown below, and then fasten them with a tool. Fastening torque of 13 ± 1N・m is recommended for the nuts.

Note: Fastening it too tight may deform the packing.



4. After completing service operation

1) After completing service operations such as the evacuation and refrigerant charging, turn the stem of the service valve to open it toward the back seated position.

(Check that the access ports of the high pressure and low pressure service valves have been closed.)

2) Any remaining nitrogen or refrigerant in the service piping should be purged.

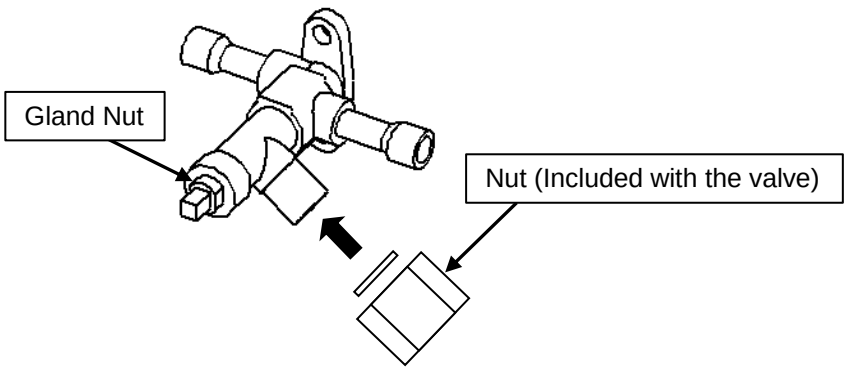
3) Detach the service piping.
After detaching the service piping, Install the nut originally used on the service valve by hand.

(Refer to "2. Service piping attachment".)

4) Fasten the nut by using a tool. Fastening torque of 13 ± 1N・m is recommended.

(Refer to "3. Fastening the service piping".)

5) Check Gland nut loosening of the low pressure and high pressure service valves and fasten them if any looseness exists. Fastening torque is 10 ± 2 N・m.



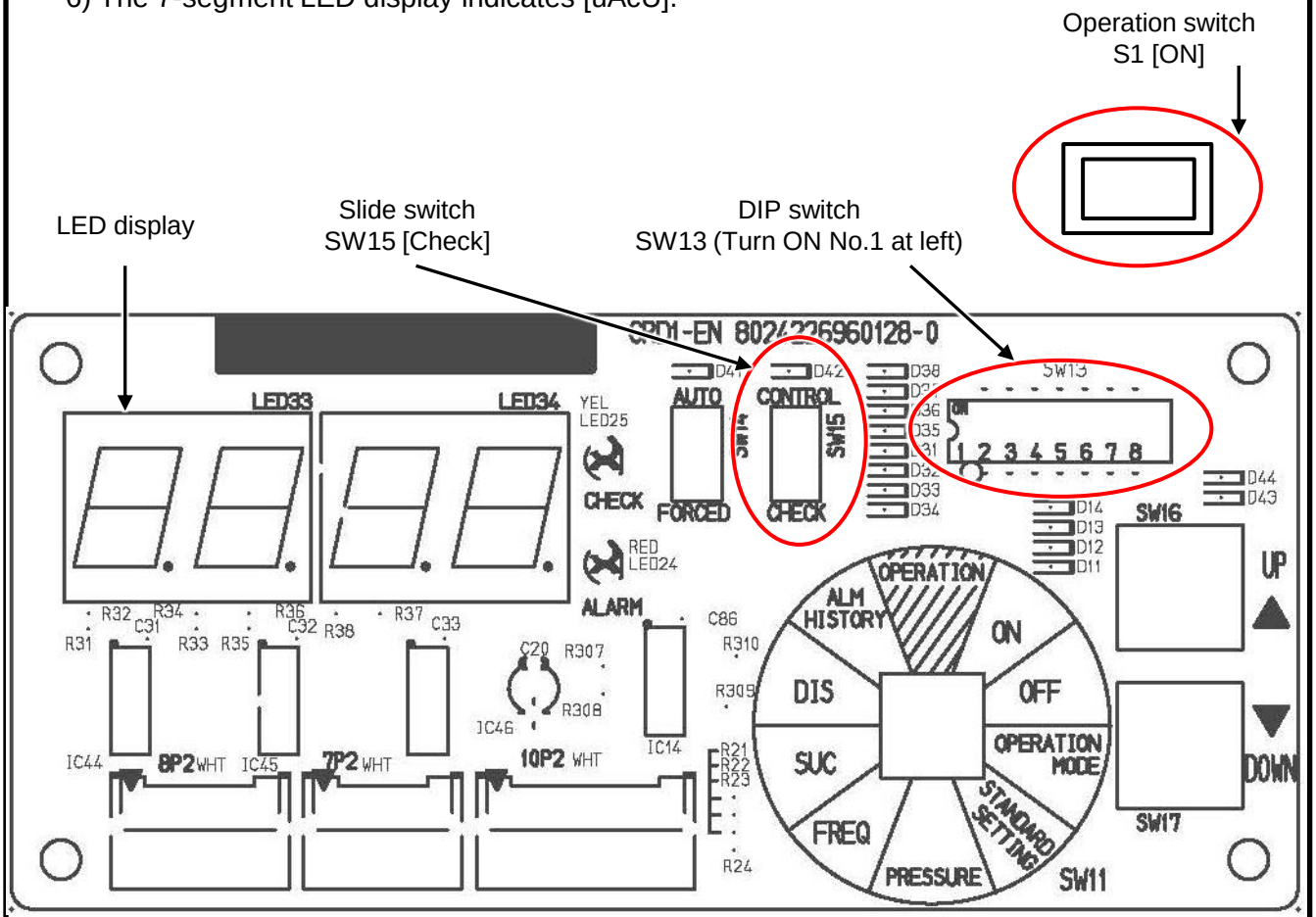
Evacuation Mode

1. Evacuation mode

In the evacuation mode, fully open the electronic expansion valve and solenoid valve in the refrigeration unit.
If the refrigeration unit is not set to the evacuation mode, the electronic expansion valve and solenoid valve in the refrigeration unit do not open, thus leading to incomplete the evacuation.

2. Evacuation mode procedure

1) Turn OFF the power circuit breaker. (The evacuation mode cannot be started with power supplied to the refrigeration unit.)
2) On the control PCB, turn switch No.1 of the 8P DIP switch ON (SW13).
3) Turn ON the operation switch (Seesaw switch S1).
4) Turn slide switch SW15 on the control PCB to [Check] .
5) Turn ON the power circuit breaker. (Supply power to the refrigeration unit.)
6) The 7-segment LED display indicates [uAcU].



Refrigerant Releasing Procedure

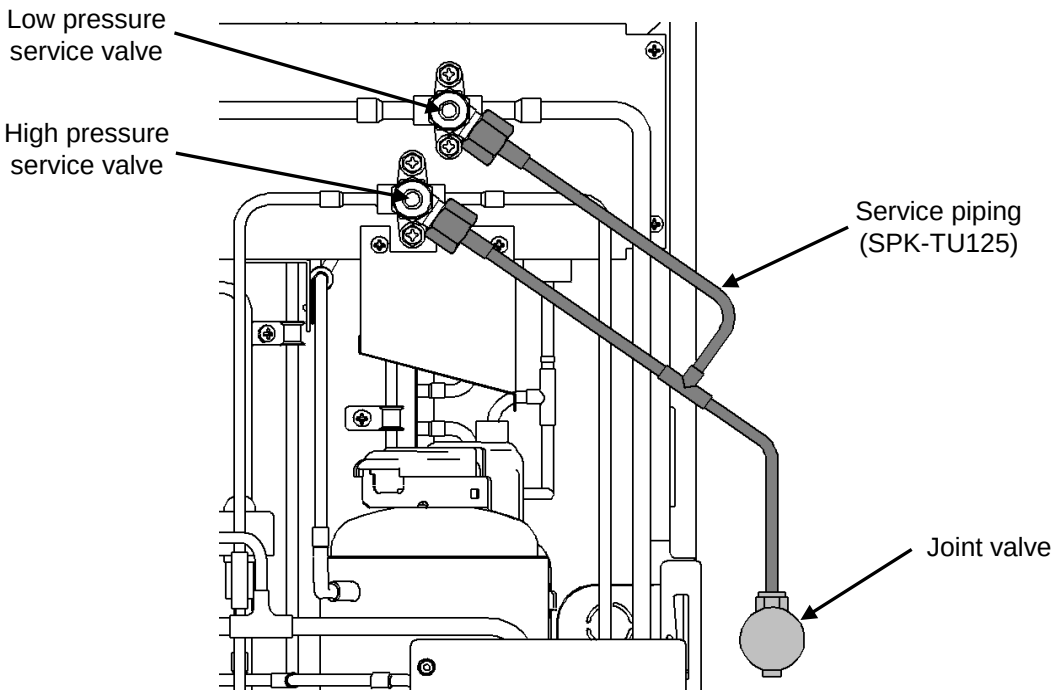
1. Service piping attachment

1) Check that the access ports of the high pressure and low pressure service valves have been closed. (The back seated position)

2) Attach the service piping with the joint valve in "Closed" condition.

3) Fasten the nuts by hand up to the condition shown below, and then fasten them with a tool. Fastening torque of 13 ± 1N･m is recommended for the nuts.

Note: Fastening it too tight may deform the packing.



2. Refrigerant releasing

1) Set the evacuation mode.

2) Set the low pressure and high pressure service valves to the Mid-position. (The access ports are open.)

3) Slowly open the joint valve to release refrigerant.

Caution **The rapid release of refrigerant could cause refrigerant oil to be released together with refrigerant.**

Airtight Test Procedure

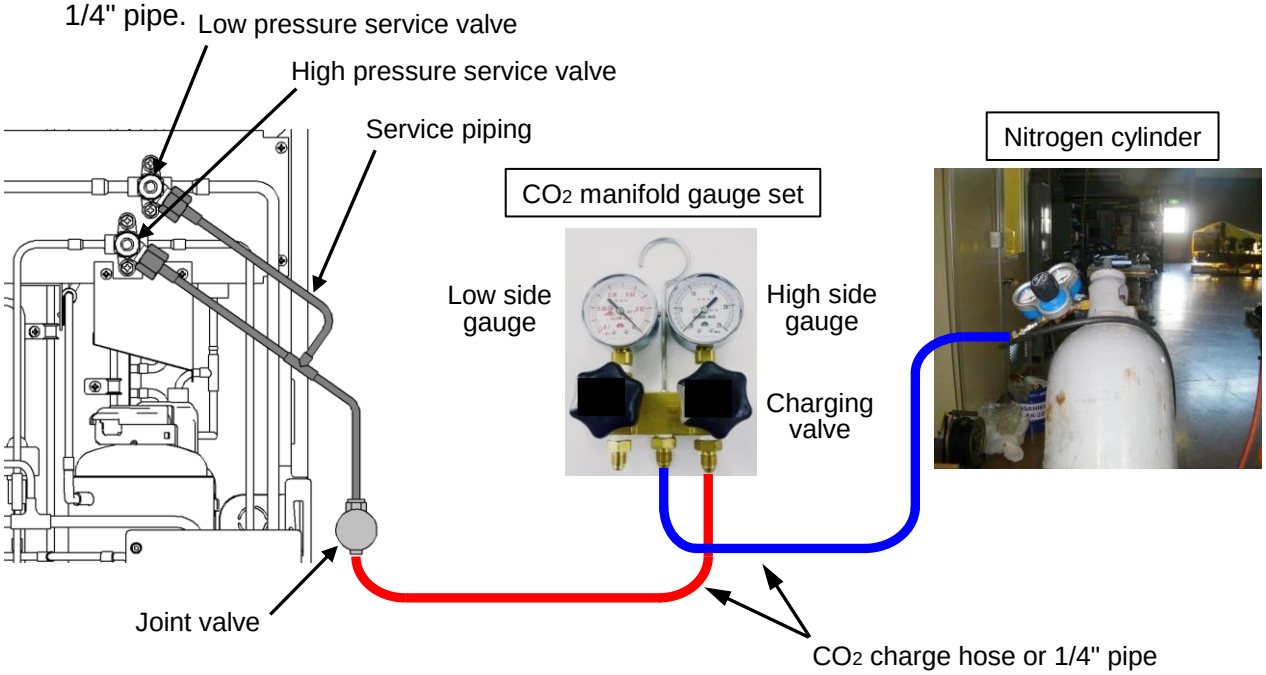
(Execute this test after competing piping work and airtight test but before starting heat insulation work)

Caution **Make sure to close the vacuum valve of CO_2 manifold gauge set. Consider special local regulations and consider Installation of all equipment have to be in accordance to pressure directive 2014/68/EU and European norm EN378.**

1. Piping connection

1) Connect the joint valve of the service piping (SPK-TU125) and the manifold gauge set exclusively for CO_2 refrigerant by using a CO_2 charge hose or 1/4" pipe.

2) Connect a nitrogen cylinder and the manifold gauge set by using a CO_2 charge hose or 1/4" pipe.



2. Airtight test

1) Set the evacuation mode in accordance with " Evacuation Mode".

2) When carrying out an airtight test of interconnecting piping and load-side equipment (such as showcase and unit cooler), set up the service valves with the front seat.

After replacing components of the refrigeration unit and when performing an airtight test of the refrigeration unit, use the Mid-position. (The access ports are open.)

However, at this time, avoid applying the high-pressure side airtight test pressure to the low-pressure side.

Note: Airtight test of the refrigeration unit was completed at the time of factory shipment. Pressure testing should only be carried out by personal / companies who have necessary certification. Consider carefully local regulations and EN378.

Design pressure in Factory

High pressure part	Low and intermediate pressure parts
12MPa	8MPa

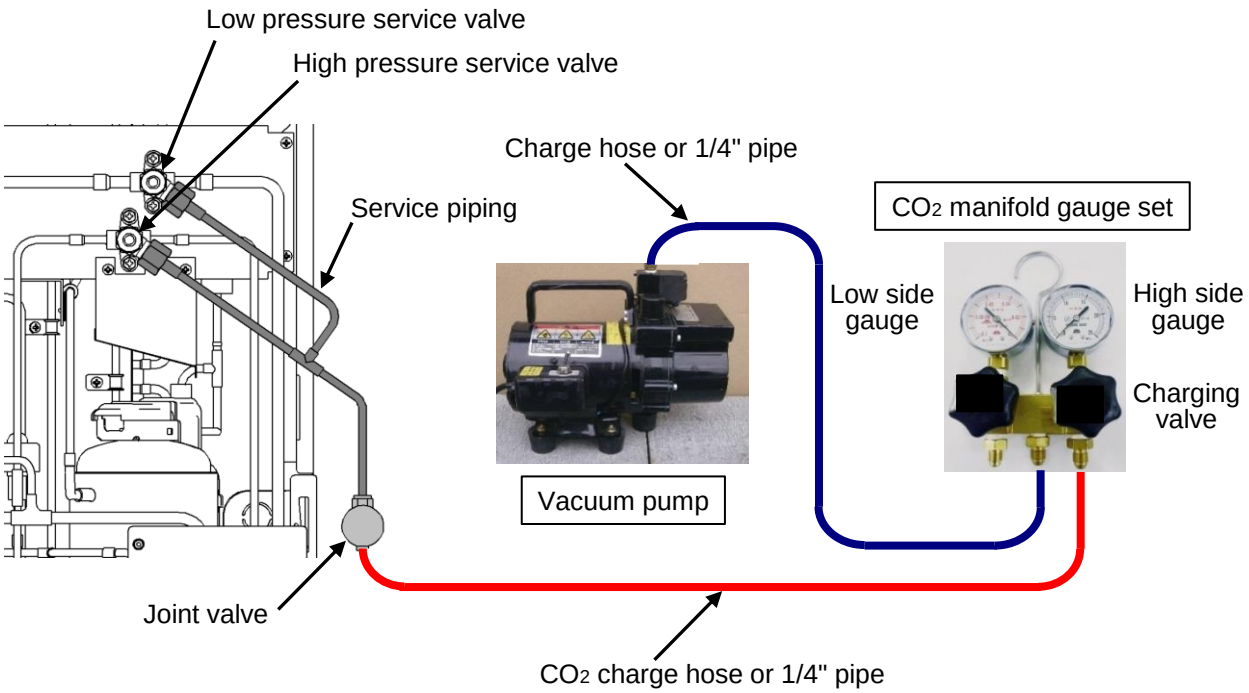
Vacuum Pump Attachment and Evacuation Procedure

Caution **Evacuation should be performed after completing the airtight test. Please follow local regulations and EN378.**

1. Piping connection

1) Connect the joint valve of the service piping (SPK-TU125) and the manifold gauge set exclusively for CO_2 refrigerant by using a CO_2 charge hose or 1/4" pipe.

2) Connect a vacuum pump and the manifold gauge set by using a charge hose or 1/4" pipe. The low side gauge for this operation should be able to indicate the vacuum level to be reached (-0.1 MPa).



2. Evacuation

1) Set the evacuation mode in accordance with “Evacuation Mode".

2) Set the low pressure and high pressure service valves to the Mid-position, the access ports are open, and operate the vacuum pump.

3) Continue the evacuation until the vacuum gauge indication reaches -0.1MPa and continue evacuation for an additional 1 to 3 hours.

Caution **When the intended vacuum level (-0.1MPa) cannot be reached after 2 hours, check the set up for any leaks.**

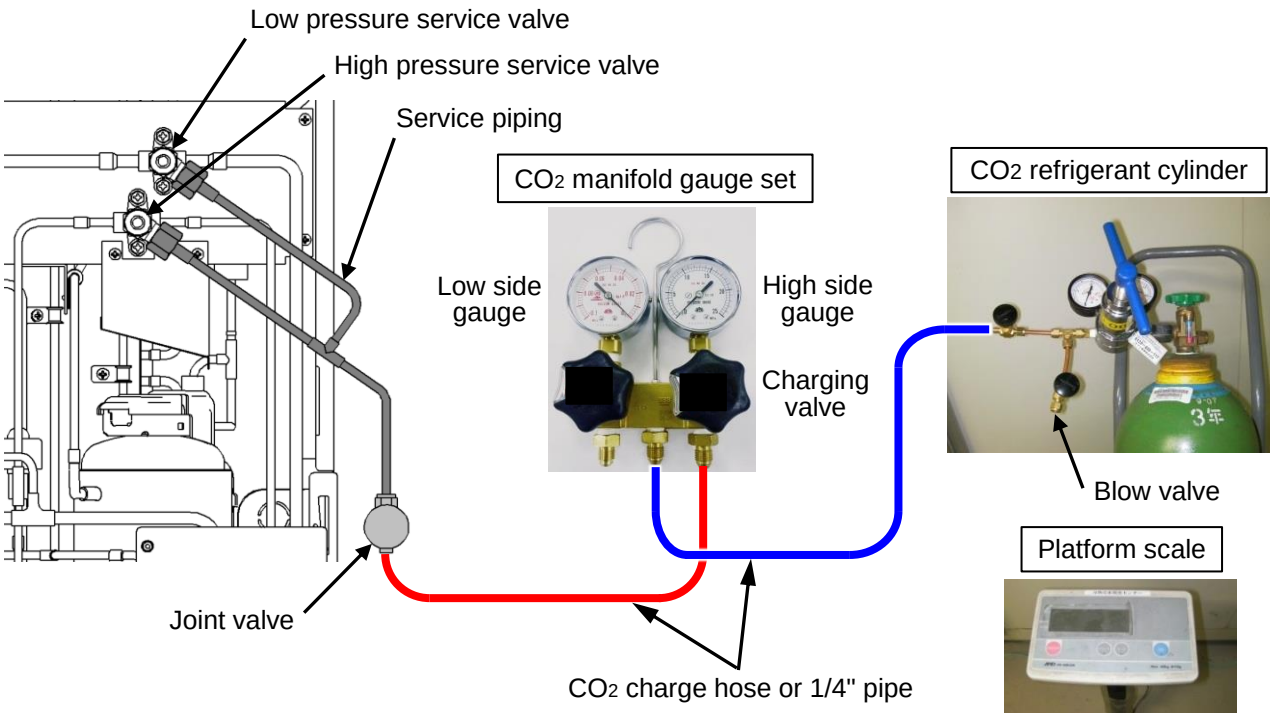
Refrigerant Charging Procedure

Caution **Make sure to close the vacuum valve of CO_2 manifold gauge set.**

1. Piping connection

1) Connect the joint valve of the service piping (SPK-TU125) and the manifold gauge set exclusively for CO_2 refrigerant by using a CO_2 charge hose or 1/4" pipe.

2) Place a CO_2 refrigerant cylinder on a platform scale, and connect the manifold gauge set by using a CO_2 charge hose or 1/4" pipe.



3) Set the high pressure service valve to the Mid-position (the access port is open), and the low pressure service valve to the back seated position.

Note: Do not charge the refrigeration unit with liquid refrigerant from the low pressure side under any circumstances.

4) Tare the platform scale.

2. Refrigerant Charging

1) Open the joint valve and gradually charge the refrigeration unit with refrigerant.
In order to avoid overcharging, maintain the charging rate at approx. 20 g in 5 sec.
When it is difficult to adjust the charging speed by using the joint valve or the charging valve of manifold gauge set, install a capillary tube between the CO_2 refrigerant cylinder and manifold gauge set.

Note: Do not install a capillary tube between the service piping and manifold gauge set.

2) When the liquid refrigerant no longer goes into the refrigeration unit, close the access port of the high pressure service valve and make the refrigeration unit in cooling operation condition to adjust refrigerant quantity using the access port of the low pressure service valve.

3) After completing refrigerant charge, close the refrigerant cylinder valve and check that the access ports of the low pressure and high pressure service valves have been closed.

4) Gradually open the vacuum valve or purge port of the manifold gauge set, and release the refrigerant remaining in the service piping, manifold gauge set, and charge hose (or 1/4" pipe). Refer to “Service Pipe Connection/Disconnection Method”.

Gas Leak Repair Procedure

1. Gas leak position identification

   1) When using a liquid leak detector
      Identify the position where oil is leaking.
      Find gas leaks by applying the liquid leak detector and checking for foaming.

   2) When using a leak detector
      Identify the position where oil is leaking.
      Detect gas leaks by bringing the leak detector probe near the identified position.

      Note: Use caution not to blow air during the detection process. (Detector reacts to blown air.)

2. Releasing refrigerant

   Release refrigerant in accordance with “Refrigerant Releasing Procedure".

3. Brazing repair operation

   1) Prepare for brazing operation.

      You will need the following tools during brazing operation:

      - Brazing burner
      - Phosphor copper solder
      - Shield plate, heat insulation plate, wet waste cloth
      - Blow and replacement nitrogen

   2) Carry out brazing operation.

      During brazing, make sure that there is no refrigeration oil residue on the surface.

      Since the copper pipes used with the CO_2 refrigeration unit have a thicker wall than the HFC refrigeration unit, make sure that the melted solder material is fully wetting the target position.

4. Airtight test

   Carry out the airtight test in accordance with "Airtight Test Procedure ".

5. Evacuation

   Carry out the evacuation in accordance with "Vacuum Pump Attachment and Evacuation Procedure".

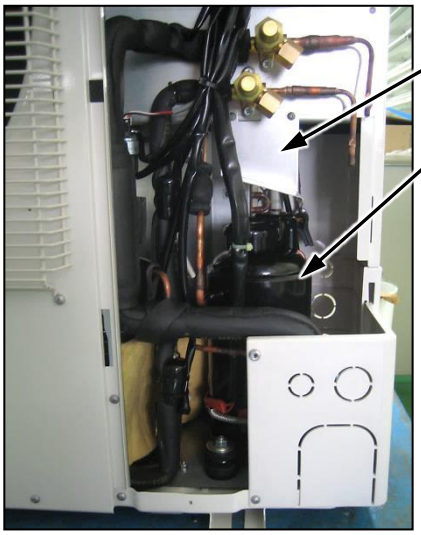
6. Refrigerant Charging

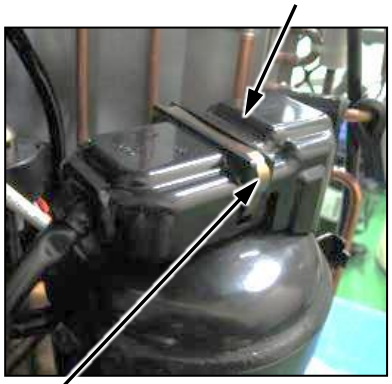
   Charge the refrigeration unit with refrigerant in accordance with "Refrigerant Charging Procedure".

Compressor Replacement Procedure

1. Turn OFF the power supply to the refrigeration unit.

2. Remove the mounting plate above the compressor and remove the terminal cover securing bracket (Clip), and then remove the compressor terminal cover.





Remove all lead wires of R, S, and T phase from the compressor.

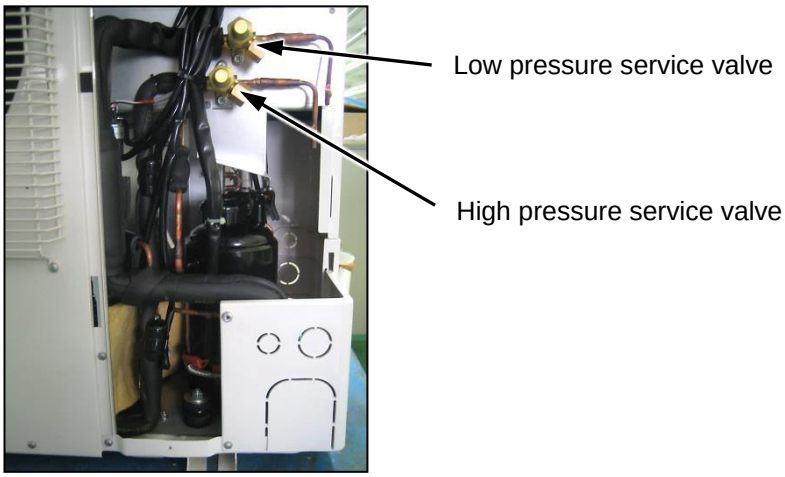
3. Remove the crankcase heater from the compressor.

Note: Bundle the lead wires of the compressor and crankcase heater in a position where they will not be affected by the heat during later pipe brazing operations.

Compressor Replacement Procedure

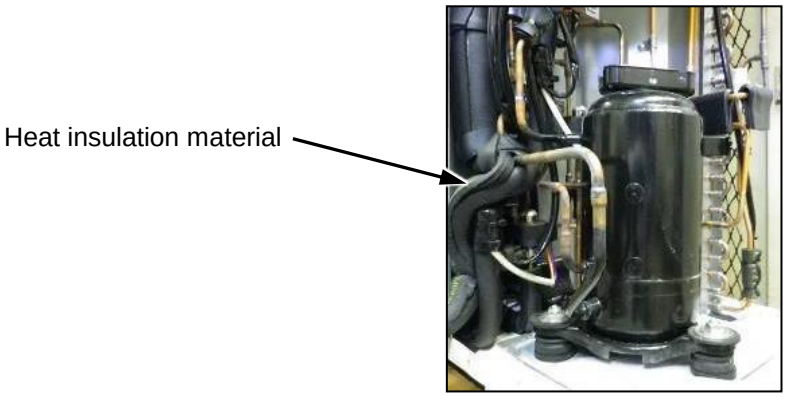
4. Refrigerant releasing

Release CO_2 refrigerant into the atmosphere in accordance with "Refrigerant Releasing Procedure ".



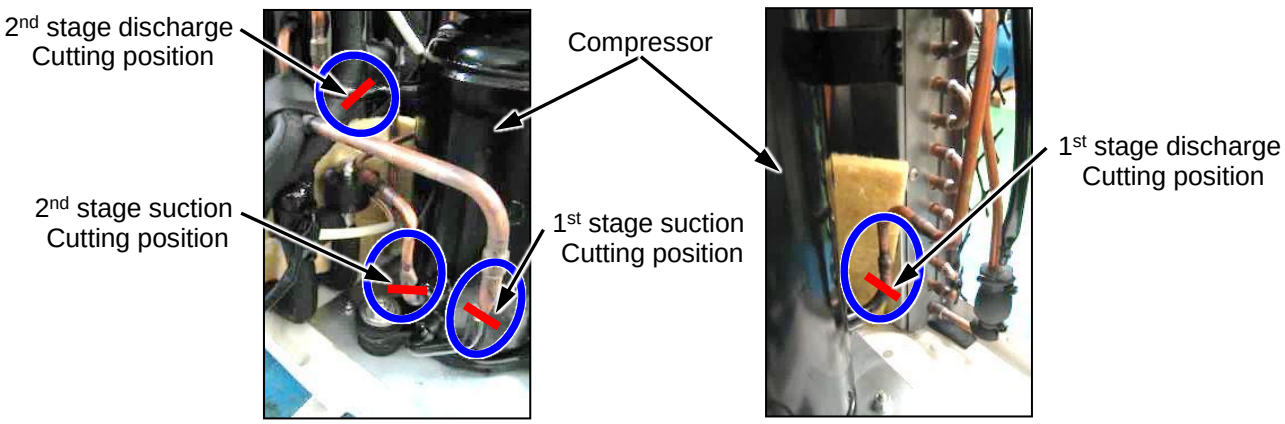
5. Pipe cutting

1) In order to avoid any damage from the heat by pipe brazing later, peel off the heat insulation material on the suction pipe to the position shown in the following photo.



2) After completing the release of refrigerant, cut the compressor piping at four places (1st stage suction, 1st stage discharge, 2nd stage suction, 2nd stage discharge) by using a pipe cutter or cable cutter.

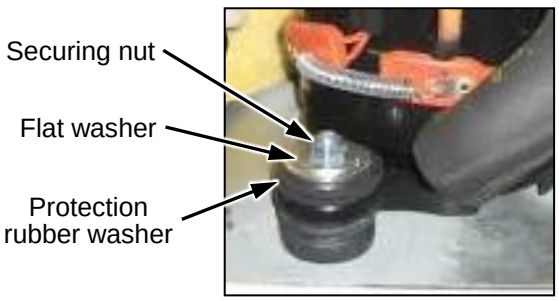
3) The cutting position should be on the compressor side from the welded part (See the photo) and use sufficient caution not to deform the welded part of the pipe during cutting.



Compressor Replacement Procedure

6. Compressor removal

1) Remove the securing nut, flat washer, and protection rubber washer in three places (two places in the front and one in the back) of the compressor to be replaced.



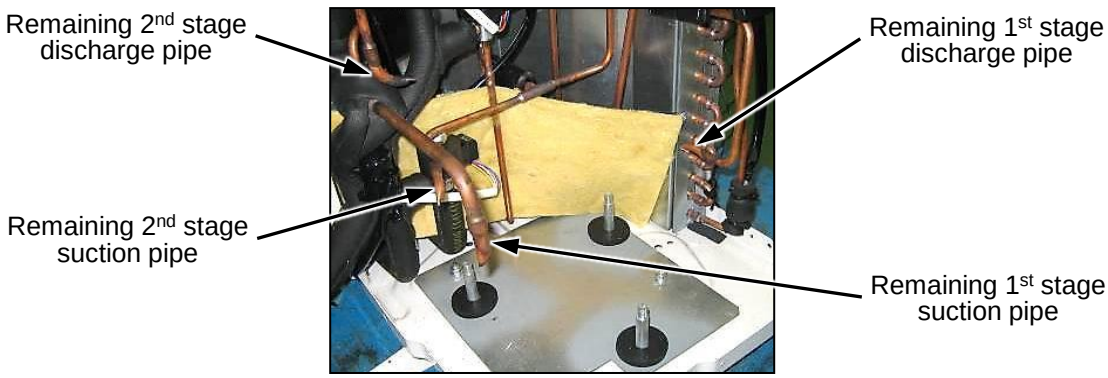
Condition after removing nuts, flat washers, and protection rubber washers

2) Remove the compressor from the refrigeration unit.

Note: Remove the compressor from the right-hand side while using caution not to apply stress to other piping in the refrigeration unit.

7. Removing the cut end pipe

Remove the compressor pipe left on the refrigeration unit side by heating the cut end. Four places in total (1st stage suction, 1st stage discharge, 2nd stage suction, 2nd stage discharge).



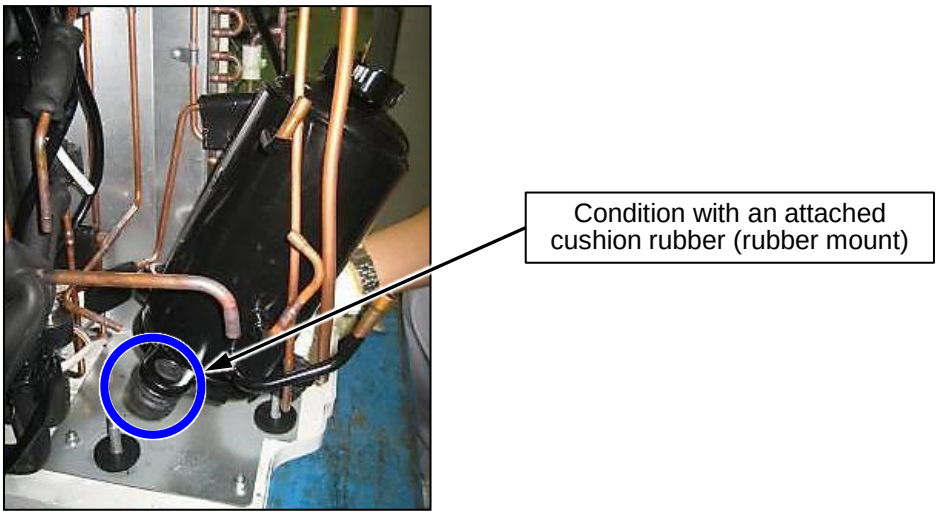
Note: 1. During this operation, always supply nitrogen gas by using the access port of the service valve.

2. In order to avoid radiation of the brazing flame, protect rubber, wiring, heat insulation material, sheet metal, etc., by covering them with wet cloths.

Compressor Replacement Procedure

8. Replacing compressor

Remove the cushion rubbers (rubber mounts) from the compressor you just removed in step “6. Compressor removal”, attach them to the new compressor, and then place the new compressor in its original position.



Note: Place the new compressor without causing stress to the refrigerant piping in the refrigerating unit.

9. Pipe brazing operation

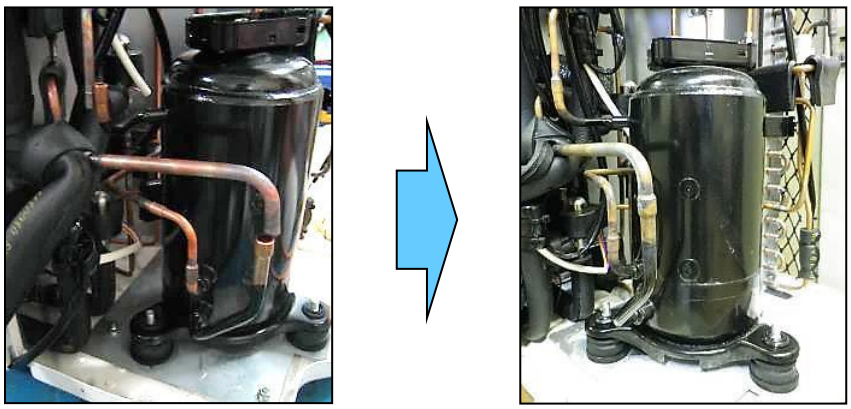
1) While heating the brazing position of each pipe (4 places), insert the tip of each pipe into the brazing part of the new compressor.
2) Maintain a flow of oxygen-free nitrogen through the pipe at a very low pressure during brazing. Nitrogen displaces the air and prevents the formation of copper oxides in the pipe.
3) Confirm that the pipe is inserted to the specified length.

Note: When inserting the 2nd stage discharge pipe, remove the piping securing screw. (Bending prevention)

4) Apply phosphor copper brazing to the welded parts. Strictly comply with the nitrogen substitution process.
5) Fasten the pipe securing screw removed in step “3)”.

Note: When the screw-fastening is omitted, excessive vibration may cause a failure by piping breakage. For that reason, be sure to fasten the screw.

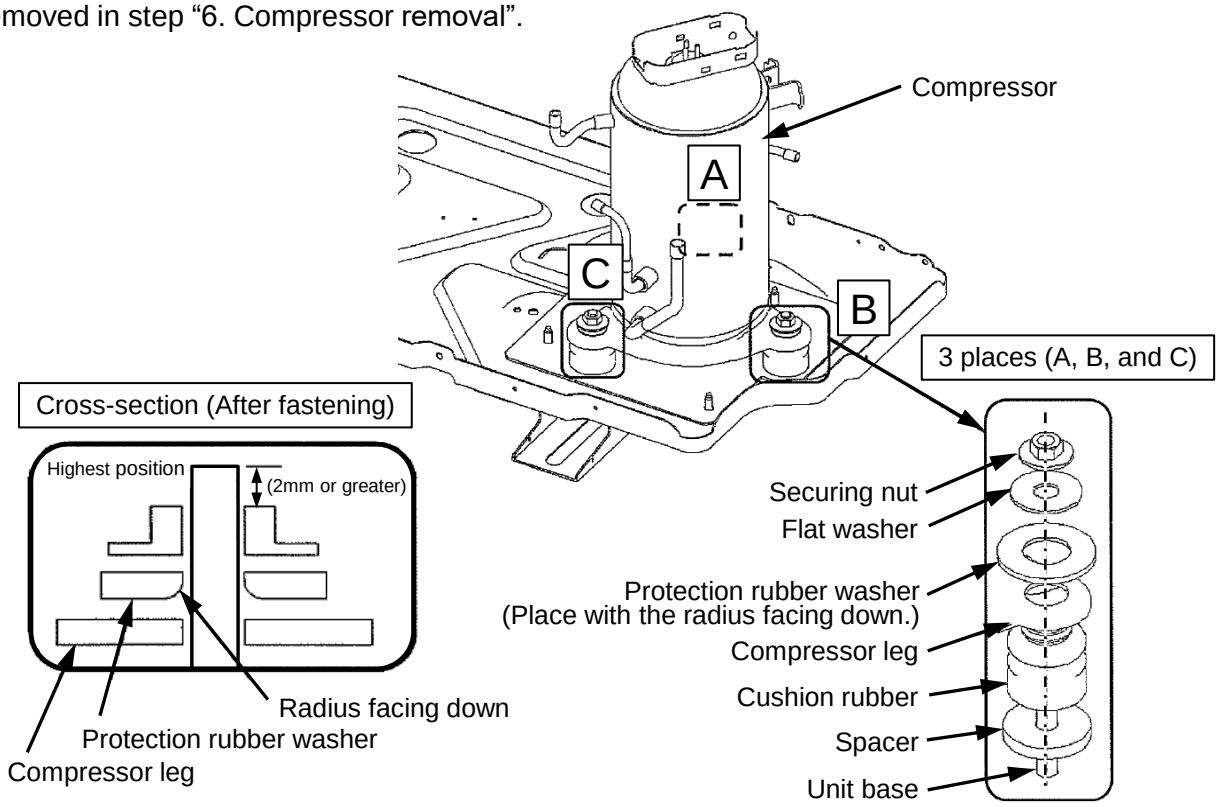
Completed condition after brazing



Compressor Replacement Procedure

10. Installing compressor securing nuts

Install the securing nut, flat washer, and protection rubber washer (three places) that were removed in step “6. Compressor removal”.



Note: 1. Incorrect attachment may cause excessive vibration and lead to a piping breakage failure. Carefully check with the illustration shown above.

2. The securing nut on each compressor leg must be fastened once and then re-fastened for confirmation purposes. (Fasten two times in total.)
Fastening order A⇒B⇒C⇒A⇒B⇒C, Fastening torque 12.8-14.3 N・m.

11. Airtight test

From the access port of the high and low pressure service valves, charge the refrigeration unit with nitrogen at the specified pressure (8 MPa). (Refer to “Airtight Test Procedure”.)

12. Gas leak test

Confirm that no leak is detected from the brazed part or other places.

13. Release of nitrogen

Release nitrogen from the access port of the high and low pressure service valves. (Refer to “Refrigerant Releasing Procedure”.)

14. Evacuation and refrigerant charging

Apply the evacuation from the access port of the high and low pressure service valves.

After reaching the specified vacuum level, continue the evacuation for 2 to 3 hours and then charge the refrigeration unit with refrigerant. (Refer to “Vacuum Pump Attachment and Evacuation Procedure” and “Refrigerant Charging Procedure”.)

15. Completing wiring

1) Connect the compressor lead wires removed in step “2” by avoiding connection errors in the R,S,T phases. (Connection described on the back of the terminal cover)

2) Attach the crankcase heater removed in step “3”, back on the new compressor.

Oil Refill Procedure

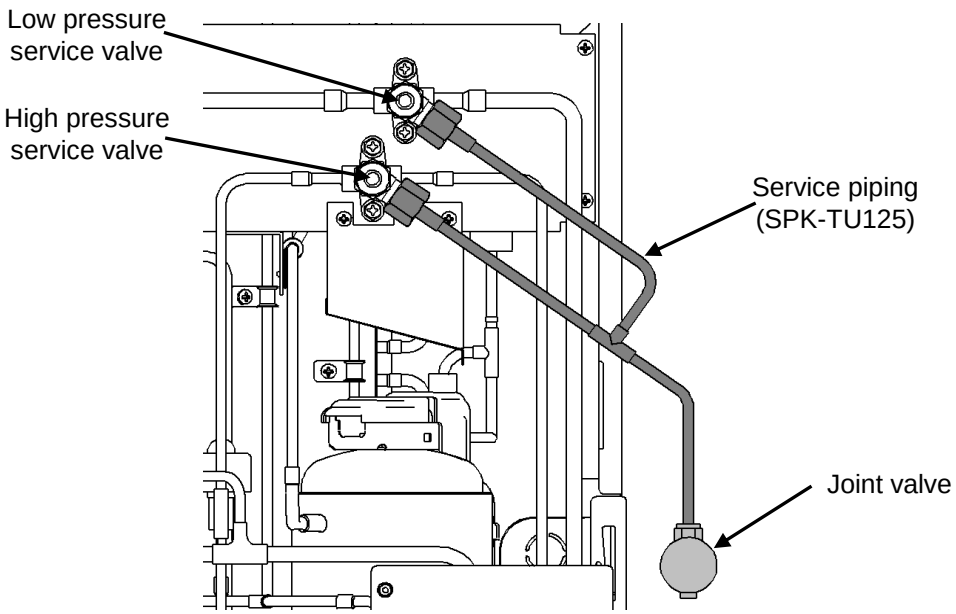
Caution

In principle, there is no need for adding oil to the refrigeration unit.

However, if such an operation is required when moving the refrigeration unit or for other reasons, then comply with the following procedure.
(Any failure of a refrigeration unit resulting from moving is not covered by the warranty.)

1. Release of refrigerant and Evacuation
   1) Carry out the release of refrigeration and the evacuation of the refrigerant circuit in accordance with the "Refrigerant Releasing Procedure" and "Vacuum Pump Attachment and Evacuation Procedure".
   2) After completing the evacuation, set the high pressure and low pressure service valves to the back seated position. (The access ports of the high pressure and low pressure service valves have been closed.)
   3) Remove the service piping (SPK-TU125).

2. Addition of oil
   1) Attach the service piping for oil (SPK-TU125) to the low pressure service valve. (Joint valve of the service piping is "CLOSED")
   2) Assemble the extension pipe to the joint valve. Make sure that the tip of the pipe reaches the bottom of the oil container.
   3) Set the low pressure service valve to the Mid-position (the access ports are open), and open the joint valve (oil is sucked up). High pressure service valve have been back seated position.
   4) After completing oil suction, close the joint valve and remove the extension pipe from the joint valve.
   5) Connect a nitrogen cylinder to the joint valve.
      Pump the oil remaining in the service piping into the circuit by using nitrogen.
   6) After completing this process, set the low pressure service valve to the back seated position, and remove the service piping and nitrogen cylinder.



Filter Dryer

1. Filter dryer to be applied

1) The filter dryer (one is shipped with each refrigeration unit) is a standard component.

2) In the case of replacement, use the same filter dryer shown below as the standard component.

Refrigeration Unit Model No.	Filter dryer Part No.	Filter dryer Type	Connection Diameter
OCU-CR200VF5	D-152T	CO-082-S	ϕ 6.35 mm

Caution **You must not use a filter dryer for HFC refrigerant under any circumstances as it does not meet the pressure requirement.**

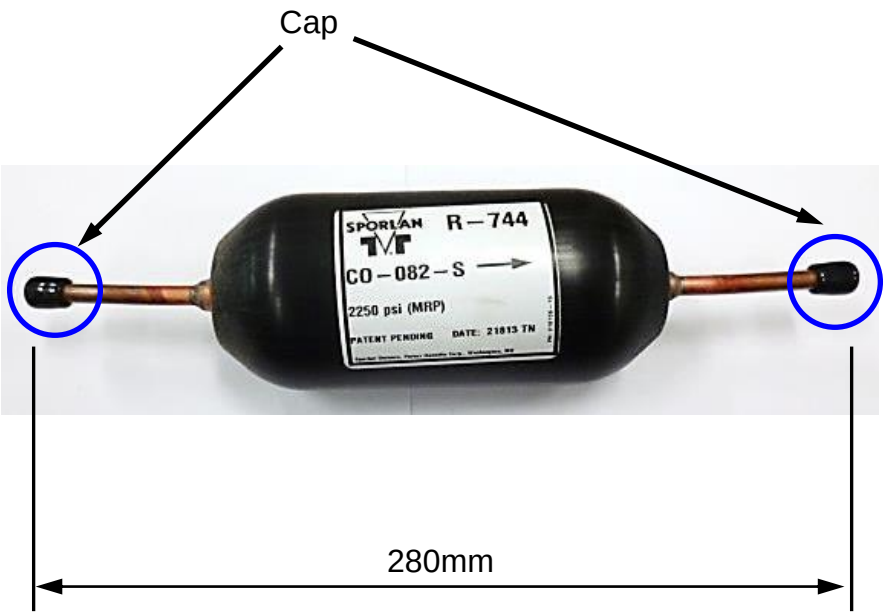
2. Filter dryer attachment

1) The filter dryer has an expanded tip on both ends.

2) Do not remove the filter dryer cap until immediately before use.

3) Connect the filter dryer to the liquid line between the refrigeration unit outlet (the high pressure service valve) and the evaporator by brazing.

4) During brazing operation, protect the filter dryer from heat by covering it with wet cloths, etc.



Error Code List

Error code	Anomaly item	Detection Condition	Motion during Anomaly Detection			Recovery Condition	
			Detail	Ext Alarm	Communication ※	Method	Detail
E 0 1	High pressure anomaly (7th Trip) or High Pressure Switch Activated	High pressure of 11.7 [MPa] or over "E31" occurred 7 times within 1 hour	All stop	Yes	Yes	Manual	Operate S1 (operation SW) or power reset
E 0 3	Discharge gas temperature anomaly (3rd Trip)	Discharge gas temperature 118°C or over "E10" occurred 3 times within 2 hours	Stop compressor	Yes	Yes	Manual	After the discharge gas temperature goes down (75°C or below), operate S1 (Op SW) or reset the power
E 0 4	Discharge gas temperature sensor anomaly	Discharge gas temperature sensor open, or shorted	Stop compressor	Yes	Yes	Manual	When sensor signals return to normal, operate S1 (Op SW) or reset the power
E 0 5	Low pressure sensor anomaly	Low pressure sensor open	All stop	Yes	Yes	Manual	When sensor signals return to normal, operate S1 (Op SW) or reset the power
E 0 6	High pressure sensor anomaly	High pressure sensor open	All stop	Yes	Yes	Manual	When sensor signals return to normal, operate S1 (Op SW) or reset the power
E 0 7	Suction gas temperature sensor anomaly	Suction gas temperature sensor open, or shorted	Continue normal operation (Indication only)	No	No	Auto	Auto reset when sensor signals return to normal
E 1 0	Discharge gas temperature anomaly (1st to 2nd Trip)	Discharge gas temperature is 118°C or over (1st to 2nd detection)	Stop compressor	No	No	Auto	Auto restart when the discharge gas temperature goes down (75°C or below)
E 1 8	Inverter communication anomaly	Inverter communication signals cannot receive for 25 sec.	Stop compressor	Yes	Yes	Manual	When communication signals return to normal, operate S1 (Op SW) or reset the power
E 1 9	Controller communication anomaly	No communication with controller for 10 min.	Continue normal operation by case operation signal	No	No	Auto	Auto reset When communication signals return to normal
E 2 3	Ambient temperature sensor anomaly	Ambient temperature sensor open, or shorted	All stop	Yes	Yes	Manual	When sensor signals return to normal, operate S1 (Op SW) or reset the power
E 2 7	Gas cooler fan motor anomaly (1st to 9th Trip)	Fan motor rotation anomaly	Stop fan motor	No	No	Auto	Auto restart after stopping for 60 sec.
E 2 8	Gas cooler fan motor anomaly (10th Trip)	Fan motor rotation anomaly (Detected after 10th Trip of E27)	Stop fan motor	Yes	Yes	Manual	Manual reset (operate S1 (operation SW) or reset the power)
E 3 1	High pressure anomaly (1st to 6th Trip)	High pressure is 11.7 [MPa] or over (High Pressure Trip)	All stop	No	No	Auto	Auto restart after stopping for 5 min.
E 3 2	Refrigerant flood back alarm	Suction gas superheat (difference between the "suction gas temperature" and "evaporating temperature converted from low pressure") became 1 K or below continuously for 2 min.	Continue normal operation (Indication only)	No	No	Auto	Auto reset when the suction gas superheat ≥ 5 [K]
E 5 7	Refrigeration unit outlet temperature sensor anomaly	Refrigeration unit outlet temperature sensor open, or shorted	All stop	Yes	Yes	Manual	When sensor signals return to normal, operate S1 (Op SW) or reset the power
E 5 9	Gas cooler outlet temperature sensor anomaly	Gas cooler outlet temperature sensor open, or shorted	All stop	Yes	Yes	Manual	When sensor signals return to normal, operate S1 (Op SW) or reset the power

Note:

※ When the controller is connected, anomaly content is sent via the communication cable.

Error Code List

Error code				Anomaly item	Detection Condition	Motion during Anomaly Detection			Recovery Condition	
						Detail	Ext Alarm	Communication ※	Method	Detail
E	6	0		Inverter anomaly (1st to 9th Trip)	Inverter hardware anomaly	Stop compressor	No	No	Auto	Auto restart after stopping for 60 sec.
E	6	2		Inverter excess current (1st to 9th Trip)	Overload caused instantaneous excess current exceeding the protection level	Stop compressor	No	No	Auto	Auto restart after stopping for 60 sec.
E	6	4		Inverter overload (1st to 9th Trip)	Refrigeration unit input current is 9 [Arms] or above	Stop compressor	No	No	Auto	Auto restart after stopping for 60 sec.
E	6	6		Inverter out of sync (1st to 9th Trip)	Detected out-of-sync motor	Stop compressor	No	No	Auto	Auto restart after stopping for 60 sec.
E	6	8		PFC abnormal (1st to 9th Trip)	PFC circuit Fault	Stop compressor	No	No	Auto	Auto restart after stopping for 60 sec.
E	7	0		Inverter anomaly (10th Trip)	"E60" occurred 10 times in 1 hour	Stop compressor	Yes	Yes	Manual	After an inverter recovery, operate S1 (Op SW) or reset the power
E	7	2		Inverter excess current (10th Trip)	"E62" occurred 10 times in 1 hour	Stop compressor	Yes	Yes	Manual	After removing the cause of the anomaly, operate S1 (Op SW) , or reset the power
E	7	4		Inverter overload (10th Trip)	"E64" occurred 10 times in 1 hour	Stop compressor	Yes	Yes	Manual	After removing the cause of the anomaly, operate S1 (Op SW) , or reset the power
E	7	6		Inverter out of sync (10th Trip)	"E66" occurred 10 times in 1 hour	Stop compressor	Yes	Yes	Manual	When sensor signals return to normal, operate S1 (Op SW) or reset the power
E	7	8		PFC abnormal(10th Trip)	PFC circuit Fault	Stop compressor	Yes	Yes	Manual	After removing the cause of the anomaly, operate S1 (Op SW) , or reset the power
E	8	0		Split cycle outlet temperature sensor anomaly	Split cycle outlet temperature sensor open, or shorted	All stop	Yes	Yes	Manual	When sensor signals return to normal, operate S1 (Op SW) or reset the power
E	8	1		Intermediate pressure sensor anomaly	Intermediate pressure sensor open	All stop	Yes	Yes	Manual	When sensor signals return to normal, operate S1 (Op SW) or reset the power
E	8	2		Refrigerant shortage alarm	Split cycle electronic expansion valve opening ≥180 [step] continues for 10 min.	Indication only (Normal operation continues)	No	No	Auto	Auto reset when split cycle electronic expansion valve (MOV3) opening ≤175 [step]

Note:

※ When the controller is connected, anomaly content is sent via the communication cable.

Troubleshooting for Each Error Code

Indication	E 0 1	Detected Content	High pressure anomaly (7th Trip) or High Pressure Switch Activated
Probable Cause	High pressure anomaly (E31) occurred 7 times within 1 hour.		
Check	Refer to E31.		
Corrective Action	Refer to E31.		

Indication	E 0 3	Detected Content	Discharge gas temperature anomaly (3rd Trip)
Probable Cause	Discharge gas temperature anomaly (E10) occurred 3 times within 2 hours.		
Check	Refer to E10.		
Corrective Action	Refer to E10.		

Indication	E 0 4	Detected Content	Discharge gas temperature sensor anomaly
Probable Cause	1. Discharge gas temperature sensor connector (2P6) disconnected or contact failure		
	2. Discharge gas temperature sensor failure		
	3. Control PCB (CS1-PCB) failed		
Check	1. Check if the connector (2P6) on the CS1-PCB is disconnected or loose.		
	2. Check the resistance value of the discharge gas temperature sensor, and check if the sensor and wiring is open or shorted. **[Method of checking]** Refer to “Method of Checking Sensor Characteristics” in the section “Failure Diagnosis”.		
Corrective Action	1. Correctly attach the connector (2P6) to the CS1-PCB.		
	2. Replace the discharge gas temperature sensor.		
	3. Replace the control PCB (CS1-PCB).		

Troubleshooting for Each Error Code

Indication	E 0 5	Detected Content	Low pressure sensor anomaly
Probable Cause	1. Low pressure sensor connector (3P1), or pressure sensor side connector disconnected or contact failure		
	2. Low pressure sensor failure		
	3. Control PCB (CS1-PCB) failed		
Check	1. Check if the connector (3P1) on the CS1-PCB or the pressure sensor side connector is disconnected or loose.		
	2. Check the output voltage of the low pressure sensor, and check if the sensor and wire is open or shorted. **[Method of checking]** Refer to "Method of Checking Sensor Characteristics" in the section "Failure Diagnosis".		
Corrective Action	1. Correctly attach the connector (3P1) to the CS1-PCB or pressure sensor side connector.		
	2. Replace the low pressure sensor.		
	3. Replace the control PCB (CS1-PCB).		

Indication	E 0 6	Detected Content	High pressure sensor anomaly
Probable Cause	1. High pressure sensor connector (3P3), or pressure sensor side connector disconnected or contact failure		
	2. High pressure sensor failure		
	3. Control PCB (CS1-PCB) failed		
Check	1. Check if the connector (3P3) on the CS1-PCB or the pressure sensor side connector is disconnected or loose.		
	2. Check the output voltage of the high pressure sensor, and check if the sensor and wire is open or shorted. **[Method of checking]** Refer to "Method of Checking Sensor Characteristics" in the section "Failure Diagnosis".		
Corrective Action	1. Correctly attach the connector (3P3) to the CS1-PCB or pressure sensor side connector.		
	2. Replace the high pressure sensor.		
	3. Replace the control PCB (CS1-PCB).		

Troubleshooting for Each Error Code

Indication	E 0 7	Detected Content	Suction gas temperature sensor anomaly
Probable Cause	1. Suction gas temperature sensor connector (2P5) disconnected or contact failure		
	2. Suction gas temperature sensor failure		
	3. Control PCB (CS1-PCB) failed		
Check	1. Check if the connector (2P5) on the CS1-PCB is disconnected or loose.		
	2. Check the resistance value of the suction gas temperature sensor, and check if the sensor and wiring are open or shorted. **[Method of checking]** Refer to "Method of Checking Sensor Characteristics" in the section "Failure Diagnosis".		
Corrective Action	1. Correct the attachment of the connector (2P5) on the CS1-PCB.		
	2. Replace the suction gas temperature sensor.		
	3. Replace the control PCB (CS1-PCB).		

Indication	E 1 0	Detected Content	Discharge gas temperature anomaly (1st and 2nd Trip)
Probable Cause	1. Compressor discharge gas temperature went up to 118°C or over.		
	2. Discharge gas temperature sensor failure		
	3. Discharge connector on CS1-PCB connection anomaly.		
Check	1. Check the cause of discharge gas temperature exceeding 118°C. (1) Split cycle electronic expansion valve (MOV3) failed. **[Method of checking]** Refer to "Method of Checking Coil Resistance of Electronic Expansion Valve" in the section "Failure Diagnosis". (2) Compressor failure, etc.		
	2. Check the resistance value of the discharge gas temperature sensor, and check if the sensor and wiring are open or shorted. **[Method of checking]** Refer to "Method of Checking Sensor Characteristics" in the section "Failure Diagnosis".		
	3. Check if the discharge connector of the CS1-PCB has a connection anomaly.		
Corrective Action	1. Replace the split cycle electronic expansion valve (MOV3) or the compressor. (1) Check the attachment condition of split cycle electronic expansion valve (MOV3) along with its coil. In case of anomaly, replace the expansion valve (MOV3). (2) Check for any abnormal sounds in the compressor, or winding resistance and insulation resistance. In case of anomaly, replace the compressor.		
	2. Replace the discharge gas temperature sensor.		
	3. Correct attachment of discharge connector.		

Troubleshooting for Each Error Code

Indication	E 1 8	Detected Content	Inverter communication anomaly
Probable Cause	1. Communication line anomaly (connector disconnected, terminal disconnected, or wire broken)		
	2. Hardware failure (CS1-PCB, inverter)		
	3. Malfunction by noise, etc.		
Check	1. Check if anomaly exists in the communication line. (1) Check if connector (2P11) of CS1-PCB is disconnected. (2) Check if connector (CN14) of inverter-PCB is disconnected. (3) Check if the communication line is broken.		
	2. Restart power and check if the same problem occurs.		
Corrective Action	1. Correct the communication line. (1) Correct the attachment of the connector (2P11) on the CS1-PCB. (2) Correct the attachment of the connector (CN14) on the inverter-PCB. (3) Replace the communication line.		
	2. Replace the control PCB (CS1-PCB) or the inverter-PCB.		

Indication	E 1 9	Detected Content	Controller communication anomaly
Probable Cause	1. Communication line anomaly		
	2. Wrong communication setting		
	3. CS1-PCB or controller failed		
Check	1. Check if anomaly exists in the communication line. (1) Check if connector (5P2, 5P3) of CS1-PCB is disconnected. (2) Check if the communication line is broken.		
	2. Check communication setting. (1) Check if the refrigeration unit number has been set correctly. Check if the number is duplicated. (2) Check if the controller has been set correctly.		
Corrective Action	1. Correct the communication line. (1) Correct the attachment of the connector (5P2, 5P3) on the CS1-PCB. (2) Replace the communication line.		
	2. Redo the communication setting. (1) Correctly set the refrigeration unit number. (Other than “0”) (2) Correctly set the controller. For more detail, refer to the operating instructions of controller.		
	3. Replace the CS1-PCB or the controller. (1) Replace the control PCB（CS1-PCB）. (2) Check the operating instructions of controller and if it is failed, replace the controller.		

Troubleshooting for Each Error Code

Indication	E 2 3	Detected Content	Ambient temperature sensor anomaly
Probable Cause	1. Ambient temperature sensor connector (2P1) disconnected or contact failure		
	2. Ambient temperature sensor failure		
	3. Control PCB (CS1-PCB) failed		
Check	1. Check if the connector (2P1) on the CS1-PCB is disconnected or loose.		
	2. Check the resistance value of the ambient temperature sensor, and check if the sensor and wiring is open or shorted. **[Method of checking]** Refer to "Method of Checking Sensor Characteristics" in the section "Failure Diagnosis".		
Corrective Action	1. Correct the attachment of the connector (2P1) on the CS1-PCB.		
	2. Replace the ambient temperature sensor.		
	3. Replace the control PCB (CS1-PCB).		

Indication	E 2 7	Detected Content	Gas cooler fan motor anomaly (1st to 9th Trip)
Probable Cause	1. Gas cooler fan motor is abnormal. (Locked, fan disengaged, failed)		
	2. Wiring anomaly		
	3. PCB failed		
Check	**This alarm automatically recovers.** **If the alarm does not recover automatically, check the following items 1 and 2.**		
	1. Check if the fan motor is abnormal. (1) Fan motor locked: Cannot turn by hand. (2) Fan disengaged: Fan has been disengaged or fractured. (3) Fan motor internal PCB failed		
	2. Check the wiring. (1) Check if the connector is correctly connected. (2) Check if the wiring is not damaged.		
Corrective Action	1. Replace the fan motor or fan. (1) Replace the fan motor. (2) Replace the fan.		
	2. Correct the wiring. (1) Correct the connection of the connector. (2) If the wiring is damaged, replace the fan motor.		
	3. Replace the control PCB（CS1-PCB）or the inverter-PCB (fan motor).		

Troubleshooting for Each Error Code

Indication	E 2 8	Detected Content	Gas cooler fan motor anomaly (10th Trip)
Probable Cause	Gas cooler fan motor anomaly (E27) occurred 10 times.		
Check	Refer to E27.		
Corrective Action	Refer to E27.		

Indication	E 3 1	Detected Content	High pressure anomaly (1st to 6th Trip)
Probable Cause	High pressure went up to 11.7 MPa.		
Check	1. Investigate the cause of high pressure going up to 11.7 MPa. (1) Split cycle electronic expansion valve (MOV3) or Adjusting refrigerant amount electronic expansion vale (MOV4) failed **[Method of checking]** Refer to "Method of Checking Coil Resistance of Electronic Expansion Valve" in the section "Failure Diagnosis". (2) Gas cooler fan motor anomaly (E27 or E28 generated) (3) Refrigerant overcharge, etc.		
	2. Check the output voltage of the high pressure sensor, and check if the sensor and wire is open. **[Method of checking]** Refer to "Method of Checking Sensor Characteristics" in the section "Failure Diagnosis".		
	3. Check if the high pressure sensor connector (3P3) on the CS1-PCB or the pressure sensor side connector is disconnected or loose.		
Corrective Action	1. Check the attachment condition of the electronic expansion valve (MOV3, MOV4) along with its coil. In case of anomaly, replace the expansion valve (MOV3, MOV4).		
	2. When the gas cooler fan motor anomaly (E27 or E28) is present, refer to the description of error code E27.		
	3. If anomaly is not confirmed in above-mentioned "1" or "2", it is refrigerant overcharge. (1) Release the refrigerant from the access port of the low pressure service valve. • Refer to "Service Pipe Connection/Disconnection Method". • Set the low pressure service valve to the Mid-position (the access port is open), and the high pressure service valve to the back seated position. (2) Open the valve very slowly. Use caution for oil leak out. **Note:** Release refrigerant slowly to avoid oil leak out. (3) As CO_2 refrigerant is heavier to air, use caution for gas stagnation. (4) After completing refrigerant charge, close the access port of the low pressure service valve. (Set the low pressure service valve to the back seated position.)		
	4. When the "check content 2 or 3" above is abnormal: Replace the high pressure sensor or the control PCB (CS1-PCB).		

Troubleshooting for Each Error Code

Indication	E 3 2	Detected Content	Refrigerant flood back alarm
Probable Cause	Suction gas superheat of 1 K or below continued for 2 minutes or longer.		
Check	Check the degree of suction gas superheat, and check if refrigerant flood back is occurring. [Suction gas superheat = Suction gas temperature - Evaporating temperature (Low pressure conversion value)]		
Corrective Action	Adjust the cooling unit (Evaporator) side for maintaining suction gas superheat of 10 K or over, and no frost remaining in the cooling unit (Evaporator).		

Indication	E 5 7	Detected Content	Refrigeration unit outlet temperature sensor anomaly
Probable Cause	1. Refrigeration unit outlet temperature sensor connector (2P4) disconnected or contact failure		
	2. Refrigerating unit outlet temperature sensor failure		
	3. Control PCB (CS1-PCB) failed		
Check	1. Check if the connector (2P4) on the CS1-PCB is disconnected or loose.		
	2. Check the resistance value of the refrigeration unit outlet temperature sensor, and check if the sensor and wiring is open or shorted. **[Method of checking]** Refer to “Method of Checking Sensor Characteristics” in the section “Failure Diagnosis”.		
Corrective Action	1. Correct the attachment of the connector (2P4) on the CS1-PCB.		
	2. Replace the refrigeration unit outlet temperature sensor.		
	3. Replace the control PCB (the CS1-PCB).		

Troubleshooting for Each Error Code

Indication	E 5 9	Detected Content	Gas cooler outlet temperature sensor anomaly
Probable Cause	1. Gas cooler outlet temperature sensor connector (2P3) disconnected or contact failure		
	2. Gas cooler outlet temperature sensor failure		
	3. Control PCB (CS1-PCB) failed		
Check	1. Check if the connector (2P3) on the CS1-PCB is disconnected or loose.		
	2. Check the resistance value of the gas cooler outlet temperature sensor, and check if the sensor and wiring is open or shorted. **[Method of checking]** Refer to "Method of Checking Sensor Characteristics" in the section "Failure Diagnosis".		
Corrective Action	1. Correct the attachment of the connector (2P3) on the CS1-PCB.		
	2. Replace the gas cooler outlet temperature sensor.		
	3. Replace the control PCB (the CS1-PCB).		

Indication	E 6 0	Detected Content	Inverter anomaly (1st to 9th Trip)
Probable Cause	1. Inverter-PCB hardware anomaly or failed		
	2. Loss of phase (S phase)		
	3. Malfunction by noise, etc.		
Check	1. Restart power and check if the same problem occurs.		
	2. Check the power voltage. (Between R-S, S-T, T-R phase)		
Corrective Action	1. Replace the inverter-PCB.		
	2. Repair the power supply unit.		

Troubleshooting for Each Error Code

Indication	E 6 2	Detected Content	Inverter excess current (1st to 9th Trip)
Probable Cause	1. Overload caused instantaneous excess current exceeding the protection level.		
	2. Compressor anomaly (short-circuit, ground fault, locked, etc.)		
	3. Short-circuit or ground fault of the connecting line between the inverter and compressor		
	4. Input power anomaly (instantaneous power failure, instantaneous voltage drop, Loss of phase, etc.)		
	5. Inverter hardware failed		
	6. Malfunction by noise, etc.		
Check	1. Check the reason for overload operation. Check if gas cooler fan motor anomaly (E27, E28) exists.		
	2. Check if the compressor is abnormal. (1) Check the compressor motor winding resistance value. (2) Check the insulation resistance between compressor terminal block and ground. (3) Check if the current value is too high (9 [Arms] or above).		
	3. Check if any anomaly exists in the connecting line between the inverter and compressor. (1) Check if any problem exists such as loose terminal, wire breakage, etc. (2) Check if any damage exists in the wiring. (3) Check if any change of color exists in the 3-pole junction connector.		
	4. Check if any anomaly exists in the power supply. (1) Check if any problem exists in the power input wiring (loose terminal, wire breakage, etc.) (2) Check if any anomaly existed in the power supply (voltage drop, etc.).		
Corrective Action	1. Eliminate the cause of overload operation. When the gas cooler fan motor anomaly (E27 or E28) is present, refer to the description of error code E27.		
	2. Replace the compressor.		
	3. Correct the connecting wire between the inverter and compressor. (1) Correct the wire connection. (2) Replace the wiring. (3) Replace the inverter-PCB and wiring.		
	4. Eliminate anomaly in the power supply. (1) Correct the connection of the power input wiring. (2) Eliminate the cause of power supply anomaly (Repair the power supply unit, etc.).		
	5. Replace the inverter-PCB.		

Troubleshooting for Each Error Code

Indication	E 6 4	Detected Content	Inverter overload (1st to 9th Trip)
Probable Cause	1. Overload caused excess current exceeding the protection level.		
	2. Input power supply anomaly (Voltage drop)		
Check	1. Check the cause of overload operation. Check if gas cooler fan motor anomaly (E27, E28) exists.		
	2. Check if any anomaly exists in the power supply. (1) Check if any problem exists in the wiring connection of power input (loose terminal, wire breakage, etc.). (2) Check if any anomaly existed in the power supply (voltage drop, etc.).		
Corrective Action	1. Eliminate the cause of overload. When the gas cooler fan motor anomaly (E27 or E28) is present, refer to the description of error code E27.		
	2. Eliminate anomaly in the power supply. (1) Correct the connection of the power input wiring. (2) Eliminate the cause of power supply anomaly (Repair the power supply unit, etc.).		

Indication	E 6 6	Detected Content	Inverter out of sync (1st to 9th Trip)
Probable Cause	1. Overload caused out-of-sync		
	2. Compressor motor is abnormal (locked)		
	3. Inverter hardware failed		
Check	1. Check the cause of overload operation. Check if gas cooler fan motor anomaly (E27, E28) exists.		
	2. Check if the compressor motor is abnormal. Check if the current value is not too high (approx. 10 A in several seconds).		
Corrective Action	1. Eliminate the cause of overload. When the gas cooler fan motor anomaly (E27 or E28) is present, refer to the description of error code E27.		
	2. Eliminate anomaly in the power supply. (1) Correct the connection of the power input wiring. (2) Eliminate the cause of power supply anomaly (Repair the power supply unit, etc.).		
	3. Replace the compressor.		
	4. Replace the inverter-PCB.		

Troubleshooting for Each Error Code

Indication	E 6 8	Detected Content	PFC abnormal (1st to 9th Trip)
Probable Cause	1. Wiring anomaly.		
	2. Input power supply anomaly.		
	3. PCB failed.		
Check	1. Check the connection to the inverter PCB.		
	2. Check whether abnormality occurred in the power supply.		
Corrective Action	1. Correctly attach the connector to the inverter PCB.		
	2. Eliminate anomaly in the power supply. (1) Correct the connection of the power input wiring. (2) Eliminate the cause of power supply anomaly (Repair the power supply unit, etc.).		
	3. Replace the inverter PCB.		

Indication	E 7 0	Detected Content	Inverter anomaly (10th Trip)
Probable Cause	Inverter-PCB hardware anomaly (E60) occurred 10 times in 1 hour.		
Check	Refer to E60.		
Corrective Action	Refer to E60.		

Troubleshooting for Each Error Code

Indication	E 7 2	Detected Content	Inverter excess current (10th Trip)
Probable Cause	Inverter instantaneous excess current (E62) occurred 10 times in 1 hour.		
Check	Refer to E62.		
Corrective Action	Refer to E62.		

Indication	E 7 4	Detected Content	Inverter overload (10th Trip)
Probable Cause	Inverter overload (E64) occurred 10 times in 1 hour.		
Check	Refer to E64.		
Corrective Action	Refer to E64.		

Indication	E 7 6	Detected Content	Inverter out of sync (10th Trip)
Probable Cause	Inverter out-of-sync detection (E66) occurred 10 times in 1 hour.		
Check	Refer to E66.		
Corrective Action	Refer to E66.		

Indication	E 7 8	Detected Content	PFC abnormal (10th Trip)
Probable Cause	PFC abnormal detection (E68) occurred 10 times in 1 hour.		
Check	Refer to E68.		
Corrective Action	Refer to E68.		

Troubleshooting for Each Error Code

Indication	E 8 0	Detected Content	Split cycle outlet temperature sensor anomaly
Probable Cause	1. Split cycle outlet temperature sensor connector (2P2) disconnected or contact failure		
	2. Split cycle outlet temperature sensor failure		
	3. Control PCB (CS1-PCB) failed		
Check	1. Check if the connector (2P2) on CS1-PCB is disconnected or loose.		
	2. Check the resistance value of the split cycle outlet temperature sensor, and check if the sensor and wiring is open or shorted. **[Method of checking]** Refer to "Method of Checking Sensor Characteristics" in the section "Failure Diagnosis".		
Corrective Action	1. Correct the attachment of the connector (2P2) on the CS1-PCB.		
	2. Replace the split cycle outlet temperature sensor.		
	3. Replace the control PCB (the CS1-PCB).		

Indication	E 8 1	Detected Content	Intermediate pressure sensor anomaly
Probable Cause	1. Intermediate pressure sensor connector (3P2) or pressure sensor side connector disconnected or contact failure		
	2. Intermediate pressure sensor failure		
	3. Control PCB (CS1-PCB) failed		
Check	1. Check if the connector (3P2) on CS1-PCB, or pressure sensor side connector is disconnected or loose.		
	2. Check the output voltage of intermediate pressure sensor and check if the sensor and wire is open or shorted. **[Method of checking]** Refer to "Method of Checking Sensor Characteristics" in the section "Failure Diagnosis".		
Corrective Action	1. Correct the attachment of the connector (3P2) on the CS1-PCB or pressure sensor side connector.		
	2. Replace the intermediate pressure sensor.		
	3. Replace the control PCB (the CS1-PCB).		

Troubleshooting for Each Error Code

Indication	E	8	2		Detected Content	Refrigerant shortage alarm
Probable Cause	1. Refrigerant shortage was detected.					
Check	1. Check the cooling condition of a refrigerator, freezer, or showcase. 2. Check if any gas leak from connecting pipe, etc.					
Corrective Action	1. When refrigerant shortage is confirmed, charge additional refrigerant. (1) Perform cooling operation and charge additional refrigerant from the access port of the low pressure service valve. • Refer to “Service Pipe Connection/Disconnection Method”. • Set the low pressure service valve to the Mid-position (the access port is open), and the high pressure service valve to the back seated position. (2) Adjust valve opening during slow charging operation to avoid frosting beyond the service valve. (3) Guideline of charging rate of refrigerant is 20 g per 5 sec. Rapid charging forces liquid slugging by the compressor and may lead to a failure. (4) After completing refrigerant charge, close the access port of the low pressure service valve. (Set the low pressure service valve to the back seated position.) 2. When refrigerant gas leak is confirmed, refer to “Gas Leak Repair Procedure” , and repair the gas leak position.					

6.Mar.2017

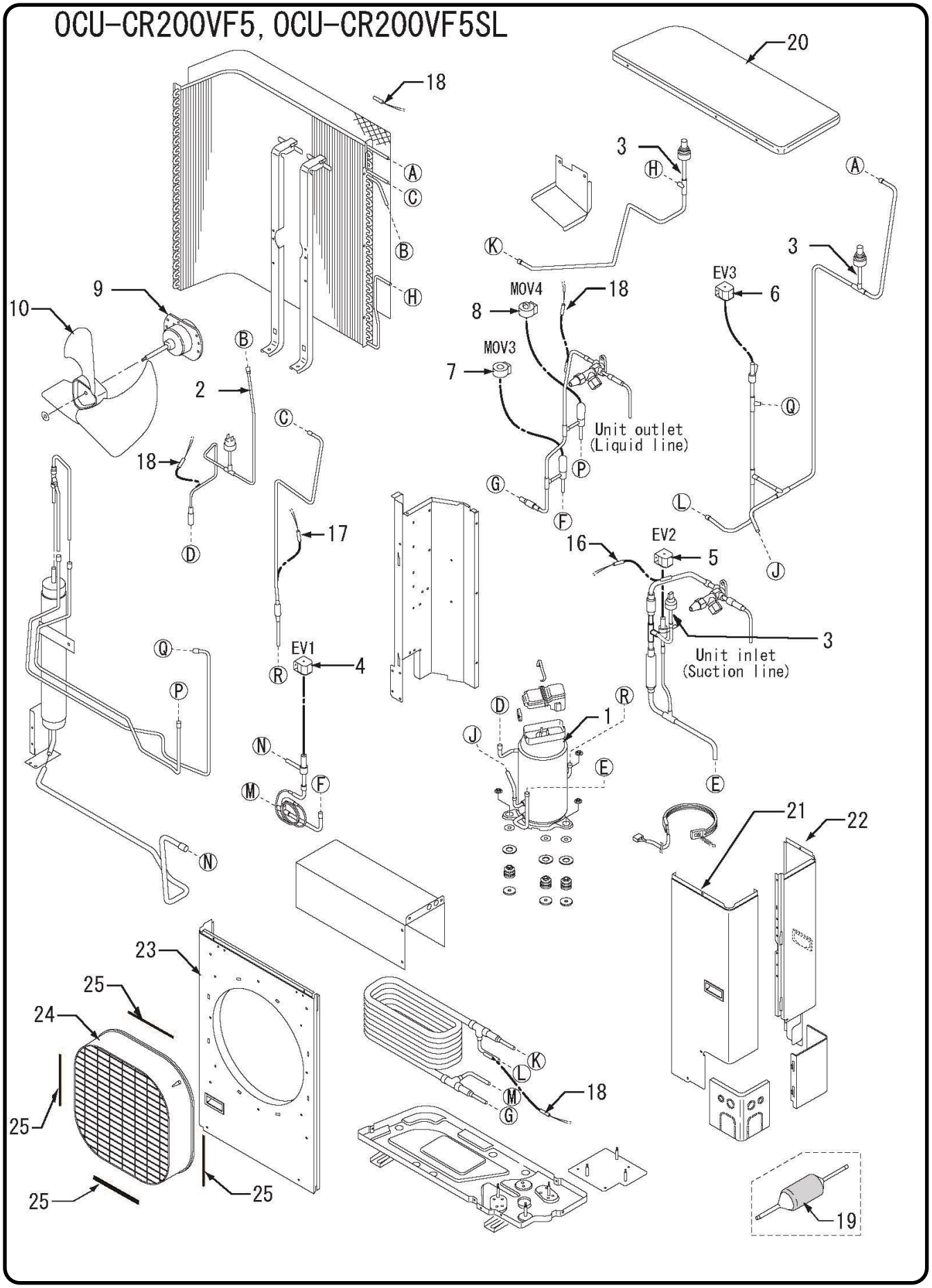
SERVICE PARTS LIST

OCU-CR200VF5SL

OCU-CR200VF5

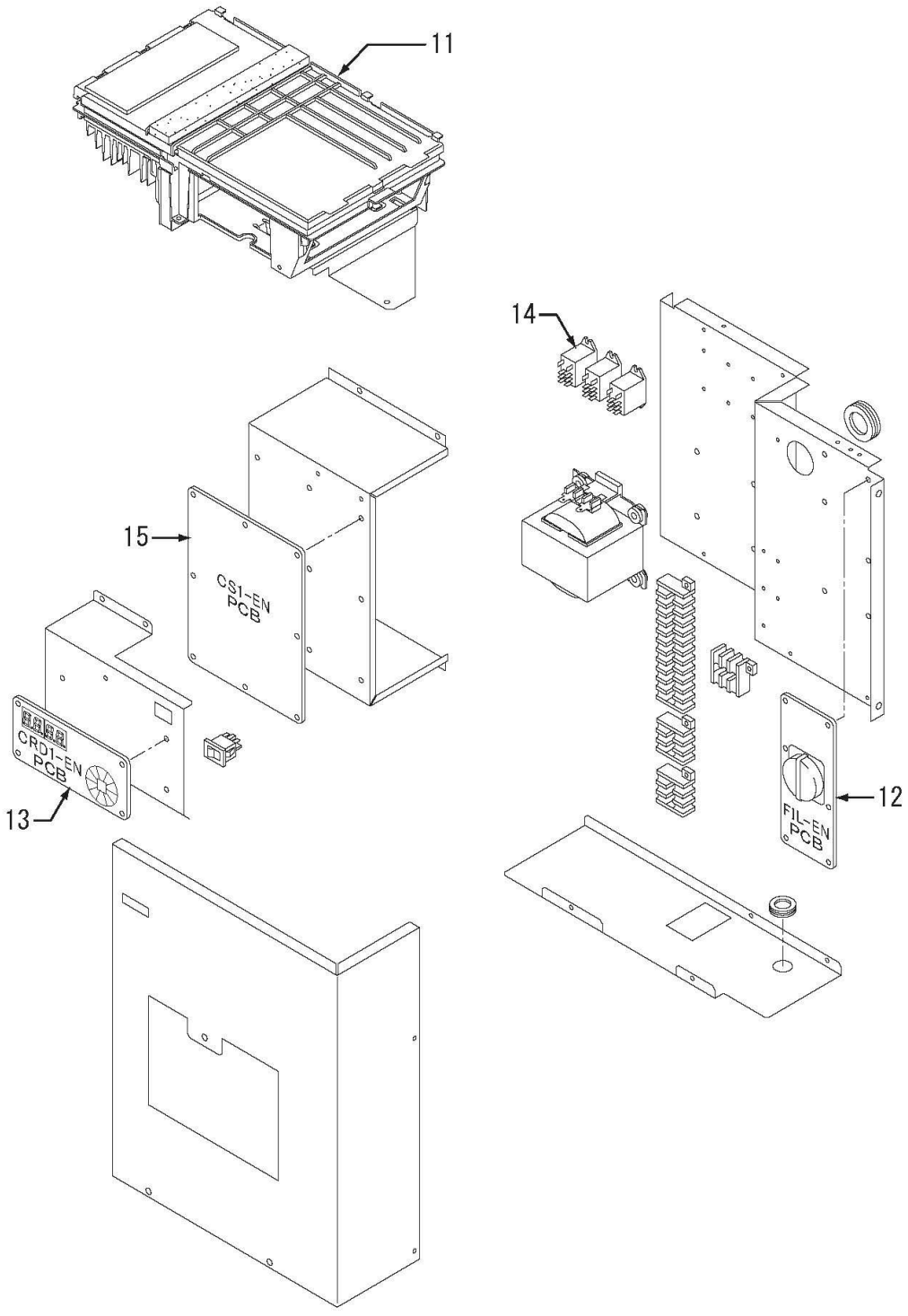
No.	PART CODE	Q'TY	Q'TY	SPECIFICATIONS	OR
1	80439360S	1	1		
2	80203511377000	1	1		
3	80225205116000	3	3	HKS-S046	
4	80205202578000	1	1		
5	80205202579000	1	1		
6	80205202580000	1	1		
7	80242649600490	1	1	CKM-MD24ST-1	
8	80242649600480	1	1		
9	1FA4M4A0161000	1	1		
10	85422539106103	1	1		
11	80205312230020	1	1	INVERTER	
12	80105334400520	1	1	CO2 INV SINGLE	
13	80105334398520	1	1	CO2 INV SINGLE	
14	42329696010	3	3	MC220/240A2-F	
15	80105334397520	1	1	CO2 INV SINGLE	
16	42049602260	1	1	PB2M-36-AS1-1	
17	42049602250	1	1	PT2M-51H-AS1	
18	42049602050	4	4	KTEC-35-S84	
19	80203513179000	1	1	D-152T	
20	80203417264000	1			
20	80203417264010		1		
21	80203415572000	1			
21	80203415572010		1		
22	80203416260000	1			
22	80203416260010		1		
23	80203415573000	1			
23	80203415573010		1		
24	80203424004001	1	1	AIR GUIDE	
25	80223305159001	4	4	Four per one AIR GUIDE	

Exploded View



Exploded View

OCU-CR200VF5, OCU-CR200VF5SL



When an accident or damage is caused by applying an installation method not described in this manual or not using the specified component, our company will not assume responsibility. If a product failure occurs by incorrect installation, the product becomes out of warranty.

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