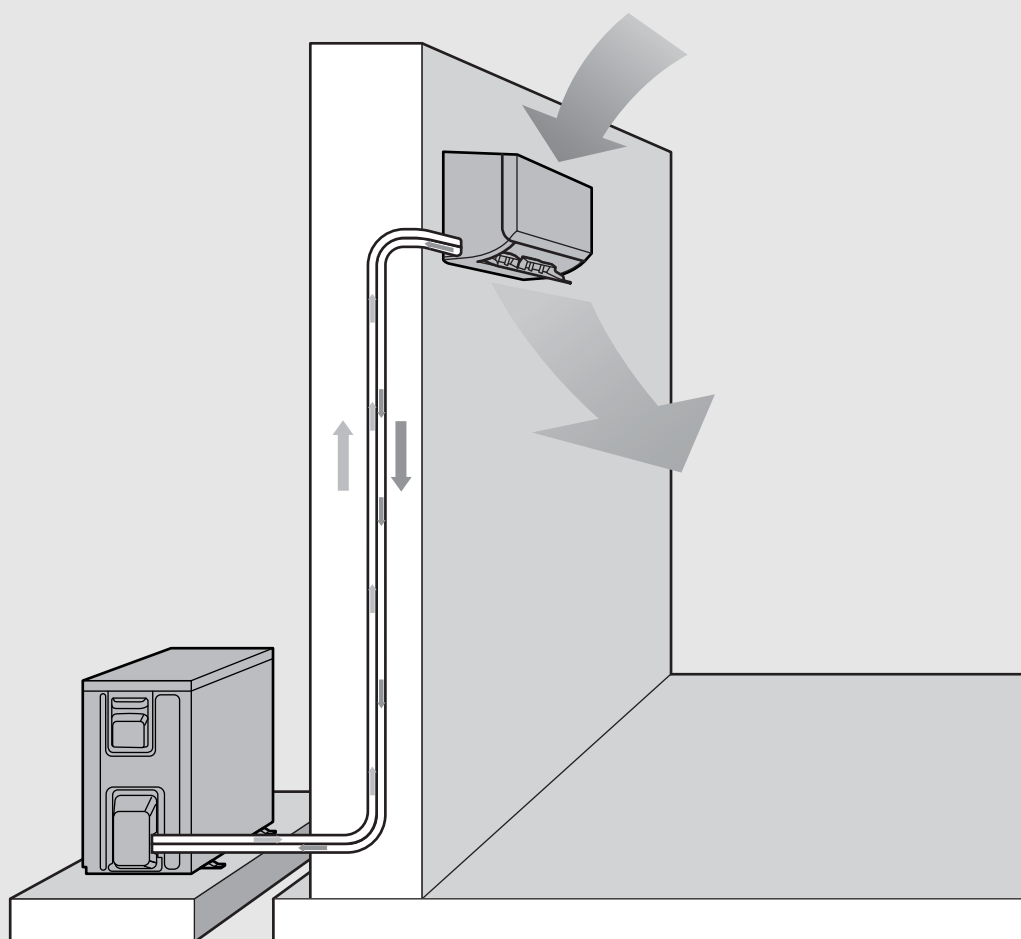




Climate 6000iP

CL6000iP W 26 | CL6000iP W 26 F | CL6000iP W 35 | CL6000iP W 35 F

Service instructions



0010032905-001

Table of contents

1	Explanation of symbols and safety instructions	3
1.1	Explanation of symbols	3
1.2	General safety instructions	4
1.2.1	Overview	4
1.2.2	Refrigerant	4
1.2.3	Electricity	5
2	General information on servicing	5
2.1	Service information	5
2.1.1	General information on servicing	5
2.2	Preparing the work area	6
2.3	Checking the refrigeration equipment	6
2.4	Checking electrical devices and cabling	6
2.5	Repairs to sealed components	6
2.6	Removal and evacuation	6
2.7	Decommissioning	7
2.8	Labelling	7
2.9	Recovery	7
2.10	Transportation, marking and storage	8
3	Product Information	9
3.1	Model Reference	9
3.2	Pipe length and drop height	9
3.3	Dimensions	9
3.4	Electrical Wiring Diagrams	11
3.4.1	Indoor unit wiring diagram	11
3.4.2	Outdoor unit wiring diagram	13
3.4.3	Outdoor unit main PCB ports	14
3.4.4	Outdoor unit printed circuit board diagram	15
4	Product Features	15
4.1	Indoor unit overview	15
4.2	Safety features	15
4.3	Operating functions	16
4.3.1	Automatic mode	16
4.3.2	Cooling mode	16
4.3.3	Heating Mode	17
4.3.4	Dry mode	18
4.3.5	Forced operation	18
4.3.6	Timer	18
4.3.7	Sleep mode	18
4.3.8	Auto-Restart	18
4.3.9	Self-cleaning (iClean)	18
4.3.10	Follow me function	18
4.3.11	Frost protection	18
4.3.12	Noise reduction	18
4.3.13	Energy saving functions	19
4.3.14	Wind avoid me (Indirect airflow function)	19
4.3.15	Wireless control function	19
5	Refrigerant	19
5.1	Recharge Refrigerant	19
5.2	Evacuate Refrigerant for Re-Installation	20
5.2.1	Indoor Unit	20
5.2.2	Outdoor Unit	20

5.3	Pressure on service port for refrigerant R290	21
5.3.1	Cooling chart	21
5.3.2	Heating chart	22
5.3.3	System pressure table	23
6	Indoor Unit Disassembly	23
6.1	Front Panel	23
6.2	Electrical parts	26
6.3	Evaporator	27
6.4	Fan motor and fan	28
6.5	Swing motors	28
6.6	Drain Hose	29
6.7	R290 Leakage sensor	29
7	Outdoor Unit Disassembly	29
7.1	Panel Plate	29
7.1.1	CL6000iP 26, CL6000iP 35	29
7.2	Electrical Parts	31
7.3	Fan and fan motor	32
7.4	Sound blanket	32
7.5	Four-way valve	33
7.6	Compressor	33
8	Diagnosis and troubleshooting	34
8.1	Error Codes	35
8.2	Parameter information inquiry	37
8.3	Error Diagnosis and Troubleshooting Without Error Code	38
8.3.1	Remote Maintenance	38
8.3.2	Field Maintenance	39
8.4	Check Procedures	40
8.4.1	Before checking	40
8.4.2	Temperature Sensor Check	40
8.4.3	Compressor Check	41
8.4.4	IPM Continuity Check	41
8.5	Troubleshooting by Error Code	42
8.5.1	EC 07: The outdoor fan speed is operating outside of the normal range	42
8.5.2	EC 51: Outdoor unit EEPROM parameter error or Compressor driven chip EEPROM parameter error	44
8.5.3	EC 52-54: Open circuit or short circuit of outdoor temperature sensor (T3, T4, TP)	45
8.5.4	EH 00/EH 0A: Indoor unit EEPROM parameter error	46
8.5.5	EH 0b: Indoor PCB / Display board communication error	47
8.5.6	EH 03: The Indoor fan speed is operating outside of normal range	48
8.5.7	EH 60-61: Open circuit or short circuit of indoor temperature sensor (T1, T2)	49
8.5.8	FH CC: Refrigerant Leakage Detection	50
8.5.9	EL 0C: Refrigerant Leakage Detection	51
8.5.10	EL 01: Indoor and outdoor unit communication error diagnosis and solution	52
8.5.11	PC 08: Current overload protection	54
8.5.12	PC 00: IPM malfunction or IGBT over-strong current protection	56
8.5.13	PC 01: Over voltage or too low voltage protection	58
8.5.14	PC 04: Inverter compressor drive error	59

8.5.15 PC 40: Communication error between outdoor main chip and compressor driven chip	60
9 Appendix	60
9.1 Temperature Sensor Resistance Value Table for T1,T2,T3 and T4.	60
9.2 Temperature Sensor Resistance Value Table for TP (T5)	61
9.3 Service Report	62
10 Environmental protection and disposal	64
11 Data Protection Notice	64

1 Explanation of symbols and safety instructions

1.1 Explanation of symbols

Warnings

In warnings, signal words at the beginning of a warning are used to indicate the type and seriousness of the ensuing risk if measures for minimizing danger are not taken.

The following signal words are defined and can be used in this document:

DANGER

DANGER indicates that severe to life-threatening personal injury will occur.

WARNING

WARNING indicates a hazardous situation which, if not avoided, could result in serious personal injury or danger to life.

CAUTION

CAUTION indicates a hazardous situation which, if not avoided, could result in minor to moderate personal injury.

NOTICE

ATTENTION indicates that material damage may occur.

Important information



The info symbol indicates important information where there is no risk to people or property.

Symbol	Meaning
 A3	Warning regarding flammable substances: the refrigerant R290 used in this product is a gas with high combustibility and low toxicity.
	Wear protective gloves during installation and maintenance work.
	Maintenance by a qualified person should be done while following the instructions of the service manual.
	For operation follow the instructions of the user manual.
	Ensure minimum room floor area requirements are followed.
	Warning: rotary parts in the indoor unit.

Table 1

1.2 General safety instructions

1.2.1 Overview

This service manual is intended for qualified service engineers who are skilled in dealing with climate, heating, electrical systems, and A3 refrigerants. All instructions must be observed. Failure to comply with instructions can result in material damage and personal injury, including danger to life.

- ▶ Read the installation manuals (outdoor unit, indoor unit, etc.) and the R290 safety manual before starting maintenance.
- ▶ Observe the safety instructions and warnings.
- ▶ Follow national and regional regulations, technical regulations and guidelines.



WARNING

Risk of burns or frostbite

The temperature of the refrigerant piping, the water piping and the internal parts can become too high or too low.

- ▶ Do not touch these parts during operation or immediately after operation.
- ▶ Wait until the temperature returns to normal before touching these parts.
- ▶ Use protective gloves when coming in contact with these parts.
- ▶ Do not touch any refrigerant that leaked accidentally.
- ▶ Do not touch the air inlet or the aluminium fin of the appliance.



WARNING

Risk of personal injury

Installation, maintenance or repair of the system can cause flying debris, sharp edges or eye injury if proper protection is not used.

- ▶ Always use appropriate personal protective equipment, including protective gloves and safety glasses, during installation, maintenance or repair of the system.



WARNING

Risk of electric shock

Improper installation or connection of the equipment and the accessories can cause electric shocks, short circuits, leaks or fire.

- ▶ Always follow the safety instructions.
- ▶ Only use accessories, equipment and spare parts made or approved by the manufacturer.

NOTICE

Risk of damage to the unit

Blockage of airflow or excessive weight can cause overheating or malfunction.

- ▶ Do not place any object or equipment on top of the unit.
- ▶ Do not sit, climb, or stand on the unit.

1.2.2 Refrigerant



WARNING

Risk to life from fire

This system contains pressurised flammable gas. In case of an external fire, there is a risk of rapid leakage and ignition of the gas.

- ▶ Using packing materials that differ from the provided options can lead to electrostatic discharge (ESD) if there are any leakages during transport.
- ▶ Do not try to accelerate the defrosting process, especially by using mechanical force or high temperatures.
- ▶ Do not clean the product with any substance corrosive to copper because a chemical reaction can cause leaks. Call your service partner for professional maintenance.
- ▶ Do not pierce or burn.
- ▶ Be aware that refrigerants may not contain an odour. Accidental releases of the refrigerant can lead to a fire hazard.
- ▶ Move away from the unit in case of fire and do not try to extinguish the fire.
- ▶ Stay in a safe distance and leave the area until professional help arrives.
- ▶ Store the unit in a room without continuously operating ignition sources (for example, open flames, an operating gas appliance or an operating electric heater).



WARNING

Risk of personal injury

Excessively high concentrations of refrigerant in enclosed areas can lead to anoxia (oxygen deficiency). Refrigerant gas can ignite if it contacts fire, hot surfaces, or other ignition sources.

- ▶ Take appropriate measures to prevent refrigerant leaks.
- ▶ If the refrigerant gas leaks, ventilate the area immediately.
- ▶ Use a vacuum pump to remove the leaked refrigerant from the appliance.
- ▶ Do not release the recovered refrigerant to the environment.

NOTICE

Risk of damage to the unit

Charging refrigerant before completing the safety procedures can cause damage to the unit.

- ▶ Do not charge refrigerant before completing the wiring layout.
- ▶ Only charge the refrigerant after the leak tests and the vacuum drying are completed.
- ▶ Do not exceed the allowable charge when charging the system with refrigerant.

What to do if refrigerant leaks

Leakages of refrigerant normally do not occur. However, if there is a leakage, the contact of the refrigerant with any ignition sources or hot surfaces can lead to fire. Leakages can be recognised by a loud hissing sound ongoing for several minutes or the exiting of liquid at a refrigerant-containing pipe. The contact with refrigerant on skin or eyes can cause frostbite and poisoning. Get medical aid if you get refrigerant on your skin or in your eyes.

If refrigerant leaks, follow this procedure:

1. Do not touch any part of the unit or piping.
2. Make sure that the space is well ventilated by opening all windows and doors.
3. Give sufficient time for the leakage to dilute. Wait at least 30 minutes before returning to the room.

4. Turn off all ignition sources in the room and around the unit.
Ignition sources can be open flames, or any device with hot surfaces and that could generate sparks.
5. Leave the area immediately and wait until the R290 has ventilated off.
6. Call your service partner to do a check of the system for any damages. Only re-use the system after your service partner has repaired the part which caused the leakage.

The steps mentioned before must be explained to the end user after the installation of the product.



Do not turn off the air conditioner unit or cut the power supply, because the running fan dilutes any leakage.

As an installer:

- ▶ Before investigating the damage on the unit, use an R290 leakage detector to make sure that the area is safe.
- ▶ Do not repair any damage on the refrigerant circuit, except for the flare joints connecting to the pipework. In this case, replace the entire unit.
- ▶ Only an authorised Bosch service partner can perform the replacement of the R290 sensor.

1.2.3 Electricity

Notice

- ▶ All electrical works and repairs must be done by a certified installer or electrician.

Warning

- ▶ Make sure you switch off the power of the unit before you open the electric control box, and access any circuit wiring or components inside. At the same time, this prevents the unit from being accidentally powered up during installation or maintenance work.
- ▶ Once you open the cover of the electric control box, do not let any liquid spill into the box, and do not touch the components in the box with wet hands.
- ▶ Cut off power supply more than 5 minutes prior to access the electrical parts. Measure the voltage of the main circuit capacitor or electrical component terminals to make sure the voltage is less than 36 V before you touch any circuit component. Refer to the connections and wiring on the nameplate for the master circuit terminals and connections.
- ▶ Make sure the wiring ends are not subjected to any external force. Do not pull or squeeze the cables and wires. At the same time, make sure the wiring ends are not in contact with the piping or sharp edges of the sheet metal.
- ▶ Make sure all terminals of the components are firmly connected before you close the cover of the electric control box. Before you power on and start the unit, check that the cover of the electric control box is seated correctly and secured with screws.

2 General information on servicing

2.1 Service information

2.1.1 General information on servicing



DANGER

Risk to life from fire

- ▶ Make sure that installation, repairs, disassembly, and disposal of the system are done only by authorised personnel with A3 refrigerants qualification.
- ▶ Be aware that accidental releases of the refrigerant can lead to a fire hazard.
- ▶ Do not repair refrigerant circuits which require brazing at the customer site. Handling errors can lead to leakages and fire hazards.
- ▶ Only do brazing or welding activities on the system at a specialised workshop after safely removing all the refrigerant following the appropriate process steps. Make sure that there is good ventilation.
- ▶ Replace the entire indoor or outdoor unit in case of damage to the refrigerant circuit. Do not try to repair it.
- ▶ If the refrigerant circuit needs to be opened, use a pipe cutter where possible.
- ▶ Be aware that R290 is bound in oil and continues to evaporate even after the refrigerant is removed from the system. Make sure that there is no residual leak after removing the compressor from the system.
- ▶ Always replace soldering joints by cutting out the damaged section of the pipe and installing a new joint. Do not attempt to reuse or repair existing joints.
- ▶ R290 refrigerant sensors must only be replaced with sensors specified by Bosch.
- ▶ Servicing must be performed only as recommended by Bosch.
- ▶ If a leak is suspected, all naked flames must be removed or extinguished.



CAUTION

- ▶ Only use the appropriate tools for the installation and servicing. In case of uncertainty, consult your Bosch partner about the tools to use with flammable refrigerants.

These are the necessary tools for installation and service of R290 systems:

- Leakage detector suitable for R290 (A3 refrigerants).
- Vacuum pump suitable for R290 (A3 refrigerants).
- R290 suitable pressure gauge / multi meter.
- R290 recovery station, e.g. Bosch RG 4.0.
- R290 recovery cylinder.



DANGER

Risk of injury or death from fire!

Using parts other than those specified by Bosch can result in the ignition of refrigerant from a leak. Do not repair electrical components or refrigerant-containing parts of heat exchangers, but replace them completely.

- ▶ Always replace components with the original parts specified by Bosch.

**WARNING****Risk to life from fire**

- ▶ Make sure that no refrigerant is in the pipes when doing brazing or welding work.

2.2 Preparing the work area

Before starting any work on systems with flammable refrigerants, do safety checks to make sure that the risk of ignition is minimised. Do the steps that follow before starting the repairs to the refrigerant system.

- ▶ Do not repair the refrigerant cycle parts of the indoor unit inside the customer's house because the R390 is highly flammable.
- ▶ Only work in a controlled area and follow a controlled procedure to minimise the risk of flammable gases or vapours being released during the task.
- ▶ Inform maintenance staff and other people working in the area about the planned repair work.
- ▶ Do not work in confined spaces.
- ▶ Remove all possible ignition sources and put a "No Smoking" sign. Ignition sources can be hot surfaces, open flames, 230 V sparks or an electrostatic discharge from opening plastic foils or a pack of tissues.
- ▶ Section off the work area.
- ▶ Inspect the area with a suitable refrigerant/leakage detector before and during the work.
- ▶ If a leak detector needs recalibration, recalibrate it in a refrigerant-free area.
- ▶ If any hot work is done on the refrigerating equipment or any associated parts, keep a dry powder or CO₂-filled fire extinguisher at hand.
- ▶ Make sure that the work area is well ventilated before and during the work.

2.3 Checking the refrigeration equipment

The following checks must be applied to installations using flammable refrigerants:

- ▶ Make sure that the refrigerant charge is in accordance with the room size requirements for the installation.
- ▶ Make sure that the ventilation machinery and outlets are operating adequately and are not obstructed.
- ▶ Make sure that all markings to the equipment are visible and legible. Any unintelligible signs must be corrected.
- ▶ Make sure that only refrigerant pipes and components made from materials resistant to corrosion, or properly protected against corrosion, are exposed. All others must be installed in a location where they will not be exposed to corrosive substances.

2.4 Checking electrical devices and cabling

Electrical components must be fit for the purpose and correspond to the correct specification. Follow the maintenance and service guidelines of Bosch at all times. If in doubt, consult your Bosch partner for assistance.

NOTICE**Temporary repairs to ensure continuing operation**

If there is a fault which can compromise safety, disconnect all electrical supply from the circuit until the fault is correctly repaired. However, if a fault cannot be corrected immediately, but it is necessary to continue operation, seek an adequate temporary solution

- ▶ Inform the owner of the equipment of this so that all parties are notified.

Repair and maintenance to electrical components must include initial safety checks and component inspection procedures.

- ▶ Discharge the capacitors in a safe manner to prevent the possibility of sparking. After cutting off the power, wait 10 minutes for the capacitors to be discharged.
- ▶ Check that no live electrical components and wiring are exposed while charging, recovering or purging the system.
- ▶ Make sure that the device is continuously grounded.
- ▶ Make sure that cabling is not subject to wear and tear, corrosion, excessive pressure, vibration, sharp edges or any other adverse environmental effects. Take into account the effects of aging or continual vibration from sources, for example compressors or fans.

2.5 Repairs to sealed components

Do not repair sealed electrical components.

Leak detection methods

Leak detection fluids are suitable for use with most refrigerants, but chlorine can react with the refrigerant and corrode the copper pipework. The use of silicon sealant can reduce the effectiveness of some leak detection equipment.

- ▶ Do not use detergents with chlorine.

**CAUTION**

- ▶ Do not use a halide torch or any other gas detection method with an open flame.

Do the following leak detection methods for systems that have flammable refrigerants.

- ▶ Use electronic leak detectors to detect flammable refrigerant. Leak detectors must not be a potential source of ignition and must be suitable for the refrigerant.
- ▶ Recalibrate an inadequate sensitivity in a refrigerant-free area.
- ▶ Set the leak detection equipment to a percentage of the LFL of the refrigerant and calibrate the leak detection equipment to the refrigerant used.
- ▶ Make sure the percentage of gas is correct (25 % is the maximum).
- ▶ If a refrigerant leak needs brazing, recover all the refrigerant from the system or isolate the refrigerant by shutting off valves in a part of the system away from the leak.

2.6 Removal and evacuation**WARNING****Risk of injury from explosion**

When breaking into the refrigerant circuit to make repairs - or for any other purpose - conventional procedures can be used.

- ▶ Do not use compressed air or oxygen for purging refrigerant systems.

Follow this procedure when opening the refrigerant system:

- ▶ Remove refrigerant following local and national regulations. The refrigerant charge must be recovered into the correct recovery cylinders.
- ▶ Evacuate with an ignition-proofed recovery station suitable for R290.
- ▶ Flush the circuit with oxygen-free nitrogen and do a check with a leakage detector for any left refrigerant at the valve.
- ▶ Evacuate.
- ▶ Continuously flush the circuit with oxygen-free nitrogen when opening it with a flame.
- ▶ Open the circuit by cutting or brazing.

Removal and evacuation for appliances containing flammable refrigerant

NOTICE

Flushing pipes containing flammable refrigerants

Make sure to always flush the system before doing any brazing on the pipework.

Correct flushing of the system is achieved with the following procedure:

- ▶ Vacuum the system.
- ▶ Fill the system with oxygen-free nitrogen until the design pressure is reached. The pressure value is stated on the type plates.
- ▶ Vent the system to atmospheric pressure.
- ▶ Repeat the above process until there is no refrigerant left in the system.



CAUTION

- ▶ Make sure that the outlet for the vacuum pump is away from any source of ignition and that ventilation is available.

If the refrigerant cannot be fully recovered due to lack of acceptability from the standard service valves, use a service clamp to create an additional connection.

Charging procedures

Follow these requirements in addition to conventional charging procedures:

- ▶ Ensure that no contamination of different refrigerants occurs when using charging equipment.
- ▶ Keep hoses or lines as short as possible to minimise the amount of refrigerant contained in them.
- ▶ Keep refrigerant cylinders upright.
- ▶ Label the system when charging is complete (if not already labelled).
- ▶ Before recharging the system, pressure-test with oxygen-free nitrogen.
- ▶ Take extreme care not to overfill the refrigeration system.
- ▶ Leak-test the system on completing charging and prior to commissioning. A follow-up leak test is to be carried out before leaving the site.

2.7 Decommissioning



Before starting this procedure, it is essential that the technician is completely familiar with the equipment and all details.

- ▶ All refrigerants must be recovered safely.
- ▶ Take an oil and refrigerant sample before decommissioning, in case an analysis is required before reusing recovered refrigerant.
- ▶ Make sure that:
 - electrical power is available before starting the work,
 - the system is electrically isolated,
 - mechanical equipment for handling refrigerant recovery into cylinders is available (if required),
 - recovery equipment and cylinders are in accordance with the appropriate standards,
 - all personal protective equipment is available and used correctly,
 - the recovery process is supervised at all times by a competent person.
- ▶ Pump down the refrigerant system, if possible.
- ▶ When vacuuming is not possible, make a manifold so that refrigerant can be removed from various parts of the system.
- ▶ Make sure that the cylinder is situated on the scales before recovery.

- ▶ Start the recovery machine and operate in accordance with the instructions from the brand.
- ▶ Do not overfill cylinders (no more than 70 % of the water capacity, converted to refrigerant density at temperature of recovery).
- ▶ Never exceed the maximum working pressure of the cylinder, not even temporarily.
- ▶ Make sure that the cylinders and the equipment are removed from the site promptly.
- ▶ Close all isolation valves on the equipment when the process is finished.



Recovered refrigerants can only be charged into another refrigeration system after they have been cleaned and checked first.

2.8 Labelling

- ▶ Make sure that the equipment label states that the equipment was decommissioned and emptied of refrigerant.
- ▶ Make sure that the label is dated and signed.
- ▶ Make sure that the equipment label states that the equipment contains flammable refrigerant.

2.9 Recovery



CAUTION

- ▶ When removing refrigerant from a system, either for servicing or decommissioning, follow good practices so that all refrigerant is removed safely.
- ▶ Make sure that:
 - only appropriate refrigerant recovery cylinders are used and that they are appropriately labelled for the refrigerant. Cylinders must be complete with pressure relief valve and all associated shut-off valves in good working condition.
 - there is a sufficient amount of cylinders to hold the total system charge.
 - empty recovery cylinders are evacuated and, if possible, cooled before recovery takes place.
 - recovery equipment is in good working condition and suitable for the recovery of flammable refrigerants.
 - all instructions concerning the equipment at hand are included.
 - a set of calibrated weighing scales in good working condition is available for the procedure.
 - hoses are complete with leak-free disconnect couplings and in good condition.
- ▶ Before use, examine:
 - if the recovery machine is in good working condition;
 - if the recovery machine was properly maintained;
 - if any associated electrical components are sealed to prevent ignition in the event of a refrigerant release.
- ▶ Consult your Bosch partner if in doubt.
- ▶ Make sure that the recovered refrigerant is processed according to local legislation and is returned to the refrigerant supplier in the correct recovery cylinder, with the relevant waste transfer note attached.
- ▶ Do not mix refrigerants in recovery units, and especially not in cylinders.



CAUTION

- ▶ If compressors or compressor oils are removed, make sure that they are evacuated to an acceptable level so that flammable refrigerant does not remain within the lubricant.

- ▶ Take into account that:
 - R290 has a good solubility in the oil and can make up to 50 % of its mass.
 - the compressor body can be heated by hot water, but under no circumstance can it be heated by an open flame or other ignition sources to accelerate this process.
 - draining of oil from a system must be done safely.

2.10 Transportation, marking and storage

- ▶ Make sure that:
 - the transportation of equipment containing flammable refrigerants is in compliance with the transport regulations.
 - the marking of the equipment using signs is in compliance with local regulations.
 - the disposal of equipment containing flammable refrigerants is in compliance with national regulations.
 - the appliance is stored in a manner that prevents mechanical damage.
 - storage of equipment and appliances is in accordance with Bosch instructions



CAUTION

- ▶ Transport refrigerant-containing components in an open or well-ventilated vehicle.
- ▶ Conduct a leak search prior to loading any refrigerant-containing components onto a vehicle.

NOTICE

Storage of packed (unsold) equipment:

- ▶ Determine the maximum number of pieces of equipment permitted to be stored together according to local regulations.

3 Product Information

3.1 Model Reference

Refer to the following table to determine the specific indoor and outdoor unit model.

Indoor Unit	Outdoor Unit	Capacity		Power Supply
		(Btu/h)	(kW)	
CL6000iP W 26	CL6000iP 26	9k	2.6	220-240V~, 50Hz, 1Phase
CL6000iPW 26 F	CL6000iP 26			
CL6000iP W 35	CL6000iP 35	12k	3.5	
CL6000iP W 35 F	CL6000iP 35			

Table 2

3.2 Pipe length and drop height

The length and the elevation of the connection pipe are shown in Table 3. If the pipe length is longer than the maximum allowed length, additional refrigerant must be charged to ensure nominal cooling/heating capacity.

Capacity (Btu/h)	(kW)	Standard Length	Max Pipe Length	Max Elevation	Additional Refrigerant
9 k/12 k	2.6/3.5	5 m	15 m	10 m	10g/m

Table 3

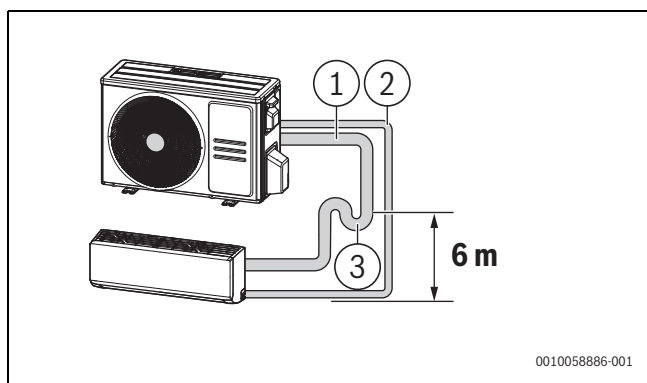


Fig. 1 Installation of outdoor unit above indoor unit

- [1] [1] Gas-side pipe
- [2] [2] Liquid-side pipe
- [3] [3] Siphon-shaped elbow as oil separator

If the outdoor unit is installed higher than the indoor unit, proper oil must return to the compressor along with the suction of refrigerant to keep compressor lubrication. If suction flow velocity drops below 7.62 m/s (1500 fpm [feet per minute]), oil will not return to the compressor. To prevent compressor damage, install an oil trap every 6 m (20 ft) of vertical gas pipe.

3.3 Dimensions

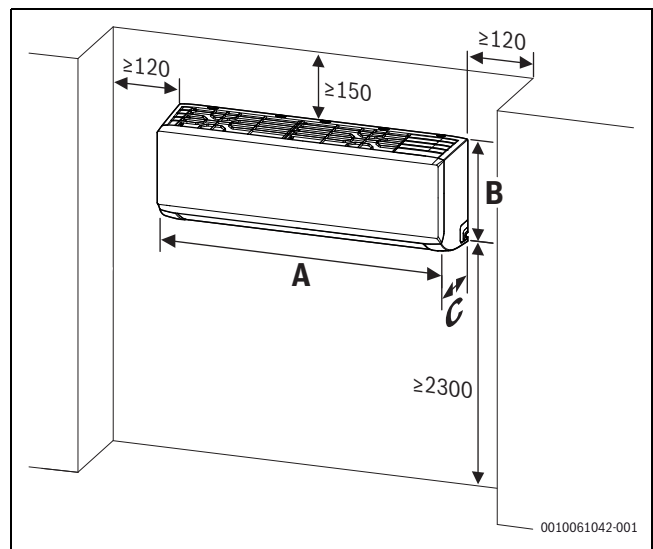


Fig. 2 Indoor unit dimensions

	A [mm]	B [mm]	C [mm]
CL6000iP W 26	802	295	200
CL6000iP W 26 F			
CL6000iP W 35			
CL6000iP W 35 F			

Table 4

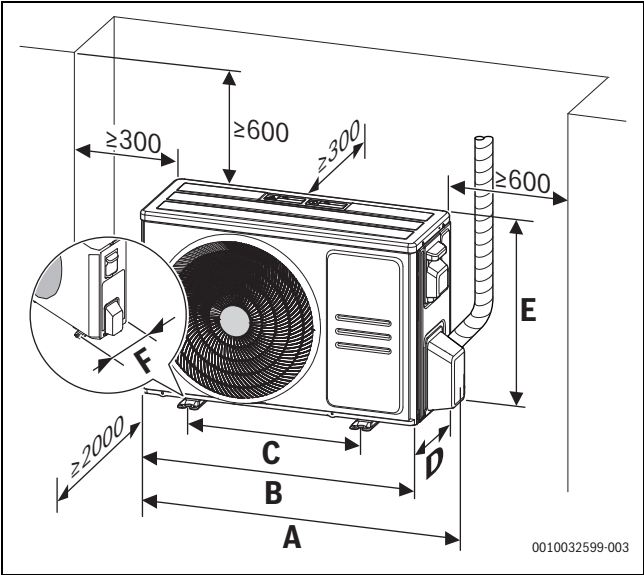


Fig. 3 Outdoor unit dimensions

	A [mm]	B [mm]	C [mm]	D [mm]	E [mm]	F [mm]
CL6000iP 26	874	805	511	330	554	317
CL6000iP 35	874	805	511	330	554	317

Table 5

3.4 Electrical Wiring Diagrams

3.4.1 Indoor unit wiring diagram

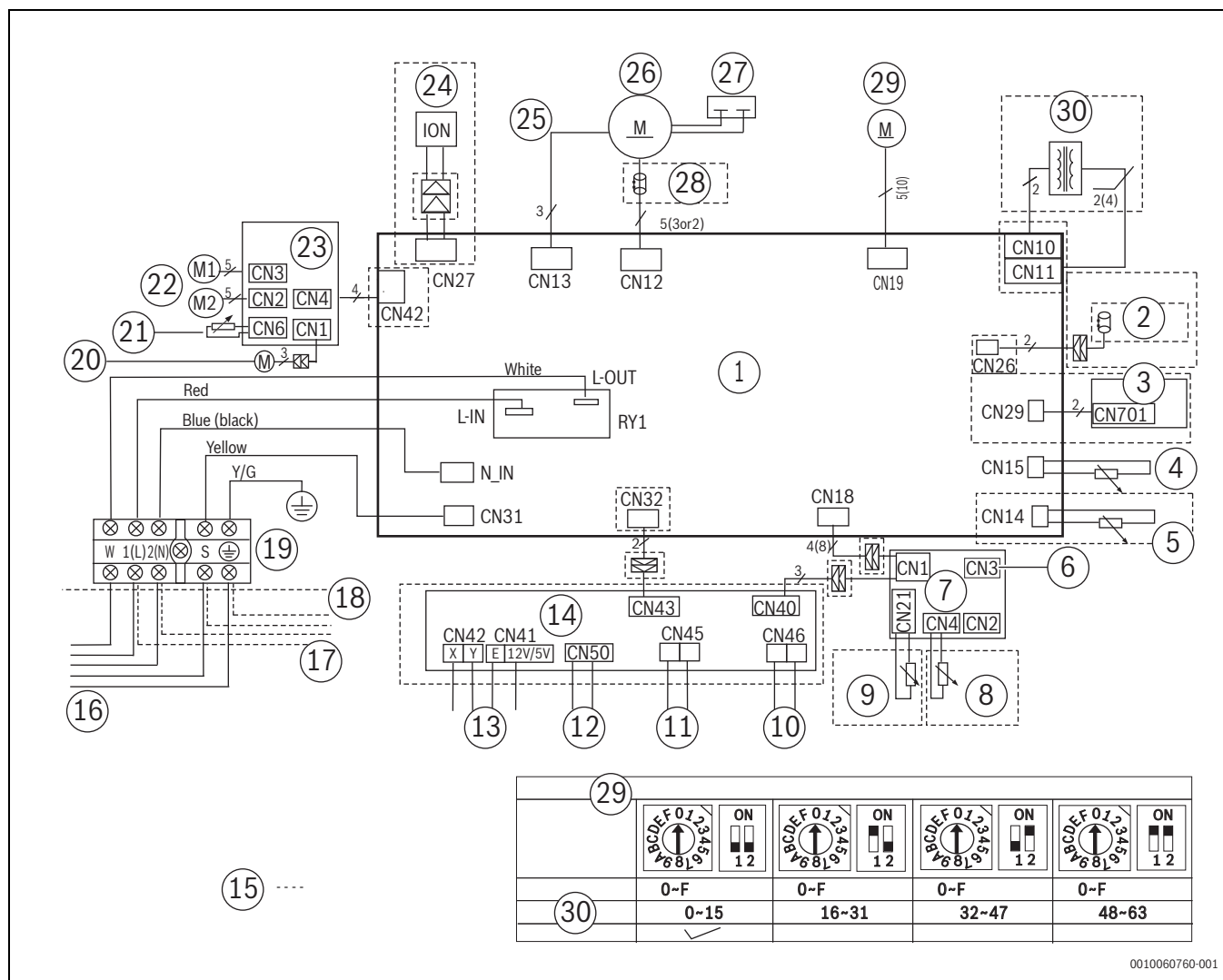


Fig. 4 Wiring diagram for indoor unit with 9 to 18 kBTU/h

- | | |
|---|---|
| [1] Main board | [23] R290 Sensor (available for products with R290 sensor) |
| [2] Reserve | [24] Ion generator |
| [3] Switch board (optional) | [25] Reserve |
| [4] Pipe temperature sensor | [26] Indoor FAN |
| [5] Room temperature sensor (optional) | [27] CAP |
| [6] Wi-Fi gateway | [28] Magnetic ring (optional) |
| [7] Display board | [29] Swing motor 1 |
| [8] Room temperature sensor (optional) | [30] Reserve |
| [9] Humidity temperature sensor (optional) | [31] For setting Netaddress (CCM Comm.Bus) ENC3+F1 (Multi-function control board) |
| [10] Remote switch | [32] Code/Netaddress/Factory setting |
| [11] Remote alarm | |
| [12] Refrigerant detection sensor | |
| [13] CCM Comm.Bus or 485 Wire-controller | |
| [14] Multi-function control board (available for products with R290 sensor) | |
| [15] This symbol indicates the element is optional, the actual shape shall prevail. | |
| [16] Applicable for MONO unit with 1W standby control feature | |
| [17] Applicable for MULTI and MONO unit without 1W standby control feature | |
| [18] Outdoor unit | |
| [19] Indoor unit | |
| [20] Fresh air motor2 | |
| [21] Sensor | |
| [22] Stepper motor 1 and 2 | |

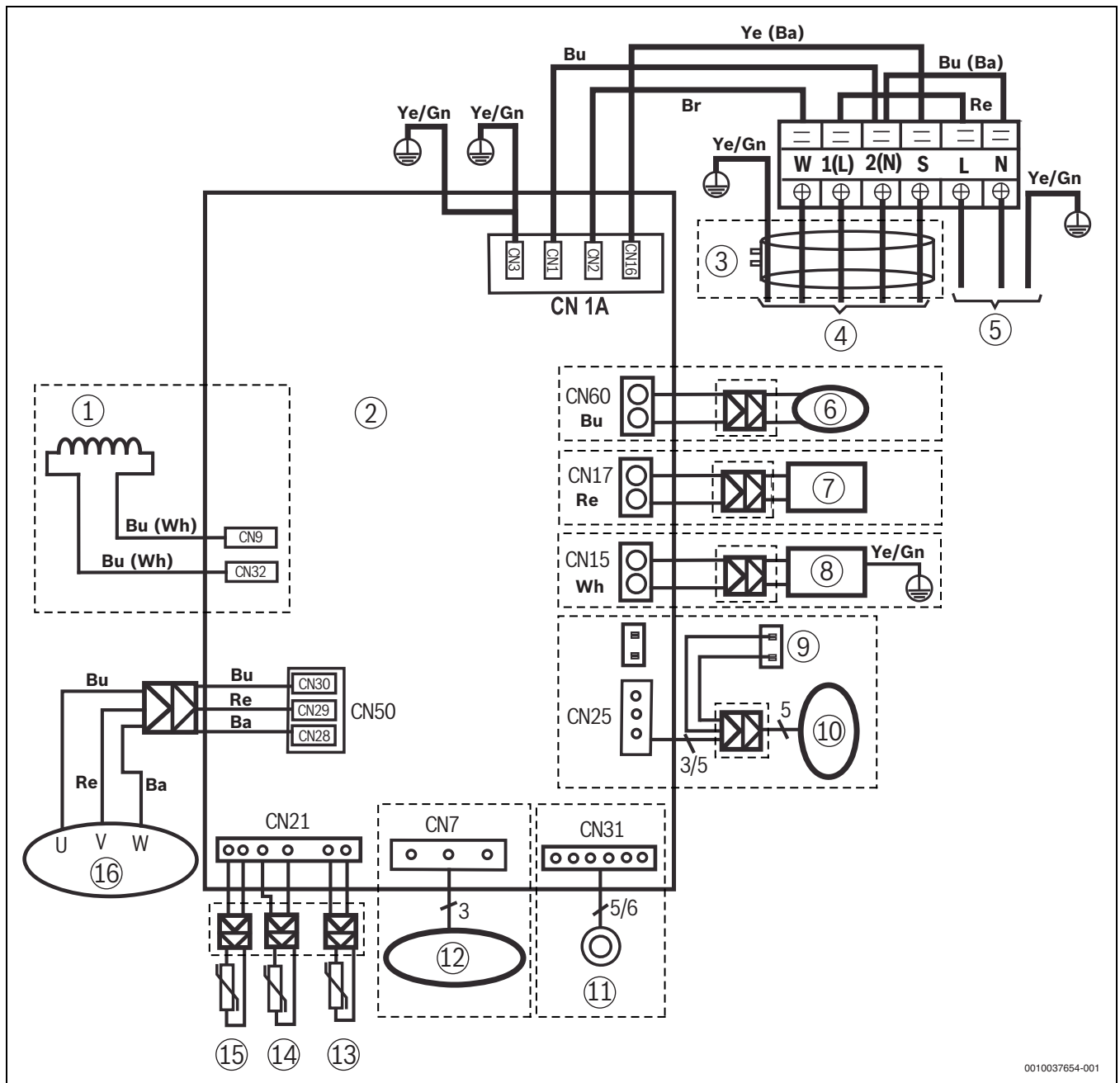
Ba (Ba)	Blue or black wire
Bu (Ba)	Blue or black wire
ENC3	Network address switch
F..	DIP switch
Re	Red wire
Ye	Yellow wire
Ye/Gn	Yellow and green wire
Wh	White wire
CN..	Port code
---	Indicated element is optional

Setting Network address (CCM communication bus)

F1	Network address
	0 – 15 (Factory setting)
	16 – 31
	32 – 47
	48 – 63

Table 6 F1 DIP switch

3.4.2 Outdoor unit wiring diagram



0010037654-001

Fig. 5 Wiring diagram for outdoor unit with 9 to 18 kBTU/h

- [1] Reserve
- [2] Main board
- [3] Magnet ring
- [4] Communication/power supply cable to indoor unit
- [5] Power supply cable
- [6] 4-way valve
- [7] Crankcase heater (reserved)
- [8] Pan heater (reserved)
- [9] Capacitor (reserved)
- [10] AC fan (reserved)
- [11] Electronic expansion valve (reserved)
- [12] Outdoor unit DC fan
- [13] Ambient temperature sensor (T4)
- [14] Condenser temperature sensor (T3)
- [15] Discharge temperature sensor (TP)
- [16] Compressor

- Br Brown wire
- Bu Blue wire
- Bu (Ba) Blue or black wire
- Bu (Wh) Blue or white wire
- Re Red wire
- Ye Yellow wire
- Ye (Ba) Yellow or black wire
- Ye/Gn Yellow and green wire
- Wh White wire
- CN.. Port code
- Indicated element is optional



For standby control the cross section area of the communication cable must be selected to suit the maximum system current. The maximum system current is equal to the sum of indoor unit and outdoor unit rated current.

3.4.3 Outdoor unit main PCB ports

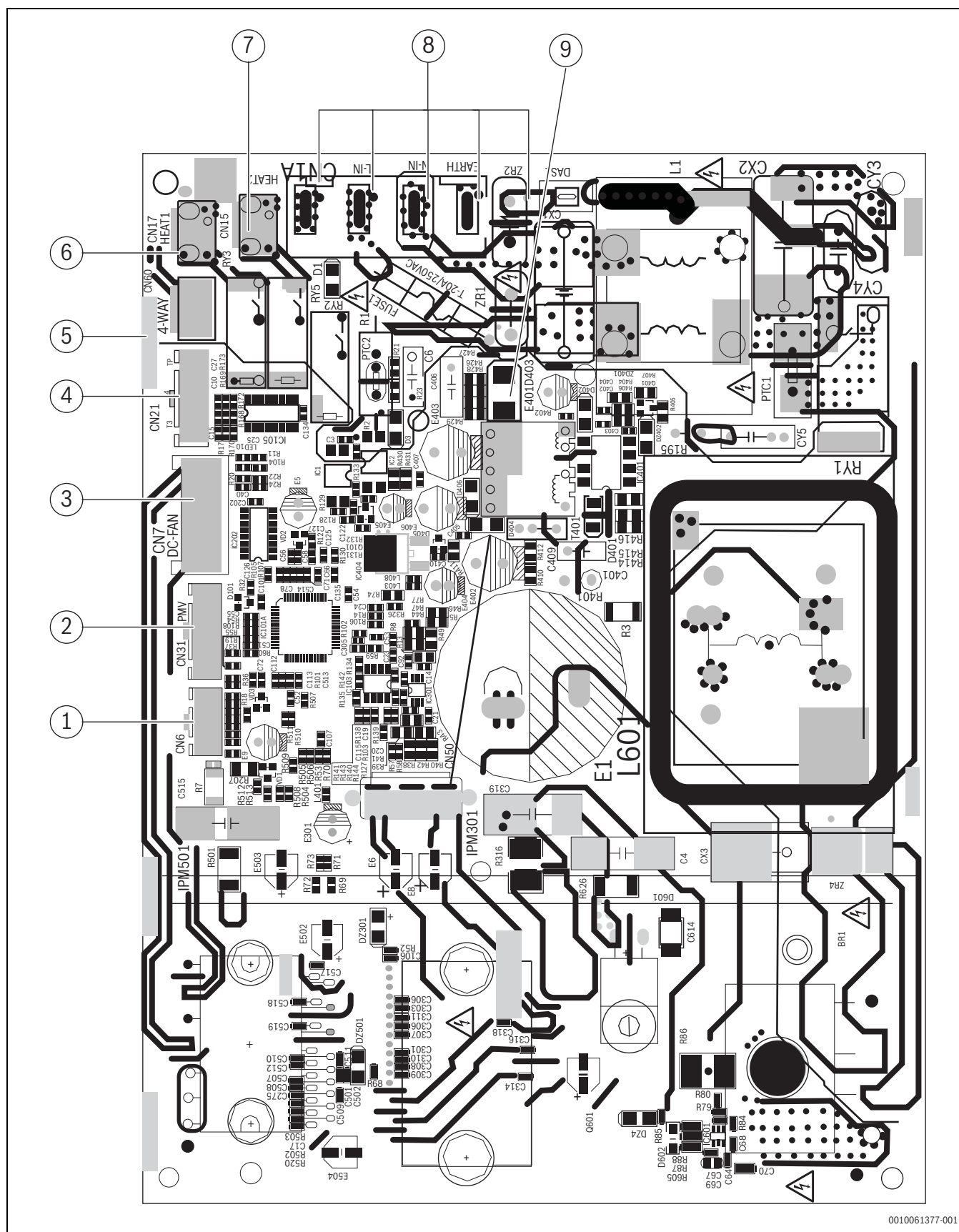


Fig. 6 Main PCB ports for outdoor unit with 9 to 18 kBTU/h

Label in Fig. 6	Name	Port	Content	Port voltage
1	CN1A	CN3	Earth: connect to Ground	
		CN1	N_in: connect to N-line	208-230V AC
		CN2	L_in: connect to L-line	208-230V AC
		CN6	S: connect to indoor unit communication	
2	HEAT1	CN17	connect to compressor heater (reserved)	208-230V AC (when ON)
3	4-WAY	CN60	connect to 4 way valve	208-230V AC (when ON)
4	HEAT2	CN15	to chassis heater (reserved)	208-230V AC (when ON)
5	AC-FAN	CN25	connect to AC fan (reserved)	
6	PMV	CN31	connect to Electric Expansion Valve (reserved)	
7	TESTPORT	CN6	used for testing	
8	TP, T4, T3	CN21/CN22	connect to pipe temp. sensor T3, ambient temp. sensor T4, exhaust temperatur sensor TP	
9	DC-FAN	CN7	connect to DC fan	
10	FAN_IPM	IPM 501	IPM for DC fan	
11	W	CN28	Compressor connection	- Standby: 0V AC - Running: 10-200V AC
	V	CN29		
	U	CN30		
12	COMP_IPM	IPM 301	IPM for compressor	

Table 7



Actual appliance can differ. This section is for reference only.

3.4.4 Outdoor unit printed circuit board diagram

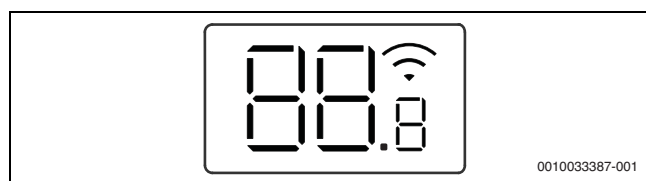


Actual appliance can differ. This section is for reference only.

4 Product Features

4.1 Indoor unit overview

Display of indoor unit



Symbol	Explanation
Number	Temperature display
	WLAN connection ¹⁾ active
	Displayed with some functions, if these are switched on. Indicates that the ON timer is active when the indoor unit is switched off.
OF	Displayed with some functions, if these are switched off.
dF	Automatic defrosting active
FP	Frost protection active: the indoor unit keeps the room temperature at at least 8 °C.
CL	The self-cleaning function is active (iClean)
Ex, Px, Fx	Fault code ("x" stands for any digit).

1) Only available as accessory with IP-Gateway.

Table 8 Symbols in the display

4.2 Safety features

Compressor three-minute delay at restart

Compressor functions are delayed for up to 10 seconds upon first starting the unit and for up to 3 minutes upon subsequent restarts.

Automatic shut-off based on discharge temperature

If the compressor discharge temperature exceeds a certain level for a period of time, the compressor ceases operation.

Automatic shut-off based on fan speed

If the indoor fan speed registers below 300 RPM or over 2100 RPM for an extended period of time, the unit ceases operation. The corresponding error code will be displayed on the indoor unit.

Inverter module protection

The inverter module has an automatic shut-off mechanism based on the unit's current, voltage and temperature. If automatic shut-off is initiated, the corresponding error code will be displayed on the indoor unit and the unit ceases operation.

Indoor fan delayed operation

- When the unit starts, the louver is automatically activated and the indoor fan will operate after the louver adjusts its position.
- If the unit is in heating mode, the indoor fan is regulated by the anti-cold air function.

Compressor preheating

Preheating is automatically (for some models) activated when T4 is lower than setting temperature.

Sensor redundancy and automatic shut-off

- If one temperature sensor malfunctions, the unit continues operation and displays the corresponding error code, allowing for emergency use.
- If more than one temperature sensor is malfunctioning, the unit ceases operation.

Refrigerant leakage protection

When the refrigerant leakage protection is activated, the unit locks and does not automatically leave the leakage protection state. If there is a power failure, the auto-restart function saves the leakage protection state.

4.3 Operating functions

Abbreviations

Abbreviation	Element
T1	Indoor room temperature
T2	Coil temperature of evaporator
T3	Coil temperature of condenser
T4	Outdoor ambient temperature
T _S	Set temperature
TP	Compressor discharge temperature

Table 9 Element abbreviations

4.3.1 Automatic mode

In automatic mode, the unit automatically switches between heating, cooling, dehumidification or fan-only mode on the basis of T1, T_S and T4 to maintain the desired temperature.

- This mode can be selected with the remote controller and the temperature can be set between 16...30 °C.
- If the setting temperature is modified, the machine selects a new running function.

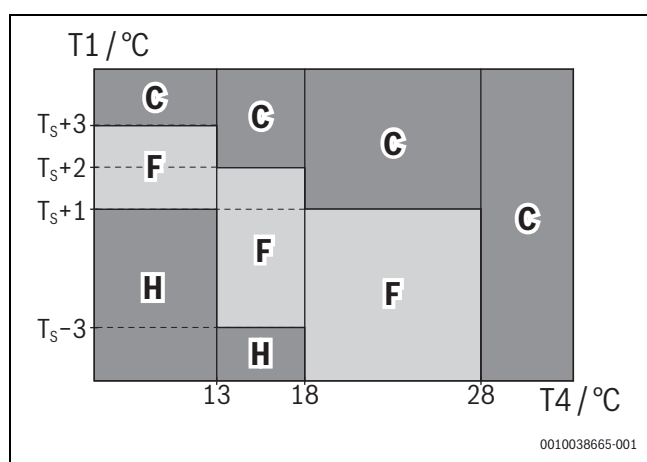


Fig. 7

- C Cooling mode
- F Fan mode
- H Heating mode
- T1 Indoor room temperature
- T4 Outdoor ambient temperature
- T_S Set temperature

4.3.2 Cooling mode

Compressor Control

While trying to reach the set temperature:

- When the compressor runs continuously for up to 120 minutes and the following conditions are satisfied, the compressor ceases operation:
 - Calculated frequency (F_b) is less than minimum limit frequency ($F_{min} = 12 \text{ Hz}$).
 - Compressor runs at F_{min} for more than 10 minutes.
 - $T1 \leq (T_S - 2.5 \text{ °C})$.
- When the compressor runs continuously for more than 120 minutes and the following conditions are satisfied, the compressor ceases operation:
 - Calculated frequency (F_b) is less than minimum limit frequency ($F_{min} = 12 \text{ Hz}$).
 - Compressor runs at F_{min} for more than 10 minutes.
 - $T1 \leq (T_S - 2 \text{ °C})$.
- If one of the following conditions is satisfied, the measures above will not be considered.
 - Compressor running frequency (F_r) > test frequency (F_T).
 - Compressor running frequency = test frequency and $T4 > 15 \text{ °C}$ or T4 error.
 - When you change the set temperature.
 - Turbo or sleep function switched on or off.
 - Various frequency limit shutdowns occurred.

Indoor Fan Control

In cooling mode, the indoor fan operates continuously. The fan speed can be set to 1...100 % or to automatic mode. In auto fan mode the following tables apply.

T1-T _S [°C] drops below value	Fan Speed decreases to value
≤ 3.5	80 %
≤ 1	60 %
≤ 0.5	40 %
≤ 0	20 %
≤ -0.5	1 %

Table 10 Fan speed in auto fan mode

T1-T _S [°C] rises above value	Fan Speed increases to value
> 0	20 %
> 0.5	40 %
> 1	60 %
> 1.5	80 %
> 4	100 %

Table 11 Fan speed in auto fan mode

Outdoor Fan Control

- The outdoor unit will run at a different fan speed according to T4 and compressor running frequency.
- The fan speeds are different for different outdoor units.



The temperature cannot be adjusted or displayed in fan mode.

Condenser Temperature Protection

When the condenser temperature exceeds a configured value, the compressor ceases operation.

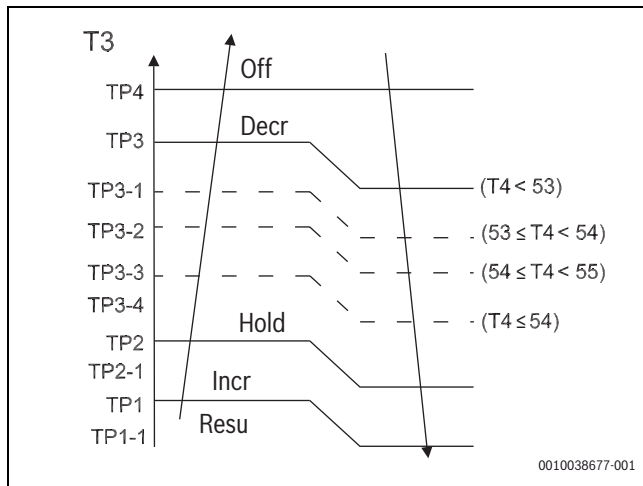


Fig. 8 Condenser temperature protection

- Off Compressor turns off
- Decr Compressor decreases performance
- Hold Compressor holds current performance
- Incr Compressor increases performance
- Resu Compressor resumes without limitation to performance
- TP Compressor discharge temperature
- T3 Coil temperature of condenser

Evaporator Temperature Protection

If the coil temperature of the evaporator T2 falls below 4 °C, the compressor decreases the running frequency to the next lower level every 1 minute.

- If T2 decreases further below 0 °C, the compressor turns off.
- If T2 increases above 4 °C, the compressor keeps the current frequency.
- If T2 increases above 7 °C, the compressor resumes without frequency limitation.

4.3.3 Heating Mode

Compressor Control

While trying to reach the set temperature:

- If the following conditions are satisfied, the compressor ceases operation.
 - Calculated frequency (F_b) is less than minimum limit frequency ($F_{min} = 12 \text{ Hz}$).
 - Compressor runs at F_{min} more than 10 minutes.
 - $T1 \geq T_s + 2 \text{ °C}$
- If one of the following conditions is satisfied, the protective measure above will not be considered.
 - Compressor running frequency (F_r) is more than test frequency (F_T).
 - When compressor running frequency = test frequency, $T4 \geq 15 \text{ °C}$ or T4 error.
 - When you change the set temperature.
 - Turbo or sleep function switched on or off.
- When the current is higher than the predefined safety limit, the protection will be activated and the compressor ceases the operation.

Indoor Fan Control

In heating mode, the indoor fan operates continuously. The fan speed can be set to 1...100 % or to auto mode. Anti-cold air function has priority.

Anti-cold air function: The indoor fan is controlled by the indoor temperature T1 and the indoor unit coil temperature T2.

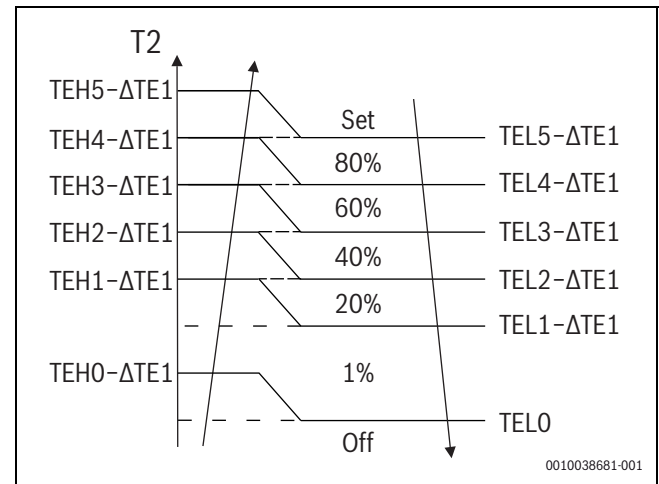


Fig. 9 Anti-cold air function

- Off Compressor turns off
- Set Set fan speed
- TEH.. Evaporator coil temperature (rising)
- TEL.. Evaporator coil temperature (decreasing)
- T2 Indoor unit coil temperature

T1 [°C]	ΔTE1 [°C]
≥ 19	0
≥ 15 and < 19	19 - T1 = 0...4
< 15	4

Table 12

In auto fan mode the following tables apply:

T1 - T _s [°C] drops below value	Fan Speed increases to value
≤ 0.5	20 %
≤ 0	60 %
≤ -1.5	80 %
≤ -3	100 %

Table 13 Fan speed in auto fan mode

T1 - T _s [°C] rises above value	Fan Speed decreases to value
> -1.5	80 %
> 0	60 %
> 0.5	40 %
> 1	20 %

Table 14 Fan speed in auto fan mode

Outdoor Fan Control

- The outdoor unit will be run at different fan speed according to T4 and compressor running frequency.
- The fan speeds are different for different outdoor units.

Defrosting mode

- The unit enters defrosting mode according to changes in the temperature value of T3, T4 and the compressor running time.
- In defrosting mode, the compressor continues to run, the indoor and outdoor motor will cease operation and the defrost light of the indoor unit will turn on. In the display, **dF** is displayed.
- In heating mode, if any of the following conditions is satisfied, defrosting ends and the machine switches to normal:
 - T3 rises above 16 °C
 - T3 stays above 6 °C for 80 seconds.
 - Unit runs for 15 minutes consecutively in defrosting mode.

- If T3 is lower than -3°C , compressor running time is more than 120 minutes and if any of the following conditions is satisfied, defrosting ends and the unit switches to normal heating mode:
 - T3 rises above 20°C .
 - T3 maintained above 10°C for 80 seconds
 - Unit runs for 15 minutes consecutively in defrosting mode.
- If T4 is lower than or equal to -22°C and compressor running time is more than 8 hours, defrosting starts. It ends if following conditions are satisfied:
 - Unit runs for 10 minutes consecutively in defrosting mode.
 - T3 rises above 10°C .

Evaporator Temperature Protection

If the coil temperature of the evaporator T2 rises above 52°C , the compressor reacts as follows:

- Between 52°C and $55,9^{\circ}\text{C}$ the compressor holds the current frequency.
- Between 56°C and 60°C , the compressor decreases the running frequency to the next lower level every 20 seconds.
- If the frequency is decreased to $F_{\min}$ (12 Hz) and T2 is still above 56°C , the compressor will stop.
- Above 60°C the compressor turns off.
- Below 52°C the compressor runs without limitation.

4.3.4 Dry mode

- In dry mode, the unit operates like the auto fan in cooling mode.
- All protections are activated and operate the same as in cooling mode.
- Low Room Temperature Protection: If the room temperature is below 10°C , the compressor stops and only restarts when the room temperature rises above 12°C .

4.3.5 Forced operation

Forced cooling mode

The compressor and outdoor fan continue to run (fixed at rated frequency), and the indoor fan runs at rated speed. After running for 30 minutes, the AC will switch to auto mode with a set temperature of 24°C .

Forced auto mode

Forced auto mode operates the same as normal auto mode with a set temperature of 24°C .

Exiting forced operation

The unit exits forced operation when it receives the following signals:

- ▶ Switch on/Switch off
- ▶ Timer on/Timer off
- ▶ Sleep mode
- ▶ Follow me
- ▶ Mode, fan speed or temperature settings are changed

Forced defrosting mode

- ▶ To enter forced defrosting, press the **AUTO/COOL** button for a few seconds when in forced cooling mode.
- ▶ Indoor fan will stop, defrosting lamp will light up.
- ▶ To quit this mode:
 - Quit normal defrosting.
 - Turn off by RC.
 - Press **AUTO/COOL button** again for a few seconds.

4.3.6 Timer

Timing range is 24 hours. Both of the following timers can be combined in any order:

- On-Timer on: When set, the unit will turn on automatically when reaching the set time.
- Off-Timer: When set, the unit will turn off automatically when reaching the set time.



Setting the timer will not change the operating mode. In case of a malfunction, timer settings are obsolete.

4.3.7 Sleep mode

The sleep function is available in cooling, heating or auto mode.

The operational process for sleep mode is as follows:

- When cooling, the temperature rises 1°C (to max. 30°C) every hour. After 2 hours, the temperature stops rising and the indoor fan is fixed at low speed.
- When heating, the temperature decreases 1°C (to min. 16°C) every hour. After 2 hours, the temperature stops decreasing and the indoor fan is fixed at low speed. Anti-cold air function takes priority.
- The unit exits this mode after 8 hours.



The timer can be set in this mode.

4.3.8 Auto-Restart

The indoor unit has an auto-restart module which allows the unit to restart automatically. The module stores the current settings and, in case of a sudden power failure, will restore those setting automatically within 3 minutes after return of power. If there is a power failure while the unit is running, the compressor starts 3 minutes after the unit restarts. If the unit was off before the power failure, the unit stands by.

4.3.9 Self-cleaning (iClean)

The unit has a self-cleaning function for the evaporator. The self-cleaning freezes dust, mould and grease. Everything is then quickly defrosted and dried with hot air. When this function is turned on, the indoor unit display shows **CL**. After 20 to 45 minutes, the self cleaning process is complete.

4.3.10 Follow me function

- Once active, the remote control will send a soundless signal every 3 minutes to the unit and the unit will set the temperature according to the measurements taken by the remote control.
- The unit will only change modes if the information given by the remote controller make it necessary.



The unit's temperature settings are ignored while the Follow me function is active. If the unit does not receive a signal for 7 minutes, the function turns off automatically. The unit will then regulate temperature based on its own sensor and settings again.

4.3.11 Frost protection

In heating mode, the temperature can be set to as low as 8°C , preventing the indoor area from freezing if unoccupied during severe cold weather.

4.3.12 Noise reduction

While this function is active, the indoor unit will run at only 1 % fan speed (faint breeze) to reduce noise to the lowest possible level.

4.3.13 Energy saving functions

- The following energy saving functions can be selected at the unit:
 - SAVE¹⁾**: operation with fan speed **AUTO** and set temperature of at least 24 °C
 - POWER CONTROL (75%)**: reduce power consumption by 25 %
 - POWER CONTROL (50%)**: reduce power consumption by 50 %
 - None of the above symbols: normal operation
- When the energy saving function is in conflict with other modes or when the set temperature is adjusted to less than 24 °C, the function will turn off.
- After 8 hours after temperature sensor malfunction, the energy saving function turns off automatically.
- Fan speed and temperature can still be set on the remote controller.

4.3.14 Wind avoid me (Indirect airflow function)

This feature avoids direct airflow blowing on the body and makes you feel indulging in silky coolness.



The indirect airflow function is available under cooling mode, fan-only mode and drying mode.

4.3.15 Wireless control function

The purpose of this function is to establish a connection via WLAN. If the unit is not displaying the function:

- Press the key repeatedly or the and keys until is displayed.
- Confirm selection with the **Ok** key.

5 Refrigerant

5.1 Recharge Refrigerant

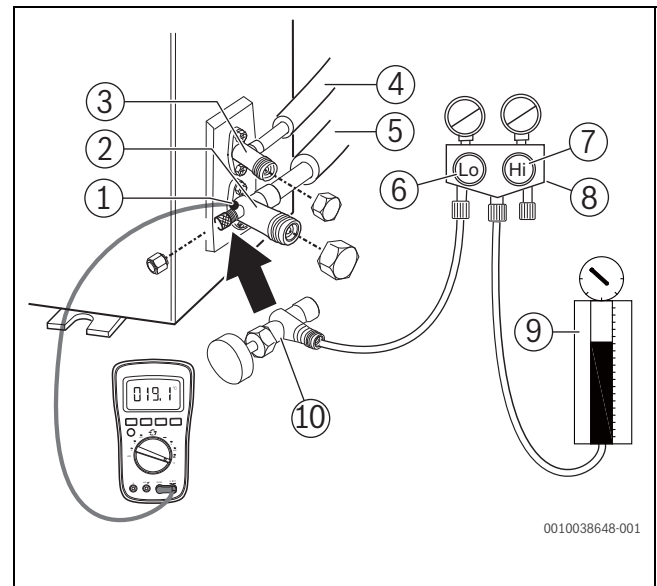


Fig. 10 Refrigerant recharge

- [1] Temperature measuring point
- [2] Gas valve
- [3] Liquid valve
- [4] Liquid pipe
- [5] Gas pipe
- [6] Low pressure control
- [7] High pressure control
- [8] Pressure gauge
- [9] Refrigerant bottle
- [10] Schrader valve opener

- Close the gas and the liquid valves.
- Connect the charge hose between pressure gauge and service port of the gas valve.
- Connect another charge hose between pressure gauge and valve on the refrigerant bottle.
- If necessary, invert the refrigerant bottle to ensure a complete liquid charge.
- Vacuum the set of gauges and charging hoses.
- Place the refrigerant bottle onto an electronic scale and record the starting weight.
- Fully open Schrader opening valve, gas valve and liquid valve.
- Operate the air conditioner in cooling mode to charge the system with liquid refrigerant.
- Slowly open the refrigerant bottle valve to charge the required amount of refrigerant.
- When the electronic scale displays the correct weight, close the refrigerant bottle valve and turn off the air conditioner.
- Unscrew and close the Schrader opening valve.
- Pump down and collect the refrigerant from the hoses into the system.
- Mount the caps of service port, gas and liquid valve.
- Use a torque wrench to tighten the caps to a torque of 18 Nm.
- Check for gas leakage.

1) Only in cooling mode

5.2 Evacuate Refrigerant for Re-Installation

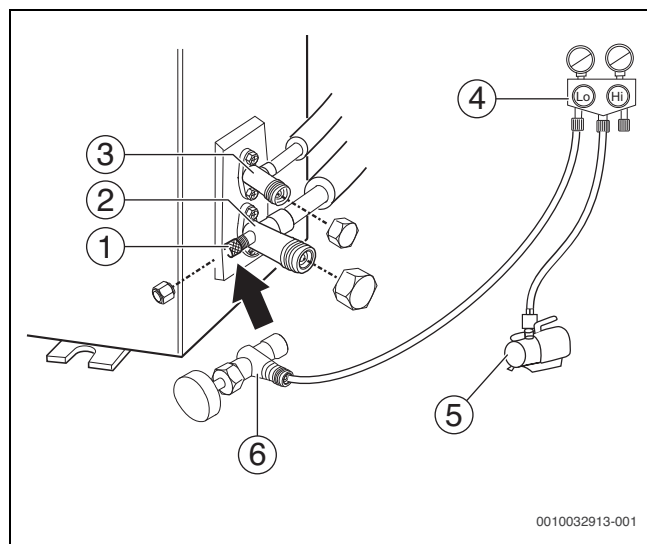


Fig. 11

- [1] Schrader valve opener connection point (service port)
- [2] Gas valve
- [3] Liquid valve
- [4] Pressure gauge
- [5] Vacuum pump
- [6] Schrader valve opener

5.2.1 Indoor Unit

Collecting the refrigerant in the outdoor unit

- ▶ Confirm that the liquid and gas valves are opened.
- ▶ Connect the charge hose between pressure gauge and service port of the gas valve.
- ▶ Connect another charge hose between pressure gauge and vacuum pump.
- ▶ Vacuum the set of gauges and charging hoses.
- ▶ Close the liquid valve.
- ▶ Operate the air conditioner in cooling mode. Cease operations when the gauge reaches 0.1 MPa. Close the gas valve so that the gauge rests between 0.3 MPa and 0.5 MPa.
- ▶ Disconnect the charge set and mount the caps of service port, liquid valve and gas valve.
- ▶ Use a torque wrench to tighten the caps to a torque of 18 Nm.
- ▶ Check for gas leakage.

Air purging with vacuum pump

- ▶ Tighten the flare nuts of the indoor and outdoor units, and confirm that liquid and gas valves are closed.
- ▶ Connect the charge hose between pressure gauge and service port of the gas valve.
- ▶ Connect another charge hose between pressure gauge and vacuum pump.
- ▶ Fully open the manifold valve.
- ▶ Using the vacuum pump, evacuate the system for at least 30 minutes.
- ▶ Check whether the compound meter indicates -0.1 MPa (approx. 500 microns).
 - If the meter does not indicate above pressure after 30 minutes, continue evacuating for an additional 20 minutes.
 - If the pressure does not achieve above pressure after 50 minutes, check for leakage.
 - If the pressure successfully reaches above pressure, fully close the manifold valve, then cease vacuum pump operations.

- ▶ Wait for 5 minutes then check whether the gauge needle moves after turning off the vacuum pump. If the gauge needle moves backward, check whether there is gas leakage.
- ▶ Loosen the flare nut of the lower valve for 6 or 7 seconds and then tighten the flare nut again.
- ▶ Confirm the pressure display in the pressure indicator is slightly higher than the atmospheric pressure.
- ▶ Remove the charge hose from the gas valve.
- ▶ Fully open the liquid and gas valves and tighten their caps.

5.2.2 Outdoor Unit

Evacuation for the whole system

- ▶ Confirm that the liquid and gas valves are opened.
- ▶ Connect the vacuum pump to the gas valve's service port.
- ▶ Evacuate the system for approximately one hour. Confirm that the compound meter indicates -0.1 MPa (approx. 500 microns).
- ▶ Close the manifold valve on the charge set and turn off the vacuum pump.
- ▶ Wait for 5 minutes then check whether the gauge needle moves after turning off the vacuum pump.
- ▶ If the gauge needle moves backward, check whether there is gas leakage.
- ▶ Disconnect the charge hose from the vacuum pump.
- ▶ Mount the caps of service port, liquid valve and gas valve.
- ▶ Use a torque wrench to tighten the caps to a torque of 18 Nm.

Refrigerant charging

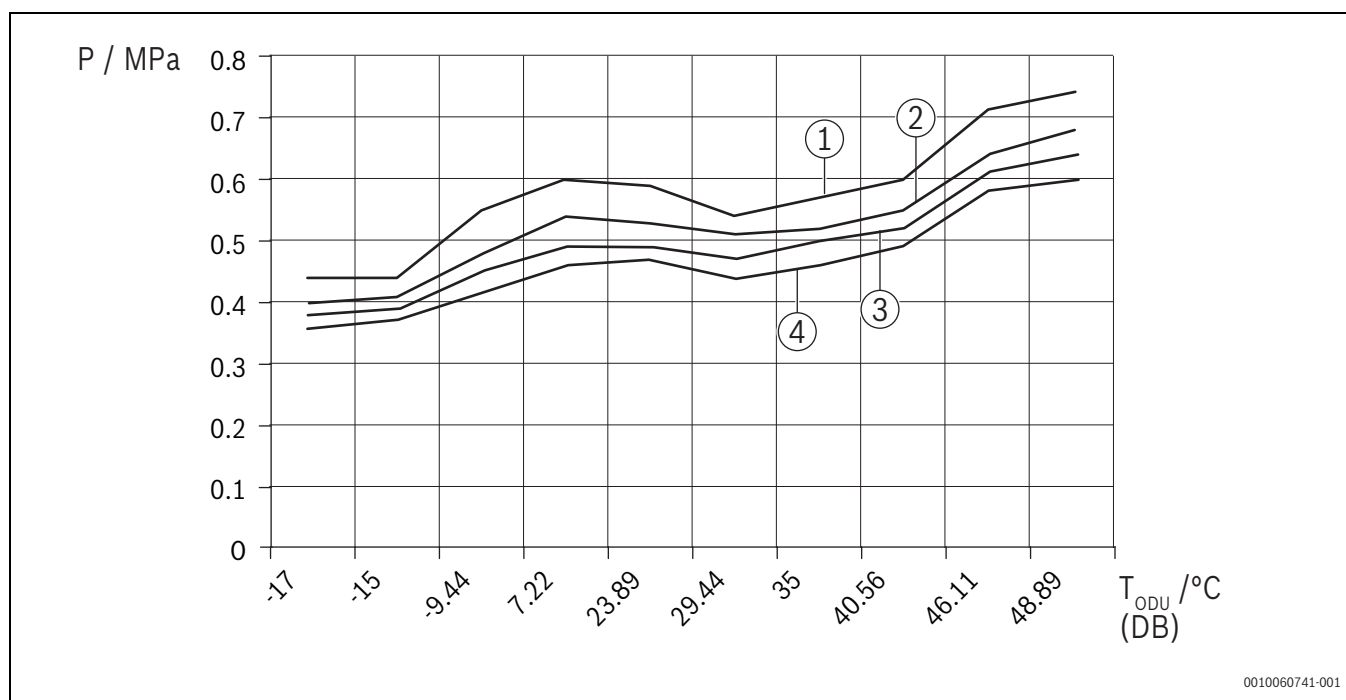
- ▶ Charge the refrigerant according to page 19.

5.3 Pressure on service port for refrigerant R290

5.3.1 Cooling chart

Unit for pressure	DB/WB T _{IDU} [°C]	DB T _{ODU} [°C]									
		-17	-15	-9.44	7.22	23.89	29.44	35	40.56	46.11	48.89
		Pressure on service port									
bar	70/59	3.6	3.7	4.2	4.6	4.7	4.4	4.6	4.9	5.8	6.0
	75/63	3.8	3.9	4.5	4.9	4.9	4.7	5.0	5.2	6.1	6.4
	80/67	4.0	4.1	4.8	5.4	5.3	5.1	5.2	5.5	6.4	6.8
	90/73	4.4	4.4	5.5	6.0	5.9	5.4	5.7	6.0	7.1	7.4
psi	70/59	53	54	60	66	68	64	67	71	84	88
	75/63	55	56	66	71	71	68	72	75	88	92
	80/67	59	59	70	79	77	74	75	80	92	99
	90/73	64	64	79	87	85	79	83	88	103	108
MPa	70/59	0.36	0.37	0.42	0.46	0.47	0.44	0.46	0.49	0.58	0.60
	75/63	0.38	0.39	0.45	0.49	0.49	0.47	0.50	0.52	0.61	0.64
	80/67	0.40	0.41	0.48	0.54	0.53	0.51	0.52	0.55	0.64	0.68
	90/73	0.44	0.44	0.55	0.60	0.59	0.54	0.57	0.60	0.71	0.74

Table 15 Pressure on service port in cooling mode



0010060741-001

Fig. 12 Pressure on service port in cooling mode

DB/WB T_{IDU} [°C]:

- [1] 90/73
- [2] 80/67
- [3] 75/63
- [4] 70/59

DB Dry bulb temperature

P Pressure on service port

T_{IDU} Temperature at indoor unit

T_{ODU} Temperature at outdoor unit

WB Wet bulb temperature

5.3.2 Heating chart

Unit for pressure	DB T _{IDU} °C	DB/WB T _{ODU} °C						
		13.89/11.67	8.33/6.11	2.78/0.56	-2.78/-5	-8.33/-10.56	-17/-19	-27/-28
		Pressure on service port						
bar	55	16.2	14.4	13.0	11.9	10.5	9.4	0.9
	65	17.1	15.2	14.5	13.3	11.7	10.8	1.1
	75	17.9	15.8	15.0	14.2	12.3	11.4	1.1
psi	55	250	235	209	188	172	153	136
	65	268	248	220	210	193	169	157
	75	279	260	230	217	206	178	165
MPa	55	1.73	1.62	1.44	1.30	1.19	1.05	0.94
	65	1.85	1.71	1.52	1.45	1.33	1.17	1.08
	75	1.93	1.79	1.58	1.50	1.42	1.23	1.14

Table 16 Pressure on service port in heating mode

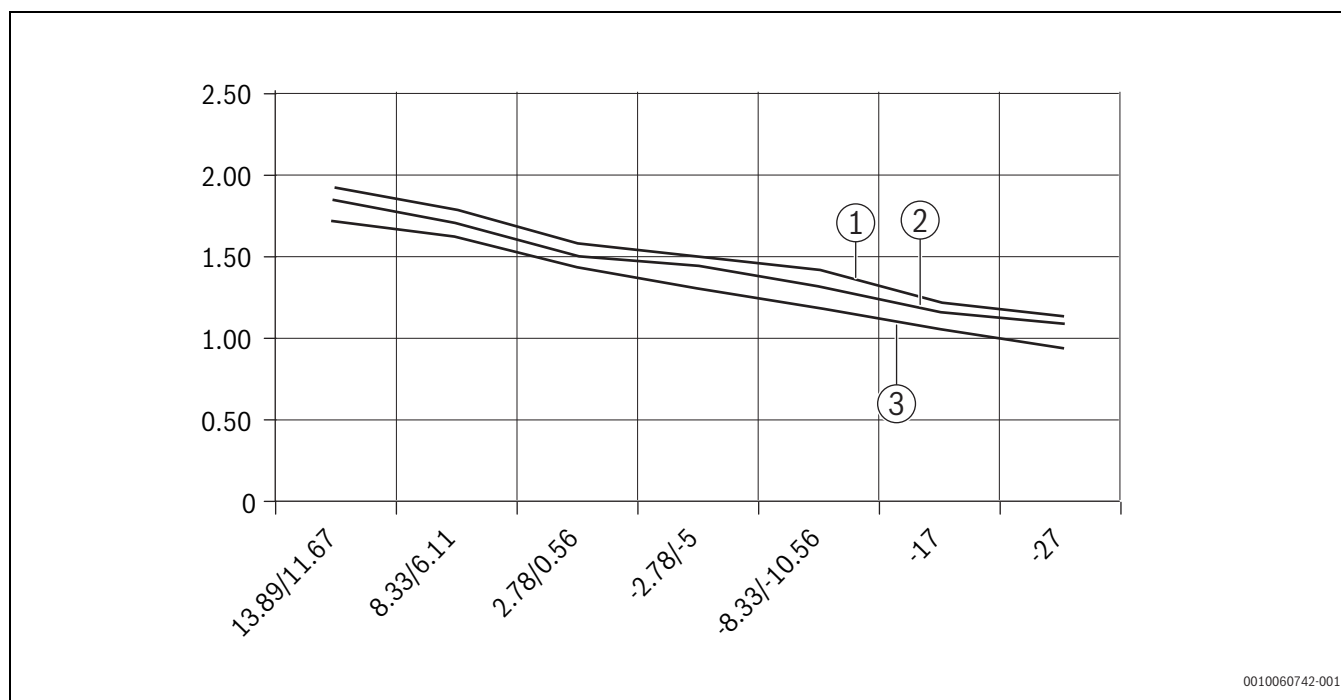


Fig. 13 Pressure on service port in heating mode

DB T_{IDU} [°C]:

- [1] 75
- [2] 65
- [3] 55

DB Dry bulb temperature

P Pressure on service port

T_{IDU} Temperature at indoor unit

T_{ODU} Temperature at outdoor unit

WB Wet bulb temperature

5.3.3 System pressure table

kPa	Pressure		Temperature °C
	bar	psi	
100	1	14.5	-42.412
150	1.5	21.75	-32.818
200	2	29	-25.451
250	2.5	36.25	-19.382
300	3	43.5	-14.176
350	3.5	50.75	-9.589
400	4	58	-5.471
450	4.5	65.25	-1.722
500	5	72.5	-1.729
550	5.5	79.75	4.931
600	6	87	7.924
650	6.5	94.25	10.738
700	7	101.5	13.396
750	7.5	108.75	15.918
800	8	116	18.318
850	8.5	123.25	20.611
900	9	130.5	22.806
950	9.5	137.75	24.914
1000	10	145	26.942
1050	10.5	152.25	28.897
1100	11	159.5	30.785
1150	11.5	166.75	32.611
1200	12	174	34.38
1250	12.5	181.25	36.096
1300	13	188.5	37.763
1350	13.5	195.75	39.383
1400	14	203	40.959
1450	14.5	210.25	42.495
1500	15	217.5	43.993
1550	15.5	224.75	45.455
1600	16	232	46.882
1650	16.5	239.25	48.277
1700	17	246.5	49.642
1750	17.5	253.75	50.977
1800	18	261	52.285
1850	18.5	268.25	53.566
1900	19	275.5	54.822
1950	19.5	282.75	56.054
2000	20	290	57.262
2050	20.5	297.25	58.449
2100	21	304.5	59.614
2150	21.5	311.75	60.759
2200	22	319	61.884
2250	22.5	326.25	62.991
2300	23	333.5	64.079
2350	23.5	340.75	65.15
2400	24	348	66.204
2450	24.5	355.25	67.241
2500	25	362.5	68.263

Table 17 System pressure table

6 Indoor Unit Disassembly



Figures are for reference only. Actual unit's appearance may vary.

6.1 Front Panel

- Hold the front panel [1] by the tabs [2] on both sides and lift it.

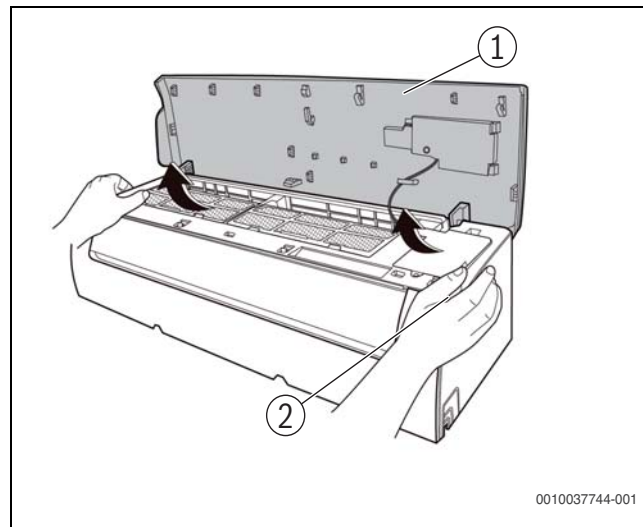


Fig. 14

- [1] Front panel
- [2] Tab

- Push up the bottom of high density air filter and then pull it out downwards.

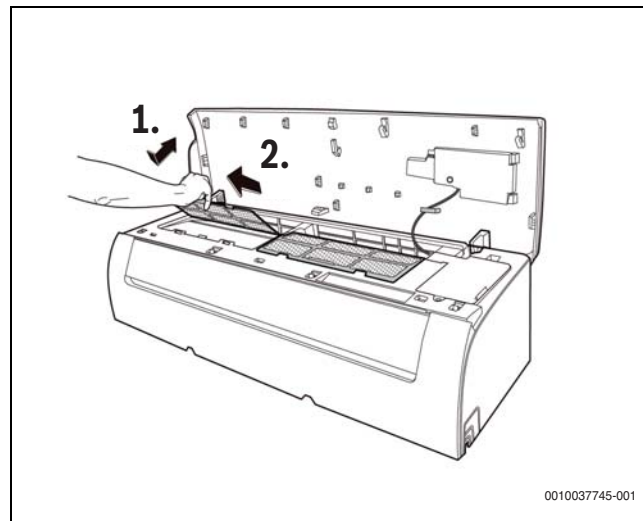


Fig. 15

- Open the horizontal louver [2] and push the hook [1] sideways to open it.

- Bend the horizontal louver lightly by both hands to loosen the other hook [3], then remove the horizontal louver.

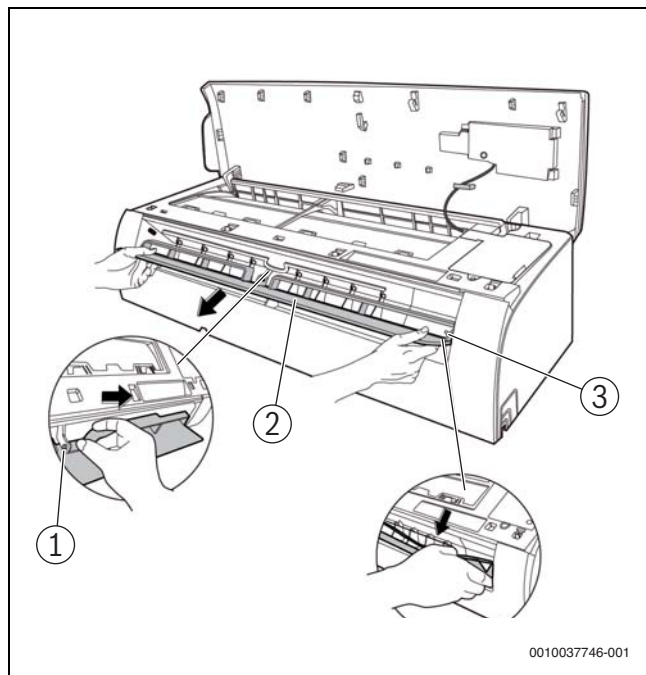


Fig. 16

- [1] Hook
- [2] Horizontal louver
- [3] Hook

- Open the electrical cover with a screw driver, rotate it to the left, and then remove it.

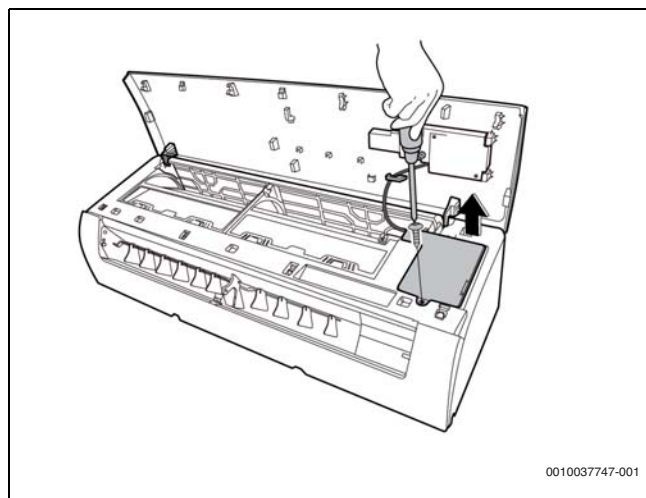


Fig. 17

- Disconnect the connector for display board.

- Slide the front panel smoothly left/right to release each axis.

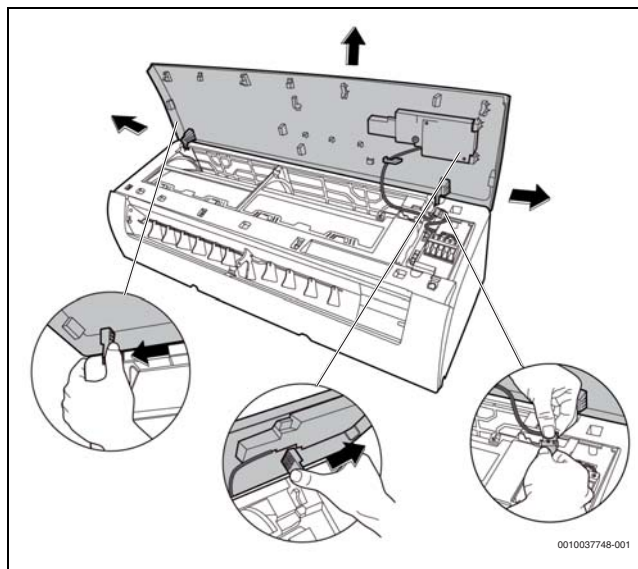


Fig. 18

- Open the screw cap and then remove the 3 screws.

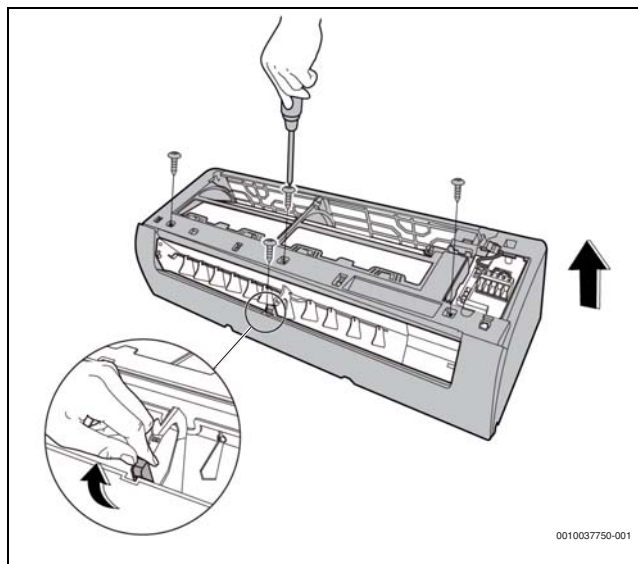


Fig. 19

- Release the hooks with hands.

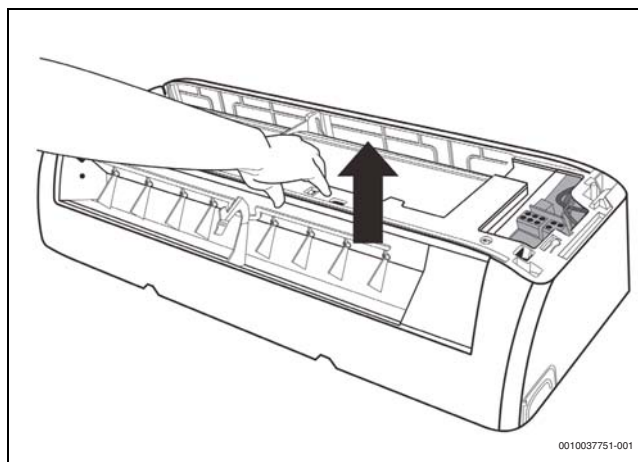


Fig. 20

- Release the 5 hooks above.

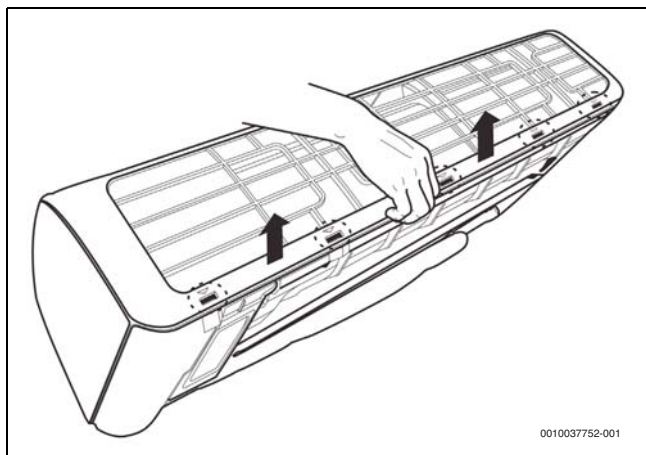


Fig. 21

- Pull out the panel frame while pushing the hook through a clearance between the panel frame and the heat exchanger.

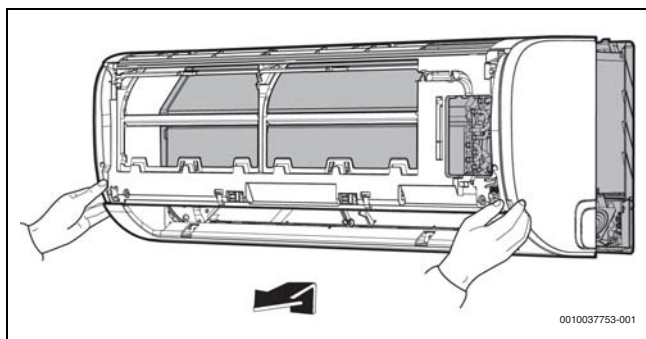


Fig. 22

- Remove the screw and then remove the refrigerant sensor.

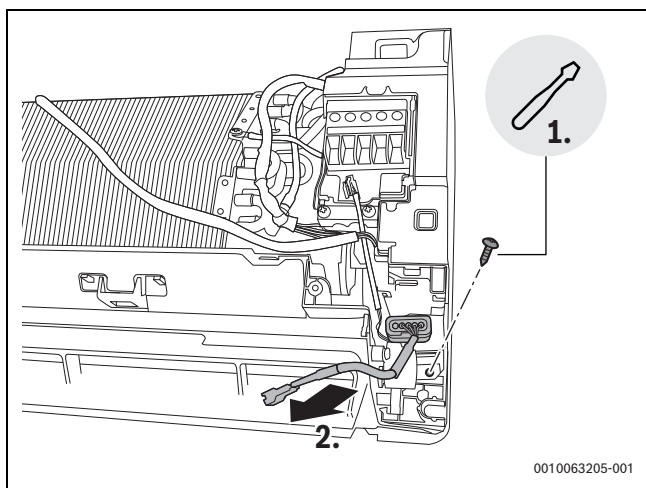


Fig. 23

- Release the 5 hooks of the vertical blades, then pull the vertical blades rightward and remove it.

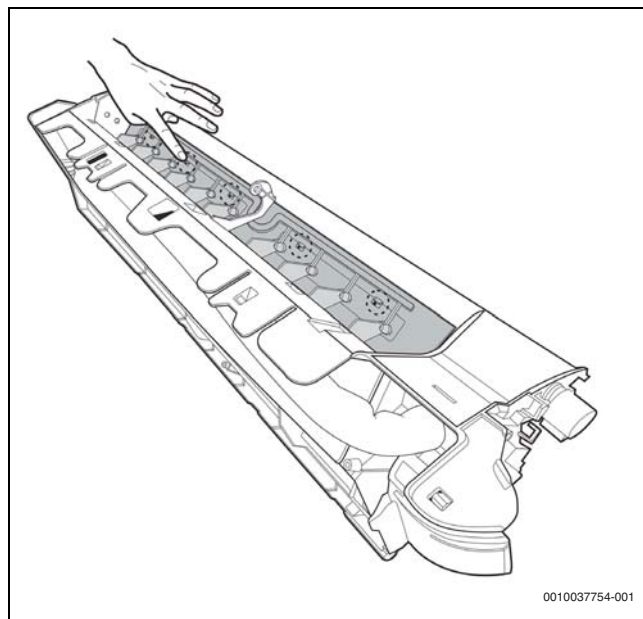


Fig. 24

- Remove 1 screw of the display board.
- Rotate the display board in the direction shown in the right picture.

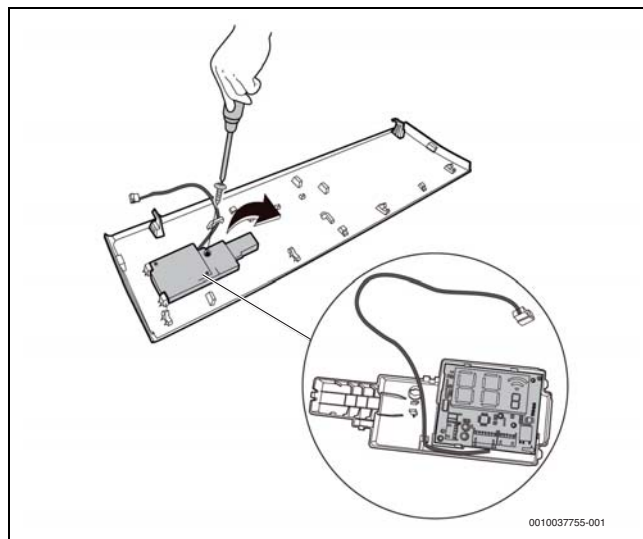


Fig. 25

6.2 Electrical parts



Remove front panel (→ page 23) before disassembling electrical parts.

NOTICE

Risk of static discharge.

Static charges can destroy sensitive electronics parts.

- ▶ Wear antistatic gloves.

If you want to repair the electrical control box components:

- ▶ Remove one fixing screw of electrical control box subassembly.

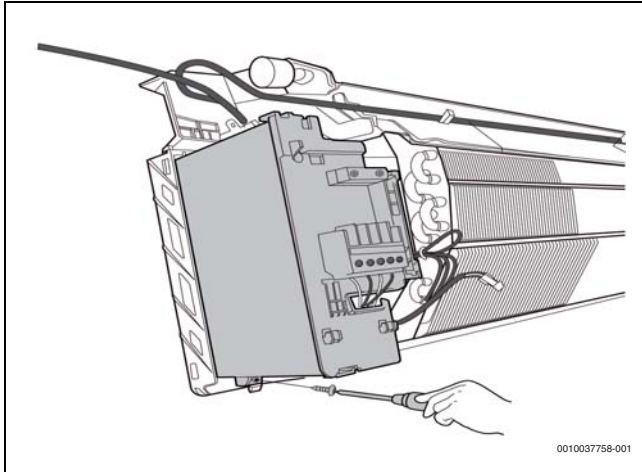


Fig. 26

If you want to repair the main control board assembly:

- ▶ Cut the cable tie, then pull out the evaporator coil temperature sensor (T2) [2].
- ▶ Remove one fixing screw of the electronic control box and two screws used for the ground connection.

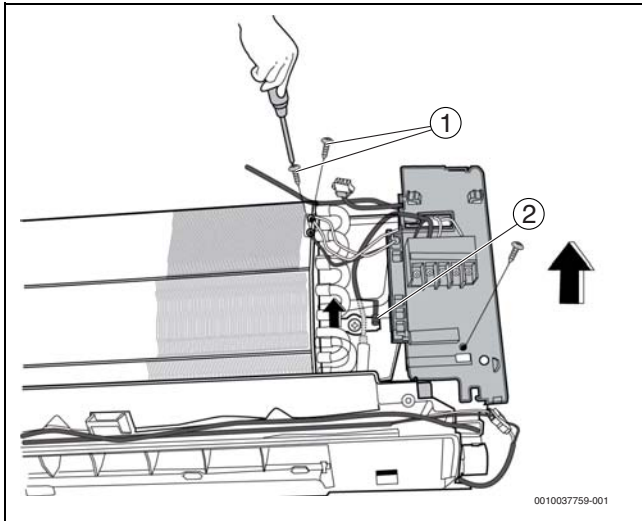


Fig. 27

- [1] Ground Screws
- [2] T2 Sensor (evaporator coil temperature)

- ▶ Pull out the electrical main board along the direction indicated below.

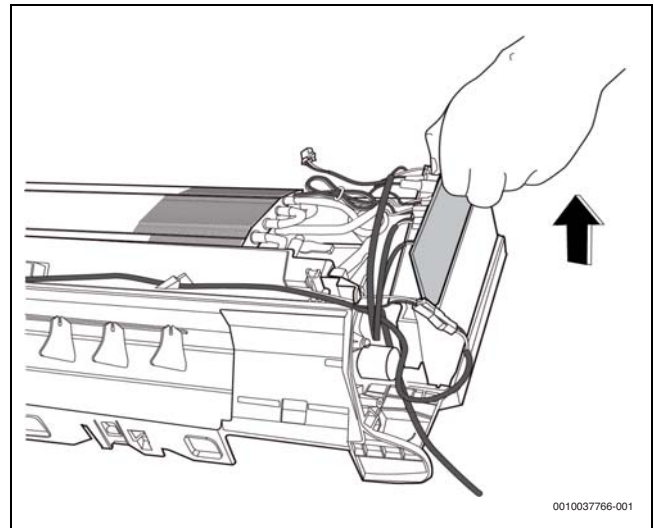


Fig. 28

- ▶ Disconnect the connectors and remove main control board.

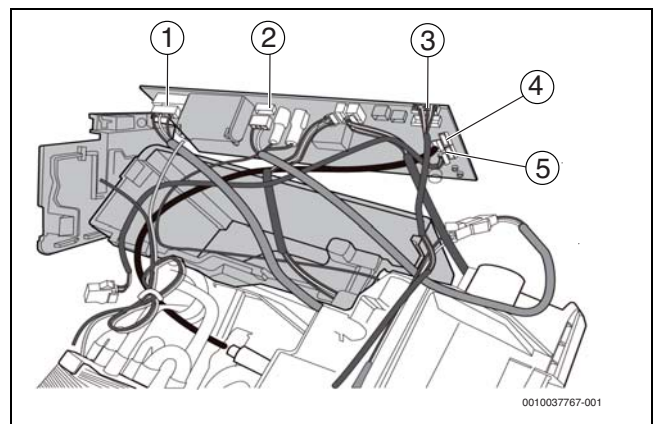


Fig. 29

- [1] Fan motor
- [2] Ionizer
- [3] Swing motor
- [4] T1 Sensor
- [5] T2 Sensor

6.3 Evaporator



Disassemble electrical parts (→ page 26) before disassembling the evaporator.

- Disassemble the pipe holder located at the rear of the unit.

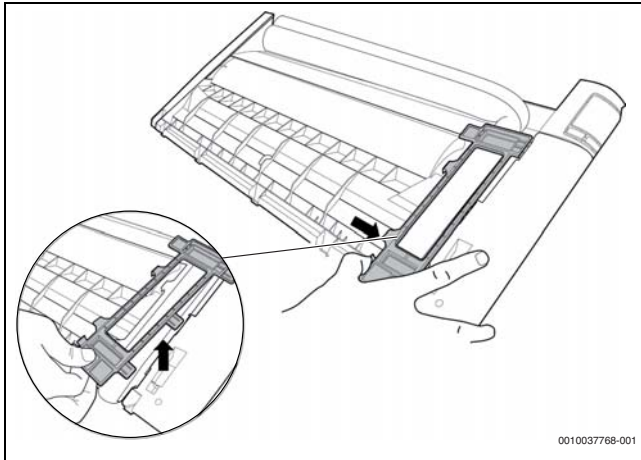


Fig. 30

- Remove the 1 screws on the evaporator located at the fixed plate.

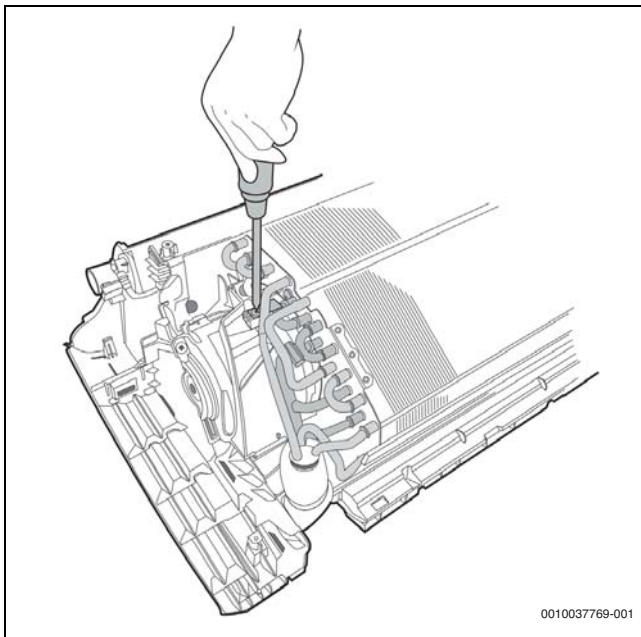


Fig. 31

- Remove 1 screw and release the hook on the evaporator.

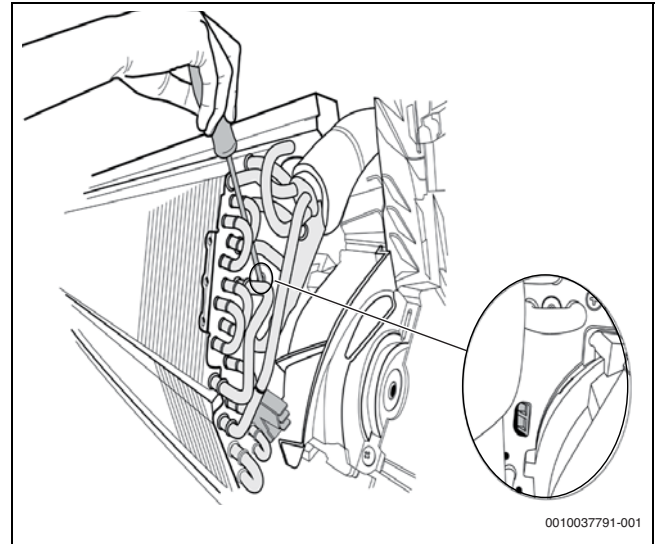


Fig. 32

- Remove the 2 screws on the evaporator located at the fixed plate

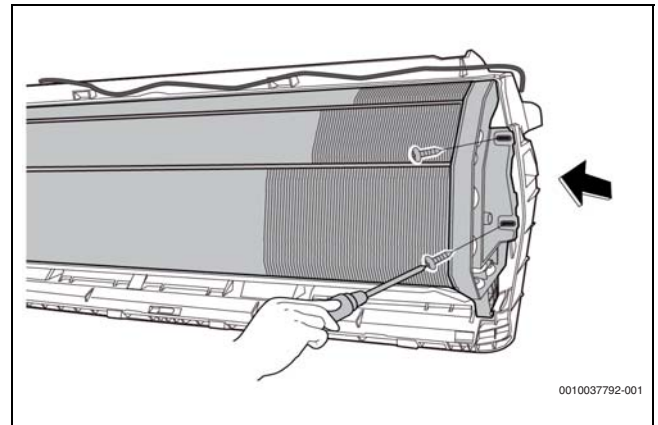


Fig. 33

- Pull out the evaporator.

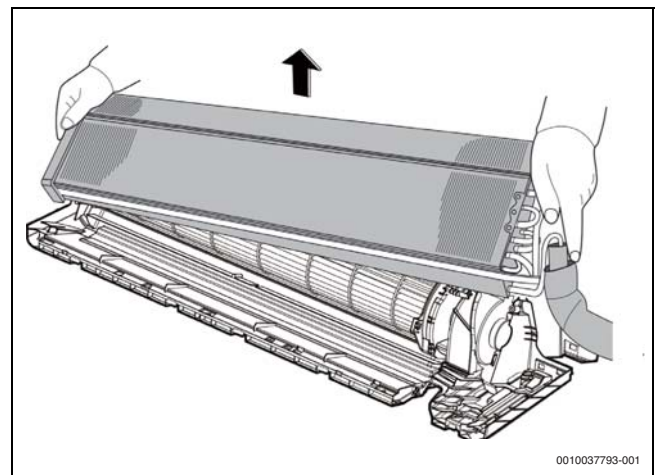


Fig. 34

6.4 Fan motor and fan



Disassemble the evaporator (→ page 27) before disassembling fan motor and fan.

- ▶ Remove the two screws [1] and remove the fixing board of the fan motor.

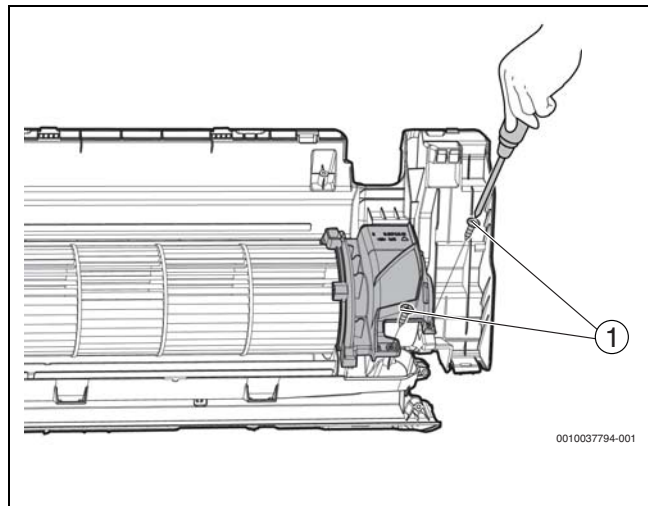


Fig. 35

[1] Screws

- ▶ Remove the bearing sleeve.

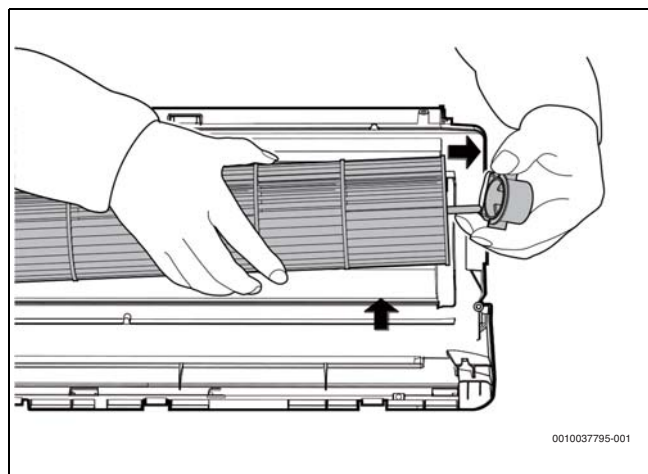


Fig. 36

- ▶ Remove the fixing screw [1].
- ▶ Pull out the fan motor and fan assembly from the side.

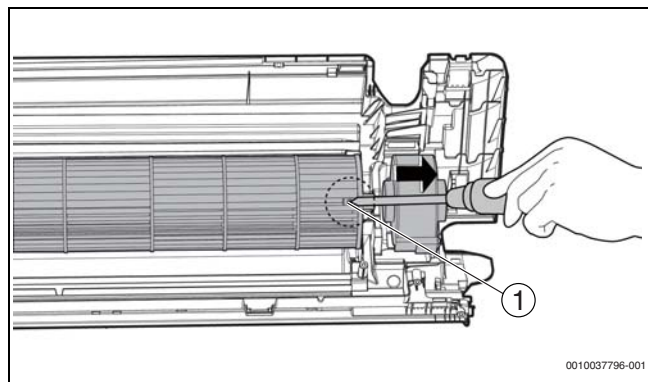


Fig. 37

[1] Fixing Screw

6.5 Swing motors



Disassemble electrical parts (→ page 26) before disassembling the swing motors.

- ▶ Remove the two screws, then remove the horizontal swing motor.

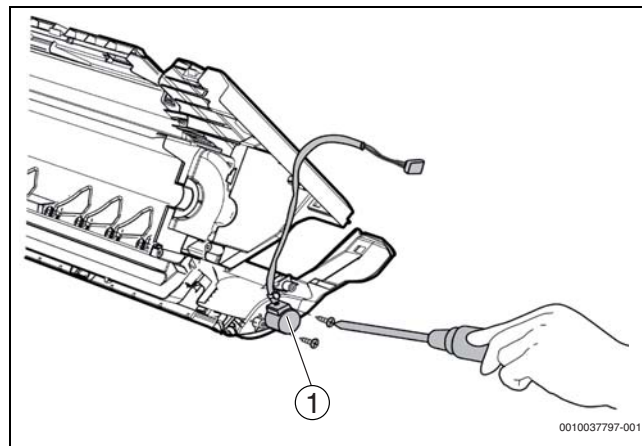


Fig. 38

[1] Horizontal swing motor

- ▶ Remove 1 screw, then remove the vertical swing motor [1].
- ▶ Remove 1 screw, then remove the ionizer generator [2].

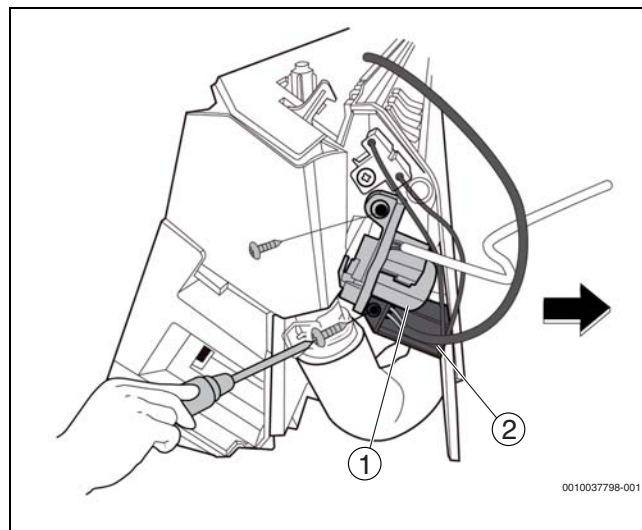


Fig. 39

[1] Vertical swing motor
[2] Ionizer generator

6.6 Drain Hose

- Rotate the fixed wire clockwise indicated in right image.

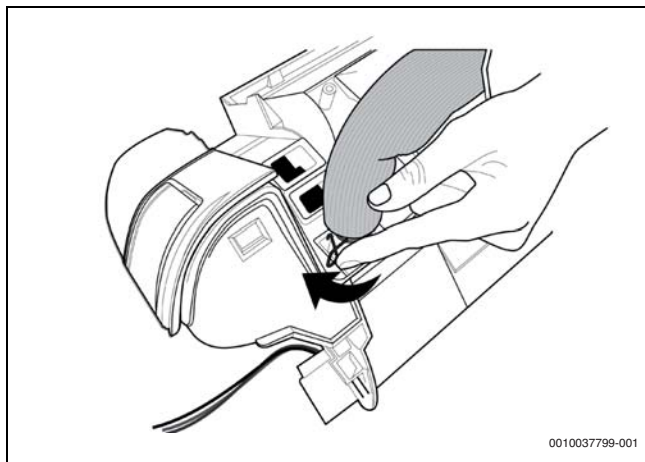


Fig. 40

- Pull up the drain hose to remove it.

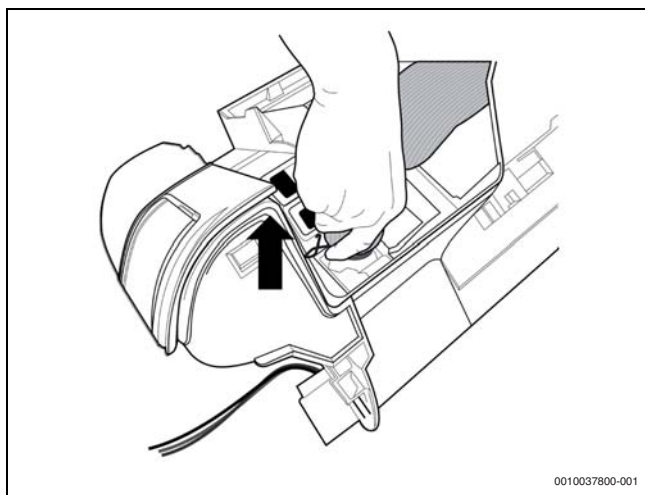


Fig. 41

6.7 R290 Leakage sensor

The R290 leakage sensor is located below the electrical control box, at the bottom-right corner of the indoor unit.



The R290 leakage sensor can only be removed once the indoor unit disassembly process is completed.

To remove the sensor, do the steps that follow:

- Disconnect the two cable connectors.
- Remove the R290 leakage sensor.

7 Outdoor Unit Disassembly



Figures are for reference only. Actual unit's appearance may vary.

7.1 Panel Plate

7.1.1 CL6000iP 26, CL6000iP 35

- Turn off the air conditioner and the power breaker.
- Remove the screw of the big handle and then remove the big handle [1] (1 screw).

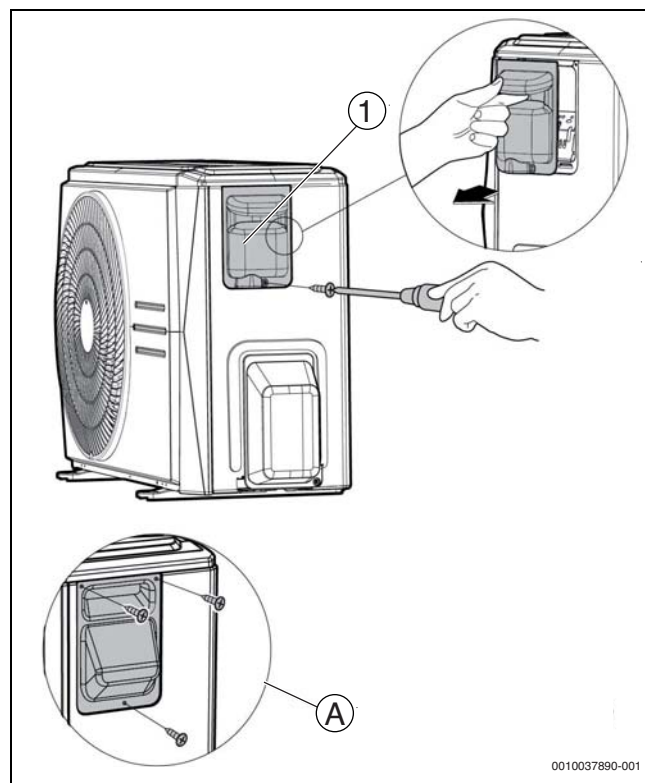


Fig. 42

[1] Big Handle

[A] 3 screws for some models

- Remove the screws of the top cover [1] and then remove the top cover (3 screws). One of the screws is located underneath the big handle.

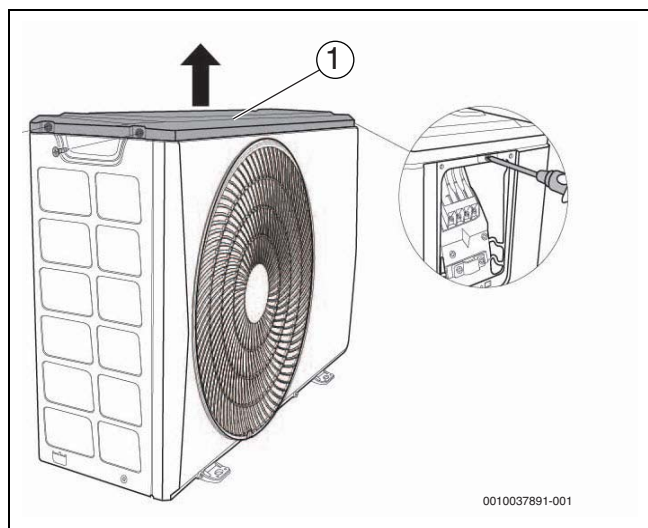


Fig. 43

[1] Top Cover

- Remove the screws of dust cover [1] and then remove the dust cover (2 screws).

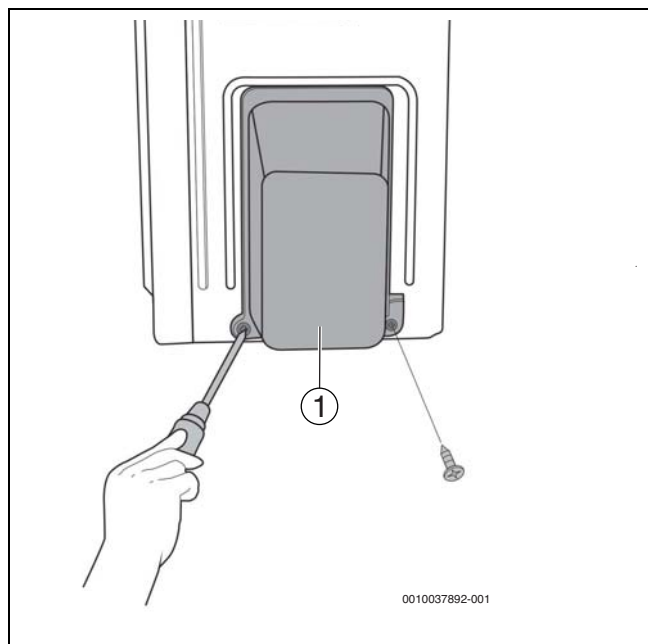


Fig. 44

[1] Dust Cover

- Remove the screws of the front panel [1] and then remove the front panel (8 screws).

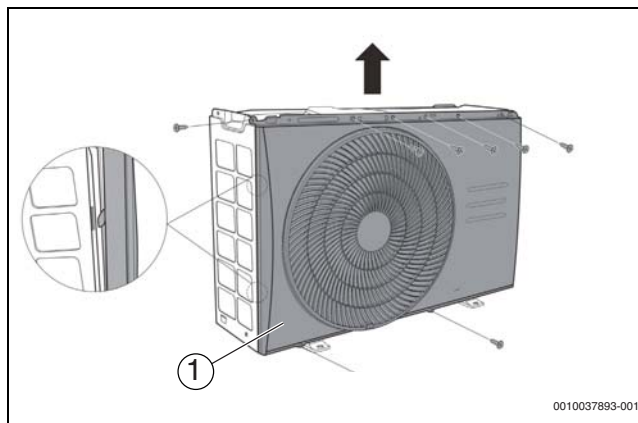


Fig. 45

[1] Front Panel

- Remove the screws of the right panel [1] and then remove the right panel (5 screws).

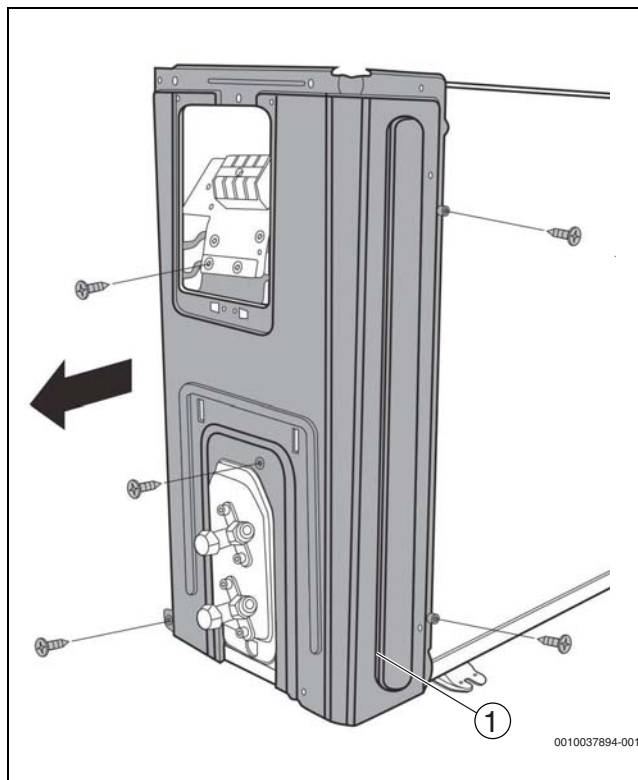


Fig. 46

[1] Right Panel

7.2 Electrical Parts

NOTICE

Risk of static discharge.

Static charges can destroy sensitive electronics parts.

- Wear antistatic gloves.



Disassemble panel plate (→ page 29) before disassembling electrical parts.

PCB board for units with 9 to 18 kBTU/h

- Disconnect the connector for compressor and release the ground wire (1 screw).

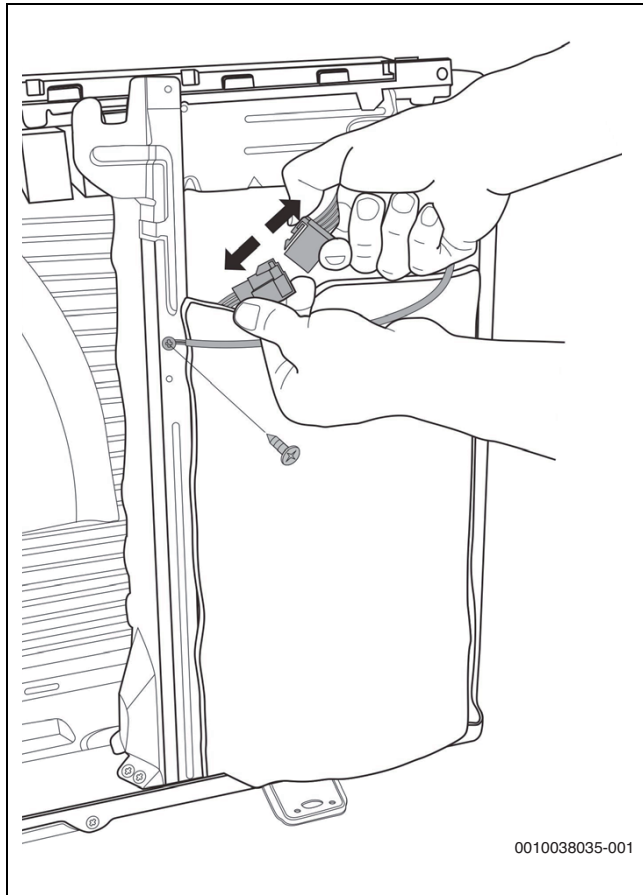


Fig. 47

- Pull out the wires from electrical supporting plate and turn over the electronic control assembly.

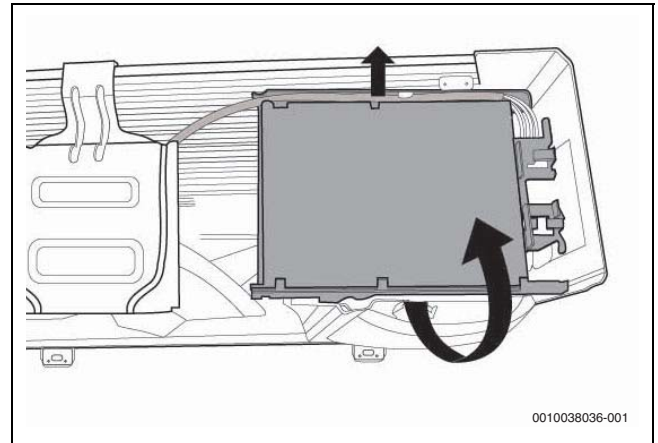


Fig. 48

- Remove the electronic installing box subassembly (4 hooks).

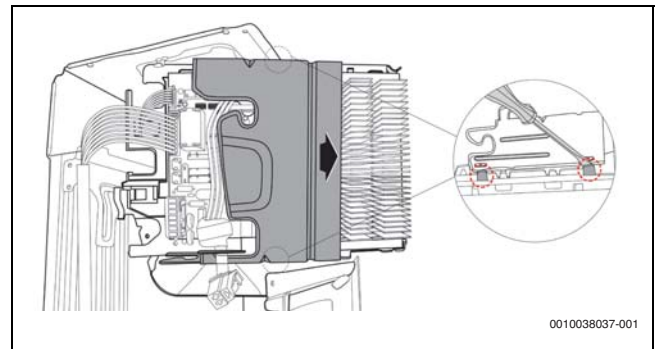


Fig. 49

- Remove the fixing board (2 hooks).

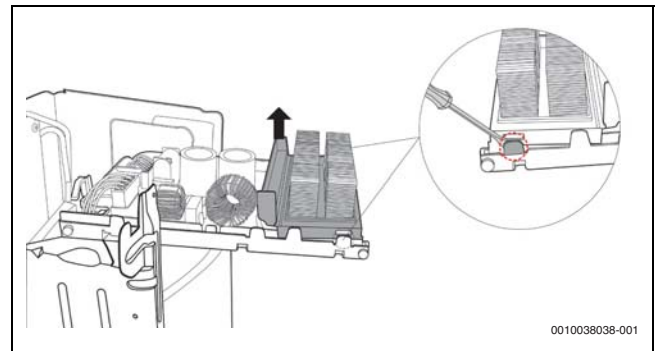


Fig. 50

- ▶ Disconnect the connectors from the electronic control board.

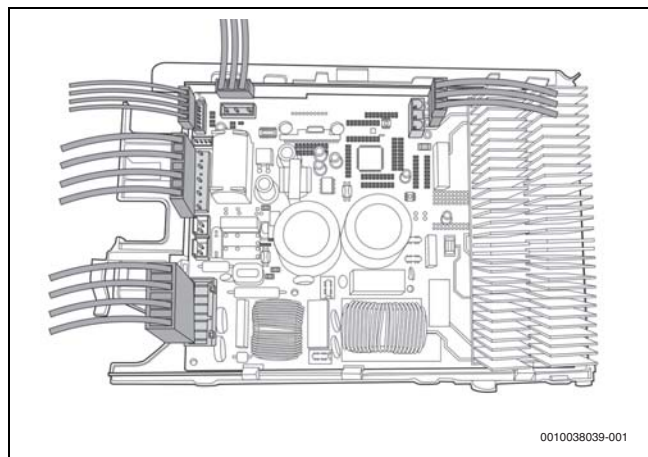


Fig. 51

- ▶ Then remove the electronic control board (4 hooks).

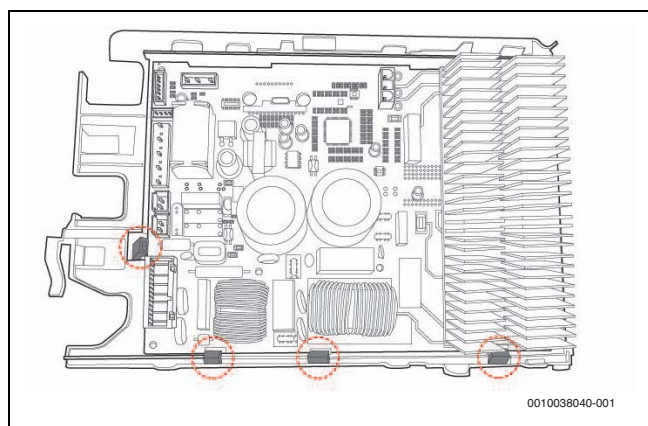


Fig. 52

7.3 Fan and fan motor



Remove the panel plate (→ page 29) before disassembling the fan and fan motor.

- ▶ Remove the nut securing the fan with a spanner.
- ▶ Remove the fan.

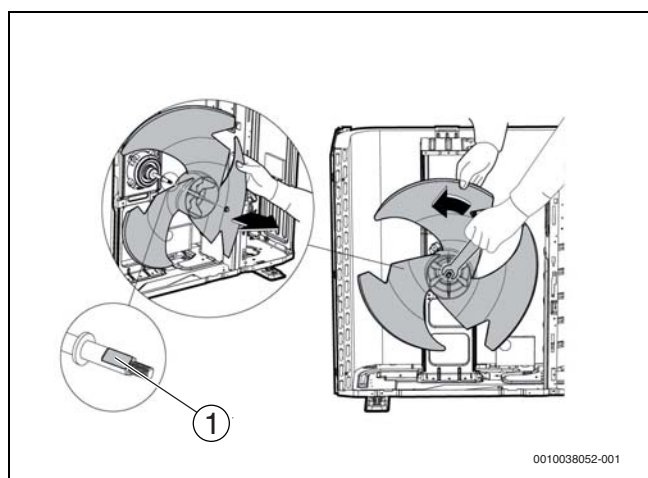


Fig. 53

[1] D-Cut

- ▶ Remove the connection of the fan motor on the PCB (→ page 31).
- ▶ Remove the fixing screws of the fan motor (4 screws).

- ▶ Remove the fan motor.

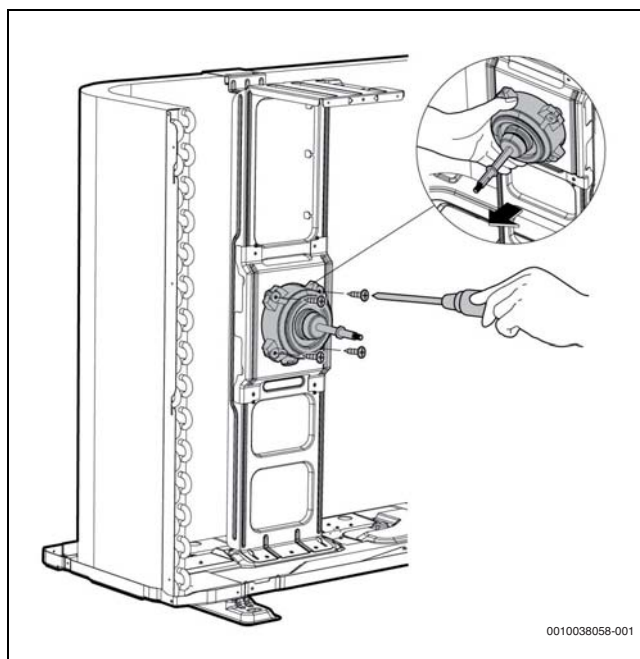


Fig. 54

7.4 Sound blanket



Remove the panel plate (→ page 29) before disassembling the sound blanket.

- ▶ Remove the sound blanket (side [2] and top [1]).

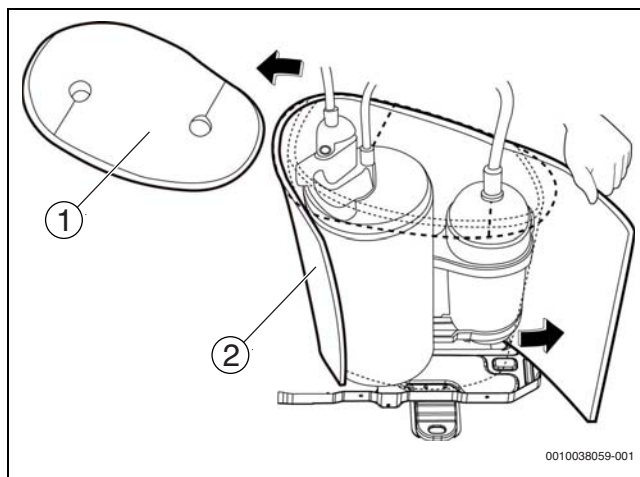


Fig. 55

- [1] Sound Blanket (top)
- [2] Sound Blanket (side)

7.5 Four-way valve



WARNING

Refrigerant leakage

- ▶ Evacuate the system and confirm that there is no refrigerant left in the system before removing the four-way valve.



Remove the panel plate (→ page 29) and disconnect the four way valve on the PCB (→ page 31) before disassembling the four-way valve.

- ▶ Heat up the brazed parts and then detach the four-way valve and the pipe.
- ▶ Remove the four-way valve assembly with pliers.

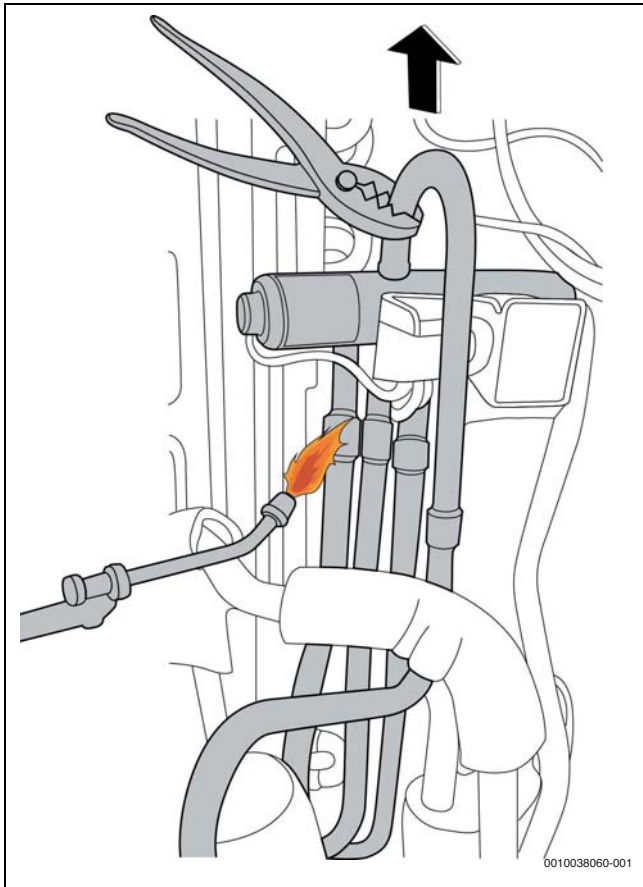


Fig. 56

7.6 Compressor



WARNING

Refrigerant leakage

- ▶ Evacuate the system and confirm that there is no refrigerant left in the system before removing the compressor.



Remove the panel plate (→ page 29) and disconnect the compressor on the PCB (→ page 31) before disassembling the compressor.

- ▶ Remove the flange nut of terminal cover [1] and remove the terminal cover.

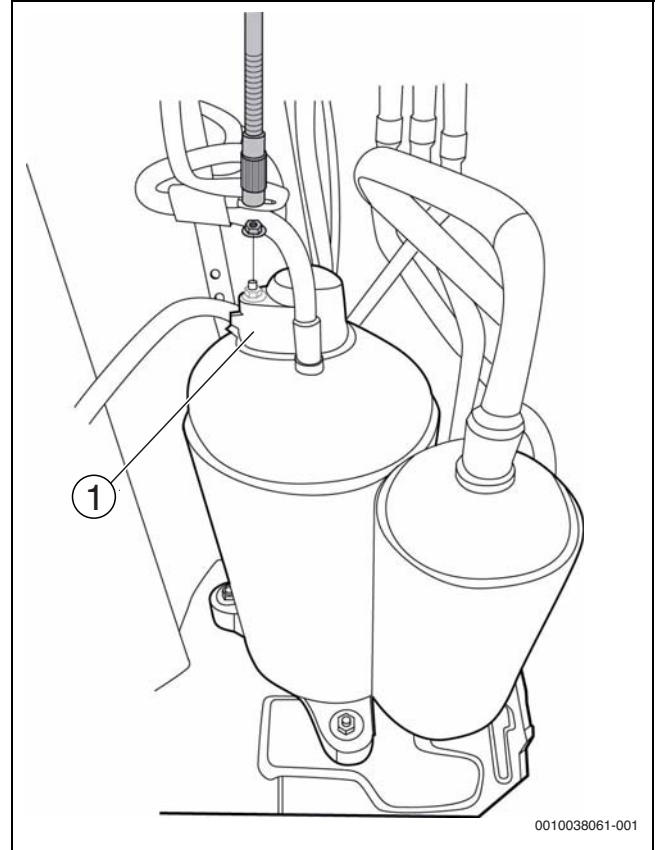


Fig. 57

[1] Terminal Cover

- Disconnect the connectors.

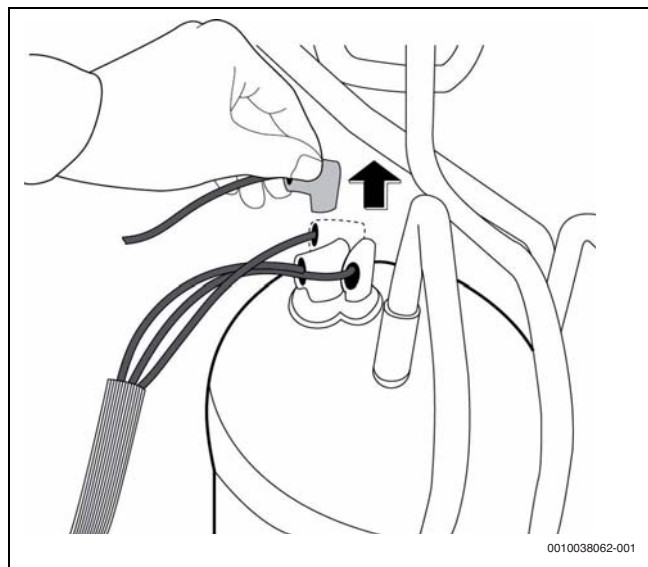


Fig. 58

- Remove the hex nuts and washers securing the compressor, located on the bottom plate.

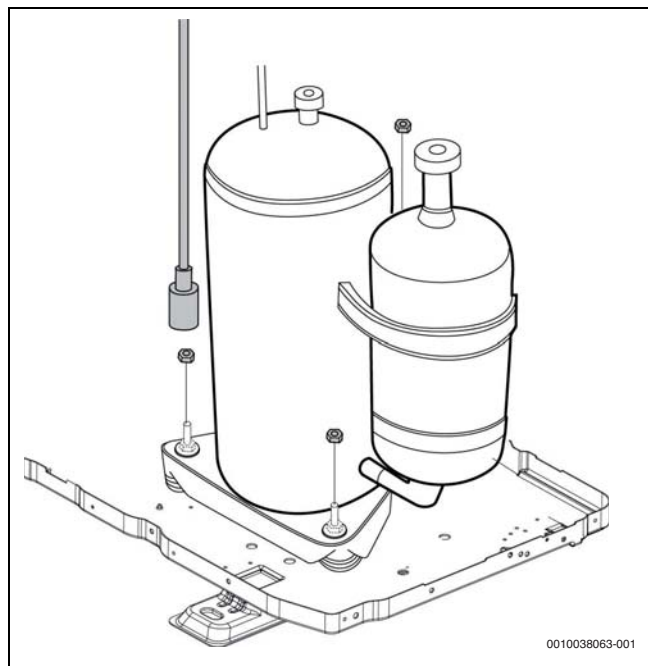


Fig. 59

- Heat up the brazed parts and then remove the discharge pipe [1] and the suction pipe [2].

- Lift the compressor from the base pan assembly with pliers.

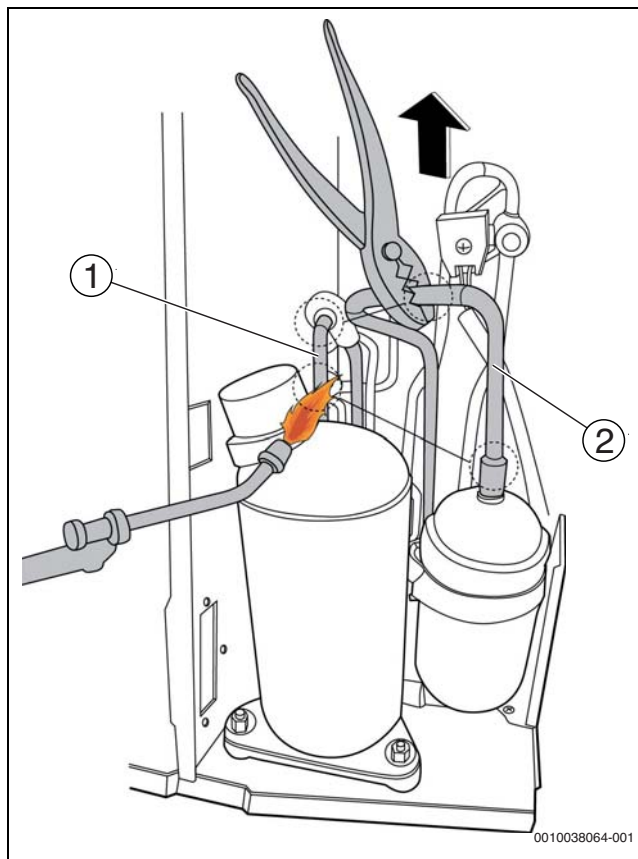


Fig. 60

- [1] Discharge Pipe
- [2] Suction Pipe

8 Diagnosis and troubleshooting



WARNING

- All electrical work must be carried out by competent and suitably qualified, certified and accredited professionals and in accordance with all applicable legislation (all national, local and other laws, standards, codes, rules, regulations and other legislation that apply in a given situation).
- Power-off all units before connecting or disconnecting any connections or wiring. Otherwise electric shock may occur, leading to damage to components, physical injury or death.

NOTICE

Risk of static discharge.

Static charges can destroy sensitive electronics parts.

- Wear antistatic gloves.

Test the voltage between P and N on the back of main PCB with multimeter. If the voltage is lower than 36 V, the capacitors are fully discharged.

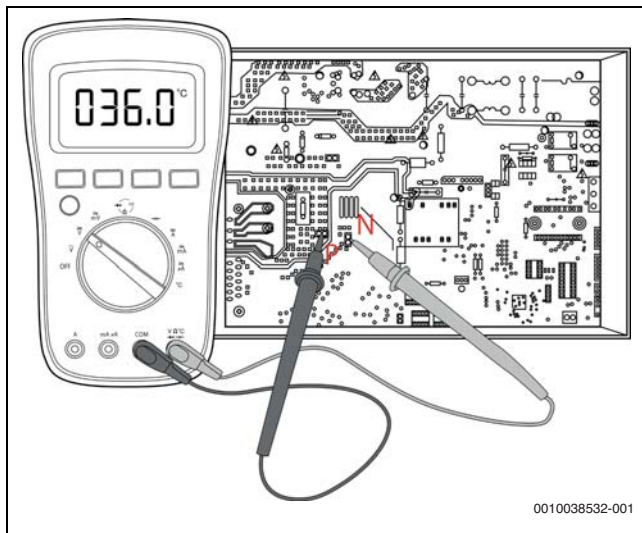


Fig. 61 Voltage between P and N

8.1 Error Codes

If a fault occurs during operation, a fault code appears in the display of the indoor unit (e.g. EH 02) or in the parameter information inquiry (→page 37).

Display	Error Information	Part possibly requiring replacement ¹⁾
EC 07	Fan speed of outdoor unit outside the normal range	
EC 51	Faulty parameter in the EEPROM of the outdoor unit	• Outdoor PCB
EC 52	Temperature sensor error at T3 (condenser coil)	• Outdoor PCB • T3 Sensor
EC 53	Temperature sensor error at T4 (outside temperature)	• Outdoor PCB • T4 Sensor
EC 54	Temperature sensor error at TP (compressor discharge pipe)	• Outdoor PCB • TP Sensor
EC 56	Only multi-split units: Temperature sensor error at T2B (outlet of evaporator coil)	• Outdoor PCB • T2B Sensor
EH 0A EH 00	Faulty parameter in the EEPROM of the indoor unit	• Indoor PCB
EH 0b	Communication error between main PCB of indoor unit and display	• Indoor PCB • Display board
EH 03	Fan speed of indoor unit outside the normal range	• Indoor PCB • Indoor fan motor
EH 30	Low voltage protection of indoor external fan	
EH 31	Over voltage protection of indoor external fan	
EH 60	Temperature sensor error at T1 (room temperature)	• Indoor PCB • T1 sensor
EH 61	Temperature sensor error at T2 (centre of evaporator coil)	• Indoor PCB • T2 sensor
EH C1	Refrigerant leakage detected by sensor	
EH C2	Operating condition of the refrigerant leakage sensor is out of range and leakage is detected	• R290 sensor • MC R module • Indoor PCB • Additional refrigerant
EH C3	Operating condition of the refrigerant leakage sensor is out of range	• R290 sensor • MC R module • Indoor PCB
EL 0C	Insufficient or escaping refrigerant or temperature sensor error at T2	• Indoor PCB • T2 Sensor • Additional refrigerant

The display board can show a garbled code or a code undefined by the service manual. For error codes not listed here:

- Make sure that this code is not a temperature reading.

If no error code is shown:

- Test the unit using the remote control.
- If the unit does not respond to the remote, replace the PCB.
- If the unit responds, replace the display board.

Display	Error Information	Part possibly requiring replacement ¹⁾
EL 01	Communication error between indoor and outdoor unit	- Indoor PCB - Outdoor PCB - Reactor
EL 02	Zero-crossing signal detection error (only for AC fan motor)	
FH CC	Malfunction of refrigerant leakage sensor or No or wrong communication between refrigerant leakage sensor and indoor unit main PCB	- R290 sensor - MC R module - Indoor PCB
PC 0A	Condenser high temperature protection	
PC 0F	PFC module malfunction	
PC 0I	Outdoor ambient temperature too low	
PC 00	Fault at IPM module or IGBT overcurrent protection	- Outdoor PCB - Outdoor fan motor - Compressor - IPM module board
PC 01	Over or undervoltage protection	- Outdoor PCB - Reactor - IPM module board
PC 02	Top temperature protection of compressor or High temperature protection of IPM module or High pressure protection	- Outdoor PCB - Outdoor fan motor - IPM module board - High pressure protector
PC 04	Inverter compressor module error	- Outdoor PCB - Outdoor fan motor - Compressor - IPM module board
PC 06	Compressor discharge temperature protection	
PC 08	Protection against current overload	- Outdoor PCB - Compressor
PC 09	Anti-cold air in heating mode	
PC 10	Low voltage protection	
PC 11	Over voltage protection	
PC 12	DC voltage protection	
PC 40	Communication fault between main PCB of outdoor unit and main PCB of compressor drive	
PC 41	Current Input detection protection	
PC 42	Compressor start error	
PC 43	Lack of phase (3 phase) protection	
PC 44	No speed protection	
PC 45	341PWM error	
PC 46	Compressor speed malfunction	
PC 49	Compressor over current protection	
PH 90	Evaporator coil temperature over high protection	
PH 91	Evaporator coil temperature over low Protection	
LC 01	Frequency limit caused by T3	
LC 02	Frequency limit caused by TP	
LC 03	Frequency limit caused by current	
LC 05	Frequency limit caused by voltage	
LC 06	Frequency limit caused by PFC	
LH 00	Frequency limit caused by T2	
LH 07	Frequency limit caused by remote controller	
--	Conflicting operating mode of indoor units; operating mode of indoor units and outdoor unit must correspond.	
nA	No malfunction	

1) If there is no time for checking to find the faulty part, try replacing the parts mentioned here.

Table 18

8.2 Parameter information inquiry

To access parameter information inquiry:

- Press and hold the  key and the  key for 7 seconds.

Displayed code	Explanation
Error code	Refer to error code table on page 35
T1	T1 temperature
T2	T2 temperature
T3	T3 temperature
T4	T4 temperature
TP	TP (T5) temperature
FT	Targeted Frequency
fr	Actual frequency
dL	Compressor current (reserved)
Uo	Outdoor AC voltage
Sn	Indoor capacity test (reserved)
--	Reserved
Pr	Outdoor fan speed = value × 8
Lr	EXV opening angle = value × 8 (reserved)
Ir	Indoor fan speed = value × 8
HU	Indoor humidity (reserved)
TT	Adjusted setting temperature
--	Reserve
--	Reserve
--	Reserve
oT	New calculated frequency (reserved)

Table 19 Information Inquiry

8.3 Error Diagnosis and Troubleshooting Without Error Code

8.3.1 Remote Maintenance



When troubles occur, please check the following points with customers before field maintenance.

Problem	Type	Possible causes of trouble	Test method / remedy
Unit will not start	Electrical	Power failure	▶ Test voltage.
		The main power tripped	▶ Close the power switch.
		Loose connections	▶ Inspect connections - tighten.
		Faulty transformer	▶ Change the transformer.
The power switch is on but fan does not run	Electrical	Loose connections	▶ Inspect connections - tighten.
		Faulty transformer	▶ Change the transformer.
		The voltage is too high or too low	▶ Test voltage.
	Other	Interference from cell phone towers and remote boosters	▶ Reconnect the power or press ON/OFF button on remote control to restart operation.
The temperature on the display board cannot be set	Electrical	The remote control is powered off	▶ Replace the battery of the remote control.
		Broken remote control	▶ Replace the remote control.
Unit is on but the airflow is not cold (hot)	Electrical	Set temperature is too high/low	▶ Adjust the set temperature.
	Refrigerant	Ambient temperature is too high/low	▶ Turn on the unit later.
		Fan mode is active	▶ Change to cooling/heating mode.
Unit runs, but shortly stops	Electrical	The voltage is too high or too low	▶ Test voltage.
	Refrigerant	Set temperature is too high/low	▶ Adjust the set temperature.
		Ambient temperature is too high/low	▶ Turn on the unit later.
The unit starts up and stops frequently	Electrical	The voltage is too high or too low	▶ Test voltage.
	Refrigerant	Ambient temperature is too high/low	▶ Turn on the unit later.
		Frosting and defrosting frequently	▶ Turn on the unit later.
	Other	The air inlet or outlet of either unit is blocked	▶ Remove the obstacles.
Unit runs continuously but insufficient cooling (heating)	Refrigerant	Dirty air filter	▶ Clean or replace filter.
		Dirty condenser fins	▶ Clean condenser fins.
		Set temperature is too high/low	▶ Adjust the set temperature.
		Ambient temperature is too high/low.	▶ Turn on the unit later.
		Noise reduction function is activated (optional function)	▶ Turn off noise reduction function.
	Other	Heavy load condition	▶ Check heat load.
		Bad air proof	▶ Close all the windows and doors.
Unit is noisy	Other	The air inlet or outlet of either unit is blocked	▶ Remove the obstacles.
		Loosen hold down bolts and / or screws	▶ Tighten bolts or screws.
		Shipping plates remain attached	▶ Remove them.

Table 20 Remote maintenance

8.3.2 Field Maintenance

Problem	Type	Possible causes of trouble	Test method / remedy
Unit will not start	Electrical	Power failure	► Test voltage
		Blown fuse or varistor	► Inspect fuse type & size
		Loose connections	► Inspect connections - tighten
		Shorted or broken wires	► Test circuits with tester
		Safety device opens	► Test continuity of safety device
		Faulty transformer	► Check control circuit with tester
Compressor will not start but fan runs	Refrigerant	Compressor stuck	► Replace the compressor
	Electrical	Shorted or broken wires	► Test circuits with tester
		Faulty thermostat / room temperature sensor	► Test continuity of thermostat / sensor & wiring
		Shorted or open capacitor	► Check capacitor with tester
		Faulty magnetic contactor for compressor	► Test continuity of coil & contacts
		Shorted or grounded compressor	► Check resistance with multimeter
Compressor and condenser (outdoor) fan will not start	Electrical	Shorted or broken wires	► Test circuits with tester
		Faulty thermostat / room temperature sensor	► Test continuity of thermostat / sensor & wiring
		Faulty magnetic contactor for compressor	► Test continuity of coil & contacts
Evaporator (indoor) fan will not start	Electrical	Shorted or broken wires	► Test circuits with tester
		Shorted or open capacitor	► Check capacitor with tester
		Faulty magnetic contactor for fan	► Test continuity of coil & contacts
		Shorted or grounded fan motor	► Check resistance with multimeter
Condenser (Outdoor) fan will not start	Electrical	Shorted or broken wires	► Test circuits with tester
		Faulty thermostat / room temperature sensor	► Test continuity of thermostat / sensor & wiring
		Shorted or open capacitor	► Check capacitor with tester
		Faulty magnetic contactor for fan	► Test continuity of coil & contacts
		Shorted or grounded fan motor	► Check resistance with multimeter
Unit runs, but shortly stops	Refrigerant	Shortage of refrigerant	► Leak test
		Restricted liquid line	► Replace restricted part
		Overcharge of refrigerant	► Reduce charged refrigerant volume
		Dirty or partially blocked condenser	► Clean condenser or remove obstacle
		Capillary tube closed completely	► Replace capillary
	Electrical	Faulty magnetic contactor for compressor	► Test continuity of coil & contacts
		Low voltage	► Test voltage
Compressor short cycling due to overload	Refrigerant	Shortage of refrigerant	► Leak test
		Overcharge of refrigerant	► Reduce charged refrigerant volume
		Dirty or partially blocked condenser	► Clean condenser or remove obstacle
	Electrical	Faulty magnetic contactor for compressor	► Test continuity of coil & contacts
High discharge pressure	Refrigerant	Low voltage	► Test voltage
		Overcharge of refrigerant	► Change charged refrigerant volume
		Dirty or partially blocked condenser	► Clean condenser or remove obstacle
		Air or incompressible gas in refrigerant cycle	► Purge, evacuate and recharge
		Limitation of the condensation air flow	► Remove obstruction to air flow
		High temperature condensing medium	► Remove obstruction in air or water flow
		Insufficient condensing medium	► Remove obstruction in air or water flow
Low discharge pressure	Refrigerant	Shortage of refrigerant	► Leak test
		Inefficient compressor	► Test compressor efficiency
High suction pressure	Refrigerant	Overcharge of refrigerant	► Change charged refrigerant volume
		Inefficient compressor	► Test compressor efficiency
		Temperature sensor is not installed correctly	► Install the sensor properly
	Other	Heavy load condition	► Check heat load

Problem	Type	Possible causes of trouble	Test method / remedy
Low suction pressure	Refrigerant	Shortage of refrigerant	▶ Leak test
		Restricted liquid line	▶ Replace restricted part
		Dirty air filter	▶ Clean or replace
		Dirty evaporator coil	▶ Clean coil
		Insufficient air through evaporator coil	▶ Check fan
		Capillary tube closed completely	▶ Replace capillary
Unit runs continuously but insufficient cooling	Refrigerant	Shortage of refrigerant	▶ Leak test
		Restricted liquid line	▶ Replace restricted part
		Dirty air filter	▶ Clean or replace
		Dirty evaporator coil	▶ Clean coil
		Insufficient air through evaporator coil	▶ Check fan
		Dirty or partially blocked condenser	▶ Clean condenser or remove obstacle
		Air or incompressible gas in refrigerant cycle	▶ Purge, evacuate and recharge
		Short cycling of condensing air	▶ Remove obstruction to air flow
		Inefficient compressor	▶ Test compressor efficiency
	Other	Heavy load condition	▶ Check heat load
		Poor choices of capacity	▶ Choose AC of larger capacity or add the number of AC
Too cool	Electrical	Faulty thermostat / room temperature sensor	▶ Test continuity of thermostat / sensor & wiring
		Wrong setting place of temperature sensor	▶ Place the temperature sensor at the central of the air inlet grille
Compressor is noisy	Refrigerant	Overcharge of refrigerant	▶ Reduce charged refrigerant volume
		Broken compressor internal parts	▶ Replace compressor
	Other	Loosen hold down bolts and / or screws	▶ Tighten bolts or screws
		Shipping plates remain attached	▶ Remove them
		Contact of piping with other piping or external plate	▶ Rectify piping so as not to contact each other or with external plate
Horizontal louver can not revolve	Electrical	Loose connections	▶ Inspect connections - tighten
		Shorted or broken wires	▶ Test circuits with tester
		Faulty stepping motor	▶ Replace the stepping motor

Table 21 Field Maintenance

8.4 Check Procedures

8.4.1 Before checking



CAUTION

Risk of injury from electric shock!

Electricity remains in capacitors even when the power supply is off.

- ▶ Ensure the capacitors are fully discharged before troubleshooting
- ▶ Be sure to turn off all power supplies or disconnect all wires to avoid electric shock.



CAUTION

Danger of burns!

During operation the compressor becomes hot.

- ▶ Operate after compressor and coil have returned to normal temperature in order to avoid injury.

8.4.2 Temperature Sensor Check

- ▶ Disconnect the temperature sensor from PCB (→ indoor and outdoor unit disassembly on page 23 and 29).

- ▶ Measure the resistance value of the sensor using a multi-meter.

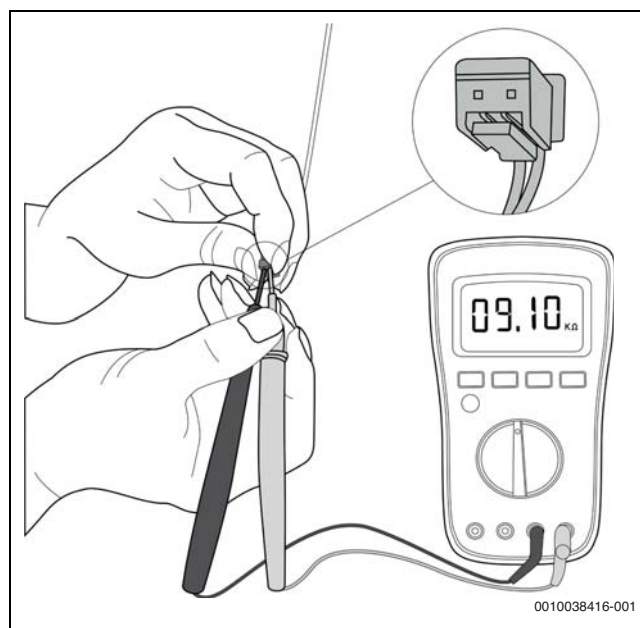


Fig. 62 Temperature Sensor Check

- ▶ Check corresponding temperature sensor resistance value table (→ chapter 9, p. 60).



The picture and the value are only for reference, actual condition and specific value may vary.

8.4.3 Compressor Check

- ▶ Disconnect the compressor power cord from outdoor PCB (→ outdoor unit disassembly on page 29).
- ▶ Measure the resistance value of each winding using a multi-meter.

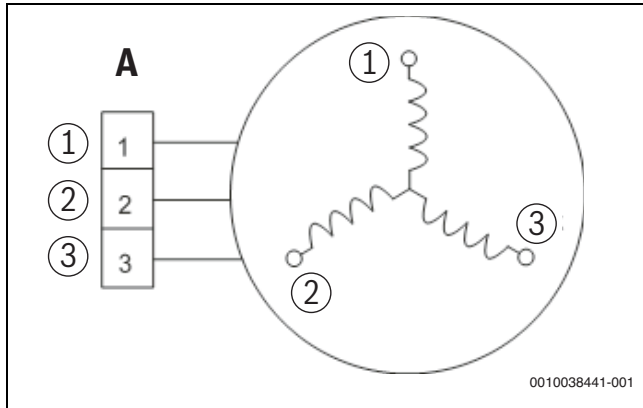


Fig. 63 Compressor Check

- [1] Blue
- [2] Red
- [3] Black

- ▶ Check the resistance value of each winding in the following table.

Compressor type	Blue-Red	Blue-Black	Red-Black
DTN210D32UFZ	1.7 ± 5% Ω (at 20 °C)		

Table 22 Resistance Value of each winding

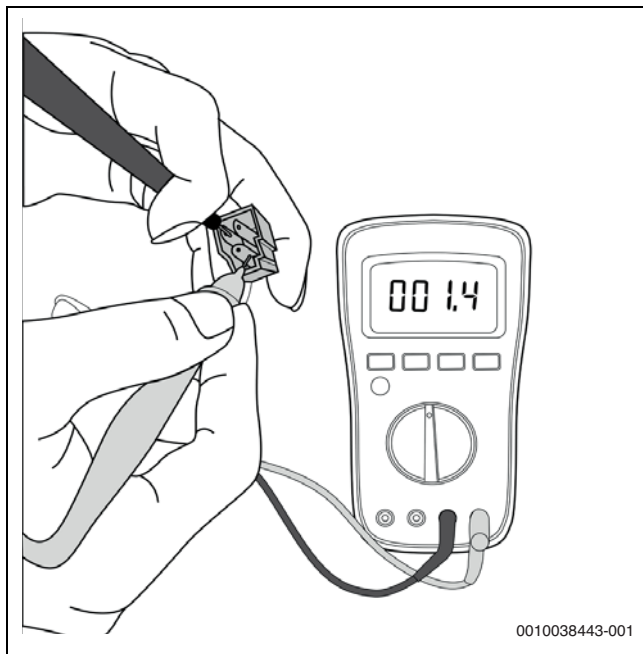


Fig. 64 Compressor Check



The picture and the value are only for reference, actual condition and specific value may vary.

8.4.4 IPM Continuity Check

- ▶ Turn off the outdoor unit and disconnect it from the power supply.
- ▶ Discharge electrolytic capacitors and make sure that all energy-storage unit has been discharged.
- ▶ Disassemble the outdoor PCB or disassemble the IPM board.
- ▶ Measure the resistance value between P and U(V, W, N); U(V, W) and N.

Digital tester		Resistance value
(+)Red	(-)Black	
P	N	∞ (Several M± 5% Ω)
	U	
	V	
	W	
U	N	∞ (Several M± 5% Ω)
V		
W		
-		

Table 23

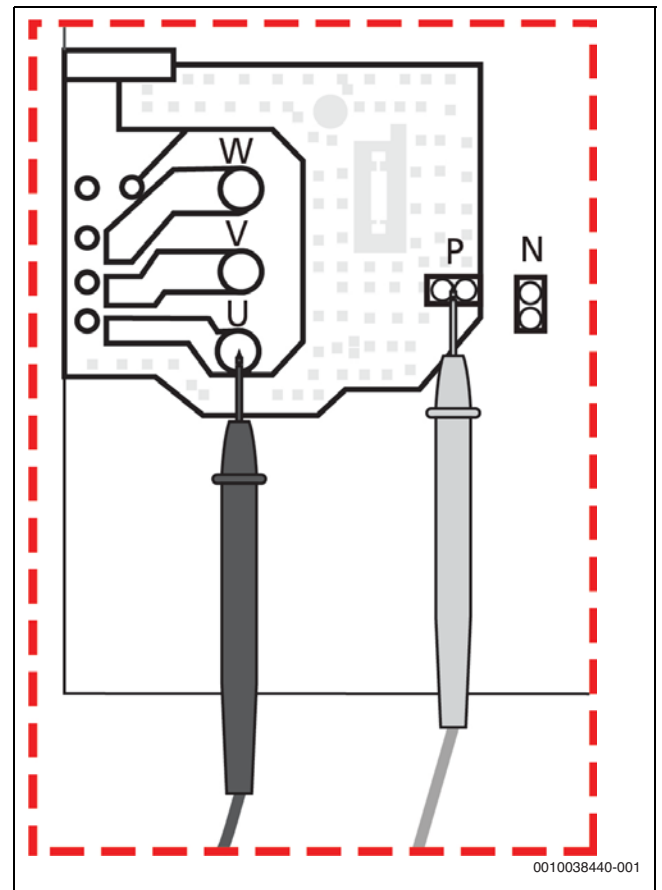


Fig. 65 IPM Continuity Check



The picture and the value are only for reference, actual condition and specific value may vary.

8.5 Troubleshooting by Error Code

8.5.1 EC 07: The outdoor fan speed is operating outside of the normal range

Digital output

- EC 07

Description

- When outdoor fan speed keeps too low (300 rpm) or too high for a certain time, the LED displays the failure code and the AC turns off.

Recommended parts to prepare

- Connection wires
- Fan assembly
- Fan motor
- Outdoor main PCB

Additional information



For certain models, outdoor PCB could not be removed separately. In this case, the outdoor electric control box should be replaced as a whole.



Outdoor DC Fan Motor

- ▶ Release the UVW connector.
- ▶ Measure the resistance of U-V, U-W, V-W. If the resistance is not equal to each other, the fan motor must have problems and need to be replaced. Otherwise the PCB must have problems and need to be replaced.

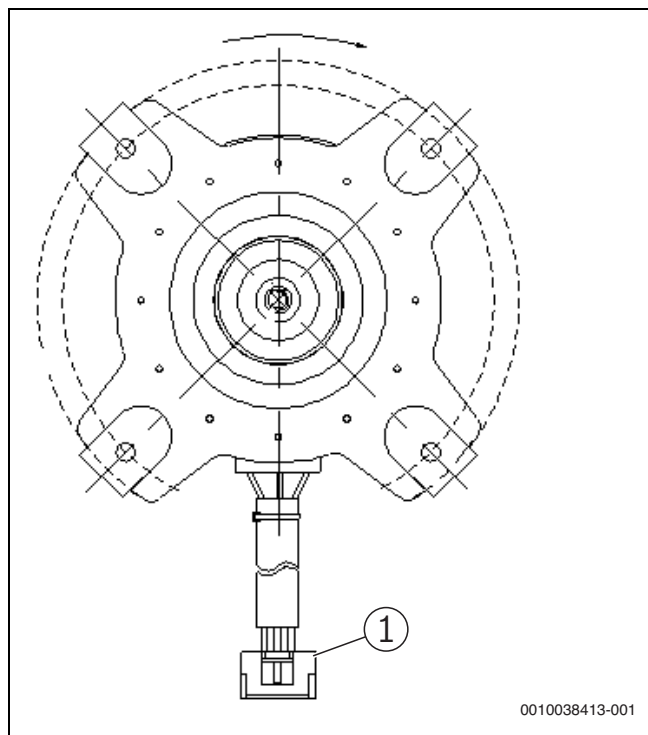
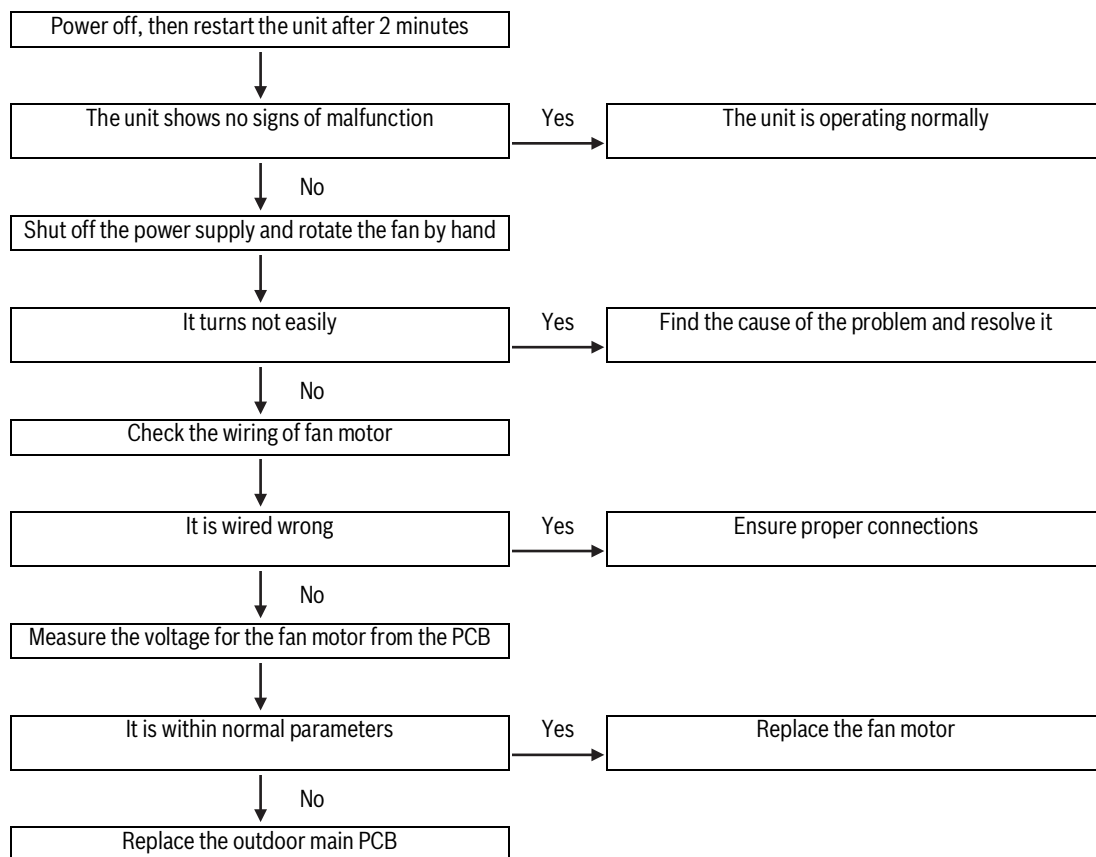


Fig. 66 Fan motor connector (control chip is in outdoor PCB)

[1] UVW connector

Color	Signal
White	W
Yellow	V
Blue	U

Table 24 DC motor voltage input and output

Procedure


8.5.2 EC 51: Outdoor unit EEPROM parameter error or Compressor driven chip EEPROM parameter error**Digital output**

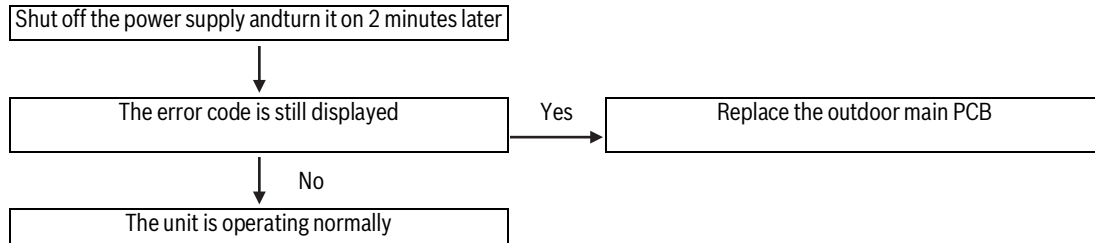
- EC 51

Description

- Outdoor PCB main chip does not receive feedback from EEPROM chip or compressor driven chip.

Recommended parts to prepare

- Outdoor PCB

Procedure

8.5.3 EC 52-54: Open circuit or short circuit of outdoor temperature sensor (T3, T4, TP)

Digital output

- EC 52
- EC 53
- EC 54

Description

- If the sampling voltage is lower than 0.06 V or higher than 4.94 V, the LED displays the failure code.

Recommended parts to prepare

- Connection wires
- Sensors
- Outdoor main PCB

Additional information



For certain models, outdoor PCB could not be removed separately. In this case, the outdoor electric control box should be replaced as a whole. For certain models, outdoor unit uses combination sensor, T3, T4 and TP are the same of sensor. The picture and the value are only for reference, actual appearance and value may vary.

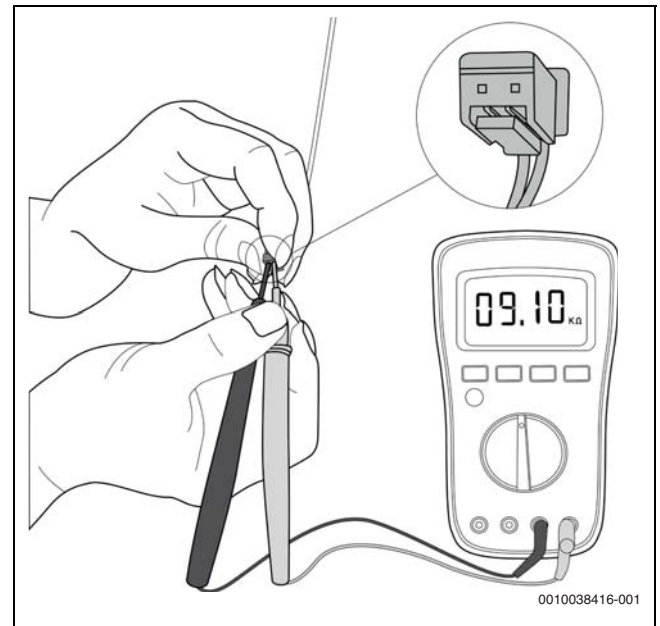
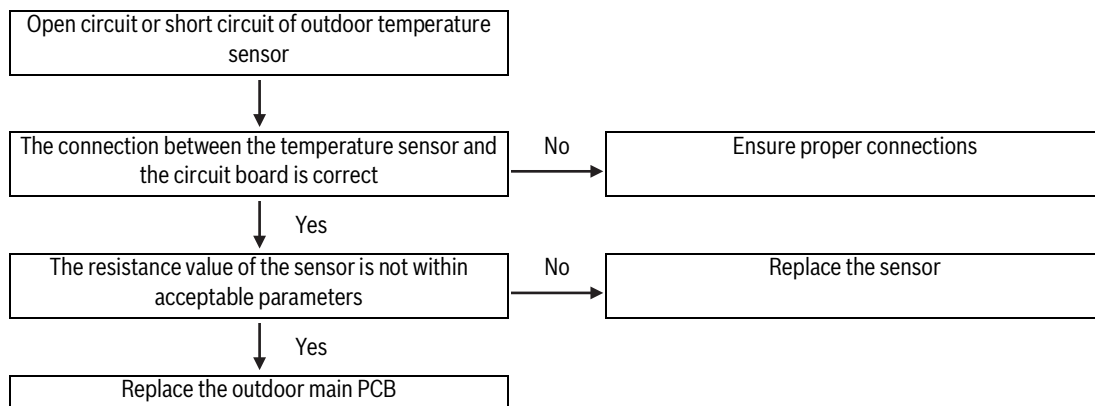


Fig. 67

Procedure



8.5.4 EH 00/EH 0A: Indoor unit EEPROM parameter error**Digital output**

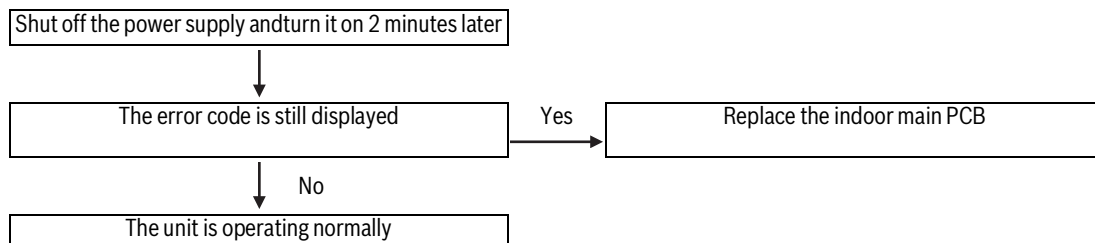
- EH 00/EH 0A

Description

- Indoor PCB main chip does not receive feedback from EEPROM chip.

Recommended parts to prepare

- Indoor PCB

Procedure

8.5.5 EH 0b: Indoor PCB / Display board communication error

Digital output

- EH 0b

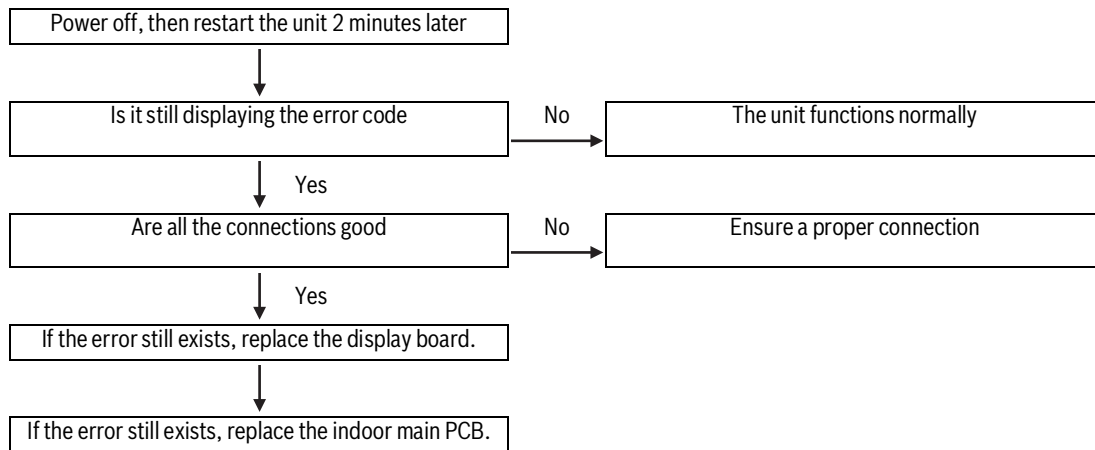
Description

- Indoor PCB does not receive feedback from the display board.

Recommended parts to prepare

- Connection wire
- Indoor PCB
- Display board

Procedure



8.5.6 EH 03: The Indoor fan speed is operating outside of normal range

Digital output

- EH 03

Description

- When indoor fan speed keeps too low or too high for a certain time, the LED displays the failure code and the AC turns off.

Recommended parts to prepare

- Connection wires
- Fan assembly
- Fan motor
- Indoor main PCB

Additional information



DC Fan Motor(control chip is in fan motor)

- Power on and when the unit is in standby, measure the voltage of pin1-pin3, pin4-pin3 in fan motor connector.

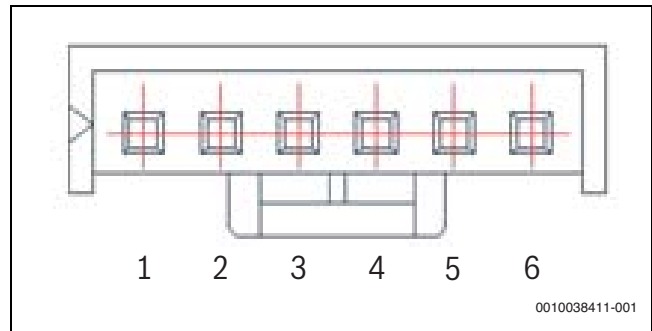


Fig. 68 Fan motor connector

No.	Color	Signal	Voltage ¹⁾
1	Red	Vs/Vm	192~380V
2	—	—	—
3	Black	GND	0V
4	White	Vcc	13.5~16.5V
5	Yellow	Vsp	0~6.5V
6	Blue	FG	13.5~16.5V

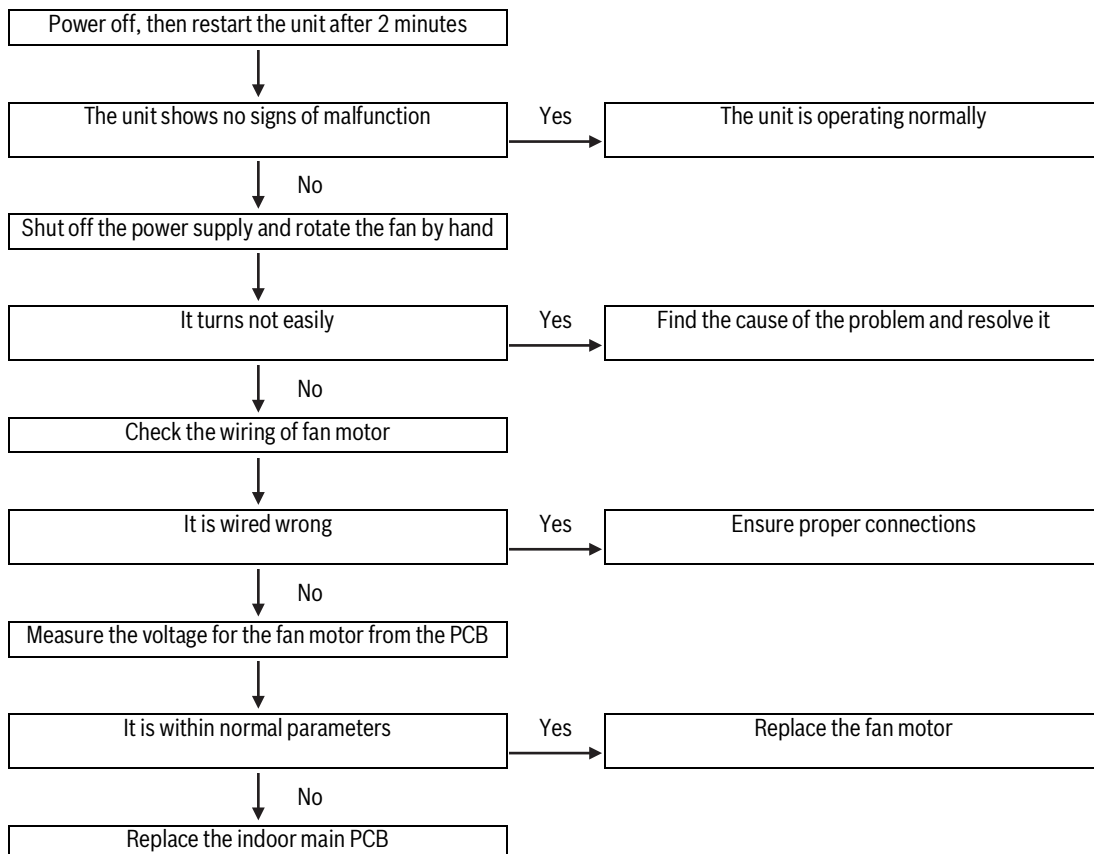
1) With mains voltage of 220-240V~

Table 25 DC motor voltage input and output



If the measured voltage does not fit the values in the table, the PCB has problems and needs to be replaced.

Procedure



8.5.7 EH 60-61: Open circuit or short circuit of indoor temperature sensor (T1, T2)

Digital output

- EH 60
- EH 61

Description

- If the sampling voltage is lower than 0.06 V or higher than 4.94 V, the LED displays the failure code.

Recommended parts to prepare

- Connection wires
- Sensors
- Indoor main PCB

Additional information



The picture and the value are only for reference, actual appearance and value may vary.

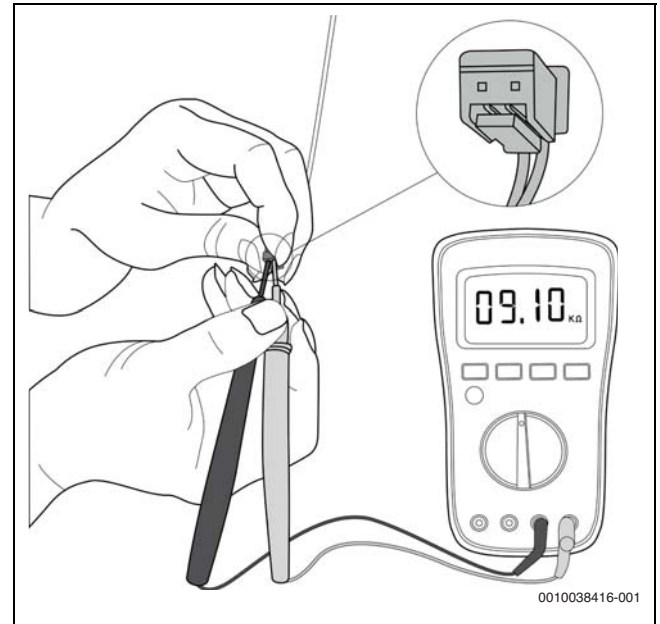
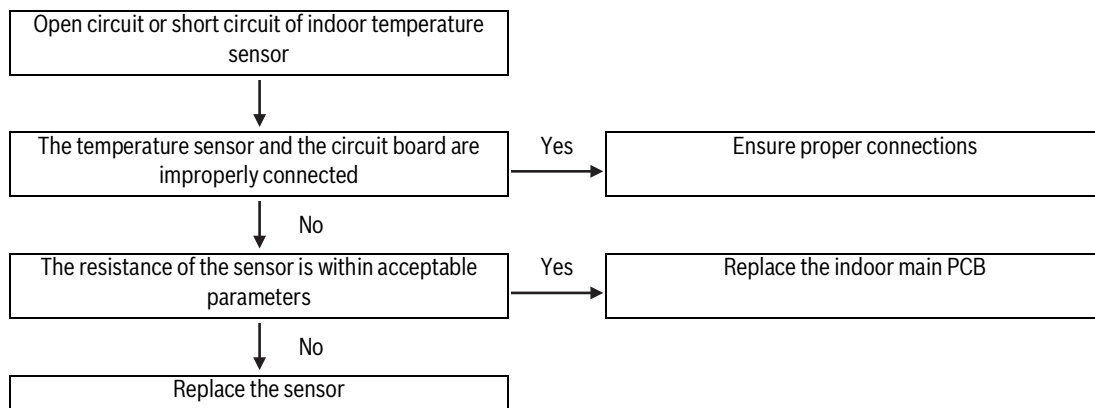


Fig. 69

Procedure



8.5.8 FH CC: Refrigerant Leakage Detection

Digital output

- EH C1
- EH C2
- EH C3
- FH CC

Description

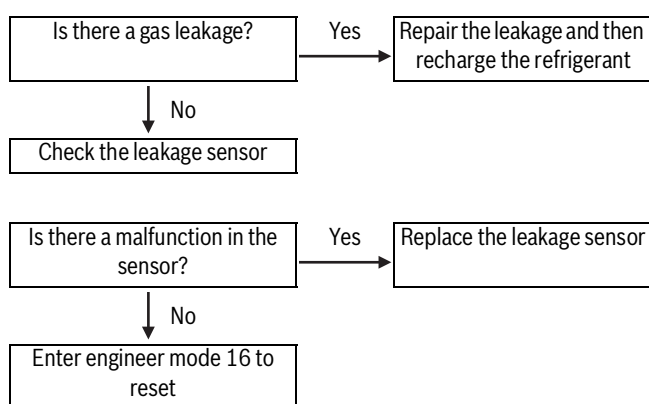
If the leakage sensor detects leakage or is out of its operation range, the sensor starts an alarm and the LED shows a failure code.

Additional information



When the refrigerant leakage protection is activated, the unit locks and does not automatically leave the leakage protection state. If there is a power failure, the auto-restart function saves the leakage protection state.

Procedure



Reset procedure

When the unit is in power-on mode or standby mode and not locked, press the “ON/OFF” and the “Fan Speed” buttons together for 7 seconds to enter engineer mode.

1. Go to channel 16 to reset in engineer mode.
2. Press “ON/OFF” for 2 seconds to enter Reset.
3. When the code “rS” displays, press “OK” to send the reset code.
4. Exit the engineer mode.

8.5.9 EL OC: Refrigerant Leakage Detection

Digital output

- EL OC

Description

- T2: current evaporator temperature
- T2_(n-1): last measured evaporator temperature

Recommended parts to prepare

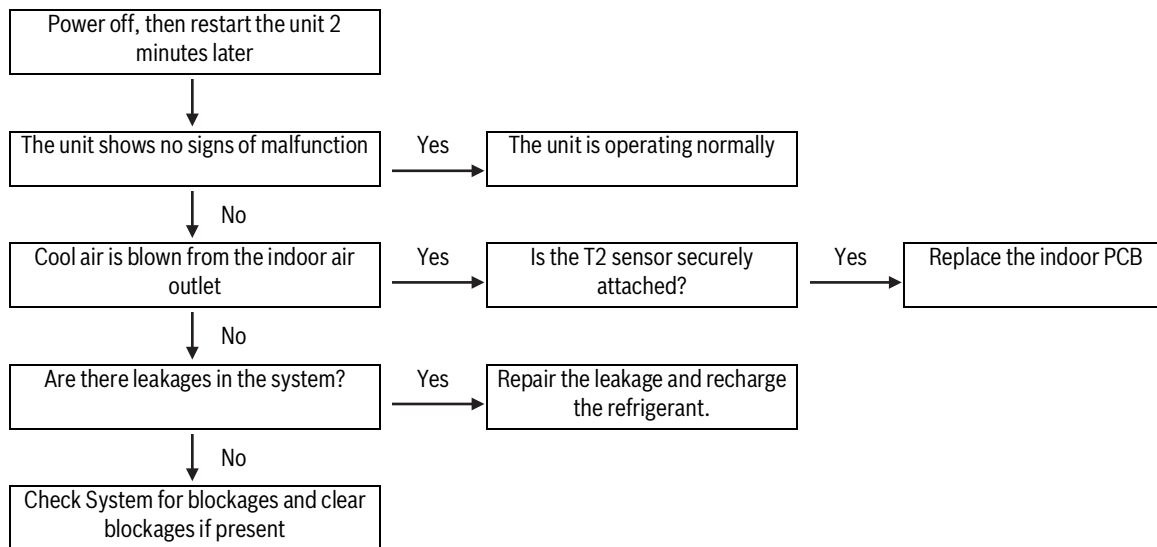
- T2 sensor
- Indoor PCB
- Additional refrigerant

Additional information



If $T2 < T2_{(n-1)} - 2\text{ °C}$ can't be kept continuously for 4 seconds in the first 5 minutes after the compressor started and the compressor frequency can not stay above 50 Hz for 3 minutes, the display will show "EC", when these conditions repeat 3 times.

Procedure



8.5.10 EL 01: Indoor and outdoor unit communication error diagnosis and solution

Digital output

- EL 01

Description

- Indoor unit can not communicate with outdoor unit.

Recommended parts to prepare

- Indoor PCB
- Outdoor PCB
- Short-circuited component

Additional information

- Use a multimeter to test the DC voltage between 2(N) and S port of outdoor unit. The red pin of multimeter connects with 2(N) port while the black pin is for S port.
- When AC is normal running, the voltage will move alternately from positive to negative values.
- If the outdoor unit has malfunction, the voltage has always a positive value.
- While if the indoor unit has malfunction, the voltage is fixed or has a value very close to zero.

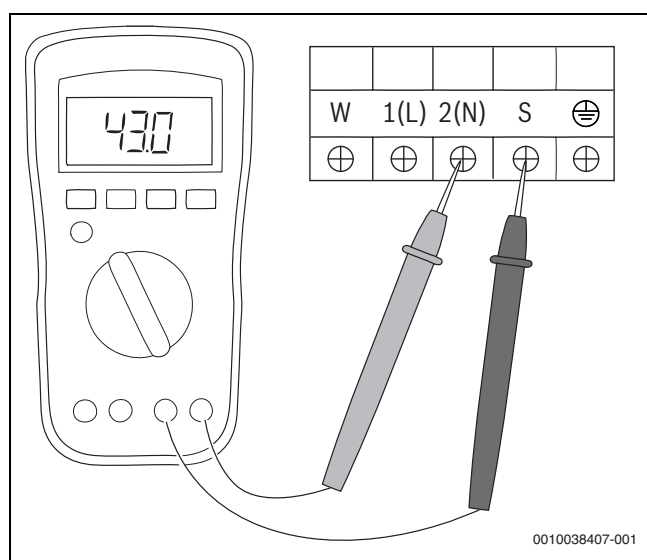
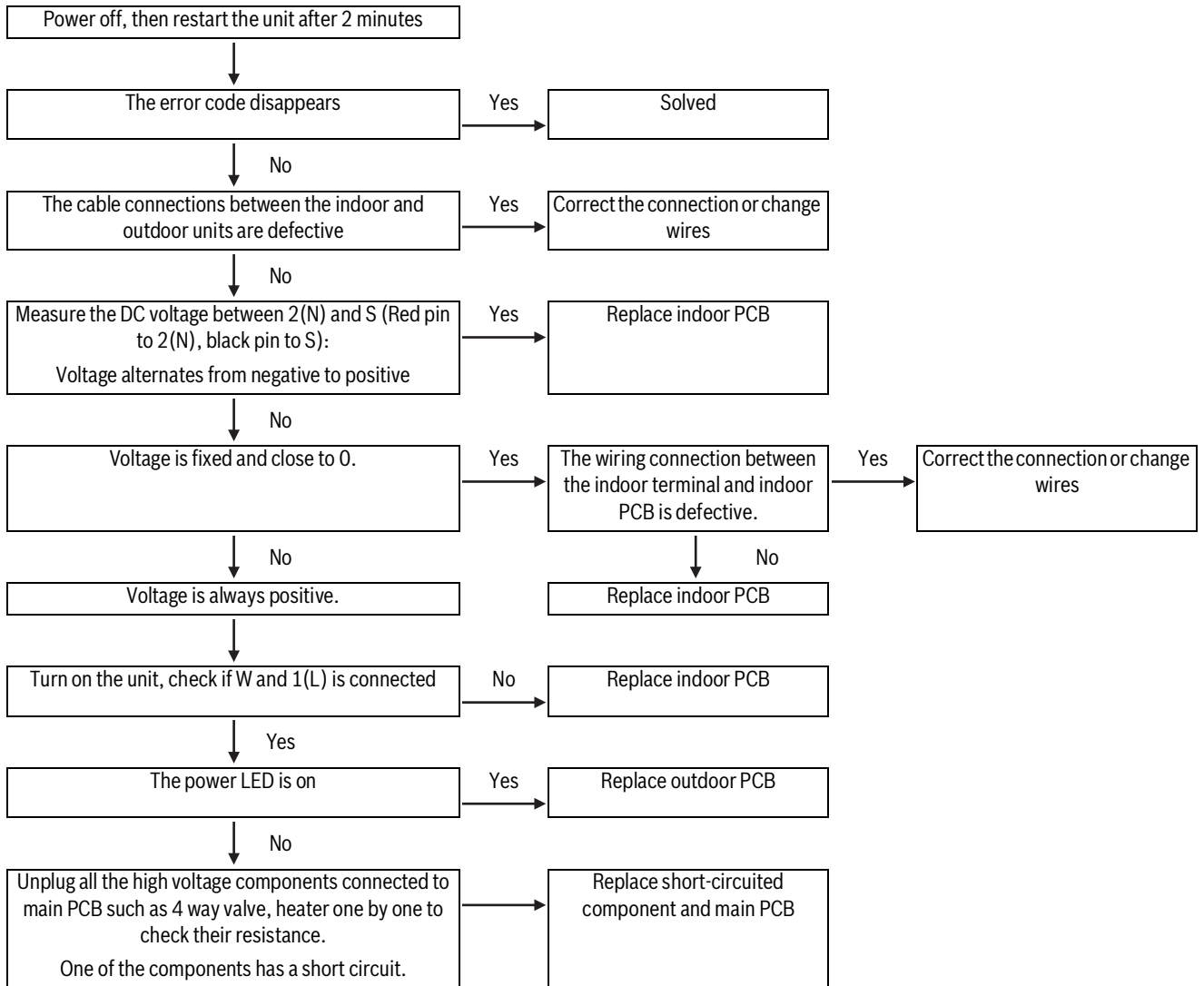


Fig. 70

- Use a multimeter to test the resistance of the reactor. Be sure that the capacitor is not connected during measurement.
- The normal value should be around zero ohm. Otherwise, the reactor may have malfunction.



The picture and the value are only for reference, actual condition and specific value may vary.

Procedure


8.5.11 PC 08: Current overload protection

Digital output

- PC 08

Description

- An abnormal current rise is detected by checking the specified current detection circuit.

Recommended parts to prepare

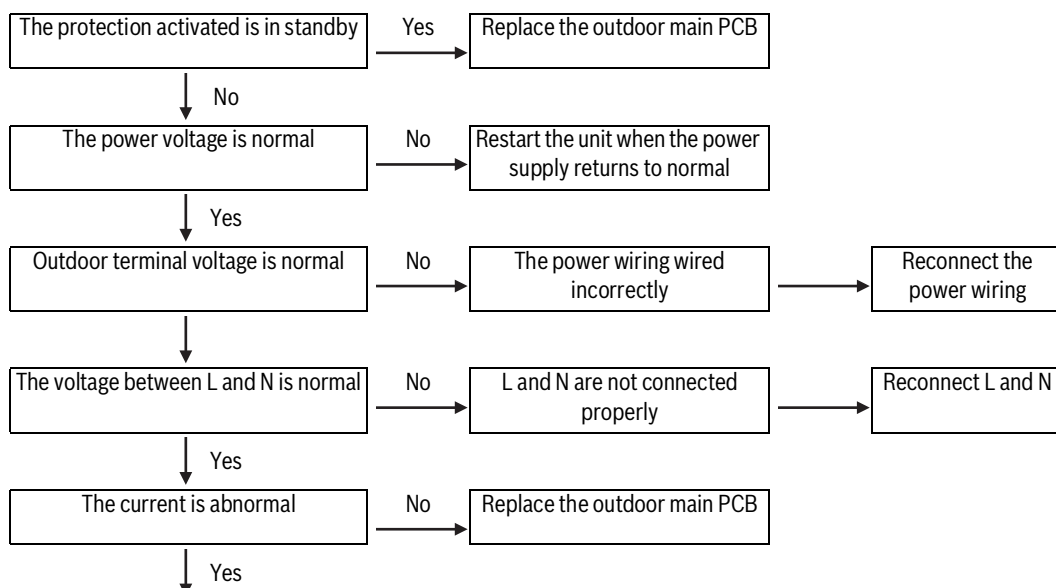
- Connection wires
- Reactor
- Outdoor fan
- Outdoor PCB

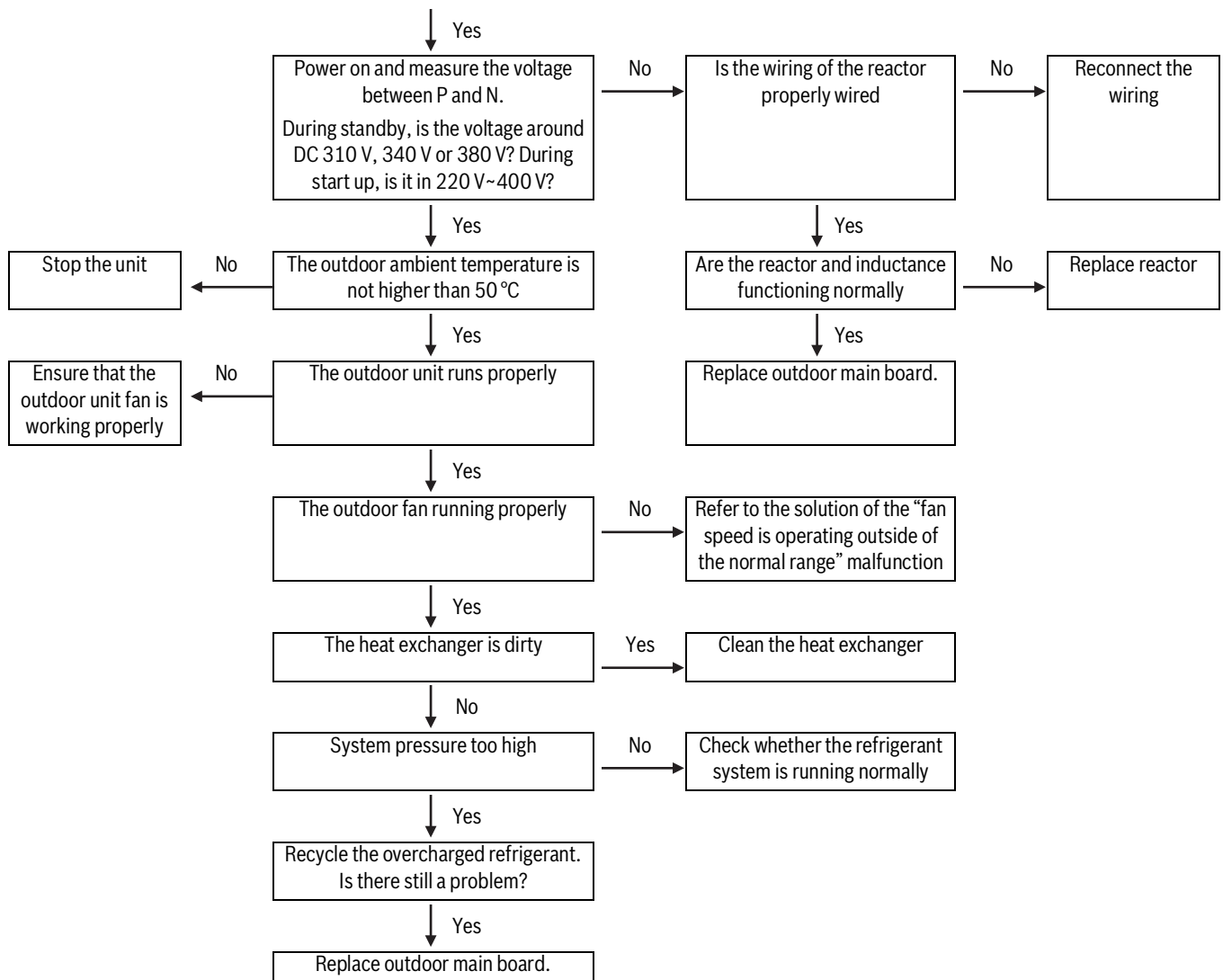
Additional information



For certain models, outdoor PCB could not be removed separately. In this case, the outdoor electric control box should be replaced as a whole.

Procedure





8.5.12 PC 00: IPM malfunction or IGBT over-strong current protection

Digital output

- PC 00

Description

- When the voltage signal the IPM sends to the compressor drive chip is abnormal, the LED displays the failure code and the AC turns off.

Recommended parts to prepare

- Connection wires
- IPM module board
- Outdoor fan assembly
- Compressor
- Outdoor PCB

Additional information



WARNING

Electricity remains in capacitors even when the power supply is off.

- ▶ Ensure the capacitors are fully discharged before troubleshooting.



IPM Continuity Check

- ▶ Turn off outdoor unit and disconnect power supply.
- ▶ Discharge electrolytic capacitors and ensure all energy-storage unit has been discharged.
- ▶ Disassemble outdoor PCB or disassemble IPM board.
- ▶ Measure the resistance value between P and (U,V,W), N and (U,V,W).

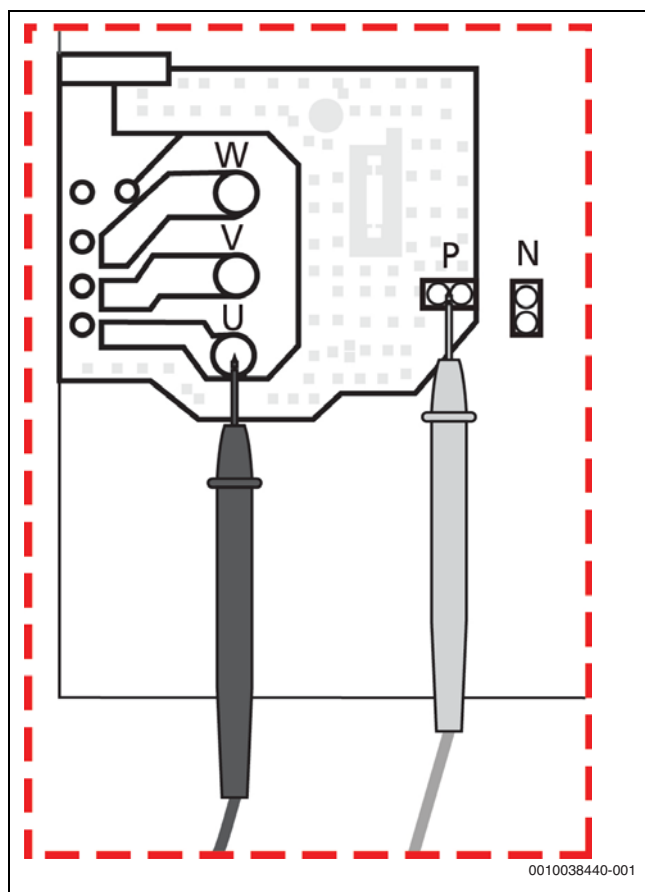


Fig. 71 IPM Continuity Check

Digital tester		Resistance value
(-) Black	(+) Red	
P	U	15,6 MΩ
	V	
	W	
N	U	15,6 MΩ
	V	
	W	

Table 26



Compressor check

- ▶ Disconnect the compressor and check the resistance between U-V, V-W and U-W, and all 3 values should be equal.
- ▶ If not, the compressor is faulty and should be replaced.

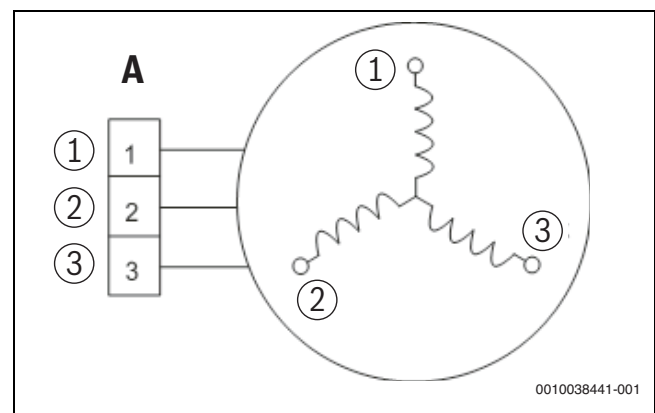


Fig. 72 Compressor check

- [1] Blue
- [2] Red
- [3] Black

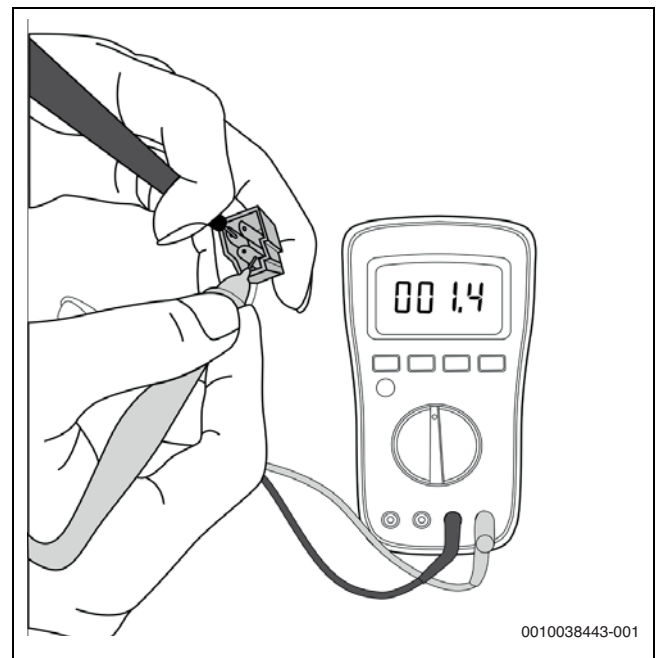
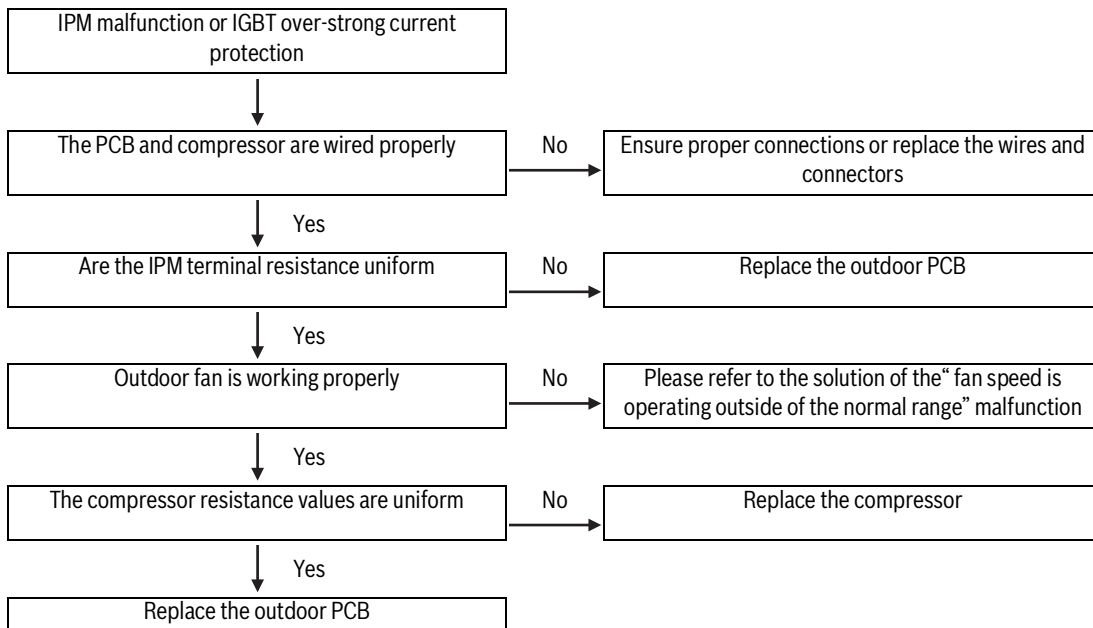


Fig. 73 Compressor check



The picture and the value are only for reference, actual condition and specific value may vary.

Procedure



8.5.13 PC 01: Over voltage or too low voltage protection

Digital output

- PC 01

Description

- Abnormal increases or decreases in voltage are detected by checking the specified voltage detection circuit.

Recommended parts to prepare

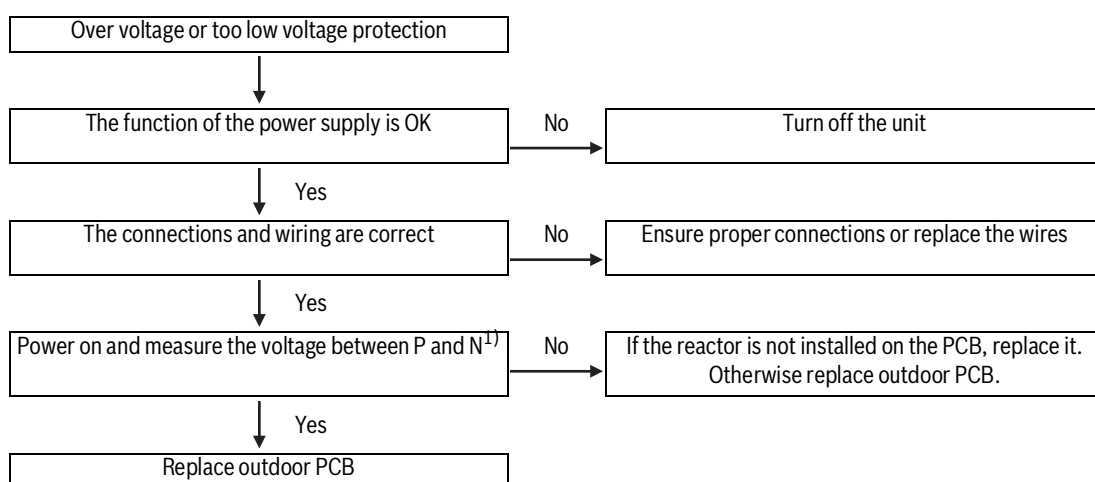
- Power supply wires
- PCB
- Reactor

Additional information



For certain models, outdoor PCB could not be removed separately. In this case, the outdoor electric control box should be replaced as a whole.

Procedure



1) While the unit is in standby, is the voltage between P and N is around DC 310 V, 340 V or 380 V. When start up the unit, is it in 220 V~400 V.

8.5.14 PC 04: Inverter compressor drive error

Digital output

- PC 04

Description

- An abnormal inverter compressor drive is detected by a special detection circuit, including communication signal detection, voltage detection, compressor rotation speed signal detection and so on.

Recommended parts to prepare

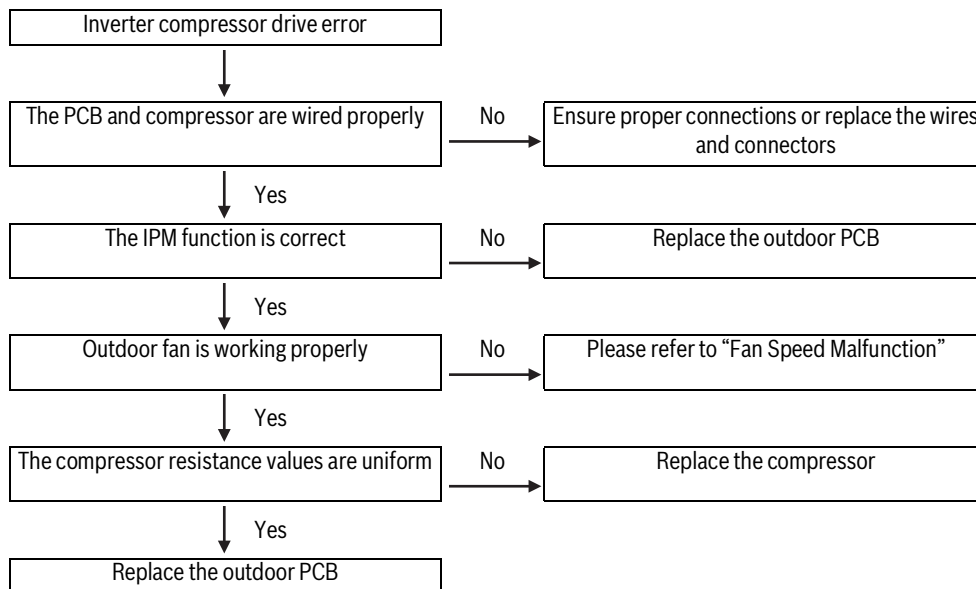
- Connection wires
- Outdoor fan assembly
- Compressor
- Outdoor PCB

Additional information



For certain models, outdoor PCB could not be removed separately. In this case, the outdoor electric control box should be replaced as a whole.

Procedure



8.5.15 PC 40: Communication error between outdoor main chip and compressor driven chip

Digital output

- PC 40

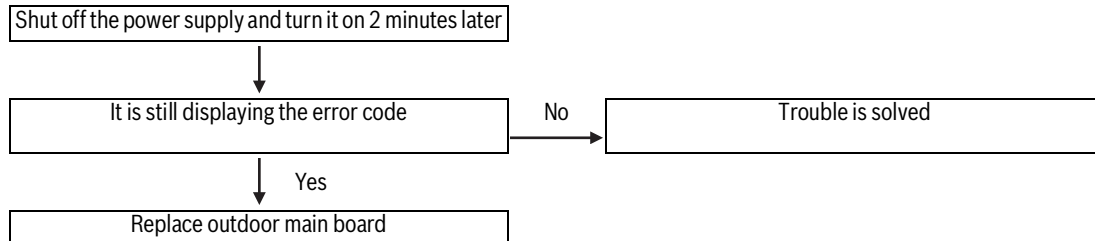
Description

- The main chip cannot detect the compressor driven chip.

Recommended parts to prepare

- Outdoor main PCB

Procedure



9 Appendix

9.1 Temperature Sensor Resistance Value Table for T1,T2,T3 and T4

Temperature [°C]	Resistance [kΩ]
-20	115.3
-18	101.5
-16	89.59
-14	79.31
-12	70.17
-10	62.28
-8	56.37
-6	49.32
-4	44.00
-2	39.82
0	35.20
2	31.56
4	28.35
6	25.50
8	22.57
10	20.72
12	18.72
14	16.93
16	15.34
18	13.92
20	12.64
22	11.50
24	10.47
26	9.551
28	8.720
30	7.971
32	7.295
34	6.684
36	6.131
38	5.630
40	5.175
42	4.763
44	4.387

Temperature [°C]	Resistance [kΩ]
46	4.046
48	3.735
50	3.451
52	3.192
54	2.959
56	2.738
58	2.540
60	2.358
62	2.191
64	2.037
66	1.896
68	1.766
70	1.647
72	1.537
74	1.435
76	1.341
78	1.254
80	1.174
82	1.100
84	1.031
86	0.9668
88	0.9075
90	0.8525
92	0.8013
94	0.7537
96	0.7094
98	0.6682
100	0.6297
102	0.5959
104	0.5604
106	0.5291
108	0.4999
110	0.4726

Temperature [°C]	Resistance [kΩ]
112	0.4470
114	0.4230
116	0.4006
118	0.3796
120	0.3598
122	0.3413
124	0.3239
126	0.3075
128	0.2922
130	0.2777
132	0.2641
134	0.2513
136	0.2392
138	0.2278

Table 27

9.2 Temperature Sensor Resistance Value Table for TP (T5)

Temperature [°C]	Resistance [kΩ]
-20	542.7
-18	483.0
-16	430.5
-14	384.3
-12	343.6
-10	307.7
-8	275.9
-6	247.8
-4	222.8
-2	200.7
0	180.9
2	163.3
4	147.6
6	133.5
8	121.0
10	109.8
12	99.69
14	90.66
16	82.54
18	75.24
20	68.66
22	62.73
24	57.37
26	52.53
28	48.14
30	44.17
32	40.57
34	37.30
36	34.32
38	31.62
40	29.15
42	26.90
44	24.85
46	22.89
48	21.26
50	19.69
52	18.26

Temperature [°C]	Resistance [kΩ]
54	16.94
56	15.73
58	14.62
60	13.59
62	12.65
64	11.79
66	10.99
68	10.25
70	9.569
72	8.980
74	8.358
76	7.820
78	7.321
80	6.859
82	6.430
84	6.033
86	5.663
88	5.320
90	5
92	4.703
94	4.426
96	4.167
98	3.927
100	3.702
102	3.492
104	3.296
106	3.113
108	2.941
110	2.781
112	2.630
114	2.489
116	2.357
118	2.233
120	2.117
122	2.007
124	1.905
126	1.808

Temperature [°C]	Resistance [kΩ]
128	1.717
130	1.632

Table 28

9.3 Service Report

Request No.:		Date:	
Installation Date:		Service Date:	
Customer Information			
Name		Telephone No.	
Home Address			
Email			
Product Information			
Indoor Unit Model		Outdoor Unit Model	
Serial No. of indoor unit		Serial No. of outdoor unit	
Working Mode	☐ Cooling ☐ Heating ☐ Fan only ☐ Dry		
Setting temperature	_____ °C	Fan speed	☐ Turbo ☐ Auto ☐ High ☐ Medium ☐ Low
Temperature of air inlet	_____ °C	Temperature of air outlet	_____ °C
Installation / Condition Information			
Indoor temperature	_____ °C	Indoor humidity	_____ %RH
Outdoor temperature	_____ °C	Outdoor humidity	_____ %RH
Length of Connecting pipe		Pipe diameter	Gas pipe: Liquid pipe:
Length of Wiring		wire diameter	
System Running Pressure	_____ MPa or _____ Bar		
Room size (L*W*H)			
Photo of Installation of Indoor unit (Photo #1)		Photo of Installation of Outdoor unit (Photo #2)	
Failure Description			
Error Code of Indoor unit:		Code of Outdoor PCB:	
Unit does not start		Less cooling or heating	
Remote control does not work		Unit starts but stops shortly	
Indoor display shows nothing		High noise	
No cooling or heating at all		High vibration	

Parameter information inquiry			
Parameter	Definition	Display value	Display value meaning
T1	Room temperature		
T2	Indoor coil temperature		
T3	Outdoor coil temperature		
T4	Ambient temperature		
TP (T5)	Discharge temperature		
FT	Targeted Frequency		
Fr	Actual Frequency		
dl	Compressor current		
Uo	Outdoor AC voltage		
Sn	Indoor capacity test		
Pr	Outdoor fan speed		
Lr	EXV opening steps		
ir	Indoor fan speed		
HU	Indoor humidity		
TT	Adjusted setting temperature		
oT	New calculated frequency		
--	Reserved		

Approval from Manufacturer	
☐ Approved	
☐ More Proof needed	
☐ Rejected	

10 Environmental protection and disposal

Environmental protection is a fundamental corporate strategy of the Bosch Group.

The quality of our products, their economy and environmental safety are all of equal importance to us and all environmental protection legislation and regulations are strictly observed.

We use the best possible technology and materials for protecting the environment taking account of economic considerations.

Packaging

Where packaging is concerned, we participate in country-specific recycling processes that ensure optimum recycling.

All of our packaging materials are environmentally compatible and can be recycled.

Used appliances

Used appliances contain valuable materials that can be recycled.

The various assemblies can be easily dismantled. Synthetic materials are marked accordingly. Assemblies can therefore be sorted by composition and passed on for recycling or disposal.

Old electrical and electronic devices



This symbol means that the product cannot be disposed of with other waste, but must be taken to waste collection points for treatment, collection, recycling and disposal.

The symbol is valid for countries that have directives on electronic waste, e.g. "European Union Directive 2012/19/EC on end-of-life electrical and electronic appliances". These provisions define the regulatory framework of the directive valid for the return and recycling of used electronic appliances in each country.

Electronic appliances that may contain hazardous substances must be recycled responsibly in order to minimise possible damage to the environment and dangers to people's health. To this end, the recycling of electronic waste contributes to the preservation of natural resources.

For more information on the environmentally safe disposal of used electrical and electronic appliances, please contact the local authorities, waste disposal company or distributor from which you purchased the product.

You can find more information here:

www.bosch-homecomfortgroup.com/en/company/legal-topics/weee/

Refrigerant R290



The appliance contains nonfluorinated gas R290 (global warming potential 0.02¹⁾) high combustibility and non-toxicity (A3).

Contained quantity is indicated on the equipment outdoor unit name label.

Refrigerant must be collected and disposed of separately.

Batteries

Batteries must not be disposed together with your household waste.

Used batteries must be disposed of in local collection systems.

11 Data Protection Notice



We, **Bosch Thermotechnology Ltd., Cotswold Way, Warndon, Worcester WR4 9SW, United Kingdom**, process product and installation information, technical and connection data, communication data, product registration and client history data to provide product functionality (art. 6 §1.1 (b) GDPR), to fulfil

our duty of product surveillance and for product safety and security reasons (art. 6 §1.1 (f) GDPR), to safeguard our rights in connection with warranty and product registration questions (art. 6 §1.1 (f) GDPR) and to analyse the distribution of our products and to provide individualized information and offers related to the product (art. 6 §1.1 (f) GDPR). To provide services such as sales and marketing, contract management, payment management, programming, data hosting and hotline services, we may request and transfer data to external service providers and/or Bosch affiliates. In some cases, but only if adequate data protection is ensured, personal data may be transferred to recipients located outside the European Economic Area. Additional information is provided upon request. You can contact our Data Protection Officer under: Data Protection Officer for Information Security and Privacy (C/ISP), Robert Bosch GmbH, Postfach 30 02 20, 70442 Stuttgart, GERMANY.

You have the right to object to the processing of your personal data at any time on the basis of Art. 6 §1.1 (f) GDPR on grounds relating to your particular situation or if your data is used for direct marketing purposes. To exercise your rights, please contact us at privacy.ttpo@bosch.com. For more information, follow the QR code.

1) Based on ANNEX I of REGULATION (EU) No 517/2024 of the European Parliament and of the Council of 7 February 2024.

Bosch Thermotechnik GmbH
Junkersstrasse 20-24
73249 Wernau, Germany

www.bosch-homecomfortgroup.com

