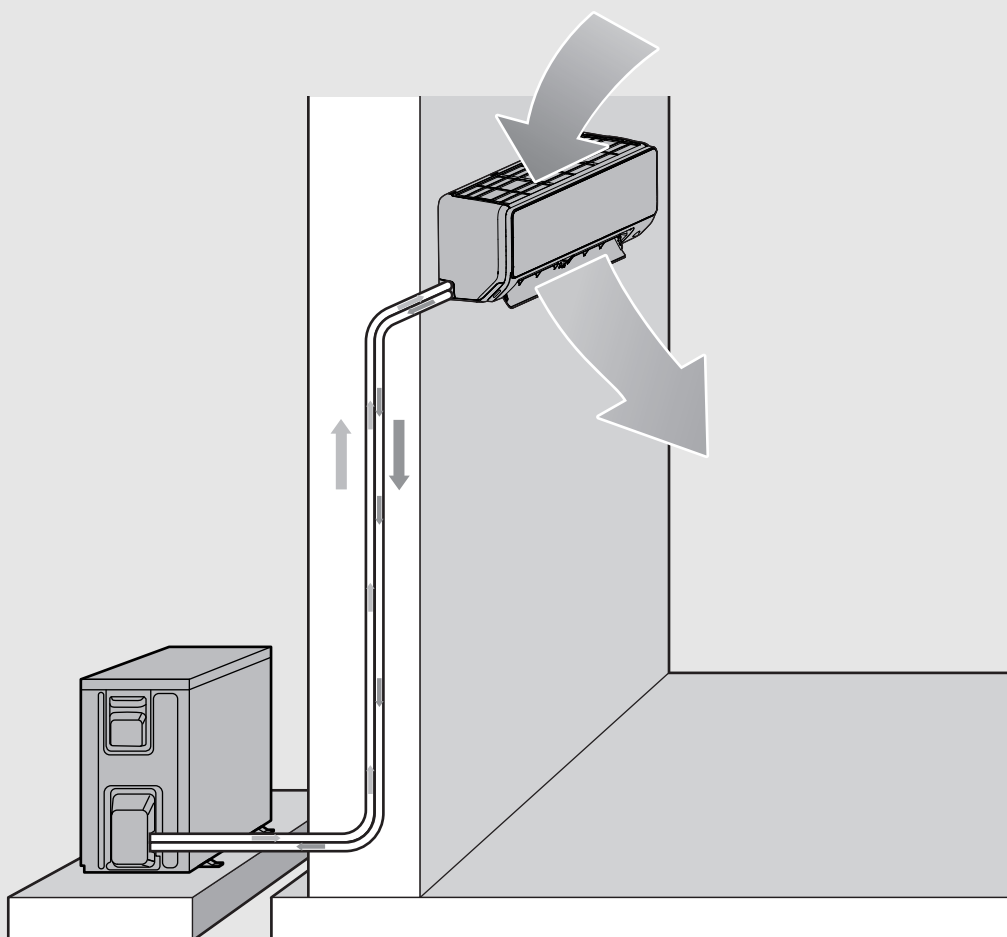


Service instructions

## Split air conditioner

### Climate 2000

CL2000U W 26 E | CL2000U W 35 E | CL2000U W 53 E | CL2000U W 70 E | CL2000 26 E |  
CL2000 35 E | CL2000 53 E | CL2000 70 E



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## 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 or life-threatening personal injury will occur.

#### **WARNING**

**WARNING** indicates that severe to life-threatening personal injury may occur.

#### **CAUTION**

**CAUTION** indicates that minor to medium personal injury may occur.

#### **NOTICE**

**NOTICE** indicates that material damage may occur.

#### Important information



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

### 1.2 General safety instructions

#### 1.2.1 Overview

This service manual is intended for service engineers. All instructions must be observed. Failure to comply with instructions may result in material damage and personal injury, including danger to life

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

#### **Warning**

- ▶ Do not touch the refrigerant piping, water piping or internal parts during operations or when the operation has just been completed. This is because the temperature may be too high or too low. Let them recover to the normal temperature first. Wear protective gloves if you must come in contact with these.
- ▶ Do not touch any refrigerant that has accidentally leaked.

#### **Caution**

- ▶ Please wear the appropriate personal protective tools during installation, maintenance or repair of the system (protective gloves, safety glasses, etc.).
- ▶ Do not touch the air inlet or aluminium fin of the unit.

#### **Notice**

- ▶ Improper installation or connection of equipment and accessories may cause electric shocks, short circuits, leaks, fires, or other damage to the equipment. Use only accessories, equipment and spare parts made or approved by the manufacturer.

- ▶ 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**

- ▶ Take appropriate precautions to prevent refrigerant leakage. If the refrigerant gas leaks, ventilate the area immediately. Possible risk: An excessively high concentration of refrigerant in an enclosed area can lead to anoxia (oxygen deficiency). The refrigerant gas may produce a toxic gas if it comes in contact with fire.
- ▶ Refrigerant must be recovered. Do not release it to the environment. Use the vacuum pump to draw the refrigerant out from the unit.

##### **Notice**

- ▶ Do not charge refrigerant before the wiring layout is completed.
- ▶ Only charge the refrigerant after the leak tests and vacuum drying have been completed.
- ▶ When charging the system with refrigerant, do not exceed the allowable charge.

#### 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



Always use appropriate tools only. In case of uncertainty, consult the manufacturer about the tools to use with flammable refrigerants.



### **DANGER**

#### **Fire hazard - Risk of injury or death**

Using other parts than those specified by the manufacturer may result in the ignition of refrigerant from a leak.

- ▶ Always replace components with the parts specified by the manufacturer.

#### **Preparing the work area**

Prior to beginning any work on systems containing flammable refrigerants, safety checks are necessary to ensure that the risk of ignition is minimised. For repairs to the refrigerating system, the following precautions are to be complied with prior to conducting work on the system.

- ▶ Undertake any works in a controlled area and a controlled procedure to minimise the risk of flammable gases or vapours being present while performing the task.
- ▶ Remove all possible ignition sources and put up a "No Smoking" sign.
- ▶ Do not use a halide torch or any other gas detection method with an open flame.
- ▶ Do not work in a confined space.
- ▶ Section off the work area.
- ▶ Ensure the work area is well ventilated before and while carrying out the work.
- ▶ Check area with a suitable refrigerant/leak detector before and while carrying out the work. If a leak detector needs recalibration, recalibrate in a refrigerant-free area.
- ▶ Keep a dry powder or CO<sub>2</sub>-filled fire extinguisher at hand.
- ▶ Inform maintenance staff and other persons working in the area of the work being carried out.

#### **Checking the refrigeration equipment**

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

- ▶ Ensure the charge size is in accordance with the room size in which the refrigerant containing parts are installed.
- ▶ Check that the ventilation machinery and outlets are operating adequately and are not obstructed.
- ▶ If an indirect refrigerating circuit is used, the secondary circuits must be checked for the presence of refrigerant, too.
- ▶ Ensure all marking to the equipment is visible and legible. Any unintelligible signage must be corrected.
- ▶ Ensure only refrigerant pipes and components constructed from materials inherently resistant to being corroded, or which are suitably protected, are exposed. All others must be installed in a position where they are unlikely to be exposed to any corrosive substances.

## Checking electrical devices and cabling



Electrical components must be fit for the purpose and correspond to the correct specification. The manufacturer's maintenance and service guidelines must be followed at all times. If in doubt consult the manufacturer's technical department for assistance.

### **NOTICE**

#### **Temporary repairs to ensure continuing operation**

If a fault exists that could compromise safety, usually, no electrical supply should be connected to the circuit until it is satisfactorily dealt with. However, if a fault cannot be corrected immediately, but it is necessary to continue operation, an adequate temporary solution must be sought.

- ▶ The owner of the equipment must be informed of this so that all parties are notified.

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

- ▶ Initial safety checks include:
  - Capacitors must be discharged in a safe manner to avoid the possibility of sparking.
  - Live electrical components and wiring may not be exposed while charging, recovering or purging the system.
  - Ensure the device is continuously grounded.
- ▶ Check 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 such as compressors or fans.

#### **Repairs to sealed components**

- ▶ Ensure all electrical supplies are disconnected from the equipment being worked on prior to any removal of sealed covers, etc.



### **CAUTION**

#### **Potentially hazardous situations**

- ▶ If electrical supply is absolutely necessary during servicing, make sure to locate a permanently operating form of leak detection at the most critical point to warn of a potentially hazardous situation.
- ▶ Ensure particular attention is paid that
  - the casing is not altered to the point where the level of protection is compromised,
  - cables are undamaged,
  - there is not an excessive number of connections,
  - all terminals are made to original specification,
  - seals are undamaged and sealing materials have not degraded to the point of not preventing ingress of flammable atmospheres.
  - glands, etc are fitted correctly.
- ▶ Ensure the device is mounted securely.
- ▶ Ensure replacement parts are in accordance with the manufacturer's specifications.

## Repairs to intrinsically safe components



Intrinsically safe components do not have to be isolated prior to working on them. They are the only components which can be worked on while live in the presence of a flammable atmosphere.

- ▶ Ensure not to exceed the permissible voltage and current permitted for the equipment in use when applying permanent inductive or capacitance loads to the circuit.
- ▶ Ensure that the test apparatus is at the correct rating.

## Leak detection methods



Leak detection fluids are suitable for use with most refrigerants. However, the use of detergents containing chlorine should be avoided, as the chlorine may react with the refrigerant and corrode the copper pipe-work.  
The use of silicon sealant may inhibit the effectiveness of some types of leak detection equipment.

The following leak detection methods are deemed acceptable for systems containing flammable refrigerants.

- ▶ Ensure that the detector is not a potential source of ignition and is suitable for the refrigerant. For this reason, use electronic leak detectors to detect flammable refrigerants.
- ▶ Ensure to recalibrate an inadequate sensitivity in a refrigerant-free area.
- ▶ Leak detection equipment should be set at a percentage of the LFL of the refrigerant and be calibrated to the refrigerant employed.
- ▶ Ensure the appropriate percentage of gas (25 % maximum).
- ▶ If a leakage of refrigerant is found which requires brazing, all of the refrigerant must be either recovered from the system or isolated by shutting-off valves in a part of the system away from the leak.

## Removal and evacuation



When breaking into the refrigerant circuit to make repairs - or for any other purpose - conventional procedures may be used.  
Do not use compressed air or oxygen for purging refrigerant systems.

- ▶ Do not open the refrigerant system by brazing. Instead, adhere to the following procedure:
- ▶ Remove refrigerant.
- ▶ Flush the circuit with nitrogen.
- ▶ Evacuate.
- ▶ Flush again with nitrogen. This process may need to be repeated several times.
- ▶ Open the circuit by cutting or brazing.

## Removal and evacuation for appliances containing flammable refrigerants

### NOTICE

### Flushing pipes containing flammable refrigerants

For appliances containing flammable refrigerants, the system should be flushed with oxygen-free nitrogen to render the unit safe.

- ▶ Always follow best practice.
- ▶ Flushing is achieved by vacuuming the system, then filling the system with oxygen-free nitrogen until the design pressure is reached.
- ▶ Vent the system to atmospheric pressure.
- ▶ Repeat the above process until there is no refrigerant left in the system.
- ▶ Make sure to always flush the system before doing any brazing on the pipework.



Ensure that the outlet for the vacuum pump is away from any sources of ignition and that ventilation is available.

## 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.

## Decommissioning



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

It is recommended good practice that all refrigerants are recovered safely or safely vented.

- ▶ An oil and refrigerant sample should be taken prior to the task, in case analysis is required before reusing reclaimed refrigerant.
- ▶ Ensure 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 conform to the appropriate standards,
  - all personal protective equipment is available and being used correctly,
  - the recovery process is supervised at all times by a competent person.
- ▶ Pump down refrigerant system, if possible.
- ▶ Make sure that cylinder is situated on the scales before recovery takes place.
- ▶ Start the recovery machine and operate in accordance with manufacturer's instructions.

- ▶ 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.
- ▶ Ensure that the cylinders and the equipment are removed from the site promptly and that all isolation valves on the equipment are closed off when the process is finished.



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

### Labelling

- ▶ Ensure equipment label states that it has been decommissioned and emptied of refrigerant and that the label is dated and signed.
- ▶ Ensure equipment is labelled to state it contains flammable refrigerant.

### Recovery



When removing refrigerant from a system, either for service or decommissioning, it is recommended good practice that all refrigerants are removed safely.

- ▶ Ensure only appropriate refrigerant recovery cylinders are employed and that they are appropriately labelled for the refrigerant. Cylinders must come complete with pressure relief valve and all associated shut-off valves in good working order.
- ▶ Ensure sufficient amount of cylinders for holding the total system charge is available.
- ▶ Ensure empty recovery cylinders are evacuated and, if possible, cooled before recovery takes place.
- ▶ Ensure recovery equipment is in good working order and suitable for the recovery of flammable refrigerants.
- ▶ Ensure instructions concerning the equipment at hand are included with it.
- ▶ Ensure that a set of calibrated weighing scales in good working order is at hand.
- ▶ Ensure hoses are complete with leak-free disconnect couplings and are in good condition.
- ▶ Before use, check that recovery machine is in satisfactory working order, has been properly maintained, and that any associated electrical components are sealed to prevent ignition in the event of a refrigerant release. Consult the manufacturer if in doubt.
- ▶ Ensure the recovered refrigerant 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.



If compressors or compressor oils are to be removed, ensure that they have been evacuated to an acceptable level so that no flammable refrigerant remains in the lubricant. Evacuation should be carried out prior to returning the compressor to the suppliers. To accelerate this process, solely electric heating to the compressor body may be employed.

### Transportation, marking and storage

- ▶ Ensure transport of equipment containing flammable refrigerants is in compliance with the transport regulations.
- ▶ Ensure the marking of the equipment using signs is in compliance with local regulations.

- ▶ Ensure the disposal of equipment containing flammable refrigerants is in compliance with national regulations.
- ▶ Ensure storage of equipment/appliances is in accordance with the manufacturer's instructions.

### NOTICE

#### Storage of packed (unsold) equipment:

Storage package protection should be constructed in a way that mechanical damage to the equipment inside the package will not cause a leak of the refrigerant charge.

- ▶ 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) |                            |
| CL2000U W 26 E | CL2000 26 E  | 9k       | 2,6  | 220-240V~, 50Hz,<br>1Phase |
| CL2000U W 35 E | CL2000 35 E  | 12k      | 3,5  |                            |
| CL2000U W 53 E | CL2000 53 E  | 18k      | 5,3  |                            |
| CL2000U W 70 E | CL2000 70 E  | 24k      | 7,0  |                            |

Table 1

#### 3.2 Pipe Length and Drop Height

The length and elevation of connection pipe are shown in the table below. If the pipe length exceeds standard pipe length, additional refrigerant should be charged to ensure nominal cooling/heating capacity.

| Capacity |         | Standard Length | Max Pipe Length | Max Elevation | Additional Refrigerant |
|----------|---------|-----------------|-----------------|---------------|------------------------|
| (Btu/h)  | (kW)    |                 |                 |               |                        |
| 9 k/12 k | 2,6/3,5 | 5 m             | 25 m            | 10 m          | 12g/m                  |
| 18 k     | 5,3     |                 | 30 m            | 20 m          |                        |
| 24 k     | 7       |                 | 50 m            | 25 m          | 24g/m                  |

Table 2

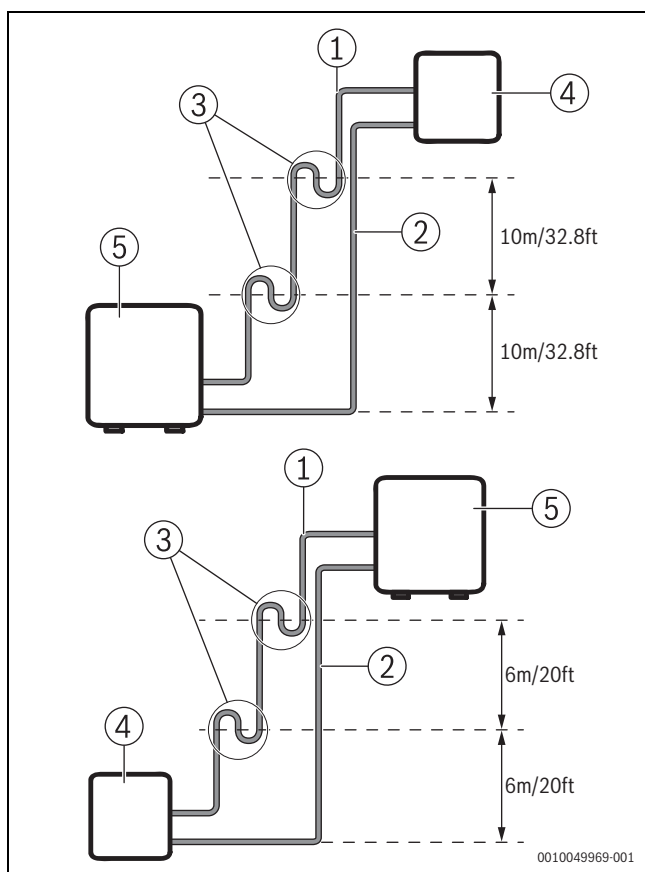


Fig. 1 Installation of indoor unit and outdoor unit

- [1] Gas-side pipe
- [2] Liquid-side pipe
- [3] Siphon-shaped elbow as oil separator
- [4] Indoor unit
- [5] Outdoor unit

If the outdoor unit is installed higher than the indoor unit, proper oil should return to the compressor along with the suction of refrigerant to keep lubrication of compressor. If the suction flow velocity drops below 7.62 m/s, oil won't return to the compressor. An oil trap should be installed every 6 m of vertical gas pipe in order to avoid a compressor damage.

**-or-**

If indoor unit is installed higher than outdoor unit, oil trap should be set every 10 m of vertical distance.

3.3 Dimensions

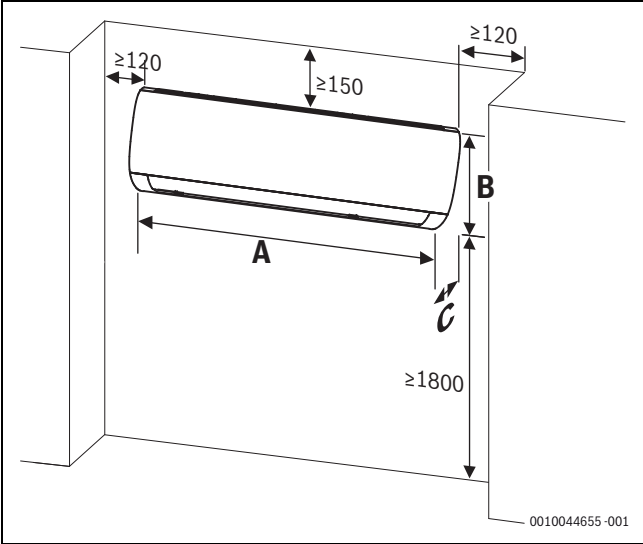


Fig. 2

|                | A [mm] | B [mm] | C [mm] |
|----------------|--------|--------|--------|
| CL2000U W 26 E | 805    | 285    | 194    |
| CL2000U W 35 E | 805    | 285    | 194    |
| CL2000U W 53 E | 957    | 302    | 213    |
| CL2000U W 70 E | 1040   | 327    | 220    |

Table 3

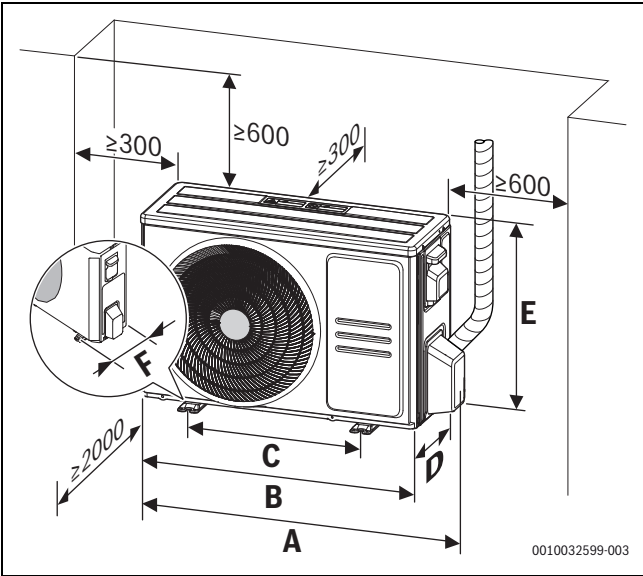


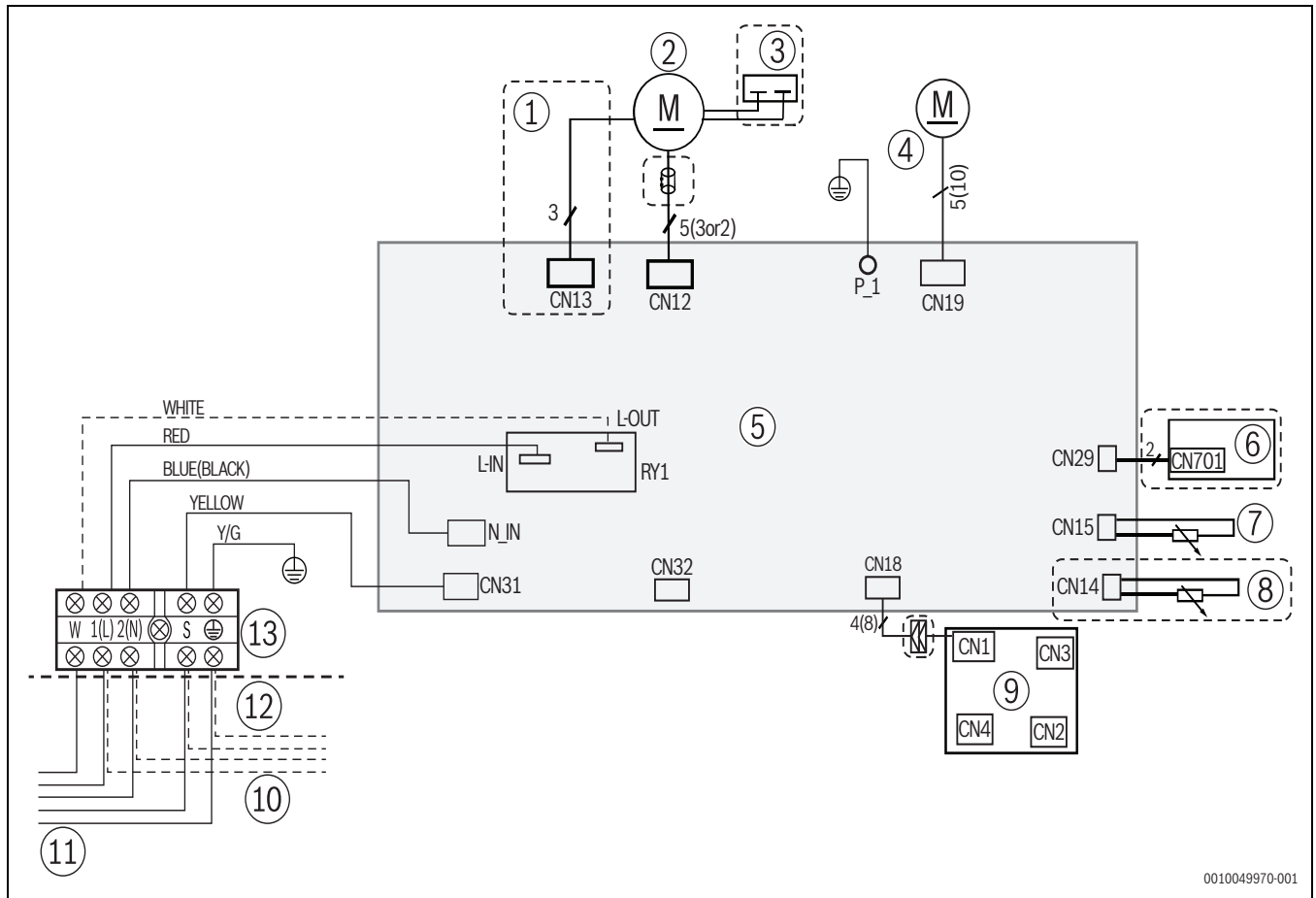
Fig. 3

|             | A [mm] | B [mm] | C [mm] | D [mm] | E [mm] | F [mm] |
|-------------|--------|--------|--------|--------|--------|--------|
| CL2000 26 E | 790    | 720    | 452    | 270    | 495    | 255    |
| CL2000 35 E | 790    | 720    | 452    | 270    | 495    | 255    |
| CL2000 53 E | 874    | 805    | 511    | 330    | 554    | 317    |
| CL2000 70 E | 955    | 890    | 663    | 342    | 673    | 354    |

Table 4

### 3.4 Electrical Wiring Diagrams

#### 3.4.1 Indoor unit wiring diagram



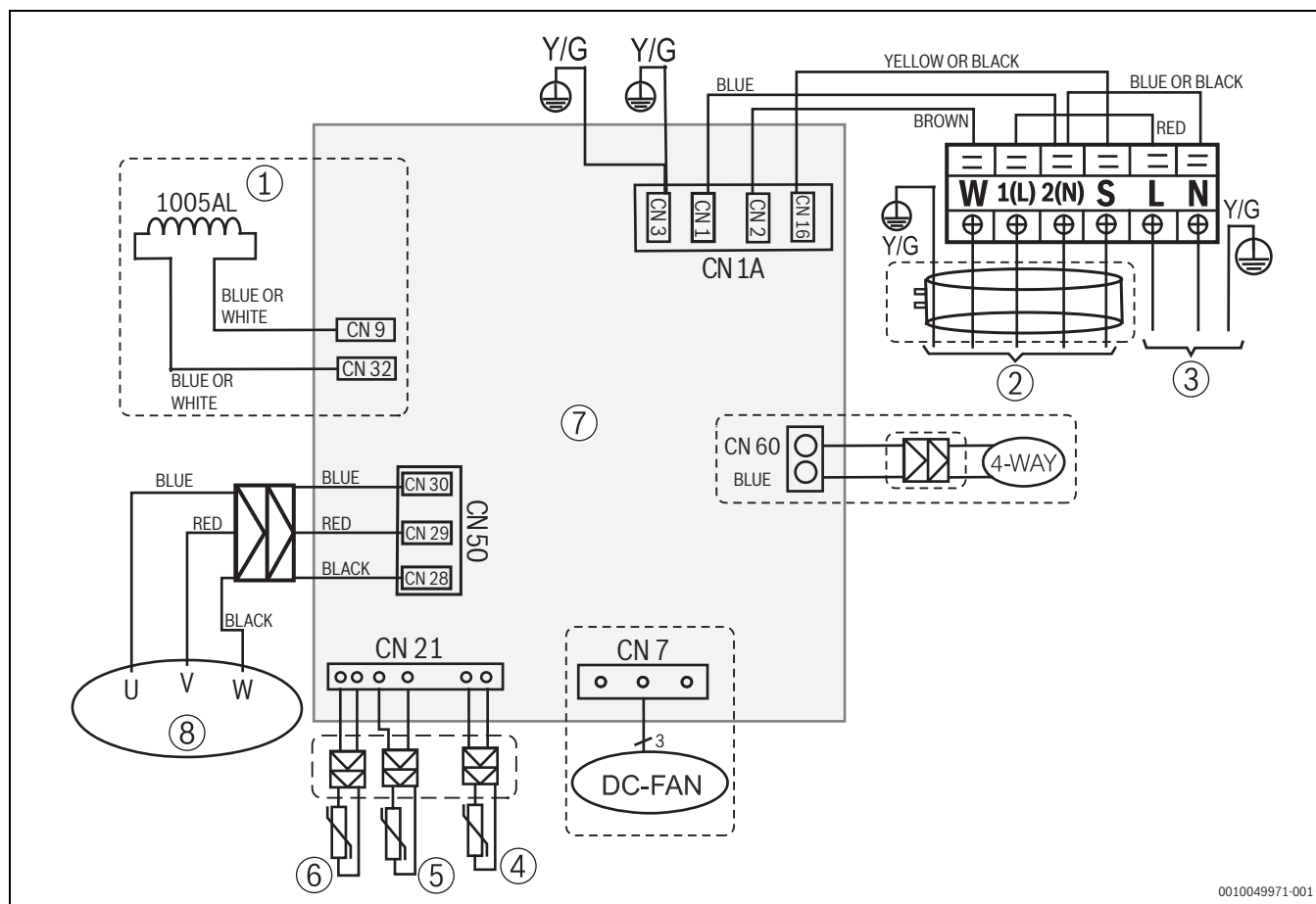
0010049970-001

Fig. 4 Wiring diagram for indoor unit

- [1] Applicable to AC motor only
- [2] Indoor fan
- [3] Cap
- [4] Swing motor 1
- [5] Main board
- [6] Switch board
- [7] Pipe temperature sensor
- [8] Room temperature sensor
- [9] Display board
- [10] Applicable for MULTI and MONO unit without 1W standby control feature
- [11] Applicable for MONO unit with 1W standby control feature
- [12] Outdoor unit
- [13] Indoor unit

- Brown Brown wire
- Blue Blue wire
- Blue (Black) Blue or black wire
- Blue (White) Blue or white wire
- Red Red wire
- Yellow Yellow wire
- Yellow (Black) Yellow or black wire
- Yellow/Green Yellow and green wire
- White White wire
- CN.. Port code
- Indicated element is optional

### 3.4.2 Outdoor unit wiring diagram



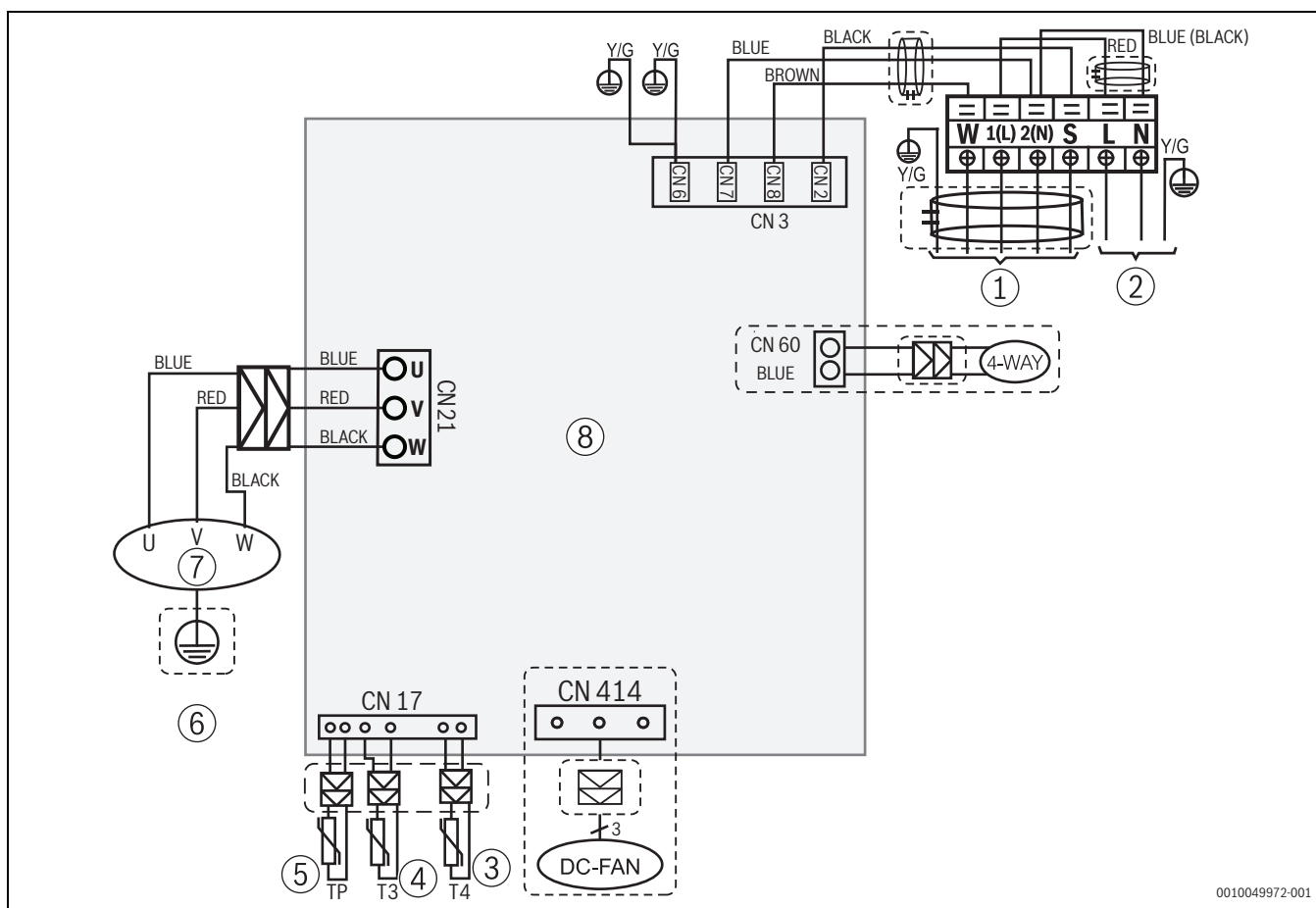
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Fig. 5 Wiring diagram for outdoor unit with CL2000 26 E, CL2000 35 E and CL2000 53 E

- |                                  |                                     |
|----------------------------------|-------------------------------------|
| [1] Reactor                      | Brown Brown wire                    |
| [2] Indoor unit                  | Blue Blue wire                      |
| [3] Power supply                 | Blue (Black) Blue or black wire     |
| [4] Ambient temperature sensor   | Blue (White) Blue or white wire     |
| [5] Condenser temperature sensor | Red Red wire                        |
| [6] Discharge temperature sensor | Yellow Yellow wire                  |
| [7] Main board                   | Yellow (Black) Yellow or black wire |
| [8] Compressor                   | Yellow/Green Yellow and green wire  |
|                                  | White 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.



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Fig. 6 Wiring diagram for outdoor unit with CL2000 70 E

- [1] Indoor unit
- [2] Power supply
- [3] Ambient temperature sensor
- [4] Condenser temperature sensor
- [5] Discharge temperature sensor
- [6] Ground wire of the compressor is contained in D box
- [7] Compressor
- [8] Outdoor main PCB

- Brown Brown wire
- Blue Blue wire
- Blue (Black) Blue or black wire
- Blue (White) Blue or white wire
- Red Red wire
- Yellow Yellow wire
- Yellow (Black) Yellow or black wire
- Yellow/Green Yellow and green wire
- White 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.

Fig. 7 Main PCB ports for outdoor unit with CL2000 26 E, CL2000 35 E and CL2000 53 E

| Label in Fig. 7 | 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                                                                        | 208-230V AC (when ON) |
| 3               | 4-WAY    | CN60      | connect to 4-way valve                                                                              | 208-230V AC (when ON) |
| 4               | HEAT2    | CN15      | connect to chassis heater                                                                           | 208-230V AC (when ON) |
| 5               | AC-FAN   | CN25      | connect to AC fan                                                                                   |                       |
| 6               | PMV      | CN31      | connect to Electric Expansion Valve                                                                 |                       |
| 7               | TESTPORT | CN6       | used for testing                                                                                    |                       |
| 8               | TP       | CN21/CN22 | connect to pipe temperature sensor T3, ambient temperature sensor T4, exhaust temperature sensor TP |                       |
|                 | T4       |           |                                                                                                     |                       |
|                 | T3       |           |                                                                                                     |                       |
| 9               | DC-FAN   | CN7       | connect to DC fan                                                                                   |                       |
| 10              | FAN_IPM  | IPM 501   | IPM for DC fan                                                                                      |                       |
| 11              | W        | CN28      | connect to compressor                                                                               |                       |
|                 | V        | CN29      | 0V AC (standby)                                                                                     |                       |
|                 | U        | CN30      | 10-200V AC (running)                                                                                |                       |
| 12              | COMP_IPM | IPM 301   | IPM for compressor                                                                                  |                       |

Table 5



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

This is a detailed technical schematic diagram of a power supply unit (PSU). It illustrates the internal electrical components and their interconnections. Key components labeled include:

- Capacitors:** C1 through C12, C20, C21, C401, C402, C403, C404.
- Resistors:** R1 through R17, R20, R21, R28, R301, R302, R303, R304, R305, R306, R307, R308, R309, R310, R311, R312, R313, R314, R315, R316, R317, R318, R319, R320, R321, R322, R323, R324, R325, R326, R327, R328, R329, R330, R331, R332, R333, R334, R335, R336, R337, R338, R339, R340, R341, R342, R343, R344, R345, R346, R347, R348, R349, R350, R351, R352, R353, R354, R355, R356, R357, R358, R359, R360, R361, R362, R363, R364, R365, R366, R367, R368, R369, R370, R371, R372, R373, R374, R375, R376, R377, R378, R379, R380, R381, R382, R383, R384, R385, R386, R387, R388, R389, R390, R391, R392, R393, R394, R395, R396, R397, R398, R399, R400, R401, R402, R403, R404, R405, R406, R407, R408, R409, R410, R411, R412, R413, R414, R415, R416, R417, R418, R419, R420, R421, R422, R423, R424, R425, R426, R427, R428, R429, R430, R431, R432, R433, R434, R435, R436, R437, R438, R439, R440, R441, R442, R443, R444, R445, R446, R447, R448, R449, R450, R451, R452, R453, R454, R455, R456, R457, R458, R459, R460, R461, R462, R463, R464, R465, R466, R467, R468, R469, R470, R471, R472, R473, R474, R475, R476, R477, R478, R479, R480, R481, R482, R483, R484, R485, R486, R487, R488, R489, R490, R491, R492, R493, R494, R495, R496, R497, R498, R499, R500, R501, R502, R503, R504, R505, R506, R507, R508, R509, R510, R511, R512, R513, R514, R515, R516, R517, R518, R519, R520, R521, R522, R523, R524, R525, R526, R527, R528, R529, R530, R531, R532, R533, R534, R535, R536, R537, R538, R539, R540, R541, R542, R543, R544, R545, R546, R547, R548, R549, R550, R551, R552, R553, R554, R555, R556, R557, R558, R559, R560, R561, R562, R563, R564, R565, R566, R567, R568, R569, R570, R571, R572, R573, R574, R575, R576, R577, R578, R579, R580, R581, R582, R583, R584, R585, R586, R587, R588, R589, R590, R591, R592, R593, R594, R595, R596, R597, R598, R599, R600, R601, R602, R603, R604, R605, R606, R607, R608, R609, R610, R611, R612, R613, R614, R615, R616, R617, R618, R619, R620, R621, R622, R623, R624, R625, R626, R627, R628, R629, R630, R631, R632, R633, R634, R635, R636, R637, R638, R639, R640, R641, R642, R643, R644, R645, R646, R647, R648, R649, R650, R651, R652, R653, R654, R655, R656, R657, R658, R659, R660, R661, R662, R663, R664, R665, R666, R667, R668, R669, R670, R671, R672, R673, R674, R675, R676, R677, R678, R679, R680, R681, R682, R683, R684, R685, R686, R687, R688, R689, R690, R691, R692, R693, R694, R695, R696, R697, R698, R699, R700, R701, R702, R703, R704, R705, R706, R707, R708, R709, R710, R711, R712, R713, R714, R715, R716, R717, R718, R719, R720, R721, R722, R723, R724, R725, R726, R727, R728, R729, R730, R731, R732, R733, R734, R735, R736, R737, R738, R739, R740, R741, R742, R743, R744, R745, R746, R747, R748, R749, R750, R751, R752, R753, R754, R755, R756, R757, R758, R759, R760, R761, R762, R763, R764, R765, R766, R767, R768, R769, R770, R771, R772, R773, R774, R775, R776, R777, R778, R779, R780, R781, R782, R783, R784, R785, R786, R787, R788, R789, R790, R791, R792, R793, R794, R795, R796, R797, R798, R799, R800, R801, R802, R803, R804, R805, R806, R807, R808, R809, R810, R811, R812, R813, R814, R815, R816, R817, R818, R819, R820, R821, R822, R823, R824, R825, R826, R827, R828, R829, R830, R831, R832, R833, R834, R835, R836, R837, R838, R839, R840, R841, R842, R843, R844, R845, R846, R847, R848, R849, R850, R851, R852, R853, R854, R855, R856, R857, R858, R859, R860, R861, R862, R863, R864, R865, R866, R867, R868, R869, R870, R871, R872, R873, R874, R875, R876, R877, R878, R879, R880, R881, R882, R883, R884, R885, R886, R887, R888, R889, R890, R891, R892, R893, R894, R895, R896, R897, R898, R899, R900, R901, R902, R903, R904, R905, R906, R907, R908, R909, R910, R911, R912, R913, R914, R915, R916, R917, R918, R919, R920, R921, R922, R923, R924, R925, R926, R927, R928, R929, R930, R931, R932, R933, R934, R935, R936, R937, R938, R939, R940, R941, R942, R943, R944, R945, R946, R947, R948, R949, R950, R951, R952, R953, R954, R955, R956, R957, R958, R959, R960, R961, R962, R963, R964, R965, R966, R967, R968, R969, R970, R971, R972, R973, R974, R975, R976, R977, R978, R979, R980, R981, R982, R983, R984, R985, R986, R987, R988, R989, R990, R991, R992, R993, R994, R995, R996, R997, R998, R999, R1000.
- Diodes:** D1 through D10, D401, D402, D403, D404.
- Transformers:** T1, T2, T3, T4, T5, T6, T7, T8, T9, T10, T11, T12, T13, T14, T15, T16, T17, T18, T19, T20, T21, T22, T23, T24, T25, T26, T27, T28, T29, T30, T31, T32, T33, T34, T35, T36, T37, T38, T39, T40, T41, T42, T43, T44, T45, T46, T47, T48, T49, T50, T51, T52, T53, T54, T55, T56, T57, T58, T59, T60, T61, T62, T63, T64, T65, T66, T67, T68, T69, T70, T71, T72, T73, T74, T75, T76, T77, T78, T79, T80, T81, T82, T83, T84, T85, T86, T87, T88, T89, T90, T91, T92, T93, T94, T95, T96,

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| Label in Fig. 8 | Name         | Port   | Content                                                                             | Port voltage                                                                                   |
|-----------------|--------------|--------|-------------------------------------------------------------------------------------|------------------------------------------------------------------------------------------------|
| 1               | Power Supply | CN6    | Earth: connect to Ground                                                            |                                                                                                |
|                 |              | CN7    | N_in: connect to N-line                                                             | 208-230V AC                                                                                    |
|                 |              | CN8    | L_in: connect to L-line                                                             | 208-230V AC                                                                                    |
| 2               | S            | CN2    | S: connect to indoor unit communication                                             |                                                                                                |
| 3               | 4-WAY        | CN60   | connect to 4 way valve                                                              | 208-230V AC (when ON)                                                                          |
| 4               | TP, T4, T3   | CN17   | connect to pipe temp. sensor T3, ambient temp. sensor T4, discharge temp. sensor TP |                                                                                                |
| 5               | DC-FAN       | CN414  | connect to DC fan                                                                   |                                                                                                |
| 6               | TESTPORT     | CN23   | used for testing                                                                    |                                                                                                |
| 7               | FAN_IPM      | IPM501 | IPM for DC fan                                                                      |                                                                                                |
| 8               | COMP_IPM     | IPM1   | IPM for compressor                                                                  |                                                                                                |
| 9               | U            | CN27   | Compressor connection                                                               | <ul style="list-style-type: none"> <li>Standby: 0V AC</li> <li>Running: 200-300V AC</li> </ul> |
|                 | V            | CN28   |                                                                                     |                                                                                                |
|                 | W            | CN29   |                                                                                     |                                                                                                |
| 10              | EE_PORT      | CN505  | EEPROM programmer port                                                              |                                                                                                |

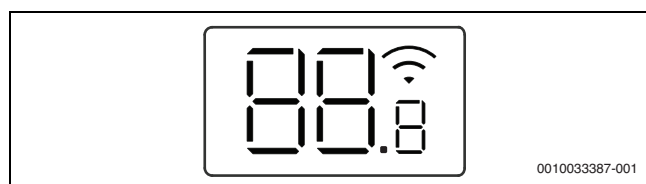
Table 6



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

## 4 Product Features

### 4.1 Indoor unit display



| Symbol                        | Explanation                                                                                                                          |
|-------------------------------|--------------------------------------------------------------------------------------------------------------------------------------|
| <b>Number</b>                 | Temperature display                                                                                                                  |
| <b>ON (3 sec)</b>             | Displayed with some functions, if these are switched on. Indicates that the ON timer is active when the indoor unit is switched off. |
| <b>OF (3 sec)</b>             | Displayed with some functions, if these are switched off.                                                                            |
| <b>AP</b>                     | AP mode of WIFI connection                                                                                                           |
| <b>dF</b>                     | Automatic defrosting active                                                                                                          |
| <b>cF</b>                     | Warming in heating mode                                                                                                              |
| <b>SC</b>                     | The self-cleaning function is active <sup>1)</sup>                                                                                   |
| <b>FP</b>                     | Heating in room temperature under 8 °C                                                                                               |
| <b>E - C - 0<sup>2)</sup></b> | The ECO function is active <sup>3)</sup>                                                                                             |

1) Available on select units only.

2) Set temperature and **E** gradually illuminates to **88** in one second intervals

3) Available on select units only.

Table 7 Symbols in the display

### 4.2 Safety features

#### Compressor three-minute delay at restart

Compressor functions are delayed for up to 1 minute upon first starting the unit and for up to 3 minutes upon subsequent restarts.

#### Zero crossing detection error protection (except for DC fan units)

If the air conditioner can not detect zero crossing signal for 4 minutes or the zero crossing signal time interval is not correct, the unit will stop and the LED will display the failure. The correct zero crossing signal time interval should be between 6-13 ms.

#### 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 shutoff based on fan speed

If the indoor fan speed registers below 300 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 a period of 7 seconds.
- If the unit is in heating mode, the indoor fan is regulated by the anti-cold air function.

#### 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 detection

This function is active only when cooling mode is selected. It will detect if the compressor is being damaged by refrigerant leakage or by compressor overload. This is measured using the coil temperature of evaporator T2 when the compressor is in operation.

### 4.3 Operating functions

#### Abbreviations

| Abbreviation   | Element                          |
|----------------|----------------------------------|
| T1             | Indoor room temperature          |
| T2             | Coil temperature of indoor unit  |
| T3             | Coil temperature of outdoor unit |
| T4             | Outdoor ambient temperature      |
| T <sub>S</sub> | Set temperature                  |
| Td             | Control target temperature       |
| TP             | Compressor discharge temperature |

Table 8 Element abbreviations

#### 4.3.1 Fan mode

When fan mode is activated:

- The outdoor fan and compressor are stopped.
- Temperature control is disabled and no temperature setting is displayed.
- The indoor fan speed can be set to high, medium, low or auto.
- The louver operations are identical to those in cooling mode.
- Auto fan: In fan-only mode, the indoor unit operates the same as auto fan in cooling mode with the temperature set at 24°C.

#### 4.3.2 Cooling mode

##### Compressor Control

Cooling temperature compensation ( $\Delta T_5$ ) is a well-setting parameter of EEPROM. Its value ranges from -2°C to 2°C. The default value is 0.

- When  $T1 - T_5 < \Delta T_5 - 2^\circ\text{C}$ , the compressor ceases operation.
- When  $T1 - T_5 > \Delta T_5 + 3^\circ\text{C}$ , the compressor continues operation.
- When the indoor unit is operating in mute mode, the compressor operates at a low frequency.
- When the current exceeds the pre-set value, the current protection function activates and the compressor ceases operation.

##### Indoor fan control

In cooling mode, the indoor fan operates continuously. The fan speed can be set to high, medium, low, or auto.

If the compressor ceases operation when the configured temperature is reached, the indoor fan motor operates at the minimum or configured speed.

In auto fan mode the following tables apply.

| T1-Td [ °C ] drops below value | Fan Speed decreases to value |
|--------------------------------|------------------------------|
| $\leq 3.5$                     | 80 %                         |
| $\leq 1$                       | 60 %                         |
| $\leq 0.5$                     | 40 %                         |
| $\leq 0$                       | 20 %                         |
| $\leq -0.5$                    | 1 %                          |

Table 9 Fan speed in auto fan mode

| T1-Td [ °C ] rises above value | Fan Speed increases to value |
|--------------------------------|------------------------------|
| $> 0$                          | 20 %                         |
| $> 0.5$                        | 40 %                         |
| $> 1$                          | 60 %                         |

| T1-Td [°C] rises above value | Fan Speed increases to value |
|------------------------------|------------------------------|
| > 1.5                        | 80 %                         |
| > 4                          | 100 %                        |

Table 10 Fan speed in auto fan mode

#### Outdoor fan control

##### Case 1:

- 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.

##### Case 2:

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

#### Condenser temperature protection

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

#### Evaporator temperature protection

When evaporator temperature drops below a configured value, the compressor and outdoor fan cease operation.

#### 4.3.3 Auto mode

This mode can be selected with the remote controller and the setting temperature can be changed between 17°C-30°C.

In auto mode, the machine selects cooling, heating, or fan-only mode on the basis of  $\Delta T$  ( $\Delta T = T1 - TS$ ).

| $\Delta T$                       | Running mode          |
|----------------------------------|-----------------------|
| $\Delta T > A$                   | Cooling               |
| $B^\circ C \leq \Delta T \leq A$ | Fan-only              |
| $\Delta T < B$                   | Heating <sup>1)</sup> |

1) In auto mode, cooling only models run the fan

Indoor fan will run at auto fan speed.

The louver operates same as in relevant mode.

If the machine switches mode between heating and cooling, the compressor will keep stopping for certain time and then choose mode according to  $\Delta T$ .

#### 4.3.4 Heating mode

##### Compressor control

Heating temperature compensation ( $\Delta T3$ ) is a well-setting parameter of EEPROM. Its value ranges from -6°C to 6°C.

- When  $T1 - TS > -\Delta T3$ , the compressor ceases operation.
- When  $T1 - TS < -\Delta T3 - 1.5^\circ C$ , the compressor continues operation.
- When the indoor unit is operating in mute mode, the compressor operates at a low frequency.
- When the current exceeds the pre-set value, the current protection function activates and the compressor

##### Indoor Fan Control

When the compressor is on, the indoor fan speed can be set to high, medium, low, or auto. And the anti-cold wind function has the priority.

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

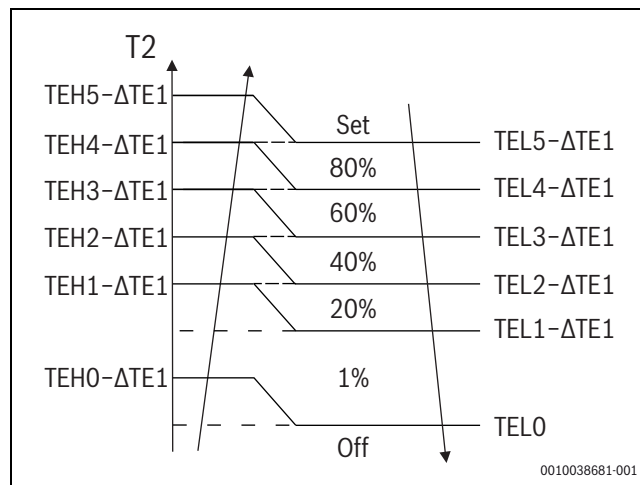


Fig. 9 Anti-cold air function

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]              | $\Delta TE1$ [°C]     |
|----------------------|-----------------------|
| $\geq 19$            | 0                     |
| $\geq 15$ and $< 19$ | $19 - T1 = 0 \dots 4$ |
| $< 15$               | 4                     |

Table 11

When the indoor temperature T1 reaches the setting temperature, the compressor continues operation, the indoor fan motor runs at the minimum speed or setting speed (the anti-cold air function is valid).

In auto fan mode the following tables apply:

| T1-T <sub>s</sub> [°C] drops below value | Fan Speed increases to value |
|------------------------------------------|------------------------------|
| $\leq 0.5$                               | 20 %                         |
| $\leq 0$                                 | 60 %                         |
| $\leq -1.5$                              | 80 %                         |
| $\leq -3$                                | 100 %                        |

Table 12 Fan speed in auto fan mode

| T1-T <sub>s</sub> [°C] rises above value | Fan Speed decreases to value |
|------------------------------------------|------------------------------|
| $> -1.5$                                 | 80 %                         |
| $> 0$                                    | 60 %                         |
| $> 0.5$                                  | 40 %                         |
| $> 1$                                    | 20 %                         |

Table 13 Fan speed in auto fan mode

#### Outdoor Fan Control

##### Case 1:

- 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.

##### Case 2:

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

## Defrosting mode

### Case 1:

- 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.
- If any one of the following conditions is satisfied, defrosting ends and the machine switches to normal heating mode:
  - T3 rises above TCDE1.
  - T3 maintained above TCDE2 for 80 seconds.
  - Unit runs for 15 minutes consecutively in defrosting mode.

### Case 2:

- The unit enters defrosting mode according to changes in the temperature value of T3 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.
- If any one of the following conditions is satisfied, defrosting ends and the machine switches to normal heating mode:
  - T3 rises above TCDE1.
  - T3 maintained above TCDE2 for 80 seconds.
  - Unit runs for 15 minutes consecutively in defrosting mode.

## Evaporator temperature protection

When the evaporator temperature exceeds a pre-set protection value, the compressor ceases operation.

### 4.3.5 Drying mode

Indoor fan speed is fixed at breeze and can't be changed. The louver angle is the same as in cooling mode.

All protections are active and the same as that in cooling mode.

### 4.3.6 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 5 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 5 seconds.

### 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.

### 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 Refrigerant leakage detection

The display area will show **EC** when the outdoor unit detects refrigerant leakage.

### 4.3.10 8 °C Heating

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.

### 4.3.11 Self-cleaning

If you press **Self Clean** when the unit is in cooling or drying mode:

- The indoor unit will run in fan-only mode, then low heat, and finally in fan-only mode.

The function keeps the indoor unit dry and prevents mold growth.

When match with multi outdoor unit, this function is disabled.

### 4.3.12 Follow Me function

If you press **Follow Me** on the remote, the indoor unit will beep. This indicates the follow me function is active.

Once active, the remote control will send a signal every 3 minutes, with no beeps. The unit automatically sets the temperature according to the measurements from the remote control.

The unit will only change modes if the information from the remote control makes it necessary, not from the unit's temperature setting.

If the unit does not receive a signal for 7 minutes or you press **Follow Me**, the function turns off. The unit regulates temperature based on its own sensor and settings.

### 4.3.13 Silence

Press **Silence** on the remote control to enable the **SILENCE** function. While this function is active, the compressor frequency is maintained at a lower level than F3. The indoor unit will run at faint breeze, which reduces noise to the lowest possible level.

When match with multi outdoor unit, this function is disabled.

## 5 Refrigerant

### 5.1 Recharge Refrigerant

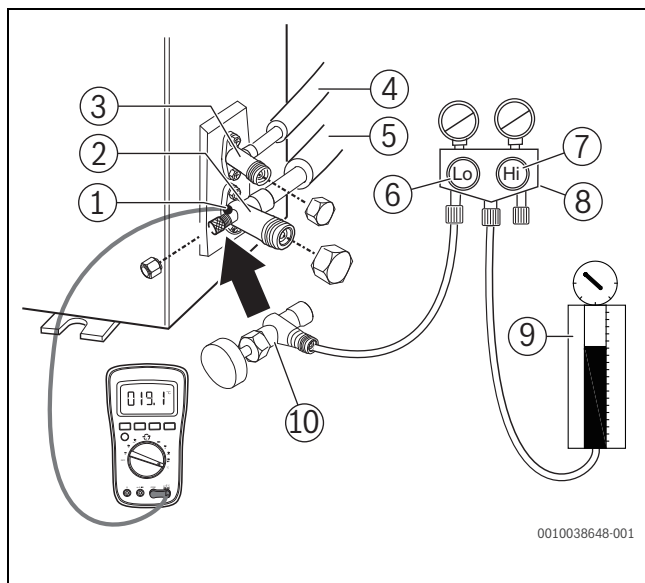


Fig. 10 Refrigerant recharge

- [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.

### 5.2 Evacuate Refrigerant for Re-Installation

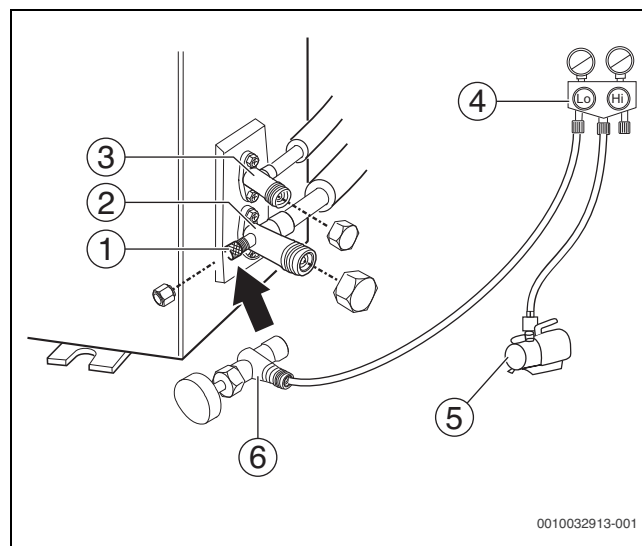


Fig. 11

- [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 refrigerants R32

### 5.3.1 Cooling chart for refrigerant R32

| Unit for<br>pressure | DB/WB T <sub>IDU</sub><br>[°C] | DB T <sub>ODU</sub> [°C] |      |       |      |       |       |      |       |       |       |
|----------------------|--------------------------------|--------------------------|------|-------|------|-------|-------|------|-------|-------|-------|
|                      |                                | -17                      | -15  | -9.44 | 7.22 | 23.89 | 29.44 | 35   | 40.56 | 46.11 | 48.89 |
|                      |                                | Pressure on service port |      |       |      |       |       |      |       |       |       |
| bar                  | 21.11/15                       | 6.5                      | 6.6  | 7.4   | 8.2  | 8.4   | 8.0   | 8.3  | 8.8   | 10.3  | 10.8  |
|                      | 23.89/17.22                    | 6.8                      | 6.9  | 8.1   | 8.8  | 8.8   | 8.5   | 8.9  | 9.3   | 10.9  | 11.4  |
|                      | 26.67/19.44                    | 7.2                      | 7.3  | 8.7   | 9.7  | 9.5   | 9.1   | 9.3  | 9.8   | 11.4  | 12.1  |
|                      | 32.22/22.78                    | 7.9                      | 8.0  | 9.8   | 10.7 | 10.5  | 9.7   | 10.2 | 10.8  | 12.6  | 13.3  |
| MPa                  | 21.11/15                       | 0.65                     | 0.66 | 0.74  | 0.82 | 0.84  | 0.80  | 0.83 | 0.88  | 1.03  | 1.08  |
|                      | 23.89/17.22                    | 0.68                     | 0.69 | 0.81  | 0.88 | 0.88  | 0.85  | 0.89 | 0.93  | 1.09  | 1.14  |
|                      | 26.67/19.44                    | 0.72                     | 0.73 | 0.87  | 0.97 | 0.95  | 0.91  | 0.93 | 0.98  | 1.14  | 1.21  |
|                      | 32.22/22.78                    | 0.79                     | 0.80 | 0.98  | 1.07 | 1.05  | 0.97  | 1.02 | 1.08  | 1.26  | 1.33  |

Table 14 Pressure on service port in cooling mode

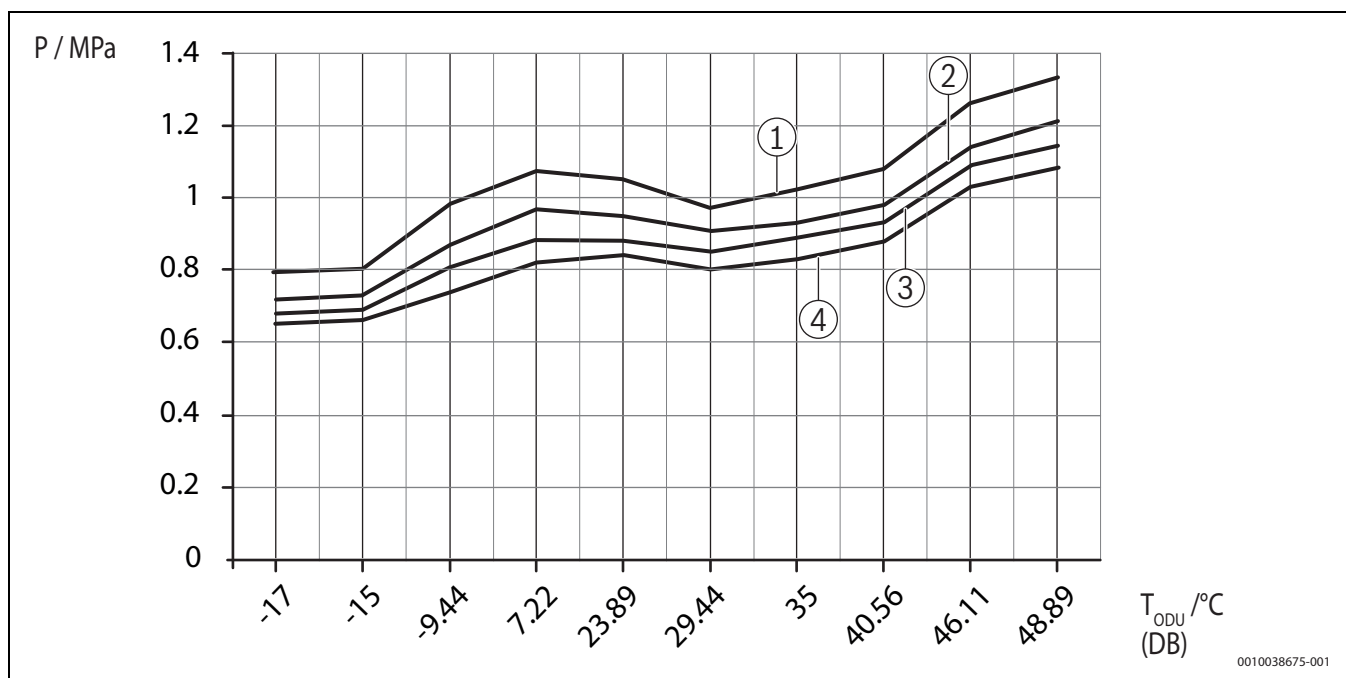


Fig. 12 Pressure on service port in cooling mode

#### DB/WB T<sub>IDU</sub> [°C]:

[1] 32.22/22.78

[2] 26.67/19.44

[3] 23.89/17.22

[4] 21.11/15

DB Dry bulb temperature

P Pressure on service port

T<sub>IDU</sub> Temperature at indoor unit

T<sub>ODU</sub> Temperature at outdoor unit

WB Wet bulb temperature

0010038675-001

### 5.3.2 Heating chart for refrigerant R32

| Unit for pressure        | DB T <sub>IDU</sub><br>°C | DB/WB T <sub>ODU</sub> °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                      | 12.78                     | 30.9                      | 29.1      | 25.8      | 23.3     | 21.2         | 18.9    | 16.8    |
|                          | 18.33                     | 33.2                      | 30.6      | 27.1      | 25.9     | 23.8         | 20.9    | 19.4    |
|                          | 23.89                     | 34.5                      | 32.1      | 28.4      | 26.8     | 25.4         | 21.9    | 20.4    |
| MPa                      | 12.78                     | 3.09                      | 2.91      | 2.58      | 2.33     | 2.12         | 1.89    | 1.68    |
|                          | 18.33                     | 3.32                      | 3.06      | 2.71      | 2.59     | 2.38         | 2.09    | 1.94    |
|                          | 23.89                     | 3.45                      | 3.21      | 2.84      | 2.68     | 2.54         | 2.19    | 2.04    |

Table 15 Pressure on service port in heating mode

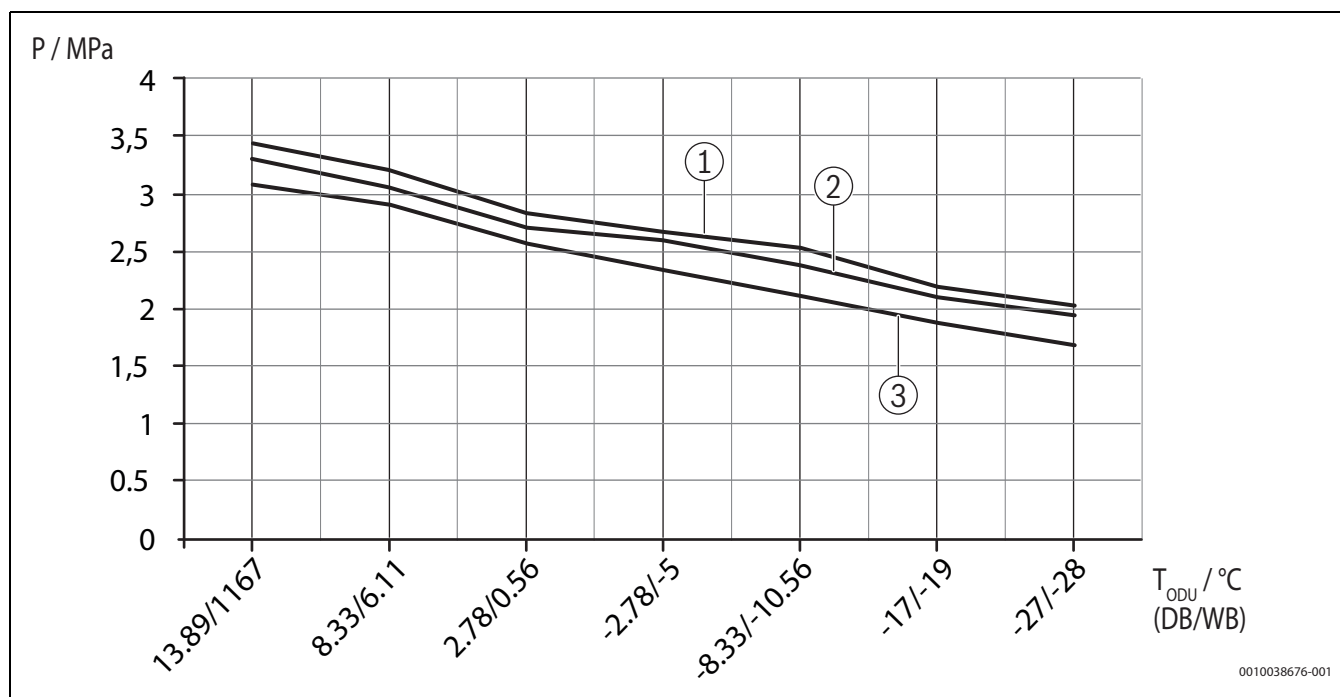


Fig. 13 Pressure on service port in heating mode

#### DB T<sub>IDU</sub> [°C]:

[1] 23.89

[2] 18.33

[3] 12.78

DB Dry bulb temperature

P Pressure on service port

T<sub>IDU</sub> Temperature at indoor unit

T<sub>ODU</sub> Temperature at outdoor unit

WB Wet bulb temperature

### 5.3.3 System pressure table for refrigerant R32

| Pressure |      | Temperature |
|----------|------|-------------|
| kPa      | bar  | °C          |
| 100      | 1    | -51.909     |
| 150      | 1.5  | -43.635     |
| 200      | 2    | -37.323     |
| 250      | 2.5  | -32.15      |
| 300      | 3    | -27.731     |
| 350      | 3.5  | -23.85      |
| 400      | 4    | -20.378     |
| 450      | 4.5  | -17.225     |
| 500      | 5    | -14.331     |
| 550      | 5.5  | -11.65      |
| 600      | 6    | -9.150      |
| 650      | 6.5  | -6.805      |
| 700      | 7    | -4.593      |
| 750      | 7.5  | -2.498      |
| 800      | 8    | -0.506      |
| 850      | 8.5  | 1.393       |
| 900      | 9    | 3.209       |
| 950      | 9.5  | 4.951       |
| 1000     | 10   | 6.624       |
| 1050     | 10.5 | 8.235       |
| 1100     | 11   | 9.790       |
| 1150     | 11.5 | 11.291      |
| 1200     | 12   | 12.745      |
| 1250     | 12.5 | 14.153      |
| 1300     | 13   | 15.52       |
| 1350     | 13.5 | 16.847      |
| 1400     | 14   | 18.138      |
| 1450     | 14.5 | 19.395      |
| 1500     | 15   | 20.619      |
| 1550     | 15.5 | 21.813      |
| 1600     | 16   | 22.978      |
| 1650     | 16.5 | 24.116      |
| 1700     | 17   | 25.229      |
| 1750     | 17.5 | 26.317      |
| 1800     | 18   | 27.382      |
| 1850     | 18.5 | 28.425      |
| 1900     | 19   | 29.447      |
| 1950     | 19.5 | 30.448      |
| 2000     | 20   | 31.431      |
| 2050     | 20.5 | 32.395      |
| 2100     | 21   | 33.341      |
| 2150     | 21.5 | 34.271      |
| 2200     | 22   | 35.184      |
| 2250     | 22.5 | 36.082      |
| 2300     | 23   | 36.965      |
| 2350     | 23.5 | 37.834      |
| 2400     | 24   | 38.688      |
| 2450     | 24.5 | 39.529      |
| 2500     | 25   | 40.358      |
| 2550     | 25.5 | 41.173      |
| 2600     | 26   | 41.977      |
| 2650     | 26.5 | 42.769      |
| 2700     | 27   | 43.55       |

| Pressure |      | Temperature |
|----------|------|-------------|
| kPa      | bar  | °C          |
| 2750     | 27.5 | 44.32       |
| 2800     | 28   | 45.079      |
| 2850     | 28.5 | 45.828      |
| 2900     | 29   | 46.567      |
| 2950     | 29.5 | 47.296      |
| 3000     | 30   | 48.015      |
| 3050     | 30.5 | 48.726      |
| 3100     | 31   | 49.428      |
| 3150     | 31.5 | 50.121      |
| 3200     | 32   | 50.806      |
| 3250     | 32.5 | 51.482      |
| 3300     | 33   | 52.15       |
| 3350     | 33.5 | 52.811      |
| 3400     | 34   | 53.464      |
| 3450     | 34.5 | 54.11       |
| 3500     | 35   | 54.748      |

Table 16 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 by the tabs on the both sides and lift it.

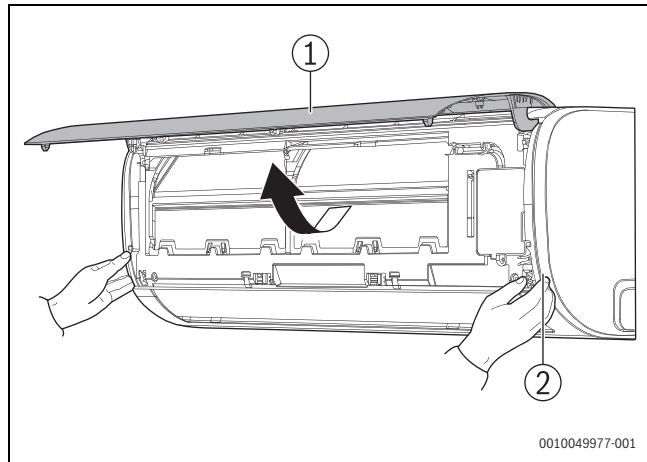


Fig. 14

- [1] Front panel
- [2] Tab

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

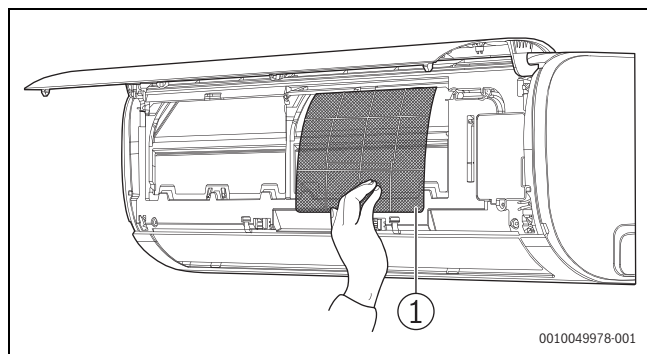


Fig. 15

- [1] Filter

- Open the horizontal louver and push the hook towards left to open it.

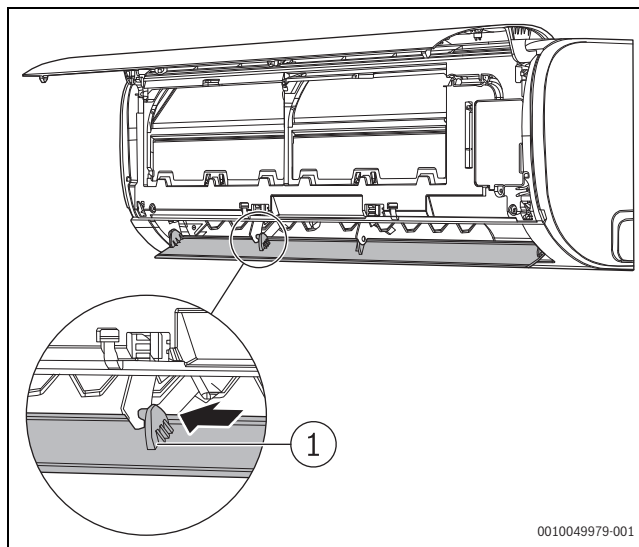


Fig. 16

- [1] Hook

- Bend the horizontal louver lightly by both hands to loosen the hooks, then remove the horizontal louver.

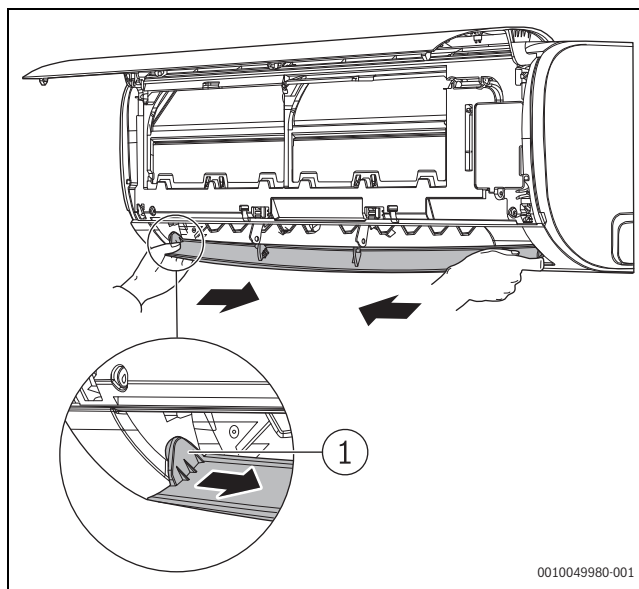


Fig. 17

- [1] Hook

- ▶ Remove one screw and then remove the electrical cover.
- ▶ Disconnect the connector for display board.
- ▶ Remove the display board.

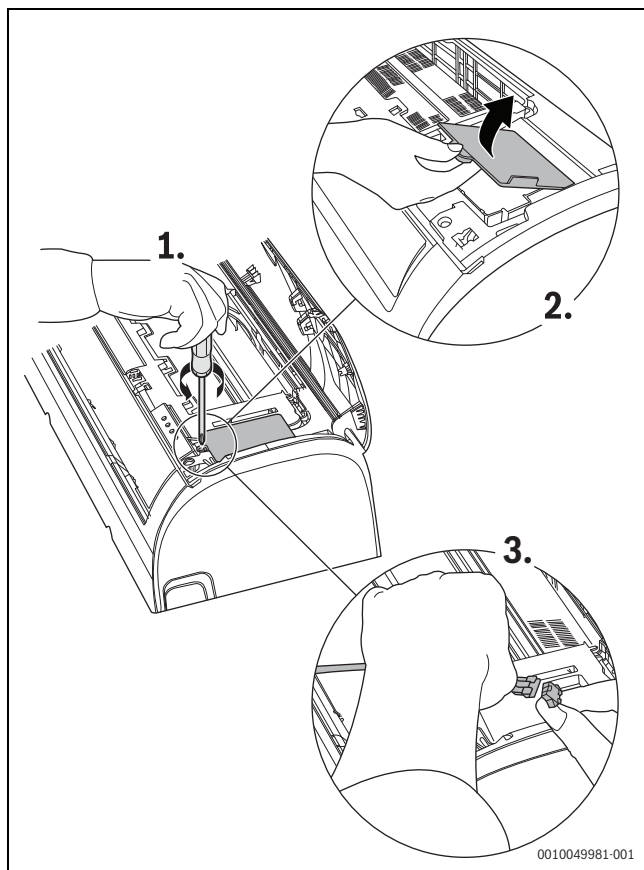


Fig. 18

- ▶ Open the two screw caps and remove the screws.
- ▶ Release the four hooks.

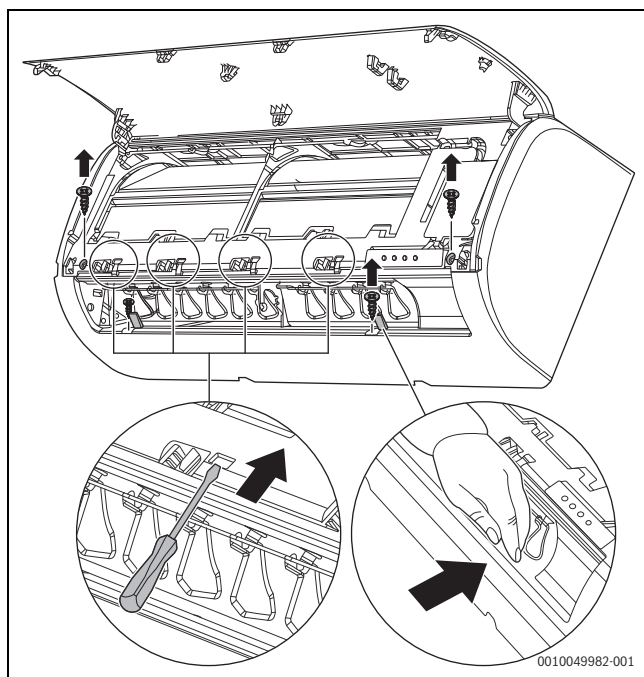


Fig. 19

- ▶ Release the seven hooks in the back.

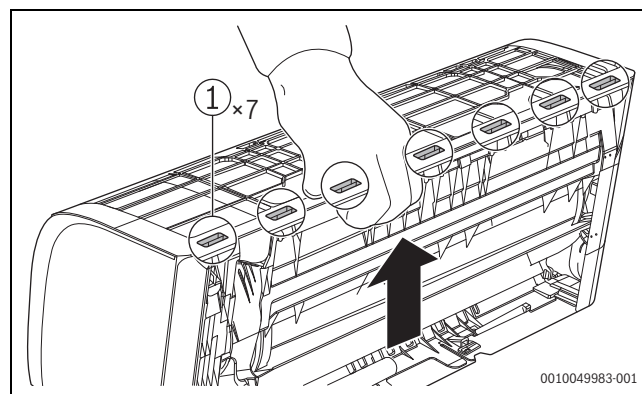


Fig. 20

[1] Hooks

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

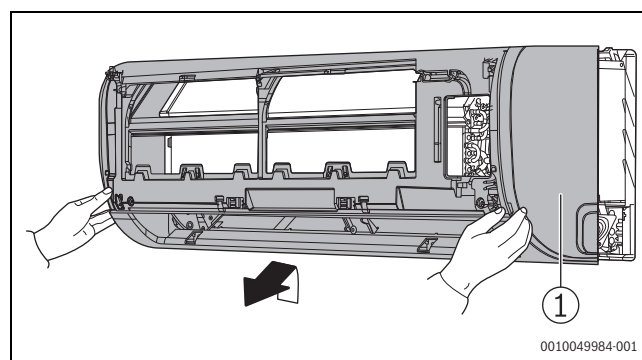


Fig. 21

[1] Panel frame

## 6.2 Electrical parts



Remove the front panel (→ chapter 6.1, p. 24) before disassembling electrical parts.

- Remove the fixing screw and then remove the cover of electronic box and the terminal cover.

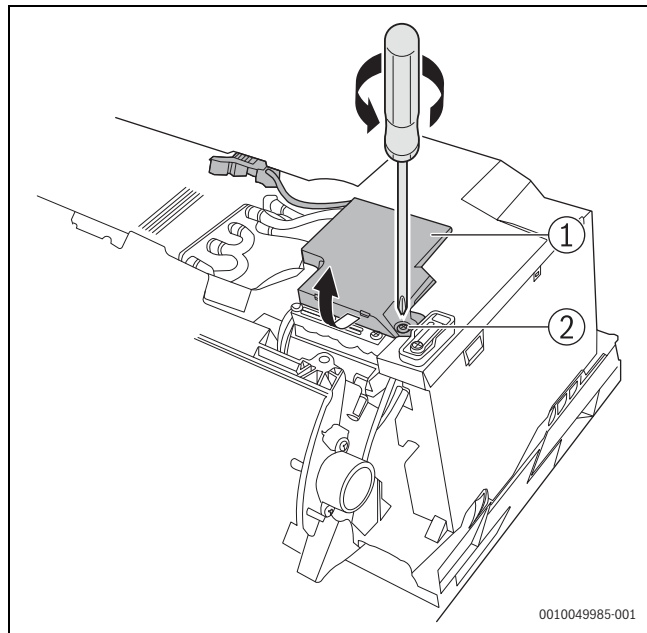


Fig. 22

- [1] Electronic cover
- [2] Fixing screw

- Pull out the room temperature sensor (T1) and the coil temperature sensor (T2).
- Remove the two screws used for the ground connection.

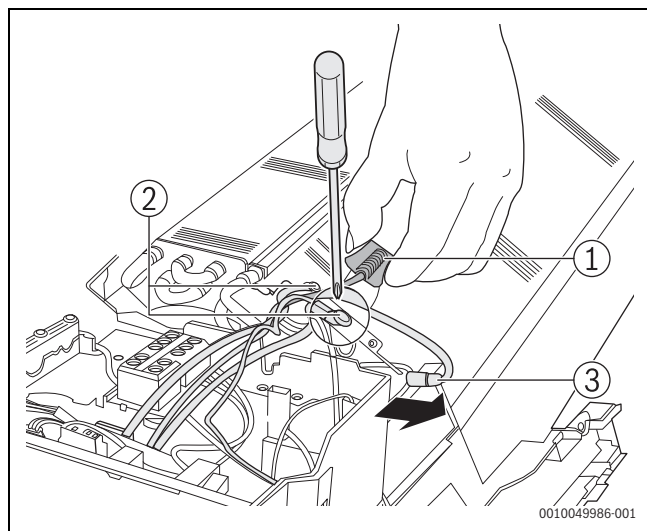


Fig. 23

- [1] T1 sensor
- [2] Ground screws
- [3] T2 sensor

- Remove the fixing screw.

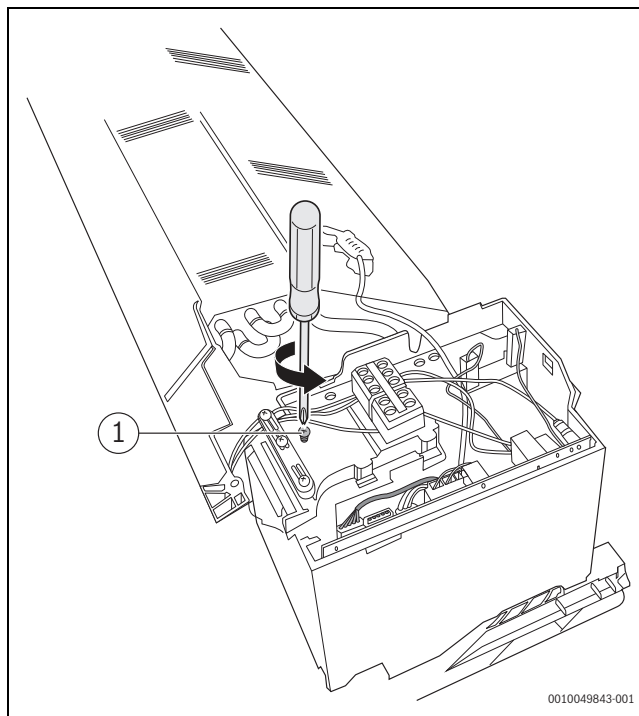


Fig. 24

- [1] Fixing screw

- Pull out the electrical control box along the direction indicated below to remove it.

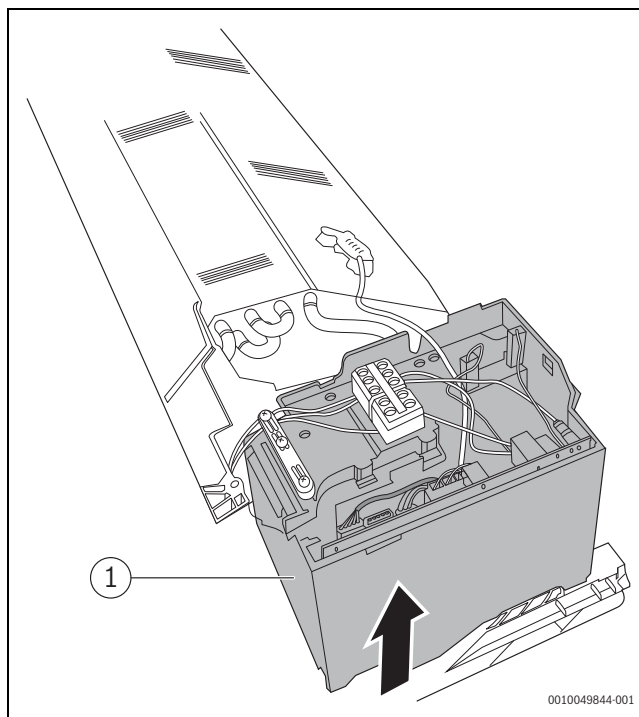


Fig. 25

- [1] Electronic box

- Disconnect the wires. Then remove the electronic main board.

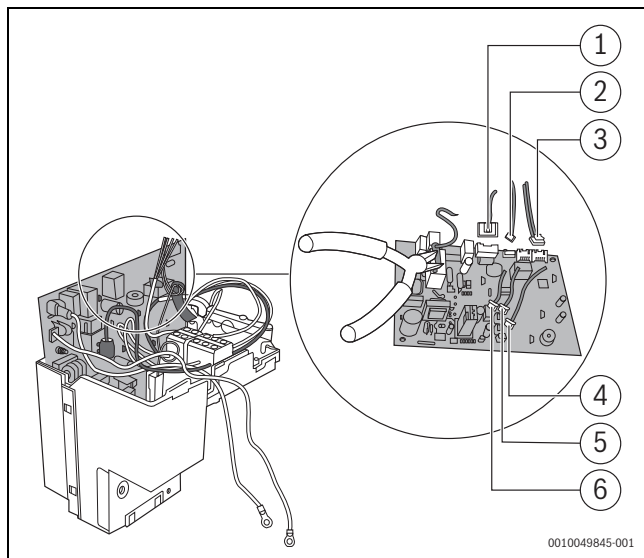


Fig. 26

- [1] Indoor fan motor
- [2] Applicable to unit motor only
- [3] Swing motor
- [4] Room temperature sensor
- [5] Pipe temperature sensor
- [6] Display board

- Remove the fixing screw, then remove the capacitor of fan motor.

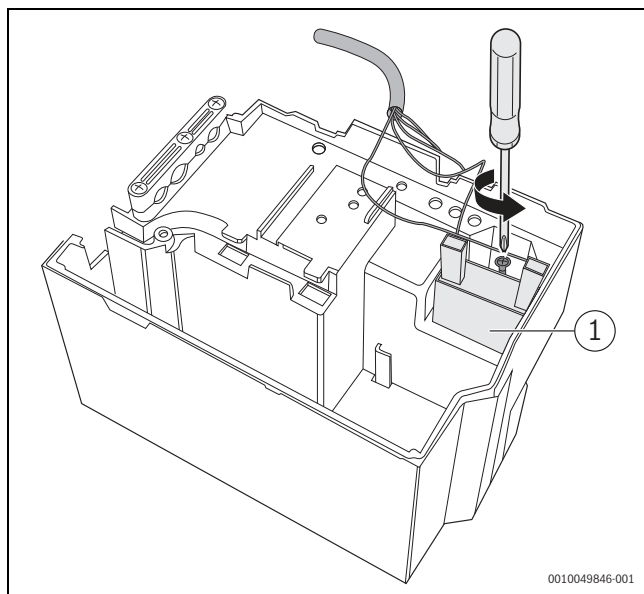


Fig. 27

- [1] Fan motor capacitor

### 6.3 Evaporator



Remove the front panel, electrical parts and fan (→ chapter 6.1, p. to → chapter 6.4, p. 28) before disassembling evaporator.

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

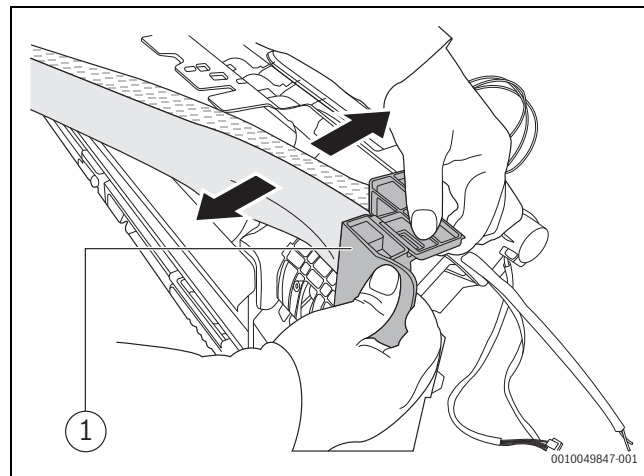


Fig. 28

- [1] Pipe holder

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

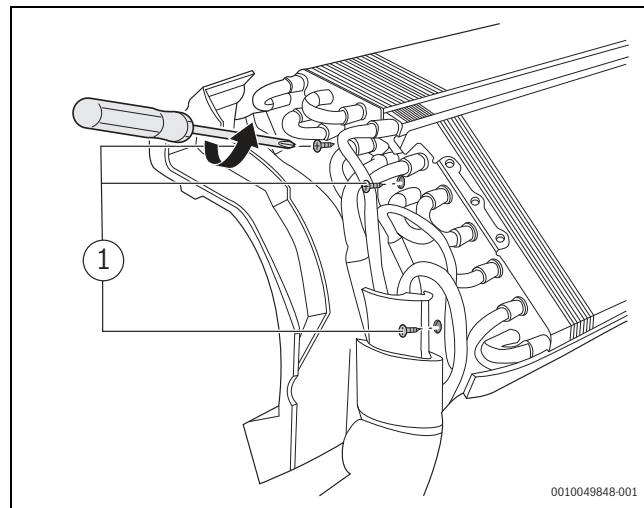


Fig. 29

- [1] Screws

- Remove the two screws on the evaporator located at the base of the bearing side.

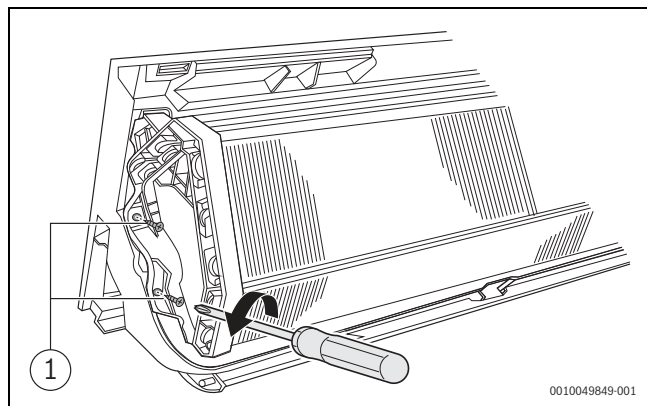


Fig. 30

[1] Evaporator

- Pull out the evaporator.

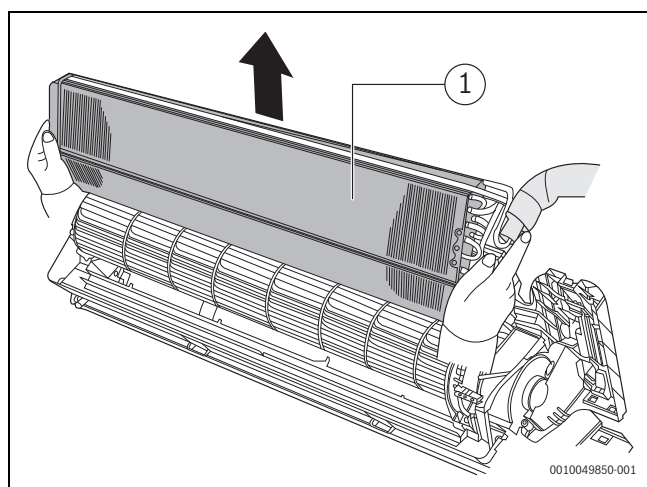


Fig. 31

[1] Evaporator

## 6.4 Fan motor and fan



Remove the front panel (→ chapter 6.1, p. 24), electrical parts (→ chapter 6.2, p. 26) and evaporator (→ chapter 6.3, p. 27) before disassembling fan motor and fan.

- Remove the two screws and remove the fixing board of the fan motor.

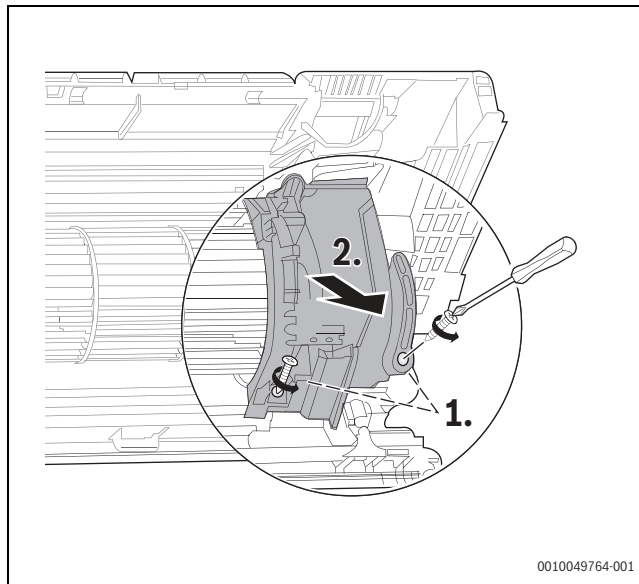


Fig. 32

[1] Screws

- Remove the bearing sleeve.

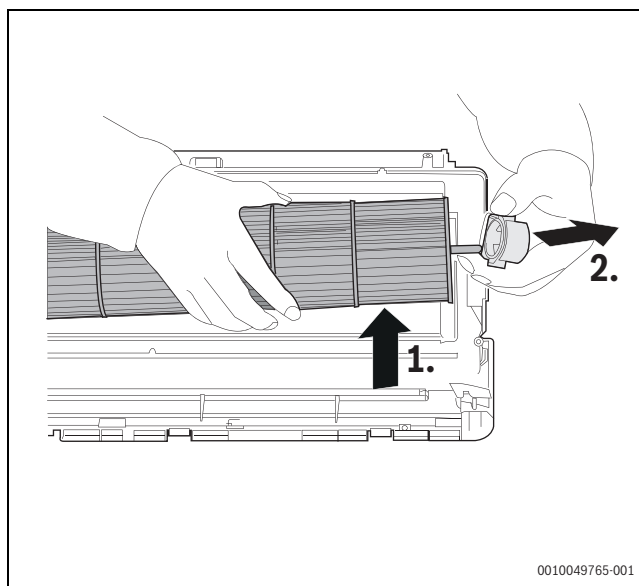


Fig. 33

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

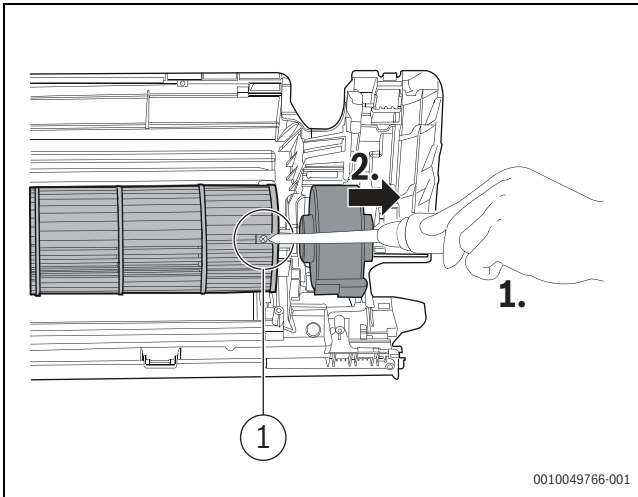


Fig. 34

[1] Fixing screw

## 6.5 Step motors



Remove the front panel (→ chapter 6.1, p. 24) and electrical parts (→ chapter 6.2, p. 26) before disassembling step motor.

- ▶ Remove the two screws, then remove the step motor.

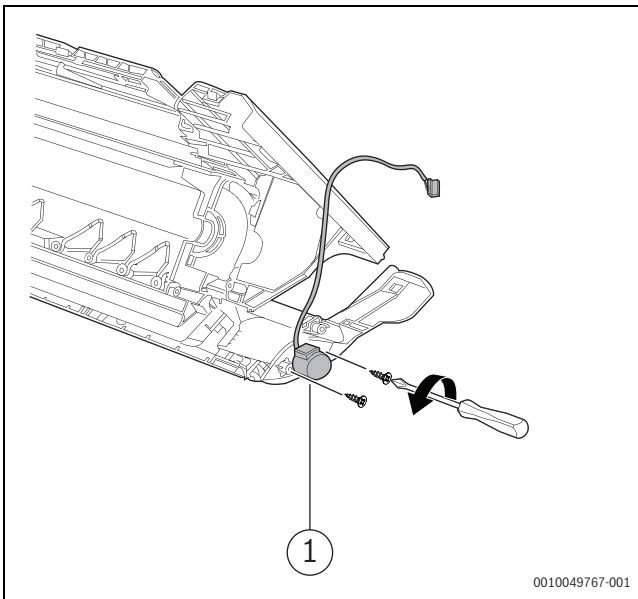


Fig. 35

[1] Step motor

## 7 Outdoor Unit Disassembly



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

### 7.1 Panel plate

#### 7.1.1 CL2000 26 E, CL2000 35 E

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

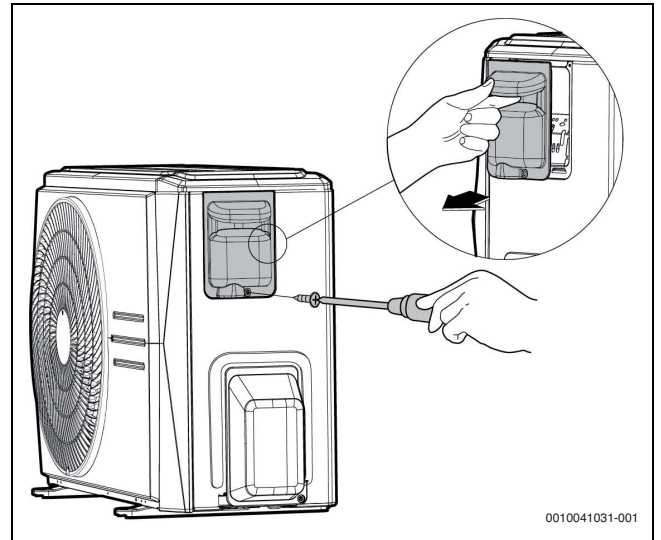


Fig. 36

- ▶ Remove the screws of the top cover [1] and then remove the top cover (4 screws). One of the screws is located underneath the big handle.

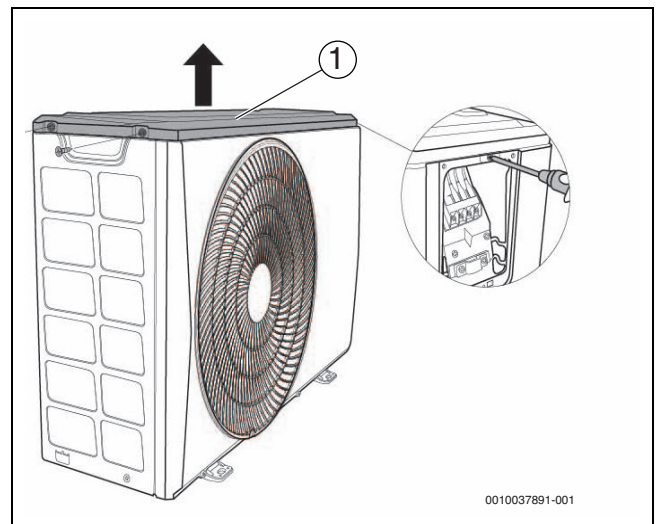


Fig. 37

[1] Top cover

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

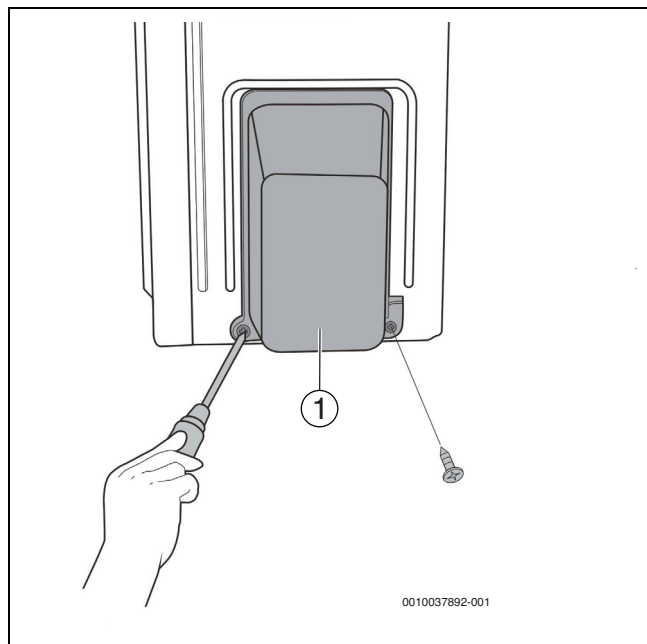


Fig. 38

[1] Water collecting cover

- Remove the screws of the front panel [1] and then remove the front panel (6 screws for the on/off models and 8 screws for the inverter models).

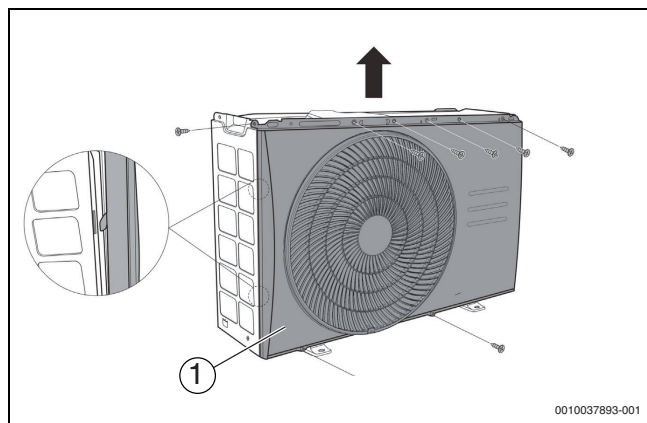


Fig. 39

[1] Front panel

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

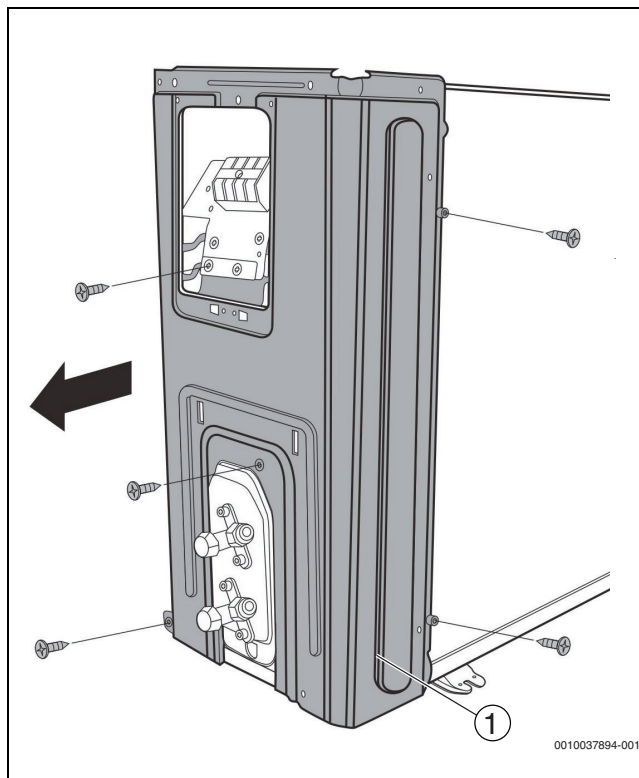


Fig. 40

[1] Right panel

### 7.1.2 CL2000 53 E

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

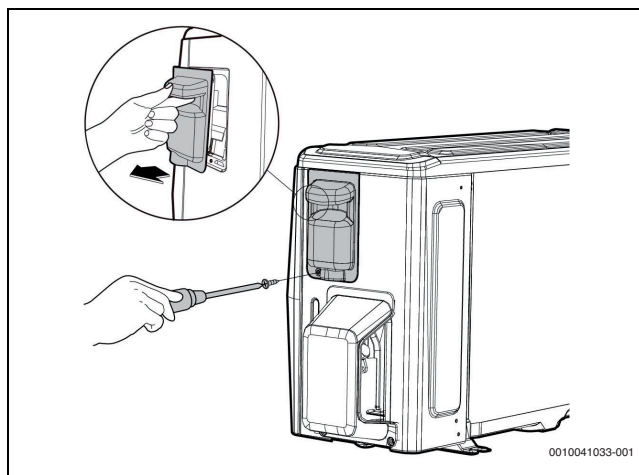


Fig. 41

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

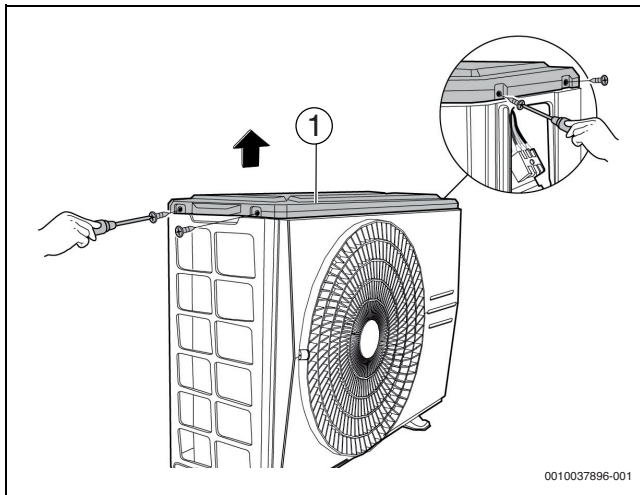


Fig. 42

[1] Top cover

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

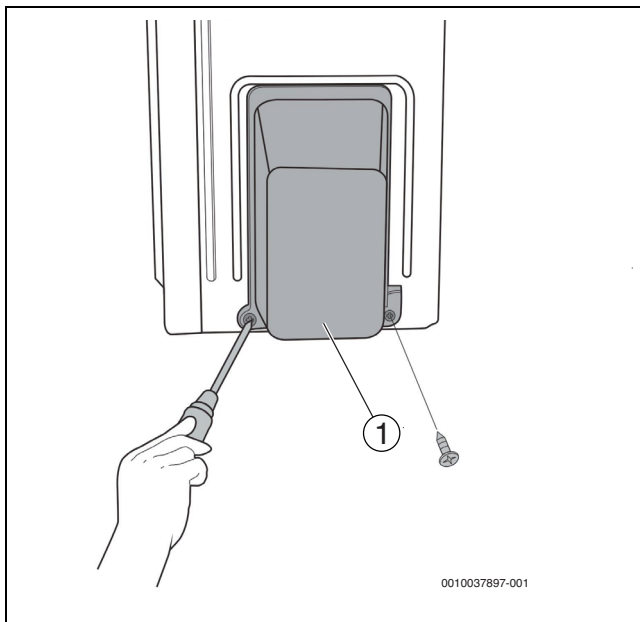


Fig. 43

[1] Water collecting cover

- Remove the screws of the front panel [1] and then remove the front panel (7 screws for the on/off models and 9 screws for the inverter models).

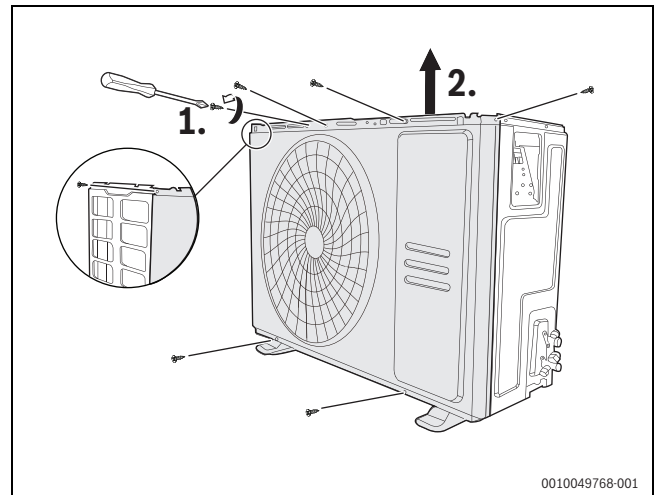


Fig. 44

- Remove the screws of the right panel (6 screws) and then remove the right panel.

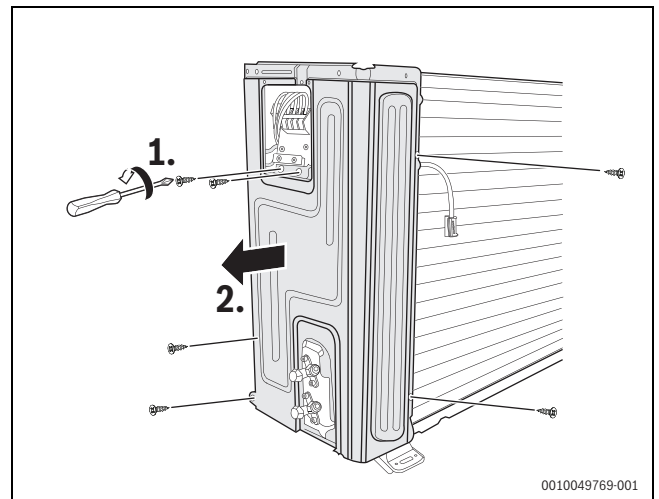


Fig. 45

### 7.1.3 CL2000 70 E

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

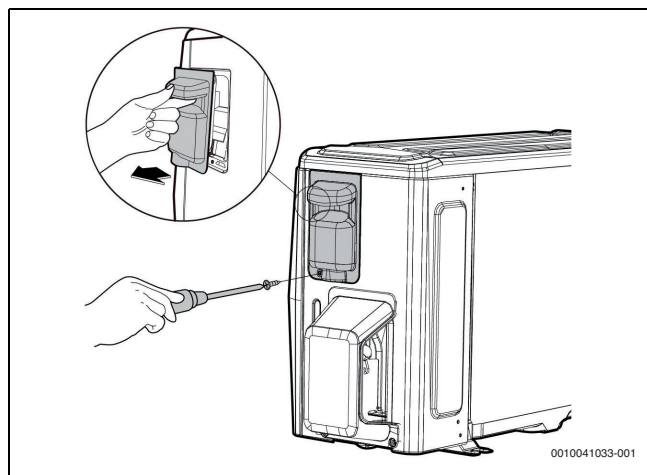


Fig. 46

- Remove the screws of the top cover and then remove the top cover [1] (4 screws). One of the screws is located underneath the big handle.

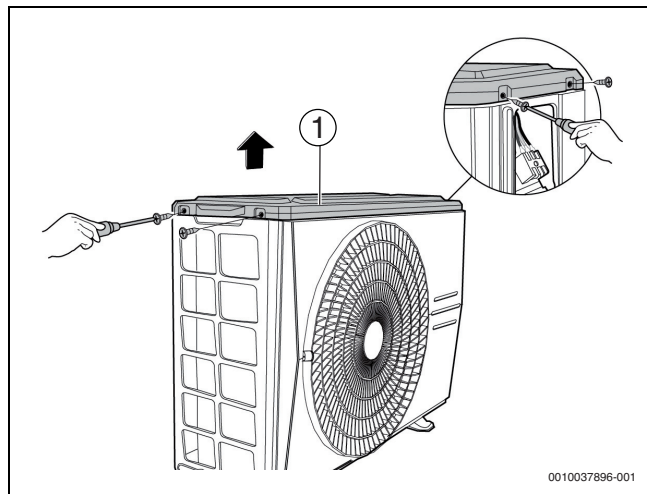


Fig. 47

[1] Top cover

- Remove the screws of the front panel [1] and then remove the front panel (7 screws for the on/off models and 9 screws for the inverter models).

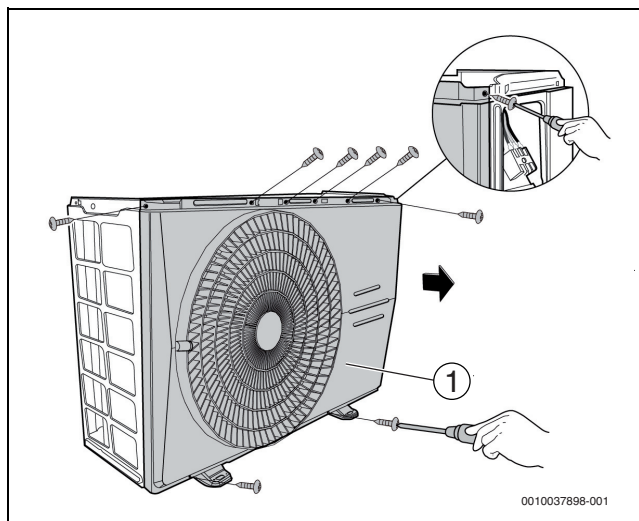


Fig. 48

[1] Front panel

- Remove the screws of the right panel [1] (6 screws) and then remove the right panel.

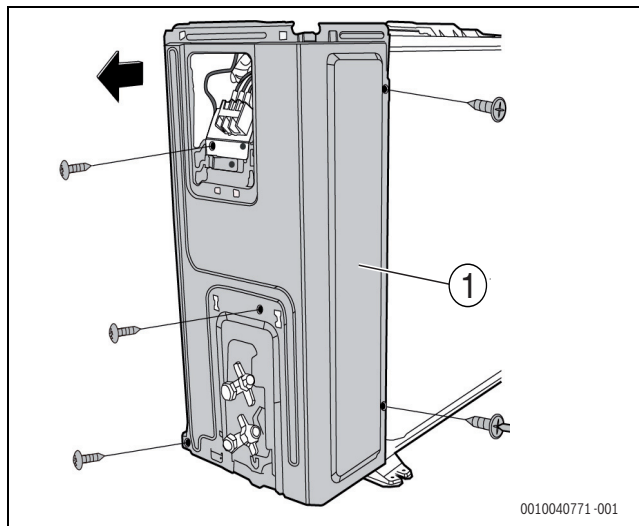


Fig. 49

[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.

#### CL2000 26 E, CL2000 35 E

- Remove the screws and unfix the hooks, then open the electronic control box cover.

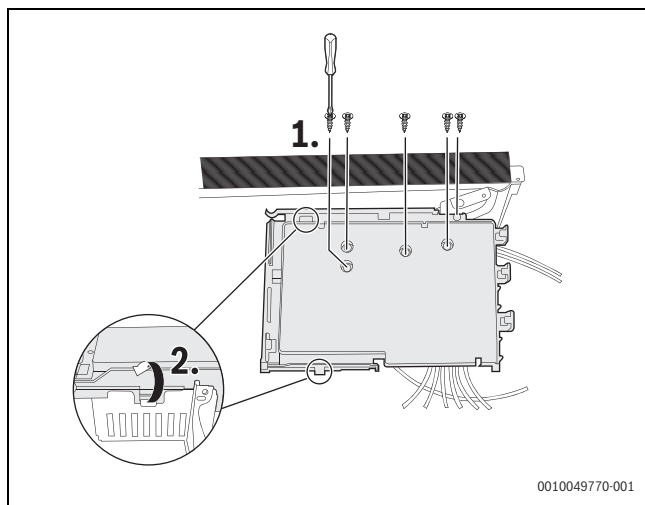


Fig. 50



The electronic control box cover cannot be removed, so the voltage between P and N cannot be measured.

#### CL2000 53 E, CL2000 70 E

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

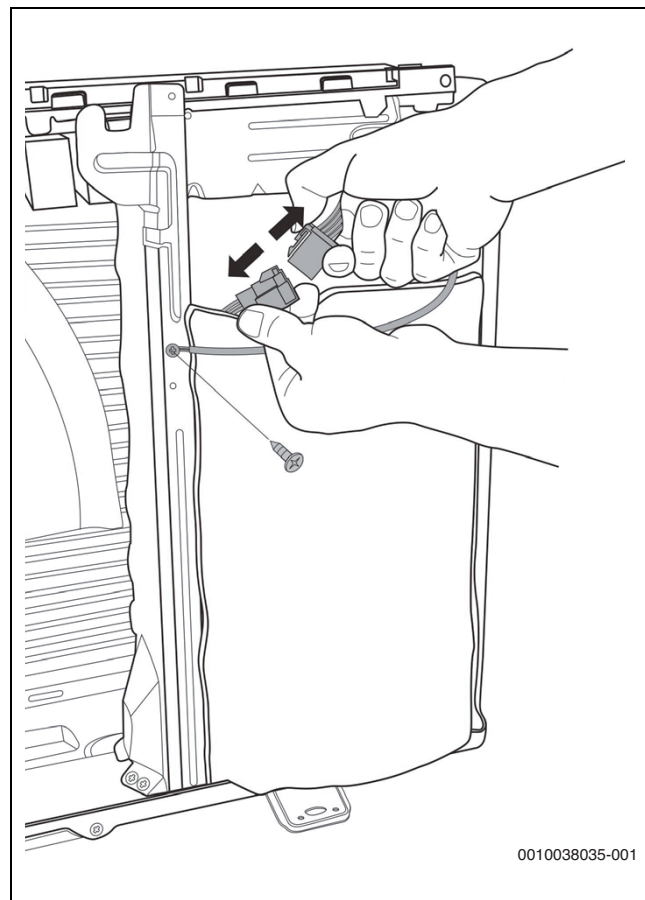


Fig. 51

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

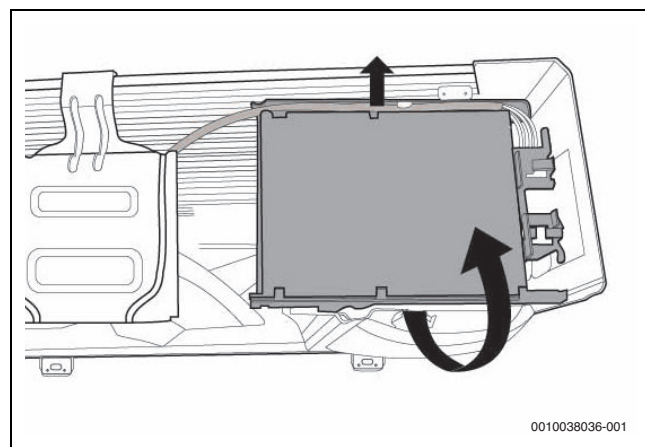


Fig. 52



The electronic control box cover cannot be removed, so the voltage between P and N cannot be measured.

### 7.3 Fan and fan motor



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

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

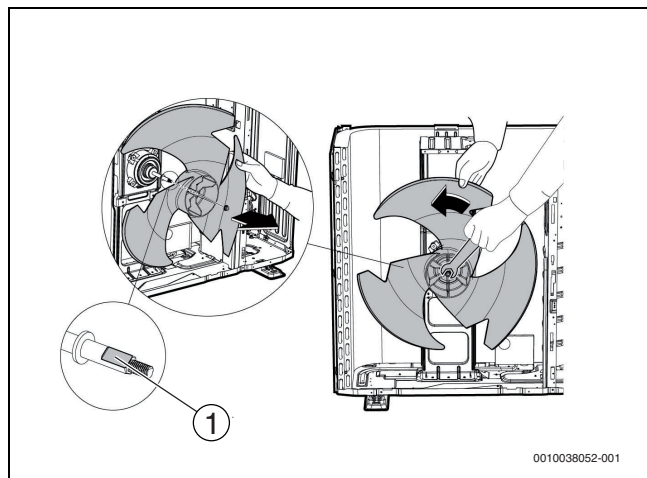


Fig. 53

[1] D-cut

- ▶ Remove the connection of the fan motor on the PCB (→ page 33).
- ▶ Remove the fixing screws of the fan motor (4 screws).
- ▶ Remove the fan motor.

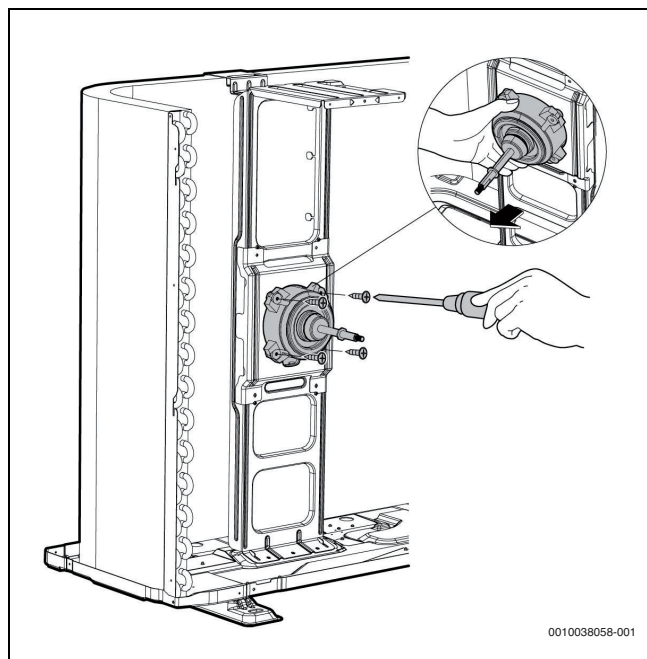


Fig. 54

### 7.4 Sound blanket



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

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

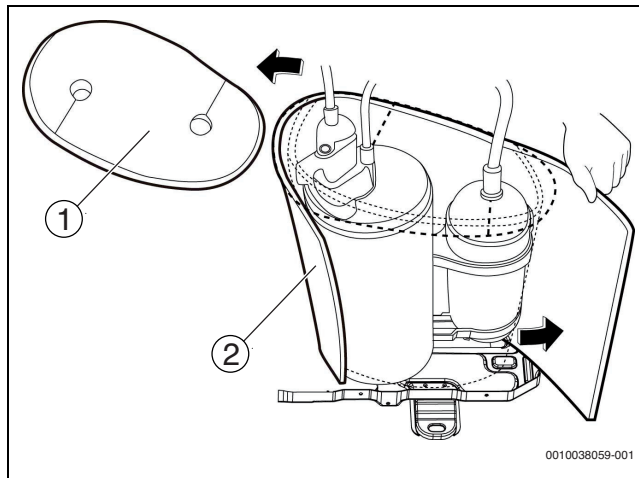


Fig. 55

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

## 7.5 Four-way valve



### 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 33) 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.

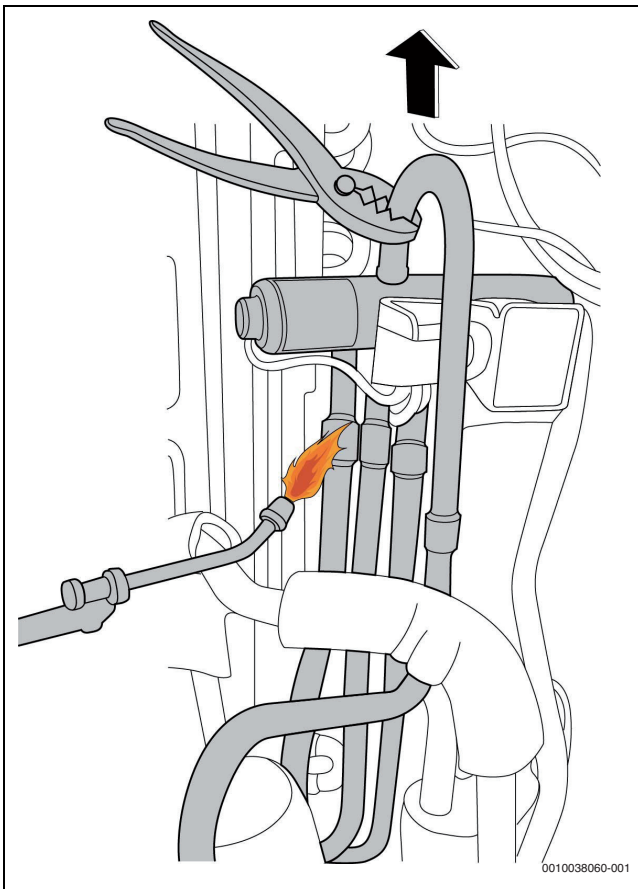


Fig. 56

## 7.6 Compressor



### 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 33) before disassembling the compressor.

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

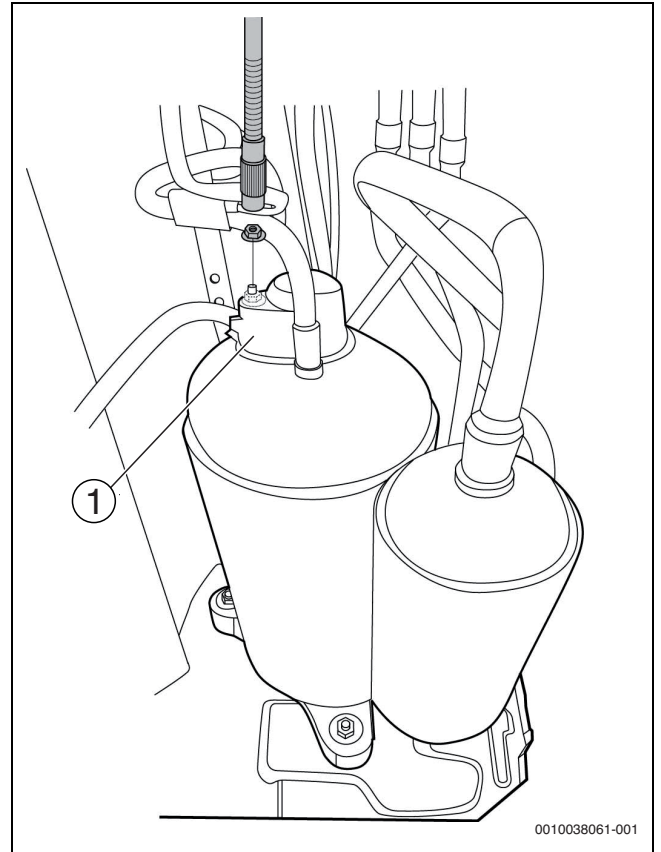


Fig. 57

[1] Terminal Cover

- Disconnect the connectors.

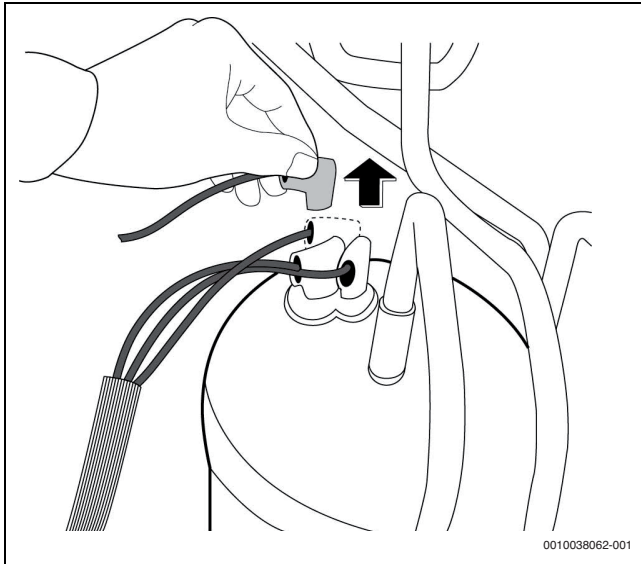


Fig. 58

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

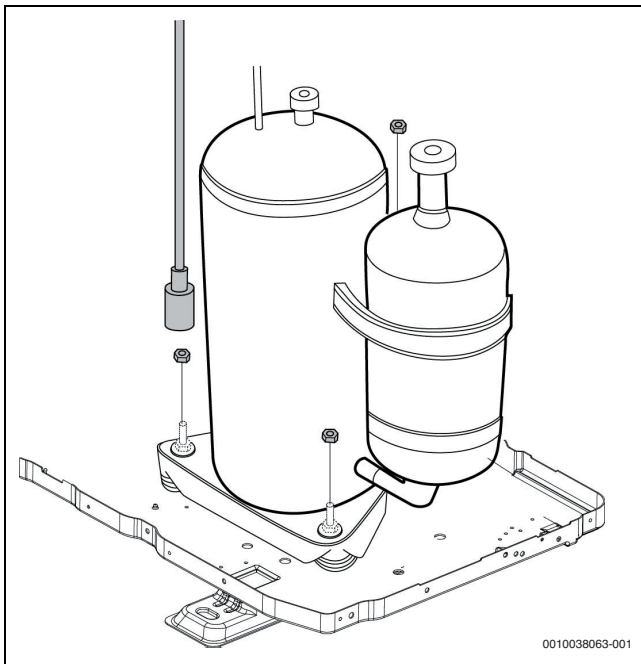


Fig. 59

- 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.

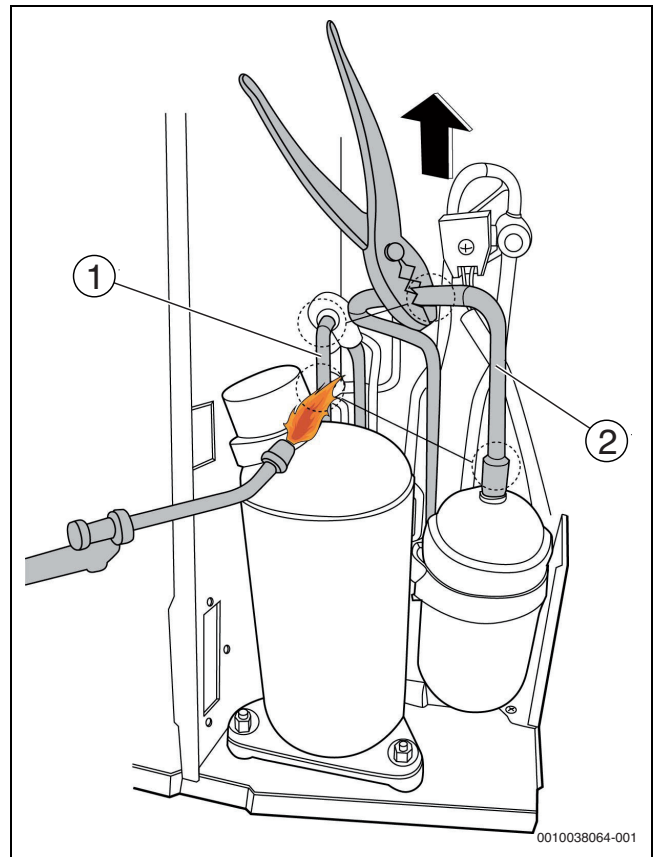


Fig. 60

- [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.

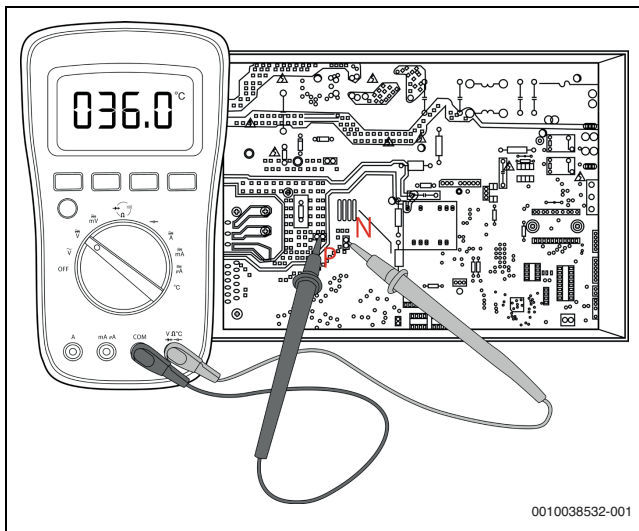


Fig. 61 Voltage between P and N

## 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 39).

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

- Ensure 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                                                                                              |
|---------|----------------------------------------------------------------------------------------------------------------|
| EH 00   | Faulty parameter in the EEPROM of the indoor unit                                                              |
| EH 0A   |                                                                                                                |
| EL 01   | Indoor / outdoor unit communication error                                                                      |
| EH 02   | Zero-crossing signal detection error (for some models)                                                         |
| EH 03   | The indoor fan speed is operating outside of the normal range                                                  |
| EC 51   | Outdoor unit EEPROM parameter error (for some models)                                                          |
| EC 52   | Condenser coil temperature sensor T3 is in open circuit or has short circuited                                 |
| EC 53   | Outdoor room temperature sensor T4 is in open circuit or has short circuited                                   |
| EC 54   | Compressor discharge temperature sensor TP is in open circuit or has short circuited                           |
| EC 56   | Evaporator coil outlet temperature sensor T2B is in open circuit or has short circuited (for Multi-split only) |
| EH 60   | Indoor room temperature sensor T1 is in open circuit or has short circuited                                    |
| EH 61   | Evaporator coil temperature sensor T2 is in open circuit or has short circuited                                |
| EC 07   | The outdoor fan speed is operating outside of the normal range (for some models)                               |
| EH 0b   | Indoor PCB/display board communication error (for some models)                                                 |
| EL 0C   | Refrigerant leak detected                                                                                      |
| PC 00   | Fault at IPM module or IGBT over-current protection                                                            |
| PC 01   | Over voltage or over low voltage protection                                                                    |
| PC 02   | High temperature protection of IPM module or high pressure protection                                          |
| PC03    | Low pressure protection (for some models)                                                                      |
| PC 04   | Inverter compressor drive error                                                                                |
| PC 08   | Protection against current overload (for some models)                                                          |
| --      | Conflicting operating mode of indoor units; operating mode of indoor units and outdoor unit must correspond.   |

Table 17 Error codes for indoor units

There are two LED lights (red and green) welded in the main board of the outdoor unit. After starting the unit, the LED will show different actions when encountering different problems.

| No. | Problem                                                                  | LED (green) | LED (red) |
|-----|--------------------------------------------------------------------------|-------------|-----------|
| 1   | Standby normally                                                         | ON          | OFF       |
| 2   | Operate normally                                                         | OFF         | ON        |
| 3   | Compressor driven chip EEPROM parameter error                            | ON          | FLASH     |
| 4   | IPM malfunction or IGBT over-strong current protection                   | FLASH       | OFF       |
| 5   | Over voltage or too low voltage protection                               | ON          | ON        |
| 6   | Inverter compressor drive error                                          | OFF         | FLASH     |
| 7   | Inverter compressor drive error                                          | FLASH       | LIGHT     |
| 8   | Communication error between outdoor main chip and compressor driven chip | FLASH       | FLASH     |

Table 18 Error codes for outdoor units (for some models, depending on the outdoor unit)

## 8.2 Parameter information inquiry by remote control

To enter the information inquiry status, complete the following procedure within ten seconds:

- ▶ Press LED (or DO NOT DISTURB) 3 times.
- ▶ Press SWING (or AIR DIRECTION) 3 times.
- ▶ Press and hold ON and Fan buttons for 7 seconds.  
You will hear beeps for two seconds, which means the unit goes into parameter checking mode.

To read the different parameters:

- ▶ Use the LED (or DO NOT DISTURB) and SWING (or AIR DIRECTION) buttons to cycle through information displayed.
- ▶ Pressing LED (or DO NOT DISTURB) will display the next code in the sequence.
- ▶ Pressing SWING (or AIR DIRECTION) will show the previous.

The following table shows information codes. The screen displays this code for two seconds, then the information for 25 seconds.

| Displayed code and explanation |                                    | Displayed value                                                                                             | Meaning                                                                                                                                                                        | Additional information                                                                                                                                                                                                                                                                                                                                                                                                                                                                     |
|--------------------------------|------------------------------------|-------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| T1                             | Room temperature                   | -1F,-1E,-1d,-1c,-1b,-1A-19—<br>99A0,A1,...A9b0,b1,...b9c0,c<br>1,...c9d0,d1,...d9E0,E1,...E9<br>F0,F1,...F9 | -25,-24,-23,-22,-21,-20-19—<br>99100,101,...109110,111,...1191<br>20,121,...129130,131,...139140,<br>141,...149150,151,...159                                                  | <ul style="list-style-type: none"> <li>All displayed temperatures use actual values.</li> <li>All temperatures are displayed in °C regardless of remote used.</li> <li>T1, T2, T3, T4, and T2B display ranges from -25 to 70 °C. TP display ranges from -20 to 130 °C.</li> <li>The frequency display ranges from 0 to 159 HZ.</li> <li>If the actual values exceed or fall short of the defined range, the values closest to the maximum and minimum values will be displayed.</li> </ul> |
| T2                             | Indoor coil temperature            |                                                                                                             |                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| T3                             | Outdoor coil temperature           |                                                                                                             |                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| T4                             | Ambient temperature                |                                                                                                             |                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| TB                             | Outlet temperature of indoor coil  |                                                                                                             |                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| TP                             | Discharge temperature              |                                                                                                             |                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| TH                             | Suction temperature                |                                                                                                             |                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| FT                             | Targeted frequency                 |                                                                                                             |                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| FR                             | Actual frequency                   |                                                                                                             |                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| IF                             | Indoor fan speed                   | 01,2,3,4<br>14-FF                                                                                           | OFF<br>Low speed, Medium speed, High speed, Turbo.<br>Actual fan speed is equal to the display value converted to decimal value and multiplied by 10. This is measured in RPM. | N/A<br>Used for some large capacitymotors.Used for some small capacitymotors.The display value is 14-FF (hexadecimal). The corresponding fan speed ranges from 200 to 2550 RPM.                                                                                                                                                                                                                                                                                                            |
| OF                             | Outdoor fan speed                  |                                                                                                             |                                                                                                                                                                                |                                                                                                                                                                                                                                                                                                                                                                                                                                                                                            |
| LA                             | EXV opening angle                  | 0-FF                                                                                                        | Actual EXV opening value is equal to the display value converted to decimal value and then multiplied by 2.                                                                    | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |
| CT                             | Compressor continuous running time | 0-FF                                                                                                        | 0-255 minutes                                                                                                                                                                  | If the actual value exceeds or falls short of the defined range, the value closest to the maximum and minimum will be displayed.                                                                                                                                                                                                                                                                                                                                                           |
| ST                             | Causes of compressor stop          | 0-99                                                                                                        | For a detailed explanation, contact technical support.                                                                                                                         | -                                                                                                                                                                                                                                                                                                                                                                                                                                                                                          |

| Displayed code and explanation |          | Displayed value  | Meaning | Additional information |
|--------------------------------|----------|------------------|---------|------------------------|
| A0                             | Reserved | 0-FF2-285-205-25 | -       | -                      |
| A1                             |          |                  |         |                        |
| b0                             |          |                  |         |                        |
| b1                             |          |                  |         |                        |
| b2                             |          |                  |         |                        |
| b3                             |          |                  |         |                        |
| b4                             |          |                  |         |                        |
| b5                             |          |                  |         |                        |
| b6                             |          |                  |         |                        |
| dL                             |          |                  |         |                        |
| Ac                             |          |                  |         |                        |
| Uo                             |          |                  |         |                        |
| Td                             |          |                  |         |                        |
| dA                             |          |                  |         |                        |
| d5                             |          |                  |         |                        |
| dT                             |          |                  |         |                        |

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 24 and 29).
- ▶ Measure the resistance value of the sensor using a multi-meter.

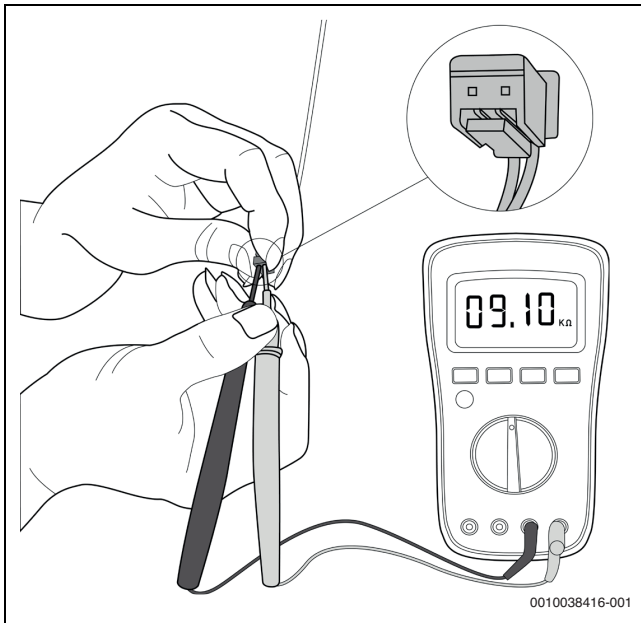


Fig. 62 Temperature Sensor Check

- ▶ Check corresponding temperature sensor resistance value table (→ chapter 9, p. 66).



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.

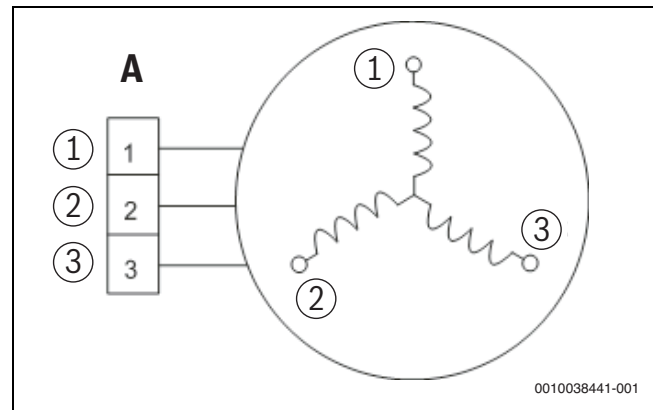


Fig. 63 Compressor Check

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

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

| Compressor type   | Blue-Red | Blue-Black | Red-Black |
|-------------------|----------|------------|-----------|
| KSK89D53UEZ       |          | 2.35 Ω     |           |
| KSK89D29UEZD      |          | 1.99 Ω     |           |
| KSN98D22UFZ       |          | 1.57 Ω     |           |
| KSK103D33UEZ3     |          | 2.02 Ω     |           |
| KSM135D23UFZ      |          | 1.72 Ω     |           |
| KSN140D21UFZ      |          | 1.28 Ω     |           |
| KTF235D22UMT      |          | 0.75 Ω     |           |
| KSK103D33UEZ3(YJ) |          | 2.13 Ω     |           |
| KTM240D57UMT      |          | 0.62 Ω     |           |
| KSN140D58UFZ      |          | 1.86 Ω     |           |
| KTM240D43UKT      |          | 1.03 Ω     |           |
| KSN98D64UFZ3      |          | 2.70 Ω     |           |
| ASN140D35TFZ      |          | 0.83 Ω     |           |
| ATF235D22TMT      |          | 0.75 Ω     |           |

Table 22 Resistance Value of each winding

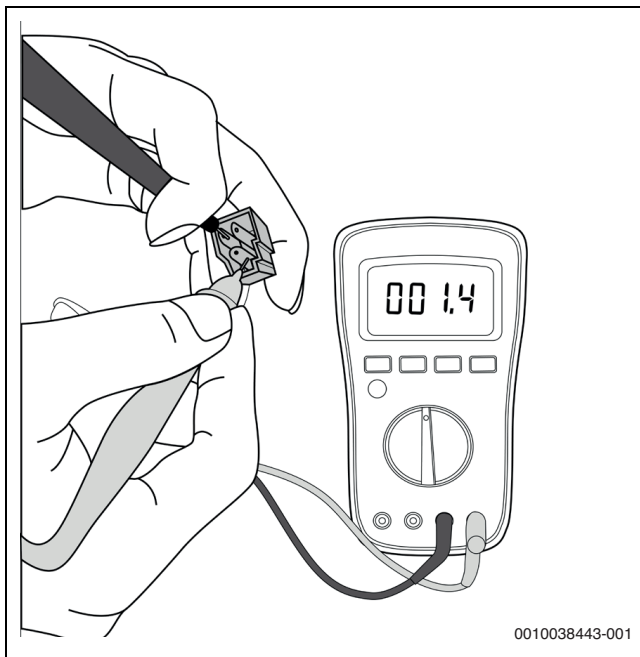


Fig. 64 Compressor Check



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

**8.4.4 IPM Continuity Check**

- ▶ Turn off 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); U(V, W) and N.

| Digital tester |          | Resistance value                  |
|----------------|----------|-----------------------------------|
| (+)Red         | (-)Black |                                   |
| P              | N        | $\infty$<br>(Several M $\Omega$ ) |
|                | U        |                                   |
|                | V        |                                   |
|                | W        |                                   |
|                |          |                                   |
| U              | N        | $\infty$<br>(Several M $\Omega$ ) |
| V              |          |                                   |
| W              |          |                                   |
| -              |          |                                   |

Table 23

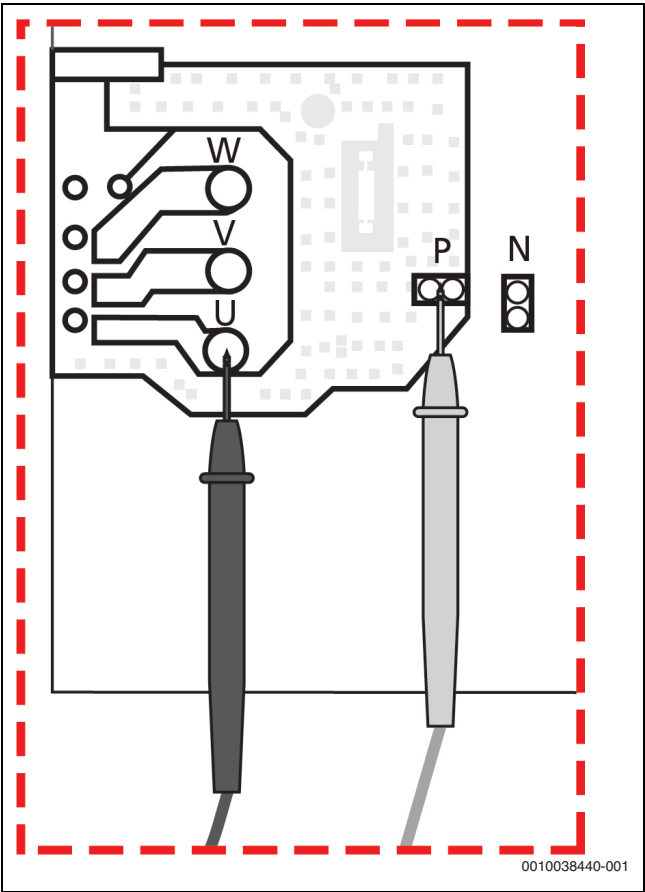


Fig. 65 IPM Continuity Check



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

### 8.4.5 Indoor AC fan motor check

- ▶ Power off and disconnect the fan motor power cord from the PCB.
- ▶ Measure the resistance value of each winding by using the multi-meter. The normal value is displayed as follows.

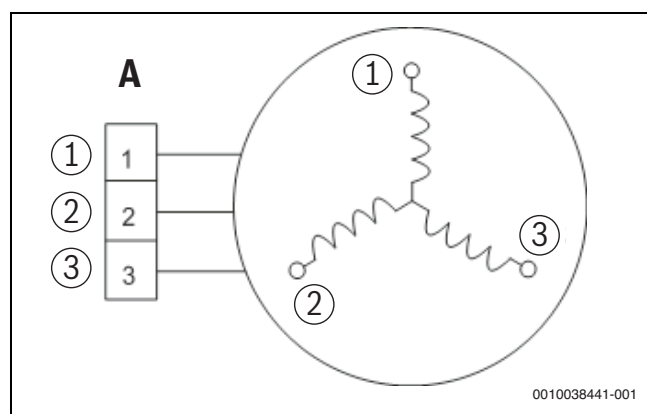
| Model             | YKFG-13-4-38LYKFG-13-4-38L-4 | YKFG-15-4-28-1 | YKFG-20-4-10L | YKFG-20-4-5-11 | YKFG-20-4-5-19 | YKFG-25-4-6-14 | YKFG-28-4-3-14 | YKFG-28-4-6-5 | YKFG-45-4-13 | YKFG-45-4-22YKFG-45-4-22-13 | YKFG-60-4-2-6 | YKFG-60-4-1 | YKFG-20-4-5-21 | YKFG-20-4-123 | YKFG-28-4-46 |
|-------------------|------------------------------|----------------|---------------|----------------|----------------|----------------|----------------|---------------|--------------|-----------------------------|---------------|-------------|----------------|---------------|--------------|
| Brand             | Welling                      | Welling        | Welling       | Welling        | Welling        | Welling        | Welling        | Welling       | Dongfang     | Welling                     | Welling       | Welling     | Welling        | Welling       | Welling      |
| Black - Red main  | 345Ω                         | 75Ω            | 269Ω          | 388Ω           | 444Ω           | 287Ω           | 231Ω           | 183.6Ω        | 125.2Ω       | 168Ω                        | 96Ω           | 68Ω         | 450Ω           | 267Ω          | 210Ω         |
| White - Black AUX | 348Ω                         | 150Ω           | 224Ω          | 360Ω           | 470Ω           | 409Ω           | 414Ω           | 206Ω          | 83.8Ω        | 141Ω                        | 96Ω           | 53Ω         | 442Ω           | 266Ω          | 288Ω         |

Table 24

- ▶ Power on and set the unit running in fan mode at high fan speed.
- ▶ After running for 15 seconds, measure the voltage of pin1 and pin2.



If the value of the voltage is less than 100V (208~240V power supply) or 50V (115V power supply), the PCB must have an issue and needs to be replaced.



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

## 8.5 Troubleshooting by Error Code

### 8.5.1 Indoor units mode conflict (only multi-split)

When using multi-split air conditioners, all operation modes are possible, but with the following peculiarities:

If you operate more than one indoor unit, indoor units may go into standby due to an operation mode conflict. An operation mode conflict occurs when at least one indoor unit is in heating mode and at the same time at least one indoor unit is in another operation mode (e.g. cooling mode). Heating mode always has priority. All indoor units that are not in heating mode will go into standby because of the operation mode conflict.



---

Indoor units with operation mode conflict show “--” in the display or the operation light flashes and the timer light is on. For more information, see the technical documentation of the indoor units.

---

Avoiding the operation mode conflict:

- All indoor units are in heating mode or cooling/fan only mode.

## 8.5.2 E0/EH 00/EH 0A/F4/EC 51: Outdoor unit EEPROM parameter error or Compressor driven chip EEPROM parameter error

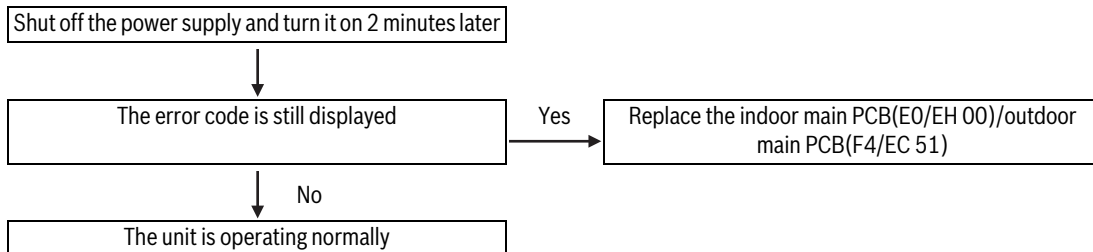
### Digital output

- E0/EH 00/EH 0A/F4/EC 51

### Description

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

### Procedure



A read-only memory whose contents can be erased and reprogrammed using a pulsed voltage. The location of the EEPROM chip on the indoor and outdoor PCB is as shown below.

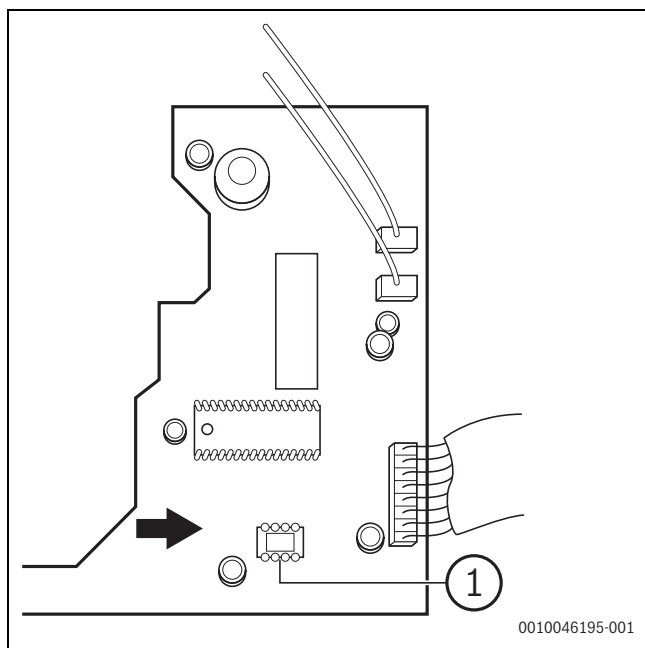


Fig. 66 EEPROM

[1] EEPROM chip

### Recommended parts to prepare

- Indoor PCB
- Outdoor PCB

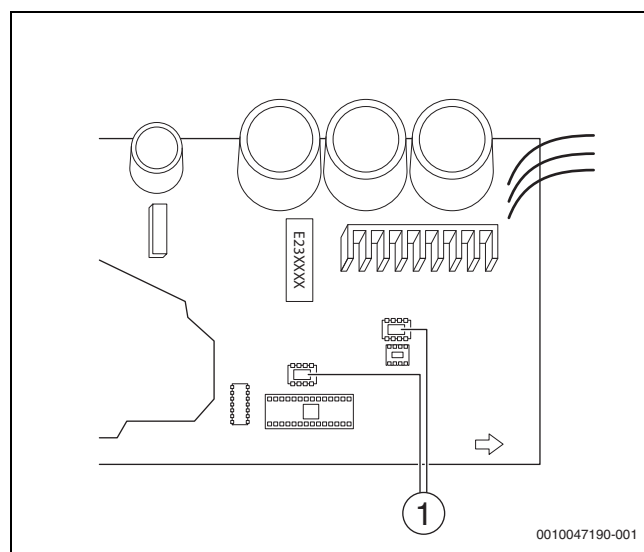


Fig. 67 EEPROM

[1] EEPROM chip



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



Troubleshooting and repair of compressor driven chip EEPROM parameter error and communication error between outdoor main chip and compressor driven chip are the same as F4/EC 51.

### 8.5.3 E1/EL 01: Indoor and outdoor unit communication error

#### Digital output

- E1/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.

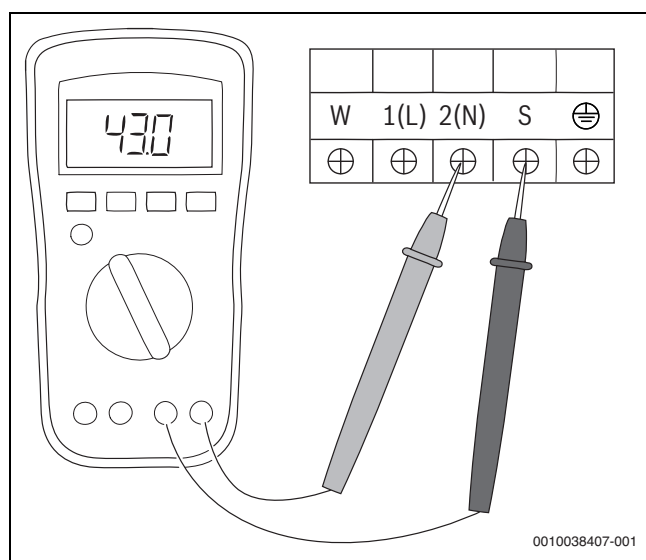
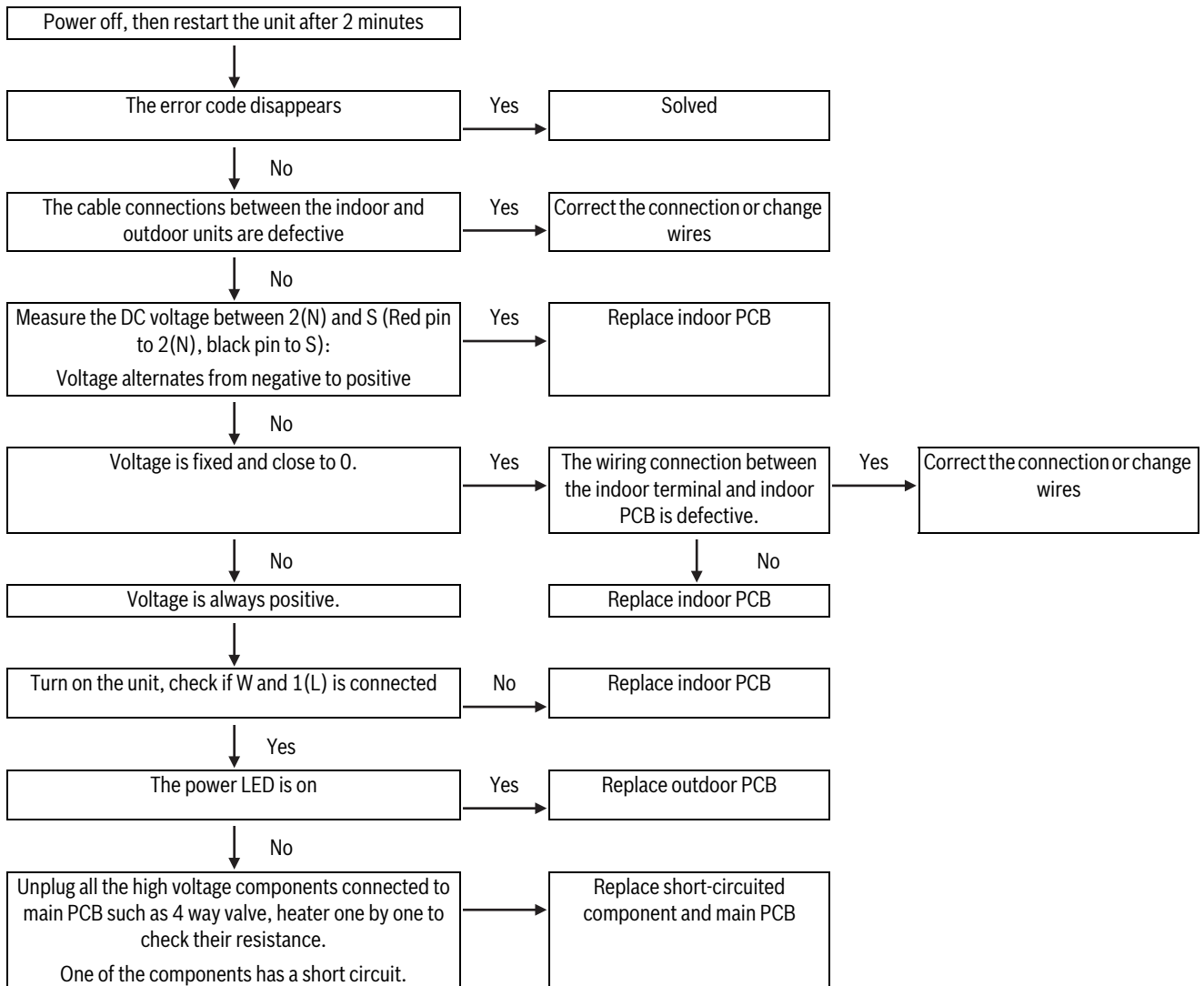


Fig. 68

- 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**


#### 8.5.4 E2/EH 02: Zero crossing detection error

##### Digital output

- E2/EH 02

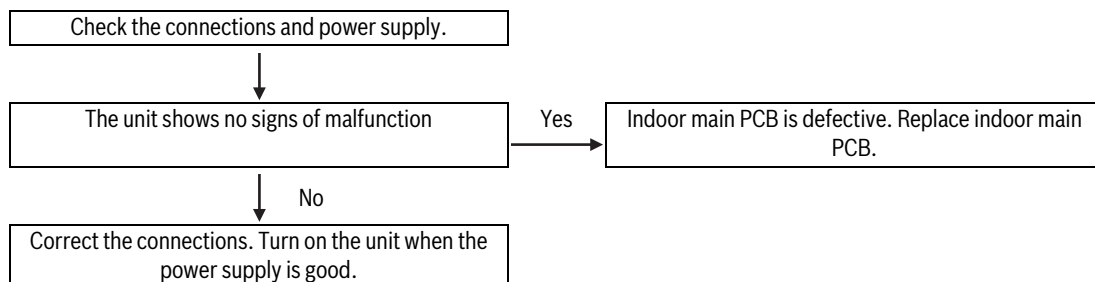
##### Description

- When PCB does not receive zero crossing signal feedback for 4 minutes or the zero crossing signal time interval is abnormal.

##### Recommended parts to prepare

- Connection wires

##### Procedure



- PCB

##### Additional information



E2/EH 02 zero crossing detection error is only valid for the unit with AC fan motor, for other models, this error is invalid.

### 8.5.5 E3/EH 03/F5/EC 07: The fan speed is operating outside of normal range

#### Digital output

- E3/EH 03/F5/EC 07

#### Description

- When indoor/outdoor 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
- 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.

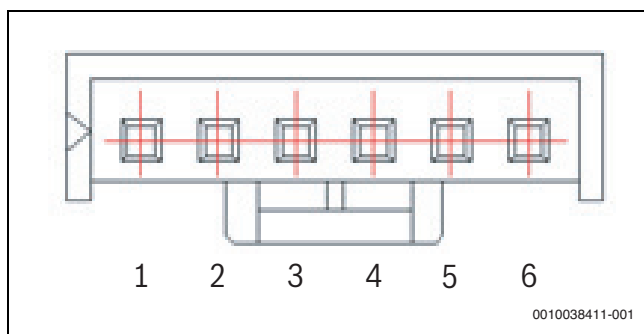


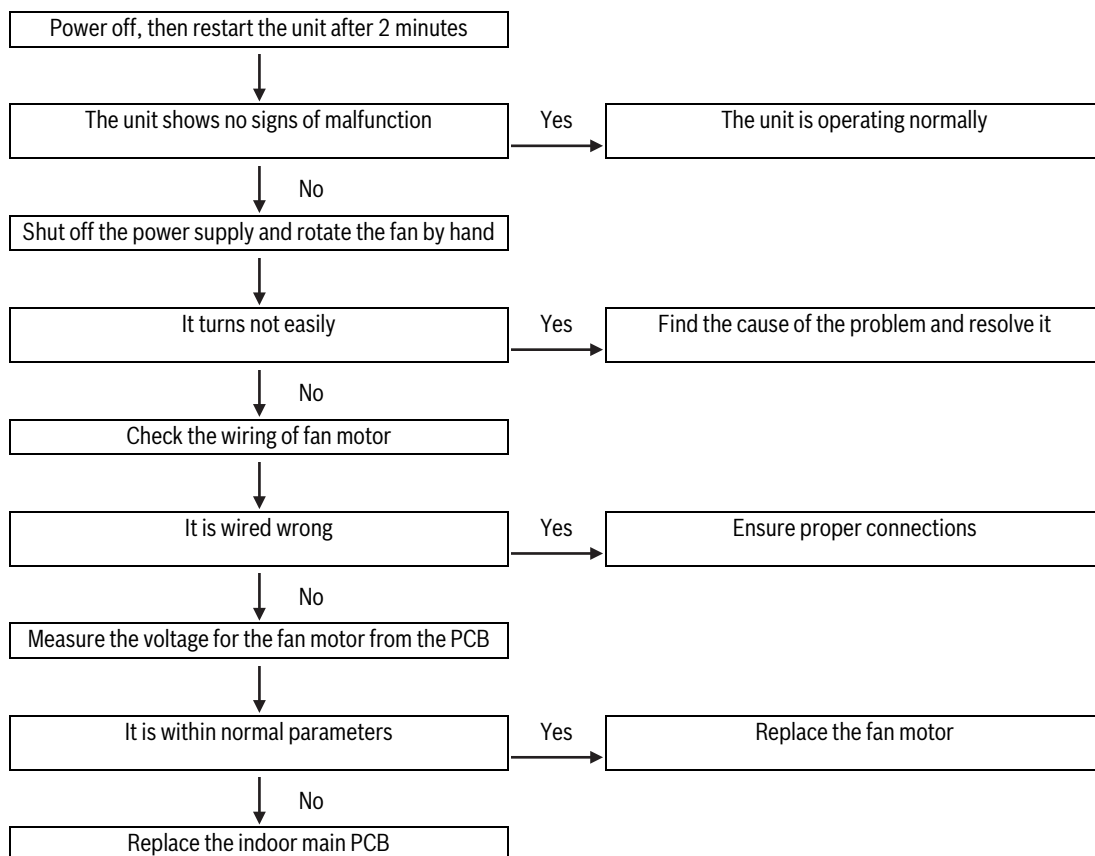
Fig. 69 Fan motor connector

| No. | Color  | Signal | Voltage<br>220 - 240V |
|-----|--------|--------|-----------------------|
| 1   | Red    | Vs/Vm  | 280 V - 380 V         |
| 2   | -      | -      | -                     |
| 3   | Black  | GND    | 0 V                   |
| 4   | White  | Vcc    | 14 V - 17.5 V         |
| 5   | Yellow | Vsp    | 0 V - 5.6 V           |
| 6   | Blue   | FG     | 14 V - 17.5 V         |

Table 25 DC motor voltage input and output (220-240V~)



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

**Procedure****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.

**Indoor AC fan motor**

- ▶ Check procedure for indoor AC fan motor check (Indoor AC fan motor check, Page 47)

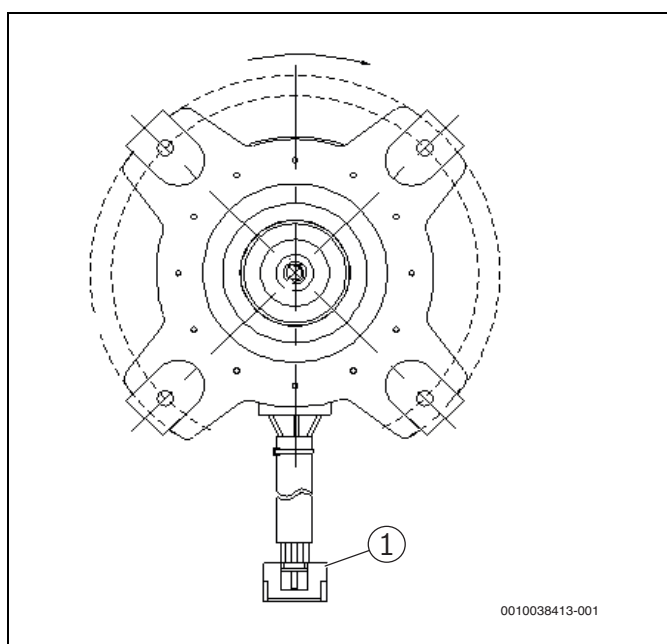


Fig. 70 Fan motor connector (control chip is in outdoor PCB)

[1] UVW connector

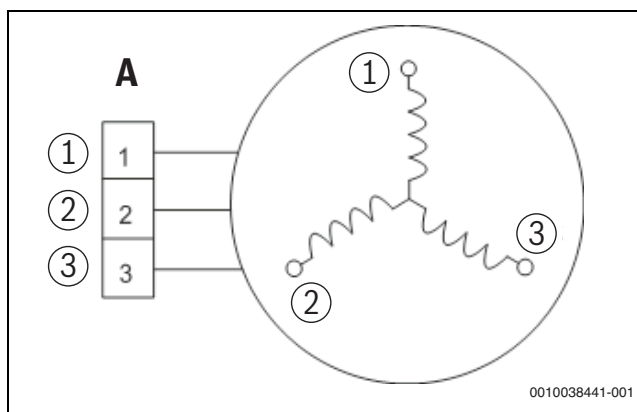


Fig. 71 Compressor check

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

### 8.5.6 E4/EH 60/E5/EH 61/F1/EC 53/F2/EC 52/F3/EC 54/F6/EC56: Open circuit or short circuit of outdoor temperature sensor

#### Digital output

- E4/EH 60/E5/EH 61/F1/EC 53/F2/EC 52/F3/EC 54/F6/EC56

#### 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
- 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.

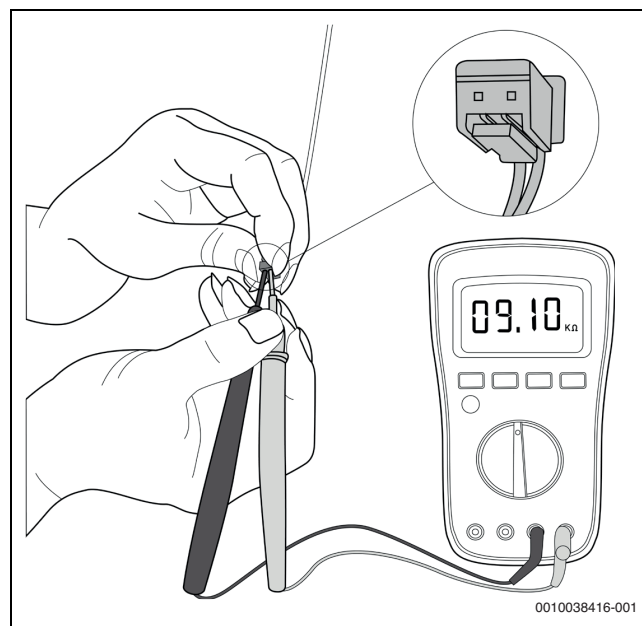
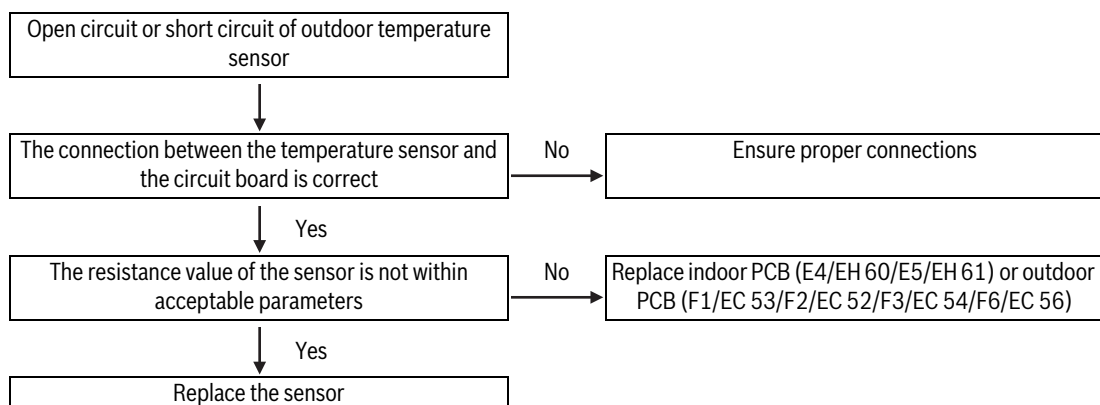


Fig. 72

#### Procedure



**8.5.7 E7/EH 0b: Indoor PCB/display board communication error****Digital output**

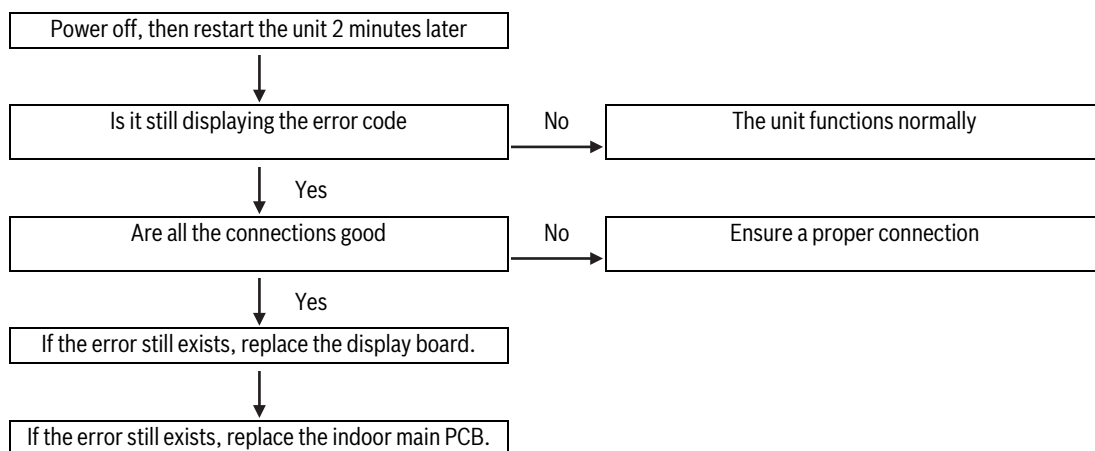
- E7/EH 0b

**Description**

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

**Recommended parts to prepare**

- Connection wire
- Indoor PCB
- Display board

**Procedure**

### 8.5.8 EC/EL OC: Refrigerant leakage detection

#### Digital output

- EC/EL OC

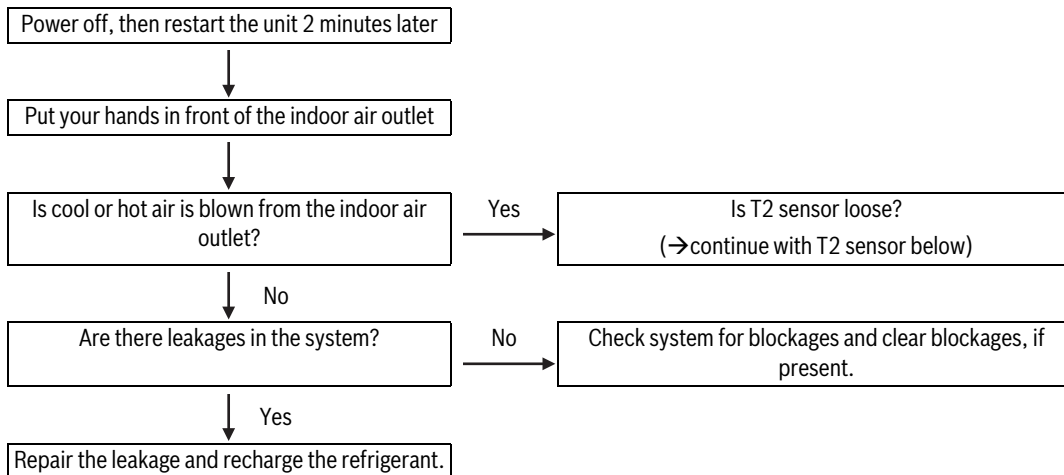
#### Description

Define the evaporator coil temperature T2 of the compressor just starts running as  $T_{cool}$ . In the beginning 5 minutes after the compressor starts up, if  $T2 < T_{cool} - 1^{\circ}\text{C}$  ( $1.8^{\circ}\text{F}$ ) does not keep continuous 4 seconds and compressor running frequency higher than 50Hz does not keep for 3 minutes, and this situation happens 3 times, the LED displays the failure code and the AC turns off.

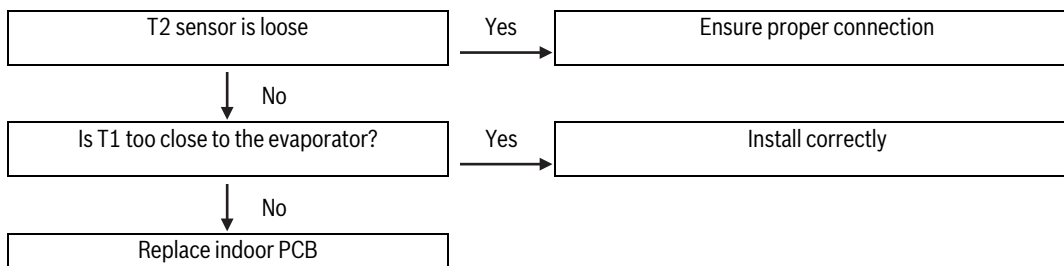
#### Recommended parts to prepare

- Indoor PCB
- T2 sensor
- Additional refrigerant

#### Procedure



#### T2 sensor



### 8.5.9 F0/PC 08: Current overload protection

#### Digital output

- F0/PC 08

#### Description

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

#### Recommended parts to prepare

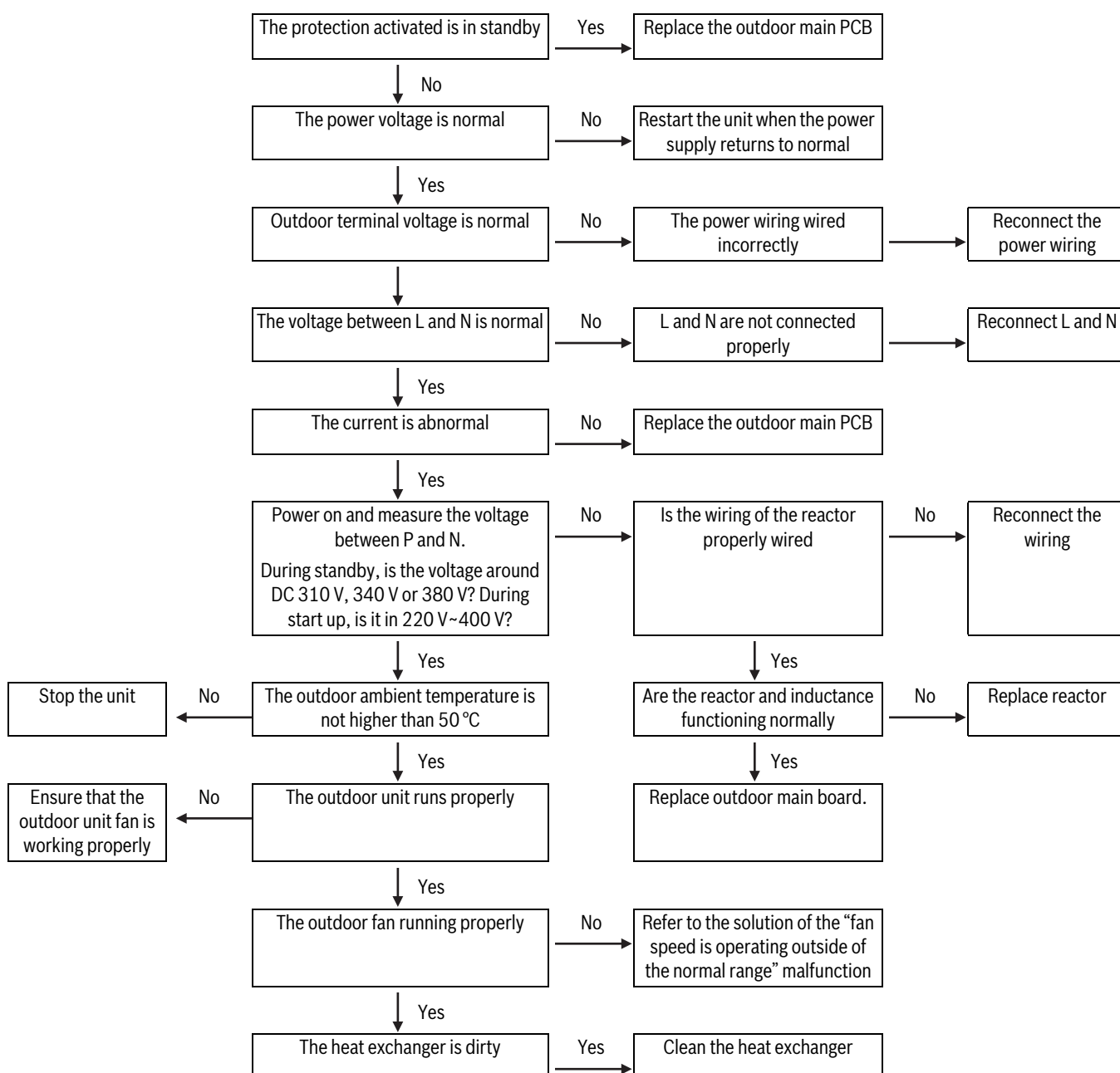
- Connection wires
- Reactor
- Outdoor fan
- Outdoor PCB

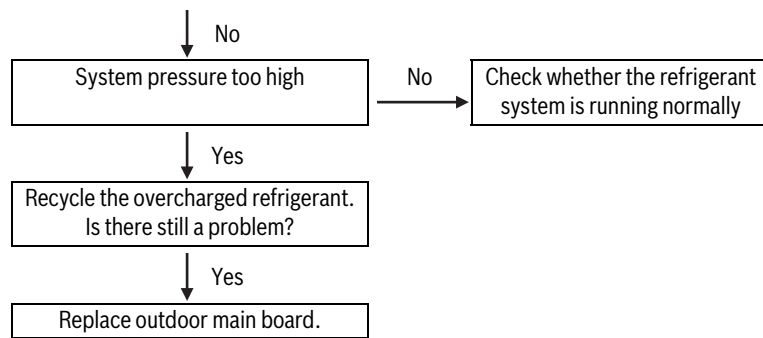
#### Additional information



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





### 8.5.10 P0/PC 00: IPM malfunction or IGBT over-strong current protection

#### Digital output

- P0/PC 00

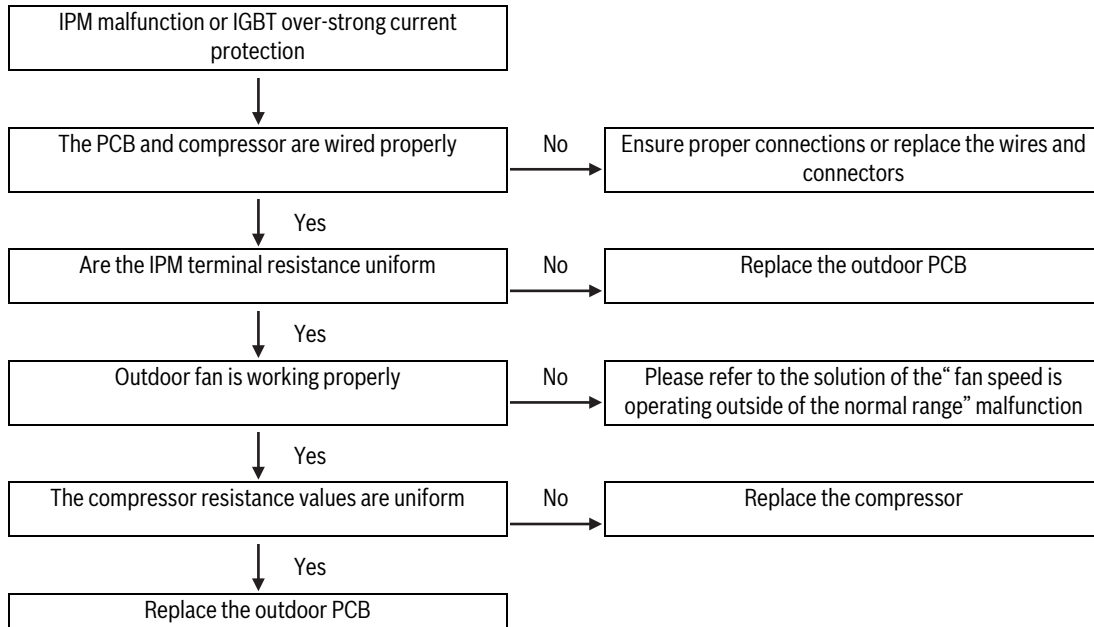
#### Description

- 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

#### Procedure



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

### 8.5.11 P1/PC 01: Over voltage or too low voltage protection

#### Digital output

- P1/PC 01

#### Description

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

#### Recommended parts to prepare

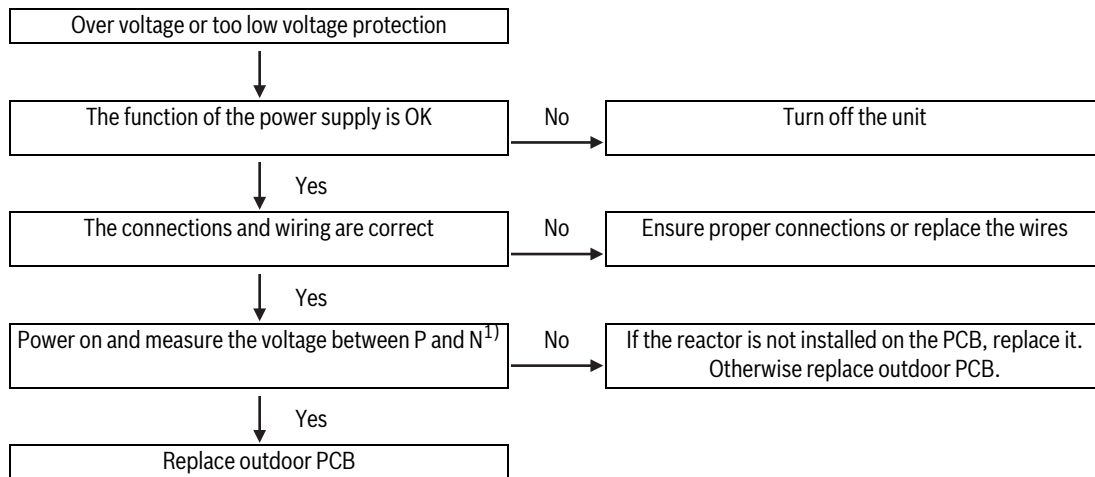
- Power supply wires
- IPM module board
- PCB
- Reactor

#### 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.

### 8.5.12 P2/PC 02: High temperature protection of IPM module or high pressure protection

#### Digital output

- P2/PC 02

#### Description

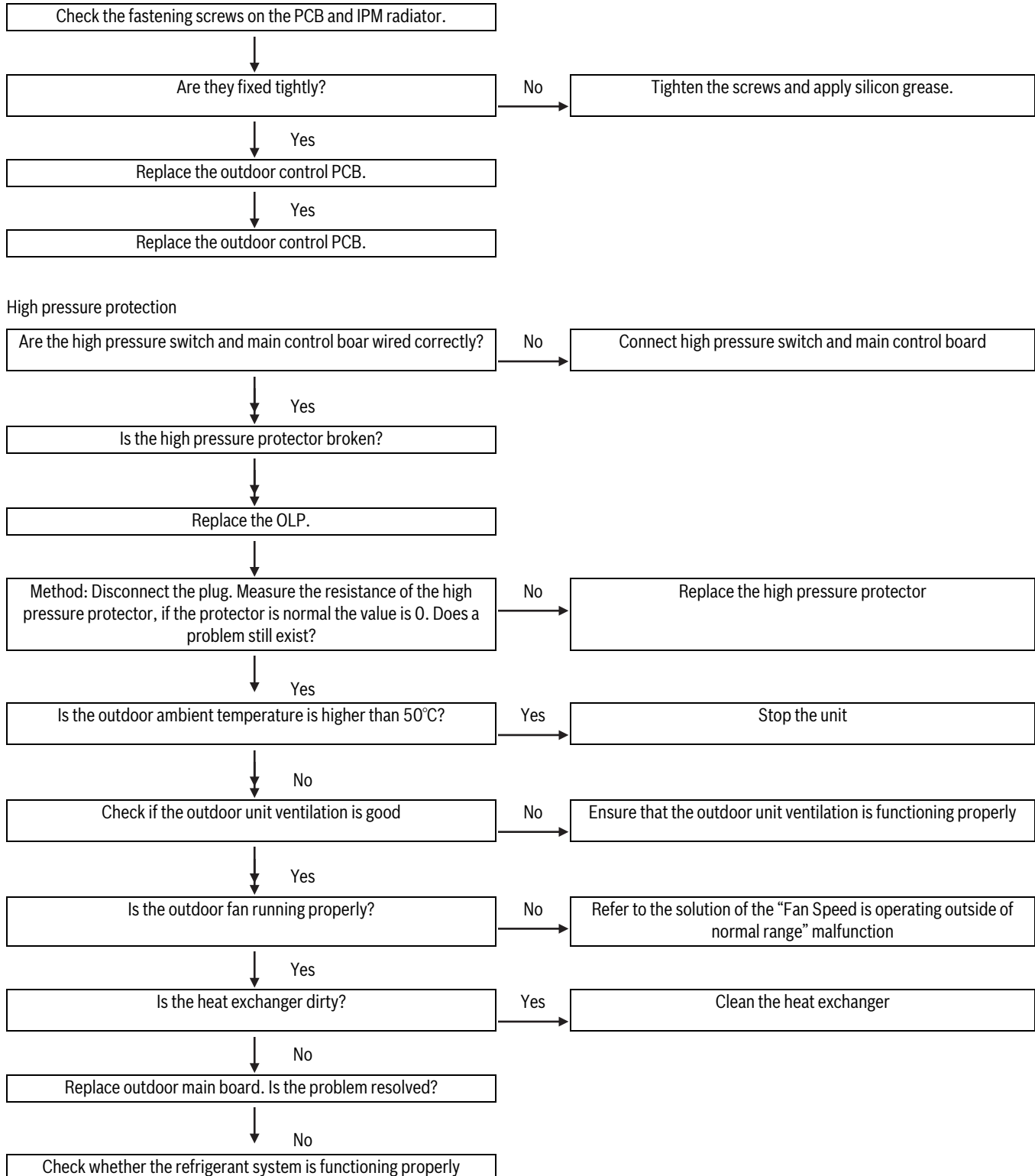
- For some models with overload protection, If the sampling voltage is not 5V, the LED will display the failure. If the temperature of IPM module is higher than a certain value, the LED displays the failure code. For some models with high pressure switch, outdoor pressure

switch cut off the system because high pressure is higher than 4.4 MPa, the LED displays the failure code.

#### Recommended parts to prepare

- Connection wires
- Outdoor PCB
- IPM module board
- High pressure protector
- System blockages

#### Procedure





---

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

---

### 8.5.13 P4/PC 04: Inverter compressor drive error

#### Digital output

- P4/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

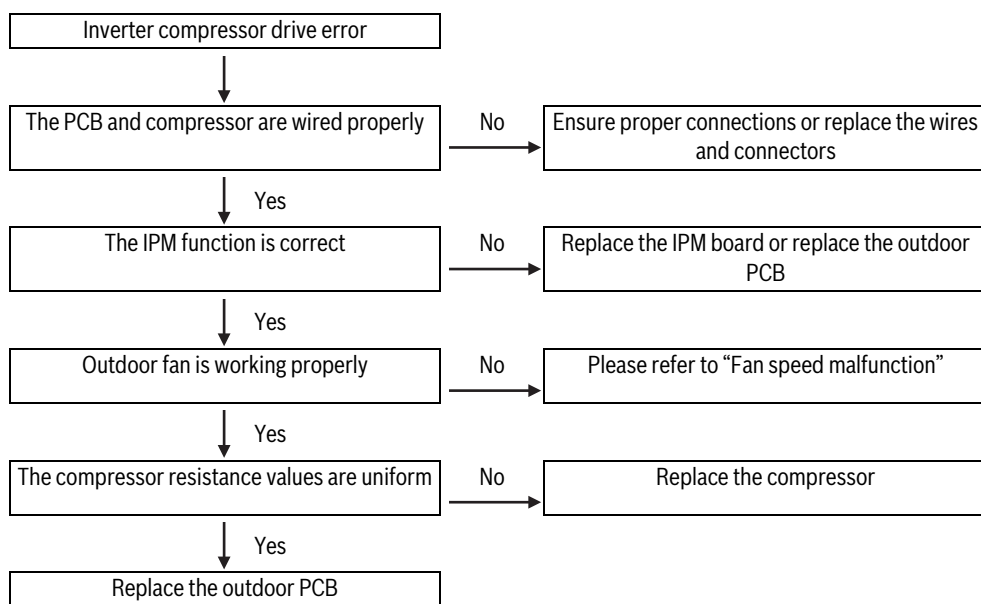
- Connection wires
- IPM module board
- Outdoor fan assembly
- Compressor
- Outdoor PCB

#### 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



### 8.5.14 PC 03: Low pressure protection

#### Digital output

- PC 03

#### Description

Outdoor pressure switch cut off the system because low pressure is lower than 0.13 MPa, the LED displays the failure code.

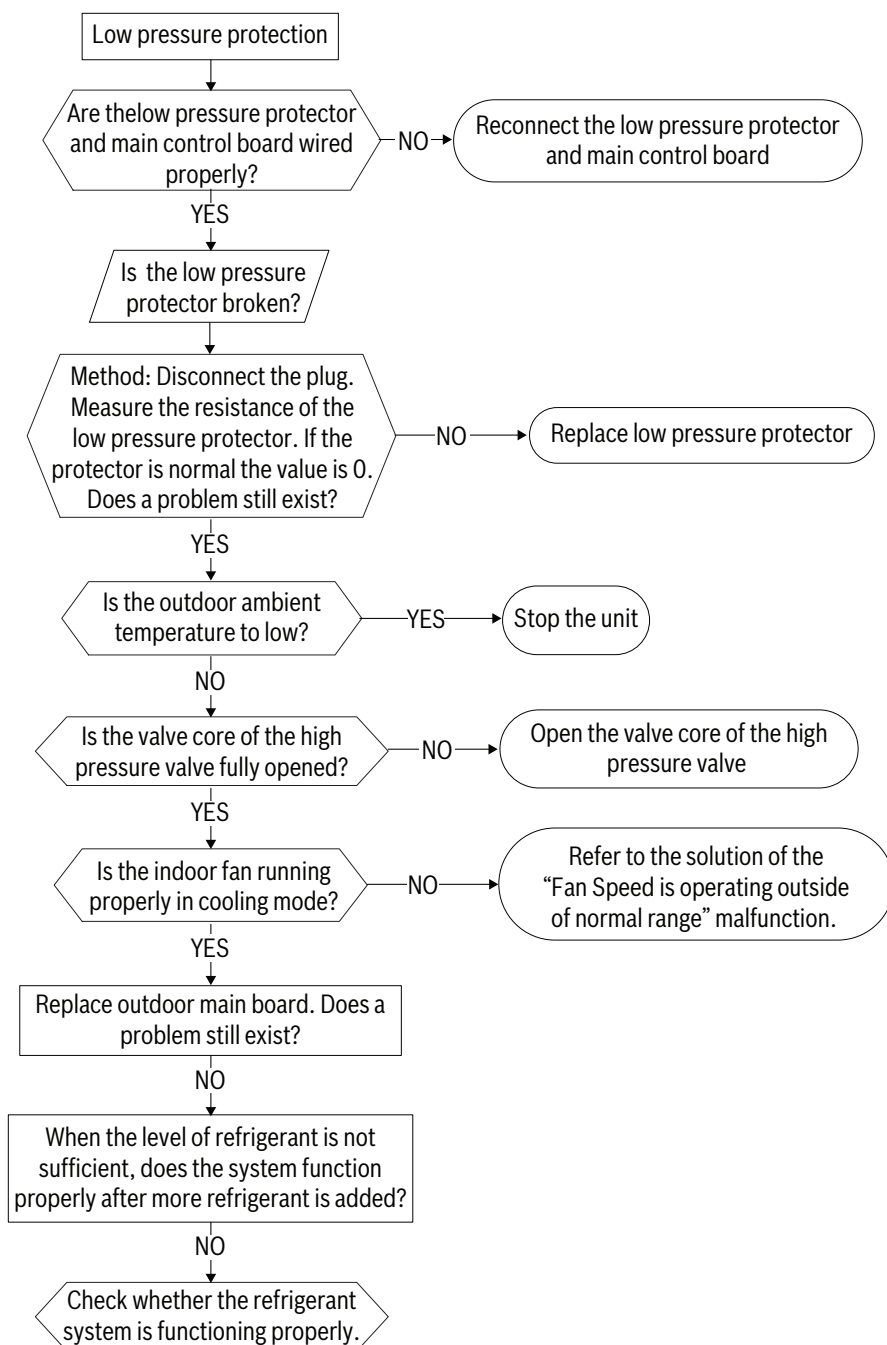
#### Procedure



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

#### Recommended parts to prepare

- Connection wires
- Outdoor PCB
- Low pressure protector
- Refrigerant



## 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           |
| 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           |

| Temperature [°C] | Resistance [kΩ] |
|------------------|-----------------|
| 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          |
| 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 26

## 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           |
| 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           |

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

Table 27

### 9.3 Complain Record Form

|                                                 |                                                                                                                                  |                                                  |                                                                                                                                                               |
|-------------------------------------------------|----------------------------------------------------------------------------------------------------------------------------------|--------------------------------------------------|---------------------------------------------------------------------------------------------------------------------------------------------------------------|
| Request No.:                                    |                                                                                                                                  | Date:                                            |                                                                                                                                                               |
| Installation Date:                              |                                                                                                                                  | Service Date:                                    |                                                                                                                                                               |
| <b>Customer Information</b>                     |                                                                                                                                  |                                                  |                                                                                                                                                               |
| Name                                            |                                                                                                                                  | Telephone No.                                    |                                                                                                                                                               |
| Home Address                                    |                                                                                                                                  |                                                  |                                                                                                                                                               |
| Email                                           |                                                                                                                                  |                                                  |                                                                                                                                                               |
| <b>Product Information</b>                      |                                                                                                                                  |                                                  |                                                                                                                                                               |
| Indoor Unit Model                               |                                                                                                                                  | Outdoor Unit Model                               |                                                                                                                                                               |
| Serial No. of indoor unit                       |                                                                                                                                  | Serial No. of outdoor unit                       |                                                                                                                                                               |
| Working Mode                                    | <input type="checkbox"/> Cooling <input type="checkbox"/> Heating <input type="checkbox"/> Fan only <input type="checkbox"/> Dry |                                                  |                                                                                                                                                               |
| Setting temperature                             | _____ °C                                                                                                                         | Fan speed                                        | <input type="checkbox"/> Turbo <input type="checkbox"/> Auto<br><input type="checkbox"/> High <input type="checkbox"/> Medium<br><input type="checkbox"/> Low |
| Temperature of air inlet                        | _____ °C                                                                                                                         | Temperature of air outlet                        | _____ °C                                                                                                                                                      |
| <b>Installation / Condition Information</b>     |                                                                                                                                  |                                                  |                                                                                                                                                               |
| 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) |                                                                                                                                                               |
| <b>Failure Description</b>                      |                                                                                                                                  |                                                  |                                                                                                                                                               |
| 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                            | 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     |               |                       |
| DT                            | Reserved                     |               |                       |
| iF                            | Reserved                     |               |                       |
| nA                            | Reserved                     |               |                       |
| --                            | Reserved                     |               |                       |

| Approval from Manufacturer                 |  |
|--------------------------------------------|--|
| <input type="checkbox"/> Approved          |  |
| <input type="checkbox"/> More Proof needed |  |
| <input type="checkbox"/> 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 appliances



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

The symbol is valid in countries where waste electrical and electronic equipment regulations apply, e.g. "(UK) Waste Electrical and Electronic Equipment Regulations 2013 (as amended)". These regulations define the framework for the return and recycling of old electronic appliances that apply in each country.

As electronic devices may contain hazardous substances, it needs to be recycled responsibly in order to minimize any potential harm to the environment and human health. Furthermore, recycling of electronic scrap helps preserve natural resources.

For additional information on the environmentally compatible disposal of old electrical and electronic appliances, please contact the relevant local authorities, your household waste disposal service or the retailer where you purchased the product.

You can find more information here:

[www.weee.bosch-thermotechnology.com/](http://www.weee.bosch-thermotechnology.com/)

### Batteries

Batteries must not be disposed together with your household waste.

Used batteries must be disposed of in local collection systems.

### Refrigerant R32



The appliance contains fluorinated gas R32 (global warming potential 675<sup>1)</sup>) mild combustibility and low toxicity (A2L or A2).

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

Refrigerant is hazardous to the environment and must be collected and disposed of separately.

## 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) sentence 1 (b) GDPR

/ UK GDPR), to fulfil our duty of product surveillance and for product safety and security reasons (art. 6 (1) sentence 1 (f) GDPR / UK GDPR), to safeguard our rights in connection with warranty and product registration questions (art. 6 (1) sentence 1 (f) GDPR / UK GDPR) and to analyze the distribution of our products and to provide individualized information and offers related to the product (art. 6 (1) sentence 1 (f) GDPR / UK GDPR). To provide services such as sales and marketing services, contract management, payment handling, programming, data hosting and hotline services we can commission and transfer data to external service providers and/or Bosch affiliated enterprises. In some cases, but only if appropriate data protection is ensured, personal data might be transferred to recipients located outside of the European Economic Area and the United Kingdom. Further information are provided on request. You can contact our Data Protection Officer under: Data Protection Officer, Information Security and Privacy (C/ISP), Robert Bosch GmbH, Postfach 30 02 20, 70442 Stuttgart, GERMANY.

You have the right to object, on grounds relating to your particular situation or where personal data are processed for direct marketing purposes, at any time to processing of your personal data which is based on art. 6 (1) sentence 1 (f) GDPR / UK GDPR. To exercise your rights, please contact us via [privacy.ttgb@bosch.com](mailto:privacy.ttgb@bosch.com) To find further information, please follow the QR-Code.

1) Based on ANNEX I of REGULATION (EU) No 517/2014 of the European Parliament and of the Council of 16 April 2014.



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