



BOSCH

Installation Manual

Outdoor Unit of Air to Water Heat Pump

Compress 3400i AWS

CS3400iAWS 4 OR-S | CS3400iAWS 6 OR-S | CS3400iAWS 8 OR-S | CS3400iAWS 10 OR-S

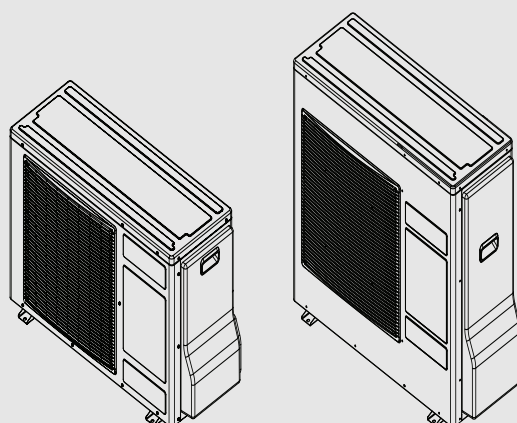


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1 Explanation of symbols and safety instructions

1.1 Explanation of symbols

Warnings



WARNING

Warnings in this document are identified by a warning triangle printed against a grey background. Keywords at the start of a warning indicate the type and seriousness of the ensuing risk if measures to prevent the risk are not taken.

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

- **NOTICE** indicates a situation that could result in damage to property or equipment.
- **CAUTION** indicates a situation that could result in minor to medium injury.
- **WARNING** indicates a situation that could result in severe injury or death.
- **DANGER** indicates a situation that will result in severe injury or death.

Important information



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

Additional symbols

Symbol	Explanation
▶	Step in an action sequence
→	Cross-reference to another part of the document
•	List entry
–	List entry (second level)

Table 1





Symbol	Meaning
	Warning low burning velocity material. This appliance uses a flammable refrigerant with low burning velocity (A2L). If refrigerant leaks and is exposed to an external ignition source, there is a risk of fire.
	Warning strong magnetic field.
	Maintenance by a qualified person should be carried out while following the instructions of the service manual.
	For operation, follow the instructions of the user manual.

Table 2

1.2 General safety instructions

Notices for the target group

These installation instructions are intended for gas, plumbing, heating and electrical contractors. 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, service and commissioning instructions (heat source, heating controller, pumps, etc.) before installation. Non-compliance with safety instructions will result in electric shock, water leakage, fire or other dangerous situations.
- ▶ The appliance must be installed, maintained, repaired and removed in accordance with the installation manual by a qualified installer or service technician.
A qualified installer or qualified service technician is a person who has the qualifications and knowledge described in the installation manual.
- ▶ This unit is part of a system that contains fluorinated gases as refrigerant. For specific information on the type of gas and its amount, please refer to the relevant label on the outdoor unit.
- ▶ Only qualified personnel can handle, fill, purge and dispose of the refrigerant.
- ▶ Observe the safety instructions and warnings.
- ▶ Follow national and regional regulations, technical regulations and guidelines.
- ▶ Record all work carried out.

Intended use

This product is intended for use in sealed heating systems in residential buildings.

Any other use is considered as not intended. Liability will not be assumed for any resulting damage.

Electrical work

Electrical work must only be carried out by electrical installation contractors.

Before starting electrical work:

- ▶ Isolate all poles of the mains voltage and secure against reconnection.
- ▶ Make sure the mains voltage is disconnected.
- ▶ Observe the wiring diagrams of other system components as well.

⚠ What to do if refrigerant leaks

If refrigerant leaks and touches the skin, it can cause frostbite.

- ▶ In case of a refrigerant leak, never touch any components of the air to water system.
- ▶ Avoid skin or eye contact with refrigerant.
- ▶ Seek medical attention if you get refrigerant on your skin or in your eyes.

⚠ Handover to the user

When handing over, instruct the user how to operate the heating system and inform the user about its operating conditions.

- ▶ Explain how to operate the heating system and draw the user's attention to any safety relevant action.
- ▶ In particular, point out the following:
 - Modifications and repairs must only be carried out by an approved contractor.
 - Safe and environmentally compatible operation requires inspection at least once a year and proper cleaning and maintenance.
- ▶ Point out the possible consequences (personal injury, including danger to life or material damage) of non-existent or improper inspection, cleaning and maintenance.
- ▶ Leave the installation instructions and the operating instructions with the user for safekeeping.

1.2.1 Refrigerant

⚠ Refrigerant R32

- ▶ This appliance is filled with refrigerant R32. If refrigerant gas gets into contact with fire, it may generate a toxic gas or fire.
- ▶ Do not let any other substance than the specified refrigerant enter the refrigerant circuit.
- ▶ Ensure that the refrigerant pipe is connected before running the compressor.
- ▶ Be aware that refrigerant may not contain any odour.
- ▶ Read all safety instructions for handling flammable refrigerants provided with this appliance in a separate document.

⚠ Installation, commissioning and service

- ▶ Do not smoke and make sure that any other possible ignition sources are kept way from the working area. Ensure that the installation area is adequately ventilated.
- ▶ Do not pierce or burn.

- ▶ This appliance must be stored in a room without continuously operating ignition sources (e.g. open flames, operating gas or operating electric heater).
- ▶ Prior and during installation, make sure that there are no refrigerant leaks using an appropriate refrigerant detector that is adequately sealed and intrinsically safe (i.e. no sparking). Never use potential sources of ignition to search for refrigerant leaks. A halide torch (or any other detector using a naked flame) may not be used. If a refrigerant leak is detected, ventilate the room immediately.
- ▶ When performing any hot work, dry powder or CO₂ fire extinguisher should be kept ready.
- ▶ Wear protective gloves during installation.
- ▶ Do not use means to accelerate the defrosting process or to clean the appliance, other than those recommended by the manufacturer.

⚠ Maintenance

- ▶ When changing electrical components assure that these correspond with the correct specification. Maintenance and service guidelines must always be followed.
- ▶ Before any repair and maintenance procedure, an initial safety check and component inspection procedures should be performed to check that:
 - Capacitors are discharged.
 - All electrical components are switched off and wiring is not exposed.
 - Earth bonding continuity is ensured.
- ▶ Do not connect any electrical supply to the circuit if a fault that can compromise safety is detected.

2 Regulations

Follow the directives and regulations given below:

- Local provisions and regulations of the electricity supplier and corresponding special rules
- National building regulations
- **F-Gas regulation**
- **EN 50160** (Voltage characteristics of electricity supplied by public electricity networks)
- **EN 12828** (Heating systems in buildings - Design for water-based heating systems)
- **EN 1717** (Protection against pollution of potable water installations and general requirements of devices to prevent pollution by backflow)
- **EN 378** (Refrigerating systems and heat pumps - Safety and environmental requirements)
- **PED, 2014/68/EU** (Pressure equipment directive)

3 Product description

3.1 Supplied parts

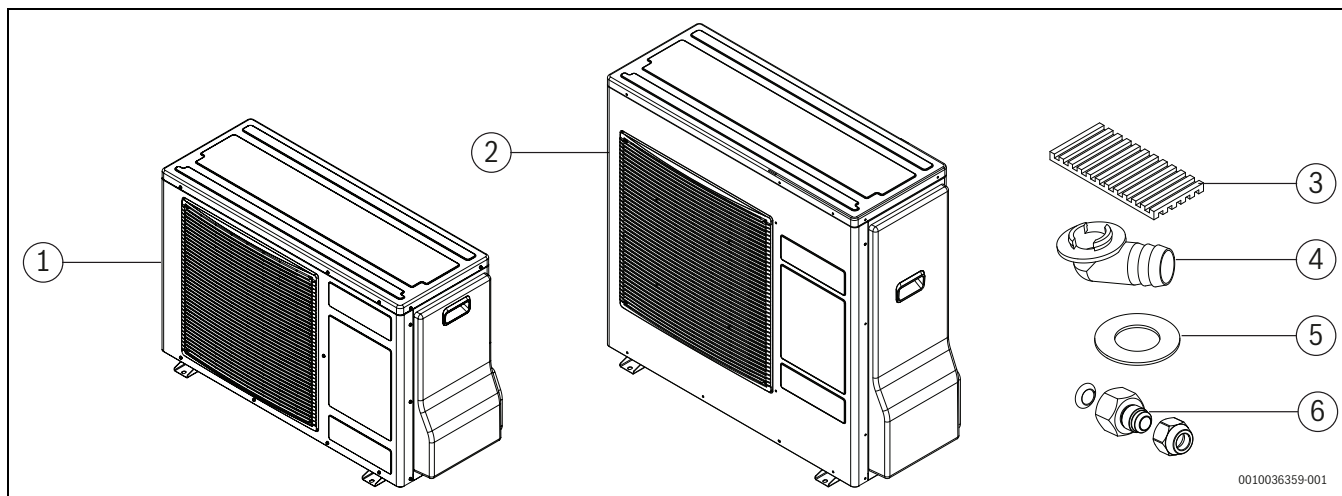


Fig. 1 Supplied parts

- [1] CS3400iAWS 4 OR-S
- [2] CS3400iAWS 6 OR-S, CS3400iAWS 8 OR-S, CS3400iAWS 10 OR-S
- [3] Rubber pads (x4 pieces)
- [4] Drain connector
- [5] Rubber washer
- [6] 5/8" to 1/2" Converter (only supplied with CS3400iAWS 4 OR-S)

3.2 Heat pump details

The CS3400iAWS outdoor unit is intended for connection to the AWS E, AWS B or AWS M indoor units.

Possible combinations:

AWS E / AWS B	AWS M	CS3400iAWS
4	4	4-S
4	4	6-S
4	4	8-S
4	4	10-S

Table 3 Outdoor unit and indoor unit combinations

AWS E and AWS M are equipped with an integrated electric booster heater.

AWS B are intended to work together with an external auxiliary heater (electric, oil, gas heater), with mixer.

3.3 Declaration of conformity

This product conforms to European directives and supplementary national requirements in design and operation. Conformity has been demonstrated with the CE marking.



You can request the conformity declaration of the product. Please refer to the address on the back of this manual.

3.4 Type plate

The data plate is located on the rear side of the outdoor unit. It contains information on the output, part number, serial number, date of manufacture, type and amount of refrigerant.

3.5 Heating system minimum volume and flow



A sufficient amount of energy stored in the system is required to avoid multiple start/stop cycles, incomplete defrosting or unnecessary alarms. Energy is stored in the heating system water volume, as well as in the system components (radiators and underfloor heating).

For the defrost operation of the outdoor unit, a minimum volume and flow must be ensured and permanently available.

The minimum volume can be provided by the open circuits (the necessary zone valves/thermostats must be always fully open) and/or by a buffer tank. For an optimal and most efficient defrost operation a recommended volume is stated.

The minimum flow must be ensured within the minimum volume available. If the minimum flow is not met, additional measures are needed, e.g. differential bypass valve or parallel buffer. Note that if an hydraulic separator is present it requires an additional heating circuit pump.

In certain circumstances depending on the available energy stored in the system, the auxiliary heater may be used to ensure the complete defrost.

Outdoor Unit	CS3400iAWS 4 OR-S	
	Minimum	Recommended
Underfloor/fan coils	13l	35l
Radiators	4l	13l
Minimum flow	15l/min	

Table 4 Minimum volume and flow for outdoor unit CS3400iAWS 4 OR-S

Outdoor Unit	CS3400iAWS 6-10 OR-S	
	Minimum	Recommended
Underfloor/fan coils	27l	40l
Radiators	10l	15l
Minimum flow	15l/min	

Table 5 Minimum volume and flow for outdoor unit CS3400iAWS 6-10 OR-S

3.6 Control principle

The control of the system is based on the heat demand of the building, changing the compressor output and/or by switching on the integrated/external auxiliary heater via the indoor unit. The user interface controls the outdoor unit according to the heating curve that has been set. If the outdoor unit is unable to meet the heat energy demand of the building on its own, the indoor unit automatically start the auxiliary heater which, together with the outdoor unit, generates the required temperature in the building and in the DHW cylinder if necessary.

Heating and DHW mode when the outdoor unit is deactivated

When the outdoor temperature is less than -20°C or exceeds 45°C (adjustable), the outdoor unit is automatically turned off and is unable to produce any heat. In this case, the integrated/external auxiliary heater of the indoor unit adopts the heating and DHW mode.

3.7 Defrost method

The principle of defrosting in the outdoor unit is known as hot gas defrosting. During defrosting, the flow in the refrigerant circuit is reversed by means of an electrically-controlled four-way valve. The compressed gas from the compressor is fed into the top of the evaporator, causing the ice on the outside to melt. During this process, the water in the heating system is slightly cooled. The time required for defrosting depends on the amount of ice and the outdoor temperature. The base of the casing below the evaporator of the outdoor unit serves as a drip pan which accumulates condensation and ice.



We recommend installing heating cable for the condensate tray and drain outlet (accessory for systematic removal of condensate). The power supply of the heating cable is supplied by the indoor unit, which will be activated during defrost operation.

3.8 Dimensions of outdoor unit model CS3400iAWS 4 OR-S

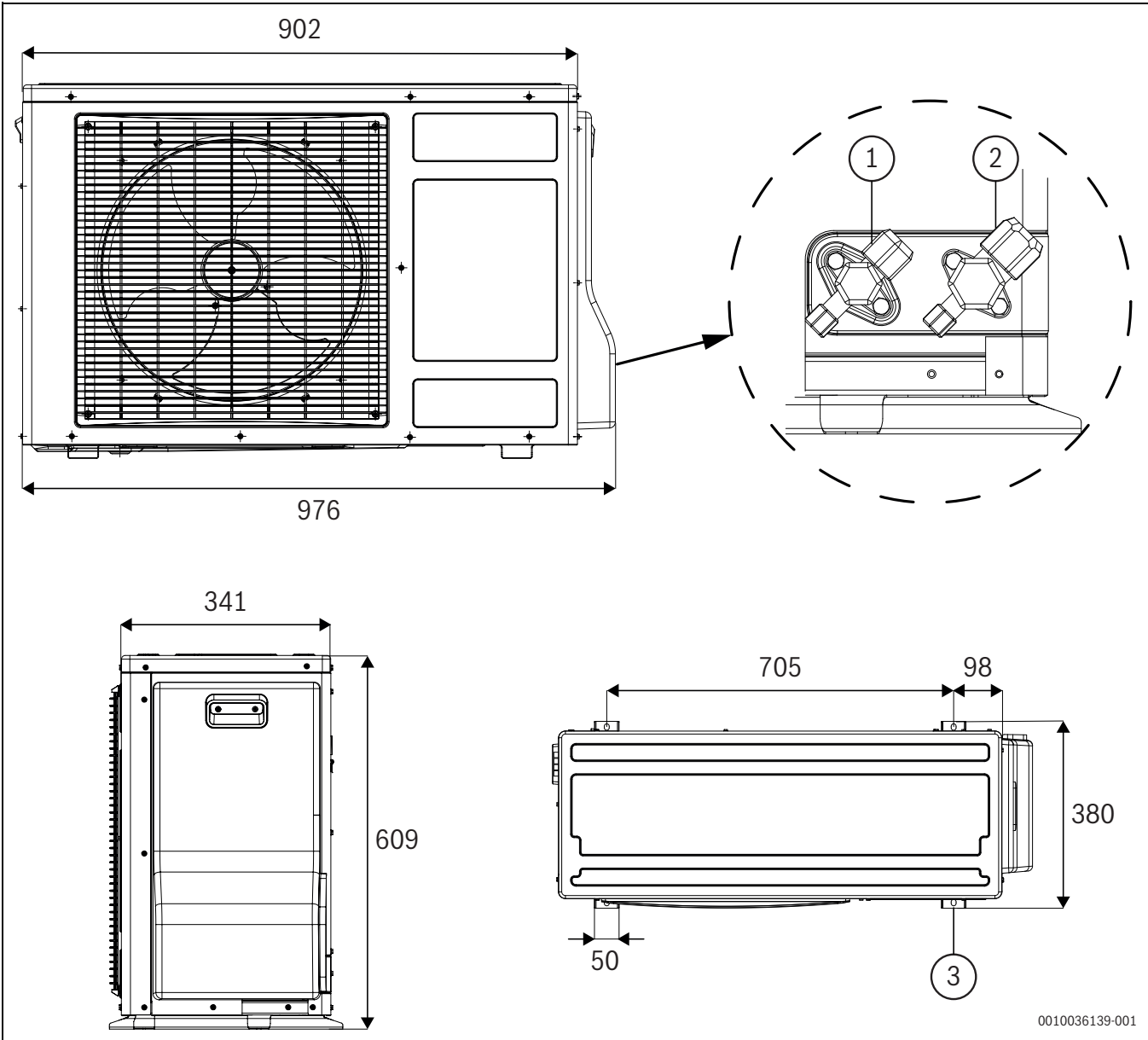


Fig. 2 Dimensions of outdoor unit CS3400iAWS 4 OR-S

- [1] Liquid side service valve
- [2] Gas side service valve
- [3] Feet for anchorage

3.9 Dimensions of outdoor unit models CS3400iAWS 6 OR-S, CS3400iAWS 8 OR-S and CS3400iAWS 10 OR-S

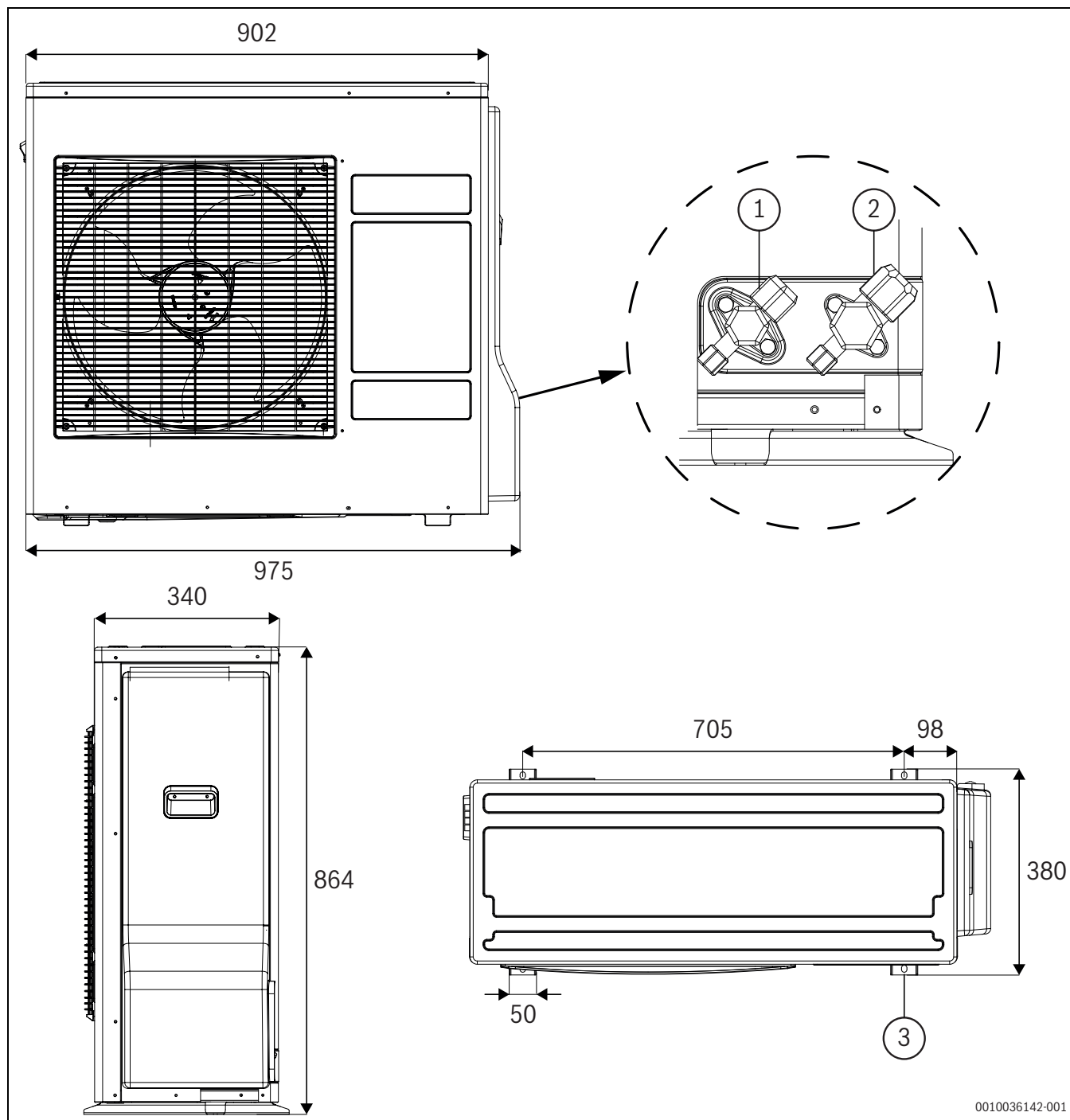


Fig. 3 Dimensions of outdoor unit model CS3400iAWS 6 OR-S, CS3400iAWS 8 OR-S and CS3400iAWS 10 OR-S

- [1] Liquid side service valve
- [2] Gas side service valve
- [3] Feet for anchorage

3.10 Minimum clearances

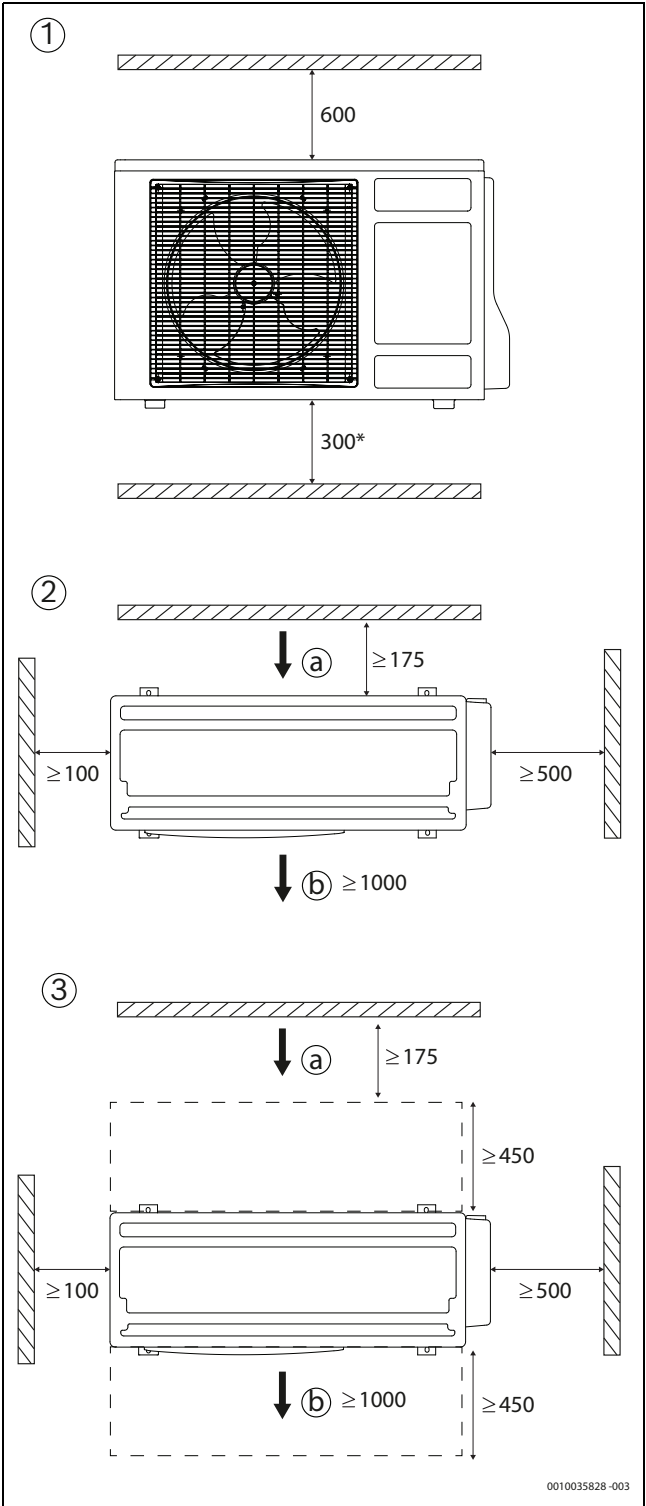


Fig. 4 Minimum clearances (mm)

- [1] Front view
- [2] Top view
- [3] Top view with sound hood (dashed line)
- [a] Air inlet
- [b] Air outlet
- [*] Recommended in locations with heavy snow

4 Preparing for installation



CAUTION

Risk of injury!

During transport and installation there is a risk of crushing injury. During maintenance, internal parts of the appliance may become hot.

- The installer is obliged to wear gloves during transport, installation and maintenance.



CAUTION

Risk of fire or explosion!

All possible ignition sources must be kept away from the installation site as it may lead to fire or explosion.

- This appliance must be stored in a room without continuously operating ignition sources (e.g. open flames, cigarette smoking, an operating gas or operating electric heater).

4.1 Transportation storage and lifting

NOTICE

The outdoor unit must be kept in the packaging during transportation.

To prevent damage on the outdoor unit:

- Transport and store upright.
- Do not lean by more than 45° angle.
- Do not transport or store when temperatures are below -20 °C or over 60 °C.

The outdoor unit must be lifted using a standard lifting equipment with a minimum 150kg lifting capacity. The centre of gravity marked in the package should be considered for this purpose.

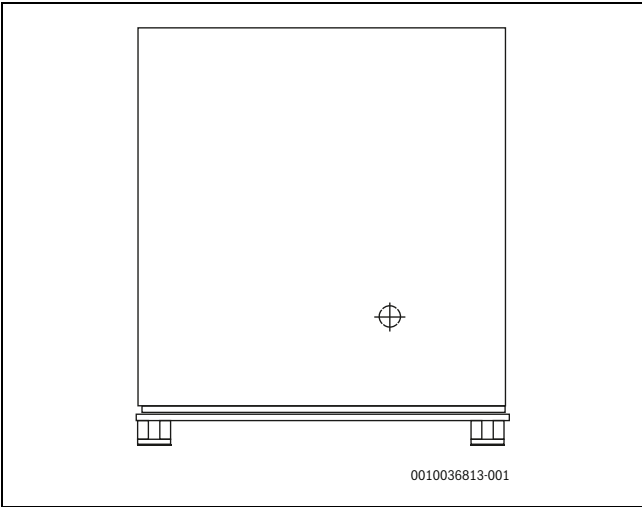


Fig. 5 Package with marked centre of gravity

4.2 Installation locations



WARNING

Risk of injury!

If the installation location does not have a sufficient strength or is not carried out correctly, the unit may fall leading to serious injury.

- ▶ Install at a strong and firm location which is able to withstand the unit's weight.

Before installing the outdoor unit, the following information should be considered:

- Set up the unit outdoors on a flat stable surface.
- Installing the outdoor unit in a dry and well-ventilated area is recommended.
- Avoid setting up in locations surrounded by walls.
- Install the outdoor unit in a place as protected as possible from direct sunlight and with minimum exposure to wind against the front side.
- Consider the sound propagation of the outdoor unit when setting it up, particularly to avoid noise nuisance to neighbours. Whenever possible, do not place the outdoor unit in front of rooms or windows.
- Make sure the unit can be always accessed in order to carry out maintenance work. If access is restricted, e.g. due to the installation height, suitable measures must be taken to ensure that maintenance work can still be carried out without additional time expenditure or costly assembly aids.
- Do not install the outdoor unit in a place that requires treading on light roofs such as a tiled roof or asbestos. No service will be provided in this case.

Considerations for installing the outdoor unit at the sea side

The outdoor unit should be placed with a minimum distance to the sea of 500m. In France and Ireland a minimum distance of 1000m is recommended. It is recommended to place the appliance in a such a way that the evaporator does not face the sea wind.

NOTICE

Risk of product damage or malfunction!

Short-circuit or corrosion of components.

- ▶ Avoid installing outdoor unit in damp locations.
- ▶ The unit should be free from corrosive and moisture surrounding.

Considerations regarding installation in areas with strong wind, heavy rain and snow:

- ▶ Install the outdoor unit so that the air flow direction is at 90° angle to the wind direction. If necessary, build a barrier in front of the unit to protect it from extremely heavy winds.
- ▶ Build a shelter above the outdoor unit to protect it from rain or snow. Be careful not to obstruct the air flow around the unit.

5 Installation



CAUTION

Risk of injury!

The evaporator of the outdoor unit is supplied with a protective cardboard to avoid injuries caused by the fins during installation. The protective cardboard should only be removed after all the steps of the checklist are preformed.

- ▶ Do not remove the protective cardboard from the evaporator until all steps mentioned below are completed.



Each installation is different. The following checklist contains a general description of the recommended installation steps.

1. Install and fix the outdoor unit on a solid surface.
2. Install the drain connector for the condensation of the outdoor unit.
3. Connect the refrigerant pipes from the outdoor unit to the indoor unit.
4. Connect the CAN-BUS cable to outdoor and indoor units.
5. Connect the power supply of the outdoor unit to the mains distribution board.

5.1 Mounting method

5.1.1 Foundation for installation



To avoid the possible noise problems associated with a wall mounted installation, it is advisable to install the unit on the ground with floor brackets (accessory) whenever possible.

- ▶ Check the strength and level of the installation so that the unit will not cause any operating vibration or noise after installation.
- ▶ Assemble the rubber pads.
- ▶ Fix the unit securely by means of the foundation bolts.

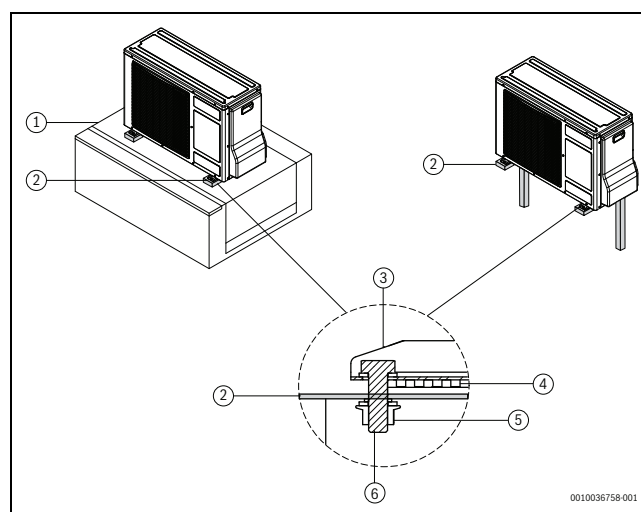


Fig. 6

- [1] Concrete
- [2] Floor/wall brackets (accessory)
- [3] Outdoor unit feet
- [4] Rubber pads
- [5] Nut
- [6] Bolts

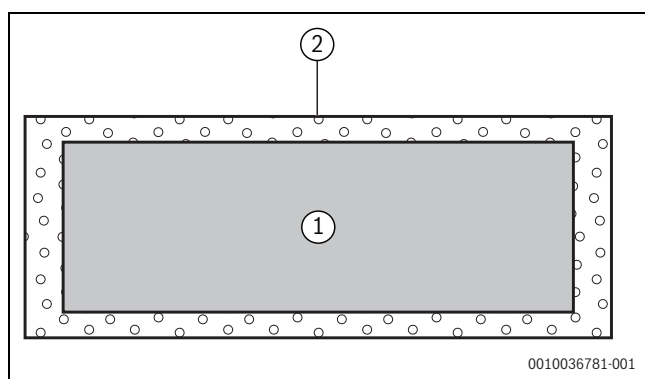


Fig. 7 Outdoor unit at the floor bracket (view from above)

- [1] Outdoor unit
- [2] Condensation drip pan (accessory)

5.1.2 Assembly of wall mounted outdoor unit

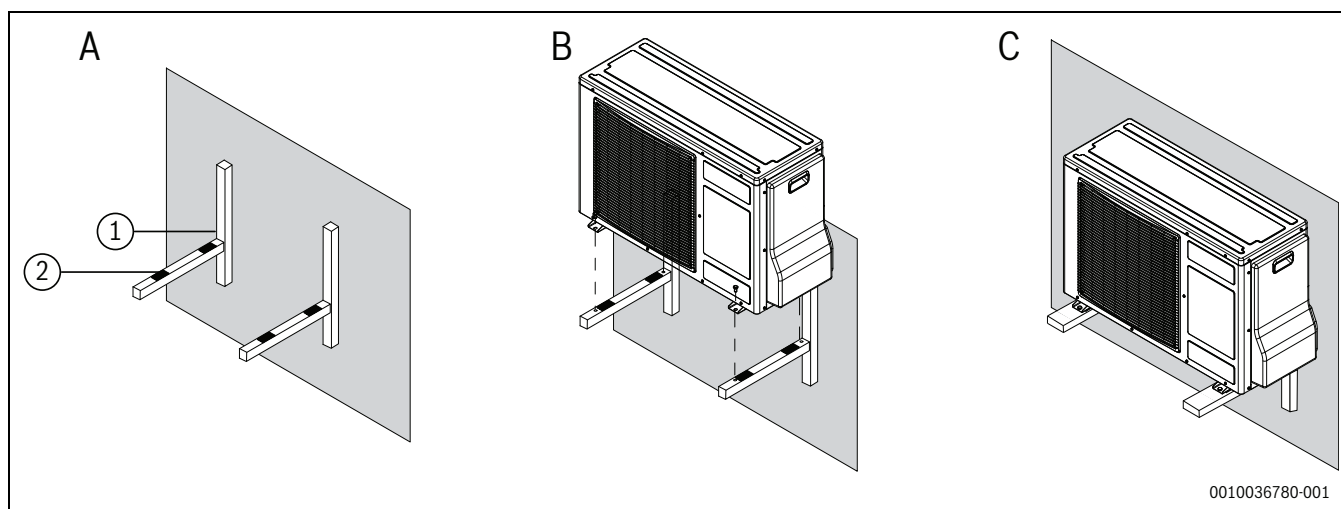


Fig. 8 Wall mounted outdoor unit

- [1] Wall bracket (accessory)
- [2] Rubber pads
- [A] Screw the wall brackets to the wall and fix the rubber pads
- [B] Place the outdoor unit on the wall brackets
- [C] Screw the outdoor unit to the wall brackets



Make sure that the thickness of the wall is more than 20cm and is able to support the total load. Do not install on a light structure wall.



If the access to the outdoor unit is via a ladder, do not install the outdoor unit more than 3m from the ground level.

The condensate can either be drained away via a gravel bed or via a drain into the building. A condensation drip pan is required for the solution with the drain and is available as an accessory.

The condensation drip pan must be equipped with a heating cable that runs into the pan and into the frost-free area of the drain.

An alternative solution would be to allow the condensate to seep away naturally. This can lead to the formation of ice on the ground.



A heating cable for the drain (accessory) is required when using the condensate collection pan.

5.1.3 Assembly of floor standing outdoor unit

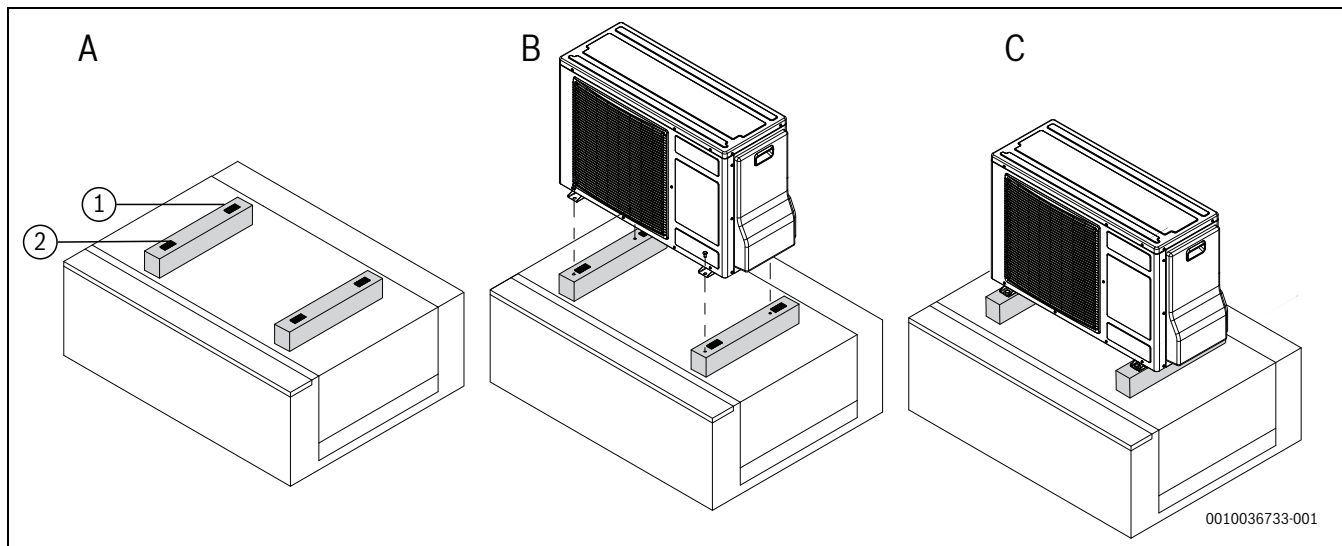


Fig. 9 Floor standing outdoor unit

[1] Floor bracket (accessory)

[2] Rubber pads

[A] Screw the floor brackets to the concrete and fix the rubber pads

[B] Place the outdoor unit on the floor brackets

[C] Screw the outdoor unit to the floor brackets



Anchor the unit to a constructive base on concrete platform with a minimum thickness of 10 cm or galvanized metal construction raised by 10cm.

5.1.4 Installation of the condensation drain

NOTICE

Carry out drainage piping as mentioned in this chapter.

► If drainage is not perfect, water leaks may damage the surrounding area.

Install the drain connector after placing and fixing the outdoor unit.

1. Assemble the washer rubber into the drain connector.
2. Connect a 16mm drain hose to the drain connector, the drain hose should be installed downwards to allow smooth flow of draining water.

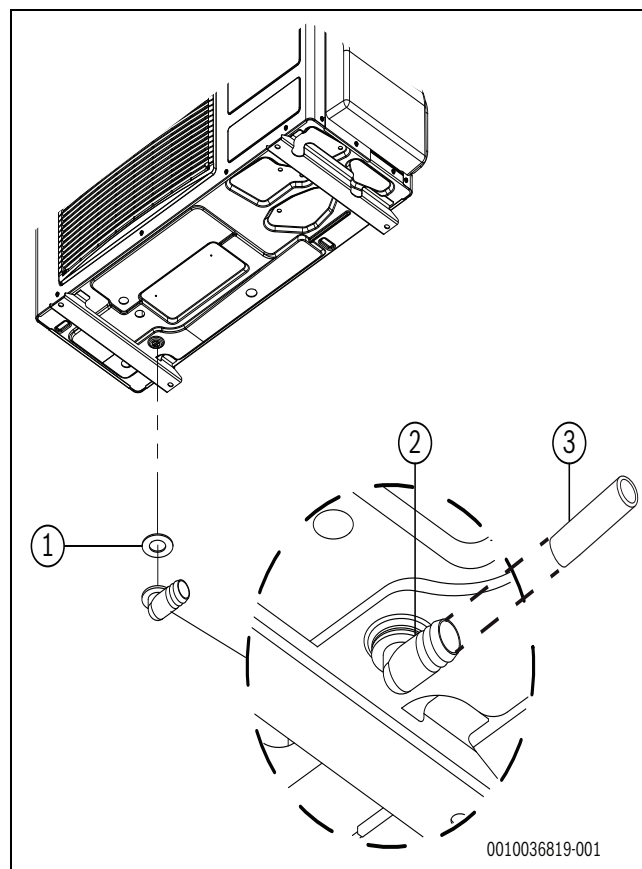


Fig. 10 Installation of drain connector

[1] Rubber washer

[2] Drain connector

[3] Drain hose (not supplied with the outdoor unit)

5.2 Refrigerant pipe

5.2.1 Safety considerations to handle R32 refrigerant systems



CAUTION

Risk of frostbite and poisoning from refrigerant leaks!

Refrigerant can cause frostbite. If the refrigerant leaks, do not touch any part of the outdoor unit.

- ▶ Avoid eye and skin exposure to the refrigerant.
- ▶ Ventilate the room immediately.



DANGER

Risk of malfunction, fire and explosion!

Malfunctions, fire and explosions may occur if the refrigerant system is not properly operated during installation.

- ▶ Only authorized installer or service person are allowed to work on the refrigerant system.
- ▶ Ignition sources of all kind must be kept away from the working area.
- ▶ Only use tools and pipe components specifically made for R32 refrigerant.
- ▶ Check for leaks in the refrigerant system with an appropriate refrigerant detector.

NOTICE

Risk of environmental hazard!

- ▶ Never release refrigerant to the atmosphere.



WARNING

Risk of explosion

Abnormal substances in the refrigerant pipes might cause lower capacity, high pressure in the refrigerant cycle, explosion and injury.

- ▶ Do not let other substances other than the specified refrigerant get into the refrigeration system.



Ensure that all pipes and connections are protected against physical damage. Mechanical connections to the indoor unit must be accessible for maintenance purposes.



To minimize output losses and waste of energy:

- ▶ Reduce the pipe movements, avoid sharp angles and twists as much as possible.



Use copper piping designed for refrigerant with a high-quality internal finish and without oil residues.



Use tools and pipe components specifically indicated for the refrigerant specified on the type plate.

5.2.2 Pipework connections - general



CAUTION

Risk of abnormal operation!

Pipe length between indoor and outdoor unit influences the operation of the appliance by reducing the thermal capacity and the efficiency of the unit.

- ▶ Keep pipe length to a minimum ($\geq 3\text{m}$).
- ▶ Do not exceed the maximum pipe length.
- ▶ Charge the refrigerant properly and notice the maximum allowed charge which must never be exceeded.
- ▶ If the pipe length is longer than 10m, add additional charge of the refrigerant according to the following table.

The single pipe length without necessary additional filling is 10m. Additional filling of refrigerant is not required up to this length.

To calculate the amount of additional refrigerant charge needed when the pipe length is more than 10m, observe this example: if the split unit with a single pipe length of 30m is installed, fill with an additional 400g refrigerant. The following applies: (single pipe length - standard single pipe length) x additional refrigerant charge = $(30-10) \times 20\text{g} = 400\text{g}$

Unit	Pipe size (mm : inch) (Diameter : Ø)		Single pipe length ¹⁾		Pipe elevation ²⁾		Refrigerant	Standard charge	*Additional Refrigerant (g/m) single pipe length	Maximum charge (kg)
	Gas	Liquid	Standard (m)	Max. (m)	Standard (m)	Max. (m) ³⁾				
CS3400iAWS 4 OR-S	12.7 (1/2")	6.35 (1/4")	10	30	0	15	R32	1.10	20	1.50
CS3400iAWS 6 OR-S	15.88 (5/8")	6.35 (1/4")	10	30	0	15	R32	1.30	20	1.70
CS3400iAWS 8 OR-S	15.88 (5/8")	6.35 (1/4")	10	30	0	15	R32	1.30	20	1.70
CS3400iAWS 10 OR-S	15.88 (5/8")	6.35 (1/4")	10	30	0	15	R32	1.30	20	1.70

1) Check for the (1) marked in →Fig. 11

2) Check for the (2) marked in →Fig. 11

3) Oil traps are required every 3 meters

Table 6 Pipe length, elevation and refrigerant charge

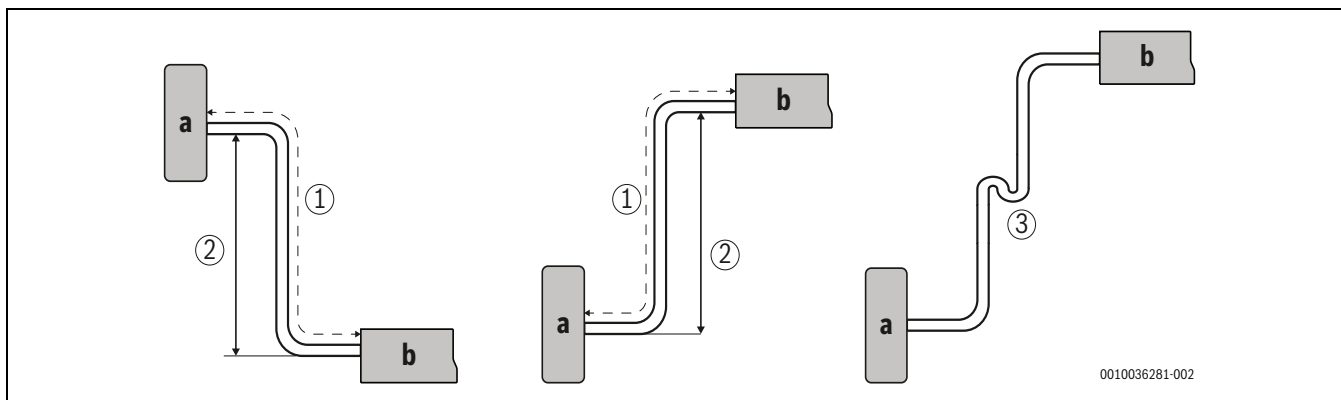


Fig. 11 Pipe length and elevation

- [a] Indoor unit
- [b] Outdoor unit
- [1] Pipe length
- [2] Pipe elevation
- [3] Oil traps

5.2.3 Piping preparation

Before proceeding with piping installation, the pipes need to be prepared. For that you will need a pipe cutter and a proper flaring tool. The following information describes how to prepare the piping for installation.

- Use the pipe cutter for cutting the pipes

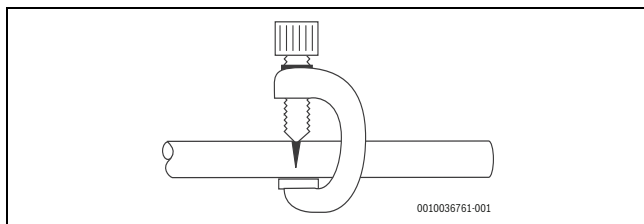


Fig. 12

- Remove all burrs by using a copper pipe reamer. Hold the pipe downwards to allow any metal debris to fall out, preventing it from remaining in the pipe.



Gas leaks might occur if the burrs are not correctly removed.

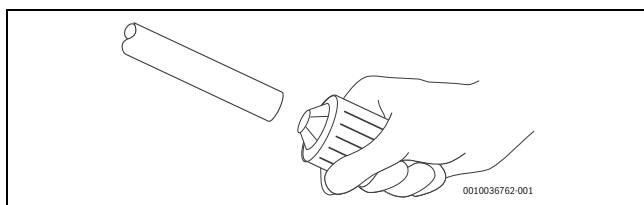


Fig. 13

- Wrap the insulated pipe end to prevent water from going inside piping.

- Insert the flare nut onto the copper pipes and make a flare using a flaring tool.

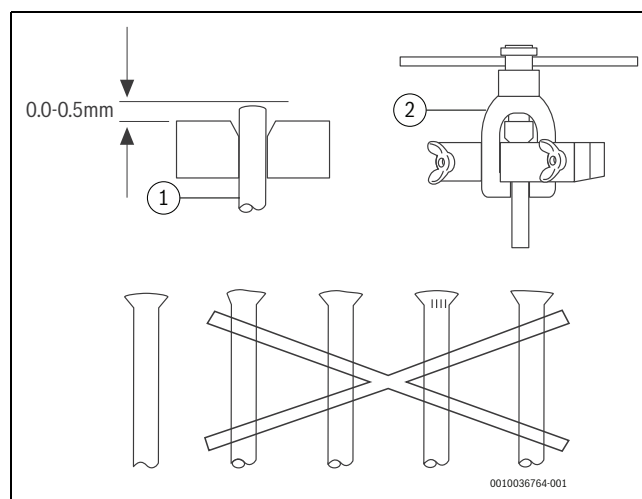


Fig. 14

- [1] Copper pipe
- [2] Flaring tool

Ensure that the flare is completely smooth, with no scratches and that the rounds are even. If this is not observed and the flare is defective (uneven rounds, scratches, cracked or tilted), redo the flaring process.

5.2.4 Connect the outdoor unit pipes to the indoor unit

To connect the pipes from the outdoor unit to the indoor unit, a hole in the wall might be necessary. For that consider a $\varnothing 60$ mm hole core drill. After pipes are prepared as mentioned in chapter 5.2.3, you can connect them to the outdoor unit.

► Firstly, you need to remove the side cover to access the valves:

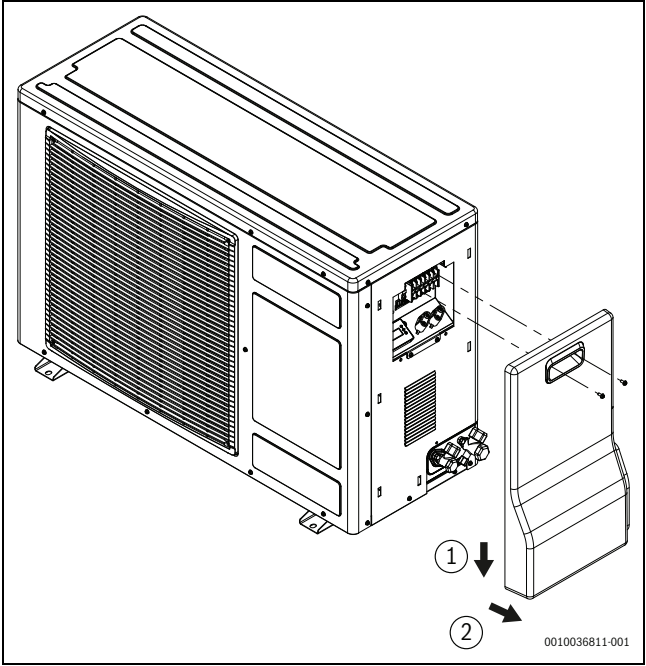


Fig. 15 Remove the side cover

► Align the centre of the pipes to the valves.

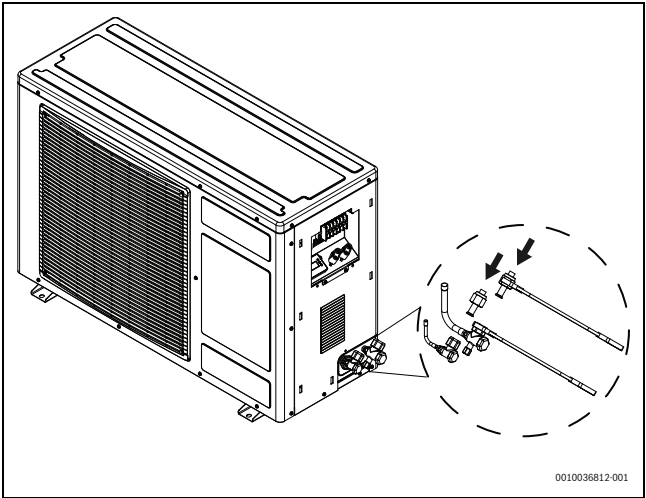


Fig. 16 Screwing

► Use a torque wrench to tighten the valves firmly according to the table below.

	Tube size	1/4	3/8	1/2	5/8
Flare nuts		13-18	40-45	60-65	70-75
Valve cap	Torque	13-20	13-20	18-25	18-25
Service port cap	N.m	11-13	11-13	11-33	11-33

Table 7

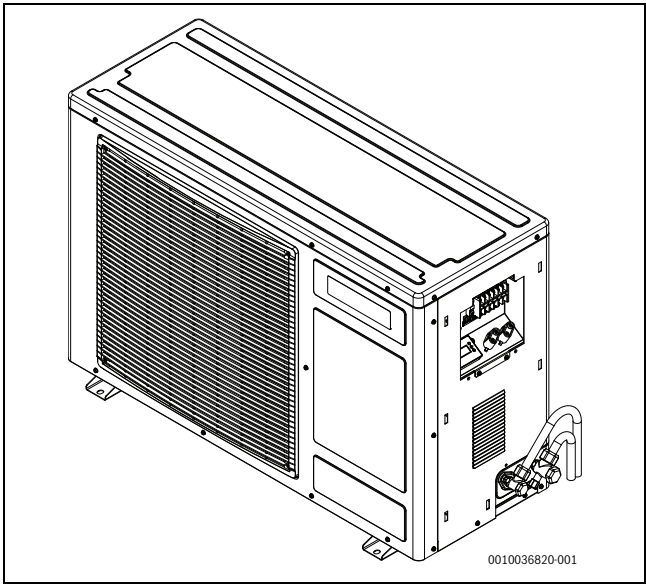


Fig. 17 Pipes connected to the outdoor unit



The refrigerant lines must not contact directly with each other or with the wall. All pipe work must be insulated.

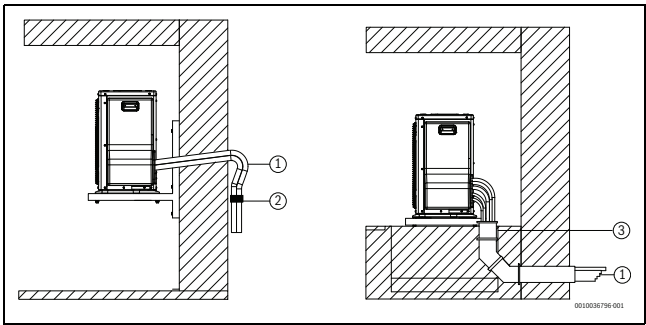


Fig. 18 Connection of the outdoor unit with the indoor unit

- [1] Insulated pipes
- [2] Pipe clamp with EDPM lining
- [3] Sealed pipes



Refrigerant pipe joints must be at surface level. Pipes joints must not be installed underground.

5.2.5 Vacuum, charging and leakage test

At this stage, pipe connections between outdoor and indoor units should be completed. Subsequently, the air that remains in the refrigerant pipes needs to be evacuated. Afterwards, a leakage test needs to be conducted to detect possible gas leaks.

The steps for the evacuation and leakage test are stated below:

1. Clean the pipes with nitrogen gas.
2. Connect the charging hoses with a push pin to the low and high sides of the charging set and the service port of the gas and liquid valves. Ensure that the end of charging hose is connected with the push pin to the service port.
3. Connect the centre hose of the charging set to a vacuum pump.
4. Turn on the power switch of the vacuum pump and ensure that the vacuum value will be approximately 30Pa (250 MICRON, 0.3milibar). This ensures that the refrigeration circuit is properly dehydrated.

5. Close the valves of low and high side of the charging set and turn off the vacuum pump. Note that the needles in the gauge should not move after approximately 30 minutes.
6. Disconnect the charging hose from the vacuum pump and from the service ports of the gas and liquid valves.
7. Tighten the service port caps on both valves.
8. Remove the valve caps on both valves and open them using a hex key, this charges the pipes and the indoor unit.
9. Remount the valve caps onto both valves.
10. Check for gas leaks from the four unions and from the valve caps. Test with electronic leak detector or with a bubble leak finder.

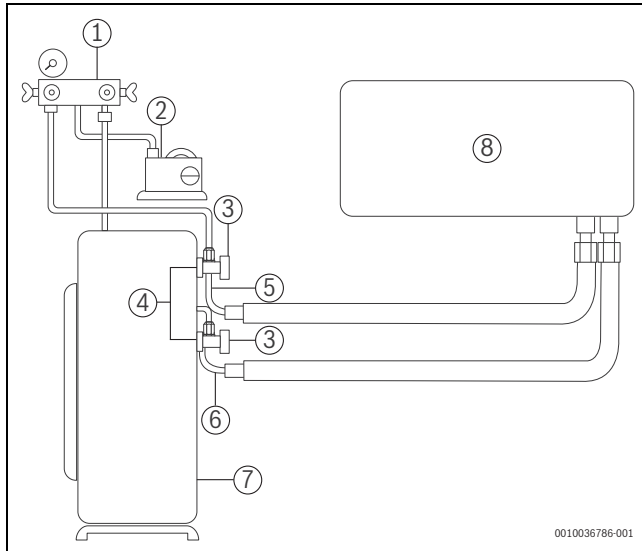


Fig. 19 Vacuum, charging and leakage test

- [1] Charging set
- [2] Vacuum pump
- [3] Cap
- [4] Service valve
- [5] Gas valve
- [6] Liquid valve
- [7] Outdoor unit
- [8] Indoor unit

5.3 Electrical connection

DANGER

Risk of electric shock!

The components in the outdoor unit conduct electricity. The capacitor in the outdoor unit must be discharged after disconnecting it from the power.

- Switch off the master switch.
- Wait at least five minutes before any electrical work to ensure full electrical discharge of the capacitors.

NOTICE

The installation will get damaged if the power is connected without water.

Components in the heating system can overheat if the power is connected before it has been filled up with water.

- Fill the DHW cylinder and heating system before turning on the heating system, and establish the correct pressure.



WARNING

Risk of electric shock or fire!

If the power load is too high for the power supply cord it will cause electrical shock or fire.

- Follow the national wiring standards and regulations for electrical work.
- If the circuit breaker is used, it must be able to disconnect all poles with 3mm contact opening.
- A different electric circuit and power outlet from the indoor unit must be used.



WARNING

Risk of electric shock or fire!

If electric cabinet cover is not fixed perfectly, it will cause heat-up at the terminals and connections, fire or electrical shock.

- Arrange wire routing properly so that electric cabinet cover can be fixed properly.



WARNING

Risk of electric shock or fire!

The incorrect use of power supply cord may cause fire or electrical shock.

- Do not damage or use an unspecified power supply cord.
- Do not modify the length of the power supply cord. If needed, use an extension cord and do not share the outdoor unit power outlet with other electrical appliances.
- If the power supply cord is damaged, only a qualified person may replace it.



The outdoor unit electrical connection must be disconnected safely and according to applicable rules.

- For a safe operation, install a disconnection device that provides a full disconnection under over-voltage category III conditions in the mains wiring in accordance with the wiring rules.



Voltage should not vary more than 10% from the rated voltage.



The voltage between earth and neutral must be below 3V. Attention must be made when connecting the phases of this appliance in the whole electrical installation, so there is no phase unbalance in the household 3-phase system (if there is any).



The outdoor unit must be connected to an adequate power outlet from a circuit breaker as specified on the type plate.

- Choose a supply cord with an appropriate cable area for the fuse protection and the appliance electrical current.
- Use the correct rating of the fuse and mains circuit for the model to be installed.
- Connect the outdoor unit according to the circuit diagram (→Chapter 9.4). Never connect any other consumers.

- Observe the colour coding when replacing circuit boards, as circuit boards with different colours are not interchangeable.
- Install a residual current device based on normative requirements in each country.

As manufacturer, we do not consider it necessary to operate the heat pump via a residual current device. If a residual current device is required, either due to the technical connection conditions of the regional utility company or by the customer, or due to the building design, a Type B AC/DC sensitive residual current device must be installed for the heat pump to protect the special electronics (inverter).

5.3.1 Connecting the outdoor unit



WARNING

Risk of fire!

If the connection between indoor and outdoor unit is not correct it can cause heat-up or fire at the connection.

- Use the specified cable, connect and clamp it tightly so the electrical connection is not susceptible to external forces.

NOTICE

Malfunction due to electrical disturbances!

Power circuit cables (230/400V) cannot be near any CAN-Bus cables (12V).

- Ensure there is a minimum distance of 100mm between power circuit cables and CAN-BUS cables.

NOTICE

System damage due to swapping of 12V and CAN-BUS connection.

The communication circuits are not designed for 12V direct voltage.

- Check that the cables are connected to the corresponding plugs on the printed circuit board.

To connect the outdoor unit:

1. Prepare the cables for connection.
2. Remove the cover of the indoor and outdoor units and open the outdoor unit terminals.
3. Remove the cable clamp screw and turn it over.
4. Connect the communication cable between outdoor and indoor units (fig 20 [A]). The end of the communication cable that connects to the indoor unit must be shielded.
5. Connect one end of the power supply to the outdoor unit (fig. 20 [B]) and the other end to the mains distribution board.
6. Secure the cables with the cable clamps.

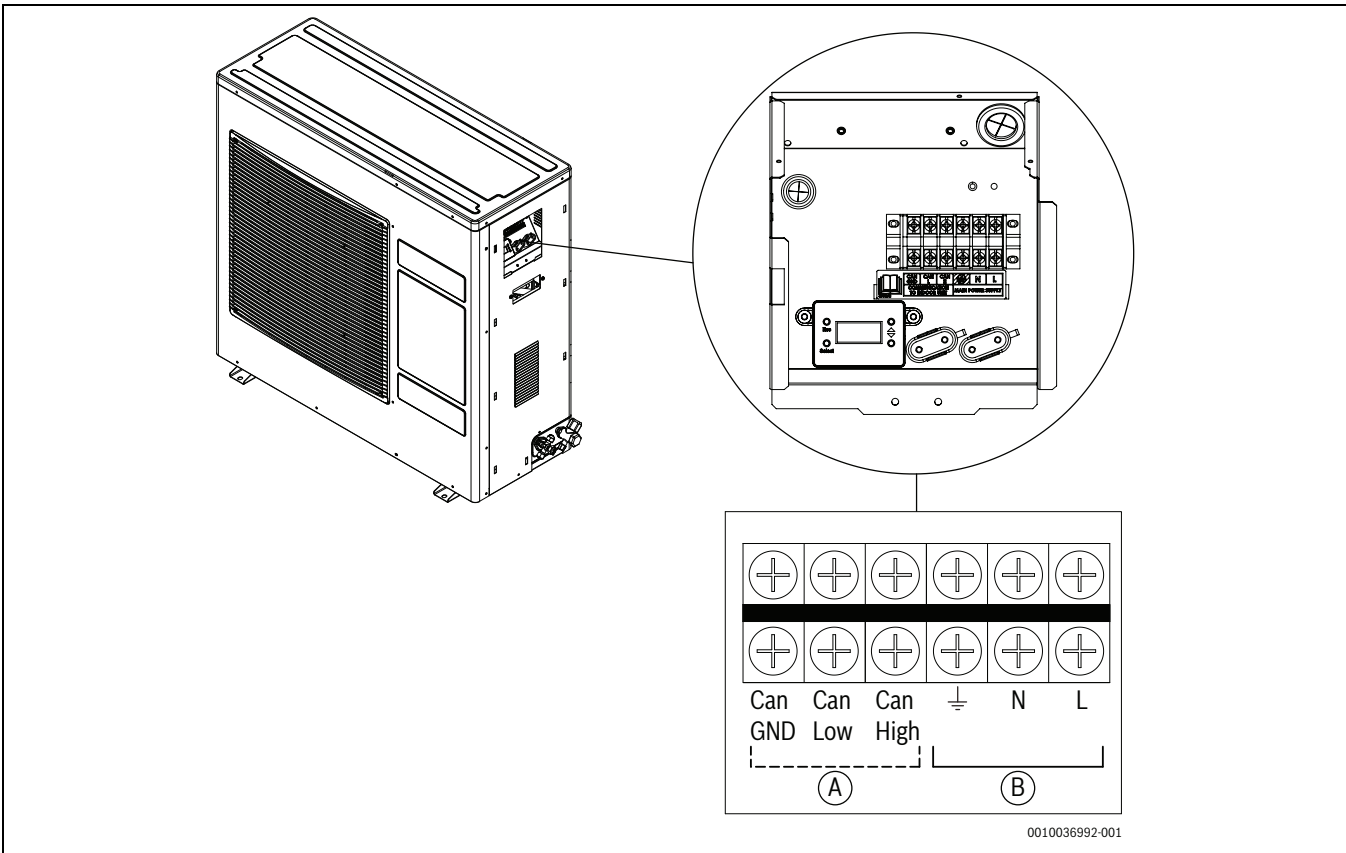


Fig. 20 Cable connections

- [A] Communication to indoor unit
[B] Power supply

CAN-BUS



CAN-BUS: do not connect at "Out 12V DC" (12V direct voltage output) on the main PCB of the indoor unit.
Maximum cable length 30m
Minimum diameter $\varnothing = 0.75\text{mm}^2$

The outdoor unit and the indoor unit are connected by a communications wire, CAN-BUS.

A LIYCY cable (TP) $3 \times 0.75\text{mm}^2$ (or equivalent) is suitable **as an extension cable outside of the unit**. Alternatively, twisted pair cables approved for outdoor can be used. One of the shielded ends must be connected to the nearest grounding terminal in the indoor unit structure. The other end cannot be connect to the groundings or any metal part of the outdoor unit structure.

The connection between the circuit boards is by three wires. The circuit boards have markings for the CAN-BUS connections.

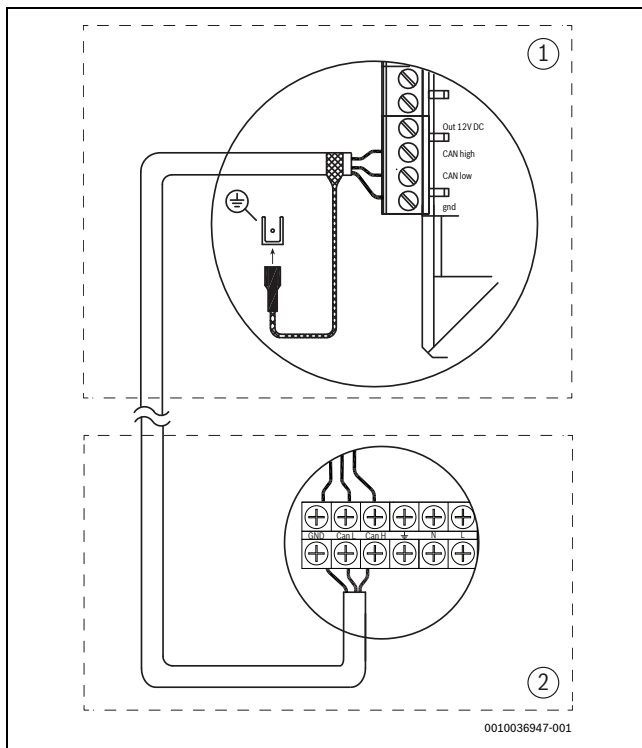


Fig. 21 CAN-BUS connection

- [1] Indoor unit
- [2] Outdoor unit

Power supply to the outdoor unit



Use exclusively H05RN-F (60245 IEC 57) cable for all power supply connections to the outdoor unit.

The circuit breaker must be able to disconnect all poles with 3mm contact opening.

ODU	Circuit breaker	Power supply cable
CS3400iAWS 4 OR-S, CS3400iAWS 6 OR-S and CS3400iAWS 8 OR-S	16A	$3 \times 2.5\text{mm}^2$
CS3400iAWS 10 OR-S	20A	$3 \times 2.5\text{mm}^2$

Table 8 Cable types

6 Commissioning

When all steps of the previous chapter are completed, all pipes and cables must be taped.

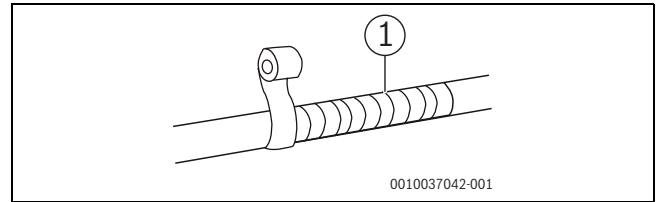


Fig. 22 Taping

The protective cardboard from the fan can be removed and the heat pump is ready to start up.



- Conduct a test run to confirm that the system was installed without abnormalities.
- Explain to the customer how to operate the unit and remind that operation instructions should be kept for future reference.

7 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. "European Directive 2012/19/EC on old electronic and electrical appliances". 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/

8 Maintenance

8.1 Repairs to the refrigerant circuit

The unit contains R32 refrigerant which is potentially flammable. If any work on the refrigerant circuit is necessary, strictly follow the safety instructions hereby given.

DANGER

Risk of electric shock!

The components in the outdoor unit conduct electricity. The capacitor in the outdoor unit must be discharged after disconnecting it from the power.

- ▶ Switch off the master switch.
- ▶ Wait at least five minutes before any electrical work.

DANGER

Risk of poisonous gas leakage!

The refrigerant circuit contains substances that can be transformed into poisonous gas if they come into contact with air or open fire. Even small concentrations of these gases can cause respiratory arrest.

- ▶ The room must immediately be evacuated and carefully aired out in case of refrigerant circuit leakage.

NOTICE

Risk of deformation due to heat!

The outdoor unit insulation material (EPP) will deform if it is exposed to high temperatures

- ▶ Remove as much of the insulation (EPP) as possible prior to any soldering work.
- ▶ Use flame retardant cloth or wet cloth to protect the insulation material while performing soldering work on the indoor unit.

i

Only a refrigerant expert can perform work on the refrigerant circuit.

- ▶ Only use genuine spare parts!
- ▶ Refer to the spare parts list when ordering spare parts.
- ▶ Always renew seals and O-rings removed during servicing or repair work.

During service, the activities described below should be conducted.

Show alarms

- ▶ Check alarm log.

Function check

- ▶ Function check (→ indoor unit installation instructions).

Electric cabling

- ▶ Check the cable for mechanical damage. Exchange any damaged cable.

Temperature sensor measured values

i

Please make sure that the right sensor (→ indoor unit installation instructions) is used. Usage of sensors with other characteristics will lead to problems as the controls will get the wrong temperature. Example of problems could be personal injuries like scalding, damage of property due to high or low temperature, low comfort is also a possible problem.

8.2 Evaporator

If there is dirt or dust on the outside of the evaporator or the aluminium fins, it must be removed.



WARNING

The thin aluminium fins are fragile and can be damaged if careless. Never wipe the delicate fins with a cloth.

- ▶ Hard objects may not be used.
- ▶ Use protective gloves to protect your hands from cuts.
- ▶ Do not use a too powerful water jet.

i

Using the wrong cleaning product may damage the installation!

- ▶ Do not use acid or chlorine based products since they contain abrasives.
- ▶ Do not use corrosive alkaline cleaning products, e.g. sodium hydroxide.

To clean the evaporator:

- ▶ Turn off the outdoor unit using the circuit breaker.
- ▶ Spray the fins with a liquid dish soap solution.
- ▶ Rinse away the soap with water.

i

In some regions, it is prohibited to let dish soap drain into the ground. In such regions, if the condensation water pipe drains into a gravel bed:

- ▶ Remove the flexible condensation water pipe from the drain before cleaning.
- ▶ Drain the dish soap into a container.
- ▶ Reconnect the condensation water pipe after cleaning.

8.3 Snow and ice

In some geographical regions or during periods of heavy snow, snow can get stuck on the back and the roof of the outdoor unit. Since it leads to icing, the snow should be removed.

- ▶ Carefully brush the snow off the fins.
- ▶ Protect the outdoor unit from snow.

8.4 Handling printed circuit boards

Printed circuit boards with control electronics are very sensitive to electrostatic discharge (ESD). To prevent damage to the components, special care is therefore required.



CAUTION

Damage due to electrostatic charge!

- ▶ Wear an ESD wrist strap when handling unenclosed PCBs.

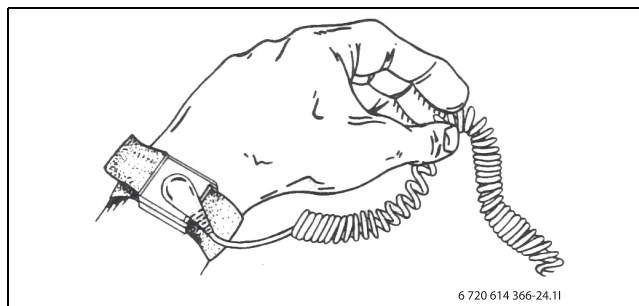


Fig. 23 Wrist strap

The damage is not normally immediately recognisable. A PCB may function perfectly during commissioning and problems often only arise

later on. Charged objects are only a problem if they are in the vicinity of the electronics. Observe a safety clearance of at least one metre from foam rubber, protective film and other packaging materials, and do not wear clothing made of synthetic fibres (e.g. fleece pullovers) and similar, when you start work.

An earthed wrist strap offers good ESD protection when working with electronics. This wrist strap must be worn when opening the screened metallic bag/package or prior to exposing a fitted PCB. The wrist strap must be worn until the PCB has been placed inside its screened packaging or has been connected inside the closed control device. Replaced PCBs that are returned must be handled in this way.

8.5 Pump down the refrigerant

- ▶ Remove the side cover to access the valves (instructions to remove side cover at →Fig. 15).
- ▶ Ensure that the system is installed correctly and ready for operation.
- ▶ Connect the manifold gauge to the service valve of low pressure side (larger diameter).
- ▶ Select "tt" >> "PD" option in the ODU HMI menu.
- ▶ After approximately 1 minute the message "Cls Liq" will show in the HMI. Close the liquid service valve (smaller diameter) with a hex key.
- ▶ When the message "End" is visible in the HMI, immediately close the gas service valve with a hex key.

9 Technical information

9.1 Technical specifications of CS3400iAWS 4-10 OR-S

	Unit	CS3400iAWS 4 OR-S	CS3400iAWS 6 OR-S	CS3400iAWS 8 OR-S	CS3400iAWS 10 OR-S
Operation, air/water					
Max power output with A2/W35 ¹⁾	kW	3.81	5.98	7.35	7.85
COP with A2/35 ¹⁾		3.39	3.72	3.47	3.38
Max. power input A2/W35 ¹⁾	kW	1.13	1.61	2.12	2.32
Modulation range with A2/W35	kW	2.1 - 3.8	2.1 - 6.0	2.1 - 7.4	2.1 - 7.9
Max. output with A7/W35 ¹⁾	kW	5.21	6.15	8.02	9.41
COP with A7/W35 (100%)		4.68	4.75	4.70	4.43
Power output with A7/W35, nominal	kW	4.42	6.15	8.02	8.92
COP with A7/W35, nominal		4.70	4.75	4.70	4.69
Max. power output with A7/W55 ¹⁾	kW	3.89	4.99	6.77	6.77
COP with A7/W55 ¹⁾		2.71	2.60	2.69	2.69
Max. power output with A-7/W35 ¹⁾	kW	4.32	5.09	6.22	6.94
COP with A-7/W35 ¹⁾		2.89	3.02	2.77	2.76
Max. power output with A-10/W35 ¹⁾	kW	3.92	4.50	5.54	6.20
COP with A-10/W35 ¹⁾		2.69	2.67	2.51	2.50
Max. power output with A-7/W55 ¹⁾	kW	3.62	5.31	5.31	5.31
COP with A-7/W55 ¹⁾		1.81	1.79	1.79	1.79
Cooling Data					
Cooling capacity with A35/W7 ¹⁾	kW	3.70	4.97	5.83	6.00
EER with A35/W7 ¹⁾		3.29	3.20	3.15	3.12
Max. power input for A35/W7 ¹⁾		1.12	1.55	1.85	1.92
Cooling capacity with A35/W18 ¹⁾		5.39	6.94	8.44	9.02
EER with A35/W18 ¹⁾		4.53	4.33	4.07	3.93
Max. power input for A35/W18 ¹⁾	kW	1.19	1.60	2.07	2.30
Cooling capacity with A35/W18, nominal		4.90	6.27	6.94	7.95
EER with A35/W18, nominal	-	4.74	4.65	4.33	4.25
Electr. Data					
Power supply		230V ~1N			
Recommended automatic circuit breaker/fuse ²⁾	A	16			20
Maximum current	A	10	16		16
Startup current	A	10			
Performance factor cos φ with maximum output		>0.92			
Information for refrigerant circuit					
Connection type		Flare connection 1/4" & 1/2"	Flare connection 1/4" & 5/8"		
Refrigerant type ³⁾		R32			
Refrigerant charge	kg	1.1	1.3		
CO ₂ (e)	Tonne	0.743	0.878		
Air and noise data					
Nominal air flow rate	m ³ /h	1800	2600		
Sound pressure level at a distance of 1 m	dB(A)	53	51	51	51
Sound power ⁴⁾	dB(A)	61	59	59	59
Max. sound power - day	dB(A)	64	61	61	62
Max. sound power - night (silent mode)	dB(A)	58	56	56	57

	Unit	CS3400iAWS 4 OR-S	CS3400iAWS 6 OR-S	CS3400iAWS 8 OR-S	CS3400iAWS 10 OR-S
Tonality addition - day ⁵⁾	dB	3	3	3	3
Tonality addition - night ⁵⁾	dB	0	0	0	0
General information					
Maximum heating water flow temperature, outdoor unit only	°C	60			
Protection class		IPX4			
Installation altitude		Up to 2000 m above sea level			
Dimensions (WxDxH)	mm	976 x 380 x 609	975 x 380 x 864		
Weight (without packaging)	kg	50	66		
Fan motor		50	80		

- 1) At 100% compressor speed
- 2) No specific fuse rating or type is required. The starting current is low and will not exceed the operating current.
- 3) GWP₁₀₀ = 675 (R32), 2088 (R410A)
- 4) Sound power level in accordance with EN 12102 (nominal output with A7/W55)
- 5) According to DIS47315/150257, April 2004 and following requirements of TA Lärm

Table 9 Outdoor unit



Note that if a sound hood (accessory) is installed on the outdoor unit, the performance will be reduced.

9.2 Operating range of the outdoor unit

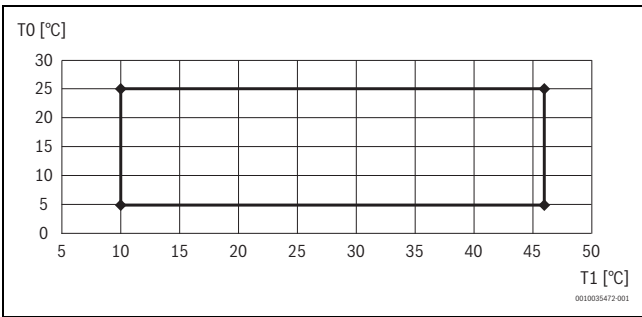


Fig. 24 Operating range of heat pump in cooling mode

[T0] Flow temperature
[T1] Outdoor temperature

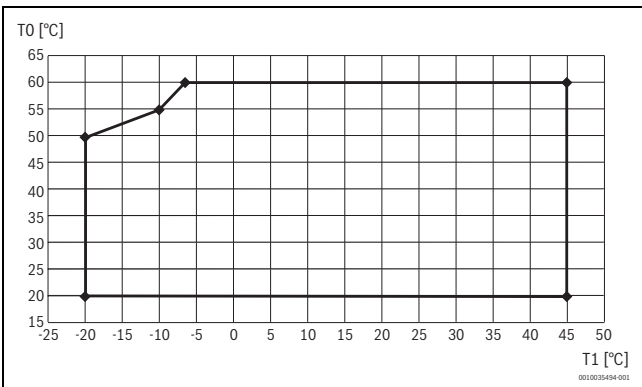


Fig. 25 Operating range of heat pump in heating mode without auxiliary heater

[T0] Flow temperature
[T1] Outdoor temperature

9.3 Refrigerant circuit

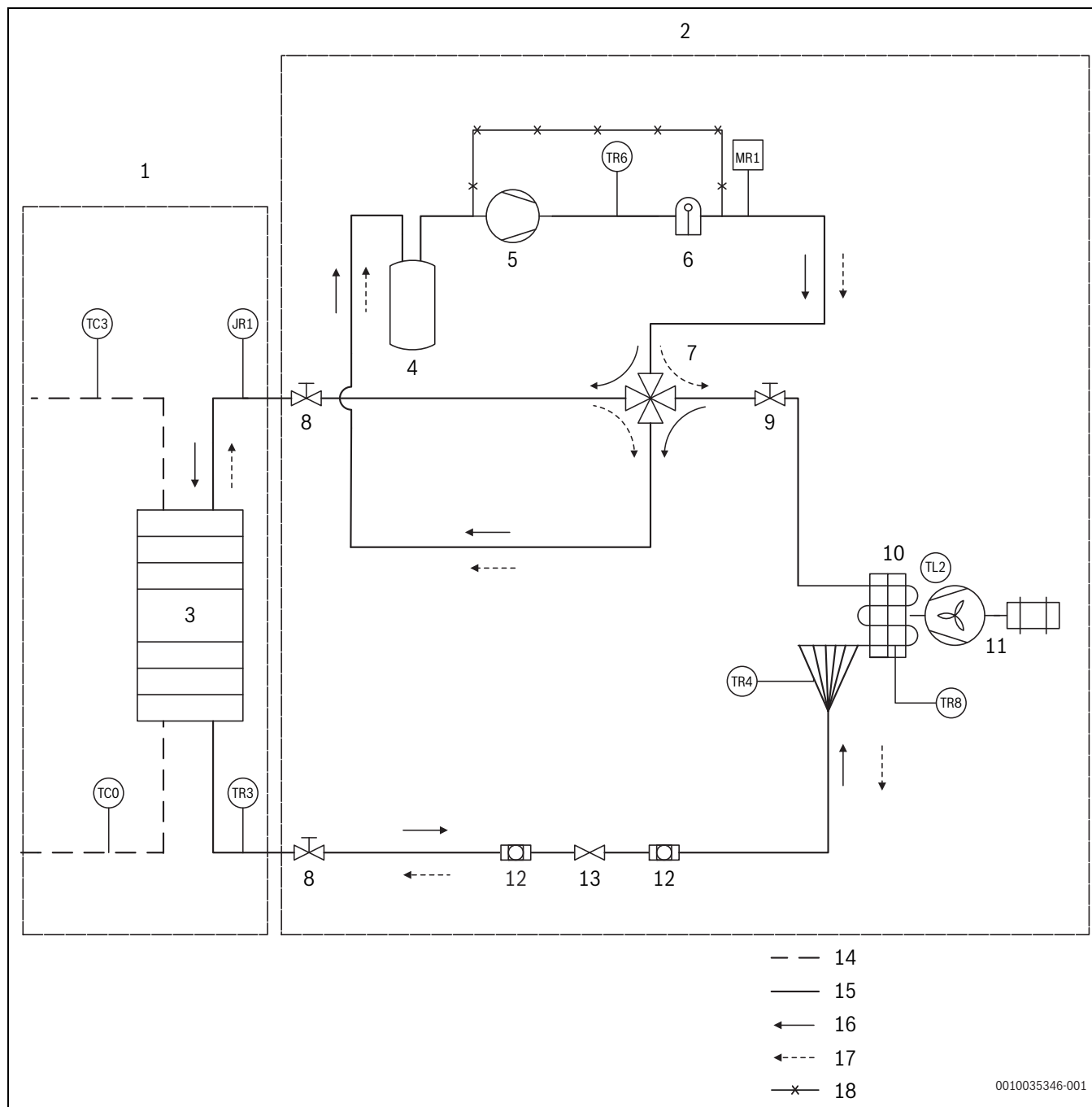


Fig. 26 Diagram of the refrigerant circuit

- [1] Indoor unit
- [2] Outdoor unit
- [3] Plate heat exchanger
- [4] Suction accumulator
- [5] Compressor
- [6] Oil separator
- [7] Four way valve
- [8] Service valve
- [9] Service port
- [10] Fin tube heat exchanger
- [11] Fan and motor
- [12] Filter
- [13] Electronic expansion valve
- [14] Water circuit
- [15] Refrigerant circuit
- [16] Heating mode
- [17] Cooling mode

[18] Oil capillary tube

Category	Symbol	Meaning	Remarks
Indoor unit	JR1	Plate heat exchanger refrigerant gas line pressure	See manual for indoor unit
	TC0	Plate heat exchanger water inlet temperature	
	TC3	Plate heat exchanger water outlet temperature	
	TR3	Plate heat exchanger refrigerant liquid line temperature	

Table 10 Sensors connected to indoor unit

Category	Symbol	Meaning	PCB Connector	Type
Outdoor unit	TR4	Fin tube heat exchanger refrigerant liquid line temperature	OCT	NTC-10k Ω
	TR6	Refrigerant discharge (hot gas) temperature	CTT	NTC-50k Ω
	TR8	Fin tube heat exchanger middle temperature	OMT	NTC-10k Ω
	TL2	Air temperature	OAT	NTC-10k Ω
	MR1	High pressure switch	HPS	NA

Table 11 Sensors connected to outdoor unit

9.4 Wiring diagram

9.4.1 Wiring diagram of CS3400iAWS 4 OR-S



WARNING

Risk of electric shock!

Working on electrical components can result in electric shocks.

- Do not perform any electric work while LED are on and wait at least one minute after power off.

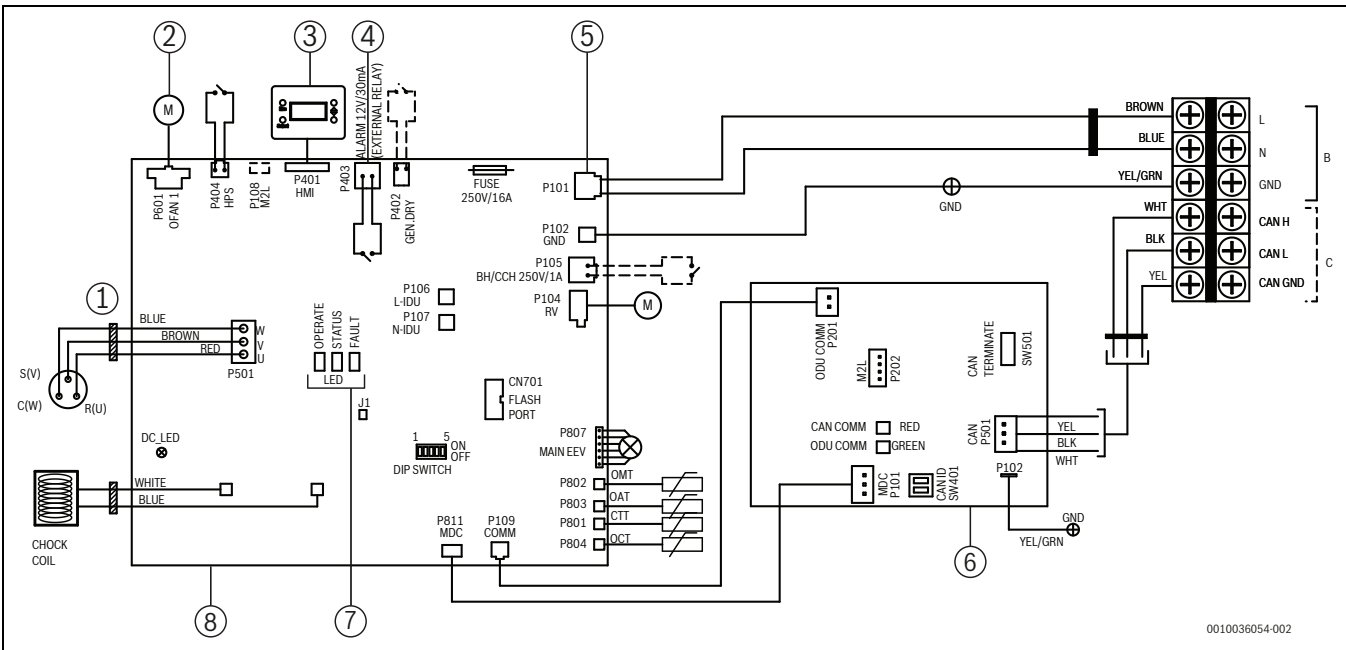


Fig. 27 Wiring diagram outdoor unit single phase CS3400iAWS 4 OR-S

- | | |
|--|---------------------------------------|
| [1] Compressor | [BH] Base heater |
| [2] Outdoor unit fan motor | [MDC] CBI board DC power supply port |
| [3] ODU HMI outdoor unit | [CCH] Crank case heater |
| [4] External alarm connection | [COMM] Communication |
| [5] Power supply to main board | [CTT] Compressor top temperature |
| [6] CBI (communication board to indoor unit) | [EEV] Electronic expansion valve |
| [7] LED (operate/status/fault) | [GND] Ground (earth) |
| [8] Main controller | [HPS] High pressure switch |
| [B] Power supply to outdoor unit (230V~, 50Hz) | [M2L] Auxiliary communication |
| [C] Communication to indoor unit | [OAT] Outdoor air temperature |
| [BLU] Blue | [OCT] Outdoor coil temperature |
| [BRN] Brown | [OMT] Outdoor coil middle temperature |
| [WHT] White | [RV] Reverse valve |
| [YEL] Yellow | [...] Optional |
| [GRN] Green | |

9.4.2 Wiring diagram of CS3400iAWS 6 OR-S, CS3400iAWS 8 OR-S and CS3400iAWS 10 OR-S



WARNING

Risk of electric shock!

Working on electrical components can result in electric shocks.

- Do not perform any electric work while LED are on and wait at least one minute after power off.

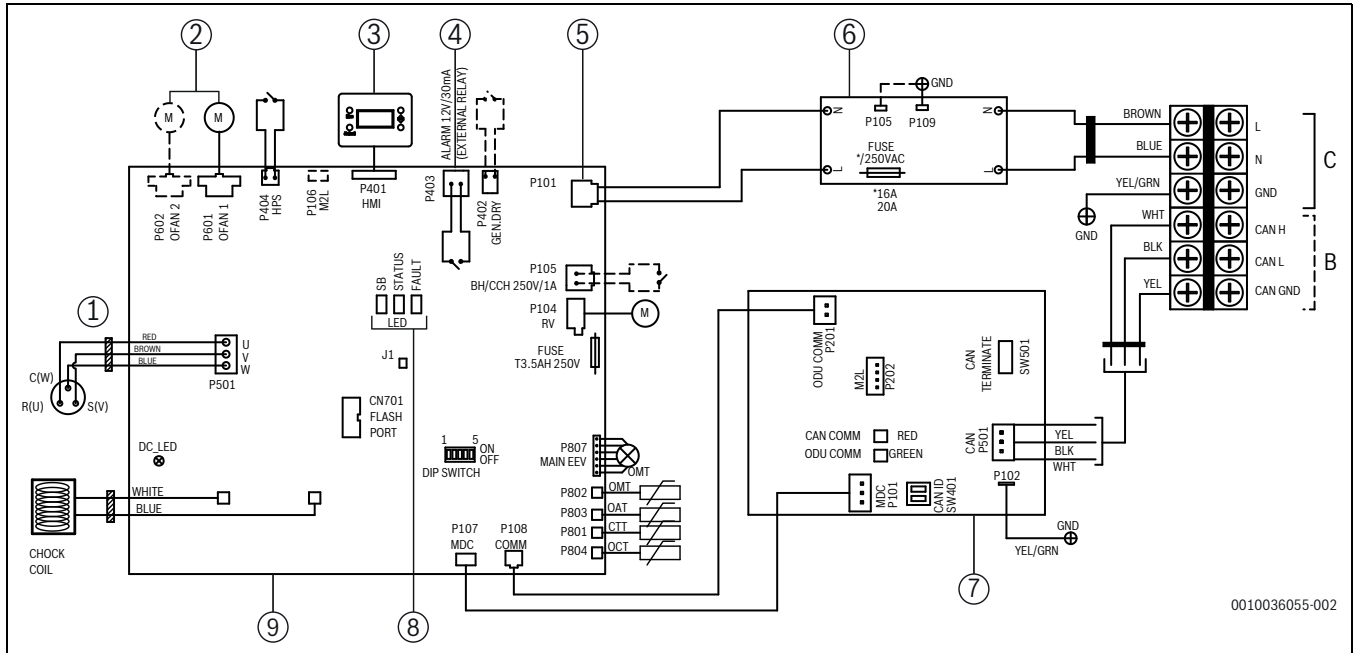


Fig. 28 Wiring diagram outdoor unit single phase CS3400iAWS 6 OR-S, CS3400iAWS 8 OR-S and CS3400iAWS 10 OR-S

- [1] Compressor
- [2] Outdoor unit fan motor
- [3] ODU HMI outdoor unit
- [4] External alarm connection
- [5] Power supply to main board
- [6] Line filter
- [7] CBI (communication board to indoor unit)
- [8] LED (operate/status/fault)
- [9] Main controller
- [B] Communication to indoor unit
- [C] Power supply to outdoor unit (230V ~, 50Hz)
- [BLU] Blue
- [BRN] Brown
- [WHT] White
- [YEL] Yellow
- [GRN] Green
- [MDC] CBI board DC power supply port
- [BH] Base heater
- [CCH] Crank case heater
- [COMM] Communication
- [CTT] Compressor top temperature
- [EEV] Electronic expansion valve
- [GND] Ground (earth)
- [HPS] High pressure switch
- [M2L] Auxiliary communication
- [OAT] Outdoor air temperature
- [OCT] Outdoor coil temperature
- [OMT] Outdoor coil middle temperature
- [RV] Reverse valve
- [...] Optional

9.5 Information on refrigerant

This device contains **fluorinated greenhouse gases** as refrigerant. You will find the information on the refrigerant according to the Regulation (EU) No 517/2014 on fluorinated greenhouse gases in the operating instructions of the device.



Information for the installer: If you refill refrigerant, enter the additional charge size and the total charge size of the refrigerant in the table "information on refrigerant" of the operating instructions.

Bosch Thermotechnik GmbH
Junkersstrasse 20-24
D-73249 Wernau

www.bosch-thermotechnology.com