

# BOX

## Vari & Vari Pro

Installation, Operation, and  
Maintenance Manual



Chiller Oy will not assume responsibility for any errors or shortcomings that may appear in this document. The end user is responsible for ensuring that the unit operates appropriately and safely. Working with electric components is subject to permission. Always abide by the existing national legislation, regulations and standards.

Chiller Oy is constantly developing its products and reserves the right to change its products.

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### Chiller Oy

**Address:** Louhostie 2, FI-04300 Tuusula  
Finland

**Telephone:** +358 9 274 7670

**E-mail:** info@chiller.fi

**Internet:** www.chiller.eu

### Approvals and version history

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# 1 General

## 1.1 About this manual

This Installation, Operation, and Maintenance Manual has been prepared as general instructions for appropriate installation, operation, and maintenance procedures. When operating the unit, always follow the precautionary instructions related to each component as well as the regulations and recommendations given by the local authorities.

The unit must be installed, operated, and maintained by a professional and in such a way that it does not cause danger to humans, the environment, or the unit itself. The unit must not be used for other than its intended purposes without a written consent from the manufacturer.



### NOTICE

**Before you start to install, operate, or maintain the system, read this manual carefully and familiarize yourself with all of the instructions.**

**Keep the manual for later reference.**

## 1.2 Guarantee

The guarantee for this unit is based on Chiller Oy's terms of guarantee.

The guarantee becomes void, if:

- the product is modified or repaired without a written consent from Chiller Oy
- the unit parameters are modified without permission
- the configuration of the unit is changed
- the installation site, unit connections, installation ground, or installation procedures do not follow these instructions
- the instructions in this Installation, Operation, and Maintenance Manual are not followed.

The guarantee does not cover damages, if:

- the user does not follow the manufacturer's instructions
- the unit is used in a way that it is not designed for and that causes damage to the unit
- the unit is not maintained according to the schedule and instructions in this manual

*Note! Warranty claims are processed only, if the complete type and serial numbers of the unit (see Section 3.3 Type plate) are notified to the manufacturer in written form.*

### 1.3 Inspection of the unit

The units are shipped from the factory as assembled (apart from some accessories), wired, and tested. In some unit models, part of the grille is shipped in a separate package for mounting onto the lower surface of the lowered ceiling after installation.

When you receive the unit:

1. Inspect the delivery against the order.
2. Verify that the contents of the delivery meet the order.
3. Inspect all the delivered units carefully.
  - a. If the units have transport damages, notify the expeditor and the seller of them.
  - b. Record the transport damages on the bill of freight.
  - c. Send a complaint about the damages to the transport company within 24 hours of delivery.

### 1.4 Related documentation

In addition to this manual, the unit is delivered with a unit-specific wiring diagram.

In case you need a new wiring diagram, you can order it. You need the unit serial number from the type plate for the order. (See *Section 3.3 Type plate.*)

## 2 Safety

### 2.1 General safety instructions

This unit is designed so that it does not expose people to hazard or risk, provided that:

- The unit is installed, operated, and maintained according to the instructions in this manual.
- No structural changes are made to the unit.

### 2.2 Safety-related signs

These are the safety-related signs used in this manual.



**DANGER**  
**DANGER** indicates a hazard with a high level of risk which, if not avoided, will result in death or serious injury.



**WARNING**  
**WARNING** indicates a hazard with a medium level of risk which, if not avoided, could result in death or serious injury.



**CAUTION**  
**CAUTION** indicates a hazard with a low level of risk which, if not avoided, could result in minor or moderate injury.

*Note! Notes are used to indicate important information and useful tips.*

### 2.3 Safety symbols



#### Hazard symbols

These symbols indicate a hazardous situation or action. Symbols are used to warn of situations, which can cause environmental damage and personal injury.

	General warning sign
	Electrical hazard


### Prohibited action symbols

These symbols are used in warnings and notifications to indicate an action that should not be taken. The prohibited action symbols are shown below.

	Limited or restricted access
	Do not touch

### Mandatory action symbols

These symbols are used in warnings and notifications to indicate an action that must be taken. The mandatory action symbols are shown below.

	Read the manual or instructions
---	---------------------------------

## 3 Unit overview

### 3.1 Introduction of the unit

The Box cassette fan coil unit is designed for room air conditioning. The unit is available in two sizes, Box Mono and Box Double. The unit is also available with two automation options, Vari and Vari Pro.

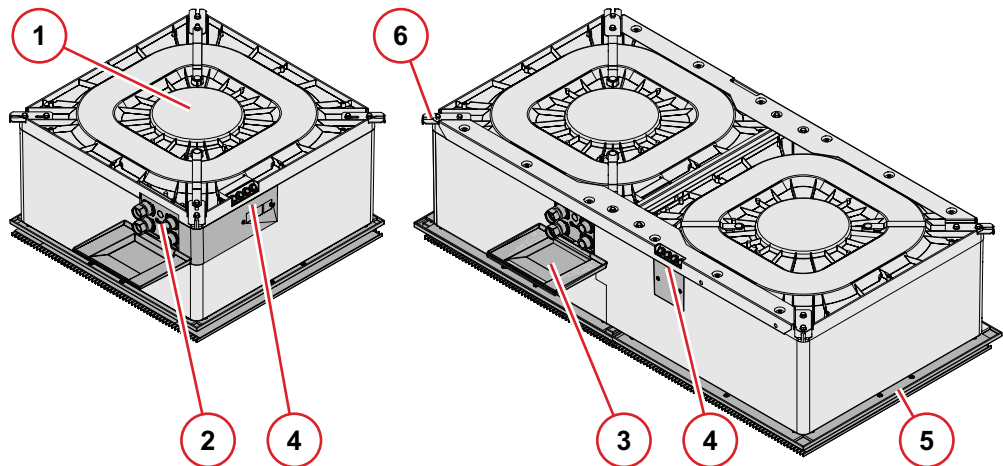


Figure 1: Overview of the units

1. Coil and fan (inside unit)
2. Water connections
3. External drain pan
4. Electrical box
5. Grille
6. Attachment brackets



## 3.2 Unit dimensions

The unit comes in two sizes, Box Mono and Box Double.

*Note! The unit dimensions are given as reference. Chiller Oy reserves the right to make changes to them. Check the actual dimensions from the order documentation.*

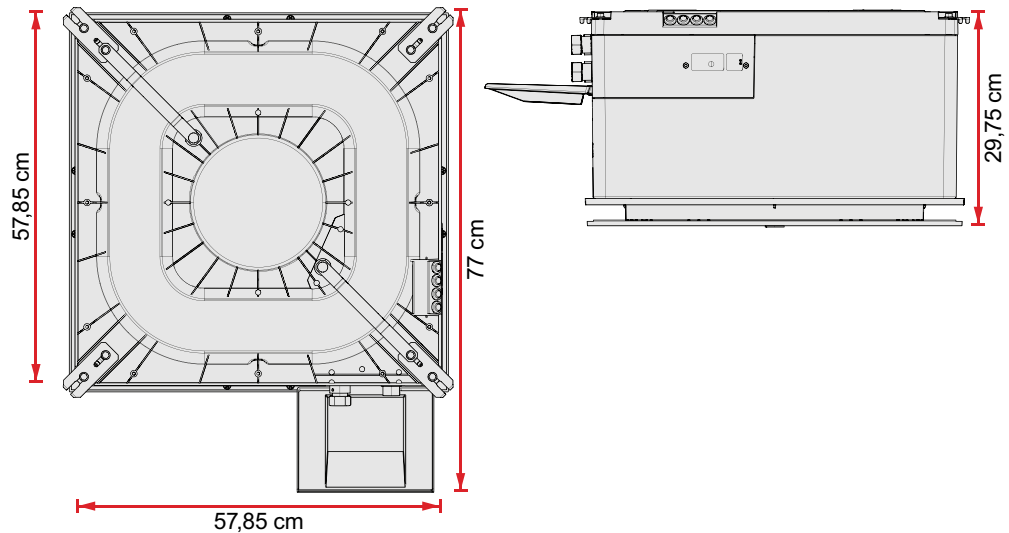


Figure 2: Dimensional drawings of Box Mono

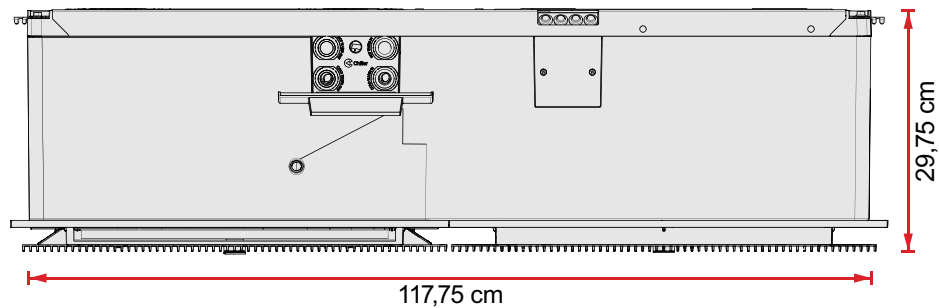


Figure 3: Dimensional drawing of Box Double

## 3.3 Type plate

The type plate is located in the inlet opening. It is visible when you remove the intake grille and filter.

*Note! Record the type plate information on the unit card and file it carefully. The type and serial numbers of the unit are required for identifying the unit when, for instance, purchasing spare parts.*

*When you order maintenance or order spare parts, you always need the serial number. You cannot make an order without the serial number.*

The type plate specifies the following information about the unit:

<b>TYPE</b>	Unit type	Including accessories (18 characters consisting of letters and numbers)
<b>SER.NR.</b>	Unit serial number	Seven (7) number combination
<b>POWER</b>	Power type	230 VAC, 50 Hz
<b>INPUT</b>	Electrical information	Input power W and current A, max. values*: BOX Mono 40 W, 0.33 A BOX Double 80 W, 0.66 A
<b>MANUF.DATE</b>	Date of manufacture	
*The actual input power of the unit is usually below the max. value. For specific information, please contact your nearest reseller.		

### 3.4 Automation options and control connections

The unit is available with two automation options referred to as Vari and Vari Pro. The automation option is selected during the unit order. Once the unit is delivered, you can see the automation type on the type plate ("Type", unit type is either Vari or Vari Pro). The automation option of the unit affects the way the fan coil is controlled and what external equipment can be connected to the unit.

*Note! Perform all electrical connections always according to the wiring diagrams supplied with the unit delivery.*

*Note! When connecting the alarm signal to the BMS, add a 30 s filter time to alarm management.*

#### 3.4.1 Vari-option

The automation option Vari has the following properties:

- Analogue control (0-10 V and 24 V AC/DC for on/off on all inputs)
- Suitable for analogue control from building automation or traditional room controller
- Potential free alarm contact, open in alarm or when unit not powered
- No additional sensor inputs or control outputs.

See *Appendix A Vari-option control connections* for further details.

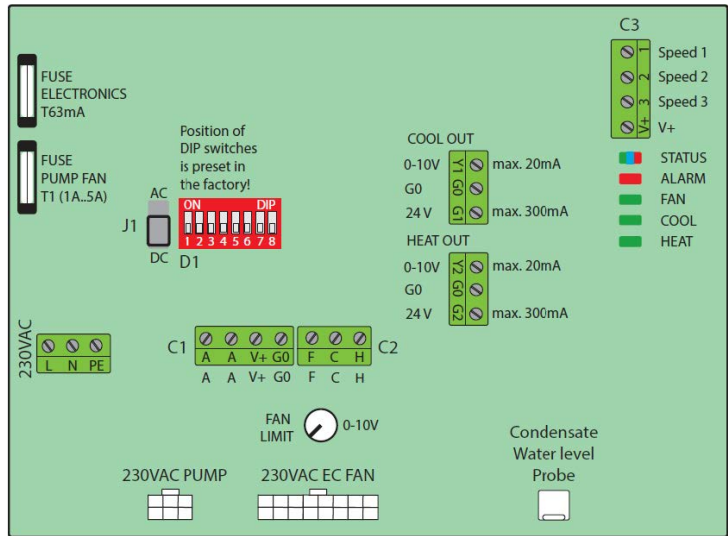


Figure 4: Vari control card

# Wiring

Vari			
A	◀	Alarm out	Open in alarm or no power
V+	◀	24 VDC supply (max 100 mA)	UI power source
GND			
F	▶	Fan control Input [0-10V] *	
C	▶	Cooling act. control input [0-10V / 24V] **	
H	▶	Heating act. control input [0-10V / 24V] **	
1	▶	Speed 1	24VDC inputs for fan speed selection
2	▶	Speed 2	
3	▶	Speed 3	
V+	◀	24V	24VDC power supply

\* Factory configured fan rpm scaling.  
 \*\* Input voltage autodetected.

Figure 5: Vari wiring instructions on the electrical box cover

### 3.4.2 Vari Pro-option

The automation option Vari Pro has the following properties:

- Control with the Vari Pro graphical room controller or directly by Modbus RTU from building management system
- 1 analogue sensor input (defined during unit order process)
- 1 digital control output (defined during unit order process)
- No analogue control options.

*Note! Vari Pro has advanced timed functions, such as valve exercise every 24 hours. The unit will resume normal operation after the timed function has ended.*

See Appendix B Register listing for Vari Pro-option for further details.

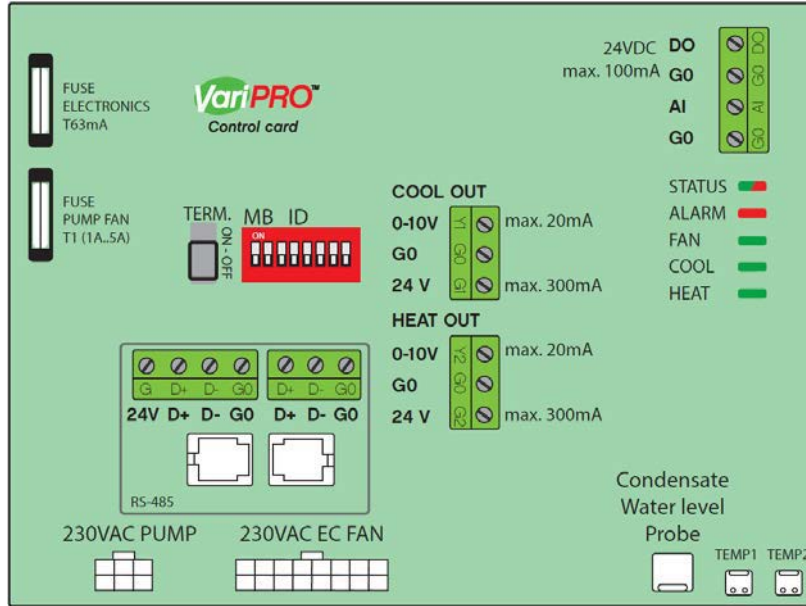


Figure 6: Vari Pro control card

# Wiring

Vari Pro

G	◀	24VDC UI power source	Modbus RTU
D+		D+	
D-		D-	
G0	GND	G0	
D+		D+	Modbus RTU
D-		D-	
G0	GND	G0	
DO	◀	Digital output*	24VDC general output for ext. relay or radiator actuator
G0	GND	G0	
AI	▶	Universal input*	Digital input (max 24 VDC) for control or 0-10 V measurement
G0	GND	G0	

\* Factory configured

Figure 7: Vari Pro wiring instructions on the electrical box cover

## 4 Installation of the unit

### 4.1 General installation instructions



#### CAUTION

Only professionally skilled and qualified personnel can install the unit.

*Note! Always follow local safety regulations when you install, operate, and maintain the unit.*

*Read these instructions carefully before installing the unit.*

When you install the unit, make sure that

- the unit is mounted to the ceiling firmly and that it does not cause danger or harm to any person, object, structure, or equipment.
- all instructions given by the manufacturer and seller are followed.
- installation, lifting, and moving the unit is performed carefully.
- fire safety and the availability of fire equipment is ensured when performing welding or soldering operations.

*Note! The manufacturer is not accountable for installations that have not been performed according to the installation instructions, or for using the unit in conditions that differ from those specified in Section 4.2 Choosing the installation site.*

The installation concept "Install, Use, Maintain" is applied with this unit.



The installation order of this concept is:

- installation on the ceiling
- pipe connections
- electrical connections
- external drain pan
- removal of the cardboard cover
- grille
- testing and commission of the unit.

The unit is installed on the ceiling with the package cover. The cover protects the unit from transportation and installation damages as well as from construction dust. Included in the unit delivery are installation instructions, external drain pan, wiring diagram and the Installation, Operation, and Maintenance Manual. You can access the documents without removing the

cover, and remove the external drain pan from the access hatch on the cover. You can also install the unit to the ceiling and attach the pipes and electrical connections without removing the cover. The package cover is removed after the room has been cleaned of construction dust. For more information, see *Section 4.4 Removing the package cover.*

## 4.2 Choosing the installation site

When you choose the installation site for the unit, make sure that you leave enough space around the unit for maintenance work. You can see the dimensional requirements for the service area in the figure below. Make also sure that there is a maintenance hatch in the underside of the false ceiling. The recommended minimum size is 600 x 600 mm.

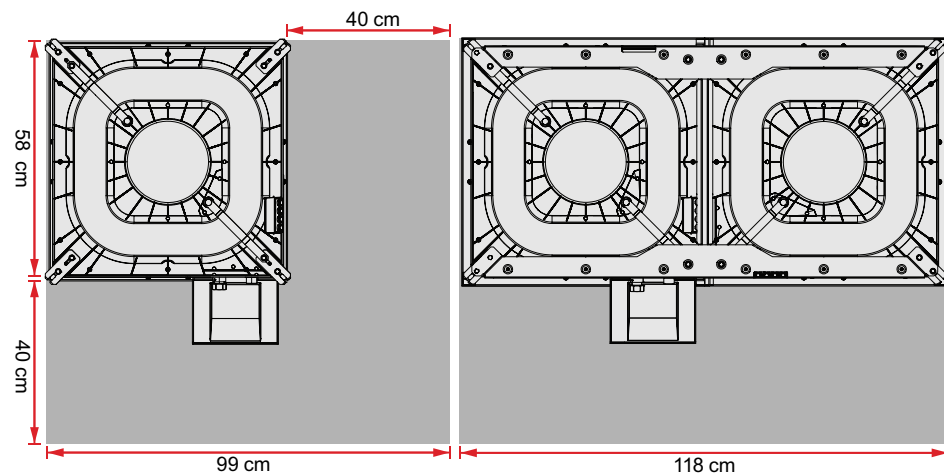


Figure 8: Service area requirements

*Note! Always take local safety regulations and installation requirements into account when choosing the installation site and before starting the installation.*

Take also the following matters into consideration, when choosing the installation site:

- the requirements for the service room and the safety requirements for the unit and its accessories must be complied with.
- the installed unit must stand in a level position.
- the unit must not be installed above any other units or equipment.
- the unit must not be installed in a room that has flammable or explosive substances or has airborne substances that corrode PVC plastics, EPS plastics, ABS plastics, copper, or aluminium.
- the unit must be installed in the room so that it allows free air circulation in the unit. The unit has four (sizes 20-80) or six (sizes 100-160) blowing outlets that contain air deflectors for directing the blowing air or for closing some of the outlets, if necessary. The maximum number of closed blowing outlets is shown in *Figure 9: Blowing air outlets.*
- the unit must not be installed in a room where recirculation air can bring such substances to the inlet opening of the unit that block air circulation (for instance greases from the kitchen).
- the installation and maintenance room required for electrical installations, pipe-laying, and installation of sewerage for condensation water.

Table 1: Limitations for the BOX installation site

Temperatures	Min.	Max.
Indoor air	5 °C (A)	32 °C
Water	4 °C (B)	80 °C (C)
Ethyl alcohol (35%)	4 °C	80 °C
Ethylene glycol (35%)	4 °C	80 °C
Propylene glycol (35%)	4 °C	80 °C

**Notes.**  
**A** If the room temperature is below 0 °C, the unit must be drained of water and the condensation water must be removed.  
**B** For lower temperatures, using anti-freeze agent is imperative.  
**C** The maximum water pressure is 1000 kPa/10 bar.

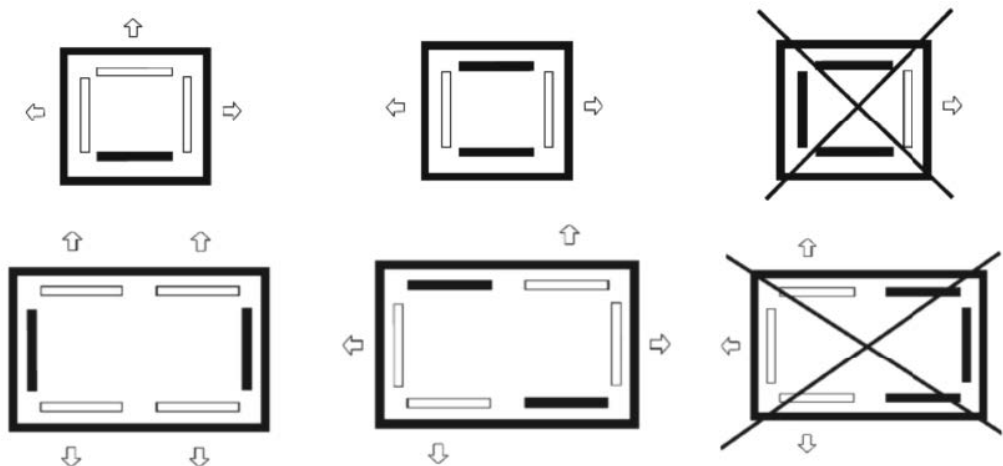


Figure 9: Blowing air outlets

### 4.3 Mounting the unit

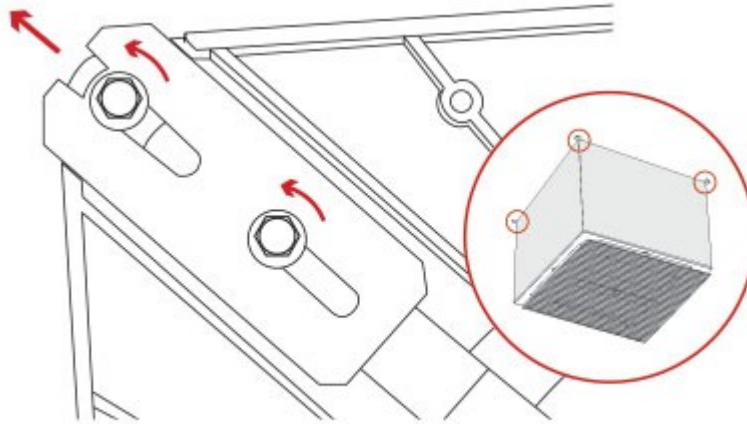
The unit is mounted on the ceiling from four (4) mounting points. The attachment brackets (4) are delivered installed on the unit. The brackets are in the transport position when delivered.



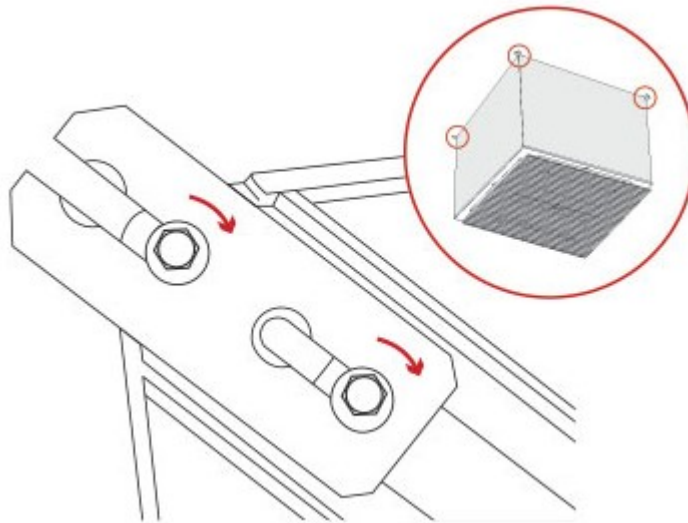
#### DANGER

**Risk of severe injury. Make sure you attach the unit firmly to the ceiling. If the unit is not properly attached, it can fall and cause severe injury.**

1. Open the attachment bracket screws by turning them counterclockwise.
2. Move the attachment brackets from transport position to installation position by pulling them outwards.



3. Secure the attachment brackets by tightening the fastening bolts. Tighten the bolts to 8 Nm.



4. Attach supports to the 8 mm wide slots on the attachment brackets.
5. Mount the unit on the ceiling with the supports.

*Note! Do not hoist the unit from pipe joints, valves, or the condensation water basin. You can hoist the unit on the ceiling by using, for instance, a flat jack.*

- a. If you use threaded bars for supporting the unit, you must secure the joint between the threaded bar and the support with locknuts and washers.
- b. Make sure that the bars are strong enough to hold the weight of the unit.
- c. Make sure that the bars are attached tightly to the ceiling and they do not come off.

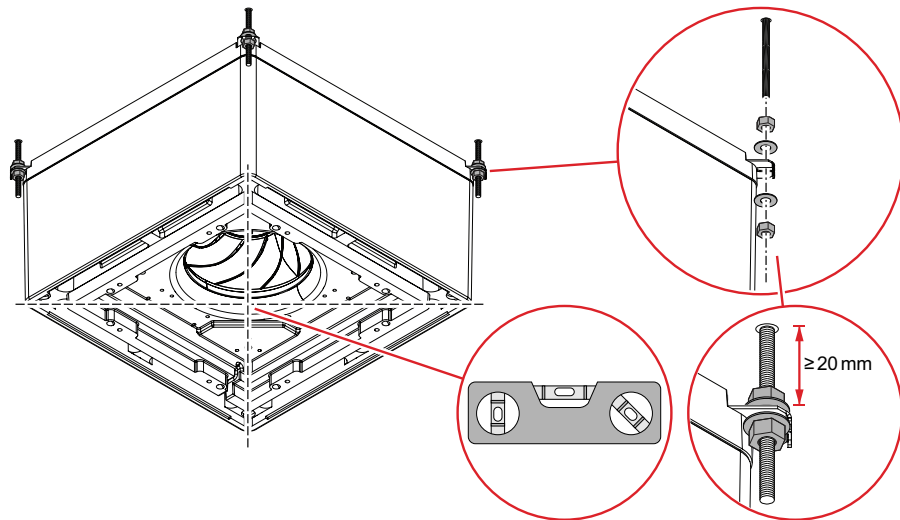


6. Make sure that the lower surface of the unit is at the same level as the lower surface of the lowered ceiling.
7. Make sure that the distance between the unit and the ceiling is at least 20 mm.
8. Use a spirit level to make sure that the unit is horizontally leveled. Check the levelness from inside the unit with the grille open.



### CAUTION

The unit must be leveled. If the unit is not leveled properly, the condensation water will run in a wrong way and this can damage the unit or surroundings.



9. Install the accessories (control valves, shut-off valves, external drain pan etc.), if they are delivered as separate items.

## 4.4 Removing the package cover

You do not need to remove the package cover, when you mount the unit to the ceiling. Remove the package cover only after the room has been cleaned of construction dust.

1. Before you remove the package cover, make sure that the pipes and electrical connections are ready.
2. After the room has been cleaned of construction dust, remove the package cover.
3. Recycle the package cover in an appropriate manner.

## 4.5 Installing the grille

The grille is delivered in a separate package, including the fastening screws (8 for Box Mono, 16 for Box Double). For Box Mono, the grille is delivered as one part ready for installation. For Box Double, the grille is delivered in two parts.

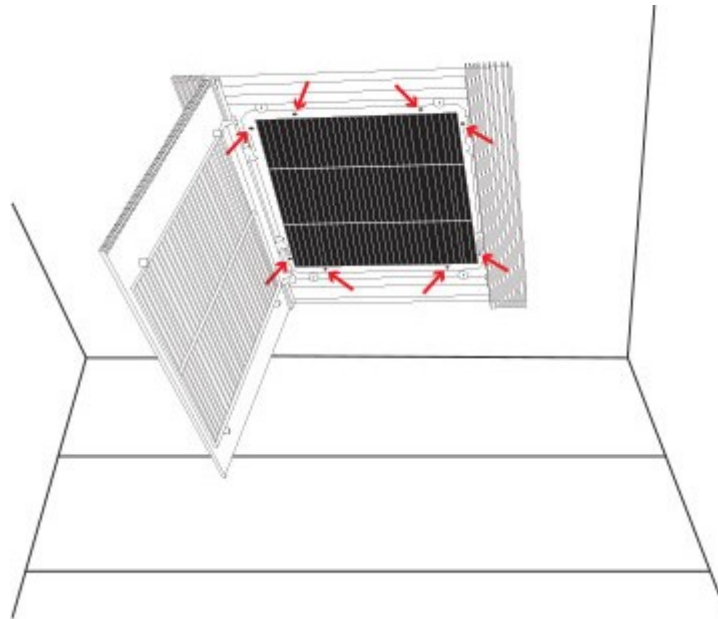
*Note! Do not overtighten the fastening screws, when you install the grille.*

*Note! Use only the screws included in the unit delivery to fasten the grille.*

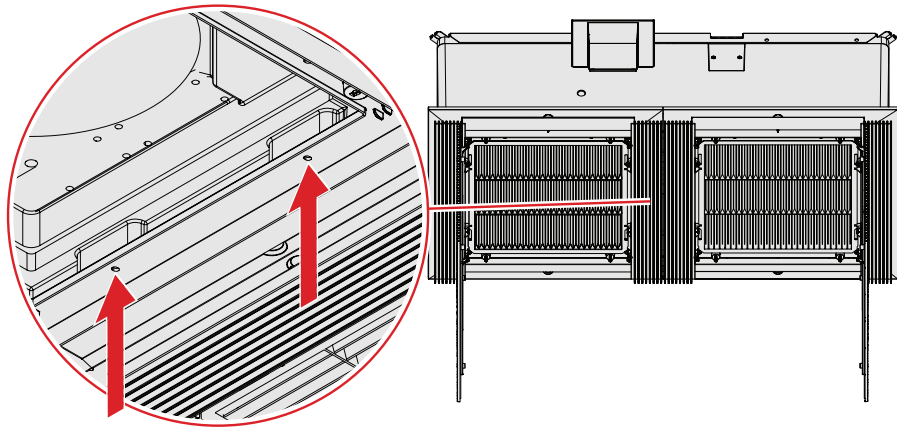
*Note! Make sure that the grille is installed firmly against the unit.*

*Note! Make sure that the grille does not touch the ceiling surface. The distance must be approximately 2 mm.*

1. **Box Mono:** after mounting the unit to the ceiling, attach the grille into place with screws (8 pcs). The grille is attached to the mounting points of the condensation water basin.



2. **Box Double:** after mounting the unit to the ceiling, attach both parts of the grille into place with screws (16 pcs). The grille is attached to the mounting points of the condensation water basin.



- a. Make sure that the grille slots lock into place.

*Note! Recycle the grille package in an appropriate manner.*

## 4.6 Attaching the water connections

The Box unit is intended to be connected to a cooling and/or heating water circulation that cannot damage the heat exchanger. More detailed information on water connections are specified separately for each order, depending on the accessories selected.

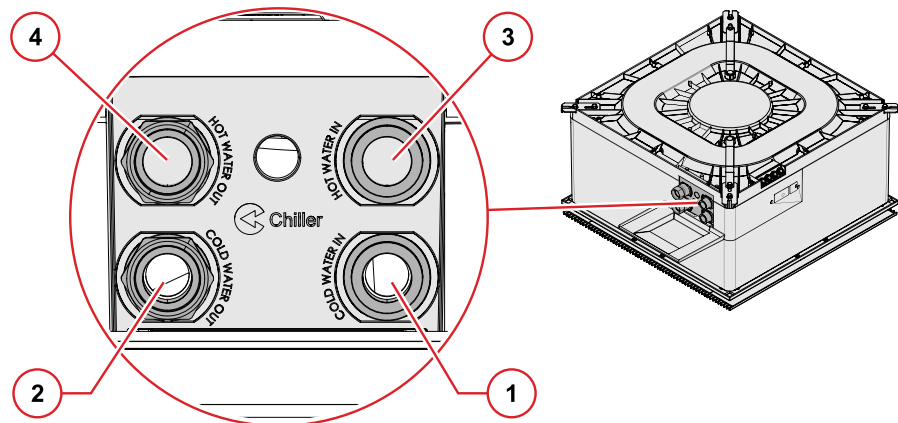
*Note! Connecting the unit to the water circuit causes pressure losses. For information on unit type-specific pressure losses in the water circuit, please contact the manufacturer.*

1. Before you connect the unit to a cooling and/or heating water circulation, make sure that the water in the water circuit has
  - a. a maximum operation pressure of 10 bar
  - b. a minimum temperature of +4 °C (inlet water)

*Note! Water must never be allowed to freeze inside the coil, condensate basin, or piping of the unit.*

- c. a maximum temperature of +80 °C (inlet water).

2. Attach the water connections as shown below.



- 1 Cooling water inlet
- 2 Cooling water outlet
- 3 Hot water inlet
- 4 Hot water outlet

3. Use flat seal connectors when you attach the water connections. Make sure that the connector material is suitable for the connector type. Incorrect connector materials can damage the connection sets in the unit.

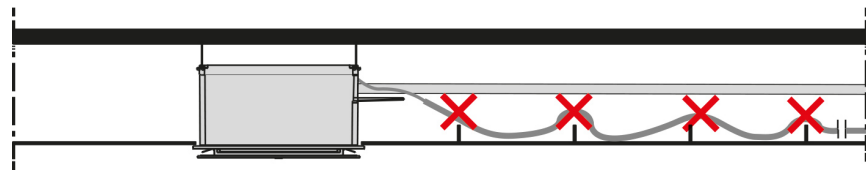
*Note! The maximum tightening torques are 11 Nm (1/2") and 15 Nm (3/4"). Overtightening can break the connection joint.*

## 4.7 Installing sewerage for condensation water

The factory-made Box version is available without or with (optional) condensation water pump.

*Note! Always follow the national construction regulations when you install the sewerage.*

1. Before you install the sewerage, make sure that
  - a. the sewerage has sufficient inclination of at least 2%.
  - b. the cross-sectional area of the condensation water pipe is sufficient, at least 22 mm.
  - c. you install a drain trap to the condensation water pipeline, if condensation water is directed to sewerage system of the property. The drain trap is dimensioned according to the installation height to ensure that water is constantly discharged at a sufficient rate.
  - d. the pipe is insulated, if it is installed in rooms where condensation can occur on the pipe surface.
  - e. you support the pipe so that it does not bend at any place.
  - f. you take into account the availability of supplementary air, when planning the sewerage.
2. When you install the sewerage, make sure that
  - a. you connect the unit to the sewerage with a stiff pipe (such as Cu or PVC).
  - b. the hose is not bent or dented. If it is, this can decrease the flow rate.



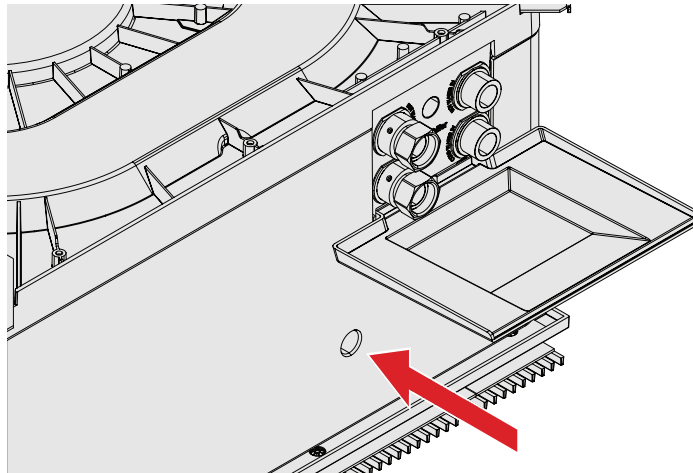
- c. you cut the hose to a suitable length. The standard condensation water hose is 1000 mm in length.

**Note!** Do not extend the condensation water hose with another hose.

- d. you do not push the hose too far into the sewerage pipe. The hose's end should be about 30–50 mm inside the seal.
- e. you connect the condensation pump hose to the sewerage from the upper side.
- f. you use the drain connection when you connect the condensation water pump to the sewerage. (For further information, see *Section 4.7.2 Sewerage with condensation water pump (option)*).
- g. you connect the pump hose tightly to the piping, so that the pressure variations caused by the condensation water pump do not remove the hose from the pipe. If necessary, use a seal.

### 4.7.1 Sewerage without condensation water pump

You can see the location of the outlet set for condensation water in the figure below.



1. Before installation, make sure that the installation site is horizontally sufficiently inclined for sewerage.
2. Cut the plastic cover on the sewerage connection (Ø 9 mm) open before connecting it to sewerage pipes.



#### WARNING

Do not use excessive force when opening or connecting free drainage outlet as this can damage the unit and cause leakage.

### 4.7.2 Sewerage with condensation water pump (option)

The Box unit is available with a condensation water pump for a rise of 1000 mm. The pump pressure side has an outlet pipe (plastic, outer diameter 15 mm, inner diameter 12 mm) that is connected to a fixed condensation water pipework. The outlet set for condensation water is located on the same side as the water sets in the unit.

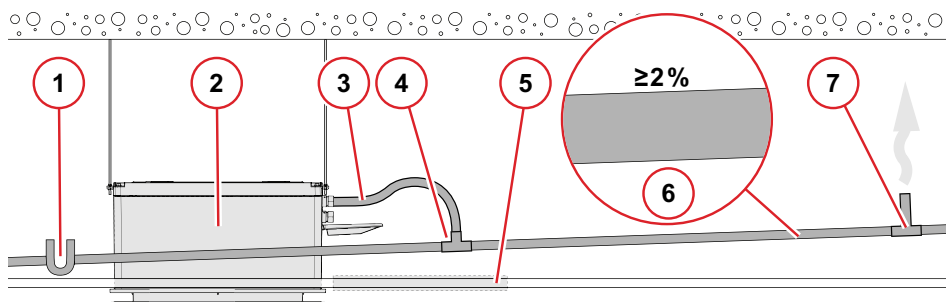


Figure 10: Overview of sewerage with condensation water pump

1. Drain trap
2. Unit
3. Condensation water hose
4. Drain connection
5. Maintenance hatch
6. Condensation sewerage
7. Supplementary air

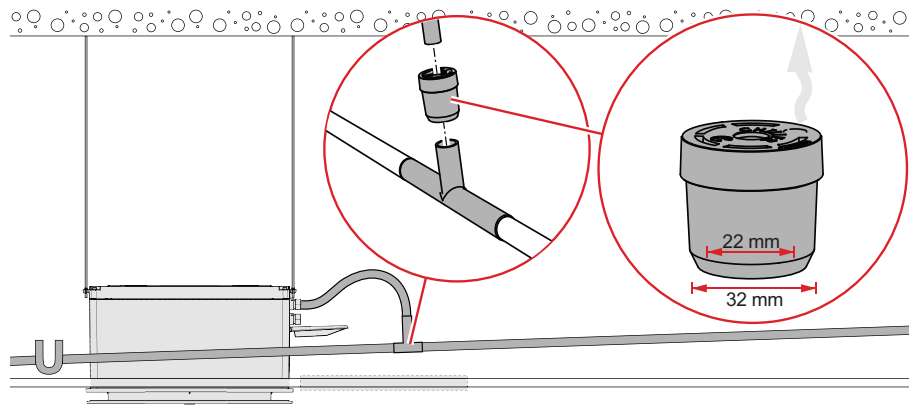
1. Before installation, make sure that the cross-sectional area of the condensation water network is sufficient.
2. Connect the tight connection to the condensation water piping.
3. Connect the drain connection to the tight connection.

*Note! You can connect the drain connection to a  $\varnothing$  22 mm (outer diameter) copper pipe or to a  $\varnothing$  32 mm (inner diameter) sewer socket.*

*Note! Make sure that the air venting of the drain connection is facing upwards and at a inclination of max. 45°.*

4. Push the condensation pump hose through the drain connection.

*Note! Make sure that the condensation pump hose does not block the sewerage.*



5. After installation, make sure that the horizontal inclination of the fall for the condensation sewerage is at least 2%.

## 4.8 Attaching the electrical connections



### DANGER

Electrocution hazard. Touching live parts or components of the unit can cause severe injury or death.

Only qualified persons are allowed to perform electrical work on the unit.



### DANGER

The mains wiring and low-voltage control wiring must be installed separately. Never run the mains and control wiring in the same cable. This can cause unit malfunction, severe injury, or death.



### CAUTION

When connecting the unit to the circuit, make sure that the connection is done in accordance with local laws and decrees.

*Note! The unit is available with Vari or Vari Pro equipment. The unit is delivered with model-specific electric diagrams that must be used when doing the electrical connections.*

The unit is delivered as wired (including internal wirings) and connected so that the unit only needs to be connected to the supply and to possible control wirings at the installation site. Please contact the seller of the unit for further information on the specific electrical and control connections of the unit and the wirings required for them.

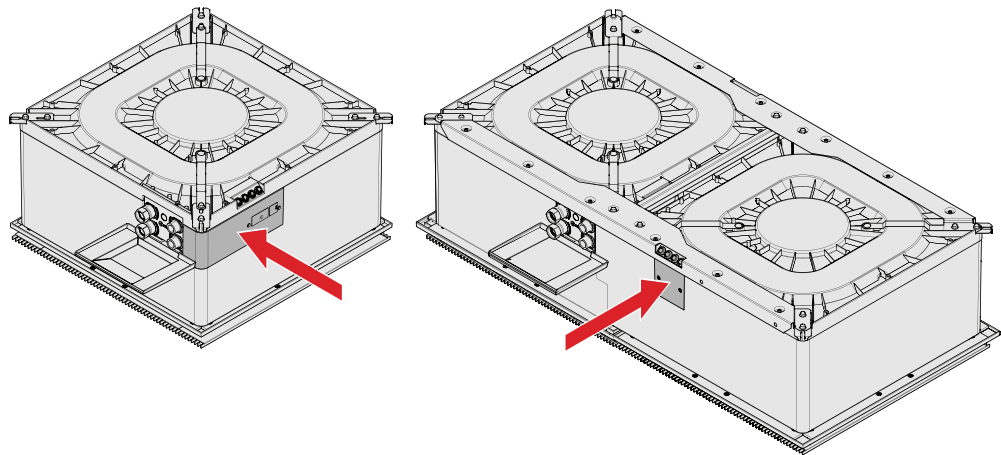


Figure 11: Electrical boxes

1. When connecting the unit, make sure that the supply of the unit is protected by means of a front fuse.
2. If several units are connected in parallel behind the same supply, make sure that the size and sufficiency of the fuse is sufficient for unit-specific protection.
3. Make sure that the cable is dimensioned in accordance with the maximum values that are specified in the type plate of the unit. (See Section 3.3 Type plate.

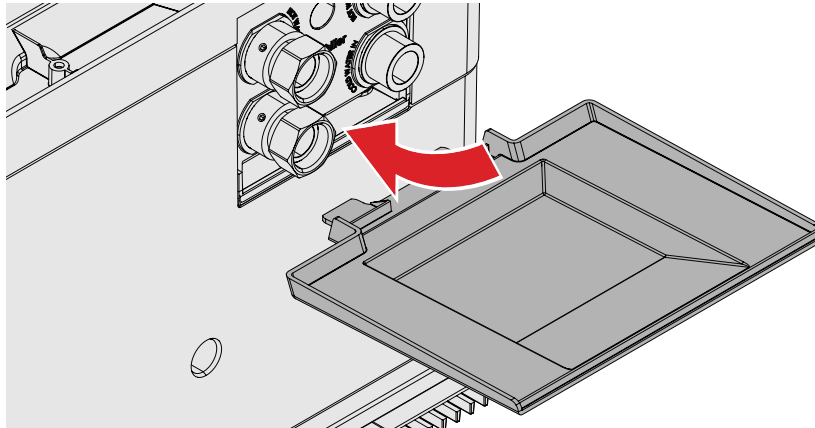
*Note! The power supply to the unit must always be continuous. If the power supply is off, the water condensation pump and the automation of the unit do not work.*

4. Connect the external cabling on the unit to the coupling card in the link box. The coupling card contains a springback terminal block.



## 4.9 Installing the external drain pan

1. Install the external drain pan by pushing it to the slots on the side of unit.



## 4.10 Testing the condensation water pump



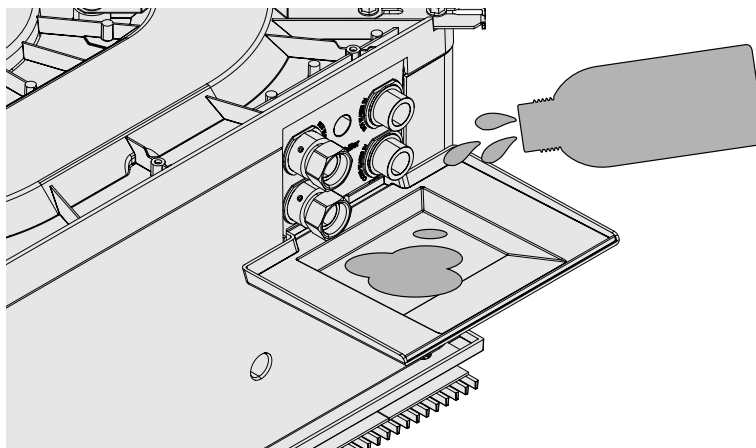
### CAUTION

**Risk of water damage. You must test the condensation water pump after you have installed the unit.**

**Do not operate the unit before you have run the test successfully.**

Before you can operate the unit, you must test the condensation water pump. Run a leak test after you have mounted the unit on the ceiling and done the necessary electrical and pipe connections.

1. To test the condensation water pump, pour approximately 2 liters of water into the external drain pan.



2. After you have poured the water into the basin, make sure that
  - a. the condensation water pump starts
  - b. the pump moves the water to the condensation sewerage
  - c. the pump stops after the water has gone to the sewerage
  - d. there are no leaks anywhere in the system.

*Note! The leak test has been successful, if the pump starts, moves the water, stops, and there are no leaks.*

3. If the leak test was successful, you can start to use the unit.
4. If the leak test failed, do not use the unit before you have run another, successful test.

## 5 Operation of the unit

### 5.1 Controlling the unit

The fan motor of the unit is equipped with a modern EC (electronically commuted) motor. The fan motor is controlled with voltage messages of 0–10 VDC. At 0 V, the fan motor is stopped, and at 10 V, the fan motor operates at full speed.

You can adjust room temperature by changing the speed and valve positions of the unit to achieve the set room temperature. The control valve and speed are controlled by a separate room/house automation control. The control method of the actuators is either 24 VAC (PWM) or 0–10 VDC, depending on the selection of actuators.

*Note! This applies only if the unit contains two- or three-way valves.*

The condensate pump is controlled internally. The condensate pump operates, even if the unit is stopped with the controller or the house automation control. The unit operates independently according to the control method selected. The blowing air outlets can be adjusted individually in accordance with the limitations (see *Figure 9: Blowing air outlets*).

## 6 Maintenance of the unit

### 6.1 Maintenance schedule



**WARNING**

If you detect water leakage during unit operation, shut down the unit and contact maintenance.

For the unit to function properly, you must do the maintenance procedures regularly. We recommend that you maintain the unit components according to the following schedule.

COMPONENT	ACTION	MAINTENANCE INTERVAL
Grille	Clean the grille with a clean, damp cloth.	Every 12 months or when needed
Filter	Clean the dust from the filter with a vacuum. Rinse the filter with water.	Every 12 months or when needed
Condensation water basin	Drain and clean the condensation water basin.	Every 5 years or when needed

*Note! If there are local and/or site-specific regulations, such as hygiene regulations, that differ from the maintenance schedule above, follow the local and/or site-specific regulations.*

*Note! You can find more detailed instructions for maintenance in the following sections.*

### 6.2 Cleaning the grille

*Note! You can access the unit for maintenance from the lower surface of the unit.*



**WARNING**

Electrocution hazard. Before you do any maintenance work on the unit, make sure that the unit is disconnected from the circuit and that it is de-energized.



**WARNING**

Risk of injury. When you use or maintain the unit, be careful with the moving parts of the machine to avoid injury.

1. Open the grille.
2. Clean the grille with a clean, damp cloth.

*Note! Do not use detergents or solvents that can damage the grille.*

3. Close the grille.

### 6.3 Removing the filter

The filters are located under the inlet grille. The unit has one (mono) filter or two (double) filters. The need for cleaning the filters depends on the location and use of the unit.

*Note! You must check and clean the filters regularly, at least once a year, depending on the conditions of the installation site. Regular maintenance ensures a longer life cycle for the unit.*

*Note! You can access the unit for maintenance from the lower surface of the unit.*



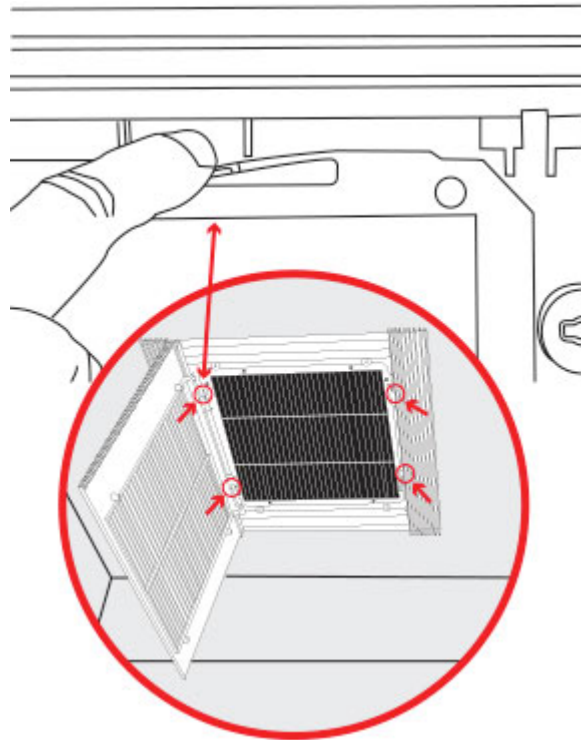
#### WARNING

**Electrocution hazard. Before you do any maintenance work on the unit, make sure that the unit is disconnected from the circuit and that it is de-energized.**

1. To remove the filter, open the grille by turning the grille screws  $\frac{1}{4}$  turn counterclockwise.

*Note! Once you have opened the grille screws, the grille opens downwards. It is advisable to have your hand below the grille when it opens, so that it does not open with too much speed.*

2. Remove the filter by opening the filter latches.



3. Once you have done the maintenance work for the filter and attached it back to the unit, close the grille by turning the grille screws  $\frac{1}{4}$  turn clockwise.

## 6.4 Cleaning and replacing the filter

The filter material is synthetic, and it can be cleaned with water.

*Note! You can access the unit for maintenance from the lower surface of the unit.*

*Note! Replace the filter, if you cannot clean the filter as required or if the filter is damaged.*

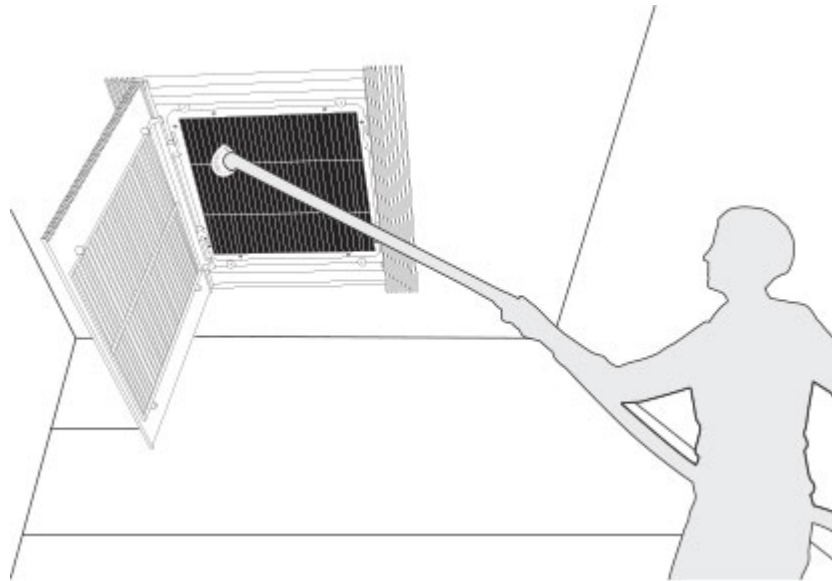


### WARNING

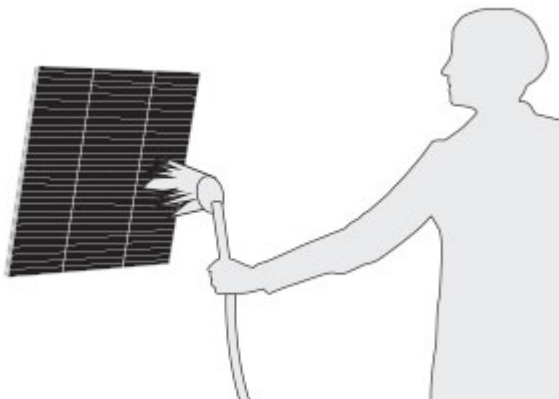
**Electrocution hazard. Before you do any maintenance work on the unit, make sure that the unit is disconnected from the circuit and that it is de-energized.**

1. To clean the filter, open the grille by turning the grille screws  $\frac{1}{4}$  turn counterclockwise.

- Clean the filter from dust by vacuuming it.



- If the filter is still dirty after you have vacuumed it, remove the filter by opening the filter hatches.
- Clean the filter by rinsing it with lukewarm water.



- Before you reattach the filter to the unit, make sure that it is dry.
- Attach the filter to the unit.
- Close the grille by turning the grille screws  $\frac{1}{4}$  turn clockwise.

## 6.5 Cleaning the condensation water basin

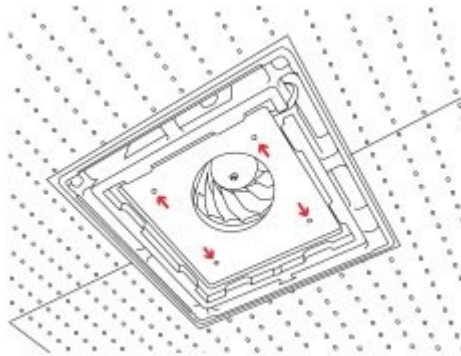


### WARNING

**Electrocution hazard. Before you do any maintenance work on the unit, make sure that the unit is disconnected from the circuit and that it is de-energized.**

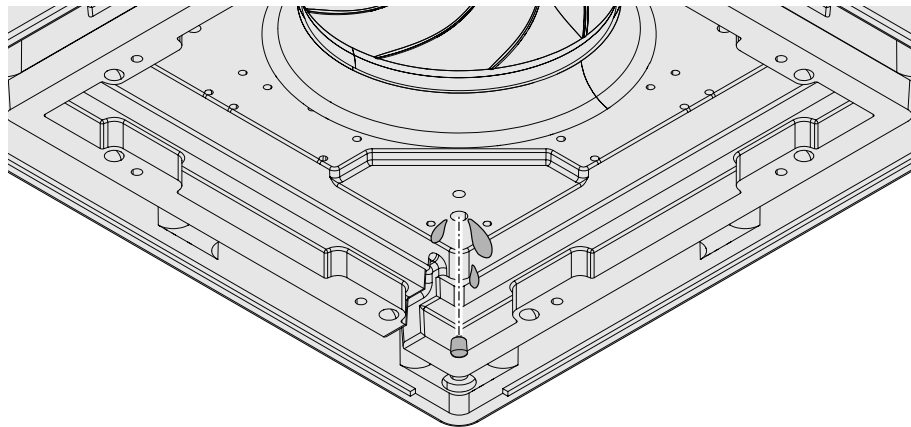
*Note! You can access the unit for maintenance from the lower surface of the unit.*

1. To clean the condensation water basin, remove the intake cone.

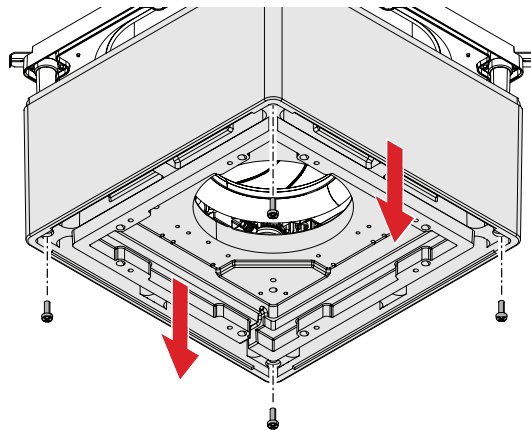


*Note! Before you remove the drain plug, make sure that you have a pan of at least 2 liters for draining the condensation water basin. In addition, ensure that the surroundings (floor, furniture etc.) do not get wet during the draining procedure.*

2. Put the pan for the condensation water under the drain plug.
3. Open the drain plug at the bottom of the unit to drain the basin.



4. Remove the fastening screws (4 pcs) on the corners of the unit.
5. Remove the unit cover and condensation water basin.





6. Clean the unit cover and condensation water basin with a clean, damp cloth.

*Note! Do not use detergents or solvents that can damage the unit.*

7. Before you reattach the unit cover and condensation water basin to the unit, make sure that they are dry.
8. Attach the unit cover and condensation water basin.
9. Close the drain plug.
10. Attach the intake cone.

## APPENDIX A: Vari-option control connections

Table 2: Vari-option control connections

POS	Connector	Function	Technical description
PWR	L	230 V AC/line	Fuse on card, max. 5 A
	N	230 V AC/neutral	
	PE	Protective Earth	
C1	AA	Alarm contact (in or out)	OPEN when alarm active or unit not powered. Potential free.
	AA	Alarm contact (in or out)	OPEN when alarm active or unit not powered. Potential free.
	V+	24 V auxiliary output from the control card. Selectable between AC or DC with jumper J1 (DC when in DOWN position)	Max. output current 0.6 A
	G0	Signal ground. All I/O signals are referenced to this connector.	Common for aux. 24 V output, 0–10 V control inputs, 0–10 V control outputs 24 V AC/DC control inputs and 24 V AC control outputs. Not connected to Protective Earth (PE).
C2	F	Fan speed input, 0–10 V (linear) or 24 V AC/DC for ON/OFF control.	Impedance 50 kΩ. Desired control mode detected automatically.
	C	Cooling valve control input, 0–10 V (linear) or 24 V AC/DC for ON/OFF control.	Impedance 50 kΩ. Desired control mode detected automatically.
	H	Heating valve control input, 0–10 V (linear) or 24 V AC/DC for ON/OFF control.	Impedance 50 kΩ. Desired control mode detected automatically.
C3	1	Fixed fan speed 1 control input, 24 V AC or DC control	When active, takes priority over F-control input.
	2	Fixed fan speed 2 control input, 24 V AC or DC control	When active, takes priority over F-control input.
	3	Fixed fan speed 3 control input, 24 V AC or DC control	When active, takes priority over F-control input.
	V+	Same as in connector C1	Same as in connector C1
COOL OUT	0–10 V	0–10 V valve output for cooling actuator	Follows C input
	G0	Same as in connector C1	Same as in connector C1
	24 V	24 V AC PWM output for cooling actuator/ 24 V AC power output for 0–10 V actuators	Follows C-input, or continuous 24 V AC output voltage
HEAT OUT	0–10 V	0–10 V valve output for heating actuator	Follows H-input

POS	Connector	Function	Technical description
	G0	Same as in connector C1	Same as in connector C1
	24 V	24 V AC PWM output for heating actuator/ 24 V AC power output for 0–10 V actuators	Follows C-input, or continuous 24 V AC output voltage

## APPENDIX B: Register listing for Vari Pro-option

*Note! Observe proper delays when communicating over Modbus. Use at least 200 ms polling delay. If you observe bus errors, increase the delay until there are no errors. Continuously rewrite (= refresh) fan speed, cooling valve, and heating valve registers at least every 5 minutes, even when desired value is 0. Always write to all 3 registers, even if there is no heating (or cooling) option in the unit.*

When controlling fan coil directly (without the room controller), use the following register map.

Table 3: Register listing for Vari Pro-option

Vari Pro FCU Controller Card Register Map v 1.4					Modbus RTU RS485 38400, 8N1	
	Description	Read/Write	Min.	Max.	Unit	Note(s)
<b>Write register 16 bit integer register</b>						
4x00002	Set fan speed	W	0	100	%	0...100 = 0...10 V 0 = OFF 100 = ON 24 V
4x00003	Set cool output	W	0	100	%	0...100 = 0...10 V 0 = OFF 100 = ON 24 V
4x00004	Set heat output	W	0	100	%	0...100 = 0...10 V 0 = OFF 100 = ON 24 V
4x00101	Reset service reminder counter	W	0	1		1 = reset
4x35203	Manufacturing year	W	20xx	20xx		By reading this data, modbus register configuration and address alignment can be validated.
4x35204	Manufacturing month	W	1	12		
4x35205	Manufacturing day	W	1	31		
<b>Read register 16 bit integer register (*)</b>						
3x00005	Alarm register	R				Bit0: Condense sensor alarm Bit1: Missing RPM from fan1 Bit2: Missing RPM from fan2 Bit3: Sensor fault, water in Bit4: Sensor fault, water out Bit11: Parameter file Bit15: Service reminder (Filter alarm)
3x00007	Current fan speed output	R	0	100	%	Scaled to maximum speed
3x00010	Condensate tank state	R	0	3		Level 2 pump start, 3 alarm
3x00011	Condensate pump status	R	1	16		1 = OFF, 16 = ON
3x00012	Cooling output	R	0	1000	x10mV	Scaled to maximum flow

Vari Pro FCU Controller Card Register Map v 1.4					Modbus RTU RS485 38400, 8N1	
	Description	Read/Write	Min.	Max.	Unit	Note(s)
3x00013	Heating output	R	0	1000	xx10mV	Scaled to maximum flow
3x00018	Temperature water in	R			x10C	
3x00019	Temperature water out	R			x10C	
3x00025	Service reminder counter	R			h	

**(\*) Reading via User Interface**

Address: 3x00N (RR-2)      N = Unit count      RR = Register address

Example: 3x00010 (Condensate tank state) from 1st unit, user interface address 3x00108

## APPENDIX C: Register listing for unit with Vari Pro room controller

When controlling fan coil with the room controller, use the following register map.

Table 4: Register listing for unit with Vari Pro room controller

Vari Pro User Interface Register Map v 1.4					Modbus RTU RS485 Baudrate: 9k6, 19k2, 38k4 Parity: None, odd, even	
	Description	Read/ Write	Min.	Max.	Unit	Note(s)
Write register 16 bit integer register						
4x00001	Application state	W				1 = Stand-by (OFF) 2 = Normal 3 = Away 4 = Flush (set cool & heat 100%) 5 = Stopped 10 = Test mode (allow cool/heat without fan)
4x00003	Fan speed control	W				0 = OFF, 1–3 = Speed, 4 = Auto
4x00004	Room set point, Normal	W			x10C	
4x00005	Room set point, Away	W			x10C	
Read register 16 integer register						
3x00004	Application state	R				0 = Init 1 = StandBy 2 = Normal, 3 = Away 4 = Flush 10 = Test
3x00006	Current fan control	R	0	4		0 = OFF, 1–3 = Speed, 4 = Auto
3x00007	Room temperature	R			°C	x10
3x00008	Current room set point	R			°C	x10
3x00009	Current fan speed	R	0	100	%	
3x00010	Cooling output	R	0	100	%	
3x00011	Heating output	R	0	100	%	

Vari Pro User Interface Register Map v 1.4					Modbus RTU RS485 Baudrate: 9k6, 19k2, 38k4 Parity: None, odd, even	
	Description	Read/ Write	Min.	Max.	Unit	Note(s)
3x00103	Alarm "Unit 1"	R				Bit0: Condense sensor alarm Bit1: Missing RPM from fan1 Bit2: Missing RPM from fan2 Bit3: Sensor fault, water in Bit4: Sensor fault, water out Bit11: Parameter file Bit15: Service reminder (Filter alarm)
3x00203	Alarm "Unit 2"	R				

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