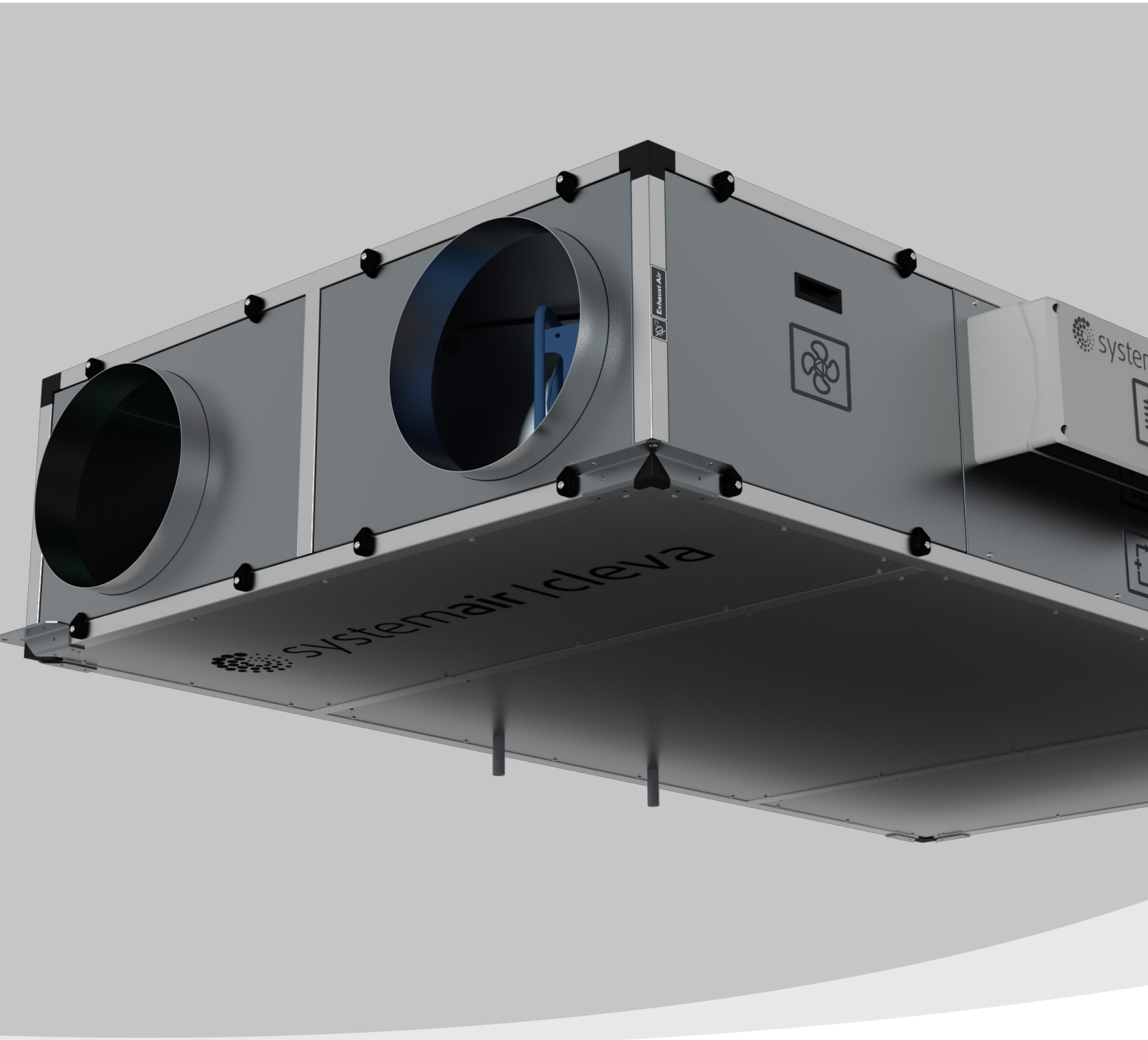
Technical documentation

Cleva
Heat Recovery System

Installation, Operation and Maitenance



systemair

Contents

1. Declaration of Conformity (CE)

CT - Declaración de Conformidad_CLEVA - Ed.00.docx
Fecha / Date: 29-09-2023

Declaración de Conformidad ERV

Declaration of Conformity ERV

El fabricante (The manufacturer):

SYSTEMAIR HVAC SPAIN, S.L.U.
C\Montecarlo 14. P.I. Uranga
28942 Fuenlabrada (Madrid). España

Por la presente declara que las siguientes unidades (Hereby declares that ERV units of the following types):

GAMA: CLEVA
TAMAÑOS: 500 / 1000 / 1500 / 2000 / 3000 / 4000

Son fabricadas y entregadas de acuerdo con las siguientes directivas:
Are manufactured and delivered in accordance with following directives:

2006/42/CE	**Directiva de Máquinas** Machinery Directive
2014/1253	**Normativa Ecodesign** Ecodesign – Commission regulation
2014/30/CE	**Directiva de Compatibilidad Electromagnética** EMC Directive
2014/35/CE	**Directiva de Baja Tensión** Low voltage Directive

Asimismo, por la presente certificamos que las unidades, están fabricada y embaladas de acuerdo con la especificación "sin silicona". Esta condición "libre de siliconas" puede perderse en caso de mala manipulación, si el producto entra en contacto con algún contaminante, etc. El producto debe mantenerse debidamente protegido y manipularse para mantener dicha condición.

We herewith certify that the units, are manufactured and packed according to "free if silicone" specification. This "free of silicone" condition may be lost in case of mishandling, if the product gets in contact with a pollutant, etc. Product must be kept properly protected and manipulated in order to keep such condition.

Esta declaración es válida sólo si la instalación de la unidad es llevada a cabo acorde con las instrucciones entregadas junto con la misma. El instalador será responsable de la declaración CE y documentación, en caso de que se produzca algún cambio en la construcción o funcionalidad de la unidad.

The declaration is only valid if the installation of the ERV unit is carried out according to the instructions delivered with the unit. The installer will be responsible for the CE declaration and documentation, if any construction or functional changes are applied to the ERV unit.

En Fuenlabrada a 29 de septiembre de 2023

Rafael Moral Gant
Director Gerente / Managing Director
Systemair HVAC Spain S.L.U.

CE

2. Dangers and Warnings

The following warnings may appear in different sections of this document:

Danger

IIndicates a potentially or imminently hazardous situation which, if not avoided, could result in death or serious injury.

Warning

Indicates a potentially dangerous situation that could result in minor or moderate injuries.

Caution

Indicates a risk of damaging the product or preventing optimal functioning.

Important

All unit handling, installation, operation, maintenance and service operations must be carried out by duly qualified personnel in accordance with the specific rules and regulations of the locality in which the unit will be installed.

3. Product Information

3.1. Overview

This manual is applicable to the range of CLEVA heat recovery units manufactured by Systemair Spain.

This manual contains basic information and recommendations regarding design, installation, commissioning, operation and maintenance, to ensure proper, failure-free unit operation.

To ensure proper and safe unit operation, it is essential to read this manual carefully, use the unit according to the guidelines, and follow all safety requirements.

The CLEVA range is made up of the following models and options:

- Models: 500, 1000, 1500, 2000, 3000 and 4000.
- Right or left register: R (right) and L (left).
  - R (right): following the direction of the supply air flow, electrical panel installed on the right side.
  - L (left): following the direction of the supply air flow, the electrical panel installed on the left side
- Optional:
  - Hot water coil.
  - Chilled water coil.
  - Combined hot/chilled water coil (2 tubes).
  - DX coil.
  - Constant flow rate control (CAV).
  - Constant pressure control (VAV).
  - Air quality sensor (CO2).
  - Remote control with room temperature reading.
  - WLAN Stick. Allows access and changes to unit settings.

3.2. Technical Information

3.2.1. Dimensions

- Sizes 500 / 1000 / 1500 / 2000. Right register.

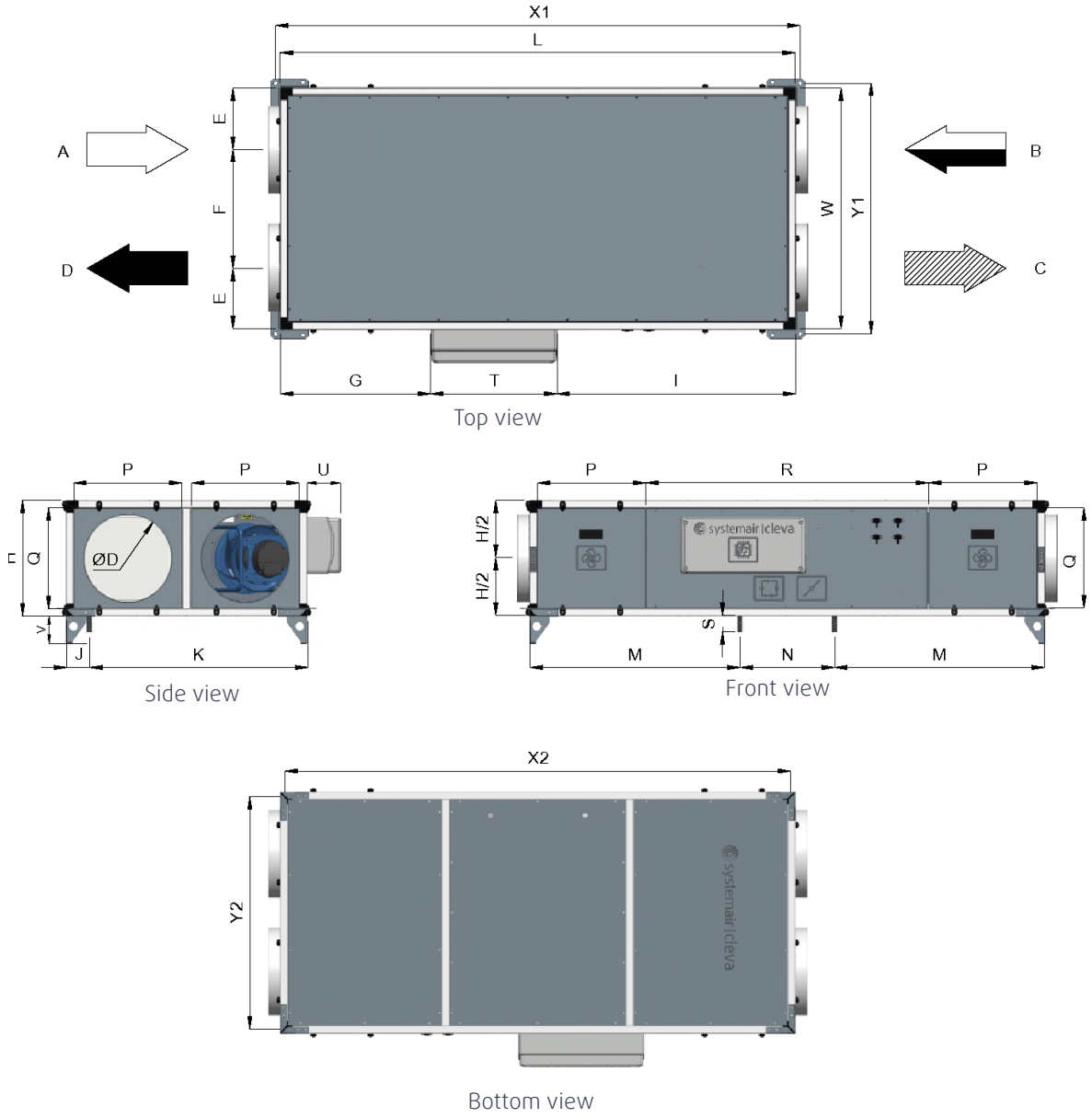


Figure 1.

Table 1. Key.

Position	Symbol	Description
A		Supplay air
B		Exhaust air
C		Outside air
D		Extract air

- Sizes 500 / 1000 / 1500 / 2000. Left register.

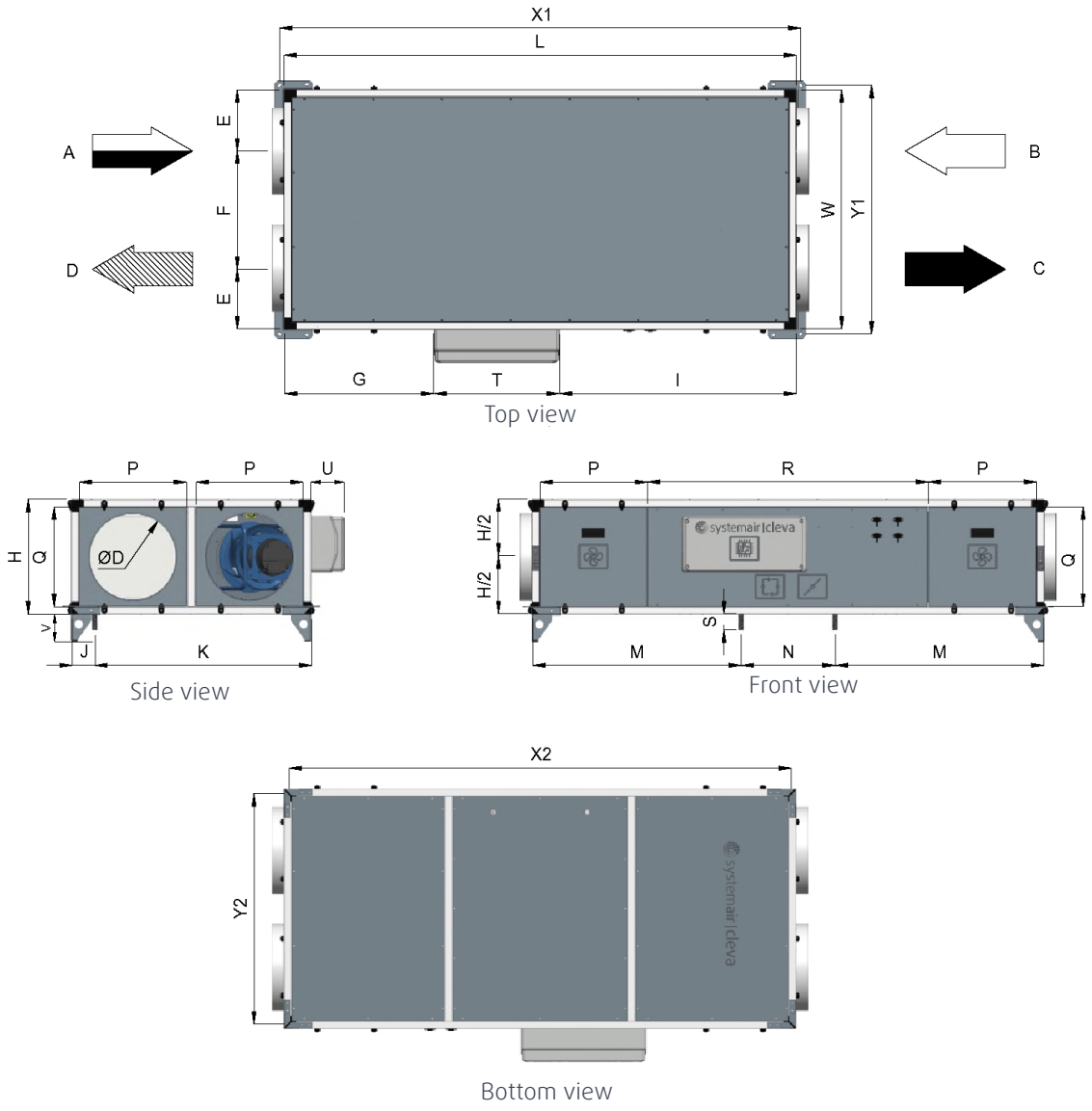


Figura 2.

Position	Symbol	Description
A		Supplay air
B		Exhaust air
C		Outside air
D		Extract air

- Sizes 3000 / 4000. Right register.

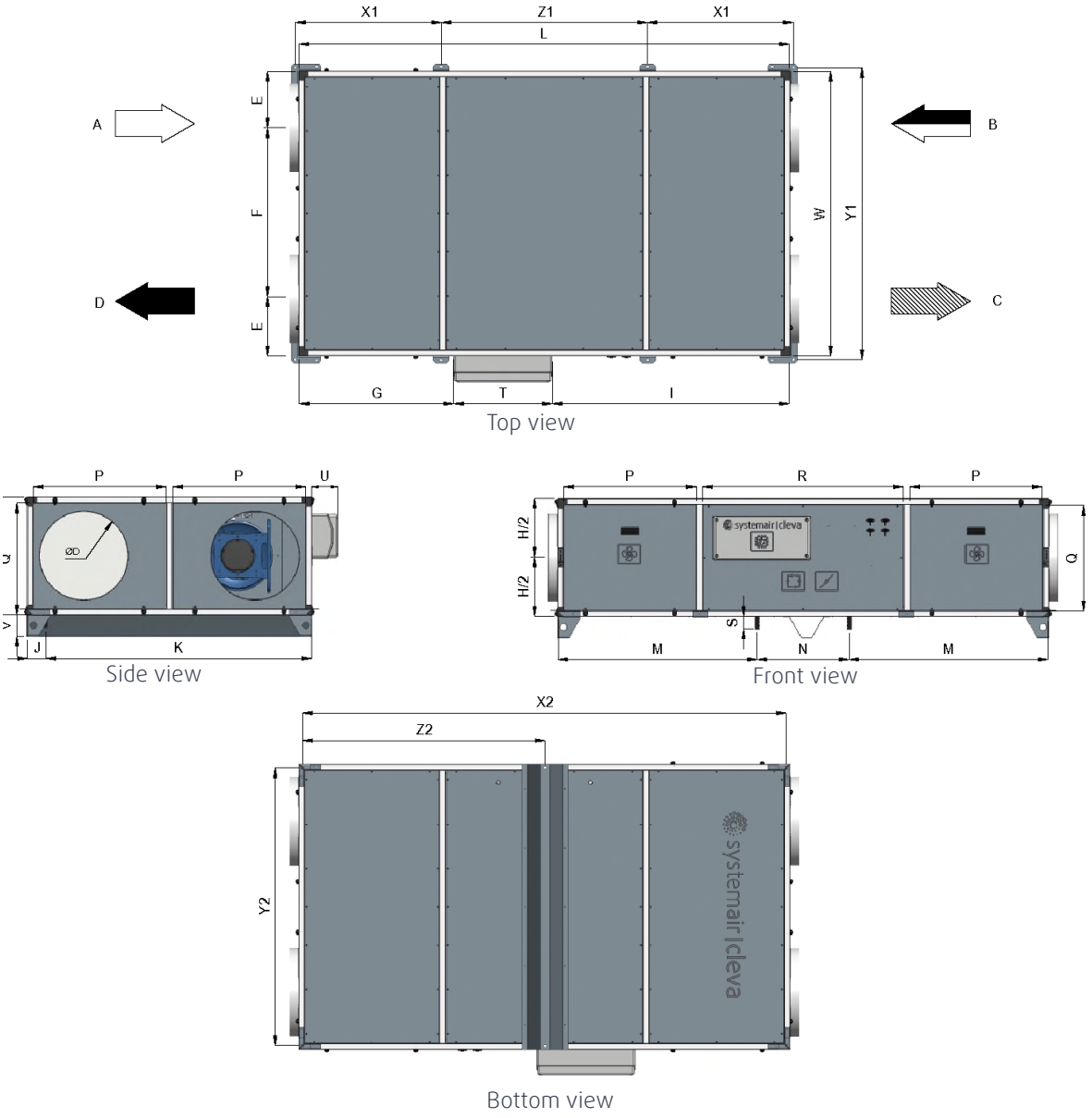


Figure 3.

Position	Symbol	Description
A		Supplay air
B		Exhaust air
C		Outside air
D		Extract air

- Sizes 3000 / 4000. Left register

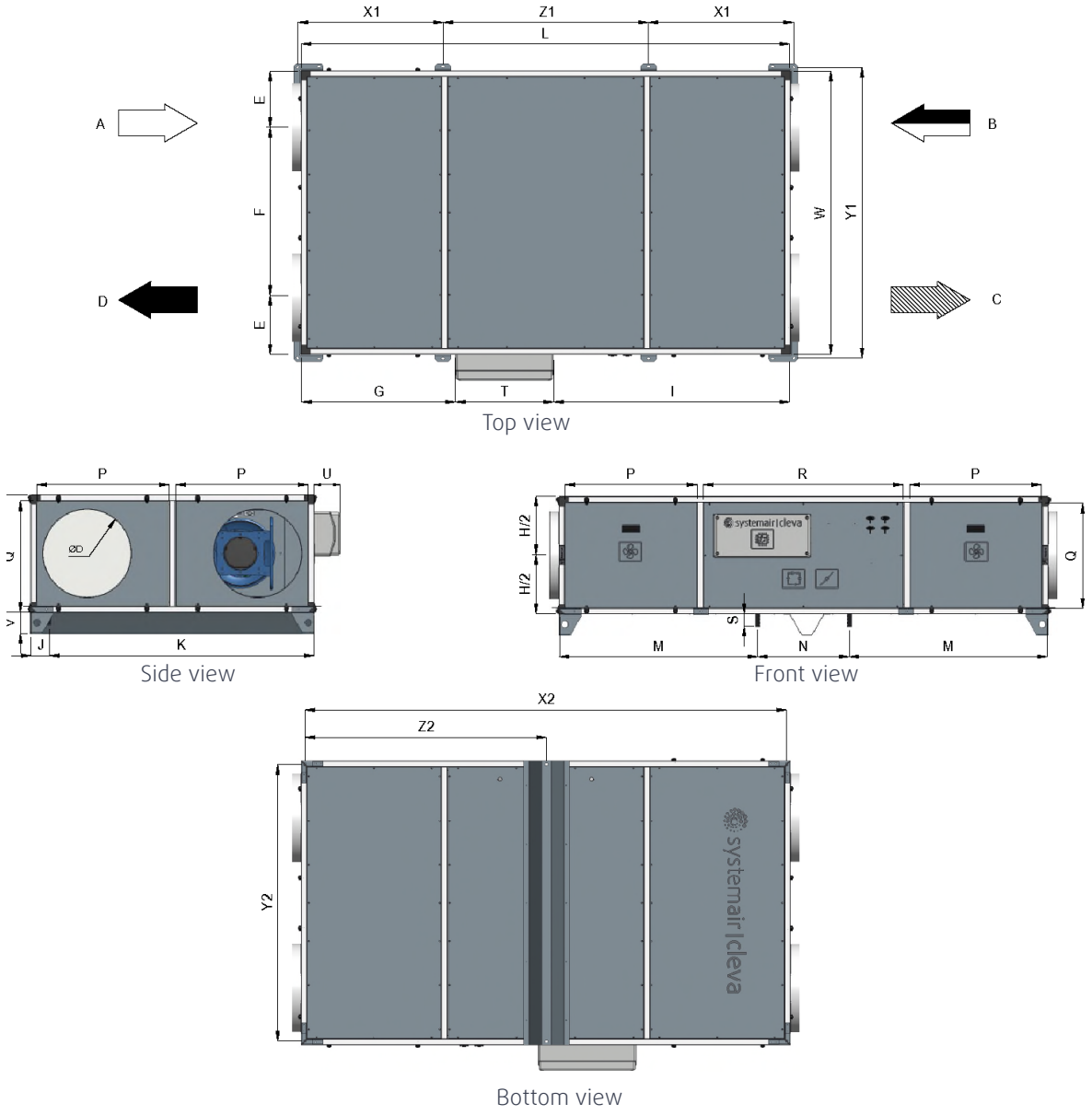


Figure 4.

Position	Symbol	Description
A		Supplay air
B		Exhaust air
C		Outside air
D		Extract air

Model	ØD	E	F	G	H	I	J	K	L	M	N	P	Q	R	S	T	U	W	X	Y	Z
Cleva 500	250	165	300	350	340	650	95	535	1500	592	316	266	278	900	65	500	135	630	1545	675	N/A
Cleva 1000	250	190	430	450	380	750	95	795	1700	693	316	396	318	840	65	500	135	890	1745	935	N/A
Cleva 1500	350	246.5	467	600.5	460	949.5	95	865	2050	837	376	431	398	1120	65	500	135	960	2095	1005	N/A
Cleva 2000	350	245.5	779	646.5	460	1033.5	95	1175	2150	890	376	586	398	914	65	500	135	1270	2195	1315	N/A
Cleva 3000	450	289	872	789	599	1211	95	1355	2500	1016	468	676	538	1020	65	500	135	1450	747.5	1495	1050
Cleva 4000	450	247	1342	1014	599	986	95	1795	2500	1016	468	896	538	578	65	500	135	1890	957.5	1935	630

Table 2. Dimensions [mm]

Model	Ceiling mounting			Floor mounting			
	X1	Y1	Z1	V	X2	Y2	Z2
Cleva 500	1545	675	N/A	110	1462	592	N/A
Cleva 1000	1745	935	N/A	110	1662	852	N/A
Cleva 1500	2095	1005	N/A	110	2012	922	N/A
Cleva 2000	2195	1315	N/A	110	2112	1232	N/A
Cleva 3000	747.5	1495	1050	110	2460	1410	1230
Cleva 4000	957.5	1935	630	110	2460	1850	1230

3.2.2. Settings

For all sizes of the CLEVA range, the duct connection panels (openings) of the unit are interchangeable on site, according to the customer's needs, as shown in the following figure.

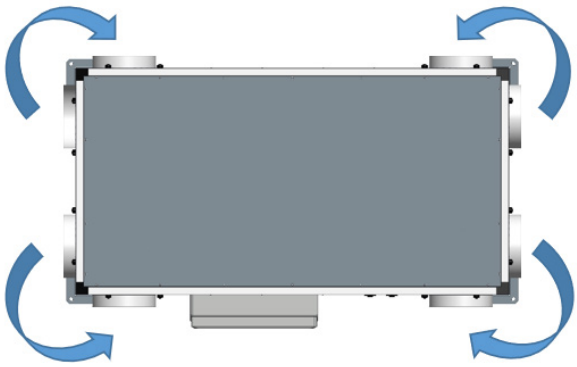


Figure 5.

The interchangeable panels are disassembled with 4 pressure closures and a Ø6mm Allen key. When assembling the switched panels, the pressure closures need to be tightened to avoid potential air leaks.

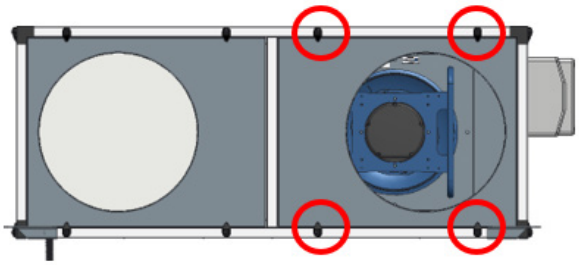


Figure 6.

3.2.3. Weights

The following table reflects the weights of the different models without considering the optional ones:

Model	Weights [kg]
Cleva 500	91
Cleva 1000	135
Cleva 1500	197
Cleva 2000	247
Cleva 3000	362
Cleva 4000	444

Table 3. Weights

3.2.4. Maintenance Spaces

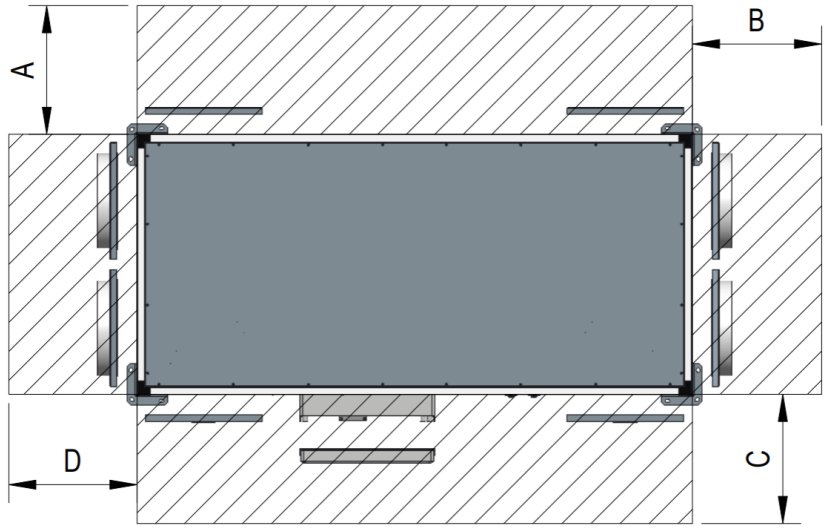


Figure 7.

Model	A	B	C	D
Cleva 500	400/400	500/400	600/600	500/400
Cleva 1000	400/400	500/400	600/600	500/400
Cleva 1500	500/400	500/400	600/600	500/400
Cleva 2000	600/400	500/400	600/600	500/400
Cleva 3000	700/400	500/400	700/600	500/400
Cleva 4000	900/400	500/400	900/600	500/400

Table 4. Maintenance spaces [mm].
NOTE: Dimensions are indicated for when there is a register panel or opening, depending on the equipment configuration (panel/opening).

3.2.5. Electrical Data

Model	Electrical connection V/Ph/Hz+Pe	Maximum absorbed current [A]	Maximum absorbed power [kW]
Cleva 500	230/1N/50+PE	3,9	0,59
Cleva 1000	230/1N/50+PE	4,0	0,59
Cleva 1500	230/1N/50+PE	5,5	1,25
Cleva 2000	230/1N/50+PE	8,5	1,81
Cleva 3000	230/1N/50+PE	13,7	2,85
Cleva 4000	400/3N/50+PE	8,1	5,05

Table 5. Electrical consumption.
No optional items.

3.3. Transportation and Storage

CLEVA units must be transported and stored in a way that ensures their protection against physical damage to panels, handles, closures, the electrical panel, etc. They must be protected from dust, wind, rain or snow entering and damaging the unit and its components. Units are delivered in a laminated module on metal legs to facilitate transportation. For sizes 500 to 2000 the units come with 4 legs (1) and for sizes 3000 and 4000, in addition to the four legs (1) the unit comes with an intermediate support (3).

If forklifts are used, forks must be properly protected to avoid damaging the frame, panelling and especially the lower drains (2) of the unit.

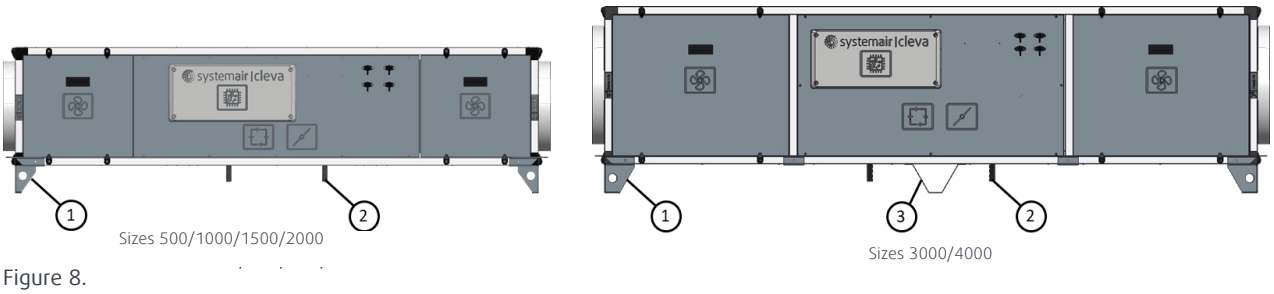


Figure 8.

Warning

The unit is heavy. Take precautions during transportation and assembly work. Risk of crush injuries. Use appropriate means of protection.

4. Installation

4.1. Unpacking

CLEVA units are supplied as a single laminated module on metal legs screwed to the unit's lower frame. If the supply legs are not used to assemble the unit, they must be disassembled by the installer.

Check that the equipment delivered is consistent with the order placed. In the event of discrepancies, contact your Systemair products supplier.

Unit components can be accessed by means of access panels through pressure closures with Ø6mm Allen head screws.

4.2. Where and How to Install the Unit

CLEVA units are designed to be installed indoors, although they can also be installed outdoors. For outdoor mounting, it is necessary to request the roof option.

For outdoor mounting, outdoor temperatures should not be lower than -15 ºC or higher than 45 ºC.

When assembling the unit, ensure that sufficient space is left to properly carry out maintenance tasks on the unit (point 3.2.4).

If possible, the outside air intake should be facing north or east of the building, away from any type of air extraction outlet in kitchens or bathrooms. It must also be protected to prevent the entry of water or animals.

Mounting Accessories

1. **Floor mounting.** Use the legs supplied with the unit for mounting in the installation. See Table 2 to view the unit anchoring dimensions with the legs installed.

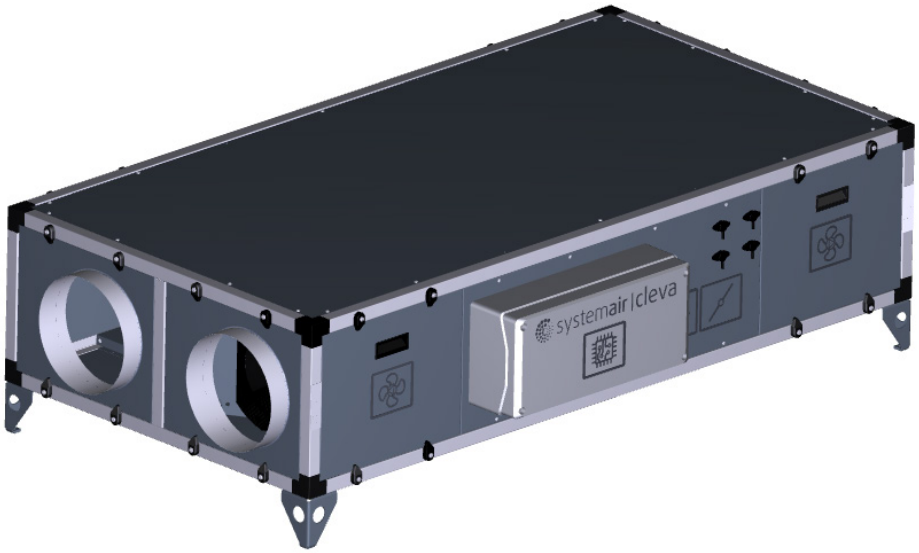


Figure 9. Unit supplied with legs for floor mounting

2. **Ceiling mounting.** Use the parts shown in the figure, supplied as accessories, after mounting them on the unit. To mount these parts on the unit, it is necessary to remove the legs, as they share anchor points on the unit. The unit has rivet nuts on the frames to facilitate the assembly of the unit's installation parts, as well as M6 screws for anchoring these parts to the unit. See Table 2 for unit anchoring dimensions with the ceiling mounting brackets.

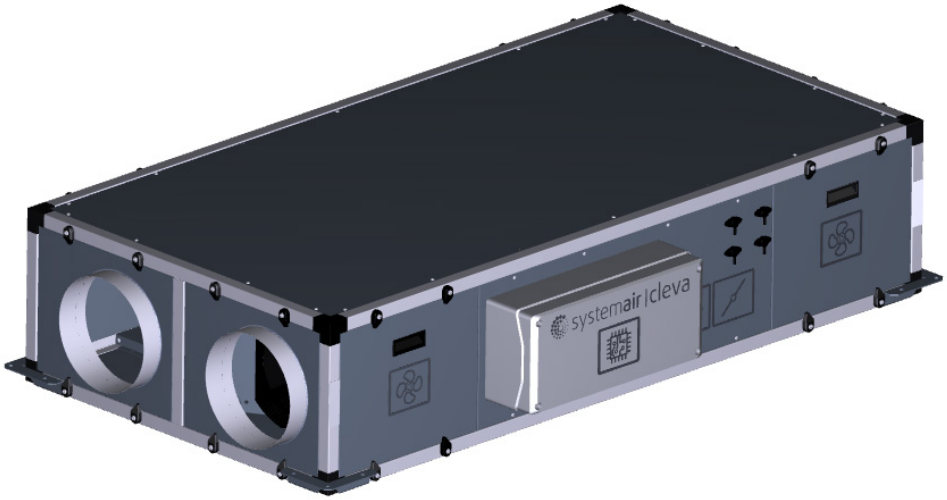


Figure 10. Unit with bracket for ceiling mounting

Silent-blocks elements are not supplied with the unit.

For proper installation of the unit make sure to:

1. Prepare the surface where the unit will be installed. The surface must be flat, level and designed to support the weight of the unit. Perform installation according to local rules and regulations.
2. Connect the unit electrically to the electrical network using a circuit breaker with differential protection. Wiring to the unit will be performed through the electrical panel. See the electrical diagram supplied with the unit and Section 5.

3. 5. Connections

5.1. Air Ducts

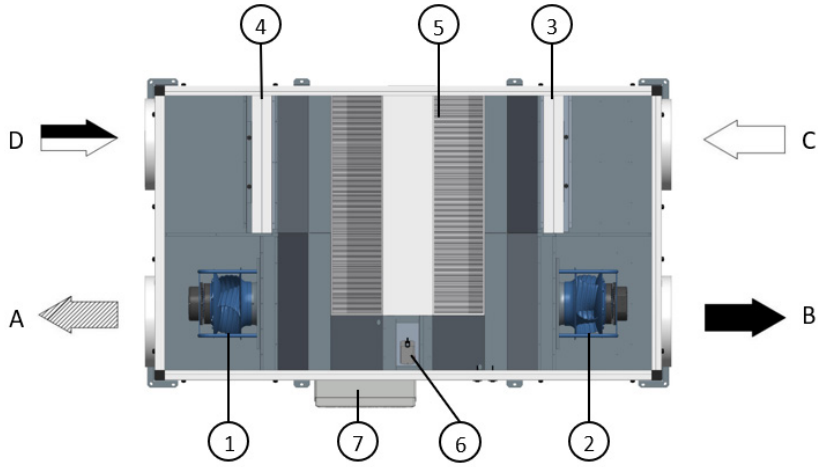


Figure 11.

Position	Description
A	Supply air
B	Exhaust air
C	Outside air
D	Extract air
1	Supply fan
2	Exhaust fan
3	Supply air filter
4	Extract air filter
5	Recovery unit
6	Bypass damper (actuator)
7	Electrical panel

Table 6. Components.

Model	Machine opening diameter [mm]
Cleva 500	250
Cleva 1000	250
Cleva 1500	350
Cleva 2000	350
Cleva 3000	450
Cleva 4000	450

Table 7. Duct connection diameter.

Caution

Air ducts must be insulated to avoid potential condensation or loss of performance risks.

The insulation used must comply with local standards and regulations. Proper sizing and installation of unit duct insulation is especially important.

5.2. Electrical Connections

Electrical connections must be made through the unit's electrical panel, located on the side of the unit as shown in the following image.

The panel components are accessed by removing the 4 screws on the electrical panel cover.

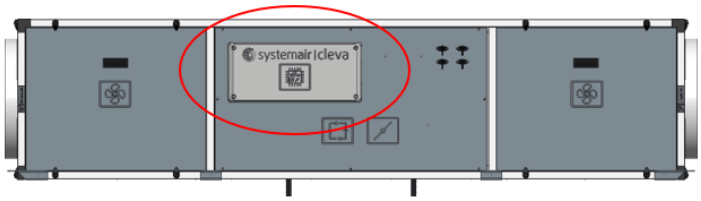


Figure 12.

The unit should not be operated if the electrical safety precautions have not been read and understood. It is also important to view the electrical diagram supplied with the unit.

Caution

- Ensure that the unit is de-energised before carrying out maintenance or electrical work.
- All electrical work must be carried out by qualified personnel in accordance with the specific rules and regulations of the locality in which the unit will be installed.

5.3. Electrical Connections, Components

All electrical connections are made by the installer through the terminal block included in the electrical panel.

The distribution of components in the electrical panel of Cleva units is as follows:

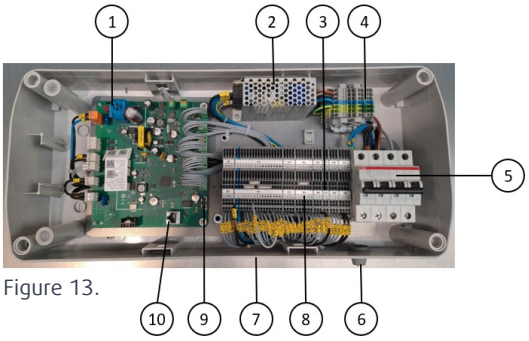


Figure 13.

Position	Description
1	Control board
2	Power supply
3	Terminal block for internal connection of unit components
4	Terminal block for internal fan connection (power)
5	Magnetothermal: • Sizes 500 to 3000: Bipolar. • Size 4000: Tetrapolar
6	Access for electrical connection of the unit
7	Access for field elements and control signals external to the unit: • BMS communication • Cold water valve actuator (optional) • Hot water valve actuator (optional) • Electrical heater control signals (optional) • Control signals for constant flow rate or constant pressure control (optional) • Control signals for air quality sensor (CO2) (optional) • Antifrost protection sensor (hot water coil) • Unit alarm signal • Operating mode signals (Unoccupied/ECO/Comfort) • Display (optional)
8	Terminal block for component connection and external signals (to be made by the installer)
9	USB connection for connecting the WLAN Stick (optional)
10	IP port for BACnet IP communication

Table 8. Electrical panel components.

5.4. External Electrical Connections (To Be Made by the Installer)

Before making the electrical connections, use the unit's electrical diagram. In the event of discrepancies between the following table and the electrical diagram, the information in the electrical diagram will prevail over the table.

Terminal block	Terminal	Description	Comment
	PE	Ground (electrical connection).	Yellow/green terminal
Magnetothermal	2	Neutral (electrical connection).	Used for 400 V 3~ / 230 V 1~.
Magnetothermal	4	L1 (electrical connection).	Used for 400 V 3~ / 230 V 1~.
Magnetothermal	6	L2 (electrical connection).	Used for 400 V 3~.
Magnetothermal	8	L3 (electrical connection).	Used for 400 V 3~.
X7	1	KNX+. Display.	Bus communication only display.
X7	2	KNX-. Display.	Bus communication only display.
X8	1	Modbus RTU-RS485 (+).	BMS communication.
X8	2	Modbus RTU-RS485 (-).	BMS communication.
X8	3	Modbus RTU-RS485 (Ref).	BMS communication.
X3	1	Common. Speed selector.	Common contact. Potential free contact.
X3	2	Speed selector. Unoccupied mode. (1-2)	Potential free contact.
X3	3	Speed selector. Eco mode. (1-3)	Potential free contact.
X3	4	Speed selector. Comfort mode. (1-4)	Potential free contact.
X2	16	24Vdc (-). Pressure transducer. BP3.	24Vdc reference. Constant flow rate or pressure control.
X2	17	24Vdc (+). Pressure transducer. BP3.	24Vdc. Constant flow rate or pressure control.
X2	18	Modbus (+). Pressure transducer. BP3.	Constant flow rate or pressure control.
X2	19	Modbus (-). Pressure transducer. BP3.	Constant flow rate or pressure control.
X2	20	Modbus (ref). Pressure transducer. BP3.	Constant flow rate or pressure control.
BP3	24Vout	Air quality sensor (G). BQ1. Electrical power supply.	24Vdc. Air quality sensor.
BP3	GND	Air quality sensor (G0). BQ1. Electrical power supply.	Reference. Air quality sensor.
BP3	AI2	Air quality sensor (AI2). BQ1. Control signal.	0-10Vdc. Air quality sensor.
X2	4	Cold water valve actuator (+). Electrical power supply.	24Vdc. Cold water or combined valve (2P).
X2	6	Cold water valve actuator (-). Electrical power supply.	Reference. GND-0Vdc. Cold water or combined valve (2P).
X2	5	Cold water/DX valve actuator. Control signal.	0-10Vdc. Cold water/combined (2P)/DX valve.

X2	7	Hot water valve actuator (+). Electrical power supply.	24Vdc. Hot water valve.
X2	9	Hot water valve actuator (-). Electrical power supply	Reference. GND-0Vdc. Hot water valve.
X2	8	Hot water valve actuator. Control signal.	0-10Vdc. Hot water valve.
X4	1	Antifrost protection sensor. Hot water coil.	NTC 10K.
X4	2	Antifrost protection sensor. Hot water coil.	NTC 10K.
X6	1	Unit general alarm signal. DO.	Potential free contact.
X6	2	Electrical Heater. On/Off control signal. DO.	Potential free contact.
X9	3	Electrical Heater. On/Off control signal. DO.	230 Vac
X9	4	Resistencia eléctrica. Señal control On/Off. DO.	230 Vac
X9	1	Electrical Heater. DI alarm signal.	Potential free contact.
X9	2	Electrical Heater. DI alarm signal.	Potential free contact.
X9	5	S/W switch. NO: HEAT (W). NC: COOL (S).	Potential free contact.
X9	6	S/W switch. NO: HEAT (W). NC: COOL (S).	Potential free contact.

Table 9. External electrical connections.

5.5. WLAN Stick

Device allowing access to unit settings. If the unit does not have a display or BMS communication, this device must be used to access the unit's settings and alarms.

In addition to the WLAN Stick, it is necessary to download the ABTGo app. More detailed information is available in the documentation provided with the accessory.

Figure 14. WLAN Stick connection.

5.6. BMS Connections

- The communication protocols that can be used for CLEVA units are:
- Modbus RTU. Terminals 1, 2 and 3 of terminal block X8.
- BACnet IP. Use the RJ45 connector on the electronic board.

Attached to this document are the control variables for both the Modbus and BACnet protocols.

Figure 15. BMS connection. BACnet IP protocol.

5.7. Drainage

The unit has two condensate trays installed under the plate exchanger for any condensation on its fins, due to extract and supply air conditions. Any water condensation will occur on the side of the air expelled from the plate exchanger, originating in the room.

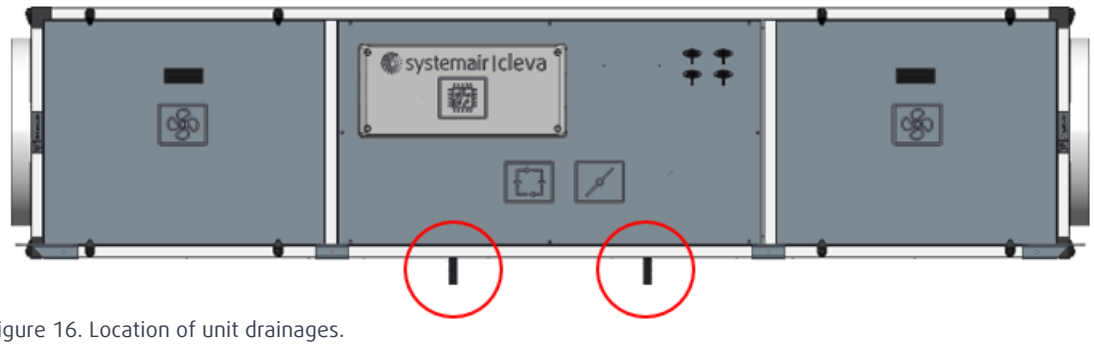


Figure 16. Location of unit drainages.

The installer must install a siphon in the appropriate drainage pipe to ensure proper drainage. The other drain must be sealed/closed to avoid potential air bypass.

Unit drain diameter: Ø1/2".

Pressure [Pa]	Minimum H1 [mm]	H2 [mm]
500	100	40
750	150	55

Table 10. Siphon height.

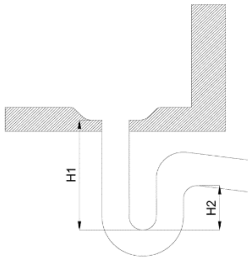


Figure 17. Siphon dimensions.

5.8. Remote Control Installation (Display)

An optional remote control can be supplied with the unit.

For proper installation, follow the instructions in the manual provided with the remote control itself.

Electrical panel electrical connection: Terminals 1 and 2 of terminal block X7. See electrical diagram supplied with the unit.

Type of cable to use: 2-wire twisted pair: Section 0.5 - 1.5 mm^2. Maximum length < 1000 m.5.8.1.

5.8.1. Dimensions

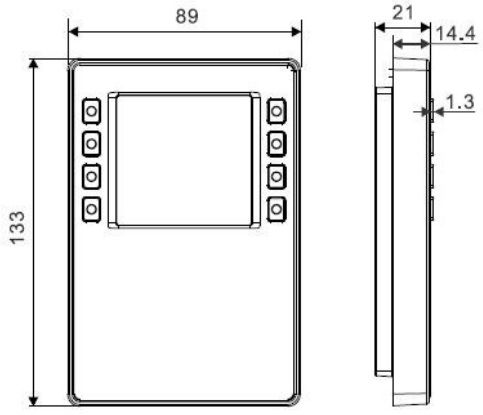


Figure 18. Housing dimensions.

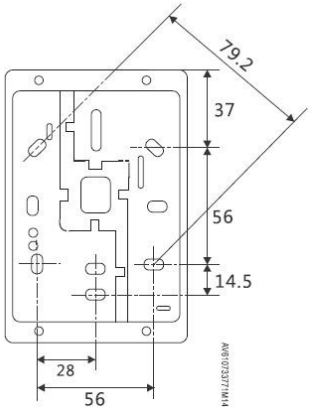


Figure 19. Dimensions for assembly.

6. Unit Features

6.1. Main Components

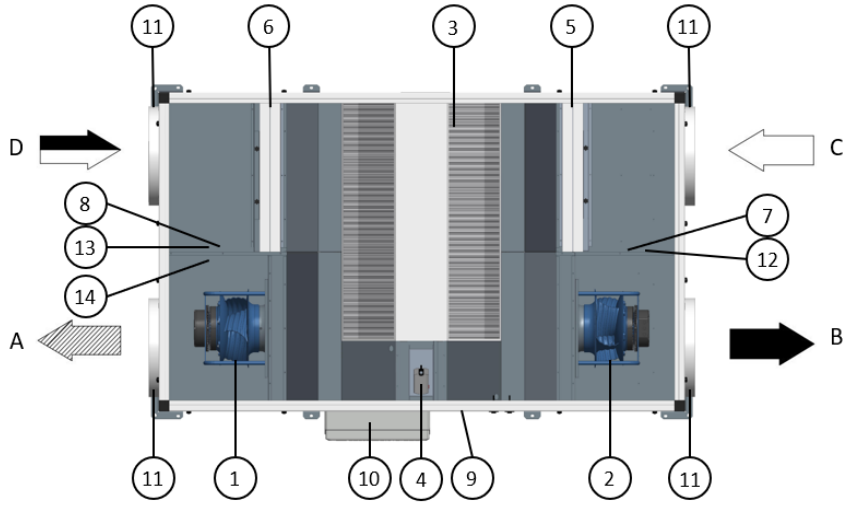


Figure 20.

Position	Description
A	Supply air
B	Exhaust air
C	Outside air
D	Extract air
1	Supply fan
2	Exhaust fan.
3	Heat recovery unit.
4	Bypass damper actuator.
5	Supply air filter. 1 or 2 filtering stages (Optional).
6	Extract air filter. 1 or 2 filtering stages (Optional).
7	Supply air filter pressure switch.
8	Extract air filter pressure switch.
9	Pressure transducer for constant flow rate or pressure control or air quality (CO2) sensor. Assembly and connections to be made by the installer (Optional).
10	Electrical panel.
11	Openings for circular ducts.
12	Outdoor temperature sensor.
13	Extraction temperature sensor.
14	Supply temperature sensor.

Table 11. Main internal and external components.

6.2. Description of Main Components and Features

6.2.1. Exhaust and Supply Fans

The unit fans are external rotor EC (electronically commutated) fans with individual proportional control signals sent from the unit controller.

There are 3 different types of fan control: by point/percentage, constant air flow and constant air pressure.

Only one control mode can be active and the operating mode must be the same for both the supply and exhaust fan.

The unit control mode is established in the unit settings. To change the control mode, contact Systemair's Technical Service.

1. Fan speed control by points/percentage [%]

There are 3 operating modes with their respective set points defined by control signal percentages. The operating modes with their established speed percentages are:

- COMFORT mode: 100%.
- ECO mode: 75%.
- UNOCCUPIED mode: 50%.

2. Constant air flow control in duct (CAV)

For this type of regulation, it is necessary to install the optional pressure transducer supplied by Systemair.

It must be assembled according to the manual supplied with the component and the unit's electrical diagram.

There are 3 operating modes with their respective set points [m^3/h]:

- COMFORT mode: Nominal flow rate defined by the customer [m^3/h].
- ECO mode: 75% of nominal flow rate [m^3/h].
- UNOCCUPIED mode: 50% of nominal flow rate [m^3/h].

When there is air quality control of the unit, the OFF and ECO air flow rates are considered as minimum values to define the operating ramp of the air quality control. See section 6.2.8**.**

3. Constant pressure control in duct (VAV)

For this type of regulation, it is necessary to install the optional pressure transducer supplied by Systemair.

It must be assembled according to the manual supplied with the component and the unit's electrical diagram.

There are 3 operating modes with their respective set points [Pa]:

- COMFORT mode: Nominal pressure defined by customer [Pa].
- ECO mode: 75% of nominal pressure [Pa].
- UNOCCUPIED mode: 50% of nominal pressure [Pa].

With constant pressure unit control, air quality control is disabled.

When the unit is subject to air quality control, the UNOCCUPIED and ECO air flow rates are considered minimum values for defining the air quality control operating ramp. See point 6.2.8.

6.2.2. Heat/Energy Recovery Units

CLEVA recovery units are counter flow aluminium plate units, with an exclusive fin design, ensuring high heat recovery performance with low pressure loss values, making the unit more efficient.

The purpose of the heat/energy recovery unit is to recover energy (heat/cold) from the extract air to transfer it to the supply air, thus increasing unit energy savings.

To prevent freezing on the heat recovery fins, for outside temperatures below -5 ºC, antifreeze protection is activated in two stages. In the first stage, the bypass damper is opened, and in the second, air flow rates are reduced to promote heat exchange with the extract air, thus raising the temperature of the exhaust air.

See Section 6.2.6 to check the management of the unit's cold/heat stages.

The recovery unit is installed on a tray with double drainage to prevent potential water condensation. The installer must install a siphon in the appropriate drainage to ensure proper drainage. The other drain must be sealed/closed to avoid potential air bypass.

6.2.3. Freecooling. Bypass Damper

The plate exchanger has a bypass damper that will be activated by the equipment controller during the freecooling operating mode, to increase energy savings in the installation. In this mode of operation, outside air is supplied directly (after being filtered) to the room to be air-conditioned, without needing to exchange its energy with the extract air.

Freecooling is activated when the following conditions are met:

- The outside temperature is sufficiently low compared to the extraction or room temperature.
- The extraction/room temperature is higher than the extraction temperature set point + the hysteresis

defined for the freecooling mode.

- The outside temperature is higher than the minimum outside air temperature set point for activating freecooling.

During activation, the operating mode set is COMFORT mode and it will remain active until one of the 3 conditions is no longer met.

See Section 6.2.6 to check the management of the unit's cold/heat stages.

6.2.4. Supply and Extract Air Filters

The air filters are compact at 2", and the customer can select their efficiency:

- M5 – ePM10 60%.
- M6 – ePM10 70%.
- F7 – ePM1 55%.
- F8 – ePM1 70%.
- F9 – ePM1 80%.

For both the supply and extract air flow, it is possible to mount 2 filter stages in the same location. When air filters are clogged, they must be replaced with new ones with the same performance.

6.2.5. Air Filter Pressure Switches

Each unit has two differential pressure switches installed in each of the air filtering modules (air supply and extraction). Its function is to measure the differential pressure in the supply and extract air filters, so that when the pressure reaches the value set on the device, it activates an alarm signal from the controller, indicating that a filter change is required.

The two pressure switches are connected in series, so the alarm signal is shared by both.

6.2.6. Temperature Sensors

There are 3 temperature probes (NTC) installed inside the unit:

- Supply air temperature sensor.
- Extract air temperature sensor.
- Outdoor air temperature sensor.

There are 3 different set points associated with the 3 operating modes:

- COMFORT mode.
- ECO mode.
- UNOCCUPIED mode.

Temperature control is carried out by cascade extraction. This type of control is aimed at maintaining room temperature at the established set point, balancing potential internal heat fluctuations and adjusting the internal set point of the supply temperature.

The temperature sensor used for this control is the extraction probe located inside the unit. If the remote control is installed in the room, the remote control sensor itself will be used for this control.

The following figure shows the sequence of the different cold and heat stages available in CLEVA units. If the selected unit does not have a cold or heat stage, the unit control will not be set to manage it. The switch between the different stages is carried out through an inner PI control loop.

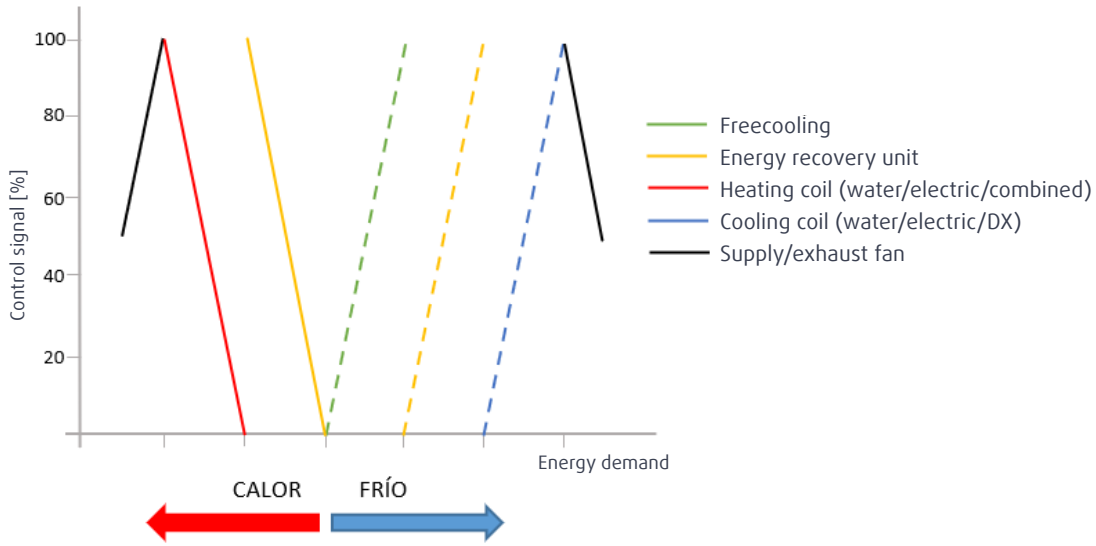


Figure 21. Sequence of unit cold and heat stages.

The unit's cooling sequence is as follows:

1. Activation of the freecooling damper (plate recovery bypass).
2. Deactivation of the freecooling damper (recovery of energy from the extract air).
3. Activation of cooling coil (water/DX/combined coil (2P)).

The unit's heating sequence is as follows:

1. Recovery of energy from extract air.
2. Activation of heating coil (water/electric resistance/combined coil (2P)).

6.2.7 Pressure Transducer

An optional pressure transducer can be supplied to manage the unit by constant flow rate (CAV) or pressure (VAV).

Depending on the pressure read by the transducer (independent supply and extraction values), the controller will send an independent signal to the fans to obtain the established set point.

Read the manual supplied with the optional transducer for more information on assembly, as well as the electrical diagram provided with the unit.

6.2.8. Air Quality Sensor (CO2).

An optional air quality sensor can be supplied to manage the supply of outside air based on the air quality read in the unit return/extraction. In addition to the air quality sensor, assembly and electrical connection of the pressure transducer is required to manage the supplied flow of outside air.

Sensor measurement range: 0 – 2000 ppm.

There are 3 operating modes with their respective set points [ppm]:

- COMFORT mode: 1000 ppm.
- ECO mode: 800 ppm.
- UNOCCUPIED mode: 600 ppm.

Depending on the set point established for each operating mode and the value read by the sensor, the unit control will change the amount of outside air brought into the room to improve air quality. Regulation is carried out through a PI control loop, and the maximum speed of the fans is the value defined in the COMFORT mode and the minimum speed is the value defined by the active operating mode.

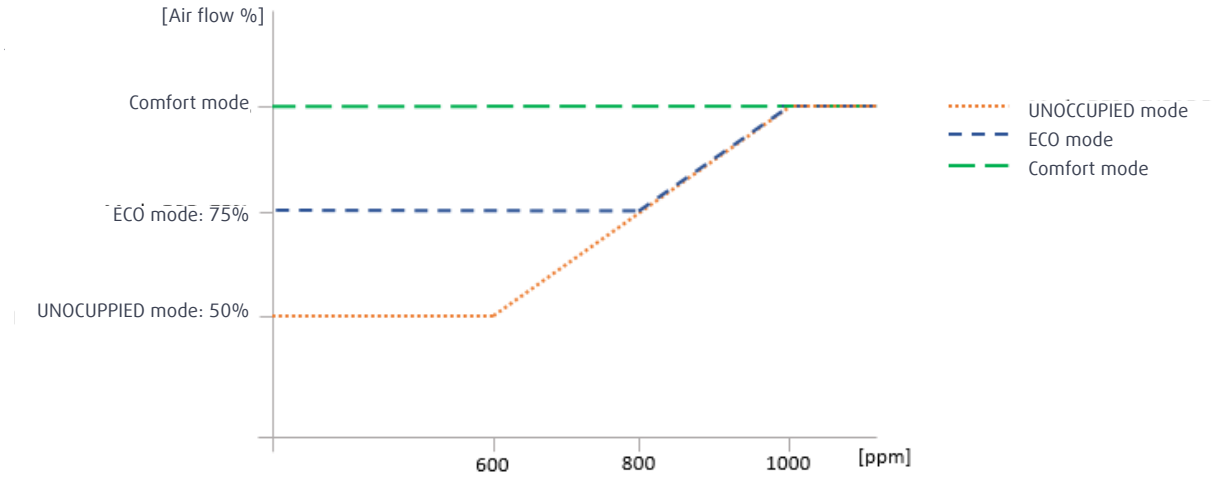


Figure 22.

Read the manual supplied with the optional transducer for more information on assembly, as well as the electrical diagram provided with the unit.

6.2.9. User Interface

It is possible to control the unit by:

- Remote control. See remote control manual.
- 3 digital inputs to select (see Table 7 and the electrical diagram of the unit):
  - Unoccupied mode. Activates temperature and fan speed set points associated with unoccupied mode.
  - ECO mode. Activates temperature and fan speed set points associated with ECO mode.
  - Comfort mode. Activates temperature and fan speed set points associated with comfort mode. Comunicación BMS.
- BMS communication. Attached to this document are the control variables for both the Modbus and BACnet protocols.
  - ModBus RTU.
  - BacNet IP.

6.2.10. Chilled Water Coil

An optional 1-stage chilled water coil can be supplied. This coil is supplied as an additional module that the installer must install in the installation's supply air duct. The water flow control valve will not be supplied with the optional coil.

The cold signal is activated when the flow temperature is higher than the set point. Regulation is carried out through a PI control loop.

The water valve control signal is 0-10Vdc.

One (water or electric) heat stage and one (water or DX) cold stage can be managed in the unit.

See Section 6.2.6 to check the management of the unit's cold/heat stages.

Read the manual supplied with the optional transducer for more information on assembly, as well as the electrical diagram provided with the unit.

6.2.11. Hot Water Coil

An optional 1-stage hot water coil can be supplied. This coil is supplied as an additional module that the installer must install in the installation's supply air duct. The water flow control valve will not be supplied with the optional coil.

To avoid freezing of the water coil, a temperature sensor is supplied with the coil to measure the temperature of the inlet water and must be electrically connected to the unit according to its electrical diagram.

This sensor makes it possible to manage the hot water coil antifreeze protection both during unit operation and when the unit is not in operation.

1. During unit operation:
    - Stage 1 – freeze risk: If the water temperature is lower than the freeze risk set point (for example 10 ºC), the hot water valve will regulate the hot water inlet until the set point is exceeded. At that point, the antifreeze protection will be disabled.
    - Stage 2 – frost protection: If the water temperature continues to drop to the antifrost protection set point (for example 5 ºC), the water valve will open 100%, the fans will turn off and the unit will trigger the antifrost alarm. The unit will restart after the triggered alarm has been reset and the water temperature is higher than the freeze risk set point (for example, 10 ºC).
2. During unit operation: If the hot water inlet temperature is lower than the freeze risk set point when the unit is not operating (for example, 25 ºC), the unit will begin to regulate the water valve until the set point is exceeded. If the temperature continues to drop up to the antifrost protection set point (for example, 5 ºC), the unit will trigger the antifrost alarm.

When the antifrost protection is active, unit temperature control (cascade temperature control) is not a priority, since the antifrost protection prevails.

The water valve control signal is 0-10Vdc.

One (water or electric) heat stage and one (water or DX) cold stage can be managed in the unit.

See Section 6.2.6 to check the management of the unit's cold/heat stages.

Read the manual supplied with the optional transducer for more information on assembly, as well as the electrical diagram provided with the unit.

6.2.12. Combined Water Coil (2P)

An optional 1-stage combined water coil (2P) can be supplied. . This coil is supplied as an additional module that the installer must install in the installation's supply air duct.

The combined water coil is used in 2-pipe (2P) installations, in which it can be used as a hot or chilled water coil, depending on the needs of the room.

The required operating mode (COOL/HEAT) is selected through the digital input enabled for that function. See the external electrical connections table and electrical diagram.

- NO Contact: HEAT mode (Winter).
- NC Contact: COOL mode (Summer).

The antifrost protection sequence is the same as the one explained in the previous point for the hot water coil.

The control signal for the water valve is 0-10Vdc.

One (water or electric) heat stage and one (water or DX) cold stage can be managed in the unit.

See Section 6.2.6 to check the management of the unit's cold/heat stages.

Read the manual supplied with the optional transducer for more information on assembly, as well as the electrical diagram provided with the unit.

6.2.13. Direct Expansion (DX) Coil

An optional 1-stage direct expansion (DX) water coil can be supplied. This coil is supplied as an additional module that the installer must install in the installation's supply air duct.

The cold signal is activated when the flow temperature is higher than the set point. Regulation is carried out through a PI control loop.

The control signal for the direct expansion system is 0-10Vdc.

One (water or electric) heat stage and one (water or DX) cold stage can be managed in the unit.

See Section 6.2.6 to check the management of the unit's cold/heat stages.

Read the manual supplied with the optional transducer for more information on assembly, as well as the electrical diagram provided with the unit.

6.2.14. Electrical Heater

An optional 1-stage electrical heater can be supplied. This coil is supplied as an additional module that the installer must install in the installation's supply air duct.

The electrical heater control signal is On/Off. The unit also has two terminals for connecting the electrical heater overheating alarm. When the electrical heater alarm is activated, the unit stops the electrical heater signal, as well as the unit fans.

One (water or electric) heat stage and one (water or DX) cold stage can be managed in the unit.

See Section 6.2.6 to check the management of the unit's cold/heat stages.

The installer is responsible for the electrical connection and its protection.

Read the manual supplied with the optional transducer for more information on assembly, as well as the electrical diagram provided with the unit

Danger

- Ensure that the unit is de-energised before carrying out maintenance or electrical work.
- All electrical work must be carried out by duly qualified personnel in accordance with the specific rules and regulations of the locality in which the unit will be installed.

7. Maintenance

7.1. Important Information

Danger

- Ensure that the unit is de-energised before carrying out maintenance or electrical work.
- All electrical work must be carried out by duly qualified personnel in accordance with the specific rules and regulations of the locality in which the unit will be installed.

Warning

- Wait several minutes after disconnecting the unit's power as the fans may be in motion.
- Wear appropriate clothing during maintenance and installation operations. The unit may contain sharp or piercing parts.

7.2. Maintenance Frequencies

The following table shows the recommended preventive maintenance periods for the unit and installation. To ensure a long unit life, it is important to perform maintenance tasks according to the recommendations provided below.

Full and continuous preventive maintenance is essential for the validity of the warranty.

7.3. Maintenance Instructions

Type of maintenance	Frecuency	When needed
General unit condition.	Annual	
Inspection of panels and registers for air leaks.	Bimonthly	
Inspection of condition and tightness of air duct connections.	Annual	
Air filter change.		X
Inspection to check for absence of noise and vibrations from fans.	Quarterly	
Inspection of drainage tray and its drain pipe.	Annual	
Inspection of unit cover condition (if any).	Annual	
Inspection of anti-vibration support.	Annual	
Cleaning of recovery unit.	Annual	
Cleaning of fans.	Annual	
Cleaning of outside air section.	Annual	
Cleaning of air ducts.		X (1)
Inspection of electrical connections. Tightening of connections.	Annual	
Inspection of grounding conductors. Tightening of connections	Annual	
Inspection of regulation elements installed in the unit.	Annual	

Table 12. Maintenance frequency.
(1) Or according to local regulations.

7.3.1. Access to the Unit's Internal Components

The following table indicates the panels to be removed to access the different unit components for maintenance.

Components	Unit size	Panel or register No.
Supply air filter. Remove the upper and lower filter retention plate.	All	7/8
Extract air filter. Remove the upper and lower filter retention plate.	All	6/5
Supply fan. Remove panel opposite to that of the duct.	All	3/4 (right register) 1/9 (left register)
Exhaust fan. Remove panel opposite to that of the duct.	All	1/9 (right register) 3/4 (left register)
Plate recovery unit and condensate tray drainage. Condition and cleanliness.	All	7 or 8 and 5 or 6 and 10
Outdoor air temperature probe.	All	7 or 8
Dirty supply air filter pressure switch.	All	7 or 8
Extract air temperature probe.	All	5 or 6
Dirty extract air filter pressure switch.	All	5 or 6
Bypass damper Actuator.	All	2
Electrical connections.	All	Electrical panel

Table 13. Maintenance accesses.

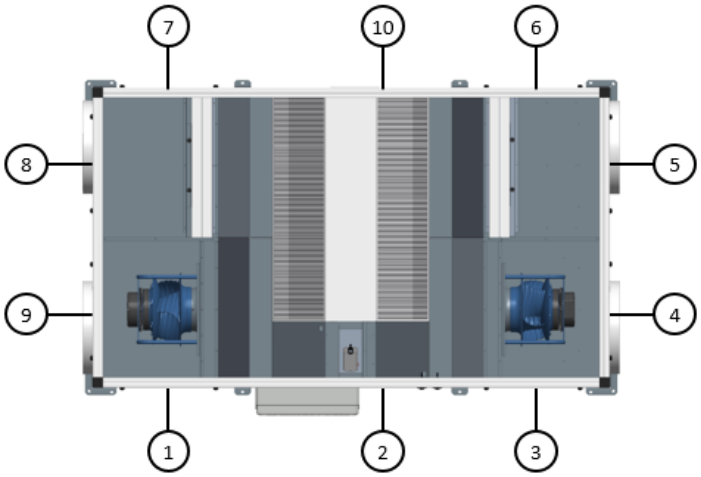


Figure 23.

7.4. Troubleshooting

Before contacting the Systemair after-sales department, review the following points and check for any active alarms on the unit. To determine the type of alarm that is active, check the display or the WLAN Stick accessory and the ABT-Go app.

Symptom	Possible causes	Possible solutions
The unit does not start.	1. Electrical power supply.	1. Check the unit's electrical connection.
	2. The fans do not start.	2. Check: • Electrical power supply. • Active alarms. • Active operating mode (by programming, manual selection or digital input).
The display does not turn on.	1. Electrical connection with the unit. 2. Communication error.	1. Check that the polarity is correct (see electrical diagram). 2. Review remote control manual.
Excessive air flow.	Excessive fan speed.	1. Load loss lower than estimated. 2. Select a lower fan speed.
Low air flow.	1. Clogged air filters. 2. Low fan speed. 3. Clogged or dirty plate recovery unit. 4. Clogged or damaged air ducts. 5. Clogged or dirty outside air intake. 6. Dirty or damaged fans	1. Check and replace air filters if they are clogged. 2. Increase fan rotation speed. 3. Remove any elements that could be obstructing the proper passage of air or clean the plate recovery unit. 4. Check that the air ducts and duct system regulation elements are clean and free of obstructions. 5. Clean the outside air intake. 6. Clean the fans or replace them if they are damaged.

Low supply temperature.	11. Low temperature set point. 2. Low outside air temperature < 10 ºC. 3. Low hot water coil water temperature (if installed). 4. Electrical heater does not work (if installed).	1. Check the unit's electrical connection. 2. Check: • Electrical power supply. • Active alarms. • Active operating mode (by programming, manual selection or digital input). 3. Check hot water valve control signal. 4. Check electrical heater control signal and alarm.
High supply temperature.	1. High temperature set point. 2. High outside air temperature. 3. High cold water coil water temperature (if installed). 4. High evaporation temperature (DX coil if installed).	1. Check assigned set points. 2. Potential need for a post-cooling device. 3. Check cold water valve control signal or chiller operation. 4. Check the DX control signal or operation of the condenser unit.
Symptoms of frozen plate recovery unit.	Very low outside air temperature < -5 ºC.	Installation of a preheating device.
Water leak.	Incorrectly installed or clogged drain.	Check for possible drainage obstructions or incorrect drainage size/installation.
High vibrations.	1. Unbalanced impeller. 2. Loose fan fixing screws. 3. Unit not installed level.	1. Check fan balance. Replace it if necessary. 2. Check tightness of fan fixing screws. 3. Check that the unit is mounted level.

Table 14. Troubleshooting.

7.5. After-Sales Service

Before contacting Systemair after-sales service, please take note of the model and serial number of the unit, as indicated on the nameplate on the unit.

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