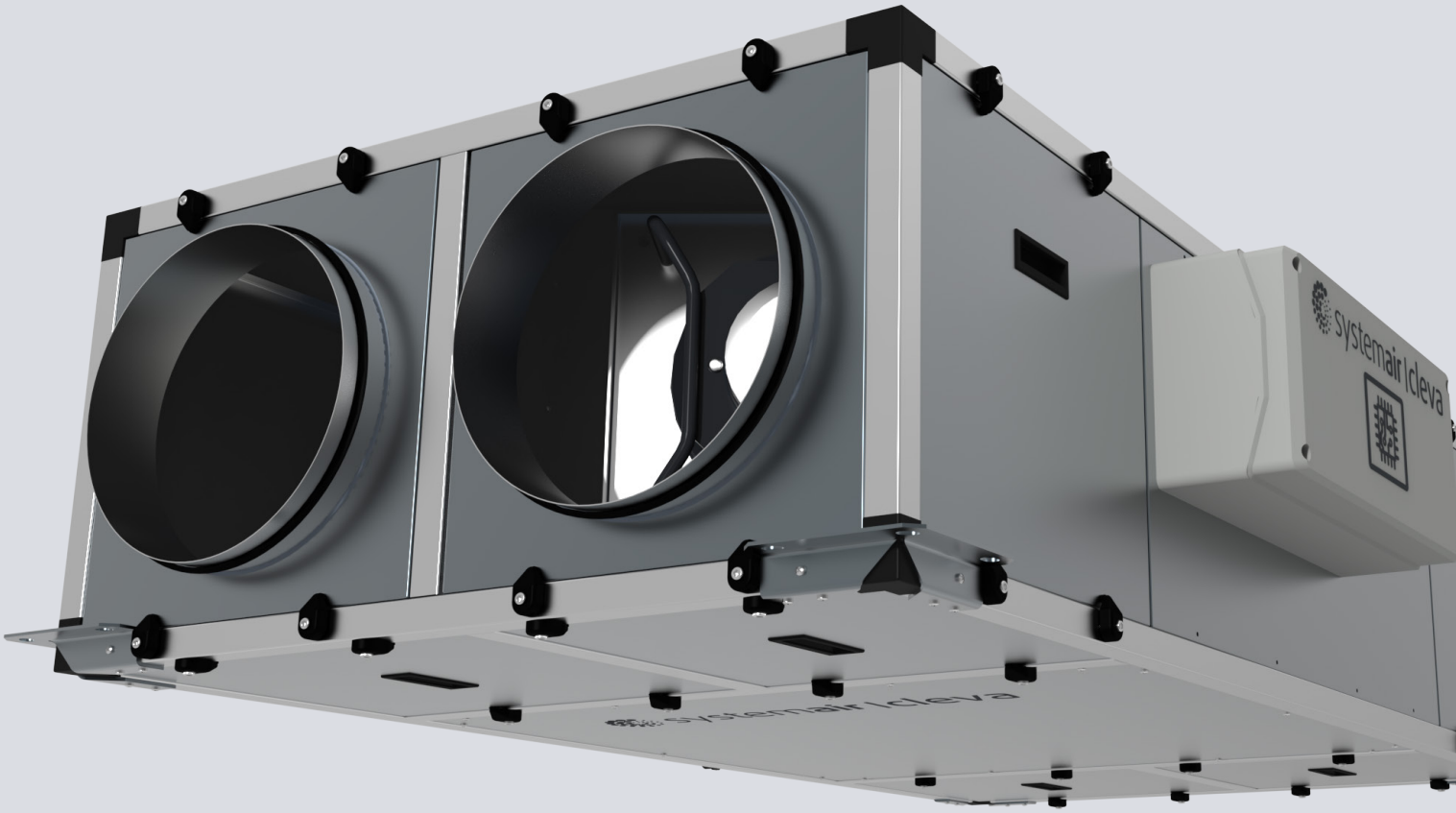
Technical documentation

Cleva
Heat recovery units

Installation, Operation and Maintenance



systemair

Contents

1. Declaration of conformity

The purpose of this document is to provide a quick and simple guide to using the remote control for Systemair's CLEVA units.

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

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

Warning

Indicates a potentially hazardous situation that may result in minor or moderate injury.

Caution

Indicates a risk of damaging the product or preventing it from operating properly

Important

All handling, installation, operation, maintenance and service tasks must be carried out by properly qualified personnel and in compliance with the specific standards and regulations of the country where the unit is installed

3. Product information

3.1. General Data

This manual applies to the range of CLEVA heat recovery units manufactured by Systemair Spain.
It provides essential technical information and specific recommendations related to the design, installation, commissioning, operation and maintenance of the units, in order to ensure optimal, safe and reliable performance throughout their service life.

The correct operation and safety of the unit directly depend on reading this manual carefully, strictly following the instructions provided, and complying with all applicable safety requirements.

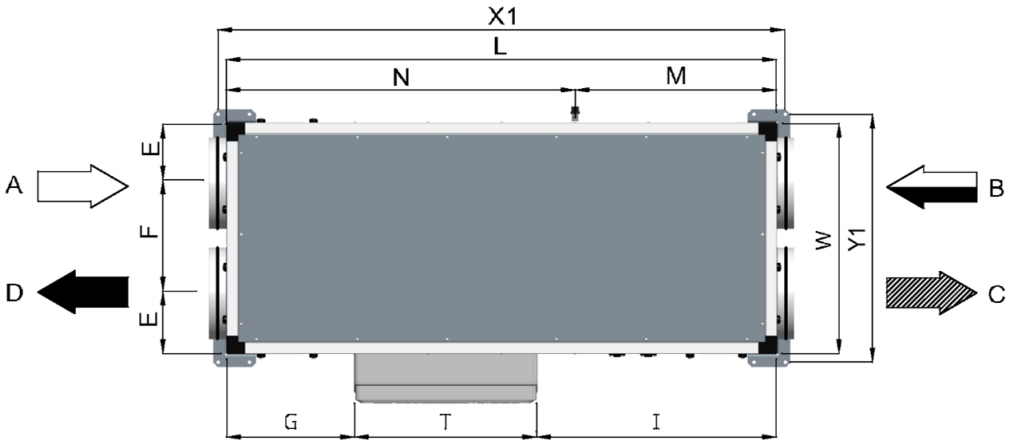
The CLEVA range includes the following models and options:

- Models: 500, 1000, 1500, 2000, 3000 and 4000.
- Right-hand or left-hand configuration: R (right) and L (left).
  - R (right): following the supply air flow direction, the electrical panel is located on the right-hand side.
  - L (left): following the supply air flow direction, the electrical panel is located on the left-hand side.
- Options:
  - Electric heater.
  - Hot water coil.
  - Chilled water coil.
  - Combined water coil (2-pipe) for heating/cooling.
  - DX coil.
  - Outdoor air pre-heating coil – On/Off signal.
  - Constant air volume (CAV) control.
  - Variable air volume (VAV) control.
  - CO_2 air quality sensor.
  - Control of external outdoor air and exhaust dampers – On/Off signal.
  - Remote control with parameter read/write access according to access level.

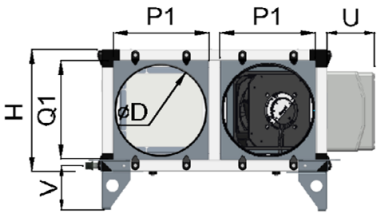
3.2. Technical Information

3.2.1. Dimensions

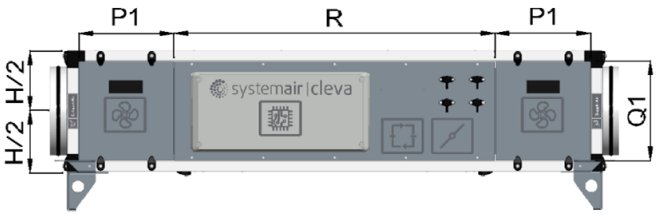
Size 500. Right register.



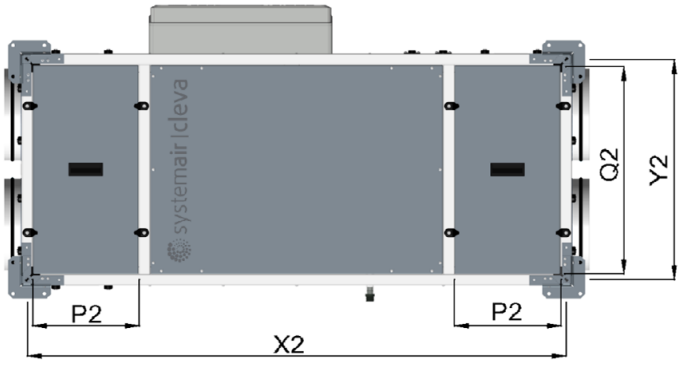
Top view



Side view



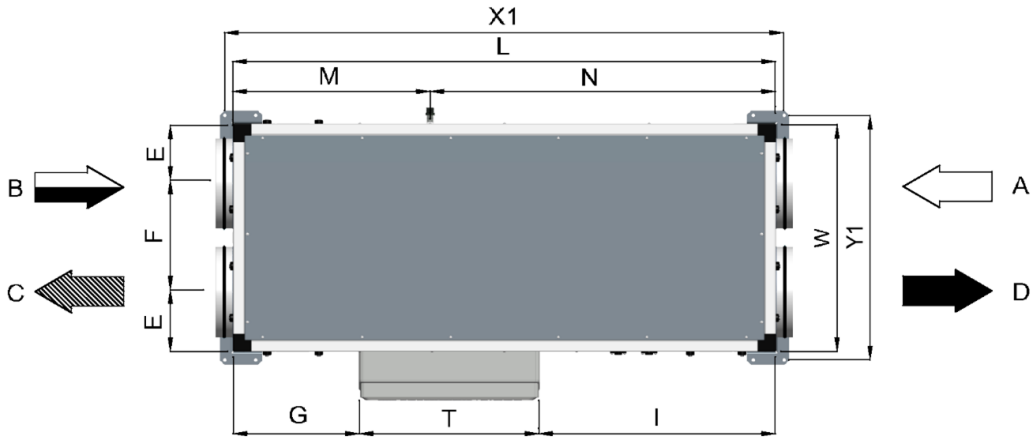
Front view



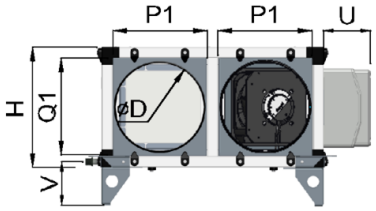
Bottom view

Symbol	Description
	Supply air
	Exhaust air
	Outdoor air
	Extract air

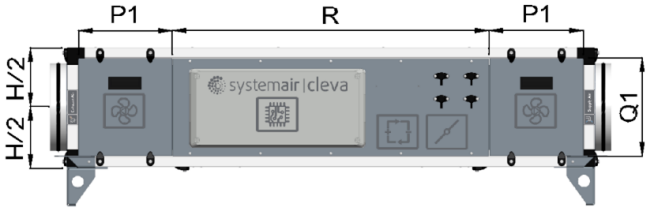
Size 500. Left register.



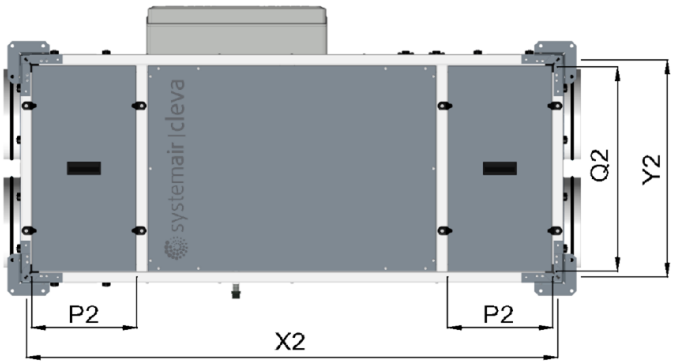
Top view



Side view



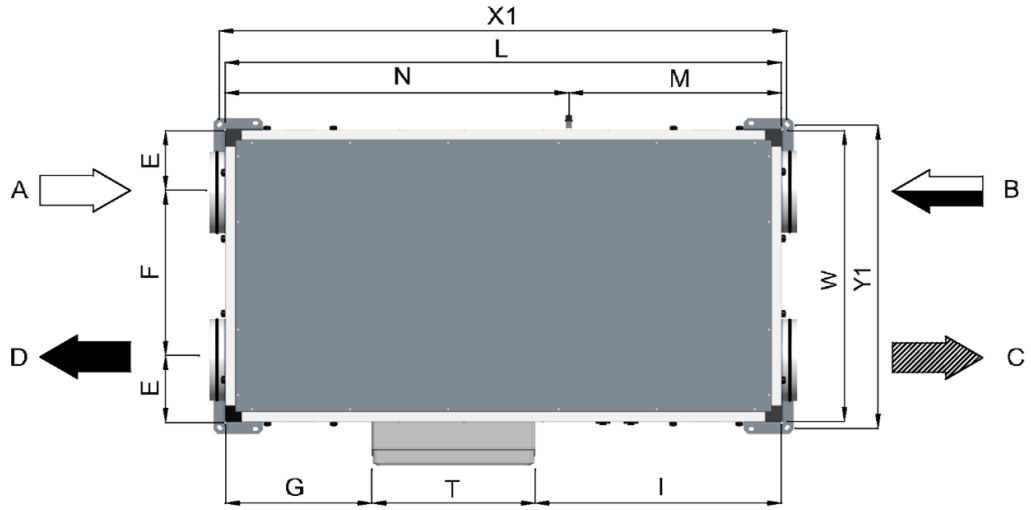
Front view



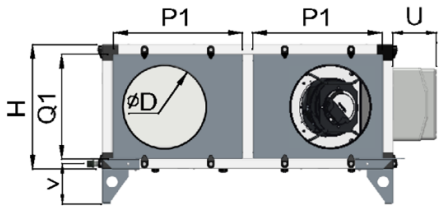
Bottom view

Symbol	Description
	Supply air
	Exhaust air
	Outdoor air
	Extract air

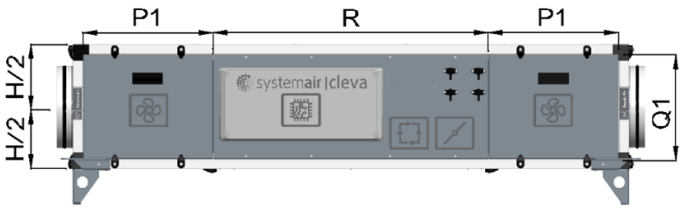
Size 1000 / 1500 / 2000. Right register.



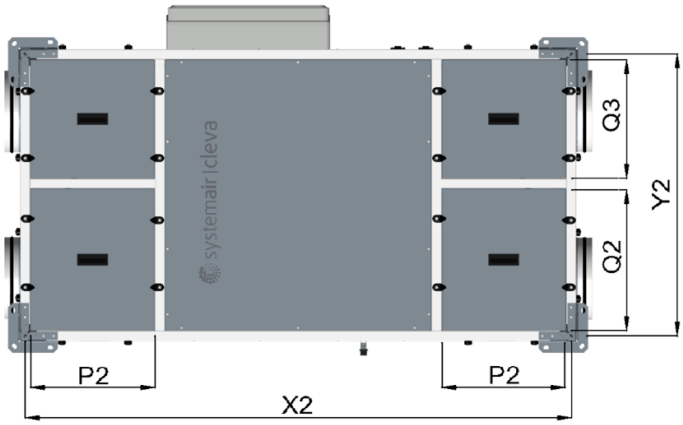
Top view



Side view



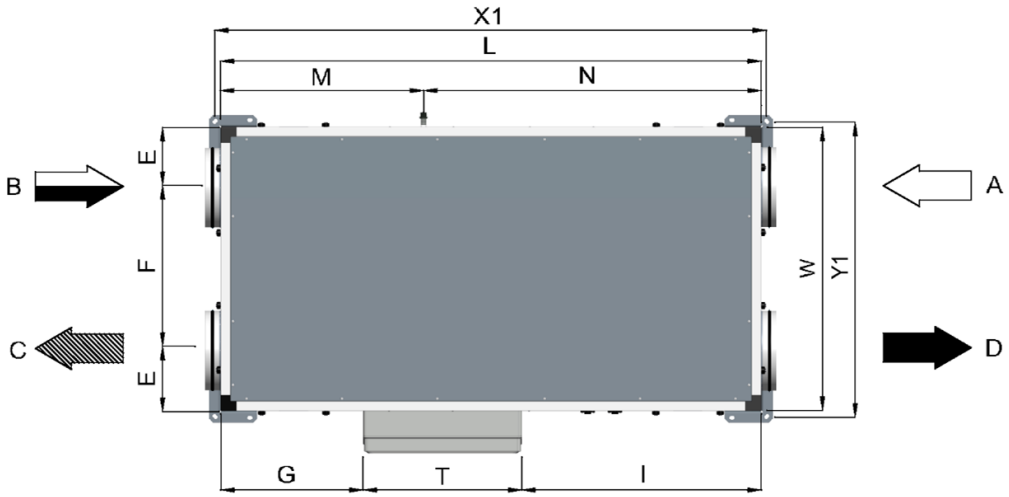
Front view



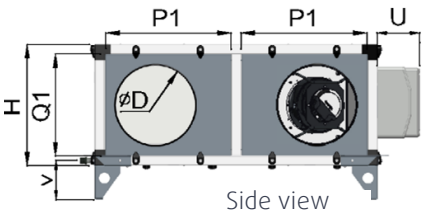
Bottom view

Symbol	Description
	Supply air
	Exhaust air
	Outdoor air
	Extract air

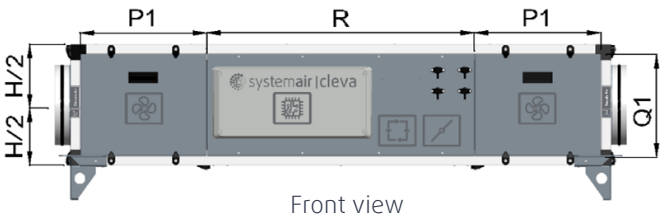
Size 1000 / 1500 / 2000. Left register.



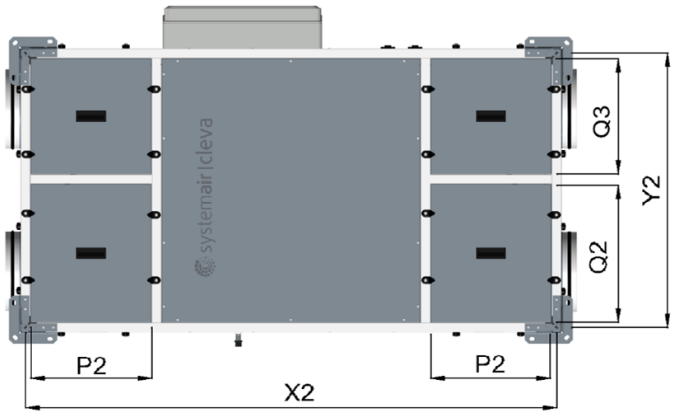
Top view



Side view



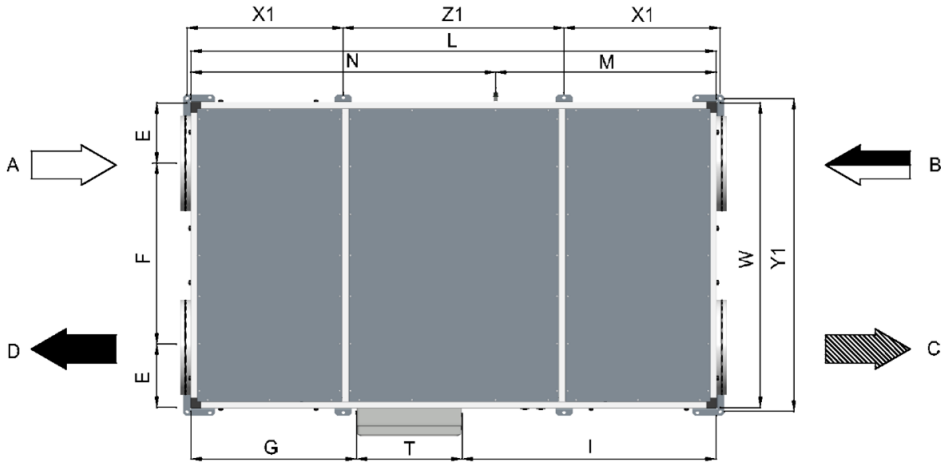
Front view



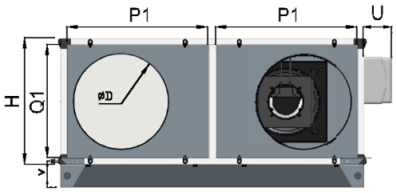
Bottom view

Symbol	Description
	Supply air
	Exhaust air
	Outdoor air
	Extract air

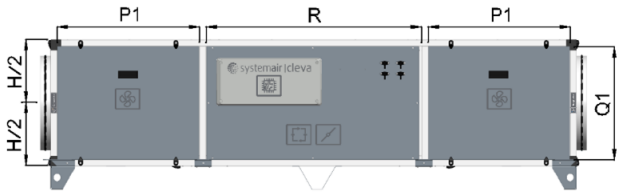
Sizes 3000 / 4000. Right register.



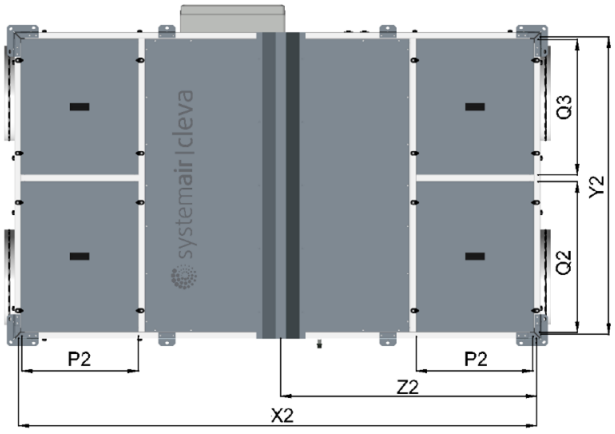
Top view



Side view



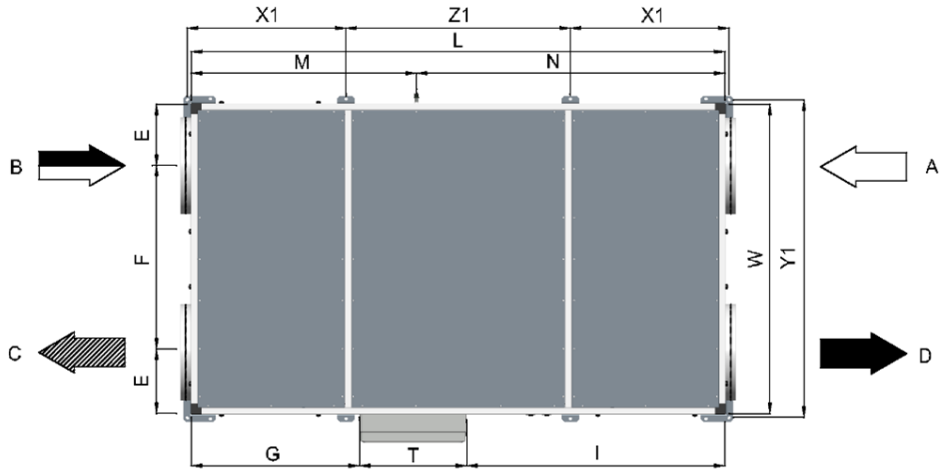
Front view



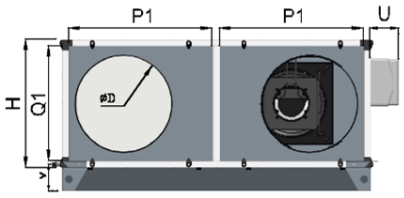
Bottom view

Symbol	Description
	Supply air
	Exhaust air
	Outdoor air
	Extract air

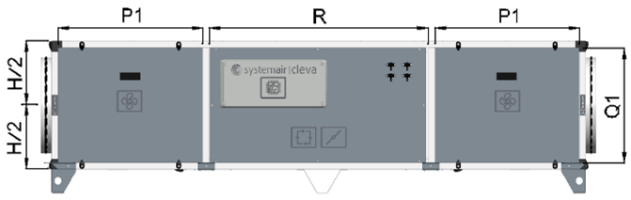
Sizes 3000 / 4000. Left register.



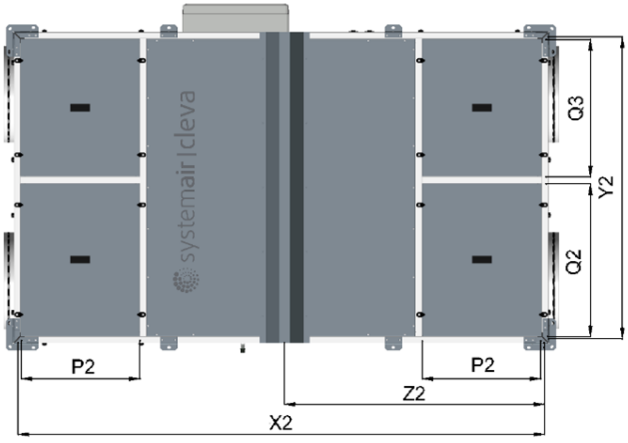
Top view



Side view



Front view



Bottom view

Symbol	Description
	Supply air
	Exhaust air
	Outdoor air
	Extract air

Model	ØD	E	F	G	H	I	L	M	N	P1	P2	Q1	Q2	Q3	R	T	U	V	W
Cleva 500	250	165	300	350	340	650	1500	550	950	266	288	278	568	N/A	900	500	135	124	630
Cleva 1000	315	229	432	450	460	750	1700	650	1050	396	380	398	433	363	840	500	135	124	890
Cleva 1500	350	246.5	467	600.5	460	949.5	2050	825	1225	431	498	398	468	398	1120	500	135	124	960
Cleva 2000	350	245.5	779	646.5	460	1033.5	2150	875	1275	586	500	398	623	553	914	500	135	124	1270
Cleva 3000	450	289	872	789	599	1211	2500	1050	1450	676	558	538	713	643	1020	500	135	124	1450
Cleva 4000	450	274	1342	1014	599	986	2500	1050	1450	896	558	538	933	863	578	500	135	124	1890

Table 1. Dimensions [mm]

Model	Ceiling mounting			Floor mounting			
	X1	Y1	Z1	X2	Y2	Z2	Z2
Cleva 500	1545	675	N/A	1460	590	N/A	N/A
Cleva 1000	1745	935	N/A	1670	860	N/A	N/A
Cleva 1500	2095	1005	N/A	2010	920	N/A	N/A
Cleva 2000	2195	1315	N/A	2110	1230	N/A	N/A
Cleva 3000	747.5	1495	1050	2460	1410	1230	1230
Cleva 4000	957.5	1935	630	2460	1850	1230	1230

Table 2. Dimensions [mm]

3.2.2. Configurations

For all sizes in the CLEVA range, the unit's duct connections can be swapped on site, according to the customer's needs, as shown in the following diagram.

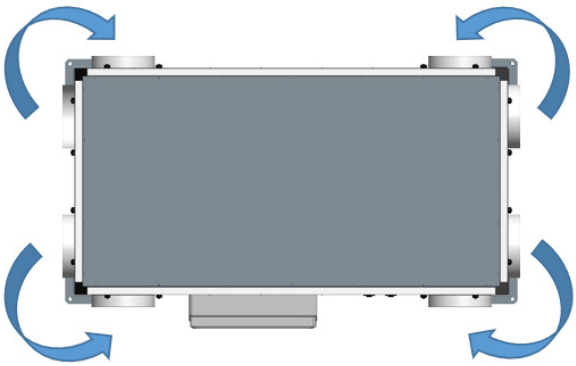


Figure 5.

The interchangeable panels are removed using four pressure latches and a 6 mm Allen key.
When reinstalling the swapped panels, the pressure latches must be tightened to prevent potential air leakage.

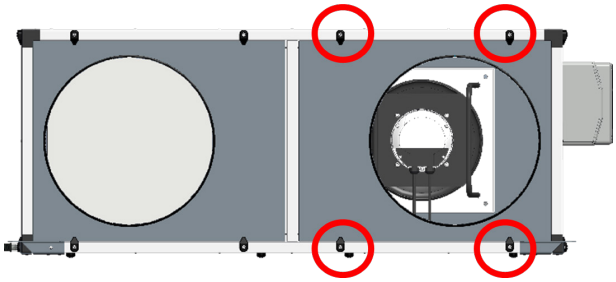


Figura 6.

3.2.3. Weights

The following table shows the weights of the different models, excluding optional components.

Model	Weight [kg]
Cleva 500	93
Cleva 1000	162
Cleva 1500	201
Cleva 2000	251
Cleva 3000	364
Cleva 4000	446

Table 3. Weight

3.2.4. Maintenance Clearances

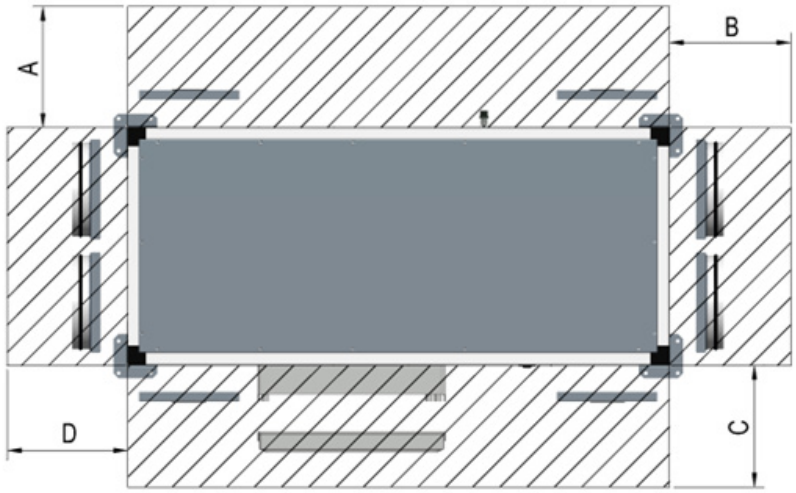


Figure 7.

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 Clearances [mm]
NOTE: The dimensions shown apply when there is an access panel or duct connection, depending on the unit configuration (panel/duct connection).

3.2.5. Electrical data

Model	Electrical Supply V/Ph/Hz+Pe	Maximum Current Draw [A]	Maximum Power Input [kW]
Cleva 500	230/1N/50+PE	3,3	0,59
Cleva 1000	230/1N/50+PE	4,9	1,25
Cleva 1500	230/1N/50+PE	4,9	1,25
Cleva 2000	230/1N/50+PE	7,5	1,85
Cleva 3000	400/3N/50+PE	5,1	3,25
Cleva 4000	400/3N/50+PE	9,1	5,75

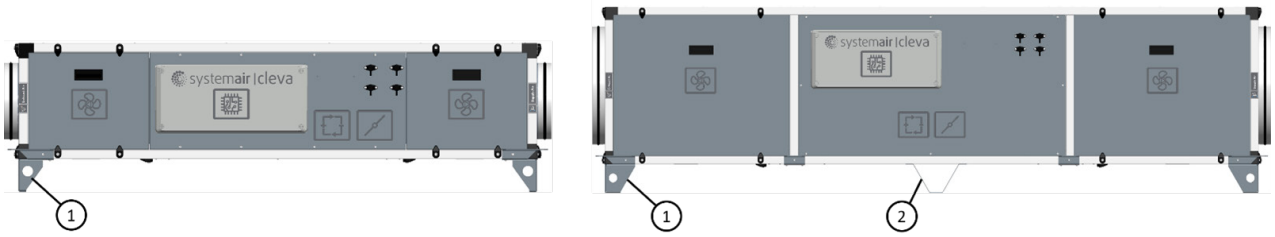
Tabl5 5. Power consumption. Without optional components.

3.3. Transport and Storage

CLEVA units must be transported and stored in a way that protects them from physical damage to the panels, handles, latches, electrical panel, etc. They must also be protected from dust, wind, rain or snow that could enter and damage the unit or its components.

The units are delivered as a single plastic-wrapped module mounted on metal feet to facilitate transport.
For sizes 500 to 2000, the units are supplied with four support feet (1), and for sizes 3000 and 4000, in addition to the four feet (1), the unit includes a central support bracket (2).

When using forklifts, the forks must be properly protected to avoid damaging the frame or the bottom panel.



Sizes 500/1000/1500/2000 Sizes 3000/4000

Figure 8.

Warning

The unit is heavy. Handle with care during transport and installation. There is a risk of crush injuries. Use appropriate protective equipment.

4. Installation

4.1. Unpacking

CLEVA units are supplied as a single plastic-wrapped module, mounted on metal feet bolted to the lower frame of the unit. If these feet are not used for installation, they must be removed by the installer.

It is recommended to verify that the delivered unit matches the order exactly. In case of any discrepancies, the official Systemair product supplier must be contacted immediately.

Access to the unit's components is possible through access panels, which are secured to the unit using pressure latches with 6 mm Allen-head screws.

4.2. Where and How to Install the Unit

CLEVA units are primarily designed for indoor installation, although they can also be installed outdoors by purchasing the specific optional roof kit.

For outdoor installations, ambient conditions must remain within the temperature range of -10 °C to 45 °C.

During installation, sufficient clearance must be provided around the unit to allow proper maintenance access, as specified in section 3.2.4.

The outdoor air intake should preferably face north or east, and must be positioned away from kitchen, bathroom, or other exhaust outlets and sources of contamination. Suitable protection must also be installed to prevent the ingress of water, insects, or animals.

Mounting accessories:

1. **Floor installation.** Use the support feet supplied with the unit for floor mounting. Refer to Table 2 to check the anchoring dimensions of the unit with the feet installed.

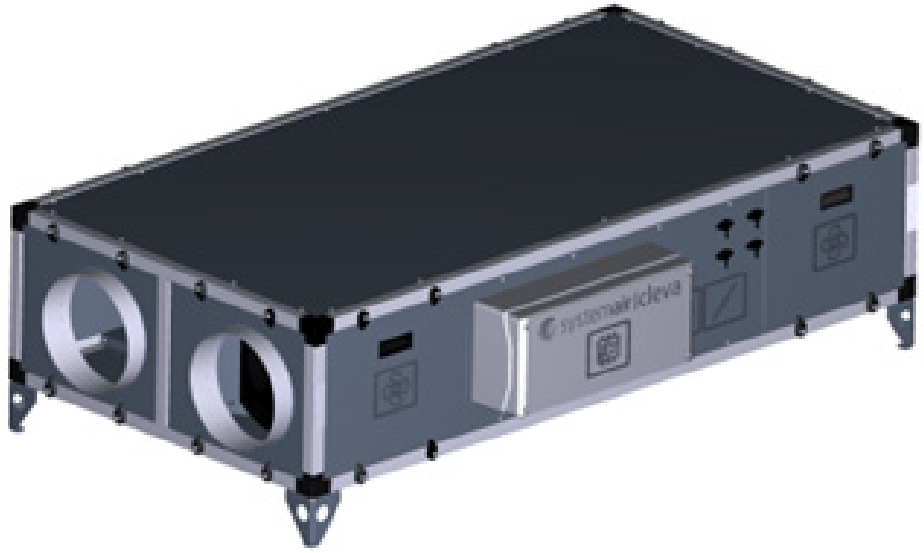


Figure 9. Unit supplied with support feet for floor installation

2. **Ceiling installation.** For ceiling mounting, use the components shown in Figure 12, which are supplied as accessories for installation on the unit. The original feet must be removed before installing these components, as both use the same anchoring points. The unit includes integrated rivet nuts in the frame to facilitate fastening of

Figure 10. Unit with ceiling mounting bracket.

the support brackets. M6 screws are also provided for attaching these components to the unit structure. Refer to Table 2 to check the anchoring dimensions of the unit with the ceiling mounting brackets.
Vibration isolators are not supplied with the unit.

Vibration isolators are not supplied with the unit.

To ensure proper installation of the unit, make sure to:

- Prepare the surface where the unit will be installed. The surface must be flat, level, and designed to support the unit's weight. Installation must comply with local standards and regulations.

- Connect the unit electrically to the mains via a circuit breaker with residual current protection. Wiring to the unit must be carried out through the electrical panel. Refer to the wiring diagram supplied with the unit and to section 5.

5. Connections

5.1. Air Ducts

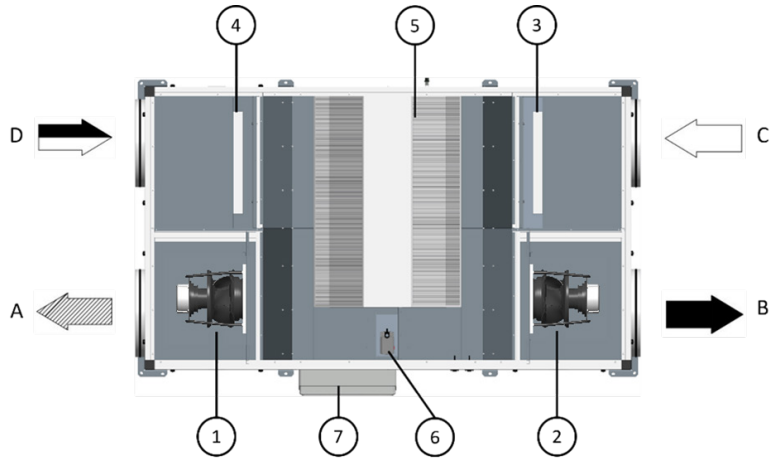


Figure 11.

Position	Description
A	Supply air
B	Exhaust air
C	Outdoor air
D	Extract air
1	Supply fan
2	Extract fan
3	Supply air filter
4	Extract air filter
5	Plate heat exchanger
6	Bypass damper (actuator)
7	Electrical panel

Table 6. Components.

Model	Duct connection diameter [mm]
Cleva 500	250
Cleva 1000	315
Cleva 1500	350
Cleva 2000	350
Cleva 3000	450
Cleva 4000	450

Table 7. Duct connection diameter

Caution

The air ducts must be insulated to avoid potential risks of condensation or performance loss.
The insulation used must comply with local standards and regulations. Proper sizing and installation of the duct insulation is especially important.

5.2. Electrical Connections

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

Access to the electrical components is gained by removing the four screws on the electrical panel cover.

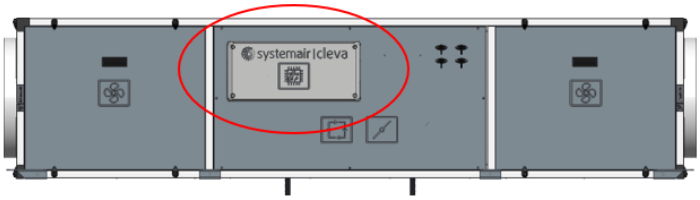


Figure 12.

The unit must not be put into operation without first reading and understanding the electrical safety precautions, as well as the wiring diagram supplied with the unit

Caution

- Ensure that the unit is de-energised before carrying out any maintenance or electrical work.
- All electrical work must be performed by properly qualified personnel and in compliance with the specific standards and regulations of the country where the unit is installed.

5.3. Electrical Connections, components

Electrical connections must be made by the installer using the terminal block inside the electrical panel, the corresponding relays depending on the selected options, and the controller itself, in accordance with the wiring diagram provided.

The electrical panel of the Cleva units has the following component layout:

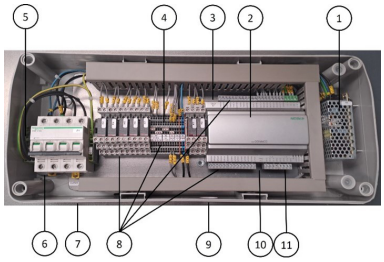


Figure 13.

Position	Description
1	Power supply
2	Controller
3	TCP/IP port for Modbus TCP-IP or BACnet IP communication
4	Internal terminal block for unit components
5	Internal terminal block for fan power supply
6	Circuit breaker: • Sizes 500 to 3000: Bipolar • Size 4000: Four-pole
7	Entry point for unit power supply
8	Terminal block for external components and signals -to be connected by the installer-
9	Access point for field devices and external control signals: • Chilled water valve actuator (optional) • Hot water valve actuator (optional) • Control signals for electric heater (optional) • Control signals for constant airflow or constant pressure control (optional) • Control signals for air quality sensor (CO_2) (optional) • Frost protection sensor (hot water coil) (optional) • On/off signal for outdoor air pre-heating coil (optional) • On/off signal for control of external outdoor air and exhaust dampers (optional) • Unit alarm signal • Fire alarm signal • Changeover signal • Operating mode signals (Normal/Reduced) • External stop signal • Display (optional)
10	RJ45 connection for Display (optional)
11	Port 1 for Modbus RTU or BACnet MS/TP communicatio

Table 8. Electrical panel components

5.4. External electrical connections (to be completed by the installer)

Before making any electrical connections, refer to the unit's wiring diagram. In case of any discrepancy between the following table and the wiring diagram, the information in the wiring diagram shall prevail.

Terminal block	Terminal	Description	Comment
	PE	Earth (power supply connection)	Yellow/green terminal
Circuit breaker	2	Neutral (power supply connection)	Used for 400 V 3\~ / 230 V 1\~
Circuit breaker	4	L1 (power supply connection)	Used for 400 V 3~ / 230 V 1~
Circuit breaker	6	L2 (power supply connection)	Used for 400 V 3~
Circuit breaker	8	L3 (power supply connection)	Used for 400 V 3~
Controller	Ext.Disp.	Display (RJ45)	Bus communication – display only
Controller		KNX-. Display	Bus communication – display only
P1	B 50	BMS Communication: RS485 (+)	BMS. Modbus RTU and Bacnet MS/TP
P1	A 51	BMS Communication: RS485 (-)	BMS. Modbus RTU and Bacnet MS/TP
P1	N 52	BMS Communication: RS485 (Ref)	BMS. Modbus RTU and Bacnet MS/TP.
X3	1/C+	Common for digital inputs (DI)	Common contact. Volt-free
Controller	DI1	Speed selector. Normal mode	Volt-free
Controller	DI2	Speed selector. Reduced mode	Volt-free
Controller	DI3	External stop	Volt-free
Controller	DI6	Changeover	Volt-free
Controller	DI7	Electric heater thermal protection (alarm)	Volt-free
Controller	DI8	Fire (alarma).	Volt-free
X2	2	Frost protection sensor. Hot water coil	PT1000.
Controller	AI4	Frost protection sensor. Hot water coil	PT1000.
X2	1	24Vdc (+). Pressure transducer. BP1	24Vdc Ctrl. by constant airflow or pressure
X2	2	24Vdc (-). Pressure transducer. BP1	Ref. Ctrl. by constant airflow or pressure.
X2	2	0V. Pressure transducer. BP1-AI1 (Supp.)	Ctrl. by constant airflow or pressure
Controller	UI1	10V. Pressure transducer. BP1-AI1 (Supp.)	Ctrl. by constant airflow or pressure
X2	2	0V. Pressure transducer. BP1-AI2 (Return)	Ctrl. by constant airflow or pressure
Controller	UI2	10V. Pressure transducer. BP1-AI2 (Return)	Ctrl. by constant airflow or pressure
K2	11-14	General unit alarm signal	Volt-free
X2	1	Air quality sensor (G). BQ1	24Vdc.
X2	2	Air quality sensor (G0). BQ1	0vdc.
Controller	UI3	Air quality sensor (AI2). BQ1	0-10Vdc.
X2	2	Outdoor preheating sensor	0vdc.
Controller	UI4	Outdoor preheating sensor	0-10Vdc.
K3	11-14	On/Off (NO). Cooling coil (water/DX/2P)	Volt-free
K4	11-14	On/Off (NO). Heating coil (water / DX / 2P / Electric heater)	Volt-free
K5	11-14	On/Off (NO). Outdoor air/exhaust dampers	Volt-free
K6	11-14	On/Off (NO). Preheating	Volt-free
K7	11-14	On/Off (NO). Running indication	Volt-free

Table 9. External electrical connections

X2	2	Chilled water valve actuator (-) Power supply	Reference. GND-0Vdc Chilled or combined valve (2P)
Control	AO3	Cooling signal (water/DX/2P) Control signal	0-10Vdc. Chilled or combi. valve (2P) / DX.
X2	1	Hot water valve actuator / Electric heater (+) Power supply	24Vdc. Heating valve
X2	2	Hot water valve actuator / Electric heater (-) Power supply	Reference. GND-0Vdc. Heating valve
Control	AO4	Señal de calor (agua/resis. eléctrica) Señal de control.	0-10Vdc. Heating valve

5.5. BMS Connections

The communication protocols that can be used with CLEVA units are:

- Modbus RTU and BACnet MS/TP: Terminals B50, A51 and N52, terminal block P1 (controller).
- Modbus TCP/IP and BACnet IP: Use the controller's RJ45 connector.

The control variables for both Modbus and BACnet protocols are provided in the annex to this document.

Figure 14. BMS Connection

5.6. Drainage

The unit includes a condensate tray installed beneath the plate heat exchanger to collect any condensation that may form on the fins due to the conditions of the extract and outdoor air.
Any potential water condensation will occur on the exhaust air side of the plate heat exchanger, coming from the room.

Figure 15. Unit drainage location

The installer must install a siphon in the corresponding drain pipe to ensure proper water drainage.
Unit drain diameter: Ø1/2"-M

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

Table 10. Siphon height

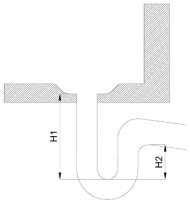


Figure 16. Siphon dimension

5.7. Remote Controller (Display) Installation

As an option, the unit can be supplied with a remote controller for operation.
For proper installation, follow the instructions provided in the manual delivered with the controller.
Use the RJ45 connector on the controller (Ext.Disp.).

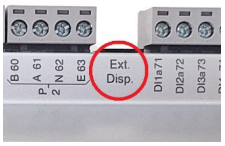


Figure 17. Remote display connection

5.7.1. Dimensions

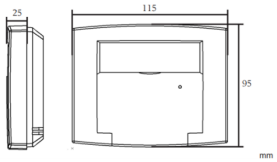


Figura 18. Remote display connection

6. Unit functionalities

6.1. Main components

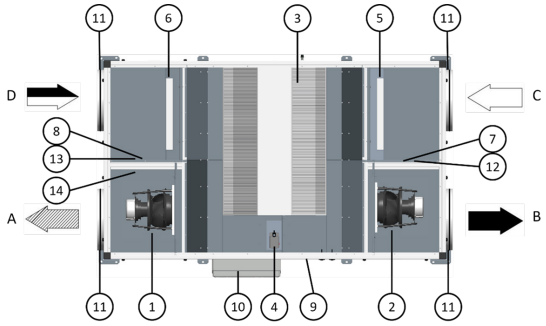


Figure 19.

Position	Description
A	Supply air
B	Exhaust air
C	Outdoor air
D	Extract air
1	Supply air fan
2	Extract air fan
3	Heat exchanger
4	Bypass damper actuator
5	Supply air filter. 1 or 2 filtration stages (optional)
6	Extract air filter. 1 or 2 filtration stages (optional)
7	Supply air filter pressure switch
8	Extract air filter pressure switch
9	Pressure transducer for constant airflow or pressure control, or air quality sensor (CO_2). Installation and wiring to be carried out by the installer (optional).
10	Electrical panel
11	Duct connections for circular ducts
12	Outdoor temperature sensor
13	Extract air temperature sensor
14	Supply air temperature sensor

Table 11. Internal and external main components

6.2. Description of Main Components and Functionalities

6.2.1. Extract and supply fans

The fans are EC type (electronically commutated) with external rotor and individually controlled proportional signal managed by the unit's controller.

There are three different fan control modes: fixed points/percentage, constant airflow, and constant pressure.

Only one control mode can be active at a time, and the operating mode must be the same for both the supply and extract fan.

The unit's control mode is defined during configuration. If a change in control mode is required, please contact Systemair Technical Support.

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

   There are two operating modes, each with predefined set points expressed as percentages of the control signal. The operating modes and their corresponding speed percentages are:

   • NOMINAL (Normal) mode: 100%

   • REDUCED (Low) mode: 50%

   When the unit is controlled based on air quality, the airflow rates used will depend on the operation ramp of the air quality control. See section 6.2.8.

2. Control air volume (CAV)

   This type of control requires the installation of the pressure transducer supplied by Systemair as an optional component.

   The installation must be carried out according to the manual provided with the component and the unit's wiring diagram.

   There are two operating modes, each with its corresponding setpoints \[m^3/h]:

   • NOMINAL (Normal) mode: Nominal airflow defined by the customer \[m^3/h]

   • REDUCED (Low) mode: 50% of the nominal airflow \[m^3/h]

   When the unit is controlled based on air quality, the airflow rates used will depend on the operation ramp of the air quality control. See section 6.2.8.

3. Variable air volume (VAV)

   This type of control requires the installation of the pressure transducer supplied by Systemair as an optional component.

   Installation must be carried out according to the manual provided with the component and the unit's wiring diagram.

   There are two operating modes, each with its corresponding setpoints \[Pa]:

   • NOMINAL (Normal) mode: Nominal pressure defined by the customer \[Pa]

   • REDUCED (Low) mode: 50% of the nominal pressure \[Pa]

   When the unit is controlled based on air quality, the airflow rates used will depend on the operation ramp of the air quality control. See section 6.2.8.

6.2.2. Plate heat exchanger

CLEVA units are equipped with a parallel-flow aluminium plate heat exchanger. These exchangers feature a unique fin design that ensures high thermal recovery efficiency while minimising pressure drop, significantly improving the overall system performance.
The heat exchanger is designed to recover thermal energy (heating or cooling) from the extract air and transfer it to the supply air. This process directly contributes to the unit's energy savings.

Bypass damper:

The unit includes an on/off type bypass damper that enables two operating modes:

- Damper closed: Outdoor and extract air pass through the plate heat exchanger, enabling thermal recovery
- Damper open: Outdoor air flows through the bypass damper, disabling thermal recovery.

Frost protection:
To prevent freezing in the heat exchanger, when the outdoor temperature drops below -3 °C (frost protection setpoint), the unit activates the following operating mode:

- The bypass damper opens.
- The extract airflow is reduced to 50 %, while maintaining nominal supply airflow. This increases the exhaust air temperature, reducing the risk of ice formation.
  This protection is deactivated when the outdoor temperature rises above the setpoint + 4 °C, that is, when it reaches 1 °C.

Heat recovery:

- Heat recovery mode: When the extract air temperature is higher than the outdoor air temperature, the bypass damper remains closed to maximise energy recovery.
- Free-heating mode: If the outdoor air temperature is at least 1 °C higher than the extract air temperature (Outdoor T > Extract T + 1 °C), the bypass damper opens, disabling heat recovery.
  See section 6.2.6 for information on heating/cooling stage management.

Cooling recovery:

- Cooling recovery mode: If the outdoor air temperature is at least 1 °C lower than the extract air temperature (Outdoor T < Extract T – 1 °C), the bypass damper remains closed to maximise energy recovery.
- Free-cooling mode: When the extract air temperature is lower than the outdoor air temperature, the bypass damper opens, disabling heat recovery.
  See section 6.2.6 for information on heating/cooling stage management.

The plate heat exchanger is installed on a tray with drainage to remove any condensation. It is the installer's responsibility to install a suitable siphon to ensure proper drainage of the accumulated water (see section 5.6).

6.2.3. Freecooling. Bypass damper.

The plate heat exchanger is equipped with a bypass damper managed by the unit's control system. It is automatically activated in free-cooling or free-heating modes to maximise the installation's energy efficiency.

In these modes, filtered outdoor air is supplied directly to the conditioned space without passing through the plate heat exchanger—that is, without exchanging energy with the extract air.

Free-cooling (free cooling)

Free-cooling is activated when:

- Activation condition:Outdoor air temperature is at least 1 °C lower than the extract air temperature:
  Outdoor T < Extract T.
- Deactivation condition:The system exits free-cooling when the extract air temperature is 1 °C lower than the outdoor air temperature:
  Extract T < Outdoor T – 1 °C.

Free-heating (free heating)

Free-heating is activated when:

- Activation condition:Outdoor air temperature is at least 1 °C higher than the extract air temperature:
  Outdoor T > Extract T + 1 °C.
- Deactivation condition:** The system exits free-heating when the extract air temperature is 1 °C higher than the outdoor air temperature:
  Extract T > Outdoor T.

See section 6.2.6 for details on heating/cooling stage management.

6.2.4. Supply and extract air filters

The units are equipped with 2" thick compact air filters in both the supply and extract airflows. Customers can select the filtration class based on their needs, choosing from the following options:

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

In addition, the unit allows for the installation of two filtration stages in the same location, enabling progressive filtration setups to improve air quality and better protect internal components.

Filters must be replaced when clogged, using replacement parts that maintain the same specified filtration performance.

See section 7.3 for instructions on how to replace the air filters.

6.2.5. Air filter pressure switches

Each unit is equipped with two differential pressure switches: one installed in the supply air filter module and the other in the extract air filter module.

Their function is to monitor the pressure drop across the filters and trigger an alarm signal when the pressure reaches the pre-set threshold on the device. This signal indicates that the filters are clogged and need to be replaced.
Both pressure switches are connected in series, so they share a single alarm signal managed by the unit's controller.

6.2.6. Temperature sensors. Operating sequence management

CLEVA units include three PT1000-type temperature sensors installed inside the unit:

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

The system uses two temperature setpoints: one for summer mode and one for winter mode:

- Summer setpoint: 24 °C (editable value)
- Winter setpoint: 22 °C (editable value)

The switch between summer and winter mode is based on the outdoor temperature sensor. The default values (editable) are: +15 °C with a hysteresis of ±1 °C.

Temperature control modes

1. Cascade control based on extract air temperature
This mode aims to maintain a stable room temperature using the extract air sensor as the reference. To achieve this, the system dynamically adjusts the internal supply air temperature setpoint.

A PI control loop is used to regulate the heating and/or cooling stages.

The supply air setpoint is limited by configurable minimum and maximum values to ensure thermal comfort and avoid excessive variations.

This control mode compensates for variable internal thermal loads, optimising the unit's energy performance.

2. Supply air temperature control
In this mode, the goal is to maintain a constant supply air temperature according to a predefined setpoint.

The supply air temperature sensor is used as the reference.

It is suitable for installations where direct control of the supply air is a priority.

This mode also operates using a PI control loop to modulate the heating and/or cooling stages.

Heating and cooling stage operation sequences

CLEVA units automatically manage the climate stages based on the measured temperature (from either the supply or extract air sensor) and the user-defined setpoint.

The system prioritises energy efficiency by activating the stages in sequence, starting with the use of outdoor air (freecooling/freeheating), followed by heat recovery, and finally the active heating or cooling systems (heating or cooling coils).

The diagram below shows the activation sequence of the available cooling and heating stages. Transitions between the different stages are managed by an internal PI control loop.

If the unit is not equipped with heating or cooling stages, the control system will not manage those functions.

Cooling mode operation sequence:

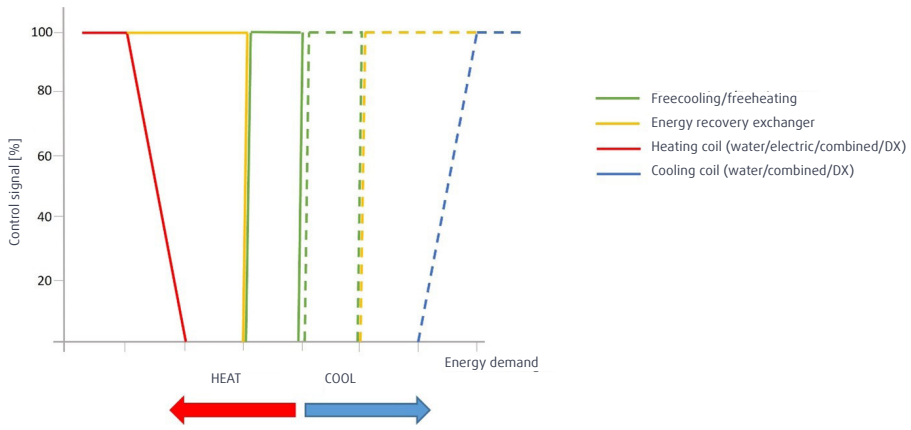


Figure 20. Sequence of the unit's heating and cooling stages

1. Freecooling activation. The bypass damper of the plate heat exchanger opens to allow direct intake of outdoor air, provided its temperature is low enough to meet the cooling demand.
2. Freecooling deactivation (heat exchanger activation). If the outdoor air is no longer sufficient, the bypass damper closes to recover cooling from the extract air via the plate heat exchanger.
3. Cooling coil activation (chilled water coil / DX coil / combined 2-pipe coil). If the thermal demand persists, the corresponding cooling coil (chilled water, DX, or combined 2-pipe) is activated.

Heating mode operation sequence:

1. Freeheating activation. The bypass damper of the plate heat exchanger opens to allow direct intake of outdoor air, provided its temperature is high enough to meet the heating demand.
2. Freeheating deactivation (heat exchanger activation). If the outdoor air is no longer sufficient, the bypass damper closes to recover heat from the extract air via the plate heat exchanger.3. Activación de la batería de calor (batería de agua / DX / resistencia eléctrica / batería combinada (2T)).

If the thermal demand persists, the corresponding heating coil is activated (hot water, DX, electric heater or combined 2-pipe).

6.2.7 Pressure Transducer

As an option, a dual pressure transducer can be supplied to enable unit control by Constant Air Volume (CAV) or Variable Air Volume (VAV).

Based on the pressure readings from the transducer (with separate values for supply and extract), the controller will send independent signals to the fans to reach the configured setpoints.

Refer to the manual supplied with the optional component for installation details, as well as the wiring diagram provided with the unit.

6.2.8. CO_2 Air Quality Sensor

As an option, a carbon dioxide (CO_2)-based air quality sensor can be supplied to dynamically regulate the intake of outdoor air according to indoor conditions (measured in the return/extract air).

• Sensor measurement range: 0 – 2000 ppm

This feature helps optimise energy consumption by adjusting the ventilation airflow based on detected air quality, rather than maintaining a constant flow.

Ventilation is managed using a compensation curve based on three setpoints (in ppm of CO_2), with corresponding modulation of airflow or ventilation percentage, depending on the configured control type.
Note: The nominal airflow is defined by the customer in the unit's technical datasheet.
The unit adjusts fan speed based on the sensor reading and the values defined in the compensation curve.
Control is carried out through a PI loop, so speed variation is not linear, even though the graph may appear so (see Figure 22).

Level	CO_2 concentration (ppm)	Adjustment relative to nominal airflow
Low	600 ppm	-20%
Medium	800 ppm	-10%
High	1000 ppm	0% (nominal airflow)

Maximum ventilation speed corresponds to the high setpoint (1000 ppm), while the minimum speed is reached at the low setpoint (600 ppm).
This regulation allows the system to operate at reduced speed most of the time, increasing only when air quality deteriorates, which leads to significant energy savings.

If the unit is configured for Constant Pressure (VAV) mode, the air quality control function is disabled.

Warning: The values defined in the compensation curve also apply in reduced airflow mode, when this function has been activated via digital input or from the control panel.

Refer to the manual supplied with the optional sensor for installation details, as well as the wiring diagram provided with the unit.

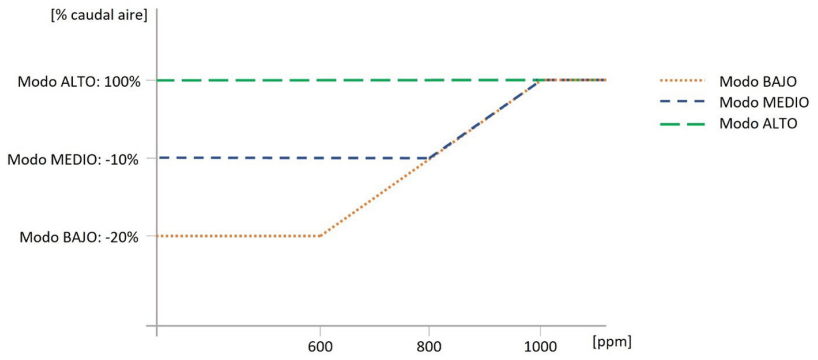


Figure 21.

6.2.9. User Interface

The unit can be controlled through different means to facilitate operation and adapt to the specific needs of the installation:

- Remote control panel. The unit can be operated via a dedicated remote controller. For more details, refer to the manual supplied with the remote control.
- Digital inputs
  The unit includes 3 digital inputs that allow selection of different operating modes (see Table 9 and the unit's wiring diagram):
  - Unit Stop: Allows remote shutdown of the unit.
  - Normal Speed Mode: Starts the unit with fans operating at nominal speed.
  - Low/Reduced Speed Mode: Starts the unit with fans operating at reduced speed (50% of nominal).
- BMS Communication (Building Management System). The unit can be integrated into centralised management systems using the following protocols:
  - Modbus RTU and BACnet MS/TP
  - Modbus TCP/IP and BACnet IP

Request the document containing the available control variables and instructions for integration with these protocols.

6.2.10. Chilled Water Coil

As an option, a single-stage chilled water coil can be supplied, designed to be installed by the installer in the system's supply air duct. The control valve for water flow is not included with the coil and must be supplied and installed by the customer or installer.

The cooling signal is activated when the supply or extract air temperature (depending on the selected temperature control mode) exceeds the setpoint. Regulation is carried out via a PI control loop, which adjusts the valve's control signal.
The control signal for the water valve is 0–10 VDC.
The unit is capable of managing one heating stage (water, DX, or electric) and one cooling stage (water or DX).
Refer to section 6.2.6 for details on how the unit manages the heating and cooling stages.
Refer to the manual supplied with the optional component for installation details, as well as the wiring diagram provided with the unit.

6.2.11. Hot water coil

As an option, a single-stage hot water coil can be supplied, designed to be installed by the installer in the system's supply air duct. The control valve for water flow is not included with the coil and must be supplied and installed by the customer or installer.

The heating signal is activated when the supply or extract air temperature (depending on the selected temperature control mode) falls below the setpoint. Regulation is carried out via a PI control loop, which adjusts the valve's control signal.

Frost protection

To prevent the risk of freezing in the hot water coil, an optional temperature sensor is available to measure the outlet water temperature. This sensor must be electrically connected to the unit according to the supplied wiring diagram and installed on the outlet water pipe to the coil.

The sensor allows frost protection management both when the unit is operating and when it is stopped.

Frost protection operation:

1. With the unit running:

- Stage 1 – Frost warning: If the water temperature drops below the frost warning setpoint (12 °C), a frost warning alarm is triggered and the hot water valve modulates to increase the water temperature until it exceeds the standby protection setpoint (25 °C). The frost warning alarm will be cleared when the water temperature rises above the frost warning setpoint (12 °C).
- Stage 2 – Frost protection: If the water temperature continues to drop and reaches the frost protection setpoint (5 °C), the hot water valve will open to 100%, the unit will shut down, and a frost protection alarm will be generated. The unit will restart once the alarm has been reset and the water temperature is again above the frost warning setpoint (12 °C).

2. With the unit stopped:
If the outlet hot water temperature drops below the frost warning setpoint while the unit is off (12 °C), the unit will begin modulating the water valve until the temperature exceeds the setpoint.
If the temperature continues to fall and reaches the frost protection setpoint (5 °C), a frost protection alarm will be generated.

When frost protection is active, the unit's temperature control mode (based on supply or extract temperature) is not prioritised, as frost protection takes precedence.

The control signal for the hot water valve is 0–10 VDC.
The unit is capable of managing one heating stage (water, DX, or electric) and one cooling stage (water or DX).
Refer to section 6.2.6 for details on how the unit manages the heating and cooling stages.
Refer to the manual supplied with the optional component for installation instructions and the unit's wiring diagram.

6.2.12. Combined water coil (2-pipe) – Changeover

As an option, a single-stage combined water coil (2-pipe) can be supplied, designed to be installed by the installer in the system's supply air duct. The control valve for water flow is not included with the coil and must be supplied and installed by the customer or installer.

The combined water coil is used in 2-pipe (2T) installations and can operate either as a heating or cooling coil, depending on the room's requirements.
The required operating mode (heating/cooling) is selected via the digital input enabled for this function. See the external electrical connections table and the wiring diagram.

- NO contact: HEATING mode (Winter)
- NC contact: COOLING mode (Summer)

The frost protection sequence is the same as described in the previous section for the hot water coil.
The control signal for the water valve is 0–10 VDC. A digital (volt-free) signal is also available to activate the heating or cooling operating mode (changeover).

The unit is capable of managing one heating stage (water, DX, or electric) and one cooling stage (water or DX).
Refer to section 6.2.6 for details on the management of the unit's heating and cooling stages.
Refer to the manual supplied with the optional component for installation instructions and the wiring diagram provided with the unit.

6.2.13. Direct expansion (DX) coil – Cooling only or heat pump

As an option, a single-stage direct expansion (DX) coil can be supplied. This coil is delivered as an additional module that must be installed by the installer in the supply air duct of the system.

The cooling signal is activated when the supply air temperature exceeds the setpoint. Regulation is carried out via a PI control loop.

The control signal for the direct expansion system is 0–10 VDC.

The unit is capable of managing one heating stage (water or electric) and one cooling stage (water or DX).

Refer to section 6.2.6 for details on how the unit manages the heating and cooling stages.

Refer to the manual supplied with the optional component for installation instructions and the wiring diagram provided with the unit.

6.2.14. Electric heater

As an option, a single-stage electric heater can be supplied, designed to be installed by the installer in the system's supply air duct.

The control signal for the electric heater is 0–10 VDC, along with an on/off signal. The unit also includes two terminals for connecting the electric heater overtemperature alarm. When the overtemperature alarm is triggered, the unit stops the electric heater signal as well as the unit fans.

The unit is capable of managing one heating stage (water, DX, or electric) and one cooling stage (water or DX). Refer to section 6.2.6 for details on how the unit manages the heating and cooling stages.

The electrical supply and protection are the responsibility of the installer.
Refer to the manual supplied with the optional component for installation instructions and the wiring diagram provided with the unit.

6.2.15. Pre-heating coil

As an option, the unit can manage a pre-heating coil with on/off control for frost protection at the outdoor air intake.

Danger

- Ensure that the unit is de-energised before performing any maintenance or electrical work.
- All electrical work must be carried out by properly qualified personnel and in accordance with the specific standards and regulations of the country where the unit is installed.

Its use is mandatory when outdoor temperatures fall below -10 °C. The coil must be equipped with an independent overtemperature protection system to ensure safe disconnection.

A digital output is configured to activate the pre-heating coil upon unit start-up, provided that the measured outdoor temperature is below the defined heating start threshold (default value: -3 °C).

For this function, it is essential to install an outdoor temperature sensor upstream of the pre-heating coil, in addition to the outdoor sensor integrated in the unit. This additional sensor is supplied by Systemair.

The pre-heating function will be automatically deactivated when the outdoor temperature rises more than 1 °C above the configured heating start threshold (i.e., -2 °C).

If, five minutes after start-up with pre-heating active, the outdoor air temperature measured in the unit does not exceed by more than 1 °C (editable value) the temperature recorded by the external sensor, the system will stop the pre-heating and trigger an alarm indicating process inefficiency.

The pre-heating function is always triggered at unit start-up, provided that outdoor temperature conditions require it.

6.2.16. Control of external dampers

As an option, the unit can manage the outdoor air intake and exhaust dampers using on/off control. These dampers must be supplied and installed by the installer.

During unit start-up, the control system will send a signal to open both dampers. Conversely, when the unit stops, a signal will be sent to close them. By default, both signals include a configured delay of 120 seconds at start-up and shutdown to ensure proper operation.

7. Maitenance

7.1. Important information

7.2. Maintenance Intervals

The following table shows the recommended preventive maintenance intervals for the unit and installation. To

Danger

- Ensure that the unit is de-energised before carrying out any maintenance or electrical work.
- All electrical work must be performed by properly qualified personnel and in compliance with the specific standards and regulations of the country where the unit is installed.

Warning

- Esperar varios minutos desde la desconexión eléctrica de la unidad ya que los ventiladores pueden estar en movimiento.
- Utilizar ropa adecuada durante las operaciones de mantenimiento e instalación. Pueden existir algunas partes punzantes o cortantes.

ensure a long service life, it is important to carry out maintenance tasks in accordance with the recommendations described below.

Regular and thorough preventive maintenance is essential for the validity of the unit's warranty.

7.3. Maintenance instructions

7.3.1. Access to the internal components of the unit

Types of maintenance	Frecuency	Only if needed
General condition of the unit	Annualy	
Check for air leaks in panels and access doors	Bimonthly	
Check condition and airtightness of air duct connections	Annualy	
Replace air filters		X
Check for unusual noises and vibrations from the fans	Quarterly	
Inspect drainage tray and its outlet	Annualy	
Check roof cover of the unit (if present)	Annualy	
Inspect anti-vibration mounts	Annualy	
Clean the heat exchanger	Annualy	
Clean the fans	Annualy	
Clean the outdoor air section	Annualy	
Clean air ducts		X (1)
Check electrical connections and tighten if necessary	Annualy	
Check grounding conductors and tighten connections	Annualy	
Inspect control components installed inside the unit	Annualy	

Table 12. Maintenance frequency.

* Or according to local regulations.

The following table shows which panels must be removed to access the different components of the unit for maintenance.

7.4. Troubleshooting

Before contacting Systemair's after-sales service department, check the following points and verify whether any

Components	Unit size	Panel or access number
Supply air filter. Side/front/bottom access.	All	7/8/11-15 (right register) 6/5/12-16 (left register)
Exhaust air filter. Side/front/bottom access.	All	6/5/12-16 (right register) 7/8/11-15 (left register)
Supply fan. Side/front/bottom access.	All	3/4/14-16 (right register) 1/9/13-15 (left register)
Exhaust fan. Side/front/bottom access.	All	1/9/13-15 (right register) 3/4/14-16 (left register)
Plate heat exchanger and condensate drain tray. Condition and cleaning.	All	7 u 8 y 5 ó 6 y 10
Outdoor air temperature sensor. Side/front/bottom access.	All	7/8/11-15 (right register 6/5/12-16 (left register)
Dirty filter pressure switch – supply air. Side/front/bottom access.	All	7/8/11-15 (right register) 6/5/12-16 (left register)
Extract air temperature sensor. Side/front/bottom access.	All	6/5/12-16 (right register) 7/8/11-15 (left register)
Dirty filter pressure switch – extract air. Side/front/bottom access.	All	6/5/12-16 (right register) 7/8/11-15 (left register)
Bypass damper. Actuator.	All	2
Electrical connections.	All	Electrical panel

Table 13. Maitenance access

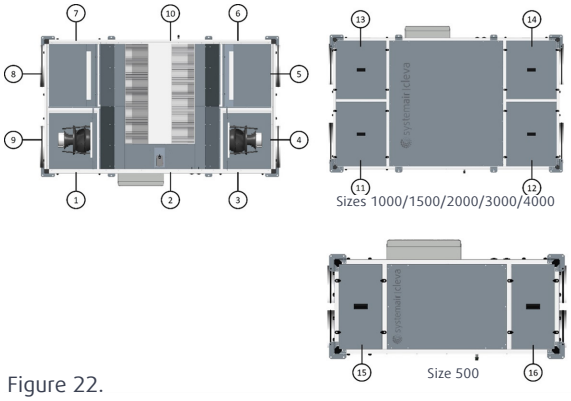


Figure 22.

alarms are active in the unit. The type of active alarm can be identified through the unit's display.

Symptom	Possible causes	Possible solutions
The unit does not start	1. Power supply 2. The fans do not start	1. Check the electrical connection of the unit. 2. Check: • Power supply • Active alarms • Active operating mode (via programming, manual selection, or digital input)
The display does not turn on	1. Electrical connection to the unit 2. Communication error	1. Check the RJ connector connection (see wiring diagram). 2. Refer to the remote control manual
Excessive airflow	Excessive fan speed	Lower than expected pressure drop Select a lower fan speed
Insufficient airflow	1. Clogged air filters 2. Low fan speed 3. Blocked or dirty plate heat exchanger 4. Blocked or damaged air ducts 5. Blocked or dirty outdoor air intake 6. Dirty or damaged fans	1. Check and replace the air filters if clogged 2. Increase the fan speed. 3. Remove any obstruction to the airflow or clean the plate heat exchanger 4. Ensure that the air ducts and any regulation devices in the duct system are clean and free of obstructions 5. Clean the outdoor air intake 6. Clean the fans or replace them if damaged
Low supply air temperature	1. Low temperature setpoint 2. Low outdoor air temperature < 10ºC 3. Low hot water coil temperature (if installed) 4. Electric heater not working (if installed) 5. Preheating coil not working (if installed)	1. Check the assigned setpoints 2. Possible need for a post-heating and/or outdoor air pre-heating device 3. Check the heating control signal 4. Check the control signal and alarm of the electric heater 5. Check the control signal of the pre-heating coil and its associated protections (customer's responsibility)
High supply air temperature	1. High temperature setpoint 2. High outdoor air temperature 3. High chilled water coil temperature (if installed) 4. High evaporation temperature (DX coil, if installed)	1. Check the assigned setpoints 2. Possible need for a post-cooling device 3. Check the control signal of the chilled water valve or the operation of the chiller 4. Check the DX control signal or the operation of the condensing unit
Signs of plate heat exchanger freezing	Temperatura del aire exterior muy baja < -5ºC.	Installation of a preheating device
Water leakage	Very low outdoor air temperature < -5 °C.	Check for possible obstructions in the drainage system or incorrect sizing/installation
Excessive vibrations	1. Unbalanced impeller 2. Loose fan mounting screws 3. Unit installed out of level	1. Check the fan balance. Replace it if necessary 2. Check the tightening of the fan mounting screws 3. Ensure that the unit is installed level

Table 14. Troubleshooting

7.5. After-Sales Service

Before contacting Systemair's after-sales department, check the following aspects and verify whether there are any active alarms on the unit. The type of active alarm can be identified through the unit's display.

Systemair España
Calle Montecarlo 14
Fuenlabrada, Madrid
28942

Tel. +34 916 00 29 00
info@systemair.es

Systemair España · Julio 2025 · V3

systemair

www.systemair.com