

EVDST

Technical Sheet



EVOST

Comfort at the service of your project's performance

QUICK FACTS

Practically invisible air-water climate control system that integrates directly into outside walls.

High capacity and no lettable space requirements.

Constructed in factory, directly in the façade or on site.

Modular units offer high flexibility.

Adapted for new building and renovation projects as well as the replacement of existing induction units.

Easy maintenance.

Cost effective in comparison to existing systems

PROJECT STATUS

European conception and production

Laboratory-tested product

First reference building has been functional since 2018



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TECHNICAL DESCRIPTION

Characteristics for EVOST

The EVOST unit is mounted already fully integrated in the facade or ceiling in factory. It means no installation space is required in the room and there is no visible part in the room floor, walls or ceiling.

The only visible part of the unit is the 58mm high air supply outlet located in the upper side of the façade.

EVOST is a complete system with all indoor climate functions: cooling, heating, ventilation and temperature control.

- Thanks to its modular design EVOST is the perfect choice for new buildings as well as for renovation projects.
- The EVOST units arrive on site already mounted in the facade, ready to be connected to the main air and water supply network
- Each facade module is thermally and acoustically insulated at the same level as a standard facade module.
- Control valves and all indoor climate room controls can be mounted in factory directly in the unit or they can be installed in the ceiling upon delivery.

Functions

- Ventilation
- Cooling
- Heating (water or electric)
- Integrated room temperature control

Areas of application

- New build extensions or renovations
- Offices
- Hotels
- Conference centers
- Hospitals



Fig. 1 : Schematic cut

EVOST

INSTALLATION

Mounting

The EVOST units are factory mounted in the façade and secured with brackets. Once mounted, the EVOST unit remains easily accessible for cleaning and maintenance.

The unit can be delivered with a copper 2 pipe or 4 pipe air-water exchanger. The associated valves can be optionally installed in-factory.





Connections

The air pipe termination fittings are installed in the room's exterior wall. Control equipment: the control valve servomotor and temperature detector arrive with a 1.2m long connection cable accessible from the upper part of the facade and under the EVOST unit, ready to be connected to your bus and low voltage power supply.



DIMENSIONS

| Global dimensions | | | | | | |
|-----------------------------|---|--|--|--|--|--|
| Available lengths for EVOST | 800, 1150, 1250, 1400 and 2600 mm | | | | | |
| Height for EVOST | 440mm integrated + 58mm visible in the façade and under | | | | | |
| | the ceiling | | | | | |



Fig. 3 : Schematic horizontal cut EVOST 1250

| L facade | L Risers | L free facade | Gap | Ltot EVOST | L batt EVOST | L Connection box |
|----------|----------|---------------|-----|------------|--------------|------------------|
| 900 | 100 | 800 | 80 | 720 | 720 | 0 |
| 1250 | 100 | 1150 | 80 | 1070 | 900 | 170 |
| 1350 | 100 | 1250 | 80 | 1170 | 1000 | 170 |
| 1500 | 100 | 1400 | 80 | 1320 | 1150 | 170 |
| 2700 | 100 | 2600 | 80 | 2520 | 2350 | 170 |

Table 1 : EVOST Lenghts



RECOMMENDED LIMIT VALUES

Water :

- Maximum recommended operating pressure: 600 kPa
- Maximum recommended test pressure for completed installations: 900 kPa Max.
- Recommended pressure drop across standard valve: 20 kPa
- Mininum warm water flow per unit: 0.013 I/s
- Highest supply temperature: 60°C
- Minimum cold water flow per unit: EVOST length 800, 1250 and 1400 mm: 0.04 l/s min.
- Cold water temperature: Should always be calibrated so that the system functions without condensation.



Fig. 4 : Integration in the façade



EVOST SYSTEM

EVOST SYSTEM is composed of EVOST Units, the control parts factory mounted and supply our flow control and air handling unit.

EVOST UNIT



The EVOST unit is designed to be integrated into the façade, not in the window, and the standard units are fitted for ventilation, cooling and heating (4-pipe or 2-pipe connection).

Length: EVOST is available in : 800, 1150, 1250, 1400 and 2600 mm

Depth: The depth is always 200 mm

Height: The EVOST height is 440 mm + outlet

Heating/Cooling : The product is equipped with an dedicated hot water circuit in the battery to provide a heating or cooling function

Water connection : The cooling and heating water connections for EVOST are made of 12 mm copper pipes (available as 2 or 4 pipes)

Air connection: EVOST is supplied with an air connection 80 mm type *Lindab Safe®* ducts.

Design: EVOST is delivered without any additional casing, ready for invisible integration in the façade. The outlet wing is delivered by the façade maker.

Surface treatment: EVOST is manufactured as standard from galvanized sheet metal.

Order Key

| VOST | | | | | | |
|--|----|------|----|----|---|---|
| | E1 | 1250 | 4p | 54 | L | v |
| Ejector Type El, El.1, E2 | | | | | | |
| Product length 900, 1250, 1400 and 2600 | | | | | | |
| <i>Coil Pipe Connection 2p or 4p</i> | | | | | | |
| Motive Air Volume (m3/h) 16 - 60 | | | | | | |
| Left or Right Connection L or R | | | | | | |
| Vertical or Horizontal Position V or H | 1 | | | | | |

Left or right connection



Horizontal or Vertical Position





TECHNICAL DATA

Definitions

Pa = Cooling capacity air [W] P_w = Cooling capacity water [W] P_{tot} = Cooling capacity total [W] q_{ma} = Air mass flow rate [kg/s] q_{α} = Primary air flow rate [I/s] q_w = Water flow rate [I/s] q_{wmin} = Minimal water flow rate [I/s] qwnom = Nominal water flow rate [I/s] c_{pa} = Specific heat capacity air [1.004 kJ/kg K] t_r = Room air temperature [°C] twi = Water inlet temperature [°C] two = Water outlet temperature [°C] Δt_{ra} = Temp.diff., room air and primary air temp. [K] Δt_{rw} = Temp.diff., room air and mean water temp. [K] Δt_w = Temp.diff., water circuit [K] $\epsilon_{\Delta t \text{w}}\text{=}$ Capacity correction for temperature $\epsilon_{\rm qw}\text{=}$ Capacity correction for water flow P_{LT} = Specific cooling capacity [W/(m K)]

Cooling and Heating Technical Data

EVOST 1250

| | ŀ | lorizontai | Mounte | d withou | t outlet pr | Cooling test | E1.1 low noise | | | | | | |
|---------|--|----------------------------|------------------------|-----------------|---|-----------------|------------------------|---------------------|-------------|-------------------------------------|-------------------------------------|--------------|-------------------------------------|
| EVOST-H | El and El.1 ejector, 4 pipe coil | Motive airfiow (I/s) | Motive qa (m3/h) | Lwa E1.1+abs | Motive air Pressure Reference Pa | ∆Tra (°C) | Air Capacity (W) | Water flow (I/s) | ∆Tw (°C) | Cooling Water Capacity (W) | Total Cooling Capacity (W) | ∆Trw (°C) | Heating Water Capacity (W) |
| | EVOST 1250-H | 16,3 | 59 | 42 | 400 | 10 | 196 | 0.080 | 1,75 | 586 | 782 | 20 | 820 |
| | EVOST 1250-H | 15.2 | 55 | 40 | 350 | 10 | 183 | 0.080 | 1,64 | 552 | 735 | 20 | 773 |
| 4-1 | EVOST 1250-H | 14.0 | 51 | 38 | 300 | 10 | 168 | 0.080 | 1,54 | 514 | 683 | 20 | 720 |
| 1 | EVOST 1250-H | 12.8 | 46 | 35 | 250 | 10 | 153 | 0.080 | 1,42 | 476 | 629 | 20 | 666 |
| | EVOST 1250-H | 11.3 | 41 | 31 | 200 | 10 | 136 | 0.080 | 1,27 | 426 | 562 | 20 | 597 |
| | EVOST 1250-H | 7.8 | 28 | 25 | 100 | 10 | 94 | 0.080 | 0,89 | 301 | 395 | 20 | 422 |

| 50 | |
|----|---------|
| | EVOST-V |
| | |

| Verti | Vertically Mounted with outlet profile (H=60mm) | | | | | | | | E1.1 low no | lse | Hec | iting |
|--|---|-----------------------------------|-----------------|---|---------------|------------------------|---------------------|-------------|-------------------------------------|-------------------------------------|---------------|-------------------------------------|
| El and El.1 ejector, 4 pipe coil | Motive airflow (i/s) | Motive airflow qa (m3/h) | Lwa E1.1+abs | Motive air Pressure Reference Pa | ∆T ra (°C) | Air Capacity (W) | Water flow (I/s) | ∆Tw (°C) | Cooling Water Capacity (W) | Total Cooling Capacity (W) | ∆T rw (°C) | Heating Water Capacity (W) |
| EVOST 1250-V | 16,3 | 59 | 42 | 400 | 10 | 196 | 0.080 | 1,63 | 551 | 747 | 20 | 772 |
| EVOST 1250-V | 15.2 | 55 | 40 | 350 | 10 | 183 | 0.080 | 1,56 | 522 | 705 | 20 | 731 |
| EVOST 1250-V | 14.0 | 51 | 38 | 300 | 10 | 168 | 0.080 | 1,47 | 493 | 662 | 20 | 690 |
| EVOST 1250-V | 12.8 | 46 | 35 | 250 | 10 | 153 | 0.080 | 1,35 | 453 | 606 | 20 | 634 |
| EVOST 1250-V | 11.3 | 41 | 31 | 200 | 10 | 136 | 0.080 | 1,23 | 412 | 548 | 20 | 577 |
| EVOST 1250-V | 7.8 | 28 | 25 | 100 | 10 | 94 | 0.080 | 0,88 | 297 | 390 | 20 | 415 |

Table 2 : Cooling and Heating Table

EVOST



Diagram 1 : Waterflow Capacity Correction



Diagram 2 : Pressure drop water circuit

| | EVOST 1250-4 pipes Pressure drop water circuit | | | | | | | | | | |
|------------------|--|-----------|------|------|------|------|------|------|------|------|------|
| | Water flow rate | qW [I/s] | 0.01 | 0.02 | 0.03 | 0.04 | 0.05 | 0.06 | 0.07 | 0.08 | 0.09 |
| Temperature wat | er outlet cooling | Two [⁰C] | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 | 15 |
| Water press | ure drop cooling | dpW [kPa] | 0.4 | 1.5 | 3 | 4.9 | 7.3 | 10 | 13.1 | 16.5 | 20.3 |
| Temperature wate | er outlet heating | Two [⁰C] | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 | 50 |
| Water pressu | ure drop heating | dpW [kPa] | 0.1 | 0.4 | 0.7 | 1.2 | 1.7 | 2.3 | 3 | 3.8 | 4.7 |

Table 3 : EVOST 1250 - 4pipes Pressure Drop Water Circuit

Dimensioning

Cooling capacity air Pa

- 1. Start by calculating the capacity required for the room, to keep a certain temperature.
- 2. Calculate which cooling capacity is supplied by the ventilation air.
- 3. Remaining cooling capacity needs to be cooled by the water circuit in EVOST

The formula for calculating the capacity of the air :

$$\mathbf{Pa} = \mathbf{q}_{a} \times \mathbf{1}, \mathbf{2} \times \Delta \mathbf{t}_{ra}$$

Size comparison by $t_r = 25^{\circ}C$ with : $q_{\alpha} = Primary air flow rate$ $Pa[W] = q_{\alpha} [I/s] \times 1.2 \Delta t_{r\alpha} [K] and$ $Pa[W] = q_{\alpha} [m^3/h] \times 0.33 \Delta t_{r\alpha} [K]$

Example :

If the air supply flow is 15,2 l/s and the temperature difference of the room air and the supply air is Δ tra = 10K, then the Cooling capacity of the air is 183W.



EXAMPLE

Cooling

Along a southern façade there are four similar offices with measurements $w \times d \times h = 3.6 \times 3.4 \times 2.7 m$. The cooling requirement is 65 W/m², which gives in total 795 W/office. The air flow should be 15,2 I/s. Available pressure, motive air, is 350 Pa. See table 2. Selected room temperature summer : 26°C. The cooling water's supply temperature is 15°C and the selected return temperature is 17°C. Supply air temperature 15°C gives : $\Delta T_{ra} = 11K$. The EVOST position in the façade gives a room gradient temperature of minimum 2°C.

Solution

Cooling

The motive air that maintains a room temperature of 26°C gives the cooling capacity

 $P_1 = 1.2 \times 15,2 \text{ I/s} \times 11 = 200,6 \text{ W}$. The remaining cooling requirement 795 - 200 = 595 W should be cooled using water.

Table 2 gives for the EVOST -1250 vertical and the air flow 15,2 l/s (350Pa) the water cooling capacity 552W at ΔT_{rw} = 10K. For a ΔT_{rw} = 12 the cooling capacity is 552 × 12/10 = 662 W.

The cooling water flow is :

$$q_w = \frac{662 \, W}{2 \times 4200} = 0,0788 \, l/s$$

We see that the water flow 0,0788 I/s gives 105% of the nominal capacity. This is compensated by counting up the unit's requisite performance with 662/1.05 = 630 W.

Total cooling : 200,6 W + 630 W = 830,6 W. The pressure drop from diagram 2 gives 16 kPa.

Solution

A total of 1 × EVOST-E1.1-1250-4p-V in each room.

Heating

Waterborne heating

The method for the heating calculation is the same as for cooling.

The heating capacity can be found in tables 2. The water flow is taken form diagrams 1-2.



EXAMPLE

EVOST E1.1 - 1250 - 4p - 55 - L - V



EVOST – integrated in the façade

EVOST is an efficient system designed to mount inside a glass facade.

EVOST can be used for cooling, heating and ventilation. EVOST can be supplied with valves, flexible pipe connections and a connection card for the <u>Regula Connect</u>[®] control system. Additional features that can be integrated into EVOST include, for example, <u>Regula Combi[®]</u> and the <u>Regula Secura[®]</u> condensation guard.

EVOST is fitted for high air pressures and low air flows.

| Requirements | | | | |
|---|------------------------|---------|---------|------------|
| Motive airflow rate | qo | 15,2 | 54,7 | l/s m³/h |
| Room attenuation | Dr | 4 | | dB |
| Motive pressure | p _{mot} | 350 | 350 | Ρα |
| | | Cooling | Heating | |
| Room air temperature | tr | 26 | 21 | °C |
| Temperature gradient in room | tg | 2 | 0 | к |
| Motive air temperature | t _{ai} | 15 | 21 | °C |
| Water inlet temperature | \mathbf{t}_{wi} | 15 | 55 | °C |
| Water flow rate | qw | 0,080 | 0,080 | I/s |
| Results | | | | |
| Temp.diff., room air and mean water temp. [K] | ∆t _{rw} | 12,2 | 32,9 | °C |
| Temperature difference in the water in-out | ∆t _w | 1.56 | 2,18 | °C |
| Water capacity | P_{W} | 638 | 1214 | w |
| Capacity air | Pα | 237 | 0 | w |
| Total Capacity | P _{tot} | 857,7 | 1214 | w |
| Water pressure drop | dpW | 16,5 | 3,8 | kPa |
| Total air pressure loss in duct | Δp_{pt} | 350 | 350 | Ρα |
| Sound power level | LwA | 40 | | dB(A) |
| Sound pressure level | LpA | 35 | | dB(A) |

EVOST

PROPOSAL FOR A REGULATION SYSTEM - LINDAB PARTNERSHIP

Factory preinstalled inside the EVOST unit.

Enclosed valve and actuator : A control valve, with variable Kv value, and an actuator can be delivered with the product (when heating is needed, two sets of actuators and valves are needed).

Integrated <u>Regula Secura®</u> : <u>Regula Secura®</u> condensation protection can be installed in the product. Please see "<u>Regula Secura®</u>".

Integrated <u>Regula Connect</u>[®] : The product can be equipped with the <u>Regula Connect</u>[®] connection card. Please see <u>"Regula Connect</u>[®].

Integrated regulation unit : It is possible to have Lindab's room controller <u>Regula Combi[®]</u>, pre-installed in the product. Please see "<u>Regula Combi[®]"</u>.



Traditionnal Regulation : Condens detectors / temperature detectors / Room controllers placed on the walls and ceiling



Regulation with EVOST : Room regulation pre-installed directly on our EVOST units

Example : EVOST-E1-1250-4p-54-L-V

Optional Accessories Factory Mounted

<u>Regula Combl[®]</u> – Room controller – Premounted

Valve + 24V NC On/Off actuators for cooling and heating – Premounted

<u>Regula Connect</u>[®] Card Pascal per Modulair – Premounted

<u>Regula Secura®</u> Condensation security per Modulair – Premounted

Optimal accessories

2x Flexible Hoses 400 mm + Tectite connectors

4x Flexible Hoses for a 4 pipe battery

Ultralink FTCU – Supply our volume control with bus connection



Control system

The room temperature control system is easy to adapt to varying room sizes and to changes in room divisions. Operating voltage 24V AC.

When existing partition walls are moved the control system can be reconnected

| 1. Connectors for heating output devices, such as heating circuit actuators 2. Connectors for cooling output devices, such as cooling circuit actuators 3. Connector for power and communication input from Regula Cooling in Supply out - L Heating link_S Cooling in Supply ink - N Supp |
|--|
| rig o Regula connect basic |





Fig 6. : Typical floor with 1 EVOST in every individual office