



Overall E2VENT module installation

We present here the installation of the different elements of the E2VENT system:

- The SMHRU
- The LHTEs
- The BEMS
- The ventilated façade

SMHRU installation

Steps	Description
Wall preparation	First activity related to installation of the E2VENT system is the marking of the openings for the units (two for SMHRU and two for LHTES). The openings are inlet and outlet of the air. The openings need to be adjusted to the location of the furniture
	Install the insulation on the back of the SMHRU unit. 2MM thickness insulation.
	Install the L profiles above the insulation.
Presintallation the tubes	Install the square tube (Exhaust air tube) to the unit. This process can be done in parallel by an operator while others are installing the L profiles.
	Install the tube (Exterior air) to the unit. This process can be done in parallel by an operator while others are installing the L profiles.
	<i>To continue with the steps described below each SMHRU unit should be approached to the cable with the connector previously installed with the procedure designed by CARTIF.</i>
	Connect the male PIN to the female PIN to see if the unit is well sensorised
	<i>If everything is OK, follow next steps. If not, open the box and check what happens and do not close until the problem is solved. Once the problem is solved, follow next steps.</i>
Main installation	Place the unit in the L profiles and fix it with the screws and bolts. It is possible to manoeuvre it with 2 people by hands.
Finalization of the tubes installation	Install the upper tube (Renovation air) with the silencer installed.
	Install the temperature sensor TR (temperature_renovation) in the hole that has the tube. This sensor should be fixed using and small slice of insulation and some tape or other material to fix the sensor to the tube.
	Install the temperature sensor TE (temperature_exterior) in the hole that has the tube. This sensor should be fixed using and small slice of insulation and some tape or other material to fix the sensor to the tube.
	Install the last tube (Interior air) and isolate all the tubes.
Grids and testings	Install the filters and grids.
	Run the commissioning tests

The LHTES detailed installation process on a building is composed of the following steps:

Steps		Description
1	Installation of the LHTES support profiles	<p>Drill 2 holes ($\varnothing 130$ mm) in the external wall for the air ducts</p> <p>Drill 6 holes (approx. $\varnothing 14$mm) in the wall to fix the anchoring profiles</p> <p>Check the correct position of the holes (L profiles and wall) with the template</p> <p>Stick the rubber thermos- pads to the back of the L profile</p> <p>Install the chemical anchors (to fix the L profiles)</p> <p>Install the L profiles</p>
2	Installation of the LHTES on the anchoring profiles	<p>Place the back-insulation layer (20 mm) of the casing</p> <p>Lift the LHTES from the top in order that it is in the correct position to place it on the profiles</p> <p>With the lifting device, place the LHTES on the anchoring profiles and fix it</p> <p>Open the front casing to check the alignment between the casing holes for internal air circuit and the holes drilled in the wall</p>
3	Installation of the air ducts	<p>Saw the ducts to the correct length for internal and external air circuit</p> <p>Collocate the ducts and the duct collars (with aluminium tape and rivets) that correspond to internal air circuit, insert them and fix them to the back casing with rivets</p> <p>Go inside the room and use sealing foam to make airtight the connexion between the duct and the internal wall</p> <p>Install the internal grids and air filters</p> <p>Collocate the ducts and the duct collars (with aluminium tape and rivets) that correspond to external air circuit, insert them and fix them to the internal cover with rivets</p>
4	Devices installation	<p>Fix the connector on the outside of the casing and connect it to the electric connections from the inside of the casing</p> <p>Connect the cable from the BEMS and process to basic testing to check the correct functioning of the fan and dampers</p>
5	Closing the casing	<p>Close the front casing with screws</p> <p>Place the external grids and air filters</p> <p>Use tape all around the casing to improve its air tightness</p> <p>Scotch the insulation layers on the front of the LHTES (30 mm)</p>
6	Commissioning	<p>Tests the dampers</p> <p>Test the fan</p> <p>Air tightness test with</p> <p>Air flow measurements</p> <p>Acoustic measurements</p>

BEMS installation

Next step is the installation of the BEMs unit, these units manage and control the working of the units. BEMs are prefabricated by the manufacturer and are delivered to the building site.

They should have the installation holes, so the workers on the building site do not need to open it and just fixed them inside or outside the building, **Erreur ! Source du renvoi introuvable.** Such approach also minimizes the possibility of destroying cables and sensors that are inside the cabinet by installation team.



Figure 4: (left) 2 devices installed inside the ventilated façade and (right) one device indoors, showing the internal elements.

Requirements and previous steps

Prior to the usage of the BEMS device, it is important to understand that:

- The BEMS has been designed to control the LHTES and SMHRU solutions, but the control can be reconfigured for similar devices by demand.
- It is necessary to have temperature + CO2 + humidity sensors inside the zone/location to be managed, compatible with LonWorks.
- The cabinet can be allocated indoors or inside the ventilated façade. Pay attention to the size and weight of the cabinet.
- It is necessary to prepare a LonWorks network inside the home, with the sensors, and also the central network manager, that might require some electric work.
- In case of using the whole E2VENT solution, the Graphic User Interface has to be accessible in order to have the data available (from the database in the server in Cartif) and the control can be done through the web application (it needs permissions to avoid security issues). In Cartif

Overall installation of the E2VENT system

we need to prepare a setup, creating the database and configuring the ancillary elements (security, backups and messages) to keep the system working.

Installation procedure inside the ventilated façade

Steps		Description
1	Installation of the support profiles.	Attach the box with any L profile with its corresponding screws. Just be careful about where are done the holes in the cabinet and in the wall.
2	Installation of the protective plate.	If the ventilation holes are going to be in the upper face of the cabinet, a protective plate can be installed to avoid the falling of big particles inside the cabinet.
3	Connection of the cabling.	Connect the cabinet with the LHTES and/or SMHRU, and with the external feed (in this case, through a hole in the wall).
4	Commissioning	It is necessary to test that the feed is on, the measurement devices work, and the controllers are selected in the correct positions.

Installation procedure inside the room

Steps		Description
1	Installation of the support profiles.	Attach the box with any L profile with its corresponding screws. Just be careful about where are done the holes in the cabinet and in the wall.
2	Connection of the cabling.	Connect the cabinet with the LHTES and/or SMHRU (in this case, through a hole in the wall), and with the external feed of the building.
3	Commissioning	It is necessary to test that the feed is on, the measurement devices work, and the controllers are selected in the correct positions.

For the installation of the device itself, the components inside the cabinet should be already installed and connected, and once the previous requirements have been met, the installation should be done in parallel with the active devices in case the cabinet would be installed inside the ventilated façade, or at any moment inside the site. For the second case, a drill could be necessary to pass the cabling between the BEMS and the active solutions, but the previous holes for the air interchanging can be also used if present.

The next part of the installation is the commissioning of the system. The procedure is to use the GUI for fine tuning of the fans and for the functioning of the devices themselves. There are speed recommendation values in order to comply with the norm in terms of noise values.

Final use of the BEMS

The E2VENT system can be managed through the use of a GUI. It is a multi-lingual tool that can be used in order to:

- Handle and configure the active devices, and watch the current environment variables
- Get historic values of data, usage and Key Performance Indicators with graphics
- See the evolution of the comfort variables, including CO₂, PMV and PDD

Overall installation of the E2VENT system

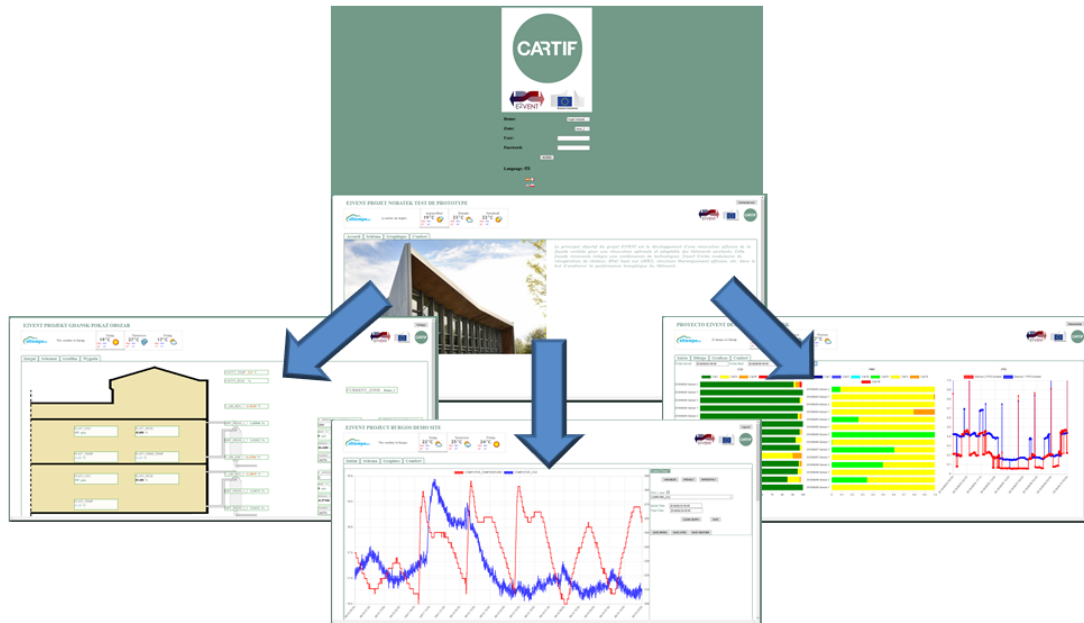


Figure 5: GUI functionalities

Façade installation

Final step is the installation of ventilated façade system. The units are hidden under the aluminium cladding, this protect them from the weather and possible destroy by the vandals. Installation of ETALBOND® aluminium façade system is easy.

Steps	Description	
1	Preparation of the wall	Marking the anchors to be fixed.
2	Anchors fixation	Fixing the anchors to the wall with the thermal pads behind it. Depending on the type of wall, it is either chemical anchorings or full anchoring that you should be used.
3	Profiles fixation	Installation of the profiles. Ensuring their verticality
4	Insulation and air tightness	Fill the holes with foam in order to ensure air tightness. Cover the wall with X cm of insulation (mineral wool)
5	Cladding fixation	Fix the sheets with rivets on the profiles.

Overall installation of the E2VENT system

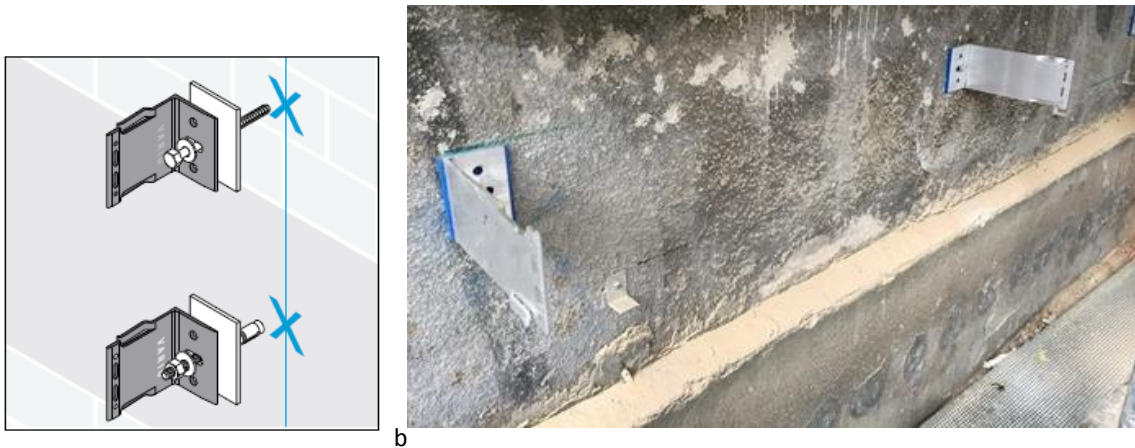


Figure 6: Thermo-insulation pad for minimisation of thermal bridges.

Available cladding systems for E2VENT façade system are:

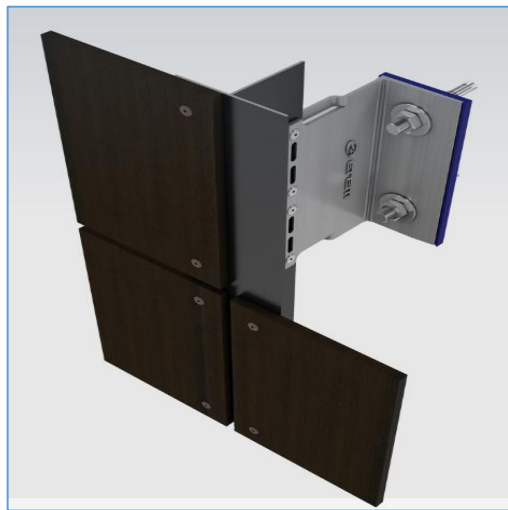


Figure 7: Riveted flat sheet 2 sides or 4 sides

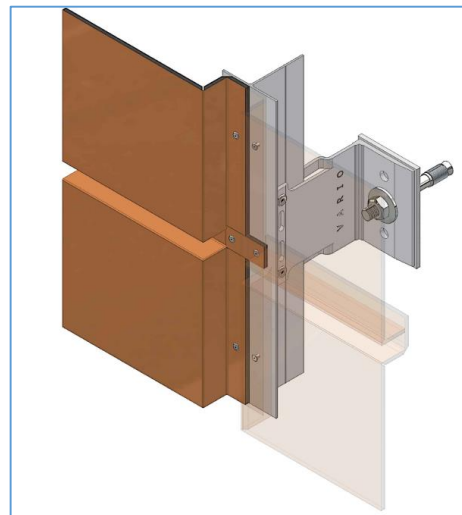


Figure 8: Riveted cassette

the system gives the possibility to adapt to the building irregularities (for instance to mask inclination of the wall from vertical line). E2VENT system gives also the possibility to use different thickness of the insulation material.

The system has the possibility to adjust to vertical inclination of the wall, what is very important for renovation process.

The installation process of E2VENT ventilated facade panels was relatively fast and efficient. The average time of installation of 1 m² of E2VENT ventilated facade is around 80 minutes for qualified façade workers. While the installation of 1m² of system based on ETICS takes 120 minutes (1h = 0,5 m²). E2VENT system is not so dependent on the weather condition as the ETICS.

Overall installation of the E2VENT system



Figure 9: Rivet fixing system used during demonstrations.

The project leading to this application has received funding from the European Union's Horizon 2020 research and innovation programme under grant agreement No 637261.



More on the E2VENT website: <http://e2vent.eu/>

More on the system of the E2VENT module: <http://systems.e2vent.eu/>

Overall installation of the E2VENT system