



Window integrated system - Climawin

Author: Jørgen Rose (SBI)

HVAC

What is the solution?

ClimaWin. Room by room ventilation with heat recovery through intelligent windows.

Why does the solution work?

Climawin is a window solution with integrated ventilation, which means that there is no requirement for ductwork or penetration of the thermal envelope at all. The window is designed to improve comfort and energy efficiency by pre-warming the ventilation air between the two layers of glazing in the window. The window features integrated vents for controlled air intake, a frame with two layers of glazing, an automated blind, integrated electronics and wireless communication between room sensors and the windows, allowing for full control of the ventilation and daylighting levels in the building. During summer the ventilation air can be taken directly from the outside by bypassing the “heat recovery” between the glasses, or it can operate in a mode, where air is circulated around the outside layer of the glazing removing heat from the incident solar radiation. The windows have 3 different settings; 1. In cold weather the system recovers and reuses the heat that is being lost (heat recovery) by preheating the ventilation air between the glasses in the window – this is of course most efficient for facades that receive sunlight, i.e. the sun increases the preheating. Cold air enters at the bottom of the window from the outside and the preheated air exits at the top to the indoors (see figure 1 left).

2. For hot weather or warm climates the system removes heat from the window by ventilating between the glasses. The warm air enters from the outside at the bottom and leaves to the outside at the top (see figure 1 middle). When necessary for occupant health and comfort (based on sensors as described below) the top part of the window can go into bypass mode, where outside air can go straight through the window (see figure 1 right). The window can operate in “external air curtain mode” and “bypass mode” simultaneously.

Description of the context:

Climawin can be used for situations where the existing windows can be replaced and where there are no restrictions on the how the new windows look. The new windows will in turn reduce the transmission heat loss through windows and allow for energy efficient ventilation of the building.

Pros and cons of the solution:

PROS: Low electricity consumption (most is covered by integrated PV) No space requirement for installation (no ducts, no unit) Little wiring necessary (only for indoor sensors Efficiently maintains a good indoor air quality CONS: The openings towards the outside may carry sound/pollution to the inside The windows are more expensive than regular windows

Type of data available (level of information, simulation):

CLIMAWIN was developed through an EU-project from October 2010 to September 2012 (<https://cordis.europa.eu/project/id/262262>) and therefore the solution is documented thoroughly in all details. The “CLIMAWIN – Technical Summary Report” from Aalborg University describes all the technical aspects including detailed measurements of the window performance under different circumstances.

Additional information about the solution:

The CLIMAWIN window is not a possible solution if the windows in the building are protected or of heritage significance, however the solution does come in a variety of designs in order to better fit an existing building expression.

Technical Summary Report: https://vbn.aau.dk/ws/portalfiles/portal/203815355/CLIMAWIN_Technical_Summary_Report.pdf Homepage of manufacturer: <https://www.enocean-alliance.org/product/rauh-climawin0/> Climawin YouTube channel: <https://www.youtube.com/user/CLIMAWIN>

Are there any related publications or pictures of the solution?

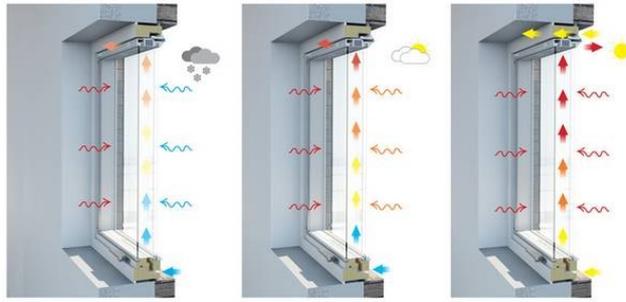


Figure 2. Visualization of ventilation modes of the ventilation window. (a) winter (b) spring/autumn (c) summer (Source: ventilationsvinduet.dk).



Figure 3. Three different designs of the window are available (source: ventilationsvinduet.dk)

https://www.hiberatlas.com/smarteredit/projects/217/CLIMAWIN_Technical_Summary_Report.pdf

Heiselberg, P. (Ed.), Larsen, O. K., Liu, M., Zhang, C., Johra, H., Herold, L., Mendez, J., Cabral, J., Brito, N., Zegowitz, A., & Heusler, I. (2013). CLIMAWIN: Technical Summary Report. Department of Civil Engineering, Aalborg University. DCE Technical reports, No. 160