

ALU



Zero-energy facade  
**AF 50KW QUANTUM**

 **aluron**  
ALUMINIUM SYSTEMS

# AF 50KW QUANTUM

## First zero-energy facade

An innovative solution that has been developed in response to the expectations of investors at a time of energy crisis. The system is designed to make thermally insulated aluminium facades of buildings with active photovoltaic infill. The appropriate design of the partition and the use of all system components make it possible to achieve a zero-energy construction, giving the possibility of fully balancing the gains and energy losses of the facade.

The AF 50 KW QUANTUM is a complete solution consisting of:

- 1 a lightweight aluminium support structure,
- 2 a system of transparent and/or opaque photovoltaic infill panels equipped with sensors to monitor the operation of the facade,
- 3 software for ongoing assessment of the facade's technical condition, with the possibility of integrating it into the building's energy management system.

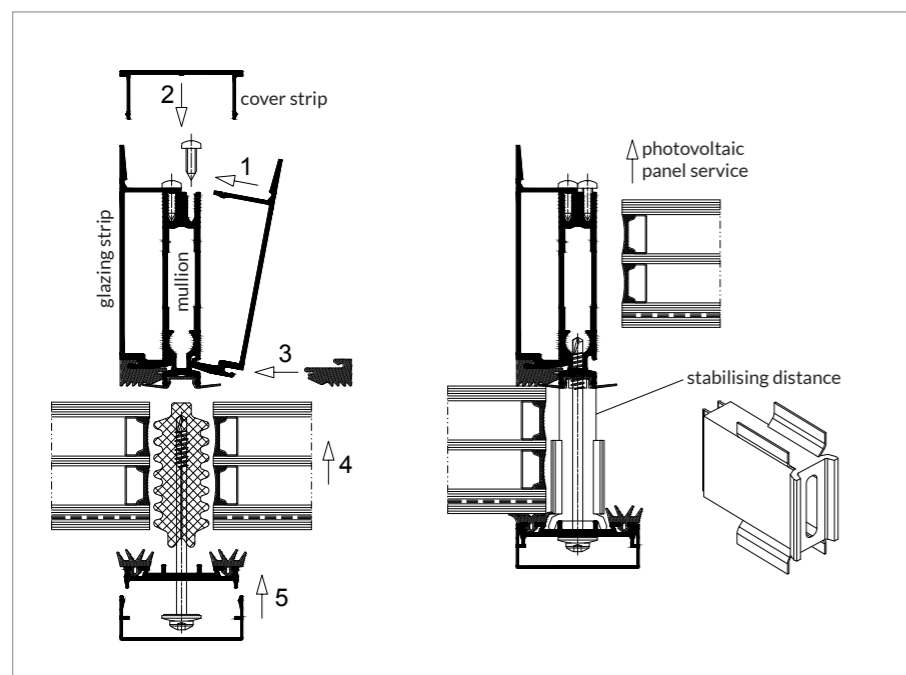
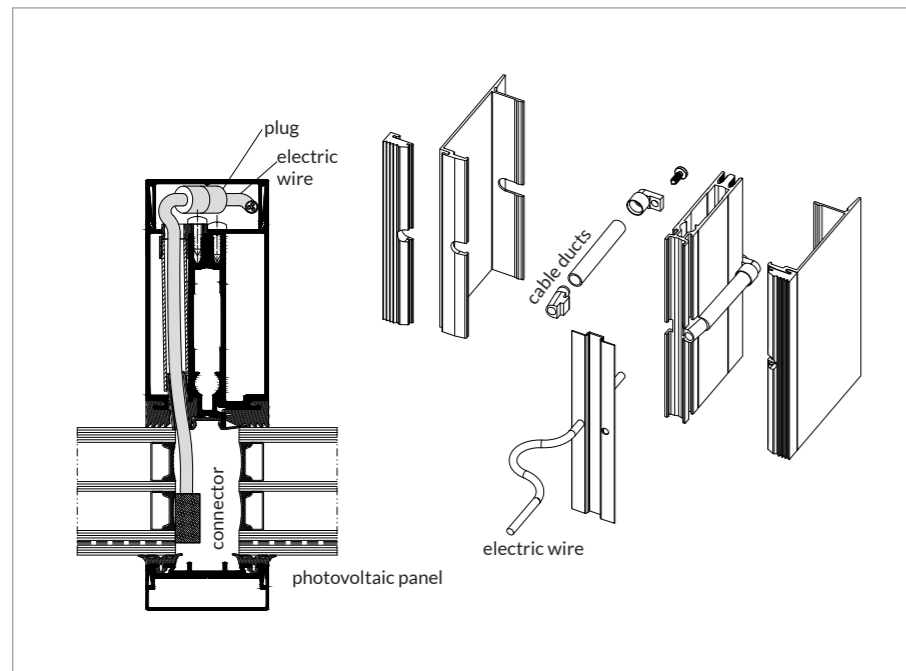


## SYSTEM ADVANTAGES:

- ✓ High passive thermal protection for low thermal energy loss ( $U$  from  $0.5 \text{ W/m}^2\text{K}$ ).
- ✓ The freedom to integrate the system seamlessly within the facade with other products from Aluron's range, enabling the structure to be used in selected sunny areas.
- ✓ The facade's ability to generate electricity between  $40\text{-}180 \text{ W/m}^2$  for heating, air conditioning, or building lighting.
- ✓ Low air infiltration and high water tightness allow the AF 50KW Quantum to also be used on tall buildings.
- ✓ Location of connectors and cabling on the inside of the structure to protect them from moisture and adverse weather conditions.
- ✓ Possibility of connection to energy storage as well as supply of heating infill function.
- ✓ Easy access to the installed active glass infill from inside the room. Replacement or repair of panels without a loss of tightness properties.
- ✓ A proprietary energy management system that provides ongoing monitoring of the energy performance of the facade and control of the technical condition of individual infill units.

## INSTALLATION WIRING

The new AF 50KW QUANTUM photovoltaic facade system allows the installation from the outside, which is traditional for this type of construction. However, the connectors and installation wiring have been relocated to the internal, dry part of the construction. In addition, in the event of a defect being detected by the software, quick and precise access to the specific filling from indoors is possible. In the case of the AF 50KW QUANTUM facade, such repairs can be carried out on an ongoing basis at no additional cost.



## TECHNICAL SPECIFICATIONS

The AS 50KW QUANTUM facade was tested by the Building Research Institute, which confirmed the very high performance of the entire structure.

AE class 2400 Pa	RE 2400 Pa class	RE 2400 Pa class	2400 Pa class	+/- 3600 Pa
Air tightness Wall with and without window	Watertight Wall without window	Watertight Wall with window	Resistance to wind load	Safety test
E5/I5 class	5 class (950 mm/466 kJ)	EI60 class	from 0,5 W/m <sup>2</sup> K	180 W/m <sup>2</sup>
Impact resistance double-chamber glazed pane	Exposure A Category	Fire resistance within the fire lane	Thermal insulation of the active filling	Max rated power 1m <sup>2</sup> of filling
		400 kg	67 mm	50 mm
		Max filling weight	Max filling thickness	Width of post profiles and transoms

# QUANTUM FACADE INFILLS

The infill panels used in the AF 50KW QUANTUM facade are built to fulfill simultaneous functions: thermal insulation and electricity generation.

Depending on the technology selected, photovoltaic cells are used in their manufacture. These cells are selected individually on the basis of design and the expected performance of the overall structure, as well as the anticipated electricity yield. The photovoltaic cells can be positioned freely on a given glass format, allowing the degree of shading to be consciously shaped without the need for additional external elements.

The first item in the glass set is a pane of glass of the thinnest possible thickness, which has the task of shielding the cell from mechanical damage. The power of the infill is determined by specifying the position of the cells on the format and by its external dimensions and the technology used.

## Examples of AF 50KW QUANTUM infills:



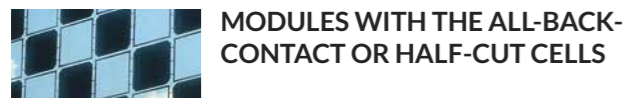
**SILICONE POLY AND MONO**

Modules based on silicon technology are known as generation 1 technology that still dominate the photovoltaic industry. They are perfect for BIPV applications as an alternative to traditional building materials.



**MODULES WITH BI-FACIAL CELLS**

Bi-Facial cells are double-sided photovoltaic cells that have two active sides absorbing light. Their efficiency is larger than traditional Mono-Facial cells. Electricity is generated simultaneously from the front and back side of the cell, which results in higher energy yields.



**MODULES WITH THE ALL-BACK-CONTACT OR HALF-CUT CELLS**

The All-Back-Contact are cells with one of the highest efficiency on the market, in which the busbars are placed on the back surface of the cell. Their surface is uniformly black, which ensures an incredibly elegant design. Half-Cut cells are cut in half from a traditional cell, and the module made of them offers, amongst others, higher output power, better operation in partial shade or improved mechanical strength.



**MODULES IN OTHER TECHNOLOGIES**

The construction of the AF 50KW Quantum allows also for assembling BIPV modules based on other currently available photovoltaic technologies. They include, amongst others, modules: thin-film (CIGS, CDTe, amorphous silicon a-Si), organic (OPV), quantum dots (QDOT), photoelectrochemical (DSSC) and even perovskites (PSC).

## Advantages of AF 50KW QUANTUM facade infills:

- ✓ Possibility to plan the transparency of the infill from 30% to 70%.
- ✓ Reduction in costs associated with the need for so-called sun breakers or façade shading systems.
- ✓ Free positioning of cells, e.g. at the top or bottom of the infill, to reduce the amount of sunlight in the room.
- ✓ Possibility to provide glazing with a heating layer as an alternative or supplement to the building's heating system.

# ALURON-ANALYZER

system for monitoring the operation of the installation and managing energy

Specialised system software based on the proprietary AluronCAD software generates base for the design of the electrical installation, the placement of the cells, and their recording on the façade. Once the facade has been designed and installed, the monitoring system is activated, which - with the help of a MESH network sensors - continuously monitors the operating status of the installation. Energy Management System is designed individually for each project by the implementation team taking into account the specific needs of the user.

## The main tasks of the system:

- 1 Analysis of facade insolation parameters and generated yields on individual infills, infill chains, and entire facades.
- 2 Monitoring of energy yields, consumption of connected equipment and technical condition of individual fillings.
- 3 Precise localisation of the areas to be checked in the event of deviations, ensuring that the facade's maximum efficiency is maintained.
- 4 Balancing of consumption and management of charging of energy storage units. Analysis and management of the energy flow between all installation components.





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