

SMARTSKINS

Customized
Solar Shading

Solutions for
dynamic building
envelopes

UNISHAD
Sonnenschutz

Customized solar shading, daylighting, and energy generation

Mankind has always aspired to capture the sun. While this idea has lost its mysticism, its essential importance to us has not diminished and it plays an important role in the interactions between people and the environment.

When applied to modern building technology, demands that initially appear to be contradictory often have to be linked.

For us building dwellers, the sun is not a static element. Not only does it change its position during the day, the portions of supplies for light and heat also differ vastly. In addition, seasonal changes have to be considered. This includes cooling during summer and heating requirements in winter – with significant displacements due to varying degrees of latitude and climate regions.

Declining natural resources are even attracting political attention. Energy-efficient buildings are continually leading to more complex building controls strategies. Still, 40% of the primary energy has to be expended for existing buildings.

Regarding the overall energy efficiency of buildings, EU directives demand that, in addition to winter and summer heat protection, artificial and natural lighting also have to be geared towards energy efficiency in the future.

Modern commercial high-rise buildings with large portions of glazing such as office and administration buildings; buildings for educational and research activities; hospitals; hotels; museums; etc. demand a high degree of complex controlling strategy of the facility management in order to ensure the following:

- air exchange
- solar shading
- glare control
- daylighting
- passive solar heat gain during winter
- thermal and visual comfort for the room user

Users can also leave their stamp of approval depending on the kind of activity that is performed.

This is where we come in as UNIMET. We are focused on the synergy between aesthetic building planning and functioning objects that fulfill all user requirements regarding comfort and safety. We are also focused on what helps to optimally distribute energy flows.

UNIMET develops solutions that are tailored to the needs of every individual object with which you work. We implement solutions for you at the highest level.

Image (right): Residential and office building, Landstraße, Linz, Austria

Architect: Kneidinger, Linz

Photo: Andreas Fettingner Fotografie, Timelkam

Product information: Folding shutters, operable and with end position lock. The meander shaped outline of the shading elements creates sufficient stiffness. The result shows lightweight structures without frame. Even in the event of fully closed elements the perforation pattern maintains appropriate daylight supply.

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**40% of the primary energy is
being used for existing building stock**



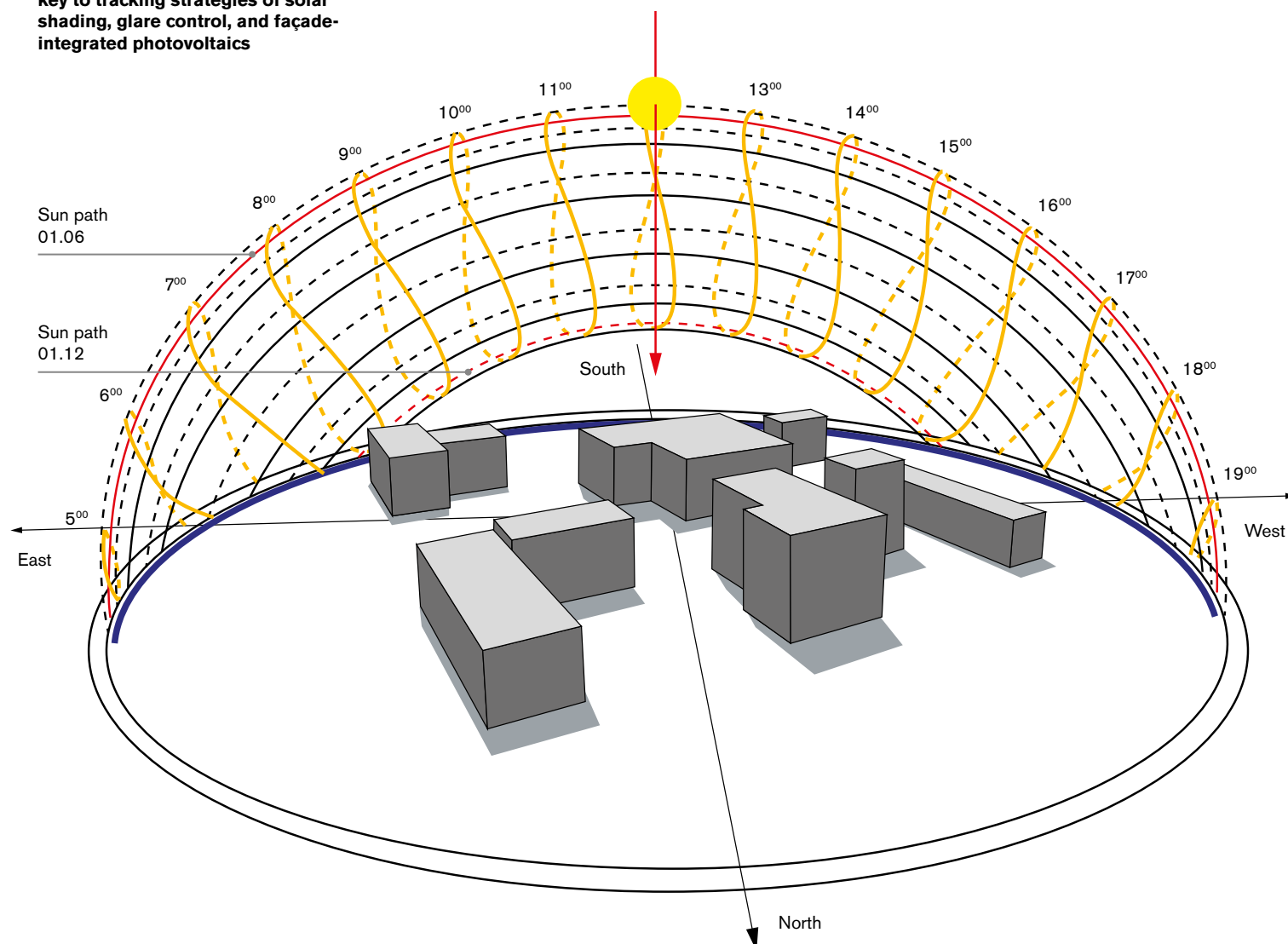
UNIMET considers itself to be more than a contractor. As a partner, we assist you early on in the planning process with shading concepts and energetic consideration that builds the bridge from exemplary architecture to an optimally functioning building.

No matter where you might be planning, we always incorporate local aspects to our global experience.

We gladly stand by your side providing the following services:

- shading concepts
- tracking strategies for movable solutions
- calculations for energy and heat protection
- photovoltaic optimized façade solutions
- photovoltaic yield estimates
- and much, more

Image: Celestial Mechanics – the key to tracking strategies of solar shading, glare control, and façade-integrated photovoltaics



Approximately 50% of the primary energy that is being expended in existing buildings throughout the world is used for heating and cooling alone. As far as energy saving is concerned, focus has been previously placed on heating technology and the

Many buildings need more energy for cooling in summer than for heating in winter

isolation of façade components. More efficient heat devices, improved U-values for windows and walls, and airtight envelopes were considered key to energy and ultimately cost savings. Considerations were hardly made for the application of these examples during the summer months.

This has changed radically because many buildings of contemporary architecture now require more energy for summer cooling than for heating in winter. Modern solar shading systems display an enormous amount of potential for climate protection and frugal use of fossil resources. They do not only serve as heat, light and energy managers. Due to their individual design, the possibilities, multi-functionality, and building aesthetics are linked in a symbiotic manner.

Image (top): New building, residential home, Altmünster, Austria
Architect: Andrea Reichhold, Weis
Photo: Andreas Fettingner Fotografie, Timelkam
Changing light and shadow effects created by fixed aluminum louvers. Milled and soft tapered edges visually encase the supporting vertical structure.

**Image (bottom): Apartment building,
Munich Moosach, Germany
Architects: Beer Bembé Dellinger,
Daniel Sautter, Munich
Photo: Andreas Fettingner Fotografie,
Timelkam
Vertical metal louvers reflecting
tailor-made perforation pattern, C31
bronze anodized, movable and fixed,
create a sense of unique look and
provide sun shading, privacy and
daylight supply.**

Fixed, projecting solar shading

These don't always have to be motorized. Brise Soleil solutions features a simple structure while remaining very robust and durable on the building. These projecting designs are highly effective in summer, preferably on southern oriented façades.

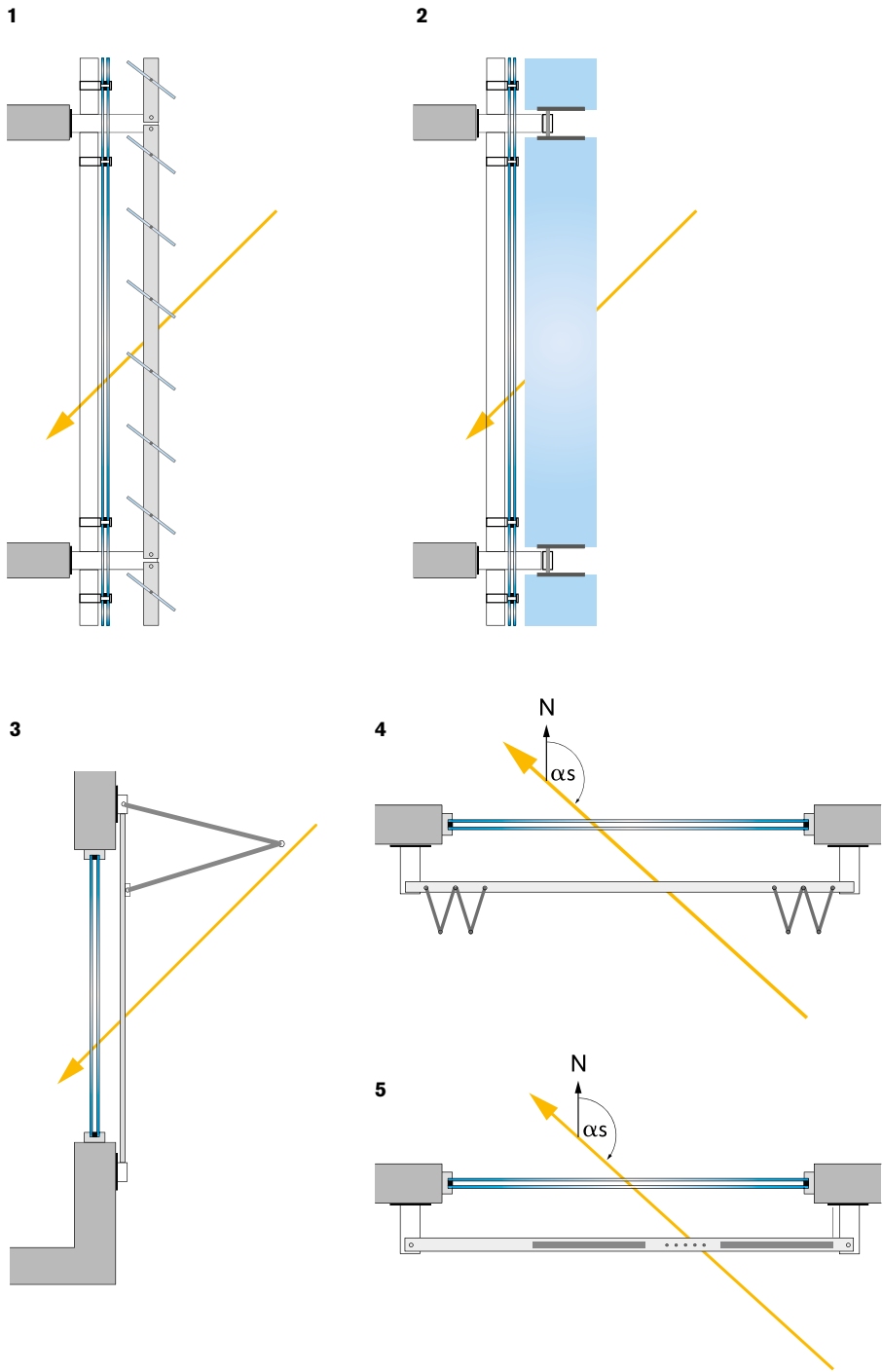
Conscientious planning efficiently reduces summer heat loads, maintains visibility to the outside, and ensures passive solar heat gain during winter.



The system features the following properties:

- single skin or aerofoil aluminum slats
- alternative materials for the slats, such as timber, glass, etc.
- the single skin solution is mounted via statically adequate, permanent, and weather-resistant plastic clips that accommodate thermal expansion without noise or tension
- plastic clips considerably reduce structure-borne sound transfer
- the possibility to choose from a wide range of slats and geometries as well as different colors
- system geometry and projection is adapted in accordance with design intent and the performance required
- Brise Soleil systems require next to no maintenance

Solutions at a Glance



Drawing 1 – Horizontal louvers, vertical section

Drawing 2 – Vertical louvers, vertical section

Drawing 3 – Vertical sliding & folding shutter, vertical section

Drawing 4 – Horizontal sliding & folding shutter, horizontal section

Drawing 5 – Sliding shutter, horizontal section

The variety of implementable façade solutions is virtually limitless. Whether horizontal or vertical louvers or shutters in all kinds of models and in various materials – UNIMET assists with experience and know-how.

Problems that appear to be contradictory in the beginning are solvable for



the skilled observer.

ENERGY VERSUS LIGHT


Introducing an old theme in a new guise. The term ‘solar shading’ is too short-sighted for today’s requirements. More appropriately, we should introduce a term such as ‘solar-harnessing’ systems. In the meantime, the inflated use of glass in facades, in combination with constantly increasing energy prices, drives the improved use of the sun as an unlimited resource without cost. Partly contradicting parameters, such as daylight and glare or solar gain and overheating, open up a narrow window for proper planning. User-friendly designs require expertise and know-how as well as planning skills.

Europe-wide, the energy consumption required for cooling buildings may lower CO₂ emissions by 80 million tons solely with solar shading. -ESCOP-EU25 Survey

MOVABLE VERSUS FIXED

There is no “best angle” for a fixed system, and very few buildings rotate with the sun. An ideal indoor climate for the user is only achievable through a dynamic building envelope that reacts automatically to changing weather conditions.

Customized controls offer plenty of additional functions. Nowadays, it’s about added value that pays off so much so that customers do not want to do without it.



Vertical metal louvers, tailor-made perforation pattern incorporated, C31 bronze anodized, movable and fixed, create a sense of unique look and provide sun shading, privacy and daylight supply.

Image: Apartment building,
Munich Moosach, Germany
Architects: Beer Bembé Dellinger, Daniel
Sautter, Munich
Photo: Andreas Fetting Fotografie, Timelkam



Customized solutions –
scalable as required

Image: RHZ Bau Salzburg, Austria
Architects: p-architektur Wolfgang Pöcklhofer,
Salzburg
Photo: Claudia Leopold, Standbild.at

Sun-tracking glass louver system: The project-specific screen printing dictates the internal temperature, operates as glare protection, and adopts the design of the Alucobond façade.



**Aesthetics meets Function –
Solar shading & glare control
as a curtain glass louver solution**



Building Integrated Photovoltaics – BIPV

This is power generation and façade design in its noblest form. Aesthetics, environmental consciousness, and functionality merge into unique solutions. The focus is not solely placed on the generation of green energy. Requirements for shading, daylight utilization, power generation, sustainability, and design are fused to form an object-oriented solution.

UNIMET will comprehensively and competently advise you with its more than 20 years of experience.

We will gladly help you with feasibility studies and concept outlines in the early project stage. This will allow you to ensure - in addition to extraordinary architecture - a functioning overall solution.

System characteristics:

- Free choice of the range of available solar cells; mono or poly crystalline
- Project-specific module layout and module structure
- Filigree frameless module supports
- Designed for extreme longevity
- Concealed cable routing
- Inverter sizing according to PV array
- Ideal balance between shading and power generation if sun-tracked
- Up to 18% additional energy yield for single axis module tracking
- Compensation for harmful solar cell shading if sun-tracked
- Choices on plant geometry and materials are made individually for every project
- Planning considers local building control requirements
- Planning on the basis of the National Electric Codes (NEC)
- And much, more

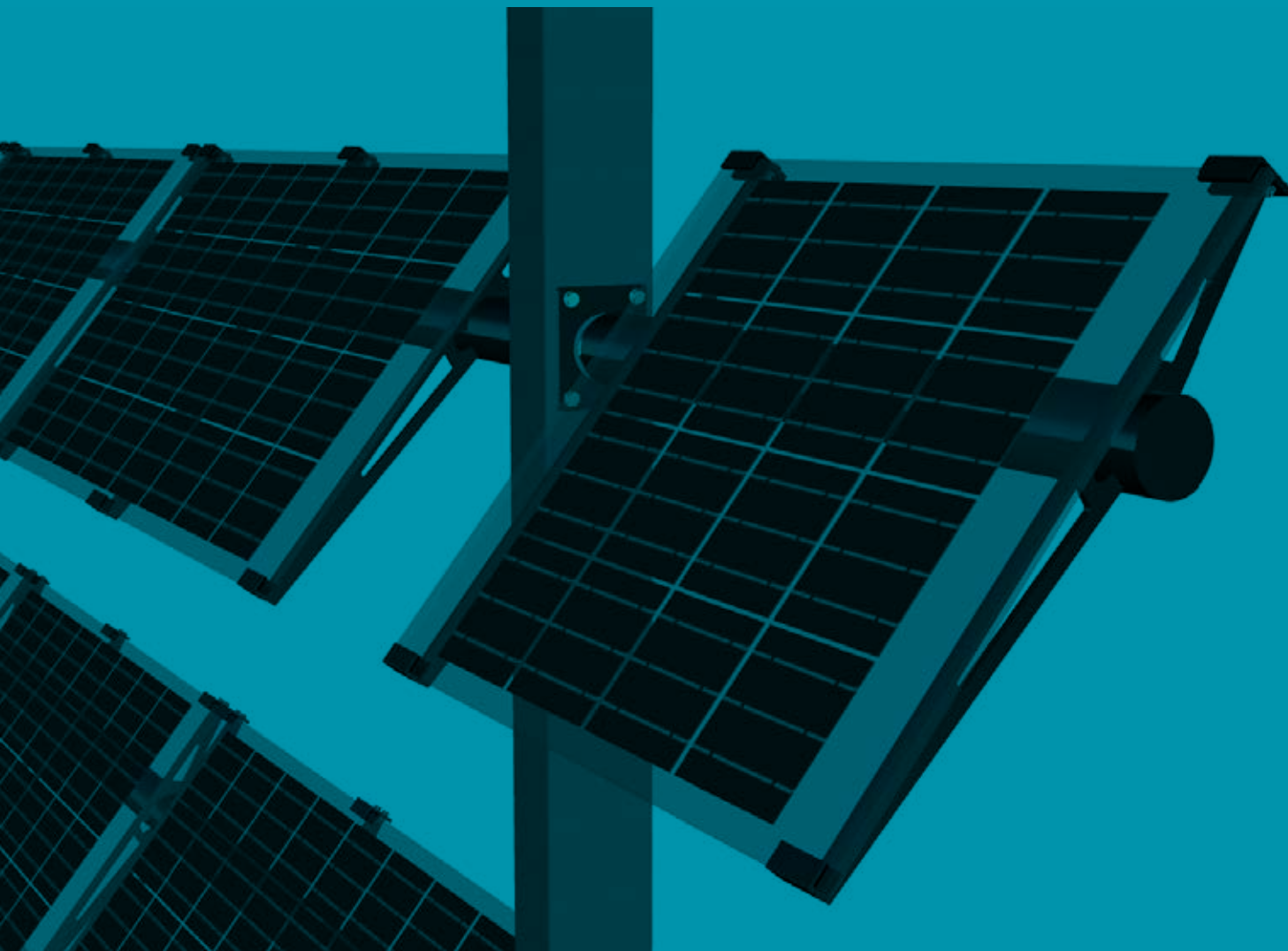


Image: Newly constructed building,
Energy Campus Stiebel Eltron,
Holzminden
Architects: HHS Planer + Architekten AG,
Kassel
Photo: Constantin Meyer, Cologne

**BIPV application at highest level –
Sun tracking tailor-made PV louvers –
The perfect calling card of top-class
buildings.**

**DGNB Platinum award received – highest
score ever in the category of educational
buildings.**



Image: Newly constructed building, Energy
Campus Stiebel Eltron, Holzminden
Architects: HHS Planer + Architekten AG,
Kassel
Photo: Constantin Meyer, Cologne

BIPV application at highest level –
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**Synergy of active & passive
energy generation – Awarded
platinum certification by the DGNB**



Glass, a special material -
Characteristics:

- Perfect transparency
- High stability
- Corrosion and chemical resistance
- Easy to clean & high self-cleaning capacity
- Adjustable semi-transparency without physical holes
- Longevity without significant degradation
- Vast design range: body tint glasses, ceramic frits, reflective coatings, lamination of colored PVB-foils or metalized textures, etc.
- Very good price-performance ratio

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Glass – the key to
transparent solar shading

Image: BMW Group Head Office,
Midrand, South Africa
Architect: Boogertman + Partner,
Johannesburg
Photo: Studio88 Photography,
Michael Schmucker, Pretoria

Control and Regulation Concepts

Fixed solutions are often insufficient in order to respond optimally to weather conditions and to the permanently changing solar altitude. Façades that are oriented towards the East or West are especially not adequately dimensioned for fixed designs. The only effective response to the sun's large angle range is an automated sun tracking system. This is how a balance between thermal insulation and daylight provisions can be ensured.

UNIMET offers a modular system that allows the cost-effective project planning of small systems, as well as large plants, and fulfills close to each and every wish within its application. This was developed for the desires of large louver systems and it allows precise positioning without the use of complex and accident-sensitive position encoders. Substantially, it consists of the elements a weather station, main controls, and a defined number of distribution boxes containing motor controllers.

Manual intervention is possible via 2-gang rocker switches. Fire alarm contacts and other inputs may also be connected. Status and error notifications may be linked to the BMS, and operation is handled via a user-friendly touch-display.

The core is a microprocessor supported control unit that constantly calculates the exact position of the sun for any location. Orientation of the façades and geometric measures of the solar shading system result in the equivalent tracking control points. The weather station supplies the control unit with the local weather conditions. Thus, decisions on louver positioning for particular façade areas (control zones) are made.

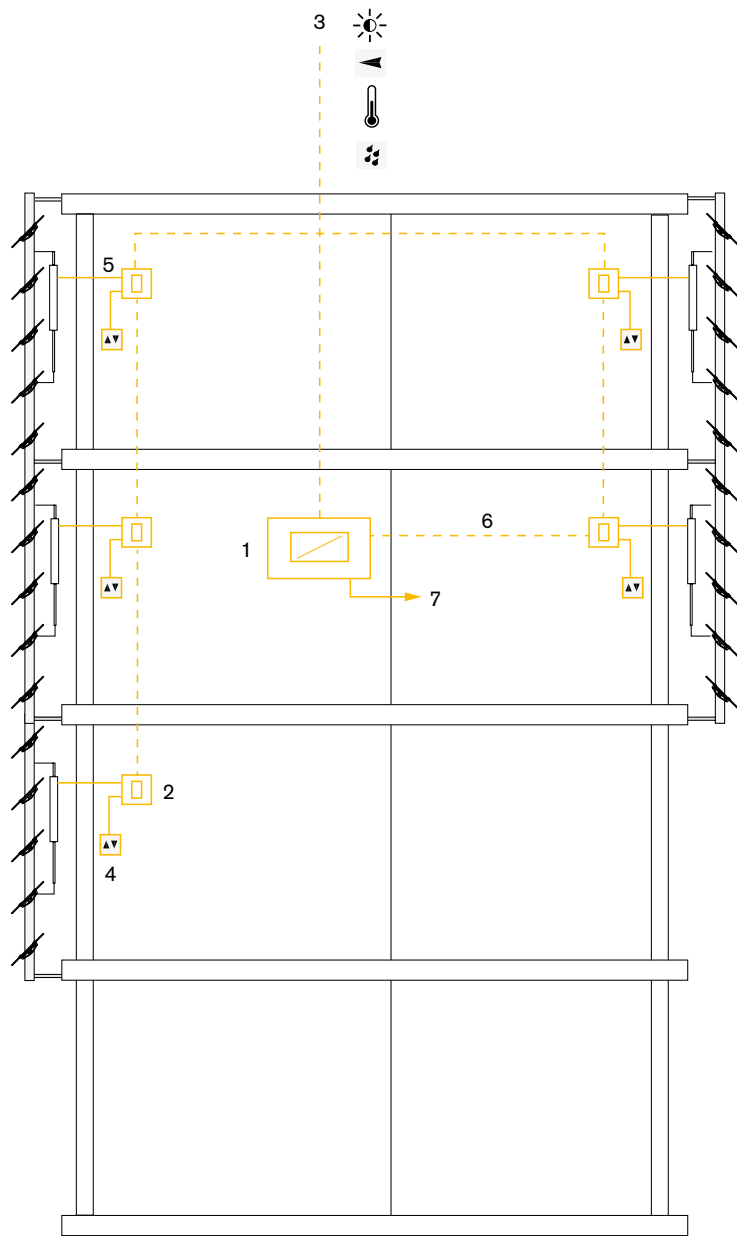
The control system can either be laid out as a decentralized option or as a central cabinet type.

- 1 Main control unit with touch-display
- 2 Distribution box containing motor controller(s)
- 3 Weather station (brightness, wind, rain, temperature)
- 4 Manual override switch
- 5 Motor wire
- 6 Bus wire
- 7 To BMS

Extended Tracking Options:

Corrections to conventional tracking have to be taken into consideration depending on the applied louver material.

- Prismatic louvers only suppress direct light in a very small range of angles. Precise tracking with corresponding angle correction is mandatory.
- Photovoltaic systems react disproportionately high regarding energy yield loss with partial solar cell shading. Tracking correction ensures perfectly illuminated solar cells.
- If louver systems are operated according to the so-called cut-off angle, outward visibility and daylight quality improve. However, these improve at the expense of higher reflected portions of radiation and increased level of glare. This option should be preferably considered for darker and matt louver surfaces.



UNIMET – Company Profile

We have been living our motto for over 20 years: design and functionality to perfection. At the same time, our customers' wishes are at the center of our thinking and action.

Based on the roots of classical metal construction, UNIMET was founded in 1996 in Atzbach, Austria. From the outset, UNIMET devoted itself to the design, manufacture, and assembly of customized manufactured construction solutions. Portal and conservatory construction, post-and-beam façades, railings, glass balustrades, and much more formed the core area in our regional domestic market.

Our focus is on processing and further refining high-quality materials, such as steel, stainless steels, aluminum, glass, and composite materials. Technical execution and designs are closely coordinated with builders and planning architects.

With the construction of the company's own facility in 2005-2006 in Ungenach, Austria; business activities were extended to include the area of building-integrated solar thermal heating. Due to the passion of the owner, in-house patented development that certainly goes beyond the characteristic features of market-oriented thermal collectors is on display on UNIMET's own premises. This development has provided over 10 years of astounding performance proof.

Our business area has expanded via planning and implementation of constructive and object-oriented solar protection solutions since 2012. Strategic partnerships allow for the development of architecturally sophisticated folding and sliding shutter solutions, automatically sun-tracking large-louver systems of the highest technical level, and

building-integrated photovoltaics (BIPV) now belong to our product portfolio, as well. At UNIMET, the building envelope mutates into 'smart skins', an efficient manager of cost- and emission-free solar energy, light, and air.

The service of CNC machining technology of highly complex components established itself in 2013 as an offshoot of the company's know-how that has been accumulated over many years. Modern rotary lathes and milling centers do not just supply UNIMET with projects. They are also available to customers and partners for the production of precision components.

With an excellently trained staff of more than 30 highly motivated and experienced employees who are very closely linked to relevant sectors, UNIMET presents itself today as a manufacturer of high-quality building solutions. We serve international markets in both private and commercial sectors. Since year one, our maxim has always been the focus of sustained and steady growth that is not conducted at all costs with the future firmly in our sights.



“Our task is to make products economically, ecologically, as well as to sustainably care for our earthen, natural habitat.”



High-quality Metal Construction



Customized Solar Shading –
UNISHAD



Multivalent Energy Façades –
UNIPOWER PRO



Precise Machining



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References:

Image P. 1: Multichoice City Randburg (5 Star Green Star SA Office Design v1 Certified)
Architect: GLH & Associate Architects, South Africa
Solar shading studies, application concepts, and engineering: ims engineering services
Manfred Starlinger, Kleve
Image P. 13 - 17: Solar shading studies, application concepts, and engineering: ims
engineering services Manfred Starlinger, Kleve