



FOR THE DEVELOPMENT OF BIOCLIMATIC FAÇADES

Somfy Solutions

Balancing energy efficiency with comfort and well-being.

somfy®



THE CHALLENGES OF BIOCLIMATIC FAÇADES

Bioclimatic façades balance energy efficiency with the comfort of a building's occupants by utilizing the best elements of the outside climate along with internal systems. Somfy accomplishes the creation of a bioclimatic façade with a fully automated intelligent integrated system that reacts to outside elements in real time; maximizing energy efficiency while eliminating undesirable climatic influences. With our integrated approach, Somfy meets the challenges of today's commercial buildings:

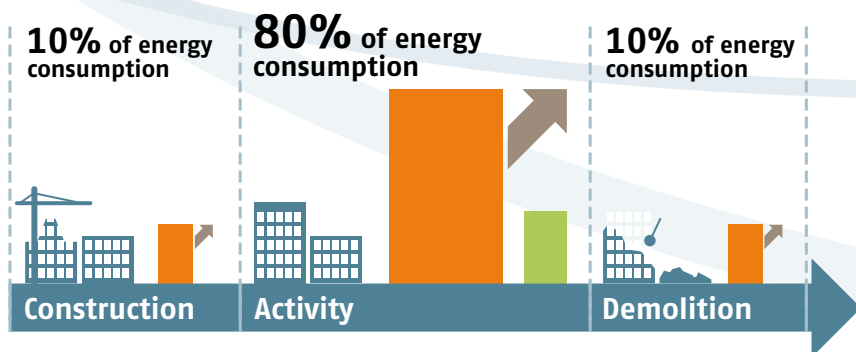
Meeting LEED and ASHRAE requirements

Utilizing Somfy solutions for bioclimatic façades can help attain 19 LEED points out of 110 on a new construction project, and up to 22 LEED points on a major renovation. Somfy contributes to key sustainability points such as light pollution, optimizing energy performance, and indoor environmental quality. Somfy also offers solutions that follow ASHRAE guidelines for enhancing the work environment by incorporating natural light to create favorable lighting and contrast, thermal comfort, and proper ventilation.

Environmental footprint

When a building is in active use, more fossil and nuclear energy is consumed than renewable energy. In the future, this situation will need to change.

Now

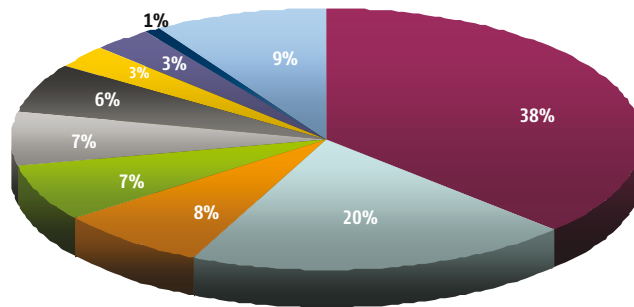


Meeting LEED and ASHRAE requirements will help to reduce the carbon footprint of commercial buildings by reducing our reliance on fossil and nuclear energy which will in turn reduce CO₂ emissions.



Meeting current environmental requirements

- Space Heating - 2,203 trillion Btu (38%)
- Lighting - 1,143 trillion Btu (20%)
- Water Heating - 449 trillion Btu (8%)
- Cooling - 431 trillion Btu (7%)
- Ventilation - 384 trillion Btu (7%)
- Refrigeration - 354 trillion Btu (6%)
- Cooking - 167 trillion Btu (3%)
- Personal Computers - 148 trillion Btu (3%)
- Office Equipment - 64 trillion Btu (1%)
- Other - 478 trillion Btu (9%)



US Energy Information Administration (USEIA) 2003 Study

Energy efficiency plays a vital role in new construction design and refurbishment of all commercial buildings today. With 72% of energy use in commercial buildings attributed to lighting and HVAC systems (USEIA 2003), there is an obvious push to reduce the energy consumption of these systems. Somfy solutions promote the use of natural energy sources such as sunshine, daylight, and outside air. Automated solar shading and window opening devices integrated within the façade optimize the use of natural sources and contribute to increasing energy efficiency of buildings. When integrated with artificial lighting systems, maximum energy savings are realized by dimming artificial light while daylight is illuminating the space, or by turning off lights when a space is unoccupied.

Improving the quality of indoor environments

On average, 80% of a company's operating costs are related to employees. Therefore, increasing productivity by only 1% would offset a company's energy costs for an entire year (REHVA Guidebook 2010). Thermal and visual comfort have a beneficial effect on the occupants' well being. Working or living in a more pleasant, healthy environment leads to improved efficiency and productivity. Automated shading devices contribute to meeting two objectives: maintaining comfortable indoor temperatures for a longer period of time and enabling continuous glare control.

Adding value and longevity to the investment

With the long term reduction of energy related costs, the initial investment for integrated automated shading is returned after just a few years due to smaller HVAC installations resulting in lower energy bills. In renovation projects, the peak load can be substantially reduced. Automated shading also reduces the handling of shading devices by the building's occupants, extending the life of the shading devices and lowering maintenance costs.

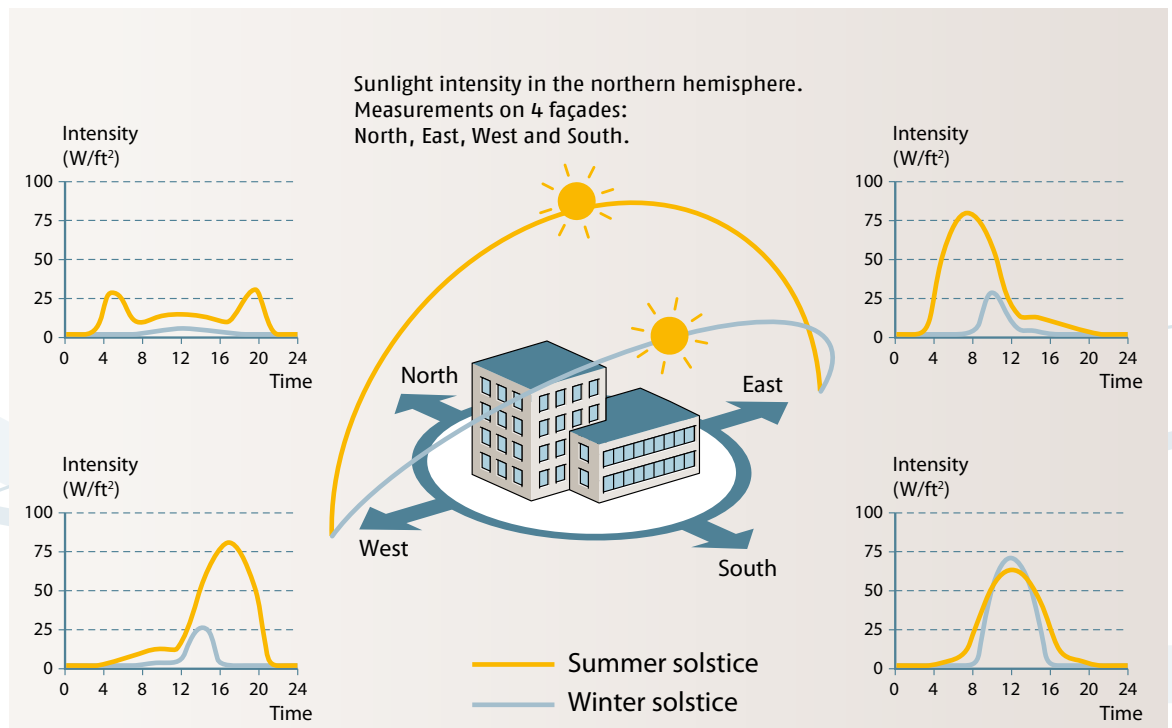
THE EFFECTIVENESS OF BIOCLIMATIC FAÇADES

A bioclimatic façade works as a dynamic filter between the indoors and outdoors by regulating sunlight and heat exchanges according to the needs of the occupants. To achieve a high level of performance from the façade, designers must pay close attention to the building's environment and the type of activities normally performed by the occupants.

The importance of context

Climate and microclimate

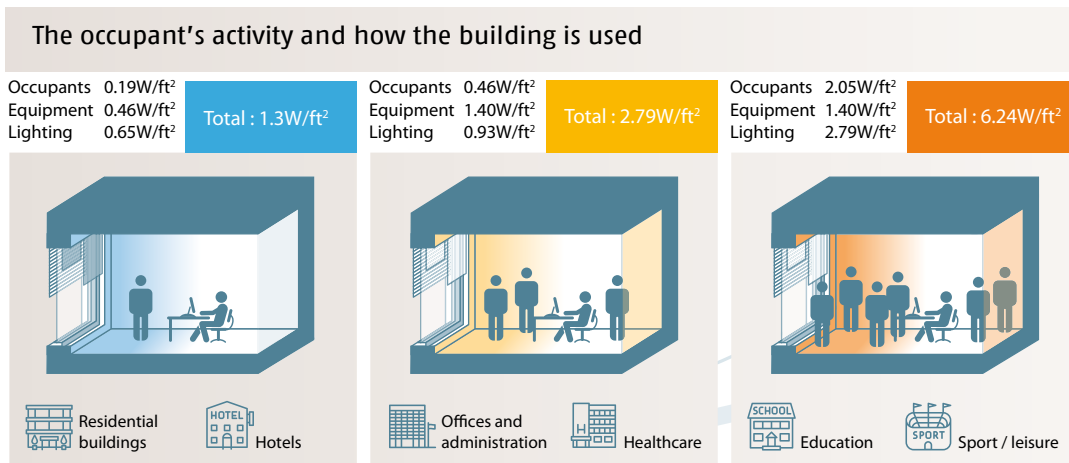
Sunlight, temperature, and precipitation vary according to the season, month, time of day, location, and orientation of the building. All of these factors will influence a building's energy needs. For example, do trees or shadows from neighboring buildings influence the sun's penetration into a building during certain times of the year? In addition to direct sunlight, are there additional sources of glare from the ground or neighboring buildings that need to be accounted for?





The occupants' activity and how the building is used

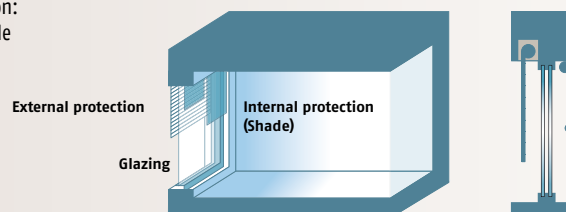
Occupation density as well as the amount of natural light required for the activities performed inside the building are just some of the many criteria that influence how interior space is organized and the choice of systems used.



Choosing the components in the façade

The type of façade (curtain wall, double skin, partly or fully glazed), the type of glazing (single, double, triple, etc...), the use of indoor and outdoor sun protection devices, and the type of fabrics utilized all have a significant impact on the performance of the building. When designing bioclimatic façades, it is essential to define comfort and energy performance levels required before choosing the elements in the façade.

Example of a possible configuration: façade combining an interior shade and external solar protection





HOW SOMFY CONTRIBUTES TO BIOCLIMATIC FAÇADES

For 40 years, Somfy has been developing intelligent solutions for building openings using high tech motorization and automation systems. Dynamic insulation, natural light management, and natural ventilation are three of Somfy's unique areas of expertise dedicated to the development of bioclimatic façades.

DYNAMIC INSULATION™

Windows are the main interface between the interior and exterior of a building. A façade with automated sun protection devices installed can provide precise control over these exchanges, influencing the way in which heat enters and leaves the building, keeping the inside cool in warm climates or optimizing solar gain in cool climates. During winter, solar devices can be programmed to close in the evening in order to avoid heat loss, whereas in the summer, they can automatically lower based on the orientation of the sun versus a façade to limit the green house effect.

THE PRINCIPLE

Automated sun protection devices are raised or lowered according to changes in outdoor weather conditions and indoor comfort needs. They react to commands from weather sensors (temperature and sunlight) or control algorithms, according to the occupancy and vacancy periods in the building.

Summer strategy

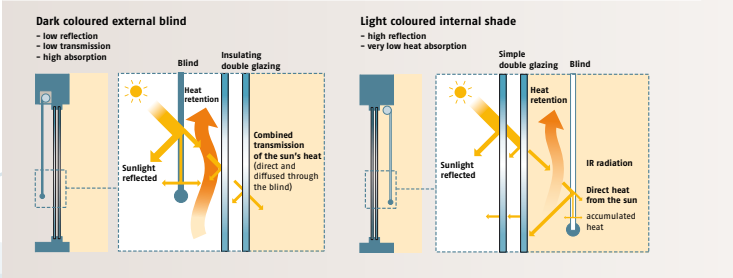


The indoor environment is protected by outdoor or indoor sun protection devices. Excess heat is reflected to keep the inside of the building cool. The combined solar factor (g) of the glazing and sun protection device must be optimized to meet energy reduction and natural light management requirements.

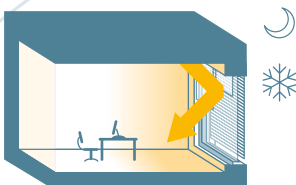
Impact the position and color of the blind have on heat gains.

The diagrams below illustrate two different Dynamic Insulation™ strategies used in summer to allow an equivalent level of heat into the building:

A sun protection device installed externally on a building is an effective solution for limiting heat gain by reflecting the sun's rays before they even reach the window. However, high performance internal shades now exist, which limit heat absorption and reflect the sun's rays outwards.



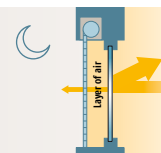
Winter strategy



During the day, heat is captured inside the building through the windows: the sun protection devices are raised when there is no glare and/or when the room is not occupied. In the evening, as the heat from the sun reduces and the outside temperature falls, heat is kept inside: the sun protection devices are lowered.

The combined heat transfer coefficient (U) of the glazing and sun protection device must be as low as possible.

A combination of double glazing and a roller shutter is an effective solution. However, adjustable sun shades can also help to insulate the window.





RESULTS

Thermal comfort and an improved indoor environment

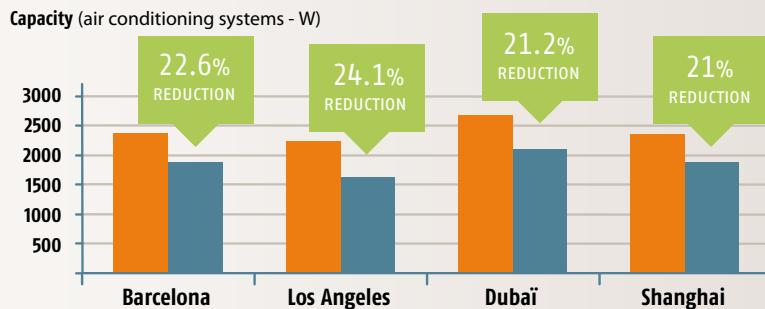
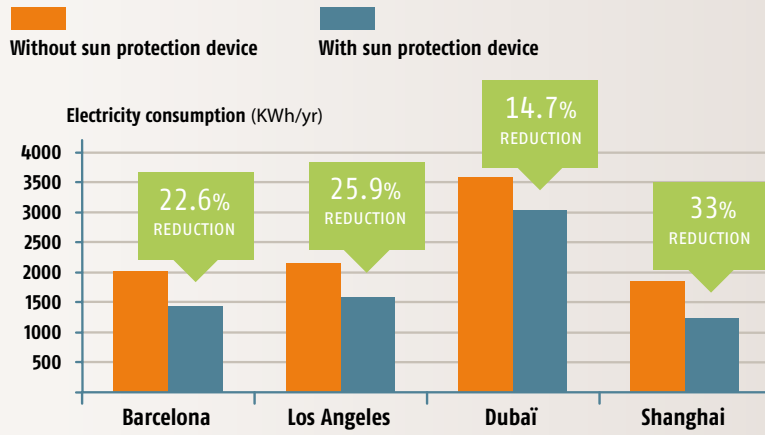
With Dynamic Insulation, the building's occupants are no longer subjected to sudden variations in temperature. Constant thermal comfort helps to improve day to day well being.

Improved energy performance

All cooling, heating, lighting, and shading management systems are fully integrated and communicate with each other to maximize energy efficiency.

Impact of automated sun protection devices on energy consumption (operational costs) and air conditioning system capacity (investment) in a hotel room.

Simulation carried out using the Somfy DISC tool, under the following conditions: Room measuring 425ft², with a double-glazed window measuring 67ft² (U = 0.27W/ft²). White PVC blind. The blind is lowered when the light level measured outside is above 15 Klux.





NATURAL LIGHT MANAGEMENT

Effective natural light management improves the visual comfort, well-being, and productivity of a building's occupants while reducing the need for artificial lights. Providing visual comfort indoors while enabling occupants to see the outside world also positively effects well-being. Striking the proper balance of natural and artificial light has a positive impact on energy consumption.

VISUAL COMFORT

Indoor visibility is a key factor in the occupants' sense of comfort. In order to maintain an optimal visual environment, automated solar shading systems take many parameters into account in order to provide occupants with maximum natural light and view to the outside, optimal levels of luminosity according to the building's activities, a good contrast level, and elimination of glare.

(1) Right contrast: the 1-3-10 rule

The difference in brightness between what the eye sees (30° angle) and a visual task (e.g. sheet of paper) must be no more than a ratio of 1 to 3. The ratio is 1 to 10 for the difference between total perceived light (90° angle) and surfaces located within the field of vision (e.g. a window).



With sun protection device



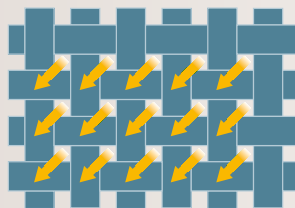
Without sun protection device

There is a suitable sun protection device for every project!

With internal or external horizontal blinds, the position of the slats can be adjusted precisely, allowing only the desired level of light to pass through.



With fabric shades or solar screens, the view to the outside world is determined by the position of the shade or by the openness factor and the color of the fabric.



Openness factor



View to the outside





NATURAL VENTILATION

Natural ventilation is a cost effective way of improving air quality in a building and cooling during the night, especially during summer months. Automating windows during the hours when a building is unoccupied means that a controlled flow of fresh air can pass through the façade, significantly reducing the accumulated temperature of the building mass and improving the quality of the indoor environment the following day.

Somfy solutions for natural ventilation include our line of window actuators that are linked to our Somfy Digital Network (SDN) which automates the process to ensure a fresh air flow and heat dissipation during the summer months.

RESULTS

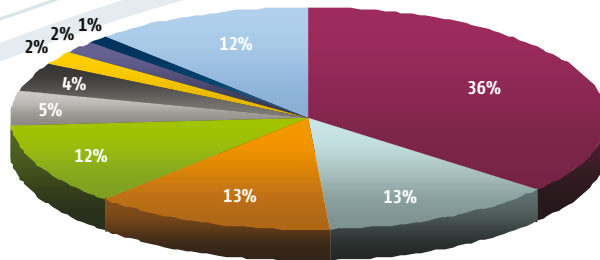
A more comfortable workspace

With automated sun protection devices, building occupants benefit from more natural light without the associated disadvantages. The ideal levels of contrast and brightness are maintained at all times and excessive glare is eliminated.

Energy savings on artificial light

Lighting accounts for a significant portion of a building's total electricity consumption and energy costs (36% on average based on USEIA study). With automated sun protection devices, this cost can be reduced significantly, yet users are able to retain their individual preferences.

- Lighting - 1,143 trillion Btu (36%)
- Cooling - 397 trillion Btu (13%)
- Ventilation - 384 trillion Btu (13%)
- Refrigeration - 354 trillion Btu (12%)
- Personal Computers - 148 trillion Btu (5%)
- Space Heating - 115 trillion Btu (4%)
- Office Equipment - 64 million Btu (2%)
- Water Heating - 52 trillion Btu (2%)
- Cooking - 22 trillion Btu (1%)
- Other - 357 trillion Btu (12%)



US Energy Information Administration 2003 Study of Energy Savings (USEIA) on Artificial Light

Artificial lighting management systems and blinds that communicate with each other generate significant energy savings and maintain optimal visual comfort for occupants...

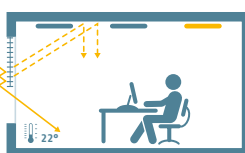
This is why Somfy and Philips Lighting share a common goal: to improve the indoor working environment through effective lighting management.



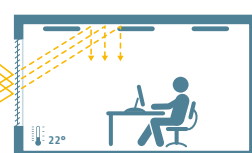
The combination of natural light and artificial lighting is optimal



No sun, overcast
Natural light: minimal
Artificial lighting: maximum



Some sun, a few clouds
Natural light: average
Artificial lighting: average



Clear skies
Natural light: maximum
Artificial lighting: minimal



CASE STUDY

TOUR SEQUANA: MAXIMIZING SAVINGS AND INDOOR COMFORT THROUGH BALANCING NATURAL AND ARTIFICIAL LIGHT

The Challenge

The new 330ft high Tour Sequana was designed and laid out to accommodate the 2,400 employees of Bouygues Telecom covering 88,000 square ft over 23 floors. The challenge was to reduce the average energy consumption to 8.3kWh/ft²/year, which is 3 to 4 times less than the tower building in the La Defense area of Paris. One of the key aspects to the design was to prioritize the use of natural light in the space where possible. "Everyone should have the same quality of space: wonderful light and a beautiful view for all," explains the architect Bernardo Fort-Brescia.

The Solution

To achieve the energy reduction figure as well as comfort levels, the developers invested in a high-performance glass façade which represented a solar factor of less than 25%, while having a light transmission figure of at least 50%.

The design team searched for the perfect solution to balance the optimization of natural and artificial light with the comfort of the inhabitants. The lighting consists of T5 high-performance luminaires and LED solutions. However, the unique solution of comfort and light balancing is the combination of lighting and solar protection management systems – the Philips Somfy Light Balancing solution. A total of 3500 automated horizontal blinds were installed, all motorized by Somfy. The blinds are activated to manage thermal heating, to reduce visual glare discomfort and to take advantage of the sun's position for natural light as required. When the blinds are closed, the artificial light levels are boosted and when the blinds are opened, the artificial lighting is dimmed. This assures optimal contrast values for working at a computer screen or on a document.



The Benefits

With the Philips Somfy Light Balancing solution, the Tour Sequana targeted energy consumption levels have been met. The management of artificial and natural light ensures the best level of indoor comfort in terms of light levels and glare.



INTERNATIONAL SOMFY PROJECTS



LA Fireman's Fund Credit Union - Pasadena, CA



Mérygnac Media Library - France



Hess Tower - Houston, TX



Lycee Colbert Building - Marseille, France



Environmental Protection Agency HQ - Denver, USA



Telus Tower - Toronto, ON



Abu Dhabi Investment Authority Headquarters - Abu Dhabi



Hexal Building - Holzkirchen, Germany



John E. Jaqua Academic Center - Portland, OR



SOMFY SOLUTIONS

There are several reasons why a building owner should utilize shades:

Energy savings, glare reduction, UV protection, minimize heat gain in summer, maximize heat gain in winter, dynamic insulation, reduce light pollution, maximize daylight, and aesthetics.

There is one reason for a building owner to use an AUTOMATED shade system. TO GUARANTEE: Energy savings, glare reduction, UV protection, minimize heat gain in summer, maximize heat gain in winter, dynamic insulation, reduce light pollution, maximize daylight, and create a uniform aesthetic look.

AUTOMATION IS KEY

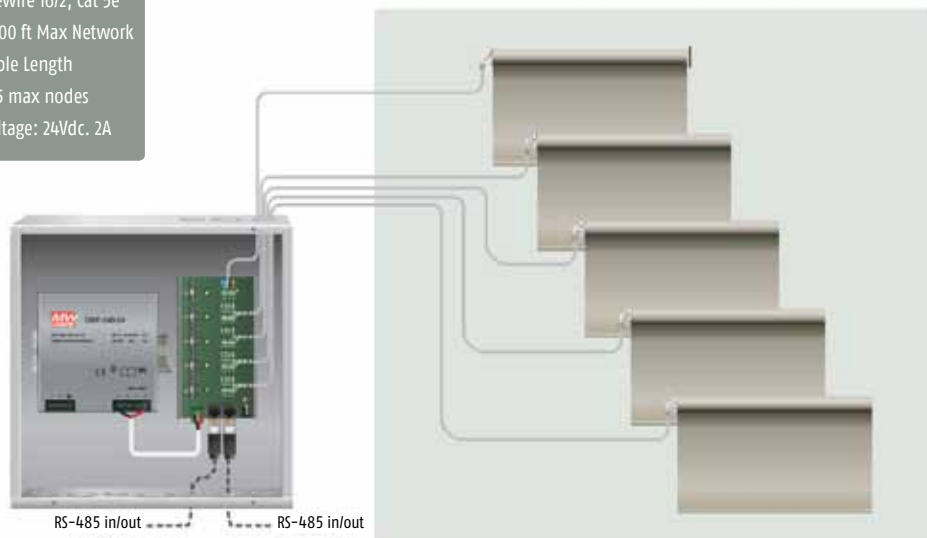
Shading devices are best utilized when they are automated. Manual shading devices are rarely adjusted, particularly for hard to reach windows or difficult to use blinds or rolling shutters. Automation is the only efficient way of using shading devices as it acts independently through an intelligent system of climate sensors and timers, delivering optimal results of energy savings and thermal and visual comfort.

There are several criteria for choosing the best solution for your project. The number of sun protection devices that need to be operated, the number of zones that need to be managed, the choice of management or maintenance systems, and the desired functionality and price. The best solutions for commercial building systems are the motors and controls offered with our Somfy Digital Network (SDN).

SONESSE 30 INTELLIGENT MOTOR DC SOLUTION

In applications where low voltage wiring is required, Somfy offers a 24V DC network solution utilizing our Sonesse 30 Intelligent DC motors, where the communication lines are directly connected to a central power supply.

- Prewire 16/2, Cat 5e
- 4000 ft Max Network Cable Length
- 255 max nodes
- Voltage: 24Vdc. 2A

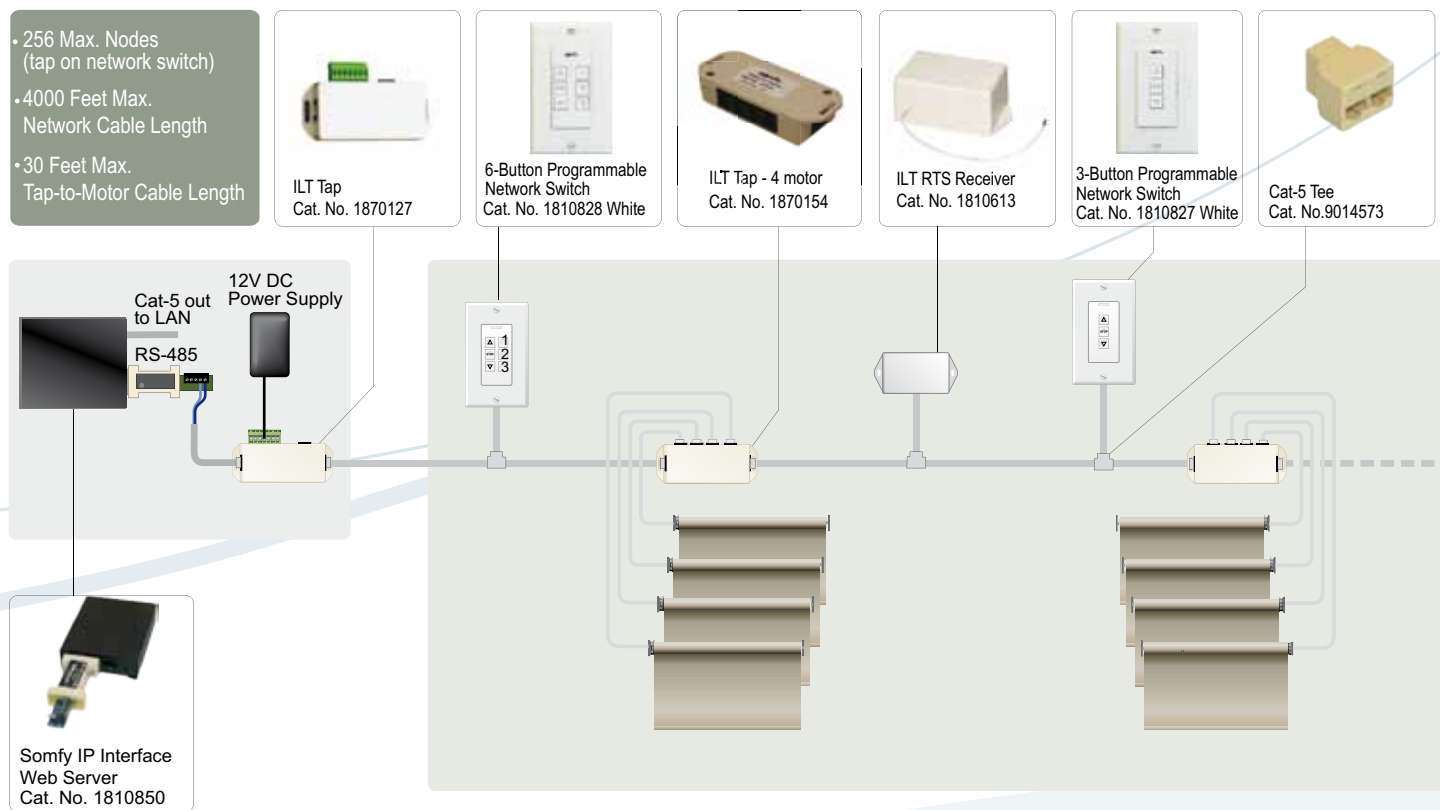


Both the AC and DC motor options provide an intelligent automated solution that is scalable for any size commercial building.



SONESSE 50 ILT2 INTELLIGENT MOTOR AC SOLUTION

Somfy offers a solution utilizing AC motors powered by local outlets, connected via a bus line which is powered by a 12V DC power supply.





SOMFY – THE PARTNER FOR YOUR PROJECTS

Somfy operates in 54 countries, with 68 subsidiaries, and 51 agencies with branches spread across 5 continents. With 7 production centers, Somfy is an efficient and reactive industry leader. Thanks to its strict quality standards, Somfy is able to satisfy the needs of 270 million users worldwide.

Before...

- Local teams dedicated to using their professional skills to help you at each stage of your project
- Personalized surveys
- Specification support
- Creation of guideline drawings
- Technical and feasibility studies
- Selection of appropriate products

During...

- Somfy supervision, equipment and system installation support
- Partnerships with an international network of manufacturers, guaranteeing high quality and fully compatible products
- Approved Somfy installers worldwide

After...

- Upgradable solutions that adapt to your changing needs over time, without requiring extensive work



Somfy products come with a five-year international guarantee and have been tested under extreme weather conditions. They are all fully factory-tested and comply with major international quality standards.

SOMFY'S COMMITMENT TO QUALITY

- Somfy has a production capacity of more than 43,000 motors per day.
- Somfy motors have over 600 standards approvals worldwide.
- Somfy is a Lloyds Registered Quality Assurance ISO 9001 Manufacturer
- Somfy has a network of 15,000 trained professional installers throughout the world
- Every Somfy motor goes through an extensive quality assurance process including testing in extreme environmental conditions, for electrostatic discharge, mechanical shock, and high life cycle.

TESTING



ASSEMBLY & PRODUCTION



LOGISTICS



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