People prefer daylight, a view out, and to be energy efficient. LUXMATE Blinds Control can deliver all three.
Daylight
Natural and ever changing

Daylight at different times of the day

- **In the morning**: Reddish light, low in the sky, from the east, at a shallow angle.
- **Late morning**: White light, rising from the south east, at a shallow angle.
- **Midday**: High, hard whitish blue light, from the south.
- **Afternoon**: Falling white light dropping to the west.
- **Evening**: Low reddish light at a shallow angle from the west.

Daylight changes constantly in quantity, directional quality and colour.

Daylight in different seasons

- **21 December**: Winter solstice, lowest altitude.
- **21 March, 21 September**: Spring and autumn equinox.
- **21 June**: Summer solstice, highest altitude.

*Northern Hemisphere
**Figures for London, UK

“Daylight needs to be provided so as to enhance visibility and beauty, without causing visual discomfort or thermal discomfort or loss of privacy”
Professor Peter Boyce, Trotter Patterson Lecture 2006
DAYLIGHT

The top 3 priorities
Energy, Energy, Energy

Daylight is indispensable for human life. It influences our bio-rhythms, fosters a sense of wellbeing and health, and boosts performance. However, the ever-changing nature of daylight carries with it potential risk, brought about by continual changes in intensity, direction of incidence and colour. Brise soleil and other fixed shading systems are often used to counteract the risks, but work less well in countries, like the UK, where the sun is often at a low altitude, with East and West facades being particularly difficult to control.

Luxmate Blinds Control responds to various daylight situations and automatically controls lighting and motorized blinds. Daylight and artificial light are perfectly balanced, providing optimum comfort in the workplace.

So, daylight has far reaching effects on comfort. But the subject that is more often focussed on is energy - and in this area as well, LUXMATE excels.

LUXMATE saves energy

In the UK, Lighting management systems are becoming a prerequisite for Part L compliance, with photocell controlled dimming of perimeter rows potentially reaping huge rewards by using daylight to light the office instead of artificial lighting. Savings figures ranging from 90% for perimeter rows, to 20% for deeper plan rows, are often quoted and are achievable with today’s fully glazed facades. And increasingly, these figures are being used in Part L compliance calculations and can make the difference between compliance, or not, for the building.

But here comes the problem. Daylight saving figures assume unobstructed windows, but in the real world windows have blinds which are normally manually controlled. Give the user manual control of the blinds and those assumed savings, essential for Part L compliance, will collapse. The solution is to use motorised, automated blinds, preferably “Daylight Harvesting”, and controlled by LUXMATE. The ability to provide complete integration of daylight and artificial lighting is a unique LUXMATE strength.
Man evolved under natural daylight and research shows that our natural preference is for lighting that changes dynamically. Moreover, our modern, fixed workplace lighting installations could be putting people to sleep. Daylight, controlled and maximised by LUXMATE, can make all the difference.

**Dynamic Daylight-Linking**

With LUXMATE, daylight can be used selectively. Blinds that redirect or “harvest” daylight will project incoming sunlight deep into the room whilst preserving the view out. The availability of daylight is maximised to the consequent benefit of the occupants.

**Daylight Harvesting**

Room users as well as legislators eg BREEAM in the UK, insist that workplaces have a view to the outside world. This is why LUXMATE always offers the user as clear an outlook as possible.

**View Out**
Protection From Glare

Daylight fosters a sense of well-being and boosts performance - provided that it does not cause glare. With the Glare control strategy, LUXMATE controls blinds so that they provide protection against glare and still allows a view to the outside. Blinds are only used when needed and can be completely retracted when not.

➜ Page 16

Solar Gains

The solar gains control strategy adjusts blinds on the basis of climatic criteria. Depending on the season, solar radiation that causes heat is either blocked or let in. If there is air conditioning it can be turned down to save energy. Luminaires are only switched on when absolutely necessary since daylight in the space is maximised.

➜ Page 18

Façade Architecture

Selective control of blinds and lighting enables LUXMATE to shape façades dynamically. A building with an appearance that constantly changes grabs people’s attention and acts as an advertising medium. Selective control also allows the creation of a planned, uniform appearance as opposed to the often random clutter of manually controlled blinds.

➜ Page 20
Multiple control strategies
from LUXMATE

Perimeter, Transition and Deep Plan Zones

Not everybody works close to a window. There are many deep plan office spaces in the UK where office workers might consider themselves starved of daylight or indeed envious of their perimeter colleagues with plentiful daylight and a view out. In these circumstances a blinds control system that maximises daylight deep into the space is of benefit to all concerned. In addition to this the control system and luminaire types should be chosen to suit the specific area and usage. There is a strong argument that perimeter, transition and deep plan office spaces should be lit and controlled differently to take account of the reducing impact of daylight across the space.

Mullion Wallwashing

The phenomenon of glare is intrinsically connected to the finite brightness of an object or surface but is also fundamentally linked to contrast. This is where a more intelligent, lighting design based approach to daylight can score. In a typical workplace, where we wish to maximise daylight factor and view out, keeping blinds raised or slats open for the maximum period of time is preferred. Selective wallwashing of window mullions reduces the contrasts across the window wall allowing blinds to remain more open for longer. This technique may seem at odds with the typical generic, one dimensional control strategy of dimming luminaires down as daylight increases but is another example of the complex interplay between daylight and artificial lighting where generic solutions may not reap the best reward.

Night Time Brightness Management

An uncovered window at night, seen as a black hole to the exterior, can be psychologically uncomfortable. The window blinds are an effective way of filling the window opening and alleviating the issue but can present a dilemma. In the example of rollscreen blinds, darker colours retain more of the view out during the day but have a negative impact on the visual lightness in the space at night.
Interesting colour change possibilities are presented by the use of Venetian blinds. Motorised revolving slats, with different colour finishes on each side, can be used to fundamentally alter the character and appearance of the space. These changes can be instigated in many ways, for example manually, by time control or in response to daylight.

In the UK, light pollution is beginning to be treated more seriously. A number of high profile court cases have shown that stray light that disturbs others is a serious issue that should be addressed and this need not necessarily be just from large, poorly aimed floodlights. On dark evenings, luminaires in office buildings could well constitute light pollution and trespass to those nearby, but this could easily be alleviated by the careful specification and control of automated blinds.

The provision of privacy should not be underestimated. In some circumstances it could be the biggest factor in ensuring comfort in the workplace.
Lighting has wide ranging effects on people - from modifying our behaviour by careful use of display lighting, to making us feel safe and at ease in a well lit night time environment. Lighting also affects our health but, perhaps surprisingly, we know more about how lighting affects those who are ill rather than the positive effects on those who are healthy. It has been suggested that indoor workers exist in so called biological darkness, with little access to the natural variations in daylight, to the extent that we are missing out on the health benefits of daylight.

In the UK, in particular, the integration of daylight in the workplace often means only one thing - look down photocells to switch or dim the artificial lighting as daylight increases. Whilst these systems can save significant amounts of energy there is little account taken of lighting quality. TRUE daylight linking should fully embrace both artificial lighting and shading control and a first requirement should be to maximise the quality of the space at all material times.

Research shows that we prefer lighting that changes dynamically, just like daylight. Dr. Susanne Fleischer showed that a static lighting scene throughout the day is not the best way to motivate and enhance workplace performance. Better is an artificial lighting system that can vary not just the level but also the ratio of up and downlight, as well as the colour temperature, all sympathetically balanced with daylight.

Dr. Susanne Fleischer

Dr. Susanne Fleischer is a distinguished German scientist working until recently at the Institute for Hygiene and Industrial Physiology in Zurich where she managed the „Lighting Harmony“ project. One of the findings from this project was that a person’s mood, motivation, performance and level of contentment varied over the course of the day, this variation depending on the light levels in the room and outdoors, and on people’s inner circadian rhythms.

In particular, she discovered that people prefer direct lighting when the sky is cloud covered, and indirect lighting when the sky is cloudless and sunny. She also established that light with a „cool“ light temperature has a more stimulating effect than „warm“ light temperatures. All these findings point to a Balanced Lighting system being the best solution.

Fleischer found a clear relationship between lighting conditions outside and inside. People prefer warm direct lighting when the sky is overcast, and indirect cool lighting when sunny.
Okay, so most of us don’t have a workplace like this. If we did then access to the magical qualities of ever changing natural light would be guaranteed. But, in our more practical workplaces, there are ways to begin to control, emulate and maximise daylight for the benefit of all concerned. Dynamic Daylight Linking is a holistic approach to lighting our interiors which spans the boundary between natural and artificial lighting, takes the best features of each and optimises them for maximum benefit.

But surely there must be a downside - what about energy, for instance, from those additional luminaires providing light on the room surfaces, or blue light for stimulation, or warmer, directional lighting to provide accent and interest. If these were conventionally used then, of course, the installed load (w/m²) would be too high. But installed load is not the new measure of efficiency. Today’s energy currency is CO₂ - and when we begin to look at our dynamic daylight linked solutions we find that the careful control of artificial lighting coupled with the maximisation of daylight drastically reduces CO₂ emissions from the levels we would have expected given the installed load. The result can be extraordinary levels of workplace comfort combined with optimum efficiency.

It is hard to think of any recent approach to lighting that could improve the workplace environment by such a large degree and yet be able to save energy.

Humanergy Balance

A Zumtobel philosophy for optimising the balance between energy, the environment and the individual.

Conventional
Manually controlled blinds, with their characteristic chaotic appearance, swallow up theoretical CO₂ savings promised by the daylight dimming because they are often closed when they should be open.

Automated
The blinds are automatically controlled in response to daylight, providing a uniform effect and maximising daylight because the blinds are only closed when they need to be closed.

Daylight Harvesting
Best in Class solution with daylight harvesting blinds - the upper element re-directs all possible daylight deep into the space via the ceiling. In addition, a subliminal Active Light cycle provides dynamically changing lighting throughout the day leading to a truly integrated daylight and artificial lighting system.
Daylight Harvesting
Using daylight to the full

Daylight Harvesting

Glass facades are shaping the image of modern architecture but some opinion suggests that energy efficiency legislation* may begin to reduce the proportion of glazing in buildings. An answer could be the adoption of combined façade systems incorporating glazing and blinds, where the blinds are automatically controlled to alter solar gains dependant on the building requirements at the time.

Functionality is crucial

Controlling daylighting involves more than just providing protection against glare. Daylight can be deliberately used to illuminate rooms by selective redirection or "harvesting". LUXMATE can allow daylighting appropriate to needs by selectively controlling the upper and lower slats of blinds.

The slats of the upper third of specialised daylight harvesting blinds are used to re-direct light via the ceiling in order to illuminate areas deep inside the room; at the same time the lower two thirds of the slats are adjusted to provide protection from glare. The performance can be further enhanced by the use of photometrically designed ceiling reflector panels that help project daylight deep into the space whilst controlling glare.

For more conventional situations, metal ceiling tiles, with a special ultra-matt finish, are available to optimise the light distribution and to prevent stray reflections. The ultimate result of these techniques is that occupants benefit from the maximum provision of daylight at all material times.

Consistent, maximised daylighting cuts the energy consumption of a building significantly.

This energy saving makes its contribution towards reducing operating costs and the emission of CO₂. At the same time, a friendly room bathed in daylight improves employees’ sense of well-being and their productivity, because, as we know, people prefer daylight.

Carefully controlled lighting is increasingly being seen as fundamental in the quest for Part L Compliance and, of course, daylight enhancement of the space can be very valuable in staff recruitment, retention and the war for talent.

*For example Part L of the UK Building Regulations, which places heavy emphasis on reducing solar gains.
An interesting feature in this daylight harvesting blinds installation is that the bottom third of the window has no control fitted because it doesn’t require any. This maximises daylight and view out with no potential glare penalty.
Studies by Dasgupta (2003) and the Fraunhofer Solar Building Innovation Centre (2004) rate view out as a highly important factor in workplace satisfaction. It seems that people’s sense of wellbeing in rooms depends on preserving contact with the outside world. In some countries Laws and Standards require an unobstructed view to the external environment for all workplaces.

LUXMATE’s automated control system meets these requirements by preserving the view out in two ways. Firstly, blinds are only ever lowered just enough to obtain the desired protection from sunlight. This could mean lowering the blinds to provide shade only as far down as the lower edge of the desk, rather than right down to their lower limit position.

Secondly, the slat position is selected to ensure the best possible unobstructed view without letting in direct sunlight. This partial shading does not cut employees off from the outside world - even when the sun is low - and always gives them a view out. At the same time, the uniform position of the blinds makes sure that the appearance of the façade is not spoilt.

Research suggests that a satisfying view constitutes sky, horizon and foreground and it therefore follows that a fully glazed façade may be preferable. But it could be argued that the lower third of any full height glazing is ineffective in daylighting terms, delivering neither improved daylight distribution nor an enhanced view for the majority of workplace occupants. Best practice would be to block the lower third, thereby reducing solar gains, and concentrate daylight engineering on the upper two thirds of the window.

Whether it be a glimpse of a palm fringed stretch of golden white sand, or a view across a typical UK business park, the quality appears to matter little. It is the presence of a view that counts, and LUXMATE know how to maximise it.
“Cut-off” control strategy - the tilt angle of the blinds slats prevents glare but retains a view out.

Rating of importance of a view out.
Results of trials involving 41 test subjects – Fraunhofer Solar Building Innovation Centre 2003/2004
Protection from glare
Dazzling ideas for glare-free light
Protection from Glare

People prefer daylight

Excessive daylight, however, may soon become distracting. For instance, sunlight and skylight can create glare, and high levels of illuminance near windows can swamp the image on display screens. Things become even more complicated if adjacent buildings reflect light onto one’s own frontage. In such situations adequate protection from glare is a necessity. Conversely, shading by an adjacent building may mean that blinds have to be opened.

The “protection from glare” control strategy can prevent such annoying phenomena by selective, automated control of the slats of blinds.

This is part of the LUXMATE lighting scene concept. The daylight-based scene includes the best possible view of the external environment, supplemented by only just the amount of artificial light needed.

Design of Blinds

A skilled lighting designer should be employed to help in the selection of blinds to avoid issues with glare. All too frequently the blinds are chosen mainly on their aesthetic attributes and this often leads to problems for end users. Some of the potential pitfalls are fairly obvious such as a material with too open a weave, too light a colour for rollscreen blinds or the wrong perforations on venetians. Other problems are less obvious, for example solar flare produced by uncontrolled interrefractions between slats in venetian blinds. The appraisal of blinds performance ideally needs the expertise of a lighting specialist.

Regulations and Information

Regulation 8(2) of the UK Workplace Regulations

“The lighting (in every workplace) shall, as far as is reasonably practical, be by natural light”

BS8206-2

Lighting for Buildings. Code of Practice for Daylighting. “An interior which looks gloomy, or does not have a view of the outside where this can reasonably be expected, will be considered unsatisfactory by users”

BREEAM

Extra points are scored where “at least 80 % of the net lettable office floor area is adequately daylit” and “all desks are within a 7 m radius of a window”
Solar Gains
The first step towards climate control

Rooms that don’t get hot don’t need to be cooled

LUXMATE is capable of controlling blinds in line with changes in daylight, changing seasons and the way the room is used.

The system’s control strategy can be set to selectively block or admit thermal radiation into the space depending on the season.

LUXMATE lets daylight in to foster a sense of well-being. Only the precise amount of artificial light needed is added.

Glass as a heat trap

Conventional glass provides hardly any obstacle to solar radiation entering rooms. Besides visible light, so-called low-temperature thermal radiation is also allowed in. This is absorbed by walls and furniture and converted into long-wave infrared thermal radiation (approximately 10,000 to 50,000 nm). Because long-wave thermal radiation cannot escape back out through the glass, the room heats up constantly; this is the well-known greenhouse effect.

The g value of glass

The total solar energy transmittance (g) of glass has two components:
- the total solar radiation transmitted through the glass and
- the radiation that is initially absorbed by the glass and then released into the interior by heat transfer and movement of the air after a time delay.

The lower the g value, the less the room will be heated by solar radiation.

Typical g values:
- Double glazing $g = 80\%$
- Thermal protection glazing $g = 50 – 70\%$
- Solar protection glazing $g = 20 – 40\%$

The fc value of window systems

The fc value is defined as the factor expressing the reduction in the total energy transmittance of a system “with glazing only” compared to a system with “the same glazing and protection from sunlight”. Without protection from sunlight, fc = 1.

The smaller the fc value, the more effective the protection from sunlight is, with a correspondingly lower room temperature and cooling load for air-conditioning systems. You should ask the relevant window treatment system manufacturer what the fc value of their product is. Multiplying the g value by the fc value gives the total solar energy transmittance of the glazing and the protection from sunlight $g'$. 

Cost savings due to thermal protection

To make a rough estimate of savings, first determine the likely cooling loads on average throughout the year caused by solar radiation. Do this twice: once with, and once without, a window treatment system.

Assuming an investment cost of £ 650 for a set of blinds with a control unit, the system would pay for itself after approximately 4.5 years.

Economic considerations include the following:
The bigger the building and the more windows it has, the shorter the payback period is for daylight linked control.

Example

<table>
<thead>
<tr>
<th>Size of room section</th>
<th>10 m²</th>
</tr>
</thead>
<tbody>
<tr>
<td>Window size</td>
<td>2 m²</td>
</tr>
<tr>
<td>Cooling load</td>
<td>400 W/m²</td>
</tr>
<tr>
<td>Hours of sunshine</td>
<td>4 h</td>
</tr>
<tr>
<td>Sunshine days/year</td>
<td>30 days</td>
</tr>
</tbody>
</table>

Total cooling load without protection from sunlight 960 kWh

Total cooling load with protection from sunlight (fc = 50%) 480 kWh

Cooling efficiency (assumed) 0.33

Gives energy difference of 1,454 kWh

Savings £ 145 (£ 0.10/kWh)
External Blinds

- Produced heat cannot penetrate glass, remains outside
- Lowest $f_c$ value, best practice thermal protection
- Architectural feature
- Need to be designed in early and to take account of typical UK wind loads
- Highest investment cost

$g = 0.53$

$fc = 0.09$ to $0.2$

Interstitial Blinds

- Produced heat can only penetrate glass through secondary effects
- Good $f_c$ value
- Simple, neat appearance and protection for blinds
- High investment cost

$g = 0.53$

$fc = 0.21$ to $0.3$

Internal Blinds

- Produced heat penetrates the glass and may stay in the room
- Moderate $f_c$ value but modern, solar control glass could solve this issue
- Practical for typical UK window details
- Can be used in the void of dual façade systems
- Low investment cost

$g = 0.53$

$fc = 0.6$
Façade Architecture

Blinds help shape the building
Façade architecture using blinds

Glass façades are shaping the image of modern architecture. With their increasing use, window treatments and blinds are also attracting the attention of designers and architects as design features.

LUXMATE allows blinds to be controlled room by room, storey by storey, or one façade at a time. This allows architectural considerations to be taken into account and promotes nightscaping.

For example, using Zumtobel’s Active Light concept or LED technology, an outer glass skin can be transformed into an eye-catching feature. The surfaces of interior blinds or blinds within a dual facade are used as light reflectors. Selective control of slat positions positions can be used to create diverse patterns, from Christmas trees or Advent calendars, to company logos.

This turns light and blinds into a design feature of a façade.
Daylight is changing constantly and indeed this factor may partly explain our preference for natural light. The quantity, direction and “quality” of daylight changes from season to season, day to day and hour to hour, or on some days more rapidly as clouds pass and weather conditions change. To keep up with these changes, and to utilise daylight to the full, a control system capable of operating across the boundary of artificial lighting and daylight is required. LUXMATE Daylight is just such a system.

LUXMATE Daylight is based on the Skyscanner, a sophisticated device capable of detecting subtle changes in daylight. With 8 photocells and an infrared sensor, the LUXMATE Skyscanner continuously registers the condition of the sky through all its changes. A distinction is made between diffuse light and direct sunlight and the LUXMATE management system processes this information and uses it to best control the luminaires and blinds. The skyscanner is positioned at the highest point of the building, in an un-shaded position, and is precisely orientated to North. By measuring data about the intensity and direction of solar radiation, the system is able to take account of direct sunlight or sky-light, reflected light from adjacent buildings, and shadowing. With impressive accuracy the LUXMATE Daylight system can progressively open or close blinds as the edge of a shadow moves.
Manual Control

A LUXMATE control system based on the Skyscanner is normally fully automated and, whilst full manual control is available, its provision is a contentious issue. Bartenbach Lichtlabor*, a World renowned Austrian daylighting consultancy, suggest that “manual blinds cannot be relied upon” and “the individual cannot be left to make the choice”. Certainly, if the blinds are used as part of the building solar gain control system, relying on manual control is unlikely to achieve the required performance. Gaining user acceptance of fully automated blinds is perhaps the main area of contention but, arguably, a clear explanation of why automated blinds are used is a major step towards that user acceptance.

*www.bartenbach.com

The daylight sensor supplies data about the intensity and direction of solar radiation – for façade-dependent and seasonally dependent optimised control of blinds and lighting.

With impressive accuracy, the blinds control system follows the edge of the shadow. Manual intervention is possible but consider the comments on the right.
Window shading
Overview of available systems

External shading systems

External blinds (slat blind)

Applications
- Daylight harvesting
- Daylight glare control
- Optimum view out
- Best thermal protection

Features
- The narrower the slats, the more attractive their appearance but protection from glare becomes more imprecise
- Non-fading
- Suitable for high wind speeds
- Difficult to retrofit
- Not light-tight

Roller shutter

Applications
- Protection from sunlight
- Blackout
- Intruder security

Features
- Daylight tracking is not possible
- Suitable as protection against heat
- Difficult to retrofit

Awnings

Applications
- Protection from sunlight

Features
- Very sensitive to wind
- Sensitive to rain
- Depending on position of sun, glare control/shading may not be possible

Interstitial blinds

Applications
- Protection from sunlight

Features
- Not susceptible to wind or dust
- Sometimes possible to retrofit
- Functions are inoperative if window is opened

Built-in shading systems in glazing or dual façades

Vertical blind

Applications
- Daylight harvesting
- Daylight glare control
- Optimum view out
- Good thermal protection

Features
- Space saving
- Maintenance free
- Unaffected by weather

Disadvantages of external shading systems
- Cannot be used in all weathers
- Investment cost is higher than that of internal protection from sunlight
- More maintenance required

Advantages of built-in shading systems
- Expensive to repair
- High investment cost
Internal shading systems

Vertical slat blind

Applications
- Partial daylight glare control
- Privacy
- Visual link possible to external environment

Features
- Unpredictable view out
- Can be retrofitted
- If left partially open, glare problems may transfer to other occupants of the space
- Heating up of rooms in summer cannot be prevented
- Currently less popular than in previous periods

Venetian blind

Applications
- Daylight harvesting
- Daylight glare control
- Optimum view out
- Moderate thermal protection
- Room partitioning function

Features
- Decorative element of interior
- Most popular UK solution
- Easiest access for maintenance of mechanism
- Potentially distracting motor noise
- “Solar flare”, leading to disturbing glare, can be a problem with decorative blinds

Roller blind

Applications
- Privacy
- Blackout
- Protection from sunlight
- Possible future daylight harvesting

Features
- Requires little space
- Sheer fabric produces pleasant lighting conditions
- Decorative element
- Heating up of rooms in summer cannot be prevented
- Quality of light control depends upon the choice of fabric
- Twin roll screens can give more control variation

Pleated blind

Applications
- Privacy
- Protection from sunlight

Features
- Decorative element
- Suitable for locations where space is cramped
- Suitable for various window shapes

Advantages of internal shading systems
- Can be used regardless of weather conditions
- Provide decorative room effect
- Lower investment cost
- Inexpensive to install, uninstall and maintain

Disadvantages of internal shading systems
- Sometimes no protection from glare if window is opened
- Once inside the room, not all solar radiation can be reflected out again

For maximum user acceptance care should be taken to minimise motor noise, particularly when using internal systems. Newer blinds motor designs are significantly quieter than previous versions with some manufacturers reporting virtually silent operation.
### General information

Maximum energy efficiency, more convenient operation, improved quality of life and protection against break-in are becoming increasingly important aspects of building design.

LUXMATE intelligent lighting and blinds management is making its contribution. Its sophisticated automatic control system can handle control of individual windows, specified areas, storeys, façades or entire buildings.

### Functions

<table>
<thead>
<tr>
<th>Short keypress up</th>
<th>Fully opens the blind. Benefit: individual adaptation of daylight conditions to suit one’s own needs.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Brief keypress down</td>
<td>Fully closes the blind. Benefit: individual adaptation of daylight conditions to suit one’s own needs.</td>
</tr>
<tr>
<td>Long keypress up</td>
<td>Opens the blind as long as the key is pressed. Benefit: individual adaptation of daylight conditions to suit one’s own needs.</td>
</tr>
<tr>
<td>Long keypress down</td>
<td>Closes the blind as long as the key is pressed. Benefit: individual adaptation of daylight conditions to suit one’s own needs.</td>
</tr>
<tr>
<td>Restore automation</td>
<td>After manual operation, restoration of automatic control can be set in the room automation computer as a time function.</td>
</tr>
<tr>
<td>Automatic protection from sunlight</td>
<td>The window treatment is lowered if a defined, measured outside brightness is exceeded. Benefit: protection from glare and heat, and potential high energy savings.</td>
</tr>
<tr>
<td>Daylight-based control</td>
<td>Regulation of daylight by means of slat positioning accurate to within one degree. Benefit: as much natural light as possible is let in without glare being caused by high sky luminance or direct sunlight. Rapid fluctuations in daylight can also be compensated by measurement.</td>
</tr>
<tr>
<td>Shadow edge control</td>
<td>Blinds are controlled in their extended position depending on the position of the sun so that a specific area is always shaded. Benefit: the edge of the shadow cast by the blinds always remains in the same place regardless of the position of the sun.</td>
</tr>
<tr>
<td>Solar function</td>
<td>General opening and closing times are adapted to suit sunrise and sunset. Benefit: opening and closing at sunrise and sunset.</td>
</tr>
<tr>
<td>Auto weekend control</td>
<td>Regardless of outdoor brightness, blinds are shut. Benefits: • Closed, e.g. for protection against break-in • Temporarily opened to allow indoor plants to get sunlight • Special programs make it possible to obtain promotionally effective façades. If buildings are sufficiently large, together with lighting, your own logo or other symbol can be simulated.</td>
</tr>
<tr>
<td>Automatic day/night timer</td>
<td>The automatic timer makes sure that window treatments are closed or opened throughout the building or one façade at a time. Benefit: blinds can be lowered in the evening in commercially used buildings to prevent people in the vicinity being bothered by stray light in case of shift working. Conversely, blinds can be opened again automatically at dawn.</td>
</tr>
<tr>
<td>Automatic precipitation control</td>
<td>A weather station measures the amount of precipitation. When a specific precipitation level is reached, awnings, for example, are retracted. Benefit: protection against excessive precipitation.</td>
</tr>
<tr>
<td>Automatic wind control</td>
<td>The wind speed is measured by a weather station. If sensor values are exceeded, the shading device is raised and manual intervention is disabled. Benefit: protects external blinds against damage by high winds.</td>
</tr>
<tr>
<td>Automatic frost control</td>
<td>If there is risk of frost or icing (measured by special sensors), automatic and manual use of the window treatment system is disabled. Benefit: protection against damage by icing.</td>
</tr>
<tr>
<td>Climate-dependent blinds control</td>
<td>In summer, slat blinds are controlled so that shading systems are closed when an interior temperature limit value is exceeded on sunlit façades. In winter, automatic control opens all shading system on sunlit façades. Benefit: energy savings thanks to reduction of cooling load in summer and heat output in winter.</td>
</tr>
</tbody>
</table>

### Solar function

- **General opening and closing times** are adapted to suit sunrise and sunset.
- **Benefit:** opening and closing at sunrise and sunset.

### Automatic protection from sunlight

- The window treatment is lowered if a defined, measured outside brightness is exceeded.
- **Benefit:** protection from glare and heat, and potential high energy savings.

### Daylight-based control

- **Regulation of daylight** by means of slat positioning accurate to within one degree.
- **Benefit:** as much natural light as possible is let in without glare being caused by high sky luminance or direct sunlight.
- **Rapid fluctuations in daylight** can also be compensated by measurement.

### Auto weekend control

- **Regardless of outdoor brightness,** blinds are shut.
- **Benefits:**
  - Closed, e.g. for protection against break-in
  - Temporarily opened to allow indoor plants to get sunlight
  - Special programs make it possible to obtain promotionally effective façades. If buildings are sufficiently large, together with lighting, your own logo or other symbol can be simulated.

### Automatic day/night timer

- **The automatic timer** makes sure that window treatments are closed or opened throughout the building or one façade at a time.
- **Benefit:** blinds can be lowered in the evening in commercially used buildings to prevent people in the vicinity being bothered by stray light in case of shift working. Conversely, blinds can be opened again automatically at dawn.

### Automatic protection from sunlight

- The window treatment is lowered if a defined, measured outside brightness is exceeded.
- **Benefit:** protection from glare and heat, and potential high energy savings.
<table>
<thead>
<tr>
<th>Functions</th>
<th>Description</th>
<th>Operation</th>
<th>Applications</th>
<th>Benefits</th>
</tr>
</thead>
<tbody>
<tr>
<td>Individual blind control</td>
<td>Individual blinds are primarily operated manually but also controlled in conjunction with redirection of daylight and daylight glare control, in single-person offices such as executive offices.</td>
<td>locally by manual override or automatic control system</td>
<td>single-person offices, executive offices, workrooms</td>
<td>individual, user-oriented operation</td>
</tr>
<tr>
<td>Sector or group control</td>
<td>Sector or group control is used in addition to manual operation, especially in team offices and open-plan offices.</td>
<td>locally by manual intervention or automatic control system</td>
<td>team offices and open-plan offices, presentation areas, shop windows, exhibition areas</td>
<td>affordable, application-linked control</td>
</tr>
<tr>
<td>Floor control</td>
<td>Control is horizontally geared towards floors or storeys. Individual systems can be merged floor by floor and controlled consecutively without causing peak energy loads.</td>
<td>by automatic control system</td>
<td>utility buildings, &quot;investment properties&quot;</td>
<td>peak energy loads are prevented when the building is being cleaned, building is used floor by floor</td>
</tr>
<tr>
<td>Façade controls</td>
<td>Façade-by-façade control is used when daylight-based control is also used for uniform façade design by window treatments. It is also used when protection against wind is controlled one façade at a time.</td>
<td>by automatic system</td>
<td>utility buildings, medium to large sized administrative buildings</td>
<td>complete shading of a façade during the day, or protection of neighbours against light trespass at night</td>
</tr>
<tr>
<td>Building control systems</td>
<td>These include all the window treatments of a building.</td>
<td>by automatic system</td>
<td>utility buildings, medium to large sized administrative buildings</td>
<td>complete blackout, protection from heat at the weekend, protection against break-in at night and at weekends; maintenance and cleaning, window treatments are protected against wind and weather damage</td>
</tr>
</tbody>
</table>
### Planning checklist

**Trouble-free implementation of blinds requires careful planning with which your local LUXMATE expert can help.**

#### Functional requirements placed on control system

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>What are the user’s requirements in terms of operation, automation, special protection from glare, façade design, redirection of daylight, visual display terminals etc.?</td>
<td>Operation can be manual or automatic. Operation is via wall-mounted momentary-action switches or touch panels or from a PC using operating software. Blinds can be controlled in the lighting scene either separately or collectively. Façade design can make allowance for a common blinds position. Redirection of daylight requires special blinds. VDT workstations require the “daylight glare control” strategy.</td>
</tr>
<tr>
<td>Are there special requirements in relation to air-conditioning technology, e.g. preventing excessive heat build-up?</td>
<td>The LUXMATE thermal protection strategy takes into account heat gain in rooms which may be undesirable (summer) or desirable (winter). Unlike conventional control systems, the artificial light “heat source” can be taken into account so that rooms need not be heated unnecessarily and the load on air-conditioning systems is reduced.</td>
</tr>
<tr>
<td>Can solar energy be used to turn down the heating by temporarily opening shading devices in the case of large glass façades?</td>
<td>Yes, in so-called winter mode (as above).</td>
</tr>
<tr>
<td>How can blinds be grouped together?</td>
<td>Simultaneous control of room facades, storeys or sectors is taken into account when addressing and programming the LUXMATE system.</td>
</tr>
<tr>
<td>Are there special requirements for seminar and conference rooms?</td>
<td>Depending on requirements, “privacy” or “blackout” strategies are implemented using opaque roller blinds, which may be in combination with other conventional blinds.</td>
</tr>
<tr>
<td>Is a uniform blinds position required at weekends or in the evening?</td>
<td>For example, to minimise light pollution, an adjoining owners’ legal protection may require that all blinds are shut at night. In addition, lowered blinds offer extra intruder security. All manner of control may be programmed, for example leaving blinds in the up position late into a summers evening for the benefit of indoor plants.</td>
</tr>
</tbody>
</table>

#### Control system equipment

<table>
<thead>
<tr>
<th>Question</th>
<th>Response</th>
</tr>
</thead>
<tbody>
<tr>
<td>What shading products will be used?</td>
<td>The mechanisms, travel distances and technologies vary widely but LUXMATE have wide ranging experience of working with all major blinds and motor suppliers.</td>
</tr>
<tr>
<td>What type of motor and what make will be used?</td>
<td>Depending on the type of control (e.g. 230 V AC, 24 V DC or the latest generation of DMI digital motors), blinds actuators will differ greatly. Specific makes have already been tested and stored as data sets in our blinds actuator system.</td>
</tr>
<tr>
<td>Can daylight harvesting blinds be used whilst still controlling glare?</td>
<td>Two-part blinds systems, with two separately controlled motors, are commonly used for this purpose. This control strategy can be taken into account in the LUXMATE planning phase.</td>
</tr>
<tr>
<td>Can special operating requirements be taken into account?</td>
<td>Individual operation by switch, group operation or remote control can all be provided. In addition, operation from a PC using a simple graphical user interface allows facility managers full control input either directly or via typical BMS software.</td>
</tr>
<tr>
<td>Where will the control units be installed?</td>
<td>There are control modules that can be installed in switch cabinets, under-floor sub-distribution boards, dado trunking or in a ceiling void. The exact type of blinds module depends on the installation scenario.</td>
</tr>
<tr>
<td>Where will sensors such as external daylight sensor, indoor light sensors, weather stations etc. be located?</td>
<td>Weather stations, required when external blinds are used, are installed on the roof or on an outside wall.</td>
</tr>
</tbody>
</table>
### Safety requirements for people and equipment

<table>
<thead>
<tr>
<th>For external blinds systems, can the system take account of inclement weather conditions like high winds, frost, icing and heavy rain?</th>
<th>Wind and rain are measured centrally on each façade by dedicated specialist sensors, and are taken into account through entries in a computerised automatic control function. Manual operation of blinds is disabled in stormy weather. Frosty and icy conditions involve similar control strategies as do intruder security situations.</th>
</tr>
</thead>
<tbody>
<tr>
<td>In emergency cases, can blinds be opened to aid escape?</td>
<td>It is possible to integrate fire alarm signals into the automatic system in order not to obstruct escape routes in specific danger situations.</td>
</tr>
<tr>
<td>Do special precautions such as remote maintenance, maintenance contracts and lockout functions for servicing and cleaning need to be taken?</td>
<td>When windows are cleaned, blinds can be opened and locked through a central lockout function.</td>
</tr>
</tbody>
</table>

### Services and organisation

| Have the deadlines for system planning, equipment delivery, installation of window treatments and electrical equipment, commissioning, acceptance and maintenance intervals been agreed? | Commissioning cannot take place until basic installation has been completed. Commissioning is often not performed by the same person who carried out installation. Acceptance in the form of a written acceptance report is recommended, especially in the case of complex systems. |

### Various requirements placed on controlled window treatments by operators and users

<table>
<thead>
<tr>
<th></th>
<th>Building Operator</th>
<th>Building User</th>
</tr>
</thead>
<tbody>
<tr>
<td>Saving energy</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>User convenience</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Protection from glare at the workplace</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>No reflected glare on VDT workstations</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Thermal insulation by minimising solar radiation in summer</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Optimum daylighting at the workplace</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Blackout for presentations</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Privacy</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>View out</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Mechanical protection against break-in</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Aesthetic appearance</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>High reliability</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Integration into building automation system</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Cost efficiency</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Workplace performance</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Protecting shading systems against extreme weather conditions</td>
<td>●</td>
<td>●</td>
</tr>
<tr>
<td>Individual user control</td>
<td>●</td>
<td>●</td>
</tr>
</tbody>
</table>
Planning example
Office complex

**Customer’s requirements**

- Maximum energy efficiency.
- The building design objective was an architecture that allowed multifunctional office organisation and flexible interior design.
- Implementation of a continuous glass façade with full height glazing.
- Employees had to be given a motivating, healthy working environment that enhanced performance.
- Technology had to be an integral component and as invisible and inaudible as possible.
- Intelligent installation systems controlling all technical functions across all systems such as: lighting, blinds, cooling, heating and ventilation.
- The way office space was divided up had to be compatible with flexible reorganisation – without extensive conversion work.
- Use of a combination of centrally, automatically and manually operated lighting and blinds.
- Window treatments had to be self-protecting, be automatically raised and prevent manual operation by employees in special cases such as stormy weather.
- Compliance with illuminance levels in conformity with standards for working and business premises.
- Protection from daylight glare particularly for areas with VDT workstations.

**Ambient conditions**

- The required flexibility has been achieved by office cubicles having a module size of 1.25 m. Building services must provide flexible support for necessary changes. All office cubicles must be uniformly equipped.
- The glass façades face in different directions.
- As much daylight (natural light) as possible is used.
- Double cavity floors are used, not dado trunking.
- A Computer Aided Integrated Facility Management (CAIFM) system is installed for professional building management and is used for planning, organisation and monitoring. It also supports important tasks that are part of use of the building such as special events, conferences, security services, catering and cleaning. Employees are included in and informed of optimisation of the building over an intranet.
- The blinds manufacturer supplied 3.20m drop external blinds finished silver grey. These were equipped with GJ5608 type AC motors manufactured by Geiger.

**The lighting solution**

- Suspended Zumtobel Orea direct/indirect luminaires were used for artificial lighting on window frontages, with compact fluorescent Panos downlights used in room interiors and in corridor areas. All luminaires were fitted with DALI electronic ballasts and are therefore individually addressable. This makes it possible to allocate individual sub-areas to new rooms and to change control options at any time without structural alterations.
- The travel strategy of the Luxmate blinds actuators is adapted to the Warema/Geiger window treatment combination giving control of AC motors and being individually controllable even though, for economy, quadruple output blinds actuators were used.
- The control strategy is set to control glare, particularly for DSE compatibility, when employees are present. When employees are not present, a thermal protection strategy is used. Warming solar radiation is kept outside in summer (blinds are largely closed) but is used as additional heating energy in winter (blinds open).
• Where facades face each other, reflections between facades are taken into account.
• Use of Luxmate Proface touch panels allows lighting scenes at the press of a button, even if PCs are not yet ready for use.
• Blinds actuators are installed within the raised floor because no dado trunking or switch cabinets are available.

• Several room automation computers take care of automatic lighting control. Safety-relevant requirements such as wind load are taken into account on the “blinds management” configuration user interface. The computers are connected via a separate LAN with a graphical user interface (GUI) to help the Facility Manager perform tasks such as “central display”, “monitoring and controlling LUXMATE system”, “fast, easy fault finding” and “central administration of user rights”.
• The infrastructure LAN is linked to the office LAN via a router. Because the employer attached importance to individual controllability of lighting and blinds by employees, networkable iSkin control software is installed on an SQL server connected to the office LAN. The iSkin user interface, which every user can use to control room sub-areas within the limits of his/her rights, is displayed on employees’ PCs. This requires no separate momentary-action switch inputs on the blinds control unit, and this makes it possible to use 4JSP, quadruple blinds actuators.

LUXMATE products
LRA-1500  LUXMATE Room Automation
LM-DALIS  DALI digital output
LM-BV     Bus supply for 100 LM units
LM-BV35   Bus supply for 35 LM units
LM-PCSIR  PC interface with relays
LM-BK     Bus coupler
LM-SCE    Quadruple switch input
LM-4JSP   Blinds control 230 V AC, 4x
LM-SKD    AV interface
LM-PFM6   Proface monochrome touch panel 6” (package)
Planning example
Museum for precious objets d’art

Customer’s requirements

- Rooms had to be flooded with daylight when required.
- During special exhibitions of oil paintings by old masters, the total amount of light (daylight and artificial light) had to be guaranteed not to exceed 250 lux. The maximum value for delicate artwork was 60 to 100 lx.
- The glazed south-facing façade of the building was fitted with attached fixed grey cross blades in order to screen out harmful direct daylight. Investigations carried out by a research institute established however that stationary glass blades were unsuitable because of reflections that could not be prevented and the fact that they modified daylight by giving it a green tinge.
- The windows had to have two different window treatments with different transmittance: external shutters with a transmittance of 12.5% for the 250 lx scenario, and internal roller blinds with transmittance of 2.5% for the 50 lx scenario.
- Daylight fell into the rooms through skylights installed all around on the second floor (through a glass structure). Further dispersion of daylight and glare control was obtained through ceiling slats in the false ceiling on the mezzanine floor.
- The internal blinds and roller blinds had to be shut at night.
- On the south-facing façade, allowance had to be made for special motors for the heavy roller blinds with relatively long travel and special starting conditions.

Ambient conditions

- The private museum is the size of a villa and is linked to adjacent historical buildings.
- Its contemporary art collection is open to the public.
- The museum is a place of encounter and interaction.
- The building consists of a second floor set back from the main façade, a mezzanine floor, a ground floor and a basement.
- The main entrance is located in the basement. The entire building is built into a slope, and the various storeys therefore rise above the ground to different heights.

The lighting solution

- The lighting solution on the second floor consists of TECTON continuous-row luminaires fitted with perforated sheet steel louvres. It is located behind the ceiling slats. This special design includes double continuous-row luminaires fitted with warm or cool white lamps depending on the exhibition. They can be controlled separately.
- Internal blinds with Maxon blinds motors (24 V DC) supplied by Dobler Metallbau have been fitted in the skylights.
- In the exhibition areas on the remaining floors, the LIGHTTOOLS modular recessed lighting system is used. It has been fitted with various warm and cool white fluorescent lamps and additionally with HIT high-pressure lamps. A special design allows air extraction through the luminaire trunking.
- The internal blinds on the second floor are controlled by 2JDCX, double blinds actuators installed on sub-distribution boards recessed into the floor.
- The roller blinds on the south-facing façade are controlled by 2JSE double blinds actuators, whilst the external blinds are controlled by 4JSP quadruple blinds actuators. Both blinds actuators can control AC motors and have a LUXMATE bus connector.
• All luminaires, except those with HIT lamps, have a DALI addressable electronic ballast. This means that every luminaire can be controlled individually using LM-DALIS modules. These are installed on sub-distribution boards. The HIT luminaires are switched via RUKS relays.
• The entire system is automatically controlled on the basis of daylight by the room automation computer. The external daylight sensor installed on the roof provides the measured values used for control purposes. The system can be monitored via a dedicated TCP/IP infrastructure LAN. A LUXMATE server with a graphical user interface allows central monitoring, central control and adaptation of the system to suit changing exhibitions. An OPC server for further control functions such as heating, ventilation and air conditioning is also connected to the TCP/IP LAN. A wireless LAN access point allows the system to be controlled and programmed via a WLAN Tablet PC. Computer-aided room automation (LRA) already has a built-in ISDN access card so that remote maintenance can be performed in the event of an emergency or for service updates.
• Emergency lighting is provided by an Onlite Section Central distributed central battery system, installed on the various storeys. Section Central monitors, and provides status feedback of, the emergency luminaires, based on DALI communication. The use of the DALI protocol allows seamless integration of the emergency luminaires and the LUXMATE luminaires and the LUXMATE control system via a standard LUXMATE DALI interface.

**LUXMATE products**
- LRA-1500 LUXMATE Room Automation
- LM-BV Bus supply for 100 LM units
- LM-PCSIR PC interface with relays
- LM-BK Bus coupler
- LM-4JSP Blinds control 230V AC, 4x
- LM-2JSE Blinds control, 2x, limit position
- LM-2JDCX Blinds control 24V DC, 2x
The type of blinds system selected dictates the complexity of the control strategy. Simple roller blinds may require only ascending and descending movement, in one travel direction, to achieve control such as glare protection, privacy and blackout. More sophisticated blinds may require intermediate positions, besides up or down, and varying slat angles. This could require precise angular control, accurate to within one degree, which is well within the capability of LUXMATE. In all cases the most important factor in realising a successful design and installation is early discussion of the daylight integration strategy. Detailed discussions, at the earliest opportunity, will ensure the successful integration of daylight, blinds and artificial lighting.

Operating strategy A
Slat products with 3-limit switch motors. The shading position is always reached with a movement from the top.

Operating strategy B
Slat products or roller shutters with 2-limit switch motors. Shading position is always reached with a movement from the bottom.

Operating strategy C
Slat products with 2-limit switch motors. Shading position is always reached with a movement from the top.

Operating strategy D
Projecting awning, shading position reached from top or bottom.

Operating strategy E
Roller shutter or window without shading position.
Travel Strategies - Data Sets - LUXMATE Technology

LUXMATE produce a wide range of blinds control units, which are armed with sensitive electronic systems and software that provide the link between the artificial lighting management system and the blinds.

Each control unit is pre-programmed with various “travel strategies” to suit a wide range of blinds types, with special strategies being possible to suit more unusual requirements.

Each travel strategy is stored as part of a data set, which holds additional information such as slat uptime and maximum slat angle, and this data set is programmed into the control units. Luxmate’s extensive experience of blinds control projects means that control units and data sets are already available for a broad range of available blinds, and others can be added as required.

<table>
<thead>
<tr>
<th>Travel Strategies - Data Sets - LUXMATE Technology</th>
</tr>
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</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>LM-2JSM</th>
<th>Supply voltage (V)</th>
<th>Current (A)</th>
<th>Channels</th>
<th>Number of limit switches</th>
<th>Local momentary action switch inputs</th>
<th>Operating strategy</th>
</tr>
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<tbody>
<tr>
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<th>Number of limit switches</th>
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<table>
<thead>
<tr>
<th>LM-4JSP</th>
<th>Supply voltage (V)</th>
<th>Current (A)</th>
<th>Channels</th>
<th>Number of limit switches</th>
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<th>Operating strategy</th>
</tr>
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<tbody>
<tr>
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| Record 6 | 24                 | 0.5         | 2       | 2                        | yes                                 | B                  |
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| Record 8 | 24                 | 0.5         | 2       | 2                        | yes                                 | D                  |

| Record 9 | 24                 | 0.5         | 2       | 2                        | yes                                 | E                  |
Zumtobel provides intelligent servicing and service packages that make sure you get the maximum possible benefit from your control system.

Services
For an intelligent system

**Analysis and advice**
After initial analysis, Zumtobel can advise you on technical options and prepare customised solution concepts in various forms. This service is available for both new systems and existing systems alike.

**Project engineering and planning**
Once the precise requirement profile has been clarified, our blinds control system experts will provide planning and project engineering in accordance with your particular instructions. Technical and energy optimisation are always at the forefront.

**Project co-ordination**
Project management involving sophisticated LUXMATE lighting and blinds control systems demands professional co-ordination and technical backup from all the partners involved. Zumtobel will co-ordinate your project competently and professionally from award of the contract and throughout all subsequent project phases.
Commissioning
Once the electricians have installed the LUXMATE system, control units, automation functions and software for central monitoring, including any connections as per the customer’s instructions, are set up and programmed.

Training
LUXMATE lighting and blinds control supports a large number of control and monitoring functions. Thanks to the straightforward, convenient user interface, training is confined to simply learning the new control and monitoring options. Training can be provided at the LUXMATE Training Centre or at the site of the installed system.

Optimisation and service
The technology used allows central monitoring and access to each individual unit. This opens up new options for optimising your systems and new maintenance and servicing possibilities. Zumtobel will be happy to assist you in maintaining your system and can offer varying levels of maintenance contract to suit the end user.

Remote maintenance
The upkeep costs of sophisticated blinds control systems can be cut significantly by remote maintenance. Subsequent optimisation and adaptation wishes can be implemented simply and without delay in many cases. The service technician has an overview of all adjustment values and logs at all times and can analyse and optimise the LUXMATE control system quickly and precisely.
Management level and automation
The graphically rendered, thinking building

Management Level

In the LUXMATE Management Level the user or his agent have full control of the building. Blinds can be controlled by floor, by façade or by building, via a graphical user interface. This interface can, if required, be integrated into the building LAN for viewing at several locations or even via modem for worldwide access.

Based on the LUXMATE Graphical Overview (GO) software, the management level shows the various areas of a building on a PC screen, in different views. Authorised persons can navigate through the building at the click of a mouse. The information displayed becomes progressively more detailed from building and floor down to room view. Users can navigate between views at the click of a mouse. Views are geared toward the actual floor plan of the building (Figure 1).

The graphical user interface offers the following functions:
• Central display, monitoring and control of LUXMATE system
• Fast, straightforward fault finding
• Central administration of user rights for accessing the LUXMATE system by PC

Central display, monitoring and control can also be used to set operating functions. For example, a lighting scene can be called up, modified and stored again. Individual systems, such as blinds and artificial lighting can be retrospectively adapted to suit new needs (Figure 2).

Display and monitoring of the building provides important information and makes it easier, for instance, to pinpoint a fault. An error log can be kept and sent by e-mail as required. In addition, central lockout functions such as window cleaning or wind alarm are displayed (Figure 3).

The administration of user rights is another important function. Various user groups can be specified and different users can be assigned to them. Rights are individually adjustable and secure thanks to extensive password protection.
**Blinds management configuration software**

LUXMATE blinds management includes a windows program for convenient, central configuring of daylight-based and time dependent blinds control. This highly sophisticated software ensures use friendly results such as optimised energy efficiency, maximising daylight in the space and minimising glare, even where this might be caused, for example, by complex interreflections from adjacent buildings.

Other automation functions include

- **Time control**
  Useful for closing blinds at night for intruder security or to eliminate light pollution.

- **Astronomic Data**
  Global astronomic data stored in the LUXMATE room automation computer significantly simplifies blinds control set up.

- **Wind Alarm**
  Where external blinds are used the wind alarm automatically moves blinds to safety if high winds are experienced.

- **Rain Alarm**
  Rain alarms are used in the control of fabric awnings to prevent them being rolled up when wet and becoming mildewed.

- **Emergency Alarm**
  Links to the building fire alarm system to ensure that blinds are raised in the case of fire.
### Technical data for blinds control units

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Type of control unit</strong></td>
<td>Dual blinds control unit for controlling blinds with alternating voltage</td>
<td>Dual blinds control unit for controlling blinds with alternating voltage</td>
<td>Quadruple blinds management unit for controlling blinds with alternating voltage</td>
<td>Dual blinds control unit for controlling blinds with alternating voltage</td>
<td>Dual blinds control unit for controlling blinds with direct voltage</td>
</tr>
<tr>
<td><strong>Number of outputs</strong></td>
<td>2</td>
<td>2</td>
<td>4</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>Suitable for alternating voltage</strong></td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td><strong>Suitable for direct voltage</strong></td>
<td>no</td>
<td>no</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
</tr>
<tr>
<td><strong>Maximum number of mechanical limit switches</strong></td>
<td>3</td>
<td>3</td>
<td>2</td>
<td>2</td>
<td>2</td>
</tr>
<tr>
<td><strong>Maximum number of electronic limit switches</strong></td>
<td>0</td>
<td>0</td>
<td>2 (on request)</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td><strong>Blinds extension module can be used</strong></td>
<td>not permitted</td>
<td>not permitted</td>
<td>not permitted</td>
<td>yes</td>
<td>not permitted</td>
</tr>
<tr>
<td><strong>Separate control of slat angle</strong></td>
<td>yes</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td><strong>Local m.-a. switch inputs</strong></td>
<td>yes</td>
<td>yes</td>
<td>no</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td><strong>Installation in switch cabinets</strong></td>
<td>yes</td>
<td>no</td>
<td>yes</td>
<td>yes</td>
<td>no</td>
</tr>
<tr>
<td><strong>Installation in dado trunking</strong></td>
<td>no</td>
<td>yes</td>
<td>no</td>
<td>no</td>
<td>yes</td>
</tr>
<tr>
<td><strong>Which data sets can be selected</strong></td>
<td>1 to 9, 0A, 0B, 0C</td>
<td>1 to 9, 0A, 0B, 0C</td>
<td>1 to 9, 0A, 0B, 0C</td>
<td>only 1 data set available</td>
<td>5, 6, 7, 8, 9</td>
</tr>
<tr>
<td><strong>Supply voltage</strong></td>
<td>230 V AC</td>
<td>230 V AC</td>
<td>230 V AC</td>
<td>230 V AC</td>
<td>24 V DC</td>
</tr>
<tr>
<td><strong>Rated current</strong></td>
<td>2 x 2.5 A</td>
<td>2 x 2.5 A</td>
<td>4 x 2.5 A</td>
<td>2 x 2.5 A</td>
<td>2 x 0.5 A</td>
</tr>
<tr>
<td><strong>Protection type</strong></td>
<td>IP20</td>
<td>IP20</td>
<td>IP20</td>
<td>IP20</td>
<td>IP20</td>
</tr>
<tr>
<td><strong>Design tips</strong></td>
<td>Travelling strategy for opened blinds with open slots as standard</td>
<td>Travelling strategy for opened blinds with open slots as standard</td>
<td>Travelling strategy for opened blinds with open slots as standard</td>
<td>Where V (= variant) is ordered, operating philosophy and time-out can be changed</td>
<td>Set up for Somfy motors as standard, modification is possible after consultation</td>
</tr>
<tr>
<td><strong>Description of application</strong></td>
<td>For separate control of 2 AC blinds motors via LUXMATE bus or m.-a. switch inputs</td>
<td>For separate control of 2 AC blinds motors via LUXMATE bus or m.-a. switch inputs</td>
<td>For separate control of 4 AC blinds motors via LUXMATE bus</td>
<td>Primarily suitable for blackouts such as roller shutters, roller blinds with limit position, intermediate positions are possible manually, control of limit positions, intermediate positions manually</td>
<td>For separate control of 2 DC blinds motors via LUXMATE bus or m.-a. switch inputs</td>
</tr>
<tr>
<td><strong>Functional description</strong></td>
<td>Precise control of any slat tilting angle and closing height</td>
<td>Precise control of any slat tilting angle and closing height</td>
<td>Precise control of any slat tilting angle and closing height</td>
<td>Precise control of any slat tilting angle and closing height</td>
<td>Precise control of any slat tilting angle and closing height</td>
</tr>
</tbody>
</table>
Zumtobel is the internationally leading supplier of integral lighting solutions for a wide variety of applications in professional interior lighting:

- Industry and engineering
- Offices and communication
- Education and science
- Presentation and retail
- Hospitality and wellness
- Art and culture
- Health and care
- Sport and leisure
- Transit areas and car parks
- Orientation and safety

We provide unique customer benefit by integrating technology, design, emotion and energy efficiency. Under the Humanergy Balance concept, we combine the best possible ergonomic lighting quality for people’s well-being with the responsible use of energy resources.

The company’s own sales organisations in twenty countries as well as commercial agencies in fifty other countries form an international network of experts and design partners providing professional lighting consulting, design assistance and comprehensive services.

Corporate goal: We want to use light to create worlds of experience, make work easier and improve communications and safety while remaining fully aware of our responsibility to the environment.
LUXMATE blinds control

People prefer daylight, a view out, and to be energy efficient. LUXMATE Blinds Control can deliver all three.