SUN PROTECTION

Simple
Intelligent
Precise

STANDARD
MOTOR INTERFACE

SMI-
Planning manual

Development

Planning

Installation

Why SMI?

This manual is intended for anyone who has an interest in modern house and building services engineering. It illustrates aspects of roller shutter and sun protection automation during the development, design and installation phases.

A number of innovative companies within the SMI-group have developed the STANDARD MOTOR INTERFACE. With this, it has for the first time been possible to define a digital interface for roller shutters and sun protection drives and to introduce it onto the market. Automation of residential homes or business and non-residential buildings is based on standards.

The additional benefits of drives and controllers with SMI-interface are wide-ranging. They include advantages such as the parallel connection of drives, the accuracy of the positioning, the availability of feedback from the drive and the possibility of flexible parameterisation.

Current demands for energy-efficiency and sustainability demand new solutions that employ recognised components. The SMI-interface for roller shutters and sun protection drives has an important role to play here.
SMI is the consistent interface between the automation and sun protection systems.

Cooperation is the hallmark of both the goal and the processes involved in the SMI project. Working together, technical obstacles to the implementation of solutions having particular ecological, economical and socio-cultural qualities have been over-come. As the decision-maker, planner or installer, this manual is relevant to you.

The manual was developed through a close cooperation between the SMI working group for marketing and the Furtwangen University. The SMI-Arbeitskreis, would like to sincerely thank the committed work given by the students and staff at the University, as well as by the representatives of the marketing working group.

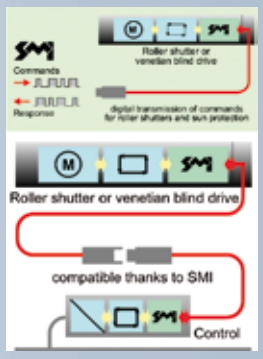
SMI-Arbeitskreis

Table of contents

SMI and building management

Development

Planning



Installation

Annex

SMI and building management

1. SMI – superior technology

You would like reliable, precise sun protection equipment?
The new SMI-interface satisfies this need, and offers additional significant advantages. The STANDARD MOTOR INTERFACE offers numerous benefits. Its quality and its high flexibility are a winning combination. Thanks to the compatibility of products from a number of manufacturers, we are able to offer you a sun protection installation individually tailored to your needs. Whether for large building projects or one-family houses, SMI offers solutions for any building project – take a look for yourself!

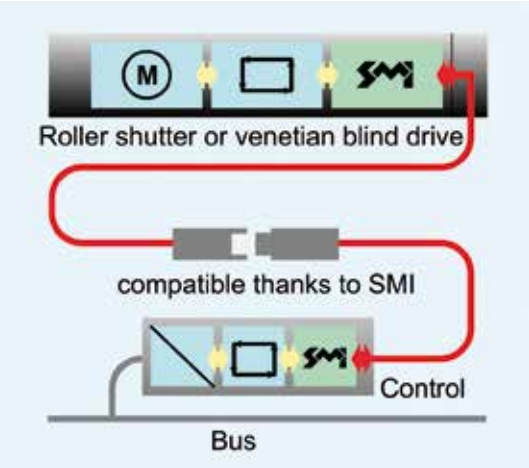
2. STANDARD MOTOR INTERFACE

The STANDARD MOTOR INTERFACE is abbreviated to SMI, and is a consistent interface for electric drives. SMI was developed to enable the connection of drives with integrated electronic circuits for applications to roller shutters and in sun protection installations. This allows telegrams to be exchanged over the consistent interface, from the controller to the drive and vice versa. SMI means that drives and controllers from different manufacturers are compatible with one another. It is now possible for the manufacturers of roller shutters and sun protection system, controller manufacturers and planners to combine products from different makers. The SMI-interface delivers high-quality problem solutions. Applications to roller shutters and sun protection systems make high demands for robustness and economy. The SMI-interface has been developed for these applications.

New application options

The simple, yet powerful, standard commands make it possible to implement functions that could not be achieved using conventional drives.
There are, for instance, commands for precisely approaching intermediate positions, querying the current position, and for diagnosis.

Robust technology and easy installation



Block diagram

For drives that operate on mains voltage, the drive and controller are connected by a 5-core cable which both supplies power and transmits data. Distances of even up to 350 m between the controller and drive are possible.
The polarity-protected connecting cables prevent the drive being damaged by reversed connection.
The newly developed electronic circuits in the drive and the controller meet all the needs for the transmission technology and for voltage surge resistance.

Data transmission with response

Data can be transmitted at 2400 bits per second in both directions.
In addition to consistent, standard commands, the efficient data protocol carries manufacturer-specific commands.
The format for the drive parameters is also specified. The same configuration tool is therefore applicable to all the products from different manufacturers.
The behaviour of the drive can be modified flexibly, even after having been fitted, and the operating status can be queried at any time.

Parallel connection reduces total costs

Depending on the controller, up to 16 drives can be connected in parallel. In this way, the hardware expense is reduced significantly in comparison with today's conventional technology.
Even when connected in parallel, the drive status can be queried by the sun protection controller.
It is possible to assign an individual address to each of the maximum of 16 drives, but this is not necessary for parallel operation

Setting up for operation without a controller

The roller shutters and sun protection installations with SMI-drives can also be set up for operation without using a controller. The SMI-interface has a setup mode through which drives can be activated using simple push buttons.

SMI logo

STANDARD
MOTOR INTERFACE

The logo

You will be able to recognise drives and controllers with the new interface from the SMI logo.
Subject to reaching an agreement, other drive and controller manufacturers will be able to use the SMI technology and brand.

SMI also for low-voltage drives

The uniform interface is also available for low-voltage drives. This means that interior sun protection installations can also be controlled intelligently and accurately. Low-voltage drives can be recognised from the SMI LoVo symbol.

Window drives

A combination of sun protection with the possibility of room ventilation makes a significant contribution to improving energy efficiency. For this reason it is helpful to integrate electric motor drives for windows, light domes and so on in the building automation via SMI. In this way the drives for the window can be controlled by the room automation equipment via a unified system.


MARCOM

Development

1. Positioning of SMI
2. Advantages of SMI
3. Fields of application
4. Functionalities of sun protection products
5. Energy efficiency and sustainability

1. Positioning of SMI

The STANDARD MOTOR INTERFACE emerged from a continuous process of development, from the initial vision through to the establishment of reliable products. Prestigious reference projects at home and abroad now confirm that all this work has been successful.

Creation of the SMI-standard was an initiative of drive and controller manufacturers, and is under continuous further development in the SMI-Arbeitskreis. The intelligent control of drives lies at its heart. Products manufactured in accordance with the standard must be subjected to a certification process, and can be identified from the protected logo.

Main administration building for Marc Cain in Bodelshausen
© HANK+HIRTH Freie Architekten; photography: Oliver Starke (pictures on pages 8 and 9)

SMI is not an alternative to a building bus system; rather it is a valuable extension.
The performance of the system is customised to the requirements of sun protection automation. SMI was developed in order to ensure compatibility between controllers and drives from different manufacturers. SMI is the first time that a consistent, digital interface standard for the operation of drives has been developed.
The STANDARD MOTOR INTERFACE is a further milestone in the penetration of digital technology into building automation.

2. Advantages of SMI

SMI is more than an interface

The SMI specification regulates the exchange of information between a controller and the drive of a roller shutter or sun protection installation. The delivery of commands to the drive and the return of feedback from it via telegrams is clearly laid down. The SMI-standard is extremely helpful to the manufacturers of drives and controllers. They can rely on problem-free operation, even when the devices do not come from the same manufacturer. SMI-drives and controllers have highly desirable properties, and offer attractive benefits to the customer.

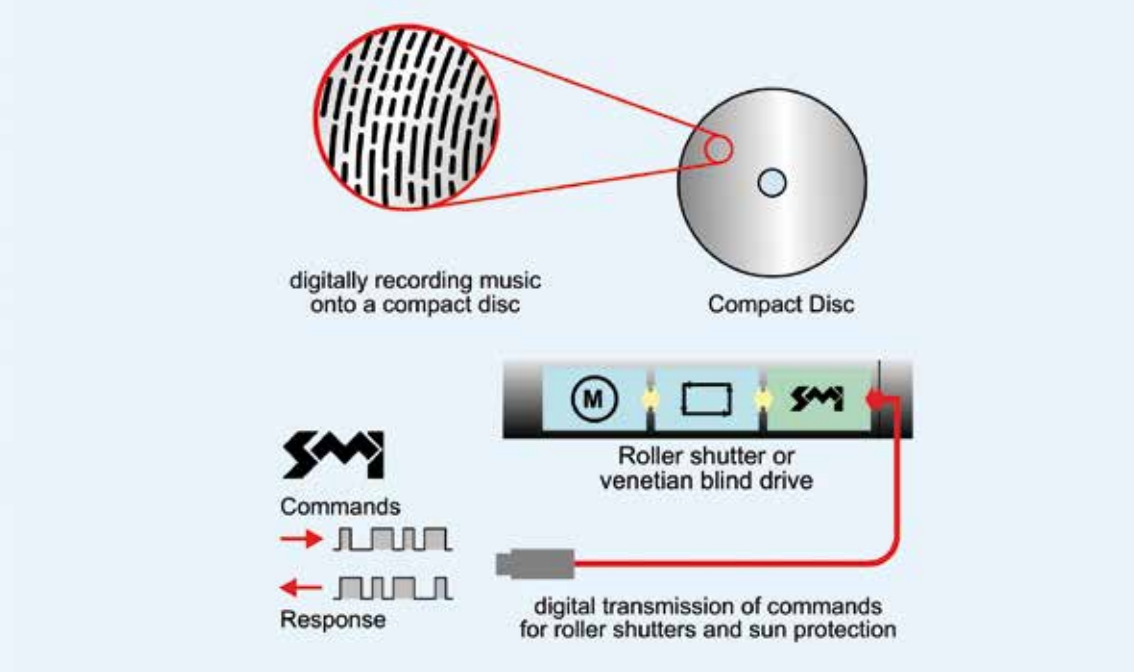
Good cooperation within the SMI-group

A growing number of companies support the common standardisation project.
They are included within the SMI-group as SMI-members, SMI-partners or SMI-supporters. Aspects of marketing and technology are handled in working groups.

Increasing digitisation in everyday life

Digitisation is already commonplace in many areas of ordinary life, for instance in the recording and playback of music. Black discs have made room for CDs on the music shelves. Digital processing and storage of music is fully established.
Digital signal processing is more robust, and is also a precondition for use with computers and for distributing music items over the Internet.

A similar development is underway in the control of roller shutters and sun protection systems. For decades, switched contacts have served effectively to operate electric drives, but there is now an alternative digital motor interface in the form of the STANDARD MOTOR INTERFACE. The commands are digitally encoded as telegrams and transmitted to the drive. Just as in the case of storing music on CD, however, digitally controlled drives offer significant quality advantages and, in the long-term, cost advantages too.



Parallel developments in the CD and in roller shutter and venetian blind drives, moving from analogue to digital signal processing

Digitally encoded commands only work if both the transmitter and receiver understand one another, i.e. if they use the same encoding system. The SMI specification describes a unified electronic circuit and a consistent method for the transmission of commands. This information interface has been specialised for application to roller shutters and sun protection systems. Digital control offers several advantages to the manufacturers of roller shutters and sun protection installations, to controller manufacturers, to planners and to builders and users.

Practical experience

You can rely on our experience! For years now, new projects using SMI-drives and controllers have been brought into operation. From a beginnings in relatively small projects, in more recent years the system has been applied to several large projects, ranging from administration buildings through to the prize-winning opera house. The STANDARD MOTOR INTERFACE has become established, and has withstood the test of practice in large projects.

What changes in the design of a roller shutter or sun protection system?

To supply the power and to address each drive individually it is necessary, for instance, to provide 5-core cables for mains-operated drives. Thanks to the integrated decoupling, it is also possible to connect the drives in parallel. This last point is advantageous when it comes to laying the cables, and reduces costs thanks to the lower expense of fire-safety measures.
The question is often raised of who is responsible for the system as a whole, since the support system and the automation projects are not supplied by the same company. Close attention was paid to this consideration during the development of the SMI-interface.

The certification and registration of SMI products is an important part of ensuring compatibility. Only tested drives and controllers are entitled to carry the SMI symbol. A further aspect here is the clear assignment of the responsibility for the proper function of the carrier products on the one hand, and of the automation system on the other. The concept of the SMI-interface supports the partitioning of tasks and responsibilities.

Variety of SMI products

Drives and controllers are available for exterior sun protection using 230 V AC mains, and also models for interior sun protection using a low-voltage power at 24 V DC. The latter are identified by the SMI LoVo (low voltage) symbol. The data sheets for each of these products are made available on the Internet site at www.smi-group.de.

Exact positioning

More precise operation and more constant positioning of sun protection systems are the outstanding features of SMI-drives. The desired position is transmitted in the form of a digitally encoded number, and the drive moves the sun protection precisely to that position by means of an internal regulator. This principle of operation means that the accuracy is ensured for the entire service life of the drive. Wear does not have any effect on precision. This exact positioning is necessary for a sun protection system if it moves in accordance with the sun‘s position, or when a number of sun protection systems are to be accurately aligned over an entire façade.
These commands are understood and implemented in the same way by all the SMI drives from every manufacturer. All the drives turn through the same angle.
It is no longer necessary to take into account the speed of rotation of each specific drive. Commands of this sort are particularly suitable for aligning sun protection equipment in accordance with the sun‘s position, something that is strongly recommended for any energy-efficient building scheme.

Exact positioning of the sun protection

A logical step for building automation

An example will clearly illustrate the advantages of encoding commands digitally.
We suppose that a drive axis is to be turned through a specified angle.
The command STEP can be used for this purpose; it initiates a defined angular turn over the SMI-interface.
Bus systems, such as KNX/EIB or LON, transmit digitally encoded commands. The STANDARD MOTOR INTERFACE now means that there is a solution for consistent digital control extending from the master control system through to the roller shutters and sun protection systems.
The digitally encoded commands from a building automation system no longer have to be converted into time-controlled switching signals. Precision is no longer lost in that conversion.
For the manufacture of controllers, the presence of a consistent interface brings a significant simplification.
What is more, a drive can provide feedback – something that was not possible with conventional drives. Feedback signals are necessary if large shade installations are to be operated efficiently. Diagnostic commands can in addition detect faulty drives and report them to a remote control centre.

Daylight control systems are an attractive application for precise SMI-drives

Saving costs, installation time and space

The STANDARD MOTOR INTERFACE allows up to 16 drives to be connected electrically in parallel. The addressing system is capable of addressing each drive separately.
This property means that new installation concepts can be implemented with significantly lower costs, shorter installation time and with a considerable saving of space. Until now, each drive requires its own controller components and its own motor connection.
Modern flat cable systems, which do not need installation sockets for branches, can be used for connecting up to 16 drives in parallel.
These installation systems significantly shorten the time needed for installation.

Individual programming

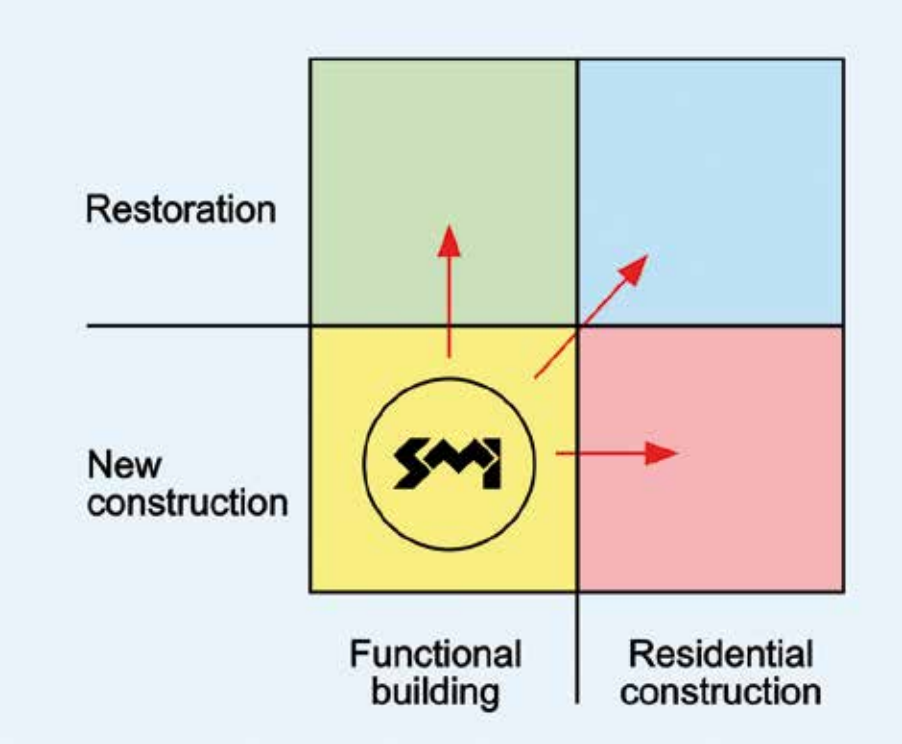
Electronic drives with SMI-interfaces can be programmed individually.
The digital interface is, in addition, used for programming the behaviour of drives.
This new capability offered by intelligent drives makes it possible to adapt to the individual requirements of roller shutters and sun protection manufacturers. A standard drive can thus become an individual, customer-specific drive.
Manufacturers use this property to customise drives for their products.
The first drives with SMI-interfaces were certified at the beginning of 2004.
Since then, many manufacturers have made a wide range of drives available, all of them using the common SMI-interface. The drives have different performance figures and properties. One property, however, they all have in common – they communicate using the same commands and the same encoding.
This is very helpful for the industry. The list of SMI-drives can be seen on the Internet under www.smi-group.com.

Quality assurance

When customers purchase products with the SMI-interface, they expect them to be compatible with one another. Reliable transfer of the encoded commands over an SMI interface must be guaranteed. The SMI-group has developed a procedure for certification and registration. Manufacturers test the SMI products themselves in accordance with a test specification, and declare conformity with the SMI specification. Only when all the requirements are satisfied is a certificate prepared, and the associated product registered in the list on the Internet.

3. Fields of application

The SMI-interface is extraordinarily versatile in application. The SMI technology can be used wherever timely communication, accurate positioning and design security are wanted. The applications can be divided in a number of ways:



Development of SMI in functional and residential construction

Building project

Products with the SMI-interface can be applied in all kinds of building projects.
This includes large commercial and industrial projects such as administration buildings, public buildings, factory buildings or residential buildings including the one-family house. Current development is placing an initial emphasis on large administration buildings. The pattern set by the introduction of innovations in sun protection automation is thus being repeated. Motorisation, automation and the functional integration of different trades were first adopted in large administration buildings, and were introduced into significant parts of the residential sector in a second step.

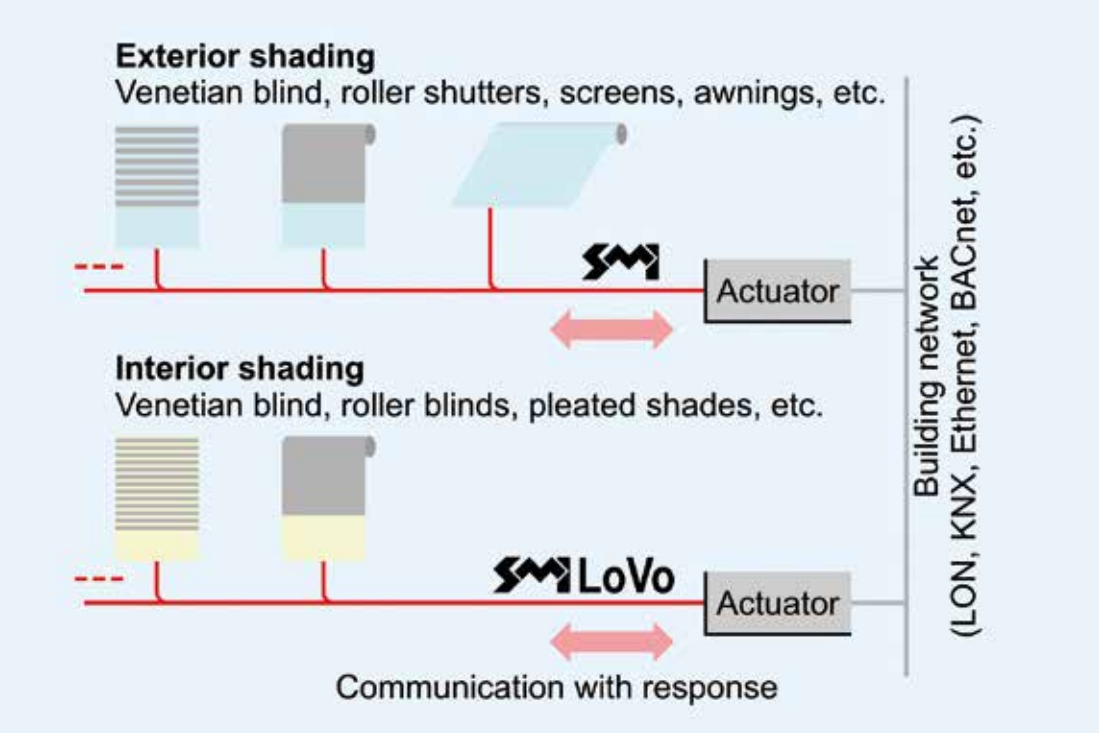
Carrier products

The motor interface was developed for the purposes of motorisation and automation associated with windows. This primarily means motor-driven sun protection installations that provide convenient lighting and climate control. Sun protection equipment can take the form of Venetian blinds with adjustable slats, as screens having textile coatings, or as awnings that can be folded out.

The motorised roller shutter is very important to the domestic sector. In addition to its sun protection function it also plays an important part in burglary prevention. It is even possible to automate window opening using a drive with an SMI-interface.
There are, moreover, special applications, such as wide slats that can be driven by means of linear drives with an SMI-interface.

Mounting location and power supply

Sun protection equipment can be mounted outside the window, between glass panes, or inside. We speak of exterior shading, between-pane shading or interior shading.
The selection of the sun protection scheme depends on considerations of economy, power or of appearance. Drives operating from mains voltage (230 V AC) are most often used for exterior shading. Shade products for interior use are frequently more delicate in conception, and require smaller drives operating from 24 V DC. The STANDARD MOTOR INTERFACE can be used in either case, both for mains-powered drives and for the smaller DC drives.



SMI for use in various carrier products in exterior and interior shading

Automation network

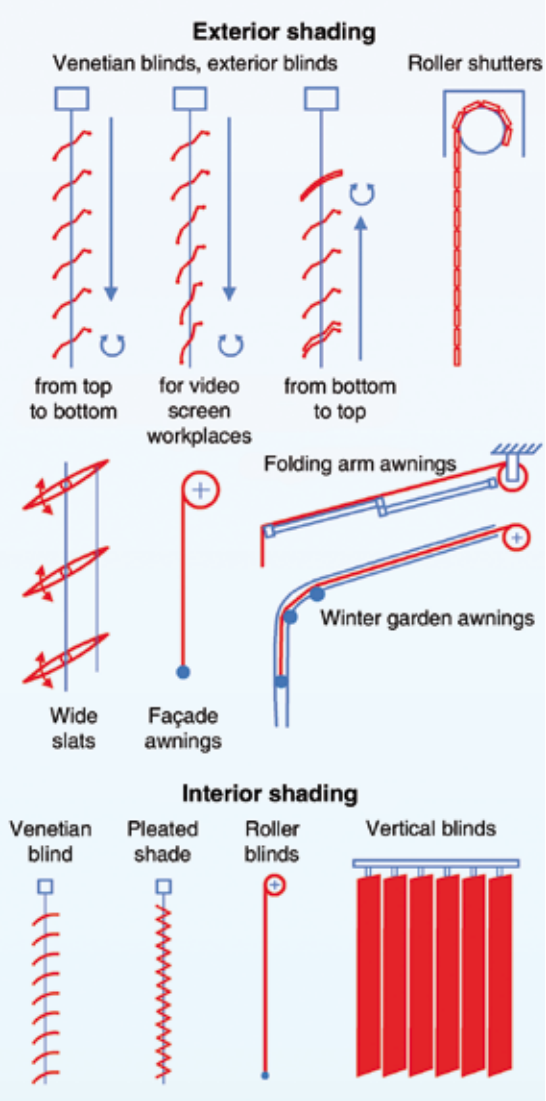
Application of the SMI-interface is not restricted to one particular automation network. SMI allows digital transmission of commands all the way to the drive for a variety of automation networks and technologies such as KNX/EIB, LON, BACnet etc.
SMI-drives are neutral, and can communicate through appropriate actuators with a variety of bus systems or building networks.

Geographical distribution

Use of the SMI technology is not restricted to any particular geographical area.
In central Europe, however, sun protection automation is well developed.
The largest number of projects implemented using SMI-interfaces is also to be found here.
The distribution of the SMI-interface now, however, includes a few projects as far away as Australia.

The SMI technology is very versatile, and can be used in many sectors. The sheer variety of technical systems found in house and building automation necessitates timely, independent solutions. The STANDARD MOTOR INTERFACE is the right answer to a large number of questions.

4. Functionalities of sun protection products



How interior and exterior shading work

The sun protection industry offers a range of sun protection products. They can be divided into exterior and interior sun protection. Exterior sun protection is most suitable for protecting against heat. Interior sun protection offers particular advantages in terms of easy retrofitting and its decorative effect.
Exterior blinds are particularly suitable for regulating daylight. These allow variable adjustment of the height of the hangings and the angle of the slats.
The angle of the slats can have a strong effect on the daylight. Depending on the angle, this can range from heavy shade through to full lighting. At the same time, the view can vary from a privacy shield through to almost complete visibility.
The task of the sun protection controller is to optimise the protection against heat and dazzle whilst making maximum use of the daylight and offering the best possible view.
The slats are opened as wide as possible without allowing direct sunshine to enter. The result is protection against heat and dazzle whilst at the same time allowing in as much daylight as possible and offering the best possible view to the outside.

4.1 Exterior sun protection:

Exterior blinds

Exterior sun protection: Exterior blinds
Picture: WAREMA

Exterior blinds are a robust exterior sun protection system, with which the amount of daylight entering the room can be individually controlled.
Unobtrusive, yet adding character to the appearance of the façade – their design adds a modern note.
Exterior blinds provide effective protection against sunshine and heat both to office buildings with large façade areas and to modern one-family houses.

Product properties – basic functions:

- Sun protection with lightweight metal slats that can be turned and lifted
- Controlled from the side by wire, guide rail or scissor system
- Protection from incoming sunlight, good privacy and dazzle protection
- Slats can be continuously controlled

Fields of application:

- Suitable for all living areas
- Conservatories: for vertical glazing and exposed positions
- Offices: suitable for video screen workplaces
- Commercial spaces: protection against dazzle, privacy protection

Roller shutters

Roller shutters not only provide effective sun protection – they also have something to offer in terms of security, thermal and noise insulation.

Exterior sun protection: Roller shutters
Picture: WAREMA

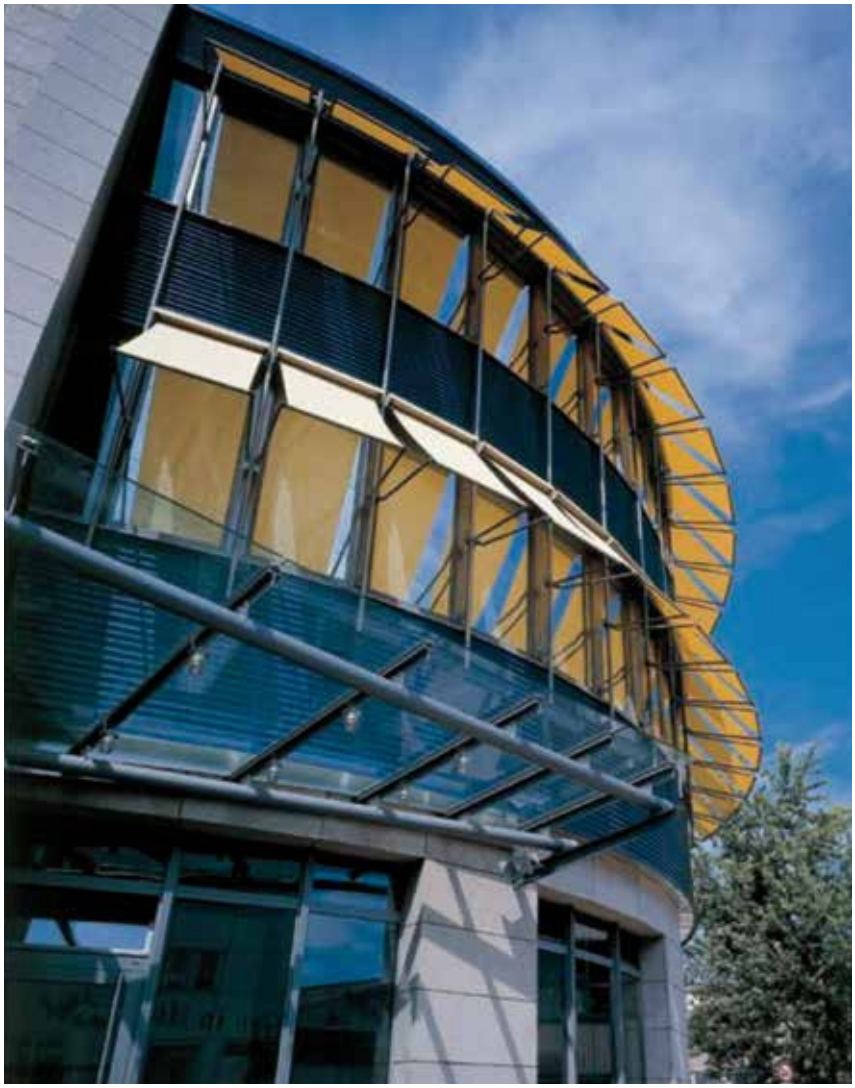
Product properties – basic functions:

- Strong weather and sunshine protection for windows and French windows
- Roll-up curtain thanks to different roller shutter profiles that can be pushed into one another
- The curtain is wound onto a shaft, while guide rails control movement at the side
- Excellent capability for heavy dimming
- Good noise protection
- Temporary heat protection
- Break-ins are discouraged; versions extending to certified safety roller shutters are available

Fields of application:

- Suitable for all living areas, provide security, sound protection and helpful darkening for bedrooms and restrooms.
- Offices: Security, darkening and heat protection function, combination with interior screens and sun protection systems is recommended
- Commercial sector: Security function (hinders break-ins) and heat protection function during the night

Awnings & window awning blinds



Exterior sun protection: Awning
Picture: WAREMA

The **vertical awning** is a functionally effective, unobtrusive sun protection system for vertical façades and for large window frontages. They can be matched to the architecture thanks to the many grid sizes available.
Drop arm awnings are a practical form of sun protection, particularly for modern buildings with a large number of windows. They integrate aesthetically into the façades of strict architectural forms, and can lend them an unmistakable profile. Comfortable shade under all conditions, and yet offering an almost unobstructed outlook – these are the most important advantages of drop arm awnings.

Façade awnings are particularly suitable for providing shade to vertical or inclined façade surfaces like those often found on modern commercial buildings.
Many technical refinements make them into a professional alternative, with the flexibility to suit them to many needs.

Window awning blinds – the awnings with the drop arm effect. They provide comfortable shade, and at the same time give an almost unhindered view to the outside. The window awning blind is the all-round performer for vertical façades. They are intended for anyone who values a harmonious façade design but who still wants to enjoy the advantages of individual shading.

Product properties – basic functions:

- A textile curtain is wound onto a shaft, control at the side is provided by guide rail wire, the curtain is unwound by a drop rod weight
- Thermal protection to assist the air conditioning
- Optimum dazzle protection for video screen workplaces
- Subdued light inside the room
- Small boxes
- Many options for façade design
- Maintaining and controlling thermal comfort in summer at window surfaces and glass façades

Fields of application:

- Living area: summer heat and dazzle protection
- Offices: privacy shield and dazzle protection, particularly for video screen workplaces, saving air-conditioning energy
- Public buildings (hospitals, nursing homes): privacy shield, dazzle and heat protection

Exterior sun protection: Awning
Picture: WAREMA

Conservatory awnings

As the sun heats up a conservatory, we need sun protection that quickly and easily provides shade without disturbing the attractive, airy impression. Conservatory awnings provide comfortable shade for most varieties of conservatory architecture.
Whether vertical or horizontal, round or angular – optimum shade is easily obtained with conservatory awnings even when the design is unconventional. Conservatory awnings provide a comfortable interior climate at the large glass areas, and provide an attractive colour accent.

Product properties – basic functions:

- Conservatory awnings are extremely strong exterior shades
- Counterbalance systems for shading larger areas
- The curtain is wound onto a shaft inside a housing
- Pulled out by a strong drop profile, held on both sides by guide rails
- Electric motor drive
- Equipment can withstand strong winds
- Effective temperature control for conservatories and for large terraces
- Special versions permit shading of large catering areas

Fields of application:

- Living area
- Sun protection for conservatories, terraces and pergolas
- Avoid the greenhouse effect in conservatories and behind large glass areas

4.2 Interior sun protection:

Venetian blinds

Interior sun protection: Venetian blinds
Picture: WAREMA

Venetian blinds solve the sun protection problem at any window – made-to-measure, and operated in a variety of ways. For some, they are just a practical detail. Others see the Venetian blind as the perfect complement to interior architectural design.
Venetian blinds are a modern way to control the light coming into a room and its temperature, and they protect against unwelcome visibility from outside.

Product properties – basic functions:

- Interior sun protection with lightweight metal slats that can be turned and lifted
- Slats can be continuously controlled
- Highly suitable as a privacy shield and as dazzle protection
- Excellent supplement to exterior sun protection equipment

Fields of application:

- All private living areas: decorative design options, good protection of the private space against views from outside
- Conservatories: as an addition to exterior shading
- Presentation rooms, laboratories: can provide darkness (unless total blackout is necessary)
- Workplace: good dazzle protection

Vertical Venetian blinds

Vertical Venetian blinds provide elegant sun protection for living rooms with broad windows. Whether providing sun protection at a window, in a conservatory or as a room divider – their extraordinary design creates a comfortable, cosy and stylish atmosphere in any room. They are made-to-measure so that they can be introduced elegantly into any room.

Product properties – basic functions:

- Interior privacy shield and dazzle protection with vertical rotating slats
- Good options for room lighting and light control
- Decorative, modern interior design
- Highly suitable for video screen workplaces

Fields of application:

- Living area: living rooms and workrooms
- Workplace: offices, presentation rooms, public rooms

Roller blinds

Interior sun protection: Roller blinds
Picture: WAREMA

Roller blinds set wonderful accents as a design element, and create a comfortable atmosphere in any room.
Roller blinds offer uncomplicated, easily used machinery, and a wide range of possible fabrics. They can be attached to almost any window – whether a studio window or one with an unusual shape.

Product properties – basic functions:

- Interior sun protection, consisting of a roller blind shaft mounted on end bearings, with integrated mechanical functions
- Privacy shield and dazzle protection
- Decorative interior design
- Excellent supplement to exterior sun protection equipment

Fields of application:

- All private living areas: highly decorative design options, good protection of the private space against views from outside
- Presentation rooms, laboratories: can provide darkness
- Workplace: good dazzle protection

Pleated blinds

Pleated blinds not only provide effective sun protection, but their homely character also sets an unmistakable tone. Light that is soft yet not without shadows gives the room a special atmosphere.

Interior sun protection: Pleated blind

Picture: WAREMA

Product properties – basic functions:

- Interior sun and dazzle protection
- Different fabrics, from transparent to entirely opaque
- Wide range of uses, e.g. video screen workplaces
- Decorative interior design
- Possibility of various special shapes
- Reflection-coated fabric as a functional option

Fields of application:

- Private living area: highly decorative
- Workplace: effective interior decoration for public rooms
- Conservatories: highly suited to non-extreme south and south-west orientations (ensure adequate ventilation)

Darkening systems

Blackout systems offer perfect light protection for rooms that have to be completely dark, such as laboratories, x-ray rooms, operating theatres, schools, auditoriums or assembly rooms.

Product properties – basic functions:

- Blackout systems most often consist of a fabric curtain which is wound onto a shaft in inside a housing
- The sides are held in light-proof guide rails
- Drop rod with light proof closure provided by rubber bead or brush

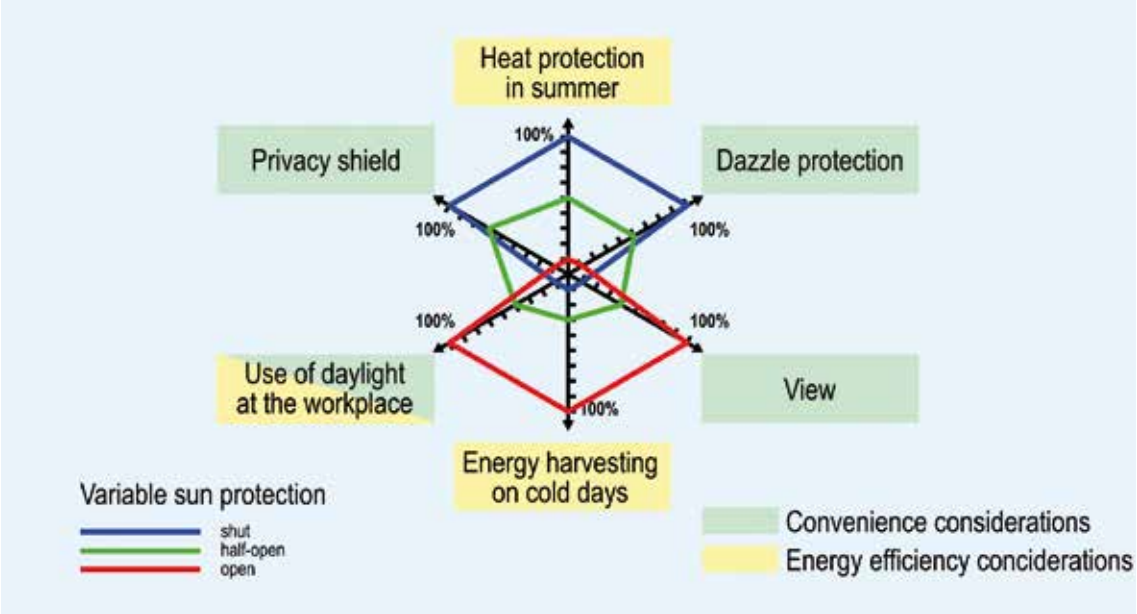
Fields of application:

- Photographic laboratories, technical medical laboratories that require complete darkness (e.g. x-ray laboratories)
- Training and presentation rooms, lecture halls

5. Energy efficiency and sustainability

„Heat out – light in“ goes the saying. With an elegant solution you can make excellent use of available daylight while at the same time optimally screening the incoming heat. The sun protection is controlled in accordance with the sun‘s position. With a daylight control system, additional daylight can be brought to the back of the room without causing dazzle. Intelligent control strategies such as harvesting energy in winter, employing shading strategies when the space is unoccupied, or temperature-dependent controllers, can save valuable primary energy.

The demands which have to be fulfilled by sun protection system are many-sided.
It is possible to divide them into considerations of comfort and convenience and considerations of energy efficiency. Only with appropriate automatic control can a sun protection system optimally satisfy these varied demands.



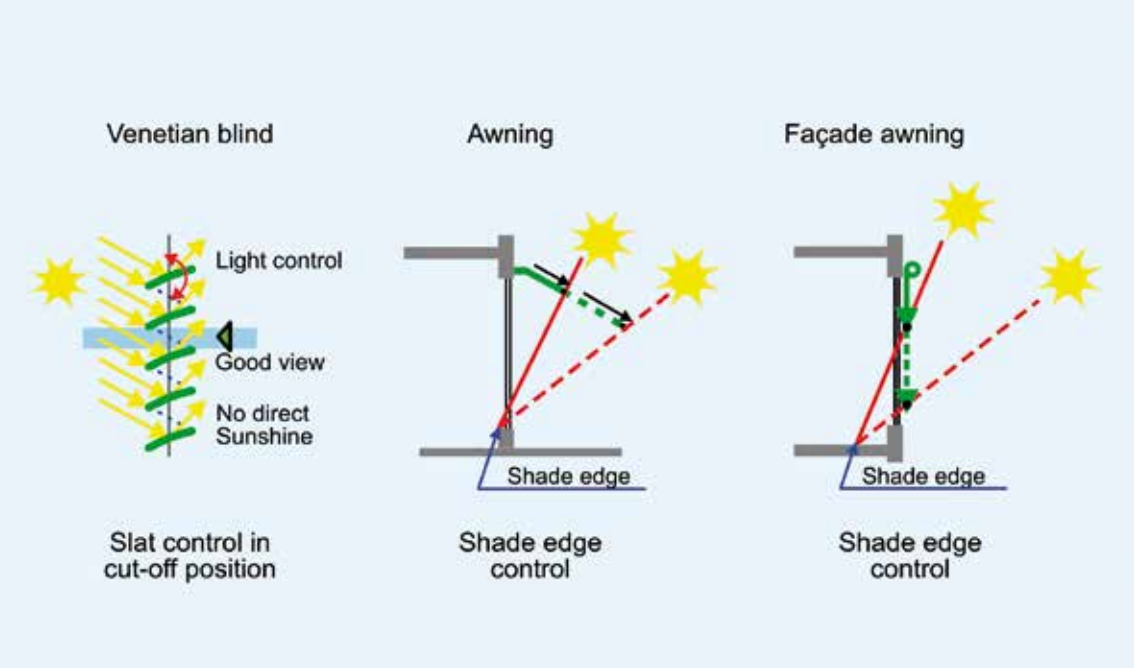
Demands for sustainable sun protection

Energy efficiency is one side of the coin. Comfort and well-being at the workplace or in the home are the other. Hardly any of the equipment in a building has such a many-sided and important effect on the functional, social and cultural quality of the space as the sun protection. Good lighting at the workplace means more than just a sense of well-being. Studies confirm higher error rates in the presence of poor or dazzling lighting.
Accurate adjustment of the sun protection according to the sun‘s position improves the lighting and prevents unwanted dazzle. An optimum can only be achieved through a combination of automatic adjustment and artificial lighting.

Functional quality includes the ability to change the use flexibly. The facility of addressing each individual drive over the SMI-interface guarantees this flexibility.

Protection from dazzle while nevertheless offering an optimum outlook is valuable, and can only be achieved through adjustment according to the sun‘s position. Another factor affecting the social and cultural quality of a building is the aesthetics of the structure, whose effect must not be ignored. Positioning the sun protection equipment precisely, and therefore consistently, conveys an impression of outstanding quality.

The day is long gone when sun protection „ON“ and sun protection „OFF“ was adequate. With precise drives and the appropriate control strategies, the sun protection can be adjusted in accordance with the direction and intensity of the light. This is a powerful concept for convenient lighting and energy efficiency.



Adjustment according to the sun‘s position

Planning

1. Principles of sun protection automation
2. SMI drive systems
3. Standards (230 V / LoVo)
4. Technical data
5. Installation concepts
6. Selection of the actuator
7. Responsibilities for planning
8. Design examples
9. Checklist for the planning of a sun protection controller

1. Principles of sun protection automation

The most important elements of a modern sun protection controller

Sun protection controllers generally coordinate all the sun protection equipment in a building. Modern controllers operate using a 2-wire bus in order to transmit control commands. The best-known universal bus systems that perform control tasks for a variety of purposes are the European installation bus KNX/EIB and LON (local operating network).

The type of drive must be settled before choosing the actuator. The sun protection manufacturer can provide the necessary information. Tube drives or Venetian blind drives may be used.

If SMI-drives are used they can be connected in parallel, which is a big advantage. Depending on the actuator, up to 16 drives can be connected to a single actuator channel. Actuators, the controllers for the drives, are available with one or more channels.

The functions

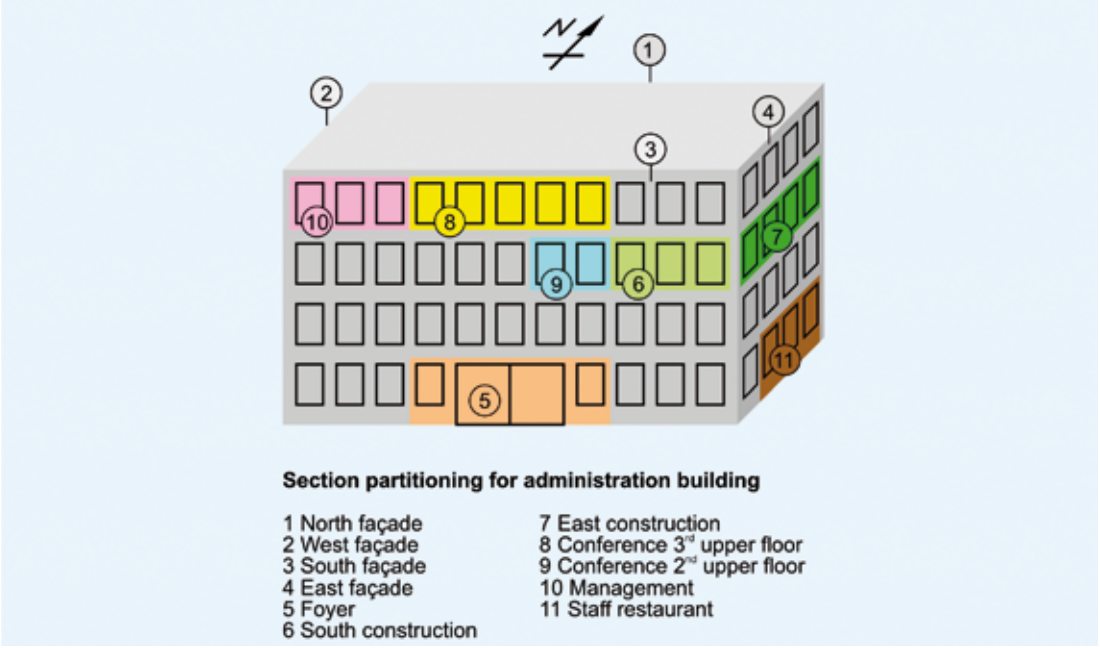
The automation system evaluates the electrical signals from sensors (brightness, wind, precipitation, temperature etc.) and controls the automatic procedures.
The most important functions of a sun protection automation system according to the VDI 3813-2 guideline are:

- Slat control (dazzle protection and energy optimisation)
- Shading correction (energy optimisation)
- Automatic storm response (product protection)
- Automatic thermal control (energy optimisation)
- Programmable timing (automation of repetitive tasks)
- Automatic shock response (forced-entry protection)

Joint operation of all the sun protection equipment, or of the sun protection units in one sector, is also carried out by the automation system. The most important central operating procedures are:

- Put the sun protection system into the desired position
- Switch the automatic control functions on or off
- Block activation or deactivation
- Read out information

Sun protection control for multiple sectors



Administration building with several sectors

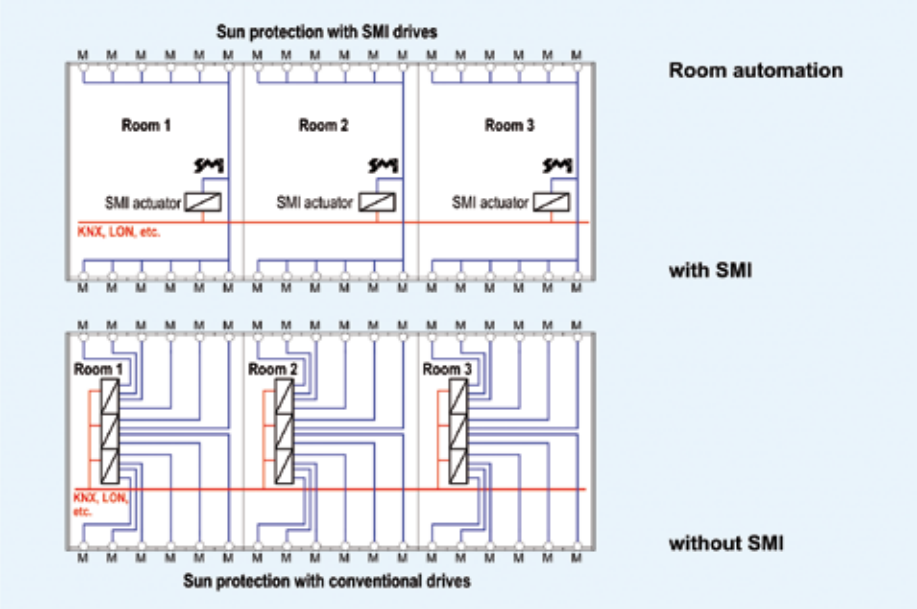
A number of sun protection controllers on the market are designed for controlling a single installation or a single sector. Awning controllers are a well-known example. For a whole house or a building, a division into multiple sectors is unavoidable, as the requirements of the automatic system vary so much. The staff restaurant, for instance, needs to be timed differently from the management offices, while the design department has different needs for dazzle protection from the conference room. The sun protection installations for a façade, a floor, room, or even a single sun protection unit are assigned to a sector, according to their usage. The design process must identify areas that are used in the same way or that have the same control requirements. For an administration building, for instance, the following sectors should be identified:

- for each façade
- for each façade area with the same sunshine exposure
- for rooms with special shading requirements
- for a meeting room
- for the foyer
- for the staff restaurant
- for awnings on the roof terrace
- etc.

The more sectors* are specified, the more flexibly a controller can be matched to the building. It must, however, be noted that this involves an increase in complexity and an increase in the configuration work.

SMI for room-oriented or segment-oriented building automation

Sun protection installations with SMI-drives, working together with the new SMI actuators, give ideal support to room-oriented or segment-oriented building automation. An interesting example of the varied applications of the SMI-interface can be seen in the „Room automation“ illustration.
Only one SMI actuator with an SMI-interface is necessary in each room. Depending on the product, up to 16 drives can be connected to a single SMI-interface. A similar situation is found in the flexible-axis building automation in office buildings, where one actuator controls the drives of up to 16 axes.
Digital technology is now taken for granted in many products we use in everyday life.
With the STANDARD MOTOR INTERFACE, innovative firms have brought a practical implementation of digital command transmission to the drives for roller shutters and sun protection systems. This technology is going to spread!



Room automation with SMI: less cabling through parallel connection
* The sectors of the planning system correspond to the concept of areas in VDI 3813.

Saving costs, installation time and space

The STANDARD MOTOR INTERFACE allows up to 16 drives to be connected electrically in parallel to each controller. The addressing system is capable of addressing each drive separately. This property means that new installation concepts can be implemented with significantly lower costs, shorter installation time and with a considerable saving of space. Until now, each drive required its own controller components and its own motor connection. Modern flat cable systems, which do not need installation sockets for branches, can be used for connecting up to 16 drives in parallel. These installation systems significantly shorten the time needed for installation.

SMI for modern room automation

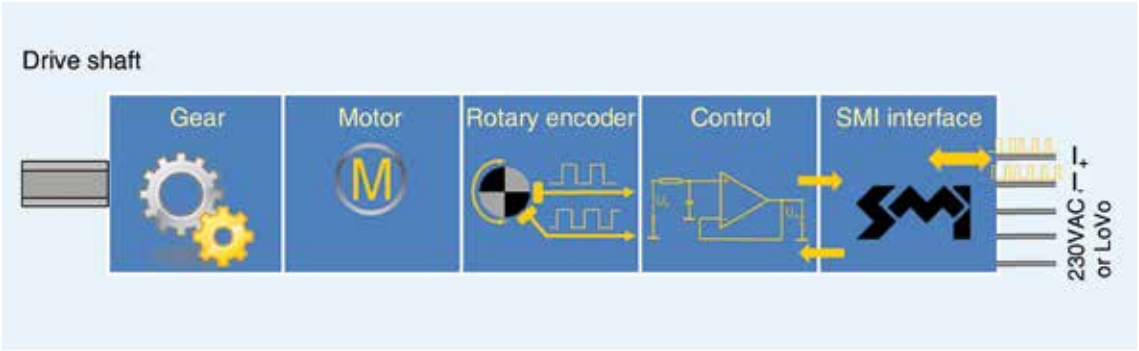
The path jointly taken by these innovative companies led to success. The breakthrough came after several years of specification, development and testing of products with the digital SMI-interface. SMI is the digital interface that links controllers to drives for roller shutters and sun protection systems, and which transmits commands in the form of telegrams. Installations of this sort, using roller shutters, awnings and Venetian blinds, are working successfully. A wide range of SMI products is now available.

The advantages of products with the SMI-interface are easy to see. Both the control equipment and the drive equipment benefit from this new technology.
For instance, several roller shutters or Venetian blind drives can be connected in parallel to SMI control devices. The drives have new properties, helpful to manufacturers and customers alike. They are more precise, report back their operating status, and have new kinds of safety functions appropriate to each product. Using them helps everyone: end customers, planners, installers and manufacturers.

2. SMI drive systems

2.1 Fundamental structure

SMI-drives consist basically of the functional units shown in the illustration



Functional units of an SMI drive

Electric motor

Either single-phase asynchronous motors for direct connection to the 230 V/50 Hz mains or DC motors (LoVo) are used.

Gears

The gears convert the relatively small torque from the electric motors to the torque required at the drive shaft. At the same time, the high rotation speed of the electric motors is reduced to the typical speeds of several rotations per minute required by sun protection drives.

Rotary encoder

The rotary encoder, also known as an incremental encoder, generates pulses in proportion to the rate at which the motor is turning. These are evaluated by the electronics that regulate the speed and limit movement to the end positions.

Electronics

The electronics evaluate the signals from the rotary encoder. In addition, the electronics use the number of electrical pulses to determine the actual current position of the drive, stopping it when it reaches the desired position.

SMI-interface

Communication with the higher-level building control system takes place over the SMI-interface. It is possible both to send commands to the SMI drive and to read status messages back from the SMI drive. Data lines and power supply lines are included in one cable.

2.2 The use of SMI drive systems

Although SMI-drives feature identical functional units, the mechanical construction differs quite considerably, depending on the product in which they are used.

Drives for Venetian blinds and exterior blinds

This kind of drive is fitted into the header piece of Venetian blinds or exterior blinds for use outside. Most of the drives are implemented with centre motors, which means that there is a shaft power outlet at both ends. Venetian and exterior blind drives also incorporate an external limit switch for the upper end position.

Tubular drives

Tubular drives are used for roller shutters or awnings. Their particular feature is that the sun protection element (the roller shutter curtain or the awning fabric) is wound onto a tube. The tubular drives are pushed into the tube, and drive it through suitable adapter. The drive shaft is only located at one end of the tubular drive, which has a bearing at the other end.

LoVo-drives

LoVo-drives are most often used for interior sun protection.
Small physical size is very important here, as the dimensions of the winding mechanism of the sun protection product must be small, for reasons of appearance. DC motors have the advantage here that they can be made smaller than AC drives. The LoVo-drives can be constructed as Venetian blind drives or as tubular drives.

Window drives / linear drives

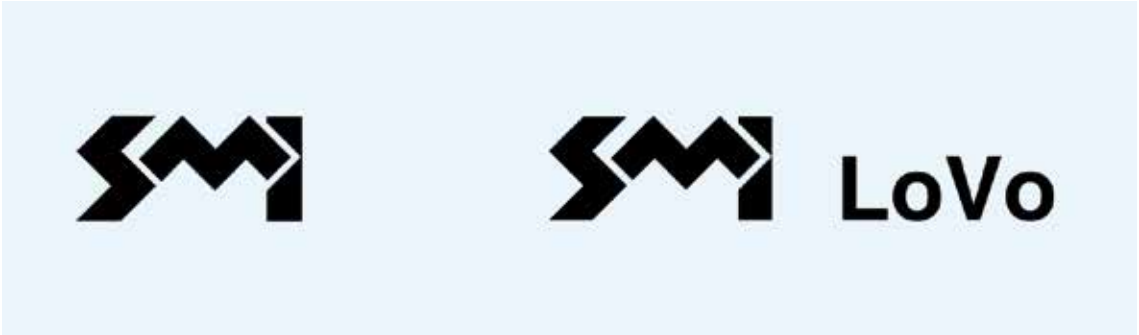
SMI is, moreover, increasingly being used for applications outside sun protection.
Linear movement is required from drives for windows, light domes, or for adjusting wide slats. Here again, the possibility of exact positioning and of status feedback is an important reason for using SMI. SMI window drives can be built to operate either from mains voltage or from low voltage.

3. Standards (230V / LoVo)

Variety of SMI products

A large number of different products with SMI-interfaces have been certified and registered. They can carry the SMI logo.
Drives and controllers are available for exterior sun protection operating from 230 V AC mains.

The uniform interface is also available for low-voltage drives (LoVo).
This means that interior sun protection installations can also be controlled intelligently and accurately. Low-voltage drives with an SMI-interface can be recognised from the SMI LoVo symbol. Thanks to the consistent SMI-interface, the intelligent drives and controllers are compatible with one another.



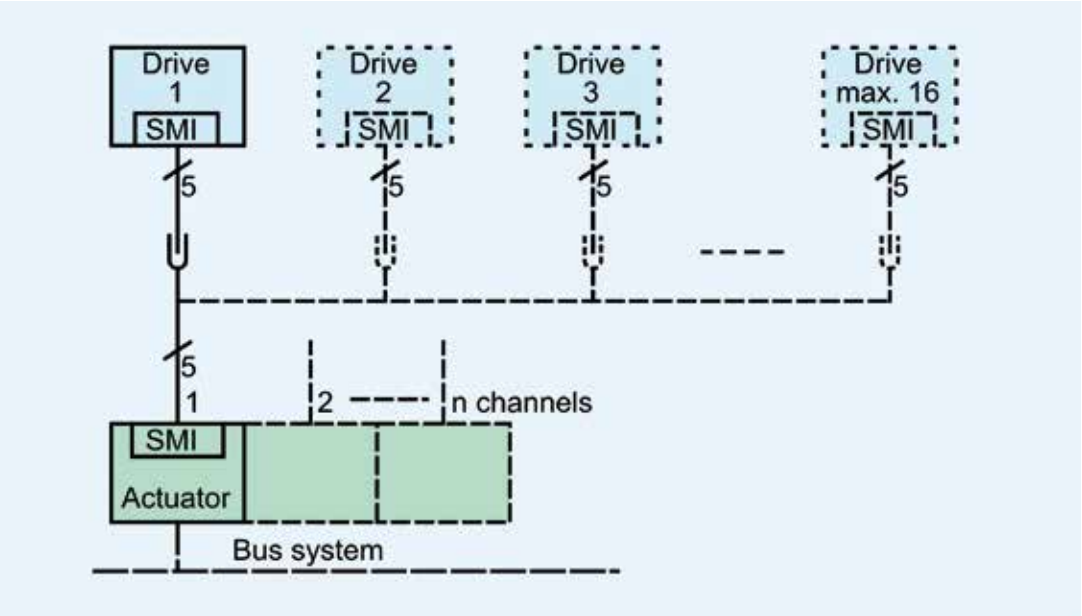
SMI logos for mains voltage and low voltage drives and controllers

4. Technical data

Introduction

The STANDARD MOTOR INTERFACE is an electrical interface for the drives of roller shutters and Venetian blinds, over which telegrams are transmitted.
In this general specification you will find all the technical data describing the principle of the SMI-interface.

The SMI-interface



The interface concept

Interface concept	one actuator, multiple drives
Number of drives (slaves) connected to one actuator (master)	maximum 16
Connecting cables, number of cores	5, including power supply and earth
Connecting cables, cable type	Installation cable, without screen
Connecting cables, maximum total cable length	350 m
Connecting cables, connection topology	free
Damage to the drive interface if wrongly connected	no
Over-voltage capacity of the transmission lines	230 V AC, 2 kV surge test

The power consumption of the drives when stationary may be found in the manufacturer‘s datasheet.

Communication

Transmission rate	2400 bit/s
Data transmission	bidirectional
Data protocol for common and manufacturer-specific commands	yes
Parallel operation of all drives without addressing	yes, with limited feedback
Individual operation with addressing	yes
Diagnostic response in parallel operation without addressing	yes

Setting up

Setting drives up for operation without controller	yes, operation with commercially available buttons
Drive configuration with consistent software	yes, with the SMI-Monitor software

Data format and commands

Data format with flexible length	yes
Security of data transfer	checksum monitoring
Synchronisation mechanism	handshake with timeout
Command types	common and manufacturer-specific
Addressing	broadcast, group and individual addressing
Query of manufacturer code	yes
Query of the serial number (slave ID)	yes
Query of the slave ID with drives connected in parallel	yes, using search process
Individual addressing	16 drives
Consistent movement commands in the end positions and when stopped	yes
Arbitrary positioning	yes, relative position, 16 bits
Query of position	yes, relative position, 16 bits
Number of fixed positions that can be preset	2
Programming the fixed positions	yes, using standard commands
Query of the fixed positions	yes, using standard commands
Incremental, absolute movement commands	yes, referenced to angle of rotation
Number of movement commands that can be combined	3 for autonomous, sequential processing
Drive parameters	read/write of 1 byte, 2 byte and 4 byte parameters
Diagnostic response in parallel operation	yes, including when the drives are not addressed
Uniform diagnostic responses	Motor turns, direction of rotation, motor fault
Query of the diagnostic responses during rotation	yes

SMI test adapter

Test adapter for drives and actuators available	yes
Power supply of the drive via test adapter	yes
Interface to test adapter	USB

5. Installation concepts

5.1 Installing and locating the control devices

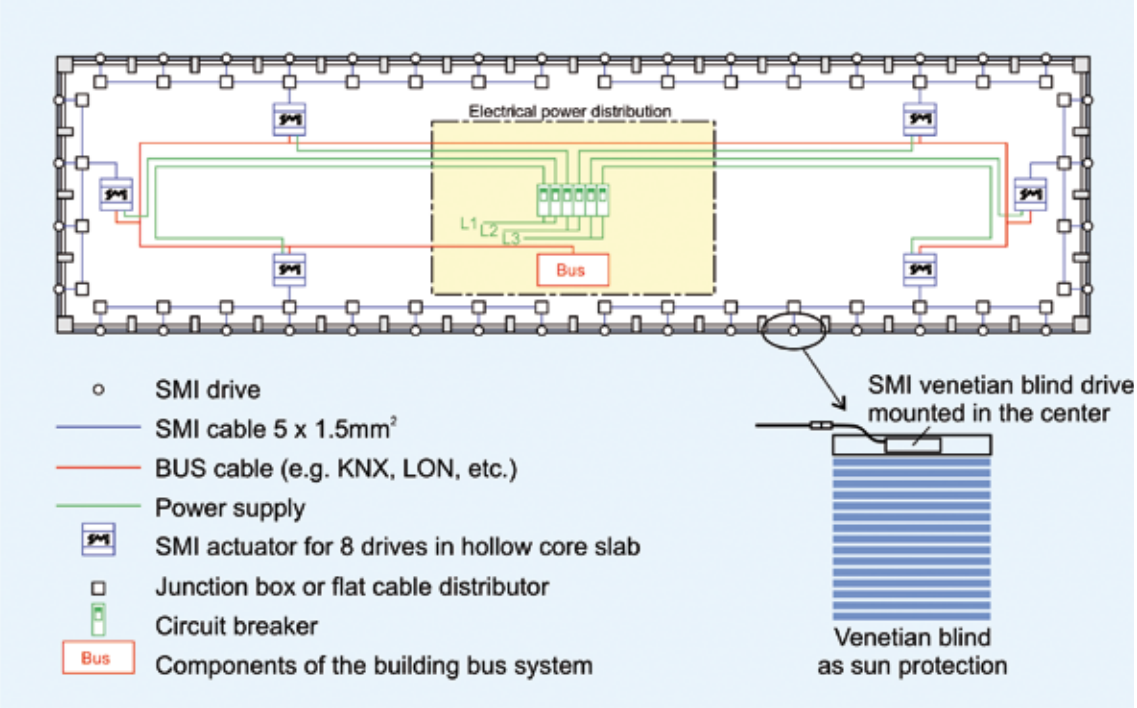
Three different installation variations are available to you, depending on the building concerned. This has no effect on the function or on the operating options.

The notes in the chapter describing installation should also be borne in mind in this connection.

Distributed device assembly

Distributed device assembly is most often used in commercial and industrial buildings, and is particularly suitable for segment-oriented automation for flexible use of floor space.

Some special features of this type of installation:
SMI-drives are connected in parallel
Short cables to the motors
Device assembly involves more work
Moderately easy to service (usually assembled in hollow ceilings or balustrades)
The power feed and SMI lines are separate

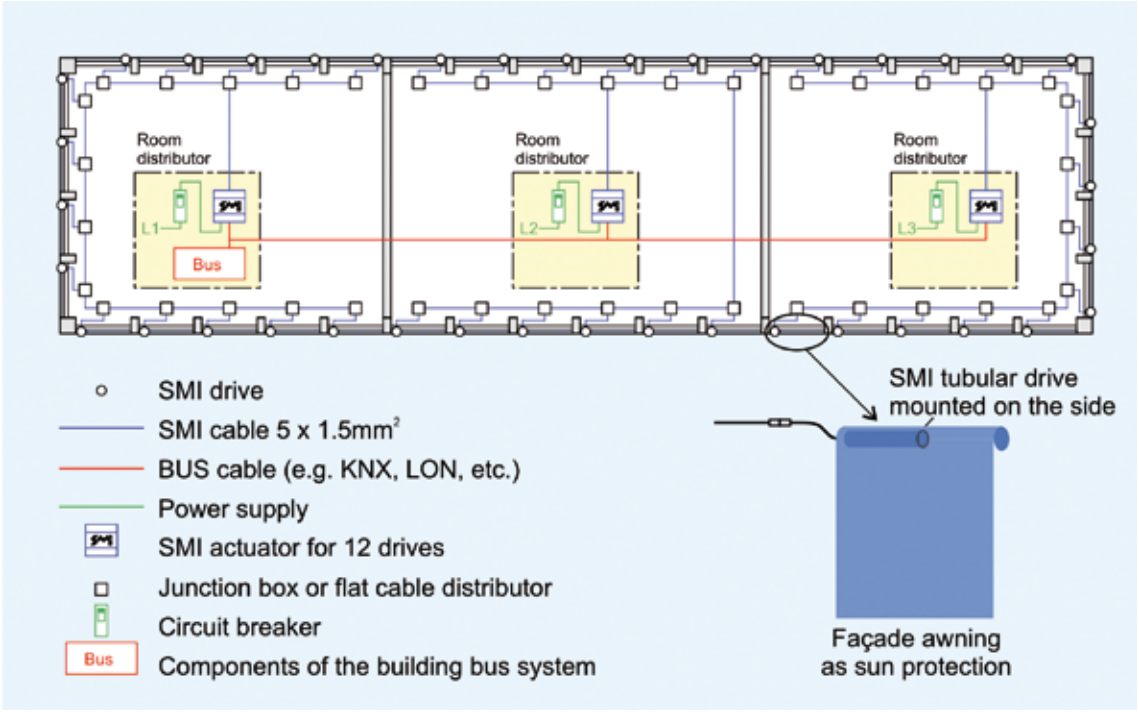


In distributed device assembly, the control devices are mounted non-centrally, e.g. in the hollow ceiling

Mounting in satellite stations

Mounting in satellite stations (e.g. in system distributors) is most often used in commercial and industrial buildings, in factory halls and, to some extent, in residential housing. The satellites are most frequently organised around a room, a group of rooms or around a part of the façade with a fixed number of axes.

Some special features of this type of installation:
SMI-drives are connected in parallel
Short cables to the motor
Space required for satellites
Satellites are connected over a bus system
More easily serviced as distributed assembly

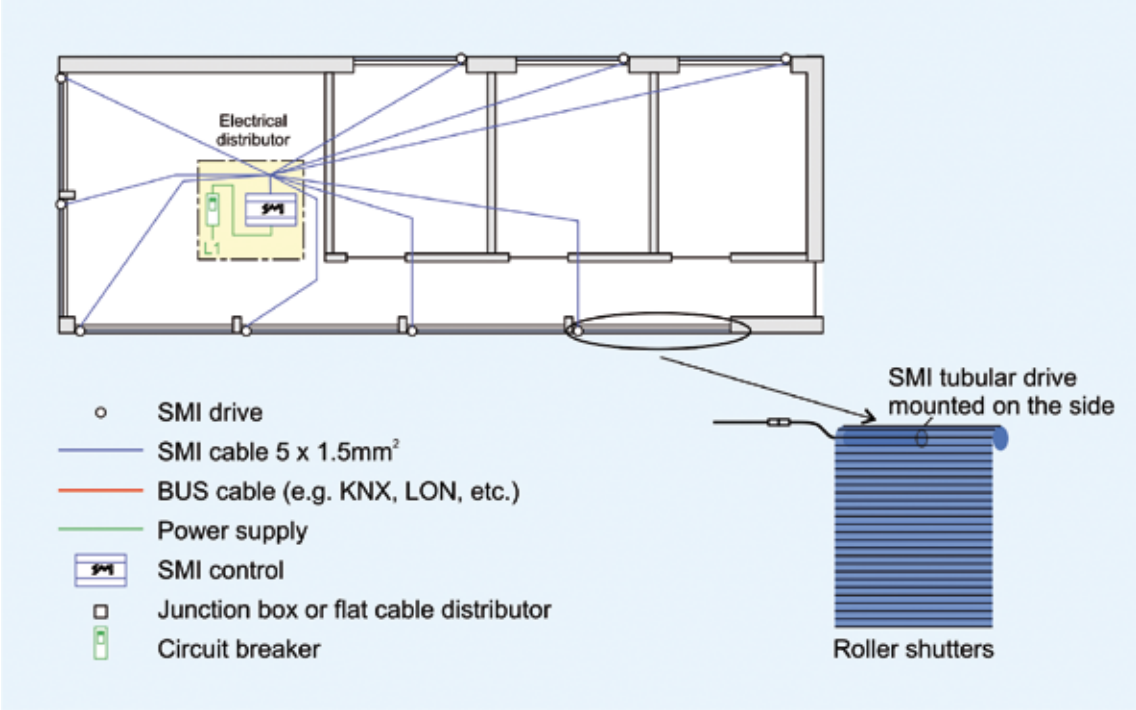


Both satellite assembly and room-oriented assembly with SMI-drives are simply arranged and save cabling

Central device mounting

Devices are most often mounted centrally in apartments and single-family houses.

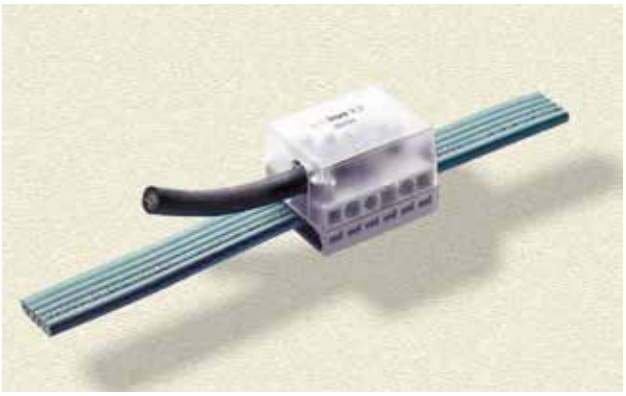
Some special features of this type of installation:
SMI-drives are connected in parallel
Short control lines in the electrical distribution system
Easily serviced: the devices are located straightforwardly
All the cables must be brought to the operating panel



Devices are most often mounted centrally in single-family houses.

5.2 Installing SMI-drives with flat cable systems

Flat cable systems are particularly suitable for installing SMI-drives, both within buildings and in the façade area, where it offers important advantages to installation.
The time and cost of assembly can be held down through the application of a flat cable system; modifications for changed use are easily made, and the potential for faults in the electrical installation is reduced almost to zero.
The principle of flat cable installation is based on a kind of „flexible“ bus bar, where in this case the bus bar is a flat cable with insulated cores and jacket. The structure of the flat cable is specifically matched to its application to SMI motor drives:
5-core cable; 5 x 2.5 mm²; assignment I+, I-, PE, N, L.



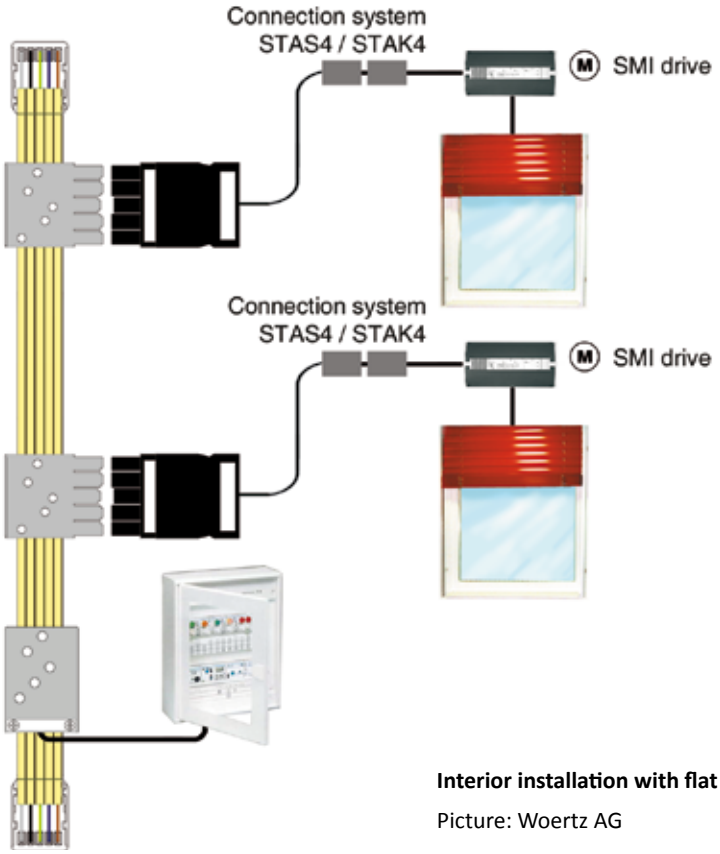
Installation with flat cable
Picture: Woertz AG

Contact is made to the flat cable using junction boxes and the piercing technique that has been proven over many years in building installations. In the „screwed“ version, pivot screws are screwed into the flat cable down to the conductor. In the fast-connection technique, a lever is used in order to push spikes down into the flat cable. This achieves a secure contact without any insulation stripping. The asymmetrical profile of the flat cable makes wrong connections almost impossible.

Application

The flat cable is laid along the SMI motor drives in the interior of the building, and a flat cable end piece is attached to each end. Power is fed into the flat cable at any suitable point through a feed connector. A round cable passes from here to a sub-distribution unit where the power and the bus signal for the flat cable are made available.

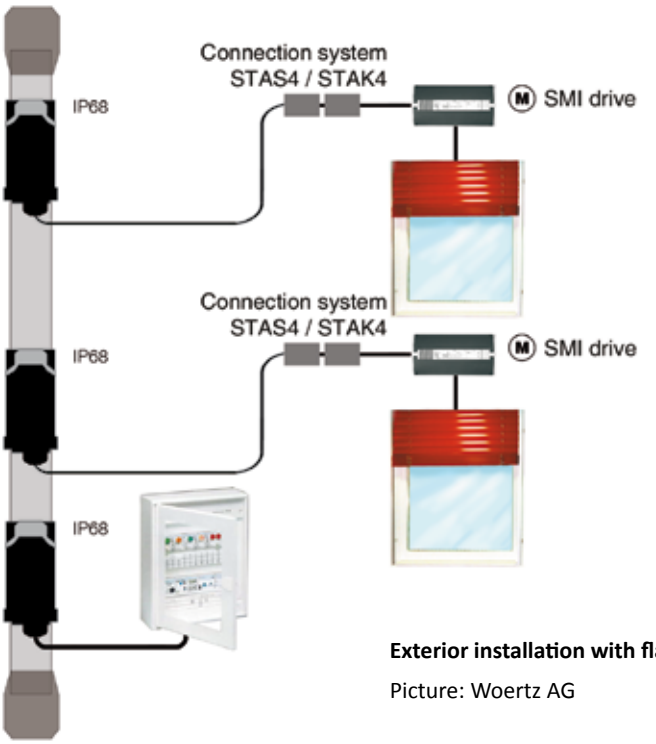
It is now possible to take a tap to an SMI drive anywhere on flat cable.
This is done with a 5-pin outlet socket („screwed“ version IP 20).
Ready-assembled connecting lines, which are available with various lengths, link the SMI motor drives with the proven STAS4/STAK4 connection system.
That completes the installation.



Interior installation with flat cable

Picture: Woertz AG

The same system is employed for façades/exterior use. In order to protect against the environment, a quick-connection socket (IP 68) is used instead of the outlet socket.



Exterior installation with flat cable

Picture: Woertz AG

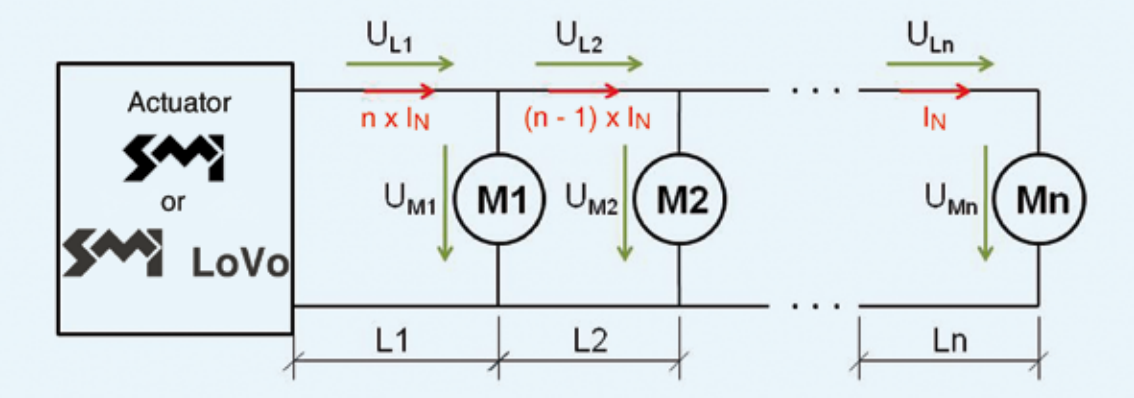
Flat-cable systems are being used for electrical installations in a growing range of applications. They have been used successfully from projects where the engineering requirements are high through to projects where simplicity and flexibility of the installation play an important role. The modular nature of the installation, as a result of which subsequent changes and extensions are easily made, is a particularly valuable property of these systems. The time saved this way improves the profitability of the installation.

5.3 Cable dimensioning

The dimensioning of the conductor cross sections has until now been based on a 1:1 connection from one actuator channel to one drive. Because SMI permits up to 16 drives to be connected in parallel, 1:n connections are now possible, which means that n drives can be operated from one channel of an actuator. As a consequence, the currents that flow down the cables are increased by the same factor n. Particular attention should therefore be paid to the dimensioning of the cables.

The following circuit diagram illustrates the distribution of the currents and voltages when drives are connected in parallel (M1 … Mn) over one SMI actuator channel. The total of all the rated motor currents n x I_N flows between the actuator in the first drive; between the first and the second drive, the current is reduced by one motor current (n-1) x I_N; and so on until the last drive, where only a single rated motor current I_N flows.

Because of these currents, there are different voltages (U_{L1}, U_{L2}, … U_{Ln}) on each of the individual cable sections, depending on their length (L1, L2, ... Ln) and the cross-section of the cupper core, and these reduce the voltages (U_{M1}, U_{M2}, … U_{Mn}) at the motors.
Drives that operate from mains voltage are usually designed to cope with a maximum voltage reduction from 230 V of 10% (207 V). The cables must be designed in such a way that the voltage does not fall below 207 V at the last drive.



Currents and voltages when SMI-drives are connected in parallel

The following table illustrates an example of the voltages seen at the individual drives in relation to the cable cross-section. The voltage is less than the required minimum of 207V in those areas that are marked red.
Mains voltage drive 230 V Rated motor current: I_N = 0.6 A Number of drives: n = 16
Total cable length: 200 m (even distribution of the individual cable sections)

	Cable cross-section			
Drive	**0,75mm²**	**1,0mm²**	**1,5mm²**	**2,5mm²**
M1	224V	226V	227V	228V
M2	221V	224V	226V	227V
M3	219V	221V	224V	227V
M4	216V	219V	223V	226V
M5	213V	217V	221V	225V
M6	210V	215V	220V	224V
M7	207V	213V	219V	223V
M8	204V	211V	217V	222V
M9	201V	209V	216V	221V
M10	199V	206V	214V	221V
M11	195V	204V	213V	220V
M12	193V	202V	211V	219V
M13	190V	200V	210V	218V
M14	187V	198V	209V	217V
M15	184V	196V	207V	216V
M16	181V	194V	206V	215V

A calculation program is available at www.smi-group.com

6. Selection of the actuator

Requirements for the actuator

A variety of installation concepts were described in Chapter 5. In each variant different properties are required of the SMI actuator in terms of connecting drives. The following table offers guidance to the planner regarding the points that must be observed when selecting the appropriate actuator. On top of this, the planner must also bear in mind the flexibility of the controller to serve different uses. The pattern of space usage in office buildings changes more and more often nowadays as organisational structures change. This often means that changes need to be made to the arrangement of the sun protection equipment. When a new arrangement is required, it can be implemented very easily due to the parallel connection of the drives in combination with individual addressing.

General functions

Function	Description
Number of SMI channels	A channel corresponds to an independent interface, having one I+ and one I- connection.
Number of drives per channel	A certain number of drives can be connected in parallel to each channel. The number of drives permitted to each channel is specified by the manufacturer of the actuator.
Parallel connection with or without individual addressing	Depending on the actuator concept, drives connected in parallel may either only be operated jointly, or maybe operated individually through the SMI addressing system.
Maximum number of drives per actuator	Maximum number of drives that can be connected to an actuator (number of channels x number of drives per interface).
Power supply voltage	According to the motor type, the voltage of the power supply to the drive can be mains (e.g. 230 V AC), or maybe a low voltage (LoVo).

7.Responsibilities for planning

Tasks and responsibilities of the partners involved

Manufacturer	Responsibility for:
Drive manufacturer	Reliable function of the drive Certification and registration by the SMI offices Marking the drive with the SMI logo Applying the key ID and manufacturer code to the drive, and possibly to the supply cable Configuring the drive (potentially according to the wishes of the sun protection manufacturer)

Drive manufacturer	Supplying operating instructions for setting up the end positions of the sun protection Supplying adjustment tools for setting up the end positions Providing information if there are difficulties with the commissioning Supplying spare drives with the same configuration in the event of failure
Sun protection manufacturer and/or roller shutter maker	Selecting the suitable SMI drive for the particular sun protection product Correct assembly of the drive and correct adjustment of the end positions Training and equipping production and assembly staff Taking all necessary measures to secure the motor address, if the motor address may be taken either from the type plate or from an additional plate, as desired by the electrical planner or integrator Appropriate identification of the sun protection device as a product with an SMI drive (when used for service) Training and equipping the service staff Training the sales personnel about SMI-drives Information for customers, planners and installers about SMI products, what has to be done when installing and servicing SMI sun protection installations, and about suppliers of SMI control products (possibly with specific information sheet)
Electrical or building automation planner	Selection of the appropriate control concept Selection of the appropriate control products Positioning the controllers Planning the cable layout, considering the number of drives to be connected in parallel Specifying the appropriate electrical cable (5-core) Information for the electrical fitter about how to install the supply cables for SMI-drives
Electrical fitter	Correct installation in accordance with the electrical planner‘s specifications Testing the installation before starting operation
Integrator or electrical fitter	Specifying the addressing method (reading the address from the motor or reading from the type plate) Configuring the controller, including setting the correct addresses

Implementing projects with SMI-drives and SMI controllers

In addition to planning the sun protection control system, the conception of roller shutter makers and sun protection equipment manufacturers is also important to the perfect implementation of a project.
To make this clearer, a checklist is given below for the introduction of SMI-drives into sun protection equipment from the point of view of roller shutter makers and sun protection manufacturers:

Selection of the correct drive	Determining the requirements of the sun protection drive for torque, mounting, axis interfaces etc. Clarifying the technical details with the drive manufacturer in terms of configuration (creeping, start-up ramp, rotation speeds, positions when shipped, procedure for setting end positions, aids for setting the end positions, labelling etc.). Specification of a consistent set of parameters Ordering samples (at least 2) for test construction Commissioning the trial installations in accordance with the intended commission procedure Testing the trial installation with SMI controller or SMI easyMonitor
Preparing documentation for production, fitting, service, consultation	Preparing installation instructions in the blind production department Preparing fitting instructions for on-site fitting Preparing service instructions for blind servicing Preparing an information sheet for sales and for giving advice to electrical planners, electrical fitters and integrators
Provisioning suitable aids for commissioning	Provisioning of a sufficient amount of tools for production, assembly and service.
Instruction of the company's own staff	Instruction tailored for production, fitting and service workers Issuing instructions in a suitable form Giving instruction to sales staff, and issuing the information sheet to help when giving advice
Nomination of an expert	Nominating an expert person who can answer enquiries related to planning questions or problems with commissioning
Identification of the sun protection device	The roller shutter or sun protection device should be identified in such a way that, if servicing is required, it is recognised as a product into which an SMI drive is integrated

8. Planning examples

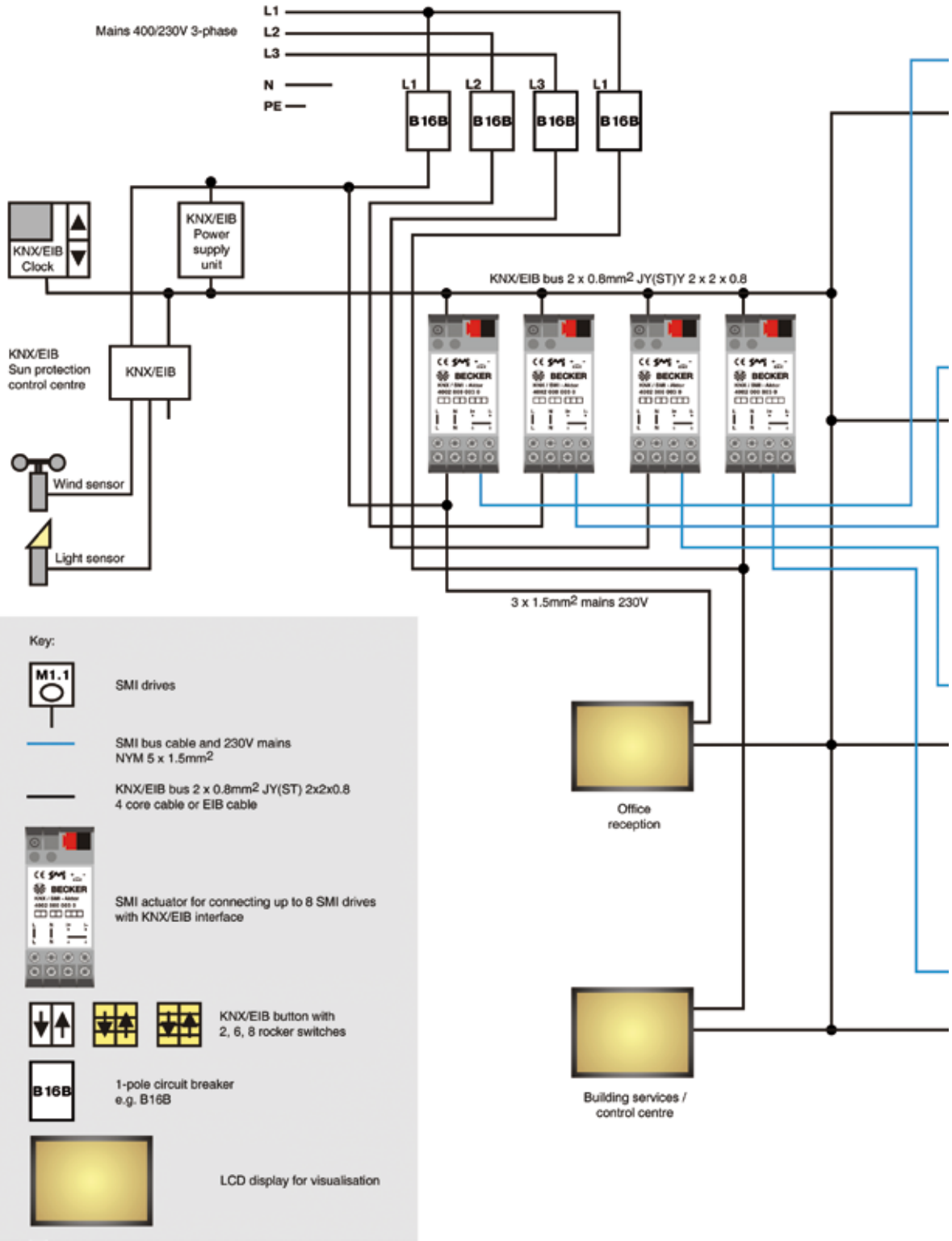
In this chapter you will find an example application for a roller shutter/sun protection controller for an office building with an SMI and a KNX/EIB system, an application example of a roller shutter/sun protection controller for a one-family house with an SMI and KNX/EIB system, and a planning example related for the SMI control unit.

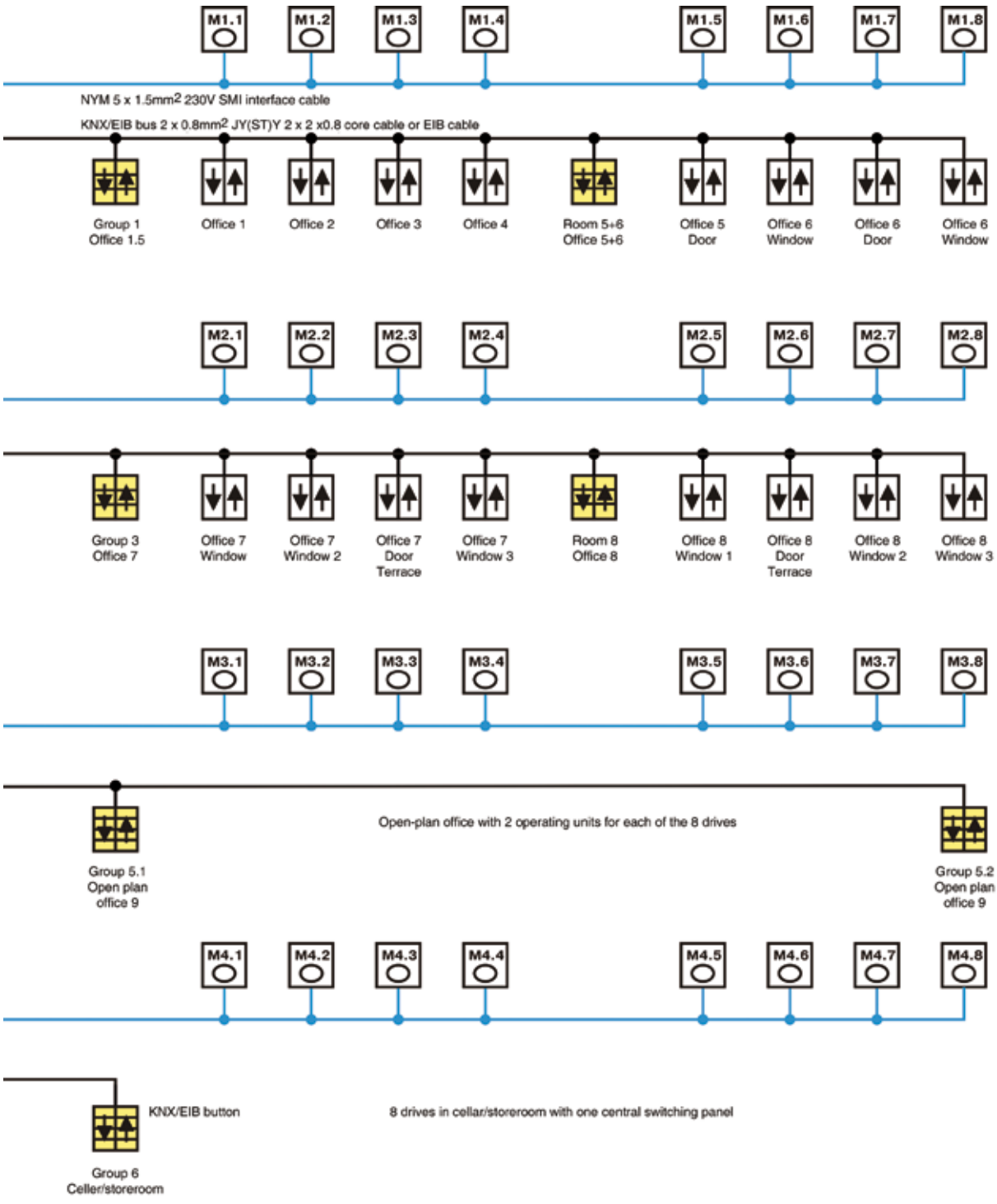
Example application for a roller shutter/sun protection controller for an office building with an SMI and a KNX/EIB system

KNX/EIB time clock and/or KNX/EIB sun protection controller as central unit

Six sub-groups

32 SMI-drives, of which 16 SMI-drives have individual operation means via KNX/EIB button





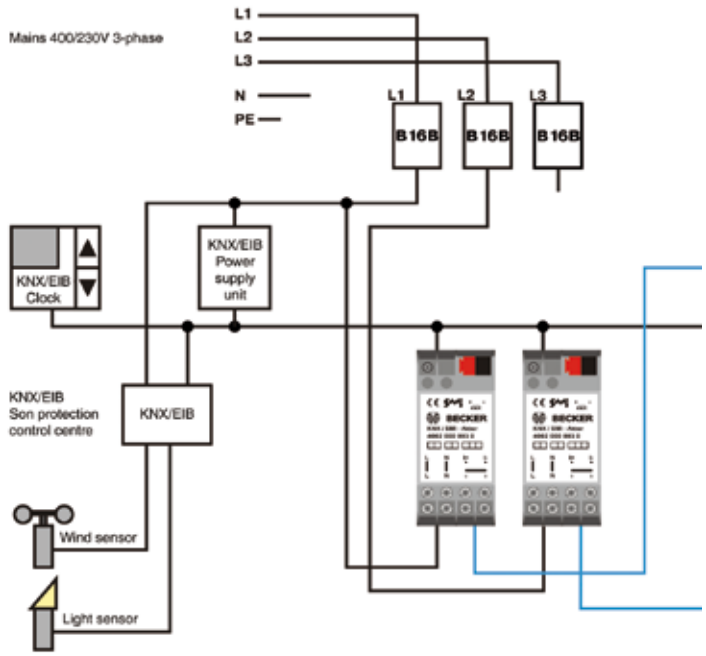
Made available by Becker Antriebe GmbH

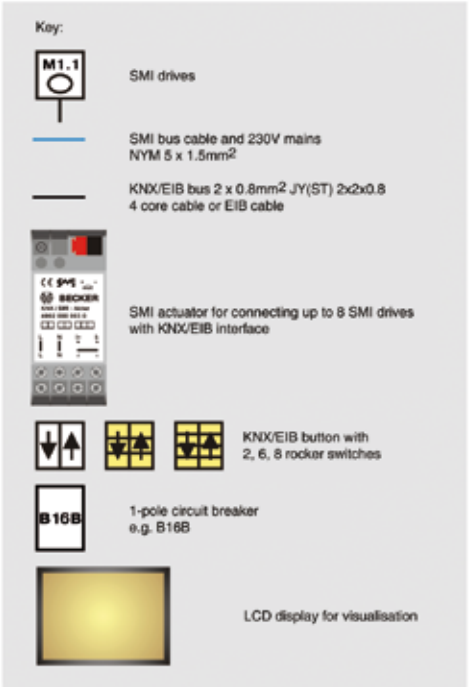
Example application for a roller shutter/sun protection controller for a one-family house with an SMI and a KNX/EIB system

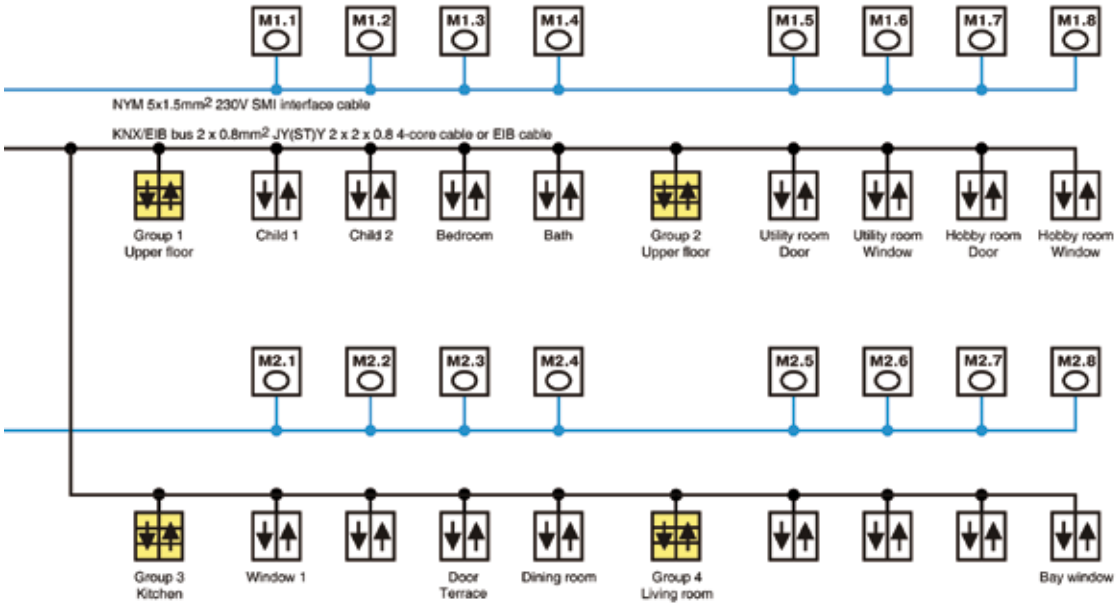
KNX/EIB time clock or KNX/EIB sun protection controller as central unit

Four sub-groups

16 SMI-drives with individual operation means via KNX/EIB button

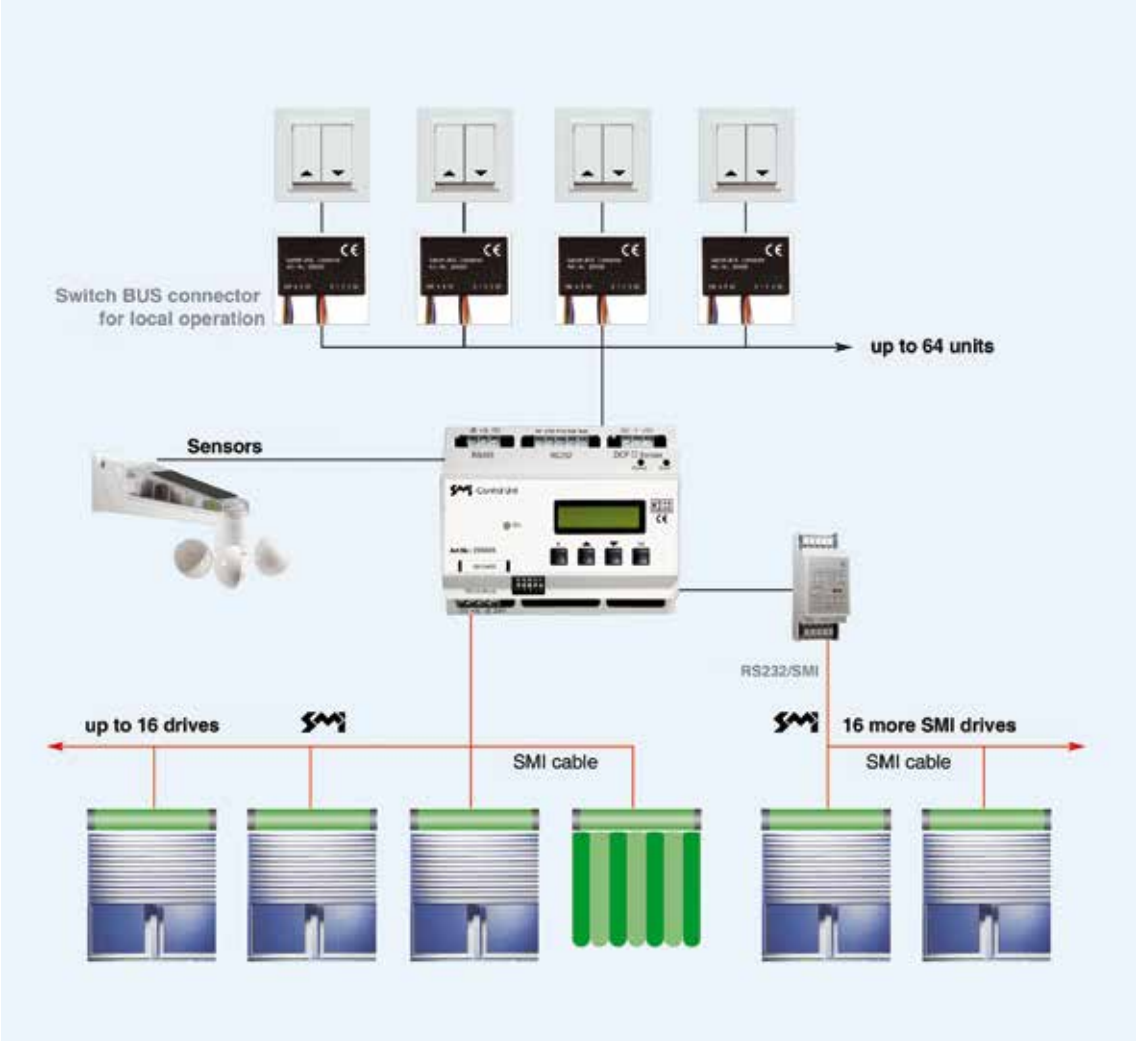






Made available by Becker Antriebe GmbH

The **design example** illustrates how an independent sun protection controller can be implemented with an SMI control unit, even though there is no higher-level building control system. This version is particularly suitable for smaller building projects such as one-family houses.



Design example of an installation with SMI control unit

Made available by Selve GmbH & Co. KG

9. Checklist for the planning of a sun protection controller

Careful planning is needed if a sun protection controller is to be implemented smoothly and appropriately for the customer. The following checklist can offer additional certainty.

☐	Have specialists been involved in the design? Specialists for sun protection controllers, power, light, etc.
☐	What shading products are being used?
☐	What drive type is being used? SMI for 230V or SMI LoVo?
☐	What requirements will the future user have? Operation, automation, special dazzle protection (video screen workplaces), etc.?
☐	Are there any requirements for protecting the product (against wind, precipitation or frost)?
☐	Are there requirements from the point of view of air conditioning in relation to room heating?
☐	Can the sun's energy be used by deliberately opening the sun protection at certain times during the winter?
☐	Do special operating requirements have to be considered? Single operation, group operation, remote operation, operation from the workplace, operation via video screen, etc.?
☐	Are there requirements for uniform positioning of the sun protection at weekends? Does the sun protection have to be opened a bit during the day at weekends, e.g. for the sake of plants?
☐	Is it necessary for individual sun protection units to be opened in emergency (e.g. escape doors)?
☐	Do special preparations have to be made for servicing? Remote servicing, servicing contracts, blocking functions for maintenance and cleaning?
☐	How and where are the actuators and motor control units mounted? Central, distributed, hollow core slab, parapet, sub-distribution unit etc.?
☐	Where are the central and operating units mounted? Can they be accessed properly? Are additional operating units necessary for the caretaker?
☐	Has a timetable been agreed for planning installation, supplying the devices, mounting the sun protection, commissioning etc.?

Installation

1. Connection scheme
2. SMI-easy monitor
3. Manual control cable

1. Connection scheme

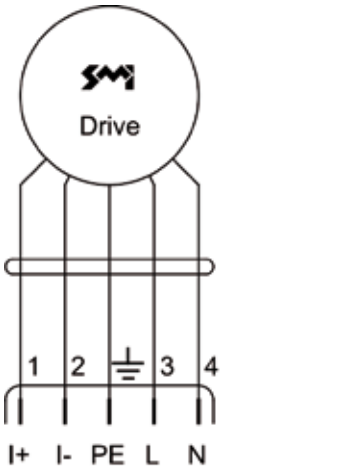
Push Button operation

The drives are operated through the I+ or I- inputs using the control voltage (230 V AC versions) or DC (LoVo). It is only possible to move the drives vertically.

Telegram operation

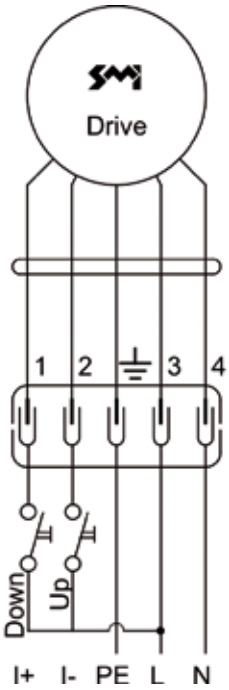
The drives are operated using digital command sequences transmitted through the I+ or I- inputs. You will find the exact connection scheme for your operating mode in this chapter.

Connecting drives for mains voltage
Conductor assignment

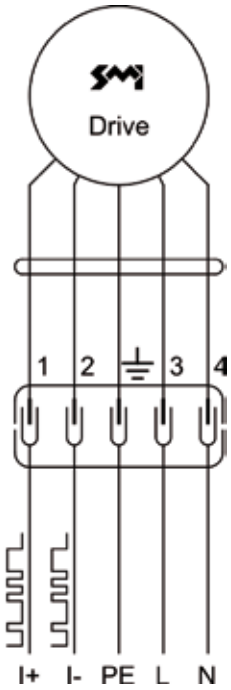


I+: Control wire +
I-: Control wire -
PE: Protective earth conductor
L: Live
N: Neutral wire

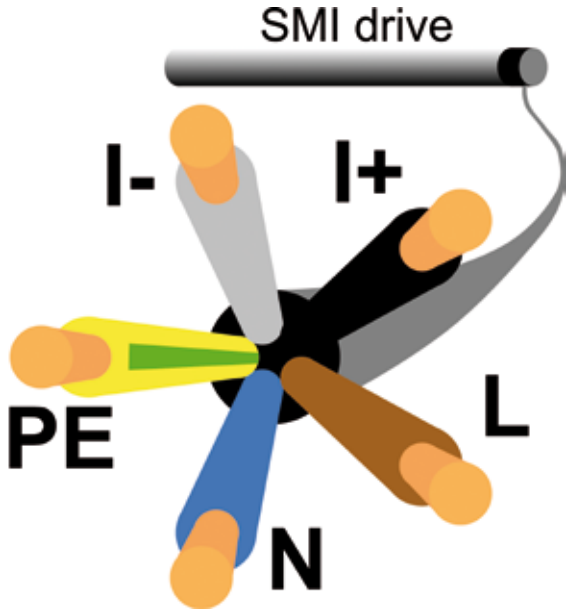
Names



Push Button operation



Telegram operation



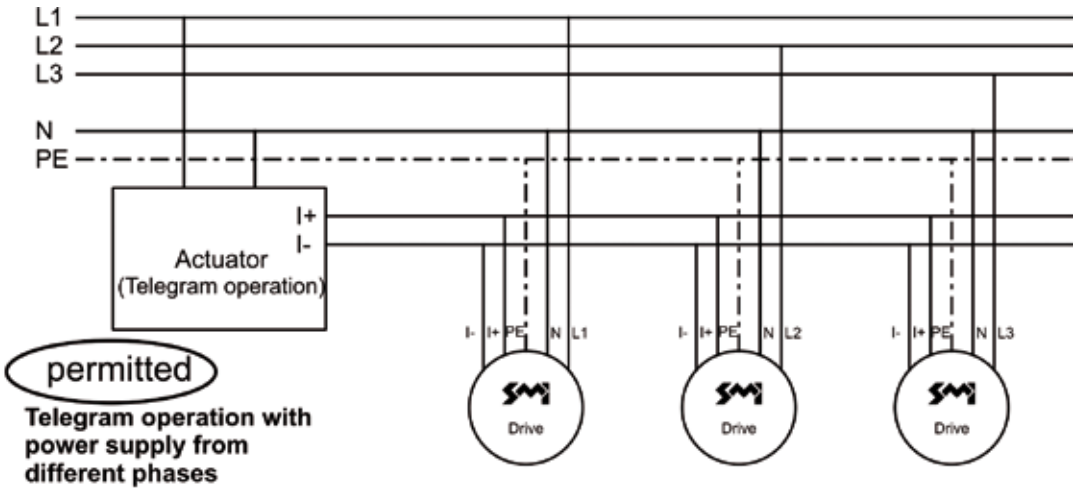
Names and colour codes of the wires for connecting SMI systems

<table>
<tr><th>Connector on drive cables</th><th colspan="3">The STAS4 connector from Hirschmann is recommended.</th></tr>
<tr><td rowspan="2">Cable connections and connector assignment for the STAS4/STAK4 connection system with cables having black, grey, brown, blue and yellow-green wires</td><td>STAS 4
STAK 4</td><td>Wire colour</td><td>Name</td></tr>
<tr><td>1
2
3
4
  </td><td>black
grey
brown
blue
green-yellow</td><td>I+
I-
L
N
PE</td></tr>
<tr><td rowspan="3">Cable connections and connector assignment for the STAS4/STAK4 connector system with cables having 2 black wires</td><td>STAS 4
STAK 4</td><td>Wire colour</td><td>Name</td></tr>
<tr><td>1
2
3
4
  </td><td>black 1
black 2
brown
blue
green-yellow</td><td>I+
I-
L
N
PE</td></tr>
<tr><td colspan="3">Definition of the black wires:
black 1: between blue and green-yellow
black 2: between brown and green-yellow</td></tr>
<tr><td>Note on laying SMI wires in custom cables</td><td colspan="3">The I+ and I- SMI wires can be laid in the motor connection line of the SMI drive (as above) or in their own cable.
It is not permitted to lay SMI wires together with wires carrying other signals in one cable.
If SMI-drives wired in parallel are supplied with electrical power from different phases, the SMI I+ and I- wires must be laid in a separate cable.</td></tr>
</table>

Applicable standards and regionally specific regulations must always be observed at installation.

SMI-drives on different AC phases

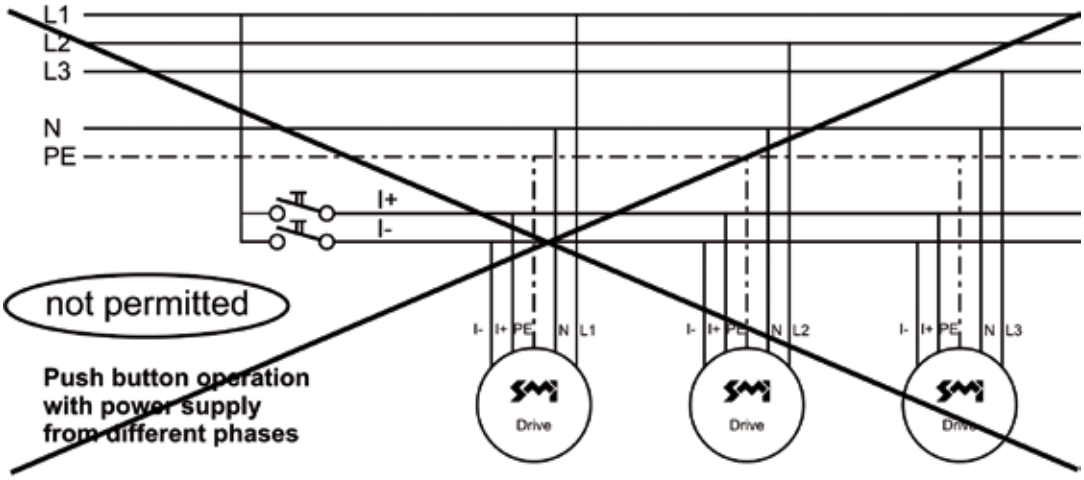
Parallel connection to the control lines I+ and I- while supplying power to the drives from different phases, is only permissible in telegram operating mode.



permitted

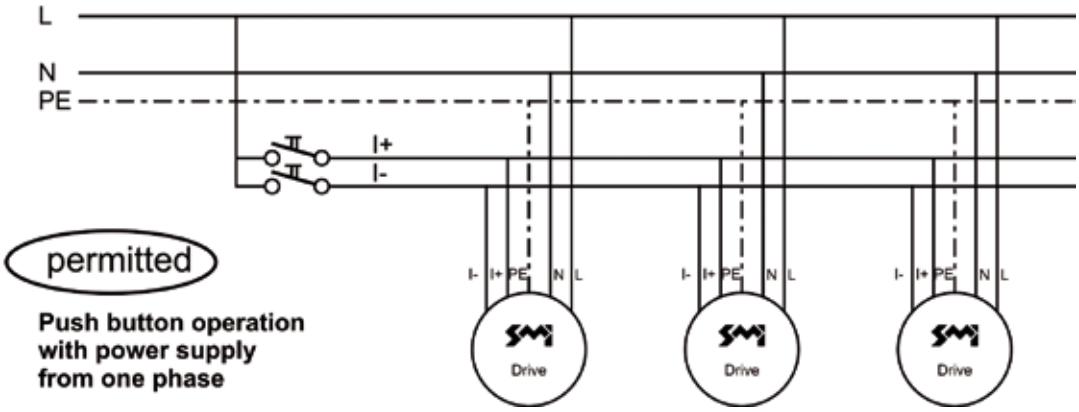
Telegram operation with power supply from different phases

DANGER



not permitted

Push button operation with power supply from different phases



permitted

Push button operation with power supply from one phase

Connection scheme for low voltage drives

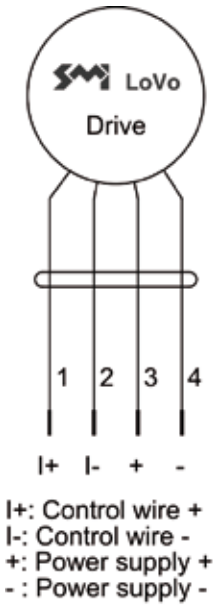
Drives for low voltage generally only have operational isolation. If an SMI-interface is connected to a low-voltage drive, it is necessary to ensure that no hazard arises from inadequate isolation between the signal lines and the mains.

DANGER

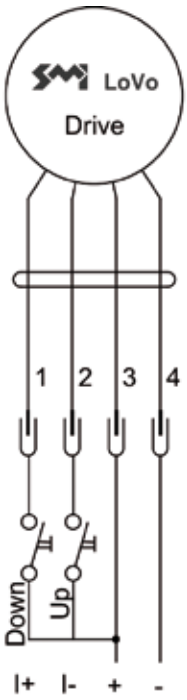
Danger through connecting mains voltage and low voltage circuits
Mortal danger from electric shock:

→ Never connect SMI LoVo drives in parallel with SMI-drives for mains power.

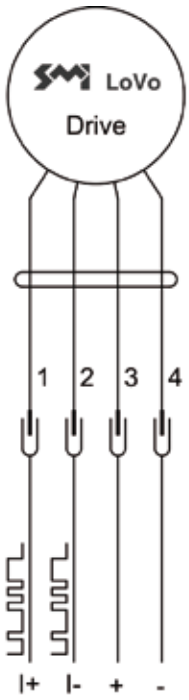
→ Only connect SMI LoVo drives to actuators that carry the SMI LoVo mark.



Cable connections



Push-button operation



Telegram operation

No plug-in connector is specified for connecting SMI-LoVo drives.
Mortal danger from electric shock:

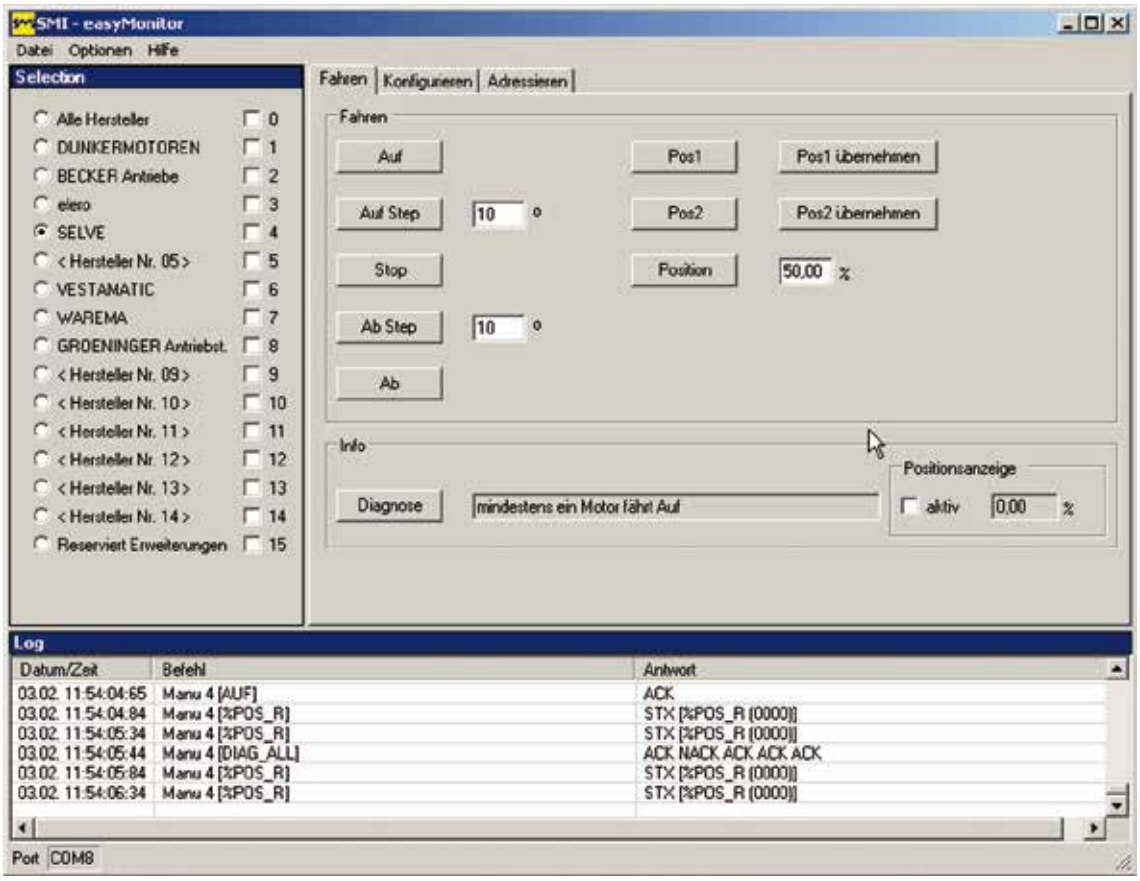
→ Do not use the STAS/STAK4 connector from Hirschmann.

→ Use a different connector.

Applicable standards and regionally specific regulations must always be observed at installation.

2. SMI-easyMonitor

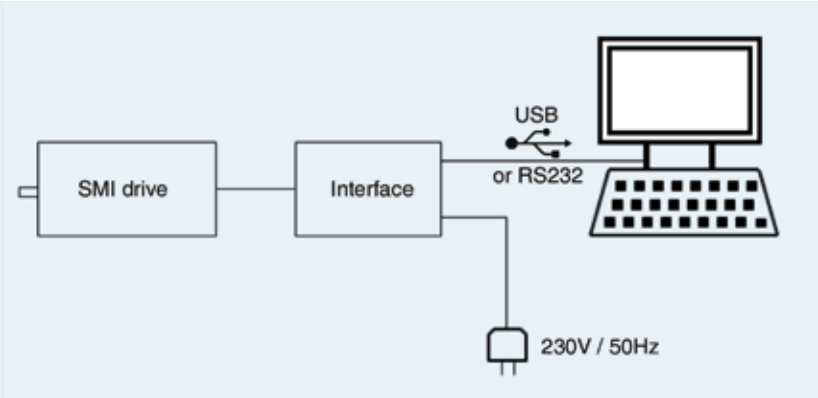
With the SMI-easyMonitor software you can operate, parameterise and address SMI-drives by means of commands from a computer.



The SMI-easyMonitor program

Requirements for use

Computer running Windows 98, 2000, XP, or above, as operating system
USB interface
USB INTERFACE box



Connection scheme for operation with SMI-easyMonitor

Sources for the individual components

INTERFACE

You can obtain the USB SMI-interface from interface manufacturers in the SMI-group. More detailed information and the contact information can be found under:
www.smi-group.com

Drives

SMI-drives can be obtained from drive manufacturers in the SMI-group. You will find the addresses of manufacturers under:
www.smi-group.com

easyMonitor software

The SMI-easyMonitor software is available free of charge. You can download the current file and obtain further information about installation under:
www.smi-group.com

3. Manual control cable

You can configure new SMI-drives for initial operation using the manual control cable.
The manual control cable is available so that configuration can also be done without expensive hardware, such as the SMI-interface operating together with the SMI-easyMonitor software, or connection to a bus system. This allows the makers of roller shutters and awnings, as well as electrical installation engineers, to test and adjust SMI-drives without great difficulty.
Various positions and end positions can be set manually. Everything is done by means of the UP and DOWN buttons.

Note:
Manual control cables can be obtained from a number of manufacturers. Only general information is therefore provided here.

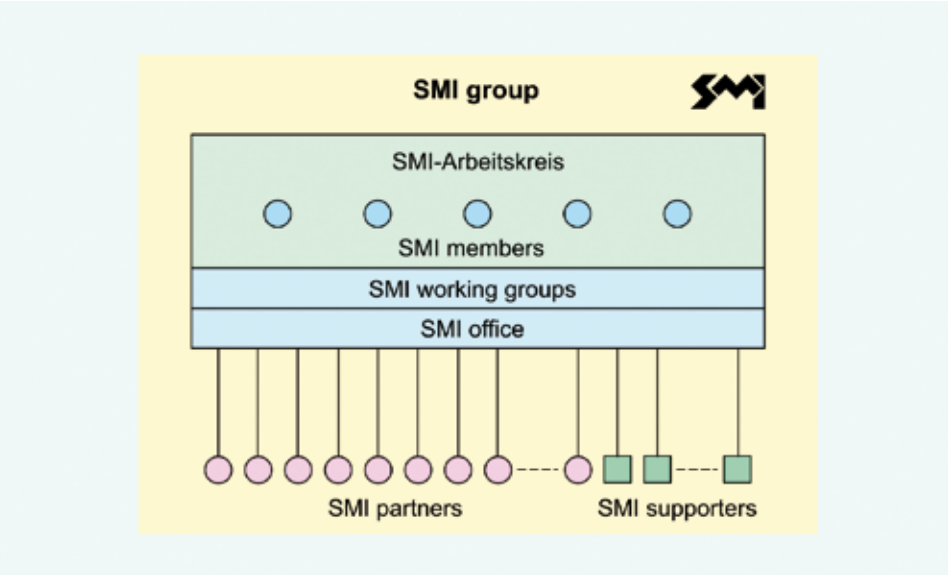
For details, please contact the manufacturer of your particular manual control cable in order to obtain product-specific operating instructions.

Specific operating instructions for the manual control cable can be found on the websites of the drive manufacturers.
Manual control cables can be obtained from the drive manufacturers within the SMI-group.

Annex

1. SMI-Group organisation
2. The steps to an SMI-product
3. Contact information for the SMI-Arbeitskreis
4. Associations and organisations
5. Standards and directives

1. SMI-Group organisation



The organisation of the SMI-group

All the companies that use, specify, or have an interest in the technology of the SMI interface come under the umbrella of the SMI-group.
The rights and obligations of these companies are governed by agreements.

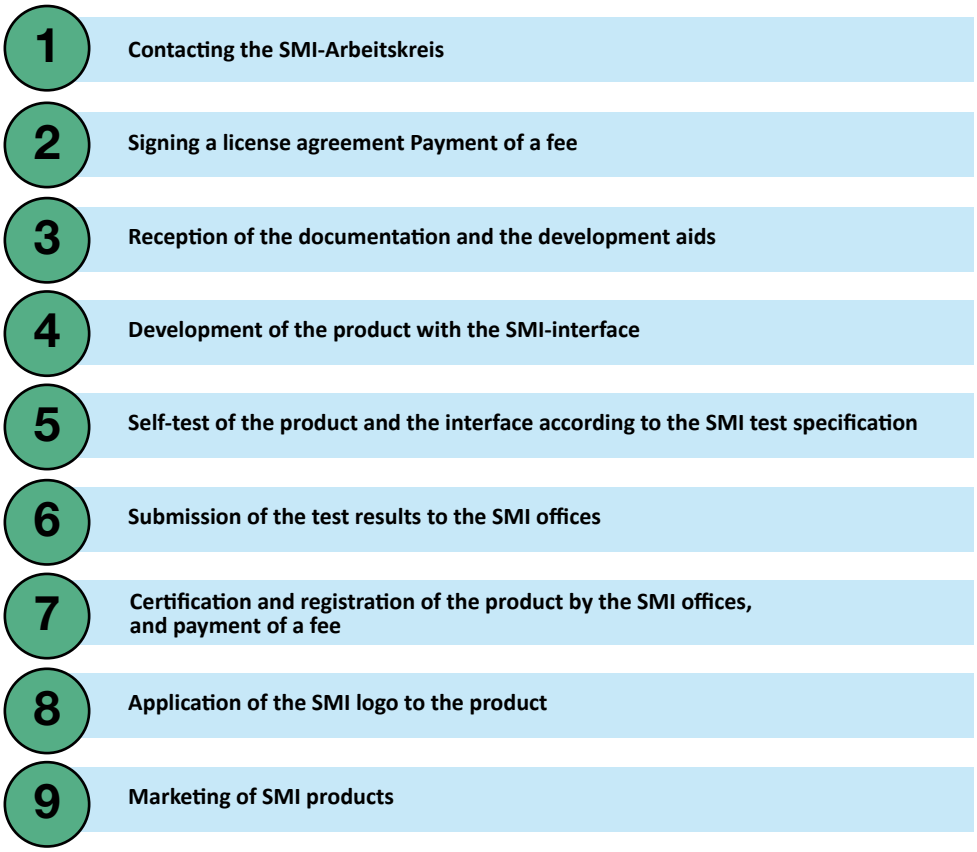
SMI-Arbeitskreis

The SMI-Arbeitskreis, which is a consortium consisting at present of 5 companies (SMI members), is the owner of the SMI brand and all rights in the development results jointly created in the framework of the SMI project. These companies include:

- Becker-Antriebe GmbH, D-Sinn
- Dunkermotoren GmbH, D-Bonndorf
- elero GmbH, D-Beuren
- Griesser electronic AG, CH-Aadorf
- SELVE GmbH & Co. KG, D-Lüdenscheid

Together, the companies constitute a simple association for achieving a common goal employing common effort and common means. The cooperation between the companies in the SMI-Arbeitskreis is regulated by the agreement of 24 October 2001, and in additional supplementary agreements.
Companies within the SMI-Arbeitskreis have financed the development, and profit from free use of all rights. They pay a yearly contribution to cover overheads. SMI members can register products with the necessary documentation for certification. After satisfying all the requirements, certification and registration of the product, the right to use the SMI logo on the product concerned is obtained.
Other companies can join the SMI-Arbeitskreis after a full year of SMI partnership.
This must be approved by the SMI-Arbeitskreis, and an entry fee must be paid.
The value of the entry fee is specified by the SMI-Arbeitskreis.
The STANDARD MOTOR INTERFACE emerged from a continuous process of development, from the initial vision through to the establishment of reliable products. Prestigious reference projects at home and abroad now provide confirmation of the success of all this work.
SMI has brought the technology of roller shutter and sun protection automation a significant step further forward.

2. The steps to an SMI product



The nine steps to your SMI product

3. Contact information for the SMI-Arbeitskreis

SMI offices

Stillhard Management Services
Ofenbachstr. 14
CH-8266 Steckborn
Phone: +41 52 761 30 40
Fax: +41 52 761 30 29
www.smi-group.com
info@smi-group.com

Companies in the SMI-group

The contact information for the SMI members, partners and supporters can be found on the website of the SMI-group:
www.smi-group.com/

4. Associations and organisations

KNX

www.knx.org
KNX Association is the creator and owner of the KNX technology (former EIB / KNX) – the worldwide STANDARD for all applications in home and building control, ranging from lighting and shutter control to various security systems, heating, ventilation, air conditioning, monitoring, alarming, water control, energy management, metering as well as household appliances, audio and lots more. The technology can be used in new as well as in existing home and buildings.

LONMARK® International

www.lonmark.org
LonMark International a global membership organization created to promote and advance the business of efficient and effective integration of open, multi-vendor control systems utilizing **ISO/IEC 14908-1** and related standards.

BACNet

www.bacnet.org
BACnet - A Data Communication Protocol for Building Automation and Control Networks. Developed under the auspices of the American Society of Heating, Refrigerating and Air-Conditioning Engineers (ASHRAE), BACnet is an American national standard, a European standard, a national standard in more than 30 countries, and an ISO global standard.

BHKS, Bundesindustrieverband Heizungs-, Klima-, Sanitärtechnik / Technische Gebäudesysteme e.V. (German Industrial Heating, Air Conditioning and Plumbing Association / Building Engineering Systems)

www.bhks.de
BHKS is one of the most important organisations in the building engineering sector, and primarily represents companies who create installations in an industrial context.

Deutsche Gesellschaft für nachhaltiges Bauen e.V., DGNB (German Society for Sustainable Building)

www.dgnb.de
It is the purpose of DGNB to establish a consistent certification system for sustainable construction in Germany and abroad. The DGNB certificate demonstrates environmentally responsible, commercially effective and user-friendly buildings.

DIAL GmbH, Deutsches Institut für Angewandte Lichttechnik (German Institute for Applied Lighting Technology)

www.dial.de
The purpose of the association is, amongst other things, to encourage research and development in light and building system technology.

FiTLicht, Fördergemeinschaft innovative Tageslichtnutzung e.V. (Association for Innovative Daylight Usage)

www.fitlicht.de
The aim of the association involves aspects of the use of daylight, such as the encouragement of scientific work, research and development in the field of daylight usage.

GNI, Gebäude Netzwerk Initiative, Switzerland (Building Network Initiative)

www.g-n-i.ch
The Building Network initiative (Gebäude Netzwerk Initiative, GNI) is the leading Swiss trade association for building automation and intelligent living.

INGA, Innovationsnetzwerk Gebäudeautomation e.V. (Building Automation Innovation Network)

www.inga.de
The innovation network informs the public about the status, applications and further developments in building automation, and encourages the transfer of know-how between its members through a variety of campaigns.

Innovationszentrum Intelligentes Haus, Duisburg (Intelligent House Innovation Centre)

www.inhaus-duisburg.de
The „Fraunhofer-inHaus-Zentrum“ is a unique innovation workshop for novel system solutions in rooms and buildings.

Minergie, Switzerland

www.minergie.ch
MINERGIE® is a Swiss quality label for new and modernised buildings.
A MINERGIE® sun protection module consists of a tested sun protection product (slatted blinds, roller shutter, etc.) and a tested controller. It is necessary for the sun protection product to be movable, automated and „located outside".

VBI, Verband Beratender Ingenieure (Association of Consulting Engineers)

www.vbi.de
The Association of Consulting Engineers (Verband Beratender Ingenieure, VBI) is the leading professional organisation for independent consultants and design engineers in Germany. It includes a professional group for electrical, lighting and information technology, and a professional group for engineering equipment.

VDMA, Verband Deutscher Maschinen- und Anlagenbau e.V. (Association of German Machine and Equipment Makers)

www.vdma.org
The professional association for automation and management for houses and buildings within VDMA brings together the manufacturers of measurement and control equipment for heating, ventilation and air conditioning, of building automation systems, as well as providers of building management services.

ZVEI, Initiative „Intelligentes Wohnen" (Intelligent Living Initiative)

www.intelligenteswohnen.com
The initiative considers itself a platform through which service providers, manufacturers, users and partners such as those in trade, manual crafts, architects and designers can advance the use of technologies for networking devices and systems.

5. Standards and directives

5.1 General standards / directives for building automation

- DIN EN ISO 16484: Building automation

The global standard covers the functions, technology, applications, data communication, project design and execution.

- VDI 3813: Room automation

The guideline applies to applications for room automation in the field of technical building equipment. This guideline supports the dialogue between investors, building owners, users, operators, installers, designers, product manufacturers and installing companies, in order to create a basis for quality management independently of the technical implementation.

- VDI 3814 Building automation

The VDI 3814 guideline applies to installations, software and services for the automatic control and regulation, monitoring, optimisation and use of the technical building equipment, as well as management for its energy-efficient and safe operation.

- VDI 6015: Bus systems in building installations, example applications

The guideline illustrates the advantages and benefits of the bus installation.
It serves as a design and argumentation aid for investors, designers, operators and users of buildings in both the private and public sectors.

5.2 Protocol-specific standards

- EN 14908: „Control Network Protocol“ (CNP) (LonWorks protocol)
- DIN EN ISO 16484-5: „Data Communication Protocol“ (BACnet protocol)
- EN 50090: „Home and Building Electronic Systems“ (KNX protocol)

5.3 Standard specific to sun protection

- EN 12216: Shutters and awnings – terminology, names and definitions

5.4 Standards for drive technology

- EN 14202: Shutters – fitness of tube and square motors for use – requirements and test methods
- DIN EN 60335-2-97: Safety of electrical devices for domestic use and similar purposes: Special requirements for roller shutters, awnings, Venetian blinds and similar equipment.
- DIN EN 55014: Electromagnetic compatibility – requirements for household devices, electrical tools and similar electrical devices
- DIN EN 61000-3: Electromagnetic compatibility EMC

5.4 Other standards relevant to SMI

- EN 15232: Energy efficiency of buildings – effect of building automation and building management
- DIN V 18599: Energy assessment of buildings
- VDI 6011: Optimisation of daylight use and artificial lighting

This design manual was created by a cooperation between the SMI-group and a project group at the Furtwangen University in 2011.