



A New Lighting Experience



The VS Lixos System

The intelligent control system
for energy-efficient street
and outdoor lighting

Street Lighting Requirements: Saving the Planet, Reducing Costs

Climate changes resulting from the CO₂ emitted by burning fossil fuels pose a major challenge for the planet.

The lighting solutions provided by Vossloh-Schwabe ensure that local authorities everywhere can save energy, achieve sustainable cost reductions and at the same time make a valuable contribution to reducing CO₂ output.

As a result of street lighting having become such a design feature of cityscapes in recent years, the volume of urban lighting has increased, but also the associated energy requirements. More importantly, though: existing facilities, operating components and the underlying lamp technology are outdated.

This not only results in higher energy requirements, but also more maintenance work and higher investment costs. All this adds up to street lighting accounting for approx. 30–50% of the entire power consumption recorded by municipal and other types of local authority – which amounts to a huge cost factor for public budgets to cover.

Using various lighting situations as examples, energy savings up to 40% can be achieved if efficient technology is used in the right place.

**Lixos enables
energy savings
of up to 40%.**

The European Union's new ErP Directive also demands that considerably more efficient use be made of energy. Vossloh-Schwabe is supporting the implementation of this directive with efficient components for street and facility lighting.

Modern-day street and outdoor lighting is mainly expected to ensure:

- sufficient light to guarantee traffic safety,
- non-intrusive lighting levels for residential areas that still let residents feel safe in their environment as well as
- sparing use of natural resources.

A major challenge facing current lighting management systems is to permit individual control of luminaires and/or lighting groups in relation both to where they are used (residential areas, trunk roads, architectural lighting, etc.) and for how long.



Lixos : Intelligent Luminaire Control

Lixos is an offline system made by Vossloh-Schwabe to enable targeted and timer-based control (power control system) and monitoring (service system) of individual luminaires and/or lighting groups in outdoor lighting systems featuring separate lighting networks. While the system needs a separate power supply cable, it does not require any additional control lines.

Thanks to Lixos, architectural/monument and street lighting used in urban areas can now be jointly programmed for the very first time. The synergies created in this way both serve to make cityscapes more attractive and achieve substantial energy savings.

Thanks to Lixos, architectural/monument and street lighting can now be jointly programmed for the first time.

Cost-saving switching cycles can be scheduled for outdoor lighting systems found in industrial plants and traffic control applications. Lixos not only ensures compliance with relevant specifications governing lighting systems for outdoor workplaces, but also enables energy-efficient operation of night-time safety lighting.

The fact that the Lixos lighting control system needs neither a control line nor a ripple control transmitter makes it an ideal choice for new developments as well as refurbishments of existing facilities.

Lixos is based on a power reduction circuit – approved by leading luminaire manufacturers – that is combined with various monitoring tools to enable cost-effective lighting system management.

Lixos in a nutshell:

- Suitable for use with separate lighting networks
- Does not require an additional control line
- Does not require a ripple control transmitter
- Limitless operating range
- Patented data transmission (carried out when the lighting system is switched off)
- Available in two editions: Basic + Advanced

Advantages of the Lixos System

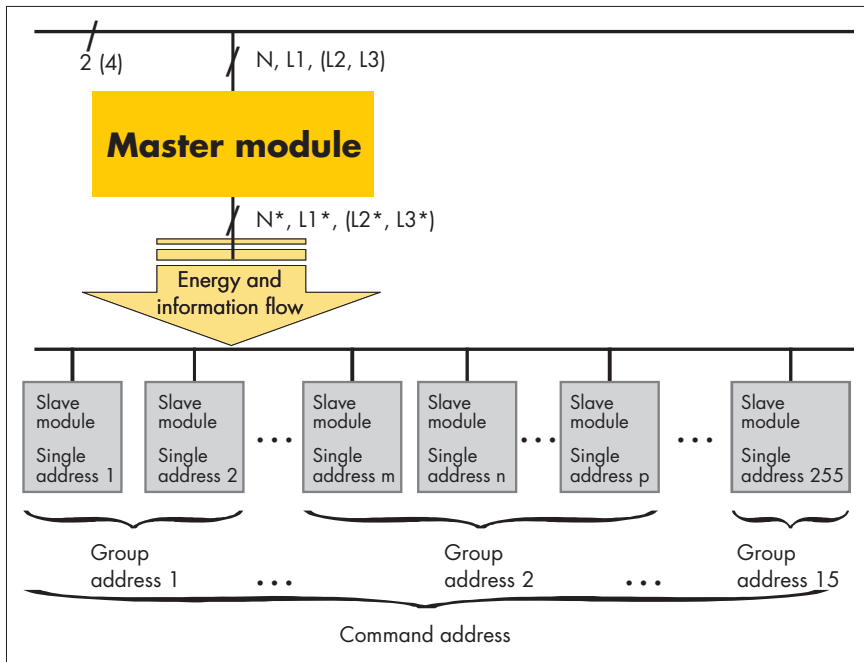
- Lixos enables individual switching of luminaires and luminaire groups, which serves to save energy. Energy costs are reduced by lowering energy consumption and adjusting lighting levels to suit time- and/or building-related requirements.
- Low investment costs with a short payback period thanks to energy savings achieved by reducing lamp power.
- No need for civil engineering work.
- Various lighting levels can be scheduled for different times. Lixos makes it possible to time different illumination levels for street and architectural/monument lighting installed at different geographical locations. In each case, the artificial lighting system will be tailored to suit natural lighting levels and the degree of visibility required.
- Reduction of required maintenance. The correct functioning of connected lamps or lamp groups can be checked by Lixos, which not only makes it possible to easily pinpoint defective lamps for replacement, but also optimises lighting levels and quality.
- The patented signal transmission system prevents mains harmonics.
- Street lighting in accordance with DIN 5044 ("Stationary Traffic Lighting") guarantees compliance with the uniformity requirements governing reduced lighting levels. This is because Lixos does not switch every second street lamp off, which prevents the creation of low-visibility zones. Obstacles consequently remain easily visible and can thus be avoided.
- Using Lixos to ensure outdoor areas are brightly lit ensures citizens can feel safe in their surroundings. In addition, the system also makes a valid contribution to creating a pleasant atmosphere in residential areas, which in turn lets people feel more strongly connected to their community.
- Thanks to its eco-friendly design, the Lixos system both works with a smaller CO₂ footprint and can even help to reduce the level of mercury contamination arising from waste lamps. Simple and cost-effective lamp disposal can be achieved by converting from mercury vapour to high-pressure sodium discharge lamps, which are largely mercury-free. Moreover, high-pressure sodium discharge lamps create an insect-friendly light spectrum.

Components of the PCS System

The Lixos PCS System functions on the basis of a computer-aided master/slave principle.

The master is therefore interconnected with the lighting cable in the main junction box and the power line is used to transmit signals to the slave modules installed in each lamppost or luminaire.

The slave modules convert the received signals into equivalent switching responses.



Lixos Advanced System: Operating Principles

Location addresses (servicing addresses; 255 max.) are allocated to the luminaires making up a lighting system.

The lighting jobs that individual luminaires will perform (e.g. pedestrian crossings, junctions, main or subsidiary roads, school routes, architectural illumination, etc.) during defined time periods must be specified prior to first operation of the lighting system. Each master can be used to control 7 or 15 different luminaire groups; each Lixos PCS slave is allocated a group address from 1 to 7 or from 1 to 15.

The group and servicing addresses of each luminaire must be set mechanically using the special dip switches included on the slave.

In addition, the times at which each switching response will be carried out must be defined for each individual group. As a result, all luminaires in the same group will be activated in accordance with the same switching cycle, which can consist of up to eight (8) switching responses.

The operating cycle of all luminaires begins when the lighting system is switched on, e.g. by the twilight switch and ends when the system is centrally switched off by the twilight switch again.

As a rule, the Lixos PCS master is programmed once with the switching data of the desired switching cycle of each luminaire group. Switching responses are programmed with the help of a user-friendly, Windows-based program that needs to be installed on a notebook or PC.

Architecture of the Lixos System

Each luminaire is fitted with a Lixos slave module that can be used either to reduce lamp output in combination with a suitable ballast or to permit alternating operation of luminaires featuring two lamps (Lixos Basic). In combination with the Lixos master module, these slaves also permit complex lighting control (Lixos Advanced).

Lixos Master - Generation M01



Lixos Master - Generation M10*

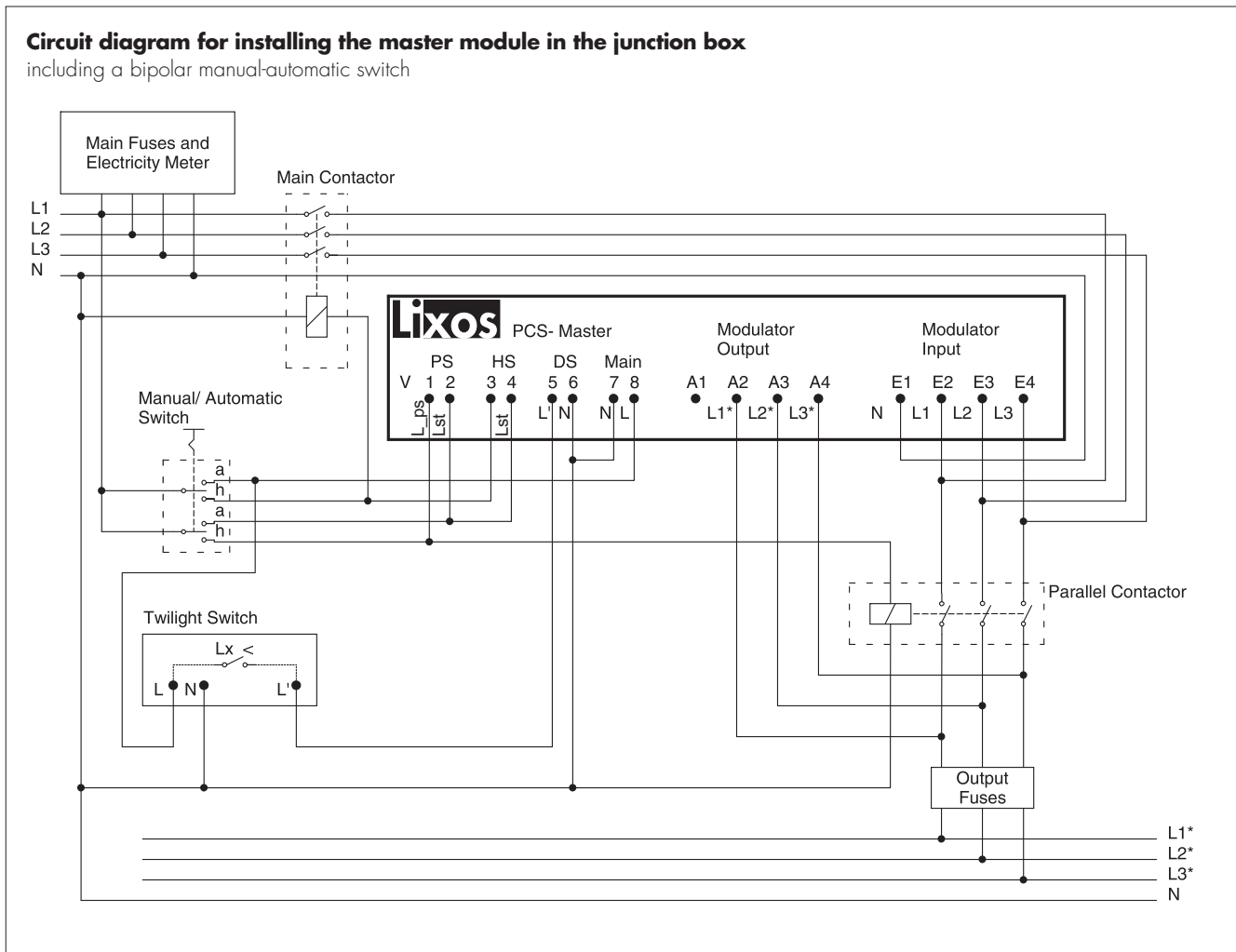


* in development, subject to alterations

Lixos Slave Modules



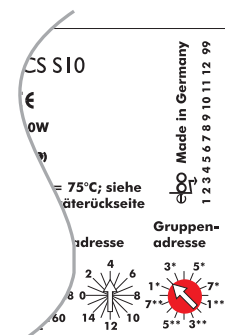
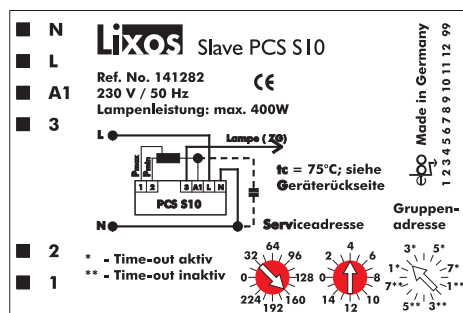
Circuit diagram for installing the master module in the junction box including a bipolar manual-automatic switch



Programming the Slave modules

The system address for every single luminaire is entered via a dial on the Lixos slave module.

- Service address = location address for the Lixos slave module (max. 255: consecutive numbers starting with 1)
- The service address is entered using the red-backed dials on the Lixos module (example address 164: key 1 = 160 | key 2 = 4)



The third dial on the module serves the creation of luminaire groups that are supposed to display the same lighting settings.

Up to 15 groups can be created in total and up to eight switching responses can be programmed for each group.

In addition, Lixos slave modules can be programmed to function as a standard power switch (Lixos Basic).

Programming of switching data

The master is first programmed upon installation of the Lixos system with the help of a PC or notebook. If required, settings can quickly be modified (e.g. luminaire functions can be changed or the lighting system extended) and individually set up to suit various areas and/or luminaire groups.

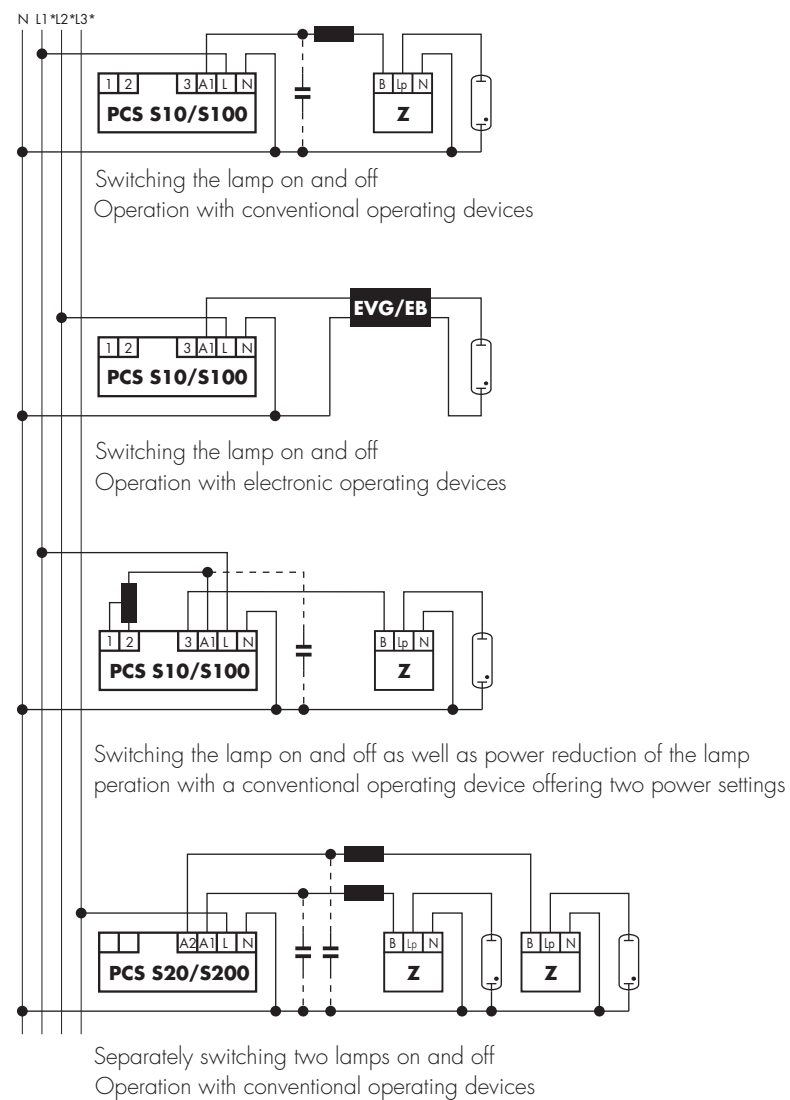
The master transfers the switching command and time to the slave installed in the luminaire:

- switch on lamp/luminaire
- switch on full power
- switch on reduced power
- switch off lamp/luminaire

Amplitude modulation is used to digitally transfer relevant data via the system's power line when the electricity is off.

The start of the daily lighting cycle can, for instance, be triggered by using a photo-sensitive (twilight) switch.

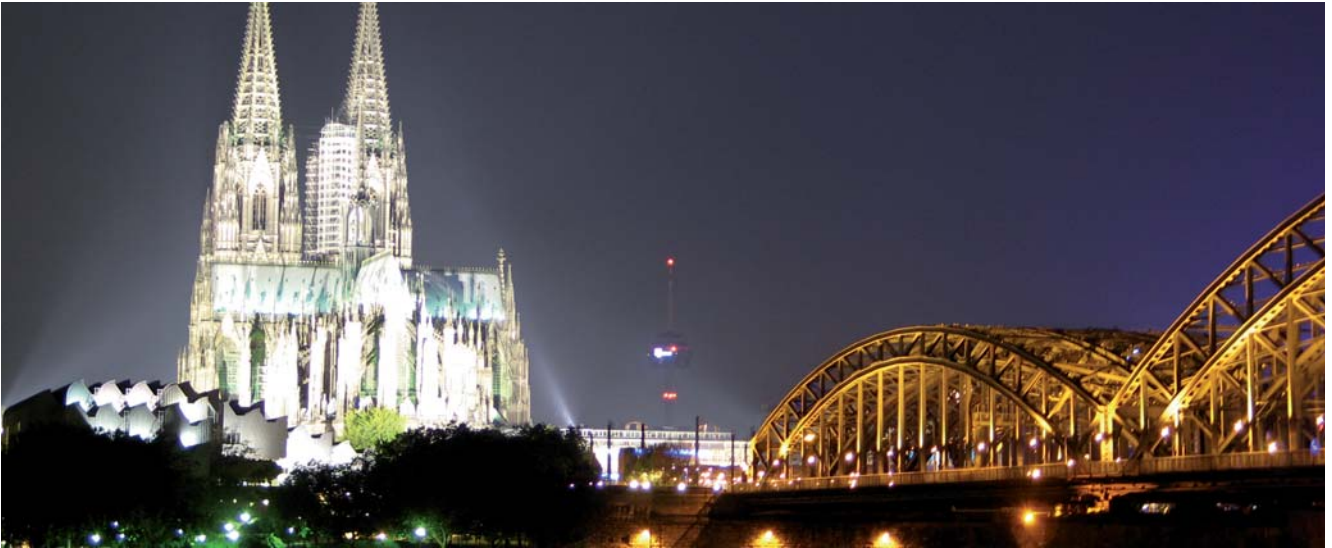
Wiring examples for Slave modules



Summary of switching commands

- Luminaires featuring a power switch (PCS S10 / S100)
 - Off (0)
 - On = reduced-power operation (1 or 2)
 - On = full output (3)
- 2-lamp luminaire (PCS S20 / S200)
 - Off (0)
 - On = full output, only lamp 1 (1)
 - On = full output, only lamp 2 (2)
 - On = full output, lamps 1 and 2 (3)





Diagnostics Tool – Service Test – Extended Service Test

Diagnosis tools: operating principle

Lixos provides two diagnosis tools for testing the system and its connected devices:

- Service test (requires the Lixos Manager or terminal software)
- Extended service text (requires terminal software)

The lamp current values measured and recorded during initial operation of the lighting system are used as reference values for service tests.

Service test

This function performs a quick test of all connected devices. Due to the high number of possibly connected devices, the duration of each device test is short. The operating current of each slave and its connected device is measured in succession. Data are then stored and compared with the values (reference values) stored during initial operation.

Starting with servicing address 1, the testing cycle first switches each slave on for 60 seconds and then off for 10 seconds. After that, the procedure is repeated for servicing address 2, and so on for all other connected slaves.

Servicing tests can be carried out automatically (e.g. at a defined time on a specified day of the week). To this end, the master must be programmed to work to a specific cycle. The system operator can then read the data from the master at any subsequent point in time.

Extended service test (requires terminal software)

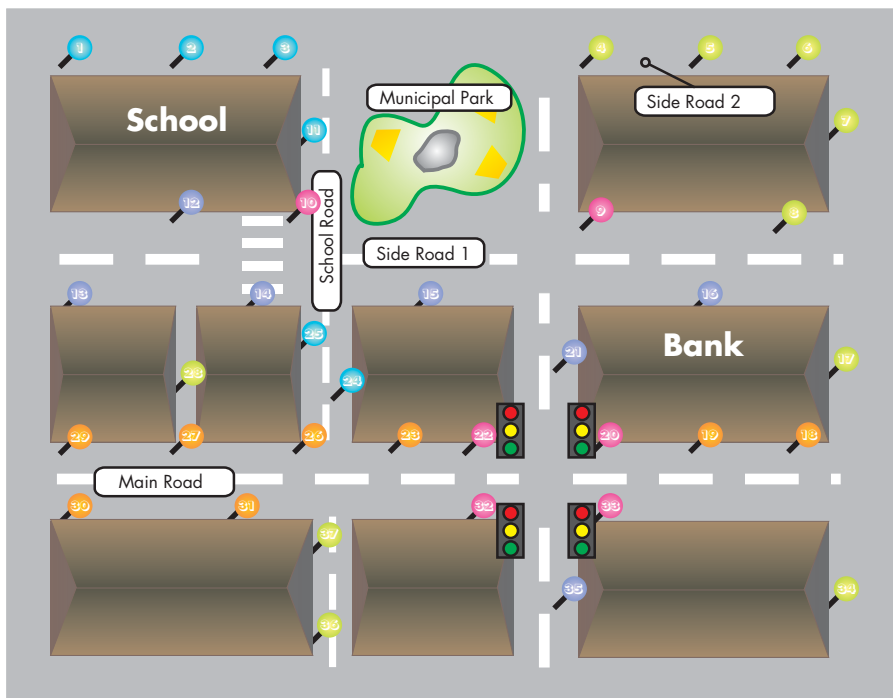
During this extended service test, a single servicing address is tested for approx. five (5) minutes and the current is measured. The measured values are then displayed for the system operator to compare with the lamp's nominal values. The lamp's nominal data, e.g. lamp output, should be detailed in the documentation belonging to the lighting project. These values are not explicitly detailed as part of the Lixos system.

The extended service test can be initiated manually from a notebook at the main junction box of the lighting system or from a desktop PC.

The Lixos system comes with a number of safety functions that ensure lighting in the event of a defect:

- If the Lixos slave does not receive a signal from the Lixos master, the luminaire will still switch on independently after a specified period of time.
- The luminaire will also be switched on if a Lixos slave has not been programmed.
- If the light sensor is activated before 14.00 hrs, the lighting system will be switched on in the "Emergency ON" mode. Night programming will therefore be omitted and the lighting system will be switched on directly.

Example of a complex lighting system



- 1 327 Hardware address of every single luminaire
- 2 Junction/Pedestrian Crossing (group address 1)
- 3 Main Road (group address 2)
- 4 School Road (group address 3)
- 5 Side Road 1, e.g. Residential Road (group address 4)
- 6 Side Road 2 (group address 5)
- 7 Architectural Lighting (group address 6)

An optimum lighting management system ensures sufficient light can be provided for any situation!

Group Address	Road	Leuchtmittel	t _{on}	18:00	20:00	22:00	00:00	02:00	04:00	06:00	t _{off}		
1	Junction Pedestrian Crossing	HS 150W		100%									
2	Main Road	HS 150W		100%			reduced			100%			
3	School Road	HS 70W		100%			reduced			100%			
4	Side Road 1	HS 70W		100%			reduced			100%			
5	Side Road 2	HS 70W		100%			reduced	off			reduced	100%	
6	Architectural Lighting	HS 400W		off	100%				off				

Lixos Master Module PCS M01

For centralised control of outdoor lighting systems consisting of separate lighting networks.

Offline data transmission to Lixos slave modules.

The Lixos master contains all relevant program parameters needed for the operation of a lighting system.

These parameters include:

- Switching data needed to operate a lighting system
- Service data gathered during service tests
- Timings for switching the system on and off
- Installation in the central junction box



System requirements

Windows-based computer

Interface: Serial; RS 232

Transmission:

- Null modem cable, analogue
- modem, GSM modem (Siemens)

Technical Data

Mains voltage: 230/400 V \pm 10%

Nominal frequency: 50 Hz

Input: Photosensitive (twilight) switch

Addressing outputs: Main and Parallel

Contactors

Switching capacity: max. 2000 W

Ambient temperature: max. 50 °C

Weight: 2.4 kg

Transferable group addresses: 1 to 15

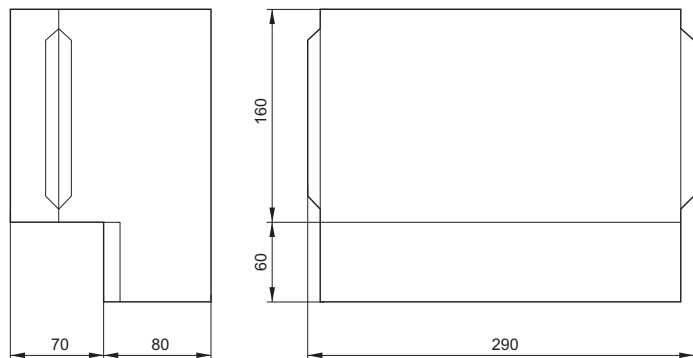
Transferable service addresses: 1 to 255

Cycle duration (min./max.): 5 minutes / 21.25 hours

Programming: Offline

Type: M01 No. of addresses: 7

Ref. No. 141033



Lixos Master Modules PCS M10

For centralised control of outdoor lighting systems consisting of separate lighting networks.

Offline data transmission to Lixos slave modules.

Very compact design.

The Lixos master contains all relevant program parameters needed for the operation of a lighting system.

These parameters include:

- Switching data needed to operate a lighting system
- Service data gathered during service tests
- Timings for switching the system on and off
- DIN rail mounting and installation in a junction box

System requirements

Windows-based computer

Interface: Serial; RS 232

Transmission:

- Null modem cable, analogue
- modem, GSM modem (Siemens)

Technical Data*

Mains voltage: 230/400 V \pm 10%

Nominal frequency: 50 Hz

Input: Photosensitive (twilight) switch

Addressing outputs: Main and Parallel

Contactors

Switching capacity: max. 2000 W

Ambient temperature: max. 50 °C

Weight: approx. 1 kg per pcs.

Transferable group addresses: 1 to 15

Transferable service addresses: 1 to 255

Cycle duration (min./max.): 5 minutes/21.25 hours

Programming: Offline

Type: M10 No. of addresses: 15

Ref. No. 142200

*We reserve the right to make changes without further notice.



Lixos Slave module

The Lixos Master module is used to address/program the Lixos Advanced version. The slave modules are installed in the luminaire or in the lamppost base.

The protection class of the slave module must be increased by using suitably dimensioned transition boxes if the module is installed in the base of the lamppost.

With the Lixos Basic version slave modules are solely used for power-reduction purposes in combination with suitable ballasts.

Technical Data

Mains voltage: 230/240 V \pm 10%

Nominal frequency: 50 Hz

Contact current:

- max. 7 A at λ 0.5
- max. 10 A at λ 1.0

Casing temperature: max. 75 °C

Weight: 155 g

Programmable group addresses: 1 to 255

Programmable group addresses in

combination with Lixos Masters:

- M01: 1 to 7 group addresses
- M10: 1 to 15 group addresses

Switching responses per operating cycle: max. 8

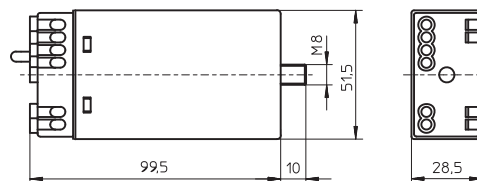
Optional: Standard programming as a power switch



PCS S10 / PCS S100



PCS S20 / PCS S200



PCS S10 / PCS S100

Power reduction of luminaires connected to electromagnetic ballasts with two power settings

Power switch integrated

For 35–400 W high-pressure discharge lamps

Type: PCS S10 for Lixos PCS Master M01

Ref. No. 141282

Type: PCS S100 for Lixos PCS Master M10

Ref. No. 142210

PCS S20 / PCS S200

For luminaires with two lamps (power reduction is effected by switching one lamp off)

For incandescent and high-pressure discharge lamps (35–400 W per lamp)

Type: PCS S20 for Lixos PCS Master M01

Ref. No. 141039

Type: PCS S200 for Lixos PCS Master M10

Ref. No. 142211



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