

# LOGIC MODULE EX-22

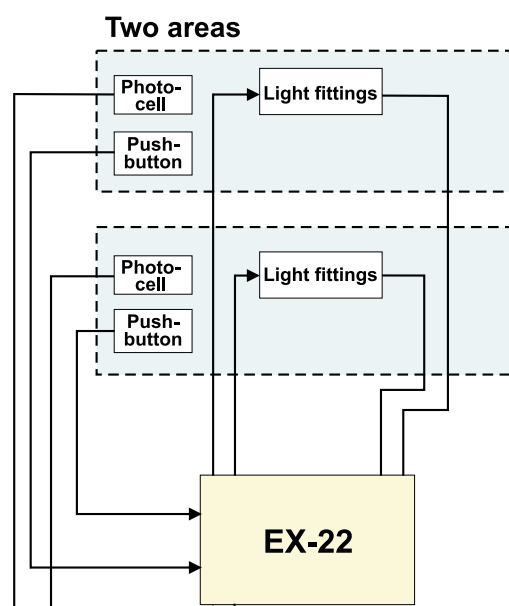
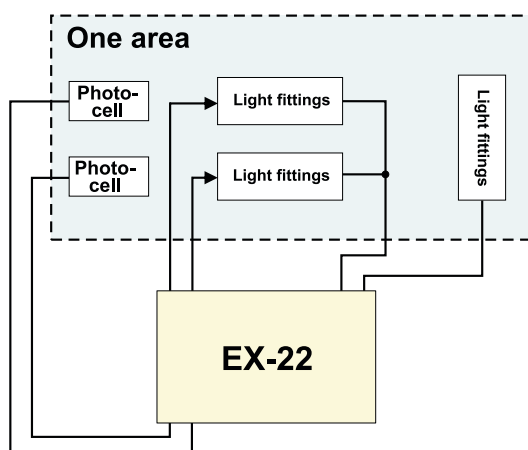
## For lighting control with automatic regulation of light level

Order no: 13166

### Description



EX-22 is a logic module for controlling two lighting groups in one area, or in two areas with one lighting group in each. Lighting group A has digital lighting control that provides auto-



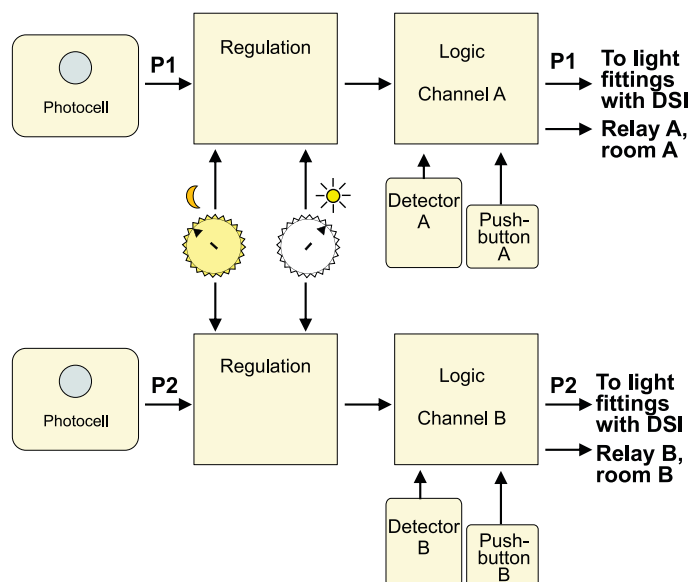
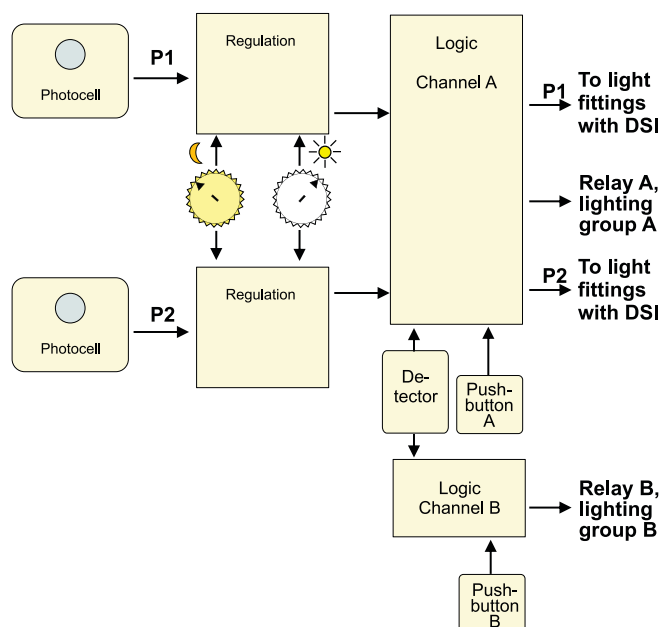
Principschema för styrning i två lokaler.

matic control of lighting with the aid of a photocell. Alternatively, two photocells can be connected to enable individual, automatic regulation of lighting via two digital channels, P1 and P2.

Light fittings are controlled digitally in accordance with the DSI standard. Two DSI channels are used to control two separate groups of light fittings over bus cables. This allows better compensation for available natural light from windows/skylights, and saves more energy.

Lighting groups A and B are switched on using the connected pushbuttons. Lighting is switched off automatically by the presence detector when presence is no longer detected, or by means of the pushbuttons. The light level can also be adjusted manually by pressing and holding in the pushbuttons for channels A or B.

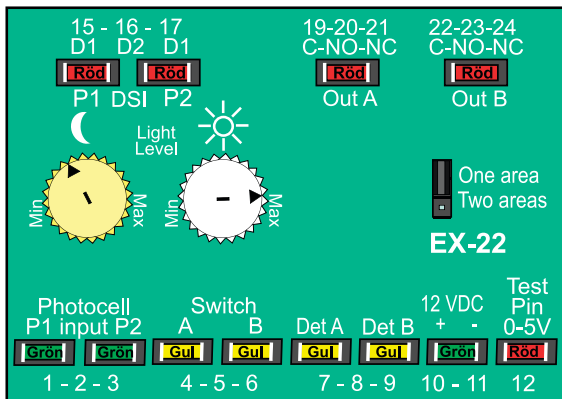
EX-22 has two inputs for presence detectors.



## Wiring and operation

Operation is indicated by twelve LEDs underneath the hinged cover. There are also two potentiometers for setting up constant light level control for two channels. The LEDs go out when the cover is closed.

For wiring details see also the application examples.



### Photocells, P1 & P2 (1(+), 2(-), 3(+))

The photocells are connected to terminals 1 - 2 - 3.

They control the light level of channel P1 and P2 via relay output A. The DSI outputs, terminals 15, 16 and 17, are regulated to give the desired light levels. The desired light levels are set using the potentiometers.

Green LEDs indicate operation: Flashing LED: light level is at set value. Steady glow: light level is higher than set value. Off: light level is lower than set value.

Recommended photocell: order no. 13100.

If the photocell inputs are shorted with a jumper the lighting comes on at the level set by the potentiometer.

### Pushbuttons for relays A and B (4, 5, 6)

Pushbuttons are connected to terminals 4 - 5 - 6.

This should be a momentary, normally open switch. A brief pulse from the pushbutton switches on the lighting at the constant light levels that are set by the potentiometers.

A second brief pulse switches off the lighting.

If the pushbutton is held in, the light level can be adjusted manually. The light level rises first to the maximum light level of both channels (P1 & P2) and then decreases.

With the jumper in the "One area" position, pushbutton A controls both channels, P1 and P2.

The system can be reset to constant light level control by switching the lighting off, then on again.

The yellow LED lights up when the pushbutton is pressed. The yellow LED flashes to indicate "buy time".

A 4.7 kOhm resistor can be connected in parallel with the pushbuttons to enable automatic lighting.

### Presence detector (7, 8, 9)

A presence detector with built-in timer, e.g. PD-2200 IR detector, is connected to terminals 7 - 8. The presence detector is used to switch off the lighting when no one is present.

When the jumper is in the "Two areas" position a second detector can be connected to terminals 8 - 9. The yellow LEDs light up when presence is detected.

### Power supply (10, 11)

12 VDC (12-16 VDC) connected to terminals +10 and -11.

The green LED lights up when the power supply is connected.

### DSI control (15, 16, 17)

Bus cable for DSI control is connected to terminals 15 - 16 - 17 (D1 - D2 - D1). (P1: 15-16 and P2: 16 - 17).

Light level can be adjusted from off to maximum lighting in 254 steps.

**Red LEDs** indicate status of DSI output: LED off: EX-22 sends switch-off pulse.

**Flashing LED:** shows light output; long pulses = high power.

**Steady glow:** maximum light level.

### Relay output A (19, 20 and 21)

Relay output is changeover type, terminals 19 - 20 - 21.

A contactor can be connected to relay output terminals 19 (C) and 20 (NO), to provide power to light fittings in lighting group A. A red LED lights up when the relay is energised.

### Relay output B (22, 23 and 24)

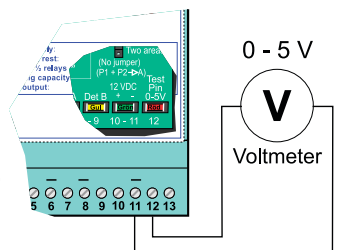
Relay output is changeover type, terminals 22, 23 and 24.

A contactor can be connected to relay output terminals 22 (C) and 23 (NO) to provide power to light fittings in lighting group B. A red LED lights up when the relay is energised.

### Test output

A voltmeter can be connected to **terminal 12** to check the DSI signal. The test signal can be 0-5 V and is proportional to the total lighting output of channels P1 and P2. This means that if the lighting is regulated at the maximum level for channels P1 and P2, the voltage should be 5 V. If both channels are operating at half of maximum output the voltage should be 2.5 V. The red LED flashes when the DSI signal is being sent.

By connecting the test output to a PC via a data logger from Pico Technology ([www.pichotech.com](http://www.pichotech.com)) the DSI signal can be logged for an extended period of time. This gives a picture of power consumption by the system, since the DSI signal is directly proportional to the lighting output (do not forget the passive consumption of the light fittings). belysningseffekten (glöm inte armaturernas egenförbrukning).



### Function jumper

Two different jumper positions can be chosen:

**One area (P1 & P2 → A):** For constant light level control using two channels in one area.

**Two areas (P1 → A, P2 → B):** For constant light level control in two separate areas.

## Buy time

The lighting is switched on by a pulse from a pushbutton. If the pushbutton is located outside the detection area of the detector the lighting is switched on for 15 seconds (bought time). In order to keep the lighting switched on, the presence detector must detect presence before this time has elapsed.

## Automatic switching on

If an application requires lighting to be switched on automatically, this function can be achieved by connecting a resistor (4.7 kOhm) to the pushbutton inputs.

## Lighting control

The lighting is regulated between two fixed levels.

The yellow knob on the left is used to set the threshold for switching the lighting to the maximum level. If the yellow knob is set too low, the lighting will not be switched to the higher level when it is dark outside.

The white knob on the right is used to set the threshold for switching the lighting to the base level. See the diagram on the right.

Between these two levels the lighting is controlled by a "fuzzy logic" system.

If the white and yellow knobs are set to the same value you get conventional lighting control at a constant light level (lux levels).

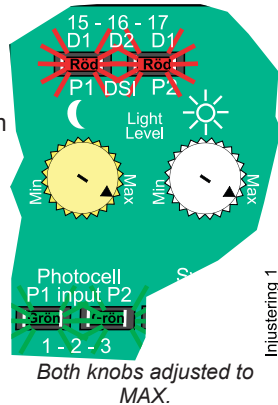
Conventional constant light level control is a technical solution that does not work very well subjectively, and should therefore be avoided. It is not very forgiving towards different lighting conditions. The light level can vary widely when a cloud passes, especially when the sun is not high in the sky, as is often the case in northern Europe.

## Suggested method of adjusting lighting control

### 1st adjustment, when it is fairly dark

It must be relatively dark outside (dark enough that you want maximum lighting).

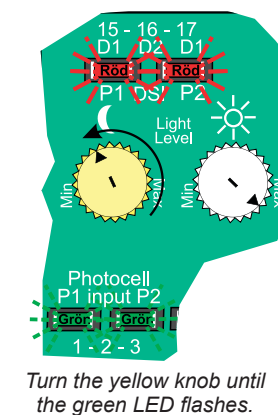
1. Turn both knobs towards MAX.
2. Both red DSI LEDs should now glow steadily and the lighting should be at maximum output. The green LEDs should also glow steadily.



3. Turn the yellow knob (left) until one or both photocell LEDs (green) start to flash.

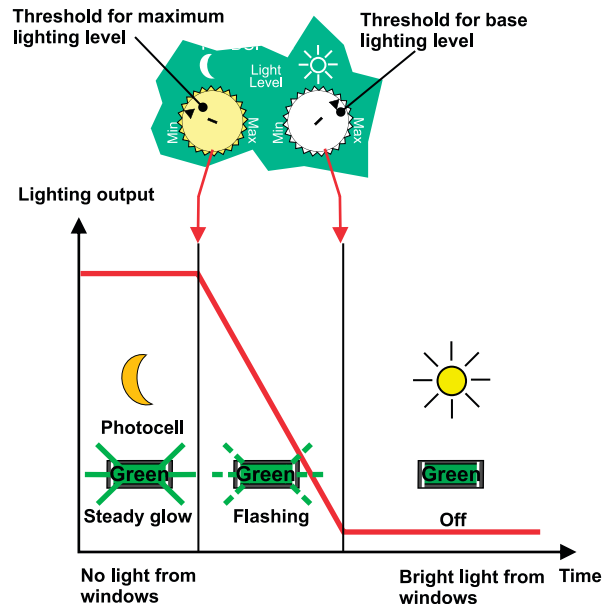
The red LEDs may also start to lash (if the knob is set too low).

The level at which the control system begins to reduce the light level is now set.



## Memory function

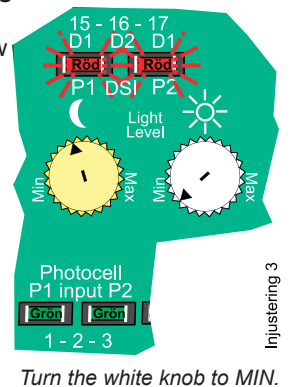
This function remains active for 15 seconds after the lighting has been switched off due to no presence being detected. If someone is still in the premises when the lighting is switched off, they can "show themselves" to the detector and the lighting will then be switched back on again at the previous level.



### 2nd adjustment, when it is fairly light

It must be relatively light outside now (light enough that you want to turn down the lighting).

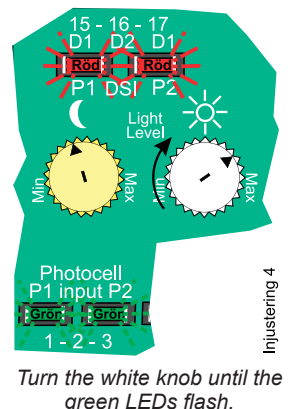
4. Turn the white knob (right) towards MIN. The photocell LEDs (green) should now be off and the lighting should be at the lowest level.



- 5a. Turn up the white knob (right) until the light level just starts to rise. One or both photocell LEDs (green) should start to flash.

OR

- 5b. Turn up the white knob until the lighting reaches a level that is comfortable.



## Wiring examples

### One area with two lighting groups

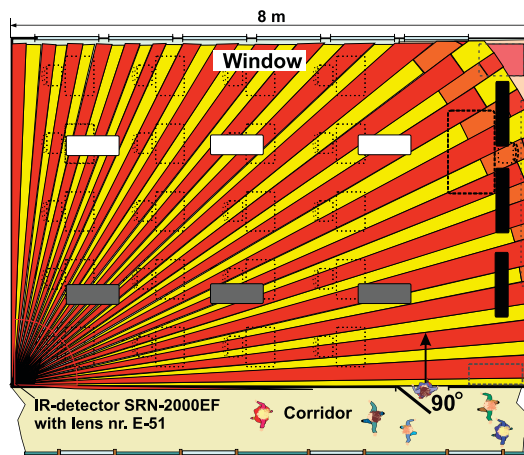
Lighting group A has **digital** lighting control, with a photocell that provides **automatic lighting control**.

Alternatively, two light sensors can be connected to provide **in-dividual lighting control via two digital channels**, P1 and P2. The light fittings are controlled digitally using the **DSI** standard. See the schematic drawing below.

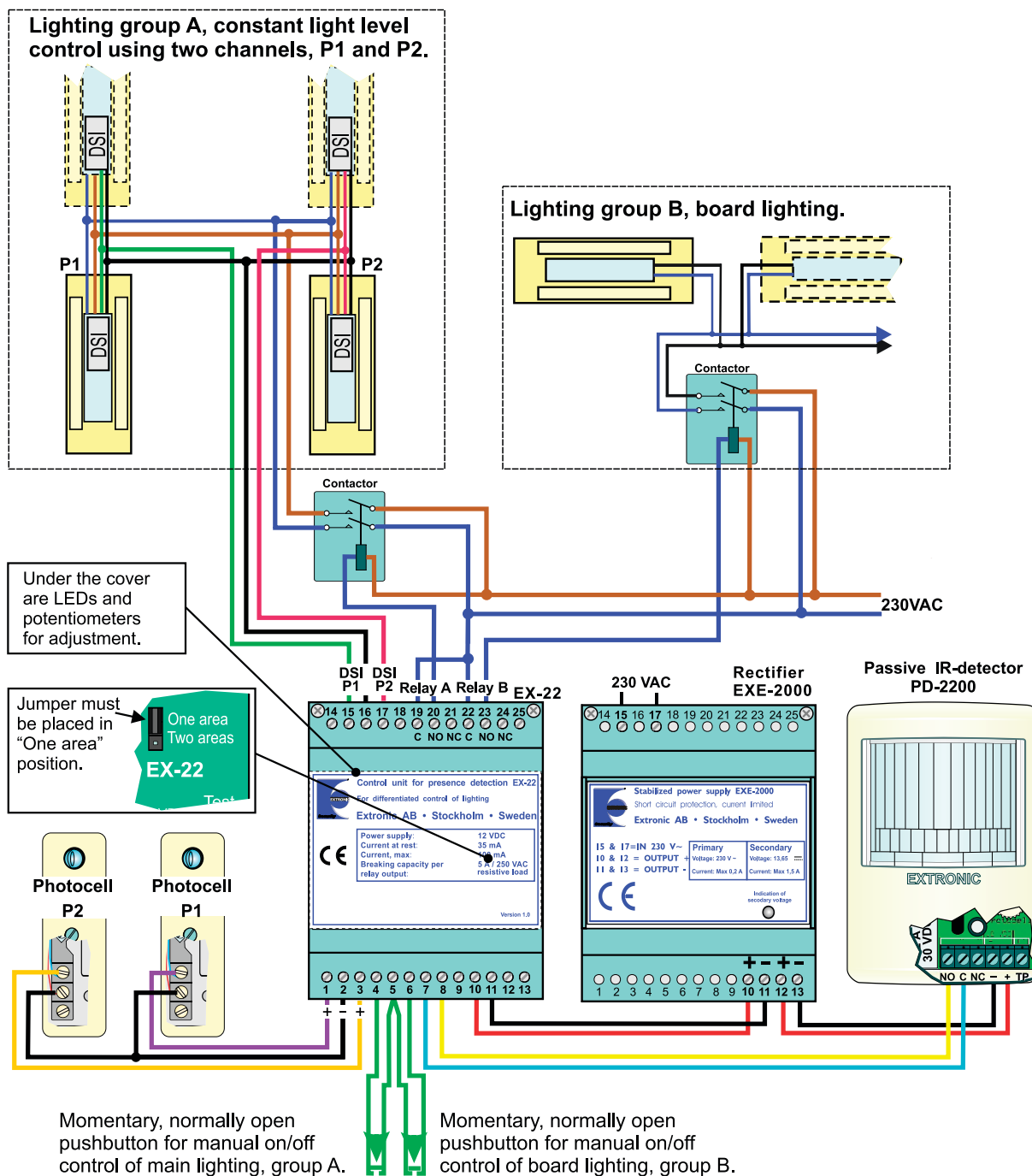
Two DSI channels are used to control two separate groups of light fittings over bus cables. This allows better compensation for light coming in from outside through windows and roof windows, and saves more energy.

Lighting groups A and B are switched on using the pushbuttons. They are **switched off automatically** by the presence detector, or by means of the pushbuttons. The EX-22 has two inputs for presence detectors.

The light level can also be controlled manually by holding in the pushbutton for channel A or channel B.



### Lighting control with EX-22 in one area, with two channels for lighting control



## Two areas, each with their own lighting group

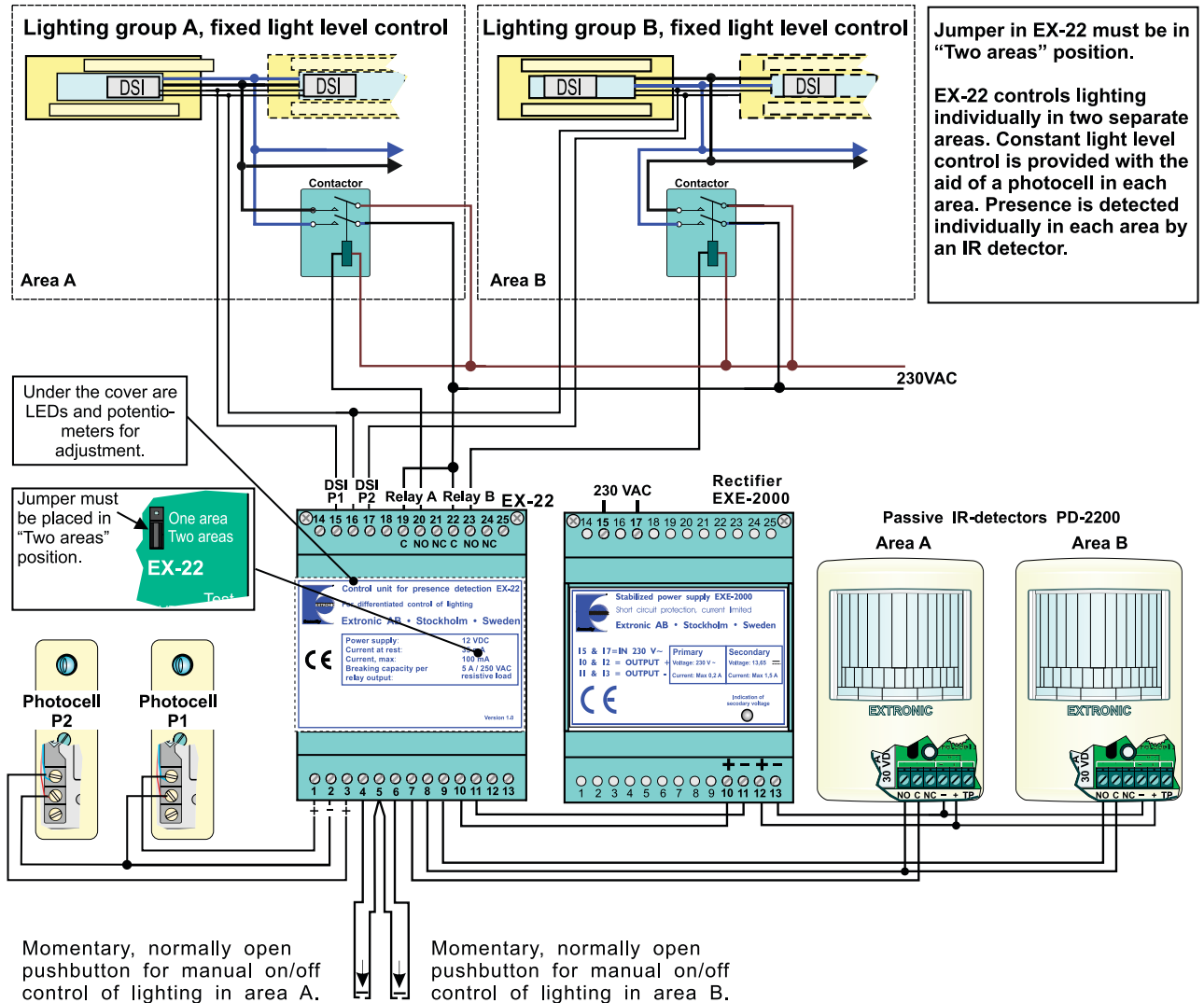
EX-22 controls the lighting in two separate areas. The light fittings permit digital lighting control. A photocell in each area provides automatic lighting control. The light fittings are controlled digitally using the DSI standard. See the wiring diagram below.

Two DSI channels control a separate lighting group in each area using bus cables. This allows better compensation for

light coming in from outside through windows and roof windows, and saves more energy.

The lighting is switched on using pushbuttons in each area. The lighting is **switched off automatically** by the presence detector when presence is no longer detected, or by means of the pushbuttons.

## Lighting control with EX-22 in two separate areas



## Technical specification:

|                               |  |
|-------------------------------|--|
| Voltage:                      | 12–16 VDC  |
| Current, passive consumption: | 60 mA  |
| Max. current:                 | 130 mA   |
|                               | Both relays active, cover open and DSI signal depends on number of light fittings.   |
| Resistive load:               | Max 5 A/relay, 230 VAC   |
| DSI:                          | Complies with DSI standard for control of light level. Does not support "Backward channel" for reporting of faulty fluorescent tubes and light fittings. |
| Dimensions:                   | 91 x 72 x 76 mm (4 modules)  |



## Accessories

### IR-detector PD-2200

PD-2200 is a passive infrared (IR) detector intended for presence detection. It uses a very sensitive pyroelectric sensor that reacts to changes in thermal radiation. The electronics and software in the PD-2200's microprocessor have been specially designed for presence detection.

The software analyses the signals from the pyroelectric sensor element and measures the noise level, signal strength and pulse count. The pulse count provides a slower method of measurement that is used to detect presence in premises where there is little activity and hence the signals are weak.

The use of a selector switch allows signal processing to be adapted to premises with differing levels of activity.

There are many different lenses available to suit different types of premises (offices, corridors, sports halls, underpasses, etc).

The detection area with a standard lens is 40 x 40 m when the detector is mounted in a corner.

**Dimensions:** 102 x 70 x 50 mm

|                     |                  |
|---------------------|------------------|
| <b>Product:</b>     | <b>Order no:</b> |
| IR-detector PD-2200 | 13140            |



### Photocell LS-10

Photocell for connecting to EX-22, so that lighting remains switched off as long as there is adequate natural light. A blocking input can be used to prevent lighting from being switched on, or to switch off lighting.

**Dimensions:** 82 x 25 x 20 mm

|                 |                  |
|-----------------|------------------|
| <b>Produkt:</b> | <b>Order no:</b> |
| Photocell LS-10 | 13100            |



### Rectifier EXE-2000

A rectifier for installation on a DIN rack that fits a standard enclosure and has a current limit/short circuit protection, rated at max. 1.5 A.

#### Technical specification:

|                      |                              |
|----------------------|------------------------------|
| Voltage:             | Primary 230 VAC,             |
| Secondary:           | 13,65 VDC/1,5 A              |
| Passive consumption: | 20 VA.                       |
| Dimensions:          | 92 x 72 x 76 mm (4 modules). |

|                    |                  |
|--------------------|------------------|
| <b>Produkt:</b>    | <b>Order no:</b> |
| Rectifier EXE-2000 | 18108            |

