

# Technical Guide 2009



# Technical Information

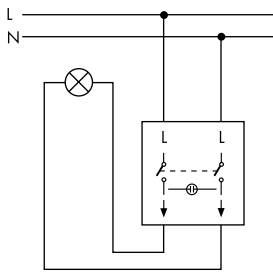
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Documentation and drawings have been broken down into sections and can be found in the Technical Information.

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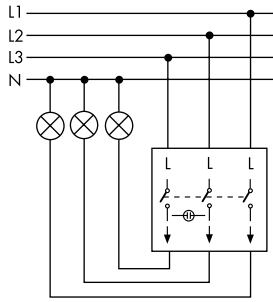
Revision: September 2008

## Circuit diagrams for installation switches



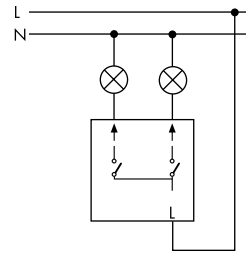
512 GLK 612 GLK  
212 B EMS 622 WAB GLK

2 pole on/off switches with control lamp



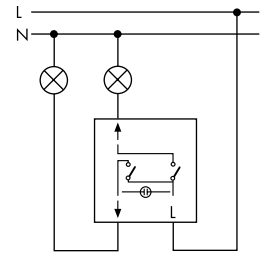
613  
623 WAB

3 pole on/off switches



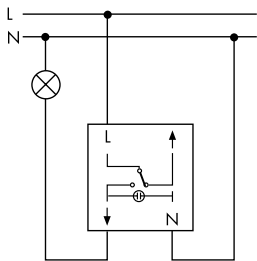
515  
625 WAB  
215 EMS

Series-bridged switches



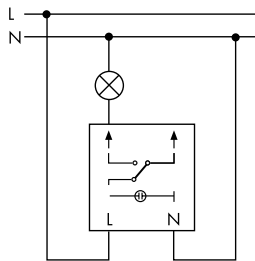
515 GL

Series-bridged switches, illuminated



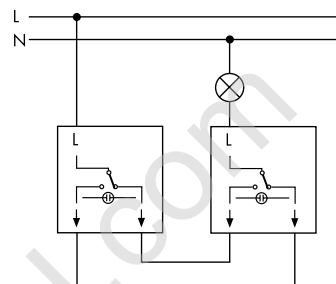
211 B EMS  
516 GLK  
626 WAB GLK

Two-way control switches as 1 pole on/off switches



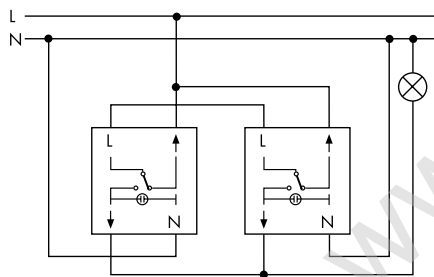
516/4 GL  
626 WAB GL

Two-way switches, constantly illuminated



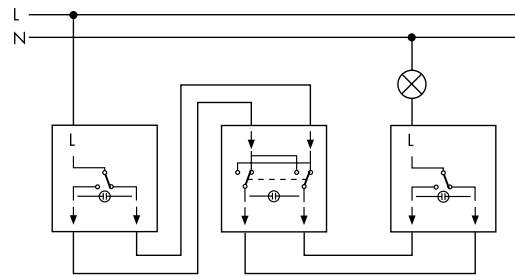
516 516  
216 EMS

Multiway switching



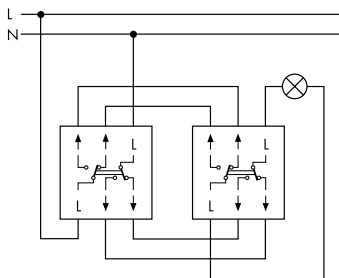
516 GLK 516 GLK  
216 B EMS 216 B EMS

Multiway switching, control



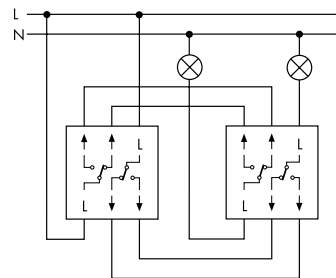
216 B EMS 217 216 B EMS  
516 517 516  
626 WAB 627 WAB 626 WAB

Back-to-back connection



616/2 616/2  
216 B EMS 216 B EMS

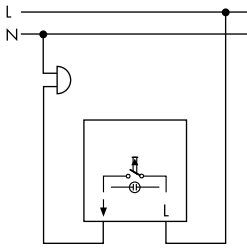
Multiway switching with 2 pole two-way switches



616/6 616/6  
626/6 WAB 626/6 WAB

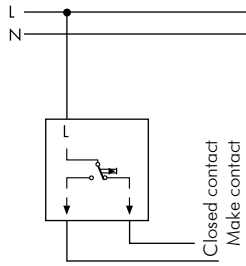
Dual multiway switching with two dual two-way switches

## Circuit diagrams for installation buttons



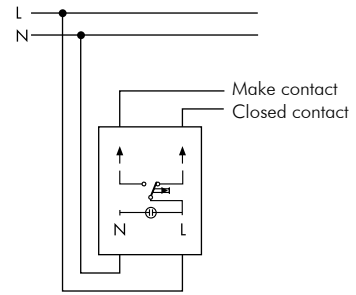
250 EMS  
550  
655 WAB

Single pole push buttons, no contact



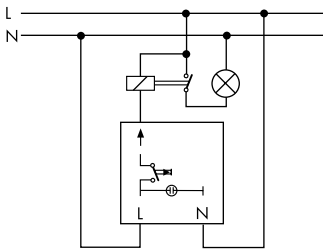
256 EMS  
556  
656 WAB

Single pole two-way buttons



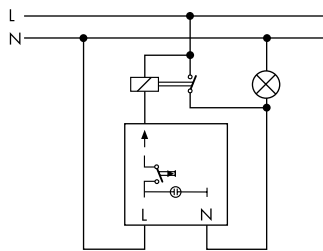
256 B EMS  
556 GLK

Two-way control buttons



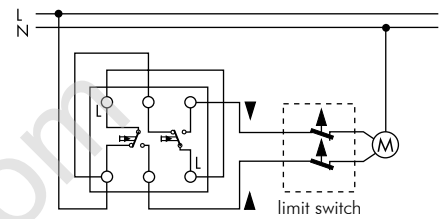
550 GLK  
655 WAB GLK

Single pole push buttons  
no contact, illuminated



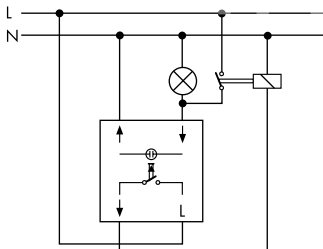
550 GLK

Single pole push buttons, no contact  
with feedback signal



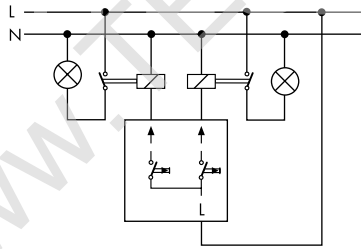
619 T  
629 T WAB

Two-way/Two-way buttons with additional jumpers as  
electronically locking blind buttons



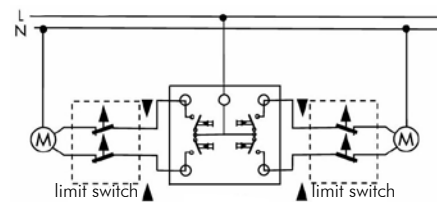
550/4  
655/4 WAB

Single pole push buttons  
no contact with feedback signal



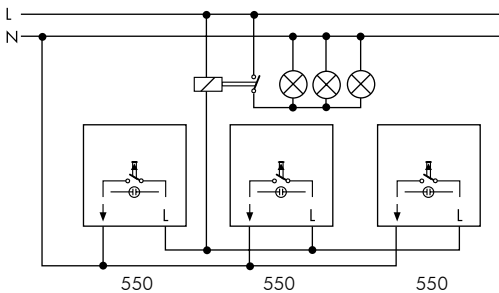
515 T  
625 T WAB

Series-bridged buttons



254 T

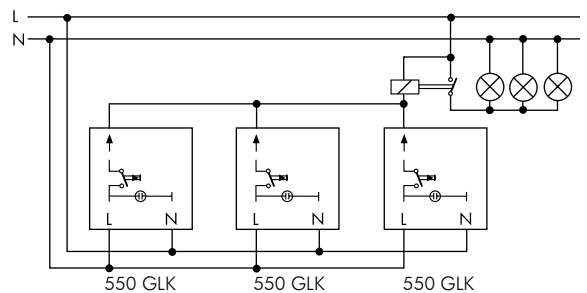
Group buttons with 4 closing contacts, e.g. for  
operating 2 blinds



550 550 550

### Staircase lighting (button-operated zero control)

Only a limited number of buttons can be parallel switched.  
A capacitor 0.5 ... 1.5  $\mu\text{F}$  250 V~ can be installed together with the relay coil to eliminate any flickering of the glow lamps occurring with parallel switched buttons in relay wiring systems.

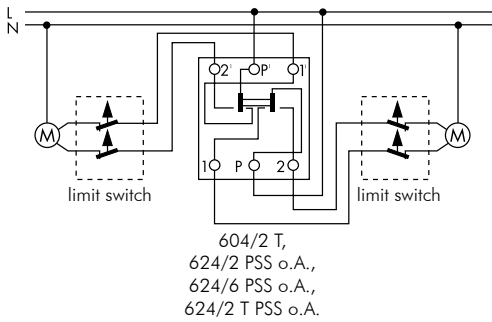


550 GLK 550 GLK 550 GLK

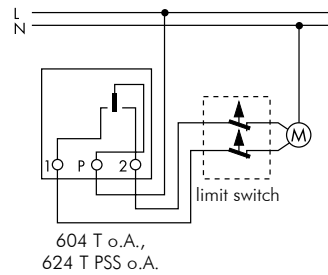
### Staircase lighting (button-operated zero control)

Any number of buttons can be parallel switched.

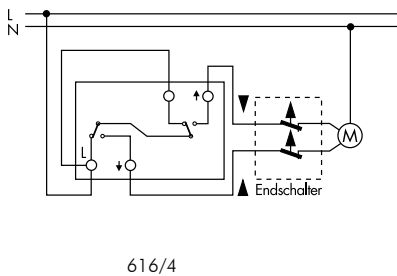
Circuit diagrams for blind switches/buttons, 3 step switches



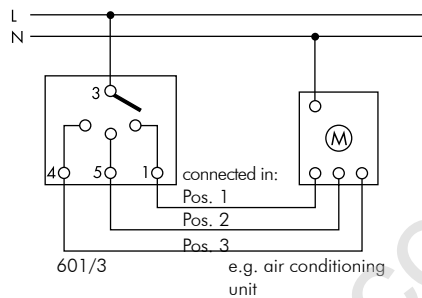
Blind (shutter) and key-operated buttons or touch-operated latch switches



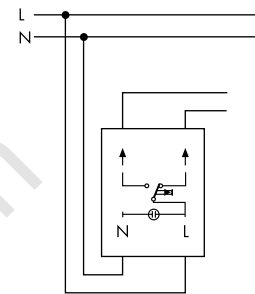
Blind (shutter) and key-operated buttons or touch-operated latch switches



Blind (shutter) switches with electrical interlock

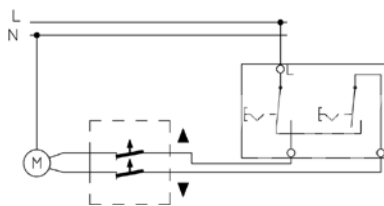


3 pole step switches, with 0 position



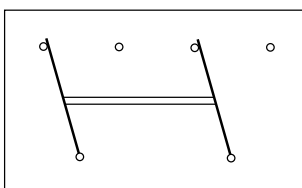
**Hotel card switches 80.556 HC GLK, 95.556 HC GLK and 20.556 HC GLK**

Technical specifications:  
1 change-over contact with N terminal, for lighting element,  
Switching contact max. 6 A 250 V~,  
Labelling area for identification 7 x 64 mm possible. GL 505 glow lamp for orientation above the entry slot, power consumption 0.8 mA.

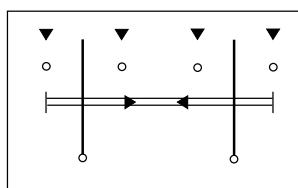


214, 206/4.02 EMS, 206/4.02 T EMS  
Blind (shutter) switches/buttons with electrical and mechanical lock

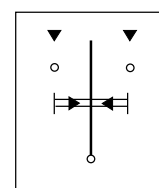
Key-operated switches



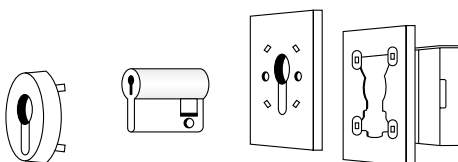
2 pole step switches, without 0 position  
624/6 PSS o.A.



2 pole touch-operated latch on/off switches, with 0 position 624/2 PSS or similar 2 pole buttons, with 0 position 624/2T PSS o.A.

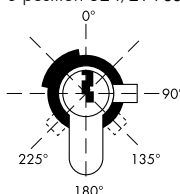


Single pole push buttons, with 0 position 624/T PSS o.A.



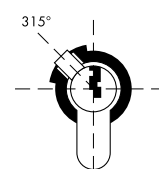
**10 A 250 V~ key-operated switches, suitable for all DIN 18 252 hemi cylinders up to a total length of approx. 40 mm (max.)**

**Note:**  
Supplied without lock. Lock cylinders are supplied with fixed or adjustable key bits, depending on the make.



**Key bit setting 90°, 135°, 225°**

The key can be returned to zero position from any setting and removed. When the key has been removed, the cover is **locked**. The key bit activates the contact element to the right or left.



**Key bit setting 315°**

The key can only be removed in zero position. The cover is **not locked** when the key is removed (e.g. touch-operated latch on/off switches or buttons for blind/shutter drives).

Flush-mounted fault-current circuit breaker 602 o.A.

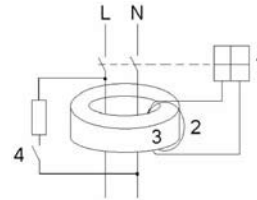
**Description**

The 602 Fi o.A FI switch consists of an integrated fault current release to protect against life-threatening electric shocks. Irrespective of the current, the device switches all poles of the consumers off, if a fault current occurs on one of the devices connected to the protected outgoing lines. The protective switch has been developed and tested according to the following regulations: EN 61008-2-1 and EN 61008-1 (equivalent to DIN VDE 0664 T 10 + DIN VDE 0664 Part 10)



**Schematic structure**

The flush-mounted insert fits any standard device box. (installation depth 32 mm). Once the basic device has been installed, a cover that matches the Standard, Aura or Dialog switch programmes is mounted. The test button can be used to perform a function test of the protective device. When the current is switched on, the device shuts off N and L.

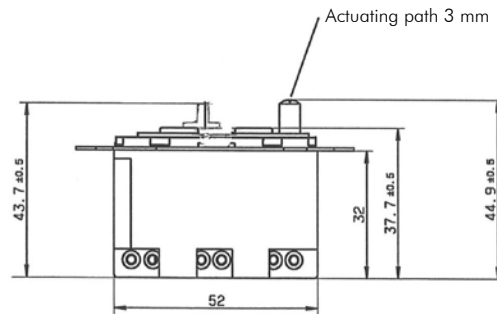
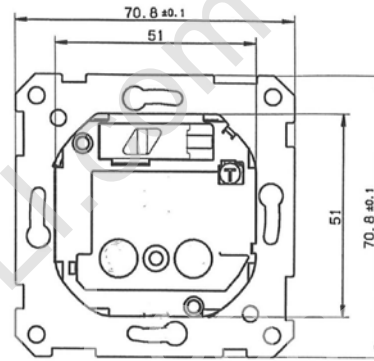


- 1 Release relay
- 2 Total current transformer secondary winding
- 3 Ring core
- 4 Test circuit

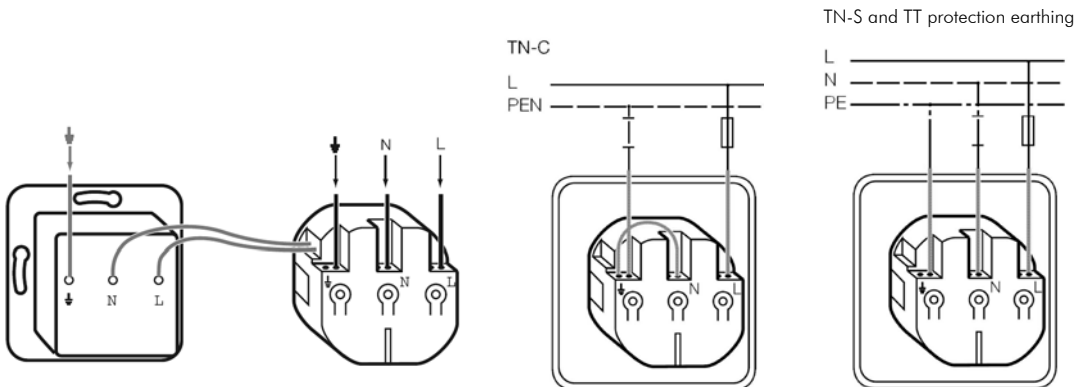
**Technical specifications**

The fault current protective switch is designed with connector clamp terminals for cross sections of 1.5 or 2.5 mm<sup>2</sup>. The protected consumers / sockets are connected using a 230 mm 7-stranded wire. A 16 A series fuse max. may be used to protect the device. The protective conductor clamp in the device only serves as a terminal to ensure contact between the protective conductor and the protected sockets.

Nominal voltage:	230 V~
Ambient temperature:	- 25 °C...+ 40° C
Climate resistance acc. to:	EN61008
Short circuit switching capability:	3 000 A
Nominal switching capability:	500 A
Surge current resistance:	500 A, 8/20 μs
Total cut-off time:	max. 30 ms



**Can be used in a TNC system**




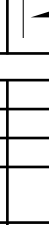
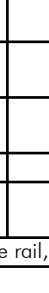
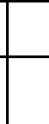
## General information on dimmers

Since electrical power first started to be used for lighting purposes, the requirements relating to the illumination of rooms and objects have changed dramatically. The introduction of brightness control and light management systems enables the optimal illumination of rooms for the most diverse occasions. When planning a building, early meetings between the architect and technician and the property developer are important to ensure that the planning of the electrical installations also incorporates dimmers, lighting elements and the utilisation of the rooms. The choice of available dimmers is enormous, from simple rotary dimmers to radio-controlled dimmable fluorescent lamps.

PEHA dimmers for controlling the brightness of

- light bulbs and 230 V halogen lamps
- low voltage halogen lamps with conventional transformers operate in line with the principle of forward phase control. PEHA dimmers for controlling the brightness of electronic transformers operate in line with the principle of inverse phase control. Depending on the brightness setting, only the power that is really needed is taken from the grid. This means that dimming saves energy. PEHA dimmers are fitted with radio interference suppression according to VDE guidelines. Nevertheless, additional interference suppression measures should be taken into account during installation (no closed loops; no cables that are sensitive to interference should be laid parallel to other cables connecting dimmer circuits; where possible, appliances that are sensitive to interference should be connected to different phases than the dimmers).

A selection of PEHA dimmers is listed below:

Dimmer type/Dimmer load designation	Dimmer output min./max.	Light bulbs and HV halogen lamps 235 V 	Wound transformers and light bulbs 	Electronic transformers, light bulbs 	Speed controllers 
Flush mounting in 58 flush device box					
Rotary dimmer <b>80.433</b>	60/300 W	•			
Push button rotary dimmer <b>434</b>	60/400 W	•			
Push button rotary dimmer <b>436</b>	60/600 W	•			
Push button rotary dimmer <b>435 HAN</b>	60/600 W 25/500 VA	•	•		
Push button rotary dimmer <b>438 HAN</b>	75/1000 W 25/800 VA	•	•		
Push button rotary dimmer <b>433 HAB</b>	20/315 W	•		•	
Push button rotary dimmer <b>435 HAB</b>	20/600 W 25/525 VA	•		•	
Speed controller <b>456</b>	230 V ~ 0,1–2,6 A				•
Touch dimmer <b>492 AB</b>	60/525 W	•	•		
Touch dimmer <b>492 AN</b>	60/600 W 60/500 VA	•		•	
Serial dimmers with button control (can be snapped onto a 36 mm DIN profile rail, installation on a distribution board)					
<b>873 EV/230</b>	60–300 W	•			
<b>439 UN REG</b>	60–300 W	•	•	•	
<b>439 M-AN REG</b> <b>439 S-AN REG</b>	60/1000 W	•	•		
<b>439 M-AB REG</b> <b>439 S-AB REG</b>	60/1000 W	•		•	

The dimmers listed above are sorted by the type of light source to be controlled.

**Controlling conventional low voltage transformers**

Transformers supply low voltage halogen lamps with extra-low voltage. A few important factors relating to the dimmer are crucial when the transformer is controlled (dimmed) from the primary side:

1. Only special dimmers approved for such operation may be used.
2. Given the high starting current, current limiters are recommended for connected loads in excess of 400 VA.

**Controlling electronic transformers**

The PEHA dimmer with inverse phase control was developed especially to operate electronic transformers for low voltage halogen lamps; its design is suitable for operating dimmable electronic transformers (switch mode power supplies) for low voltage halogen lamps. The dimmers generate low noise levels. Dimmers with inverse phase control are not suitable for conventional transformers!

**Max. permissible length of 12 V low voltage lines**

The length of the 12 V line must not exceed 2 m in order to ensure adherence to the noise suppression limits.

**Cable routing**

The mains lead should not be laid alongside the housing of the electronic transformer nor the high frequency 12 V discharge cable. This ensures that high frequency couplings are avoided in the mains lead.

**Dimmer load marking:**


Forward phase:  
Dimmers marked with this sign are only approved for ohmic loads  
(e.g. light bulbs, high voltage halogen lamps).



Dimmers marked with this sign are approved for ohmic and inductive loads  
(e.g. light bulbs, low voltage halogen lamps with wound transformers;  
transformer is marked with an **L**).

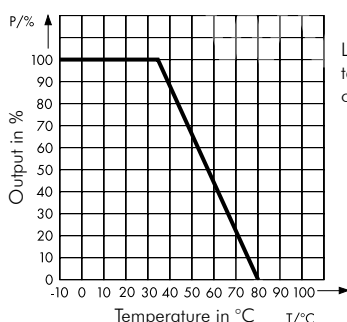


Inverse phase:  
Dimmers marked with this sign are approved for ohmic and inductive loads  
(e.g. light bulbs, low voltage halogen lamps with wound transformers;  
transformer is marked with an **C**).

**Reducing the connected load of all dimmer types**

The connected load indicated for a dimmer may not be exploited to the maximum limit if the dimmer is unable to dissipate sufficient heat. For example, the maximum connected load is reduced by at least approx.

- 25%, if the dimmer is installed in a cavity or wooden wall,
  - 25%, if several dimmers are combined into one installation,
  - 25%, if several built-in dimmers are mounted next to each other on a top hat rail,
  - 30%, if single or double dimmers are surface-mounted or desk-mounted,
  - 50%, if triple dimmers are surface-mounted or desk-mounted.
- If several factors occur jointly, the reductions aggregate accordingly. The following diagram indicates the standard for precisely determining the max. connected load:



Load reduction depending on the temperature in the immediate vicinity of the dimmer

**1-10 V control**

In addition to conventional dimmers, which can be used to dim only a limited number of lights, 1-10 V technology enables the control of fluorescent lamps and larger lighting systems. The control/upstream device generates a reference voltage which generates a current of max. some mA if the system short circuits.

If this reference voltage is changed by using a variable potentiometer or control unit, the brightness of the connected lights changes accordingly. This technology makes it possible to dim lights parallel that are connected to different power circuits. PEHA offers its electronic rotary potentiometer **430 POT**, its touch potentiometer **430 TPOT** and its **940 AMA** as a serial unit for flush installation.

**Tabular overview of 1–10-V devices**

0–10-V-control, operation of dimmable upstream appliances/fluorescent lamps and PEHA-REG dimmers		
Installation in 58 flush device box		
Electronic potentiometer <b>430 POT</b>	Control current max. 50 mA	Switching contact 4 A~
Electronic potentiometer <b>430 TPOT</b>	Control current max. 50 mA	Keying contact 2 A~
Serial appliance with button control (can be snapped onto a 36 mm DIN profile rail, installation in a distribution board)		
Button control 1 channel/1 light <b>940 AMA</b>	Control current max. 50 mA	Switching contact 10 A~ circuit

**Remote control dimmers**

Remote control dimming is an elegant way of offering clients added convenience in addition to further switching centres without causing any mess when extending existing wiring, especially when performing retrofitting or renovation works. Radio controlled or infrared systems are available as alternatives. In the case of both systems, installing a flush-mounted insert 492 AN or 492 AB enables the system to be extended at a later date. The dimmer can be controlled both locally or using one or more trained transmitters by simply clipping on the xx.440.xx FU-E receiver button from one of the PEHA range of switches. Other appliances are available for radio control in the Easywave and Easyclick systems.

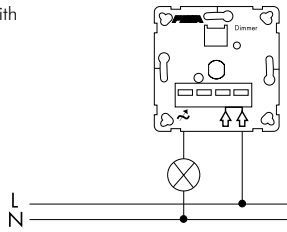
**Tabular overview of radio controlled dimmers**

Dimmer type/ dimmer load designation	Dimmer output min./max.	Electronic transformers, light bulbs, high- voltage halogen lamps
<b>Radio-controlled dimmer Easyclick</b>		
Built-in/flush-mounted installation and lamps		
<b>451 FU-BEP DAB</b>	60 W– 210 W	
<b>Fasywave radio dimmer</b>		
Serial/ceiling appliances 1–10 V		
<b>2-channel/ 2 light circuits 463 FU-E/ 463 FU-E DE</b>	Control current max. 45 mA 2 independent channels	Switching contact 10 A~ 2 independent channels



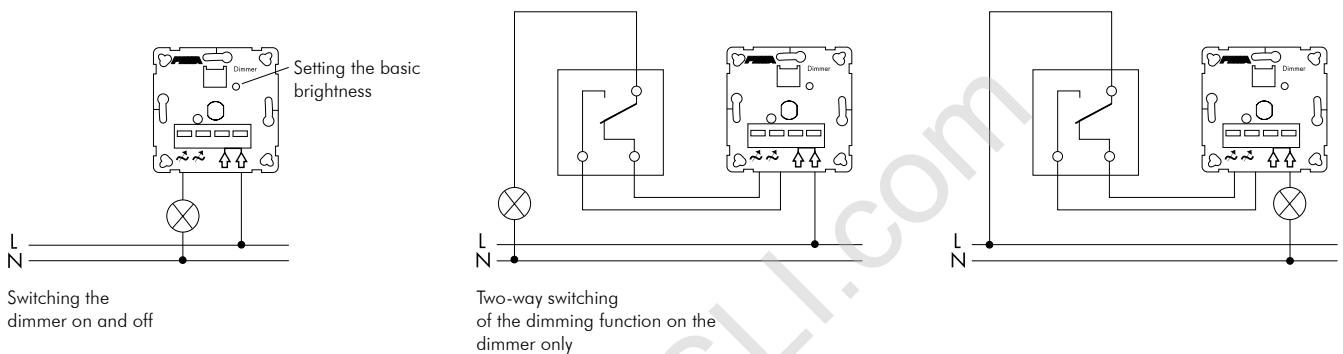
## Rotary on/off dimmer, forward phase for light bulbs

High voltage halogen lamps and other ohmic consumers with rotary on/off switch, fully covered for individual installation, Art. No. 80.433 V



## Rotary dimmer switching

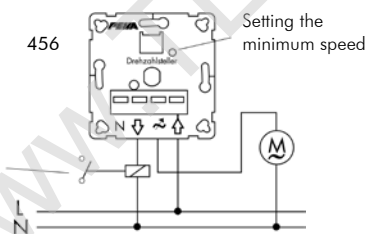
The rotary dimmers in the 400 range, with two-way switch, art. no. 434 o.A., 436 o.A., 435 HAN o.A., 438 HAN o.A., 433 HAB o.A., 435 HAB o.A. and 439 HAB o.A. and COMPACTA dimmers 837/1 and 837/1 HA can be used for two-way switch installations. The dimmers can be installed in the device box with the lamp cable or in the device box with the feed cable. Both alternatives are permitted. The dimming function can only be performed on the dimmer.



## Speed controllers

Rotary on/off switch, turn on at max. speed, switched output 230 V using rotary button

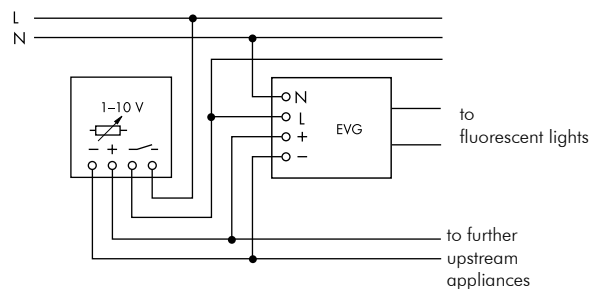
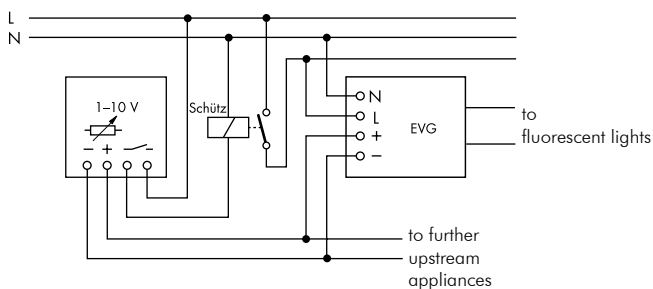
The N conductor does not need to be connected



## Electronic potentiometer for upstream fluorescent lights with 1-10 V control voltage

Rotary potentiometer with on/off push switch  
Electronic potentiometer 430 POT for operating electronic upstream appliances with 1-10-V voltage input

**Technical specifications:**  
max. control voltage 12 V  
min. control voltage 1 V  
max. control current 50 mA

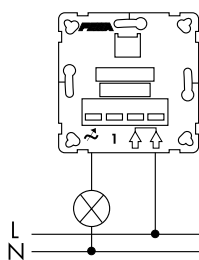


Upstream appliances have high levels of peak currents when switched on. A power relay must be used, if more than 5 upstream appliances need to be switched. Consult the technical specifications of the upstream appliances.

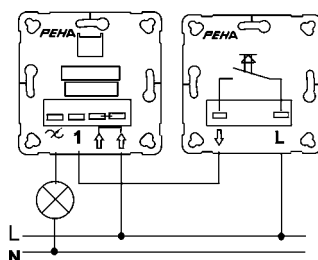
Up to 5 upstream appliances without power relay.

## Touch dimmers

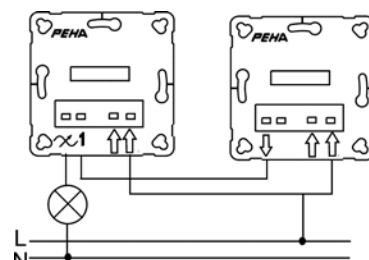
Connection diagrams for basic multi-functional appliance for 2 conductor connection  
PEHA art. no. 492 AN o.A. and 492 AB o.A.



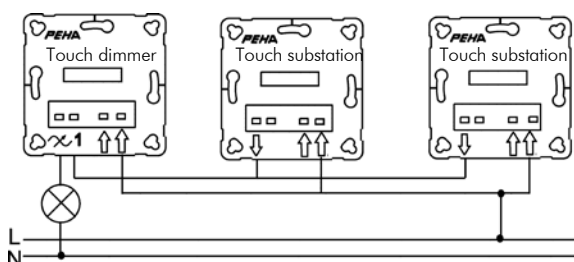
Connection diagram for switching the dimmer on and off



Connection diagram for controlling substations using substation button 490 N o.A. or button (e.g. 550)



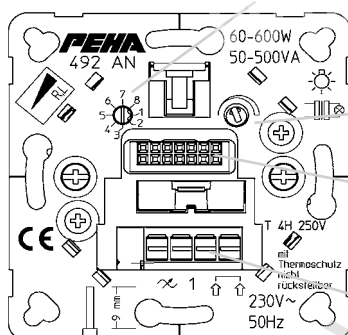
Connection diagram for controlling substations instead of using existing two-way wiring



Connection diagram for controlling substations instead of using existing cross wiring

### Flush-mounted insert

#### Function selector switch



Potentiometer

Socket for the upper section (branch)

Clamp terminals

#### Suitable adapters:

Touch dimmers/switches without lighting with rocker xx.420/425

Touch dimmers with lighting with rocker 941 RÜ

Radio receiver buttons with rocker 440 FU- E

Infrared receiver buttons without lighting with rocker 941 IR

PEHA touch dimmers are operated by touch. The appliance is switched on or off by applying short pressure, by applying longer pressure the connected lights are dimmed. Lights that are switched off can be lit at infinitely variable increments up to their maximum by applying long pressure.

The flush-mounted appliance is equipped with automatic detection of the upper section used. This enables a wide range of different functions.

A neutral conductor is not needed. The minimum load is 60 W, which is needed to supply the appliance itself. This results in a reduction in the maximum brightness of the lights when using a touch dimmer.

Other touch points can be used to operate the lights by using a substation input.

The adapters from the PHC range (e.g. 80.941.02 RÜ) can be fitted to enable the touch dimmers / touch switches to be used with lighting or control lamps. The infrared touch adapter (e.g. 80.941.02 IR) can also be fitted as a further adapter together with remote control 871 IR to the flush-mounted insert. The appliance can be used both as a dimmer and as a touch or timer switch by setting the function selection switch accordingly. The connectors are designed as terminal clamps with release buttons; the L terminal is designed for through-wiring.

The covers are held in place by steel clamp springs; a 14 pole cable connector is used for contact. Please consult the radio guide for details on radio touch adapter control.

The triac flush-mounted insert 492 AN o.A. is designed for primary side connection to ohmic and inductive loads (wound transformers).

The FET flush-mounted insert 492 AB o.A. is designed for primary side connection to ohmic loads and electronic transformers.

## Serial dimmers 1-10 V Control unit 940 AMA

**For switching and dimming upstream appliances with 1-10 V DC control voltage  
Circuits for conventional operation (without PHC system)**

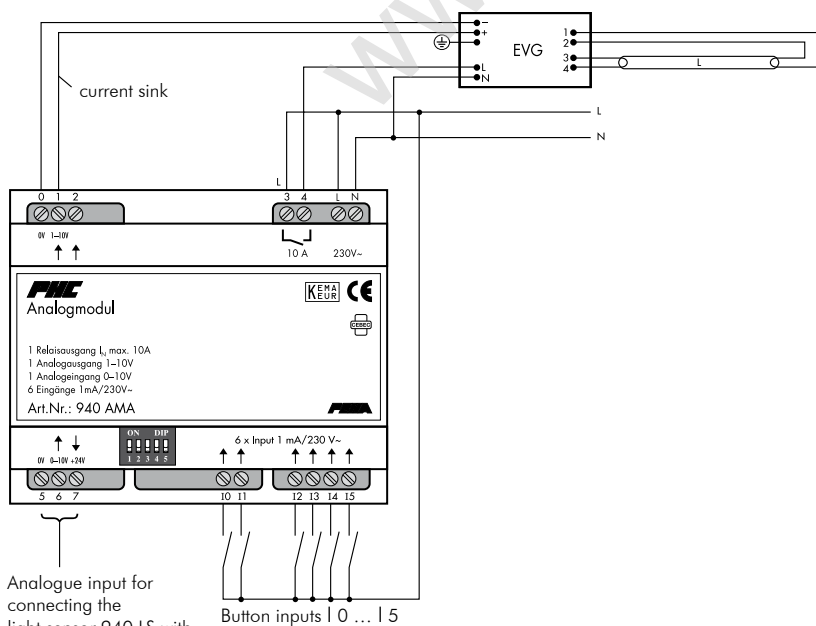
<b>Operating voltage</b>	230 V~ ± 10% 50 Hz
<b>Button inputs</b>	6 inputs 1 mA/230 V~
<b>Analogue output (not SELV)</b>	Current reducer 1–10 V~/50 mA for dimming upstream appliances
<b>Analogue input (not SELV)</b>	for connecting the light sensor 940 LS for daylight-dependent control
<b>Relay output</b>	10 A~ parallel radio interference suppression capacitor with C = 10 nF, maximum 5 upstream appliances can be switched directly.
<b>Switching capacity of the relay output</b>	Starting peaks 150 A/1 ms possible with zero switching
<b>Temperature range</b>	+ 10 °C - + 50 °C
<b>Storage temperature</b>	- 20 °C - + 60 °C
<b>Screw clamps</b>	max. 2 x 1.5 mm <sup>2</sup>
<b>Protection class</b>	IP 20
<b>Dimensions</b>	DIN housing width 6 TE = 108 mm, height = 55 mm

**Button assignment, L is keyed to inputs I 0 to I 5**

Input	Short activation (< 1 sec)	Long activation (> 1 sec)
<b>I 0</b>	Soft ON	Dimming UP to 100%
<b>I 1</b>	Soft OFF	Dimming DOWN to 0%
<b>I 2</b>	Call-up DIA 1	Storage of the set value for DIA 1
<b>I 3</b>	Call-up DIA 2	Storage of the set value for DIA 2
<b>I 4</b>	Buttons ON/Memory value OFF	Dimming UP to 100%/Dimming DOWN to 0%
<b>I 5</b>	Buttons ON/OFF and light sensor control	Switches to light sensor control

**Dip switch assignment**

Switch 1	Times Soft start	2 times
Switches 2 + 3 sec.)	Dimmer adjusting times	(approx. 4–6–8–10)
Switches 4 + 5	Curves	3 curves

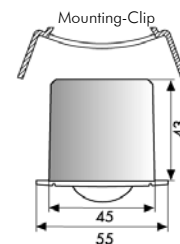


Analogue input for connecting the light sensor 940 LS with adapter cable 940 AK LS for daylight-dependent light control

Button inputs I 0 ... I 5

## Light sensor 940 LS

Installation dimensions



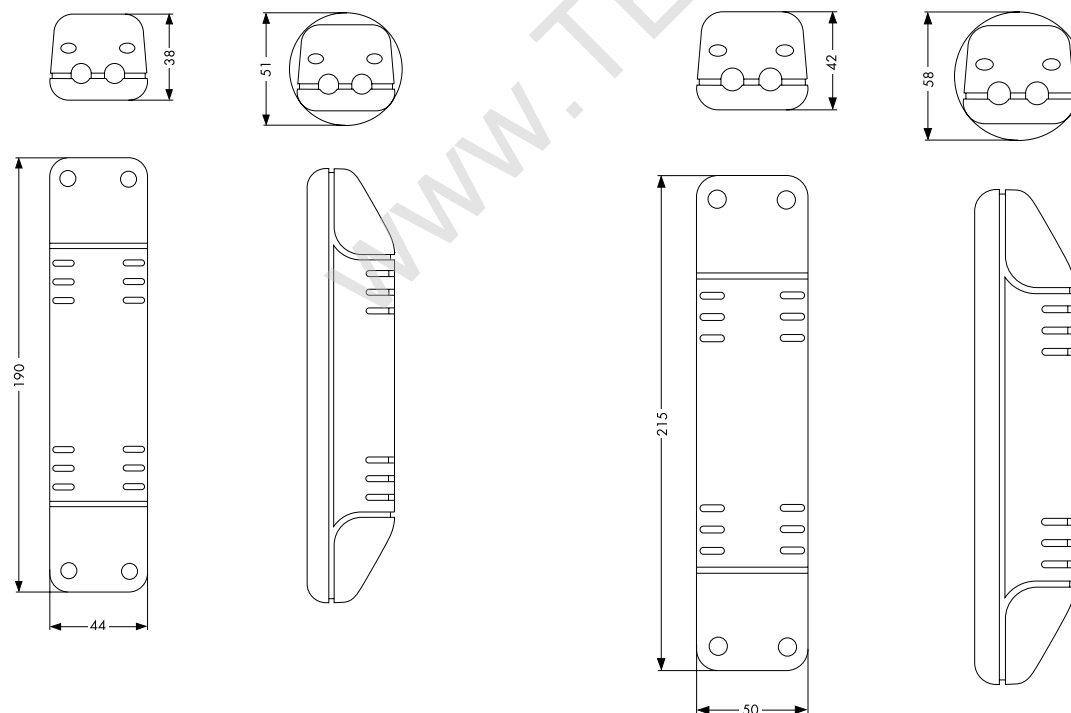
## TRONIC transformers

Type	105 W	150 W	200 W
Min. load:	35 W	50 W	
Nominal output:	105 W	150 W	200 W
Primary voltage:	230 V~, 50 Hz		
Primary current:	0.48 A	0.68 A	0.91 A
Secondary voltage:	11,6 V~		
Power factor:	$\cos \mu = 0.98$		
Efficiency factor:	approx. 95%		
Overload protection:	Thermal overload and short circuit cut-out		
Short circuit protection:	Automatic restart following elimination of the short circuit	Ready for operation following elimination of the short circuit and disconnection from the power supply	
Noise suppression protection:	acc. to VDE 0875/2		
Protective mechanisms:	Protection category, II, protective insulation		
Safety:	acc. to DIN VDE 0860, IEC 65		
Connection cross sectional area:	max. 2 x 2,5 mm <sup>2</sup> per clamp		
Dimensions:	190 x 44 x 38 mm	215 x 50 x 42 mm	
Ceiling opening:	Ø 51 mm	Ø 58 mm	
Ambient temperature ta:	50 °C	50 °C	45 °C

**105 W**  
835/105 TT  
875/105 TTD

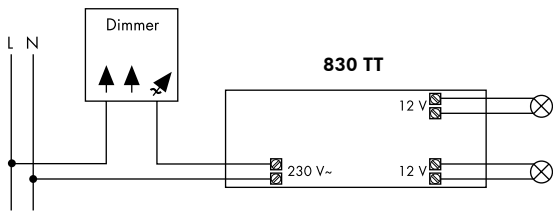


**150 W and 200 W**  
830/150 TT, 830/200 TT  
835/150 TT, 835/200 TT  
875/150 TTD, 875/200 TTD

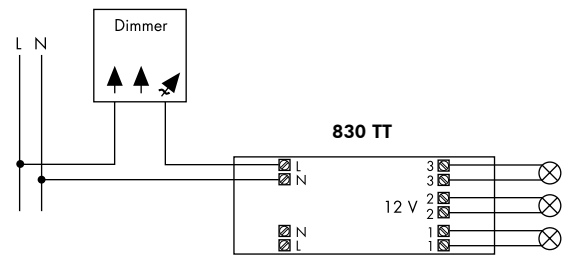


## Connection diagrams for all electronic transformers

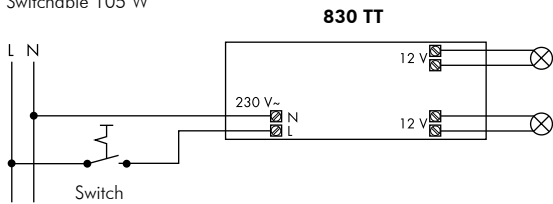
Dimmable 105 W



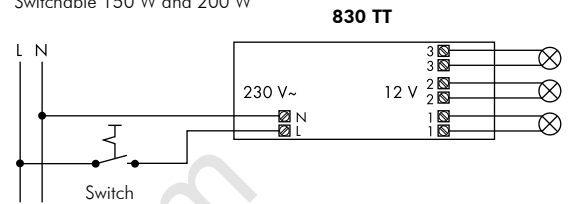
Dimmable 150 W and 200 W



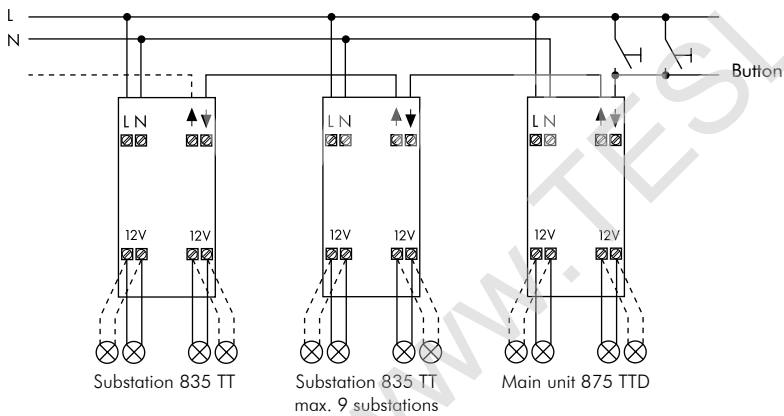
Switchable 105 W



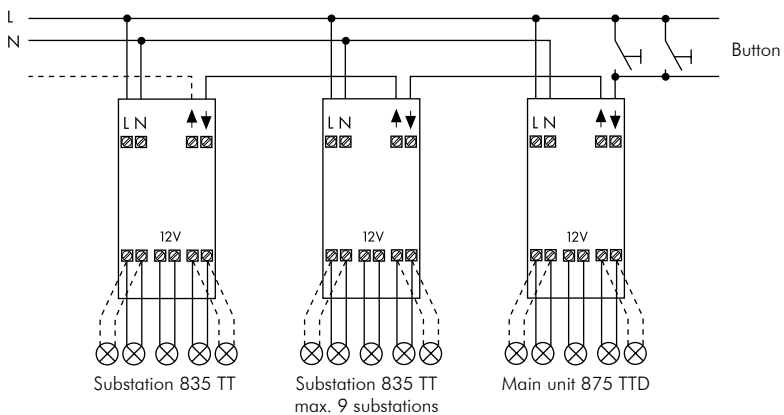
Switchable 150 W and 200 W



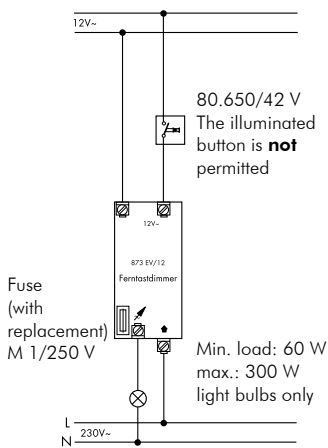
875 TTD main station and 835 TT substation 105 W



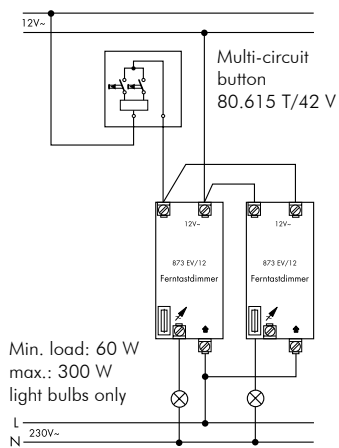
875 TTD main station and 835 TT substation 150 W and 200 W



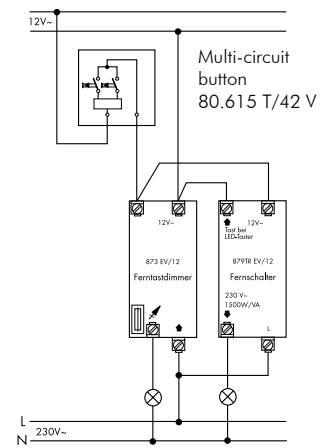
## Electronic remote control touch dimmer 873 EV/12 for 12 Volt, 50 Hz control voltage



**Individual operation**

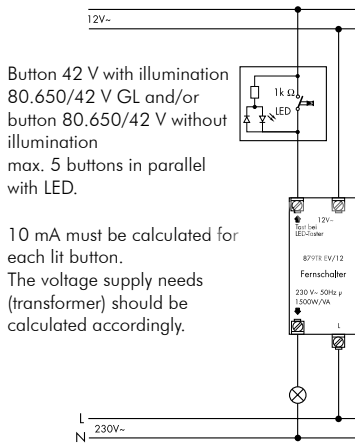


**Remote control touch dimmer operation of 2 lighting points**

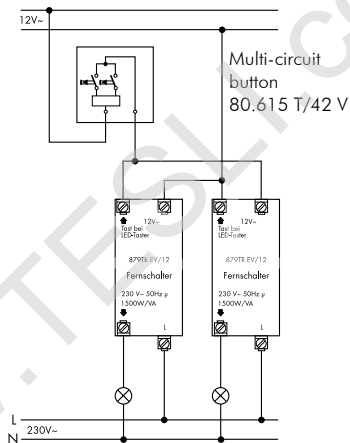


**Remote control switch combined with remote control touch dimmer**

## Electronic impulse switch for 12 Volt, 50 Hz control voltage

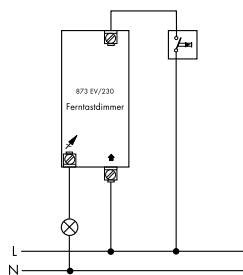


**Individual operation 879 TR EV/12**



**Remote control touch dimmer operation of 2 lighting points with two 879 TR EV/12**

## Electronic remote control touch dimmer 873 EV/230 for 230 Volt control voltage



**Individual operation 873 EV/230 with button**

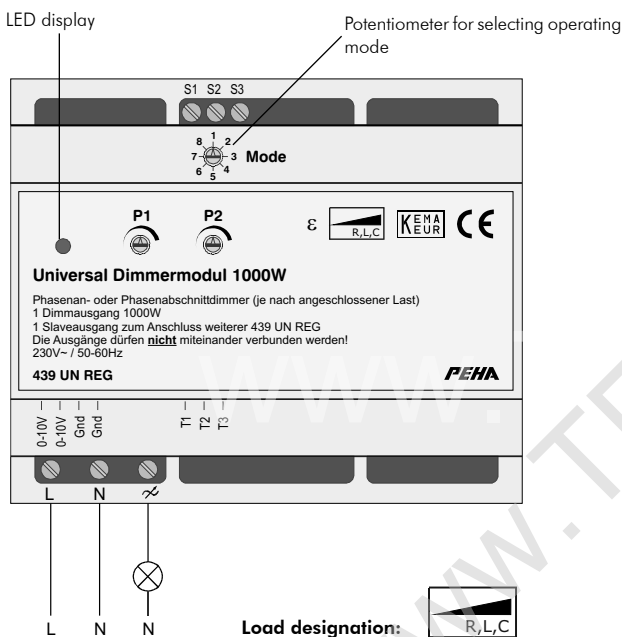
## Universal dimmer 439 UN REG, 1000 W

### Description

The universal dimmer can switch and dim connected consumers in line with the principle of both forward and inverse phase control. The corresponding principle is applied automatically when the dimmer is switched on, irrespective of the connected load. This enables, e.g., the use of light bulbs, inductive loads, electronic transformers or upstream appliances. The rotary „Mode“ function switch is used to select the required operating mode for the dimmer. The potentiometers P1 and P2 are used to set the brightness or time functions, depending on the selected operating mode. The LED on the dimmer module displays the current brightness of the connected light. The universal dimmer can be used on its own or in a master-slave combination as the master dimmer in combination with max. 31 additional universal (slave) dimmers. Each slave dimmer that is connected to the control connection (S1-S3) of the master dimmer performs in the same operating mode as the master dimmer.

**Caution!** Mixed loads and/or mixed voltages may not be used!! The level of connected load(s), max. wire length (max. 100 m) and the line diameter (max. 2.5 mm<sup>2</sup>) must also be observed!

### Individual operation of the universal dimmer



### Potentiometers P1 and P2:

Potentiometers for setting brightness or time functions (depending on the selected operating mode)

### Inputs T1-T3:

Universal dimmer button inputs

### Inputs 0-10 V and GND:

Inputs for 0-10 V operation of the dimmer using an external potentiometer

### Load designation

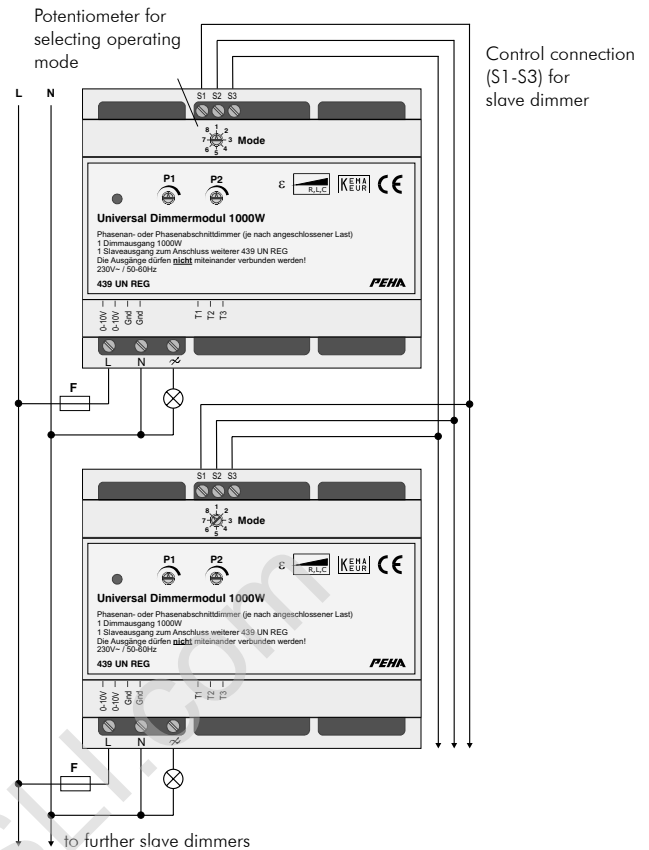
The control lamp indicates that mains voltage is connected.

Individual operation of the master dimmer with with 230 V~, 50-60 Hz power connection at terminal L, N and load (max. 1000 W) on the terminal.

### Master-Slave operation of the universal dimmers

One universal dimmer as the master dimmer can be combined with max. 31 additional universal (slave) dimmers for master-slave operation. The operating mode (1-7) can be selected for the master dimmer. The slave dimmers must be set to operating mode 8.

**Caution!** No buttons may be connected to the button inputs T1..T3 on a slave dimmer. Nor may the 0...10 V input be used!



### Connection restrictions:

- No mixed loads (wound and electronic transformers) may be connected to the power output of a dimmer module!
- The design of the transformers must be compatible with the secondary voltage.
- The transformers must be approved for primary dimming by the manufacturer.
- Wound transformers must be operated at nominal load.
- Light bulbs may not account for more than 50% of the total load connected to each dimmer module!

### Setting the potentiometers P1 and P2

**Basic setting in the dimming range (total dimming range)**

P1 turned to the left: min. brightness (30% of the supply voltage)

P2 turned to the right: max. brightness (100% of the supply voltage)

**Staircase lighting without switch-off warning**

P1 turned to the left: Illumination period 1 s

P2 turned to the right: max. brightness

**Staircase lighting with switch-off warning**

P1 turned to the left: Illumination period 1 s

P2 turned to the left: Warning period 1 s

### Universal dimmer operating modes

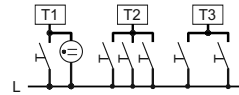
List of universal dimmer operating modes with potentiometer functions.

Modes	Function	Potentiometer P1	Potentiometer P2
1	Touch dimmer with memory	min. brightness	max. brightness
2	Touch dimmer without memory	min. brightness	max. brightness
3	Reverse dimmer with memory	min. brightness	max. brightness
4	Staircase lighting with switch-off warning	illumination period 1 s to 2,3 h	warning period 1 s to 8 min.
5	Staircase lighting without switch-off warning	illumination period 1 s to 2,3 h	max. brightness
6	Light scene control for 3 light scenes	brightness scene 2	brightness scene 3
7	0...10 V control	-	-
8	Activation of slave operation	-	-

### Function of button inputs T1-T3 on the universal dimmer

Mode	Button input T1	Button input T2	Button input T3
1-5	Function input! (for max. 10 buttons with glow lamp)	Central ON with long pressure! (for switches or buttons without glow lamp)	Central OFF with long pressure! (for switches or buttons without glow lamp)
6	Light scene 1	Light scene 2	Light scene 3
7	Activation of 0...10 V control (switch operation only).	Without function	Without function
8	Without function	Without function	Without function

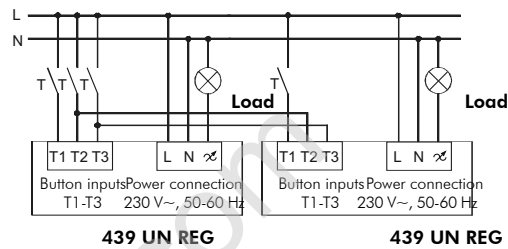
The T1, T2, T3 inputs are connected using pluggable screw clamps. Once the wires (max. 1.5 mm diameter) have been fastened, push on the clamps firmly.



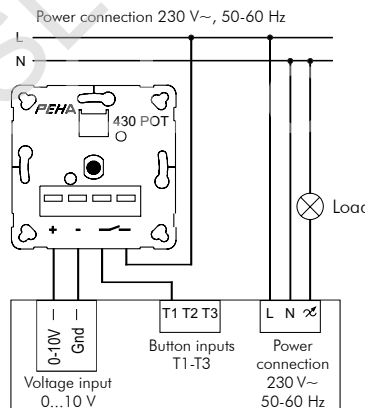
Switching example with buttons on button inputs T1-T3

### Switching example for the central functions ON (T2) and OFF (T3)

The switching example using two universal dimmer modules enables the devices to be centrally switched on using the button on button inputs T2. The appliances can be centrally switched off using the button on button inputs T3. The appliances can be separately operated using the buttons on button inputs T1. This switching variation can be used on modes 1-5.



### 0...10 V control



The dimming of the load is controlled using an externally connected potentiometer, e.g. PEHA's electronic potentiometer 430 POT on the terminals „0...10 V“ and GND of the universal dimmer. (see switching example)

Touch input T1	Function
ON/OFF switch (switch operation only)	Switching the lighting on and off and/or activating or deactivating „0...10 V“ control.

### SLAVE operating mode

Master-slave operation is only possible using a combination of one dimmer as the master dimmer and at least one additional universal dimmer as the slave (max. 31 slave dimmers). Caution! Please refer to section 4 of the operation instructions for further important notes!



## Master dimmer modules 439 M-AB REG and 439 M-AN REG

The 439 M-AB REG dimmer module is designed in line with the principle of inverse phase control and is used to dim light bulbs, electronic transformers and upstream appliances. The 439 M-AN REG dimmer module is designed in line with the principle of forward phase control and is used to dim light bulbs and inductive loads. The dimmer module is used as the master dimmer and the dimmer modules 439 SL-AB REG and 439 SL-AN REG as slave dimmers when operating a master-slave combination.

The rotary „Mode“ function switch is used to select the required operating mode for the dimmer. The potentiometers P1 and P2 are used to set the brightness or time functions, depending on the selected operating mode. The LED on the dimmer module displays the current brightness of the connected light. The operating mode of the master dimmer applies for both individual operation and master-slave operation. The slave dimmers connected to a master dimmer perform the same functions as the master dimmer.

Technical specifications	439 M-AB REG	439 M-AN REG
Master dimmer connections	2 screw clamps for L and N 1 dimmer output for the dimmed phase 1 „A1, B1“ output for slave inverse dimmer 1 „A2, B2“ output for slave forward dimmer	2 screw clamps for L and N 1 dimmer output for the dimmed phase 1 „A1, B1“ output for slave forward dimmer 1 „A2, B2“ output for slave inverse dimmer
Cable length (buttons)	Max. length to the buttons = 100 m	Max. length to the buttons = 100 m
Operating voltage	230 V~ / 50-60 Hz	230 V~ / 50-60 Hz
Max. load	1000 W / 900 VA	1000 W / 900 VA
Min. load	60 W / 50 VA	60 W / 50 VA
Fuse	none / short circuit proof	T5A H250 V
Ambient temperature	-5 °C - +40 °C	-5 °C - +40 °C
Storage temperature	-20 °C - +70 °C	-20 °C - +70 °C
Screw clamps	2x 1.5 mm <sup>2</sup> or 1x 2.5 mm <sup>2</sup> for L and N 4x 0.75 - 1.5 mm <sup>2</sup> for slave connections (A, B) Stripping length = 8 mm	2x 1.5 mm <sup>2</sup> or 1x 2.5 mm <sup>2</sup> for L and N 4x 0.75 - 1.5 mm <sup>2</sup> for slave connections (A, B) Stripping length = 8 mm
Test specifications	EN 60669-2-1	EN 60669-2-1
Certification	CE KEMA/KEUR CEBEC	CE KEMA/KEUR CEBEC
Type of protection	IP 20	IP 20
Dimensions	DIN housing Width 6 TE = 108 mm Height = 55 mm	DIN housing Width 6 TE = 108 mm Height = 55 mm

### Inverse phase dimmer 439 M-AB REG:

Parallel operation is possible!

Caution: Inductive loads (conventional transformers, drives, etc.) may not be connected to inverse phase dimmers!

The following loads may be connected to inverse phase dimmers:

- Light bulbs (ohmic load) 1000 W
- HV halogen lamps 1000 W
- Electronic transformers for low voltage halogen lamps 900 VA
- Upstream appliances for fluorescent tubes 900 VA

### Use of dimmable upstream appliances

The +12V and SE terminals must be bridged in order to activate „MAX. START“ operation. The dimmer then switches the lighting on at maximum brightness.

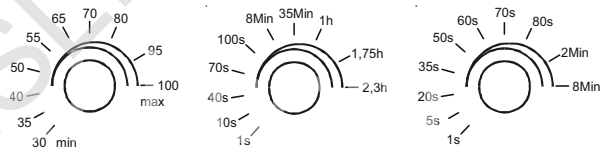
### Forward phase dimmer 439 M-AN REG:

Caution: Outputs may not be switched in parallel when using a forward phase dimmer. Electronic transformers may only be used if they are approved by the manufacturer for leading edge dimming.

The following loads may be connected to forward phase dimmers:

- Resistance load 1000 W
- Light bulbs 1000 W
- HV halogen lamps 1000 W
- Conventional transformers with halogen lamps 900 VA

### Basic settings of the potentiometers P1 and P2 for commissioning and test operation



### Basic setting in the dimming range (total dimming range):

P1 turned to the left: min. brightness (30% of the supply voltage)  
P2 turned to the right: max. brightness (100% of the supply voltage)

### Staircase lighting with switch-off warning:

P1 turned to the left: Illumination period 1 s  
P2 turned to the left: Warning period 1 s

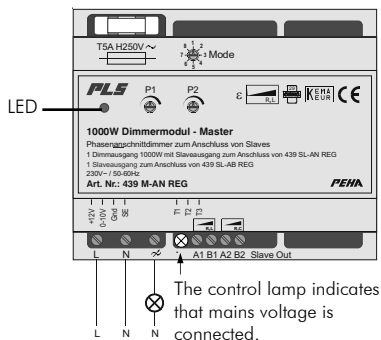
### Staircase lighting without switch-off warning:

P1 turned to the left: Illumination period 1 s  
P2 turned to the right: max. brightness

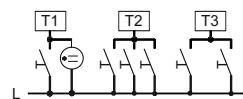
### Function of button inputs T1-T3 on the dimmer

Mode	Button input T1	Button input T2	Button input T3
1-6	Function input! Input for button with glow lamp (max. 10 buttons)	Central ON! Long pressure > 1 s Input for switch or button without glow lamp	Central OFF! Long pressure < 1 s Input for switch or button without glow lamp
7	Light scene 1	Light scene 2	Light scene 3
8	Activation of 0...10 V control (switch operation)	Central ON! Long pressure > 1 s Input for button without glow lamp	Central OFF! Long pressure < 1 s Input for button without glow lamp

### Individual dimmer operation



Basic circuit diagram for individual operation of the dimmer with power connection 230 V~ / 50-60 Hz at terminal L, N and load on the terminal  $\infty$ .

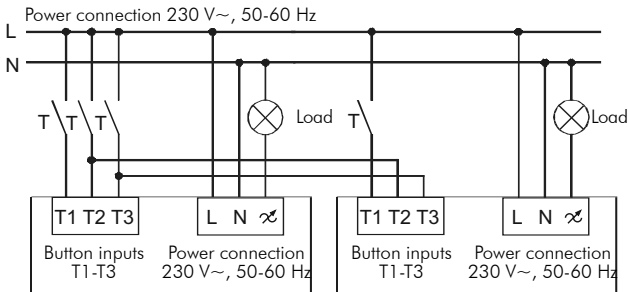


Switching example with buttons on button inputs T1-T3

### Combined switching example for two 439 Master REG dimmers with central functions ON (T2) and OFF (T3)

This switching programme allows both appliances to be switched on centrally using the button on button inputs T2. The appliances can be centrally switched off using the button on button inputs T3. The appliances can be separately operated using the buttons on button inputs T1.

This switching variation can be used on all modes of operation.



### Operating modes of master dimmers 439 M-AB REG and 439 M-AN REG

Mode	Function	Poti P1	Poti P2
1	Touch dimmer with memory Switch on with memory value or switch off! Releasing the button stops the dimming process and the memory value is stored. Dimming stops at min. and max. brightness.	min. brightness	max. brightness
2	<b>Touch dimmer without memory</b> Switch on with maximum brightness or switch off! Releasing the button stops the dimming process. Dimming stops at min. and max. brightness.	min. brightness	max. brightness
3	<b>Reverse dimmer with memory</b> Switch on with maximum brightness or switch off! Releasing the button stops the dimming process and the memory value is stored. Change in dimming direction at min. and max. brightness.	min. brightness	max. brightness
4	<b>Reverse dimmer without memory</b> Switch on with maximum brightness or switch off! Releasing the button stops the dimming process. Change in dimming direction at min. and max. brightness.	min. brightness	max. brightness
5	<b>Staircase lighting with switch-off warning</b>	illumination period 1 s to 2.3 h	warning period 1 s to 10 min
6	<b>Staircase lighting without switch-off warning</b>	illumination period 1 s to 2.3 h	max. period 1 s to 10 min
7	<b>Light scene control for 3 light scenes</b>	brightness scene 2	brightness scene 3
8	<b>0...10 V control</b>		

### 0...10 V control (mode 8)

The dimming of the load is controlled using an externally connected potentiometer, e.g. PEHA's electronic potentiometer 430 POT on the terminals 0...10 V and GND of the 439 M-AB REG dimmer.

### Button input T1

A switch on button input T1 switches the lighting on and off and/or activates 0...10 V control.

### Long pressure on T2:

Switches on at max. brightness. T2 cannot be used to switch off.

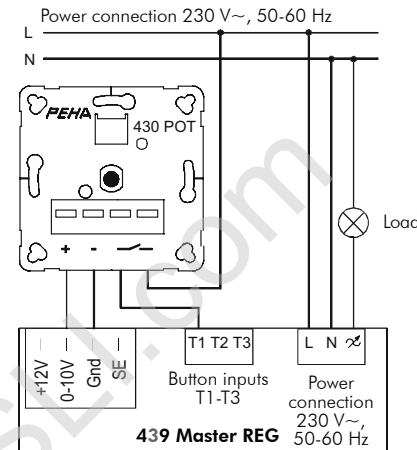
### Long pressure on T3:

Switches off the lighting.

Following long pressure on T2 or T3, short pressure on T2 or T3 can reduce brightness back to the level of 0...10 V control, if activated.

If 0...10 V control is not activated, the lighting switches off.

### Switching example for a 439 Master REG dimmer with PEHA's electronic potentiometer 430 POT



Slave dimmer modules 439 SL-AB REG and 439 SL-AN REG

**Description**

The 439 SL-AB REG dimmer module is designed in line with the principle of inverse phase control and is used to dim light bulbs, electronic transformers and upstream appliances.

The 439 SL-AN REG dimmer module is designed in line with the principle of forward phase control and is used to dim light bulbs and inductive loads.

The max. load of the dimmer modules is 1000 W and the min. load 60 W.

**Master-Slave operation using master dimmers 439 M-AB REG and 439 M-AN REG**

The 439 SL-AB REG and 439 SL-AN REG dimmer modules can be connected to the „Slave Out“ outputs of the master dimmer as slave dimmers (bearing in mind their differing technical concepts). They are then in the same operating mode as the master dimmer (see table for selecting operating mode in the operating instructions for master dimmer 439 M-AN REG) and therefore perform the same dimming functions. The inverse slave dimmers can be combined with forward slave dimmers for „Master-Slave operation“. The dimmers must be connected to a shared phase, together with the master dimmer (L and N terminals). Performance can be greatly enhanced by combining a master dimmer with several slave dimmers. The line diameter and protection of the feed line must be observed.

**Connecting the SLAVE dimmers to the SlaveOut outputs of master dimmers 439 M-AB REG and 439 M-AN REG**

When connecting the slave dimmers to the „Slave Out“ outputs of the master dimmer, observe the polarity of the slave connections (A, B) in order to ensure the correct functioning of the slave dimmers. The slave connections (A,B) only serve to transmit control signals from the master dimmer to the slave dimmers (voltage level 5 V). The mains voltage may not be connected.

In the case of inverse phase dimmer 439 M-AB REG, the slave connection A1 and B1 is provided for trailing edge slave dimmer 439 SL-AB REG. The slave connection A2 and B2 is provided for forward slave dimmer 439 SL-AN REG.

In the case of forward phase dimmer 439 M-AN REG, the slave connection A1 and B1 is provided for forward slave dimmer 439 SL-AN REG. The slave connection A2 and B2 is provided for inverse slave dimmer 439 SL-AB REG.

If the „Slave Out“ outputs on the master dimmer are occupied, a further slave dimmer of the same type (forward or inverse phase dimmer) can be connected to the „Out“ output of a slave dimmer.

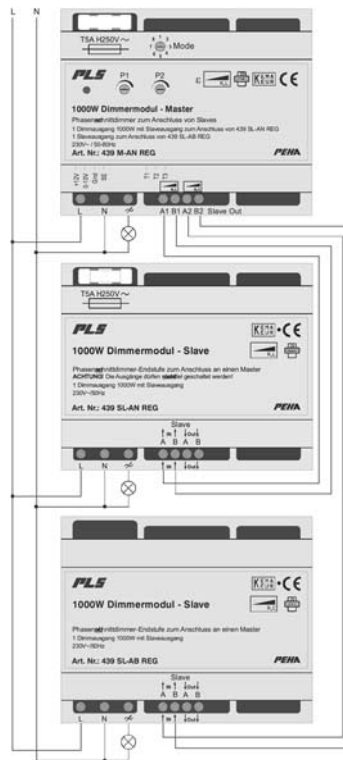
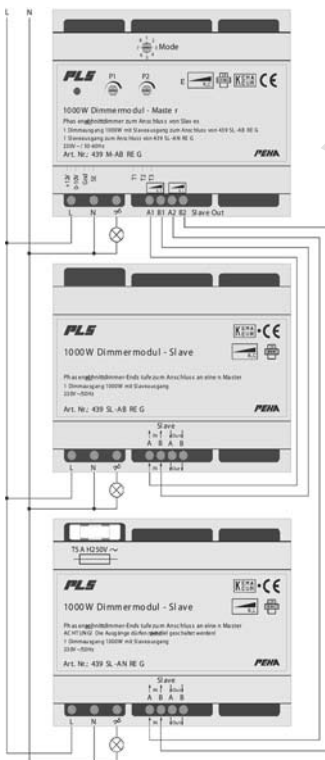
Technical specifications	439 M-AB REG	439 M-AN REG
Master dimmer connections	2 screw clamps for L and N 1 dimmer output for the dimmed phase 1 „IN“ input for master or slave dimmer 1 „Out“ output for slave dimmer	2 screw clamps for L and N 1 dimmer output for the dimmed phase 1 „Out“ output for slave dimmer 1 „IN“ input for master or slave dimmer
Operating voltage	230 V~ / 50-60 Hz	230 V~ / 50-60 Hz
Max. load	1000 W / 900 VA	1000 W / 900 VA
Min. load	60 W / 50 VA	60 W / 50 VA
Fuse	none / short circuit proof	T5A H250 V
Ambient temperature	-5 °C - +40 °C	-5 °C - +40 °C
Storage temperature	-20 °C - +70 °C	-20 °C - +70 °C
Screw clamps	2x 1.5 mm <sup>2</sup> or 1x 2.5 mm <sup>2</sup> for L and N 4x 0.75 - 1.5 mm <sup>2</sup> for slave connections (A, B) Stripping length = 8 mm	2x 1.5 mm <sup>2</sup> or 1x 2.5 mm <sup>2</sup> for L and N 4x 0.75 - 1.5 mm <sup>2</sup> for slave connections (A, B) Stripping length = 8 mm
Test specifications	EN 60669-2-1	EN 60669-2-1
Certification	CE KEMA/KEUR CEBEC	CE KEMA/KEUR CEBEC
Type of protection	IP 20	IP 20
Dimensions	DIN housing Width 6 TE = 108 mm Height = 55 mm	DIN housing Width 6 TE = 108 mm Height = 55 mm

**Connection diagram: SLAVE dimmer to master dimmer 439 M-AB REG**

Inverse slave dimmer 439 SL-AB REG is connected to slave connection A1 and B1 on the master dimmer 439 M-AB REG and forward slave dimmer 439 SL-AN REG to slave connection A2 and B2.

**Connection diagram: SLAVE dimmer to master dimmer 439 M-AN REG**

Forward slave dimmer 439 SL-AN REG is connected to slave connection A1 and B1 on the master dimmer 439 M-AN REG and inverse slave dimmer 439 SL-AB REG to slave connection A2 and B2.



### Inverse phase dimmer 439 SL-AB REG:

Parallel operation is possible! **Caution:** Inductive loads (conventional transformers, drives, etc.) may **not** be connected to inverse phase dimmers!

The following loads may be connected to inverse phase dimmers:

- Resistance load 1000 W
- Light bulbs 1000 W
- HV halogen lamps 1000 W
- Electronic transformers for low voltage halogen lamps 900 VA
- Upstream appliances for fluorescent tubes 900 VA

### Forward phase dimmer 439 SL-AN REG:

Parallel operation not permitted! Outputs may **not** be switched in parallel when using a forward phase dimmer. Electronic transformers may only be used if they are approved by the manufacturer for forward phase dimming.

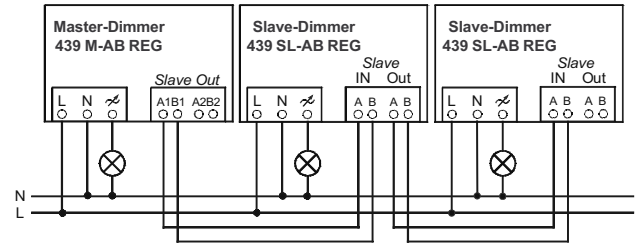
The following loads may be connected to forward phase dimmers:

- Resistance load 1000 W
- Light bulbs 1000 W
- HV halogen lamps 1000 W
- Conventional transformers with halogen lamps 900 VA

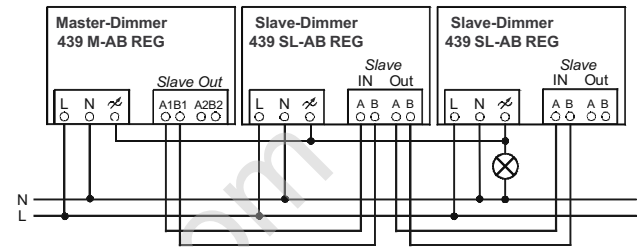
### Examples for connecting SLAVE dimmers 439 SL-AB REG and 439 SL-AN REG to master dimmer 439 M-AB REG

#### Examples for connecting SLAVE dimmers 439 SL-AB REG and 439 SL-AN REG to master dimmer 439 M-AB REG

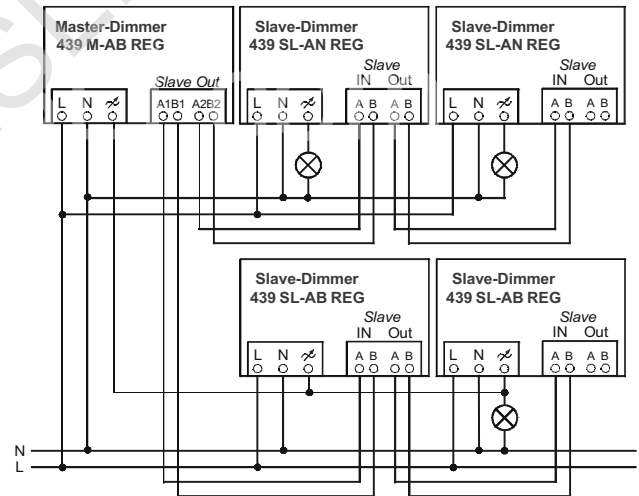
Circuit arrangement A: Individual operation of loads



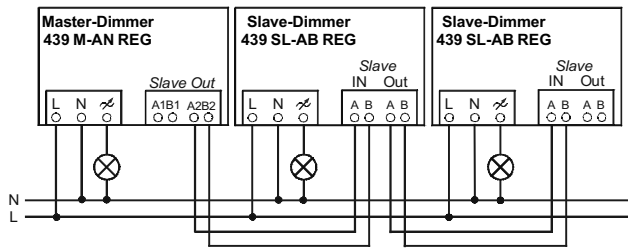
Circuit arrangement B: Parallel operation of inverse phase dimmers



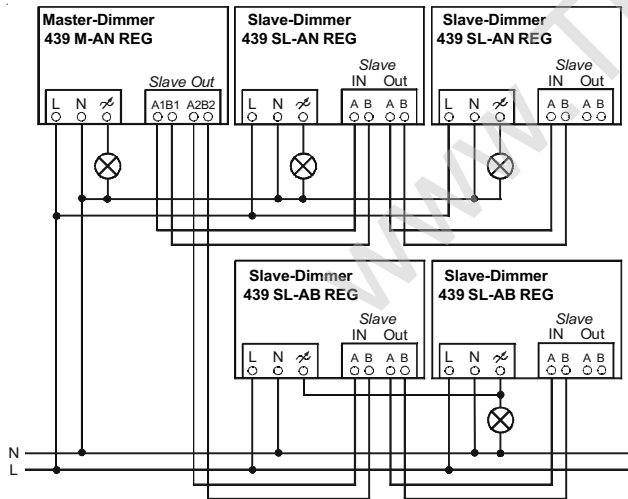
Circuit arrangement C: Combined switching of master and slave dimmers



Circuit arrangement A: Individual operation of loads



Circuit arrangement B: Combined switching of master and slave dimmers



## General information on motion detectors

Motion detectors consist of two different evaluation units:

### 1. Motion detector:

The sensing of moving bodies makes use of the fact that most moving bodies have a higher surface temperature than the ambient temperature. Behind the lens of the motion detector is a so-called PIR\* sensor which converts the changes in incoming thermal radiation into a voltage change.

The lens is split into numerous segments. These segments bundle the thermal radiation onto the PIR sensor. When a heat source moves from one lens segment to the next, the thermal radiation detected by the PIR sensor changes dramatically (infrared radiation). This signal is amplified and evaluated. The range and detection scope of the motion detectors are determined by the number of lens segments and the sensitivity of the PIR sensor. One disadvantage of PIR sensors is their limited temperature range and their inability to detect movements of cold objects.

\* (PIR = Passive Infrared)

### 2. Brightness sensor

The response brightness can be set on common motion detectors, in addition to movement detection. A photodiode or photoresistance is used to measure current light values.

A resistance potentiometer on the appliance is used to set a comparable value corresponding to a LUX figure.

### Function:

The PIR sensor element detects changes to the incoming thermal radiation. These are converted into a voltage change ( $\mu V$  range).

The brightness sensor compares the set light value with the current light value. If the room is too dark, the motion detector's output is switched through (light is switched on).

If the PIR sensor on the motion detector again registers movement when the light is switched on, the time is restarted. Whilst the light is switched on, the brightness sensor is deactivated or its trigger level raised considerably.

A release phase reacts to the switching off of the load circuit / light by briefly blocking the motion detector function so that influences from the switching off process (burning lights close to the sensor area, cooling down influences) are not misinterpreted as „movement“.

At the end of the set time this results in a delay in restarting that lasts a couple of seconds if no more movement is detected.

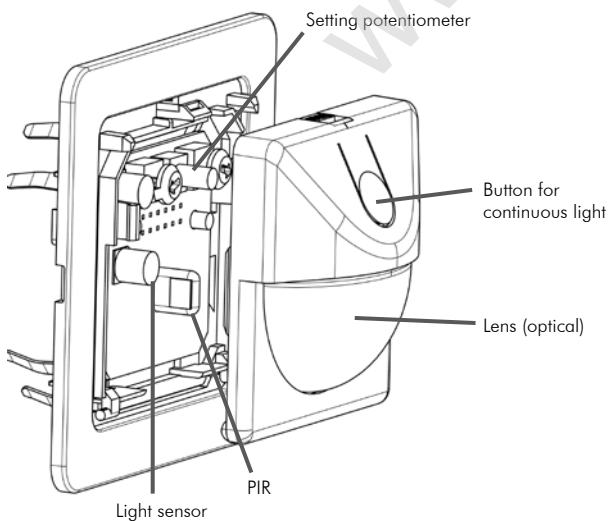
So-called multimaster switching was developed to prevent the lights being switched off when several motion detectors are looped to one light circuit. In this case, the PIR sensors are activated on all looped motion detectors as soon as the load circuit is switched on. This prevents other sensors in the group from subsequently connecting in response to the increased light level resulting from the lighting being switched on. The restart delay is activated for all motion detectors in the group once the time has expired on the last appliance.

If the supply voltage is turned on or interrupted briefly, the appliance runs a self-test. The timing stage is started at the beginning of this initialisation. This self-test can be used to manually switch on the lighting by briefly interrupting the power connection using a break-contact button. Following this self-test, a switching command is only issued if the minimum set brightness is undercut and the incoming IR radiation (= movement detection) changes.

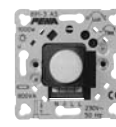
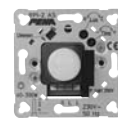
When movement is detected, the output/light is switched on for the time set in the timing stage.

The motion detector is usually switched on or interrupted by relay. Frequently, only two lines are available when retrofitting a motion detector instead of switches or buttons. For this reason, motion detectors that supply their own power needs from the lighting have been developed. Only semiconductor switching elements that consume very little power when triggering switching processes meet such requirements. The load / light may only have a certain minimum resistance to ensure that the motion detector can work.

2 conductor motion detectors can therefore only be used for light bulbs, wound or electronic transformers with a specific minimum load (usually 60 W).



## Areas of application for flush-mounted motion detectors



	xx.410 BM + 492 AN	xx.410 BM + 493	xx.410 BM + 482/24	891-2 AS o.A.	891-3 AS o.A.
<b>Large range &gt; 50 m<sup>2</sup></b>					
Auditoriums					
Open plan offices					
Forecourts					
Shops					
Sports halls					
Production plants					
Kitchens					
Canteens					
Warehouses					
Rack storage areas					
Multi-storey car parks					
Underground garages					
<b>Medium range &gt; 10 m<sup>2</sup> &lt; 50 m<sup>2</sup></b>					
Conference rooms					
Gymnasiums					
Offices					
Classrooms					
Production plants					
Kitchens					
Canteens					
Shops					
Changing rooms					
Corridors					
Corridors, wide					
Staircases					
Warehouses					
Rack storage areas					
Storage areas					
Recreation rooms					
<b>Small range &lt; 10 m<sup>2</sup></b>					
Storage areas					
Offices (single-person)					
Copy rooms					
Changing rooms					
Corridors					
Toilets					
<b>Technical specifications</b>					
Supply voltage	230 V	230 V	24 V	230 V	230 V
Light sensor	2...1000 Lux	2...1000 Lux	2...1000 Lux	Daytime operation, dark	Daytime operation, dark
Switching times	2 sec.–30min.	2 sec.–30 min.	2 sec.–30 min.	15 sec.–20 min.	15 sec.–20 min.
Output, NPN/0..10 V			NPN		
Output	Triac or FET 60-600W	Relay 2300 W/600 VA	0.1 A	Triac 40–300 W	Relay 1000 W/800 VA
Technology	PIR	PIR	PIR		
Scope	180 degrees	180 degrees	180 degrees	110 degrees	110 degrees
Range, metres	8 m	8 m	8 m	6 m/4.5 m	6 m/4.5 m
Motion >10 cm					
Automatic on/off					
Constant on/off	max. 2 h	max. 2 h	max. 2 h		
Type of protection	IP 20	IP 20	IP 20	IP 20	IP 20
Lateral cable entry	FM assembly	FM assembly	FM assembly	FM assembly	FM assembly
Base cable entry	FM assembly	FM assembly	FM assembly	FM assembly	FM assembly
Mounting height	aprox. 0.8–1.2 m	aprox. 0.8–1.2 m	aprox. 0.8–1.2 m	aprox. 0.8–1.2 m	aprox. 0.8–1.2 m

The detection scope and range depend on the mounting height!

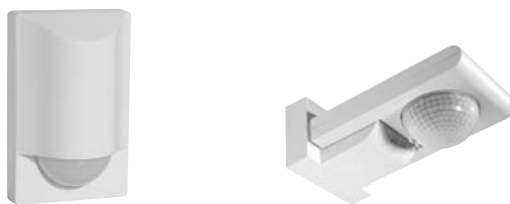


Recommended



Recommended with reservation

### Overview of motion detectors for outdoor installation



	496.xx BM WAB	498.xx BM xxx WAB
<b>Technical specifications</b>		
Supply voltage	230 V AC - 240 V	230 V AC
Light sensor	2–2000 Lux	2–2000 Lux
Switching times	10 sec.–15 min.	1 sec.–30 min.
Ohmic load	10 A	10 A
Technology	IR	IR
Scope	180 degrees	120 and 290 degrees
Range, metres	5–12 m	10–16 m
Automatic on/off	yes	yes
Constant on/off	no	no
Outdoor areas	yes	yes
Type of protection	IP 44	IP 55
Lateral cable entry	yes	yes
Base cable entry	yes	yes
Mounting height	2.00–2.20 m	2.00–4.00 m

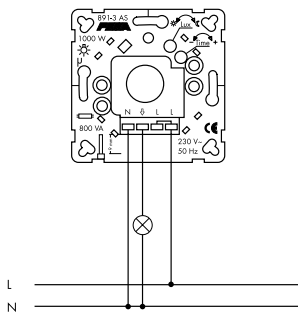
Areas of application: Entrances, cellars, garages ...



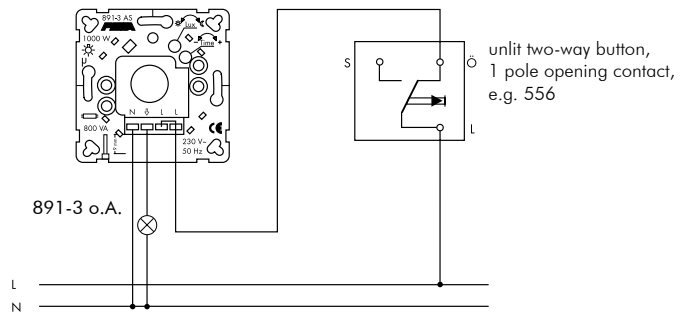
	493 BM WAB	493 HF WAB
<b>Technical specifications</b>		
Supply voltage	230 V AC	230 V AC
Light sensor	2–2000 Lux	2–2000 Lux
Switching times	10 sec.–30 min.	10 sec.–30 min.
Ohmic load	10 A	10 A
Technology	IR	HF
Scope	180 degrees	140 degrees
Range, metres	8 m	1–8 m
Automatic on/off	yes	yes
Constant on/off	2 h	2 h
Outdoor areas	no	no
Type of protection	IP 54	IP 54
Lateral cable entry	yes	yes
Base cable entry	no	no
Mounting height	approx. 1.10–2.20 m	approx. 1.10–2.20 m

Areas of application: Entrances, cellars, garages ...

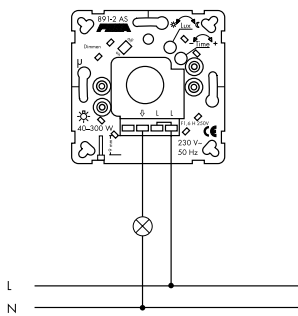
## Flush-mounted motion detector - Automatic switch 110°



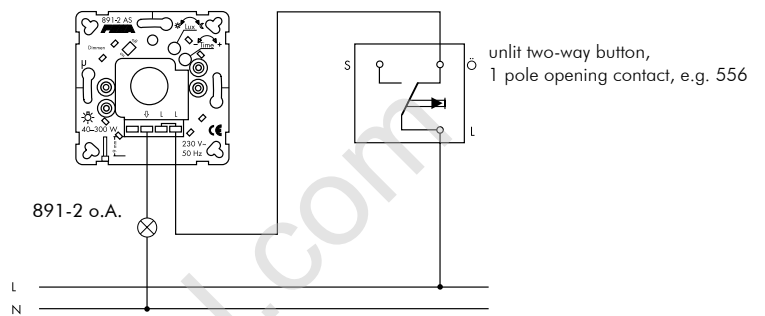
891-3 o.A. relay version



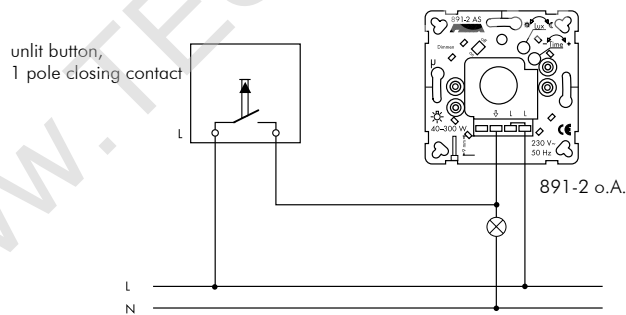
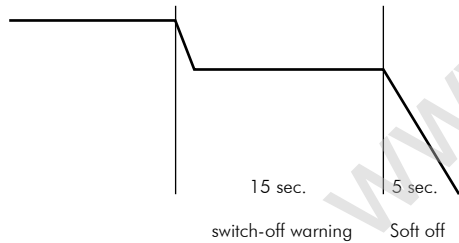
The automatic switch is turned on for the pre-selected time by pressing the button.



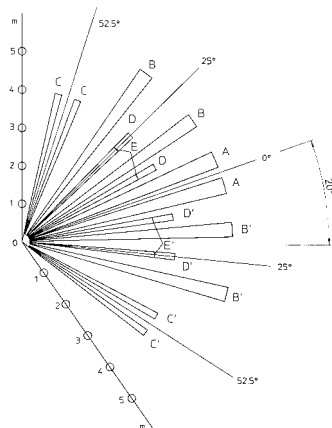
891-2 o.A. Triac version with switch-off alarm



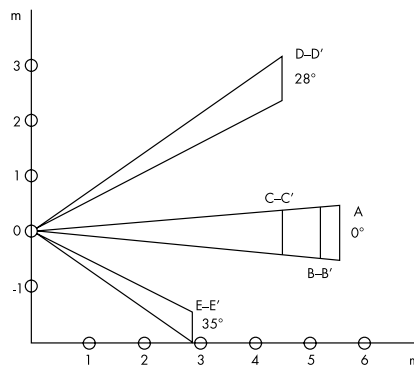
The automatic switch is turned on for the pre-selected time by pressing the button.



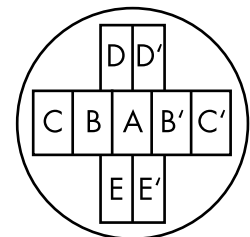
The automatic switch is turned on for the pre-selected time by pressing the button.



Bird's view sensor zones, sensor at a lateral angle of 20°, for mounting next to doors. Mounting height 0.80 – 1.20 m.



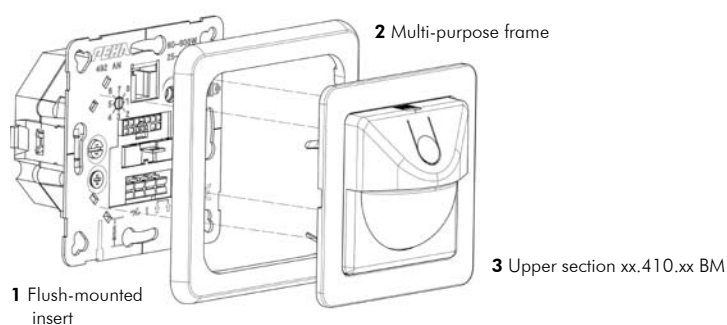
Lateral view of sensor zones



The lens system of the automatic switch 110°

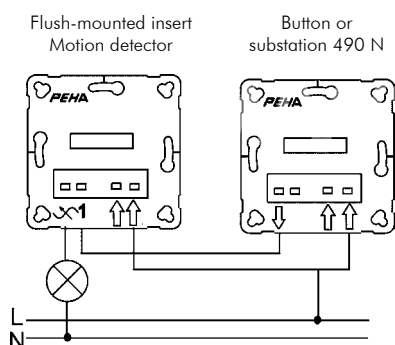


## Motion detector design



- 1** Flush-mounted insert  
Relay: Art. no. 483 and 493 o.A.  
Triac appliance: Art. no. 482 and 492 AN o.A.  
FET appliance: Art. no. 492 AB o.A.  
24 V insert for PHC: Art. no. 482/24
- 2** Multi-purpose frame
- 3** Detector upper section xx.410.xx BM

## Appliance with substations (only 493, 492 AN and 492 AB)



Touching the substation input causes the light to be switched on for the time set in the lower section. If the timers are running both on the upper section and the flush-mounted insert of the motion detector, the appliance switches off at the end of the longer time. When using multimaster settings (only flush-mounted appliances 493 and 492), further appliances turn on for the set time, regardless of the brightness at movement detection. This switching prevents lights from going off, when walking along long corridors or staircases.

## Group wiring

### Flush-mounted motion detector 180°

#### Flush-mounted triac insert 492 AN and AB o.A.

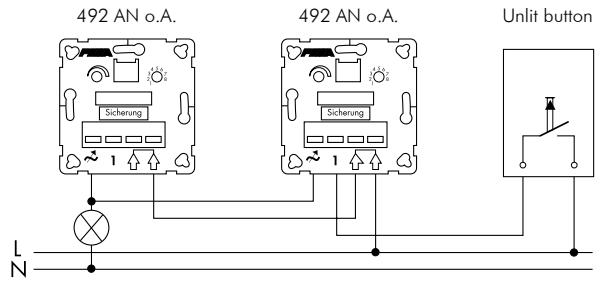
Connection example:

Parallel switching of motion detector with flush-mounted insert 492 or similar

A maximum of 3 appliances only can be switched in parallel.

Min. loads:	1 Motion detector	60 W
	2 Motion detector	80 W
	3 Motion detector	120 W

Unlit buttons can also be connected to substation input 1.

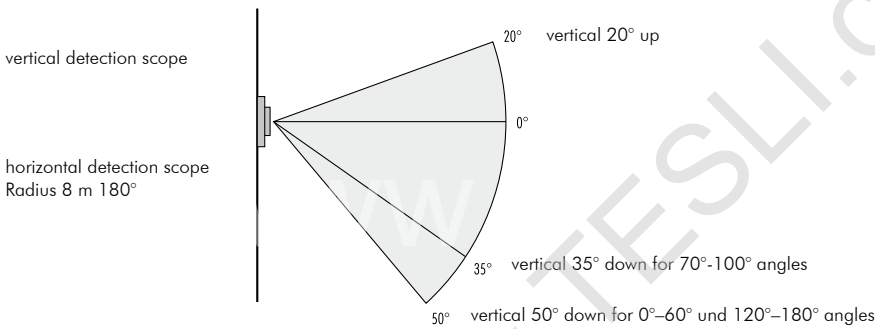
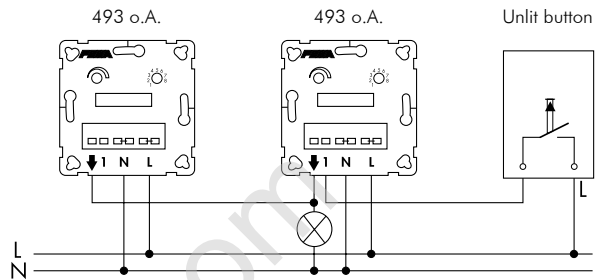


#### Flush-mounted relay insert 493 o.A.

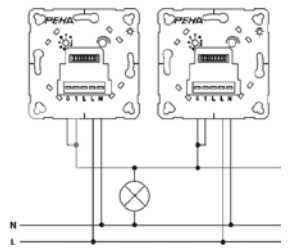
Connection example:

Parallel switching of motion detectors with flush-mounted relay insert 493 o.A. (min. load 25 W).

Unlit buttons can also be connected to substation input 1

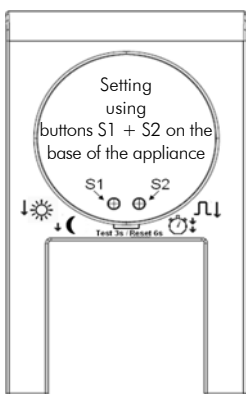


Multi-master switching  
Function selector switch position 2

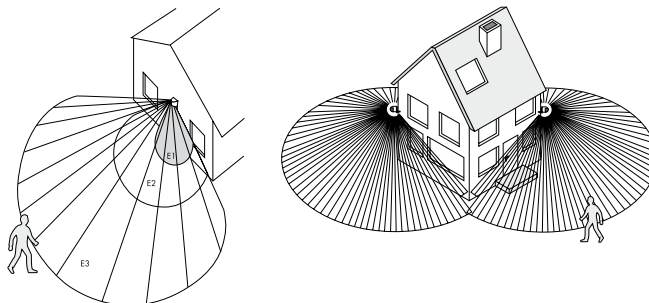


## Surface-mounted motion detector

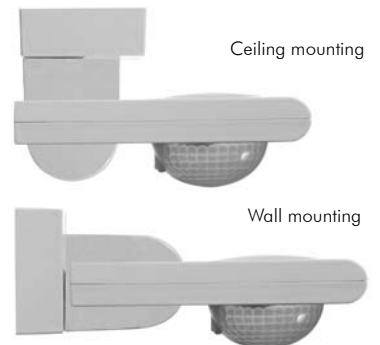
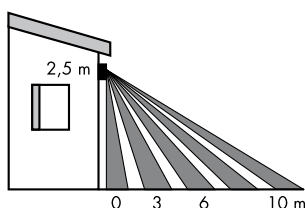
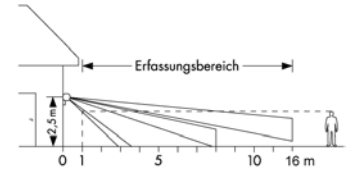
### Outdoor use – Motion detectors 120° 498 BM 120 WAB and 290° 498 BM 290 WAB



Range 120° Appliances: 10 m  
Switching capacity max. 1000 W  
Touch button adoption of luminosity 0.5 Lux to daylight operation



Range 290° Appliances: 16 m  
Switching capacity 2500 W  
Also available with infrared remote control



## Motion detector 291 BM for FM relay insert 293/6 o.A.

### General

The motion detector 291 BM is used in combination with relay insert 293/6. It registers movement of bodies and the daylight value (LUX). The lighting is switched on if a movement is detected and the daylight value is lower than the pre-set light value (LUX). The lighting remains switched on for as long as movement is detected. Once movement is no longer detected, the system switches off after expiry of the switch-off time. The switch-off time can be set on the motion detector. The lighting can be switched on/off manually on the device. It can also be switched using the relay insert substation.

- Manual operation
- Detection range 8 m
- Horizontal detection angle 180°

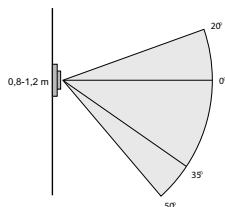
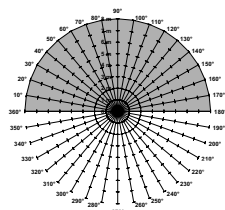
### Detection range

At an installed height of 2.20 m, the motion detector detects people of heights of 1.50 m or more at a distance of 0.50 m.

### Detection angle

- 180° horizontal
- vertical 20° up
- vertical 50° down (angle 0°-60° & 120°-180°)
- vertical 35° down (angle 70°-110°)

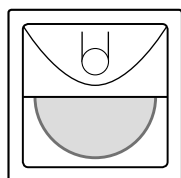
### Detection diagrams



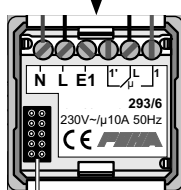
### Technical specifications

Installation height: 0.8 – 2.2 m  
 Range: 8 m radius  
 Switch-off time: 5 s to 30 min  
 Light sensitivity: 2 Lux to daylight  
 Identification: CE  
 Protection type: IP20

### Structure and description



Motion detector 291 BM



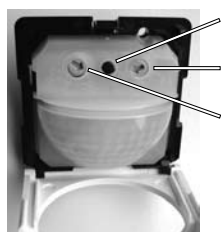
Relay insert 293/6

Jack for upper section

### Function



The motion detector has two possible settings. The designer cover on the top must be opened to use the adjusting potentiometer.



Continuous light

Switch-off time

Light value

### Setting the light value (Position 3)

The lighting is switched on, when the measured daylight value is lower than the pre-set light value (LUX) and motion is detected. Turning to the clockwise limit causes the light to be switched on in daylight.



☀ Light value brighter & Daylight operation

☾ Light value darker

### Setting the switch-off time (Position 2)

Once movement is no longer detected, the lighting switches off after expiry of the switch-off time. Turning to the left produces a brief impulse. Turning further to the right extends the switch-off time.

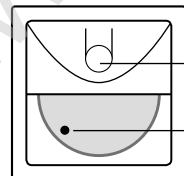


Turn to the left ⇐ 5s (impulse)

Turn to the right ⇒ 30 Min.

The lighting is switched on/off automatically (depending on movement and the daylight value). It can be manually operated using a button on the device. It activates the continuous light function. The relay insert can also be switched from a substation.

### Manual operation



Continuous light function button

LED

The button on the motion detector can be used to activate the continuous light function. When activated, an LED is lit in the motion detector's lens. The lighting is then switched on for 4 hours. Subsequently the device returns to automatic operation. Pressing the button during continuous light operation returns the device to automatic operation.

### Substation function (relay insert)

An external button on the substation input E1 on the relay insert performs the following functions:

Relay insert	Function
Press button/release	Switch on for pre-set switch-off time

### FM relay insert 293/6 o.A.

The relay insert is combined with different upper sections. Different switching functions are possible. A motion detector (290 BM), indoor thermostat (291 RTR) or timer (291 Z) can be used as upper sections. The switching functions are performed on the upper section (automatically or manually). The relay insert can also be switched from a substation. The relay insert can switch various consumers, such as bulbs, HV halogen lamps, upstream appliances and inductive loads.

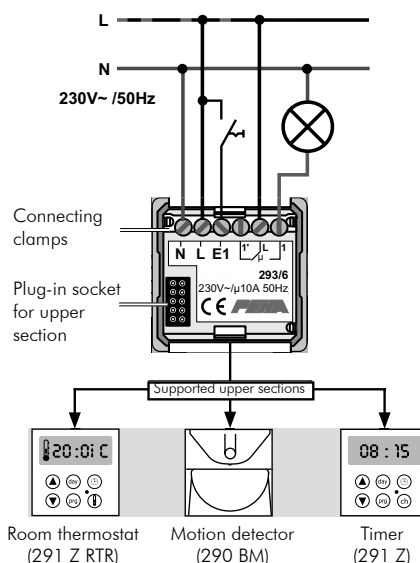
### Technical specifications

Voltage supply: 230 V~, 50 Hz  
 Protection of the power line: Circuit breaker or fuse, max. 16 A  
 Line diameter of the Connecting clamp: 2x 1.5 mm<sup>2</sup> or 1x 2.5 mm<sup>2</sup>  
 Stripping length = 8 mm  
 Installation depth: min. 40 mm  
 Ambient temperature: 0° to +40°C  
 Storage temperature: -25°C to +70°C  
 Test specifications: EN 60669-2-1  
 Certifications: CE KEMA/KEUR  
 Protection type: IP 20  
 Load specifications:  
 Light bulbs: 920 W (4 A)  
 HV halogen lamps: 920 W (4 A)  
 Conventional transformers: 575 VA (2.5 A)  
 Fluorescent lamps (upstream appliances): 575 VA (2.5 A)  
 Drives: 920 VA (4 A)

### Notes:

- External protection mechanisms can be incorporated to allow the use of other loads or to increase performance
- The load of conventional transformers must be at least 85 %

### Structure and description



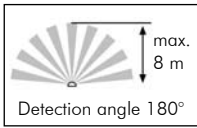
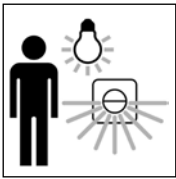
### Connection possibilities

Function	Terminal
Voltage supply 230 V / 50 Hz	L, N
Substation input 230 V / 50 Hz, for buttons and switches	E1
<b>Consumer output</b> (changeover contact) 1' = opening contact L = Consumer voltage 1 = Closer contact	1', L, 1

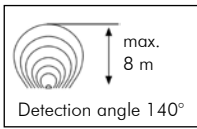
### Operation

The relay insert is operated from the attachment (automatically or manually). The relay insert can also be switched from a substation. Observe the operating instructions for the relevant upper section when operating!

## Surface-mounted motion detectors WAB – 493 BM WAB and 493 HF WAB



The 493 BM WAB is equipped with a pyro sensor that detects invisible thermal radiation from moving bodies (humans, animals, etc.).



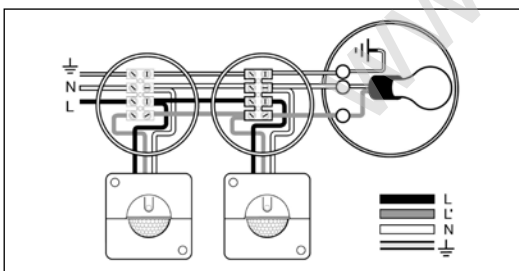
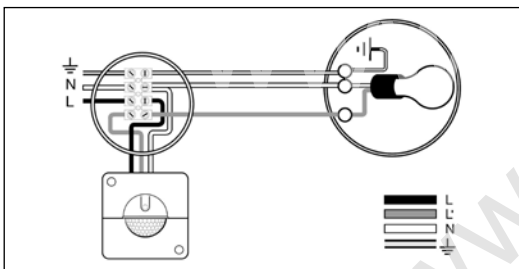
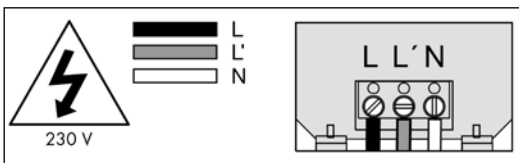
The 493 HF WAB with HF sensor reacts to the smallest movement, irrespective of the temperature. It transmits electromagnetic waves (5.8 GHz) and receives their echo. The range can be set between 1 – 8 m, and the sensor also detects movements through obstacles, such as thin walls, glass panes, etc.

### Dimensions:

Wall clearance 64 mm, height 82 mm, width 72 mm

### Areas of application:

Cellar corridors, outdoor staircases, garage entrances ...

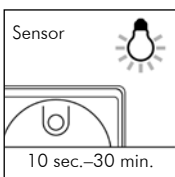


### Technical specifications

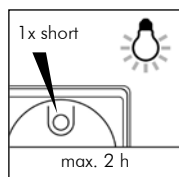
	493 BM WAB	493 HF WAB
Dimensions (H x W x D):	82 x 72 x 67 mm	82 x 72 x 64 mm
Output:	max. 1000 W (ohmic load, e.g. light bulb) max. 500 VA (uncompensated, inductive, cos = 0,5 e.g. fluorescent lamps) max. 2 (upstream appliances, capacitive)	
Power connection:	230 V, 50 Hz 3-wire connection (L, L', N)	
Contact opening:	• Contact opening width of less than 1.2 mm between the contacts when switched off.	
Mounting height:	approx. 1.1 and 2.2 m*	approx. 1.1 and 2.2 m*
Sensor technology:	Infrared sensor	5.5 Ghz high frequency
Transmission power:	–	approx. 1 mW
Detection angle:	180° horizontal 90° vertical, down	140° horizontal, club shaped, Close range 180°
Range:	max. 8 m	1–8 m infinitely adjustable
Dusk setting:	2–2000 Lux	2–2000 Lux
Time setting:	10 sec.–30 min.	10 sec.–30 min.
Continuous light:	switchable (max. 2 h)	switchable (max. 2 h)
Protection type:	IP 54	IP 54

\*Mounted above doors

### Button for light functions



Sensor operation



Continuous light operation

Button 1x ON  
Button 2x OFF

## PHC – DETEC Motion Detector 110°

### Art. no. 894 BM WAB

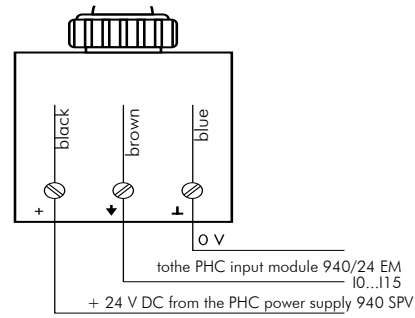
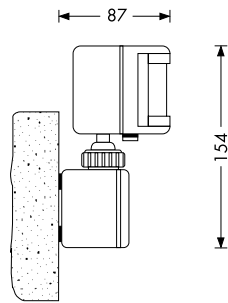
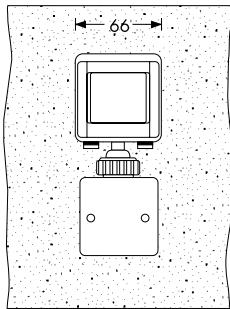
For connection to the PHC system, for wall mounting at a height of approx. 2.5 m, IP 44.

Light sensor: adjustable from 5 Lux to daylight brightness

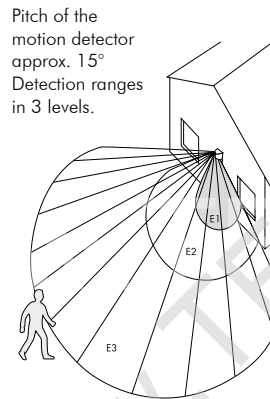
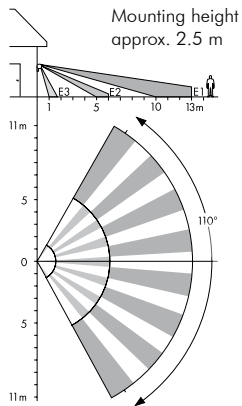
Setting time: approx. 5 sec. to 10 min.

The motion detector can be programmed like a switch using the PHC system software

Power consumption: I = 15 mA from the PHC power supply 940 SPV



Dimensions in mm



### Areas of application for motion and presence detectors



	887 DE-L	887 DE-LV	887-2 DE	887 DE-L M SL	887/24 DE
<b>Technical specifications</b>					
Supply voltage	230 V AC	230 V AC	230 V AC	230 V AC	24 V DC
Light sensor	10...1000 Lux	10...1000 Lux	10...1000 Lux	10...1000 Lux	30..0.3000 Lux
Switching times	1–30 min.	1–30 min.	1–30 min.	1–30 min.	1–30 min.
Output, NPN/0..10 V					yes
Output/Relay	1x 2300 W/140 µF	2x 2300 W/140 µF	2x 2300 W/140 µF	1x 2300 W/140 µF	0,5 A 24 V DC*
Technology	PIR	PIR	PIR	PIR	PIR
Scope	360 degrees	360 degrees	360 degrees	360 degrees	360 degrees
Range, metres	10 m	10 m	10 m	10 m	10 m
Motion <10 cm	9 m <sup>2</sup>	9 m <sup>2</sup>	9 m <sup>2</sup>	9 m <sup>2</sup>	9 m <sup>2</sup>
Motion >10 cm	140 m <sup>2</sup>	140 m <sup>2</sup>	140 m <sup>2</sup>	140 m <sup>2</sup>	140 m <sup>2</sup>
Manual OFF	yes	yes	yes		via PHC/PCS
Automatic on/off	yes	yes	yes	yes	via PHC/PLS
Constant on/off	yes	yes		yes	via PHC/PLS
Type of protection	IP 20	IP 20	IP 20	IP 20	IP 20
Lateral cable entry	yes	yes	yes	yes	yes
Base cable entry	yes	yes	yes	yes	yes
Mounting height	approx. 2.5 - 3 m	approx. 2.5 - 3 m	3 m	approx. 2.5 - 3 m	3 m

\* potential-free

#### 887 DE-L

Ceiling light presence detector preferably suited for use in single offices, installation directly above the desk.

#### 887 DE-LV

Ceiling light and fan presence detector preferably suited for use in toilets, kitchens and rooms where a further channel/fan needs to be operated in addition to the light and irrespective of the level of daylight.

#### 887 DE-2

Ceiling presence detector for presentation rooms preferably suited for use in rooms where some of the light switching is daylight-dependent and some not (e.g. classrooms, small conference rooms).

#### 887 DE-L M-SL

Master-slave ceiling light presence detector for combining several appliances in one room. Master-slave switching enables the light value to be assessed by just one ceiling presence detector (master) within a group comprising several ceiling sensors. Movement is sensed by the master and slave ceiling presence detectors.

#### 887/24 DE

Ceiling presence detector with 24 V supply voltage preferably suited for use on PHC systems or on zone control. Movement is evaluated by a relay contact, irrespective of daylight. The 1-10 V dusk output can only be used in connection with zone control. If used on PHC, a separate light sensor must be connected to ensure brightness-dependent switching of the lighting.

## Areas of application for motion and presence detectors



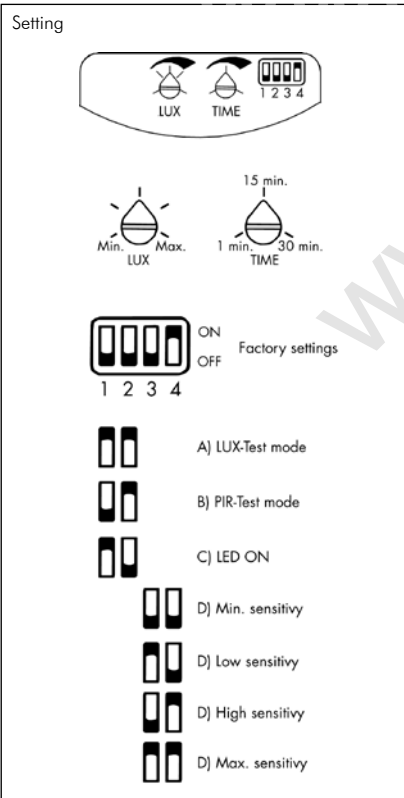
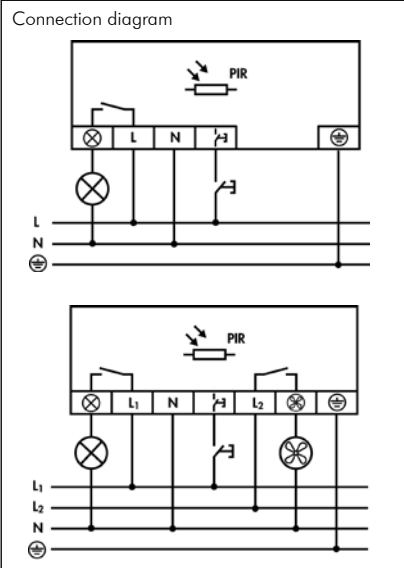
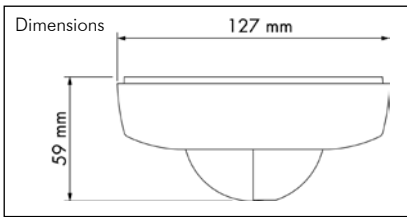
	897.10 PM DE/100	897.10 PM DE/200	890 BM DE-L	890 BM DE	890/24 BM DE-L
<b>Large range &gt; 50 m<sup>2</sup></b>					
Auditoriums					
Open plan offices					
Forecourts					
Shops					
Sports halls					
Production plants					
Kitchens					
Canteens					
Warehouses					
Rack storage areas					
Multi-storey car parks					
Underground garages					
<b>Medium range &gt; 10 m<sup>2</sup> &lt; 50 m<sup>2</sup></b>					
Conference rooms					
Gymnasiums					
Offices					
Classrooms					
Production plants					
Kitchens					
Canteens					
Shops					
Changing rooms					
Corridors					
Corridors, wide					
Staircases					
Warehouses					
Rack storage areas					
Storage areas					
Recreation rooms					
<b>Small range &lt; 10 m<sup>2</sup></b>					
Storage areas					
Offices (single-person)					
Copy rooms					
Changing rooms					
Corridors					
Toilets					
<b>Technical specifications</b>					
Supply voltage	24 V	24 V	230 V	230 V	24 V
Light sensor	10...1000 Lux	10...1000 Lux	100...1000 Lux		100...1000 Lux
Switching times	8–40 min.	8–40 min.	10 sec.–14 min.	approx. 10 min.	10 sec.–14 min.
Output, NPN/0..10 V	2x NPN	2x NPN			NPN
Output/Relay	1x 0.5 A/24 V	1x 0.5 A/24 V	200 W	200 W	24 V, 15 mA
Technology	PIR & UL	PIR & UL	PIR	PIR	PIR
Scope	180 degrees	360 degrees	rectangular	rectangular	rectangular
Range, metres	6.5/10 m	12 m	5 x 7 m	5 x 7 m	5 x 7 m
Motion <10 cm	40 m <sup>2</sup>	90 m <sup>2</sup>			
Motion >10 cm	100 m <sup>2</sup>	200 m <sup>2</sup>			
Manual OFF					
Automatic on/off	yes	yes	yes	yes	yes
Constant on/off					
Type of protection	IP 40	IP 40	IP 20	IP 20	IP 20
Lateral cable entry	no	no	no	no	no
Base cable entry	yes	yes	yes	yes	yes
Mounting height	approx. 2.5 m	approx. 2.5 m	2.5-3.2 m	2.5-3.2 m	2.5-3.2 m

The detection scope and range depend on the mounting height!

  Recommended, alternative in respect of function, application and computer work

  Recommended with reservation

Movement control with ceiling presence detector 887DEL and 887 DEL-V



**Technical specifications**

Supply voltage 230 V AC  $\pm$  10 %, 50 Hz  
 Power consumption, own consumption:  
 887 DEL active/passive max. 1 W  
 887 DEL-V active/passive max. 1.5 W



**Output relay:**  $\mu$  10 A 250 V AC, NO  
 Start-up current: 80 A/20 ms

**Load:**

Light bulbs	R	2300 W
Fluorescent tubes	L	1200 VA
	C	140 $\mu$ F
Energy-saving lamps	18 W	58 lamps
Low voltage halogen:		
• inductive (ring core transformer)		500 VA
• with electronic transformer		1200 VA
		(11 x 105 W lamps)
Halogen light bulbs	230 V	2300 W

Setting range: 10-1000 Lux  
 Hysteresis: + 10 %  
 Switch-off delay: 1-30 min.  
 Ambient temperature: -5 °C... + 50 °C  
 Protection type: IP 20  
 Colour: RAL 9010 (white)  
 Cable: max. 2 x  $\varnothing$  12 mm  
 Detection angle: 360°  
 Lens fields/Detection range at a height of 0.8 m above ground level: 618 fields  
 • Small movements 474 fields/9 m<sup>2</sup>  
 • Body movements 144 fields/140 m<sup>2</sup>  
 Mounting height (ceiling installation): max. 2.5-3 m

**Motion detector PIR 360° (230 V AC) for controlling interior lights and ventilation systems.**

- **887 DEL Light control (1 channel)**
- **887 DEL-V Light and fan control (2 channels)**
- **Detection angle 360°**
- **Large detection range = 140 m<sup>2</sup>**
- **Detection of small movements within a range of 9 m<sup>2</sup>**
- **Additional energy saving function:**  
**The light can also be switched off manually when leaving the room.**

The PIR 360° sensor is available in two designs:  
 887 DEL For motion and daylight control (1 channel)  
 887 DEL-V As 887 DEL, but with an additional output relay for ventilation control (2 channels)

**Function**

If the light is not switched off manually when leaving the room, it switches off automatically after expiry of the specified time.

**Sensitivity**

Sensitivity can be retroactively adjusted if needed.

**Cover**

A cover is supplied to prevent the sensor from switching unintentionally in certain areas.

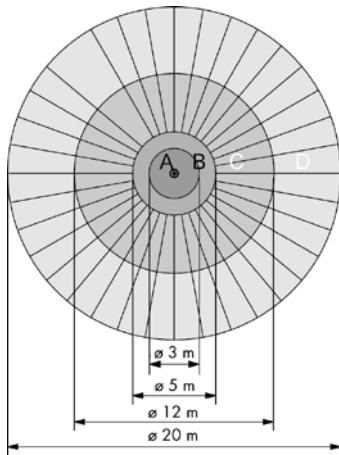
**Manual control**

- **Short pressure (0.5-2 sec.):**  
The light can be switched off when leaving the room.
- **Continuous light** by applying longer pressure > 2 sec. (Short pressure automatically resets to „Auto“.)
- **Continuous OFF** by applying longer pressure > 2 sec. (Short pressure automatically resets to „Auto“.)



Detection characteristics

Fig. 1



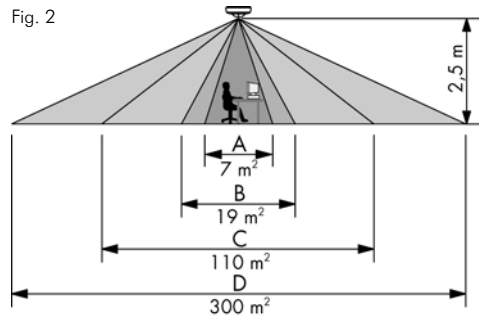
A + B = Small movements  
C + D = Body movements

Bird's eye view - Indication of diameter at ground level.

**Planning**

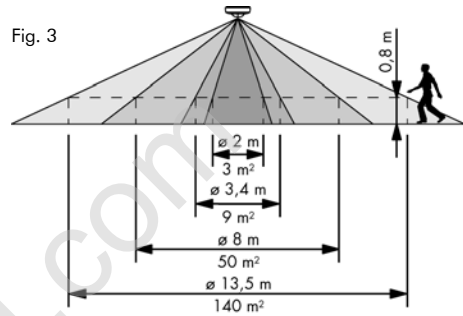
To ensure the best possible detection in the entrance area of the room, the distance of the sensor must be reduced, as shown in Fig. 3. People can only be effectively detected at a height of 0.8 m above ground level.

Fig. 2



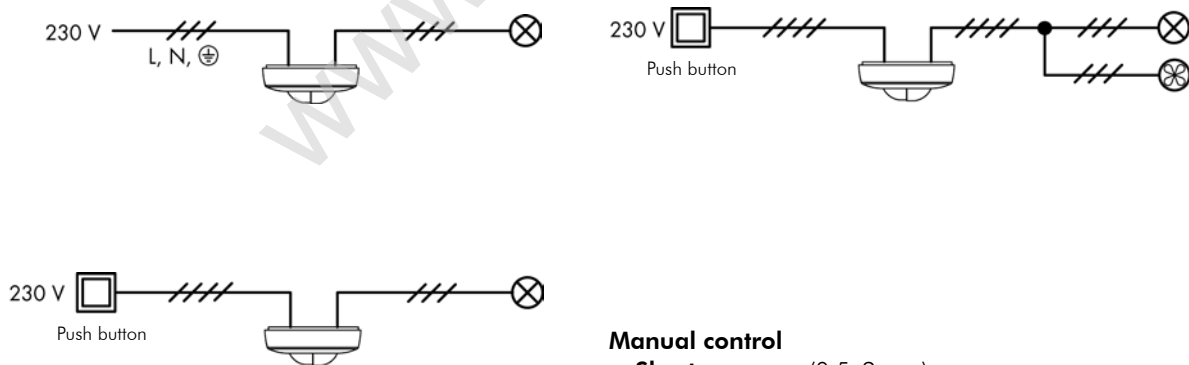
Lateral view - Indication of area at ground level.

Fig. 3



Indication of area at table height.

Schematic circuit diagram



**Manual control**

- **Short pressure** (0.5–2 sec.):  
The light can be switched off when leaving the room.
- **Continuous light** by applying longer pressure > 2 sec. (Short pressure automatically resets to „Auto“.)
- **Continuous OFF** by applying longer pressure > 2 sec. (Short pressure automatically resets to „Auto“.)

PLS - Motion control using ceiling presence detectors 887-2 DE, 887 DE-L and 887 M SL

**Ceiling presence detector art. no.: 887-2 DE**

- Available in pure white
- Appliance with 2 switch outputs

**Technical specifications**

Supply voltage:	230 V AC
Low power consumption:	approx. 1 W
Relay contact:	NO $\mu$ 10 A
Lux range:	10...1000 Lux
Switch-off delay:	1 – 30 min.
Sensitivity:	selectable
Mounting height:	2.5 – 3m

- Test modes
- Activation display
- Use the same conductors

**1st output:**

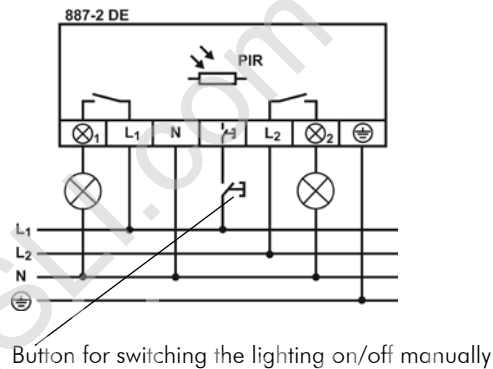
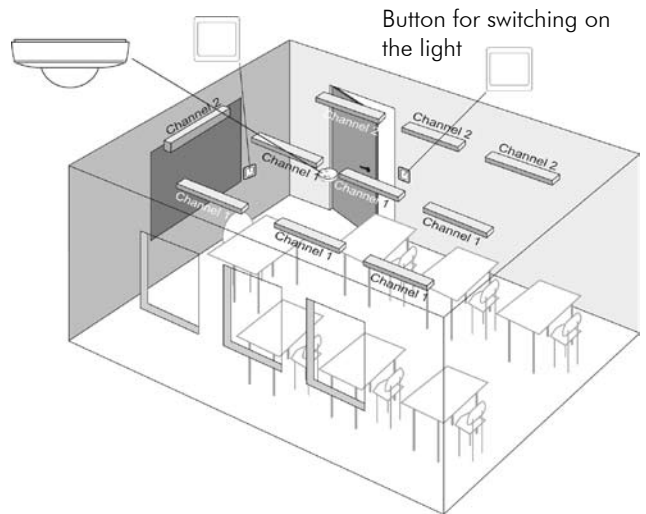
Daylight-dependent switching when motion is detected (illumination of window areas)

**2nd output:**

Daylight-independent switching when motion is detected (illumination of the board and rest of the room)

**Use in presentation rooms or classrooms:**

- Switch on and off manually using the closer button.
- Light is switched on manually, when the room is entered.
- Light is switched off manually, when leaving the room.
- If someone forgets to switch off, the sensor switches the lighting off after the pre-set follow-up time.



Special features of the 887 M SL

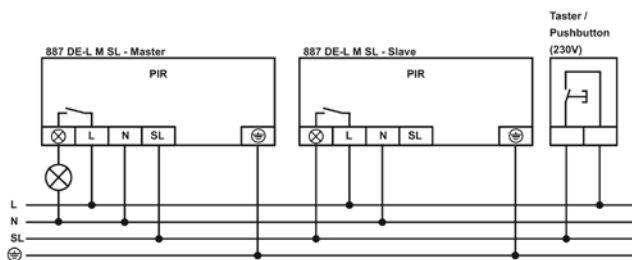
**Master/Slave operation:**

- Positioning of the master in the area of the window to measure daylight intensity
- Button connection: a connected button can activate the lighting if incident daylight falls below the set value.

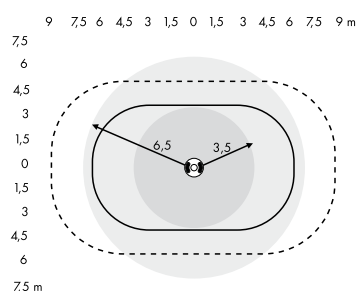
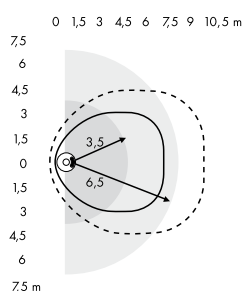


**Difference to 887 DE-L and 887 DE-LV:**

The button on these appliances allows daylight-independent continuous ON/OFF switching and premature OFF.



## Ceiling presence detectors - Ultrasound



Ultrasound range

- Minor movement
- ⊞ Major movement

Infrared range

- Minor movement
- Major movement

Figures in metres

Art. no.: **897.10 PM DE/100**  
 Detection angle: 180°  
 Area: 100 m<sup>2</sup>  
 Power consumption: 18 mA

Art. no.: **897.10 PM DE/200**  
 Detection angle: 360°  
 Area: 200 m<sup>2</sup>  
 Power consumption: 33 mA

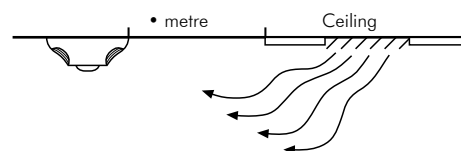
### Only for ceiling mounting at a height of approx. 2.5 m

Surface-mounted housing for ceiling presence detector 891.10

Power pack for ceiling presence detector 897 SPV-REG.

The aforementioned ranges are valid for open rooms without partitions.

Please bear in mind that partition walls reduce the range of infrared sensors. The infrared transmitter requires a field of view of at least 25% in order to detect an object.



### Installation notice:

The sensors must be placed at least 1 m away from any air vents in order to avoid interference from airflow.

### Technical specifications:

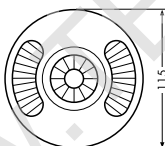
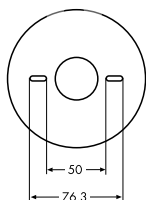
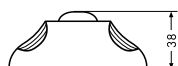
Supply voltage: 24 V DC ±10%  
 Lux range (blue potentiometer): 10-1000 Lux  
 Timer (black potentiometer): 8-40 min.  
 Ultrasound frequency: 32 KHz (presence detector)  
 Air temperature: 0...+40 °C  
 Air humidity: 0...95%  
 Protection category acc. to IEC 529: IP 40 flat installation, indoors  
 Weight: 142 grams

### Outputs:

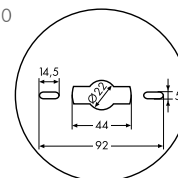
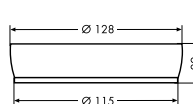
Blue wire (movement): NPN, max. 50 mA  
 Grey wire (movement and light): NPN, max. 50 mA  
 Relay (movement): Potential-free two-way contact, max. 24 V DC, 500 mA  
 Blue/white = Reference contact  
 Black/white = NC (opening contact)  
 Yellow/white = NO (closing contact)

## Dimensional diagrams of the ceiling presence detectors and surface-mounted housing

897.10 PM DE/100  
 897.10 PM DE/200



Surface-mounted housing 891.10



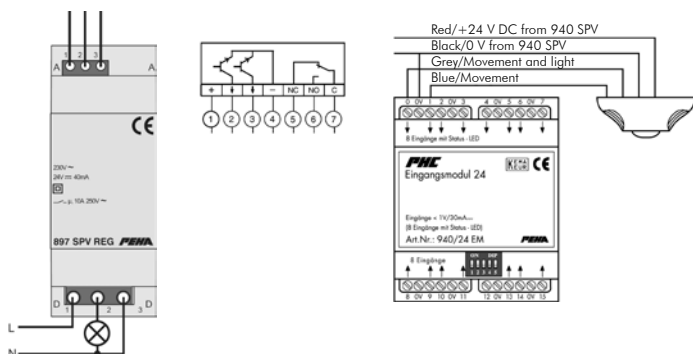
## Components of the ceiling presence detectors

### Minimum number of components

PEHA ceiling sensor (897.10 PM DE/200 or max. two 897.10 PM DE/100) and a power unit for the ceiling sensor (897 SPV-REG) or PHC building system technology. The ceiling sensor power unit (897 SPV-REG) supplies the sensor with 24 V DC and has a 10-A relay for switching loads. When using PHC, the ceiling presence detector is supplied with 24 V DC from the 940 SPV voltage supply. Bear in mind the power consumption at these dimensions.

### Connecting the ceiling sensor to the power unit:

One ceiling sensor can be operated with one power unit. Independent of light (e.g. ventilator):



### Function

(All settings at factory setting)

Light-independent output: The output is triggered by infrared and (blue line) ultrasound detection. The output remains switched on until both signals (infrared and ultrasound) are present. If both signals are not present for the duration of the set or learned time, the output switches off.

Light-dependent output: The output is only triggered by infrared and (grey line) ultrasound detection if the set Lux value is undercut. The output remains switched on until both signals (infrared and ultrasound) are present. If both signals are not present for the duration of the set or learned time, the output switches off.

### Connecting the ceiling detector to PHC building system technology:

Example:

Input 00.00 Movement and light for illumination  
 Input 00.01 Movement for ventilation or light-independent illumination control

PHC programming as a button (switch) sequence in the basic programming or individually in the function programming.

## Ceiling motion detectors 890 BM DE-L and 890 BM DE

### Technical specifications

Voltage supply: 230 V, 50 Hz  
 Load: max. 200 W / 200 VA  
 3x upstream appliances 1x58w  
 Ambient temperature: 0 - 50° C  
 Connection: 0.08 - 2.5 mm  
 Max. range: 5 m

### 890 BM DE-L setting options

Light value setting, above which the motion detector is switched off. Adjusting towards (-) switches off at lower light intensity, adjusting towards (+) switches off at higher light values. If the light value is exceeded when the ceiling lighting is switched on and daylight is increasing, the motion detector is deactivated and the ceiling lighting switched off after expiry of the pre-set follow-up time. Adjustable light value: 100-1000 Lux  
 Adjustable follow-up time: 10 s - 14 min

### 890 BM DE setting options

The motion detector on 890 BM DE is always active, irrespective of daylight intensity. The follow-up time is fixed at about 10 min. These appliances are ideal for toilets/storage areas, etc., with little incident light.

### Detection area

The orientation of the rectangular detection area is marked on the front as shown here.



Ceiling height	H (m)	W (m)	L (m)
	1.9	4.30	5.37
	2.0	4.53	5.65
	2.1	4.75	5.93
	2.2	4.98	6.21
	2.3	5.21	6.50
	2.4	5.43	6.78
	2.5	5.66	7.06
	2.6	5.89	7.34
	2.7	6.11	7.62
	2.8	6.34	7.91
	2.9	6.57	8.19
	3.0	6.79	8.47
	3.1	7.02	8.75
	3.2	7.24	9.04

Max. permissible ceiling height 5 m, although the monitored area is no longer magnified above a ceiling height of 3.2 m.

### Mounting accessories



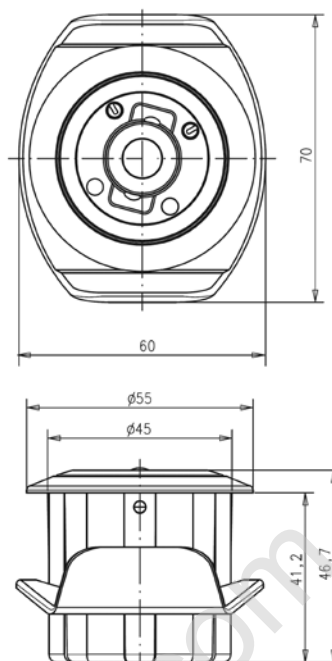
Line connection with actuator



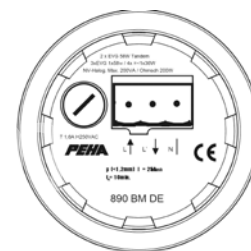
With cover



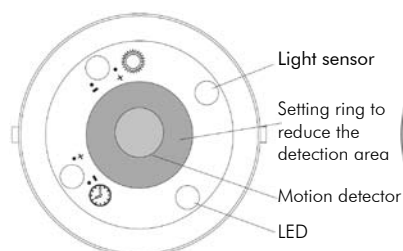
Strain relief



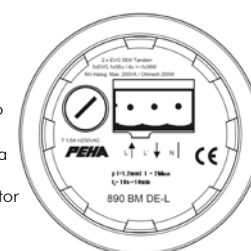
890 BM DE front



890 BM DE back



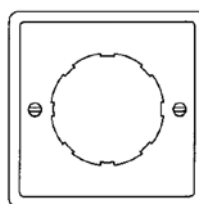
890 BM DE-L front



890 BM DE-L back

### Installation accessories

Adapter plate Art. No. 90.810.02 LS for mounting in suspended ceilings



Zone control

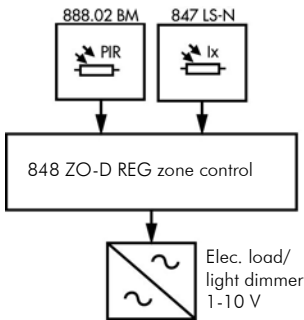
Dimming 848 ZO-D REG

**App. 10.01, e.g. for corridors (factory setting)**

Daylight-dependent three-zone control, automatically switched on/off by motion detector.

**Description of the function:**

The light switches on, when the motion detector detects activity and light is needed. The light is then controlled in daylight dependency in line with the set parameters in three channels for the duration of the activity. As incoming daylight increases, the room illumination is lowered to the set requisite minimum luminosity. If the motion detector does not detect any activity in its detection range or the room is sufficiently lit, the light switches off after a pre-set delay. Optional manual on/off and dimming via I/O.

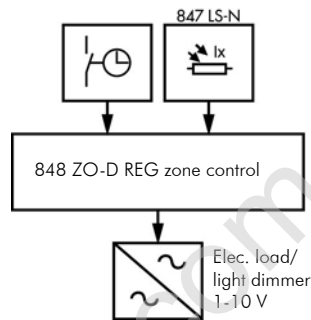


**App. 11.01, e.g. for exhibition halls**

Daylight-dependent three-zone control with (time switch).

**Description of the function:**

The daylight-dependent three-zone control is activated/deactivated by external (time switch). The light is then controlled in daylight dependency in line with the set parameters in three channels. As incoming daylight increases, the room illumination is lowered to the set requisite minimum luminosity. The light is switched off automatically by the time switch, resp. when the room is sufficiently lit. Optional manual on/off and dimming via I/O.

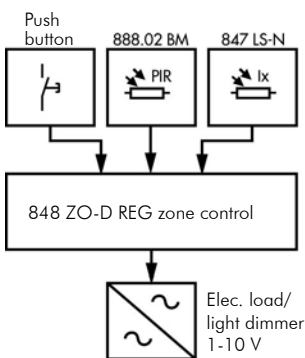


**App. 12.01, e.g. for offices/conference rooms**

Daylight-dependent three-zone control, manual on/off, automatically switched off by motion detector.

**Description of the function:**

The daylight-dependent three-zone control is activated/deactivated by push button. The light is then controlled in daylight dependency in line with the set parameters in three channels for as long as the motion detector detects activity. As incoming daylight increases, the room illumination is lowered to the set requisite minimum luminosity. If the motion detector does not detect any activity in its detection range or the room is sufficiently lit, the light switches off after a preset delay. Manual on/off and dimming via I/O.





### App. 13.01, e.g. for schools

Daylight-dependent two-zone control, one channel on/off, manual on/off, automatic off by motion detector.

#### Description of the function:

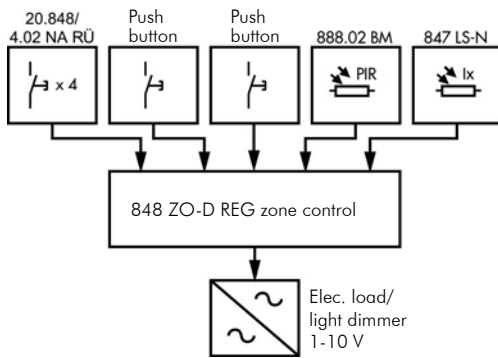
General lighting:

The daylight-dependent two-zone control is activated/deactivated by push button (door). The light is then controlled in daylight dependency in line with the set parameters in two channels for as long as the motion detector detects activity. As incoming daylight increases, the room illumination is lowered to the set requisite minimum luminosity. If the motion detector does not detect any activity in its detection range or the room is sufficiently lit, the light switches off after a preset delay. Manual on/off and dimming via I/O,  and .


Blackboard lighting:

The push button (blackboard) controls the on/off process. The light then remains switched on for as long as the motion detector detects activity. If the motion detector does not detect any activity in its detection range, the light switches off after a preset delay.




The blackboard lighting is switched off when the general lighting (push button door) is switched off.

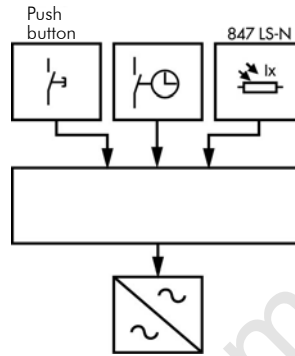





































### App. 14.01, e.g. for production halls

Daylight-dependent three-zone control, manual of/off with switch, automatic off by external  (time switch).

#### Description of the function:

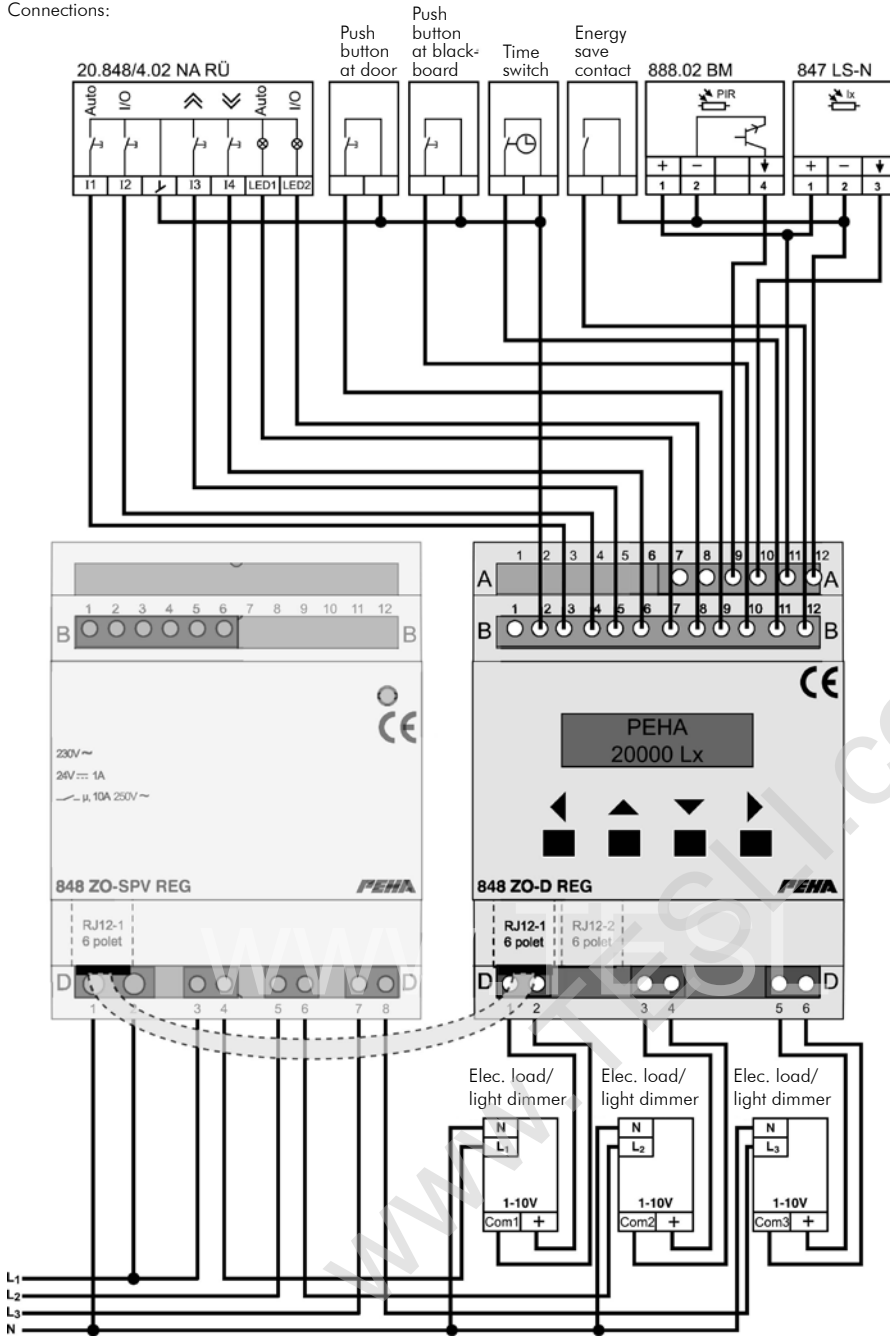
The daylight-dependent three-zone control is activated/deactivated by switch. The light is then controlled in daylight dependency in line with the set parameters in three channels. As incoming daylight increases, the room illumination is lowered to the set requisite minimum luminosity. The light is switched off automatically by the external  time switch, resp. when the room is sufficiently lit. Manual on/off and dimming via I/O,  and .



	Light sensor 847 LS-N	Movement sensor	Push-button at door	Push-button at blackboard	Time switch	20.848/ 4.02 NA RÜ	Energy save contct
App.							
10.01			 *		 *	 *	 *
11.01						 *	 *
12.01					 *	 *	 *
13.01					 *		 *
14.01						 *	 *

\* Optional

Connections:



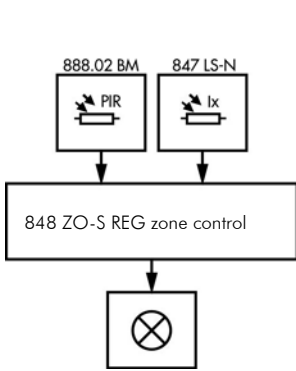
Switching 848 ZO-S REG

**App. 00.01, e.g. for corridors/halls (factory setting)**

Daylight-dependent three-zone on/off, automatic on/off by motion detector.

**Description of the function:**

The daylight-dependent three-zone on/off is activated when the motion detector detects activity. The light is then controlled in daylight dependency in line with the set parameters in three channels for the duration of the activity. As incoming daylight increases, the room illumination is lowered to the set requisite minimum luminosity. If the motion detector does not detect any activity in its detection range, the light switches off automatically after a pre-set delay. Optional manual on/off via I/O.

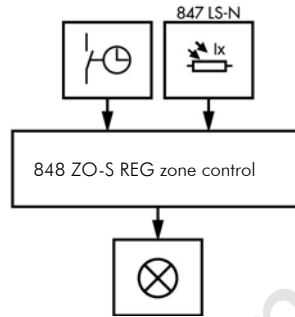


**App. 01.01, e.g. for exhibition halls**

Daylight-dependent three-zone on/off controlled by time switch.

**Description of the function:**

The daylight-dependent three-zone on/off is activated/deactivated by an external time switch. The light is then controlled in daylight dependency in line with the set parameters in three channels. As incoming daylight increases, the room illumination is switched off, when it reaches the set requisite minimum luminosity. Optional manual on/off via I/O.

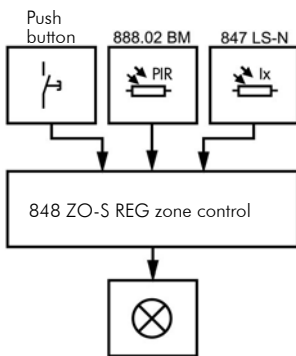


**App. 02.01, e.g. for warehouses**

Daylight-dependent three-zone on/off, manual on/off by (push button), automatic off by motion detector.

**Description of the function:**

The daylight-dependent three-zone on/off is activated/deactivated by push button. The light is then controlled in daylight dependency in line with the set parameters in three channels for as long as the motion detector detects activity. As incoming daylight increases, the room illumination is switched off when it reaches the set requisite minimum luminosity. If the motion detectors do not detect any activity in their detection range, the light switches off automatically after a pre-set delay. Optional manual on/off via I/O.





### App. 03.01, e.g. for schools

Daylight-dependent two-zone on/off, one channel on/off, manual on/off, automatically switched off by motion detector.

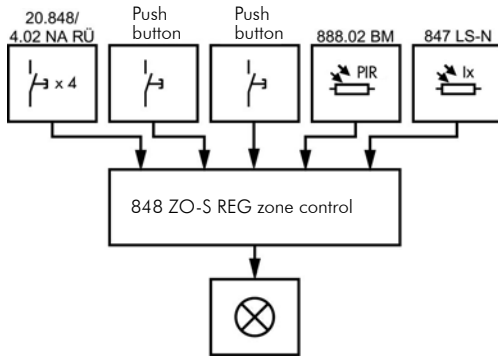
#### Description of the function:

##### General lighting:

The daylight-dependent two-zone control is activated/deactivated by push button (door). The light is then controlled in daylight dependency in line with the set parameters in two channels for as long as the motion detector detects activity. As incoming daylight increases, the room illumination is lowered to the set requisite minimum luminosity. If the motion detector does not detect any activity in its detection range or the room is sufficiently lit, the light switches off after a pre-set delay. Manual on/off via I/O.

##### Blackboard lighting:

The push button (blackboard) activates/deactivates the on/off process. The light then remains switched on for as long as the motion detector detects activity. If the motion detectors do not detect any activity in their detection range, the light switches off after a pre-set delay. The blackboard lighting is switched off when the general lighting (push button door) is switched off.

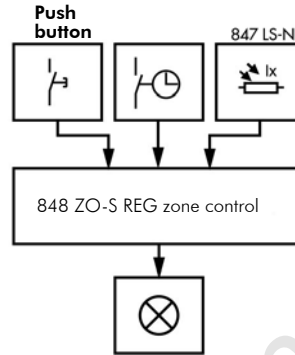


### App. 04.01, e.g. for production halls

Daylight-dependent three-channel on/off, manual on/off by push button, automatic off by time switch.

#### Description of the function:

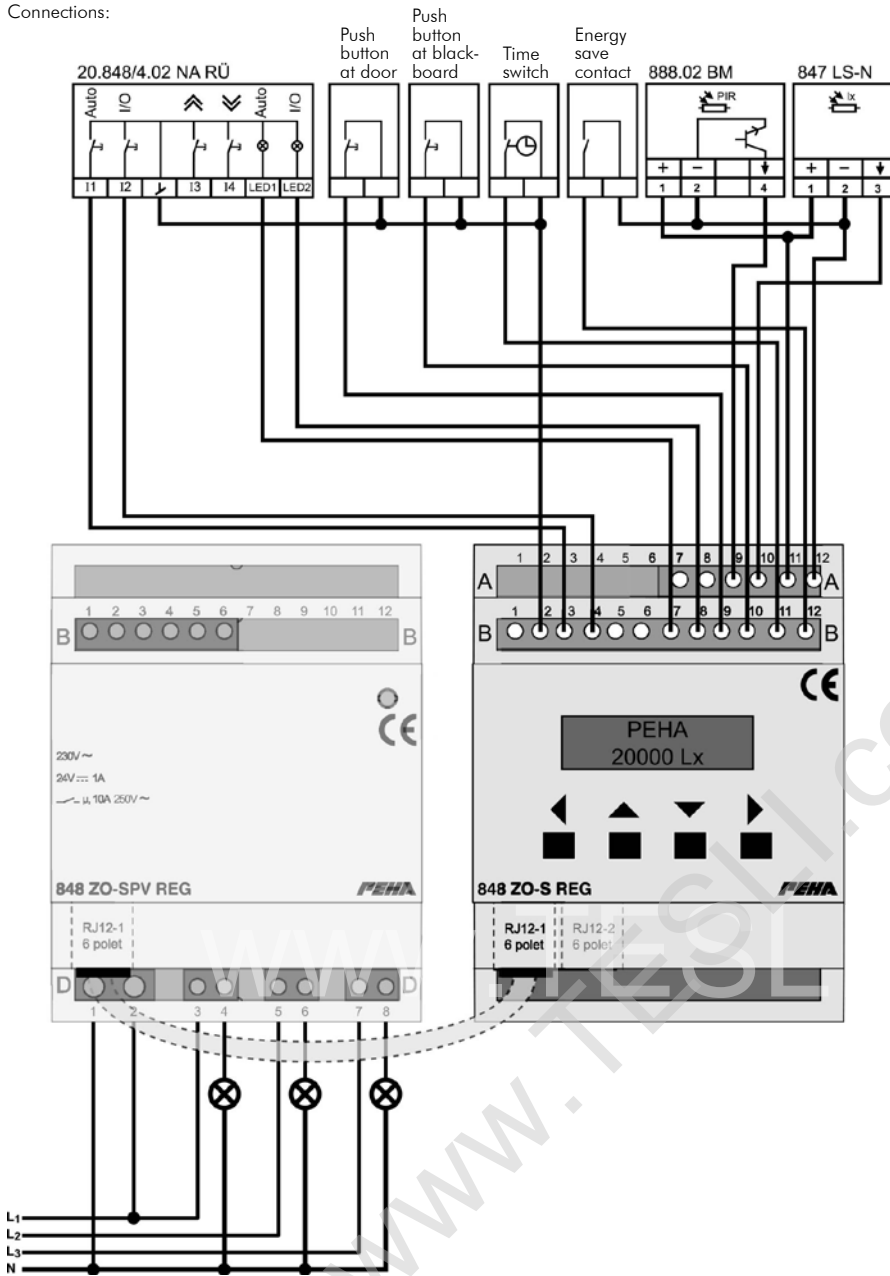
The daylight-dependent three-channel on/off is activated/deactivated by switch. The light is then controlled in daylight dependency in line with the set parameters in three channels. As incoming daylight increases, the room illumination is switched off when it reaches the set requisite minimum luminosity. The light can be switched off automatically by time switch. Optional manual on/off via I/O.



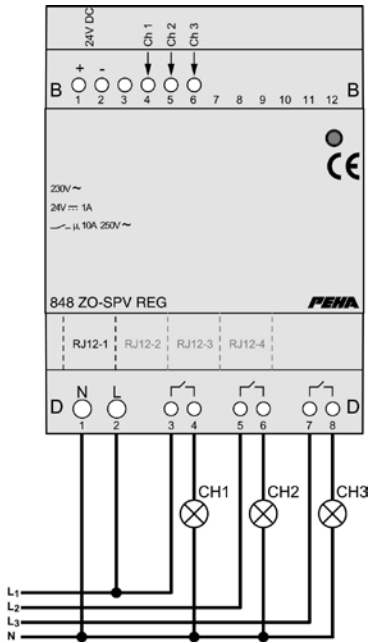
	Light sensor 847 LS-N	Movement sensor	Push-button at door	Push-button at blackboard	Time switch	20.848/ 4.02 NA RÜ	Energy save contct
App.							
00.01			*		*	*	*
01.01						*	*
02.01					*	*	*
03.01					*		*
04.01						*	*

\* Optional

Connections:



848 ZO-SPV REG voltage supply



The 848 ZO-SPV REG voltage supply is designed to supply the zone control.

**Protection**

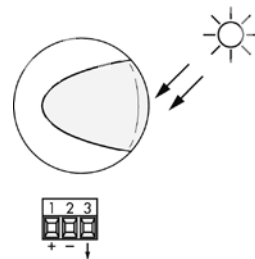
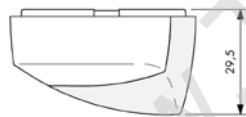
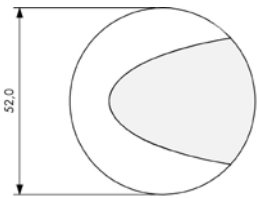
The integrated protective switching is triggered by overloads.  
The protective switching is **reset when switched off**.  
The voltage supply can bear a max. load of 1 A.

Load:

- R 2300 W
- L 1200 VA
- C 140  $\mu$ F

Light sensor 848 LS-N for zone control 848 ZO-... REG

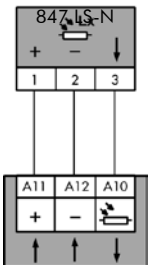
Dimensions:



Operation temperature -40 °C...50 °C

IP 20

Connection:

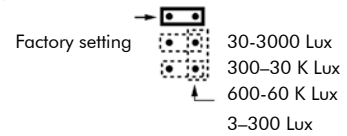


Zone control



- Ø 1 +24 V DC  $\pm$ 10%
- Ø 2 -24 V DC  $\pm$ 10%
- Ø 3  $\downarrow$ 0-10 V
- Ø 2  $\downarrow$ 0-10 V

Setting the values:



Motion detector 888.02 BM without light sensor for zone control 848 ZO-... REG

**Areas of application**

The 888.02. BM motion detector is used for controlling light using zone control.

The use of light control offers a range of advantages, for example in the following areas:

- Corridors
- Exhibition rooms
- Offices
- Conference rooms
- Training rooms
- Production halls
- Canteens
- Sports halls
- Halls
- Warehouses

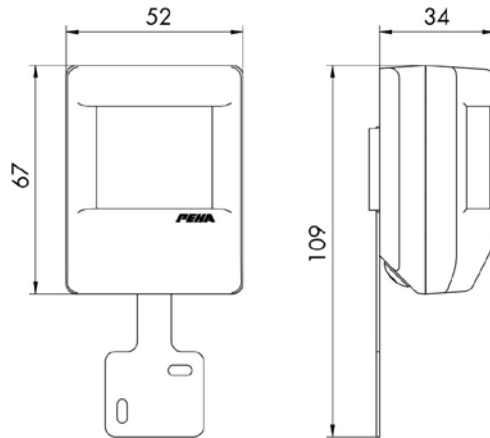
**Function**

Motion detector 888.02 BM without incorporated light sensor.

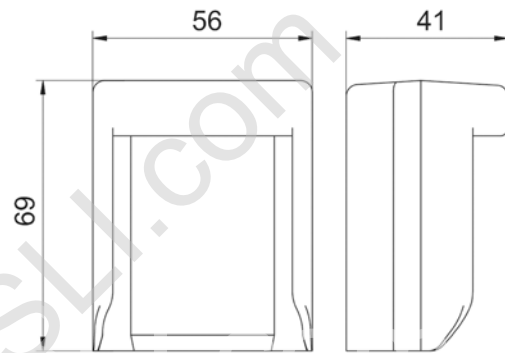
Depending on the type of zone control, the motion detector 888.02 BM switches on the room lighting.

The light goes off after a pre-set time if the motion detector 888.02 BM does not detect any movement in its detection range.

Dimensions:

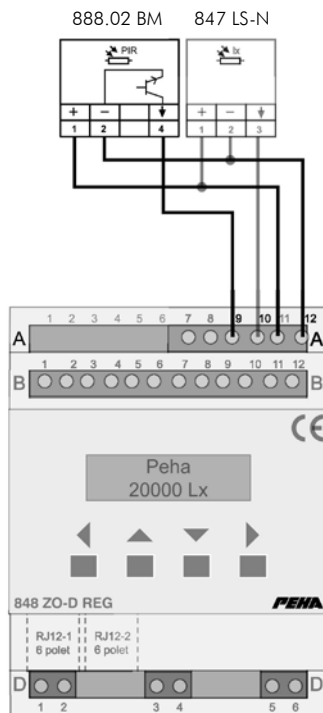


Motion detector 888.02 BM

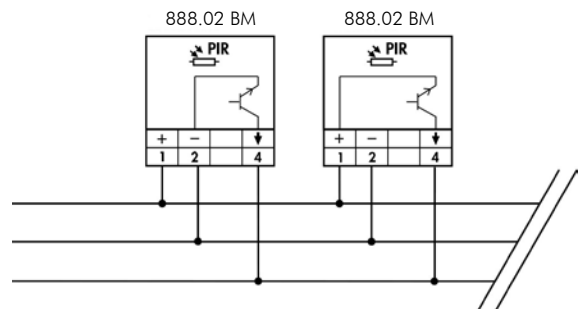


Protective cap 88 WA for 888.02 BM (IP 54)

Connection:



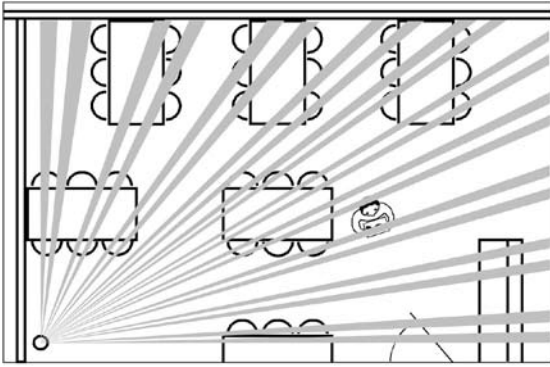
Parallel switching (max. 8):



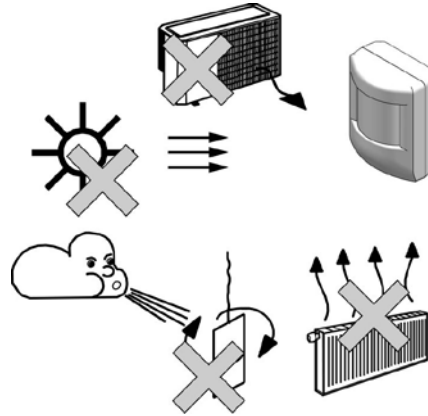
**Technical specifications:**

Supply voltage	24 V DC ± 10%
Power consumption:	
Standby	< 3 mA (24 V DC)
Max. current strength	< 50 mA (24 V DC)
Switch output	ON/OFF, NPN
Range	90°, 0,5..0.15 m
Type of protection	IP 20
With 88 WA cover	IP 54
Ambient temperature	-20 °C.. +50 °C
Cable entry	2 x Ø 6mm

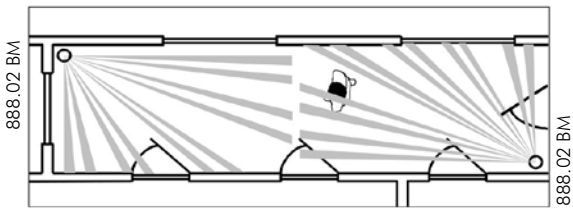
Location:



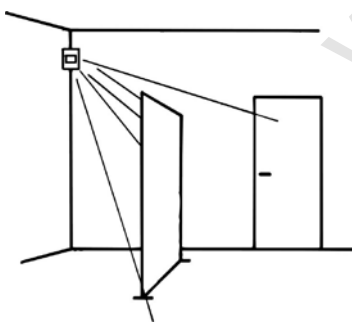
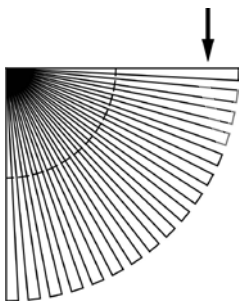
888.02 BM (e.g. classroom)



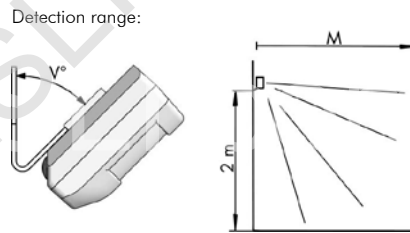
Avoid proximity to sources of heat.



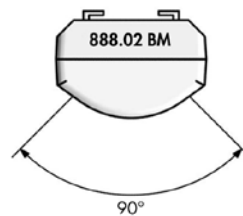
(e.g. long corridor)



Restrictions caused by obstacles (e.g. partition walls) should be avoided.



888.02 BM		metres				
M	15	7,5	4	3	1,5	
V	0°	5°	10°	20°	45°	



Motion detector 888.02 BM-H without light sensor for zone control 848 ZO-... REG

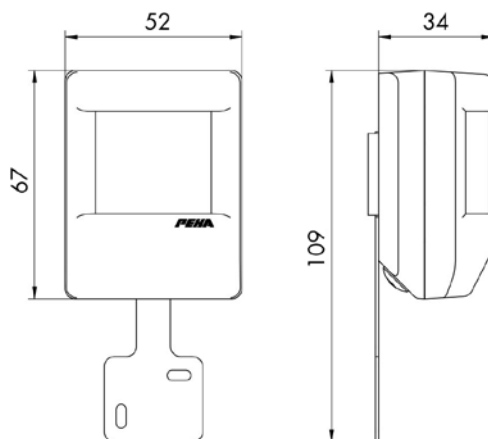
**Areas of application**

The 888.02. BM-H motion detector is used for controlling light using zone control. 888.02 BM-H is designed for use in warehousing.

**Function**

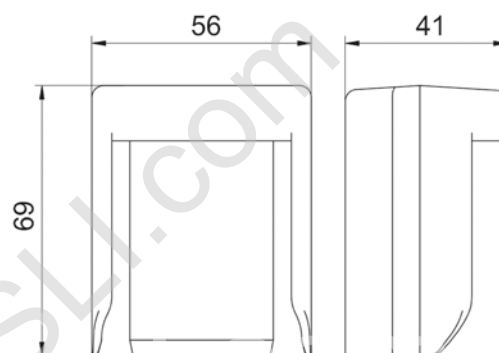
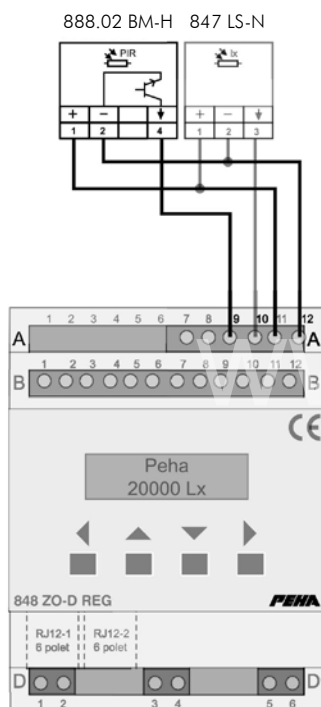
Motion detector 888.02 BM-H without incorporated light sensor. Depending on the type of zone control, the motion detector 888.02 BM-H switches on the room lighting. The light goes off after a pre-set time if the motion detector 888.02 BM-H does not detect any movement in its detection range.

Dimensions:



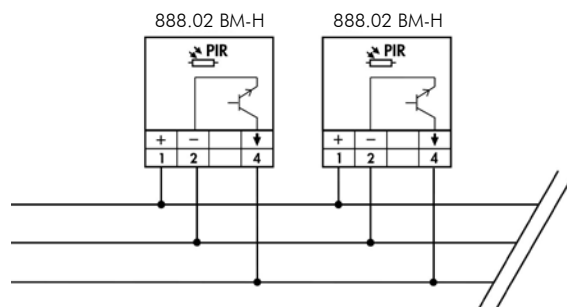
Motion detector 888.02 BM

Connection:



Protective cap 88 WA for 888.02 BM (IP 54)

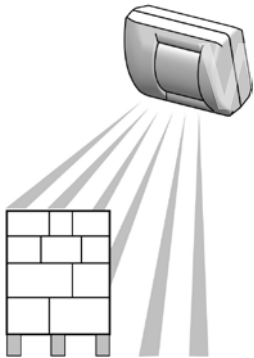
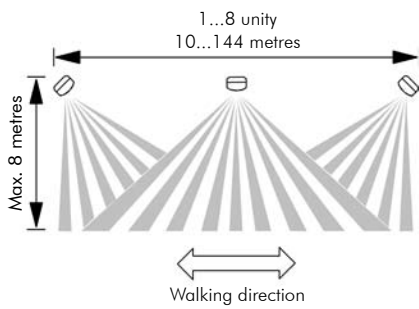
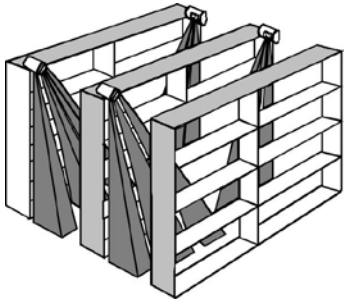
Parallel switching (max. 8):



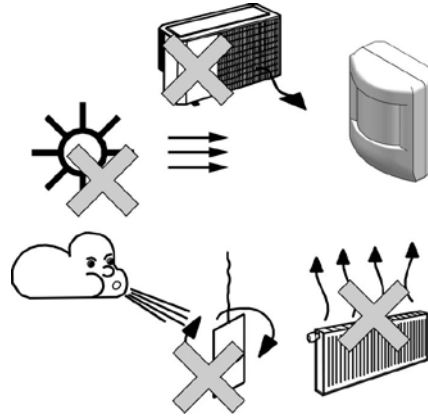
**Technical specifications:**

Supply voltage:	24 V DC ± 10%
Power consumption:	
Standby:	< 3 mA (24 V DC)
Max. current strength:	< 50 mA (24 V DC)
Switch output:	ON/OFF, NPN
Range:	90°, 0,5..0.15 m
Protection type:	IP 20
With 88 WA cover:	IP 54
Ambient temperature:	-20 °C..+50°C
Cable entry:	2 x Ø 6mm

Location:

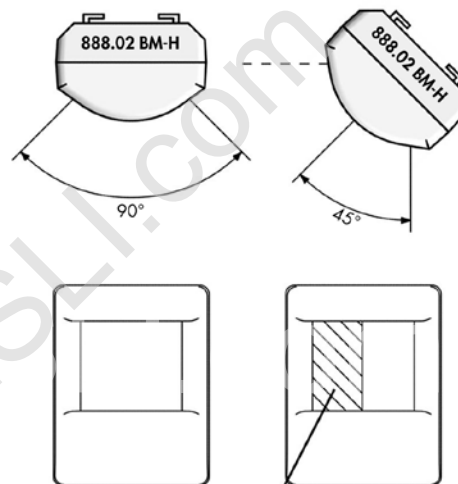


Restrictions caused by obstacles (e.g. partition walls) should be avoided.



Avoid proximity to sources of heat.

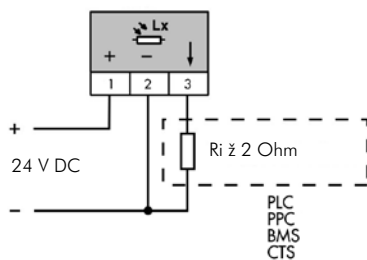
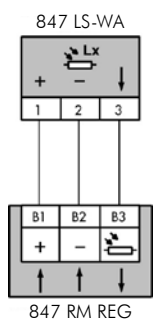
Detection range:



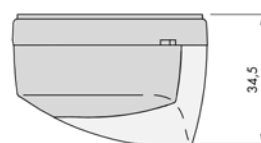
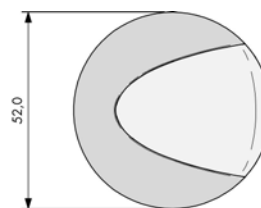
Use enclosed tape to cover lens

Light sensor 847 LS-WA

Connections:

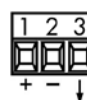
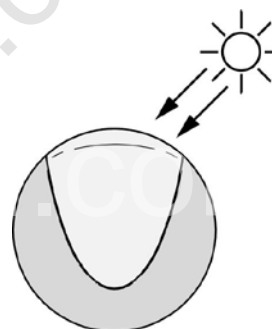
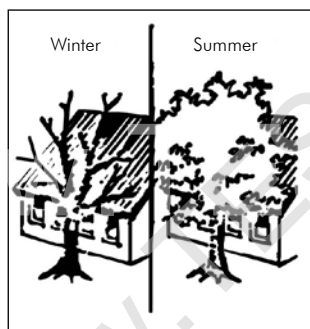
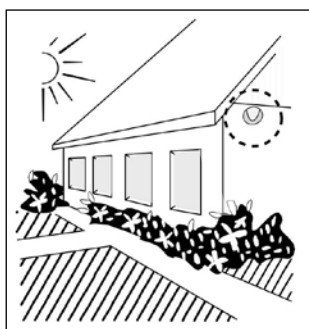


Dimensions:



- Ø 1            24 V DC ±10%
- +              -
- Ø 2            -
- Ø 3            0-10 V
- Ø 2            -

Location:



We recommend that the light sensor 847 LS-WA be placed facing North/East to ensure optimal control of the lighting. Care must be taken to ensure that the light sensor 847 LS-WA is not influenced by other lighting or its own scattered light. Changes to the strength of daylight caused by reflections, leaves falling, trees and bushes being cut down can result in changes to the on/off switching process. Please ensure that the light sensor setting is changed to 3 – 300 Lux.



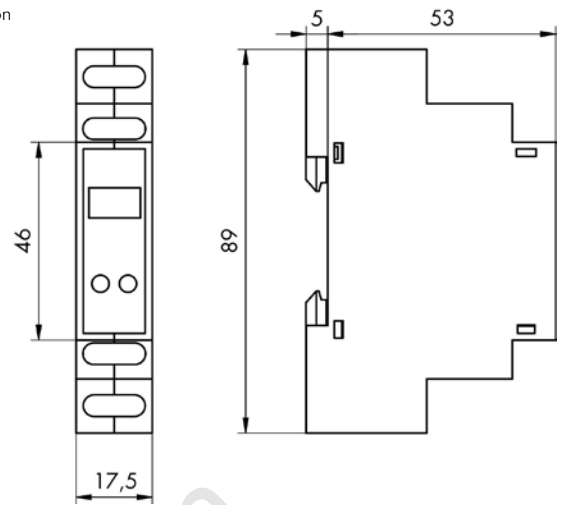
Light management

Dusk switch 847 RM REG

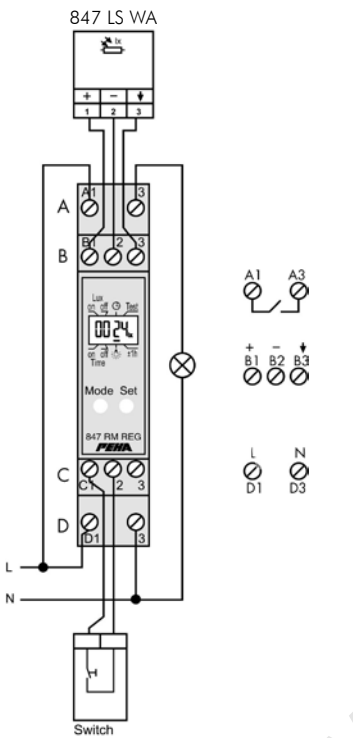
The 847 RM REG is designed for mounting on a control board on a DIN rail. An external light sensor 847 LS-WA is connected to the 847 RM REG to measure the relevant level of daylight. The dusk switch is a practical solution for the following areas:

- Car parks
- Outdoor areas
- Footpaths/Alleyways
- Street lighting

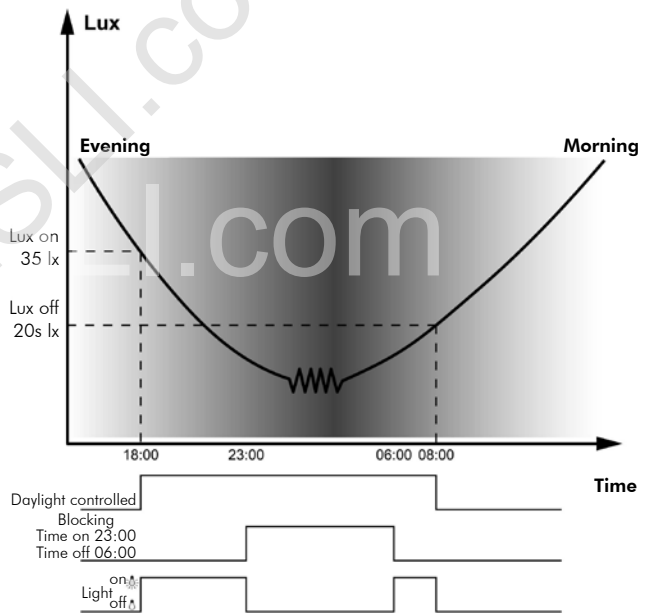
Dimension



Connection:



Blockage time:



**Load:**

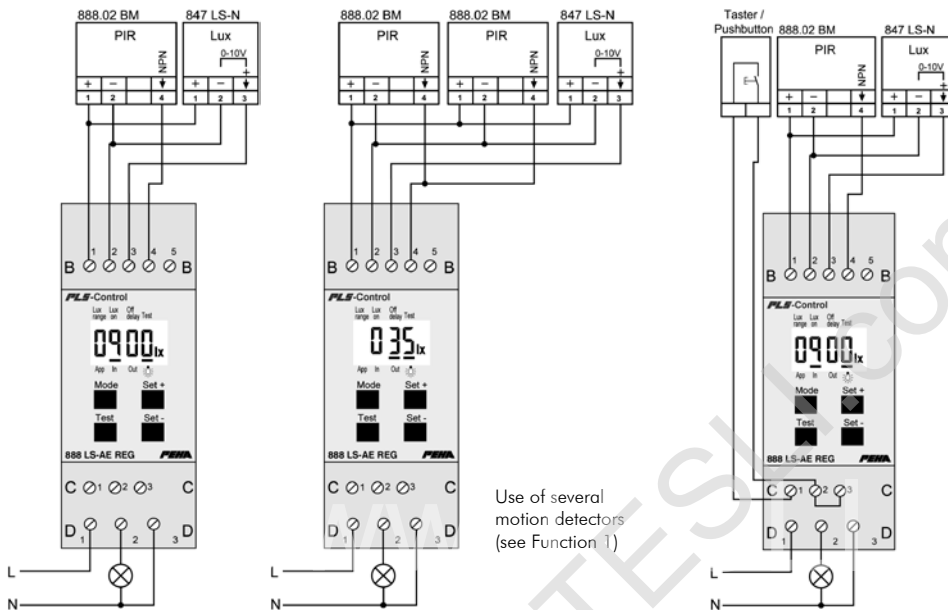
Light bulbs	2300 W
Uncompensated fluorescent tubes	1200 VA
Halogen light bulbs	500 W
Max. compensation capacity	140 $\mu$ F
Max. start-up current	80 A / 20 m sec.
Power consumption	< 1 W
Lux range	3–300 lx

PLS - Control 888 LS-AE REG

Functions

Function	PIR				Manual function					
	Automatic ON	Automatic OFF	Daylight-dependent	Daylight-independent	OFF	ON	Continuous ON	Button/switch activation	Daylight-dependent	Daylight-independent
Function 1	•	•	•							
Function 2					•	•		Button	•	
Function 3a	•	•	•			•		Button		•
Function 3b	•	•	•			•	•	Switch		•
Function 4	•	•			•			Button		
Function 5	•	•	• only ON	• only OFF						
Function 7	•	•		•						

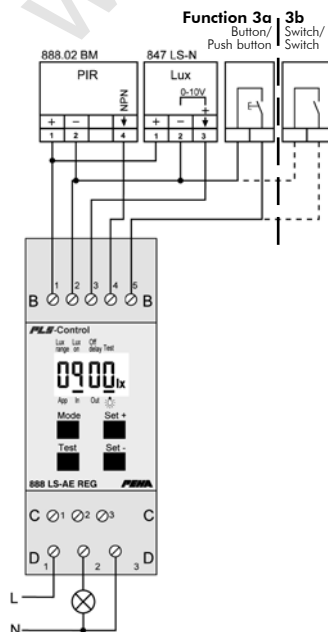
Internal application:



Use of several motion detectors (see Function 1)

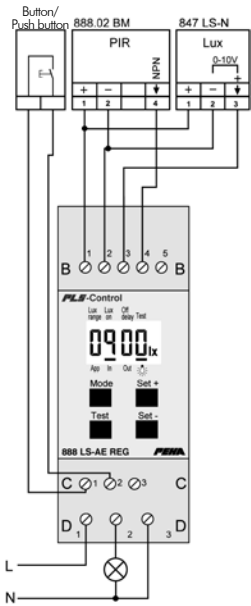
**Function 1: Automatic ON and OFF triggered by motion detector - daylight-dependent. External light sensor in use; brightness is 1st priority**  
Automatic ON and OFF triggered by motion detector - daylight-dependent. Lighting switches on automatically when movement is detected in the monitoring range and the light intensity is less than the set brightness level (Lux on). Lighting switches off again after a pre-defined period, when movement is no longer detected in the monitoring range or the light intensity exceeds the set brightness level.

**Function 2: Manual ON / OFF using button - daylight-dependent**  
Manual ON and OFF using button, automatic OFF triggered by movement detection or daylight. The button can be used to switch on the lighting if daylight intensity is less than the set brightness level. Lighting switches off again after a pre-defined period when movement is no longer detected in the monitoring range or the light intensity exceeds the set brightness level. The button function can always be used to switch off the lighting.



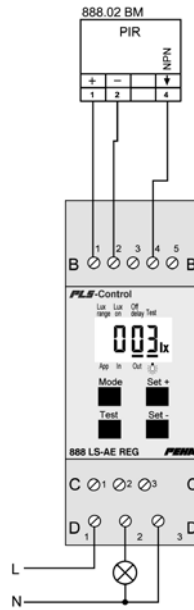
**Function 3a: Manual ON using button - daylight-independent**  
Automatic ON and OFF triggered by motion detector - daylight-dependent. Lighting switches on automatically, when movement is detected in the monitoring range and the light intensity is less than the set brightness level. Lighting switches off again after a pre-defined period, when movement is no longer detected in the monitoring range or the light intensity exceeds the set brightness level. The light can be switched on using the button function independently of daylight intensity.

**Function 3b: Continuous light**  
A switch can be used instead of the button, e.g. a key switch for maintenance purposes. This allows continuous switching of the light.



**Function 4: Manual OFF using button (energy saving operation)**

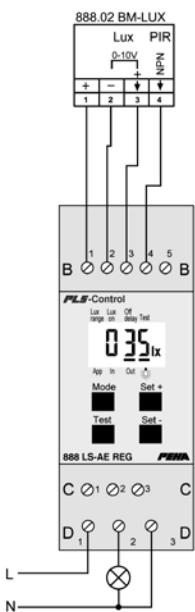
Automatic ON and OFF triggered by motion detector - daylight-dependent. Lighting switches on automatically when movement is detected in the monitoring range and the light intensity is less than the set brightness level. Lighting switches off again after a pre-defined period when movement is no longer detected in the monitoring range or the light intensity exceeds the set brightness level. If the button is used to switch off the light, a 10-second lock prevents it being switched on again, after which the motion detector can automatically switch on the light again.



**Function 6: Automatic ON and OFF triggered by motion detector. Light sensor not in use**

Automatic ON and OFF triggered by motion detector. Lighting switches on automatically, when movement is detected in the monitoring range. The light switches off again automatically, when movement is no longer detected in the monitoring range.

**External application**



**Function 5: Automatic ON and OFF triggered by motion detector - daylight-dependent. Light sensor in use in the motion detector, brightness is 2nd priority.**

Automatic ON and OFF triggered by motion detector - daylight-dependent. Lighting switches on automatically when movement is detected in the monitoring range and the light intensity is less than the set brightness level. The light switches off again automatically, when movement is no longer detected in the monitoring range.

Manual functions can also be used in combination with the external application.

**Technical specifications**

<u>Input:</u>	
Supply voltage:	230 V ± 10% 50 Hz
Load:	max. 40 mA (not short circuit proof)
Power consumption:	approx. 2 W
Light sensor signal:	0-10 V
<u>Output:</u>	
Relay contact:	NO, μ 10 A
Load:	
Light bulbs:	2300 W
Uncompensated fluorescent tubes:	1200 VA
Halogen light bulbs:	00 W
Max. compensation capacity:	140 μF
Energy-saving lamps:	58 lamps (18 W)
Max. start-up peak:	80 A / 20 m sec.
Secondary voltage:	24 V DC ± 10%
Motion detector 888.02 BM(-LUX)	max. 8
Lux range:	3-300 lx or 30-3000 lx or 300-30000 lx
Setting range:	3-270 lx or 30-2700 lx or 300-27000 lx
Tolerance in Lux range:	± 10 %
Off delay:	0 – 60 min.
Positive hysteresis:	10%
Protection type:	IP 20
Insulation class:	Class II product
Ambient temperature:	+5°C..+50°C

Shutter operation using the multiple control relay 409 SR

**Description**

The multiple control relay allows you to easily combine shutter drives into group systems. These can be individual groups or centrally controlled subgroups. The benefits offered by the product are very special:

- superb operating reliability
- particularly compact design, only 22 mm high
- complete separation of load and control circuits
- automatic locking mechanism in both directions of travel to protect your drives and control equipment

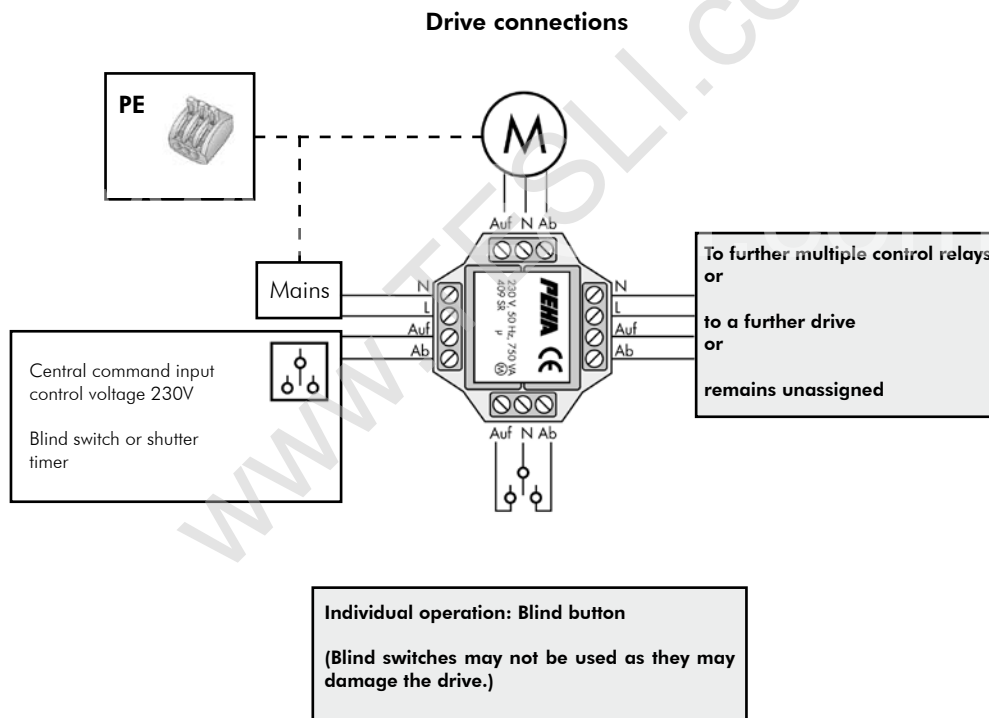
**Drive operation**

One or two shutter drives can be connected to each multiple control relay. **Blind buttons are connected for local operation. Do not use blind switches as these can damage the system and drives!** A blind button or switch, time switch or programmable shutter switch can be used as the control centre. **The central command works as a priority circuit.**

**Technical specification and installation dimensions**

Supply voltage:	230 V, 50 Hz, ±10%, Neutral conductor required
Control voltage:	230 V, 50 Hz, ±10%
Power consumption:	10 mA in relay operation mode
Switching capacity:	μ 6 A, 250 V AC, Engine load max.750 VA, only for 230-V drives with with limit switches
Temperature range:	0-60 °
Screw clamps:	massive, 2 x 1.5 mm <sup>2</sup> , 1 x 2.5 mm <sup>2</sup> , flexible 1.5 mm <sup>2</sup>
Dimensions:	H 22 x W 52 x D 49 mm
Installation:	in deep flush device box or SM moisture-proof branch box

**The total phase load must be taken into account when designing the overall system.**

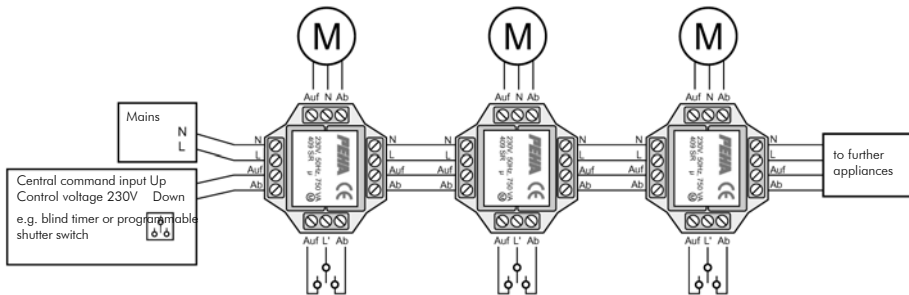


Multiple control relay 409 SR for shutter drives

The central command works as a priority circuit.

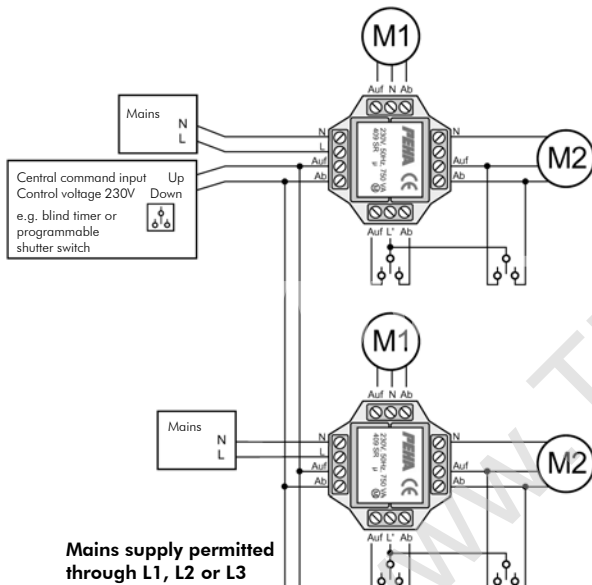
**Application example 1 (single drive operation)**

One multiple control relay 409 SR is needed for each drive.




**Application example 2 (dual drive operation)**

Connection of two drives to a multiple control relay 409 SR and an example for setting up group control with subgroup.



**Important notices:**

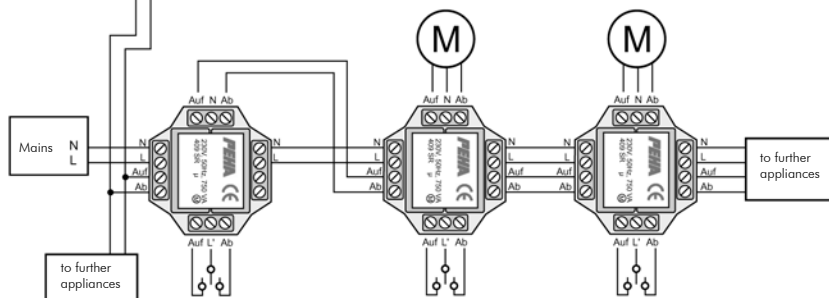
- Only use blind buttons for individual operation; blind switches damage the system
- Please take the total phase load into consideration when planning the overall system
- The central command works as a priority circuit
- The application examples do not take account of the protective conductor connections (PE). Each appliance is supplied with a terminal that is suitable for rigid and flexible conductors.



**Legend:**

N	Neutral conductor
L	Phase
L'	Switched phase
Up	Drive direction up
Down	Drive direction down

Mains supply permitted through L1, L2 or L3



Multiple control device as control device for group operation

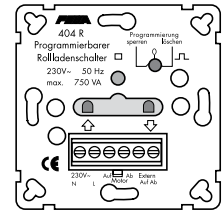
An additional multiple control device is needed for each subgroup. The application example shown here shows „single drive operation“. The drives can also be operated in „dual drive operation“ model.

## Programmable shutter switch 404 R

The programmable shutter switch 404 R is controlled by a microprocessor and is used for controlling drive-operated shutters and blinds.

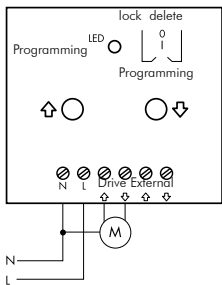
- Manual operation UP, DOWN, STOP
- Manual operation up to 1 sec. = slat adjustment
- Manual operation more than 1 sec. self-run for 3 min.
- Programming of an up and down time that is repeated every 24 hours (e.g. on weekdays) = Manual operation 7 – 12 sec.
- Programming of individual up and down times for each day that are only executed on that weekday (e.g. different times for Saturdays and Sundays) = Manual operation 12-17 sec.

- Programming lock for use, e.g., in children's rooms
- Automatic function can be temporarily disengaged
- Up to max. 1 hour reserve in case of power outage
- The 3 min. self-run can be stopped manually
- Several 404 R can be combined into groups using two external 230 V inputs. All shutter switches must be connected in the same phase.
- The external inputs are designed to operate in button sequence. The shutter switch does not work in self-run mode. Observe priorities, see Fig. 2.
- Nominal voltage 230 V, 50 Hz, for one drive max. 750 VA

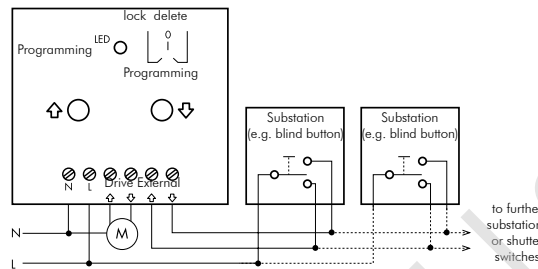


### Examples of application

**Fig. 1:**  
Individual control



**Fig. 2:**  
One or more substations for additional means of operating the shutter switch



#### Priorities:

External signals must be in the same phase as the 404 R.

#### External signal DOWN ↓

The shutter moves DOWN as long as the signal is present. The appliance can be stopped locally by pressing UP or DOWN.

#### External signal UP ↑ always has priority

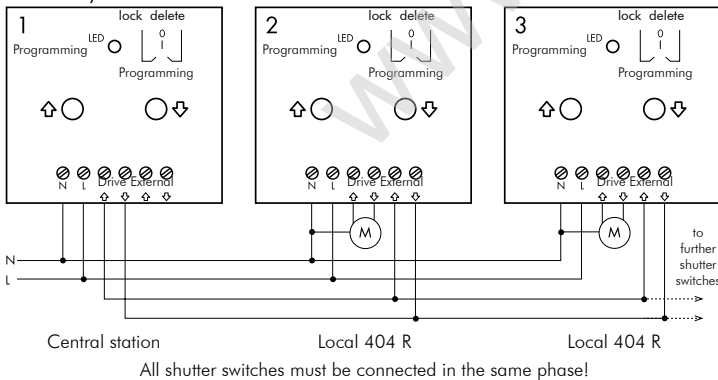
The shutter moves UP, as long as the signal is present. The appliance can **not** be stopped locally by pressing UP or DOWN. This is especially useful during wind alarm, servicing, etc.

#### Special feature

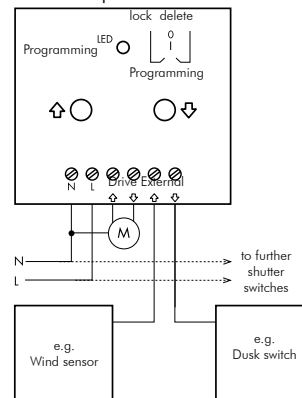
If the shutter switch is self-running when the external signal UP is triggered, the appliance stops. If the external signal UP continues for more than 7 sec. the shutter moves UP. The drive relay UP is halted for the duration of the external signal UP.

Local interference is not possible during the duration of the external signal UP. Application: Wind alarm, servicing, cleaning

**Fig. 3:**  
Shutter switch 1 centrally controls a group comprised of any number of further appliances, even if these are located in several different rooms. Shutter switches 2 and 3 can be activated individually on site.



**Fig. 4:**  
The shutter switch responds to any command initiator that supplies a 230 V signal to the „External UP“ and „External DOWN“ inputs.



The electronic blind timers 814 J and 814 JS with sun sensor connection can, for example, also be used as the central station.

#### Caution:

Groups comprised of 404 R and 814 J may not be connected to each other via the external inputs.

A cut-off relay 409 SR can be used locally in each case as an alternative.

Max. cable length 50 m, max. 6 appliances per group.

External signals must be in the same phase as the 404 R. Observe priorities, see Fig. 2.

## Weekly shutter timer 291 JR for FM relay insert 293/2 o.A.

### General

The weekly shutter timer (291 JR) is used in combination with relay insert 293/2. The weekly shutter timer can be used to automatically or manually control a shutter, blind or awning. It can be switched using two relay insert substations.

- Manual operation
- Adjustable intervals
- Day/Week programming
- 24 programmable time switches
- 30 minutes reserve power in case of power failure, no loss of programming.

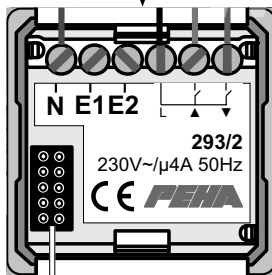
### Technical specifications

Installation height: 0.8 - 1.5 m  
 Minimum transit time: 1 minute  
 Ambient temperature: 0° to +40°C  
 Storage temperature: -25° to 75°  
 Identification: CE  
 Protection type: IP 20

### View and accessories



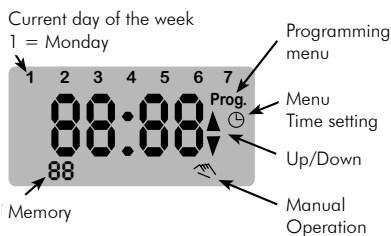
Weekly shutter timer 291 JR



Relay insert 293/2

Jack for upper section

### Display and operating buttons



- ▲ Down
- ▼ Select
- day part of week / day
- prg Activate programming mode
- ⌚ Set time and day
- Reset

**Note:** The day and prg buttons are only used, when the shutter timer is commissioned for the first time or programmed.

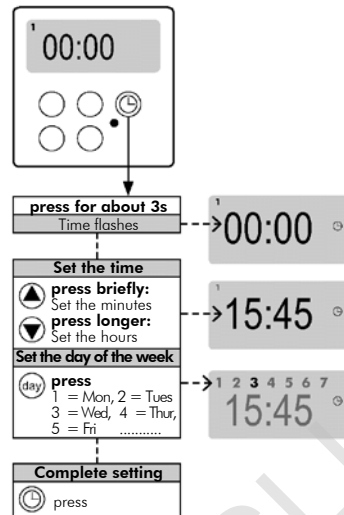
### Important installation notes

- Only connect the shutter timer to the relay insert 293/2.
- Only remove or plug the shutter timer into the jack when the power is turned off.
- Only use one drive for each shutter timer!
- Only use indoors.

### Functions/Basic settings

The basic setting must be programmed prior to first use or following a reset.

### Set time and day

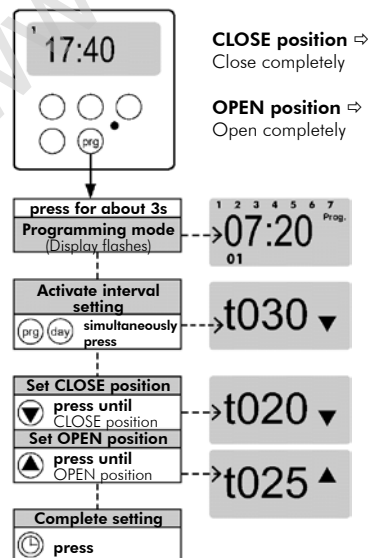


### Set the interval

Shutters, blinds and awnings are not always the same length. As such the interval (time between CLOSE and OPEN) must be set.

### Factory interval settings

CLOSE position ⇨ Close completely t=30s  
 OPEN position ⇨ Open completely t=30s



### Notes:

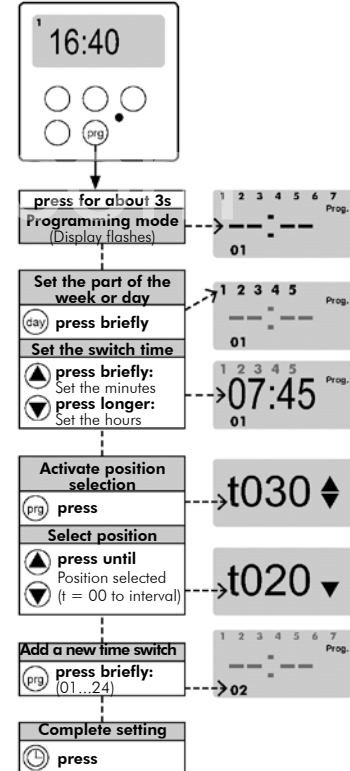
- The OPEN position (open completely) must be set before setting the interval!
- The device returns automatically to basic display if no buttons are pressed for 30s.

### Programming the time switches

The device can control a shutter, blind or awning automatically using time switches. 24 time switches can be programmed (01 - 24). Each timer contains the switching time and the day or part of the week.

Day of the week	
Mon = 1, Tues = 2, Wed = 3, Thur = 4, Fri = 5, Sat = 6, Sun = 7	
Part of week	
Mon - Sun (full week)	⇨ 1 2 3 4 5 6 7
Mon - Sat (long working week)	⇨ 1 2 3 4 5 6
Mon - Fri (short working week)	⇨ 1 2 3 4 5
Fri - Sun (long weekend)	⇨ 5 6 7
Sat - Sun (short weekend)	⇨ 6 7
Position of a shutter, blind or awning	
A position (t = 00 to t = interval) can be selected for each programmed switch time. If the interval is t = 30 s, for example, the positions are as follows:	
CLOSE position ⇨ Close completely	(t = 00s)
Position 1/3 ⇨ 1/3 open	(t = 10s)
Position 1/2 ⇨ 1/2 open	(t = 15s)
Position 2/3 ⇨ 2/3 open	(t = 20s)
OPEN position ⇨ Open completely	(t = 30s)
Important function note!	
The intervals must already have been set (see Basic settings)!	

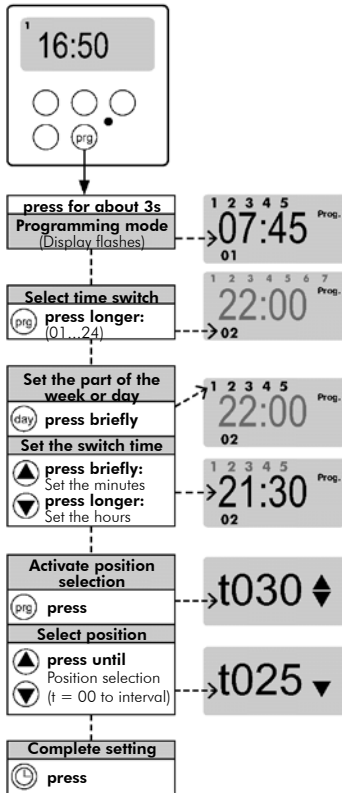
### Add a new time switch



### Notes:

- The setting can be interrupted at any time.
- The number of remaining free time switches is displayed, e.g. rE: 21 = 21 time switches remaining.
- The device returns automatically to basic display if no buttons are pressed for 30s.

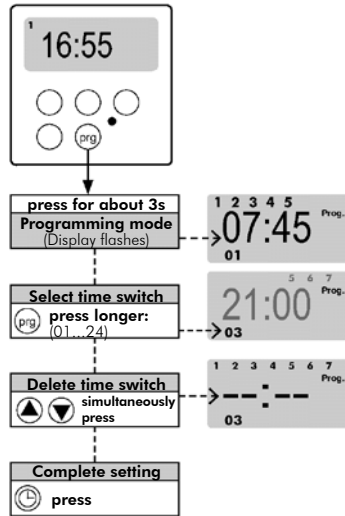
## Changing a switch time



## Notes:

- The setting can be interrupted at any time.
- The number of remaining free time switches is displayed, e.g. rE: 21 = 21 time switches remaining.
- The device returns automatically to basic display if no buttons are pressed for 30s.

## Delete time switch



## Switching timer operation on/off

Automatic operation using programmed time switches can be switched on or off.

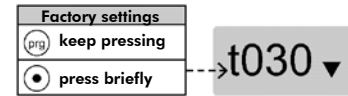
Shutter timer	Function	Display
Button UP+DOWN	Time switches ON	flashes
press simultaneously	Time switch OFF	does not flash

## Reset button

In case of malfunction, press the RESET button briefly. Programmed settings are maintained.

## Call up factory settings

All of the settings and time switches programmed by the user will be deleted. **Caution!** A new basic setting must then be programmed!



The display first shows **t030** followed by **30s t. OPEN position** (open completely) is set automatically. The interval setting function is then active and the interval can be set.

## Operation

The relay insert is operated automatically using programmed timers or manually using the UP and DOWN buttons. The relay insert can also be switched from two substations.

## Manual operation

The system can be operated manually at any time. The hand symbol "manual operation" flashes.

Shutter timer	Display
Long pressure on UP button	Up
Long pressure on DOWN button	Down

## Substation function (relay insert)

The external buttons on substation inputs E1 and E2 on the relay insert perform the following functions:

Relay insert	Display
Keep pressing (E1)	Up
Keep pressing (E2)	Down

## Relay insert 293/2 o.A.

### General

The relay insert 293/2 o.A. is combined with different upper sections. Different switching functions are possible. A weekly shutter timer (290 JR) and a timer (291 Z) can be used as upper sections. The switching functions are performed on the upper section (automatically or manually). The relay insert can also be switched from two substations. The relay insert can switch various consumers, such as bulbs, HV halogen lamps, upstream appliances and inductive loads.

### Technical specifications

Voltage supply:	230 V, 50 Hz
Protection of the Power supply cable:	Circuit breaker or fuse, max. 16 A
Line diameter of the Connection terminals	2x 1.5 mm <sup>2</sup> or 1x 2.5 mm <sup>2</sup>
Stripping length =	8 mm
Installation depth:	min. 40 mm
Ambient temperature:	0° to +40°C
Storage temperature:	-25°C to +70°C
Test specifications:	EN 60669-2-1
Certifications:	CE KEMA/KEUR
Protection type:	IP 20
Load specifications:	
Light bulbs:	920 W (4 A)
HV halogen lamps:	920 W (4 A)
Conventional transformers:	575 VA (2.5 A)
Fluorescent lamps (upstream appliances):	575 VA (2.5 A)
Drives:	920 VA (4 A)

### Notes:

- External protection mechanisms can be incorporated to allow the use of other loads or to increase performance.
- The load of conventional transformers must be at least 85%.

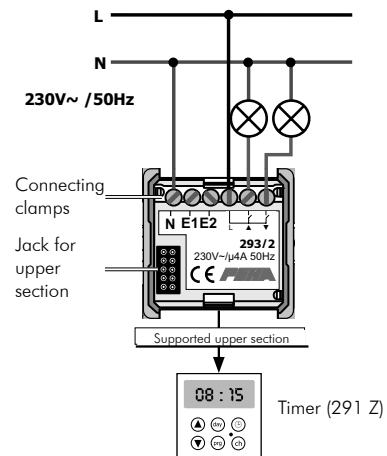
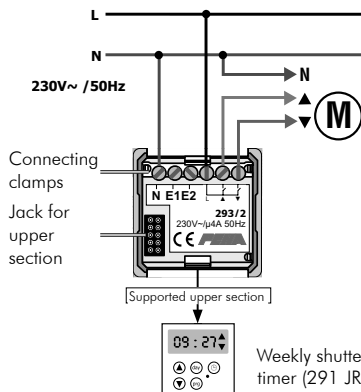
### Operation

The relay insert is operated from the upper section (automatically or manually). The relay insert can also be switched from two substations. Observe the operating instructions for the relevant upper section when operating!

### Connection possibilities

Function	Terminal
Voltage supply 230 V~ / 50 Hz	L, N
Substation inputs 230 V~ / 50 Hz for buttons or switches	E1, E2
Weekly shutter timer (291 JR)	
▲ = Drive UP, ▼ = Drive DOWN	▲ ▼
Timer (291 Z)	
▲ ▼ = Switch ON / OFF	

### Structure and description



### Installation and commissioning

- During drive operation, the UP and DOWN outputs of the relay insert are counter-locked.
- Connect only one drive to the relay insert!
- Parallel switching of drives is forbidden!
- The direction of drive rotation can be changed over without transit time! A drive which permits direct changeover of the direction of rotation is to be used.
- The relay insert and substations must be connected to the same phase conductor (L).
- Only the weekly shutter timer (291 JR) and timer (291 Z) are permitted for use as upper sections.
- Observe the technical specifications of the upper sections when connecting the substations!
- Only remove or plug the upper section into the jack when the power is turned off!
- Only use indoors.



Upper section Timer 291 Z for FM relay inset 293/2 or 293/6

**General**

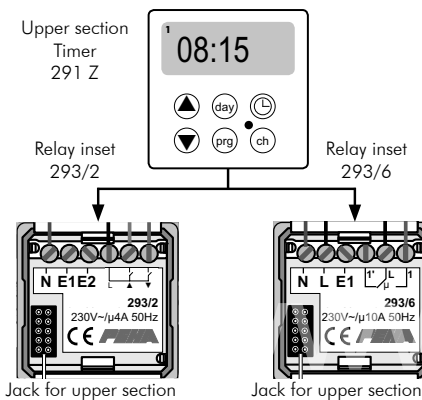
The timer 291 Z is used in combination with relay inset 293/2 and 293/6. The timer can be used to switch consumers on/off automatically at programmed times or manually. It can also be switched using two relay inset substations.

- Manual operation
- Minimum switching time 1 minute
- Day/Week programming
- 24 programmable switch times
- 30 minutes reserve power in case of power failure, no loss of programming.

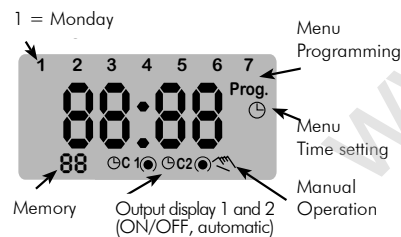
**Technical specifications**

Installation height: 0.8 – 1.5 m  
 Minimum transit time: 1 minute  
 Ambient temperature: 0° to +40°C  
 Storage temperature: -25° to 75°C  
 Identification: CE  
 Protection type: IP 20

**View and accessories**



**Display and operating buttons**



- ▲ Switch output 1 on/off
- ▼ Switch output 2 on/off
- day Select part of week / day
- prg Activate programming mode
- ch Set output / outputs
- ⌚ Set time and day
- Reset

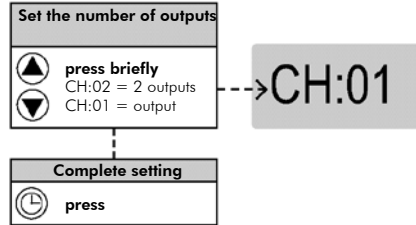
**Note:** The day and prg buttons are only used when the timer is commissioned for the first time or programmed.

**Functions/Basic settings**

The basic setting must be programmed prior to first use or following a reset.

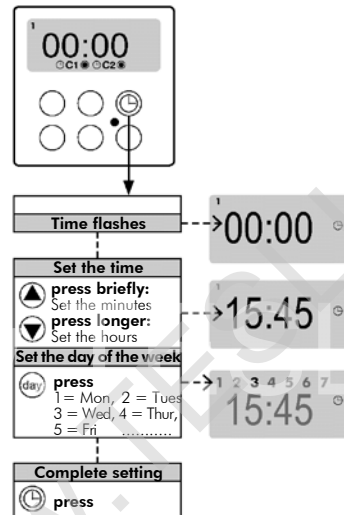
**Set the number of outputs**

The timer is used in combination with relay inset 293/6 (1 output) or 293/2 (2 outputs). The number of outputs to be used must be set. The setting is maintained in case of a power outage and only needs to be programmed once.



**Note:** The setting is activated automatically when the system is commissioned for the first time.

**Set time and day**

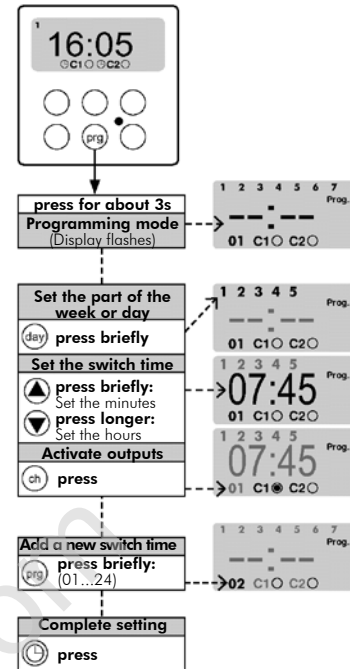


**Programming switch times**

The device can switch consumers on/off at programmed times. 24 switch times can be programmed (01 - 24). The day or part of the week and the switching state of the outputs must also be selected.

<b>Day of the week</b>	
Mon = 1, Tues = 2, Wed = 3, Thur = 4, Fri = 5, Sat = 6, Sun = 7	
<b>Part of week</b>	
Mon - Sun (full week) ⇔ 1 2 3 4 5 6 7	
Mon - Sat (long working week) ⇔ 1 2 3 4 5 6	
Mon - Fri (short working week) ⇔ 1 2 3 4 5	
Fri - Sun (long weekend) ⇔ 5 6 7	
Sat - Sun (short weekend) ⇔ 6 7	
<b>Switching state of outputs C1 and C2</b>	
When using the relay inset 293/2 (2 outputs), the following switching states apply in the following sequence:	
C1 ○ = OFF	C2 ○ = OFF
C1 ● = ON	C2 ○ = OFF
C1 ○ = OFF	C2 ● = ON
C1 ● = ON	C2 ● = ON
C1 ○ = OFF	—
C1 ● = ON	—
—	C2 ○ = OFF
—	C2 ● = ON
<b>Switching state of output C1</b>	
When using the relay inset 293/6 (1 output), the following switching states apply in the following sequence:	
C1 ○ = OFF	
C1 ● = ON	

**Add a new switch time**



**Notes:**

- The setting can be interrupted at any time.
- The number of remaining free time switches is displayed, e.g. rE: 21 = 21 time switches remaining.
- The device returns automatically to basic display if no buttons are pressed for 30s.

**Call up factory settings**

All of the settings and switch times programmed by the user will be deleted. Caution! A new basic setting must then be programmed!



The setting for the number of outputs is then activated.

**Operation**

The relay inset is operated automatically using programmed timers or manually using the UP and DOWN buttons. The relay inset can also be switched from two substations.

**Manual operation**

The system can be operated manually at any time. The hand symbol "manual operation" and the relevant output (C1, C2) flash.

Timer	Function
press UP button briefly	Output 1 ON/OFF
press DOWN button briefly	Output 2 ON/OFF

**Automatic OFF / ON**

Automatic operation using programmed switch times can be switched on or off.

Timer	Function
Button UP, DOWN	Automatic OFF
press longer (about 3s)	Output permanently ON/OFF
Button UP, DOWN	Automatic ON
press briefly	Output ON/OFF

## Displaying automatic / manual operation

Operating mode	Symbols
Automatic ON	C1/C2 OFF C1/C2 ON
Automatic OFF + manual	C1/C2 permanently OFF C1/C2 permanently ON
Automatic ON + manual	C1/C2 + flashing OFF C1/C2 + flashing ON

## Substation function (relay insert)

The external buttons on substation inputs E1 and E2 on the relay insert perform the following functions:

Relay insert	Function
Press (E1) briefly	Output 1 ON/OFF
Keep pressing (E1) (about 3s)	Output 1 ON/OFF (non-automatic)
Press (E2) briefly	Output 2 ON/OFF
Keep pressing (E2) (about 3s)	Output 2 ON/OFF (non-automatic)

## Weekly thermostat timer 291 Z RTR for FM relay insert 293/6 o.A.

### General

The indoor thermostat timer (291 Z RTR) is used in combination with relay insert 293/6. It controls the circulating pump of a heating system. On/off control is either automatic, using switch times, or manual. It can also be switched using the relay insert substation.

- Manual operation
- Day/Week programming
- 24 programmable switch times
- Daytime, night-time and frost protection settings
- Time and room temperature adjustable at any time
- 6 control speed settings (RP)
- 30 minutes reserve power in case of power failure, no loss of programming.

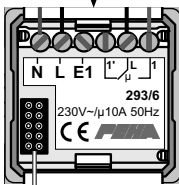
### Technical specifications

Installation height:	1.5 m
Setting accuracy:	± 0.5 °C
Ambient temperature:	0° to +40°C
Storage temperature:	-25° to 75°C
Identification:	CE
Protection type:	IP20

### View and accessories



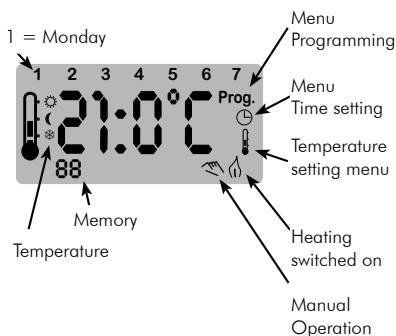
Indoor thermostat (291 Z RTR)



Relay insert 293/6

Jack for upper section

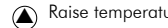
### Display and operating buttons



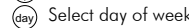
Day



Night



Frost protection



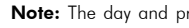
Raise temperature



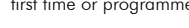
Lower temperature



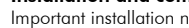
Select day of week



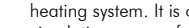
Activate programming mode



Set and display temperature



Set and display time



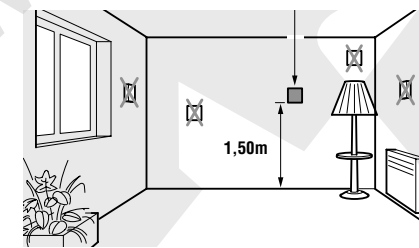
Reset

**Note:** The day and prg buttons are only used when the indoor thermostat timer is commissioned for the first time or programmed.

### Installation and commissioning

Important installation notes

- Do not use the indoor thermostat to directly control a heating system. It is only suitable for controlling the circulating pump of a heating system.
- Only use the device in combination with relay insert 293/6.
- Only remove or plug the indoor thermostat into the jack when the power is turned off.
- Only use indoors.
- Do not install in/on outside walls.
- Do not expose to direct sunlight.
- Do not mount close to a source of heat (radiator, lamp, TV, computer, ...).
- Ensure the free circulation of air.
- Do not mount behind curtains.



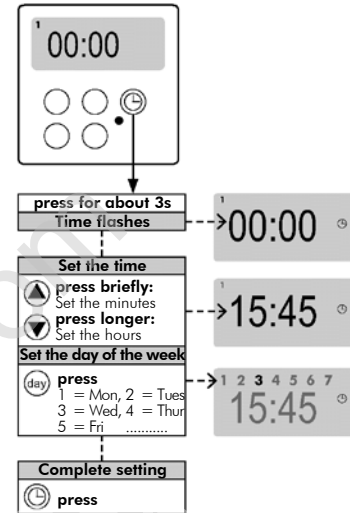
### Functions/Basic settings

The basic setting must be programmed prior to first use or following a RESET.

### Factory settings

No.	Switch time	Day/s	Temperature
1	23:00 a.m.	1234567	☾ Night = 15°C
2	7:00 a.m.	1234567	☀ Day = 20°C

### Set time and day



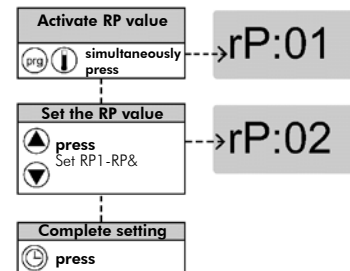
### Notes:

- The time and day of the week are set automatically if no time is stored.
- The time must be displayed before the setting can be activated.
- The device returns automatically to basic display if no buttons are pressed for 30s.

### Set the RP value

Since heating systems differ in reaction speed, the heating must be adapted to local conditions (controlled system). The RP value is used for this purpose. RP values can be set for small rooms (RP1 = fast controlled system) to large rooms (RP6 = slow controlled system).

RP value	Min	Controlled system
1	4	Small rooms, electric heating 4...0.6°C / hour
2	8	↓
3	12	
4	16	
5	20	
6	24	Large rooms, floor heating 1...2°C / hour



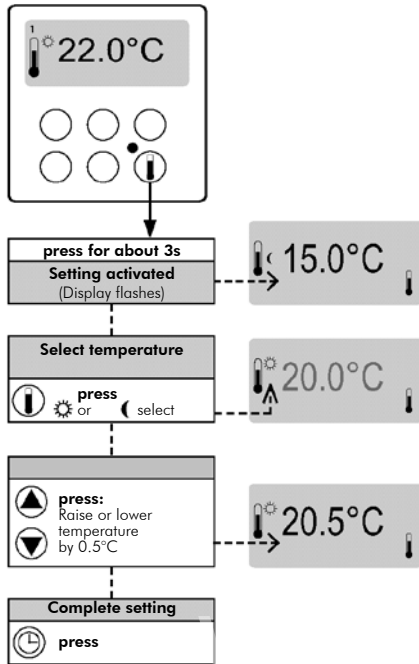
## Notes:

- The device returns automatically to basic display if no buttons are pressed for 30s.
- Factory setting RP = 1.

## Set temperatures

Factory settings:

Temperature	Standard	Setting
☼ Day	+ 20°C	☾ to + 30°C
☾ Night	+ 15°C	+ 7°C to ☼
❄ Frost protection	+ 7°C	not adjustable



## Notes:

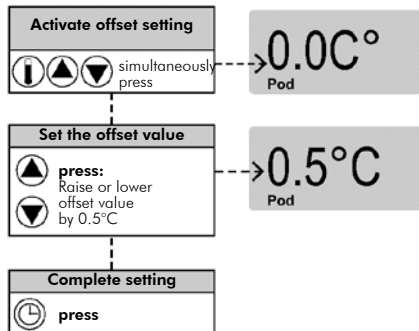
- The temperature must be displayed before the setting can be activated.
- The device returns automatically to basic display if no buttons are pressed for 30s.
- The indoor thermostat timer will display the correct temperature after a stabilisation period of about 10 minutes.

## Set the offset value

Various factors can cause the temperature displayed (resp. temperature measured) by the indoor thermostat timer to differ from the actual room temperature.

The following points should be observed when correcting this deviation:

- Wait 10 minutes until the temperature display has stabilised.
- Measure the room temperature with an accurate thermometer.
- If the displayed temperature differs from the room temperature, set a pos. or neg. offset value.



## Notes:

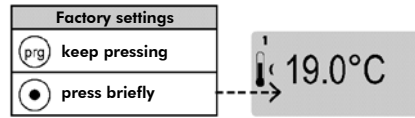
- The offset value should be set during initial commissioning. Factory setting Offset value = 0.
- The setting can be adjusted between -6°C and +6°C.

## Operation

The relay insert is operated automatically using programmed timers or manually using the UP and DOWN buttons. The relay insert can also be switched from two substations.

## Call up factory settings

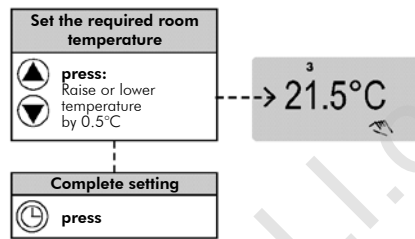
All of the settings and switch times programmed by the user will be deleted. The device is restored to factory settings.



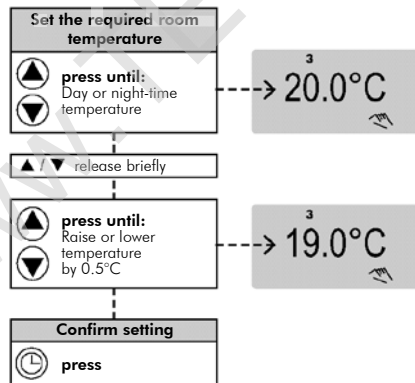
**Caution:** A new basic setting must then be programmed!

## Manual operation

The desired room temperature can be set manually at any time (flashing hand symbol). Once the temperature has been changed, the time is no longer displayed and the current room temperature is displayed after a few seconds.

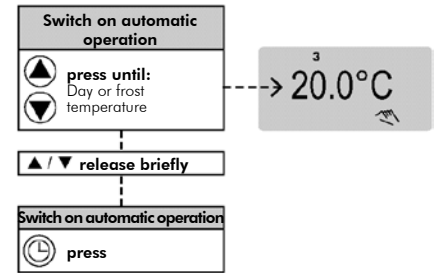


Temperatures below day-time or above night-time temperatures are set as follows:



## Automatic OFF / ON

Manually setting the room temperature (hand symbol flashes) switches off automatic operation. Automatic operation can be switched on by means of a switch time, or manually, as follows:



## Substation function (relay insert)

An external switch on the substation output E1 on the relay insert performs the following functions:

Relay insert	Function
Switch OFF	normal operation
Switch ON	Night-time temperature is active (hand symbol is visible)

**Note:** If the switch is ON, only switch times or a reset can be programmed.

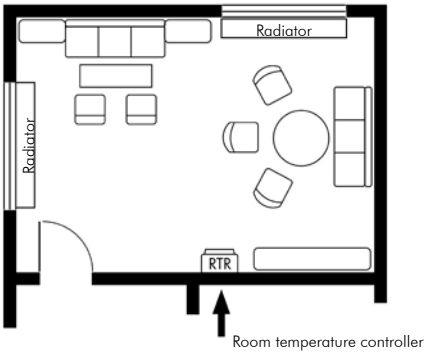
## Room temperature controller

### Areas of use

The room temperature controller controls the temperature in closed rooms, such as apartments, schools, halls, workshops, etc. with the usual surroundings.

### Recommended location

- Installation opposite a heat source on an inside wall is recommended.
- Mounting height: approx. 1.5 m above ground level.
- Avoid external walls and draughts from windows and doors.
- Make sure that the normal convection air in the room can reach the controller unhampered. The controller should therefore not be mounted in shelves or behind curtains and similar covers.
- Third party heat sources have a disadvantageous impact on the control accuracy.



Room temperature controller

### You should therefore avoid:

- direct sunlight, proximity to television, radio and heating appliances, lights, fireplaces and heating pipes.
- Even dimmers generate heat!  
If the controller is mounted together with a dimmer in the same switch frame, the distance between the two should be as large as possible. If arranged one above the other, the controller must be below the dimmer.

### Scales for setting temperatures using code numbers

- ☀ = approx. 5 °C    ● = approx. 20 °C
- 2 = approx. 10 °C    5 = approx. 25 °C
- 3 = approx. 15 °C    6 = approx. 30 °C

### Electrical connection

Connect all lines precisely as shown on the relevant wiring diagram. Ensure that neutral conductor N is connected to terminal N. If it is not, this will result in major temperature fluctuations since the controller cannot work properly.  
Cross sectional area of the conductor: 0.8 to 2.5 mm<sup>2</sup> Massive conductor.  
No protective conductor needed since the appliance has protective insulation.

### Brief explanation of the wiring diagram

- L = Outer conductor (phase)
- Ⓝ = Neutral conductor (formerly Mp)
- ⚡ = Connection for timing signal to lower the temperature
- ☀ = Heating load connection
- ☁ = Cooling load connection
- RF = Resistance for thermal feedback
- TA = Resistance for lowering the room temperature at nights

### Technical specifications

Art. no.	635 RTR o.A.	636 RTR o.A.	639/24 RTR PHC o.A.
Temperature range	5...30 °C	5...30 °C	5...30 °C
Nominal voltage	AC 250 V	AC 250 V	DC 24 V
Nominal current (cos = 0,6)			
Heating ⚡	10(4) A	10(4) A	1 A
Cooling ☁	-	5(2) A	1 A
Switching capacity			
Heating ⚡	2.2 kW	2.2 kW	24 W
Cooling ☁	-	1.1 kW	24 W
Switching difference	approx. 0.5 K	approx. 0.5 K	approx. 0.5 K
Night economy	approx. 4 K	-	approx. 4 K

### Reducing the temperature setting range

The room temperature controller is factory set to the maximum range of 5–30 °C (see Fig. 1).

2 setting rings are located in the setting button.

These can be used to set the temperature to any required range.

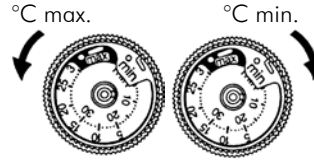


Fig. 1:  
Reducing the temperature setting range:

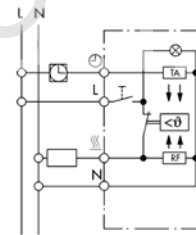
### Symbols

- OFF
- | ON
- ☀ permanently selected temperature
- ☁ permanently selected night-time temperature
- ⌚ Time switch controlled switching between daytime and night-time temperatures.

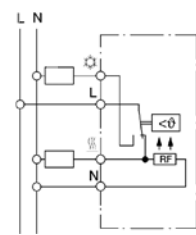
### Wiring diagrams

#### 635 RTR o.A.

Note: LED on = Controller is active

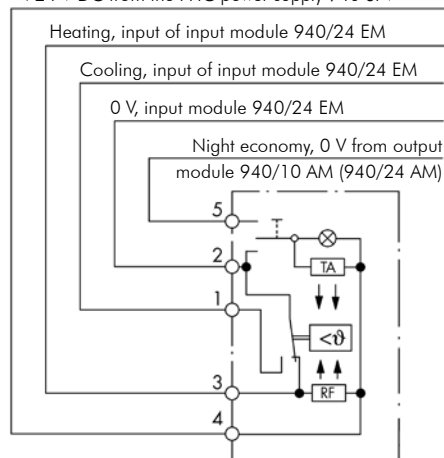


#### 636 RTR o.A.



#### 639/24 RTR/PHC o.A.

+24 V DC from the PHC power supply 940 SPV



## Flush-mounted floor heating controller 637 FTR

### Areas of use

In housing technology to control electrical floor heating and floor temperature regulating systems.

### Description of the function

The floor heating controller consists of 2 parts:

- 2.1. **Control device** for setting the required floor temperature
- 2.2. **Remote sensor** in the floor to monitor the set temperature

#### 2.1. Control device

The setting button is used to set the required temperature for your floor. The scale from 5 - 1 corresponds to a temperature range of 10-50°C resp. 10-40°C. Please consult the setting instructions of your floor heating manufacturer. If the temperature in the floor drops below your set value, the control unit requests heat, which is displayed by the red LED above the setting button. So you can see when your heating system is using energy. The range can also be reduced on the setting button; for a description see point 8. The power switch 0 – I is used for switching your floor heating operating state on or off. You can also use an **external** time switch to programme a reduction in temperature, e.g. at night time. If such a time switch is installed, the green LED above the setting button displays the start of the temperature reduction. The temperature is lowered by approx. 5 °C.

**Example:** You have set the temperature on the control unit to 40 °C (= scale 4). The temperature in the floor can therefore drop to 35 °C, for example at night, without the heating switching itself on. Your heating will only switch on again if the temperature drops even lower.

#### 2.2. Sensor

The sensor is installed in the floor. It monitors the floor temperature you have set on the control unit and initiates commands to switch the floor heating on and off.

Switching capacity	2.3 kW
Switch	Power switch „On/Off“
LED display red	Control unit demands heat (Heating operation)
LED display green	Temperature reduction „On“
Contact (relay)	1 closer (for heating)
Temperature reduction (TA)	<b>(not potential-free)</b>
Switching temperature difference	approx. 5 K
Protection type housing according to DIN VDE 0470 T 1	approx. 1 K
Operating temperature	IP 30
Storage temperature	T 40
	-25 T 70

#### Remote sensor white

Sensor element	NTC
Sensor cable	PVC, 2 x 0.50 mm <sup>2</sup> , 4 m
Protection type according to DIN VDE 0470 T 1	IP 68
Ambient temperature	-25 T 70

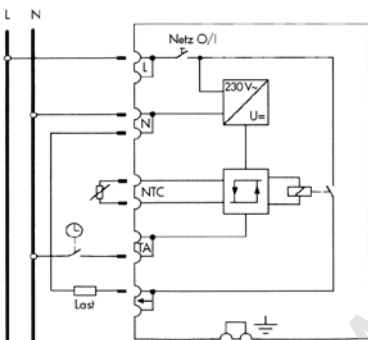
If needed, the sensor cable can be extended to up to 50 m using a 2-wire line with a cross sectional area of 1.5 mm<sup>2</sup> without affecting the accuracy of the controller. Shielded cables should be used when laying in cable ducts or close to heavy current lines.

#### Sensor parameters:

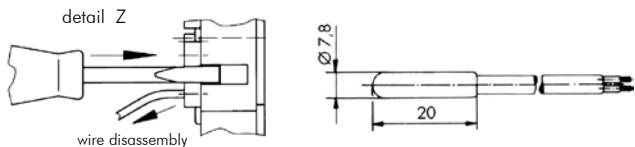
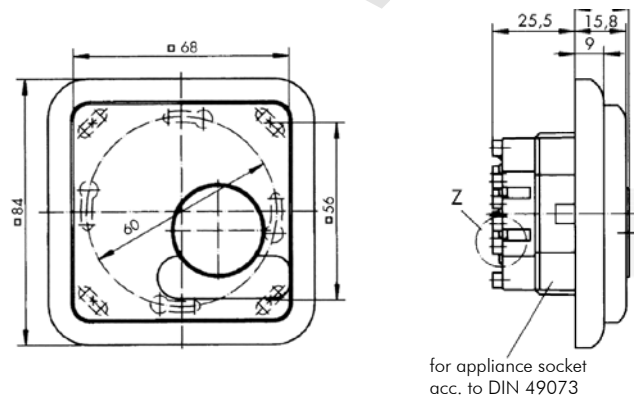
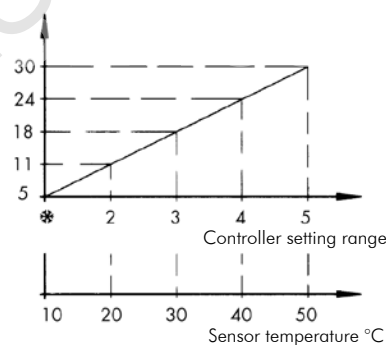
Measuring device Ri > 1 M Ω	Temperature °C	Resistance k Ω
5	85,279	30
10	66,785	35
15	52,330	40
20	41,272	45
25	33,000	50

Resistance can only be measured on disconnected sensors.

### Wiring diagram

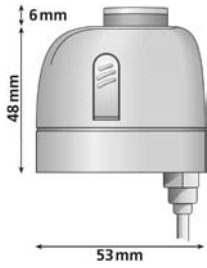


### Range reduction in the setting button

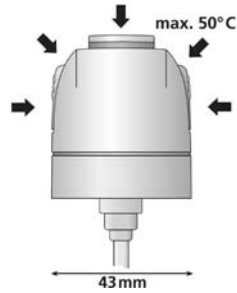


Information on servo drives 681 TSA

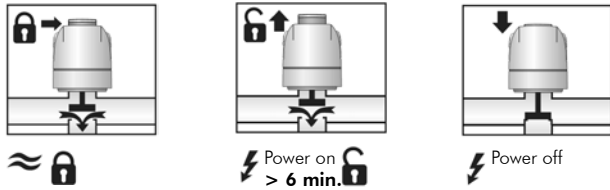
Dimensions



Max. ambient temperature

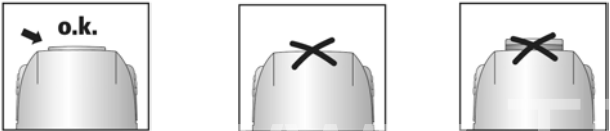


First open function



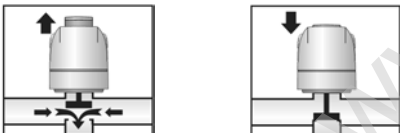
The drive is supplied with First open function. Upon starting up, the first lifting movement (> 6 min.) deactivates the First open function and activates the drive.

Adjustment control



Once the First open function has been released and start-up completed, the spacing between the lower section of the valve and the drive can be checked. The function display should be slightly raised at zero current. It should not be flush with the housing, nor should the coloured area be visible.

Function display



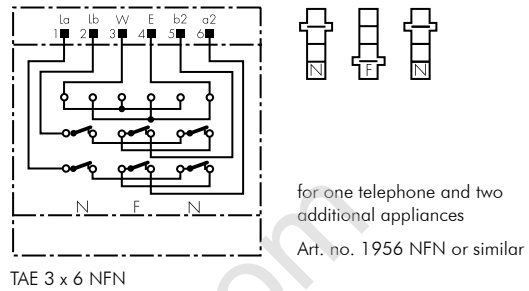
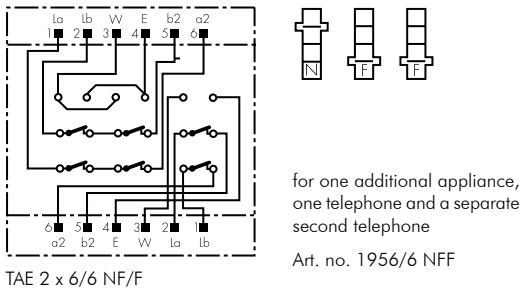
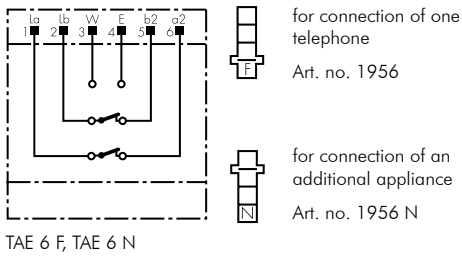
The drive is open when the colour marking on the setting valve is visible.

Overview - Valve adapters

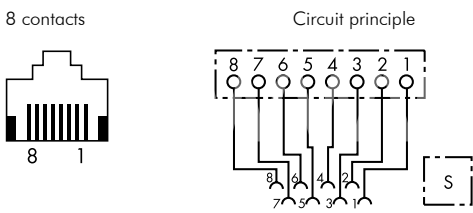
Adapter	Make of valve	Low design	High design
680-50	Honeywell&Brauk. Reich MNG (prior to 98) Böhnisch (SBK) (H) (prior to 98) Cazzaniga Frese Landis&Gyr KaMo (from Sept. 2005)	 Thread: M 30 x 1.5  Adapter colour: dark grey (UN 7028)	
680-78	Danfoss RA		 Adapter colour: pure white (RAL 9010)
680-80	Heimeier, MNG (from 98) Oventrop M 30 x 1.5 (from 97) Onda, Schlösser (from 93) Comap (M 30x 1.5) TA from 99, Empur, Böhnisch (SBK) (H) (from 98) Thermotechnik TT-i IVAR, Siemens Strawa (new bracket from 03) Taco (for Alpha drive from 05)	 Thread: M 30 x 1.5  Adapter colour: white grey (UN 7002)	

Communication technology

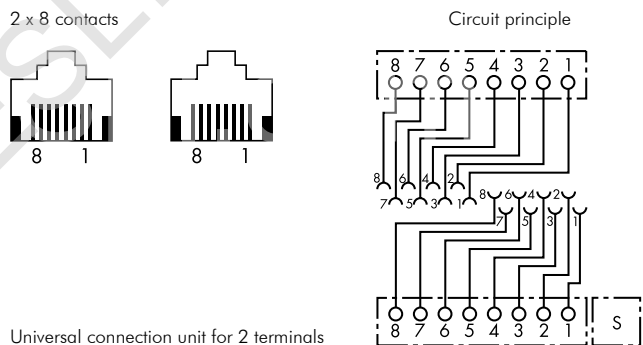
TAE (Telephone) connection sockets



UAE (Universal connection unit)

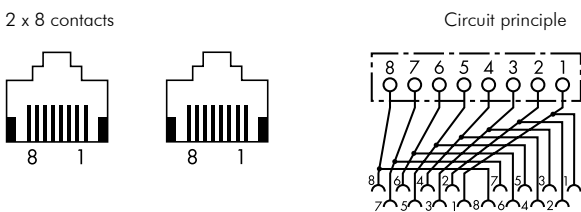


Universal connection unit for 1 terminal  
Art. no. 1958 UAE o.A., Cat 5, Cat 6



Universal connection unit for 2 terminals  
Art. no. 1958/8 UAE o.A., Cat 5, Cat 6

UAE (Universal connection unit) COMPACTA



Universal connection unit for 2 terminals  
Art. no. 1758/8 UAE o.A., Cat 3



## Technical Information – Section 7

### List of modular jacks that match PEHA mounting boards 600 MJ1 to 600 MJ12

Art. no. Mounting plate	MJ1	MJ2	MJ3	MJ4	MJ5	MJ6	MJ7	MJ8	MJ9	MJ10	MJ11	MJ12
Insert colour	red	transp.	black	yellow	green	white	orange	blue	brown	grey	beige	silver
<b>3 M Volition Typ VOL-OCK6-</b>												
43096 746 000 + 43096 747 000												X
<b>AMP/tyco Type-Nr.</b>												
216000-2	X											
216005-4	X											
216811-1		X										
406372-x cat5 + 1116515-1 cat5e				X								
1339015-1 cat5e				X								
1375055-x + 1375187-x cat6				X								
1375188-1 cat6 1375189-1 cat5e				X								
1375190-x + 1375191-x cat5e				X								
1375192-x + 1375193-x cat3 RJ11				X								
1116604-x + 1339189-x cat5e				X								
188650 - 3 to 6				X								
338038 - 1 to 4				X								
1711342-1				X								
MTRJ127841-1 and MTRJ127842-1				X								
<b>ASYCO</b> Cat 5e/6 SFTP				X								
<b>AVAYA Anixter Systemax (Lucent Techn.)</b>												
MPS100E cat 5, MPS 200E					X							
MGS 400 cat 6, MGS 500, MFP 520					X							
<b>Brand Rex</b> GPC Jack F01 3LF			X									
<b>BTR</b>												
EDat Modul Nr. 130910-1											X	
UTP 130A 10 I							X					
<b>DANCHIEF</b> 568 A/B cat 5							X					
<b>Daetwyler</b> Unilan MS 1/8 Cat. 6											X	
<b>Hubbel</b> HXJ 5 EBU + UTP							X					
<b>Kerpen</b> E-Line 600 GG45 cat 6 with Keystone-Clip Nr. 9ZE20009				X								
<b>KRONE RJ 45 cat 5</b>												
MT-RJ 7023 1 303-xx	X											
STP 6830 1 312-xx	X											
UTP 6830 1 302-xx	X											
6830 1 800-xx + 810-xx	X											
STP 6540.1.154.xx								X				
UTP 6540.1.130-xx								X				
6540.1.100.xx								X				
<b>Lexel</b> LexCom 125 and LexCom 250 with Montagerahmen 30 658 0009										X		
<b>LEVITON</b> Typ 41108			X									
<b>MMC</b> MK 6 NB, MK 6 AN + MK 6 FS								X				
<b>Nexans</b> all LENmark-Modular Jacks with Keystone-Clip Nr. N429.620					X							
<b>NORDIX/CDT</b>												
061110 AO 405302						X						
061110 AO 405303						X						
<b>PANDUIT Keyst. Cat 5E</b>												
KJ588TPBL and KJ688TPBL							X					
<b>Quante Volition RJ 45 (Qmax)</b>												
P28770AB, P28771AB + P28772AB					X							
<b>RADIALL</b>												
R280 MOD 802, MOD 803	X											
R280 MOD 804, MOD 805	X											
R280 MOD 807	X											
R280 MOD 809 and R280 MOD 811							X					
<b>Reichle De Massari</b> R30511, -2, -3 and -4 with adapter 310694					X							
<b>Rutenbeck</b> 13900300								X				
<b>Setec</b> SeSix 501244 and UKJ 501292								X				
<b>SIEMON</b>												
MX-K-C5-80-ND and MX-K-C5-02-ND	X											
SIEMON MX6-FS									X			
<b>Schrack</b> HSEMRJ5UWS and HSEMRJ6GWS							X					
<b>Telegärtner</b> J00029A0036	X											



Earthing contact sockets with overvoltage protection

**How they work**

PEHA overvoltage protection sockets channel harmful transients measuring several kilovolts and kiloamperes to the earth in fractions of seconds, thus ensuring that the mains voltage is not interrupted or short circuited at any time.

The protective switching is designed as a so-called Y assembly. The level of protection between L and N is ensured by two sequentially switched varistor blocks, irrespective of incoming surge peaks. The level of protection between L and/or N and PE is ensured by the sequential switching of a varistor with a gas discharge arrester. This reduces leakage currents to within a microampere range. The varistor serves as a reset aid for the gas discharge arrester.

The overvoltage protection is equipped with operating temperature monitoring. The overvoltage protection is switched off if the permissible operating temperature is exceeded.

**Control lamp**

The control lamp indicates that the overvoltage protection is operational. It goes off in the event of a power outage or if the overvoltage protection malfunctions.

**Important**

The equipotential bonding (earthing) must be performed carefully to ensure the faultless functioning of the overvoltage protection.

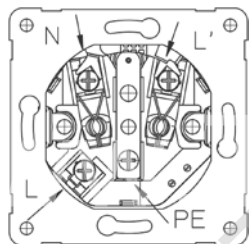
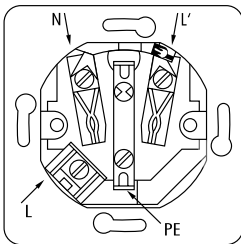
**The cable connecting the protected device and the overvoltage protection socket may not be longer than 5 m.**

The overvoltage protection socket should always be installed behind the FI switch. Always use FI switches that comply with VDE 0664 Part 1/10.85 with delayed release and/or current surge resistance.

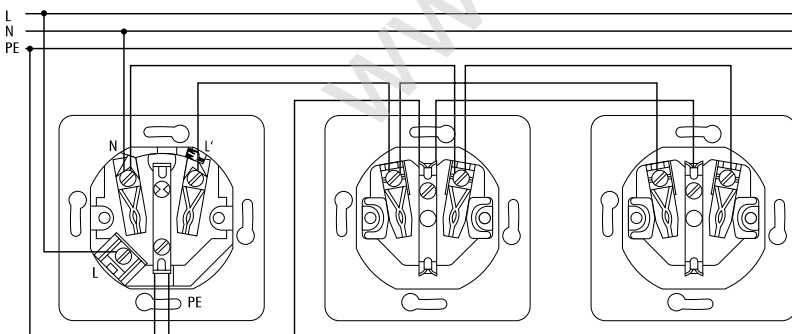
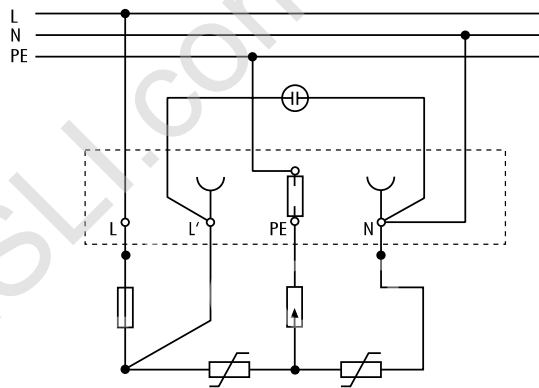
**80.6611 ÜS/25 and 80.6671 ÜS/25**

Nominal discharge current 3 kA

Function: If the overvoltage protection is overloaded or malfunctioning, the socket switches off. The control lamp goes off.

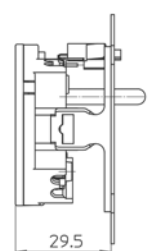
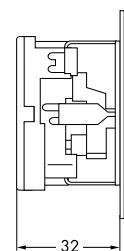


Wiring diagram



80.6611 ÜS/25

80.6671 ÜS/25



Additional earthing contact sockets can be protected by simply wiring through, as shown on the wiring diagram!

## Earthing contact sockets with overvoltage protection

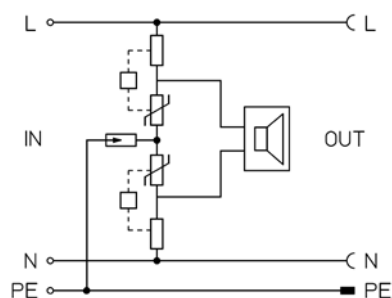
### 6611 ÜSC/A

Type 3 acc. to VDE 61643-11

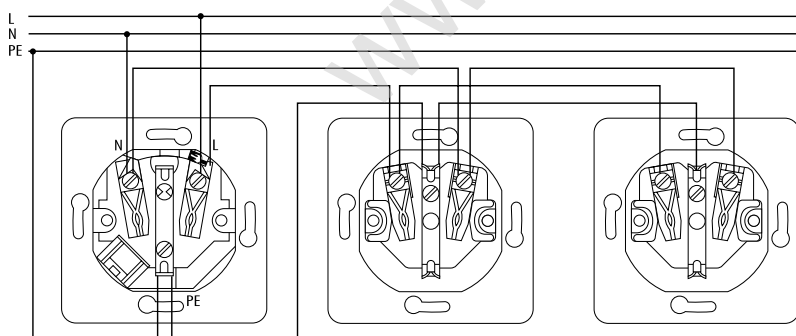
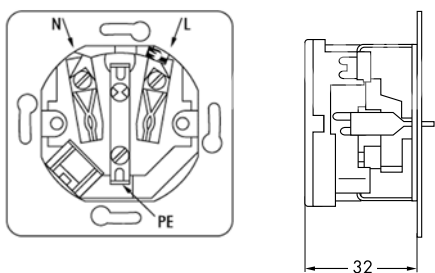
#### Technical specifications:

Nominal voltage:	UN : 230V ~
Max. continuous operating voltage:	UC : 255 V ~
Max. series fuse:	16 A
Nominal discharge current: (8/20, usec wave):	In: 3 kA (up to 10x)
Max. discharge current:	Inmax = 8 kA
Level of protection:	UP = 1.5 kV
Connection cross sectional area:	max. 2.5 qmm
Installation depth:	32 mm
Combined surge:	Uoc = 6 kV
Overvoltage category II acc. to VDE 0110/T3	

Wiring diagram

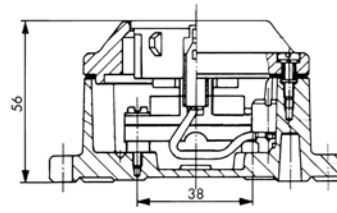
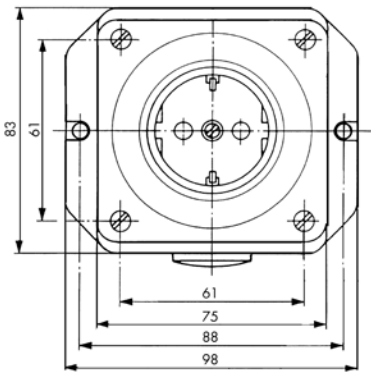


An alarm sounds when the overvoltage protection is overloaded or malfunctioning. The control lamp stays on. The alarm goes off when the mains plug is pulled. The overvoltage protection socket should always be installed behind the FI switch. The equipotential bonding (earthing) must be performed carefully to ensure the faultless functioning of the overvoltage protection. The cable connecting the protected device and the overvoltage protection socket may not be longer than 5 m.

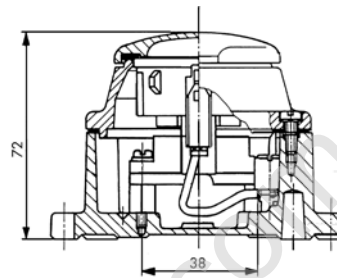
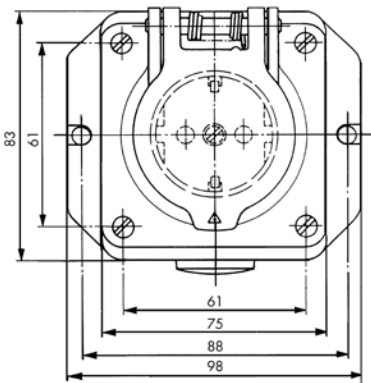


Additional earthing contact sockets can be protected by simply wiring through, as shown on the wiring diagram!

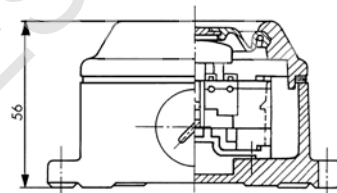
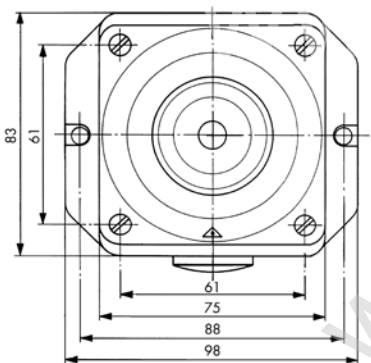
Cast aluminium



Earthing contact socket without flap, surface-mounted

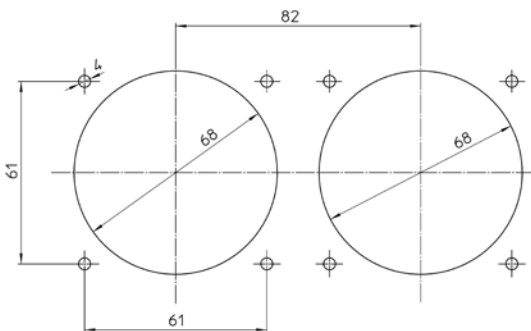


Earthing contact socket with flap, surface-mounted

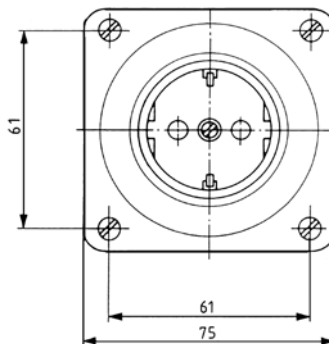


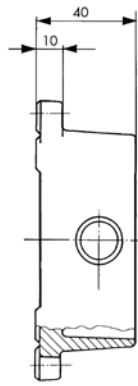
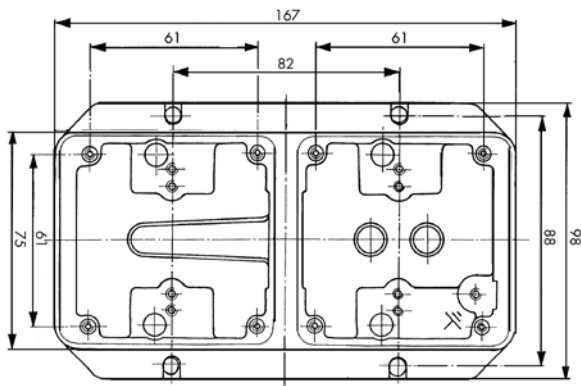
Pressure switch/Push button, surface-mounted

Installation hole pattern



Installation dimensions





Lower section of housing,  
2-fold  
392.69 AGU WA

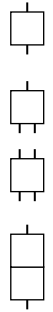
Cable entry scheme  
for lower sections of housing

Lower section of housing,  
1-fold with 2 entries  
391.69 AGU WA

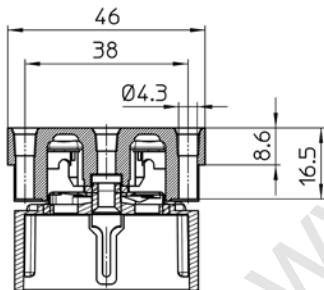
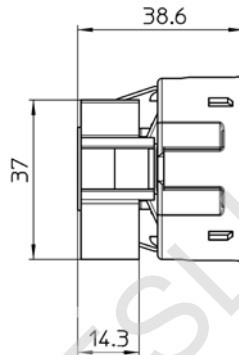
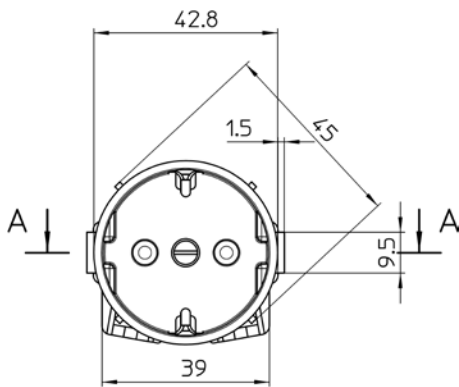
with 3 entries  
391.69 AGU WA/5

with 4 entries  
391.69 AGU WA/6

Lower section of housing,  
2-fold with 2 entries  
392.69 AGU WA  
397.69 AGU WA



Socket insert 6611



A-A

## Flush-mounted radio 20.485.xx RADIO

### General

The radio is used, e.g. in private rooms (bathroom, kitchen, bedroom) or hotel rooms. All radio functions can be easily set by pressing the buttons. Settings and current information are shown on the illuminated display (e.g. time, radio functions and alarm function).

- FM-RDS-Radio (87.5 - 108.0 MHz)
- Programme memory (6 programmes)
- Time display
- Alarm function
- Sleep timer
- Substation function
- Rotating display insert for vertical or horizontal installation
- 2 flush-mounted sockets needed
- 230V~/50Hz connection needed
- Special glass and stone frames available as accessories

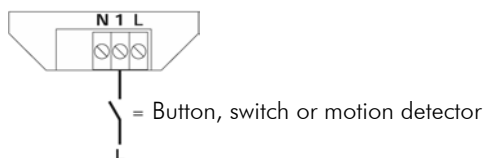
### Technical specifications

Receiving frequency: 87.5 – 108.0 MHz  
 Voltage supply: 230 V~ / 50 Hz  
 Own consumption: 1.5 W (standby)  
 Temperature range: 0° - 50° C  
 Test specifications: EN 55020, EN 55013  
 Certifications: CE  
 Protection type: IP 20  
 Dimensions in mm: 155 x 83 x 45

### Substation function

The radio can be switched on and off using a substation. A button, switch or motion detector can be used as the substation. The substation is connected to terminal 1 on the back of the display unit.

Substation	Function
Button	Press button ⇔ Switch radio on/off
Switch	Switch ON ⇔ Switch radio on
	Switch OFF ⇔ Switch radio off
Motion detector	On signal ⇔ Switch radio on
	Off signal ⇔ Switch radio off



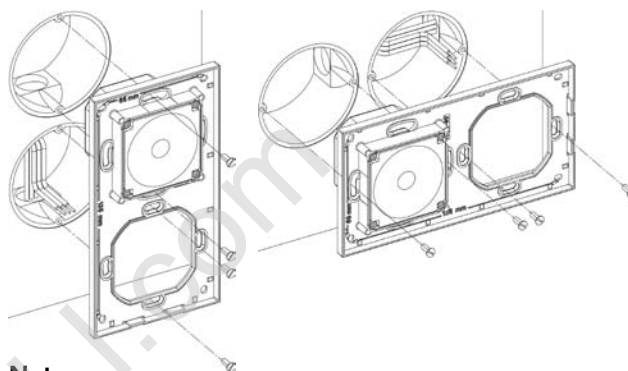
### Notes

- The substation is pre-configured as a switch
- A motion detector is configured like a switch



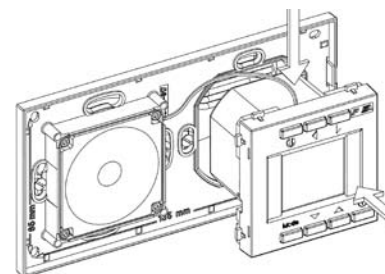
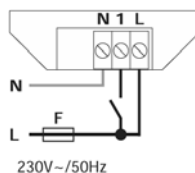
### Assembly and installation

- The radio must be mounted firmly (e.g. in a wall). It has a rotating display for vertical or horizontal installation.
- Two flush-mounted sockets with 60 mm Ø are needed for the installation.



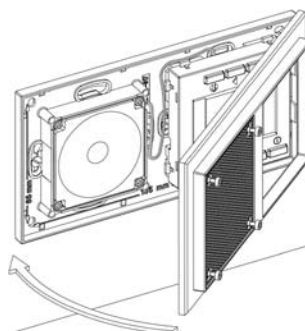
### Notes

- Observe the safety notices during installation!
- Ensure that radio reception is good at the intended location before installing!



### Notes

- Protect the supply cable (230V~/50Hz) with a circuit breaker (max. 16 A)!
- Caution! Be sure to use the same phase for the substation!



- Snap into the side on the frame lower section with loudspeaker cover.
- Screw the frame firmly to the lower section using the supplied hexagonal spanner (2 mm) (flush with the loudspeaker cover).

## Easyclick radio system

### Range planning, notes and installation tips

The PEHA radio transmitters transmit radio signals to the PEHA radio receivers. The receiver checks the incoming signals and uses them to control its power unit. This means that the strength of the radio signals must be sufficient to reach the receiver. Since radio signals are electromagnetic waves, the signal is dampened by various influences en route to the receiver. As such, the field strength becomes weaker, the further the transmitter is from the receiver. As such, the transmission range is physically limited. The construction materials and effective wall thicknesses through which the signal has to pass have a material influence on the transmission range. The table shows the ability of radio signals to pass through various materials.

#### Material

Plasterboard, wood, glass (uncoated)  
Brick walls / Porous concrete  
Reinforced concrete  
Metal walls / Metal grating

#### Penetration

approx. 90 - 100%  
approx. 65 - 95%  
approx. 10 - 90%  
approx. 0 - 10%

In practical terms, this means that the materials used in a building play an important role in evaluating the radio range. Some guidelines for evaluating the environment:

#### Visually unobstructed ranges

Typ. 30 m in corridors, up to 100 m in halls

#### Plasterboard/Wood (dry)

Typ. 30 m, through max. 5 walls

#### Brick walls / Porous concrete

Typ. 20 m, through max. 3 walls

#### Reinforced concrete walls/ceilings

Typ. 10 m, through max. 1 ceiling

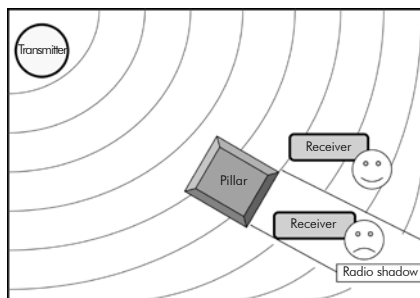
#### Elevator shafts, fireproof walls and utility areas should be taken into consideration!

#### The range can be further limited by:

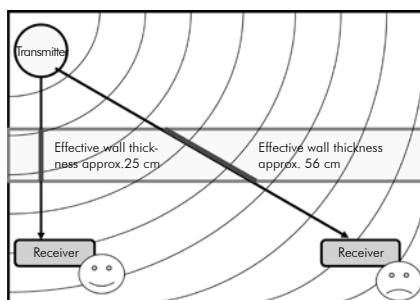
- moisture in the material
- cavity partition walls with insulation on metal foil
- suspended ceilings with metal or carbon fibre panels
- lead glass or metal-coated glass
- steel furniture
- metal-mounted transmitters or receivers

#### Notes and installation tips

- There are good and bad locations for installing transmitters and receivers for radio systems in buildings. In borderline cases, the choice of installation location can even be the decisive factor for the faultless functioning of a radio connection.
- When mounting receivers, bear in mind that a radio shadow is cast by the reverse side of metal building components, such as pillars, ceiling supports or fireproof doors. Receivers installed in these locations can only receive weakened reflected signals, but not direct signals.
- Windows might seem to offer excellent permeability for radio signals at first glance. If the window is fitted with metal damped thermal glazing, however, the radio signal will be strongly damped or reflected. In such



- Insulation on metal foil is usually used for roof insulation and does not cause problems when transmitting radio signals within the building. If insulation with metal foil is used in cavity partition walls or ceilings, however, the metal foil would of course prevent the penetration of the radio signals.
- A minimum clearance of 10 cm should be observed to metallic objects, radiators, doors, etc.
- PEHA radio appliances should be placed at least 0.5 m away from third-party transmitters that also transmit high-frequency signals (e.g. computers, audio and video systems, upstream appliances for lights).
- Moisture in ceilings and walls or snow on roofs increases their conductivity and therefore their ability to dampen radio signals.
- When installing radio receivers in suspended ceilings, ensure that no metallic or incorporated carbon fibre panels are used.
- Installing the transmitters and receivers at or close to ground level produces strong reflections and limits the range.
- The angle at which the transmitted signal hits the wall also needs to be taken into account. Depending on the angle, the effective wall thickness changes, thus damping the signal. The signals should not run at too flat an angle through brickwork, if possible. Wall niches should be avoided.
- In the case of appliances with internal receiver antenna, the appliance should not be mounted on the same side of the wall as the transmitter. In the vicinity of walls, radio waves are subject to unwanted scattering or reflection. Mounting them on the opposite or adjacent wall surface is better.



- In the case of appliances with external magnetic base antenna, the ideal location for mounting the antenna is a central spot in the room. If possible, the antenna should be at least 10 cm away from a wall and 50 cm away from the ceiling. Given the polarisation of the radio waves, a magnetic base antenna should point vertically up or down. In order to ensure sufficient antipole, the antenna should be mounted on a metal board measuring at least 180 x 180 mm. When laying the antenna cable, ensure that the cable is not bent and thus irrevocably damaged (reduction in performance as a result of changes in wave resistance).

#### Use of repeaters

Radio amplifiers, so-called „repeaters“ can be very helpful if problems with reception quality arise. Repeaters do not require any configuration (e.g. learning processes) whatsoever. They are commissioned simply by connecting them to the supply voltage.

**Tip:** When planning, bear in mind the possibility of retrofitting repeaters.

In 1-level operation, the radio signal from a transmitter is received, tested and forwarded on to the relevant receiver at max. transmission capacity. In 2-level operation, a radio signal can be transmitted through max. two repeaters within one radio path to the relevant receivers.

**Tip:** The use of too many repeaters is counter-productive (higher costs, telegram collisions).

#### Diagnostic tool

Technicians can use a mobile field strength measuring device to simply determine the best possible location for the transmitters and receivers. It can also be used to test malfunctioning connections between installed appliances. The appliance displays the field strengths of received radio telegrams and interfering radio signals in the 868 MHz range.

#### Troubleshooting radio interferences

On a new or existing system:

- Test the mains voltage of the receivers.
- Test whether the receivers are correctly connected.
- Test the function of the connected consumers.
- Delete all trained programmes in the receiver and reprogramme the receiver.
- Check whether any changes have taken place in the system environment that are causing interference (e.g. metal cupboards, furniture has been shifted or walls moved, etc.).
- Mount the transmitters/receivers in a better location.

The receiver switches itself ON or OFF:

- This may happen if a third-party programme, which had also previously been trained to the receiver, is activated in the receiving range.
- Delete all trained programmes in the receiver and reprogramme the receiver.

A transmitter is not functioning:

- Take the transmitter and move towards the receiver. If the system works at a closer distance, the transmitter was mounted outside the transmission range or is malfunctioning.
- Mount the transmitters/receivers in a better location.

## Easyclick surface-mounted transmitters 80.450.xx, 80.455.xx, 95.450.xx, 95.455.xx, 20.450.xx, 20.455.xx / hand-held transmitter 450 FU-K

### General

These transmitters are part of PEHA's radio system. The signals are transmitted over the European harmonised frequency 868.3 MHz. The transmitters are particularly well suited to individual situations where the electrical installations should not be flush-mounted in the wall, e.g. when renovating, retrofitting electrical systems or in offices with movable walls. The transmitters work without batteries and are maintenance-free! Pressing a button on the transmitter enables wireless switching of consumers via receivers. They must be trained to the receivers. Please observe the operating instructions for the receivers. Each transmitter can control an unlimited number of receivers.

A transmitter with 2-button function performs as follows:

○ = OFF I = ON  
 ▲ = UP ▼ = DOWN  
 A = OFF/UP B = ON/DOWN  
 C = OFF/UP D = ON/DOWN

### Alternative functions of surface-mounted transmitter

Models	Symbols	Description
FU-BLS	○ I	OFF ON
FU-BLS JR	▲ ▼	UP DOWN
FU-BLS N	—	Neutral (no symbol assigned)

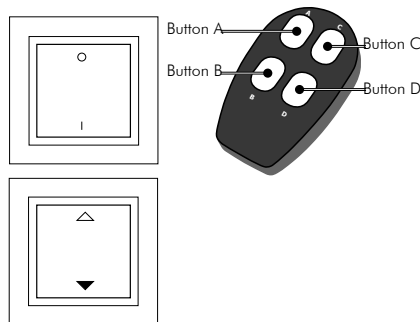
### Technical specifications

#### General specifications:

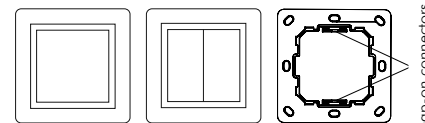
Operating frequency: 868.3 MHz  
 Transmission power: 10 mW  
 Modulation type: (ASK = Amplitude Shift Keying)  
 Switching cycles: min. 50,000  
 Rel. air humidity: 0% to 95 %

#### Range in buildings:

Masonry: 20 m, through 3 walls maximum  
 Reinforced concrete: 10 m, through 1 wall/ceiling max  
 Plasterboard/wood: 30m, through 5 walls maximum

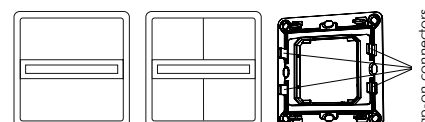


### STANDARD design surface-mounted transmitter



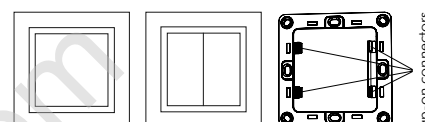
80.450.xx 80.455.xx Central plate

### DIALOG design surface-mounted transmitter



95.450.xx 95.455.xx Central plate

### AURA design surface-mounted transmitter



20.450.xx 20.455.xx Central plate

## Easyclick window contact 450 FU FK

### General

The window contact is part of PEHA's radio system. It works without batteries and has an internal, solar-powered energy storage device. The signals are transmitted over the European harmonised frequency 868.3 MHz.

The window contact can be used to monitor the state of windows and doors. Activating the magnetic contact transmits a radio signal to a receiver for evaluation. Every window contact (transmitter) can control an unlimited number of receivers. They must be trained to the receivers. Please observe the operating instructions for the receivers.

### Solar powered energy storage device

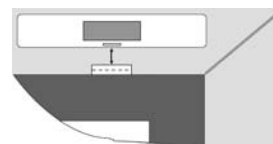
The internal solar powered energy storage device may need to be charged following longer storage. It generally charges automatically during the first operating hours in daylight.

A fully charged energy pack offers reserve power for about 50 hours in complete darkness. At 100 Lux, a charging time of 2-3 hours produces a reserve of 14 hours. The stronger the luminosity, the quicker the charging time.

**Caution!!** During operation the luminosity must be minimum 100 Lux on daylight average.

### Technical specifications

Voltage supply: Solar powered energy storage device  
 Operating frequency: 868.3 MHz  
 Transmission power: 10 mW  
 Range: approx. 30 m in buildings  
 Identification: CE  
 Protection type: IP40

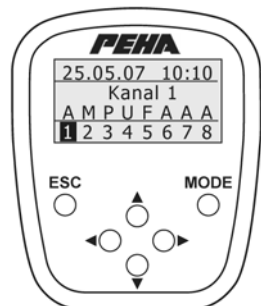


**Installation:**  
 Distance between magnet and window contact: max. 5 mm

## Easyclick timer 4514 FU-TS ST

### General

The Easyclick timer (transmitter) serves as a time switch for the Easyclick receiver. The receivers are time controlled via time switches or manually via the buttons ▲, ▼. Prior to use as a time switch, one channel (1-8) on the Easyclick timer must be trained to a receiver. A channel can be used to control an unlimited amount of receivers. Additionally, the Easyclick timer can be used as a repeater for Easyclick transmitters and receivers.

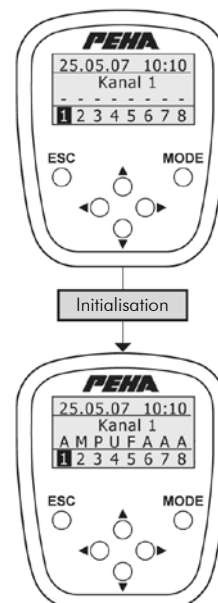


### Initialisation and channel options

When the device is not initialised, the power reserve time (30 mins.) only allows for programming of the Easyclick timer. No radio signal can be transmitted. To activate and use all functions, connect the Easyclick timer to an electrical outlet and wait for **initialisation** to complete (approx. 2 minutes). Initialisation is completed when the channel options are shown in the display. The programming is secure, even in the event of a power outage. The time is sustained for 48 hours.

### Channel options

<b>A</b> = Automatic	Time switch function activated
<b>M</b> = Manual	Time switch function deactivated (only manual operation)
<b>P</b> = Party	In automatic operation mode, the next switching time is not executed
<b>U</b> = Vacation	All switching times are randomly increased by up to 15 min.
<b>F</b> = Holiday	Only the switching times programmed for Sundays are activated





## Repeater (1-level)

The repeater function of the Easyclick timer is automatic. It is used to increase the range between Easyclick transmitters and receivers. The Easyclick timer should only be used as a repeater in an area between the Easyclick transmitter and receiver. Radio signals received from the transmitter can then be optimally passed on to the receiver.

## Switching function comparison with surface-mounted transmitters

Easyclick timer transmitter	Surface-mounted
Taste ▲, Time switch OFF	Button ○
Taste ▼, Time switch ON	Button I
Taste ▲, Blind timer OFF	Button UP ▲
Taste ▼, Blind timer DOWN	Button DOWN ▼

## Functions recommended for receivers

Switching receiver	Function
451 FU-EP o.T.	1
451 FU-BEP	1
4511 FU-EP ST	1
452 FU-EP o.T.	1
452/24 FU-EP-MF o.T.	1
Dimming receiver	Function
451 FU-BEP DAB	2
4511 FU-EP DAB ST	2
Blind switching receiver	Function
452 FU-EP JR o.T.	1

## Technical specifications

### General specifications:

Operating frequency: 868.3 MHz  
 Voltage supply: 230 V, 50 Hz  
 Number of channels: 8  
 Number of time switches: 95  
 Reserve charging time: 1 hour  
 Reserve in case of power outage: 30 min. (for programming only)  
 Clock programming: manually (6 buttons)  
 Test specifications: EN 60669-2-1  
 Identification: CE  
 Protection type: IP20  
**Range in buildings:**  
 Masonry: 20 m, through 3 walls maximum  
 Reinforced concrete: 10 m, through 1 wall/ceiling max  
 Plasterboard/wood: 30 m, through 5 walls maximum

Easyclick switching receivers 451 FU-BEP, 451 FU-EP o.T., 451 FU-EP UP o.A., 452 FU-EP o.T., 4511 FU-EP ST

## General

Easyclick receivers can be used to switch connected lighting on/off. Easyclick transmitters are used to operate the Easyclick receivers (radio signal). They must be trained to the receivers (max. 32 transmitters). The receiver's Function 1 is preset after training the receiver to a transmitter. It can be altered in function programming.

### Selectable functions:

- Targeted ON/OFF with 2 buttons (standard)
- ON/OFF with 1 button
- Staircase lighting with selectable switch-off time and OFF warning
- Automatic OFF after selectable time
- Button sequence - Switch on whilst button is pressed
- Ventilation function - Delayed ON and selectable follow-up time
- Store and activate 4 lighting situations at any time by pressing a button
- Ventilation control with window monitoring for open fires

## Technical specifications

### General specifications:

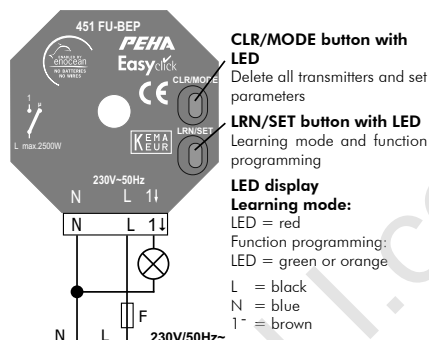
Operating frequency: 868.3 MHz  
 Voltage supply: 230 V, 50 Hz  
 Test specifications: EN 60669-2-1  
 Identification: CE  
 Protection type: IP20

### Range in buildings:

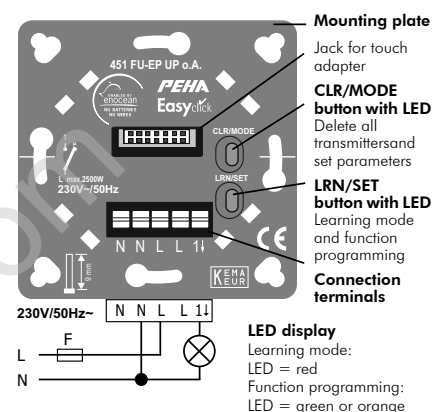
Masonry: 20 m, through 3 walls maximum  
 Reinforced concrete: 10 m, through 1 wall/ceiling maximum  
 Plasterboard/wood: 30 m, through 5 walls maximum

Receiver	Performance data
451 FU-BEP	Light bulb(Ω) = 2500 W
451 FU-EP o.T.	High-voltage halogen lamps = 1250 W
451 FU-EP UP o.A.	Inductive load = 600 VA
	Electronic ballast loads = 3
452 FU-EP o.T.	Light bulb(Ω) = 500 W
	High-voltage halogen lamps = 100 W
	Inductive load = 100 VA
	Electronic ballast loads = 1
4511 FU-EP ST	Light bulb(Ω) = 2500 W
	High-voltage halogen lamps = 1250 W

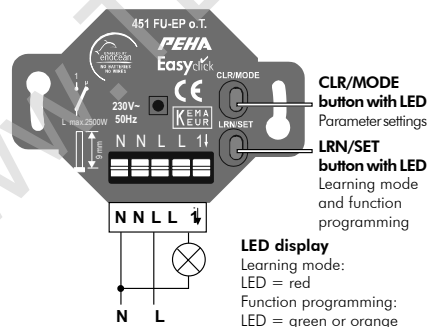
## Connection diagrams and operation



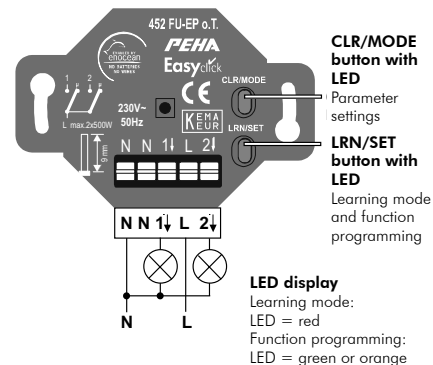
Easyclick awning receiver Plus, 1-channel 451 FU-BEP



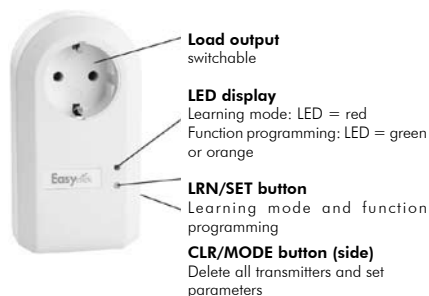
Easyclick flush-mounted receiver Plus with mounting plate 1-channel 451 FU-EP o.A.



Easyclick flush-mounted receiver Plus, 1-channel 451 FU-EP o.T.



Easyclick flush-mounted receiver Plus, 2-channel 452 FU-EP o.T.



Easyclick plug and socket receiver Plus, 1-channel 4511 FU-EP ST



## Easyclick blind/shutter receivers 452 FU-EP JR o.T., 452 FU-EP JR UP o.A.

### General

Easyclick shutter receivers can be used to control a shutter, blind or awning with limit switch (230V/50 Hz drive). Easyclick transmitters are used to operate the shutter receiver (radio signal). They must be trained to the receivers (max. 32 transmitters). The receiver's Function 1 is preset after training the receiver to a transmitter. It can be altered in function programming.

Selectable functions:

- UP/STOP/DOWN/Slat adjustment with 2 buttons (standard)
- UP/STOP/DOWN/Slat adjustment with 4 buttons for simple operation
- Sun protection with adjustable drive times already integrated for future solutions
- Sun protection ON/OFF activate by separate surface-mounted transmitter
- Safety function using separate radio transmitter (maintenance function)
- Store and activate 4 position situations UP/DOWN at any time by pressing a button

### Caution!!

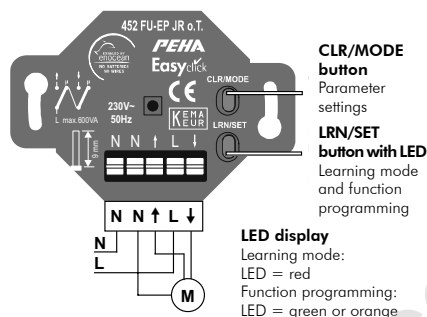
Only one drive may be connected to the shutter receiver!

### Technical specifications

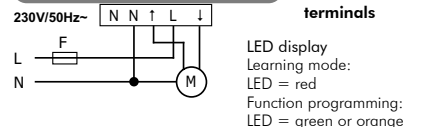
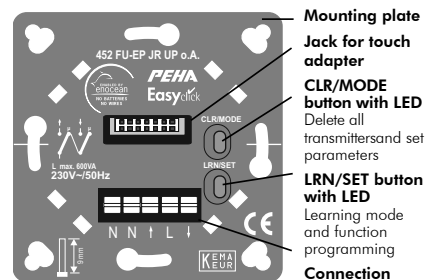
#### General specifications:

Operating frequency: 868.3 MHz  
 Voltage supply: 230 V~ / 50 Hz  
 Max. switching capacity: 600 VA  
 Test specifications: EN 60669-2-1  
 Identification: CE  
 Protection type: IP20  
Range in buildings:  
 Masonry: 20 m, through 3 walls maximum  
 Reinforced concrete: 10 m, through 1 wall/ceiling max.  
 Plasterboard/wood: 30m, through 5 walls maximum

### Connection diagrams and operation



Easyclick flush-mounted JR receiver Plus, 2-channel 452 FU-EP JR o.T.



Easyclick flush-mounted JR receiver Plus with mounting plate 2-channel 452 FU-EP JR UP o.A.

## Easyclick dimmer receiver 451 FU-BEP DAB, 451 FU-EP DAB o.A., 4511 FU-EP DAB ST

### General

Easyclick dimmers (receivers) can be used to switch and dim connected lighting. Easyclick transmitters are used to operate the dimmer (radio signal). They must be trained to the receivers (max. 32 transmitters). The dimmer's Function 1 is preset after training the receiver to a transmitter. It can be altered in function programming.

Selectable functions:

- Dimming with memory function brighter/darker and ON/OFF with 2 buttons (standard)
- Dimming without memory function brighter/darker and ON/OFF with 2 buttons and adjustable brightness values
- Targeted ON/OFF/Dim with individual buttons for simple operation
- Dimming with memory function brighter/darker and ON/OFF with 1 button
- Staircase lighting function with selectable switch-off time and OFF warning
- Store and activate 4 lighting situations at any time by pressing a button

### Diagnostic function for unsuitable loads (4511 FU-EP DAB ST)

LED flashes 5x orange then remains continuously red.

### Technical specifications

#### General specifications:

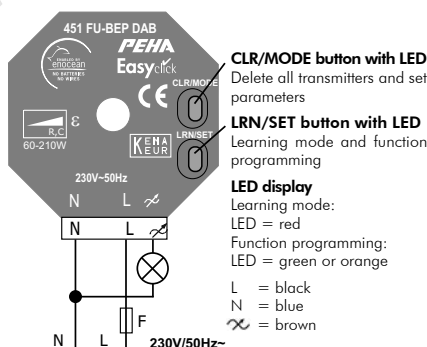
Operating frequency: 868.3 MHz  
 Voltage supply: 230 V~ / 50 Hz  
 Permissible loads: Light bulbs (Ω)  
 High-voltage halogen lamps  
 electric transformers  
 Test specifications: EN 60669-2-1  
 Identification: CE  
 Protection type: IP20  
Range in buildings:  
 Masonry: 20 m, through 3 walls maximum  
 Reinforced concrete: 10 m, through 1 wall/ceiling max.  
 Plasterboard/wood: 30m, through 5 walls maximum

Receiver	Performance data
451 FU-BEP DAB	Min. load = 60 W
451 FU-EP DAB UP o.A.	Max. load = 210 W
4511 FU-EP DAB ST	Min. load = 60 W
	Max. load = 420 W

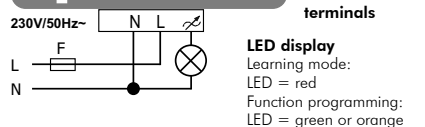
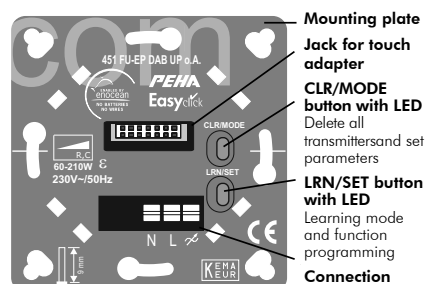
### Caution!!

- **Not** suitable for transformers approved for **leading-edge** phase dimming.
- **Not** suitable for inductive loads (e.g. conventional transformers or drives).

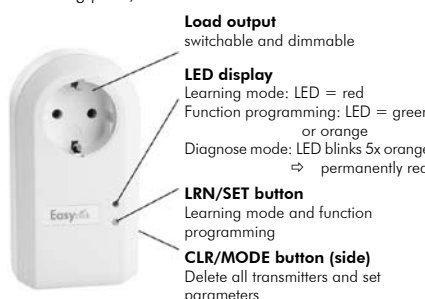
### Connection diagrams and operation



Easyclick awning dimmer receiver Plus, 1-channel 451 FU-BEP DAB



Easyclick flush-mounted dimmer receiver Plus with mounting plate, 1-channel 451 FU-EP DAB o.A.



Easyclick plug and socket dimmer receiver Plus, 1-channel 4511 FU-EP DAB ST

## Easyclick flush-mounted multi-functional receiver 24V, 452/24 FU-EP MF o.T.

### General

A shared COM clamp terminal with extra-low voltage (max. 42 V) can be used to operate the potential-free relay contacts. The relay contacts are not electrically locked. Easyclick transmitters are used to operate the receiver (radio signal). They must be trained to the receiver (max. 32 transmitters). The receiver's Function 1 is preset after training the receiver to a transmitter. It can be altered in function programming.

Selectable functions:

- Targeted ON/OFF with 2 buttons (Function 1)
- ON/OFF with 1 button
- Button sequence - Switch on whilst button is pressed
- Button sequence, time-limited
- Automatic OFF after selectable time

### Technical specifications

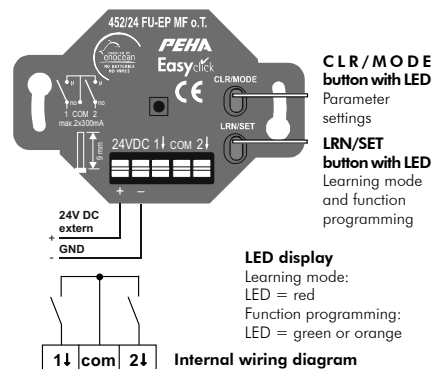
General specifications:

Operating frequency: 868.3 MHz  
 Voltage supply: 24 V DC (external)  
 Max. switching capacity per output: 300 mA at 24 V DC  
 Test specifications: EN 60669-2-1  
 Identification: CE  
 Protection type: IP20

Range in buildings:

Masonry: 20 m, through 3 walls maximum  
 Reinforced concrete: 10 m, through 1 wall/ceiling max.  
 Plasterboard/wood: 30m, through 5 walls maximum

### Connection diagram and description



Easyclick flush-mounted multi-functional receiver 24V, 452/24 FU-EP MF o.T.

## Easyclick repeaters 453 FU-RPP o.T., 453 FU-RP ST

### General

This repeater is used to increase the range between Easyclick transmitters and receivers. In 1-level operation, a radio signal received from a transmitter will be transmitted on to the respective receiver. In 2-level operation a radio signal can be transmitted past a maximum of two repeaters to a receiver in a radio link! The repeater is factory preset for 1-level operation when delivered. Manual operation of this device is not possible. Radio signals are received and transmitted automatically.

### 1-level operation

In 1-level operation, a radio signal received from a transmitter (LED 1 flashes red) will be passed on to the respective receiver.

**Activation:**

Keep pressing button 1 LEV ⇒ LED 1 lights for more than 2 s up for approx. 3 s (1-level operation is active)

### 2-level operation

In 2-level operation (LED 2 flashes red) a transmitter's radio signal will be received and passed on through maximum two repeaters to the respective receiver.

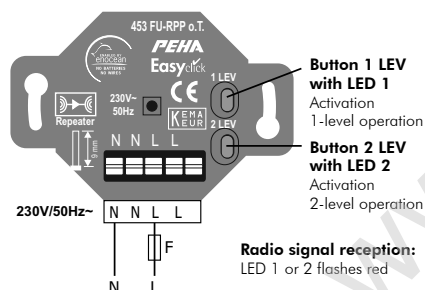
**Activation:**

Keep pressing button 2 LEV ⇒ LED 2 lights for more than 2 s up for approx. 3 s (2-level operation is active)

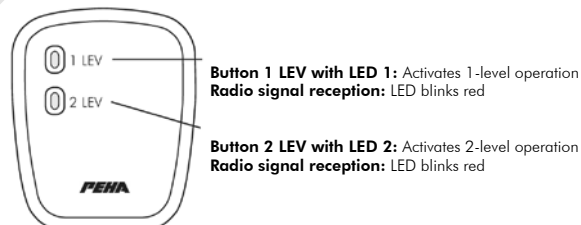
**Technical specifications**

Operating frequency: 868.3 MHz  
 Voltage supply: 230 V, 50 Hz  
 Test specifications: EN 60669-2-1  
 Identification: CE  
 Protection type: IP20

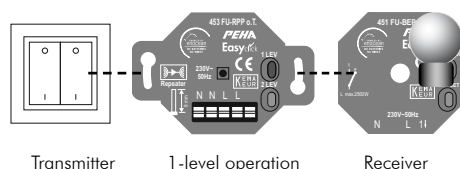
### Connection diagrams and descriptions



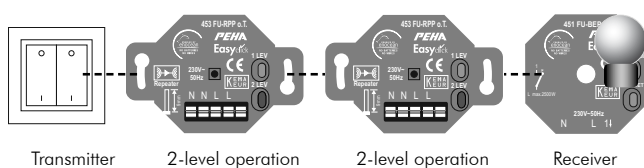
Easyclick repeater 453 FU-RPP o.T.



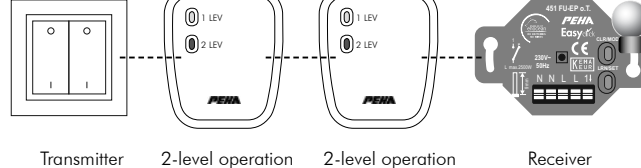
Easyclick repeater 453 FU-RP ST



### in 1-level operation



### in 1-level operation



### in 2-level operation

### in 2-level operation

## Easyclick receiver 454 FU-E DE for ceiling installation and Easyclick receiver 454 FU-E REG for serial installation

### General

Easyclick receivers can be used to switch connected lighting on/off. Easyclick transmitters are used to operate the Easyclick receivers (radio signal). They must be trained to the receivers (max. 30 transmitters). The devices offer no Plus functions!

### 454 FU-E DE outputs

The receiver has 4 potential-free outputs. Outputs 1↓-3↓ are closing contacts and output 4↓ is a changeover contact.

**Caution!!** Mixed voltages (e.g. 12V DC and 230V AC) may not be connected.

### 454 FU-E REG outputs

The receiver has 4 potential-free outputs. Outputs 1↓-4↓ are closing contacts and outputs C↓ are changeover contacts.

**Caution!!** Mixed voltages (e.g. 12 V DC and 230 V AC) may not be connected.

### Technical specifications

#### General data

Operating frequency: 868.3 MHz  
 Voltage supply: 230 V~ / 50 Hz  
 Test specifications: EN 60669-2-1  
 Identification: CE  
 Certification: KEMA / KEUR  
 Protection type: IP20

#### Range in buildings:

Masonry: 20 m, through 3 walls maximum  
 Reinforced concrete: 10 m, through 1 wall/ceiling max.  
 Plasterboard/wood: 30m, through 5 walls maximum

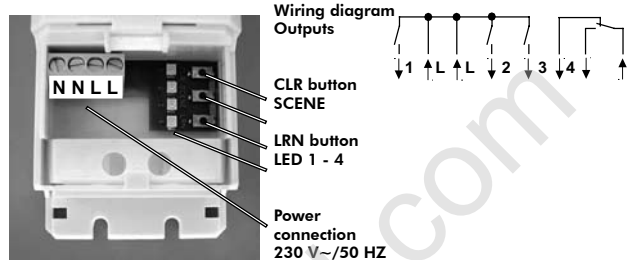
### Performance data 454 FU-E DE (per channel)

Closing contact 1↓ - 3↓		Changeover contact 4↓	
Light bulb(Ω)	= 2500W	Light bulb(Ω)	= 1000W
High-voltage halogen lamps	= 1250W	High-voltage halogen lamps	= 500W
Inductive load	= 600VA	Inductive load	= 250VA
Electronic ballast loads	= 3x	Electronic ballast loads	= 1x

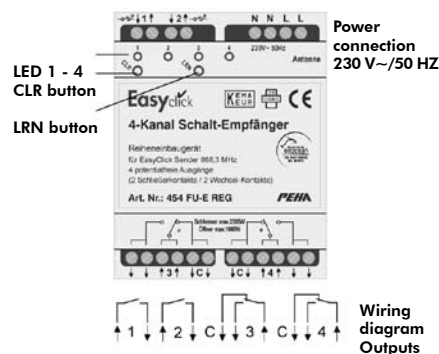
### Performance data 454 FU-E REG (per channel)

Closing contact 1↓ - 4↓		Opening contact 4↓	
Light bulb(Ω)	= 2500W	Light bulb(Ω)	= 1000W
High-voltage halogen lamps	= 1250W	High-voltage halogen lamps	= 500W
Inductive load	= 600VA	Inductive load	= 250VA
Electronic ballast loads	= 3x	Electronic ballast loads	= 1x

### Connection diagrams and description



Easyclick receiver 454 FU-E DE for ceiling installation



Easyclick receiver 454 FU-E REG for serial installation

## Training and deleting Easyclick transmitters

### Easyclick transmitter to receiver train/delete

The receiver must be connected to the power supply for programming. The receiver's learning mode must be activated in order to train/delete. A transmitter is alternately assigned (LED ON) or deleted (LED OFF) each time the transmitter's button is pressed! Several transmitters can be assigned or deleted in learning mode.

Transmitter	Button	Action
Surface-mounted transmitter	Activate rocker O, ▲, I, ▼	1x
Hand-held transmitter	Activate button A/C or B/D	1x
Timer	Activate button ▲, ▼	1x
Window contact	Activate programming button	1 x

### Notes:

- No transmitter is trained to the receiver in its delivered state.
- Function 1 on the receiver is pre-set after a transmitter has been trained. This can be altered for each transmitter in function programming.
- If no action takes place, learning mode will be terminated after 30 s.

## Function and parameter programming

### Function and parameter programming of the Easyclick receivers

The receiver's functions and parameters can be amended for each trained transmitter in function and parameter programming mode.

### Transmitter detection in function programming

Press LRN/SET until both LEDs flash green. Press the already assigned transmitter. The LED flashes orange. The number of flashes corresponds to the current function of the receiver. Press the CLR/MODE button briefly to programme parameters, the LED flashes green. The number of flashes corresponds to the current parameter of the receiver.

### The following button must be pressed to detect the transmitter:

Transmitter	Transmitter detection
Surface-mounted transmitter	Activate rocker O, ▲, I, ▼
Hand-held transmitter	Activate button A/C or B/D
Timer	Activate button ▲, ▼
Window contact	Activate magnetic contact with magnets

### Setting the receiver function

#### (e.g. Function 3)

Press LRN/SET button 3x °C LED flashes 3x orange = Function 3

### Setting the receiver parameter

#### (e.g. Parameter 2)

Press LRN/SET button 2x °C LED flashes 2x green = Parameter 2

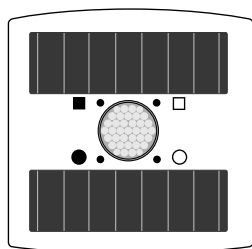
**Further information can be found in the operating instructions!**

## Sensolux solar presence detector 482 FU-BM DE

### General

The presence detector is ideally suited for expanding existing electrical installations. It does not require any wiring. It is powered by built-in solar cells. The parameters for presence detectors are set at the energy controller. The presence detector registers the presence (movement) of persons and the light value (IR component) of the ambient light. The light value is dependent on the artificial lighting, nature of surfaces (light/dark) or the incidence of light from windows. It sends the registered values for presence/absence (after approx. 2 minutes) to the energy controller for evaluation (radio signal). The light value is dependent on the artificial lighting, nature of surfaces (light/dark) or the incidence of light from windows.

**Presence**      ⇨ Movement detected  
**Absence**      ⇨ No movement detected



- LRN button
- Test button
- Light measurement
- LED test

### Caution!!

- The energy storage device must be charged over several days at 50-100 LUX for light measurement to function correctly.
- The presence detector detects the infrared portion of the light. As such, the light can only be switched on in the case of presence detection, if using light bulbs and halogen lamps!

### Scope

The higher the presence detector is mounted, the larger is its detection range (approx. 25 m<sup>2</sup> - 36 m<sup>2</sup>) although its sensitivity is reduced.



**Height**      **Person (seated)**  
 2.5 m ⇨      D = 5 m  
 3.0 m ⇨      D = 6 m

### Solar powered energy storage device

The energy pack must be charged. The charging time is approx. 5 - 10 minutes at 50-100 LUX. The device is then ready for immediate operation (assign or reset).

### Caution!!

- The energy storage device must be charged over several days at 50-100 Lux for light measurement to function correctly.

### Battery operation (optional)

The presence detector can be operated with batteries (type 1.5 V Micro AAA). Battery operation is necessary, when the device is used in rooms with low daylight or artificial light levels (less than 50 LUX). In battery mode, the presence detector can be assigned directly to an energy controller (no charging time).

### Note:

Battery replacement after approx. 8-10 years.

### LRN button

Pressing the LRN button trains/deletes the presence detector to/on the energy controller. The energy controller must be in learning mode!

### Test / LED Test button

The Test LED lights up when the Test button is pressed and the presence detector transmits a test signal. In this way, it is possible to check the charge level of the energy storage device.

### Technical specifications

#### General specifications:

Operating frequency: 868.3 MHz  
 Voltage supply: Solar cells (50-200 Lux)  
 2x batteries (up to 50 Lux)  
 1.5 V Micro AAA/LR03

Charging time for immediate operation: approx. 5 – 10 minutes  
 Ambient temperature: + 10° to + 50°C

Test specifications: EN 60669-2-1  
 Identification: CE  
 Protection type: IP50  
 Dimensions: 108 mm x 108 mm x 26 mm

#### Range in buildings:

Masonry: 20 m, through 3 walls maximum  
 Reinforced concrete: 10 m, through 1 wall/ceiling max.  
 Plasterboard/wood: 30m, through 5 walls maximum

## Sensolux energy controller 482 FU-E

### General

The energy controller is ideally suited for expanding existing electrical installations without the need for additional wiring. Various consumers such as lamp bulbs, HV halogen lamps, electronic ballast devices and inductive loads can be switched with the outputs O1 and O2 of the energy controller (receiver). A presence detector or an Easyclick transmitter (radio signal) provide the switching function of the energy controller (receiver). Before use, presence detectors and transmitters must be assigned to the energy controller (max. 8 presence detectors and 8 transmitters). They can operate an unlimited number of energy controllers. The energy controller can also be switched via two substations (buttons or switches).

**Presence**      ⇨ Movement detected  
**Absence**      ⇨ No movement detected

### Structure and description

Button A/1    Button B/0    LED A  
 LED B



### Parameters for presence detector

#### a) Standard parameters (factory setting)

On delivery, the energy controller is preset to „Fully automatic+daylight“ mode for presence detectors. The presence detector **automatically switches on** the lighting in response to presence. It **automatically switches off** the lighting in response to absence (delayed shut-down approx. 10-12 minutes). The lighting is also switched off on reaching the preset daylight value (mixed light) even in presence mode. The lighting is switched on again in response to a renewed presence state after approx. 2 minutes absence.

Parameter: Time	Function	Code
Delayed shut-down time 10-12 min	OFF	01100100
Parameter: Light value	Function	Code
LW 4	OFF	01001011
Parameter: Mode	Function	Code
Fully automatic + daylight	ON/OFF	00000111

#### b) LED display and entry of standard parameters

The code belonging to the standard parameters is indicated by LEDs (A/1+B/0) flashing. Buttons 1/0 must be used to enter the code (8-digit) of the standard parameters.

Parameter	Anzeige
<b>Time</b>	A/1 + B/0 1x flashing
<b>Code</b>	0 1 1 0 0 1 0 0
<b>Lichtwert</b>	A/1 + B/0 2x flashing
<b>Code</b>	0 1 0 0 1 0 1 1
<b>Modus</b>	A/1 + B/0 3x flashing
<b>Code</b>	0 0 0 0 0 1 1 1

## c) Parameter list

The parameter settings can be changed using buttons 1/0 according to the following code.

Parameter: Time (1)	Function	Code
Delayed shut-down time approx. 3 min	OFF	00001110
Delayed shut-down time approx. 6 min	OFF	00111100
Delayed shut-down time approx. 10 min	OFF	01100100
Delayed shut-down time approx. 15 min	OFF	10010110
Delayed shut-down time approx. 20 min	OFF	11001000
Parameter: Light value (2)	Function	Code
LW 1	OFF	00011001
LW 2	OFF	00100011
LW 3	OFF	00110010
LW 4	OFF	01001011
LW 5	OFF	01100100
Parameter: Mode (3)	Function	Code
Fully automatic	ON/OFF	00000011
Fully automatic + daylight	ON/OFF	00000111
Fully automatic + daylight + dusk	ON/OFF/ON	00001111
Semiautomatic	OFF	00000001
Semiautomatic + daylight	OFF	00000101

(1) The delayed shut-down time can extend up to 2 min (depending on the transmission interval).

(2) Light value (LW) measurement

### Darker

LW 1  
LW 2  
LW 3  
LW 4  
LW 5

### Lighter

(3) Daylight/dusk ⇒ „Parameter: Light value“

## Technical specifications

### General specifications:

Operating frequency: 868.3 MHz  
Voltage supply: 230 V~ / 50 Hz

### Charging time for

immediate operation: approx. 5 – 10 minutes

Ambient temperature: + 5° to + 50°C

Test specifications: EN 60669-2-1

Identification: CE

Protection type: IP50

### Range in buildings:

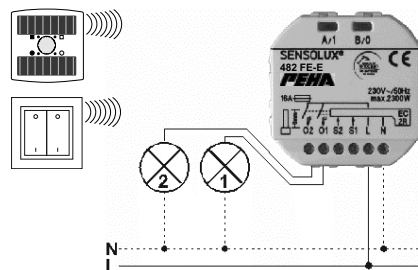
Masonry: 20 m, through 3 walls maximum

Reinforced concrete: 10 m, through 1 wall/ceiling max.

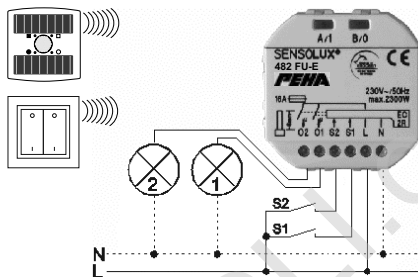
Plasterboard/wood: 30m, through 5 walls maximum

Permissible loads	
Ohmic light bulb (W)	2300 W
High-voltage halogen lamps	1250 W
fluorescent lights	1000 VA
Inductive load	600 VA
Electronic ballast loads	5x

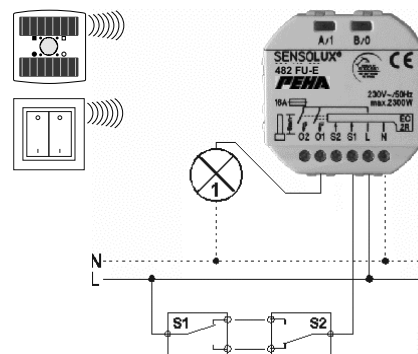
## Connection diagrams



Actuation by presence detector/transmitter with no substation



Actuation by presence detector/transmitter and substation S1 and S2 (button or switch)



Actuation by presence detector/transmitter and existing electrical installation

## Important installation notes

### Important information for commissioning the presence detector:

The energy storage device must be fully charged before placing the presence detector into operation. Observe following points:

- For immediate operation (assign or delete), charge the device for approx. 5-10 minutes at 50-100 Lux or optionally select battery mode.
- The energy storage device must be charged over several days at 50-100 LUX for light measurement to function correctly.

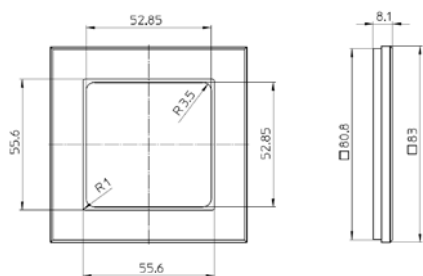
### Important information on operating the presence detector:

If the procedure for assigning to the energy controller takes place in the detection range of the presence detector, observe the following points:

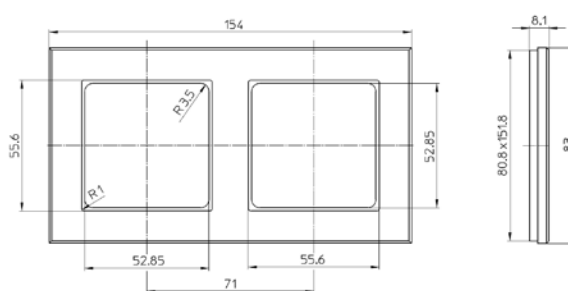
- The presence detector must transmit an ON signal for it to function correctly.
- For this purpose, all persons must leave the detection area for at least 2 minutes.
- The presence detector transmits the ON signal when persons re-enter the detection area.

Dimensional diagrams: AURA

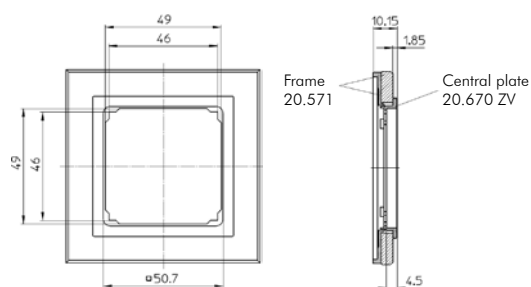
Multi-purpose frame 20.571 T



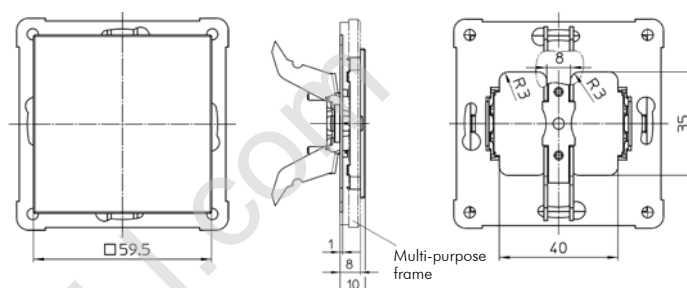
20 572 T



Standard opening 20.670 ZV

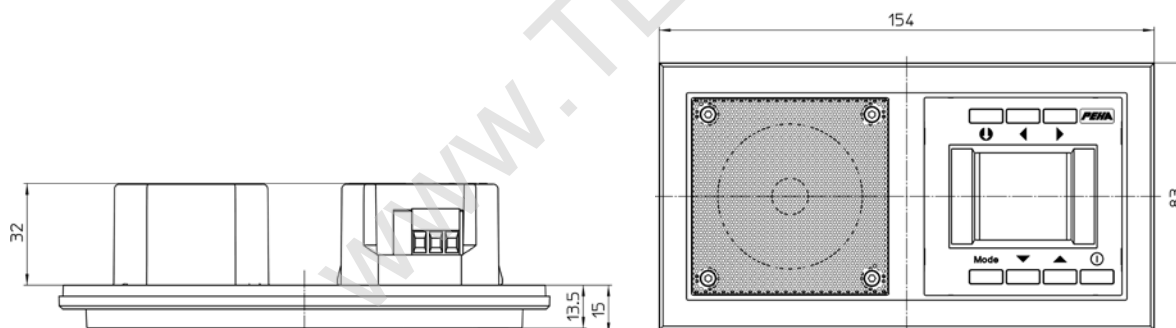


Dummy plate 20.677

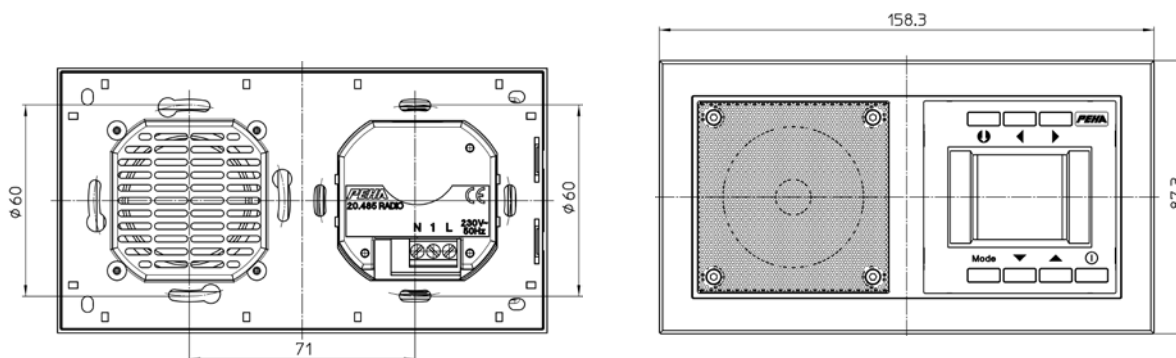


Flush-mounted radio 20.485.xx RADIO

Plastic frame



Stone/glass frame

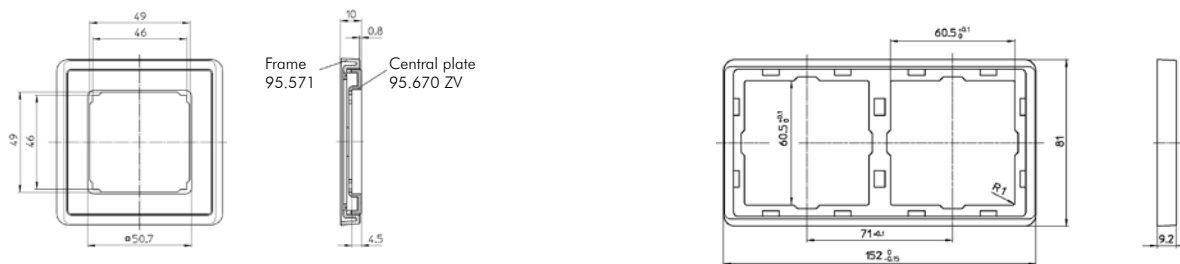




Dimensional diagrams: DIALOG

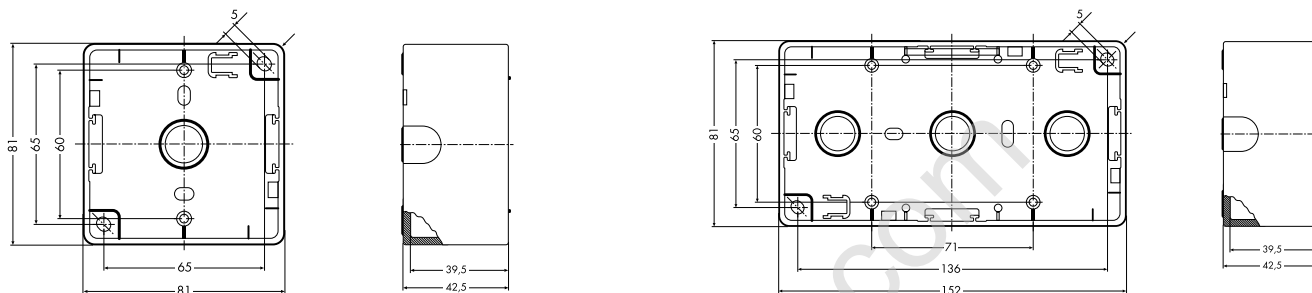
Multi-purpose frames 95.571 and 95.67 T

95.572



Surface-mounted housing 95.691

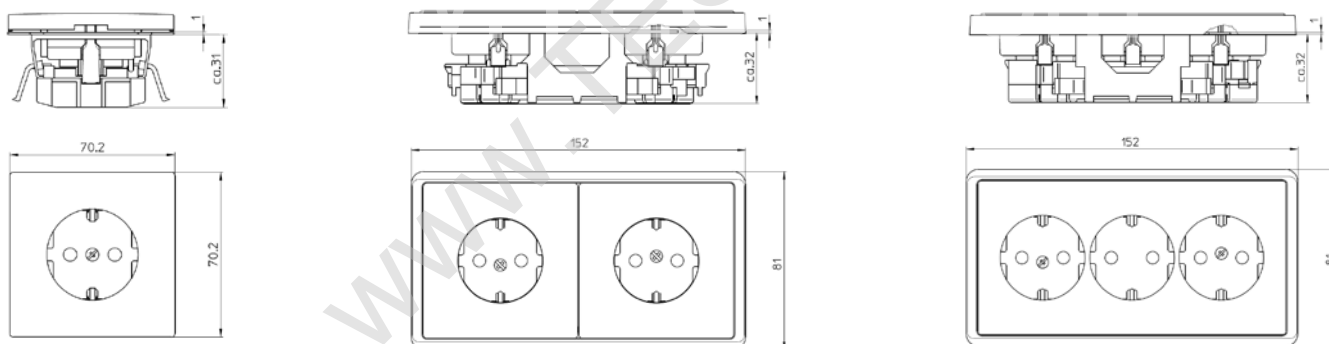
95.692



Sockets 95.6511

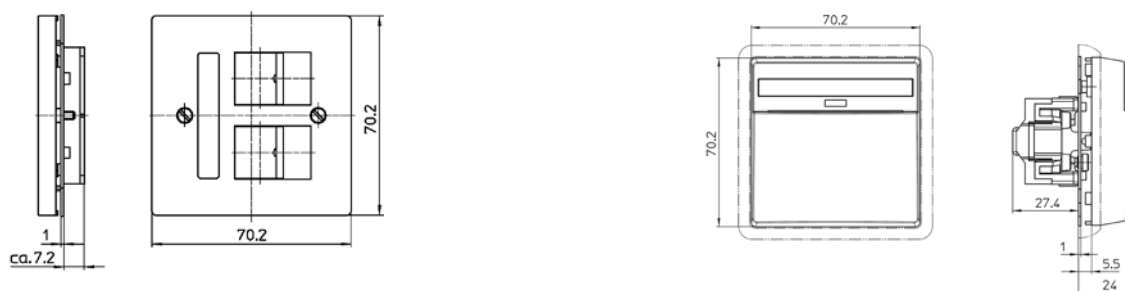
95.6512

95.6513



KT cover 95.610 MJ2 Na

95.556 HC GLK

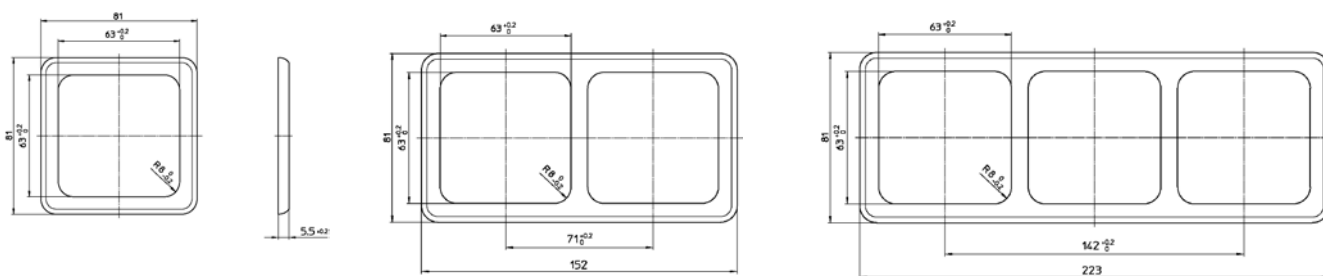


Dimensional diagrams: STANDARD

Multi-purpose frames 80.671

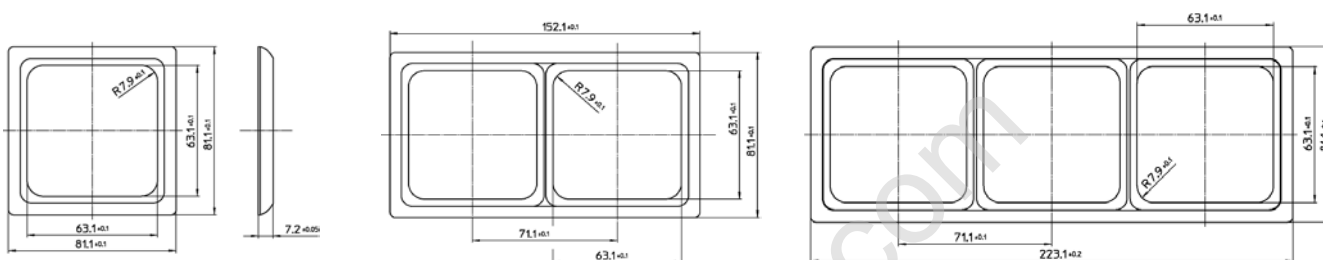
80.672

80.673



STANDARD Inline multi-purpose frames 80.571

80.572

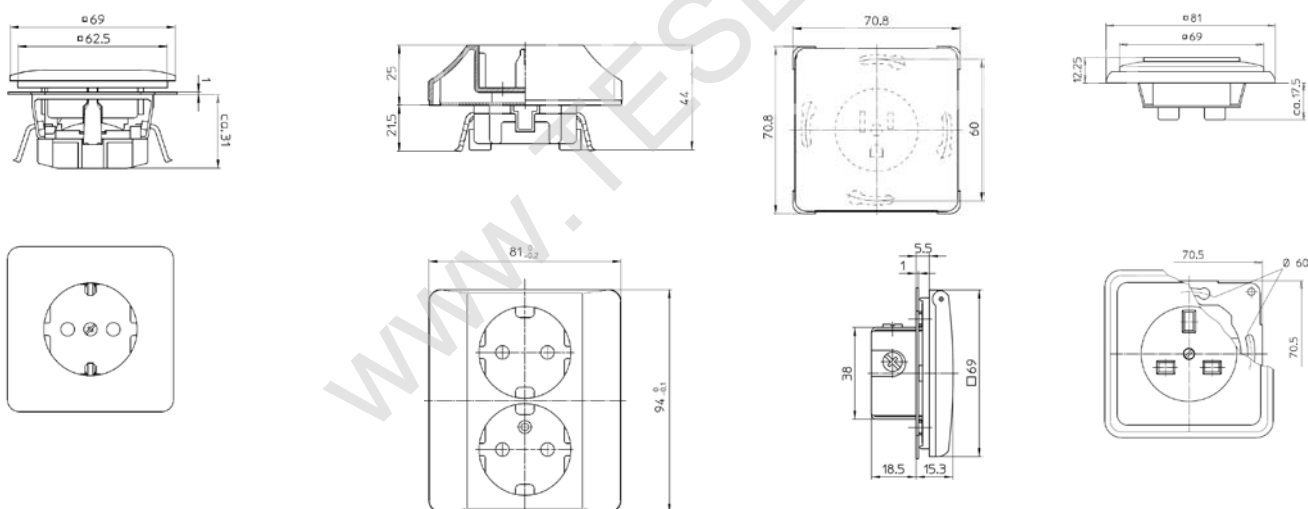


Sockets 80.6511 Si

80.6512

80.6700 US K

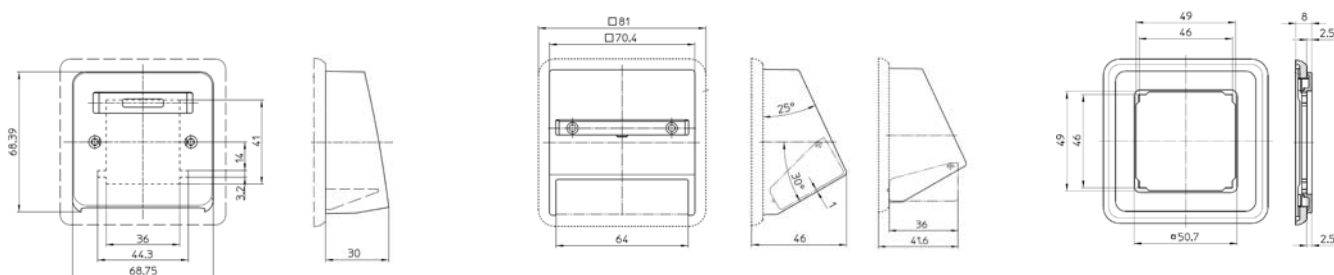
80.6700 GB



KT cover 80.610 KT

80.610 KTU

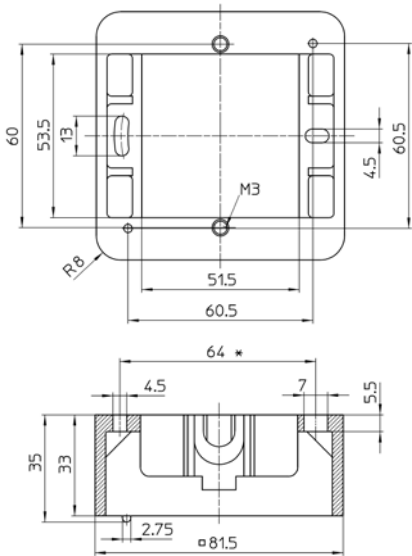
80.670 ZV



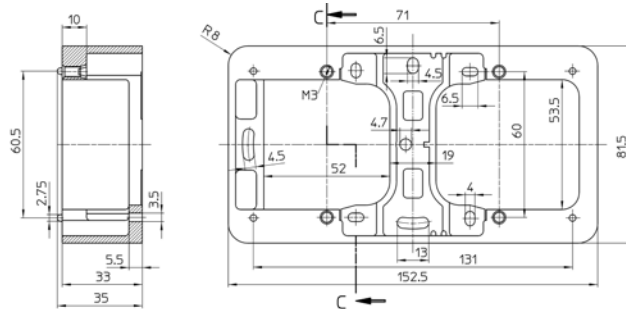


Dimensional diagrams: STANDARD surface-mounted housings

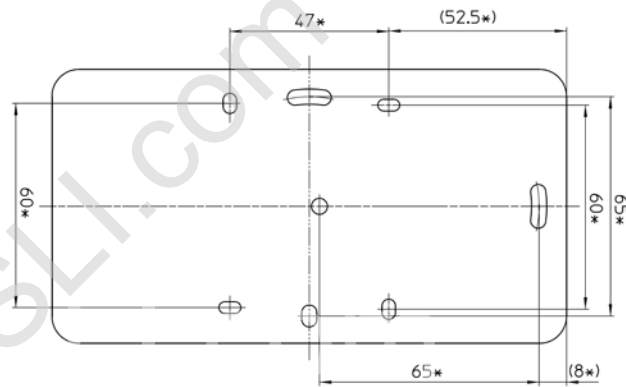
80.691



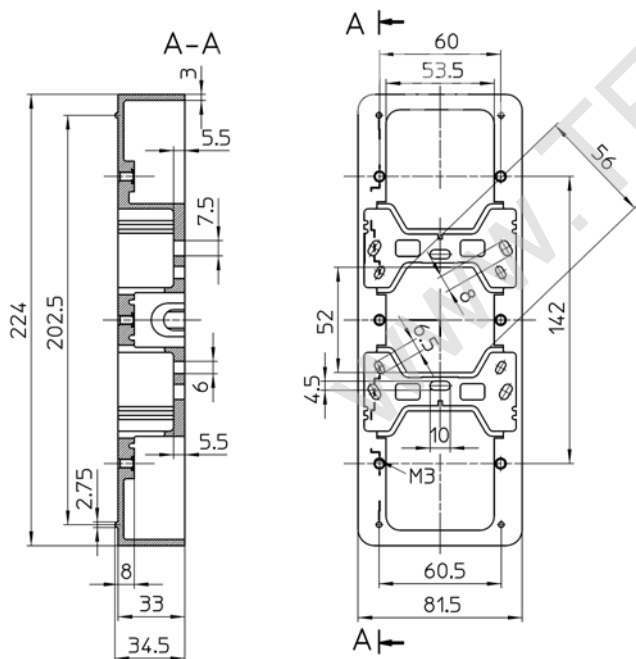
80.692



Hole pattern for mounting the dual housing

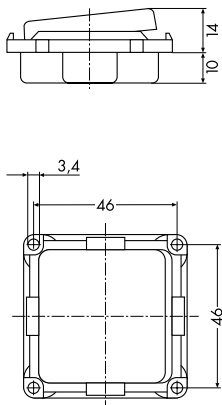


80.693

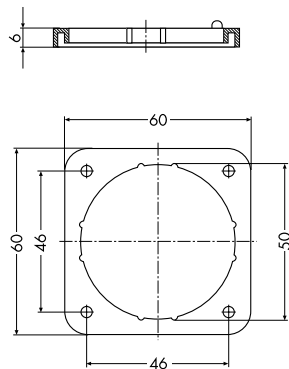


Dimensional diagrams: COMPACTA built-in series

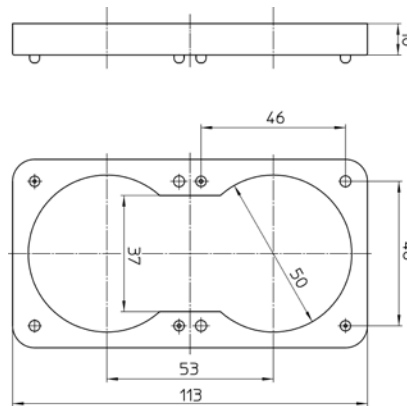
711, 712, 716, 750



71 ME  
Spacer ring



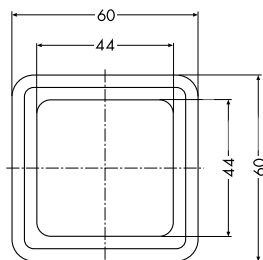
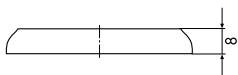
72 ME  
Spacer ring



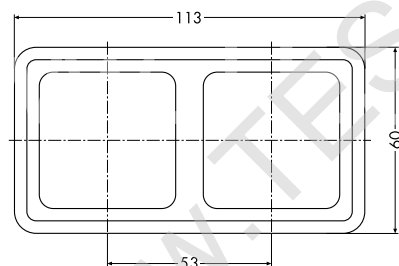
Max. diameter of fastening screw heads  
6 mm

Not for use with 702-2 Do

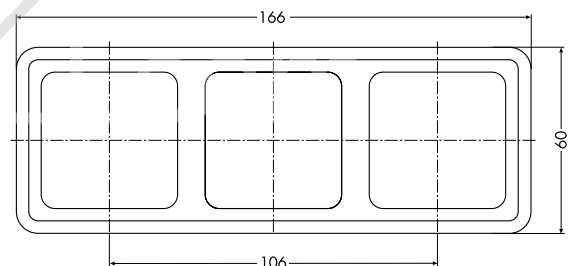
Multi-purpose frames



771

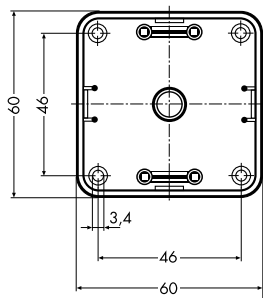
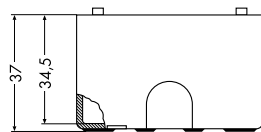
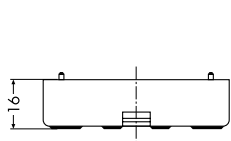


772

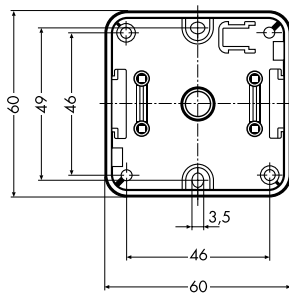


773

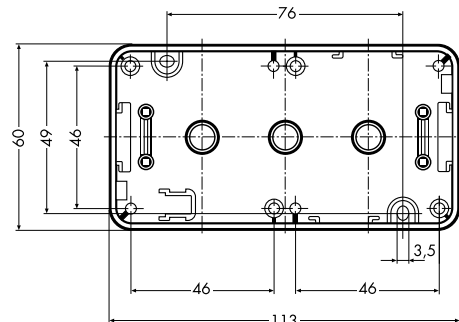
Surface-mounted housings



791 F

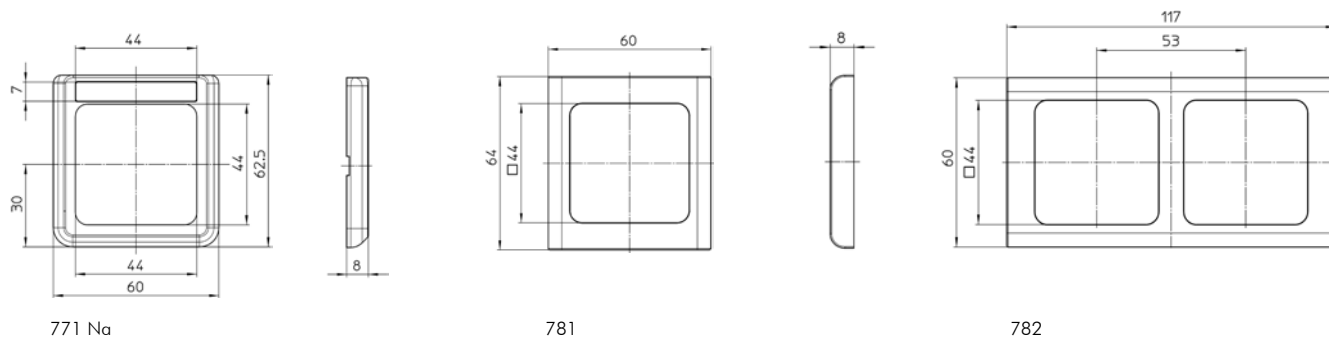


791



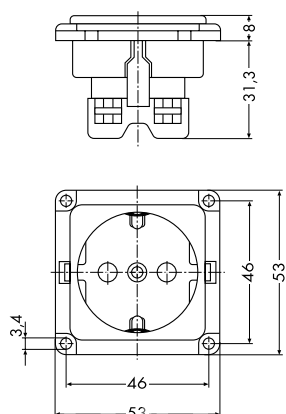
792

COMPACTA Plus frames

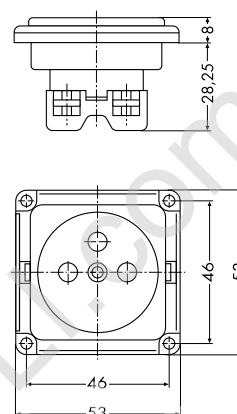


Dimensional diagrams: COMPACTA built-in series

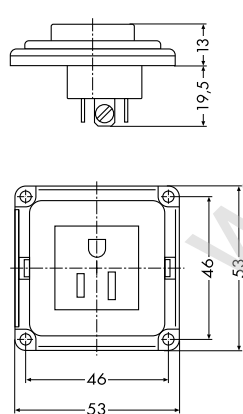
6711



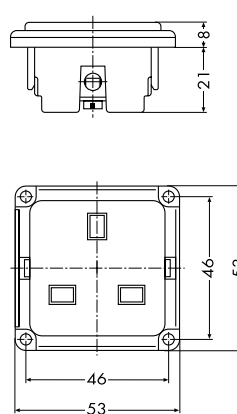
6771 Si



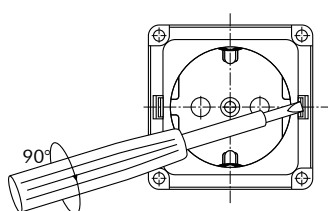
6770/15 US



6 771 GB

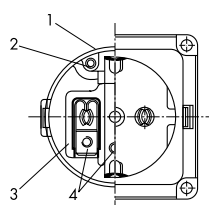


Disconnecting appliances from the insulated socket

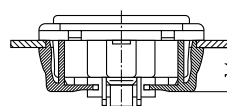
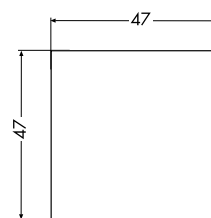


Positioning of the socket base in the insulated socket

- 1 – Insulated socket
- 2 – Cable grip
- 3 – Base
- 4 – Connecting terminals



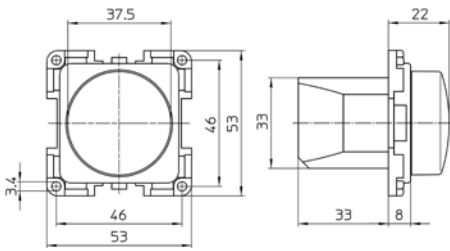
Wall cut-out for mounting



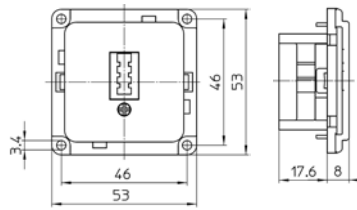
Fastening clip for mounting without insulated socket for 1mm and 2mm walls:  
77/1 CL for 1 mm  
77/2 CL for 2 mm

Dimensional diagrams

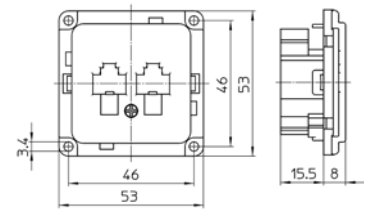
Dimmer 837/xx



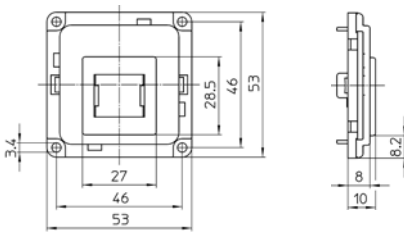
TAE socket 1765.xx F



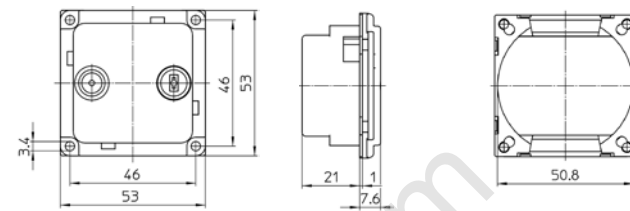
UAE socket 1758/8.xx UAE



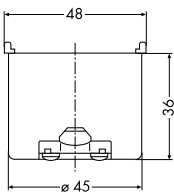
Modular Jack 710.xx MJ ATT



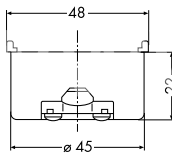
Antenna socket 1712.xx



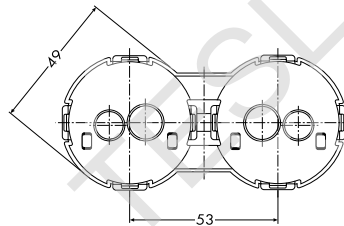
Built-in socket 701 Do



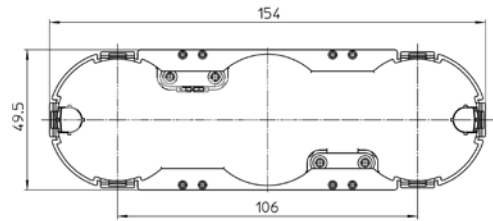
Built-in socket 701 Do F



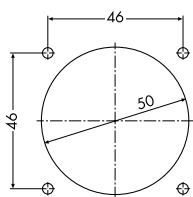
Built-in socket 702 Do



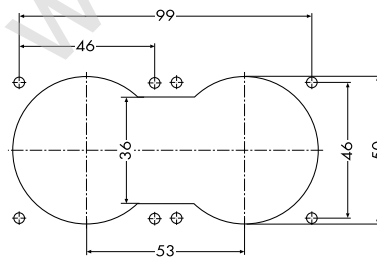
Built-in socket 703 Do



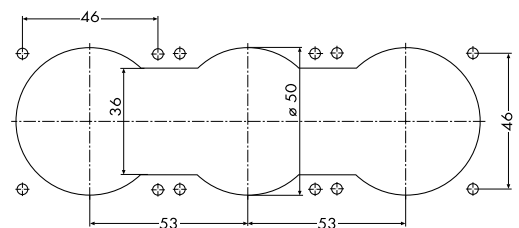
Cut-out for built-in socket 1 x single, 701 Do



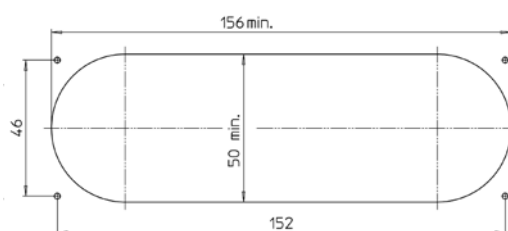
Cut-out for built-in socket 1 x double, 702 Do



Cut-out for built-in socket 3 x single

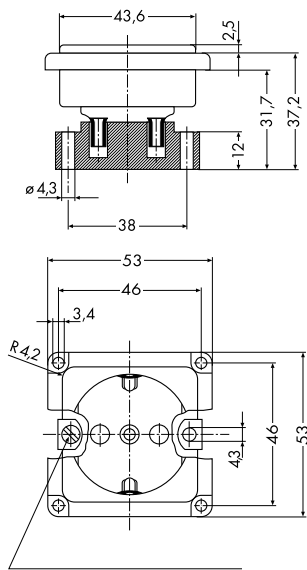


Cut-out for built-in socket 1 x triple, 703 Do

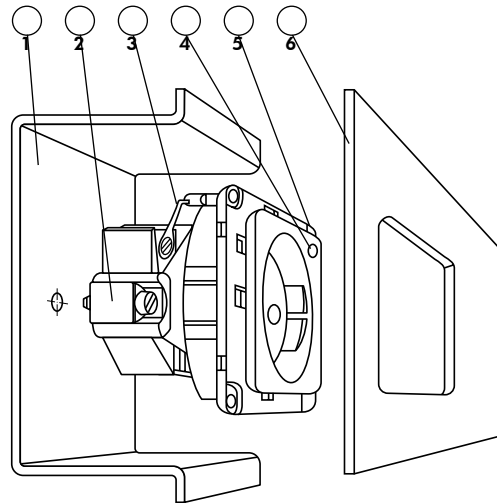


Dimensional diagrams: Built-in sockets

6611 ME

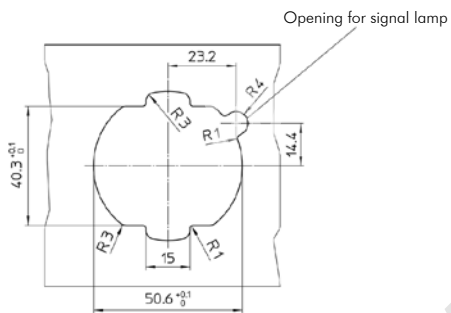


Screw head max.  $\varnothing 7$  mm

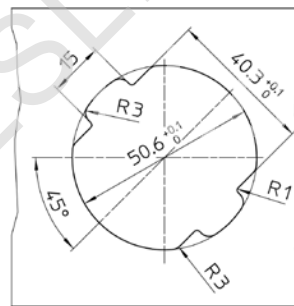


- 1 – Angle bracket
- 2 – Base
- 3 – Glow lamp
- 4 – Lighting resp. labelling lens
- 5 – Socket cover
- 6 – Front cover

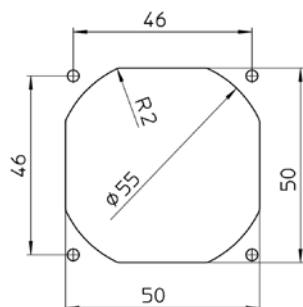
Hole pattern 6711



Hole pattern 6711 Wi

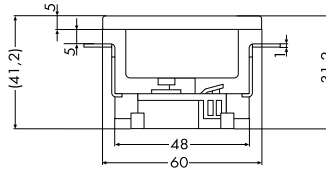
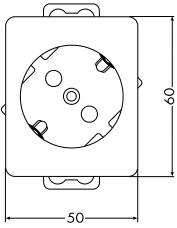


Hole pattern 6511 and 6611

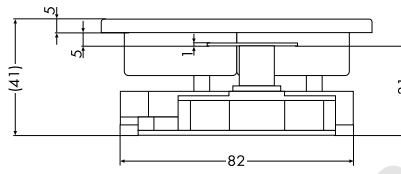
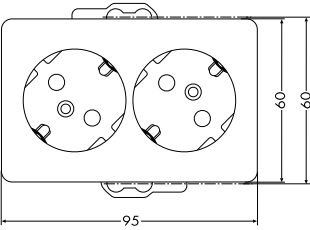


Dimensional diagrams: Flush-mounted sockets

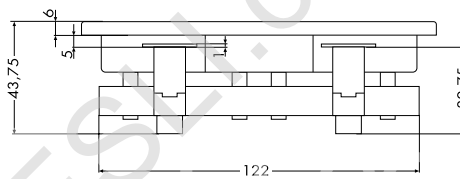
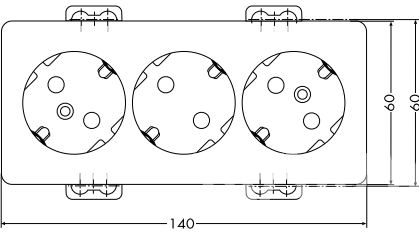
Single socket 6511.. UF Wi



Double socket 6512.. UF Wi



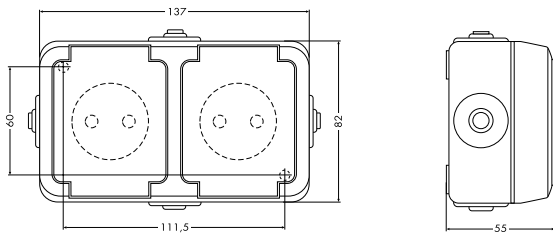
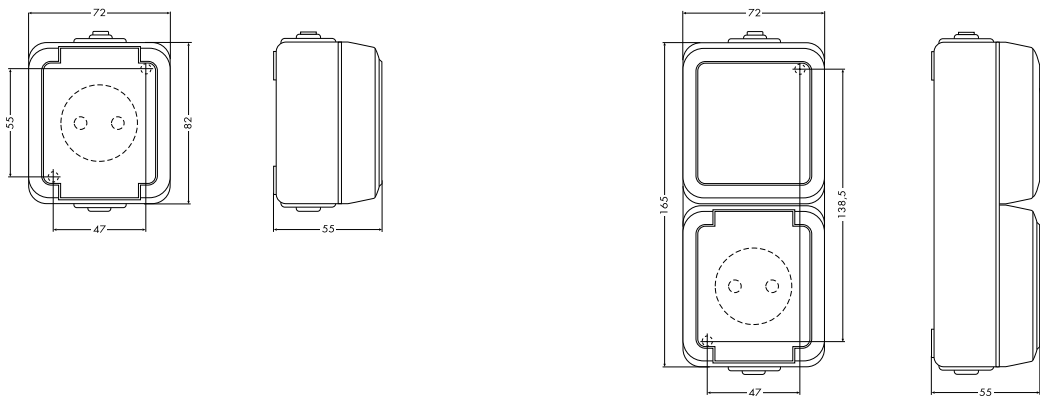
Triple socket 6513.. UF Wi



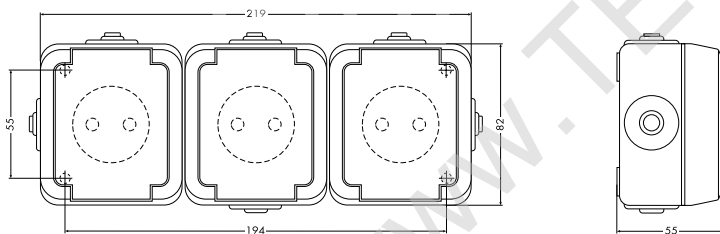
WWW.TESOL.COM

Dimensional diagrams: WAB

Sockets

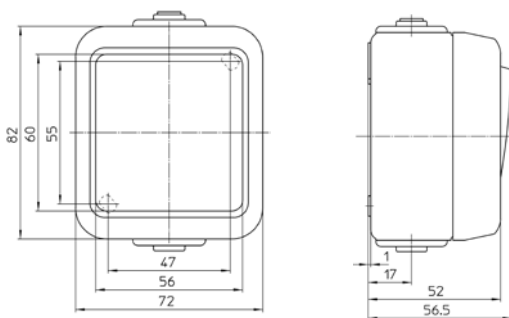


6632 WAB



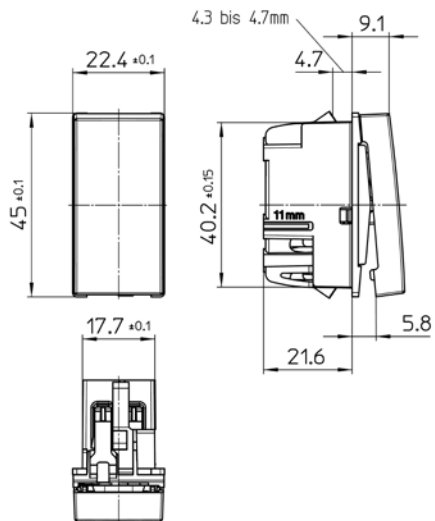
6633 WAB

Switch

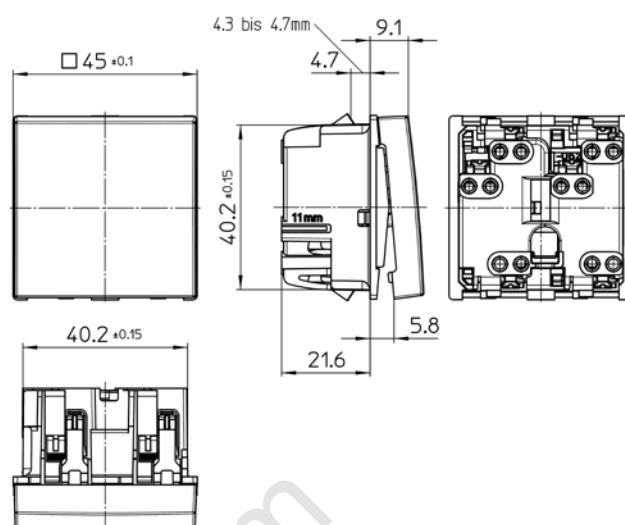


Dimensional diagrams: Module 45

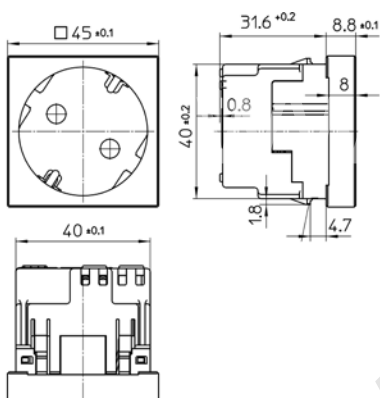
Switch  
1/2 module wide e.g. 216.02 EMS



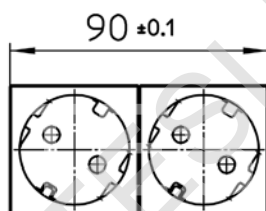
Switch  
1 module wide e.g. 212.02 EMS



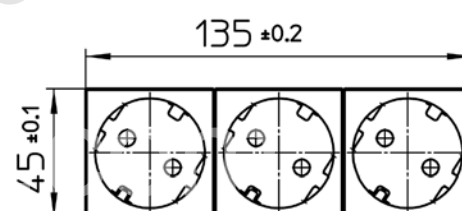
Built-in sockets  
6211 EMS SI WI



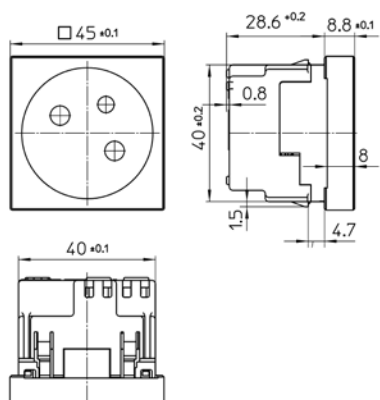
Built-in sockets  
6212 EMS SI WI



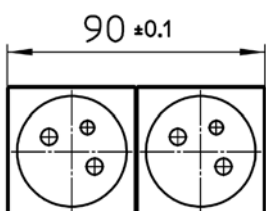
Built-in sockets  
6213 EMS SI WI



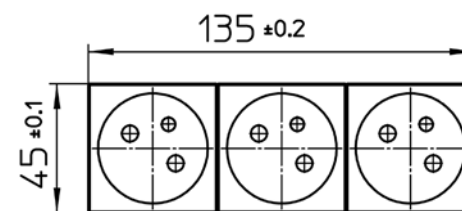
Built-in sockets  
6271 EMS SI WI



Built-in sockets  
6272 EMS SI WI



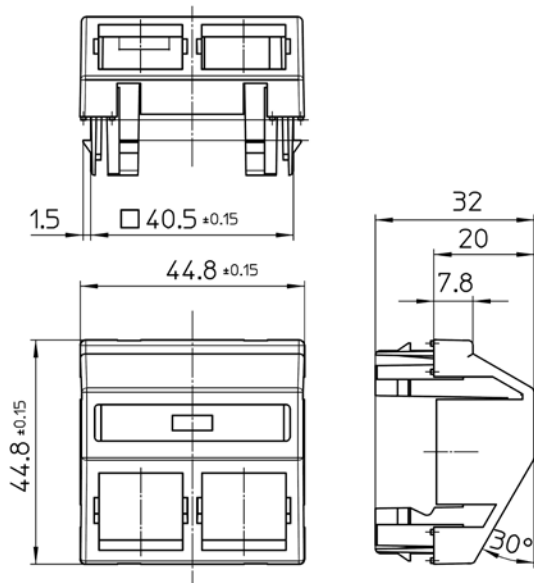
Built-in sockets  
6273 EMS SI WI



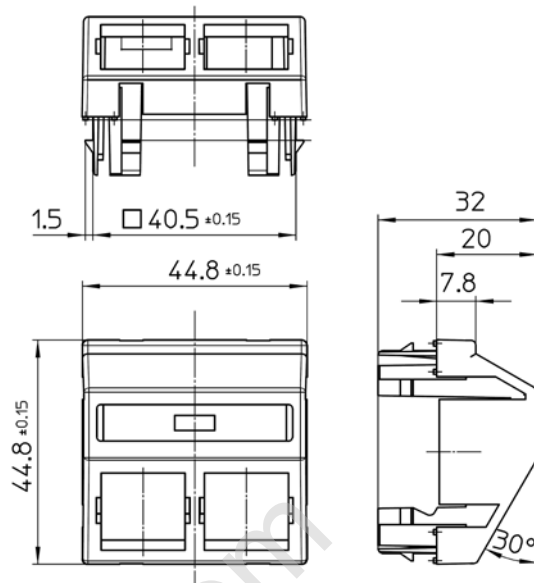


Dimensional diagrams: Module 45 CT

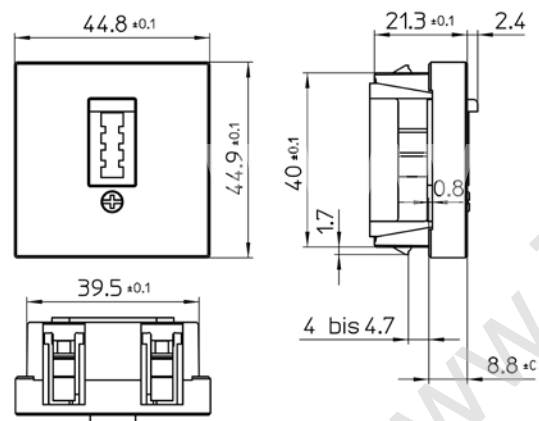
610 MJ\* EMS/67,5



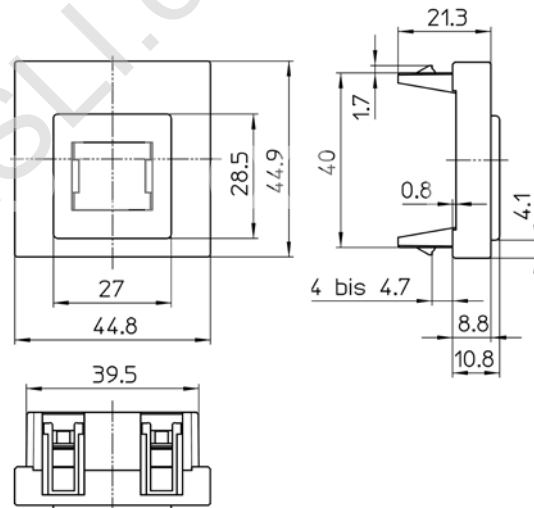
610 LU/2 EMS/\*



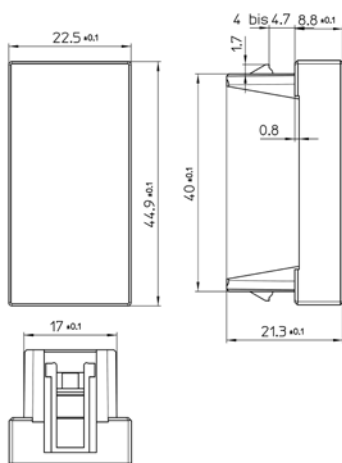
TAE connection socket 1756 F EMS



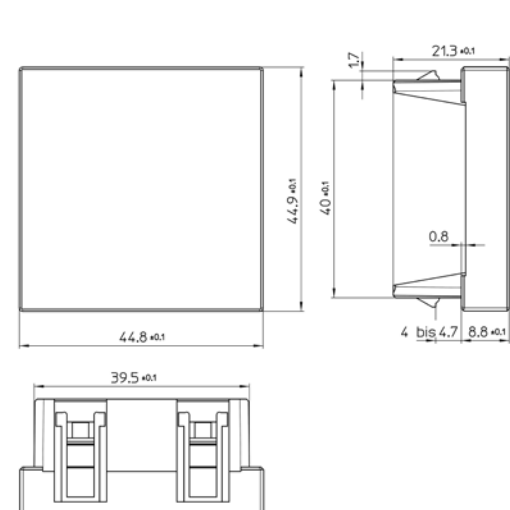
710 MJ ATT/\*EMS



Dummy cover 677/22,5

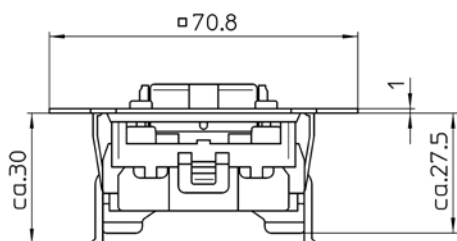


Dummy cover 677

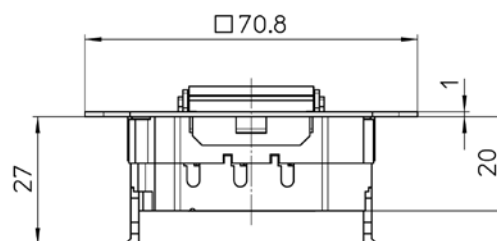


## Dimensional diagrams: Basic elements

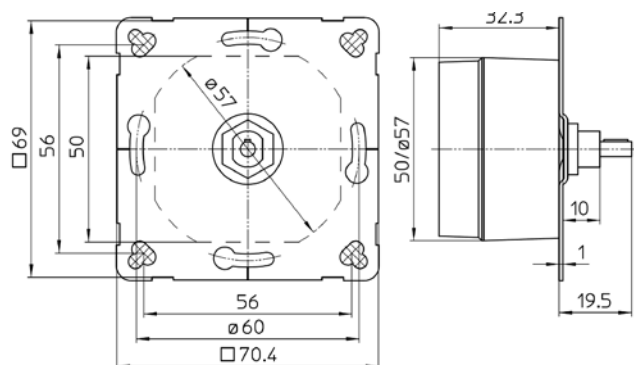
500 switch



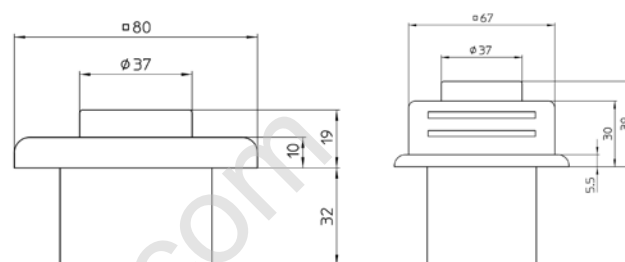
600 switch



Rotary dimmers 434 HR and 436 HR

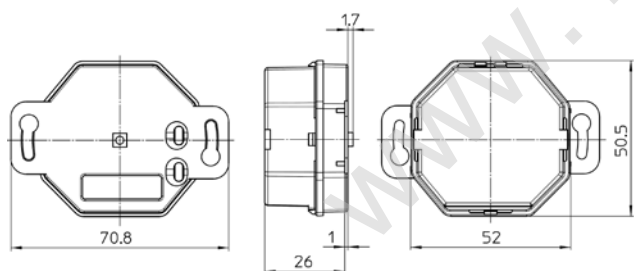


with cover 433 HR and HRK with cooling element

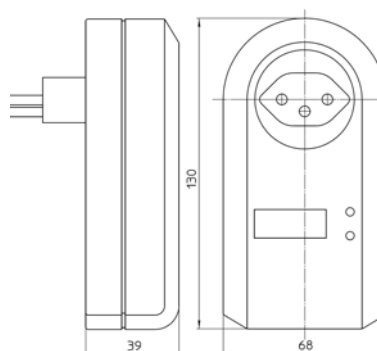


## Dimensional diagrams: Easyclick

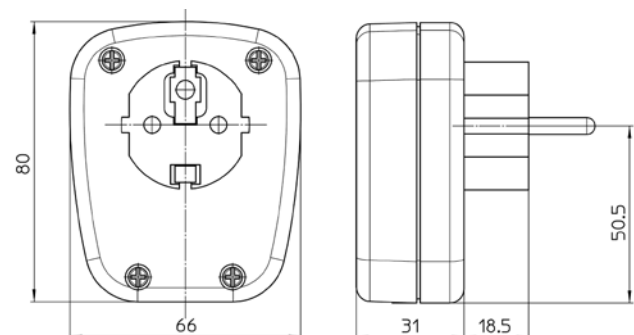
Easyclick receiver



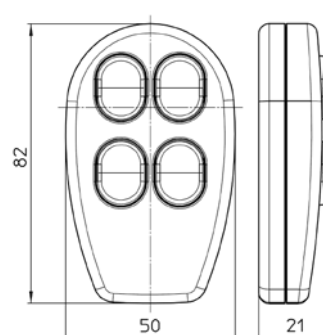
Easyclick plug and socket receiver



Easyclick repeater/timer



Easyclick hand-held transmitter



## Explanation of terms and symbols



### VDE test mark

For products that comply with VDE requirements.



### VDE noise suppression mark

For products that comply with VDE noise suppression requirements.



### CE conformity mark

All PEHA products that are subject to CE marking requirements

comply

with the stipulations of the following European directives:

- Low voltage directive 73/23/EEC
- EMC directive 89/336/EEC



### CEBEC test mark

For products that comply with Belgian CEBEC requirements.



### KEMA test mark

For products that comply with Dutch KEMA requirements.



### ÖVE test mark

For products that comply with Austrian ÖVE requirements.



### S test mark

For products that comply with Swedish SEMKO requirements.



### FI test mark

For products that comply with Finnish FIMKO requirements.



### N test mark

For products that comply with Norwegian NEMKO requirements.



### SEV test mark

For products that comply with Swiss SEV requirements.

### Definition of protection types

All appliances not specially marked are suitable for use in dry rooms. For areas of application with more stringent requirements, the protection type is shown on the appliance by means of a symbol or IP code.

### IP..

#### IP (International Protection)

An appliance's IP protection classification according to DIN 40 050, IEC 529 indicates the level of protection against foreign bodies and moisture.



#### Splash proof - equivalent to IP 44 -

Protection against splash water from all directions.



#### Hardly inflammable

For products mounted on wood that comply with the Association of Property Insurers' requirements.

### AC

#### Alternating Current

### DC

#### Direct Current



#### „mu“

Figure for switching contacts with an opening width <3 mm (acc. to VDE).

### NEMA The American Standards Committee



#### Underwriters Laboratories

The American Testing Institute



Registered trademark of SCHUKO-Warenzeichenverband e.V.; acc. to DIN 49 441.



Registered trademark of PERILEX Gemeinschaft e.V.; acc. to DIN 49 445/46, DIN 49447/48.



Plug and socket device acc. to CEE 17, DIN 49 462/63 and 65.

### Arb.

#### Workplace Directive

### Stätt.V.

The Workplace Directive dated 20.3.1975 is a national legal standard that defines the work safety requirements for workplaces.

### Information on materials

The principal properties, such as

- mechanical stability,
- technical dependency,
- fire behaviour,
- the chemical resistance of the individual parts of our products (e.g. rockers, housings, covers, etc.) all depend largely on the plastics used. A distinction must be made between three main groups:
  - Duroplasts (Duromers)
  - Thermoplasts (Plastomers)
  - Elastomers (Rubbers):

• **Duroplasts** are moulding compounds made of resins. They are blended with various fillers, such as wood, powdered stone, textile fibres, glass fibres - depending on the properties required. Duroplasts can be liquefied once by applying heat and pressure and can then be pressed or injected into moulds. Once they have dried (polymerisation), duroplasts can no longer be softened by applying heat.

• **Thermoplasts** are non-hardenable plastics that are flowable at high temperatures. They are injection moulded into moulds where they cool down and solidify. Unlike duroplasts, thermoplasts can be softened any number of times by applying heat and solidify when cold.

• **Elastomers** are rubber elastic moulding compounds. They are liquefied, similarly to duroplasts, by applying heat, pressure and solidifying agents, and injected into moulds (vulcanisation). Elastomers are permanently flexible, although the degree of resilience can differ:

- elastomers are hard flexible at low temperatures,
- elastomers are soft flexible at high temperatures.

### Safety requirements

In recent years, safety requirements have become drastically more stringent. Special measures to prevent consequential damages from fire are increasingly becoming the focus of public interest. Major damages are frequently not directly caused by fire, but rather by the corrosive or toxic gases produced during the fire. These gases are produced, when plastics containing halogen burn. PEHA uses corrosion-neutral plastics that do not contain halogen and which are hardly inflammable and have self-extinguishing properties. No PEHA products contain substances that can damage the ozone layer.

### Chemical stability

Unlike metals, plastics are relatively stable to aqueous solutions, such as acids, bases or salts. The utilisability of a plastic can, however, be severely compromised by oil or grease. A plastic that is stable to all chemicals does not exist. Please consult us or request a stability table if you have special areas of application.

### Product safety

The notices contained in our catalogues and data sheets must be observed, together with the technical specifications. Exceeding the current carrying capacity or incorrect assembly or wiring of the appliances can cause electric shocks or the risk of fire.

### Note

We are constantly striving to improve and further develop our products. PEHA products may, therefore, deviate from the descriptions in the technical specifications and from the illustrations in catalogues or data sheets.

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