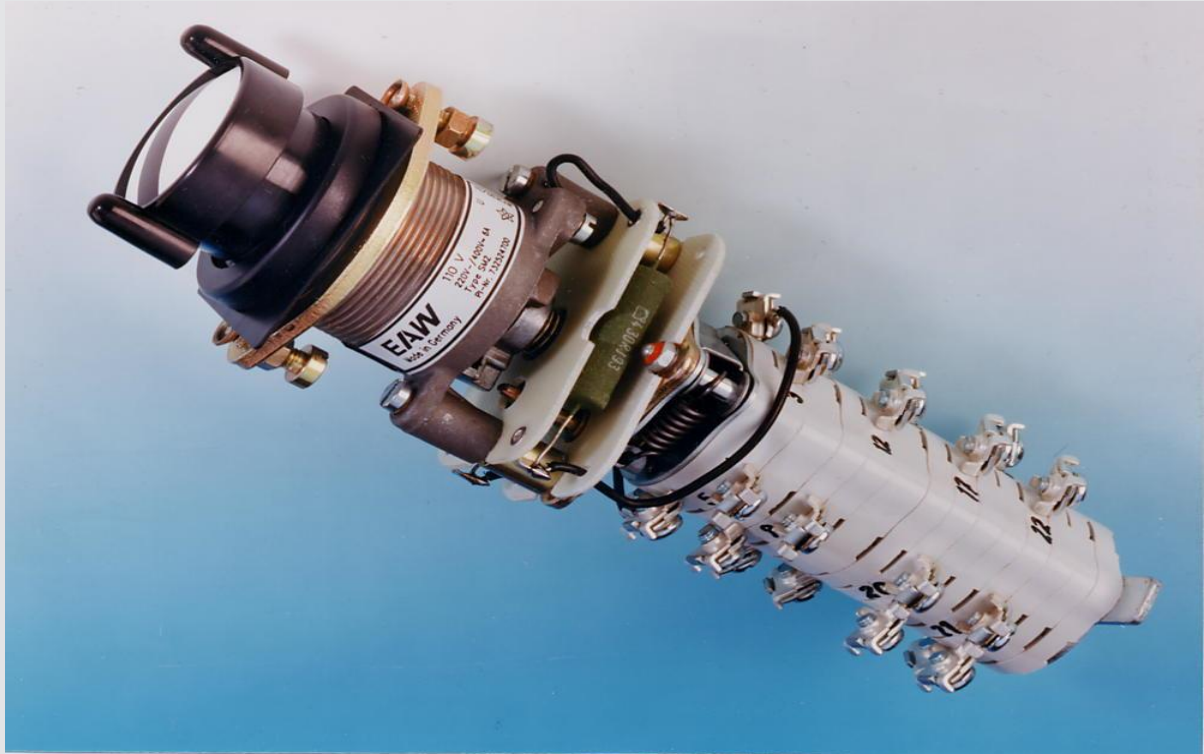


Control-Discrepancy  
Switch  
SM 2

Discrepancy Switch  
BM 2



## Control-Discrepancy Switch SM 2

### Use

The control-discrepancy switch is used to control circuit-breaker and disconnecting switch and to monitor and display their circuit state in mimic and illuminated mimic diagrams whereas the switch front is designed as graphical symbol. When it lights up it is indicated that the position of the control-discrepancy switch does not match with the assigned circuit breaker. The control-discrepancy switch can be operated in preselection circuits, i.e., the new switch position is preselected by change of the graphical symbol in the mimic diagram, then the switching command for the circuit-breaker is given.

The control-discrepancy switch can also be used if control comes first and then the new circuit state is acknowledged.

### Design

The control-discrepancy switch consists of a packet-type switch with nine wafers, the switching button with lighting unit and a breaker mechanism that has two latched positions staggered by 90°. Furthermore, this position can be turned in the same direction by 45°; however the switching button must be pressed, if not, the switch will jump back into its 90° position.

The 90° rotary control switch is used for acknowledgement (signaling switch), and the +45° press-and-twist switch (control switch) is used for control.

The lightened switching button is designed in two versions as graphical symbol of the switch:

- black bar in white field, display is accomplished by lightening up of the white field
- white bar in black field, display is accomplished by lightening up of the white bar

Both versions are equipped with a squared black front cover that can be removed, if necessary.

The control-discrepancy switch is designed in such a way to match well with the general shape of the switchboard.

### Method of Operation

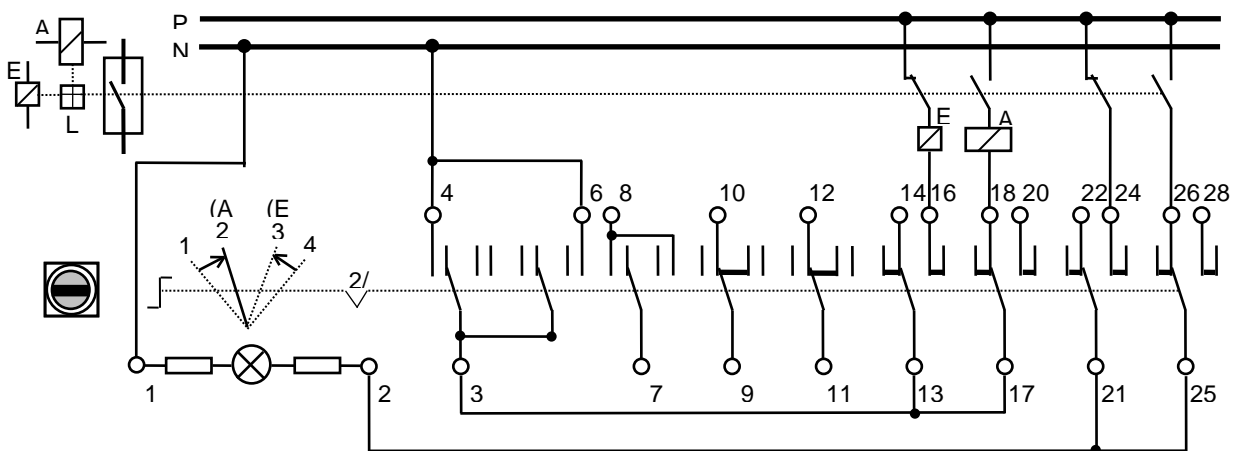
The signaling switch has two latched positions staggered by 90° and is operated by turning the switching button. For control purposes, the switch may be turned from these positions into the same direction by 45°, while the switching button must be pressed. When the switch is released, it jumps back into its 90° position.

#### Method of operation in the circuit "Preselection → Control"

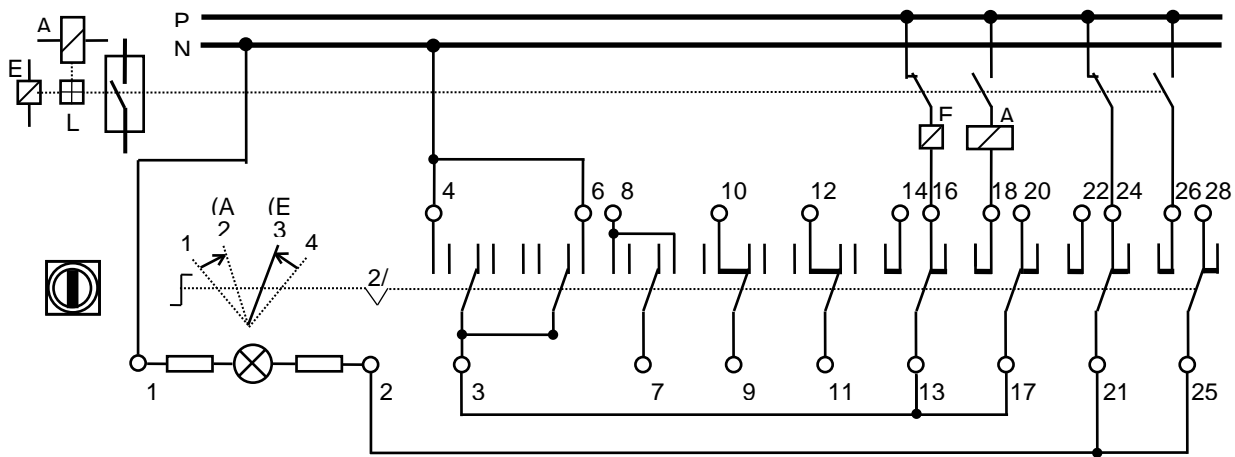
Figures 1 to 3 of the Rs 801 280 circuit diagram (internal circuit diagram of Rs 801 362) show the control-discrepancy switch in the preselection circuitry. In figure 1, the control-discrepancy switch is in correspondence with the circuit-breaker. If the circuit state of the circuit-breaker is to be changed, preselection is accomplished by turning the control-discrepancy switch by 90°. After it is turned, the lamp lights up, thus indicating that the position of the control-discrepancy switch does not longer correspond with the circuit-breaker, see figure 2.

The circuit-breaker is operated by pressing and turning the switching button by 45°, thus matching again with the switch position, the lamp is out, see figure 3.

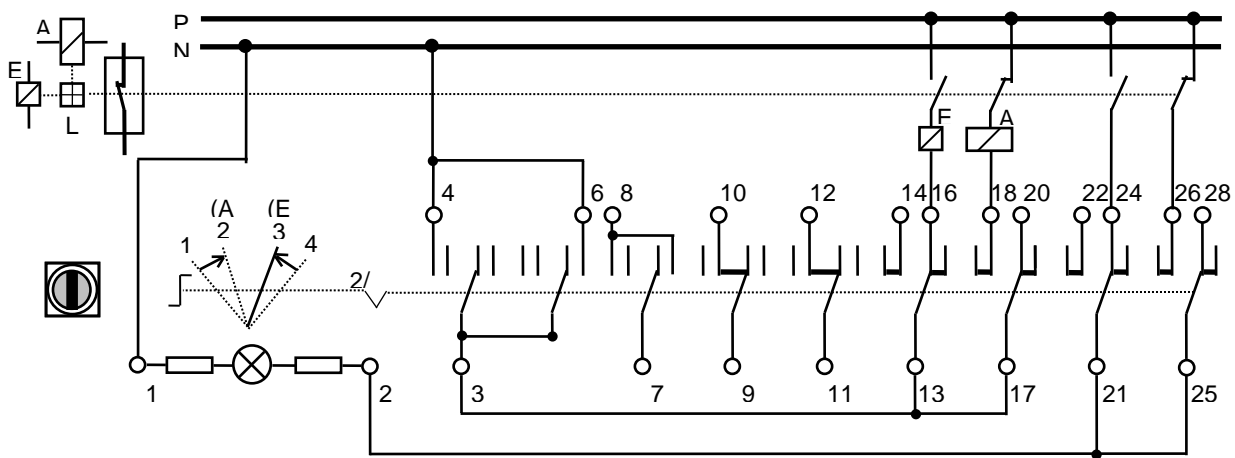
If the circuit-breaker changes its position, for example by release of a protective relay, the lamp lights up again. This message is acknowledged by turning the switching button of the control-discrepancy switch by 90° to the other side (the lamp is out).



Rs 801 280 diagram of connection: Figure 1



Rs 801 280 diagram of connection: Figure 2



Rs 801 280 diagram of connection: Figure 3

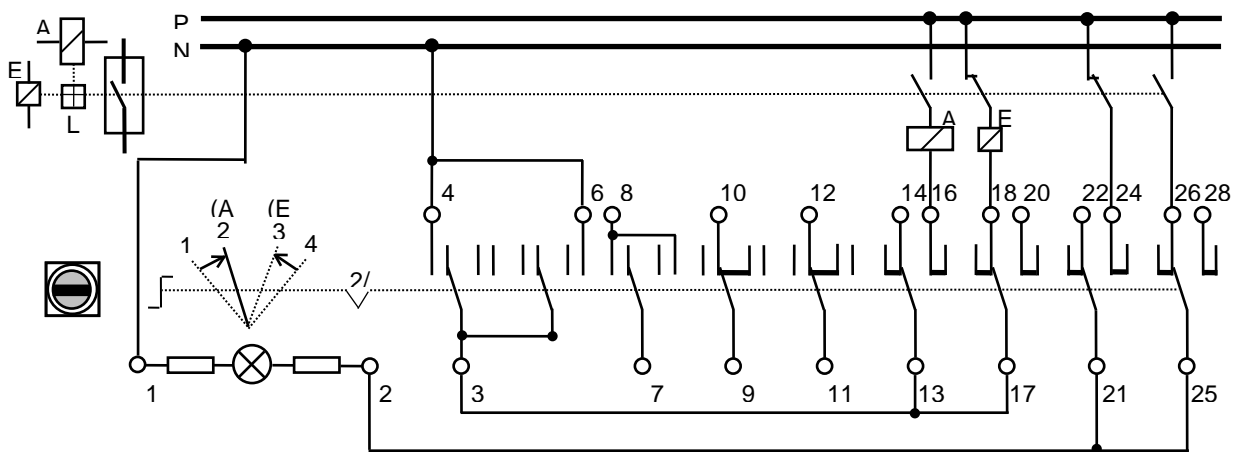
**Method of operation in the circuit "Control → Acknowledgement"**

Figures 4 to 6 of the Rs 801 281 circuit diagram (internal circuit diagram of Rs 801 362) show the control-discrepancy switch connected in such a way to be controlled first and then be acknowledged. Three different circuit states for the control-discrepancy switch and the assigned circuit-breaker are shown. If the circuit state should be changed, see figure 1, the control contacts are closed and thus, the closing solenoid of the circuit-breaker is operated by pressing the switching button of the control-discrepancy switch by 45° in excess of the 90°-position.

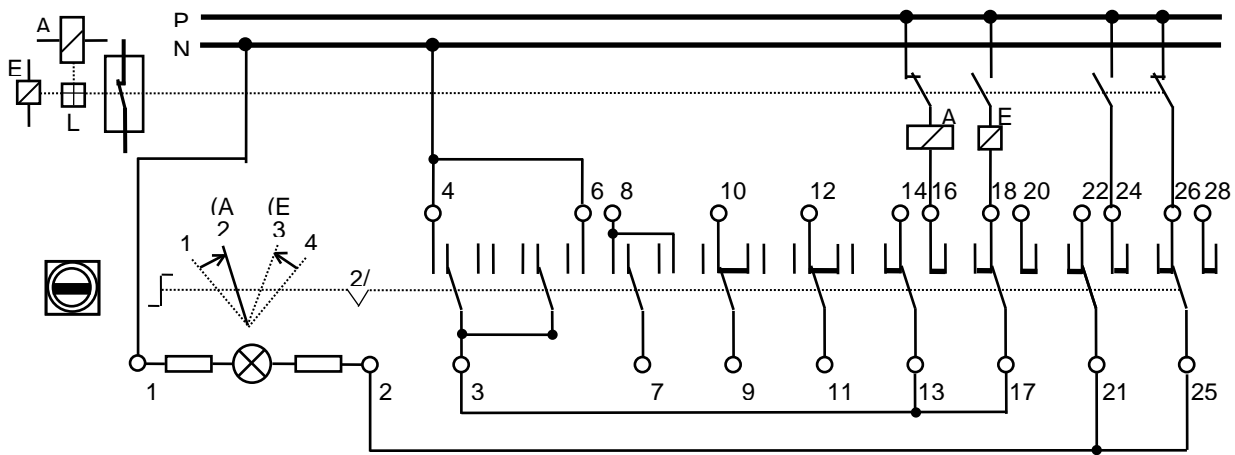
After it is switched on, the lamp lights up thus indicating that the position of the control discrepancy switch does not longer correspond with the circuit-breaker, see figure 5.

Correspondence of the switch position is reached again by turning the control-discrepancy into the "On" position, then the lamp is out, see figure 6.

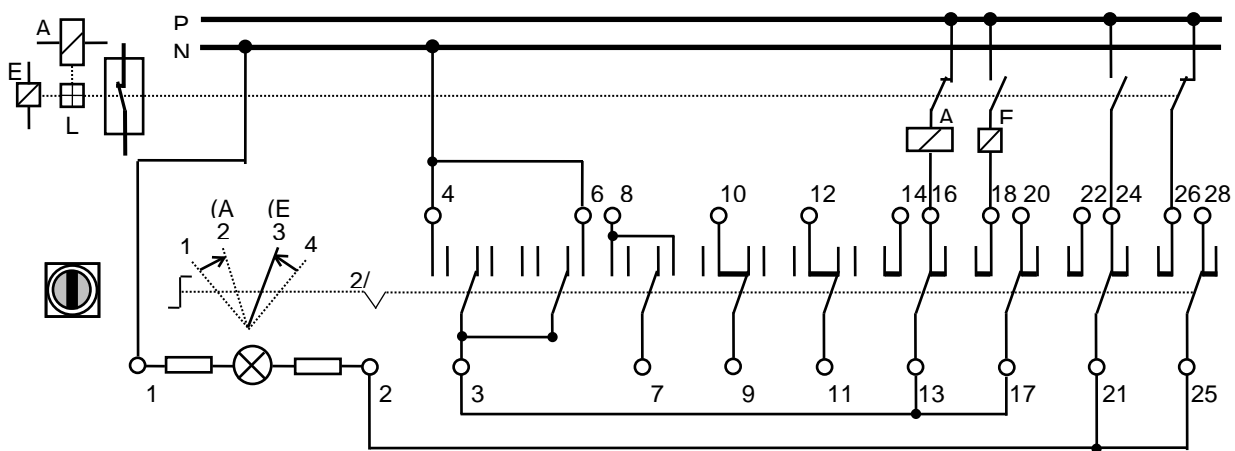
If requested, the signaling lamp can be operated with flashlight instead of permanent light through a clock generator which could be the same for several control-discrepancy switches in the unit.



Rs 801 281 diagram of connection: Figure 4



Rs 801 281 diagram of connection: Figure 5



Rs 801 281 diagram of connection: Figure 6

## BM 2 Discrepancy Switch

### Use

The discrepancy switch is used as pilot switch to control switches and to monitor and display their circuit state in mimic and illuminated mimic diagrams of electrical installations as well as to indicate the position of valves in pipe systems. The switching button shows the position of the assigned switch and/or valve. When the rotary control switch button lights up it is indicated that the circuit state of the assigned switch and/or valve does not match with the position of the discrepancy switch. Therefore, the discrepancy switch is particularly suitable to be installed into units where the state of the switch should be monitored independently of the control point.

### Design

The discrepancy switch consists of a packet-type switch with nine changeover contacts, the switching button with lighting unit and a breaker mechanism that has two latched positions staggered by 90°.

The lightened switching button is designed in two versions as graphical symbol of the switch:

- black bar in white field, display is accomplished by lightening up of the white field
- white bar in black field, display is accomplished by lightening up of the white bar

Both versions are equipped with a squared black front cover that can be removed, if necessary.

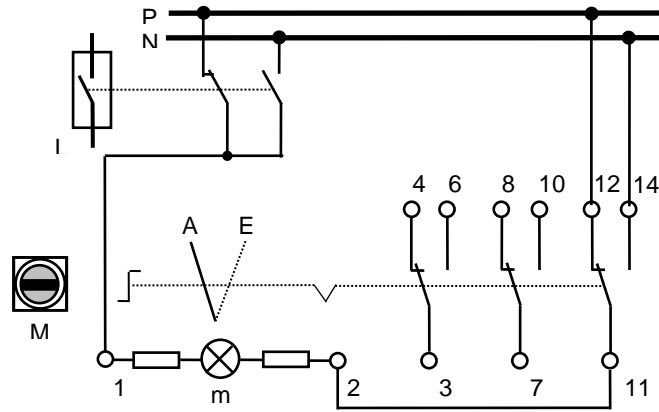
The discrepancy switch is designed in such a way to match well with the general shape of the switchboard.

## Mode of Operation

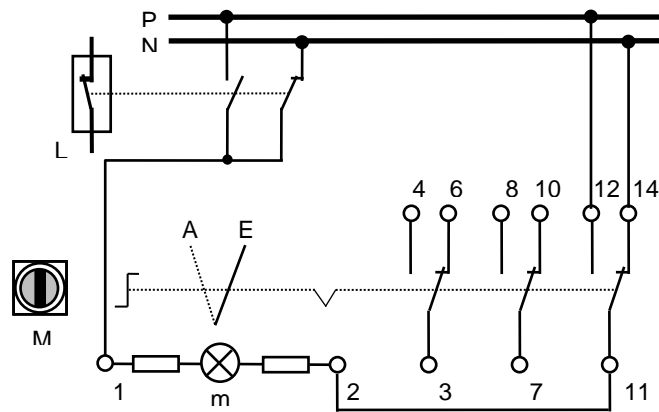
The signaling switch has two latched positions staggered by 90° and is operated by turning the switching button.

### • Mode of operation as discrepancy switch

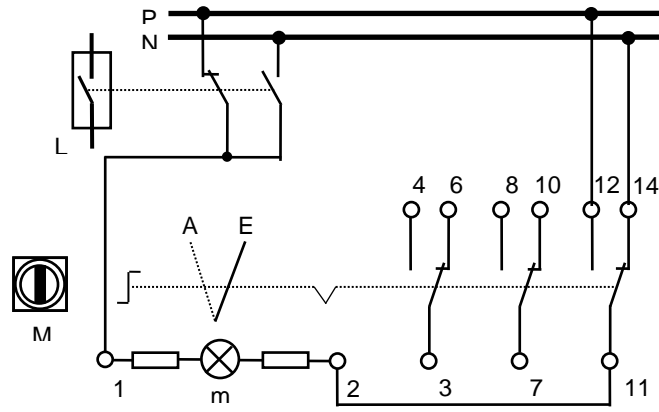
Figures 1 to 3 of the Rs 801 346 diagram of connection show an example for an application of a BM 2 discrepancy switch to monitor a circuit-breaker L in figure 1, switching state "OFF", and in figure 2, switching state "On" the position of the circuit-breaker L corresponds to that of the discrepancy switch M. In both cases the lamp is not energized, and the graphical symbol of the switch does not light up. If the position of the circuit-breaker L changes, for example if the switch is released by a protective relay, or by executing a switching command from another point, the circuit of the signaling lamp is closed, see figure 3. The graphical symbol of the switch lights up and indicates a new switching state. This message is acknowledged by changing the discrepancy switch, whereby the lamp goes out.



Rs 801 346 diagram of connection: Figure 1 – Switch L switched off, position acknowledged



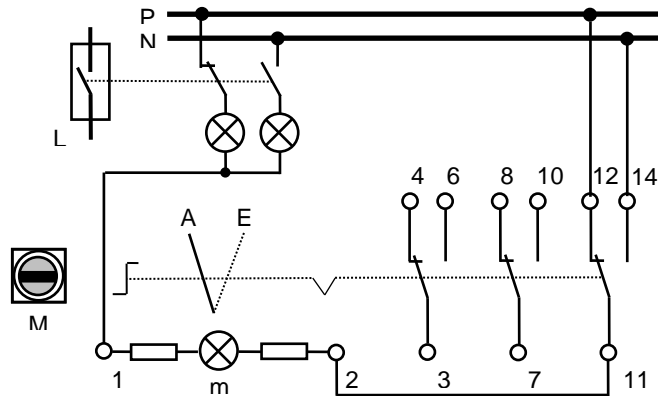
Rs 801 346 diagram of connection: Figure 2 – Switch L switched on, position acknowledged



Rs 801 346 diagram of connection. Figure 3 – Switch L switched off, position not acknowledged

**• Mode of operation as a pilot switch**

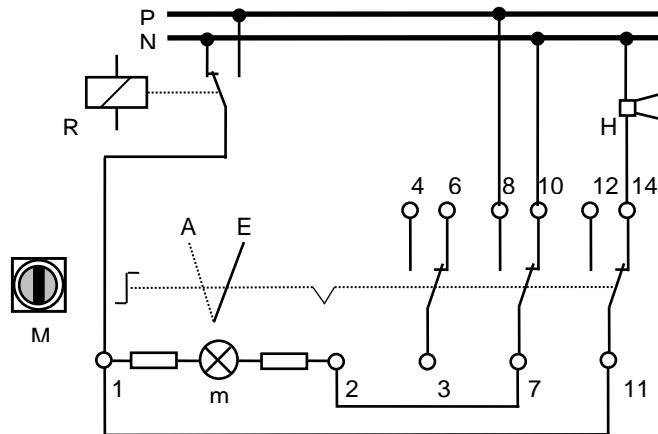
In the circuit diagram Rs 801 347, the discrepancy switch is used as pilot switch. If, at the control, a switching operation is performed, the distribution station either receives the "On" or "Off" signal of the assigned switch and then, gives the switching command. Simultaneously, the graphical symbol of the discrepancy switch is illuminated in the control. If the command is given, instruction sign, and graphical symbol of the switch go out. The control necessarily and immediately gets informed on the execution of the switching command.



Rs 801 347 diagram of connection: Figure 4

**• Mode of operation as alarm indicator**

According to the Rs 801 348 diagram, the BM 2 discrepancy switch can be used to indicate fault alarms for an optical or acoustic indication. If the protective relay shown in the initial state R switches over into the operated condition, the signal lamp m of the discrepancy switch M lights up and the acoustic signal goes on. When the discrepancy switch M changes into the warning position (bar in the switch front is horizontally), the signal lamp m goes out and the signal device H is switched off. The warning position of the discrepancy switch indicates that there is still a fault in the unit. If the protective relay goes back into its initial position, then lighting up of the signal lamp requires to set back the discrepancy switch.



Rs 801 348 diagram of connection: Figure 5

**Installation of the SM 2Control-Discrepancy Switch and the BM 2 Discrepancy Switch**

In their mode of operation, the switches are working independently of their position. They are suitable to be installed into switchboards of 1 to 15 mm thickness. After removing the switching button and screwing off the front ring, the switch is pushed from the backside through a  $\varnothing 42$  mm opening of the switchboard. Then, the front ring is screwed on again with or without the squared black front cover and the switching button is plugged on. After that, the switch must be turned into the position according to the diagram and then be tightened from the backside by the two fastening screws.

In the built-in state, the switches - from the operating side - are provided with IP 40 degree of protection, from the terminal end (behind the switchboard) IP 00 degree of protection. According to the relevant instructions concerning the protection against electric shock the switches have to be installed safe to touch by the installer or, respectively, the operator observing the necessary measures. When exchanging the lamp, the operating handle should only be removed in the de-energized state of the lamp circuit.

## Connection of the SM 2 Control-Discrepancy Switch and the BM 2 Discrepancy Switch

The switch is connected to the screw terminals on its backside (switch and lighting), i.e., behind the switchboard according to circuit diagram or, respectively, the selected circuit.

To connect the wiring, screw-type terminals used for wire range from von  $1 \times 0,75 \text{ mm}^2$  up to  $1 \times 4 \text{ mm}^2$  Cu, single- and multicore, and/or  $1 \times 1 \text{ mm}^2$  up to  $1 \times 2,5 \text{ mm}^2$  Cu, finely stranded, are provided.

Any dead metal parts of the switches are connected to the ground terminal point. This point must be incorporated by the user into the protective measures of the electrotechnical unit.

Depending on the specific circuit of the switch contacts, the user shall provide appropriate measures to meet the requirements of the law of electromagnetic compatibility.

## Manufacturing quality of the SM 2 Control-Discrepancy Switch and the BM 2 Discrepancy Switch

The products are manufactured in line with a quality management system according to the requirements of the DIN EN ISO 9004 standard as well as they are documented in line with DIN EN ISO 9001.

## Survey of Standards of SM 2 Control-Discrepancy Switch and BM 2 Discrepancy Switch

The following national and international standards shall apply to the low-voltage switchgears:

DIN EN 60947-1 / VDE 0660 Part 100: 2002-12

Low-voltage switchgears

Part 1: General Provisions

DIN EN 60947-3 / VDE 0660 Part 107: 2001-12

Low-voltage switchgears

Part 3: Load switches, disconnectors, load-interrupter switches and fuse combination units

DIN EN 60947-5 / VDE 0660 Part 200: 2000-08

Low-voltage switchgears

Part 5 – 1: Control units and switching elements – electromechanical control units

DIN VDE 0110-1 / VDE 0110 Part 1: 1997-04

Insulation coordination for electrical equipment in low voltage units

Part 1: Principles, requirements to tests

DIN EN 60529 / VDE 0470 Part 1: 2000-09

Degrees of protection provided by enclosure (IP code)

DIN EN 60999-1 / VDE 0609 Part 1: 2000-12

Connecting devices – electrical copper conductors – safety requirements for screw-type terminals

Part 1: General requirements and specific requirements for terminal point for conductors from  $0.2 \text{ mm}^2$  up to including  $35 \text{ mm}^2$

## Technical Parameter of SM Control-Discrepancy Switch and of BM 2 Discrepancy Switch

<b>Lighting of the Rotary-Control Switch Button</b>																					
Rated voltage	24 V up to 230 V DC/AC, see list of order numbers																				
Limits of rated voltage	85 % up to 110 %																				
Rated consumption:	<table> <tr> <td>24 V AC/DC</td> <td>⇒ 3,0 W / VA</td> </tr> <tr> <td>32 V AC/DC</td> <td>⇒ 4.0 W / VA</td> </tr> <tr> <td>42 V AC/DC</td> <td>⇒ 5.0 W / VA</td> </tr> <tr> <td>48 V AC/DC</td> <td>⇒ 5.5 W / VA</td> </tr> <tr> <td>60 V AC/DC</td> <td>⇒ 7.0 W / VA</td> </tr> <tr> <td>80 V AC/DC</td> <td>⇒ 9.5 W / VA</td> </tr> <tr> <td>100 V AC/DC</td> <td>⇒ 12.0 W / VA</td> </tr> <tr> <td>110 V AC/DC</td> <td>⇒ 12.5 W / VA</td> </tr> <tr> <td>125 V DC; 127 V AC</td> <td>⇒ 14.0 W / 14.5 VA</td> </tr> <tr> <td>220 V DC; 230 V AC</td> <td>⇒ 24.5 W / 26.5 VA</td> </tr> </table>	24 V AC/DC	⇒ 3,0 W / VA	32 V AC/DC	⇒ 4.0 W / VA	42 V AC/DC	⇒ 5.0 W / VA	48 V AC/DC	⇒ 5.5 W / VA	60 V AC/DC	⇒ 7.0 W / VA	80 V AC/DC	⇒ 9.5 W / VA	100 V AC/DC	⇒ 12.0 W / VA	110 V AC/DC	⇒ 12.5 W / VA	125 V DC; 127 V AC	⇒ 14.0 W / 14.5 VA	220 V DC; 230 V AC	⇒ 24.5 W / 26.5 VA
24 V AC/DC	⇒ 3,0 W / VA																				
32 V AC/DC	⇒ 4.0 W / VA																				
42 V AC/DC	⇒ 5.0 W / VA																				
48 V AC/DC	⇒ 5.5 W / VA																				
60 V AC/DC	⇒ 7.0 W / VA																				
80 V AC/DC	⇒ 9.5 W / VA																				
100 V AC/DC	⇒ 12.0 W / VA																				
110 V AC/DC	⇒ 12.5 W / VA																				
125 V DC; 127 V AC	⇒ 14.0 W / 14.5 VA																				
220 V DC; 230 V AC	⇒ 24.5 W / 26.5 VA																				
Lamp	Ba9s 24 V / 3 W																				

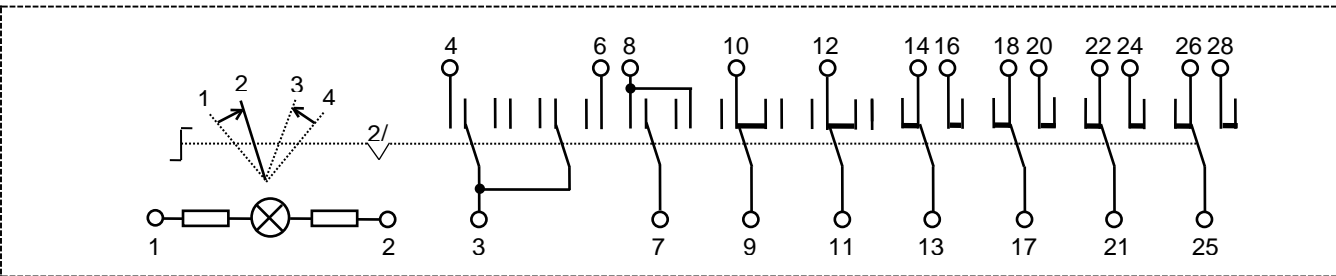
<b>Switch Parameters</b>	
Maximum switching voltage:	400 V AC, 50 / 60 Hz 250 V DC
Maximum making current	9 A
Conventional thermal current	6 A
Utilization category AC 21 • Rated operating voltage • Rated operating current	switching of resistive loads including slight overload 230 / 400 V AC 6 A AC
Utilization category AC 15 • Rated operating voltage • Rated operating current	control of electromagnetic load 230 / 400 V AC 1 A AC
Utilization category DC 13 • Rated operating voltage • Rated operating current	control of electromagnetic loads 220 V DC 0.5 A DC
Switching rate	≤ 30 s.r per h or, resp., according to utilization category
Voltage endurance	according to utilization category
Mechanical endurance	≥ 2 × 10 <sup>5</sup> switching cycles
Ambient temperature	-10°C up to 45°C
Function indicator • rotary control switch button depending on design type	environment lighted or central bar lighted
Operating position	any
Number of contacts ⇒ SM 2 control-discrepancy switch • switch • pushbutton ⇒ BM 2 discrepancy switch • switch	4 changeover contacts depending on design type, see circuit diagrams  3 changeover contacts
Rated insulation voltage • Lighting • SM 2, BM 2 switches	according to DIN VDE 0110-1 / VDE 0110 Part 1: 04.97 250-volt 400-volt
degree of pollution	3 according to DIN EN 60947-1 / VDE 0660 Part 100: 2002-12
Rated power-frequency voltage strength • Lighting • SM 2, BM 2 switches	2.0 kV 2.5 kV
Rated surge withstand strength • lighting • SM 2, BM 2 switches	according to DIN EN 60947-1 / VDE 0660 Part 100: 2002-12 - 4.0 kV, voltage form 1.2/50 μs
Clearances in air • lighting • SM 2, BM 2 switches	according to DIN EN 60947-1 / VDE 0660 Part 100: 2002-12 ≥ 3 mm ≥ 4 mm
Creepage distances • lighting • SM 2, BM 2 switches	according to DIN EN 60947-1 / VDE 0660 Part 100: 2002-12 ≥ 4.0 mm ≥ 6.3 mm
Electric shock protection	safe from touch by the back of the hand and the fingers in the installed state from the operating side
Degree of protection • operating side • connecting side	according to DIN EN 60529 / VDE 0470 Part 1: 2000-09 IP 40 IP 00
Connections • type attachment • wire range	according to DIN EN 60999-1 / VDE 0609 Part 1: 2000-12 screw-type terminals 1 × 0,75 mm <sup>2</sup> up to 1 × 4 mm <sup>2</sup> single- and multicore 1 × 1.0 mm <sup>2</sup> up to 1 × 2.5 mm <sup>2</sup> finely stranded
Dimensions, see also dimensioned drawings • depth of SM 2 control-discrepancy switch • depth of BM 2 discrepancy switch • switch button • front cover, black • fixing opening of the switchboard • permissible thickness of switchboard	≤ 184 mm ≤ 157 mm ∅ 52 mm 52 mm × 52 mm × 1 mm ∅ 42 mm 1 mm ... 15 mm
Dimensioned drawings • SM 2 control-discrepancy switch • BM 2 discrepancy switch	Rs 805,575 Rs 805,149
Weight • SM 2 control-discrepancy switch • BM 2 discrepancy switch	about 0.6 kg about 0.6 kg



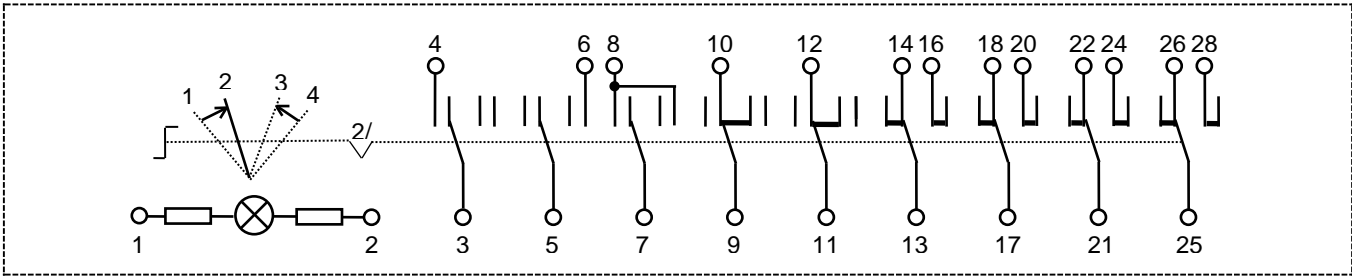
Circuit diagrams: ⇒ SM 2 control-discrepancy switch <ul style="list-style-type: none"> <li>• circuit diagrams:</li> <li>• circuit "preselection → control"</li> <li>• circuit "control → acknowledgement"</li> </ul> ⇒ BM 2 discrepancy switch <ul style="list-style-type: none"> <li>• circuit diagram</li> <li>• discrepancy switch with switch position</li> <li>• discrepancy switch as pilot switch</li> <li>• discrepancy switch as alarm indicator</li> </ul>	Rs 801 362, Rs 801 473, Rs 801 449 Rs 801 280 Rs 801 281  Rs 801 303 Rs 801 346 Rs 801 347 Rs 801 348
Operating instructions	Rs 808 067

**Internal Circuit Diagrams of SM 2 Control-Discrepancy Switch and BM 2 Discrepancy Switch**

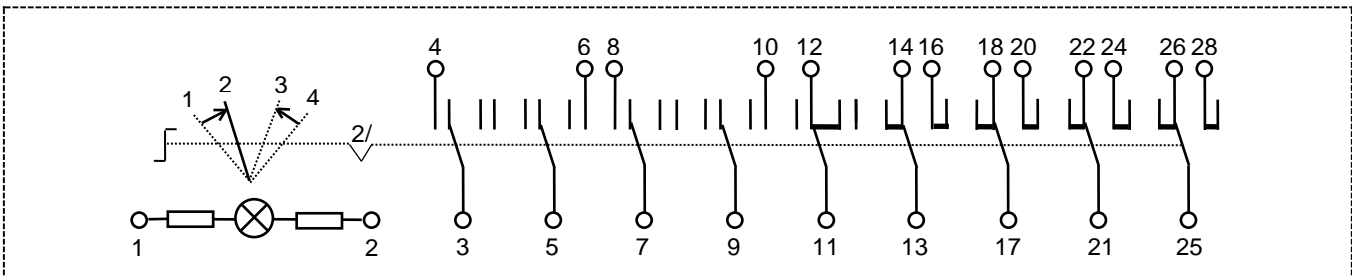
**SM 2 control-discrepancy switch**



Circuit diagram Rs 801 362:

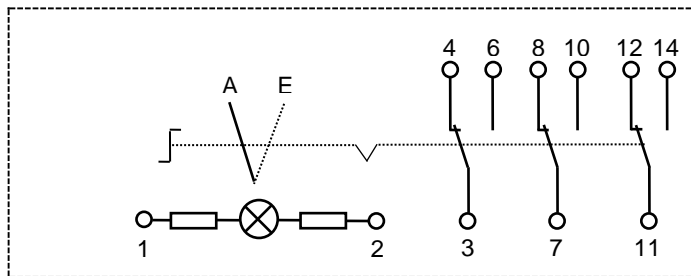


Circuit diagram Rs 801 473 (special design)



Circuit diagram Rs 801 449 (special design)

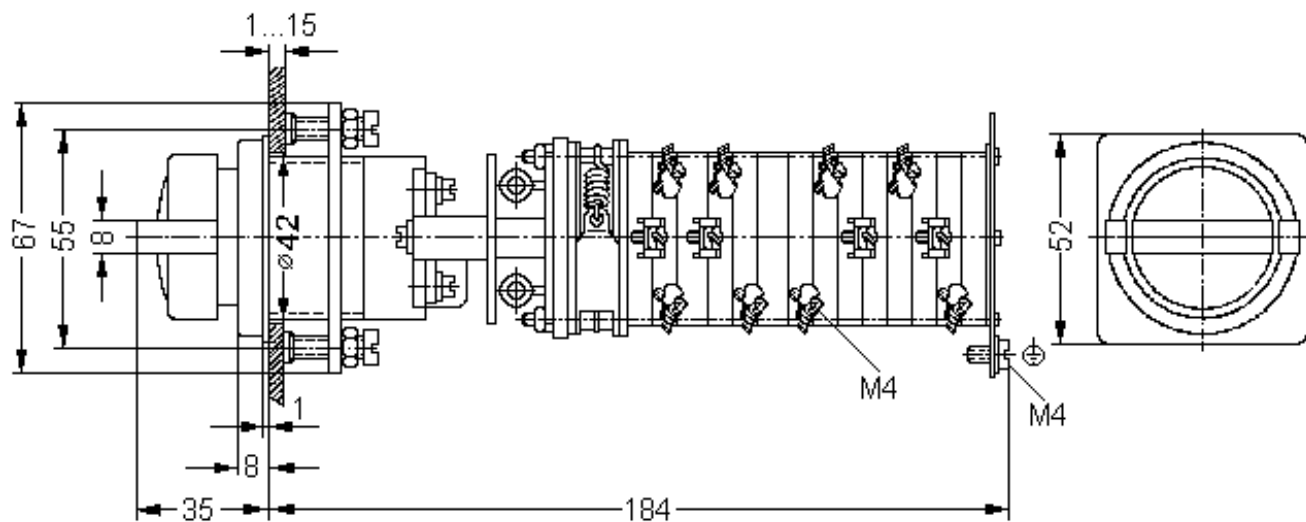
**BM 2 discrepancy switch**



Circuit diagram Rs 801 303:

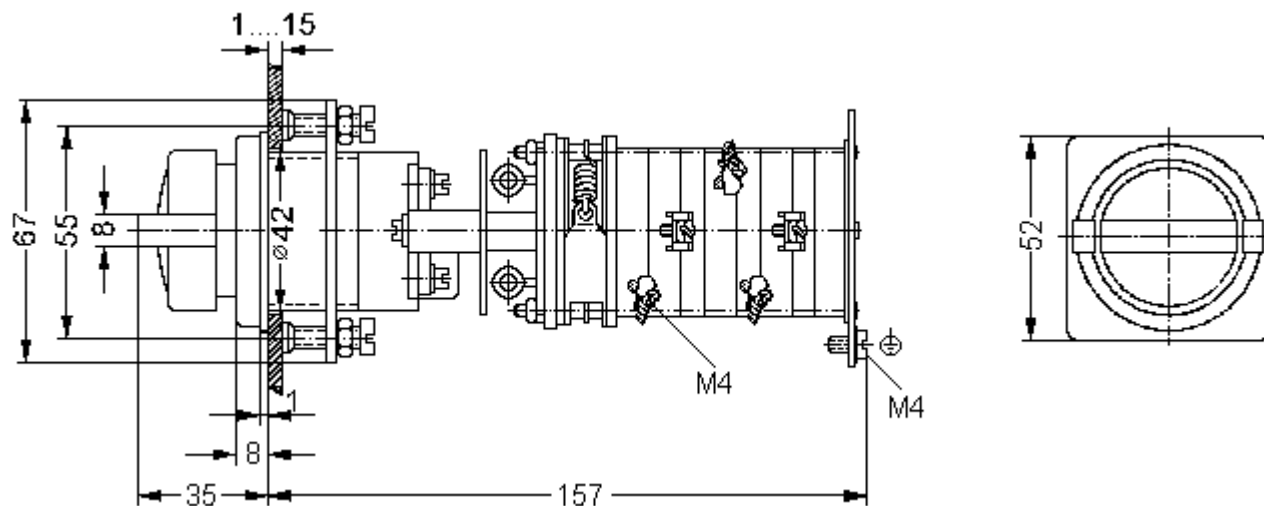
## Dimensions of SM 2 Control-Discrepancy Switch and BM 2 Discrepancy Switch

### SM 2 control-discrepancy switch



Dimensioned drawing Rs 805 575

### BM 2 discrepancy switch



Dimensioned drawing Rs 805 149

## List of Order Numbers of SM 2 Control-Discrepancy Switch and BM 2 Discrepancy Switch

### SM 2 control-discrepancy switch

Rated voltage of lighting of switch button  [ U <sub>N</sub> ]	Pl. nos.			
	Environment lighted Arrangement acc. to circuit diagram Rs 801 362	Central bar lighted Arrangement acc. to circuit diagram Rs 801 362	Environment lighted Arrangement acc. to circuit diagram Rs 801 473 <sup>1)</sup>	Environment lighted Arrangement acc. to circuit diagram Rs 801 449 <sup>1)</sup>
24 V	1 732 527 002	1 732 537 002	1 732 527 702	1 732 527 802
32 V	1 732 527 003	1 732 537 003	1 732 527 703	1 732 527 803
42 V	1 732 527 004	1 732 537 004	1 732 527 704	1 732 527 804
48 V	1 732 527 005	1 732 537 005	1 732 527 705	1 732 527 805
60 V	1 732 527 006	1 732 537 006	1 732 527 706	1 732 527 806
80 V	1 732 527 007	1 732 537 007	1 732 527 707	1 732 527 807
100 V	1 732 527 008	1 732 537 008	1 732 527 708	1 732 527 808
110 V	1 732 524 000	1 732 534 000	1 732 524 700	1 732 524 800
125 V / 127 V	1 732 527 009	1 732 527 009	1 732 527 709	1 732 527 809
220 V / 230 V	1 732 526 000	1 732 536 000	1 732 526 700	1 732 526 800
f. a. rated voltages	1 732 527 00 .	1 732 537 00 .	1 732 527 70 .	1 732 527 80 .

<sup>1)</sup> special design

### BM 2 discrepancy switch

Rated voltage of the lighting of switch button	Pl. nos.	
	Environment lighted	Central bar lighted
24 V	1 732 023 002	1 732 027 002
32 V	1 732 023 003	1 732 027 003
42 V	1 732 023 004	1 732 027 004
48 V	1 732 023 005	1 732 027 005
60 V	1 732 023 006	1 732 027 006
80 V	1 732 023 007	1 732 027 007
100 V	1 732 023 008	1 732 027 008
110 V	1 732 021 000	1 732 025 000
125 V / 127 V	1 732 023 009	1 732 023 009
220 V / 230 V	1 732 022 000	1 732 026 000
f. a. rated voltages	1 732 023 0 . .	1 732 027 0 . .

## Spare Parts of SM 2 Control-Discrepancy Switch and BM 2 Discrepancy Switch

Spare part	order number
switch button	Rs 6 821 249 90
collar white	Rs 6 821 147 00
collar black	Rs 6 821 148 00
lamp	Ba9s 24 V / 3 W; DIN 49 715 / IEC 7004 - 14

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