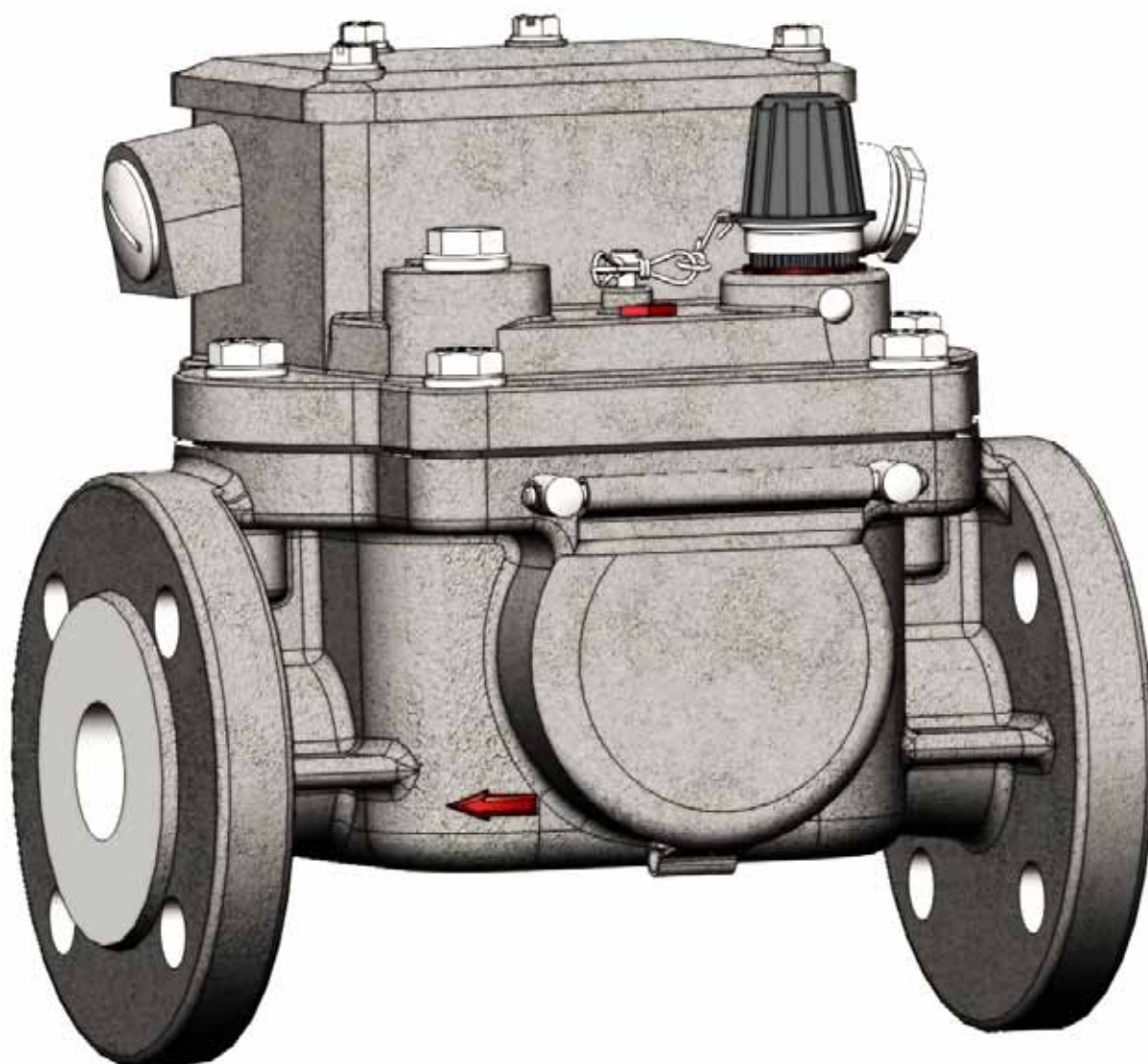




*Elektromotoren und  
Gerätebau Barleben GmbH*



**OPERATING INSTRUCTIONS**  
**Monitoring relay**  
**for tap changers**



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# Table of Contents

|  | Page |
|--|------|
| 1 Safety instructions  | 4    |
| 2 Installation   | 5    |
| 2.1 Installation in pipework                                 | 5    |
| 2.2 Filling the monitoring relay                             | 6    |
| 2.3 Monitoring relay with special design automatic bleeding  | 6    |
| 2.4 Monitoring relay with special design bleeder valve       | 7    |
| 2.5 Connection of signal lead                                | 8    |
| 3 Functional test  | 9    |
| 3.1 Checking by means of test key                            | 9    |
| 3.2 Operating value of damper                                | 10   |
| 4 Use of monitoring relay in combination with Buchholz relay | 10   |
| 5 Maintenance  | 11   |

## 1 Safety instructions

Make sure that any persons installing, taking into operation and operating the monitoring relay:

- are qualified and competent and
- fully comply with these operating instructions.

Improper operation or misuse might cause danger to

- life and limb,
- the relay and other property of the operator and
- the relay's proper function.

**Warranty expires when the relay is opened or the adjusting screw for the damper is readjusted from outside (see section 3.2).**

Safety instructions in this manual are presented in three different forms to emphasize important information:



**NOTE**

**This symbol refers to important information on a specific subject.**



**CAUTION**

**This symbol indicates particular risks for the device or any other property of the operator. Danger to life and limb cannot be excluded.**



**WARNING**

**This symbol indicates serious danger to life and limb. Disregarding the warning can lead to serious or even fatal injury.**

## 2 Installation

### 2.1 Installation in pipework

The monitoring relay (Figure 1/ No. 1) is installed in the pipe (Fig. 1/ No. 2) between the tap changer (Fig. 1/ No. 3) and the conservator (Fig. 1/ No. 4) as close as possible to the tap changer head.

To ensure free escape of the gases generated during normal operation, the pipe leading to the conservator should be installed with a slope of 2° to 4° and without any bends, if possible.

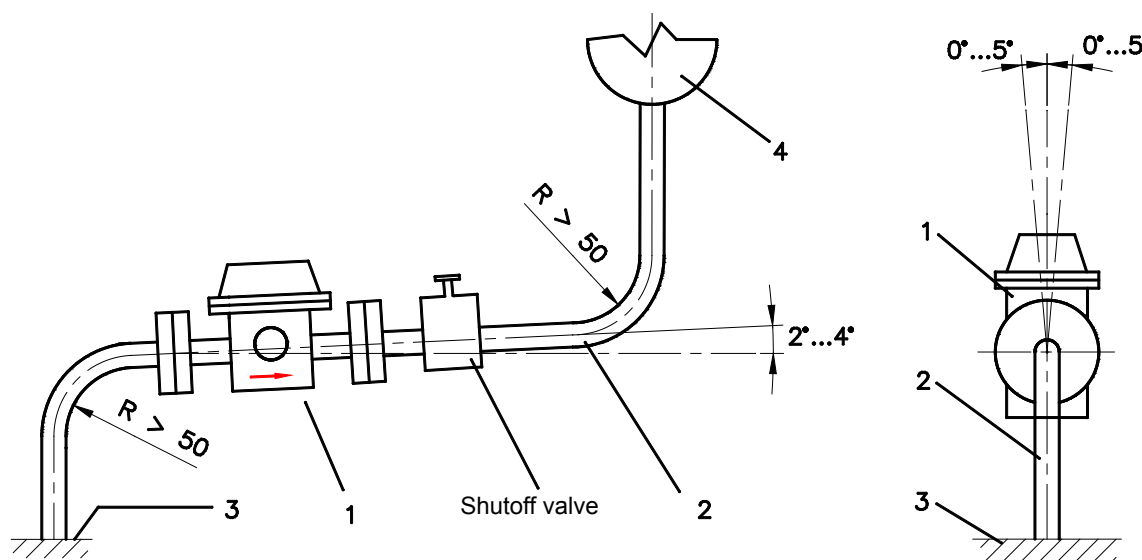


Figure1 - Installation in piping

Make sure that:

- the red arrow on the monitoring relay points to the conservator.
- the flanges are stressed evenly when tightening the screws.
- the slope of the pipe to the conservator is between 2° and 4°.
- the position of the monitoring relay in relation to the direction of flow does not deviate from the perpendicular by more than 5°.
- the pipe has no elbows, and bends are designed preferably with an inside pipe radius  $R > 50$  mm.



#### CAUTION

**Make sure during installation that no dirt, moisture or foreign matter gets into the monitoring relay.**

**The insulating liquid of the tap changer may not contain conductive materials!**



#### CAUTION

**When supplied with sealing make sure that the elements protecting the equipment during transport (protective cardboard) are removed.**

## 2.2 Filling the monitoring relay

The monitoring relay is filled when the device to be protected is filled.

During normal operation of the tap changer gases are generated which accumulate in the gas dome of the monitoring relay. If the gas volume generated exceeds the capacity of the gas dome, the gas flows in the direction of the conservator.



### NOTE

**During normal operation the gas dome is always filled with gas. This gas does not affect the operation of the device. Therefore, proper function does not require bleeding of the device after installation.**

**Therefore, do not open the screw plug (Fig. 2/ No. 1).**

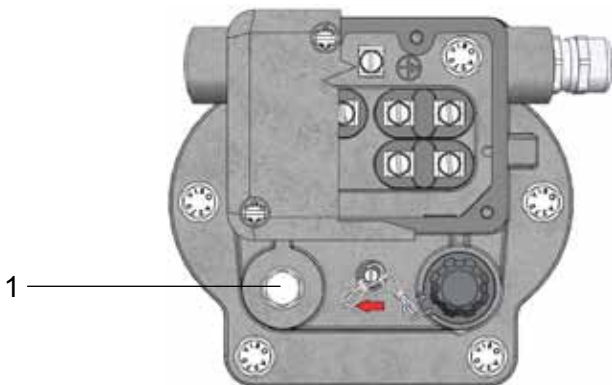


Figure 2 - Screw plug

## 2.3 Monitoring relay with special design automatic bleeding (Code 96)



### NOTE

**On request, the monitoring relay can be equipped with an automatic bleeder valve instead of the screw plug.**

**If the monitoring relay shall be bled automatically during operation, the mini ball valve (Fig. 3/ No. 1) has to be open permanently.**

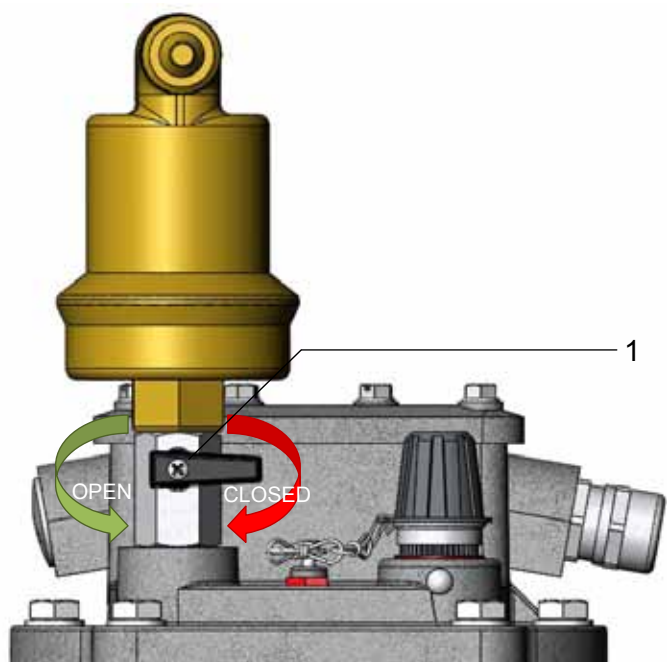


Figure 3 - Automatic bleeder valve

## 2.4 Monitoring relay with special design bleeder valve



### NOTE

If on customer's request the screw plug was replaced by a bleeder valve, the monitoring relay can be bled.

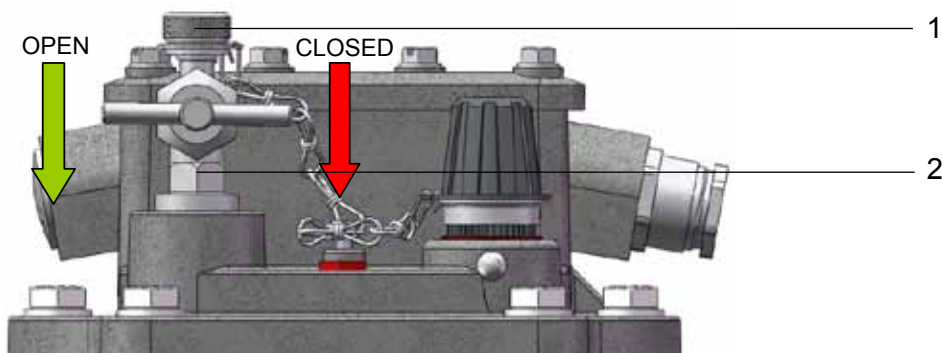


Figure 4 - Bleeder valve

Proceed as follows:

- Remove the small cap nut (Fig. 4/ No.1) from the bleeder valve (Fig. 4/ No. 2).
- Open the bleeder valve (turn counterclockwise) and let the air escape from the monitoring relay.
- As soon as insulating liquid comes out, close the bleeder valve (turn clockwise).
- Screw the small cap nut tightly on the bleeder valve.

## 2.5 Connection of signal lead

Multicore signal leads can be fitted in the monitoring relay through cable glands. A conductor cross section of 1.5 mm<sup>2</sup> (copper) is recommended. The maximum cross section that can be clamped is 4.0 mm<sup>2</sup>.

Proceed as follows:

- Remove 4 screws M5 (Fig. 5/ No. 1)
- Remove the cap (Fig. 5/ No. 2)
- Insert the lead through the cable gland (Fig. 5/ No. 3)
- Connect the lead to the terminal studs (Fig. 5/ No. 4) (maximum torque 3 Nm)

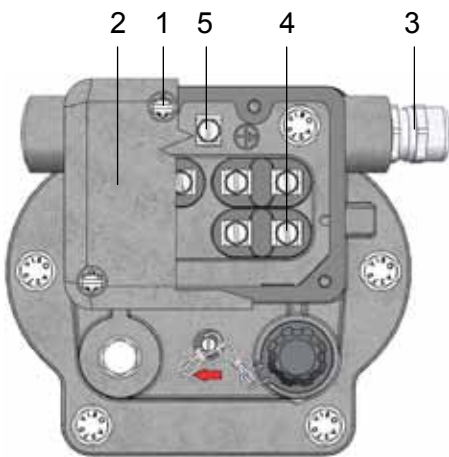


Figure 5 - Electrical connection

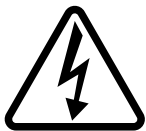
### Connected load of the switching systems:

|                     |  |
|---------------------|--|
| Voltage:            | AC 5 V - max. 250 V                        |
|                     | DC 5 V - max. 250 V                        |
| Current:            | AC 0,01 A - max. 6 A $\cos \varphi > 0,5$  |
|                     | DC 0,01 A - max. 6 A $L/R < 40 \text{ ms}$ |
| Switching capacity: | AC max. 1500 VA                            |
|                     | DC max. 1250 W                             |



### NOTE

The inner side of the cap accommodates a plate with the graphic symbol and the connection diagram. The schemes show the switching systems in their neutral position. The neutral position is the operating condition when the device to be protected operates without any fault.



### WARNING

Connect the protective conductor (green-yellow insulation) to the earth terminal (Fig. 5/ No. 5) (maximum torque 3 Nm).

- Tighten the cable gland
- Fit the cap
- Tighten 4 screws M5 (maximum torque 3 Nm)



### 3 Functional test

#### 3.1 Checking by means of test key

The monitoring relay is provided with a test key that allows checking of the damper for proper function in installed state. The damper setting is not checked.

Proceed as follows:

- Remove the cap nut (Fig. 6/ No. 1)
- Press the test key (Fig. 6/ No. 2) down to stop position, then release the test key (the damper will return to operating position)
- Obtain verification of correct function from the control room
- Turn the test key counterclockwise as far as to stop position, then release the key (the damper will return to neutral position)
- Fit and tighten the cap nut

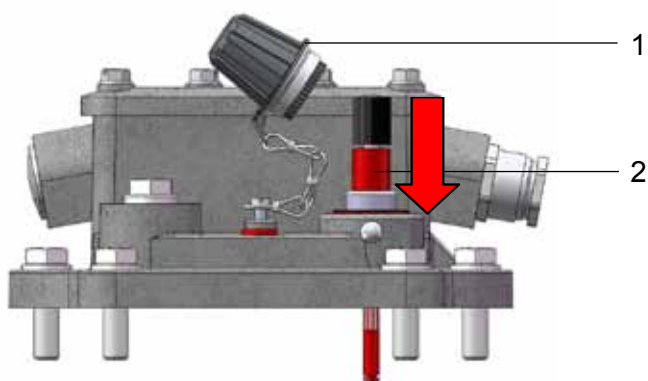


Figure 6 - Press the test key

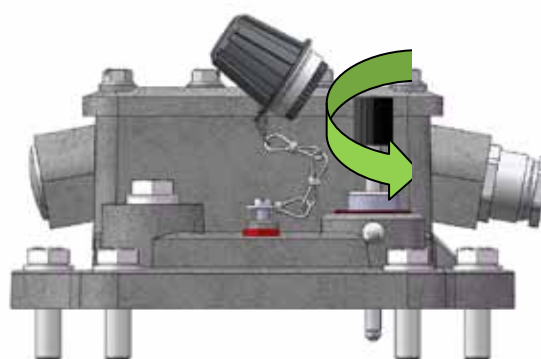


Figure 7 - Turn the test key

### 3.2 Operating value of damper

The operating value of the damper is set and checked by the manufacturer in accordance with the order specifications.

The **adjusting screw** (Fig. 8/ No. 1) **must not be readjusted** as in this case the operating value of the damper would be changed.

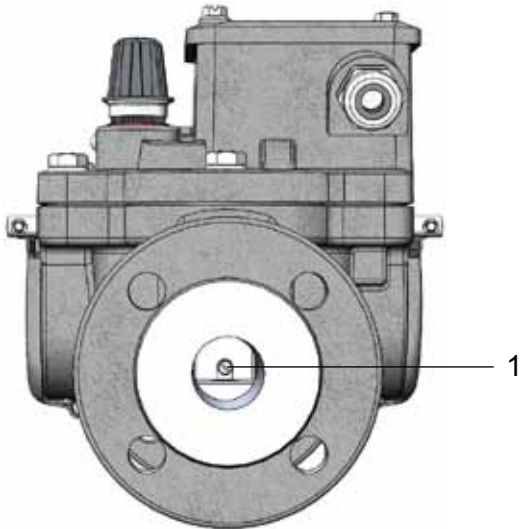


Figure 8 - Lateral view of monitoring relay  
with adjusting screw

## 4 Use of monitoring relay in combination with Buchholz relay

For instructions and information about installation and combination of monitoring relay and Buchholz relay, see the separate instructions enclosed.

## 5 Maintenance

Monitoring relays are insensitive to ambient conditions, provided these conditions were considered when selecting the particular design of the monitoring relay. Therefore, no special maintenance is required during operation.

Monitoring relays should be inspected and tested at specified intervals as described in the maintenance instructions of the plant operator. Make sure that the functional tests described are performed.

Unless otherwise specified by the operator, EMB recommends operating the test key once a year in the framework of the scheduled maintenance operations.



### WARNING

**Potentially explosive gases (switching gases) are collected in the monitoring relay during operation. When opening the monitoring relay, make sure that there are no open fires or sparks in the vicinity. Otherwise the danger of explosion exists. Wait approx. 10 min until the gases have volatilized before performing any work on the relay.**



### CAUTION

**When removing the monitoring relay, make sure that there is no insulating liquid in the device. On customers request EMB GmbH will ensure proper disposal of old relays.**



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Due to technical improvement of our products, the information contained in these operating instructions is subject to change without notice. We would like to apologize for any printing errors which have not been found despite of intensive proof-reading.

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