

Limit value switches in oil

General

There are several reasons to fill pointer type measuring instruments with oil, e.g. for use in pressure gauges and thermometers. Pulsation of the pressure medium, vibration of the entire unit, etc. account for high wear and tear of all movable elements, if they are not immersed in oil.

If the instruments are filled with oil, the viscosity of the oil has a dampening effect, i.e. the amplitude of the vibrations is reduced, the pointer is steady, and the originally high wear of the movable elements is essentially reduced.

In addition, the lubricating effect of the oil adds to the preservation of the elements. The actual values indicated can be accurately ascertained.

Fitting of the limit value switches

Electrical components require an electrically insulating oil, a so called non conductor.

The oil must be free of chlorine and acid.

In this medium, the appropriate contacts are snap-action, inductive contacts and electronic contacts.

- Snap-action contacts -

The use of open limit value switches in oil often causes problems with the switching accuracy, the service life of the contact pins, and oil pollution.

As the oil is non conducting, an insulating layer is formed between the two contact pins which must be overcome by the applied voltage.

The light arc which is formed between the pins will burn the oil and turn it cloudy.

In principle, direct voltages should only be used with small currents (20 mA), as direct voltage causes a standing light arc.

High currents must also be avoided with alternating voltages, because these would burn the oil.

Moreover, a high alternating voltage (e.g. 230 V) may be required to overcome the insulating layer.

Tests have shown that at 230 V, only currents up to 90 mA will be operative, equalling a capacity of up to 20 VA.

Depending on the thickness of the oil layer between the pins, a voltage of 24 V may be too small.

To keep the insulating layer as thin as possible, the pressure of the two contact pins must be as high as possible.

For the snap-action contact this means that

- a) the hair spring must be sufficiently strong (standard 2.0 mNcm, 4.0 mNcm are recommended) and
- b) the magnets must be set in a way to produce a jump of at least 2 mm.

To avoid cloudy oil and to improve the switching safety, we recommend our „pulse controlled contact protection relays“ type MSR ... (re. catalogue group K11).

The service life of the limit value switches is considerably extended by the use of our multifunctional relays, because the pulse and pause ratio will open and close the contacts at an almost voltage free level (99%).

In addition, the relays have a certain time response which almost completely excludes fluttering effects.

To inform your customer, or his respective staff member „on site“, we keep the following free label for you which should not be missing on any oil filled measuring instrument.

To avoid cloudy oil and to improve the switching safety, we recommend „pulse controlled contact protection relays“ **type MSR** for oil filled measuring instruments.

- Inductive and electronic contacts -

According to our experience, inductive and electronic contacts immersed in oil offer the best guarantee for perfect operation and a long service life.

For inductive contacts, we offer the following amplifiers:

1. Isolating amplifiers of the series type WE 77/Ex ... / KFA ... bzw. KFD ... (re. catalogue group K 12)
 - for inductive contacts in areas under a risk of explosion.
2. Multifunctional relays of the series type MSR-I (re. catalogue group K 11)
 - for use with inductive contacts in normal industrial plant which do not require a protection against explosion.