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1. Safety

1.1 Safety instructions

Make sure that any personnel installing and operating the “relay for OLTC OR-25”:

- Are technically qualified and competent
- Fully comply with these assembling instructions

Improper operations or misuse could cause danger to:

- Life and limb
- To the equipment and other assets of the operator
- To the proper function of the equipment

Safety instructions in this manual are shown in three different forms to emphasize important information.

1.2 Specified applications

The relay for OLTC is used to protect the on-load tap-changer and the transformer when a malfunction occurs in the diverter switch or selector switch oil compartment.

It is important to observe the limit values indicated on the nameplate and in the operating instruction before commissioning the device.

1.3 Safety notes on the equipment operation

Electrical installation is subject to the relevant national safety rules.

It is mandatory for safety reasons to connect the grounding cable.

- **WARNING**
  - This information indicates particular danger to life and health. Disregarding such a warning can lead to serious or fatal injury

- **CAUTION**
  - This information indicates particular danger to equipment or other property of the user. Serious or fatal injury cannot be excluded.

- **NOTE**
  - This note gives important or specific information concerning the equipment.

- **CAUTION**
  - Installation, electrical connection and fitting the device may only be carried out by qualified personnel and only in accordance to this instruction manual.
  - It is the responsibility of the user to make sure that the device is used for the specified application only.
  - For safety matters, please avoid any unauthorized and improper usage.

- **WARNING**
  - All relevant fire protection regulations must be strictly followed
2. RELAY FOR ON LOAD TAP CHANGER TYPE “OR-25”

2.1 Drawing

In figure 1, the external dimensions are provided for the relay type OR-25:
2.2 Operating principle

The relay for OLTC application is positioned in the pipe work between the on-load tap-changer head and the oil conservator. This relay responds only if oil flow occurs from the on-load tap-changer head to the oil conservator. If this happens, the flow vane (2/D) which has 2 magnets (2/E) switches the reed (2/F). The circuit breakers are tripped and the transformer is de-energized.

The housing (2/A) consists of powder painted or treated aluminum parts and is provided with flanges for the connection to the on-load tap-changer head pipe and the oil conservator pipe. The terminals of the reed switches are positioned in the terminal box (2/B) and sealing is guaranteed by an OR gasket. The terminal box is ventilated by a breather with IP grade 65/68. The terminal box cover is fixed to the terminal box with 4 screws (2/C).

2.3 Technical features

<table>
<thead>
<tr>
<th>General data</th>
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<tr>
<td>Overall dimension</td>
</tr>
<tr>
<td>Material</td>
</tr>
<tr>
<td>Ambient temperature</td>
</tr>
<tr>
<td>Oil temperature</td>
</tr>
<tr>
<td>Degree of protection</td>
</tr>
<tr>
<td>Weight</td>
</tr>
<tr>
<td>Oil flow speed (oil temperature 20°C)</td>
</tr>
<tr>
<td></td>
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<tr>
<td></td>
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<table>
<thead>
<tr>
<th>Switch electrical data (according to EN50126-1/2)</th>
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<table>
<thead>
<tr>
<th>Voltage</th>
<th>Current</th>
<th>Breaking capacity</th>
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</thead>
<tbody>
<tr>
<td>24 d.c. to 220 V d.c.</td>
<td>2 A for 1000 maneuvers</td>
<td>250 W</td>
</tr>
<tr>
<td>230 V a.c.</td>
<td>2 A for 1000 maneuvers</td>
<td>400 VA</td>
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</table>

<table>
<thead>
<tr>
<th>Dielectric strength of contacts</th>
<th>Short duration power frequency withstand voltage 1 min – kV (r.m.s.)</th>
<th>Lightning impulse withstand voltage kV (peak)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between circuits and earth</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Between contacts in open positions</td>
<td>1</td>
<td>3</td>
</tr>
</tbody>
</table>

2.4 Tests

<table>
<thead>
<tr>
<th>Type test:</th>
<th>Relevant Standard:</th>
<th>Routine test</th>
<th>Relevant Standard:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Vibration test</td>
<td>EN 60137-3-4</td>
<td>Oil leakage test in hot oil (90°C for 30 minutes at 100kPa)</td>
<td>EN 50216-2</td>
</tr>
<tr>
<td>Vacuum test (2.5 kPa for 24 hours)</td>
<td>EN 50216-2</td>
<td>Operation test</td>
<td></td>
</tr>
<tr>
<td>Leakage test (250 kPa for 2 minutes at 100°C)</td>
<td>EN 50216-2</td>
<td>Mechanical test</td>
<td>EN 50216-2</td>
</tr>
<tr>
<td>Salt fog test (500 hours)</td>
<td>UNI EN ISO 9227</td>
<td>Flow vane test</td>
<td>EN 50216-2</td>
</tr>
<tr>
<td>Degree of protection IP65</td>
<td>EN 60529</td>
<td>Dielectric test</td>
<td>EN 50216-2</td>
</tr>
</tbody>
</table>
3. INSTALLATION

3.1 Assembly

Install the relay in the pipe leading from the on-load tap-changer head to oil conservator (located as near as possible to the on-load tap-changer).
Install the relay in a horizontal position and the test button upwards. The red arrow on the relay must point towards the conservator.
Use a pipe of at least 25 mm nominal diameter between the relay and the on-load tap-changer / oil conservator. Install the relay well supported and protected against vibrations in this pipe connection. Between the relay flanges and pipe flanges, install the plane gasket that can be found in the box for the device.

Provide a stop valve between relay and oil conservator.

NOTE
The pipe from the relay to the oil conservator must be placed with an inclination to ensure free escape of switching gas. COMEM recommends an angle of 2.5 degree from horizontal (at maximum 5 degree).

After the installation check the function of the relay.
The trip contacts can be tested manually moving the rod (mechanical test – chapter 3.2).

3.2 Mechanical test

Unscrew the plug (Fig.3/A) then slowly push the upper button (Fig.3/B) following the red arrow direction (figure below). In this way the internal mechanism is moved and the magnets switch the trip reeds. The button, after being released, will automatically come back to the original position as well as the internal components. This test does not provide the conformity of the electrical scheme.
After the flow vane operation, the re-arming is manual pushing the upper button.
3.3 Electrical connection

The reed switch of the relay can either be provided as NO, NC or CHANGE OVER contacts. The various types of contact combinations are available in chapter 4.1.

CAUTION
Connect the relay into the tripping circuit of the circuit breakers for the transformer so it is protected and immediately disconnected by the circuit breakers when the relay of the transformer is tripped.

Remove the terminal box cover (3/C) un-screwing the four M5 screws (3/D). Feed the wire through the cable gland M20x1.5 (standard solution). Other cable glands are available, for further information contact COMEM. The cable gland M20x1.5 is adequate for leads with an outside diameter of 8 to 14 mm.
Connect the leads (terminal bolts M6, max torque 2 Nm) following the electrical scheme shown on the label under the terminal box cover.

Connect the protective conductor to the ground screw M4 in the terminal box (max torque: 5 Nm).
Fix the terminal box cover on the terminal box. During this step check the terminal box cover gasket, the surface must be clean.

The relay responds to oil flow, not gas accumulated. It is not necessary to discharge air from the relay when filling oil into the transformer tank. Gas accumulation in this type of relay is normal.

WARNING
Potential exposed gases collect in the relay while the on-load tap-changer is in operation.
When you open the relay, make sure that there are not open fires or spark near it. Otherwise a danger of explosion exists. A period of time must pass before beginning further work on the relay so that the gases have time to volatilize.

4. CONNECTION

4.1 Electrical contacts layout

Diagram AO: 1-2 (NO contact)
Diagram LO: 1-2-3 (CHANGE OVER contact)
Diagram GO: 1-2 (NO contact), 3-4 (NO contact)
Diagram VO: 1-2 (NC contact), 3-4 (NC contact)
Diagram RO: 1-2 (NC contact), 3-4 (NO contact)
Diagram CO: 1-2-C1 (CHANGE OVER contact), 3-4-C2 (CHANGE OVER contact)
Diagram LO: 1-2-3 (CHANGE OVER contact)
Diagram SO: 1-2 (NO contact), 3-4 (NO contact), C1-C2 (NO contact)
5. Maintenance

5.1 Maintenance

During regular checking of the transformer, we recommend performing the following checks on the relay for on-load tap changers:

- Check the exterior condition of the device
- To verify the contacts function following the chapter 3.2 (Mechanical test)
- Check the gaskets condition and if any leakage exists

5.2 Movement, transport and storage

The OR25 for OLTC storage must remain in the original packaging and in a dry place with temperature range between -10°C to 40°C.

Upon receiving the OR25, please check:

- The outer surface of the packaging to check that it is intact
- That there are no breakages to the packaging

If damages are found, please contact COMEM, providing the data given on the shipping list and the serial number of the OR25 for OLTC.