NEW
ESKOM SPEC BUCHHOLZ BS25

FIRST BUCHHOLZ RELAY
to comply to the Rev 2 Eskom Spec

• Tested and verified compliance to Eskom’s latest specification: 240-56063908 Rev 2
• Anodised and hard baked C5M coated enamel - for high corrosive environments.
• Stainless steel fasteners throughout with thread lubrication.
• Accurate low tolerance gas accumulation functionality for alarm, trip and surge flow.
• Serialized test calibration certificate included.
• Protective double layered packaging for shipment protection.
• IP65 (Buchholz Relay is sealed)
• MADE IN SA BY ALLBRO
**Buchholz Relays**

### BS 25

- **Part Number**: 021-119/E
- **Description**: Buchholz Relay BS80MA / E
- **Weight**: 3.9kg

**Remarks:**
- MA = Magnetic - normally open contacts

### BS 50

- **Part Number**: 021-115
  - **Description**: Buchholz Relay Model BS25MA
- **Part Number**: 021-115/E
  - **Description**: Buchholz Relay BS25MA / E Eskom Spec 240-56063908 Rev 2
- **Part Number**: 021-400
  - **Description**: Buchholz Valve 25mm
- **Part Number**: 021-426
  - **Description**: Buchholz Valve 25mm (60mm FTF) with lockable handle
- **Weight**: 2.31kg

**Remarks:**
- MA = Magnetic - normally open contacts

### BS 80

- **Part Number**: 021-117
  - **Description**: Buchholz Relay Model BS50MA
- **Part Number**: 021-117/E
  - **Description**: Buchholz Relay BS50MA / E
- **Part Number**: 021-401
  - **Description**: Buchholz Valve 50mm
- **Part Number**: 021-427
  - **Description**: Buchholz Valve 50mm (60mm FTF) with lockable handle
- **Weight**: 4.51kg

**Remarks:**
- MA = Magnetic - normally open contacts
WHAT IS A BUCHHOLZ RELAY?

Buchholz Relays are essentially a gas detection relay. They are placed on transformers, that are equipped with a conservator tank. The vast majority of the failure / fault conditions in transformers are associated with “gassing” which is detected by the Buchholz Relay which will provide early indication by means of an alarm and subsequently a trip contact to protect the transformer from catastrophic failure.

Allbro’s Buchholz Relay complies with the latest CENELEC EN 50216-2 and EN 50216-2 standards.

HOW DOES A BUCHHOLZ RELAY WORK?

The Buchholz Relay is fitted in the pipework between the transformer itself and the conservator at a 2.5 to 5 degree angle. During normal transformer operation the relay allows oil flow between the conservator and the main tank and it is filled with oil. However, a fault within the transformer will result in gas being generated within the transformer. Gas being lighter in density than oil, the gas rises towards the conservator and collects in the upper chamber of the relay. The result is an oil level drop within the relay. The top float drops and triggers an alarm switch. Should no effective remedial action take place after the alarm, and should the transformer continue gassing the build-up of gas within the Buchholz relay will result in a trip.

The Relay is designed to trip immediately on a sudden oil surge. A large sudden fault, like a short circuit, will instantly raise the temperature of the oil and force oil up the piping through the relay at a high velocity. This sudden surge is detected by the Buchholz Relay.

CONSTRUCTION

Made from aluminium the main body of the relay is fitted with tempered glass windows to allow for visual indication of the oil level. The oil drain plug is located at the bottom of the main body for drainage when required.

The mechanism of the Relay consists of two floats, the magnetic reed switches, a surge flow valve and two permanent magnets.

Positioned on the lid of the Buchholz Relay are the following:
• Gas discharge valve with “G/8” in male thread with a protective cap
• Manual valve for pneumatically testing the alarm and insulation circuits also with a protective cap
• Push rod for mechanically tripping the alarm and the insulation circuits, also with a protective cap,
• Terminal box, containing 4 numbered M6 terminals and one earth terminal.
EXTERNAL COATING AND PROTECTION

The external housing of the Buchholz Relay is made from aluminium alloy. A phosphate treatment is used to clean the housing before application of a vinyl enamel. 72 hour salt spray tests have shown that this coating provides a protection layer from corrosion and resistance against most atmospheric conditions. All external fittings are brass plated and nuts are made from stainless steel. For extremely corrosive conditions due to extreme high salt spray or high acidic atmospheres, Allbro have treated our Buchholz relay units with anodized C5M coating, with stainless fittings. This model conforms to the latest Eskom requirements.
RELAY SELECTION

The size and type of relay to be used will depend on the transformer rating and oil volume. Suggestions are given in the following table but the final choice is often as a result of the transformer manufacturers experience.

<table>
<thead>
<tr>
<th>MVA Transformer Power</th>
<th>Nominal Diameter</th>
</tr>
</thead>
<tbody>
<tr>
<td>Up to 5</td>
<td>25</td>
</tr>
<tr>
<td>From 5 up to 20</td>
<td>50</td>
</tr>
<tr>
<td>From 20 to 50</td>
<td>80</td>
</tr>
</tbody>
</table>

TECHNICAL DATA

- **Recommended angles for Buchholz Relay pipework between main tank and conservator**
  - The relay pipework is typically mounted at 2,5 degrees to the horizontal. A positive inclination of up to 5 degrees to the horizontal axis is admissible.

- **Operating pressure** - 1 bar, tested to 2,5 bar for 2 minutes at 100 deg C.

- **Gas volume to trip alarm:**

<table>
<thead>
<tr>
<th>Buchholz Relay Type</th>
<th>Gas Volume Necessary to Activate Switch</th>
<th>Tolerance</th>
<th>Trip</th>
<th>Tolerance</th>
</tr>
</thead>
<tbody>
<tr>
<td>BS 25</td>
<td>150 ± 50 cm³</td>
<td>Min 100</td>
<td>300 ± 50</td>
<td>Min 250</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max 200</td>
<td></td>
<td>Max 350</td>
</tr>
<tr>
<td>BS 50</td>
<td>300 ± 50 cm³</td>
<td>Min 250</td>
<td>700 ± 100</td>
<td>Min 600</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max 350</td>
<td></td>
<td>Max 800</td>
</tr>
<tr>
<td>BS 80</td>
<td>400 ± 100 cm³</td>
<td>Min 300</td>
<td>800 ± 100</td>
<td>Min 700</td>
</tr>
<tr>
<td></td>
<td></td>
<td>Max 500</td>
<td></td>
<td>Max 900</td>
</tr>
</tbody>
</table>

- **Rate of oil flow in m/s to trip insulation.** In the following table standard values are highlighted with an ‘O’ available, on request with an ‘X’ and not available with a ‘//’. +/- 15% tolerance at 20°C with oil viscosity according to IEC296.

<table>
<thead>
<tr>
<th>Inside Pipe Diameter</th>
<th>1,0 m/s</th>
<th>1,5 m/s</th>
<th>2,0 m/s</th>
</tr>
</thead>
<tbody>
<tr>
<td>25</td>
<td>O</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>50</td>
<td>O</td>
<td>X</td>
<td>X</td>
</tr>
<tr>
<td>80</td>
<td>O</td>
<td>X</td>
<td>X</td>
</tr>
</tbody>
</table>

- The relay operates within 0,5 seconds.
- Oil temperature between -25 and +115 deg C.
- Ambient temperature between -25 and +60 deg C.
- Degree of Protection IP65 to EN 60529.

SWITCH ELECTRICAL DATA

<table>
<thead>
<tr>
<th>Specification</th>
<th>Values</th>
</tr>
</thead>
<tbody>
<tr>
<td>Max. switching current DC</td>
<td>3A</td>
</tr>
<tr>
<td>Max. switching current AC</td>
<td>5A</td>
</tr>
<tr>
<td>DC load min. 5 - max. 250 V min. 100 000 operations</td>
<td>250 VA</td>
</tr>
<tr>
<td>AC load min. 5 - max. 250 V min. 100 000 operations</td>
<td>400 W</td>
</tr>
<tr>
<td>DC load min. 5 - max. 250 V min. 10 000 operations</td>
<td>1.250 VA</td>
</tr>
<tr>
<td>AC load min. 5 - max. 250 V min. 10 000 operations</td>
<td>1.500 W</td>
</tr>
<tr>
<td>Min. switching current</td>
<td>5 mA</td>
</tr>
<tr>
<td>Dielectric withstand circuits-earth</td>
<td>Short Duration min. 2.5kV</td>
</tr>
<tr>
<td>Dielectric withstand open contracts</td>
<td>Short Duration min. 1.5kV</td>
</tr>
<tr>
<td>Working temperature</td>
<td>-40°C - +135°C</td>
</tr>
</tbody>
</table>
The following Type Tests have been performed on the relay.

- 72 hour salt spray
- Electromagnetic Field Test. Relay does not trip in field strength up to 25mT (ref EN 50216-2)
- Stationary sinusoidal mechanical vibrations. Tests according to EN 60721-3-4 standards have been performed.
  (a) Class 4M4 (4M6 on request) vibration test applied in sites where vibrations are transmitted from machinery and vehicles. Three-axis movement was impressed to the relay using special equipment with stationary sinusoidal vibrations from 2 to 200 Hz.
  (b) A seismic test has also been performed on each unit according to the EN 50216-1 standards that refers to EN 60068-3-3 class 0, level 2 standards. The test consists of application of a 9m/s² horizontal acceleration and a 4.5m/s² vertical acceleration, increasing frequency one octave per minute. No activation of alarm or release switches was encountered.
- Pressure withstands Tests 2.5 bar for 2 minutes with oil at 100°C.
- Vacuum Withstand Test of 2500Pa for 24 hrs.
- Test to show the relay is insensitive to oil flow from conservator to transformer.

FUNCTIONAL TESTS

The following Functional Tests are applied to all relays.

- High Pressure Leak test @ 2.5 Bar
- Oil Flow Test (meters/sec trip Value).
- Gas Accumulation Alarm Value (volume in cm³).
- Gas Accumulation Trip Value (volume in cm³).
- Press-To-Test Function Test
- Temperature Rise Test over 48 hours
- Efficacy of seal verified with transformer oil (at 80°C) at a pressure of 1.0 bar. This test ensures that the relay meets the required EN Standards.
INSTALLATION INSTRUCTIONS

The following installation procedures must be observed for proper relay operation:

• The red arrow on the relay must point towards the conservator.
• The relay must always be full of oil, which means that the minimum oil level in the conservator must be higher than the relays breather valve.

• The recommended inclination of the relay pipework is 2.5 degrees from the horizontal.
• The pipe from the transformer to the relay must exit the transformer at the highest point.
• The pipeline upstream from the relay has to be straight and with a length equal to 5-10 times the pipeline diameter, at least.
• Down stream from the relay, pipeline length has to be 3 times the pipeline diameter, only. It must rise up towards the conservator.
• M5 connections in terminal box must be tightened to a maximum of 2NM torque.