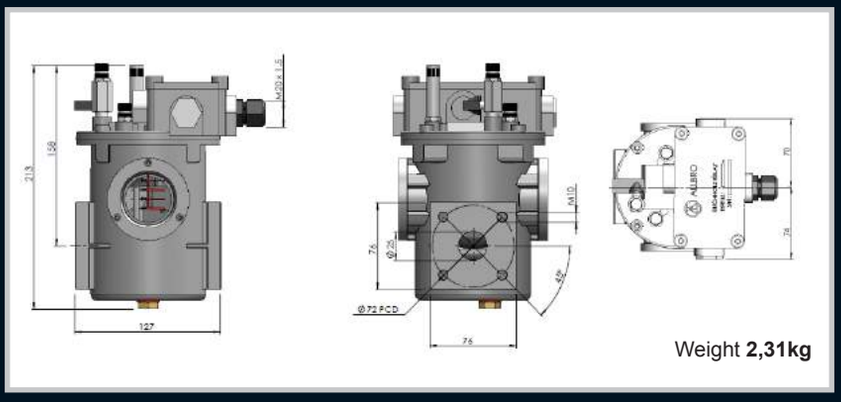
BS 25

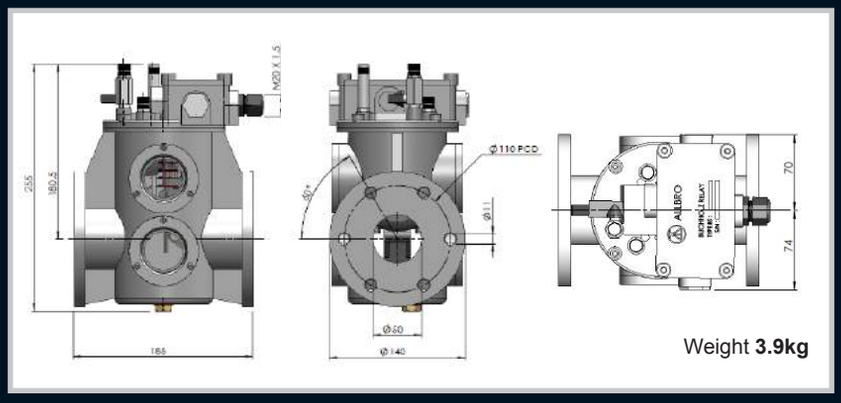


Weight **2,31kg**

PART NUMBER	DESCRIPTION
021-114	Buchholz Relay Model BS25HA
021-115	Buchholz Relay Model BS25MA
021-115/E	Buchholz Relay BS25MA / E
021-400	Buchholz Valve 25mm
021-426	Buchholz Valve 25mm (60mm FTF)

Remarks:
- MA = Magnetic - normally open contacts
- HA = Mercury - normally open contacts

BS 50

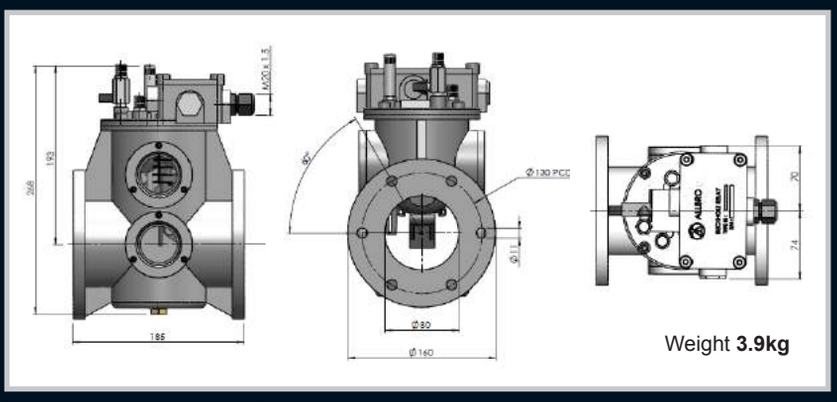


Weight **3.9kg**

PART NUMBER	DESCRIPTION
021-116	Buchholz Relay Model BS50HA
021-117	Buchholz Relay Model BS50MA
021-117/E	Buchholz Relay BS50MA / E
021-401	Buchholz Valve 50mm
021-427	Buchholz Valve 50mm (60mm FTF)

Remarks:
- MA = Magnetic - normally open contacts
- HA = Mercury - normally open contacts

BS 80



Weight **3.9kg**

PART NUMBER	DESCRIPTION
021-119/E	Buchholz Relay BS80MA / E
021-428	Buchholz Valve 80mm (60FTF)

The generation of gas in an oil filled transformer is a clear indication of a problem. The gas may be a result of the following:

- **Decomposition / degradation of solid , or liquid insulation inside the transformer due to overheating, or arcing.**
- **From the outside towards the pipeline.**
- **From the oil itself due to unsatisfactory de-gassing prior to filling.**

Rapid oil movement in the pipeline towards the conservator is caused by an internal arc, short circuit, or hot spot which must be correctely addressed.

Oil leaks from the transformer are environmentally unacceptable and a fire hazard will lead to transformer failure.

To indicate any of the above malfunctions we have developed a Buchholz relay to comply fully with the latest CENELEC EN 50216-1 and EN 50216-2 standards.

The relay incorporates the very latest technology in its construction.

PRINCIPAL OF OPERATION

The Buchholz relay is sited in the pipework between the transformer and its conservator and it is filled with oil during normal transformer operation. When gas is generated in the transformer it rises towards the conservator and collects in the upper chamber of the relay.
The oil level drops and the top float triggers alarm switch.

Gas shall not freely pass from the relay body and escape into the pipework before the alarm contact has operated.
The trip contact shall operate at a steady oil flow as indicated in Table 3.

This operation shall not be adversely affected when the alarm contact has already closed and gas is escaping freely.
In the event of an oil leak the Buchholz relay will only operate after the conservator has exhausted all of its oil. In order to check this eventually it is recommended that an RDR MK II automatic shutter valve is fitted between the Buchholz and the conservator.

Specific information on this product are available on request.

CONSTRUCTION

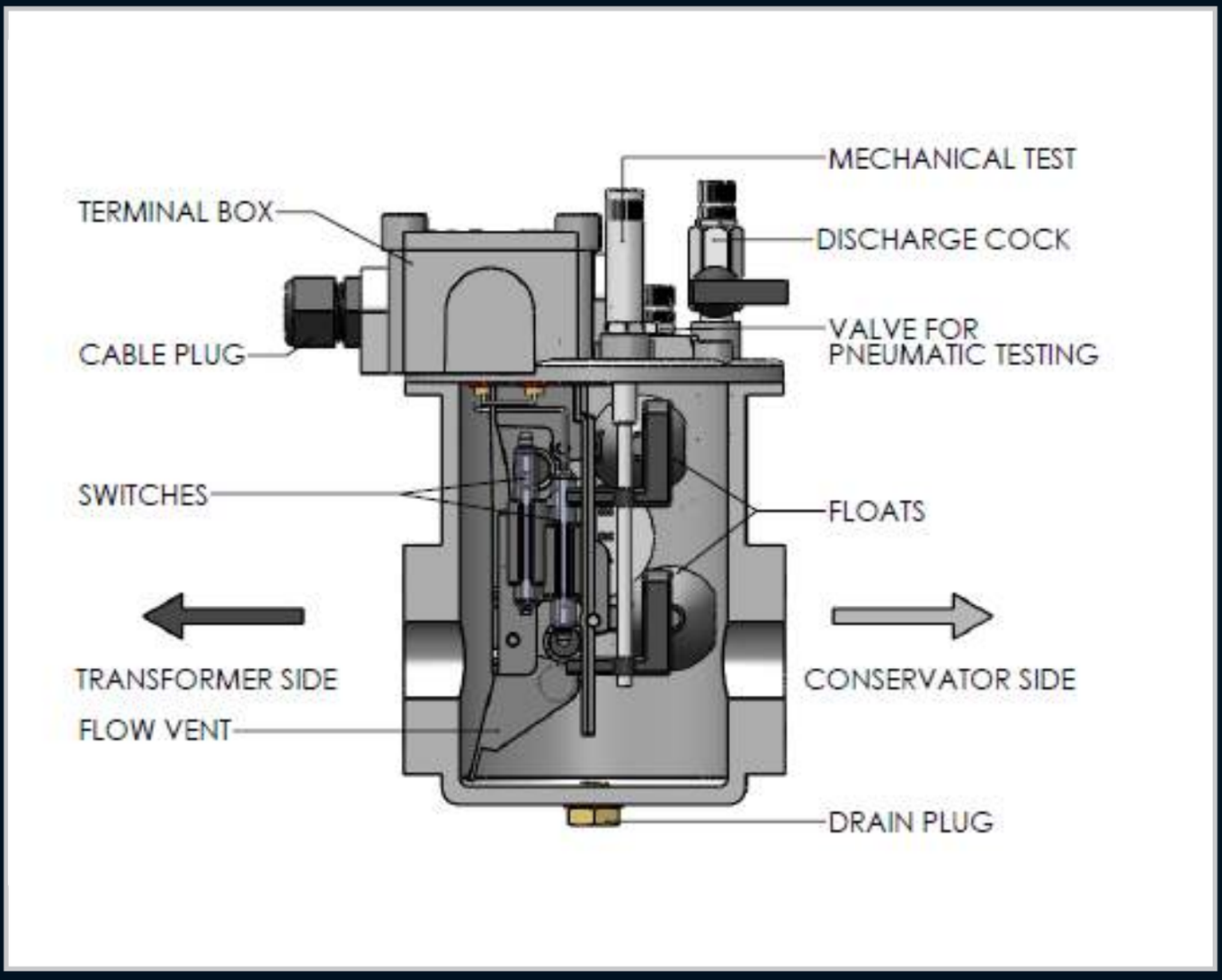
The Buchholz relay is an assembly of two machined aluminium alloy castings that effect a perfect oil seal.

1) The main body of the relay is fitted with tempered glass inspection windows with graduated scale markings in cubic centimeters to indicate the internal volume. The oil drain plug is located at the bottom of the main body.
2) The top cover carries the frame which contains the moving parts of the relay. These comprise the two floats and their associated switches encapsulated in glass bulbs, one calibrated flow valve and two permanent magnets.

The cover carries:

(4) a gas discharge valve with G1/8” in male thread with protective cap.
(5) A valve for pneumatically testing the alarm and insulation circuits, with protective cap.
(2) A push rod for mechanically tripping the alarm and the insulation circuits, with protective cap.

A terminal box which as standard contains 4 numbered M6 terminals and one earth terminal.



EXTERNAL COATING AND PROTECTION

To the external aluminium alloy parts is given a phosphate treatment prior to applying one coat of vinyl enamel, colour RAL 7001. This treatment has proved more than satisfactory over the years for the majority of applications including desert and tropical situations.
However, in particularly severe applications (>500h salt fog) such as applications in corrosive atmospheres (acids) a suitable epoxy primer is recommended. (This should be discussed at the time of selection).
All external brass fittings are plated and all nuts are made in stainless steel.

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.

MVA TRANSFORMER POWER	NOMINAL DIAMETER
Up to 5	25
From 5 up to 20	50
From 20 to 50	80

TECHNICAL DATA

- 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:

BUCHHOLTZ RELAY TYPE	GAS VOLUME NECESSARY TO TRIP THE ALARM
BS 25	170÷230
BS 50, BS 80	250÷300

- 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.

INSIDE PIPE DIAMETER	1,0 m/s	1,5 m/s	2,0 m/s
25	o	x	x
50	o	x	x
80	o	x	x

- 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

Rated switch current is 2 A r.m.s. with max. 10 A r.m.s. as short term 30 ms current value.
Breaking power is specified in the following table:

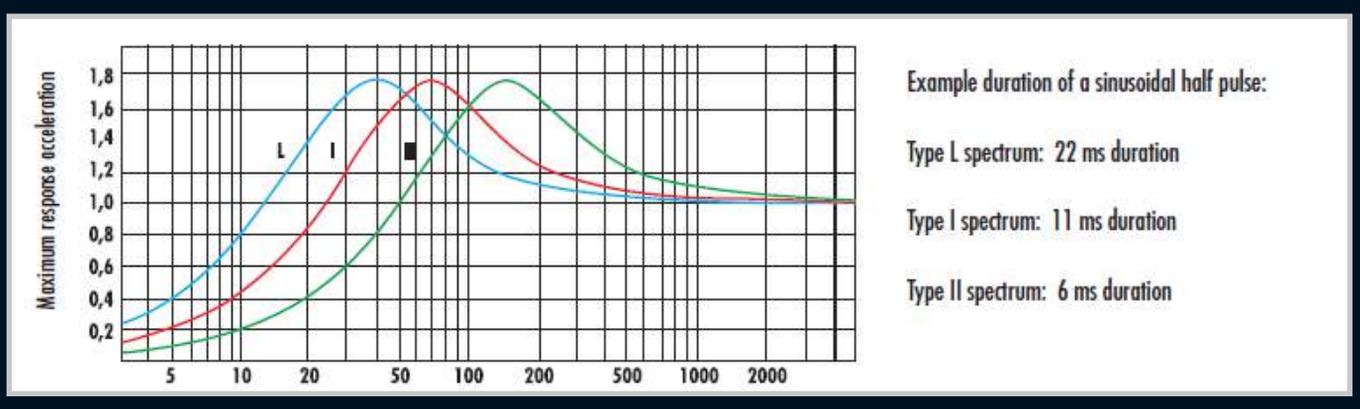
VOLTAGE	CURRENT	BREAKING POWER
220 Vd.c. (min. 12V)	2 A for 10000 maneuvers	250 W
230 V a.c. (min.12V)	6 A for 1000 maneuvers	400 VA

Dielectric contact voltage as specified in the following table:

	SHORT TERM INDUSTRIAL FREQUENCY LEAKAGE TEST Kv / 1min. (r.m.s)	RESISTANCE VOLTAGE PER PULSE Kv (peak)
Between circuits and ground	2.5	5
Across open contacts	1	3

The following Type Tests have been performed on the relay.

• Measurement of the volume of gas necessary to trip the alarm.
• 500 hr salt fog.
• Electromagnetic Field Test. Relay does not trip in field strength up to 25 mT (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. Not suitable for machines exposed to high vibration and shock levels. Three-axis movement was impressed to the relay using special equipment with stationary sinusoidal vibrations from 2 to 200 Hz.
Movement had a constant 3 mm
(6 mm peak-peak)
amplitude in the range from 2 to 9 Hz whereas above this frequency it had constant 10 m/s2 acceleration. The alarm and release switches did not trip.
b) non-stationary vibration tests with vertical shock with 100 m/s2 acceleration with type I spectrum (duration 11 ms) as shown in the graph below. Alarm and release contacts did not trip. On demand we are able to manufacture Buchholz relays with special features and test values higher than the ones stated above.



• A seismic test was also performed according to EN 50216-1 standards that refers to EN 60068-3-3 class 0, level 2 standards. The test consists of application of a 9 m/s2 horizontal acceleration and a 4.5 m/s2 vertical acceleration, increasing frequency one octave per minute. No activation of alarm or release switches was encountered.
• Pressure Withstand Test 2.5 bar for 2 minutes with oil at 100 deg C.
• Vacuum Withstand Test of 2500 Pa for 24 hrs.
• Rate of oil flow test to operate trip contcts, (as shown in table 3).
• Test to show the relay is insensitive to oil flow from conservator to transformer.
• Electrical tests per table 5.

ROUTINE TESTS

The following Routine Tests are applied to all relays.
• Hydraulic seal test in mineral oil at 90 deg C and 100 kpa pressure for 30 minutes.
• Contact operation via mechanical push rod.
• Contact operation by lowering the oil.
• Rate of oil flow to trip contacts.
• Electrical withstand test between contacts (as table 5).
• Electrical withstand test between contacts and earth (as table 5).
An individual routine Test Report is shipped with each relay

RELAY OPERATING TEST

The following site Tests can be performed when the relay is installed on the transformer:
The Alarm and Trip contacts can be tested manually by the push rod (2) - mechanical test, or (only for alarm contact) by the introduction of air into the relay through valve (5) - pneumatic test.
A bicycle pump can be utilised for this test.
To effectively test the rate of flow of oil is a complex test requiring specialised equipment. Should this test be required other than as a type test then we can perform this on request at the time of the order.

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 minimun 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.