



P&B Weir Electrical Ltd. Buchholz Relays 2018

Buchholz Relays

The PENTA range of Buchholz Relays has a proven track record of many years service. As well as supplying a standard range of approved equipment, PENTA P&B also have the capability to design new solutions for any transformer protection requirement.



Our range includes a range of Buchholz Relays of many sizes and configurations, Dry Air Pumps and gas collectors.



FOR A LIFE ON THE LINE

P&B Weir Electrical Ltd +44 (0) 1225 811 449 www.pentaesp.com



INTRODUCTION

Buchholz Relays from PENTA can provide a service for many decades if maintained properly. Our Relays have been providing transformer protetion globally for many years.



Most faults in an oil filled Transformer are accompanied by the generation of gas. By using a suitable Relay, the formation of gas can be used as a warning of a developing fault.

Once a specified volume of gas has collected within the Buchholz Relay, the alarm element will cause an alarm indication.

If there is a more serious fault within the Transformer, the trip element will function. The trip element will cease the functioning of the Transformer to protect it from further damage, and protect those working around it.

Possible causes for Alarm indication

Broken-down core bolt insulation. Shorted laminations. Bad contacts. Overheating of part of the windings.

Possible causes for Trip

Earth Faults. Winding short circuits. Puncture of bushings. Short circuits between phases.



+44 (0) 1225 81 1449





Mounting Position

The relay should be mounted in the connecting pipe between the transformer and conservator tank. This pipe should be as long and as straight as possible, and must be arranged to slope upwards, towards the conservator at an angle within the limits of 3 to 7 degrees to the horizontal.

There should be a straight run on the transformer side of the relay of at least five times the internal diameter of the pipe, and at least three times this diameter on the conservator side.

A machined surface is provided on the relay body for the purpose of testing the mounting of the relay, both in the inclined direction and at right angles to the pipe where it should be horizontal.

Connections

The terminal boxes on double element relays are normally drilled and tapped M20x1.5mm for bottom entry by conduit or cable gland. Side entries and alternative thread sizes can be supplied for most types on request. Alarm and tripping circuit connections are made to 0BA terminal stems (M6) in the terminal box, and secured by 0BA nuts and washers. The maximum recommended torque value (2.8Nm) should not be exceeded when making connections.

Testing on Site

Double element relays are provided with a seperate ball valve to enable the injection of compressed air when testing on-site.

To test the operation of the alarm element, air from an air bottle should be admitted slowly so that the alarm element falls gradually until the switch operates.

To test the trip element, the valve controlling the bottle is opened quickly so that the air rushes in, depresses the flap, operating the switch. The pressure required is dependent upon the equipment used. To facilitate on-site testing, a portable Dry Air Pump is available.

Routine Testing

Relays are individually calibrated in accordance with BEBS T2 (1966). Values are recorded for loss of oil/gas collection to operate the alarm switch and steady oil flow to operate the trip switch.

The unit is also observed to ensure the trip switch operates due to a complete loss of oil. Assembled relays are pressure tested with transfomer oil at 1.4 bar for 6 hours. Electrical circuits are flash tested at 2000 volts r.m.s and the insulation resistance measured at 500 Volts is not less than 10 $M\Omega$ in air.

Although specifically designed to function with transformer oil according to BS148, succesful trials have also been conducted with Silicone coolant.

+44 (0) 1225 81 1449



BUCHHOLZ RELAYS (MK I O Model)

Trip Operation

When a serious fault occurs, the generation of the gas is so rapid that an oil surge is set up through the relay. This oil flow will impinge upon the flap fitted to the trip element causing it to rotate about its axis and so bring the Mercury switch to the closed position, which in turn operates the tripping devices. In the event of serious oil loss from the transformer, both alarm and trip elements operate in turn, in the manner previously described for gas collection.

The oil level in the double element relay can be monitored against a graduated scale on the windows both sides.





Single Element and Tap-Changer Types

Single element type relays are available for 1" bore size, designated 1SE, which operate indiscriminately for gas or oil collection and are suitable for small oil filled transformer, capacitor and potential transformer protection.

A special range of single element relays are also available for Tap-changer type transformers which operate for a surge condition or loss of oil only and allow gas, normally produced during tap changing operations to pass freely. The SE relay has only one operating element and operates in the same manner as the DE relays.

A special open frame unit designated R575/1 suitable for fitting inside the header tank tapchangers which operate due to gas collection, oil loss and surge conditions is available.

A protective diode unit type D1 can also be provided to protect Reed switches employed in single element units.

+44 (0) | 225 8 | | 449



Characteristics	Steady Oil Flo Operate Trip E	w (mm/sec) to Element Switch	Oil level (cc) to oper Switch @ 50		
Model	Pipe angle 1º Not less than	Pipe angle 9º Not more than	Min	Мах	For equipment containing
1SE	650	900	140	200	
1SE/VO	650	900	120	160	
1SE/VK/ML	900	1050	150	230	
1SET 1SET/VO	450	600	N/A	N/A	
1SET/HF	650	750	N/A	N/A	
1DE 1DE/VO 1DE/Vc/o	1000	1300	200	300	Up to 1000 litres 1000 kVA
2DE 2DE/VO 2DE/Vc/o	1100	1400	200	300	1001/10,000 litres 1001/10,000 kVA
3DE 3DE/VO 3DE/Vc/o	1200	1600	200	300	10,000/50,000 litres 10,001 kVA/99 MVA
3DE/HF2 3DE/HF2/VO	1900	2500	250	350	50,000 litres + 100 MVA +



+44 (0) 1225 81 1449





Туре	Dims	A	В	C	D	E	F	G	н	J	К	L	м	Ν
1DE	mm	127	269	232	171	98	76	114	72	76	25	-	-	-
	in.	5.0	10.6	9.13	6.75	3.9	3.0	4.5	2.84	3.0	1.0	-	-	-
2DE	mm	184	269	232	158	111	76	114	110	139	51	13	-	-
	in.	7.25	10.6	9.13	6.2	4.37	3.0	4.5	4.33	5.5	2.0	0.5	-	-
3DE	mm	184	269	234	158	111	80	114	130	160	76	13	-	-
	in.	7.25	10.6	9.21	6.2	4.37	3.15	4.5	5.12	6.31	3.0	0.5	-	-
1SE	mm	120	174	212	110	64	76	103	72	76	25	-	3.0	22
	in.	4.75	6.85	8.35	4.33	2.52	3.0	4.0	2.84	3.0	1.0	-	0.13	0.85
1SET	mm	120	174	212	104	70	76	103	72	76	25	-	3.0	22
	in.	4.75	6.85	8.35	4.1	2.75	3.0	4.0	2.84	3.0	1.0	-	0.13	0.85
	ın.	4./5	6.85	8.35	4.1	2.75	3.0	4.0	2.84	3.0	1.0	-	0.13	0.8

+44 (0) 1225 81 1449



As well as conventional MK10 model Relays, PENTA P&B also provide DIN style relays depending upon your requirements,.

We can also supply bespoke flange sizes, paint types and numbers of fitting holes. Please contact us for more information on this service.

Characteristics Steady Oil Flo					ow (mm/ Element	′sec) to Switch	Oil leve	el (cc) to op Switch @ 5	oerate Alar 50º Inclina					
Model			Pipe Not	angle 1º less than	Pipe angle 9º Not more than		Min			Мах		For equipment containing		
25DE 25DE/VO 25DE/Vc/o				1000	1300		200			300		Up to 1000 litres 1000 kVA		
50DE 50DE/V(50DE/V(DE DE/VO DE/Vc/o			1100	1	400	2	200	300			1001/10,000 litres 1001/10,000 kVA		
75DE 75DE/VO 75DE/Vc/o				1200	1	1600		200		300		10,000/50,000 litres 10,001 kVA/99 MVA		
75DE/HF2 50DE/HF2/VO 50DE/HF2/Vc/o				1900	2	2500		250		350		50,000 litres+ 100 MVA +		
Туре	Dims		Α	В	c	D	E	F	G	н	J	К	L	
25DE	mm in.	2 7.	00 .87	269 10.6	232 9.13	171 6.75	98 3.9	76 3.0	114 4.5	85 3.35	115 4.53	25 1.0	16 0.63	
50DE	mm in.	1 7.	84 .25	269 10.6	232 9.13	158 6.2	111 4.37	76 3.0	114 4.5	125 4.92	165 6.5	51 2.0	13 0.5	
75DE	mm in.	1 7.	84 .25	269 10.6	254 10	158 6.2	111 4.37	100 3.94	114 4.5	160 6.3	200 7.87	76 3.0	13 0.5	



+44 (0) 1225 81 1449









+44 (0) 1225 81 1449

DRY AIR PUMP



Dry Air Pump

The Dry Air Pump from PENTA provides a portable solution for on-site testing of Gas and Oil operated Buchholz Relays.

A charge of air is created in the polycarbonate cylinder by means of a foot-operated pump. The cylinder contains an indicating silica gel which absorbs the moisture present in the air.

The pressure of the air charge is monitored on the built-in pressure gauge. When a suitable pressure has been attained, the air charge is then quickly passed to the Buchholz via a flexible tube by opening the ballvalve fitted to the cylinder. To prevent backpressure forcing oil back down the flexible pipe, a non-return valve is incorporated in the unit.

The indicating silica gel is a crystalline material, which absorbs moisture readily. The properties of the crystals can be easily regenerated by heating/drying. The crystals are impregnated with Iron compounds which give them an orange colour. Upon absorption of moisture, these crystals change from their orange colour to a pale yellow and then become colourless.

When the crystals change to pale yellow, they should be regenerated. This gel is not classifed as dangerous.



+44 (0) 1225 81 1449