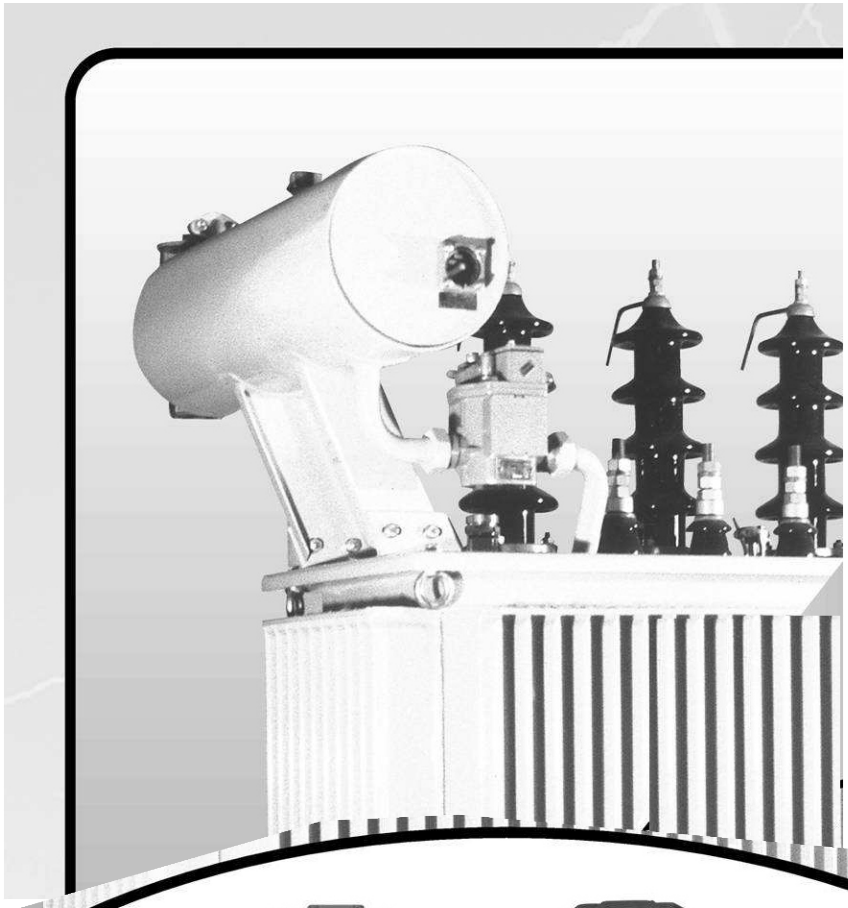
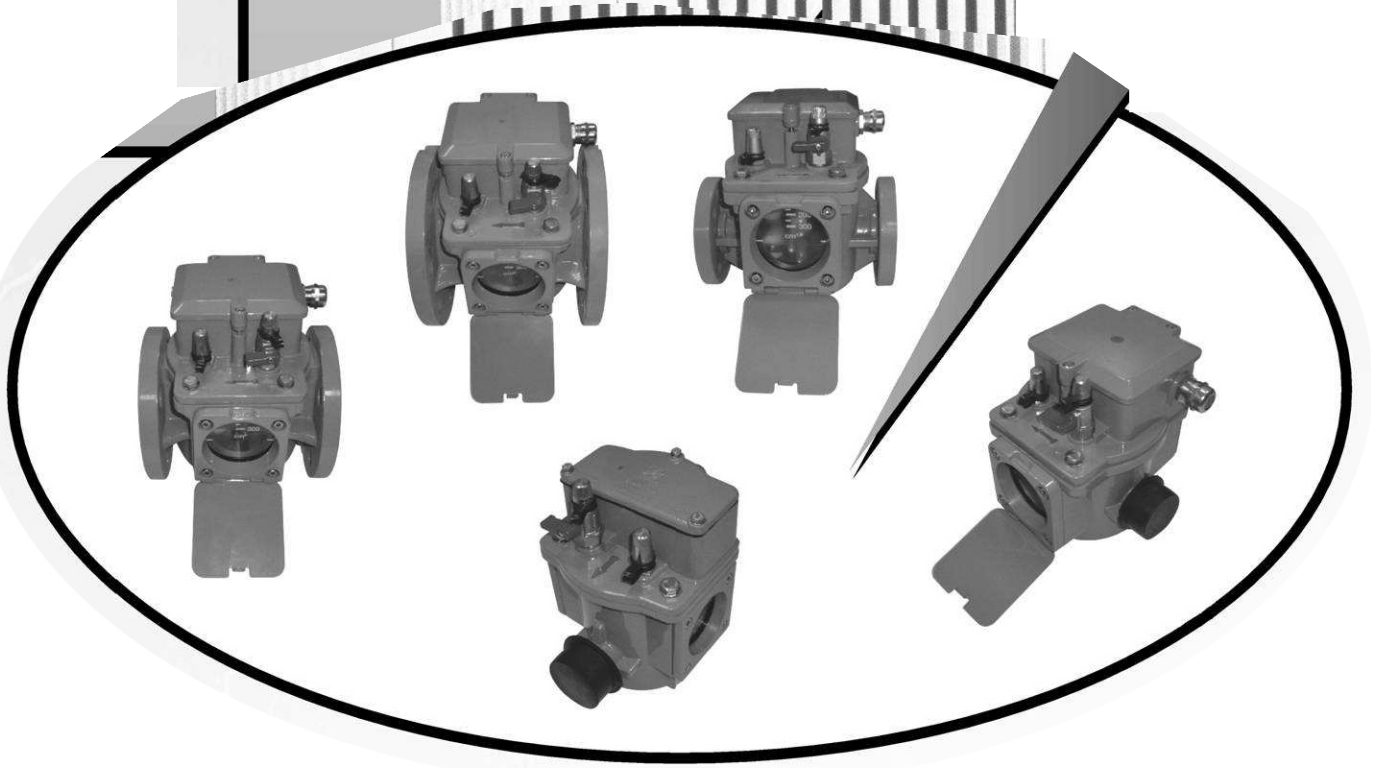
BUCHHOLZ RELAYS

FOR ALL TYPES OF TRANSFORMERS





MILTON OVERSEAS

APPLICATION

Buchholz Relay is a protection device for monitoring the gas and oil movements in oil immersed transformers.

It is designed to detect the faults and minimize the propagation of any damage which might occur within oil circuit, induction coils etc.

The examples of the faults which could cause gas accumulation or strong oil flows in the oil circuit are as follows;

- short-circuited core laminations
- broken-down core insulation
- overheating of windings
- bad contacts
- short-circuit between phases
- earth faults
- puncture of bushing insulators inside tank
- falling of oil level due to leaks
- ingress of air as a result of defective oil circulation system

CONSTRUCTION

ELMEK relays, structurally consist of two main sections, i.e., main housing and upper housing which are both made of corrosion-resistant aluminum alloy and covered with electrostatic powder paint. These sections are also resin treated to seal possible micropores.

Main Housing

Depending on the model, screw or flange type connections are available.

On each side, there are graduated inspection glass windows which enable the volume of gas to be read off and the contact system to be examined. The inspection windows have also additional metal protection covers against external hazards.

Upper Housing

Upper housing holds all the inside mechanisms and also fitted with a cable terminal box, a breather cock and a test button for the mechanical release of the floats to test the alarm circuits.

Cable terminal box incorporates the base mounted electrical connection parts and earth terminal, and has a cover for external hazard protection.

Breather cock is generally used to exhaust the air in the relay and to take out gas samples.

The inside mechanism comprises upper and lower contact systems for alarm and tripping positions.

Both contact systems includes;

- a float made of oil resistant, closed cellular typ e special plastic foam
- a magnet and a mechanical or mercury contact

Additionally, lower contact system is also fitted with a deflector plate for oil flow sensing.

Single float Buchholz relay has only one contact system together with the deflector plate.

OPERATION PRINCIPLE

During normal operation, the relay is completely filled with oil keeping the floats in their top limit or rest position.

The contact mechanisms in the relays respond to;

- slight faults causing a slow evolution of gas in the transformer,
- serious faults creating immediate oil surge,
- oil leakages.

Slight Faults

When a slight or incipient fault occurs in the transformer, the small bubbles of gas, which pass upwards towards the oil conservator tank, are trapped in relay housing, thus causing its oil level to fall.

As a result, the upper float rotates on its hinge and operates the alarm switch, thus operating an external alarm device.

Serious Faults

When a serious fault, core insulation break-down, short circuits etc., occurs in the transformer, the gas generation is violent and causes the oil rush through the Buchholz Relay to the oil conservator tank.

In the relay, this oil surge impinges on the deflector plate fitted on the lower float and causes the rotation of the float itself, thus operating the tripping contact and disconnecting the transformer.

Oil Leakage

An oil leak in the transformer causes the oil level in the relay to fall, thus operating first the alarm (upper) float and then the tripping (lower) float.

The ingress of air into the transformer, arising from the defects in the oil circulation system operates the alarm float.

TECHNICAL SPECIFICATIONS

Electrical

- Nominal Voltage : AC / DC 230V
- Nominal Current : AC / DC 2 A
- Insulation Voltage : AC 2000 V

Oil

- Type : Transformer oil
- Permissible temperature range : -25℃ to 115℃
- Viscosity : 1mm ^{2}/s – 1100mm^2/s

Response conditions of the contact systems

- Gas accumulation : 200 cm‡ - 300 cm‡
- Oil flow velocity : 0.65 m/s,
  (– 15%) 1.00 m/s, (Default)
  1.50 m/s.
- Deflector plate reaction time : max. 0.5 s.

Ambient

- Temperature range : -40℃ to +60℃
- Protection Class : IP 54

Shock resistance

- Earthquake : max. 2 g
  (at 5 to 15Hz seismic wave frequency)
- Vibration : max. 1 g
  (at vibrations of the sinusoidal wave form with 16 to 720 Hz frequency)
- Impacts : max. 10 g
  (at shocks of the half-sinusoidal wave form with a duration of 10 ms)

FINAL TESTS

The following tests are applied to the relays (100%) at the end of the production line;

Leakage test

The relays are filled with oil at the temperature of 90℃ and at the pressure of.... bars and checked for the leakage after min. 30 minutes.

Electrical test

Earthing insulation of the connections is checked at the voltage of 2000V, 50Hz for 1 minute.

Functional test

All the relays are tested on specially designed PLC controlled testing unit and all the response conditions of the contact systems are checked.

ASSEMBLY INSTRUCTIONS

The following conditions should be verified for the best results;

- On the relay, there is an arrow showing the direction of the assembly (from the transformer to the oil conservator tank)
- The relay should always be full of oil. Therefore, the minimum oil level in the conservator should always be above the breather cock of the relay.
- The relay should be assembled horizontally to ensure correct operation of the floats. A maximum inclination of 4° with respect to the horizontal axis towards the conservator tank is allowed.
- The pipe which connects the transformer to the relay should come out from the uppermost part of the transformer cover.

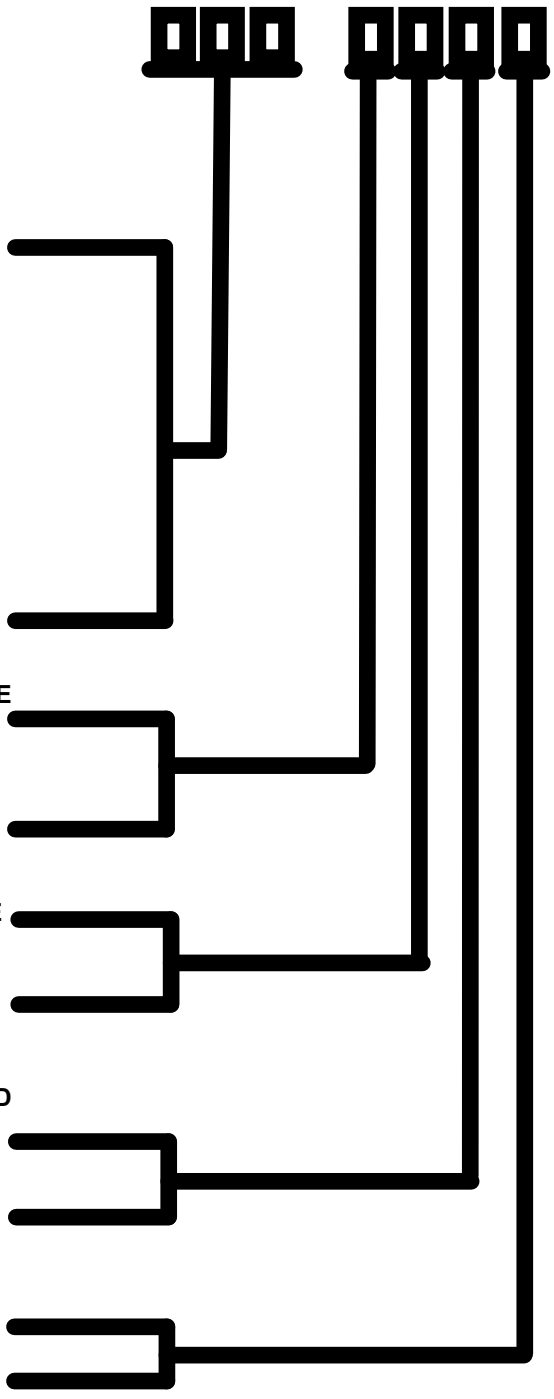
MILTON OVERSEAS

BUCHHOLZ RELAYS

ORDERING SYSTEM

Purchase orders should be given in accordance with the following chart.

Buchholz Relay Type 01 - 08



TYPE	CODE NO
BRC25 – F16 (-)	221
BRC25 – V16 (-)	231
BRC25 – V50 (DG-25)	241
BRR25 – F50 (DR-25)	251
BRR50 – F100 (DR-50)	261
BRR80 – F100 (DR-80)	271
BRR80 – KF100 (DQ-80)	281
BRR 25 – UF16	211LU
BRR 25 – KF16	221KL
BRR50 – UF100	261LU
BRR 50 – UC-F100	261UC
BRR 80 –U F100	271LU
BRR 80 – UC-F100	271UC

UPPER CONTACT SYSTEM	CONTACT CODE
MERCURY CONTACT *	C *
STANDART REED RELAY	R
CHANGEOVER REED RELAY	W
WITHOUT CONTACT	0

LOWER CONTACT SYSTEM	CONTACT CODE
MERCURY CONTACT *	C *
STANDART REED RELAY	R
CHANGEOVER REED RELAY	W

OIL FLOW SPEED SETTING	OIL FLOW SPEED SETTING CODE
0,65 m / s	1
1,00 m / s	2
1,50 m / s	3

COLOR DESCRIPTION	COLOR CODE
RAL 7033	3
RAL 7037	7

Example :

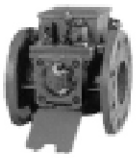
BRR25-F50 : 251-R-R-2-3

* Mercury contact for 1,2,3,4 type no only.

MILTON OVERSEAS

BUCHHOLZ RELAYS

TYPE TABLE

CODE NO.		Item No Type No (DIN Code)	Connection	Nom.-Pipesize (mm) d_1	Flange dim. (mm) d_2	d_3	d_4	d_5	f	Equipment dim. (mm) b	l	h_1	h_2	Weight (kg)	Transformer Power Class
221		01 BRC 25 – F16 (-)	Flanged	25	100	75	-	11.5	10	138	160	190	80	3.2	≤ 5000 KVA
231		02 BRC 25 – V16 (-)	Screwed G 1½ A	25	-	-	-	-	25	138	185	184	80	2.8	≤ 5000 KVA
241		03 BRR 25 – V50 (DG-25) (DIN 42566)	Screwed G 1½ A	25	-	-	-	-	25	180	185	184	68.5	3.7	≤ 5000 KVA
251		04 BRR 25 – F50 (DR-25) (DIN 42566)	Flanged	25	115	85	68	14	16	180	200	188	68.5	4.1	≤ 5000 KVA
261		05 BRR 50 – F100 (DR-50) (DIN 42566)	Flanged	50	165	125	102	18	16	180	195	213	65	5.3	≥ 5000 KVA ≤ 10000 KVA
271		06 BRR 80 – F100 (DR-80) (DIN 42566)	Flanged	80	200	160	138	18	18	180	195	230	65	6.3	≥ 10000 KVA
281		07 BRR 80 – KF100 (DG-80) (DIN 42566)	Square Flanged	80	125	132	-	18	20	180	200	193	65	5	≥ 10000 KVA

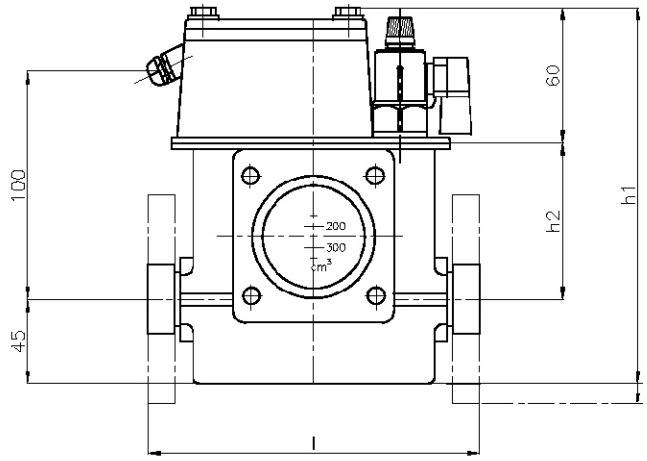
MILTON OVERSEAS

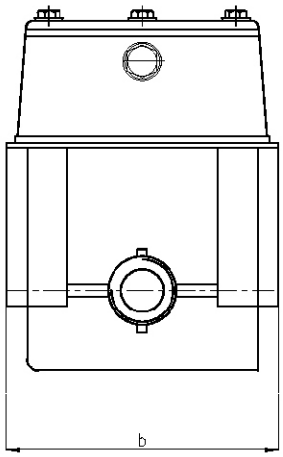
BUCHHOLZ RELAYS

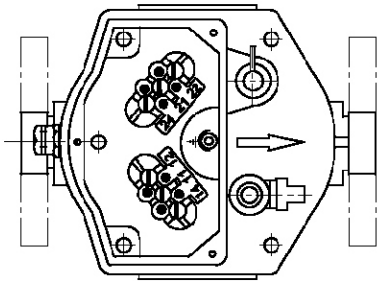
TYPE TABLE

CODE NO.		Item No Type No (DIN Code)	Connection	Nominal Pipesize (mm) d_1	Flange dim. (mm) d_2	d_3	d_4	d_5	f	Equipment dim. (mm) b	i	h_1	h_2	Weight (kg)	Transformer Power Class
211LU		08 BRC 25 – UF16 (-)	Flanged	25	100	75	-	11,5	10	138	240	190	80	3.4	≤ 1600 KVA
221KL		09 BRR 25 – KF16 (-)	Square Flanged	25	80	72	-	M10	-	138	127	144	80	3.2	≤ 1600 KVA
261LU		10 BRR50 – UF100 (-)	Flanged	50	165	125	102	18	16	180	240	213	65	6	≥ 5000 KVA ≤ 10000 KVA
271LU		11 BRR 80 –U F100 (-)	Flanged	80	200	160	138	18	18	180	240	230	65	7	≥ 10000 KVA

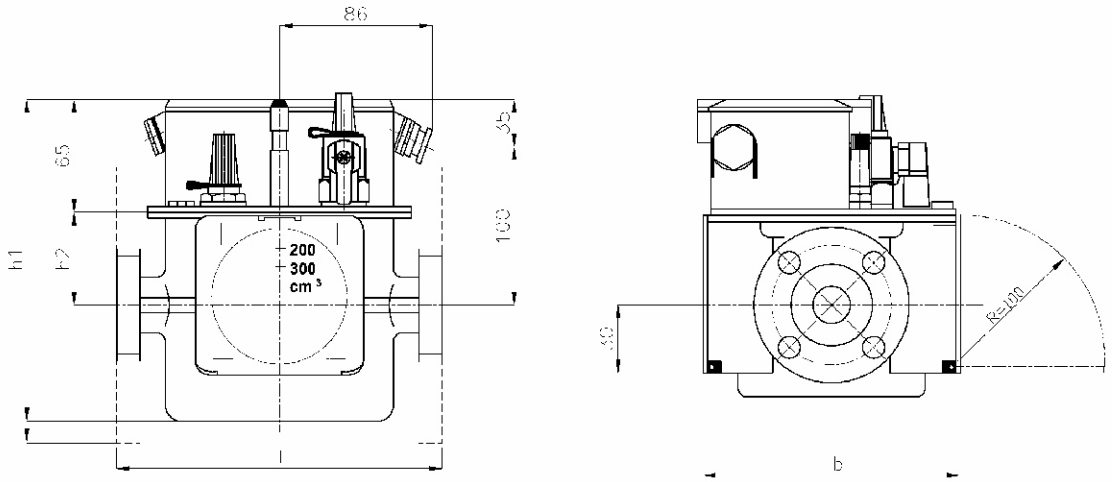
ITEMS: 01–02–08–09

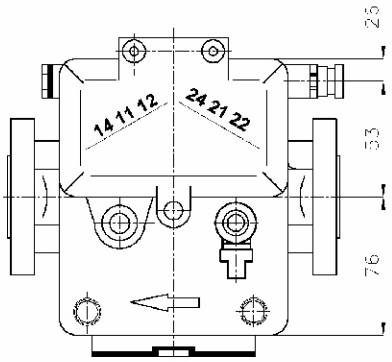




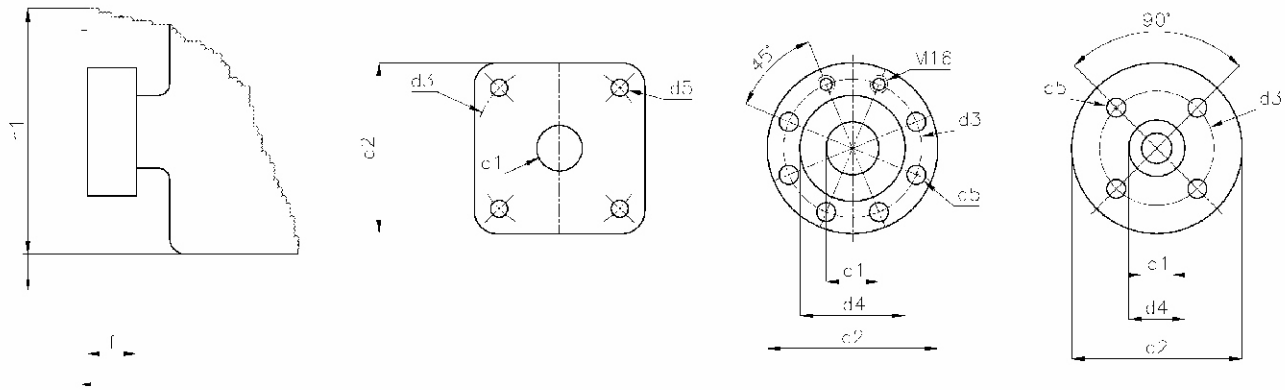


ITEMS: 04–...–08, 11–...–14





FLANGE DIMENSIONS



MILTON OVERSEAS

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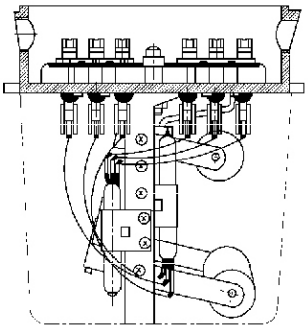
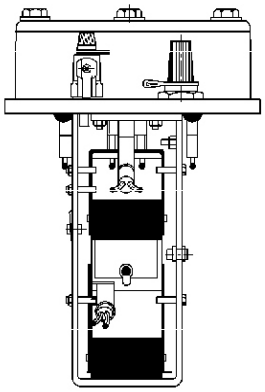
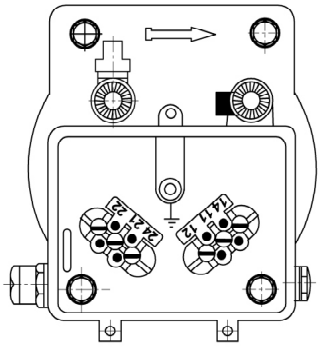
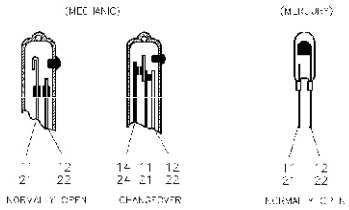
CONTACT TYPES

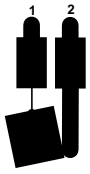
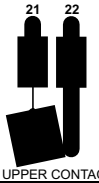
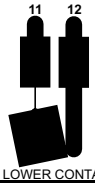
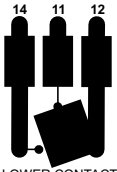






CONTACT TYPES



Construction	Reaction System	Mode of Operation	Contact Scheme (Positions of the contacts are given for normal positions, i.e. floats are at top rest position)	
			Normally open Contact	Changeover Contact
Single Float Buchholz Relay	Float	Gas accumulation		
		Oil leakage		
	Deflector plate	Oil flow		
Twin Float Buchholz Relay	Top float	Gas accumulation	 UPPER CONTACT	 UPPER CONTACT
		Oil leakage		
	Bottom float	Oil leakage	 LOWER CONTACT	 LOWER CONTACT
	Deflector plate	Oil flow		