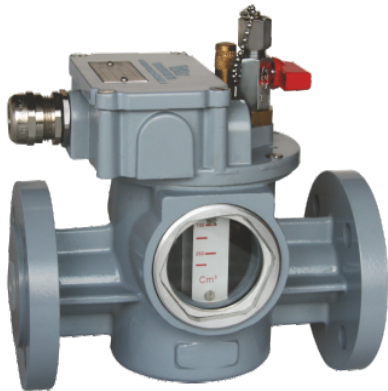


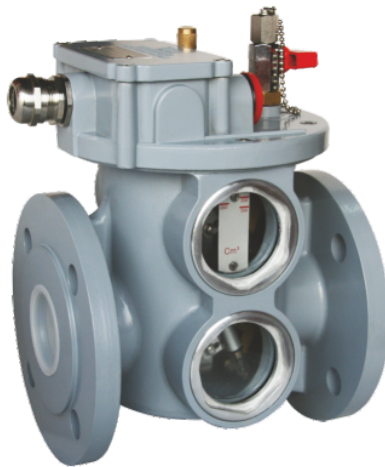
# **GAS ACTUATED RELAY (Buchholz)**

**For Oil Filled Transformers**

**Size : 25mm to 80mm to EN-50216-2**



**GOR-1**



**GOR-2**



**GOR-3**

## **FEATURES**

- Aluminium alloy housing.
- Unique internal design of housing prevents false air traps on top of the relay.
- Well designed internal layout gives clear view of colour of gas inside the relay through glass window for fault analysis.
- Solid Float type design with inherent ability to withstand vacuum treatment of transformers.
- Built in test facility for checking continuity of both alarm and trip circuits.
- Design of magnetic switches gives high stability against mechanical shocks and vibrations.
- Switching option of 2-4 switches / normally open or change over type.
- One of the largest manufacturer of Buchholz Relays in the world with more than 47 years of site experience.

## 1. WORKING PRINCIPLE:

**1.1** During normal operation of a transformer the relay is completely filled with oil. Due to buoyancy, floats are in their upmost position. In the event of some fault in the interior of the transformer tank, gas bubbles are produced which accumulate in the relay on the way to the conservator. In consequence, the oil level in the relay enclosure drops which in turn lowers the upper float. This causes the magnetic switch to operate an alarm signal

**1.2** The lower float does not change its position, because when the gas reaches the upper inside wall of the pipe and it can escape into the conservator. Hence, minor fault in the transformer tank will not trigger the lower switching assembly and will not trip the transformer.

In case the liquid continues to drop due to loss of oil, the lower float also goes down. In consequence, the lower switching system operates if the level of oil goes below the bottom level of the pipe connected to the relay.

Alternately in the event the liquid flow exceeds a specific value (which is adjustable, by means of a flap) the lower float is forced down, thus triggering the lower switching system to operate.

As the liquid flow rate decreases, or the level of the liquid rises, the float returns to its original position.

## 2. CONSTRUCTION FEATURE, FINISH & ACCESSORIES:

### 2.1 Construction features :

The Body and Cover of the relay are made of Aluminium. The casting is oil tight and has weather proof protection. The body houses the assembly including floats and switches. There are inspection window on either side for viewing. Additional sun protection cover can be provided.

### 2.2 Accessories :

On the top cover of the relay are provided mini ball

valve for the release of the gas, a push button for testing the electrical circuits , a small valve for pneumatic test (standard on Buchholz size 2" & 3" and a cable box with 2 cable gland. On the bottom of the relay is provided a plug for draining of oil.

### 2.3 Finish :

In standard execution, all cast parts are protected by one coat of powder coating (total thickness 80-100µm), final colour RAL7001 and all hardware are in stainless steel.

## 3. CONTACTS:

### 3.1 General :

The magnetic switches consist of two thin reed contact blades hermetically sealed inside a glass capsule in an atmosphere of dry inert gas. The switches are operated by a permanent magnet. The operating principle of the magnetic switches is very simple: when a magnet approaches the switch, the reeds close the circuit and when the magnets moves away from the switch, the contact gets open.

### 3.2 Rated current :

The rated current for normally open contacts is 2A r.m.s. and 1 A for changeover contacts; The short time current is 10A r.m.s. for 30 ms.

### 3.3 Breaking and making capacity :

Normally Open Contacts			
Voltage	Max Current	Breaking capacity	
24V DC. to 240V DC	2A	250W	. L/R<40ms
230V AC	2A	400VA	cosØ>0,5

Change Over Contacts			
Voltage	Max Current	Breaking capacity	
24V DC. to 240V DC	1A	130W	. L/R<40ms
230V AC	1A	250VA	cosØ>0,5

## 4. WIRING DIAGRAMS:

### 4.1 Standard wiring diagrams :

Standard wiring diagram available are:

Type "A" – 2 NO (normally open) contacts  
(1 for alarm; 1 for trip signal)

Type "B" – 2 CO (change-over) contacts  
(1 for alarm; 1 for trip signal)

Type "C" – 3 NO (normally open) contacts  
(1 for alarm; 2 for trip signal)

## 5. SERVICE CONDITIONS:

### 5.1 Environmental conditions :

Relays comply with environmental conditions 4K2  
as classified in EN60721-3-4.

### 5.2 Corrosion :

The relay is designed to withstand to corrosion test  
acc to ASTM B 117 in salt fog chamber for 500h

### 5.3 Pressure and vacuum :

The relay is designed to work continuously with an

internal pressure of 50Kpa but is capable to  
withstand an over pressure of 250 Kpa for 2 min  
and to vacuum pressure of 2.5 Kpa for 24h.

### 5.4 Special mechanical conditions :

The relay can withstand mechanical stresses without  
unattended operation to the following stresses acc to  
EN 60721-3-4.

Stationary sinusoidal vibration class 4M4.

### 5.5 Protection degree :

Protection degree of the terminal box is IP65 acc to  
EN60529.

### 5.6 Mounting position :

The relay is designed to operate properly on a pipe  
having an inclination from horizontal between 2 and  
5 degrees.

### 5.7 Working temperature :

Ambient : -40°C to +80°C

In oil : -25°C to +120°C

## 6. PERFORMANCE PARAMETERS:

Oil pipe connection internal diameter	Alarm for gas accumulation	Trip for steady oil flow	Trip for gas accumulation
25 mm	150±50 cm³	100±15 cm/s	After alarm contact is operated and before the oil reaches lowest point of pipe
50 mm	200±100 cm³	100±15 cm/s (standard)	
80 mm		150±25 cm/s (upon request)	
		200±35 cm/s (upon request)	

## 7. INSTALLATION & MAINTENANCE:

### 7.1 Mounting installation to pipeline :

For installing the relay into pipe line proceed as  
follows:

- Ensure that the relay is positioned with the arrow  
pointing towards the conservator.

- Mount the relay as close as possible to the tank in the  
pipeline between transformer and conservator.
- Keep pipe bends as wide as possible. Avoid close  
bends. Make sure pipe ascends to the conservator at  
angle between two degrees to five degrees.
- See that the relay enclosure is not subjected to stress.  
If necessary, use expansion compensators.

- Ensure that the Test button key is in locked position during storage, transportation and mounting of the relay.
- Ensure that floats are in the Service position (remove spacer below knurled cap) after commissioning of the relay.
- Connect the electrical circuit as shown in wiring diagram.

**To fill the Buchholz Relay, proceed as described below:**

- Open the air vent cock to let air escape until insulation liquid emerges.
- Shut the air vent cock.
- Check liquid level in relay through glass window.

**Setting the relay in service mode :**

- Unscrew the knurled cap covering the push button.
- Remove small nylon spacer.
- Screw back the knurled cap in position.

## 7.2 Maintenance:

The relays are not sensitive to external influences. No servicing is needed during operation. On routine inspections of the protection equipment, test the function of the relay by checking the alarm and trip devices connected to them.

## 7.3 Functional Test:

Unscrew the knurled cap which covers the push button for checking the continuity of alarm and trip contacts. Remove the small spacer which locks the alarm and trip floats when the relay is in transit. Push the test button down to check continuity of contacts. Release the test button to bring the contacts back to the normal open position. Screw the knurled cap back in position.

## 8. CHECK AFTER ACTUATION OF RELAY:

### 8.1 Alarm signal :

When the alarm signal is given, the colour of the gas should be observed through the inspection-windows. The gas may be released or samples can be taken for analysis. Gas collection is only possible with a proper gas collection device.

- **Whitish gas** : Arcing in paper/cotton
- **Yellowish gas** : Arcing in Wood and cardboard
- **Greyish gas** : Breakdown of the magnetic circuit
- **Black gas** : Free arcing in the oil

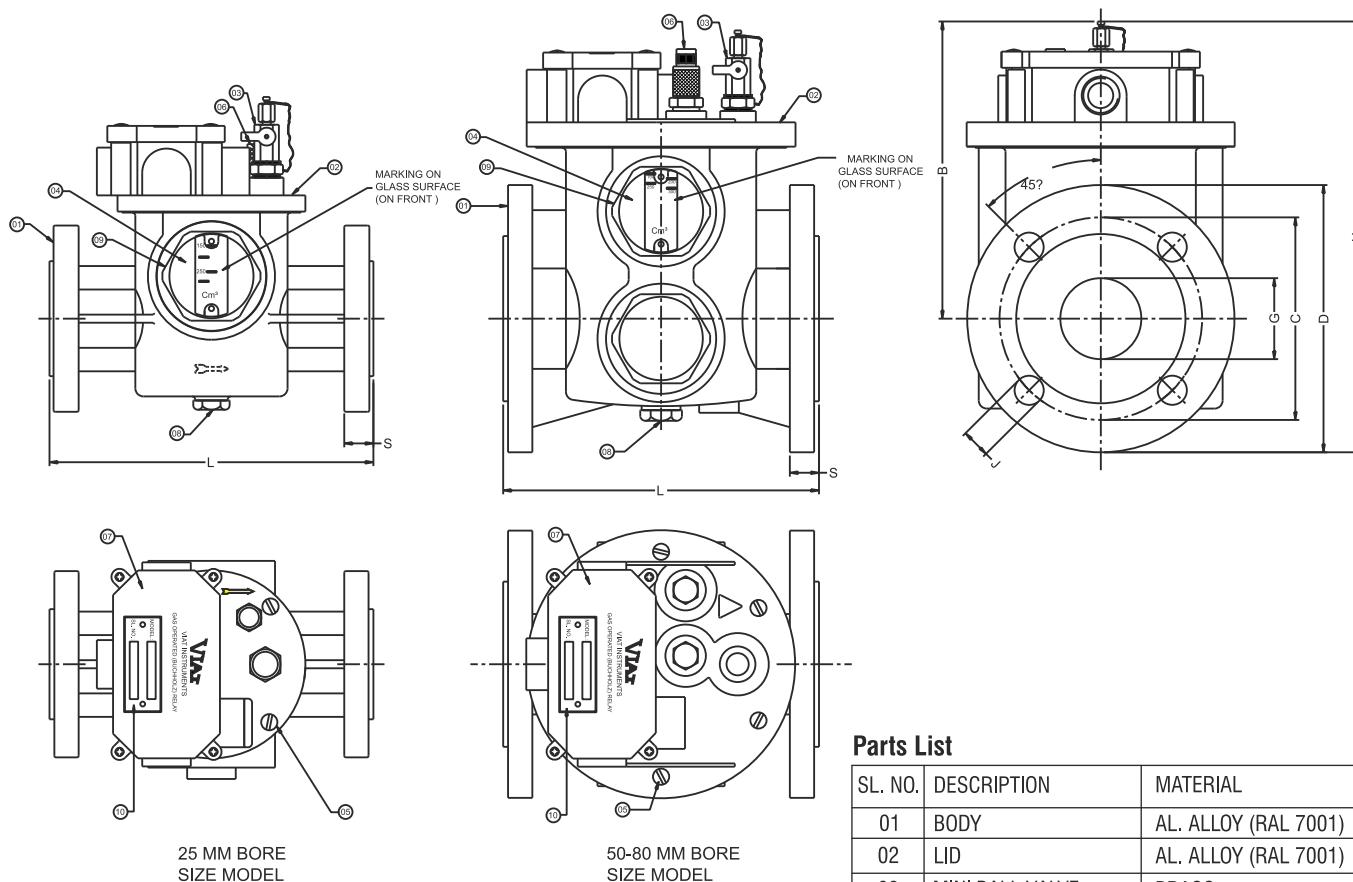
Note that there may be air in the transformer during commissioning or after an operation of oil refilling. In such cases the alarm is only temporary and should end in a short period of time.

### 8.2 Trip signal :

The actuation of trip element denotes a more serious fault. If the trip is actuated due to loss of oil then check for leakage and fill oil in the conservator. If tripping is due oil surge then a thorough investigation may be warranted. The oil surge may be caused by one or more of the following reasons:

- a) Earth faults
- b) Winding short circuits
- c) Puncture of bushings
- d) Short circuit between phases

It may be noted that in forced cooled transformers simultaneous operation of two or pumps may generate oil surge which can then trigger the trip signal.



## Parts List

SL. NO.	DESCRIPTION	MATERIAL
01	BODY	AL. ALLOY (RAL 7001)
02	LID	AL. ALLOY (RAL 7001)
03	MINI BALL VALVE	BRASS
04	WINDOW GLASS	TOUGHENED GLASS
05	EXTERNAL HARDWARE	BRASS & SS.
07	PUSH BUTTON	BRASS
08	TERMINAL COVER	AL. ALLOY (RAL 7001)
09	DRAIN PLUG	BRASS
10	WINDOW GLASS NUT	AL. ALLOY
11	NAMEPLATE	ALUMINIUM SHEET

TABLE - MODEL BF MODEL

MODEL	SIZE / NOM. PIPE BORE 'G'	DIMENSIONS								APPROX Wt. in Kgs
		D	C	HOLE Ø J	NOS. OF HOLE	S	L	H	B	
BF-25	25	115	85	Ø14	4	18	200	212	140	≈ 2,800
BF-50	50	165	125	Ø18	4	18	195	280	195	≈ 4,600
BF-80	80	200	160	Ø18	8	18	195	310	210	≈ 5,500

TABLE - MODEL BR MODEL

MODEL	SIZE / NOM. PIPE BORE 'G'	DIMENSIONS								APPROX Wt. in Kgs
		D	C	HOLE Ø J	NOS. OF HOLE	S	L	H	B	
BR-50	50	140	110	Ø18	4	13	183	265	195	≈ 4,600
BR-80	80	200	160	Ø18	4	18	195	310	210	≈ 5,500

TABLE - MODEL BS MODEL

MODEL	SIZE / NOM. PIPE BORE 'G'	DIMENSIONS								APPROX Wt. in Kgs
		D	C	HOLE Ø J	NOS. OF HOLE	S	L	H	B	
BS-50	50	140	110	Ø12	6	13	185	265	195	≈ 4,600
BS-80	80	160	130	Ø12	6	13	185	290	210	≈ 5,500

POSITIONS OF TERMINALS IN TERMINAL BOX		CIRCUIT DIAGRAM	
CIRCUIT DIAGRAM IN SERVICE POSITION	ALARM	3	4
	TRIP	2	1
CIRCUIT DIAGRAM IN OPERATED / TEST CONDITION	ALARM	3	4
	TRIP	2	1
CIRCUIT DIAGRAM			
ALARM CIRCUIT		A A	
TRIP CIRCUIT		T T	
CIRCUIT	SERVICE POSITION	LOCKED / TEST POSITION	
ALARM	OFF	ON	
TRIP	OFF	ON	

ALARM-NO TRIP-NO

POSITIONS OF TERMINALS IN TERMINAL BOX		CIRCUIT DIAGRAM	
CIRCUIT DIAGRAM IN SERVICE POSITION	ALARM	3	4
	TRIP	2	1
CIRCUIT DIAGRAM IN OPERATED / TEST CONDITION	ALARM	3	4
	TRIP	2	1
CIRCUIT DIAGRAM			
ALARM CIRCUIT		A A	
TRIP CIRCUIT		T T	
CIRCUIT	SERVICE POSITION	LOCKED / TEST POSITION	
ALARM	OFF	ON	
TRIP	OFF	ON	

ALARM-1NO TRIP-2NO

POSITIONS OF TERMINALS IN TERMINAL BOX		CIRCUIT DIAGRAM	
CIRCUIT DIAGRAM IN SERVICE POSITION	ALARM	3	4
	TRIP	2	1
CIRCUIT DIAGRAM IN LOCKED / TEST CONDITION	ALARM	3	4
	TRIP	2	1
CIRCUIT DIAGRAM			
ALARM CIRCUIT		A A A A	
TRIP CIRCUIT		T T T T	
CIRCUIT	SERVICE POSITION	LOCKED / TEST POSITION	
ALARM	OFF	ON	
TRIP	OFF	ON	

ALARM-CO TRIP-CO

## ORDERING INSTRUCTIONS

When ordering a relay it is necessary to indicate (see Table) :

● Type ● Size ● Wiring diagram ● Oil flow rate ● Operating conditions ● Cable Gland

TYPE	SIZE	WIRING DIAGRAM	OIL FLOW RATE	OPERATING CONDITIONS	CABLE GLAND	LEGEND		
					6	CABLE GLAND M25x1.5 (STANDARD)		
					7	EXTRA ADAPTOR M20x1.5		
					8	EXTRA ADAPTOR PG 16		
				4		TROPICAL CONDITION TEMPERATURE		
						5	VERY LOW TEMPERATURE	
				2			100 cm/sec	
				3			150 cm/sec	
				4			200 cm/sec	
				A				2 NO Contacts
				B				2 SPDT Contacts (CO)
			C	3 NO Contacts				
			025				SEE DRAWINGS	
			050					
			080					
	BF							
	BR							
	BS							

To order Buchholz Relay type BF-25 wiring diagram A; standard flow rate (100cm/sec);  
tropical conditions with M20x1.5 gland indicate the following : Buchholz Relay type BF025A246

Due to our policy of continuous product improvement, dimensions and designs are subject to change.



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