

# BUCHHOLZ RELAYS EB Series



The most popular Buchholz relay  
for oil-immersed power transformers



## 1. General Features

### Characteristics

The gas-actuated protective relay is designed to detect faults as well as to minimise the propagation of any damage, which might occur within oil-filled transformers.

The relay is therefore particularly effective in case of:

- short-circuited core laminations
- broken-down core bolt insulation
- overheating of some part of the windings
- bad contacts
- short circuits between phases, turns
- earth faults
- puncture of bushing insulators inside tank

Furthermore the relay can prevent the development of conditions leading to a fault in the transformer, such as the falling of the oil level due to leaks, or the penetration of air as a result of defects in the oil circulating system.

The adoption of other forms of protection does not therefore exclude the use of the gas-actuated Buchholz relay, as this device is the only means of detecting incipient faults, which if unnoticed, can cause heavy failures.

### Operating principle

The operation of the Buchholz relay is based upon the fact that every kind of fault in an oil-filled transformer causes decomposition of the insulating material, be it liquid or solid, due to overheating in the fault zone or to the action of an intense electric field, and generation of bubble of gas.

These reach the relay (normally filled with oil) through the pipe connecting the transformer to the conservator where the buchholz relay is mounted

## 2. Special features

### Design of active part

The active part of relay is designed in order to permit the free passage of the oil flow through the body, not any obstacle (except the flap that detects the oil flow rate) such as the floats or any other apparatus is present between the entry and the exit of the oil inside the relay.

The lower and the upper floats are isolated from flux of oil thus unattended operation due to turbulence of oil are avoided.

On demand, a special device permit, in case of oil surge, to hold the trip contact in his operated position making possible the relay be resettable only manually.

### Design of contacts

The relays are provided with magnetic switches which avoid unattended closing of the contacts and the consequent mal-functioning of the relay, whenever this is subject to severe vibrations.

Moreover, each contact is operated by 2 magnets displaced in a such way that make a constant magnetic field around the contact itself, in this way contact is not influenced by external magnetic fields that are present on a transformer

### 3. Operating features

#### Slight faults

When a slight or incipient fault occurs in the transformers, the small bubbles of gas, which pass upwards towards the conservator, are trapped in the relay housing, thus causing a decrease of the oil level inside the relay.

As a result, the upper float closes its magnetic switch, thus completing the alarm circuit and operating an external alarm device.

#### Serious faults

##### Gas generation

When a serious fault occurs in the transformer, the gas generation is violent and causes the oil to rush through the connecting pipe to the conservator.

In the relay, this oil surge impinges on the flap fitted on the lower part (located in front of the hole for the oil passage) and causes the closing of its magnetic switch, completing the tripping circuit to the circuit-breaker and disconnecting the transformer.

The value of the oil speed required to operate the tripping device can be varied by changing a counterweight fitted on the device itself or changing its size.

##### Oil leak

An oil leak in the transformer causes the fall down of the oil level inside the relay, thus operating first the alarm (upper) float and then the tripping (lower) float, which will close their own circuits

##### Air inlet

The ingress of air into the transformer, arising from defects in the oil circulating system or from other causes, operates the alarm float first and after the trip contact.

### 4. Construction feature, Finish and Accessories

#### Construction features

The body and the cap of the buchholz relay are made of aluminium alloy casting, oil tight weatherproof; the compact design, that means low weight, small sizes, efficiency, is the result of a very long experience in manufacturing relays. Two flanges on the body permit an easy connection of the relay to the tubes; two large inspection windows made in trogamid (on request made in tempered glass), with graduated scale, are fitted on both sides of the relay housing (on request windows can be provided with sun shield protection).

A flat surface on the cap of the relay make it possible, using a spirit level, to mount the relay with the proper inclination

#### Accessories

On the cap of the relay are provided petcock 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" on request on Buchholz size 1") and a cable box (which is cast integrally to the cap) with 2 cable gland entry size M25x1.5.

On the bottom of the relay is provided a plug for draining of oil.

#### Finish

In standard execution, all cast parts are protected by one coat of epoxy primer and one coat of polyurethane paint (total thickness 80 µm), final colour RAL 7030 and screws and washer are in stainless steel; the protection degree of the device is IP 55. Therefore the device is suitable for outdoor installation in tropical climate and with industrial pollution.

## 5. Contacts

### 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 reeds are made of a ferromagnetic material and are cantilevered into the end of the capsule.

The tips of the reeds overlap and are separated by an air gap. The tips, forming the contact surfaces, are coated with a contact material.

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; when the magnets moves away from the switch, the contact gets open.

### Rated current

The rated current for normally open contacts is 2 A r.m.s. and 1 A for changeover contacts;

The short time current is 10A r.m.s. for 30 ms

### Breaking and making capacity

| Normally Open Contacts |             |                   |          |
|------------------------|-------------|-------------------|----------|
| Voltage                | Max Current | Breaking capacity |          |
| 24V d.c. to 240V d.c.  | 2A          | 250W              | L/R<40ms |
| 230V a.c.              | 2A          | 400VA             | cosφ>0,5 |

| Change over Contacts  |             |                   |          |
|-----------------------|-------------|-------------------|----------|
| Voltage               | Max Current | Breaking capacity |          |
| 24V d.c. to 240V d.c. | 1A          | 130W              | L/R<40ms |
| 230V a.c.             | 1A          | 250VA             | cosφ>0,5 |

## 6. Wiring diagrams

### Standard wiring diagrams

Standard wiring diagram available are:

Type "A" – 2 N/O contacts (1 for alarm; 1 for trip signalling)

Type "L" – 2 change-over contacts (1 for alarm; 1 for trip signalling)

Type "G" – 3 N/O contacts (1 for alarm; 2 for trip signalling)

### Special wiring diagrams

Special wiring diagram are available on demand on relays NB 50 & 80 mm like

Type S2 - 1 changeover contacts for alarm and 1 changeover contact plus 1 N/O contact for trip

Type S3 - 1 changeover contacts plus 1 N/O contact for alarm and 1 changeover contact for trip

Type S4 - 4 contacts N/O; 2 for alarm and 2 for trip

Type R - 2 changeover contacts with a device which hold the trip contact in its position in case of oil surge operation; manual reset of the contact by pushing the test button on top of relay (same as TU system).

## 7. Service conditions

### Environmental conditions

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

|   |                                |             |
|---|--------------------------------|-------------|
| K | Climatic conditions            | 4K2         |
| Z | Special climatic conditions    | 4Z2+4Z4+4Z7 |
| B | Biological conditions          | 4B1         |
| C | Chemically active substances   | 4C2         |
| S | Mechanically active substances | 4S3         |

### Special mechanical conditions

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

- stationary sinusoidal vibration class 4M4
- non stationary vibration : a vertical shock of 100m/s<sup>2</sup>, with type 1 spectrum

### Protection degree

Protection degree of the terminal box is IP65 acc to EN60529

### Corrosion

The relay is designed to withstand to corrosion test acc to ASTM B 117 in salty fog chamber for 200h

### Pressure and vacuum resistance

The relay is designed to work continuously with an internal pressure of 50kPa but is capable to withstand an overpressure of 250 kPa for 2 min and to vacuum pressure of 2.5 kPa for 24h

### Insulating liquid

The relay is designed for operate with transformer oil with viscosity range from 1 mm<sup>2</sup>/s to 1100 mm<sup>2</sup>/s

### Working temperature

The relay is suitable for operation in transformer oil over temperature range from minimum minus 40 °C to plus 115 °C

The relay is suitable for operation in ambient air temperature range from minimum minus 40 °C to plus 70 °C

Special execution are available on demand

### Mounting position

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

## 8. Operational performance

### Operating characteristics

Typical values of the oil speed required to operate the tripping element under surge conditions and the volume of accumulated gas required to operate the alarm float and trip contact , are:

| Oil pipe connection internal diameter | Alarm for gas accumulation | Trip for steady oil flow   | Trip for gas accumulation   |
|---------------------------------------|----------------------------|----------------------------|---|
| 25 mm                                 | 150±50 cm <sup>3</sup>     | 100±15 cm/s                | after alarm contact is operated and before the oil reaches lowest point of pipe |
| 50 mm                                 | 300±100 cm <sup>3</sup>    | 100±15 cm/s (standard)     |   |
| 80 mm                                 |                            | 150±25 cm/s (upon request) |   |
|                                       |                            | 200±35 cm/s (upon request) |   |

## 9. Installation

### Mounting

The gas actuated relay is mounted on the connecting pipe between the transformer and the conservator.

The pipe has to allow the easy flow to the relay of the gas arising from faults inside the transformer, starting from the highest point on the transformer cover and must not protrude inside into the transformer.

The pipe should not contain any right-angle elbows. Its diameter should correspond to the diameter of the hole for the passage of oil of the relay.

The pipe must be arranged to slope upwards towards the conservator at an angle of about 2 to 4 degrees to the horizontal (max 5 degrees).

The part of the pipe preceding the relay should be straight for a length equal to at least five pipe diameters; the part of the pipe leading to the conservator immediately adjacent to the relay should be straight for a length equal to at least three pipe diameters.

A flat surface on the cap of the relay make it possible, using a spirit level, to mount the relay with the proper inclination

The petcock at the top of the relay must be at a level below the bottom of the conservator.

When mounting, the arrow engraved on the body of the relay must point in the same direction as the oil flow to the conservator.

If the transformer is provided with an explosion vent or similar attachment, this must be sealed in such a way that any gas liberated by the transformer does not accumulate in the vent, otherwise the operation of the alarm float will be delayed.

### Setting to work

Once the relay has been mounted, unscrew the knurled cap which covers the push-button for checking the circuits and remove the small wood spacer which immobilises the alarm and tripping floats in their lower position, thereby preventing their movement during transport.

Open up the gas release cock, located on the relay cover, to allow the relay to fill up with oil.

The filling up and the position of the floats can be seen through the inspection windows.

When the relay is filled with oil, close the gas release cock.

The electrical circuits must be connected as shown in the diagram accompanying the relay.

### Test of contacts

The relay is provided with a push-button, self resetting, for checking the continuity of the electrical circuits.

The procedure for testing is very simple: unscrew the knurled cap pos.3 (see drawing) which protect the push-button and press it slowly in order to activate first the alarm contact and after the trip contact. When the push-button end his stroke, release it slowly, in order to turn off the trip contact and after the alarm contact.

It is possible to see the movement of the float through the inspection windows.

### Maintenance

The buchholz relay does not need periodic maintenance; however it is advisable to check regularly the electric contact and the freely movement of float.

## 10. Check after actuation of relay

### 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. (If the relay is supplied with our "Buchholz gas sampling apparatus RG3, this operation can be carried out at eye-level).

It should be noted that:

- whitish gas : it is caused by electric arcing in contact with paper, cotton and silk
- yellowish gas : it is caused by wood and cardboard
- greyish gas : it is caused by from a breakdown of the magnetic circuit
- black gas : it is caused by from free arcing in the oil

Note that there may be air in the transformer during commissioning or after an operation of oil refilling

In similar cases the alarm is only temporary and should end in a short period of time.

### Trip signal

If the relay disconnects the transformer, similar checks on the gas should be made to determine the colour and the quantity of gas collected.

It is always good practice to make a gas analysis.

In any case, the transformer should not be immediately re-energized, as this would increase the seriousness of the fault.

Note that tripping contact can be actuated also by oil leak; in that case refill oil into conservator after discovered the cause of the oil fall before re-energizing the transformer.

## 11. Test of gas on site

It can be executed only if a gas analyser is available

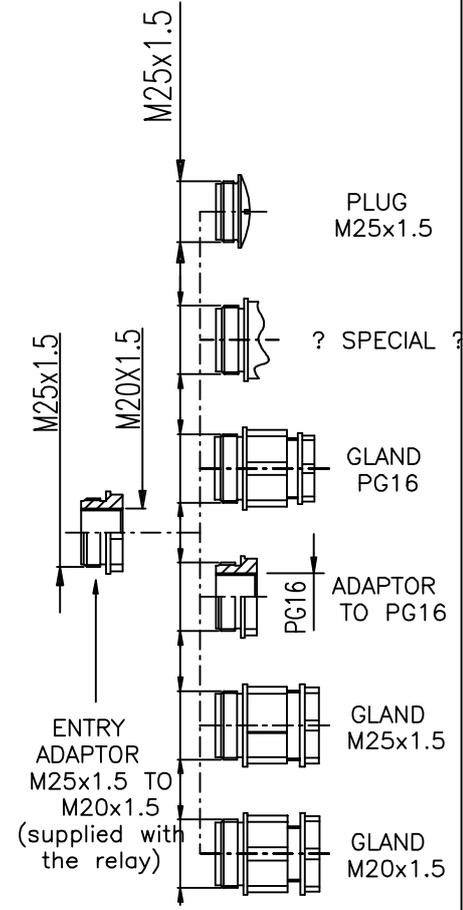
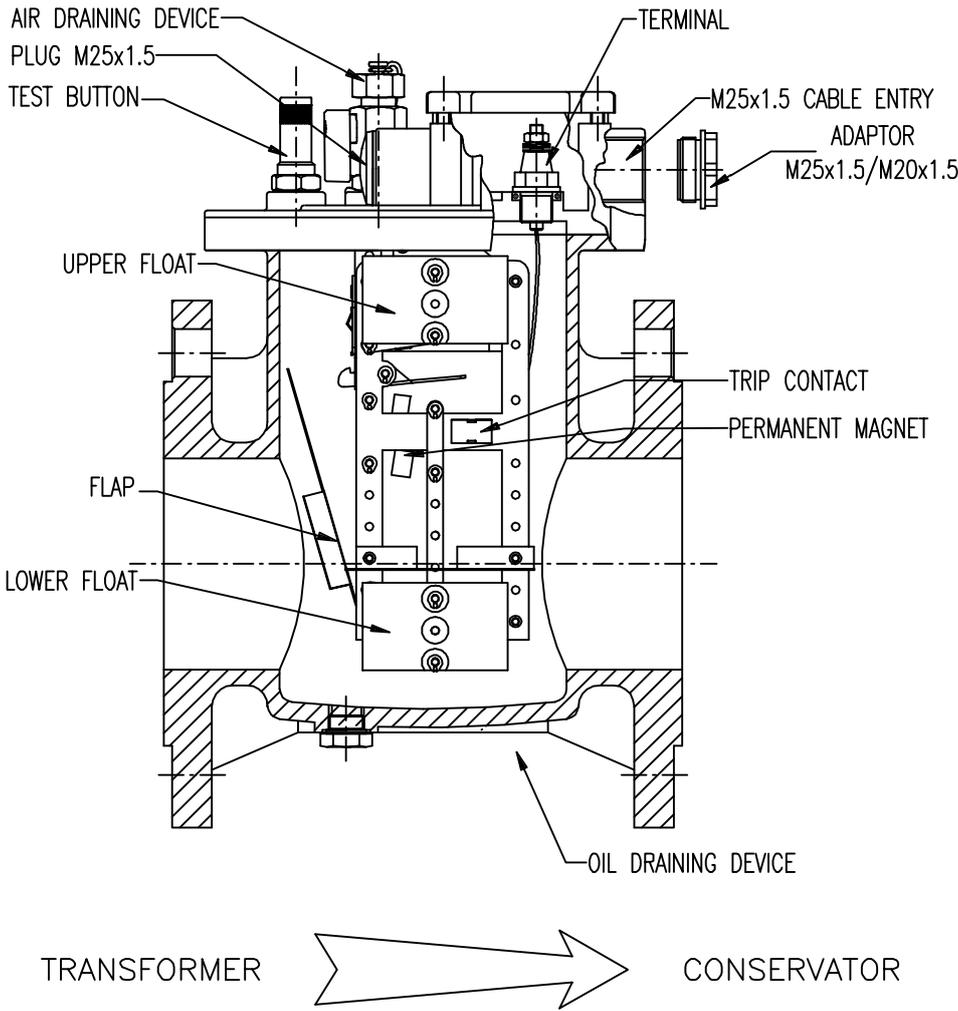
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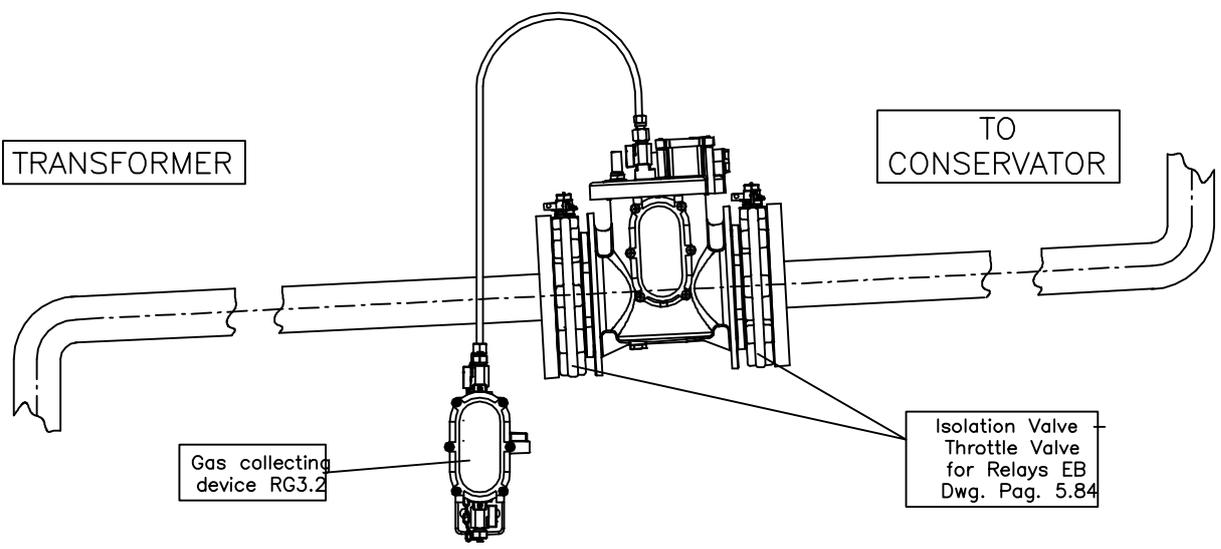
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REV. 01 DTD 27/05/16

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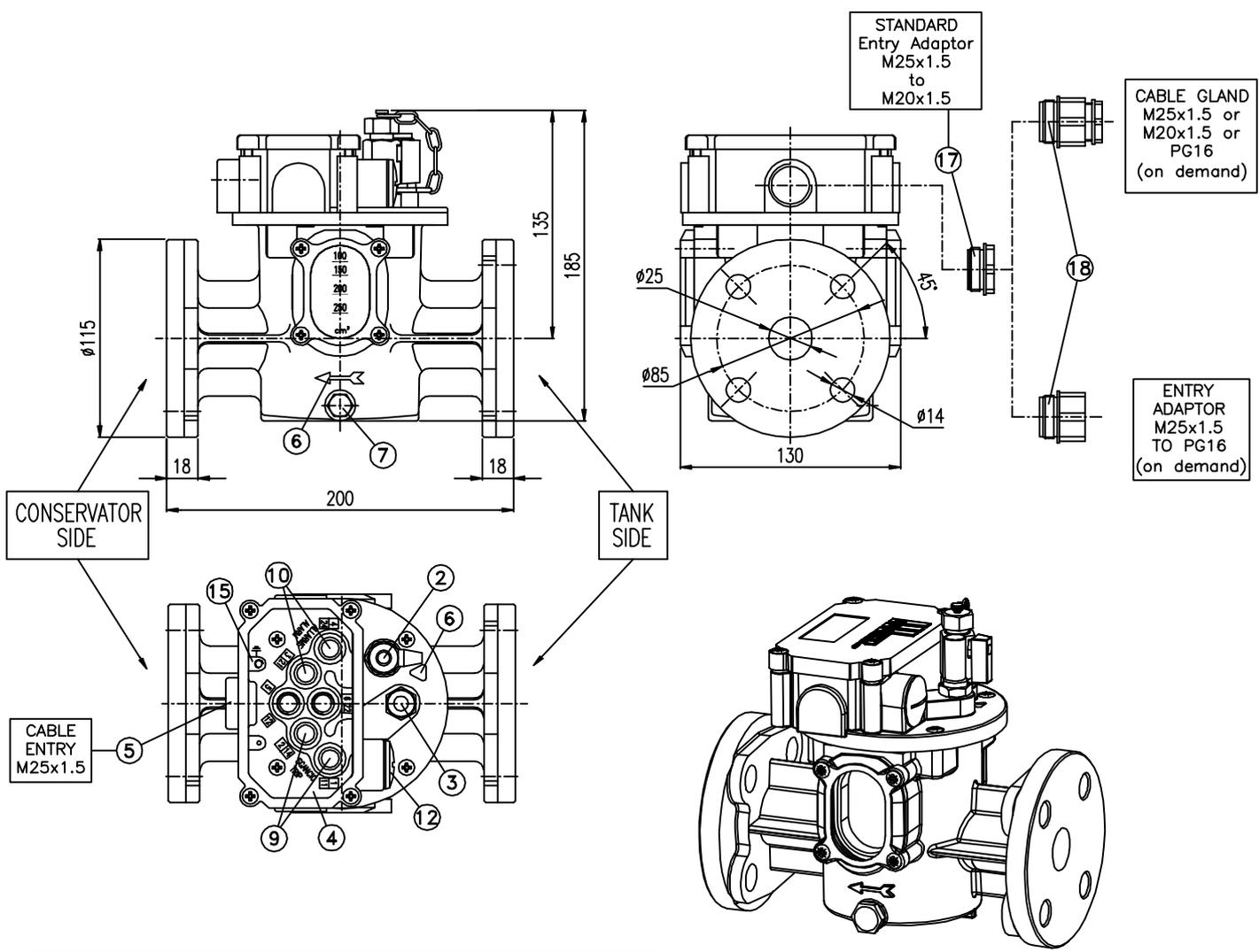
MOUNTING SKETCH WITH ISOLATION VALVE



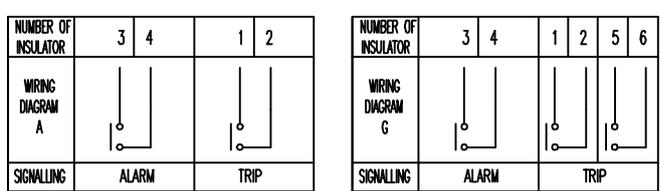
Titolo  
**EB Relay assembly sketch**

Data 12/03/13  
 Scala ==  
 Dis.  
 Visto

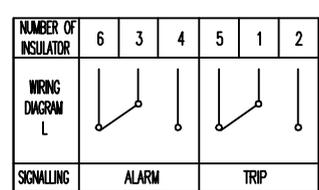
Dis. Nr  
**3855**  
 1



STANDARD WIRING DIAGRAM



| Normally open contacts |             |                      |
|------------------------|-------------|----------------------|
| Voltage                | Max current | Breaking capacity    |
| 24V d.c. to 240V d.c.  | 2A          | 250W L/R<40ms        |
| up to 230V a.c.        | 2A          | 400VA $\cos\phi>0.5$ |



| Change over contacts  |             |                      |
|-----------------------|-------------|----------------------|
| Voltage               | Max current | Breaking capacity    |
| 24V d.c. to 240V d.c. | 1A          | 130W L/R<40ms        |
| up to 230V a.c.       | 1A          | 250VA $\cos\phi>0.5$ |

|      |  |
|------|--|
| 18   | Option   |
| 17   | Entry adaptor M25x1.5 to M20x1.5 (supplied with the relay) |
| 16   | Cock for air injection test                                |
| 15   | Earth screw  |
| 13   | Window sunshield cover                                     |
| 12   | Plug M25x1.5   |
| 10   | Alarm terminals  |
| 9    | Trip terminals   |
| 8    | Pneumatic test device                                      |
| 7    | M8 Oil drain plug  |
| 6    | Oil flow direction (from tank to conservator)              |
| 5    | Cable gland entry M25 - M20                                |
| 4    | Terminal box   |
| 3    | Push button for checking electric circuits                 |
| 2    | 1/4" G Gas release cock                                    |
| 1    | Inspection window  |
| Pos. | Description  |

Average weight : ~3 Kg



Titolo  
New relay  
EB25 (M.Y. 2016)

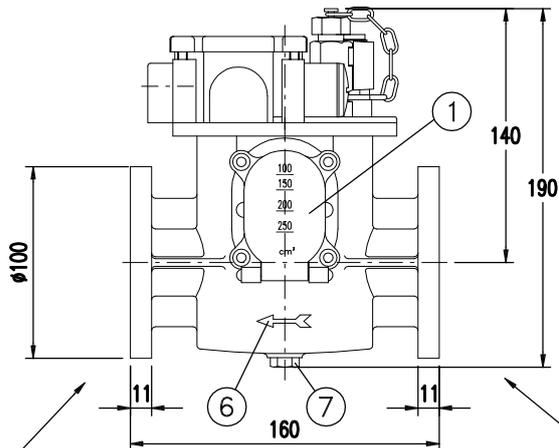
Data 26/07/11  
Scala 1:4  
Dis.  
Visto

Dis. Nr  
3517  
1 2 3

# TYPE ET025

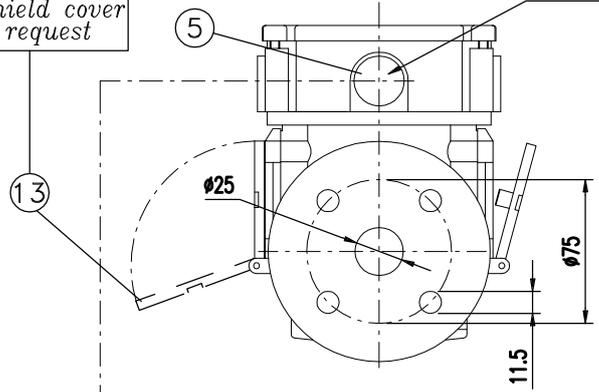
PAGE 12

FILE = 3856 .DWG  
REV. 00 DTD 12/05/13  
LMT [(0,0) (196,286)]  
A4 (210x297)



Protezione finestra a richiesta  
*Sunshield cover upon request*

CABLE ENTRY M25x1.5



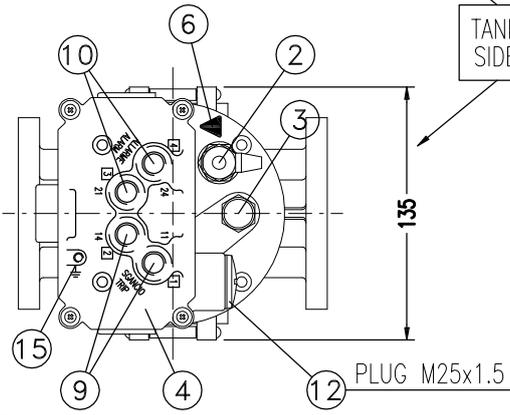
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ENTRY ADAPTOR M25x1.5 TO PG16 (on demand)

CABLE GLAND M25x1.5 or M20x1.5 or PG16 (on demand)

CONSERVATOR SIDE

TANK SIDE

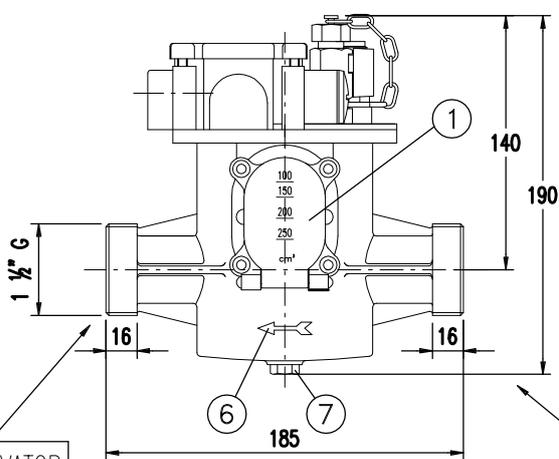


Dim in mm.  
WEIGHT Kg 1.50

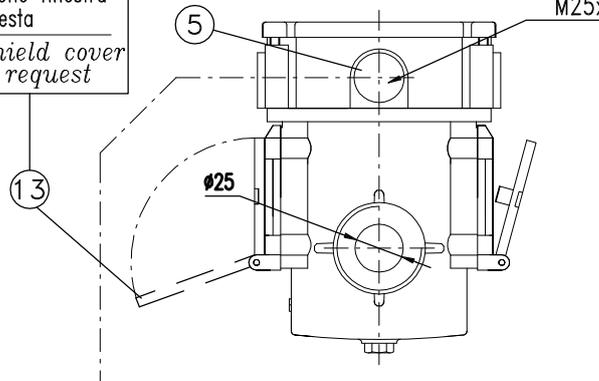
The figure shows the relay ET025 Scale 1:4

# TYPE EB024

CABLE ENTRY M25x1.5



Protezione finestra a richiesta  
*Sunshield cover upon request*



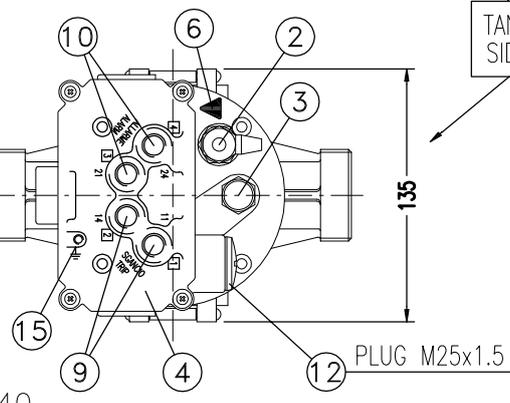
ENTRY ADAPTOR M25x1.5 TO M20x1.5 (supplied with the relay)

ENTRY ADAPTOR M25x1.5 TO PG16 (on demand)

CABLE GLAND M25x1.5 or M20x1.5 or PG16 (on demand)

CONSERVATOR SIDE

TANK SIDE



Dim in mm.  
WEIGHT Kg 1.40

The figure shows the relay EB024 Scale 1:4

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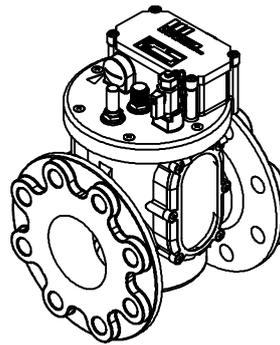
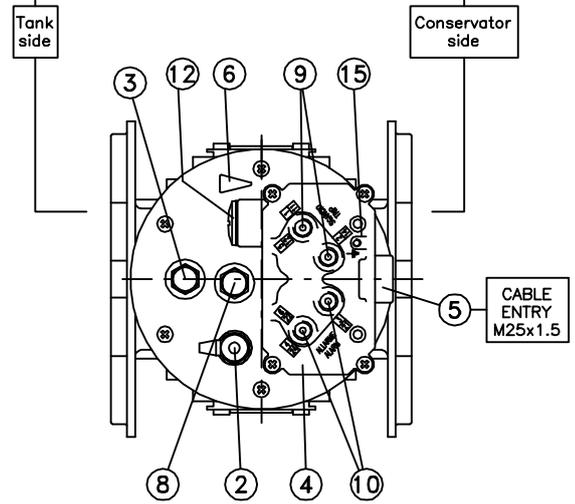
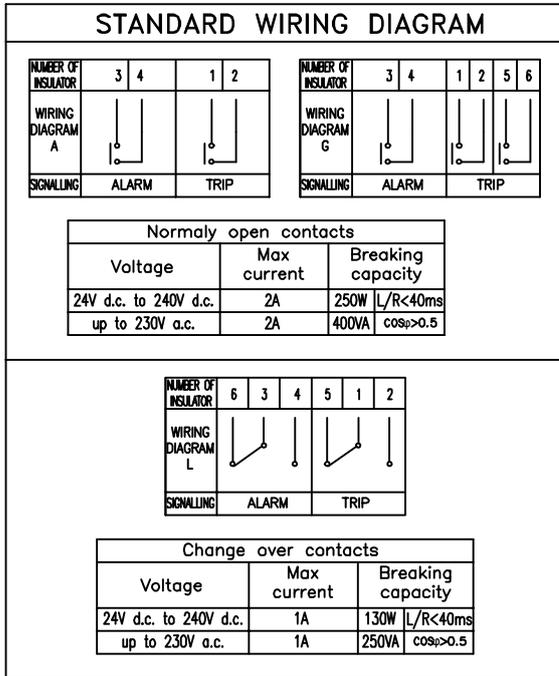
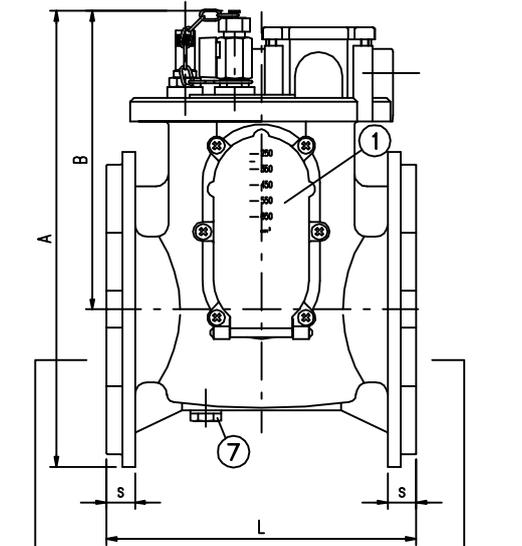
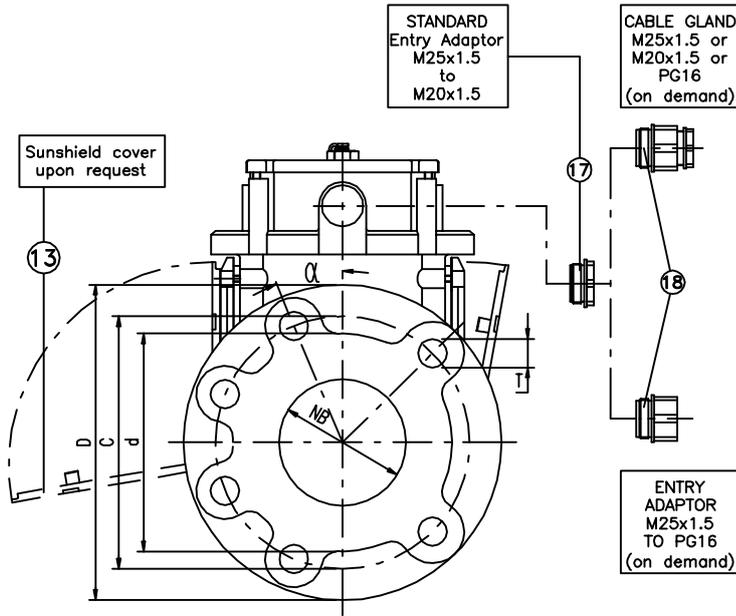


Titolo  
**Gas actuated relay ET 25**  
**EB 24 EN50216-2**

Data **12/03/13**  
Scala **====**  
Dis.  
Visto

Dis. Nr  
**3856**

FILE = 3857 .DWG  
 LMT [(0,0) (196,286)] A4 (210x297)  
 REV. 04 DTD 19/01/17  
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|      |  |
|------|--|
| 18   | Option   |
| 17   | Entry adaptor M25x1.5 to M20x1.5 (supplied with the relay) |
| 15   | Earth screw  |
| 13   | Window sunshield cover                                     |
| 12   | Plug M25x1.5   |
| 10   | Alarm terminals  |
| 9    | Trip terminals   |
| 8    | Pneumatic test device                                      |
| 7    | M8 Oil drain plug  |
| 6    | Oil flow direction (from tank to conservator)              |
| 5    | Cable gland entry M25 - M20                                |
| 4    | 4 Terminal box   |
| 3    | Push button for checking electric circuits                 |
| 2    | 1/4" G Gas release cock                                    |
| 1    | Inspection window  |
| Pos. | Description  |

Z = Nr of holes

| Type  | NB | A   | D   | C   | B   | s  | L   | α     | d   | Z | T  | Weight (kg) |
|-------|----|-----|-----|-----|-----|----|-----|-------|-----|---|----|-------------|
| EB050 | 50 | 267 | 165 | 125 | 185 | 18 | 195 | 45°   | 102 | 4 | 18 | ≈ 4.60      |
| EB079 | 80 | 303 | 200 | 160 | 203 | 18 | 195 | 45°   | 138 | 4 | 18 | ≈ 5.50      |
| EB080 | 80 | 303 | 200 | 160 | 203 | 18 | 195 | 22.5° | 138 | 8 | 18 | ≈ 5.50      |

The figure shows the relay EB080/EB079 Scale 1:4

**CEDASPE**

Titolo  
 Gas actuated relay  
 type EB EN50216-2

Data 12/03/13

Scala 1:4

Dis.

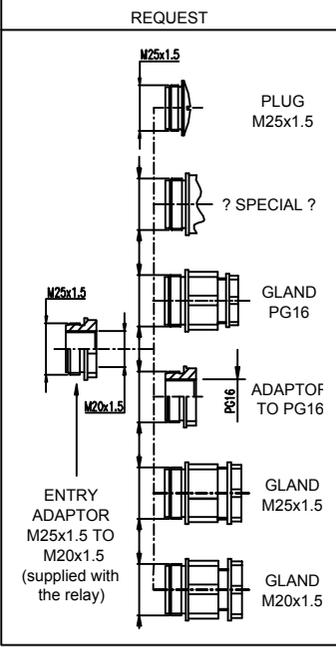
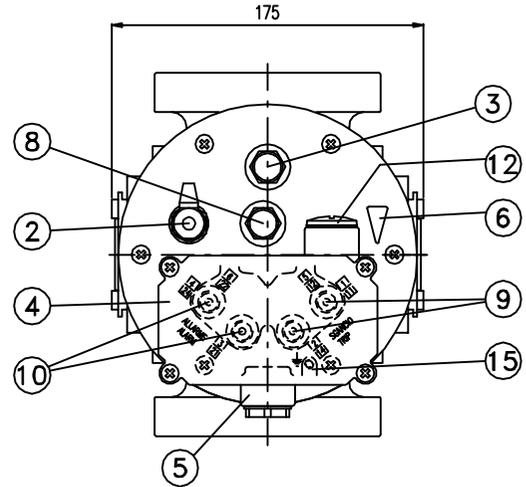
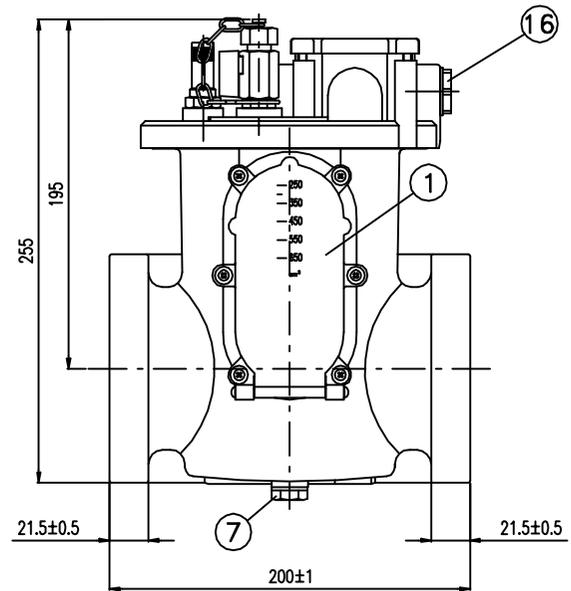
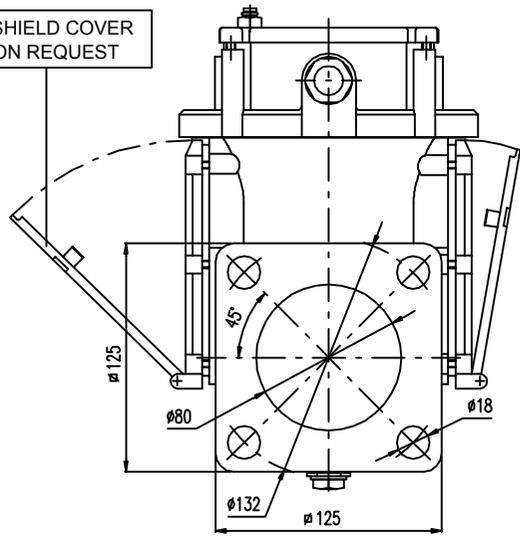
Visto

Dis. Nr

3857

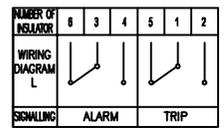
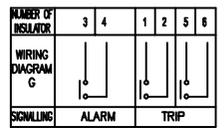
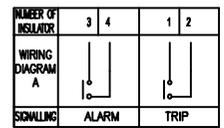
|   |   |   |   |
|---|---|---|---|
| 1 | 2 | 3 | 4 |
|---|---|---|---|

SUNSHIELD COVER  
UPON REQUEST



|      |  |
|------|--|
| 16   | Entry adaptor M25x1.5 to M20x1.5 (supplied with the relay) |
| 15   | Earth screw  |
| 13   | Window sunshield cover                                     |
| 12   | Plug M25x1.5   |
| 10   | Alarm terminals  |
| 9    | Trip terminals   |
| 8    | Pneumatic test device                                      |
| 7    | M8 Oil drain plug  |
| 6    | Oil flow direction (from tank to conservator)              |
| 5    | Cable gland entry M25 - M20                                |
| 4    | Terminal box   |
| 3    | Push button for checking electric circuits                 |
| 2    | 1/4"G Gas release cock                                     |
| 1    | Inspection window  |
| Pos. | Description  |

STANDARD WIRING DIAGRAM



| Normally open contacts |             |                   |
|------------------------|-------------|-------------------|
| Voltage                | Max current | Breaking capacity |
| 24V d.c. to 240V d.c.  | 2A          | 250W L/R<40ms     |
| up to 230V a.c.        | 2A          | 400VA cosφ>0.5    |

| Change over contacts  |             |                   |
|-----------------------|-------------|-------------------|
| Voltage               | Max current | Breaking capacity |
| 24V d.c. to 240V d.c. | 1A          | 130W L/R<40ms     |
| up to 230V a.c.       | 1A          | 250VA cosφ>0.5    |

|      |          |                          |                           |                                  |
|------|----------|--------------------------|---------------------------|----------------------------------|
| 3    | 02/11/17 | agg tabella contatti     | Finitura                  | TOLLERANZA GENERALE UNI-ISO 2768 |
| 2    | 25/02/16 | camb. denom & rimosso S4 | Trattamento               | Qualità = f □ m □ c □            |
| 1    | 24/01/13 | Modif. sp. flange        | Materiale Unific. Design. | Assieme =                        |
| Ind. | Data     | Modifica                 | Peso Grizzo Finito        | kg Codice grizzo =               |
|      |          |                          |                           | kg Codice =                      |



Titolo  
**Buchholz relay  
BQ80**

|       |          |         |      |
|-------|----------|---------|------|
| Data  | 12/11/12 | Dis. Nr | 3698 |
| Scala | =====    |         |      |
| Dis.  |          |         |      |
| Visto |          |         |      |

# STANDARD WIRING DIAGRAM

|   |  |  |  |  |                                       |
|---|--|--|--|--|---------------------------------------|
| <b>FLOAT AND SWITCHES DESIGN</b><br><b>WD A</b> |  |  |  |  | <b>NUMBER OF INSULATOR</b><br>1 2 3 4 |
|   |  |  |  |  |                                       |
| <b>WIRING DIAGRAM</b><br><b>A</b>               |  |  |  |  | <b>SIGNALLING</b><br>TRIP      ALARM  |
|   |  |  |  |  |                                       |

# SPECIAL WIRING DIAGRAM

|   |  |  |  |  |  |
|---|--|--|--|--|--|
| <b>FLOAT AND SWITCHES DESIGN</b><br><b>WD Z</b> |  |  |  |  | <b>NUMBER OF INSULATOR</b><br>5 2 3 4                                    |
|   |  |  |  |  |  |
| <b>WIRING DIAGRAM</b><br><b>Z</b>               |  |  |  |  | <b>SIGNALLING</b><br>TRIP (oil surge)      TRIP (loss of oil)      ALARM |
|   |  |  |  |  |  |

|  |  |  |  |  |   |
|--|--|--|--|--|---|
| <b>FLOAT AND SWITCHES DESIGN</b><br><b>WD S2</b> |  |  |  |  | <b>NUMBER OF INSULATOR</b><br>1 2 5 6 7 3 4 8 |
|  |  |  |  |  |   |
| <b>WIRING DIAGRAM</b><br><b>S2</b>               |  |  |  |  | <b>SIGNALLING</b><br>TRIP      ALARM          |
|  |  |  |  |  |   |

|  |  |  |  |  |   |
|--|--|--|--|--|---|
| <b>FLOAT AND SWITCHES DESIGN</b><br><b>WD S3</b> |  |  |  |  | <b>NUMBER OF INSULATOR</b><br>1 2 5 3 4 8 6 7 |
|  |  |  |  |  |   |
| <b>WIRING DIAGRAM</b><br><b>S3</b>               |  |  |  |  | <b>SIGNALLING</b><br>TRIP      ALARM          |
|  |  |  |  |  |   |

|  |  |  |  |  |   |
|--|--|--|--|--|---|
| <b>FLOAT AND SWITCHES DESIGN</b><br><b>WD S4</b> |  |  |  |  | <b>NUMBER OF INSULATOR</b><br>1 2 5 6 3 4 7 8 |
|  |  |  |  |  |   |
| <b>WIRING DIAGRAM</b><br><b>S4</b>               |  |  |  |  | <b>SIGNALLING</b><br>TRIP      ALARM          |
|  |  |  |  |  |   |

|  |  |  |  |  |   |
|--|--|--|--|--|---|
| <b>FLOAT AND SWITCHES DESIGN</b><br><b>WD S5</b> |  |  |  |  | <b>NUMBER OF INSULATOR</b><br>1 2 5 8 6 7 3 4 |
|  |  |  |  |  |   |
| <b>WIRING DIAGRAM</b><br><b>S5</b>               |  |  |  |  | <b>SIGNALLING</b><br>TRIP      ALARM          |
|  |  |  |  |  |   |

|  |  |  |  |  |   |
|--|--|--|--|--|---|
| <b>FLOAT AND SWITCHES DESIGN</b><br><b>WD S8</b> |  |  |  |  | <b>NUMBER OF INSULATOR</b><br>1 2 7 8 3 4 6 |
|  |  |  |  |  |   |
| <b>WIRING DIAGRAM</b><br><b>S8</b>               |  |  |  |  | <b>SIGNALLING</b><br>TRIP      ALARM        |
|  |  |  |  |  |   |

A4 (210x297)

LMT [(0,0) (196,286)]

.DWG

FILE = 3851

REV. 01 DTD 19/06/14

La CEDASPE S.p.A. si riserva a termini di legge la proprietà del presente disegno con divieto di riprodurlo o comunicarlo a terzi senza sua autorizzazione.

**CEDASPE**

Titolo

Wiring diagram

Data 12/03/13

Scala ==

Dis.

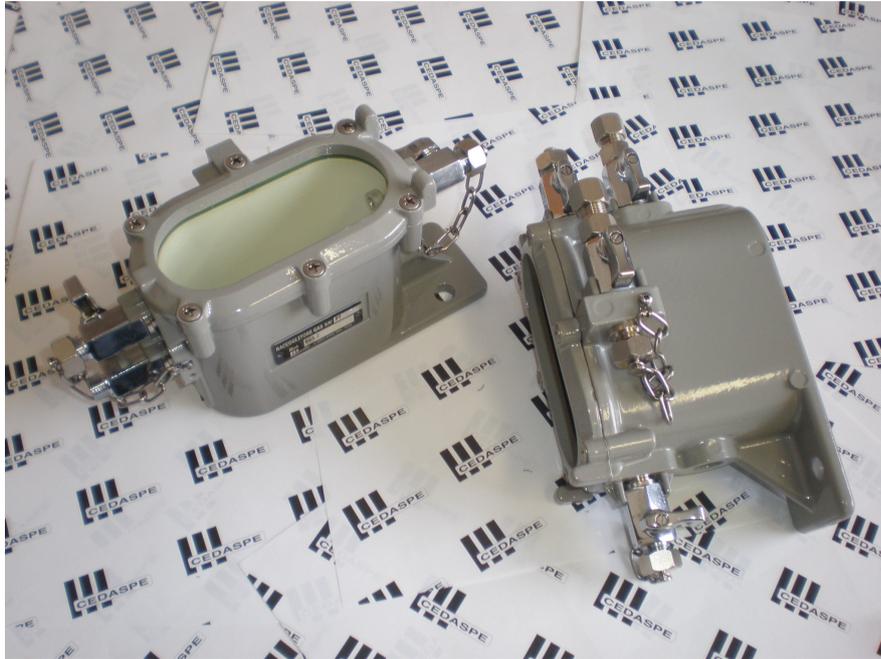
Visto

Dis. Nr

3851

1

## Gas sampling device RG3.2



### General features

The body is made of aluminium alloy casting; in order to check gas and oil two large inspection windows made in trogamid (on request made in tempered glass and with sunshield), are fitted on either side of the casting.

Two petcock complete with hermeto joints are present for connection to relay and one pneumatic valve for test and another petcock draining oil complete the apparatus

### Installation

The Buchholz gas sampling device "RG3" must be fitted on the transformer tank, from the ground level, within handy height.

A copper tube size OD 8 mm / ID 6 mm (supplied upon request) shall be used to connect the "RG3" device from the cock "12" to the top of the Buchholz relay (cock R).

In case your RG3.2 has been provided of oil draining kit (not included in standard supply and to be ordered as an accessory) use a copper tube, having same dimensions as described earlier on, to connect cock "15" on gas collecting device to the drain cock (pos.T) located at the bottom of relay body. Special ermeto joints "14" are provided with each device (q.ty: 2/EA for RG3.2 model or 4/EA with oil draining kit).

To fill up the RG3.2 device with oil open first the cocks "R" and "12". Now open cock "2" until oil has entirely filled up the device and then close it when filling up is completed; you can check oil level rising up inside the device through the inspection sight window located on the front side of the same.

After the gas sampling device RG3 has been oil filled the cock "R" top of the relay must be left in open position.  
During the normal operation condition the gas sampling device, the Buchholz relay and the tubes which connect the two devices shall be oil filled.

## Operating instruction

### Gas sampling from the Buchholz relay

The RG3.2 device allows to perform three different functions:

- Sampling the gas off Buchholz relay and release the gas off system
- Testing ALARM circuit of Buchholz relay
- Draining oil off Buchholz relay (with draining kit to be ordered separately)

### Gas sampling off Buchholz relay

1. Open cock "11" located underneath the RG3 to drain oil and await until gas collected in the relay fills the device (you can observe this through the window).
2. Close the cocks "11" and "12" when the amount of gas needed for sampling is inside the RG3.

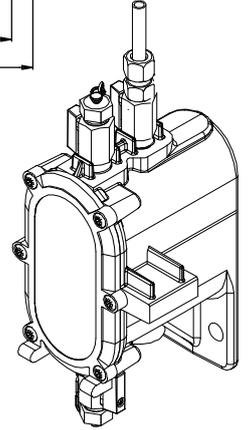
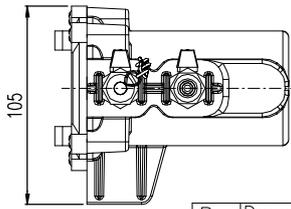
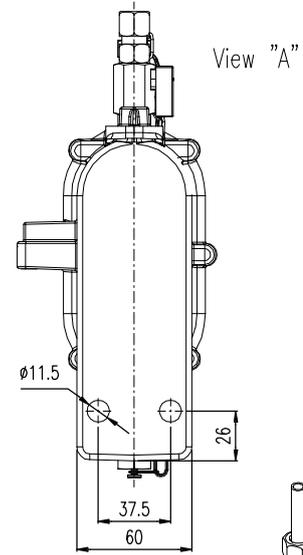
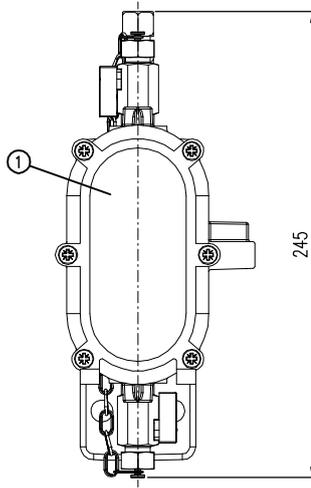
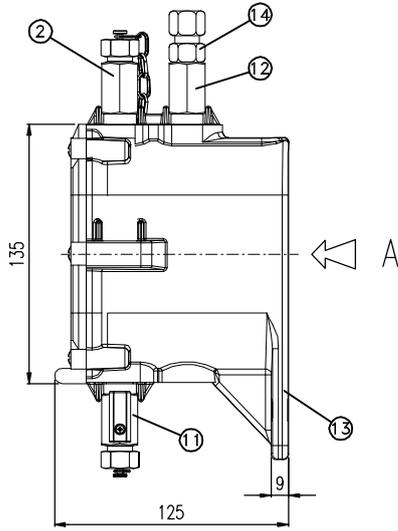
Now the gas formerly accumulated in the Buchholz relay, due to some electrical failures inside the transformer, may be drawn off for laboratory analysis or released by opening the cock "2".

### Checking of alarm circuits

#### Test of ALARM circuit

1. Cock "R" top of relay cover shall be open.
2. Unscrew the protective cap of cock "2"
3. Connect a compressed air bottle, pump for bicycle tyres or our pneumatic test device (supplied upon request) to the cock "2".
4. Open cock "2" and inject air inside RG3 slowly until you get ALARM contact operation.
5. Close cock "2".
6. **RESET TO OPERATION:** the testing medium inflated in the system must be fully released (i.e. until the RG3 is completely filled up again with oil) to reset the Buchholz relay to normal operating conditions: open cock "2" keeping a cloth top of cock until oil leaks out and then close the cock.

### Throttle valves for buchholz relays

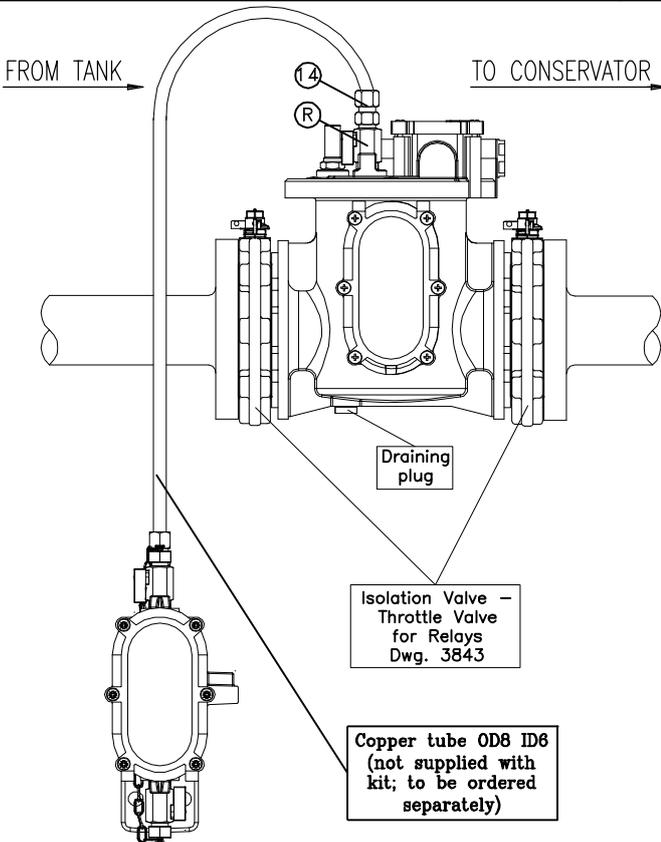


| Pos | Description       |
|-----|-------------------|
| 1   | Inspection window |
| 2   | Gas release cock  |
| 11  | Oil drain cock    |
| 12  | Stop cock         |
| 13  | Fixing plate      |
| 14  | Hermeto joint     |

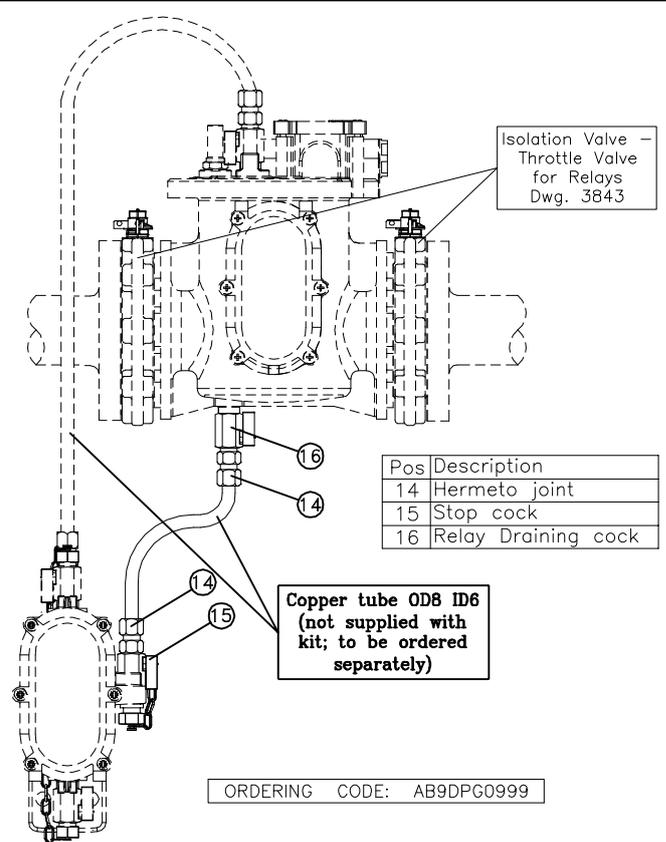
| ORDERING CODES |                 |            |
|----------------|-----------------|------------|
| MODEL          | WINDOW MATERIAL | CODE       |
| RG3.2          | TEMPERED GLASS  | AB9DPG0172 |
| RG3.2          | TROGAMID        | AB9DPG0102 |

Average weight : ~2.5 Kg

**RG3 Mounting sketch**



**OPTIONAL: Relay oil draining Kit**



| Pos | Description         |
|-----|---------------------|
| 14  | Hermeto joint       |
| 15  | Stop cock           |
| 16  | Relay Draining cock |

ORDERING CODE: AB9DPG0999

### Gas analyser for buchholz relays



If a gas analyser kit is available it is possible to have an idea of the cause that generated the gas by checking the precipitate inside the test tube of the gas analyser.

If gas is due only to oil decomposition, in the test tube 1 a white precipitate is formed which, exposed to the light, slowly turns brown.

Should, however, in the test tube "2" a black precipitate be formed, this means that the gases contain decomposition products of solid insulation, such as cotton, paper, wood and the like.

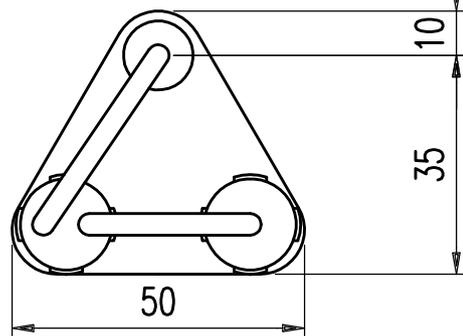
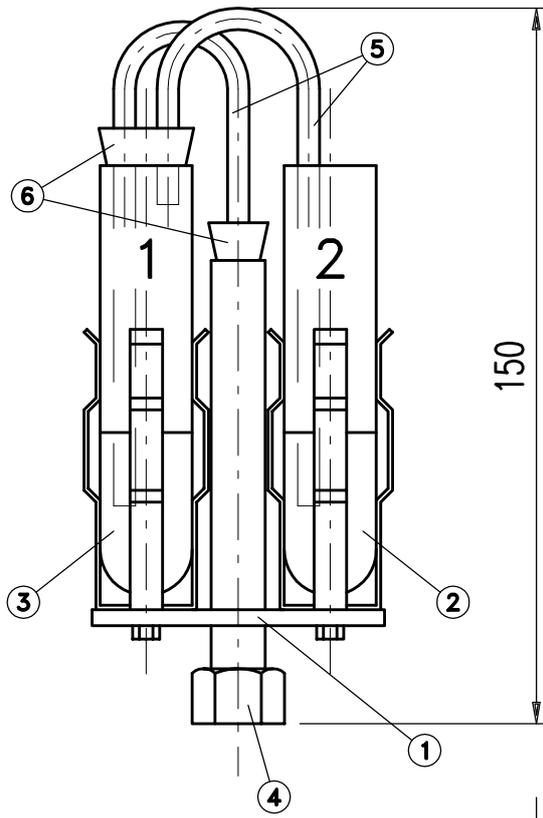
In such a case, a coil deficiency has taken place.

In the case the Buchholz relay operation is caused by air (first installation into work, total oil refilling, defect in the cooling system) there isn't any formation of precipitate inside the tubes.

After the sample of the gases has been drawn, the cock should be closed again, and the analyser housed in its container.

## 7. Part denomination of relay

| Pos. | Part denomination                             | Material            |
|------|---|---------------------|
| 1    | Inspection window                             | Trogamid            |
| 2    | Gas release cock                              | Brass               |
| 3    | Push button for checking electric circuits    | Brass               |
| 4    | Terminal box                                  | Aluminium alloy     |
| 5    | Cable gland entry M25 – M20                   | Brass nickel plated |
| 6    | Oil flow direction (from tank to conservator) |                     |
| 7    | Oil drain plug                                | Brass               |
| 8    | Pneumatic test device                         | Brass               |
| 9    | Trip terminals                                | Brass               |
| 10   | Alarm terminals                               | Brass               |
| 12   | Plug M25x1.5                                  | Brass nickel plated |
| 13   | Window sunshield cover                        | Aluminium           |
| 15   | Earth screw                                   | Brass               |
| 16   | Cock for air injection test                   | Brass               |



| Pos. | Description            |
|------|------------------------|
| 6    | Rubber plugs           |
| 5    | Glass tubes            |
| 4    | Revolving nut 1/4" BSP |
| 3    | Test probe 1           |
| 2    | Test probe 2           |
| 1    | Support                |

Schema di montaggio  
Mounting sketch

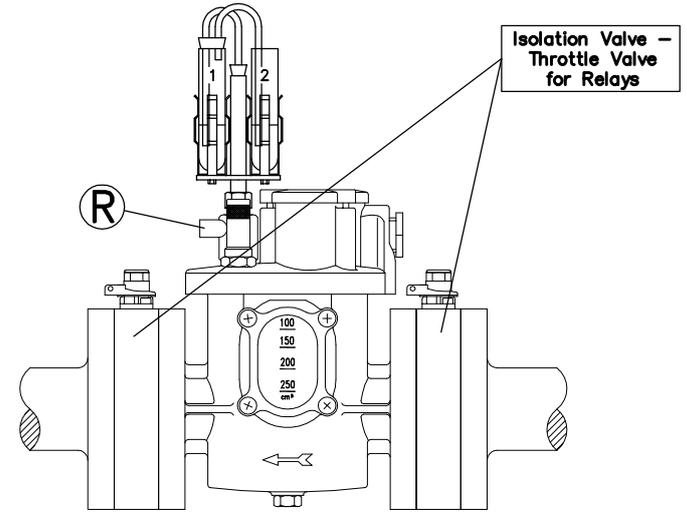


Fig. A: directly on relay

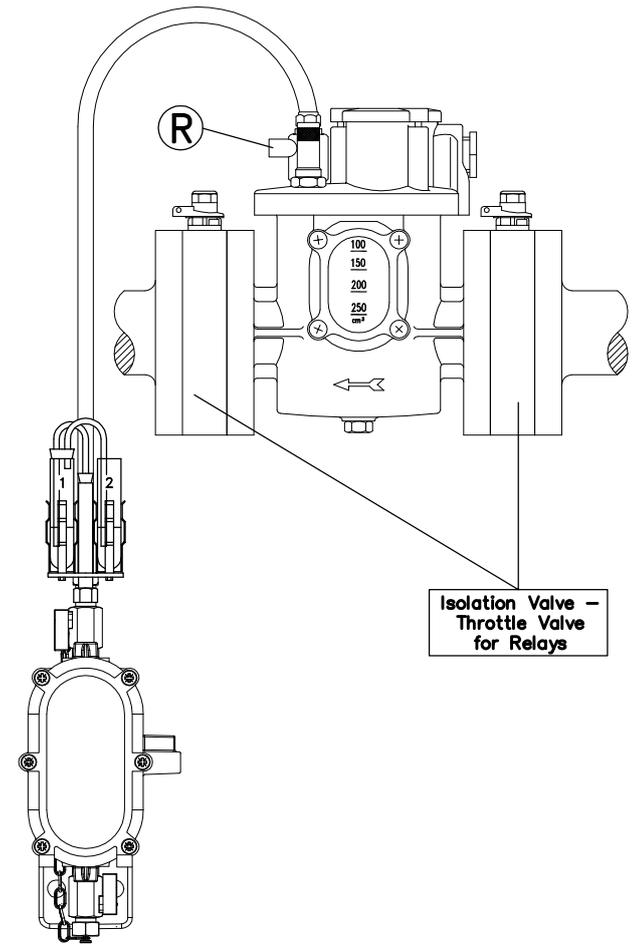


Fig. B: With RG3 apparatus



Titolo  
**Gas analyser  
for buchholz relays**

Data **12/03/13**  
Scala =====  
Dis.  
Visto

Dis. Nr  
**3858**