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Ed. 1.1 IT - 2012

spirax sarco

# Torque Tube TB300
# Digital Transmitters
# Installation and Maintenance Instructions

CE Ex II 2 G D

The PED Directive 97/23/EC is repealed and replaced by the new **PED Directive 2014/68/EU** with effect from 19 July 2016.

# ATTENZIONE

## Lavorare in sicurezza con apparecchiature in ghisa e vapore
## *Working safely with cast iron products on steam*

Informazioni di sicurezza supplementari - *Additional Informations for safety*

### Lavorare in sicurezza con prodotti in ghisa per linee vapore

I prodotti di ghisa sono comunemente presenti in molti sistemi a vapore.

Se installati correttamente, in accordo alle migliori pratiche ingegneristiche, sono dispositivi totalmente sicuri.

Tuttavia la ghisa, a causa delle sue proprietà meccaniche, è meno malleabile di altri materiali come la ghisa sferoidale o l'acciaio al carbonio.

Di seguito sono indicate le migliori pratiche ingegneristiche necessarie per evitare i colpi d'ariete e garantire condizioni di lavoro sicure sui sistemi a vapore.

### *Working safely with cast iron products on steam*

*Cast iron products are commonly found on steam and condensate systems.*

*If installed correctly using good steam engineering practices, it is perfectly safe.*

*However, because of its mechanical properties, it is less forgiving compared to other materials such as SG iron or carbon steel.*

*The following are the good engineering practices required to prevent waterhammer and ensure safe working conditions on a steam system.*

### Movimentazione in sicurezza

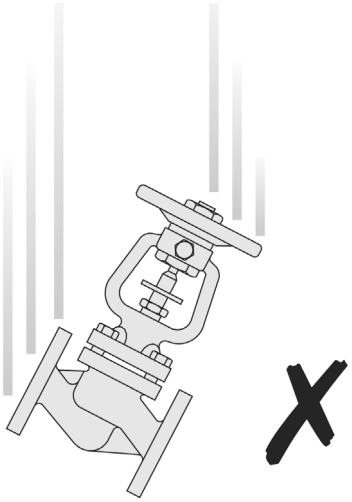
La ghisa è un materiale fragile: in caso di caduta accidentale il prodotto in ghisa non è più utilizzabile. Per informazioni più dettagliate consultare il manuale d'istruzioni del prodotto.

Rimuovere la targhetta prima di effettuare la messa in servizio.

### *Safe Handling*

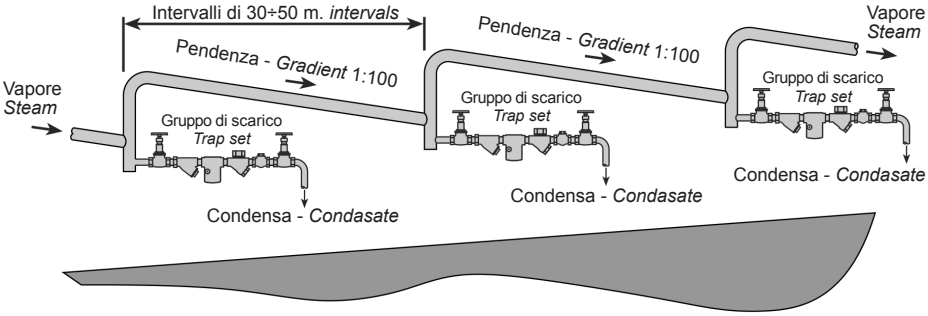
*Cast Iron is a brittle material. If the product is dropped during installation and there is any risk of damage the product should not be used unless it is fully inspected and pressure tested by the manufacturer.*

*Please remove label before commissioning*

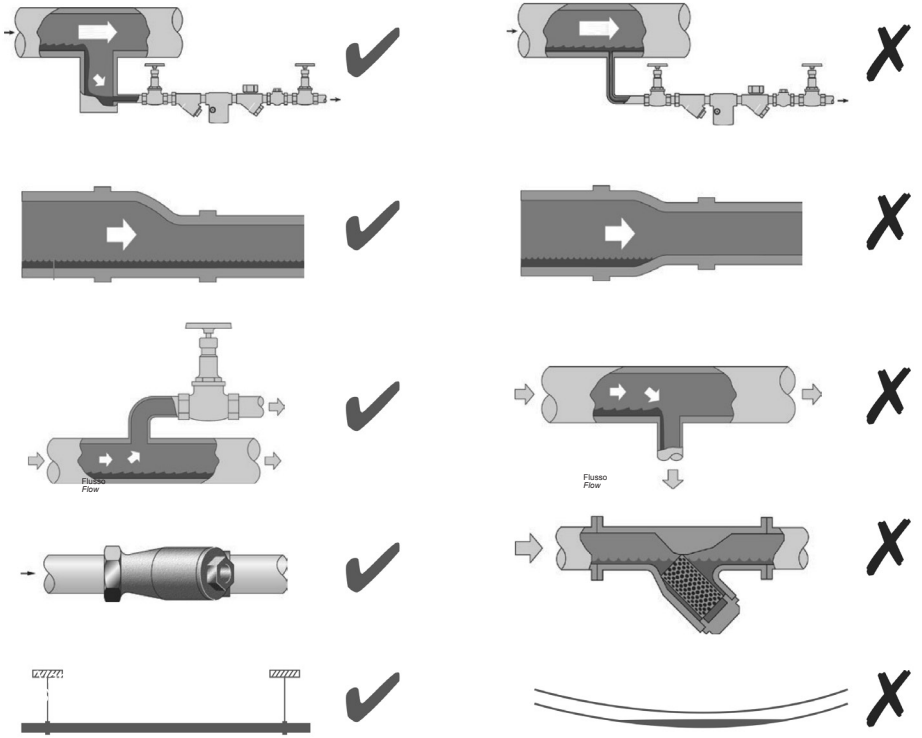


## Prevenzione dai colpi d'ariete - *Prevention of water hammer*

Scarico condensa nelle linee vapore - *Steam trapping on steam mains:*



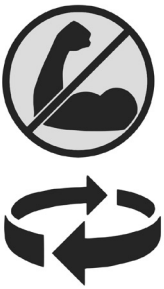

## Esempi di esecuzioni corrette (✔) ed errate ( ✗) sulle linee vapore: *Steam Mains - Do's and Dont's:*



## Prevenzione delle sollecitazioni di trazione
## *Prevention of tensile stressing*

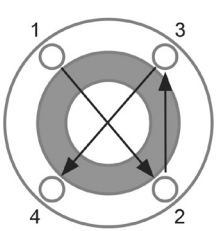
Evitare il disallineamento delle tubazioni - *Pipe misalignment:*

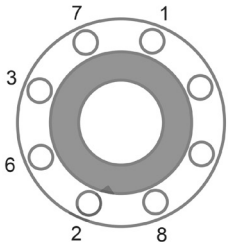
**Installazione dei prodotti o loro rimontaggio post-manutenzione:**
***Installing products or re-assembling after maintenance:***



Evitare l'eccessivo serraggio. Utilizzare le coppie di serraggio raccomandate.

*Do not over tighten. Use correct torque figures.*



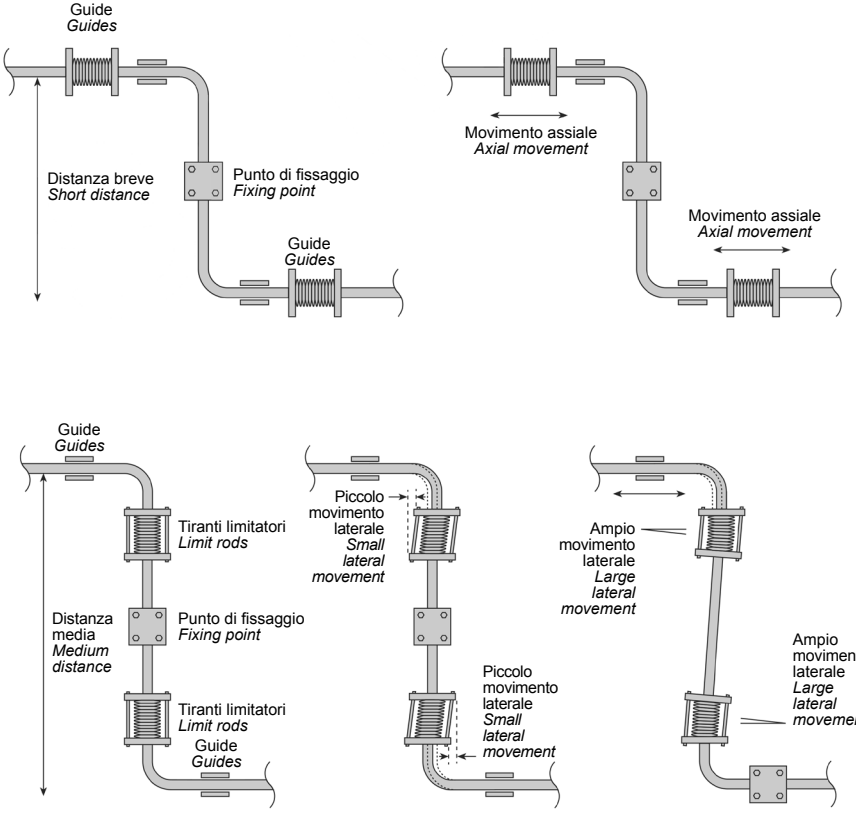

Per garantire l'uniformità del carico e dell'allineamento, i bulloni delle flange devono essere serrati in modo graduale e in sequenza, come indicato in figura.

*Flange bolts should be gradually tightened across diameters to ensure even load and alignment.*

## Dilatazioni termiche - *Thermal expansion:*

Gli esempi mostrano l'uso corretto dei compensatori di dilatzione. Si consiglia di richiedere una consulenza specialistica ai tecnici dell'azienda che produce i compensatori di dilatazione.

*Examples showing the use of expansion bellows. It is highly recommended that expert advise is sought from the bellows manufacturer.*



## Index

# 1. Safety Information

Safe operation of these products can only be guaranteed if they are properly installed, commissioned, used and maintained by qualified personnel (see Section 1.11 on this document) in compliance with the operating instructions.
General installation and safety instructions for pipeline and plant construction, as well as the proper use of tools and safety equipment must also be complied with.

## 1.1 Intended use

Referring to the Installation and Maintenance Instructions, name-plate and Technical Information Sheet, check that the product is suitable for the intended use/application. These products comply with the requirements of the European Pressure Equipment Directive 97/23/EC and carry the  mark when so required. It should be noted that product rated as 'SEP' are required by the Directive not to carry the CE mark.

i) These products have been specifically designed for use on steam, air or condensate /water, which is in Group 2 of the above mentioned Pressure Equipment Directive. The products' use on other fluids may be possible but, if this is contemplated, Spirax Sarco should be contacted to confirm the suitability of the product for the application being considered.

ii) Check material suitability, pressure and temperature and their maximum and minimum values. If the maximum operating limits of the product are lower than those of the system in which it is being fitted, or if malfunction of the product could result in a dangerous overpressure or overtemperature occurrence, ensure a safety device is included in the system to prevent such over-limit situations.

iii) Determine the correct installation situation and direction of fluid flow.

iv) Spirax Sarco products are not intended to withstand external stresses that may be induced by any system to which they are fitted. It is the responsibility of the installer to consider these stresses and take adequate precautions to minimise them.

v) Remove protection covers from all connections before installation.

## 1.2 Access

Ensure safe access and if necessary a safe working platform (suitably guarded) before attempting to work on the product. Arrange suitable lifting gear if required.

## 1.3 Lighting

Ensure adequate lighting, particularly where detailed or intricate work is required.

## 1.4 Hazardous liquids or gases in the pipeline

Consider what is in the pipeline or what may have been in the pipeline at some previous time. Consider: flammable materials, substances hazardous to health, extremes of temperature.

## 1.5 Hazardous environment around the product

Consider: explosion risk areas, lack of oxygen (e.g. tanks, pits), dangerous gases, extremes of temperature, hot surfaces, fire hazard (e.g. during welding), excessive noise, moving machinery.

## 1.6 The system

Consider the effect on the complete system of the work proposed. Will any proposed action (e.g. closing isolation valves, electrical isolation) put any other part of the system or any personnel at risk? Dangers might include isolation of vents or protective devices or the rendering ineffective of controls or alarms. Ensure isolation valves are turned on and off in a gradual way to avoid system shocks.

## 1.7 Pressure systems

Ensure that any pressure is isolated and safely vented to atmospheric pressure. Consider double isolation (double block and bleed) and the locking or labelling of closed valves. Do not assume that the system has depressurised even when the pressure gauge indicates zero.

## 1.8 Temperature

Allow time for temperature to normalise after isolation to avoid danger of burns.
If parts made from Viton have been subjected to a temperature approaching 315°C (599°F) or higher, it may have decomposed generating toxic fumes. Avoid any inhalation of fumes or skin contact.
If parts made from PTFE have been subjected to a temperature approaching 260°C (500°F) or higher, they will give off toxic fumes which, if inhaled, are likely to cause temporary discomfort. It is essential for a no smoking rule to be enforced in all areas where PTFE is stored, handled or processed as persons inhaling the fumes from burning tobacco contaminated with PTFE particles can develop 'polymer fume fever'.

## 1.9 Tools and consumables

Before starting work ensure that you have suitable tools and/or consumables available. Use only genuine Spirax Sarco replacement parts.

## 1.10 Protective clothing

Consider whether you and/or others in the vicinity require any protective clothing to protect against the hazards of, for example, chemicals, high /low temperature, radiation, noise, falling objects, and dangers to eyes and face.

## 1.11 Permits to work

All work must be carried out or be supervised by a suitably competent person. Installation and operating personnel should be trained in the correct use of the product according to the Installation and Maintenance Instructions.
Where a formal 'permit to work' system is in force it must be complied with. Where there is no such system, it is recommended that a responsible person should know what work is going on and, where necessary, arrange to have an assistant whose primary responsibility is safety.
Post 'warning notices' if necessary.

## 1.12 Handling

Manual handling of large and/or heavy products may present a risk of injury. Lifting, pushing, pulling, carrying or supporting a load by bodily force can cause injury particularly to the back. You are advised to assess the risks taking into account the task, the individual, the load and the working environment and use the appropriate handling method depending on the circumstances of the work being done.

## 1.13 Residual hazards

In normal use the external surface of the product may be very hot. If used at the maximum permitted operating conditions the surface temperature of some products may reach very high temperatures 300°C (577°F). Many products are not self-draining. Take due care when dismantling or removing the product from an installation (refer to "Maintenance" instructions).

## 1.14 Freezing

Provision must be made to protect products which are not self-draining against frost damage in environments where they may be exposed to temperatures below freezing point.

## 1.15 Safety information specific for the product

See the specific details relating to the product in the following "Maintenance" section.

## 1.16 Disposal

Unless otherwise stated in the Installation and Maintenance Instructions, this product is recyclable and no ecological hazard is anticipated with its disposal providing due care is taken.

### Viton:

- Can be landfilled, when in compliance with National and Local regulations.
- Can be incinerated, but a scrubber must be used to remove Hydrogen Flouride, which is evolved from the product and with compliance to National and Local regulations.
- Is insoluble in aquatic media.

### PTFE:

- Can only be disposed of by approved methods, not incineration.
- Keep PTFE waste in a separate container, do not mix it with other rubbish, and consign it to a landfill site.

## 1.17 Returning products

Customers and stockists are reminded that under EC Health, Safety and Environment Law, when returning products to Spirax Sarco they must provide information on any hazards and the precautions to be taken due to contamination residues or mechanical damage which may present a health, safety or environmental risk. This information must be provided in writing including Health and Safety data sheets relating to any substances identified as hazardous or potentially hazardous.

## 2.1 Description

Series TB300 torque tube liquid level instruments utilize the buoyancy exerted on a displacer when immersed in a liquid. The buoyancy on the displacer is proportional to the liquid level and operates on an elastic torque tube which, transforming the applied force in a rotary movement, operates the magnet and consequently the electronic transmitter.
This system is exceptionally accurate and friction free as the torque tube acts also as sealing device towards the pressure of the process fluid whose level is being measured.
The instruments are provided with a system for the specific gravity calibration of the measured liquid. They can be also designed for the interface measurement of different liquids or for density measurements.
They are available in different styles for external or internal mounting on tank and offer different possibilities both for the process connection position and for the construction materials.
The TB301 is 4-20 mA loop powered transmitter the configuration may be done locally or remotely by means of Hart protocol. The level is continuosly displayed in percentage on the transmitter LCD.
The instrument is intended to be used as an accessory equipment in pressure with a service function for level control. Therefore, it is not intended as a safety device. The transmitter is suitable with both group 1 and 2 fluids.

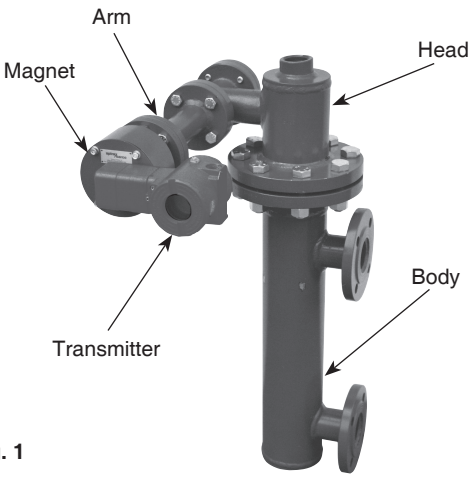



**Fig. 1**

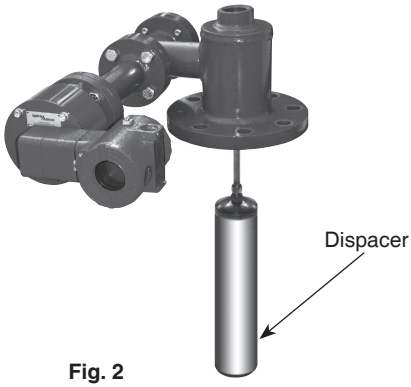



**Fig. 2**

**The Local Indicator**

The local indicator is required for signaling and operation in local adjustment.
Normal displaying is interrupted when the magnetic tool is placed in office **Z** (Local Adjustment), entering the programming mode local adjustment. Upon receiving power, the **TB300** initializes the position indication on the display, by showing model **TB300** and its software version (X.XX). Should the indication be higher than 19999 it will be displayed as a two digit and an exponent.

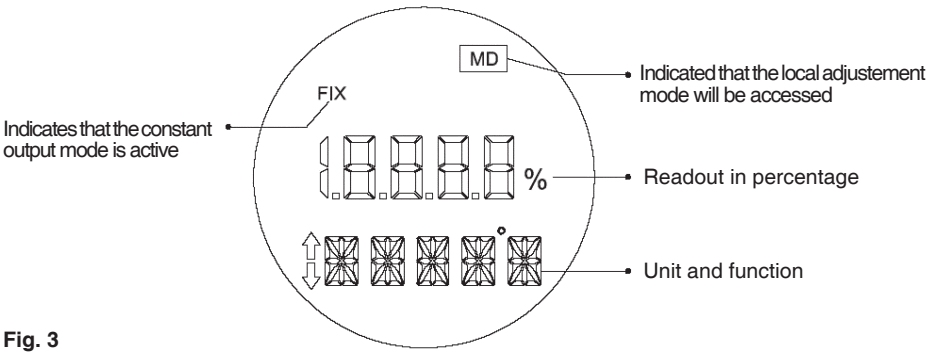



**Fig. 3**

## 2.2 Tecnical data

### Torque tube

| | |
|---|---|
| **Standard ranges of measurement in mm (or inches)** | 0÷ 356 mm (14") 0÷ 508 mm (20") 0÷ 610 mm (24") 0÷ 813 mm (32")<br>0÷1219 mm (48") 0÷1524 mm (60") 0÷1829 mm (72") 0÷2134 mm (84")<br>0÷2439 mm (96") 0÷2743 mm (108") 0÷3048 mm (120") |
| **Specific gravity adjustement ranges** | 0.5 to 1.1 0.8 to 1.3 1.2 to 1.7 |
| **Accuracy** | 1% of range span |
| **Sensivity** | 0.2% of range span |
| **Linearity** | 0.5% of range span |
| **Repeatibility** | 0.5% of range span |
| **Materials of cage and/or head** | • carbon steel<br>• AISI 316 stainless steel<br>• other special materials |
| **Materials of displacer and torque tube** | • AISI 316 stainless steel<br>• Inconel or other special materials |
| **Connecting flanges to precess** | According to UNI 2223-2229 PN 40 or ANSI 300 RF standards; tongues and groves upon request; special executions ANSI 600, 900 and 1500 lbs. |
| **Maximum pressure for process fluid** | Standard executions according to UNI PN40 or ANSI 300 lbs rating.<br>Higher rating for special executions on request. |
| **Temperature limits for process fluid** | Minimum -190°C for stainless steel and -20°C for carbon steel.<br>Maximum 400°C for special executions and for stainless steel and 300°C for carbon steel. |

### Transmitter

| | |
|---|---|
| **Indicator** | Optional 4 ½ - digit numerical and 5 - character alphanumerical LCD indicator. |
| **Hazardous Area Certifications** | Explosion proof, weather proof and instrincally safe<br>(CEPEL, FM, CENELEC standards pending). |
| **Temperature Limits** | Ambient -40 to 85°C (-40 to 185°F)<br>Process -40 to 100°C (-40 to 212°F)<br>Storage -40 to 100°C (-40 to 212°F)<br>Digital Display -10 to 60°C (-14 to 140°F)<br>-40 to 85°C (-40 to 185°F) without damage |
| **Humidity Limits** | 0 to 100 % RH |
| **Attual Position Sensing** | Magnetic (non-contact) via Hall Effect |
| **Configuration** | Can be done through digital comunication using the Hart protocol or, partially, through local adjustment. |
| **Electrical connection** | ½" - ¼" NPT, Pg 13.5 or M20= x 1.5 metric |
| **Material of Construction** | Injected low copper aluminium with polyester painting or 316 Stainless Steel housing, with Bruna N 'O' rings on cover (NEMA 4X, IP67). |

## 2.3 Mounting

The level transmitter **TB300** are described in detail in the data sheet 7E.300. They are available for external mounting (displacer cage type) or for top or side mounting (displacer internal to process, without cage)
The mounting on the tank is achieved by means of flanged connections and the various styles are shown in figure 4. Standard connections are DN 40 (1½") for the external mounting execution and DN 100 (4") for the type for internal installation; flanges are size a according to UNI 2223-2229 PN 40 or ANSI 300 RF. Special executions may have connections DN 50 (2") and/or flanges sized for higher ratings; groovers and tongues are available on request. In the types for internal installation the displacer connecting rod to the torque tube is factory cut to proper length; on this installation the displacer has to work in liquid not subject to turbolence: otherwise it is advisable to provide a stilling well to minimize liquid movements with particular reference to the cross forces. Naturally the stilling well must allow the free displacer movement along his axis without frictions and permit the regular flow of the measured liquid: its internal diameter must be 10-15 mm higher thant the displacer diameter, the bottom must be open and a series of side holes are required for a free liquid circulation. During installation avoid shocks or damages to displacer and its rod. Dimensions of various standard executions, in different ranges are shown on the page X and X.
To assure the working continuity of the process also during the instrument maintenance operations, the installation of two stop valves is advisable to isolate the displacer cage from the process fluid.

## 2.4 Dimensions

### Mounting and Dimensions (mm) for Fixed position version (F)

| Ranges | | A | B | C | D | F | M | Ø Displacer |
|---|---|---|---|---|---|---|---|---|
| Inches | mm | | | | | | | |
| **14"** | 356 | 279 | 733 | 620 | 356 | 469 | 178 | 76 |
| **20"** | 508 | 355 | 885 | 772 | 508 | 621 | 254 | 70 |
| **24"** | 610 | 406 | 987 | 874 | 610 | 723 | 305 | 60 |
| **32"** | 813 | 507.5 | 1190 | 1077 | 813 | 926 | 406.5 | 50 |
| **48"** | 1219 | 710.5 | 1596 | 1483 | 1219 | 1332 | 609.5 | 40 |
| **60"** | 1524 | 863 | 1901 | 1788 | 1524 | 1637 | 762 | 38 |
| **72"** | 1829 | 1015.5 | 2206 | 2093 | 1829 * | 1942 | 914.5 | 34 |
| **84"** | 2134 | 1168 | 2511 | 2398 | 2134 | 2247 | 1067 | 28 |
| **96"** | 2439 | 1320 | 2816 | 2703 | 2439 | 2552 | 1219 | 28 |
| **108"** | 2743 | 1472.5 | 3120 | 3007 | 2743 | 2856 | 1371.5 | 28 |
| **120"** | 3048 | 1625 | 3425 | 3312 | 3048 | 3161 | 1524 | 28 |

***** Maximum lenght for side mounting, left and right mounting.

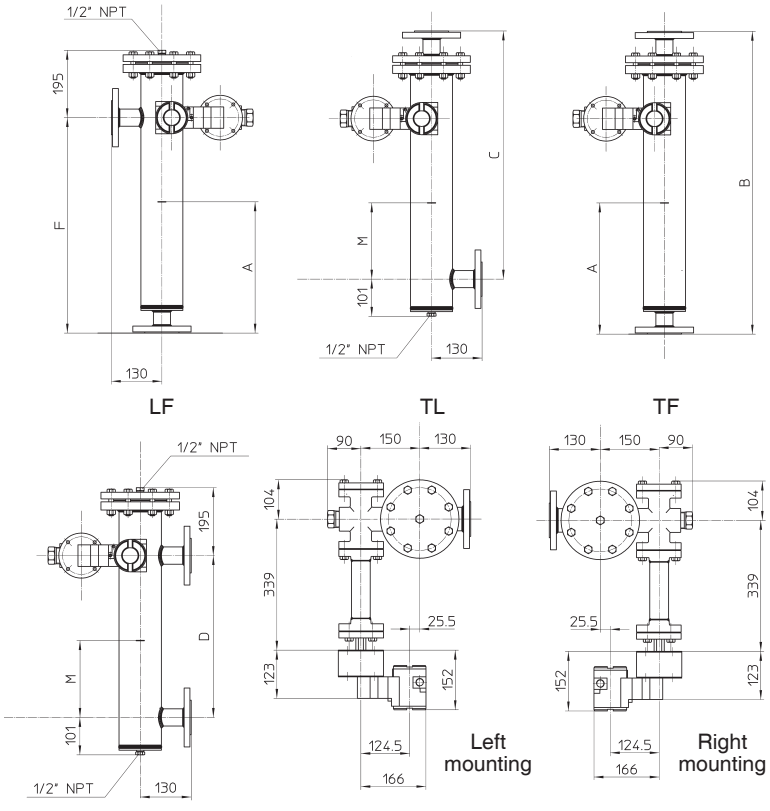



**Fig. 4**

## Mounting and Dimensions (mm) for Adjustable position version (O)

| Range | | A | B | C | D | F | M | Ø Displacer |
|---|---|---|---|---|---|---|---|---|
| Inches | mm | | | | | | | |
| **14"** | 356 | 258 | 626 | 556 | 356 | 426 | 178 | 76 |
| **20"** | 508 | 335 | 778 | 708 | 508 | 578 | 254 | 70 |
| **24"** | 610 | 385 | 880 | 810 | 610 | 680 | 305 | 60 |
| **32"** | 813 | 486.5 | 1083 | 1013 | 813 | 883 | 406.5 | 50 |
| **48"** | 1219 | 689.5 | 1489 | 1419 | 1219 | 1289 | 609.5 | 40 |
| **60"** | 1524 | 842 | 1794 | 1724 | 1524 | 1594 | 762 | 38 |
| **72"** | 1829 | 994.5 | 2099 | 2029 | 1829 * | 1899 | 914.5 | 34 |
| **84"** | 2134 | 1147 | 2404 | 2334 | 2134 | 2204 | 1067 | 34 |
| **96"** | 2439 | 1299 | 2708 | 2638 | 2439 | 2508 | 1219 | 28 |
| **108"** | 2743 | 1451.5 | 3013 | 2943 | 2743 | 2813 | 1371.5 | 28 |
| **120"** | 3048 | 1604 | 3318 | 3248 | 3048 | 3118 | 1524 | 28 |

***** Maximum lenght for side mounting, left and right mounting.

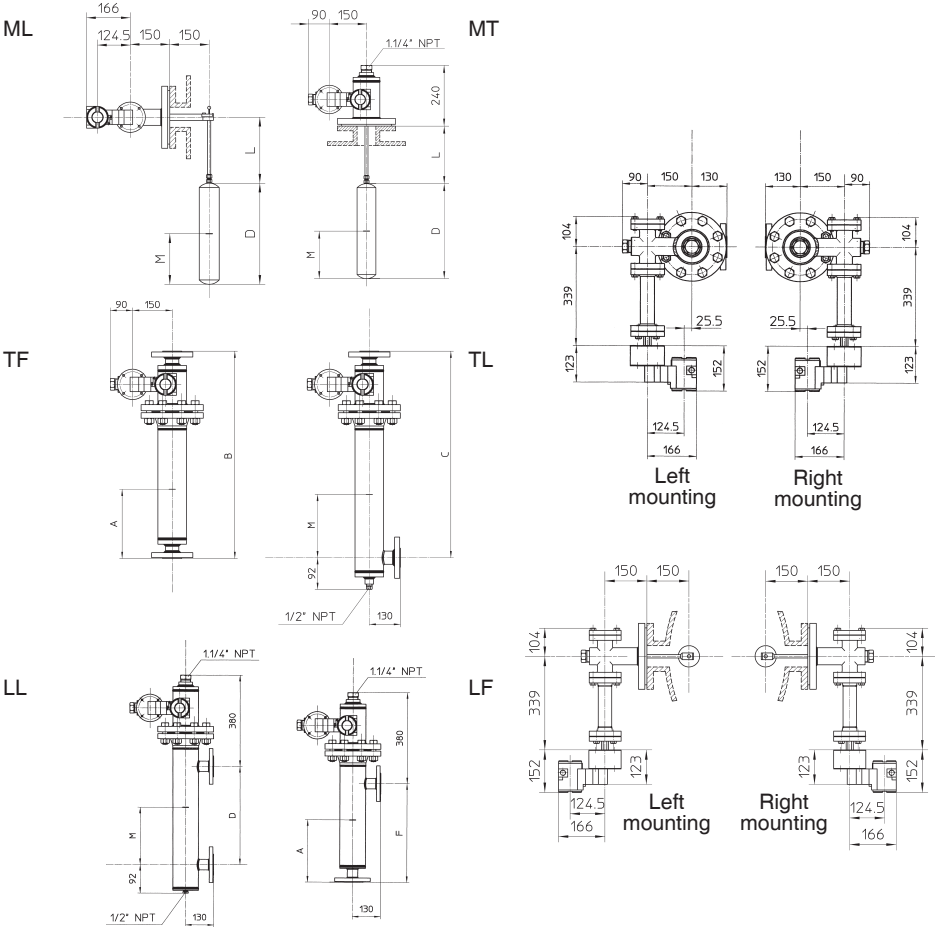
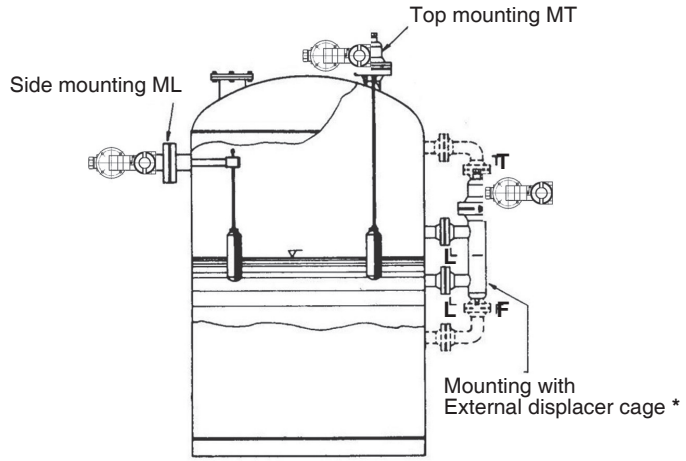



**Fig. 5**




*** Arrangement of connections**

**TF** - Top and Bottom
**TL** - Top and Side
**LL** - Side and Side
**LF** - Side and Bottom

**Fig. 6 - Mounting styles**

## 2.5 Electrical connection

Reach the wiring block by removing the Electrical Connection Cover. This cover can be locked closed by the cover locking screw. To release the cover, rotate the locking screw clockwise. The wiring block has screws on which fork or ring-type terminals can be fastened. For convenience there are two ground terminals: one inside the cover and one external, located close to the conduit entries.

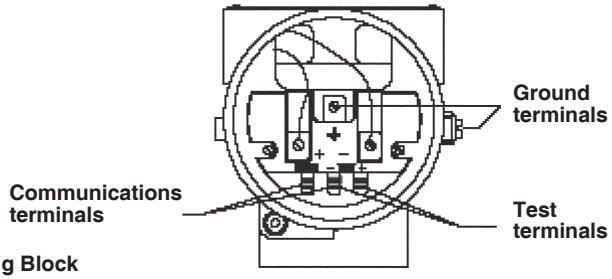



**Fig. 7 - Wiring Block**

The Fig. **8** - conduit installation diagram shows the correct installetion of the conduit, in order to avoid penetration of water or other substance, which may cause malfuntioning of the equipment.

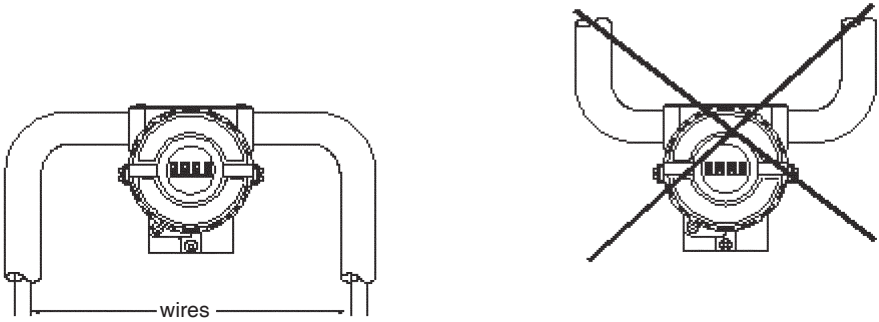
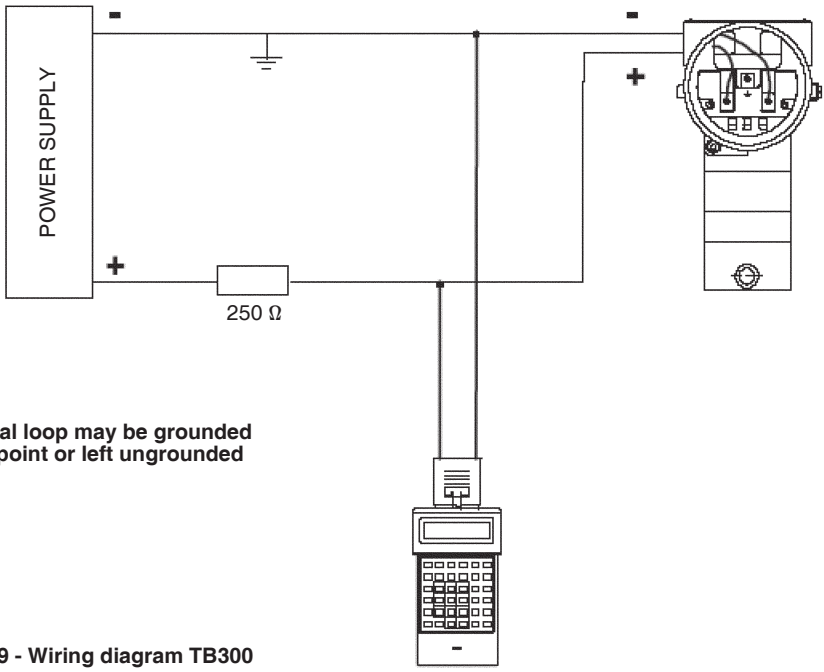



**Fig. 8 - Conduit Installation Diagram**

| HAZARDOUS AREAS |
| --- |
| In hazardous zones with explosion proof requirements the covers must be tightened with at least 7 turns. In order to avoid moisture or corrosive gases, hand tight the covers until the O-rings are compressed. Lock the covers closed with the locking screw.<br>In hazardous zones with intrinsically safe or nonincendive requirements, the circuit entity parameters and applicable installation procedures must be observed.<br>Cable access to wiring connections is obtained by the two conduit outlets. Conduit threads should be sealed by means of code-approved sealing methods.<br>Explosion proof, nonincendive and intrinsic safety Factory Mutual certification pending for **TB300**.<br>Should other certifications be necessary, refer to the certification or specific standard for installation limitations. |

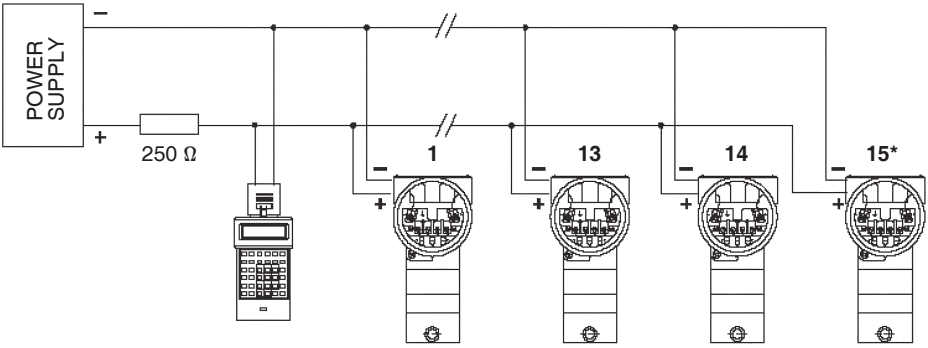
Avoid routing signal wiring close to power cables or switching equipment.
The **TB300** is protected against reverse polarity, and can withstand ±50 mA without damage.
The **TB300** connection could be done conform the figure **9** and **10**.
For proper operation, the Hand-Held Terminal requires a minimum load of 250 Ohm between it and the power supply.
The Hand-Held Terminal can be connected to the communication terminals of the transmitter or at any point of the signal line.
It is also recommended to ground the shield of shielded cables at one end only. The non grounded end must be carefully isolated.




**Signal loop may be grounded any point or left ungrounded**

**Fig. 9 - Wiring diagram TB300**

Connection of the **TB300** in multidrop configuration should be done as in Fig. **10**. Note that a maximum of 15 transmitter can be connected on the same line and that they should be connected in parallel. Take care to the power supply as well, when many transmitters are connected on the same line.




* Maximum number without considering intrinsic safety

**Fig. 10 - Wiring Diagram for the TB300 in Multidrop Configuration**

| NOTE |
| --- |
| Make sure that the transmitter is operating within operating area as shown on the load curve (Fig. **11**). Communication requires a minimum load 250 Ohm. |

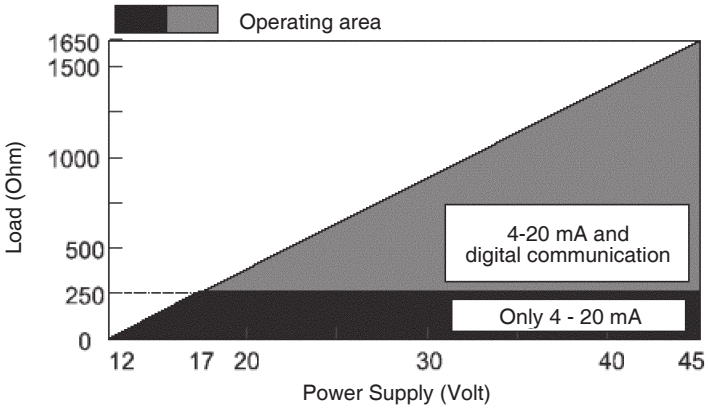
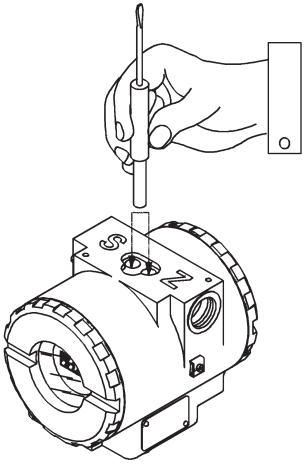



**Fig. 11 - Load Curve**

The transmitter is calibrated in the factory, nevertheles ot is possible to recalibrate it in the field through the "simple adjusting" procedure.
There are two orifices on the Transmitter , under the nameplate, identified by "**S**" and "**Z**" respectively, which provide access to two magnetic switches actuated by means of a magnetic tool (Refer to Fig.**12**).




**Z: set 0%**
**S: set 100%**

**Fig. 12 - Shows the results of what actions on "Z" and "S" cause on the FY301.**

In order to perform a level calibration you just need to decrease the tank level to its minimum point (0%) and insert the magnetic tool in the "**Z**" hole ("ZERO").
Then increase the level to its maximum point (100%) and insert the magnetic tool in the "**S**" hole ("SPAN").
When you insert the tool in "**Z**" the LCD should display "0%", otherwise it means that "simple adjusting" is disabled. To enable it and perform the calibration, check the jumpers on the board: set W1 to ON and W2 to SI. (See Fig. **13**).

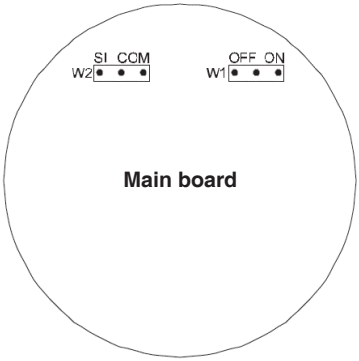



**Fig. 13**

# 4. Troubleshooting

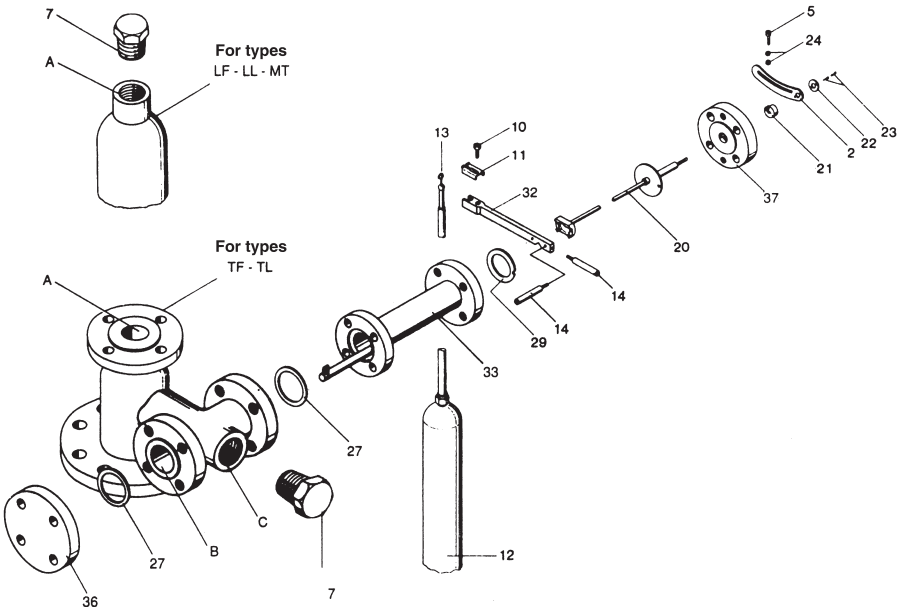
| DIAGNOSTIC | |
|---|---|
| **SYMPTOM** | **PROBABLE ERROR SOURCE** |
| **Position is not display** | • Position Transmitter Connections<br>• Check wiring polarity and continuity<br><br>• Power Supply<br>• Check load curve<br><br>• Electronic Circuit Failure<br>• Check the boards for malfunctions and faulty boards for spare ones |

In case of exceptional events, like strong shocks or earthquakes, please verify operating functionality and execute the calibration procedure.

# 5. Maintenance

Displacer, displacer rod with its articulation and torque tube must be kept free form deposits and scales which can increase free from deposits and scales which can increase the weight and introduce frictions. For the ordinary maintenance of the pneumatic unit see the proper handbook.

## 6.1 Orientable torque tube spare parts list

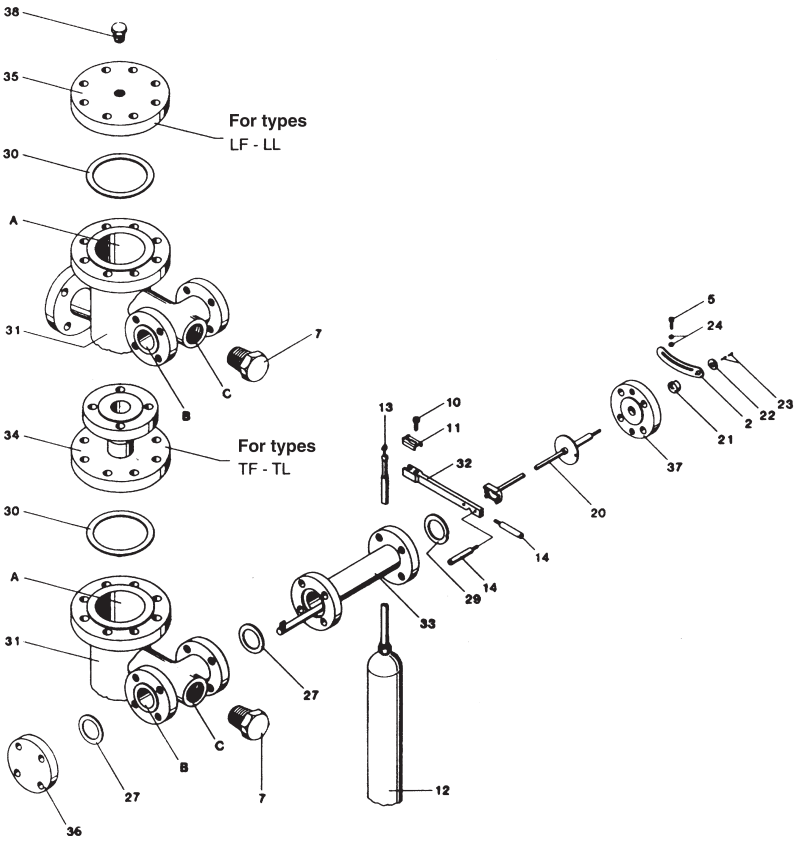



**Displacer and torque tube detail**

| Part. No. | Description |
|---|---|
| 1) | Adjustable slide |
| 2) | Graduade sector |
| 3) | Slide screw |
| 4) | Link |
| 5) | Socket head screw M4x16 |
| 6) | Bolt |
| 7) | Upper screwed plug |
| 10) | Screw |
| 11) | Level slide |
| 12) | Displacer |
| 13) | Displacer hook |
| 14) | Screwed pillar |
| 20) | Torque tube |
| 21) | Retaining ring |
| 22) | Fixing washer |
| 23) | Screw M2x5 |
| 24) | Washer |
| 27-29) | Gaskets |
| 32) | Lever |
| 33) | Torque tube arm |
| 36) | Side blind flange |
| 37) | Torque tube fixing flange |

**Note:** When ordering spares please always specify:
- Instrument **serial number**
- Description and part number as per above list

## 6.2 Non-Orientable torque tube spare parts list

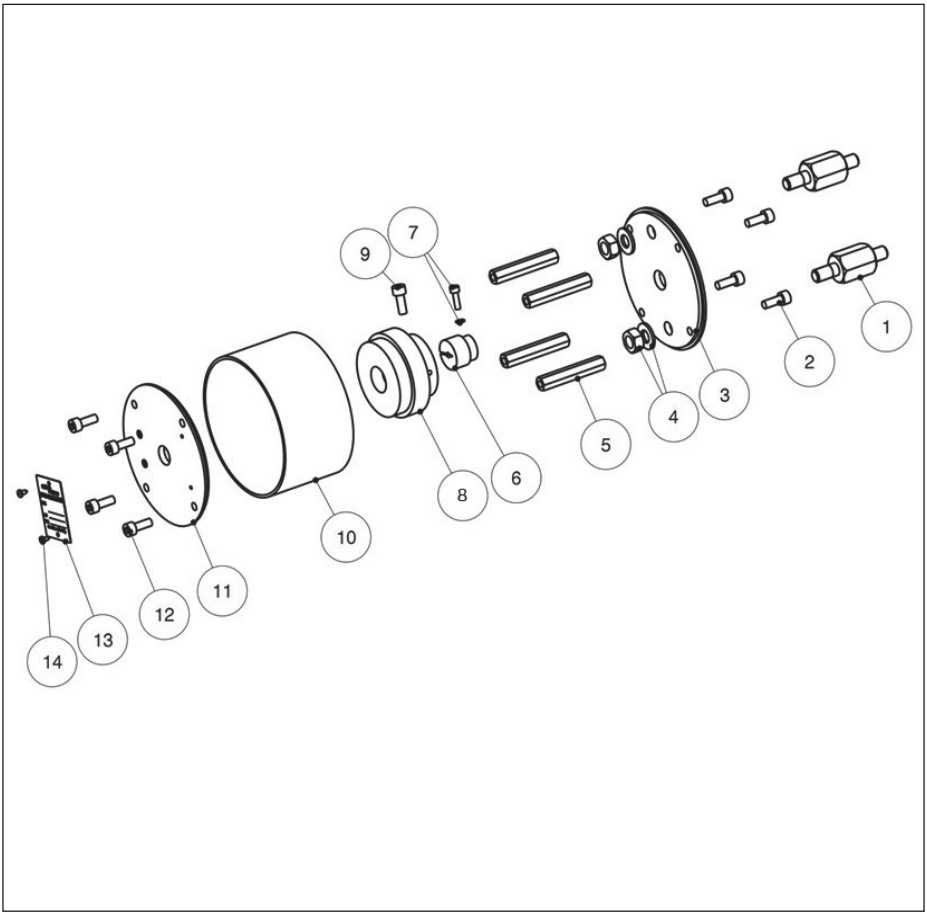



**Displacer and torque tube detail**

| Part. No. | Description |
|---|---|
| 1) | Adjustable slide |
| 2) | Graduated sector |
| 3) | Slide screw |
| 4) | Link |
| 5) | Socket head screw M4x16 |
| 6) | Nut |
| 7) | Screwed plug (1¼" NPT) |
| 10) | Screw |
| 11) | Lever slide |
| 12) | Displacer |
| 13) | Displacer hook |
| 14) | Screwed pillar |
| 20) | Torque tube |
| 21) | Retaining ring |
| 22) | Fixing washer |
| 23) | Screw M2x5 |
| 24) | Washer |
| 27-29-30) | Gaskets |
| 31) | Displacer cage |
| 32) | Lever |
| 33) | Torque tube arm |
| 34) | Upper connecting flange set (types TF and TL) (versione TF e TL) |
| 35) | Upper blind flange (types LL and LF) |
| 36) | Side blind flange |
| 37) | Torque tube fixing flange |
| 38) | Vent plug |

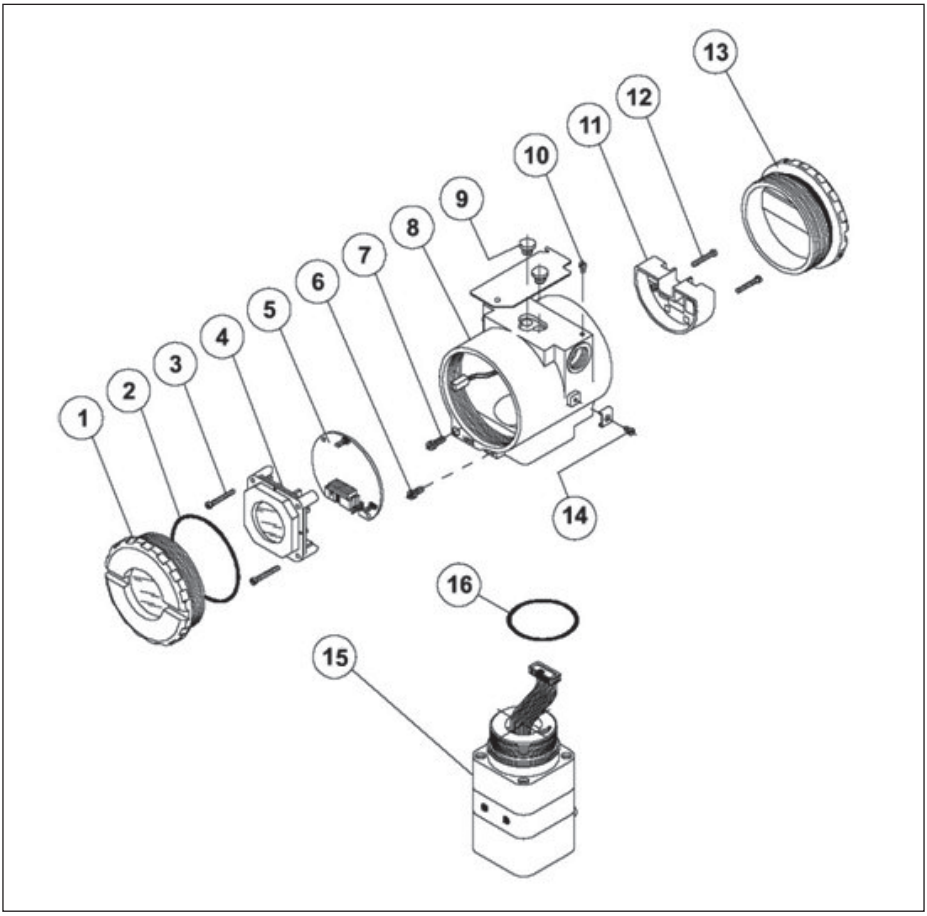
**Note:** When ordering spares please always specify:
- Instrument **serial number**
- Description and part number as per above list

## 6.3 Magnet spare parts list




| Part. No. | Description |
|---|---|
| 1) | Spacer |
| 2) | Screw |
| 3) | Blind flange |
| 4) | Nut + washer |
| 5) | Pillar |
| 6) | Bush |
| 7) | Screw + Washer |
| 8) | Magnet |
| 9) | Screw |
| 10) | Housing |
| 11) | Flange |
| 12) | Screw |
| 13) | Plate |
| 14) | Screw |

## 6.4 Transimitter spare parts list




| Part. No. | Description |
|---|---|
| 1) | Cover |
| 2) | 'O' rings |
| 3) | Screw |
| 4) | Digital indicator |
| 5) | Main board |
| 6) | Sensor locking screw |
| 7) | Cover locking screw |
| 8) | Housing |
| 9) | Protections cap |
| 10) | Identification plate with fixing screw |
| 11) | Terminal block |
| 12) | Screw |
| 13) | Cover |
| 14) | External ground screw |
| 15) | Transducer |
| 16) | 'O' rings |

**REPAIRS**
Please contact our nearest Branch Office or Agent, or directly Spirax-Sarco S.r.l.
Via per Cinisello, 18 - 20834 Nova Milanese (MB) – ITALY - Tel.: +39 0362 49 17.1 - Fax: +39 0362 49 17 307

**LOSS OF GUARANTEE**
**Total or partial disregard of above instructions involves loss of any right to guarantee.**

**Spirax-Sarco S.r.l.** - Via per Cinisello, 18 - 20834 Nova Milanese (MB) - Tel.: 0362 49 17.1 - Fax: 0362 49 17 307