



INSTRUCTION MANUAL FOR TRANSPARENCY LEVEL INDICATORS T series

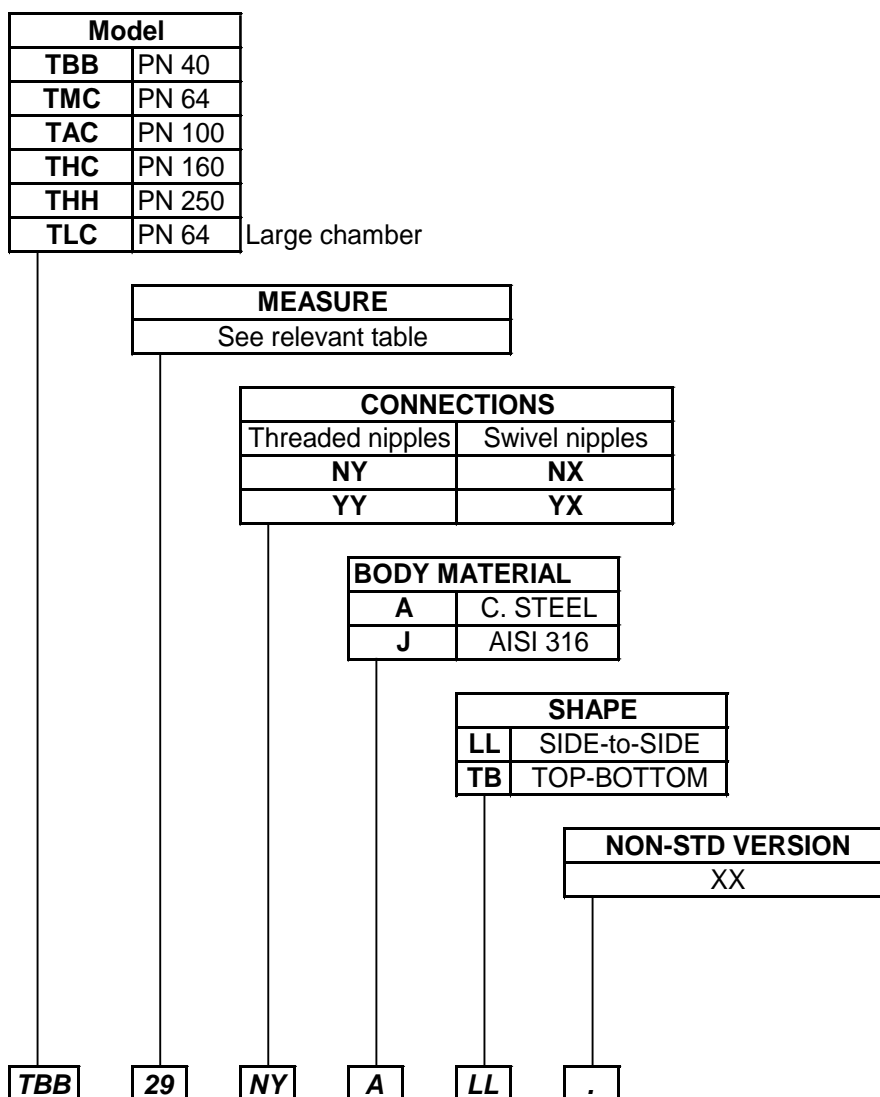
1. INSTRUMENT DESCRIPTION

Transparency-type level indicators display the fluid level through a transparent surface that is part of column connected to the vessel via interception (on/off) members.

The robust construction and good visibility enable use in heady-duty applications with pressure values up to a rating of PN250 and temperatures up to 300°C.

In order to ensure an accurate reading, its use is **not recommended** with fluids that tend to form deposits or scaling.

2. MODEL IDENTIFICATION



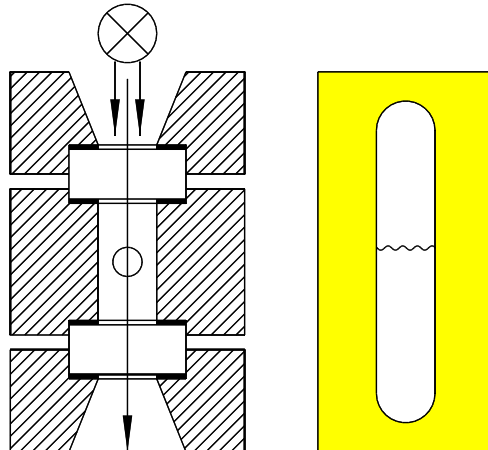
Accessories: the instrument can be equipped with various accessories, such as:

- illuminator to improve the reading;
- reading extension with cryogenic fluids (antifrost);
- Centimetre-graduated scale (other engineering units on demand)
- MICA or PFA sheet to protect crystal from aggressive fluids

3. OPERATING PRINCIPLE

The measuring portion includes two flat and transparent crystals that form, along with the indicator's body, the chamber that holds the fluid.

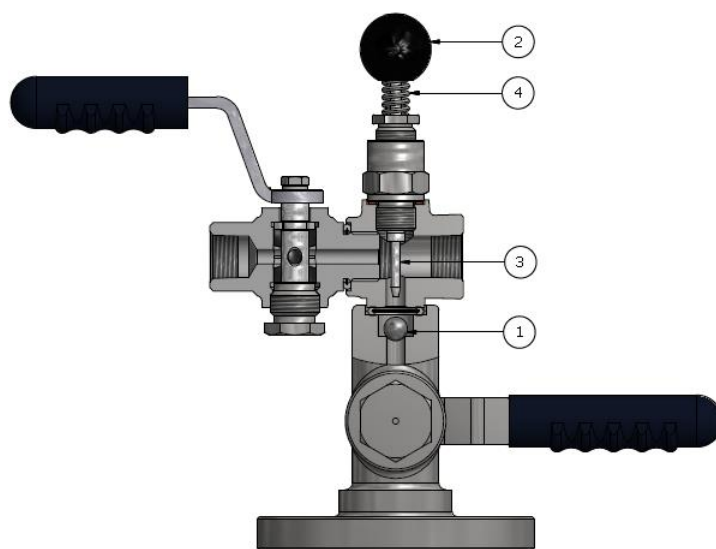
Through the light that runs across the two crystals, the fluid level can be viewed. If sunlight is not enough, a lamp is used.



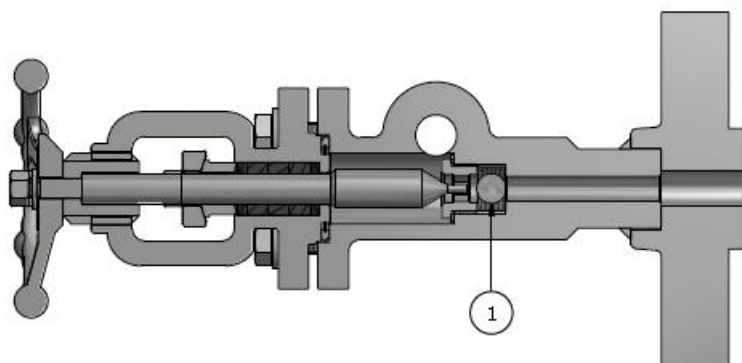
SAFETY BALL FUNCTION

The safety ball is used to prevent the fluid from flowing out of the vessel in cases when a crystal breaks.

In the NY model, the ball (1) automatically **closes** the passage of the flow that forms when the crystal breaks. Once instrument integrity is restored, at the starting stage the knob (2) needs to be pressed so that the bar (3) moves the ball (1) and allows the level gauge body to be correctly filled. It is always advisable to adopt at least one safety ball, to be located in the lower portion of the device. It is advisable to use two balls, one above and one below, when the vessel level exceeds that of the level gauge (e.g. in the event of several level gauges in a row).



In the YY model, the same instructions as given above apply, except that the ball (1) is moved by the stem at the closing stage. Hence, a reset is operated by performing a closing-opening move.



4. INSTALLATION

4.1. FITTING

The (standard) instrument is supplied equipped with on/off valves, a drain valve and a safety ball located in the device lower portion. (Standard) connections are **side-to-side** with facing crystal. The instrument shall only be installed and used by qualified staff. Before installing it, check vessel and instrument connections for compatibility. It is strictly forbidden to load the device with external loads and it is the user's obligation to protect it from all stress; never use it as a support point. To avoid galvanic corrosion effects, the use of materials with a different electrochemical potential is forbidden. The user shall adopt all technical measures required to preserve the unit from such an event. The system shall be equipped with the prescribed safety valve, to remedy overpressure beyond the maximum expected values. In the event of air or steam bubble formations, please apply relief valves on the upper connections. For installation on vessels exposed to strong vibration, please contact our customer service. The system connection process shall be accurate so that all items (flanges, gaskets, stud bolts) perfectly match to avoid sealing problems and create useless mechanical stress over the system and/or the instrument.

Warning: if the fluid in use is allowed to turn to ice (e.g. water), the instrument could suffer damages. Therefore, we suggest using a heating tracer.

4.2. ELECTRICAL WIRING

To improve the liquid visibility in situation with low light (e.g., nighttime, shadow or low light indoor installation), the level gauges T series can be equipped with a white LED illuminator located on the indicator's rear side.

The illuminator is composed of three main parts: aluminium enclosure, modular LED bars and power supply.

ALUMINIUM ENCLOSURE

Made with an aluminium extrusion, is protected on the front with a two layers security glass sealed over the entire length, the ends are closed with two SS316 covers sealed with a shaped silicone gasket.

Covers are joined with extruded bar with four screws each cover and the one of the bottom side is equipped with a cable gland suitable for low temperature. The back side of the extrusion has a T profile to allow fixing of the power supply, if needed, and the bar itself to the level indicator.

The enclosure is IP66 compliant with IEC/EN 60079-0.

LED BARS

The LED bars are made with a custom PCB that slide inside the aluminum extrusion.

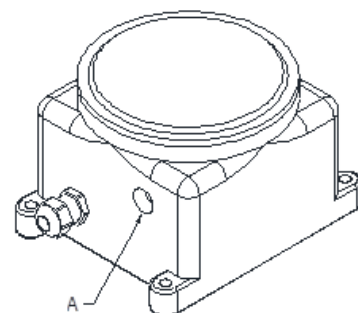
Power supply, from 20 to 24 VDC, comes from a multicore cable with 8 single conductor.

POWER SUPPLY ENCLOSURE

The power supply is fixed on the backside of the aluminium extrusion or in a remote location.

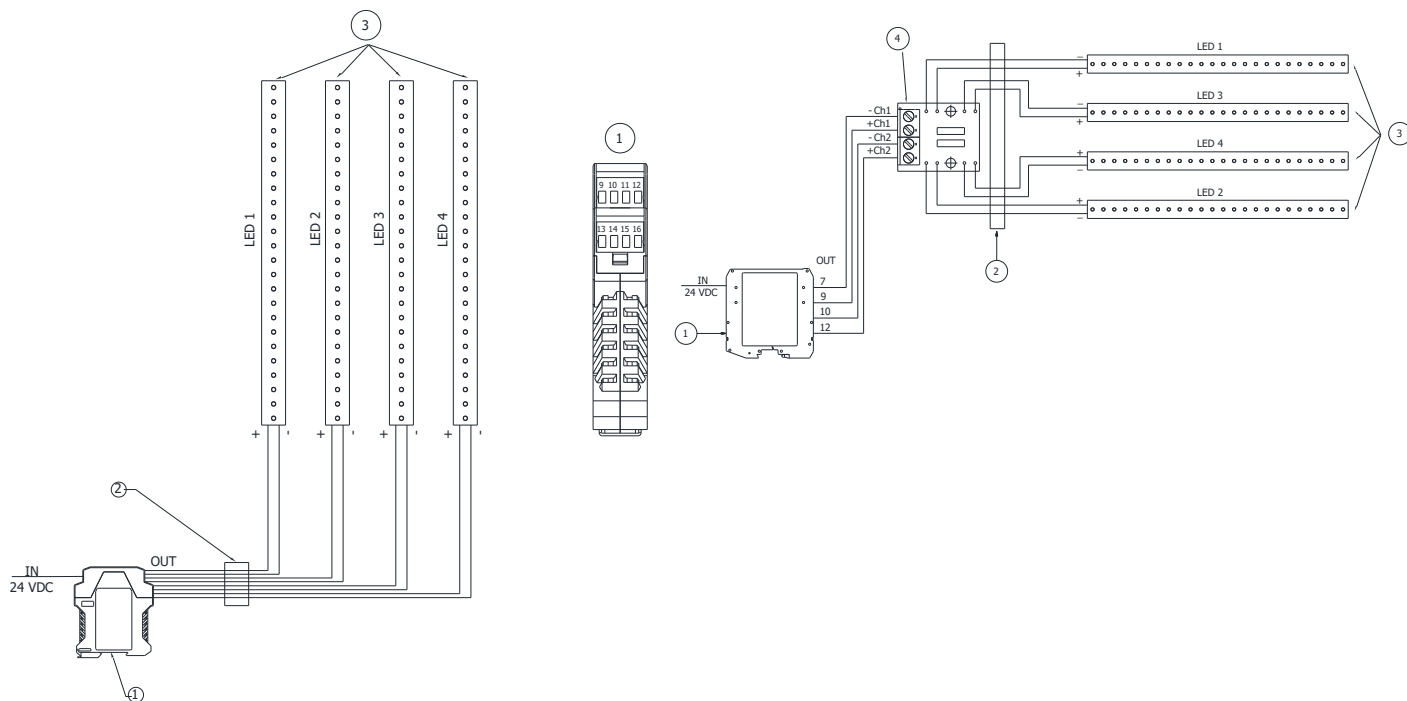
It's composed of three parts:

1. Aluminium enclosure
2. AC/DC power supply and DC/DC four channels power supply.
3. Two cable glands, one for the AC power IN and one for the DC power OUT to the LEDs bars.



INTRINSICALLY SAFE VERSION WIRING

INTRINSICALLY SAFE – HIGH TEMPERATURE VERSION WIRING



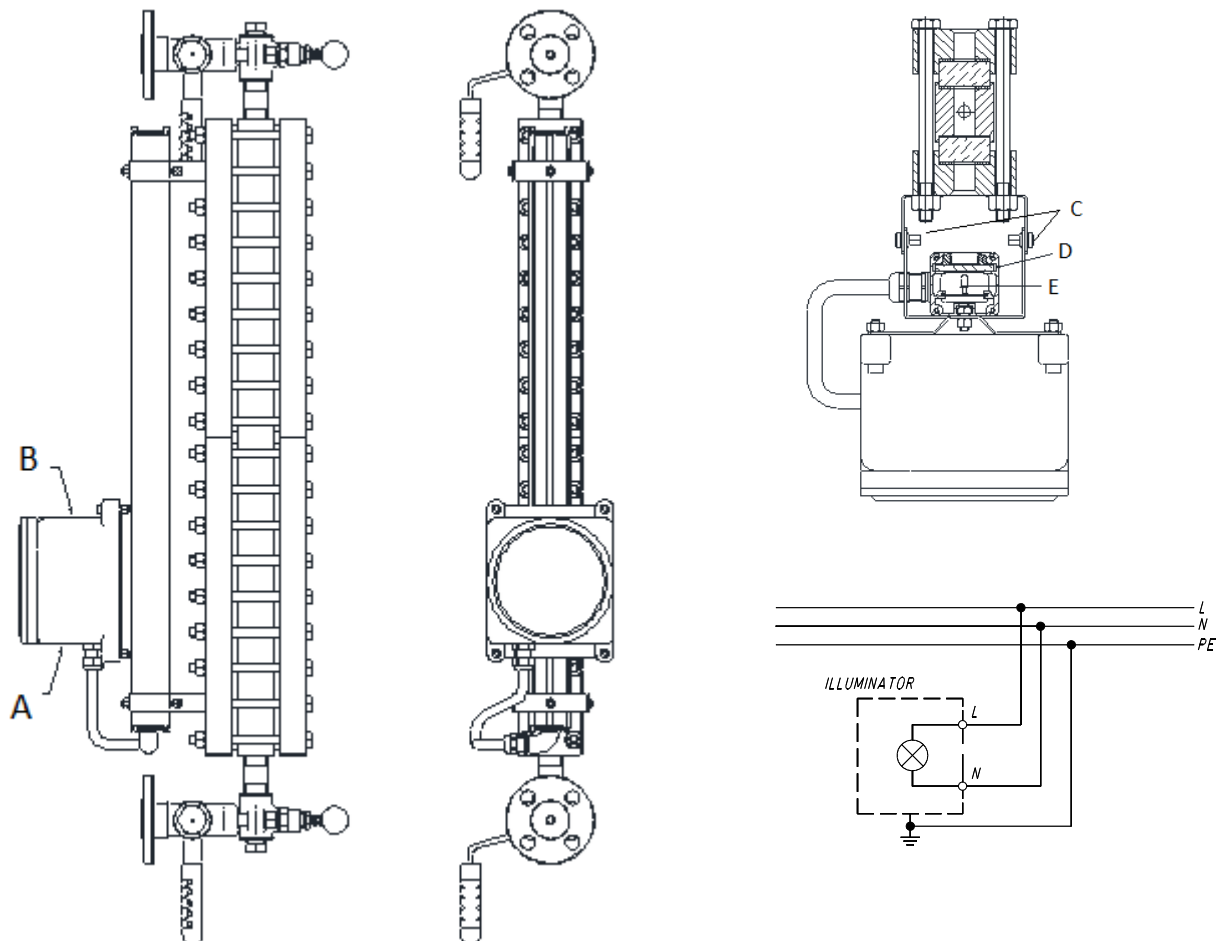
LED BAR	WIRE	POWER SUPPLY TERMINAL
1	Yellow +	9
1	Green -	10
2	White +	11
2	Brown -	12
3	Grey +	13
3	Pink -	14
4	Red +	15
4	Blue -	16

WIRE	POWER SUPPLY TERMINAL
Red	7
Black	9
Brown	10
Green	12

1	Intrinsically safe power supply 24 VDC
2	8 poles screened cable
3	LED bars
4	LED management board

MOUNTING

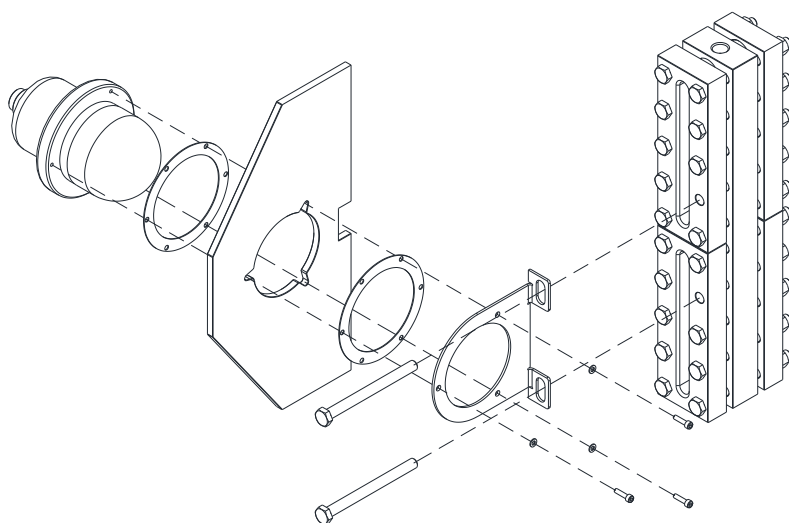
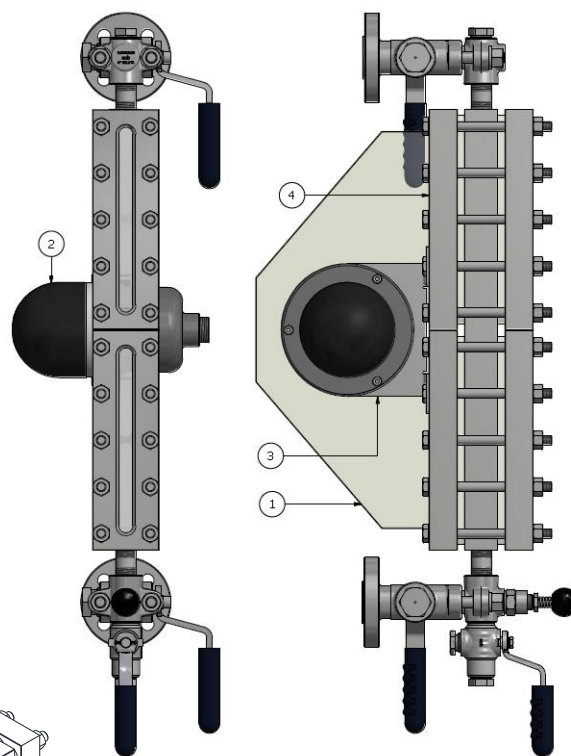
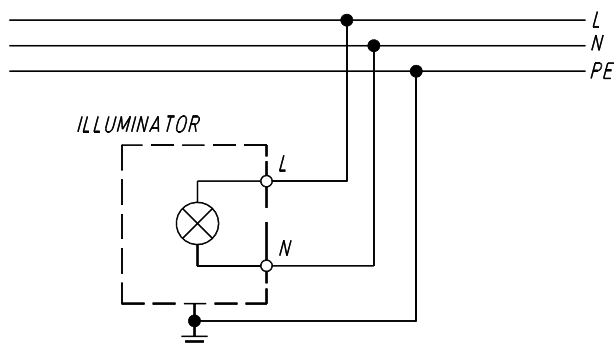
Refer to the following drawings:



A	Electrical connection
B	Power supply unit
C	Mounting screws
D	Glass
E	LED bar

4.2.1 LAMP ILLUMINATOR (obsolete)

1	Diffuser
2	Illuminator
3	Fastening plate
4	Cover



Inside the illuminator there is a terminal block for the electrical wiring. The illuminator, diffuser, lamp and mounting bracket set shall be mounted on site, and only after the unit has been connected to the system; this is due to the fact that the illuminator is made of a fragile material and needs to be handled with the utmost care. In the event of levels with a high centre distance, two separated illuminator-diffuser units are adopted. The lamp to be placed into the illuminator is provided as a detached part along with the material. The assembling sequence is provided in paragraph 7 (Maintenance). Ensure the illuminator cover is closed before injecting voltage. The user, as per the drawing, shall provide suitable ground connections to protect the working staff along with any other equipment possibly present

FITTING THE DIFFUSER-ILLUMINATOR

The diffuser-illuminator shall be assembled after the instrument has been fitted on the system.

We recommend that two people do the job, to avoid breaking the (glass) diffuser.

- ensure the diffuser is correctly sized; it shall fit into the device slots and come into contact with the crystal
- verify the bracket is correctly in place; if it is located on the side of the diffuser, its fixing slots shall match the crystal closing bolts
- ensure the instrument is turned off, discharged of any pressure and without fluid inside



- unscrew the two bolts (4) from the cover corresponding to the plate slots (3) and re-assemble by re-tightening all of the cover screws. Comply with the sequence and the torque values given in the table (see par.7.1);
- insert the diffuser into the slot against the crystal and ensure the bracket holes are aligned with those of the diffuser (place the gasket between the glass and the bracket).
- insert the illuminator and carefully tighten the screws.

5. FIRST START-UP

Remove all plugs or other protection devices from the connections before starting fitting the instrument onto the system. Ensure that any on/off, drain and relief valves are closed. Connect the device to the system. For very hot fluids, to avoid excessive thermal stress on the crystals, you need to adapt the body temperature to the process temperature, before opening on/off valves. Slowly open the upper on/off valve, to balance pressure values between the instrument and the vessel. Then slowly open the lower on/off valve to let the fluid into the instrument without actuating the safety ball. As soon as pressure inside the instrument has stabilized, the valves can open wide. The instrument has been previously tested and it has been ascertained that it does not have any fluid leaking out of the junctions. In cases when leaks show up owing to the settlement of junctions, the latter shall be clamped as indicated in paragraph 7 (Maintenance). During the first 24 hours of operation, periodically inspect junctions for damages.

Warning:

- Valves are **closed** when the knob is aligned with the connection.
- The drain valve shall only be opened when the instrument is blocked and pressure has been released; at the beginning, the vent shall be opened by a few degrees, so as to slowly release the instrument internal pressure, then action shall be taken on the drain valve to let out all the fluid that is in the level gauge.

6. CALIBRATION

The instrument does not require any calibration to be performed (not applicable).

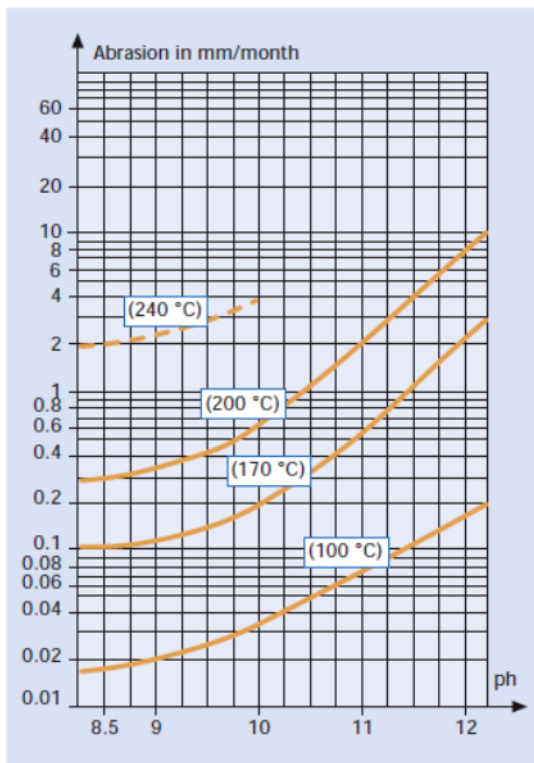
7. MAINTENANCE

Maintenance shall **only** be performed by qualified personnel, being perfectly aware of operation and having sound and proven experience with this kind of work. A cyclical inspection is recommended (once every six months approximately) to guarantee the perfect working order of the instrument. More in detail, check crystals for integrity, since some fluids may deeply corrode the glass. Inspect and clean the glass and intercept valves. Moreover, check the bolts for proper tightening. The numerical series shows the bolt tightening sequence. The tightening value is indicated in the table below, as a function of the various models. **Note:** all maintenance activities shall **always** be performed with the interceptor instrument emptied of the fluid that is inside, and once it has come back to room temperature.

LIMITS OF USE WITH SATURATED STEAM OR CORROSIVE SUBSTANCES FOR GLASS.

Glass level indicators when used with saturated steam must be controlled periodically to verify the glass condition. In particular reflex level gauges in presence of steam can't exceed 20 bar pressure with a 211 °C temperature. In this conditions glass abrasion become relevant and the replacement / control must be scheduled at least every three months. In case of high water's pH value the abrasion become more pronounced, see the fig.1 graph that shows the abrasion in function of pH and temperature over time.

Fig. 1



What said is true also for corrosive substances for glass, for example Sodium hydroxide or acids that corrode glass (Hydrofluoric acid, citric acid or others).

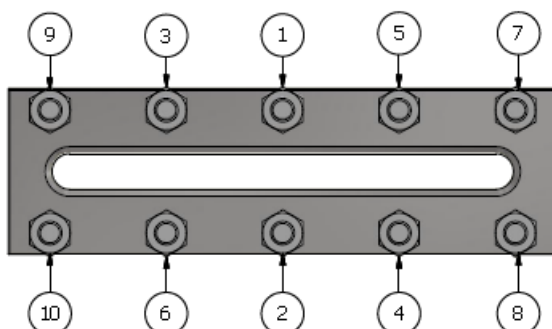
With transparent level gauge the reflex level gauges limits can be overcome applying MICA sheets. This material has a great high temperature resistance even in presence of steam; periodic controls are needed anyway because in case of collapse of the mica protection the glass would be exposed to the direct action of the abrasive. For high corrosive media, protect the glass with KEL-F foils or other equivalent materials.

For usage limits of glass levels indicators contact Officine Orobiche or visit the website.

7.1. WARNINGS

- **never** open the illuminator cover without first ensuring that voltage supply has been disconnected
- **never** leave the illuminator housing without its cover for longer than the inspection time
- **never** use the instrument at a temperature or a pressure that exceeds the values specified on the rating plate;
- **never** use the instrument with an electrical rating that exceeds the plate rating
- **never** perform settings or replace parts without having read the instructions beforehand; in case of doubts, please contact our customer service department
- **never** lubricate any part of the instrument;
- If the instrument is used with very high temperatures, take all precautionary measures required to guarantee personal protection to the personnel on duty during the various maintenance stages.

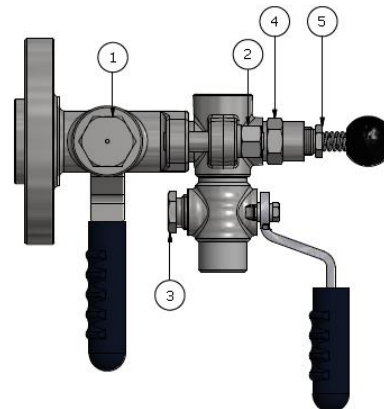
LEVEL GAUGE BODY DETAIL VIEW



Bolt torque table		
Model	Size	Tightening
TBB	11 - 79	35 Nm
TMC	11 - 79	38 Nm
TAC	11 - 79	40 Nm
THB	11 - 79	55 Nm
THC	11 - 79	55 Nm
THH	11 - 79	65 Nm
TLC	12 - 69	38 Nm

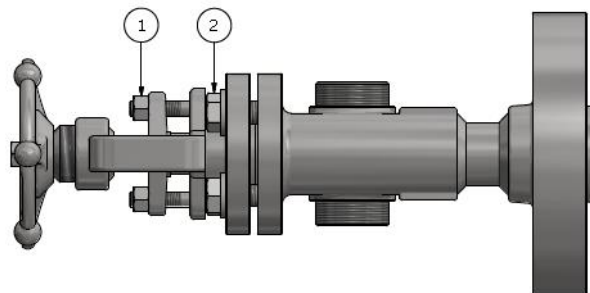
NY VALVE ASSEMBLY DETAIL VIEW

In cases when leaks show up, owing to the settlement of junctions in positions 1 to 5, operate a further tightening until the leak is undone.



YY VALVE ASSEMBLY DETAIL VIEW

In cases when leaks show up, owing to the settlement of junctions in positions 1 and 2, operate a further tightening until the leak is undone.



7.2. LEVEL BODY MAINTENANCE

LEVEL GAUGE BODY CLEANING

- Close intercept valve
- Slowly open the vent, until environmental pressure is balanced in the indicator
- Drain the fluid into a suitable vessel
- Open the drain or the drain valve so that the fluid can flow out
- Use a flushing fluid that does not interfere with the process fluid, or does not cause problems to the glass. Clean the indicator inside, if necessary, use a brush.
- Put the indicator into service in accordance with paragraph 5 (First Start-Up)

VALVE CLEANING

Intercept valves of the glass level indicator cannot be cleaned on site. The cleaning shall only be performed in a laboratory.

CRYSTAL GLASS REPLACEMENT

- Note:**
- Crystal replacement shall only be made by experienced staff
 - Crystal replacement always goes along with gasket replacement
 - Model TBB is equipped with “type A” crystals, 30 mm wide; models TMC, TAC, THC, THH and TLC are equipped with “type B” crystals, 34 mm wide.
 - Take all the steps set forth in paragraph 7.2 (Level gauge body cleaning)
 - Unscrew the cover nuts (see drawing Level Gauge body)
 - Remove the cover
 - Remove all defective glass and replace all leaking gaskets
 - Clean the gasket area (do not use sharp tools)
 - Insert the new gasket in the dedicated area
 - Insert the gasket with the glass inside the cover
 - Insert the reflection glass into the special groove
 - Fit the cover back in place
 - Tighten the bolts as described in paragraph 7



- Check all tightening again during the first 24 working hours.
- For severe application (eg high pressure steam) after the first 24-48 hour working close intercept valves, reset the pressure inside the instrument and tight the bolts again

NY VALVE CASE REPLACEMENT

See paragraph 9 (Recommended spare parts) for reference numbers.

- The replacement of the case shall be performed with the device being disconnected from the system and in a laboratory setting.
- Disassemble the valves from the level gauge body by unscrewing the stud bolts (1)
- Unscrew the plug (7) and (9) as a function of the valve type
- With a wooden or aluminium extension, hit the case with a knocker so that all parts that are inside may come out.
Warning: the screw-tap shall not be exposed to blows or scratches, as they would compromise the valve sealing capacity
- Carefully clean the parts
- Apply the ring in two halves (5) or (12) to the screw-tap (4) or (10)
- Introduce the screw-tap into the new case (6) or (11) until it presses against the ring
- Insert the whole set into the valve body, taking care the case is driven by the dedicated slot provided in the valve body.
- Put the case-pressing plug (7) or (9) back in place.
- Move the knob a few times to check for proper rotation.
- Put the valve unit back in place on the level gauge body.
- Set the device to operate, in accordance with paragraph 5 (First Start-Up)
- Inspect the gasket during the first 24 working hours.

YY VALVE CASE REPLACEMENT

See paragraph 9 (Recommended spare parts) for reference numbers.

- The replacement of the stuffing box ring shall be performed with the device being disconnected from the system and in a laboratory setting.
- Disassemble the valves from the level gauge body by unscrewing the stud bolts.
- Remove the handwheel 13 by unscrewing nut 15
- Remove the stuffing box ring 7 and the stuffing box retainer 9
- Replace the stuffing box ring with the new one
- Re-assemble the whole set
- Move the handwheel a few times to ensure proper rotation
- Put the valve unit back in place on the level gauge body.
- Set the device to operate, in accordance with paragraph 5 (First Start-Up)
- Inspect the gasket during the first 24 working hours.

8. BODY DIMENSIONAL DRAWINGS

MODELLO	RATING	GLASS WIDTH	TABLE
TBB	PN40	30 mm	A
TMC	PN64	34 mm	A
TAC	PN100	34 mm	A
THC	PN160	34 mm	A
THH	PN250	34 mm	THH
TLC	PN64	34 mm	TLC

All measures are in mm.

Connection ranges are referred to side-side position.

TLC model is the large chamber version.

In the Measure Number, the first cipher is the number of sections and the second one is the crystal dimension

TABLE A

Measure	V	D	C	Minimum C to C for valves				Weight [~kg]
				NY	NX	YY	YX	
11	90	128	115	197	234	216	256	12
12	115	153	140	222	259	241	281	13
13	140	178	165	247	284	266	306	13
14	165	203	190	272	309	291	331	14
15	195	233	220	302	339	321	361	15
16	225	263	250	332	369	351	391	17
17	255	293	280	362	399	381	421	18
18	295	333	320	402	439	421	461	19
19	315	353	340	422	459	441	481	20
24	368	406	190	475	512	494	534	22
25	428	466	220	535	572	554	594	24
26	488	526	250	595	632	614	654	26
27	548	586	280	655	692	674	714	28
28	628	666	320	735	772	754	794	31
29	668	706	340	775	812	794	834	32
36	751	789	250	858	895	877	917	35
37	841	879	280	948	985	967	1007	38
38	961	999	320	1068	1105	1087	1127	42
39	1021	1059	340	1128	1165	1147	1187	44
47	1134	1172	280	1241	1278	1260	1300	48
48	1294	1332	320	1401	1438	1420	1460	54
49	1374	1412	340	1481	1518	1500	1540	56
57	1427	1465	280	1534	1571	1553	1593	59
58	1627	1665	320	1734	1771	1753	1793	66
59	1727	1765	340	1834	1871	1853	1893	69
68	1960	1998	320	2067	2104	2086	2126	77
69	2080	2118	340	2187	2224	2206	2246	81
79	2433	2471	340	2540	2577	2559	2599	93

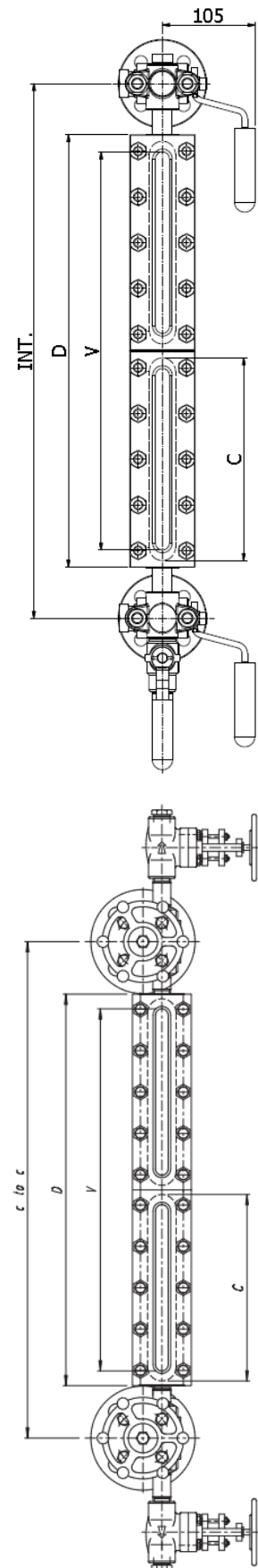


TABLE THH

Measure	V	D	C	Minimum C to C for valves		Weight [~kg]
				YY	YX	
11	95	135	115	223	263	32
12	120	160	140	248	288	33
13	145	185	165	273	313	33
14	170	210	190	298	338	34
15	200	240	220	328	368	36
16	230	270	250	358	398	38
17	260	300	280	388	428	39
18	300	340	320	428	468	41
19	320	360	340	448	488	43
24	380	420	190	508	548	49
25	440	480	220	568	608	52
26	500	540	250	628	668	56
27	560	600	280	688	728	59
28	640	680	320	768	808	63
29	680	720	340	808	848	66
36	770	810	250	898	938	74
37	860	900	280	988	1028	79
38	980	1020	320	1108	1148	84
39	1040	1080	340	1168	1208	89
47	1160	1200	280	1288	1328	98
48	1320	1360	320	1448	1488	106
49	1400	1440	340	1528	1568	112
57	1427	1465	280	1588	1628	118
58	1627	1665	320	1788	1828	128
59	1727	1765	340	1888	1928	135
68	1960	1998	320	2128	2168	149
69	2080	2118	340	2248	2288	158
79	2433	2471	340	2608	2648	181

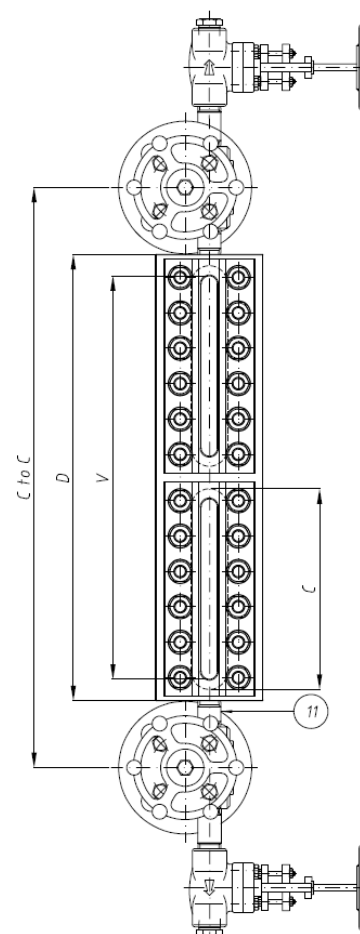
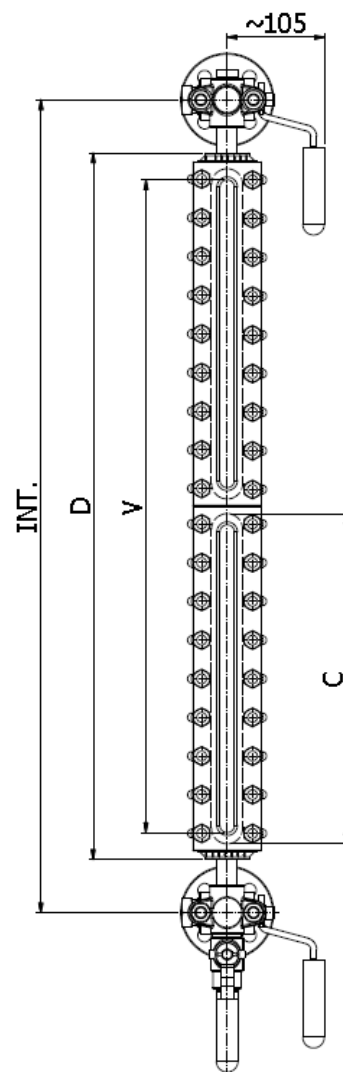


TABLE TLC

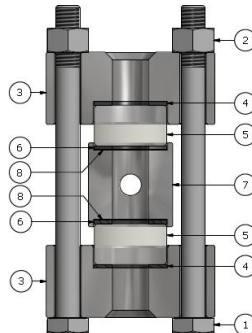
Measure	V	D	C	Minimum C to C for valves				Weight [~kg]
				NY	NX	YY	YX	
11	90	183	115	145	145	145	145	12
12	115	208	140	170	170	170	170	13
13	140	233	165	195	195	195	195	13
14	165	258	190	220	220	220	220	14
15	195	288	220	250	250	250	250	15
16	225	318	250	280	280	280	280	17
17	255	348	280	310	310	310	310	18
18	295	388	320	350	350	350	350	19
19	315	370	340	370	370	370	370	20
24	368	461	190	423	423	423	423	22
25	428	521	220	483	483	483	483	24
26	488	581	250	543	543	543	543	26
27	548	641	280	603	603	603	603	28
28	628	721	320	683	683	683	683	31
29	668	761	340	723	723	723	723	32
36	751	844	250	806	806	806	806	35
37	841	934	280	896	896	896	896	38
38	961	1054	320	1016	1016	1016	1016	42
39	1021	1114	340	1076	1076	1076	1076	44
47	1134	1227	280	1189	1189	1189	1189	48
48	1294	1387	320	1349	1349	1349	1349	54
49	1374	1467	340	1429	1429	1429	1429	56
57	1427	1520	280	1482	1482	1482	1482	59
58	1627	1720	320	1682	1682	1682	1682	66
59	1727	1820	340	1782	1782	1782	1782	69
68	1960	2053	320	2015	2015	2015	2015	77
69	2080	2173	340	2135	2135	2135	2135	81
79	2433	2526	340	2488	2488	2488	2488	93



9. SPARE PARTS AVAILABLE ON REQUEST (*)

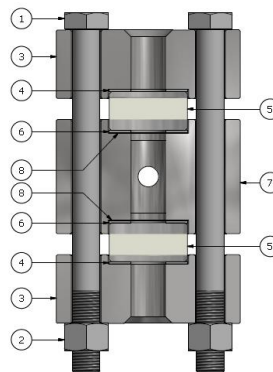
Version for series TBB - TMC – TAC

POSITION	DESCRIPTION
1	Stud bolts
2	Nuts
3	Cover
4 (*)	Protection
5 (*)	Crystal
6 (*)	Gasket
7	Body
8(*)	Shield (if required)



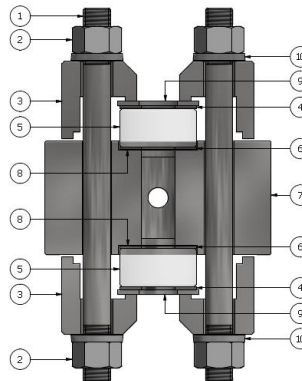
Version for series THC

POSITION	DESCRIPTION
1	Stud bolts
2	Nuts
3	Cover
4 (*)	Protection
5 (*)	Crystal
6 (*)	Gasket
7	Body
8(*)	Shield (if required)



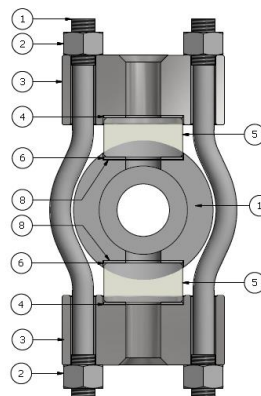
Version for series THH

POSITION	DESCRIPTION
1	Stud bolts
2	Nuts
3	Cover
4 (*)	Protection
5 (*)	Crystal
6 (*)	Gasket
7	Body
8(*)	Shield (if required)
9	Pressure plate
10	Cupped spring washer

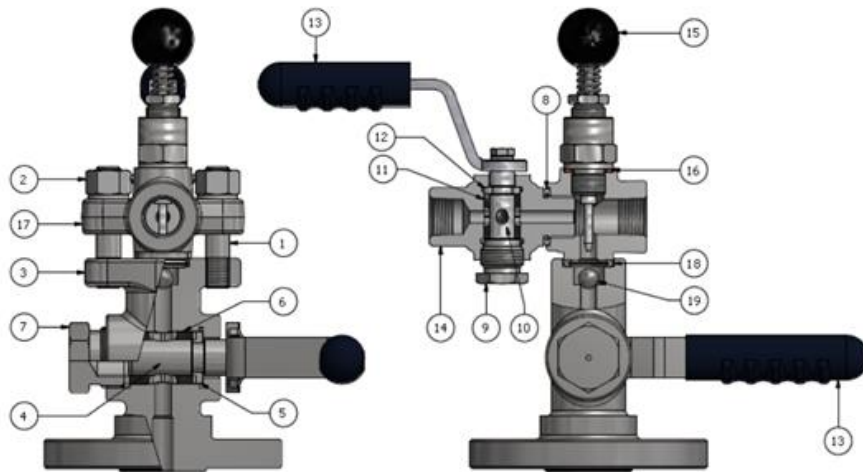


Version for series TLC

POSITION	DESCRIPTION
1	Stud bolts
2	Nuts
3	Cover
4 (*)	Protection
5 (*)	Crystal
6 (*)	Gasket
7	Body
8(*)	Shield (if required)



Version for series NY valve assembly



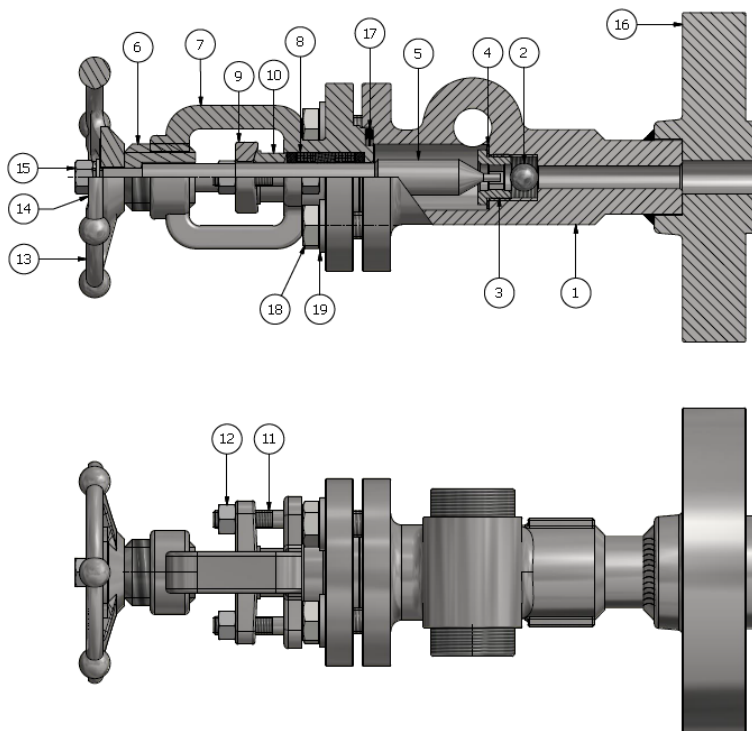
POS.	DESCRIPTION
1	Stud bolt
2	Nut
3	Intercept valve body
4	Male size 18
5	Ring size 18
6(*)	Case size 18
7	Case presser size 18
8	Seal
9	Case presser size 12
10	Male size 12
11(*)	Case size 12
12	Ring size 12
13	Handle
14	Drain valve body
15	Separator
16	Seal
17	Flange body
18	Seal
19	Safety ball

The recommended spare parts are marked with an asterisk placed beside the position.

In the demand for spare parts, always indicate the equipment serial number.

This number is provided in the instrument identification plate, that is fastened to the bottom of the instrument, and is a five-digit number preceded by the letter "F" (e.g.: F.45678).

Version for YY valve assembly



POS.	DESCRIPTION
1	Body
2	Ball check
3	Valve seat
4	Gasket
5	Spindle
6	Threaded bush
7	Bonnet
8(*)	Stuffing box ring
9	Stuffing box retainer
10	Packing gland
11	Stud bolts
12	Nut
13	Handwheel
14	Identification plate
15	Nut
16	Connection
17(*)	Gasket
18	Body screw
19	Washer



10. TROUBLESHOOTING

Level indicators of the T series are not normally exposed to faults.

Warning: in the event of fluid leaks, the level indicator shall be immediately intercepted. Follow the step-by-step instructions as indicated in paragraph 7 (Maintenance) to restore the instrument integrity.

11. DISPOSAL

When the instruments have come to the end of their service life, they need to undergo disposal. Always comply with the applicable regulations in force.

During the disposal stages, specially mind the polymers, resins and rubbers used in the manufacture (such as PVC, PTFE, PP, PVDF, neoprene, Viton, etc.).

All metal parts, after the removal of seals and gaskets, special protective coatings requested by the customer and all other plastic parts, can be recycled.

12. GUARANTEE

All level indicators of the T series are guaranteed to be free from manufacturing faults over a period of 12 months from the date of shipment. In the event of failures, implying return of goods within the limit specified above, Officine Orobiche will replace (**shipment fees not included**) all damaged parts free, provided that the failure does not ensue from incorrect use. Officine Orobiche shall never be held responsible for any incorrect use of their products when these are used for purposes other than those mentioned in the specifications approved at the order stage. In these cases, no complaints will ever be taken into consideration. No damage and/or fee, whether direct or indirect, ensuing from an incorrect installation or use shall ever be debited to Officine Orobiche. The instrument can be used for a maximum life period of 10 years dating from delivery.

When this period is over, there are two alternative options:

- 1) Replace it with a new instrument.
- 2) Have the old instrument overhauled by Officine Orobiche

INSTRUMENT RETURN PROCEDURE

The instrument returning to the factory shall bear, in attachment, the following data:

- 1) Buyer's name.
- 2) Description of the material.
- 3) Detected fault.
- 4) Process data.
- 5) Specification of the fluids that have been used with the instrument.

The instrument shall be returned perfectly clean and free from dust or deposits. Otherwise, Officine Orobiche reserves the right not to carry out the servicing and return the instrument to the sender.

FINAL REMARKS

Each instrument is supplied fully assembled and equipped with all the needed accessories.

Some parts are sold separately under special circumstances only.

Therefore, we warn you to carefully inspect the supply and notify us at once if discrepancies are found

NB: IN CASES WHEN THE DEVICES ARE INTENDED FOR USE BIS AREAS FEATURING POTENTIALLY HAZARDOUS ATMOSPHERES, THE USER SHALL STICK TO THE **ADDITIONAL SAFETY INSTRUCTIONS** ATTACHED TO THE STANDARD ONES.