



**technical** S.r.l.

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Via Toscana, 9  
20060 Vignate (MI) - Italy Tel.  
+39-02-95.36.12.40  
Fax +39-02-95.60.273  
E-mail : [sales@technical.IT](mailto:sales@technical.IT)  
[www.technical.it](http://www.technical.it)

# ***PNEUMATIC LEVEL SENSOR***

## ***TPL 10001 SERIES***

***USE AND  
MAINTENANCE  
MANUAL***

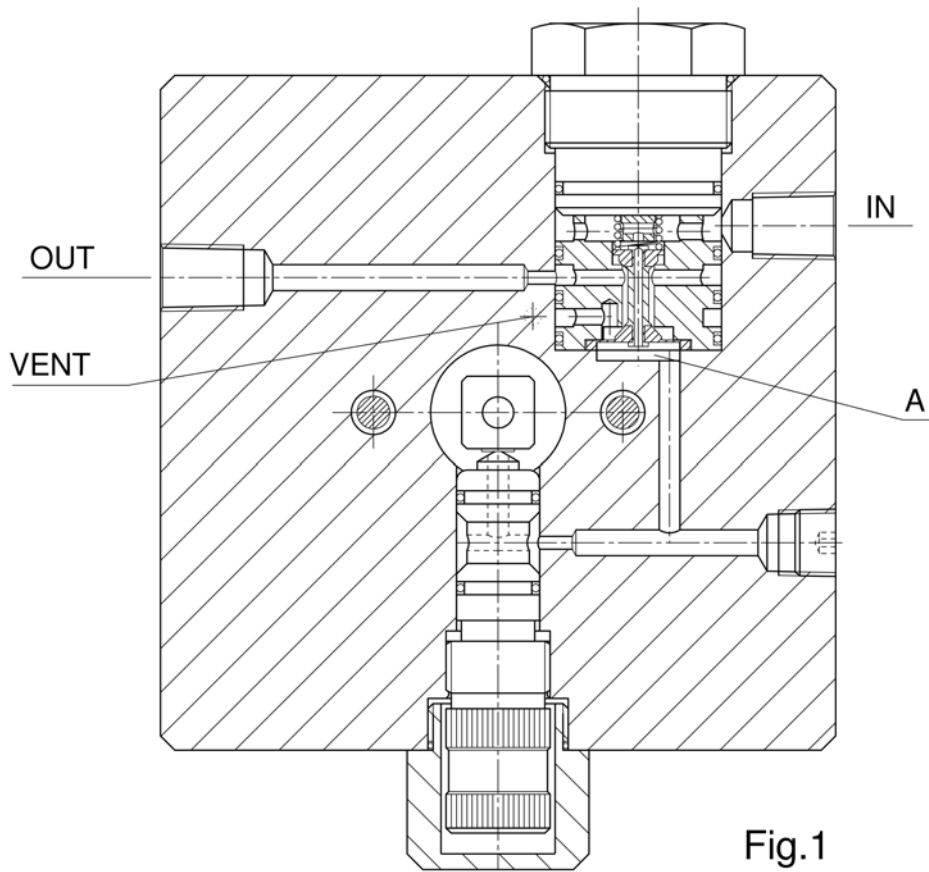
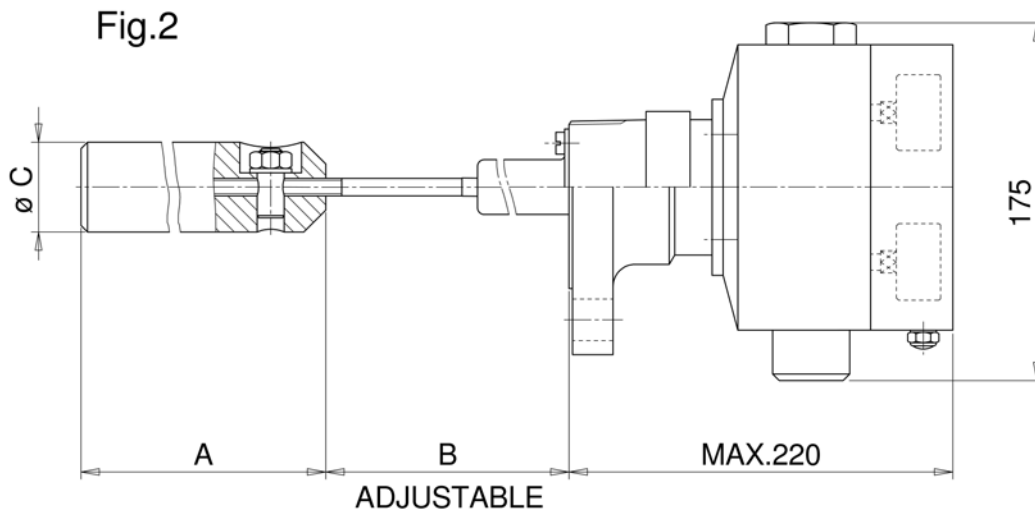


Fig.1



B	240 ÷ 340				
A	305	200	305	280	280
Ø C	48		41		36

## PNEUMATIC LEVEL SENSOR TPL 10001 SERIES

It is an instrument composed of two separate parts: a liquid sensor, completed with connection to the tank and an ON-OFF pneumatic distributor. The high sensibility of the distributor permits the use of the sensor with different type of fluids and with very low specific weight. It is available with threaded connections (ANSI, UNI-DIN, API) or special as per client's specification sheets. The maximum working pressure is 700 bar.

The standard materials usually supplied are: nickel alloy for the sensor pipe; carbon steel for the support body; aluminium for the distributor body and stainless steel for the internal parties.

### Working Principles

The **TPL-10001** pneumatic level sensor gives or takes away pneumatic signal (30÷60 psig.) when the level in the tank reaches the sensor inserted at the end of the flexible pipe.

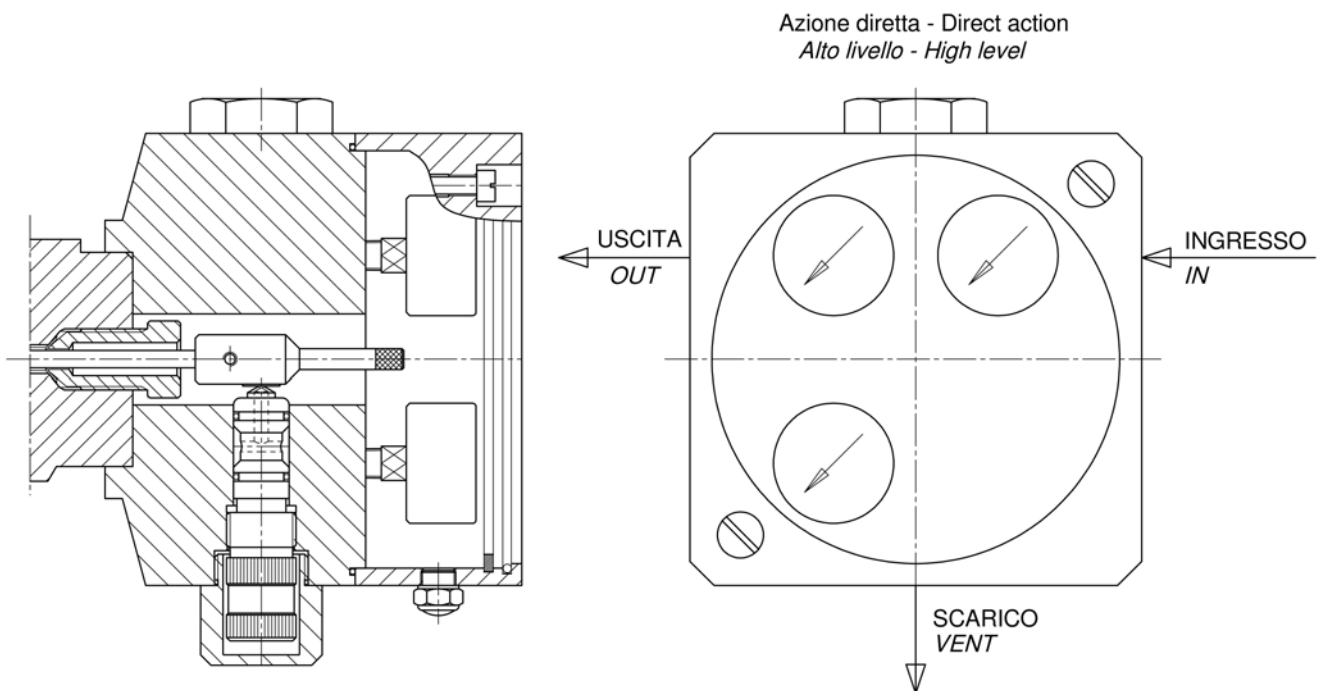


Fig.3

### Direct Action ( High level ) - ref. picture 1 and 3 -

Under normal working conditions and with a liquid below the sensor (7), the sensor weight itself maintains the disc (16) takes off from the nozzle (33) with the consequent discharge setting of the distributor: the disc (49) intercepts the supply - IN - while the OUT outlet is connected to the - VENT -.

When the tank level reaches the sensor (7) and cover about half sensor, the hydrostatic thrust decreases the thrust-weight sensor with the consequent reduction of pipe-flexibility (5) and of the rod-flexibility (45) : the disc (16) stroke against the nozzle (33) ; in the A-volume pressure forms progressively and at about 40% of the supply pressure ( gauge 26 ) the stem (39) commutes joining the OUT-outlet with the IN-inlet . At the lowering of the level in the tank, the hydrostatic thrust decreases leaving act the sensor weight (7) that increases the pipe-flexibility (5) and the rod-flexibility (45): the disc (16) get lifted with the consequent nozzle-opening (33); the pressure of A-volume get discharged and the distributor stem(39), becomes as showed in picture 3 pushed by the spring (37), joints the OUT-outlet with the VENT-discharge.

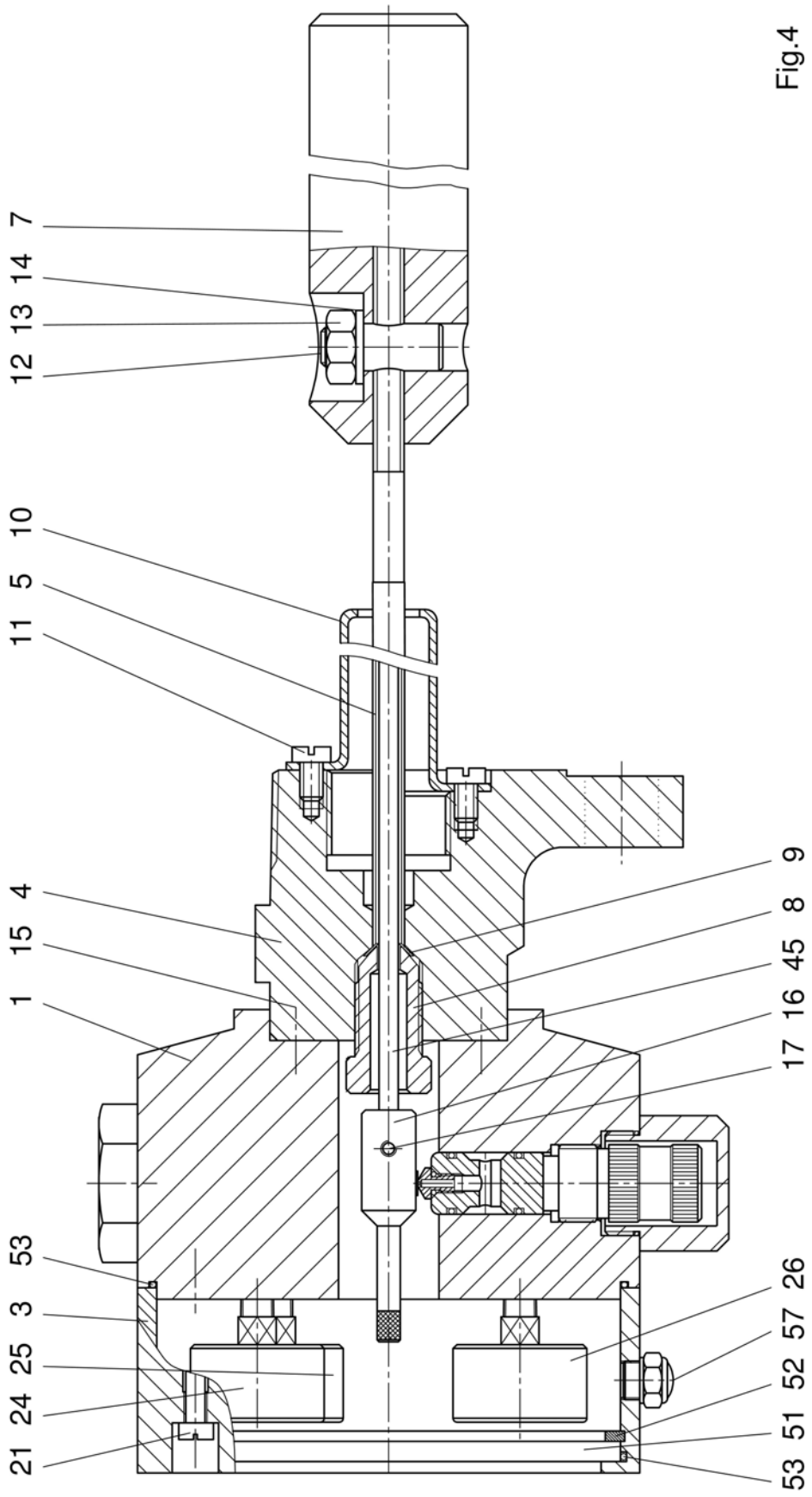


Fig.4

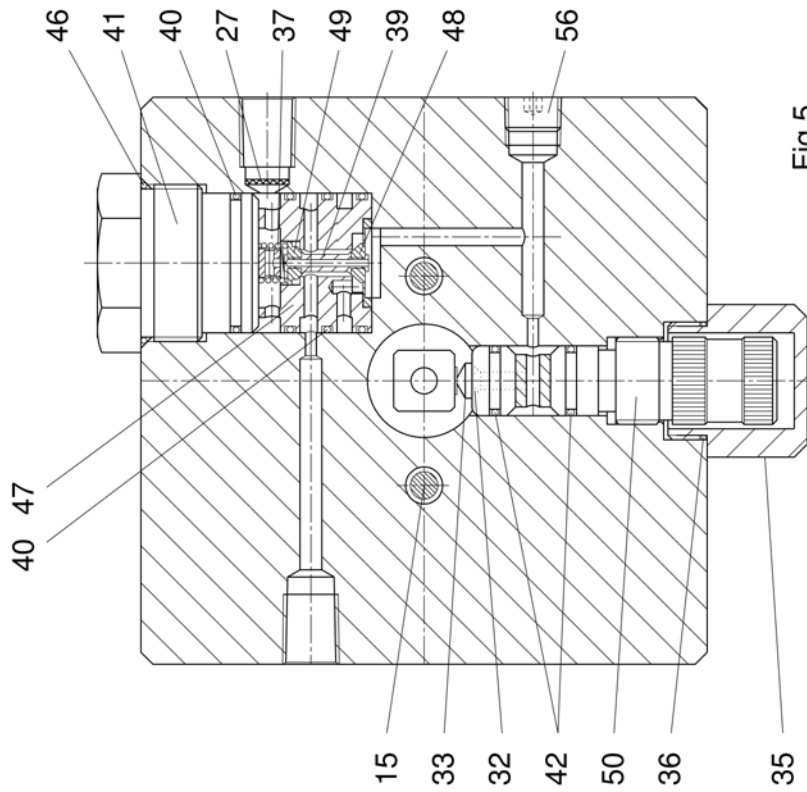


Fig.5

ITEM	DESCRIPTION	MATERIAL	ITEM	DESCRIPTION	MATERIAL
1	Body	Aluminium	27	Filter	St. Steel
3	Bonnet	Aluminium	32	O-Ring 2015	FPM rubber
4	Flange	Carb. steel	33	Nozzle	Aisi 316
5	Flexible pipe	Monel + Aisi 316	35	Plug	Aluminium
7	Sensor	Plexiglass	36	O-Ring 2100	FPM rubber
8	Lock nut screw	Aisi 304	37	Distributor spring	Aisi 302
9	Cupped washer	Aluminium	39	Distributor stem	Aluminium
10	Protection	Aisi 304	40	O-Ring 2112	FPM rubber
11	Screw	Aisi 304	41	Plug	Aluminium
12	Pin	Aisi 303	42	O-ring 2050	FPM rubber
13	Nut	Aisi 304	45	Flexible rod	Aisi 316
14	Elastic grower	Aisi 304	46	O-Ring 2131	FPM rubber
15	Lock nut screw	Aisi 304	47	Distributor bush	Aisi 303
16	Dsic	Aluminium	48	Diaphagm	FPM rubber
17	Grain	Aisi 304	49	Dsic	FPM rubber
21	Locking bonnet screw	Aisi 304	50	Adjusting screw	Aisi 316
24	Snap ring		51	Trasparent disc	Plexiglass
25	Inlet gauge		52	Seal ring	Alloy steel
26	Outlet gauge		53	O-Ring 2475	FPM rubber
	Pressure gauge		56	Plug	Aisi 304
			57	Filter	Aisi 304

Azione inversa - Inverse action  
Basso livello - Low level

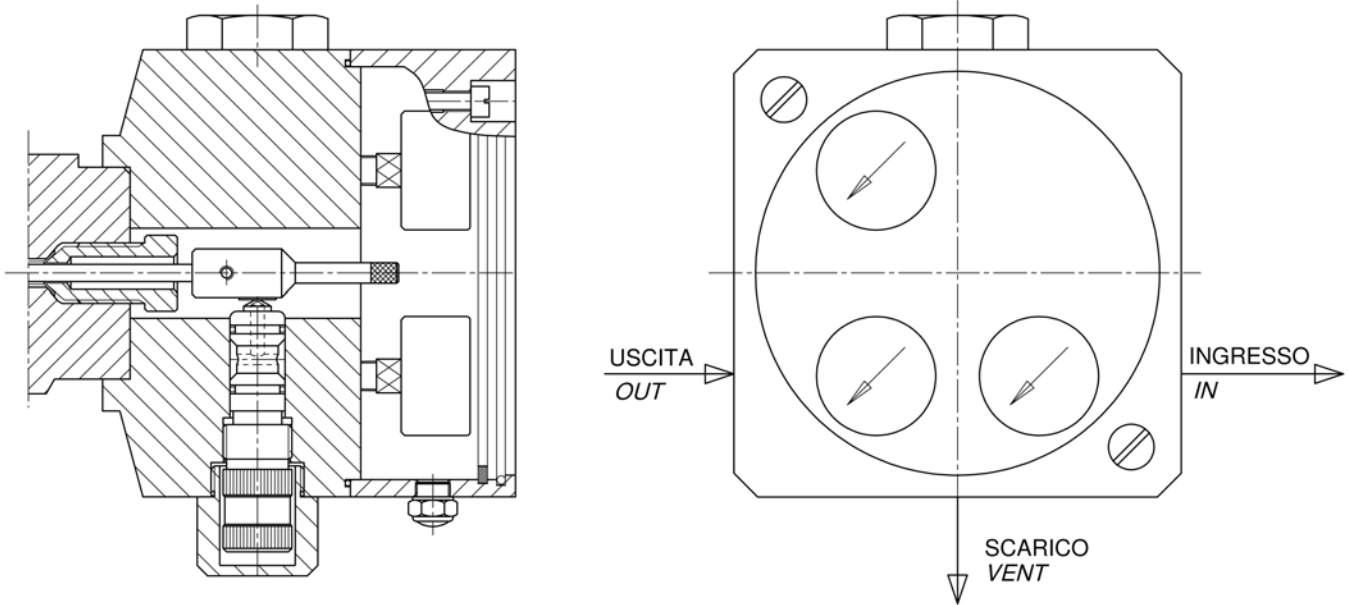


Fig.3.1

### ***Inverse Action ( Low level ) - ref. picture 1 turned of 180° and picture 3.1 -***

*Under normal working conditions the sensor (7) is submerged by the liquid and the result of the force-weight and hydrostatic thrust is such that the pipe-flexure (5) and the rod-flexure (45) is reduced so that the disc (16) is discharged from the nozzle (33). The IN-supply is intercepted by the disc (49) while the OUT-outlet is joint to the VENT.*

*When the tank level, decreasing, reaches the sensor (7) and uncover half of it, the hydrostatic thrust reduces with the result of the pipe-flexure increase (5) and of the rod-flexure (45): the nozzle (16) is taken stroke against the nozzle (33); in the A-volume pressure forms progressively and at about 40% of the supply pressure ( gauge 26 ) the distributor stem (39) commutes joints the OUT-outlet with the IN-inlet.*

*The above described working principles are related to a use with pressure signal-dispatch when the liquid level reaches the sensor (7). It is possible use or instrument with inverse working in comparison with what above described that is with the instrument that intercepts the supply and let out the pressure to be discharged when the liquid level reaches the sensor (7).*

*In this case you will have:*

- ⇒ **DIRECT ACTION** for intervention in LOW LEVEL
- ⇒ **INVERSE ACTION** for intervention in HIGH LEVEL

### **Instrument setting for intervention in HIGH LEVEL ( ref. pictures 4 and 5 )**

- a) joint air to the inlet - IN - and assure that the sensor (7) is completely uncovered by the liquid and that the flexible pipe (5) does not touch or touch slightly the protection (10) lower point at the maximum.
- b) For setting the instrument follow progressively the following instructions:
  - close the OUT-outlet or joint it to a pneumatic valve and supply 30-40 psig. air at the IN-inlet;
  - Point out if the pressure in the three gauges (24), (25) and (26) is the same;

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**Caution :** in case the gauges ( 25 and 26 ) show nought pressure, it is necessary turn clockwise the adjusting screw (50) as far as on the three gauges it is showed about the same pressure

- turn the adjusting screw (50) anti clockwise, until take the OUT-outlet pressure away; at that point turn again clockwise the adjusting screw (50) of 1/4 of turn ( two notches ).

With this setting, only the IN-inlet gauge shows the supply pressure and the instrument is prepared for intervening in HIGH LEVEL with security margin.

### **Instrument setting for intervention in LOW LEVEL( ref. picture 4 and 5 )**

Instrument turned of 180° compared to picture 4 and 5 ( high level )

a) joint air to the inlet - IN - and assure that the sensor (7) is completely uncovered by the liquid and that the flexible pipe (5) does not touch or touch slightly the protection (10) lower point at the maximum.

b) For setting the instrument follow progressively the following instructions:

- close the OUT-outlet or joint it to a pneumatic valve and supply 30-40 psig. air at the IN-inlet; Point out if the pressure in the three gauges (25 and 26) is nought;

**Caution :** in case the gauges ( 25 and 26 ) show pressure, it is necessary turn clockwise the adjusting screw (50) as far as on both gauges it is showed pressure is nought.

- turn the adjusting screw (50) clockwise, until give the OUT-outlet pressure at that point turn again clockwise the adjusting screw (50) of 1/4 of turn ( two notches ).

With this setting the three gauges show the same pressure and the instrument is prepared for intervening in LAW LEVEL with security margin.

### **DISASSEMBLING AND ASSEMBLING ( ref. picture 4 and 5 )**

#### **DISASSEMBLING ( picture 4)**

For the disassembling carry out progressively the following instructions:

- loosen the screws (21) until complete release and remove the cover (3);
- take the screws away (15) and unthread the body (1) loosen the grains (17) and unthread the disc (16);
- remove the flange (4) from the plant connection ( this procedure and the following one can be followed if the connection is flanged-type or similar type);
- loosen the nut (13) and turn the sensor (7) anti clockwise until the complete release;
- take the test gag away (8) and unthread the flexible pipe (5) together with the sensor rod (45).

#### **BODY DISASSEMBLING ( picture 5 )**

For the body disassembling carry out progressively the following instructions:

- remove the plug (35) making it turn anti clockwise;
- turn anti clockwise the adjusting screw (50) until complete unthread and extract it;
- remone the plug (41), making it turn anti clockwise and separate it from the spring (37);
- using the proper instrument or two hooks, remove the distributor-bush (47) hooking it in the two transversal holes;
- remove the gauges ( 24, 25 and 26).

#### **ASSEMBLING**

For the assembling follow the same disassembling instructions in inverse sense paying attention in positioning the disc (16) with the seal seat perfectly horizontal and complanar with the nozzle seat (33).



20060 Vignate - Milano ( Italy )