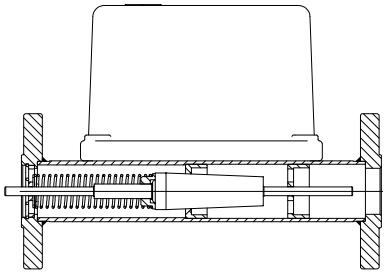
OFFICINE OROBICHE

FLUSSIMETRO AREA VARIABILE
Serie TMO





DESCRIPTION

The Variable Area Metallic Flow Meter TMO Series consists of a horizontal metallic cone containing a guided float with an internal magnet. As the flow rate increases, the **float**—in equilibrium between the force of a spring, the buoyancy force, and the fluid dynamic force—moves into a position determined by the fluid passage area.

On the outside of the cone, isolated from the fluid, is an enclosure containing a pointer magnetically coupled to the float, which indicates its position. The instrument scale is specific to the fluid and is calculated based on its operating process conditions: density, temperature, and pressure.

FEATURES

- Cost-effective, direct measurement with no external power supply required
- Wide measurable flow ranges
- Magnetic coupling overcomes limitations of glass flowmeters (corrosive or hazardous fluids, high temperatures and pressures)
- Replaceable float
- Easy installation and maintenance
- Complete production control fully integrated inside the company and highly competent
- local suppliers.
- Qualified welders and welding procedures compliant with ASME IX and EN ISO 15614.
- Completely customizable on client's needs thanks to the support of our technical and sales departments
- Over 60 years company experience with instruments installed worldwide

APPLICATIONS

- Chemical and petrochemical
- Oil & Gas On and Off-shore
- Power plants
- Water treatment

TECHNICAL SPECIFICATIONS

- Pressure rating up to ANSI2500, PN400
- Gaskets-free corrosion resistant design
- Accuracy ± 2.5 % full scale value, the value varies with the viscosity, above 5 cP
- Repeatability ± 0.5%
- Measuring range ratio 1-10, scale lenght ~ 100 mm
- Fluid's temperature form -196 to +400 °C and over on request
- Ambient temperature from -40 to +70 °C and over on request
- Available in many materials, depending on the application
- Wide range of accessories

MODELS

Measurement ranges for Series TMO are defined in steps by model. Flow rates in the table refer to water at normal conditions. Values for other fluids or conditions are calculated by Officine Orobiche based on operating density. Variations in these parameters will compromise the instrument calibration.

Table B

CONNECTIONS Ø MIN	CODE	FLOW RATE [l/h]
15 (½")	A01	10 - 100
15 (½")	A02	16 - 160
15 (½")	A03	25 - 250
15 (½")	A04	40 - 400
15 (½")	A05	63 - 630
15 (½")	A06	100 - 1 000
25 (1")	A07	160 - 1 600
25 (1")	A08	250 - 2 500
25 (1")	A09	400 - 4 000
50 (2")	A10	450 - 4 500
50 (2")	A11	750 - 7 500
50 (2")	A12	1 100 - 11 000
50 (2")	A13	1 600 - 16 000
50 (2")	A14	2 500 - 25 000
80 (3")	A15	2 500 - 25 000
80 (3")	A16	4 000 - 40 000
80 (3")	A17	6 300 - 63 000

OTHER INSTRUMENTS

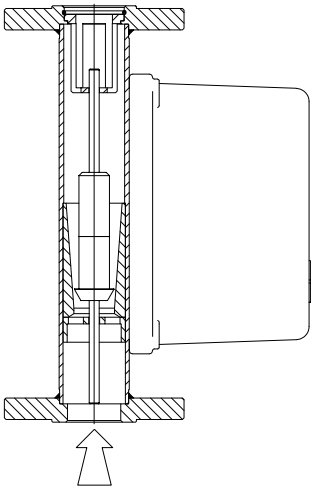
The TMO Series flow meter is designed for horizontal mounting. For vertical installations, the spring force in the **TMG Series** Metallic Flow Meter is replaced by gravity.

For lower flow rate, the Metallic Variable Area Flowmeter **TMS Series** can measure down to 0.1 L/h of water or 3 NL/h of air.

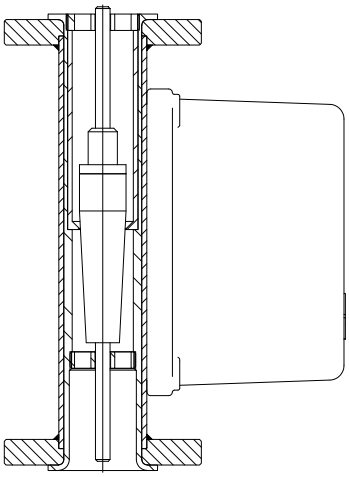
For highly corrosive fluids, the Metallic Variable Area Flowmeter **TMN Series** has a simpler geometry that allows it to be manufactured in special materials, like titanium or nickel alloys, and it can even be PTFE-lined.

Officine Orobiche manufactures also transparent glass variable area flowmeters, which are more economical and allow visual fluid inspection.

For other types of flows gauges, Officine Orobiche manufacture a whole range of Primary Flow Elements that includes Orifice Plates, Orifice Plate Assemblies, Meter Runs, Flow Nozzles, Venturi Tubes, Venturi Cone Meters, Wedge Meters and Multiport Averaging Pitot Tubes.



TMG Series



TMN Series



TMS Series

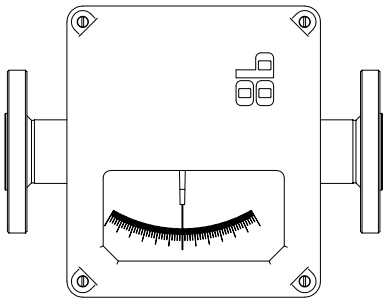
MATERIALS

Due to magnetic coupling, the instrument's body can only be made of non-ferromagnetic materials. The standard version is made of **dual-grade SS 316/316L**. On request other materials are available.

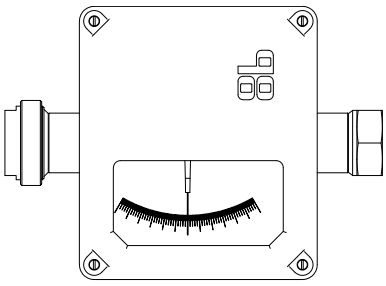
CONNECTIONS

The TMO Series Metallic Flowmeter can be supplied with the following process connections or others on request:

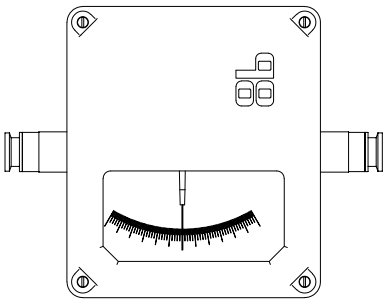
- **Flanged**
  - ASME B16.5
  - EN 1092/1
- **Threaded**
  - NPT-F or NPT-M
  - GAS-F or GAS-M
- DIN 11851 (Hygienic)
- Tri-clamp (BS4825)



Flanged



Threaded



Tri-Clamp

Table A

CODE	CONNECTIONS
A	Flanges ASME B16.5
E	Flanges EN
U	Flanges UNI
D	DIN Hygienic
T	Tri-Clamp
G	Threads GAS-F
N	Threads NPT-F
X	Others

HOUSING

Instrument's housing is available in painted die-cast **aluminum** or **SS 316L**.

For versions with electrical accessories it's available in **IP66** version or **explosion-proof Ex d** IP68 version for classified areas.

	ALUMINUM	SS316L
STANDARD IP66		
EXPLOSION-PROOF IP68 Ex d		

When electrical accessories are present, the housing has a PG11, ½" NPT, or ISO M20×1.5 entry. On request it can be supplied with an additional entry, reductions, or cable glands as accessories.

TRANSMITTER

The TMO Series flowmeter can be equipped with a **4–20 mA**, Fieldbus, or Profibus transmitter inside the housing. The 4–20 mA analog signal can be overlaid with a **HART digital signal**. For classified areas, an **intrinsically safe Ex i version** is available.

A four digits LCD loop-powered **display** can be placed, on the instrument's scale, that shows the 4-20 mA signal value in percentage. This configuration combines the dial mechanical indication with the display analogic one.

The following table outlines the available configurations:

Table D

CODE	TRANSMITTER
T0	No transmitter
T1	Standard 4-20 mA
T2	4-20 mA Ex i
T3	4-20 mA HART 7
T4	4-20 mA HART 7 Ex i
TF	Foundation Fieldbus
TP	PROFIBUS

The code shows an additional "+D" if it comes with the Display.

SWITCHES

The TMO Series Flowmeter can be supplied with one or more bistable switches: **Reed type** (30 VDC 0.1 A) or **NAMUR type** (8 VDC 0.01 A).

Table E

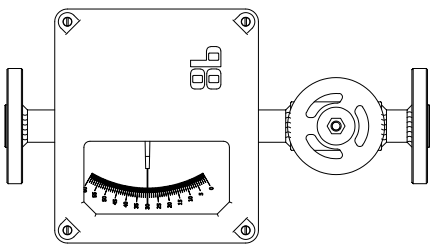
CODE	SWITCH
C1	n°1 Reed *
C2	n°2 Reed *
C3	n°1 NAMUR
C4	n°2 NAMUR

* High or low alarm only

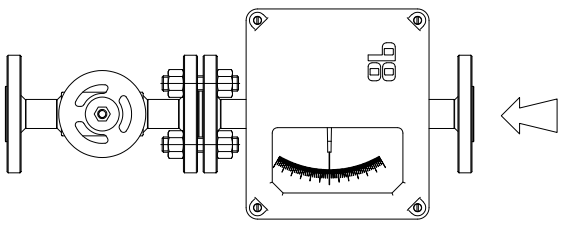
VALVES

The TMO Series flowmeter can be supplied with an **integrated inlet** needle or globe/needle valve.

On request the valve can be supplied in outlet position but not integral with the flowmeter's body, otherwise it wouldn't be possible to remove the float for maintenance.



Integral Inlet Valve



Mounted Outlet Valve

OTHER ACCESSORIES AND VARIATIONS

- Double scale
- Electric, steam, or self-heating cable tracing
- Insulation
- High-temperature version up to 450 °C (higher on request)
- Full-penetration welds with WN flanges
- Connections curves and reducers
- Custom panels per customer design
- Standard Officine Orobiche or customer coatings
- Surge protector for electrical parts

APPROVALS

On request the following approvals are available:

- PED 2014/68 UE
- ATEX II 2G Ex h IIC/IIB Tx Gb, II 2d Ex h IIIC Tx Db
- IECEx Ex h IIC T4 Gb / Ex h IIIC T100°C Db
- NACE MR-0175 or MR-0103
- EAC CU TR 012: 1 Ex h IIC Tx Gb
- Pattern Approval and Poverka for export to Russia

For electrical accessories:

- ATEX Ex d or i
- IECEx Ex d
- IECEx Ex h ib IIC T4 Gb / Ex h ib IIIC T100°C Db
- EAC Ex d or i
- IEC 61508 SIL 2
- IEC 60529:1989 IP66
- ECAS Ex for export to UAE

SPARE PARTS

Our company database contains information about the instruments manufactured in 60 years, to request spare parts for an installed instrument state the F number written in the top-right of the tagplate:



The standard spare kit includes float, stopper and clipring, depending and they depend on the model (Table A).

MODEL CODE

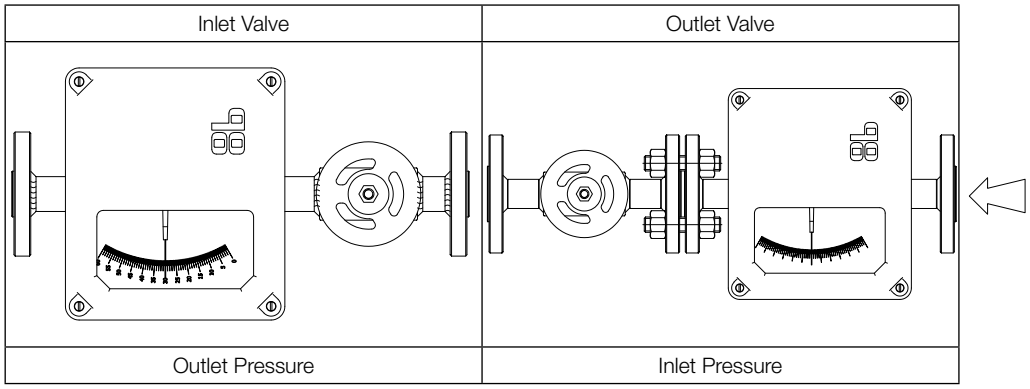
TMO250	A	BB	CCC	DD	EE	XX
	Connection Type: Table A	Connections Ø min: Table B	FLow Model: Table B	Transmitter: Table D	Alarm: Table E	Any possible variations

EE and XX are present only when applicable.

Example: TMO250.A.15.A05.T0.XX

To request a quotation please state:
- Fluid density
- Area classification (safe or classified)
- Design temperature and pressure
- Connection details (type, DN, Rating)
- Material

For instruments with valves or self-regulators, the pressure should be measured as per the following table:



Our technical and commercial departments are available to discuss any variation or customization not mentioned in this catalogue.

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