



EN



## Serie IMTM

Turbine Gas Meter



High accuracy  
 High quality  
 High performances  
*The Best !*

Natural gas companies all over the world use **Pietro Fiorentini** Turbine meters in commercial, industrial and residential applications with a high flow of natural gas measurement.

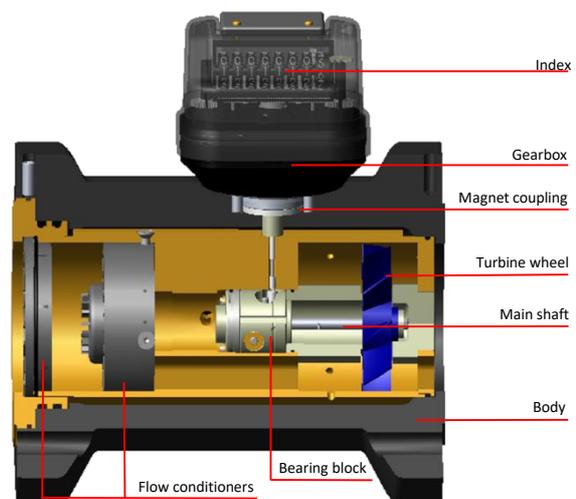
**Pietro Fiorentini** turbine meters are used in the wellhead collection line, in compression stations, in gas distribution systems and in end users such as chemical and processing plants.

Standard construction meters are used in the measurement of a variety of filtered and dry non-corrosive gases, including special gases.

**Pietro Fiorentini** turbine meters are approved for custody transfer applications and used by natural gas transmission and gas distribution companies.

### Turbine Meter Design Feature

- Removable metrological cartridge assembly
- High performance aluminum alloy turbine wheel
- Optimized bearing construction
- Multi-stage integrated flow conditioner
- Simplified maintenance and repair
- Multi-functional index
- Light weight aluminum body



### Turbine Meters measurement principle

Designed to measure gas velocity, the operating principle of the turbine meter incorporates an innovative method of conditioning flow in the meter body. A straightening section in the meter body conditions the gas flow by removing undesired swirl, and turbulence before it reaches the turbine rotor. The dynamic forces from gas flow initiate rotation of the turbine rotor. The precision machined rotor, mounted on an axial shaft, includes high quality, low friction stainless steel ball bearings to allow world class measurement accuracy chamber.

The turbine rotor has helical blades and a known angle relative to the gas flow. The turbine rotor angular velocity is proportional with the gas velocity. The rotating movement of the turbine rotor and primary gear train, all fitted in a pressurized body; drive an externally mounted exchangeable 8-digit mechanical counter. The counter assembly provides readout represented in engineering units such as cubic meters. Two LF (low frequency) pulse outputs are included in the standard counter assembly.

## Major Design Features

### Meter Cartridge Assembly

The Pietro Fiorentini Turbine Meter product line extends from G40 through G4000. Aluminum bodies can operate up to 8" (20 bar) and steel bodies up to 12" (100 bar). All sizes incorporate an innovative, removable measurement cartridge assembly. The removable cartridge enables users to change the meter's volume capacity or perform critical maintenance by removing and installing a new cartridge. The flexibility of the removable cartridge provides cost savings for common meter repairs, upgrades, and testing. The removable cartridge also gives users flexibility in designing cost effective meter stations, especially when end user requirements call for an increase in meter capacity.

The Pietro Fiorentini Turbine Meters is available with enhanced volumetric capacity by utilizing four different cartridge sizes for each meter body.

This feature offers modular flexibility in terms of minimum and maximum capacity. In accordance with European Standard EN 12261:2002/AMD1:2006

#### 6.4 Removable meter mechanism

##### 6.4.1 Integrity,

##### 6.4.1.1 Requirements

*"the design and integrity of a meter with removable mechanism or cartridge shall not be affected by the removal or replacement of the measuring element or cartridge. A meter will be deemed to meet this requirement if it remains leak tight, as defined in 6.2.3, when subjected to the test given in 6.4.2".*

For example, the 6" turbine meter body may be ordered with a Qmax of 650 m<sup>3</sup>/h, 1000 m<sup>3</sup>/h, 1600 m<sup>3</sup>/h, or 2500 m<sup>3</sup>/h.

If flow parameters change customers can change the measurement cartridge. This unique feature offers a distinct cost savings advantage, reducing the need to replace a complete meter or redesigning the metering station.

The cartridge and turbine wheel are machined from high quality aluminum to offer long term reliability and stability. All cartridges are hard-coated (anodized) to reduce wear and corrosion of the flow channels caused by contaminants within the gas stream.

Customers can purchase new, pre-calibrated cartridges with a calibration certificate. As an option and at an additional charge, we can supply the cartridge with certified calibration at elevated pressure by an independent test facility. The existing measurement cartridge can then be exchanged with a new, light weight, pre-calibrated cartridge by removing the special ring that positions and holds the cartridge inside the meter body.



### Multifunctional Index

The **Pietro Fiorentini** turbine meters utilize a magnetically coupled index. A “drive” magnet couples to the “follower” magnet of the index, which in turn drives the odometer on the meter index.

The index uses an 8 digit odometer and provides direct readings in cubic meters. The index is 100% sealed IP67 approved.

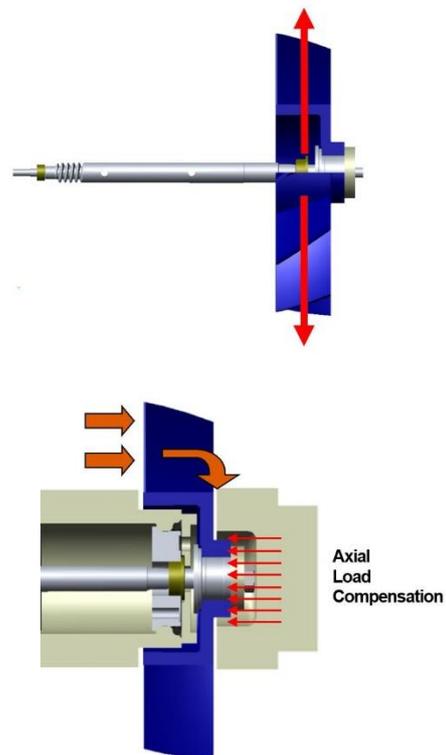
The index can be removed or installed with just “one twist and a click”. The magnetic coupling allows for adjustable orientation of 355° or exchange without decommissioning the meter. A single index is adaptable to all turbine meter sizes due to the gear reduction (gear-box). The gear reduction is used to turn the drive magnet at an output ratio common to all turbine meters. By using a common index, the design enables standardization, reduces inventory and maximizes modular flexibility. The turbine index also contains a pocket that can hold different types of Low Frequency (LF) pulse devices, such as reed switches, or fraud detection/tamper indication devices,

For applications requiring serial communication, the turbine index is available with an encoder. The encoder uses three optical sensors to detect light passing through a specially designed slotted disc rotating within the index. The light detected passing through the disc is converted to a numeric value using Gray Code. The system offers high resolution and allows for instant flow calculation.



### Optimized Bearing Construction with Axial Load Compensation

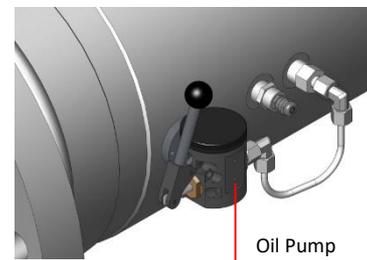
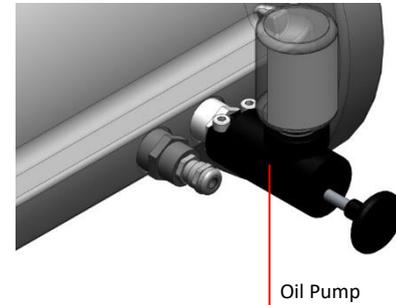
Since the axial load on the bearings is proportional to the density of the flowing gas, this load increases significantly when the meter operates at elevated pressures. The **Pietro Fiorentini** Turbine Meter reduces the axial load on bearings operating at elevated pressures with our innovative Axial Load Compensation (ALC) design feature. The Axial Load Compensation design feature induces slightly higher pressure downstream of the turbine wheel, this reducing mechanical friction on the bearings. To further enhance bearing life we located bearings and gears upstream of the turbine wheel. This protects bearings from contaminants, especially contaminants that tend to accumulate around the turbine wheel.



### Oil refreshing & Flushing Lubrication System

The **Pietro Fiorentini** Turbine Meter product incorporates high quality precision bearings that should be kept clean and lubricated. Meter performance is optimized by flushing contamination from the bearings and refreshing or adding of oil during operation. Recommendations as to when to lubricate turbine meters varies by product design, customer procedures, and regulatory requirements. Many regulatory agencies extend turbine meter re-calibration intervals when utilizing a lubricating system. Effective removal of dirt and dust along with oil refreshment enhances turbine meter accuracy. This is important in applications where gas quality is inferior. Some gas networks have locations where flowing gas includes increased levels of dirt, entrapped liquids and other foreign materials. For applications with inferior gas quality, conventional oil injection systems only add oil to bearings and other critical gears. Flushing dirty oil can significantly improve bearing and gear performance.

The **Pietro Fiorentini** Turbine Meters incorporate an inventive oil refreshing and flushing lubrication system. During meter operation oil pumps into a reservoir in the bearing block. A splash vane, rotating at main rotor shaft speed, lubricates all bearings, gears, and shafts. This splash vane also flushes dirty oil away from critical parts.



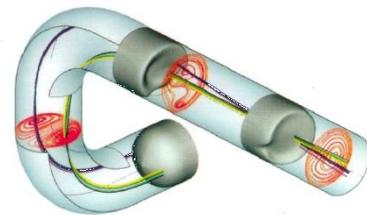
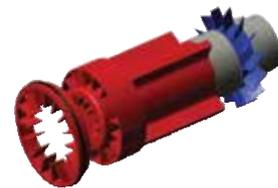
### Multi-Stage Flow Conditioners

To promote superior meter accuracy, even in non-ideal metering installations, the **Pietro Fiorentini** Turbine meter product line features a multi-stage flow conditioner with the turbine wheel positioned at the very rear end of the cartridge. This creates twice the length for straightening the incoming flow profile as compared to conventional turbine meters.

Our integrated multi-stage flow conditioner reduces the effects of high flow disturbances, complying with the European and major International directives and guidelines such as the OIML, ISO and DVGW.

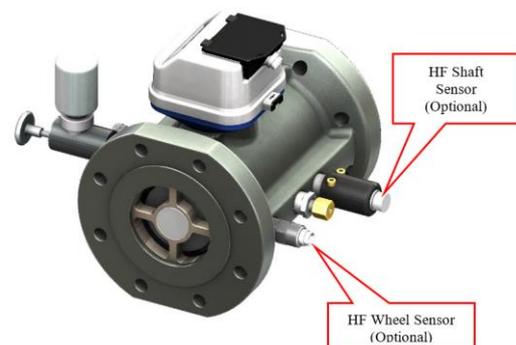
The pipe upstream of the turbine meter can have a minimum straight section of 2 DN.

The turbine meter design permits very compact M&R stations without sacrificing meter accuracy.



### HF Sensors

As an option, turbine meters can be provided with a HF (High Frequency) sensor. The HF sensor can also be installed into the meter at a later time without having to remove the meter or the cartridge from the installation. The sensor is designed and approved in accordance with ATEX. The generated output signal complies with EN 60947-5-6/NAMUR.

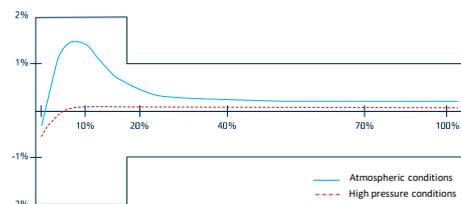


## Turbine Meter Technical data

Applications:	Clean and dry natural gas, town gas, propane, inert gases
Materials:	Body : Hard anodize Aluminum Alloy or Carbon Steel Rotor : Aluminum Alloy Shaft & Bearing: Stainless Steel Gears: Technopolymer Bearing supports: stainless steel
Nominal pressure rating:	from PN16 to ANSI600
Nominal Diameters:	Aluminum body: from DN50 to DN200 Steel body: from DN50 to DN300
Measuring Range:	1:20 at atmospheric conditions acc.to EN12261
Flow rates:	Aluminum body: From 8 m <sup>3</sup> /h to 4000 m <sup>3</sup> /h Steel body: From 8 m <sup>3</sup> /h to 6500 m <sup>3</sup> /h
Repeatability:	Better than 0,1%
Measuring Accuracy:	According to EN12261
Temperature Range:	Aluminum body: -25° C to +55° C Steel body: -25° C to +55° C (at request -40° C)
Low frequency pulse:	2x low frequency NO reed contact and 1 x anti fraude NC reed contact
High frequency pulse:	Optional one HF main shaft acc.to EN 60947-5-6 / NAMUR Optional one or two HF turbine wheel acc.to EN 60947-5-6 / NAMUR
Pressure & Temperature point:	¼ " NPT female ( others at request)
Approval:	EN12261 2014/32/EU MID 2014/34/EU ATEX 2014/68/EU PED

Our facility is ISO 9001 quality system certified by Lloyd's Register

The [Pietro Fiorentini](#) turbine meters are each supplied with a calibration certificate. The initial verification and calibration are carried out at the factory on an VSL approved Test-bench. As an option, the turbine meters can be provided with a high pressure calibration from a certified test facility.



**Available sizes / nominal operating conditions**

Model	Qmax	Qmin	Range	DN	PN	Length	Weight	LF impulses	Series
	m <sup>3</sup> /h	m <sup>3</sup> /h	max	metric (imperial)		mm	kg	Imp. /m <sup>3</sup>	
G40	65	13	1:5	50 ( 2 " )	PN16 or ANSI 150	150	5,5	10	QUANTOMETERS Aluminium body
G65	100	10	1:10					1	
G100	160	16	1:10					80 ( 3 " )	
G100	160	8	1:20						
G160	250	13	1:20						
G250	400	20	1:20						
G400	650	32	1:20	100 ( 4 " )	PN16 or ANSI 150	150	8,2	1	
G160	250	13	1:20						
G250	400	20	1:20						
G400	650	32	1:20						
G650	1000	50	1:20						

G40	65	13	1:5	50 ( 2 " )	PN16 or ANSI 150	150	5,5	10	CUSTODY TRANSFER Aluminium body
G65	100	10	1:10					1	
G100	160	16	1:10					80 ( 3 " )	
G100	160	8	1:20						
G160	250	13	1:20						
G250	400	20	1:20						
G400	650	32	1:20	100 ( 4 " )	PN16 or ANSI 150	300	15	1	
G160	250	13	1:20						
G250	400	20	1:20						
G400	650	32	1:20						
G650	1000	50	1:20						
G400	650	32	1:20	150 ( 6 " )	PN16 or ANSI 150	450	30	1	
G650	1000	50	1:20					0,1	
G1000	1600	80	1:20						
G1600	2500	130	1:20						
G650	1000	50	1:20	200 ( 8 " )	PN16 or ANSI 150	600	57	1	
G1000	1600	80	1:20					0,1	
G1600	2500	130	1:20						
G2500	4000	200	1:20						

G40	65	13	1:5	50 ( 2 " )	From PN16 to ANSI 600	150	Depending of PN or Class designation	10	CUSTODY TRANSFER Steel body
G65	100	10	1:10					1	
G100	160	16	1:10					80 ( 3 " )	
G100	160	8	1:20						
G160	250	13	1:20						
G250	400	20	1:20						
G400	650	32	1:20	100 ( 4 " )	From PN16 to ANSI 600	300		1	
G160	250	13	1:20						
G250	400	20	1:20						
G400	650	32	1:20						
G650	1000	50	1:20						
G400	650	32	1:20	150 ( 6 " )	From PN16 to ANSI 600	450	1		
G650	1000	50	1:20				0,1		
G1000	1600	80	1:20						
G1600	2500	130	1:20						
G650	1000	50	1:20	200 ( 8 " )	From PN16 to ANSI 600	600	1		
G1000	1600	80	1:20				0,1		
G1600	2500	130	1:20						
G1000	1600	80	1:20						
G1600	2500	130	1:20						
G2500	4000	200	1:20	250 ( 10 " )	From PN16 to ANSI 600	750	0,1		
G1600	2500	130	1:20						
G2500	4000	200	1:20						
G1600	2500	130	1:20						
G2500	4000	200	1:20	300 ( 12 " )	From PN16 to ANSI 600	900	0,1		
G4000	6500	320	1:20						

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[www.fiorentini.com](http://www.fiorentini.com)

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