GE Oil & Gas

Dresser* Turbine Meters

Above all - accuracy and reliability

imagination at work

GE Oil & Gas' innovative Dresser Turbine Meter helps reduce installation and maintenance costs while improving measurement accuracy

Built with Operation in Mind

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.

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.

GE's turbine meters are approved for custody transfer applications and used by natural gas transmission and gas distribution companies.

Design Features

- Removable meter cartridge assembly
- Optimized bearing construction
- Oil flushing and lubrication system
- Multi-stage flow conditioner
- Multi-functional Index assembly
- Light weight aluminum body

Meter Cartridge Assembly

GE's Dresser 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 Dresser Turbine Meter 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, 6.4 *Removable meter mechanism, 6.4.1 Integrity, 6.4.1.1 Requirements that states "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^3/h, 1000 m^3/h, 1600 m^3/h, or 2500 m^3/h.

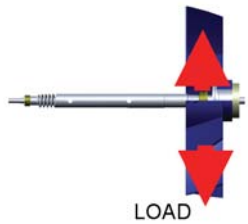
If load parameters change customers can change the measurement cartridge. This unique feature offers a distinct cost savings advantage, reducing the need to replace a complete meter or redesigning the metering station.

The length of the meter is three times the pipe diameter (3d) in compliance with the European directives for turbine meters. 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 contaminates 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.

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 Dresser 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, thus 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 contaminates, especially contaminates that tend to accumulate around the turbine wheel.



Oil Refreshing & Flushing Lubrication System

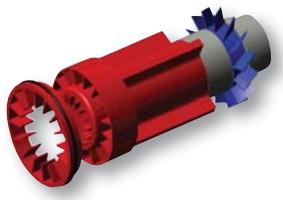
The Dresser Turbine Meter product incorporates high quality precision bearings that should be kept clean and lubricated. Meter performance is optimized by flushing contamination from the bearings and refreshing or adding of oil during operation. Recommendations as to when to lubricate turbine meters varies by product design, customer procedures, and regulatory requirements. Many regulatory agencies extend turbine meter re-calibration intervals when utilizing an automatic lubricating system. For example, Germany extends the re-calibration frequency from eight to twelve years when users utilize a turbine meter with a lubrication device or 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 Dresser 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 into the reservoir.

Multi-Stage Flow Conditioner

To promote superior meter accuracy, even in non-ideal metering installations, the Dresser Turbine meter product line features a multi-stage flow conditioner with the turbine wheelpositioned 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.



Material flow conditioner:
Aluminum + glass reinforced Crastin

Multi Functional Index Assembly

Dresser Turbine Meters and Series C Rotary Meters are equipped with a magnetic coupled index. Standardization reduces inventory and increases modular flexibility to its fullest extent. Using a specially designed magnet inside the meter, the reading of the meter can be changed from mechanical to electronic with ease. A "mechanical" magnet is used to drive the follower magnet of the mechanical index. The index can be removed or installed with just "one twist and a click." The magnetic coupling allows adjustment for orientation or exchange without decommissioning the meter.

To enhance design flexibility, the mechanical index contains a pocket that can hold different types of LF pick-ups such as reed switches, Wiegand sensors or fraud detection devices. This allows the sensors to be changed quickly and easily.

- Direct Reading in cubic meter as per OIML R137-1, Odometer Type, 8 digits.
Index is 100% sealed and IP67/IP55 approved.

HF Sensor Combined with Isolated Thermowell

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, FM and CSA. The generated output signal complies with EN 60947-5-6/NAMUR. The housing for the high frequency sensor is also suitable to be fitted with a thermowell for accurate temperature measurement. The traditional offset in temperature reading is eliminated by isolating the thermo well from the meter body by means of O-rings.

Low Weight Aluminum Meter Body

Conventional steel body turbine meters are increasing transportation cost and safety in handling. Our aluminum body turbine meters are lighter in weight to equivalent iron case GGG40 meter bodies.

Turbine Meter Advantages

- Precision machined rotor, superior component parts, and robust body design provides long-term accuracy and reliability.
- Replaceable Measurement Cartridge (RMC) allows customers to design small metering stations when planning for future meter capacity increases.
- Low cost associated with government accuracy test directives by replacing the existing measurement cartridge with a new pre-calibrated cartridge.
- Reduce the need to replace the entire meter by replacing a measurement cartridge when it is necessary to perform important repair work.
- Multi-stage flow conditioner doubles the internal flow conditioning inside the meter body.
- Main bearing location provides protection from dirt, dust, and pipeline contamination.
- Increased meter life expectancy from innovative meter oil lubrication system that lubricates all moving parts, flushes contamination, and refreshes oil in the main bearing reservoir.

Technical Data

Applications:
Media: Clean and dry natural gas, town gas, propane, inert gases

Industries: Gas supply, heating manufacturers, chemical

Nominal pressure ratings:
PN 10/16 and ANSI 150/300/600
DIN and ANSI Flanges

Nominal diameters:
Aluminum: 50 mm (2") to 200 mm (8")
Steel: 50 mm (2") to 300mm (12")

Measuring Range:
1:20 minimum or better at atmospheric conditions.
Up to 50:1 at higher densities

Flow rates:
Aluminum: 8 m^3/h up to 4000 m^3/h
Steel: 8 m^3/h up to 6500 m^3/h

Repeatability: Better than 0,1%

Measuring accuracy:
0,2 Qmax to Qmax : ± 1% or better
Qmin to 0,2 Q max: ± 2% or better

Temperature Range:
Aluminum: -25°C to +55°C,
Steel: -10°C to +55°C,
Steel on request: -20°C to +55°C
Others on request

Material

- Aluminum alloy body, turbine wheel and cartridge
- Steel body with aluminum turbine wheel and cartridge
- High grade steel alloy shafts

Standards:
Dresser Meters & Instruments Turbine Meters are designed in accordance with the following relevant international standards: EC Directive MID 2004/22/EC, EN12261; OIML R137-1; and various National metrological approvals by NMi. Accredited according to the Pressure Equipment Directive (PED)

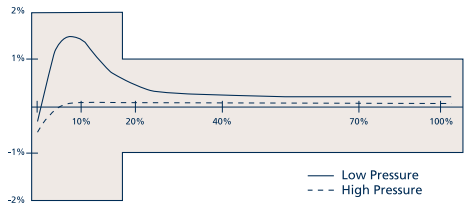
Calibration

Dresser Turbine Meters and removable cartridge assemblies are each supplied with a calibration certificate. The initial verification and calibration are carried out at the factory on an NMi and/or PTB approved calibration bench.

As an option, the turbine meters can be provided with a high pressure calibration from a certified test facility.

Installation

- Our integrated multi-stage flow conditioner reduces the effects of flow disturbances, complying with the European and major International Directives and guidelines such as the OIML, ISO and DVGW. The turbine meter design permits very compact M&R stations without sacrificing meter accuracy.



- All Dresser Turbine Meters are designed for outdoor installation. The index is IP65/IP55 approved.
- Gas pipes must be clean and free from foreign impurities such as sand, dirt, welding debris and other particles, as well as liquid. Where dirty gas exists, it is recommended to fit the meter with an automatic lubrication system and or a purge system.
  Note: The lubrication system works relatively well with dirty gas flowing through the meter. In this case, the lubrication system must be operated at an increased frequency to eliminate the negative effect of dirty gas on the meter bearings.
- Although the ALC (Axial Load Compensation) protects for sudden flow variations, it is recommended to pressurize the meter slowly to prevent overspeeding and damaging the meter rotating parts.

Size DN	mm	50	50	50	80	80	80	80	100	100	100	100
G-Value	–	G40	G65	G100	G100	G160	G250	G400	G160	G250	G400	G650
Qmax	m^3/h	65	100	160	160	250	400	650	250	400	650	1000
Qmin	m^3/h	13	10	8	8	13	20	32	13	12	32	50

Size DN	mm	150	150	150	150	200	200	200	200	250	250	250
G-Value	–	G400	G650	G1000	G1600	G650	G1000	G1600	G2500	G1000	G1600	G2500
Qmax	m^3/h	650	1000	1600	2500	1000	1600	2500	4000	1600	2500	4000
Qmin	m^3/h	32	50	80	130	50	80	130	200	80	130	200

Size DN	mm	300	300	300
G-Value	–	G1600	G2500	G4000
Qmax	m^3/h	2500	4000	6500
Qmin	m^3/h	130	200	320

Temperature Range	-25 to 55° C Aluminum Body (other temperatures on request) -10 to 55° C Steel Body -25 to 55° C Cartridge
Environmental Temperature	-25 to 55 °C (other temperatures on request)
Pressure Loss	According EN12261 (5.2.9 Table 8)
Flange/Pressure Ratings	PN 10, 16 / ANSI 150, 300, 600 (other Flange Rating on request)
Weight (kg)	Depending on Flange/Pressure Rating (on request)
Ua Index	According to EN12261
HF Main Shaft	Refer to Price List
HF Turbine Wheel	Consult Factory
2 Each HF Turbine Wheel	Consult Factory

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