Brent Adler®
INNOVATIVE CONTROL

GAS TURBINE FLOWMETER
Model : TFM-153

The **Gas Turbine Flowmeter – Model TFM-153** measures the **volumetric flow of gases** using a precision rotor that spins with the gas stream, converting its rotation into an accurate flow rate signal. Known for its **high accuracy, repeatability, and durability**, the **TFM-153** is ideal for **natural gas, petrochemical, and power generation** applications. Best suited for **clean, dry gases**, it delivers **reliable and cost-effective performance** with proper calibration and maintenance.

TFM-153
GAS TURBINE FLOWMETER

Applications

- The **TFM-153** Turbine Gas Flowmeter is fit for use in the custody transfer measurement of gas volumes - especially natural gas in gas transmission stations, in power plants and city stations as well as in various industrial plants wherever custody transfer equivalent accuracy of measurement is requested.

Key features

- Flow rates from 2.5 to 13000 m3/h
- Nominal sizes from DN 25 to DN 400 (1" to 16")
- Pressure class PN 16 to PN 100 and ANSI 150, 300 and 600
- Measuring range 1 :20, optional 1 :30 depending on operating conditions
- Meter housing made of anodized high strength Aluminum, Carbon Steel or a welded steel construction
- Index head by default made of engineering UV stabilized polymer material, optional made of Aluminum
- Rotating counter (355 °)
- compact installation no straight inlet pipe is required for low level perturbation according to OIML standard, however, due to complicated applications, we would recommend to use straight inlet pipe 2 DN and outlet pipe 1 DN with low level perturbations. In case of high level perturbations an additional straight in let pipe of 2DN is necessary.
- Horizontal and vertical mounting positions possible
- Approvals according to MID (2014/32/EU). OIML, PED (PED 2014/68/EU), ATEX.

Description and operation

The **TFM-153** turbine meter registers the operating volume using an eight-digit mechanical counter. Via pulses the operating volume is transferred to an electronic volume corrector and converted to normal or standard conditions. The TBQM turbine is approved for custody transfer according to MID (2014/32/EU) / OIML.

The turbine meter **TFM-153** is a volume flow meter. The flow of the gas to be measured causes the turbine rotor to rotate.

The gas flow is narrowed on an annular cross section, is accelerated and directed onto the smooth-running Aluminum rotor. The number of rotations is proportional to the traversed gas volume, the frequency of rotations is proportional to the actual gas flow. The rotation of the rotor is connected to a speed-reducing gear train and transmitted by a magnetic coupling from the gas area to the adjustable roller counter in the atmospheric environment.

The actual volume flow can be transmitted to electronic volume correctors or data loggers via low frequency (LF) pulses generated by Reed contacts. An additional anti-tampering contact is placed in the LF pulser unit. This contact is triggered in the presence of strong magnetic fields in case these are used for tampering purposes.

The rotation of the rotor can also be scanned with one or two high frequency (HF) sensors. The TF-sensor signal allows the determination of the actual gas flow in high resolution. It is used in flow computers on its own or in addition to the LF signal.
Damage of the rotor or missing or crooked blades can be detected by a changed frequency pattern.

Technical specifications

Gas temperature:	-20 °C to +60 °C , MID : -10 °C to +55 °C
Ambient temperature:	-20 °C to +60 °C , MID : -10 °C to +55 °C
Storage temperature:	-30 °C to +60 °C
Operating pressure:	110 bar max., according to housing specification
Protection class:	IP 67
Materials:	
• Meter housing	Aluminum alloy /Steel
• Turbine rotor:	Aluminum alloy
• Meter index head:	Engineered UV stabilized polymer, aluminum head as an option
PED-Approval:	Hpi / 222-103-Q-06
ATEX-Approval:	Ex II 1 G Ex ia IIC T4 Ga
MID - Approval:	T10488 - NMi Certine
OIML- Recommendation:	The gas meter of the type TFM-153 meets the requirements of OIML R137-1 & 2: 2012 “gas meters”, confirmed by NMI
Repeatability:	<0.1 %
Overload:	Short term up to 1 .25 Qmax
Pressure change rate:	< 0.35 bar FS
Counter:	Eight-digit mechanical roller counter
Meter index head:	Standard synthetic material, aluminum as option
Pulse output:	1 LF-pulser (Reed contact) and 1 anti-tampering contact
	Option: additionally, 1 HF-pulser or 2 HF-pulsers
Connections:	
• Pressure:	1 connection with¼" NPT - thread
• Temperature:	1 thermowell with G ¼ " - thread (option)

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Error limits and typical error curve

According to EN 12261 maximum permissible error limits:

$Q_{min} \leq Q < 0{,}2 * Q_{max}$: ±2.0 %

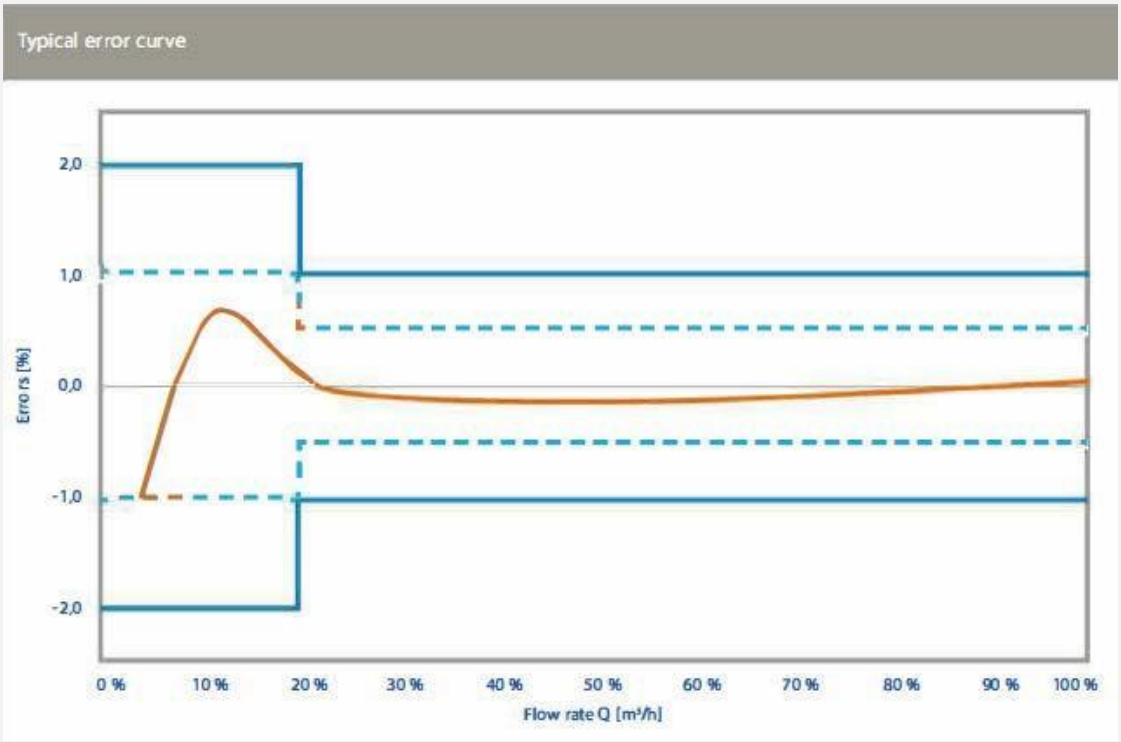
$0{,}2 * Q_{max} \leq Q \leq Q_{max}$: ± 1.0 %

On Special request:

$Q_{min} \leq Q < 0.2 * Q_{max}$: ± 1.0 %

$0.2 * Q_{max} \leq Q \leq Q_{max}$: ± 0.5 %

The turbine meters **TFM-153** are all initially calibrated within the standard measurement errors within the maximum permissible errors of EN 12261 and OIML. Reduced measurement errors with only half the maximum permissible error limits are optionally available.



The turbine meters **TFM-153** show very stable and reproducible measurement results.

The measurement cartridge has been designed to be assembled into the pressure containing housing positioned by soft O-rings. This makes the **TFM-153** Flowmeter very robust against any torsional and bending stresses resulting out of installation stresses.

The meters can withstand far more than double the specified torsional and bending stresses implied through the installation as defined in EN 12261.

The lifetime durability of the **TFM-153** turbine meter is very stable due to the large dimensioned high precision ball bearings "made in Italy" along with the high precision machining of the body and all moving parts on state of the art machines "made in Italy". After machining all aluminum parts, especially the turbine wheel, are dynamic balanced and hard anodized for less friction and higher resistance to mechanical wear and tear or chemical influences, and a Long Lifetime and stability is obtained.

Performance Data:

DN	G – Size	Q_{max} [m^3/h]	Measuring range 1:20 Pressure range 1-100 bar 8-100 bar		Measuring range 1:30 Pressure range 8-100 bar 16-100 bar		Measuring range 1:50** Pressure range 8-100 bar 30-100 bar		HF* [Imp/m^3]	LF [Imp/m^3]	Pressure loss at Q_{max}[mbar] and ρ=1bar abs.	
			Q_{min} [m^3/h]	Q_{min} [m^3/h]	Q_{min} [m^3/h]	Q_{min} [m^3/h]	Q_{min} [m^3/h]	Q_{min} [m^3/h]			Air (ρ=1.2kg/m^3)	Natural gas (ρ=1.2kg/m^3)
50	65	100	5		3.3				105000	10	13.7	8.8
80	100	160		8		5.3		3.2	26000	1	4.4	2.8
80	160	250	12.5		8		5		26000	1	8.7	5.6
80	250	400	20		13.3		8		26000	1	18.1	11.6
100	160	250		12.5		8.3		5	13500	1	0.5	0.3
100	250	400	20		13.3		8.3		13500	1	9.6	6.2
100	400	650	32.5		20		13		13500	1	19.2	12.4
150	400	650		32.5		21.7		13	5000	1	3.6	2.3
150	650	1000	50		33.3		20		5000	1	10.4	6.7
150	1000	1600	80		53.3		32		5000	1	17.8	11.5
200	650	1000		50		33.3		20	2200	1	1.1	0.7
200	1000	1600	80		53.3		32		2200	1	2.8	1.8
200	1600	2500	125		83.3		50		2200	1	6.5	4.2
250	1000	1600		80		53		32	1900	0.1	6.2	4.0
250	1600	2500	125		83.3		50		1900	0.1	12.5	8.0
250	2500	4000	200		133.3		80		1900	0.1	19.3	12.4
300	1600	2500		125		83		50	1200	0.1	4.6	3.0
300	2500	4000	200		133.3		80		1200	0.1	10.0	6.4
300	4000	6500	325		216.7		130		1200	0.1	20.1	12.9

**** in preparation** ***The pulse value can vary and is being determined exactly during calibration**

* The absolute number of the pulses depends on the meter size and the single meter itself. The stated values are of typical size. Exact values determined by calibration of the meter are located on the nameplate.

The turbine meters **TFM-153** are manufactured with large measurement ranges due to the precision machining of the parts and a very reproducible assembly process. The standard calibrated measurement range for the Tfm-153 is 1:20 under atmospheric conditions. An extended measurement range of 1 :30 is optionally available. Measurement ranges of 1:50 are under preparation.

The pressure loss of the **TFM-153** turbine meter is minimized through a fluid dynamically optimized inlet diffusor, very low manufacturing tolerances and the high precision, low friction ball bearings. The optimized flow conditions allow no straight inlet pipe for low level perturbations and only 2 DN additional straight inlet piping under severe perturbations according to OIML standards. **TFM-153** turbine meters housings are manufactured on a standard basis with raised face (RF) flanges according to EN 1092-1 or ANSI B 16.5 for class 150/300/600 with a maximum operating pressure of 110 bar/ 11 MPa.

More technical details, especially for commissioning and operation, please refer to the operation manual of the TBQM turbine meter.

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Housing Materials

DN [mm]	Pressure class							
	PN 16	PN 25	PN 40	PN 63	PN 100	ANSI 150	ANSI 300	ANSI 600
50	Aluminium/Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel
80	Aluminium/Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel
100	Aluminium/Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel
150	Aluminium/Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel
200	Aluminium/Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel
250	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel
300	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel	Carbon Steel

Meter Design

The pressure containing housing (1) is very robust against torsional or bending forces due to the large cross sections. The Aluminum turbine wheel (2) is machined out of full material on a 4 axis machine, dynamically precision balanced, and hard anodized. The computer optimizes profile of the turbine blades in combination with the fluid dynamic optimized inlet flow straightener (5) provide for a very stable measurement charateristic also under high pressure operating conditions. The high precision bearings "made in Germany" with minimal bearing play ensure a smooth running turbine wheel with a high load capacity. The measuring cartridge (7) is positioned in the pressure containing housing by 0-rings. This design feature also creates a circular room with absolute static operating pressure for very precise pressure measurement without any dynamic flow influences. The oil lubrication of the bearings is ensured through the lubrication pump (6). The turning of the turbine wheel is transmitted via a low friction gear train and a pressure stable and leak tight magnetic coupling to the eight digit mechanical counter (4) with an environmental protection class of IP 65.

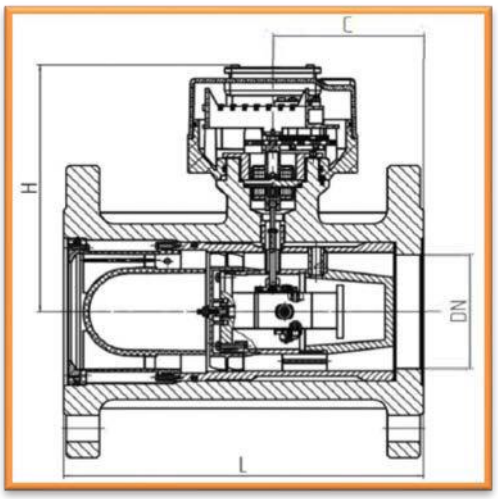
The turbine meter **TFM-153** can be installed horizontally and vertically up or down due to the 355°C turn able index head. The exchangeable low frequency (LF) switch in com bination with an anti-tampering contact provides for the electrical connection to an electronic volume corrector and a possible further AMR device. The complete design of the **TFM-153** turbine meter has been aimed to be very robust in combination with highest measurement performance.

Dimensions, weights and connections

DN [mm]	Approx. weight [kg]							
	PN 16	PN 25	PN 40	PN 63	PN 100	ANSI 150	ANSI 300	ANSI 600
50	7	15	15	17	31	13	15	22
80	10	25	25	27	58	23	26	47
100	13	36	36	38	54	35	39	60
150	35/70	75	75	85	125	75	88	118
200	38/62	70	76	125	146	67	118	150
250	140	154	194	218	285	149	203	302
300	163	193	280	300	368	180	300	356

TFM-153 turbine meters housings are manufactured on a standard basis with raised face (RF) flanges according to EN 1092-1 or ANSI B 16.5 for class 150/300/600 with a maximum operating pressure of 110 bar/ 11 MPa.

More technical details, especially for commissioning and operation, please refer to the operation manual of the TBQM turbine meter.



Connections.

DN [mm]	Flanges with threaded holes							
	EN 1092-1					ANSI B 16.5		
	PN 16	PN 25	PN 40	PN 63	PN 100	ANSI 150	ANSI 300	ANSI 600
50	4xM16	4xM16	4xM16	4xM20	4xM24	4xM16	8 X M16	8 X M16
80	8xØ18	8xØ18	8xØ18	8xØ22	8xM24	4xØ19	8 XØ22	8 X M20
100	8xØ18	8xØ22	8xØ22	8xØ26	8xØ30	8xØ19	8 X Ø22	8 X Ø26
150	8xØ22	8xØ26	8xØ26	8xØ33	12 xØ33	8xØ22	12 XØ22	12 X Ø29
200	12xØ22	12xØ26	12xØ30	12xØ36	12 xØ36	8xØ22	12xØ26	12 X Ø32
250	12xØ26	12xØ30	12xØ33	12xØ36	12 xØ39	12xØ26	16xØ29	16xØ35
300	12xØ26	12xØ30	16xØ33	16xØ36	16xØ42	12xØ26	16xØ32	20xØ35

Other Model of
Gas Turbine Flowmeter
TFM-152

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