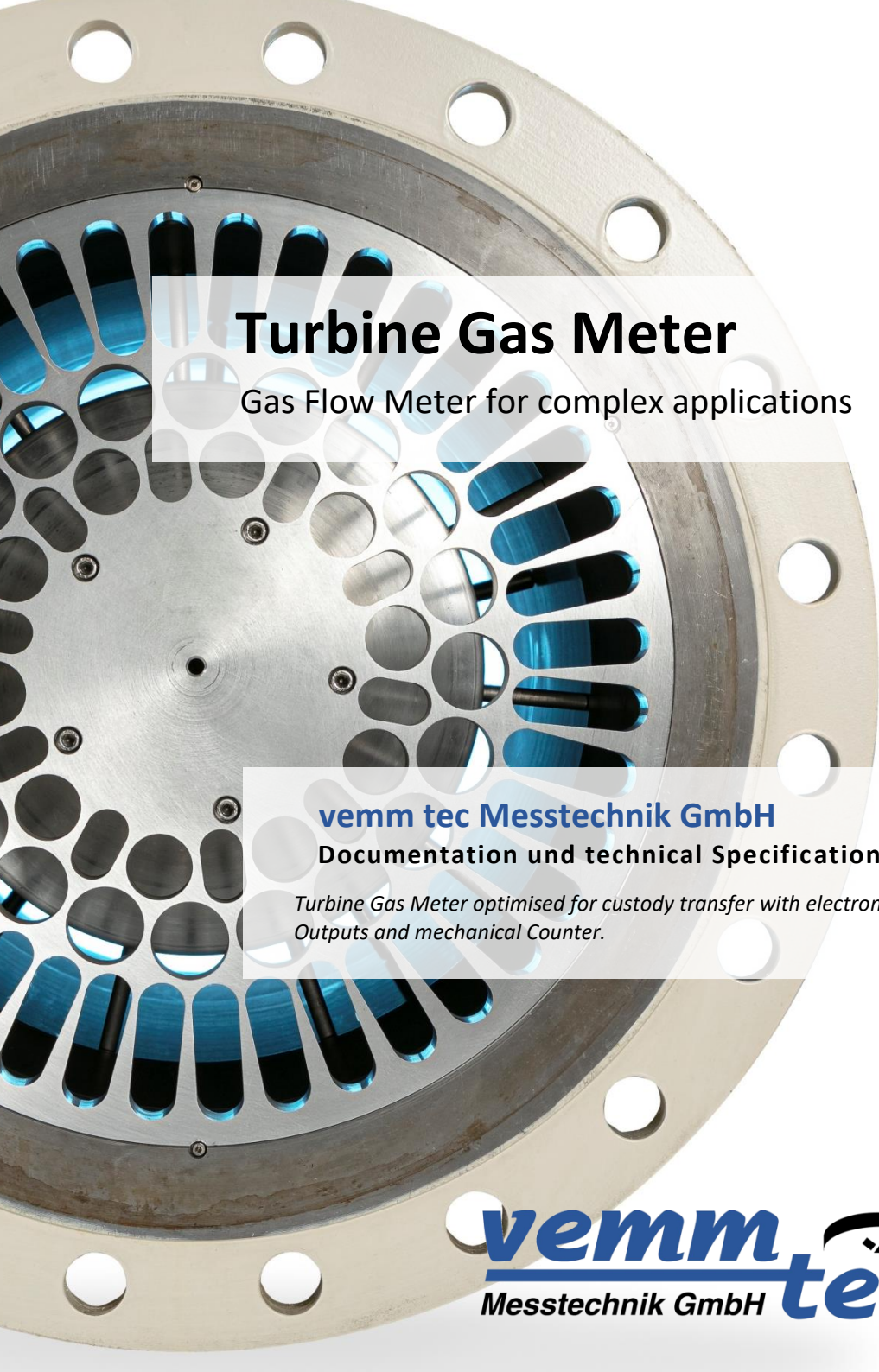


Turbine Gas Meter

Gas Flow Meter for complex applications

vemm tec Messtechnik GmbH

Documentation und technical Specification

Turbine Gas Meter optimised for custody transfer with electronical Outputs and mechanical Counter.

vemm tec
Messtechnik GmbH

vemm tec Messtechnik GmbH

Experience meets Innovation

*Your Partner for **V**olume- and **E**nergy **M**easure**M**ent **Tec**hnology*

Introduction

Thank you for your interest in our products. This booklet provides recommendations that will enable you to achieve highly accurate measurement results and briefly describes the mode of operation, technical principles and advantages of your future turbine gas meter.

vemm tec Messtechnik GmbH is certified according to ISO 9001:2015 and ISO 14001:2015.

The vemm tec turbine gas meter IGTM is a high-precision volume meter for gases, equipped with electronic pulse outputs and a mechanical counter. This booklet briefly summarises the operating principle, measuring ranges, calibration and outputs of the device. For further questions, please contact our sales team, who can be reached by e-mail sales@vemmtec.com or by phone +49 (0) 331 7096 0.

The IGTM measures the volume of gas flowing through a ring-shaped channel in the meter. The gas volume flowing through is totalised in a local mechanical counter. In addition, low or high frequency pulse signals are generated to determine the gas flow and volume. The displayed gas volume corresponds to the operating volume flowing through the meter at operating temperature and pressure. The IGTM is available in two versions: CT and WT. The IGTM-CT is used for high-precision measurements and for use in legal transactions. This booklet is all about IGTM-CT.

The IGTM-WT is a low-cost quantometer with good measurement accuracy and suitable for operational measurements outside of legal commercial traffic. For more information, please contact us and request the related data sheet.

Turbine Gas Meter

How it works

The operation of the IGTM is based on the measurement of the gas velocity. The gas flowing through is accelerated and conditioned in the meter's inlet channel. The flow straightener creates a uniform flow profile and eliminates unwanted vortices, turbulences and asymmetries before the gas hits the turbine wheel. The dynamic forces of the flowing gas cause the wheel to rotate. The turbine wheel is mounted on the main shaft with special smooth-running precision ball bearings. The helical blades of the turbine wheel are at a certain angle to the gas flow. The processed and accelerated gas spins the turbine wheel with an angular velocity that is proportional to the gas velocity.

Using shafts and gears, the rotating turbine wheel drives the index head with the eight-digit mechanical totaliser.

The volume and flow rates can also be displayed electronically. A proximity sensor generates a pulse signal every time a blade of the turbine wheel passes by. From the device-specific K-factor and the number of pulses, the volume flowed through can be calculated. With the help of the measured frequency, the flow rate can be determined.

All at a glance

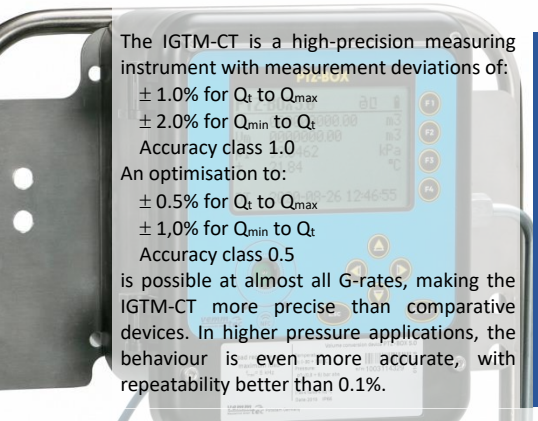
- MID approval according to EN 12261 for custody transfer
- High measuring accuracy
- Repeatability 0.1% and better
- Integrated flow straightener
- Meter sizes G 40 to G 10,000
- Measuring range 5 to 16,000 m³/h
- Nominal sizes DN 50 (2“) to DN 500 (20“)
- Design pressure 0 to 102 bar(g)
- Flange designs PN 10 – 100 and ANSI 150# – 600#
- Temperature range: -25°C to +55°C (MID) or rather -20°C to +60°C (PED)
- By standard 1 LF- and 1 HF-Sensor installed at index head; up to 2 LF- and 2 HF-Sensors possible (option)
- Up to 2 integrated thermowells at the meter body (option)
- Up to 2 integrated HF-Sensors at the meter body (option)
- Absolut-Encoder (option)
- Magnetical tamper switch (option)
- Mounting of PTZ-BOX 5.0 Electronic Volume Corrector on top (option)
- Suitable for natural gas, pressured air, butane, biogas, nitrogen and other gases – Please ask us!

Individual and highly accurate

Technical Overview

The available nominal sizes of the IGTM-CT turbine meter range from DN 50 (2") to DN 500 (20"). Other sizes are available on request.

The IGTM-CT can be supplied in G sizes from G 40 to G 10,000, i.e. it is designed for flows from 5 m³/h to 16,000 m³/h with ductile iron, carbon steel or stainless steel housings and either ANSI or DIN flanges up to ANSI 600 RF (or RTJ) or PN100.



The IGTM-CT is a high-precision measuring instrument with measurement deviations of:

± 1.0% for Q_t to Q_{max}
± 2.0% for Q_{min} to Q_t
Accuracy class 1.0

An optimisation to:

± 0.5% for Q_t to Q_{max}
± 1,0% for Q_{min} to Q_t
Accuracy class 0.5

is possible at almost all G-rates, making the IGTM-CT more precise than comparative devices. In higher pressure applications, the behaviour is even more accurate, with repeatability better than 0.1%.

Precise measurements perfected for all relevant nominal sizes, flow rates and flanges compliant and approved according to all relevant European directives such as 2014/32/EU (MID), 2014/68/EU (PED), 2014/34/EU (ATEX), and many more.

The standard measuring range (Qmin:Qmax) of an IGTM-CT is 1:20 from DN 50 (2'') G 65 when calibrated with air under ambient conditions. The measuring range may be limited for DN 50 (2") G 40, special designs or gases with low density.

Meters approved according to MID always have a measuring range of at least 1:20. Most meters are available with an enlarged measuring range of 1:30 or 1:40.

Feel free to ask for it!

Individual Solutions

The IGTM-CT is individually customised to your area of application such as:

- Complete solution with additionally on top mounted PTZ-BOX 5.0 (electronic volume corrector) from our catalogue
- Applications with high operation pressure ≥ 4 bar absolute
- Applications with temperatures over +60°C or below -20°C
- Applications for aggressive gases such as sour gas und biogas
- Applications with life-time lubrication
- Individual colors, special coating or zinc treatment

And many more – We will be happy to advice you further!

Index Head

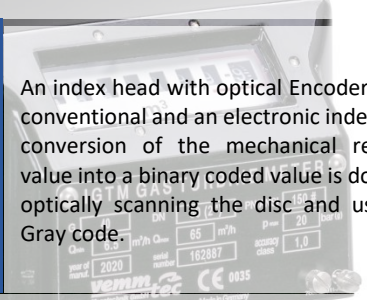
With a special ventilation device in the counter head as standard, the IGTM is also approved for tropical conditions and certified for applications up to IP67.
Equipped with an 8-digit non-resettable mechanical totaliser, which can be rotated through 350° without breaking the lead seal, the IGTM has been perfected for virtually any location in order to process the totalised volume with the greatest possible accuracy.

Optical Encoder

The Intelligent Optical Encoder is an extension of the standard index head and provides a digital measured value of the mechanical index reading from the IGTM. In accordance with the EN 60847-5-6 (NAMUR) protocol, the digital measured value is transmitted directly to follow-on devices such as a PTZ-BOX 5.0. The convincing advantage of the Encoder is the indication of the flow direction without an additional impluse sensor, as well as the output of the same volume value instead of an additional pulse output.

Digital output of the counted volumes in addition to the mechanical counter:

Optical Encoder for direct further processing

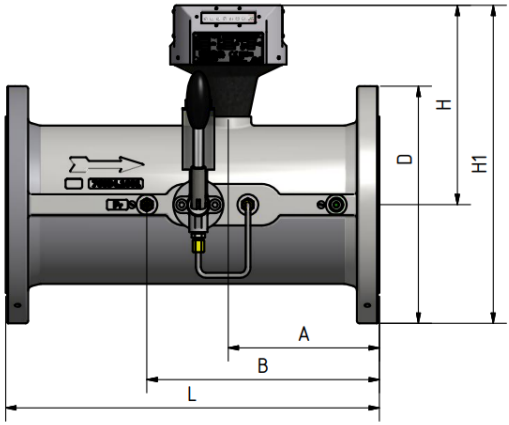


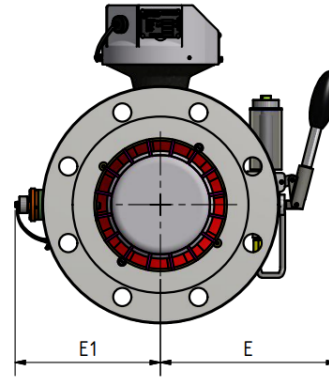
An index head with optical Encoder has a conventional and an electronic index. The conversion of the mechanical reading value into a binary coded value is done by optically scanning the disc and using a Gray code.

Initial synchronisation between the mechanical and electronic indexes during commissioning is enabled with password-protected configuration software for added security.
Two additional pulse outputs are configurable as either volume or alarm outputs. The Encoder is rounded off with intelligent digital fixed memories for logging index volumes and other important parameters in the event of an alarm. The configuration software allows uncomplicated access to the event-triggered memory.
We will be happy to send you the full scope of the optical Encoder, as well as a technical summary, and advise you on your individual project.

DN [mm] (inch	G-rate	Q_{max} m³/h]	Q_{min} m³/h]	Pressue loss at Q_{max} 1 bar with natural gas [mbar]	Rotation speed of turbine wheel at Q_{max}	Turbine wheel		Maximum frequency [Hz]			k-factor [Imp/m³]		
						Angle	Pallets	HF1 / HF2	HF3 / HF4	1R1 Reed	HF1 / HF2	HF3 / HF4	1R1
50	40	65	7	5,5	8900	45	18	2800	80	0,18	155000	4400	10
(2“)	65	100	10	11,7	13700	45	18	4300	120	0,28	155000	4400	10
80	100	160	8	3,7	6200	45	16	1900	50	0,04	42200	1200	1
(3“)	160	250	13	8,6	9600	45	16	2900	80	0,07	42200	1200	1
	250	400	20	13,8	8900	30	16	2600	70	0,11	23500	670	1
100	160	250	13	3,1	4300	45	16	1200	60	0,07	17000	800	1
(4“)	250	400	20	6,8	6900	45	16	1900	90	0,11	17000	800	1
	400	650	32	10,8	6500	30	16	1700	80	0,18	9400	440	1
150	400	650	32	3,1	3400	45	20	1100	70	0,18	6280	360	1
(6“)	650	1000	50	7,1	5200	45	20	1700	100	0,28	6280	360	1
	1000	1600	80	11,3	4800	30	12	1600	60	0,04	3570	135	0,1
200	650	1000	50	2,5	2200	45	20	790	40	0,03	2840	150	0,1
(8“)	1000	1600	80	4,3	3500	45	20	1300	70	0,04	2840	150	0,1
	1600	2500	130	10,2	3100	30	20	1100	60	0,07	1510	80	0,1
250	1000	1600	80	2,5	2000	45	20	830	60	0,04	1870	135	0,1
(10“)	1600	2500	130	4,9	3100	45	20	1300	90	0,07	1870	135	0,1
	2500	4000	200	7,9	2900	30	20	1200	90	0,11	1110	80	0,1
300	1600	2500	130	2,5	1900	45	20	780	60	0,07	1120	80	0,1
(12“)	2500	4000	200	4,9	3000	45	20	1300	90	0,11	1120	80	0,1
	4000	6500	320	7,9	2800	30	24	1200	130	0,18	660	75	0,1
400	2500	4000	200	2,5	1600	45	24	610	60	0,11	550	55	0,1
(16“)	4000	6500	320	4,9	2600	45	24	990	100	0,18	550	55	0,1
	6500	10000	500	8,6	2300	30	24	1300	130	0,28	470	50	0,1
500	4000	6500	320	2,5	1400	45	24	540	60	0,17	310	40	0,1
(20“)	6500	10000	500	5,0	2300	45	24	860	100	0,28	310	40	0,1
	10000	16000	800	8,8	2000	30	24	750	30	0,04	170	8	0,01

Dimensions and Weight





DN	Pressure rating	Housing material	A mm	B mm	E mm	D mm	H mm	H1 mm	L mm	Weight kg
50 (2”)	PN 10/16, ANSI 150	Ductile iron	62	109	102	165	215	298	150	11
	PN 10/16, ANSI 150	Carbon steel			127		200	283		24
	PN 25/40, ANSI 300	Carbon steel			127		200	283		24
	PN63/100, ANSI 600	Carbon steel			127		200	283		24
80 (3”)	PN 10/16, ANSI 150	Ductile iron	92	160	120	200	205	305	240	17
	PN 10/16, ANSI 150	Carbon steel				191	192	288		26
	PN 25/40, ANSI 300	Carbon steel				210	192	297		28
	PN63/100, ANSI 600	Carbon steel				210	192	297		29
100 (4”)	PN 10/16, ANSI 150	Ductile iron	120	205	135	220	230	340	300	27
	PN 10/16, ANSI 150	Carbon steel			140	229	215	330		36
	PN 25/40, ANSI 300	Carbon steel			140	254	215	342		43
	PN63/100, ANSI 600	Carbon steel			140	273	215	352		50

150 (6")	PN 10/16, ANSI 150	Ductile iron	182	280	190	285	255	398	450	45
	PN 10/16, ANSI 150	Carbon steel			215	285	250	393		63
	PN 25/40, ANSI 300	Carbon steel			215	300	250	400		70
	PN63/100, ANSI 600	Carbon steel			215	345	250	423		100
200 (8")	PN 10/16, ANSI 150	Ductile iron	240	340	230	340	270	440	600	76
	PN 10/16, ANSI 150	Carbon steel				340		440		83
	PN 25/40, ANSI 300	Carbon steel				360		450		106
	PN63/100, ANSI 600	Carbon steel				375		458		155
250 (10")	PN 10/16, ANSI 150	Carbon steel	300	415	240	395	285	483	750	110
	PN 25/40, ANSI 300	Carbon steel				425		498		150
	PN63/100, ANSI 600	Carbon steel				450		510		240
300 (12")	PN 10/16, ANSI 150	Carbon steel	360	385	260	445	320	543	900	160
	PN 25/40, ANSI 300	Carbon steel				485		563		210
	PN63/100, ANSI 600	Carbon steel				515		578		290
400 (16")	PN 10/16, ANSI 150	Carbon steel	480	625	300	565	355	638	1200	430
	PN 25/40, ANSI 300	Carbon steel						645		450
	PN63/100, ANSI 600	Carbon steel						665		590
500 (20")	PN 10/16, ANSI 150	Carbon steel	600	730	390	670	375	710	1500	620
	PN 25/40, ANSI 300	Carbon steel				715		735		740
	PN63/100, ANSI 600	Carbon steel				730		742		925

Space for Your Ideas

Norms, Standards and Directives for our Turbine Gas Meters

International	
OIML R 6	General regulations for volumetric gas meters (replaced by R137)
OIML R 32	Rotary piston meter and gas turbine meter (replaced by R137)
OIML R 137-1	Gas meters - Part 1: Requirements (replaces R6, R31 and R32)
ISO 9951	Gas flow measurement in closed pipes - Turbine meters (replaced by EN 12261)
AGA 7	Gas measurement with turbine meters
EN 12261	Gas meter - gas turbine meter
EN IEC 60079-0	Electrical equipment for potentially hazardous areas

European Union – EU	
2014/32/EU (MID)	European Measuring Instruments Directive
2014/68/EU (PED)	European Pressure Equipment Directive
2014/34/EU (ATEX)	European ATEX - Directive: Equipment and protective systems intended for use in hazardous areas
2011/65/EU (RoHS)	European Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment

Yes, please send me your offer!

Company _____

Contakt _____ Department _____

Address _____ Adder _____

City _____ ZIP _____ Country _____

Telefon ( ) _____ E-Mail _____

Area of Application ❑ Custody Transfer ❑ In-house measurement ❑ Others

Country of Destination[1] _____ Adder _____

_____

Date, Stamp, Sign

Mandatory details				Optional	
Qty	Nominal size mm / inch	Flow range / G-rate	Flanges PN / ANSI	Pressure bar	Additional Information

[1] This information is needed for the definition of the required approvals

vemm tec Messtechnik GmbH

We offer you the solution for your individual application.

Our motivated sales team is at your disposal with advice and support.

Let us also inform you about our other products and their wide-ranging application possibilities!

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