

# METRI MEASUREMENTS LTM & GTM TURBINE SERIES

Axial Turbine Flow Meters for Accurate Measurement of Liquids and Gases



IC-LTM/GTM Brochure 2015/1



OIL &  
GAS



INDUSTRIAL &  
ENERGY



MEDICAL &  
SCIENCE



RESEARCH &  
DEVELOPMENT

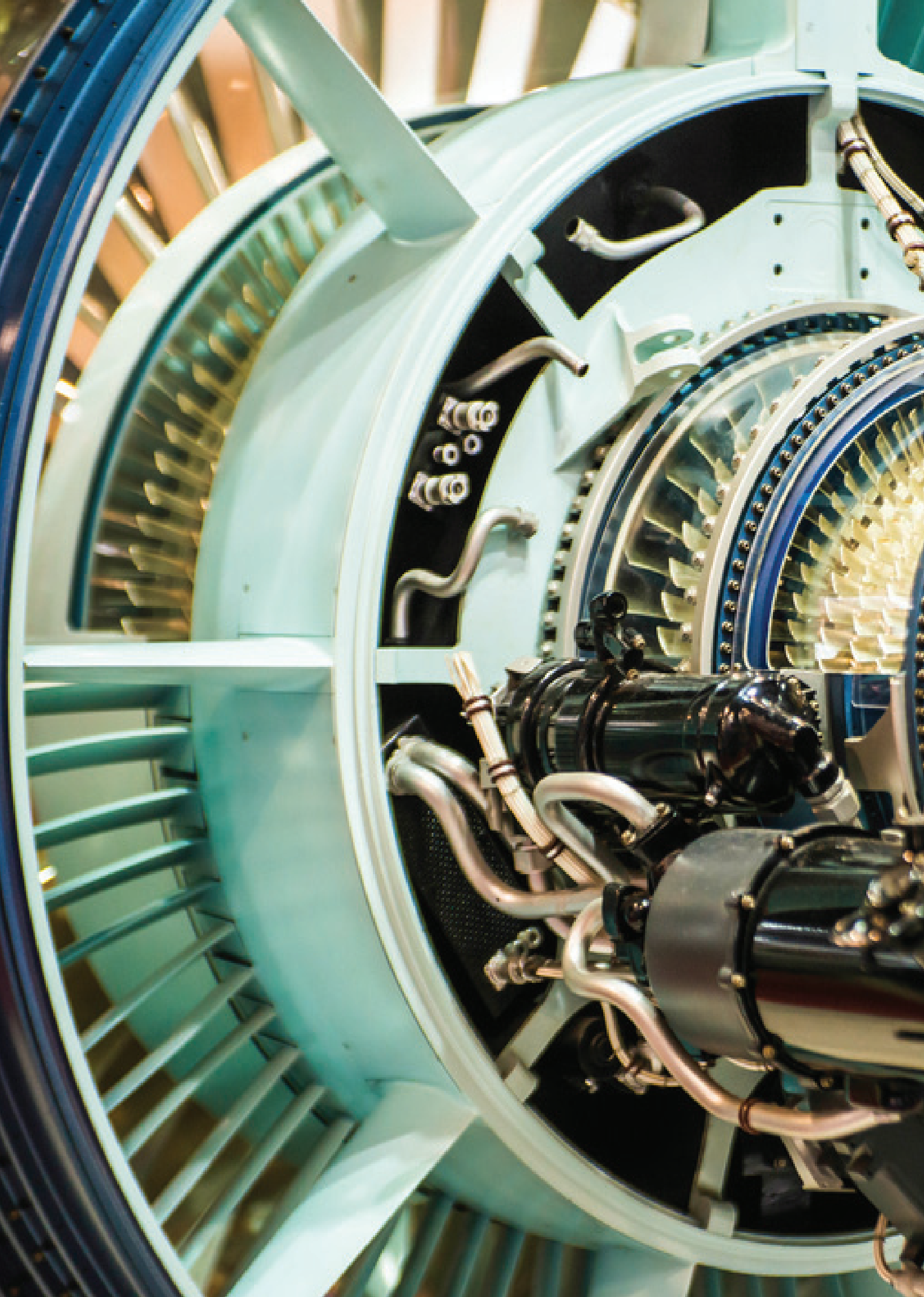


AEROSPACE &  
AUTOMOTIVE



MARINE &  
OFFSHORE





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## METRI LTM & GTM SERIES

Accurate Rugged Versatile  
Compact or Remote

Industrial Turbines flow meters for accurate continuous volumetric measurement of liquids and gases

- Wide range of line sizes
- Accurate measurement with excellent linearity & repeatability
- Rugged stainless steel construction
- Versatile, adaptable design with custom options
- High pressure rating up to + 400 bar (higher ranges possible to 1000 Barg )
- High temperature option up to 350°C
- Selection of flow instruments & displays for compact or remote installation
- Choice of outputs including pulse, 4-20 mA
- ATEX rated option

## APPLICATIONS

### INDUSTRIAL & ENERGY

- Fuel & oil monitoring
- Bunker metering
- High pressure water monitoring
- Crude Oil and Oil Production
- Cooling circuit monitoring and control
- High Pressure Pumping Systems

### MARINE & OFFSHORE

- High temperature thermal oil monitoring
- Marine fuel oil monitoring
- Subsea Meters for BOP and ROV applications

### MEDICAL & SCIENCE

- Chemical & water batching
- Batching and ratio blending processes

### RESEARCH & DEVELOPMENT

- Chilled water circuit monitoring
- Food, Beverages and Medical
- Test rig & calibration systems



# ACCURATE LIQUID AND GAS FLOW MEASUREMENT

Manufactured in the UK by icenta Controls and result of over 30 years of development, the IC-LTM/GTM series of industrial in-line turbine flow meters provide a high standard of accuracy and reliability in a large number of volumetric flow measurement applications.

IC-LTM meters are available in a range of nominal sizes from 6 to 150 mm, offering standard Liquid flow ranges from as low as 0.028 to 0.28 m<sup>3</sup>/hr (0.5 to 5 l/min) up to 55 to 550 m<sup>3</sup>/hr (920 to 9200 l/min); each individual meter has a specific standard flow range of 10:1 with an extended option on larger sizes of 20:1 (or higher) when the application suits. See Section 7 Configurations.

The IC-LTM/GTM has a robust stainless steel construction providing excellent corrosion resistance and meeting the demands of all but the most arduous applications. Its versatile design can be adapted to meet the requirements of a range of flow applications.

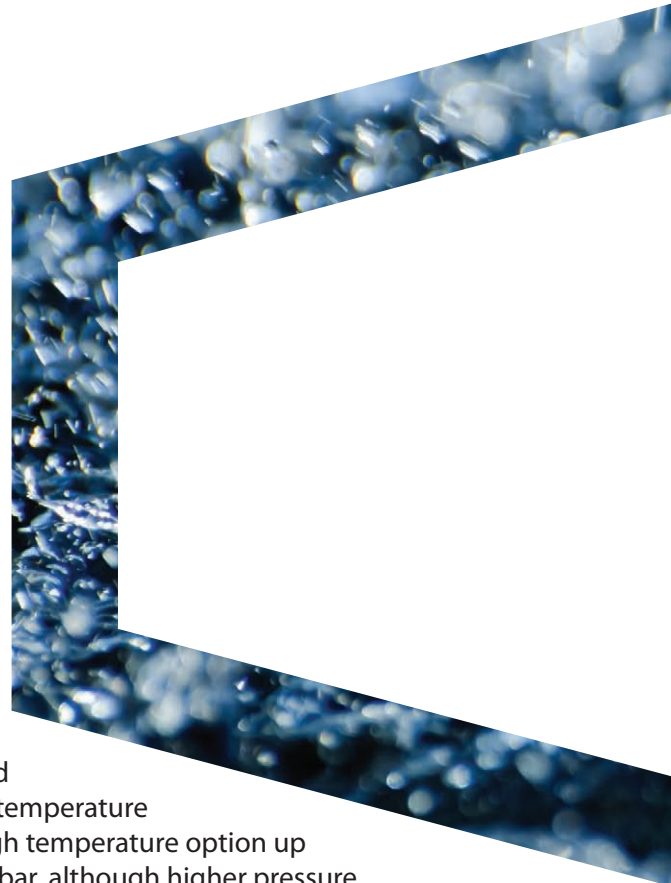
IC-LTM flow meters are supplied with a choice of threaded or flanged connections and a range of outputs, flow instruments and displays for compact or remote installation. There is a choice of 2 temperature ratings - a standard operating temperature of up to 230°C and high temperature option up to 350°C; threaded versions will withstand pressures of up to 400 bar, although higher pressure options are also available on request.

All IC-LTM turbine flow meters are individually calibrated and where intended for fiscal or custody transfer applications, Metri can arrange for independent certification to comply with the regulatory requirements of the government or authority concerned.

The meter's versatility makes the IC-LTM suitable for applications across most industrial sectors, especially where superior accuracy is required including high temperature and high pressure flows and hygienic environments.

## PRINCIPLE OF OPERATION

The IC-LTM meter features a freely supported full-bore rotor with bearings on a polished or hardened shaft mounted between 2 individual end supports that on larger sizes, act as flow straighteners for improved flow performance. As the fluid passes through the meter, it forces the rotor blades (set at a prescribed angle to the direction of flow) to produce a speed of rotation which is directly proportional, within a small level of uncertainty, to the volumetric flow rate. A magnetic pick-up assembly, mounted on the meter body, detects the rotation of each blade and generates a voltage output proportional to the flow rate.





# COMPACT OR REMOTE INSTALLATION

We offer a comprehensive selection of flow instruments & displays for compact or remote installation. Metri liquid turbine meters can be combined with the following products;



## FIELD AND PANEL MOUNT FLOW TRANSMITTERS

### TYPE FI210 / FI220 FLOW TRANSMITTERS

- Rugged diecast aluminium construction
- Choice of powered (FI210) or battery powered (FI220)
- 2-line, 12-character LCD display
- Total / accumulated total / flow rate
- Compact or remote installation
- Frequency input
- Open collector pulse output
- 4-20 mA output (external loop-powered on FI220)
- Alarm set points (2 relays) on FI210 only



### TYPE FI110 PANEL MOUNT FLOW TRANSMITTER

- 2-line, 16-character LCD display
- Total / accumulated total / flow rate
- Frequency input
- Open collector pulse output
- 4-20 mA output
- Alarm set points (2 relays)



## E-SERIES EXPLOSION PROOF



- IP67
- -40 TO +70°C
- The ATEX markings are:  
Gas: II 2 G Ex d IIC T6 Gb  
Dust: II 2 D Ex tb IIIC T85°C Db

The CSA / FM certification is pending according:  
Explosion-proof for use in Class I, Division 1, Groups A, B, C, D.  
DIP (Dust-Ignition-proof): Class II, Division 1, Groups E, F, and G. Class III; hazardous (classified) locations.



## F-SERIES



- IP67
- Intrinsically Safe - ATEX and IECEx approval for gas and dust applications.
- Explosion/flammable proof II 2 GD EEx d IIB T5.
- Modbus RS 485



## PULSE / ANALOGUE OUTPUT MODULES

- Low mV input range
- PNP/NPN selectable output (pulse module)



## FLOW SWITCH

- Freely adjustable module for each meter size
- Switching ranges from 0.5-1200 l/min

# THE METRI LIQUID METER SPECIFICATION

Nominal size	DN6, DN15, DN20, DN25, DN40, DN50, DN80, DN100, DN150 (other sizes on request)
Process connection	BSPP (parallel) & BSPT (taper) female threaded, DIN & ANSI flanged; other on request eg PNXX, tri-clamp, NPT, RJT, Weco
Flange rating	PN 16, 40, 100 (BS EN 1092-1); ANSI 150, 300, 600 RF (ANSI B16.5) Slip on and Butt Weld type
Compatibility	Solids free and partially contaminated liquids including water, chemicals, hydrocarbons, mineral oils, alcohols
Flow range (liquid)	0.028 to 550 m3/hr (0.5 to 9166 l/min), various ranges (see section 6 Configuration)
Flow direction	Single; bi-directional on certain sizes
Operating temperature	Standard: -40 to 230°C High: -40 to 350°C (excludes ATEX)
Viscosity	DN6 Meters = Maximum 10 Centistokes Larger Sizes up to 100 centistokes can be compensated
Max operating pressure	All threaded bodies: Standard design 15-80mm up to 250 bar (400 Bar + Optional) Flanged bodies: Depends on flange rating operating temperature range Higher pressure rating on request
Frequency range	50-2500 Hz
Pressure drop	Typically less than 250 mbar at maximum flow rate (standard ranges without flow restrictor)
Linearity	< +/- 0.25% of reading (selected range) < +/- 0.5% of reading (linear range) over 1-5 cSt
Repeatability	+/- 0.02 to 0.05% over stated conditions at operating viscosity range
Materials	Body: 316 (Standard); other materials available on request e.g. Incoloy Rotor: 431 stainless steel * Alternatives Available on request e.g. 174PH, Super Duplex Rotor Shaft: 316 stainless steel; Tungsten Carbide, other materials on request Bearings: Tungsten Carbide, Stainless steel ball race, Jewel.
Output/display	Variable reluctance coil only (mV); pulse / analogue output modules; flow transmitter (see below)
Installation	Horizontal or vertical flow rising, full pipe only
Approvals (Sensor)	CE, ATEX EEx ia IIC or IIB T6 to T3 (excluding high temperature option) Ex d Ex II 2 G Ex d IIC T6 to T2 PED Category 2 Gases and Liquids, Category 3 pending

Approvals (Displays)	<p>F Series approvals</p> <ul style="list-style-type: none"> <li>• IP67</li> <li>• Intrinsically Safe - ATEX and IECEx approval for gas and dust applications.</li> <li>• Explosion/flame proof II 2 GD EEx d IIB T5.</li> </ul>	<p>E Series Approvals</p> <p>IP67 -40 TO +70°C</p> <p><b>The ATEX markings are:</b> Gas: II 2 G Ex d IIC T6 Gb Dust: II 2 D Ex tb IIIC T85°C Db</p> <p><b>The IECEx markings are:</b> Gas: Ex d IICT6 Gb Dust: Ex tb IIIC T85°C Db</p> <p>The CSA / FM certification is pending according: Explosion-proof for use in Class I, Division 1, Groups A, B, C, D, DIP (Dust-Ignition-proof): Class II, Division 1, Groups E, F, and G. Class III; hazardous (classified) locations.</p>
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## INSTRUMENT / DISPLAY SPECIFICATION

Type	Coil only	IC-MV-PO pulse output module	IC-MV-AN analogue output module	FI200 battery powered flow transmitter	FI110/FI210 powered flow transmitter	FI220 battery powered flow transmitter
Input	-	20-200 mV peak to peak	20-300 mV peak to peak	mV/Pulse	mV/Pulse/4-20 mA	mV/Pulse
Frequency range	50-2500 Hz	50-2500 Hz	50-2500 Hz	50-2500 Hz	50-2500 Hz	50-2500 Hz
Supply voltage	-	5-24 Vdc	24 Vdc	-	24 Vdc 110/240VAC	-
Outputs	mV	Open collector PNP/NPN selectable	4-20 mA, 2 wire current loop	Open collector pulse, 4-20 mA external loop-powered	Open collector pulse, 4-20 mA, relay	Open collector pulse, 4-20 mA external loop-powered
Operating temp	-	-10 to 55°C	-10 to 55°C	-10 to 55°C	-10 to 55°C	-10 to 55°C
Rating	IP65, ATEX (optional)	IP65	IP65	IP65	FI110:IP67 FI210:IP67, ATEX (consult factory)	IP67



# THE METRI GAS METER SPECIFICATION

Nominal size	DN15, DN20, DN25, DN40, DN50, DN80, DN100, DN150, DN200, DN250, DN300 (other sizes on request)
Process connection	BSPP (parallel) & BSPT (taper) female threaded, DIN & ANSI flanged; other on request eg PNXX, tri-clamp, NPT, RJT, Weco, Autoclave
Flange rating	PN 16, 40, 100 (BS EN 1092-1); ANSI 150, 300, 600 RF (ANSI B16.5) Slip on and Butt Weld type
Compatibility	Dry and Wet gases compatible with 430, 174PH and Duplex stainless steels (other materials available on request)
Flow range (gases)	0.44 – 2000 m <sup>3</sup> /hr *See Notes 1. & 2 (Section 7 Configurations)
Flow direction	Single; bi-directional on certain sizes
Operating temperature	Standard: -20 to 150°C shielded ball bearings High: -40 to 350°C (excludes ATEX)
Max operating pressure	All threaded bodies: Standard design 15-80mm up to 400 bar (Higher Pressures Optional) Flanged bodies: depends on flange rating operating temperature range Higher pressure rating on request
Frequency range	50-2500 Hz
Pressure gauge (gas)	Typically less than 2" Water Gauge at Max flow rate (gas density 1.29 kg/cm <sup>3</sup> )
Linearity	< +/- 1.0% Typical of reading over normal operating range inclusive of repeatability at pressures greater than 10Kg/CM <sup>2</sup> for sizes up to and including 3"
Materials	Body: 316 (Standard); other materials available on request e.g. Incoloy Rotor: 431 stainless steel * Alternatives Available on request e.g. 174PH, Super Duplex Rotor Shaft: 316 stainless steel; Tungsten Carbide, other materials on request Bearings: Stainless steel 440C Ball race Shielded. Other materials available
Output/display	Variable reluctance coil only (mV); pulse / analogue output modules; flow transmitter (see Section 7 Configurations)
Installation	Horizontal or vertical flow rising, full pipe only
Approvals (Sensor)	CE, ATEX EEx ia IIC or IIB T6 to T3 (excluding high temperature option) Ex d Ex II 2 G Ex d IIC T6 to T2 PED Category 2 Gases and Liquids, Category 3 pending
Approvals (Displays)	F Series approvals • IP67 • Intrinsically Safe - ATEX and IECEx approval for gas and dust applications. • Explosion/flame proof II 2 GD EEx d IIB T5.  E Series Approvals • IP67 -40 TO +70°C The ATEX markings are: Gas: II 2 G Ex d IIC T6 Gb Dust: II 2 D Ex tb IIIC T85°C Db  The IECEx markings are: Gas: Ex d IIC T6 Gb Dust: Ex tb IIIC T85°C Db  The CSA / FM certification is pending according: <b>Explosion-proof for use in Class I, Division 1, Groups A, B, C, D.</b> <b>DIP (Dust-Ignition-proof): Class II, Division 1, Groups E, F, and G. Class III; hazardous (classified) locations.</b>



# VERSATILE CONFIGURATIONS

## Ordering information: IC-LTM flow meter (Liquid Meter)

Configurations can be adapted or customised to meet your requirements

IC-LTM Nominal size & flow range (based on H <sub>2</sub> O @ 20°C)					
	Standard flow range		Extended flow range*		
	m <sup>3</sup> /hr	Imp GPM	m <sup>3</sup> /hr	Imp GPM	
006A	6 mm (1/4"), 0.028 - 0.28	0.1 - 1			
006B	6 mm (1/4"), 0.055 - 0.55	0.2 - 2			
012A	12 mm (1/2"), 0.11 - 1.1	0.4 - 4	0.5 - 1.1	0.16 - 4	
016A	16 mm (5/8"), 0.22 - 2.2	0.8 - 8	0.088 - 2.2	0.35 - 8	
016B	16 mm (5/8"), 0.4 - 4	1.5 - 15	0.16 - 4	0.6 - 15	
020A	20 mm (3/4"), 0.8 - 8	3 - 30	0.32 - 8	1.2 - 30	
025A	25 mm (1"), 1.6 - 16	6 - 60	0.64 - 16	2.4 - 60	
040A	40 mm (1.5"), 3.4 - 34	12.5 - 12	1.15 - 34	4.2 - 125	
050A	50 mm (2"), 6.8 - 68	25 - 250	2.3 - 68	8.5 - 250	
080A	80 mm (3"), 13.5 - 135	50 - 500	4.5 - 135	17 - 500	
100A	100 mm (4"), 27 - 270	99 - 990	9 - 270	33 - 990	
150A	150 mm (6"), 55 - 550	200 - 2000	18 - 550	66 - 2000	
0Z0Z	Other sizes and flow rates on request				

Flow range: standard/extended (see above for values)	
S	Standard
E	Extended
Flow Direction	
S	Single
B	Bi-directional
Process connection	
A	BSPP (parallel) male
B	BSPT (taper) female
C	PN16
D	PN40
E	PN100
F	ANSI 150 RF
G	ANSI 300 RF
H	ANSI 600 RF
Z	Other on request (eg PNXX, tri-clamp, NPT, RJT etc)
Bearings	
B	Ball Race
T	Journal
Max operating temperature	
S	Standard: -40 to 230°C
H	High: -40 to 350°C
Approvals	
0	General purpose
1	ATEX
Output / display	
0	Coil only
P	IC-MV-PO pulsed output module
A	IC-MV-AN analogue output module
D	Flow transmitter / display (specify separately)
Mounting of instrument	
0	No instrument
C	Compact (locally mounted on flow sensor)
R	Wall mounted, including mounting bracket (up to 3 m from sensor, please specify)
Options	
0	None
1	Specify options

IC-LTM 025A S S A B S 0 A C 0 Order code example



# VERSATILE CONFIGURATIONS

## Ordering information: IC-GTM flow meter (Gas Meter)

Configurations can be adapted or customised to meet your requirements

IC-GTM Nominal size & flow range			
	Standard Operating Range	Maximum operating Repeatable Range*	
	m <sup>3</sup> /hr	Ft <sup>3</sup> /min	m <sup>3</sup> /hr
<b>012A</b>	13mm (1/2"), 0.44 -3.3		
<b>016A</b>	16 mm (3/4"), 0.88 -6.6	0.375-4.5	0.66 -7.92
<b>016B</b>	16 mm (3/4"), 1.6 -12	0.75-9	1.2 - 14.4
<b>020A</b>	20 mm (3/4"), 3.2 -24	1.5 -18	2.4 - 29.0
<b>025A</b>	25 mm (1"), 6.4 -48	3-36	4.8 - 58.0
<b>040A</b>	40 mm (1.5"), 10-100	3-72	5.0 - 120
<b>050A</b>	50 mm (2"), 20-200	6-144	10.4 -240
<b>080A</b>	80 mm (3"), 40-400	12-288	20 - 480
<b>100A</b>	100 mm (4"), 80 -800	24-576	40 - 980
<b>150A</b>	150 mm (6"), 160 - 1600	50 - 1200	85 - 2000
<b>0Z0Z</b>	Other sizes and flow rates on request		
<b>Flow range: standard/extended (see above for values)</b>			
<b>S</b>	Standard		
<b>E</b>	Extended		
<b>Flow Direction</b>			
<b>S</b>	Single		
<b>B</b>	Bi-directional		
<b>Process connection</b>			
<b>A</b>	BSPP (parallel) male		
<b>B</b>	BSPT (taper) female		
<b>C</b>	PN16		
<b>D</b>	PN40		
<b>E</b>	PN100		
<b>F</b>	ANSI 150 RF		
<b>G</b>	ANSI 300 RF		
<b>H</b>	ANSI 600 RF		
<b>Z</b>	Other on request (eg PNXX, tri-clamp, NPT, RJT etc)		
<b>Bearings</b>			
<b>B</b>	Ball Race		
<b>O</b>	Other		
<b>Max operating temperature</b>			
<b>S</b>	Standard: -20 to 150°C * Excludes ATEX Option		
<b>H</b>	High: -40 to 250°C on request		
<b>Approvals</b>			
<b>0</b>	General purpose		
<b>1</b>	ATEX		
<b>Output / display</b>			
<b>0</b>	Coil only		
<b>P</b>	IC-MV-PO pulsed output module		
<b>A</b>	IC-MV-AN analogue output module		
<b>D</b>	Flow transmitter / display (specify separately)		
<b>Mounting of instrument</b>			
<b>0</b>	No instrument		
<b>C</b>	Compact (locally mounted on flow sensor)		
<b>R</b>	Wall mounted, including mounting bracket (up to 3 m from sensor, please specify)		
<b>Options</b>			
<b>0</b>	None		
<b>1</b>	Specify options		

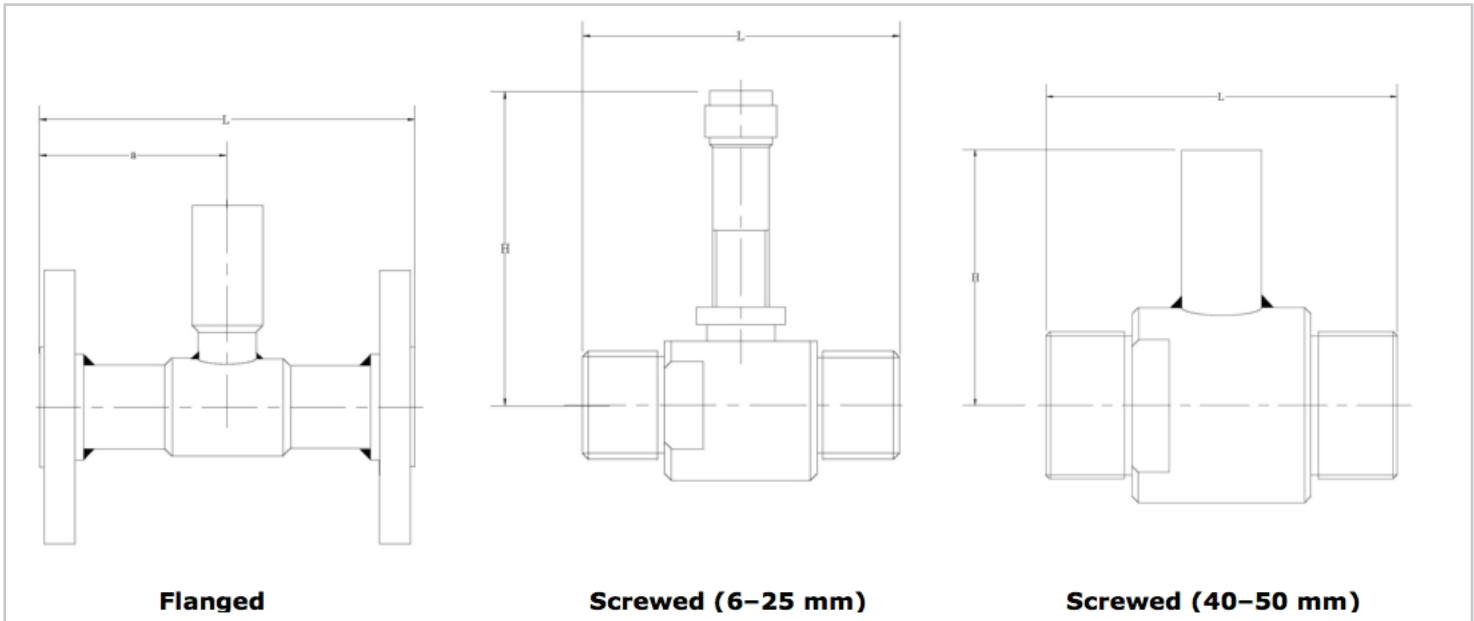
  

IC-GTM	080A	E	S	G	B	S	1	D	C	0	Order code example
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Notes 1. The ranges are only applicable to the linearity specification for pressures in excess of 10 Kg/cm<sup>2</sup> for sizes up to 3". At lower pressures the range ability is reduced. Details available on request.

2. In many cases the stated operating flow ranges can be extended to a lower range where the gas density (Pressure) is sufficiently high. Specific data on request.

# IC-LTM DIMENSIONS



## INSTALLATION

Asymmetric flow conditions can cause errors in turbine flow meter performance. It is therefore essential if these errors are to be reduced the flow meter should be installed with the appropriate upstream / downstream pipe lengths.

The meter can be installed either horizontally or vertically with flow rising and only with a full pipe.

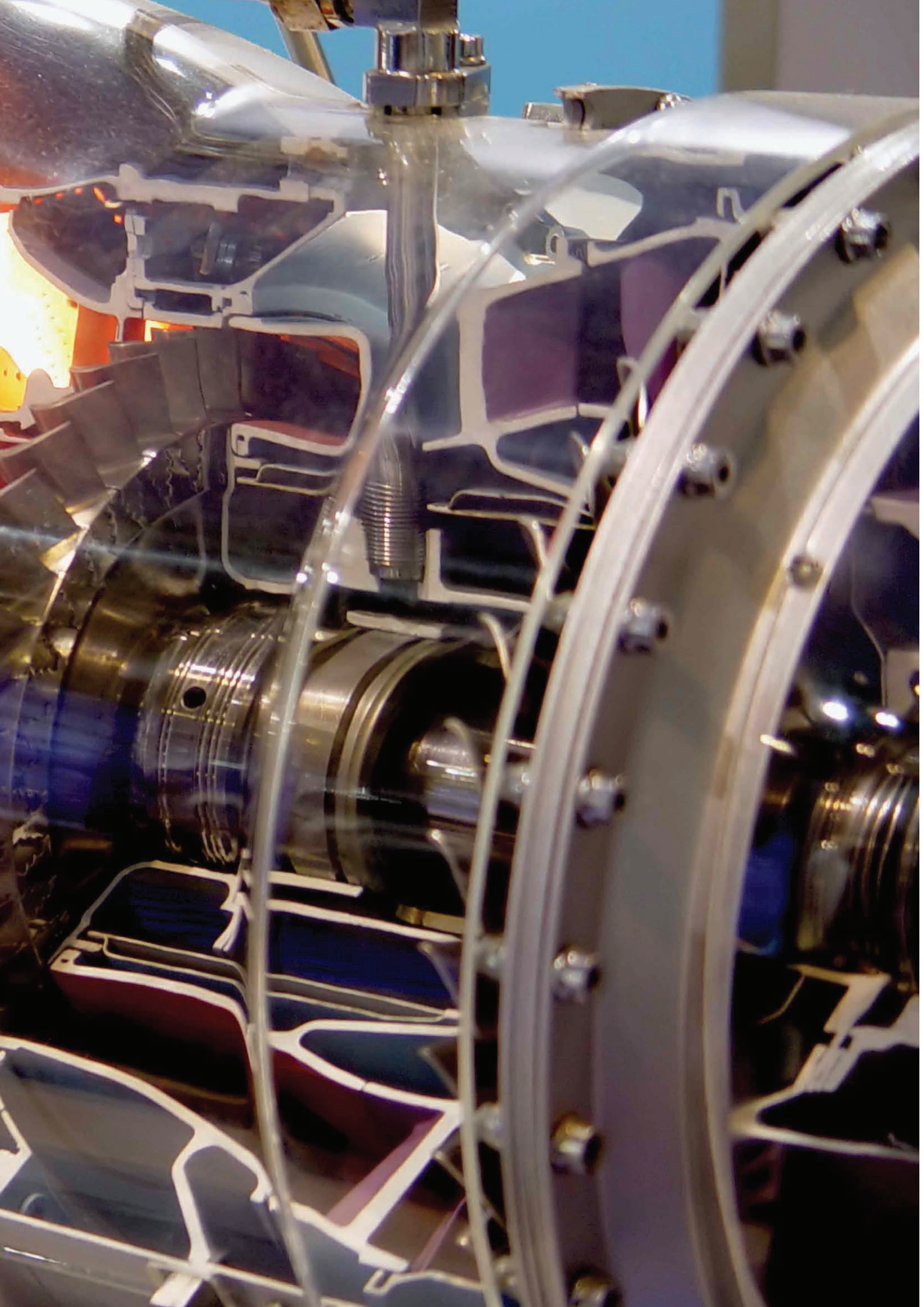
For best practice, allow at least 10 diameters of straight pipe run upstream and 5 diameters of straight pipe run downstream of the flow meter installation. Greater straight run lengths may be required when installed close to bends, elbows and valves (please consult our engineers with details of your application).

If there is not a sufficient straight run of pipe, a Metri flow straightener may be used to reduce the straight run requirements.

Nominal Size	Flanged		Screwed	
	L mm	H mm	L mm	H mm
6 mm (1/4")	114		51	92
12 mm (1/2")	127	69	63.5	94
16 mm (5/8")	127	69	63.5	94
20 mm (3/4")	140	72	83	96
25 mm (1")	152	75	89	98
40 mm (1.5")	178	78	114	82.5
50 mm (2")	197	78	134	92
80 mm (3")	254	92	200	
100 mm (4")	356	110		
150 mm (6")	368			

**GET IN TOUCH TO DISCUSS  
YOUR PROJECT**

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