GRAFTEL LLC

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GRAFTEL MODEL: GT-IN-2000

Induction Flow Meter

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The Graftel GT-IN-2000 Series electromagnetic flow meters are designed for measurement of conductive liquids. With no moving parts and a PTFE lining, they can handle applications involving wastewater, pulp, food, and slurries. Standard outputs include analog, frequency, and RS485 communications.

The induction flow meter consists of a sensor through which the measured liquid flows, and an electronic unit where the low-level signal from the sensor is modified to a standardized form suitable for further processing in various industrial electronic devices. The output signal is proportional to the volume flow rate of the measured liquid. The only factor limiting the application of induction flow meters is the requirement that the measured liquid shall be conductive and non-magnetic. The induction flow meter can be designed either as a compact device or with the sensor separated from the associated electronic unit. In the former case, the electronic unit is fitted directly onto the meter sensor, in the latter case it is connected to the sensor by a special cable.

The sensor design shall take into consideration the type of the measured liquid and its operational parameters. To facilitate fitting into the liquid piping, the sensor can be provided with end flanges, screwing, or it may be of a sandwich design.

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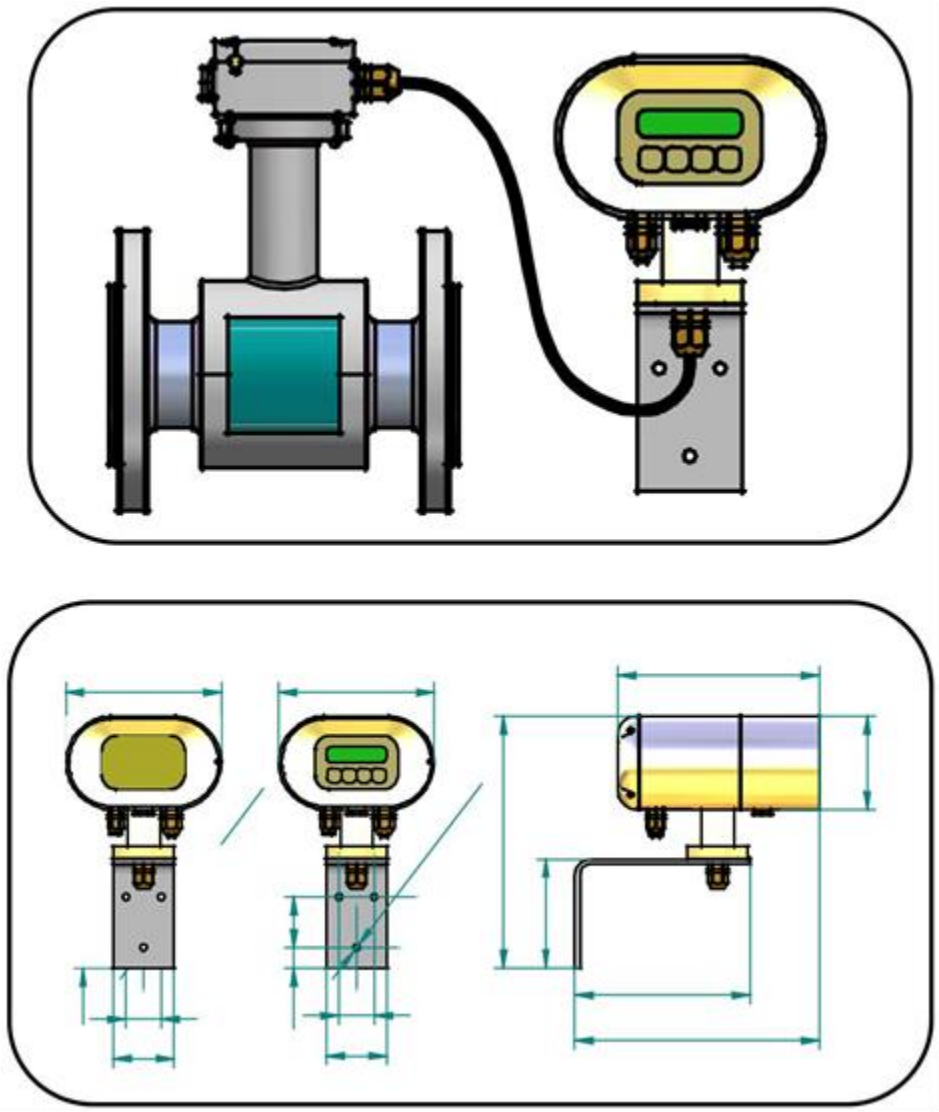
Flanged sensor connected by a cable with the associated separate electronic unit.



Dimensions of the box to accommodate separate electronic unit & the mounting bracket

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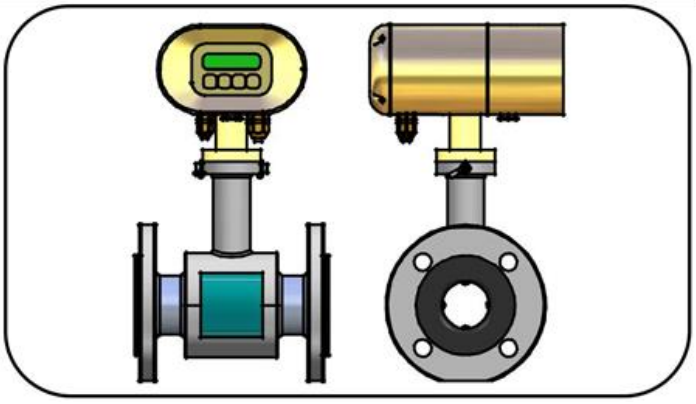
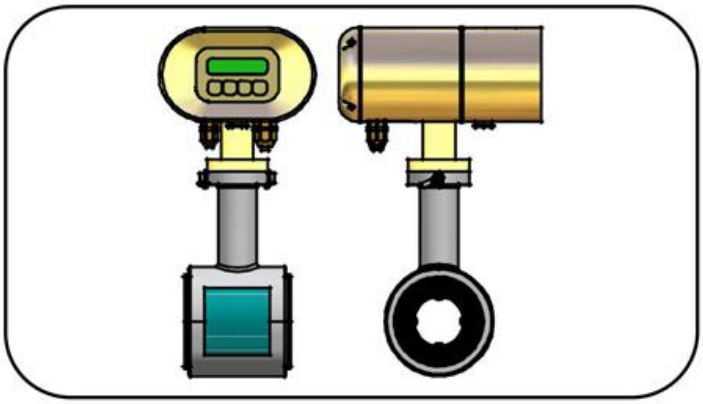
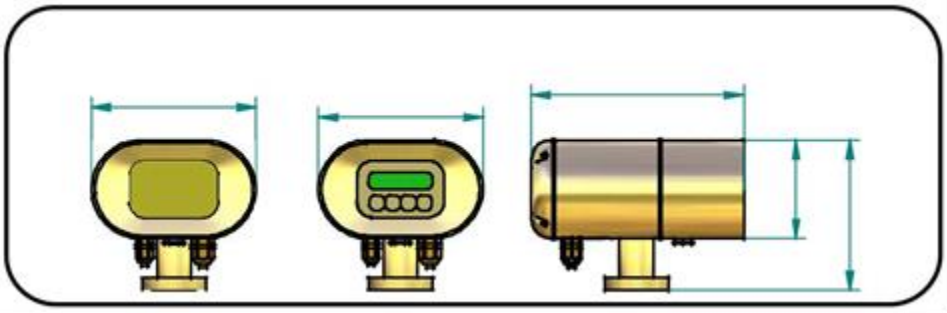
Flanged sensor with associated electronic unit



Flangeless sensor and associated electronic unit



Dimensions of the box to accommodate the flow meter in the compact design version



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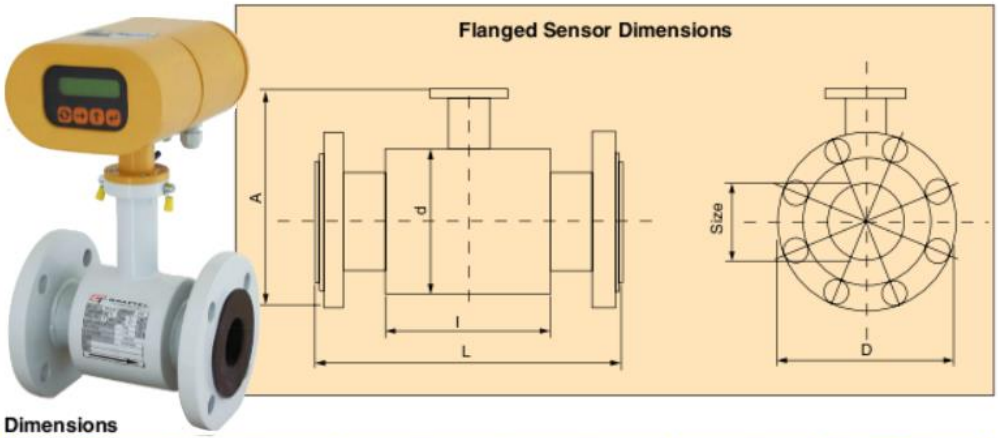

Flanged Sensor Dimensions

Nominal size mm (inch)	D mm (inch)	d mm (inch)	A mm (inch)	L mm (inch)	l mm (inch)	Weight kg (lb)
15 (½)	89 (3.5)	62 (2.4)	164 (6.5)	200 (7.9)	66 (2.6)	3.5 (7.7)
20 (¾)	99 (3.9)	62 (2.4)	170 (6.7)	200 (7.9)	66 (2.6)	3.5 (7.7)
25 (1)	108 (4.3)	72 (2.8)	180 (7.1)	200 (7.9)	96 (3.8)	3.5 (7.7)
32 (1¼)	117 (4.6)	82 (3.2)	199 (7.8)	200 (7.9)	96 (3.8)	6 (13.2)
40 (1½)	127 (5.0)	92 (3.6)	209 (8.2)	200 (7.9)	96 (3.8)	7 (15.4)
50 (2)	152 (6.0)	107 (4.2)	223 (8.8)	200 (7.9)	96 (3.8)	8 (17.6)
65 (2½)	178 (7.0)	127 (5.0)	244 (9.6)	200 (7.9)	96 (3.8)	10 (22.0)
80 (3)	191 (7.5)	142 (5.6)	260 (10.2)	200 (7.9)	96 (3.8)	12 (26.5)
100 (4)	229 (9.0)	162 (6.4)	280 (11.0)	250 (9.8)	96 (3.8)	16 (35.3)
125 (5)	254 (10.0)	192 (7.6)	310 (12.2)	250 (9.8)	126 (5.0)	21 (46.3)
150 (6)	279 (11.0)	218 (8.6)	340 (13.4)	300 (11.8)	126 (5.0)	28 (61.7)
200 (8)	343 (13.5)	274 (10.8)	398 (15.7)	350 (13.8)	211 (8.3)	35 (77.2)
250 (10)	406 (16.0)	370 (14.6)	480 (18.9)	450 (17.7)	211 (8.3)	43 (94.8)
300 (12)	483 (19.0)	420 (16.5)	535 (21.1)	500 (19.7)	320 (12.6)	55 (121.3)

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MINIMUM AND MAXIMUM FLOW RATES FOR VARIOUS SENSOR SIZES

Dia. Inches	Gal / Min	
	min	max
.5	.044	11
.75	.52	52.7
1	.79	79.25
1.25	1.32	132
1.5	1.98	198
2	3.1	317
2.5	5.28	528
3	7.9	792
4	12.3	1232
5	18.9	1893
6	28.6	2861
8	50.6	5062
10	79.25	7925
12	110.9	11095
14	154	15406
16	198	19812
20	317	31700
24	440	44032
28	606	61641
32	792	79251

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Electronic unit box

The signal-processing electronic unit is accommodated in a cast aluminum box coated on the surface with paint of hue RAL 1017. The box is held by four M5 bolts with hexagonal socket heads. Upon loosening the bolts slightly the box can be rotated around horizontal axis through ±180°. At the rear part of the box there is a terminal board under a lid held in position by six bolts with hexagonal socket heads. At the bottom of the box there are cable glands and a special valve preventing condensation of the air humidity inside the box.

Electronic unit specifications

Power source	230V~ (+10 % / -15 %) / 50 ÷ 60 Hz 115V~ (+10 % / -15 %) / 50 ÷ 60 Hz 24V~ (+10 % / -15 %) / 50 ÷ 60 Hz 24V = (± 20 %)
Power consumption	15 VA
Line fuse	T 250 mA, T 2.0 A (with power supply 24 V)
Electric shock protection according to standard CSN 332000-4-41	Automated disconnection from power source in TN-S network
Box material	Aluminum casting
Weight	3.0 kg
Ambient temperature	-5°C to 55°C (protected from direct sun light)
Storage temperature	-10°C to 70°C at relative air humidity not exceeding 70 %
Flow velocity range	0.1 to 10 m/s
Maximum flow error	0.2 % for 10 to 100 % Qmax 0.5 % for 5 to 100 % Qmax
Zero flow-rate setting	
Output 1 - passive output, insulated Output 2 - passive output, insulated Active current output, insulated Dosing: input 1 output 3 Output relay	Binary multi-function optocoupler 30 V / 50 mA Binary multi-function optocoupler 30 V / 50 mA Analog 0 (4) to 20mA, max. load 1,000 Ohm Input optocoupler diode 5 V, 10 mA Binary multi-function optocoupler 30 V / 50 mA Insulated switch contact 0.3 A, 30 VDC Mechanical lifetime 50,000,000 cycles
Serial communication ports	USB (not insulated) RS 485 (insulated)

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Flow sensor specifications

Sensor size	Flanged sensors, .5" to 48" Flangeless sensors, .5" to 8"
Operational pressure	(580 psi) for .5" to 2" (232 psi) for 2.5" to 8" (145 psi) for 10" to 30" (87 psi) for 32" to 48"
Mechanical connection	Flanges according to ČSN, EN or DIN standards Flangeless Others
Earthing	On flanges Earthing rings Earthing electrode
Flow velocity of measured liquid	From 0.1 m/s to 10 m/s
Maximum temperature of measured liquid	Up to 150ºC (according used lining)
Minimum conductivity of measured liquid	20 µS/cm, 5 µS/cm in special applications
Empty pipe alarm	From DN 50
Lining	Soft rubber Hard rubber Resistant rubber Teflon (PTFE) E-CTFE
Measuring electrodes	Stainless steel, grade 1.4571 (17248) Hastelloy C4 Platinum Tantalum Titanium
Protection class	IP 67 IP 68
Storage temperature	-10ºC to +70ºC at max. relative air humidity 70%

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Selection of sensor tube lining

The sensor lining material selection depends on the operational parameters of the measured liquid.

Technical rubber

This lining material is suitable for less corrosive liquids and operational temperatures between 0 and +80°C. It is sufficient for most applications in water supply and waste water treatment plants. Technical rubber is available in two grades: HR – hard rubber and SR – soft rubber. Soft rubber lining is recommended for liquids containing abrasive particles, such as sand grains.

Resistant rubber

Designated SPR, resistant (heavy-duty) rubber is recommended for use with liquids of medium corrosiveness and operational temperatures between 0 and +90°C. It is suitable for flow measurements of technical water, condensate and in similar applications. Where the temperatures are likely to exceed +100°C, it is safer to use Teflon lining.

Teflon

Teflon (PTFE) lining is a universal solution for highly corrosive liquids and temperatures ranging from –20 to +150°C. Typical applications are in the chemical an d food processing industries.

E-CTFE

E-CTFE lining is a universal solution for flow meters from DN 300 and higher for corrosive liquids and temperatures ranging from -20 to 130oC. Typical applications are in the chemical processing industries.

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Advantages on using magnetic/induction technology over vortex

Low Cost

Measuring principle magnetic/induction is more variable
(clean, waste, drinking water)

Range of Diameters VTMA (1" – 4") , magnetic/induction (1/2" – 48")

Better Accuracy VTMA 1%, magnetic/induction standard +/- 0,5%, on request +/- 0,2%

Magnetic/induction can have RS485 or HART, both with protocol

High accuracy of measurement in wide range of measured values

High reliability, minimum requirements on maintenance

Low hydraulic losses are unaffected

Vortex Disadvantages

High Cost

Vortex meters are generally not suitable for slurries or O high-viscosity liquids.

Users cannot check calibration

Turbulent flow is required.

Vortex meters have over range limitations.

Strainers may be required.

Vortex meters are affected by pulsating flow.