



PROFLOW 5000



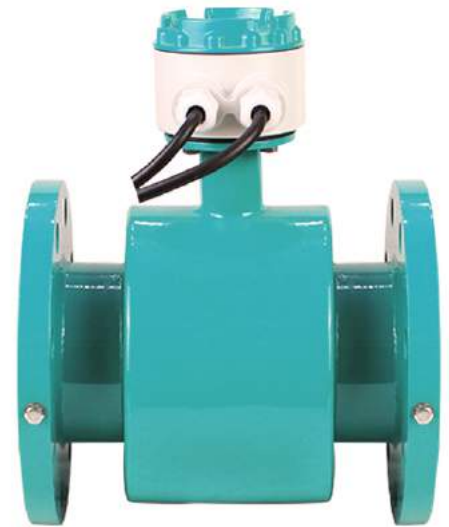
Application

- The bidirectional flowmeter is virtually independent of pressure, density, temperature and viscosity.
- Dedicated to process applications in harsh environments
- Less maintenance with advanced diagnostics

PROFLOW 5000

DURABLE CONSTRUCTION

The design has a circular cross section and a homogeneous magnetic field, forms the basis for a flow-optimised pipe cross section. The design allows the sensor to measure the flow bidirectionally. As an additional benefit, there is no pressure drop and density changes. The liner of the measuring tube is made of 7 different types of Materials to suit your application against resistant to vacuum, corrosion, aging and abrasion. The three electrode design is our standard offering in all the product variants.



THE TECHNOLOGY

Electromagnetic Flowmeters are based on Faraday's Law of Electromagnetic Induction.

In an Electromagnetic Flowmeter, the magnetic field is generated by a set of coils. As the conductive liquid passes through the electromagnetic field, an electric voltage is induced in the liquid which is directly proportional to its velocity. This induced voltage is perpendicular to both, the liquid flow direction and the electromagnetic field direction. The voltage sensed by the electrodes is further processed by the transmitter to give standardised output signal or displayed in appropriate engineering unit.

The flux density of the electromagnetic field in a given Flowmeter and the distance between the electrodes are constant. Therefore, the induced voltage is only a function of liquid velocity.

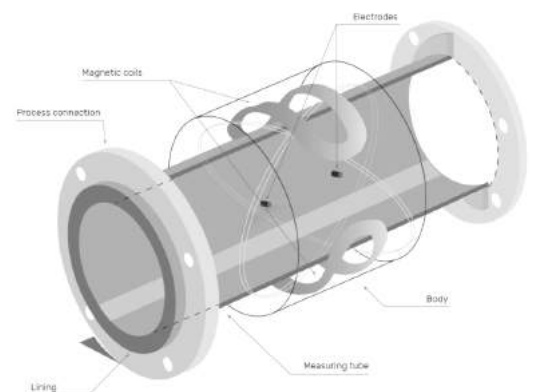
$$E = K \times B \times \bar{v} \times D$$

where **E** : Induced voltage
K : Flow tube constant
B : Magnetic field strength
 $\bar{v}$: Mean flow velocity
and **D** : Electrode spacing

Volume flow is calculated by the equation

$$Q = \bar{v} \times D^2 \times \pi / 4$$

Therefore, $Q = \frac{E \times D \times \pi}{K \times B \times 4}$



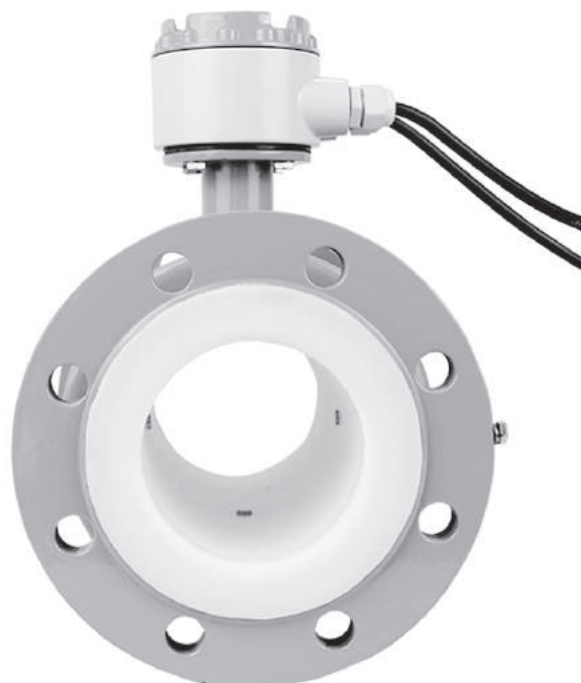
The induced voltage is not affected by the physical properties of liquids like temperature, viscosity, pressure, density and conductivity as long as the conductivity of the measured liquid is above the minimum threshold level. For reliable measurement, the pipe must be completely full of liquid.

The electromagnetic field coil assembly is excited by pulsed DC technique which eliminates the interfering noise and provides automatic zero correction.

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LINER SELECTION

	PFA/ PFA+ - Fluoropolymer High temperature chemically aggressive applications.
	PTFE - Fluoropolymer Most common liner - suitable for most applications
	ETFE - Fluoropolymer Improved abrasion resistance liner - good chemically
	Polyurethane Water applications with limited to no chemicals
	Adiprene Oil and gas applications with high pressure, high salinity
	Neoprene Best for sea water / lower concentration brine solutions
	Linatex Standard liner for mining or fluid streams w/ large debris



ACCURACY

Reference condition

Accuracy : $\pm 0.3\%$ o.r. ± 1 mm/s

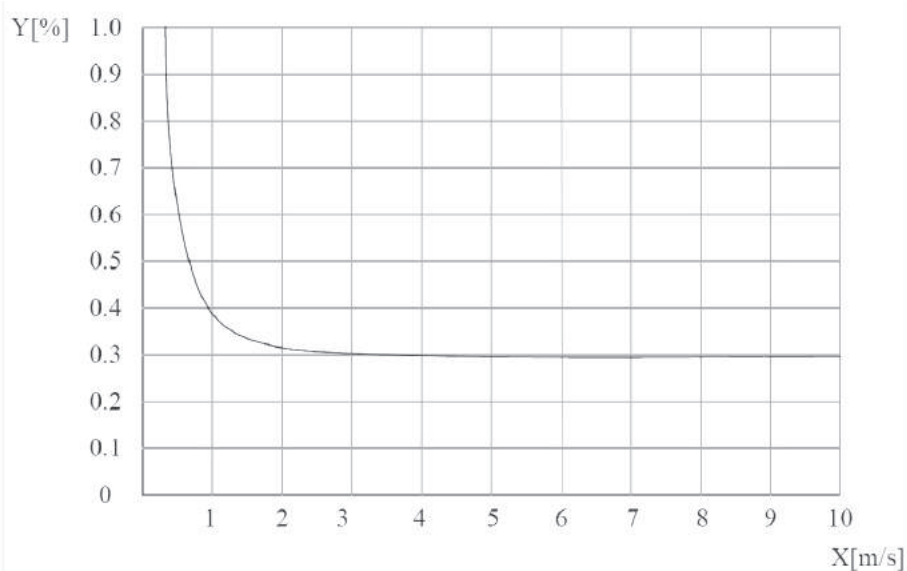
Repeatability : Max. $\pm 0.1\%$

Medium: water

Temperature: 20 deg C

Pressure: 0.1MPa

Input subsidiary conduit: ≥ 5 DN



X[m/s]: flow speed

Y[%]: deviation of actual investigations (mV)

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Measuring system

Measuring principle	Faraday's law of electromagnetic induction	
Function	Instantaneous flow rate, flow velocity, mass flow (when the density is constant), real-time measurement and flow accumulation	
Module configuration	Measurement system is made up of signal converter and measurement sensor.	
Flow meter		
Protection class	IP65 or IP68	
Measurement sensor		
Nominal Diameter	DN15-DN2000	
Flange	In line with GB / T9119-2000 standard carbon steel (Optional stainless steel flanges), other standard flange can be customized	
Pressure rating (High pressure can be customized)	DN15 - DN50, PN<4.0MPa	
	DN65 - DN150, PN<1.6MPa	
	DN200 – DN600, PN<1.0MPa	
	DN700 – DN2000, PN<0.6MPa	
Lining Material	Chloroprene rubber(CR), Silicon fluorine rubber(FVMQ) Polytetrafluoroethylene (PTFE/F4), Fluorinated ethylene propylene (FEP/F46), Teflon(PFA)	
Electrode Material	316L Stainless Steel, Hastelloy C, Hastelloy B, Ti, Ta, Pt	
Medium temperature	-20 – 180℃	-20 – 80℃
Buried depth	Less than 5 meters (only IP68 protection of split type sensor)	
Immersion depth	Less than 3 meters (only IP68 protection of split type sensor)	
Sensor cable	Only for the split, the standard 10m cable; other cables suggest custom no longer than 30 meters.	

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communications

Serial communications	RS-485(Modbus-RTU)
Output	Current (4-20 ma) , Pulse , frequency , HART
Function	ATC recognition, electrode contamination

Display user interface

Graphic display	Monochrome LCD, white backlight; Size: 128*64 pixels
Display function	2 measurement value
Language	English
Unit	You can configure the menu to select the unit L/hr,L/min,L/sec m3/hr,m3/min,m3/sec Kg/hr,Kg/min,Kg/sec
Operating unit	Mechanical key or photoelectric key

Measurement accuracy

Max measuring error	Measurement value $\pm$ 0.5% (low speed 0.5m/s) ; $\pm$ 2.5mm/s (low speed<0.5m/s)
Repetitiveness	<0.15%

Operating environment

Temperature	
Environment	-10℃ - 55℃
Storage	-40℃ - 65℃
Conductivity	
Conductivity	>3 μ S/cm

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Material

Sensor housing	Carbon steel ,SS304,SS316L
Converter	Standard die cast aluminum ,SS316L

Electrical connections

Power supply	100-240VAC, 50/60Hz
Power consumption	Max 15VA
Signal cable	Apply only to split type
Shielded cable	Signal section, wire: 0.5mm Cu /AWG20

Output

Current output		
function	Measurement of volume and quality (in the case of constant density)	
Setting	scope	4-20mA
	Max	20mA
	Min	4mA
Internal voltage	24VDC	
loading	≤750Ω	
Pulse and frequency output		
function	Set up Pulse and frequency output	
Pulse output	basis	Output pulse width: 0.25ms ~100ms Duty cycle: 50% (Pulse frequency ≥5Hz) F _{max} ≤ 5000 cp/s
	setting	0.001L – 1m ³
frequency	Max	F _{max} ≤ 5000Hz
	setting	0-5000Hz
passive	Outer ≤ 36VDC	
Status output		
function	Output as alarm	
passive	Outer ≤ 36VDC	

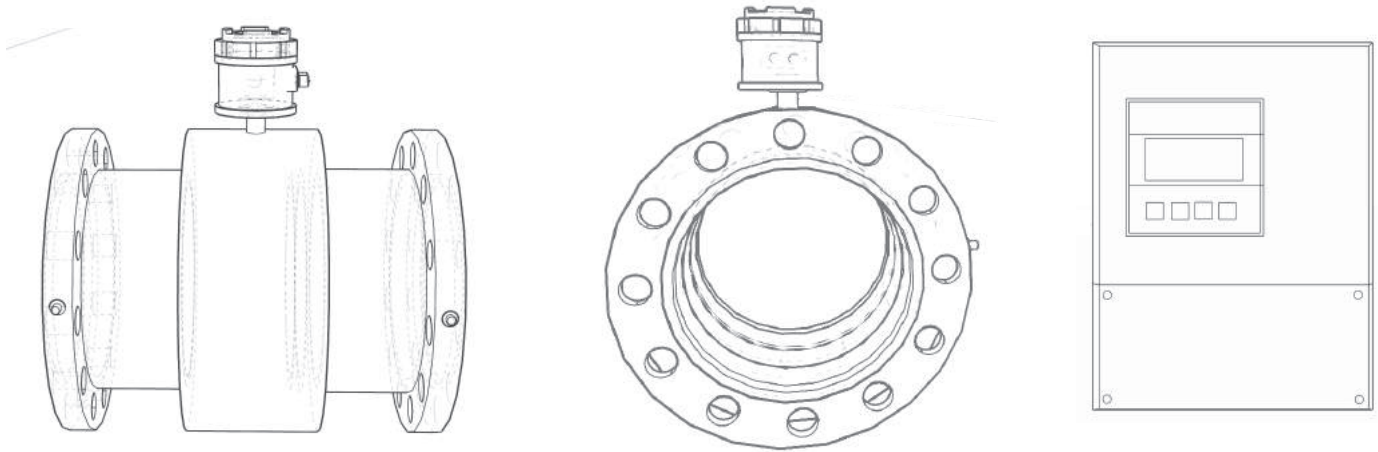
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MODEL NUMBER SELECTION

PF6000

Transmitter Type I - Integral R - Remote W - Integral without Display	Line Size 0010 - 10 (¾") 0015 - 15 (½") 0020 - 20 (¾") 0025 - 25 (1") 0032 - 32 (1.25") 0040 - 40 (1.50") 0050 - 50 (2") 0065 - 65 (2.5") 0080 - 80 (3") 0100 - 100 (4") 0125 - 125 (5") 0150 - 150 (6") 0200 - 200 (8") 0250 - 250 (10") 0300 - 300 (12") 0350 - 350 (14") 0400 - 400 (16") 0450 - 450 (18") 0500 - 500 (20") 0600 - 600 (24") 0700 - 700 (28") 0800 - 800 (32") 0900 - 900 (36") 1000 - 1000 (40") 1100 - 1100 (44") 1200 - 1200 (48") 1300 - 1300 (52") 1400 - 1400 (56") 1500 - 1500 (60") 1600 - 1600 (64") 1800 - 1800 (72") 2000 - 2000 (80") 2700 - 2700 (106")	Cable Length C1 - 10 meter C2 - 15 meter C3 - 20 meter C4 - 25 meter C5 - 30 meter C6 - 50 meter C7 - 80 meter C9 - Not Applicable
Power Supply P1 - 12 - 60 V DC P2 - 80 - 300 V AC/DC P3 - Battery Powered		Approval D - None F - Flameproof
Output OP1 - 4 - 20 mA DC OP2 - 4 - 20 mA DC + Open Collector Pulse OP3 - 4 - 20 mA DC + 24 V Active Pulse OP4 - 4 - 20 mA DC + Relay - 1 No. OP5 - 4 - 20 mA DC + Relay - 2 Nos.		Protection Class for Sensor A - IP 65 B - IP 67 C - IP 68
		Coil Housing CH1 - Carbon Steel CH2 - SS 304 CH3 - SS 316 CH4 - SS 316L
		Measuring Tube T1 - SS 304 T2 - SS 316 T3 - SS 316L T4 - HDPE
Communication Interface C1 - Not Applicable C2 - RS 485 (Modbus RTU) C5 - HART		Earthing Rings G1 - None (Earth Electrode) G2 - SS 316 G3 - SS 316L G4 - Not Applicable
Flange Standard/ Design of Measuring Sensor S1 - Flange ANSI 150 S2 - Flange ANSI 300 S3 - Flange ANSI 600 S4 - Flange DIN PN 10 S5 - Flange DIN PN 16 S6 - Flange DIN PN 25 S7 - Flange DIN PN 40 S10 - Flange BS S11 - Flange BS S12 - Wafer S13 - SMS S14 - Tri Clamp S15 - BSP Thread-end S16 - Not Applicable	Flange Material F1 - Carbon Steel F2 - SS 304 F3 - SS 316 F4 - SS316L F5 - HDPE F6 - Not Applicable	Sensor Lining L1 - Hard Rubber L2 - Neoprene L3 - PTFE L4 - Polyurethane L5 - PFA L6 - Polypropylene L7 - Not Applicable
		Electrode Material E1 - SS 316L E2 - SS 316 E3 - Hastelloy C E4 - Titanium E5 - Tantalum E6 - Platinum E7 - SS Duplex

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Size Caliber	Length (mm)	Flange diameter (mm)	Flange center distance (mm)	Flange thickness (mm)	Height (mm)		Bolt			Weight (Kg)
					Separatin g type	Integrated type	Hole DIA	QTY	Bolt Size	
DN15	200	95	65	14	190	265	14	4	M12	5
DN20	200	105	75	16	200	275	14	4	M12	6
DN25	200	115	85	16	210	285	14	4	M12	7
DN32	200	140	100	18	220	310	18	4	M16	8
DN40	200	150	110	18	230	320	18	4	M16	9
DN50	200	165	125	20	245	335	18	4	M16	10
DN65	200	185	145	20	265	355	18	8	M16	12
DN80	200	200	160	20	280	370	18	8	M16	14
DN100	250	220	180	22	300	390	18	8	M16	15
DN125	250	250	210	22	330	420	18	8	M16	18
DN150	300	285	240	24	360	450	22	8	M20	23
DN200	350	340	295	24	420	505	22	8	M20	27
DN250	400	395	350	26	480	560	22	12	M20	38
DN300	500	445	400	26	530	610	22	12	M20	48
DN350	500	505	460	30	590	670	22	16	M20	65
DN400	600	565	515	32	645	725	26	16	M24	80
DN450	600	615	565	36	695	775	26	20	M24	100
DN500	600	670	620	38	750	830	26	20	M24	120
DN600	600	780	725	42	855	940	30	20	M27	210
DN700	700	895	840	50	970	1055	30	24	M27	300
DN800	800	1015	950	56	1090	1170	33	24	M30	400
DN900	900	1115	1050	62	1190	1270	33	28	M30	500
DN1000	1000	1230	1150	70	1290	1380	36	28	M33	700
DN1200	1200	1455	1380	83	1530	1610	39	32	M36	850
DN1400	1400	1675	1590	90 ^b	1740	1820	42	36	M39	1100
DN1600	1600	1915	1820	100 ^b	1950	2050	48	40	M45	1500
DN1800	1800	2115	2020	110 ^b	2170	2250	48	44	M45	1900
DN2000	2000	2325	2230	120 ^b	2380	2460	48	48	M45	2300

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Flow speed and flow rate Contrast worksheet

Flowspeed (m/s) Flow rate (m³/h) Diameter(mm)	0.01(Mini)	1	2	3	4	5	15(Max)
15	0.0064	0.6362	1.2723	1.9085	2.5447	3.1809	9.5426
20	0.0113	1.131	2.2619	3.3929	4.5239	5.6549	16.9646
25	0.0177	1.7671	3.5343	5.3014	7.0686	8.8357	26.5072
40	0.0452	4.5239	9.0478	13.5717	18.0956	22.6195	67.8584
50	0.0707	7.0686	14.1372	21.2058	28.2743	35.3429	106.0288
65	0.1195	11.9459	23.8918	35.8377	47.7836	59.7295	179.1886
80	0.1810	18.0956	36.1911	54.2867	72.3823	90.4779	271.4336
100	0.2827	28.2743	56.5487	84.8230	113.0973	141.3717	424.1150
150	0.6362	63.6173	127.2345	190.8518	254.4690	318.0863	954.2588
200	1.1310	113.0973	226.1947	339.2920	452.3893	565.4867	1696.4600
250	1.7671	176.7146	353.4292	530.1438	706.8583	883.5729	2650.7188
300	2.5447	254.4690	508.9380	763.4070	1017.8760	1272.3450	3817.0351
350	3.4636	346.3606	692.7212	1039.0818	1385.4424	1731.8030	5195.4089
400	4.5239	452.3893	904.7787	1357.1680	1809.5574	2261.9467	6785.8401
450	5.7256	572.5553	1145.1105	1717.6658	2290.2210	2862.7763	8588.3289
500	7.0686	706.8583	1413.7167	2120.5750	2827.4334	3534.2917	10602.8752
600	10.1788	1017.8760	2035.7520	3053.6281	4071.5041	5089.3801	15268.1403
700	13.8544	1385.4424	2770.8847	4156.3271	5541.7694	6927.2118	20781.6354
800	18.0956	1809.5574	3619.1147	5428.6721	7238.2295	9047.7868	27143.3605
900	22.9022	2290.2210	4580.4421	6870.6631	9160.8842	11451.1052	34353.3157
1000	28.2743	2827.4334	5654.8668	8482.3002	11309.7336	14137.1669	42411.5008
1200	40.7150	4071.5041	8143.0082	12214.5122	16286.0163	20357.5204	61072.5612
1400	55.4177	5541.7694	11083.5389	16625.3083	22167.0778	27708.8472	83126.5416
1600	72.3823	7238.2295	14476.4589	21714.6884	28952.9179	36191.1474	108573.4421
1800	91.6088	9160.8842	18321.7684	27482.6525	36643.5367	45804.4209	137413.2627
2000	113.0973	11309.7336	22619.4671	33929.2007	45238.9342	56548.6678	169646.0033

TAG PLATE DETAILS

MAGNETIC FLOWMETER		LABTECH	
MODEL:	PLUS-OUT:		
SUFFIX:	MATERIALS:		
	ELECTRODES:		
SIZE:	PRESSURE:		
ACCURACY:	FLUID TEMP:		
METER FACTOR:	AMB. TEMP.:		
SUPPLY:	PROTECTION:		
SCALE:	NO:		
I-OUT:	2016-06-16		