Polaris™

Electromagnetic Flow Meter

The Polaris™ MA1 is the first liquid flow meter offered by Magnetrol®, expanding the already diverse level and flow measurement portfolio that has been established over the last 80 years.

Magnetrol®

Polaris™

Electromagnetic Flow Meter

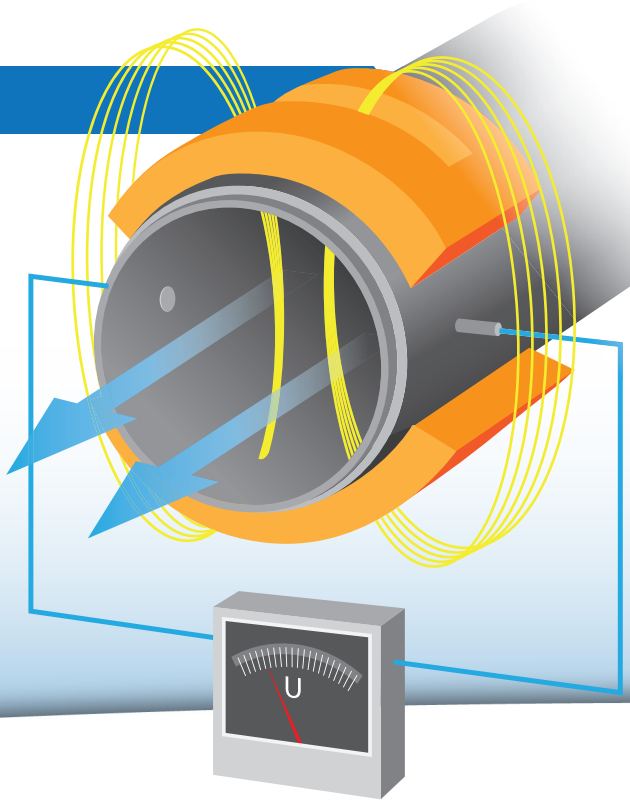
The electromagnetic flow meter consists of a sensor through which the measured liquid flows and an electronic unit where the low-level signal from the sensor is modified to a standardized form suitable for further processing in various industrial electronic devices.

The output signal is proportional to the volumetric flow rate of the measured liquid. The only factor limiting the application of electromagnetic flow meters is the requirement that the measured liquid shall be conductive and non-magnetic.

The electromagnetic flow meter can be designed either as an integral device or with the sensor separated from the associated electronic unit. In the former case, the electronic unit is fitted directly onto the sensor, in the latter case it is connected to the sensor by a remote 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 or as a wafer style design.

The function of an electromagnetic flow meter is based on Faraday's law of induction. The sensor consists of a non-magnetic and non-conductive tube with two embedded measuring electrodes. To create an alternating magnetic field, two coils are fitted onto the tube in parallel with the plane defined by the active parts of the measuring electrodes. If a conductive liquid flows across the magnetic field, a voltage will appear on the measuring electrodes proportional to the flow velocity and the conductor length.



Transmitter

Digits

4 | Power

0	115 VAC
1	230 VAC
2	24 VDC

5 | Outputs

1	4-20 mA with HART®, Pulse, Alarm (Status)

6 | Display

B	Display with keypad

9 | Housing Location/Protection

1	Integral, IP67 transmitter (max 90 °C (194 °F))
2	Remote transmitter with IP67 sensor*
3	Remote transmitter with IP68 sensor*

10 | Enclosure/Conduit Entries incl. cable glands

0	Aluminum, ¾" NPT
1	Aluminum, M20

M	A	1				0	0		
1	2	3	4	5	6	7	8	9	10

**Need to order remote cable*

Remote Cable

Digits

7 | Units of Measurement

1	Feet
2	Meters

8 - 10 | Length**

020-164	If digit 7 = 1 (20 – 164 feet)
006-050	If digit 7 = 2 (6 – 50 meters)

0	3	7	3	3	2				
1	2	3	4	5	6	7	8	9	10

***Consult factory if conductivity is less than 50 µS/cm*

Sensor

Digits

2 | Measurement System

E	**English:** Sensor size in hundreths of an inch (use with ANSI or AWWA flanges)
M	**Metric:** Sensor size in millimeters (use with DN flanges)

3 | Sensor Type

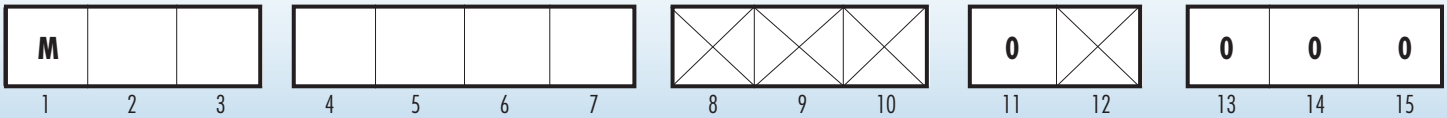
0	Wafer style sensor ¾"–8" (DN20-200)
3	Flanged ANSI B16.5 or AWWA
A	Flanged EN 1092-1

4-7 | Sensor Size (table below)

0050-3200	If digit 2 = E
0015-0800	If digit 2 = M

Sensor Table

Digit 2 = E			Digit 2 = M		
Size (in)	Code	Class	Size (DN)	Code	Class
½"	**0050**	ANSI 150#	15	**0015**	PN40
¾"	**0075**	ANSI 150#	20	**0020**	PN40
1"	**0100**	ANSI 150#	25	**0025**	PN40
1 ¼"	**0125**	ANSI 150#	32	**0032**	PN40
1 ½"	**0150**	ANSI 150#	40	**0040**	PN40
2"	**0200**	ANSI 150#	50	**0050**	PN40
2 ½"	**0250**	ANSI 150#	65	**0065**	PN16
3"	**0300**	ANSI 150#	80	**0080**	PN16
4"	**0400**	ANSI 150#	100	**0100**	PN16
5"	**0500**	ANSI 150#	125	**0125**	PN16
6"	**0600**	ANSI 150#	150	**0150**	PN16
8"	**0800**	ANSI 150#	200	**0200**	PN16
10"	**1000**	ANSI 150#	250	**0250**	PN10
12"	**1200**	ANSI 150#	300	**0300**	PN10
14"	**1400**	ANSI 150#	350	**0350**	PN10
16"	**1600**	ANSI 150#	400	**0400**	PN10
18"	**1800**	ANSI 150#	450	**0450**	PN10
20"	**2000**	ANSI 150#	500	**0500**	PN10
24"	**2400**	ANSI 150#	600	**0600**	PN10
28"	**2800**	AWWA (B)	700	**0700**	PN10
32"	**3200**	AWWA (B)	800	**0800**	PN6



Sensor (cont.)

Digits

8 | Sensor Lining Material

1	Hard Rubber DN20–800, +80 °C max (¾"–32", +175 °F max)
2	Soft Rubber DN20–800, +80 °C max (¾"–32", +175 °F max)
3	PTFE DN15–250, +150 °C max (½"–10", +300 °F max)
4	ECTFE DN300–800, +130 °C max (12"–32", +265 °F max)

9 | Material of Electrodes

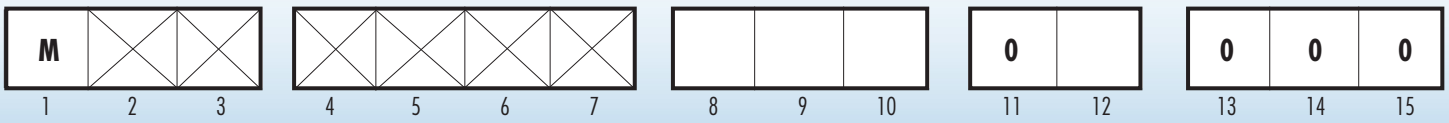
A	Stainless Steel (standard with rubber liners)
B	Hastelloy® C (standard with PTFE or ECTFE liners)

10 | Material of Cover and Flanges*

A	Carbon Steel cover and Stainless Steel flanges
0	Wafer style with Carbon Steel cover
1	Carbon Steel cover and Carbon Steel flanges (standard)

12 | Optional Grounding Rings

A	None – 3rd grounding electrode provided for ¾" + (DN20+)
B	Provide



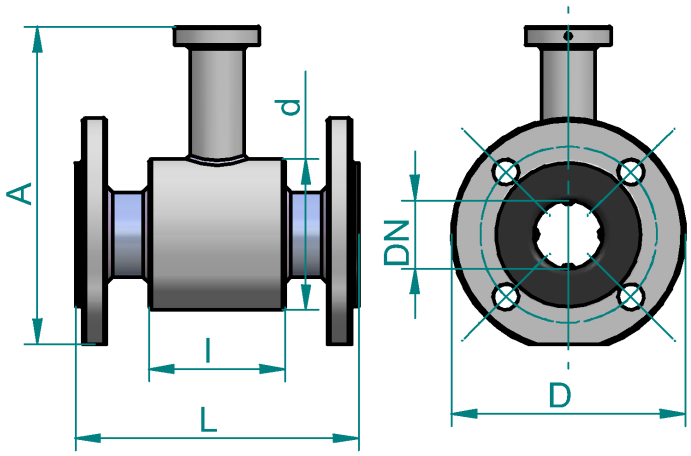
*Spool piece is always SS

Dimensions and Ratings of Flanged Sensor

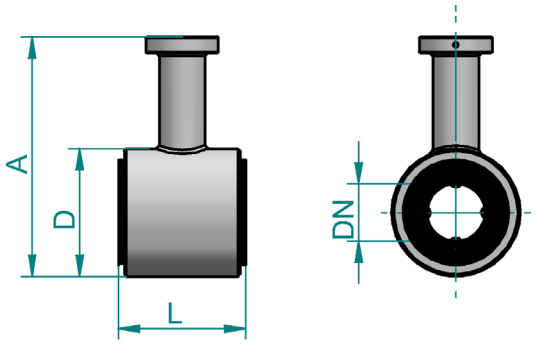
Sensor dimensions (mm) for various rated diameters

Flanges according to ANSI B16.5 (150#) and AWWA Class B

	DN	D	d	A*	L	l
ANSI (max. working pressure 15,9 bar)	½"	89	62	173	200	66
	¾"	98	62	177	200	66
	1"	108	72	187	200	96
	1 ¼"	117	82	197	200	96
	1 ½"	127	92	207	200	96
	2"	152	107	227	200	96
	2 ½"	178	127	250	200	96
	3"	191	142	264	200	96
	4"	229	162	293	250	96
	5"	254	192	320	250	126
	6"	279	218	346	300	126
	8"	343	274	406	350	211
	10"	406	370	485	450	211
ANSI (max. working pressure 10,3 bar)	12"	483	420	549	500	320
	14"	533	480	604	550	320
	16"	597	530	661	600	320
	18 "	635	581	705	600	320
	20"	699	640	767	600	320
	24"	813	760	884	600	320
AWWA (max. working pressure 5,9 bar)	28"	927	880	1001	700	420
	32"	1060	960	1107	800	420



Dimensions of wafer sensor mm (inches)



DN	D	A*	L
¾" (20)	62 (2.4)	145 (5.7)	74 (2.9)
1" (25)	72 (2.8)	158 (6.2)	104 (4.1)
1 ¼" (32)	82 (3.2)	168 (6.6)	104 (4.1)
1 ½" (40)	92 (3.6)	179 (7.0)	104 (4.1)
2" (50)	107 (4.2)	192 (7.6)	104 (4.1)
2 ½" (65)	127 (5.0)	212 (8.3)	104 (4.1)
3" (80)	142 (5.6)	227 (8.9)	104 (4.1)
4" (100)	162 (6.4)	247 (9.7)	104 (4.1)
5" (125)	192 (7.6)	277 (10.9)	134 (5.3)
6"(150)	218 (8.6)	303 (11.9)	134 (5.3)
8" (200)	274 (10.8)	359 (14.1)	219 (8.6)

Sensor dimensions (mm) for various rated diameters (DN)

Flanges according to standard EN 1092-1

	DN	D	d	A*	L	l	Wt. (kg)**
PN 40	15	95	62	164	200	66	3
	20	105	62	170	200	66	3
	25	115	72	180	200	96	3
	32	140	82	199	200	96	4
	40	150	92	209	200	96	4
	50	165	107	223	200	96	6
PN 16	65	185	127	244	200	96	9
	80	200	142	260	200	96	14
	100	220	162	280	250	96	16
	125	250	192	310	250	126	19
	150	285	218	340	300	126	25
	200	340	274	398	350	211	41
PN 10	250	395	370	480	450	211	54
	300	445	420	535	500	320	77
	350	505	480	584	550	320	92
	400	565	530	642	600	320	116
	450	615	581	695	600	320	150
	500	670	640	752	600	320	167
	600	780	760	870	600	320	315
	700	895	880	990	700	420	357
PN 6	800	975	960	1100	800	420	427

** Dimension A (sensor height) is net of the electronic unit box (or terminal box in the distributed meter version).*

*** The sensor weight data are only approximate.*

Transmitter dimensions

Height	150 mm (5 ⅞")
Length	207 mm (8 ⅛")

Performance

Range	0.1 – 10 m/s (0.33 – 32.8 ft/s)
Accuracy	0.3 % of reading for 5 to 100 % Qmax
Repeatability	0.15 % of reading

Transmitter

Power source	230 VAC (+10 % / -15 %) / 50/60 Hz 115 VAC (+10 % / -15 %) / 50/60 Hz 24 VDC (±15 %)
Power consumption	AC = 10 VA; DC = 10 W
Housing material	Aluminum
Ambient temperature	-20 °C (-5 °F)* to 60 °C (140 °F)
Outputs Analog (active) Pulse (passive) Status (passive)	 0/4–20 mA (isolated) 24V, 60 mA (isolated) 24V, 60 mA (isolated)
Communication	Keypad on display, HART protocol for use with PACT*ware*™
Menu language	English, German
Protection class	IP 67
Empty pipe detection	At measuring electrodes, selectable on/off

**Display may not read under this value but the outputs will still function*

Sensor

Sensor size	Flanged, ½" (DN15) to 32" (DN800) Wafer, ¾" (DN20) to 8" (DN200)
Flanges	ANSI B16.5 (150#) and AWWA (B) or EN 1092-1 Carbon Steel standard; optional 304 Stainless Steel
Grounding	Grounding electrode provided for ¾" (DN20) and larger Optional grounding rings in 304 Stainless Steel and Hastelloy C-276
Maximum operating temperature of liquid	+150 °C (+300 °F)** – liner dependent
Minimum conductivity of liquid	20 µS/cm; consult factory for down to 5 µS/cm
Lining	Hard rubber 0 °C (+32 °F) to +80 °C (+175 °F), size ¾"– 32" (DN20-DN800) Soft rubber 0 °C (+32 °F) to +80 °C (+175 °F), size ¾"– 32" (DN20-DN800) PTFE -20 °C (-4 °F) to +150 °C (+300 °F), size ½"– 10" (DN15-DN250) ECTFE -20 °C (-4 °F) to +130 °C (+265 °F), size 12"– 32" (DN300-DN800)
Measuring electrodes	316 Stainless Steel – standard with rubber liner Hastelloy C-276 – standard with PTFE or ECTFE liner Other options available as a special
Pipe spool material	304 Stainless Steel
Sensor cover	Carbon Steel
Protection class	IP67 or IP68

***For liquid temperatures greater than 90 °C (194 °F) use a remote transmitter*

Polaris™

Electromagnetic Flow Meter

- 4-20 mA, pulse, and alarm outputs
- Liquid conductivity down to 5 µS/cm
- Forward and reverse flow indication
- Multiple liner and electrode options
- HART protocol for use with PACT*ware*™
- Flanged or wafer style sensors

For more information, please visit us at **water.magnetrol.com**

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