M-SERIES® M2000
ELECTROMAGNETIC FLOW METER

ModMAG®
M-Series® | B-MAG Electromagnetic Flow Meters

DESCRIPTION

The Badger Meter M-Series® M2000 is the result of years of research and field use of electromagnetic flow meter technology. Based on Faraday's law of induction, these meters can measure almost any liquid, slurry or paste that has minimum electrical conductivity.

Designed, developed and manufactured under strict quality standards, the M-Series meter features sophisticated, processor-based signal conversion with accuracies of ±0.25 percent. The wide selection of liner and electrode materials helps ensure maximum compatibility and minimum maintenance over a long operating period.

OPERATION

The flow meter is a stainless steel tube lined with a non-conductive material. Outside the tube, two DC powered electromagnetic coils are positioned opposing each other. Perpendicular to these coils, two electrodes are inserted into the flow tube. Energized coils create a magnetic field across the whole diameter of the pipe.

As a conductive fluid flows through the magnetic field, a voltage is induced across the electrodes. This voltage is proportional to the average flow velocity of the fluid and is measured by the two electrodes. The M2000 amplifier receives the detector's analog signal, amplifies that signal and converts it into digital information. At the processor level, the signal is analyzed through a series of sophisticated software algorithms. After separating the signal from electrical noise, it is converted into both analog and digital signals that are used to display rate of flow and totalization.

With no moving parts in the flow stream, there is no pressure lost. Also, accuracy is not affected by temperature, pressure, viscosity or density and there is practically no maintenance required.

ELECTRODES

When looking from the end of the meter into the inside bore, the two measuring electrodes are positioned at three o'clock and nine o'clock. M2000 mag meters have an "empty pipe detection" feature. This is accomplished with a third electrode positioned in the meter between twelve o'clock and one o'clock.

If this electrode is not covered by fluid for a minimum five-second duration, the meter will display an "empty pipe detection" condition, send out an error message, if desired, and stop measuring to maintain accuracy. When the electrode again becomes covered with fluid, the error message will disappear and the meter will continue measuring.

As an option to using grounding rings, a grounding electrode (fourth electrode) can be built into the meter during manufacturing to assure proper grounding. The position of this electrode is at five o'clock.

APPLICATION

The M2000 amplifier can be integrally mounted to the detector or can be remote-mounted, if necessary and has many advantages over other conventional technologies. The meter targets a variety of applications and is well suited for the diverse water and wastewater treatment industry. The M2000 meter can accurately measure fluid flow—whether the fluid is water or a highly corrosive liquid, very viscous, contains a moderate amount of solids, or requires special handling. Today, magnetic meters are successfully used in industries including food and beverage, pharmaceutical, water and wastewater, and chemical

FEATURES

- Available in sizes 0.25…54" (6…1350 mm)
- Pulsed DC magnetic field for zero point stability
- Integral and remote signal converter availability
- Corrosion resistant liners for long life
- Measurement largely independent of flow profile
- User friendly programming procedure
- Empty pipe detection
- Power loss totalization
- Digital signal processor (32-bit)
- Non-volatile programming memory
- Rotating cover
- Calibrated in state-of-the-art facilities
- NSF listed
- CSA certified

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ELECTROMAGNETIC FLOW METER

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SPECIFICATIONS

Flow Range	0.10…39.4 ft/s (0.03…12 m/s)
Accuracy	± 0.25 percent of rate for velocities greater than 1.64 ft/s (0.50 m/s) ± 0.004 ft/s (± 1 mm/s) for velocities less than 1.64 ft/s (0.50 m/s)
Repeatability	± 0.1%
Power Supply	**AC Power Supply:** 85…265V AC; Typical Power: 20V A or 15W; Maximum Power: 26V A or 20W **Optional DC Power Supply:** 10…36V DC; Typical Power: 10W; Maximum Power: 14W
Analog Output	4…20 mA, 0…20 mA, 0…10 mA, 2…10 mA (programmable and scalable) Voltage sourced 24V DC isolated. Maximum loop resistance < 800 ohms.
Digital Output	Four total, configurable 24V DC sourcing active output (up to 2),100 mA total, 50 mA each; sinking open collector output (up to four), 30V DC max, 100 mA each; AC solid-state relay (up to 2), 48V AC, 500 mA max
Digital Input	Max 30V DC (programmable – positive zero return, external totalizer reset or preset batch start)
Frequency Output	Scalable up to 10 kHz, open collector up to 1 kHz, solid-state relay
Misc Output	High/low flow alarm (0…100% of flow), error alarm, empty pipe alarm, flow direction, preset batch alarm, 24V DC supply, ADE
Communication	RS232 Modbus RTU; RS485 Modbus RTU, HART, Profibus DP require separate daughterboards
Pulse Width	Scalable up to 10 kHz, passive open collector up to 10 kHz, active switched 24V DC. Up to two outputs (forward and reverse). Pulse width programmable from 1…1000 ms or 50% duty cycle.
Processing	32-bit DSP
Empty Pipe Detection	Field tunable for optimum performance based on specific application
Excitation Frequency	1 Hz, 3.75 Hz, 7.5 Hz or 15 Hz (factory optimized to pipe diameter)
Noise Dampening	Programmable 0…30 seconds
Low Flow Cut-Off	Programmable 0…10% of maximum flow
Galvanic Separation	250V
Fluid Conductivity	Minimum 5.0 micromhos/cm
Fluid Temperature	**With Remote Amplifier:** PFA, PTFE & Halar 302° F (150° C) **With Meter-Mounted Amplifier:** Rubber 178° F, (80° C), PFA, PTFE & Halar 212° F (100° C)
Ambient Temperature	– 4…140° F (–20…60° C)
Relative Humidity	Up to 90 percent non-condensing
Flow Direction	Unidirectional or bidirectional two separate totalizers (programmable)
Totalization	Programmable/resettable
Units of Measure	Ounce, pound, liter, US gallon, imperial gallon, barrel, hectoliter, mega gallon, cubic meter, cubic feet, acre feet
Display	4 x 20 character display with backlight
Programming	Three-button, external manual or remote
Amplifier Housing	Cast aluminum, powder-coated paint
Detector Housing	Carbon steel welded
Pipe Spool Material	316 stainless steel
Flanges	**Standard**: ANSI B16.5 Class 150 RF cast steel; **Optional:** 300 lb cast steel, 316 stainless steel
Liner Material	PFA up to 3/8", PTFE 1/2…24", soft and hard rubber from 1…54", Halar® from 14…40"
Electrode Materials	**Standard:** Alloy C; **Optional:** 316 stainless steel, gold/platinum plated, tantalum, platinum/rhodium
Mounting	Meter mount or remote wall mount (bracket supplied)
Locations	Indoor and outdoor
Meter Enclosure Classification	NEMA 4X (IP66); **Optional:** Submersible NEMA 6P (IP67), remote amplifier required
Junction Box Enclosure Protection	For remote amplifier option: powder-coated die-cast aluminum, NEMA 4 (IP66)
Cable Entries	1/2" NPT cord grip (3)
Optional Stainless Steel Grounding Rings	**Meter Size** — **Thickness (of one ring)** Up through 10" — 0.135" 12…54" — 0.187"
NSF Listed	Models with hard rubber liner, 4"size and up; PTFE liner, all sizes
Token Features	Data Logging (Blue token); Store/Restore (Red token); Firmware Upgrade (Black token)

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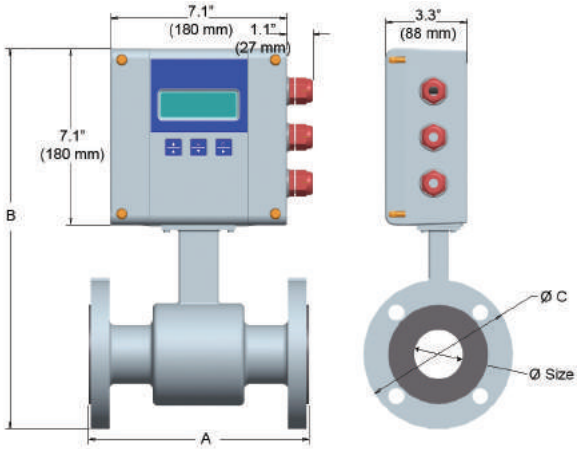
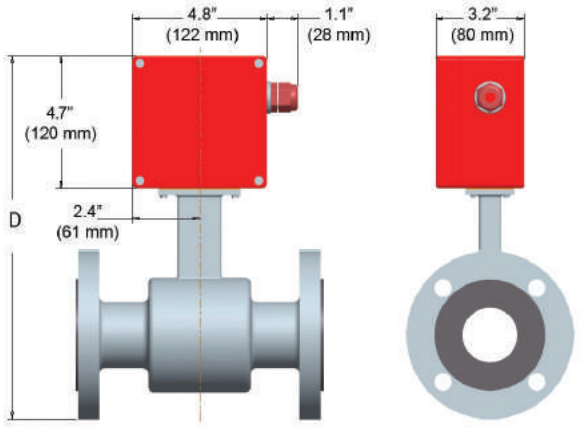
DIMENSIONS IN INCHES (MILLIMETERS)



Meter with M2000 Amplifier



Meter with Junction Box for Remote M2000 Amplifier

Size		A		B		C		D		Est. Weight with M2000		Flow Range			
												LPM		GPM	
inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	lb	kg	min	max	min	max
1/4	6	6.7	170	14.0	356	3.5	89	11.4	288	10	4.5	0.05	20	0.01	5
5/16	8	6.7	170	14.0	356	3.5	89	11.4	288	10	4.5	0.09	36	0.02	10
3/8	10	6.7	170	14.0	356	3.5	89	11.4	288	10	4.5	0.14	57	0.04	15
1/2	15	6.7	170	14.0	356	3.5	89	11.4	288	10	4.5	0.32	127	0.08	34
3/4	20	6.7	170	14.2	361	3.9	99	11.5	293	13	5.5	0.46	183	0.12	48
1	25	8.9	225	14.4	366	4.3	108	11.7	298	18	8.0	0.79	318	0.21	84
1-1/4	32	8.9	225	15.2	386	4.6	117	12.5	318	20	9.0	1.5	594	0.39	157
1-1/2	40	8.9	225	15.4	390	5.0	127	12.7	322	21	9.5	2.1	834	0.55	220
2	50	8.9	225	15.9	403	6.0	152	13.2	335	26	11.5	3.6	1431	0.94	378
2-1/2	65	11.0	280	17.1	434	7.0	178	14.4	366	52	23.5	6.2	2471	1.63	653
3	80	11.0	280	17.3	440	7.5	191	14.7	372	54	24.5	8.4	3344	2.21	883
4	100	11.0	280	18.4	466	9.0	229	15.7	398	56	25.5	12	4997	3.30	1320
5	125	15.8	400	19.6	498	10.0	254	16.9	430	58	26.0	20	8008	5.29	2115
6	150	15.8	400	20.6	524	11.0	279	17.9	456	60	27.0	30	11890	7.85	3141
8	200	15.8	400	22.5	572	13.5	343	20.4	518	86	39.0	59	23765	15.69	6278
10	250	19.7	500	26.8	681	16.0	406	24.1	613	178	81.0	95	37934	25.05	10021
12	300	19.7	500	28.9	734	19.0	483	26.2	666	207	94.0	127	50894	33.61	13445
14	350	19.7	500	30.8	782	21.0	533	28.2	716	258	117	173	69272	45.75	18300
16	400	23.6	590	33.7	856	23.5	597	31.0	788	306	139	226	90477	59.75	23902
18	450	23.6	590	35.0	890	25.0	635	32.4	822	400	181	286	114511	75.63	30250
20	500	23.6	590	38.2	969	27.5	699	35.5	901	493	224	353	141371	93.37	37346
22	550	23.6	590	39.6	1005	29.5	749	36.9	937	523	237	428	171059	112.97	45189
24	600	23.6	590	42.2	1071	32.0	813	39.5	1003	552	251	509	203574	134.45	53779
28	700	23.6	590	46.2	1173	36.5	927	44.0	1118	648	294	693	277089	183.00	73199
30	750	31.5	800	48.3	1228	39.0	984	45.7	1161	702	319	795	318087	210.07	84030
32	800	31.5	800	52.2	1325	41.4	1015	49.5	1257	768	349	905	361912	239.02	95607
36	900	31.5	800	55.3	1405	46.0	1168	54.1	1374	848	385	1145	458045	302.51	121003
40	1000	31.5	800	60.0	1525	50.2	1230	57.4	1457	922	419	1414	565487	373.46	149386
42	1050	36.0	914	66.0	1675	53.0	1346	63.4	1610	1198	499	1559	623449	411.74	164698
48	1200	39.4	1000	69.9	1775	59.4	1455	67.2	1707	1208	549	2036	814301	537.79	215116
54	1350	39.4	1000	75.4	1915	66.2	1681	73.0	1927	1854	619	2576	1030599	680.64	272255

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M-SERIES® M3000
ELECTROMAGNETIC FLOW METER

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DESCRIPTION

The innovative design of the Badger Meter M-Series M3000 meter represents the next generation of electromagnetic flow meter technology. Incorporating the latest developments in micro processing signal conditioning the advanced design of the M3000 allows an accuracy of better than ± 0.25% with a flow range of 300:1. Targeted to a variety of industrial and municipal applications, the M3000 is virtually unaffected by density, temperature, pressure, and viscosity changes and provides an accurate and reliable long term metering solution. This meter complies with ANSI/NSF Standard 61, Annex G.

OPERATION

The operating principle of the electromagnetic flow meter is based on Faraday's law of magnetic induction: The voltage induced across any conductor, as it moves at right angles through a magnetic field, is proportional to the velocity of that conductor. The voltage induced within the fluid is measured by two diametrically opposed internally mounted electrodes. The induced signal voltage is proportional to the product of the magnetic flux density, the distance between the electrodes and the average flow velocity of the fluid.

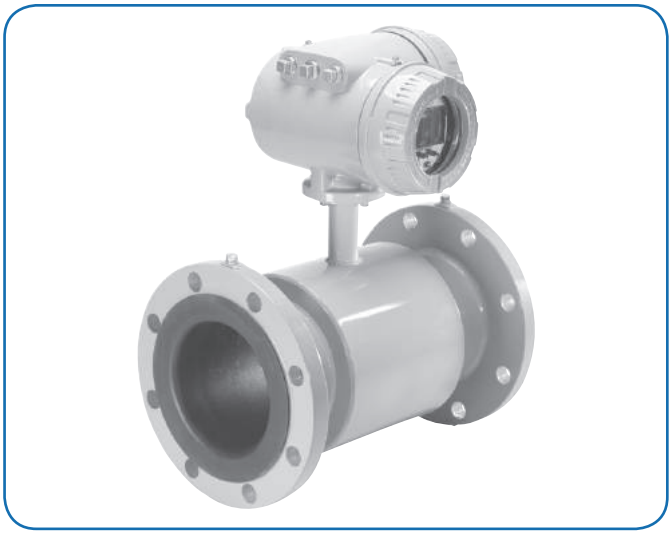
ELECTRODES

When looking from the end of the meter into the inside bore, the two measuring electrodes are positioned at three o'clock and nine o'clock. As a conductive fluid flows through the magnetic field, a voltage is induced across the electrodes. This voltage is proportional to the average flow velocity of the fluid and is measured by the two electrodes. This induced voltage is then amplified and processed digitally by the converter to produce an accurate analog or digital signal. The signal can then be used to indicate flow rate and totalization or to communicate to remote sensors and controllers.

M3000 meters also have an "empty pipe" detection feature. This is accomplished with a third electrode positioned in the meter between twelve o'clock and one o'clock. If this electrode is not covered by fluid for minimum of five seconds, the meter will display an "empty pipe" condition. When the electrode again becomes covered with fluid, the error message will disappear and the meter will continue measuring.

DETECTOR

The flow meter is a stainless steel tube lined with a non-conductive material. Outside the tube, two DC powered electromagnetic coils are positioned opposing each other. Perpendicular to these coils, two electrodes are inserted into the flow tube. Energized coils create a magnetic field across the whole diameter of the pipe. With the no moving parts, open flow tube design there is no pressure lost and practically no maintenance required.



APPLICATION

The M3000 is suited for use in applications where indication of rate and totalization is required. The ability to display flow parameters locally at the flow meter, or remotely by mounting the amplifier up to 100 feet away from the detector, provides a versatile solution for most industrial and municipal flow applications. Whether the fluid is water or something highly corrosive, very viscous, contains a moderate amount of solids, or requires special handling, the meter is able to accurately measure it. Housed in a Class 1, Division 2, NEMA 4X/6P (IP66/IP67) enclosure, the M3000 design has been tested and approved by Factory Mutual (FM) in the United States and the Canadian Standards Association (CSA international) in Canada.

FEATURES

- Sizes 1/4…24 in. (6…600 mm)
- Accuracy of ± 0.25%
- Better than 0.1% repeatability
- Large 4-line by 16-character, back-lit, LCD display
- Digital Signal Processor (DSP) based
- Bi-directional flow sensing and totalization
- Automatic zero point stability
- Measures fluids with as low as 5.0 micromhos/cm conductivity
- Empty pipe detection
- No pressure loss for low operational costs
- Long life, corrosion-resistant liners
- Precise calibration
- NEMA 4X/6P (IP66/IP67) enclosure
- FM approved for Class I, Div 2 hazardous locations
- CE and FCC compliant
- CSA Certified

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ELECTROMAGNETIC FLOW METER

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SPECIFICATIONS

Sizes	1/4…24 in. (6…600 mm)	
Flow Range	0.10…39.4 ft/s (0.03…12 m/s)	
Accuracy	± 0.25% of rate for velocities greater than 1.64 ft/s (0.50 m/s) ± 0.004 ft/s (± 0.001 m/s) for velocities less than 1.64 ft/s (0.50 m/s)	
Repeatability	0.1% of rate	
Power Supply	AC or optional 24V DC **AC Power Supply:** 85…265V AC, 45…65 Hz Voltage Fluctuation = ± 10% of nominal Over Voltage = Catagory II Power Consumption = 20 W **DC Power Supply (optional):** 24V DC ± 10% 8 W	
Analog Outputs	0…10 mA, 0…20 mA, 4…20 mA (programmable and scalable) Voltage sourced (18V DC) isolated Max. loop resistance = 750 Ω	
Digital Outputs	(2) Open Collector, (programmable – scaled pulse, flow alarm, status, or frequency output) Max. 24V DC, 0.5 W (2) AC solid-state relay (programmable – flow alarm or status) Max. 24V D C @ 0.5 A	
Frequency Output	Open Collector – Max. full scale flow = 10 Khz	
Communication	RS232C serial, standard ANSI terminal compatible data stream	
Pulse Width	Open Collector, 5 ms to 1 second (programmable) or automatic 50% duty cycle	
Min-Max Flow Alarm	Open collector or solid state relay (programmable, 0 to 100% of flow)	
Empty Pipe Detection	Field tunable for optimum performance based on specific application	
Excitation Frequency	Programmable, 3.75 Hz, 7.5 Hz or 15 Hz	
Auxiliary Input	Max. 24V DC (programmable – positive zero return, external totalizer reset or preset batch start)	
Noise Dampening	1 to 30 seconds (programmable)	
Low Flow Cutoff	0…100% of full scale (programmable)	
Zero-Point Stability	Automatic correction	
Galvanic Separation	500V	
Fluid Conductivity	Min. 5.0 micromhos/cm	
Fluid Temperature	**With Meter-Mounted Amplifier:** PFA, PTFE & Halar®: 4…212° F (20…100° C) @ max. ambient temperature of 122° F (50° C). Hard rubber: 32…178° F (0…80° C) @ max. ambient temperature of 122° F (50° C.	**With Remote Amplifier:** PFA, PTFE & Halar: 4…248° F (20…120° C) @ max. ambient temperature of 122° F (50° C). Hard rubber: 32…178° F (0…80° C) @ max. ambient temperature of 122° F (50° C)
Ambient Temperature	– 4…122° F (–20…50° C)	
Relative Humidity	Up to 90% non-condensing	
Altitude	Maximum 6500 ft (2000 m)	
Flow Direction	Uni-directional or bi-directional	
Totalization	3 separate displayable totalizers – 10 digits (programmable – forward, reverse and net)	
Units of Measure	U.S. gallons, imperial gallons, million gallons per day, cubic feet, cubic meters, liters, oil barrels, pounds, ounces, acre feet (programmable).	
LC Display	4-line by 16-character, alphanumeric, back light Displays: 3 totalizer values, flow rate, alarm status, output status, error/diagnostic messages	
Programming	Internal 3-button or external magnetic wand	
Field Wiring Entry Ports	(3) 1/2" NPT, internal thread	
Amplifier Housing	Amplifier enclosure and remote junction enclosure: cast aluminum (powder coated paint)	
Amplifier Housing Rating	Amplifier enclosure and remote junction enclosure: NEMA 4X/6P (IP66/IP67)	
Detector Pipe Spool Material	316 stainless steel	
Detector Spool Housing Material	Carbon steel, welded, NEMA 4X/6P (IP66/IP67)	
Electrode Materials	Alloy C, 316 stainless steel (standard), gold/platinum plated, tantalum, platinum/rhodium	
Liner Material	PFA from 1/4…3/8 in. (6…10 mm), PTFE from 1/2…24 in. (15…600 mm), hard rubber from 1…24 in. (25…600 mm), Halar from 12…24 in. (300…600 mm)	
Flanges	Carbon steel or 316 stainless steel (ANSI B16.5 Class 150 RF)	
Coil Power	Pulsed DC	
Pressure Limits	Max. 150 psi (10 bar)	
Mounting	Direct detector mount or remote wall mount, bracket included. For remote mount, max. cable distance = 100 ft (30 m)	
Junction Enclosure Material	For remote mounted amplifier option: Cast aluminum, powder-coated paint, NEMA 4X/6P (IP66/IP67)	
Optional Stainless Steel Grounding Rings	Meter Size	Thickness (of 1 ring)
	1/4…10 in. (6…250 mm) 10…24 in. (250…600 mm)	0.135 in. (3.43 mm) 0.187 in. (4.75 mm)
Optional Grounding Electrodes	Alloy C, 316 stainless steel, gold/platinum plated, tantalum, or platinum/rhodium	
Electrical Classification	FM approved for Class I, Div 2, Groups A-D; Class II, Div 2, Groups F and G, – CSA Certified	

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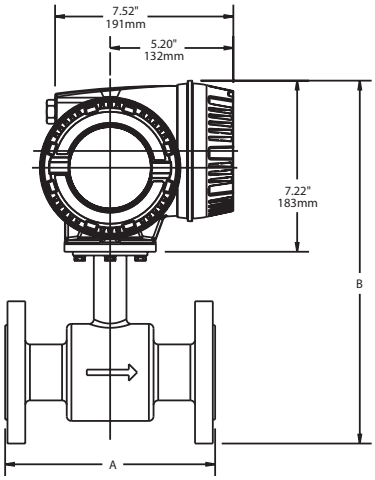
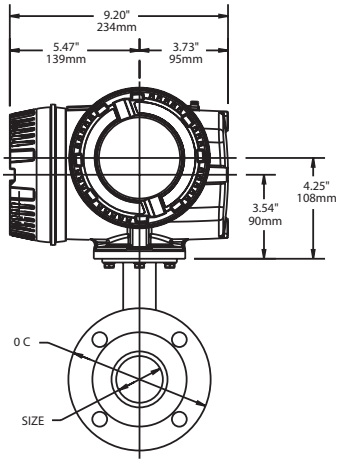
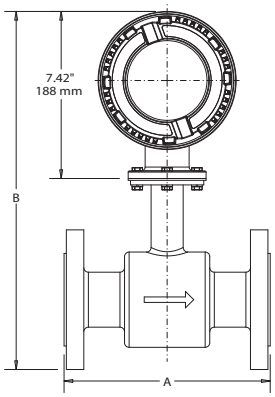
DIMENSIONS





M3000 Meter Mount



M3000 Remote Mount Junction Box on Detector

Size		A		B		C		D		Est. Weight with Amplifier		Flow Range			
												GPM		LPM	
inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	lb	kg	min	max	min	max
1/4	6	6.7	170	13.4	342	3.5	89	13.9	351	17	7.7	0.01	5	0.05	20
5/16	8	6.7	170	13.4	342	3.5	89	13.9	351	17	7.7	0.02	10	0.09	36
3/8	10	6.7	170	13.4	342	3.5	89	13.9	351	17	7.7	0.04	15	0.14	57
1/2	15	6.7	170	13.4	342	3.5	89	13.9	351	17	7.7	0.08	34	0.32	127
3/4	20	6.7	170	13.6	347	3.9	99	14	356	17	7.7	0.12	48	0.46	183
1	25	8.9	225	13.8	352	4.3	108	14.2	361	18	8.8	0.21	84	0.79	318
1-1/4	32	8.9	225	14.6	372	4.6	117	15	381	20.3	9.2	0.39	157	1.5	594
1-1/2	40	8.9	225	14.8	376	5.0	127	15.2	386	22	10	0.55	220	2.1	834
2	50	8.9	225	15.3	389	6.0	152	15.7	398	26	11.7	0.94	378	3.6	1431
2-1/2	65	11.0	280	16.5	420	7.0	178	16.9	429	35	15.7	1.63	653	6.2	2471
3	80	11.0	280	16.7	426	7.5	191	17.2	435	38	17.1	2.21	883	8.4	3344
4	100	11.0	280	17.8	452	9.0	229	18.2	461	49	22.1	3.30	1320	12	4997
5	125	15.8	400	19	484	10.0	264	19.4	493	60	27.1	5.29	2115	20	8008
6	150	15.8	400	20	510	11.0	279	20.4	519	71	32.1	7.85	3141	30	11890
8	200	15.8	400	21.9	558	13.5	343	22.9	583	96	43.1	15.69	6278	59	23765
10	250	19.7	500	26.2	677	16.0	406	26.6	676	130	59.1	25.05	10021	95	37934
12	300	19.7	500	28.3	720	19.0	483	28.7	729	219	99.3	33.61	13445	127	50894
14	350	19.7	500	30.2	768	21.0	533	30.7	779	287	130.2	45.75	18300	173	69272
16	400	23.6	590	33.1	842	23.5	597	33.5	851	354	160.9	59.75	23902	226	90477
18	450	23.6	590	34.4	876	25.0	635	34.9	885	409	185.3	75.63	30250	286	114511
20	500	23.6	590	337.6	955	27.5	699	38	964	502	228.3	93.37	37346	353	141371
22	550	23.6	590	39	991	29.5	749	39.4	1000	532	241.3	112.97	45189	428	171059
24	600	23.6	590	41.6	1057	32.0	813	42	1066	561	255.3	134.45	53779	509	203574

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M-SERIES® M5000
ELECTROMAGNETIC FLOW METER

ModMAG®
M-Series® | B-MAG Electromagnetic Flow Meters

DESCRIPTION

Designed, developed and manufactured under strict quality standards, the M-Series M5000 electromagnetic meter features sophisticated, processor-based signal conversion with accuracies of ± 0.50%. Based on Faraday's Law of Induction, these meters can measure well water, wastewater, reclaimed water, chemicals, pharmaceuticals, and bi-directional flow applications that have minimal electrical conductivity.

The flow meter is a stainless steel tube lined with a non-conductive material. Outside the tube are two DC-powered electromagnetic coils positioned opposite each other. Perpendicular to the coils are two electrodes inserted into the flow tube. The energized coils create a magnetic field across the diameter of the pipe.

As a conductive fluid flows through the magnetic field, a voltage is induced across the electrodes. This voltage is proportional to the average flow velocity of the fluid and is measured by the two electrodes. This induced voltage is then amplified and digitally processed by the converter to produce an accurate analog or digital signal. The signal can then be used to indicate flow rate and totalization, or to communicate to remote sensors and controllers. In addition, the processor controls zero-flow stability, frequency outputs, serial communications, and other parameters.

With no moving parts in the flow stream, there is no pressure loss. Also, accuracy is not affected by temperature, pressure, viscosity or density and there is practically no maintenance required.

ELECTRODES

When looking from the end of the meter into the inside bore, the two measuring electrodes are positioned at three o'clock and nine o'clock. M5000 mag meters have an "empty pipe detection" feature. This is accomplished with a third electrode positioned in the meter between twelve o'clock and one o'clock.

If this electrode is not covered by fluid for a minimum five-second duration, the meter will display an "empty pipe detection" condition, send out an error message, if desired, and stop measuring to maintain accuracy. When the electrode again becomes covered with fluid, the error message will disappear and the meter will continue measuring.

The wide selection of liner and electrode materials helps ensure maximum compatibility and minimum maintenance over a long operating period. The M5000 amplifier can be integrally mounted to the detector, or if necessary, mounted remotely. The amplifier is housed in a NEMA 4X (IP66) enclosure.

OPERATION

In addition to using grounding rings, a grounding electrode (fourth electrode) can be built into the meter during manufacturing to assure proper grounding. The position of this electrode is at five o'clock.

APPLICATION

The M5000 mag meter is designed for applications without power line access, where flow is continuous, and when indication of rate and totalization are required. The M5000 can accurately measure fluid flow—whether the fluid is water or a highly corrosive liquid, very viscous, contains a moderate amount of solids, or requires special handling. Today, electronic meters are successfully used in industries including food and beverage, pharmaceutical, water and wastewater, and chemical.

FEATURES

- Available in sizes 0.50…24" (15…600 mm)
- Battery powered
- ± 0.50% accuracy independent of fluid viscosity, density and temperature
- Unaffected by most solids contained in fluids
- Pulsed DC magnetic field for zero point stability
- No pressure loss for low operational costs
- Corrosion resistant liners for long life
- Calibrated in state-of-the art facilities
- Integral and remote signal converter availability
- Optional grounding rings or grounding electrode
- Measurement largely independent of flow profile
- Low-power digital microcontroller (16 bit)
- Simple programming procedure
- Digital and infrared outputs
- Automatic zero-point stability
- Non-volatile programming
- NSF listed
- Data logging

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M-SERIES® M5000
ELECTROMAGNETIC FLOW METER

ModMAG®
M-Series® | B-MAG Electromagnetic Flow Meters

SPECIFICATIONS

Flow Range	0.1…32.8 ft/s (0.03…10 m/s)	
Accuracy	± 0.50 % rate for velocities greater than 1.64 ft/s (0.50 m/s), ± 0.008 ft/s (± 0.0025 m/s) for velocities less than 1.64 ft/s (0.50 m/s)	
Minimum Fluid Conductivity	≥ 20 micro siemens/cm	
Pressure Limits	Maximum allowable non-shock pressure and temperature ratings for steel pipe flanges, according to American National Standard ANSI B16.5. Examples: 150-lb flange, rated 285 psi at ambient temperature; 300-lb flange rated 740 psi at ambient temperature.	
Fluid Temperature	**With Remote Amplifier:** PTFE 302° F (150° C), Hard rubber 178° F (80° C)	**With Meter-Mounted Amplifier:** PTFE 212° F (100° C), Hard rubber 178° F (80° C)
Ambient Temperature	– 4…140° F (–20…60° C)	
Flow Direction	Uni-directional or bi-directional. Two separate programmable totalizers for uni-directional measurement.	
Outputs (4 digital)	Galvanically isolated open collector, 30V DC maximum, 20 mA each, maximum output frequency at 100 Hz	
Outputs	ADE, High/low flow alarm (0…100% of flow), error alarm, empty pipe alarm, flow direction	
Communication	RS232 Modbus RTU, IrDA	
Empty Pipe Detection	Field-tunable for optimum performance based on specific application	
Min-Max Flow Alarm	Programmable outputs 0…100% of flow	
Low Flow Cut-Off	Programmable 0…10% of maximum flow	
Galvanic Separation	Functional 50 volts	
Pulse Width	Programmable 5…500 ms	
Coil Power	Pulsed DC	
Repeatability	± 0.1%	
Sampling Rate	Programmable from 1 to 63 seconds. Standard sampling period is 15 seconds.	
Display	Two lines x 15 characters (7 on top + 8 on bottom), LCD display	
Programming	Three external buttons	
Units of Measure	Gallons, ounces, MGD, liters, cubic meters, cubic feet, imperial gallon, barrel, hectoliter and acre feet	
Battery Life	10 years	
Power Supply	Internal lithium batteries 3.6 volt	
Processing	Low power microcontroller (16 bit)	
Amplifier Housing	NEMA 4X (IP66), cast aluminum, powder-coated paint	
Meter Housing Material	Standard: Carbon steel welded	
Pipe Spool Material	316 stainless steel	
Flanges	*Standard*: ANSI B16.5 Class 150 RF Cast steel; *Optional*: 316 stainless steel & 300 lb cast steel	
Liner Material	PTFE 0.5…24", Hard rubber 1…24"	
Electrode Materials	*Standard*: Alloy C; *Optional*: 316 stainless steel	
Mounting	Detector-mount or remote wall mount (bracket supplied)	
Meter Enclosure Classification	NEMA 4X (IP66); *Optional*: Submersible NEMA 6P (IP67)-remote amplifier required	
Junction Box Enclosure Protection	For remote amplifier option: Powder coated die-cast aluminum, NEMA 4 (IP66)	
NSF Listed	Models with hard rubber liner 4" size and up; PTFE liner, all sizes.	
Cable Entries	1/2" NPT Cord Grip	
Optional Stainless Steel Grounding Rings	Meter Size — Thickness (of 1 ring) Up through 1" — 0.135" 12…24" — 0.187"	

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ELECTROMAGNETIC FLOW METER

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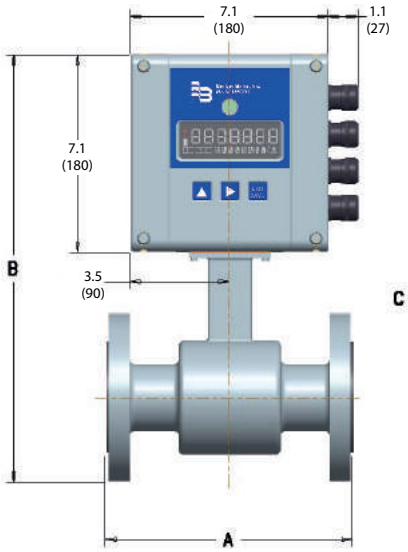
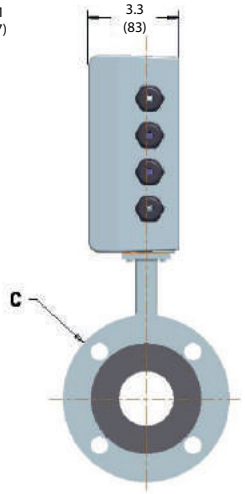
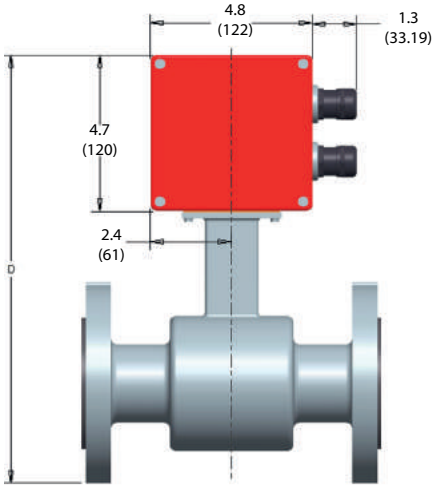
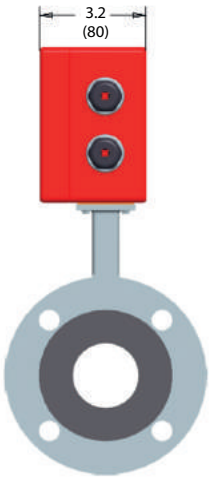
DIMENSIONS IN INCHES (MILLIMETERS)





Meter with M5000 Amplifier





Meter with Junction Box for Remote M5000 Amplifier

Size		A		B		C		D		Est. Weight with Amplifier		Flow Range			
												GPM		LPM	
inch	mm	inch	mm	inch	mm	inch	mm	inch	mm	lb	kg	min	max	min	max
1/2	15	6.7	170	13.4	342	3.5	89	13.9	351	17	7.7	0.08	28	0.32	106
3/4	20	6.7	170	13.6	347	3.9	99	14	356	17	7.7	0.12	40	0.46	153
1	25	8.9	225	13.8	352	4.3	108	14.2	361	18	8.8	0.21	70	0.79	265
1-1/4	32	8.9	225	14.6	372	4.6	117	15	381	20.3	9.2	0.39	131	1.5	495
1-1/2	40	8.9	225	14.8	376	5.0	127	15.2	386	22	10	0.55	184	2.1	695
2	50	8.9	225	15.3	389	6.0	152	15.7	398	26	11.7	0.94	315	3.6	1192
2-1/2	65	11.0	280	16.5	420	7.0	178	16.9	429	35	15.7	1.63	544	6.2	2059
3	80	11.0	280	16.7	426	7.5	191	17.2	435	38	17.1	2.21	736	8.4	2787
4	100	11.0	280	17.8	452	9.0	229	18.2	461	49	22.1	3.30	1100	12	4164
5	125	15.8	400	19	484	10.0	264	19.4	493	60	27.1	5.29	1763	20	6673
6	150	15.8	400	20	510	11.0	279	20.4	519	71	32.1	7.85	2617	30	9908
8	200	15.8	400	21.9	558	13.5	343	22.9	583	96	43.1	15.69	5232	59	19804
10	250	19.7	500	26.2	677	16.0	406	26.6	676	130	59.1	25.05	8351	95	31611
12	300	19.7	500	28.3	720	19.0	483	28.7	729	219	99.3	33.61	11204	127	42411
14	350	19.7	500	30.2	768	21.0	533	30.7	779	287	130.2	45.75	15250	173	57727
16	400	23.6	590	33.1	842	23.5	597	33.5	851	354	160.9	59.75	19918	226	75398
18	450	23.6	590	34.4	876	25.0	635	34.9	885	409	185.3	75.63	25209	286	95425
20	500	23.6	590	337.6	955	27.5	699	38	964	502	228.3	93.37	31122	353	117809
22	550	23.6	590	39	991	29.5	749	39.4	1000	532	241.3	112.97	37658	428	142549
24	600	23.6	590	41.6	1057	32.0	813	42	1066	561	255.3	134.45	44816	509	169645

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