

# TigermagEP

## Technical Specifications

### FM626 Flangeless Electromagnetic Flowmeter



#### DESCRIPTION

The Model 626 is a microprocessor based electromagnetic flowmeter designed to measure the flow of conductive liquids in full pipes. The sensor and the transmitter are integral and enclosed in a NEMA-7 explosion-proof housing. The sensor housing is made of steel.

A wide variety of liners and electrodes are available to tailor the meter to operate in many processes.

The Model 626's nonvolatile EEPROM memory and circuitry eliminates the need for a microprocessor backup battery. It is not necessary to reprogram if the electronic module is replaced or exchanged with electronics from another size flowmeter.

#### APPLICATIONS

The Model 626's high signal frequency makes it ideally suited to applications with high levels of inherent noise including: Process Chemicals, Heavy Slurries, Polymers, Acids, Alkalies, Sewage, Cooling Water. Nearly any conductive liquid can be measured.

#### CERTIFIED ACCURACY

Each TigermagEP™ is wet-flow calibrated in Sparling's Primary Flow Lab traceable to the National Institute of Standards and Technology. A certificate of accuracy is furnished with each meter.

#### PRINCIPLE OF OPERATION

The Model 626 magnetic flowmeter is based on Faraday's Law which states that the voltage induced in a conductor moving through a magnetic field is proportional to the velocity of that conductor. The magnetic flowmeter will measure liquids with conductivities greater than 5 micromhos.

#### STANDARD FEATURES

- Sampling frequency up to 100 Hz for accurate measurement of fluids with high levels of inherent noise
- Forward, reverse and net totalization
- Programmable high and low flow alarms
- Nonvolatile EEPROM memory
- Universal electronics module compatibility
- 2-Line, 16 character backlit display
- Programming made easy with Mag-Command
- User-selectable damping & low flow cutoff
- NEMA-4X or NEMA-7 explosion proof enclosure
- Approvals include: FM, CSA, NSF61
- Rotatable modular display
- Empty pipe detection
- PZR - Positive Zero Return
- Standard 0.5% accuracy
- Sizes available from 0.01" - 4"



## DIAGNOSTICS

The TigermagEP's unique diagnostic functions eliminate the need for a technician to carry test equipment or open the housing. Current ramp, complete coil check and true front-end input simulator may be activated in Mag-Command™ without opening the enclosure. This is especially important in hazardous areas and aggressive plant environments.



## LARGE BACKLIT ROTATABLE DISPLAY

The large 16 character, 2-line backlit transmitter display is rotatable 360° in 90° increments ensuring easy reading in any orientation.

## INSTALLATION

The Model 626 meter must be mounted at a point in the line which is always full of process liquid under flowing conditions.

Only three diameters of straight pipe length are required from the center of the meter to normal obstructions to obtain specified accuracies. In the smaller sizes all of the necessary straight pipe is contained within the meter itself.

The meter may be mounted between ANSI 150 or 300 lb., AWWA, DIN, PN10 or 16, JIS 10K OR 20K, or British Standard flanges.

## E<sup>2</sup>PROM NON-VOLATILE MEMORY

and circuitry eliminates the need for a back-up battery and eliminates the need to reprogram if the electronics module is replaced or exchanged. Meter identification (tube ID, serial number, K, offset, etc.) is stored on an E<sup>2</sup>PROM chip independent of transmitter electronics. The E<sup>2</sup>PROM chip has lifetime data retention.

## EMPTY PIPE DETECTION - Standard

The Sparling TigermagEP™ is designed to detect absence or inadequate volume of process fluid in the pipe and will hold the output signal to 4mA or zero. This feature does not require any hard wiring as it is a software selection. One of the most important values of this feature is that it prevents false totalization possible with other meters under partially filled pipe conditions.

## EASE OF COMMUNICATIONS

The TigermagEP™ is programmable with Mag-Command or Hart Protocol. 4-20mA, RS232 or RS485 outputs give you flexibility when interfacing with your DCS.

## HI-Z CIRCUITRY

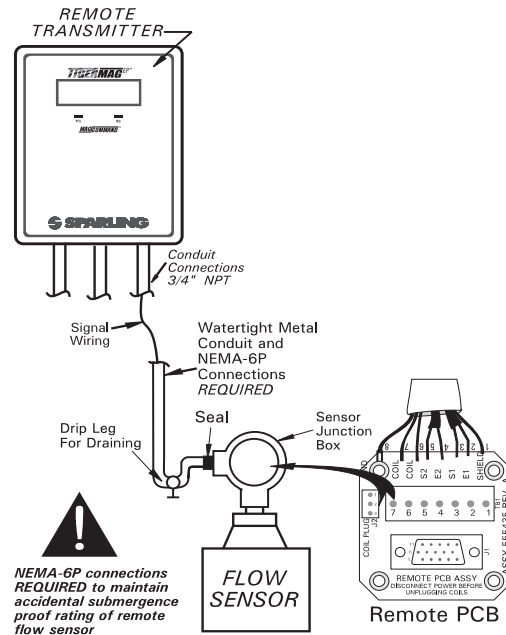
The Sparling TigermagEP™ provides superior performance in liquids which tend to deposit non-conductive coatings. The TigermagEP™ utilizes Hi-Z circuitry which produces a high input impedance to the transmitter's pre-amplifier ( $10^{12}$  ohms). The impedance of the coating is negligible as compared to the impedance of the receiving instrument. The voltage drop across the electrode coating will also be negligible. This eliminates the need for electrode cleaners.

## TWO FLOW ALARMS

Fault alarms can be configured with alarm set points between 0-99% of flow for each alarm. Open collector output turns on above programmed set point.

## REMOTE MOUNTED TRANSMITTER

Remote mounting of the electronics is required when pipe vibration is excessive, or when flooding is possible. Connections for power and signal are made in the NEMA-4X transmitter housing. Interconnecting cable is supplied between the sensor and transmitter enclosure. Also supplied is a sensor mounted NEMA-7 rated junction box in which coil and electrode connections are made. An optional bracket for pipe mounting is available.



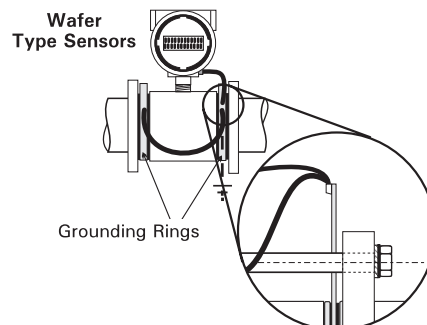
The TigermagEP™ remote enclosure features a larger sized (8mm) 16 digit 2-line backlit display. The meter is programmed using Mag-Command. Hall-effect switches are accessed from outside the enclosure... no need to open the enclosure!

## PZR - Positive Zero Return

Designed and built into the TigermagEP™ is an electronic circuit which is activated by an external contact closure indicating to the meter that it should drive the output signal to 4 mA or zero. An example of where this may be used is where the lines go empty when the pump or valve is shut down.

## GROUNDING

The use of grounding rings is recommended to ensure accuracy. Grounding rings are required if adjacent piping is lined or non-conductive. Pump noise or excessive RF should be minimized to achieve highest accuracy.



# FLOWRATES & DIMENSIONS

**Table 1 - Flow & Dimensions**

Meter Size Inches	Mating Flange Size	Dimensions				Flowrates (GPM) – Full Scale					
						Ceramic			Polyurethane / FEP (TEF)		
		A	B	C (new)	D	1 fps	3 fps	33 fps	1 fps	3 fps	33 fps
0.1	0.5	4.00	2.31	8.97	5.26	.04	0.1	1.3	N/A	N/A	N/A
0.25	0.5	4.00	2.31	8.97	5.26	.22	0.6	7.2	N/A	N/A	N/A
0.5	0.5	4.00	2.31	8.97	5.26	.50	1.5	16	0.6	1.7	18
1	1	4.00	2.92	9.60	5.87	1.62	4	53	2	6	66
1.5	1.5	4.00	3.62	10.22	6.57	4	13	145	5	15	174
2	2	4.00	4.12	10.85	7.07	7	21	231	9	27	303
3	3	6.00	5.70	11.97	8.65	N/A	N/A	N/A	20	60	664
4	4	6.00	6.60	13.22	9.55	N/A	N/A	N/A	35	107	1182

Allow 1/8" to 1/4" for lining thickness

C & D Dimensions ±.0125

## HOW TO ORDER A TIGERMAG EP MODEL 626

**Base Model Number**

FM626- TigermagEP

**Size**

AA = 0.10", OA = 0.25", OD = 0.50", OF = 1", OG = 1.5", O2 = 2", O3 = 3", O4 = 4"

**Table 3 - Liner Material**

1 Hard Rubber (1" - 4")    6 Ceramic (0.1" - 4")    8 FEP (TEF) - NSF Approved (0.25" - 4")  
 5 Polyurethane (2" - 4")    A NSF Approved Polyurethane (2" - 4")

**Table 4 - Electrode Material**

1 316SS	4 Titanium	7 Platinum
2 Hastelloy C	5 Tantalum	8 Zirconium
3 316SS Bullet Nosed	6 Fused Platinum	9 Monel
		0 Tungsten Carbide

**Table 5 - Mounting Bolts, Nuts and Washers**

0 Carbon Steel, Zn Plated  
 1 None Required  
 2 Stainless Steel, type 304

**Table 6 - Transmitter and Mounting**

0 Integral NEMA-4X/NEMA-7 enclosure  
 1 Remote NEMA-4X/NEMA-7 encl.15 ft cable  
 2 Remote NEMA-4X/NEMA-7 encl.15 ft cable, perm sub - to 30ft  
 3 Remote NEMA-4X/NEMA-7 encl.15 ft cable, acc sub - 48hrs/30ft  
 4 Remote NEMA-4X/NEMA-7 encl.15 ft cable, direct burial  
 5 Remote NEMA-4X encl.15 ft cable  
 6 Remote NEMA-4X encl.15 ft cable, acc sub. proof - 48hrs/30ft  
 7 Remote NEMA-4X encl.15 ft cable, direct burial  
 8 Remote NEMA-4X encl.15 ft cable, perm sub proof - to 30 ft

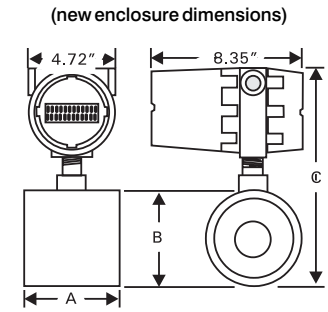
**Table 7 - Power Supply\***

0 77-265 VAC Power  
 1 12-60 VDC Power

**Options:**

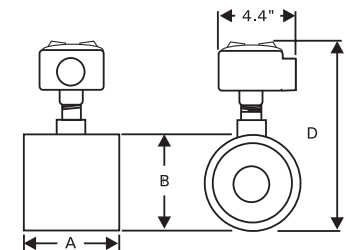
- HART, Modbus
- RS-485 Communications port
- High temperature coils – temperatures over 266 °F  
 Requires remote mount option from Table 6  
 Ceramic max temp 420°F/TEF max 300 °F@ 100 psi
- Special cable length (over 15 feet - Max 100 ft)
- Alarm with relay contacts

## Integral

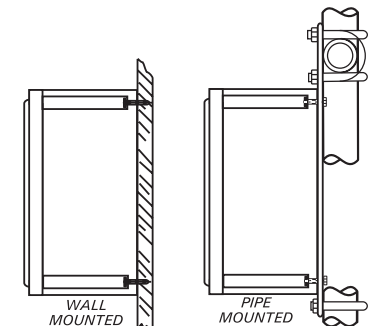
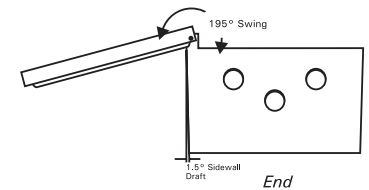
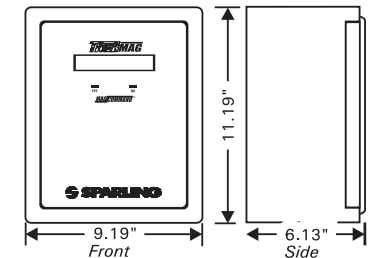


## Remote

**▼ Sensor**



**▼ Transmitter Enclosure**



## Standard Specifications

<b>Accuracy (Freq)</b>	0.5"-4": 0.5% offlow rate (1-33 fps) 0.1" - 0.25": 1% of flow rate (1-33 fps)
<b>Temp Effect:</b>	±0.025% FS/°C
<b>Full Scale Ranges:</b>	From 0-3 fto0-33ft/sec
<b>Repeatability:</b>	±0.1% of full scale
<b>Electrodes:</b>	316 stainless steel standard (others available)
<b>Liner:</b>	Ceramic (aluminum oxide 99.5%)Hard Rubber, Neoprene, Polyurethane - NSF 61 approved, FEP (TEF) - NSF 61 approved
<b>Outputs:</b>	1) Isolated analog 4-20mA DC into 800 ohms (std) 2) scaled pulse 24 V DC with selectable 12.5/25/50/100 ms on time, max.freq. 60 Hz 3) 0-1000 Hz freq., for 0-100% of flow rate, 15 V DC 4) Two flow alarms 5) Fault, with open collector 6) RS232 communication 7) flow direction with open collector 8) Positive Zero Return (PZR) for external relay contacts. Outputs 2 & 3 can be open collector if required.
<b>Mag-Command™:</b>	Selection and change of meter parameters by magnetic probe without opening the enclosure.
<b>Display:</b>	2-Line, 16 Digit alphanumeric backlit display (rate and total). Modular, rotatable 360° in 90° increments
<b>Conductivity:</b>	Minimum 5 micromhos/cm
<b>Min Velocity:</b>	0.3 fps (0.1 mps)
<b>Power Requirements:</b>	77-265 Vac 50/60 Hz (12-60 Vdc optional)
<b>Power Consumption:</b>	Less than 20 Watts
<b>Enclosures:</b>	Transmitter: Cast aluminum epoxy coated. Integral (NEMA-7) or remote mounted (NEMA-4X)
<b>Sensor Housing:</b>	Fabricated steel, epoxy coated.
<b>Preamp Impedance:</b>	10 <sup>12</sup> ohms minimum
<b>Amb. Temp:</b>	-20° to 140°F (-30° to 60°C) Display darkens over 158°F (70°C)
<b>End Connections:</b>	150 lb or 300 lb
<b>Sensor Tube:</b>	304 Stainless Steel
<b>Process Temp:</b>	<b>Integral Mount:</b> Hard Rubber, Neoprene, Polyurethane ..... -40- 180°F TEF, Ceramic.....-40 - 212°F <b>Remote Mount (opt):</b> TEF, Ceramic.....-40 - 266°F <b>High Temp Coils (opt)</b> TEF.....-40 - 300°F Ceramic.....-40 - 420°F
<b>Selectable Damping:</b>	0-99 seconds
<b>Low Flow Cutoff:</b>	Selectable 0-9% of FS
<b>Options:</b>	• Remote Mounted NEMA-4X or NEMA-7 Enclosure • Electrode Materials: Titanium, Hastelloy C, Monel, Zirconium, Tantalum, Platinum, Fused Platinum (ceramic only) • Process Temperature to 420°F (216°C) (Ceramic Only) • 12-60 Vdc operation • HART, Modbus • RS-485 Communication • Alarm with 10A relays (NEMA-4X remote only) • Process Pressure to 1750 psi

## Model FM-626 Specifications

1.0	The magnetic flowmeter shall be microprocessor-based flangeless. It shall indicate, totalize, and transmit flow in full pipes.
1.1	The magnetic flowmeter shall utilize DC bipolar pulsed coil excitation, operating at frequencies up to 100 Hz and automatically re-zeroing after every cycle.
1.2	The accuracy shall be at least 0.5% of flow rate over a 33:1 turn-down at all flow rates above 1 fps. Accuracy shall be verified by calibration in a flow laboratory traceable to the U.S. National Institute of Standards and Technology.
1.3	The flow sensor liners shall be Ceramic, Hard Rubber, Neoprene, Polyurethane, or FEP (TEF). The housing shall be steel.
1.4	NSF 61 certified for potable water.
1.5	The integrally-mounted flow sensor and transmitter shall be FM approved for Class I, Division 1 & 2, Groups B, C, D and Class II, Division 1, Groups E, F, G environments without use of air purge. CSA Approved for Class 1, Division 2.
1.6	The electronics shall be integrally or remote mounted.
1.7	When remote mounted, the flowmeter transmitter shall be furnished in a NEMA-4X enclosure box, with a larger 3/8" character, 2-line 16 digit backlit display and 15 feet of cable (standard). NEMA-7 remote option available. The remote mounted flow sensor shall be accidental submergence proof, 30 ft/48 hours
1.8	The flowmeter shall be suitable for operation at temperatures from -40°F to 266°F and at pressures from full vacuum to 740 psi. (Optional: higher temperature & pressure)
1.9	The flowmeter electrodes on ceramic liners shall be fused platinum.
1.10	The meter shall incorporate Hi-Z circuitry. The preamplifier input impedance shall not be less than 10 <sup>12</sup> ohms. External ultrasonic electrode cleaners shall not be acceptable.
2.0	Available outputs 1) Isolated analog 4-20mAdc into 800 ohms (std); 2) scaled pulse 24 Vdc with selectable 12.5/25/50/100 ms on time, max. freq.60 Hz; 3) 0-1000 Hz freq., for 0-100% of flow rate, 15 Vdc; 4) two flow alarms; 5) fault, with open collector; 6) RS232 communication; 7) flow direction with open collector; 8) Positive Zero Return (PZR) for external relay contacts. Outputs 2 & 3 can be open collector if required.
2.1	Low flow cutoff shall be selectable from 0-9% of FS and there shall be two flow alarms settable from 0-99% of span.
2.2	A 2-line, 16 character backlit alphanumeric display shall include user-defined flow units and total flow. All menu advice and commands shall be visible on this display. The display shall be modular and rotatable 360°, in 90° increments. Characters shall be at least 0.125" high for ease of readability.
2.3	The flowmeter shall incorporate the MAG-COMMAND™ feature allowing menu selection and changes to be made from outside the housing via Hall-effect sensors. It shall not be necessary to remove covers, panels or fasteners to accomplish calibration or program changes.
2.4	The TigermagEPs unique diagnostic functions eliminate the need for a technician to carry test equipment or open the housing. Current ramp, complete coil check and true front-end input simulator may be activated in MAG-COMMAND™ without opening the enclosure.
2.5	The meter software shall incorporate a password feature preventing changes.
2.6	The meter shall feature nonvolatile E2PROM memory and universal electronics module compatibility between all TigermagEP™ meters.
2.7	The flowmeter shall have a switching power supply having an operating range from 77-265 Vac, 50/60 Hz (12-60 Vdc). Power consumption shall not exceed 20 Watts.
2.8	All printed circuit boards shall be contained in a plug-in module and be interchangeable for any size without requiring test equipment.
2.9	The flowmeter manufacturer shall have meters of the DC pulse type in similar flowing media for a minimum of five years.
3.0	The flowmeter shall be warranted against defective workmanship or materials for a period of two years from date of shipment.
4.0	Totalized flow and programmed configuration shall be maintained in memory for the meters lifetime.
5.0	The flowmeter shall be FM 626 TigermagEP™ manufactured by Sparling Instruments, LLC



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