

EMCO's UniMag M Series Magnetic Flow Meter System specifically meets the requirements of the Water and Wastewater industry. The complete M Series system consists of a patented UniMag flow meter assembly and a remote 4411e transmitter.

Features

- Totally encapsulated sensor components
- No liner; M Series flow tubes are fusion bonded epoxy coated and approved by NSF61 and AWWA C213 for drinking water
- No liner means no meter failure due to a defective liner
- Low conductivity media > 0.08 mS / cm
- Patented AC coil excitation (high coil current and high pulsation frequency)
- Field replaceable sensors
- Sensor reference coils
- Internal grounding electrodes
- Carbon steel flow tubes for powerful magnetic field retention
- Accuracy unaffected by media coatings such as calcium carbonate, raw sewage, grease, algae and similar
- High signal-to-noise ratio for immunity to media noise



The UniMag M Series, shown with 1, 2 and 4 sensors. The flow tube size determines the number of sensors used.

EMCO UniMag M flow meters are comprised of the flow tube (spool piece), sensors and junction box. M Series UniMags have no liner, and therefore have no risk of failure due to a defective liner.

Each sensor includes an exciter coil and reference coil. Voltage is generated in the flow tube by the media in accordance with Faraday's Law, from which volumetric flow is calculated.

M Series UniMags are Entela certified to Class 1, Div. 2 CD, ATEX II 3 G EExnAL IIB T3 X and evaluated to CSA 14, 142, 213 IEC 60079-15, 61010, UL 508, NEC, EN50021.

UniMag Technology

Innovative Sensor Technology

- UniMag sensors include an exciter coil and a reference coil, and are available in various electrically insulative materials.
- A unique electrode design distributes the magnetic field over the flow tube's entire cross section.
- These combined effects, along with a uniquely powerful field strength, provide a truly weighted velocity signal.
- Each sensor includes a reference coil, separate from the exciter coil.

No Liner Means No Liner Failure

- Each UniMag sensor is a complete solid-state insulated magnetometer; a liner is not necessary for insulation.
- No liner means no meter failure due to a defective liner.
- UniMag M Series flow tubes are coated with fusion bonded epoxy and approved by NSF61 and AWWA C213 for drinking water.

Modular Construction / True Field Repairability

- Sensors can be replaced in the field, meaning minimal downtime and no need to ship the flow tube back to the manufacturer.
- Spare sensors can be kept in stock for easy replacement if needed.
- Output continues if one sensor fails, with 1% to 3% of rate typical accuracy.
- Costly bypass pumping is unnecessary since sensors can be removed and immediately replaced.

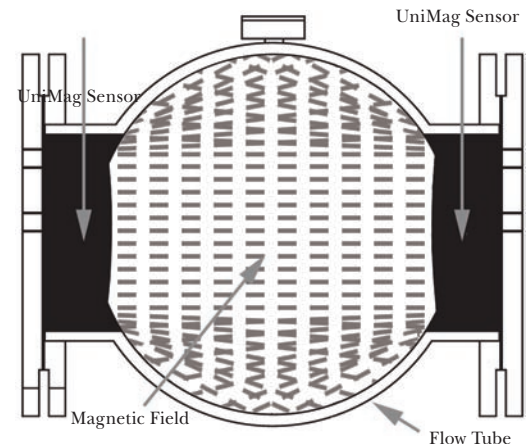
Configurations for Municipal Applications

- M Series UniMags are designed meet the specific needs of the Water & Waste industry.
- Sensors with conical electrodes and fusion bonded epoxy coating: ideal for water, sewage and similar applications.



UniMag Sensor

UniMag Sensors are completely encapsulated, solid-state, and do not depend on a liner for insulation.



UniMag Magnetic Field

Large UniMag sensors create a magnetic field over the entire flow tube cross section. The flow signal represents the true weighted velocity of the media and is highly insensitive to velocity profile distortion and swirl effects.

Application Guide

	Temperature Range		Maximum Pressure ¹		Notes
	°F	°C	psi	bar	
Coating					
Fusion Bonded Epoxy	-40 to 240	-40 to 116	based on sensor		Conforms to USA National Sanitation Foundation Standard NSF61 and AWWA Standard C213 for drinking water.
Sensors					
Polyurethane (≥16" / 400mm)	175 max.	80 max.	150	10	Conforms to NSF61 and AWWA C213 for drinking water.
PVDF (2" - 14" / 50 - 350mm)	240 max.	116 max.	150	10	Full vacuum capability. Temperature rating is for water and may be lower for other media. PVDF is approved by the US FDA #21 CFR 177.2510
Sensor Notes	Sensor assembly includes a non-wetted carbon steel cover flange, fusion bonded polyethylene protected. Sensor assemblies are supplied with outer cover flanges, 50 feet (15m) cables, re-enterable potting gel, junction box, conduit and stainless steel bolts. Special length cable on request. Standard 2-year warranty against material defects and bad workmanship, not including media compatibility, erosion and abrasion, or for media > 180°F / 80°C.				

1 Maximum pressure at maximum temperature with appropriate connection.

Media Conductivity

Typical required conductivity: ≥ 5 µS/cm (5 micromhos/cm)

Low conductivity option: for conductivities > 0.08 or < 5 µS/cm use the UniMag pre-amplifier option

For deionized, distilled or demineralized water, consult EMCO.

Performance Specifications

Accuracy and Traceability	
DS-M Accuracy Flow Tubes 2" to 6" (50mm to 150mm)	±0.5% of rate for flows ≥ 2 fps (0.6 m/s) ±0.0075 fps (± 0.00225 m/s) for flows < 2 fps (0.6 m/s)
DT-M Accuracy Flow Tubes 8" to 80" (200mm to 2000mm)	±0.5% of rate for flows ≥ 1.5 fps (0.45 m/s) ±0.0075 fps (± 0.00225 m/s) for flows < 1.5 fps (0.45 m/s)
Traceability	Accuracy is traceable to the National Institute of Science and Technology. A NIST traceable Calibration Certificate is provided with each flow tube.
Accuracy Notes	Accuracy is unaffected by electrode coatings such as sewage, grease, calcium carbonate, algae or similar.

1 For media such as ferric chloride, ferric sulfate (Odophos) or similar highly conductive media, flow meter performance can be adversely affected.

Please consult EMCO for these types of applications, otherwise performance guarantee is null and void.

Operating Specifications

Flow Range	Minimum	Maximum	Notes
fps and m/s	0 to 2 fps (0 to 6 m/s)	50 fps (15 m/s)	
gpm	0 to 50D ² gpm	120D ² gpm	Where D is in inches
m ³ /h	0 to 0.002D ² m ³ /h	0.04D ² m ³ /h	Where D is in millimeters

Power Requirements for 4411e Flow Transmitter

Power Supply Options	120V, 60Hz 230V, 50Hz 120V, 50Hz
Analog Output	2 x 4-20 mA 2-wire system
Pulse Output	2-wire potential-free output

Physical Specifications

Materials of Construction	Flanges and flow tubes: Carbon steel. Flanges have stainless steel retention bolts.
Flange Notes	Maximum pressure and temperature rating of the flow tube may be limited by the flange type selected. Flow tubes can be specially ordered with plain ends or with butt weld ends.
Installation	NEMA 6/IP68 indefinitely submersible to 30 foot water column up to 175°F (80°C)
Process Connections	ANSI 150 RF (<28 in.) ANSI/AWWA C207 Class D FF (≥28 in.) DIN/BS4504 PN 10

Measurable Flow Rates at 0.5% Accuracy

Line Size		Minimum Flow Rate Velocity		Maximum Flow Rate Velocity	
inches	mm	fps	gpm	fps	gpm
2	50	2	20	50	490
2.5	65	2	30	50	766
3	80	2	44	50	1,103
4	100	2	78	50	1,960
6	125	2	175	50	4,410
8	150	1.5	235	50	7,840
10	200	1.5	368	50	12,250
12	250	1.5	529	50	17,640
14	300	1.5	720	50	24,010
16	350	1.5	941	50	31,360
18	400	1.5	1,191	50	39,690
20	450	1.5	1,470	50	49,000
22	500	1.5	1,779	50	59,290
24	600	1.5	2,117	50	70,560
28	700	1.5	2,881	50	96,040
32	760	1.5	3,763	50	125,440
36	800	1.5	4,763	50	158,760
42	900	1.5	6,483	50	216,090
48	1000	1.5	8,467	50	282,240
54	1200	1.5	10,716	50	357,210
56	1400	1.5	11,525	50	384,160
60	1600	1.5	13,230	50	441,000
66	1700	1.5	16,008	50	533,610
72	1800	1.5	19,051	50	635,040
80	2000	1.5	23,520	50	784,000

Straight Run Piping Requirements

Piping	DS-M (2"-6" / 50mm-150mm)		DT-M (8"-80" / 200mm-2000mm)	
	Upstream	Downstream	Upstream	Downstream
Minimum requirement	5 D	3 D	5 D	3 D
Single elbow or tee upstream	10 D	5 D	5 D	3 D
Two elbows, coupled in the same plane	10 D	5 D	5 D	3 D
Two elbows, close coupled and out of plane	20 D	5 D	10 D	3 D
Pump, blending point, control valve upstream	30 D	5 D	20 D	3 D
Pump, control valve downstream	10 D	5 D	10 D	5 D

D is equal to the internal diameter of the pipe

Other Installation Considerations

Mounting Recommendations

The UniMag may be mounted into a pipeline in any attitude, taking note of the flow direction arrow on the flow tube. To obtain accurate measurement, the pipe must be completely full and air must not be entrained in the flow.

Straight Run Requirements

For particularly poor velocity profiles caused, for example, by upstream bends in two or more planes or partially open valves, the UniMag DT requires a minimum of 10 pipe diameters of straight pipe upstream from the flow tube, and a minimum of 5 diameters downstream.

Non-Homogenous Media

For particularly non-homogenous slurries, pulps or pastes, the flow tube should be mounted in a vertical pipe to obtain the most even distribution of solids and fibers. There must be a minimum of 20 pipe diameters between any media mixing point and the UniMag M flow tube.

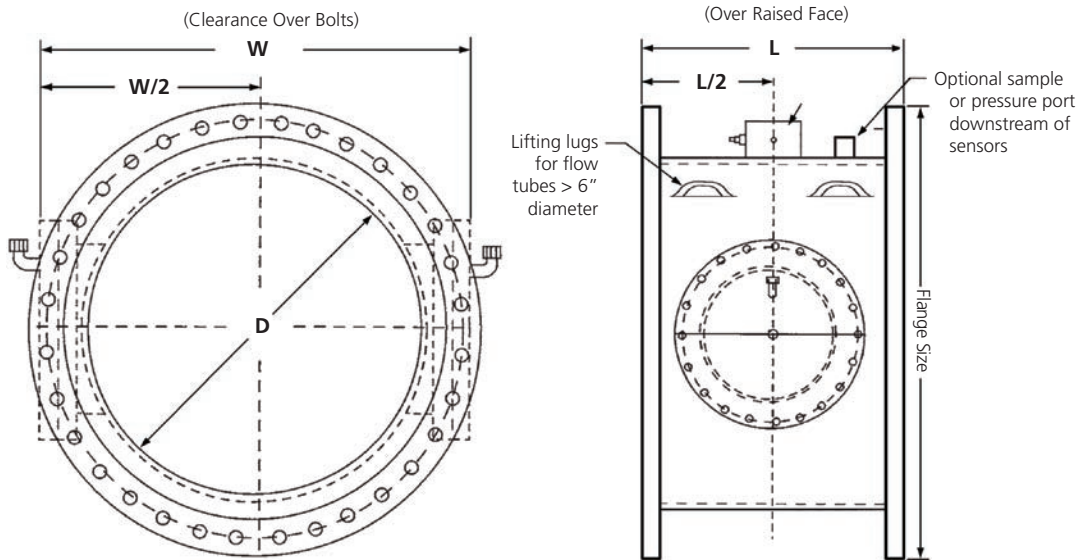
Partially Closed Valves

If the piping is horizontal and includes a partially closed valve, the valve should always be installed downstream of the UniMag. This will allow the head pressure in the system to be adjusted, reducing the chance of air entrainment in the flow, and will prevent excessive irregular profiles forming upstream of the flow tube.

Vacuum Conditions

The fusion bonded epoxy coating on M Series flow tubes is suitable for vacuum conditions caused, for example, by a pump downstream from the flow tube.

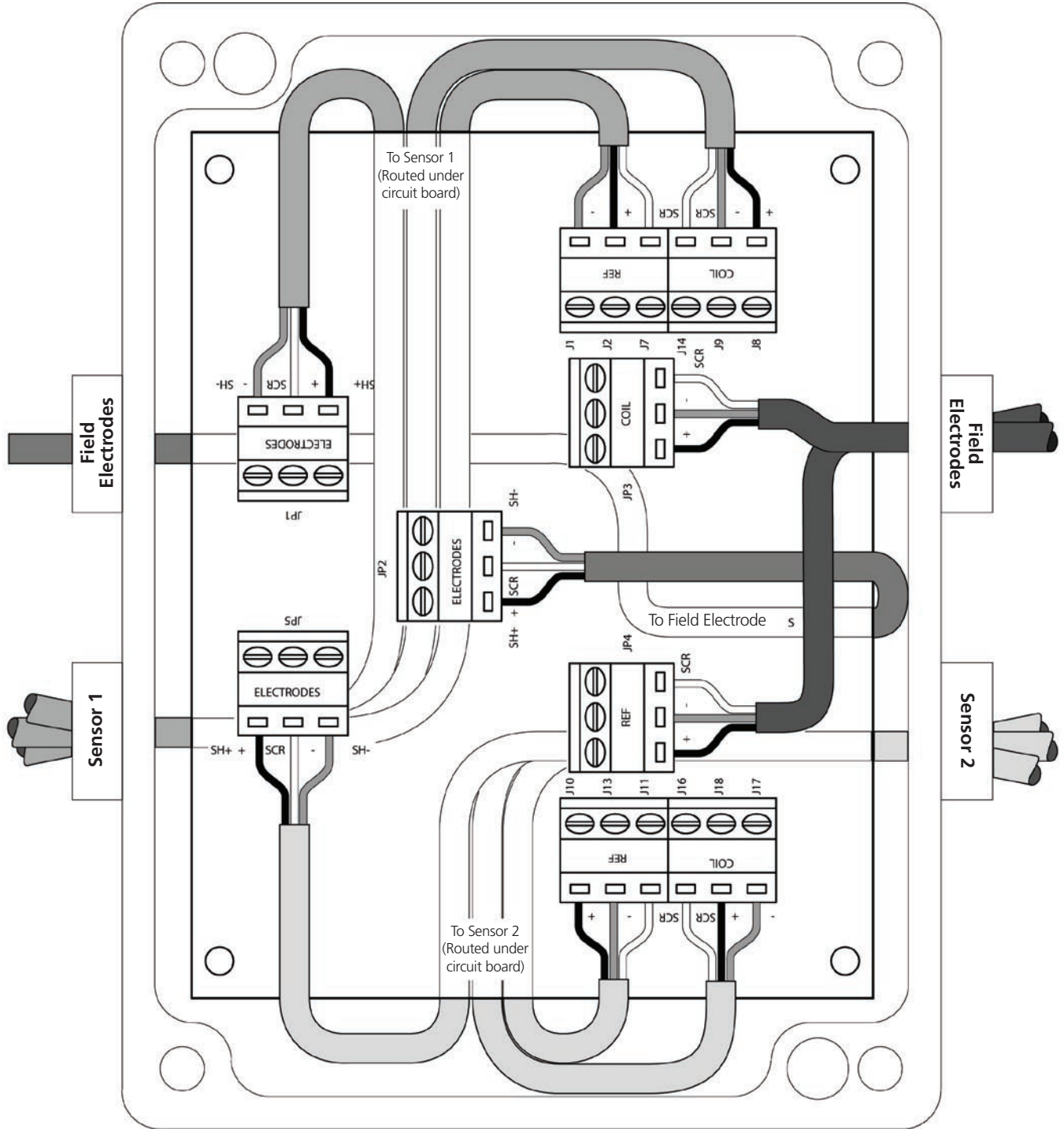
Dimensions and Weights



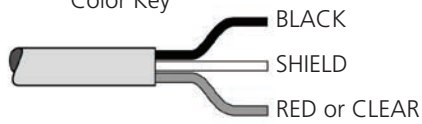
Nominal Size D		Dimension L*		Dimension W		Approximate Weight	
Inches	mm	Inches	mm	Inches	mm	LB	KG
2	50	10	254	9.20	235	35	16
2.5	65	10	254	10.00	255	40	18
3	80	10	254	10.50	260	45	20
4	100	12	305	12.00	305	65	29
5	125	12	305	13.25	340	76	35
6	150	12	305	14.50	370	84	38
8	200	18	457	21.25	540	185	84
10	250	18	457	23.55	598	225	102
12	300	18	457	25.75	654	301	137
14	350	18	457	27.05	687	335	152
16	400	20	508	30.25	769	490	223
18	450	20	508	32.45	824	515	234
20	500	20	508	34.55	878	615	280
24	600	24	610	38.85	987	840	382
28	700	30	762	41.75	1061	980	445
30	760	30	762	43.85	1114	1280	580
32	800	30	762	46.05	1170	1310	595
36	900	30	762	50.25	1277	1625	740
42	1000	40	1016	56.45	1434	1980	900
48	1200	40	1016	62.55	1589	2210	1015
56	1400	48	1219	70.55	1792	2860	1300
60	1600	48	1219	78.65	1998	2930	1335
66	1700	48	1219	84.65	2150	3270	1480
72	1800	48	1219	90.45	2218	3609	1633
80	2000	48	1219	98.45	2501	3898	1764

Wiring Diagrams

Junction Box Wiring (1 or 2 Sensors)

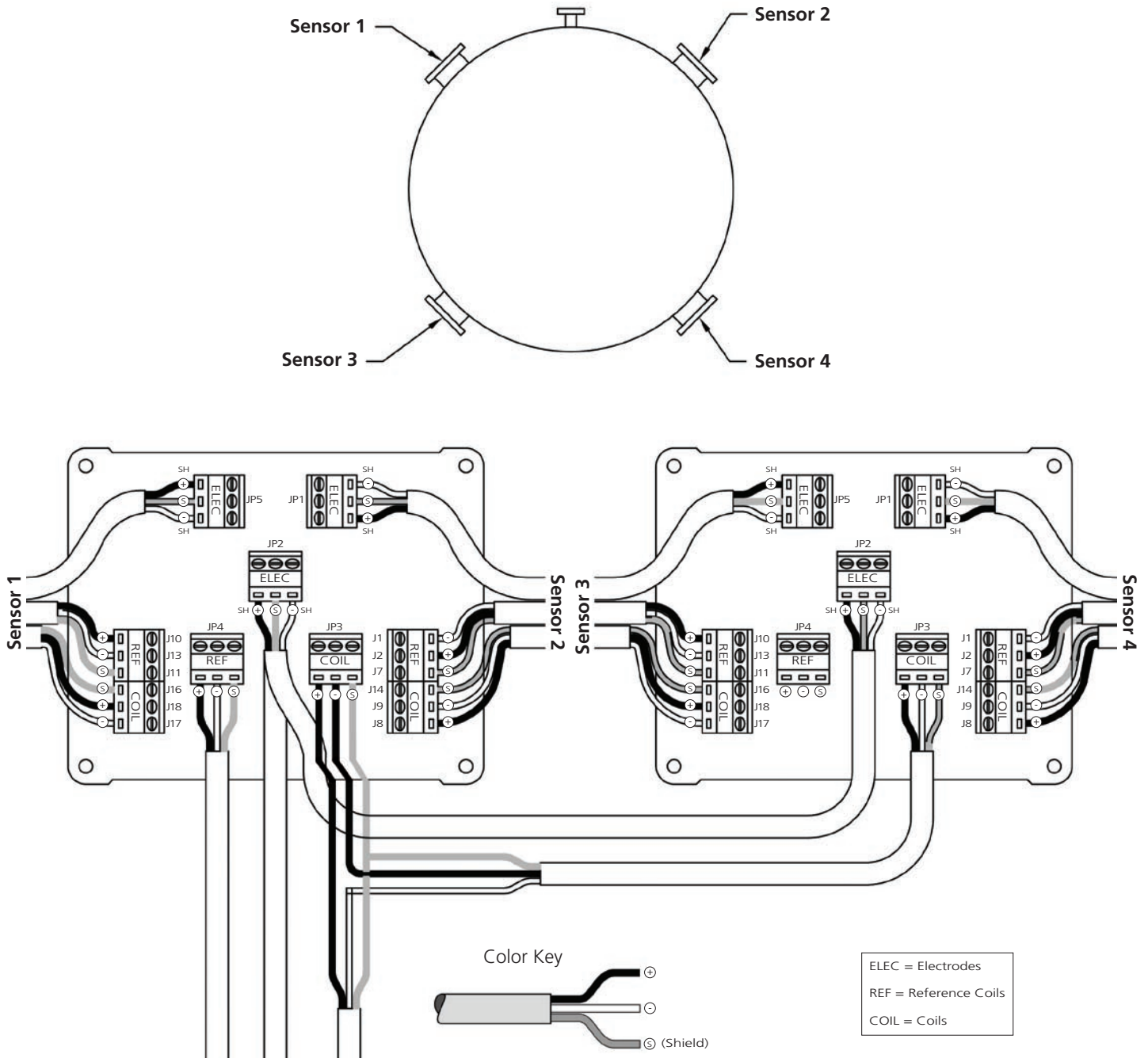


Color Key



Wiring Diagrams

Junction Box Wiring (4 Sensors)



Notes

1. Electrodes are connected in parallel.
2. Coils are connected with opposite pairs in parallel, each pair in series.
3. Two reference coils make one set.

Model and Suffix Codes

Category	Suffix Codes								
Model									
UniMag M Series Flow Tube For sizes 2" to 6" (50 - 150mm)	DS-M								
UniMag M Series Flow Tube For sizes 8" to 80" (200 - 2000mm)	DT-M								
Nominal Size									
2 Inches (50mm)		02							
2½ inches (65mm)		2H							
3 inches to 80 inches (80 to 2000mm)		03-80							
Flowtube / Flange Material									
Carbon Steel			C						
Sensor Materials									
PVDF with Elastomer Gaskets, Viton Seals (2" - 14" diameters only)				E					
Polyurethane with Elastomer Gaskets, Viton Seals (16" and larger)				P					
Electrodes									
AISI 316 Stainless Steel					T				
Flow Tube Liners and Coatings									
Fusion Bonded Epoxy Coating Inside and Outside						X			
Installation (all options include 50 feet / 15m cables) *									
NEMA 6/IP68 Indefinitely Submersible to 30 foot water column							R		

* Extra length cable is specified as a separate line item when ordering.

Category	Suffix Codes										
Process Connections											
ANSI 150 RF (<28"); ANSI / AWWA C207 Class D FF (≥28")										1	
DIN / BS4504 PN 10										5	
Coil Supply											
120V Supply											A
230V Supply											B
	DT-M	08	C	E	T	X	R	1	A		



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