UniMag, DemiMag and DeltaKit Magnetic Flowmeters

Instruction Manual

Released April 2007 / R6

EMCO
FLOW SYSTEMS

EMCO Flow Systems

Product Limited Warranty Statement

EMCO Flow Systems (EMCO) warrants each UniMag magnetic flow metering system to be free from defects in material and workmanship under normal use and service for the following periods from the date of purchase:

Note: EMCO may recommend materials that come into contact with the media. However, EMCO cannot guarantee the compatibility of those materials for any specific application, and does not include compatibility in its warranty.

UniMag Sensors And Flowtubes	2 year warranty, except when temperatures and pressures exceed approved customer application data.
DemiMags	1 year warranty
ChannelMag	1 year warranty
Transmitters	1 year warranty

The user must provide any notice of any defect to EMCO within the warranty period, thoroughly clean the product, return intact and prepay transportation charges. The obligation of EMCO under this warranty is limited to repair or replacement at its factory. This warranty shall not apply to any product which has been repaired or altered by non EMCO employees, or which has been subject to misuse, negligence, accident, or incorrect wiring by non EMCO employees.

EMCO
FLOW SYSTEMS
A Division of Spirax Sarco, Inc.

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FOREWORD

This instruction manual is designed to help you gain a thorough understanding of the operation of the equipment. EMCO Flow Systems (EMCO) recommends that you read this manual completely before placing the equipment in service.

Although EMCO designs reliability into all equipment, there is always the possibility of a malfunction occurring. You can use this manual to help in diagnosing and repairing the malfunction, if possible.

If the malfunction persists, call or write the EMCO Customer Service Department for assistance.

Address and contact information:

EMCO Flow Systems
2150 Miller Drive
Longmont, CO 80501

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email: sales@emcoflow.com
website: www.emcoflow.com

For other countries, consult your nearest EMCO representative. Simple difficulties can often be diagnosed over the phone. If it is necessary to return the equipment to the factory for service, please read our Return Authorization Policy on the following page. This will aid in the prompt repair and return of the equipment.

EMCO welcomes suggestions that would improve the information presented in this manual or enhance the operation of the equipment itself.

IMPORTANT NOTICE
RETURN AUTHORIZATION POLICY

EMCO Flow Systems (EMCO) must pre-approve and assign a Return Authorization Number to any instrument you plan to return. Please identify the Return Authorization Number clearly on all shipping cartons and paperwork.

Please note that the provision of a Return Authorization Number does not automatically mean that the return is covered by our warranty.

In order to serve you better, and to protect our employees from any potentially hazardous containers, EMCO MUST RETURN UNOPENED, AT THE SENDER'S EXPENSE, ALL ITEMS THAT DO NOT HAVE A RETURN AUTHORIZATION NUMBER AND DECONTAMINATION CERTIFICATE.

To obtain a Return Authorization Number, EMCO requires a completed Decontamination Certificate, which states that equipment to be returned has been thoroughly cleaned. To receive a copy of this document, please contact EMCO and request a Decontamination Certificate.

Phone: 800-356-9362 or 303-682-7060
Fax: 303-682-7069

email: sales@emcoflow.com
website: www.emcoflow.com

Please note that we will be unable to issue a Return Authorization Number unless we have a completed Decontamination Certificate. This ensures everyone's safety and helps us speed up the repair and return process.

OSHA Hazard Communication Standard 29CFR 1910.1200 mandates that we take special steps to protect our employees from exposure to potentially hazardous materials. Therefore, all equipment so exposed must be accompanied by a completed Decontamination Certificate prior to issuance of an RA number by EMCO.

The employees of EMCO sincerely appreciate your cooperation in following this policy.

Address your equipment to:

EMCO Flow Systems
2150 Miller Drive
Longmont, CO 80501

IMPORTANT – PLEASE READ

⚠ DANGER

The installation and operation of this product may put you at risk of serious injury or even death. Take whatever precautions are necessary to ensure your safety before making an installation or working on one. Never work alone or unsupervised. Install and operate this product in accordance with all applicable safety and health regulations, as well as any appropriate local ordinances.

This product may be installed in confined spaces. Examples of confined spaces are manholes, pipelines, digesters, and storage tanks. These places can be dangerous or fatal if you are not suitably prepared. The primary hazards of confined spaces are the possibility of poisoned air and the lack of proper ventilation. Work in such places is governed by OSHA 1910.146, and may require a permit before entering. The other major hazard particular to this product is its extreme weight, which makes it dangerous to handle and creates the risk of being crushed or struck by the unit during installation.

This manual may also contain Material Safety Data Sheets (MSDS) for chemical agents supplied or recommended for use with this product. If needed, these sheets will be in the MSDS Appendix. These sheets provide information about possible hazards from the chemicals. Additional MSDS, covering various proprietary agents (name-branded or trademarked mixtures) that can also be used with this product, are available from the manufacturers of those agents.

This manual uses the following notations to set apart hazard warnings and notes:

⚠ DANGER

DANGER describes situations that will result in loss of life or serious personal injury, unless avoided. The emphasis is on clear and immediate threats to your life or safety.

⚠ WARNING

WARNING describes situations that could result in loss of life or serious personal injury unless avoided. The emphasis here is on the potential for a serious accident.

⚠ CAUTION

CAUTION describes situations that may result in moderate personal injuries, property damage, or damage to the equipment, unless avoided.

☑ *Note*

NOTES draw your attention to particular features, practices, tips, or other information useful in setting up or operating the product.

UniMag, DemiMag and DeltaKit

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Section 1 Introduction

1.1 Scope

UniMag and DemiMag flowtubes are suitable for full pipes and are normally calibrated for volumetric flow in accordance with National Institute of Standards and Technology (NIST) standards, complete with a Calibration Certificate.. The flowtube is normally powered by a remote 4411e transmitter. The flowtube and transmitter make up a complete magnetic flowmeter system. The transmitter has separate instructions.

The DeltaKit is supplied as a flow sensing assembly for use with existing weldable pipes, or as a calibrated spare set of sensors for an existing UniMag. The installation and instructions for the DeltaKit are the same as for UniMags.

The flowmeter system operates in accordance with Faraday's Law of Induction, which states that a voltage will be generated across a conductor as it passes through a magnetic field. The magnitude of the voltage generated across the conductor is directly proportional to the velocity of the conductor.

The conductor is the media being measured (the liquid inside the pipe). The magnetic field is generated by coils in the flowtube assembly and the generated voltage is measured across a pair (or pairs) of insulated electrodes. When the flowtubes are supplied with the 4411e Pulsed AC transmitter, they are equipped with additional reference coils. The reference coils compensate for variation in media temperature and for any magnetic field inherent in the media. For magnetite in the media, consult EMCO.

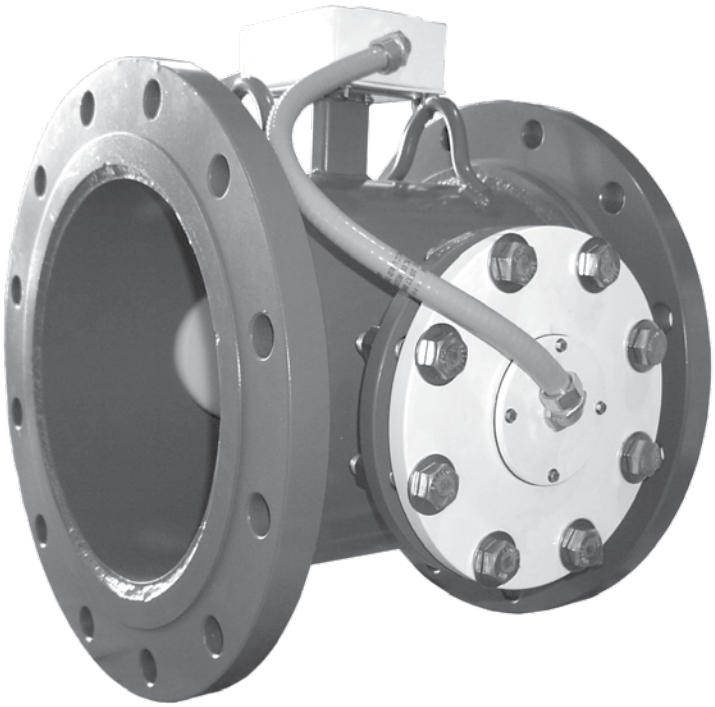


Figure 1-1 UniMag Flowtube

1.2 Safety

The following warnings are provided for your safety. Please read them and keep them in mind when working with UniMag flowtubes.

⚠ DANGER

Crush hazard. The flowtubes may be very heavy (from 12 pounds to two tons). You could be crushed to death instantly or very seriously injured if the flowtube slips during installation and strikes you or falls on you. Keep your hands away from flanges when positioning the flowtube for installation. Make sure that the hoisting apparatus can safely lift the weight of the flowtube.

⚠ WARNING

Before installation, make sure that the operating environments of the flowtube and transmitter are consistent with appropriate national approvals, such as USA UL, Canadian CSA, Entela. The installation of the flowtube must be carried out by qualified personnel only. Read all appropriate instruction manuals before attempting to install or operate the equipment, including the separate instructions for the transmitter.

☑ *Note*

The flowmeter requires AC commercial power for the transmitter only. The flowmeter produces no electromagnetic fields that are harmful to the environment or operating personnel.

Figure 1-2 DemiMag Flowtube

UniMag, DemiMag and DeltaKit

Section 2 Installation

2.1 Media Considerations

UniMag flowmeters are suitable for such media as drinking water, raw sewage, slurries, pulps, pastes and some acids. The minimum conductivity is 1.0 micromhos/cm (micro Siemens/cm), for operation with EMCO 4411e transmitters. Most water based media has a conductivity of 100-800 micromhos/cm.

Check the compatibility of the media with the wetted parts. With some media the percent consistency and operational temperature range can affect this compatibility. Make sure the operational temperature and pressure of the media does not exceed that specified for the flowtubes (See Sections 5.1.2 and 5.2.2).

2.2 Location

The flowmeters have high insensitivity to environmental electrical noise, including radio frequency interference. However, it is good practice to locate the sensors and transmitter away from the immediate area of such noisy environments.

Make sure the flowtube is located consistent with its environmental protection rating. See the code on the flowtube nameplate and check against the appropriate specification.

For integrally mounted transmitters, the transmitter must not be mounted where it is under direct sunlight or subject to driving rain, where it cannot be reasonably read or serviced. Place at least a simple canopy over the transmitter and avoid environments where moisture can accumulate. See separate transmitter instructions.

2.3 Cautions and Important Notes

⚠ CAUTION

Do not use transmitters in manholes or similar locations subject to flooding. In all cases it is essential that the cable terminals be dry at all times.

UniMags and DemiMag are supplied submersible to NEMA 6 and IP68 (see Section 2.8.4). However, when any further cable junction boxes are located in an area where flooding can occur, that junction box must be first dried out with a portable hair dryer, direct sunlight or other method.

☑ Note

When the junction box is absolutely dry, fill it with potting compound (see important note in Section 2.8.5) so that air is not trapped in it when the lid is finally assembled.

The specification for indefinite submersibility to 30 feet water column (10m) to NEMA 6 (IP68) is only valid when the cables in

the potted junction box are in the correct European or conduited cable connectors and are mechanically undisturbed.

Do not use silicone rubber (RTV) for potting; acetic acid released during curing can corrode terminals.

☑ ***Note***

a) The cable shielding should not be cut more than 1" (25 mm) from the terminals.

b) It is a requirement that conduit or Teck metal clad cable is used for the connection of the transmitter to the UniMag or DemiMag flowtube assembly. Metal ½" conduit connectors type UNYSONR-A are supplied in the flowtube junction box and transmitter.

c) It is also a requirement of Class 1, Division 2 approval that the UniMag and DemiMag are completely potted with 3M "High Gel" type 4442 re-enterable compound. Details of this are given in Section 2.8.5.

For UniMags with polyurethane sensors the differential temperature between the media and ambient should not exceed 140°F (60°C). This may be prevented by thermal insulation on the outside of the flowtube.

2.4 Serial Numbers

Make sure the serial number of the flowtube, shown on the nameplate of the flowtube, agrees with the serial number on the transmitter when they have been supplied together. When they have been supplied separately, the transmitter range factor and pulse frequency must be adjusted to the sensor and flowtube calibration requirements. See separate instructions for the transmitter.

2.5 Mounting Recommendations

The UniMag or DemiMag may be mounted into a pipeline in any attitude, taking note of the flow direction arrow on the flowtube flowtube. However, the recommendations in this section should be observed.

☑ ***Note***

To obtain accurate measurement with a magmeter, the pipe must be totally full (unless using a UniMag designed to measure flow in non-full pipes) and air must not be entrained in the flow. If the pipe is not full, or if air is entrained in the flow (for example, due to pump cavitation) a magmeter will indicate a flow rate higher than the actual flow rate.

2.5.1 Straight Pipe Lengths

The piping downstream of a flowtube is much less critical than upstream. Essentially, the downstream piping must be at a higher level than the flowtube to ensure the flowtube remains full.

A full pipe UniMag requires a minimum of 5 pipe diameters of straight length of pipe upstream from the flowtube and a minimum of 2 diameters downstream. 90° bends can then be located upstream and downstream (see Figure 2-1).

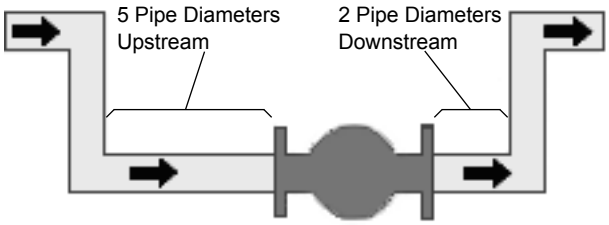


Figure 2-1 Piping Configuration

Straight pipe lengths for DemiMags > 1" (25mm) diameter and all UniMags are presented in the table below. For DemiMags < ¾" diameter (20mm) diameter no straight pipes are required.

Table 2-1 Minimum Straight Lengths of Pipe

Condition	2 Sensor UniMags
90° bend or tee	5D up, 2D down
90° bends in 2 planes	10D up, 5D down
Upstream pump	20D up
Downstream pump	5D down
For 1 sensor UniMags, the above lengths should be doubled.	
D = Pipe Internal Diameter	

☑ ***Note***

For upstream straight pipe lengths less than 10D, the UniMag sensors should be in plane with the last upstream bend or tee.

2.5.2 Increasing Velocity

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

Extremely large measurement errors may occur in installations with both low velocities less than 1 ft/s (0.3 m/s), and poor velocity profiles due to insufficient lengths of straight pipe upstream and downstream from the UniMag flowtube. In such cases flow straighteners are typically used in pipes from 6" (150 mm) in diameter. Flow straighteners are bundles of small tubes 1½ pipe diameters in length, located inside the pipe 10 pipe diameters upstream of the UniMag flowtube. In pipes 4" (100 mm) and less in diameter, a flow straightener would restrict the flow considerably

and is not recommended. In addition, flow straighteners should not be used in pipes containing sludge due to the potential for blockage.

In some applications it is necessary to install a UniMag flowtube smaller in diameter than the adjacent piping, in order to increase the velocity through the UniMag to maintain accuracy. In such installations, the angle on the reduction and expansion must be less than 10°, in which case no additional straight lengths of pipe are required between the UniMag flowtube and the reduction and expansion (see Figure 2-2).

Figure 2-2 Angle on the Reduction and Expansion

2.5.3 Vertically Oriented Pipes

One way to prevent non-full pipes is to install the UniMag in a vertical pipe with upward flow (see Figure 2-3).

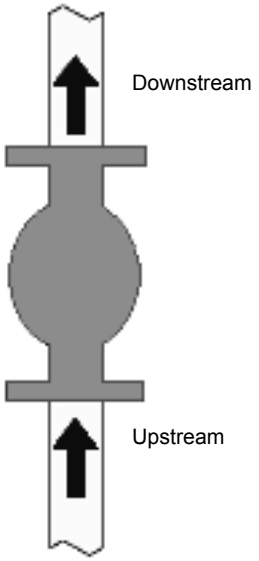


Figure 2-3 Installation in Vertically Oriented pipes

2.5.4 Horizontally Oriented Pipes

Horizontally-Oriented pipes should always be installed with a downstream head of media above the flowtube to prevent non-full pipes, as shown in Figure 2-4.

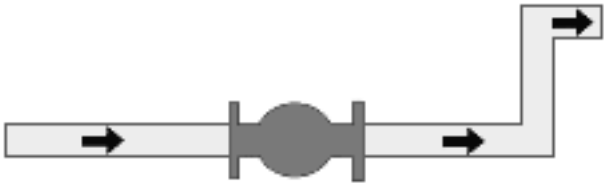


Figure 2-4 Installation in Horizontally Oriented Pipes

☑ *Note*

Avoid installing the flowtube at the highest part of the pipe work (Figure 2-5). If it is installed at the highest location in the piping, a full pipe condition cannot be guaranteed.

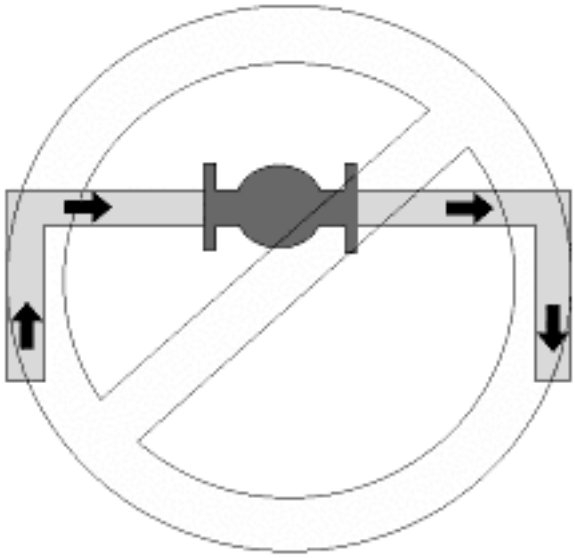


Figure 2-5 Avoid Installing at Highest Horizontal Location

Horizontally-mounted pipes should be supported so that there are no undue stresses on them or the flowtubes. There must not be any misalignment between the pipes either side of the flowtube. Make sure there are no gaskets protruding into the pipes either side of the flowtube, nor immediately before or after the upstream and downstream straight lengths of pipe respectively. PVC or HDPE UniMags must not be installed in metal pipes to avoid excessive bolt torque and misalignment stresses.

2.5.5 Sensor Electrodes

In horizontal pipes the diameter across the center point of opposite pairs of UniMag sensor electrodes should be mounted horizontally. This avoids possible buildup of solids on the bottom electrode pair and gas build-up on the upper pair, as shown in Figure 2-6. With UniMags, the electrodes should be horizontal.

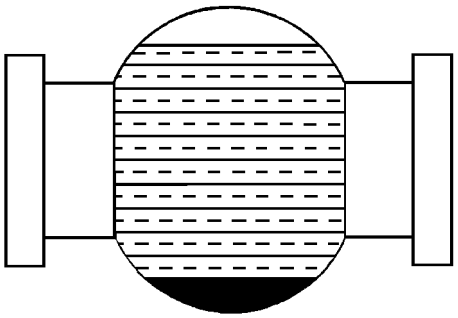


Figure 2-6 Solids and Gas Buildups

2.5.6 Non-Full Pipe Detection

For non-full pipe detection in horizontally-mounted pipes the electrodes detect when the media has fallen below their level (Figure 2-7).

At that time the non-full pipe contact is actuated in the transmitter. The signal will fall to 4 mA, a N/O or N/C contact is actuated. Alternatively, a non-full pipe condition may be actuated by an external pump switch.

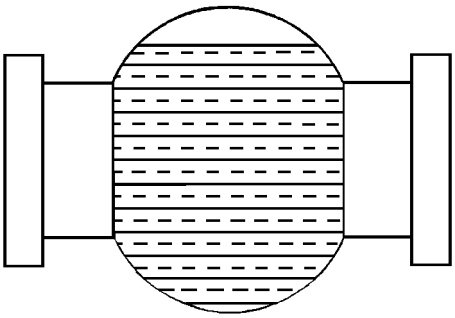


Figure 2-7 Non-Full Pipe Condition

2.5.7 Non-Homogenous Media

For particularly non-homogenous slurries, pulps, or pastes, the flowtube 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 flowtube (Figure 2-8). The 20 pipe diameters can include a bend if the bend is located a minimum of 10 pipe diameters upstream of a double sensor UniMag (a minimum of 20 pipe diameters with single sensor UniMag).

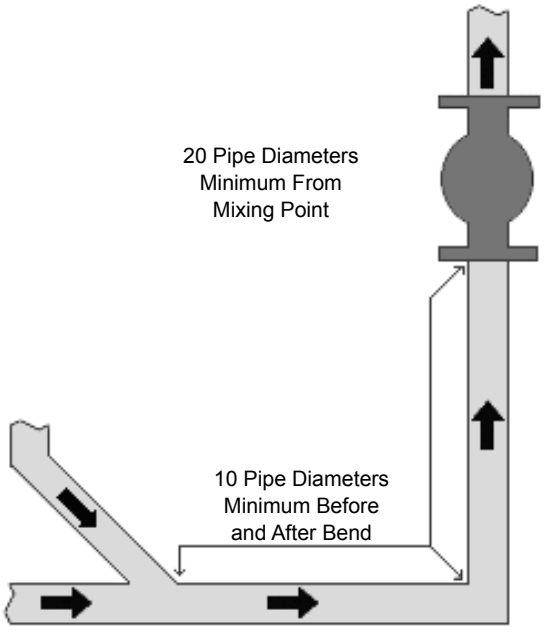


Figure 2-8 Non-homogenous Media

2.5.8 Partially Closed Valve

If the piping is horizontal and includes a partially closed valve, the valve should always be installed downstream of the UniMag, as shown in Figure 2-9. This will allow the head pressure in the system to be adjusted, reducing the chance of air entrainment in the flow. It also prevents excessive irregular profiles forming upstream of the UniMag.

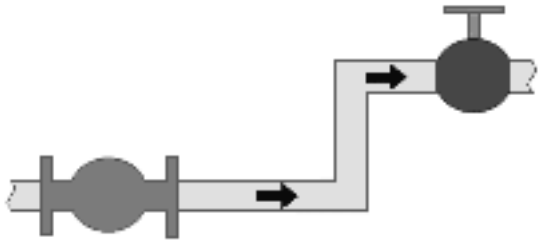


Figure 2-9 Partially Closed Valve Downstream

2.5.9 Vacuum Conditions

For vacuum conditions (for example, due to a pump downstream from the UniMag flowtube), use fusion bonded epoxy coated UniMag internals, or no liner at all. For full vacuum, use PEEK sensors only.

A minimum of 3 pipe diameters of straight length of pipe are required downstream from the UniMag flowtube to the pump (Figure 2-10).

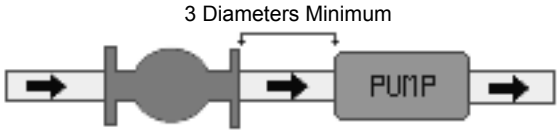


Figure 2-10 Avoiding a Vacuum Condition, Example One

For other liners, a vacuum condition can be averted by installing the flowtube on the positive pressure side of a pump (downstream from the pump). The pump should be a minimum of 20 pipe diameters upstream (Figure 2-11).

Figure 2-11 Avoiding a Vacuum Condition, Example Two

A vacuum condition can also be avoided by limiting vertical falling pipes downstream of the flowtube to a maximum of 16 feet (5m) water column of vacuum (Figure 2-12). If this is unavoidable, a vacuum relief valve is then recommended downstream from the flowtube.

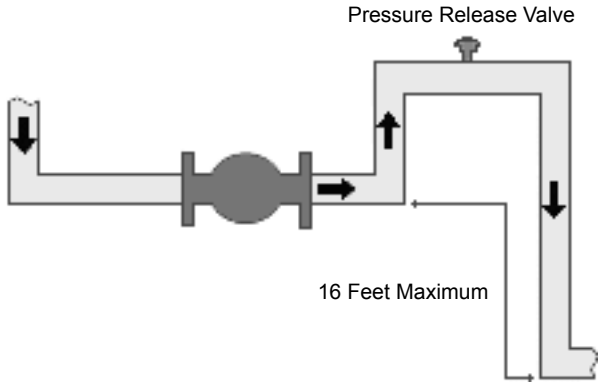


Figure 2-12 Avoiding a Vacuum Condition, Example Three

2.5.10 DemiMag Installation

The DemiMag flowtubes > 1" (25 mm) diameter installed in all pipe configurations require 5 pipe diameters of straight pipe upstream and 2 downstream. However, an upstream pump requires 20 pipe diameters upstream of the DemiMag. A downstream pump requires 5 diameters.

Care must be taken to ensure there is no entrained gas in the media, particularly on these smaller sizes. If this is unavoidable a positive error will result, which can possibly be compensated by the alteration of the Calibration Factor in the transmitter. See separate instructions.

The DemiMag may be mounted in any attitude.

2.5.11 DeltaKit Installation

The DeltaKit may be supplied as a single, double or quadruple sensor assembly for use with existing pipes or as a spare sensor for an existing UniMag. It is normally supplied with weldable standpipes, contoured for an existing pipe outside diameter when not supplied as UniMag spares.

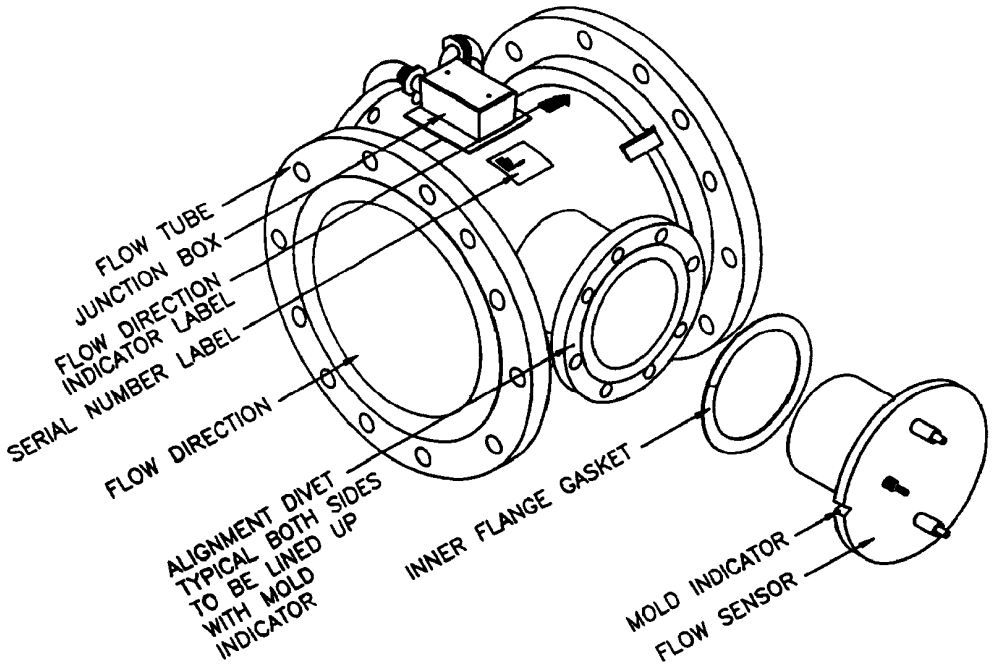


Figure 2-13 DeltaKit Sensor Assembly

When a DeltaKit is used on an existing pipe, the sensors must be temporarily removed from the standpipes so that the standpipes can be welded to the existing pipe.

a. Cut a hole into the pipe in a location in accordance with the UniMag instructions in the preceding paragraphs. A single hole (for a one sensor) should be cut horizontally or ±45˚ from horizontal. A pair of holes (for two sensors) in horizontal pipes should be the same as a single hole, except diametrically opposite. Quadruple holes should be cut in "X" formation.

The DeltaKit hole diameters are cut as follows:

2" Sensors: 2⅜" (61mm) Diameter
3" Sensors: 3½" (90mm) Diameter
6" Sensors: 6⅝" (170mm) Diameter
8" Sensors: 8⅝" (220mm) Diameter
12" Sensors: 12¾" (325mm) Diameter

b. When the holes are cut, weld the contoured standpipe(s) concentrically around the holes with the flange bolt holes symmetrically about the vertical center line of the cut pipe hole (not in line with it).

c. When the sensors are assembled in the standpipes of the flowtube, a vee notch in the sensor flange is mounted coincident with a center punch mark provided on the flowtube standpipe. The point of the vee notch indicates the direction of flow and the vee is situated on the upstream side of the flowtube standpipe. This applies to single or multiple sensor models. The electrode's axis is then at 90 degrees to the flow stream.

d. The new sensor is then retained with the outer remaining flange using an elastomer 1/16" thick gasket under the sensor flange and ⅛" thick elastomer gasket above the sensor flange. Other gaskets and thicknesses are supplied with the DeltaKit for media other than water and waste water applications. The sensor is then wired to the junction box. Normally a DeltaKit comes completely wired and with conduits to a junction box, with cables from the junction box. If not, before installing the covers on the junction box and outer sensor retaining flange, the exposed cables must be potted for submersible duty using an epoxy (not silicone rubber), or preferably a "re-enterable" encapsulant. The "re-enterable" encapsulant is removeable. EMCO recommends 3M's "High Gel" type 444 re-enterable compound in a 6 kg size, mixed with 50/50%, with a typical drying time of 2-3 hours.

⚠ WARNING

All sensor retaining flanges of any material should be tightened in an X formation regardless of any sensor material. Each bolt should be tightened gradually. NO NOT TORQUE THE SENSOR BOLT TO THE SPECIFIED TORQUE REQUIREMENT IN ONE PASS. Torque each sensor bolt gradually and in the X formation until the proper torque is reached.

The torque values are provided in paragraph 4.1 and must not be exceeded, otherwise warranty is void.

2.6 Grounding

UniMags and DemiMags are equipped with grounding electrodes. As such they may be installed in adjacent pipes that are lined with electrically insulating material or made from plastic or similar materials, normally without any further grounding requirements.

In the rare event that excessive unequal potentials occur between the pipeline and the flowtube cable shielding, and the transmission distance between a metallic flowtube and the transmitter is greater than 100 feet (30m), the following checks are recommended.

At the transmitter cable end, remove the electrode cable from the terminals. Measure the mV AC across black and shield, then white and shield with a multimeter.

- Black to shield should be 1 to 6 mV AC
- White to shield should be 1 to 6 mV AC
- These should both be approximately equal.

⚠ DANGER

High Voltage Exciter Coils. Use extreme caution when working with the exciter coils, as contact with these coils can cause extreme injury or death.

- Measure the resistance between the exciter coil shield and electrode shield (the cables may remain in their terminals). This resistance should be less than 8 Ohms.

If these conditions are not achieved, disconnect the exciter coil shield, apply insulating tape and leave disconnected from its terminal. If that does not achieve the desired conditions as explained above, then install as necessary in accordance with Figures 2-14, 2-15, 2-16, 2-17, with or without the exciter coil shield connected in its terminal.

2.6.1 Normal Grounding

The UniMag or DemiMag and the media must have the same electrical potential in order to ensure specified measuring accuracy. This also avoids corrosion of the electrodes. Such equalization is normally achieved by means of grounding electrodes installed in the flowtube. If the media flows through unlined and grounded metallic

pipes, it is normally sufficient to connect the grounding terminal of the UniMag to a "good ground", as in Figure 2-14.

⚠ CAUTION

For sensors without reference electrodes or without metal process connections, carry out potential matching as per the instructions for special cases, described below. These special measures are particularly important when standard grounding practice cannot be ensured due to excessive unequal potentials.

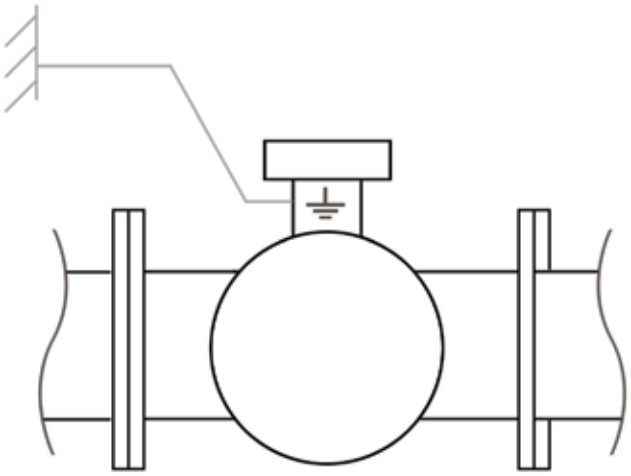


Figure 2-14 Normal Grounding Arrangement

2.6.2 Metallic Pipes with Unequal Potentials

In order to avoid errors due to unequal potentials, use grounding cables to connect each UniMag flange to its corresponding pipe flange and ground the flanges. For installations with pipe joints a grounding cable is necessary to connect the flanges either side of the pipe joint and then to the UniMag grounding screw. Use 9AWG, ⅛" (3mm) copper wire.

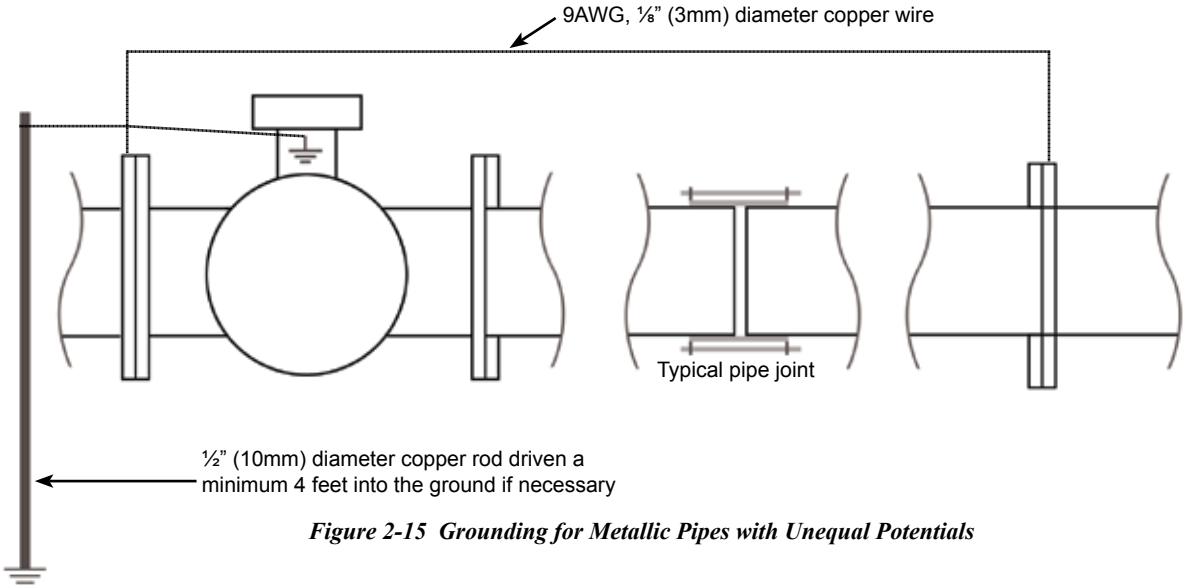


Figure 2-15 Grounding for Metallic Pipes with Unequal Potentials

2.6.3 Grounding in Plastic Pipes

If the flowtube has plastic construction and is installed in plastic pipes with cables > 50 feet (15m), the two grounding rings should be used. These have a thickness of not less than 0.1" (2.5 mm), with a connection tab wired to a bolt on the underside of the UniMag junction box, or to terminal 26 of the transmitter in the case of DemiMag. It may also be necessary to drive a ½" diameter (10mm) copper rod a minimum of 4 feet (1m) into the earth. The grounding rings are then electrically connected to the copper rod. Grounding cable should be 9AWG, ⅛" (3mm) diameter.

☑ *Note*

1. Excessive unequal potentials are beyond the control of EMCO and the additional cost of remedy is extra to that of our normal supply.

2. There is a risk of electro-chemical corrosion if grounding rings and grounding electrodes are of different metals.

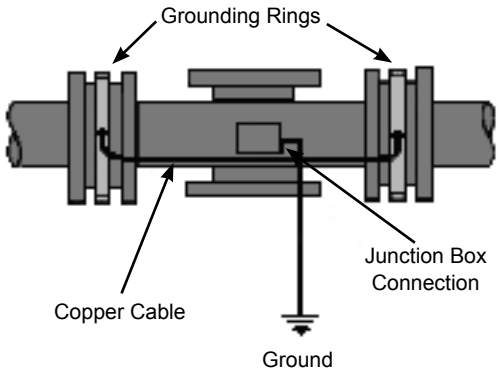


Figure 2-16 Grounding Rings

2.6.4 Cathodic-Protected Pipes

Cathodic-protected pipes are normally insulated on the outside and inside, so that the media inside the pipe is not grounded. When the flowtube is installed in cathodic-protected pipe it is necessary to install it with insulated grounding rings immediately upstream and downstream of the flowtube. The flange bolts must be insulated and the cathodic protection current must bypass the flowtube (Figure 2-17).

The grounding rings are connected to one of the bolts on the underside of the junction box of the UniMag, or to terminal 26 of the transmitter in the case of DemiMag. Grounding cable should be 9AWG, ⅛" (3mm) diameter.

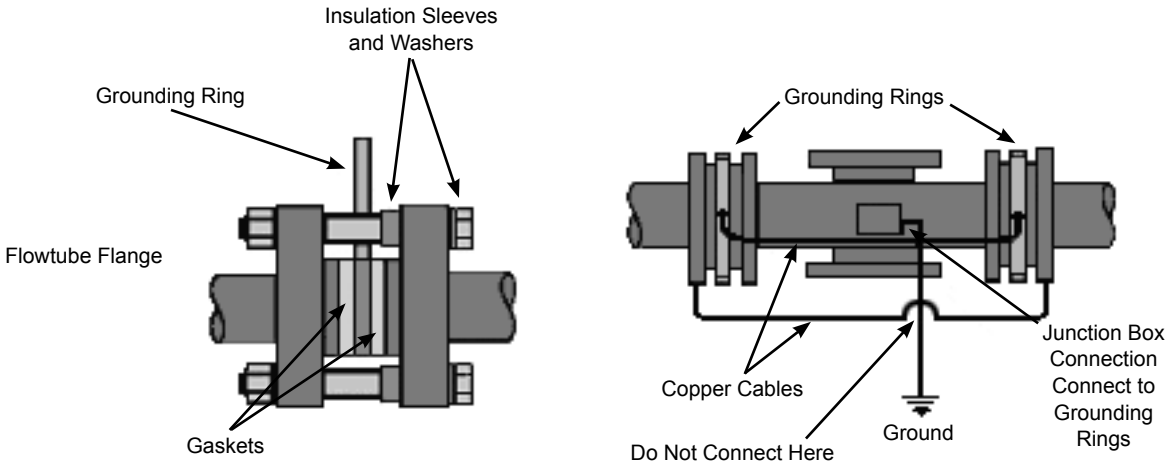


Figure 2-17 Grounding Rings for Cathodic-Protected Pipes

> ☑ ***Note***
>
> **The flowtube cable shield and the media must be at the same potential.**

Standard UniMag orders do not include grounding rings. Grounding rings must be ordered separately.

2.7 Cable Types

The flowtube is connected to the transmitter using two-wire shielded cables. There are 3 cables (optional 4) Beldon #8760 or 2 x 0.75mm^2, as shown in Table 2-2.
Note that the cables may be supplied as 1 x 4 core cable for the reference coils and exciter coils and 1 x 4 for the pre-amp and electrodes. The cable free ends are fitted with a shrink fitted shroud, not to be cut until immediately prior to installation.

> ☑ ***Note***
>
> **FOR UNIMAGS AND DEMIMAGS IN EXPLOSIVE ATMOSPHERES USED WITH A 4411e IN A SAFE AREA: For Entela approval conforming to ATEX Zone 2, only one cable is permitted per cable connector.**

2.8 Cable Runs

The cables are marked “coils,” “electrodes,” “pre-amp,” and “reference.” The cable colors are connected to the transmitter terminals as outlined in Table 2-2.

Table 2-2 Cable Connections

Exciter Coils	Electrodes	Pre-Amp	Reference
black to 4	black to 24	shield to 19	black to 31
white to 5	white to 25	black to 20	white to 32
shield to 6	shield to 26	white to 21	shield to 19
Note: IEC Hazardous Location cables may have other colors, but they will be labeled.			

The coils and electrodes of multiple sensors are connected in parallel in the junction box of the flowtube.

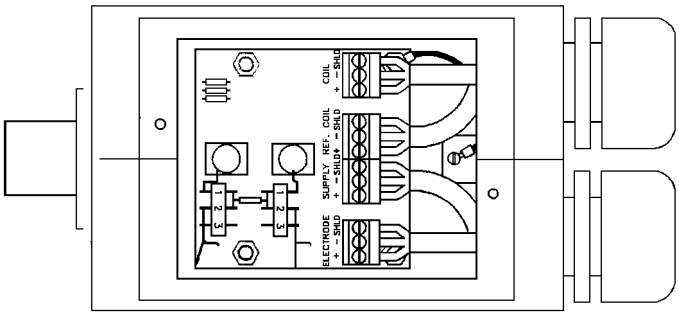


Figure 2-18 Cable Connections

☑ *Note*

1. The cable shielding should not be cut more than 1” (25mm) from the terminals.

2. It is a requirement that conduit or Teck metal clad cable is used for the connection of the transmitter to the UniMag or DemiMag flowtube assembly. Conduit connectors Appleton type UNY50NR-A are supplied. Conduits are not necessary for ATEX Zone 2 areas.

3. The UniMag and DemiMag must be completely potted with 3M re-enterable gel type 4442, when used in hazardous locations. See Section 2.8.5.

⚠ CAUTION

NEMA 6 and IP68 submersible protected versions have their cables as pigtail leads already potted in the junction box (see note in Section 2.8.5). Any wiring in additional junction boxes for extended cable lengths must have the coil terminals separated from the electrode terminals or each individual cable must be braid-shielded. An aluminum or other metal shield must be placed between the coil and electrode terminals within the junction box. The junction box must be potted with 3M re-enterable gel or equivalent. See Paragraph 2.3. Alternatively, cables may be solder joined, which must include the shield braiding. All joined cables must have shrink fit sleeving to prevent moisture ingress.

2.8.1 Long Runs

Cables running greater than 30 feet (10m) must have the electrode pair separated from the coil pair by at least 2 feet (0.5m). See Figure 2-19.

2.8.2 Multiple Runs

For cable runs from multiple flowtube sensors to the transmitter, multi-electrode cables may all run together in the same conduit, but separate from all other cables. Multi-coil cables, reference and pre-amp cables may all run together in the same conduit, even with other power cables.

The maximum recommended distance for separate multiple runs is 150 feet (50m) or ten times the media conductivity in feet, whichever is less. The multiple flowtubes and cable runs must be at least two feet (0.5m) from each other (Figure 2-19).

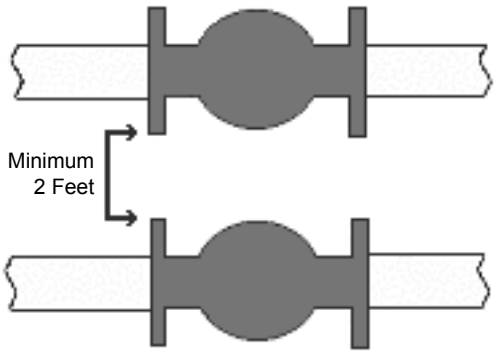


Figure 2-19 Multiple Runs

The maximum distance between the single flowtube and the transmitter depends on the media conductivity for the given recommended cable in Section 2.7.

2.8.3 Media Conductivity

For media conductivities that are greater than 3 micromhos/cm (microSiemens/cm), use the following maximum distances:

- 300 feet or ten times the media conductivity µS/cm (micromhos/cm) in feet, whichever is less.

• 90m or three times the media conductivity µS/cm (micromhos/cm), whichever is less.

For conductivities < 3 micromhos/cm the maximum distance is 30 feet (9 m).

Most water-based media has a conductivity of 100-800 micromhos/cm. (Micromhos/cm = microSiemens/cm.)

2.8.4 NEMA 6 or IP68 Specifications

The cables from the flowtube junction box specified to NEMA 6 or IP68 have shrink-fit sleeves at their free ends. These are to prevent permeating the cables, which can cause a signal zero offset and instability.

⚠ CAUTION

It is important not to cut these sleeves off the cables during storage of the flowtube. Do not cut until immediately before wiring to the transmitter terminals or other cable extension joins for operation.

2.8.5 Junction Box Terminals and Wiring Identification

Should the junction box on the flowtube be installed to NEMA 4 specifications (non-standard) it must be wired as shown in Figure 2-20. NEMA 6 versions are readily wired and potted normally with a submersible removable gel.

⚠ CAUTION

Each individual cable must be braid-shielded. The cables must not be coiled within the junction box. The cables must run straight to the terminals and split not more than 1" (25mm) from the terminal entries and exits.

☑ ***Note***

It is a requirement that conduit or Teck metal clad cable is used for the connection of the transmitter to the UniMag or DemiMag flowtube assembly. Metal ½" conduit connectors type UNY50NR-A are supplied in the flowtube junction box and 4411e transmitters.

For ATEX Zone 2 areas conduits are not required.

☑ *Note*

The UniMag and DemiMag are completely potted with 3M "High Gel" type 4442 re-enterable compound, or equivalent, mixed 50% / 50%. The typical drying time is 2-3 hours, but it never solidifies hard. This gel must completely fill the space between the outside of the sensors and outer cover, the connection conduits from the sensor outer covers to the junction box and the junction box itself.

A wiring diagram for the UniMag junction box is shown in Figure 2-20 for your reference. Normally, the junction box is wired, potted, and sealed at the factory.

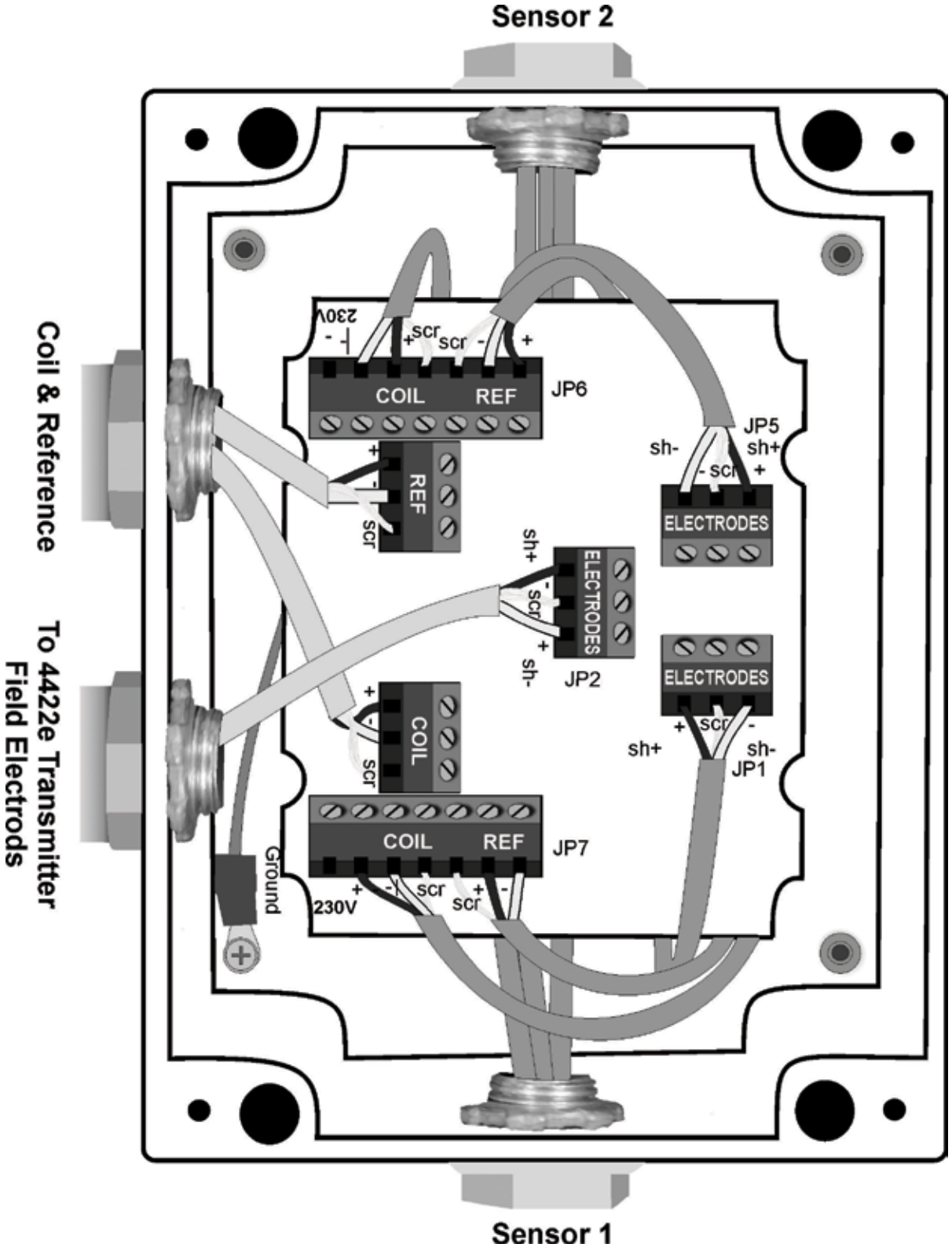


Figure 2-20 4411e Connection Diagram, 1 or 2 Sensors

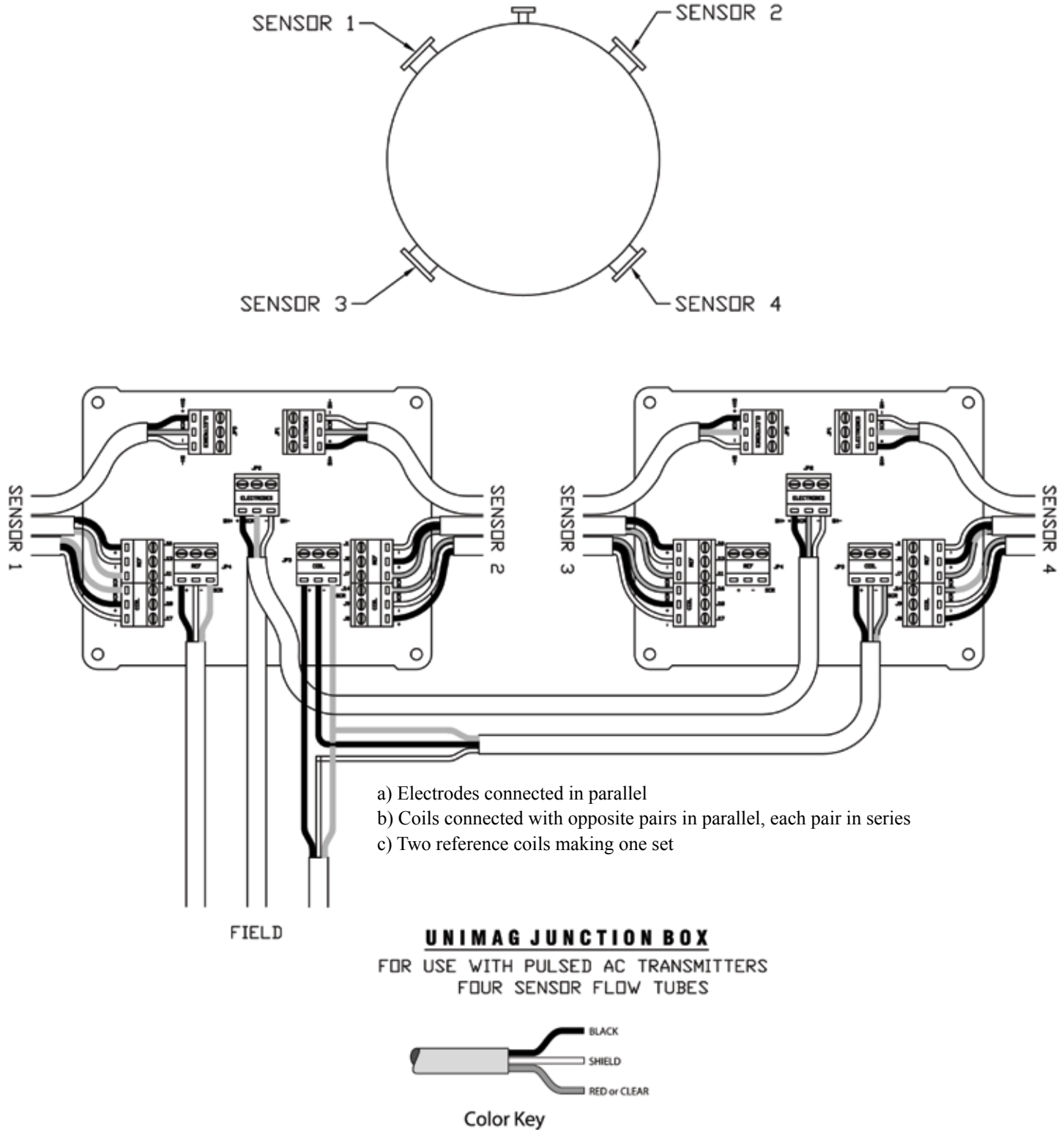


Figure 2-21 UniMag Junction Box Wiring Connections with 4 Sensors

2.9 Pre Start-Up and Installation Checklist

It is highly recommended that each installation and start-up is checked against the following list.

Wires in Separate Conduits?	Yes ☐	No ☐
Splice in Wire Runs?	Yes ☐	No ☐
Proper Splices?	Yes ☐	No ☐
Direction of Flow Correct?	Yes ☐	No ☐
Non-Full Pipe Condition?	Yes ☐	No ☐
Cathodic Protection?	Yes ☐	No ☐
Sensors Oriented Properly?	Yes ☐	No ☐
Junction Box Wiring Correct?	Yes ☐	No ☐
Moisture Around Wiring?	Yes ☐	No ☐
Correctly Grounded?	Yes ☐	No ☐
A/C Power Connected?	Yes ☐	No ☐
Media Present?	Yes ☐	No ☐
Hydraulic Zero Conditions Available (Full Pipe No Flow)?	Yes ☐	No ☐
Straight Diameters Downstream:		
Straight Diameters Upstream:		
Cable Length:		
Distance to Nearest Pump:		
Distance to Nearest Valve:		
Customer Signature: Date:		

Figure 2-22 Pre Start-Up and Installation Checklist

UniMag, DemiMag and DeltaKit

Section 3 Calibration Data

3.1 Calibration Factors

A calibration factor C appears on the flowtube nameplate. For the superseded 4412 or DeltaPulse transmitter this is equated to a range factor R in the flowmeter transmitter as follows:

$$R = \frac{100C}{\text{Range}}$$

where the range is full-scale in gallons per minute

$$R = \frac{22.73C}{\text{Range}}$$

where the range is full-scale in m^3/hr

The range factor R or meter factor C is determined to four figures and set digitally in the transmitter. Should a range change be required, then:

$$C_{new} = C_{old} \times \frac{\text{Range old}}{\text{Range new}}$$

If relevant, the pulse frequency output and totalizer scaling in the transmitter input must be changed accordingly. See appropriate transmitter instructions.

3.2 DemiMag and UniMag Simulation

For use with superseded pulsed DC 4401/4404 transmitters, the flowtubes may be simulated for bench testing using a coil resistance 8-10 Ohms, 15-250 mH. A resistor instead of a coil is not acceptable.

For use with 4411e transmitters no flowmeter simulation input is necessary. However, for checking for correct wiring, the sensor coils with 120V AC transmitter supply have the following resistances:

Table 3-1 120V Sensor Coil Resistances (Ohms)

Sensor Diameter	Single or Quadruple	Pair
2”/3” (50 mm / 80 mm)	Pre-2005 version: 40 2005+ version: 70	Pre-2005 version: 20 2005+ version: 35
6” (150 mm)	10	5
8” (200 mm)	5	2.5
12” (300 mm)	8	4
DemiMag DM Series	100	--
DemiMag DL Series	--	50
Reference Coils	10k (single only)	6.6k (pair or quadruple)
For 230V coils multiply the above x 4		

☑ *Note*

Multiple sensors are normally wired in parallel. However, 4 sensors are wired with 2 sensors in series, wired in parallel with the other 2 sensors in series.

☑ *Note*

Since zero, span and calibration diagnostics are available in the transmitters, an extra "calibration box" is not necessary.

4.1 Removal and Replacement of UniMag Sensors

When the sensors are placed in the standpipes of the flowtube, a vee notch in the sensor flange is mounted on the upstream side of the flow. The point of the vee notch indicates the direction of flow and the vee is situated on the upstream side of the flowtube standpipe. This applies to both sensors, when diametrically opposite on the flowtube. The electrode's axis is then at 90 degrees to the flow stream.

The new sensor is then retained with the existing outer retaining flange using a l/l6" thick gasket under the sensor flange and ⅛" thick gasket above the sensor flange. The sensor is then wired to the junction box.

Before installing the covers on the junction box and outer sensor retaining flange, the exposed cables must be potted for submersible duty using an epoxy (not silicone rubber), or preferably a "re-enterable" encapsulant. The "re-enterable" encapsulant is removable. We recommend 3M's "High Gel" Type 4442 re-enterable compound in a 6 kg size, mixed 50/50%, with a typical drying time of 2-3 hours.

☑ ***Note***

For use in explosive atmospheres see the important note in Section 2.8.5.

The sensor retainer flanges in metal flowtubes should be tightened in diagonal sequence to a torque as follows:

Table 4-1 Torque Specifications (Metal)

Flange Size	Torque		
2" - 6"	40 ft. lb	5.6 m Kg	56 N.m
8" - 14"	60 ft. lb	8.5 m Kg	85 N.m
16" - 34"	75 ft. lb	11 m Kg	110 N.m
36" - 80"	105 ft. lb	15 m Kg	150 N.m

For PVC flanges, the torque is as follows:

Table 4-2 Torque Specifications (PVC)

Flange Size	Torque		
2" - 12" (50-300mm)	25 ft. lb	3.5 m Kg	35 N.m

The illustration below identifies the different components of the UniMag.

4.2 UniMag Components

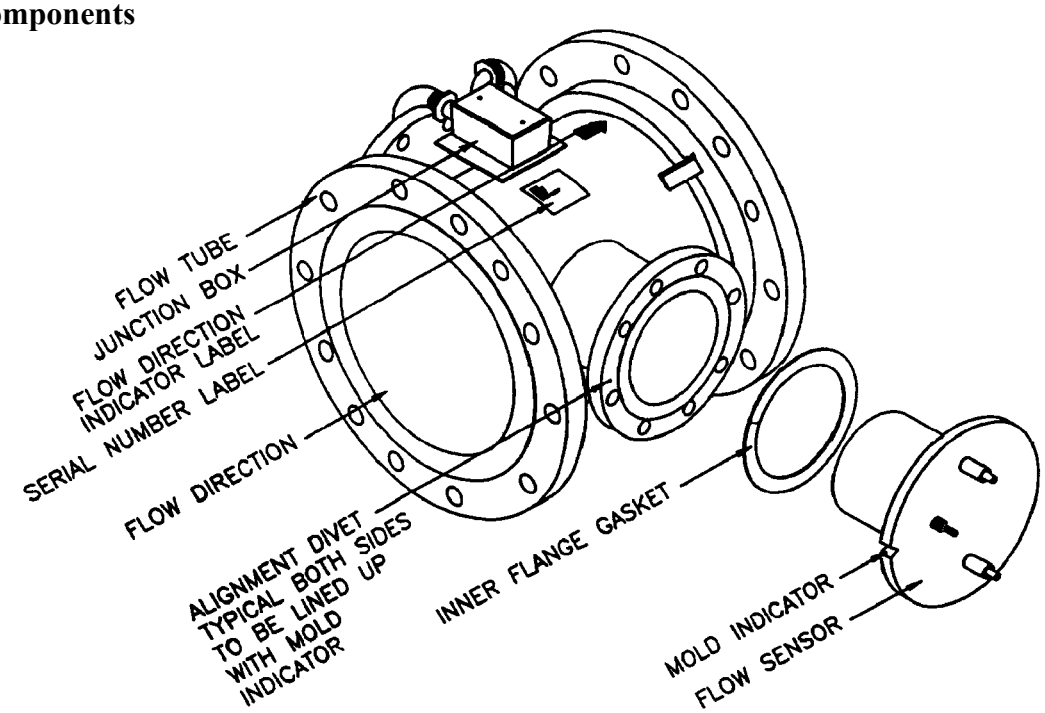


Figure 4-1 UniMag Components

4.3 Fault Finding

With the flowtube connected to the transmitter, check for zero and span in accordance with the appropriate transmitter instructions. This confirms whether an electrical fault or leak into the flowtube has occurred. If zero or span has significantly deviated, then determine whether the flowtube or transmitter is at fault. Note that bad grounding will not affect the zero and span electrical test.

4.3.1 Flowtube Coil Check

Check the flowtube coils by removing the cables from the transmitter terminals. The resistance between the shield (terminal 6) and coil (terminal 4 or 5) should be a minimum of 10 Meg Ohms. If it is significantly less, the media has penetrated the flowtube internals.

⚠ DANGER

Before removing the exciter coil cables make sure the main power supply is off. The exciter coils are powered with 120V AC or 230V AC.

The coil terminals should have an approximate resistance as stated below. If these tests

are unsatisfactory, the DemiMag or the sensor(s) of the UniMag must be replaced, unless they can be dried out.

For sensor coil resistances see Paragraph 3.2.

Electrode resistance readings should be as below and approximately equal:

Black - White	> 100 K
White - Shield	> 100 K
Black - Shield	> 100 K

The reference coils should have the following readings:

Black - White	typically 6.6 kΩ for multiple sensors, or 10 kΩ for single sensors
White - Shield	> 100 K
Black - Shield	> 100 K

Should the flowtube prove acceptable, but the zero and span test are still unacceptable, then the transmitter is at fault.

Should the zero and span test prove satisfactory, but in operation an erratic signal is obtained, the most common fault is a non-full pipe, where at least one electrode is uncovered. Check all terminal connections and wiring layout and make sure the flowtube is correctly grounded. If all is satisfactory, then check pipe work against the mounting recommendations in Section 2.5 and make sure the flowtube is full.

For information on grounding strategies for unequal potentials, see Section 2.6.2.

4.3.2 Bad Grounding Due To Excessively Unequal Potentials

☑ ***Note***

Such excessive differences in grounding potentials are extreme and beyond the control of EMCO. The additional cost of remedy is not included in our normal supply.

4.4 Other Fault Symptoms

The following list describes other fault symptoms and instructions on how to resolve the problem. Additional troubleshooting guidance is provided in Table 4-3.

a. **Incorrect flow direction.** Change over electrode terminals 24 and 25 in the junction box or incoming at the transmitter terminals. Take note of the flow direction arrow on the flowtube.

b. I**ndicated flow is approximately one third the expected flow.** One or more of the electrodes are being grounded or are open-circuited. If the electrodes are covered with media, check each electrode resistance to ground 6. Each should be between 100K- 5 meg Ohms and approximately equal. If any electrode is significantly different, it has an open or broken electrode lead. Similarly if the electrodes are not covered with media, each electrode resistance to ground must be greater than 10 Meg Ohms.

c. **Media conductivity too low.** This will result in erratic readings, particularly if media is of low conductivity and the distance between sensors and transmitter is too long.

d. **No flow indication.** Check piping condition, making sure any valves, actuators or positioners are correctly set. Check the flow direction.

e. **Signal or indication "swing."** If all of the symptoms above check satisfactorily then this will be due to pulsating flow. Dampen the signal in the transmitter. For extreme conditions requiring damping more than 60 seconds, consult EMCO or nearest approved representative.

☑ *Note*

Should pulsating flow prevail and totals and/or 4-20mA control loop output be required, the 4411e transmitter should be used as follows:

The 4411e has separate damping on the rate indicator, so that the average rate is displayed. The pulse frequency output and totalizer, together with the isolated 4-20mA output should be un-dampened, or dampened as little as possible, for best accuracy and to prevent "hunting" in the control loop. A proportional controller capable of fast time constant input from 4411e should be selected.

f. **Erratic signal, especially with "walky talky" or variable frequency drive noise in the area of the flowmeter.** Normally UniMag and DemiMags are virtually immune to these effects. However, should the media be low conductivity and/or low velocity and/or distances > 50 feet (15m), particularly using plastic flowtubes in plastic piping and flow loops, the resultant erratic signal is likely due to unequal potentials in grounding. Normally the internal grounding electrodes are sufficient. But in extreme cases an extra grounding ring may be necessary, as described in Section 2.6.3.

g. **Signal/totals too high.** Possible non-full pipe. Check pipework configuration in Section. 2.5.

h. **Signal/totals too low.** Either 1) the long distance cables should be separated (see Section 2.7), or 2) the response time to slow - signal has not responded to relatively fast change flow rate conditions. Reduce damping to as fast as possible (see Note above).

i. **Bad grounding**. This is shown by measuring the mV AC across each electrode in turn and ground. They should each be typically between 1-6 mV AC. If one is substantially different and over 6 mV AC it normally indicates unequal potentials due to bad grounding. See Paragraph 2.6.

Table 4-3 Troubleshooting Guide

Problem	Probable Cause
No Display or Totalizer	Check fuse F1, and battery display
Forward Span Test Goes to Zero	Check fuse F1. Check wire connections
Fluctuating Flow Rate	Separate coil and electrode wires, isolate electrode from 4-20 mA cables. Ground coil and electrode shields are together. Check wire connections and wire location. Verify that the flowtube is full. Ground the flowtube.
Flow Rate is Incorrect	Check hydraulic zero, rate scale, range factor, or meter factor.
Low Flow Rate	Check the resistance between the shield and black/white wires.
Zero Flow Rate	Check the resistance of coil and electrode wires. Check Meter Factor (or range factor). The coil fuse may be open. The coil wires may not be connected. Cycle the power. Check the flow direction.
No Flow Rate	Switch the black and white wires on the electrode.
No 40-200 mV Output at Test Point	Make sure either a wire or a 4-20 device is connected to the 4-20 mA output terminal strip.
Totalizer counting backwards	Re-program the counter.

4.5 Revalidation of Electrical Parameters Certificates

For details on the EMCO Flow Systems (EMCO LLC) program for revalidation of magmeter Electrical Parameters Certificates, consult EMCO.

UniMag, DemiMag and DeltaKit

Section 5 Specifications

5.1 Metal UniMag

The dimensions and weights for the metal UniMag are listed in the Tables 5-1 and 5-2. Refer also to Figures 5-1 and 5-2. For comprehensive specifications, see the appropriate separate product brochures.

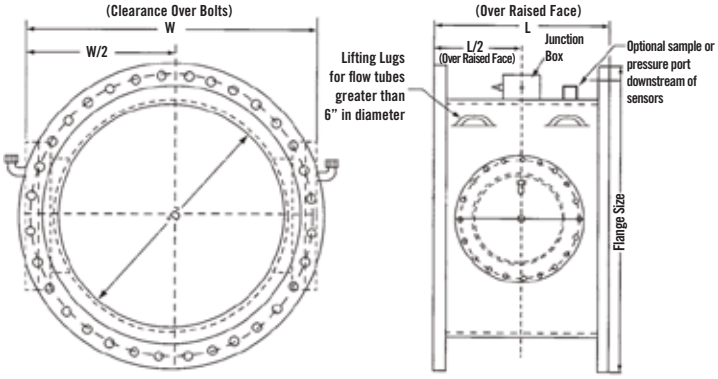


Figure 5-1 Dimensional Drawings for Metal UniMag (DT)

Table 5-1 Metal UniMag Dimensions and Weights (DT)

Nominal Size D		Dimension L *		Dimension W		Approximate Weight	
Inches	mm	Inches	mm	Inches	mm	LB	KG
2	50	10	254	13.05	332	43	20
2.5	65	10	254	13.55	344	50	23
3	80	10	254	14.35	365	55	25
4	100	12	305	16.35	416	80	36
5	125	12	305	17.55	446	92	42
6	150	12	305	18.65	474	100	46
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
72	1800	48	1219	90.45	2218	3609	1633
80	2000	48	1219	98.45	2501	3898	1764

** Note: For flowtubes 6" Ø and less having ¾" or 1½" NPT sampling or pressure ports Dimension L = 15.0" (380 mm)*

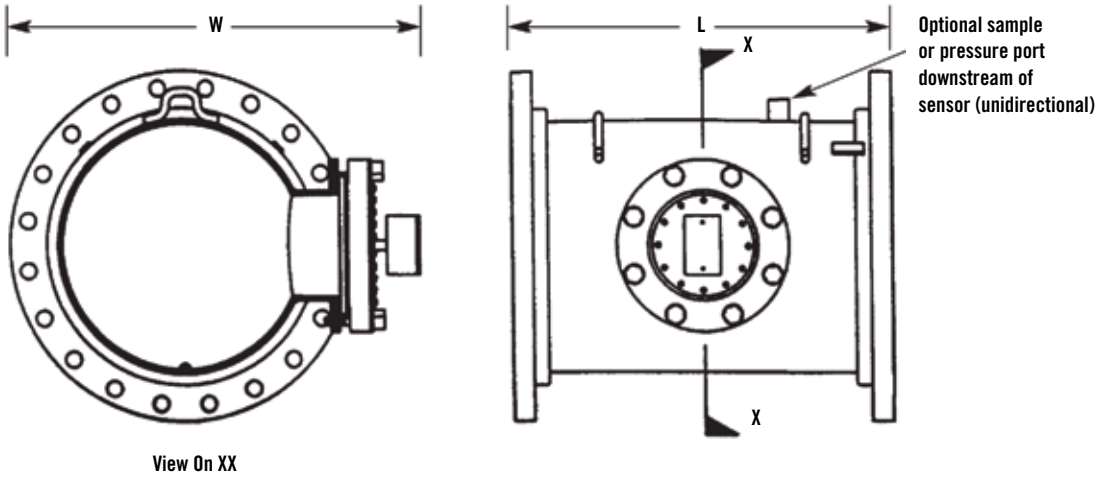


Figure 5-2 Dimensional Drawings for Metal UniMag (DS)

Table 5-2 Metal UniMag Dimensions and Weights (DS)

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	17.00	435	149	68
10	250	18	457	19.50	500	182	83
12	300	18	457	22.50	575	240	109
14	350	18	457	24.50	625	271	123
16	400	20	508	30.25	769	432	196

NOTES

1. 2 in. sensors are used in sizes 1 to 3 in. (25 to 80 mm), 3 in. sensors in sizes 4 to 6 in. (100 to 150 mm) and 6 in. sensors in sizes 8 to 14 in. (200 to 350 mm)

2. Flowtubes with plain ends, without flanges, suitable for pipe couplings or butt welds may be supplied

3. Flowtubes can be made to order with different length dimension L

4. Flowtubes 2 to 6 in. (50 to 150 mm) equipped with a sampling port have an L dimension of 15 in. (380 mm)

5.1.1 Metal UniMag Ordering Code

See the ordering code in the separate data sheet.

5.1.2 Metal UniMag Maximum Pressure and Temperature

For metal UniMag maximum pressures and temperatures, refer to the table below.

Table 5-3 Metal UniMag Maximum Pressure and Temperature Ratings

Maximum Pressure	Polyurethane, UHMWPE Sensors	150 psig / 10 bar g
	PVDF, PEEK Sensors	356 psig / 25 bar g
Maximum Temperature	Polyurethane[1] / Epoxy / Elastomer	175°F / 80°C
	PVDF[3] / Tefzel[2] / No Liner	240°F / 115°C
	PEEK	350°F / 176°C
Protection	Submersible NEMA 6 and IP68 to 33 feet / 10mwc	

[1] For polyurethane sensors or liners, temperature differentials between inside and outside ambient of the flowtube is limited to 140°F (60°C).
This may be accomplished using thermal insulation on the outside of the flowtube.

[2] Do not use Tefzel with large abrasive solids. Use polyurethane or ceramic liners.

[3] PVDF at 285°F (140°C) is based on water. Various media may reduce this. Check manufacturer's recommendations.

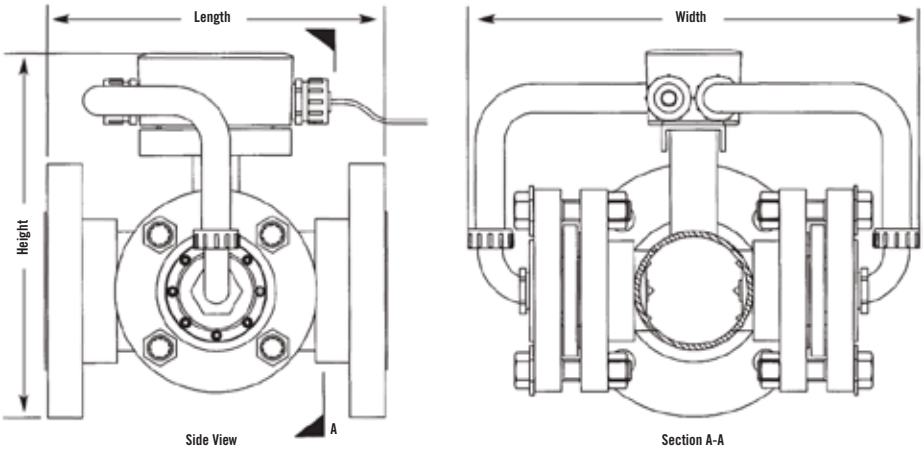
☑ ***Note***

For use in hazardous locations, the maximum surface temperature must not exceed +275°F (+135°C), with a maximum ambient temperature of +104°F (+40°C).

5.2 UniMag PVC

The dimensions and weights for the UniMag PVC are listed in Table 5-4. Refer also to Figure 5-3.

For comprehensive specifications, see the appropriate separate product brochures.



NOTE: For single sensor flowtubes and L dimension remains the same as shown in the table below, and the W dimension in the table value less 2.50 in. (65 mm)

Figure 5-3 Dimensional Drawings for UniMag PVC

Table 5-4 UniMag PVC Dimensions and Weights

Nominal		Dimensions						Weight (Flanged)		Weight (Flanged)	
Size		Length		Height		Width		Double Sensors		Single Sensors	
Inches	mm	Inches	mm	Inches	mm	Inches	mm	lb	kg	lb	kg
2	50	10.00	254	10.00	254	12.00	310	14	6.4	10	4.5
2½	65	10.00	254	11.00	280	13.00	330	16	7.3	11	5.0
3	80	10.00	254	11.00	280	13.50	345	18	8.2	12	5.5
4	100	12.00	305	12.00	305	16.00	410	25	11.4	17	8.0
6	150	12.00	305	14.00	360	17.00	435	32	15.0	22	10.0
8	200	18.00	457	16.00	410	18.00	460	58	26.0	40	18.0
10	250	18.00	457	19.00	485	25.00	635	72	33.0	48	22.0
12	300	18.00	457	22.00	560	26.00	660	95	43.0	65	30.0

5.2.1 UniMag PVC Ordering Code

See the ordering code in the separate data sheet.

5.2.2 UniMag PVC Maximum Pressure and Temperature

Refer to the table below for maximum pressure and temperature ratings for the UniMag PVC .

Table 5-5 UniMag PVC Maximum Pressure and Temperature Ratings

	Temperature		Maximum Pressure	
Maximum Pressure and Temperature for PVC	°F	°C	psig	bar gauge
	85	30	80	5.5
	105	40	60	4.0
	140	60	15	1.0

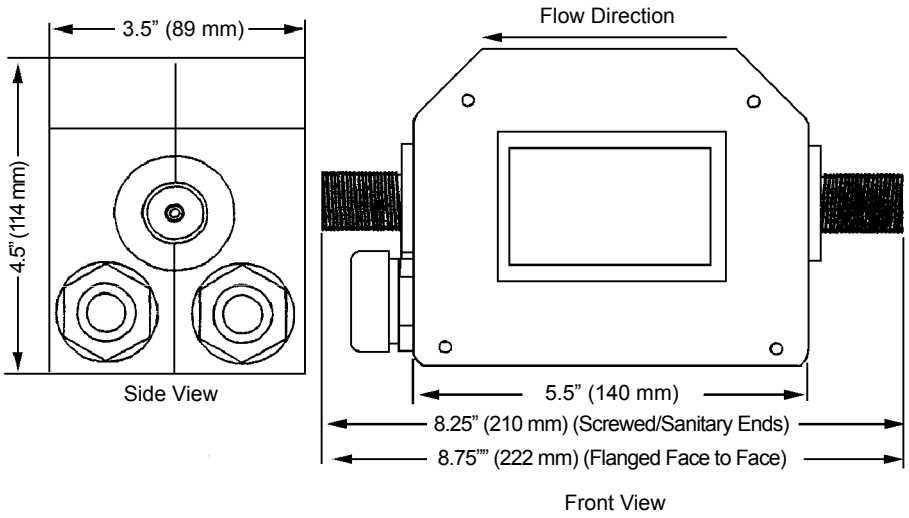
5.3 DemiMag

The dimensions and weights for the DemiMag are listed in Table 5-6. Refer also to Figure 5-4.

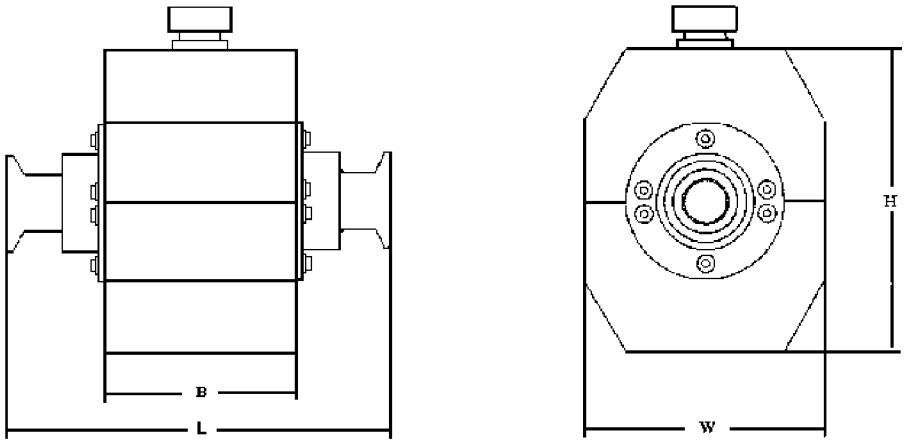
For comprehensive specifications, see the appropriate separate product brochures.

⚠ WARNING

For use in hazardous locations, see Section 2.8.5.



DemiMag 1/16" - 1/2", 12 lb (2 - 12 mm, 5.5 kg)



DemiMag ¾" - 1½", 12 lb (20 - 40 mm, 5 kg)

Figure 5-4 Dimensional Drawings for the DemiMag

Table 5-6 DemiMag Dimensions and Weights

Nominal Size	L	B	W	H	Weights (Flanged)	
					lb	kg
0.75' (20 mm)	7.87' (200 mm)	3.92' (100 mm)	5.00' (125 mm)	6.30' (160 mm)	13	6
1' (25 mm)	7.87' (200 mm)	3.92' (100 mm)	5.00' (125 mm)	6.30' (160 mm)	18	8
1.5' (40 mm)	7.87' (200 mm)	3.92' (100 mm)	5.50' (138 mm)	7.00' (175 mm)	26	12

Note: Maximum torque for DemiMag DM or DL flange or screwed connections is 25 ft. lbs (3.5 m. kg), diagonally tightened in turn.

5.3.1 DemiMag Ordering Code

See the ordering code in the separate data sheet.

5.3.2 DemiMag Maximum Pressure and Temperature

Refer to the table below for maximum pressure and temperature ratings for the DemiMag.

Table 5-7 DemiMag Maximum Pressure and Temperature Ratings

Part	Maximum Temperature	Maximum Pressure
Ceramic Flowtube	285°F (140°C)	150 psi (10 bar g)
PVDF Parts *The PVDF ratings are based on water*	250°F (120°C) at 40 psi (3 bar g)	150 psi (10 bar g) at 70°F (20°C)

Note: The pressure and temperaure relationship is provided as a guide. We cannot guarantee that material strength is unaffected by media, mixtures, or excessive vibration. These and other factors may alter the material strength. Check manufacturers' recommendations.

⚠ WARNING

For use in hazardous locations, the maximum surface temperature must not exceed +275°F (+135°C), with a maximum ambient temperature of +104°F (+40°C).

UniMag, DemiMag and DeltaKit

Section 6 Spare Parts and Accessories

6.1 UniMag Spares

The recommended spare parts for the UniMag sensor assembled in the flowtube in pairs are as follows:

A quantity of one (1) Calibrated UniMag sensor pair for up to 10 flowmeters of each flowmeter size over 10 years.

For single sensor flowmeters only a single sensor is recommended as above.

☑ ***Note***

Calibrated spare sensors are normally supplied at the time of original order in pairs for accuracy ±.05% of rate >1.5 fps (.045 m/s) or ±.0075 fps (0.0025 m/s) for <1.5 fps.EMCO does not recommend replacing one sensor from a pair. For sensor replacement, contact EMCO.

6.2 DemiMag Spares

One spare DemiMag is recommended for up to 10 flowmeters for each flowmeter size over 10 years.

6.3 Accessories

The following list includes parts that you may need while using a UniMag flowtube. Accessories can be purchased by contacting EMCO's Customer Service Department.

EMCO Flow Systems
2150 Miller Drive
Longmont CO 80501

Phone: 800-356-9362 or 303-682-7060
Fax: 303-682-7069
E-Mail: support@emcoflow.com

• Junction Box Refill Kit: P/N 500-000-013

Notes

Section 7 Additional Resources

7.1 Additional Resources Available

Additional information is available on the EMCO Web site www.emcoflow.com, in the Documentation section.

To search for documentation, go to www.emcoflow.com and click on **Documentation**. Type in a search term in the **Partial Title** box, or use the **Keyword** drop-down list and click **Search For Documents**.

☑ ***Note***

Due to continuous product improvement, details may be subject to change without notice. Our Web site will always have the latest version of any document.