# EMCO **DeltaKit Magnetic Flow Sensor Assemblies**



**DeltaKit Field Welded Stand Pipe** 

DeltaKit sensor assemblies convert existing weldable piping, from 2 to 120 in. (50 to 3000 mm), into a highly accurate, non-obtrusive magnetic flowmeter. They are used with a remote 4411e transmitter (see separate data sheet).

DeltaKits are used as spare sensor assemblies for existing flowtubes, or as economic flowmeters using existing weldable piping.

The illustration shows sensor assemblies attached via retention standpipes that have been welded directly to the pipe.

DELTAKIT SERIES FEATURE	BENEFIT	
Sensors mount flush with internal pipe diameter and do not obstruct flow	Compatible with pulps, slurries, raw sewage, etc.	
Uses existing weldable pipework (no liners)	Lower initial cost	
Patented 4411e AC coil excitation (high coil current & high exciter frequency)	Time constant of 0.03 seconds for batching and stable process control; High signal-to-noise ratio for insensitivity to media noise Low media conductivity > 0.08 µS/cm	
Optional extended electrodes	Outperforms conventional magmeters on media that coat piping surfaces	
Field replaceable sensors	Minimizes downtime due to failures and reduces stocking costs (associated with spare parts)	
Inherent redundancy from multiple sensors	Output continues if one sensor fails with 0.5% - 1% of rate typical accuracy	
Sensor reference coils (with 4411e transmitter only)	Output compensated for effects due to magnetic particles (slurries) and ambient/process temperature shifts	
Internal grounding electrodes	Grounding rings unnecessary for most installations.	

Астана +7(77172)727-132 Волгоград (844)278-03-48 Воронеж (473)204-51-73 Екатеринбург (343)384-55-89 Казань (843)206-01-48 Краснодар (861)203-40-90 Красноярск (391)204-63-61 Москва (495)268-04-70 Нижний Новгород (831)429-08-12 Новосибирск (383)227-86-73 Ростов-на-Дону (863)308-18-15 Самара (846)206-03-16 Санкт-Петербург (812)309-46-40 Саратов (845)249-38 Уфа (347)229-48-12 Россия, Казахстан и другие страны ТС доставка в любой город. Единый адрес для всех регионов: emp@nt-rt.ru || www.emco.nt-rt.ru

DeltaKits are Entela certified to UL and CSA standards for safety in ordinary locations, with optional NEC and CSA to Class 1, Div. 2 or ATEX Zone 2 explosive atmospheres.

#### Innovative Sensor Technology

DeltaKit sensor assemblies convert existing weldable piping into a highly accurate magnetic flowmeter. One to four sensors are used, depending on the size of the pipe and the level of performance desired. Sensors attach to the piping via retention standpipes, which can be optionally supplied by EMCO. The retention standpipes are directly welded to the existing piping, and are contoured to a specified pipe size.

Each DeltaKit series sensor contains a signal coil, reference coil, 2 conical measurement electrodes, and 1 conical grounding electrode. All components are encapsulated using a solid block of stiff setting insulating material up to 1 inch thick. Encapsulation makes the measurement insensitive to pipeline vibration and shock, and provides ultimate protection against the corrosive/erosive effects of the media. The measurement electrodes are on sensors of various sizes, spaced apart at a distance sufficient to maximize the size of the sensor coils, which in turn produce a well distributed magnetic field. This, together with a uniquely powerful field strength, provides a truly weighted velocity signal, highly insensitive to velocity profile distortion.

Each sensor uniquely incorporates a reference coil, quite separately from the exciter coil. The reference coil measures magnetic fields in the media and compensates for it. (For magnetite applications consult EMCO). Patented Pulsed AC coil excitation energizes



Picture Showing a 2 in. and 12 in. Diameter Sensor

the sensor coils with high frequency needles of power (up to 5 amps) that last for about 16 milliseconds. The high frequency current permits the coils in the DeltaKit sensors to be smaller than those in a conventional magmeter, while actually creating a stronger magnetic field. High excitation current and high exciter frequency (40 Hz) combine for a high signal-to-media noise ratio, up to 3x higher than conventional AC magmeters, and up to 50x higher than pulsed DC magmeters.

The use of one or multiple sensors has minimal affect on accuracy, but can affect the minimum pipe run requirements. Multiple sensors provide the advantage of inherent signal redundancy. The output signal will continue if one sensor coil should ever fail, with a typical 0.5% - 1% of rate based on calibrated accuracy, depending on straight pipe lengths available.

DeltaKit sensors have been designed for long life in even the harshest environments, and on the most difficult fluids. Sensors can be easily replaced in the field, without any special know-how or equipment. Hydraulic recalibration is not required after sensor replacement.



**Magnetic Field Generated Inside Flowtube** 

Large UniMag sensors create a magnetic field over the entire flowtube area. The flow signal represents the true weighted velocity of the flowing media and is highly sensitive to velocity profile distortion/swirl effects Not Just Another Magmeter

See specifications for 4411e transmitters

#### GROUNDING

Internal grounding electrode on each sensor.

- NOTE: 1. For cathodic protected pipes consult EMCO Flow Systems.
  - 2. For transmission to a remote transmitter > 100 feet (30m) with low conductivity media, or when excessive unequal potentials exist between the pipeline and the flowmeter cable shields, it may be necessary to have a grounding ring or other grounding arrangement installed. Consult EMCO Flow Systems.

#### CABLING (TO TRANSMITTER)

50 ft (15 m) standard, but longer lengths can be provided on request. 2-core pair, 18 gauge (0.75 mm) twisted and shielded (Beldon 8760 or equivalent). 3 cables are used with 4411e transmitters (electrodes, exciter coils and reference coils). An extra cable is used for an optional pre-amplifier.

For ATEX Zone 2 applications NEC approved cables must be used, with 4411e in the safe area. For Class 1, Div. 2 applications cables must run in conduits or Teck metal clad cable, with 4411e in the safe area.

#### MAXIMUM RECOMMENDED CABLE LENGTH

33 ft (10 m) maximum when media conductivity is < 3  $\mu$ S/cm. 300 ft. or 10xC (100 m or 3xC), whichever is less, when media conductivity is > 3  $\mu$ S/cm (C is the media conductivity in  $\mu$ S/cm).

### NOTE: DK Series sensor assembly kits are not intended for lined pipe because of the welding required. EMCO can supply lined UniMag DS and DT Series flowtubes. For applications to ATEX Zone 2 requirements only one IEC approved cable is permitted per cable connector.

## DELTAKIT MATERIALS OF CONSTRUCTION (REFER TO ORDERING CODE)

Sensors

Polyurethane -175° F max and 150 psig max (80° C max and 10 bar g max). Conforms to NSF61 and AWWA C213 for drinking water

PVDF - 240° F max and 356 psig max (115° C max and 25 bar g max). Full vacuum capability. The temperature rating shown is for water and may be lower for other media due to corrosion considerations (consult manufacturer). **PVDF is approved by USA Food & Drug Administration #21 CFR 177.2510**.

UHMWPE -175° F max and 150 psig max (80° C max and 10 bar g max).

 $\mathsf{PEEK}$  - 350° F max and 356 psig max (176° C max and 25 bar g max). Full vacuum capability.

#### NOTE: 1. Sensor assembly includes a non-wetted carbon steel cover flange with fusion bonded polyethelene protection.

- 2. Sensor assemblies are supplied with outer cover flanges, 30 ft (10 m) of cable, re-enterable potting gel, junction box, conduit and stainless steel bolts. Multiple sensors are pre-wired to junction box, conduited, and potted with re-enterable gel.
- 3. Temperature differential between process and ambient limited to 140° F (60° C) for polyurethane sensor, and 212° F (100° C) for PVDF sensor .
- 4. Sensors must be removed from standpipe before welding.

Electrodes	Each sensor has 1 conical grounding and 2 conical measurement electrodes. Options for AISI 316 stainless steel, Hastelloy B & C, Titanium, Tantalum.
Sensor Electrode Seals	Viton, Kalrez or Chemraz
Sensor Gaskets	Viton, Elastomer, and Teflon (sensor retention flange is carbon steel with stainless steel bolts)

## **DeltaKit Specifications**

See specifications for 4411e transmitters

#### CALIBRATED ACCURACY

Single Sensor (for pipes < 16 in / 400 mm)  $\pm 0.5\%$  of rate for flows > 2.0 fps (0.6 mps)

Multiple Sensors  $\pm 0.5\%$  of rate for flows > 1.5 fps (0.45 mps) ± 0.01 fps (+0.003 mps) for flows < 2.0 fps (0.6 mps) ± 0.0075 fps (± 0.00225 mps) for flows < 1.5 fps (0.45 mps)

NOTE: 1. Accuracy is traceable to the National Institute for Science and Technology (NIST). A NIST traceable calibration certificate is provided with each sensor assembly 2. Final on-site accuracy is a function of the measurement accuracy of internal diameter of the existing piping, as well as the conformity of standpipe dimensions relative to the pipe ID as specified by EMCO

Note: For media such as ferric chloride, ferric sulphate (Odophos), high temperature paper mill liquors, lime mud or similar highly conductive media, flowmeter performance can be adversely affected. Please consult EMCO for these types of applications, otherwise performance guarantee is null and void.

#### MINIMUM STRAIGHT PIPING RUNS (D IS THE PIPE DIAMETER)

Piping	Upstream Piping Requirement		Downstream Piping Requirement	
	Multiple Sensors	Single Sensor	Multiple Sensors	Single Sensor
Minimum Requirement	5 Diameters	10 Diameters	3 Diameters	5 Diameters
Single elbow, or tee upstream	5 Diameters	10 Diameters	3 Diameters	5 Diameters
Two elbows coupled in same plane	5 Diameters	10 Diameters	3 Diameters	5 Diameters
Two elbows, close coupled and out of plane	10 Diameters	20 Diameters	3 Diameters	5 Diameters
Pump, blending point, control valve upstream	10 Diameters	20 Diameters	3 Diameters	5 Diameters
Pump, control valve downstream			5 Diameters	5 Diameters

## FLOW RANGE

0 - 2 fps (0 - 0.6 mps) minimum to 0 - 50 fps (0 - 15 mps) maximum

or

0 - 5D<sup>2</sup> gpm minimum to 0 - 120D<sup>2</sup> gpm maximum, where D is in inches

0 - 0.002D<sup>2</sup> m3/h minimum to 0 - 0.04D<sup>2</sup> m3/h maximum, where D is in mm

## COIL EXCITATION

Patented Pulsed AC excitation. Consult data sheets for 4411e transmitter for more information.

#### MEDIA CONDUCTIVITY

> 0.5 µS/cm standard > 0.08 µS/cm on request. This does not include distilled, deionized or demineralized water; consult EMCO.

## ENVIRONMENTAL PROTECTION

NEMA 6 and IP68 indefinitely submersible to 30 ft. (10 m) water column, or NEMA 4X and IP65. Note: Sensor assemblies must be removed from standpipes when they are welded to the pipeline. Standard version is Entela certified for ordinary locations to UL and CSA standards.

## DeltaKit Flowtube Ordering Information

You must order UniMag and transmitter separately (see appropriate data sheet) for a complete flowmeter



#### NOTES

1. All special orders must include a complete description along with the ordering code.

2 .Sensor assembly includes a non-wetted carbon steel cover, fusion bonded polyethylene.

3. Standpipes have temporary epoxy enamel finish. The junction box assembly includes conduit and non-wetted outer cover carbon steel flange. Single sensors have the junction box attached directly to the outer cover flange. Standard supply is 50 feet (15 m) cables.

4. Stainless steel standpipes have carbon steel flanges welded to them, unless otherwise specified.

5. Special may include extra long electrodes for thick, non-fluidic coatings (consult factory).

6. Use with W or X electrodes with K PEEK sensors only, for papermill liquors and lime mud < 200° F (93° C). Use with Ryton internally coated UniMag flowtubes only.

7. Use H electrodes on paper mill liquors and lime mud >200° F (93° C). Use with H sensors only. Use with Ryton internally coated UniMag flowtubes only.

## DeltaKit Series Dimensions and Weights

#### Consult EMCO representative for dimensional information or refer to UniMag DT and DS series flowtube data sheets

Pipe Size	1 Sensor (note 1)	2 Sensors (note 2)	4 Sensors (note 1)	Single Standpipe and Flange (note 2)
2-3 in. (50-80 mm)	9 lb (4 kg)	16 lb (8 kg)	N/A	19 lb (9 kg)
2-6 in. (100-150 mm)	15 lb (7 kg)	27 lb (12 kg)	N/A	24 lb (11 kg)
8-14 in. (200-350 mm)	38 lb (17 kg)	71 lb (32 kg)	N/A	40 lb (18 kg)
16-24 in. (400-600 mm)	63 lb (29 kg)	118 lb (54 kg)	N/A	74 lb (34 kg)
28-48 in. (700-1200 mm)	118 lb (54 kg)	225 lb (102 kg)	440 lb (200 kg)	120 lb (55 kg)
≥ 50 in (1250 mm)	118 lb (54 kg)	225 lb (102 kg)	440 lb (200 kg)	120 lb (55 kg)

The table below can be used to calculate the total weights for any DeltaKit series sensor assembly.

#### NOTES

1. Includes weight of sensor(s) and mounting assemblies

2. You must add the weight of the standpipe and flange assemblies to the sensor assembly weights to arrive at the total

 2-3 in. pipes use 2 in. (50 mm) sensor assemblies; 4-6 in. pipes use 3 in. (80 mm) sensor assemblies; 8-14 in. pipes use 6 in. (150 mm) sensor assemblies; 16-24 in. pipes use 8 in. (200 mm) sensor assemblies; 28 in. and larger pipes use 12 in. (300 mm) sensor assemblies



Астана +7(77172)727-132 Волгоград (844)278-03-48 Воронеж (473)204-51-73 Екатеринбург (343)384-55-89 Казань (843)206-01-48 Краснодар (861)203-40-90 Красноярск (391)204-63-61 Москва (495)268-04-70 Нижний Новгород (831)429-08-12 Новосибирск (383)227-86-73 Ростов-на-Дону (863)308-18-15 Самара (846)206-03-16 Санкт-Петербург (812)309-46-40 Саратов (845)249-38 Уфа (347)229-48-12 Россия, Казахстан и другие страны TC доставка в любой город. Единый адрес для всех регионов: emp@nt-rt.ru || www.emco.nt-rt.ru