

## High-Performance Magnetic Flowmeter

No Moving Parts! Plug & Play! Minimal Straight Pipe Required!

USonic Metering high-performance Electromagnetic flowmeter accurately measures the flow volume of any conductive liquids, such as water, salt water, sewage, pulps, slurry, acid, alkali, or, any mixtures of liquids and solids which have a specific minimum of electric conductivity. USONIC METERING E-MAG3i series has been widely used in applications where inline MAG meters with flanges are not practical to use.



*Integral Insertion Type  
(with or without battery)*



*Remote Insertion Type*

Compared with other measurement methods, E-MAG3i electromagnetic flowmeters offer the following particular advantages:

- No moving parts to wear and tear
- Short straight-pipe run required, thus, suitable for any desired installation location
- Plug and play. All parameters are pre-configured in factory
- High accuracy.  $\pm 1\%$  accuracy as standard offer.
- Large operable flow range, 1200:1. Reliable and accurate measurement over the widely varying flow rates, including minimal night flows, which occur in typical water distribution network
- Wide size selection, from DN 100 up to DN3000 (1/2"~120")
- No pressure loss
- Standard output: 4-20mA, pulse, RS232, or RS485/MODBUS
- Optional HART or PROFIBUS communication interface
- Self-diagnosing capability to minimize operational downtime



## Introduction

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With a microprocessor and exclusive integrated circuit, USonic Metering’s electromagnetic flowmeter has the advantages of reliable performance, high-accuracy, and is exceptionally easy to use. The high speed CPU and advanced signal processing technology ensure a wide measuring range. The two-line LCD display makes the readings and parameter setting comprehensive and convenient.

USonic Metering’s electromagnetic flowmeter insertion type is an adequate type for economical installation. In other words, no need to cut the pipe and weld the flanges which can be very costly, time consuming and not optimal due to the difficulty on site. The insertion type can be widely used in industries such as chemical, power supply, metallurgical mine, water supply and drainage, paper plants, pharmaceutical, food, and more.

An Electromagnetic flowmeter is an induction type flow instrument often used to measure, based on Faraday Law, the volume flowrate of conductive medium

## Specifications

### Insertion type electromagnetic flow sensor

|                         |   |
|-------------------------|---|
| Size                    | DN100~DN3000mm  |
| Nominal Pressure        | 1.6MPa  |
| Sensor material         | ABS, POLY   |
| Measuring pipe material | Carbon steel, stainless steel                                     |
| Accuracy                | Flow rate ≤ 0.5m/s, ± 1%, flow rate of full range > 1m/s, ± 0.5%. |
| Medium Temperature      | Plus 80°C   |
| Electrode material      | Stainless steel SUS316, Hastelloy C, Hastelloy B                  |
| Environment temperature | -25°C to +60°C  |
| Length of straight pipe | Upstream 15D, Downstream 10D                                      |
| Atmosphere pressure     | 86~106kPa   |
| Protection class        | IP65, IP68 (optional)   |
| Ex-proof Mark           | optinal   |
| Connection mode         | Flange type, thread type  |

## Components and parameters

The Electromagnetic flowmeter consists of a converter (main unit) and a flow sensor. The flow sensor is composed of a measuring insertion probe, carbon steel housing.

The measured fluid must be conductive liquid or slurry with conductivity no less than 5 $\mu$ s/cm. It is recommended to avoid using this technology for fluid with too much ferromagnetic substance. The pressure rating, liner material, electrode material and instrument structure should be chosen based on the characteristics of the fluid.

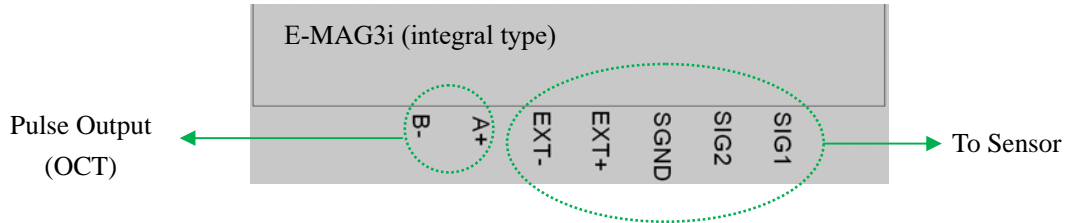
Range of application: Conductive liquid or solid-liquid phase medium, such as drinking water, beverages, sewage, as well as strongly corrosive medium like sulfuric acid to slurry.

### \* Accuracy Table

| Size mm<br>(inch)   | Velocity<br>m/s | 1.0% Grade<br>Accuracy |
|---------------------|-----------------|------------------------|
| 15~20<br>(1/2-3/4)  | N/A             | N/A                    |
|                     | N/A             | N/A                    |
|                     | N/A             | N/A                    |
| 100~300<br>(1-12)   | <0.3            | $\pm 1.2$ mm/s         |
|                     | 0.3~0.5         | $\pm 1.0$ %R           |
|                     | 0.5~1           | $\pm 1.0$ %R           |
|                     | 1~15            | $\pm 1.0$ %R           |
| 350~600<br>(14-24)  | <0.3            | $\pm 1.2$ mm/s         |
|                     | 0.3~1           | $\pm 1.0$ %R           |
|                     | 1~15            | $\pm 1.0$ %R           |
| 700~2000<br>(28-80) | <0.3            | $\pm 1.5$ mm/s         |
|                     | 0.3~1           | $\pm 1.0$ %R           |
|                     | 1~15            | $\pm 1.0$ %R           |

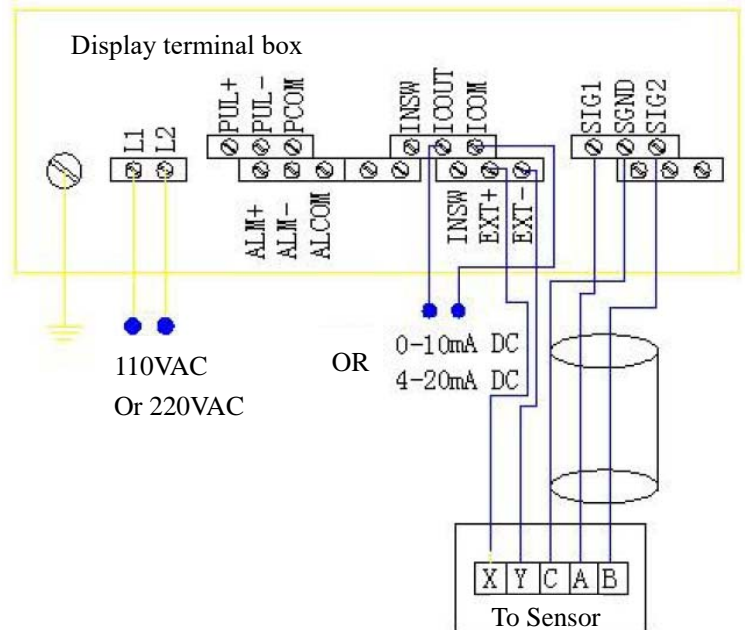
%R: relative to reading

## Diagram for E-MAG3i

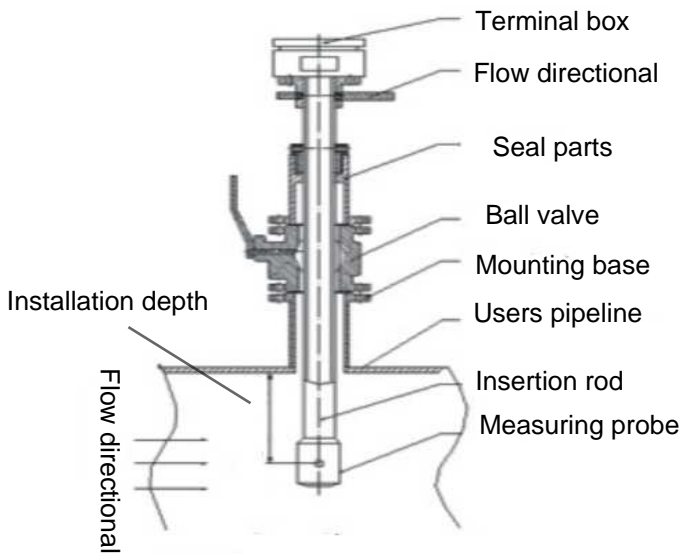


E-MAG3i (remote type)

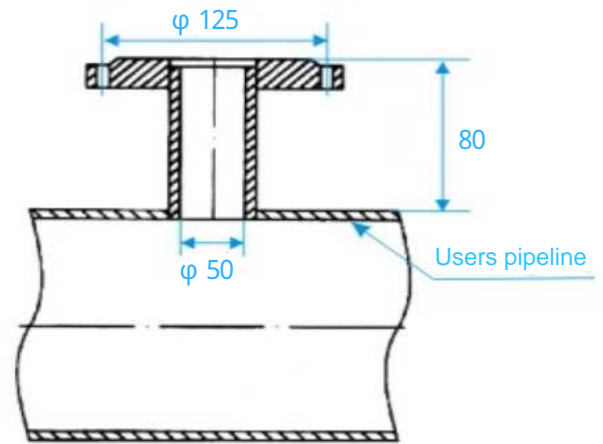
| Wiring Terminal | Description                                       |
|-----------------|---|
| L1, L2          | AC Power Supply, Line (L1) and Neutral (L2)       |
| PUL+            | Pulse output +                                    |
| PUL-            | Pulse output -                                    |
| PCOM            | Pulse output ground                               |
| ALM+            | Alarm output +                                    |
| ALM-            | Alarm output -                                    |
| ALCOM           | Alarm output ground                               |
| IOOUT           | 0-10mA / 4-20mA current output +                  |
| ICOM            | 0-10mA / 4-20mA current output -                  |
| EXT+            | Excitation signal +, connect to sensor terminal X |
| EXT-            | Excitation signal -, connect to sensor terminal Y |
| SIG1            | Signal 1, connects to sensor terminal A           |
| SIG2            | Signal 2, connects to sensor terminal B           |
| SGND            | Signal ground, connects to sensor terminal C      |



## Flow Sensor Selection



External drawing of insertion type sensor



Installation size

| Materials of Electrode                         | Applications  |
|--|---|
| Mo-containing stainless steel (0Cr18Ni12Mo2Ti) | Liquids with weak corrosivity, such as industrial water, sewage, living water, polluted water, are widely used in industries like oil, chemical, petrochemical, urea, vinylon, carbamide, etc.  |
| Hastelloy B (HB)                               | Good corrosion resistance of different concentration of hydrochloric acid under boiling point, resist the corrosion of non-oxidizing acid, alkali, non-oxidizing salt solution, such as sulfuric acid, phosphoric acid, organic acid, etc.                          |
| Hastelloy C (HC)                               | Able to resist the corrosion of oxidizing acid, such as nitric acid, mixed acid, the mixture of chromic acid and sulfuric acid, oxidizing salt like $Fe^{+++}$ , $Cu^{++}$ or other oxidants such as hypochlorite solution above ordinary temperature and seawater. |

|               |   |
|---------------|---|
| Titanium (Ti) | Seawater, chloride, hypochlorite salt, oxidable acid, organic acid, alkali, etc. Unable to resist the corrosion of purer reducing acid like sulfuric acid and hydrochloric acid. The corrosivity of alpha hydroxy acids will be substantially decreased if there are oxidants such as nitric acid, Fe <sup>+++</sup> , Cu <sup>++</sup> , etc. in it. |
| Tantalum (Ta) | The corrosion resistance of tantalum is as good as glass. Except hydrofluoric acid, fuming nitric acid and alkali, it is able to resist the corrosion of almost any other chemical media.   |

As there is a great variety of medium and the corrosiveness of each medium could significantly depend on temperature, concentration, flow rate and more, the above two tables can only be used as references.

Users should make a choice according to the actual situation of their applications. If necessary, corrosion resistance experiments such as a hanging sheet experiment using similar material should be performed.

## How to Order

Please select one option ID from each category.

### Notes:

\* Please consult the size-velocity-flowrate table on the previous page for size selection.

\*\* Sensor flow tube is always SS, but housing & flange may be CS or SS.

\*\*\* Self-cleaning electrode, good for sewage application (for size > DN200 or 8").

### E-MAG3i

|  |             |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |
|--|-------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| <b>Type</b>                            |             | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| Remote                                 | A           |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |
| Integral                               | B           |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |
| <b>Sensor Size*</b>                    |             | <b>ID</b>                |                          |                          |                          |                          |                          |                          |                          |                          |                          |
| DN100 (4")                             | 0015 (0050) |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |
| DN125 (5")                             | 0020 (0075) |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |
| DN150 (6")                             | 0025 (0100) |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |
| .....                                  | .....       |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |
| DN3000 (120")                          | 2000 (8000) |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |
| <b>Nominal Pressure</b>                |             | <b>ID</b>                |                          |                          |                          |                          |                          |                          |                          |                          |                          |
| 2.5MPa (362psig) / DN15-50(½"-2")      | 1           |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |
| 1.6MPa (232psig) / DN65-250(2½"-10")   | 2           |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |
| 1.0MPa (145psig) / DN300-1000(12"-40") | 3           |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |
| 0.6MPa (87psig) / >DN1000 (40")        | 4           |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |
| Other, please specify                  | 5           |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |
| <b>Electrode Material</b>              |             | <b>ID</b>                |                          |                          |                          |                          |                          |                          |                          |                          |                          |
| 316LSS (OCr18N112M02Ti) (Default)      | A           |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |
| HB (Hastelloy B)                       | B           |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |
| HC (Hastelloy C)                       | C           |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |
| <b>Cable length</b>                    |             | <b>ID</b>                |                          |                          |                          |                          |                          |                          |                          |                          |                          |
| 15m / 45ft (Default)                   | 1           |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |
| 30m / 90ft                             | 2           |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |
| 50m / 150ft                            | 3           |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |
| <b>Output &amp; Communication</b>      |             | <b>ID</b>                |                          |                          |                          |                          |                          |                          |                          |                          |                          |
| Pulse + 4-20mA (Default)               | A           |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |
| Pulse + 4-20mA + RS485 / MODBUS        | B           |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |
| Pulse + 4-20mA +RS232                  | C           |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |
| Flow Volume HART Communication         | D           |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |
| <b>Power Type</b>                      |             | <b>ID</b>                |                          |                          |                          |                          |                          |                          |                          |                          |                          |
| 220VAC (for remote type only)          | 1           |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |
| 110VAC (for remote type only)          | 2           |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |
| 24VDC (for remote type only)           | 3           |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |
| Battery                                | 4           |                          |                          |                          |                          |                          |                          |                          |                          |                          |                          |

## Required Accessories

| Power Supply Cable     | Model No. |
|------------------------|-----------|
| 110VAC (American Plug) | WA-PWC-1  |
| 220VAC (European Plug) | WA-PWC-2  |

## Optional Accessories

| External Adapter   | Model No.   |
|--|-------------|
| 485-Ethernet Adapter (to connect to an Ethernet network) | WA-485Ether |

## Example

### Model# E-MAG3i-A-0100-2-A-1-B-1

Stands for E-MAG3i electromagnetic flowmeter insertion, remote type, of size DN100 with 1.6MPa pressure, 316SS electrode and 15meter cable. 4~20mA and RS485/Modbus outputs and 220VAC.

### Model# WA-PWC-2

Stands for 220VAC power supply with European style power plug.

## About USONIC Metering:

USONIC metering is a global leader in flow and energy management solutions. Through continuous innovation, we transform cutting-edge technologies into affordable, reliable solutions for accurate flow and energy measurement. USONIC Metering offers water, heat, electricity and gas meters as well as AMR/AMI solutions. To find out how we can help today, please tell us about your application.