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# Electromagnetic Flow Meter

FineTek

*Innovation · Quality · Sharing*

# FLOW MEASUREMENT FIELD

FineTek is the only inspection institution that owns a Class 2 flow test laboratory in Taiwan. With the most professional R&D and Design Team, it can design and develop high-accuracy electromagnetic flow meters. Moreover, it conducts calibration in Class 1 Flow Laboratory of the National Measurement Laboratory (ITRI Measurement Center), so as to guarantee the flow accuracy on the measurement field.

FineTek's flow laboratory has received certification from the Taiwan Accreditation Foundation and conforms to the regulations of international organizations such as ILAC and APALC. It has the complete ability of uncertainty testing and rating for flow test.

TAF

財團法人全國認證基金會
Taiwan Accreditation Foundation

Certificate of Accreditation

This is to certify that

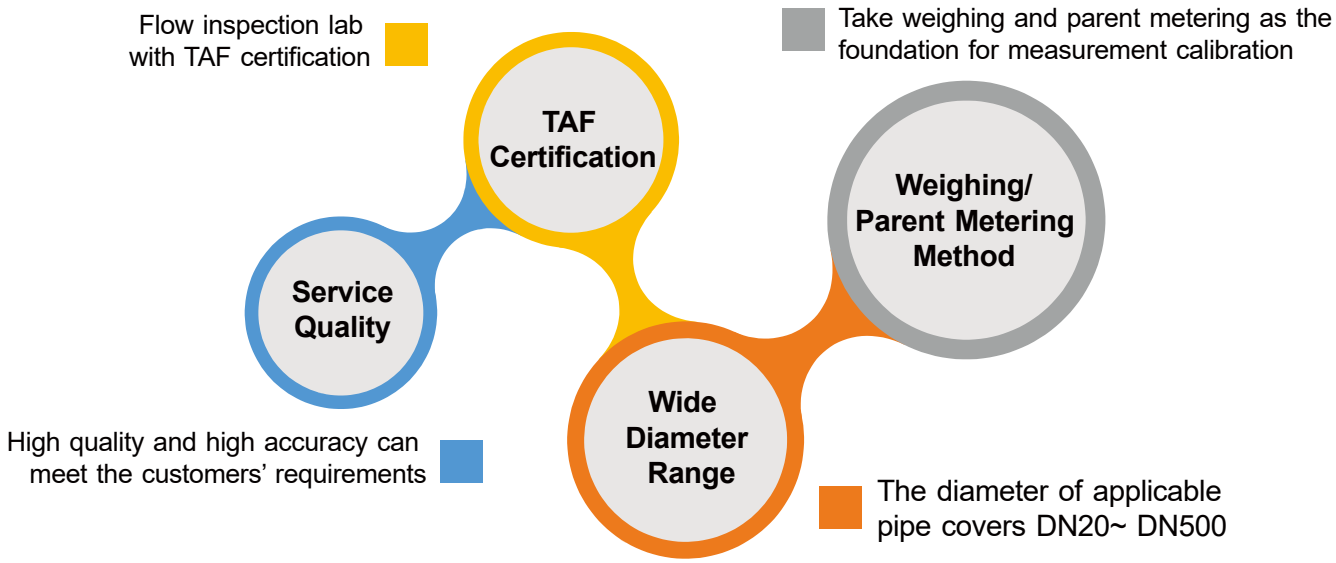
Fine Tek Co., Ltd.
Quality Center Testing Laboratory
No.16, Ziqiang St., Tucheng Dist., New Taipei City 236, Taiwan (R.O.C.)

is accredited in respect of laboratory

| | | |
|---|---|---|
| Accreditation Criteria | : | ISO/IEC 17025:2005 |
| Accreditation Number | : | 3086 |
| Originally Accredited | : | June 25, 2015 |
| Effective Period | : | June 25, 2018 to June 24, 2021 |
| Accredited Scope | : | Testing Field, see described in the Appendix |

Chung-Lin Wang
President, Taiwan Accreditation Foundation
Date : May 28, 2018

P1, total 2 pages




# FLOW MEASUREMENT FIELD

PUMP equipment
(The maximum horsepower is 110KW per unit)

Weighing equipment

Control room & Graphical HMI

Piping system I
(Max capacity for four meters calibration simultaneously in above system.)

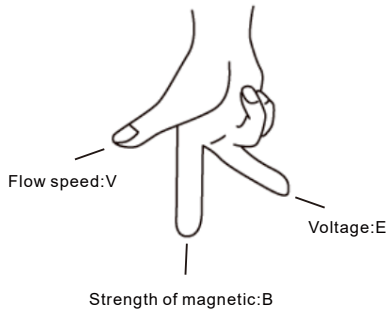
Piping system II
(Maximum diameter is 500mm)

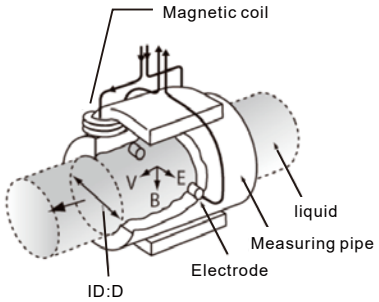

The exclusive report
(Each flow meter has its own calibration report)

# ELECTROMAGNETIC FLOW METER

EPD electromagnetic flow meter is a high-accuracy flow meter manufactured based on the latest international technology. It is widely applied in papermaking, chemical industry, metallurgical industry, drainage, waste water treatment, liquid high-pressure metering, medical care, food, and environmental protection industries.

It is used to measure the non-magnetic liquid and plasma in the enclosed pipe.




## WORKING PRINCIPLE

The working principle of the electromagnetic flow meter is based on the Faraday law of electromagnetic induction. When the conducting liquid flows in the orthogonal direction of the magnetic line direction, it will cut the magnetic lines and generate induced voltage, which shows linear relationship with the flowing speed. Thus, the fluidic volume flow can be calculated.

EPD electromagnetic flow meter is mainly composed of the sensor and transmitter. The measuring tube of the sensor is equipped with the excitation coils upward and downward. The transmitter supplies the excitation current, which generates the magnetic field which goes through the measuring tube once it is powered on. A pair of induction electrodes installed on the inner side of the measuring tube comes in contact with the liquid to guide the induced voltage to the sensor.

## APPLICATIONS

- Waste water treatment
- Tapped water purification
- Sewerage
- Sea water desalination module
- Dyeing machines
- Solar energy and PCB wet processing
- Food manufacturing
- Pharmaceutical machines

## FEATURES

**Low impact on environmental matter**

- The measurement results are not affected by the change in liquid density, viscosity, temperature, pressure and conductivity.
- It can be widely applied in the conducting liquids that may contain fiber, solid granules and suspended matters.
- Enclosure protection rating: IP67/NEMA 4X

**Wide measurement range & high efficiency**

- The wide measurement turndown ratio can be reach 1:100, which can be set randomly and achieve high accuracy for small flow measurement.
- Highly-integrated backlit display of two rows, dual isolation, parameter setting, menu-type operation, memory function, reliable programming, password lock and access, small signal elimination, non-linear correction and two-way measurement.
- Various outputs: Current output 4~20mA, frequency output 2~8KHz and RS485 communication.

**Multiple self-diagnosis function**

- Power-saving and low fault rate: The measuring tube is without baffle and movable parts, so it won't cause pressure loss and jam.
- Smart self-detection and self-diagnosis function, as well as various alarms

**The low installation cost**

- It is easy-to-install with low requirements for the straight tube section (Front 5D and rear 2D)

**IECEx ,CSA Explosion proof(EPD30)**

**Available for records for parameter modifications, boot/ shut down device(Option)**

**Authority management is available in menu (Option)**

# SPECIFICATION

| Item | EPD36 Standard type |
|---|---|
| Display | LCM 128*64 pixel backlit type |
| Buttons | Tri-button operation |
| Communication interface | RS-485 (Modbus)<br>(Optional support for ZigBee Pro wireless transmission) |
| Accuracy | ±0.5% of reading@1m/s(0.2% optional) |
| Medium temperature | -20 ~ 150°C(PFA Lining) |
| Ambient temperature | -40 ~ 70 °C* |
| Fluidic conductivity | > 5 uS/cm |
| Measuring scope | 0.1m/s ~ 10m/s |
| Current output accuracy | 0.1% of Pulse Output Accuracy<br>Temperature coefficient (100 ppm/°C) |
| Operating pressure | 10 Kg/cm$^2$ |
| Current output mode | Proactive |
| Analog output | 4 ~ 20 mA |
| Maximum load of current output | < 700W |
| Alarming current | 3.6mA or 22 mA |
| Frequency output scope | 2 ~ 8 KHz |
| Pulse width | Automatic (pulse width 50%) |
| Pulse mode | Isolated NPN Transistor output 32vdc/200mA |
| Time constant | 1~100 s |
| Control output (DO) | Isolated NPN Transistor output 32vdc/200mA; 2-CH |
| Control input (DI) | Dry contact ON< 200W ; 1,000W< OFF ; 1-CH |
| Data logger(Option) | 500 items. With calendar (Internal battery: Lift time>6 month) |
| Baud rate | 1200 ~ 57600 bps |
| Protection rating | IP67 / NEMA 4X |
| Enclosure material | Aluminum alloy |
| Input power | DC 24V |
| Power consumption | < 10W |
| Wire inlet specification | 1/2" NPT |
| Excitation mode | Pulse DC |
| Vibration regulation | MIL-STD-202G-201A:2002 |
| EMC regulation | IEC/EN 61326-1 Class A table2 |

*It can' t display when LCM is lower than -20˚C.

# MATERIAL SELECTION

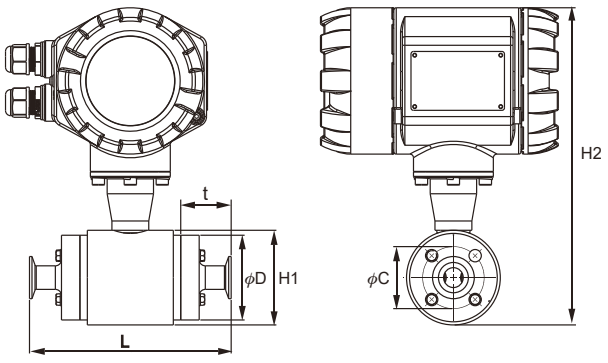
## ※Electrode material

| Electrode material | Anti-corrosion property |
|---|---|
| Stainless steel (316L) | It is applied in water, sewage and organic and non-organic corrosive medium. |

## ※Lining material

| Lining material | Main properties | Application scope |
|---|---|---|
| PFA | 1. Stable chemical properties, resistant to various acid, alkane, and salt solutions and various organic solvents. It is not tolerant to the corrosion of CIF3, high-temperature OF3 and high-speed liquid oxygen and ozone.<br>2. The anti-abrasion property is average. | 1. -20~120°C<br>2. Strong corrosive medium such as concentrated acid and alkane. |

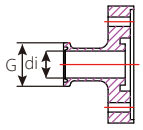
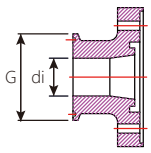
# APPEARANCE AND DIMENSION AND FLANGE CONNECTION DIMENSION STANDARD TYPE




**DN15~50**

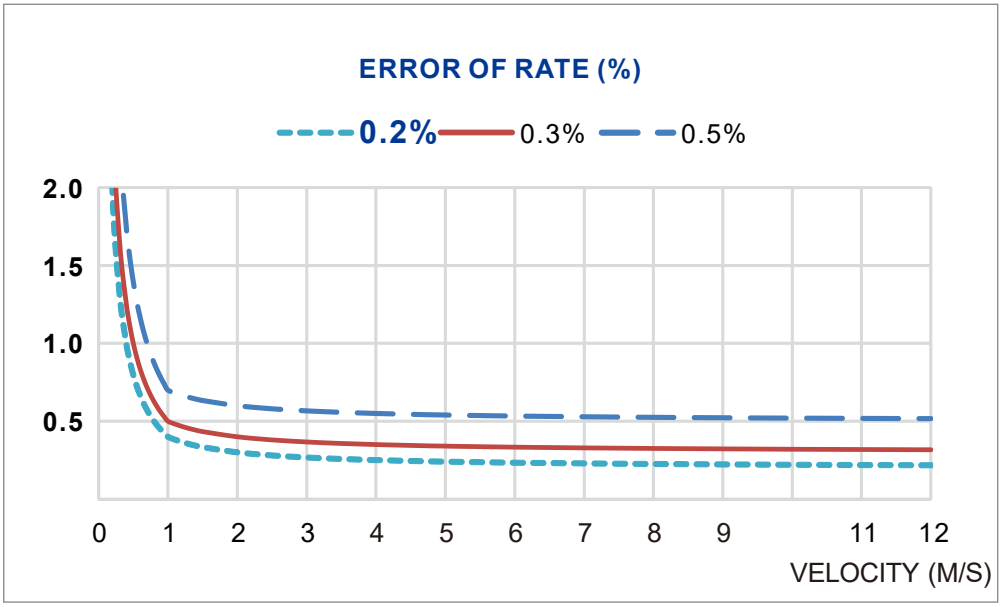
| Connection specification | | Tri-Clamp | | | |
|---|---|---|---|---|---|
| Nominal diameter(mm) | | 15 | 25 | 40 | 50 |
| Lining material | | PFA | | | |
| Length | L | 164 | 164 | 258.6 | 258.6 |
| External diameter | ϕD | 68.3 | 81.1 | 106.3 | 106.3 |
| PCD | ϕC | 50 | 60 | 83 | 83 |
| Flange thickness | t | 41 | 41 | 61.5 | 61.5 |
| Quantity of screw holes | N | 4 | 4 | 4 | 4 |
| Height of sensor casing | H1 | 76.3 | 89.1 | 114.3 | 114.3 |
| Total height | H2 | 256 | 270 | 294 | 294 |
| Weight(kg) | H1 | 4.9 | 5.7 | 8.6 | 9.1 |

## Connection specification

| Tri-Clamp | DN | di (mm) | G (mm) |
|---|---|---|---|
|  | 15 | 15.8 | 25 |
| | 25 | 22.1 | 50.5 |
|  | 40 | 34.8 | 50.5 |
| | 50 | 47.5 | 64 |

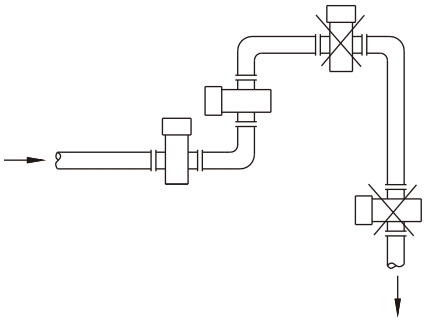
# PIPE DIAMETER, FLOW RANGE AND ACCURACY SELECTION

| Pipe diameter (mm) | Flow range ($m^3/h$) | |
|---|---|---|
| | Flowing speed 0.1~1.0m/s | Flowing speed 1.0~10m/s |
| 15 | 0.06~0.64 | 0.64~6.4 |
| 25 | 0.17~1.77 | 1.77~17.7 |
| 40 | 0.45~4.5 | 4.5~45.2 |
| 50 | 0.71~7.1 | 7.1~71 |



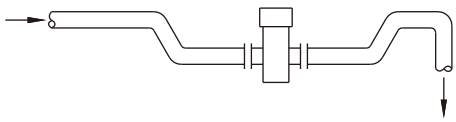
# INSTALLATION INSTRUCTIONS

1. The flow meter must be free from strong electromagnetic field. The magnetic intensity of the flow meter installation site must be smaller than 400A/m (It should not be installed near large motors or transformers).
2. It should be installed at the lower point and the vertically upward point of the horizontal pipe. Don't install it at the highest point and the vertically downward point of the pipe.

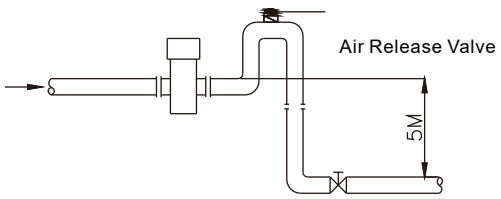


3.It should be installed at the rising point of the pipe.

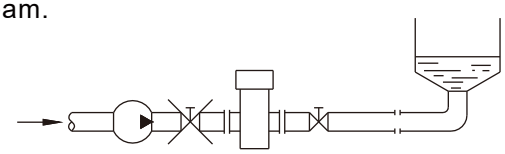
4. It should be installed at the lower point of the pipe when it is installed on the pipe with opening for drainage.



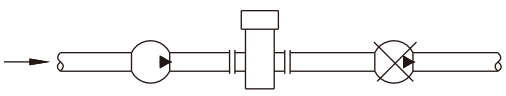
5.If the pipe gap exceeds 5m, the air release valve should be installed at the downstream of the sensor. The downstream of the sensor should have some back pressure.




6.The control valve and cut valve should be installed at the downstream of the sensor rather than the upstream.



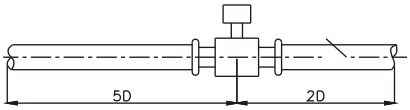
7. The sensor should be installed at the pump outlet rather than the inlet.



8. The fluidic must flow towards the arrow direction of the flow meter.
9.The axial line of the measuring electrode must be approximate to the horizontal direction (The angle of from the horizontal direction).
10.The measuring pipe must be completely filled with liquid.

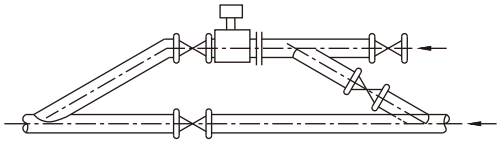
# INSTALLATION INSTRUCTIONS

11. The straight tube section is required to be at least 5D (internal diameter of the flow meter) on the front side, and at least 2D on the rear side.




12. When measuring the mixture of different media, the distance between the mixing point and the flow meter must be 30D at least.

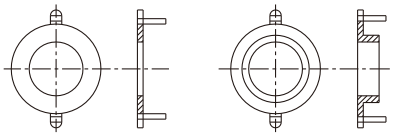
13.For convenient cleaning and maintenance of the flow meter, a bypass pipe must be installed.



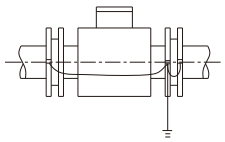
14.When installing the sensor, it should ensure that the measuring pipe and the process pipe must be on the same axial line. For the flow meter with the pipe meter of 50mm or below, the axial line deviation should not exceed 2mm. For those of DN65□DN150, the axial line deviation should not exceed 3mm. For those of ≥DN20**0**, the axial line deviation should not exceed 4mm.

15.The shim installed between the flanges should have excellent anti-corrosion property. The shim should not intrude in the pipe, which will affect the fluidic in the pipe.

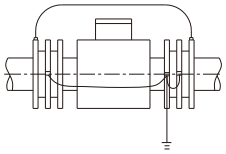
16.The sensor and transmitter should be equipped with high-quality independent grounding wire (The section area of the copper core is 1.6mm2). The grounding resistance should be <10Ω. If the grounding is poor, it won't work normally. The grounding ring is needed if the pipe connecting with the sensor is insulating, and the material of the grounding ring should be the same as that of the electrode. If the test medium is abrasive, the neck grounding ring should be selected.



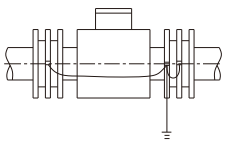
16.1 It is for installing the flow meter on the metal pipe not coated with insulating layer internally.



16.2When installing the flow meter on the protective pipe of the cathode, the pipe with the protection of electrolytic corrosion generally has insulating walls and protruding sides. Thus, during installation, the grounding ring and the flanges on the pipe should be insulating.

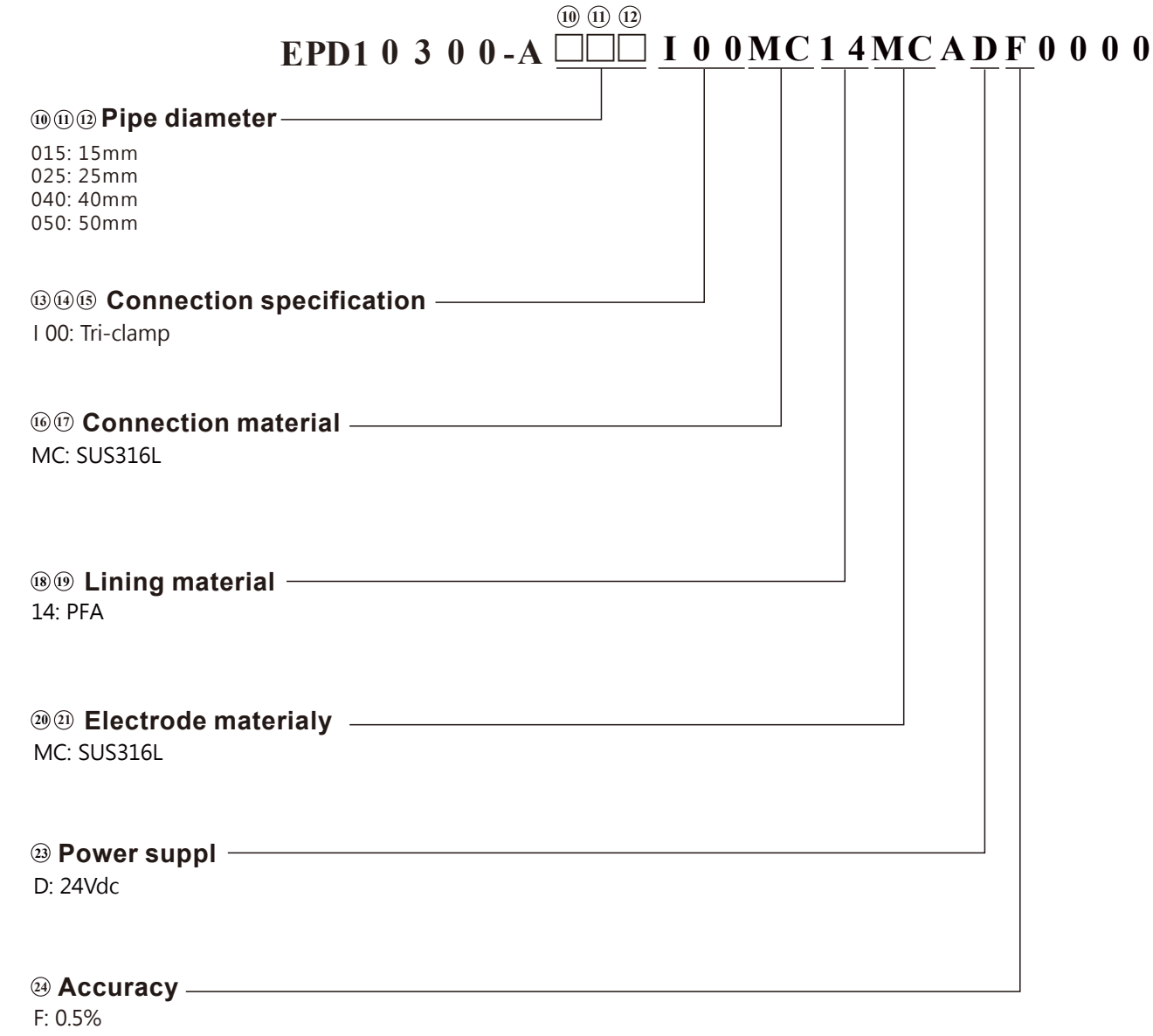


16. When installing the flow mater on the plastic pipe or the pipe with insulating coating material, paints or lining, grounding rings on both ends of the sensor should be installed.



# MODEL NUMBER / ORDER CODE COMPARISON TABLE
# ORDERING INFORMATION

| Model Number | Order Code |
|---|---|
| EPD36 | EPD10300-A |



# SETTING VALUES

| Main Menu | Sub Menu | Unit | Default | Setting Range |
|---|---|---|---|---|
| Fast Set(0) | Device Tag Num (1.1) | | The paremeter is linking form standard manu | |
| | Zero Adj. (2.1) | | | |
| | Flow Span (1.5) | | | |
| | Flow Unit (1.4) | | | |
| | Low cutoff (2.4) | | | |
| | Damping Time (3.1) | | | |
| | Pulse Out Unit (3.3) | | | |
| | Total Reset (1.9) | | | |

| Main Menu | Sub Menu | Unit | Default | Setting Range |
|---|---|---|---|---|
| Basic Set (1) | Device Tag Num (1.1) | | 00001 | 00001~65535 |
| | Measure Type (1.2) | - | Water | Water |
| | Tube Size (1.3) | mm | actual | 10,15,25,32,40,50,65,80,100<br>125,150,200,250,300,350,400,450,500 |
| | Flow Unit (1.4) | - | $m^3/h$ | L/(s,min,h), $m^3$ /(s,min,h), gal/(s,min,h), kg(s,min,h), Ton(s,min,h)<br>(Flow rate* Liquid density = weight)<br>"L/s", "L/m", "L/h", "$m3/^s$ ", "$m3/^m$ ", "$m3/^h$ ", "gal/s", "gal/m", "gal/h",<br>"kg/s", "kg/m", "kg/h", "Ton/s", "Ton/m", "Ton/h", "m3/d" |
| | Flow Span (1.5) | =Flow Rate Unit | (5m/s ) x (Diameter/2 ) $^2$ x pi x Unit of Flow Forward | (0.1 ~ 10.0m/s ) x (Diametermm/2)2 x pi x Unit of Flow Forward |
| | Direction (1.6) | dir | Forward | Forward,Reverse |
| | Total Unit (1.7) | - | m3 | Liter,gal,$m^3$,kg,Ton |
| | Total Mode (1.8) | none | Forward | Forward,Reverse,Bi-direction |
| | Total Reset (1.9) | none | Cancel | Cancel,Accept |

| Main Menu | Sub Menu | Unit | Default | Setting Range |
|---|---|---|---|---|
| Advanced Set (2) | Zero Adj. (2.1) | m/s | actual | -0.5000~+0.5000 |
| | K-Factor (2.2) | none | 1.000 | 0.000~3.000 |
| | Density (2.3) | $g/cm^3$ | 1.0000 | 0.0001~9.9999 |
| | Low cutoff (2.4) | % | 0.5 | 0.00~100.00 |
| | Fwd. Init. (2.5) | =Total Unit | 0 | 0~9999999999 |
| | Rev. Init.(2.6) | =Total Unit | 0 | 0~9999999999 |

# SETTING VALUES

| Main Menu | Sub Menu | Unit | Default | Setting Range |
|---|---|---|---|---|
| I/O Signal Set (3) | Damping Time (3.1) | second (s) | 3 | 0~100 |
| | Pulse Out Mode (3.2) | none | Pulse NO | Pulse NO, Pulse NC, Frequency |
| | Pulse Out Unit (3.3) | Unit/pulse | 0.1 L | 0.001~100(L,gal,$m^3$,g,kg,Ton) $m^3$/pulse,gal/pulse,$m^3$/pulse g/pulse,kg/pulse,Ton/pulse |
| | Max. Freq. (3.4) | Hz,kHz | 2K | 1~8K (00.0000) |
| | Curr. Mode (3.5) | none | 4-20 | 4-20,0-20 |
| | 4mA Fine-Tune (3.6) | count | 0 | -5000~5000 |
| | 20mA Fine-Tune (3.7) | count | 0 | -5000~5000 |
| | Input1 Func. (3.8) | N/A | None | None, Total Reset |
| | Input1 Type (3.9) | N/A | NO | NO,NC |
| | Filter Variation (3.10) | m/s | 1 | 0.000~10.000 |
| | Filter Weight (3.11) | % | 10 | 0~100 |
| | Median Filter(3.12) | % | Enable | Disable,Enable |

| Main Menu | Sub Menu | Unit | Default | Setting Range |
|---|---|---|---|---|
| Alarm Set (4) | Max. Flow (4.1) | Flow Rate Unit | Max. | Max. Flow Rate |
| | Min. Flow (4.2) | Flow Rate Unit | Min. | Min. Flow Rate |
| | Empty Tube Set (4.3) | N/A | Enable | Enable, Disable |
| | Output 1 Func. (4.4) | N/A | Max. Flow Rate | Max. Flow Rate, Min. Flow Rate, Empty Tube, System Alarm |
| | Output 1 Type (4.5) | N/A | No | NO,NC |
| | Output 2 Func. (4.6) | N/A | Min. Flow Rate | Max. Flow Rate, Min. Flow Rate, Empty Tube, System Alarm |
| | Output 2 Type (4.7) | N/A | No | NO,NC |
| | Curr. Func. (4.8) | N/A | None | Empty Tube, System Alarm |
| | Alarm Curr. (4.9) | mA | 3.6 | 3.6,3.8,20.5,22 |
| | Temp. Alarm. (4.10) | N/A | 1 | 0:OFF, 1:ON |

# SETTING VALUES

| Main Menu | Sub Menu | | Unit | Default | Setting Range |
|---|---|---|---|---|---|
| System Set (5) | Language (5.1) | N/A | | English | English, Traditional Chinese,Simplified Chinese |
| | System Info.(5.2) | Tube Status | N/A | Actual | (Normal, Empty) |
| | | Act. Flow Speed | m/s | Actual | N/A |
| | | Resistance | kΩ | Actual | N/A |
| | | Status Code | N/A | Actual | 0000 0000 ~ FFFF FFFF |
| | Self-Test (5.3) | N/A | /A | Cancel | Normal, Circuit Fail ,Excitation Fail, Amb. Temp, Electrode Coating |
| | Analogy Input (5.4) | 4mA Display | N/A | 0000 | 0~9999 |
| | | 20mA Display. | N/A | 1000 | 0~9999 |
| | | 4-20mA Unit | N/A | Kpa | None, Kpa, Mpa, Psi, Bar,°C, °F |
| | | Dot | N/A | 1 | 0~3 |
| | ModBus Comm. (5.5) | Modbus ID(2.13.1) | /A | | ~255 |
| | | BaudRate(2.13.2) | S | | 1200,2400,4800,9600,19200 38400,57600 |
| | | Data bit(2.13.3) | N/A | 8 | 8 |
| | | Parity(2.13.4) | N/A | none | none,odd,even |
| | | Stop bit(2.13.5) | /A | | 1,2 |
| | Recovery Default (5.6) | N/A | N/A | Cancel | Cancel, Accept |
| | Mains Frequency (5.7) | N/A | Hz | 50 | 50, 60 |
| | LCM Contrast Brightness(5.8) | N/A | % | 50 | 10~100 |
| | Manu Password (5.9) | User Password(5.9.1) Admin Password(5.9.2) | N/A | 00000 | 0~99999 |

| Main Menu | Sub Menu | Unit | Default | Setting Range |
|---|---|---|---|---|
| Simulation (6) | Flow Speed (6.1) | m/s | 0 | -10 ~ 10 |
| | Flow Rate (6.2) | Flow Rate Unit | 0 | 0~max. |
| | Output Curr. (6.3) | mA | 4mA | 3.6~22 |
| | Output Freq. (6.4) | Hz(pulse/sec) | 2 | 8000 |
| | Output1 Status (6.5) | N/A | OFF | ON/OFF |
| | Output2 Status (6.6) | N/A | OFF | ON/OFF |
| | Input1 Status (6.7) | N/A | Actual | ON/OFF |
| | Input Curr. (6.8) | N/A | Actual | 0~24mA |

| Main Menu | Sub Menu | Unit | Default | Setting Range |
|---|---|---|---|---|
| System Log (7) | Date Set (7.1) | N/A | actual | year : 17~99, month : 01~12, day : 01~31 |
| | Time Set (7.2) | N/A | actual | hour : 00~23, minute : 00~59, sec : 00~59 |
| | Log data clear (7.3) | N/A | Cancel | Cancel, Accept |
| | System Log Info (7.4) | N/A | actual | N/A |

| Main Menu | Sub Menu | Unit | Default | Setting Range |
|---|---|---|---|---|
| Infomation (8) | F.W. Version(8.1) | | actual | |

※Sub menu 1.3、1.9、2.2、2.5、2.6、.6、5.9、7.3, only the admin can change.

# APPLICATION DEMO

Pharmaceutical

Pharmacy

Beverage

Electronics

Food & Beverage

Incinerator

Mining

Plastic

# TUCHENG PLANT/YILAN PLANT

# EPD APPLICATION / ORDER FORM

## Company Profile

Company Name: _____ Contact Person: _____

E-mail: _____ Phone: _____ Tax: _____

## Application

Medium: _____ Temperature: _____ Sanitary Degree Request:Yes ☐ NO ☐

Conductivity: _____ Viscosity: _____

Diameter of Tube (DN) : _____ Accuracy Request(%): _____ Ambient Temp.: _____

Normal Flow Rate($m^3$/h): _____ Max. Flow Rate($m^3$/h): _____ Min. Flow Rate($m^3$/h): _____

Connection Spec: _____ Connection Material**: _____

Pressure ($Kg/cm^2$): _____ Max. Static Pressure ($Kg/cm^2$): _____ **SUS304, SUS316, SUS316L

Lining Material*: _____ Electrode Material***: _____

*PTFE、NBR、Neoprene

***SUS316L,Hastelloy Alloy,Titanium, tantalum

Power: ☐ 110Vac ☐ 220Vac ☐ 24Vdc

Output: ☐ 4-20mA/Pulse(ferq) ☐ RS-485/Modbus

Grounding: ☐ NO ☐ YES

Installation Direction: ☐ Horizontal ☐ Vertical

Vibration Inside Tube: ☐ NO ☐ YES

Strong Magnetic Nearby: ☐ NO ☐ YES

Explosion Proof: ☐ NO ☐ YES

Explosion Proof Code: _____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