# SINTEK

# CORIOLIS MASS FLOW METER

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## 01 CORIOLIS MASS FLOW METER WORKING PRINCIPLE

Mass Flowmeter is designed according to the principle of Coriolis force. Under the alternating current effect, the magnet and coil installed on the measuring tube will make two parallel measuring tubes vibrate according to some fixed frequency. Once there is flow passing through the pipes, Coriolis force will give rise to deflection (phase shift) on the vibration of two pipes and the deflection of vibration is directly proportional to the mass flow of fluid. Pick up them and the mass flowrate could be calculated.

The vibration frequency of measuring tube is determined by the total mass of measuring tube and inner fluid. When the fluid density changes, the vibration frequency of measuring tube will be also changing, as a result, the fluid density can be calculated.

The temperature sensor installed in the pipeline can pick up the fluid temperature on time under the coordination of measuring circuit.

## 02 APPLICATIONS

- Gases
- Liquids
- Custody transfer
- Reactor feed ratio
- Density measurement
- Batch control

## 03 FEATURES

- U shape design-provides excellent stability and repeatability
- Dedicated ASIC with digital closed-loop control(DLC) improves the performance of gas-liquid flow measurement
- Dynamic vibration balance(DVB) technology enhances system stability
- 2-point temperature compensation and process pressure compensation
- Special configurations for difficult applications (e.g.high temperature)
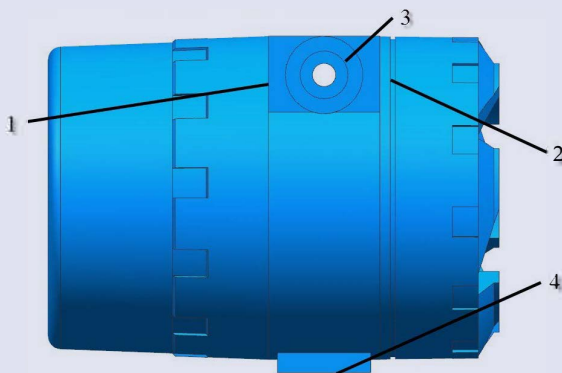
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## 04 LCD DISPLAY
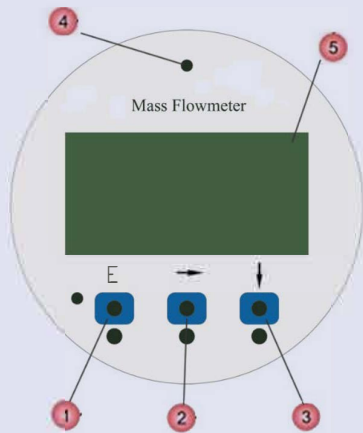


| No. | Notes |
|-----|-------|
| 1 | E    key：enter |
| 2 | → key: move curse or return |
| 3 | ↓ key : page down |
| 4 | Light for working status |
| 5 | Two line OLED |

## 05 WIRE TERMINAL DESCRIPTION

Overview of the transmitter( Same for both integrate & remote type)



| No. | Position of thread | Pitch | Thread form + quality of pitch | Threads engaged | Thread length |
|-----|--------------------|-------|--------------------------------|-----------------|---------------|
| （1）Case | Thread on front cover | 2mm | Medium，6h | ≥6 | 25mm |
| （1）Front cover | Thread on front cover | 2mm | Medium，6H | ≥6 | 25mm |
| （2）Case | Thread on back cover | 2mm | Medium，6h | ≥6 | 25mm |
| （2）Back cover | Thread on back cover | 2mm | Medium，6H | ≥6 | 25mm |
| （3）A/F | Thread for cable gland 1/2" NPT | 1.814mm | Medium，6H | ≥6 | 15mm |
| （4）A/F | Thread for case | 1.5 | Medium，6H | ≥6 | 26mm |
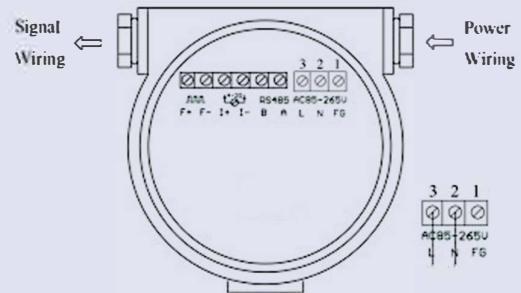


AC Power Wiring for DSP transmitter
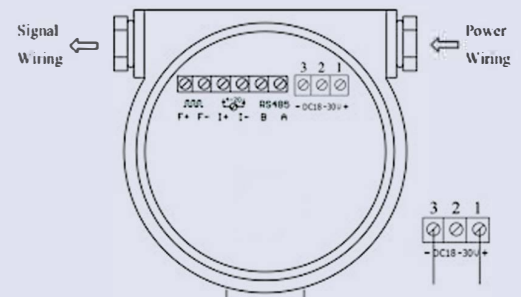
DC Power Wiring for DSP transmitter

# CORIOLIS MASS FLOW METER

## 06 MORE PRODUCTS

| U TYPE | U TYPE | W TYPE | S TYPE |

## 07 TECHNICAL DATA

| Measuring Tube | | SS316L; Hastelloy C |
|---|---|---|
| Pressure | | Refer to chart shown above.<br>Special orders would be placed for high pressure |
| Medium Temperature | | -50°C...+130°C |
| | | -50°C...+180°C |
| | | -50°C...+250°C |
| | | -50°C...+350°C |
| Ambient Temperature | | -25°C...+60°C(with LCD); -40°C...+85°C (without LCD) |
| Flow Rate Accuracy | | ±0.1%; ±0.2%; ±0.5% |
| Density Measurement Accuracy | | ERROR: 0.0005g/cm$^3$(0.5g/m$^3$) |
| Repeatability | Liquid | ≤0.05% |
| | Gas | ≤0.17% |
| Uncertainty | Liquid | ± 0.10% |
| | Gas | ± 0.35% |
| Output | | 4-20mA; Pulse |
| Communication | | RS485; HART; Profibus DP; FF |
| Explosion Proof | | ExdibllCT6Gb |
| Protection | | IP67 |

# CORIOLIS MASS FLOW METER

## 08 FLOW RANGE (U-TYPE)

Table 1: Flow Range for liquid (U Type)

| DN | Allowable Flow Range (kg/h) | Normal Flow Range for Accuracy 0.1% (kg/h) | Normal Flow Range for Accuracy 0.2% (kg/h) | Normal Flow Range for Accuracy 0.5% (kg/h) | Stability of Zero Point (kg/h) |
|---|---|---|---|---|---|
| 10 | 10～1000 | 100～1000 | 70～1000 | 50～1000 | 0.03 |
| 15 | 20～3000 | 300～3000 | 200～3000 | 150～3000 | 0.07 |
| 25 | 80～8000 | 800～8000 | 600～8000 | 400～8000 | 0.15 |
| 40 | 240～32000 | 2000～32000 | 1500～32000 | 1500～32000 | 0.9 |
| 50 | 500～50000 | 3500～50000 | 2500～50000 | 2000～50000 | 1.5 |
| 80 | 800～140000 | 8000～140000 | 7000～140000 | 6000～140000 | 3.5 |
| 100 | 1500～200000 | 15000～200000 | 12000～200000 | 10000～200000 | 7 |
| 150 | 5000～500000 | 50000～500000 | 35000～500000 | 28000～500000 | 17 |
| 200 | 10000～1000000 | 200000～1000000 | 120000～1000000 | 80000～1000000 | 45 |
| 300 | 25000~2500000 | 50000~25000000 | 300000~2500000 | 200000~2500000 | 70 |

## 09 FLOW RANGE(W/V-TYPE)

Table 2: Flow Range for liquid (V Type)

| DN | Max. Flow range (kg/h) | Normal flow range for 0.1% accuracy(Kg/h) | Normal flow range for 0.2% accuracy(Kg/h) | Normal flow range for 0.5% accuracy(Kg/h) | Stability of Zero point (Kg/h) |
|---|---|---|---|---|---|
| 3 | 1.2~120 | 10~120 | 8~120 | 6~120 | 0.004 |
| 8 | 8~800 | 80~800 | 55~800 | 40~800 | 0.035 |
| 10 | 10~1000 | 100~1000 | 70~1000 | 50~1000 | 0.045 |
| 15 | 20~3000 | 300~3000 | 200~3000 | 150~3000 | 0.09 |
| 25 | 80~8000 | 600~8000 | 400~8000 | 300~8000 | 0.25 |
| 40 | 240~24000 | 2400~24000 | 1200~24000 | 1000~24000 | 1 |
| 50 | 500~45000 | 5000~45000 | 2500~45000 | 2000~45000 | 2 |
| 80 | 800~120000 | 10000~120000 | 8000~120000 | 6000~120000 | 3.5 |
| 100 | 1500~200000 | 20000~200000 | 15000~200000 | 10000~200000 | 7 |
| 150 | 5000~500000 | 50000~500000 | 35000~500000 | 30000~500000 | 23 |
| 200 | 10000~1000000 | 100000~1000000 | 70000~1000000 | 50000~1000000 | 45 |
| 250 | 15000~1500000 | 150000~1500000 | 120000~1500000 | 75000~1500000 | 70 |

# CORIOLIS MASS FLOW METER

| Model | Stuffix Code | | | | | | | | | | | Description |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| FCM- | ❶ | ❷ | ❸ | ❹ | ❺ | ❻ | ❼ | ❽ | ❾ | ❿ | ⓫ | Coriolis Mass Flow Meter |
| Type | U | | | | | | | | | | | U Type |
| | V | | | | | | | | | | | V Type |
| Diameter | | XXX | | | | | | | | | | Stand for diameter 001: DN1; 250: DN 250 |
| Signal Output | | | 4 | | | | | | | | | 4-20mA/0-10KHz |
| Communication | | | | 5 | | | | | | | | RS485 |
| | | | | 7 | | | | | | | | Hart |
| | | | | 8 | | | | | | | | PF |
| | | | | 9 | | | | | | | | FF |
| | | | | 4 | | | | | | | | None |
| Temperature Rating | | | | | T1 | | | | | | | -50…+150°C |
| | | | | | T2 | | | | | | | -50…+250°C |
| | | | | | T3 | | | | | | | -50…+350°C |
| | | | | | T4 | | | | | | | -200…+150°C |
| Measuring Tube | | | | | | I6 | | | | | | SS316 |
| | | | | | | A | | | | | | Hastelloy C |
| | | | | | | XX | | | | | | On request |
| Accuracy Rating | | | | | | | 10 | | | | | ±0.1% of rate |
| | | | | | | | 02 | | | | | ±0.2% of rate |
| | | | | | | | 15 | | | | | ±0.15% of rate |
| | | | | | | | XX | | | | | On request |
| Connection | | | | | | | | AXX | | | | ANSI Flange;A15:ANSI 150#;A30:ANSI 300#… |
| | | | | | | | | DXX | | | | DIN Flange;D16:DIN PN16;DN25:DIN PN25… |
| | | | | | | | | JXX | | | | JIS Flange;J10K:JIS 10K;J20K:JIS 20K… |
| | | | | | | | | CLA | | | | Tri-clamp type(Sanitary connection) |
| | | | | | | | | THR | | | | Thread connection (<DN 40) |
| Body Material | | | | | | | | | I4 | | | SS304 |
| | | | | | | | | | I6 | | | SS316 |
| Structure | | | | | | | | | | C | | Compact type with local display |
| | | | | | | | | | | R | | Remote display include bracket |
| Power Supply | | | | | | | | | | | 1 | 24V DC |
| | | | | | | | | | | | 0 | 220V AC |

# 011 INSTALLATION

Step 1: Location: Determine the installation location of sensor, which should take the installation area, pipeline, transmitter location and valve into account.

Step 2: Direction: Determine the installation direction of sensor in the pipeline.

Step 3: Installation: Install the sensor and transmitter in the pipeline.

Step 4: Connection: When Mass Flowmeter is installed separately; the sensor and transmitter should be connected through special Nine-Core Cable.

Step 5: Start-up.

The Mass Flowmeter works well only when the liquid fills with the measuring tube. In principle, as long as the measuring tube is full of liquid, the Mass Flowmeter will function in any orientation installation. Generally speaking, the Mass Flowmeter is installed in the orientation which makes the liquid fill with the measuring tube.

For the horizontal installation, the measuring tube should be installed underside the pipeline when the process medium is liquid or slurry (shown on Picture 1) and topside the pipeline when the process medium is gas (shown on Picture 2). For the vertical installation, the measuring tube should be installed besides the pipeline when the process medium is liquid or slurry or gas (shown on Picture 3).
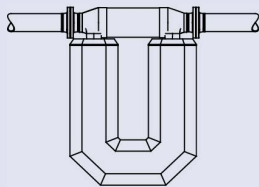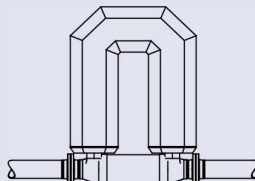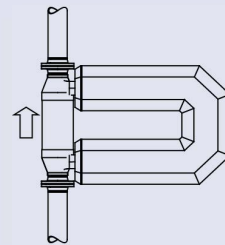
**PICTURE 1**          **PICTURE 2**          **PICTURE 3**

The installation of the Mass Flowmeter should decrease the tortuosity of the process connection. Meanwhile, do not support the pipeline by the sensor of the Mass Flowmeter. (Shown in Picture 4)