

## MTF VARIABLE AREA FLOW METER ( ROTAMETER )

### Summary

MTF Variable Area Flow Meter is an intelligent instrument developed by our company. It converts the fluid flow signal into corresponding analog voltage signal, outputs 4~20mA two-wire linear current signal and loads HART protocol for communication. With the features of high precision, low drift, and strong anti-interference ability, it can realize the remote configuration, monitoring, maintenance and calibration of the instrument and the flow measurement, supervision and management of the production process.

Patent Certificate No.: ZL02 3 53133.9



MTF-A Type Variable Area Flow Meter



MTF-B/MTF-C Type Variable Area Flow Meter



MTF-D Type Variable Area Flow Meter

### Operating Principle

The measured fluid flows in from the lower end of the measuring tube, and with the action of the fluid, a differential pressure is generated between the upper and lower ends of the float, and this differential pressure is the lifting force of the float. The float will remain in a certain position when the lifting force applied to the float is balanced with the gravity of the float. The measured flow rate corresponds to the position of the float in the measuring tube, as shown in Figure 1. through the float's built-in magnet coupled with the detection of the magnetic steel on the axis of the indicator, the flow rate is displayed directly on the dial, or through the circuit conversion, the Hall sensor transforms the magnetic signal into electrical signal, and then processed by the controller, the flow rate is displayed on the LCD screen, 4-20mA current signal is output, loading a digital signal compliant with the HART protocol communication.

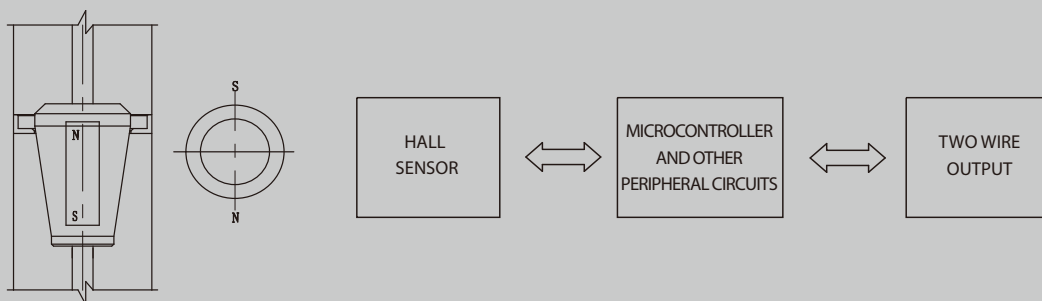


Figure 1 Mechanical Transmission, Electrical Schematic

Flow meter is composed of measuring meter and converter. It can be divided into vertical installation and horizontal installation according to the mounting type. Please see the details of Figure 2 and 3.

## Technical Parameters

### 1. Main parameters

- **Power Supply:** 12V~30VDC
- **Output signal:** Two wire, 4~20mADC + HART
- **Flange standard:** HG/T20592; HG/T20615 (or on request)
- **Power entrance:** M20×1.5(F) or on request
- **Input impedance:** >100M $\Omega$
- **Standard load resistance:** 250 $\Omega$
- **Nominal pressure:** DN15~DN50: PN $\leq$ 10.0MPa; DN80~DN100: PN $\leq$ 6.3MPa (or on request)
- **Accuracy:** 1.0% FS, 1.5% FS, 2.0% FS
- **Range ratio:** 10:1
- **Fluid temperature:** -40 $^{\circ}$ C  $\leq$  T  $\leq$  300 $^{\circ}$ C
- **Damping period:** (0~16 seconds)
- **Ambient temperature:** -40 $^{\circ}$ C  $\leq$  T  $\leq$  80 $^{\circ}$ C (When  $\leq$  -35 $^{\circ}$ C, LCD cannot display)
- **Explosion proof type:** Intrinsically safe explosion type Exia II CT5/T4 Ga, Isolation explosion type Exd II CT6/T5/T4/T3 Gb
- **IP Rating:** IP66
- **Measuring Range:**
  - Water: 2.5 L/h~100000L/h(20 $^{\circ}$ C)
  - Air: 0.07~1800m<sup>3</sup>/h(0.1013MPa, 20 $^{\circ}$ C)
- **Medium temperature:** 350 $^{\circ}$ C  $\leq$  T  $\leq$  450 $^{\circ}$ C
- **Applicable Fluid viscosity:**
  - DN15, DN20:  $\eta$  < 5mPa.s (FZ15.1~FZ15.5)  
 $\eta$  < 30mPa.s (FZ15.6, FZ15.15, FZ20.1~FZ20.4)
  - DN25, DN40:  $\eta$  < 250mPa.s
  - DN50, DN80, DN100:  $\eta$  < 300mPa.s

### 2. Classification

- **Classification by mounting type:** vertical installation and horizontal installation
  - **Classification by applicable fluid:**
    - Basic type: apply to liquid measurement
    - Damping type: apply to gas and vapor measurement
    - Anti-corrosion type: lining with PTFE and apply to corrosive fluid measurement
    - Jacket type: apply to the fluid needs to keep warm or cold.
- Notice:** There is no horizontal installation for anti-corrosion type or jacket type

### Model Selection Table

#### 1. Model selection table

| Model | Code                     |                          |   | Content  |   |                          |                          |                          |                          |                       |
|-------|--------------------------|--------------------------|---|--|---|--------------------------|--------------------------|--------------------------|--------------------------|-----------------------|
| MTF - | A                        |                          |   | Pointer indicating type variable area flow meter   |   |                          |                          |                          |                          |                       |
|       | B                        |                          |   | Digital display + remote transmission type variable area flow meter                      |   |                          |                          |                          |                          |                       |
|       | C                        |                          |   | Pointer indicating + remote transmission type variable area flow meter                   |   |                          |                          |                          |                          |                       |
|       | D                        |                          |   | Pointer indicating + digital display + remote transmission type variable area flow meter |   |                          |                          |                          |                          |                       |
|       | 2                        |                          |   | PN10(1.0MPa)   |   |                          |                          |                          |                          |                       |
|       | 3                        |                          |   | PN16(1.6MPa)   |   |                          |                          |                          |                          |                       |
|       | 4                        |                          |   | PN20(Class150)   |   |                          |                          |                          |                          |                       |
|       | 5                        |                          |   | PN25(2.5Mpa)   |   |                          |                          |                          |                          |                       |
|       | 6                        |                          |   | PN40(4.0MPa)   |   |                          |                          |                          |                          |                       |
|       | 7                        |                          |   | PN50(Class300)   |   |                          |                          |                          |                          |                       |
|       | 8                        |                          |   | PN63(6.3Mpa)   |   |                          |                          |                          |                          |                       |
|       | 9                        |                          |   | PN100(10.0Mpa)   |   |                          |                          |                          |                          |                       |
|       | 10                       |                          |   | PN110(Class600)  |   |                          |                          |                          |                          |                       |
|       | .....                    |                          |   | Other nominal pressures shall follow the actual code of sage X3 system                   |   |                          |                          |                          |                          |                       |
|       | Z                        |                          |   | Damping type   |   |                          |                          |                          |                          |                       |
|       | W                        |                          |   | Non damping type   |   |                          |                          |                          |                          |                       |
|       | 2                        | 11                       |   | DN15 1/2"  |   |                          |                          |                          |                          |                       |
|       | 3                        | 12                       |   | DN20 3/4"  |   |                          |                          |                          |                          |                       |
|       | 4                        | 13                       |   | DN25 1"  |   |                          |                          |                          |                          |                       |
|       | 6                        | 15                       |   | DN40 1-1/2"  |   |                          |                          |                          |                          |                       |
|       | 7                        | 16                       |   | DN50 2"  |   |                          |                          |                          |                          |                       |
|       | 9                        | 18                       |   | DN80 3"  |   |                          |                          |                          |                          |                       |
|       | 10                       | 19                       |   | DN100 4"   |   |                          |                          |                          |                          |                       |
|       | /                        |                          |   |  |   |                          |                          |                          |                          |                       |
|       | P                        |                          |   | Wetted Material: lining with PTFE  |   |                          |                          |                          |                          |                       |
|       | 2                        |                          |   | Wetted Material: 304   |   |                          |                          |                          |                          |                       |
|       | 3                        |                          |   | Wetted Material: 316   |   |                          |                          |                          |                          |                       |
| 4     |                          |                          | Wetted Material: 316L   |  |   |                          |                          |                          |                          |                       |
| ..... |                          |                          | Other material shall follow the actual code of sage X3 system |  |   |                          |                          |                          |                          |                       |
| 0     |                          |                          | NA  |  |   |                          |                          |                          |                          |                       |
| i     |                          |                          | Intrinsically safe  |  |   |                          |                          |                          |                          |                       |
| d     |                          |                          | Explosion isolating   |  |   |                          |                          |                          |                          |                       |
| D     |                          |                          | Fluid Temperature: 0°C < T ≤ 200°C                            |  |   |                          |                          |                          |                          |                       |
| G     |                          |                          | Fluid Temperature: -40°C ≤ T ≤ 0°C                            |  |   |                          |                          |                          |                          |                       |
| S     |                          |                          | 200°C < T ≤ 300°C   |  |   |                          |                          |                          |                          |                       |
| C     |                          |                          | Horizontal Installation                                       |  |   |                          |                          |                          |                          |                       |
| MTF - | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/>                                      | <input type="checkbox"/>   | / | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | Vertical Installation |

#### Example

MTF-B3W4/2dDC is Variable Area Flow Meter: Digital display + remote transmission type; Flange rate is PN1.6, Non damping type, Size DN25, Wetted material is 304, Isolation explosion type, Working temperature is 0°C < t ≤ 200°C, Vertical installation.

## 2. Model selection flow table

| Nominal Diameter | Connectable Flange | Float Number | Flow value ( Water L/h; Air m <sup>3</sup> /h ) |      |                 | Pressure Loss (kPa) |      |                 |
|------------------|--------------------|--------------|---|------|-----------------|---------------------|------|-----------------|
|                  |                    |              | Water Calibration                               |      | Air Calibration | Water Calibration   |      | Air Calibration |
|                  |                    |              | Float material                                  |      |                 | Float material      |      |                 |
|                  |                    |              | 304   | PTFE | 304             | 304                 | PTFE | 304             |
| DN15             | ≥DN15              | FZ15.1       | 25  | -    | 0.7             | 6.5                 | -    | 7.1             |
|                  |                    | FZ15.2       | 32  | 25   | 1               | 6.5                 | 5.5  | 7.1             |
|                  |                    | FZ15.3       | 40  | 40   | 1.2             | 6.5                 | 5.5  | 7.2             |
|                  |                    | FZ15.4       | 50  | 60   | 1.5             | 6.5                 | 5.6  | 7.2             |
|                  |                    | FZ15.5       | 60  | 100  | 1.8             | 6.6                 | 5.6  | 7.3             |
|                  |                    | FZ15.6       | 80  | 160  | 2.5             | 6.6                 | 5.8  | 7.4             |
|                  |                    | FZ15.7       | 100   | 250  | 3               | 6.6                 | 6.1  | 7.5             |
|                  |                    | FZ15.8       | 130   | 400  | 4               | 6.7                 | 7.3  | 7.8             |
|                  |                    | FZ15.9       | 160   | -    | 4.9             | 6.8                 | -    | 8.0             |
|                  |                    | FZ15.10      | 200   | -    | 6.2             | 7.0                 | -    | 8.9             |
|                  |                    | FZ15.11      | 250   | -    | 7.7             | 7.2                 | -    | 10.0            |
|                  |                    | FZ15.12      | 320   | -    | 9.9             | 7.9                 | -    | 10.4            |
|                  |                    | FZ15.13      | 400   | -    | 12.3            | 8.6                 | -    | 10.8            |
|                  |                    | FZ15.14      | 500   | -    | 15.4            | 9.9                 | -    | 12.4            |
|                  |                    | FZ15.15      | 600   | -    | 18.5            | 11.1                | -    | 14.0            |
| DN20             | ≥DN20              | FZ20.1       | 750   | -    | 23              | 6.9                 | 5.9  | 7.3             |
|                  |                    | FZ20.2       | 1000  | -    | 30              | 7.1                 | 6.2  | 7.5             |
|                  |                    | FZ20.3       | 1300  | -    | 40              | 7.5                 | -    | 7.9             |
|                  |                    | FZ20.4       | 1600  | -    | 49              | 7.8                 | -    | 8.2             |
|                  |                    | FZ20.5       | 2000  | -    | 62              | 7.8                 | -    | 8.2             |
| DN25             | ≥DN25              | FZ25.1       | 1000  | 600  | 30              | 7.0                 | 5.5  | 7.7             |
|                  |                    | FZ25.2       | 1300  | 1000 | 40              | 7.5                 | 5.6  | 8.3             |
|                  |                    | FZ25.3       | 1600  | 1600 | 49              | 8.0                 | 5.6  | 8.8             |
|                  |                    | FZ25.4       | 1800  | 2500 | 55.5            | 8.6                 | 6.4  | 9.5             |
|                  |                    | FZ25.5       | 2100  | -    | 65              | 9.5                 | -    | 10.5            |
|                  |                    | FZ25.6       | 2300  | -    | 71              | 10.1                | -    | 11.2            |
|                  |                    | FZ25.7       | 2500  | -    | 77              | 10.8                | -    | 12.0            |
|                  |                    | FZ25.8       | 2900  | -    | 90              | 13.2                | -    | 13.2            |
|                  |                    | FZ25.9       | 3200  | -    | 100             | 14.2                | -    | 14.1            |
|                  |                    | FZ25.10      | 3600  | -    | 111             | 15.6                | -    | 15.3            |
|                  |                    | FZ25.11      | 4000  | -    | 123             | 16                  | -    | 16.5            |
|                  |                    | FZ25.12      | 4400  | -    | 135             | 17.4                | -    | 17.8            |
|                  |                    | FZ25.13      | 4800  | -    | 148             | 18.8                | -    | 19.0            |
| DN40             | ≥DN40              | FZ40.1       | 3000  | -    | 93              | 7.2                 | 6.2  | 7.8             |
|                  |                    | FZ40.2       | 3750  | -    | 116             | 7.4                 | 6.5  | 8.2             |
|                  |                    | FZ40.3       | 4500  | -    | 139             | 7.5                 | 7.1  | 8.5             |
|                  |                    | FZ40.4       | 5500  | -    | 170             | 7.9                 | 8.5  | 9.0             |
|                  |                    | FZ40.5       | 6500  | -    | 200             | 8.3                 | -    | 9.4             |
|                  |                    | FZ40.6       | 7500  | -    | 230             | 9.1                 | -    | 9.9             |
|                  |                    | FZ40.7       | 8500  | -    | 262             | 9.8                 | -    | 10.3            |
|                  |                    | FZ40.8       | 10000   | -    | 309             | 10.0                | -    | 10.7            |

| Nominal Diameter | Connectable Flange | Float Number | Flow value ( Water L/h; Air m <sup>3</sup> /h ) |       |                 | Pressure Loss (kPa) |      |                 |
|------------------|--------------------|--------------|---|-------|-----------------|---------------------|------|-----------------|
|                  |                    |              | Water Calibration                               |       | Air Calibration | Water Calibration   |      | Air Calibration |
|                  |                    |              | Float material                                  |       |                 | Float material      |      |                 |
|                  |                    |              | 304   | PTFE  | 304             | 304                 | PTFE | 304             |
| DN50             | ≥ DN50             | FZ50.1       | 6000  | 4000  | 185             | 8.1                 | 6.8  | 8.6             |
|                  |                    | FZ50.2       | 7000  | 6000  | 220             | 8.8                 | 8.8  | 9.1             |
|                  |                    | FZ50.3       | 8000  | 10000 | 250             | 9.5                 | 13.7 | 9.6             |
|                  |                    | FZ50.4       | 10000   | 14000 | 310             | 11.0                | 18.5 | 10.4            |
|                  |                    | FZ50.5       | 13000   | -     | 400             | 14.0                | -    | 12.9            |
|                  |                    | FZ50.6       | 16000   | -     | 495             | 17.0                | -    | 15.5            |
|                  |                    | FZ50.7       | 20000   | -     | 620             | 19.7                | -    | 16.4            |
|                  |                    | FZ50.8       | 25000   | -     | 770             | 20.0                | -    | 18.6            |
| DN80             | ≥ DN80             | FZ80.1       | 25000   | 16000 | 770             | 8.1                 | 6.3  | 8.0             |
|                  |                    | FZ80.2       | 30000   | 25000 | 925             | 8.6                 | 7.2  | 10.0            |
|                  |                    | FZ80.3       | 35000   | -     | 1080            | 9.1                 | -    | 12.0            |
|                  |                    | FZ80.4       | 40000   | -     | 1234            | 9.5                 | -    | 14.0            |
| DN100            | ≥ DN100            | FZ100.1      | 60000   | 35000 | 1800            | 10.0                | 7.9  | 25.0            |
|                  |                    | FZ100.2      | 100000  | -     | -               | 15.0                | -    | -               |

**Outline Drawing and Installation Size**

**1. Outline drawing and installation size of flow meter**

The dimensions in the figures (see Figures 2 and 3) are the installation dimensions of standard instruments (when nominal pressure ≤ Class600). When the nominal pressure is >Class600, the mounting size of the instrument should be determined according to the specific design.

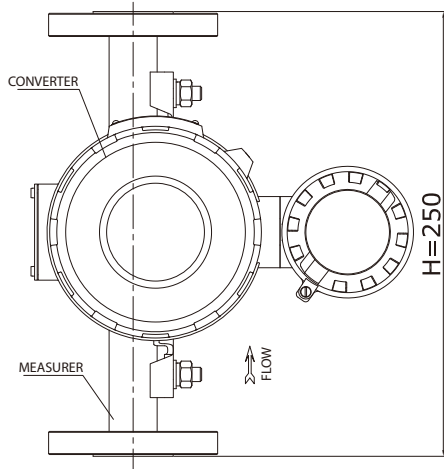


Figure 2 Outline Drawing for Vertical Installation

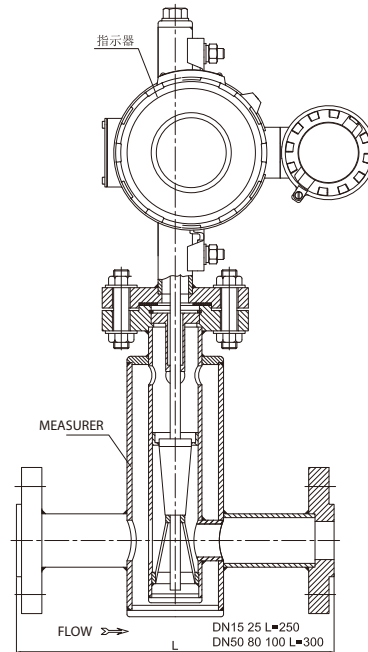
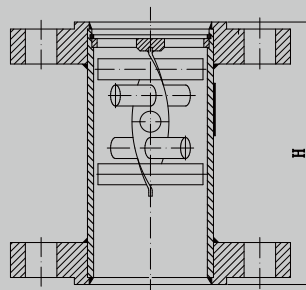


Figure 3 Outline Drawing for Horizontal Installation

**2. Filter outline drawing and installation size**

If the fluid contains solid particles, a corresponding filter should be installed before the upstream straight pipe section of the instrument to filter out particle impurities. If the fluid contains ferromagnetic substances, the magnetic filter produced by our company should be equipped at the same time when purchasing the machine to prevent affecting the accuracy of the instrument and to extend the instrument's service life. The magnetic filter (see Figure 4), the wetted material can be 304, 316L or other materials. The size in the figure is the installation size of the standard magnetic filter (when the nominal pressure  $\leq$  Class600). When the nominal pressure  $>$  Class600, the installation size of the magnetic filter should be determined according to the specific design.



DN15-DN50 H=150mm  
DN80-DN100 H=200mm

Figure 4 Outline Drawing for Magnetic Filter

**Safety Barrier Recommended Use Table**

| Safety Barrier Recommended Use Table                |                          |
|---|--------------------------|
| Shanghai Ben An Instrument System Co., Ltd          | LS4041-Ex                |
| German P+F Company                                  | KFD2-STC3-Ex1            |
| Shanghai Institute of automation and instrument     | GS8041-Ex GS8045-Ex      |
| Dandong Top Electronics Instrument (Group) Co., Ltd | TP5041-Ex TP5045-Ex      |
| Long Fei Group                                      | LF1045                   |
| U.K.  | MTL3046B MTL5042 MTL706+ |

**Ordering Information**

Please provide the following data when you place an order

|  |  |
|--|--|
| Fluid  |  |
| Working Pressure (no need to fill if fluid is liquid)    |  |
| Working Temperature (no need to fill if fluid is liquid) |  |
| Density (gas provides the standard density)              |  |
| Manufacturing Range                                      |  |
| Connection Standards                                     |  |