VNER

# VORTEX FLOWMETER

MA80T SERIES


JIANGSU VNER ELECTRONIC TECHNOLOGY LTD

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Thank you for VNER Vortex flowmeter.

To ensure correct use of the instrument, please read this manual thoroughly and fully understand how to operate the instrument before operating it.

## • *Safety and Precautions*

The following safety precautions must be observed during all phases of operation, service and repair of this instrument. The following safety symbol marks are used in this manual.

| | |
|---|---|
|  | Indicates safety attentions which are dangerous. |
|  | Indicates safety attentions which are needed to pay attention to. |
|  | Indicates safety attentions which are forbidden. |

Error operation in case of ignoring the tips might cause the personal injury, or damage to the instrument and property.

***Select explosion-proof instrument for explosive environment application***

Confirm whether the nameplate of instrument has the identifiers of explosion-proof certification and temperature class, the instrument can't be used in explosive environment without those identifiers.

***The explosion-proof temperature class of instrument must meet the explosion-proof and temperature of environmental requirements on site***

When the instrument is used in explosion-proof environment, make sure that the explosion-proof certification and temperature class of instrument meet to the requirements on site.

***No opening while working in explosive environment***

Before wiring, please power instrument off.

***The protection class of instrument must meet the working condition requirements on site***

The requirement of protection class on site should be under, or the same as the protection class of instrument to ensure that the instrument is working fine.

***If doubting that the instrument in the event of failure, please do not operate it***

If there are something wrong with the instrument or it had been damaged, please contact us.

**VNER Vortex flowmeter are thoroughly tested at the factory before shipment.**

- When these instruments are delivered, perform a visual check to make sure that no damage occured during shipment.

**Transportation and Storage Precautions**

- If the instrument is to be stored for a long period of time after delivery, please follow below points.
- The instrument should be stored in original packing.
- The instrument need to be stored in the place where will not be exposed to rain or water.
- Temperature: -40°C to +60°C
- Humidity: 5 to 100% RH

## VNER MA80T VORTEX FLOWMETER OVERVIEW

The MA80T series vortex flowmeter strictly follows the principle of reliability in its design, adopting an optimized design scheme with simplified structure. The entire series of product components achieve high universality and interchangeability; The circuit components use new components with high reliability indicators and adopt surface mount technology, eliminating low reliability components such as potentiometers and connectors, significantly improving the overall reliability indicators of the machine.

***1. Rotatable meter head***

***2. Anti-interference***

***3. Easy maintenance***

***4. Intelligent modular design***

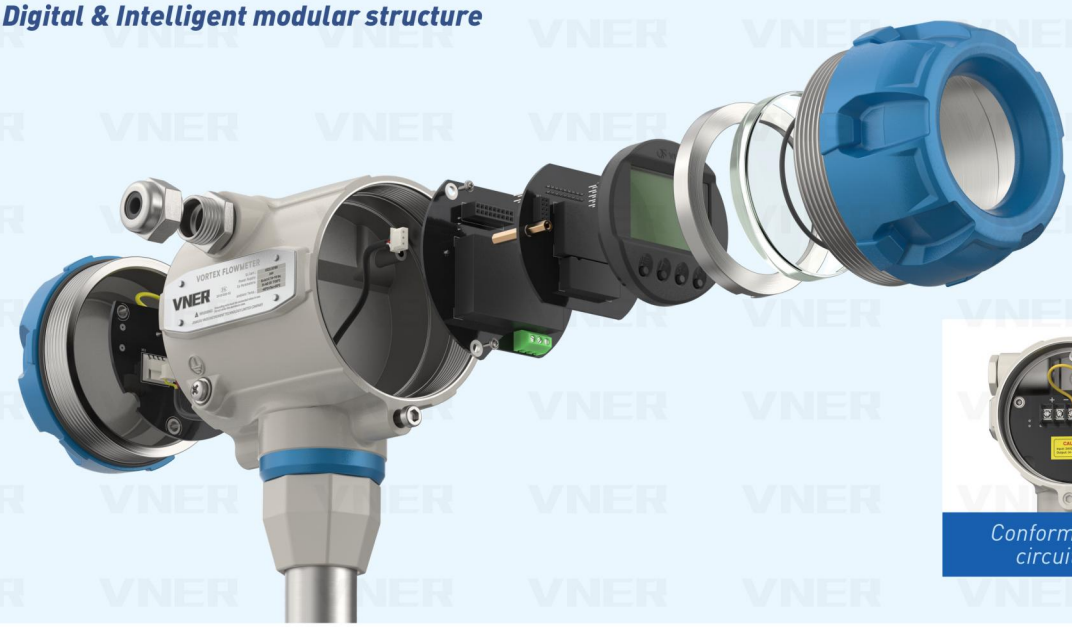
Rotatable Meter Tower

Removable Protection Covers

Easy-Maintenance Design

Eye-Catching Protection Paint


### *Digital & Intelligent modular structure*




Conformal coated circuit board

## PRODUCT DESCRIPTION

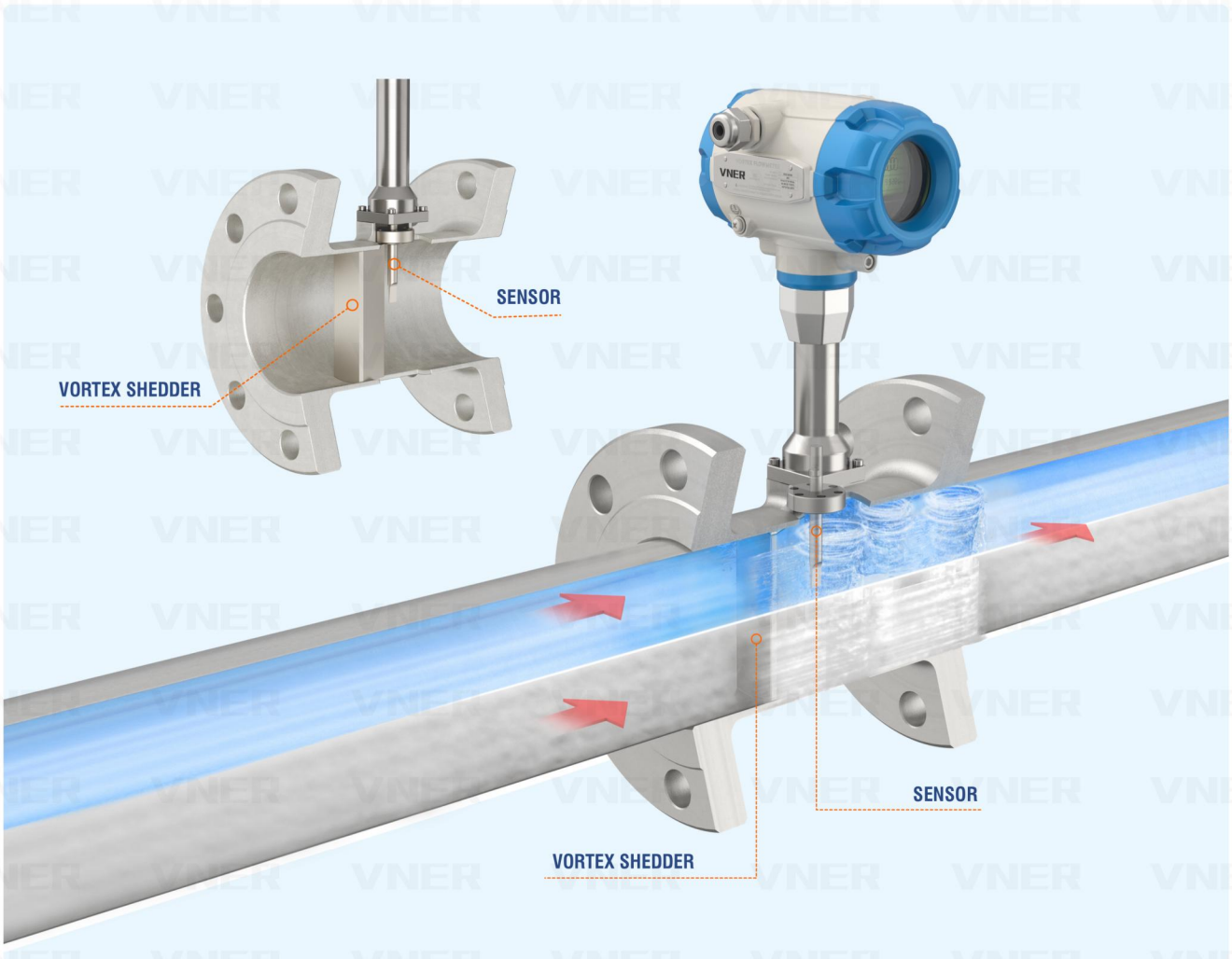
Vortex flowmeter is a kind of flowmeter applying Karman vortex principle, which is used to measure the flow of liquid, gas and steam, and also can be used to measure the disturbed liquid containing particles and impurities.It is widely used in petroleum, chemical, pharmaceutical, papermaking, metallurgy, electric power, environmental protection, food, pharmaceutical, papermaking, metallurgy, electric power, food and other industries.

MA80T series vortex flowmeter is designed in strict accordance with the principle of reliability, and adopts the optimized design scheme of structural simplification, and the components of the whole series of products achieve high universality and interchangeability; the circuit components are selected from the new components with high reliability indexes, and the surface mounting process is adopted, which eliminates the potentiometers, plug-ins and other low-reliability components, and the reliability index of the whole machine is significantly improved.

## WORKING PRINCIPLE

### SENSOR IN THE VORTEX FLOWMETER

A vortex meter is a type of volumetric flow meter that makes use of a natural phenomenon that occurs when a liquid flows around a bluff object. Vortex flow meters operate under the vortex shedding principle, where vortices are shed alternately downstream of the object.



## MAIN TECHNICAL PARAMETERS

**The main technical parameters of the MA80T series are listed in the table below:**

Applicable Medium: Gas, Liquid, Saturated Steam, Superheated Steam

Available Connection: Flange, Wafer, Insertion

Nominal Diameter (mm): 15, 20, 25, 32, 40, 50, 65, 80, 100, 125, 150, 200, 250, 300, 350, 400, 450, 500, 600 other available upon request

Nominal Pressure (Mpa): **Liquid:** 1.0, 1.6, 2.5, 4.0, other pressure optional, maximum 30MPa
**Gas and Steam:** 1.0, 1.6, 2.5, 4.0, other pressure optional, maximum 30MPa

Medium Temperature (°C): **- 200°C ~ 160°C: C**ryogenic liquids and gases
- **40°C ~ 300°C: L**iquids, gases, saturated steam, superheated steam
- **40°C ~ 350°C: S**uperheated steam

Accuracy: Standard ≤1%, (≤0.75% available upon request)

Body and Wetted Material: 304, 316L, Hastelloy C (other materials available upon request)

Flow Range: **Liquid: 0.3 ~ 7 m/s**
**Gas : 3~60 m/s**
**Steam: 3~70 m/s**

Power Supply: 24V DC, 3.6V DC Battery powered

Signal Output: 4-20mA, Pulse

Communication Protocol: Modbus RS-485, HART

Explosion-Proof Marking: **Intrinsically Safe:** ExiaIICT4-T6 Ga; Ex iaD T135°C
**Explosion-proof:** Exd IC T6 Gb; Ex tD A21 IP66 T80°C

Ingress Protection: **Standard type IP65**
**Submersible type IP68**

Environmental Conditions: **Ambient Temperature:** - 40°C to + 55°C
**Relative Humidity:** 5% to 90%
**Atmospheric Pressure:** 86% to 106Kpa

## INSTRUMENT SERIAL CODE DESCRIPTION

| BASE MODEL: MA80T | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Transmitter Type:** | | | | | | | | | | | | | | |
| Integral Model | E | | | | | | | | | | | | | |
| Split Model | R | | | | | | | | | | | | | |
| Submersible Model | Q | | | | | | | | | | | | | |
| **Output Signal:** | | | | | | | | | | | | | | |
| 4-20mA Analog and Pulse | | D | | | | | | | | | | | | |
| **Process Connection Type:** | | | | | | | | | | | | | | |
| Wafer Connection | | | | | | | | | | | | | | |
| DIN HG 20592 Flange | | | 0 | | | | | | | | | | | |
| ANSI HG 20615 Flange | | | 1 | | | | | | | | | | | |
| Other Customization | | | 2 | | | | | | | | | | | |
| **Measured Medium:** | | | 3 | | | | | | | | | | | |
| 250°C | | | | 1 | | | | | | | | | | |
| 350°C | | | | 2 | | | | | | | | | | |
| 400°C | | | | 3 | | | | | | | | | | |
| **Housing Material:** | | | | | | | | | | | | | | |
| Stainless Steel 304 | | | | | A | | | | | | | | | |
| Stainless Steel 316L | | | | | B | | | | | | | | | |
| Customization Available Upon Request | | | | | E | | | | | | | | | |
| **Nominal Diameter:** | | | | | | | | | | | | | | |
| DN15 | | | | | | 015 | | | | | | | | |
| DN20 | | | | | | 020 | | | | | | | | |
| DN25 | | | | | | 025 | | | | | | | | |
| DN32 | | | | | | 032 | | | | | | | | |
| DN40 | | | | | | 040 | | | | | | | | |
| DN50 | | | | | | 050 | | | | | | | | |
| DN65 | | | | | | 065 | | | | | | | | |
| DN80 | | | | | | 080 | | | | | | | | |
| DN100 | | | | | | 100 | | | | | | | | |
| DN125 | | | | | | 125 | | | | | | | | |
| DN150 | | | | | | 150 | | | | | | | | |
| DN200 | | | | | | 200 | | | | | | | | |
| DN250 | | | | | | 250 | | | | | | | | |
| DN300 | | | | | | 300 | | | | | | | | |
| DN350 | | | | | | 350 | | | | | | | | |
| DN400 | | | | | | 400 | | | | | | | | |
| DN500 | | | | | | 500 | | | | | | | | |
| DN600 | | | | | | 600 | | | | | | | | |

| BASE MODEL: MA80T | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Nominal pressure:** | | | | | | | | |
| PN10 | A | | | | | | | |
| PN16 | B | | | | | | | |
| PN25 | C | | | | | | | |
| PN40 | D | | | | | | | |
| ANSI CLASS 150 | F | | | | | | | |
| ANSI CLASS 300 | G | | | | | | | |
| ANSI CLASS 600 | H | | | | | | | |
| Customization Available (Max.15MPa) | E | | | | | | | |
| **Piezo Sensor & Wetted Parts Material:** | | | | | | | | |
| Stainless Steel 304 | | 1 | | | | | | |
| Stainless Steel 316 | | 2 | | | | | | |
| Customization Available Upon Request | | 3 | | | | | | |
| On Request: Hastelloy | | - | | | | | | |
| On Request: Tantalum | | - | | | | | | |
| **Piezo Sensor Sealing Material:** | | | | | | | | |
| Polytetrafluoroethylene (PTFE): ( -40 to 150°C) | | | 1 | | | | | |
| Graphite O-Ring:( -200 to 280°C) | | | 2 | | | | | |
| **Explosion Protection Certification:** | | | | | | | | |
| Without | | | | A | | | | |
| Explosion-Proof Exiall CT2-T6 | | | | B | | | | |
| Explosion-Proof Exd IIB T6 Gb | | | | G | | | | |
| **Electrical Interface:** | | | | | | | | |
| M20x1.5 | | | | | 1 | | | |
| 1/2 NPT(F) | | | | | 2 | | | |
| **Communication Protocol:** | | | | | | | | |
| Without | | | | | | A | | |
| HART | | | | | | H | | |
| Modbus RS485 | | | | | | M | | |
| **Temperature and Pressure Compensation:** | | | | | | | | - T |
| Temperature Compensator | | | | | | | | - P |
| Pressure Compensator | | | | | | | | - TP |
| Temperature and Pressure Compensator | | | | | | | | |
| **Additional Information:** | | | | | | | | |
| Device Identification Plate/Certification and Tag Plate Available On Request | | | | | | | | |
| Display Glass Cover Depends On Request and Preference | | | | | | | | |
| Operating Handle Customization Please Consult Manufacturer | | | | | | | | |
| Specifications On Parts and Components Please Consult Manufacturer | | | | | | | | |

## MEASURING RANGE FOR GAS AND LIQUIDS

### GAS MEASURING RANGE

| VNER MA80T VORTEX FLOWMETER GAS FLOW MEASURING RANGE (UNDER REFERENCE CONDITIONS) | | | | | |
|---|---|---|---|---|---|
| Vales Based on Air: Temperature (t): 20°C / 68°F; Pressure (p): 0.1013 MPa / 14.7 Psi; Density (p): 1.205 kg/m³ / 0.0751 lb/ft³ | | | | | |
| Nominal Pipe Size | Nominal Diameter DN Standard (mm) | Nominal Diameter ANSI Standard (in) | Designed Measuring Range (m³/h) | Optional Measuring Range (m³/h) | Signal Output Range Hz (m³/h) |
| 15 mm | 15 | 1/2" | 5 ~ 30 | 5 ~ 50 | 460 ~ 3700 |
| 20 mm | 20 | 3/4" | 6 ~ 50 | 6 ~ 60 | 220 ~ 3400 |
| 25 mm | 25 | 1" | 8 ~ 60 | 8 ~ 120 | 180 ~ 2700 |
| 32 mm | 32 | 1 1/4" | 14 ~ 100 | 14 ~ 150 | 130 ~ 1400 |
| 40 mm | 40 | 1 1/2" | 18 ~ 180 | 18 ~ 310 | 90 ~ 1550 |
| 50 mm | 50 | 2" | 30 ~ 300 | 30 ~ 480 | 80 ~ 1280 |
| 65 mm | 65 | 2 1/2' | 50 ~ 500 | 50 ~ 800 | 60 ~ 900 |
| 80 mm | 80 | 3" | 70 ~ 700 | 70 ~ 1230 | 40 ~ 700 |
| 100 mm | 100 | 4" | 100 ~ 1000 | 100 ~ 1920 | 30 ~ 570 |
| 125 mm | 125 | 5" | 150 ~ 1500 | 140 ~ 3000 | 23 ~ 490 |
| 150 mm | 150 | 6" | 200 ~ 2000 | 200 ~ 4000 | 18 ~ 360 |
| 200 mm | 200 | 8" | 400 ~ 4000 | 320 ~ 8000 | 13 ~ 325 |
| 250 mm | 250 | 10" | 600 ~ 8000 | 550 ~ 18500 | 11 ~ 220 |
| 300 mm | 300 | 12" | 1000 ~ 10000 | 800 ~ 20000 | 9 ~ 210 |
| 350 mm | 350 | 14" | 1500 ~ 15000 | 1100 ~ 24000 | 8 ~ 175 |
| 400 mm | 400 | 16" | 1800 ~ 18000 | 1500 ~ 30800 | 7 ~ 143 |
| 450 mm | 450 | 18" | 2100 ~ 21000 | 2000 ~ 35000 | 6 ~ 90 |
| 500 mm | 500 | 20" | 2500 ~ 25000 | 2000 ~ 48000 | 5 ~ 120 |
| 600 mm | 600 | 24" | 3200 ~ 32000 | 2500 ~ 70000 | 3.5 ~ 98 |

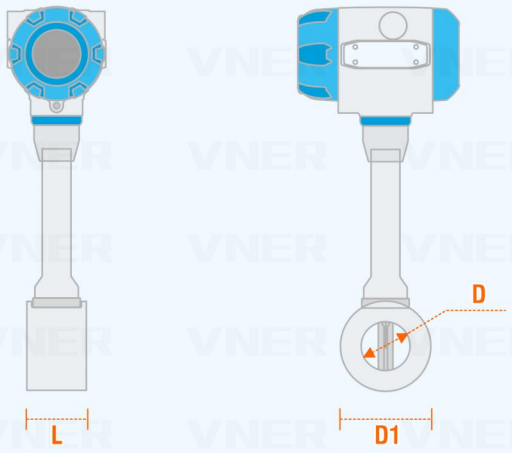
## LIQUID MEASURING RANGE

| VNER MA80T VORTEX FLOWMETER LIQUIDS FLOW MEASURING RANGE (UNDER REFERENCE CONDITIONS) | | | | | |
|---|---|---|---|---|---|
| Vales Based on Air: Temperature (t): 20°C / 68°F; Pressure (p): 0.1013 MPa / 14.7 Psi; Density (p): 1.205 kg/m³ / 0.0751 lb/ft³ | | | | | |
| Nominal Pipe Size | Nominal Diameter DN Standard (mm) | Nominal Diameter ANSI Standard (in) | Designed Measuring Range ($m^3/h$) | Optional Measuring Range ($m^3/h$) | Signal Output Range Hz ($m^3/h$) |
| 15 mm | 15 | 1/2" | 1 ~ 6 | 0.8 ~ 8 | 90 ~ 900 |
| 20 mm | 20 | 3/4" | 1.2 ~ 8 | 1 ~ 15 | 40 ~ 600 |
| 25 mm | 25 | 1" | 2 ~ 16 | 1.6 ~ 18 | 35 ~ 400 |
| 32 mm | 32 | 1 1/4" | 2.2 ~ 20 | 1.8 ~ 30 | 20 ~ 250 |
| 40 mm | 40 | 1 1/2" | 2.5 ~ 25 | 2 ~ 48 | 10 ~ 240 |
| 50 mm | 50 | 2" | 3.5 ~ 35 | 3 ~ 70 | 8 ~ 190 |
| 65 mm | 65 | 2 1/2' | 6~60 | 5 ~ 85 | 7 ~ 150 |
| 80 mm | 80 | 3" | 13 ~ 130 | 10 ~ 170 | 6 ~ 110 |
| 100 mm | 100 | 4" | 20 ~ 200 | 15 ~ 270 | 5 ~ 90 |
| 125 mm | 125 | 5" | 30 ~ 300 | 25 ~ 450 | 4.5 ~ 76 |
| 150 mm | 150 | 6" | 50 ~ 500 | 40 ~ 630 | 3.8 ~ 60 |
| 200 mm | 200 | 8" | 100 ~ 1000 | 80 ~ 1200 | 3.2 ~ 48 |
| 250 mm | 250 | 10" | 150 ~ 1500 | 120 ~ 1800 | 2.5 ~ 37.5 |
| 300 mm | 300 | 12" | 200 ~ 2000 | 180 ~ 2500 | 2.2 ~30.6 |
| 350 mm | 350 | 14" | 300 ~ 3000 | 220 ~ 3500 | 1.7 ~ 27 |
| 400 mm | 400 | 16" | 350 ~ 3500 | 300 ~ 4500 | 1.4 ~ 21 |
| 450 mm | 450 | 18" | 420 ~ 4200 | 400 ~ 6000 | 1.2 ~ 15 |
| 500 mm | 500 | 20" | 500 ~ 5000 | 400 ~ 7100 | 1.0 ~ 17.8 |
| 600 mm | 600 | 24" | 700 ~ 7000 | 500 ~ 10000 | 0.7 ~ 14 |

## STEAM MEASURING RANGE

| VNER MA80T VORTEX FLOWMETER STEAM FLOW MEASURING RANGE (UNDER REFERENCE CONDITIONS) | | | | | |
|---|---|---|---|---|---|
| Vales Based on Air: Temperature (t): 20°C / 68°F; Pressure (p): 0.1013 MPa / 14.7 Psi; Density (p): 1.205 kg/m³ / 0.0751 lb/ft³ | | | | | |
| Nominal Pipe Size | Nominal Diameter DN Standard (mm) | Nominal Diameter ANSI Standard (in) | Minimum Measuring Range (kg/h) | Maximum Measuring Range (kg/h) | Extended Maximum Measuring Range (kg/h) |
| 15 mm | 15 | 1/2" | 8.24 x √p | 49.5 x √p | 38.2 x p |
| 20 mm | 20 | 3/4" | 9.88 x √p | 79 x √p | 67.8 x p |
| 25 mm | 25 | 1" | 13.12 x √p | 104 x √p | 2106 x p |
| 32 mm | 32 | 1 1/4" | 23 x √p | 184 x √p | 174 x p |
| 40 mm | 40 | 1 1/2" | 26.65 x √p | 265 x √p | 271 x p |
| 50 mm | 50 | 2" | 49.41 x √p | 494 x √p | 424 x p |
| 65 mm | 65 | 2 1/2' | 82.35 x √p | 823 x √p | 716 x p |
| 80 mm | 80 | 3" | 115.3 x √p | 1153 x √p | 1085 x p |
| 100 mm | 100 | 4" | 164.7 x √p | 1647 x √p | 1696 x p |
| 125 mm | 125 | 5" | 247.1 x √p | 2471 x √p | 2649 x p |
| 150 mm | 150 | 6" | 329.4 x √p | 3294 x √p | 3815 × p |
| 200 mm | 200 | 8" | 658.8 x √p | 6588 x √p | 6782 x p |
| 250 mm | 250 | 10" | 988.2 x √p | 9882 x √p | 1.596 x p |
| 300 mm | 300 | 12" | 1647 x √p | 16470 x √p | 15260 x p |
| 350 mm | 350 | 14" | 2471 x √p | 24710 x √p | 20771 x p |
| 400 mm | 400 | 16" | 2965 x √p | 29650 x √p | 27130 x p |
| 450 mm | 450 | 18" | 3459 x √p | 34590 x √p | 34336 x p |
| 500 mm | 500 | 20" | 4118 x √p | 41180 x √p | 42390 x p |
| 600 mm | 600 | 24" | 5270 x √p | 52700 x √p | 61042 x p |

## DIMENSIONS FOR MA80 WAFER CONNECTION

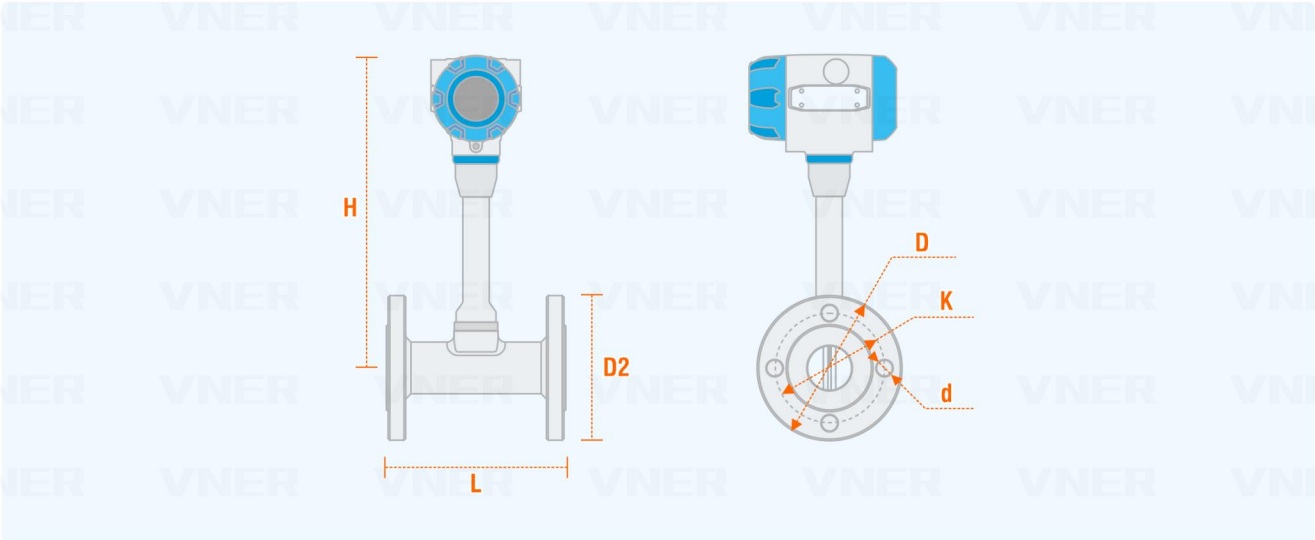



**VNER MA80T VORTEX FLOWMETER-WAFER**

Dimensions with Wafer Connection ( PN 25 )

| Nominal Diameter | Inner Diameter (D) | Outer Diameter (D1) | Tube Length (L) | Flange Ring Diameter (D2) | Bolt Hole Centre Diameter (K) | Flange Thickness (C) | Bolt Hole Diameter (d) | Number of Bolts (n) | Thread Specification |
|---|---|---|---|---|---|---|---|---|---|
| 15mm | 15 | 65 | 15 | 120 | 85 | 14 | 14 | 4 | M12 |
| 20mm | 20 | 65 | 20 | 120 | 85 | 16 | 14 | 4 | M12 |
| 25mm | 25 | 65 | 25 | 135 | 100 | 16 | 14 | 4 | M12 |
| 32mm | 32 | 65 | 32 | 145 | 110 | 18 | 18 | 4 | M16 |
| 40mm | 40 | 65 | 40 | 150 | 110 | 18 | 18 | 4 | M16 |
| 50mm | 50 | 65 | 50 | 165 | 125 | 20 | 18 | 4 | M16 |
| 65mm | 65 | 70 | 65 | 185 | 145 | 22 | 18 | 8 | M16 |
| 80mm | 80 | 80 | 80 | 200 | 160 | 24 | 18 | 8 | M16 |
| 100mm | 100 | 100 | 100 | 235 | 190 | 26 | 22 | 8 | M20 |
| 125mm | 125 | 110 | 125 | 270 | 220 | 28 | 26 | 8 | M24 |
| 150mm | 150 | 120 | 150 | 300 | 250 | 30 | 26 | 8 | M24 |
| 200mm | 200 | 140 | 200 | 360 | 310 | 32 | 26 | 12 | M24 |
| 250mm | 250 | 140 | 250 | 425 | 370 | 35 | 30 | 12 | M27 |
| 300mm | 300 | 140 | 300 | 485 | 430 | 38 | 30 | 16 | M27 |

## DIMENSIONS FOR MA80 FLANGE CONNECTION




**VNER MA80T VORTEX FLOWMETER-FLANGE**

Dimensions with Flange Connection ( PN 25 )

| Nominal Diameter | Inner Diameter (D) | Outer Diameter (D1) | Tube Length (L) | Bolt Hole Centre Diameter (K) | Flange Thickness (C) | Bolt Hole Diameter (d) | Number of Bolts (n) | Thread Specification | Meter Height (H) |
|---|---|---|---|---|---|---|---|---|---|
| 15mm | 15 | 95 | 200 | 65 | 14 | 14 | 4 | M12 | 325 / 335 |
| 20mm | 20 | 105 | 200 | 75 | 16 | 14 | 4 | M12 | 328 / 338 |
| 25mm | 25 | 115 | 200 | 85 | 16 | 14 | 4 | M12 | 330 / 340 |
| 32mm | 32 | 140 | 200 | 100 | 18 | 18 | 4 | M16 | 318 / 328 |
| 40mm | 40 | 150 | 200 | 110 | 18 | 18 | 4 | M16 | 320 / 330 |
| 50mm | 50 | 165 | 200 | 125 | 20 | 18 | 4 | M16 | 325 / 335 |
| 65mm | 65 | 185 | 200 | 145 | 22 | 18 | 8 | M16 | 330 / 340 |
| 80mm | 80 | 200 | 200 | 160 | 24 | 18 | 8 | M16 | 335 / 345 |
| 100mm | 100 | 235 | 250 | 190 | 26 | 22 | 8 | M20 | 345 / 355 |
| 125mm | 125 | 270 | 250 | 220 | 28 | 26 | 8 | M24 | 360 / 370 |
| 150mm | 150 | 300 | 300 | 250 | 30 | 26 | 8 | M24 | 375 / 385 |
| 200mm | 200 | 360 | 350 | 310 | 32 | 26 | 12 | M24 | 420 / 430 |
| 250mm | 250 | 425 | 450 | 370 | 35 | 30 | 12 | M27 | 445 / 455 |
| 300mm | 300 | 485 | 500 | 430 | 38 | 30 | 16 | M27 | 475 / 485 |
| 350mm | 350 | 555 | 600 | 490 | 42 | 33 | 16 | M30 | 500 / 510 |
| 400mm | 400 | 620 | 600 | 550 | 46 | 36 | 16 | M33 | 525 / 535 |
| 450mm | 450 | 670 | 600 | 600 | 50 | 36 | 20 | M33 | 550 / 560 |
| 500mm | 500 | 730 | 600 | 660 | 56 | 36 | 20 | M33 | 575 / 585 |
| 600mm | 600 | 845 | 600 | 770 | 68 | 39 | 20 | M36 | 625 / 635 |

## INSTALLATION

**CAUTION**

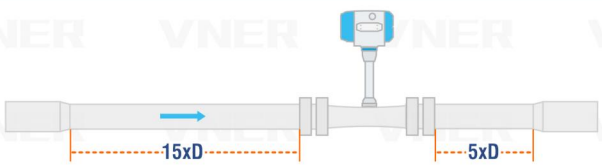
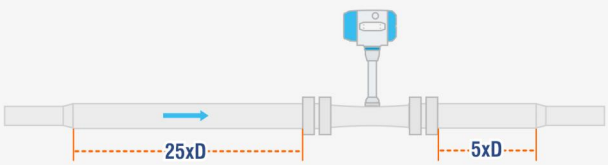
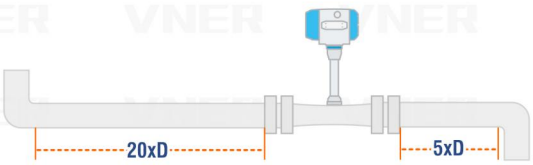
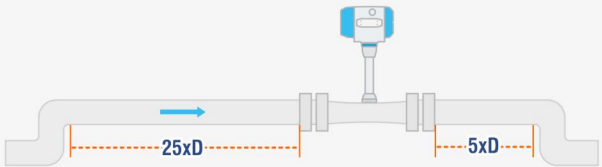
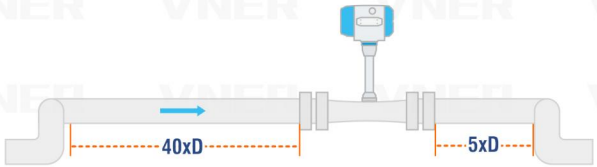
- Installation of the vortex flow meter must be performed by expert engineer or skilled personnel.
- Be careful that no damage is caused to people through accidentally dropping.
- When the vortex flow meter is processing with hot mediums like hot fluid or steam,be careful not to get burnt.
- All procedures relating to installation must comply with the installation requirements.
- Suggest to select an area subject to minimize mechanical vibration.If the flow meter is subject to vibrations,it is recommended to provide pipeline supports.
- No collision by hard subject,when the flow sensor is being installed otherwise the accuracy will be influenced,even the flow meter will be damaged.

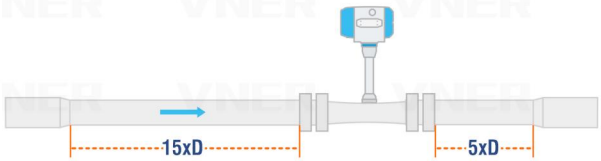
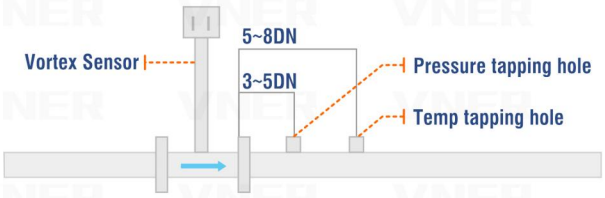
## FLANGE/WAFER TYPE INSTALLATION

- **Installation Direction**

Horizontal or Vertical (The flow direction should always be upwards while vertical installation)

- **Straight Pipe Length Recommendation(D:Nominal Diameter mm)**

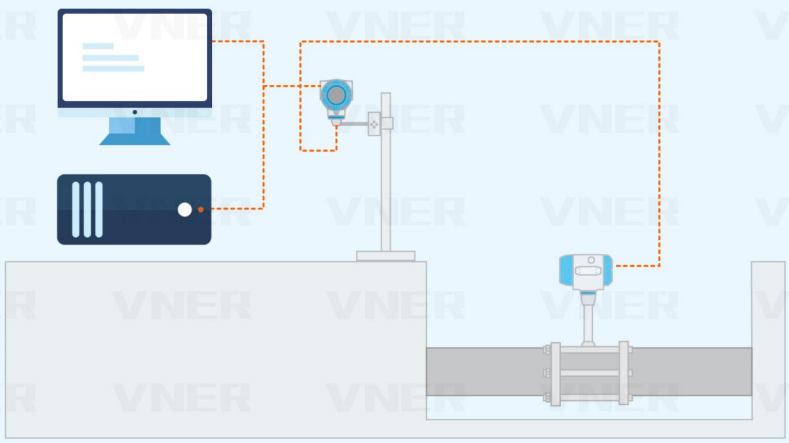
| Description | Figure |
|---|---|
| Concentric reducers pipeline |  |
| Concentric expansion pipeline |  |
| Single quarter bend |  |
| Two quarter bends on the same surface |  |
| Two quarter bends on the different surface |  |

| Description | Figure |
| --- | --- |
| Regulating valve,half-open gate |  |
| Valve position | Flow regulating valve must be installed at the downstream of flow sensor. |
| Pressure and temperature taps(for remote type vortex flow meter with T&P compensation only) Remote type vortex flow meter with pressure and temperature compensation need to place pressure and temperature tap according to the requirement.Install pressure tapping point at3-5D downstream of flow sensorand temperaturetaking point at 5-8D downstream of flow sensor. |  |
| Vibration<br>Flow sensor should be not installed on a strong vibration pipeline | If install the flow sensor on a vibration pipeline,there are following methods to decrease the disturbing of vibration:<br>Installinga fixed support on pipeline at 2D upstream of flow meter.<br>At the condition of meeting the straight length,install ahosepipe as a transmission. |
| High temperature pipeline | If the heat preservation not good,the flow meter should be installed downward vertical. |

If the length of upstream can not meet the requirement,suggest to install a flow regulator at the upstream pipeline.

## REMOTE MODEL

The remote model vortex flowmeter is to separate the signal processing part (circuit board) and vortex sensor (flowmeter body) to adapt to the harsh installation environment, so as to facilitate the commissioning of the instrument. The maximum separation distance is 10 meters, see schematic diagram.



*REMOTE VORTEX FLOWMETER INSTALLATION DIAGRAM*

1) The vortex flowmeter can be installed indoors or outdoors. If installed in an underground well with the possibility of flooding, the submersible type should be selected.

2) Vortex flowmeter can be installed horizontally, vertically or inclined on the pipeline. When measuring liquids, the pipeline must be filled with liquid, so when installing vortex flowmeter on vertical or inclined pipeline, the flow direction of liquid should be from bottom to top.

3) vortex flowmeter upstream side and downstream side should leave a long straight section, the required length of the upstream and downstream straight section varies with the pipeline conditions.Vortex flowmeter upstream should try to avoid the installation of regulating valves or half-open valves, regulating valves or half-open valves should be installed downstream of the flowmeter after 5D.Different pipeline conditions, the installation requirements of straight pipe section

4) Installation of vortex flowmeter pipe diameter must be consistent with the inner diameter of the flowmeter, otherwise the pipe must be reduced in diameter, straight pipe section requirements

5) When designing piping installation, 500mm space should be left at the upper end of the signal processing converter to facilitate commissioning and maintenance.

## ELECTRICAL CONNECTIONS

**WARNING**

- The wiring of the swirl flow meter must be performed by expert engineer or skilled personnel.Before wiring,check that no voltage is applied to the power cable.The supply voltage is within the range of the instrument.

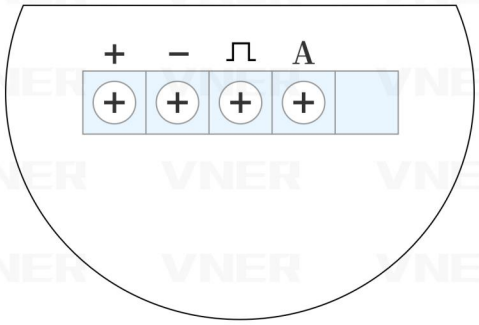
*According to different functions there are four types of terminal boards:*

1. *Normal type without compensation,4-20mA+Pulse+HART*
2. *Normal type without compensation,4-20mA+Pulse+RS485*
3. *With compensation,4-20mA+Pulse+HART*
4. *With compensation,4-20mA+Pulse+RS485*

**Please check your product terminal and follow the correct wiring instructions.**

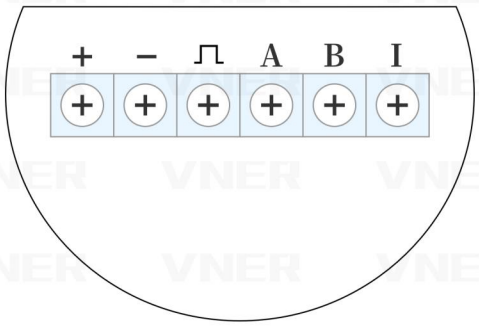
## WIRING DIFFERENT TYPES OF TERMINAL BOARDS

### NORMAL TYPE WITHOUT COMPENSATION,4-20MA+PULSE+HART



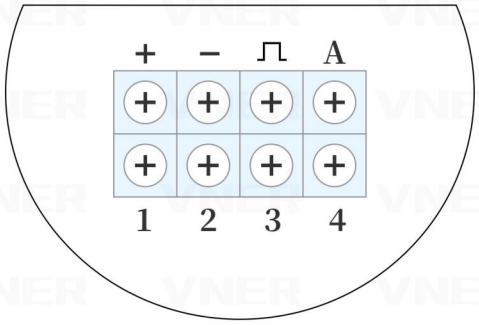

| Connection | Description |
|---|---|
| Power Supply | DC24V + → +<br>DC24V - → - |
| 4-20mA/HART(two wire) | 4-20mA + → +<br>4-20mA - → - |
| Pulse | Pulse + → ⎍<br>Pulse - → -<br>Short circuit ⎍ and A |

### NORMAL TYPE WITHOUT COMPENSATION,4-20MA+PULSE+RS485



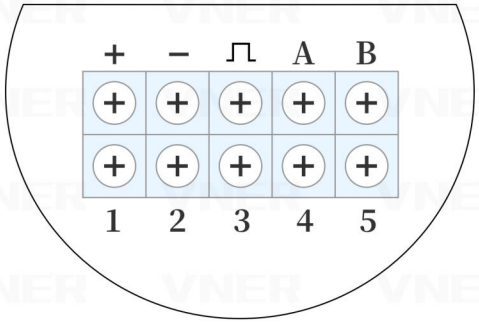

| Connection | Description |
|---|---|
| Power Supply | DC24V + → +<br>DC24V - → - |
| 4-20mA/HART(two wire) | 4-20mA + → +<br>4-20mA - → - |
| Pulse | Pulse + → ⎍<br>Pulse - → - |
| RS485 | RS485 + → A<br>RS485 - → B |

## WITH COMPENSATION,4-20MA+PULSE+HART



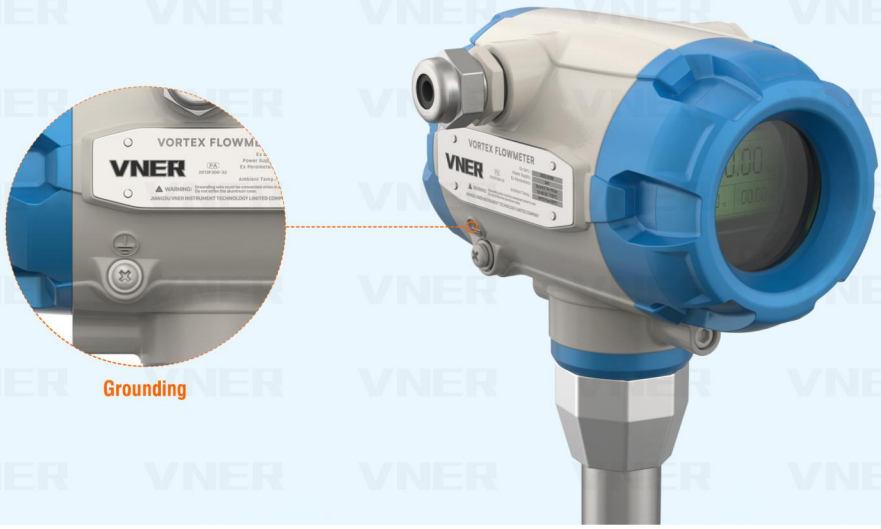

| Connection | Description |
|---|---|
| Power Supply | DC24V + → +<br>DC24V - → - |
| 4-20mA/HART(two wire) | 4-20mA + → +<br>4-20mA - → - |
| Pulse | Pulse + → ⎍<br>Pulse - → -<br>Short circuit ⎍ and A |

## WITH COMPENSATION,4-20MA+PULSE+RS485




| Connection | Description |
|---|---|
| Power Supply | DC24V + → +<br>DC24V - → - |
| 4-20mA/HART(two wire) | 4-20mA + → +<br>4-20mA - → - |
| Pulse | Pulse + → ⎍<br>Pulse - → - |
| RS485 | RS485 + → A<br>RS485 - → B |

### *Grounding*

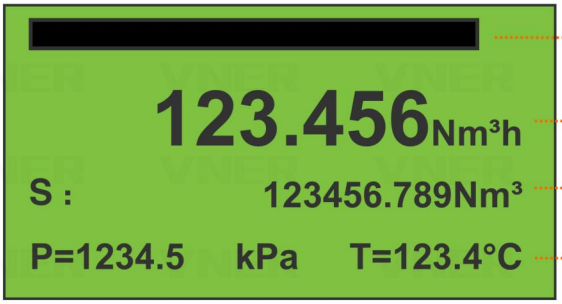


## OPERATION

**WARNING**

- Do not open the cover with wet hands
- When opening the cover,wait for more than 2 minutes after turning off the power.

## DISPLAY CONFIGURATION




*Display the current percentage in progress bar*

*First line display instantaneous flow*

*The second line display totalized flow*

*The third line display frequency,pressure,temperature,density, current or the percentage*

If the pressure sensor is set to “automatic acquisition”mode,when pressure sensor failure is detected the corresponding value will be replaced by the manual setting value (the value set in basic menu “Gauge Pre.KPa”) and the value will flash on display.

If the temperaturesensor is set to “automatic acquisition”mode, when temperature sensor failure is detected,the corresponding value will be replaced by manual setting value (the value set in basic menu “Temperature”) and the value will flash on display.

**NOTES**

When the flow mode is set as “Sat Steam (P)”,it means saturated steam with pressure compensation only.At this time temperature value wll display as "----” which means the acquisition of temperature sensor is not activated.

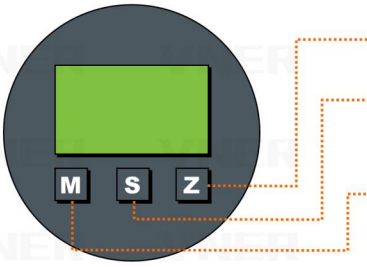
When the flow mode is set as “Sat_Steam (T)”,it means saturated steam with temperature compensation only.At this time pressure value will display as "----” which means the acquisition of pressure sensor is not activated.

You can press KEY-M to change the third line display variables.Use indicator to distinguish between different display variables shows in the second line.

| Indicator | F: | Den: | P: | T: | Curr: | Per: | P=T= |
|---|---|---|---|---|---|---|---|
| Variable | Frequency | Density | Pressure | Temperature | Loop Current | Percentage | Pressure and temperature |

## DATA SETTING METHOD

Data setting can be performed with the three keys on the front panel (M,S and Z).




*Press Z-Key to enter or exit the menu mode (data entry)*

*Press S-Key to scroll forward through the menu,or to shift the setting number*

*Press the M-Key to scroll backwards through the menu,or to increase the setting number Long press (over 3 seconds)the M-Key to enter subnmenu setting,or access the parameter to be changed,or accept the new selected or entered value*

### ◆ Enter or Exit Menu Mode

**Enter Menu Mode**

In the operating mode,press the "Z"key to enter the menu mode (data entry).

**Exit Menu Mode**

In the menu mode,press the "Z"key to back to the operating mode.

### ◆ Data Entry Method

Press M-Key for 2 seconds to enter setting,and the menu options will start flashing. Short press M-Keyor S-Keyto scroll backwards or forwards the menu.

Press M-Key for 2 seconds to save(access)the parameter.

## MENU LIST

### BASIC FUNCTION

Menus settings have been done by our engineer.In normal case do not suggest user to change menu by themselves which may cause the meter work improperly.

| Menu | Description | Setting method |
|---|---|---|
| Contrast | 1~5 Normal set as 3. | Menu Selection |
| Protection | ON/OFF | Press"M"button for 2 seconds to change |
| Min Alarm(%) | Set low alarm value.Unit:% | Direct Input |
| Max Alarm(%) | Set high alarm value.Unit:% | Direct Input |
| Meter Size | View meter size setting | Read Only |
| Flow mode | LiquidQv:Liquid volume Steam Qv:Steam volume<br>Liquid Qm:Liquid mass Steam(P/T):Steam mass<br>Gas Qv:Gas volume Sat_Steam(T):Saturated steam mass (temperature compensation)<br>Gas Qm:Gas mass Sat_Steam(P):Saturated steam mass (pressure compensation) | Menu Selection |
| Unit-Qv<br>Unit-Qm | Volume units supported:<br>Nm/h,Nm³/m,Nm³/s, m/s,m³/m,m³/h,m³/d, cf/s,cf/m,cf/h, UKG/s,UKG/m,UKG/h,<br>L/s,L/m,L/h, Scf/s,Scf/m,Scf/h, USG/s,USG/m,USG/h, bbl/h,bbl/d<br>Mass units supported:<br>g/s,g/m,g/h, kg/s,kg/m,kg/h,kg/d, t/m,t/h,t/d, lb/h,lb/d<br>Note:accumulative flow unit based on the instant flow unit. | Menu Selection |
| Range 100% | Set the Qmax value for selected flow mode(=20 mA) | Direct Input |
| Density (kg/m³)<br>Density (g/c m) | Set gas density (unit:Kg/m³)<br>Set liquid density (unit:g/cm³) | Direct Input |
| Gauge Pre. (KPa) | Use for gas or steam measure.Unit:kPa | Direct Input |
| Temperature(C) | Use for gas or steam measure.Unit:℃ | Direct Input |
| PV Cutoff (%) | Range:0%～20% | Direct Input |
| Damping | Range:0～64S | Direct Input |
| Disp.Point | Set the first line displaypoint,can be 0.1.2.3 | Menu Selection |
| Display Mode | Set display mode | Menu Selection |
| Totalizer reset | When Lcd display"Yes",long press M-Key to reset the totalizer and overflow counter. | Menu Selection |
| Numberof totalizer overflows | Display of the number of totalizer overflows; 1 overflow=10,000,000 | Read Only |
| K-Factor | View the K-Factor. | Read Only |

### Flow Unit &Total Flow Unit Relation

| Flow Unit | Total Flow Unit | Flow Unit | Total Flow Unit |
|---|---|---|---|
| $Nm^3/h,Nm^3/m,Nm^3/s$ | $Nm^3$ | UKG/s,UKG/m,UKG/h, | UKG |
| $m^3/d,m^3/h,m^3/m,m^3/s$ | $m^3$ | bbl/h,bbl/d, | bbl |
| L/h,L/m,L/s | L | g/h,g/m,g/s | g |
| Scf/s,Scf/m,Scf/h, | Scf | kg/d,kg/h,kg/m,kg/s | kg |
| cf/s,cf/m,cf/h, | cf | t/d,t/h,t/m | t |
| USG/s,USG/m,USG/h, | USG | Lb/h,Lb/d | Lb |

## ADVANCED FUNCTION (PASSWORD PROTECTION)

Below menusare for expert engineers only.All settings had been done properly during flow meter calibration in factory.Do not suggest user to change any of the settings which may cause flow meter work improperly.

| Menu | | Description | Description | Setting method |
|---|---|---|---|---|
| M51 | Signal Monitor | LCD display:<br>450.00 This is the PGA gain.<br>CH2 CH2 issignal channel. | ****50 | Read Only |
| M52 | Meter Size | Options:<br>15mm,20mm,25mm,32mm,40mm,50mm,65mm,80mm,100mm,125mm,150mm,200mm,250mm,300mm,<br>350mm,400mm | | Menu Selection |
| M53 | Fluid Type | Options:Gas,or Liquid. | | Menu Selection |
| M54 | Low Flow Limit | According to the meter size and measuring media,set the corresponding low limit of the flow.<br>The unit of 'Low Flow Limit'is fixed as $m^3/h$ | | Direct Input |
| M55 | HighFlow Limit | The'High Flow Limit'defaultsto 10 times the 'Low Flow Limit',the actual measurement of the upper limit of 2.5 times the set value The unit of'High Flow Limit'is fixed as m/h When the actual required range ratio exceeds 20:1,can manually modify the 'High Flow Limit'. | | Direct Input |
| M56 | Max AMP. | Between 200 and 1000 suggested.Typically about 400. | | Direct Input |
| M57 | K-Factor | Set average calibration K-Factor ($1/m^3$)<br>Means how many pulses corresponding to $1m^3$ flow | | Direct Input |
| M58 | Pulse Factor Unit | Options:$m^3$,$Nm^3$,t,kg,Scf,cf,USG,UKG, bbl,lb. | | Menu Selection |
| M59 | Pulse Factor | Set the numberof output pulses corresponding to one 'Pulse Factor Unit'.<br>Note:If you want to output the original pulse, set'K-factor [57]'and *Pulse factor [59]'to the same value, and 'Pulse Factor Unit [58]'must set to $m^3$. | | Direct Input |
| M60 | K-Factor Trim Fi<br>K-Factor Trim Yi | Five-point K-Factor correction.<br>Where Fiis the reference frequency,Yi is the correction coefficient K.i=1,2,3,4,5. | ****60 | Direct Input |
| M61 | Frequency Factor | The reference frequency value of the five-point correction is multiplied by the frequency factor,and then the new reference frequency value of the correction point is obtained Normally,this value should be 1.<br>When calibrated with water,for gas measurements,you can set the coefficient so that the five-point correction factor remains in effect | ****61 | Direct Input |
| M62 | AMP.<br>Channel | There areCH_1,CH_2,CH_3 three options. CH_3 gainmaximum CH_1 gain minimum<br>Note:<br>CH2 generally used for liquid measurement, which corresponds to the configuration software,select X1 and X2.<br>CH_3 generally used for gas measurement, which corresponds to the configuration software,select X1,X2 and X3. | ****62 | Menu Selection |
| M63 | Work Mode | There are F_1,F_2,F_3,F_4 four options.<br>F_1:Anti-vibration Mode F_2:Normal Mode F_3:Turbine Mode F_4:Test Mode<br>Note: Generally choose F_2. | ****63 | Menu Selection |

| Menu | | Description | Description | Setting method |
|---|---|---|---|---|
| M40 | Trim 4mA | Steps:<br>1.Press M-Key for 2 seconds,enter trim;<br>2.Short press M-key to decrease current. Press S-Key to increase current.Stepping is 16 microamperes.<br>3.Press M-Key for 2 seconds to save new trim value.<br>Or press Z-Key to exit without saving. | ****40 | |
| M41 | Trim 20mA | | | |
| M70 | Temp. Measure | Temperature acquisition mode setting.<br>Options:Manual,or Auto.<br>Manual:Temperature uses the input reference value.<br>Auto:Temperature is automatic acquisition, should be use external Pt1000 or Pt100. | ****70 | Menu Selection |
| M71 | Pressure Measure | Pressure acquisition mode setting.<br>Options:manual,or auto.<br>Manual:If select manual,the pressure value will be replaced by the manual setting value (the value set in basic menu"GaugePre.Kpa").<br>Auto:If select auto,pressure value is by automatic acquisition,need toconnect with external pressure sensor. | | Menu Selection |
| M72 | Temperature Low Trim | Enter the lower calibration resistance value unit:ohm.<br>Use standard resistance as input.<br>For example:1000 forPt1000,or 100 for Pt100 | | Direct Input |
| M73 | Temperature Low Trim | Enter the high calibration resistance value unit:ohm.<br>Use standard resistance as input.<br>For example:2500 for Pt1000,or 250 for Pt100 | | Direct Input |
| M74 | Pressure Low Trim | Enter the calibration reference pressure value Unit:KPa.<br>Apply the standard pressure to the sensor. For example:0 KPa | | Direct Input |
| M75 | Pressure High Trim | Enter the calibration reference pressure value<br>Unit:KPa.<br>Apply the standard pressure to the sensor. For example:1000 KPa | | Direct Input |
| M76 | Pre. Cutoff | Set the low pressure cutoff value.Unit:KPa. If the measured pressure value is less than 'Pre Cutoff',the pressure will be set to 0 KPa | | Direct Input |
| M77 | Set Pre. Bias | Set the pressure bias value.Unit:Kpa.<br>Enter the current actual pressure value to achieve bias.The pressure value will beset as the entered value. | | Direct Input |
| M38 | Min Pre. (Kpa) | This parameter is only used for steam mass measurement.<br>In the steam mass measurement mode,if the pressure is less than the set 'minimum pressure value'when thepressure compensation is activated,the flow will automatically return to zero. | ****38 | Direct Input |
| M39 | Min Temp. (°C) | This parameter is only used for steam mass measurement.<br>In the steam mass measurement mode,if the temperature is less than the set 'minimum temperature value' when the temperature compensation is activated,the flow will automatically return to zero. | | Direct Input |
| M11 | Version | To view the embedded software version. | ****11 | Read Only |
| M12 | Max Frequency | The internal conversion frequency value corresponds to the'High Flow Limit'. | | Read Only |
| M13 | Min Frequency | The internal conversion frequency value corresponds to the'Low FlowLimit'. | | Read Only |
| M90 | Modbus Addr | 1～247 | ****90 | Direct Input |
| M91 | Modbus Baud | "9600","4800","2400","1200","600" | ****90 | Menu Selection |
| M111 | Total Preset | Used todirectly set the current total flow value. | ****111 | Direct Input |
| M721 | Temp. Data X0<br>Temp. Data Y0<br>Temp. Data Xi<br>Temp. Data Y1 | You can directly view and modify the temperature sensor calibration values.<br>Temp. Data X0 and Temp. Data X1 are internal ADC measurements.<br>Temp. Data Y0 [73]and Temp. Data Y1[74] are the input calibration value. | ****721 | Direct Input |
| M741 | Pre .DataX0;<br>Pre. Data Y0;<br>Pre. Data X1;<br>Pre. Data Y1; | You can directly view and modify the pressure sensor calibration values.<br>Pre. Data X0 and Pre. Data X1 are internal ADC measurements.<br>Pre. Data Y0 [75]and Pre. Data Y1[76]arethe input calibration value. | ****741 | Direct Input |

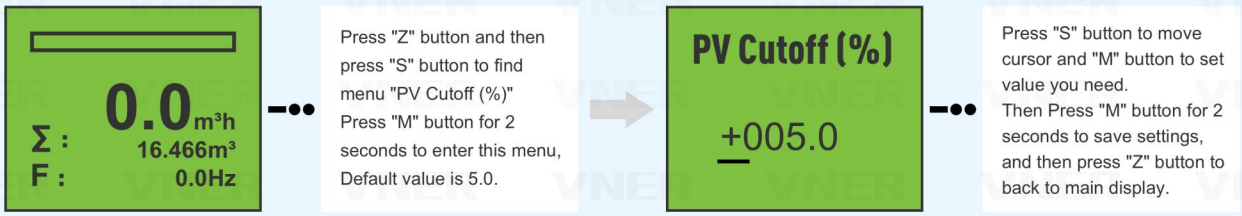
## ● *Adjust LCD contrast:*

**Power on display**


Press“M”button for 2 seconds to save the settings, and then press“Z”button to back to main display.

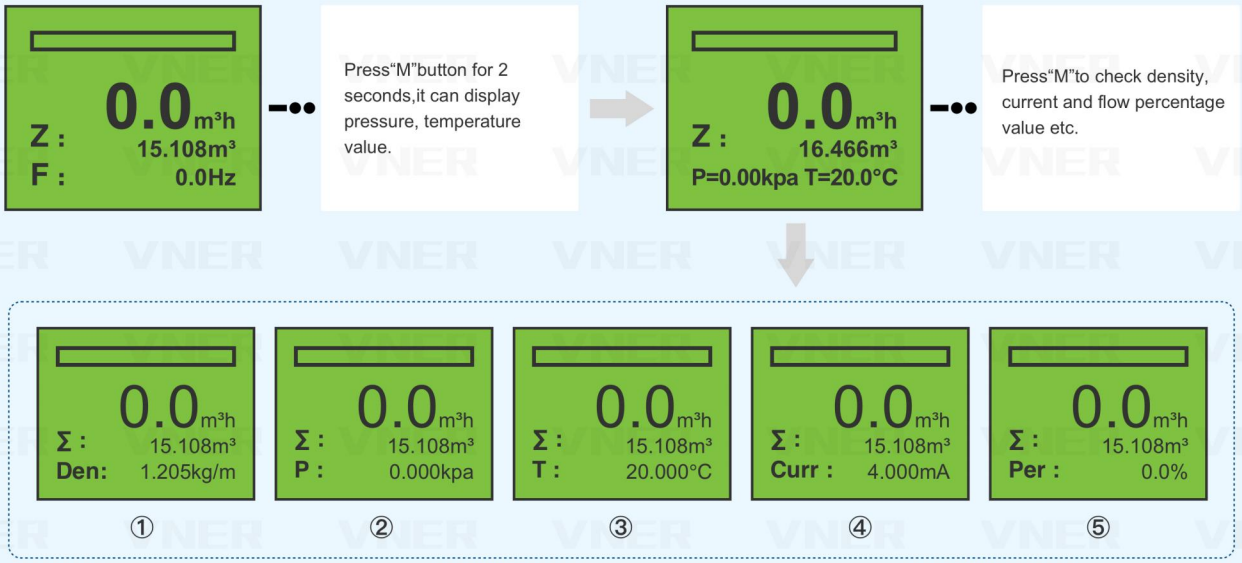
## ● *Low flow cutoff setup:*

**Power on display**




## ● *Checking display values:*

**Power on display can check the frequency on the bottom line.**

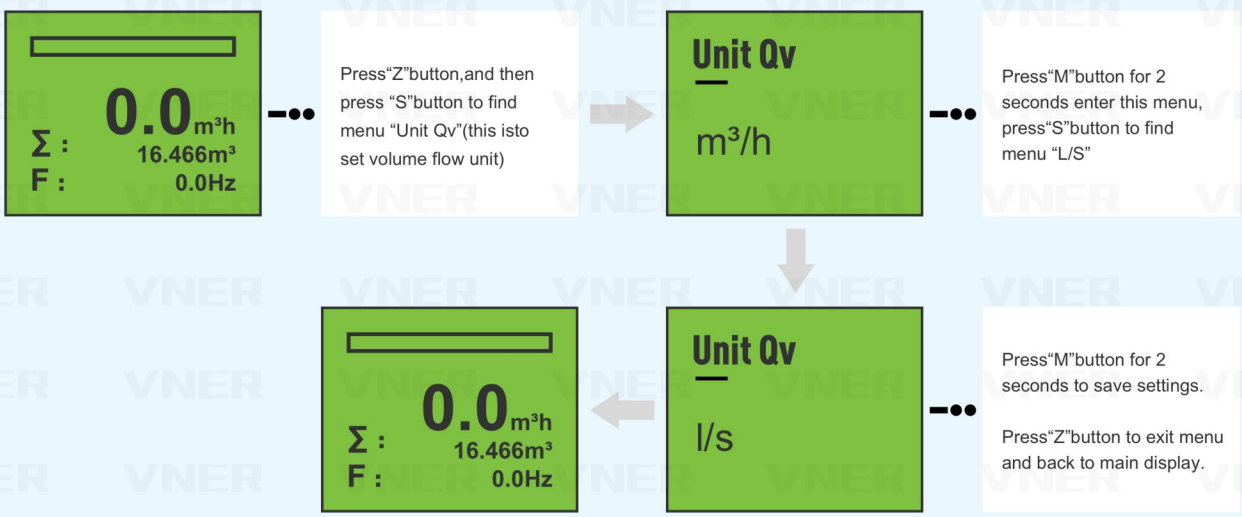


## ● *Total flow reset:*

**Power on display**
**For example,total flow value is 16.466m³**


## ● *Flow unit setup:*

**Power on display**

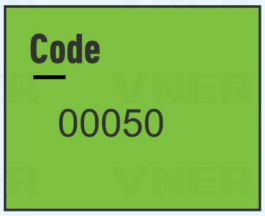


## ● *Pulse parameters setup:*

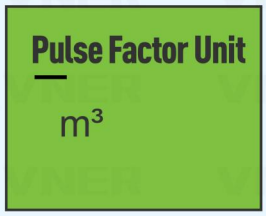
**Power on display**


Press “Z” button and then Press “S” button to find menu“Code”

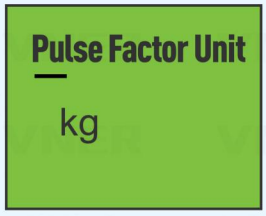

Press“M”button for 2 seconds to enter this menu, and then press “S” button move cursor and press “M” button set number “00050”



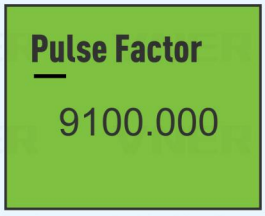

Press “M” button for 2 seconds to enter. Press “S” button to find menu “Pulse Factor Unit” (Default is m³)



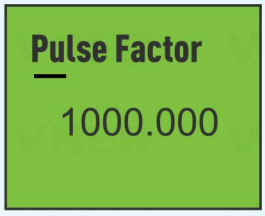

For example, if need to change to “kg”, Press “M” button for 2 seconds to enter this menu, and press “S” button to change to “kg”




Press “M” button for 2 seconds to save settings. And then press “S” button to find the next menu “Pulse Factor”




Press “M” button for 2 seconds to enter this menu, press “S” button to move cursor and press “M ”button to set values. For example change to “1000”

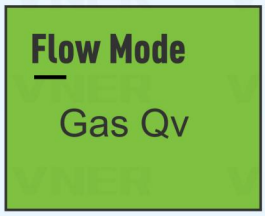



Press “M” button for 2 seconds to save settings and press “Z” button to exist and back to main display.

## ● *Adjust medium type:*

**Power on display**

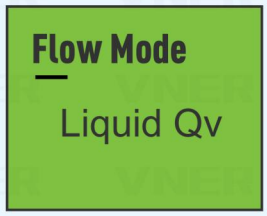

Press “Z” button, and then press “S” button to find menu “Flow Mode”



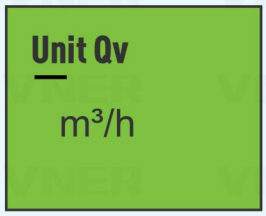

**Options in this menu**

| Flow Mode | Description |
|---|---|
| Gas Qv | Gas volume flow |
| Gas Qm | Gas mass flow |
| Steam Qv | Steam volume flow |
| Steam (P/T) | Steam mass flow with both temperature and pressure compensation |
| Sat_Steam(T) | Saturated steam mass flow with temperature compensation only |
| Sat_Steam(P) | Saturated steam mass flow with pressure compensation only |
| Liquid Qv | Liquid volume flow |
| Liquid Qm | Liquid mass flow |

Press “M” button for 2 seconds to enter this menu and press “S” button to choose “Liquid Qv”




Press “M” button for 2 seconds to save settings.
Press “S” button to find menu “Unit Qv” (for liquid Qv flow unit need in volume flowunit ) Set “Unit Qv” as “m³/h”

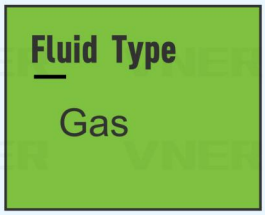



Press “S” button to find menu “Range 100%” and set according to the recommend flow range for your medium type.


Press “S” button to find menu “Code”


Press "M" button for 2 seconds to enter this menu, and then press “S”button to move cursor and press “M” button to set number “00050”.

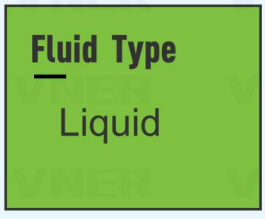

Press “M ”button for 2 seconds to save and then press “S” button to find menu “Fluid Type”



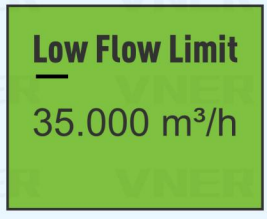

**Options in this menu**

| Fluid Type | Description |
|---|---|
| Gas | For gas, and steam |
| Liquid | For liquid flow |

Press “M” button for 2 seconds enter this menu, and press “S” button to choose “Liquid”




Press “M” button for 2 seconds to save settings. Then Press “S” button to find “Low Flow Limit”




Set the number according to the min flow of your medium type and size correctly

## TROUBLE SHOOTING

| Fault | Reason | Solution |
|---|---|---|
| Measurement Error | 1) Straight pipe section is not enough | 1) Lengthen thestraight pipe section or install a regulator |
| | 2) Supply voltage changes too much | 2) Check the power supply |
| | 3) The instrument exceeds the verification period | 3) Timely inspection |
| | 4) The inner diameter of the flow meter and the pipe are quite different | 4) Check the piping inner diameter to correct the meter coefficient |
| | 5) The installation is not concentric or the gasket is protruding into the flow tube | 5) Adjust and install,rest the gasket |
| | 6) The sensor is stained or damaged | 6) Clean or replace the sensor |
| | 7) There is two-phase flow or pulsating flow | 7) Eliminate two-phase flow or pulsating flow |
| | 8) There is leakage in the pipeline | 8) Eliminate leakage |
| Unstable/Irregular Output signal | 1) There is a strong electrical interference signal | 1) Strengthen shielding and grounding |
| | 2) The sensoris stained or damp,and the sensitivity is reduced | 2) Clean or replace the sensor |
| | 3) The sensor is damaged or the lead is not in contact | 3) Check the sensor and lead |
| | 4) Two-phase flow or pulsating flow | 4) Strengthen process management and eliminate two phases flow or pulsating flow |
| | 5) The impact of pipeline vibration | 5) Take measures to reduce vibration |
| | 6) Unstable process | 6) Adjust the installation position |
| | 7) The sensor installation is not concentric or the gasket protrudes into the tube | 7) Check the installation and correct the inner diameter of the gasket |
| | 8) Upstream and downstream valve disturbance | 8) Lengthen straight pipe section or install adjuster |
| | 9) The pipe is not fully filled with fluid | 9) Installationlocation and method of replacing the sensor |
| | 10) The vortex generator has windings | 10) Eliminate entanglement |
| | 11) There is cavitation phenomenon | 11) Reduce the flow rate and increase the pressure in the pipe |
| Leakage | 1) The pressurein the pipe is too high | 1) Adjust the pipe pressure and change the installation position |
| | 2) The nominal pressure of the sensor is incorrectly selected | 2) Choose a higher nominal pressure sensor |
| | 3) The seal is damaged | 3) Replace the gasket |
| | 4) The sensor is corroded | 4) Take anti-corrosion and protection measures |
| Abnormal Noise | 1) The flow rate is too high,causing strong tremor | 1) Adjust the flow or replace a larger diameter instrument |
| | 2) Cavitation phenomenon occurs | 2) Adjust the flow rate and increase the liquid pressure |

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## JIANGSU VNER ELECTRONIC TECHNOLOGY LTD

We adapt to local regulations, we strive to deliver quality solutions and we are constantly trying to reduce our environmental impact.



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