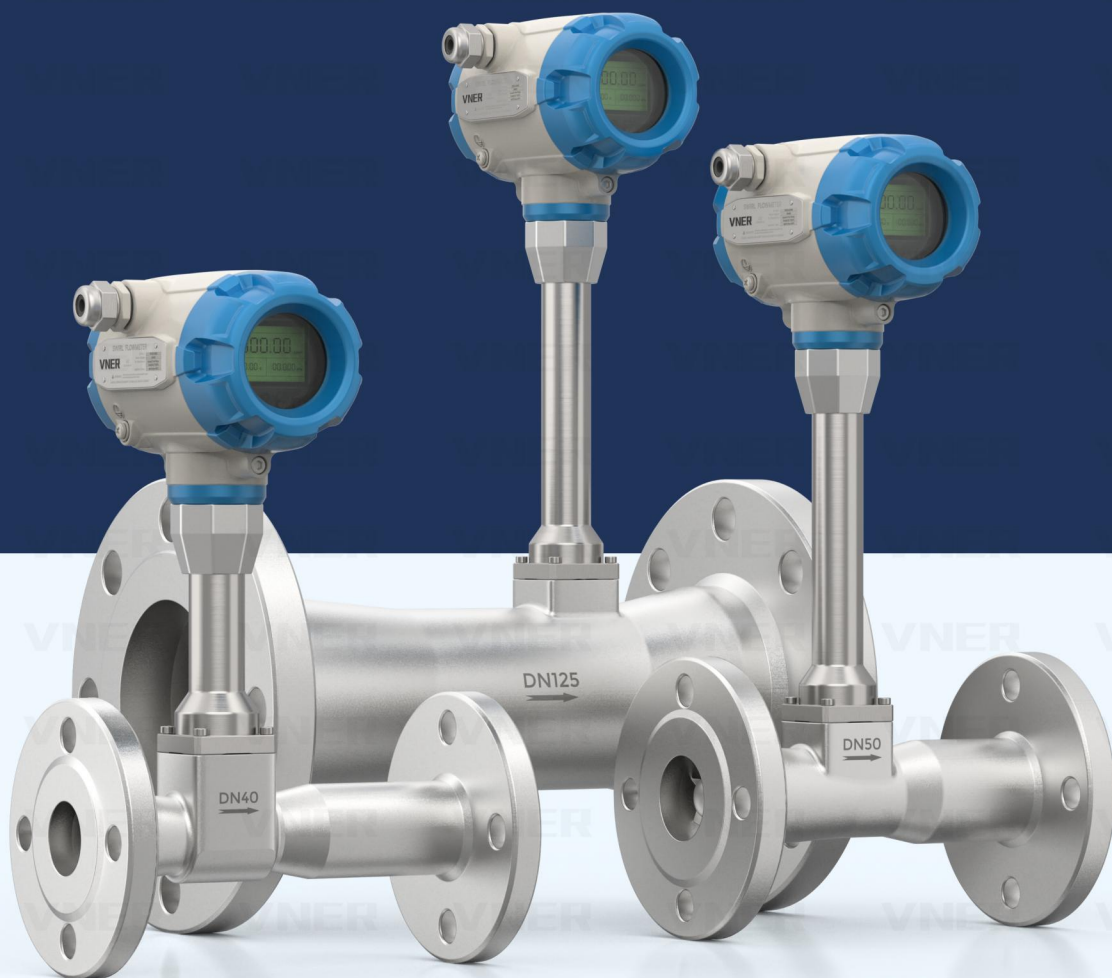


# VNER

# SWIRL FLOWMETER

SA80T SERIES



JIANGSU VNER ELECTRONIC TECHNOLOGY LTD

[WWW.VNER.COM.CN](http://WWW.VNER.COM.CN)

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Thank you for purchasing VNER Swirl 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 Swirl flowmeters are thoroughly tested at the factory before shipment.**

- When these instruments are delivered, perform a visual check to make sure that no damage occurred 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 SA80T SWIRL FLOWMETER OVERVIEW

The SA80T Enhanced Swirl flowmeter is a dependable device, designed with a simplified structure that is highly versatile and interchangeable. It utilizes digital signal processing, which enhances its anti-interference capabilities. The circuit module is assembled with components that meet higher reliability and durability standards, and the surface mount modular design eliminates low-reliability components such as potentiometers and plugs. This ensures that the flowmeter is highly stable and accurate.

1. Rotatable meter head
2. Anti-interference
3. Easy maintenance
4. Intelligent modular design



Rotatable Meter Tower



Removable Protection Covers



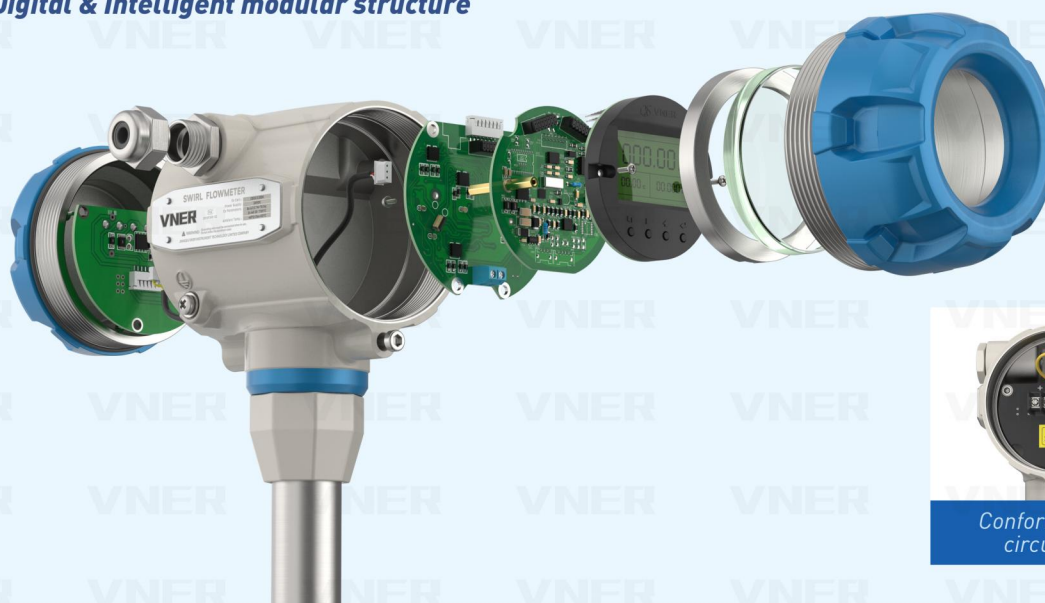
Easy-Maintenance Design



Eye-Catching Protection Paint



### Digital & Intelligent modular structure



Conformal coated circuit board

## SWIRL FLOWMETER INTRODUCTION AND SCOPE OF APPLICATION

The swirl flowmeter is one of the major flow measurement instruments in the international market today. It is widely used in industrial sectors such as petroleum, chemical engineering, metallurgy, as well as in municipal construction and environmental protection projects. It measures, detects, and controls the flow of most liquids, gases, and steam.

The SA80T swirl vortex flowmeter is manufactured using the latest German technology and processes.

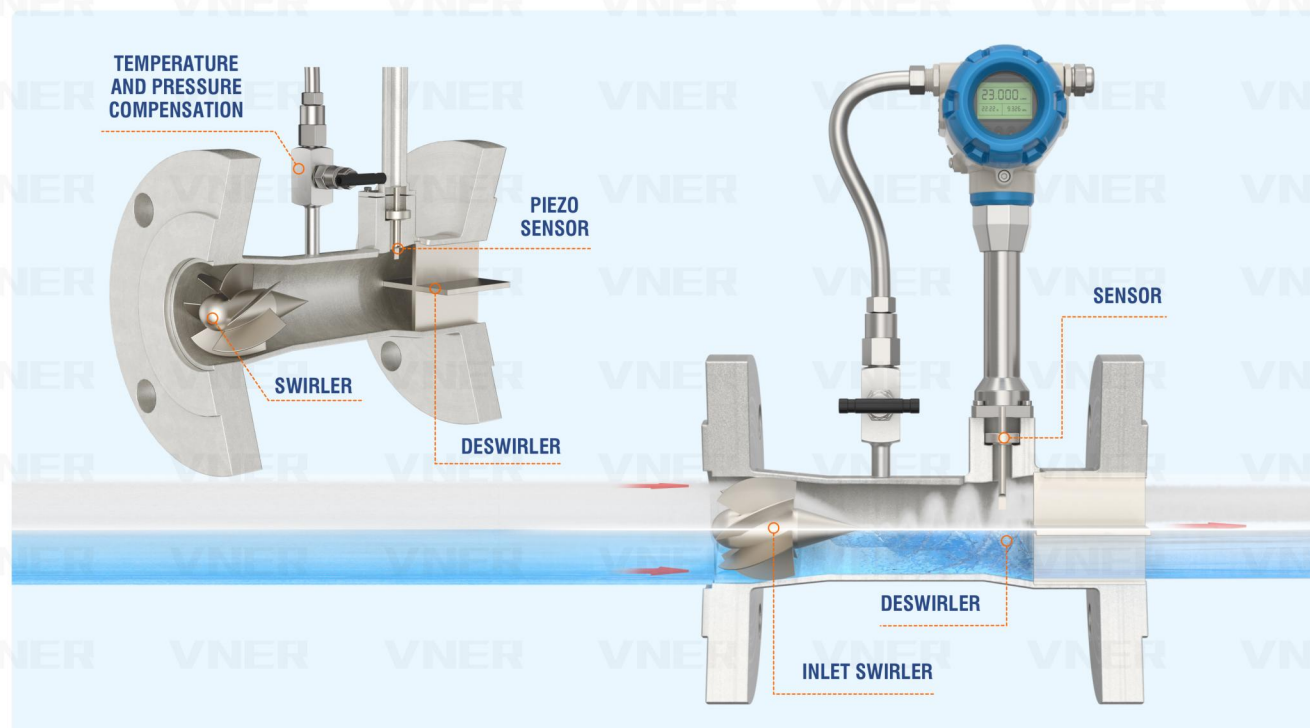
The product line includes the following variants with different functions:

- 1) The two-wire integral transmitter: Outputs a 4-20mA current signal and provides real-time display of instantaneous flow, cumulative flow, signal frequency, and output current value. It features low flow cut-off and fixed interference signal elimination functions.
- 2) Remote Type: Suitable for harsh environments such as high temperatures or high altitudes.

## MAIN TECHNICAL PARAMETERS

The main technical parameters of the SA80T series are listed in the table below:

Applicable Medium	Gas, Liquid, Steam		
Nominal Diameter (mm):	15, 20, 25, 32, 40, 50, 65, 80, 100, 125, 150, 200, 250, 300, 350, 400		
Nominal Pressure (Mpa)	PN series, ANSI series		
Medium Temperature	-40 to 250°C; custom configurations available for 350~400°C		
Body Material	304, 316L stainless steel (other materials available by agreement)		
Accuracy	Standard $\pm 1\%$ , ( $\pm 0.5\%$ available upon request)		
Turndown Ratio	1:15 to 1:30		
Output Signal	Transmitter: 4-20mA standard current signal proportional to flow		
Power Supply	24VDC		
Resistance Loss Coefficient	(Cd) < 5		
Explosion-Proof Marking	Exiall CT4-T6, ExdII CT4-T6		
Ingress Protection	Standard type IP65, Submersible type IP67/IP68		
Environmental Conditions	Ambient Temperature: -40 to +55°C	Relative Humidity: 5% to 90%	Atmospheric Pressure: 86% to 106Kpa



# INSTRUMENT SERIAL CODE DESCRIPTION

SWIRL FLOWMETER									
<b>Transmitter Type:</b>									
Integral Model	E								
Remote model	R								
Submersible Model	C								
<b>Digital Display and Power:</b>									
On-Site LCD, 24 VDC System Power	D								
On-Site LCD, 3.6 VDC Battery Powered	B								
<b>Process Connection Type:</b>									
GB Flange		1							
DIN Flange		2							
ANSI Flange		3							
<b>Measured Medium:</b>									
Liquid			1						
Gas			2						
Saturated Steam, Overheated Steam < 350°C			3						
<b>Body Material:</b>									
Stainless Steel 304				A					
Stainless Steel 316L				B					
Carbon Steel				C					
Customization Available Upon Request				E					
<b>Nominal Diameter:</b>									
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				
<b>Nominal pressure:</b>									
PN10					A				
PN16					B				
PN25					C				
PN40					D				
ANSI CLASS 150					F				
ANSI CLASS 300					G				



SWIRL FLOWMETER									
ANSI CLASS 600					H				
Customization Available (Max.15MPa)					E				
Piezo Sensor Material:									
Stainless Steel 304					1				
Stainless Steel 316					2				
Hastelloy C					3				
Hastelloy B					4				
Titanium					5				
Sealing Material:									
Polytetrafluoroethylene (PTFE): (-40 to 150°C)					1				
Graphite O-Ring: (-200 to 280°C)					2				
Metal Wrapped					3				
Explosion Protection Certification:									
Without						A			
Explosion-Proof Exiall CT2-T6						B			
Explosion-Proof Exdll CT2 -T6						G			
Nominal Calibration Type:									
Standard: Manufacturer Calibration						1			
Designated Third-Party Calibration						9			
Electrical Connection:									
M20x1.5						1			
1/2 NPT(F)						2			
Communication Protocol:									
Standard							A		
HART							H		
RS485							M		
Cryogenic Piezo Sensor:									
								Z	
Temperature and Pressure Compensation:									
Temperature Compensation									- T
Pressure Compensation									- P
Temperature and Pressure Compensation									- TP
Natural Gas Specific									- NG
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 LIQUID

### GAS MEASURING RANGE

VNER SA80T SWIRL FLOWMETER GAS FLOW MEASURING RANGE (UNDER REFERENCE CONDITIONS)				
Values Based on Air: Temperature (t): 20°C / 68°F; Pressure (p): 0.1013 MPa / 14.7 Psi; Density (ρ): 1000 kg/m³ / 62.42 lb/ft³				
Nominal Pipe Size	Nominal Diameter DN Standard (mm)	Nominal Diameter ANSI Standard (in)	Minimum Flow Rate (m³/h)	Maximum Flow Rate (m³/h)
15 mm	15	1/2"	1	15
20 mm	20	3/4"	2	30
25 mm	25	1"	3	50
32 mm	32	1 1/4"	4	130
40 mm	40	1 1/2"	7	200
50 mm	50	2"	11	350
65 mm	65	2 1/2"	15	500
80 mm	80	3"	20	850
100 mm	100	4"	30	1500
125 mm	125	5"	45	2200
150 mm	150	6"	70	3600
200 mm	200	8"	120	5000
250 mm	250	10"	180	7000
300 mm	300	12"	250	10000
350 mm	350	14"	350	14000
400 mm	400	16"	450	20000

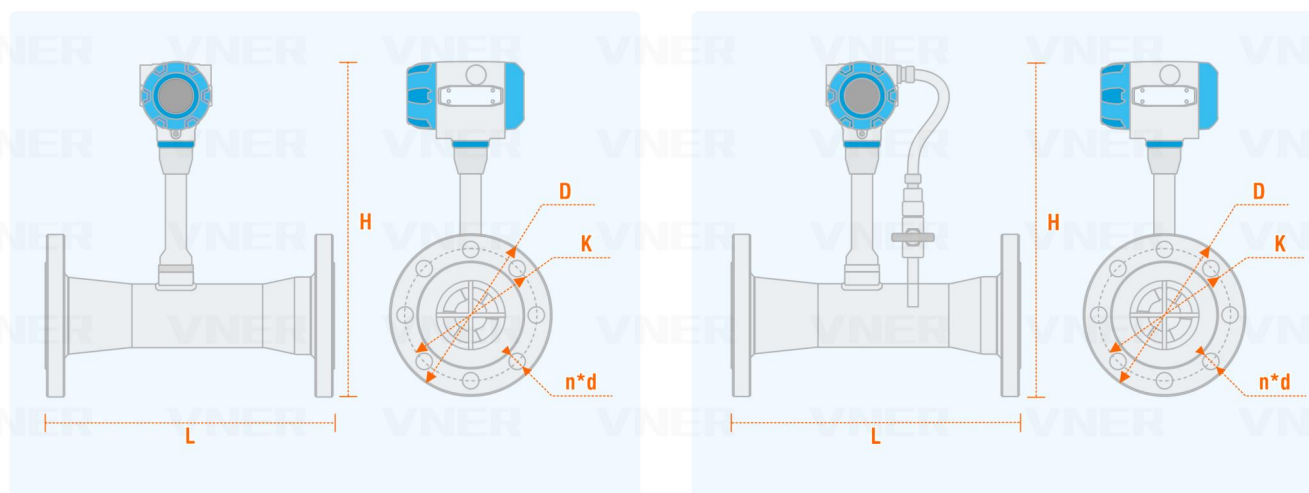
### LIQUID MEASURING RANGE

VNER SA80T SWIRL FLOWMETER LIQUID MEASURING RANGE (UNDER REFERENCE CONDITIONS)				
Values Based on Water: Temperature (t): 20°C / 68°F; Pressure (p): 0.1013 MPa / 14.7 Psi; Density (ρ): 1000 kg/m³ / 62.42 lb/ft³				
Nominal Pipe Size	Nominal Diameter DN Standard (mm)	Nominal Diameter ANSI Standard (in)	Minimum Flow Rate (m³/h)	Maximum Flow Rate (m³/h)
15 mm	15	1/2"	0.15	1.5
20 mm	20	3/4"	0.2	2
25 mm	25	1"	0.4	6
32 mm	32	1 1/4"	0.8	10
40 mm	40	1 1/2"	1.6	16
50 mm	50	2"	2.5	25
65 mm	65	2 1/2"	3.5	60
80 mm	80	3"	5	100
100 mm	100	4"	7.5	150
125 mm	125	5"	10	250
150 mm	150	6"	18	370
200 mm	200	8"	35	500
250 mm	250	10"	60	800
300 mm	300	12"	100	1000
350 mm	350	14"	130	1300
400 mm	400	16"	180	1800



## INSTALLATION DIMENSIONS

### SWIRL FLOWMETER DIMENSIONS



### DIMENSIONS FOR DIN STANDARD

SA80T Swirl FlowMeter- PN 1.6 MPa											
Dimensions for DIN standard flange											
Nominal Diameter (mm)	Outer Diameter (D)	Bolt Hole Centre Diameter (K)	Bolt Hole Diameter (L)	Bolt Number	Bolt Thread Spec	Sealing Gasket Flange (d)	Mount (f)	Flange Thickness (C)	Flange Inner Diameter (B)	Tube Length (L)	Weight (KG)
15	95	65	14	4	M12	45	2	14	22.5	200	2
20	105	75	14	4	M12	58	2	16	27.5	200	2.1
25	115	85	14	4	M12	68	2	16	34.5	200	3.4
32	140	100	18	4	M16	78	2	18	43.5	200	3.7
40	150	110	18	4	M16	88	2	18	49.5	250	6.8
50	165	125	18	4	M16	102	2	19	61.5	250	7.1
65	185	145	18	8	M16	122	2	20	77.5	300	9
80	200	160	18	8	M16	138	2	20	90.5	330	11.7
100	220	180	18	8	M16	158	2	22	116	410	17
125	250	210	18	8	M16	188	2	22	143.5	410	23
150	285	240	22	8	M20	212	2	24	170.5	580	29
200	340	295	22	12	M20	268	2	26	221.5	600	43
250	405	355	26	12	M24	320	2	29	276.5	800	105
300	460	410	26	12	M24	378	2	32	328	1000	173
350	520	470	26	16	M24	428	2	35	360	1100	209
400	580	525	40	16	M27	490	2	38	411	1270	247

**SA80T Swirl FlowMeter- PN 2.5 MPa**
**Dimensions for DIN standard flange**

Nominal Diameter (mm)	Outer Diameter (D)	Bolt Hole Centre Diameter (K)	Bolt Hole Diameter (L)	Bolt		Sealing Gasket		Flange Thickness (C)	Flange Inner Diameter (B)	Tube Length (L)	Weight (KG)
				Number	Thread Spec	Flange (d)	Mount (f)				
15	95	65	14	4	M12	45	2	14	22.5	200	2
20	105	75	14	4	M12	58	2	16	27.5	200	2.1
25	115	85	14	4	M12	68	2	16	34.5	200	3.4
32	140	100	18	4	M16	78	2	18	43.5	200	3.7
40	150	110	18	4	M16	88	2	18	49.5	250	6.8
50	165	125	18	4	M16	102	2	19	61.5	250	7.1
65	185	145	18	8	M16	122	2	20	77.5	300	9
80	200	160	18	8	M16	138	2	20	90.5	330	11.7
100	220	180	18	8	M16	158	2	22	116	410	17
125	250	210	18	8	M16	188	2	22	143.5	410	23
150	285	240	22	8	M20	212	2	24	170.5	580	29
200	360	310	26	12	M24	274	2	32	222	600	59
250	425	370	30	12	M27	330	2	35	276	800	130
300	485	430	30	16	M27	389	2	38	328	1000	200
350	555	490	33	16	M30	448	2	42	384	1100	250
400	620	550	36	16	M33	503	2	46	430	1270	300

**SA80T Swirl FlowMeter- PN 4.0 MPa**
**Dimensions for DIN standard flange**

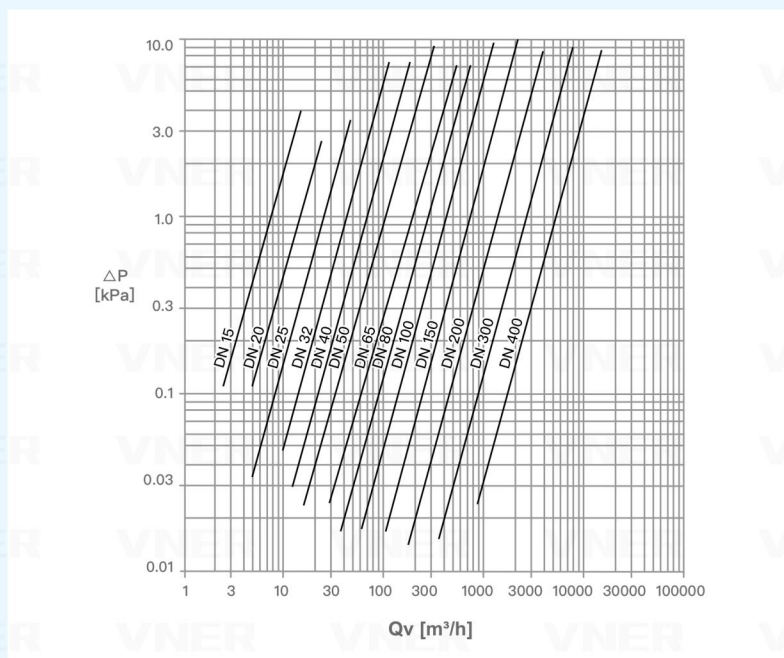
Nominal Diameter (mm)	Outer Diameter (D)	Bolt Hole Centre Diameter (K)	Bolt Hole Diameter (L)	Bolt		Sealing Gasket		Flange Thickness (C)	Flange Inner Diameter (B)	Tube Length (L)	Weight (KG)
				Number	Thread Spec	Flange (d)	Mount (f)				
15	15	65	14	4	M12	45	2	14	19	200	3
20	20	75	14	4	M12	58	2	16	26	200	3.2
25	25	85	14	4	M12	68	2	16	33	200	3.5
32	32	100	18	4	M16	78	2	18	39	200	4.7
40	40	110	18	4	M16	88	2	18	46	250	7
50	50	125	18	4	M16	102	2	20	59	250	7.2
65	65	145	18	8	M16	122	2	22	78	300	9.5
80	80	160	18	8	M16	138	2	24	91	330	12
100	100	190	22	8	M20	158	2	26	110	410	18
125	125	220	26	8	M24	188	2	28	135	410	28
150	150	250	26	8	M24	212	2	30	161	580	35
200	200	320	30	12	M27	268	2	36	222	600	66
250	250	385	33	12	M30	320	2	42	276	800	150
300	300	450	33	16	M30	378	2	48	328	1000	200
350	350	510	36	16	M33	428	2	55	380	1100	280
400	400	585	39	16	M36	490	2	60	430	1270	350

## DIMENSIONS FOR ANSI STANDARD

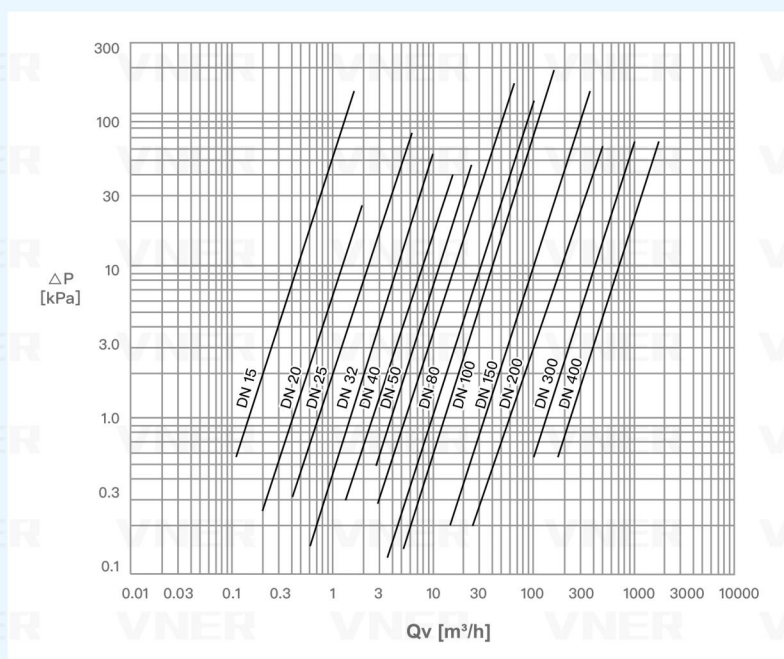
SA80T Swirl Flowmeter - Class 150 lbs ( PN 2.0 MPa )												
Dimensions for ANSI B16.5 standard												
Nominal Diameter (mm)	Nominal Diameter ANSI B16.5 (in)	Outer Diameter (D)	Bolt Hole Centre Diameter (K)	Bolt Hole Diameter (L)	Bolt Number	Bolt Thread Spec	Sealing Gasket Flange (d)	Mount (f)	Flange Thickness (C)	Flange Inner Diameter (B)	Tube Length (L)	Weight (KG)
15	1/2"	90	60.3	16	4	M14	34.9	2	9.6	22.5	200	2
20	3/4"	100	69.9	16	4	M14	42.9	2	11.2	27.5	200	2.1
25	1"	110	79.4	16	4	M14	50.8	2	12.7	34.5	200	3.4
32	1 1/4"	115	88.9	16	4	M14	63.5	2	14.3	43.5	200	3.7
40	1 1/2"	125	98.4	16	4	M14	73	2	15.9	49.5	250	6.8
50	2"	150	120.7	18	4	M16	92.1	2	17.5	61.5	250	7.1
65	2 1/2"	180	139.7	18	4	M16	104.8	2	20.7	77.6	300	9
80	3"	190	152.4	18	4	M16	127	2	22.3	90.5	330	11.7
100	4"	230	190.5	18	8	M16	157.2	2	22.3	116	410	18
125	5"	255	215.9	22	8	M20	185.7	2	22.3	143.5	410	24
150	6"	280	241.3	22	8	M20	215.9	2	23.9	170.5	580	30
200	8"	345	298.5	22	8	M20	269.9	2	27	221.5	600	45
250	10"	405	362	26	12	M24	323.8	2	28.6	276.5	800	110
300	12"	485	431.8	26	12	M24	381	2	30.2	328	1000	182
350	14"	535	476.3	30	12	M27	412.8	2	33.4	360	1100	220
400	16"	595	539.8	30	16	M27	469.9	2	35	411	1270	260

SA80T Swirl Flowmeter - Class 300 lbs ( PN 5.0 MPa )												
Dimensions for ANSI B16.5 standard												
Nominal Diameter (mm)	Nominal Diameter ANSI B16.5 (in)	Outer Diameter (D)	Bolt Hole Centre Diameter (K)	Bolt Hole Diameter (L)	Bolt Number	Bolt Thread Spec	Sealing Gasket Flange (d)	Mount (f)	Flange Thickness (C)	Flange Inner Diameter (B)	Tube Length (L)	Weight (KG)
15	1/2"	95	66.7	16	4	M14	34.9	2	12.7	22.5	200	3
20	3/4"	115	82.6	18	4	M16	42.9	2	14.3	27.5	200	3.2
25	1"	125	88.9	18	4	M16	50.8	2	15.9	34.5	200	3.6
32	1 1/4"	135	98.4	18	4	M16	63.5	2	17.5	43.5	200	5.4
40	1 1/2"	155	114.3	18	4	M16	73	2	19.1	49.5	250	8.9
50	2"	165	127	22	8	M20	92.1	2	20.7	61.5	250	9.8
65	2 1/2"	190	149.2	22	8	M20	104.8	2	23.9	77.6	300	13
80	3"	210	168.3	22	8	M20	127	2	27	90.5	330	16.2
100	4"	255	200	22	8	M20	157.2	2	30.2	116	410	27.5
125	5"	280	235	22	8	M20	185.7	2	33.4	143.5	410	36
150	6"	320	269.9	22	12	M20	215.9	2	35	170.5	580	46
200	8"	380	330.2	26	12	M24	269.9	2	39.7	221.5	600	75
250	10"	445	387.4	30	16	M27	323.8	2	46.1	276.5	800	120
300	12"	520	450.8	33	16	M30	381	2	49.3	328	1000	200
350	14"	585	514.4	33	20	M30	412.8	2	52.4	360	1100	280
400	16"	650	571.5	36	20	M33	469.9	2	55.6	411	1270	360

## PRESSURE DROP FIGURES FOR GAS AND LIQUID



PRESSURE DROP FIGURE FOR GAS MEASUREMENT



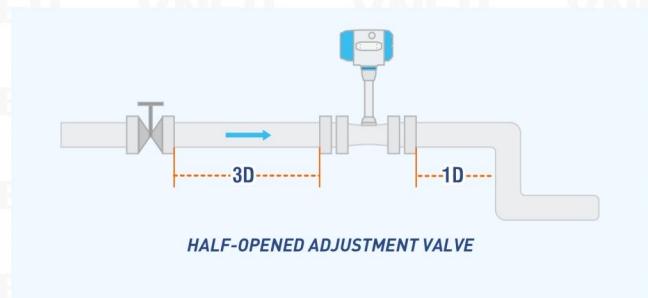
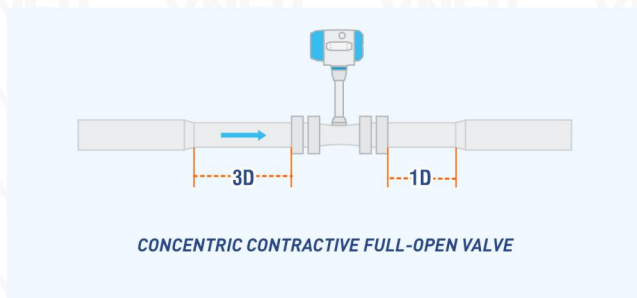
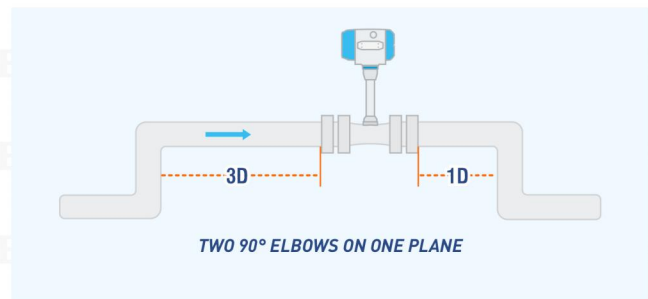
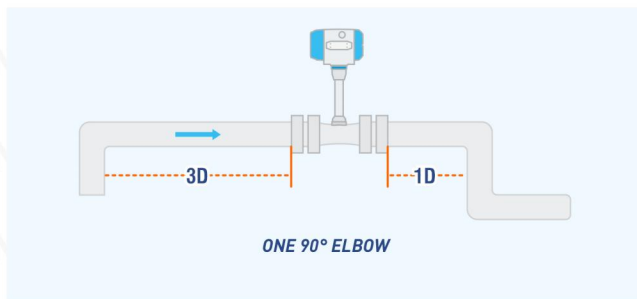
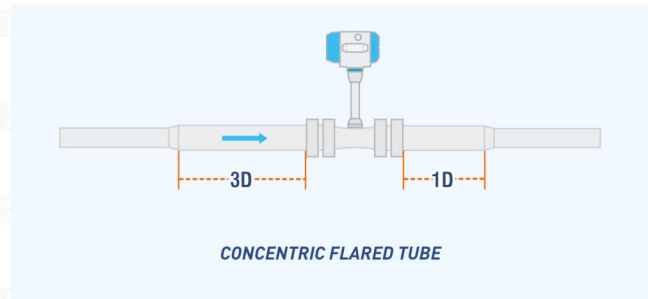
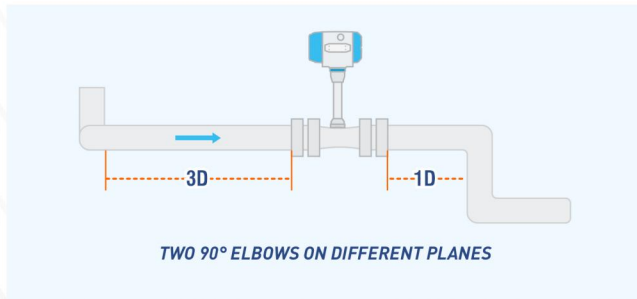
PRESSURE DROP FIGURE FOR LIQUID MEASUREMENT



## INSTALLATION CONDITIONS

- The swirl flow meter can be installed indoors or outdoors. If installed in an underground well and there is a possibility of flooding, the submersible type should be selected.
- The swirl flow meter can be installed horizontally, vertically or inclined in the pipeline. When the measuring medium is liquid, then the pipe must be filled with liquid. Therefore, when installing swirl flow meter on vertical or inclined pipeline, the flow direction of liquid should be from bottom to top.
- Swirl flowmeter does not require a long straight pipe section, and the required length of the upper and lower straight pipe sections depends on the condition of the pipe. The upper end of the swirl flow meter should avoid installing a regulator or half-open valve as much as possible, and should be installed 5D after the lower end of the flow meter.
- In the design of the pipeline installation, the upper end of the flowmeter signal converter should be left 500mm space, to facilitate commissioning and maintenance.
- When the flowmeter requires a temperature-pressure compensation type, the pressure transmitter is installed at (1-2) D downstream of the flowmeter, and the temperature measuring element (usually with platinum resistance) is installed downstream (3-5) D.

## GENERAL UPSTREAM AND DOWNSTREAM PIPE SECTIONS

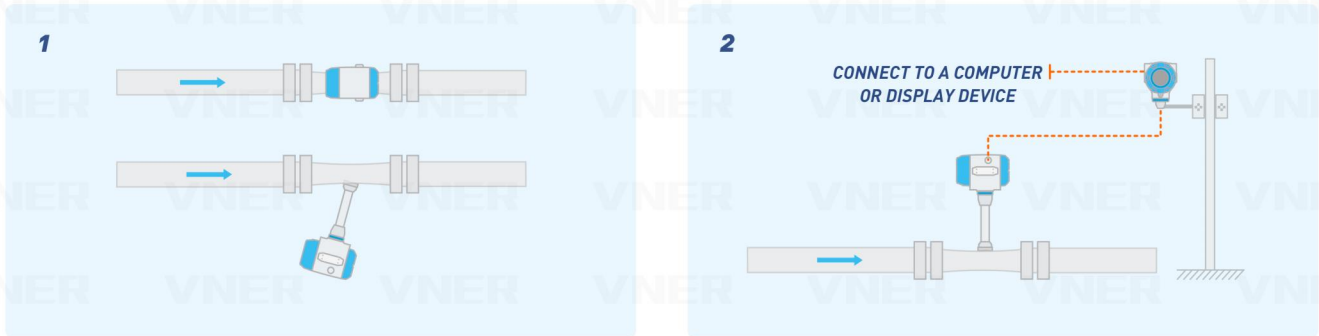




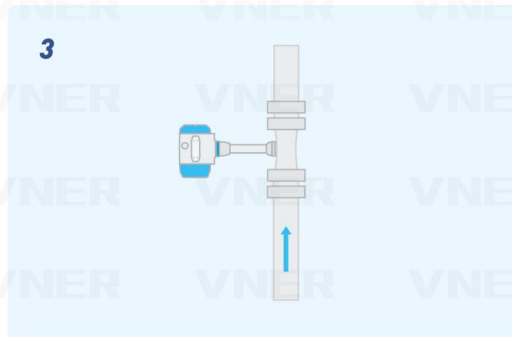
## INSTALLATION POSITIONING

### BASIC INSTALLATION REQUIREMENTS

- 1) The flowmeter can be installed indoors or outdoors, with an ambient temperature range of  $-20^{\circ}\text{C}$  to  $+55^{\circ}\text{C}$ .
- 2) When the temperature of the measured medium exceeds  $150^{\circ}\text{C}$ , the display head can be installed horizontally or vertically downward (see Figure 1). Alternatively, a remote type can be selected, which is also suitable for harsh environments such as high altitudes or underground (see Figure 2). The maximum extension distance is 10 meters.



- 3) When measuring liquids and the flowmeter is installed on a vertical or inclined pipeline, the liquid flow direction should be from bottom to top (see Figure 3).



- 4) To facilitate commissioning, disassembly, and on-site maintenance of the flowmeter, there should be at least 0.5 meters of clear space above the display head (see Figure 4). If this cannot be ensured, the installation angle should be adjusted during installation.

- 5) It is advisable to avoid installing control valves or partially open valves upstream of the flowmeter. If required by the process, they can be installed downstream of the flowmeter at a distance of  $5D$  (see Figure 5).



6) Signal Transmission Distance: The maximum transmission distance for the current output signal is 800 meters.

7) If the swirl flowmeter is installed on a pipeline with significant vibration, a flexible connection pipe should be added, or the pipeline should be secured (see Figure 6).

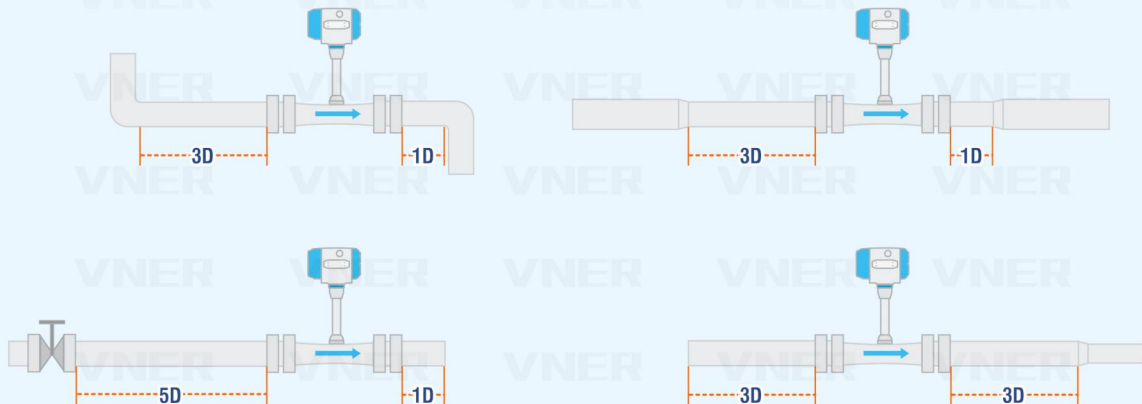
6



8) When measuring gas or steam, the swirl flowmeter should be installed at a high point in the pipeline to avoid condensate accumulating in low points. If installed at a low point, a drain valve should be added. When measuring liquids, the flowmeter should be installed at a low point in the pipeline to ensure full-pipe measurement.

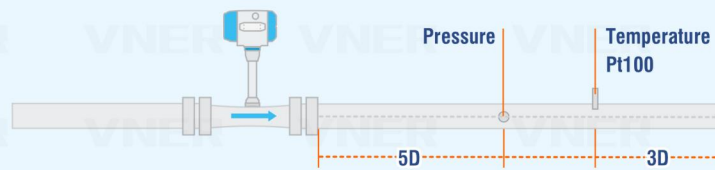
9) Sufficient straight pipe sections should be reserved upstream and downstream of the flowmeter. The recommended lengths of the straight pipe sections are shown in Figure 7. D is the nominal diameter of the instrument in mm

7



## INSTALLATION FOR EXTERNAL TEMPERATURE AND PRESSURE MEASUREMENT

8



- 1) The temperature sensor (PT100) should be installed by drilling a hole ( $\varnothing 25$  diameter) 5D downstream of the flowmeter. Weld the base in place and tighten the temperature sensor.
- 2) The pressure transmitter should take pressure from the pressure tapping point (1/4" NPT) on the lower side of the flowmeter or from a point 3D downstream of the flowmeter.

### ISSUES TO NOTE DURING INSTALLATION:

- 1) Pay attention to the flow direction arrow on the flowmeter body; it should be aligned with the direction of the medium flow.
- 2) The inner diameter of the gaskets on both sides of the flowmeter should not be smaller than the inner diameter of the flowmeter body.
- 3) Pay special attention to the alignment of the flanged flowmeter with the pipeline.
- 4) During flange welding, the flowmeter should be removed to avoid damaging the sensor probe due to excessive welding temperatures.

## 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

3 With compensation, 4-20mA+Pulse+HART

2 Normal type without compensation, 4-20mA+Pulse+RS485

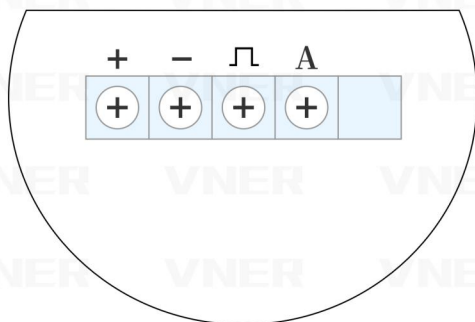
4 With compensation, 4-20mA+Pulse+RS485



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

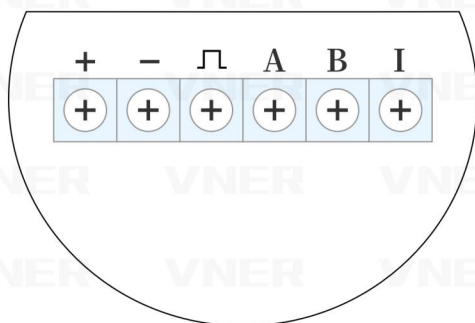
## WIRING DIFFERENT TYPES OF TERMINAL BOARDS

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



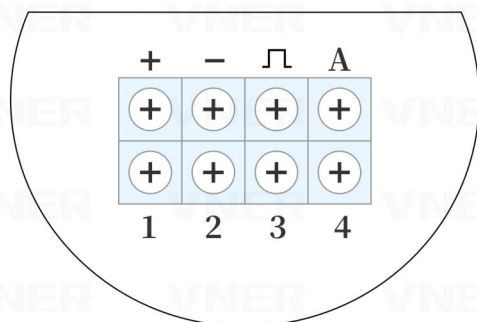
Connection	Description
Power Supply	DC24V + → +
	DC24V - → -
4-20mA/HART(two wire)	4-20mA + → +
	4-20mA - → -
Pulse	Pulse + → □
	Pulse - → -
	Short circuit □ and A

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



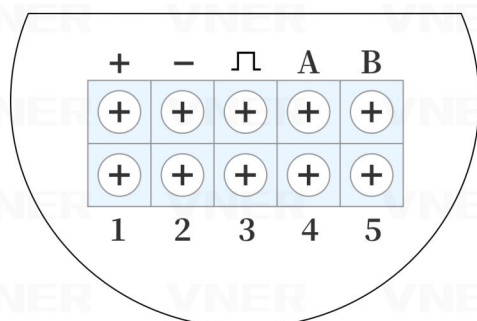
Connection	Description
Power Supply	DC24V + → +
	DC24V - → -
4-20mA/HART(two wire)	4-20mA + → +
	4-20mA - → -
Pulse	Pulse + → □
	Pulse - → -
RS485	RS485 + → A
	RS485 - → B

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



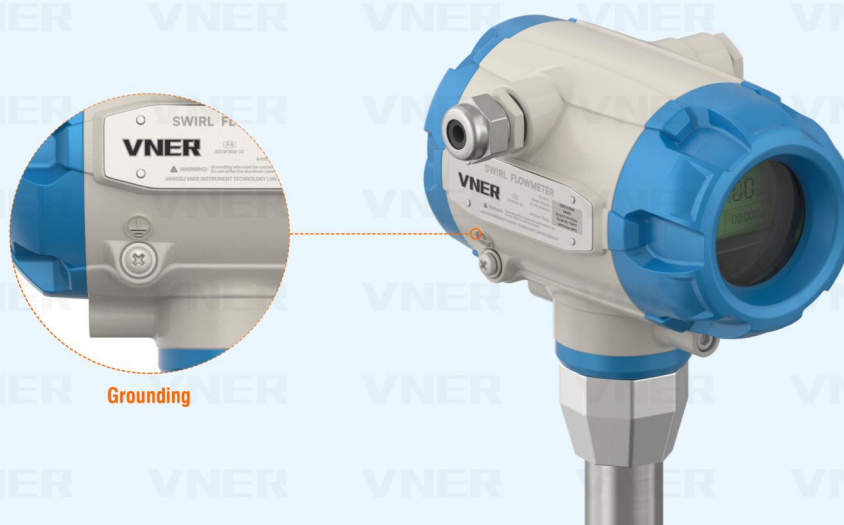
Connection	Description
Power Supply	DC24V + → +
	DC24V - → -
4-20mA/HART(two wire)	4-20mA + → +
	4-20mA - → -
Pulse	Pulse + →
	Pulse - → -
	Short circuit  and A

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



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

## Grounding





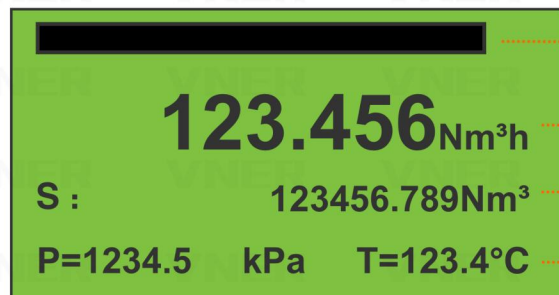
## OPERATION



### 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 temperature sensor 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 will display as "----" which means the acquisition of temperature sensor is not activated.

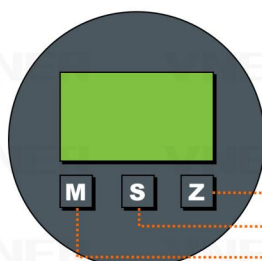
When the flow mode is set as "Sat\_Steam (T)", it means saturated steam with temperature compensation only. At this time pressure value will display as "----" which means the acquisition of pressure sensor is not activated.

You can press KEY-M to change the third line display variables. Use indicator to distinguish between different display variables shown 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 submenu 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-Key or S-Key to scroll backwards or forwards the menu.

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

## MENU LIST

### BASIC FUNCTION



Menu 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	Liquid Qv: Liquid volume Liquid Qm: Liquid mass Gas Qv: Gas volume Gas Qm: Gas mass Steam Qv: Steam volume Steam (P/T): Steam mass Sat_Steam(T): Saturated steam mass (temperature compensation) Sat_Steam(P): Saturated steam mass (pressure compensation)	Menu Selection
Unit-Qv Unit-Qm	Volume units supported: Nm <sup>3</sup> /h, Nm <sup>3</sup> /m, Nm <sup>3</sup> /s, m <sup>3</sup> /s, m <sup>3</sup> /m, m <sup>3</sup> /h, m <sup>3</sup> /d, cf/s, cf/m, cf/h, UKG/s, UKG/m, UKG/h, L/s, L/m, L/h, Scf/s, Scf/m, Scf/h, USG/s, USG/m, USG/h, bbl/h, bbl/d  Mass units supported: g/s, g/m, g/h, kg/s, kg/m, kg/h, kg/d, t/m, t/h, t/d, lb/h, lb/d  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/m <sup>3</sup> ) Density (g/cm <sup>3</sup> )	Set gas density (unit: Kg/m <sup>3</sup> ) Set liquid density (unit: g/cm <sup>3</sup> )	Direct Input
Gauge Pre. (KPa)	Use for gas or steam measure. Unit: kPa	Direct Input
Temperature (C)	Use for gas or steam measure. Unit: °C	Direct Input
PV Cutoff (%)	Range: 0% ~ 20%	Direct Input
Damping	Range: 0 ~ 64S	Direct Input
Disp. Point	Set the first line display point, 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
Number of 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 <sup>3</sup> /h,Nm <sup>3</sup> /m,Nm <sup>3</sup> /s	Nm <sup>3</sup>	UKG/s,UKG/m,UKG/h,	UKG
m <sup>3</sup> /d,m <sup>3</sup> /h,m <sup>3</sup> /m,m <sup>3</sup> /s	m <sup>3</sup>	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 menus are 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.

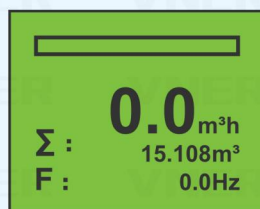
Menu	Description	Description	Setting method
M51 Signal Monitor	LCD display: 450.00 This is the PGA gain. CH2 CH2 issignal channel.	****50	Read Only
M52 Meter Size	Options: 15mm,20mm,25mm,32mm,40mm,50mm,65mm,80mm,100mm,125mm,150mm,200mm,250mm,300mm,350mm,400mm		Menu Selection
M53 Fluid Type	Options:Gas,or Liquid.		Menu Selection
M54 Low Flow Limit	According to the meter size and measuring media,set the corresponding low limit of the flow. The unit of 'Low Flow Limit'is fixed as m <sup>3</sup> /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 <sup>3</sup> ) Means how many pulses corresponding to 1m <sup>3</sup> flow		Direct Input
M58 Pulse Factor Unit	Options:m <sup>3</sup> ,Nm <sup>3</sup> ,t,kg,Scf,cf,USG,UKG, bbl,lb.		Menu Selection
M59 Pulse Factor	Set the numberof output pulses corresponding to one 'Pulse Factor Unit'. 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 <sup>3</sup> .		Direct Input
M60 K-Factor Trim Fi K-Factor Trim Yi	Five-point K-Factor correction. 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. 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. Channel	There areCH_1,CH_2,CH_3 three options. CH_3 gainmaximum CH_1 gain minimum Note: CH2 generally used for liquid measurement, which corresponds to the configuration software,select X1 and X2. 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. F_1:Anti-vibration Mode F_2:Normal Mode F_3:Turbine Mode F_4:Test Mode Note: Generally choose F_2.	****63	Menu Selection



Menu		Description	Description	Setting method
M40	Trim 4mA	Steps: 1.Press M-Key for 2 seconds,enter trim; 2.Short press M-key to decrease current. Press S-Key to increase current.Stepping is 16 microamperes. 3.Press M-Key for 2 seconds to save new trim value. Or press Z-Key to exit without saving.	****40	
M41	Trim 20mA			
M70	Temp. Measure	Temperature acquisition mode setting. Options:Manual,or Auto. Manual:Temperature uses the input reference value. Auto:Temperature is automatic acquisition, should be use external Pt1000 or Pt100.	****70	Menu Selection
M71	Pressure Measure	Pressure acquisition mode setting. Options:manual,or auto. Manual:If select manual,the pressure value will be replaced by the manual setting value (the value set in basic menu"GaugePre.Kpa"). 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. Use standard resistance as input. For example:1000 forPt1000,or 100 for Pt100		Direct Input
M73	Temperature Low Trim	Enter the high calibration resistance value unit:ohm. Use standard resistance as input. For example:2500 for Pt1000,or 250 for Pt100		Direct Input
M74	Pressure Low Trim	Enter the calibration reference pressure value Unit:KPa. Apply the standard pressure to the sensor. For example:0 KPa		Direct Input
M75	Pressure High Trim	Enter the calibration reference pressure value Unit:KPa. 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. 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. 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. 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 Temp. Data Y0 Temp. Data Xi Temp. Data Y1	You can directly view and modify the temperature sensor calibration values. Temp. Data X0 and Temp. Data X1 are internal ADC measurements. Temp. Data Y0 [73]and Temp. Data Y1[74] are the input calibration value.	****721	Direct Input
M741	Pre .DataX0; Pre. Data Y0; Pre. Data X1; Pre. Data Y1;	You can directly view and modify the pressure sensor calibration values. Pre. Data X0 and Pre. Data X1 are internal ADC measurements. Pre. Data Y0 [75]and Pre. Data Y1[76]arethe input calibration value.	****741	Direct Input

## Adjust LCD contrast:

Power on display



Press "Z" button, and then press "S" button to find menu "Contrast"



Press "M" button for 2 seconds to enter into this menu, press "S" button to choose the options.

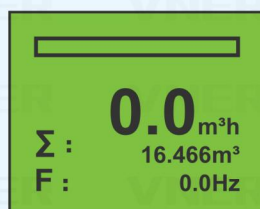
Default is "4", max number is "5"



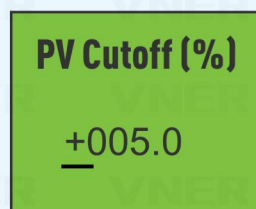
Press "M" button for 2 seconds to save the settings, and then press "Z" button to back to main display.

## Low flow cutoff setup:

Power on display



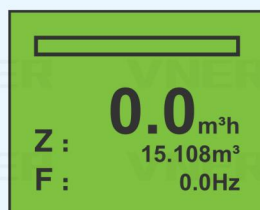
Press "Z" button and then press "S" button to find menu "PV Cutoff (%)"  
Press "M" button for 2 seconds to enter this menu, Default value is 5.0.



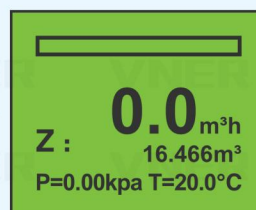
Press "S" button to move cursor and "M" button to set value you need.  
Then Press "M" button for 2 seconds to save settings, and then press "Z" button to back to main display.

## Checking display values:

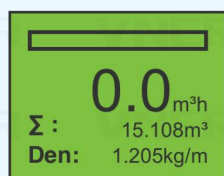
Power on display can check the frequency on the bottom line.



Press "M" button for 2 seconds, it can display pressure, temperature value.



Press "M" to check density, current and flow percentage value etc.



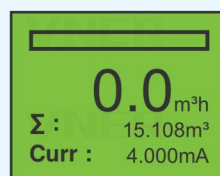
①



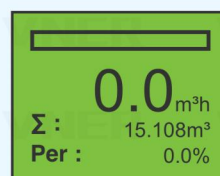
②



③



④



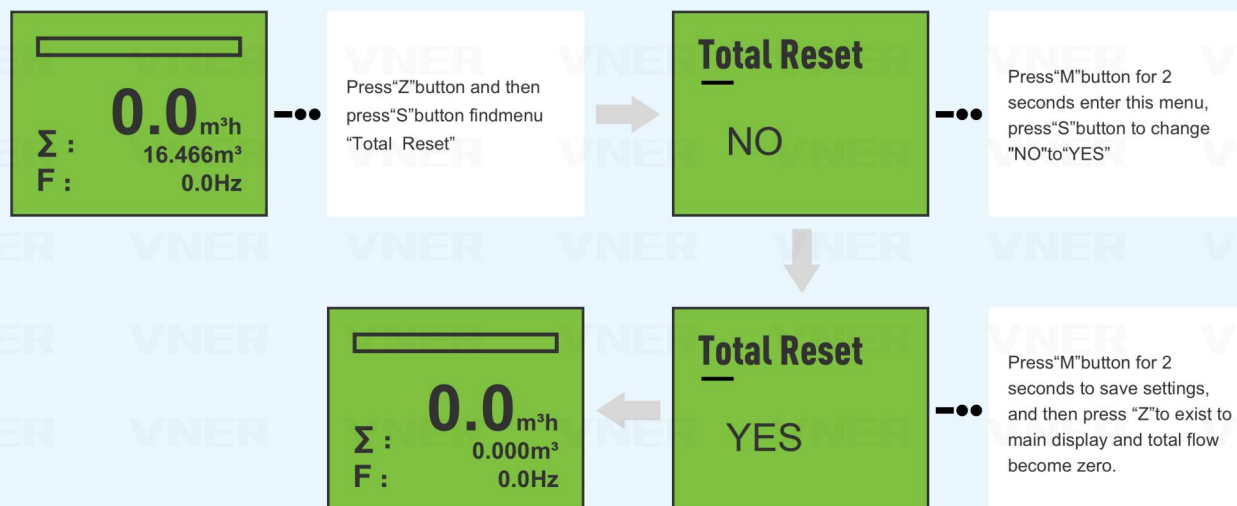
⑤



## • Total flow reset:

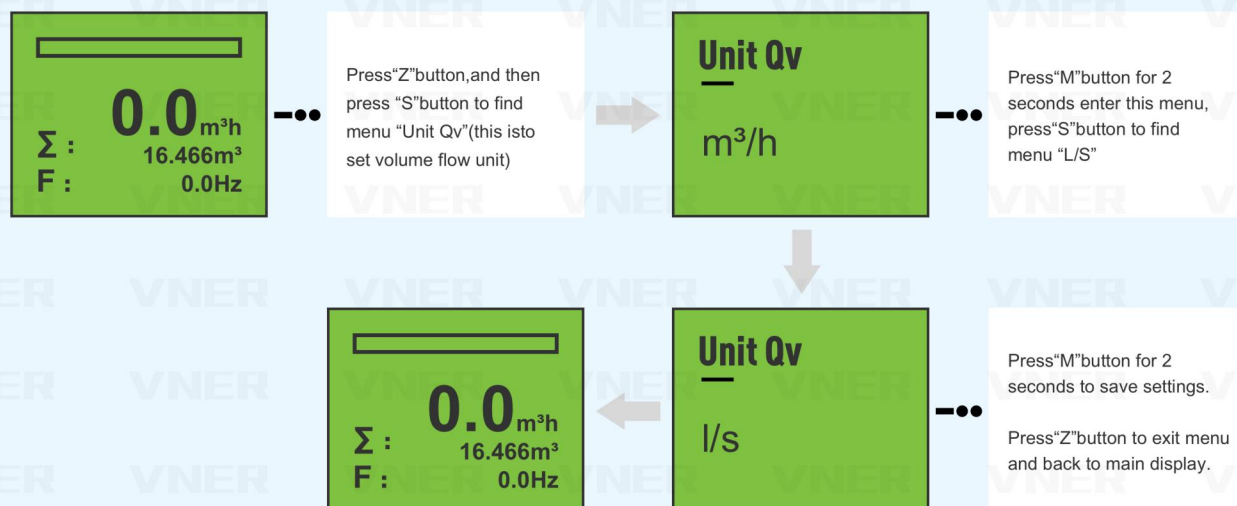
Power on display

For example, total flow value is 16.466m<sup>3</sup>



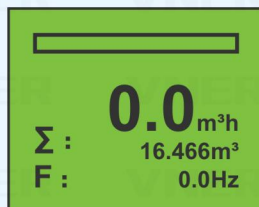
## • Flow unit setup:

Power on display

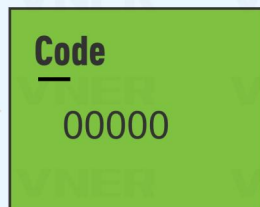


## • Pulse parameters setup:

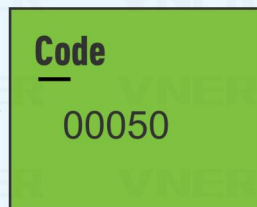
Power on display



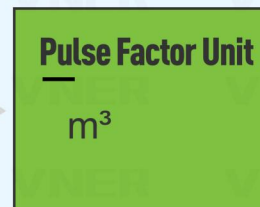
Press "Z" button and then Press "S" button to find menu "Code"



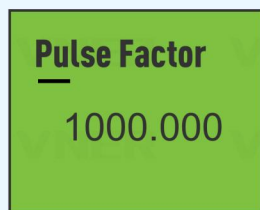
Press "M" button for 2 seconds to enter this menu, and then press "S" button move cursor and press "M" button set number "00050"



Press "M" button for 2 seconds to enter. Press "S" button to find menu "Pulse Factor Unit" (Default is m<sup>3</sup>)



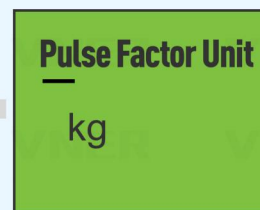
For example, if need to change to "kg", Press "M" button for 2 seconds to enter this menu, and press "S" button to change to "kg"



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



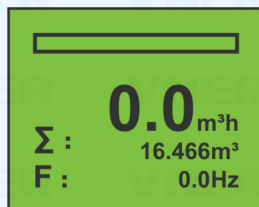
Press "M" button for 2 seconds to enter this menu, press "S" button to move cursor and press "M" button to set values. For example change to "1000"



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

## Adjust medium type:

Power on display



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

### Flow Mode

Gas Qv

#### 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"

### Flow Mode

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"

### Unit Qv

m³/h

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

### Fluid Type

Gas

#### 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"

### Code

00050

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

### Code

00000

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".

### Range 100%

100.000

Press "S" button to find menu "Code"

### Fluid Type

Liquid

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

### Low Flow Limit

35.000 m³/h

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

## TROUBLE SHOOTING

Fault	Reason	Solution
Measurement Error	<ol style="list-style-type: none"> <li>1) Straight pipe section is not enough</li> <li>2) Supply voltage changes too much</li> <li>3) The instrument exceeds the verification period</li> <li>4) The inner diameter of the flow meter and the pipe are quite different</li> <li>5) The installation is not concentric or the gasket is protruding into the flow tube</li> <li>6) The sensor is stained or damaged</li> <li>7) There is two-phase flow or pulsating flow</li> <li>8) There is leakage in the pipeline</li> </ol>	<ol style="list-style-type: none"> <li>1) Lengthen the straight pipe section or install a regulator</li> <li>2) Check the power supply</li> <li>3) Timely inspection</li> <li>4) Check the piping inner diameter to correct the meter coefficient</li> <li>5) Adjust and install, rest the gasket</li> <li>6) Clean or replace the sensor</li> <li>7) Eliminate two-phase flow or pulsating flow</li> <li>8) Eliminate leakage</li> </ol>
Unstable/Irregular Output signal	<ol style="list-style-type: none"> <li>1) There is a strong electrical interference signal</li> <li>2) The sensor is stained or damp, and the sensitivity is reduced</li> <li>3) The sensor is damaged or the lead is not in contact</li> <li>4) Two-phase flow or pulsating flow</li> <li>5) The impact of pipeline vibration</li> <li>6) Unstable process</li> <li>7) The sensor installation is not concentric or the gasket protrudes into the tube</li> <li>8) Upstream and downstream valve disturbance</li> <li>9) The pipe is not fully filled with fluid</li> <li>10) The vortex generator has windings</li> <li>11) There is cavitation phenomenon</li> </ol>	<ol style="list-style-type: none"> <li>1) Strengthen shielding and grounding</li> <li>2) Clean or replace the sensor</li> <li>3) Check the sensor and lead</li> <li>4) Strengthen process management and eliminate two phases flow or pulsating flow</li> <li>5) Take measures to reduce vibration</li> <li>6) Adjust the installation position</li> <li>7) Check the installation and correct the inner diameter of the gasket</li> <li>8) Lengthen straight pipe section or install adjuster</li> <li>9) Installation location and method of replacing the sensor</li> <li>10) Eliminate entanglement</li> <li>11) Reduce the flow rate and increase the pressure in the pipe</li> </ol>
Leakage	<ol style="list-style-type: none"> <li>1) The pressure in the pipe is too high</li> <li>2) The nominal pressure of the sensor is incorrectly selected</li> <li>3) The seal is damaged</li> <li>4) The sensor is corroded</li> </ol>	<ol style="list-style-type: none"> <li>1) Adjust the pipe pressure and change the installation position</li> <li>2) Choose a higher nominal pressure sensor</li> <li>3) Replace the gasket</li> <li>4) Take anti-corrosion and protection measures</li> </ol>
Abnormal Noise	<ol style="list-style-type: none"> <li>1) The flow rate is too high, causing strong tremor</li> <li>2) Cavitation phenomenon occurs</li> </ol>	<ol style="list-style-type: none"> <li>1) Adjust the flow or replace a larger diameter instrument</li> <li>2) Adjust the flow rate and increase the liquid pressure</li> </ol>

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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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