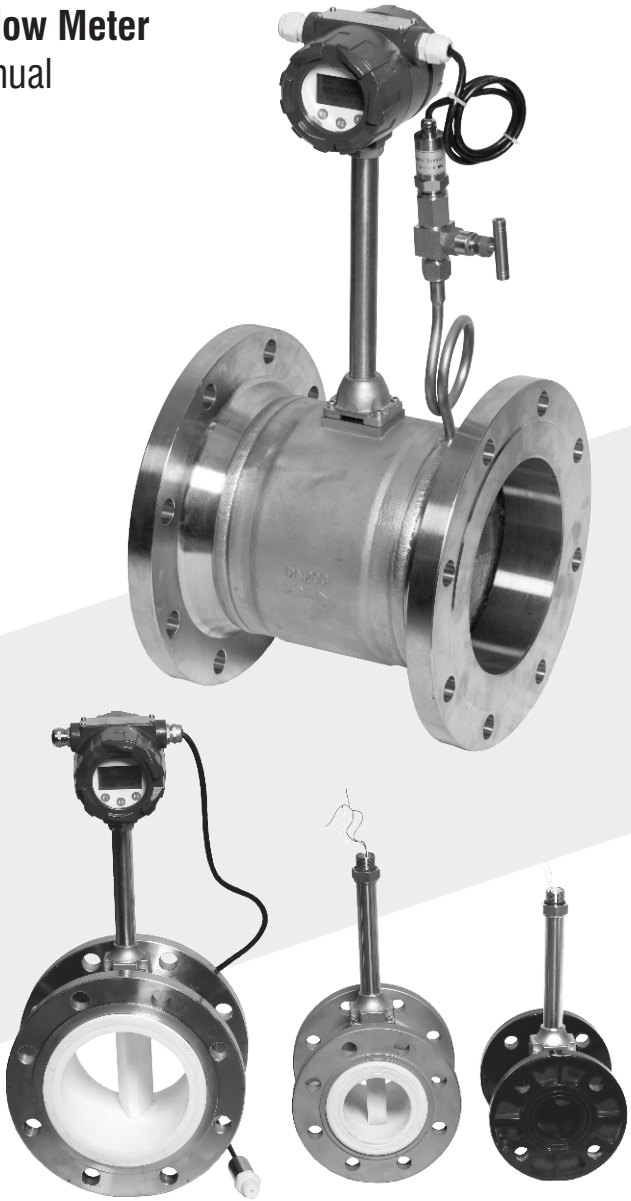
BROIL

Vortex Flow Meter

User Manual



www.broiltech.com

BROIL SENSOTEK INDUSTRIES

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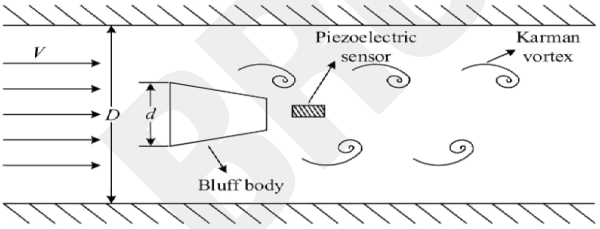


1. Description

BROILTECH Vortex flow meter is one kind of velocity type flowmeter, it's based on Karman vortex theory and adopts piezoelectric crystal to detect the burble frequency of the fluid caused by flowing through the triangular prism in the pipeline and then measure the flow of fluid. It is widely used in Measurement of hydrocarbons and natural gas flow in pipelines, Monitoring flow rates in refineries and petrochemical, chemical industry, light industry and power heat supply and so on.

2. Working Principle

Vortex flow meters operate based on the von Karman effect, and it's consists of a bluff body. When fluid flow it creates alternating vortices behind a bluff body in the flow stream. These vortices are detected by a sensor, and the frequency of their formation is directly proportional to the fluid velocity. By measuring this frequency, the vortex flow meter accurately calculates the flow rate of the fluid. The releasing frequency of Karman vortex depends on the size of triangle prim and flow rate of fluid, while independent of the medium feature parameter, such as the temperature, pressure, it can be indicated by the following formulas:



- F=sR*v (1-1.27*d/D) Q=3600*F/K M =Q*P
- F .....The releasing frequency of Karman vortex (Hz)
- Sr .....Strouhal number (unit: dimensionless)
- V .....Medium flow rate (m/s)
- d .....The width of triangle prim
- D.....Vortex meter inner diameter (m)
- Q ..... Instantaneous volume flow rate (m3/h)
- K .....Vortex meter coefficient (unit pulse number/m^3)
- M ..... Instantaneous quality flow rate (kg / h)
- P .....Fluid density (kg / (m ^ 3)

3. Features

- Integrated pressure and temperature compensation.
- 4-20mA, pulse with HART; Optional pulse with RS485
- Wide temperature range up to highest temperature 350°C
- Embedded sensor, 4 piezo-electric % crystal encapsulated inside the sensor.
- No moving parts, no abrasion, non-wearing parts inside, fully welded SS316 body (Optional SS304)

Medium	Max Flow Rate (m/s)	Standard Flow Rate (m/s)
Gas	2 ~ 70	3 ~ 50
Liquid	0.3 ~ 7	0.5 ~ 5
Steam	2 ~ 80	3 ~ 50

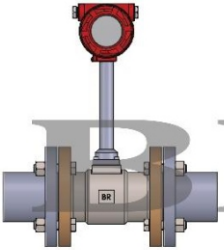
4. Technical Data

- Size : DN15-DN300mm
- Accuracy : ± 1.0%
- Power Supply : 24VDC, battery 3.6v
- Communication : RS485/Modbus, HART
- Flange Standard : EN1092-1 PN10, PN16, PN25, PN40
  ANSI BS16.5 Class 150,300,600
  JIS2220 10K, 20K, 40K
- Straight Pipe : Inlet Path ≥ 10D, Outlet Path ≥ 5D
- Signal Output : 4~20 mA, pulse
- Frequency Output : 2~3000 Hz
- Relative Humidity : ≤ 85%
- Explosion-proof : Exia IIC T1~T6 Ga
- Ambient Temperature : -40°C~55°C (Non-Ex-proof Place)
- : -20°C~55°C (Non-Ex-proof Place)
- Nominal Pressure 1.6 MPa, 2.5 MPa, 4.0 MPa
- Protection Grade : IP65
- Velocity : 0.3~7.0 m/s liquid
  2.0~70 m/s gas
  2.0~80 m/s steam
- Body Material : SS316(Standard), SS304(Optional)
- Resistance Coefficient : Cd ≤ 2.6
- Oscillatory Acceleration : ≤ 0.2g
- Reynolds Number : 2x104~7x106

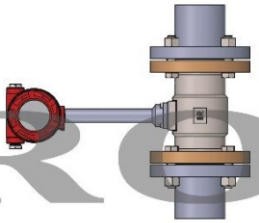
5. Flow Range

Model Number	Water Flow Range (m3/hr)	Air Flow Range (m3/hr)
BT-VTM-015	0.36 ~ 5.07	3.62 ~ 47.05
BT-VTM-020	0.57 ~ 7.92	5.65 ~ 73.51
BT-VTM-025	0.81 ~ 11.4	8.14 ~ 105.86
BT-VTM-032	1.45 ~ 20.27	14.48 ~ 188.19
BT-VTM-040	2.04 ~ 28.58	20.41 ~ 326.63
BT-VTM-050	3.53 ~ 49.48	35.34 ~ 565.49
BT-VTM-065	5.97 ~ 83.62	59.73 ~ 955.67
BT-VTM-080	7.74 ~ 108.38	77.42 ~ 1238.64
BT-VTM-100	13.30 ~ 186.22	133.02 ~ 2128.27
BT-VTM-125	22.09 ~ 309.25	220.89 ~ 3534.29
BT-VTM-150	30.13 ~ 421.89	301.35 ~ 4821.57
BT-VTM-200	56.55 ~ 791.68	565.49 ~ 9047.79
BT-VTM-250	90.49 ~ 1266.87	904.41 ~ 14478.49
BT-VTM-300	127.33 ~ 1781.28	1272.35 ~ 20357.52

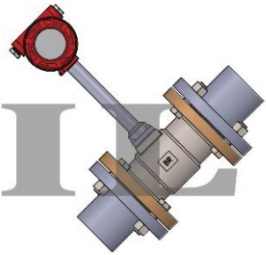
6. Installation



Horizontal Installation



Vertical Installation



Inclined Installation

Installation steps

- Prepare to make a hole on the pipes to precise dimensions, ensuring alignment with the straight pipeline requirement.
- Input the Complete set of flow meter which connecting the top flange to the pipeline hole.
- Weld and fix the position on flange and pipeline.
- Remove the flow meter, welding the flange according to requirement, and clean the protruding part inside of pipeline.
- Install the sealing gasket which has the same size of pipe on inner flange.
- Insert the flowmeter into flange, ensuring the flow direction of flow meter should be the same as direction.
- Fasten the bolts securely to complete the installation.

Installation Considerations

- Preferably install the flow meter indoors. If outdoor installation is necessary, protect it from direct sunlight and rain to avoid damage.
- Avoid placing flow meter in magnetic interference, small space and maintenance inconvenient occasions.
- Avoid installing the flow meter in high-temperature environments exposed to thermal radiation or corrosive gases. If unavoidable, ensure proper insulation and ventilation.
- Flow meter should be avoided in the mechanical vibration of the pipe, if to be installed, damping measures must be taken, Hose can be installed transition, or on the 2D of flowmeter upstream or downstream Installation of pipes fixed anchor and add shock pad.
- After positioning spot welding flange and pipe, cannot be welded with flowmeter
- Vortex flow meter can measure liquid, gas and steam, but it is not universal among different media, the same kind of media is divided into low, high and special high temperature in three sizes, it is not universal among different temperatures.
- When measuring liquids must ensure that the pipe is filled with liquid, So the medium should be a bottom-up flow.
- Avoid installing flow meters for extended lengths on overhead pipes due to the risk of sagging, potentially causing seal leakage. If the required installation, on the 2D of flow meter upstream or downstream set Pipe support points.
- When measuring steam pipes, insulate the connecting rod for at least half a meter to prevent overheating of the converter.
- For measuring high temperature medium, the elbow should be filled with water in advance, in order not to damage the pressure transmitter because of high Temperature.
- Shielded cable that connect flow meter direction, Keep away from strong electromagnetic interference occasions, And definitely not with the high voltage cable laying. Keep shielding lines as short as possible, under 500 meters, and ensure they do not coil to reduce inductance.
- When wiring, unscrew the case back cover first. Route signal lines through waterproof connectors according to the wiring diagram. Tighten waterproof joints and ensure cables bend

downward before entering the connector to prevent water does not enter in the housing along the cable.

Prohibited installation when measuring liquids

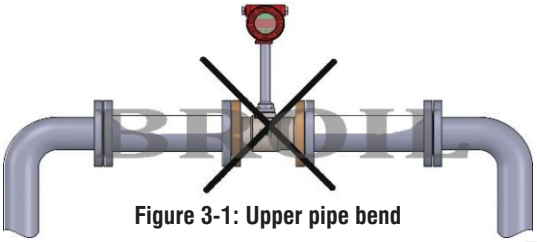


Figure 3-1: Upper pipe bend

Prohibited: Installing the device in an upper pipe bend due to the risk of gas bubble formation. Gas bubbles can cause pressure surges and lead to inaccurate measurements.

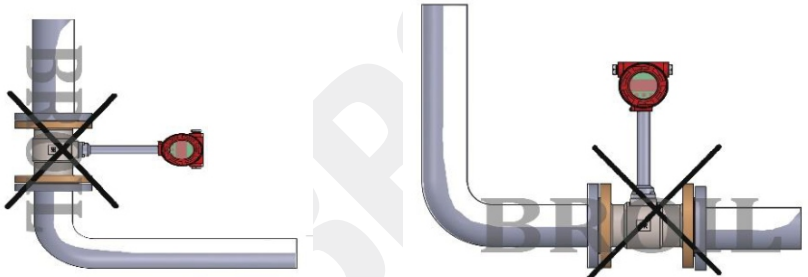


Figure 3-2: Downstream pipe and outlet

Avoid installing the device in a downstream pipe or upstream pipe of an outlet due to the risk of partially filled pipes, which can result in inaccurate measurements.

Prohibited installation when measuring steam and gases

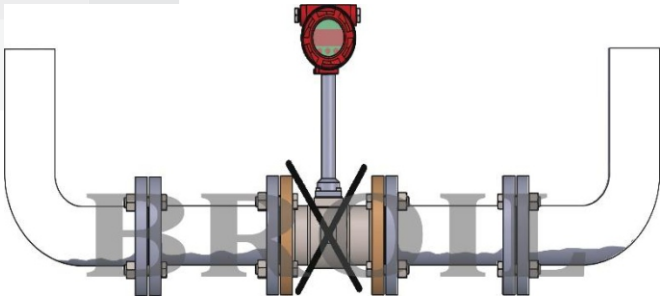


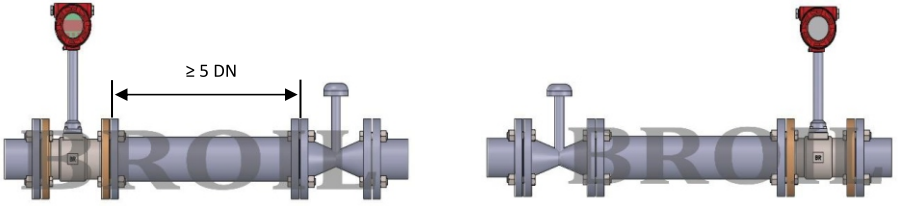
Figure 3-3: Prohibited installation when measuring steam and gases

Prohibited: Installing the device in a lower pipe bend due to the risk of condensate formation.

Condensate can lead to cavitation, resulting in inaccurate measurements. Under certain circumstances, this can lead to the device being damaged, potentially causing leaks in the measured medium.

Pipelines with control valve

- To ensure accurate measurement, the manufacturer recommends avoiding installation of the measuring device downstream from a control valve. This would run the risk of vortex formation, which would distort the measuring result.

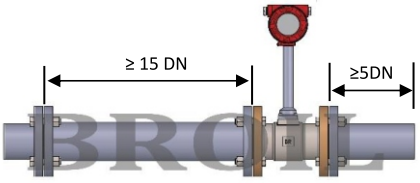


Recommended **Not Recommended**

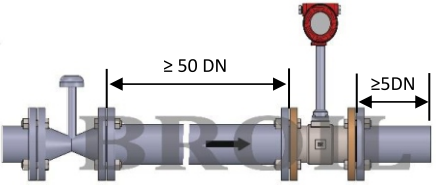
Figure 3-4: Pipelines with control valve

- Recommended: Install the device before the control valve at a distance of at least 5 times the nominal diameter (≥ 5 DN).
- Not recommended: Installing the flowmeter directly downstream of control valves, due to vortex formation.

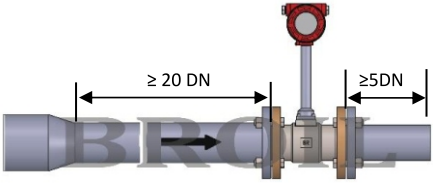
Minimum inlet sections



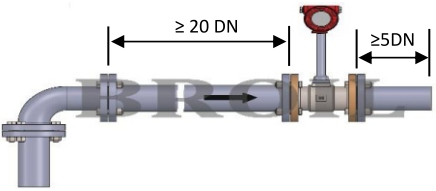
- General inlet section without disturbing flow ≥ 15 DN



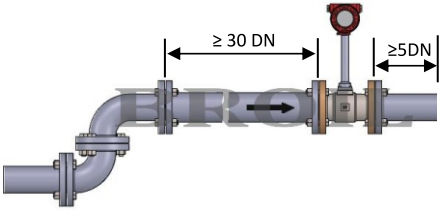
- After a control valve ≥ 50 DN



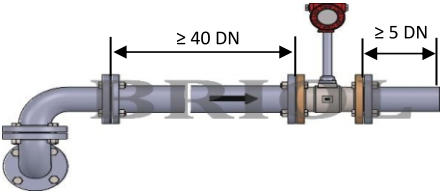
- After a pipe diameter reduction ≥ 20 DN



- After a single bend 90° ≥ 20 DN



- After a pipe diameter reduction ≥ 20 DN

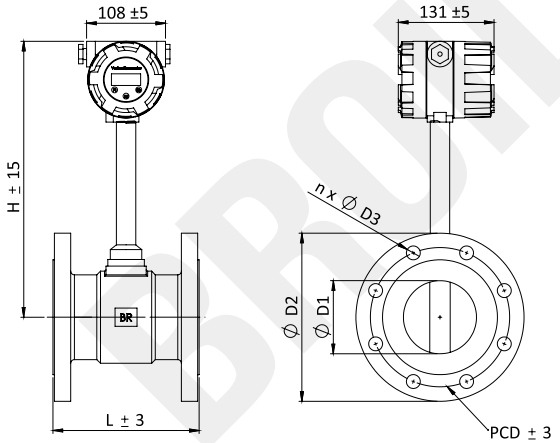


- After a double three-dimensional bend 2x90° ≥ 40 DN

Installation Precautions

- Installation point should be same as the inner diameter of the flow meter, should meet the requirement point should be the same as the inner diameter of the flow meter, should meet the requirement of the following formulas:
- $0.98D \leq DN \leq 1.05D$
- Formula: D = The inner diameter of the flow meter
- DN = Pipe inner diameter
- Piping and flow meter must be concentric. Coaxial deviation should be less than 0.05D

7. Dimensions



Model Number	L	H	D1	D2	n x D3	PCD
BT-VTM-015	220	431	16	90	4 x 16	60.3
BT-VTM-020	220	431	20	100	4 x 16	69.9
BT-VTM-025	220	431	24	110	4 x 16	79.4
BT-VTM-040	170	428	38	125	4 x 16	98.4
BT-VTM-050	170	431	50	150	4 x 19	120.7
BT-VTM-080	200	448	74	190	4 x 19	152.4
BT-VTM-100	220	459	97	230	8 x 19	190.5
BT-VTM-150	270	484	146	280	8 x 22.3	241.3
BT-VTM-200	310	504	200	345	8 x 22.3	298.5
BT-VTM-250	370	535	253	405	12 x 25.4	362
BT-VTM-300	400	560	300	485	12 x 25.4	431.8

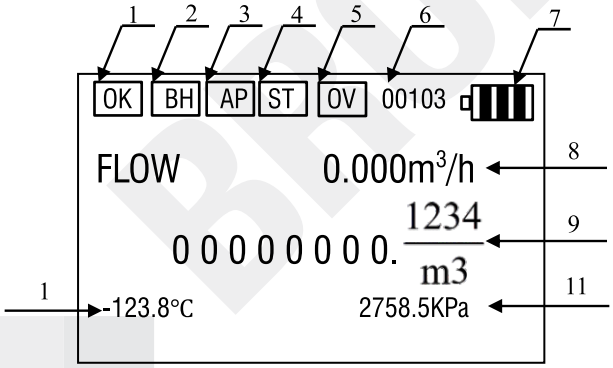
8. Operation Instruction

Keypad Operation

The meter operates via a keypad with three keys: F1, F2, and F3 arranged from left to right. F1 is Shift key, F2 is Enter/Next Key, and F3 is Modify/Return Key. (If there are Some special functions of keys, please follow the instruction below the LCD screen). When the system is running, pressing F3 key can switch to main screen 2/main screen 3.

Power on

After powering on, the meter will do self-checking. If the system is abnormal after self-checking, the meter will display the interface of error self-checking (Details in self-test menu). 1～2 seconds later, the meter will enter the main screen 1 automatically. If the system is normal, the meter will enter the main screen 1 directly. The main screen 1 is shown as below:

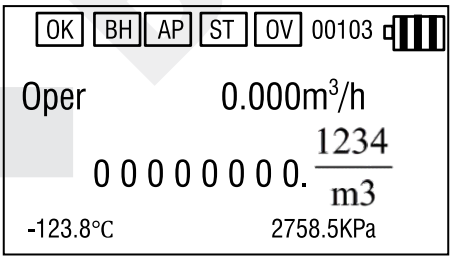


Main Screen 1

Main Screen 1

1. The running status of meter. If the system of meter is working well, it displays “OK”. Otherwise it displays “ERR”.
2. Steam compensation tips, BH for saturated steam, GR for superheated steam.
3. Pressure sensor type hints. When the sensor is gauge pressure sensor display “GP”, when the sensor for absolute pressure sensor display ”AP”.
4. Temperature and pressure parameter overflow. If the system of meter is abnormal or the temperature is manually set, it displays “ST”. If they are temperature sensors and the temperature sensors are working well, it will be blank (The temperature range is -50℃～+300℃). If the system of meter is abnormal or the pressure is manually set, it displays “SP”. If it is pressure sensor and the pressure sensor is working well, it will be blank. (The absolute pressure range is 50KPa 20000KPa), When the temperature and pressure are abnormal or manual settings, display “TP”.

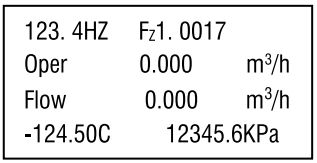
5. Indicator of operation parameters overflow. If the operation parameters overflow, it displays “OV”. If the system of meter is working well, it will be blank. (Overflow includes the parameters which can’t be negative are negative, the parameters which can’t be zero are zero, and parameters beyond the indication range.)
6. Instrument communication state information display, before three are expressed, and the four said the parity bit, 0: no parity; 1: odd parity; 2: parity check; fifth, said the baud rate, the 0:1200; 1:2400; 2:4800; 3:9600. When the table number is 1, check for no parity, baud rate is 9600, the display interface prompt displays “00103”. The instrument output current if the output current overflow overflow flag, display “mA”, the normal display parameters for communication.
7. Indicator of running modes. It displays the battery voltage in battery mode, displays “II” in two-wire current mode, and displays “III” in three-wire mode.
8. Flow rate. The maximum value is 9999 999.
9. Total flow. The maximum value is in 8 bits, and if total flow is more than 8 bits, it will display 99999999.
10. Temperature. If the internal setting is manually set, it displays the setting temperature. Otherwise it displays the temperatures which are collected by the temperature sensors on-the-spot.
11. Pressure. If the meter is set in manual mode, it displays the setting pressure. Otherwise it displays the pressure which is collected by pressure sensor on-the-spot.



Main Screen 2

Main Screen 2

Display flow rate in real-time working condition, total flow in standard condition, current temperature and pressure.



Main Screen 3

Main Screen 3:

- 123.4Hz: Display the running frequency of sensor, the maximum value is 9999.
- Fz1.0017: Medium density or compressibility factor. If the measured medium is fluid, it displays the set density. If the measured medium is natural gas, it displays compressibility factor. Otherwise it will be blank.
- Oper 0.000m³/h: Flowrate in working condition, the maximum value is 9999999.
- Flow 0.000m³/h: Flow rate in standard condition, the maximum value is 9999999.

2.3 Main Menu

--Main menu--

1. Self-test
2. Total reset
3. Setup
4. Calibration
5. Password
6. Display unit
7. Record query

In the main screen 1, main screen 2 or main screen 3, press F2 key to enter main menu, press F1 Shift key to select submenu, and then press F2 to enter.

Record query : Query the operation record of meter.
Self-test : Check the running status of meter
Total reset : Reset total flow.
Setup : Set the operating parameters of meter.
Calibration : Set the parameters of temperature, pressure, current output and flow coefficient.
Password : Modify the passwords of setup, total reset and calibration.
Display unit : Change the display unit of flow, temperature and pressure.

2.3.1. Record query

Day Record

Month Record

Year Record

Shift Enter Exit

In Record query menu, users able to view all the operation records by daily, monthly and yearly basis. Press F1 key to select the option, and press F2 to enter.

2.3.2. Self-test

Self – test

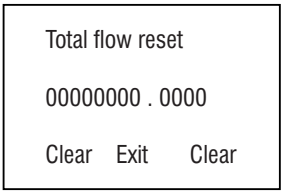
Clock ✓ Memory ✓

Power ✓ AD con ✓

Param ✓ Sensor ✓

If the system of meter is abnormal, enter this menu to check the details of running status, ✔ is ok, and X means this option is abnormal. After powering on, the meter will do self-checking. If there are one or some abnormal options, the meter will display the self-test menu. When the meter is running, it also can enter this menu to check the running status of meter.

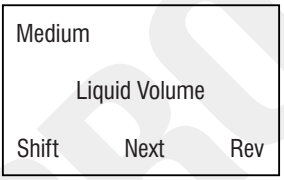
Total reset



In order to prevent unauthorized operation or wrong operation, it needs to input password before total reset. Input the correct password by F1 Shift key and F3 Modify key, and then press F2 Enter key to enter. In the total reset menu, it displays the current total flow. Press F1 and F3 key at the same time to reset total flow. When the LCD displays 00000000.0000, it means that the resetting is successful, press F2 key to return main menu.

Setup

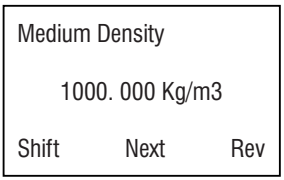
In Setup menu, it can set the operation parameters of meter. In order to prevent unauthorized operation or wrong operation, it needs to input password before entering this menu. After inputting correct password, the LCD will show as below.



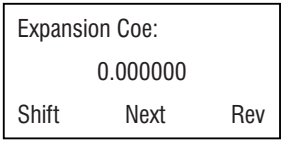
Setup menu 1: Select the measuring medium. It can select the following mediums:

1. Saturated steam temperature compensation (Steam T Cmp)
2. Saturated steam pressure compensation (Steam P Cmp)
3. Superheated Gas (Super Heat)
4. Steam automatic compensation (Steam Auto)
5. Gas volume in standard condition (Compress Gas)
6. Gas mass (Gas Mass)
7. Liquid mass (Liquid Mass)
8. Liquid volume (Liquid Volume)

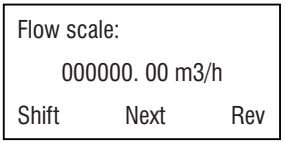
According to different measuring medium, the parameters which are needed to set are different. If select liquid mass and liquid volume, enter setup menu 2. Otherwise enter setup menu 7.



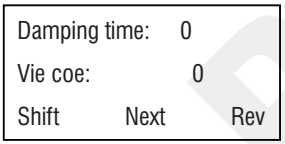
Setup menu 2: Medium Density. Set the density of the medium at 20°C. Please pay attention to the unit of density



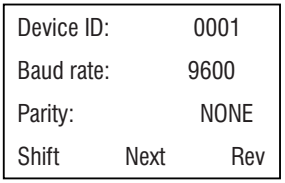
Setup menu 3: Coefficient of cubical expansion. Use this parameter to correct the density of measuring liquid.



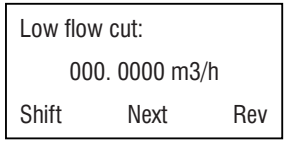
Setup menu 5: Flow range. Set the maximum flow, and this value is the corresponding value of 20mA when there is 4-20mA output.



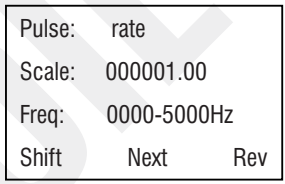
Setup menu 7: Damping time, 0-9. “Vib coe” is vibration resistance coefficient. O means no vibration resistance. This value is larger, the more strange ability of vibration resistance could have. But the large coefficient also might resist irregular flow signal. Adjust this value flexibly according to different applications.



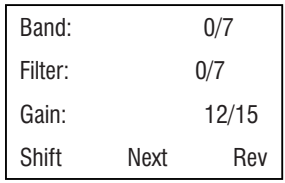
Setup menu 9: Set Device ID, Baud rate, Parity of RS485 communication



Setup menu 4: Low flow cut off. When the flow of interference signal is less then this value, the meter will set the flow zero automatically. This setup can well restrain interference of low frequency.



Setup menu 6: Equivalent and Pulse output. If selecting “pulse”, the output is used for equivalent output (Total flow). If selecting “rate”, the output is used for pulse output (Flow rate). When selecting “rate”, the first value of Freq is the frequency of pulse which is correspond to flow0, and the second value of Freq is the frequency of pulse which is correspond to maximum flow, The Scale can’t be zero or negative.



Setup menu 8: Frequency band adjustment (Band), Filtering adjustment (Filter) and Gain adjustment (Gain). Using the three parameters accurately can make the meter working in the best performance (Laypeople shouldn’t be permitted to modify this menu).

T Input:	Setup	
T setup:	+020.0	
Normal T:	+020.0	
Shift	Next	Rev

Setup menu 10: T Input: Collection mode of temperature signal and temperature setup. The temperature range is-999.9999.9, and the unit is ℃. If the collection mode is “setup”, the meter will correct the flow by setting temperature. I setup: Temperature setup. There are two collection modes of temperatures signal (Temperature sensors and setup). When the temperature of sensor is too large or invalid, the meter calculates the flow with the setting temperature. The default value is 20℃. Normal T: The temperature in standard condition, operation data when measuring gas.

High alarm value:		
+000000.0000		
Hyst:	000.000	
Shift	Next	Rev

Setup menu 13: High alarm value. Set the high alarm value and difference value. Difference value is used to prevent alarm vibration around high alarm value. The difference value can make the alarm vibration in control area, but reduce the control precision at the same time. Set this value according application and experience.

Low alarm value:		
+000000.0000		
Hyst:	000.000	
Shift	Next	Rev

Setup menu 15: Low alarm value. Set the low alarm value and difference value. Refer to high alarmvalue.

P Input:	Setup	
P setup:	+00800.0	
Atmo P:	101.325	
Shift	Next	Rev

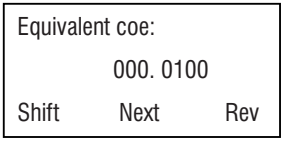
Setup menu 11: P input: Input collection mod e of pressure. It can select “setup” or “sensor”. If selecting “setup”, the meter will compensate the flow with the setting pressure. P setup: Pressure setup, absolute pressure of operation parameters. Unit is KPa. Atmo P: Atmosphere pressure. Set as the average atmosphere pressure in local Use this value to calculate flow. Unit is KPa.

High alarm:		
Param:	None	
level:	Low	
Shift	Next	Rev

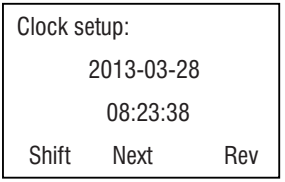
Setup menu 12: High alarm. Set the parameter of high alarm and electrical level of alarm output. (HART board doesn’t support this function)

Low alarm:		
Param:	None	
level:	Low	
Shift	Next	Rev

Setup menu 14: Low alarm. Set the parameter of low alarm and electrical level of alarm output.

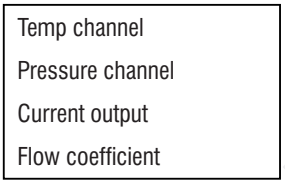


Setup menu 16: Equivalent coefficient. Equivalent equals to specific or common numerical quantity. This value used to make the flow rate to output equivalent pulse. Unit is m3/p (m3/p is cubic meter per pulse).

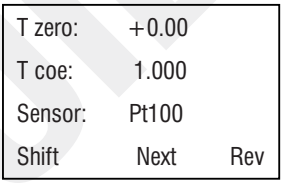


Setup menu 17: Clock setup. Display and set current data and time.

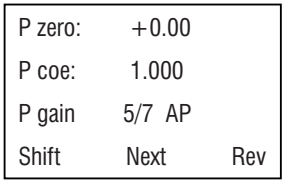
Calibration



The parameters in this menu are very important. In order to prevent unauthorized operation or wrong operation, it needs to input password before entering this menu. In this menu, there are four options: Temperature channel, Pressure channel, Current output and Flow coefficient. Press F1 Shift key to select options.



Temperature channel: Input correction coefficient and sensor type to correct the temperature which is collected by temperature sensor. If the collection mode of temperature signal is temperature setup, there is no need to set these parameters. T Zero: When calculating flow, use the temperature collected by temperature sensor adding T zero. T coe: Correct the temperature in a multiple. If not, T coe is 1. Sensor type can select Pt100 or Pt1000.



Pressure channel: Input correction coefficient to correct the pressure which is collected by pressure sensor. If the collection mode of pressure signal is pressure setup, there is no need to set these parameters.

P Zero: The calculating pressure is the pressure collected by pressure sensor adding P zero.

P coe: Correct the pressure in a multiple. If not, P coe is 1.

P gain: Amplification factor of signal collected by pressure sensor.

GP: gauge pressure sensor; AP: absolute pressure sensor.

Press F2 Next key to enter the second correction of pressure channel.

P coe:	sect	0
Std:	00000.0 Kpa	
Test:	00000.0 Kpa	
Shift	Next	Rev

Second correction of pressure channel. It cancorrect pressure second time, and there are five sections. It is suitable forapplication requiring higher pressure accuracy. Std standard pressure value,and Test is the pressure value measured by sensor.

Current zero:		
	20/40	
DC	Exit	Inc

Current output: input correction parameter to adjust the zero point of current output Note: if modifying this parameter, it will shut off the current output. Therefore, if the current output is in use, please don't modify this parameter.

Flow coe:	Sect 0	
Freq :	5000	
Coe :	000000.0000	
Shift	Next	Rev

Flow coefficient: When setting flow coefficient, it can set by section, the number of section is 0-9.

Freq: Frequency of section, the input range is0-9999.

Coe: Flow coefficient corresponding to different section.

After calibration, input the frequency of section and flow coefficient from section 0 to section 9.

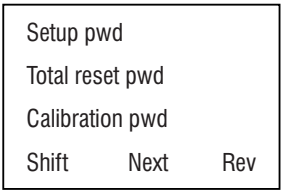
Note: If the ten sections are not all in use, for example, there are five sections in use (Section 0 to section 4), set sectionof frequency 5000 and flow coefficient of section 4 in section 5. Press F2 Nextkey to enter the average flow coefficient.

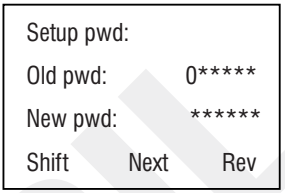
Average flow coe		
	000000. 0000	
Shift	Next	Rev

Average flow coefficient: It is used fornon-linearity correction. When the coefficients of section close up to theaverage flow coefficient, then it can reduce the nonlinear error greatly, andimprove the accuracy of meter.

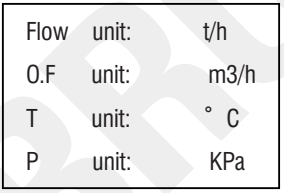
Password

In this menu, it can modify the password of total reset, setup and calibration, enter this menu, press F1 Shift key select the option which is needed to modify, enter, input the old password, and then input new password in new password option, press 12 Enter key. If the old password is correct, the LCD will display modification successful, and then enter main screen 1 automatically. Otherwise the LCD will be play modification failed, and then enter main screen 1 automatically.

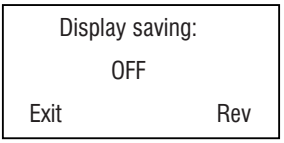




Display unit



Flow: The unit of standard condition. If the medium is liquid mass, the unit can be selected t/h, t/min, kg/h and kg/min. If the medium is liquid volume, the unit can be selected m^3/h, m^3/min, l/h and l/min. O.F: The unit of working condition. The unit can be selected m^3/h, m^3/min, l/h and l/min. T: The unit of temperature. P: The unit of pressure. Select the needed unit, and then press F2 Enter key, the main screen will display with the selected unit.



Power-saving mode: In display unit menu, press F2to enter the setup of power saving mode. If opening the power save mode, themeter will induction the light through light dependent resistor on LCD tocontrol the meter's display.

9. Sensor Connection

1	2	3	4	5	6	7	8	9	10
S1	GND	S2	V-	P-	P+	V+	B	B	A

Path 1 Path 2 — Vortex Sensor
Pressure Sensor
Temperature Sensor

Path 1 of vortex sensor:
S1: +

GND: -

Path 2 of vortex sensor:
S2: +

GND: -

Pressure Sensor:
V- : Pressure sensor power supply –

P- : Pressure sensor signal –

P+ : Pressure sensor signal +

V+ : Pressure sensor power supply +

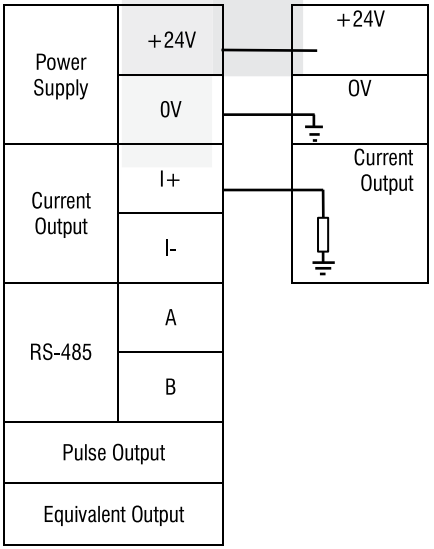
Temperature Sensor:
B : Pt100 (1)

B : Pt100 (1)

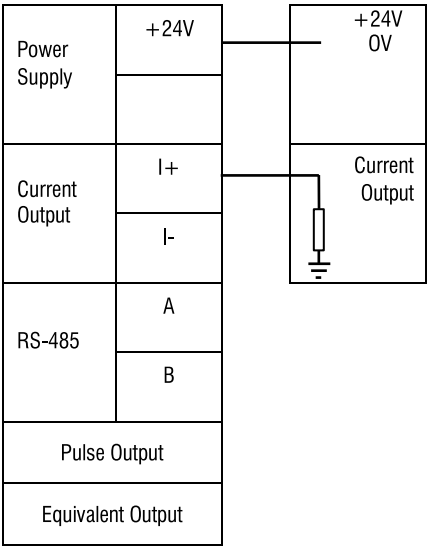
A : Pt100 (2)

Outputs Connection

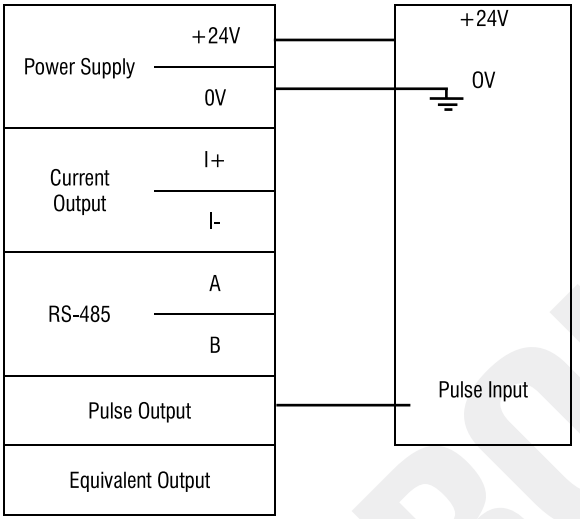
1. Three-Wire Current Output Wiring



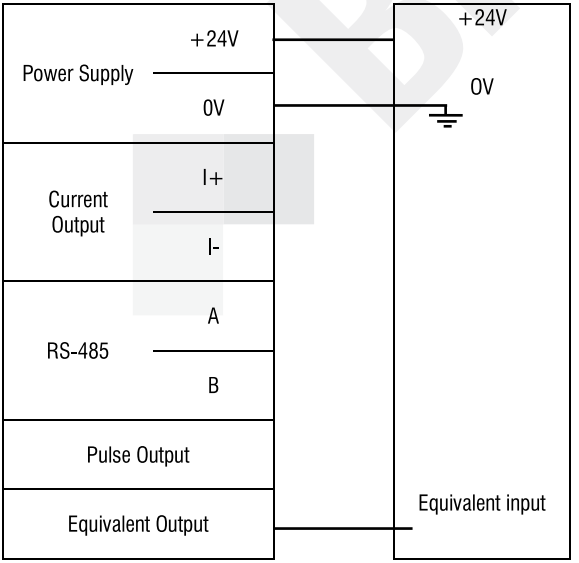
2. Two-Wire Current Output Wiring



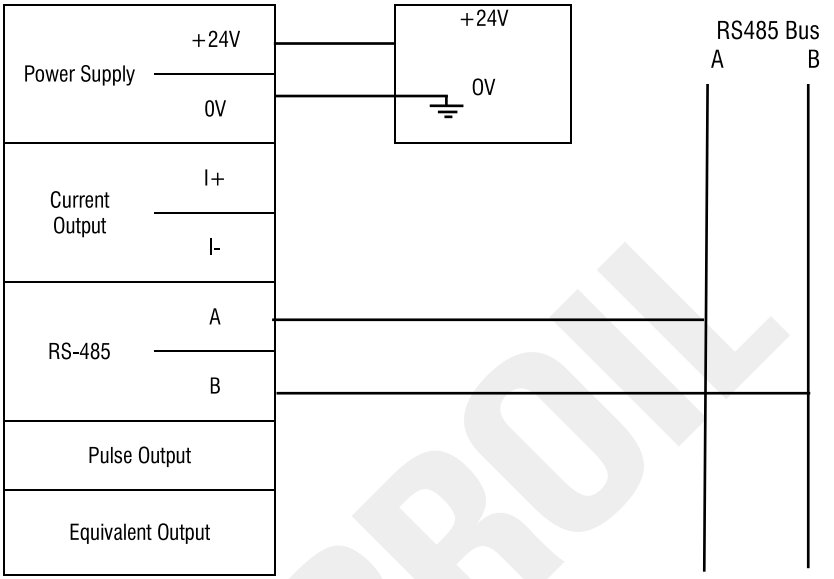
3. Three-Wire Pulse Output Wiring (Flow rate)



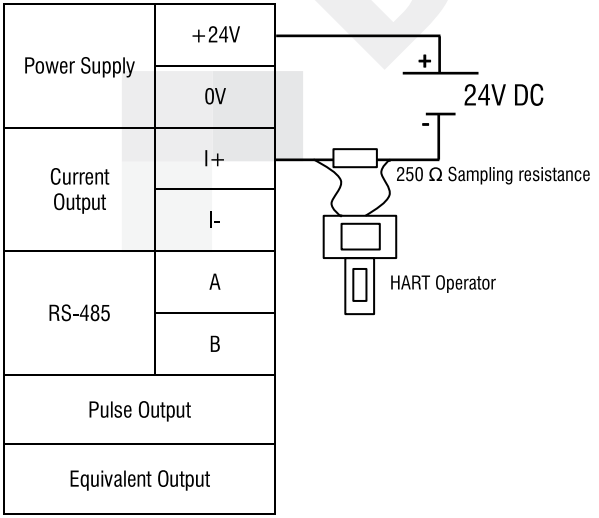
4. Three-Wire Equivalent Output Wiring (Total flow)



5. The wirings of RS485 output



6. Hart communication method (HART protocol only used in two-wire system)



10. Ordering Code

BT-VTM	1100	050	P1	OP1	C3	B2	W2	F1	H1	T1	SP1	N	C5	A1	I1	X1	DISCRIPTION
Type	1100																Inline with Single Sensor
	2200																Inline with Dual Sensor
	3300																Other
Line Size		XXX															DN15 ~ DN500 15, 20, 25, 32, 40, 50, 65, 80, 100, 125, 150, 200, 250, 300, 350, 400, 450, 500……..
Power Supply			P1														24V DC
			P2														Battery Operated
			P3														Other
Output				OP1													4-20 mA
				OP2													4-20 mA + Relay 1 No
				OP3													4-20 mA + Relay 2 Nos
				OP4													4-20 mA + Pulse + High and Low Alarm Output
				OP5													Other
Communication Interface					C1												No Communication
					C2												RS-485
					C3												HART
					C4												Other
Body & Connection Material						B1											SS304
						B2											SS316
						B3											Other
Wetted Material							W1										SS304
							W2										SS316
							W3										PTFE
							W4										As Per Customer Advice

Connection Type	F1									ANSI #150 Flange End
	F2									ANSI #300 Flange End
	F3									DIN PN16 Flange End
	F4									Thread End
	F5									Wafer / Sandwich Type
	F6									As Per Customer Advice
Electronic Housing material and conduit entries		H1								Aluminium Die Casting Housing with Two M20 x 1.5 conduit entries
		H2								Other
Sensor process temperature range			T1							Standard : (-40° C to +250° C)
			T2							Not required
			T3							Other
Sensor process Pressure range				SP1						0 to 16 bar
				SP2						Not required
				SP3						Other
Data Logger Cum Totalizer					Y					Required
					N					Not required
Cable						C1				10 Meter
						C2				15 Meter
						C3				30 Meter
						C4				50 Meter
						C5				No Cable
						C6				As Per Customer Advice
Accessories							A1			Not required
							A2			Mating Flange
							A3			Mating Flange + Gasket + Nut Bolt
							A4			As Per Customer Advice
IBR								I1		NON-IBR
								I2		IBR
Certification (Approval)									X1	Not Required
									X2	ATEX (**Ex II 2G Ex db IIC T6 Gb / Ex II 2D Ex tb IIIC T6 Db / Ex II 1G Ex ia IIC T6 Ga)**
									X3	CIMFR (**Ex db IIC T6 Gb/Db / Ex tb/tc IIIC T6 Db/Dc**)

11. Troubleshooting

Fault	Cause	Solution
No output signals after power on	1. No flow or the Flow rate is under starting flow. 2. The connections of power supply and output are incorrect. 3. The pre-amplifier is damaged (The calculator can't count, and the flow rate is 0). 4. The circuit of diving amplifier is damaged (The display of calculator is normal).	1. Increase the flow rate or replace a flow meter with smaller nominal Diameter to meet the requirement of flow range 2. Make the connection correct 3. Replace the pre-amplifier 4. Replace the damaged components in the circuit of driving amplifier.
The meter outputs signal when no flow	1. The interference of bad grounding of meter, strong electricity and interference of other grounding 2. The higher sensitivity of amplifier or it may produce self-excitation. 3. Unstable power supply, bad filtering or other electrical disturbance.	1. Make the grounding well 2. Replace the preamplifier correct 3. Repair or replace the power Supply.
Unstable display of flow rate	1. Unstable flow in pipe 2. The higher or lower sensitivity of amplifier make the output pulses are more counted or less counted. 3. There is debris in the shell of meter. 4. Bad grounding 5. The flow rate is under the low limit 6. The downstream seal ring reaches into pipe, and make disturbance	1. Begin to measure after the flow rate is stable 2. Replace the pre-amplifier 3. Remove the debris. 4. Check the grounding, make the grounding well
The display ed total f low is inconsistent as actual total flow	1. The flow coefficient of meter is incorrect. 2. The flow rate on site is higher than the maximum flow of meter. 3. The bad quality of the flow meter.	1. Recalibrate the meter and input the new flow coefficient. 2. Reduce the flow rate in pipe or replace the flow meter. 3. Recalibration
Abnormal display	Bad contact of the key or dead lock the key	Replace the display board.
System halts after replacement new battery	The electrify reset circuit is abnormal, or the oscillating circuit can't afford to boost.	Reinstall the battery (Before reinstall the battery, the meter is needed to discharge more than 5 seconds)

Note :

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Note :

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Products Portfolio



Helical Rotor Flow Meter



Turbine Flow Meter



Oval Gear Flow Meter



Vortex Flow Meter



Swirl Flow Meter



Thermal Mass Flow Meter



Electromagnetic Flow Meter



Plastic Helical Flowsensor



Mechanical Oval Gear Flow Meter



Fuel Consumption Meter

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