

Intelligent multi parameter transmitter

1. Overview:

Smart Multi-Parameter Transmitters A new type of transmitter that combines differential pressure transmitters, temperature acquisition, pressure acquisition, and flow accumulation to display work pressure, temperature, instantaneous, and cumulative flow in place. The gas and steam can be automatically compensated for temperature and pressure to realize the function of displaying standard flow and mass flow at the site. And can use dry battery work, can be directly used with the differential pressure flow meter.

1.1 main feature:

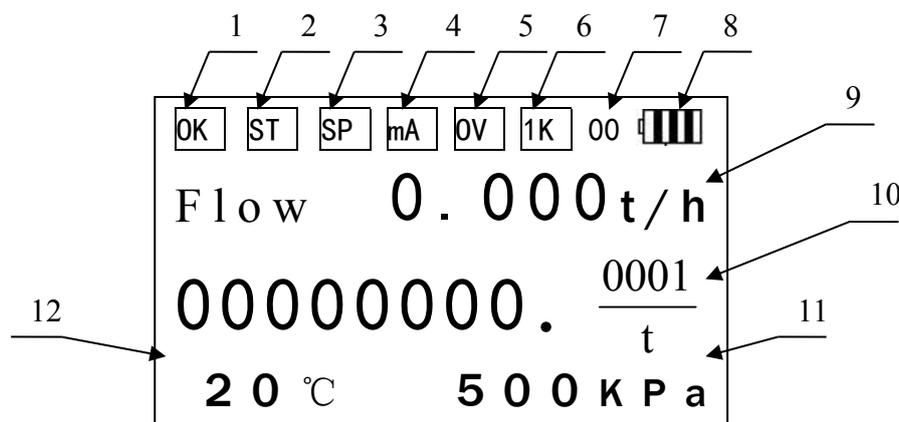
1. Liquid crystal lattice Chinese characters display, intuitive and convenient, simple and reset operation;
2. Equipped with non-contact magnetic data settings, without opening the cover, safe and convenient;
3. Can be connected with a variety of differential pressure flow sensors (such as orifice plate, V-cone, Annubar, elbow and other differential pressure sensors);
4. With temperature / pressure sensor interface, strong interchangeability. Can be connected to Pt100 or Pt1000, pressure can be connected to gauge pressure or absolute pressure sensor, and can be modified in sections; (optional);
5. Measuring a wide range of media, can measure steam, liquid, gas, etc.;
6. With excellent nonlinear correction function, greatly improve the instrument's linearity;
7. The ratio of 1:100 (special requirements can be 1:200);
8. With full-featured HART protocol, remote parameter setting and debugging; (optional);
9. The converter can output frequency pulse, 4 ~ 20mA analog signal, and has RS485 interface, can be directly connected with the computer, the transmission distance up to 1.2km; (optional);
10. Language can be selected, there are two models in Chinese and English;
11. The parameters are convenient to set up, can be permanently saved, and can save up to three years of historical data;
12. Ultra-low power consumption, a full dry battery performance work can be maintained for at least 3 years;
13. The work mode can be automatically switched, battery-powered, two-wire system;
14. With self-test function, a wealth of self-inspection information, user-friendly maintenance and debugging;
15. With an independent password settings, anti-theft function is reliable, parameters, total reset and calibration can set different levels of passwords, user-friendly management;
16. Display units can be selected, can be customized.

2. Operation Instruction:

Transmitter through the button to set the parameters, generally during the installation to use the button to manually set some parameters. The instrument has three keys, from left to right in the order of F1, F2 and F3. Usually F1 is the shift key, F2 is the confirm and change key, and F3 is the change and return key. If there is a special function of the key, the function of the key is different. Please refer to the function description of the key below the interface of the LCD screen when using. When the instrument is running, it can be manually switched to the main interface 2 by the F3 key. The main interface 2 also shows the working condition and instantaneous flow, as well as the differential pressure value and density value. When measuring natural gas, the compression factor is displayed.

2.1 start up

When the instrument is powered on, a self-test will be performed. If the self-test is abnormal, the self-test error interface will be displayed (self-test interface description refers to the self-test menu), and it will jump to the main interface after about 1 to 2 seconds. Otherwise it will jump directly to the main interface. The main interface starts as shown in the following figure:



Main interface 1

Label 1: The instrument running status is displayed in real time. If "OK" is displayed normally, "ERR" is displayed in the fault.

Label 2: Set the temperature label. If the instrument is running abnormally or manually set to set the temperature, it displays "ST". If it is a sensor and it is normal, it will be displayed as empty (the instrument limits the normal temperature of the sensor: -50°C—300°C).

Label 3: Set the pressure. If the instrument is running abnormally or manually set to set pressure, "SP" will be displayed. If it is the sensor and the pressure is normal, it will be displayed as empty (the instrument limits the normal pressure of the sensor to absolute pressure: 50KPa-20000KPa).

Label 4: Meter current output overflow flag. If the current output overflows to

display "mA", if the normal display is empty.

Label 5: The instrument operation parameter overflows. If the instrument operation parameter overflow shows "OV", it will be displayed as empty if it is normal. (The overflow includes parameters that cannot be negative and the parameters are negative, and cannot be zero and the data is beyond the indication range).

Label 6: In order to facilitate display and read, when the accumulated flow exceeds 10000000, the cumulative display data of the instrument is multiplied by 1000 to be the true cumulative value.

Label 7: When the HART communication, the instrument short address display;

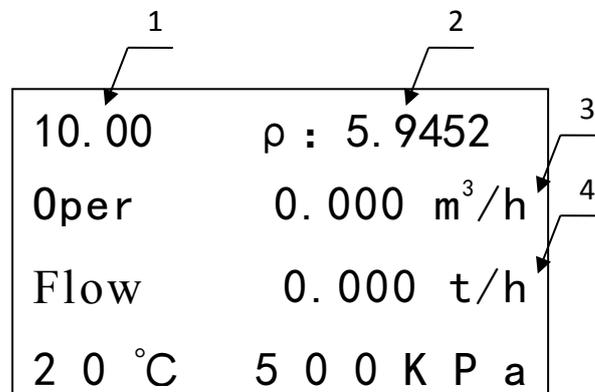
Label 8: Run mode display shows the current battery level when in battery mode; "II" when displaying two-wire current; "III" when three-wire system;

Label 9: Instantaneous flow value display, showing the maximum value is 9999999.

Label 10: The total flow rate is displayed. The maximum value is 8 digits. If 8 digits are exceeded, 99999999 is displayed.

Label 11: The current sensor collects the pressure display. If the instrument is internally set to manual, the set pressure is displayed; otherwise, the sensor temperature is displayed. When the HART communication, the instrument short address display;

Label 12: The current sensor collection temperature display. If the instrument is set to manual, the set temperature is displayed. Otherwise, the sensor temperature is displayed.



Label 1: The current working differential pressure value is displayed. The maximum value is 9999.

Label 2: Media Density/Compression Factor Display (Super compression factor is displayed when the media is natural gas, other media densities are displayed).

Label 3: Instantaneous flow display with unit conditions. The maximum display value is 9999999.

Label 4: Instantaneous flow rate display with unit status. The maximum value is 9999999.

2.2 Main Menu

- Main menu--**

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

In all main interface (Main Interface 1, Main Interface 2), press F2 key to enter the main menu interface. The F1 shift key can be used to select the corresponding menu item and press the F2 key to enter. The operation of each menu item can be found in the following sections, which are briefly described as follows:

Self-test: Instrument operation status check.

Display: Changes in instantaneous, operating condition, temperature, and pressure display units.

Reset: The cumulative flow is cleared.

Settings: Instrument operating parameter settings.

Calibration: Setting of flow parameters, and temperature channel, pressure channel, current output, flow coefficient, and differential pressure transmitter zero calibration settings.

Password: modify the settings, reset and calibrate the password.

2.3 Display unit

Flow unit: t/h
O.F unit: m³/h
T unit: °C
P unit: KPa

Instantaneous unit: Instantaneous or standard unit selection;

Operating unit: Operating unit selection.

Temperature unit: Select temperature unit to display °C or °F;

Pressure unit: pressure unit selection, can display KPa or MPa.

The display unit option can change the unit displayed when the instrument is running and enter the display unit interface. If you select, there are four options for the liquid quality: t/h, t/min, kg/h, and kg/min. If the liquid has volume m³/h, m³/min, L/h, and L/min are four options; condition flow rate has four options: m³/h, m³/min, L/h, and L/min. Select the appropriate unit and press OK. After the key, the main interface will display the value in the setting display unit.

2.4 Self-test

Self-test			
Clock	✓	Memory	✓
Power	✓	AD con	✓
Param	✓	Sensor	✓

If the instrument is running in error, you can query the specific instrument operation error by entering this option, ticking it as normal and tying it as error. The self-test is performed when the instrument starts up. If there is an error, this screen will be displayed. When the instrument is running, you can also enter this option to query the status of the instrument.

2.5 Reset

Total flow reset:		
00000000. 0000		
Reset	Next	Reset

The cumulative value of the traffic is cleared. In order to prevent the emptied value of the traffic or the wrong operation from being cleared, enter the password when entering the reset option. In the password check interface, enter the correct password by shifting the modifier key, press the F2 confirm key, enter the reset interface, and display the current cumulative flow value. In the reset interface, in order to prevent misuse, use both hands to press the F1 and F3 keys at the same time to reset the operation, reset the successful screen display 00000000.0000, press the F2 change key, to the running time reset interface;

Run time reset:		
00004176 min		
Reset	Exit	Reset

The running time is cleared and the running time is measured in minutes. Record the startup time of the instrument and up to 8 digits (clear operation is same as the cumulative flow clearing).

2.6 Setup

The setting options set some parameters required for the instrument work. In order to prevent human mis operation, entering this option requires checking the password. Enter the correct password, enter the settings interface.

Medium type:		
liquid volume		
Shift	Next	Rev

Setup interface 1: media selection, through this item to modify the meter measurement media, the meter measurement media selection is different, the need to set the parameters are also different, so the interface entered is also different. If the instrument selects the volume of the liquid and the mass of the liquid, reference is made to interface 2. If natural gas is selected, reference is made to interface 4, other reference interface 7. There are the following media to choose from:

1. saturated vapor temperature compensation
2. saturated vapor pressure compensation
3. superheated vapor
4. vapor automatic compensation
5. gas Std.volume
6. gas Oper.volume
7. liquid mass
8. liquid volume
9. Natural gas

Medium density:		
1000. 0000 Kg/m ³		
Shift	Next	Rev

Std density:		
0001. 0000 Kg/m ³		
Shift	Next	Rev

Setup interface 2: Medium Density (20°C), set the density of the measured media at 20°C, and note the unit when setting. This parameter is mainly used for liquid quality and liquid volume. Media standard density, set the measured media's density at 20°C and an atmospheric pressure (101.325kpa), and pay attention to the unit when setting, this parameter is mainly used for gas standard volume and gas quality.

Expansion coe:		
0. 000000		
Shift	Next	Rev

Setup interface 3: volume expansion coefficient, parameter for correcting density when measuring liquid.

Fz compensation:		
		NO
Shift	Next	Rev

Setup interface 4: parameters used in natural gas measurement, set whether or not to use hyper compression factor correction.

Relative density:		
0. 664		
Shift	Next	Rev

Setup interface 5: Set Relative Density, the parameters used when measuring natural gas. Natural gas relative air density (standard density), dimensionless. This parameter is provided by the gas analysis report.

Molar composition :		
N ₂ :	00. 07	
CO ₂ :	01. 65	
Shift	Next	Rev

Setup interface 6: Set the molar percentage of nitrogen and carbon dioxide. The molar percentage of nitrogen and carbon dioxide in natural gas. This parameter is provided by the gas analysis report.

```

Flow cut-off:

0000. 0000

Shift    Next    Rev

```

Setup interface 7: Low flow cut off, low flow cut off for anti-jamming, when the interference signal flow is less than this set value, the meter will automatically set the flow to zero, this setting can better inhibit the low frequency interference.

```

Flow full scale:

000000. 00

Shift    Next    Rev

```

Setup interface 8: Flow range, set the maximum range of the meter, corresponding to the current output 20mA value.

```

Damping time: 0

Shift    Next    Rev

```

Setup interface 9: damping time, input range 0-9. When the on-site flow shows excessive fluctuations that affect readings, increase the damping time and stabilize readings.

<pre> HART Address: 00 Protect: Close Shift Next Rev </pre>	<pre> Device ID: 001 Baud rate: 9600 Parity: NONE Shift Next Rev </pre>
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Setup interface 10: HART communication and RS485 communication related settings, when the instrument is HART communication, need to set the short address and write protection mode. The short address range is 0-15,0 is the master-slave communication mode. When the short address setting is not zero, the current is fixed output 4mA; when the instrument is RS485 communication, the instrument table number, baud rate and communication parity bit need to be set.

T input:	Sensor	
T setup:	+020.0	
Ref T:	+020.0	
Shift	Next	Rev

Setup interface 11: Temperature signal acquisition mode and set temperature settings. The effective range of temperature input is -999.9-999.9. Set the temperature unit: °C. If the temperature signal acquisition mode is set to:

The table is compensated according to the set temperature. Standard temperature: Calculate data when measuring gas.

Temperature parameter settings, temperature input sensor and set two options, the temperature input is set, the instantaneous flow calculation, does not call the sensor to collect temperature. The temperature input is a sensor, and the instantaneous flow calculation calls the temperature data collected by the sensor. When the data collected by the temperature sensor is abnormal, the instrument calls the set temperature for flow calculation. The standard temperature is the temperature parameter of the gas standard volume and gas mass conversion.

P input:	Sensor	
P set:	+00800.0	
Atmo P:	101.325	
Shift	Next	Rev

P input:	4-20mA	
P set:	+00800.0	
Atmo P:	101.325	
Shift	Next	Rev

Setup interface 12: Pressure input: Pressure input mode selection, setting, sensor and 4-20mA. If the collection mode of the pressure signal is set to: Set, the instrument will be compensated according to the set pressure. The set pressure is the absolute pressure value of the instrument's operating parameters. Unit: KPa; Sensor: The instrument collects the pressure signal by matching the pressure sensor; Atmospheric pressure: The local atmospheric pressure value, set the local average atmospheric pressure, for the flow calculation parameters, unit: kPa.

Trans scale (kPa):		
4mA: +000000.000		
20mA: +001600.000		
Shift	Next	Rev

Setup interface 13: When the pressure is selected as 4-20mA input, the upper and lower limits of the pressure transmitter need to be set. Change the pressure input to 4-20mA. Press F2 to switch to the pressure range input interface. The pressure range is only set when the pressure is 4-20mA.

```
Pulse out:  Pulse
Freq:      0000-5000Hz
F. S:      0005000.000

Shift      Next      Rev
```

Setup interface 14: Pulse output setting, with pulse and equivalent selection; when selecting the pulse to set the frequency and range, the maximum frequency of 5000, when you select the equivalent to set the equivalent coefficient, the maximum output frequency equivalent to 1000.

```
I output:  Flow

Shift      Exit      Rev
```

Setup interface15: Current output, select current output variables, instantaneous flow and differential pressure for selection.

2.7 Calibration

The calibration option sets the parameters required for the instrument flow calculation. The setting parameter is an engineer-level parameter. Changing this parameter affects the flow measurement accuracy. Non-professionals do not move. In order to prevent human error, entering this option requires setting a password (initial password is 000000), enter the correct password, you can enter the calibration parameter settings.

```
Temp channel
Pressure channel
Current output
Flow coefficient
```

Calibration channel selection: Select the channel to be set in the interface through the shift key.

T	zero:	+0.00
T	coe:	1.000
Sensor:		Pt100
Shift	Exit	Rev

Temperature channel: By entering the correction parameters and the sensor type, the sensor acquisition temperature is corrected. If it is set temperature, this item is not set. Temperature Zero: The temperature collected by the sensor plus this temperature is the temperature of the flow calculation. The temperature coefficient, which is a multiple of the temperature correction parameter, is set to 1 if it is not corrected. Type is temperature sensor type, now select Pt100 and pt1000.

Pressure sensor		
4-20mA input		
Shift	Next	Rev

Pressure channel: Pressure input with two-wire pressure transmitter and pressure sensor (four-wire bridge).

P	zero:	+0.00
P	coe:	1.000
P	gain:	5/7 AP
Shift	Next	Rev

Pressure sensor calibration: through the input pressure correction parameters, the sensor's collection pressure is corrected. If it is set pressure, this item does not need to be set.

Pressure zero: The current sensor acquisition pressure plus this value is the current instrument pressure.

Pressure coefficient: Correction of the accompaniment compensation for the current collection pressure. This value is set to 1 if no correction is made.

Gain: The magnification of the acquired signal when acquiring the pressure sensor signal. Gauge pressure/absolute pressure is set for the sensor type. Absolute pressure indicates that the instrument connection is an absolute pressure sensor, and gauge pressure indicates that the instrument connection is a gauge pressure sensor.

```

4-20mA input cal
SV: 4mA
PV: 00.0000

Shift Next Rev

```

```

4-20mA input cal
SV: 20mA
PV: 00.0000

Shift Exit Rev

```

Pressure-varying current input calibration : According to the totalizer prompts input current during calibration. Zero calibration input current value of 4mA, the measured value will display a value close to 4mA, then press F2 key to enter the full calibration, the input current value of 20mA, the measured value will display a value close to 20mA, in the F2 key instrument prompts calibration is successful, and Return to the interface.

```

I cal. : 4mA
Measure: 04.0000

Shift Next Rev

```

Current output calibration: Calculate the zero point and coefficient of the current calibration by outputting the actual measured current value. When 4mA is selected, the instrument outputs 4mA. At this time, the measured data of the standard instrument is input to the measured current value, then the cursor is moved to 4mA and the F3 key is pressed. (Modification key) Select the output 20mA meter output 20mA, then input the measured value to the measured current value, press F2 key (change item key) to see the current zero point and current coefficient at the next interface, when the input 4mA, the range is 3.5-4.5 Between 20 and 18mA, the new zero point and coefficient are recalculated. If it is exceeded, the original zero point and coefficient are maintained. The correction is based on the original zero point and coefficient.

```

I Zero: +0.0000
I coe: 1.0000

Shift Exit Rev

```

After the current output is calibrated, press F2 to view the current coefficient and current zero. By inputting correction parameters, the output zero and fullness of the current are adjusted. Note: Modifying this parameter will turn off the current output. Do not set if the system associated with the instrument is running using the current

output.

Flow calibration:

Setup interface 1: Flow meter type options. This option can be used to modify the type of flow sensor. The type of flow sensor is different, and the parameters to be set are also different, so the interface to enter is different. There are several differential pressure flow sensors for selection:

1. Orifice DP
2. V-Cone DP
3. Annubar DP
4. Elbow DP
5. K coe.
6. DP Scale

Setup Interface 2: Pipe ID, Flow Sensor Pipe ID;

Pipe diameter :		
0100.000		mm
Shift	Next	Rev

Hole diameter :		
0080.000		mm
Shift	Next	Rev

Cone diameter :		
0080.000		mm
Shift	Next	Rev

Setup interface 3: Hole diameter, opening diameter of orifice plate (set orifice flowmeter);

Cone diameter, maximum cross-sectional diameter of V-cone under operating conditions (Set V-cone flowmeter);

Flow coe:	Seq0	
DP:	+0100.0000	
Coe:	000.80000	
Shift	Next	Rev

Setup interface 4: Since the outflow coefficient C is not necessarily an invariable constant, C is divided into 10 segments to perform segmentation calculation, thereby

improving the measurement accuracy. This factor applies to orifice plates and V-cone flowmeters;

BD ratio:		
0001.200		
Shift	Next	Rev

Setup interface 5: Bend-diameter ratio, bending ratio of elbow flow sensor, this coefficient is only used for elbow flowmeter;

Flow coe:	Seq0	
Dp:	+0100.0000	
Coe:	000.80000	
Shift	Next	Rev

Setup interface 6: Since the flow coefficient K is not necessarily an invariant constant, K is divided into 10 segments for segmented calculation, thereby improving the measurement accuracy. This coefficient applies to Annubar, K-factor and elbow flowmeters;

Isentr Index (K) :		
1.0000		
Shift	Next	Rev

Setup interface 7: Isentropic index, used to calculate the flow rate expansion coefficient, dimensionless;

Scale flow:		
001000.000		
Shift	Next	Rev

Setup interface 8: scale flow, flow rate sensor corresponding to the maximum differential pressure value of the flow, this parameter is only used for scale flow.

Design density:
0001.0000
Shift Next Rev

Setup interface 9: design density, medium density used when designing the flow sensor, this parameter is only used for scale flow;

DP URV:
+000000.0000
Shift Next Rev

Setup interface 14: upper limit of differential pressure, differential pressure transmitter upper limit of differential pressure (unit: kPa);

DP LRV:
+000000.0000
Shift Next Rev

Setup interface 15: lower limit of differential pressure, differential pressure range of multi-parameter transmitter (in kPa);

DP zero:
0.000
Enter Next Enter

Setup interface 16: differential pressure zero point, when the sensor input is zero, due to the change of the measurement value caused by some influence, resulting in the lower limit value is not zero value, the zero pressure shift is required, the displayed value is the zero point of the sensor at that time; When you first

determine the sensor input is zero, then press the F1 and F3 keys at the same time, the migration is complet;

2.8 Password

This option can be used to modify the clear, set, and calibrated passwords respectively (clear, calibrate, and set the password to change the operation, here only to set the password change), enter the change password selection interface, select the item to be modified, after entering Enter the old password, and then enter the password to be modified in the new password item, press the F2 confirmation key, if the old password is entered correctly, the prompt modification is successful, the following message prompts successful modification and automatically jumps to the main interface, otherwise the display modification fails while jumping To the main interface.

```
Setup pwd
Total reset  pwd
Calibration  pwd

Shift  Enter  Rev
```

Password change selection interface: Use the shift key to select the password setting of the corresponding module.

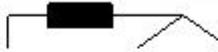
```
Setup pwd:
Old  pwd: 0*****
New  Pwd: *****

Shift  Enter  Rev
```

Password modification interface: Enter the corresponding password. If it is correct, it indicates that the password has been successfully modified. Otherwise, jump to the main interface.

3. Wirings:

3.1 Sensor terminal description:

24V DC POWER + - I+	RS-485 A B	P-Transmitter 4-20mA +24V PI	 Temp.
			IP- VP- VP+ IP+ P-Sensor

Power supply:

Three-Wire Current Output Wiring:

- 1 : Power supply DC24V+
- 2 : Power supply DC24V-
- 3: Current output I+

Two-Wire Current Output Wiring:

- 1 : Power supply 24V+
- 3 : Current output I+

Temperature Sensor: (Pt100/ Pt1000):

- 1: Pt100 (A)
- 2: Pt100 (B)
- 3: Pt100 (B)