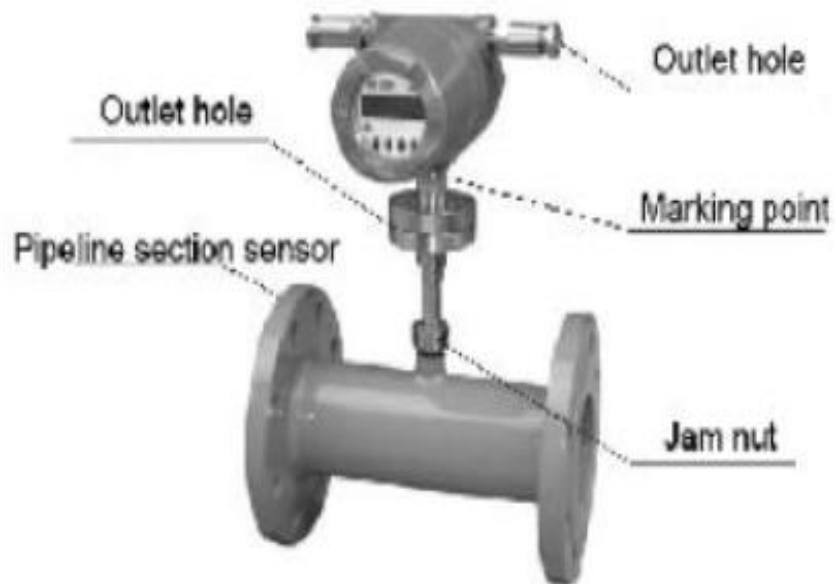


# THERMAL GAS MASS FLOW METER USER MANUAL



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## **SAFETY NOTICE**

Thank you for choosing our Thermal type gas mass flow meter

This manual provides instructions on correct and safe operation of our product a delicate electronic instrument for measuring gas- flow rate. To prevent any damage and to ensure a perfect performance, please read this manual carefully before installation, energizing, debugging and setting

This manual is applicable for flow control engineers, professional engineers and technicians, or qualified personnel authorized by our company

- After reading, please properly keep the manual for future reference
- Please store the manual in end user technical section
- In the manual, the importance rates of safety notice are classified as dangerous and attention

If ignoring this warning mark and operating wrongly, personal injury can be caused while this instrument and other property may be damaged

If ignoring this warning mark and operating wrongly, personal injury or serious accident can be caused

You may see the following marks when reading this manual

This mark refers to operations that have potential dangers

This mark refers to operations that must be paid attention

This mark refers to prohibited operations

### **Please choose explosion prevention meter when used in explosion environment**

Make sure whether there are explosion prevention authentication marks and temperature group marks on the nameplate. Meters without such marks cannot be used in explosion environment. (Explosion prevention meter needs a special appointment when ordered)

**The Explosion prevention temperature group of the meter should meet the need of the explosion environment.**

When applying the meter in anti- detonation situations, the user should compare the explosion prevention temperature group of the meter to check whether it reaches the standard to avoid explosion



**Hot- line and uncap work in explosion environment is prohibited**

When connecting, please first turn off the power. There are three ways for changing parameter setting to avoid accident, including remote changing, changing via intrinsically safe infrared hand- written device and changing in safe environment

**The level of protection of the meter must meet the need of working condition**

The level of protection of need of working condition should be lower than or equal to that of the meter so as to ensure a good working condition

**The type of power supply should be confirmed**

Users may be choose multiple power supply types- AC220V or DC +24V (a remark is needed when ordering). Please confirm whether the type of power supply matches the meter, otherwise it may cause some damage to the meter and also personal injury.

**The working environment and medium temperature should be confirmed**

The working environment and the maximum design temperature of medium should be lower than the nominal value (for details see technical parameter)

**The On- Line installation and maintenance operation are forbidden when the medium temperature is too high**

When the tested medium temperature is higher than human endurance or potential dangerous temperature, please stop running or make cooling treatment until it reaches safe temperature. Please stop running if unable to operate on- line to avoid accident.

The working air pressure and medium pressure should be confirmed

The working air pressure and the maximum design pressure of medium should be lower than the nominal value (for details see technical parameter). The nominal value of meter is within 10% higher or lower than normal atmosphere

The On- Line installation and maintenance operation are forbidden when the medium pressure is too high

When the absolute pressure of the tested medium is higher than two normal atmosphere or potential dangerous pressure. Please stop running or make decompression treatment until it



reaches safe pressure. Please stop running if unable to operate on- line to avoid accident. Such gases include coal gas, chlorine etc

Please do not operate when there is any suspected product failure

If you suspect that the meter is broken, please contact our technical personnel, otherwise only qualified service personnel can have inspection

## **1. Preface**

Thermal type Gas Mass Flow meter utilizes the principle of heat exchange to measure fluid-flow. This meter employs method of constant temperature difference to accurately measure gas mass flow, and it has the advantages of small size, high degree of digitations, easy installation, accurate measurement etc

The Sensor part consists of two platinum resistance converters of reference level. It utilizes bridge type loop circuit, with one converter measuring fluid temperature, and another maintaining constant temperature difference that is higher than fluid temperature. The measurement can be made high temperature and high pressure situation

### **Thermal Gas mass Flow meter has the following technical advantages:**

It is a true mass Flow Meter that can conveniently and accurately measure gas- Flow rate without temperature and pressure compensation, from which users can get gas mass Flow or standard volume flow.

Large ratio of measuring range. It can measure gas with velocity of flow from 100 Nm/s to 0.5 Nm/s and be used in gas leak hunting

Good anti- Seismic performance and long useful life. The convertor doesn't contain movable part and pressure sense part, so that the measuring accuracy will not be influenced by shaking

Easy installation and maintance. If possible on line installations and maintenance are allowed (See Safety Notice)

Digital design. The meter utilizes digital circuit measurement to assure accurate result and convenient maintenance

Factory automation and integration can be achieved by usingRS-485 or HART communication.



**2. TECHNICAL PARAMETER**

|                                       |  |                               |
|---------------------------------------|--|-------------------------------|
| Measuring medium                      | All kinds of gases (excluding acetylene)   |                               |
| Range of caliber                      | DN100~4000mm   | DN25~200mm                    |
| Range of Velocity of flow             | 0.5~100 Nm/s   |                               |
| Order of accuracy                     | ±1%  |                               |
| Working temperature                   | Sensor: Ambient temperature -10~+200°C<br>High temperature modification -10~+350°C<br>Converter: -10~+45°  |                               |
| Working Pressure                      | Medium pressure ≤2.5 Mpa   | Medium pressure ≤4.0 Mpa      |
| Power supply Source                   | All in one machine (DC 24V or AC220V ≤ 18 W)<br>Split type Converter (AC220V ≤ 19W)  |                               |
| Response Speed                        | 1S   |                               |
| Output Signal                         | 4~20 mA (Photoelectric isolation with top load of 500Ω)<br>RS-485 (Photoelectric isolation), HART protocol   |                               |
| Pipeline material                     | Carbon Steel, Stainless Steel, Plastic, etc  |                               |
| Display                               | All in one type: four lines with LCD   |                               |
| Contents of display                   | Gas mass flow, Standard condition volume flow, accumulated flow, standard time, accumulated running time, temperature of media, standard flow rate etc |                               |
| Level of protection of one time meter | IP67   |                               |
| Converter Material                    | Stainless Steel  | Stainless steel, Carbon steel |



## 2. INSTALLATION AND CONNECTION

If installed outside, the meter should be covered by sky shade to avoid exposing to the sun and rain

Do not install in sharp pounding situation

Do not expose to dangerous environment heavily charged with corrosive gas

Do not share power source with polluting equipment such as converter and welding machine and power conditioner can be installed for converter if necessary

### 3.1 installations and connection of all in one meter

1. All in one plug type should be inserted in axes of the measured pipeline; therefore, the length of overcasting staff depends on the caliber of the measured pipeline. If impossible, the manufacture will offer calibration coefficient to accomplish accurate measurement
2. All in one full- Tube type employees flanged connection

## CONNECTION

No hot-line work

Confirm the type of power supply

### 3.1 Instruction on connecting terminals of the sensor

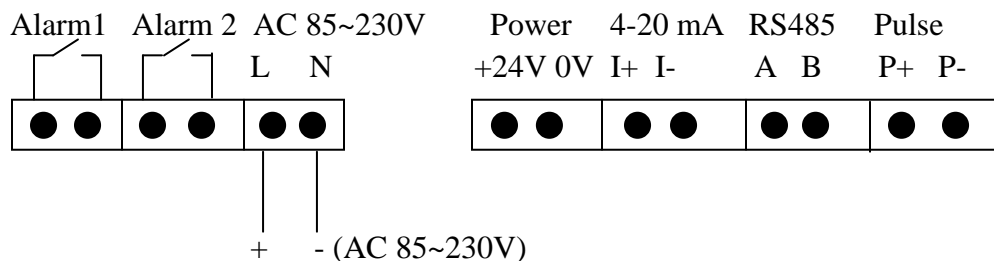
|     |     |     |     |
|-----|-----|-----|-----|
| 1   | 2   | 3   | 4   |
| RT1 | RT2 | RT3 | RT4 |

(1, 2) Measurement (Pt1000)    (3, 4) Heating (Pt20)

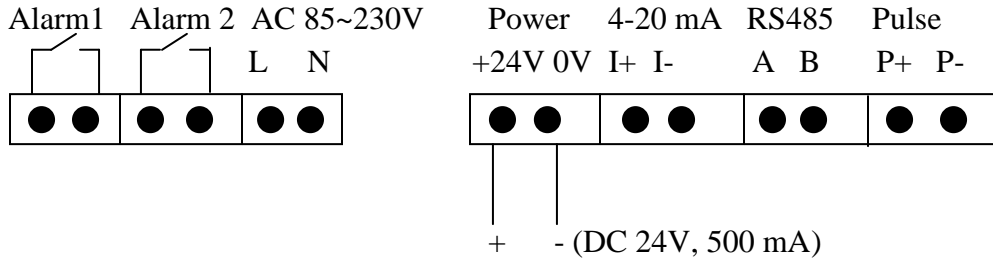
### 3.2 Instructions on output terminal and connection way:

1. Connection way of power source

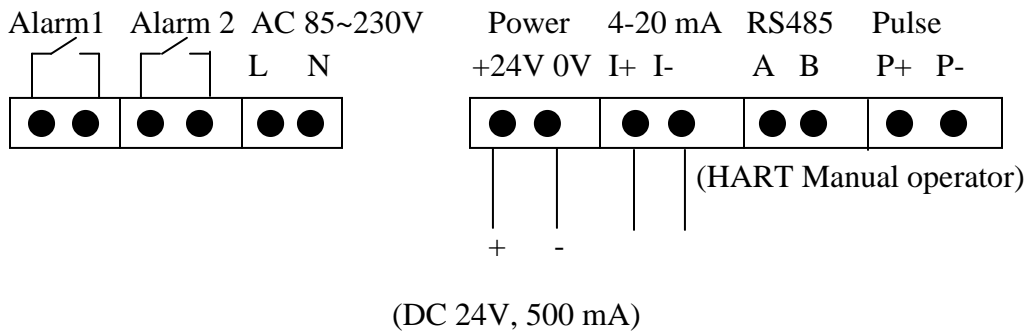
#### a. Connection way of AC power source



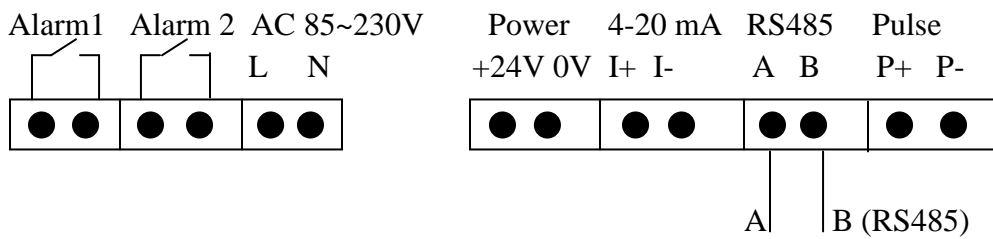
**B. Connection Way of DC 24 V:**



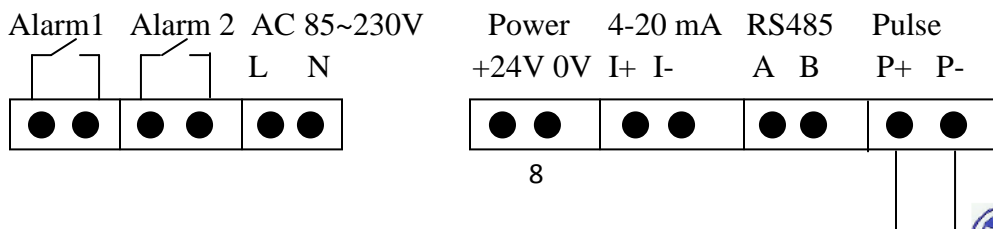
**(2) Connection way of four- wire system 4-20 mA output and HART manual operator:**



**(3) Connection Way of RS- 485**



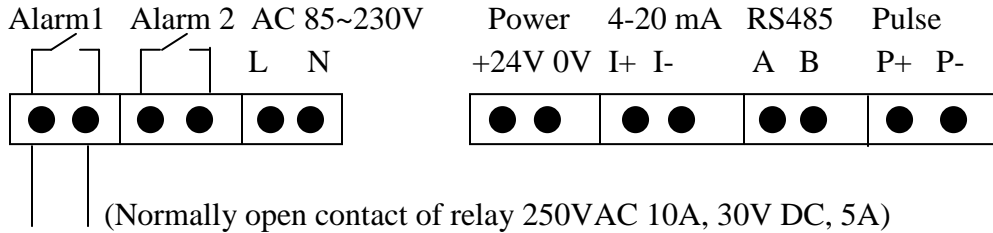
**(4) Connection Way of pulse output**





+    - (VPP~24V)

**(5) Connection Way of alarm output:**



**Installation of On- Site plug in type**

(1) The choice of mounting point

Please choose straight horizontal sections for installations. The specific requirements of the mounting point include that the distance between restricting element of the upper reaches and mounting point must be larger than five times of pipeline diameter, and the distance between restricting element of the lower reaches and mounting point must be larger than three times of pipeline diameter. If applicable, please make the straight horizontal sections as long as possible

Welding operation is forbidden in explosion environment

Environments that have special welding requirements should be operated

**Installation of ball valves**

According to different installation methods, bases can be classified into such two categories as figure 5 and figure 6. Base should be installed in the summit of pipeline section orientation, and the axes of base pylome must be perpendicular to that of pipeline. See figure 7 for an ideal base position and welding procedure

Fasten stainless special valves to the base, and then use sealing gasket in compression joint surface (Choose nylon material when medium temperature is lower than 100°, and red copper or LOCTITE 567 pipe sealant when it is higher than 100°)

Please carefully confirm the on-site environment before stiletto to ensure safety

Please timely close the valve to avoid leak

If on line stiletto and installation are allowed, our special portiforium tool can realize on line stiletto and installation without stopping production. You can choose from multiple methods of



stiletto under stopping production environment while ensuring the axis and that of the base must be concentric. If this requirement cannot be met, please enlarge the hole of the pipe so as to have space for adjustment

### **Installation of the Meter**

- 2) Loose the stopping nut on the sensor pope of the meter, making cavate connecting nut able to skid to sensor cover along pope so as the cover completely retracts into the stopping nut
- 3) Fasten the cavate connecting nut to special ball plug (add sealing gasket between them)
- 4) Open the special ball plug, and press the lever into the pipeline until stopping nut can be fastened with connecting nut
- 5) Turn the lever, making the remark point and the medium flowing direction homodromous, and then clamp the nut
- 6) Change the direction of display screen. If the direction of display screen cannot meet the needs of the On- Site display angle, it can be changed. The display head can move in six horizontal directions, and the changing steps are: dump power, open the convertor preoperculam, disconnect sensor and convertor (Totally 6 lines in 4 groups. Their arrangement from left to right is two red lines in one group, one red line in one group, one yellow line in one group and two yellow lines in one group, this has been set before leaving the factory), loose the hesd flange (Turn off 6 M6 hexogen socket head cap screws), then you can turn the convertor 9be careful to avoid dropping), reset flange until it is convenient to observe, connect sensor and convertor, cover the convertor preoperculam closely and switch on.
- 7) If installed latterly, this meter can be shifted with an angle of 90°, 180° and 270° to meet your different requirements

### **See Appendix 2 (Simplified Thermal type gas mass Flow meter)**

- 1) Please confirm the actual diameter and wall Thickness before installing simplified thermal type gas mass flow meter
- 2) Encase the rest part of thermal type gas mass flow meter into special ball valve, and calculate the insertion depth. While doing this step, you can insert an approximate size and fasten cap nut manually
- 3) Turn the lever, making the remark point and the medium flowing direction hydromous
- 4) Convert to the corresponding scale of the lever based on the calculated data, and then fasten the cap nut



- 5) If installed laterally, this meter can be shifted with an angle of 90°, 180° and 270° to meet your different requirements

**See Appendix 3 (Full-Tube thermal type gas mass flow meter)**

Confirm the Connecting type of pipeline sections (Make preparation for flange connection such as gasket and whorl connection)

Stop production when installing. Please follow close to the line of relevant regulation

Pipeline section type meter has sensor equipped on special pipeline section when leaving factory. Users only need to reassemble it to working on-site scene, thus the process is easier than that of on-site plug type. First choose mounting point, then incise pipeline, install matching flange and whorl based on the size of pipeline section type sensor. Then ensure that the fluid-flow accords with the flow identifier marked on the full-tube thermal type gas mass Flowmeter, that the display axel center is pipeline axel center is parallel to the plain, with differences less than ±2.5 degrees. Finally tighten the nut

**Installation Impression Drawing**

Manually set parameters of the meter by keystrokes when installing. There are three keystrokes on the meter, including F1, F2 and F3 from left to right. In general F1 acts as shift key; F2 acts as the enter and next key; F3 acts as the modifier and back key. For special functions if there is any, please refer to instructions displayed at the bottom of the screen. When running the meter, by pressing F3 users can manually shift to main interface 2 and main interface 3, with the former displaying generally the same as main interface 1, expert for on-site flow rate instead of instantaneous flow rate, and the later displaying both on-site flow rate and instantaneous flow rate.

**2.1 Start- Up**

The meter performs self-check when self-check when the current on. If any abnormality checked, a self-check error interface will be displayed for 1-2 seconds before shifting to the main interface (Instructions on self-check interface please see self-check menu). If not, the main interface will be directly seen. After start-Up, the main interface displays as follows:

Label 1: Real-time display of running state, with “OK” for normal state and “ERR” for faults

Label 2: Alarm channel 1, with “AL1” for alarm at channel 1

Label 3: Alarm channel 2, with “AL2” for alarm at channel 2



Label 4: Current output overflow label, with “mA” for current output overflow

Label 5: for easy display and reading, when the integrated flow rate exceeds 10000000, the real integrated data can be obtained after multiplying the displayed data with 1000

Label 6: information of communication start, with the first three digits for meter number

The forth digit for parity check bit; 0: no parity, 1: odd, 2: even

The fifth digit for baud rate; 0:1200, 1:2400, 2:4800, 3:9600

Label 7: Display of instantaneous flow rate, with the maximum of 9999999

Label 8: Display of integrated flow rate, with the maximum of 8 digits

Label 9: Default setting of standard temperature of medium (°C)

## 2.2 Main Menu

| <b>--Main Menu—</b> |                    |                 |
|---------------------|--------------------|-----------------|
| <b>Display</b>      | <b>Self-Check</b>  | <b>Reset</b>    |
| <b>Set</b>          | <b>Calibration</b> | <b>Password</b> |
| <b>Query</b>        |                    |                 |

In the main interface, press F2 to enter the main menu. Press shift key F1 to select menu and press F2 to enter. Details see the following instructions on menus. Briefly illustrated as:

Self-Check: Check of the running state

Display: Change of display units, including instantaneous, integrated flow rate and temperature

Reset: Reset of integrated flow rate

Set: settings of running parameter

Calibration: settings of zero voltage, current output, flow rate graph and flux parameter

Password: password for change, reset and calibration

## 2.3 Self- Check

| <b>--Self - Check—</b> |                     |
|------------------------|---------------------|
| <b>Clock</b>           | <b>Memorizer</b>    |
| <b>Power supply</b>    | <b>AD Convertor</b> |
| <b>Parameter</b>       | <b>Sensor</b>       |



If there is running-time error, users can check for specific error by entering this menu, refers to normality, and refers to error, besides, the meter performs self-check when the current on. If any abnormality checked, this interface will be displayed. Users can also enter this menu to check while the meter is running. The default setting of temperature unit is °C.

## 2.4 Reset

|                                    |             |              |
|------------------------------------|-------------|--------------|
| <b>Reset Integrated Flow Rate:</b> |             |              |
| <b>0000000.0000</b>                |             |              |
| <b>Reset</b>                       | <b>Next</b> | <b>Reset</b> |

To prevent illegal reset of integrated flow rate or mis operation, reset menu requires

Password to enter. In the password- check interface, enter the correct password with shift key and press F2 to enter the reset interface, where the current integrated flow rate will be shown. In the reset interface, to prevent disoperation, double hand operation is adopted (Press F1 and F3 at the same time to reset). The screen will display 00000000.000 when the operation succeeds. Press F2 to the next page

|                         |             |              |
|-------------------------|-------------|--------------|
| <b>Reset Runtime:</b>   |             |              |
| <b>0000000.0000 min</b> |             |              |
| <b>Reset</b>            | <b>Back</b> | <b>Reset</b> |

Reset runtime (Displayed in minutes). Run time record of meter's operating time, with maximum of 8 digits. See reset of integrated flow rate for the same operation

## 2.6 Settings

Users can set parameters in this interface. To prevent disoperation, set menu requires password. After entering the correct password, the set interface will be displayed



Set 1:

|                  |             |            |
|------------------|-------------|------------|
| <b>Language:</b> |             |            |
| <b>English</b>   |             |            |
| <b>Shift</b>     | <b>Next</b> | <b>Set</b> |

Set 1: Language settings: Choose the display language as English

|                                       |             |            |
|---------------------------------------|-------------|------------|
| <b>Pipe Equivalent Inner Diameter</b> |             |            |
| <b>0100.000 mm</b>                    |             |            |
| <b>Shift</b>                          | <b>Next</b> | <b>Set</b> |

Set 2: Pipe Equivalent Inner diameter settings: set the inner diameter of the measured pipe with the unit of millimeter

|  |             |            |
|--|-------------|------------|
| <b>Excision of flow rate lower limit</b> |             |            |
| <b>000000.000</b>                        |             |            |
| <b>Shift</b>                             | <b>Next</b> | <b>Set</b> |

Set 3: Excision of flow rate lower limit: the calculated value is zero when the flow rate is lower than set value

|                             |             |            |
|-----------------------------|-------------|------------|
| <b>Filtering Parameter:</b> | <b>00</b>   |            |
| <b>Shift</b>                | <b>Next</b> | <b>Set</b> |



Set 4: Filtering Parameter: when the On-Site flow rate shows great fluctuation, users can increase the parameter to get stable reading. This parameter ranges from 0-32, 0 referring to no filtering

|   |             |            |
|---|-------------|------------|
| <b>Medium Density under Standard Condition:</b> |             |            |
| <b>1.000 Kg/m3</b>                              |             |            |
| <b>Shift</b>                                    | <b>Next</b> | <b>Set</b> |

Set5: Medium Density under standard condition: Inter conversion between volume and quality under standard condition

|                |   |            |
|----------------|---|------------|
| <b>Medium:</b> |   |            |
| <b>Air</b>     | <b>Conversion Co-Efficient: 01.0000</b> |            |
| <b>Shift</b>   | <b>Next</b>                             | <b>Set</b> |

Set 6: Medium Conversion Co-efficient: Conversion Co- efficient (displayed as a reference value), can be set and reentered by changing the number of the medium (00-60), under which the selected medium and its corresponding conversion coefficient (also reference value) are displayed

|                                      |             |            |
|--------------------------------------|-------------|------------|
| <b>Measuring Range of flow rate:</b> |             |            |
| <b>0000000.000</b>                   |             |            |
| <b>Shift</b>                         | <b>Next</b> | <b>Set</b> |

Set 7: Measuring range of flow rate: set the measuring range of the meter when the current output reaches 20 mA



|                         |             |            |
|-------------------------|-------------|------------|
| <b>Number: 0001</b>     |             |            |
| <b>Baud Rate: 9600</b>  |             |            |
| <b>Verify Check: No</b> |             |            |
| <b>Shift</b>            | <b>Next</b> | <b>Set</b> |

Set 8: 485 Communication settings: set meter address and communication mode

|                                 |             |            |
|---------------------------------|-------------|------------|
| <b>HART Short Address: 00</b>   |             |            |
| <b>HART Write- Protect: Off</b> |             |            |
| <b>Shift</b>                    | <b>Next</b> | <b>Set</b> |

Set 9: HART Communication settings: set short address and write- protect mode

|   |             |            |
|---|-------------|------------|
| <b>Frequency Output: Pulse</b>            |             |            |
| <b>Frequency: 0000-5000 Hz</b>            |             |            |
| <b>Measuring Arrangement: 0005000.000</b> |             |            |
| <b>Shift</b>                              | <b>Next</b> | <b>Set</b> |

Set 10: Pulse output settings: alternative pulse and equivalency, the former requires frequency (maximum 5000) and measuring arrangement settings, and the later requires frequency (Maximum 1000) equivalency coefficient settings

|   |             |            |
|---|-------------|------------|
| <b>Alarm 1: Instantaneous upper limit</b> |             |            |
| <b>Alarm: +000000.000</b>                 |             |            |
| <b>Return difference: 000.000</b>         |             |            |
| <b>Shift</b>                              | <b>Next</b> | <b>Set</b> |





Set 11: Alarm 1 settings: Choose from instantaneous upper limit, instantaneous lower limit, upper temperature limit, lower temperature limit and none.

Alarm refers to output value when alarming. Return difference means to prevent alarm variable producing controlling oscillation when the upper limit of alarm variable is larger than the critical controlling value. Return difference settings can keep thus produced oscillation within manageable limits while reducing control accuracy at the same time. Please set the value return difference based on actual situation

|   |             |            |
|---|-------------|------------|
| <b>Alarm 2: Instantaneous upper limit</b> |             |            |
| <b>Alarm: +000000.000</b>                 |             |            |
| <b>Return difference: 000.000</b>         |             |            |
| <b>Shift</b>                              | <b>Next</b> | <b>Set</b> |

Set 12: Alarm 2 settings: Choose from instantaneous upper limit, instantaneous lower limit, upper temperature limit, lower temperature limit and none. Alarm refers to output value when alarming. Return difference means to prevent alarm variable producing controlling oscillation when the upper limit of alarm variable is larger than the critical controlling value. Return difference settings can keep thus produced oscillation within manageable limits while reducing control accuracy at the same time. Please set the value return difference based on actual situation.

|                   |             |            |
|-------------------|-------------|------------|
| <b>Clock:</b>     |             |            |
| <b>2013-05-16</b> |             |            |
| <b>09-13-29</b>   |             |            |
| <b>Shift</b>      | <b>Next</b> | <b>Set</b> |

Set 13: Clock settings: adjust time and date (already adjusted before leaving factory). Make sure the date and time are correct before operation to avoid disordered record



## 2.7 Calibration

Calibration parameters needed for meter settings, with parameters set at engineer level. Changes to parameters personnel are not allowed to operate. To prevent disoperation, calibration menu requires password. After entering the correct password, the calibration interface will be displayed

|                                     |             |             |
|-------------------------------------|-------------|-------------|
| <b>Zero- Point Voltage: Measure</b> |             |             |
| <b>0.0000V</b>                      |             |             |
| <b>No discharge!</b>                |             |             |
| <b>Enter</b>                        | <b>Next</b> | <b>Back</b> |

Calibration 1: zero-point voltage: real-time display flow voltage. Before setting, make sure there is no discharge through pipe and leave about half minute for stabilization

|   |             |             |
|---|-------------|-------------|
| <b>Resistance of measuring Temperature (0°C):</b> |             |             |
| <b>1000.000Ω</b>                                  |             |             |
| <b>Enter</b>                                      | <b>Next</b> | <b>Back</b> |

Calibration 2: Resistance of measuring temperature: enter resistance value of temperature sensor

|                                       |             |            |
|---------------------------------------|-------------|------------|
| <b>Flow meter: present segment 01</b> |             |            |
| <b>Voltage: 00.0000V</b>              |             |            |
| <b>Flow Rate: 000.000 Nm/s</b>        |             |            |
| <b>Shift</b>                          | <b>Back</b> | <b>Set</b> |



Calibration 3: Sectional flow meter: set nominal voltage and flow rate for each segment (maximum 40 segments). Scaled by calibration device, sectional voltage and flow rate are successively input from small to large (the 0 segment is the zero point, with a fixed flow rate of zero). Note: if less than 40 segments, set voltage of the segment next to the last scaled one to 2V and the same flow rate as the prior one.

|  |             |            |
|--|-------------|------------|
| <b>Calibration of flow rate: present segment 0</b> |             |            |
| <b>Flow Rate: 000000.000</b>                       |             |            |
| <b>Coefficient: 000000.0000</b>                    |             |            |
| <b>Shift</b>                                       | <b>Back</b> | <b>Set</b> |

Calibration 4: second calibration: calibration of segment flow rate (Maximum 5 segments). If less than 5 segments, set the flow rate of the segment next to the last scaled segment as the value of measuring range and the same coefficient as the prior one. To skip second calibration, set the flow rate and co-efficient to zero at the first segment and every two segments

|                                     |             |            |
|-------------------------------------|-------------|------------|
| <b>Calibration of Current: 4 mA</b> |             |            |
| <b>Measured Value: 00.0000</b>      |             |            |
| <b>Shift</b>                        | <b>Next</b> | <b>Set</b> |

Calibration 5: Calibration of current output: calculate zero point and co-efficient of current calibration by outputting measured value. For example, enter 4mA to get 4mA meter output, then enter value measured by standard meter to measured value then press "next" to get new current zero point and current co-efficient (Valid Range: 3.5-4.5 mA for 4 mA output: 18-22 mA for 20 output). Calibration is made on the basis of original zero point and current coefficient

|                                    |             |            |
|------------------------------------|-------------|------------|
| <b>Current Zero: +0.0000</b>       |             |            |
| <b>Current Coefficient: 1.0000</b> |             |            |
| <b>Shift</b>                       | <b>Back</b> | <b>Set</b> |



Calibration 6: Calibration of current output: adjust current output zero by entering correction coefficient Note: alternation to this coefficient will cause is certain system related to the meter running.

|  |             |            |
|--|-------------|------------|
| <b>Temperature Zero: +0.000</b>        |             |            |
| <b>Temperature Coefficient: 1.0000</b> |             |            |
| <b>Shift</b>                           | <b>Back</b> | <b>Set</b> |

Calibration 7: Calibration of temperature output: Calibrate error caused by circuit itself by entering correction coefficient, so as to get a higher precision of temperature output

## **2.8 Password**

Users can revise passwords for reset, settings and calibration (only revision to settings password is exemplified here). First enter password revision interface, choose item to be revised , then enter the old and the new password, press F2 “Enter”. For successful revision with entering the correct old password, it will display a prompting frame at the bottom automatically skipping to the main interface (also a prompting frame for failed revision)

|                           |              |                    |
|---------------------------|--------------|--------------------|
| <b>Password Revision:</b> |              |                    |
| <b>Shift</b>              | <b>Reset</b> | <b>Calibration</b> |
| <b>Shift</b>              | <b>Enter</b> | <b>Set</b>         |



Password revision interface: choose password settings by pressing ‘Shift’

|                                       |              |            |
|---------------------------------------|--------------|------------|
| <b>Revision of settings Password:</b> |              |            |
| <b>Old Password: 0*****</b>           |              |            |
| <b>New Password: 0*****</b>           |              |            |
| <b>Shift</b>                          | <b>Enter</b> | <b>Set</b> |

Password revision Interface: enter relevant passwords. For successful revision with entering the correct old password, it will display a prompting frame at the bottom before automatically skipping to the main interface (also a prompting frame for failed revision)

### **Display Unit**

|                                  |              |            |
|----------------------------------|--------------|------------|
| <b>Instantaneous Unit: Nm3/h</b> |              |            |
| <b>Integrated Unit: Nm3</b>      |              |            |
| <b>Temperature Unit: °C</b>      |              |            |
| <b>Shift</b>                     | <b>Enter</b> | <b>Set</b> |

Instantaneous Unit: Alternative instantaneous unit and standard condition unit

Integrated Unit: Choose from multiple units of integrated flow rate

Temperature Unit: Choose from multiple units of temperature

Users can modify display unit in this section. First enter the interface of display unit

There are eight optional units of displaying liquid quality, including Nm3/h, Nm,3/min, L/h, L/min, t/h, t/min, Kg/min. Press “Enter” to choose and then the main interface will display data on chosen unit



**Fault Clearance**

| <b>Fault</b>   | <b>Possible cause</b>  | <b>Processing method</b>   |
|--|--|--|
| <b>Non- Display</b>                                      | <ul style="list-style-type: none"> <li><b>A. No Power Transmission</b></li> <li><b>B. Reversed power source</b></li> </ul>   | <ul style="list-style-type: none"> <li><b>A. Turn the power On</b></li> <li><b>B. Check the display</b></li> </ul>   |
| <b>Lower Velocity of flow</b>                            | <ul style="list-style-type: none"> <li><b>A. Reversed feeler</b></li> <li><b>B. Dirty sensor</b></li> </ul>  | <ul style="list-style-type: none"> <li><b>A. Reinstall the feeler</b></li> <li><b>B. Clean the sensor</b></li> </ul>   |
| <b>Exceptional velocity of flow, serious fluctuation</b> | <ul style="list-style-type: none"> <li><b>A. The fluid is pulsating flow</b></li> <li><b>B. Dirty sensor</b></li> <li><b>C. Damaged sensor</b></li> </ul>                        | <ul style="list-style-type: none"> <li><b>A. Adjust the damping</b></li> <li><b>B. Clean the sensor</b></li> <li><b>C. Send back for repair</b></li> </ul>                 |
| <b>Abnormalities in 4-20 mA output</b>                   | <ul style="list-style-type: none"> <li><b>A. Wrong setting of measuring range of 20 mA</b></li> <li><b>B. Fault of convertor</b></li> <li><b>C. Up looped circuit</b></li> </ul> | <ul style="list-style-type: none"> <li><b>A. Reset measuring range of 20 mA</b></li> <li><b>B. Send back for repair</b></li> <li><b>C. Check the connection</b></li> </ul> |
| <b>Abnormalities in RS-485 output</b>                    | <ul style="list-style-type: none"> <li><b>A. Wrong setting of baud rate and station number</b></li> <li><b>B. Reversed polarity</b></li> </ul>                                   | <ul style="list-style-type: none"> <li><b>A. Reset</b></li> <li><b>B. Alter the polarity</b></li> </ul>  |

