# Content

# 1 Product function explanation

## 1.1 Basic functions

- Low frequency square-wave excitation, excitation frequency: 1/10 power frequency, 1/16 power frequency, 1/25 power frequency;
- High frequency square-wave excitation, excitation frequency: 1/2 power frequency (apply to slurry measurement) (matching);
- Excitation current can be selected as 125 mA, 187.5 mA;
- Without adding empty tube measuring function of electrode, continuous measurement, fixed value alarm;
- Flow-rate measuring scope: 0.1---15 m/s, flow-rate resolution: 0.5 mm/s;
- AC high frequency switch power, application scope of voltage: 85 VAC---250VAC;
- DC 24V switch power, application scope of voltage: 16 VDC---36VDC;
- Network function: MODBUS, HART (matching);
- Chinese / English display modes, (can customize other language);
- Interior has three integrating meters total flow, can record respectively: forward total flow, backward total flow, difference value total flow;

## 1.2 Special functions

- Power cut-off time record function, automatically record power discontinuous film time of the instrument system, make-up omission flow;
- Hour total flow record function, take hour as unit, record total flow, apply to time-sharing measurement system;
- Infrared hand-held operation keyboard, long distance non-contact operate all functions of converter.

# 2 Basic circuit of the converter

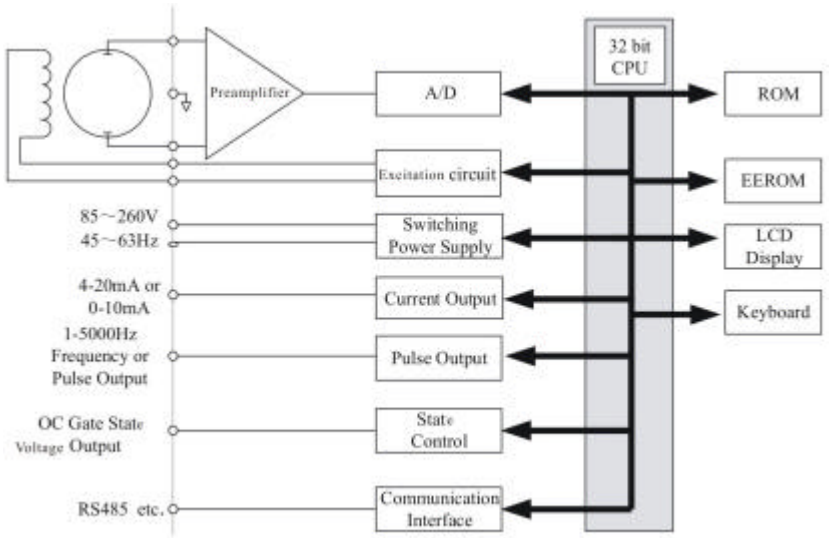



Fig. 2.1 Structure of the converter circuit

The converter of electromagnetic flowmeter can supply stable excitation current to the excitation coil in the sensor of electromagnetic flowmeter, the preamplifier amplifies the induced electromotive force from the sensor, and converts it into standard current signals or frequency signals, convenient for displaying, controlling and regulating flow. Structure of converter circuit is as shown in Fig. 2.1.

## 3 Converter operation

### 3.1 Converter graphs

Circular graph

Square graph

### 3.2 Keyboard definition and display

3.2.1 Keyboard definition and liquid crystal display of square meter

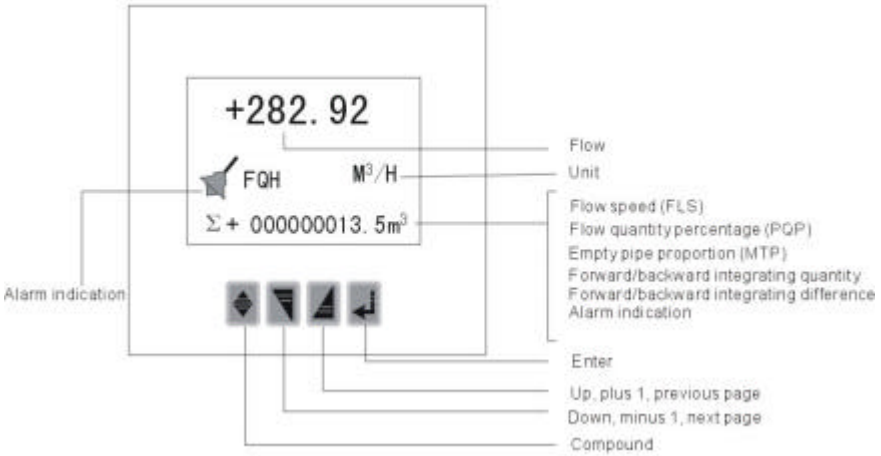



Fig. 3.2.1Keyboard definition and liquid crystal display of square meter

3.2.2 Keyboard definition and liquid crystal display of circular meter

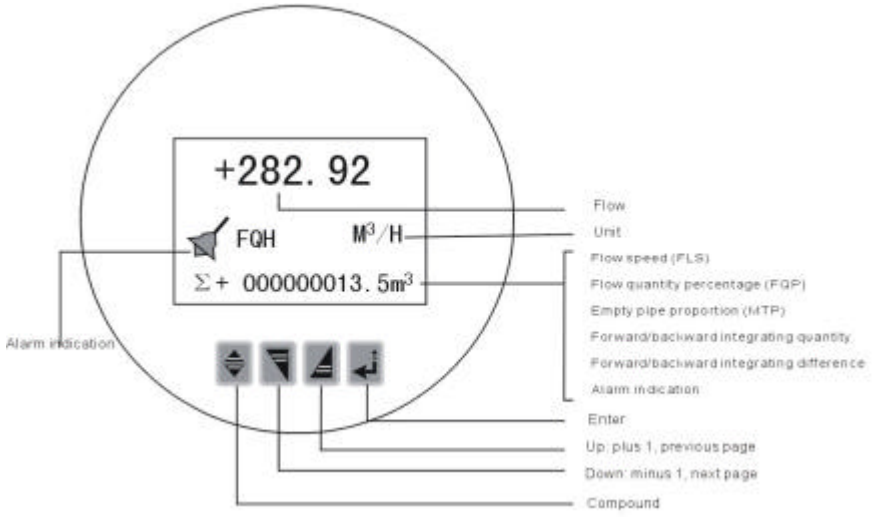



Fig. 3.2.1Keyboard definition and liquid crystal display of circular meter

Explanation: under measuring state, press “enter + confirm key”, appear converter function option picture “parameter setting”, press confirm key, the instrument appears input password state, based on security grade, according to security grade to do corresponding modification by our factory provided password.

After press “enter + confirm key” again, then enter required parameter setting state. If want to return to running state, please press confirm key for several seconds.

### 3.3 Wiring diagram of converter

3.3.1 Terminal wiring and labels of square meter

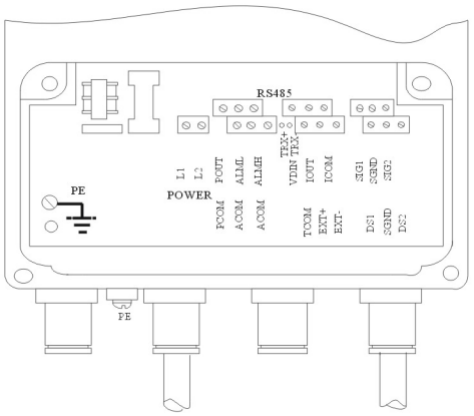



Fig. 3.1 (a) Wiring terminal diagram of square meter

Labels meanings of each wiring terminal are as follows:

| | | |
|---|---|---|
| SIG1 | Signal 1 | Connect split-type sensor |
| SGND | Signal ground | |
| SIG2 | Signal2 | |
| DS1 | Excitation shield 1 | |
| DS2 | Excitation shield 2 | |
| EXT+ | Excitation current + | |
| EXT- | Excitation current - | |
| VDIN | Current two-wire system 24V Joint | Analog current output |
| IOUT | Analog current output | |
| ICOM | Analog current output ground | |
| POUT | Flow frequency (pulse) output | Frequency or pulse output |
| PCOM | Frequency (pulse) output ground | |
| ALMH | High limit alarm output | Two-way alarm output |
| ALML | Low limit alarm output | |
| ACOM | Alarm output ground | |
| TRX+ | Communication input | Communication input |
| TRX- | Communication input | |
| TCOM | 232 communication ground | |

3.3.2 Signal wires processing and labels of connection of square meter and sensor

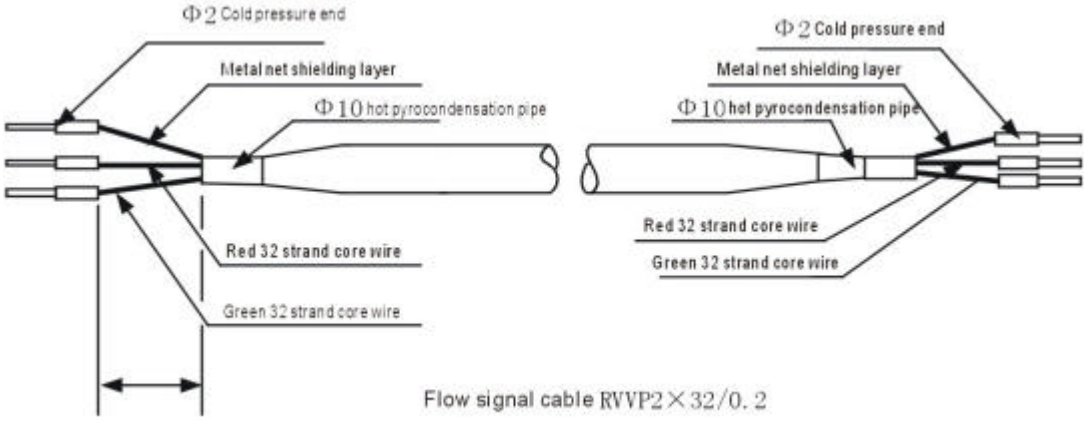
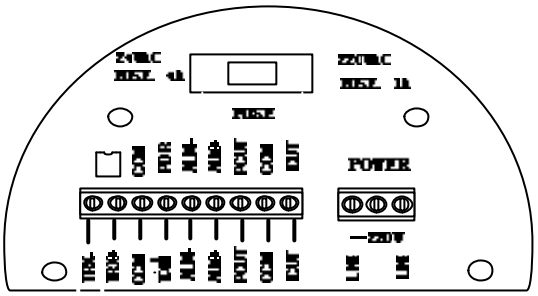



Fig. 3.3.2 Signal wires processing and labels of connection of square meter and sensor

3.3.3 Terminal wiring and labels of circular meter


POWER
—220V
LINE
LINE

switch can be poked to ON, getting frequency signals from POUT and PCOM wring.

Pulse current output, alarm current output, external-connection of supply power and load see Fig. 3.4. When using inductive load should as shown in figure to add freewheeling diode.

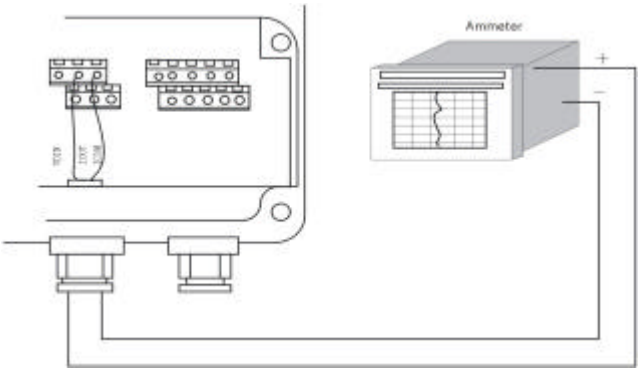



Fig. 3.4 (a) Wiring diagram of current output

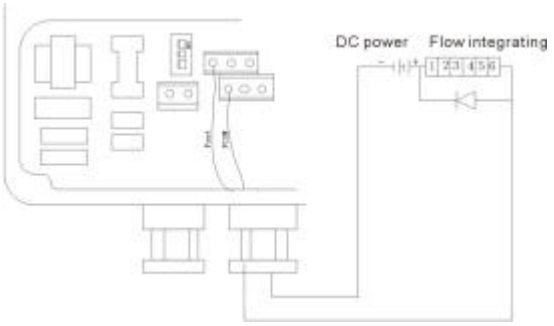



Fig. 3.4 (b) Electromagnetic counter wiring

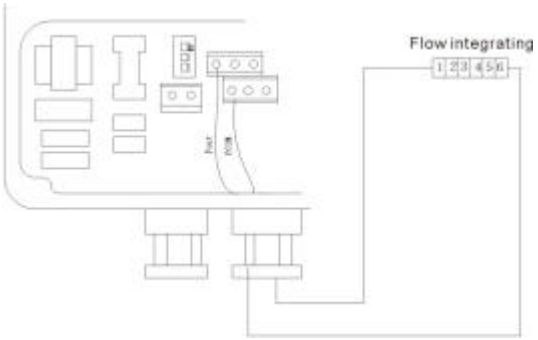



Fig. 3.4 (c) Electronic counter wiring

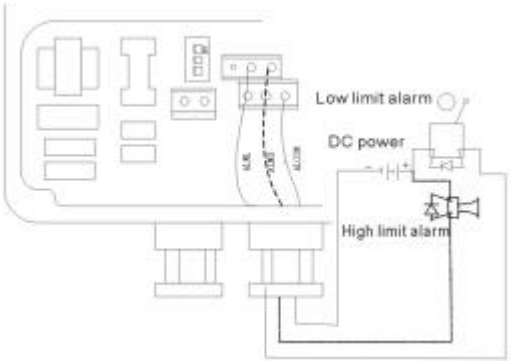



Fig. 3.4 (d) Alarm output wiring

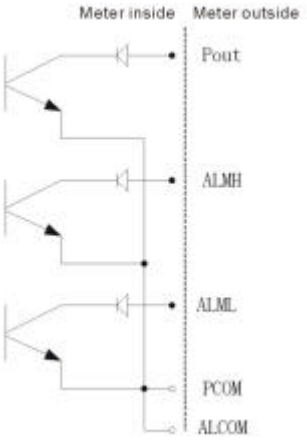



Fig. 3.4 (e) Meter inside OC gate connection mode

3.4.4 Grounding wire connection

Shell grounding terminal PE of the converter should adopt grounding copper wire which is at least 1.6 $mm^2$ to connect ground. The grounding resistance from converter shell to ground should be less than 10$\Omega$.

### 3.5 Digital quantity output and calculation

Digital output means frequency output and impulse output. The output point used for frequency output and impulse output on the wiring is the same one. Therefore, users cannot use frequency output and impulse output simultaneously, but only select one of them.

3.5.1 Frequency output:

The scope of frequency output is 0~5000Hz, frequency output is corresponding to flow percentage,

$$F = \frac{\text{Measured value}}{\text{Full range value}} \bullet \text{Frequency scope}$$

The upper limit of frequency output is adjustable. Users can select 0~5000Hz, also can select lower frequency: such as 0~1000Hz or 0~5000Hz etc.

Frequency output mode is generally used for control application, because it reflects percentage flow, if users use it for measurement application, then should select impulse output mode.

3.5.2 Impulse output mode:

Impulse output mode is mainly used for measurement mode, output an impulse, means an equivalent fluid flowing through pipeline, such as an impulse means 1L or 1$M^3$ etc.

Impulse equivalences can be divided into: 0.001L, 0.01L, 0.1L, 0.001$M^3$, 0.01 $M^3$, 0.1$M^3$, 1 $M^3$. When users select impulse equivalences, should pay attention that flow scopes of flowmeter match impulse equivalences. For volume flow, calculation formulas are as follows:

$$Q_L = 0.0007854 \times D^2 \times V \ (L/S)$$

$$\text{or} \quad Q_M = 0.0007854 \times D^2 \times V \times 10^{-3} \ (M^3/S)$$

Here: D pipe diameter (mm) V flow rate (m/s)

If pipeline flow is too large but impulse equivalence is too small, will cause impulse output exceeds upper limit, so impulse output frequency should be limited below 3000Hz. Pipeline flow is small but selected impulse equivalence is too large that will cause the instrument not input an impulse until a long time.

In addition, should explain that impulse output is different from frequency output, impulse output can output an impulse if accumulate enough an impulse equivalence, therefore, impulse output is not very homogeneous. Generally, should select counter instrument to measure impulse, but should not select frequency meter instrument.

3.5.3 Wiring of digital quantity output

Digital quantity output has two contacts: digital output contact, digital ground wire contact, symbols are as follows:

POUT—Digital output contact; PCOM—Digital ground wire contact;

POUT is collector open-circuit output, when wiring user can refer to the following circuit:

3.5.3.1 Digital quantity electrical level output wiring method

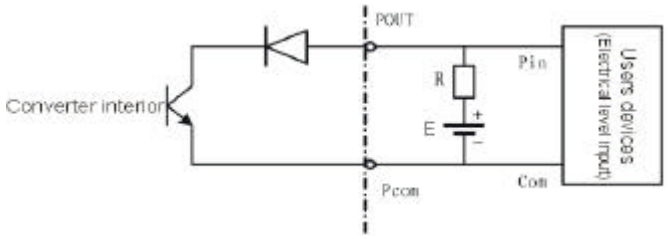



Fig. 3.5 (a) Digital quantity electrical level output wiring method

3.5.3.2 Digital quantity output connects photocoupler (such as PLC etc.)

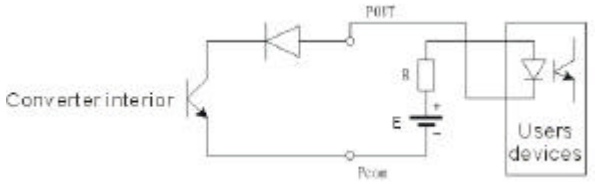



Fig. 3.5 (b) Digital quantity output connects photocouper

Generally, user photocoupler need current about 10 mA, therefore, E/R=10mA or so, E=5~24V.

3.5.3.3 Digital quantity output connects relay

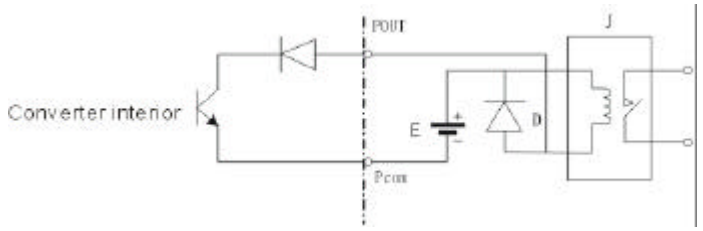



Fig. 3.5 (c) Digital quantity output connects relay

Generally, the required E of middle relay I is 12V or 24V. D is freewheeling diode. At present, most middle relays have this diode in interior. If middle relay itself does not have this diode, user should connect one in exterior.

Digital quantity output parameters table is as follows:

**POUT**

| Parameters | Testing conditions | Minimum value | Typical value | Maximum value | Unit |
|---|---|---|---|---|---|
| Working voltage | IC=100mA | 3 | 24 | 36 | V |
| Working current | Vol≤1.4V | 0 | 300 | 350 | mA |
| Working frequency | IC=100mA<br>Vcc=24V | 0 | 5000 | 7500 | HZ |
| High electrical level | IC=100mA | Vcc | Vcc | Vcc | V |
| Low electrical level | IC=100mA | 0.9 | 1.0 | 1.4 | V |

### 3. 6 Analog quantity output and calculation

3.6.1 Analog quantity output

Analog quantity output can be divided into two signal systems: 0~10mA and 4~20mA signal system. When using, users can select one of two signal systems by parameter setting.

Analog quantity current output interior is 24V power supply, under 0~20mA signal system, can drive load resistance of 750Ω.

Analog quantity current output correspondent to percentage flow of flow, namely:

$$I_0 = \frac{\text{Measured value}}{\text{Full range value}} \bullet \text{Current range} + \text{Current zero}$$

For 0~10mA signal system, current zero is “0”.

For 4~20mA signal system, current zero is 4mA.

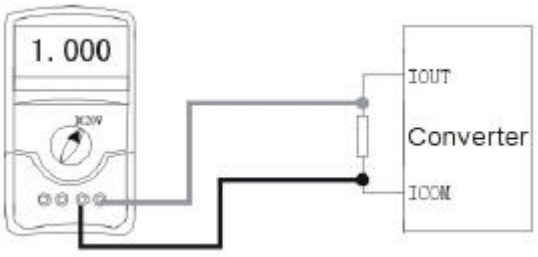
Therefore, in order to improve resolution of output analog quantity current, users should select the range of flowmeter properly.

When flowmeters are out off factory, every parameter of analog quantity output has been calibrated by manufactory. Under general condition, users do not need to adjust again. If abnormal condition occurs and need to calibrate analog quantity output, user can operate according to following operating regulations.

3.6.2 Adjustment and calibration for analog output quantity

(1) Preparations for instrument adjustment and calibration

The instrument start to run for 15 minutes, let instrument interior reaches thermal stabilization. Prepare 0.1% grade ammeter, or 250Ω resistance and 0.1% grade voltmeter, do wiring as the figure below.




(2) Current “0” point correction

Set the converter to parameter setting state, select “current zero correction” item, enter, poke standard signal source to “0” range, adjust correction coefficient value, make ammeter just indicates 4mA (± 0.004mA).

(3) Current full-scale correction

Select “current full-scale correction” parameter, enter, poke standard signal source to full range,

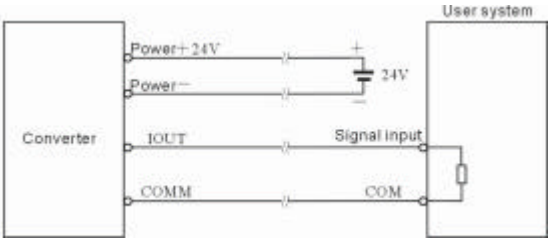
adjust correction coefficient of the converter, make ammeter just indicates 20mA (±0.004mA).

After adjusting current "0" point and full range value, current function of the converter can ensure to reach precision. Current output linearity of the converter is within 0.1%.

(4) Current linearity inspection

Poke standard signal source to 75%, 50%, 25%, examine linearity of output current.

3.6.3 Current output wiring of the electromagnetic flowmeter converter




3.6.a Four-wire system wiring method (supply power and current output isolation mode)

## 4. Parameter setting

After the electromagnetic flowmeter converter and sensor connect to fluid pipeline (either calibration or use), should do the following work at first:

- Use copper wires to connect fore and after pipes of sensor firmly;
- Make sensor connect ground well;
- Ensure fluid in the pipeline is static when adjust zero-point of the instrument;
- Ensure electrode oxide film of sensor can stably generate (electrode connects fluid continuously for 48 hours).

### 4.1 Parameter and operation

When the instrument power-up, automatically enter measuring state. Under auto-measuring state, the instrument automatically finishes every measuring function and displays correspondent measured data. Under parameter setting state, users use four panel keys to finfish parameter setting of the instrument.

4.1.1 Key-press function

a) Key function under auto-measuring state

Up key: circulating select displayed contents on the lower-line of screen;

Compound key + confirm key: enter parameter setting state;

Confirm key: return to auto-measuring state.

Under measurement state, adjustment method of LCD indicator contrast. By "compound key + up key" or "compound key + down key" to adjust proper contrast.

b) Every key functions under parameter setting state

Down key: digit minus 1 at cursor place

Up key: digit add 1 at cursor place

Compound key + down key: cursor move left;

Compound key + up key: cursor move right;

Confirm key: enter / exit submenu;

Confirm key: under any state, press down continuously for two second, return to auto-measuring state.

Note: (1) When using "compound key", should press compound key at first and then press "up key" or "down key" at the same time.

(2) Under parameter setting state, the instrument automatically return to measuring state if there is no key-press operation within three minutes.

(3) Flow direction selection of flow zero correction, can move cursor to leftmost "+" or "-", use "up key" or "down key" switch to make it be opposite to actual flow direction.

4.1.2 Parameter setting functions and function key operation

In order to do parameter setting or modification of the instrument, should make the instrument enter parameter setting state from measuring state. Under measuring state, press "compound key + confirm key", the instrument enters function selection picture "parameter setting", and then press confirm key to enter input password state, "00000" state, input password to enter, press "compound key + confirm key" to enter parameter setting picture.

The instrument has been designed with 6 grades passwords, where users can set up password value for 4 grades by themselves, the highest 2 grades is fixed password value, 6 grades passwords are used respectively for operators of different security grades.

4.1.3 Function selection picture

Press "compound key + confirm key" to enter function selection picture, then press "up key" or "down key" again to select, there are three functions can be selected in this picture:

| Parameter number | Function contents | Explanation |
|---|---|---|
| 1 | Parameter setting | Select this function, can enter parameter setting function |
| 2 | Total flow clear | Select this function, can do total flow clear operation of instrument |
| 3 | Modification records of coefficients | Select this function, can browse modification records of flow coefficients |

4.1.3.1 Parameter setting

Press "compound key + confirm key", display "parameter setting" function, the instrument enter function selection picture "parameter setting", and then press confirm key to enter input password state, "00000" state, input password to enter, press "compound key + confirm key" to enter parameter setting picture.

4.1.3.2 Total flow clear

Press "compound key + confirm key" to display "parameter setting" function, and then press "up key" turn page to " total flow clear", input password of total flow clear, press "compound key + confirm key", after password of total flow clear auto-change to "00000", clear function of the instrument finished, total flow of the instrument interior is 0.

4.1.3.3 Modification records of coefficients

Press "compound key + confirm key" to display "parameter setting" function, and then press "up key" to turn page to "modification records of coefficients" (see Appendix 1)

4.1.4 Parameter setting menu

There are 45 parameters, when using the instrument, users set up every parameter according to concrete situation. Parameters list is as follows:

**Parameters setting menu list table**

| Parameter number | Parameter character | Setting mode | Parameter scope | Password grade |
|---|---|---|---|---|
| 1 | Language | Option | English , Chines | 2 |
| 2 | Instrument communication address | Number-setting | 0~99 | 2 |

| | | | | |
|---|---|---|---|---|
| 3 | Instrument communication speed | Option | 300~38400 | 2 |
| 4 | Measuring pipeline aperture | Option | 3~3000 | 2 |
| 5 | Flow unit | Option | L/h, L/m, L/s, m**3**/h, m**3**/m, m**3**/s | 2 |
| 6 | Instrument range setting | Set number | 0~99999 | 2 |
| 7 | Measuring damping time | Option | 1~50 | 2 |
| 8 | Flow direction option | Option | Forward, backward | 2 |
| 9 | Flow zero point correction | Set number | 0~±9999 | 2 |
| 10 | Small signal remove point | Set number | 0~599.99% | 2 |
| 11 | Allow remove display | Option | Allowance/ prohibition | 2 |
| 12 | Flow integrating unit | Option | 0.001 m³~1 m³, 0.001L~1L | 2 |
| 13 | Backward output allowance | Option | Allowance, prohibition | 2 |
| 14 | Current output type | Option | 0~10mA/4~20mA | 2 |
| 15 | Impulse output mode | Option | Frequency /impulse | 2 |
| 16 | Impulse unit equivalent | Option | 0.001 m**3**~1 m**3**, 0.001L~1L | 2 |
| 17 | Frequency output scope | Option | 1~5999 Hz | 2 |
| 18 | Empty pipe alarm allowance | Option | Allowance/ prohibition | 2 |
| 19 | Empty pipe alarm threshold value | Set number | 59999% | 2 |
| 20 | Upper limit alarm allowance | Option | Allowance/ prohibition | 2 |
| 21 | Upper limit alarm numerical value | Set number | 000.0~599.99% | 2 |
| 22 | Lower limit alarm allowance | Option | Allowance/ prohibition | 2 |
| 23 | Lower limit alarm numerical value | Set number | 000.0~599.99% | |
| 24 | Field excitation alarm allowance | Option | Allowance/ prohibition | 2 |
| 25 | Total flow clear password | Set number | 0-99999 | 3 |
| 26 | Sensor coding 1 | User set | Ex-factory year, month (0-99999) | 4 |
| 27 | Sensor coding 2 | User set | Product coding (0-99999) | 4 |
| 28 | Field excitation mode selection | Option | Mode 1, 2, 3 | 4 |
| 29 | Sensor coefficient value | Set number | 0.0000~5.9999 | 4 |
| 30 | Forward total flow low level | Can be modified | 00000~99999 | 4 |
| 31 | Forward total flow high level | Can be modified | 0000~9999 | 4 |
| 32 | Backward total flow low level | Can be modified | 00000~99999 | 4 |
| 33 | Backward total flow high level | Can be modified | 0000~9999 | 4 |
| 34 | Spike suppress allowance | Option | Allowance/prohibition | 4 |
| 35 | Spike suppress coefficient | Option | 0.010~0.800m/s | 4 |
| 36 | Spike suppress time | Option | 400~2500ms | 4 |
| 37 | Security code 1 | User modify | 00000~99999 | 4 |
| 38 | Security code 2 | User modify | 00000~99999 | 5 |
| 39 | Security code 3 | User modify | 00000~99999 | 5 |
| 40 | Security code 4 | User modify | 00000~99999 | 5 |
| 41 | Current zero point correction | Set number | 0.0000~1.9999 | 5 |
| 42 | Current full-scale correction | Set number | 0.0000~3.9999 | 5 |
| 43 | Ex-factory calibration coefficient | Set number | 0.0000~5.9999 | 5 |

| | | | | |
|---|---|---|---|---|
| 44 | Instrument coding 1 | Manufacturer set | Ex-factory year, month (0-99999) | 6 |
| 45 | Instrument coding 2 | Manufacturer set | Product coding (0-99999) | 6 |

Parameters of the instrument determine running state, calculation method, input mode and state of the instrument. Select and set up parameters of the instrument properly, can make the instrument running under best state, and obtain higher measuring display precision and measuring output precision.

Parameters setting function of the instrument set up 6 grades passwords, where 1~5 grades are user passwords; sixth grade is manufactory password. Users can use fifth password to reset up the 1~4 grades passwords.

No matter which grades password is used, users all can inspect parameters of the instrument. But if users want to modify parameters of the instrument, then use password of different grade.

First grade password (ex-factory value 00521): users can only inspect parameters of the instrument;

Second grade password (ex-factory value 03210): users can change 1~24 parameters of the instrument;

Third grade password (ex-factory value 06108): users can change 1~25 parameters of the instrument;

Fourth grade password (ex-factory value 07206): users can change 1~29 parameters of the instrument;

Fifth grade password (fixed value): users can change 1~43 parameters of the instrument;

Suggest that users who are higher grade personnel to master fifth grade password; fourth grade password, mainly use for set total flow; 1~3 grade passwords, users determine which grade personnel to mater.

### 4.2 Detailed parameters explanation of the instrument

4.2.1 Languages

The electromagnetic converter has two kinds of languages that are English and Chinese, users can select operation by themselves.

4.2.2 Communication address of the instrument

It means that communication address of this meter when multi-instrument communication, optional scope: 01~ 99 addresses, 0 address retain.

4.2.3 Communication speed of instrument

Option scope for communication baud rate of the instrument: 600, 1200, 2400, 4800, 9600, 19200.

4.2.4 Measuring pipeline aperture

Aperture scope of matching sensor of the electromagnetic flowmeter converter is: 3~3000 mm.

4.2.5 Flow units

Select flow displayed units in parameters, flow displayed units of the instruments are: L/s, L/m, L/h, m**3**/s, m**3**/m, m**3**/h, users can select a proper flow displayed unit according to technology requirements and usage habit.

4.2.6 Range setting of the instrument

Range setting of the instrument means that determine upper limit flow value, lower flow value of the instrument is automatically set as “0”.

Therefore, range setting of the instrument determines range scope of the instrument, namely determines percentage display of the instrument, frequency output of the instrument, corresponding relation between current output and flow of the instrument:

Percentage displayed value of the instrument= (flow measuring value/range scope of the instrument)*100%;

Frequency output of the instrument= (flow measuring value/range scope of the instrument)*frequency full range value;

Current output value of the instrument= (flow measuring value/range scope of the instrument)*current full range value + base;

Impulse output value of the instrument does not been affected by range setting of the instrument;

4.2.7 Measuring filter time (measuring damping time)

Long measuring filter time can improve flow displayed stability and output signal stability of the instrument, apply to pulse flow measurement of total flow accumulation. Short measuring filter time is expressed by quick measuring response speed, apply to production process control. The setting of measuring filter time adopts selection mode.

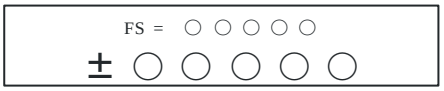
4.2.8 Option of flow direction

If users think when adjusting fluid direction is different to designed one, users do not need to change excitation wire or signal wire connection, but by change setting parameter of flow direction.

4.2.9 Flow zero-point correction

When correcting zero-point, should ensure that sensor pipelines is filled with liquid, and liquid is under static state. Flow zero-point is expressed by flow-rate, unit is mm/s.

Flow zero-point correction of the converter is shown as follows:




Uplink small characters display: FS means zero-point measuring value of the instrument;

Downlink big characters display: flow-rate zero-point corrected value;

When FS display is not "0", should adjust corrected value to make FS=0. Attention: if change corrected value, FS value increases, need to change positive sign/negative sign of downlink numerical value, make FS is able to be corrected as zero.

Corrected value of flow zero-point is matching constant value of the sensor, should record recording sheet of the sensor and sensor marker. When recording, zero-point value of the sensor is flow-rate value which unit is mm/s, its sign is opposite to corrected value's.

4.2.10 Small signal excision point

Small signal excision point setting is expressed by percentage flow of range. When small signal excising, users can select excision flow, flow-rate and percentage display and signal output at the same time; can also select only excise current output signal and frequency (pulse) output signal, keep flow, flow-rate and percentage display.

4.2.11 Flow integrating unit

The indicator of converter is 9-bit counter, max. allowable count value is 999999999.

Using integrating units are: L, $m^3$

Flow-integrating equivalents are 0.001L, 0.010L, 0.100L, 1.000L, 0.001$m^3$, 0.010 $m^3$, 0.100 $m^3$, 1.000 $m^3$;

4.2.12 Backward output allowance function

When backward output allowance parameter is set under "allowance" state, only if liquid flows, the converter outputs impulse and current according to flow value. When backward output allowance parameters is set under "prohibition" state, if liquid flows reversely, converter output impulse is "0", current output is signal "0" (4mA or 0mA).

4.2.13 Current output types

Users can select 0~10 mA or 4~20 mA current outputs in current output types.

4.2.14 impulse output modes

Impulse output modes are two kinds that are frequency output and impulse output, can be optional:

- Frequency output mode: frequency output is continuing square-wave, frequency value is corresponding to flow percentage.
- Frequency output value = (flow measuring value / range scope of the instrument) * frequency full range value;

Impulse output mode: impulse output is rectangular wave pulse train, every impulse means a flow equivalent flows pipeline, impulse equivalent is selected by the following "impulse equivalent unit" parameter. Impulse output mode is mostly used in total flow accumulations, generally connect with integrating instruments.

Generally, frequency output and impulse output is OC door form. Therefore, should connect DC power and load outside. The details see 3.5.

4.2.15 impulse equivalent unit

Impulse unit equivalent means one impulse expressed flow value, option scope for impulse equivalent of the instrument is:

| Impulse equivalent | Flow value | Impulse equivalent | Flow value |
|---|---|---|---|
| 1 | 0.001L/cp | 5 | 0.001m**3**/cp |
| 2 | 0.01L/cp | 6 | 0.01m**3**/cp |
| 3 | 0.1L/cp | 7 | 0.1m**3**/cp |
| 4 | 1.0L/cp | 8 | 1.0m**3**/cp |

Under the same flow, impulse equivalent is small, then output impulse frequency is high, accumulation flow error is small.

4.2.16 Frequency output scope

Frequency output scope of the instrument is corresponding to upper limit of flow measuring, namely 100% of percentage flow. Upper limit value of frequency output can be arbitrary set up in the scope of 1~5000Hz.

4.2.17 Empty pipe alarm allowance

Have empty pipe inspection function, and without adding electrode. If users select allowance empty pipe alarm, instrument can inspect an empty pipe state when fluid in the pipe is lower than measuring electrode. After empty pipeline state is examined, the instrument's analog output and digital output value are set signal zero, at the same time, flow of the instrument displays zero.

4.2.18 Empty pipe alarm threshold value

Under fluid full-pipe situation (whether have flow-rate or not is OK), modify empty alarm setting for users to use it conveniently, the upline of empty pipe alarm threshold value parameter displays actual measured conductivity, downline set up empty pipe alarm threshold value. When set up empty pipe alarm threshold value, can depend on actual conductivity to set up, namely, it can be set as 3~5 times of the conductivity.

4.2.19 Upper limit alarm allowance

Users select allowance or prohibition

4.2.20 Upper alarm numerical value

Upper limit alarm can be calculated by range percentage, this parameter adopts numerical value setting mode, users set up a numerical value among 0%~199.9%. When the instrument satisfies alarm conditions on running, the instrument will output alarm signal.

4.2.21 Lower limit alarm

The same as upper limit alarm

4.2.22 Field excitation alarm

Select allowance, with field excitation alarm function; select prohibition, cancel field excitation alarm function.

4.2.23 Total flow clear password

Users use password that above third grade can set up this password, and then set up this password in total flow clear.

4.2.24 Sensor coding

Sensor coding can be used for mark ex-factory time and number of matching sensors, so that to fit set up sensor coefficients.

4.2.25 Sensor coefficient value

Sensor coefficient: namely, electromagnetic flowmeter whole-machine calibration coefficient, this coefficient is obtained by actual calibration, and imprint steel seal on sensor label. User must take this coefficient set into converter parameter table.

4.2.26 Field excitation modes selection

Electromagnetic converter provides three options of field excitation frequency: namely, 1/10 power frequency (mode 1), 1/16 power frequency (mode 2), 1/25 power frequency (mode 3). Field excitation system inductance value of sensor with small aperture is small, should select 1/10 power frequency. Excitation system inductance value of sensor with big aperture is big, users only can select 1/16 power frequency or 1/25 power frequency. During using, select excitation mode 1 at first, then select mode 2 or mode 3 successively if flow-rate zero point of the instrument is too high. Attention: should calibrate and operate under the same excitation mode.

4.2.27 Forward total flow high level/ low level

Total flow high-low level setting can change numerical values of forward accumulation total flow and backward accumulation total flow, mainly use for instrument maintenance and instrument replacement.

Users use 5 grades passwords to enter, can modify forward accumulation quantity ( $\Sigma$ +), general set accumulation quantity cannot exceed max. numerical value that calculated by counter (999999999).

4.2.28 Backward total flow high level/ low level

Users use 5 grades passwords to enter, can modify backward accumulation quantity ( $\Sigma$ -), general set accumulation quantity cannot exceed max. numerical value that calculated by counter (999999999).

4.2.31 Spike inhibition time

This parameter selected time width of desire inhibition sharp interference, the unit is msec.. Duration time is less than flow change of selected time; the converter is regarded as sharp interference. Duration time is more than flow change of selected time, the converter is regarded as normal flow change. Also should depend on actual situation, try to select this parameter.

4.2.32 Users password 1~4

Users use 5 grades passwords to enter, can modify this password;

4.2.33 Current zero point correction

Adjustment for ex-factory current output zero point of the converter, make current output is 0mA or 4mA accurately.

4.2.34 Current full-scale correction

Adjustment for ex-factory current output full-scale of the converter, make current output calibration is 10mA or 20mA accurately.

4.2.35 Ex-factory calibration coefficient

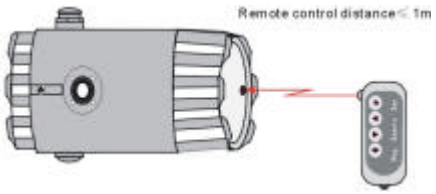
This coefficient is special coefficient of converter manufactory, converter manufactory uses this coefficient to make normalization of electromagnetic converter measuring circuit system so that ensure interchange ability among all electromagnetic converter reach 0.1%.

4.2.36 Coding 1 and 2 of the instrument

The coding of converter records converter ex-factory time and coding.

## 5 Infrared handheld remote control keyboard

Infrared hand-held remote control operation keyboard of the instrument, its operation is the same as keyboard operation of the instrument, when operating, please make infrared emission port of infrared hand-held remote control operation keyboard and infrared receive port of the instrument put parallel at the same level, distance L about 1M, concrete operation see the following figure:




## 6 Alarm information

Printed circuit board of electromagnetic flow converter adopts surface wielding technology, as for users, it is non-repairable. Therefore, users cannot open the converter shell.

Intelligent converter has self-diagnosis function. It can correctively give alarm information for faults occurred in general application excepted power and hardware circuit faults. These information suggest that "" on the left side of the indicator. Under measuring state, the instrument automatically display faults contents as follows:

FQH --- flow upper limit alarm; FQL --- flow lower limit alarm;

FGP --- fluid empty pipe alarm; SYS --- system field excitation alarm;

UPPER ALARM --- flow upper limit alarm;

LOWER ALARM --- flow lower limit alarm;

LIQUID ALARM --- liquid empty pipe alarm;

SYSTEM ALARM --- system excitation alarm;

## 7 Fault treatments

### 7.1 Instrument non-display

* Check power whether turn on or not;

* Check power fuse whether fine or not;

* Check supply voltage whether meet requirements or not;

### 7.2 Field excitation alarm

* Whether field excitation wiring EX1 and EX 2 is open circuit or not;

* Whether total resistance of sensor field excitation coil is less than 150Ω or not;

* If item a and b are normal, then the converter has fault.

### 7.3 Empty pipe alarm

* Measure whether fluid is filled in the measuring pipe of sensor;

* Use wire to make converter signal input ends SIG 1. SIG2 and SIGGND short circuiting, if "Empty pipe" suggest cancel at the moment, it shows the converter is normal, maybe conductivity of measured fluid is low or empty pipe threshold value and range setting error;

* Check whether signal wiring is correct or not;

* Check whether sensor electrode is normal or not;

Make flow as zero; observe displayed conductance ratio should be less than 100%;

Under flow existing state, measure respectively resistance of ends SIG1 and SIG2 to SIGGND which should be less than 50 kΩ (as for measuring value of water. It is best to use pointer multimeter for measuring, and can see charge and discharge phenomenon during measuring process).

* DC voltage that is measured between DS1 and DS 2 by multimeter should be less than 1V, otherwise explain sensor electrode is polluted, should provide cleaning.

### 7.4 measured flow incorrect

* Measure whether fluid is filled in the measuring pipe of sensor;

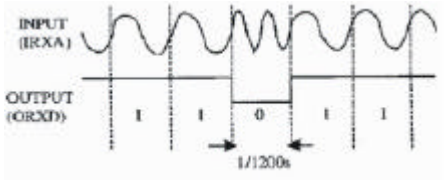
* Whether signal wiring is normal or not;

*Check whether sensor coefficient, sensor zero point is set up depends on sensor mark or ex-factory check list.

## 8 Explanations for HART function

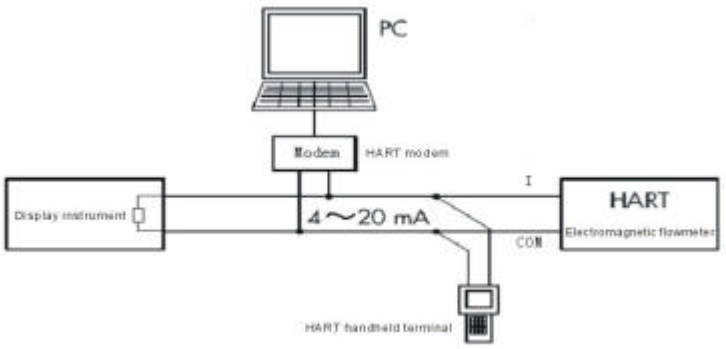
### 8.1 Outline of HART bus

HART bus is a data communication bus which applies to field devices and developed by Rosemount Company in 1993, it is the short form of "Highway Addressable Remote Transducer", the meaning is "addressable remote transducer data path". Its data signal transmission method is to stack a current frequency modulated signal on 4-20mA signal, where logic "1" is expressed by 1200 Hz signal, logic "0" is expressed by 2200Hz signal, baud rate is 1200 bps. Its signal modulation waveform shown as the figure below:




### 8.2 Field network chart of HART bus

The feature of HART bus is that transmit data signal by using 4~20mA signal wire, so not only can save field data communication wire, but also can realize data communication, apply to field application very much. The field network that composed of HART bus as the figure below:




### 8.3 Notices of HART operation function

1) Handheld terminal and HARTMODEM parallel connect two end of electromagnetic flowmeter current output load without polarity;

2) resistance of loops should more than 200Ω, less than 500Ω;

3) Handheld terminal, HARTMODEM cannot connect current loop;

Attention:

1. EMF-series electromagnetic flowmeters use handheld operator and HARTMODEM to set up parameter, the instrument should set up communication address as non-zero value, baud rate is 4800.

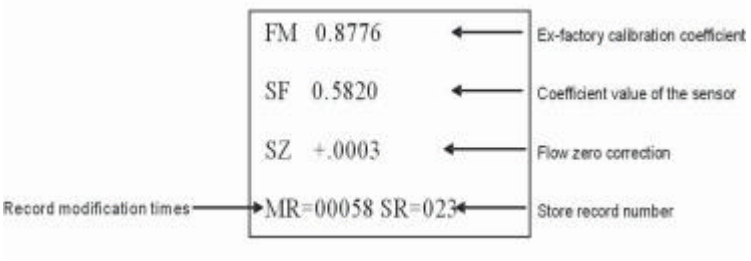
2. If communication mode, address and baud rate setting of the instrument is incorrectly, handheld operator and HARTMODEM can not set up parameter.

## Appendix 1: The function of modification records of flow coefficients

According to new rules of "National Metrology Verification of Electromagnetic Flowmeter", electromagnetic flow converter records one group (3) flow characteristic parameters, they are respectively correction coefficient of the converter (ex-factory calibration coefficient), calibration parameter of the sensor (coefficient value of the sensor), sensor zero (flow zero correction), meanwhile, automatically record modification times of flow characteristic parameter (MR number). To modify any parameter in the flow catachrestic parameter group, the modification times records plus 1, user cannot change numerical value of correction times records. User should record flow calibration coefficient of the sensor and modify times record (MR number) in the verification-book, any following modification will produce different modification times records, browse the modification record times will know whether flow characteristic parameter is modified or not.

Electromagnetic flow converter can store 32 groups of history records of flow characteristic parameters so that user can browse it. Concrete operating methods as follows:

1. Under measuring state, press "compound key +confirm key", appear the converter's function selection picture "parameter setting", and the press "up key" turn page to "coefficient modification record", press "compound key" for a time, enter to browse the picture of coefficient modification record.




※ Attention **!**

The last record is displayed when this item is first entered, if you want to browse the history records press "down key", and could search for the last record to the thirty-two record ahead. Finally the times of record modified (MR) should be written down on the paper before next time test.

## 9 Installation commission

If electromagnetic flowmeter installation is not correct will obviously affect its measuring accuracy and other performance, even seriously make it cannot normal work, before install, users must carefully read instruction and strictly abide by related stipulation of this instruction so ensure the meter can normally work.

### 9.1 Choice of installation environment

According to working characteristics and specifications of the electromagnetic flowmeter, we shall pay attention to the following several requirements while choosing installation environment:

1) The flowmeter should be mounted on the dry and ventilated place, but not mounted on the wet place.

2) The flowmeter should avoid mounting on the occasion where temperature variation is very large and suffer high-temperature radiation from the device, if need to install, must take heat insulation and

ventilation measures.

3) The flowmeter should avoid mounting on the environment including corrosion gas (such as free ammonia, acid mist and so on), if need to install, where must have ventilation measure.

4) Avoid being exposed to rain and run, and prevent ambient temperature too high, outdoor installation should have shelter from rain facilities.

5) Installation place shouldn't have strong shock. If shock of the pipeline is too strong, then at two sides of the flowmeter should have fixed pipeline support.

6) Installation place should try to avoid the device with strong magnetic field like large electric machine, large transformer etc.

7) The pipeline of fix flowmeter don't exist larger leakage current before install, and its nearby place should have good ground condition.

8) In order to conveniently install and maintain, around the flowmeter must have enough installation space.

**9.2 When select installation place of the sensor on the process pipeline, users must pay attention to the following several point.**

1) The mark of flow direction adheres on the sensor is in accordance with the medium flow direction in the pipe.

2) Usually, the flowmeter adopts horizontal installation; the axis of two electrodes should be sat in the same level.

3) Must ensure measured medium is always filled in the measuring tube of the sensor.

4) When metering average flow, the sensor should choose sit on the place where pipe inner flow ripple is smaller. In general conditions, the place is far from the pump, chocked flow elbow and valve, such instrument indication is more stable, ripple is smaller.

5) For measurement of bi-phase fluid which including solid substance such as ore pulp, slurry, fiber pulp etc. should choose suitable place, in which it cannot phase-separation. In addition, it best only to take vertical installation so as to make measured medium flow from down to up, in this way, can avoid solid grain deposit in the measuring pipeline, make liquid border on axisymmetric flow , and also can make sensor lining wear is uniform, prolong service life.

6) In order to prevent occurring negative pressure, the height of the flowmeter must below to the height of the pipeline slightly, or it is guarantee that downstream of the flowmeter has definite pressure, the sensor should try to avoid install in the pipe where present negative pressure.

7) Because of measured medium easy to make the measuring tube inside and electrode generate the conglutination and deposit, in order to clean measured tube and electrode under process pipeline flow without break off, the sensor adopted bypass parallel installation and with cleaning port.

8) When the pipeline caliber isn't in accordance with the sensor, reducer and divergent pipe are installed in two ends of the sensor, and then connect with the pipeline again. When adopt tamplate pipe, you must pay attention to the center cone angle of the tamplate pipe isn't greater than 15, the smaller the better, and consider pressure loss from this brought.

Correctly install the electromagnetic flowmeter is shown in the following drawing:

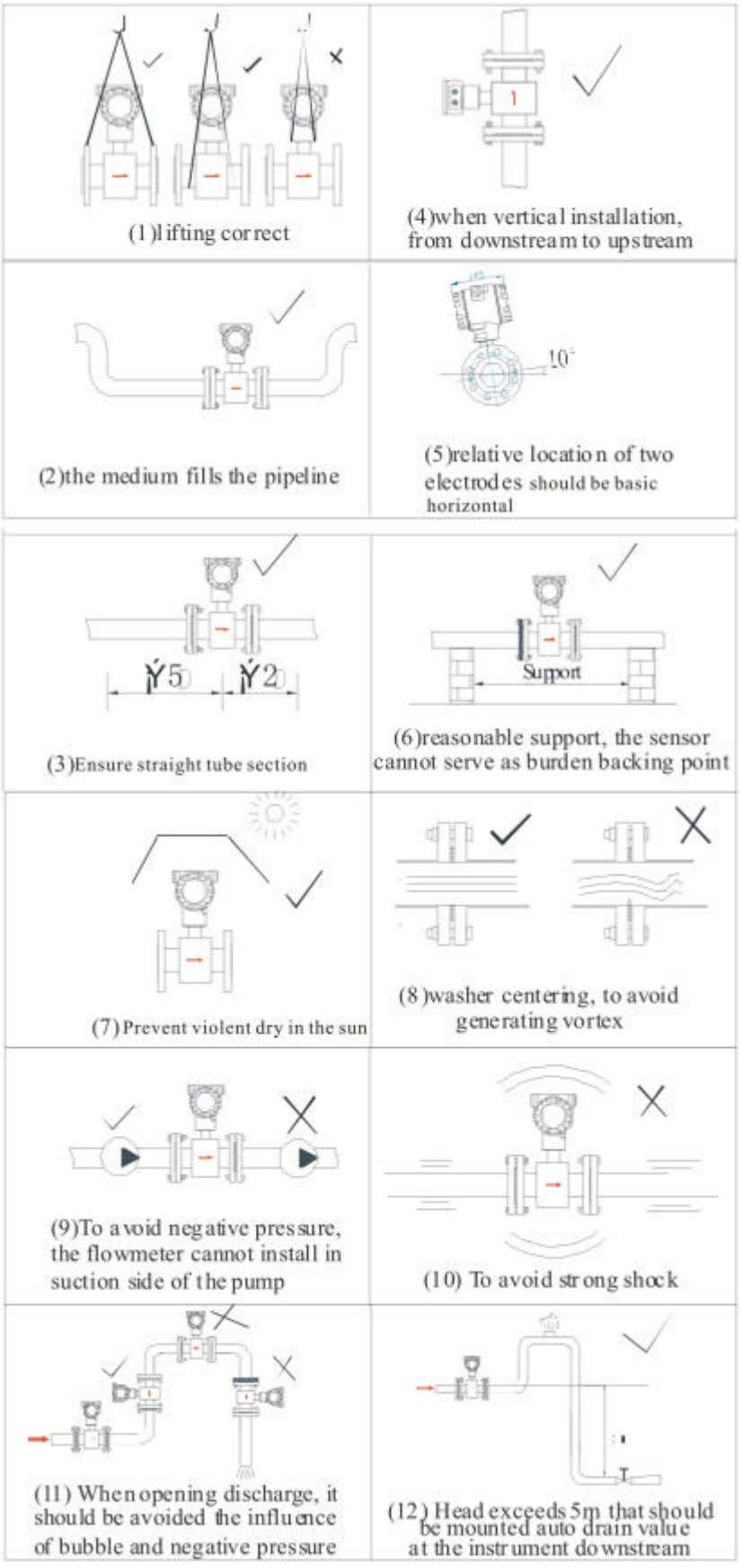
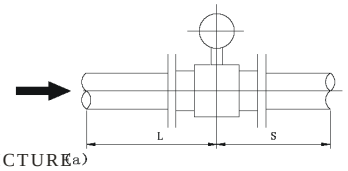



Fig. 9.2 Graphical representation electromagnetic flowmwter installation

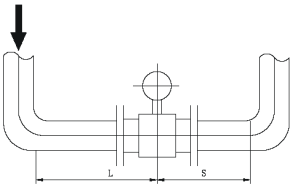
### 9.3 Requirement of straight pipe section

It will be know from measurement principle of an electromagnetic flowmeter, only when flow velocity in the measuring tube of the sensor is distributed into axial symmetry, induced electromotive force of the sensor is proportion to average flow velocity. When the distribution of axial symmetry is damaged, especially for large caliber electromagnetic flowmeter will cause bigger measurement error. So at the pipeline upstream, on the front of electrode plane must bring a straight pipe section which length more than 5 times of measuring pipe caliber. When the sensor is installed in the pipeline of non-full open valve, then its upstream should be brought a straight pipe which length is ten times length of measuring pipe caliber; backward straight pipe length not less than three times length of measuring pipe caliber.

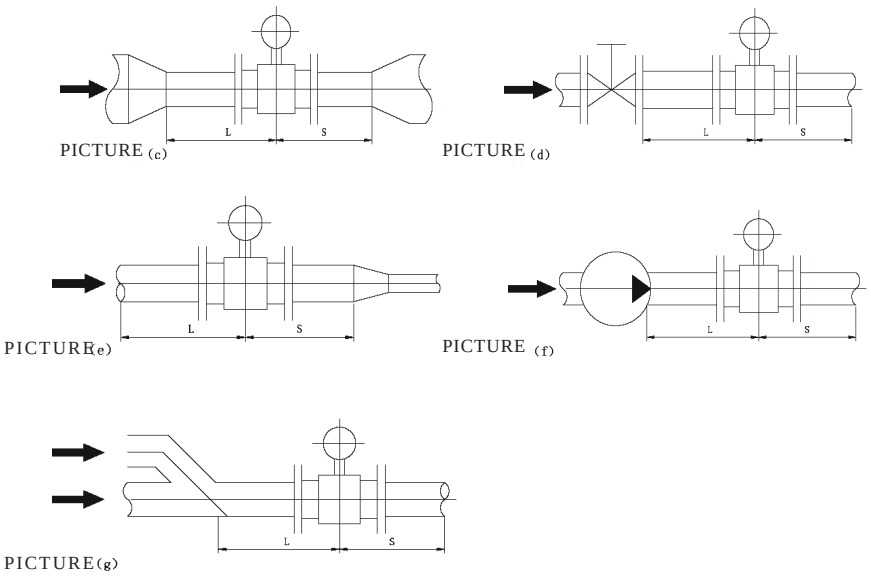
| **Installation type** | **Schematic drawing forms of installation** | **Pipeline mode** | |
|---|---|---|---|
| | | **Forward length** | **Backward length m** |
| Horizontal pipe | Figure (a) | 5D | 3D |
| Elbow pipe | Figure(b) | 5D | 3D |
| Flared tube | Figure (c) | 10D | 5D |
| Valve downstream | Figure (d) | 10D | 5D |
| Reducer | Figure (e) | 10D | 5D |
| Pump downstream | Figure (f) | 15D | 5D |
| Mixture liquid | Figure (g) | 30D | 3D |




PICTURE(a)




PICTURE(b)




### 9.4 Transportation and lift mounting

Must guard against use rope when an electromagnetic flowmeter is transporting, moving and lifting, put the bar into the measuring tube of the sensor to lift mounting (see figure 9.2), so as to avoid damaging the lining, when lift mounting, not only two ends of the flowmeter can be bound with rope to lift mounting but also can use steel rope or hook put on the flange bolt hole at the two ends of the flowmeter to lift mounting.

### 9.5 Installation on special usage site

Use condition for an electromagnetic flowmeter has varieties, here only explanation of special condition

A. Installation on insulation pipeline

Because of the electromagnetic flowmeter must be grounded while using make measured medium and the enclosure of the sensor both are on the same potential. For non-conducting nonmetallic pipeline, in order to make the instrument is zero potential by measured medium potential, that is to say, measured medium communicated with the enclosure of the sensor each other, now should use ground ring made by metal material or metal short pipe of which without insulation lining (or without insulation coating), two ends metallic flange is embedded between sensor flanges, as shown in Fig.9.5.1:

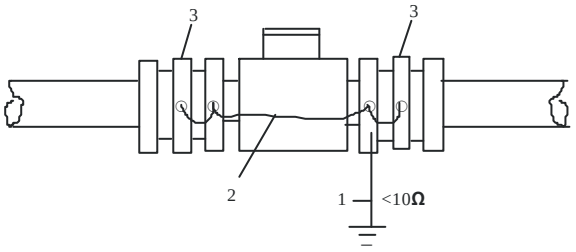



Fig.9.5.1 Installation method on the insulation pipeline

In Fig.9.5.1, measured medium contacted with ground ring or metallic pipe without lining, and then communicate with the enclosure of the sensor by connection, thus reach the purpose of measured medium communicates with the enclosure of the sensor each other

1. Measuring ground connection
2. Connecting wire (sectional area of copper core is 6 $mm^2$)

3. Ground ring or without insulation lining metal short-pipe

For strong corrosive measured medium neither can not use ordinary stainless steel ground ring nor cannot adopt metal short-pipe of no-insulation lining, now can adopt the method of which embedding ground electrode on the insulation pipeline. Because of the material of ground electrode is very little that may be made from noble metal materials of which corrosion resistant performance very good.

B. Installation on pipeline with cathode protection potential

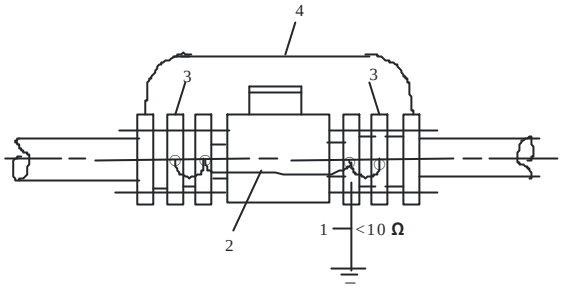



Fig.9.5.2 Installation method of the sensor is on pipeline with cathode protection potential

1. Measuring ground connection

2 Connecting wire (sectional area of copper core is $mm^2$)

3. Ground ring or ground flange, they must be isolated with pipeline flange

4. Connecting wire, sectional area of copper core is 6 $mm^2$, isolate between cathode protection potential and the sensor.

Usually, the pipeline of cathode protection where insulation material is covered on its internal wall and external wall, so measured medium has not ground potential. Now ground ring of the sensor should be embedded between flange which on two ends of the sensor and process pipeline they must be insulated with the flange of process pipeline and connect to the sensor and ground ring through ground wire 2. Flange of process pipeline on two ends of the sensor connect each other by copper wire 5 to isolate between cathode protection potential and sensor.

C. Installation on the pipeline with large working frequency current

In some metallic pipeline system, working frequency current via the pipeline is bigger; in order to prevent this working frequency current directly passed over the enclosure of the sensor and measured medium, to avoid producing interference potential and let the flowmeter can normally work installation method, as shown in Fig.9.5.3.

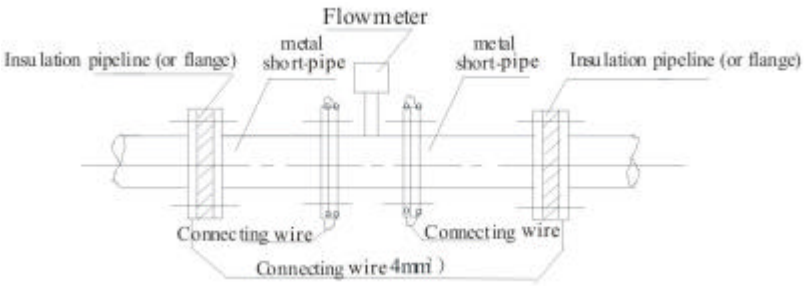



Fig.9.5.3 Installation method on the pipeline with large working frequency current

Across two ends of the sensor is connected each section of insulation pipe or flange, and ground flange or metal short-pipe is installed between the sensor and insulation pipeline, the same as general installation method, ground flange and the sensor together linked to good ground device, and link place of two insulation pipeline and process pipeline from short circuit sectional area which not less than 4 $mm^2$ by other use the copper wire.

### 9.6 Ground requirement of installation

The electromagnetic flow sensor must have good ground. During actual measurement, we can take the whole fluid as a zero resist body. This zero resist body just became the midpoint of differential signal voltage, so measured fluid must reliable ground, otherwise if "ground" of measured fluid and converter line have not switch on, then differential signal cannot be formed, and result in the flowmeter doesn't work. There are two things for ground requirement of the electromagnetic flow sensor:

1) Measured medium must be contacted. From the point of view of working principle of the flowmeter, the ground end of the sensor must connect electrically with measured medium.

2) Reliable ground, take ground as zero potential to reduce environmental interference. In generally, process pipeline are all metal pipeline, themselves are all grounded. Do this requirement is very easy. But under larger environmental electro-magnetic field interference states, especially, when stray current as working frequency on the pipeline is bigger, need other to set reliable ground device, at the more wet place, ground device general is embedded in ground copper bar which length is greater than 1 m and connect with ground location of sensor work by using conductor which area is greater than 4 $mm^2$. General demand for ground resistance less than 10 ohm and must be paid attention: Ground connection of the sensor never connect on common ground of the motor or other electric equipment, so as to avoid interference influence of leakage current.

### 9.7 Cable laying

1) Cable used for wiring table 3

| Serial number | Terminal | Specification Description |
|---|---|---|
| 1 | Signal line A, B, C | Three-core PVC dual shielding cable RVVP2×28/0.15 (separate type) |
| 2 | Excitation line X, Y | Two-core PVC dual-shielding cable RVVP2×28/0.15 (separate type) |
| 3 | Output current line | Two-core PVC dual-shielding cable RVVP2×28/0.15 |
| 4 | Power line | Three-core PVC dual-shielding cable RVVP2×28/0.15 (ac 220v/ dc 24v) |

2) When lay cable points for attention (separate type)

A. Input signal line A, B, C on the converter must put into the steel tube alone, the steel tube links up the ground.

B. Both signal cable and excitation cable should be avoided to parallel mounting together with other cables like motor, transformer or other power cable; its distance must be greater than 1m above at least.

C. Both signal cable and excitation cable can neither be broke nor be extended cable by using welding or other connection method.

D. Between excitation terminal X and Y can neither be short circuit nor linked up any load except excitation coil of the sensor.

### 9.8 Installation of separate converter

A. Installation surrounding

1) Installation surrounding must be paid attention to keep cleaning, the surrounding has not corrosion atmosphere drying and ventilate site.

2) Ambient temperature cannot exceed -10℃～+55℃, relative humidity cannot exceed 85%, and try to avoid the devices generated strong electromagnetic field (like large motor, large transformer)

3) When installing on the wall where must be apart from the ground about 1.5 m, and be paid attention to avoid sun-scorched and rain-drenched and strong shock and impact.

B. Installation method

Wall-type converter installation may be mounted on the wall or metal bracket on the instrument's panel as well as in field instrument box. After installed the converter front and below must empty out enough space so as to obstruct the meter opening and wire connection. When installing, first fix one end of ground connection using M4 screw to ground screw of shell base, and then using four screws penetrates through inside hole, tighten up the screw, take the converter closely connected together with installation panel, then using four M5 screws penetrate through outside hole on the installation panel. At last, tighten up nut and washer, thus the converter can be firmly installed on the need bracket. Installation dimension is shown as fig.14.

### 9.9 Put into operation

Before the flowmeter is formally put into operation, strictly check whether its installation and connection is correct and whether confirm to regulated requirement.

It must be pointed out that the whole set of electromagnetic flowmeter has already passed over strict adjustment and actual calibration before leaving the factory. Generally speaking, users can put into operation and needn't to do any adjustment and. To the problem happened in primary operation, according to this instruction, each stated points must be checked and analyzed carefully, troubleshooting, don't move at will mix up original adjustment even damage it. Checking the operation before power on:

1) Check whether the sensor, converter and connection with terminal wire base on flow accumulator, and intact whether each screw is tighten or not.

2) Open the valve to fill the pipeline with the fluid still and remove residual gas in the pipeline, and then observe whether leakage point exist

Check while electrifying:

After the tests is correct before electrifying, namely may try to electrify, observe whether abnormal condition. If it is found that it occurs failure, power must be cutoff immediately and check connection. If without abnormal condition, the converter shows transient flow and net accumulated flow.

Put into operation:

1) Open the valve to make the fluid flows, now the converter should has output current; LCD display shows transient flow and net accumulated flow.

2) To change opening of the valve, observe whether instantaneous flow value change.

## EMF-A/B flanged-type electromagnetic flow meter type spectrum table

| Model | | | | | | | | | | | | | | | Explanation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| -EMF- | □ | □□ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | |
| Structure form | A | | | | | | | | | | | | | | Integrated flanged-type electromagnetic flow meter |
| | B | | | | | | | | | | | | | | Split flanged-type electromagnetic flow meter |
| Aperture | | ( ) | | | | | | | | | | | | | Aperture from DN10~DN2000 |
| Electrode | | | 1 | | | | | | | | | | | | 316 stainless steel |
| | | | 2 | | | | | | | | | | | | Halloy B |
| | | | 3 | | | | | | | | | | | | Halloy C |
| | | | 4 | | | | | | | | | | | | Pt (not provide temporarily) |
| | | | 5 | | | | | | | | | | | | Ti |
| | | | 6 | | | | | | | | | | | | Ta |
| | | | 9 | | | | | | | | | | | | Other |
| Lining material | | | | A | | | | | | | | | | | Chloroprene rubber (CR) |
| | | | | B | | | | | | | | | | | Polyurethane rubber (PU) |
| | | | | C | | | | | | | | | | | Polytetrafluoroethylene (PTEE, F4) |
| | | | | D | | | | | | | | | | | Solubility Polytetrafluoroethylene(PFA) |
| | | | | E | | | | | | | | | | | F46 |
| | | | | G | | | | | | | | | | | Solubility Polytetrafluoroethylene (withstand negative pressure) (PFA) |
| | | | | H | | | | | | | | | | | F46 (withstand negative pressure) |
| Working pressure | | | | | 1 | | | | | | | | | | 4.0MPa (aperture DN10~DN80 ) |
| | | | | | 2 | | | | | | | | | | 1.6MPa (aperture DN100~DN150 ) |
| | | | | | 3 | | | | | | | | | | 1.0MPa (aperture DN200~DN1000 ) |
| | | | | | 4 | | | | | | | | | | 0.6MPa (aperture DN1200~DN2000 ) |
| Earthing ring | | | | | | A | | | | | | | | | None |
| | | | | | | B | | | | | | | | | General earth ring |
| | | | | | | C | | | | | | | | | Earth ring with neck |
| Protection grade | | | | | | | A | | | | | | | | IP65 |
| | | | | | | | B | | | | | | | | IP67 |
| | | | | | | | C | | | | | | | | IP68 (split type) |
| Output mode | | | | | | | | 1 | | | | | | | 4~20mA |
| | | | | | | | | 2 | | | | | | | 0~3KHz |
| | | | | | | | | 3 | | | | | | | Pulse X..XXX $m^3$/cp |
| Communication mode | | | | | | | | | 0 | | | | | | None |
| | | | | | | | | | 1 | | | | | | RS485 |
| | | | | | | | | | 2 | | | | | | RS232C (match III type converter) |
| | | | | | | | | | 3 | | | | | | HART (match III type converter) |
| Power supply | | | | | | | | | | T | | | | | 220V AC |
| | | | | | | | | | | W | | | | | 24V DC |
| Accuracy | | | | | | | | | | | 4 | | | | 0.2grade |
| | | | | | | | | | | | 5 | | | | 0.5 grade |
| | | | | | | | | | | | 6 | | | | 1.0 grade |
| Converter type | | | | | | | | | | | | 1 | | | Integrated I type |
| | | | | | | | | | | | | 2 | | | Integrated II type |
| | | | | | | | | | | | | 3 | | | Split I type |
| | | | | | | | | | | | | 4 | | | Split II type |

| | | | | | |
|---|---|---|---|---|---|
| | | 5 | | | Integrated III type |
| | | 6 | | | Split III type |
| **Flame-proof type** | | | | | General type |
| | | | D | | Flame-proof type (Exd II CT 6) |
| **Max. flow** | | | | ( ) | In the bracket give clear indication of max. flow, unit |

For example: EMF-A (100)1A2AA0T51D (80)

## EMF-C/D gripping-type electromagnetic flow meter type spectrum table

| Model | | | | | | | | | | | | | | | Explanation |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **EMF-** | □ | □□□ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | □ | |
| **Structure form** | C | | | | | | | | | | | | | | Integrated gripping-type electromagnetic flow meter |
| | D | | | | | | | | | | | | | | Split gripping-type electromagnetic flow meter |
| **Aperture** | | ( ) | | | | | | | | | | | | | Aperture from DN10~DN200 |
| **Electrode** | | | 1 | | | | | | | | | | | | 316 stainless steel |
| | | | 2 | | | | | | | | | | | | Halloy B |
| | | | 3 | | | | | | | | | | | | Halloy C |
| | | | 4 | | | | | | | | | | | | Pt (not provide temporarily) |
| | | | 5 | | | | | | | | | | | | Ti |
| | | | 6 | | | | | | | | | | | | Ta |
| | | | 9 | | | | | | | | | | | | Other |
| **Lining material** | | | | D | | | | | | | | | | | Solubility Polytetrafluoroethylene(PFA) |
| | | | | E | | | | | | | | | | | F46 |
| | | | | G | | | | | | | | | | | Solubility Polytetrafluoroethylene (withstand negative pressure) (PFA) |
| | | | | H | | | | | | | | | | | F46 (withstand negative pressure) |
| **Working pressure** | | | | | 1 | | | | | | | | | | 4.0MPa (aperture DN10~DN80 ) |
| | | | | | 2 | | | | | | | | | | 1.6MPa (aperture DN100~DN150 ) |
| | | | | | 3 | | | | | | | | | | 1.0MPa (aperture DN200 ) |
| **Earthing ring** | | | | | | A | | | | | | | | | None |
| | | | | | | B | | | | | | | | | General earth ring |
| | | | | | | C | | | | | | | | | Earth ring with neck |
| **Protection grade** | | | | | | | A | | | | | | | | IP65 |
| | | | | | | | B | | | | | | | | IP67 |
| | | | | | | | C | | | | | | | | IP68 (split type) |
| **Output mode** | | | | | | | | 1 | | | | | | | 4~20mA |
| | | | | | | | | 2 | | | | | | | 0~3KHz |
| | | | | | | | | 3 | | | | | | | Pulse X..XXX $m^3$/cp |
| **Communication mode** | | | | | | | | | 0 | | | | | | None |
| | | | | | | | | | 1 | | | | | | RS485 |
| | | | | | | | | | 2 | | | | | | RS232C (match III type converter) |
| | | | | | | | | | 3 | | | | | | HART (match III type converter) |
| **Power supply** | | | | | | | | | | T | | | | | 220V AC |
| | | | | | | | | | | W | | | | | 24V DC |
| **Accuracy** | | | | | | | | | | | 4 | | | | 0.2grade |
| | | | | | | | | | | | 5 | | | | 0.5 grade |
| | | | | | | | | | | | 6 | | | | 1.0 grade |
| **Converter type** | | | | | | | | | | | | 1 | | | Integrated I type |
| | | | | | | | | | | | | 2 | | | Integrated II type |
| | | | | | | | | | | | | 3 | | | Split I type |
| | | | | | | | | | | | | 4 | | | Split II type |
| | | | | | | | | | | | | 5 | | | Integrated III type |
| | | | | | | | | | | | | 6 | | | Split III type |

| | | | | |
|---|---|---|---|---|
| **Flame-proof type** | | | | General type |
| | | D | | Flame-proof type (Exd II CT 6) |
| **Max. flow** | | | ( ) | In the bracket give clear indication of max. flow, unit $m^3/h$ |

For example: EMF-C (100)1D2AA0T51D (80)