YC01 Smart online density/concentration meter Operating Instructions

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Note that the following!

- Before installation and use, please read this manual carefully to understand the contents in order to be able to correctly install, circuit connection, operation and maintenance, etc.operation,

maintenance, etc.

- Please install and debug this instrument by professionals who fully understand the safety regulations.
- This manual should be kept until the sensor is scrapped.

The foreword

Ⅰ. Open the box and check the goods

Check whether the outer package is intact, and check whether the number of instruments and accessories are complete according to the packing list.

If the instrument is found to be damaged during transportation, the carrier and the supplier shall be notified immediately.The damaged instrument cannot be returned to the consignor, otherwise the carrier shall not compensate.Keep the packing box and damaged parts for carrier inspection.

Use the instructions	One serving
Certificate of eligibility	One serving
On-line densito meter / concentration meter	One set

II. Commissioning preparation before installation

1. Power on the meter and check whether the meter is turned on normally.

2. Fill the container with 25°C pure water, and place the fork of the meter to be immersed in the center of the container. After the temperature of the fork and the water are constant, the meter should have a density of 0.997~1 and a concentration of 0%. If the value is not correct, the sensor may drift due to transportation vibration or long-term storage. Water calibration can be performed. For operation details, please refer to the pure water calibration instructions in the operation of the debugging menu.

III. matters needing attention

★ The product should be installed as far as possible in a place where the temperature gradient and temperature change are small, and there is no impact or vibration.

★ The measured medium is not allowed to freeze, otherwise the sensing element will be damaged and the tuning fork density/concentration meter will be damaged.

★ To prevent the dregs from depositing in the tank.

★ It should be handled with care to prevent damage to the product.

★ Do not drop the instrument directly.

★ It is forbidden to operate the instrument above the rated pressure.

★The pressure test is forbidden to exceed the specified test pressure.

★ It should be known whether the instrument is suitable for all explosion-proof occasions.

★ Note It is forbidden to weld pipes during product installation.

Table of Contents

1.Product introduction

◆ 1.1 About the products

The online density / concentration meter was used to measure the concentration of liquid media in the tank and pipeline.Concentration measurement is an important process control in the product production process, and the sound fork density / concentration meter can be used as an indicator of other quality control parameters such as solid content or concentration value.It can meet the user measurement requirements of density, concentration and solid content.

◆ 1.2 Operating principle

The online density / concentration meter inspires the acoustic fork using the acoustic frequency signal source and vibrthe fork freely at the central frequency, which corresponds to the density of the contact liquid. By analyzing the density of the liquid, the temperature supplement eliminates the system ; at the concentration, the concentration value at 25℃ temperature can be calculated according to the relationship between the corresponding liquid density and concentration.

Particle restriction		Air-containing	Maximum liquid viscosity
Particle diameter	Suspension particles%		
<10 microns	＜=40%	Recommended	500cp
10~50 microns	＜=20%	It is generally not used	2000cp

◆ 1.3 Application industry

1.petrochemical industry: diesel, gasoline, ethylene, etc.

2.Chemical Industry : sulfuric acid, hydrochloric acid, nitric acid, chloroacetic acid, ammonia water, methanol, ethanol, saline, sodium hydroxide, frozen solution, sodium carbonate,glycerol,hydrogen peroxide, etc.

3.pharmaceutical industry: pharmaceutical liquid, biological liquid, alcohol lift, acetone, alcohol recovery, etc.

4.Food & Beverage Industry : Sugar water, fruit juice, brewing,cream, etc.

5.battery, electrolyte industry: sulfuric acid, lithium hydroxide, etc.

6.environmental protection industry: desulfurization (lime slurry, gypsum slurry), denitration (ammonia water, urea), wastewater treatment mvr(acid, alkali, salt recovery), etc.

◆ 1.4 Typical working conditions

Oil and petrochemical industries	- -Interface detection- -Multiple oil delivery pipeline

Chemical industry	-acid-alkali production-quality control
Brewing industry	-Quality control- -continuous online testing
Organic and inorganic chemicals	-Leak detection — Underground storage tank using saline
Pharmaceutical industry	-Traditional Chinese medicine concentration, alcohol recovery
Battery industry	-Concentration of lithium hydroxide, electrolyte, and sulfuric acid solution

2. Product performance

accuracy	±0.001g/cm^3	±0.25%
Scope of work	0～2g/cm^3	0～100%
Repeatability	±0.0001g/cm^3	±0.1%
Process temperature effect (corrected)	±0.0001g/cm^3	±0.1%(℃ per ℃)
Process pressure impact (corrected)	Ignoring	Ignoring

(1) The above accuracy applies to the calibration range 0.8–1.5g/cm3 (8001500 kg/m3).

(2) The viscosity of the liquid is up to 2,000 cP.

(3) Temperature influence refers to the maximum measurement deviation caused by the process fluid temperature deviation from the factory calibration temperature.

(4) Pressure impact is defined as the changes in sensor flow and density sensitivity due to process pressure deviation from calibration pressure.

3. Temperature and specifications

Process temperature	Standard: 25℃~+ 120℃ Custom-made: 25℃~+ 150℃
Environmental temperature	–25℃~+85℃
Temperature coefficient	20ppm/℃ (after correction)
Built-in temperature sensor	Temperature chip

4. Structural materials

Fluid parts	316L, Kazakh alloy, titanium alloy, zirconium, etc
The fork teeth are polished	Standard polishing, PTFE coating, electrolytic polishing
Case	I P 65, aluminum alloy

5. Pressure rating value

Maximum working	Standard	Within 2.5MPa
	Special Custom	Within 6.3MPa

pressure		
Test pressure	Testing was performed at 1.5 times the maximum operating pressure	
The actual maximum operating pressure is limited by the process connection rating		

6. Process connection

Process connection type	Farland
	Cards
	Threaded

7. Dangerous area classification

Explosion proof certification	Ex d ⅡC T6 Gb

8.Electrical characteristics

Power supply requirements	24 VDC,100mA
output	Four-wire system, 4-20mA/RS485
Electrical interface	M20*1.5

9. Fluid viscosity range

Scope of viscosity	0-2000cP

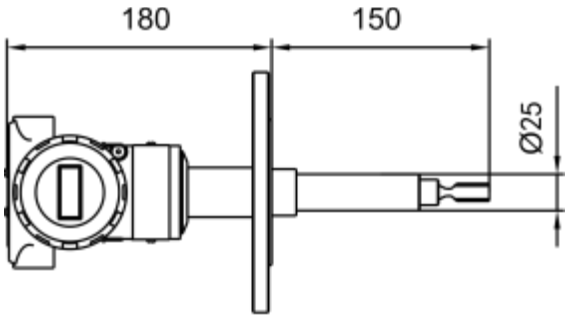
10 Fluid and material compatibility

Name	Name	Molecular type	Concentration of (%)	316L	Hart alloy	Titanium alloy	Zirconium	PTFE
Acid	hydrochloric acid (no hydrofluoric acid)	HCl	0-40	×	○	×	☆	☆
	Sulfate	H_2SO_4	0-50	○	☆	○	☆	☆
		H_2SO_4	50-75	×	○	×	○	☆
		H_2SO_4	75-98	○	☆	○	○	☆
	Nitrate	HNO_3	0-100	○	○	○	○	☆
	Phosphoric acid	H_3PO_4	0-98	×	×	×	×	☆
Base	Sodium hydroxide	NaOH	0-50	☆	☆	☆	○	☆
	Potassium hydroxide	KOH	0-50	☆	☆	☆	○	☆
	Calcium hydroxide	$Ca(OH)_2$	0-50	☆	☆	☆	○	☆
	Sodium chloride	NaCl	0-50	×	☆	☆	☆	☆

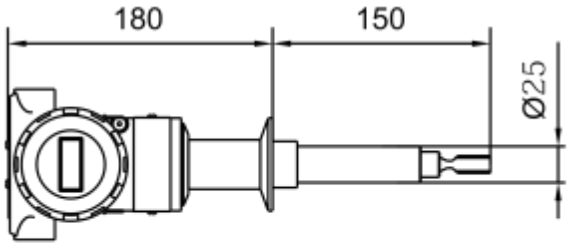
Salt	Ammonium chloride	NH_4Cl	0-50	×	☆	☆	☆	☆
	ammonium sulfate	$(NH_4)^2SO_4$	0-50	×	☆	☆	☆	☆
Other	Urea	$(NH_2)^2CO$	0-100	☆	☆	○	☆	☆
	Sodium hypochlorite	NaOCl	0-16	×	○	×	☆	☆
	Hydrogen peroxide	H_2O_2	0-90	☆	☆	○	☆	☆

☆ Recommend
○ Use under certain concentration and temperature limits
× Do not use

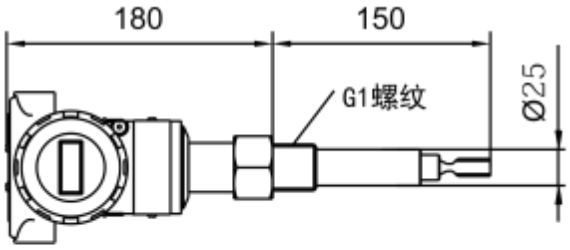
11. Size drawing



Flange connection



Clamp connection

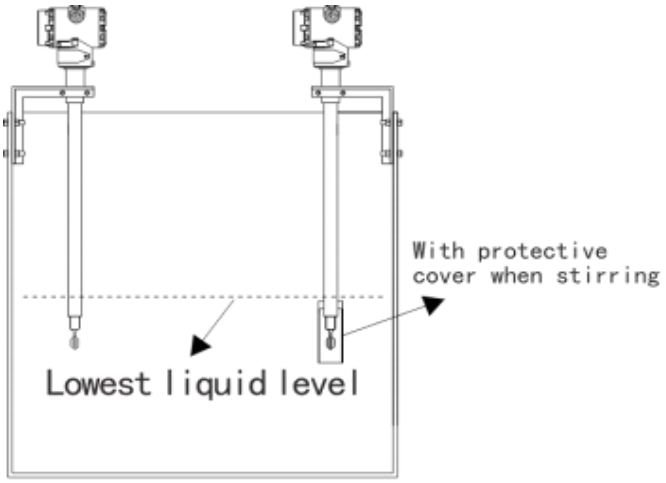


Threaded connection

Note: The above insertion length can be as long as 4m

12. Installation method

◆ 12.1 Installation of open tank or open tank

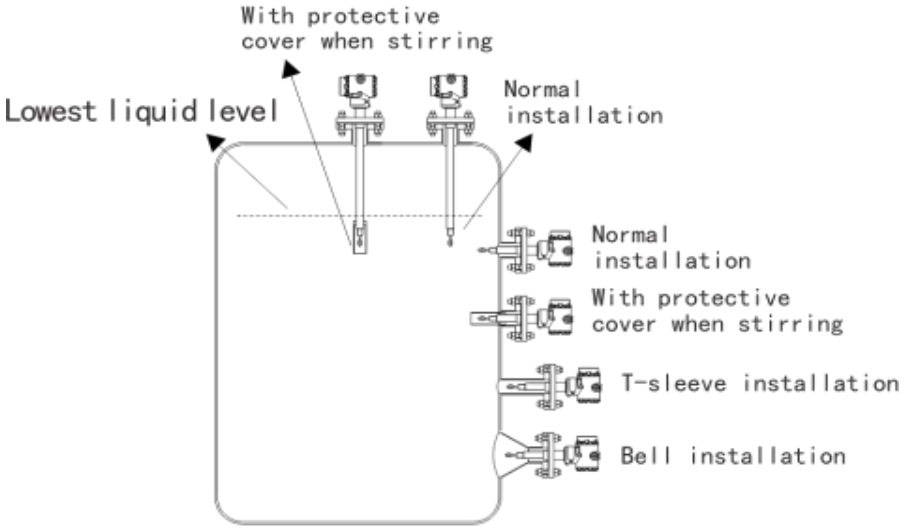


Open tank or open tank installation

Note:

When the open pool or opening tank is installed, the bracket is fixed and the sound fork fork must be kept below the minimum liquid level for measurement. When there is stirring in the open pool or opening tank, a shield should be required. In this way, the sound fork insertion rod is longer and can reach 4 meters.

◆ 12.2 Installation of sealing tank



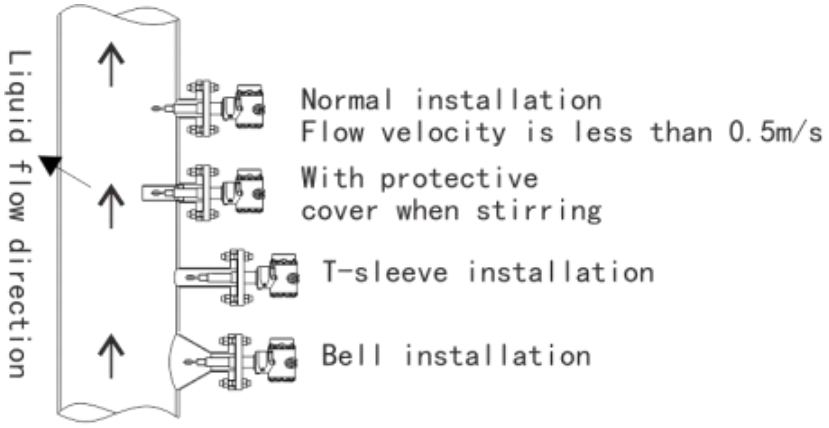
Sealed tank installation

Note:

At the top of the A, tank, similar to the open tank, the sound fork fork shall be below the liquid surface, generally for tanks or buried tanks with only the top opening.To change the insertion depth, a section of support with a flange can be used.The fork body portion of the B, product is not fully enclosed.The boundary effects produced by the tube wall or container wall on the fluid plus the viscosity effects of the measurement media itself, which will have some effect on the measurement calibration of the sensor.To

overcome these, for different environments,we summarized the installation method and pipe diameter to facilitate the type selection under the same conditions.On the side of the tank, sound fork fork can be directly extended into the tank ; when there is stirring without precipitation, with shield or T casing, sound fork fork in the shield or T casing ; when stirring and precipitation, the horn shall be installed.

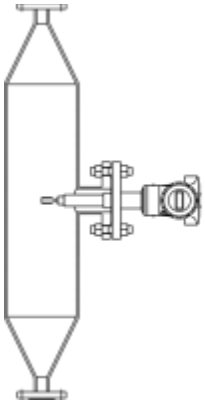
◆ 12.3 Pipe installation

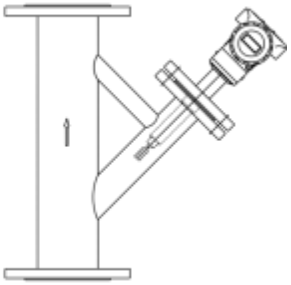


Pipeline installation

Note:

The fork body part of the product is not fully enclosed.The boundary effects produced by the tube wall or container wall on the fluid plus the viscosity effects of the measurement media itself will have some effect on the measurement calibration of the sensor.To overcome these, for different environments, we summarized the installation method and pipe diameter to facilitate the type selection under the same conditions.For pipe installation, the sound fork fork can extend directly into the pipe when the flow rate is within 1m /s ; when the flow rate exceeds 1m /s and no precipitation, the shield or T sleeve can be installed, the sound fork fork in the shield or T sleeve ; if precipitation, the horn mouth can be installed.At all times, the fork opening should be in a vertical direction to avoid accumulation of sediment or bubbles on the fork.

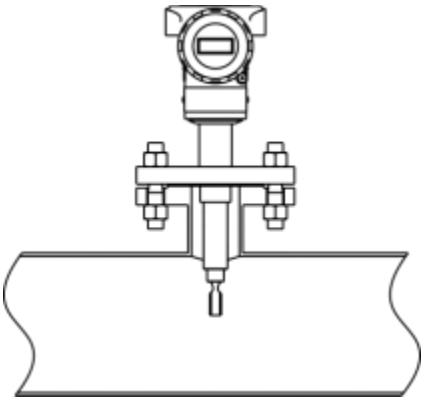




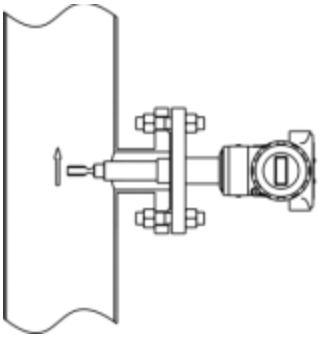
Note:

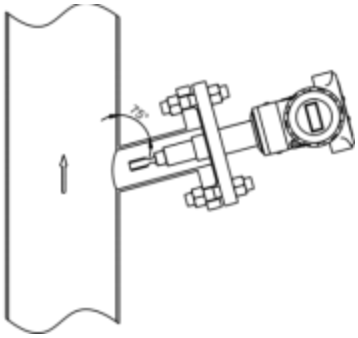
When the main canal diameter is small, the variable diameter can be installed, as in the left figure.When the pipeline flow rate is high, there is precipitation and bubbles, it shall be installed in the right picture, the right picture part can be provided as an attachment,its typical application is the desulphdesulfurization lime slurry density measurement field.

◆ 12.4 Typical installation and precautions



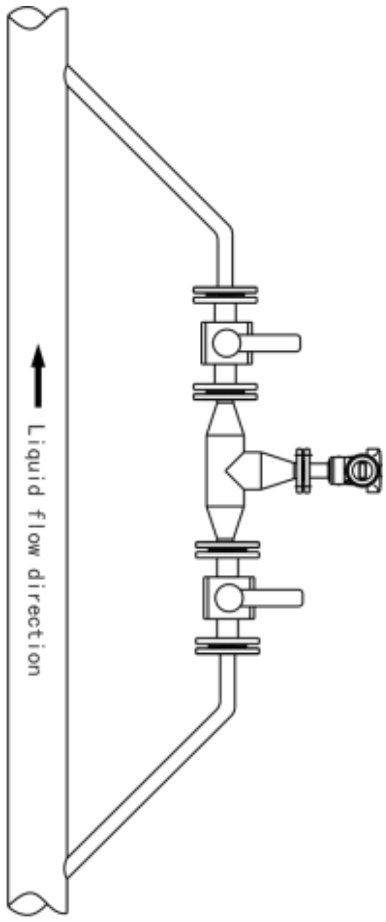
During the installation of the horizontal pipe, the flange opening is recommended that the fork of the pipe is below the side of the pipe for the installation space (the pipe at the lower end of the flange is easy to accumulate gas).Note the fork opening direction parallel to the flow speed.



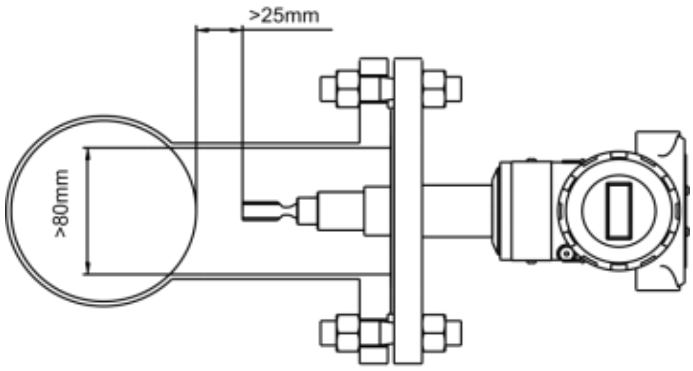


For vertical installation, install density/concentration meter on vertical upward pipeline, approximately O. at flow rate ≤When 5m/s, install as the figure above.

For vertical installation, install the density/concentration meter on the vertical upward flow pipeline, at 0.5-3m/s or when the medium is thick, according to the figure above for installation.



For pipelines ⩾150, more bypass installation methods are available



T pipe flange installation

Applicable conditions :

Flow speed:> 1m/s(main road flow speed) Viscosity range : ≤ 2000cP

Temperature range : -10~120℃

The heat of the flange may affect the sensor temperature and therefore have some influence on the response time.The flow speed of the main channel, the medium viscosity must meet the use conditions, and the medium of the type T pipe area must ensure continuous flow.At high viscosity, this installation mode is not very responsive to DC installation.

◆ 12.5 Pipeline description

In order to ensure accurate measurement and stability of the density / concentration meter, the flow rate of the measured medium shall not be kept away from the pump, and the distance is greater than 1.5 m ;. When the flow speed is greater than 1m /s, the expansion diameter is installed by 1m,. 5 times, ≥ 600mm in front of the instrument and ≥ 300mm after the instrument to ensure that the flow is in the laminar state when flowing through the fork.

Installation criteria	DC flow	Type T side opening (pipe diameter 2 "or 3" pipe or welded line)	Fluid through container
Descripti on	The fork body portion enters directly Main fluid	The fork pulls into the pipe side opening portion avoiding the main fluid and opens at 26mm	Forfork body part loaded into the DC container, is the mainstream forming a backflow
Flow rate	The flow velocity of passing through the fork body is 0.3-0.5m/s	The main flow speed is 0.3-0.5m/s	1030L/min
Scope of viscosity	Maximum of 2,000 cP	Max to 500cP	Maximum of 2,000 cP
Media temperature	-10～120 ℃	-10～120 ℃	-10～120℃
Head lane size	The ≥ horizontal pipeline is 100mm(4")≥ vertical pipe 150mm(6")	≥50mm(2")	There is no limit
Advantages	1.For easy installation of large pipe diameter 2.Works good on purified solutions or unwaxed oils	1.For easy installation of large pipe diameter 2.Works good on purified solutions or unwaxed oils	1.Is suitable for various pipe diameter main roads or tank installations. 2.has good effects on circulating solutions and temperature regulation. 3.responded quickly
Disadvantage s	1, has a low or unstable flow rate 2, tubule diameter	Not applicable to: 1. turbid solution or mud 2.has a low or unstable flow rate 3.viscosity has a recursive solution 4.tubule diameter Case of a significant 5.temperature effect	1, needs to rework the system design for special measurements by frequently flushing the lines

13. Installation

Due to the online density / concentration meter, it is often installed on the site with poor working conditions.In order to minimize the working conditions of the instrument, it shall be installed without impact and small vibration and at low flow speed when flowing pipeline.To this end, the Company has improved the probe.Only by ensuring that all liquid contact sensors and taking full consideration to the unique conditions of the site can the accuracy index should be played.

Note the following matters during installation:

◆ 13.1 Electrical installation

After opening the table cover of the electrical box, it should be tightened to ensure tight contact with the seal O ring. If not tight, moisture will enter the electrical box and affect the normal operation of the circuit.

◆ 13.2 Ground thing

The instrument housing must be effectively grounded, with the ground terminal next to the terminal.

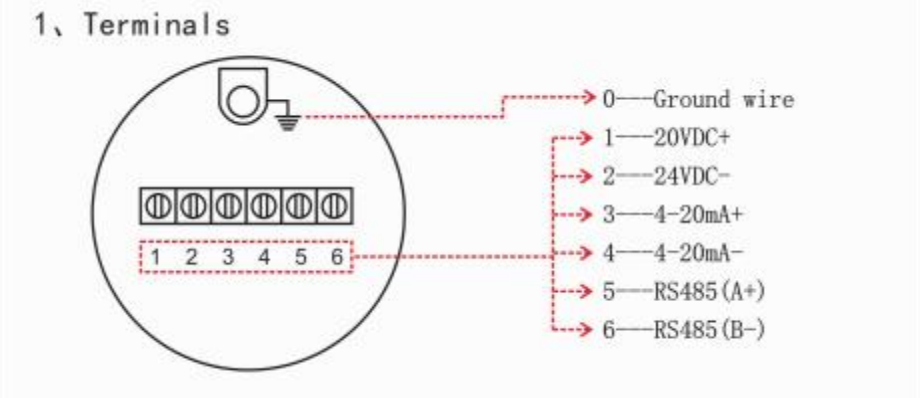
◆ 13.3 Isolation

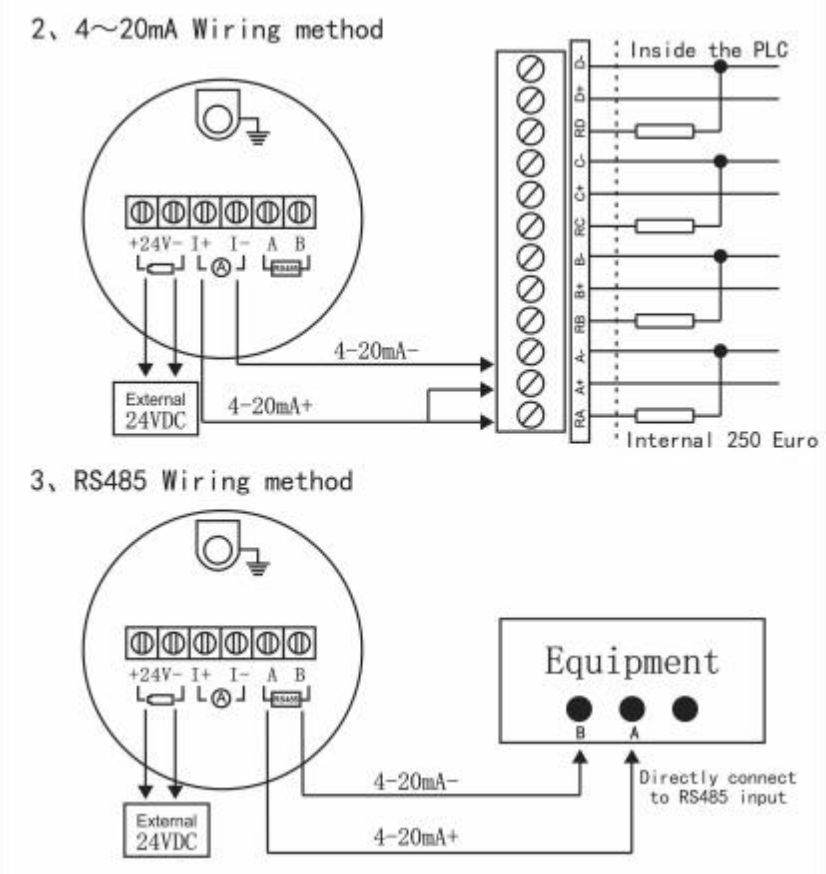
Installation position as far away from frequency converter or high power motor, take isolation measures if necessary, and use shielding power cord and electrical isolation gate.

14. Wiring method

The signal terminals are set in a separate compartment of the electrical box.When wiring, unscrew the gauge cover on the wiring side.Connect the power line 24V and the current signal line as indicated.Current signal lines are best advised not to lean together with other strong power lines or put together in the front-line groove, and do not pass near the strong power field equipment.

On-line density/concentration imeter housing is grounded.When checking the insulation resistance, the circuit check shall use a voltage not to exceed 45V, and the maximum output current of the density/concentration meter shall not exceed 30mA.DC.

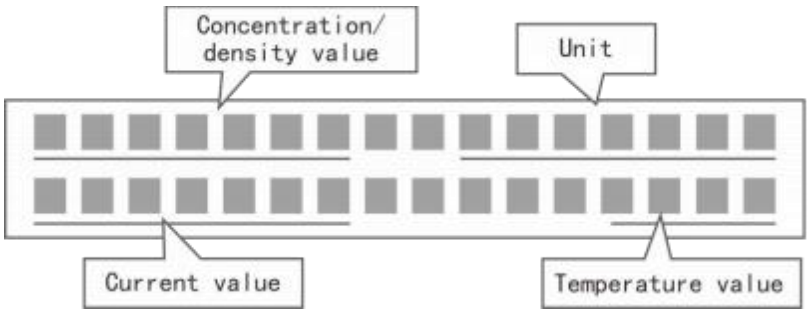




15. Commissioning

The product has been calibrated and temperature supplemented before leaving the factory, measured at 25℃ density/concentration value. With pure water for verification after correct installation, the meter head should be about 0.0% in% (density is 0.997). If not, field calibration (pure water method) is required.

◆ 15.1 Screen instructions



◆ 15.2 Description of the keys

a. In the normal display state, the three keys are not functional!

b. When entering the main menu, Z and S keys are the menu scroll function, and M is the selected entry function.

c. When entering a menu for operation, S is the cursor movement function and Z is

the modified data function. (0-9 and loop display), M is the determination key.

◆ 15.3 Operation of the menu

Press and hold the "M" key for 5 seconds to enter the user function menu (enter this function, can only use settings: range, unit, instrument coefficient, zero fine tuning, damping).

All of the menus are shown in Fig:

1.Range (range)
2.Unit (Units)
3. (4-20mA) (calibrated current) It is only used by manufacturers
4.Calibration(Format) It is only used by manufacturers
5.Temp CAL (temperature calibration) It is only used by manufacturers
6.Temp Comp (temperature supplement) It is only used by manufacturers
7.PV Trim (measurement value fine-tuning)
8.CAL.H2O (water calibration)
9.Damping(damping)
10.ADC Value (AD value) Only view the sampled AD values
11.Temp Comp?(Switch temperature supplement) It is only used by manufacturers 12. RS485-ID (Communication ID Settings) 485 The function is an optional function
13.EXIT (Exit)

1）The upper and lower limits of the 1) range, regardless of size, can be set, but can not be equal.

2) The unit is set before leaving the factory.

3) current calibration with 4-20mA output calibration.

4) is formatted, which is only available to manufacturers.

5) temperature calibration, this function is only limited to the manufacturer.

6) temperature compensation for liquid temperature supplement, which is only limited to the manufacturer.

7) measurements are fine tuned when measurements are found not accurate to set.

Example : (After the installation, the standard liquid (or experimental value) should be used as the standard.

Values, single point calibration here for accurate measurements!

8) pure water calibration, adjusted when long-term use produces drift or the measurement is inaccurate (can move the instrument to the room, add 25℃ pure water for verification, static and stable to choose "YES" "determination") This method belongs to the density method calibration (first set the unit to density g/cm)3, After water calibration, change the unit to concentration v%).

9) damping, when the pipe fluid fluctuates too much, the measurement value may have a beating and volatile image, which can be set large, can be set from 0-20.

10)The AD value, and this function cannot be modified.

11)The temperature compensation switch is turned on or off as required.

12)485 Communication ID settings for setting the communication ID.

13)The exit menu settings function

◆ 15.4 Introduction of the main functions

1、 Scale Settings

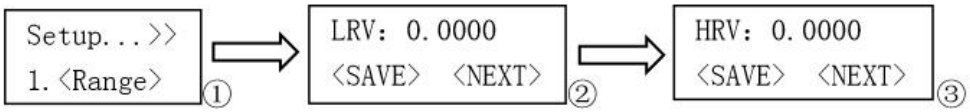
Press M for more than 5 seconds to enter the Settings menu, with menu 1 <Range> displayed.

Press M to enter the lower menu and set the scale.

② low point set, use the S and Z keys to enter the corresponding number, input to complete press the M cursor to SAVE, and then press M to confirm saving.Automatically enter the high point setting

③ high point set, use the S and Z keys to enter the corresponding number, press the M cursor to SAVE, and press M to confirm saving.Automatic exit scale setting.

(If you do not want to save the change value, when the cursor moves to the <SAVE> position, press S to move the cursor to the <EXIT> position, and press M to go back to the superior menu.)



2、Unit settings

Press M for more than 5 seconds, enter the S ettings menu, press S to switch to menu 2 <Unit>, and press M to enter the setting. ⑤ Select the desired unit by Z or S, move the M cursor to SAVE, and then press M to confirm saving.Auto-exit the unit settings.

(If you do not want to save the change value, when the cursor moves to the <SAVE> position, press S to move the cursor to the <EXIT> position, and press M to go back to the superior menu.)

3、Measurement value fine-tuning

Press M for more than 5 seconds, enter the Settings menu, press S 6 times, and enter the menu for 7 <PV Trim>.⑦ press M to enter fine tuning settings, change the PV number to the desired corrected value, where Z key is modified number, S key is mobile cursor, after the number modification is completed, press M key, cursor moved to <SAVE> position, press M key to save, automatically back to the previous menu.

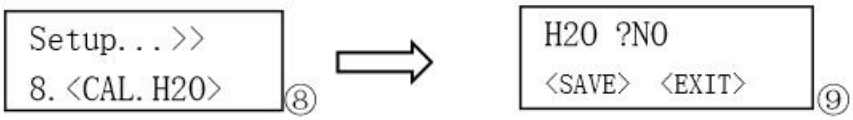
(If you do not want to save the change value, when the cursor moves to the <SAVE> position, press S to move the cursor to the <EXIT> position, and press M to go back to the superior menu.)

4、Water calibration

Press M for more than 5 seconds and enter the Settings menu.Press S 7 times to enter the menu for 8 <CAL.H2O> ⑧

⑨ press M to enter, then press S to change "NO" to "YES", press M, cursor moved to <SAVE> position, press M to save, automatically back to the previous menu.

(If you do not want to save the change value, when the cursor moves to the <SAVE> position, press S, move the cursor to the <EXIT> position, and press M to exit.)

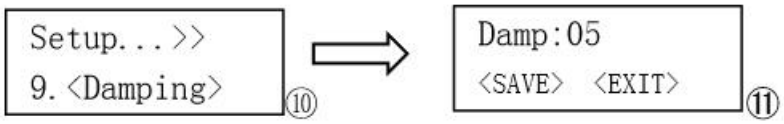


5、 Tune damping

Press M for more than 5 seconds, enter the Settings menu, press S for 8 times, enter the menu for 9 <Damping>, press M, and enter S ettings.

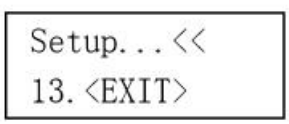
Change the PV number to the desired value, where Z key is the modified number, S key is the mobile cursor, after the number modification is completed, press M key, cursor to <SAVE> position, press M key to save, automatically back to the previous menu.

(If you do not want to save the change value, when the cursor moves to the <SAVE> position, press S to move the cursor to the <EXIT> position, and press M to go back to the superior menu.)



6、Exit the menu

Press S to switch to menu 13 <EXIT>, and press M to exit.



16. Troubleshooting

The following steps help identify the cause of the problem.It can also help decide whether to be down for repair.The following options help diagnose and repair several basic fault situations. For each case, handle the easiest conditions to check first. If you cannot be excluded, please contact our Service Center.

◆ 16.1 No display

A, Check for the power supply matching ;

B, Check whether the power supply is connected, polarity is reversed, four lines can not be connected wrong ;

C, power supply cannot be loaded ; check for short circuit and check that the voltage is normal

◆ 16.2 Large ror error

A, Check the sensor for adhesive and, if any, rinse off or wipe with a cotton swab and alcohol ;

B, Long-term use, produces drift, with water calibration correction or measurement fine-tuning correction ;

C, The instrument can only measure a single medium, and measuring the mixture of multiple media will have large errors ;

D, Check whether the measurement object is corresponding to the instrument measurement setting ;

E, checks for bubble effects ;

F, fork body corrosion or deformation, shall return to the factory for repair.

◆ 16.3 The values are unstable

A, Check the sensor for adhesive and, if any, rinse off or wipe with a cotton swab and alcohol ;

B, To observe whether there is large vibration or interference of high power frequency converter and motor, then replace the installation position ;

C, checks for large bubbles or excessive flow rate to adjust the system damping value appropriately.If there is no effect, speed limit or a better position;

D, Check the liquid for all contact sensors;

E, fork body corrosion or deformation, shall return to the factory for repair;

F, instrument has good grounded.

◆ 16.4 Instrument values do not correspond to quadratic display tables or DCS values

A, Check whether the two-time display meter or DCS range setting is consistent with the meter range ;

B, The loss of the transmission line is too large, and the wire needs to be replaced.

17. Transportation and Storage

1、Suitable for land and water transportation and freight loading requirements

2、The products and accessories should be stored indoors under the original packaging conditions at the factory. The ambient temperature is -10～+55℃, and the relative humidity does not exceed 85%.