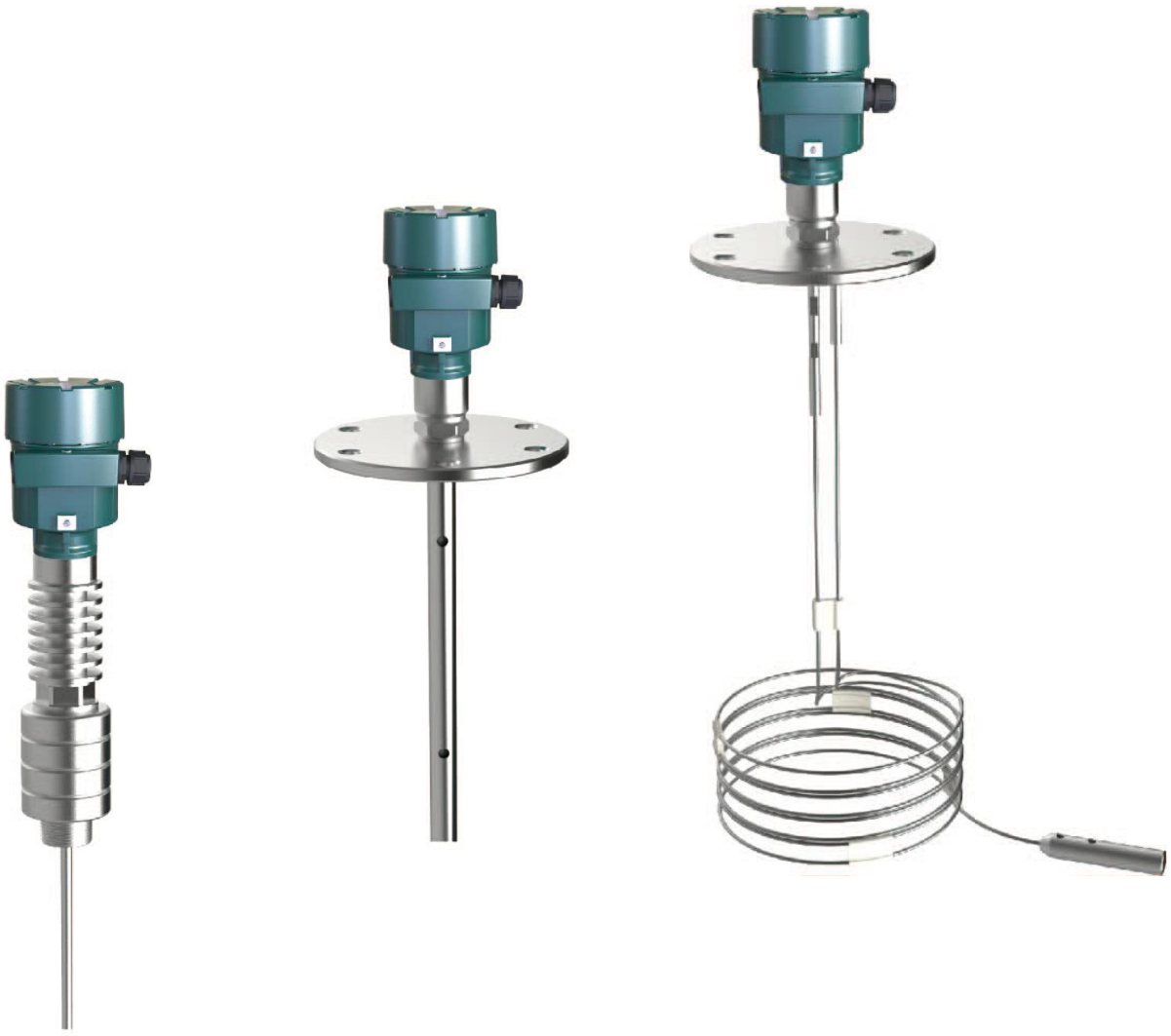
GUIDED WAVE RADAR
LEVEL TRANSMITTER



丹东德泽科技有限公司

DANDONG VIRTURE RIVER TECHNOLOGY CO., LTD

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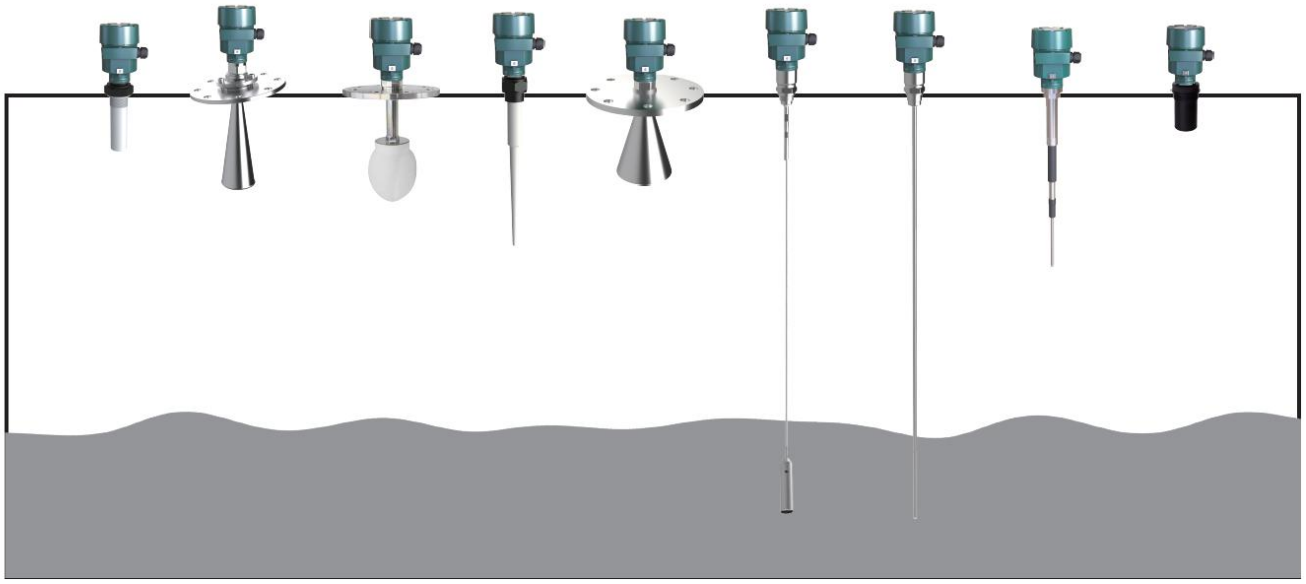
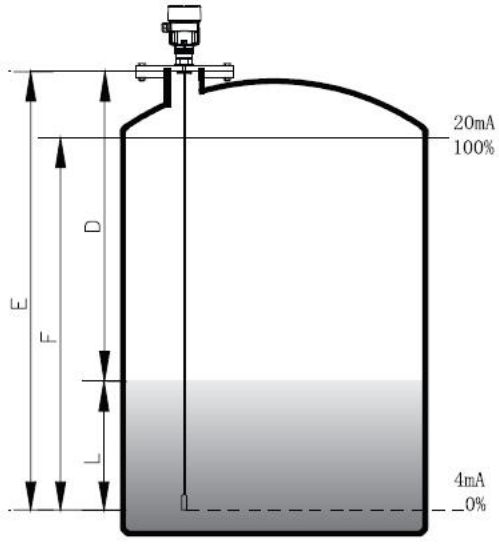


1. Product description

1.1. Working principle

Guided wave radar transmitter works on the principle of time and travel (TDR). Radar wave travels at the velocity of light. The flying time is converted into level signal via the electronic components. The probe emits high frequency wave pulse which travels along a cable probe or a rod probe. When the wave pulse reaches the medium surface, it will be reflected and received by the receiver, and then the distance signal will be converted into level signals.



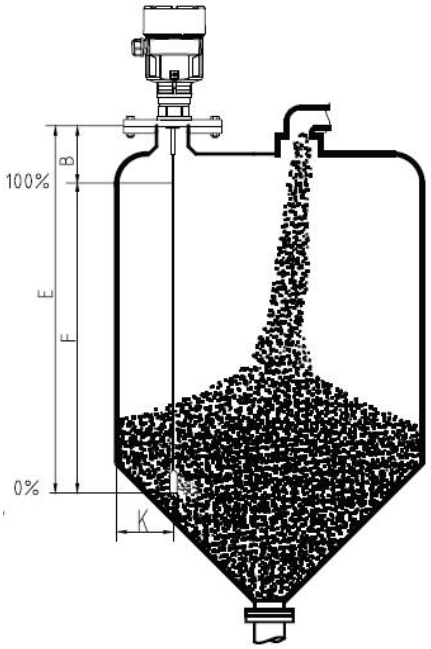
- Input

The reflected wave pulse travels back along the cable and arrives at the electronic unit. The microprocessor will process the signals and recognize the returned waves from medium surface. The identification of correct return wave signals can be done by the intelligent software. The distance D from the medium surface is proportional to the travel time:

D=C X T/2 (C is velocity of light)

Due to the empty tank distance D is known, and then the level L is:

L=E-D



- Output

By setting of empty tank height E as zero point, the height of full tank F as full range point, and other applicable parameter, the instrument will adapt into the working environment automatically and correspond to output 4-20mA.

1.2. Measuring range

F----measuring range

E----distance of empty tank

B----dead zone on the top

K----min. distance between probe and tank wall

Dead zone at top refers to the min. distance between the highest medium position and the measuring reference position (point).

Dead zone at bottom refers to the distance which cannot be measured accurately nearby the bottom of the cable.

The distance between the dead zone at the top and the dead zone at the bottom is the effective measuring distance.

Note:

Level measurement in a tank can be effectively performed only when the medium level within the top dead zone and the bottom dead zone.

2. Main specification

VRPWRD31

- Features: Cable probe, two optional sensor types: for liquid or solid.
- Application: liquid or solid powder.
- Measuring range: 30m
- Process connection: thread, flange
- Process temperature: -40℃~+250℃
- Process pressure: -0.1~ 2.0MPa
- Accuracy: ±3mm
- Repeatability: ±2mm
- Frequency range: 100MHz ~ 1.8GHz
- Signal output: 4-20mA/ HART (24V DC/ 2-wire/ 4-wire)

4-20mA/ HART (220V AC/ 4-wire)

- Explosion proof: Ex ia IIC T6 Ga
- Euclosure protection grade: IP67

VRPWRD32

- Features: Single rod probe
- Application: liquid
- Measuring range: 6m
- Process connection: flange, thread
- Medium temperature: -40℃~+250℃
- Process pressure: -0.1~2.0MPa
- Accuracy: ±3mm
- Repeatability: ±2mm
- Frequency range: 100MHZ~1.8GHz
- Signal output: 4-20mA/ HART (24V DC/ 2-wire/ 4-wire)

4-20mA/ HART (220V AC/ 4-wire)

- Explosion proof: Ex ia IIC T6 Ga
- Euclosure protection grade: IP67

VRPWRD33

- Features: Twin-cable probe
- Application: solid powder and low dielectric constant liquid.
- Measuring range: 30m
- Process connection: thread, flange
- Medium temperature: -40℃~+250℃
- Process pressure: -0.1~2.0MPa
- Accuracy: ±3mm
- Repeatability: ±2mm
- Frequency range: 100MHZ~1.8GHz

- Signal output: 4-20mA/ HART (24V DC/ 2-wire/ 4-wire)
  4-20mA/ HART (220V AC/ 4-wire)
- Explosion proof: Ex ia IIC T6 Ga
- Euclosure protection grade: IP67

VRPWRD34

- Features: Ceramic sensor for high temperature and high pressure. Single rod probe and coaxial probe are available for option
- Application: liquid
- Measuring range: 6m
- Process connection: thread, flange
- Medium temperature: -200℃ ~ +400℃
- Process pressure: -0.1~ 40MPa
- Accuracy: ±3mm
- Repeatability: ±2mm
- Frequency range: 100MHZ~1.8GHz
- Signal output: 4-20mA/ HART (24V DC/ 2-wire/ 4-wire)
  4-20mA/ HART (220V AC/ 4-wire)
- Explosion proof: Ex ia IIC T6 Ga
- Euclosure protection grade: IP67

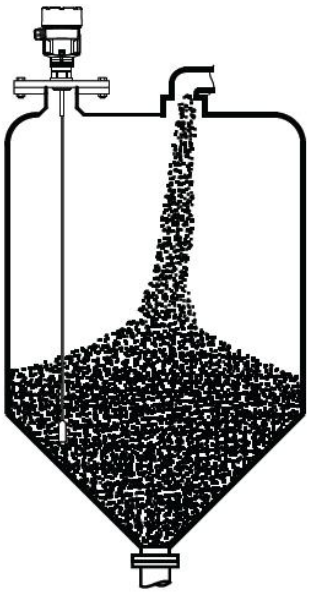
VRPWRD35

- Features: PTFE Single rod probe
- Application: corrosive liquids
- Measuring range: 6m
- Process connection: flange
- Medium temperature: -40℃~+180℃
- Process pressure: -0.1~2.0MPa
- Accuracy: ±3mm

- Repeatability: ±2mm
- Frequency range: 100MHz ~1.8GHz
- Signal output: 4-20mA/ HART (24V DC/ 2-wire/ 4-wire)
  4-20mA/ HART (220V AC/ 4-wire)
- Explosion proof: Ex ia IIC T6 Ga
- Euclosure protection grade: IP67

VRPWRD36

- Features: Coaxial probe
- Application: Liquids with lower dielectric constant or liquids with wave surface, best choice for measurement of storage tank with complicated inner structure
- Measuring range: 6m
- Process connection: thread, flange
- Medium temperature: -40℃~ +250℃
- Process pressure: -0.1~ 2.0MPa
- Accuracy: ±3mm
- Repeatability: ±2mm
- Frequency range: 100MHz ~1.8GHz
- Signal output: 4-20mA/ HART (24V DC/ 2-wire/ 4-wire)
  4-20mA/ HART (220V AC/ 4-wire)
- Explosion proof: Ex ia IIC T6 Ga
- Enclosure protection grade: IP67



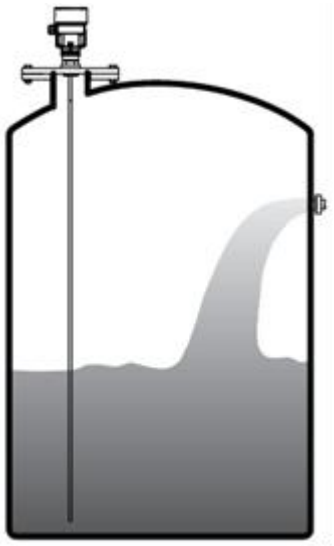
3. Installation guidance

The following installation guide is suitable to the level measurement for both liquids and solids with cable probe or rod probe. Coaxial tube probe is only suitable to liquids.

3.1. Mounting position

- Away from the medium inlet and outlet as far as possible.

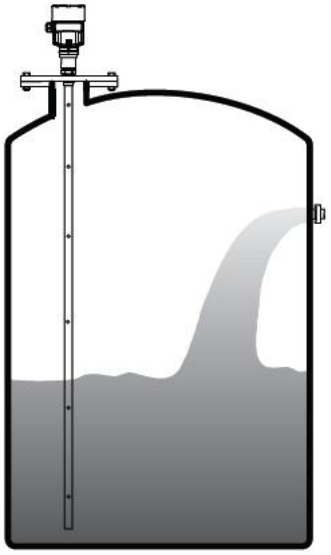
- For metal tanks and plastic tanks, it is not allowed for probe to touch the inner wall along its whole length. Do not mount the level transmitter in the middle of a metal tank.
- For cable probe or rod probe, the probe must be kept away from inner wall at least 300mm.
- The distance from probe bottom end to the bottom of a tank is approx. 50mm.
- Probe should keep away from any obstacle inside a tank at lease 300mm.
- When bottom of a tank is tapered, the transmitter can be mounted in the middle of tank top. So it can measure the level of medium to the bottom of the tank.



3.2. This drawing on the right is for the installation of a guided wave radar transmitter with rod probe, mainly for liquid level measurement.

Features:

- It can measure any liquid which dielectric constant is ≥1.9.
- Generally it can measure a liquid which viscosity is ≦500cst and is not adhesive.
- The maximum measuring range of rod probe guided wave radar can be up to 6 m.
- Measurement will not be affected when there is steam and foam in a tank.

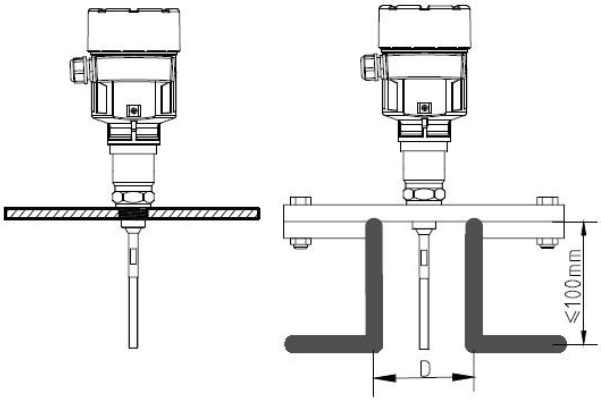


3.3. This drawing on the right is for the installation of a guided wave radar transmitter with a coaxial probe, mainly for liquid level measurement.

- Coaxial tube radar can be used for liquids with low dielectric constant to ensure the exact measurement.
- It can measure any liquid which dielectric constant is

≥1.6.

- Generally it can measure a liquid which viscosity is ≦500cst and not adhesive.
- The maximum measuring range of coaxial probe radar can be up to 6m.
- Measurement will not be affected when there is steam and foam in a tank.



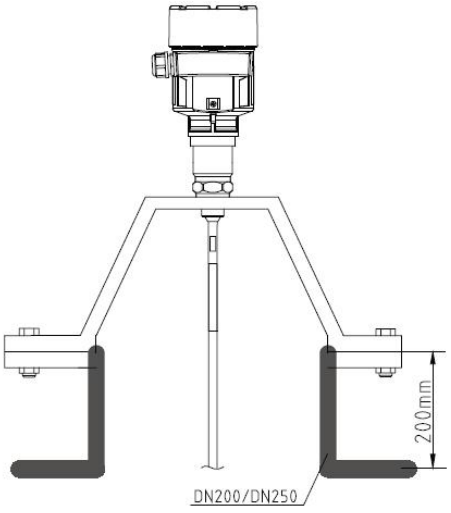
3.4. Installation methods

- Properly installation of the transmitter can make correct and reliable measurement.

The transmitter can be mounted with thread, and the installation height should be higher than 100mm. It can also be mounted on a short pipe with the diameter of 2”~6”. The installation height of the short pipe should be ≦100mm. When the instrument has to be mounted on a longer short pipe, the cable probe should be fixed at the bottom end of it, or use the centering frame to fix the probe so as to avoid it from contacting the short pipe end.

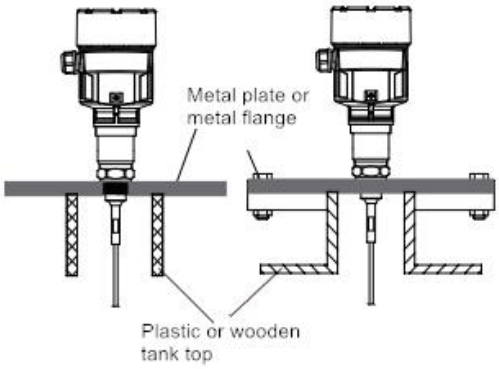
- Mounting on a short pipe DN200 or DN250

When the transmitter has to be mounted in a short pipe which diameter is >200mm, there will be echoes inside the short pipe wall, this will cause the error especially when the medium has low dielectric constant. Therefore, a special flange with “horn” is required for the short pipe which diameter is 200mm or 250mm.



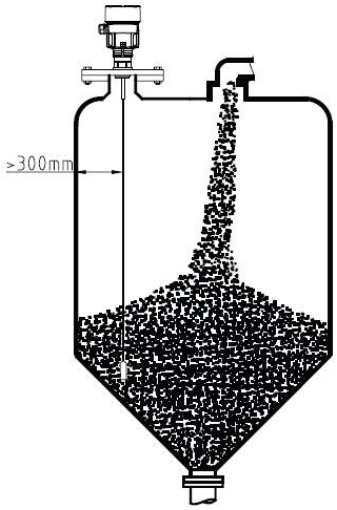
- Installation on a plastic tank

Note: whichever cable probe or rod probe, the connection surface must be metal if want to keep the transmitter normal work. When a transmitter is mounted on a plastic tank, metal flange is required for the transmitter if the tank top is also plastic material or other nonconductive materials. When the process connection is thread, a metal board is required.



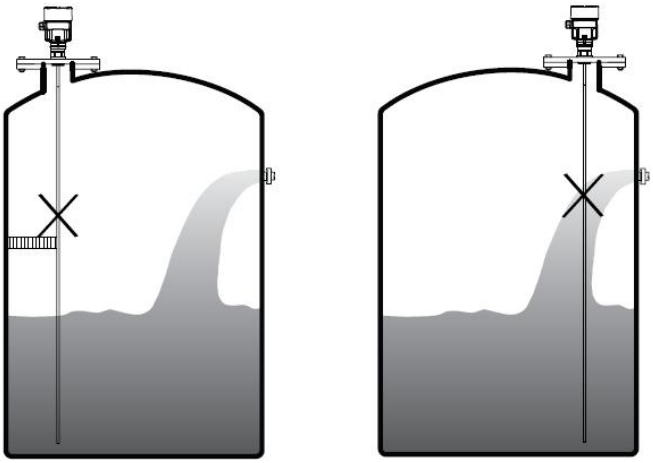
- Distance between probe and tank wall

It is suggested the min. distance between a transmitter probe and wall side is at least more than 300mm, for the concentrate tank at least 500mm, the distance between probe bottom and tank bottom is larger than 50mm.



Attention:

- Keep anything inside a tank away from the micro wave sensing components (see the picture on the left below).
- Radar is not allowed to be mounted above the medium inlet (see the picture on the right below).



4. Wiring (see the picture below)

2-Wire

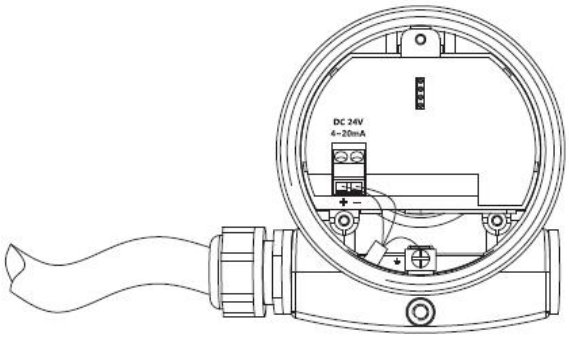
Power supply: 24V DC;

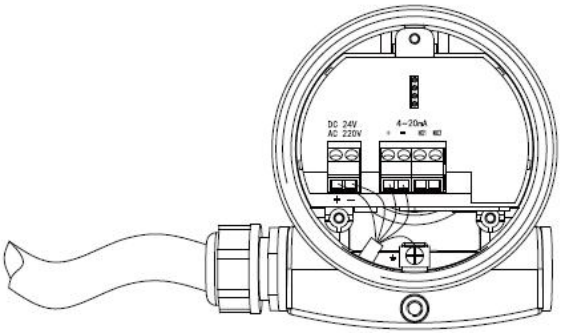
Output: 4-20mA

4-Wire

Power supply: 220V AC/ 50Hz or
24V DC (12V DC is optional)

Output: 4-20mA



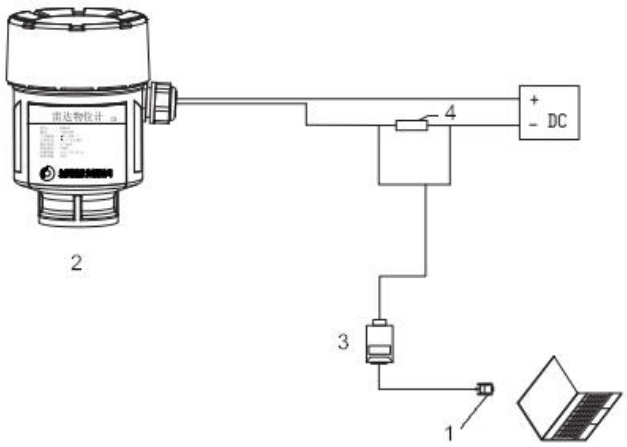


5. Calibration

5.1. Calibration with PC and software

All radar transmitters can be debugged by software via a PC no matter what kind of output signals it is, 4 – 20mA/ HART. A transmitter drive “CONNECTCAT” is required when using the software for the debugging.

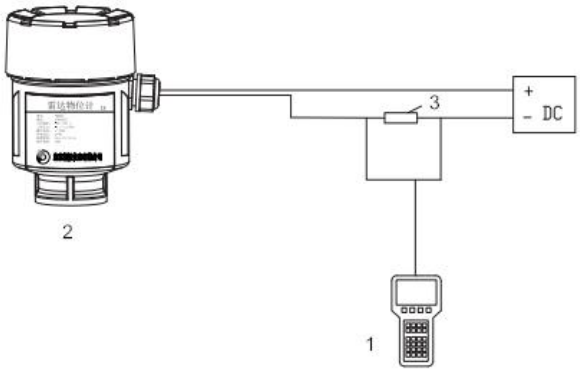
Radar transmitter requires 24V DC when debugging via software, at the same time to connect a 250ohm resistance in the front of the HART adapter. If it is an integrated HART resistance (integrated resistance is 250ohm), then the additional outside resistance is not required, HART adapter can be connected in parallel to 4~20mA wire.



1. Communication interface RS232 or USB
2. Guided wave radar level transmitter: VRPWRD3X

3. HART modem
4. A resistance of 250 ohm

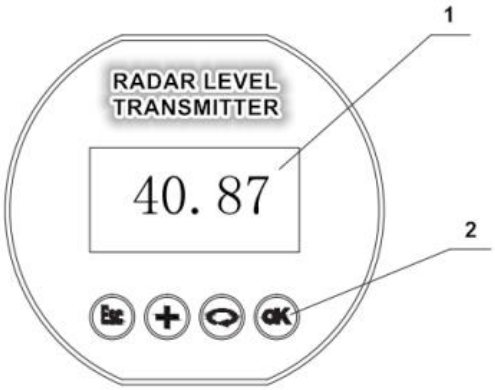
5.2. Calibration with a HART hand-hold communicator



1. A HART hand hold communicator
2. Guided wave radar level transmitter: VRPWRD3X
3. A resistance of 250 ohm

5.3. Calibration with a programmer module

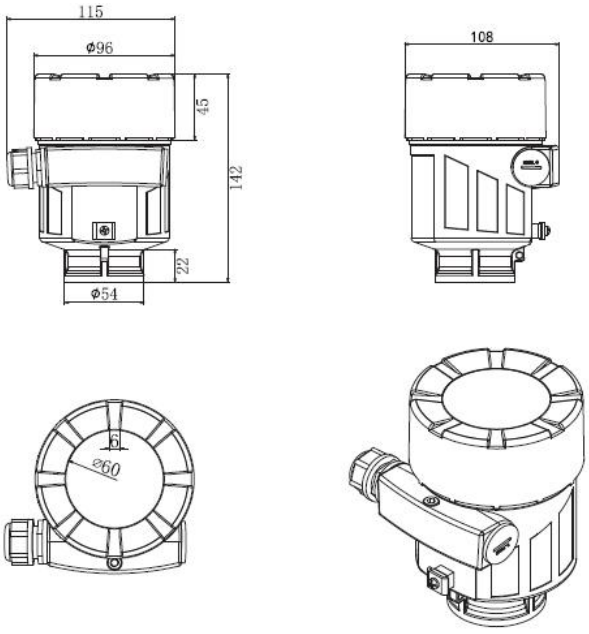
The programmer module is composed of 4 integral buttons and one LCD display via which the be debugging menu and parameters can be set.



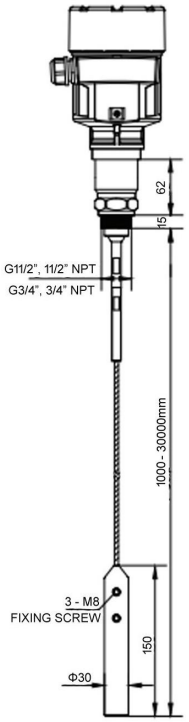
1. LCD
2. BUILT-IN BUTTONS

6. VRPWRD30 series dimensions

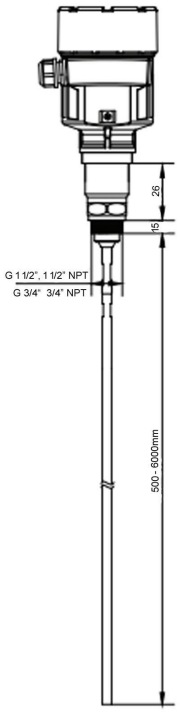
Housing material: aluminium



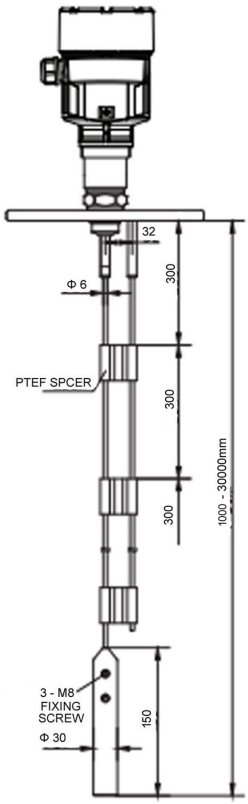
VRPWRD31



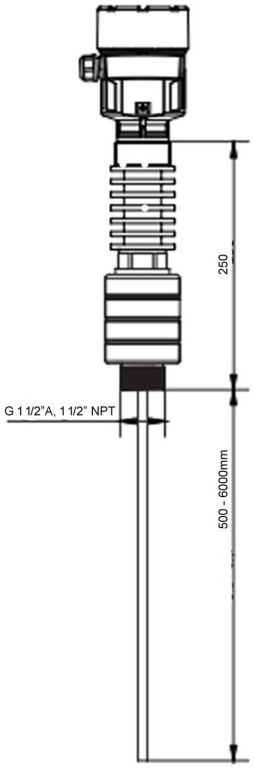
VRPWRD32



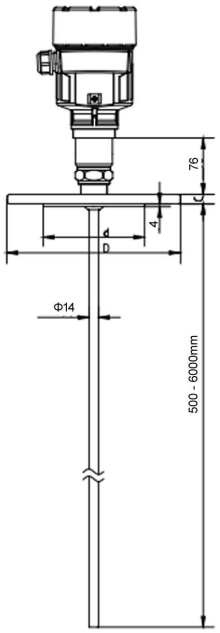
VRPWRD33



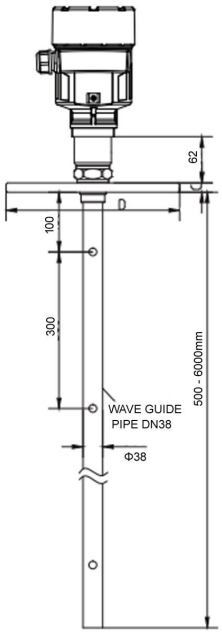
VRPWRD34

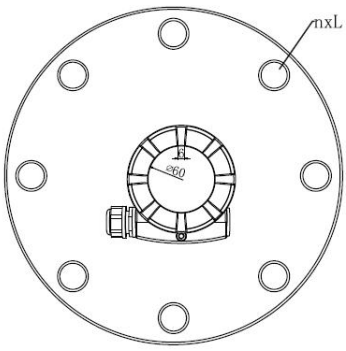


VRPWRD35



VRPWRD36





Flange Size Table (GB/ T9119-2000)					Unit: mm
No.	Size	OD	Hole Centers Distance K	Hole quantity n	Hole Diameter L
1	DN50	Ø165	Ø125	4	Φ18
2	DN80	Ø200	Ø160	8	Φ18
3	DN100	Ø220	Ø180	8	Φ18
4	DN150	Ø285	Ø240	8	Φ22
5	DN200	Ø340	Ø295	12	Φ22
6	DN250	Ø405	Ø355	12	Φ26

7. Linearity

Cable probe

Rod probe

Coaxial tube probe

8. Technical data

General parameters

Working frequency: 100MHz ~ 1.8GHz

Measuring range: 0~30m for cable probe;

0~6m for rod probe or coaxial probe;

Repeatability: ±2mm

Resolution: 1mm

Sample: echo sampling 55 times /s

Responding time: >0.2s (depends on the application)

Current signal output: 4~20mA

Accuracy: ±3mm

Communication: HART protocol

Process connection: Thread, G1½”A.

Flange DN50, DN80, DN100, DN150, DN200, DN250

Process pressure: -0.1~ 2.0MPa

Power supply: 24V DC (+/-10%), ripple voltage: 1Vpp

Power consumption: Max.22.5mA

Ambient temperature: -40℃~ +70℃

Explosion proof approval: Ex ia IIC T6 Ga

Enclosure protection grade: IP67

2-wire connection: input and signal output share one 2-wire shielded cable.

Cable entry: M20*1.5 * 2 or ½NPT*2 (cable diameter is 5~9mm)

Measuring range: The following table shows the relationship between different mediums and the measuring range.

Medium group	DK (ε)	Solid particles	Liquid	Measuring range
1	1.4~1.6		- cold concentrate, e.g. N2CO2	3m (only for coaxial probe)
2	1.6~1.9	- White lime - Specials Cement - Sugar	- Liquefied gas, e.g. Propane - Solvent - Freon12/ Freon - Palm oil	20m
3	1.9~2.5	- Normal cement - Plaster	- Mineral oil, fuel	20m
4	2.5~4	- Grain, seeds - Stone - Sand	- Benzene, styrene, Toluene - Furan - Naphthalene	25m
5	4~7	- Moist stone, mineral - Salt	- Chlorobenzene, Chloroform - Cellulose spray - Isocyan hydrochloric Acid - Aniline	30m
6	>7	- Metal powder - Carbon black - Coal	- Liquid with water - Alcohol - Liquid ammonia	30m

9. Model selection table

VRPWRD31

Code	Approvals
P	Standard type (Non-explosion)
I	Intrinsically safe type (Ex ia IIC T6 Ga)
D	Explosion isolation type (Ex d IIC T6 Gb)
E	Classification certificate (CCS)

Code	Cable probe diameter/ Material
A	Liquid 4mm/ SS304
B	Liquid 4mm/ SS316L
C	Solid 6mm/ SS304
D	Solid 6mm/ SS316L

Code	Sensor type/ Material

Material / Flange size / Code	SS304	SS316L
Thread G1½ A, Liquid	GA	GB
Thread 1½ NPT, Liquid	NA	NB
Thread G1½ A, Solid	GC	GD
Thread 1½ NPT, Solid	NC	ND
Thread G¾ A, Liquid	G3	G4
Thread ¾ NPT, Liquid	N3	N4
Y	Special design	

Code	Flange matching/ Material

Material / Flange size / Code	SS304 Face Flange	SS316L Face Flange
DN40, PN16	AA	AB
DN50, PN16	BA	BB
DN65, PN16	CA	CB
DN80, PN16	DA	DB
DN100, PN16	EA	EB
DN125, PN16	FA	FB
DN150, PN16	GA	GB

DN200, PN16	HA	HB
DN250, PN16	JA	JB
ANSI 1.5”, 150lb	AAM	ABM
ANSI 2”, 150lb	BAM	BBM
ANSI 2.5”, 150lb	CAM	CBM
ANSI 3”, 150lb	DAM	DBM
ANSI 4”, 150lb	EAM	EBM
ANSI 5”, 150lb	FAM	FBM
ANSI 6”, 150lb	GAM	GBM
ANSI 8”, 150lb	HAM	HBM
ANSI 10”, 150lb	JAM	JBM
X	None	
Y	Special design	

Code	**High temperature adaptor/ Process temperature**
P	Without/ (-40 ~ +130)℃
G	With/ (-40 ~ +250)℃

Code	**Electronic unit**
2	(4~20)mA/ 24V DC 2-wire
3	(4~20)mA/ 24V DC 4-wire
4	(4~20)mA/ 220V AC 4-wire
5	(4~20)mA/ 24V DC/ HART/ 2-wire
6	(4~20)mA/ 24V DC/ HART/ 4-wire
7	(4~20)mA/ 220V AC/ HART/ 4-wire
Y	Special design

Code	**Housing/ Enclosure protection grade**
L	Aluminum/ IP 67
G	Stainless steel 304/ IP 67

Code	**Cable entry**
M	M20x1.5
N	½″ NPT

Code	**Display/ Programmer**
V	With standard display
B	With backlight display
X	Without

VRPWRD32

Code	Approvals
P	Standard type (Non-explosion)
I	Intrinsically safe type (Ex ia IIC T6 Ga)
D	Explosion isolation type (Ex d IIC T6 Gb)

Code	Cable probe/ Material
A	6mm/ SS304
B	6mm/ SS316L
C	10mm/ SS304
D	10mm/ SS316L

Code	Sensor type/ Material

Material / Code / Flange size	SS304 Flat face flange	SS316L Flat face flange
Thread G1½ A, Liquid	GA	GB
Thread 1½" NPT, Liquid	NA	NB
Thread G¾ A, Liquid	G3	G4
Thread ¾" NPT, Liquid	N3	N4
Y	Special design	

Code	Flange matching/ Material

Material / Code / Flange size	SS304 Face Flange	SS316L Face Flange
DN40, PN16	AA	AB
DN50, PN16	BA	BB
DN65, PN16	CA	CB
DN80, PN16	DA	DB
DN100, PN16	EA	EB
DN125, PN16	FA	FB
DN150, PN16	GA	GB
DN200, PN16	HA	HB

DN250, PN16	JA	JB
ANSI 1.5”, 150lb	AAM	ABM
ANSI 2”, 150lb	BAM	BBM
ANSI 2.5”, 150lb	CAM	CBM
ANSI 3”, 150lb	DAM	DBM
ANSI 4”, 150lb	EAM	EBM
ANSI 5”, 150lb	FAM	FBM
ANSI 6”, 150lb	GAM	GBM
ANSI 8”, 150lb	HAM	HBM
ANSI 10”, 150lb	JAM	JBM
X	None	
Y	Special design	

Code	**High temperature adaptor/ Process temperature**
P	Without/ (-40 ~ +130)℃
G	With/ (-40 ~ +250)℃
Code	**Electronic unit**
2	(4~20)mA/ 24V DC 2-wire
3	(4~20)mA/ 24V DC 4-wire
4	(4~20)mA/ 220V AC 4-wire
5	(4~20)mA/ 24V DC/ HART/ 2-wire
6	(4~20)mA/ 24V DC/ HART/ 4-wire
7	(4~20)mA/ 220V AC/ HART/ 4-wire
Y	Special design
Code	**Housing/ Enclosure protection grade**
L	Aluminum/ IP 67
G	Stainless steel 304/ IP 67
Code	**Cable entry**
M	M20x1.5
N	½″ NPT
Code	**Display/ Programmer**
V	With standard display
B	With backlight display
X	Without

VRPWRD33

Code	Approvals
P	Standard type (Non-explosion)
I	Intrinsically safe type (Ex ia IIC T6 Ga)
D	Explosion isolation type (Ex d IIC T6 Gb)
E	Classification certificate (CCS)

Code	Cable probe diameter/ Material
CC	Twin cable 6mm/ SS304
DC	Twin cable 6mm/ SS316L

Code — **Flange matching/ Material**

Material / Code / Flange size	SS304 Face Flange	SS316L Face Flange
DN80, PN16	DA	DB
DN100, PN16	EA	EB
DN125, PN16	FA	FB
DN150, PN16	GA	GB
DN200, PN16	HA	HB
DN250, PN16	JA	JB
ANSI 3”, 150lb	DAM	DBM
ANSI 4”, 150lb	EAM	EBM
ANSI 5”, 150lb	FAM	FBM
ANSI 6”, 150lb	GAM	GBM

ANSI 8”, 150lb	HAM	HBM
ANSI 10”, 150lb	JAM	JBM
Y	Special design	

Code	High temperature adaptor/ Process temperature
P	Without/ (-40 ~ +130)℃
G	With/ (-40 ~ +250)℃

Code	Electronic unit
2	(4~20)mA/ 24V DC 2-wire
3	(4~20)mA/ 24V DC 4-wire
4	(4~20)mA/ 220V AC 4-wire
5	(4~20)mA/ 24V DC/ HART/ 2-wire
6	(4~20)mA/ 24V DC/ HART/ 4-wire
7	(4~20)mA/ 220V AC/ HART/ 4-wire
Y	Special design

Code	Housing/ Enclosure protection grade
L	Aluminum/ IP 67
G	Stainless steel 304/ IP 67

Code	Cable entry
M	M20x1.5
N	½″ NPT

Code	Display/ Programmer
V	With standard display
B	With backlight display
X	Without

VRPWRD34

Code	Approvals
P	Standard type (Non-explosion)
I	Intrinsically safe type (Ex ia IIC T6 Ga)
D	Explosion isolation type (Ex d IIC T6 Gb)

Code	Cable probe/ Material
A	6mm/ SS304
B	6mm / SS316L
C	10mm/ SS304
D	10mm / SS316L

Code	Sensor type/ Material

Material / Flange size / Code	SS304 Flat face flange	SS316L Flat face flange
Thread G1½" A, Liquid	GA	GB
Thread 1½" NPT, Liquid	NA	NB
Y	Special design	

Code	Flange matching/material

Material / Flange size / Code	SS304 Face Flange	SS316L Face Flange
DN40, PN16	AA	AB
DN50, PN16	BA	BB
DN65, PN16	CA	CB
DN80, PN16	DA	DB
DN100, PN16	EA	EB
DN125, PN16	FA	FB
DN150, PN16	GA	GB
DN200, PN16	HA	HB
DN250, PN16	JA	JB

ANSI 1.5”, 150lb	AAM	ABM
ANSI 2”, 150lb	BAM	BBM
ANSI 2.5”, 150lb	CAM	CBM
ANSI 3”, 150lb	DAM	DBM
ANSI 4”, 150lb	EAM	EBM
ANSI 5”, 150lb	FAM	FBM
ANSI 6”, 150lb	GAM	GBM
ANSI 8”, 150lb	HAM	HBM
ANSI 10”, 150lb	JAM	JBM
X	None	
Y	Special design	

Code	**High temperature adaptor/ Process temperature**
G	With/ (-20 ~ +400)℃
Code	**Electronic unit**
2	(4~20)mA/ 24V DC 2-wire
3	(4~20)mA/ 24V DC 4-wire
4	(4~20)mA/ 220V AC 4-wire
5	(4~20)mA/ 24V DC/ HART/ 2-wire
6	(4~20)mA/ 24V DC/ HART/ 4-wire
7	(4~20)mA/ 220V AC/ HART/ 4-wire
Y	Special design
Code	**Housing/ Enclosure protection grade**
L	Aluminum/ IP 67
G	Stainless steel 304/ IP 67
Code	**Cable entry**
M	M20x1.5
N	½″ NPT
Code	**Display/ Programmer**
V	With standard display
B	With backlight display
X	Without

VRPWRD35

Code	Approvals
P	Standard type (Non-explosion)
I	Intrinsically safe type (Ex ia IIC T6 Ga)
D	Explosion isolation type (Ex d IIC T6 Gb)

Code	Cable probe diameter/ Material
A	8mm/ SS304 with PTFE sleeve
B	8mm / SS316L with PTFE sleeve
C	12mm/ SS304 with PTFE sleeve
D	12mm / SS316L with PTFE sleeve

Code	Flange matching/ Material	
Material / Flange size / Code	SS304 Face Flange	SS316L Face Flange
DN40, PN16	AA	AB
DN50, PN16	BA	BB
DN65, PN16	CA	CB
DN80, PN16	DA	DB
DN100, PN16	EA	EB
DN125, PN16	FA	FB
DN150, PN16	GA	GB
DN200, PN16	HA	HB
DN250, PN16	JA	JB
ANSI 1.5”, 150lb	AAM	ABM
ANSI 2”, 150lb	BAM	BBM
ANSI 2.5”,150lb	CAM	CBM

ANSI 3”, 150lb	DAM	DBM
ANSI 4”, 150lb	EAM	EBM
ANSI 5”, 150lb	FAM	FBM
ANSI 6”, 150lb	GAM	GBM
ANSI 8”, 150lb	HAM	HBM
ANSI 10”,150lb	JAM	JBM
Y	Special design	

Code	High temperature adaptor/ Process temperature
P	Without/ (-40 ~ +120)℃
G	With/ (-40 ~ +180)℃

Code	Electronic unit
2	(4~20)mA/ 24V DC 2-wire
3	(4~20)mA/ 24V DC 4-wire
4	(4~20)mA/ 220V AC 4-wire
5	(4~20)mA/ 24V DC/ HART/ 2-wire
6	(4~20)mA/ 24V DC/ HART/ 4-wire
7	(4~20)mA/ 220V AC/ HART/ 4-wire
Y	Special design

Code	Housing/ Enclosure protection grade
L	Aluminum/ IP 67
G	Stainless steel 304/ IP 67

Code	Cable entry
M	M20x1.5
N	½″ NPT

Code	Display/ Programmer
V	With standard display
B	With backlight display
X	Without

VRPWRD36

Code	Approvals
P	Standard type (Non-explosion)
I	Intrinsically safe type (Ex ia IIC T6 Ga)
D	Explosion isolation type (Ex d IIC T6 Gb)

Code	Coaxial tube probe/ Material
A	Φ38mm/ SS304
B	Φ38mm/ SS316L
C	Φ50mm/ SS304
D	Φ50mm/ SS316L

Code	Sensor type/ Material	
Material / Flange size / Code	SS304	SS316L
Thread G1½″ A Liquid	GA	GB
Thread 1½″ NPT Liquid	NA	NB
Thread G¾″ A Liquid	G3	G4
Thread ¾″ NPT Liquid	N3	N4
Y	Special design	

Code	Flange matching/ Material	
Material / Flange size / Code	SS304 Face Flange	SS316L Face Flange
DN40, PN16	AA	AB
DN50, PN16	BA	BB
DN65, PN16	CA	CB
DN80, PN16	DA	DB
DN100, PN16	EA	EB
DN125, PN16	FA	FB
DN150, PN16	GA	GB
DN200, PN16	HA	HB

DN250, PN16	JA	JB
ANSI 1.5”, 150lb	AAM	ABM
ANSI 2”, 150lb	BAM	BBM
ANSI 2.5”, 150lb	CAM	CBM
ANSI 3”, 150lb	DAM	DBM
ANSI 4”, 150lb	EAM	EBM
ANSI 5”, 150lb	FAM	FBM
ANSI 6”, 150lb	GAM	GBM
ANSI 8”, 150lb	HAM	HBM
ANSI 10”, 150lb	JAM	JBM
X	None	
Y	Special design	

Code	**High temperature adaptor/ Process temperature**
P	Without/ (-40 ~ +130)℃
G	With/ (-40 ~ +250)℃

Code	**Electronic unit**
2	(4~20)mA/ 24V DC 2-wire
3	(4~20)mA/ 24V DC 4-wire
4	(4~20)mA/ 220V AC 4-wire
5	(4~20)mA/ 24V DC/ HART/ 2-wire
6	(4~20)mA/ 24V DC/ HART/ 4-wire
7	(4~20)mA/ 220V AC/ HART/ 4-wire
Y	Special design

Code	**Housing/ Enclosure protection grade**
L	Aluminum/ IP 67
G	Stainless steel 304/ IP 67

Code	**Cable entry**
M	M20x1.5
N	½″ NPT

Code	**Display/ Programmer**
V	With standard display
B	With backlight display
X	Without

10. Programming manual

Calibration introduction:

Shown as the figure right, there are four buttons in the indication face board, by pressing which, you can set and debug the instrument. Menu languages are selectable. After setting or calibration, LCD indicates measured values, which can be read clearly through a glass window.

Following bellows are functions of the four buttons:

Button "ESC":

- Exit from editing state;
- Return back to the previous menu;
- Shift between a measured value and an echo curve during operation;

Button "+":

- Amend values of parameters;
- Select model of indication;

Button "↻":

- Select a setting item
- Select digit of edited parameters
- Indicate the content of the selected parameter

Button "OK":

- Enter editing state
- Confirm settings

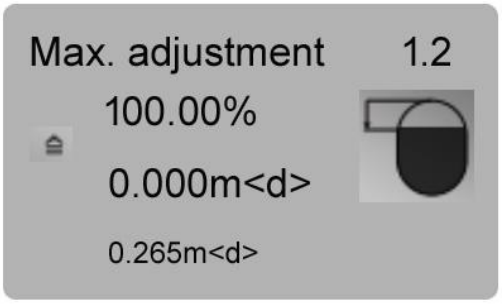
- Save parameter modification

1. Basic settings

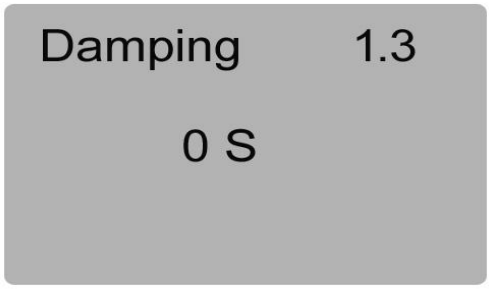
1.1. Min. adjustment: It is to set measuring range. It, together with Max. adjustment determines the proportion of corresponding relationship of output current linearity. In the main menu, when the menu number is 1 at up-right corner on the screen, press button OK, then enter into the submenu of Basic settings 1.1-Min. adjustment. LCD indicates as follows:

Press button OK, entering programming for percentage of Min. adjustment. Please refer to the previously stated parameter editing method for setting of character/ figure to edit the percentage value and distance value. After editing, press button OK for confirmation, or press button ESC for quitting.

1.2. Max. adjustment: It is for setting of measuring range. It, together with Min. adjustment determines the proportion of corresponding relationship of output current linearity. When LCD indicates the menu number 1.1, press button SELECTION, then enter into 1.2 Max. adjustment. LCD indicates as follows:

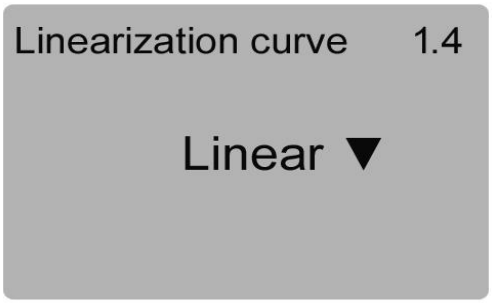


1.2. Damping: When LCD indicates the menu number 1.2, press button SELECTION, then enter into setting menu of 1.3 Damping. LCD indicates as follows:



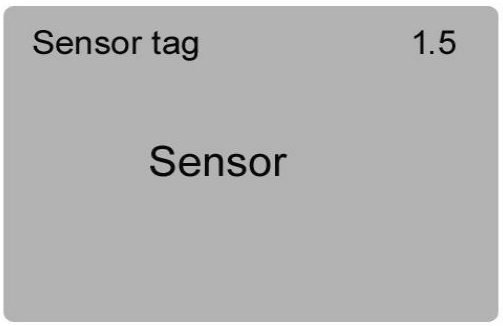
Press button OK to enter into parameter editing mode. Press button “+” to set the figure. And press button SELECTION to select the figure digit to be edited. Then press button OK for confirmation when editing is finished.

1.4. Linearization curve: When LCD indicates the menu number 1.3, press button SELECTION to enter into editing menu of 1.4 Linearization curve. LCD indicates as follows:



Curve can be selected according to different shape of measured tanks or vessels. Normally it is set as “Linear”.

1.5. Sensor tag: When LCD indicates the menu 1.4, press button SELECTION to enter into the menu of 1.5 Sensor tag. LCD indicates as follows:



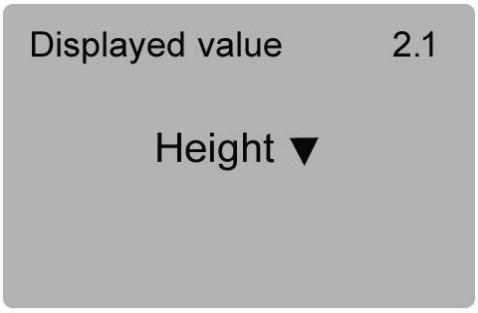
Press button OK， then parameters area turns into black. It can be edited by using button SELECTION or “+”. Press button OK for confirmation when editing is finished.

This function is used for editing mode of indication. When LCD indicates main menu, press button SELECTION to move the arrow to Display. LCD indicates as follows:

Press button OK to enter editing mode of display.

2.1. Display

When enter editing with display, LCD indicates as follows:



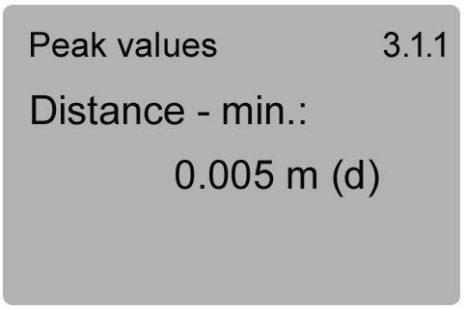
It means the presenting parameter on display is “Height”, that is to display measured value of the level. Press button OK to enter into editing state, then LCD indicates:

Press button SELECTION to move the arrow to the required item and press button OK for confirmation. After editing, press button “ESC” to exit display programming and go back to the previous menu.

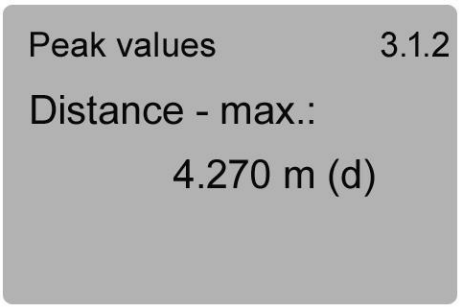
2. Diagnostics: When LCD indicates main menu, press button SELECTION to move the arrow to item of Diagnostics. LCD indicates as follows:

The function of diagnostics can be used for testing the working conditions of the instrument and its parts, and the system debugging. Press button OK to enter the function of Diagnostics.

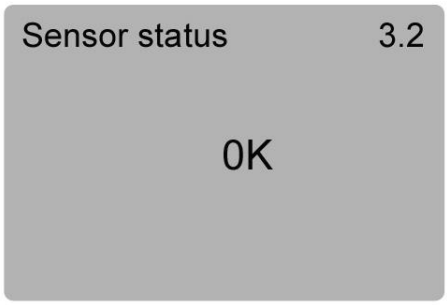
3.1.1. Peak values (Distance - min): When LCD indicates menu number 3.1, enter display of Peak (Distance - min.) state 3.1.1. The screen presents as follows:



3.1.2. Peak values (Distance – max.): When LCD indicates menu number 3.1, enter display of Peak (Distance - max.) state 3.1.2. The screen presents as follows:

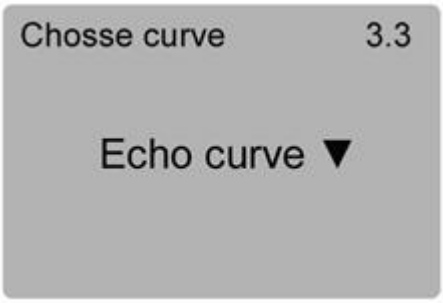


3.2. Sensor status: When LCD indicates the menu number 3.1.2, press button SELECTION to enter the next diagnostics mode of 3.2, Sensor status. LCD indicates as follows:

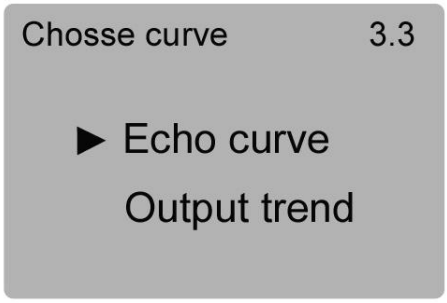


Note: OK presents the instrument is at normal status. Otherwise, it means the instrument is at abnormal status when the display indicates other codes (error code).

3.3. Choose curve: When LCD indicates the menu number 3.2, press button SELECTION to enter into menu of 3.3 Choose curve. LCD indicates as follows:

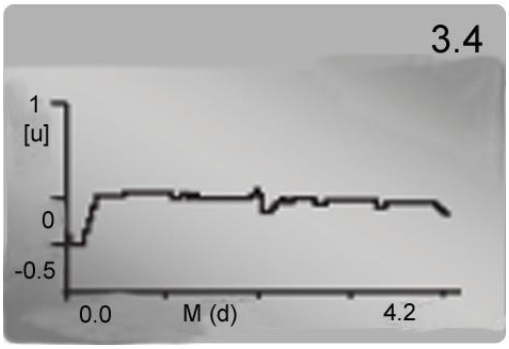


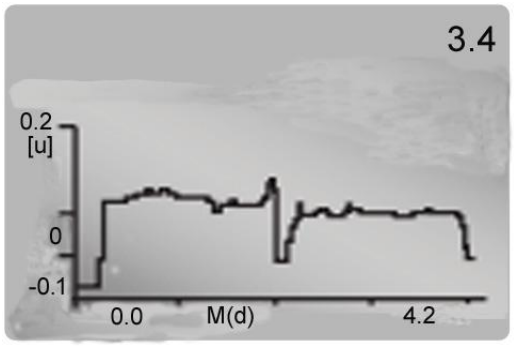
If it is in need to select other curves, press button OK to choose curve. LCD indicates as follows:

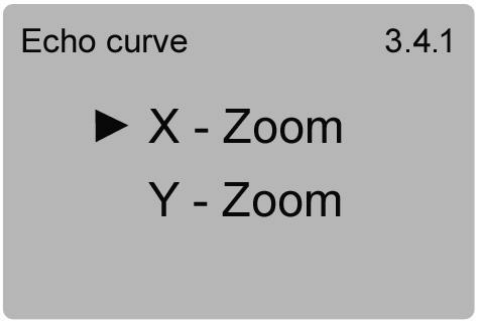


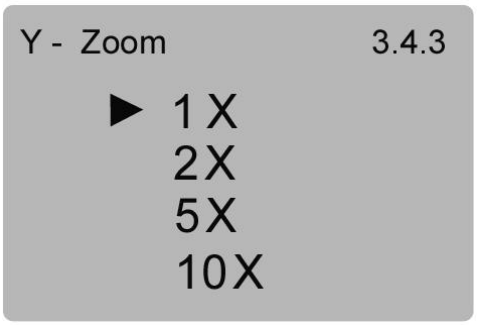
Press button SELECTION to move the arrow to curve in need. Press button OK for confirmation.

3.4. Echo curve: When LCD indicates the menu number 3.3, press button SELECTION to make LCD indicate the selected curve. The function of curve zoom can be used to amplify the curve along the axes of time and amplitude so that it can be read clearly. When LCD indicates echo curve, press button OK to enter menu of curve zoom editing. LCD indicates as follows:

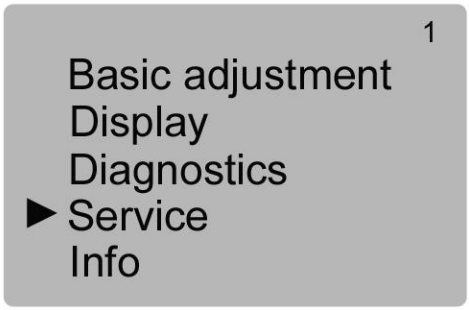




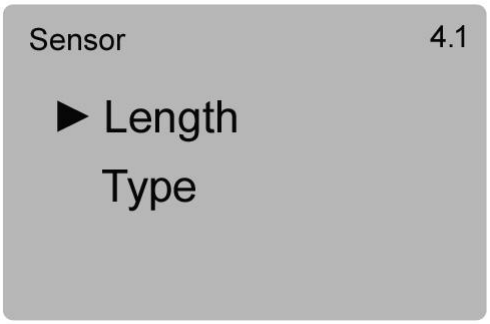




4.Service: The menu of service contains more professional functions, which should be used by trained personnel. Main functions are for setting cable length and cable type, medium state, false echo suppress, reset, language, sensor data copy, etc. When LCD indicates main menu, press button SELECTION to move the arrow to the item of service. LCD indicates as follows:

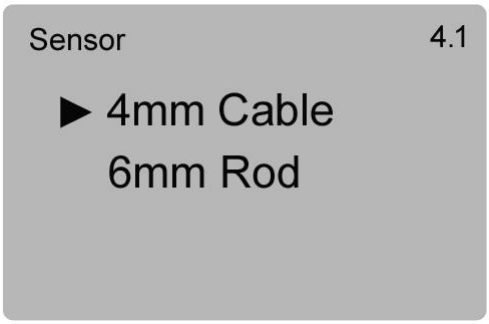


4.1. Sensor length and version: Length of probe (cable or rod) and type should be set in order to get correct measurement result. When LCD indicates the main menu, press button OK to enter setting status. LCD indicates as follow:



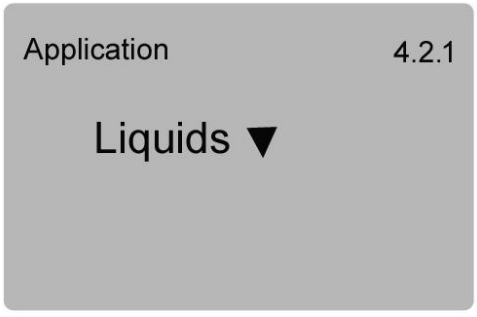
When enter menu 4.1, Press button OK for sensor length setting via button SELECTION or “+”, then press button OK for confirmation. LCD indicates as follows:

Press button ESC to return the previous menu and press button SELECTION to shift different cable version. Then press button OK to select probe type (4mm for a cable probe and 6mm for a rod probe). LCD indicates as follows:



4.2.1. Medium

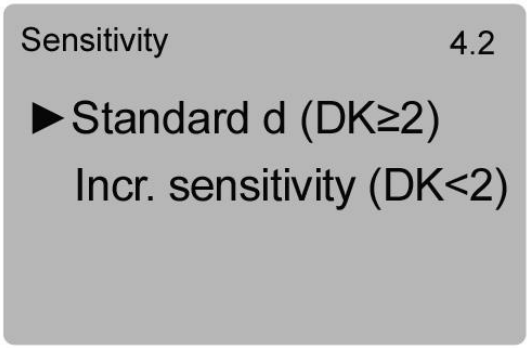
When LCD indicates menu number 4.1, press button SELECTION to enter medium state editing and select medium as solid or liquid, in addition to confirm other measurement features of medium. LCD indicates as below:



4.2.2. Sensibility

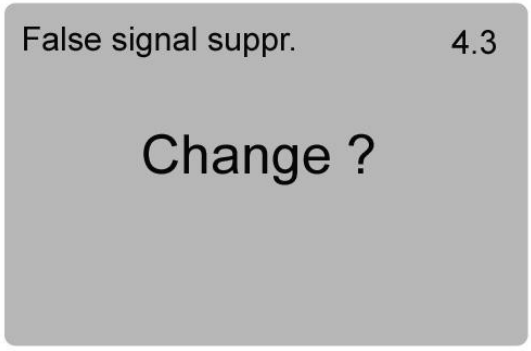
When LCD indicates menu number is 4.2.1, press button SLECTION, enter the menu

of standard sensitivity and high sensitivity selection. The LCD indicates as below:



4.3. False echo suppress

It is used to get rid of interface to level measurement caused by a fixed obstacle within scope of measuring range. When LCD indicates menu 4.2, press button SELECTION to enter the menu or interface of “False echo suppr.”, shown as below:

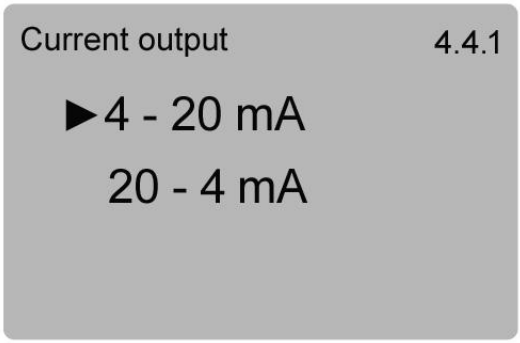


Press button SELECTION to move the arrow to needed item to Delete/ Update/ Create new, and then press button OK for confirmation.

4.4.1. Current output

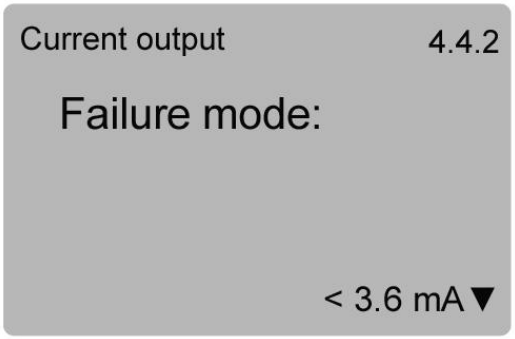
When LCD indicates menu number 4.4, press button SELECTION to enter into

Current output. LCD indicates as below:



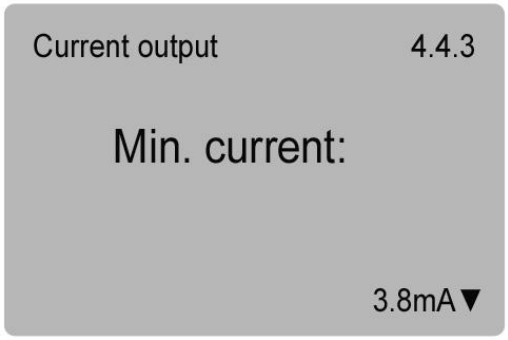
4.4.2. Failure mode

When LCD indicates menu number 4.4.1, press button SELECTION, enter the menu of “Failure mode”, the display indicates as below:



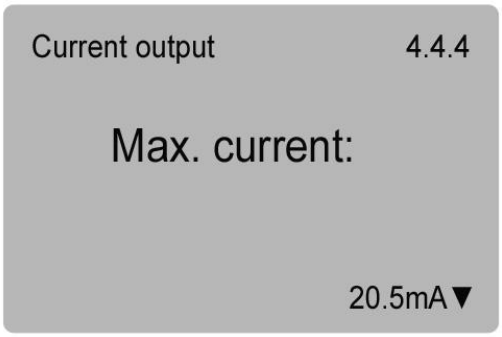
4.4.3. Min. current

When LCD indicates menu number 4.4.2, press button SELECTION to enter the interface of “Min.current”, the display shows as follows:



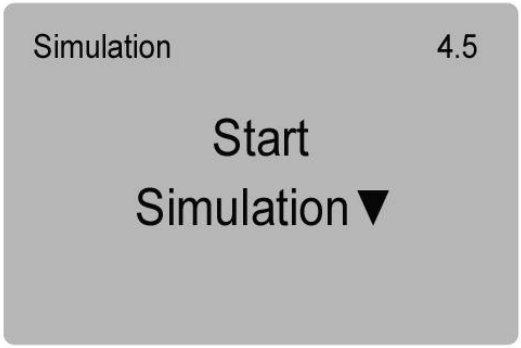
4.4.4. Max. current

When LCD indicates menu number 4.4.3, press button SELECTION to enter the interface of “Max. current”. The display shows as below:



4.5. Simulation

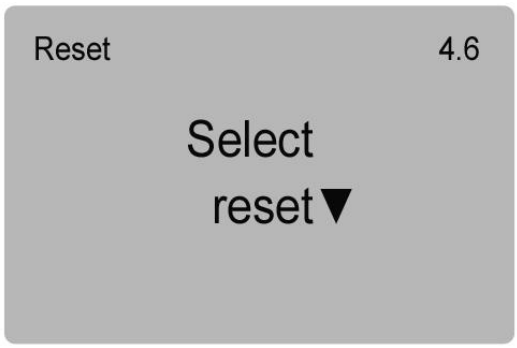
“Simulation” means the instrument simulates current output of 4-20mA, which is used verify if the current output of instrument is working normally; meanwhile it is also used for system debugging. When LCD indicates 4.4, press button SELECTION to enter the interface of “Simulation”. The display shows as below:

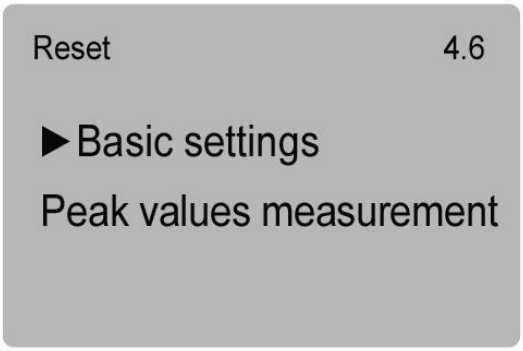


Press button OK for confirmation.

4.6. Reset:

The function of reset is used for the reset of finished parameters. There are two kinds of reset functions: Basic settings and Peak values measurement. Basic setting is to recover different kinds of parameters in basic settings items back to factory default setting. Peak values measurement is to clear the peak measurement in the diagnostics. When LCD indicates menu number 4.5, press button SELECTION to enter into Reset function. LCD indicates as follows:

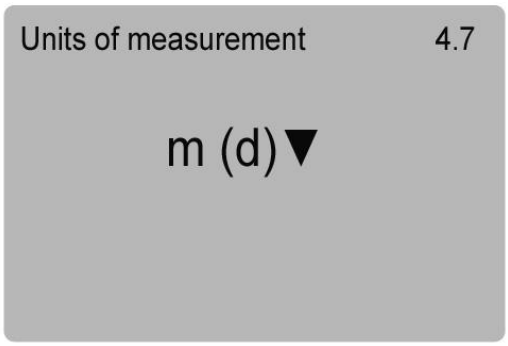




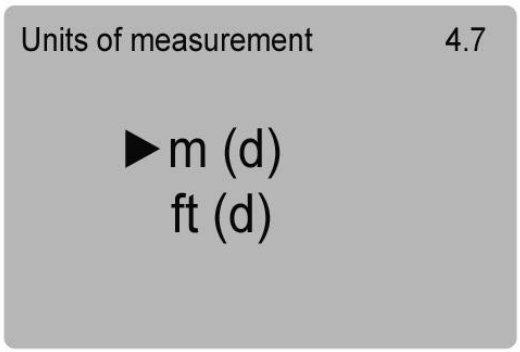
Press button OK to enter the reset selection menu, select the corresponding reset function item for resetting according to the needs.

4.7.Units of measurement:

There are two choices of units of measurement for users, one is the metric system, and the other is imperial system. When LCD indicates menu number 4.6, press button SELECTION to enter the menu of “Units of measurement”, and then dislay shows as below:



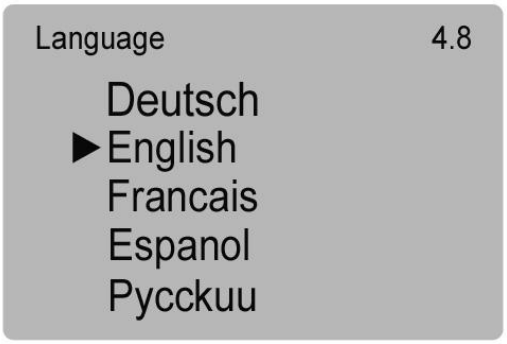
Press button OK to enter the measuring unit selection menu to select the unit according to the needs.



4.8. Language:

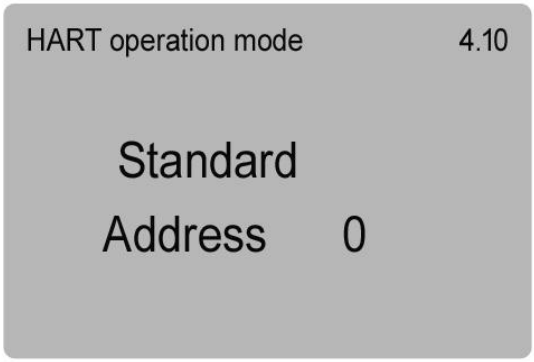
There are nine options of languages for users, Chinese, English, French and Italian, etc. When LCD indicates menu number 4.7, press button SELECTION to enter the menu of “Language”, and then, the display shows as below:

Press button OK for entering the languages selection menu and select the language as you need.

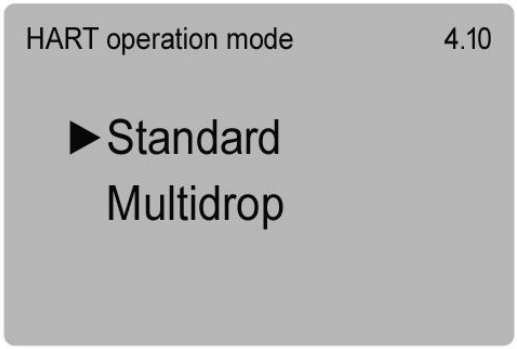


4.10. HART operation mode:

When two or more than two instruments are connected to a computer with HART communication interfaces, use this function to set the instrument into multiple working modes. When LCD indicates the menu number 4.9, press button SELECTION to enter “HART operation mode menu”. The display shows as follows:

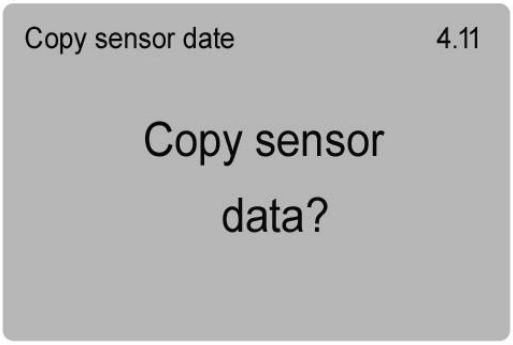


Press button OK to enter HART working mode setting interface, the display shows as follows:



4.11. Copy sensor data:

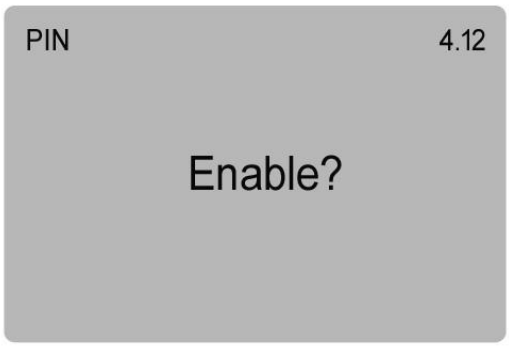
There are two submenus, one is “COPY FROM SENSOR”, the other is “COPY TO SENSOR”. This function is used for protecting the parameters. When technician finishes setting the instrument parameters according to the working conditions, you can use the function of “COPY FROM SENSOR” to protect or save the set parameters. Once the parameters are altered accidentally, you can use the function of “COPY TO SENSOR” to restore them. When LCD indicates the menu number 4.10, press button SELECTION to enter the menu of “Copy sensor data”. The display shows as below:



4.12. PIN:

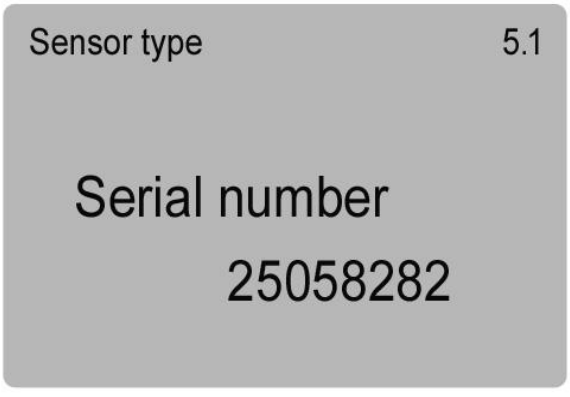
PIN is used for the safety of the parameters. Once the function is actuated, you have to input the password every time when you want to change a parameter. When the right passwords are input, the protection function will be cancelled. Then you can modify the parameters. When LCD indicates menu number 4.11, press button

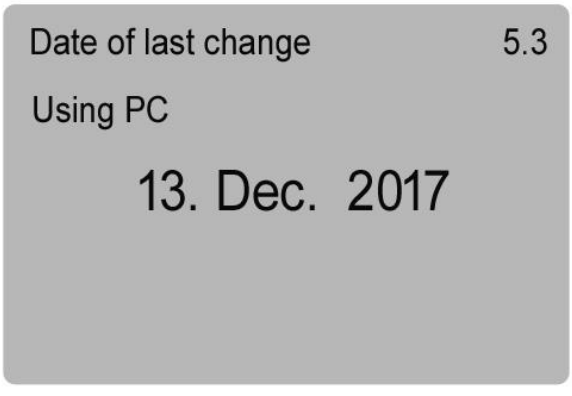
SELECTION to enter into PIN function. LCD indicates as follows:

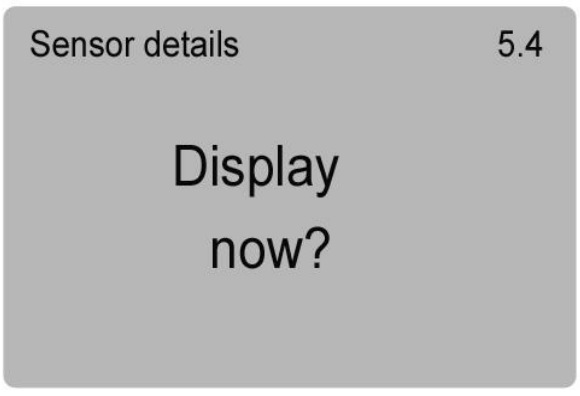


5. Info.

The basic information of an instrument includes “Sensor type”, “serial number”, “Date of ma” and “Software version”, etc. When LCD indicates the main menu, press button SELECTION to move the arrow to Info item, and press button OK to enter the interface of “Info function”. Press button SELECTION to see related information of the instrument. LCD indicates as follows:







11. Transportation and Storage

The condition of transportation and storage of radar level transmitter should meet regulations of JB/T 9329 and also rules as below.

Transportation of radar level transmitter should follow strictly product features and requirements in the instruction.

Radar level transmitters should be stored in a ventilated dry room between 0 to 40℃ with relative humidity less than 80%, which can not be stored with something corrosive. Radar level transmitters stored for long term should be sold and used after inspection and test.

12. Information requested when place an order

Customer information

Company: Contact person:

Address: Post code:

Telephone: Fax:

Mobile phone: E-mail:

Date:

Certificate

□ Standard type (non-explosion proof) □ Intrinsically safe (Ex ib IIB T5)

□ Intrinsically safe (Ex ib IIC T6 Gb)

□ Intrinsically safe + marine approval (Ex ib IIC T6 Gb)

□ Intrinsically safe + flame proof (Ex d ib IIC T6)

Tank/container information

Tank type:

□ Storage tank □ Reaction tank □ Separation tank □ Marine tank

Tank structure:

□ Tank material: □ Tank pressure:

Tank size:

Height of tank: m

Diameter of tank: m

Shape of tank top:

□ Arch □ Flat top □ Open □ Conic

Shape of tank bottom:

□ Tapered □ Flat □ Inclined □ Arch

Installation:

□Top mounted □Side mounted □Bypass pipe mounted □Wave guide pipe mounted

Extension pipe at tank top (important information):

Pipe height: mm, Pipe diameter: mm

Measuring medium

Medium name: □ Liquid □ Solid □ Mixed medium

Medium temperature: ℃

Dielectric constant:

Adhesion: □ Yes □ No

Stirring: □ Yes □ No

Process connection

Thread: (□ G1½″ □ 1½″ NPT □ G2”A □ G1″A □ 1″ NPT)

□ Flange (DN=) □ Flange (ANSI=)

Power supply:

□ 24V DC 2-wire □ 220V AC

Output: □ 4-20mA □ HART □ PROFIBUS PA

Display: □ With display and programmer

□ Without display and programmer

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