Guided Wave Radar Level Meter

manual of operation
Display/Adjustment  Adjustments can be done with four buttons on the viewpoint. Optional menu languages are available. Viewpoint is only used for display after adjustments. Measurement results would be displayed on the LCD.

Display/Adjustment Module

1 LCD  2 Adjustment Keypad

[OK] Keypad
- Enter programming mode;
- Confirm programming options;
- Confirm modifications to parameters.

[ ] Keypad
- Choose programming options;
- Choose the digit of parameters to edit;
- Display the contents of parameters.

[ ] Keypad
- Modify parameter values.
- Enter display mode while running.

Shortcut
[BK] Display Echo wave

[BK] Keypad
- Programming mode exit;
- Return to higher menu level.
Program instruction

Adjustments parameter settings and testings can be done by the four keys on View Point.

Program Menu Structure

Menu Structure is shown in the appendix. Turn to next menu item pointed by right arrow with OK. Turn to next menu item pointed by down arrow with ⬇. Turn to left item with BK.

Program Submenu

Basic settings

Basic adjustment for the Sensor are included in this menu. They are min. adjustment, max. adjustment, medium, damping time, Mapping curve, scaled units, scaling, near blanking and sensor tag.

Display

In this menu you can setup the sensor display mode and adjust B/W contrast for LCD.

Diagnostic

In this menu you can check and test the sensor. You can view the measurement peak values, measurement status, echo-curve and Simulation.

Service

In this menu you can store false echo curve and current output, units of measurement, language, rest HART operation mode, copy sensor data and PIN.

Info

The information of sensor including sensor type, serial number, date of manufacture, software version.

Program operation

Enter program mode by press OK. press OK after each parameter editings. Otherwise the modification will be abandoned. Press BK to quit program status.

Parameters editing

Parameter editing

The first digit of the edited parameter will be displayed in black background on entering parameter editing. Modify the digit with ⬆️. Then you can edit next digit with ⬇️. After editing, press OK to confirm and store the modification.

Optional item programming

Some settings can be done by selecting one of several optional items with ⬆️ and confirming with OK.

Program menu instruction

1 Basic settings

Basic settings are basic setup of the sensor, such as min/max adjustment, medium, damping and etc. To bring the sensor to program mode from run mode, press OK. Then the menu is displayed as below.

Note: The menu item number is displayed on the top right corner.
1.1 Min. adjustment

The item is one of the two setting points that regulates the linear scaled current output. At main menu (the menu number is 1). Select Basic settings with ➔ and confirm with OK. Now the Min. Adjustment is displayed on LCD, the menu item number is 1.1.

```
Min adjustment 1.1
0.000%
35.000 m (d)
1.346 m (d)
```

Press OK, you can edit the percentage value. Press OK again, you confirm the modification, and further more you can edit the corresponding distance value. See parameter edition to learn how to edit parameters.

1.2 Max. adjustment

The item is one of the two setting points that regulates the linear scaled current output. Pushing ➔ enter this menu when the menu item number is 1.1. LCD displays as below

```
Max adjustment 1.2
100.000%
0.000 m (d)
1.409 m (d)
```

Press OK, you can edit the percentage value. Press OK again, you confirm the modification, and further more you can edit the corresponding distance value. See parameter edition to learn how to edit parameters.

1.3 Medium

When LCD menu is 1.2, press OK to enter edit Medium property, LCD displays as below. There are three options to choose from, Liquid, Solid, and Micro DK. By setting the property of the medium, measurement can be made accurately.

```
Medium 1.3
Liquid
```

```
Medium 1.3
▶ Liquid
Solid
Micro DK
```

1.3.1 Fast level change

Pushing OK will enter this menu when it is liquid or solid selection menu and menu item number is 1.3. LCD displays as below

```
Fast level change 1.4
Yes ▶
```

Push OK enter Fast level change confirmation. LCD displays as below
1.3.2 First Echo

When medium is chosen as liquid or solid, LCD menu is 1.3.1, press OK to choose next menu. LCD displays as below:

Press OK to enter First Echo menu. LCD displays as below:

Press to choose the way to set First echo. There are five ways:
- Normal: No adjustments on first echo
- Small: Decrease first echo by 10dB
- Big: Increase first echo by 10dB
- Bigger: Increase first echo by 20dB
- Biggest: Increase first echo by 40dB

1.3.3 (Liquid) Agitated surface

When measure medium is liquid, LCD menu is 1.3.2, press to choose next menu and enter Agitated surface. LCD displays as below:

Press OK to enter Agitated surface menu.

1.3.3 (Solid) Large angle repose

When measure medium is solid, LCD menu is 1.3.2, press to choose next menu and enter Large angle repose. LCD displays as below:

Press OK to enter Large angle repose menu.
1.3.4 (Liquid) Foaming

Pushing will enter this menu when the menu item number is 1.3.3. LCD displays as below:

```
Foaming
No ▶
```

Push OK, enter the submenu of Foaming/Powder dust confirmation. LCD displays as below:

```
Foaming
Yes ▶
```

1.3.4 (Solid) Powder dust

Pushing will enter this menu when the menu item number is 1.3.3. LCD displays as below:

```
Powder dust
No ▶
```

Push OK, enter the submenu of Foaming/Powder dust confirmation. LCD displays as below:

```
Powder dust
Yes ▶
```

1.3.5 Low DK

Pushing will enter this menu when the menu item number is 1.3.4. LCD displays as below:

```
Low DK
▶ No
```

Push OK, enter the submenu of Low DK confirmation. LCD displayed below:
Move arrow with ◀ to Select Yes or No for medium with Low DK. Then confirm with OK.

1.3.6 Measuring in tube

When measurement is carried through a tube, that is limited for the liquid medium, the tube diameter must be set in menu Measure in tube so as to rectify the measuring error.

Pushing ◀ will enter this menu when the menu item number is 1.3.5. LCD displays as below

```
Measure in tube 1.3.6
```

Push OK, enter the submenu of Measure in tube confirmation. LCD displays as below

```
Measure in tube 1.3.6
```

If the selection Yes is confirmed by OK, the diameter of the tube will be required. LCD displays as below

```
Measure in tube 1.3.6
Measure diamet
0000mm
```

Press OK, the value can be edited.

1.3.1 Micro DK

When choose Micro DK as medium property, press OK to enter Micro DK setting.

```
Micro DK 1.3.1
Empty Span 10.00m
True Lever 0.00m
DK 1.00
```

Normally when electronic constant is smaller than 1.4, the direct echo from the medium is low and hard to detect. However by measuring the echo reflected from the base of the vessel, the height of the medium can be measured. Two parameters are needed to be entered here.

1. Height of empty vessel. 2. True medium height or medium electronic constant, these two parameters are related, entering either one is accepted. The precision of parameters will affect the precision of the measurement.

Notes: it should be taking cautions while applying the function, Micro DK. When applying this function the system will decide whether use direct echo or echo from the base to take the measurement.
1.4 Damping
Pushing \( \rightarrow \) will enter this menu when the menu item number is 1.3. LCD displays as below

Press \( \textbf{OK} \), enter editing menu. See parameter edition to learn how to edit the parameter. To confirm the modification with \( \textbf{OK} \), give up with \( \textbf{BK} \).

1.5 Signal threshold
Signal threshold menu is used to set the effective echo amplitude noise margin. When the liquid crystal display menu number is 1.4, Press \( \textbf{OK} \) to enter the signal threshold programming, LCD displays as below

Press \( \textbf{OK} \), enter editing menu. See parameter edition to learn how to edit the parameter. To confirm the modification with \( \textbf{OK} \), give up with \( \textbf{BK} \).

Note: This parameter must be professional, according to echo intensity adjustment.

1.6 Mapping curve
This menu define the correlation between the measured value and the current output. Linear or non-linear mapping can be selected in this menu. For the non-linear correlations, parameter setting must be done by a computer previously. Pushing \( \rightarrow \) will select this menu when the menu item number is 1.4. LCD displays as below

Press \( \textbf{OK} \), enter editing menu. Move arrow with \( \rightarrow \) to Select linear or non-linear. Then confirm with \( \textbf{OK} \).

1.7 Scaled units
The unit of the scaled output value can be set in this menu. Pushing \( \rightarrow \) will enter this menu when the menu item number is 1.5. LCD displays as below

Pushing \( \textbf{OK} \) to enter the editing menu then move arrow with \( \rightarrow \) to select the measure word and corresponding unit, confirm by \( \textbf{OK} \).

1.8 Scaling
Used for linear scaled output to set the linear mapping values. Pushing \( \rightarrow \) will enter this menu when the menu item number is 1.6. LCD displays as below

Pushing \( \textbf{OK} \) to enter the editing menu, see parameter editing for the value editing. Press \( \textbf{OK} \) to confirm the modification.
1.9 Sensor Length

In order to get correct result, the length of sensor (cable or stick) should be measured first. When LCD menu no. is 1.7, push to enter sensor length menu. LCD displays as below.

![Sensor Length](sensor_length.png)

Push \textbf{OK} to set sensor length. Re. p. 2 parameter editing. After editing, push OK to confirm or push BK to quit.

1.10 Near blanking

The Near blanking is an area near the antenna where the correct measurement is impossible. The default value is the minimum set by the manufacture.

Press \(\uparrow\) to enter menu Near blanking when the menu item number is 1.7. See parameter editing to edit the near blanking value and then confirm the modification with \textbf{OK}.

![Near blanking](near_blanking.png)

1.11 Sensor tag

In the menu Sensor TAG you edit a 11-digit measurement loop designation. The character set comprises: Letters from A–Z and Numbers from 0–9.

![Sensor tag](sensor_tag.png)

See Optional item programming to edit the tag name.

2. Display

This menu is used to set display mode. Pushing \(\uparrow\) will select this menu when the main menu item number is 1. LCD displays as below.

![Basic settings](basic_settings.png)

Push \textbf{OK}, you get

2.1 Display value

Enter display mode set with \textbf{OK}, LCD displays as below.

![Display value](display_value.png)

Push \textbf{OK}, you can select different display types of the measured value as shown below.
3 Diagnostics

The running status of the sensor can be provided by the menu Diagnostics, and furthermore sensor testing can be done. Pushing \( \leftarrow \) to select this menu when the main menu item number is 2. LCD displays as below

\[
\begin{array}{c}
\text{Basic settings} \\
\text{Display} \\
\quad \text{Diagnostics} \\
\quad \text{Service} \\
\quad \text{Info}
\end{array}
\]

Push \( \text{OK} \), you get

3.1 Peak values

Peak values record the maximal and minimal distance. The records can be cleared to zero at menu 4.4.

\[
\begin{array}{c}
\text{Peak values} \\
distance-min \quad 0.000 \, \text{m (d)} \\
distance-max \quad 2.109 \, \text{m (d)}
\end{array}
\]
3.2 Meas. Status (measure)  Pushing \(\bigcirc\) to display measuring status when the menu item is 3.1. LCD displays as below

3.3 Choose curve (echo curve)  At this menu, different curves can be selected to be displayed at menu 3.4, when the menu item is 3.2 press \(\bigcirc\) you get

3.4 Curve  Pushing \(\bigcirc\) will display the selected curve when the menu item is 3.3. LCD displays as below

Curve zoom
When the curve is displayed, pushing \(\bigcirc\) will enter Curve Zoom function menu.

Move arrow with \(\bigcirc\), select menu item for X/ Y axis zoom or unzoom. Then Confirm with \(\bigcirc\).
For X axis zoom pushing \(\uparrow\) to mark the start position for zoom, then confirm with \(\bigcirc\). Pushing \(\uparrow\) again to mark the end position for zoom and confirm with \(\bigcirc\). The selected area of the curve will be shown on the whole screen. Exit zoom with \(\bigcirc\).

3.5 Simulation  Simulation is used to simulate the 4~20mA current output. By current output simulation the accuracy and linearity of the current output can be checked. And the system testing can be carried out. Push \(\bigcirc\) to enter Simulation menu when the menu item number is 3.4. LCD displays as below
4 Service

This menu with professional functions can only be used by trained technicians. They are False echo storage, Reset, sensor settings back up Password setting and etc.

4.1 False echo

High sockets or vessel installations, e.g. struts or agitators as well as buildup and weld joints on the vessel walls cause interfering reflections which can impair the measurement. A false echo storage detects and marks these false echoes, so that they are no longer taken into account for the level measurement. A false echo memory should be created with empty vessel so that all potential interfering reflections will be detected.

Pushing **OK** will enter this menu when the menu item is 4. LCD displays as below.

Then push **OK**, LCD displays as below

With **select** Update/Create new/Delete a false echo, confirm with **OK**.
4.2 Current output

Setup the current output mode. Pushing OK will enter this menu when the menu item is 4.1 LCD displays as below:

- **Current output**: 4.2
  - Output mode: 4-20mA ➤
  - Failure mode: no change ➤
  - Min. current: 4mA ➤

With OK you get:

- Output mode
  - 4-20mA
  - 20-4mA

Push, you select the item you want and confirm with OK.

**Output mode**

Select output current as 4-20mA or 20-4mA. 4-20mA mean the Min. level is corresponding to 4mA and the Max. level is corresponding to 20mA. 20-4mA mean the Min. Level is corresponding to 20mA and the Max. level is corresponding to 4mA. When the arrow points at output mode, push OK you get:

**Failure mode**

Setup the output current on sensor error. Three status are available. When the arrow points at output mode, push , you get item failure mode and confirm with OK, you get:

- 4-20mA
- 20-4mA

**Min. current**

Setup the minimal output current is 4mA or 3.9mA. When the arrow points at fail mode, push , you get min. current menu. Confirm with OK, you get:
Two sets of measure system units are available. The metric system and the British system.

4.3 Reset
With the reset function, modified settings are reset. Three subfunctions are available:
- Basic settings
- Factory settings
- Peak measured values

When the menu item is 4.2, push \( \Rightarrow \), you get

Select the item you want with \( \Rightarrow \) and confirm with \( \textbf{OK} \).

4.4 Units of measurement
Two sets of measure system units are available. The metric system and the British system.

Push \( \textbf{OK} \), LCD displays as below

Select the item with \( \Rightarrow \) confirm with \( \textbf{OK} \).

4.5 Language
In this menu you can change the language. English and Chinese are available.

Push \( \textbf{OK} \), to change it.

4.6 HART operation mode
HART offers standard and multidrop mode. The standard mode with the fixed address 0 means output of the measured value as 4...20 mA signal. In multidrop mode, up to 15 sensors can be operated on one two-wire cable.

In this menu you determine the HART mode and enter the address for multidrop.
In this menu the most important sensor information can be displayed:

**Sensor type**
Serial number: 6-digit number, e.g. 123456
Date of manufacture, e.g. 2006-01-01
Software version, e.g. 06.08.28

Push **OK**, you can select HART operation mode.

The default setting is standard mode with address 0.

4.7 Copy sensor data

In this menu you can back up the sensor settings so as to restore them when necessary.

Push **OK**, LCD displays below

Copy from sensor means to save the sensor settings and copy to sensor means to restore the sensor settings.

4.8 PIN

In this menu, the PIN is activated/inactivated permanently. Entering a 4-digit PIN protects the sensor data against unauthorized access and unintentional modifications.

5 Info

In this menu the most important sensor information can be displayed:
Sensor type, e.g. GDRD51
Serial number: 6-digit number, e.g. 123456
Date of manufacture, e.g. 2006-01-01
Software version, e.g. 06.08.28

Pushing **Enter** will select this menu when the main menu item number is 4. LCD displays as below
Example: To display echo curve do as follow:

1. Push **OK** to enter program status. Main menu is displayed on LCD.
2. Push \(\Rightarrow\) twice to select Diagnostics submenu item.
3. Push **OK** to enter the submenu menu number is 3.1.
4. Push \(\Rightarrow\) to enter next menu, the menu number is 3.2.
5. Push \(\Rightarrow\) again , the menu number is 3.3.
6. Push **OK** to enter the curve select menu (3.3).
7. Set arrow to point to Echo Curve with \(\Rightarrow\).
8. Push **OK** to confirm.
9. Push \(\Rightarrow\), the echo curve will be shown. Menu number is 3.4.
10. Push **OK** to enter curve zoom menu.
11. Push \(\Rightarrow\) to select X zoom.
12. Push **OK** to confirm.
13. Push \(\uparrow\) to mark the start position.
14. Push **OK** to confirm.
15. Push \(\uparrow\) to mark the end position.
16. Push **OK** to confirm. The area of the curve you select will be shown on the whole screen.
17. Push **BK** several times to return to run state.

Note: Shortcut key **BK** can display echo curve on measurement mode, but it has no zoom functions.
3、Installation Guide

Within the measurement range, determined not to come into contact with the cable or rod internal obstacles, Therefore, the installation should be avoided as far as possible the tank facilities, such as: human ladder, limit switches, heating devices, stand etc. Also note that the cable or rod may not intersect with the material during feeding.

Also note that when installing the meter: Highest Level measurement can not enter into the blind; Must be maintained between the instrument and the tank wall a certain distance; When the meter is installed, try to stick with cable or perpendicular to the surface of the measured medium. Meter installation in hazardous areas must comply with state regulations explosion hazardous installation area. Intrinsically safe instrument requires the use of shell with aluminum. Intrinsically safe instrument can be installed in explosion-proof requirements of the occasion, the instrument must be connected to the earth.

The following guidelines apply to the installation of the cable and the rod radar level measuring solid powder or liquid.

- **Installation position:**
  - Far away from the discharge port and inlet.
  - Metal cans in the entire measuring range, not to touch the tank wall and tank bottom.
    - Recommended meter installed in 1/4 or 1/6 of the silo diameter, and the minimum distance is 1/10 of the tank wall of the measuring range.
  - Cable type or rod probe the minimum distance from the tank wall ≥300mm.
  - Bottom of the probe from the tank bottom ≥30mm.
  - The minimum distance from the probe obstructions ≥200mm.
  - If the bottom of the container is a cone, you can install a central tank top.

Measurement reference plane is the sealing surface of the thread.

1. Blinder Range (Menu 1.9)
2. Cable Length (Menu 1.8)
3. Max.Measurement Range (Menu 1.2)
4. Min.Measurement Range (Menu 1.1)
5. reference Plane
Below is a single rod radar level meter installation drawings, mainly used for liquid level measurement

Features:

- You can measure any dielectric permittivity of $\geq 1.8$.
- Generally used to measure viscosity $\leq 500$ cst, not prone to adhesion medium.
- Rod radar maximum range of 6 m.
- Instrumentation for steam and foam has a strong penetrating power, the measurement is not affected.
- For a lot of foam liquid measurement environment, you should select a single rod guided wave radar level meter measurement.

Below is double rod radar level meter installation drawings, mainly for low dielectric constant liquid and solid lightweight powder measurements

Features:

- For low dielectric constant of the liquid and light solid powder, can double cable measurement mode, in order to ensure accurate measurements.
- You can measure the dielectric constant of $\geq 1.6$ in any medium.
- Generally used to measure viscosity $\leq 500$ cst, not prone to adhesion medium.
- Double cable radar level meter maximum range of up to 30 meters.

Installation Method:

- Reasonable meter installation to ensure long-term reliable and accurate measurement

Guided Wave Radar Level Meter can be connected by threaded, thread length should not exceed 15 mm, also can be installed on a short tube. When installing a short tube diameter of 2 " to 6", the installation of a short tube height should $\leq 100$ mm (Thread length and short tube shorter measurement will be more stable), If you install a short pipe is longer, it is best to cut it short, or using insulation bracket fixed cable type probe, avoiding probe in contact with the short end of the pipe to further affect the measurement.
DN200 or DN250 installed in the short tube

When guided wave radar level meter need to be installed at the short pipe diameters greater than 200mm, the short tube wall will produce an echo, the medium in the case of a low dielectric constant can cause measurement errors. Therefore, with a diameter of 200mm or 250mm short tube, you need to choose a special flange with a "horn Interface" of.

Installation Notes on plastic containers

Whether cable or rod type, if you want to guided wave radar is working properly, the process of connecting to the metal surface should be. When the guided wave radar mounted on a plastic pot, If the tank top is plastic or other non-conductive material, the instrument needs with metal flanges, the use of threaded connections, to be equipped with a metal plate.

Optimized interference

Interference echo suppression: Software can be realized on disturbance echo suppression, to achieve the desired measurement results.
For a medium viscosity of less than 500cst, can bypass pipe or waveguide (Only for liquids) to avoid interference.

**Installation of low dielectric constant of the liquid**
For dielectric constant greater than 1.3, the viscosity ≤500cst, and is not easy adhesion medium, guided wave radar meter can be installed in the waveguide is measured, has the following characteristics:
- superior reliability, high-precision
- Can be used in any medium of dielectric constant ≥1.3, it doesn't matter between measurement and conductive medium.
- obstructions and short pipe size does not affect the measurement

**Corrosive media measurement**
If the measurement of corrosive media, the choice of rod or cable probe sets PTFE, PFA sleeve measurement.

**installed in horizontal and vertical tank on tank**
- Rod probe can be up to six meters, more than six meters for measuring distances tank, the choice of 4mm rope probe.
- Installation and fixation with the same measurement of solid powder compartment.
- Distance from the tank wall ≥300mm, the probe must avoid contact with the tank wall.
- In the choice of probe length, note at the bottom of the probe from the tank bottom distance> 30mm.
- If obstructions are more, or too close to the probe by the sensor, it can then be measured by installing tube waveguide.

**The matters needing attention:**
- To be measured in the waveguide radar, generally used in rod probe sensors, during installation You should use insulated bracket fixed probe, ensuring rod probe with concentric waveguide, or they will have a very strong false echoes.
- When measuring range exceeds the maximum measuring range rod probe should be used in guided wave radar probe cable, In this case waveguide diameter should be greater than or equal to 6", otherwise it will generate strong false echoes.

**Installation of right and wrong**

![Diagram](image)

Wrong: Do not install the meter above the feed inlet stream, cable or rod should avoid material entrance.

Correct:
Note: when installed outdoors take shade, rain measures
Moisture:

For instruments installed outdoors or indoors and wet cooling or heating of the tank, in order to moisture, should tighten the cable jacket, but also to the cable at the inlet bend downward, as shown in Figure.

4、Structure Size (Unit: mm)

5、The Electrical Connection

Power Supply

(4~20) mA/HART (Two-wire)

Power supply and current signal are carried by the same two-wire connection cable. See the Technical Specifications of this guide for
detailed requirement on power supply. A safety barrier should be placed between power supply and instrument for intrinsically safe version.

(4~20) mA/HART（Four-wire）

Power supply and current signal are carried by two 2-wire connection cables respectively. See the Technical Specifications of this guide for detailed requirement on power supply.

Earth-connected current output can be used for standard version of level instruments, while the explosion proof version must be operated with a floating current output. Both instruments and earth terminals should be connected with ground firmly and securely. Normally you can either choose to connect with the earth terminal on vessel or adjacent ground in case of plastic vessels.

● Cable Connection

General Introduction

Supply cable can use ordinary two-core cable, the cable diameter should be (5 ~ 9) mm, to ensure that the cable entry seal. If electromagnetic interference exists, recommended to use shielded cable.

(4~20) mA/HART（Two-wire）

Supply cable can use ordinary two-core cable.

(4~20) mA/HART（Four-wire）

Supply cable should be used with a dedicated ground cable.

Shielding and wiring

The two ends of shielded cable must be connected with earth terminal. The shielded cable must be connected with inner earth terminal directly inside the transducer, while the outside earth terminal on housing must be connected with ground. In the event of earth-connected current, the shielding side of shielded cable must be connected to ground potential via a ceramic capacitor (e.g. 1 F/1500V) in order to dampen the low frequency grounding current and avoid the disturbance caused by high frequency signals.

● Wiring Diagram

24V  2-wire:
220V 4-wire:

- **Explosion Proof Connection**

The intrinsic safety version sensors (Exia IIc T6) use Alu-die casting housing and filling Silicone rubber sealants internal structure aimed to prevent sparks resulted from circuit failure from leaking out. It is applicable for the continuous level measurement of flammable medium under Exia IIc T6.

A safety barrier FBS-2 must be used together with the intrinsic safety instrument. It is an associated device to this product for the power supply of this product. The main specification is intrinsic safety: Exia IIc, voltage of power supply: 24V DC ± 5%, short-circuit current: 135mA, operating current: 4...20mA.

All cables must be shielded. The max length is 500m for the cable from the barrier to the sensor. Stray capacitor ≤ 0.1 μ F/Km, stray inductance 1mH/Km. Instrument must be connected to the ground potential. Any unapproved associated device is not allowed to be used.


**Safety instructions:**

- Please observe the local electrical code requirements!
- Please comply with local requirements for personnel health and safety regulations. All electrical components of instrument operation must be completed by the formal training of professionals.
- Please check the instrument nameplate to provide product specifications meet your requirements. Please make sure that the power supply voltage and instrument nameplate on the requirements.

**Protection Grade:**

The instrument fully meet the requirements of protection class IP66/67, make sure the cable head waterproof seal. As shown below:

![Protection Grade Diagram](image)

- How to ensure that the installation meets IP67 requirements:
  - Make sure that the sealing head is not damaged.
  - Make sure that the cable is not damaged.
  - Make sure the cable is used in line with the electrical connection specifications.
  - Before entering the electrical interface, the cable is bent downwardly, to ensure that water does not flow into the casing, see ①
  - Please tighten the cable sealing head, see ②
  - Keep electrical interface with blind unused block after block tight, see ③

**6. Adjustment Instructions**

**Adjustment Methods:**

- Display/adjustment module ViewPoint
- An adjustment software
- HART handheld programmer
● Display / Adjustment Module

ViewPoint is a pluggable display/adjustment module. The adjustment can be done through operating with four buttons on ViewPoint. Optional menu operation languages are available for selection. ViewPoint is only used for display after adjustment in that the measurement results can be seen clearly through the glass window.

Display / Keypad

1. Liquid Crystal Display
2. Adjustment Keypad

● PC debugging

Connect with another unit through HART

1. RS232 Connect Cable/USB port
2. Radar level meter
3. HATR port adapter used on COMWAY convertor
4. 250 ohm Resistance

● HART Handheld Programmer

Adjust meter with HART Handheld Programmer

1. HART Handheld Programmer
2. Radar level meter
3. 250 ohm Resistance
7. Technical Specification

General Parameters

Probe Material:
- Rod: Stainless Steel 316L/PTFE
- Cable: Stainless Steel 316L/PTFE
- Coax: Stainless Steel 316L/PTFE
- Seal: Viton fluoroelastomer, Kalrez perfluoroelastomer
- Process Connection: Stainless Steel 316L
- Shell: Stainless Steel 316L, Plastic, Aluminum
- Alu-die casting, Powder Coated
- Seal ring between the shell and the shell: Silicone Rubber
- ViewPoint Window: Polycarbonate
- Ground Terminal: Stainless Steel 316L

Power

2-Wire
- Standard Version: (16~36)V DC
- Intrinsic Safe Version: (21.6~26.4)V DC
- Power Consumption: max. 22.5mA
- Ripple Allowed: Uss < 4V
- (100~100K)Hz: Uss < 10mV

4-wire
- Intrinsic Safe + Explosion-Proof: (22.8~26.4)V DC, (198~242)V AC
- Power Consumption: max. 1VA, 1W

Parameters on Cable

- Cable Entry/Plug: One cable entry of M20x1.5 (cable diameter of 5~9mm)
- One blind stopper M20x1.5
- Spring Connection Terminal: Applicable for cables with cross section of 2.5mm

Output

- Output Signal: (4~20)mA/HART
- Resolution: 1.6μA
- Failure mode: 20.5mA; 22mA; 3.9mA, hold
- 2-wire load resistance: See the diagram below
- 4-wire load resistance: Max.500 ohm
Integration Time (0~40) sec, adjustable

2-Wire Load Resistance Diagram

Technical data

Max Measurement Distance
701  30m/6m (Cable/Rod)
702  20m/6m (Cable/Rod)
703  30m/6m (Cable/Rod)
704  6m
705  15m/6m (Cable/Rod)

Measurement Interval About 1 sec (Depend on parameter settings)
Adjustment Time About 1 sec (Depend on parameter settings)
Resolution of Display 1mm
Accuracy ±10mm (See the accuracy illustration diagram below)

The accuracy illustration diagram

Temperature for Storage/Transport (-40~80) °C
Process Temperature (Probe)
701, 704 (-40~250)°C
702 (-40~200)°C
703 (-40~150)°C
705 (-200~400)°C

Relative Humidity <95%
Pressure Max. 40MPa
Vibration Proof Mechanical vibration 10m/s², (10~150)Hz
When measuring solid medium, the pulling force is determined by the diameter of vessel and medium level, some examples of pulling force generated by typical medium are shown on the diagrams below.
Guided Wave Radar Level Meter