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1. Safety Instructions

1.1 Intended Use

This Tek-Flex 4100D Explosion-Proof Guided Wave Radar Level Transmitter measures distance and level of liquids. It can also measure the level and interface of liquids at the same time.

1.2 Certification

Tek-Flex 4100D Explosion-Proof Guided Wave Radar Level Transmitter CSA certified to be installed in hazardous areas.

1.3 Safety Instructions from the Manufacturer

1.3.1 Disclaimer

The manufacturer will not be held accountable for any damage that happens by using the product, and not limited to, direct, indirect, or incidental and consequential damages. Any product purchased from the manufacturer is the assurance by the relevant product documentation and our Terms and Conditions of Sale.

The manufacturer has all rights to modify the content of this document at any time with any reason and without any prior notice, will not be answerable for the possible consequence of such changes.

1.3.2 Product Liability and Warranty

The operator shall bear authority for the suitability of the device for the specific application. The manufacturer accepts no liability for the consequences of misuse by the operator. A wrong installation or operation of the devices (systems) will cause the warranty to be void. The respective Terms and Conditions of Sale, which forms the basis for the sales contract shall also apply.

1.3.3 Information Concerning the Documentation

It is essential to read the information in this document and the applicable national standard safety instructions for preventing any injury or damage of the device and operator. This operating manual contains all the information required in various stages, such as product identification, incoming acceptance and storage, mounting, connection, operation and commissioning, troubleshooting, maintenance, and disposal.

1.4 Safety Precautions

You must read these instructions carefully before installing and commissioning the device. These instructions are an essential part of the product and must be kept for future reference. Only by observing these instructions, optimum protection of both personnel and the environment, as well as safe and fault-free operation of the device can be ensured. For additional information that are not discussed in this manual, contact the manufacturer.



WARNING

Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.



CAUTION

Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.



NOTE

Indicates that operating the hardware or software in this manner may damage it or lead to system failure.

1.5 Packaging, Transportation and Storage

1.5.1 Packaging

The original package consists of

1. Tek-Flex 4100D Explosion-Proof Guided Wave Radar Level Transmitter.
2. Documentation.

1.5.2 Transportation

- Avoid impact shocks to the device and prevent it from getting damaged during transportation.
- Verify local safety regulations, directives, and company procedures with respect to hoisting, rigging, and transportation of heavy equipment.
- Transport the product to the installation site using the original manufacturer's packing whenever possible.

1.5.3 Handling

- Use a sling to lift and carry the instrument.
- Lift the instrument using the process connection.

Do not lift the instrument on the transmitter housing or on the transmitter rod.



WARNING

The centre of gravity of the instrument is higher than the suspension points of the sling. There is a risk of injury if the instruments slips. Fulfil the local safety instructions while lifting the instrument.

1.5.4 Storage

If this product is to be stored for a long period of time before installation, take the following precautions:

- Store your product in the manufacturer's original packing used for shipping.
- Storage location should conform to the following requirements:
 - Free from rain and water

- Free from vibration and impact shock
- At room temperature with minimal temperature and humidity variation

1.5.5 Nameplate

The nameplate lists the order number and other important information, such as design details and technical data.



NOTE

Check the device nameplate to ensure that the device is delivered according to your order. Check for the correct supply voltage printed on the nameplate.



2 Product Description

This section covers the reference and specification data, as well as ordering information.

2.1 Principal of Operation

The Tek-Flex 4100D Explosion-Proof Guided Wave Radar Level Transmitter is a smart line transmitter designed to measure the level of solid and liquid material. The Explosion-Proof Guided Wave Radar Transmitter operates on the Time Domain Reflectometry principle, which transmits electromagnetic pulses guided by steel wire or tube/rod to propagate at a speed of light. When the pulse reaches the surface of the medium to be measured, it gets reflected along with part of the energy due to the different dielectric constant of air and the material. The time difference between generated and reflected pulse is used to calculate the distance between the surface of the medium and transmitter.

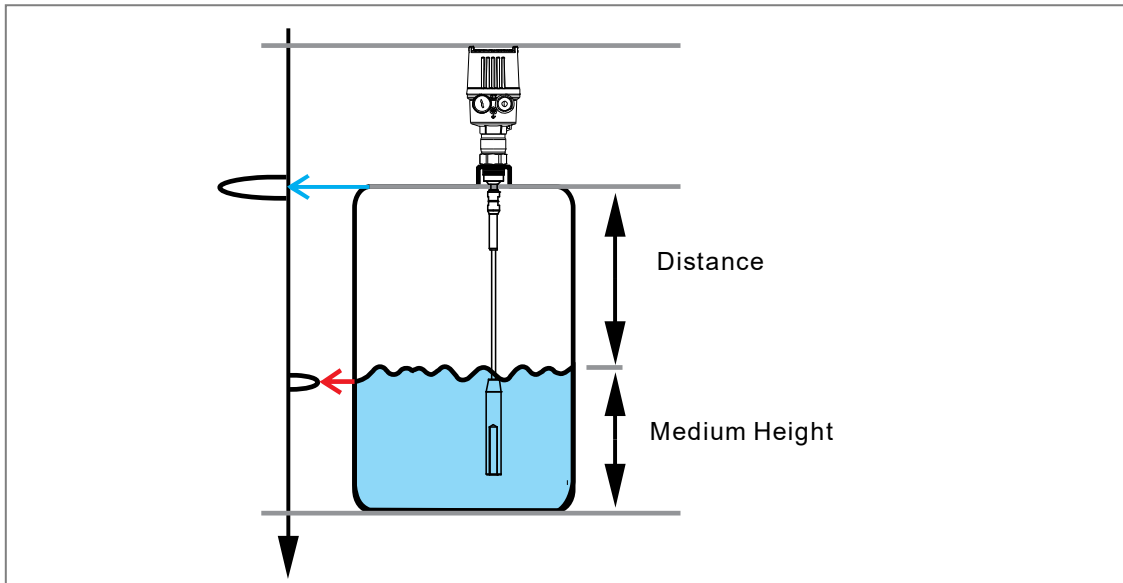


Fig. 2.1: Operation of Tek-Flex 4100D Explosion-Proof Guided Wave Radar Level Transmitter

2.1.1 Bottom Tracking Probe Technology

In interface applications where the dielectric constant is very low such as plastic particles material, or the signal is attenuated, due to this, the amplitude of the reflected signal is relatively low and difficult to detect for the transmitter. In such a situation, bottom tracking probe technology is beneficial to increase the sensitivity of the reflected signal. The level measurement value depends on the last recorded dielectric constant if the dielectric constant is less than 3, which affects the measurement accuracy.

2.1.2 Dual-Level Interface Measurement

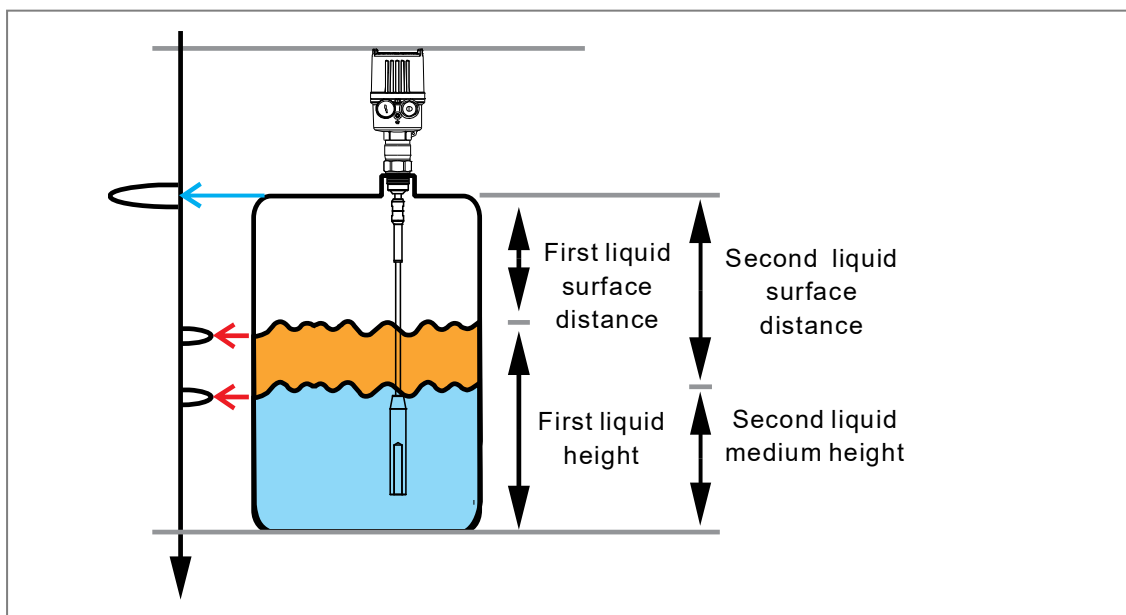


Fig. 2.2: Dual-Level Interface Measurement

Tek-Flex 4100D is an ideal choice for measuring the dual-level interface of any liquid with significantly different dielectric constant. The high-frequency microwave pulse

travels through steel wire or tube/rod when it reaches the surface of the media, part of the microwave pulse reflected. The first part penetrates the upper layer product, and the second part reflects between the upper and lower interface layers. The two periods of pulse running simultaneously, that calculated by PCB inside the instrument, which provides two output levels.

- Measurement condition of dual level interface:
 - Upper Layer product:
 - The upper layer product must be non-conducting.
 - The dielectric constant of the upper layer product must be known. It is must be larger than 1.6
 - It must be stable and uniform.
 - Thickness of upper layer product must be larger than 2" (50 mm) and separated from lower layer product. In case of the emulsion layer, the maximum thickness should be 2" (50 mm); if possible, the surface should be without foam, which gives better measurement results.
 - Lower Layer product:
 - The lower layer product either conducting or non-conducting.
 - The dielectric constant of the lower layer product must be known. It is must be 10 times larger than upper layer product.

2.2 Models

The Tek-Flex 4100D Explosion Proof Guided Wave Radar Level Transmitter is available in 4100D configuration.

2.3 Technical Specifications

Model	4100D
Application	Liquids, Solids and Interface
Measuring Principle	TDR (Time Domain Reflectometry)
Wetted Materials	316 SS, 304 SS and PTFE
Measuring Range	60' (18m) Cable; 10' (3m) Rod
Accuracy	±5mm
Process Pressure	0 to 870 psi (0 to 60 Bar)
Process Temperature	-40 to 302°F (-40 to 150°C)
Process Connections	1-½" NPT; Optional 2" and 3" 150# ANSI Flange
Protection Category	IP67
Housing	Aluminium Alloy
Electrical Connection	½" NPT
Power Supply	16 to 30 Vdc
Analog Output Signal	4 to 20 mA
Minimum Dielectric Constant	1.6
Digital Communication	HART (2-Wire), Modbus (4-Wire)
Approvals	Class I Div I Group A, B, C & D, T3C (CSA)

2.4 Electrical Specifications

2.4.1 Current Output

A passive current output of 4-20mA can be configured to indicate the level or distance.

Analog Output	4 to 20 mA
Digital Output	HART or RS485 Modbus
Resolution	0.2" (5mm)
Accuracy	0.2" (5mm)
Ambient Temperature	-40 to 176°F (-40 to 80°C)
Operating Temperature	-40 to 300°F (-40 to 150°C)

2.4.2 RS 485 Output

RS485 output is compatible with the RTU mode of the Modbus protocol. For details, contact Tek-Trol.

2.4.3 Power Consumption

The maximum power consumption for Level transmitter is 2.4 W.

2.5 Dimensional Drawings:

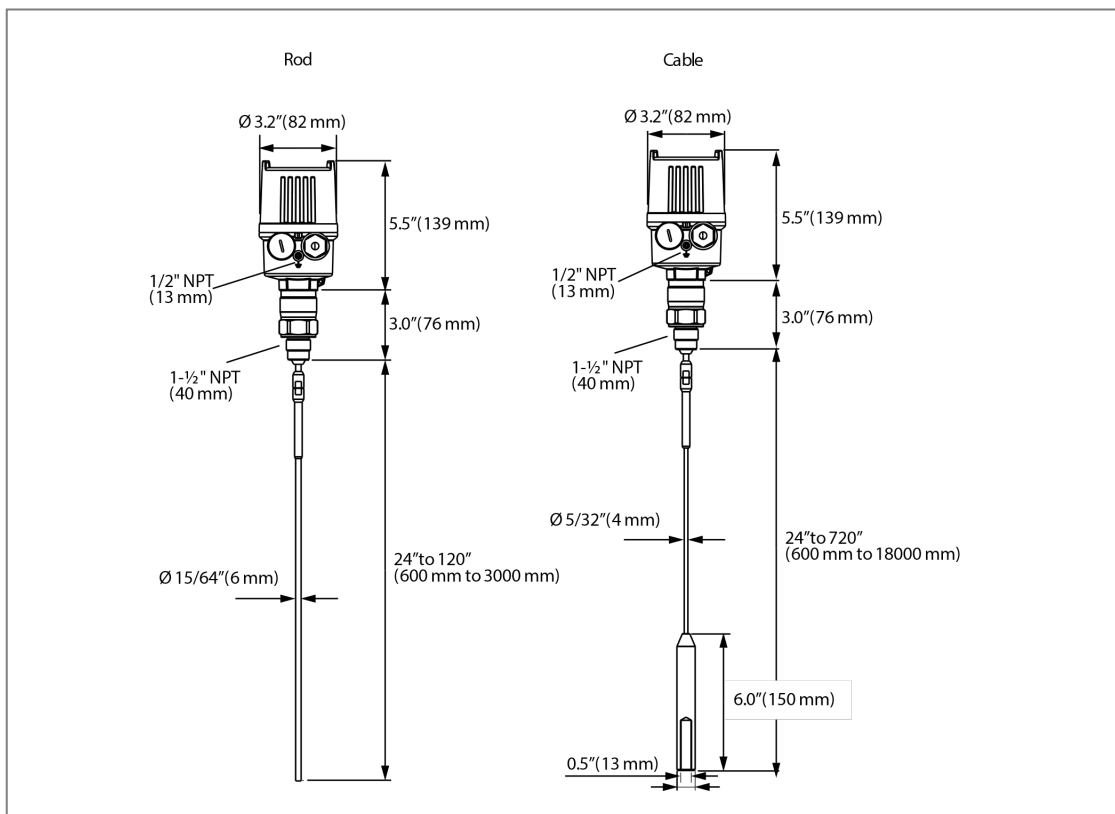


Fig. 2.3: Dimensional Drawings

2.6 Model Chart

Example	Tek-Flex 4100D	XP	R	1	2	N	A	240	Tek-Flex 4100D-XP-C-1-2-N-A-240
Series	Tek-Flex 4100D								Explosion-Proof Guided Wave Radar Level Transmitter
Enclosure		XP							Explosion-Proof Class I Division I
Probe Type			R C						316 SS Rod (up to 10') 316 SS Cable (up to 60')
Process Connection				1 2 3					1-½" NPT 2" 150# ANSI Flange 3" 150# ANSI Flange
Output					2 4				Two 4 to 20mA with HART Two 4 to 20mA and Modbus RS485
Electrical Connection						N			Two ½ " NPT Female
Display							A		Removable LCD Display
Probe Length								XXX	Probe Length in Inches

2.7 Installation

2.8 Basic Requirement for Installation

This section covers instructions on installation and commissioning. Installation of the device must be carried out by trained; qualified specialists authorized to perform such works.



CAUTION

- When removing the instrument from hazardous processes, avoid direct contact with the fluid and the meter.
- All installation must comply with local installation requirements and local electrical code.

2.8.1 General Instructions

Procedures and instructions in this section provide safety precautions of the personnel performing the operations. A warning symbol indicates information that increases potential safety issues. Lock Instrument When locking the instrument and the tank, the suitable hex wrench is used to fasten it.

Note! During the installation, please apply force on the hex screw to fasten it. Don't apply force on the instrument housing because it may damage the internal parts.

Moisture Proof Instructions

Please refer following precautions for the instrument from moisture effects:

- Use appropriate cable (The standard cable for the instrument is 1/2" NPT cable connector) for fastening the cable connector.
- Prevent Moisture, cable connectors directed downwards at the time of installation.
- When cable is connecting, leave a small segment of cable is hanging down in front of fixing header.

- Prevent Moisture that should not be entered in housing through cable. Please pay special attention to moisture proofing when the product is applied in the following environments:
- Outdoor installation.
- Installation in areas with estimated high moisture (such as cleaning process equipment).
- Installation in cooling or heating containers.

Operating Conditions

Please check whether the specifications of all parts meet the operating environment, when the instrument is use:

- Sensor Measurement.
- Connect and Fix thread or flanges.
- Seal Material
- Operating Pressure
- Operating Temperature
- Properties of Chemical media
- Abrasion and Mechanical effects



NOTE

If the instrument is applied in the pressure tank or the low-pressure container, it must be sealed when fixing during the installation. Before usage, it must be checked as to whether the operating temperature of the sealing material meets the ambient temperature.

2.9 Installation Guidelines

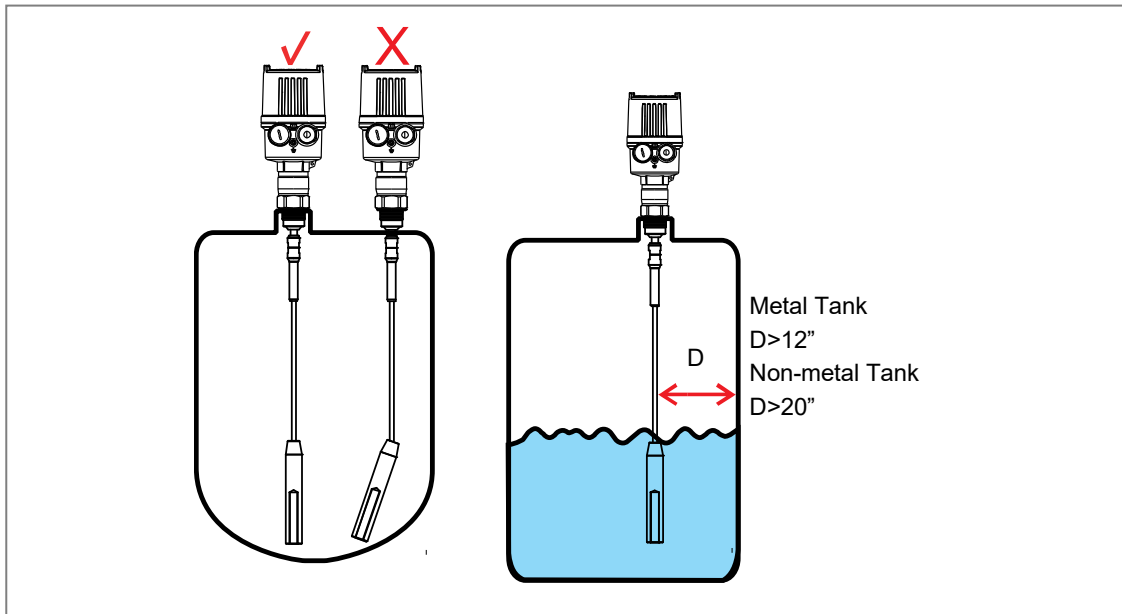
2.9.1 Instruction for 4100D Series Products Installation

- For metal containers or tank: Distance between container parts and the inner wall of the container should be at least greater than 12".
- For non-metal container or tank: Distance between container parts and the inner wall of the container should be at least greater than 20".
- Make sure that the sensor does not come into contact with any objects in the tank.
- If the sensor contains steel rope, please fix the sensor bottom in the tank to reduce the vibration of the sensor is recommended.
- For the lowest part of core shape tank, installation in the center of the container is recommended to measure the lowest point at the bottom.



NOTE

Unable measure the lowest point of the sensor if the instrument is blind in the upper and lower area.



i NOTE

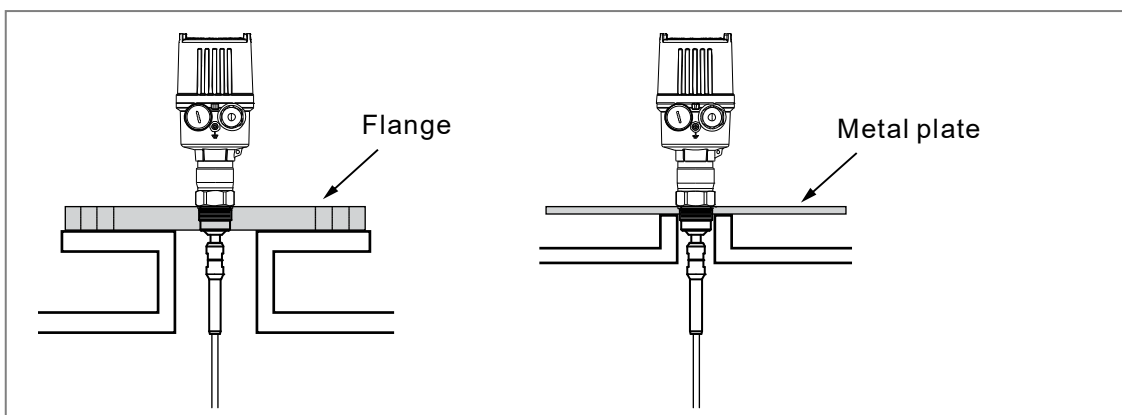
Requesting to remove the electronic module of the sensor from the junction box before welding. It can prevent the damage on the electronic device due to the inductive coupling or other abnormalities.

2.9.2 Plastic Tank/Glass Tank

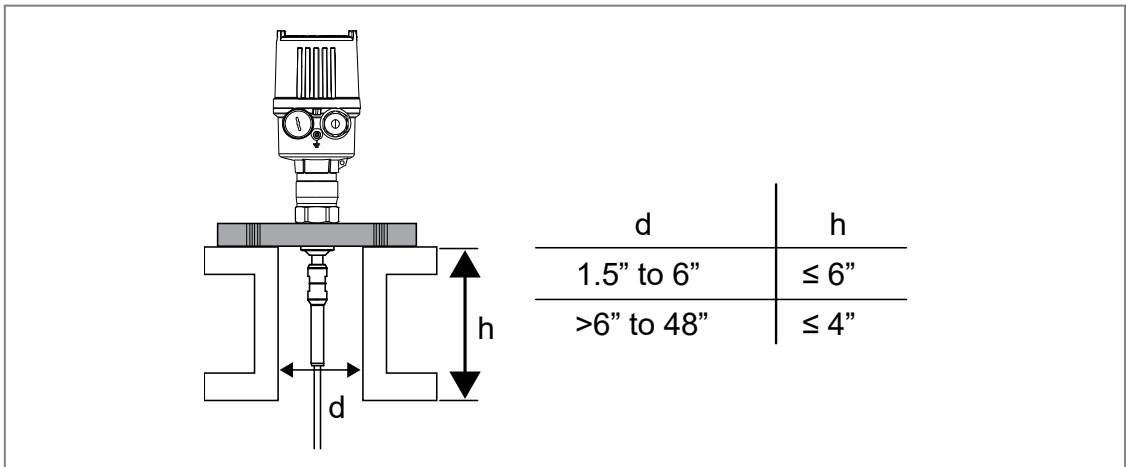
At the process junction point, Explosion-Proof Guided Wave Radar requires a metal plane for level measurement, which is not possible with plastic containers; therefore, it requires instrument with flange (2") or a metal plate ($\varnothing > 8"$ (200mm)) placed under the process connection.

i NOTE

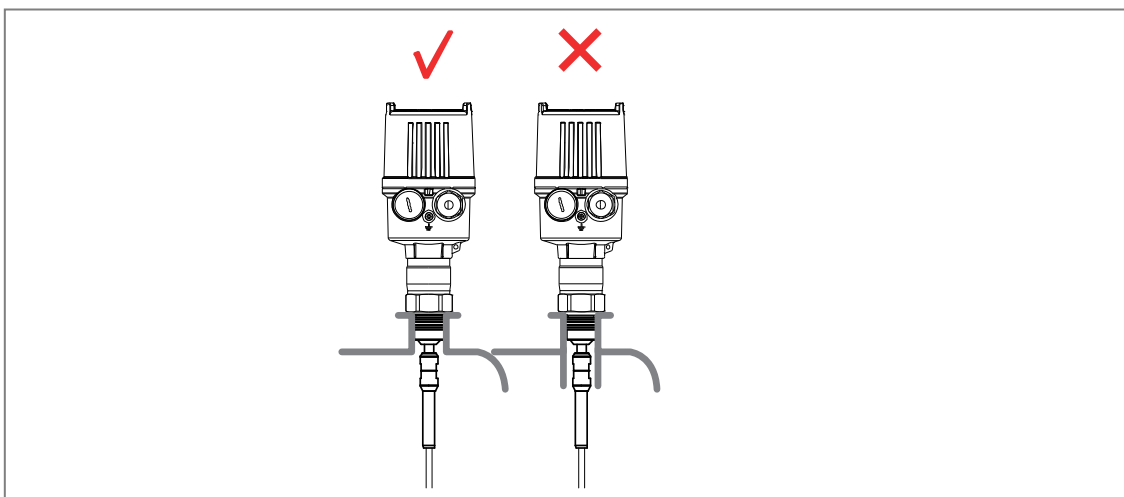
The metal plate should be connected directly with the process connection. When installing the sensor of the connecting rod or steel rope in the plastic container without a metal wall, the measured value will be affected by the strong electromagnetic field (The interference emission based on EN 61326: Class A).



Do not use extension pipe on the container; Kindly install the sensor and the container cap flush with the ground.

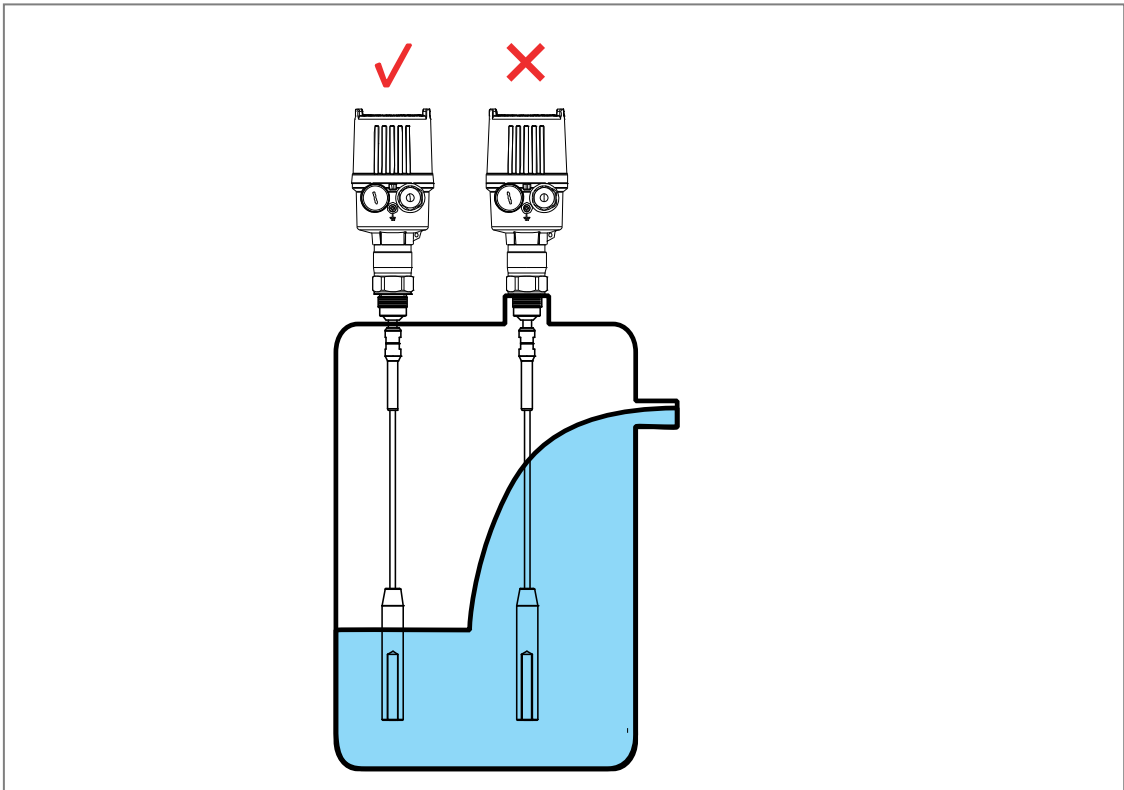


Please make the edge of the extension pipe connector flush with container cap, when welding the connector to the extension pipe.



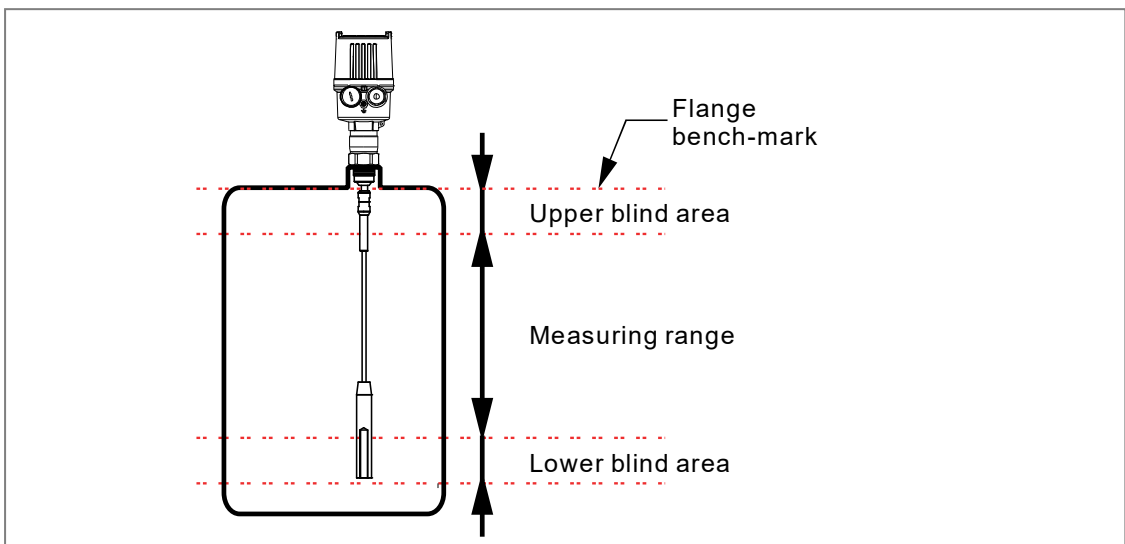
2.9.3 Feeding Tank Installation Precautions

- Do not install the instrument in feeding port.
- The instrument must be in stable position media for accurate measurement.



2.9.4 Measuring Range

The measuring range is from the bottom of flange is shown in figure below



NOTE

The measuring range is for and is located at the bottom of the sensor. It does not include the upper/lower blind areas. Default measuring range of the instrument is based on the media, "water".

2.10 Wiring

2.10.1 Basic Requirements

Local or electrical codes assemble the electrical connections or instrument wiring. An overvoltage prevention device should be installed to protect the instrument. The instrument wiring is only permitted when it is powered OFF.

2.10.2 Cable Connection

The instrument can be connected without shielding layer 2-wire. The electromagnetic phenomenon occurs in the installation and wiring environment value, which increases by comparing inspection value as per the EN61326-1 Standards in the industrial field. Due to the electromagnetic phenomenon, using a shielded cable is recommended. A Circular cross-section cable is used for an instrument with a housing and cable screw thread connector. To ensure the sealing on the cable screw thread connector (IP protection method), please check the external diameter of the cable. Please use the cable screw thread connector matching with the cable diameter.

2.10.3 Earthing

When wiring, please follow the requirements of DIN EN 61140 VDE 0140-1(Protection against electric shock - Common aspects for installation and equipment), to guarantee the safety isolation between the power circuit and the grid circuit.

Recommended using shielding isolated mesh cable; by setting up the shielding isolated mesh on both sides of the earth potential. In the sensor, the shielding isolated mesh must be connected with the internal grounding terminal. The external grounding terminal on the housing must be connected with the low impedance of the earth potential. For explosion-proof equipment, it should perform grounding based on the requirements on the license. For the electroplating and KKS equipment (cathodic anti-corrosion protection), the great potential difference should be considered. When the shielding isolated mesh is grounded on both sides, it may cause the current of the shielding isolated mesh to exceed the permitted scope.



NOTE

Transmitter housing should be grounded. After installation and commissioning, make sure that no ground current exists.

2.10.4 Power Line Wiring

The product is connected with a 2-wire to supply power and send current signal
Working voltage (Vs): With display adjustment module: 16-30VDC Load impedance: $(V_s - V_{min}) / 0.022A$ For example: When supplying 24VDC for the instrument with display adjustment module: $(24 - 16) / 0.022 = 363\Omega$.

3 Electrical Connections

3.1 Connection Methods

When wiring with 2-wire, go through the enclosure and make a connection based on the positive/negative power supply, as shown in the figure below. A flathead screwdriver is used for the connection.



Fig. 3.1: Electrical Connections

3.1.1 Wiring Steps

- Remove the display module by rotating it anticlockwise.
- Loosen the fixing screw on the cable screw thread connector.
- Remove the jacket of about 4in (10cm) on the cable and remove the insulation of 0.4in (1cm) at the core wire end.
- Check the cable if it goes through the cable connector and insert it inside the housing.
- Connect the wire to the terminal according to the wiring diagram, and check the wire is fixed firmly on the terminal by lightly pulling.
- Connect the shielding with the terminal of the internal grounding wire and connect the terminal of the external grounding wire with the electric potential compensation.
- Fasten the fixing screw of the cable screw thread connector, and make sure the sealing ring is surrounding the cable.
- Re-assemble the display module.
- Put on the housing cover to complete the electric connection.

3.1.2 Wiring Diagram

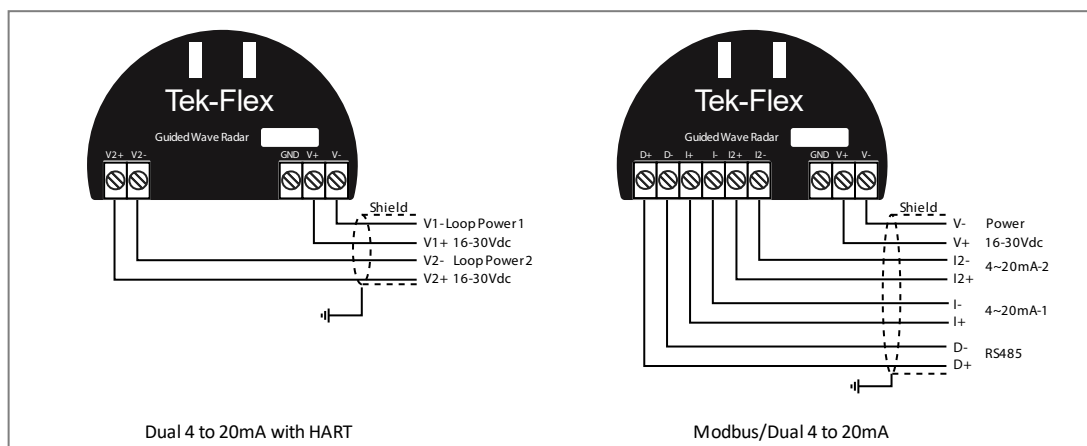


Fig. 3.2: Wiring Diagram



NOTE

The product is of 2-wire loop power supply. When it is applied for two analog outputs, the current for each circuit should be measured individually. Parallel connection of the two circuits will cause abnormal current output.

3.2 Instructions

After the instrument is connected with the power supply and powered ON again, it will start system initialization and self-diagnosis for about 30 seconds:

- Internal inspection of the electronic parts.
- It will show the model type, hardware and software version on the display mode.

4 Operation

4.1 Display Module and Adjustment Setting

4.1.1 Operation Step

- Rotate the housing cover anticlockwise to remove it.
- Adjust the display module on the electronic part at the required direction, rotate clockwise to fix it.
- Fasten the housing cover. The disassembly should follow the reverse direction.



Fig. 4.1: Display Setting

- [ENT] button: – Enter the menu–Confirm the selected content–Save the value
- [>] button: – Select item in the menu–Select the edit field
- [^] button: – Add setting parameter value
- [ESC] button: – Go back to the previous menu layer

4.1.2 Adjustments

The transmitter can be adjusted through the display module. LCM display can show the content of various menus. The functions of the 4 buttons are as introduced above. It shows the measurement value automatically if the buttons are not operated for 4

minutes. 4100D series Explosion-Proof Guided Wave Radar will perform a short self-diagnosis after it is powered ON. During the start-up procedure, the current output is 4.0mA. Moreover, the display module will show the information as below:

- Model type
- Software version (Software-Ver)
- Hardware version (Hardware-Ver)

4.1.3 Menu

The LCM display can show two data values and a percentage. The data values can be modified as distance or material height according to demands, which can be set to probe length/current/percent. When a single media is measured, the two data values are corresponding to the same measurement value. When it is applied in the liquid interface, the upper part shows the first interface measurement value, while the lower part shows the second interface measurement value.



The main menu is divided into 5 parts, as introduced below:

Setting: It includes the parameter settings related to measurement, such as unit, probe length, and high/low level adjustment.

Display: It includes the language, display content of the measurement value, contrast.

Diagnostics: It includes information such as the measurement peak, echo curve, instrument status, etc.

Additional Set: It includes the communication mode, reset, dielectric constant, etc.

Information: It includes the hardware and software version, the production date, etc.

4.1.4 Measuring Unit

Measurement Settings includes 6 parameters for setting, as following:

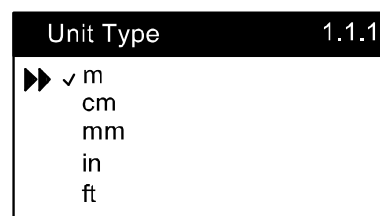
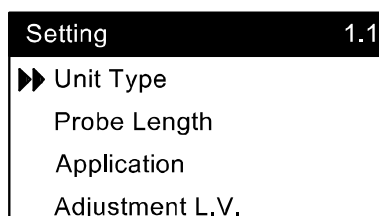
Unit Type: It sets the unit of measurement value shown on the LCM screen.

Probe Length: It sets the length of sensing probe.

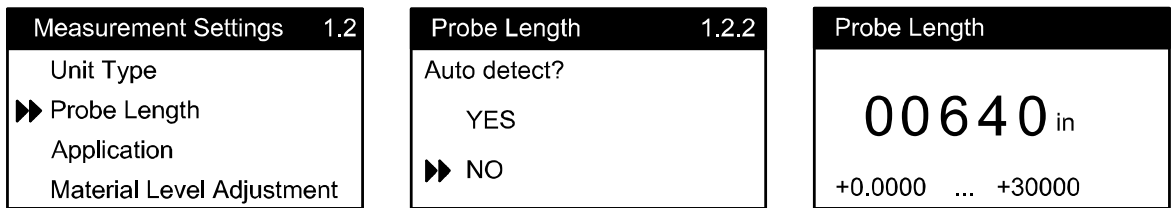
Application: It is to set the application model and dielectric constant of the media to be measured.

Adjustment: It is to set the upper/lower limit corresponding to 4-20mA and the percentage. **Filter Level:** It is to set the output filter level.

- **Current Set:** It is to set the current output direction (4-20mA/20-4mA).



In the Unit menu, user can adjust the unit of measurement value shown on the LCM display, with 5 available units, m/cm/mm/in/ft.

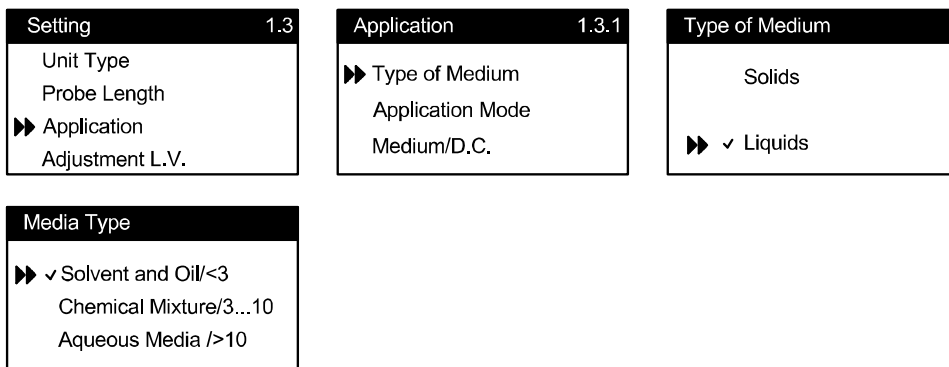


Probe Length is applied in the bottom tracking probe mode, which can be filled after the probe is changed, or detected automatically by placing the instrument in an empty tank.



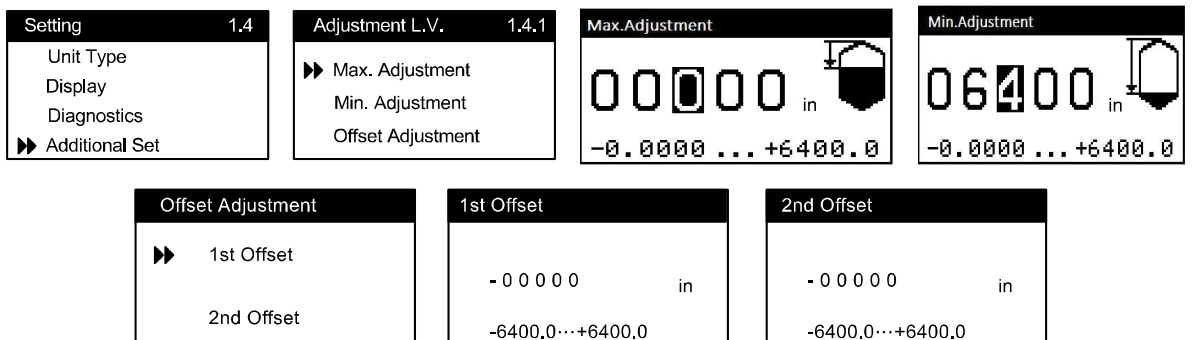
NOTE

The material height shown on the instrument is the probe length deducted with the distance from the material level to the flange reference plane.



Application menu provides settings based on application media and condition, including the following parameters:

- Media Type: Set media type to solid or liquid media.
- Media/ Dielectric Constant: For solid media, set the media as [Dust, Wood Chips/3]; For liquid media, set the media as [Solvent and Oil /10].

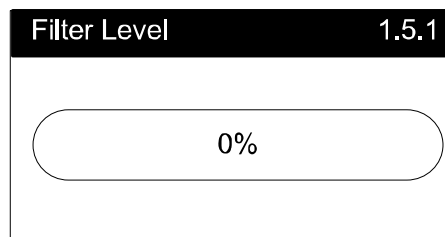
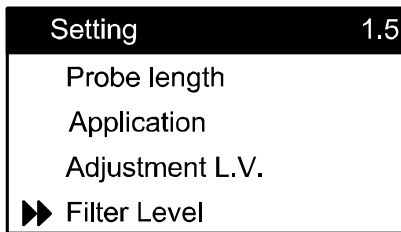


Material Level Adjustment menu can be divided into High Level Adjustment and Low-Level Adjustment used to set the upper/lower limit (0/100%) shown on the LCM display and upper/lower limit(4/20mA) of analog output.

Deviation Adjustment refers to the difference between the measured signal and the actual material height. You may set this value to change the measured value.

i NOTE

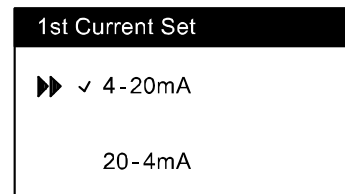
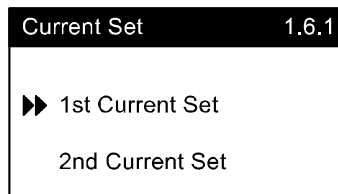
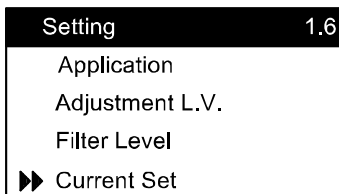
The parameter settings of High/Low Level Adjustment require inputting the distance from the bottom of flange.



Filter Wave Setting menu is used to adjust the filter wave degree of the output signal within 0%-100%, which is applied in fluctuating level.

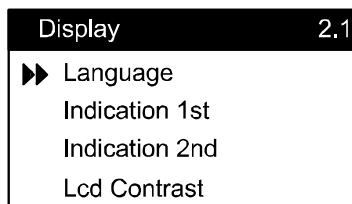
i NOTE

The higher the percentage of the filtered wave, the slower the output reaction time.

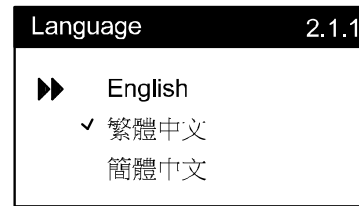
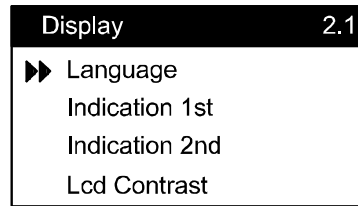


Current Settings menu can be divided into 1st and 2nd current set. The 2nd current set is only available for the models with dual-analog output. In this setting, the user may set the current output to correspond to the distance or the material height, with an output conversion of 4-20mA and 20-4mA.

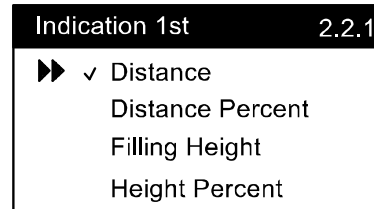
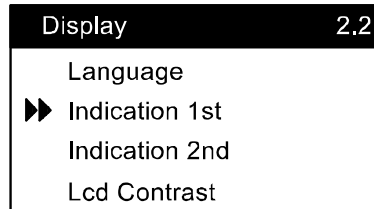
4.1.5 Display Setting Menu



Display Settings menu provides 4 settings items, along with the functions as following:
Language: It sets the language shown on the LCM display.

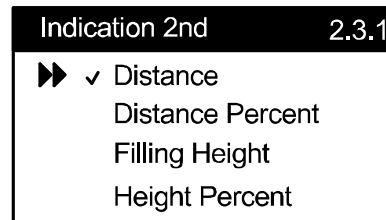
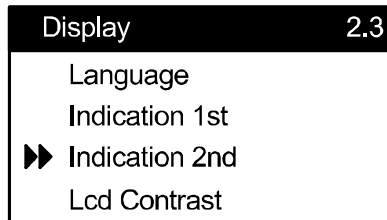


1st Indication: It sets the display content shown on the upper part of the LCM display.



1st Display menu allows you to adjust the content shown on the upper part of the LCM display. The content shown on the upper part includes Distance (distance from the reflection plane and the flange reference plane) or Material Height (height between the reflection plane and the probe bottom). The content shown on the lower part includes Distance/Percentage/Current.

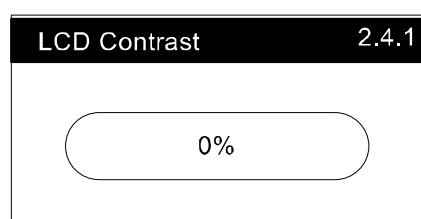
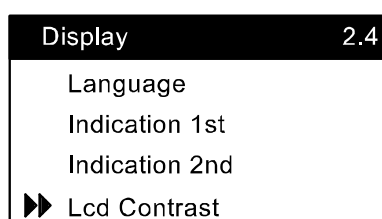
2nd Indication: It sets the display content shown on the lower part of the LCM display.



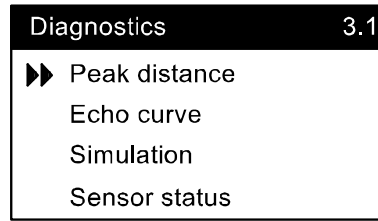
2nd Display menu allows you to adjust the content shown on the upper part of the LCM display. The content shown on the upper part includes Distance (distance from the reflection plane and the flange reference plane) or Material Height (height between the reflection plane and the probe bottom). The content shown on the lower part includes Distance/Percentage/Current.

Note! When it is applied in different interfaces, 2nd Display shows the measured value of the second reflection interface.

- LCM Contrast: It sets the display contrast shown on the LCM display.

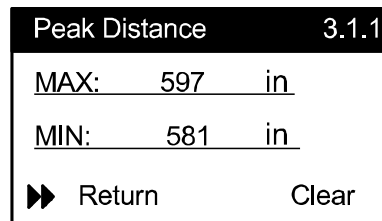
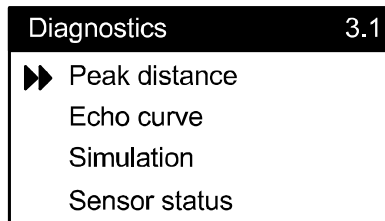


4.1.6 Diagnostics



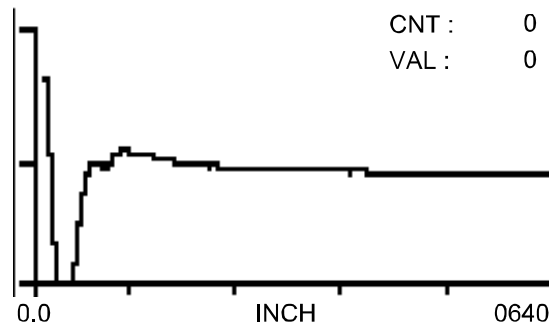
Diagnostics menu consist 6 parameters for setting, with the function as following:

- Peak distance: Allows to query and reset the measuring peak value.

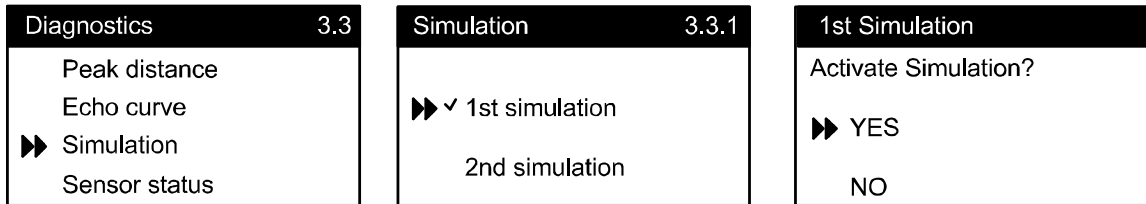


Peak distance menu records the measured peak value after start-up. This value can be queried and reset in this menu.

- Echo curve: Allows to view the echo curve of the measured signal.

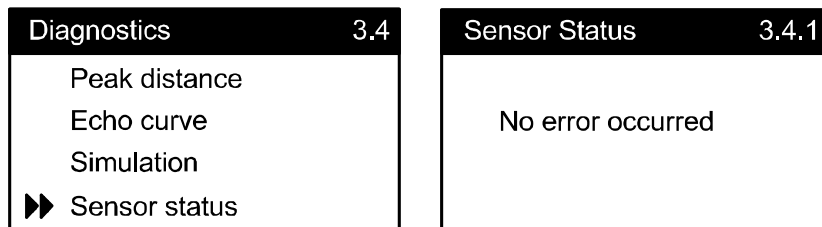


- Simulation: It simulates the height of the measured media.



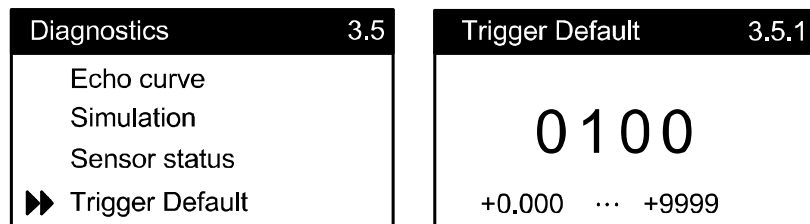
Simulation menu provides settings in two phases. The first phase is to select whether to start the simulation function. The second phase is to input the target distance value to be simulated.

- Sensor Status: Allows to view the sensor status.



Sensor Status menu allows you to query the current instrument status. Under normal status, it shows No Error. After self-diagnosis, it shows error code in case of error.

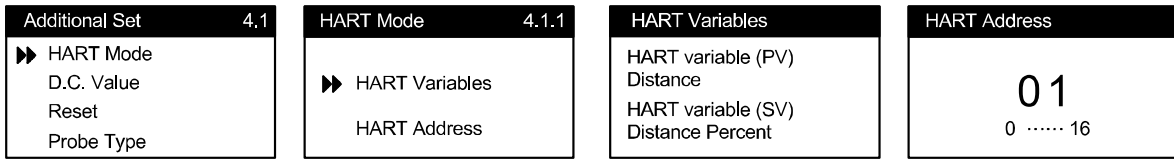
- Trigger Default: It sets the minimum level of echo signal.



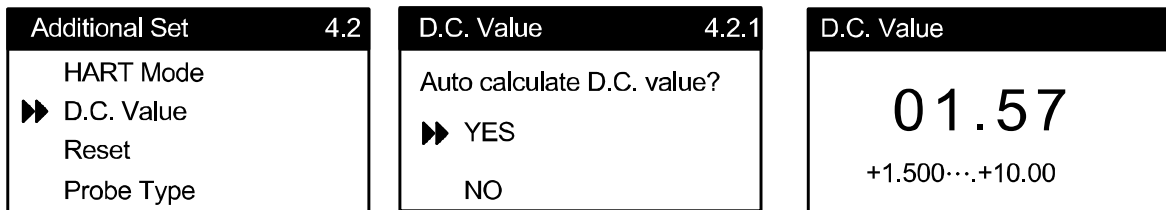
- Blind Distance: It is the distance from the bottom of flange that can't be measured.



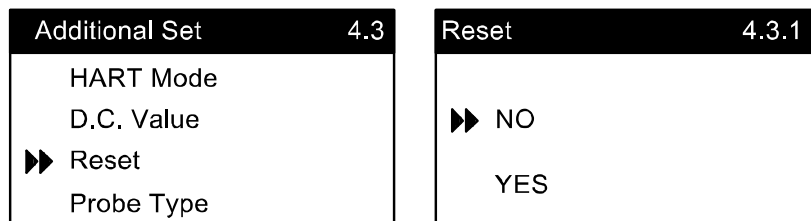
4.1.7 Additional Settings Menu



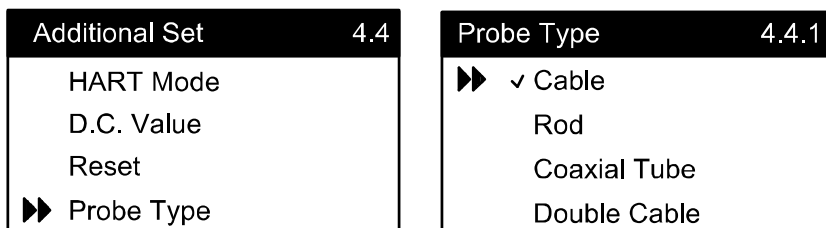
HART Mode menu, the first layer is divided into HART Variable and HART Address. HART Variable submenu allows you to query the data of 4 HART variables, while HART Address submenu is to set the communication ID.



D.C. Value menu is to set the dielectric constant of the media. It is used for the bottom tracking probe mode.

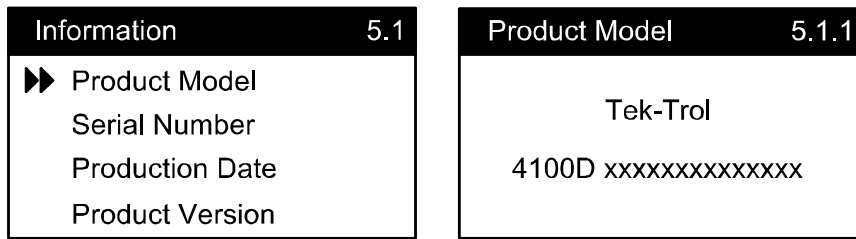


Reset menu is to restore to the factory settings. After Yes is pressed, all parameters will be reset.

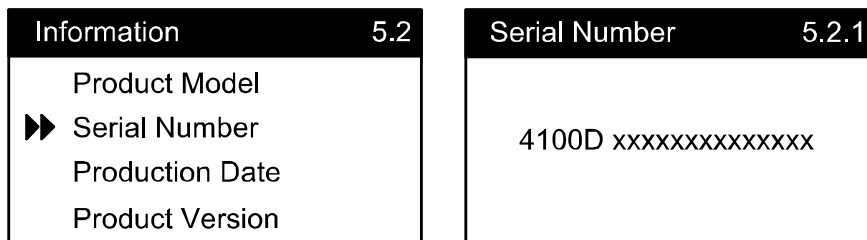


Probe Type menu provides the available probe types, Cable, Rod, Coaxial Tube, Double cable and Double Rod.

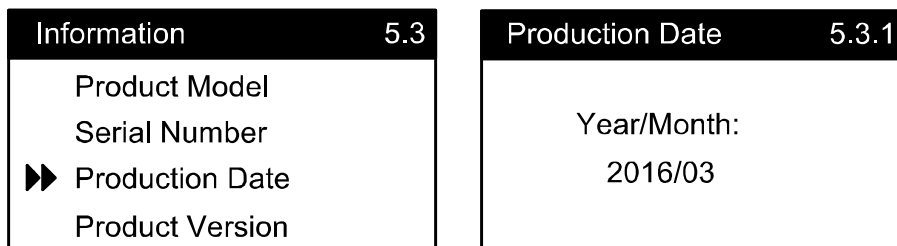
4.1.8 Product Information Menu



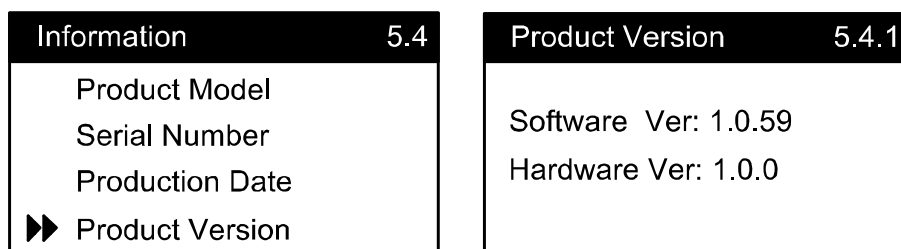
Product Model menu allows you to view the product model of the instrument.



Serial No. menu allows you to view the product serial number of the instrument.

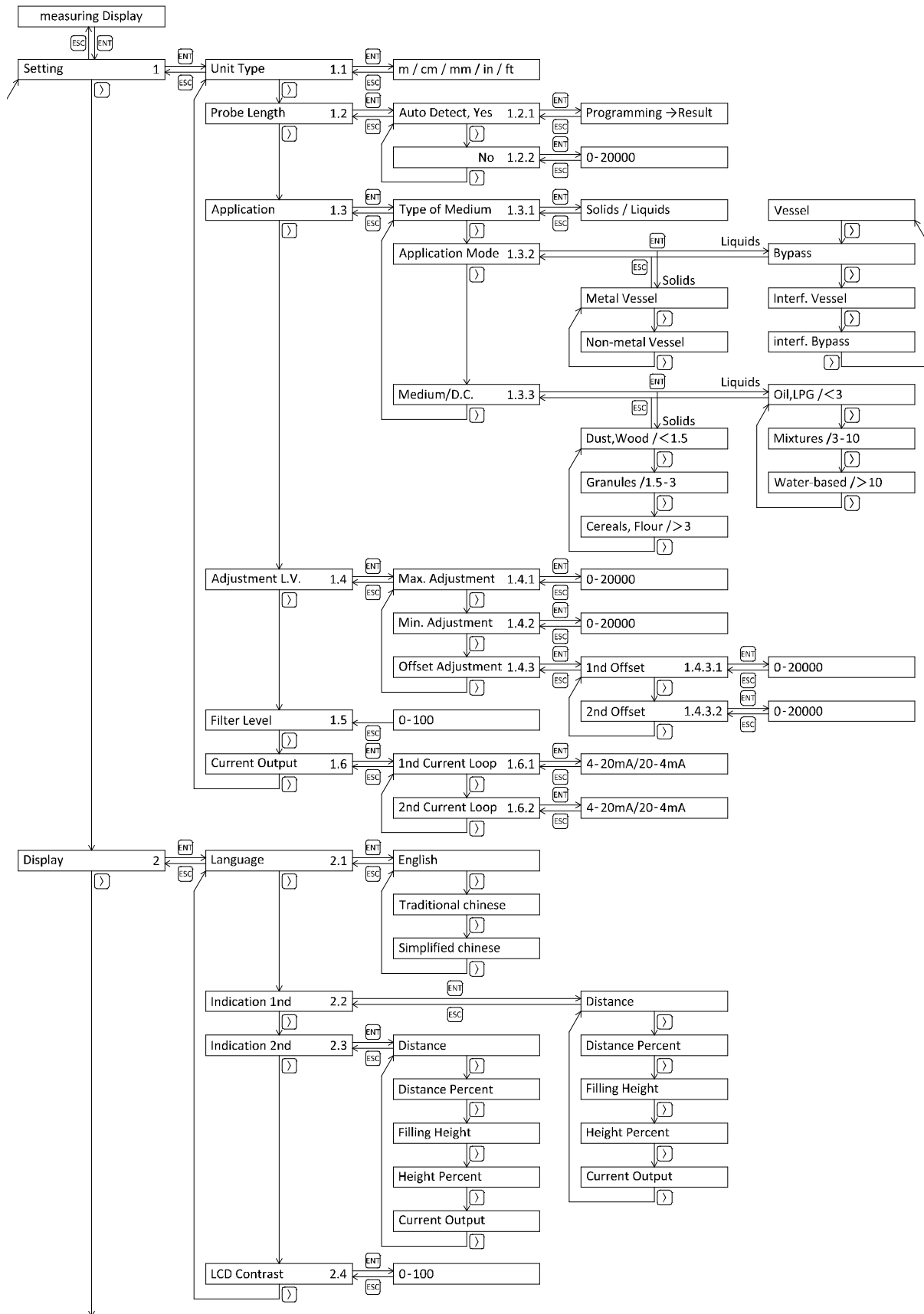


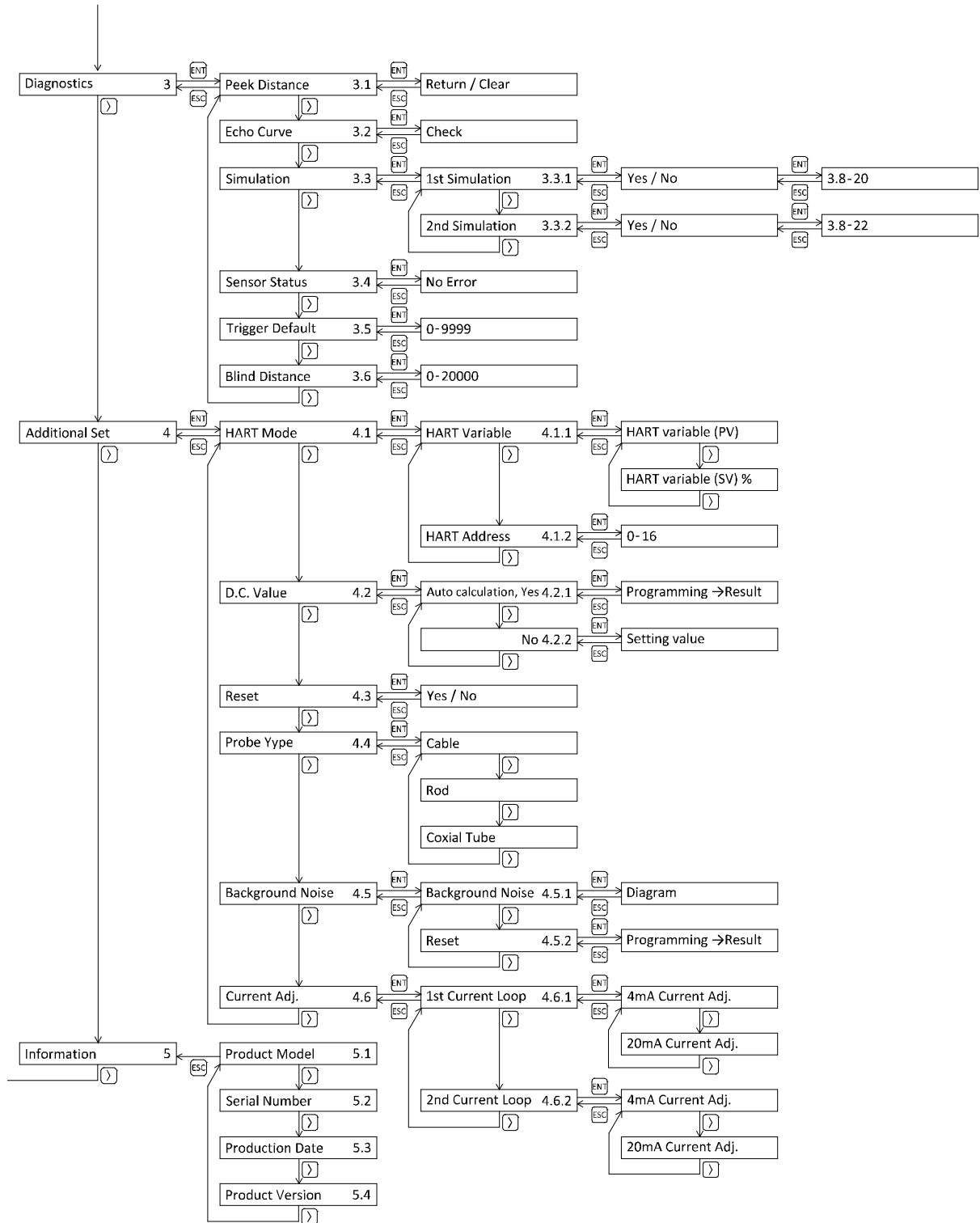
Production Date allows you to view the production date of the instrument.



Production Version allows you to view the product version of the instrument.

4.2 Menu Tree





5 Warnings and Cautions

- Casing material used is Aluminium.
- Please take precautions while Installation to prevent burn by shock or rub.
- Please take precaution to avoid static and burn caused by non-metal material.
- 4100D connect with equipment in non-hazardous area, please follow the user's manual and wire correctly.
- Shielded cable should be used when connect with external equipment. Shields should be well grounded.
- Customer is not allowed to replace components by themselves. It's requested to contact manufacturer and solve problem together to avoid damage happened.

The product installation, uses and maintenance shall follow the user's manual and the following standards :

- GB3836.13 (IEC 60079-19) "Electric Apparatus for Explosive Gas Atmospheres Part 13 : Equipment repair, overhaul and reclamation".
- GB3836.15 (IEC 60079-14) "Electric Apparatus for Explosive Gas Atmospheres Part 15 : Electrical installations design, selection and erection (Except for Coal Mine)".
- GB3836.16 (IEC 60079-17) "Electric Apparatus for Explosive Gas Atmospheres Part 16 : Electrical installations inspection and maintenance (Except for Coal Mine)".
- GB3836.18 (IEC 60079-25) "Electric Apparatus for Explosive Gas Atmospheres Part 18 : Intrinsically safe electrical systems".
- GB50257 "Electric Equipment Installation Engineering Code for Construction and Acceptance of Electric Device within Explosion and Fire Hazard Environments".

6 Troubleshooting

This section provides troubleshooting techniques for most common operating problems.

Abnormal	Cause	Solution
No LCM display No current output.	No power supply.	Check wiring and pin, and repair.
		Check power supply and open again.
No LCM display Have current output.	LCM module in bad connection.	Remove LCM first Disconnect the power in 3 seconds and reconnect it again Then install LCM immediately. Contact sales if it's still not solved.
	LCM is not installed for a long time; Instrument does not update LCM status.	
Not able to show the correct distance.	Signal is too low.	Press "ESC" to enter reflection page and check "L.V." , Reduce the trigger level under "L.V."
Measure the incorrect position.	Background noise is too big.	Operate and save the background noise under empty tank condition. Contact sales if it's still not solved.