ELECTRONICS INSTRUMENT

通博集团

TRG808X

SERIES 80GHz RADAR LEVEL METER

Product Instructions

TRG808X- DT- JS- 1052- 2021 (A)

Preface

Thank you for choosing the products of Dandong Top Electronics Instrument (Group) Co., Ltd.

This product instructions provides you with important information about installation, connection and commissioning as well as maintenance, troubleshooting and storage. Please read it carefully before installation and commissioning and save it as an integral part of the product near the instrument for reading at any time.

This manual can be downloaded from www.ddtop.com.

If you do not follow this manual, the protection provided by this instrument may be damaged.

Trademarks, Copyrights and Restrictions Instructions

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The performance specifications of this instrument are effective from the date of release, and are subject to change without notice. Dandong Top Electronics Instrument (Group) Co., Ltd reserves the right to modify the products described in this manual at any time without prior notice.

Quality Assurance

Dandong Top Electronics Instrument (Group) Co., Ltd guarantees that all products will be free from defects in materials and manufacturing processes within one year from the date of leaving the factory.

During the warranty period, if the product is returned due to quality problems, and the claim is determined to fall within the scope of the warranty after inspection by the manufacturer, Dandong Top Electronics Instrument (Group) Co., Ltd is responsible for repairing or replacing it for the buyer (or owner) free of charge.

Dandong Top Electronics Instrument (Group) Co., Ltd is not responsible for the costs caused by improper use of equipment, labor claims, direct or subsequent damage, and installation and use of equipment. Except for the special written warranty certificate for certain products, Dandong Top Electronics Instrument (Group) Co., Ltd does not provide any express or implied quality guarantee.

Quality

Dandong Top Electronics Instrument (Group) Co., Ltd has passed the ISO9001 quality system certification. The entire production process is strictly implemented in accordance with the scope of the quality system, providing the strongest guarantee for the quality of products and services.

Content

1 Safety Tips

For safety reasons, it is expressly prohibited to modify or change the product without authorization. Repair or replacement is only allowed to use the accessories specified by the manufacturer.

1.1 An explosion may cause death or serious injury

When installing the device in an explosive environment, be sure to comply with applicable local, national, and international standards, codes, and regulations. Ensure that the equipment is installed in accordance with intrinsically safe or non-flammable site operating procedures.

1.2 Process leaks can cause serious injury or death

If the process seal is damaged, the medium may leak at the connection.

1.3 Failure to follow the safety installation guidelines may result in death or serious injury

The operations described in this manual need to be completed by professionals who have received professional training and obtained corresponding qualifications or special end-users.

2 Product Description

2.1 Operating Principle

80GHz radar level meter uses frequency modulated continuous wave (FMCW) technology to transmit a high frequency FM radar signal through the antenna, which propagates in space at the speed of light and is received by the antenna when it encounters the surface of the measured medium and part of its energy is reflected back. The frequency difference between the transmitted signal frequency and the received signal frequency is proportional to the measured distance, thus calculating the distance from the antenna to the surface of the measured medium.

The radar antenna transmits a very short microwave pulse with very low energy, the pulse propagates in space at the speed of light, encountering the surface of the measured medium, and some of its energy is reflected back and received by the same antenna. The time interval between the transmitted pulse and the received pulse is proportional to the distance from the antenna to the surface of the measured medium. The distance from the antenna to the surface of the measured medium is thus calculated.

2.2 Packaging

Please take your packaging waste to a special recycling facility.

2.3 Storage

Storage temperature -20°C to 40°C
Storage humidity ≤20%

3 Technical Parameters

3.1 Appearance and Parameters

TRG8081

Antenna structure: small lens antenna
Measuring range: 0.08m ~ 10m/0.08m ~ 30m
Power supply: 12 ~ 28V DC
Accuracy: ±1mm/±1mm
Beam angle: 8°
Output signal: 4 ~ 20mA+HART
RS485+Modbus RTU
Ambient temperature: -40℃ ~ +70℃
IP rating: IP67
Housing material: Aluminum alloy
Process temperature: -40 ~ 85℃
Process pressure: -0.1 ~ 2.5 MPa

TRG8082

Antenna structure: Standard lens antenna
Measuring range: 0.08m ~ 10m/0.08m ~ 30m/
0.3m ~ 60m/0.3m ~ 120m
Power supply: 12 ~ 28V DC
Accuracy: ±1mm/±1mm/
±3mm/±5mm
Beam angle: 3°
Output signal: 4 ~ 20mA+HART
RS485+Modbus RTU
Ambient temperature: -40℃ ~ +70℃
IP rating: IP67
Housing material: Aluminum alloy
Process temperature: -40 ~ 200℃
Process pressure: -0.1 ~ 2.5 MPa

TRG8083

Antenna structure: Anti-corrosion antenna
Measuring range: 0.08m ~ 10m/0.08m ~ 30m/
0.3m ~ 60m/0.3m ~ 120m
Power supply: 12 ~ 28V DC
Accuracy: ±1mm/±1mm
±3mm/±5mm
Beam angle: 3°/8°
Output signal: 4 to 20mA + HART
RS485+Modbus RTU
Ambient temperature: -40℃ ~ +70℃
IP rating: IP67
Housing material: Aluminum alloy
Process temperature: -40 ~ 150℃
Process pressure: -0.1 ~ 2.5 MPa

TRG8084

Antenna structure: Universal blow-up antenna
Measuring range: 0.08m ~ 10m/0.08m ~ 30m/
0.3m ~ 60m/0.3m ~ 120m
Power supply: 12 ~ 28V DC
Accuracy: ±1mm/±1mm
±3mm/±5mm
Beam angle: 3°
Output signal: 4 ~ 20mA+HART
RS485+Modbus RTU
Ambient temperature: -40℃ ~ +70℃
IP rating: IP67
Housing material: Aluminum alloy
Process temperature: -40 ~ 200℃
Process pressure: -0.1 ~ 0.3 MPa

TRG8085

Antenna structure: High temperature and high voltage antenna
Measuring range: 0.08m ~ 10m/0.08m ~ 30m/
0.3m ~ 60m/0.3m ~ 120m
Power supply: 12 ~ 28V DC
Accuracy: ±1mm/±1mm
±3mm/±5mm
Beam angle: 3°
Output signal: 4 ~ 20mA+HART
RS485+Modbus RTU
Ambient temperature: -40℃ ~ +70℃
IP rating: IP67
Housing material: Aluminum alloy
Process temperature: -40 ~ 1000℃
Process pressure: -0.1 ~ 10 MPa

3.2 Explosion-proof Signs

Pass national level explosion-proof certification:
Intrinsically safe: Ex ia IIC T1~T5/T6 Ga; Ex iaD 20 T85°C
Intrinsically safe and explosion-proof composite type: Ex d ia [ia Ga]IIC T1 ~ T5/T6 Gb; Ex tD A21 T105℃/T85℃

3.3 Implementation Standards

TRG808X 80GHz Radar Level Meter Implementation Standards:
JB/T 13252-2017 Microwave (Radar) Level Meters

4 Outline Dimension Diagram

The connection flange is used in conjunction with the site flange, the user is required to provide the flange standard, if the order requires a special size, the actual size shall prevail - Figure 1 to Figure 5

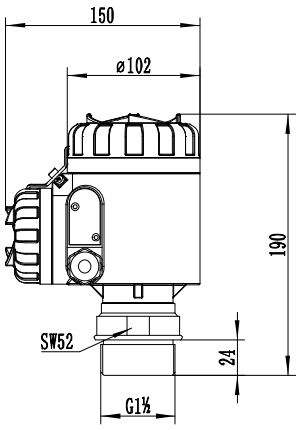
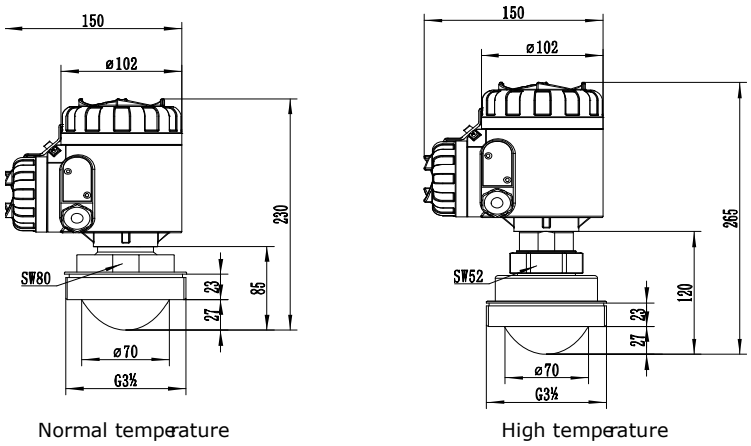


Figure 1 TRG8081



Normal temperature High temperature

Figure 2 TRG8082

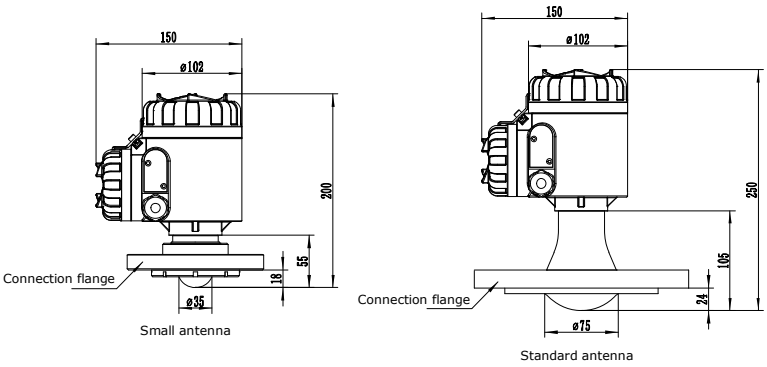


Figure 3 TRG8083

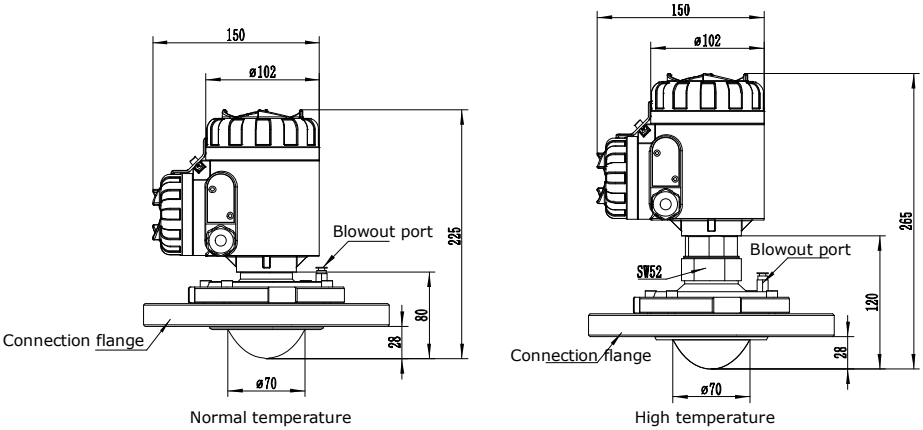


Figure 4 TRG8084

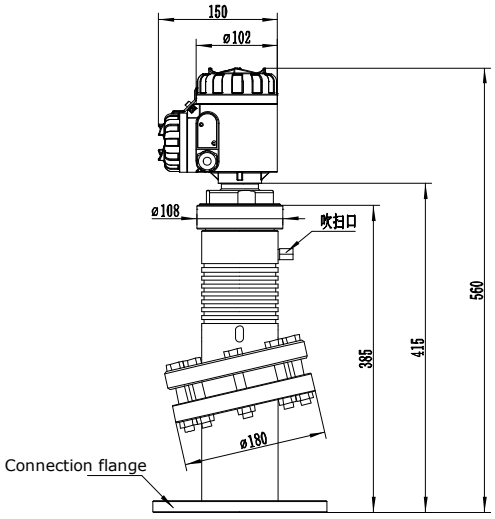


Figure 5 TRG8085

5 Unpacking and Inspection

5.1 Precautions for Unpacking Inspection

5.1.1 Check the product nameplate for consistency with the supply list information - Figure 6

DDTOP ELECTRONICS INSTRUMENT **Radar Level Meter**

Model:
Explosion-proof Rating: Ex ia IIC T1~T5/T6 Ga; Ex ia D 20 T85℃
Explosion-proof Certificate No.: CCRI 17. 2020X
Explosion-proof Rating: Ex d ia [ia Ga] IIC T1~T5/T6 Gb
Ex tD A21 T100℃ / T85℃
Explosion-proof Certificate No.: CCRI 18. 1038X
Output Signal: Accuracy:
Antenna Form: Connection Method:
Ambient Temperature: -40~80℃ (T1~T5) /-40~60℃ (T6)
IP Rating: IP67 Medium :
Operating Pressure: MPa Operating Temperature: ℃
Measurement Range: Tag No:
Factory No: Factory Date:

Dandong Top Electronics Instrument (Group) Co., Ltd

Figure 6 Nameplate

5.1.2 Check the quantity and material of each part against the packing list.

5.2 Check Content

5.2.1 Check whether the appearance of the instrument is defective or damaged.

6 Installation

6.1 Installation Tools

Spanners, flange gaskets and flange bolts for process joints.

6.2 Installation Requirements

Installation Position

When mounting, take care to keep the instrument at least 200 mm away from the vessel wall – Figure 7

①- Reference surface

②- Central container or axis of symmetry

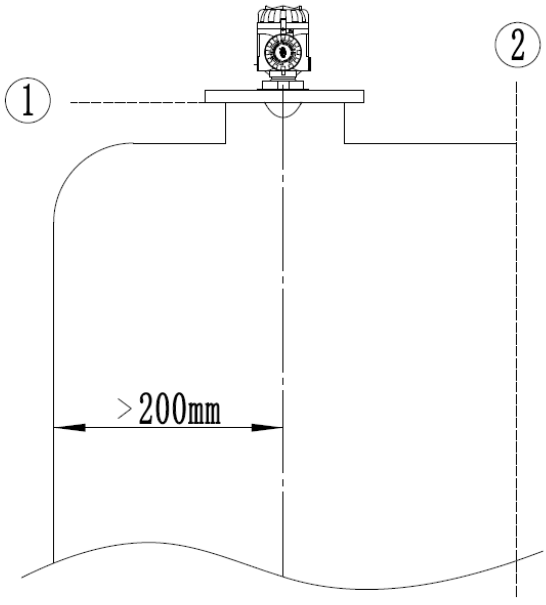


Figure 7 Installation Position Diagram

For conical vessels with a flat tank top, the best mounting position for the instrument is in the center of the top of the capacity so that the bottom of the vessel can be measured - Figure. 8

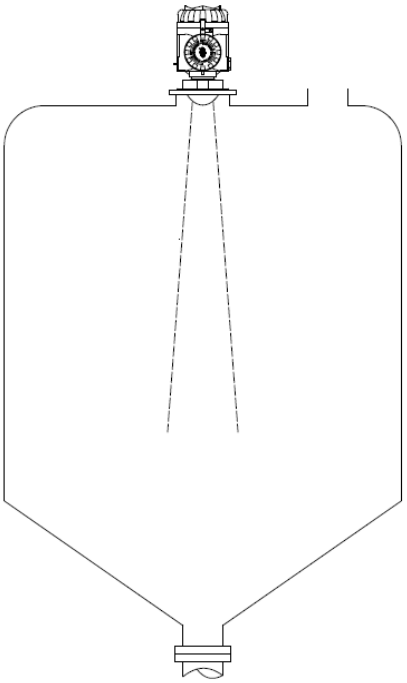


Figure 8 Conical Bottom Tank Installation Position Diagram

Damp-proof

For installation outdoors or in wet rooms and on refrigerated or heated tanks, the cable sealing sleeve should be tightened to protect against moisture and the cable should be bent downwards at the entry point - Figure. 9

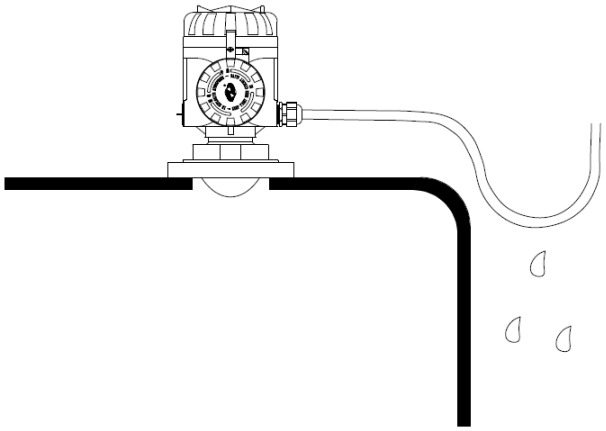
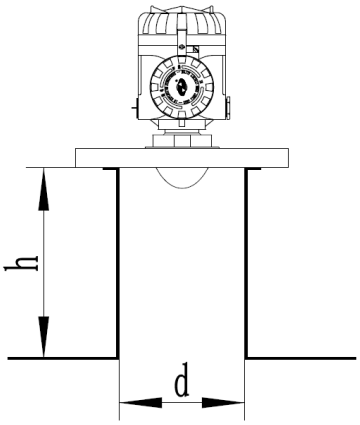


Figure 9 Damp-proof Wiring Schematic Diagram

Container Receiver

The length of the vessel receiver should be such that the end of the antenna extends into the tank as far as possible - Figure 10



d	h
50mm	≤150mmm
80mm	≤200mmm
100mm	≤300mmm
150mm	≤500mmm

Figure10 Schematic Diagram of Container Receiver

7 Electrical Wiring

Output signal: 4 to 20mA two-wire system

Terminal 1: Connected to the negative terminal of 24VDC.

Terminal 2: Connected to the positive terminal of 24VDC.

Terminal 3: Loop current test, used in conjunction with terminal 2. Terminal 2 and 3 are connected to an ammeter to measure the loop output current.

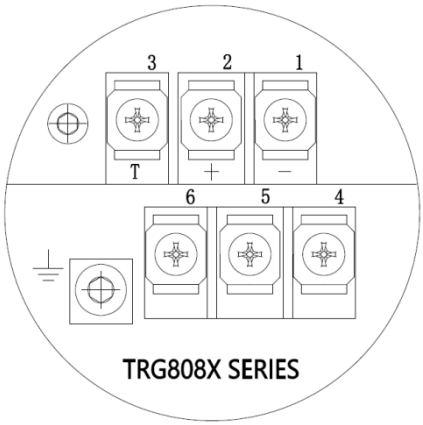


Figure 11 4～20mA Wiring Diagram

Output signal: RS485

Terminal 1: Connected to 24VDC negative.

Terminal 2: Connected to 24VDC positive.

Terminal 6: Connected to RS485 A.

Terminal 5: Connected to RS485 B.

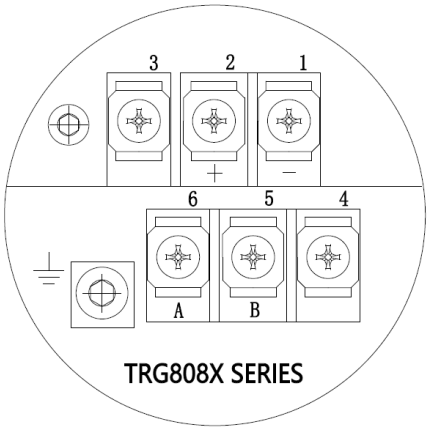


Figure 12 RS485 Wiring Diagram

8 Instrument Configuration

8.1 Key Descriptions

The system mentions 4 operation interface modes:

[Measurement Interface]: Display the system operation status and current measurement data.

[Echo Interface]: Display the echo situation of the current measurement of the system.

[Setting Interface]: Set various data parameters for system operation.

The functions of the 4 keys in different operation modes are also different.

8.2 Measurement Interface

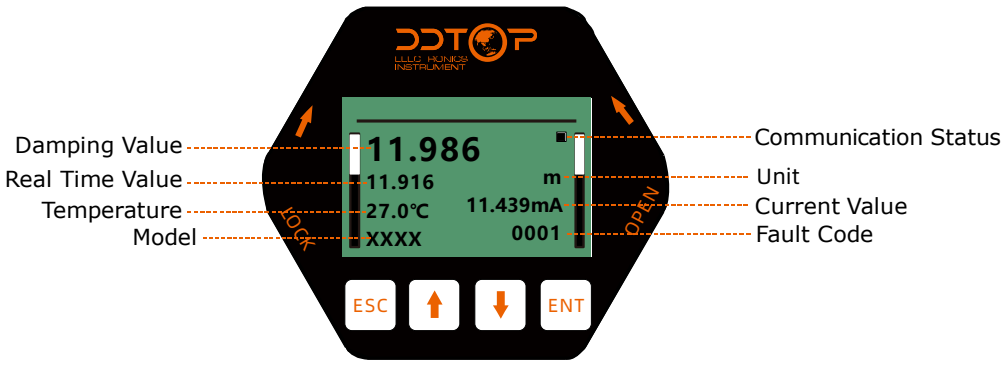


Figure 13 Diagram of the measurement interface

ESC — Access to the settings screen

UP — Access to the parameter overview screen

DN — Streamlined main interface

ENT — Access to the echo screen

Real time value: Indicates the result of a process quantity (level, air height, distance) measured by the system in real time.

Damping value: The result of smoothing the real-time value through a damping filter.

Temperature: Indicates the operating temperature of the internal components of the instrument.

Version number: Displays the customer-defined product model number.

Communication status: Heartbeat indication of the system communication status, 1S blinks

once for normal status, if it does not blink or blinks only once in a long time, it indicates that there is a communication fault.

Units: Indicates the system distance measurement units.

Current value: Indicates the theoretical 4-20mA current output value corresponding to the analogue quantity to be measured, which is obtained by converting the system according to the [high and low adjustment points] and 4-20mA [current output function], see sub-section 6.5.4. (6-8) for the specific conversion relationship.

Fault codes: Please see Fault Analysis and Troubleshooting for specific meanings.

8.3 Echo Screen

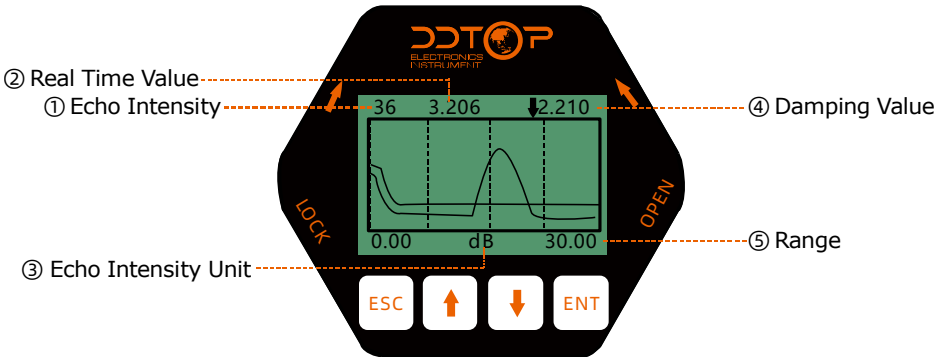


Figure 14 Schematic diagram of the echo interface

Switch to main screen

UP — Switching of the return intensity display units (dB/modal value)

DN — Show/hide threshold curves

ENT — NULL

Return strength: The number indicates the maximum return strength within the range. With a good metal reflector, the return strength should be around 90dB, if the return strength is less than 30dB, it indicates a weak return signal and requires the technician to carry out the corresponding troubleshooting.

Real time value: The real time and damping values of the echo interface are not affected by the [Sensor type] setting and always give distance information, pointing to the selected echo wave crest.

Echo strength unit: indicates the signal strength of the echo currently selected by the algorithm. Due to the noise floor rising near the end of the FMCW itself, the echo strength and echo strength units are not necessarily the same.

8.4 **Setup Screen**

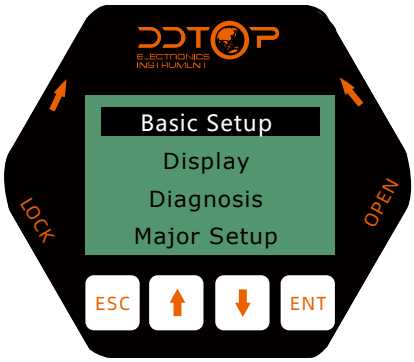


Figure 15 Diagram of the setup screen

ESC — Access to the main screen

U P — Move up to select an entry

D N — Move down to select an entry

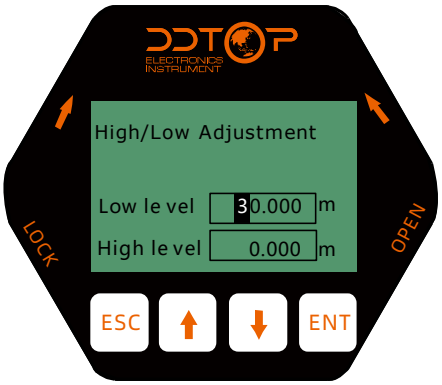
ENT — Access to the selected entry sub screen

The [Basic Settings] menu item contains the basic function options required for the normal operation of the instrument, as shown in the table below. In general operating conditions, the instrument can be quickly started up by setting these parameters. Select [Basic Settings] and press [ENT] to enter the options screen.

Common Basic Menu Settings

High-Low Adjustment

[High/Low Adjustment] The high level corresponds to a full material position and the low level corresponds to a short position.



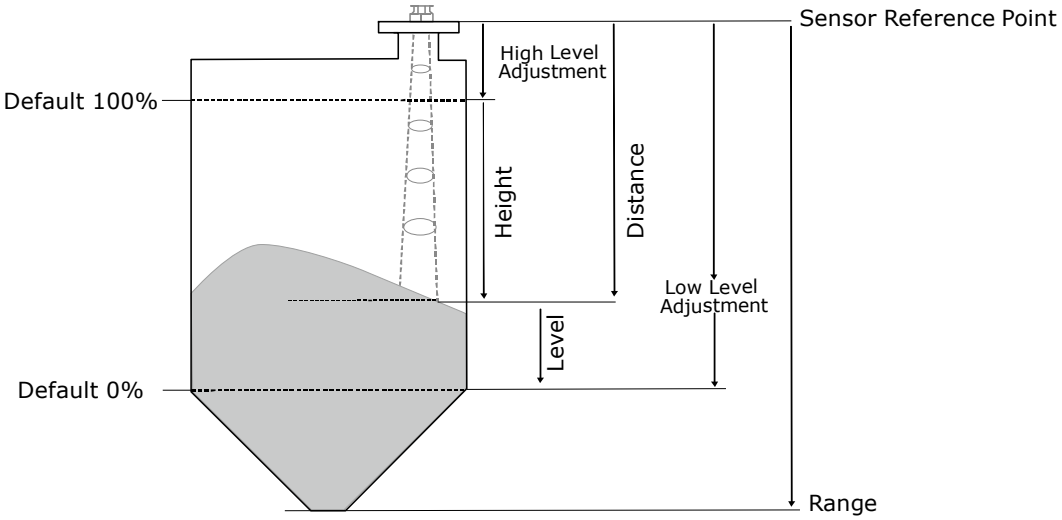


Figure 16 Low Level Adjustment Editing Screen With Definitions

Example: Tank to be measured, tank height 5m, then high level set to 0, low level set to 5.

Blind Zone Setting

The [Blind Zone Setting] and the [Range Setting] together determine the area selected by the meter's internal echo algorithm. The algorithm will ignore echoes within the blind zone, so that interference from the near end can be avoided by this option. See the table below for details.

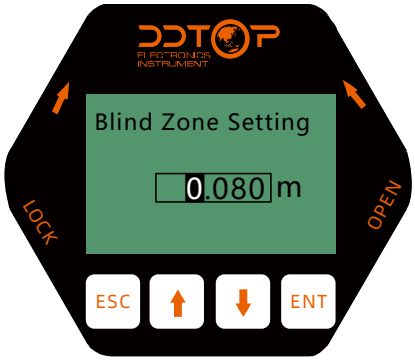


Figure 17 Blind Zone Setting Edit Screen

Range Setting

The [Range Setting] is used to limit the algorithm area and does not refer to the distal measurement limit of the instrument. Please refer to the technical specifications section for the measurement limits of the instrument. The algorithm will ignore echoes outside the range, so a reasonable range setting will avoid multiple reflections and possible out-of-range interference. The range should be 1-2m greater than the actual tank height, especially for tanks with a conical bottom, to obtain a full echo.

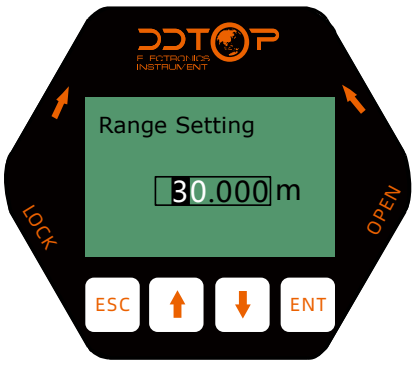


Figure 18 Range Setting Edit Screen

Commonly Used Professional Menu Settings

[False Echo Learning]

[False Echo Learning] learns false echoes from containers containing known obstacles and forms a screening curve for background noise (threshold curve TVT). This option contains two levels of guidance menus, [False Echo Mode] and [False Echo Region]. The [False echo mode] can be selected in three ways: (1) Full means that the false echo learning is performed within the default full range of the instrument (2) Select area means that the false echo learning is only done within the set area (3) Exclude area means that the false echo learning is only done outside the set area. After selecting "Select Area" or "Exclude Area", you need to further enter the area "Start" and "End" points. The menu is displayed as shown below:

Figure 19 False Echo Learning Interface

For example, if there is an interference signal within 2m-4m from the instrument, a new TVT curve is needed to suppress the interference:

(1) Select "Select area" in [False echo mode].

(2) Set the start of the [false echo area] to 2m and the end of the [false echo area] to 4m.

(3) In [False echo learning], select "New", confirm and wait for the "ok" prompt, indicating that the new TVT curve is successful.

9 Precautions

9.1 Make sure that the power supply is safe and reliable, that the power supply is connected in accordance with the correct positive and negative poles, and that the grounding terminal of the meter head is reliably earthed.

9.2 When installing the radar level meter, please take care not to install it above the material flow, if this cannot be avoided, it is recommended to install a wave guide or bypass tube to facilitate measurement.

9.3 When installing, ensure that the radar antenna is perpendicular to the surface of the measured medium, connect the radar to the tank flange and tighten the fixing screws using a tool.

9.4 The operating temperature range of the electronic components is -40°C to +70°C and the temperature range of the LCD display is -20°C to +70°C (outside the range the LCD does not display, remote transmitter is normal).

9.5 Tighten the display and power supply cover after configuration to prevent the instrument from getting water and moisture.

10 Fault Analysis and Troubleshooting

When the instrument fails, a fault code is displayed on the instrument LCD and there may be multiple faults occurring together, e.g. 0003, indicating states 2 and 3 together.

Serial No	Fault Code	Meaning
1	0000	The instrument is operating correctly
2	0001	No valid echoes found within the given range
3	0002	Communication exception with TR
4	0004	No factory threshold learning
5	0008	4-20mA Abnormal current output
6	0010	Current manual output
7	0020	LCD Communication anomalies
8	0040	TR board Connection anomalies
9	0080	Signal processing clock exception
10	0100	Processor hardware errors
11	0200	Abnormal temperature sensor
12	0400	Processor acquisition exceptions

11 Disassemble

11.1 Warning

Before disassembling, pay attention to dangerous process conditions, such as pressure, high temperature, corrosive or toxic media in the container, etc.

11.2 Waste Disposal

Please follow the current regulations in each region for waste disposal.