DHS 2W – Series
[WB type]

Model : DU-30-WB　DU-50-WB
DU-30-WB-C　DU-100-WB-C

Summary

So to use this product safely and correctly, fully understand the manual and keep it for reference.

- Installation and operation manual must be provided to the end user.
- Installation and operation manual is subject to change without prior notice for quality improvement.
- This manual should not be altered without manufacturer's approval for any purpose.
- You must follow the instructions in the manual for safety, the manufacturer is not responsible for problems caused by user carelessness.
- The manufacturer does not have any resposnsibility to the accident arised by user's intentional or negligent fault. (any alteration, exploded)
  If A/S or modification of the product is required, please feel free to contact us.
- Unless it is specifically stated, warranty period is one year in principle after the product is shipped.
- Even during the warranty period, in case of any problems caused by the following reasons, please note that it will be charged.

  – Users improperly maintain and / or repair products
  – Improper transportation, storage or handling of the product beyond the its conditions
  – The breakdown caused by using the product beyond the specification range
  – Problems caused by natural disasters such as fire, earthquake, storm, flood, thunder, lightning, and etc

- During installation and operation, be sure to use the products in compliance with safety regulations of the site.
- When you open the cover of the product, be sure to shut off the power and should work after one minute waiting.
- You must use sealing fitting or cable gland when you do electrical wiring.

Safety Instruction

This product's installation, maintenance should be performed by a qualified technician following proper safety regulations and standard. Improper installation, usage and maintenance may cause defects or malfunctions. Therefore, to prevent any possible danger, we highly recommned that you are aware of the warning and cautions regarding safety in this manual.

Warning, Caution and Note regarding Safety

Definitions about Warning, Caution and Note in this manual are as followings.

⦿ Warning
- In which human and product damage may occur due to faulty usage or installation.

⦿ Caution
- In which product damage may occur due to faulty usage or installation.

⦿ Note
- In which wrong measurement value is predicted due to faulty usage or installation.

Precautions for Installation

Warning

Human and product damage may occur due to faulty usage or installation.

- Please be aware of all contents of this manual before you install and operate this ultrasonic level transmitter.
- Please do NOT disassemble or modify at user's discretion, which may harm product's perfomance.
  In these case of modification or disassemble, the product's performance can't be guaranteed and you may also have human or physical, property damage.
- Please do NOT disassemble the product when power supply is connected. When disassembled, the product can't maintain its performance. Therefore Explosion and fire may caused and you may have human or physical, property damage.
- Please start installation and wiring of the ultrasonic level transmitter, 1 minute after shutting down power supply. Installation and wiring when power is on and supplied, explosion and fire may caused, so you may have human or physical, property damage due to possible abnormal operation.
- Please do NOT connect power with wet hands but do after checking power is firmly shut. Otherwise, you may have human, property and product damage due to electric shock.
- Please do NOT give too much pressure or strength to the product.
- Please do NOT give shock when moving the product. Damage due to the shock may cause malfunction of the inner circuit and tranducer, then the product can't be operating properly.
- Please check the contents in the name plate and do NOT apply un-prescribed usage. Otherwise blackout, fire and explosion may occur when the sensor is used.

Precautions for Installation

Caution

Product damage may occur due to faulty usage or installation.

- This product is divided into 2 big parts as an upper part (Body) and a lower part (Tranducer) from the socket or the flange. Please make sure that the upper part is NOT submerged. When the upper part is submerged, due to potential leakakge into inside, improper operation may occured, explosion and fire may accprdingly be caused, so you may have damage.

- This product is divided into 2 big parts as an upper part (Body) and a lower part (Tranducer) from the socket or the flange. Please do NOT give a shock to the lower part (Tranducer). When it's damaged, the product may not properly operate.

- This product uses cables with sheild when wiring. (Sheild cable " 3Cx24AWG " recommended) To suppress outter noise not to interfere with the product's proper operation, and to prevent inner noise leakage into out, communication cable with shield must be used and ground-connected.

- When you install the product, you need to check whether if the mounting specification suits its application. And kindly have slightly more than 0.5mm gap from the socket when installing. When there's no gap, tranducer may encounter mechanical damage.

- In case the tank has a long or narrow nozzle, the product may have an error due to an obstruction to the beam's movement. Please install a nozzle (or a socket) which meets standard requirements. And please remove dust or sludge and any leftovers on the surface of inside the nozzle.

- When installed outdoor, the product may have a malfunction due to the outdoor conditions. So please make sure that the product is protected by awnings or shades

- Please install a line filter to tips of input & output lines from the sensor.
  In case it's hard, install at power supply and singal input line. At that time, please make sure that the line filter is coiled with the wire at least 1 time.
  (For the line filter, we recommend "ZCAT-V-BK" or ZCAT Series of TDK company.)

Precautions for Installation

Note

Wrong measurement value is predicted due to faulty usage or installation.

⦿ In case of drops, waves, bubbles and floating matters inside the tank, errors can be prevented by planting a stand pipe. When installing the stand pipe, a vent hole must be located within a dead band and the bottom of the pipe must be cut at an angle of 15~45 degree and drain filter must be also installed to prevent floating matters.

⦿ In case of usage of a stand pipe, more than 100mm diameter is recommended. And when connection is required to extend length, a pipe with more than 200mm diameter is recommended.

⦿ Please remove any obstacles in the stand pipe. If there is any left obstacle, this may be regarded as what to be measured.

⦿ Please make sure that the product has at least 200mm gap from the inside wall of the tank or from any other utility in the tank. When there's any obstacle within the range of ultrasonic beam, the sensor may not operate properly. So be reminded of Min. gap distance for measuring range.

MIN. GAP DISTANCE = MAX MEASURING RANGE(HEIGHT) * 0.12
(JUST, WHEN THE RESULT VALUE IS LESS THAN 20CMS, PLEASE APPLY 20CMS.)
EX) MIN. GAP DISTANCE FOR 2M HEIGHT TANK?
200cm * 0.12 = 24cm
EX) MIN. GAP DISTANCE FOR 1M HEIGHT TANK?
100cm * 0.12 = 12cm
12cm IS LESS THAN MINIMUM VALUE. SO GAP DISTANCE IS 20cms.

⦿ When the gap distance from the inside wall of the tank to the ultrasonic transmitter is less than minimum distance, Installing a stand pipe can prevent measuring malfunction.

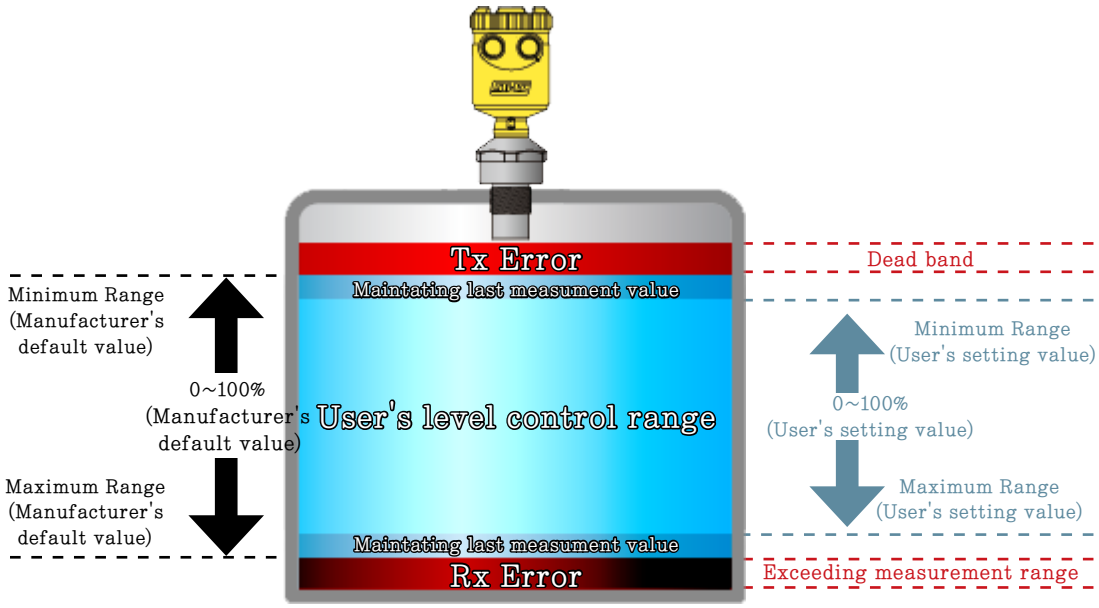
⦿ If wiring is exposed to out of facility (or building) and longer than 30M, we'd recommend RS-485 communication. (4~20mA current way may have an error due to high frequecy induction when the length is over 30mts)

Precautions for Installation

⦿ Within dead band, a fluid can't be measured. So the sensor shows "TX Error" messege on the screen and emits a alamring cureent value which was set as default.
This "TX Error" messege can also be shown when there is any dust, connections which can cause reflection of ultrasonic wave, and when condensation, freezing or foreign materials are covering up the emitting part.

Applied models : DU-30-WB, DU-50-WB, DU-30-WB-C, DU-100-WB-C

When exceeding user level control range,
the product maintains the last measured value till reaching error range.



⦿ When exceeding Max. measurement range, the fluid can't be measured.
So the sensor shows "Rx Error" messege on the screen and emits a alamring cureent value which was set as default. Inhibitors such as drops, waves, oil layer and floating matters within the level controlling range can also cause "Rx Error".

⦿ When the temperature exceeds standard(-20~60 degree C), "Temp Error" messege is shown on the screen and emits a alamring cureent value which was set as default.
(When the temperature can't be read due to mechenical or physical damage of a transducer or inundation, the sensor also shows "Temp Error" and the alarm LED blinks.)

⦿ When the bottom part under the sensor's thread is submerged, A high level alarm function operates and emits no current (open output) or a alamring curent value which was set as default.

Specifications

Wiring : 2-WIRE
(Shield cable 3Cx24AWG)

Range : [DU-30-WB] 300 ~ 3,300mm
[DU-50-WB] 300 ~ 5,300mm
[DU-50-WB-C] 300 ~ 5,300mm
[DU-100-WB-C] 300 ~ 10,300mm

Dead band : 300mm

Accuracy : Full Scale 0.25%

Resolution : 1mm

Temp. Comp. : Automatic in full scale

Beam width : 11°

Current consumption : Max 22mA

Supply voltage : DC 24V

Output signal : CURRENT
DC 4~20mA (DC 20~4mA)

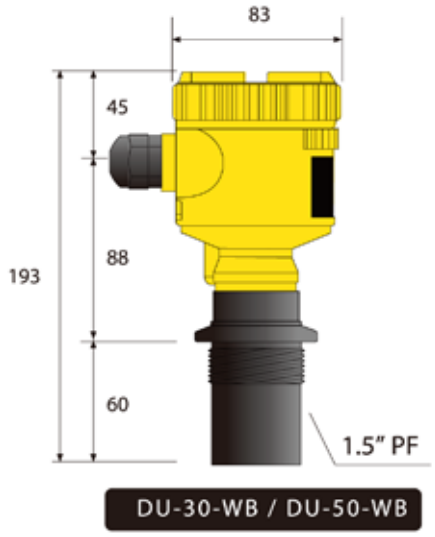
Process Temp. : -20℃ ~ 60℃

Process pressure : 0.7~2.5Kgf/㎠

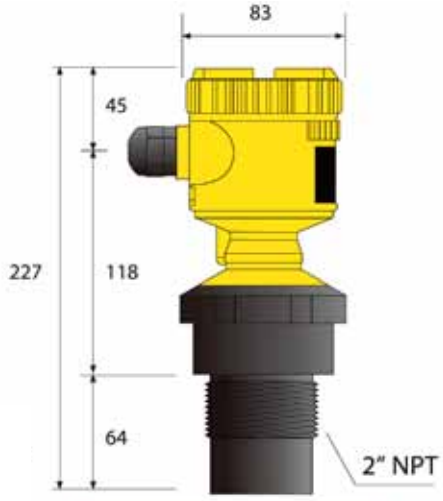
Mounting : [DU-30-WB, DU-50-WB]
1.5 inch
[DU-50-WB-C]
1.5 inch
[DU-100-WB-C]
2.0 inch

Material : Head - PBT-FR-GF10
Flange - PVC(OPTION)
Ptobe - POM

Protect rating : IP65



DU-30-WB / DU-50-WB



DU-100-WB-C

DU (Daehan Ultrasonic) senosr uses ultrasound to measure the level in non-contact signal. It is excellent in durability and easy to setup. Built-in temperature sensor enables to measure more precise level.

DU Series sensors are widely used in such as industrial sewage treatment plants, rivers, dams, power plants, untreated water / purified water ank, food / beverage tanks, fuel tanks, and chemical / medical tanks.

Installation

Install a sensor like in the picture.

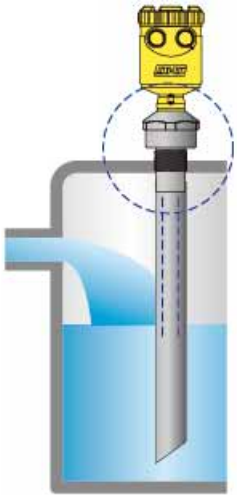
Check the suitability between the flange attached to the tank and the product specification.

Install the sensor so that it is perpendicular.

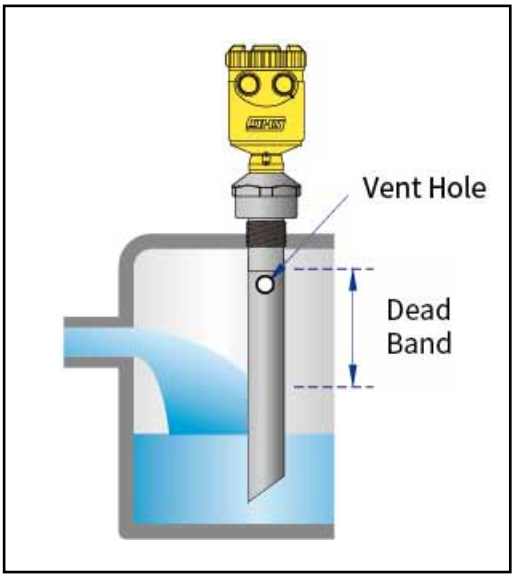
Avoid any interference from obstructions in tank.

⚠ Water drops on the top of the tank can cause sensor malfunction.

[Incorrect Installation]



[Correct Installation]



If there are water drops on the top of the tank, be cautious not to affect the sensor beaming. Swell due to water drops can occur sensor malfunction.

If the severity of the tank, a vertical pipe can be planted to prevent malfunction. The vertical pipe should have vent holes (Ø5~Ø10) which exist whithin the dead -band accordingly to the DU models.

⚠ 100A or more diameters pipe is recommended.

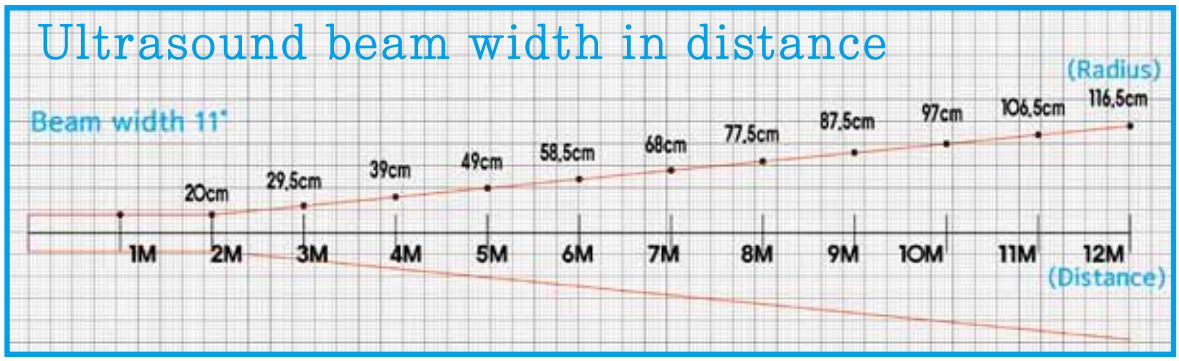
Installation

[Incorrect Installation]

[Correct Installation]

Sensor installation close to the wall of the tank may cause malfunction.

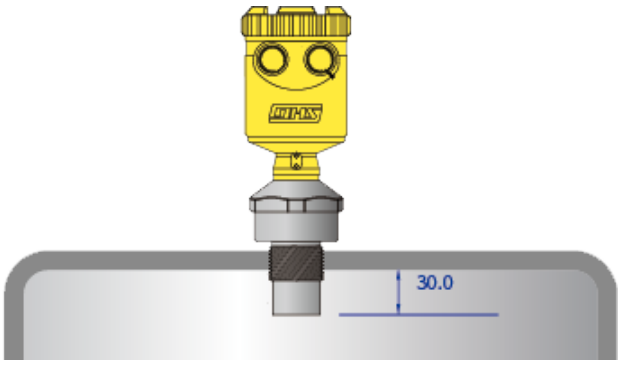
Beamwidth is about 11°. Considering this beamwidth, install the sensor securing enough distance from the wall.



If there is not enough space in the tank, you may prevent malfunction by using a veretical pipe planted.

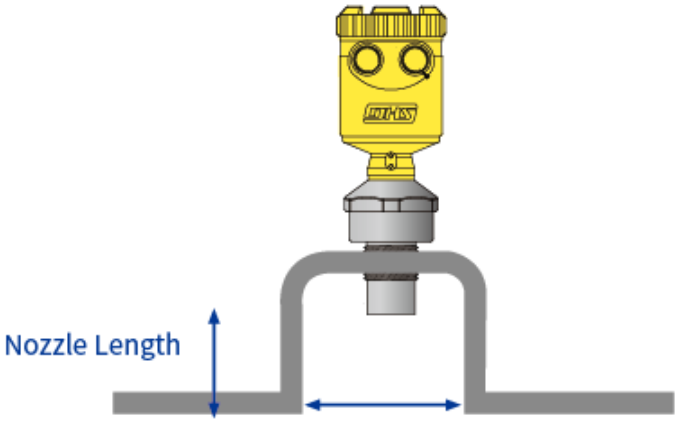
Installation

When installing the sensor socket area directly to the tank must be installed in consideration of the following environments..



The floor surface sensor must be installed at least 30mm to enter the inner tank.

When to use a nozzle or pipe, the following conditions must be considered.

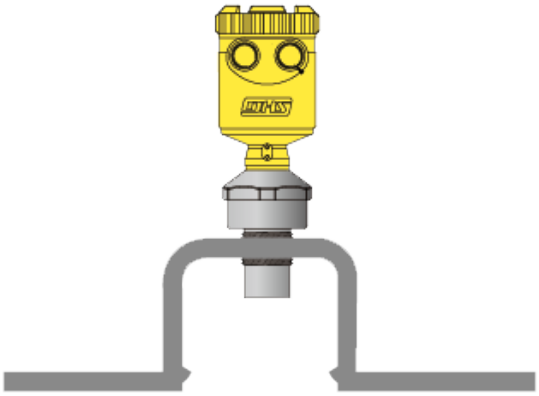


Nozzle Diameter	Nozzle Length
3 inch (80A)	Max. 200 mm
4 inch (100A)	Max. 300 mm
6 inch (150A)	Max. 400 mm
8 inch (200A)	Max. 400 mm

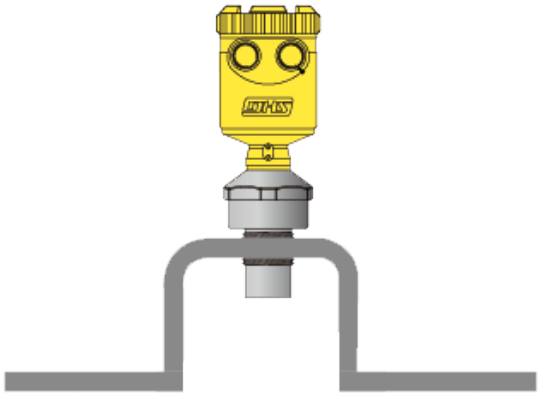
When nozzle length is too long and its diameter is narrow, it can cause malfunction caused from improper beamwidth. Nozzle must be used in compliance with specification.

Installation

When to use a nozzle or pipe, the following conditions must be considered.



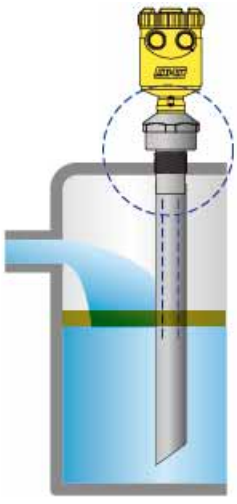
[Incorrect Installation]



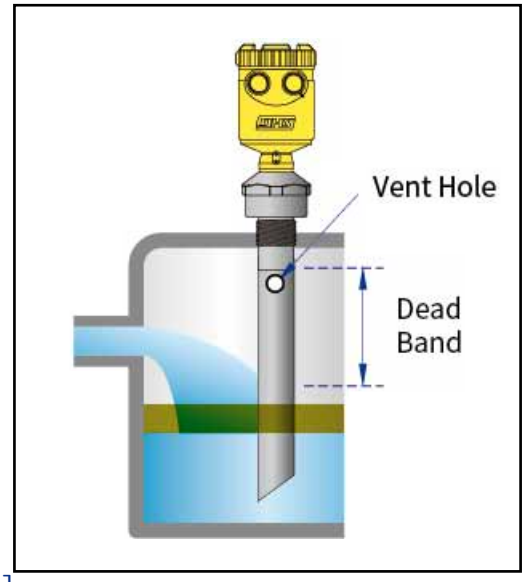
[Correct Installation]

⚠ If there is a buy or a welding seam in the inner wall surface of the nozzle it can be recognized in detection target. After installation, you must remove.

If there is suspended solid or form in the tank, it can cause malfunction.



[Incorrect Installation] [Correct Installation]

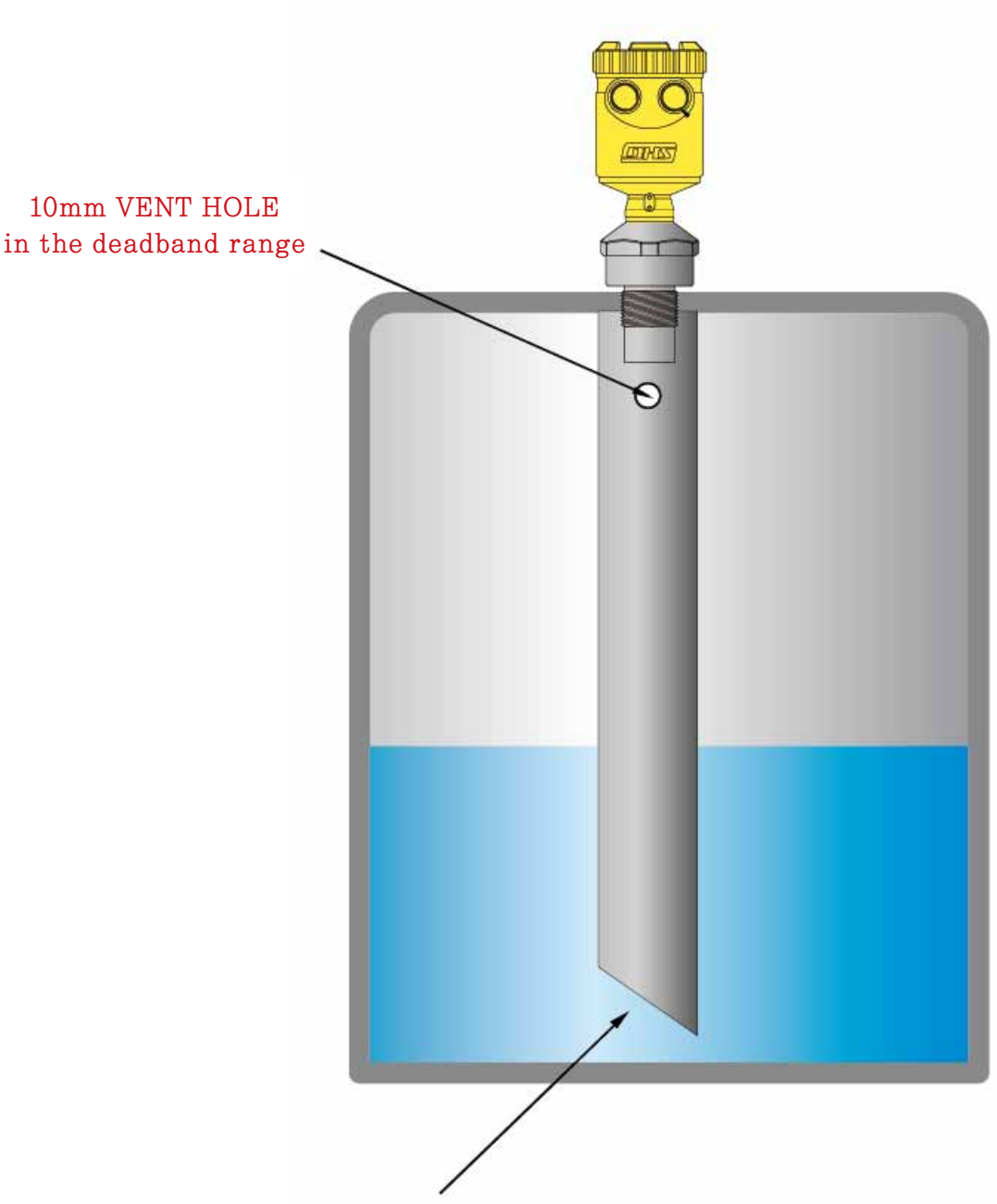


⚠ You can prevent malfunction with protection pipe when suspended solid exist in the tank as shwon in the above pictures.

⚠ The vertical pipe should have vent holes(Ø5~Ø10) which exist whithin the dead band.

Installation

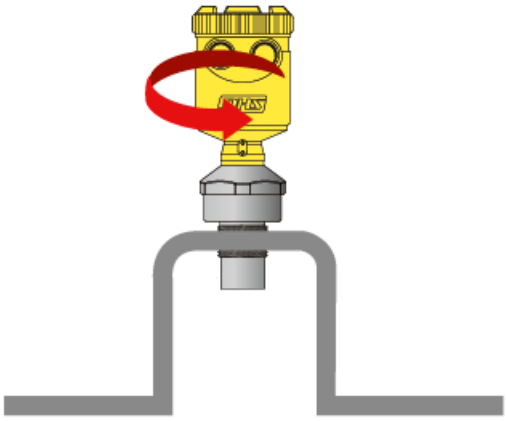
Install the pipes (STAND PIPE) inside the tank following the installation.



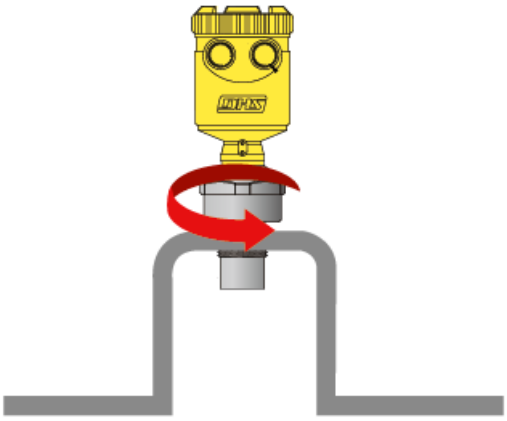
So as to cut into the bottom 15 ~ 45° float in the pipe it is not flowing net installed.
or
Install pipe plugs on the bottom and a 10mm hole drilled
more than 4ea should be given to create a liquid exit.

Installation

When installing the sensor, do NOT grab or hold the head part with too much strength.



[Incorrect Installation]

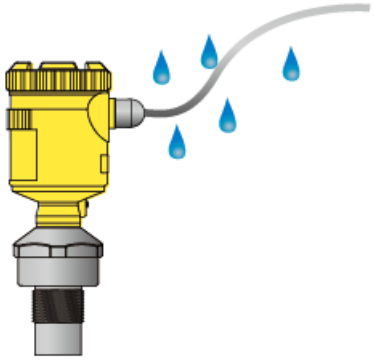


[Correct Installation]

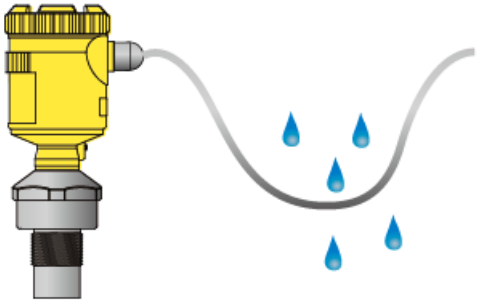
⚠ the sensor may have inside & outside damage so may cause malfunction or improper operation.

⚠ When installing, please grab the hexagonal handgrip of the lower part. (Tranducer)

In sensor wiring, the following conditions must be considered.



[Incorrect Installation]



[Correct Installation]

⚠ As shown in the above pictures, slacken the cable to the bottom in order to prevent water (rain, any liquid) coming in through the cable gland.

Application installation instruction

To build up menu setting, users need to reach "Play Store" in android system and download "DHS RC" application.

Few android devices are not available for "DHS RC" application..

1. Users can see the application list as in the below picture by searching "DHS RC" in searching box of playstore. Please choose "DHS RC" application icon in blue.

① Among listed icons, what's in the red box is "DHS RC"

2. Click "INSTALL" botton and install to the device.

① Click the green "INSTALL" button in right side..

Application installation instruction

3. Run "DHS RC" application from user's device.

① Press a green "AGREE" button at center of the screen and users can see that the installation starts.

4. Run "DHS RC" application from user's device.

① What's in the red box is "DHS RC" application.

5. This is the screen when users initially run.

① This screen is shown when the application is normally installed.

Application installation instruction

6. Administrator password is requested

① Type "daehansensor".
This is a default password.

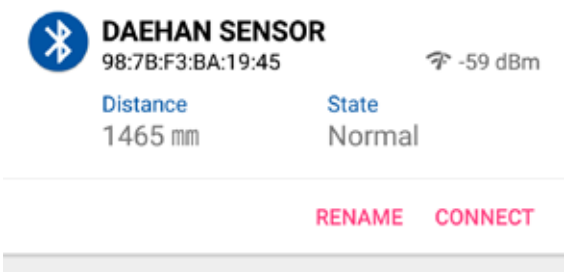
② If you choose "Not ask since next time", it will never again ask for the password when you run next time.

7. This is a screen when "Bluetooth" is NOT activated.

① Please click "ENABLE" button to activate "Bluetooth" function

② Then the device automatically starts to search for the ultrasonic level sensors around the device.

8. This is a list of the ultrasonic sensors in the range of 10 meters from the android device.

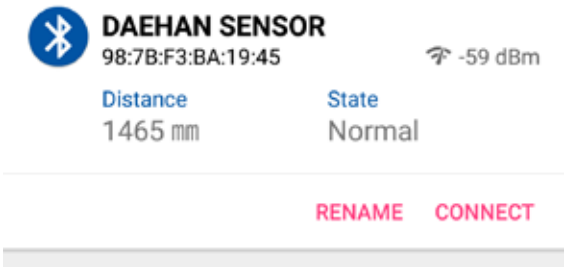


① What this list is showing are as belows.

- DAEHANSENSOR
: "Name" of the ultrasonic level sensor, which was named by factory
- 98:7B:F3:BA:19:45
: MAC address of the ultrasonic level sensor.

*MAC address is the sensor's own serial number. Each devices has different number.

Application installation instruction



- dBm
 : Strength of bluetooth communication

- Distance / Space / Level
 : Currently measured value of the ultrasonic sensor.

- State
 : This shows the operating status of the ultrasonic waves.

 * Normal : Normally operating
 * Rx Error : Receiving isn't operating normall
 * Tx Error : Transmitting (Emitting) isn't operating normally
 * Temp Error : Temperature sensor isn't operating ormally.

- RENAME
 : A User can rename the "Name" of the ultrasonic level sensor according to the user's preference.

- CONNECT
 : 선택된 초음파 레벨센서와 접속하여 설정 값을 변경 할 수 있습니다.

* Additional explanations on State

Normal : A state that the sensor is operating normally.
Rx Error : A state that the sensor is failing in measuring.
Tx Error : A state that the measured value is less than the value of the deadband.
Temp Error : A state that the sensor is facing trouble in the measured temperature value.

* Explanations on sensor's LED alarming status
Users can see the sensor's status via LED on the top of the sensor.

Red : When the sensor is booting or has Error status, a red light is turned on.
Green : When transmitting ultrasonic waves or transmitting data to the application (or the remote control), a green light is turned on.
Blue : When receiving ultrasonic waves or receiving data from the application (or the remote control), a blue light is turned on.

Sensor setting instruction

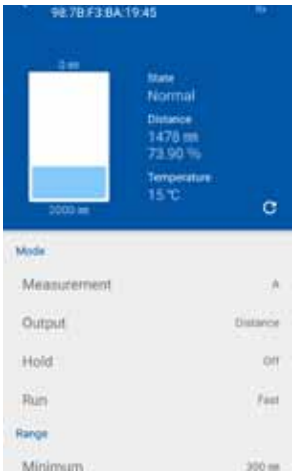
For menu setting, users need to connect to "Play Store" in android system and download "DHS RC" application.

Few android devices are not available for "DHS RC" application.

1. After searching for ultrasonic near level sensors via "DHS RC", access to the ultrasonic level sensor which the user wants to set by clicking "connect".

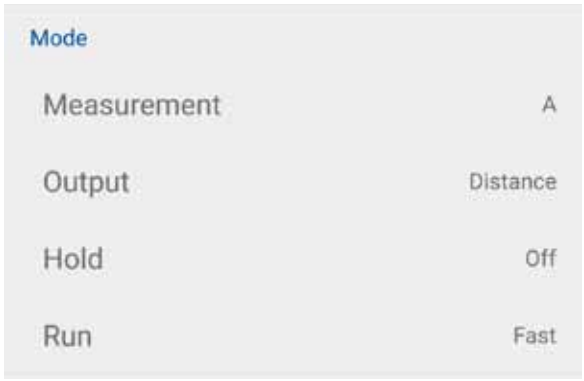
① In the list, click "CONNECT" button marked in red box.

2. Then the screen shows a state, measured values, setting values of the ultrasonic sensor.



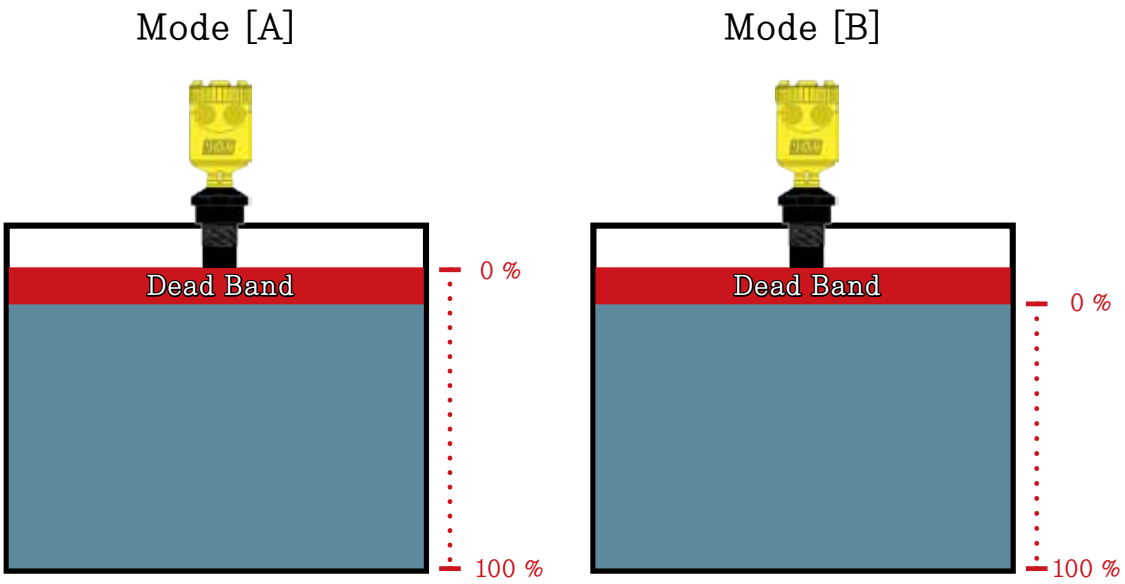
Sensor setting instruction

1. To change setting value of height, please follow as below.



① Measurement Mode
Users can choose whether to include the deadband to or to exclude it from the range to be measured.

A (Mode A) : Includes the deadband and shows 0~100% (Suitable for 20~4 mode)
B (Mode B) : Excludes the deadband and shows 0~100% (Suitable for 4~20 mode)



Dead band : A range whose liquid level can not be measured

Sensor setting instruction

② Output Mode
Users can choose a measuring method.

Level – Measuring a height of liquid.

Distance (Space) – Measuring a height of empty space in a tank.

③ Hold
This is a function to fix the output at the last measured value in case of errors.
When the errors are dismissed, a currently measured value is updated as an output.

On – Transmits the last measured value in a fixed status.

Off – Rx Error / Temp Error : Transmits an empty status of a tank.
TX Error : Transmitsa full status of a tank.

④ Run
You can choose either Slow/Fast mode.

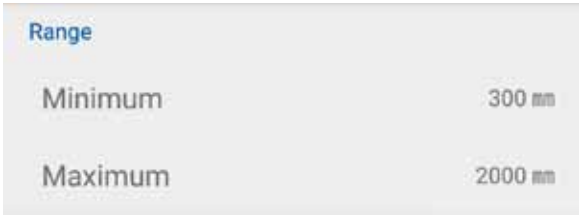
Slow – Inner measurement value filter is turned on and when an output excceeds a certain range, the sensor doesn't apply immediately to the output but the output is converged after taking few turns of plus and minus to the last measured value.

Fast – Inner measurement value filter is turned off and the sensor immediately applies the measured value to output.

* When the error is dismissed, slow modes's output is converged after taking few turns of plus and minus to the last measured value, while fast mode applies measured value immediately to output .

Sensor setting instruction

2. To change the lowest and the highest level for height measuring, please follow below.

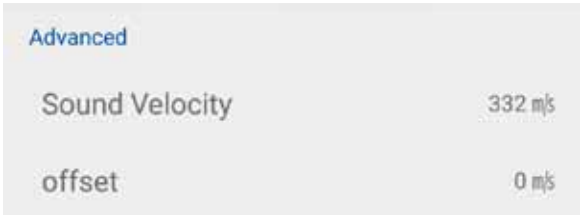


① Minimum Range
This is the minimum measurement value which sets the distance from the bottom of the sensor to the surface of liquid when a tank is full

② Maximun Range
This is the maximum measurement value which sets the distance from the bottom of the sensor to the botton of a tank when a tank is empty.

* Users can't set over each sensor's maximum measuring range.

3. To change a compensation value of sound velocity.



① Sound Velocity
As a sound velocity compensation function, the screen shows current sound velocity value on a basis of the offset value applied. This fuction is to be used when the space for ultrasonic waves' movement isn't atmospheric, and a sound velocity compensation is required according to the medium. By compensating +−250m/s for the sound velocity in the air 332m/s, users can set to Min. 82~ Max. 582m/s

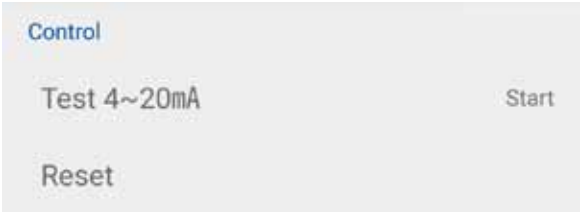
② Offset
Adjusting sound velocity compensation value.

* If a user changes this value in a normal atmosphere, an abnormal value will be measured. So, be cautious

Sensor setting instruction

Chlorine : 206m/s	Methane : 430m/s
Argon : 308m/s	Oxygen : 316m/s
Ammonia : 415m/s	Neon : 435m/s
Air(Atmosphere) : 332m/s	Carbon dioxide : 259m/s

4. Extra functions



① Test 4 ~20mA
Tests current operation.

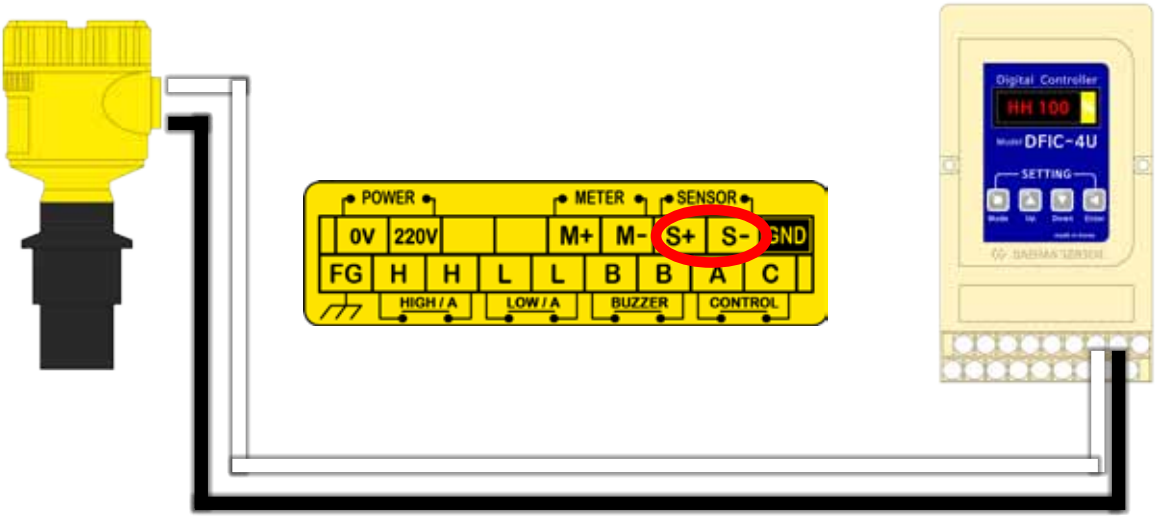
Start – Repeatedly transmits 4mA, 12mA, 20mA in 5 seconds cycle.

Stop – Stops current operation test.

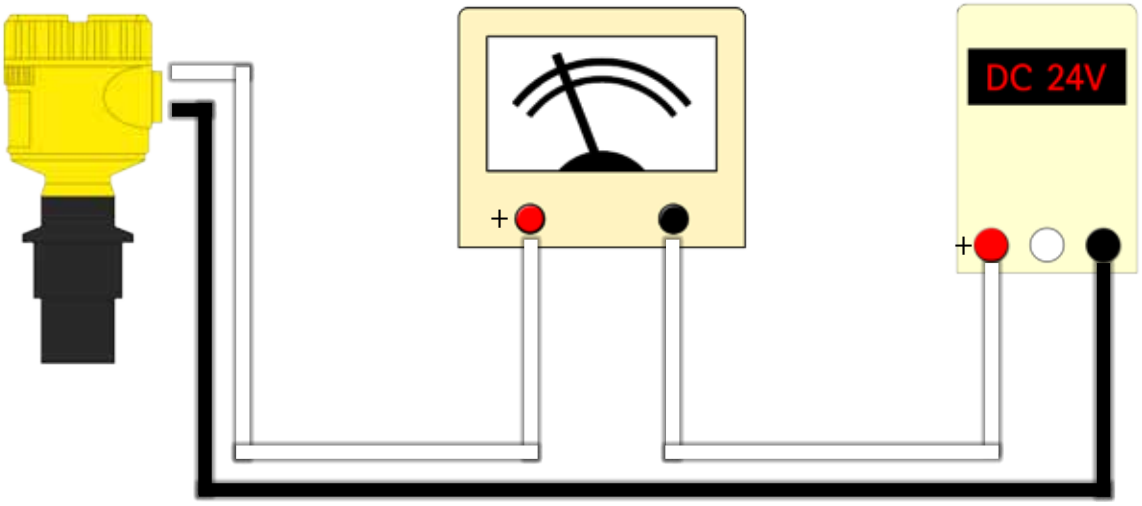
② Reset
Resets the ultrasonic sensor.

Wiring

DC 24V
DC 0V



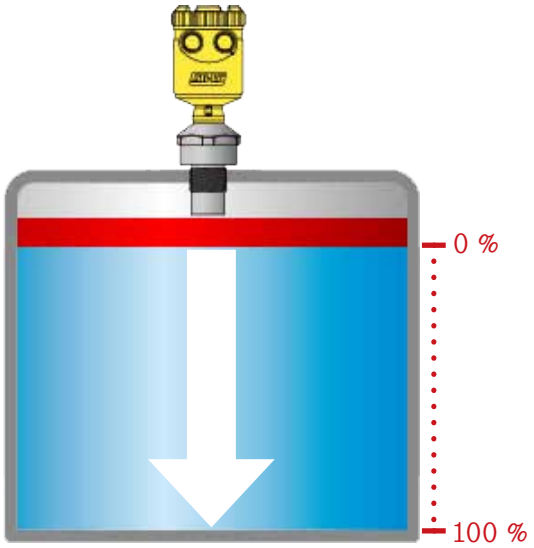
DC 24V
DC 0V



Check-list

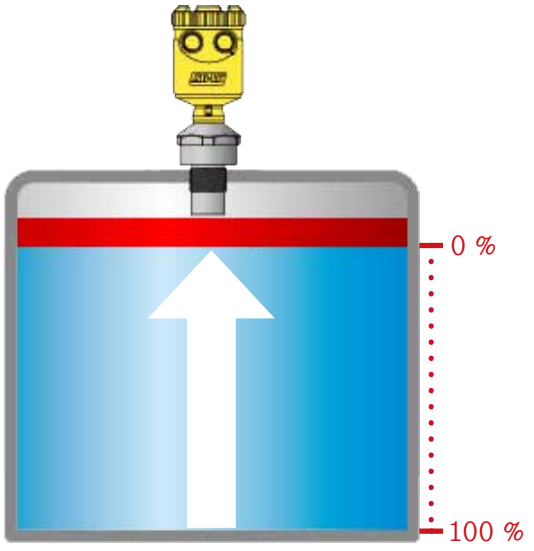
1. When an incorrect measurement value is shown, please check the settings with following instructions. (After 10 minutes from installation, an error due to temperature can be minimized.)

Mode [A] / Reverse Mode
(Measuring distance from the botton of a sensor to the surface of a fluid via non-contact tape-measure method)



1. Set Mode[A] / Mode [Reverse].
2. Make the fluid to the lowest level, and a distance which the sensor is showing is a value which should be set as Max. Range.
3. Make the fluid to the highest level, and then the distance which the sensor is showing is a value which should be set as Min. Range.

Mode [B] / Normal Mode
(Measuring fluid's level on a basis of default setting. Standard user mode.)



4. After finishing range settings, please set Mode[B] / Mode[Normal].
5. Check whether if the actual level is measured.

Check-list

2. Please make sure that the power is off when wiring the sensor.
   If the power is on when wiring the sensor or disassembling the LCD module, the sensor may have a disorder

3. Is inside/outside of the sensor okay?
   Please check the inside and the outside of the sensor don't have a problem.

4. Correctly wired?
   Please make sure of correct contacts of the wires.

5. Supplying power correctly?
   Please make sure that correct power voltage (24 VDC) is being supplied without trouble

6. Is current output okay?
   Please make sure that the sensor emits normal current output DC 4~20mA(DC 20~4mA) without trouble.

7. Please make sure that the environment around the tank, sensor's installation and setting conditions are appropriate and suitable.

8. In cases pf tanks with drops, floating matters(foreign matters, bubbles) inside, Please install a stand pipe.

9. The sensor may misoperate in tanks with high temperature and pressure.

10. The sensor may misoperate in tanks with steam, vapor and gas.

11. Please make the sensor's LED avoid direct sunlight via installing a shade when the sensor is installed outdoor.

12. Please do NOT spin the sensor grabbing the sensor's head part.
    When spinning the sensor to fix, please grab the hexagonal handgrip of the lower part.

13. It's highly recommended that you use the sensor after you become fully aware of all instructions in this manual.

Specifications and operations in this user manual may be altered
and modified for advancements of the product without pre-notification.

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Model classification

Remark [○ : 100% available / △ : 30~50% available / X : not available]

	3 WIRE TYPE ULTRASONIC TRANSMITTERS				2 WIRE TYPE ULTRASONIC TRANSMITTERS		
	DU-03	DU-05	DU-08	DU-010	DU-30	DU-50	DU-100
Signal Output	○	○	○	○	○	○	○
RS485 Output	○	○	○	○	X	X	X
Anti-Condensation	○	○	○	○	○	○	○
Temp. Compensation	○	○	○	○	○	○	○
Built-in-Display	○	○	○	○	○	○	○
Mounting	1.5" (NPT)	1.5" (NPT)	2" (NPT)	2" (NPT)	1.5" (NPT)	1.5" (NPT)	2" (NPT)
Enclosure Rating	IP 65	IP 65	IP 65	IP 65	IP 65	IP 65	IP 65

	2WIRE TYPE BLUETOOTH ULTRASONIC TRANSMITTERS			
	DU-30-WB	DU-50-WB	DU-50-WB-C	DU-100-WB-C
Signal Output	○	○	○	○
RS485 Output	X	X	X	X
Anti-Condensation	△	△	△	△
Temp. Compensation	○	○	○	○
Built-in-Display	○	○	○	○
Mounting	1.5" (NPT)	1.5" (NPT)	1.5" (NPT)	2" (NPT)
Enclosure Rating	IP 65	IP 65	IP 68	IP 68

Model classification

Remark [○ : 100% available / △ : 30~50% available / X : not available]

	COMPACT 2 WIRE TYPE ULTRASONIC TRANSMITTERS				
	DU-10-G	DU-50-G	DU-100-G	DU-50-G-C	DU-100-G-C
Signal Output	○	○	○	○	○
RS485 Output	X	X	X	X	X
Anti-Condensation	○	○	○	○	○
Temp. Compensation	○	○	○	○	○
Built-in-Display	○	○	○	○	○
Mounting	1" (NPT)	1.5" (NPT)	1.5" (NPT)	1.5" (NPT)	1.5" (NPT)
Enclosure Rating	IP 65	IP 65	IP 65	IP 68	IP 68

	DETACHABLE TYPE ULTRASONIC TRANSMITTERS	
	DU-12-D	DU-20-D
Signal Output	○	○
RS485 Output	○	○
Anti-Condensation	○	○
Temp. Compensation	○	○
Built-in-Display	○	○
Contact Point Output	○	○
Mounting	1" (NPT)	1" (NPT)
Enclosure Rating	IP 68 (Transducer)	IP 68 (Transducer)

Model classification

Remark [○ : 100% available / △ : 30~50% available / X : not available]

	3 WIRE, EXPANDED TYPE	2 WIRE, EXPANDED TYPE	3 WIRE, BENDED TYPE	2 WIRE, BENDED TYPE
	DU-03(05/08/010)-L	DU-30(50/100)-L	DU-03(05/08/010)-B	DU-30(50/100)-B
Signal Output	○	○	○	○
RS485 Output	○	X	○	X
Anti-Condensation	○	○	○	○
Temp. Compensation	○	○	○	○
Built-in-Display	○	○	○	○
Mounting	1.5" or 2" (NPT)	1.5" or 2" (NPT)	1.5" or 2" (NPT)	1.5" or 2" (NPT)
Enclosure Rating	IP 65	IP 65	IP 65	IP 65