

# DHS DU – Series [D type]

Model : DU-12-D



Controller  
(DUC-200)

Transducer



# 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 responsibility to the accident arising from 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 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 recommend 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 performance.  
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 a Controller part and a Transducer part 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 leakage into inside, improper operation may occur, explosion and fire may accordingly be caused, so you may have damage.
- ⦿ This product is divided into 2 big parts as a Controller part and a Transducer part from the socket or the flange. Please do NOT give a shock to the Transducer part. When it's damaged, the product may not properly operate.
- ⦿ This product uses cables with shield when wiring. (Shield cable " **3C×24AWG** " recommended) To suppress outer 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, transducer 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 signal 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?

$200\text{cm} * 0.12 = 24\text{cm}$

EX) MIN. GAP DISTANCE FOR 1M HEIGHT TANK?

$100\text{cm} * 0.12 = 12\text{cm}$

12cm IS LESS THAN MINIMUM VALUE, SO GAP DISTANCE IS 20cms.

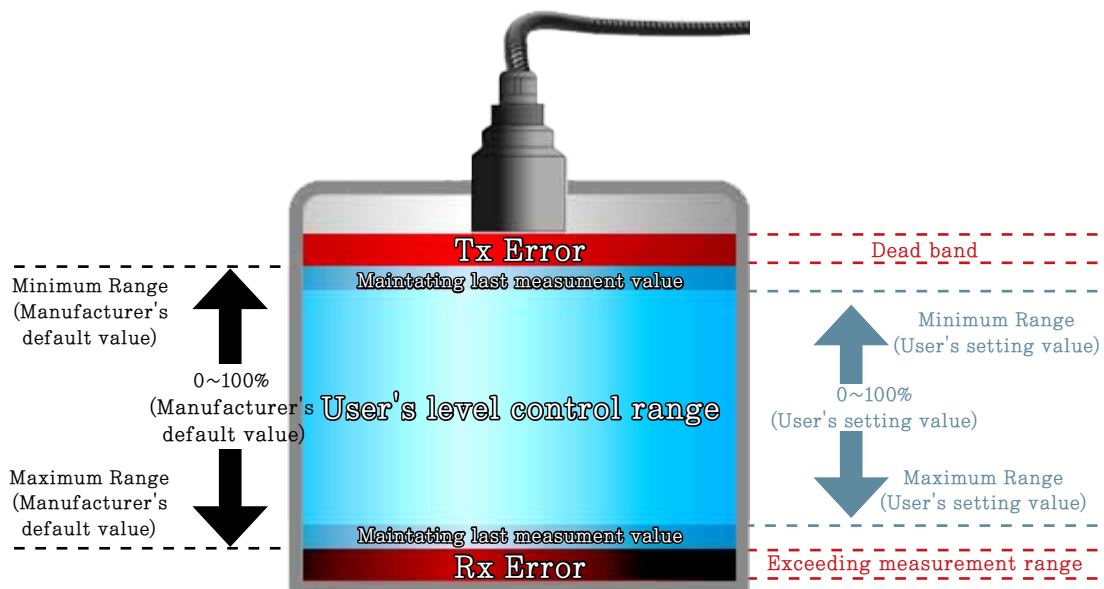
- ⦿ When the gap distance from the inside wall of the tank to the ultrasonic transmitter is less than minimum distance, Installing a stand pipe can prevent measuring malfunction.
- ⦿ If wiring is exposed to out of facility (or building) and longer than 30M, we'd recommend RS-485 communication. (4~20mA current way may have an error due to high frequency 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" message on the screen and emits a alarming current value which was set as default. This "TX Error" message 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 - 12 -D

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" message on the screen and emits a alarming current 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" message is shown on the screen and emits a alarming current value which was set as default. (When the temperature can't be read due to mechanical 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 alarming current value which was set as default.

# Specifications

Range : 500 ~ 12,000mm

Dead band : 500mm

Accuracy : Full Scale 0.25%

Resolution : 1mm

Temp. Comp. : Automatic in full scale

Beam width : 11°

Current consumption : Max 100mA

Supply voltage : AC 220V 60Hz

Output signal : CURRENT

DC 4~20mA ( DC 20~4mA)

RS485 (Modbus RTU)

Relay Output 4ea

Process Temp. : -20°C ~ 60°C

Process pressure : 0.7~2.5Kgf/cm<sup>2</sup>

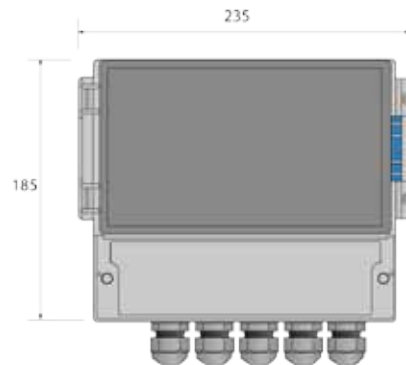
Mounting : 1.0 inch

Material : Unit – ABS

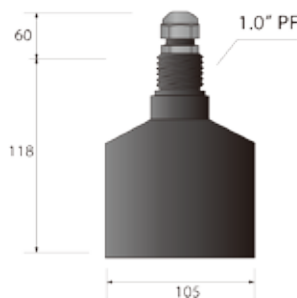
Flange – PVC(OPTION)

Ptobe – PVDF Kynar 720

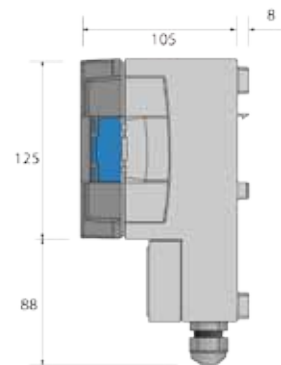
Protect rating : IP65



CONTROLLER (FRONT)



TRANSDUCER



CONTROLLER (SIDE)

DU (Daehan Ultrasonic) sensor 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 tank, food / beverage tanks, fuel tanks, and chemical / medical tanks.



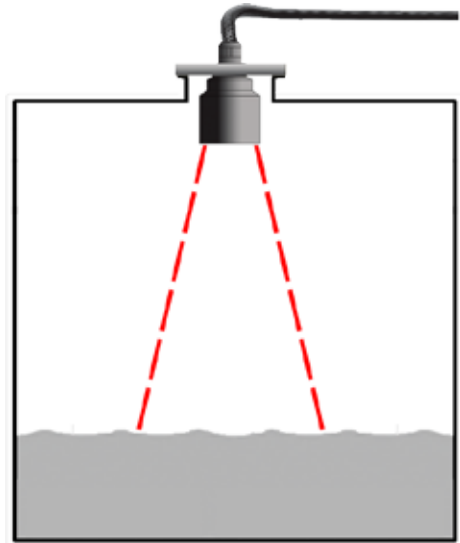
# Installation

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.

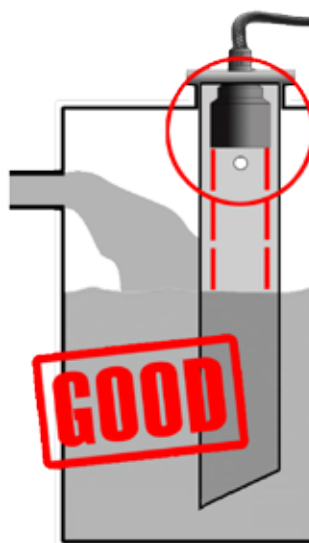
Avoid any interference from obstructions in tank.



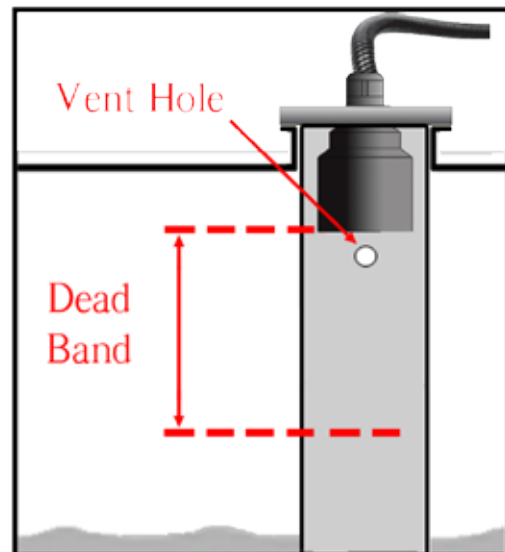
Water drops on the top of the tank can cause sensor malfunction.



[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 ( $\phi 5 \sim \phi 10$ ) which exist within the dead band accordingly to the DU models.

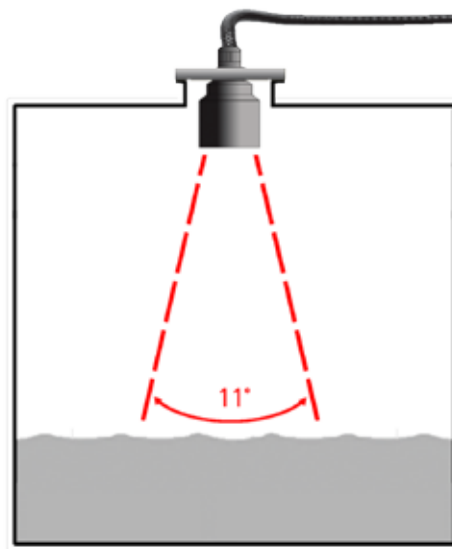


100A or more diameters pipe is recommended.

# Installation



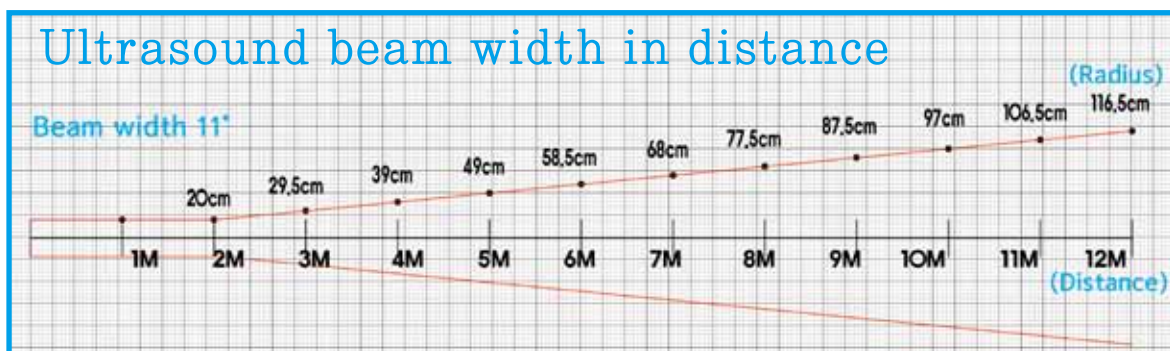
[Incorrect Installation]



[Correct Installation]

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

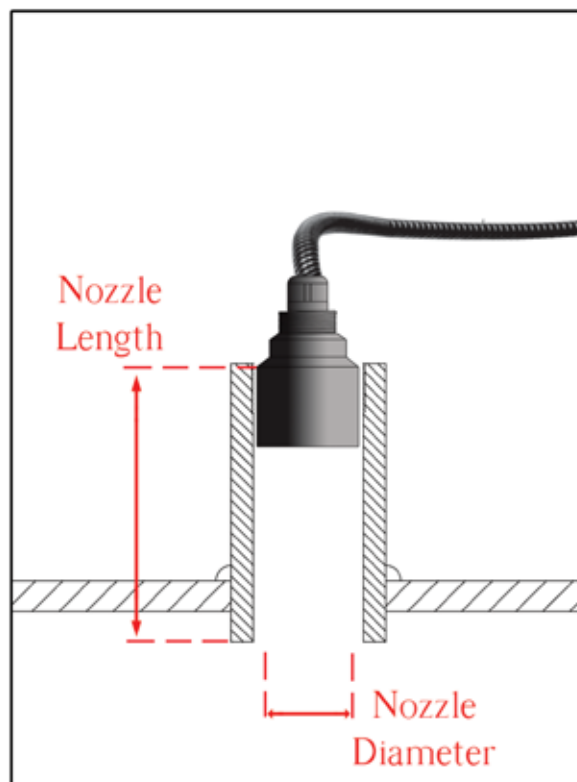
Beamwidth is about 11°. Considering this beamwidth, install the sensor securing enough distance from the wall.



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

# Installation

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

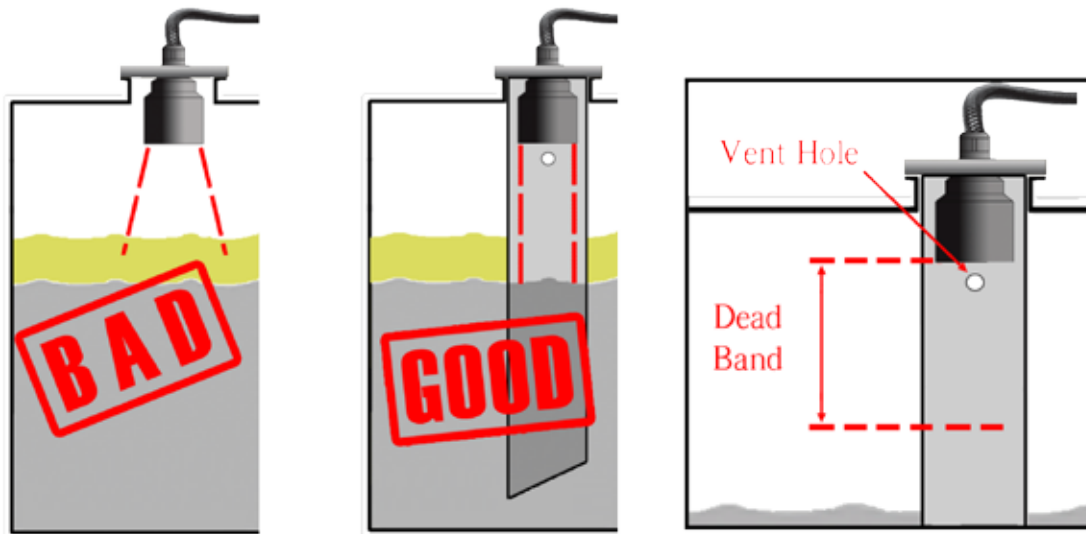


Nozzle Diameter	Nozzle Length
3 inch (80A)	Max. 200 mm
4 inch (100A)	Max. 300 mm
6 inch (150A)	Max. 400 mm
8 inch (200A)	Max. 400 mm

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

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



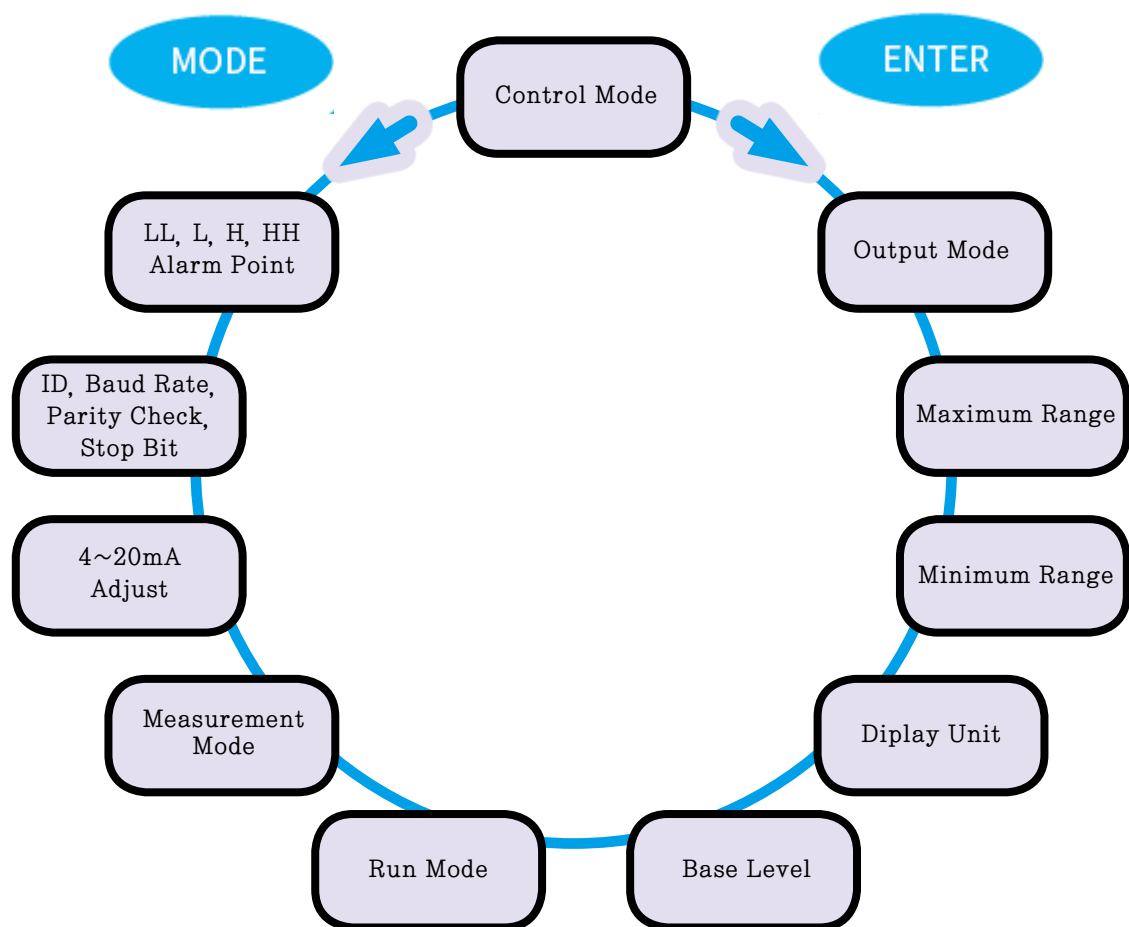
[Incorrect Installation]    [Correct Installation]

- ⚠ You can prevent malfunction with protection pipe when suspended solid exist in the tank as shown in the above pictures.
- ⚠ The vertical pipe should have vent holes( $\phi 5 \sim \phi 10$ ) which exist within the dead band.

# Setting

Hold [MODE] over 2 seconds, press [ENTER] over 1 second, it starts menu setting.

Model : DU-10, DU-50, DU-100



In the menu setting, if press [MODE], it turns counter-clockwise, if press [ENTER],

It turns clockwise. With [UP]/[DOWN] key, you can change the value.

After changing the value setting, press [ENTER] over 2 seconds to finish menu setting.

If you finish menu setting, the changed value will be saved automatically.

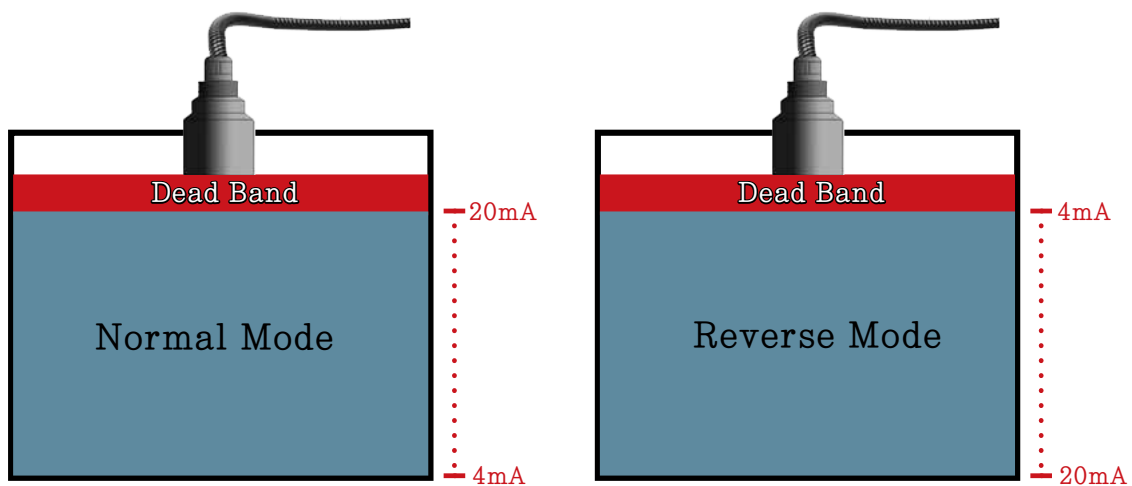
# Setting

## Output Mode

You can choose output signal type as below.

Normal – When the tank is empty, it shows 4mA.  
When the tank is full, it shows 20mA.

Reverse – When the tank is empty, it shows 20mA.  
When the tank is full, it shows 4mA.



## Minimum Range

Set the distance from the sensor to the surface of the fluid when the tank is full.

The digit point is moved by pressing "Mode" button.



You can't set the Min range to less than the dead band.

# Setting

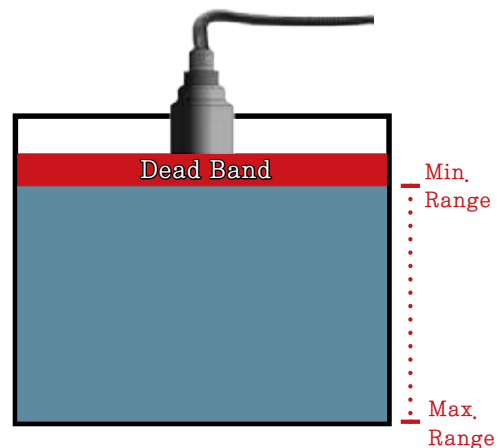
## Maximun Range

Set the distance from the sensor to the bottom of the tank when the tank is empty.

The digit point is moved by pressing "Mode" button.



You can set upto Max. measurement distance of each models.  
The sensor measures the fluid's level between Min. Range and Max. Range



## Display

You can choose the display unit in Cm or in Inch.



Regardless of the LCD's indicating, the distance measurement for RS-485 communication model's output signal is "mm"

## Run Mode

You can choose the sensing speed for either Slow mode or Fast mode.  
This is to increase precision of measurement.

In case of a drastic level change, the precision gets decreased.  
To acquire accurate measurement value, you can choose either slow or fast for measuring speed.



Fast mode doesn't go through hunting filtering process and regards reaction speed as top priority. So the sensor may fail to acquire a correct value.  
Fast mode is suitable for applications with drastic level changes.

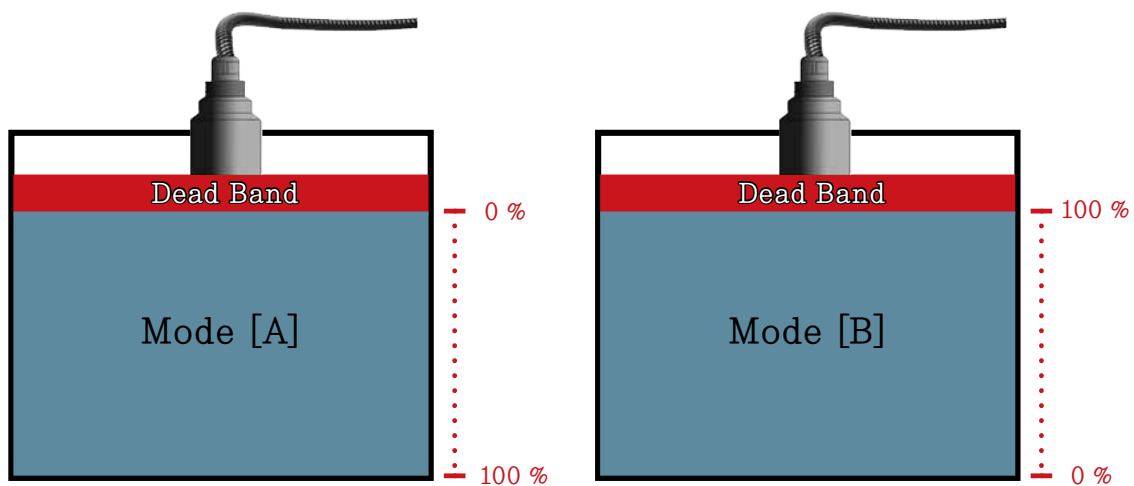
# Setting

## Measurement M.D (Mode)

You can set whether measuring distance value includes deadband or not.

Mode A : Measuring distance value including deadband.

Mode B : Measuring distance value excluding deadband.



Dead Band : A range where a level or distance can't be measured.

## 4~20mA Adjust

Users can adjust the output current in detail.

## ID, Baud rate, Parity check, Stop bit

RS-485 Communication setting mode.



# Setting

## LL, L, H, HH Point

Users can set the measurement value in which the relay contact point is activated

## Base Level

In Normal Mode, users can revise the measured level to the new basic level manually via Up-set.

## Control Mode

Users can choose to run either Supply or Drain with the relay.

If Supply is chosen, the sensor emits 100% in case of an error.

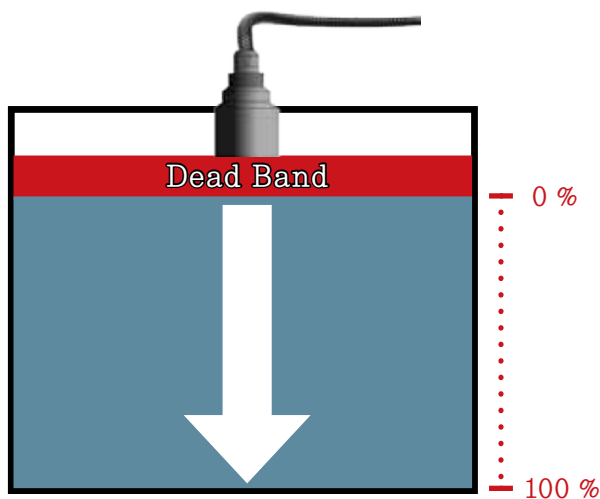
If Drain is chosen, the sensor emits 0% in case of an error.

# 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

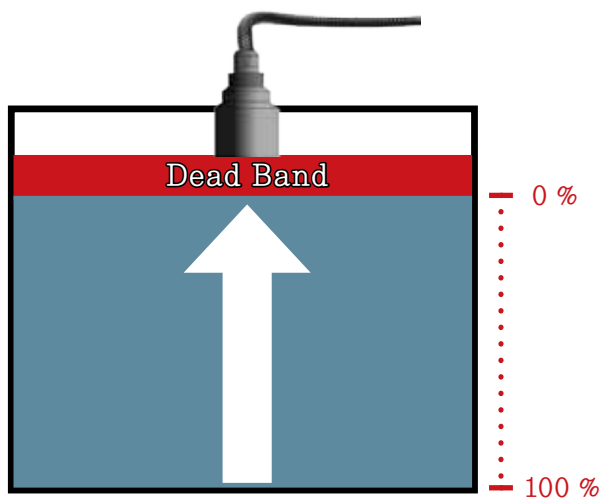
(Measuring distance from the bottom of a sensor to the surface of a fluid via non-contact tape-measure method)



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