# ULTRASONIC DENSITY METER

## MODEL LT-3000






LETECH Co., Ltd.





## Outline

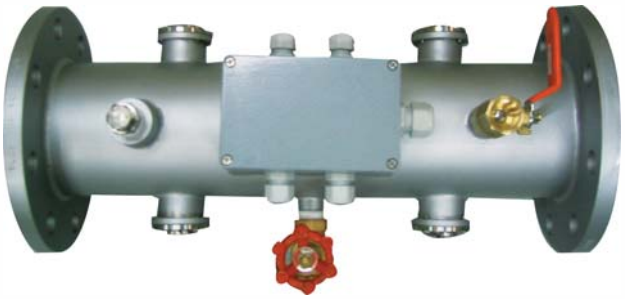
Our LT-3000 ultrasonic double beam densitometer is designed for accurate measurement of concentration unlike existing ultrasonic devices, as it is also easily applicable to the sludge mixed with a huge amount of air occurring from the operation of pump and gas occurring from raw sludge and thickened sludge in the water purification plant and sewage disposal plant.

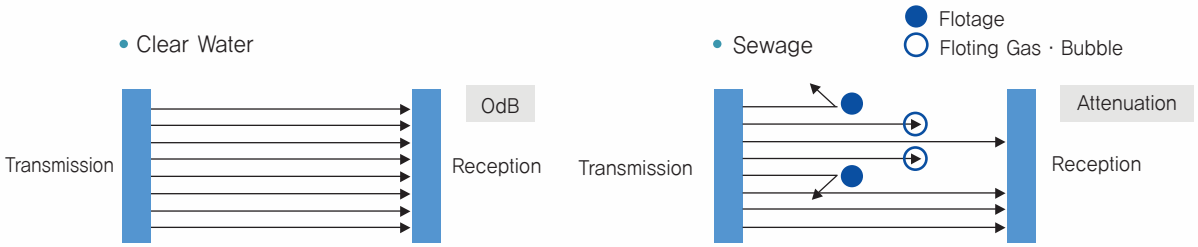
Continuous measurement of exact sludge concentration in the pipe has not been possible, due in large part to, the influence of gas and air with general ultrasonic densitometer, which means that the ultrasonic wave is completely absorbed to the gas or air layer. Although the sludge concentration in the pipe is not considerably high, it demonstrates radically high output. A supplementation, accordingly, is required for stable output in order to minimize the influence from gas or air.

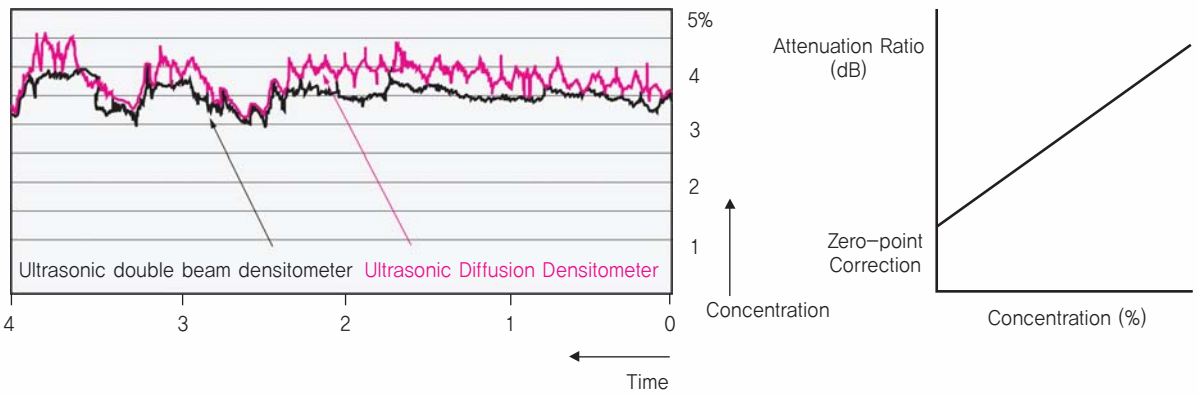
Our ultrasonic double beam densitometer renders a stable output, in spite of diminution of ultrasonic wave in the gas or air layer, as it employs a special double beam differentiated from existing ultrasonic devices to transmit leveled data of CH1 and CH2.

## Measuring Principle

Ultrasonic double beam densitometer has a ultrasonic sensor inserted to a tube as the figure below. The ultrasonic wave, transmitted from each sender, decreases in the flow and arrives at the receiver. The amount of ultrasonic wave decreased here is calculated to measure the sludge concentration.






- The graph above demonstrates the output trends of ultrasonic double beam densitometer and ultrasonic distribution type densitometer.
- The double beam type shows a stable output with response and cut off functions.



## Features

- Heightened Measurability

  Ultrasonic double beam makes up for flaws of existing ultrasonic products, and is not influenced by chromaticity or conductivity

- Easier Manipulation

  Instant commencement of measurement with simple one-touch manipulation, and easier replacement of tube due to its length switch identical to existing ultrasonic densitometers

- Decreased Influence by Gas or Air

  Leveled output data of CH1 and CH2 substantially decreases the measurement errors

- Built-in Response Function

  Restrictive condition for rate of change shall be set by adjusting the allowable variable breadth, the function for control of output change, in the event that the output changes substantially by radical change in concentration or penetration of excessive bubbles

- Automatic Zero-Point Correction

  No additional zero-point settings necessary after initial zero-point setting.

- Built-in Temperature Sensor

  Temperature sensor built in detector or converter for automatic temperature compensation

- Simple Range Setting

  Simple range setting without change of frequency by low or high concentration

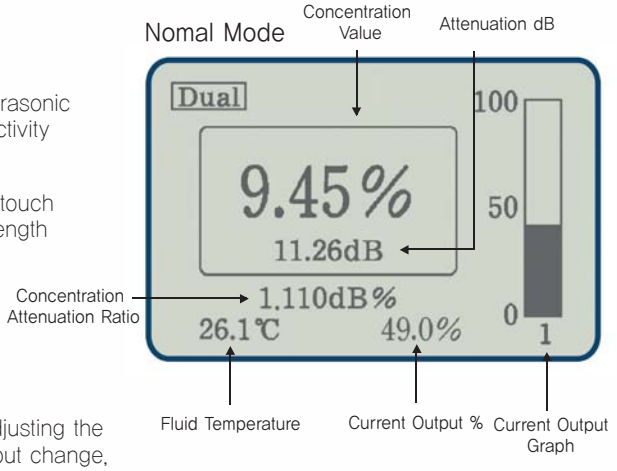
- Sensor Removable for Cleaning

  Air or water cleaning available if necessary

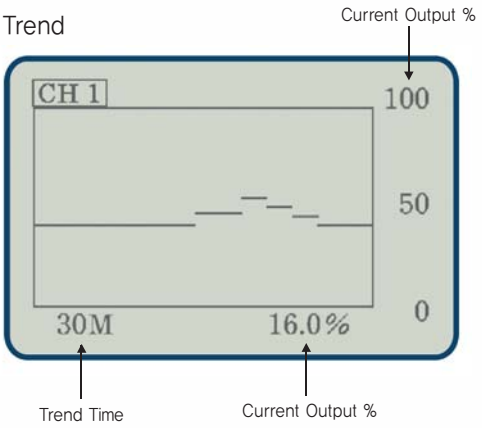
- High Output and Sensitivity

  High sensitivity maintained by maximized output in the same frequency even for the contaminant

Nomal Mode



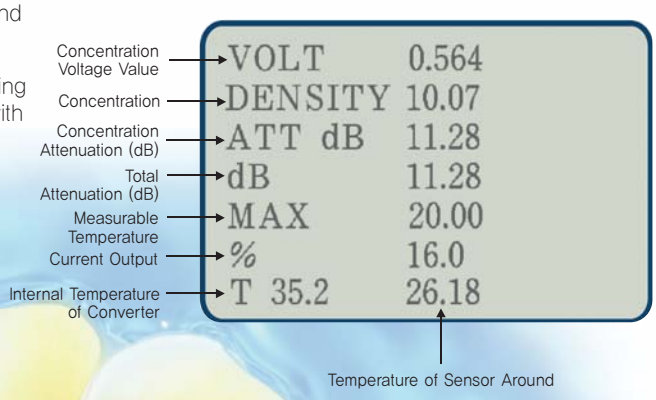

Trend




## Function

- Liquid crystal display (LCD) for indicating measurement status including Concentration, Temp, Bargraph, Trend
- Self-diagnosis and display brightness control
- Present current value and concentration value ranging from 5 minutes to 48 hours identifiable on display with a built-in trend
- Data cut off: data shall be cut off in the event that there exits a radical decrease in the echo by penetration of excessive bubbles
- Frequency change: change of frequency by low or high concentration
- Simultaneous indication of 2ch data: Simultaneous indication of measuring data of CH1 and CH2, and indication of average value

DISP MODE C







# Product Specification

## Equipment Configuration (Standard)

| | |
|---|---|
| Converter | LT-3000 |
| Detector | SS-03 |

## Converter

| | |
|---|---|
| MODEL | LT-3000 |
| Measuring method | Ultrasonic attenuation |
| Measuring type | Double beam type, Single beam type |
| Measuring range | 0~30% (0~10%, 0~20%, 0~30%) |
| Measuring degree | ±1% F. S |
| Resolution | 0.1% T. S |
| Reproducibility | ±1.0% F. S |
| Limearity | ±1.0% F. S |
| Control method | CPU control method |
| Indication unit | %, ppm, g/ℓ |
| Response speed | Adjustable |
| Function | Self-diagnosis, display brightness control |
| Indication | LCD (CONCENTRATION, TREND, TEMP, BARGRAPH, CURRENT VALUE) |
| Output | • DC4-20mA (Built-in lightning arrestor) • Load resistance ≤600Ω • ISOLATION OUTPUT<br>• RS-485 OUTPUT MAX 1200m (option) Profibus |
| Alarm output | H, L (Rated voltage: AC250V 5A), Lamp |
| Ambient temperature | -20℃~+70℃ |
| Structure | IP65 |
| Material | Speical coated STEEL |
| Power consumption | Approx. 30VA |
| Power | AC90 ~240V |
| Weight | 5.5Kg |

## Detector

| | |
|---|---|
| MODEL | SS-03 (Convertible High Concentration or Low Concentration) |
| Frequency | 1MHz, 3MHz (Automatic frequency conversion) |
| Pipe diameter | 50mm, 65mm, 80mm, 100mm, 125mm, 150mm, 200mm, 250mm, 300mm, 400mm, 500mm<br>(Customization required for other sizes) |
| Sedimentary type | 200mm (Gap Size) |
| material | PIPE : SUS304 or SUS316<br>SENSOR : SUS316<br>FLANGE : SUS304 or SUS316 |
| Flange specification | KS, JIS, DIN, ANSI |

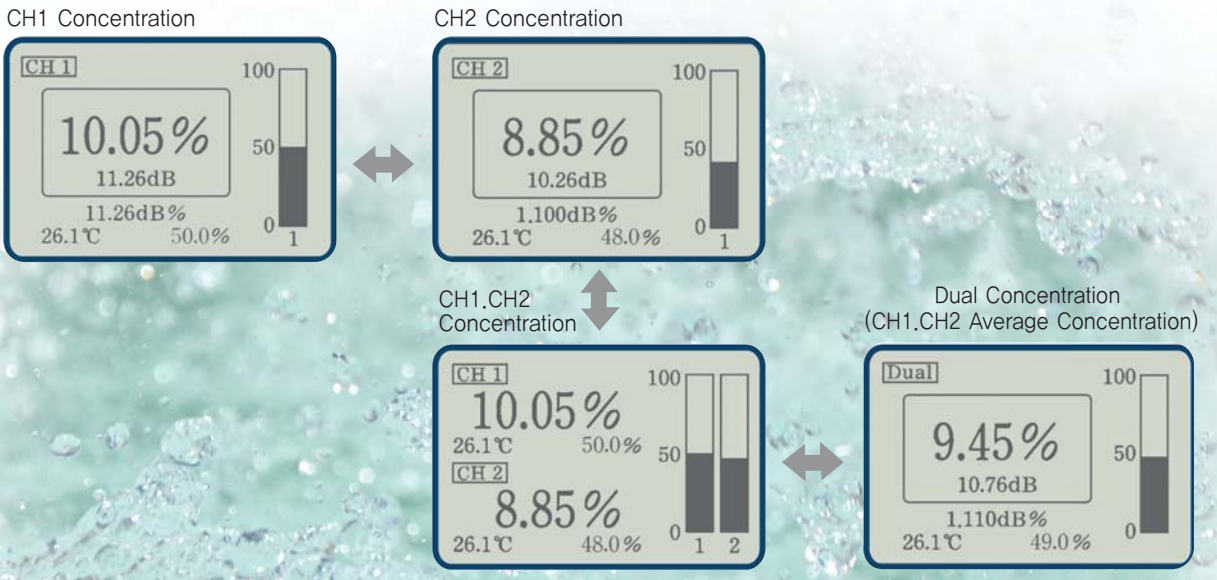
| Specification | Internal pressure |
|---|---|
| JIS10K | 1MPa (10bar) |
| KS10K | 1MPa (10bar) |

| | |
|---|---|
| Sensor quantity | Double Beam : 4 units (2 sets), Single Beam : 2 units (1 set) |
| Workable temperature | -20℃ ~ +150℃ |
| Resolution | 0.05%T. S |
| Liquid temperature | 0 ~ 90℃ |
| Pressure range | 1MPa |
| Structure | IP68 |
| Exclusive cable | 10M (Standard) |
| Cable Box | IP65 (Aluminium) |
| Temperature detector | Built-in type (pt100Ω) |
| Cleaning method | Water or air cleaning selectable |



## Cautions for Sensor Installation and Piping

- Put the sensor in a place without vibration and corrosive gas, where the repair and maintenance are relatively easier.
- Secure enough space for repair and maintenance on the front and rear side of densitometer.
- Prepare for a cover to protect densitometer from direct sunlight or rain, during installation of the sensor outdoors.
- Avoid installing densitometer in a place, where there exists a possibility of leakage of combustible or volatile gas.
- Apply a vertical piping, in the event that
  - the excessive amount of bubble is likely to linger in the pipe.
  - the concentration distribution of measured object in the pipe is judged to be ununiform, on account of sedimentation or floatation of measured object by slow velocity of flow.
  - LT-3000 the diameter of which is bigger than main pipe is installed.
- Install densitometer, where the measured object makes full-pipe, and where the bubble occurs less. The prolonged transit time may affect the measurement.
- Install densitometer, where the measured object does not deposit on the bottom of densitometer.
- Install the densitometer around the pump discharge to prevent air from penetrating through the pipe.
- Let the bidirectional sensor be parallel in the event of applying a horizontal piping.
- Erect LT-3000 in a place, where the repair and maintenance are relatively easier, as it is not affected by the direction and velocity of flow of measured object.
- Install the pipes in a place free from the vibration of pump.
- Install the densitometer in a place, with certain water pressure, away from pipe exits to minimize the influence by penetration of bubbles
- Avoid allowing the flow fill up the pipe of densitometer when the pump stops. Let the measurement be made, only when the pump operates, on the exploitation of external interlocking machine, for the place where the concentration distribution is not uniform.
- Install stop valves at upper and lower parts of densitometer, and subsequently erect by-pass pipes, as the pipe is equipped with sampling part, zero supply part, and drain part at the pipe of detector for repair and maintenance.
- Use the packing appropriate for the specification of flange, and choose the proper material suitable for the measured object.







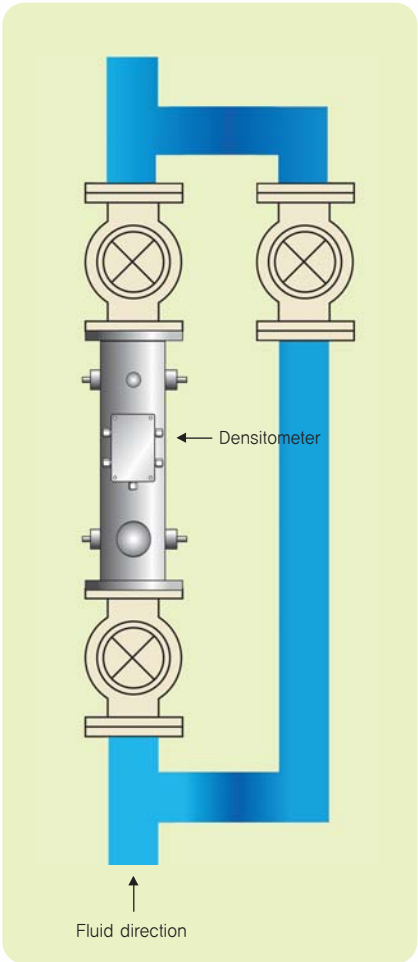
## Usage of Each Valve

- Zero-point water valve
  Zero-point water valve is installed to supply clear water (concentration 0%) to the inside of detector when calibrating the zero-point. Install horizontal pipe at the top of pipe. Attach 1/2-inch glove valve to the pipe, in order to connect vinyl hose for water supply. Make sure to install an open valve for atmosphere, as the water supply pipe connected to the valve may prevent the air to be discharged from the pipe.

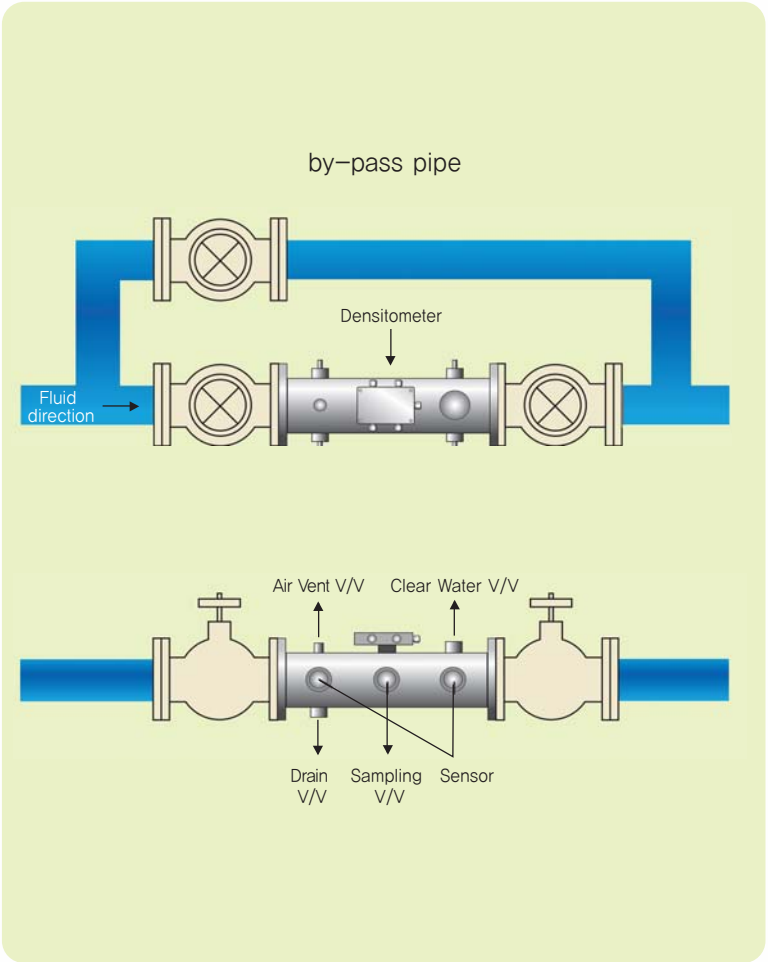
- Air Vent valve
  Air vent valve is installed to uniformly supply clear water (concentration 0%) to the inside of densitometer, by throwing open the upper part of pipe to the air, when calibrating the zero-point.

- Drain valve
  Drain valve is installed to discharge measured object, before supplying clear water to the inside of densitometer, when calibrating the zero-point. This valve is installed at the bottom of pipe as an 1-inch ball valve.

- Sampling valve
  Sampling valve is installed to collect a sample for water analysis. This valve shall be installed in the middle of a horizontal pipe as an 1/2-inch ball valve.




Vertical pipe (Ex.)

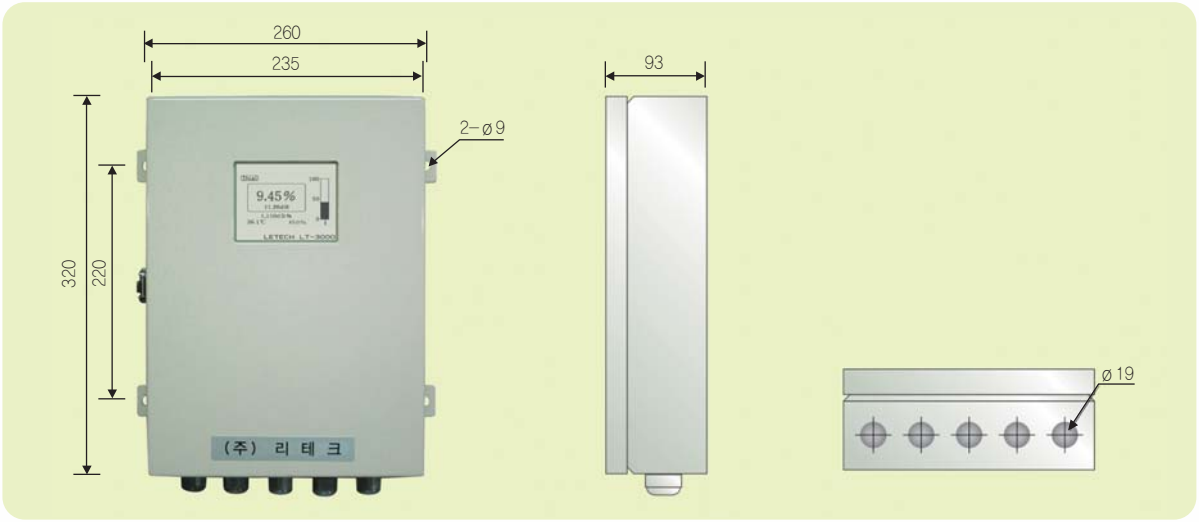



Horizontal pipe (Ex.)

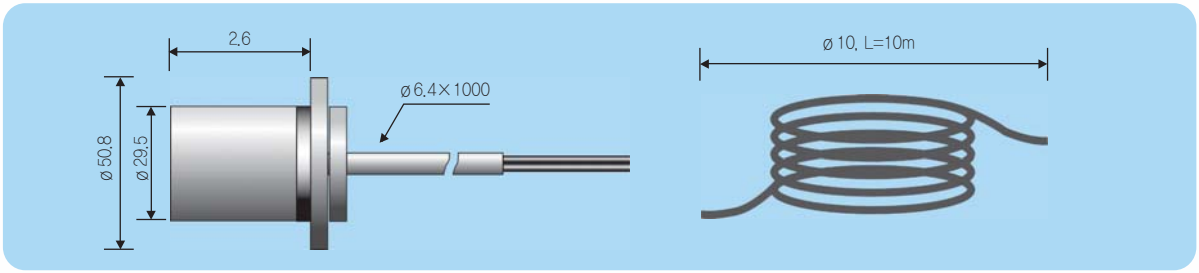


## Outside View

■ Converter




■ Detector




■ Insertional type



■ Sedimentary type



## Wiring Diagram

| AD0 | | AD1 | | | ALARM H | | | ALARM L | | | RS485 | | | | 4-20mA | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| + | − | + | − | | NC | COM | NO | NC | COM | NO | FG | TX | RX | GND | ⊕ | ⊖ |
| 18 | 19 | 20 | 21 | 22 | 23 | 24 | 25 | 26 | 27 | 28 | 29 | 30 | 31 | 32 | 33 | 34 |

| 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | 17 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| TX+ | TX− | SH | SH | RX+ | RX− | | TX+ | TX− | SH | SH | RX+ | RX− | | L | N | FG |
| SENSOR CH1 | | | | | | | SENSOR CH2 | | | | | | | 85-264VAC | | |



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