

Temperature Sensor for LNGC

SUMMARY

These temperature sensors will be installed inside the LNG carrier insulation spaces for :

- * Indication of primary and the secondary insulation spaces temperature.
- * Detection of leak inside insulation space (IS)

The following common equipment shall be provided:

- * All necessary wires, gas tight penetration(s) (multipacking gland) and necessary junction boxes and all connectors.

Pair of temperature sensor (one operational and one spare, double element type) shall be provided under the secondary barrier. The stand-by temperature sensor can be selected from electric distribution panel room when the working temperature sensor fails.

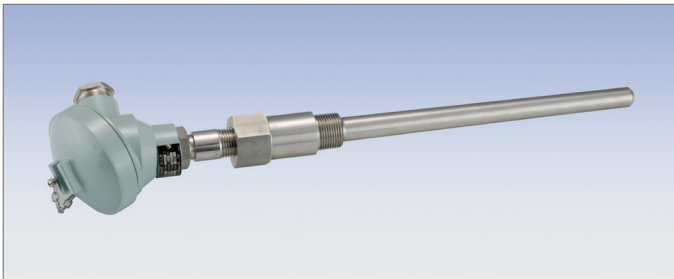
These sensors are used for detection of leak inside the insulation space (IS). The secondary barrier temperature measurement system shall be capable of detecting and reporting any temperature sensor failure or malfunctioning.

RTD(Resistance Temperature Detector) will be used for temperature measurement. RTD element / sensing shall be platinum PT100 (100Ω at 0°C), three wires. The temperature measurement minimum accuracy shall be below ±0.2°C over the different temperature set points mentioned above. The read-out precision of the temperature display system shall be 0.1°C

Calibration shall be NF/IEC 60751 with temperature coefficient $\alpha=0.003851$ ohms/ohms/°C and accuracy Class A 100 Ohms ±0.06% at 0 degrees Celsius.

The materials used for the manufacturing of all the components of the equipment shall be compatible with the stored product (LNG) and its associated vapor phase (NG) as well as the other fluids filling the tank during the non-operational periods (air, inert gas) will be specified by the supplier.

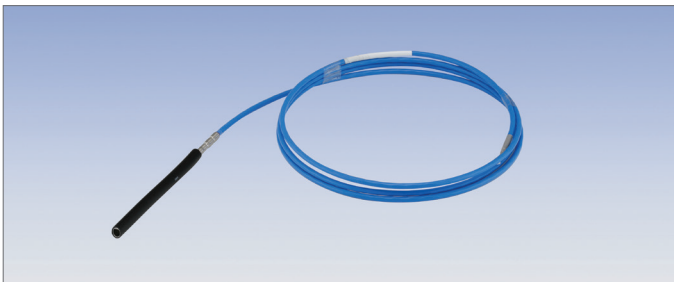
TYPE OF TEMPERATURE SENSOR



Application Use for LNG Cargo Tank Spray, Liquid , vapor Line

- Features
1. Excellent measurement accuracy
 2. Rapid response speed.
 3. High durability against vibrations
 4. Easy maintenance and checks

- Operating Range : -200~100 °C
- CLASS : A



Application Use for LNG Cargo Tank Barrier

- Features
1. Excellent measurement accuracy
 2. Rapid response speed.
 3. High durability against vibrations
 4. Easy maintenance and checks

- Operating Range : -200~100 °C
- CLASS : A



Application Use for LNG Cargo Tank Bulk Head

- Features
1. Excellent measurement accuracy
 2. Rapid response speed.
 3. High durability against vibrations
 4. Easy maintenance and checks

- Operating Range : -200~100 °C
- CLASS : A

Temperature Sensor for Main Engine / Generator Engine

SUMMARY

Outline of Temperature Sensors

The temperature resistance characteristic of platinum is internationally utilized.

For measuring temperatures in the range of -200°C to 600°C.

Resistance Temperature Detector are known to be most suitable when used as temperature sensors which require extreme accuracy and stability.

Thermocouple is a temperature-measuring device consisting of two dissimilar conductors that contact each other, where a temperature differential is experienced by the different conductors.

For measuring temperatures in the range of 0°C to 600°C.

High Temperature Sensor

Resistance Temperature Detector and Thermocouple used to measure and monitor the exhaust and steam temperature of the main engine and the boiler.

This Resistance Temperature Detector provided as a unit by depositing platinum and internal protected with ceramic mold, matches a thermocouple in mechanical strength.

Resistance Temperature Detector allows accuracy and stability even under such a strict environment as a continuous high working temperature of 700°C.

Metal Sheathed thermocouple is comprised of metal sheath in which the thermoelectric elements are embedded in highly compacted magnesium oxide (MgO) insulation.

The construction guarantees a superb insulation quality and high resistance to pressure, and has, in addition, an excellent flexibility, which has been given to it by annealing in a proper method.

Low Temperature Sensor

Resistance Temperature Detector is used to measure and monitor the temperatures of lubricating oil, cooling water and bearing of various engines as well as the air temperature.

TYPE OF TEMPERATURE SENSOR



▶ INSTRUMENT

TEMPERATURE SENSOR FOR LNGC

TTR-LD

Application Use for LNG Cargo Tank Spray, Liquid , vapor Line

- Features**
1. Excellent measurement accuracy
 2. Rapid response speed.
 3. High durability against vibrations
 4. Easy maintenance and checks

Operating Range : -200~100 °C

CLASS : A



TTR-M

Application Use for LNG Cargo Tank Barrier

- Features**
1. Excellent measurement accuracy
 2. Rapid response speed.
 3. High durability against vibrations
 4. Easy maintenance and checks

Operating Range : -200~100 °C

CLASS : A



TTR-M

Application Use for LNG Cargo Tank Bulk Head

- Features**
1. Excellent measurement accuracy
 2. Rapid response speed.
 3. High durability against vibrations
 4. Easy maintenance and checks

Operating Range : -200~100 °C

CLASS : A



EXPLOSION PROOF TYPE TEMPERATURE SENSOR

TTR-LN-DX / TTR-LD-L-DX / TTR-SD-DX

Certificate No. : IECEX KTL 15.0008

Grade : Ex d IIC T6 Gb

Ambient Temperature : -40°C ~ +50°C

Application : For cooling fresh water, lubricating oil, fuel oil, cooling sea water temperature and low temperature flow object.

Features : High accuracy / Rapid response time / High durability against vibration / Easy maintenance/Replaceble internal element at fitting status

Operating Range : -200°C ~ +750°C



Weather Information System

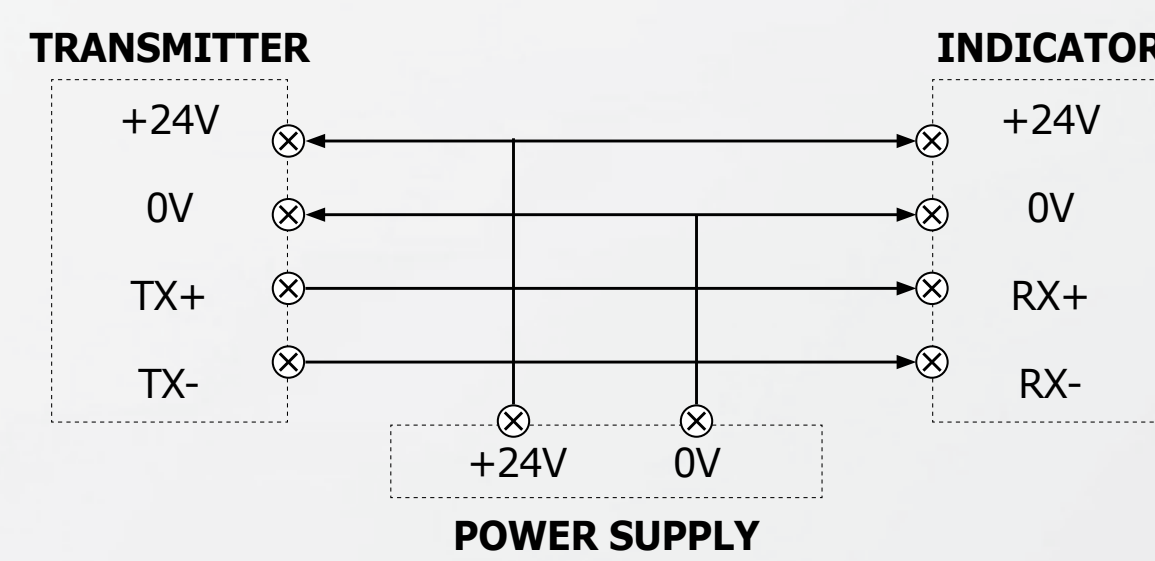
Ultrasonic Wind Sensor



UWS-300

The Ultrasonic Anemometer 3D is designed compact automatic sensor without moving parts and measures wind direction and wind speed from all spatial directions. This conduct is very accurate, responds rapidly to wind changes, and has zero starting threshold. In addition, The Ultrasonic Anemometer 3D can measure the vertical wind, unlike the ultrasonic anemometer 2D. The Ultrasonic Anemometer 3D is not affected by extreme climatic conditions. The Ultrasonic Anemometer 3D can be used in conjunction with a PC, Data Logger or other device, and also it is compatible with the RS-422 output.

Connection



Specification

Measuring range

- Wind speed : 0 ~ 75m/s
- Wind direction : Azimuth : 0° ~ 360°
Elevation : 0° ~ 180°

Accuracy

- Wind speed : ±2%
- Wind direction : ±2°
- Temperature : -40 ~ +70°C
- Data output : RS422 / RS232
- Power source : 24VDC ±20%, Max.1.5A
- Protection : IP66
- Weight : approx. 1.8kg

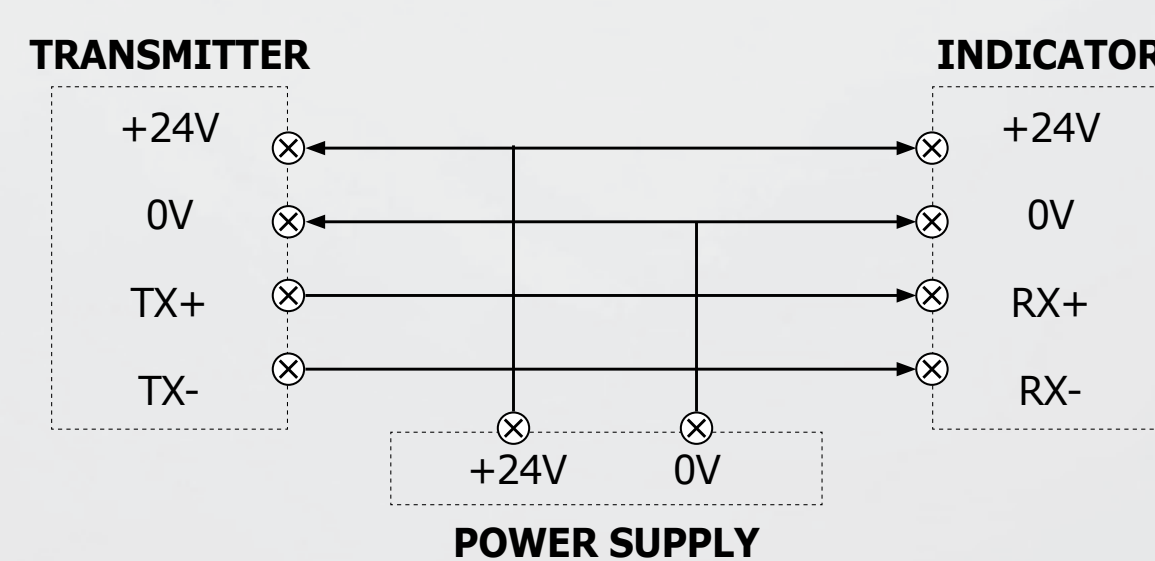
Ultrasonic Wind Sensor



UWS-200

The Ultrasonic Anemometer is designed a compact automatic sensor without moving parts. Anemometer measures wind speed and wind direction. The Ultrasonic Anemometer is very accurate, responds rapidly to wind changes, and has zero starting threshold. The anemometer is not affected by extreme climatic conditions. The Ultrasonic Anemometer can be used in conjunction with a PC, Data Logger or other device, provided it is compatible with the RS422 output.

Connection



Specification

Measuring range

- Wind speed : 0 ~ 75m/s
- Wind direction : 0 ~ 360°

Accuracy

- Wind speed : ±2%
- Wind direction : ±3°
- Temperature : -40 ~ +70°C
- Data output : RS422 / RS232
- Power source : 24VDC ±20%, Max.3.8A
- Protection : IP66
- Weight : approx. 1.5kg



Ultrasonic Wind Sensor

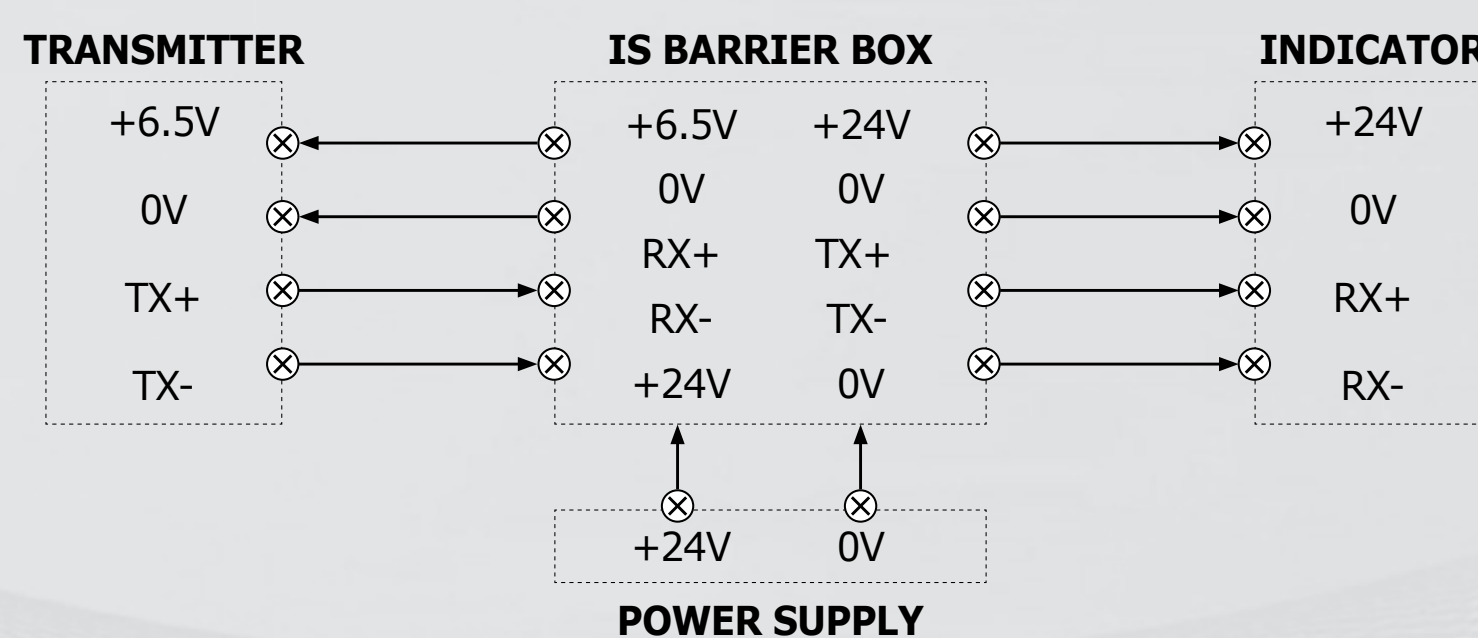


AT-US(I.S)

The Ultrasonic Anemometer is designed a compact automatic sensor without moving parts. Anemometer measures wind speed and wind direction. The Ultrasonic Anemometer is very accurate, responds rapidly to wind changes, and has zero starting threshold.

The anemometer is not affected by extreme climatic conditions. The Ultrasonic Anemometer can be used in conjunction with a PC, Data Logger or other device, provided it is compatible with the RS422 output. In addition, the ultrasonic anemometer is the product obtained international certification for explosion-proof electrical equipment (Ex-ib) enabled to Zone1.

Connection



Specification

Measuring range

- Wind speed : 0 ~ 75m/s
- Wind direction : 0 ~ 360°

Accuracy

- Wind speed : ±2%
- Wind direction : ±3°
- Temperature : -40 ~ +70°C
- Data output : RS422 / RS232
- Power source : 6.5V DC ±10%, Max.0.17A
- Protection : IP66, Ex-ib
- Weight : approx. 2.0kg



Weather Information System

A Multitude of Weather data with one System



Weather Information System measures Wind speed and direction, Air temperature, and Barometric pressure, Humidity, Rainfall, Finedust (PM2.5).

Performance

- Wind speed
- Wind direction
- Temperature
- Barometric pressure
- Relative humidity
- Rainfall
- Finedust (PM2.5)



Power

- Power requirements : 24V DC (±20%) 4A

Output

- RS422/RS232
- Output rate : 1sec
- Units : m/s
- Serial output format : DAEYANG protocol
- Serial output baud rate : 2400, 4800, 9600, 19200 or 38400 (Default : 9600)

Environmental

- Operating temperature range : -40°C to +70°C
- Storage temperature range : -50°C to +80°C

Specification

- Wind speed range : 0 ~ 75m/s
- Wind speed accuracy : ±3%
- Wind direction range : 0 ~ 360°
- Wind direction accuracy : ±3°
- Temperature range : -40 ~ +60°C
- Temperature accuracy : ±0.3°C
- Barometric pressure range : 600 ~ 1100hP
- Barometric pressure accuracy : ±0.5hP
- Relative humidity range : 0 ~ 100%RH
- Relative humidity accuracy : ±3%RH
- Rainfall range : 0 ~ 250mm/h
- Rainfall accuracy : ±5%
- Fine dust range : 0 ~ 500ug/m³
- Fine dust accuracy : ±10%

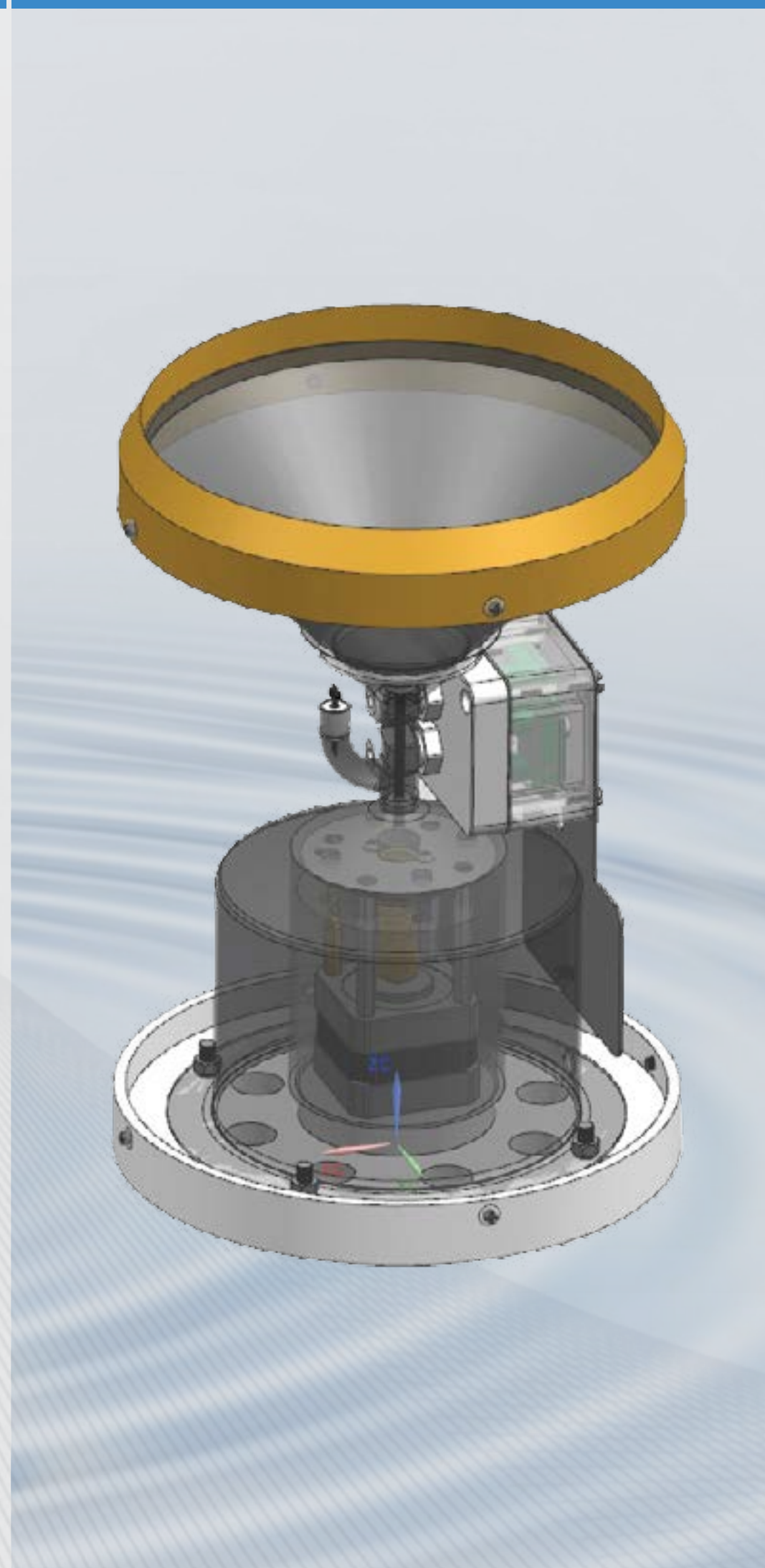
Data Output Protocol

- * Weather Information System Protocol
\$DEWMS,xxx.xx,R,xxxx,M,A,H,xxx.x,T,xxxx.x,B,x xxx.x*[CS]<CR><LF>
- * Rainfall Protocol
\$RAINxxx.xMM*[CS]<CR><LF>
- * Fine dust Protocol
\$DUST,xxxx,PM1.0,xxxx,PM2.5,xxxx,PM10,UG*[CS]<CR><LF>

NEW TECHNOLOGY

Electronic Bucket precipitation sensor

SUMMARY



This product is a precipitation sensor used the Pascal's principle and electric signal conducting of the phenomenon in the water. Existing conductive or weighing-type precipitation sensor is a way to convert the volume by measuring the weight of precipitation.

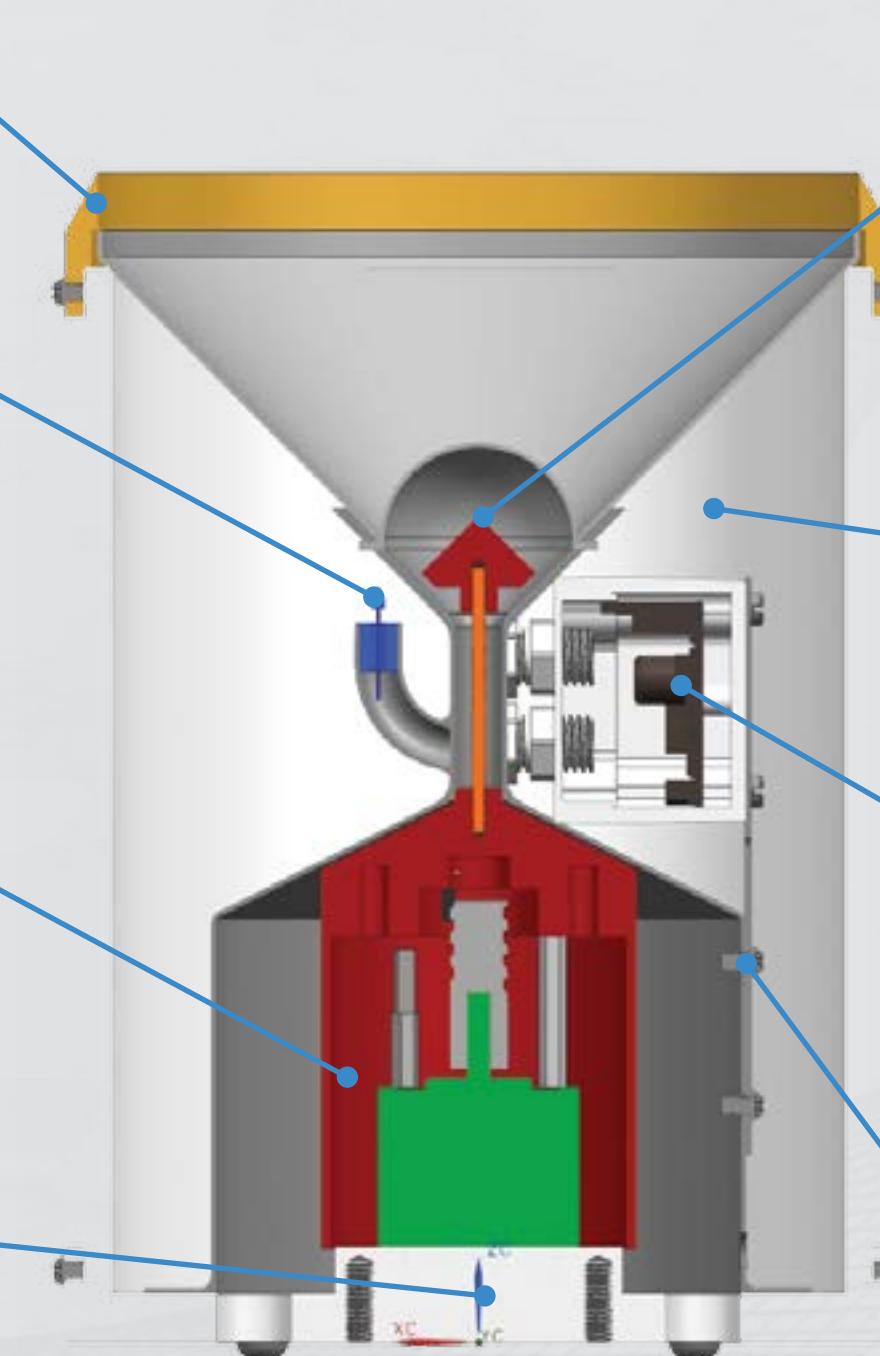
But this product is the precipitation sensor of new type for outputting to measure the actual volume of the precipitation. Also, In order to measure the precipitation of 0.1 mm unit, This product is made and a resolution is very high. It is almost not influenced on the external environment or wind due to open and close the drainage plug by using a stepping motor. So it is possible to measure the exact precipitation than existing products, has high durability and reliability.

Collecting Ring
Role collect precipitation

Probe Pin
Printed constant clock output pin and receiving the clock as an input pin to pass the signal processing circuit.

Bottom drainage plug
Collect rainwater in the inner body, or drain

Step motor
Is connected to the drain plug by a vertical bolt operated to open and close the drain plug.



Upper drainage plug
Foreign objects inflow prevent and during drainage, prevent the falling rain, increases the reliability of the measurements.

Prevent foreign objects filter
Which prevents foreign objects such as insects and leaves more than 1mm.

Signal Processing Circuit Part
Oscillates a clock output pin to control the operation and speed of the stepping motor depending on the incoming input value to the input pin.

Inner Body
Collect rainwater flowing pipe