



Compact Bubbler Sensor (CBS) CSI Specifications

Part 1 - General

1.1 Section includes:

Sensor for water level measurement using the bubble-in principle

1.2 Measurement Procedures

Bubble-in method with drift-free acquisition of measured values by zero-point-reference measurement before each measuring cycle. Intelligent pumping strategy to optimize the air volume needed, to reduce power consumption and extend the lifetime of the pump.

1.3 Alternates

- Staff Level Gauges (manual read)
- Contact Gauges (manual read)
- Float-operated shaft encoder level sensor
- Non-contact radar level sensor
- Pressure Level Sensor

1.4 System Description

Performance Requirements

Water Level

Measurement ranges:

- "Standard" + "USGS specification" version
0 ... 15 m; 0 ... 1500 mbar; 0 ... 50 ft; 0 ... 25 psi
- "30 m measuring range" version
0 ... 30 m; 0 ... 3000 mbar; 0 ... 100 ft; 0 ... 50 psi

Resolution (SDI-12 interface)

1 mm; 0.1 mbar; 0.01 ft; 0.001 psi

Accuracy (linearity + hysteresis)

- SDI-12 "Standard" + "30 m measuring range" version:
±5 mm
±0.02 ft
- "USGS specification" version:
measuring range 0 ... 15 ft: ±0.01 ft
measuring range 15 ... 50 ft: ±0.065 % of measured value or ±0.02 ft, whichever is less
- 4... 20 mA:
±0.1 % FS; TC 10 ppm/°C (at 20 °C)

Measuring dynamics (max. level change): 1 m/min

Units : m or ft; bar or PSI

Operating/display elements

DIP switches Setting operating parameters (eight)

“Pump” membrane button Call purge function; display error status using LED

“Status” LED Display operating state/error status

Supply voltage 10 ... 30 VDC, typ. 12/24 VDC

Current consumption

Query interval 1 min typ. 320 mAh / day (max. 3 700 mAh / day)

Query interval 15 min typ. 25 mAh / day (max. 300 mAh / day)

Interfaces

4 ... 20 mA

SDI-12 (Version 1.4)

SDI-12 (Version 1.4) via RS-485

Measuring tube

Internal diameter Connection possibilities for 2 mm, 4 mm, 1/8”

Length 2 mm, 1/8”: max. 100 m

4 mm: max. 75 m

1.5 Certifications

Performance classification in accordance with DIN EN ISO 4373

Measurement reliability Performance class 1

Temperature range Temperature class 2

Relative humidity Class 1

EMC limits

complies with EN 61326-1:2013

CE compliant

1.6 Environmental Requirements

Operational Criteria

Housing material ABS

Type of protection IP 43

Temperature range

Operation -20 ... +60 °C

Storage -40 ... +85 °C

Relative humidity 10 ... 95 % not condensing

1.7 Warranty

The product includes a one-year warranty from the date of shipment (EU: 2 years)

1.8 Maintenance Service

Carrying out maintenance work

The bubble sensor itself is maintenance free.

It is recommended that the measuring tube and bubble chamber are checked at regular intervals

Scheduled Maintenance

Part 2 - Products

2.1 Manufacturer

OTT Hydromet GmbH

2.2 Manufactured Unit

The OTT Compact Bubble Sensor (CBS) measures water levels accurately and remains stable long-term. It operates according to a non-drifting measurement principle, covering a range of measurement of up to 30 m. The system uses an indirect measurement technique that keeps the pressure measurement cell and electronics out of the water.

An integrated compact piston pump produces the bubbling pressure required for the indirect measurement process. The compressed air is blown out in the water with the attached measuring tube using a bubble chamber – after the blowing process the pressure between the measuring tube and the water pressure at the bubble chamber is equalized. A pressure measuring cell in the OTT CBS measures the air pressure and the prevailing tube pressure in succession. By taking the difference between both signals, the exact water level is calculated compensated for drift.

By using an intelligent pumping strategy, the bubble sensor doses the exact amount of air required in order to be able to guarantee a precise water level measurement and minimize condensation. In addition, power consumption is reduced, and the lifetime of the pump unit increased.

2.3 Equipment

Bubble Sensor OTT CBS

Installation kit (top hat rail with fastening parts; screw terminal blocks, pin jumpers)

2.4 Components

Standard Equipment

OTT CBS

Installation kit

Operating instructions

Factory acceptance test certificate (FAT)

Dimensions: L x W x H 165 mm x 205 mm x 115 mm

Shipping weight: approx. 1.5 kg

2.5 Instrument Options

Must be selected at the time of order. Choose one or the other.

Accuracy

- Standard (± 0.02 ft ; ± 5 mm)
- USGS specification (only available for 0 ... 50 ft; 0 ... 15 m measuring range)

measuring range 0 ... 15 ft: ± 0.01 ft

measuring range 15 ... 50 ft: ± 0.065 % of measured value or ± 0.02 ft, whichever is less

Measuring Range

- 0 ... 50 ft; 0 ... 15 m water column (0 ... 1.5 bar)
- 0 ... 100 ft; 0 ... 30 m water column (0 ... 3 bar)

Tube diameter:

- \varnothing 2/4mm or 4/6mm
- ID 1/8", OD 3/8"

Units preset

- Metric
- Imperial

2.6 Optional Accessories

Select as many as required .

- Measuring tube 4 mm/2 mm external/internal diameter; transparent PE Straight cable suspension; 50 m
- Measuring tube 4 mm/2 mm external/internal diameter; transparent PE Straight cable suspension; 100 m
- Combined measuring tube/bubble chamber suspension cable black, with kevlar core for length stabilization, measuring tube with 4 mm/2 mm external/internal diameter; transparent PE; 50 m
- Combined measuring tube/bubble chamber suspension cable black, with kevlar core for length stabilization, measuring tube with 4 mm/2 mm external/internal diameter; transparent PE; 100 m
- Measuring tube 6 mm/4 mm with sheathing... m ea.
- Measuring tube 6 mm/4 mm without sheathing... m ea.
- Bubble chamber suspension cable black, with Kevlar core for length stabilization 50 m
- Bubble chamber suspension cable black, with Kevlar core for length stabilization 100 m
- Bubble chamber for ground water – for observation wells beginning at 2" diameter, 670 gram
- Bubble Pot EPS 50 for surface water - hose connector 4 mm/2 mm
- Bubble Pot EPS 50 for surface water - hose connector 6 mm/4 mm
- Straight pipe fitting - for connecting measuring tubes with 1/8" internal diameter and 3/8" external diameter

Part 3 - Execution

3.1 Preparation

Preparing the OTT CBS for installation: If required and not yet completed: Adjust operating parameters using service interface (eight-position DIP switch)

3.2 Installation

Fastening OTT CBS

The OTT CBS is designed only to be installed on top hat rails (a section of top hat rail is supplied with the OTT CBS). Choose a dry and dust free location for the installation such as a gage station or control cabinet.

Connecting measuring tube to OTT CBS

Installing bubble chamber

Preparation

No contamination or moisture may be allowed into the measuring tube.

When immersing the bubble chamber (only EPS 50), the OTT CBS must be activated, so that the piston pump is operating during this process.

Do not damage or kink the measuring tube during installation.

Lay the measuring tube such that there is a continuous drop from the OTT CBS towards the bubble chamber. Otherwise moisture could collect in a "hollow" and potentially block the tube with the formation of drops

Installing bubble chamber for surface water

It is recommended to use the Bubble Pot EPS 50 for measurements in surface waters.

Installing bubble chamber for ground water

It is recommended to use the Bubble chamber for ground water

Connecting the OTT CBS

Available interfaces:

SDI-12

RS-485, (2-wire; SDI-12 /Modbus protocol)

4 ... 20 mA (current loop)

The three interfaces make it possible to connect the OTT CBS both to OTT data loggers and to any data logger by another manufacturer that has the correct interfaces. Note that only one of the interfaces at a time can be used (no parallel operation of interfaces).

All electrical connections are made using two screw terminal strips (supplied)

Connect power supply

The OTT CBS requires a power supply of 10 ... 30 V DC, typ. 12/24 V DC (e.g. using batteries or mains connection with galvanically separated low safety voltage)

3.3 Manufacturer's Service and Start-Up