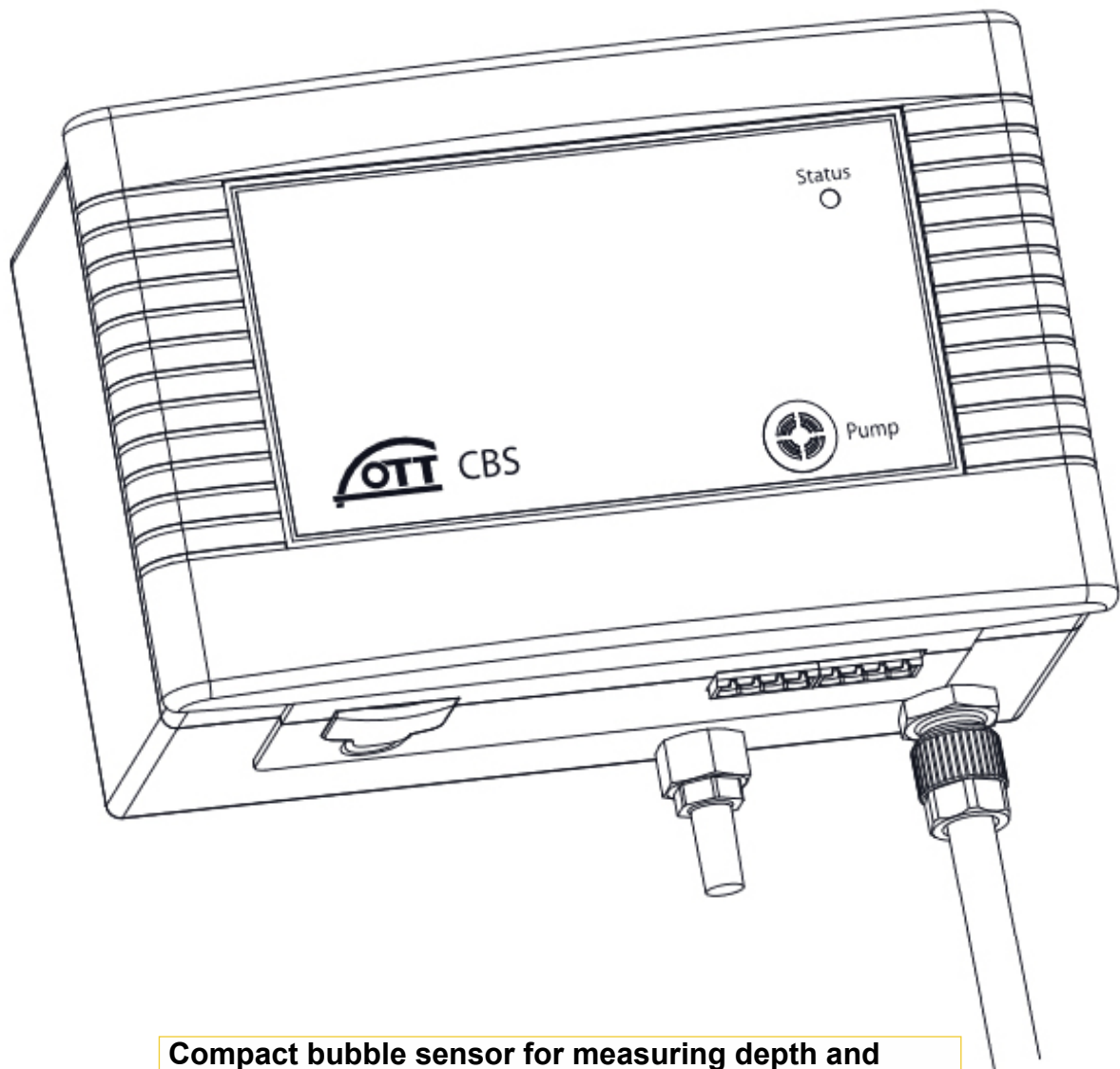


Original instruction manual

Bubble Sensor OTT CBS



Compact bubble sensor for measuring depth and water level with optional datalogger



Read the operating instructions carefully and follow them!
Valid for instruments with firmware versions from 1.20.0!

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2 Safety instructions

2.1 Intended use

The **OTT CBS** is a bubble sensor used for drift-free measurement of the water level. From the difference between the air pressure and the prevailing line pressure, it determines the water level with drift-compensation very accurately. A “standard”, a “USGS specification” and a “30 m measuring range” version are available.

■ The OTT CBS is designed only to be installed on top hat rails. Measuring tubes with 2 mm, 4 mm or 1/8” (with special fitting) can be used; measuring tubes and bubble chambers must be installed according to installation instructions provided in this manual. The sensor is to be installed outside the water.

■ The sensor may only be used within the scope of this application and the specified physical limits. Any other use or use beyond the specified limits is considered improper and not in accordance with the intended use.

■ Intended use also includes reading and understanding the operating instructions, instructions, in particular the safety instructions, as well as carrying out the necessary maintenance work and safety checks.

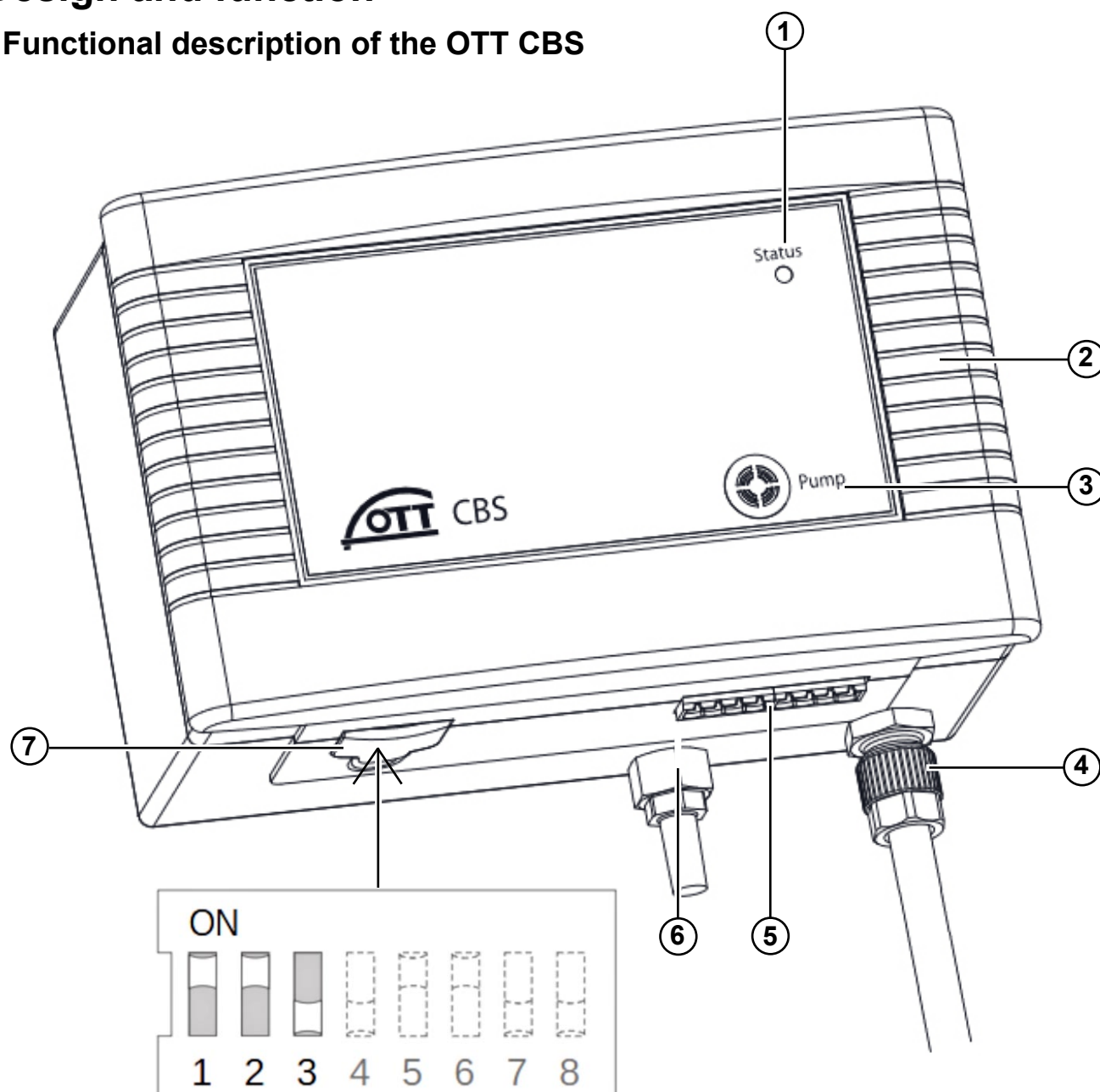
2.1 General safety instructions

Before operating the **OTT CBS** for the first time, read the operating instructions and read the safety instructions.

- Refrain from any operation (e.g. incorrect operation) that endangers safety.
- Comply with the country-specific accident prevention regulations and the general safety instructions.
- Follow the operating and work instructions provided by your company.
- Work on the sensor and the measurement system must only be carried out with suitable tools.
- For installation, work carefully. Use gloves if appropriate.
- Don't install electrical components with wet skin! Dry your skin before.
- Secure yourself if working close to open water surfaces, e.g. channels. Work carefully!

3 Design and function

3.1 Functional description of the OTT CBS

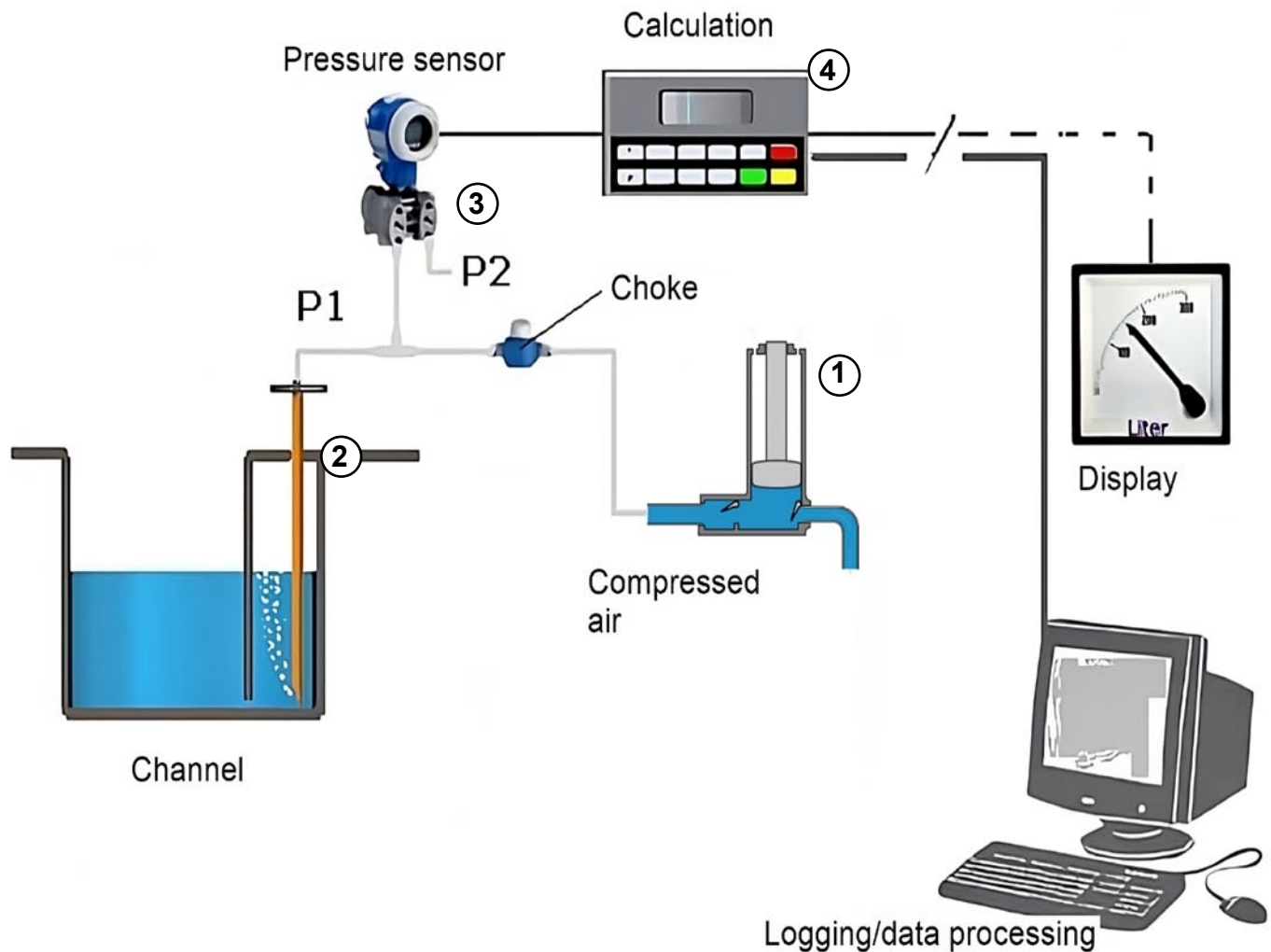


1 Status LED	2 OTT CBS
3 Pump Button for purging unit	4 Connection for measuring tube
5 Connection datalogger/power supply	6 Air filter
7 Interface protocol settings (DIP)	

The **OTT CBS** (2) is a pneumatic bubble sensor which measures the water level via a succinct differential measurement of tube pressure (4) and barometric pressure (6, via filter) at variable measuring intervals. The **OTT CBS** (2) is operated via a DIP switch compartment for protocol choice (7), a status LED (1) and a button for manual activation of the purging unit (3). The OTT CBS switches on as soon as power is supplied. Power and interface supply are made using two screw terminal strips (5). The power supply can be provided from a mains adapter, battery or solar power. SDI-12, RS-485, and 4-20 mA current loop interface protocols are supported.

3.2 Functional description of the measurement system

Bubble process for water level monitoring



A piston pump (1) compresses air into a tube (2) immersed in water. When bubbles rise to the surface, the tube (2) is completely filled with air; the pressure of the air is then identical to the hydrostatic pressure of the water column. The hydrostatic pressure in relation to the air pressure is now evaluated by a differential pressure regulator (3) and the depth is calculated.

The calculation (4) is based on Pascal's law:

with:

$$h = \frac{p(h)}{\rho \cdot g}$$

h - Height of the liquid column; [h] = m, cm or mm

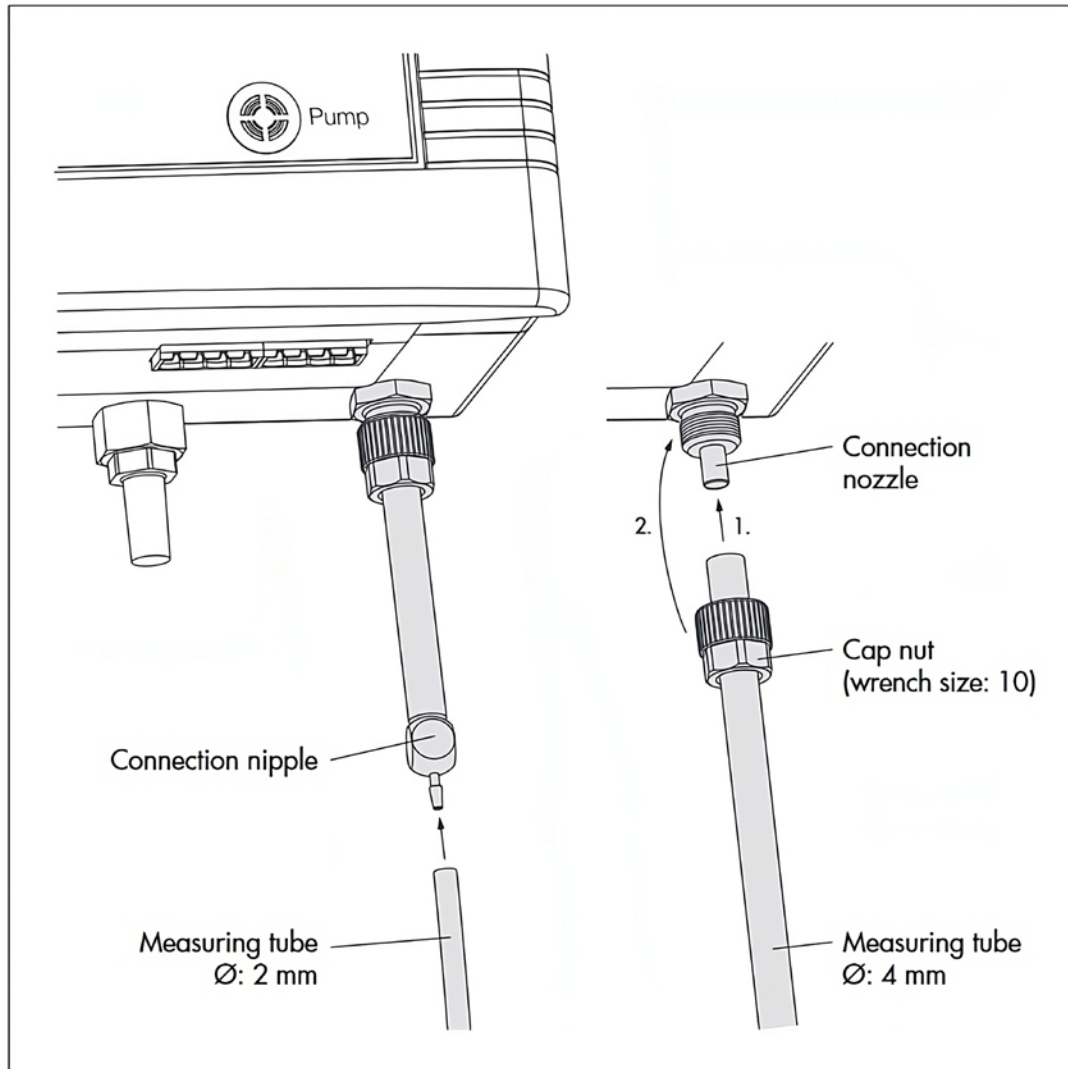
$p(h)$ - hydrostatic pressure as a function of the water height; [p] = Pa

ρ - density (Rho) (for water: $\rho = 1,000 \text{ kg/m}^3$); [ρ] = kg/m^3

g - gravitational acceleration ($g = 9,81 \text{ m/s}^2$); [g] = m/s^2

4 Installation

4.1 Connecting the measuring tube

**Caution: Small cuts!**

Use gloves for installation.

If cutting the tube with a knife, cut slowly with care!

Measuring tube with 2 mm internal diameter

- Cut off the end of the measuring tube with a sharp knife or a cutter.
- Push the end onto the factory fitted connection nipple.

Maximum length of the measuring tube: 100 m.

Measuring tube with 4 mm internal diameter

- Cut off the end of the measuring tube with a sharp knife or a cutter.
- Remove cap nut (width across flats: 10) and pull off the (short) factory mounted measuring tube from the connection nozzle.
- Push cap nut over the measuring tube (Ø 4 mm).
- Push measuring tube onto the connection nozzle.
- Push the cap nut back onto the connection nozzle and tighten by hand.

Maximum length of the measuring tube: 75 m

10 Glossary and contact information

10.1 Glossary

Term/Abbreviation	Meaning	Explanation
CBS	Compact Bubbler System	Bubble sensor for water level measurement
SDI-12	Serial Digital Interface at 1200 baud	Asynchronous serial communications protocol for intelligent sensors that monitor environment data
RS 485	Recommended Standard #485	Older standard for asynchronous serial communication
Data logger	Electronic device	Electronic device that records data over time with a sensor or via external instruments and sensors
4 ... 20 mA interface	Closed loop	Simple and reliable communication protocol used to connect sensors to data loggers.
DIP	DIP switch	Series of switches in a single unit, used to choose the connection protocol
Terminal blocks	Screw terminal strip	Screw terminal strip for power supply and interface connection

10.2 Contact information

In the case of device defects, contact the **OTT Repaircenter**:

OTT Hydromet GmbH

Repaircenter
Ludwigstrasse 16
87437 Kempten · Germany
Phone +49 831 5617-433
Fax +49 831 5617-439
repair@ott.com