Density Sensor

Measuring principle

The density sensor uses a vibrating/tuning fork principle to calculate liquid density based on measured changes in the vibration frequency of the submerged fork. As the fork vibrates, the surrounding fluid's density affects its resonant frequency—denser fluids lower the frequency. The sensor uses this frequency shift to calculate density.

The measuring principle used is commonly used in industries like chemical processing, oil and gas, and food production. These sensors are highly reliable due to their lack of moving parts.

The sensor also measures the temperature with a built-in PT1000 element and uses this temperature as part of the compensation to get the best accuracy.

> The sensor will be available in different lengths based on the tank it will be installed in. Make sure to get the correct sensor based on your tank. The sensor should be inserted at least 100mm from the inner wall.

> Accuracy and function can vary based on trub, yeast health, yeast flocculation, rapid temperature changes, dry-hopping and other additions and distance to tank wall/heating elements etc. Pressure fermentation can increase accuracy. Accuracy and features will improve over time with software updates.

Installation

Follow these simple steps to ensure correct installation in the tank.

1. Alignment of the fork
   - Use arrows on the lid to position the sensor fork vertically to avoid yest to settle on the fork.
   - Installing the sensor pointing upwards in a tank may reduce accuracy.
2. TC port dimensions
   - The density sensors require a 1.5” TC port with an inner diameter of minimum 25mm.
3. Distance to tank wall or other elements
   - Sensor proximity to walls and other parts in the tank may affect accuracy.
4. TC gasket and clamp tightening force
   - Tighten the TC clamp firmly and do not tighten or loosen after calibration as it may affect the measurement. Always use soft TC gaskets (avoid PTFE).
5. Tees and adapters
   - The sensor should be inserted at least 100mm from the inner wall of the tank. In double walled, insulated tanks or with use of TC tee or reduces this will normally require sensors with longer stem.

Connecting to FCS – Fermentation Control System

Connect the density sensor to an available CAN bus port on the FCS using a 5-pin cable.

From the home menu, open the settings screen:

- Set the desired unit for density measurement (Page 2).
- We recommend using the temperature readings from the density sensor (Page 3).

Calibration

All density sensors need a calibration reference to be able to give correct readings.

Calibration is quick and can be done in two different ways.

1. Calibrate in wort after filling tank (preferred method) - Measure the wort density with Anton Paar Easy Dens or similar. Calibration is done directly in manual mode or fermentation profile by pushing the "Set OG" area and following the on-screen guide. You are setting the Original Gravity for the batch at the same time. This is used to compensate calculations for alcohol during fermentation.
2. Calibrate in water (1.000 SG) – If you do not have accurate measuring devices, calibration is done from the settings menu page 6. The button for calibration is available only when the sensor is connected.

If removing the sensor from the tank during e.g. cleaning, a new calibration is recommended.

Calibration must only be done with water or wort before fermentation has started.

Using the sensor

The sensor generates a low but hearable tone at ~1kHz when measuring. Measurements are running for a few minutes every hour. It is possible to change how often the sensors perform measurements from the settings menu.

During fermentation, the FCS allows for manual entry of measured density. These readings will be sent to the cloud, and plotted as dots in the graphs.

The following can affect readings:

- A spike in density can be seen when fermentation kicks in.
- Air bubbles on the sensor can cause incorrect readings after pitching. Pressure fermentation can mitigate this.
- Poor yeast health and heavy flocculation can cause incorrect readings. Make sure your yeast has the best possible conditions (oxygen, temperature, nutrition etc.)
- After dry hopping; hop particles can periodically cause unstable readings.
- During cold crash the density may vary, however at this point fermentation is complete and the FG should be logged.

Cleaning and care

The sensor can be left inside the tank during CIP cleaning and sanitizing.
Note that it is not recommended to expose the sensor for a higher temperature than 80°C.

The stem is made of stainless steel (SS304) and is resistant to normal alkaline cleaning agents and acid-based sanitizing liquids used for fermentation tanks.

The sensor housing is made of anodized aluminum which will be vulnerable to acid corrosion and caustic cleaning agents. Especially with prolonged exposure or high concentrations. Avoiding using strong acids and caustic cleaning solution directly on the surface prevents discoloring.

Do not submerge the density sensor fully as the housing and electrical connection are not designed for it.

To avoid fork damage (tip of the sensor) use the protection cap the was included during storage.

FAQ

See the seperate section for FAQ by following the link below.

Density sensors >

Specifications

Density range:	0.950 to 1.201 g/cm3
Density accuracy:	+/- 0.002 SG
Operating temperature range:	0 – 80°C (32 - 176°F)
Temperature accuracy:	+/- 0.3°C
Flange size:	TC 1.5"
Flange tube diameter:	Minimum inner diameter Ø25mm
Stem+fork length:	200mm / 300mm (based on model)
Total length:	294mm / 394mm (based on model)
Connector:	LP12 5-pin (CAN bus + 24V)
IP rating:	IP44
Operating pressure rating:	0-5 bar (0-72.5 psi)
Materials:	Fork (SS304), housing (anodized aluminum)
Certification:	CE

Declaration of Conformity

Follow the link below.

All documents >