



TurbSense®

Turbidity and Suspended Solids Monitor

The TurbSense® range of Turbidity/Suspended Solids analysers is made up of an ISO 7027 compliant Turbidity/Suspended Solids Meter covering the range of 0.01-1000 NTU (0.01-2000mg/l depending on the sample).

- **Extremely low total cost of ownership**
- **Single point calibration (patented) - no 'zero' required**
- **Autoclean solid state optical sensor - no moving parts**
- **Suitable for all potable, waste and most process waters**
- **Up to 1 year between calibration**
- **From 0.01-1000 NTU (0.01-2000 mg/l, application dependent)**
- **Stable and reliable - excellent process control**
- **Debubbling options available**



"In a constant sample, the drift is <0.01 NTU per month. Amazing!"

Dr. Jeff Prest, UK.

The TurbSense® sensors are available with different controllers giving you the same great performance with different communication, display, and control options. With the TurbSense® range of turbidity meters, you get great stability, reliability and ease of use coupled with great resolution and limits of detection. Combine this with the simplicity of a single point calibration and the TurbSense® is a joy to use. Calibration is made with liquid standards or the solid Secondary Standards from Pi.

CRONOS® TurbSense®



- High Quality - Lowest Cost
- Multilingual
- High resolution grayscale display
- 9 buttons for easy navigation
- Graphing and datalogging
- Enclosure; wall, panel, pipe or pole mounting. IP65/Nema 4x.
- Options:
 - **Modbus RS485/LAN**
 - **Profibus DPV 1**
 - **Up to 2 sensors**
 - **PID/flow proportional controls**
 - **Remote sensors**
 - **Colour display**
 - **Downloadable data logs**

CRIUS® 4.0 TurbSense®



- High Quality - Low Cost
- Multilingual
- High resolution colour display
- Intuitive user interface
- Downloadable data logs
- Customisable home pages
- All CRONOS® options plus:
 - **Up to 8 sensors**
 - **Remote access via LAN**
 - **Remote access via 3G/4G**
 - **Expandable to 16 sensors**

For more information please see the individual brochures for CRONOS® and CRIUS® 4.0

Flow Cell Mounting

Pi's TurbSense® range of Turbidity/Suspended Solids analysers can be mounted in a pressured flow cell or a non-pressure flow cell, with or without a debubbler cell, all available from Pi.



Advantages include:

- **Made from black acetal plastic** - eliminating stray light
- **Covered** - eliminating ambient light
- **Debubbler cell** - removes entrained bubbles
- **Pressure flow cell** - prevents nucleated bubbles from forming (degassing)



Principle of Operation

The TurbSense® determines true turbidity and/or suspended solids in water, using a nephelometric measurement of scattered light in accordance with ISO 7027. The TurbSense® sensor uses lifetime-based optical technology to provide an extremely stable, accurate, low maintenance sensor, with no moving parts and no consumables.

Each probe is equipped with a light source, a side detector for the measurement of scattered light from the sample and a reference detector for monitoring the light output. The light source is a long-life IR LED emitter. This configuration allows accurate and reliable measurements of turbidity and suspended solids to be made using the patented Mutolux® method. Reliable calibration can be carried out using a single calibration with no need for a 'zero'. To learn more, see the related technical note IST135.

The probes are constructed of stainless steel and sapphire so can withstand demanding operating environments. An Autoclean system can be included to keep the optical surfaces clean, thereby reducing maintenance to a potential 'maintenance free'.

Mounting

The TurbSense® can be mounted on the end of a pole for dip mounting in a channel or tank, or in a pressure flow cell or non-pressure flow cell with or without a debubbler cell.

Bubbles

As with all turbidity instruments, bubbles can interfere. Pi has developed several methods of removing bubbles including using a pressure flow cell, the Autoclean function, and a debubbler cell. Whatever the source of bubbles, the TurbSense® can come equipped to handle them.

Specification*

Range:	Selectable within 0.01-1000 NTU, 0.01-2000 mg/l (application dependent)
Typical Ranges:	0.01-20 NTU, 0.01-100 NTU, 0.01-1000 NTU
Linearity:	$r^2 > 0.99$
Response Times:	$T^{90} \geq 10s$ (adjustable based on averaging)
Accuracy:	< 1% of measured value or 0.01 NTU (whichever is greater)
Repeatability:	< 0.3% of measured value or 0.005 NTU (whichever is the greater) (Ref: ISO 15839)
Resolution:	0.001 NTU (0-2), 0.01 NTU (2-10), 0.1 NTU (10-100), 1 NTU (>100)
Limit Of Detection:	0.01 NTU (0-10 NTU, Ref: ISO 15839)
Temperature:	0 to 50°C
Pressure:	0-10 Bar
Averaging:	10s - 10min
Lamp Source:	IR LED, 860nm
Cleaning Cycles:	User settable cleaning cycle time and cleaning time
Cleaning:	Autoclean water jet
Enclosure rating:	IP65
Sensor Environmental Protection:	IP68
Display:	Value and Alarms and Graphs at the same time
Calibration:	One point (zero not required)
Diameter:	38mm (1.5 inch)
Length:	278mm (11 inch)

Calibration

Due to the Mutolux® technology calibration is never required as any drift is compensated for, however it is required for compliance purposes.

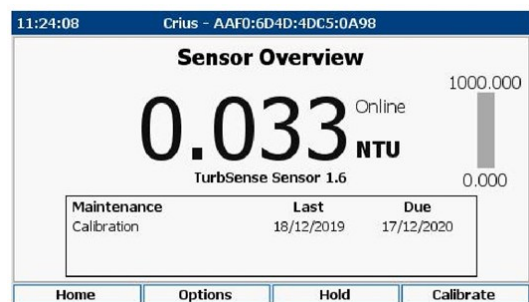
Calibration can be done in any one of three ways;

- take a reading of the water with another method and enter the value into the analyser
- put the TurbSense® sensor into our black polyethylene calibration pot filled with 0.5l of standard (typically 20 NTU)
- use a solid Secondary Standard from Pi

The analyser calibrates the sensor by a procedure that reduces the light output through four stages, taking measurements at each. This process provides a very accurate and reliable zero and span without the requirement to use a '0' NTU sample.

Cleaning

To keep the sensor clean, the TurbSense® is fitted with cleaning nozzles. These can be used to clean the optical windows with a jet of water. This cleaning procedure can be automated to carry out the cleaning at predefined intervals.



TurbSense® Sensor Overview Screen

*All subject to change without notice