



# ppbSense

## Particle Counter

The ppbSense's performance, reliability, ease of use, and measurement capability make it an ideal choice for online steam cycle corrosion monitoring, product transport monitoring, and online filter performance monitoring and optimization. This is most clearly demonstrated in the ppbSense's ability to detect as low as 0.01 ppb of insoluble contaminant (>2 micron) in boiler/condensate systems, or in the case of water treatment applications, being able to detect filter breakthrough often hours in advance of any NTU turbidity change.

- **Boiler/Condensate**
- **Water Treatment**
- **Wastewater Treatment**
- **Reverse Osmosis Pretreatment**
- **Membrane Filtration**
- **Parts Washing**
- **Food & Beverage**
- **Pharmaceutical**



Close to two decades of customer experience with ppbSense has proven the effectiveness of this technology to take water quality monitoring to the next level. ppbSense is the right choice if the optimization demands of your application are not being met by relative and less sensitive measurements of water quality, like those provided by turbidity meters or SDI test systems.

### Standard Features

- **Counts particles in liquid from 2-750 microns**
- **Sizes particles from 2-125 microns**
- **Volumetric ppb readout for >2 micron particles**
- **Report total counts, counts/ml or counts/100ml**
- **Up to 8 user programmable size ranges**
- **Large display with 8 channel readout & graph**
- **User friendly, menu driven calibration**
- **MODBUS RTU communication**
- **Laser & cell condition readout (0-100%)**
- **External sensor with sapphire optics**
- **User calibratable**
- **No requirement for a laptop to set up**

### Optional Features

- **4 Analogue Outputs (4-20mA)**
- **TracWare and TracData Software**
- **USB Cable for data download**

*The ppbSense Particle Counter is just one of a range of Particle Counters available from Process Instruments, including:*

- **ParticleSense**
- **CounterSense**
- **FilterSense**

*You can find more information on our particle counters at [www.processinstruments.net/products/particle-counter](http://www.processinstruments.net/products/particle-counter)*

## Principle of Operation

### What It Does

The ppbSense is designed to "count" particles in a liquid sample from 2 to 750 micron in diameter and "size" particles ranging from 2 to 125 microns in diameter. Particles larger than 125 micron will be sized as >125 micron particles. Particles are divided into user adjustable size channels (or bins). The number of particles counted in each of these ranges can be reported as Counts per ml, Counts per 100 ml, or Raw Counts.

After particle size is determined, the volume of the particle is then calculated. The reported volume for each particle is totalled and displayed as a "total ppb" readout. A correction factor is provided in the user menu to improve the correlation between the volumetric ppb readout and actual ppb determination using gravimetric analysis. Particles smaller than 2 micron are not detected, which means some percentage of the sample's volume cannot be measured.

Even though there are a much larger number of particles in the submicron range, their relative volume is small. Particles smaller than 2 micron will account for approximately 20% of the total particulate volume assuming a typical size distribution.

When dealing with relatively clean water (less than a few NTU), light scatter, turbidity measurements are not useful for volumetric ppb determinations due to the fact that their

response to a given mass of particulate decreases with increasing particle size.

### How It Works

The sensor consists of a flow cell with two transparent windows that sits directly between a 780 nm infrared laser diode and a light detector. The laser's tightly focused beam of light is transmitted across the flow cell and onto the detector which converts light energy into electrical voltage. Sample flow passes between through the flow cell, so that any particles in the sample will pass through the laser beam. This causes a small percentage of the light to be blocked from reaching the detector. The light blockage then appears as a change in the detector's output voltage.

The amplitude of the pulse is then compared to the instruments calibration curve to determine the approximate size of the particle. The output of the sensor is a stream of pulses of varying amplitude, each corresponding to a particle. This type of device is known as a light blocking or light extinction particle counter.

Calibration of the ppbSense using PSL spheres is very user friendly and can be performed in just a few minutes. Unlike most other particle counters, the ppbSense does not require the use of an external computer or software package to setup or calibrate the instrument.

### Specification\*

<b>Laser Type:</b>	Solid-state laser diode (780nm)
<b>Cell Material:</b>	Nituff™ coated aluminum PEEK plastic (optional)
<b>Viewing Windows:</b>	Sapphire
<b>Detection Range:</b>	2-750 microns
<b>Sizing Range:</b>	2-125 microns
<b>Flow Rate:</b>	75 ml/min
<b>Sample Temp:</b>	0°-50°C (32°-120°F)
<b>Resolution:</b>	Better than 10% at 10 micron (ASTM-F658)
<b>Coincidence Limit:</b>	20,000 cnts/ml (2 micron)
<b>Signal to Noise Ratio:</b>	Better than 5:1
<b>Size Channels:</b>	8-user selectable
<b>Alarms:</b>	Sensor diagnostic, particle count limit
<b>Laser Diode Life:</b>	MTBF > 75,000 hours @ 55°C (131°F)
<b>Measurement Type:</b>	Light obscuration, volumetric, counts/ml
<b>Local Display:</b>	Graphical, 8 size channels displayed at once, unit info/diagnostic screen, alarm screen, ppb readout screen, total count screen, graphical trending, user menus
<b>Display Readout:</b>	Size channel, counts, cell condition (0-100%), laser condition (0-100%), unit address, sample period, sample frequency, flow rate, days until data log overwrite

<b>Graphical Trending:</b>	Trending of last 64 logged values for any size range, analog input, or sensor status %
<b>Data Storage:</b>	>60,000 sample strings User defined logging interval (1-254min.)
<b>Keypad Interface:</b>	All instrument settings may be modified via the keypad interface, including instrument calibration (some settings require password)
<b>Serial Comms:</b>	2 wire RS485 (Network) and RS232 (Local)
<b>Comms Protocols:</b>	Standard: MODBUS RTU (RS485) Optional: MODBUS TCP (Ethernet) PROFIBUS DP multiple communication protocols supported (contact for details)
<b>Analog Outputs:</b>	2, 4, 6, or 8 channels, 4-20 mA (optional)**
<b>Analog Inputs:</b>	2, 4, 6, or 8 channels, 0-5V, 0-10V, 0-20 mA, 4-20 mA (optional)**
<b>Alarm Relays:</b>	2 Dry Contact Relays, 250V, 5A (optional)**
<b>Power Requirements:</b>	100-240 VAC, 1A, 47-63 Hz, 12 VDC
<b>Operating Temp:</b>	0°-50°C (32°-120°F)
<b>Dimensions:</b>	12" W x 11" H x 5" D (305mm W x 280mm H x 127mm D)
<b>Weight:</b>	3.2 kg (7 lbs)

*\*All subject to change without notice \*\*Subject to a maximum of 6 outputs & inputs*