

# Turbidity Systems



**INGOLD**

Leading Process Analytics

**InPro 8000 Sensor Series**  
**Trb 8300 Transmitter Series**

Improved product quality and  
process reliability

Increased productivity

Easy handling

Enhanced process control



## **In-line Turbidity Measurements** For More Visibility Into Your Process

**METTLER TOLEDO**

## Cost-Effective Operation in Every Application

**Innovative Mettler-Toledo Ingold turbidity systems represent a further step forward in providing efficient equipment for in-line process control. Leading-edge technology for reliable measurements allows superior results in shorter time.**

### **High product quality at low concentrations**

Accurate turbidity measurements through highly sensitive scattered light detection capture unwanted particles even in seemingly clear liquids. Product quality after filtration is significantly improved and ensured.

### **Improved yield at mid to high concentrations**

A wide linear measuring range due to unique backscatter light technology provides reliable fermentation control of your complete process. Crystallization processes can be fully monitored with only one sensor.

### **Higher productivity**

Reliable and accurate measurements prevent time-consuming cross-checks with offline laboratory equipment. Consequently, process interruptions or redundant downstream purification steps are avoided or eliminated.

### **Reduced investment costs**

The sensors can be installed both in small reactors and in commercial-scale production vessels by using standard METTLER TOLEDO housings. Therefore, no changes of measuring methods during scale-up processes are required, which eliminates costs.

### **Fast start-up and safe process control**

Modern transmitter technology allows downloadable configurations for traceable documentation and higher process safety. A unique wireless configuration leads to convenient and fast start-up and reduced installation costs.



Breweries: turbidity/clarity/color.



Chemical industry: particle concentration/crystallization.



Pharmaceutical industry: filtration/purification/fermentation.



Wastewater process.

# Versatile Solutions to Cover your Needs!

**The complete INGOLD turbidity portfolio is the answer to any requirement for measuring undissolved particles. Innovative solutions tailored to your applications guarantee an outstanding performance and cost savings through low maintenance.**

## **From haze to clarity: extensive range of sensors available**

- Wide measurement range at high particle concentration
- High resolution at medium turbidity
- High process safety even at low turbidity
- Ideal for trend monitoring of particle size distribution in filters

## **Sensor management up to the highest quality standards**

- Plug and measure:  
The sensor is up and running in minutes
- Sensors carry their own calibration data
- Easy installation with the InTrac series housings
- Wireless configuration option for quick set-up

## **Virtually no maintenance**

- Advanced diagnostics for early fault detection
- Sapphire windows withstand aggressive media
- Smooth surface finishes for no cross-contamination



**High turbidity**  
InPro 8100  
InPro 8200

**Low turbidity**  
InPro 8400

**Low turbidity  
dual angle measurement  
color measurement**  
InPro 8600



Transmitter Trb 8300



Retractable housing  
InTrac 779 e



Wireless configuration tool

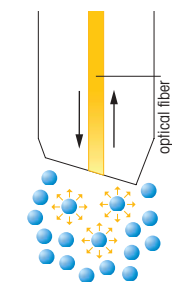
## Wide Measurement Range at High Particle Concentration

The single optical fiber sensor series InPro® 8100 and its basic version InPro® 8050 provide a wide linear measuring range – even at values where competitive absorbance probes have long reached their saturation limits.

Backscattered light technology enables a sensor design with uniform, unbroken surface structure. Therefore, METTLER TOLEDO probes are able to meet the toughest demands placed on optical sensors with respect to freedom from fouling and with easy cleanability.

These two key features are required typically in:

- fermentation processes / cell growth monitoring / optical density measurements
- industrial wastewater applications.



Single optical fiber: emitted and back-scattered light travel on same fiber.

### Your benefits

#### Wide measurement range

Efficient process control due to high linearity from 10 ... 4000 FTU and 0 ... 250 g/l suspended solids.

#### Broad range of application

From laboratory benchtop level to commercial process installations due to compact 12 mm design.

#### Reduced fouling and coating

Resistance to abrasive particles and fiber fouling in wastewater applications due to sapphire rod protection.



Transmitter Trb 8300



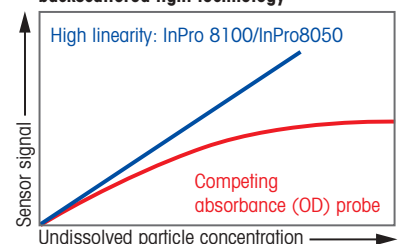
InPro 8100

InPro 8050

### Distinctive features of single optical fiber sensors

	InPro 8100	InPro 8050
Steam-sterilizable	130 °C / 266 °F	–
Shaft material	1.4404 (316L)	PSU (Polysulfone)
Process connection Pg 13.5	•	•
Sapphire rod for fiber protection	–	•
Process temperature	–30 ... 130 °C –22 ... 266 °F	0 ... 60 °C 32 ... 140 °F
Process pressure	0 ... 16 bar 0 ... 232 psi	0 ... 2 bar 0 ... 29 psi

### Advantages of backscattered light technology



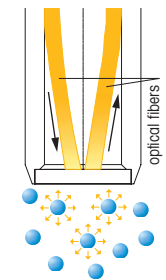
# High Resolution at Medium Turbidity

**The dual optical fiber sensor series InPro® 8200 combines high resolution at low turbidity ranges with high linearity in the mid turbidity range.**

Based on backscattered light technology, InPro 8200 series sensors are free of surface cutouts, and are equipped with an optical sapphire window to minimize sensor fouling and provide fiber protection in the presence of abrasive particles. All sensors are fully compatible with METTLER TOLEDO housings.

These sensors are specially designed for:

- crystallization control
- biomass growth monitoring
- control of liquid/solids separation processes.



Two optical fibers:  
for emitted and  
backscattered light.

## Your benefits

### High resolution

Reliable and reproducible detection of turbidity from 5 ... 4000 FTU and 0 ... 30 g/l suspended solids.

### Broad spectrum of applications

For installations ranging from laboratory benchtop to in-line process installations due to compact 12 mm design.

### Reduced fouling and coating

Resistance to abrasive particles and fiber fouling due to sapphire window protection.

### Sensor installation in hazardous areas (Ex-proof)

Process safety due to use of passive fiber optic components.



Transmitter Trb 8300



InPro 8200

## Distinctive features of dual optical fiber sensors

	InPro 8200/ S(H)/Epoxy	InPro 8200/ S/Kalrez-FDA
Steam-sterilizable	–	130 °C/266 °F
Shaft material	1.4404 (316L) or Hastelloy C-276	1.4404 (316L)
Process connection Pg 13.5	•	•
Sapphire window for fiber protection	Epoxy bonded	Kalrez-FDA gasket
Process temperature	–30 ... 130 °C –22 ... 266 °F	–10 ... 130 °C 14 ... 266 °F
Process pressure	0 ... 16 bar 0 ... 232 psi	0 ... 6 bar 0 ... 87 psi

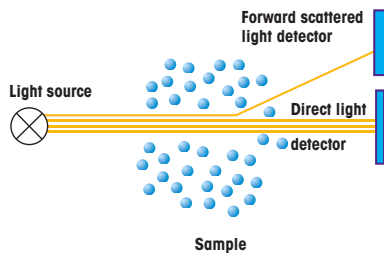
# High Process Safety at Low Turbidity

**The low turbidity sensor series ties accurate measurements with user-friendly configuration technology in the low turbidity range. High process safety is made possible by color compensation with ratio measurements.**

Forward scatter sensors are ideal for detection of larger particles (> 0.3µm). The simultaneous measurement of forward scattered and direct light allows compensation of color changes.

These are key features typically required in the industrial process industry, breweries/beverage industry and pharmaceutical industry for:

- filter breakthrough detection
- centrifuge/separator control
- lauter tun control
- particle concentration measurements in liquid streams.



Forward scattered light sensors: Ratio measurement for color compensation.

$$\text{Turbidity} \sim \frac{\text{Forward scattered light}}{\text{Direct light}}$$

### Distinctive features of forward scattered light sensors

	InPro 8400	InPro 8600/*/1
Measuring range	0 ... 400 FTU 0 ... 100 EBC, 0 ... 1000 ppm	0 ... 400 FTU 0 ... 100 EBC, 0 ... 1000 ppm
Wetted materials	Stainless steel, sapphire, polymer gaskets (FDA)	Stainless steel, sapphire
Process temperature	0 ... 140°C (32 ... 284 °F), steam-sterilizable	0 ... 100°C (32 ... 212 °F)
Process pressure	1 ... 16 bar (14.5 ... 232 psi)	1 ... 16 bar (14.5 ... 232 psi)
Ex-proof	Optional according to ATEX or FM (pending)	–
Certificates	CE, calibration certificate, 3-A and 3.1 with corresponding flow-cells, MaxCert™ package	EHEDG; 3-A (pending) CE, calibration certificate, MaxCert™
Configuration	Via transmitter	Via transmitter or via wireless PDA
Industries	Pharmaceutical, Chemical	Food & Beverages

InPro 8400 sensors are available with industry-specific options, e.g. with flanges, with welding ends or in Ex-proof version.

### Your benefits

#### Easy start-up

Factory-calibrated sensors with industry-specific units such as FTU, EBC and ppm allow immediate use in process.

#### High process safety

Resistance to aggressive chemicals and abrasive particles due to sapphire optics. Suitable for CIP (cleaning-in-place) processes.

#### Reduced maintenance

The METTLER TOLEDO Trb 8300 serie transmitters provide detailed information on sensor performance, resulting into reduced maintenance work.



InPro 8600/1

InPro 8400

Transmitter  
Trb 8300 F/S  
Trb 8300 D



# Best Product Quality With the Turbidity/Color Sensor



Digital sensor  
InPro 8600

The innovative InPro® 8600 sensor combines accurate optical technology with advanced measurement electronics in one compact sensor head, and provides highly reliable measurements at reduced installation costs.

## Key advantages are

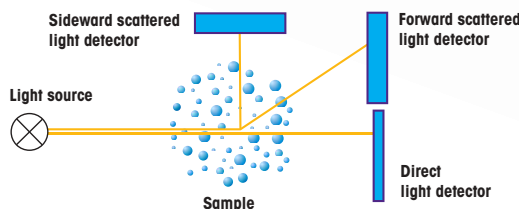
- Innovative wireless configuration enables convenient installation
- Digital measurement technology for highest accuracy and fast signal response
- Optional color (yellowness) version reduces costs and simplifies installation

## Typical application areas

- Real-time monitoring of filter performance in the food and beverage industry
- Product purification processes



Optional wireless configuration tool for InPro 8600.



Dual angle measurement for particle size trend monitoring.

**Turbidity 25°** ~ Forward scattered light  
Direct light

**Yellowness** ~ Absorption  
Direct light

**Turbidity 90°** ~ 90° Scattered light  
Direct light

## Your benefits

### Reduced investment and installation costs

Innovative combination of dual angle turbidity and color measurement in one sensor. The wireless configuration tool allows multiple sensor management.

### Improved process quality

Sapphire optics and certified hygienic design guarantee reliability and process safety.

### Intelligent sensor management

Factory calibration and sensor recognition enable easy and fast instrument configuration.



## Distinctive features of forward/sideward scattered light sensors

	InPro 8600/*/2	InPro 8600/W/3
Measuring range	0 ... 100 EBC 0 ... 400 FTU	0 ... 100 EBC 0 ... 400 FTU Color: 0 ... 30 EBC
Process connection	In-line housing (Varivent or compatible)	In-line housing (Varivent or compatible)
Wetted parts	Stainless steel, sapphire	Stainless steel, sapphire
Process temperature	0 ... 80 °C (32 ... 176 °F)	0 ... 80 °C (32 ... 176 °F)
Process pressure	1 ... 16 bar (14.5 ... 232 psi)	1 ... 16 bar (14.5 ... 232 psi)
Certificates	EHDG; 3-A (pending) CE, calibration certificate, MaxCert™	EHDG; 3-A (pending) CE, calibration certificate, MaxCert™
Configuration	Via transmitter or via wireless PDA	Via wireless PDA



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