

# Satron VOD

Turbidity and solids sensor for  
Food and Biopharma

**SATRON**  
instruments

The SATRON VOD sensor allows savings to be obtained in process industries such as:

- Impurities monitoring of clean water
- Detection of yeast after the membrane in breweries
- Integrity monitoring of filters
- Whey turbidity on separator discharge

The sensor uses fully flat front process side flushing and communicates via 4...20mA and digitally using the HART® protocol



Pipe to be ordered separately

## TECHNICAL SPECIFICATIONS

### Measuring range

0...1 500 NTU equivalent on 1.5" pipe  
0...1 000 NTU equivalent on 2" pipe  
0...200 NTU equivalent on 3" pipe  
0...50 NTU equivalent on 4" pipe

### Calibration

The sensor is factory calibrated at 4mA = water, 20mA = full absorption, freely adjustable with pushbuttons or Hart® modem.

### Damping

Time constant adjustable 0.01 to 60 s.

### Repeatability

0.1% from maximum span.

### Response time

0.1s (with less than 0.1s damping)

### Accuracy

0...50 NTU 0.2%  
0...1 500 NTU 1%

### Unit selection

%, NTU, FNU, FTU, mg/L, g/dm<sup>3</sup>, PPM

### Temperature limits

AAmbient: -30 to +80 °C  
Display operating range: 0 to +50 °C  
(Does not affect operation of the sensor)  
Process N type: -5 to +100 °C  
(120 °C for 10min)  
Process H type: -5 to +140 °C  
(160 °C for 30 min)  
Shipping and storage: -40 to +80 °C

**Output** 3-wire (3W), 4-20 mA

### Supply voltage

Nominal 24 VDC, (21.6 - 27.6V) 200mA

**Humidity limits** 0-100% RH

### Pressure class:

- PN40  
- Test pressure -1 to 30 bar (-14.5 to 435 PSI)

### EMC directive 2014/30/EC

- EN 61326-1: 2013

### CONSTRUCTION

#### Materials:

Sensing element <sup>1)</sup>: AISI316L, Duplex (EN. 1.4462), Hast. C276/C22, or Titanium Gr2.  
Surface quality: Polished Ra <0.8µm  
Lens: Sapphire or Spinel ceramic  
Cable Material of slave probe: PP+EPDM

#### Housing with display, code N:

Housing: AISI303/316  
Seals: Nitrilerubber and Viton®  
Nameplates: Polyester

#### Housing without display, code H:

Housing: AISI303/316  
Seals: Viton® and NBR  
Nameplates: Polyester

#### Connection hose between sensing element and housing code L:

PVC signal cable or hose protected with PTFE/AISI316 braiding  
Nameplates: Polyester

### Electrical connections

Housing without display code H:  
1x M12 plug connector  
Housing with display, code N:  
2x M12 plug connector

### I/O-connections

Current output1 Turbidity active  
Range (Namur NE 043) 3.5...23 mA  
Maximum load 600 Ω  
Factory setting 4...20 mA

#### Switch outputs (up to 3 available)

Relay, grounding contact  
Maximum voltage 35 V  
Maximum current 50 mA  
Maximum leakage current 10 µA

#### Switch inputs (up to 3 available)

NC (no connection) OFF  
0...2 V ON  
Minimum values for switch in use  
Voltage 16 V  
Current 4 mA  
Leakage current 1 mA

Current output2

Internal power supply  
Current output 2 has same ground as binary IO  
Maximum load 400 Ω  
Range 3.5...23 mA  
Factory setting 4...20 mA  
External power supply  
Current output 2 is galvanically isolated

Maximum supply voltage 35 VDC  
Range 3.5...23 mA  
Factory setting 4...20 mA  
Maximum isolation voltage 100 VDC

### Process connections

- Tuchenhangen Type "N"

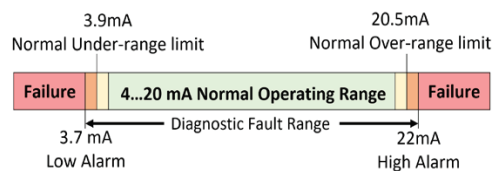
### Protection class: IP66, IP67

See Selection chart.

### Weight

Housing without (H): 1.0 kg  
Housing with Display (N): 1.3 kg  
Remote Housing (L): 2.5 kg

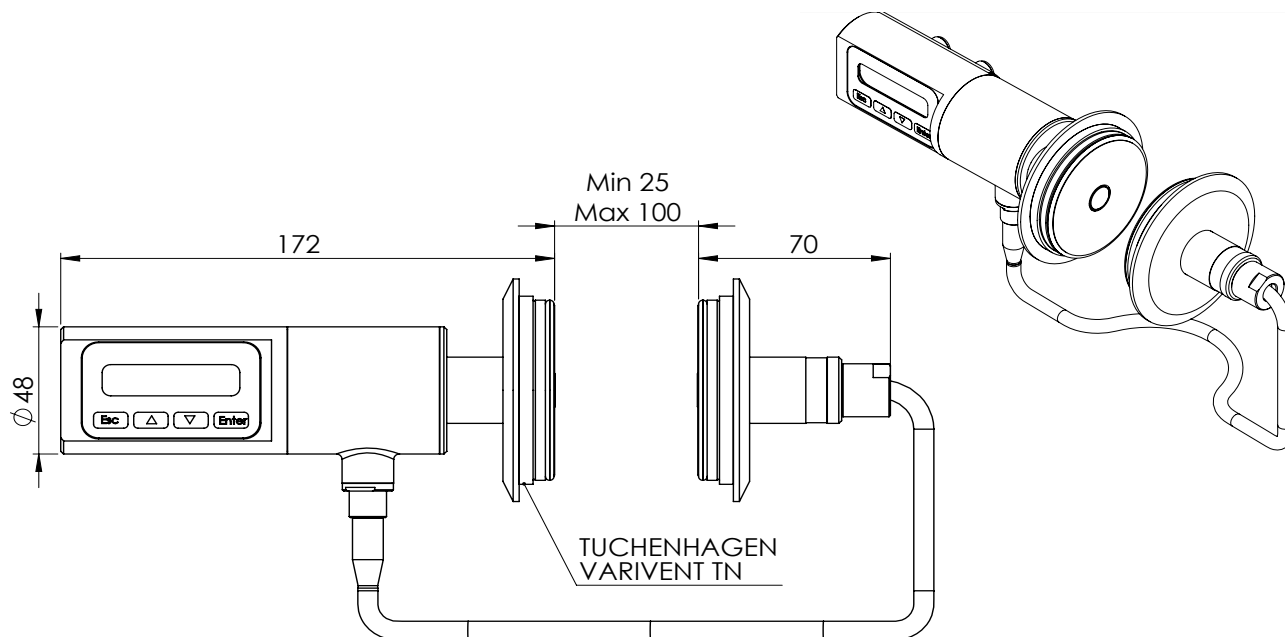
Output signal according to NAMUR NE043 Signal Level for the failure information of Digital Transmitters.  
Min. load using HART®-communication 250 Ω



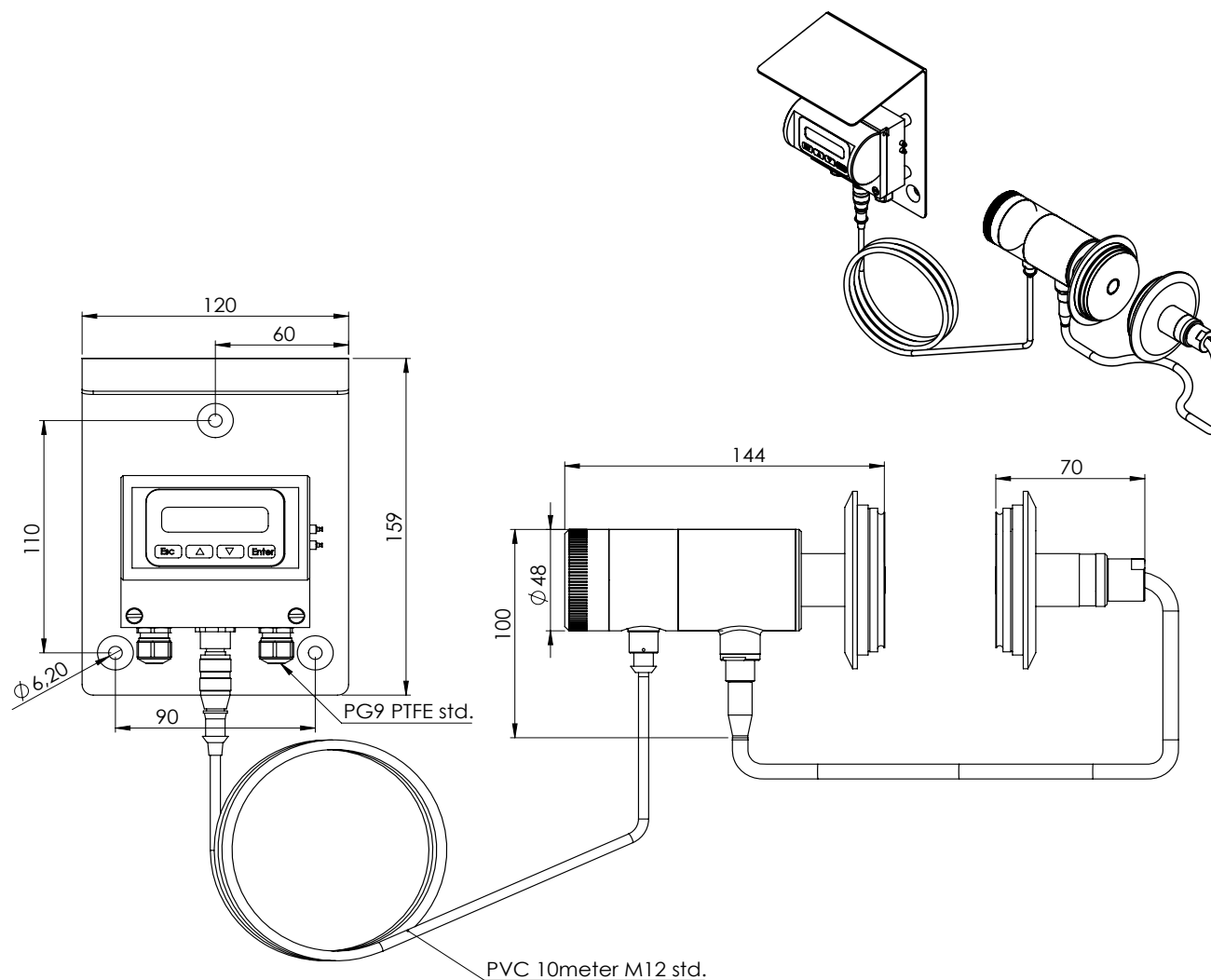
UL 61010-1, 3rd Ed. Rev May 11, 2012  
CAN/CSA C22.2 No. 61010-1-12, Ed. 3  
EMC directive 2014/30/EC

- EN 61326-1:2013  
<sup>1)</sup> Parts in contact with process medium compliant to FDA

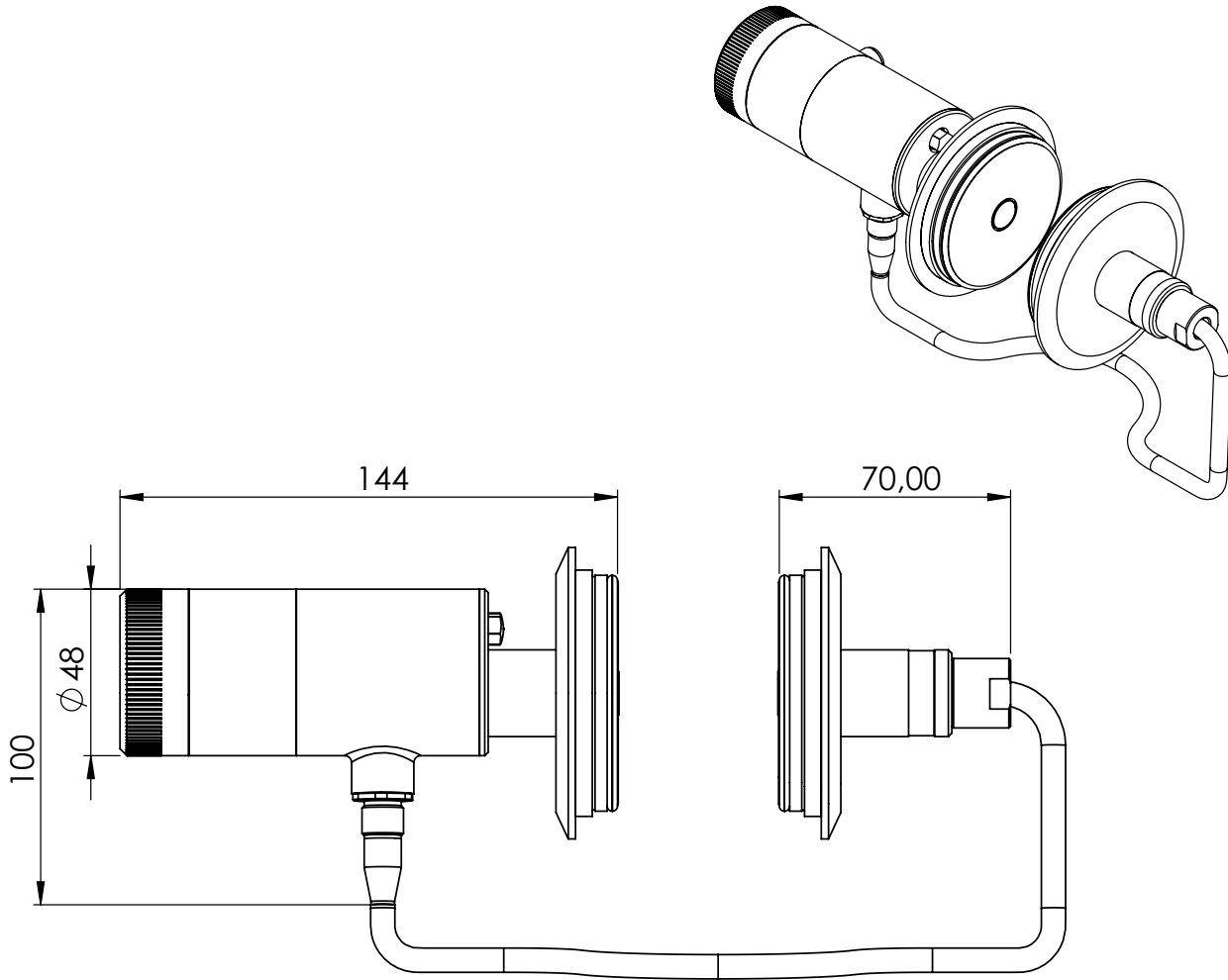
**Dimensions and Housing types VOD (mm)**



**VOD with display and pushbuttons (N housing)**



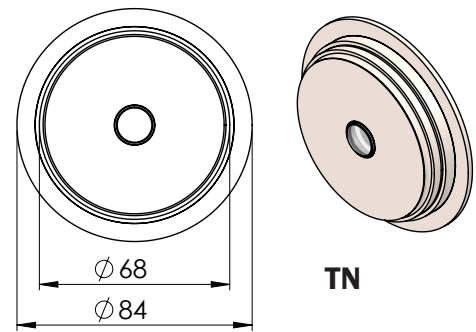
**VOD with remote electronics housing with display (L housing)**



**VOD with no display (H-housing)**

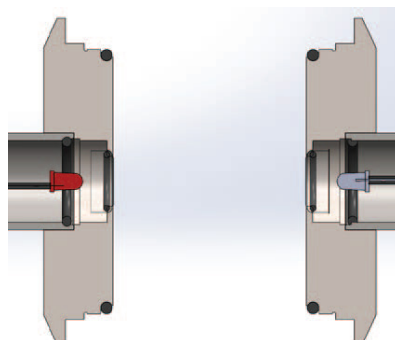
## Process connection details

The Satron VOD is equipped with a VARLININE process connection TYPE N.  
Several pipe diameters are commercially available.  
Change of pipe will require a recalibration of the sensor.

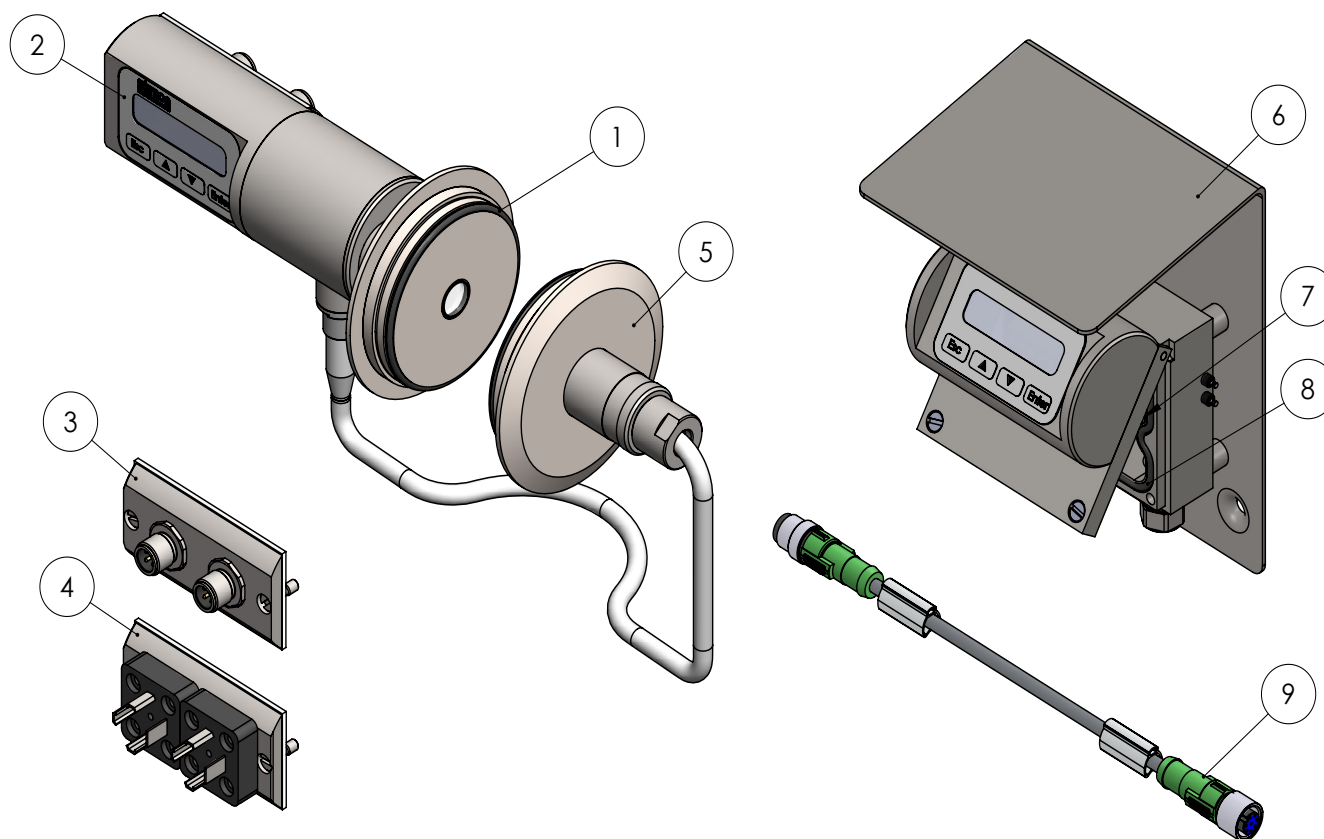


## VOD measurement principle:

Turbidity measurement according absorption with selectable wavelength LED lightsources (see selection chart). The LED (in red) sends light through the process and is received by the photodetector (in grey). Depending on the turbidity the amount of light received by the photodetector will change. The lifetime for the optical LED and photodetectors is 20 years minimum.



## Spare-parts VOD



No.	Part name	Order code
1	O-ring EPDM	80036203
1	O-ring FPM	80016203
1	O-ring FFPM(Kalrez®)	80046203
2	Sticker	T1325215
3	Plug cover M12	T1325031
4	Plug cover DIN43650 (old type)	T1325003-K48
5	Slave probe	T1325012-xxx-TN
6	Remote Display Unit RDU	T13250016
7	FUSE for L-Housing	74212000
8	Seal for L-Housing display	80017226
9	L-Housing data cable 10m PVC	70000450
9	L-Housing data cable 15m PUR	70000440

**Note**  
3A 18-03 Class II (Do not exceed above 8% fat content).  
3A 18-03 Class I  
3A 18-03 Class I

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## Selection Chart

<b>Adjustability</b>	<b>Span, min</b>	<b>Span, max</b>				
VOD with a 1.5" pipe	0...200 NTU	0...1 500 NTU				
VOD with a 2" pipe	0...50 NTU	0...500 NTU				
VOD with a 3" pipe	0...30 NTU	0...200 NTU				
VOD with a 4" pipe	0...10 NTU	0...50 NTU				
<b>Process temperature limits</b>	<b>N</b>	Normal version -5...+100 °C continuous (120 °C for 10 minutos)				
	<b>H(**)</b>	High temperature -5...+140 °C continuous (160 °C for 30 minutos)				
<b>Output</b>	<b>S</b>	4-20mA DC/HART® for 50Hz (Europe)				
	<b>J</b>	4-20mA DC/HART® for 60Hz (USA / Japan)				
<b>Material of wetted parts</b>	<b>Body</b>	<b>Lens</b>	<b>Seal</b>	<b>3A 18-03</b>		
	<b>2</b>	AISI316L	<b>2</b>	<b>1(***)</b>	EPDM	Class II
	<b>3</b>	Hast. C 276	<b>4</b>	<b>2</b>	FPM (Viton®)	Class I
	<b>6</b>	Titanium Gr2		<b>3</b>	FFPM (Kalrez®)	Class I
	<b>8</b>	Duplex (EN 1.4462)		<b>4(*)</b>	PTFE (Teflon)	
	<b>9</b>	Peek				
<b>Housing type</b>	<b>N</b>	Housing with display and pushbuttons				
	<b>H</b>	Housing without display (only one mA output)				
	<b>L</b>	Remote electronics housing with display				
<b>Probe type</b>	<b>0</b>	No remote probe				
<b>Connection type</b>	<b>T</b>	M12, IP67				
	<b>V</b>	PG9 (always with L housing), IP66				
<b>Cable Material (L HOUSING)</b>	<b>0</b>	No L housing option selected				
	<b>4</b>	PVC M12 cable				
<b>Cable length (L HOUSING)</b>	<b>0</b>	No L housing option selected				
	<b>2</b>	10 Meter				
	<b>3</b>	15 Meter				
<b>Light source</b>	<b>3</b>	460nm				
	<b>7</b>	880nm				
<b>Sensor process connections</b>	<b>TN</b>	Tuchenhagen "N" type DN50				

### Documentation

**Calibration certificate** **AE** English

**Installation and operating instructions** **IE** English **IF** Finnish **FR** French

### Material certificates

**0** No material certificate

**MC1** Raw material certificate without appendices, in accordance with SFS-EN 10204-2.1 (DIN 50049-2.1) standard

**MC2** Raw material certificate for wetted parts, in accordance with SFS-EN 10204-2.2 (DIN 50049-2.2) standard

**MC3** Raw material certificate for wetted parts, in accordance with SFS-EN 10204-3.1 B (DIN 50049-3.1 B) standard

\* Not EHEDG certified & Not within the 3A approval

\*\* Only in combination with Quartz, Sapphire lens and Kalrez Seals. And only 880nm

\*\*\* Do not exceed above 8% fat content



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EMC directive 2014/30/EC  
- EN 61326-1:2013

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We reserve the right for technical modifications without prior notice.

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