SATRON®

LUMINA™ VOD
Turbidity Optical Sensor

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#LookCloser

SATRON VOD Turbidity and solids sensor for Food and Biopharma

The SATRON VOD is a hygienically approved optical sensor that operates on the absorption principle using advanced LED technology. It measures light absorption in direct correlation with the clarity of the process medium, making it an ideal solution for applications such as reverse osmosis (RO) outlets, condensate recovery, whey turbidity in separator discharge lines and ultrafiltration processes.
Designed for high-performance and reliability, VOD enables significant process optimization and cost savings in industries requiring precise turbidity monitoring.
The sensor features a fully flush, flat front design for easy cleaning and optimal hygiene.
It supports both analog (4–20 mA) and digital communication via 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/dm3, PPM, or custom text

Temperature limits
Ambient: -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 +120 °C
Shipping and storage: -40 to +80 °C

Output
3-wire (3W), 4-20 mA NAMUR NE43, IO-Link (optional)

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

Humidity limits
0-100% RH

Pressure class
PN25

CONSTRUCTION
Materials:
Sensing element[1]: AISI316L, Duplex (EN. 1.4462), Hast. C276/C22, or Titanium Gr2.
Surface quality: Ra <0.8µm
Lens: Sapphire or Spinel ceramic
Cable material of detector probe: PVC
Seal: EPDM, FPM, FFPM, FEP

Housing with display, code **N**:
Housing: AISI303/316
Seals: FPM
Nameplates: Polyester
Display window: Polycarbonate

Housing without display, code **H**:
Housing: AISI303/316
Seals: FPM and NBR
Nameplates: Polyester

Connection cable between sensor and housing (RDU) code **L**:
PVC signal cable
Nameplates: Polyester
Display window: Polycarbonate

Electrical connections
Housing without display code **H**:
1x M12 plug connector
Housing with display, code **N**:
2x M12 plug connector
Remote display unit, code **L:**
3x PG9 gland for cable;
Conductor cross section: max 2.5 mm²

I/O-connections

Current output1	Turbidity active
Range (Namur NE 043)	3.5...23 mA
Maximum load	600 Ω
Factory setting	3.7...22.5 mA*

Switch outputs
Housing **N**: 1 output[2]
Housing **L**: 3 outputs
Solid state relay, grounding contact

Maximum voltage	35 V
Maximum current	50 mA
Maximum leakage current	10 µA

Switch inputs
Housing **N**: 1 input[2]
Housing **L**: 3 inputs

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
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"

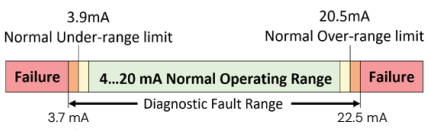
Protection class
IP66, IP67
See Selection chart.

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

*



[1] Parts in contact with the process medium are FDA compliant.

[2] Either 1 output or 1 input.

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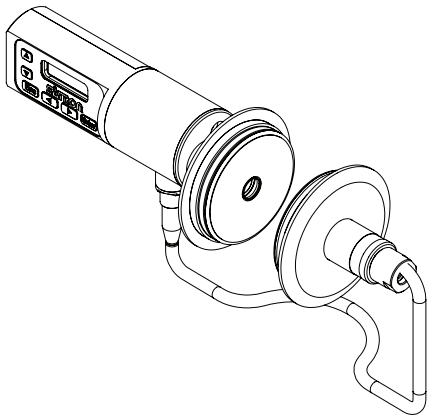
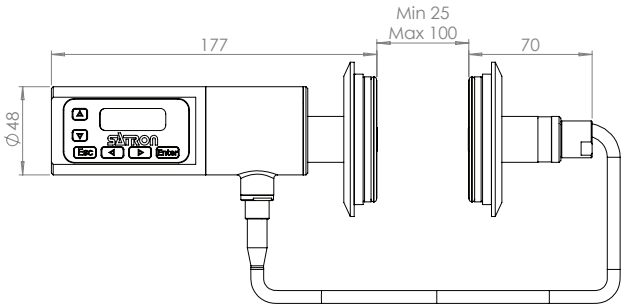
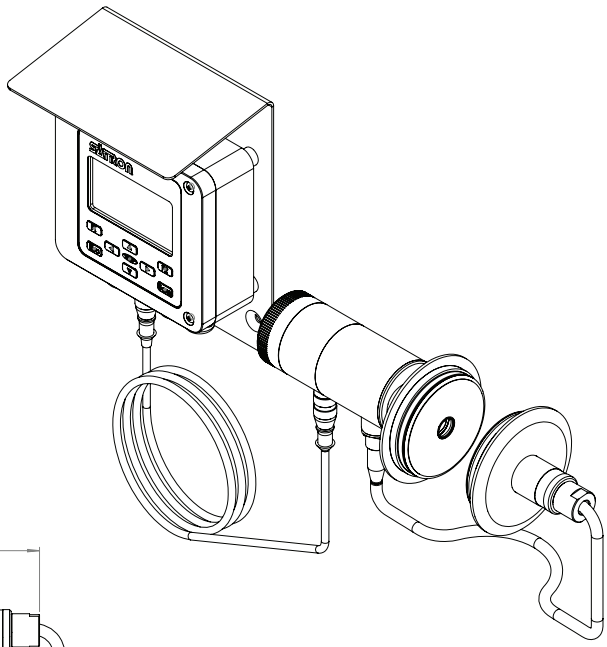
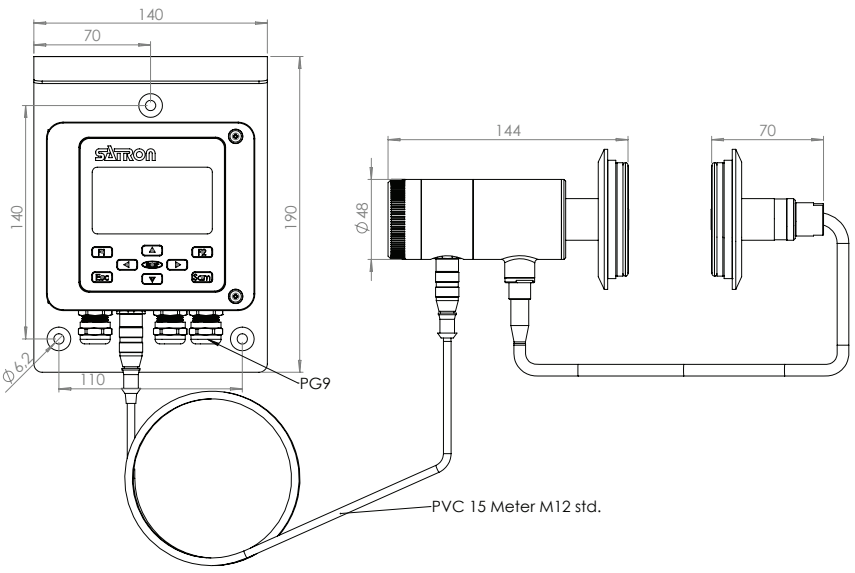
Dimensions and Housing Types VOD (mm)



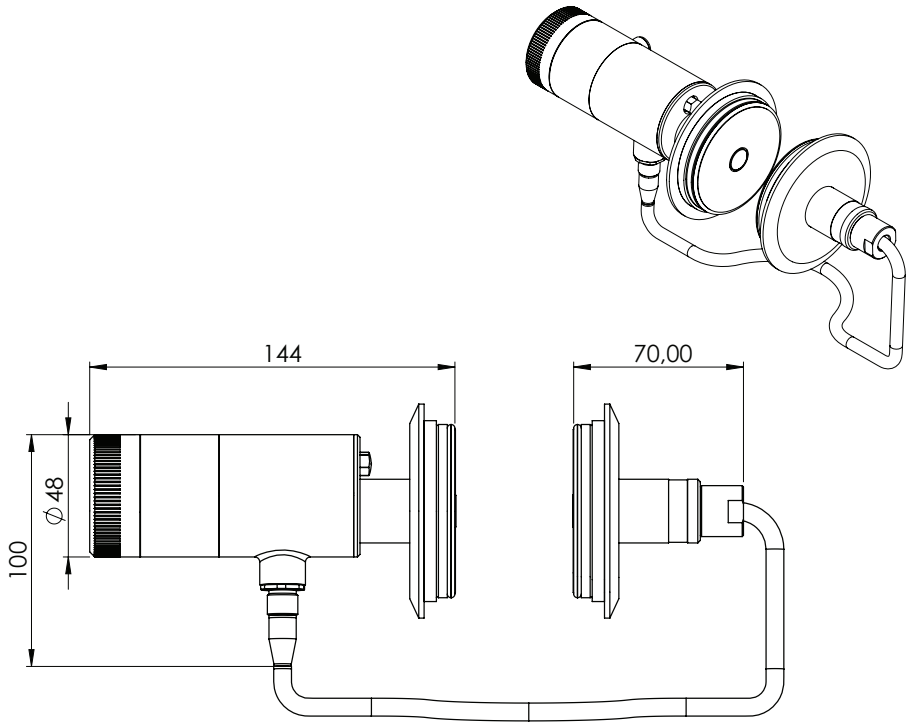


VOD with display and pushbuttons (N housing)





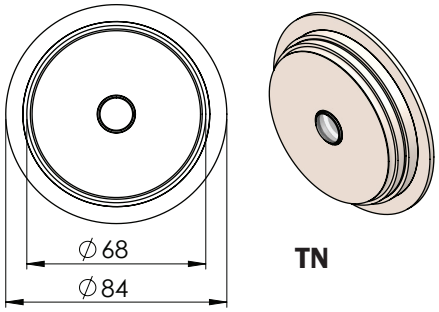
VOD with remote electronics housing with display (L housing)



VOD with no display (H-housing)

Process connection details

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



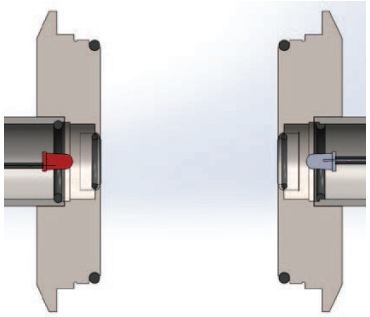
TN

VOD measurement principle

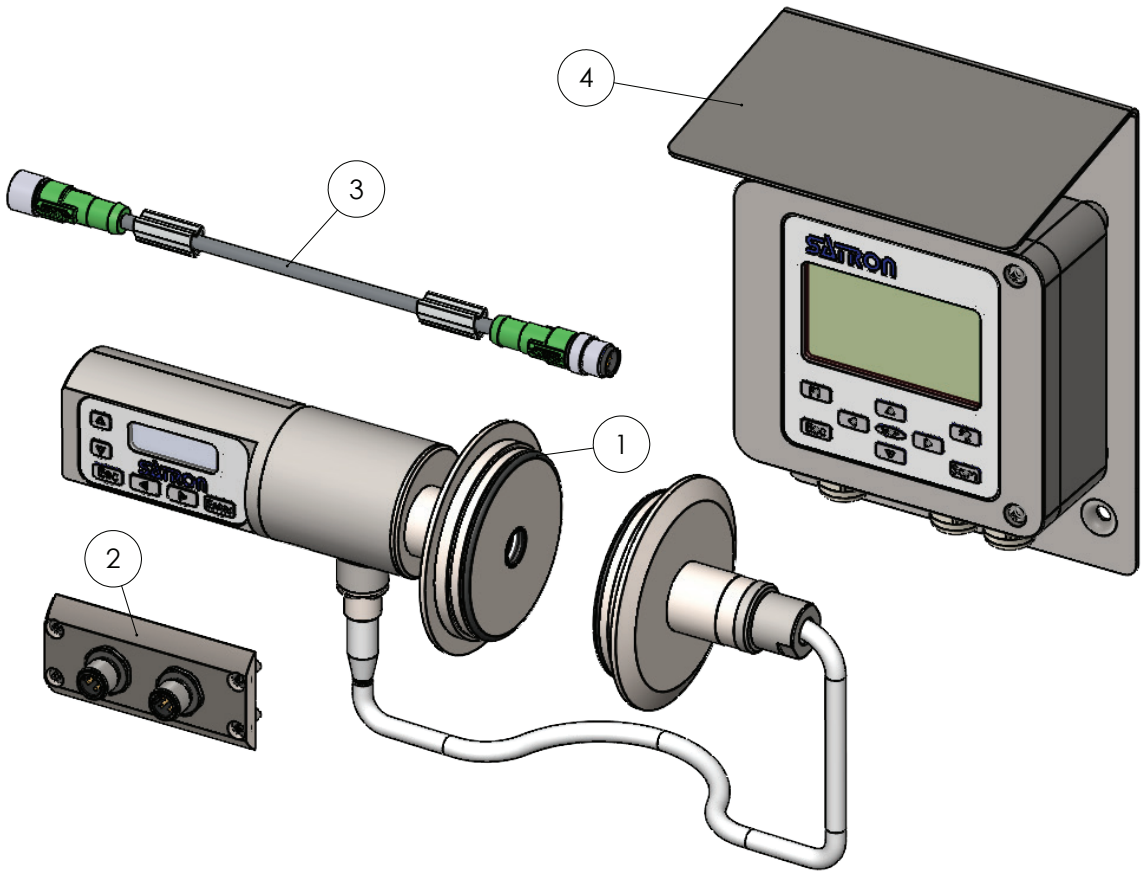
The SATRON VOD sensor utilizes the absorption-based turbidity measurement method, employing high-performance, LED light sources (see selection chart). In this configuration, the LED emitter (shown in red) transmits a focused beam of light through the process medium. The transmitted light is then received by a precision photodetector (shown in grey) positioned on the opposite side of the optical path.

As turbidity increases, suspended particles in the medium cause more light to be absorbed and scattered, resulting in a lower intensity of light reaching the photodetector. This decrease in detected light is used to determine the turbidity level in real time.

SATRON employs industrial-grade optical components in the VOD sensor design. The integrated LEDs and photodetectors are selected for their long-term stability and robustness, with typical lifespans exceeding 20 years under normal operating conditions.



Spare-parts VOD



No.	Part name	Order code	Note
1	O-ring EPDM	80036203	3A 18-03 Class II (Do not exceed above 8% fat content)
1	O-ring FPM	80016203	3A 18-03 Class I
1	O-ring FFPM	80046203	3A 18-03 Class I
2	Plug cover M12* N-housing	T1370011	
2	Plug cover M12* B-housing	T1370012	
3	L-Housing data cable 10m PVC*	70000600	
3	L-Housing data cable 15m PVC*	70000601	
4	Remote Display Unit RDU*	T1370009	

*Compatible with M3 model sensors. For older generations with 4 button displays (M1 and M2), please contact Satron.

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SELECTION CHART

Adjustability	Span, min	Span, max
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 4" pipe	0...10 NTU	0...50 NTU

Process temperature limits
- **N** Normal version -5...+100 °C continuous (120 °C for 10 minutes)
- **H**[1] High temperature -5...+120 °C continuous

Output
- **S** 4-20mA DC/HART® for 50Hz (Europe)
- **J** 4-20mA DC/HART® for 60Hz (USA / Japan)
- **T**[2] 4-20mA DC/HART® + IO-Link for 50Hz
- **K**[2] 4-20mA DC/HART® + IO-Link for 60Hz

Material of wetted parts

Body		Lens		Seal FEP +		3A 18-03
2	AISI316L	**2**	Sapphire	**1**[3]	EPDM	Class II
3	Hastelloy® C276	**4**	Spinel	**2**	FPM	Class I
6	Titanium Gr2			**3**	FFPM	Class I
8	Duplex (EN 1.4462)					

Housing type
- **B** Housing with display and push buttons, 1mA output
- **N** Housing with display and push buttons, 2mA outputs, binary in/output
- **H** Housing without display
- **L** Remote electronics housing with display

Probe type
- **0** No remote probe

Connection type
- **T** M12, IP67
- **V** PG9 (always with L housing), IP66

Cable material (L HOUSING)
- **0** No L housing option selected
- **4** PVC M12 cable

Cable length (L HOUSING)
- **0** No L or R option selected
- **2** 10 Meter
- **3** 15 Meter

Lightsource
- **3** 460nm
- **7** 880nm

Process connection
- **TN** Tuchenhagen "N" type DN50

Example code

VOD	N	5	221	N	0	T	0	0	3	TN

Documentation

Material certificates

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
MC3-3A	Raw material certificate for wetted parts, in accordance with SFS-EN 10204-3.1 B (DIN 50049-3.1 B) standard + 3A approval

1) **3A approval in combination only with FFPM**
2) **IO-link only with N housing type**
3) **Do not exceed above 8% fat content process media**

We reserve the right for technical modifications without prior notice.
HART® is a registered trademark of FieldComm Group, Inc.
Hastelloy® is the registered trademark of Haynes International, Inc.
PASVE® is the registered trademark of Satron Instruments Inc.
3-A is a registered mark owned and administered by 3-A SSI.

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: 2021

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