

Satron VOD

Turbidity and solids sensor for
Food and Biopharma

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/dm³, 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 ¹⁾: 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"

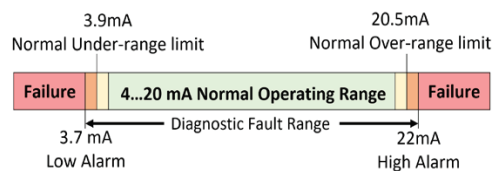
Protection class: IP66, IP67

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

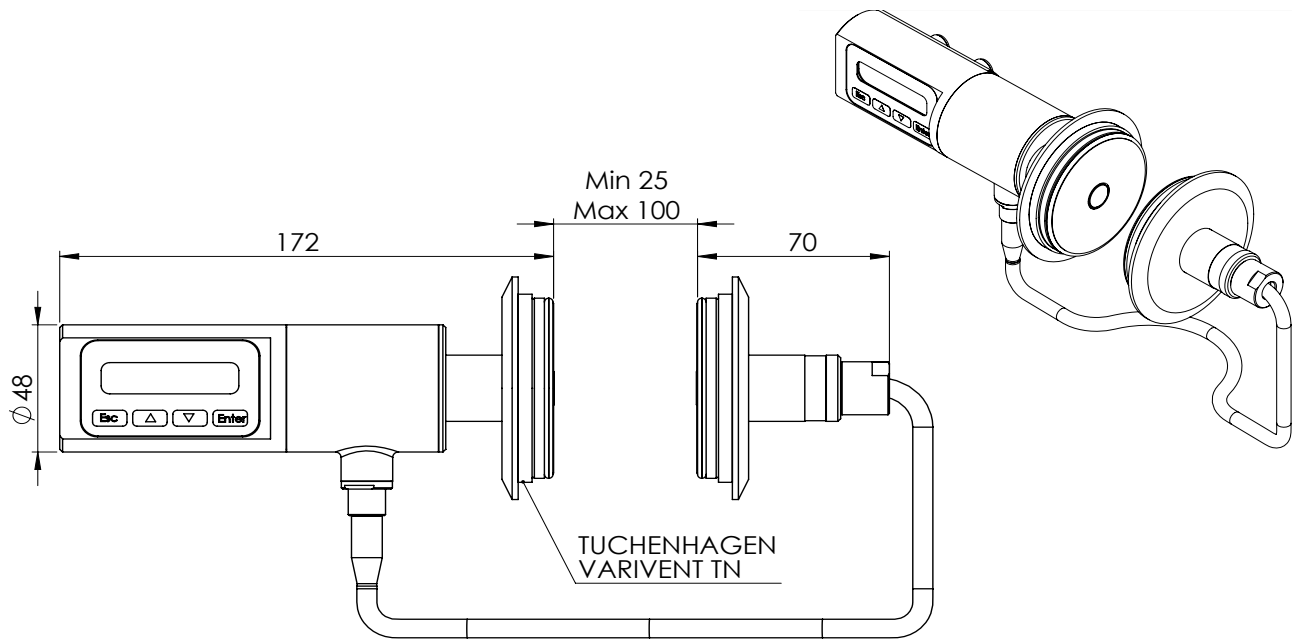


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CAN/CSA C22.2 No. 61010-1-12, Ed. 3
EMC directive 2014/30/EC

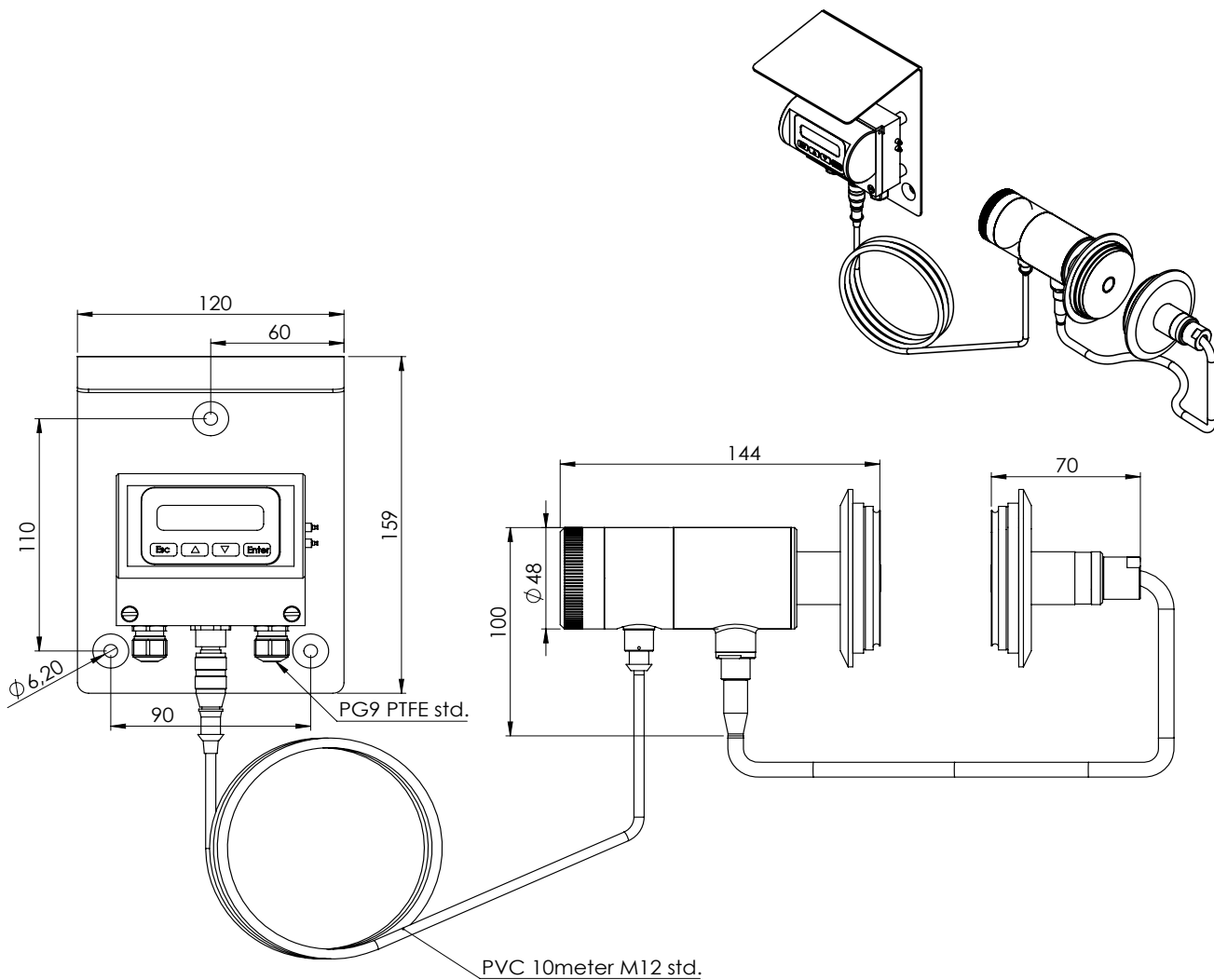
- EN 61326-1:2013

¹⁾ Parts in contact with process medium compliant to FDA

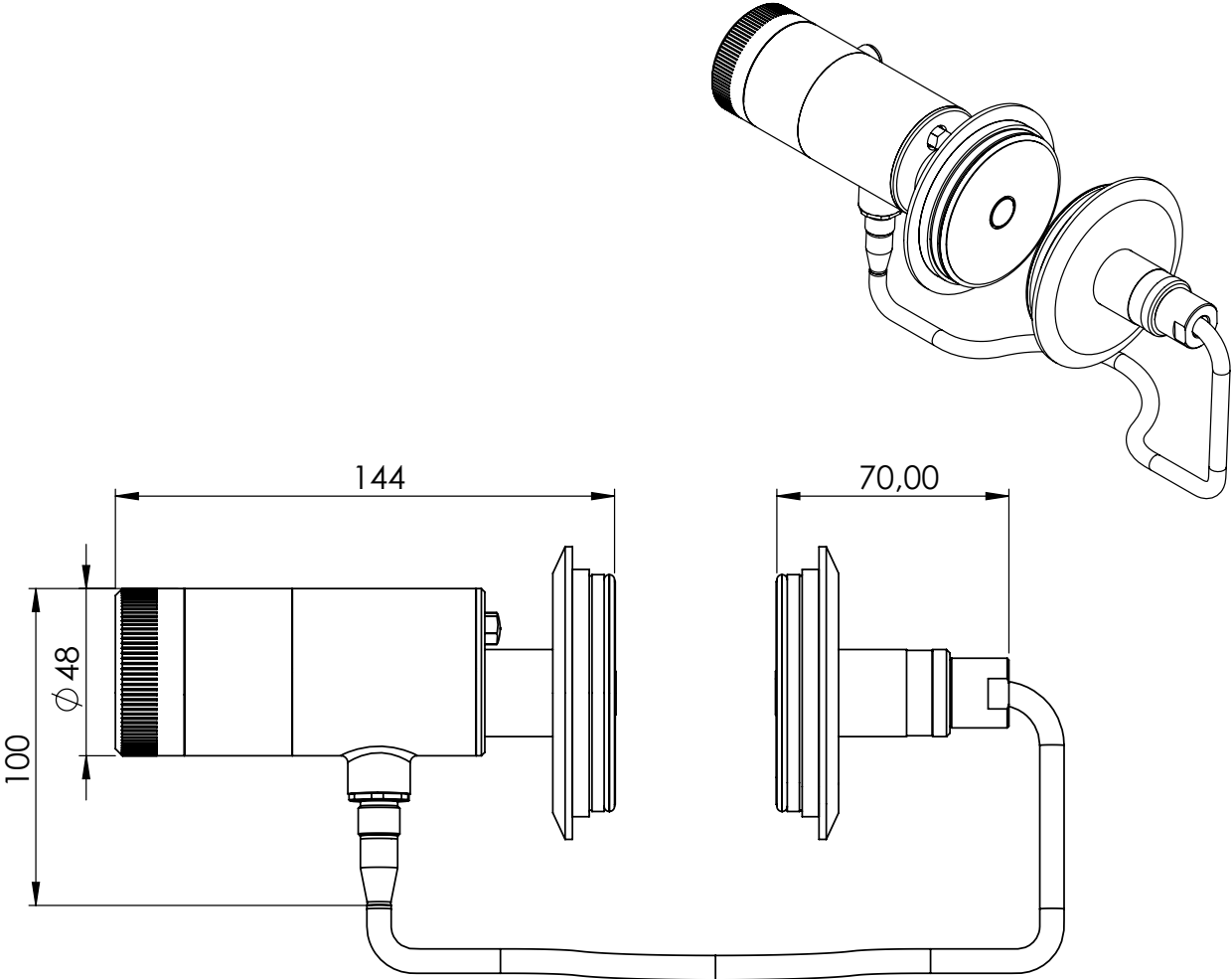
Dimensions and Housing types VOD (mm)



VOD with display and pushbuttons (N housing)



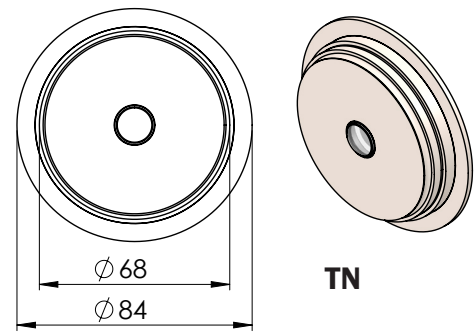
VOD with remote electronics housing with display (L housing)



VOD with no display (H-housing)

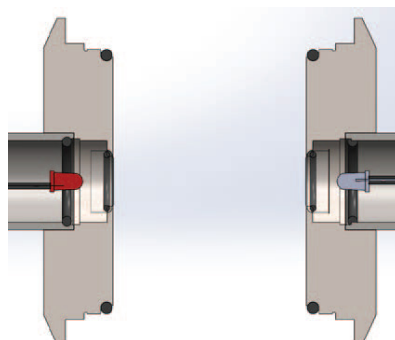
Process connection details

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.

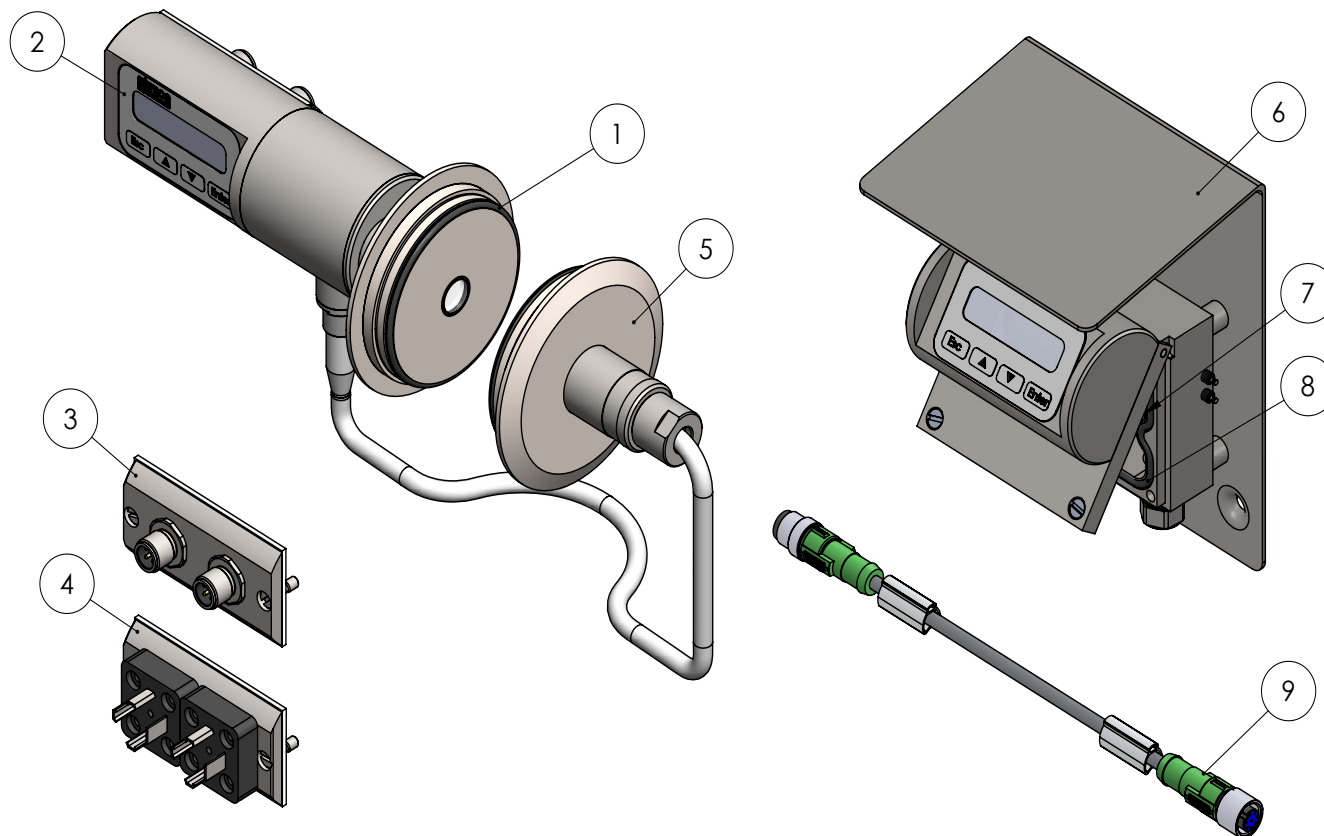


VOD measurement principle:

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

Contact Satron

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 a 4" pipe	0...10 NTU	0...50 NTU				
Process temperature limits	N	Normal version -5...+100 °C continuous (120 °C for 10 minutos)				
	H(**)	High temperature -5...+140 °C continuous (160 °C for 30 minutos)				
Output	S	4-20mA DC/HART® for 50Hz (Europe)				
	J	4-20mA DC/HART® for 60Hz (USA / Japan)				
Material of wetted parts	Body	Lens	Seal	3A 18-03		
	2	AISI316L	2	1(***)	EPDM	Class II
	3	Hast. C 276	4	2	FPM (Viton®)	Class I
	6	Titanium Gr2		3	FFPM (Kalrez®)	Class I
	8	Duplex (EN 1.4462)		4(*)	PTFE (Teflon)	
	9	Peek				
Housing type	N	Housing with display and pushbuttons				
	H	Housing without display (only one mA output)				
	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 housing option selected				
	2	10 Meter				
	3	15 Meter				
Light source	3	460nm				
	7	880nm				
Sensor process connections	TN	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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1) Parts in contact with process medium compliant to FDA

We reserve the right for technical modifications without prior notice.

HART is the registered trademark of HART Communication Foundation.
PASVE is the registered trademark of Satron Instruments Inc.
Hastelloy is the registered trademark of Haynes International.
Viton is the registered trademark of DuPont Down Elastomer.
3-A is a registered mark owned and administered by 3-A SSI.

