

The SATRON VO analyzer allows savings to be obtained in process industries such as:

- Transition monitoring for startup, changeovers and shut-down
- CIP return line monitoring
- Automation of yeast harvesting in breweries
- Integrity monitoring of filters

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

TECHNICAL SPECIFICATIONS

Measuring range

0...300 000NTU equivalent

Calibration

The transmitter is factory calibrated at 4mA = water, 20mA = 2% fat cow milk, 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...1 000 NTU	0.25% ±50 NTU offset
1 000...10 000 NTU	1%
10 000...300 000 NTU	5%

Unit selection

%, NTU, FNU, FTU, mg/L, g/dm³, PPM

Temperature limits

Ambient: -30 to +80 °C (-22 ...176°F)
 Process N type: -5 to +100 °C (23 ...212°F)
 (120 °C for 10min) (248°F)
 Process H type: -5 to +140 °C (23 ...284°F)
 (160 °C for 30 min) (320°F)
 Shipping & storage: -40 to +80 °C
 (-40 ...176°F)
 Display operating range: 0 to +50 °C
 (Does not affect operation of the transmitter)

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

Supply voltage

Nominal 24 VDC, (21,6 - 27,6V) 200mA

Humidity limits 0-100 % RH

Pressure class:

- PN40
- Test pressure -1 to 250 bar (-14,5 to 3625,94 PSI)

EMC directive 2014/30/EC

- EN 61326-1:2013

CONSTRUCTION

Materials:

Sensing element ¹⁾: AISI316L, PEEK, Duplex (EN. 1.4462), Hast. C276/C22, or Titanium Gr2.
 Surface quality: Polished Ra <0,8µm
 Lens: Sapphire or Spinel ceramic

Housing with display code N:

Housing: AISI303/316, Seals: Nitrile-rubber 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)

solid state 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

- With G1 connecting thread
- Tri-Clamp 25/38 and 40/51
- Tuchenhangen Type "N"
- 1" retractable "B1"

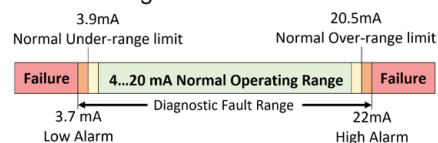
Protection class: IP66, IP67 and IP68
 See Selection chart.

Weight

Housing without (H):	0.9 kg
Housing with Display (N):	1.3 kg
Remote Housing (L):	2.5 kg
Remote sensor (R):	2.5 kg

Min. load using HART®-communication
 250 Ω

Output signal according to NAMUR NE043 Signal Level for the failure information of Digital Transmitters.

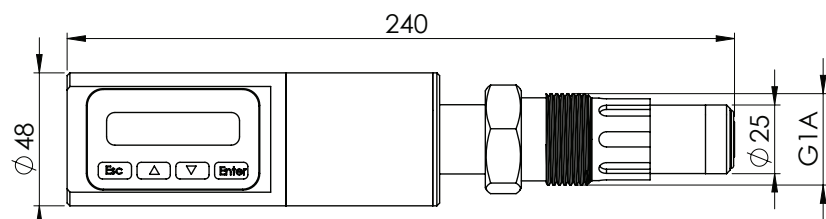


UL 61010-1, 3rd Ed. Rev May 11. 2012
 CAN/CSA C22.2 No. 61010-1-12, Ed. 3
 EMC directive 2014/30/EC
 - EN 61326-1:2013

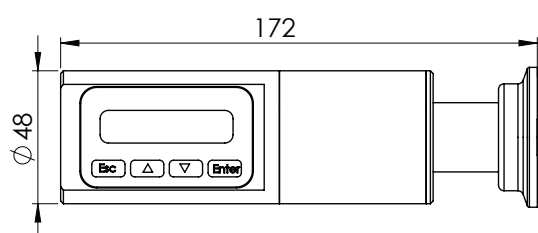
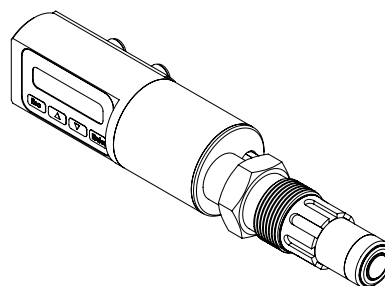
¹⁾ Parts in contact with process medium compliant to FDA

SATRON VOM Turbidity and solids sensor for food and Biopharma

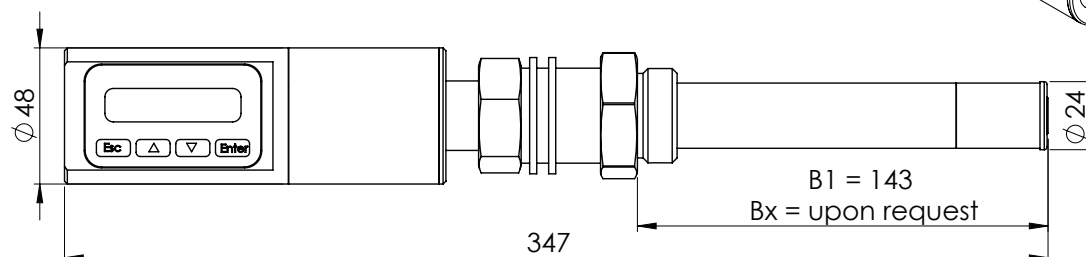
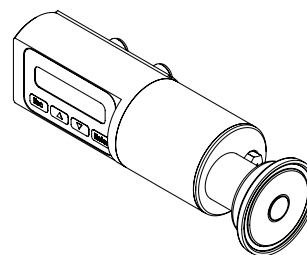
Dimensions and Housing types VOM (mm)



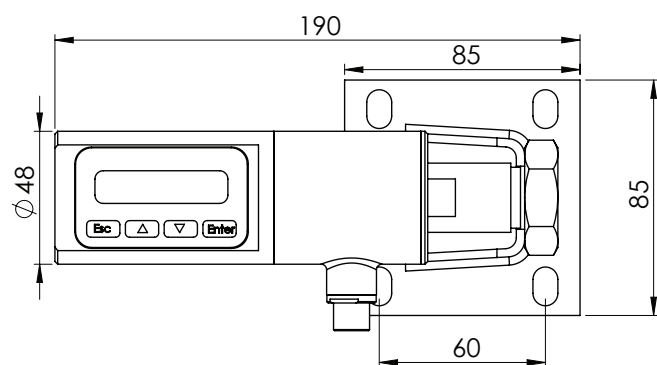
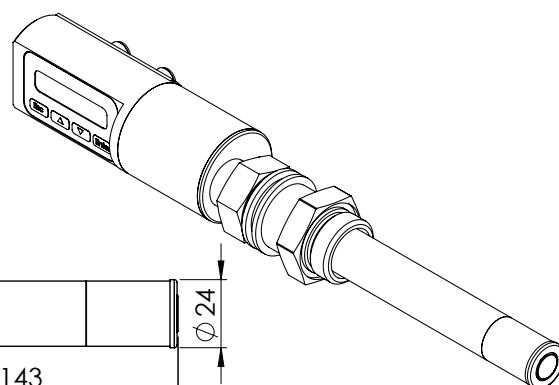
VOM with display (N) and G1 process connection



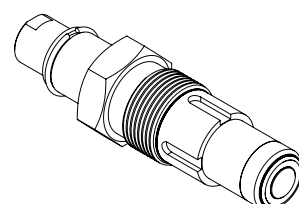
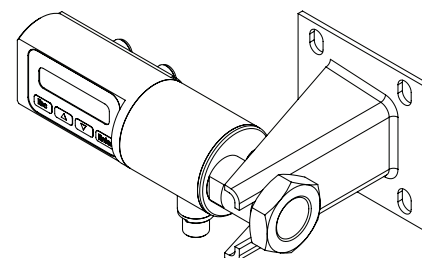
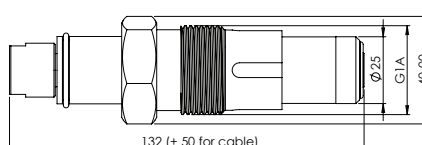
VOM with display (N) and Tx clamp connection



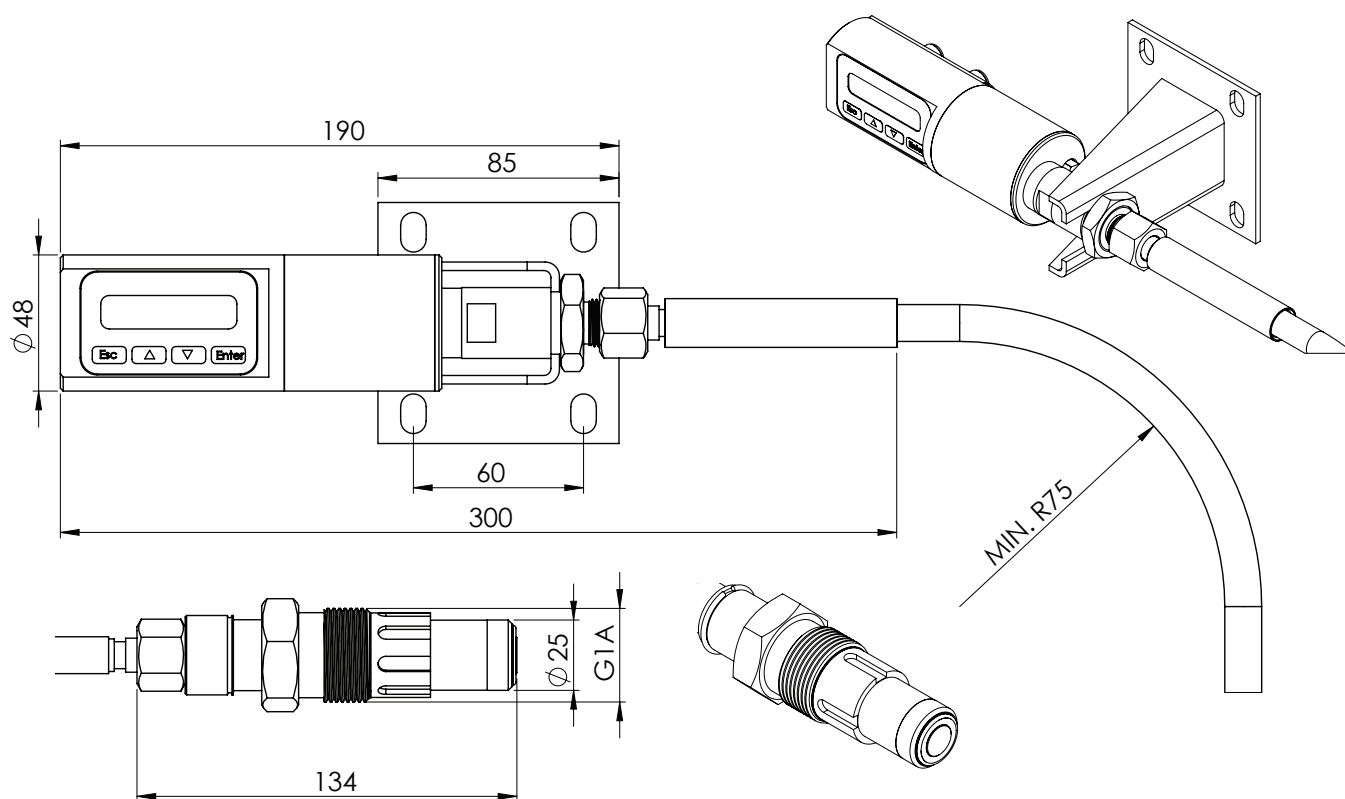
VOM with display (N) and B1 / BX ball valve insertion process connection



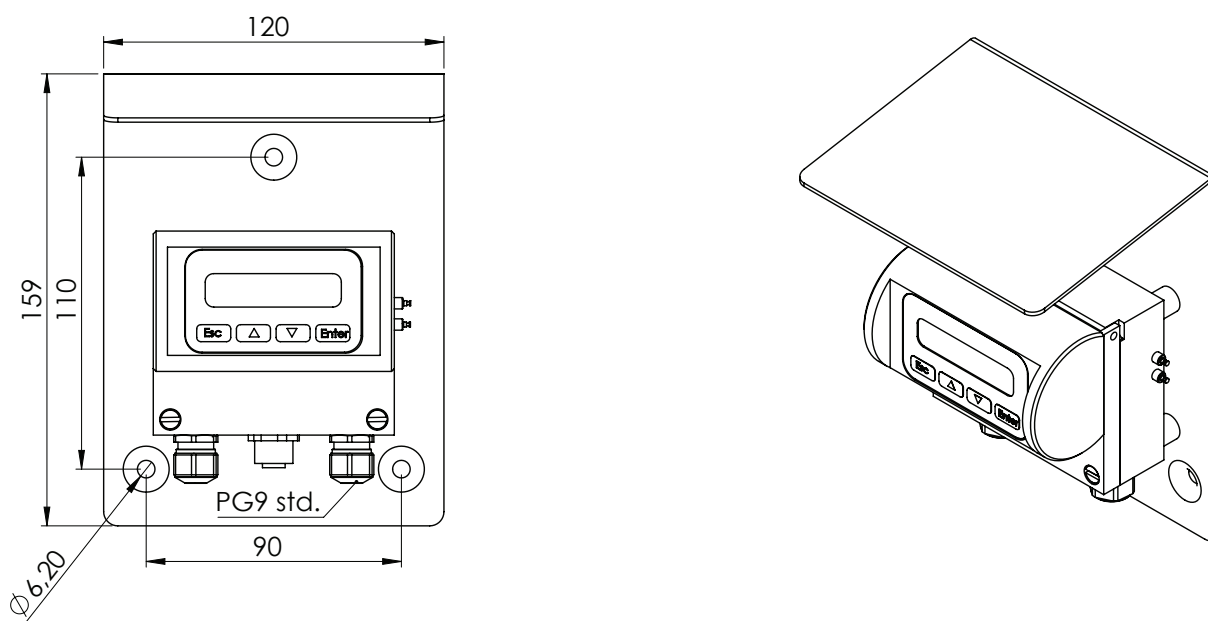
VOM with remote measuring probe and PVC M12 cable (NRT43 & NRT12)



SATRON VOM Turbidity and solids sensor for food and Biopharma

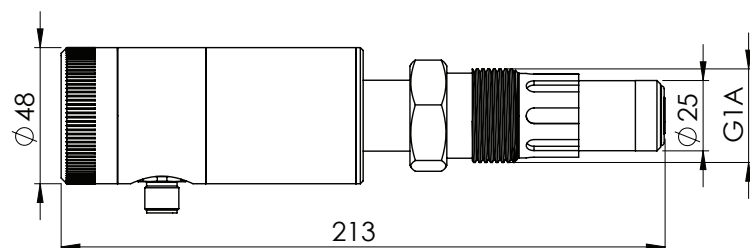


**VOM with remote measuring probe and AISI or PUR hose
(NRT2 & NRT3)**

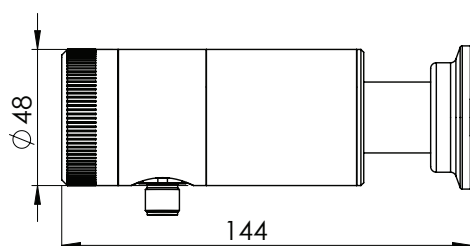
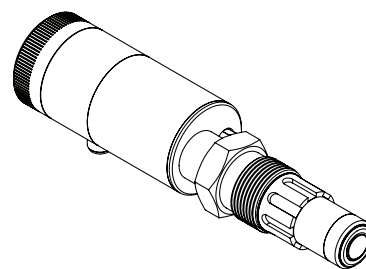


Remote electronics housing with display (L) T1325016

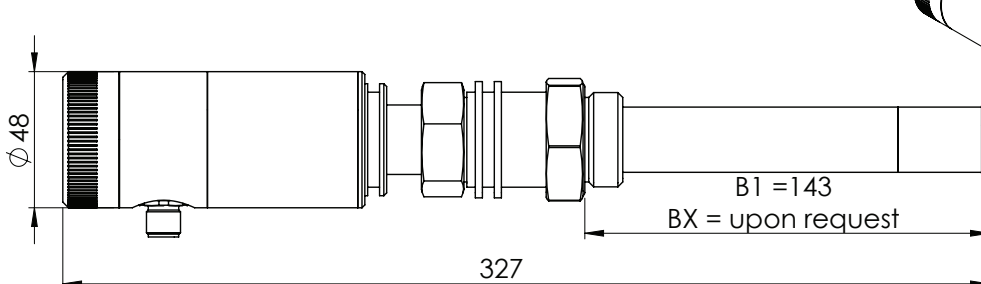
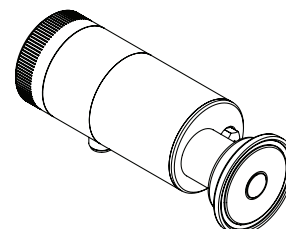
SATRON VOM Turbidity and solids sensor for food and Biopharma



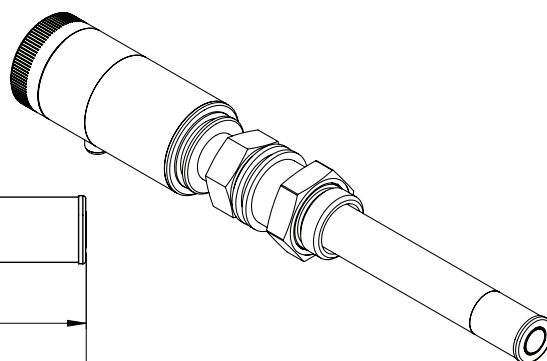
VOM with no display (H) and G1 process connection



VOM with no display (H) and TA, TB and TN clamp connection

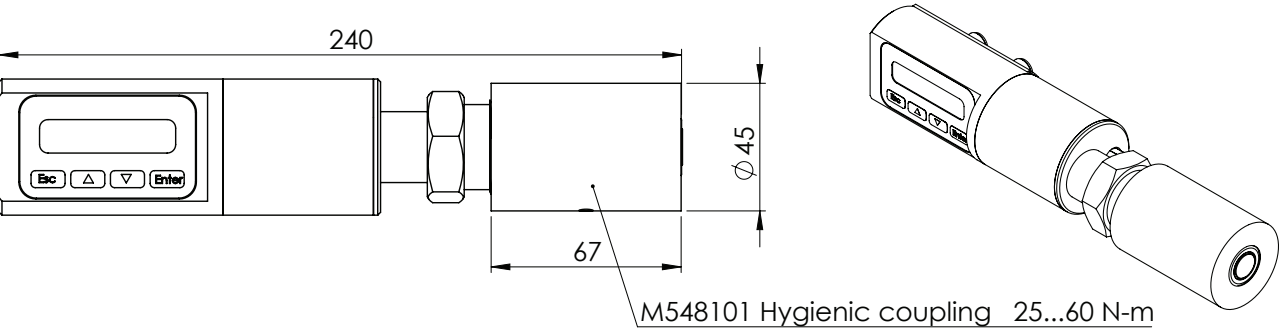


VOM with no display (H) and B1 / BX retractable ball valve insertion process

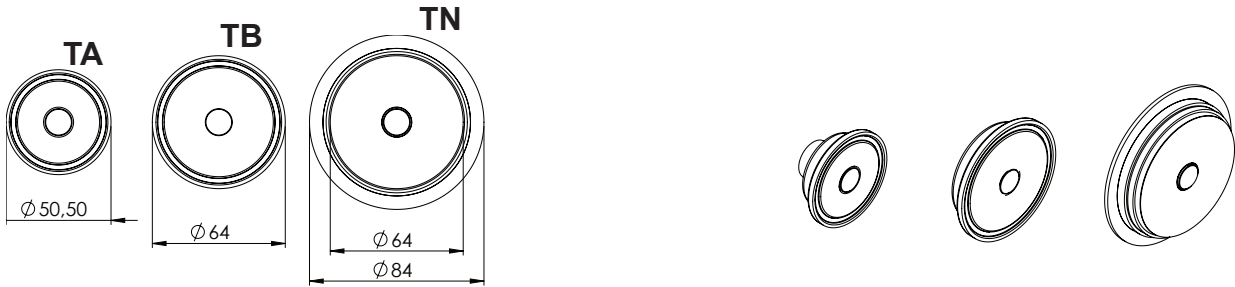


SATRON VOM Turbidity and solids sensor for food and Biopharma

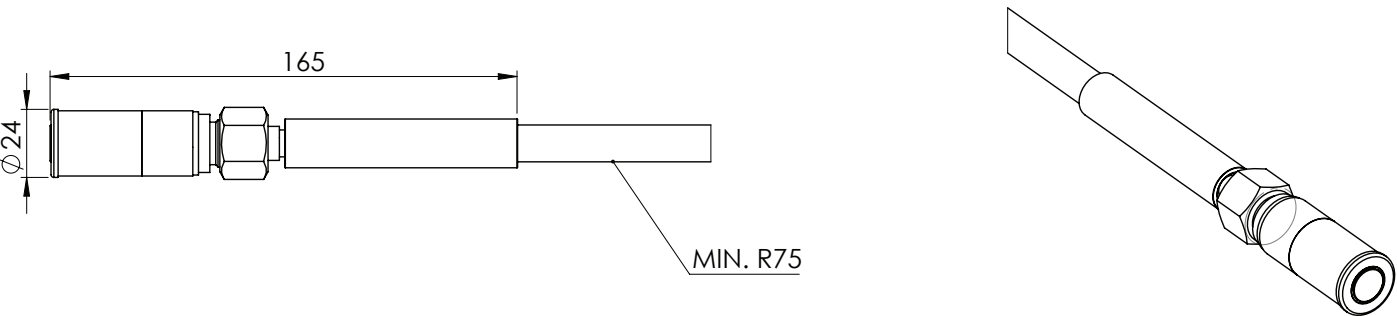
Process connection details



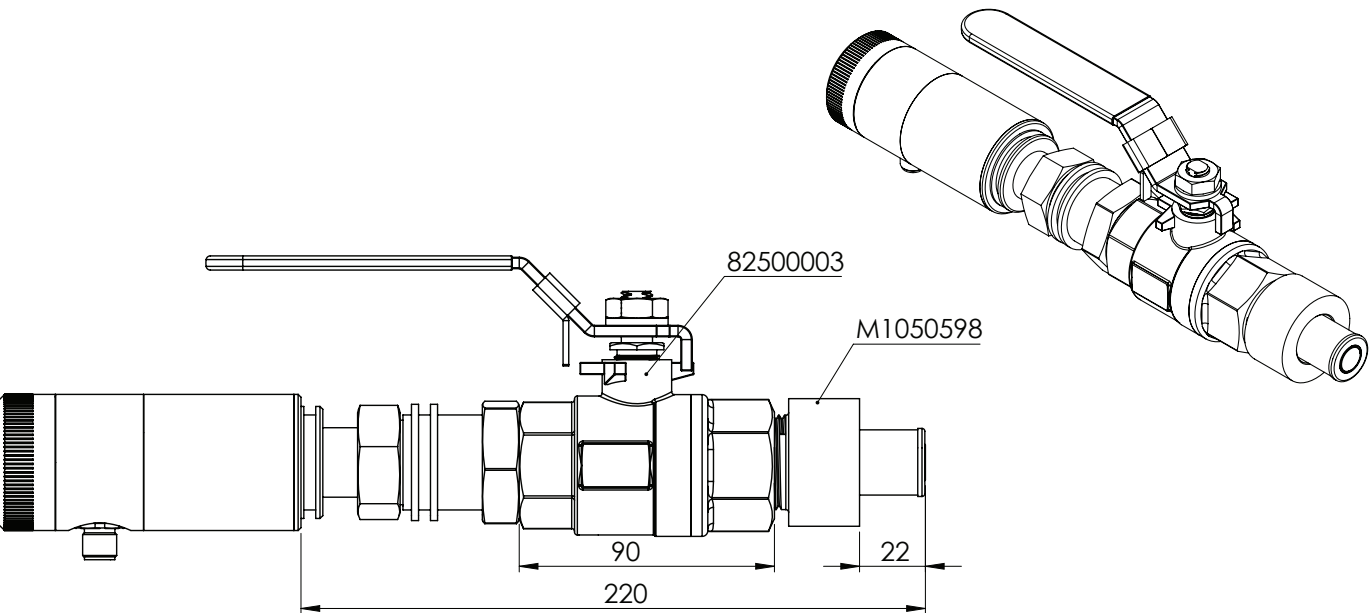
VOM G1 connected to M548101 hygienic coupling. (Flush mounted) EHEDG, 3A



VOM with Tri-clover TA, TB (ISO 2852) and Tuchenhagen TN process connection



VOM with H1 fixed mounting tube process connection and AISI316L hose, "21.H1"



VOM B1 connected to Ball valve 8250000 and M1050598 coupling

SATRON VOM Turbidity and solids sensor for food and Biopharma

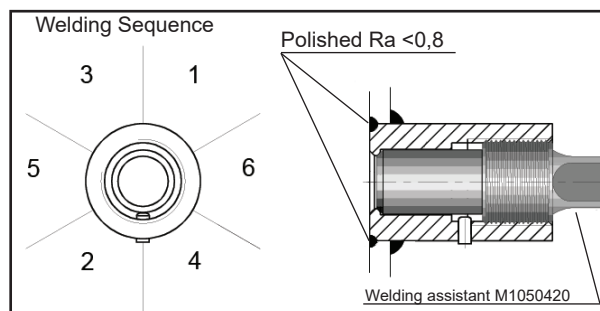
Instructions and spare parts that are according and within the 3-A appliance



Welding the coupling

These instructions apply to hygienic welded couplings; welding the G1 standard coupling is described here as an example.

- Place the coupling in the mounting hole as shown in Fig. 1-4. Make sure the leakage detection port is down. Then weld with several runs so to prevent the coupling's oval distortion and tightness problems. The inside welding must be cleaned, and polished with an end result of $Ra < 0,8$
- The analyzer must be **out of the coupling** while the coupling is welded. You can use the shut-off plug shown in Fig. 1-5 to shut the coupling. The plug protects the coupling's sealing face and permits the starting of the process without the transmitter.
- It is always recommendable to use the welding assistant (M1050450) while welding the coupling to prevent any distortions due to heat.
- Do not make weld grounding via any analyzer's body!



Mounting the analyzer on the coupling

Procedure

- Make sure that the coupling's sealing face is clean.
- Remove the orange protective plug from the analyzer head.
- Insert the analyzer **in a straight line** into the coupling, so that the guide groove on the transmitter aligns with the stop pin on the coupling. The analyzer settles into position when the groove and pin are aligned, and will be prevented from rotating in the coupling.

When inserting the analyzer, be careful not to damage the edge of the lens on the edges of the coupling or on the end of the stop pin!

- Lock the transmitter in position by screwing the hex nut fully home. Finger tightness is sufficient to tighten the sealing faces. However, we recommend final tightening with a tool to eliminate the effect of vibration and other such factors. Apply 60 ± 20 Nm torque.

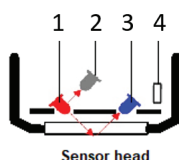
Do not use sealing tape etc. on threaded connection!

VOM measurement principle:

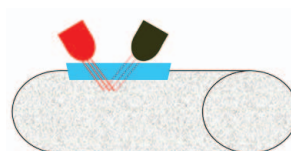
Backcattering with selectable wavelength lightsource LED (see selection chart)

The light source is fully compensated for aging, temperature, and ambient light changes due to the high duty cycle measurement (up to 100 measurements per second).

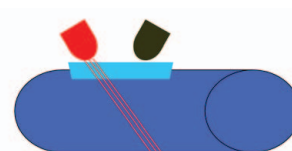
The lifetime for the optical LED and photodetectors is 20 years minimum.



- 1 LED
- 2 Reference detector
- 3 Turbidity detector
- 4 PT100 Temperature probe



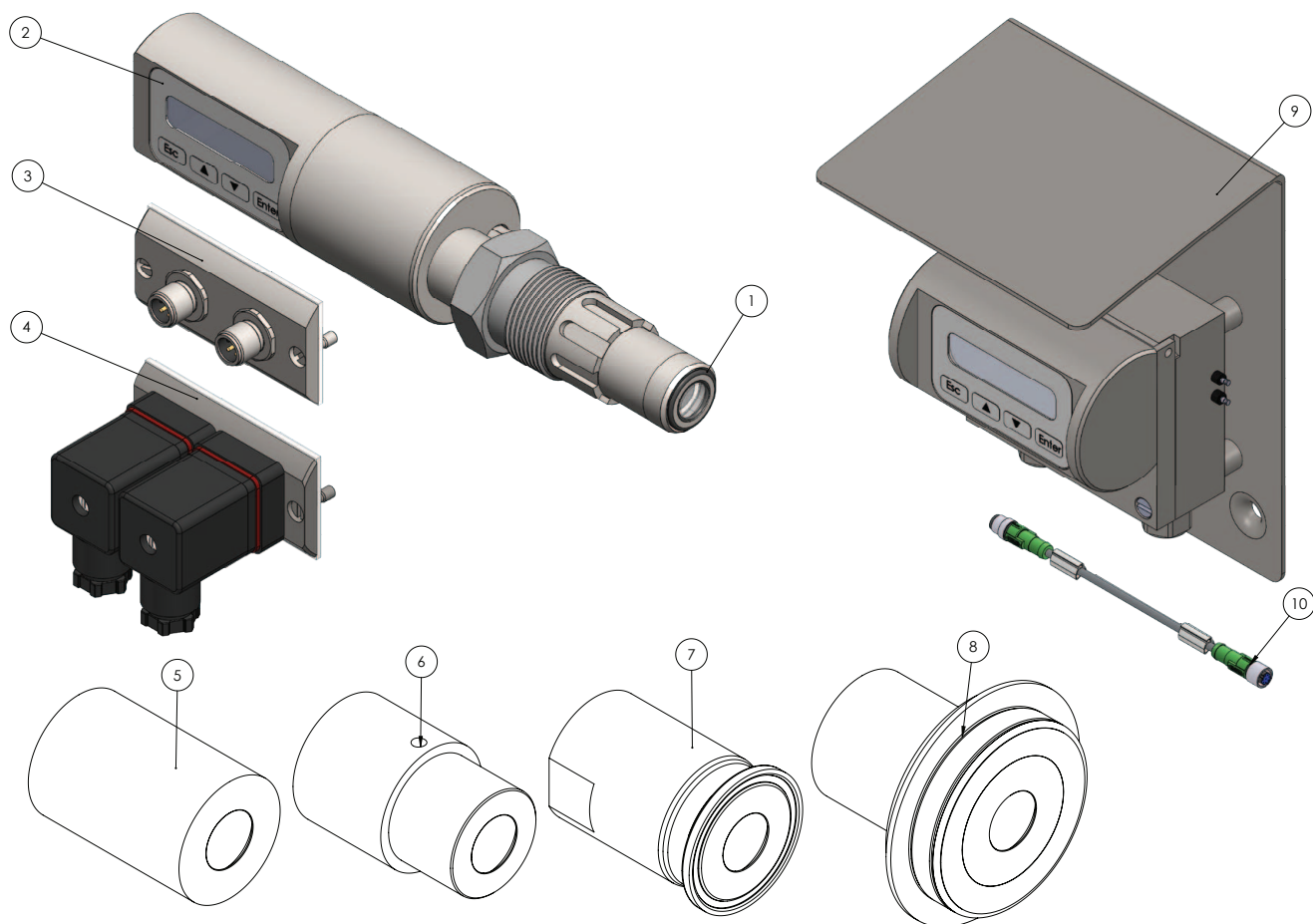
Milk = 100% = 20mA



Water = 0% = 4.0mA

SATRON VOM Turbidity and solids sensor for food and Biopharma

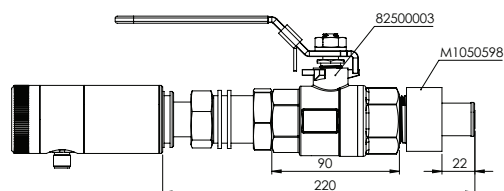
Spare-parts VOM G1



No.	Part name	Order code
1	O-ring EPDM	80031720
1	O-ring FPM (Viton®)	80011720
1	O-ring FFPM(Kalrez®)	80041717
2	Sticker	T1325215
3	Plug cover M12	T1325031
4	Plug cover DIN43650 (old type)	T1325003-K48
5	45/G1" Welding adapter	M548101
6	38/G1" Welding adapter	M1050577
7	Tri-clover 25/38 ISO2852	M1050206
7	Tri-clover 40/51 ISO2852	M1050222
7	Tri-clover 63.5 ISO2852	M1050224
8	Tuchenhausen / Varivent DN25	M1050090
8	Tuchenhausen / Varivent DN50	M1050091
8	Tuchenhausen / Varivent DN65,5	M1050092
9	Remote Display Unit RDU	T13250016
10	L-Housing data cable 10m PVC	70000450
10	L-Housing data cable 15m PVC	70000451
10	Extension cable +10m PVC	70000460
	FUSE for L-Housing	74212000
	Seal for L-Housing display	80017226
	Bracket remote probe electronics	T1050009

Note

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



Ballvalve	82500003
Straight coupling for ballvalve	M1050598
15 degree coupling for ballvalve	M1050597

Mounting bracket for R probe type: T1050009

SATRON VOM Turbidity and solids sensor for food and Biopharma

Selection Chart

Adjustability VOM	Span, min 0...1000 NTU	Span, max 0...300 000 NTU
Process temperature limits N Normal version -5...+100 °C (23 ...212°F) (120 °C (248°F) for 10 minutes) H(**) High temperature -5...+140 °C (23 ...284°F) (160 °C (320°F) for 30 minutes)		
Output S 4-20mA DC/HART® for 50Hz (Europe) J 4-20mA DC/HART® for 60Hz (USA / Japan)		
Material of wetted parts Body 2 AISI316L 3**** Hast. C 276 6**** Titanium Gr2 8**** Duplex (EN 1.4462) 9**** Peek Lens 2 Sapphire 4 Spinel Seal 1*** EPDM 2 FPM (Viton®) 3 FFPM (Kalrez®) 4 (*) PTFE (Teflon) 3A 18-03 Class II Class I Class I		
Housing type B Housing with display and pushbuttons, 1mA output. N Housing with display and pushbuttons, 2mA outputs, 3 bin in/outputs H Housing with, no display, L Remote electronics housing with display		
Probe type 0 No remote probe R Remote measuring probe (not available with L housing), IP68		
Connection type T M12, IP67 V PG9 (always with L housing), IP66		
Cable Material 0 No, L or R selected 2(*) AISI316L braided PTFE hose. 4 PVC cable (std.)		
Cable length 0 No L, R option selected 2 10 M PVC 3 15 M PVC. Extension 10M PVC cable available.		
Light source 6 640nm 7 880nm 9 IR+		
Process connections G1 Standard G1A thread + Oring TA Tri-Clover 25/38 (ISO 2852) TB Tri-Clover 40/51 (ISO 2852) TN Tuchenhausen "N" type DN50 H1(*) Fixed mounting tube, (see H1 picture) HX(*) Fixed mounting tube, (specify length) B1(*) G1A ball valve insertion. Extension 19cm diameter ø 24mm BX(*) G1A ball valve insertion. Extension on request		



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

** For EHEDG & 3A in combination with Kalrez Seals.

*** Do not exceed above 8% fat content process media

**** Only process connection G1.



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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

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Hastelloy is the registered trademark of Haynes International.
Viton is the registered trademark of DuPont Down Elastomer.
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