

SATRON VOM Turbidity and solids sensor for food and Biopharma

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
 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

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

Pressure class:

- PN40
- Test pressure -1 to 250 bar

Housing with display,

codes **N0S & N0T**:
 Housing: AISI303/316, Seals: Nitrile-rubber and Viton®,
 Nameplates: Polyester

Housing with M12 connector, code

H0T: Housing: AISI303/316, Seals: Viton® and NBR.

Housing with PLUG DIN 43650 connector, code

H0S: Housing: AISI303/316, Seals: Viton® and NBR.

PLUG connector: PA6-GF30 jacket, Silicone rubber seal, AISI316 retaining screw.

Connection hose between sensing element and housing

Codes **L** and **R** :
 PVC signal cable or hose protected with PTFE/AISI316 braiding

Electrical connections

Housing with PLUG connector, code **H0S**:

Connector type DIN 43650 model AF; Pg9 gland for cable; wire cross-section 0.5 to 1.5 mm².

Housing with M12 connector, code **H0T**: M12 plug connector

Housing with display, code **N0S**: Connector type DIN 43650 model AF; Pg9 gland for cable; wire cross-section 0.5 to 1.5 mm².

Housing with display, code **N0T**: 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 |

bin1-3

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

bin1-3

| | |
|----------------------------------|------|
| 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 load, See picture below
 Maximum isolation voltage 100 VDC

Process connections

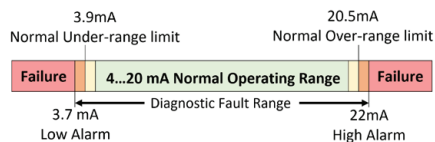
- With G1 connecting thread
- Tri-Clamp 25/38 and 40/51
- Tuchenhangen Type "N"
- 1" retractable "B1"

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

Weight

| | |
|--|--------|
| Housing with PLUG DIN43650 connector (H0T): | 0.9 kg |
| Housing with M12 connector (H0S): | 0.9 kg |
| Housing with display (N0S & N0T): | 1.3 kg |
| Remote Housing (L): | 2.5 kg |
| Remote sensor (R): | 2.5 kg |

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 2004/108/EC

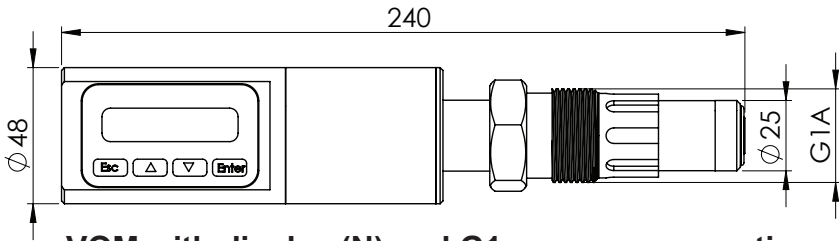
- EN 61326-1:2005

¹⁾ Parts in contact with process medium compliant to FDA

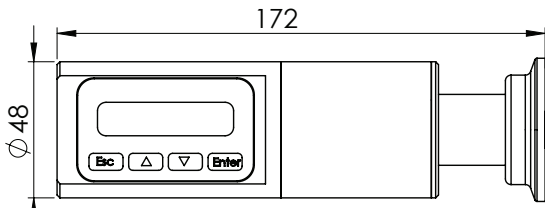
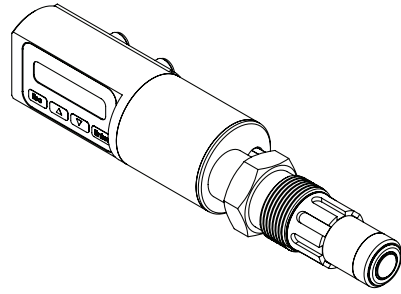
SATRON VO Turbidity and solids content sensor

BA201
rev. 1.1
11-07-2018

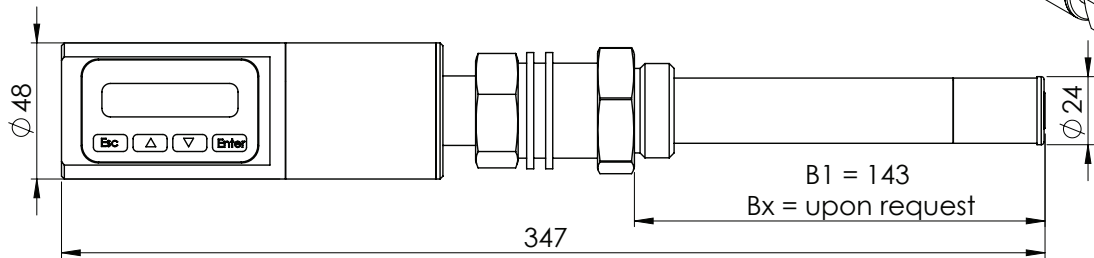
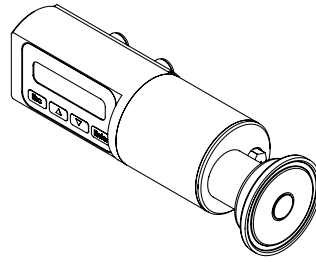
Dimensions and Housing types VOM (mm)



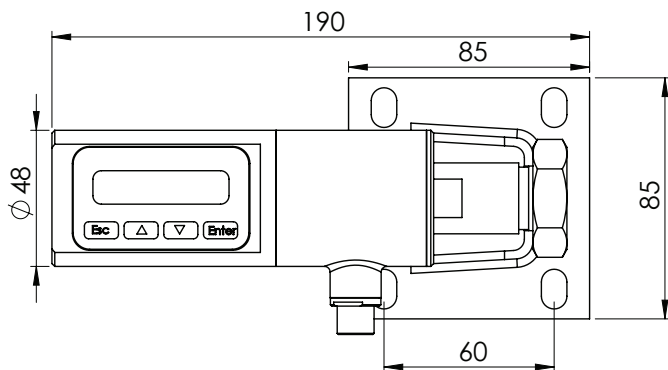
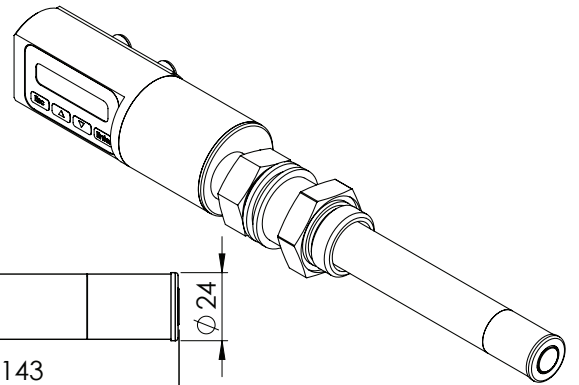
VOM with display (N) and G1 process connection



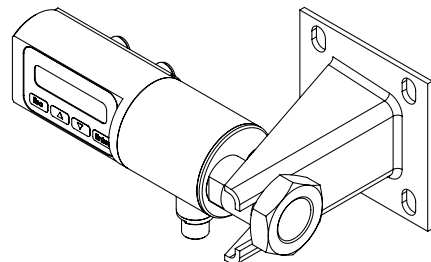
VOM with display (N) and Tx clamp connection

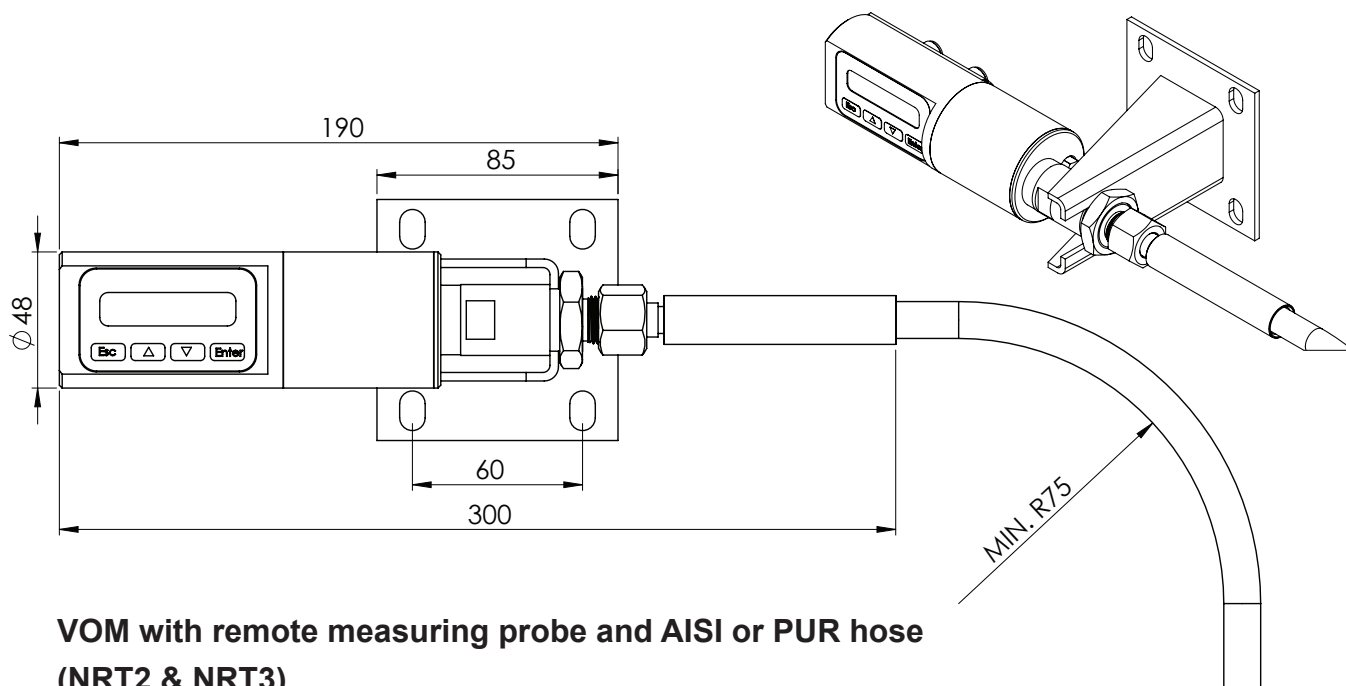


VOM with display (N) and B1 / BX ball valve insertion process connection

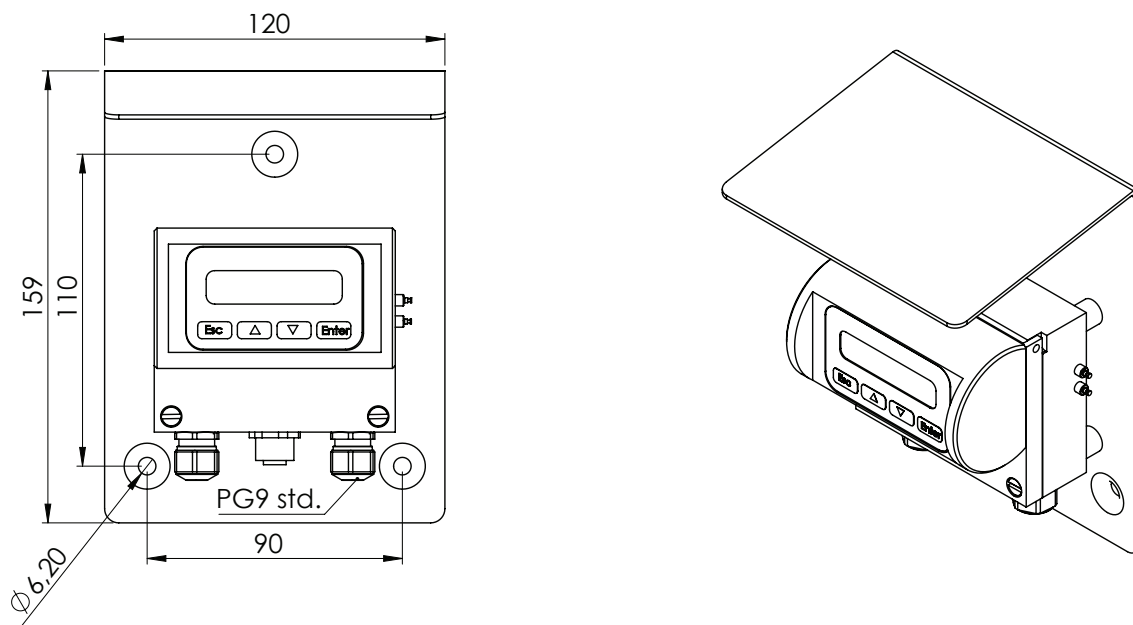


VOM with remote measuring probe and PVC or PUR M12 cable (NRT43 & NRT12)



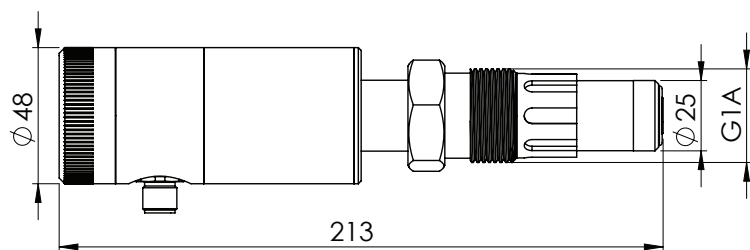


VOM with remote measuring probe and AISI or PUR hose (NRT2 & NRT3)

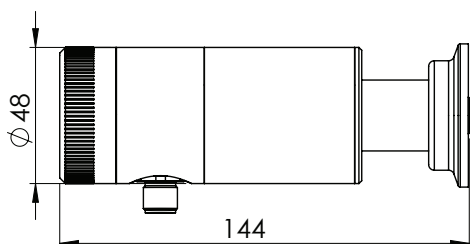
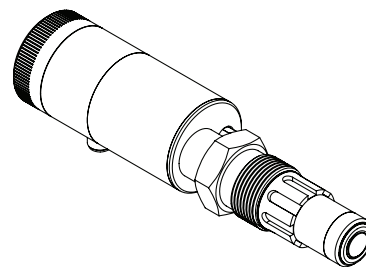


Remote electronics housing with display (L) T1325016

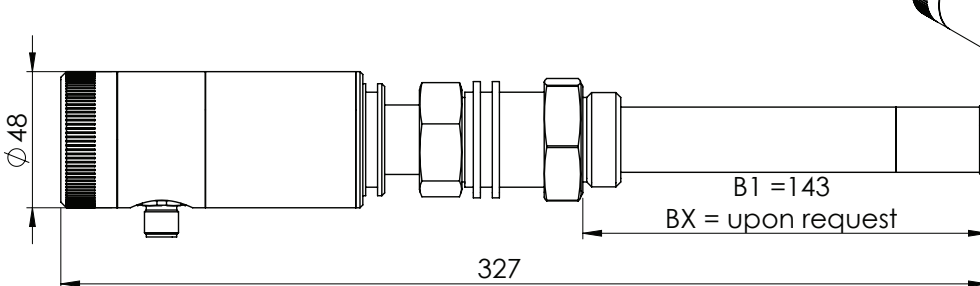
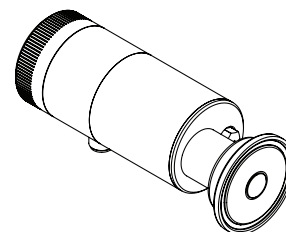
SATRON VO Turbidity and solids content sensor



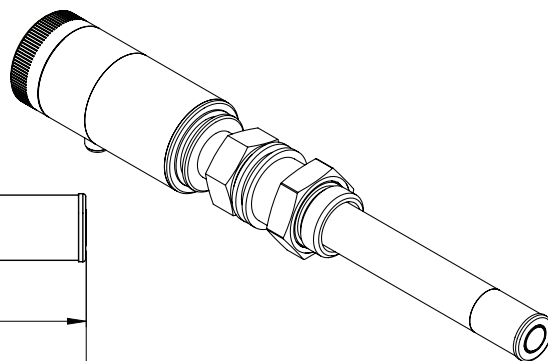
VOM with no display (H) and G1 process connection



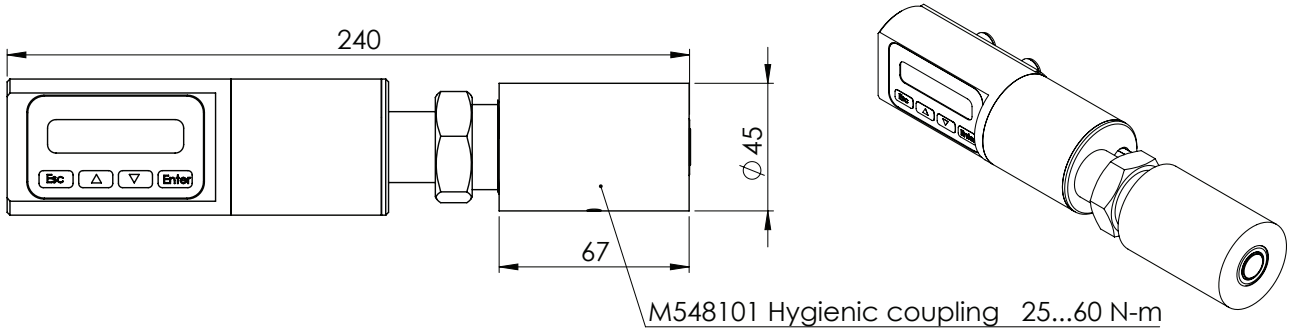
VOM with no display (H) and TA, TB and TN clamp connection



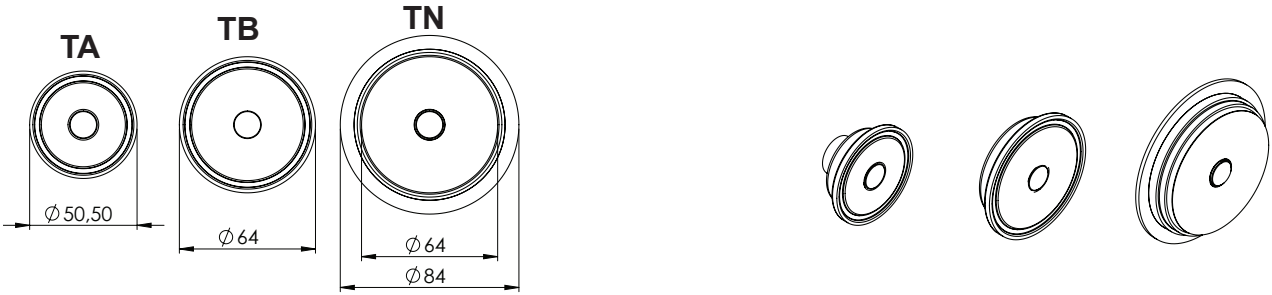
VOM with no display (H) and B1 / BX retractable ball valve insertion process



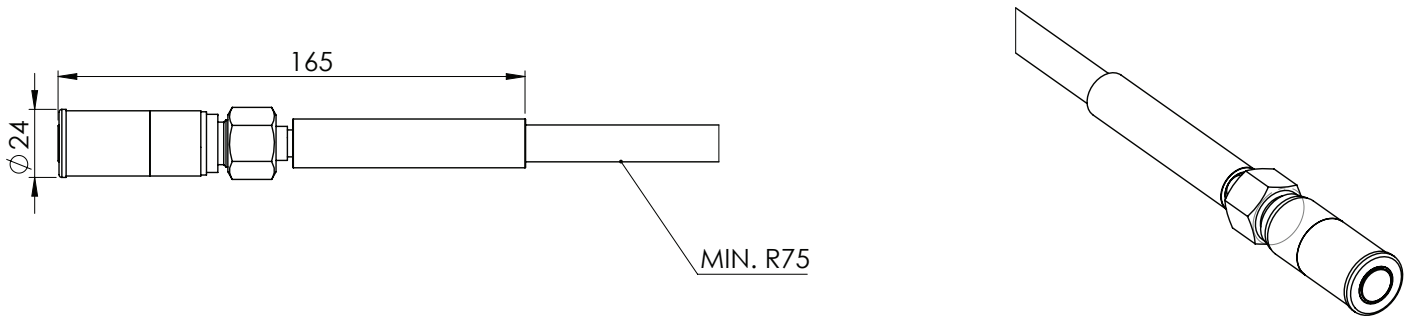
Process connection details



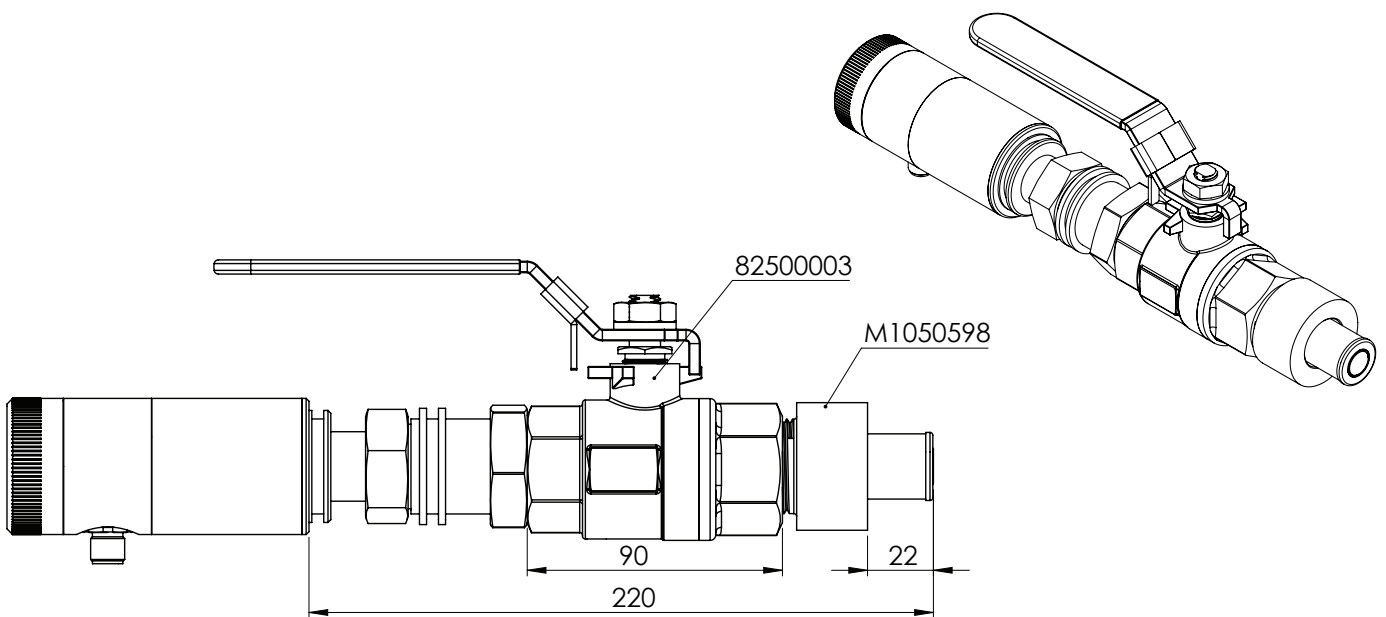
VOM G1 connected to M548101 hygienic coupling. (Flush mounted) EHEDG, 3A



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

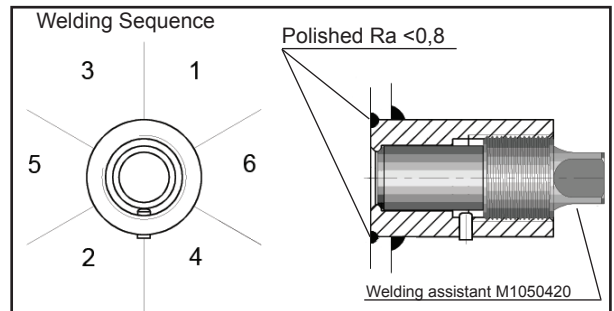
Instructions and spare parts that are according and within the 3-A appliance



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.

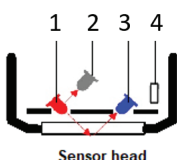
Do not use sealing tape etc. on threaded connection!

VOM measurement principle:

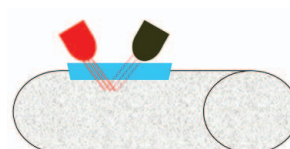
Backcattering with selectable wavelenth lightsource LED (see selection chart)

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).

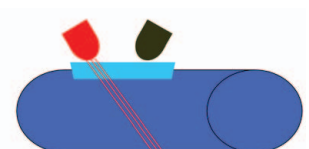
The lifetime for the optical LED and photodetectors is 20 years minimum.



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

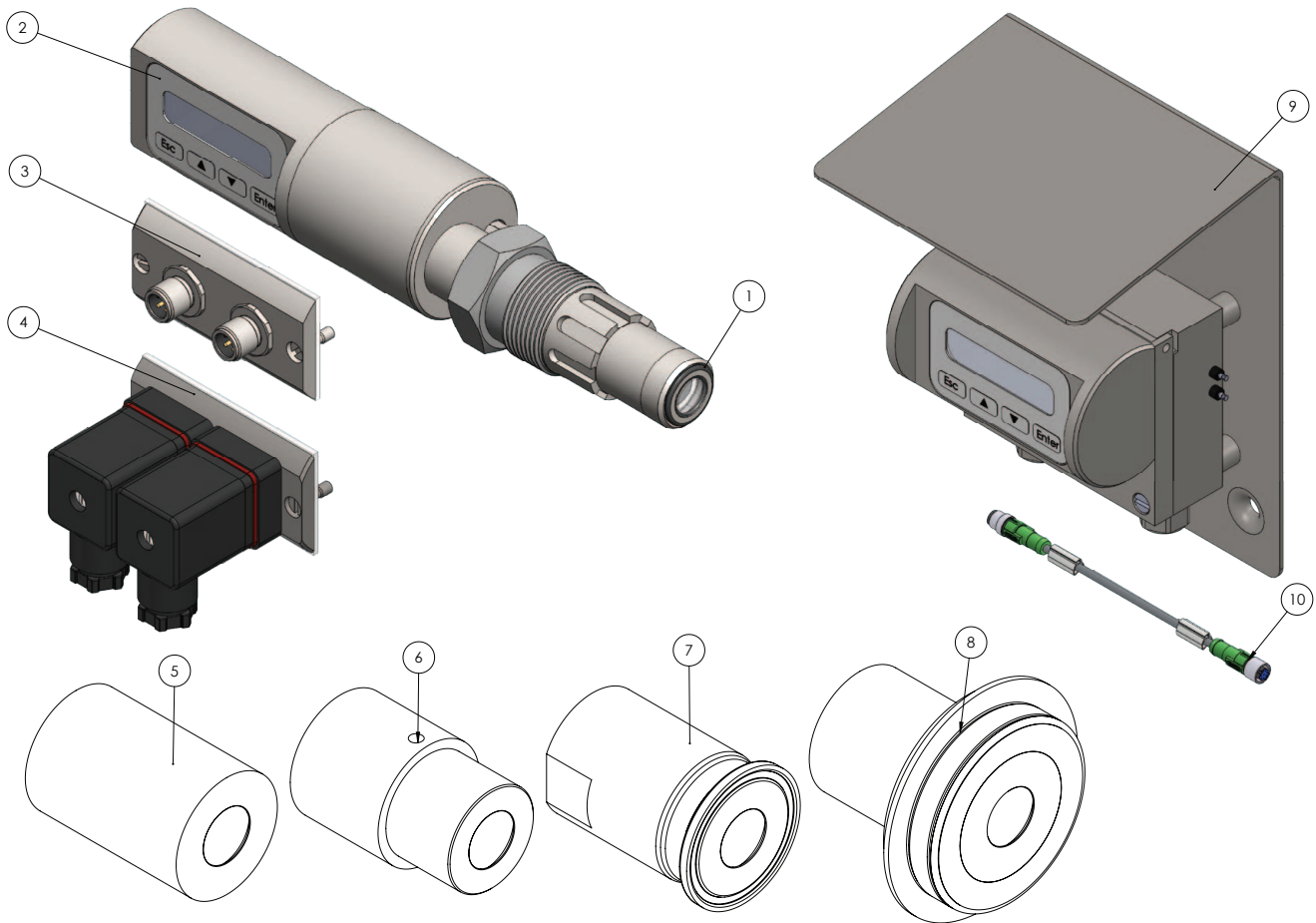


Milk = 100% = 20mA



Water = 0% = 4.0mA

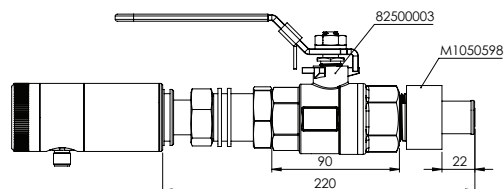
Spare-parts VOM G1



| 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 | 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 | Tuchenhagen / Varivent DN25 | M1050090 |
| 8 | Tuchenhagen / Varivent DN50 | M1050091 |
| 8 | Tuchenhagen / Varivent DN65,5 | M1050092 |
| 9 | Remote Display Unit RDU | T13250016 |
| 10 | L-Housing data cable 10m PVC | 70000450 |
| 10 | L-Housing data cable 15m PUR | 70000440 |
| | 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

Selection Chart

| | | | | |
|-----------------------------------|---|--|---|-----------------|
| Adjustability VOM | Span, min 0...1000 NTU | Span, max 0...300 000 NTU | | |
| Process temperature limits | N Normal version -5...+100 °C (120 °C for 10 minutes) | H(**) High temperature -5...+140 °C (160 °C 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 | Lens | Seal | 3A 18-03 |
| | 2 AISI316L | 2 Sapphire | 1(***) EPDM | Class II |
| | 3 Hast. C 276 | 4 Spinel | 2 FPM (Viton®) | Class I |
| | 6 Titanium Gr2 | | 3 FPM (Kalrez®) | Class I |
| | 8 Duplex (EN 1.4462) | | 4 (*) PTFE (Teflon) | |
| | 9 Peek | | | |
| Housing type | N Housing with display and pushbuttons | H Housing with, no display, (only one mA output) | | |
| | L Remote electronics housing with display | | | |
| Probe type | 0 No remote probe | R Remote measuring probe (not available with L housing), IP68 | | |
| Connection type | S DIN43650 with PG9, IP66 | T M12, IP67 | | |
| | | V PG9 (always with L housing), IP66 | | |
| Cable Material | 0 No VOD, L or R selected | 1 PUR cable. | | |
| | 2(*) AISI316L braided PTFE hose. | 3 Steel reinforced PUR hose. | | |
| | 4 PVC cable (std.) | | | |
| Cable length | 0 No VOD or L, R option selected | 1 5 M. | 3 15 M. (PUR std.) | 5 25 M. |
| | | 2 10 M. (PVC std.) | 4 20 M. | ... |
| Light source | 6 640nm | 8 950nm | 9 IR+ *others available on request | |
| | 7 880nm | | | |
| Process connections | G1 Standard G1A thread + Oring | | | |
| | TA Tri-Clover 25/38 (ISO 2852) | | | |
| | TB Tri-Clover 40/51 (ISO 2852) | | | |
| | TN Tuchenhagen "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
 ** Only in combination with Quartz, Sapphire lens and Kalrez Seals. And only 880nm
 *** Do not exceed above 8% fat content.



UL 61010-1, 3rd Ed. Rev May 11, 2012
 CAN/CSA C22.2 No. 61010-1-12, Ed. 3
 EMC directive 2004/108/EC
 - EN 61326-1:2005
 1) Parts in contact with process medium compliant to FDA

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