



SATRON®

LUMINA™ VOM Turbidity Optical Sensor

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#LookCloser

The **Satron VOM** optical sensor works according the backscattering principle with the use of LED technology. The Hygienic approved sensor receives the scattered light back from the process media. This makes the Satron VO ideal for measuring white liquid applications in the dairy industry. For example, measuring during the start and the end of CIP cycles will give real-time information on the amount of milk and water currently in the process. This will prevent wasting valuable amounts of water, milk, time, chemicals, and of course energy. All with the use of one sensor. Additionally, the VOM sensor is ideal for transition monitoring, heat exchanger contamination control and dairy wastewater applications.



TECHNICAL SPECIFICATIONS

Measuring range
0 ... 300 000NTU equivalent

EMC directive 2014/30/EC
– EN 61326-1: 2021

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

Calibration
The sensor is factory calibrated at 4mA = water, 20mA = 2% fat cow milk, freely adjustable with pushbuttons or Hart® modem.

CONSTRUCTION
Materials:
Sensing element¹⁾: AISI316L, PEEK, Duplex (EN. 1.4462), Hast. C276/C22, or Titanium Gr2.
Surface quality: Polished Ra <0.8µm
Lens: Sapphire or Spinel ceramic
Seal: EPDM, FPM, FFPM, FEP

Switch inputs
Housing **N**: 1 input
Housing **L**: 3 inputs
NC (no connection) OFF
0...2 V ON

Damping
Time constant adjustable 0.01 to 60 s.

Repeatability
0.1% from maximum span.

Housing with display, code N, B
Housing: AISI303/316
Seals: Nitrile rubber and FPM
Nameplates: Polyester
Display window: Polycarbonate

Minimum values for switch in use
Voltage 16 V
Current 4 mA
Leakage current 1 mA

Response time
0.1s (with less than 0.1s damping)

Current output²
External power supply
Current output 2 is galvanically isolated

Accuracy
0...1 000 NTU ± 0.25% ±50 NTU
1 000...10 000 NTU ± 1%
10 000...300 000 NTU ± 5%

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

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

Unit selection
%, NTU, FNU, FTU, mg/L, g/dm³, PPM, or custom text

Connection hose between sensing element and housing (RDU) code L
PVC signal cable or hose protected with PTFE/AISI316 braiding
Nameplates: Polyester
Display window: Polycarbonate

Process connections
With G1 connecting thread

Temperature limits
Ambient: -30 to +80 °C (-22 ...176°F)
Process **N** type: -5 to +100 °C (23 ...212 °F) (120 °C for 10 min) (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
Display operating range: 0 to +50 °C (Does not affect operation of the sensor)

Electrical connections
Housing code **H, B**
1x M12 plug connector
Housing with display, code **N**
2x M12 plug connector
Remote electronics housing with display code **L**
PG9 gland for cable;
Conductor cross section: max 2.5 mm²

Protection class
IP66, IP67 and IP68
See Selection chart.

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

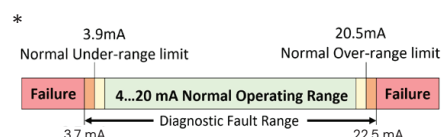
Weight
Housing without display (**H**): 0.9 kg
Housing with display (**B**): 1.3 kg
Housing with display (**N**): 1.3 kg
Remote housing (**L**): 2.5 kg

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

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*

Output signal according to NAMUR NEO43 Signal Level for the failure information of Digital Transmitters. Min. load using HART® communication 250 Ω

Humidity limits
0-100% RH

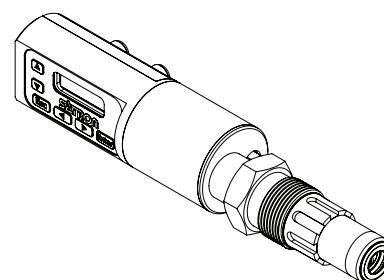
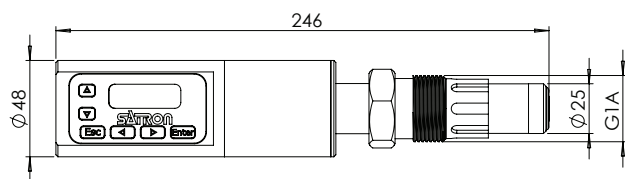


Pressure class
PN25

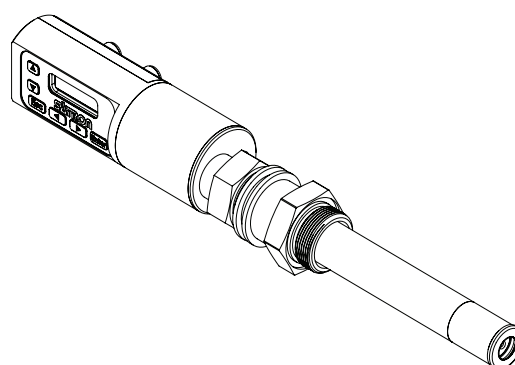
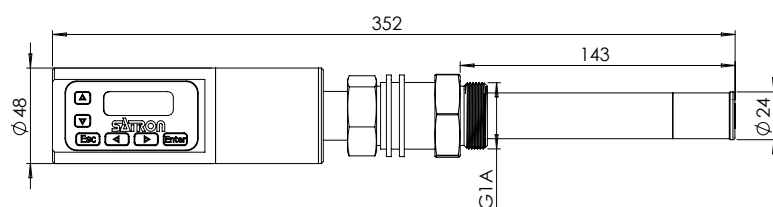
Switch outputs
Housing **N**: 1 output
Housing **L**: 3 outputs
Solid state relay, grounding contact

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

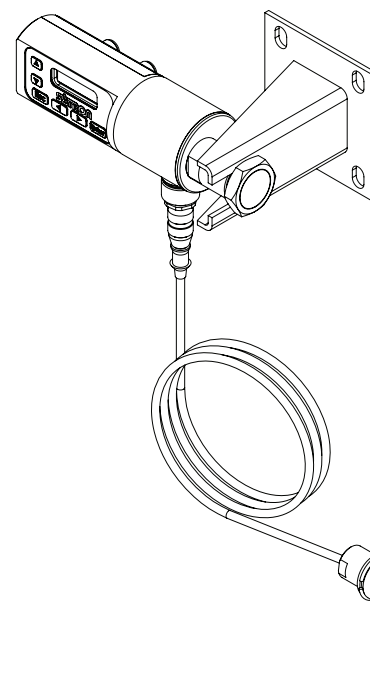
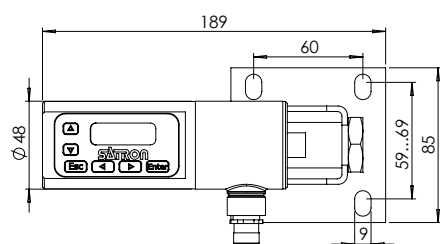
Dimensions and housing types VOM (mm)



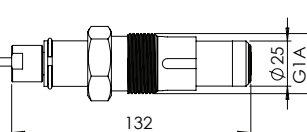
VOM with display (N) and G1 process connection



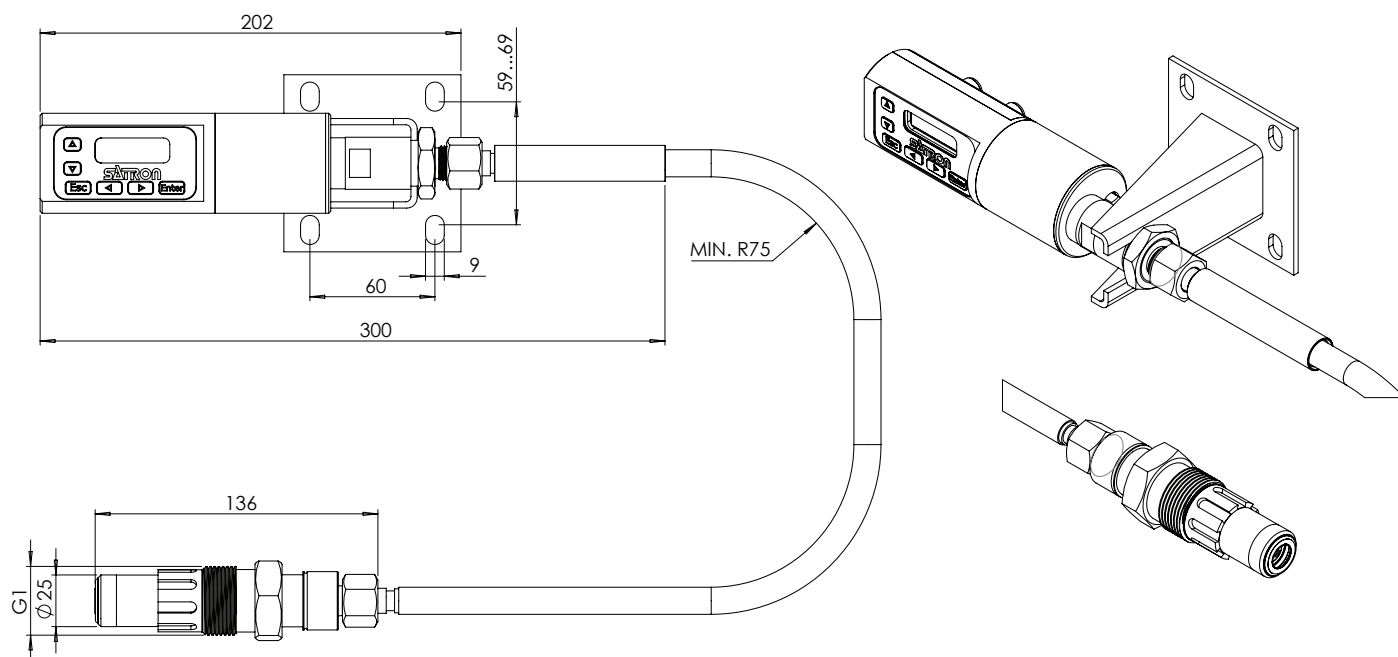
VOM with display (N) and B1 / BX ball valve insertion process connection



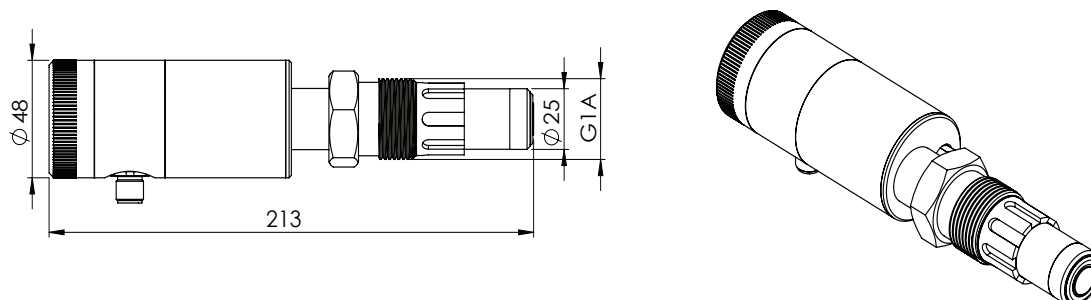
10m PVC cable (std.), R>50



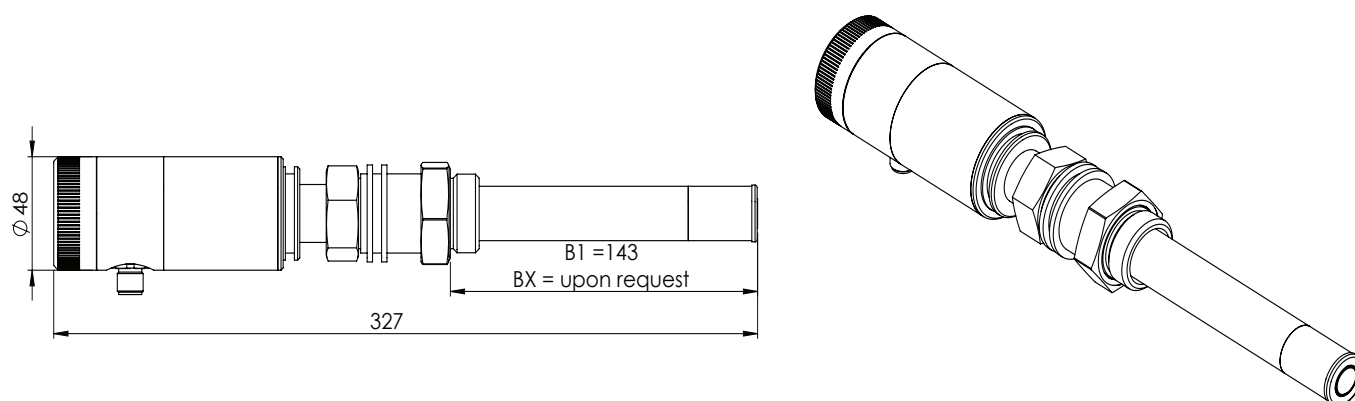
VOM with remote measuring probe and PVC M12 cable (NRT4)



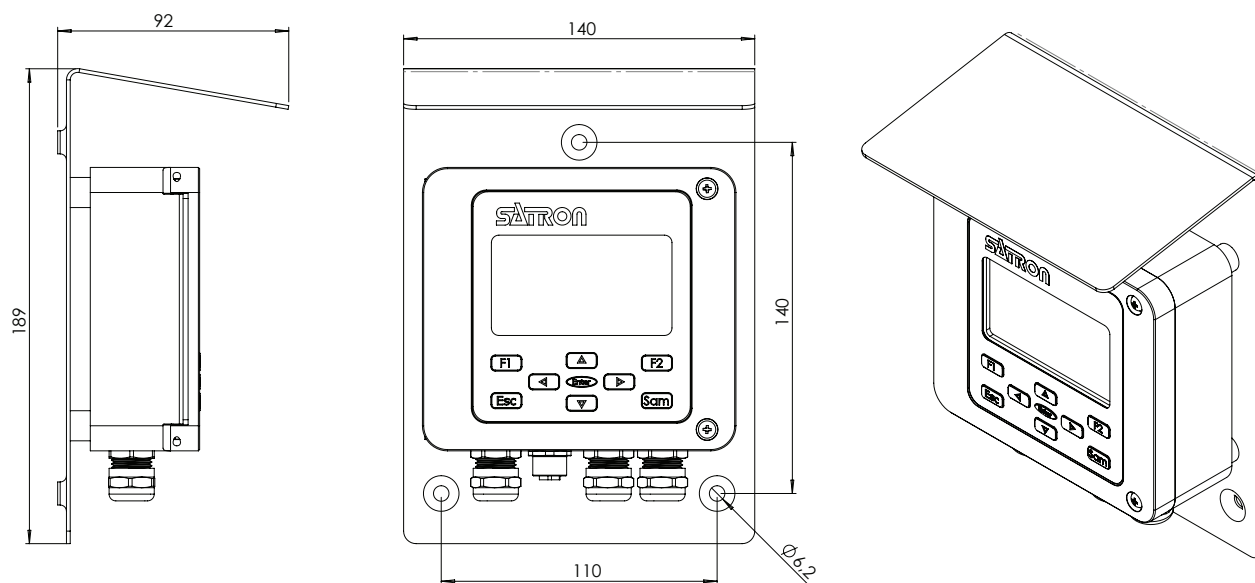
VOM with remote measuring probe and AISI hose (NRT2)



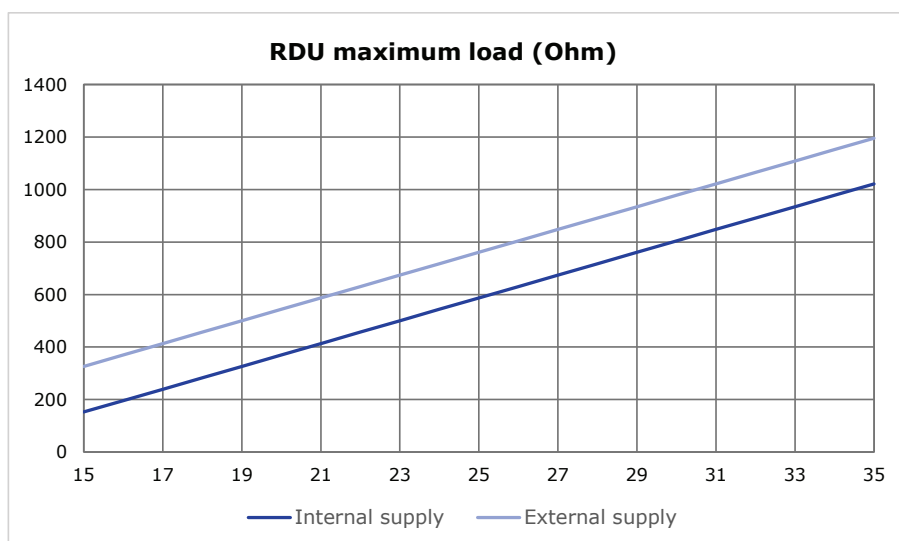
VOM without display (H) and G1 process connection



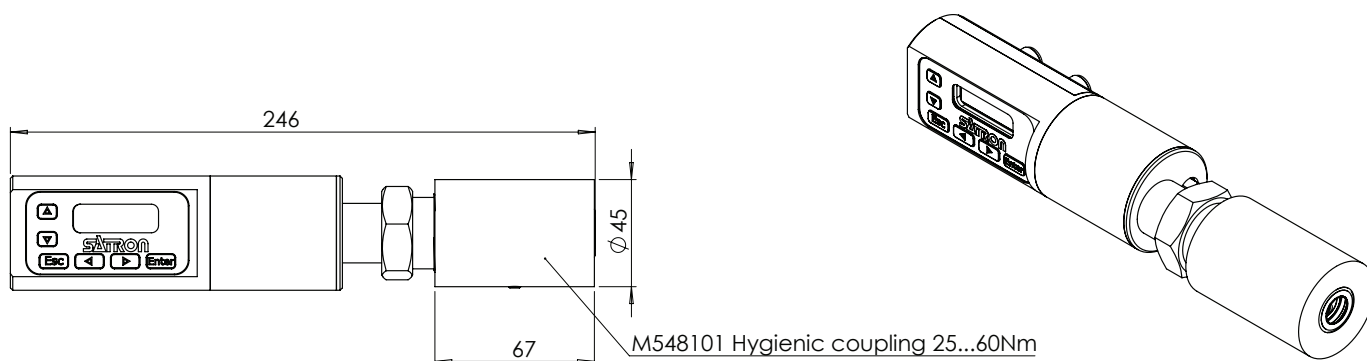
VOM without display (H) and B1 / BX retractable ball valve insertion process



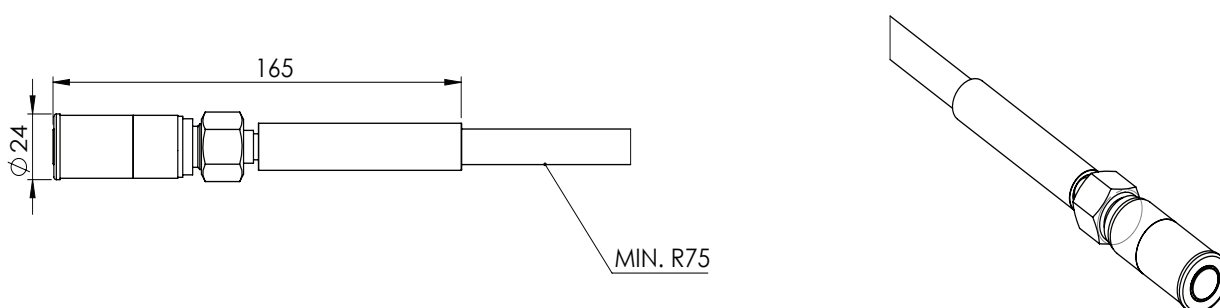
RDU – Remote Display Unit (L) T1370009



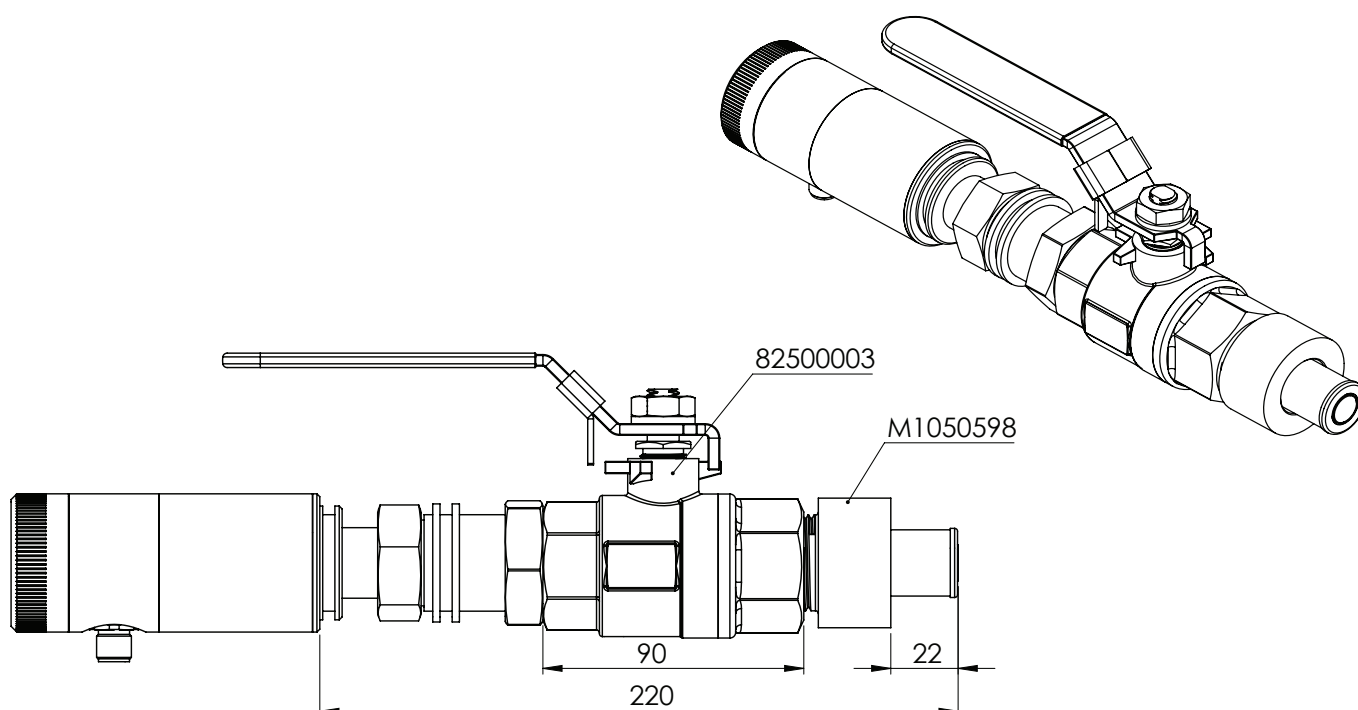
Process connection details



VOM G1 connected to M548101 3A hygienic coupling (flush mounted).



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



VOM B1 connected to ball valve 82500003 and M1050598 coupling

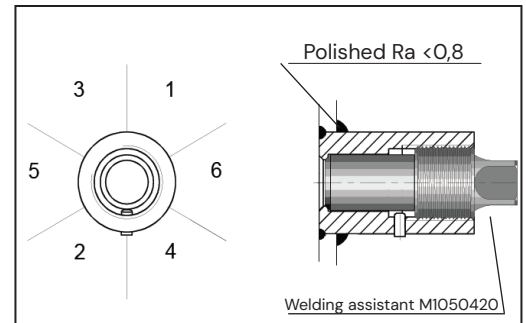
Instructions and spare parts that are according and within the 3-A appliance



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. 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 sensor must be **out of the coupling** while the coupling is welded. You can use the shut-off plug to shut the coupling. The plug protects the coupling's sealing face and permits the starting of the process without the sensor.
- It is always recommendable to use the welding assistant (M1050420) while welding the coupling to prevent any distortions due to heat.
- Do not make weld grounding via any sensor's body!



Mounting the sensor on the coupling

Procedure

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

When inserting the sensor, 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 sensor 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.

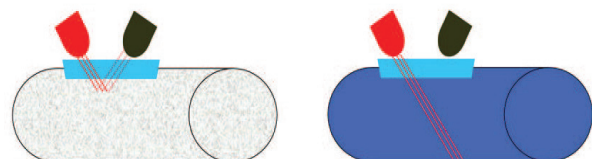
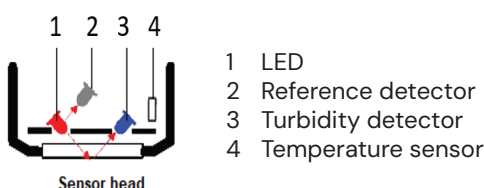
Do not use sealing tape etc. on threaded connection!

VOM measurement principle:

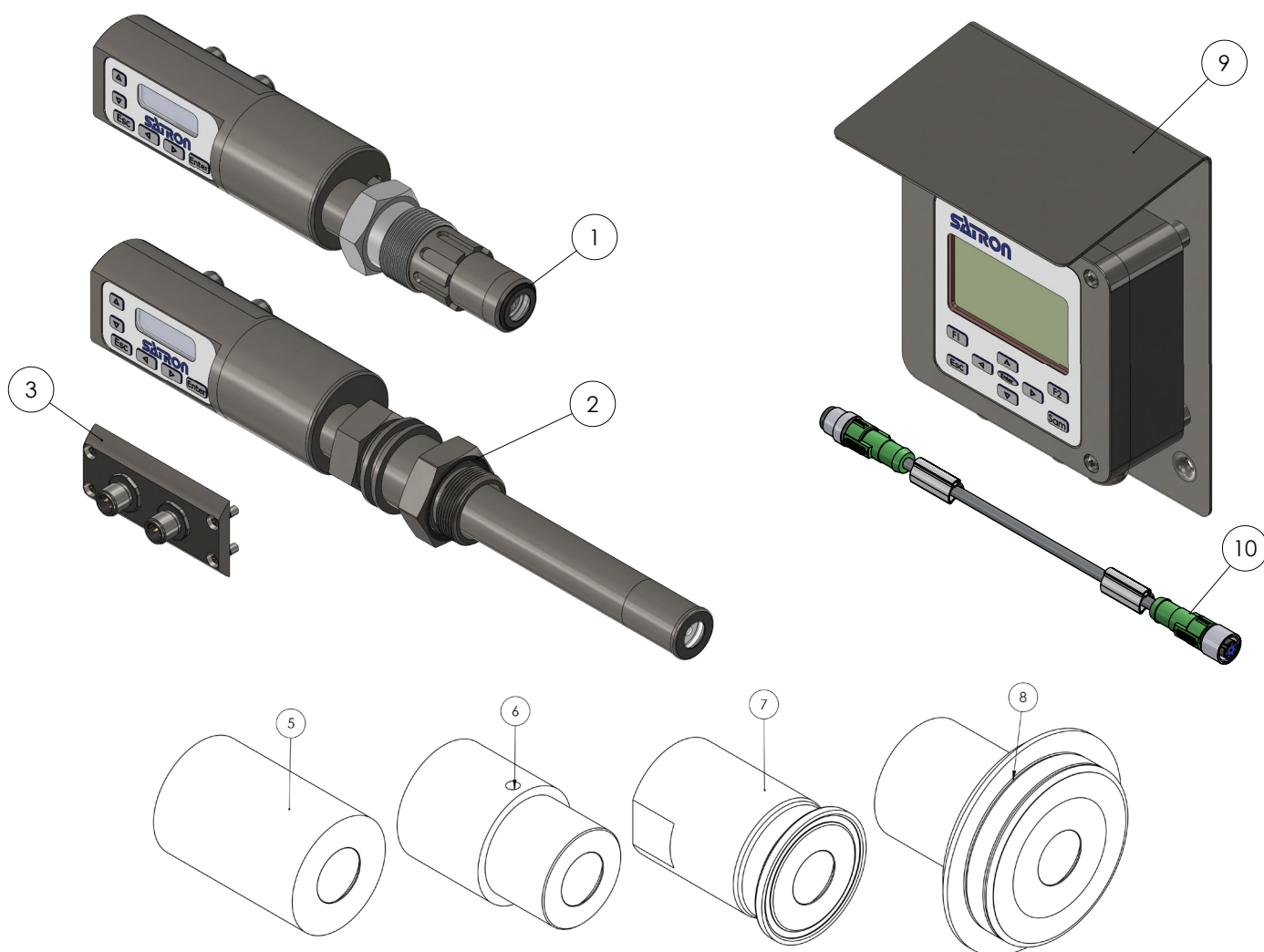
Backscattering with selectable wavelength light source LED (see selection chart)

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 photo-detectors is 20 years minimum.



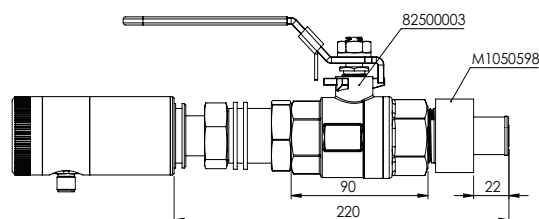
Spare Parts VOM



No.	Part name	Order code
1	O-ring EPDM	80031721
1	O-ring FPM	80011721
1	O-ring FFPM	800417020
2	O-ring EPDM	80033426
2	O-ring FFPM	800434626
3	Plug cover M12*	T1370011
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*	T1370009
10	L-Housing data cable 10m PVC*	70000600
10	L-Housing data cable 15m PVC*	70000601
	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



Ball valve 82500003
Straight G1 coupling for ball valve M1050598
15° G1 coupling for ball valve M1050597

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

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) H¹⁾ High temperature -5...+140 °C (23 ...284°F) (160 °C (320°F) for 30 minutes)		
Output S 4-20mA DC/HART® for 50Hz (Europe) T²⁾ 4-20mA DC/HART® + IO-Link for 50Hz J 4-20mA DC/HART® for 60Hz (USA / Japan) K²⁾ 4-20mA DC/HART® + IO-Link for 60Hz		
Material of wetted parts	Body 2 AISI316L 3 Hastelloy® C276 6 Titanium Gr2 8 Duplex (EN 1.4462)	Lens 2 Sapphire 4 Spinel
	Seal FEP + 1³⁾ EPDM 2 FPM 3 FFPM	3A 18-03 Class II Class I Class I
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 O 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 option selected 2⁴⁾ AISI316L braided PTFE hose 4 PVC cable (std.) Extension 10m PVC cable available (code: 70000600)		
Cable length 0 No L or R option selected 2 10 meters (std.) 3 15 meters		
Light source 6 640nm 7 880nm		
Process connections G1 Standard G1A thread + O-ring H1⁴⁾ Fixed mounting tube (see H1 picture) HX⁴⁾ Fixed mounting tube (specify) B1⁴⁾ G1A ball valve insertion. Special extension length. BX⁴⁾ G1A ball valve insertion. Extension on request.		

Example code

VOM N S 221 N O T O O 6 G1

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
- ⁴⁾ Not within 3A approval

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 CAN/CSA C22.2 No. 61010-1-12, Ed. 3
 EMC directive 2014/30/EC
 - EN 61326-1: 2021



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