SATRON®

LUMINA™ VOA

Dual wavelength turbidity and solids content sensor

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#LookCloser

SATRON VOA Dual wavelength turbidity and solids content sensor

The SATRON VOA dual wavelenght turbidity and solids content sensor is ideal for the food and beverage industry, particularly dairy applications.
Its precise measurements of turbidity and solids content optimize water consumption, streamline cleaning processes, and ensure consistent product quality, for e.g. monitoring filling machines, phase transitions, and ice cream quality. The sensor's IO-Link compatibility and 4-20 mA signal enables seamless integration with existing control systems.

TECHNICAL SPECIFICATIONS

Measuring range
0 ... 300 000NTU equivalent

Calibration
The sensor is factory calibrated at 4mA = water, 20mA = 35% fat cream, 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
1 000....10 000 NTU	± 1%
10 000...300 000 NTU	± 5%

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

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)
Process **H** type: -5 to +140 °C 23...284 °F (160 °C for 30 min)
Shipping & storage: -40 to +80 °C
Display operating range: 0 to +50 °C (Does not affect operation of the sensor)

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

Supply voltage
Nominal 24 VDC, (21.6 - 27.6V) 250mA

Humidity limits
0-100% RH

Pressure class
PN25

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

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
Seal: EPDM, FPM, FFPM, FEP

Housing with display, code **N, B**
Housing: AISI303/316
Seals: Nitrilerubber and Viton®
Nameplates: Polyester
Display window: Polycarbonate

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

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

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

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
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
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
With G1 connecting thread

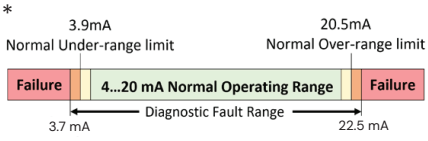
Protection class:
IP66, IP67 and IP68
See Selection chart.

Weight with G1 process connection

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

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.

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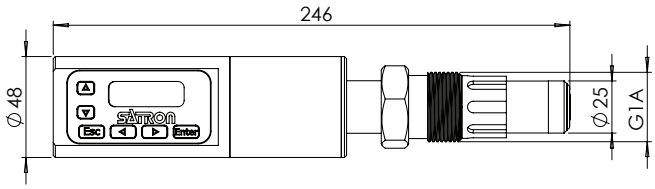
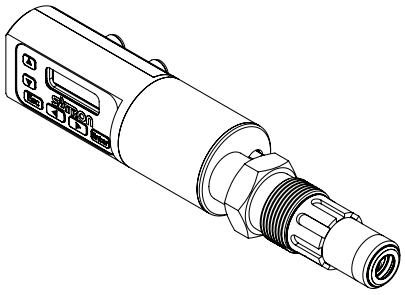
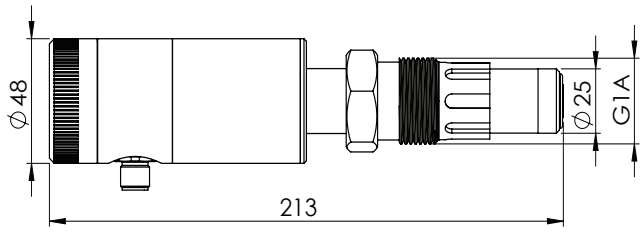
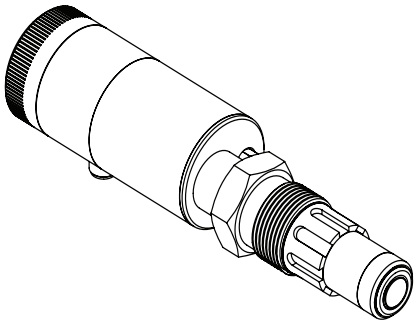
Dimensions and housing types VOA (mm)



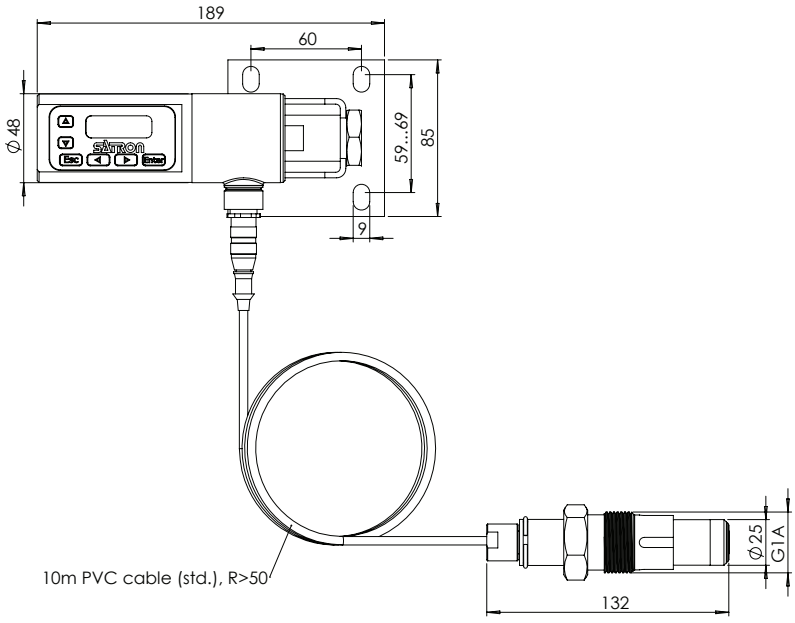


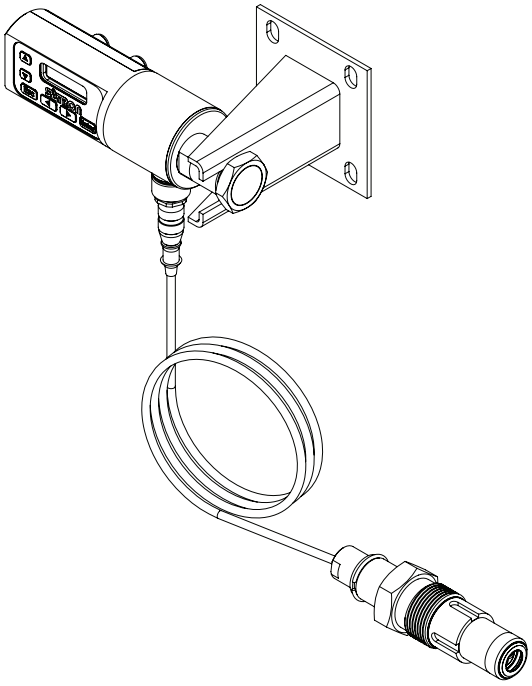
VOA with display (N) and G1 process connection



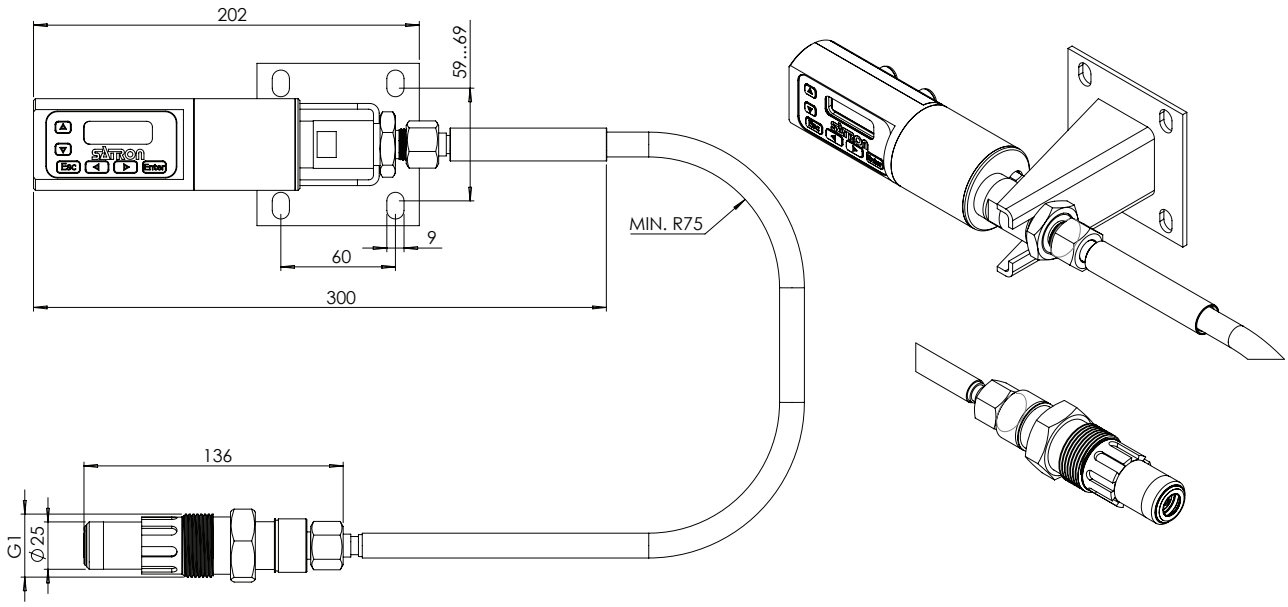


VOA without display (H) and G1 process connection



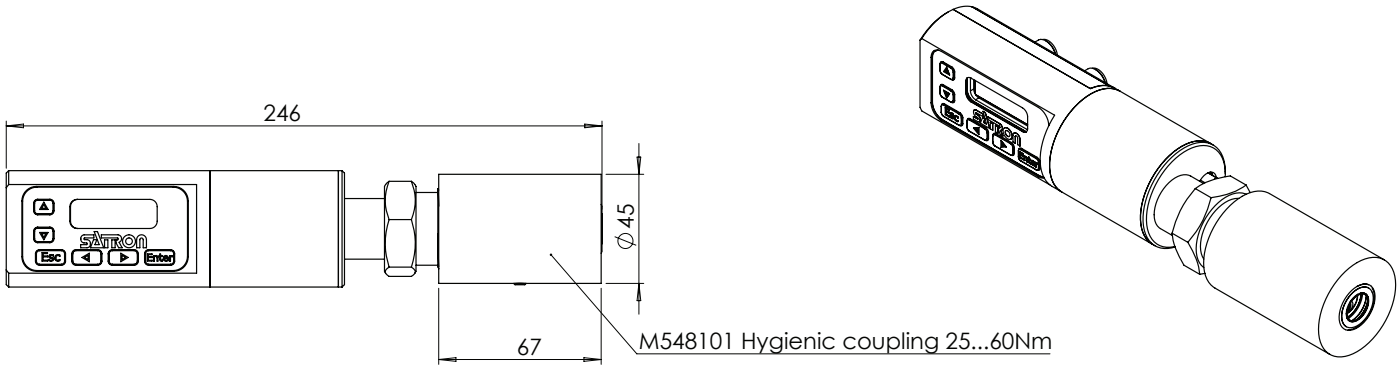


VOA with remote measuring probe and PVC M12 cable (NRT4)

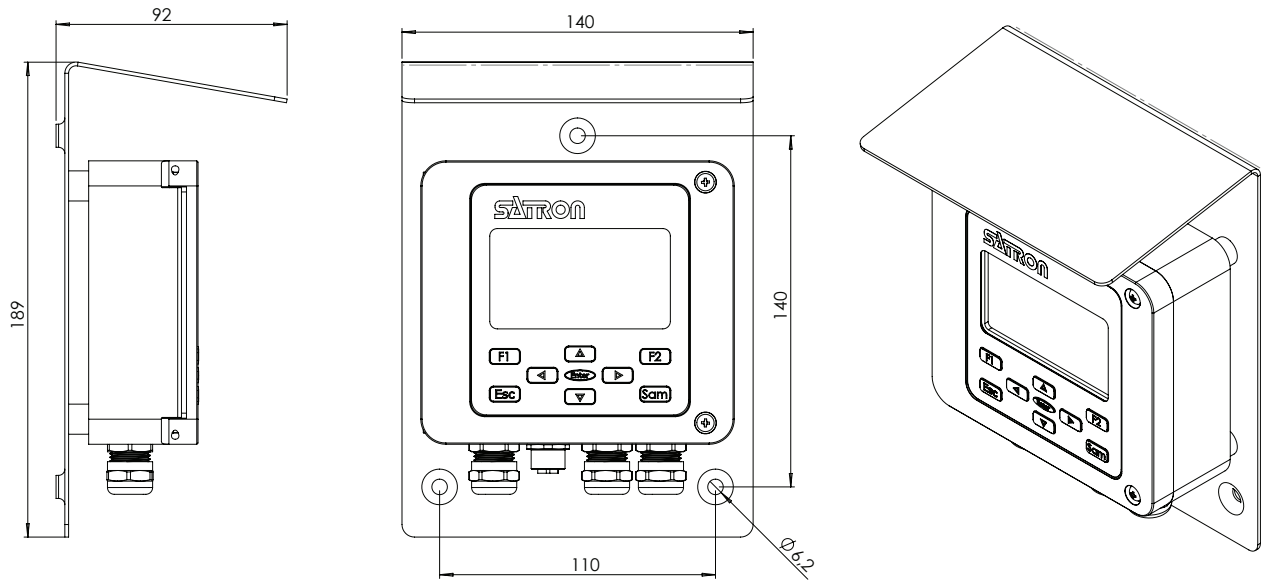


VOA with remote measuring probe and AISI hose (NRT2)

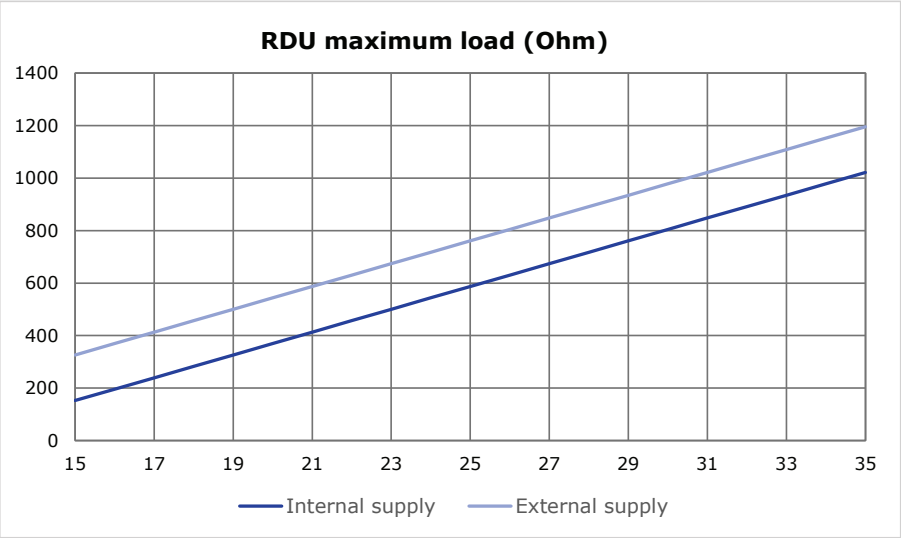
Process connection details



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



RDU – Remote Display Unit (L) T1370009



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

46 - 04

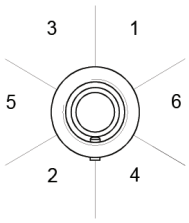
Welding the coupling

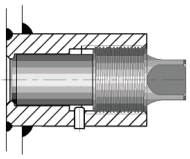
These instructions apply to hygienic welded couplings; welding the G1
standard coupling is described here as an example.

- 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.

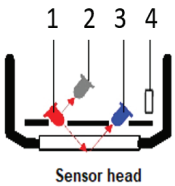
When inserting the sensor, be careful not to damage the edge of the lens on the edges of the coupling or on the end of the stop pin!

- 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.

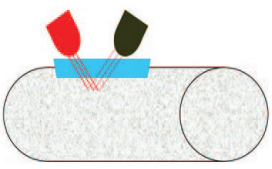
Do not use sealing tape etc. on threaded connection!

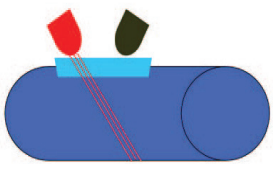
VOA measurement principle:

Backscattering with RED and Infrared wavelenght light source LED´s.
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. Illustration below shows only the principle for 1 light source. The sensor has 2 LED´s and 4 detectors in total.



1 LED
2 Reference detector
3 Turbidity detector
4 Temperature sensor





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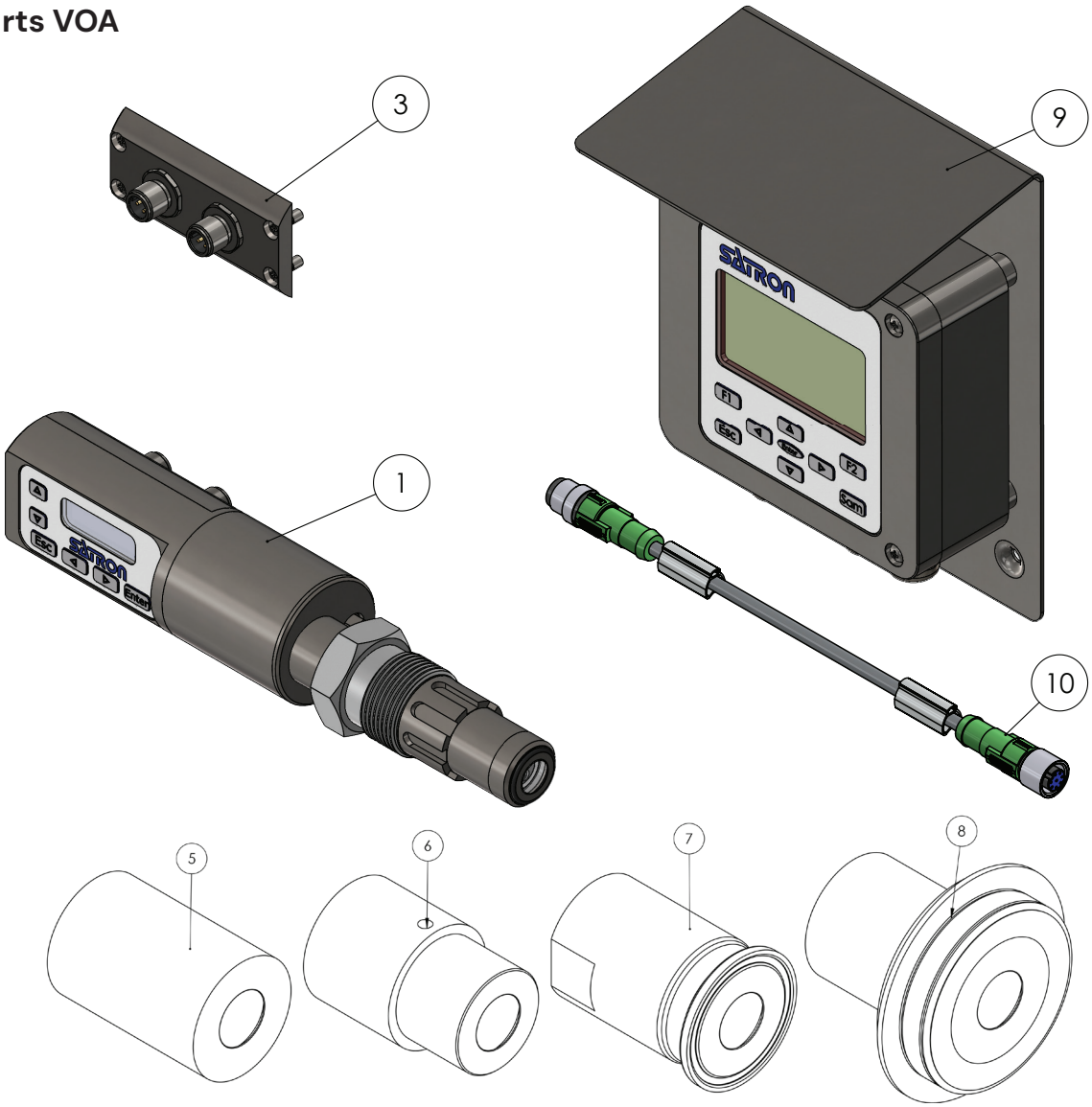
Spare Parts VOA



No.	Part name	Order code	Note
1	O-ring EPDM	80031721	3A 18-03 Class II (Do not exceed above 8% fat content)
1	O-ring FPM	80011721	3A 18-03 Class I
1	O-ring FFPM	800417020	3A 18-03 Class I
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	

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

SATRON VOA Dual wavelength turbidity and solids content sensor

SELECTION CHART

Adjustability	Span, min	Span, max
VOA	0...1000NTU	0...300 000 NTU

Process temperature limits

N	Normal version -5...+100 °C (23 ...212°F) (120 °C (248°F) for 10 minutes)
H[1]	High temperature -5...+140 °C (23 ...284°F) (160 °C (320°F) for 30 minutes)

Output

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

N	Housing with display and pushbuttons, 2mA outputs, binary in/output
H	Housing without 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 option selected
2[4]	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

Lightsource

1	RED & IR

Process connections

G1	Standard G1A thread + Oring

Example code

VOA	N	5	222	N	0	T	0	0	1	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**

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

46-04 800029 EC 1935/2004

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