



SATRON®

LUMINA™ VOA PRIME

Dual wavelength
optical sensor

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#LookCloser

SATRON VOA PRIME Dual wavelength optical sensor

BA201

M3 rev 1.3

13.10.2025

The **SATRON VOA PRIME** dual wavelength optical sensor is ideal for the food and beverage industry, particularly dairy applications. It measures both the process value (FU) and its rate of change (FU/s). This enables: **early detection of phase transitions**—even before process values shift; **differentiation of similar products** with minimal FU differences; monitoring of reaction kinetics and process stability; reliable operation even if the process value is out of calibration range. 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

Process calibration should be made from process sample. The sensor is factory calibrated at 4mA = water, 20mA = white ceramic that corresponds to 35% fat milk 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 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

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

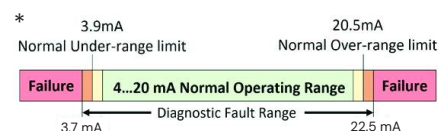
Output signal according to NAMUR

NEO43 Signal Level for the failure

information of Digital Transmitters.

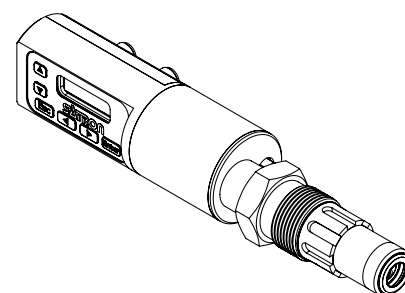
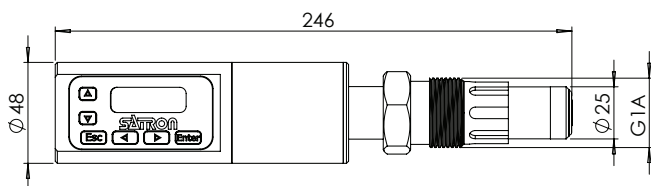
Min. load using HART®-communication

250 Ω

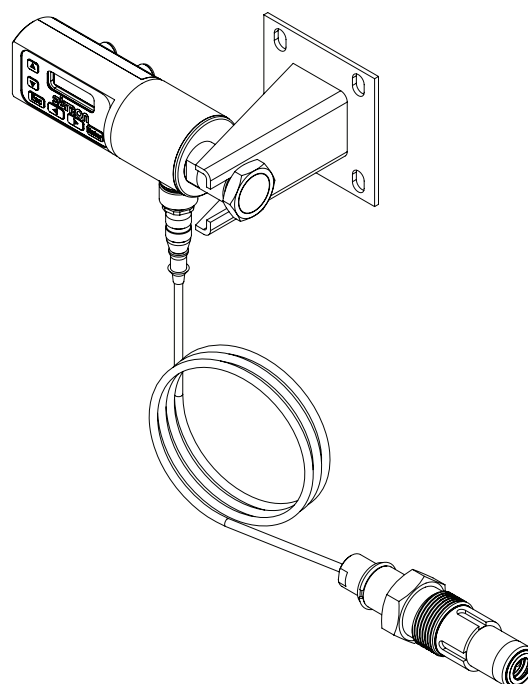
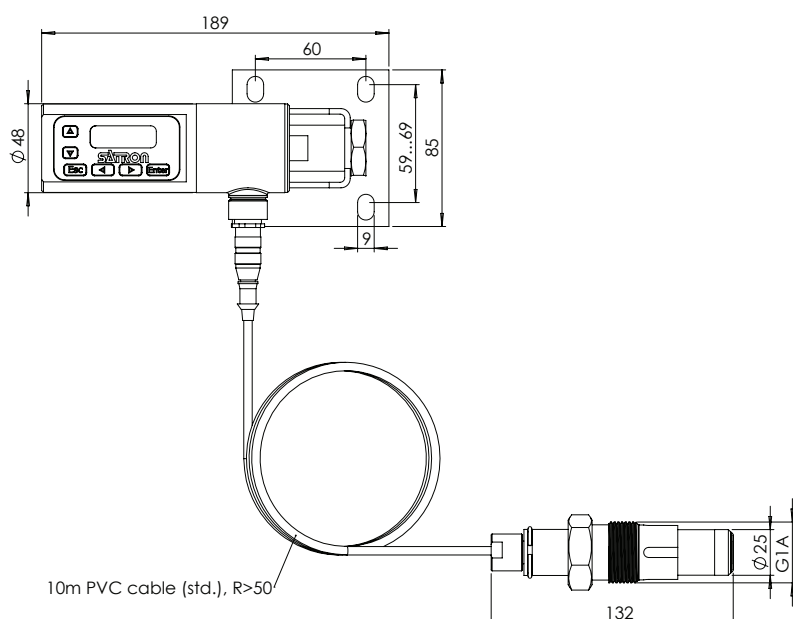


¹⁾ Parts in contact with the process medium are FDA compliant.

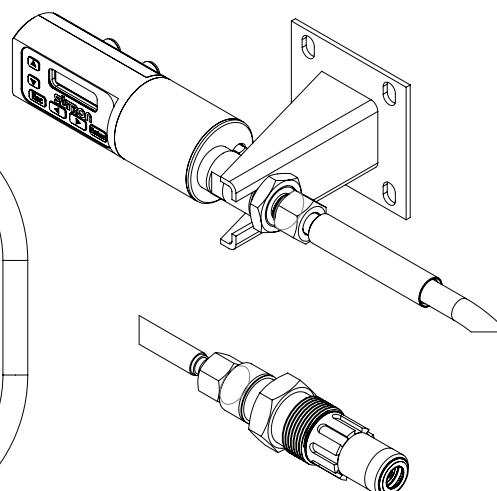
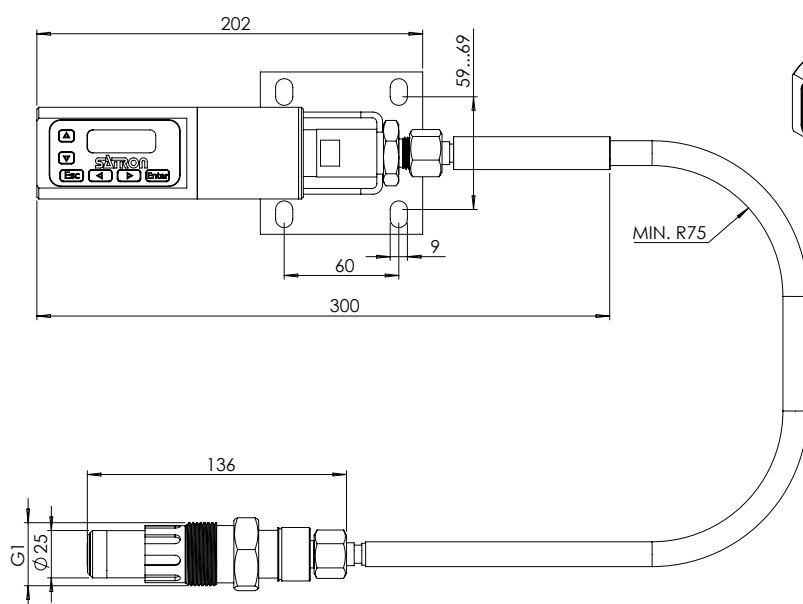
Dimensions and housing types VOA (mm)



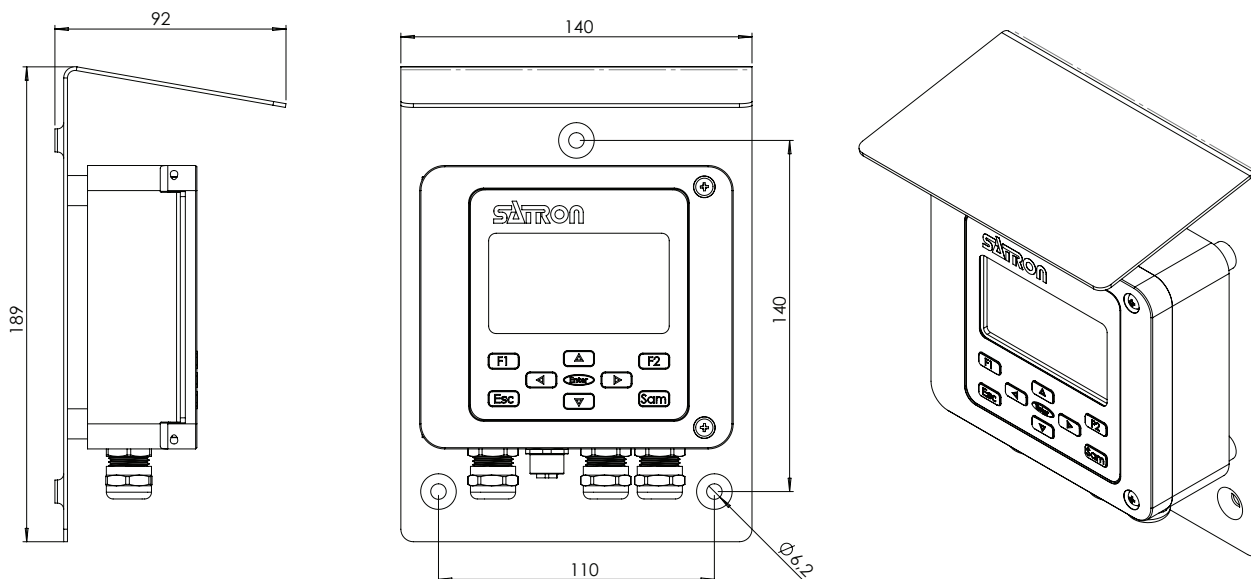
VOA with display (N) and G1 process connection



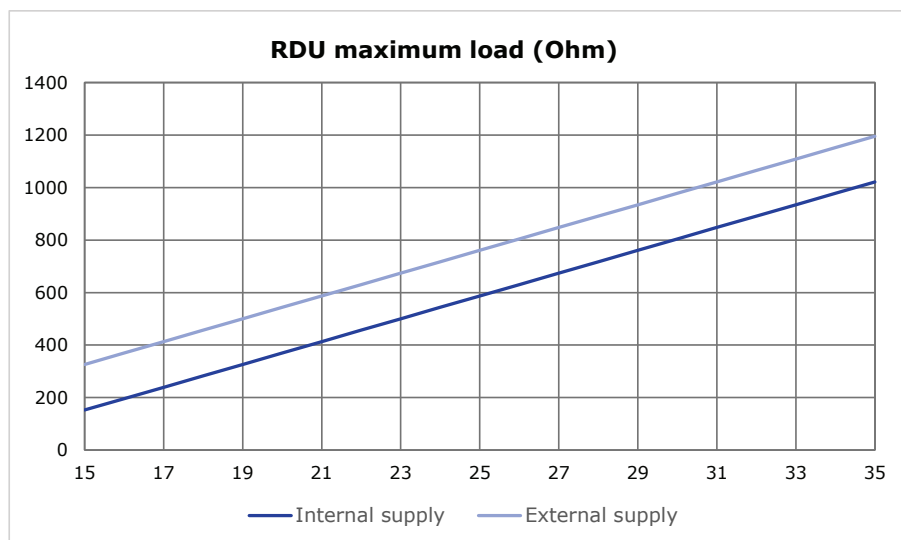
VOA with remote measuring probe and PVC M12 cable (NRT4)



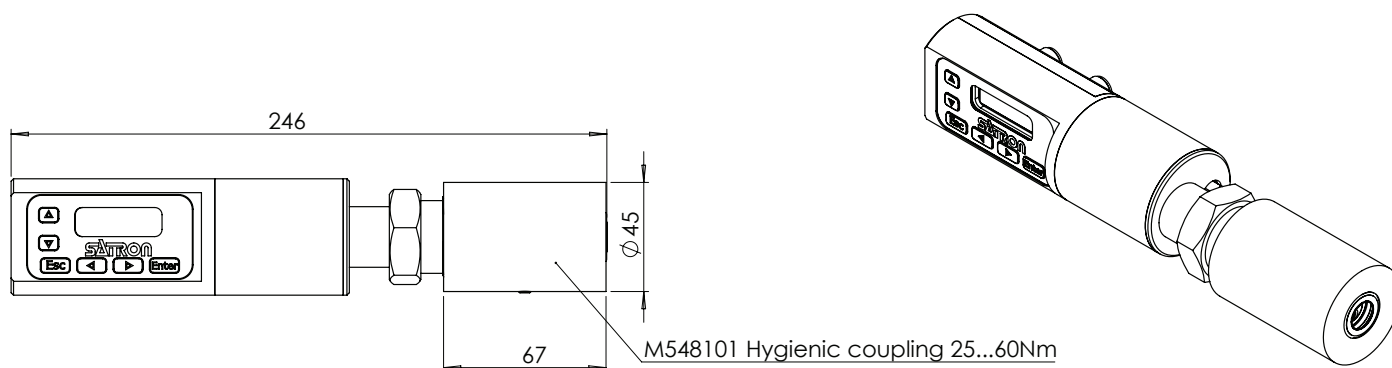
VOA with remote measuring probe and AISI hose (NRT2)



RDU - Remote Display Unit (L) T1370009

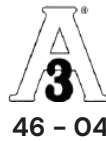


Process connection details



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

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.

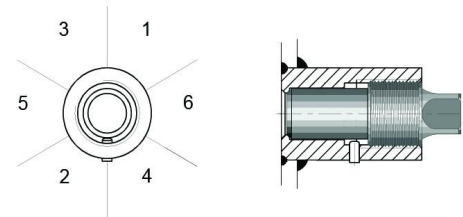
- Place the coupling in the mounting hole. Make sure the leakage detection port is down. Then weld with several runs so to prevent the coupling's oval distortion and tightness problems. The inside welding must be cleaned, and polished with an end result of $R_a < 0,8$

- 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 start-up 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.

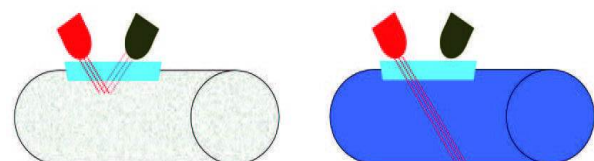
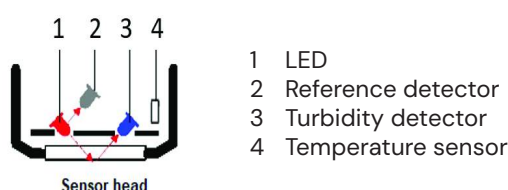
Do not use sealing tape etc. on threaded connection!

VOA measurement principle:

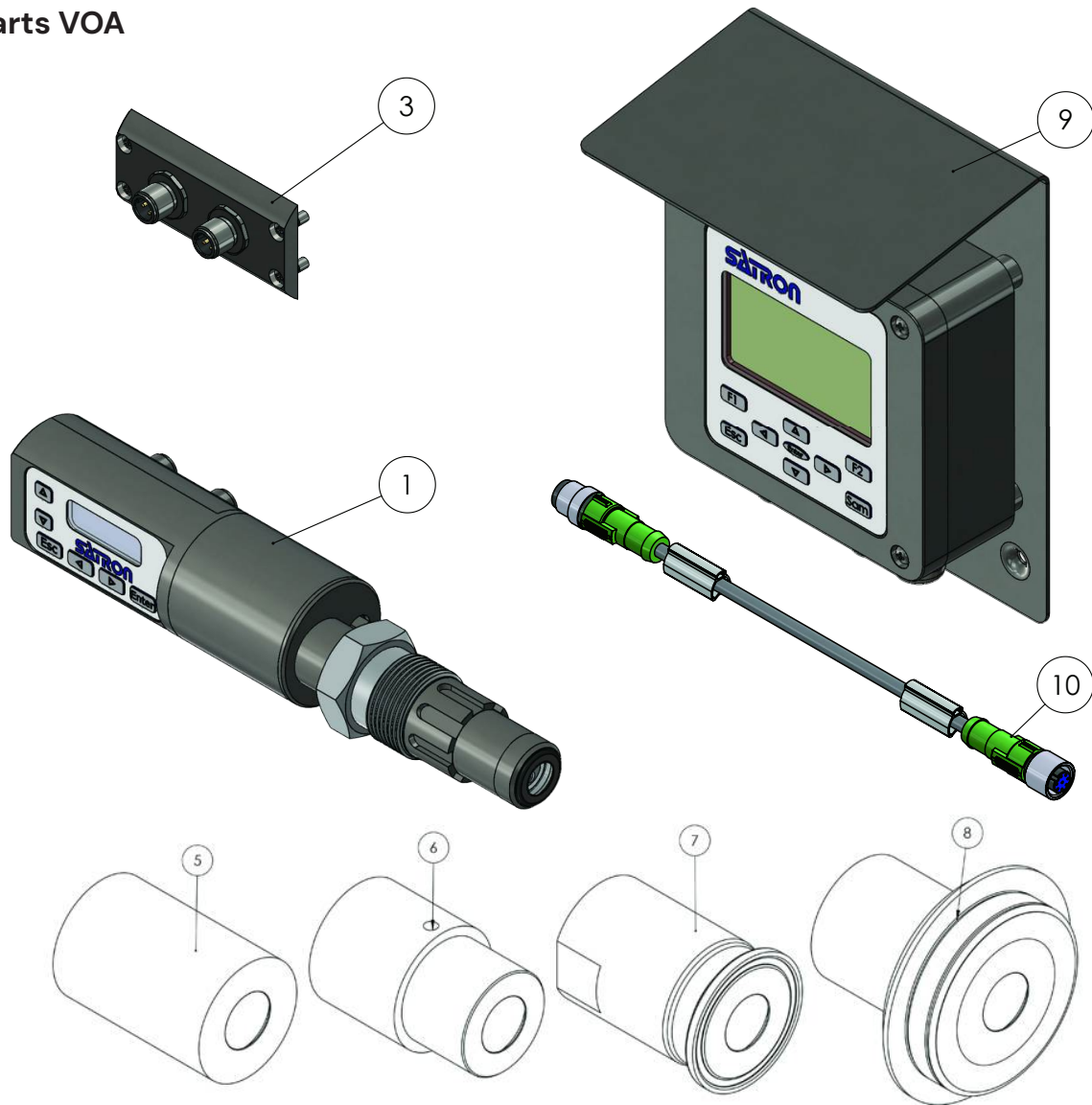
Backscattering with RED and Infrared wavelength light source LED's.

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.



Spare Parts VOA



No.	Part name	Order code
1	O-ring EPDM	80031721
1	O-ring FPM	80011721
1	O-ring FFPM	800417020
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

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

SELECTION CHART

Adjustability VOA	Span, min 0...1000NTU	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 N Housing with display and pushbuttons, 2mA outputs, binary in/output 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		
Lightsource 1 RED & IR		
Process connections G1 Standard G1A thread + Oring		

Example code

VOA N S 222 N O T O O 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

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 Hastelloy® is the registered trademark of Haynes International, Inc.
 PASVE® is the registered trademark of Satron Instruments Inc.
 3-A is a registered mark owned and administered by 3-A SSI.

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



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