SATRON VOA Dual wavelenght Turbidity and solids content sensor

The SATRON VOA Dual wavelenght turbidity and solids content analyzer is suitable for the measurement of different liquids. Savings can be obtained by using SATRON VOA analyzer in process industries, e.g. the use of clean water can be minimized, the time used for the cleaning (CIP) will be shortened, the use of the end product (in dairy applications: milk) and the use of cleaning materials needed in the process can be optimized. The transmitter communicates digitally using the HART® protocol.

TECHNICAL SPECIFICATIONS

Measuring range and span
0...300 000NTU equivalent

Calibration
The transmitter 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)

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
Display operating range: 0 to +50 °C
(Does not affect operation of the transmitter)

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 NAMUR NE43

Supply voltage
Nominal 24 VDC, (21,6 - 27,6V) 250mA

Humidity limits 0-100 % RH

EMC directive 2014/30/EC
- EN 61326-1:2013

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 (-14,5 to 3625,94 PSI)

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"

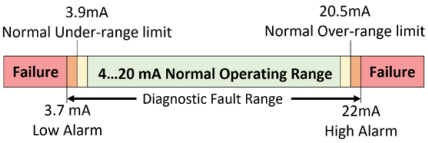
Protection class: IP66, IP67 and IP68
See Selection chart.

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

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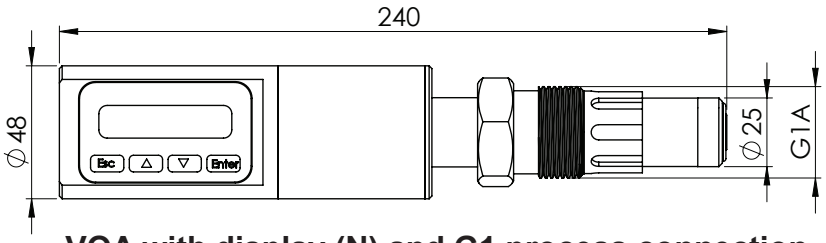
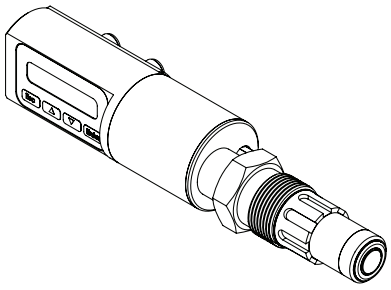
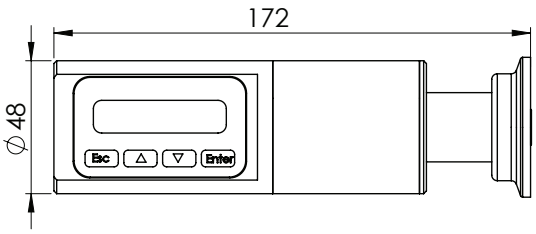
SATRON VOA Dual wavelenght Turbidity and solids content sensor

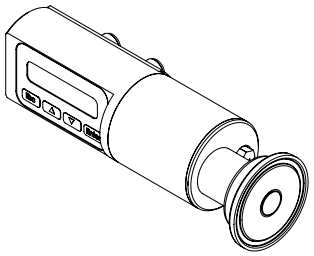
Dimensions and Housing types VOA (mm)



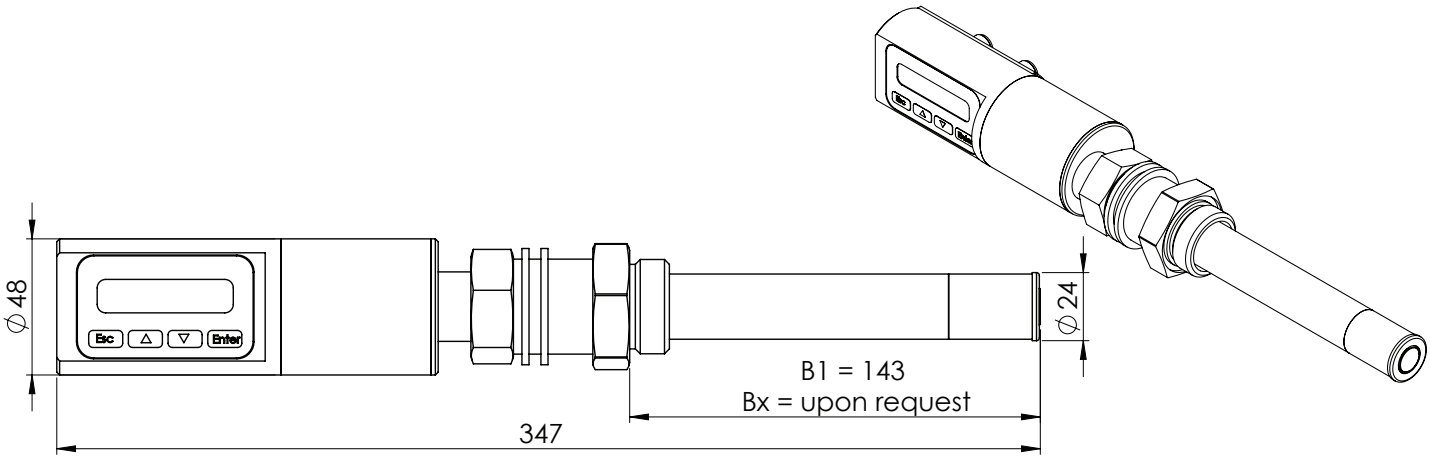


VOA with display (N) and G1 process connection

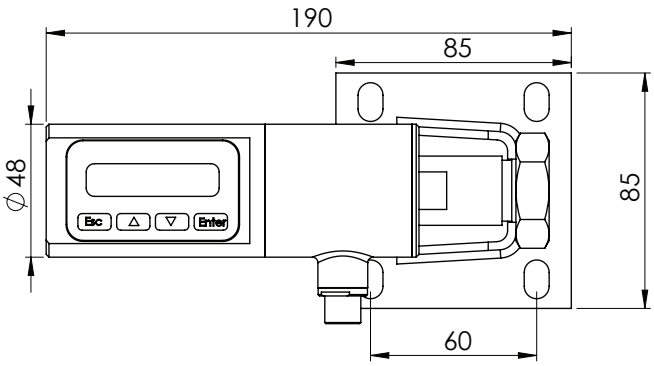


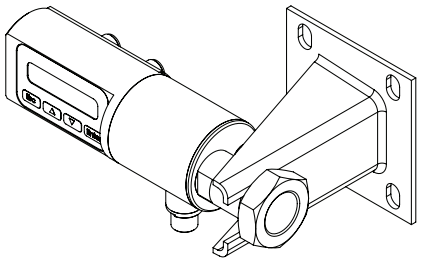


VOA with display (N) and Tx clamp connection



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





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

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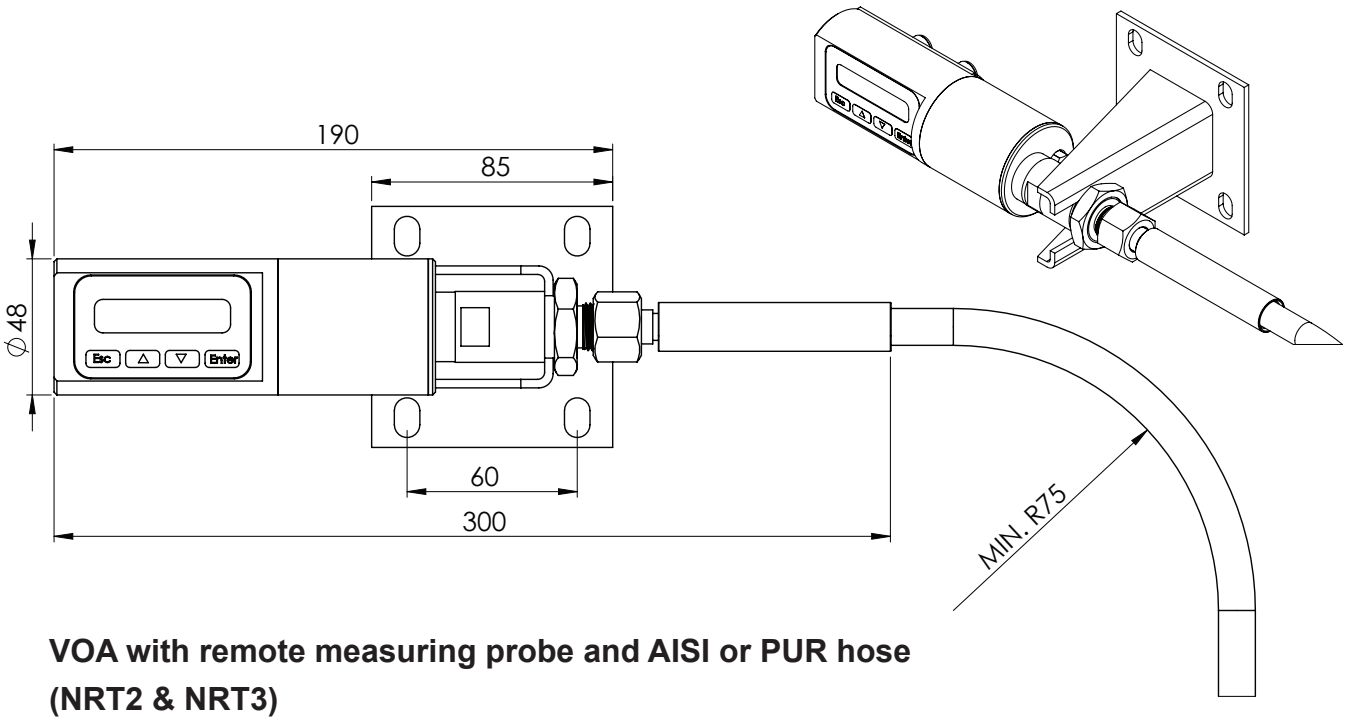
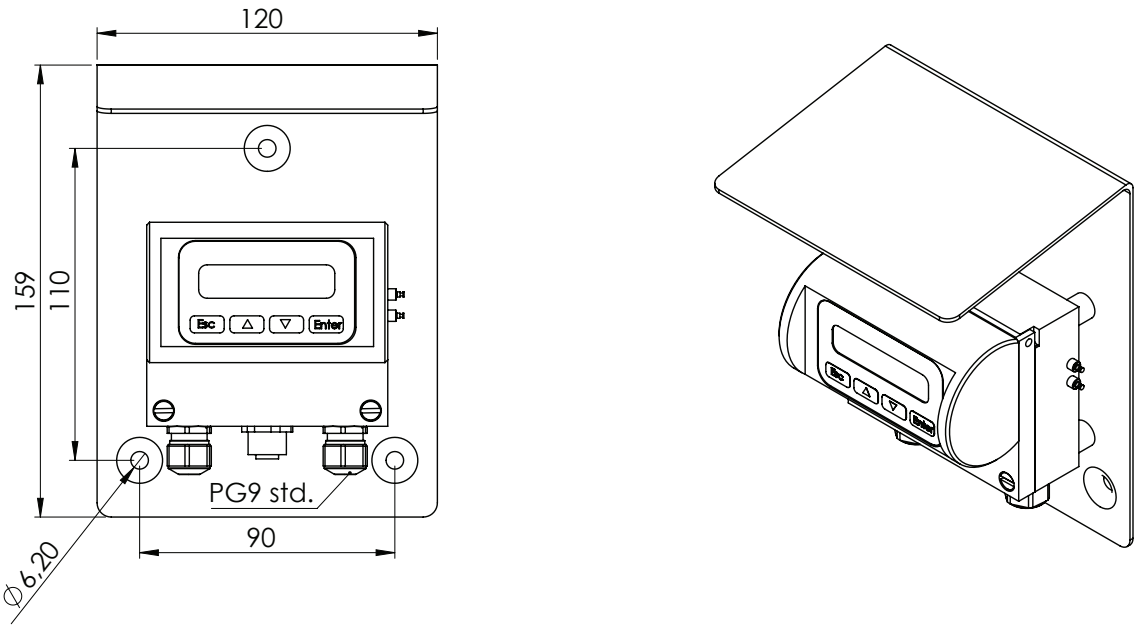


VOA with remote measuring probe and AISI or PUR hose (NRT2 & NRT3)



Remote electronics housing with display (L) T1325016

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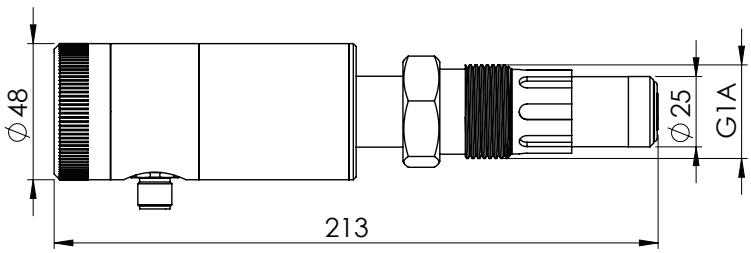
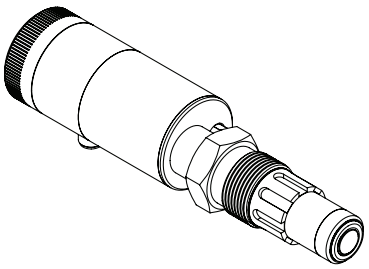
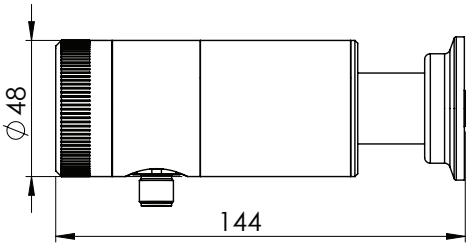
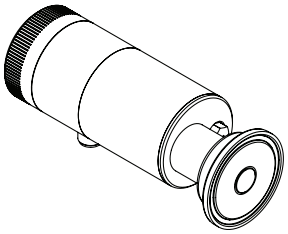


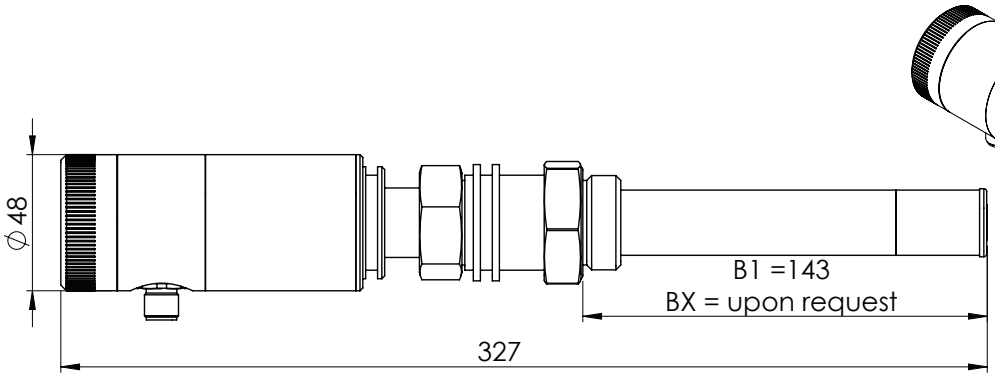


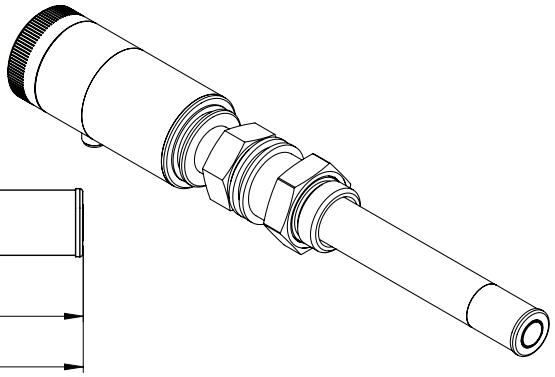
VOA with no display (H) and G1 process connection





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





VOA with no display (H) and B1 / BX retactable ball valve insertion process

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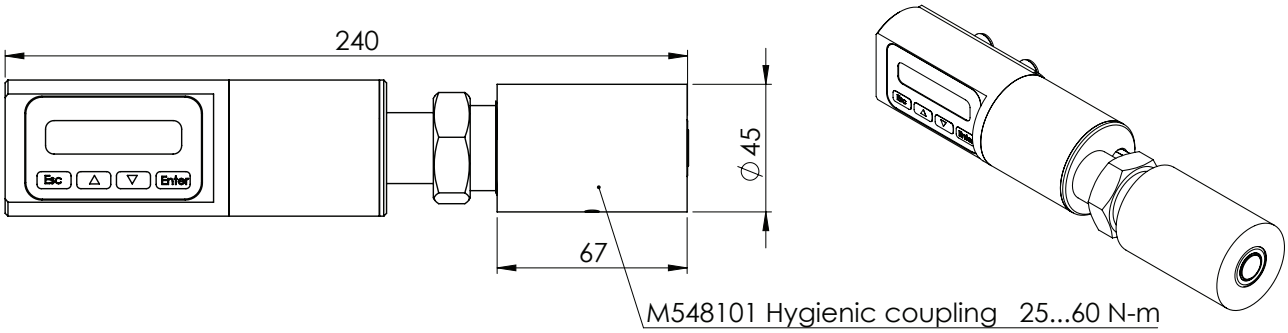
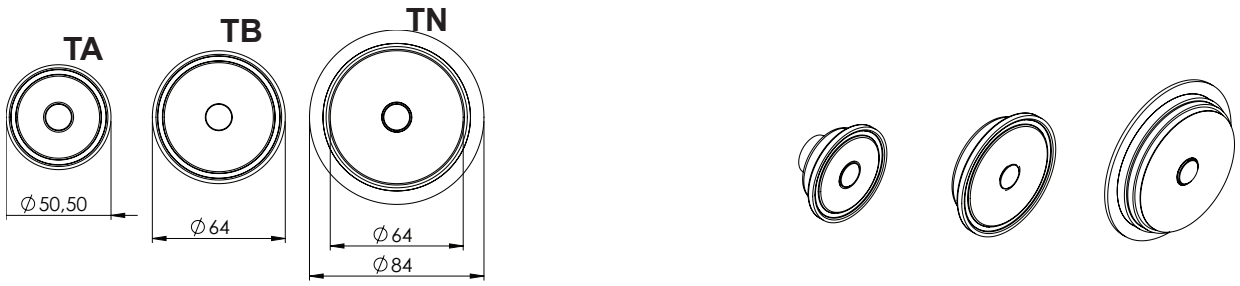
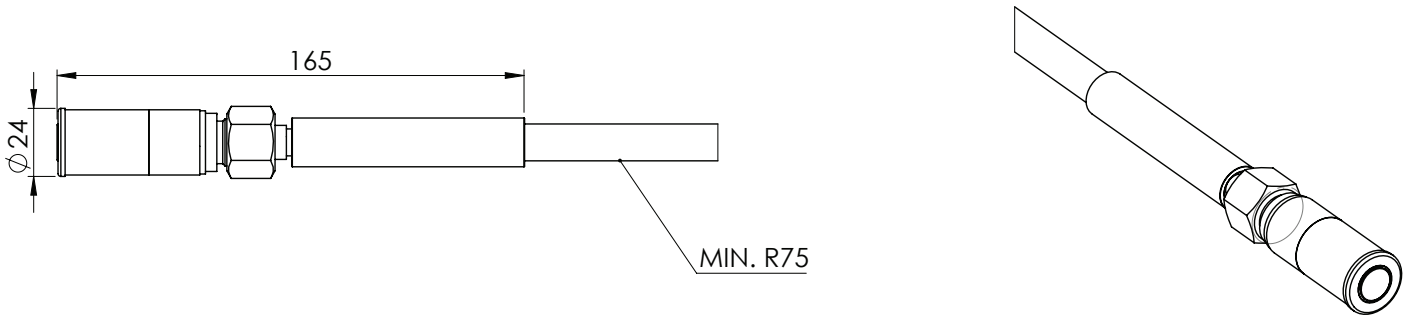
Process connection details



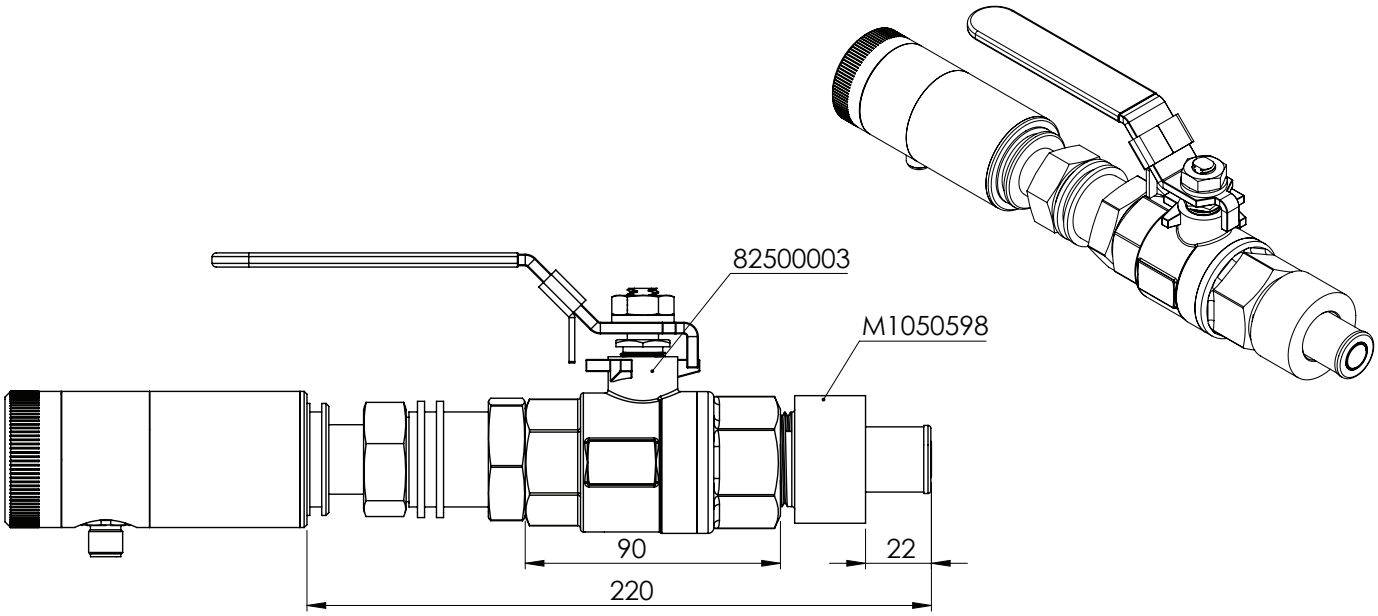
VOA G1 connected to M548101 hygienic coupling. (Flush mounted) EHEDG, 3A



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



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



VOA B1 connected to Ball valve 8250000 and M1050598 coupling

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

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Welding the coupling

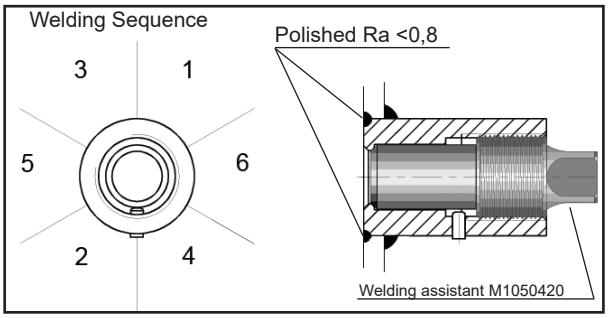
These instructions apply to hygienic welded couplings; welding the G1 standard coupling is described here as an example.

• 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.

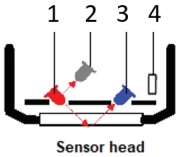
Do not use sealing tape etc. on threaded connection!

VOA measurement principle:

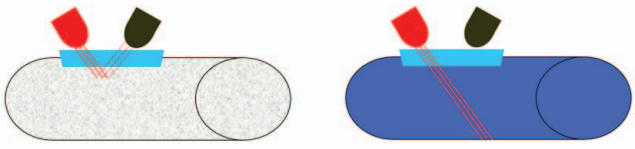
Backcattering with RED and Infrared wavelenght lightsource LED´s

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´s 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	PT100 Temperature probe



Milk = 100% = 20mA **Water = 0% = 4.0mA**

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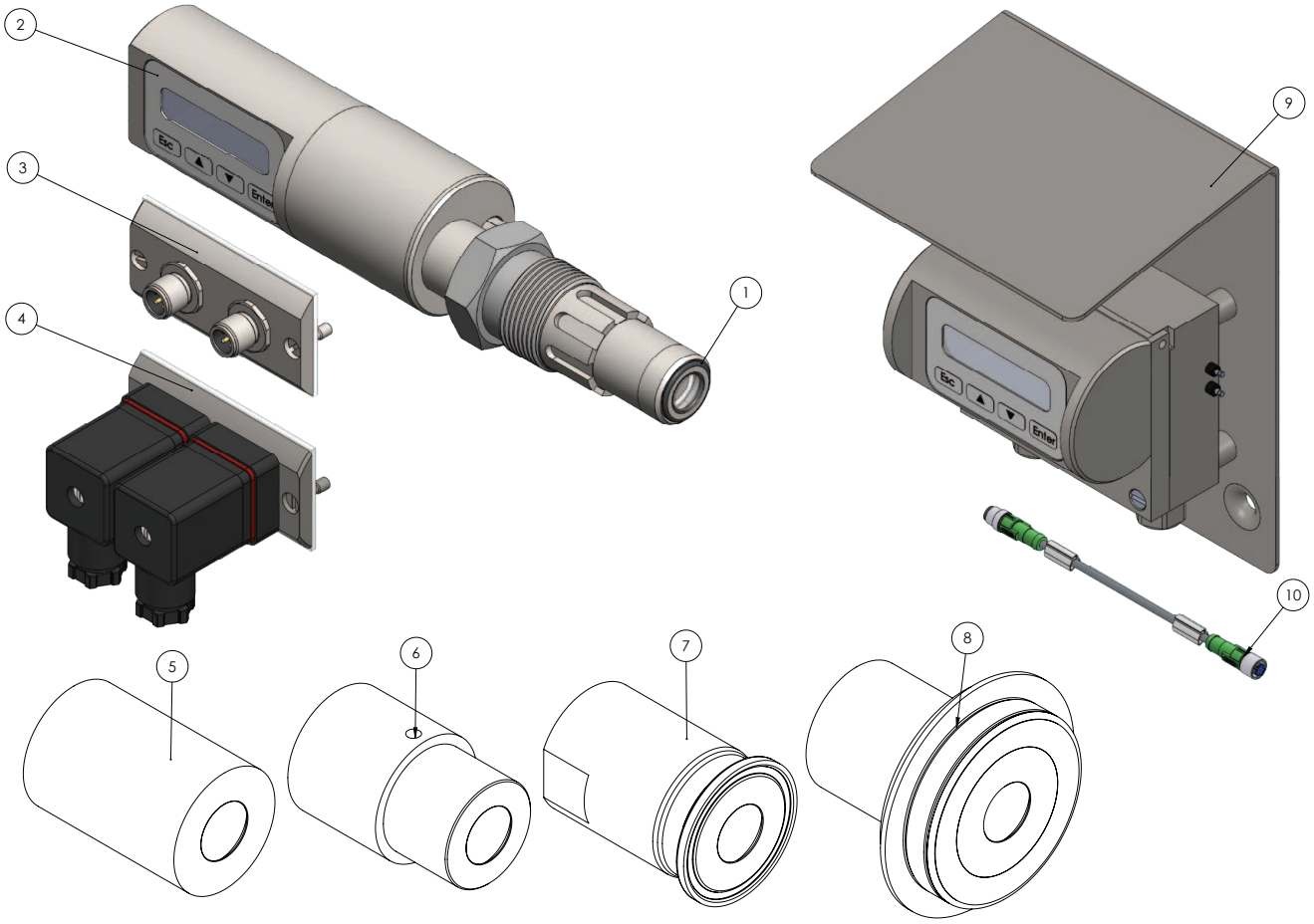
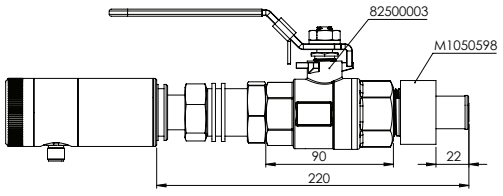
Spare-parts VOA G1



No.	Part name	Order code	Note
1	O-ring EPDM	80031720	3A 18-03 Class II (Do not exceed above 8% fat content).
1	O-ring FPM (Viton®)	80011720	3A 18-03 Class I
1	O-ring FFPM(Kalrez®)	80041717	3A 18-03 Class I
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	



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

Mounting bracket for R probe type: T1050009

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Selection Chart

Adjustability	Span, min	Span, max
VOA	0...1000 NTU	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**	FFPM (Kalrez®)	Class I
8	Duplex (EN 1.4462)			**4** (*)	PTFE (Teflon)	
9	Peek					

Housing type

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.
3	Steel reinforced PUR hose.
4	PVC cable (std.)

Cable length

0	No L or R option selected		
1	5 M.	**3**	15 M.
2	10 M. (PVC std.)	**4**	20 M.

Light source

1	RED & IR

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

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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.

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UL 61010-1, 3rd Ed. Rev May 11. 2012
CAN/CSA C22.2 No. 61010-1-12, Ed. 3
EMC directive 2014/30/EC
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1) Parts in contact with process medium compliant to FDA

We reserve the right for technical modifications without prior notice.

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