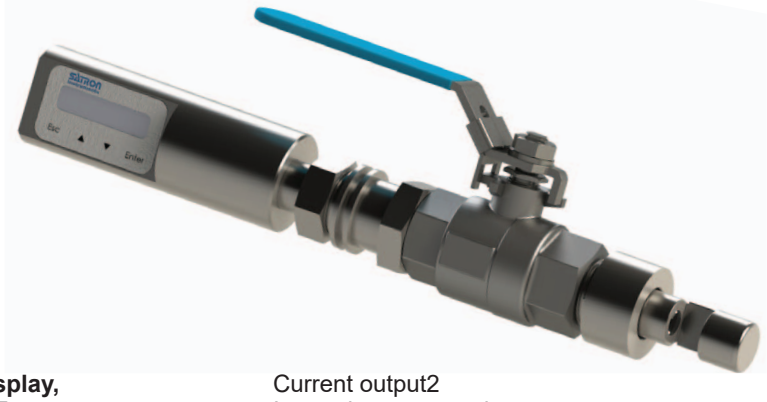
SATRON VOF Turbidity and solids sensor for food and Biopharma

The SATRON VOF analyzer allows savings to be obtained in process industries such as:
- **Impurities monitoring of clean water**
- **Detection of yeast after the membrane in breweries**
- **Integrity monitoring of filters**
- **Evaporator impurities monitoring**

The transmitter uses absorption principle and communicates via 4...20mA and digitally using HART® protocol.



TECHNICAL SPECIFICATIONS

Measuring range
0...1 500 NTU

Calibration
The transmitter is factory calibrated at 4mA = water, 20mA = full asorption. 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...50 NTU	0.2%
0....1 500 NTU	1%

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: 0 to +100 °C (120 °C for 10min)
Process H type: 0 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

Pressure class:
- PN40
- Test pressure -1 to 30 bar (-14.5 to 435 PSI)

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**
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 mm^2.

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 mm^2.

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

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

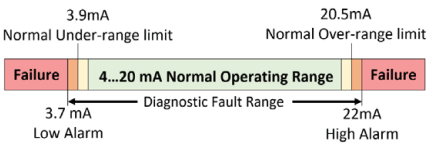
Process connections of the sensor
- G1A ball valve insertion. Extension 19cm diameter ø 24mm

Protection class: IP66, IP67 See Selection chart.

Weight

Housing with PLUG DIN43650 connector **(H0T)**:	1,2 kg
Housing with M12 connector **(H0S)**:	1,2kg
Housing with display **(N0S** & **N0T)**:	1.3 kg
Remote Housing (**L):**	2.5 kg

Min. load using HART®-communication 250 Ω

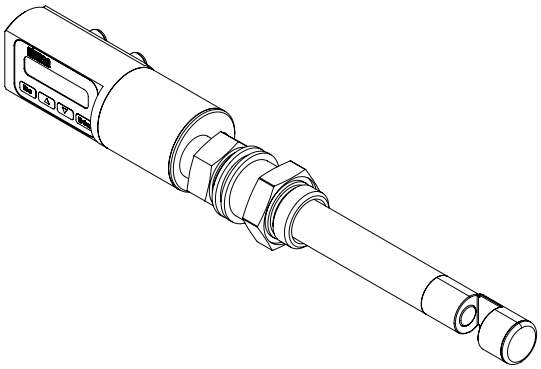


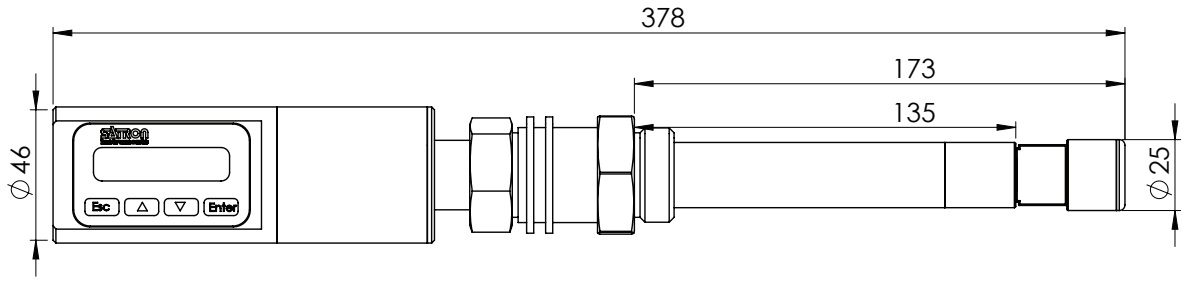
Output signal according to NAMUR NE043 Signal Level for the failure information of Digital Transmitters.

UL 61010-1, 3rd Ed. Rev May 11. 2012
CAN/CSA C22.2 No. 61010-1-12, Ed. 3
EMC directive 2004/108/EC
- EN 61326-1:2005

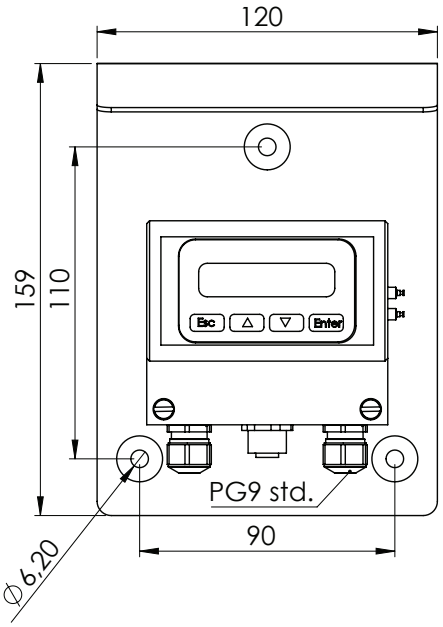
SATRON VOF Turbidity and solids content sensor

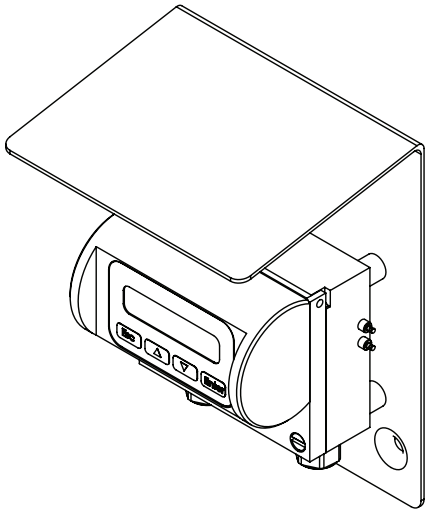
Dimensions and Housing types VOF (mm)





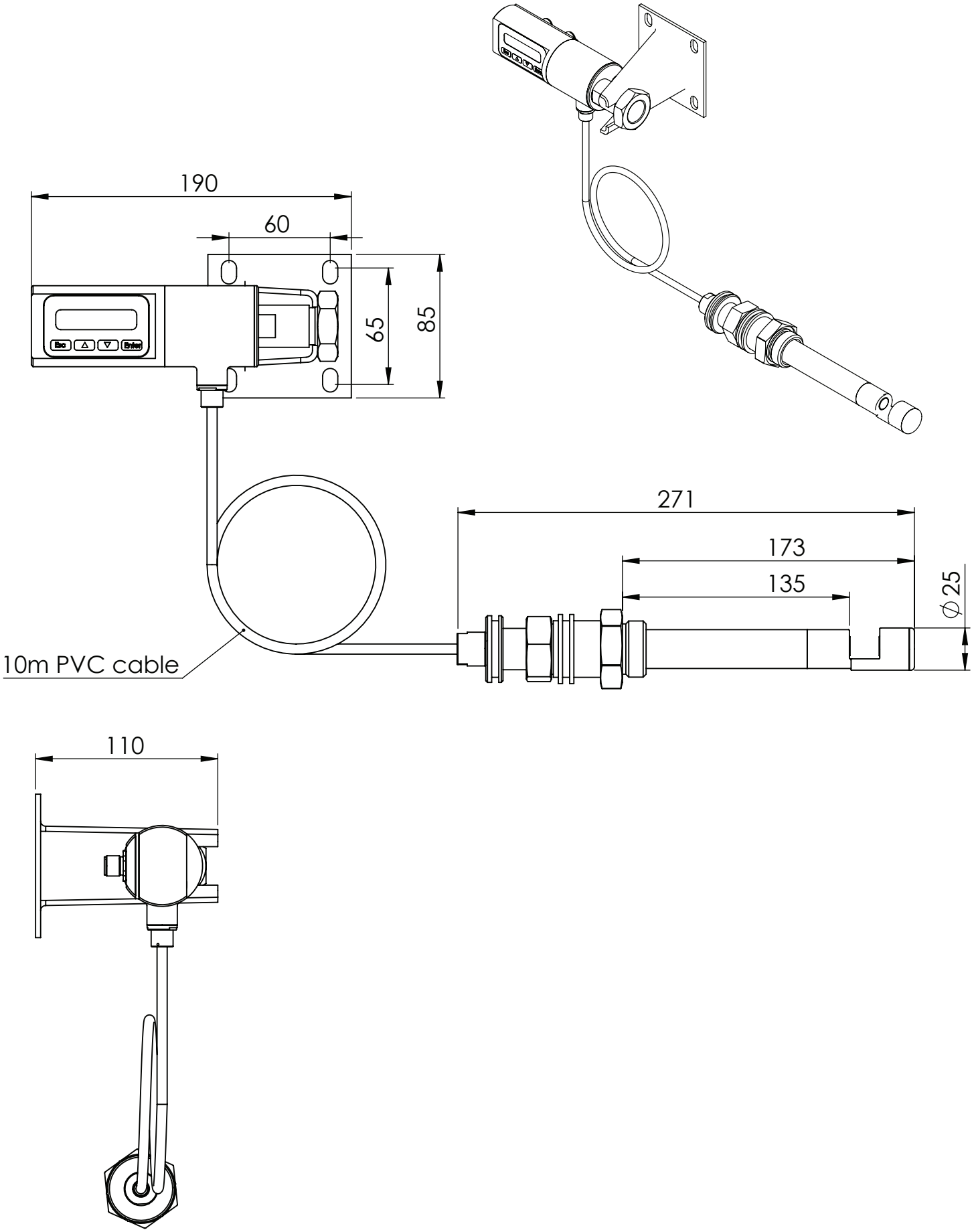
VOF B1 with display and pushbuttons (N housing)





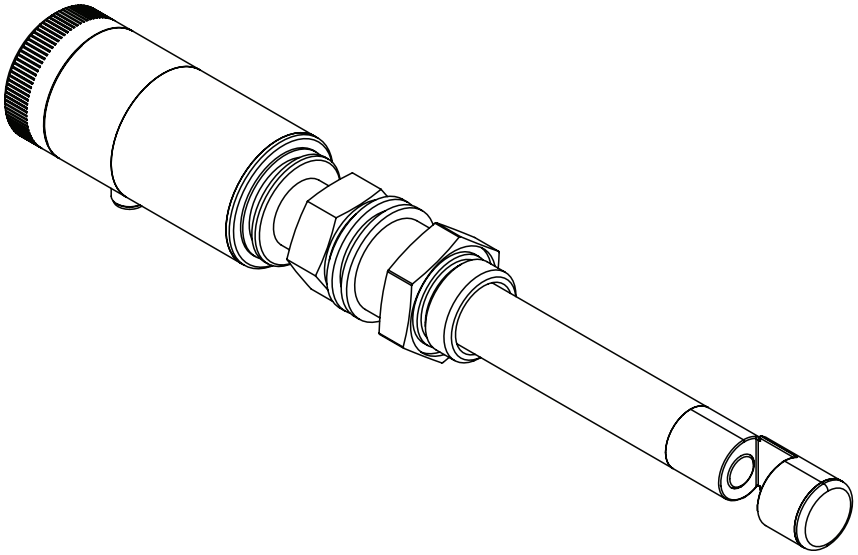
VOF with remote electronics housing with display (L housing)

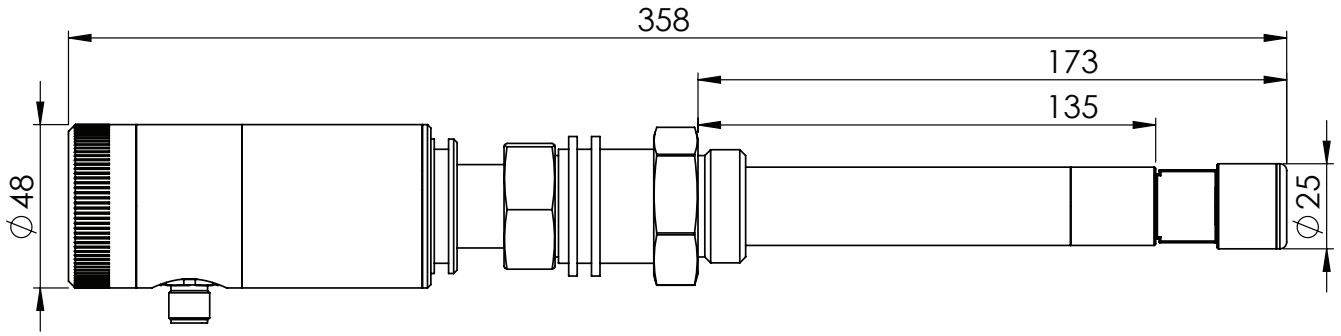
SATRON VO Turbidity and solids content sensor



VOF B1 with remote electronics NR housing)

SATRON VO Turbidity and solids content sensor

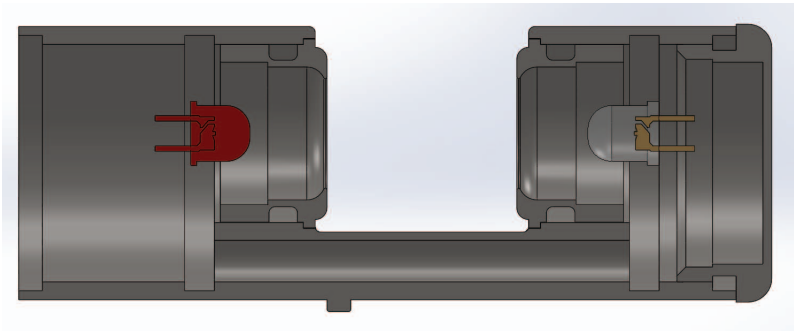




VOF B1 with no display or remote display (H or L housing)

VOF measurement principle:

Turbidity measurment according absorption with selectable wavelength LED lightsources (see selection chart). The LED (shown as red) sends light through the process and is received by the photodectector (shown as grey). Depending on the turbidity the amount of light received by the photodectector will change.The lifetime of the high quality optical LED and photodetectors used in our process instruments is generally considered to be in excess of 20 years.

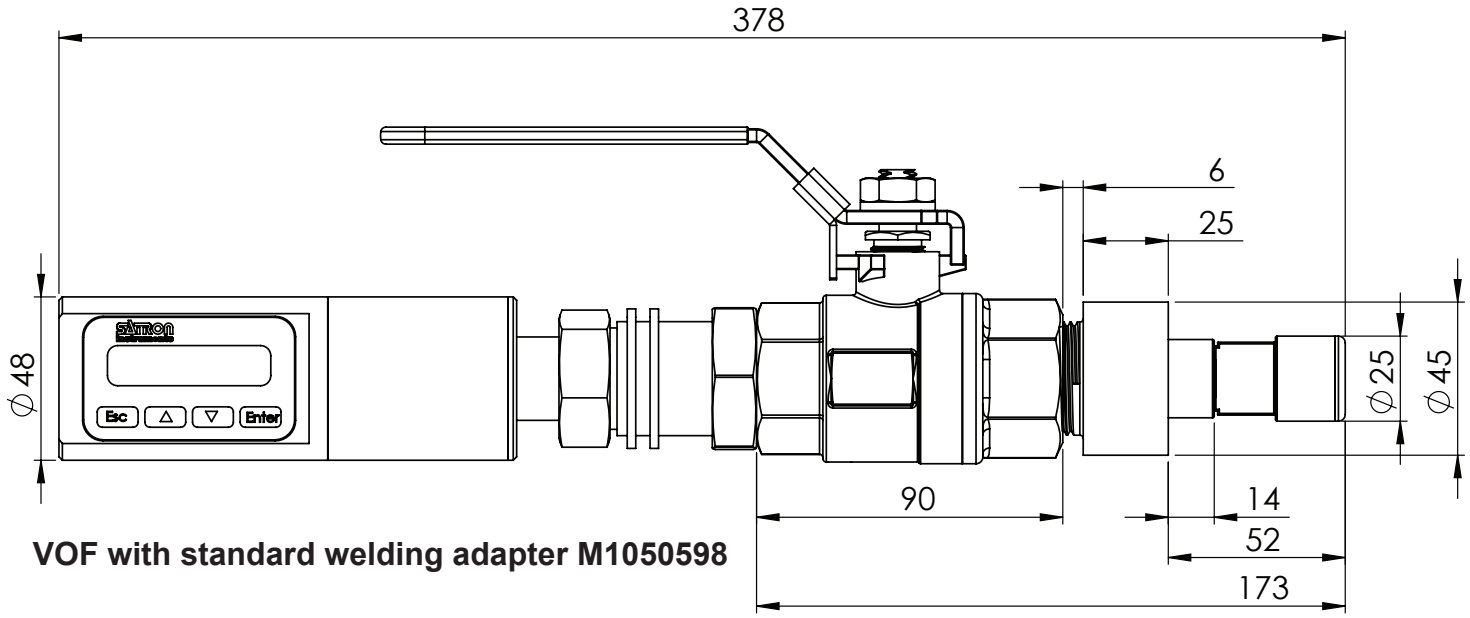


SATRON VO Turbidity and solids content sensor

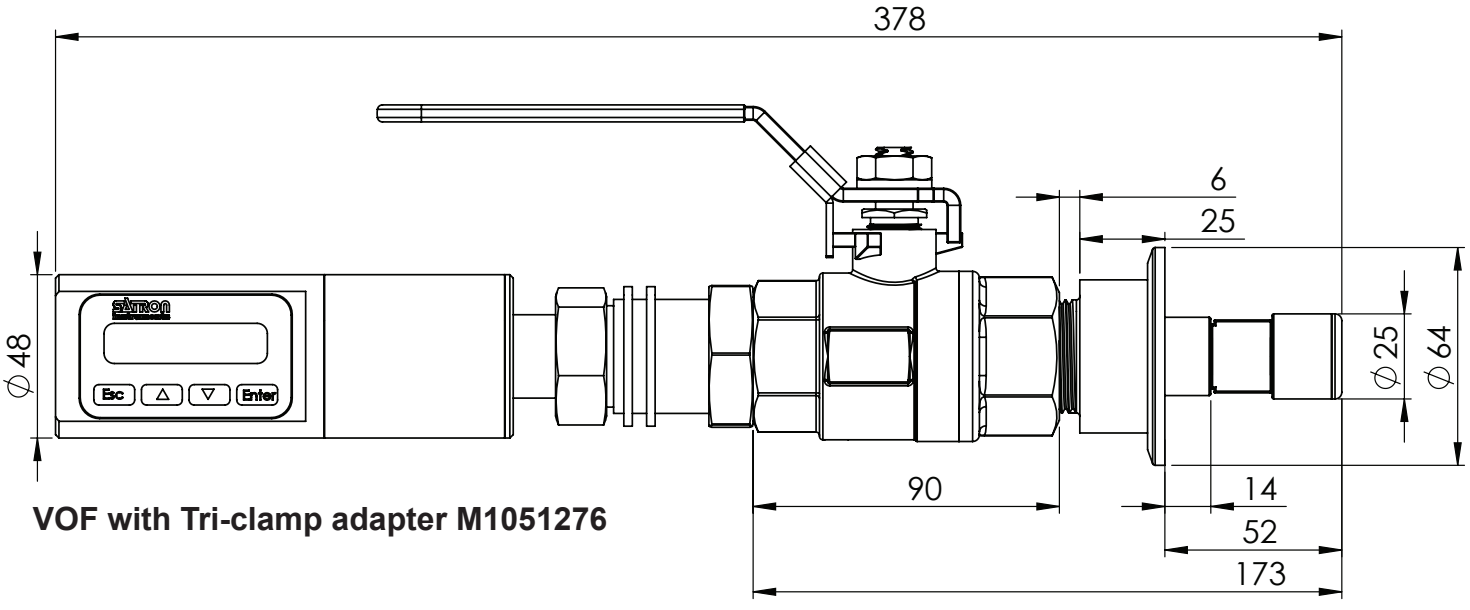
Process connection details

The Satron VOF comes with a G1" retractable process connection type B1.

Different process couplings allow for welding, flanged or clamped connection.



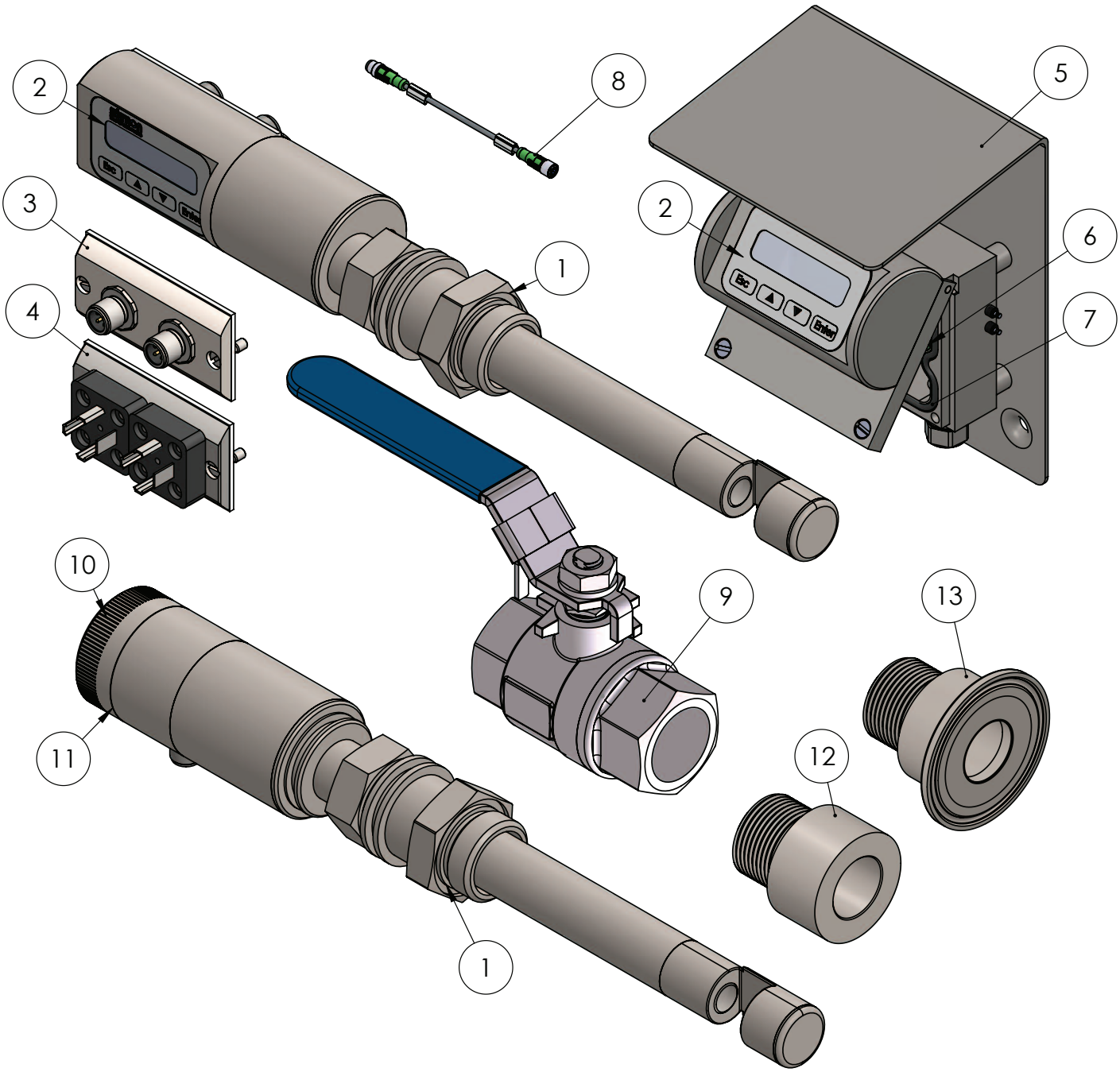
VOF with standard welding adapter M1050598



VOF with Tri-clamp adapter M1051276

SATRON VO Turbidity and solids content sensor

Spare-parts VOF



No.	Part name	Order code	Note
1	O-ring EPDM	80036203	.
2	Sticker	T1325215	
3	Plug cover M12	T1325031	
4	Plug cover DIN43650	T1325003-K48	includes 2 M12 female connectors
5	Remote Display Unit RDU	T13250016	includes 2 DIN43650 female connectors
6	FUSE for L-Housing	74212000	
7	Seal for L-Housing display	80017226	
8	L-Housing data cable 10m PVC	70000450	
8	L-Housing data cable 15m PUR	70000440	
9	AISI316L ball valve	82500003	
10	AISI 316 cover	T1300256	contact satron
11	O-ring	80013800	
12	B1 Welding process coupling	M1050598	
13	B1 Triclamp 64mm coupling	M1051276	

SATRON VO Turbidity and solids content analyzer

Selection Chart

Adjustability	Span, min	Span, max
VOF	0...50 NTU	0...1 500 NTU

Process temperature limits

N	Normal version 0...+100 °C continuous (120 °C for 10 minutes)
H(**)	High temperature 0...+140 °C continuous (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 PTFE +	
2	AISI316L	**2**	Sapphire	**1**	EPDM
3	Hast. C 276			**2**	FPM (Viton®)
6	Titanium Gr2			**3**	FFPM (Kalrez®)
8	Duplex (EN 1.4462)				
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 electronics

Connection type

S	DIN43650 with PG9, IP66
T	M12, IP67
V	PG9 (always with L housing), IP66

Cable Material (R & L housing)

1	PUR cable.
2	AISI316L braided PTFE hose.
3	Steel reinforced PUR hose.
4	PVC cable (std.)

Cable length (R & L housing)

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

Light source **3** 460nm **7** 880nm **9** IR+

Process connections

HX	Fixed mounting tube, (specify length)
B1	G1A ball valve insertion. Extension 19cm diameter ø 25mm
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

800029 EC 1935/2004

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

We reserve the right for technical modifications without prior notice.

INDUSTRIE AUTOMATION GRAZ Ing. W. Häusler GmbH AUTALER STRASSE 55 A-8074 RAABA-GRAMBACH
TEL: +43 316 405 105 FAX: +43 316 405 105 22 E-MAIL: OFFICE@IAG.CO.AT WWW.IAG.CO.AT