



**SATRON®**

# LUMINA™ VOF Turbidity and Solids Optical Sensor

[www.satron.com](http://www.satron.com)

#LookCloser

The **SATRON VOF** is an optical sensor that operates on the absorption principle using reliable LED technology. Designed for flexibility, it can be easily removed from the process line via a 1" ball valve, allowing quick relocation or maintenance without disrupting operations.

Its robust design makes it ideal for monitoring waste outlets, effluents, and color variations in various processes. It's commonly used to monitor impurities in clean water, detect yeast after membrane filtration in breweries, verify filter integrity, and track impurities in evaporators.

The sensor ensures accurate in-line measurement and communicates via 4–20 mA and the HART® protocol, providing smooth integration with process control.



## TECHNICAL SPECIFICATIONS

### Measuring range

0 ... 1 500 NTU

### Calibration

The sensor is factory calibrated at 4mA = water, 20mA = full absorption, 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/dm<sup>3</sup>, PPM, or custom text

### Temperature limits

Ambient: -30 to +80 °C  
Display operating range: 0 to +50 °C (Does not affect operation of the sensor)  
Process N type: 0 to +100 °C (120 °C for 10min)  
Process H type: 0 to +120 °C  
Shipping and storage: -40 to +80 °C

### Output

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

### Supply voltage

Nominal 24 VDC, (21.6 – 27.6V) 200mA

### Humidity limits

0–100% RH

### Pressure class:

PN25

### EMC directive 2014/30/EC

– EN 61326-1: 2021

### CONSTRUCTION

#### Materials:

Sensing element<sup>1)</sup>: AISI316L, Duplex (EN. 1.4462), Hast. C276/C22, or Titanium Gr2.  
Surface quality: Ra <0.8µm  
Lens: Sapphire  
Seal: EPDM, FPM, FFPM, FEP

#### Housing with display, code N:

Housing: AISI303/316  
Seals: FPM  
Nameplates: Polyester  
Display window: Polycarbonate

#### Housing without display, code H:

Housing: AISI303/316  
Seals: FPM and NBR  
Nameplates: Polyester

#### Connection sensor between sensor and housing (RDU) code L:

PVC signal cable  
Nameplates: Polyester  
Display window: Polycarbonate

### Electrical connections

Housing without display code H:  
1x M12 plug connector  
Housing with display, code N:  
2x M12 plug connector  
Remote display unit, code L:  
3x PG9 gland for cable;  
Conductor cross section: max 2.5 mm<sup>2</sup>

### 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<sup>2)</sup>  
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<sup>2)</sup>  
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

G1A ball valve insertion.  
Extension 19cm diameter ø 24mm

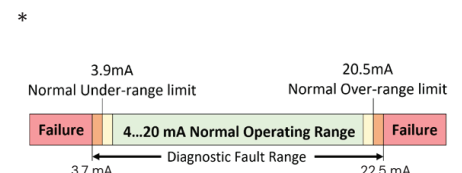
### Protection class

IP66, IP67 and IP68  
See Selection chart.

### Weight

|                              |        |
|------------------------------|--------|
| Housing without Display (H): | 1.2 kg |
| Housing with Display (N):    | 1.3 kg |
| Remote Housing (L):          | 2.5 kg |

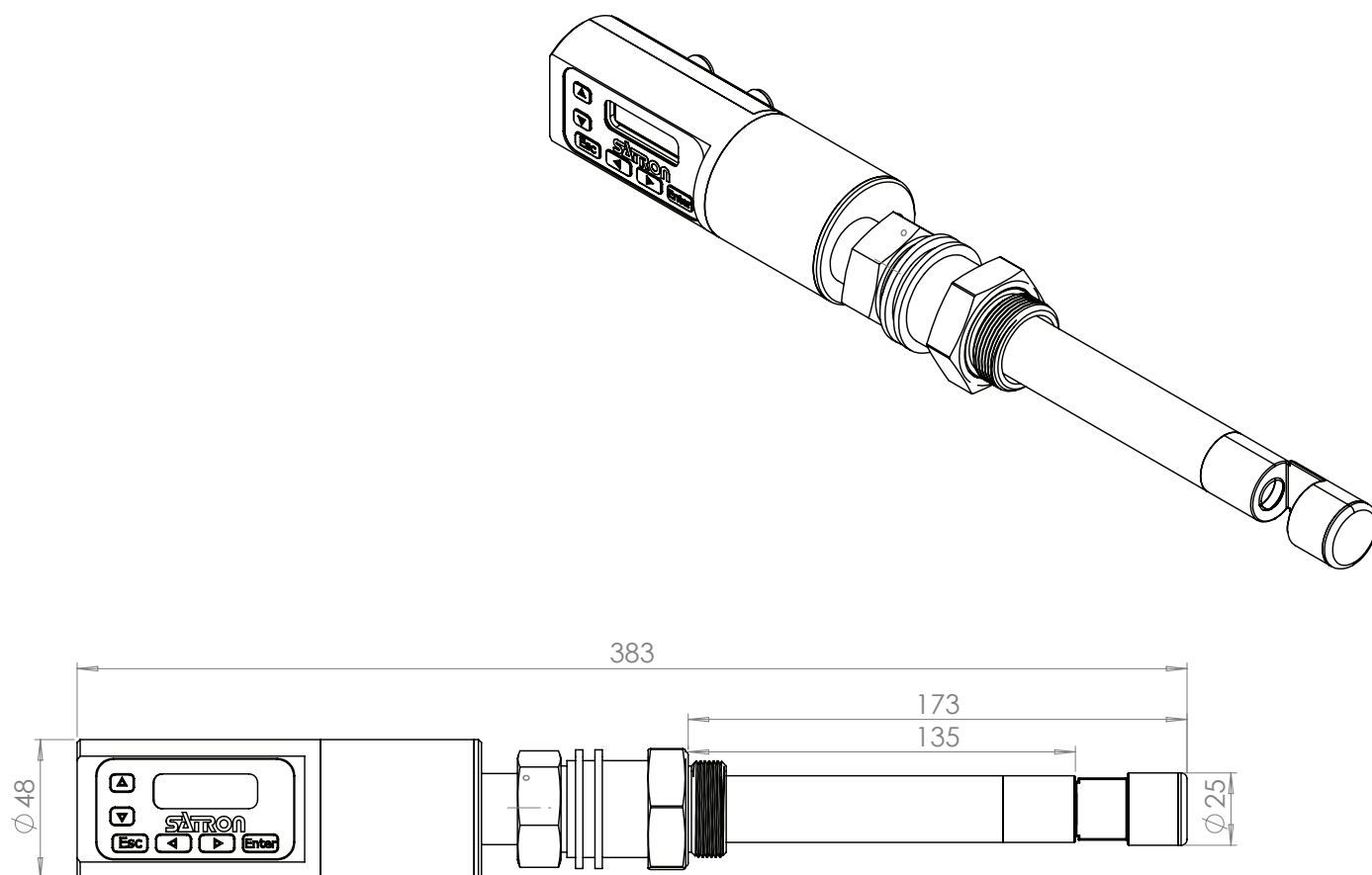
Output signal according to NAMUR  
NE043 Signal Level for the failure information of Digital Transmitters.  
Min. load using HART®-communication 250 Ω



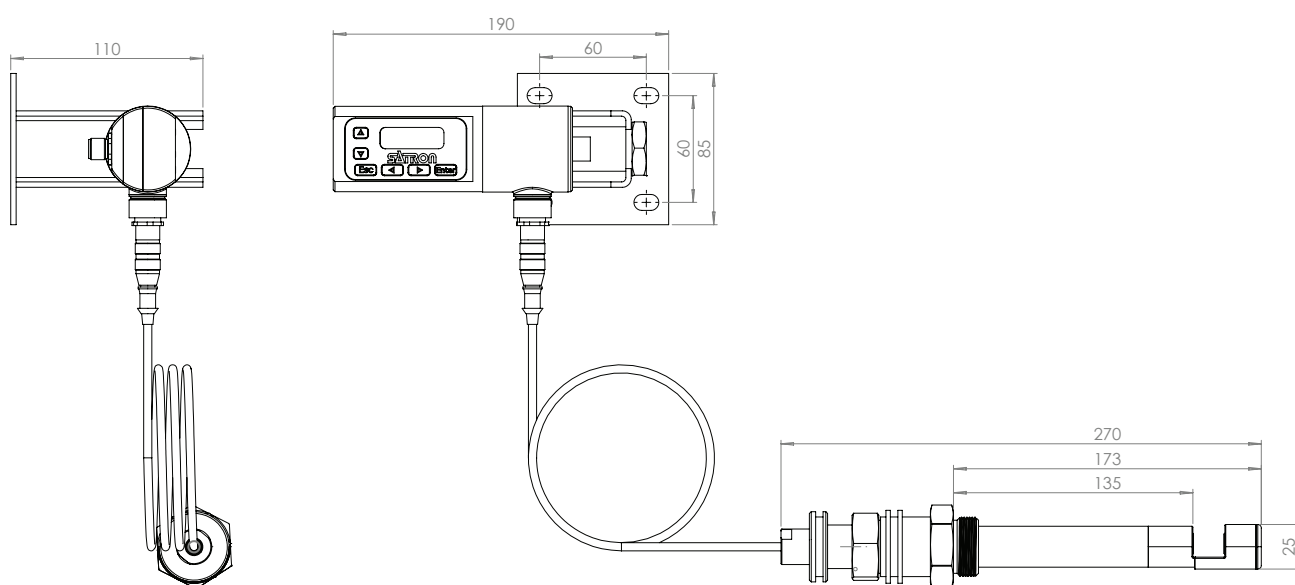
<sup>1)</sup> Parts in contact with the process medium are FDA compliant.

<sup>2)</sup> Either 1 output or 1 input.

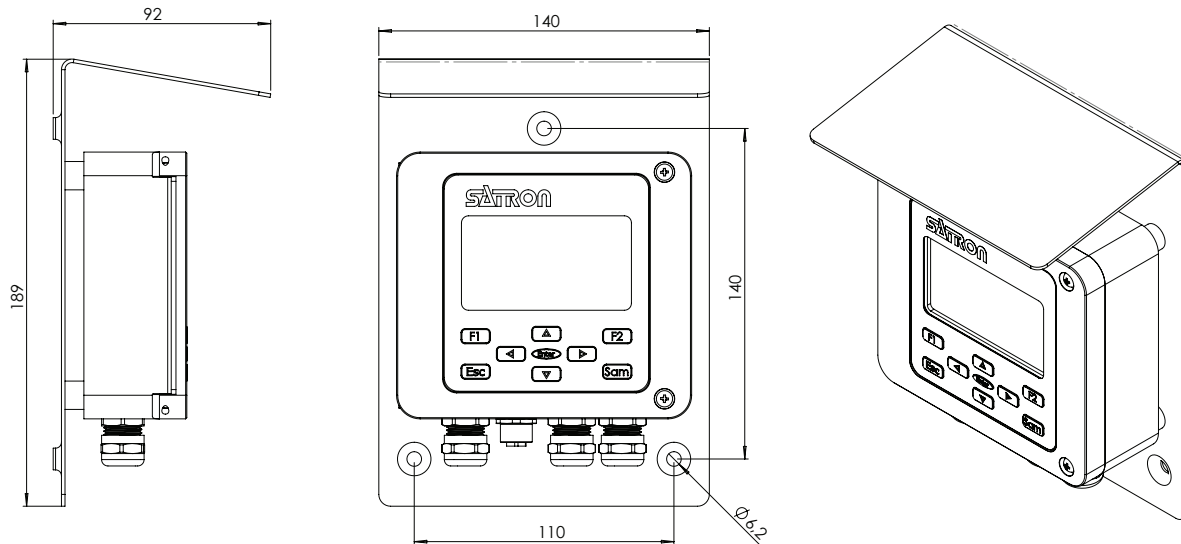
## Dimensions and Housing types VOF (mm)



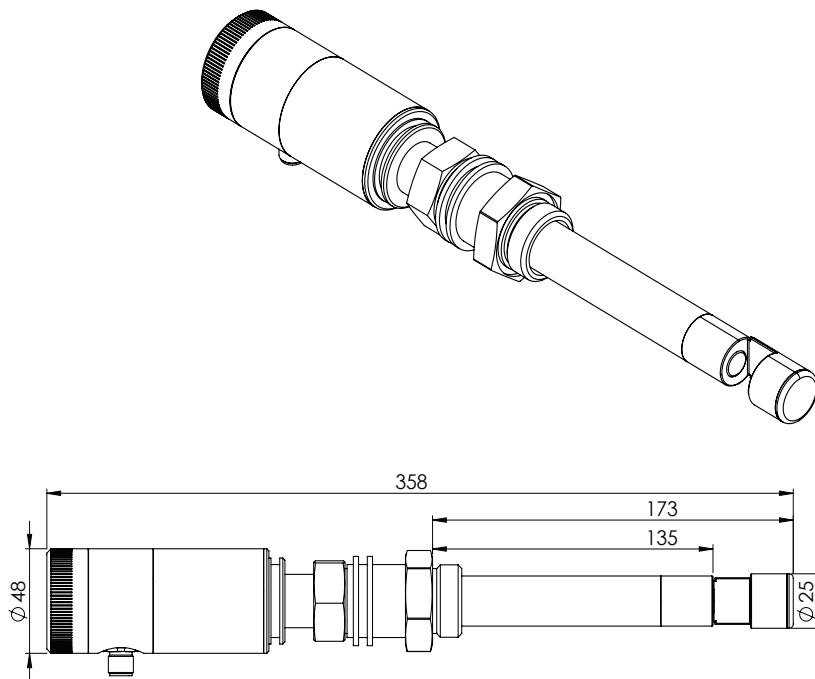
## VOF B1 with display and pushbuttons (N housing)



## VOF B1 with remote electronics (NRT housing)



## RDU – Remote Display Unit (L) T1370009

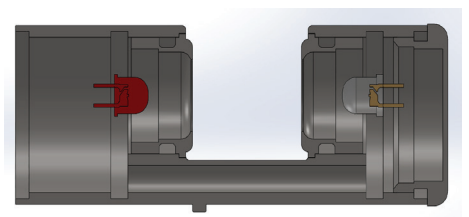


## VOF B1 with no display (H or L housing)

### VOF measurement principle

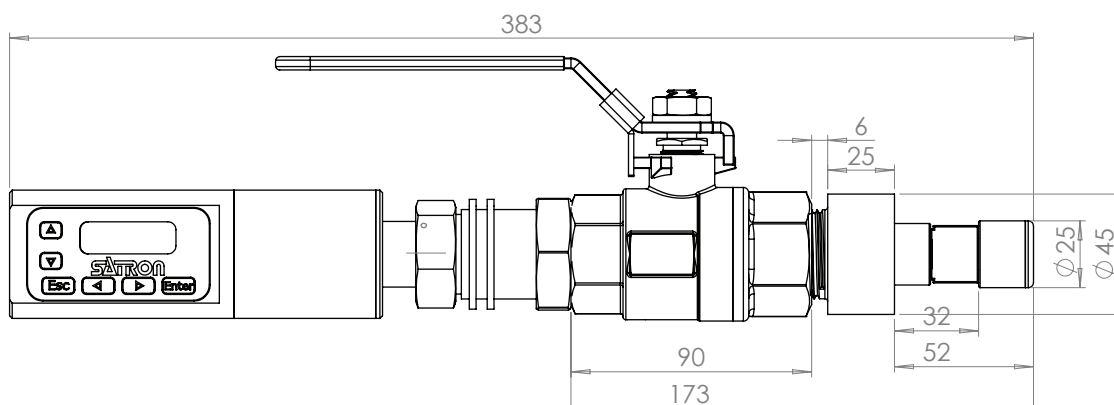
The SATRON VOF sensor uses the absorption principle to measure turbidity with LED light sources (see selection chart). The LED (red) emits light through the process medium, and a photodetector (grey) receives the transmitted light.

As turbidity increases, more light is absorbed and scattered by particles, reducing the signal at the detector. This change is used to calculate turbidity in real time. The sensor's optical components are built for durability, with an expected lifetime of over 20 years.

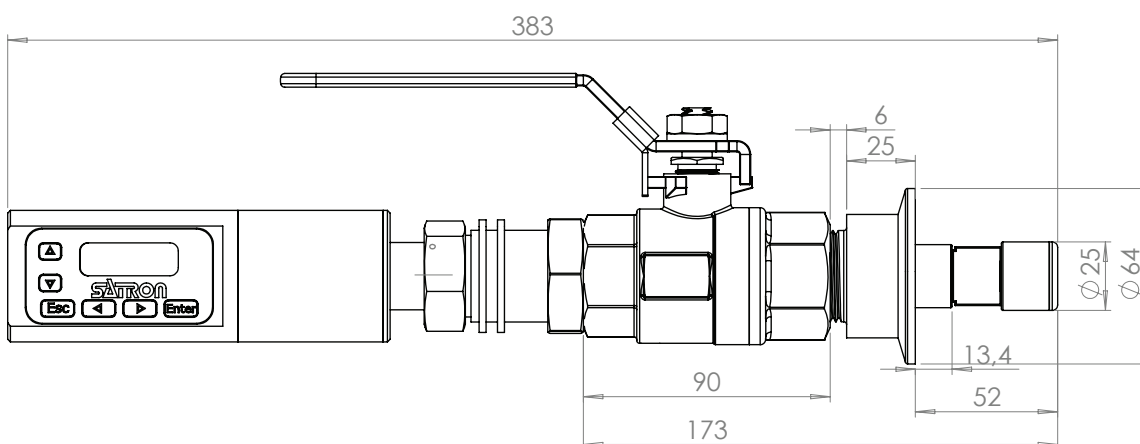


## Process connection details

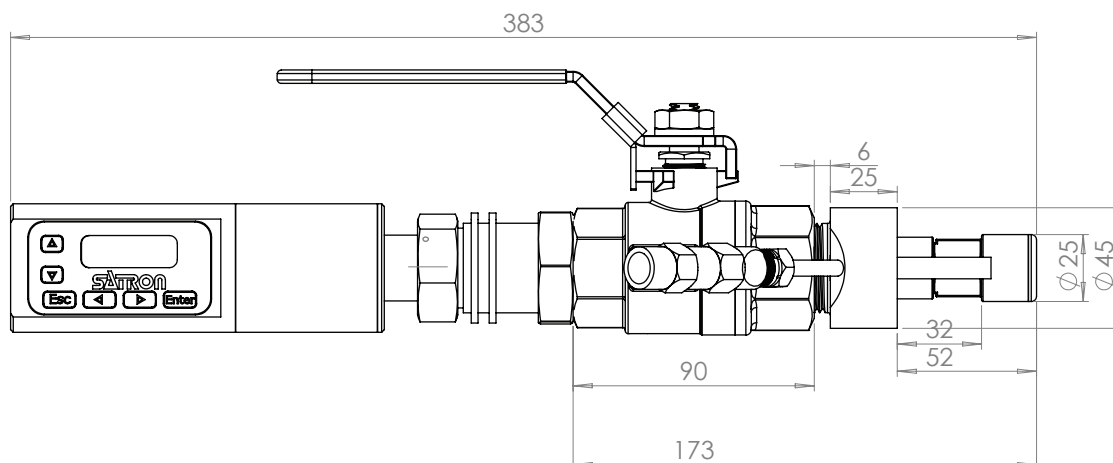
The Satron VOF comes with a G1" retractable process connection type B1. Different process couplings allow for welding, flanged or clamped connection.



## VOF with standard welding adapter M1050598



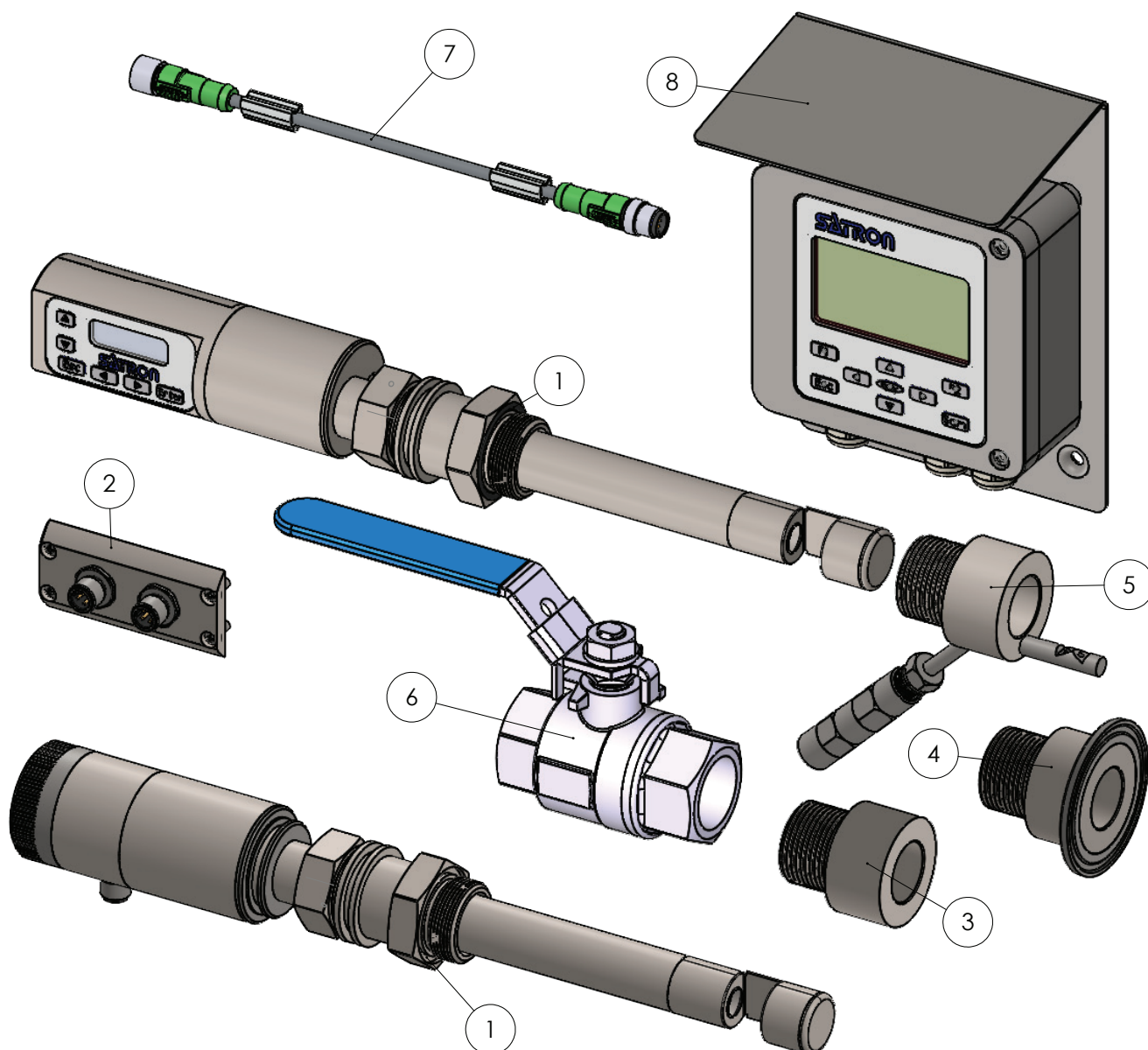
## VOF with tri-clamp adapter M1051276



## VOF with flushing adapter M1050102-VOF



## Spare-parts VOF



| No. | Part name                                           | Order code   |
|-----|-----------------------------------------------------|--------------|
| 1   | O-ring EPDM                                         | 80033426     |
| 2   | Plug cover M12* N-housing                           | T1370011     |
| 2   | Plug cover M12* B-housing                           | T1370012     |
| 3   | B1 Welding process coupling                         | M1050598     |
| 4   | Male 1" to Tri-Clamp DN 40...51 ISO2852 (C7=64,0mm) | M1050222     |
| 5   | Flushing coupling for VOF                           | M1050102-VOF |
| 6   | AISI316L ball valve                                 | 82500003     |
| 7   | L-Housing data cable 10m PVC*                       | 70000600     |
| 7   | L-Housing data cable 15m PVC*                       | 70000601     |
| 8   | Remote Display Unit RDU*                            | T1370009     |

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

## SELECTION CHART

|                                                                                                                                                                                                                                                            |                                 |                                    |
|------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|---------------------------------|------------------------------------|
| <b>Adjustability</b><br>VOF                                                                                                                                                                                                                                | <b>Span, min</b><br>0... 50 NTU | <b>Span, max</b><br>0... 1 500 NTU |
| <b>Process temperature limits</b><br><b>N</b> Normal version 0...+100 °C continuous (120 °C for 10 minutes)<br><b>H<sup>1)</sup></b> High temperature 0...+120 °C continuous                                                                               |                                 |                                    |
| <b>Output</b><br><b>S</b> 4–20mA DC/HART® for 50Hz (Europe) <b>T<sup>2)</sup></b> 4–20mA DC/HART® + IO-Link for 50Hz<br><b>J</b> 4–20mA DC/HART® for 60Hz (USA / Japan) <b>K<sup>2)</sup></b> 4–20mA DC/HART® + IO-Link for 60Hz                           |                                 |                                    |
| <b>Material of wetted parts</b><br><b>Body</b> 2 AISI316L <b>Lens</b> 2 Sapphire <b>Seal FEP +</b><br>1 EPDM<br>2 FPM<br>3 FFPM                                                                                                                            |                                 |                                    |
| <b>Housing type</b><br><b>B</b> Housing with display and push buttons, 1mA output<br><b>N</b> Housing with display and push buttons, 2mA outputs, binary in/output<br><b>H</b> Housing without display<br><b>L</b> Remote electronics housing with display |                                 |                                    |
| <b>Probe type</b><br><b>O</b> No remote probe<br><b>R</b> Remote measuring probe (not available with L housing), IP68                                                                                                                                      |                                 |                                    |
| <b>Connection type</b><br><b>T</b> M12, IP67<br><b>V</b> PG9 (always with L housing), IP66                                                                                                                                                                 |                                 |                                    |
| <b>Cable material</b><br><b>0</b> No L or R option selected<br><b>2<sup>4)</sup></b> AISI316L braided PTFE hose<br><b>4</b> PVC cable (std.)<br>Extension 10m PVC cable available (code: 70000600)                                                         |                                 |                                    |
| <b>Cable length</b><br><b>0</b> No L or R option selected<br><b>2</b> 10 meters (std.)<br><b>3</b> 15 meters                                                                                                                                               |                                 |                                    |
| <b>Lightsource</b><br><b>3</b> 460nm<br><b>7</b> 880nm<br><b>9</b> IR+                                                                                                                                                                                     |                                 |                                    |
| <b>Process connections</b><br><b>B1</b> GIA ball valve insertion. Extension 19cm diameter ø 25mm                                                                                                                                                           |                                 |                                    |

Example code

VOF N S 221 N O T O O 7 B1

## Documentation

| Material certificates |                                                                                                             |
|-----------------------|-------------------------------------------------------------------------------------------------------------|
| <b>MC1</b>            | Raw material certificate without appendices, in accordance with SFS-EN 10204-2.1 (DIN 50049-2.1) standard   |
| <b>MC2</b>            | Raw material certificate for wetted parts, in accordance with SFS-EN 10204-2.2 (DIN 50049-2.2) standard     |
| <b>MC3</b>            | Raw material certificate for wetted parts, in accordance with SFS-EN 10204-3.1 B (DIN 50049-3.1 B) standard |

- <sup>1)</sup> Only in combination with FFPM seals. And only 880nm.  
<sup>2)</sup> IO-Link only with N housing type