

# CONTINUOUS IMMERSION TURBIDITY MONITORING SYSTEM TURBISENS 2



## PRECAUTIONS OF USE

- Only connect the device to a power supply that complies with that indicated in these instructions.
- Installation and start-up must be carried out by qualified personnel.
- Assembly and maintenance operations must be carried out with the power off.
- Only use the device under the conditions defined in this user manual.

## DESCRIPTION

The TURBISENS probe is used to measure the turbidity of a liquid.

It is designed for measurement in immersion, in tanks or open channels.

Turbidity expresses the clarity or transparency of a liquid, such as water, based on the presence of suspended particles that scatter and absorb light. The more turbid a liquid is, the less transparent it becomes.

The measuring principle is based on a combined transmitted light / scattered light measurement according to DIN EN ISO 7027 :

One receiver is facing the transmitter at 180° for transmitted light measurement. A second receiver is positioned at an angle of 90° for scattered light measurement.

- Transmitted light measurement is used for high turbidity values, it is usually referred to with the unit FAU.

- Scattered light measurement is used for low turbidity values, it is usually referred to with the unit FNU or NTU.

A measuring range 0-100g/l SiO<sub>2</sub> solids concentration can be selected, which works only by means of transmitted light measurement.

## TECHNICAL DATA

Output signal	4...20mA calibrated on selected turbidity range, via DIP switches for use with our BAMOWIZ or an analog PLC input In case of error: 21mA (dirty lenses or faulty sensor) If the measurement range is exceeded: 22mA (see correspondence of the error codes displayed in the connection head on page 2)
Supply voltage	24V DC (10...30V DC), galvanically isolated from the measuring circuit
Power consumption	<1W Note: if the 4...20mA measurement signal is supplied by the connected measurement amplifier, the load increases by 24V DC x 20mA = 0.48W
Immersion depth	max. 10m (water column)
Protection class	IP68 (max. 1bar) according to EN 60 529
Probe material	PVC or PP
Media temperature	0°C...60°C (PVC) or 0°...+80°C (PP)
Cable	TPK, length 6m (standard, special lengths on request), resistant to diluted acids and alkalis
Sensors/convertor	The sensors inside the submerged probe are connected by cable to the measurement conversion electronics in the probe head. The cable connection to the probe head is IP67.

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## TECHNICAL DATA (continued)

Glasses	Sapphire glass
Seals	EPDM (standard), others on request
Connection head	PBT plastic, protection class IP65 according to EN 60 529 with G2" thread, locknut and mounting bracket
Ambient temperature	0°...+45 °C
Display	Digital display in the connection head for displaying the current turbidity value and probe settings Status LED in the connection head for displaying operating and alarm signals
Setting mode	Combined rotary knob/pushbutton for navigating into operating menu and setting the values
Measuring ranges	can be selected via the settings menu

Range (Display)	NTU (ntu)	FNU (FnU)	FAU (FAU)	g/l (GPL)
0...20	■	■		
0...50	■	■		
0...100	■	■		■
0...200	■	■		
0...500	■	■		
0...1000	■	■	■	
0...2000	■		■	
0...4000			■	
0...9999			■	

### Recommendation:

Always use NTU if turbidity values are expected to be below 2000.  
If turbidity values above 2000 are expected, switch to FAU.

Accuracy	Up to 1000 FNU → ±5% of the measured value and ±1% of the full scale. Up to 2000 NTU/FNU → ±5% of the measured value and ±1% of the full scale. From 1000 to 4000 FAU → ±10% of the measured value ±3% of the full scale. Over 4000 FAU → uncalibrated Measurement of 0 to 100 g/l of silica (SiO <sub>2</sub> ) → ±10% of the measured value ±5% of the full scale In pure transmitted light mode (FAU), only measured values above 1000 FAU are valid
Display resolution	0.01...1NTU/FNU/FAU, depending on the selected measurement range 0.1 g/l concentration of solids of SiO <sub>2</sub>

**CE conformity: The device complies with the legal requirements of the European Directives in force.**

## ERROR CODES

Code	Cause	Output current
crc	internal memory error, default setting active	4...20 mA
CAL	Calibration probe mode activated	0mA
NoSd	Probe not transmitting	21 mA
crSd	Probe parity value incorrect	21 mA
FALS	Incorrect probe type	21 mA
SLEr	Scattered light (90°) transmitter failure	21 mA
dLEr	Transmitted light (180°) transmitter failure	21 mA
LtEr	Temperature too low	21 mA
HtEr	Temperature too high	21 mA
dirt	Probe contamination (no transmitted light at the receiver)	21 mA
nCEr	Probe not calibrated (display only)	4...20 mA
EtEr	EMC fault (display only)	4...20 mA
PSEr	Incorrect supply voltage	21 mA
tESr	Test mode active	21 mA
^^^	Measuring range exceeded	22 mA

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## MAINTENANCE

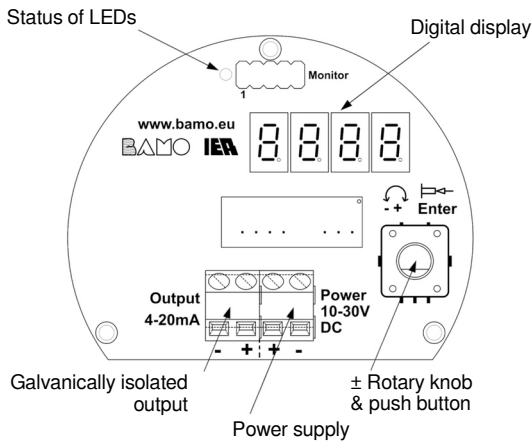
The device requires no specific maintenance if used correctly.  
Only the glass surfaces need to be cleaned gently, depending on how dirty they are.

## INSTALLATION

By sliding the cable and using the cable clamp on the fixing bracket, adjust the immersion depth of the probe so that it is at least 10 cm from the bottom of the tank or channel, to keep it above sludge or any waste that may settle on the bottom.

Plan the installation in such a way as to facilitate access to the immersed probe for regular cleaning.

## OPERATION/SETTINGS

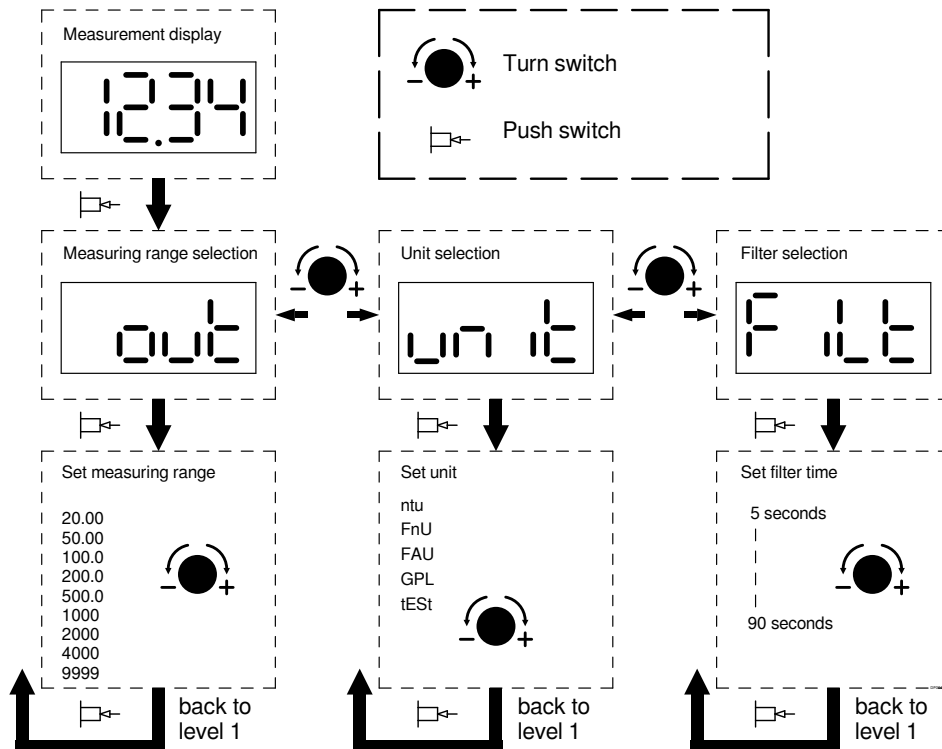


### Setting the measuring ranges:

- **Switch on**  
Wait until the start-up process begins and the LED flashes green.
- Press the push button  
*Display = OUT*
- Press the push button again  
*Display = numerical value*
- Select the desired measuring scale using the rotary knob  
*Stay on selected range*
- After approximately 5 seconds without changing the setting, the display automatically returns to measurement value mode and has now permanently recorded the selected measurement range.

LED flashes green	Unit is ready for operation and the measurement is running
LED off	Device is off (not powered)
LED red	Faulty 4...20mA output

## SETTINGS MENU



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## TESTING WITH THE TEST ADAPTER (TEST UNIT)

The correct functioning of TURBISENS 2 can be checked with the test adapter supplied with the device.



Note: As long as the test mode is active on the TURBISENS 2, the current output is 21mA.

To perform the function test, follow the steps below :

1. Remove the probe from the fluid.
2. Clean the device.
3. Note the measurement scale and the unit.
4. If the measurement range "100" is selected, go directly to step 8.
5. Select the measurement scale "1000" in the "out" menu.
6. Select the "ntu" unit in the unit menu.
7. Select the measurement range "100" in the "out" menu.
8. Select the "tEst" unit in the "unit" menu (the current output is now 21mA).
9. Wait a few seconds.
10. The display should now show "fAiL".
11. Insert the test unit into the measuring section of the immersion probe.



12. Wait a few seconds.
13. The display should now show "PASS".
14. Remove the test adapter (test unit).
15. Display shows "fAiL" again.
16. Test passed, all values are within the allowed parameters.
17. Set back the measuring scale and unit to their previous setting
18. The probe can be put back in place.

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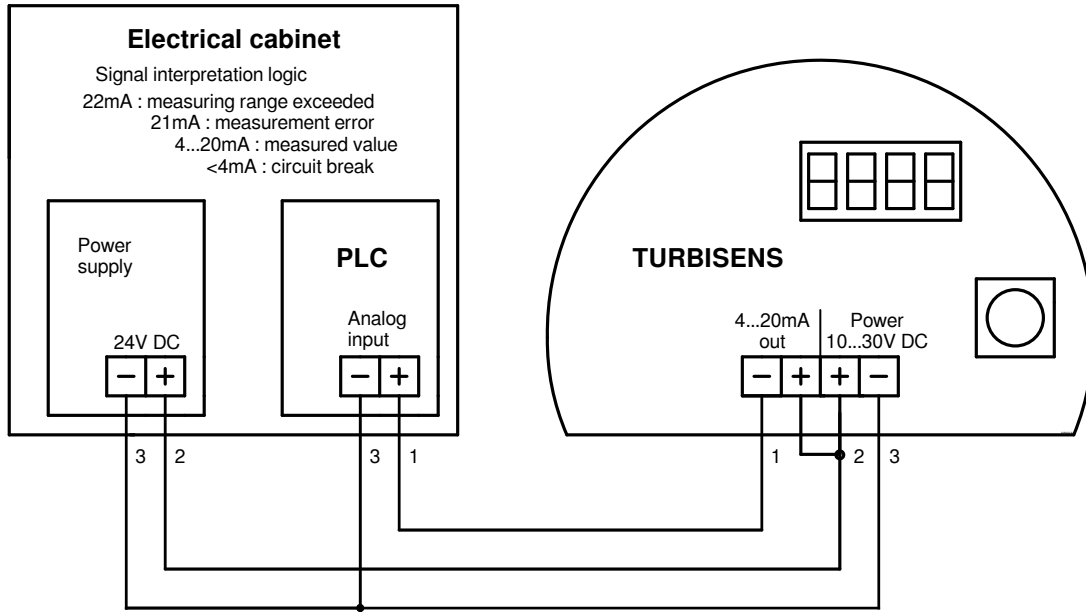
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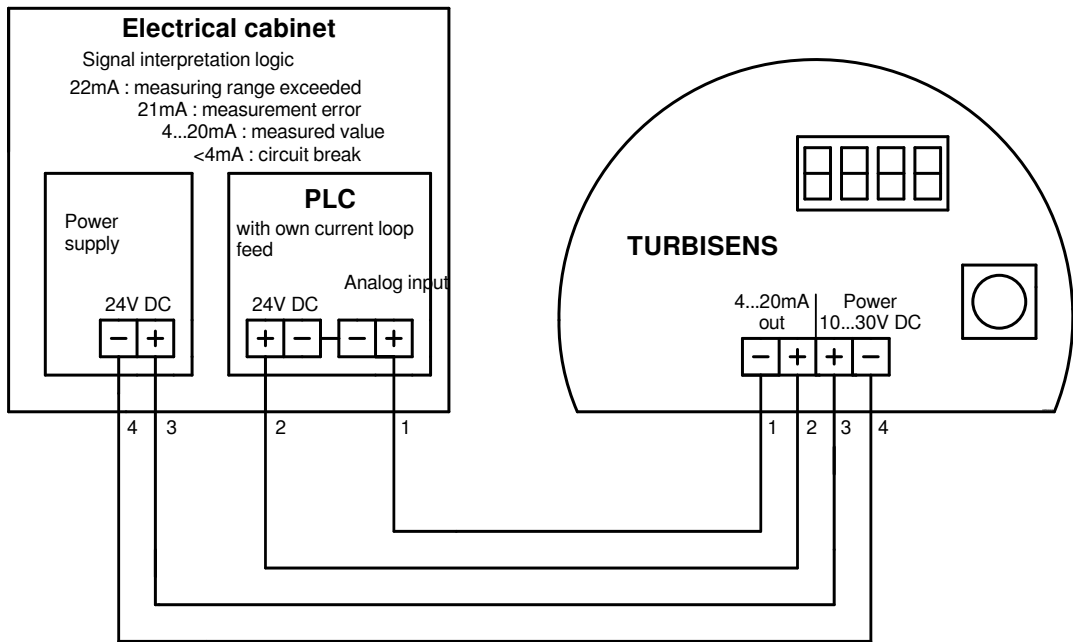
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# ELECTRICAL CONNECTIONS

## 3-wire connection

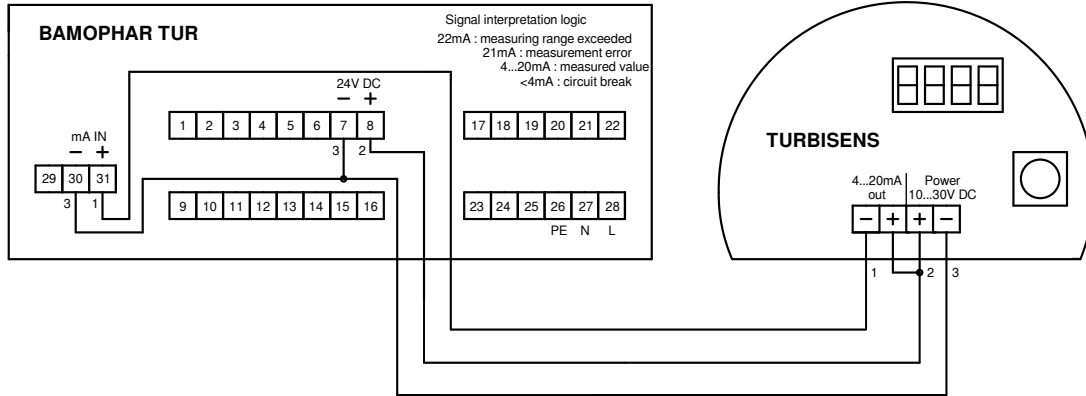


## 4-wire connection



**ELECTRICAL CONNECTION TO BAMOPHAR TUR (optional)**

**TURBISENS BAMOPHAR TUR**



**ELECTRICAL CONNECTION TO BAMOWIZ 213 (optional)**

**TURBISENS BAMOWIZ 213**

