In-line turbidity measurement system
TRUBOMAT GAB

USER MANUAL

BAMO INTERNATIONAL
22, Rue de la Voie des Bans · Z.I. de la gare · 95100 ARGENTEUIL
Tel **+33 (0)1 30 25 83 20** **Web** **www.bamo.eu**
Fax +33 (0)1 34 10 16 05 E-mail export@bamo.fr

SAFETY INSTRUCTIONS

- Installation, commissioning and maintenance may only be carried out by qualified personnel!
- Only connect the unit to the voltage specified in the technical data or on the type plate!
- Disconnect the unit from the power supply during installation/maintenance work!
- Only operate the unit under the conditions defined in these operating instructions!

DESCRIPTION

TRUBOMAT GAB measures the turbidity of the medium optically. A combined attenuated light / scattered light measurement is used for this purpose, where one transmitter and one receiver face each other and another transmitter is arranged orthogonally (at an angle of 90°).
The attenuated an scattered lights are evaluated by electronics integrated in the receiver head,which transmits a 4-20 mA signal to a remote PLC.
The sensor supplies a 4...20mA signal, corresponding to the set measuring range.

TRUBOMAT GAB 20
5 measuring ranges selectable by DIP switch, 0.01...20FNU

TRUBOMAT GAB 1000
5 measuring ranges selectable by DIP switch, 0.1...1000FNU

TECHNICAL DATA

Power supply	24V DC nominal (10...30V DC)
Connected load Auxiliary energy	0,5...1W
Output signal	4...20mA
Ambient temperature	+5...+45 °C
Media temperature	+5...+100 °C
Max. operating overpressure	10bar / 60°C

MATERIAL

Fitting	Stainless steel 316L (1.4404)
Connection head	Plastic housing PBT glass-fibre reinforced, protection class IP65 according to EN 60529
Seals	EPDM (others on request)
panes	Borosilicate glass with CLEANOSIL VMF nanocoating

MEASUREMENT RANGE

TRUBOMAT GAB 20					
DN25...DN100	0.01...1FNU	0.01...2FNU	0.01...5FNU	0.01...10FNU	0.01...20FNU

TRUBOMAT GAB 1000					
DN20...DN65	0.1...0.50FNU	0.1...100FNU	0.1...200FNU	0.1...500FNU	100...1000FAU
DN80...DN100	0.1...0.50FNU	0.1...100FNU	0.1...200FNU	0.1...300FNU	100...1000FAU

Accuracy	±5% of reading, ±1% of current F.S.
Resolution	0.001...0.2FNU depending on the measuring range
Colour/soiling compensation	Integrated with GAB 20 up to DN65
Operating	DIP switch, calibration potentiometer
Signalling	Status LED (green), fault LED (red)
Process connections	Flange on both sides DIN 2633 DN25...DN100 / PN10 TRICLAMP connection on both sides DIN 11850 DN25...DN100 / PN10 more on request

EC Conformity: The device meets the legal requirements of the current European Directives

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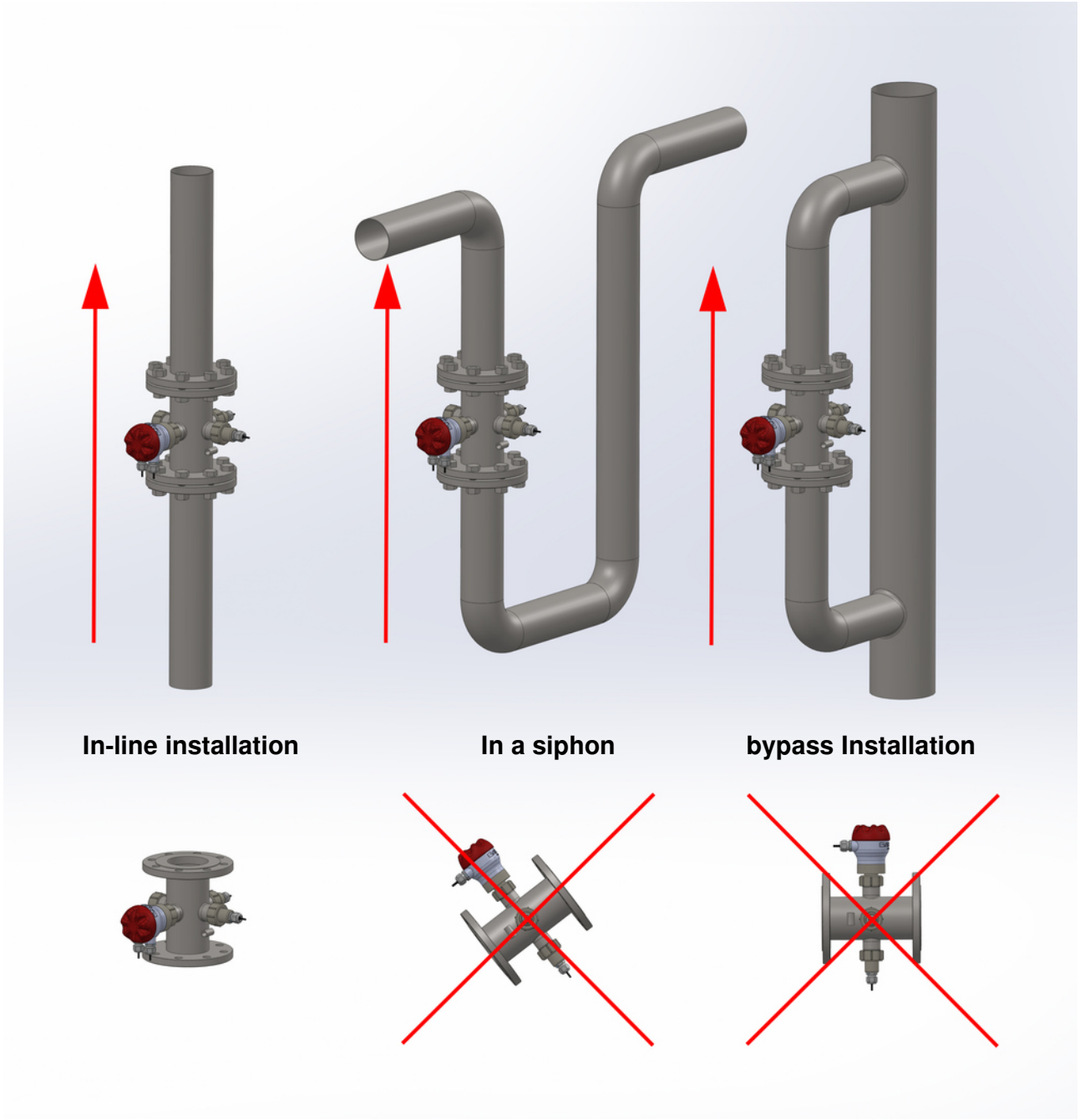
INSTALLATION

The turbidity measuring system can be installed in-line or as a bypass

Note!

Vertical installation only; Ascending liquid only.
Straight distances to respect: 600 mm upstream and 400 mm downsteam.

- The device must be completely filled during the measurement (if necessary, installation in vertical pipe of a siphon).
- Gas bubbles result in false measurements.
- The use of a pipe restriction is possible downstream of the device (Never upstream).
- Optical windows must be clean (clean regularly according to the application)



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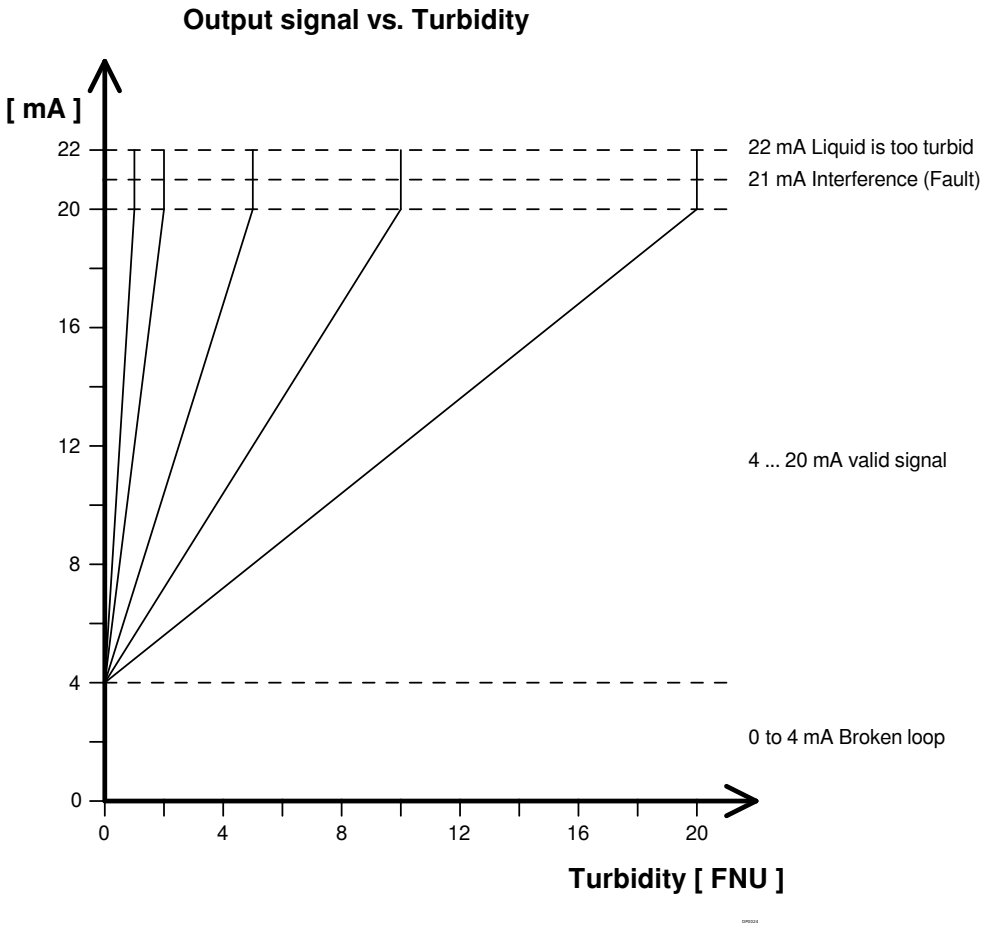
SETTING OF TRUBOMAT GAB 20

The complete system consists of a receiver with microprocessor and two transmitters mounted on the measuring cell.
The measuring range is set via the DIP switches of the receiver module.
The TRUBOMAT GAB provides a 4-20mA output signal for the set range, according to the following diagram:



DIP switch setting

Measuring ranges [FNU]	DIP1	DIP2	DIP3	DIP4	DIP5	DIP6*)
1= 0.01...1	ON	ON	OFF	OFF	OFF	OFF
2= 0.01...2	OFF	OFF	ON	OFF	OFF	OFF
3= 0.01...5	ON	OFF	ON	OFF	OFF	OFF
4= 0.01...10	OFF	ON	ON	OFF	OFF	OFF
5= 0.01...20	ON	ON	ON	OFF	OFF	OFF

*) with DIP 6 = ON --> colour / fouling compensation is switched on.
Note: This function is only available for TRUBOMAT GAB up to DN65

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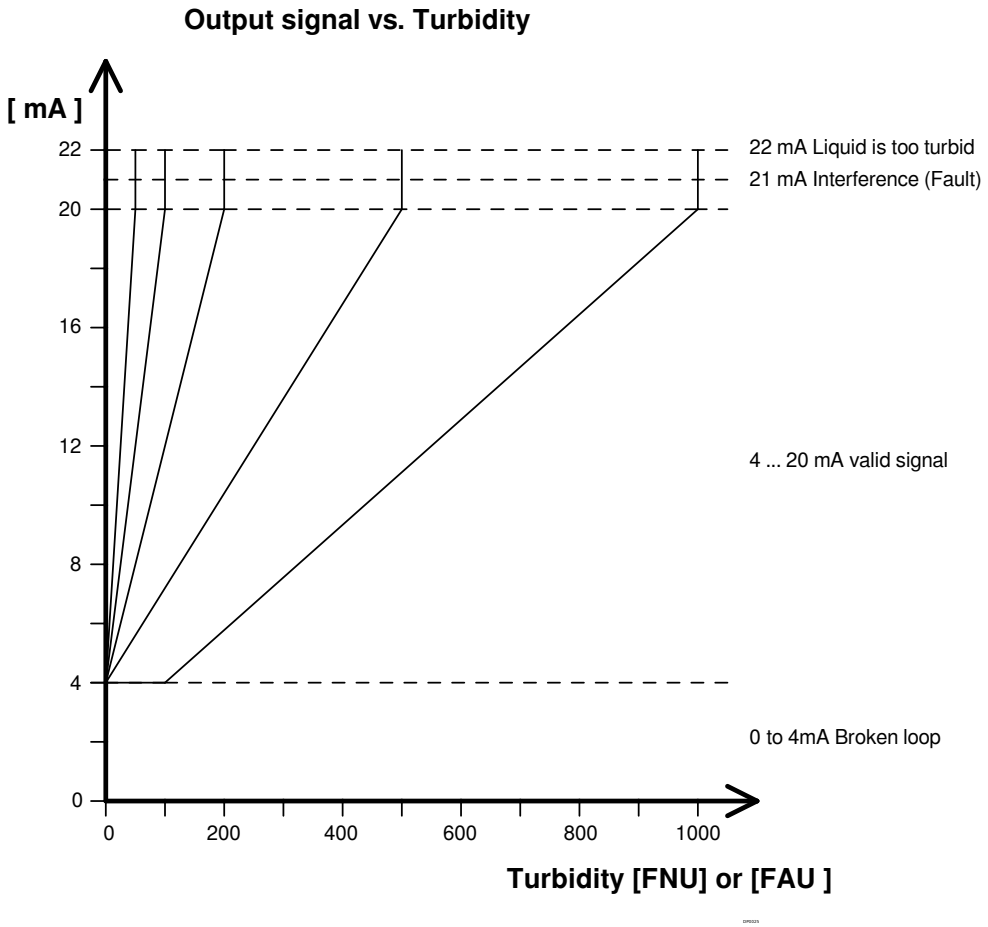
SETTING TRUBOMAT GAB 1000

The complete system consists of a receiver with microprocessor and two transmitters mounted on the measuring cell.
The measuring range is set via the DIP switches on the receiver module.
The TRUBOMAT GAB provides a 4-20mA output signal for the set range, according to the following diagram:



DIP switch setting

Measuring ranges [FNU]	DIP1	DIP2	DIP3	DIP4	DIP5	DIP6*)
1 = 0.1...50	OFF	OFF	OFF	ON	OFF	OFF
2 = 0.1...100	ON	OFF	OFF	ON	OFF	OFF
3 = 0.1...200	OFF	ON	OFF	ON	OFF	OFF
4 = 0.1...500 (**300)	ON	ON	OFF	ON	OFF	OFF
5 = 100...1000	OFF	OFF	OFF	OFF	OFF	OFF

*) Do not switch DIP switches 5 and 6! Position = OFF
**) For fittings with nominal width DN80...DN100

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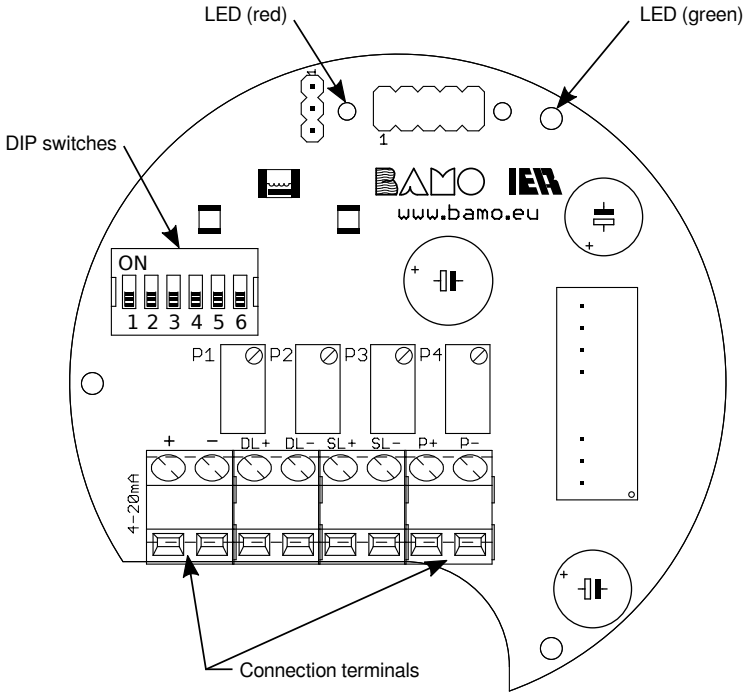
OPERATING DISPLAY / FAULT MESSAGES

Green LED flashes 1x per sec. (approx. 1Hz) Current output 4...20mA	Unit ready for operation, measured value processing running
Green LED flashes, current output 22mA	Overrange >5% - Light is still arriving at the receiver, but the medium is too turbid for the set measuring range. - The light emitters have been have been reversed after dismantling
Red LED lights up, current output 0 mA	Fault in the measuring circuit (interruption/short circuit)
Green LED continuous light, current output 21 mA	Other disturbances - The medium is so turbid that no more light reaches the receiver - Transmitter not connected or not correctly installed
Red LED flashes, current output 4...20mA (only with GAB 20)	Colour / fouling compensation not possible - Glasses too dirty or liquid too much coloured, attenuation >20dB
Green LED Off	Supply voltage missing or unit defective

SETTING

Note:

The TRUBOMAT GAB are calibrated with formazin dilutions: international standards.
Measured values from turbidimeters using other standard than formazin, other light sources and other measuring angles, cannot be compared directly with measurements according ISO 7027.



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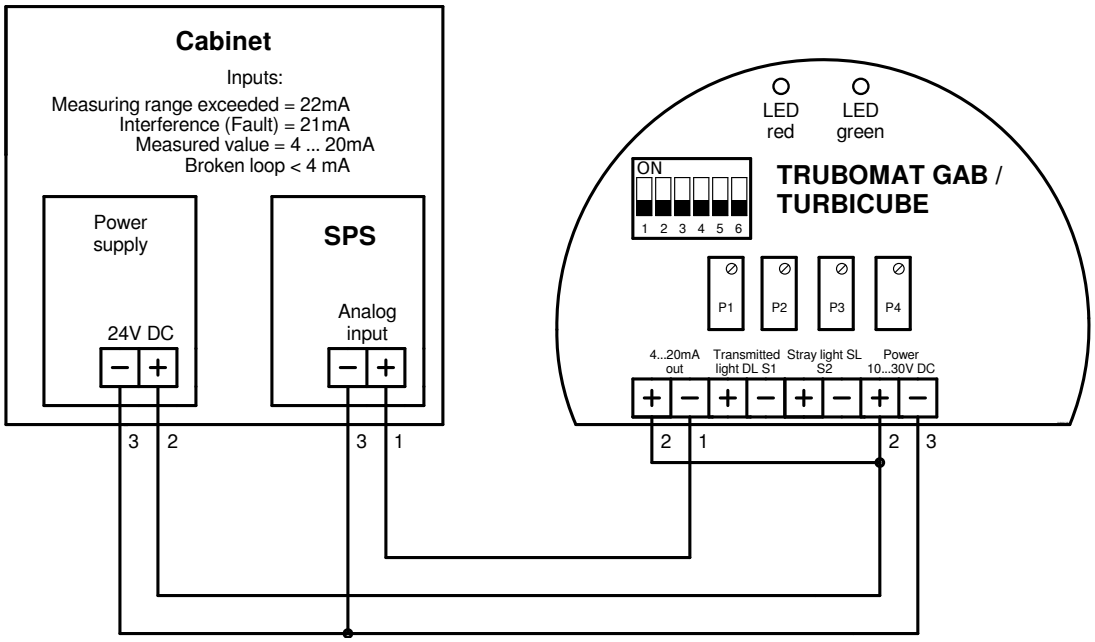
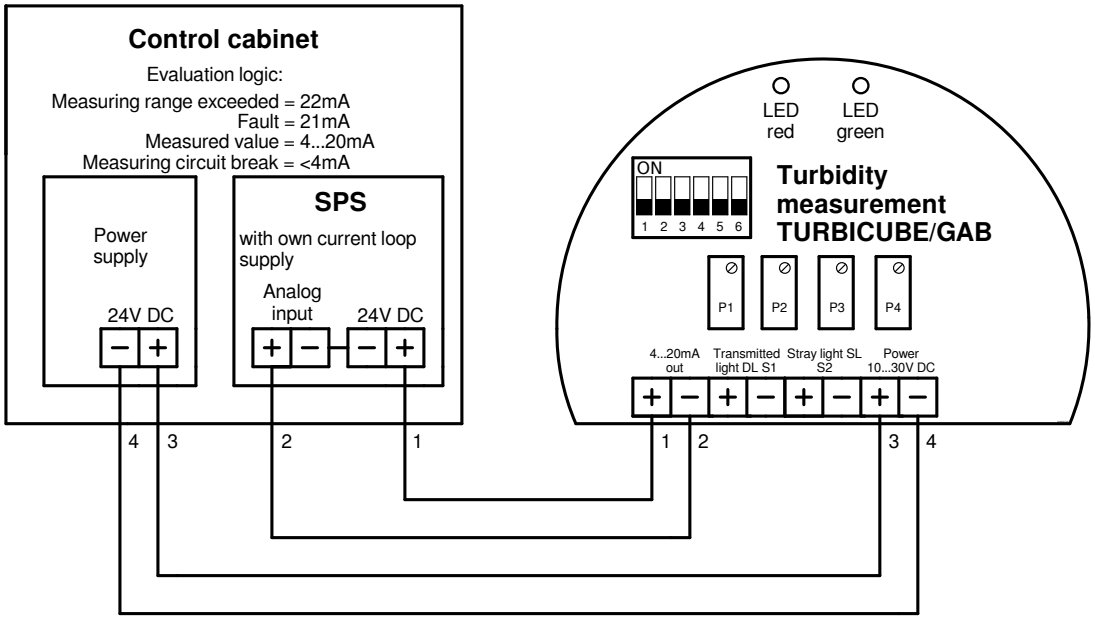
ELECTRICAL CONNECTION

TURBICUBE / TRUBOMAT GAB 3-wire



TURBICUBE / TRUBOMAT GAB 4-wire connection



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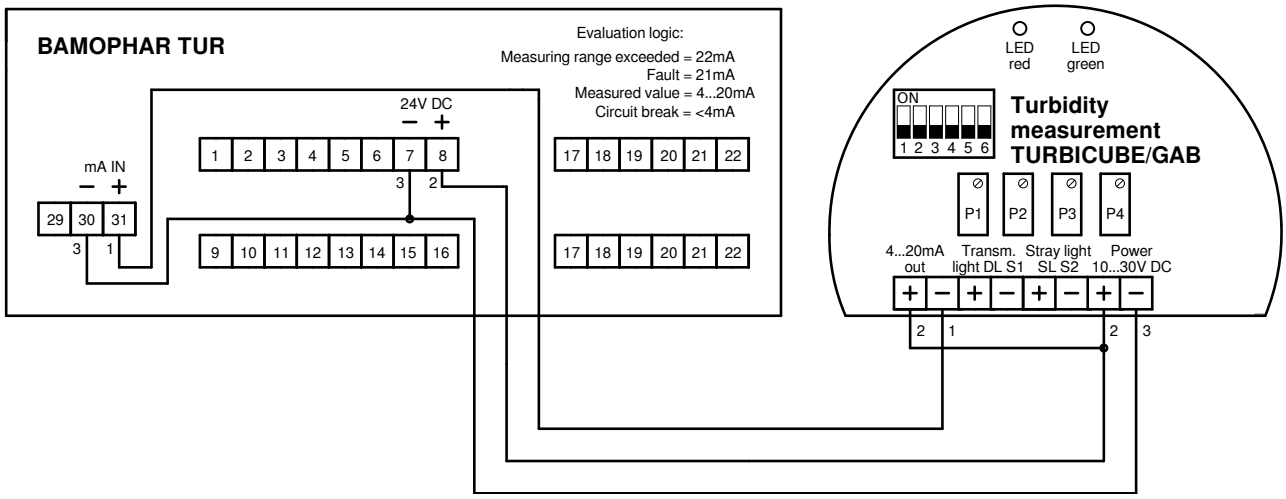
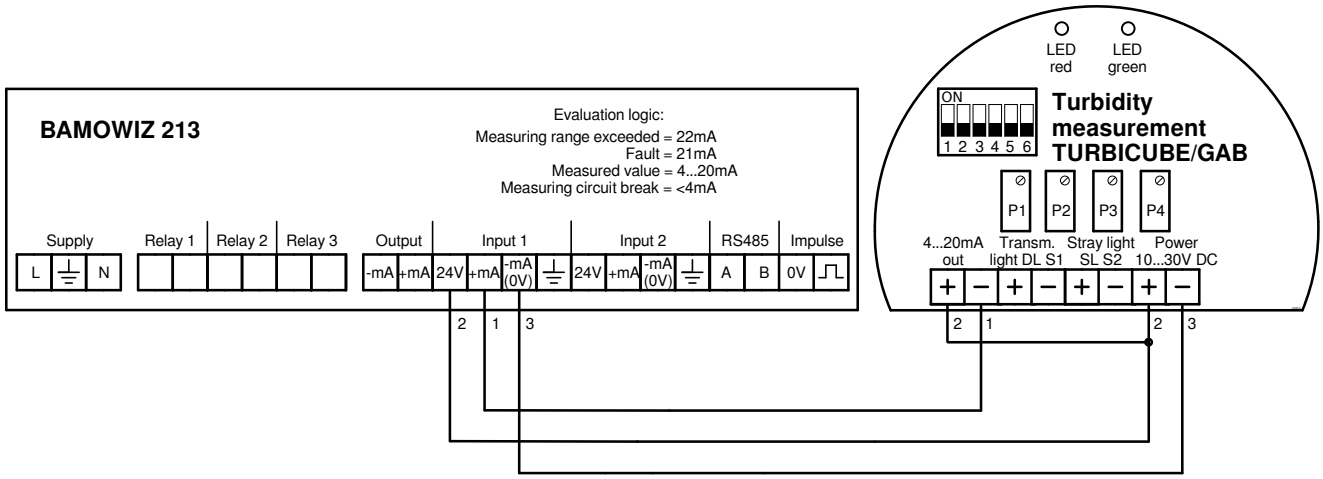
TURBICUBE/TRUBOMAT GAB to BAMOPHAR TUR



TURBICUBE/TRUBOMAT GAB to BAMOWIZ 213



MAINTENANCE

The cleaning intervals depend on the liquid and must be determined on site.

Cleaning the glasses:
- De-energise the turbidimeter
- Depressurise the pipeline and drain the TRUBOMAT.
- Remove the transmitters and the receiver from the measuring cell by unscrewing the union nuts.

- Unscrew the washers using the tool and open-end wrench (SW17) or screwdriver (inserted in the tool hole) provided.

- Then pull out the glasswindow with the supplied suction cup and clean it; Do not use abrasive cleaners.

ASSEMBLY

NOTE: Insert the glass windows so that the side marked with a dot is facing the inside of the measuring cell.

Note: Before reassembly, check the sealing ring and replace it if necessary.

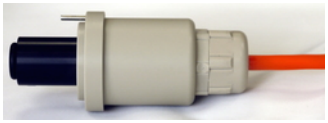
Only use original BAMO IER sealing rings.

- Tighten the washers with a tool (5...6Nm)

Torque wrench TURBICLICK 5.7 (art. no. 444 910) available as an optional accessory

- Dry all parts well before final assembly of the transmitters & receiver.
- Fill the measuring cell and check for leaks.

Note the locking hole!



Note the pin!

Note for cold liquids
With cold media, fogging of the window surfaces must be prevented during assembly and cleaning.
Mounting:
The measuring cell may only be installed in the piping with receiver and transmitters mounted.
Cleaning:
To clean the optical window: the measuring cell must be removed.
Cleaning as described above, reassembly only with receiver and transmitters already mounted.