Product Information ITM-4 **FOOD**

4-Beam-Turbidity Meter ITM-4

Application / Specified Usage

- Turbidity measurement from 0 up to 5 000 NTU resp. 0 up to 1 250 EBC
- Filter monitoring
- Phase separation of low turbid media

Communication

4...20 mA 0/1

Application Examples

- Process control of brewing processes
- Fresh water control in the beverage industry
- Water-/waste water control e.g. in dairys
- Quality control
- Separator monitoring

ITM-4 / GG65

Hygienic Design / Process Connection

- CIP-/ SIP-cleaning up to 130 °C / 266 °F
- Fitting completely made of stainless steel, optical block made of PEEK, glass panes made of sapphire glass
- All wetted materials are FDA-conform
- Further process connections: dairy flange DIN 11851, hygienic thread connection DIN 11864-1 form A, Tri-Clamp, DIN flange

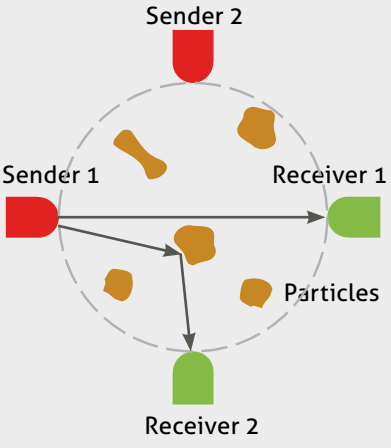
Features / Advantages

- Pollution of the glass panes will be compensated
- Compact device, no separate evaluation unit necessary
- Units NTU and EBC switchable (11 ranges per unit)
- 4 free selectable and externally switchable measurement ranges
- Smallest measurement range 0...5 NTU resp. 0...1 EBC
- Highest measurement range 0...5 000 NTU resp. 0...1 250 EBC
- Smallest pipe diameter DN 25
- Colour independent measurement principle (wave length 860 nm)
- Switching and analog output

Options / Accessories

- Electrical connection with M12 plug-in connector
- Preassembled cable for M12 plug-in connector

Measurement Principle



Measuring Principle of the 4-Beam-Turbidity Meter

The ITM-4 measures turbidity using the 4-beam alternating light method. The transmitter contains two infrared senders and two infrared receivers arranged at right angles to each other. To determine the turbidity value, the senders are alternately activated. When sender 1 is active, receiver 1 detects the transmitted light and receiver 2 detects the light scattered at 90°. When sender 2 is active, the situation is reversed.
An exact turbidity value is calculated from the four measured values of a measurement cycle. Since a transmitted light measurement is available as a reference for each 90° scattered light measurement, interference factors such as contamination of the optics or component ageing can automatically be compensated. Disturbing influences from the sporadic occurrence of solids and air bubbles are largely cancelled out due to the evaluation of multiple measurement cycles.

Specification		
Process connection	dairy flange DIN 11851 hyg. thread conn. DIN 11864 DIN flange Tri-Clamp	DN 25; 40; 50; 65; 80; 100 DN 25; 40; 50; 65; 80; 100 DN 25; 40; 50; 65; 80; 100 DIN: DN 25; 40; 50; 65; 80; 100 ASME: DN 1"; 1½"; 2"; 2½"; 3"; 4"
Materials	connector head thread connection optic block optics window in lid seal	stainless steel 1.4301 / AISI 304, ø 89 mm stainless steel 1.4404 / AISI 316L PEEK, FDA 21 CFR 177.2415 sapphire glass PMMA EPDM, FDA 21 CFR 177.2600
Temperature ranges	ambient process CIP-/SIP-cleaning	-10...60 °C / 14...140 °F 0...100 °C / 32...212 °F up to 130 °C / 266 °F, maximum 30 minutes
Operating pressure		maximum 10 bar / 14.5 psi
Protection class		IP 69 K (with M12 plug-in connector)
Measurement range	NTU EBC	0...5; 10; 20; 50; 100; 200; 500; 1 000; 2 000; 4 000; 5 000 0...1; 2; 5; 10; 20; 50; 100; 200; 500; 1 000; 1 250
Damping (in seconds)	adjustable t_{90} response time	0; 1; 2; 4; 8; 16; 32; 64; 128 sec.
Accuracy		see table "Accuracy ITM-4" below
Measurement priciple	acc. EN 7027	4-beam alternating light
4-beam alternating light	acc. EN 7027	860 nm ±60 nm
Display	LCD with backlight	2 x 8-digit
Electrical connection	cable entry cable connection power supply	2 x M16 x 1.5 2 x M12-plug-in 1.4301 / AISI 304 18...36 V DC, maximum 160 mA
Digital inputs	measurement range switching	E1 and E2, PNP, galvanically isolated
Output	current output switching output	4...20 mA, galvanically isolated 24 V DC, maximum 100 mA, PNP, short-circuit proof
Weight	depends on fitting see dimension tables on page 7	

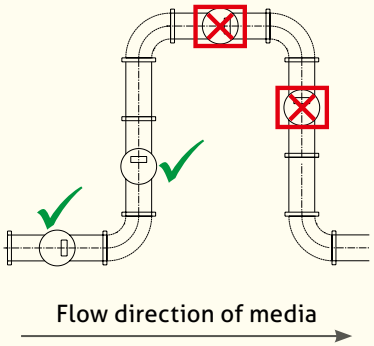
Accuracy ITM-4					
Measurement range	**0...5 NTU 0...1.25 EBC**	**6...100 NTU 1.5...25 EBC**	**101...1 000 NTU 26...250 EBC**	**1 000...5 000 NTU 251...1 250 EBC**	**Annotation**
Resolution	0.1 NTU	0.1 NTU	1 %	10 %	display
Reproducibility (with the same process conditions)	±0.3 NTU	±0.5 NTU	±3 %	±4 %	of measurement value ±1 resolution step
Absolute accuracy acc. to FNU-formazine-scale	±2 NTU ±0.5 EBC	±4 NTU ±1 EBC	±4 %	±6 %	of measurement value ±1 resolution step

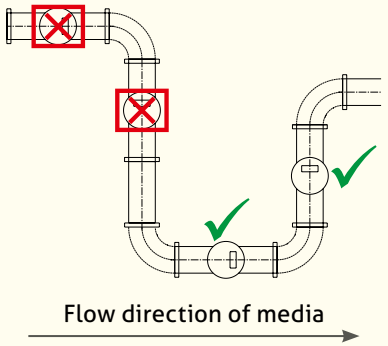
Mechanical Connection / Installation

- **The device has to be installed in that way that the fitting is entirely filled with media.**
  Air or air bubbles are detected as turbidity.

- **Correct installation:**
  - Before or into an ascending pipe.

- **Wrong installation:**
  - Before or into a descending pipe.
  - Into the highest point of a pipe, air bubbles will concentrate there





- Pay attention to the above-mentioned drawings!

- Do not open the screws at the optical PEEK-block!

Conventional Usage

- Not suitable for applications in explosive areas.
- Not suitable for applications in security-relevant equipments (SIL).

Note on CE

- Applicable directives:
  Electromagnetic Compatibility Directive 2014/30/EU
- Compliance with the applicable EU directives is identified by the CE label on the product.
- The operating company is responsible for complying with the guidelines applicable to the entire installation.

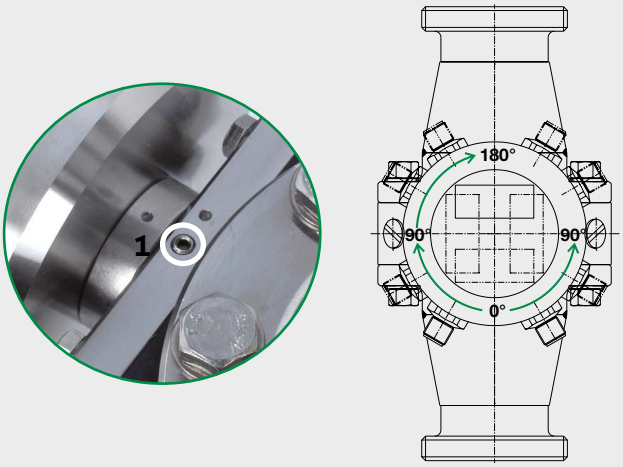
Advice to Pressure Equipment Directive

ITM-4 turbidity meters are pressure accessories as defined by the Pressure Equipment Directive PED 97/23/EC and must therefore be subjected to a conformity assessment procedure. The devices are approved for „Fluid Group 2 Media". By definition, Article 3 Paragraph 3 Sound Engineering Practice applies.

Turning the display

1. Loosen the set screws (1) on top and bottom resp.on the left and right.
2. Turn the head to the desired position.
   Turnig is possible only in steps of 90°!
3. Tighten the two set screws (1).

Fig.: Turning the display



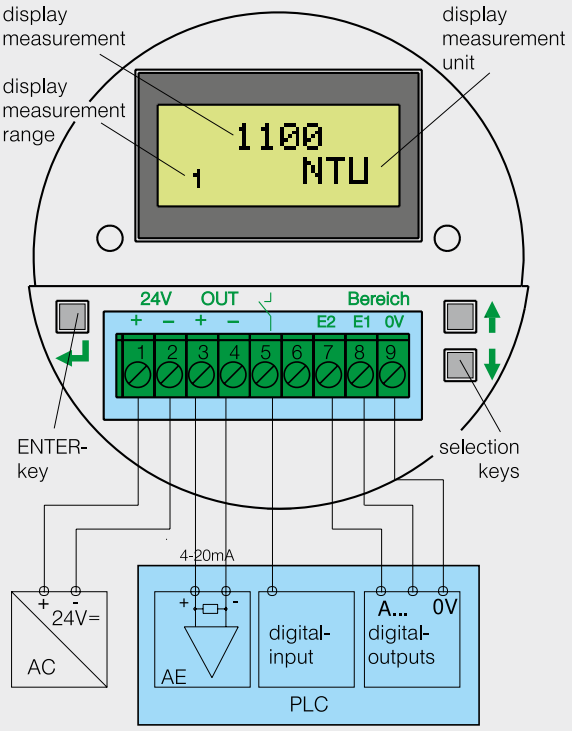
External measurement range selection

- The turbidity meter is delivered with measurement range 1 (0...1 000 NTU / 0...1 000 EBC = 4...20 mA)
- Range 2 (E1=24 V DC), range 3 (E2=24 V DC) and range 4 (E1=24 V DC and E2=24 V DC) can be chosen by means of the ratedsignal +24 V DC (18...36 V DC) at the inputs on pin 7, 8 and 9. Please take note of the connection plan and the table below.
- If these inputs are not connected, measurement range 1 always will be active!

E1*	E2*	Measurement range
0	0	1
1	0	2
0	1	3
1	1	4

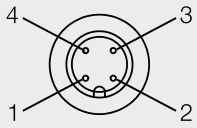
*0 = 0 V DC / 1 = 24 V DC
The digital inputs E1and E2 are DC decoupled to the power supply.
Reference ground: pin 9

Electrical connection ITM-4



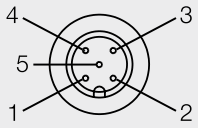
Connecting diagramm M12 plug-in ITM-4/.../M12

M12 plug-in left (4-pin)
power supply /
outputs 4...20 mA



1. + 24 V power supply
2. + output turbidity
3. - output turbidity
4. - power supply

M12 plug-in right (5-pin)
switching output /
digital inputs

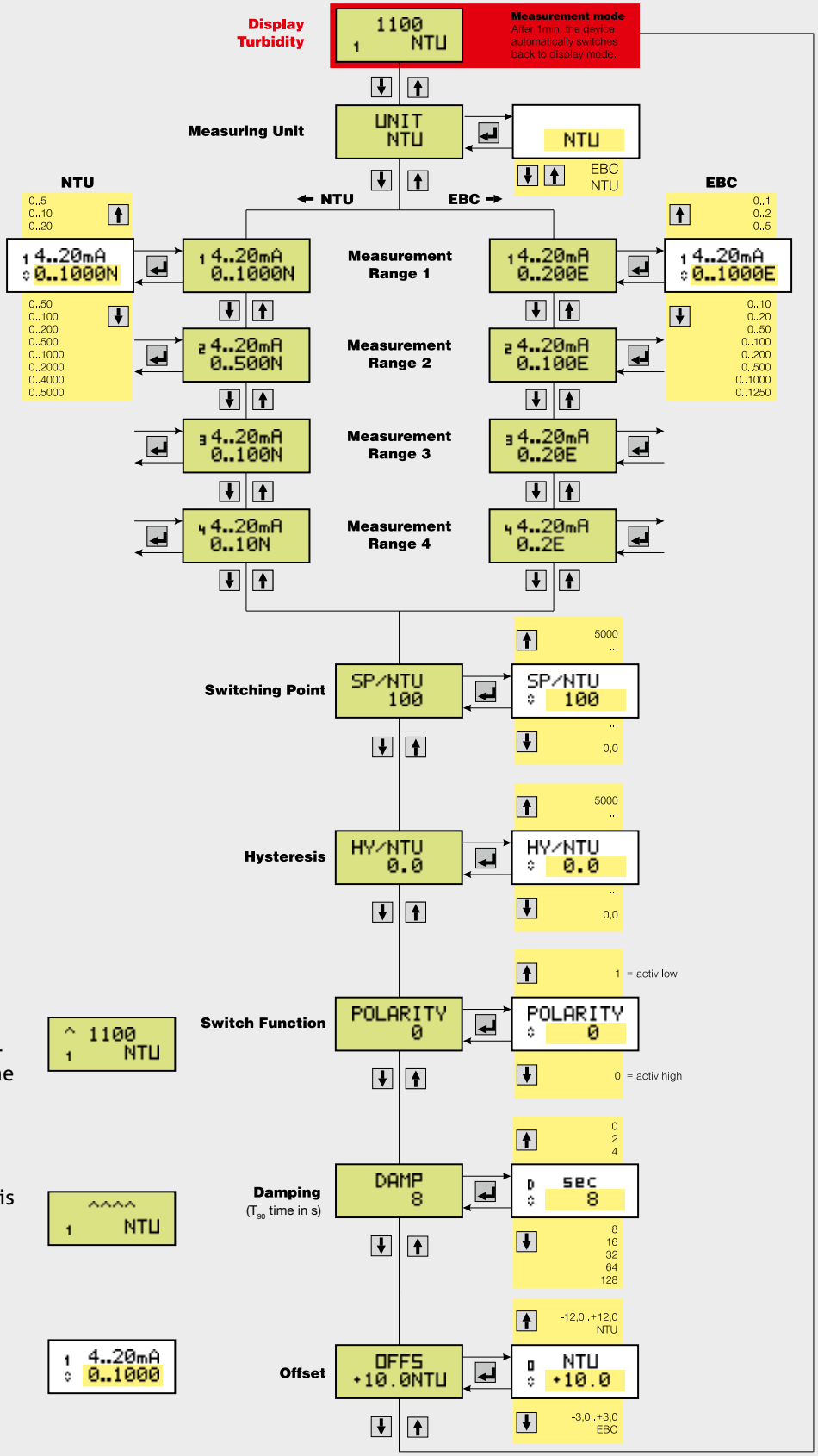


1. E1 input
2. E2 input
3. 0 V input
4. not connected
5. switching output

Note: Switching output

- If the output current is higher than the specified current (80 mA) an electronic fuse switches off the output.
- To reset the switch output disconnect the output (or deactivate and activate the turbidity meter).

Operation diagram ITM-4



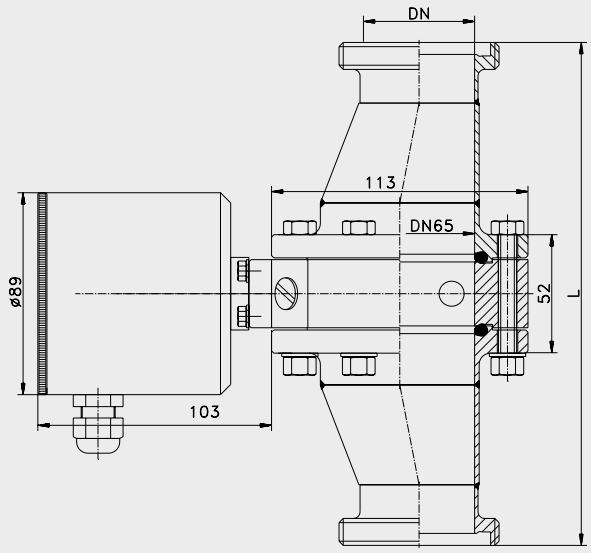
Legend

^-Symbol
"current output overload":
will be displayed if the measured value is higher than the measurement range.
I_{out}: > 20 mA (max. 21.6 mA)

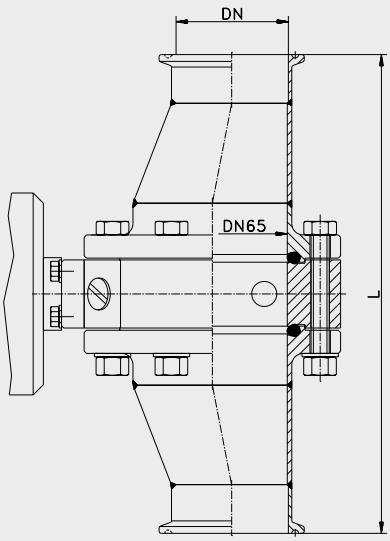
^^^^-Symbol
the current measured value is higher than 5 000 NTU resp. 1 250 EBC
I_{out}: > 20 mA (max. 21.6 mA)

1 (top left)
current editable measurement
◊-Symbol (bottom left)
the value aside is now editable by using the arrow-buttons

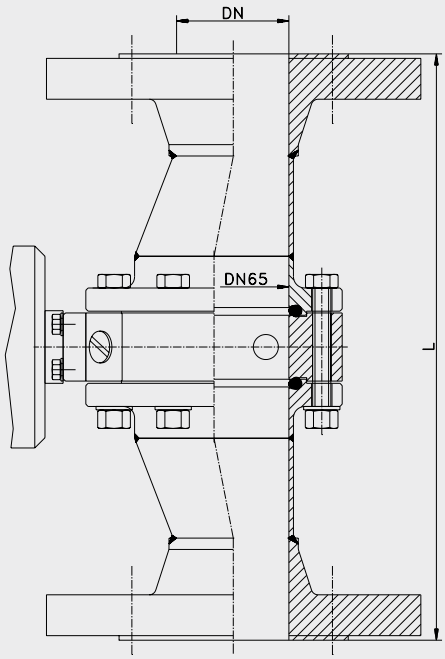
Dairy flange connection ITM-4-GG
Hygienic thread connection ITM-4-HH



Tri-Clamp ITM-4-TC



DIN flange ITM-4-DF



Transport / Storage

- No outdoor storage
- Dry and dust free
- Not exposed to corrosive media
- Protected against solar radiation
- Avoiding mechanical shock and vibration
- Storage temperature 0...40 °C / 32...104 °F
- Relative humidity max. 80 %

Reshipment

- Sensors shall be clean and must not be contaminated with dangerous media! Please note the advice for cleaning!
- Use suitable transport packaging only to avoid damage of the equipment!

Cleaning / Maintenance

- Don't use sharp items or aggressive detergents for cleaning the optics.
- In case of using pressure washers, dont't point nozzle directly to electrical connections!

Disposal

- Electrical devices should not be disposed of with household trash. They must be recycled in accordance with national laws and regulations.
- Take the device directly to a specialized recycling company and do not use municipal collection points.

Total length L of the fitting (tolerance ±2 mm) and weight						
Process connection / Diameter	**Dairy flange (-GG) acc. to DIN 11851**		**Hygienic thread connection (-HH) acc. to DIN 11864-1 form A**		**DIN Flange (-DF) acc. to EN 1092-1 type 11 form B**	
DIN DN 25	356 mm	4 kg	350 mm	4 kg	377.4 mm	8 kg
DIN DN 40	298 mm	4 kg	294 mm	4 kg	321.4 mm	9 kg
DIN DN 50	236 mm	4 kg	228 mm	4 kg	256 mm	10 kg
DIN DN 65	250 mm	5 kg	236 mm	5 kg	290 mm	11 kg
DIN DN 80	250 mm	5 kg	244 mm	5 kg	260 mm	12 kg
DIN DN 100	373 mm	5 kg	365 mm	5 kg	369 mm	13 kg

Total length L of the fitting with process connection Tri-Clamp (-TC) acc. to DIN 32676 (tolerance ±2 mm) with Tri-Clamp-size and weight									
Diameter DIN	**DN 25**	**TC Ø**	**Weight**	**DN 40**	**TC Ø**	**Weight**	**DN 50**	**TC Ø**	**Weight**
	341 mm	50.5 mm	4 kg	275 mm	50.5 mm	4 kg	209 mm	64 mm	5 kg
Diameter ASME	**DN 1"**	**TC Ø**	**Weight**	**DN 1½"**	**TC Ø**	**Weight**	**DN 2"**	**TC Ø**	**Weight**
	360.2 mm	50.5 mm	4 kg	292 mm	50.5 mm	4 kg	223 mm	64 mm	4 kg
Diameter DIN	**DN 65**	**TC Ø**	**Weight**	**DN 80**	**TC Ø**	**Weight**	**DN 100**	**TC Ø**	**Weight**
	256 mm	91 mm	5 kg	216 mm	106 mm	5 kg	321 mm	119 mm	5 kg
Diameter ASME	**DN 2½"**	**TC Ø**	**Weight**	**DN 3"**	**TC Ø**	**Weight**	**DN 4"**	**TC Ø**	**Weight**
	166 mm	77.5 mm	4 kg	172 mm	91 mm	5 kg	305.8 mm	119 mm	5 kg

Accessories	
PVC-cable with M12 connection, brass nickel-plated, IP69K, shielded	
M12-PVC/5G-8m	5 pin, length 8 m
M12-PVC/5G-15m	5 pin, length 15 m
M12-PVC/5G-30m	5 pin, length 30 m
CERT / 2.2	factory certificate 2.2 acc. to EN 10204 (only product contacting surface)
CAL / ITM-4	factory calibration certificate for turbidity meter ITM-4

Order Code

ITM-4

Process Connection / Diameter

GG25	diameter DN 25; process connection dairy flange DN 25 acc. to DIN 11851
GG40	diameter DN 40; process connection dairy flange DN 40 acc. to DIN 11851
GG50	diameter DN 50; process connection dairy flange DN 50 acc. to DIN 11851
GG65	diameter DN 65; process connection dairy flange DN 65 acc. to DIN 11851
GG80	diameter DN 80; process connection dairy flange DN 80 acc. to DIN 11851
GG100	diameter DN 100; process connection dairy flange DN 100 acc. to DIN 11851
HH25	diameter DN 25; process connection hygienic thread DN 25 acc. to DIN 11864-1
HH40	diameter DN 40; process connection hygienic thread DN 40 acc. to DIN 11864-1
HH50	diameter DN 50; process connection hygienic thread DN 50 acc. to DIN 11864-1
HH65	diameter DN 65; process connection hygienic thread DN 65 acc. to DIN 11864-1
HH80	diameter DN 80; process connection hygienic thread DN 80 acc. to DIN 11864-1
HH100	diameter DN 100; process connection hygienic thread DN 100 acc. to DIN 11864-1
TC25	diameter DN 25; process connection Tri-Clamp
TC40	diameter DN 40; process connection Tri-Clamp
TC50	diameter DN 50; process connection Tri-Clamp
TC65	diameter DN 65; process connection Tri-Clamp
TC80	diameter DN 80; process connection Tri-Clamp
TC100	diameter DN 100; process connection Tri-Clamp
TC1"	diameter ASME 1"; process connection Tri-Clamp
TC1,5"	diameter ASME 1½"; process connection Tri-Clamp
TC2"	diameter ASME 2"; process connection Tri-Clamp
TC2,5"	diameter ASME 2½"; process connection Tri-Clamp
TC3"	diameter ASME 3"; process connection Tri-Clamp
TC4"	diameter ASME 4"; process connection Tri-Clamp
DF25	diameter DN 25; process connection DIN flange acc. to EN 1092-1
DF40	diameter DN 40; process connection DIN flange acc. to EN 1092-1
DF50	diameter DN 50; process connection DIN flange acc. to EN 1092-1
DF65	diameter DN 65; process connection DIN flange acc. to EN 1092-1
DF80	diameter DN 80; process connection DIN flange acc. to EN 1092-1
DF100	diameter DN 100; process connection DIN flange acc. to EN 1092-1

Electrical Connection

X	2 x cable gland M16 x 1.5
M12	2 x M12 plug

ITM-4 / GG65 / M12

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