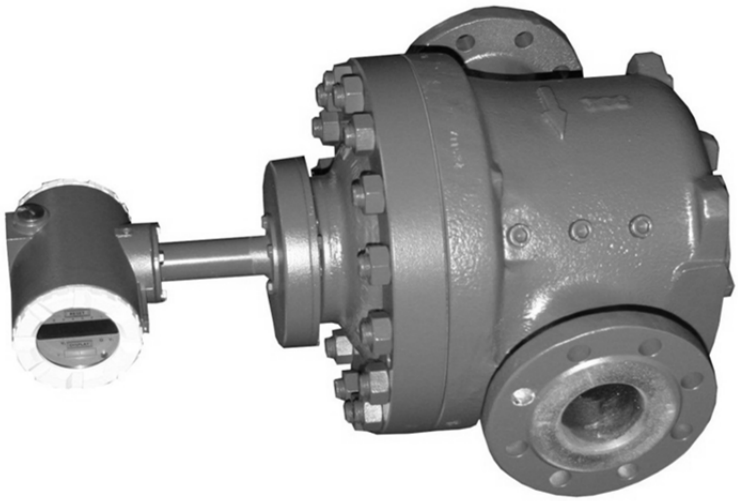
BOPP & REUTHER
MESSTECHNIK

Oval Wheel Meter
with Universal Smart Transmitter
with HART® Communication

Series OaP
UST

Ex ia version

Operating manual



Bopp & Reuther
Messtechnik GmbH
Am Neuen Rheinhafen 4
67346 Speyer
Germany

Phone : +49 6232 657-0
Fax: +49 6232 657-505
info@bopp-reuther.de
www.bopp-reuther.de

A-EN-01222-XIRev.E
05/2020

Inhaltsverzeichnis

Foreword

I. Transport, Delivery, Storage

Always protect devices against humidity, soiling, impacts and damages

Delivery Inspection:

Check the delivery for completeness upon receipt. Compare the device data with the data on the delivery note and in the order records.
Report any in-transit damage immediately. Damage reported at a later date shall not be recognized.

II. Warranty

Please refer the contractual terms and conditions relating to delivery for the scope and period of warranty.
Warranty claims shall be conditional to correct installation and commissioning in accordance with the operating instructions of the device. The necessary installation, commissioning and maintenance work should only be carried out by qualified and authorized personnel..

III. General safety instructions

1. Oval Wheel Meters are reliable, high accurate volumetric measuring devices. They should only be used for their intended purpose. Always observe the pressure and temperature limits stated on the type plate, as well as all other technical data and safety information during device installation, start-up and operation.
2. Always observe national and international regulations concerning the operation of devices and systems under pressure.
3. Prior to installation, the operator has to ensure that the pressure bearing parts have not been damaged during transportation.
4. The devices have to be installed, operated and serviced by qualified personnel. The operator has the responsibility to ensure that the personnel have received sufficient and appropriate training. In cause of doubt, please contact the manufacturer.
5. The operator must ensure that the materials used (wetted parts) of the device compared with the measured liquid are chemically resistant.
6. The gaskets or sealing elements must be handled with care according to the operating instructions.
7. The tightening torques for the screw connections at the cover and lower part of the housing, as well as for the flange connections in the pipework are available on request.
8. The sensors (for the pulse pick-up and, if necessary, for the temperature measurement) should only be replaced once it has been ascertained that the meter is depressurised.
9. Symbols used

Warning!
Failure to observe this warning can lead to injury of persons or a security risk.

Attention!
Non-compliance can lead to faulty operation or damage to the device.

IV. CMOS - Components

The electronic transmitter uses CMOS chips. Therefore, when the electronics casing is opened, static electricity discharges must be avoided. These can damage the electronic transmitter. Bopp & Reuther Messtechnik GmbH may not be held liable for any damages, which are caused either indirectly or directly by improper handling.

Use only antistatic transport containers for transport of electronic assembly groups.

1. Identification

Manufacturer Bopp & Reuther Messtechnik GmbH
Am Neuen Rheinhafen 4
67346 Speyer
Telefon : +49 6232 657-0
Telefax : +49 6232 657-505

Product type direct volumetric meters (positive displacement flow meters)

Product name Oval Wheel Meter series OaP with Universal Smart Transmitter (USTI) and HART® Protocol

Version-no. A-EN-01222-00E

2. Range of Application

Quantity control of certain industrial liquids is an economic necessity considering the high value of these products. The volume measuring instruments required for these procedures must be adjusted to the particular operating conditions and the characteristics of the liquids to be measured, both with respect to design and the materials used for these instruments.
The field of application of all Oval Wheel Meters of the OI series comprises measuring, dosage, and controlling of liquids. Oval Wheel Meters of the OI series meet all of these requirements. They are used for the measurement of intermediate and final liquid products such as liquified gases, acids, alkaline solutions, fats, alcohol, solvents, dispersions, polymers, polycondensates, paints, colors, adhesives and other media.
Please note the Oval Wheel Meter's capability to measure liquids with very high viscosities with nearly no pressure loss.

The high accuracy provided by the OaP series Oval Wheel Meters ensure a maximum quality of the products being manufactured.

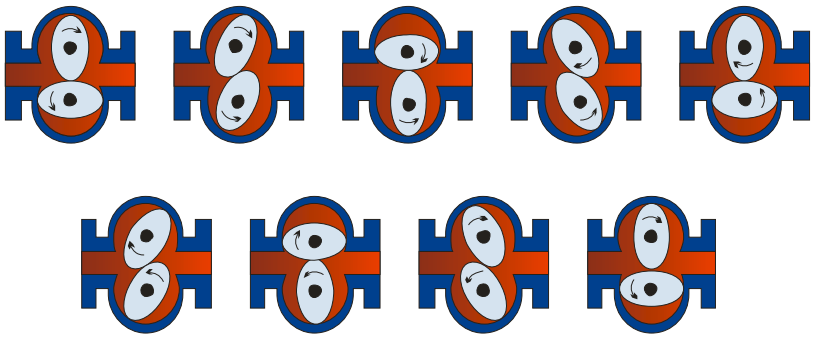
Oval Wheel Meters of the OaP series are manufactured with nominal widths of 25 to 400 mm. Depending on the nominal width they can be used for up to PN 100 with a maximum operating temperature of up to 170 °C.

For all Oval Wheel Meters a wide choice of accessories is available including mechanical, electrical and electronic transmitters. Their signals may be used for remote counting, flow measuring and flow control as well as for data processing systems. In addition, automatic batch control systems (with appropriate valves) of the most varied constructions and working principles are available to facilitate dosage of media.
The USTI Universal Smart Transmitter represents state-of-the-art transmitter electronics. It processes the electrical pulses of the different sensor systems to display volume and flow of the fluid. The flow-rate is displayed with an analogue 4-20 mA current loop (in accordance with NAMUR NE 43). The USTI is 2-wire-based and is also supplied with auxiliary power by this current loop. Additionally a separate pulse output according to NAMUR is provided.
With the integrated HART®-interface, long-distance data transmission to a control room or a portable on-site data terminal may be achieved by the same analog current loop. All relevant operating or configuration data can be read out from the transmitter or stored into the transmitter. Thus the operational mode of the Oval Wheel Meter can be optimized for any measuring task directly on-site or via a control system.

3. Working Principle and System Design

3.1 Measuring Principle

Oval Wheel Meter belongs to the group of direct volumetric meters for liquids with movable partition walls (displacement flow meters).
The Oval Wheel Meter consists of measurement chamber housing with two pivoted oval wheels which are toothed and roll off each other in counter-rotations.
The diagram displays oval wheel movement during the measurement process.



Each revolution the oval wheels displaces a discrete volume of liquid (defined by the space between the oval wheel and measurement chamber) through the chamber.

For measuring purposes the rotation of the oval wheel is transmitted from the pressure chamber to the outside via an electromagnetic sensor according to the Wiegand principle and processed to be available as standardized electrical signal or counter display.

3.2 System design

The Oval Wheel Meter with Universal Smart Transmitter (USTI) consists of the following components:

Transducer:
Measuring of the volumetric flow and the volume of liquids is performed by the Oval Wheel Meter.

Pulse pick-up:

For signal detection pulse pick-ups serve after Wiegand principle of series AG44

Transmitter (USTI):
The USTI electronic transmitter pre-processes and evaluates the meter pulses.
An analog 2-wire based 4 - 20 mA current loop, a digital communication module with HART® protocol as well as a separate pulse output for the measuring of the volume (original pulses or scaled pulses) according to NAMUR are standard features of the device.

4. Input

4.1 Measured value

Volume and volumetric flow

4.2 Measuring range

Typw	DN	Flowrate Qmax	Ranges at viscosity	< 0.3 mPa·s		0.3-1.5 mPa·s		1.5-150 mPa·s		upto 350 mPa·s		upto 1000 mPa·s		upto 3000 mPa·s	
		ℓ /min		ℓ /min	m³/h	ℓ /min	m³/h	ℓ /min	m³/h	ℓ /min	m³/h	ℓ /min	m³/h	ℓ /min	m³/h
OaP 5	25	50	min	8	0.5	5	0.3	5	0.3	2.5	0.15	1.25	0.075	0.45	0.027
			max	40	2.5	50	3	50	3	25	1.5	12.5	0.75	4.5	0.72
			continuos	16	1.0	33	2	45	2.7						
			batching			45	2.7	50	3						
OaP 10	25	100	min	16	1.0	10	0.6	10	0.6	7	0.42	3.5	0.20	1.2	0.072
			max	80	5.0	100	6	100	6	70	4.2	35	2.0	12	0.72
			continuos	33	2.0	66	4	90	5.4						
			batching			90	5.4	100	6						
OaP 50	50	300	min	50	3.0	30	1.8	30	1.8	18	1.08	9,0	0.54	3	0.18
			max	250	15	300	18	300	18	180	10.8	90	5.4	30	1.8
			continuos	100	6	200	12	270	16.2						
			batching			270	16.2	300	18						
OaP 125	65	700	min	100	6	70	4.2	70	4.2	60	3.6	40	2.4	15	0.9
			max	500	30	700	42	700	42	600	36	400	24	150	9
			continuos	200	12	420	25.2	525	31.5						
			batching			560	33.6	630	37.8						
OaP 250	80	1200	min	200	12	120	7.2	120	7.2	100	6	60	3.6	30	1.8
			max	1000	60	1200	72	1200	72	1000	60	600	36	300	18
			continuos	400	24	720	43.2	1000	60						
			batching	500	30	960	57.6	1200	72						
OaP 600	100	3000	min	400	24	250	15	250	15	200	12	150	9	75	4.5
			max	2000	120	3000	180	3000	180	2500	150	1500	90	750	45
			continuos	800	48	1650	100	2500	150						
			batching	1000	60	3000	180	3000	180						
OaP 1200	150 6”	5000	min	800	48	500	30	500	30	400	24	250	15	120	7.2
			max	4000	240	5000	300	5000	300	4000	240	2500	150	1200	72
			continuos	1600	96	2500	150	3500	200						
			batching	2000	120	4000	240	4000	240						
OaP 2000	200 8”	8000	min	1300	80	800	48	800	48	660	40	400	24	200	12
			max	6500	400	8000	480	8000	480	6600	400	4000	240	2000	120
			continuos	2600	160	4000	240	5500	320						
			batching			5000	300	6600	400						
OaP 3200	300 12”	12000	min	2000	120	1200	72	1200	72	1000	60	600	36	300	18
			max	10000	600	12000	720	12000	720	10000	600	6000	360	3000	180
			continuos	4000	240	6000	360	8000	480						
			batching			8000	480	10000	600						
OaP 4000	400 16”	20000	min	3200	200	2000	120	2000	120	1500	90	1000	60	400	24
			max	16000	1000	20000	1200	20000	1200	15000	900	10000	600	4000	240
			continuos	6600	400	10000	600	13500	800						
			batching					15000	900						

Measuring ranges for cold water: column 0.3-1.5 mPa·s
For continuous operation apply 50%
and for max. flow rate resp. batching
70% of the line 2 (max)
> 150 mPa·s special toothed
Oval wheels are special toothed for cast wheels OaP 10 - 4000

Measuring ranges for hot water: column < 0.3 mPa·s
< 0.3 mPa·s line min. to continuous.

5. Output

5.1 Output signal

The output signals are available as analog output or as current pulse output with two-wire technology, as well as separate NAMUR pulse output.

5.1.1 Analog current output

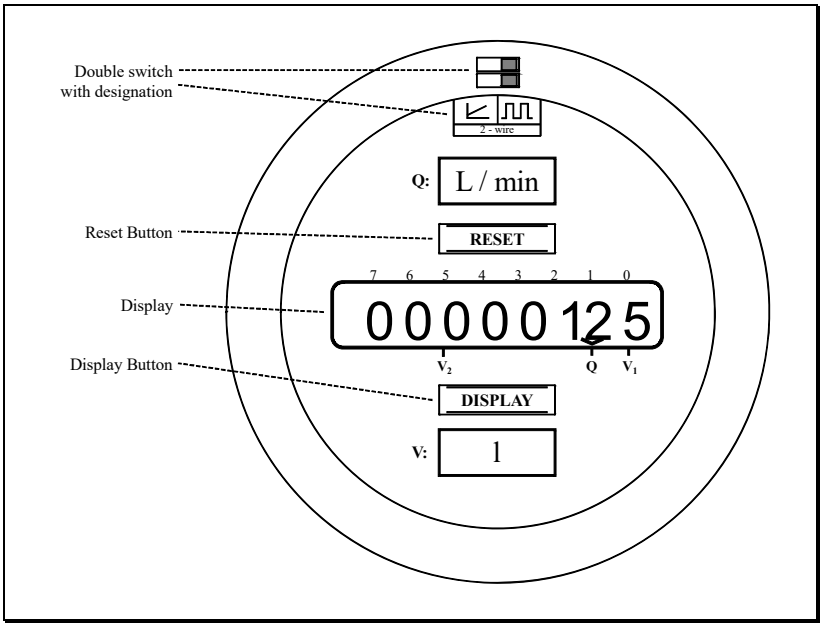
The flow is a unit signal output of 4 to 20 mA. Initial value, final value and attenuation can be pre-set. The analog current output transmits the analog flow measurement value within the range of 4 to 20 mA.

5.1.2 Pulse outputs

There are two different types of pulse outputs (current pulse or NAMUR pulse) for the transmission of volume. The output can be set as either an original pulse without evaluation or as a scaled pulse with selectable pulse width. This configuration applies to both types of pulse outputs. The pulse value can be scaled with an additional factor with respect to the internal meter advance. The original pulse has a set pulse width of 0.5 ms. The maximum output frequency is 1 kHz. The pulse width for the scalable pulse can be selected. The maximum output frequency is limited accordingly due to this.

5.1.2.1 2-wire-current pulse output

On the two-core current loop, the output signal is outputted as a current pulse between 4 ma = low and 20 mA = high. This pulse output can be activated by means of a double cut-out on the power supply circuit board. The current pulse is provided at the terminals 1 and 2 of the current loop. The analog measurement signal of 4 to 20mA for the flow is no longer available then. HART® communications is only possible to a limited degree.



5.1.2.2 Pulse output according NAMUR

The NAMUR pulse output pulse is provided at the terminals 3 and 4. The signals are structured according to the European standard, EN 60947-5-6.

5.2 Load

Several parameters must be considered for the allowable load.
In order to insure secure HART® communications, the limits for the minimal load with $R_L \geq 230\ \Omega$ and the maximum load with $R_L \leq 1100\ \Omega$ must be observed.

Maximum load:

The maximum load is dependent on the supply voltage. The following relations exist:

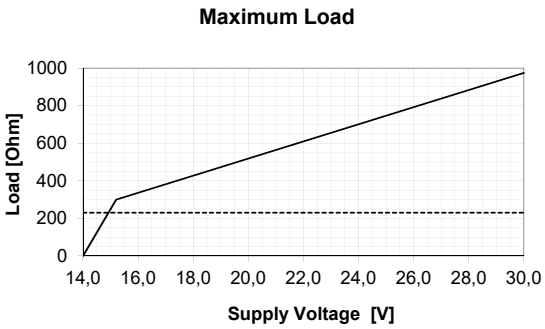
For U_B < 15.2V :

$R = (U_B - 14V) / 0{,}004A$

For $U_B \geq$ 15,2V:

$R = (U_B - 8{,}5V) / 0{,}022A$

Resistances are given in Ω.



5.3 Electrical and thermal safety data

1. Power supply and signal circuit (terminals 1+2) for the connection to an approved, fail-safe 4 to 20 mA current loop.

Voltage	U_i	=	DC 30V
Amperage	I_i	=	110 mA
Output	P_i	=	825 mW
Internal effective inductivity	L_i	<	0.6 mH
Internal effective capacity	C_i	<	34 nF

2. Floating NAMUR opto-coupler output (terminals 3+4) for connection to fail-safe circuits.

Voltage	U_i	=	DC 18 V
Output	P_i	=	100 mW
Internal effective inductivity	L_i	≤	4 µH
Internal effective capacity	C_i	≤	16 nF

3. Measurement value sensor circuit with ignition protection type, Ex ia IIC, for the connection of passive sensors, galvanically connected with power supply and signal circuits.

Sensors	Coil	Contact
Connection terminals	7 and 8	5 and 6
Voltage Uo	1 V	6.6 V
Amperage Io	4 mA	23 mA
Output Po	1 mW	37 mW
Max. external capacity Co	≤ 100 µF	≤ 22 µF
Max. external inductivity Lo	≤ 1 H	≤ 35 mH
Max. external capacity Co (mixed switching-on)	≤ 4 µF	≤ 0.9 µF
Max. external inductivity Lo (mixed switching-on)	≤ 1 H	≤ 1.5 mH
Inductivity-resistance relation Lo/Ro	40.5 mH/Ω	0.93 mH/Ω

4. The following ambient temperature range applies to the Universal Smart Transmitter Type ***USTI***:
   -20°C ≤ Ta ≤ +70°C (Ex i - variant)

The influence of the process temperature on the transmitter must be considered.

6. Characteristic Parameter

6.1 Reference conditions

All oval wheel counters are calibrated at test benches approved for fiscal metering. Pressure: 2 to 7 bar, temperature: 20°C to 30 °C

6.2 Measuring accuracy

Lin. ± 0.05% to ± 0.3% of the measured value (depending on product characteristics and measuring range)

6.3 Repeatability

< 0.02%

6.4 Settling time

1 s

6.5 Switch-on drift

2 s

6.6 Long-term drift

< 0.005% / year

6.7 Influence of ambient temperature

< 0.005% / °C

6.8 Influence of media temperature

Negligible

7. Operating conditions

7.1 Installation conditions

7.1.1 Installation instructions

Warning!

Before mounting and operating the device, carefully read and observe the installation instructions.

Before mounting or disassembling the device, **depressurize** and **cool down the system**.

7.1.1.1 General information

- Bopp & Reuther Oval Wheel Meters are precision flow meters. Inlet and outlet are covered with protective caps against foreign substances. Remove caps shortly before putting the device into operation.

- Observe the operating data marked on the oval wheel, the order confirmation and the configuration data sheet. If you want to use the device under differing operating conditions, consult Bopp & Reuther Messtechnik GmbH indicating the factory number.
- Install the Oval Wheel Meter in the pressure pipe behind the pump (approximately 3 m liquid column pressure drop for nominal flow rate).
- Install the Oval Wheel Meter in such a way, that it remains filled with liquid also in non-operating condition.
- To avoid measuring inaccuracies due to gas bubbles or contamination, preventive measures must be taken (e.g. gas separator or strainer).

7.1.1.2 Installation

- Flush and purge the pipe. When doing so, replace the Oval Wheel Meter with a suitable piece of piping.
- Do not remove the caps on the in- and outlet of the Oval Wheel Meter until the device is being installed to prevent ingress of foreign substances.
- The flow direction is indicated by an arrow on the housing of the Oval Wheel Meter.
- The housing cover of the Oval Wheel Meter is to be placed vertically so that the axes of the Oval Wheel are in a horizontal position independent of the position of the pipe.
- The Oval Wheel Meter must be installed free from strain.

The sensor can be used together with the pulse pick-up series AG44 according to the protection type intrinsic safe II 1/2G Ex ia IIC T4 Ga/Gb in the Ex-area.

EMV protection can only be granted with shielded wires. The shielding must be grounded in the metal-PG-connecting bolts.

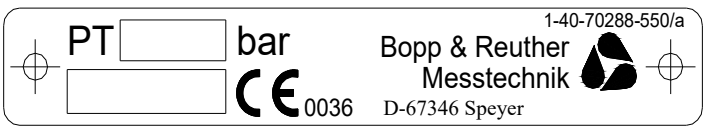
7.1.2 Start-up instructions

Important

- **Start-up the Oval Wheel Meter slowly increasing the flow quantity.**
- **For systems measuring viscous fluids, which have to be heated, be sure to switch on the heater of the Oval Wheel Meter, the filter and the pipe well ahead in time; only then the Oval Wheel Meter may be started-up while the flow quantity is slowly increased.**

Type plates with pressure relevant information

Additional type plate at the flange connection with CE0036 mark.
The used abbreviations have the following meaning:
PT: Achieved test pressure and test date



7.2 Environmental conditions

7.2.1. Ambient temperature

-10°C to +70°C

7.2.2 Storing temperature

OaP: -20°C to +70°C
USTI: -20°C to +70°C
OaP with USTI: -20°C to +70°C

7.2.3 Climatic category

Class D IEC 654-1

7.2.4 Degree of protection

IP65 IEC 529 / EN 60529

7.2.5 Electromagnetic compatibility

DIN EN 61000-6-2; DIN EN 61000-6-3

Electromagnetic compatibility may only be warranted when the electronics housing is closed.

7.3. Process conditions

7.3.1 Media temperature

	OaP 5	OaP 10	OaP 50	OaP 125	OaP 250
A2	---	---	---	< 110°C; < 170°C with high temperatures tolerances	< 110°C; < 170°C with high temperatures tolerances
D2	< 170°C;	< 170°C	< 170°C	< 170°C	< 170°C

	OaP 600	OaP 1200	OaP 2000	OaP 3200	OaP 4000
A2	< 90°C; < 170°C with high temperatures tolerances	< 90°C; < 170°C with high temperatures tolerances	---	---	---
D2	< 170°C	< 170°C	< 170°C	< 170°C	< 170°C
B2	< 60°C	< 60°C	< 60°C	---	---

7.3.2 State of aggregation

Suitable for liquids

7.3.3 Viscosity

0.3 - 3000 mPa·s

7.3.4 Media temperature range

-10 to +170°C

7.3.5 Media pressure range

Depends on the material used (for materials see section 8.3.)

	OaP 5	OaP 10	OaP 50	OaP 125	OaP 250	OaP 600	OaP 1200	OaP 2000	OaP 3200	OaP 4000
A2				PN 25 PN40 PN 63 PN 100	PN 25 PN40 PN 63 PN 100	PN 25 PN40 PN 63 PN 100				PN 25
D2	PN40 PN 100	PN40 PN 100	PN40 PN 63 PN 100	PN 25 PN40 PN 63 PN 100	PN 25 PN40 PN 63 PN 100	PN 25 PN40 PN 63 PN 100	PN 25 PN40 PN 63 PN 100	PN 25 PN40 PN 63 PN 100	PN 25 PN40	PN 25
B2						PN 25 PN40	PN 25 PN40	PN 25 PN40	PN 25 PN40	

Attention!

At temperatures higher than 50°C, the maximum pressure must be reduced according to the nominal pressure according to the tables "Pressure/temperature assignment of the flange standard DIN EN 1092

7.3.6 Flow rate range

Values in l/min

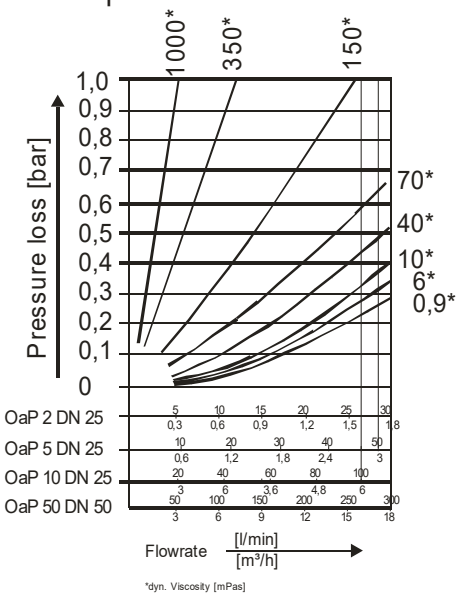
OaP 2	OaP 5	OaP 10	OaP 50	OaP 125	OaP 250	OaP 600	OaP 1200	OaP 2000	OaP 3200	OaP 4000
30	50	100	300	700	1200	3000	5000	8000	12000	20000

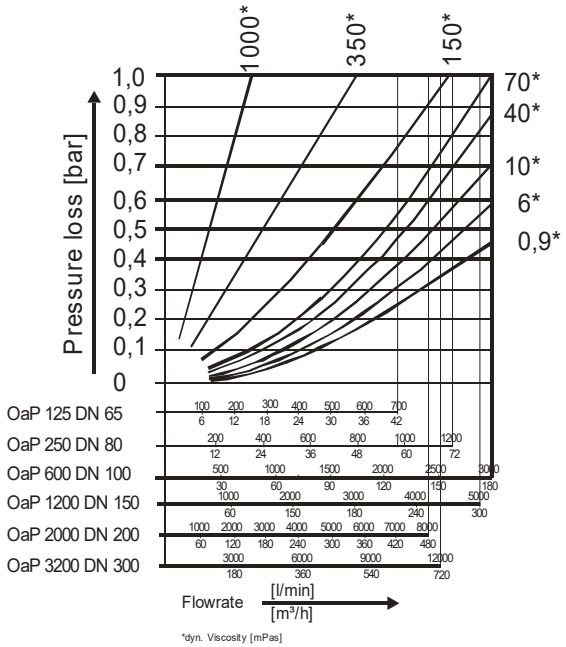
7.3.7 Pressure loss

Value in bar for water

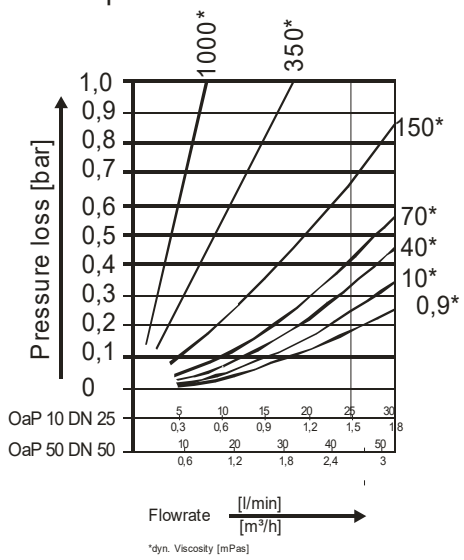
OaP 2	OaP 5	OaP 10	OaP 50	OaP 125	OaP 250	OaP 600	OaP 1200	OaP 2000	OaP 3200	OaP 4000
< 0,3	< 0,3	< 0,25	< 0,3	< 0,25	< 0,4	< 0,45	< 0,45	< 0,35	< 0,35	< 0,45

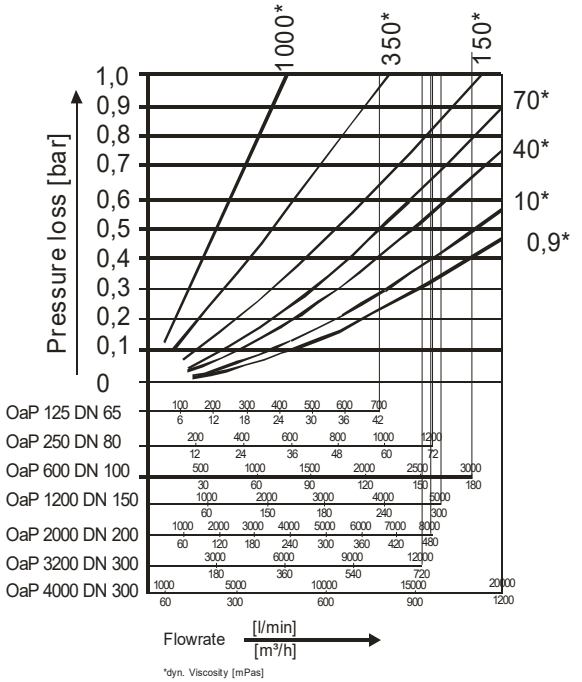
Normal tooth profile





Special tooth profile





8. Construction details

8.1 Design/dimensions

PN 16/25/40

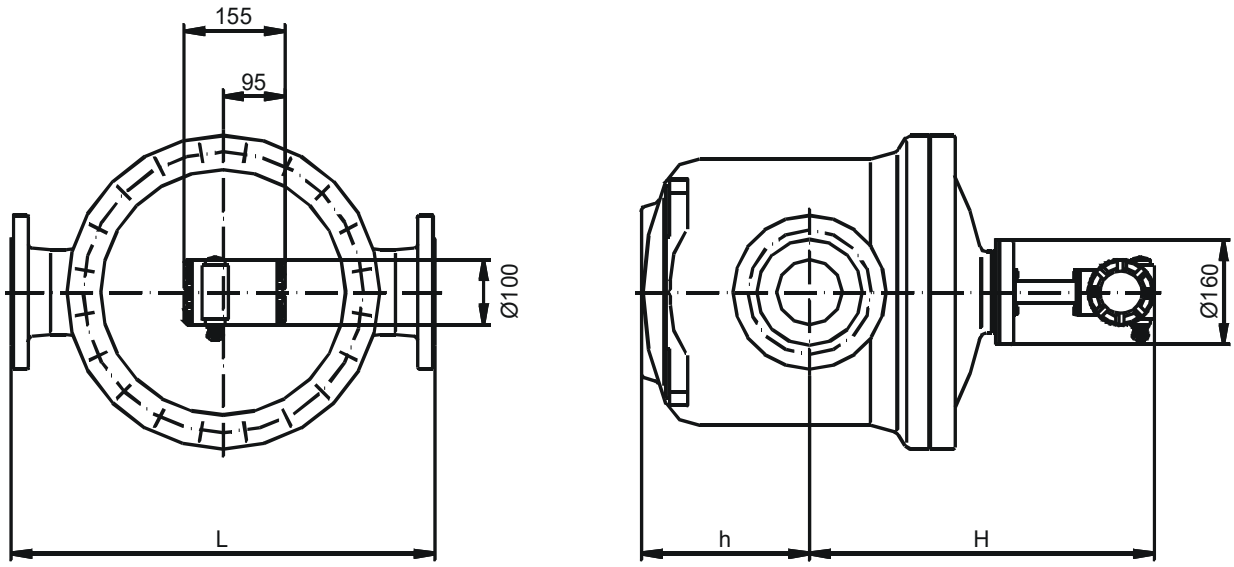
	OaP 2	OaP 5	OaP 10	OaP 50	OaP 125	OaP 250	OaP 600	OaP 1200	OaP 2000	OaP 3200	OaP 4000
L	220	220	220	325	450	550	650	800	900	900	1200
h	142	142	82	104	150	176	258	280	400	658	748
H	308	308	331	404	431	471	518	571	679	915	1003

PN 63

	OaP 50	OaP 125	OaP 250	OaP 600	OaP 1200	OaP 2000
L	325	450	550	650	900	900
h	121	152	202	269	310	405
H	404	431	471	518	571	679

PN 100

	OaP 2	OaP 5	OaP 10	OaP 50	OaP 125	OaP 250	OaP 600	OaP 1200
L	250	250	310	400	500	600	700	900
h	70	70	81	121	166	202	278	310
H	410	410	377	404	432	469	418	571



8.2 Weight

PN 16/25/40/63

	OaP 2	OaP 5	OaP 10	OaP 50	OaP 125	OaP 250	OaP 600	OaP 1200	OaP 2000	OaP 3200	OaP 4000
kg	19	19	27	61	80	155	260	509	894	1224	1924

PN 100

	OaP 2	OaP 5	OaP 10	OaP 50	OaP 125	OaP 250	OaP 600	OaP 1200
kg	28	28	53	98	140	260	440	869

8.3 Material

	A2	D2	B2
Measuring chamber	Brass	Cast iron	Brass
Housing	Cast steel	Cast steel	Cast steel
Oval wheels	Bronze	Cast iron	Light alloy
Bearing	Hard carbon	Cast iron	Haed carbon

The oval gear meter is generally provided with a mineral oil resistant internal coating.

For other media will be examined in each individual case whether above coating is suitable.

8.4 Process connection

OaP 2	OaP 5	OaP 10	OaP 50	OaP 125	OaP 250	OaP 600	OaP 1200	OaP 2000	OaP 3200	OaP 4000
25	25	25	50	65	80	100	150 6“	200 8“	300 12“	400 16“

8.5 Electrical connection

The electrical connections are located under the cover of the shorter casing side.

cable connection screws : M20 x 1.5 mm

or

NPT ½"

The connection must be performed as follows according to the EN 60079-11.
When you connect the transmitter is essential to ensure that the individual free wires are no longer than 50mm. This can be done by cutting the casing, an insulating tube or a cable tie just before the connecting terminal.

To operate the USTI a two-wire connection (terminals 1 + 2) is sufficient. This line serves three functions:

- Transmission of the analog signal representing the flow volume with 4 to 20mA.
- Generation of auxiliary energy by the USTI itself from the live zero with 4mA.
- Modulation of the FSK-signal (Frequency Shift Keying) on the current loop for digital data transmission according to HART® specifications.

The output of the NAMUR-pulses are terminals 3+4.

No further connections are required. For test purposes the connection circuit board is equipped with three soldering pins (see below) to which either a HART®-Interface for data-transmission on-site or a measuring device in order to monitor the current can be connected.

There are several possibilities to connect HART®-communication, but the loop resistance must be within the values given under section 5.2. The HART® interface can be connected to test-points TP2 and TP3 in the terminal connection area while the cover is open. If the HART® interface is to be used at a different position in the loop it can be connected to points X-Y or X-Z as shown in figure 2. However it must not be connected directly to the power supply device at point Y-Z.

In the example of figure 1 the connections of the HART® communicator can be interchanged with those of the PC or laptop.

Attention!

When installed in areas with potentially explosive atmospheres observe the respective country’s specific regulations (for Germany: EN 60079-14 resp. VDE 0165).

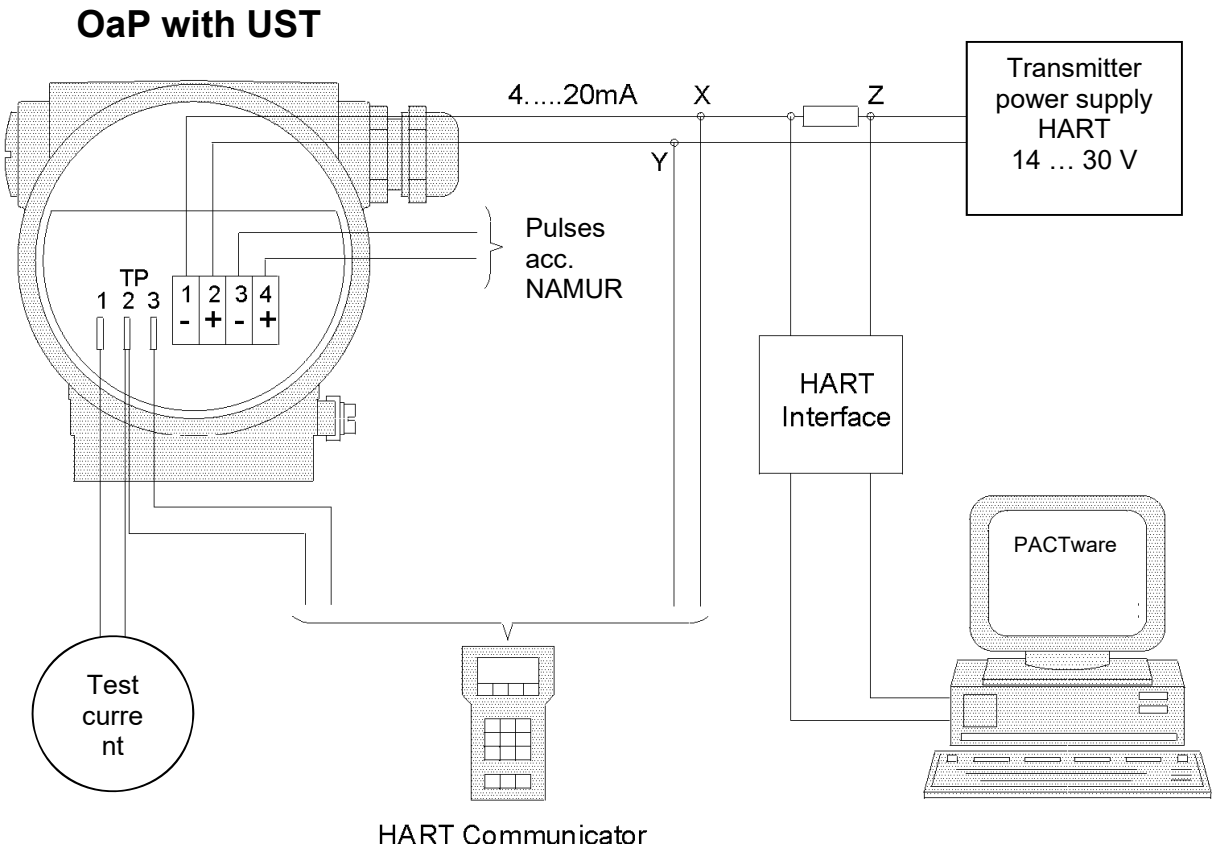


Figure 1 shows various connections as described in section 8.5.

8.5.1 Operation with PACTware (Software)

To operate the USTI with the PACTware operating software a HART®-Interface is required. The Interface transforms the level of the RS232 interface or USB- interface into a frequency shift keying (FSK) signal. The interface can also be installed permanently. The connection is set up as shown in figure 1.

Warning!

The use of a PC or a Laptop and HART®-Interface in an Ex-Zone requires special approval certificates.

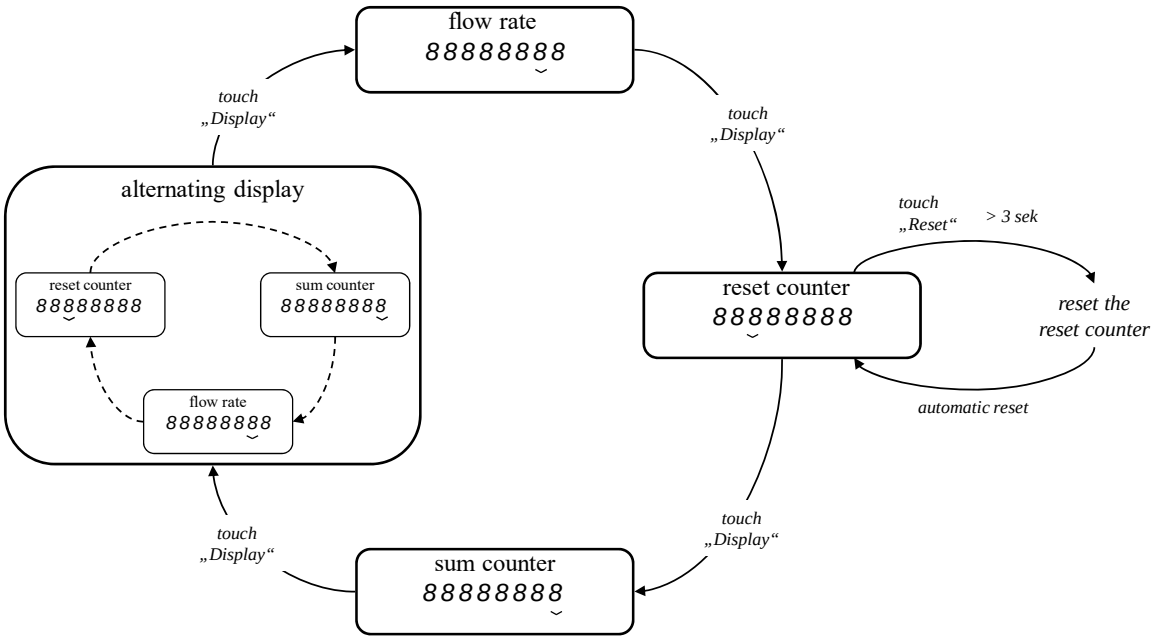
9. Display and user interface

9.1 General

The meters are set before delivery according to the operating conditions specified in your order. For further information please refer to attached configuration data sheet.
For the configuration respectively the operation of the transmitter you have the choice between the following two options:
1. HART® communication
2. On-site control of simple functions by means of a switching magnet.

9.2 LC - Display

The flow rate, the sum and the reset counter can be displayed on the 8-digit LCD display. The displayed value is selected via the switching magnet, which is operated by touching the “Display” button below the display window. The value chosen is identified by a line below the decimal point. After pressing the button the display switches as shown in the overview below:



In the alternating display mode all three indications are activated sequentially at preset time intervals.

The resetting of the reset counter can only be effected while this specific value is being displayed. The contact must be actuated for at least three seconds. For better legibility the display circuit board may be rotated mechanically by 90° or 180°. See also Appendix B3.

9.3. Operation with HART®-Communikation

9.3.1 PACTware

To operate the Oval Wheel Meter with USTI the PACTware software can be used. PACTware is a configuration- and operation software that provides all USTI functions via HART®communication. The individual functions are listed in chapter 9.4 “Device functions and parameter”. A PC is required for the use of PACTware with the following minimum system requirements:

- Pentium III 400
- Windows XP, VISTA or 7
- Hard drive with 100MB free space

The software is free to download: https://www.bopp-reuther.de/en/download/ software

USTI is connected to the RS232 or USB-interface of the PC using a HART®interface (see chapter 8.5.1).

9.3.2 HART®-Communicator

A HART® communicator (e.g. handheld HC-375 from Emerson) is another operating element which can be used. The operating functions for HC-375 are defined in a DD (Device Description). Using the HC-375 it is possible to operate or configure the OI on-site. The connection is described in appendix C.
The Device Description Language (DD) can be downloaded from the Internet (HART® Foundation www.hartcomm.org).

9.4 Device functions and parameter

9.4.1 Measuring values

- **Volume flow:**
  Display of the actual volumetric flow in the selected unit.
- **Flow unit:**
  Units to define the volumetric flow. Options are: l/s, l/min, l/h, m^3/s, m^3/min, m^3/h, gal/s, gal/min, gal/h, impgal/s, impgal/min, impgal/h, ft^3/s, ft^3/min, ft^3/h.
- **Reset counter:**
  The reset counter adds up the volume values measured in the selected unit and can be reset. After a power outage the counter is automatically reset to zero.
- **Sum counter:**
  The sum counter adds up the volume values measured in the selected unit. This counter can only be reset when being serviced. The value displayed does not change after a power outage.
- **Unit of Volume:**
  This unit defines the value of the reset and the sum counter. If this unit is changed during operation, the new volume units are added up to the old volume units. Therefore please set the counters to zero before changing the unit. Choose between l, m^3, gal, impgal, ft^3.
- **Frequency history**:
  The maximum sensor frequency is recorded. The display can not be set to zero or altered (drag hand function) and remains unchanged after a power outage.
- **Pulse Meter:**
  The Pulse Meter displays the number of all original pulses without evaluation. The display can not be set to zero and remains unchanged after a power outage.

9.4.2 Output

- **End value of measuring range:**
  The end sensor value is pre-set in the USTI of all meters regardless of the series. This value must not be exceeded during operating.
- **Initial Value of Measuring Range:**
  The initial sensor value is pre-set in the USTI of all meters regardless of the series. Below this value there is no defined error curve.
- **Minimum Measuring Span:**
  The minimum measuring span can be set as desired within the measuring range. The minimum measuring span should be maintained as a lower value can lead to fluctuations of the output current.
- **Initial Value of Current Output:**
  The desired initial flow value in the selected unit is assigned to the initial value of 4 mA. Usually the flow value of zero is assigned to 4 mA.
- **Final Value of Current Output:**
  The desired final flow value in the selected unit is assigned to the final value of 20 mA.
- **Attenuation:**
  Attenuation affects the output current and the flow rate display. Choose a value between 1s and 200s. The resolution is approx. 1s.

- **Current Alarm:**
  When the current alarm is activated the current output is set to 22 mA, as soon as a current alarm occurs.
- **Pulse Output:**
  The pulse output can either be set as original pulse with the frequency und pulse value corresponding to the K-factor of the meter or as a scaled pulse with a pulse value and pulse width that can be scaled in decade steps.

9.4.3 Device parameter

- **Sensor Type**
  Indicates to which sensor type (Wiegand, Reed or inductive pick-up) the electronics are set.
- **K_P Factor:**
  The test factor is device specific and cannot be changed. It is defined during the calibration process, the unit is pulses/l.
- **K_K Factor:**
  The correction factor is without dimension and serves to adjust the error curve to various media. The factor can be adjusted by the servicing staff. Thus viscosity correction is possible.
- **K_B Factor:**
  The operating factor is the product of test factor times correction factor. This factor is not stored in the USTI but calculated and displayed with PACTware.
- **Display Mode:**
  The display can be switched between flow rate, reset counter and sum counter. The three values are shown alternately at intervals of about 2 seconds (see section 9.2).
- **Pulse Value Factor:**
  The values of the output pulses and of the meter are set using the pulse value factor F_w. Together with the selected unit the pulse value factor corresponds to the pulse value and to the increment of the meter.

  $$1\,Ipulse \mathrel{\hat{=}} \underbrace{\underbrace{0{,}1}_{Factor} \cdot \underbrace{l}_{Unit}}_{value}$$

  Example: pulse value factor 0.1 means:

  When the factor is set, the display automatically adjusts the decimal point accordingly so that the values can be read directly from the meter.

  The pulse value factor can be set as follows:

Pulse value factor	1	0.1	0.01	0.001

If this factor is changed during operation the meters should be set to zero as otherwise mixing various volume evaluations will lead to incorrect figures. Please make sure that the maximum output frequency is not exceeded, which depends on the selected pulse width (see table “pulse width” below). If the output frequency is exceeded, the excessive pulses are counted into a buffer memory; the output is effected with a time delay.

- **Pulse Relation Factor:**
  Using the pulse relation factor F_i ratio the meter and the pulse output can be evaluated differently. The pulse relation factor is the relation of the value of the meter increment and the value of the pulse output.

  The standard setting is F_i =1, i.e. one increment on the meter corresponds to one pulse output.

  If the factor is set to $F_i \neq 1$ the value of the pulse output is changed whereas the value of the meter remains unchanged. The maximum output frequency must be checked.

- **Pulse Width:**
  Choose the pulse width according to the table below:

Pulse width	150 ms	50 ms	20 ms	10 ms
Maximum output frequency	3.3 Hz	10 Hz	25 Hz	50 Hz

This setting applies to both pulse outputs, i.e. current pulse and NAMUR pulse. The maximum output frequency has to be taken into account when choosing pulse value and pulse relation factor.

9.4.4 Dialog / Functions

- **Reset of the reset counter:**
  The reset counter can be reset to zero at any time.
- **Reset sum counter:**
  The sum counter may only be reset by our service staff. If the units of the volume or the pulse value are changed, this meter has to be reset to zero.
- **Current Simulation:**
  For testing serially connected devices a fixed output current may be set. After testing the current value 0 mA must be entered to end the simulation.
- **Calibration of Current Output:**
  The characteristic curve of the analog current output may be calibrated at 4 mA for the zero point and at 20 mA for the end value. Please note that the zero point has to be calibrated before the end value.

9.4.5 HART®

- **Software Version:**
  The number indicates the version of the USTI software.
- **Hardware Version:**
  The number indicates the version of the USTI hardware.
- **Polling Address:**
  If the USTI is to be installed for multi-drop application a polling address from 1 – 15 must be entered. This means that a point-to-point connection with the desired address has to be configured beforehand. If the polling address is set to zero the operation is analog.

9.5 Checking the maximum output frequency of the pulse output

To ensure that the maximum output frequency is not exceeded observe the following

For $F_i=1$, $F_w \mathrel{\hat{=}} W_{countl}=W_{puls}$ the following applies:

$$F_W \geq \frac{Q_{max}}{f_{max}}$$

For $F_i \neq 1$, $F_w \mathrel{\hat{=}} W_{zähl}$ the following applies:

$$F_W \geq \frac{Q_{max}}{f_{max}} \cdot F_i$$

and

$$W_{puls} = \frac{W_{count}}{F_i}$$

Meaning of formula symbols:

Q_{max}: maximum flowrate $\left[\frac{selected\ unit}{second}\right]$

f_{max}: max. output frequency (see table)

pulse width	150 ms	50 ms	20 ms	10 ms
max. output frequency	3.3 Hz	10 Hz	25 Hz	50 Hz

F_w: pulse value factors

pulse value factor	1	0.1	0.01	0.001

F_i: pulse relation factor

W_{count}: counting value in l, m^3, ...

W_{puls}: pulse value in l, m^3, ...

Calculation examples to check the scaled pulse output taking into account the maximum output frequency

1. Example
   for a selected pulse width of 150 ms the
   maximum output frequency is f_{max} = 3.3Hz.

   - selected volume unit [l]

   - maximum flow rate (e.g. OU 5) Q_{max} = 0.83 l/s

   The smallest possible pulse value factor is calculated as follows:

   $$F_W \geq \frac{Q_{max}}{f_{max}} = 0.83 / 3.3 = 0.25$$

   According to the table (see page 22) for the pulse value factors

   $$F_w = 1$$

   the next larger value or the same value must be selected.

   Thus the value of the meter and the pulse output is 1 l, i.e. 1 l per pulse.

2. The same meter data as in example 1 are assumed, but the value on the meter is to be one tenth of the value of the pulse output (meter is 10 times faster). A pulse relation factor of 0.1 needs to be set.

   The smallest possible pulse value factor is calculated as follows:

   $$F_W \geq \frac{Q_{max}}{f_{max}} \text{ x } Fi = 0.83/3.3 \text{ x } 0.1 = 0.025$$

   The next larger value must be selected, i.e.:

   $$Fw = 0.1$$

   The pulse value of the pulse output is calculated as follows:

$$W_{pulse} = \frac{W_{count}}{F_i} = 0.1 / 0.1 = 1\ l \qquad \text{(for } F_i \neq 1 \text{ is } F_w \triangleq W_{count})$$

Higher pulse values can be selected by setting the pulse value factor to a higher decimal level.

Note: The maximum output frequency will be exceeded, if the pulse value factors are smaller than the calculated critical value.

10. Connection of the USTI

Power supply

The supply voltage is within 14 - 30 V DC and must not exceed 30 V DC.

cable connection screws	:	M20 x 1.5
cable diameter	:	6 - 12 mm
terminals	:	GKDS Ex
core cross section	:	2.5 mm² flexible

The connection must be performed as follows according to the EN 60079-11.
When you connect the transmitter is essential to ensure that the individual free wires are no longer than 50mm. This can be done by cutting the casing, an insulating tube or a cable tie just before the connecting terminal.

Appendix

A. Trouble Shooting and Debugging

The Oval Wheel Meter and the USTI do not require servicing. If a malfunction or incorrect measuring occurs, the following instructions offer help to identify the cause of possible errors and information for debugging.

Warning!
When working on electrical connections observe local regulations and all safety instructions in the operating instructions.

For Ex-devices all information and regulations from the Ex-documentation must be observed in addition to the above. The following describes possible malfunctions and the necessary measures for remedy. For some tests it is necessary to remove the USTI electronics from the casing. To do so, remove the cover and the face of the counter so that you can loosen both diagonally opposed cylinder head studs on the circuit board. Please take care not to lose the two plastic washers.

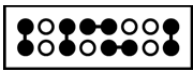
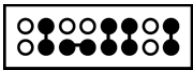
A.1 Fault in the electronic transmitter

No LCD-display :

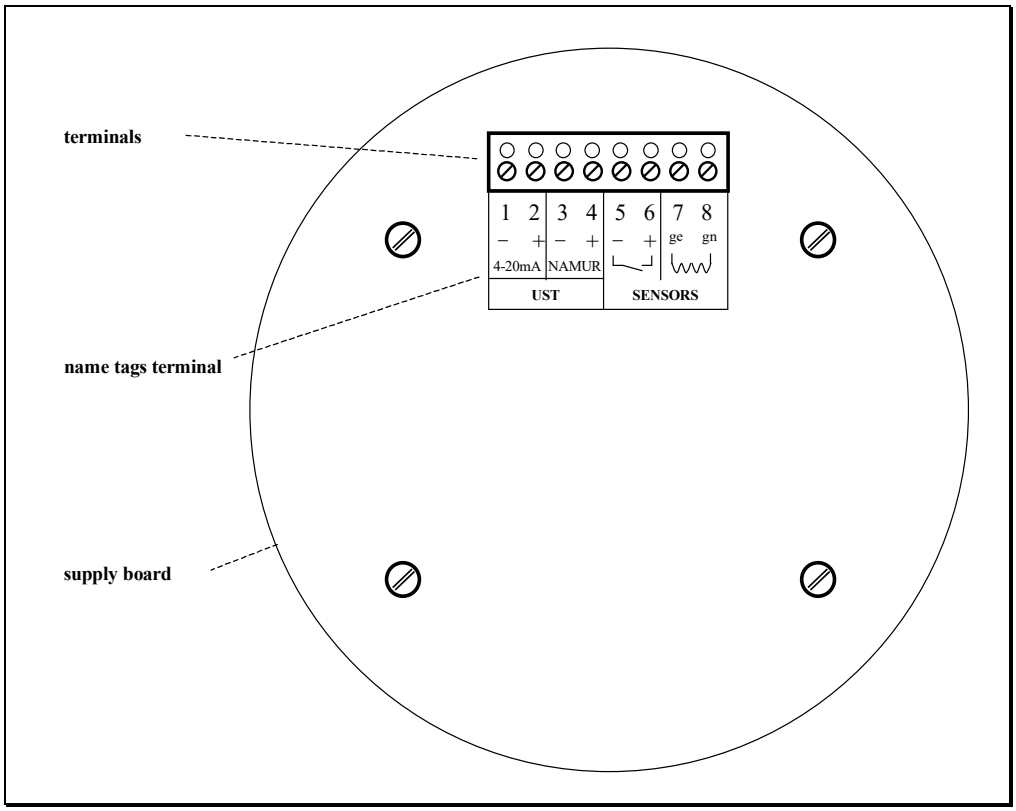
Check the current loop, the load and the voltage supply. The supplied voltage should be between 14 V DC and 30 V DC. The maximum load is based on the supply voltage. See section 5.2.

No flow information on the LCD:

If a „zero“ flow is shown although there is a flow check the coding on the jumpers above the LCD according to the following diagram. To do so first remove the dial face. (See section 9.4.3: Type of Sensor).

Coding	Sensor	Type
	Oval Reed	AG 5x
	Oval Wiegand	AG 4x

The sensor pulse can be checked at the terminals on the supply board. Depending on the design, the terminals Reed (no. 5 and 6) or W/I (no. 7 and 8) are used. At the terminals of the Reed contact a pulse of approx. 5 V can be measured. The Wiegand pulse has an amplitude of approx. 200 mV to 400 mV with a pulse width of 20µs to 50µs



Volume counter cannot be deleted:

With the Reed "RESET" above the display only the reset counter may be reset to zero, not the sum counter. The reset counter can only be reset if this display mode is active. The display mode may be changed by means of the HART® protocol or with the "DISPLAY" Reed below the display. Actuate > 3 seconds.

Current output does not function correctly:

If the value of the output current deviates from the theoretical reference value, the supply voltage and the maximum load limits must be checked. A load which is too large may result in a substantial decrease of the terminal voltage for the USTI. The calibration of the 4 mA and the 20 mA points of the output characteristic curve must be checked, too.
If the current output does not show analog values check the positioning of switch on the supply circuit board. (See also diagram in section 5.1.2.1)

Pulse output does not function correctly:

IF the USTI current pulse output is used the double actuator must be set correctly (see diagram in section 5.1.2).

The current pulse is available at terminals 1 and 2, the NAMUR-pulse at terminals 3 and 4!

If the high level is lower than 20 mA check the supply voltage and the load (see section 5.2).

Pulse output at zero flow rate:

If pulses are transmitted to the pulse output although there is no flow rate check pulse value, pulse relation factor and pulse width. If a large pulse width has been selected, the output of the pulses is processed rather slowly. If the factors have been selected in such a way that the theoretical output frequency is significantly higher than the maximum possible frequency, the excess pulses are stored. The overflow memory then sends signals with a maximum frequency even if the flow is zero until the memory is empty. Thus no volume pulses are lost.

Counter increments are too small:

Check the volume rate unit, K_P-, K_K- and pulse value factors as well as the decimal point.

Counter increments are too high:

Check the volume rate unit, K_P-, K_K- and pulse value factors as well as the decimal point.

Output current is over 20mA:

The flow of the Oval Wheel Meter is larger than the maximum limit value of the measurement output. The range end must be increased accordingly.

Output current remains at 4mA for small flow rates:

The minimum limit value of the measurement output is set at a value that is too high. The minimum limit value must be reduced accordingly.

Output current fluctuates significantly:

The revolutions of the Oval Wheel Meter or the pulse frequency are low. The minimum measuring range has not been reached. Attenuation of > 1s may result in a smoothing.

Displayed flow rates are too high:

Check the volume rate unit, K_P-, K_K- and pulse value factors.

Displayed flow rates are too small:

Check the volume rate unit, K_P-, K_K- and pulse value factors.

Data transmission does not function properly:

The minimum load must be attained for reliable communication. The optimal minimum loop resistance is about 230 Ω. If the load is higher a sufficiently high supply voltage must be available (see diagram section 5.2).

Data transmission not possible:

The USTI must be connected by means of a point-to-point connection. Only one master may access the interface. The multi-drop address must be set to 0. Loop resistance and supply voltage must be within the limits given in diagrams 1 and 2. With these settings communication should be possible.

General:

If the cause of a malfunction cannot be identified please contact the Bopp & Reuther service or send the device to Bopp & Reuther for repair (see Appendix B1).

B Maintenance, Cleaning and Changing the Display

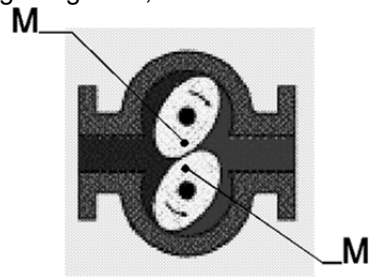
B.1 Maintenance, Cleaning

If the Oval Wheel Meter is put out of operation for a longer period of time it has to be dismounted, thoroughly cleaned, and protected with acid-free oil. Oval Wheel Meters used for liquid food must not be prepared for conservation in this manner. In- and outlet must be covered with caps. Make sure to store the Oval Wheel Meter in a dry room.

Cleaning the Oval Wheel Meter (e.g. for food)

The oval wheels have to be dismounted if the pipes are flushed with hot water.

- Loosen tommy nuts of the casing cover, lift-off casing cover with pressure screws, pull off oval wheels one by one from their shaft, handle with great care, do not place on stone floors, rather use a rubber pad or a wooden board.
- When assembling the oval wheels position them and make them mesh such that the marking points (M) on the faces match. Turn the oval wheel manually to make sure they are properly inserted (one revulotion). When placing the gasket, make sure that it is seated properly.



B.2 Repair / Hazardous Material

Before sending the Oval Wheel Meter to Bopp & Reuther, make sure to observe the following:

- Attach a note describing the malfunction, state the application field and the chemical/physical properties of the media (please find the respective form in section 14.2).
- Remove all residues of the media and pay special attention to sealing grooves and slits. This is of special importance if the medium is hazardous to health, i.e. caustic, toxic, carcinogenic or radioactive etc.
- Please do not return the device if you are not perfectly sure that all media hazardous to health have been cleaned off.

Costs incurred due to inadequate cleaning of the device and possible costs for disposal and/or personal injuries (causticization etc.) will be billed to the operating company.
Please ask our customer service for help and advice if your Oval Wheel Meter does not work properly:

Bopp & Reuther
Messtechnik GmbH
Service
Am Neuen Rheinhafen 4
67346 Speyer
Telefon: +49 6232 657-420
Fax: +49 6232 657-561

B.3 Rotating the display

If you want to change the display direction of the standard model, the LCD can be rotated by 90° by our service personnel or by yourself. Remove the cover with the pane of glass and unscrew the fastening screws of the dial face. If you want to rotate the display by 180° you only need to remove the electronics block and rotate it. If you want to rotate the display 90° you must remove the electronics block and the mounting plate below and rotate both. All assembly work may only performed off-circuit.

B.4 Rotating the housing

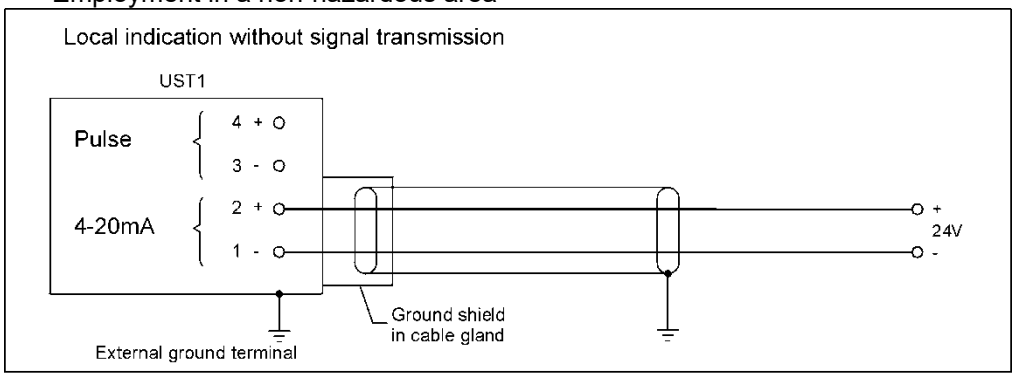
Rotating the housing might be advantageous for some applications (e.g. vertical installation of the Oval Wheel Meter). The connection between the housing and the spacer tube may be loosened and turned. Make sure that the sensor wires are not damaged.

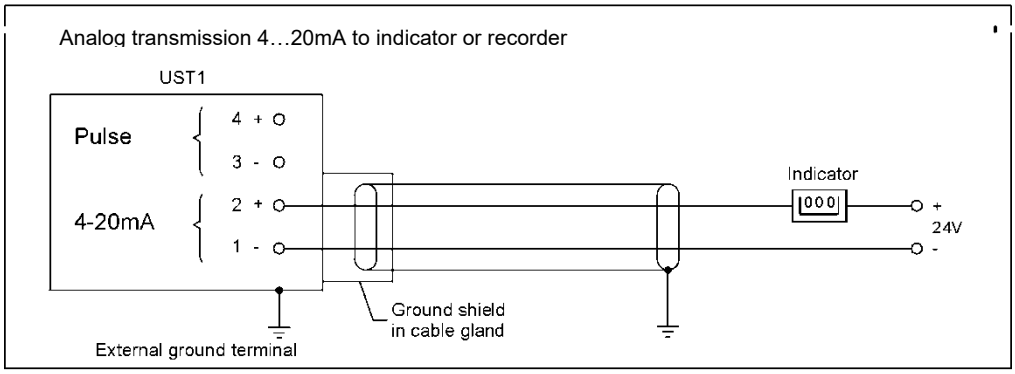
C. Connection Examples

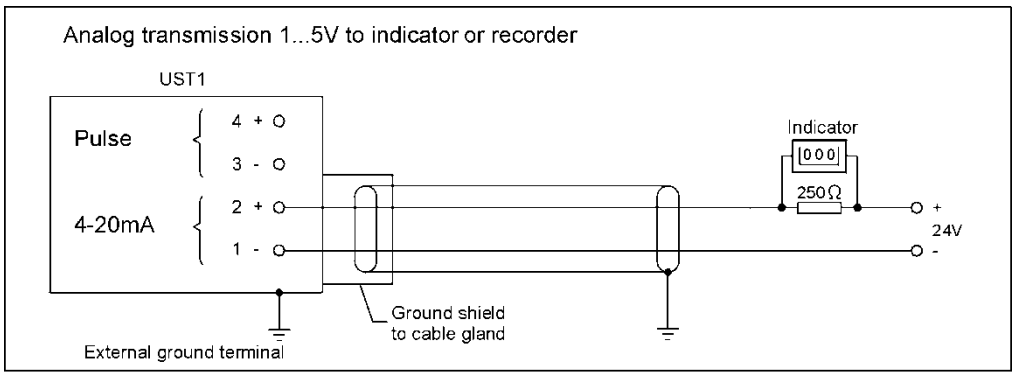
C.1 Connection Example 1

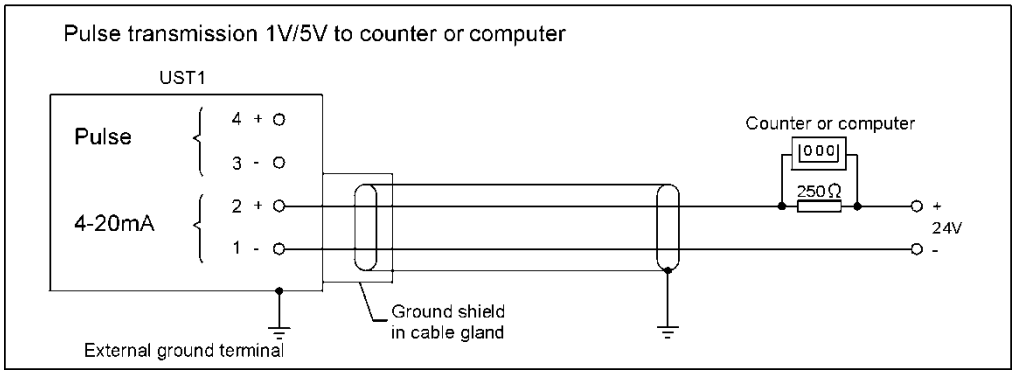
for

- Employment in a non-hazardous area





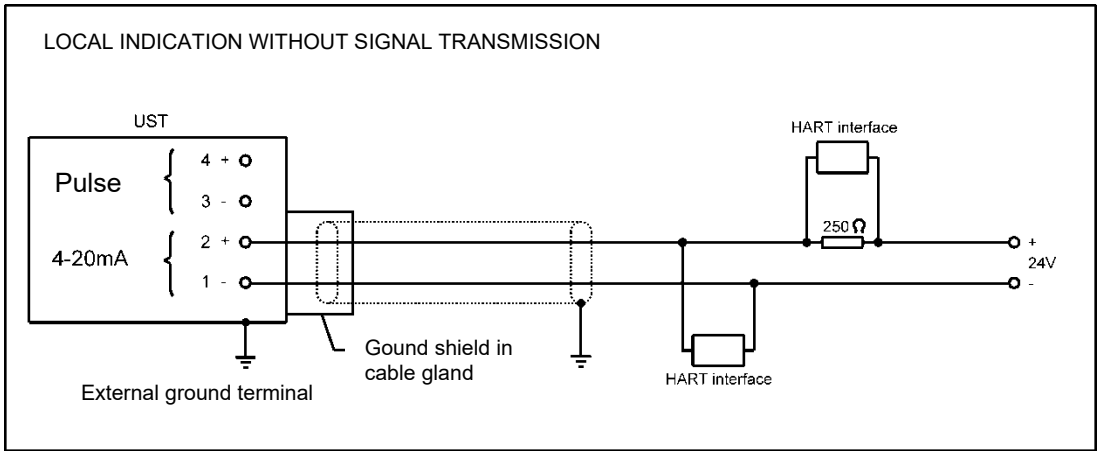




C.2 Connection Example 2

for

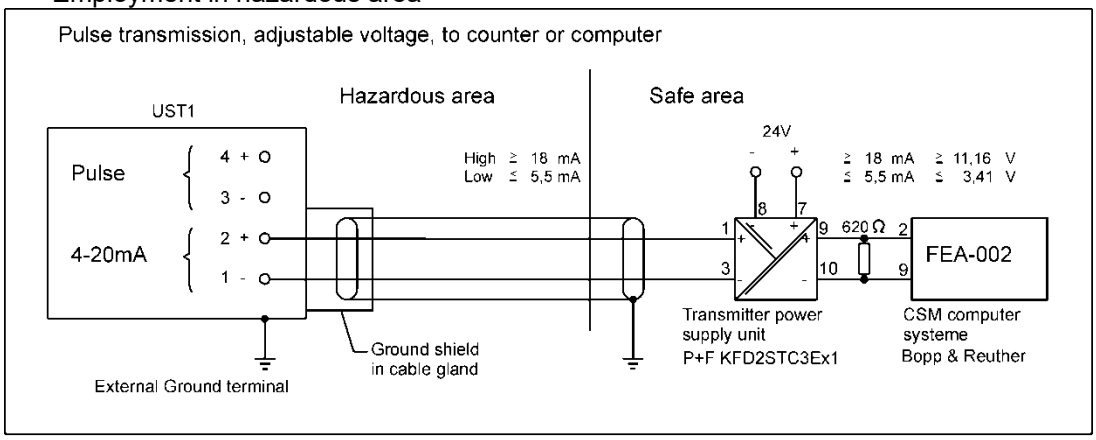
- Employment in non-hazardous area with HART®

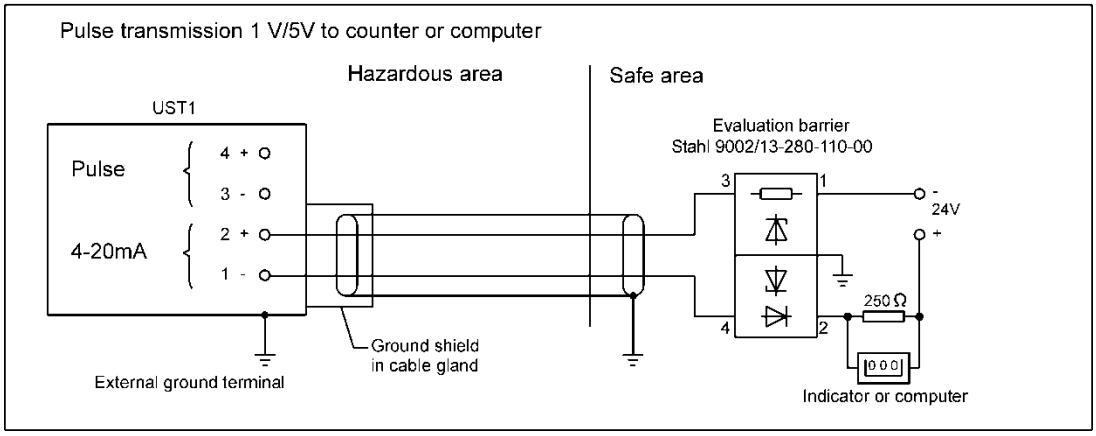


C.3 Connection Example 3

for

- Employment in hazardous area

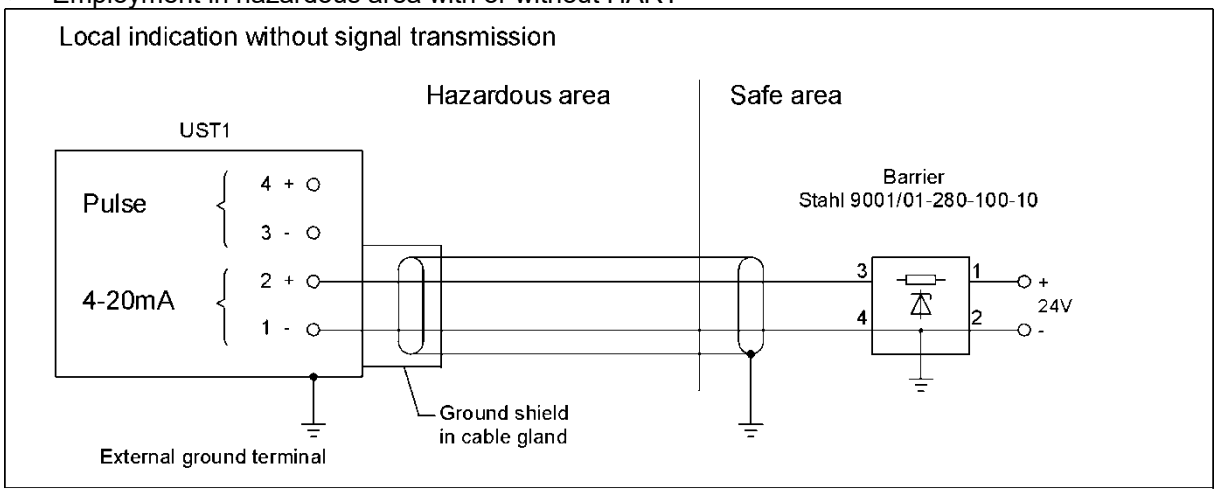


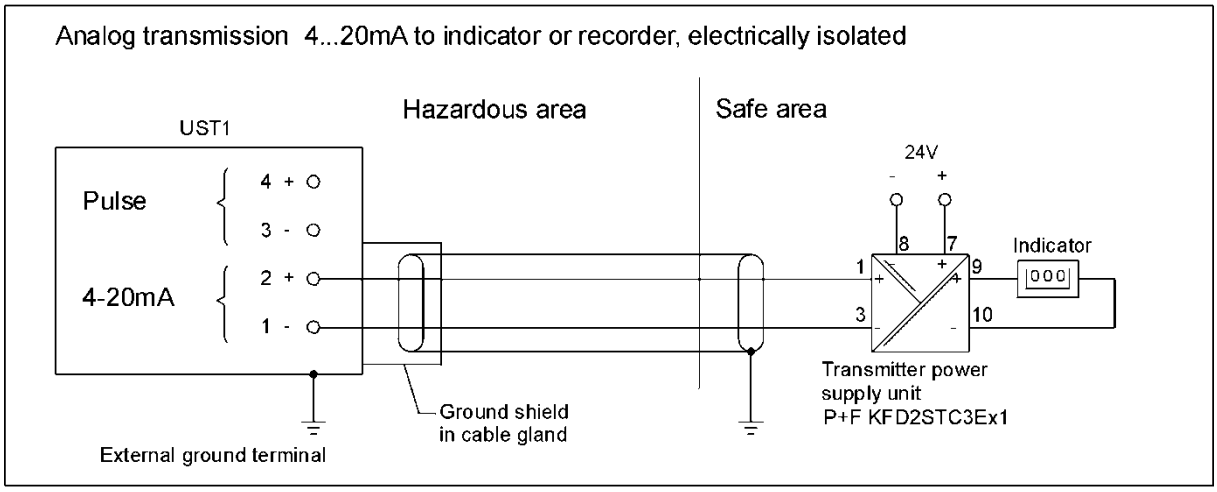


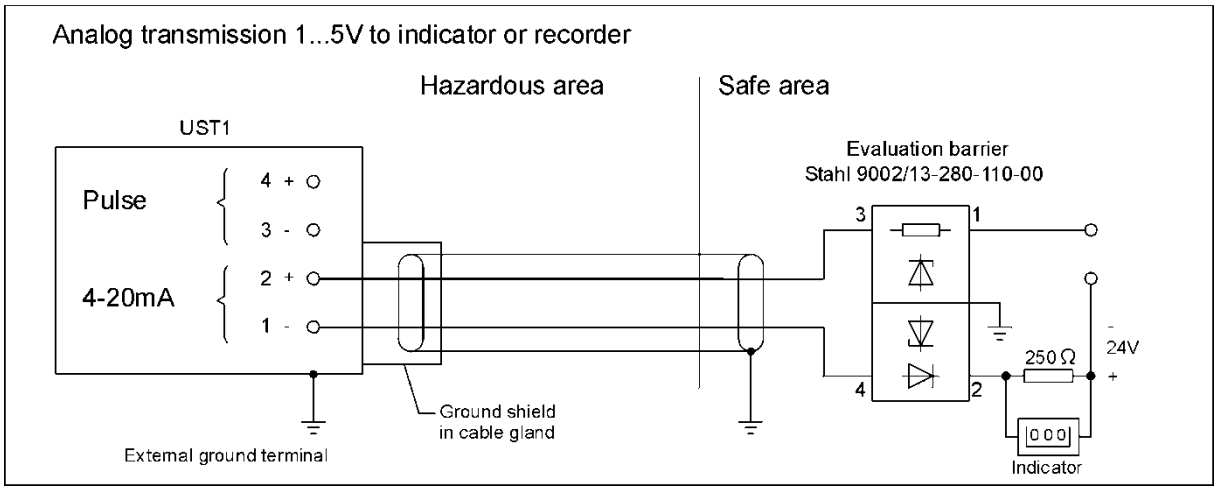
C.4 Connection Example 4

for

- Employment in hazardous area with or without HART®



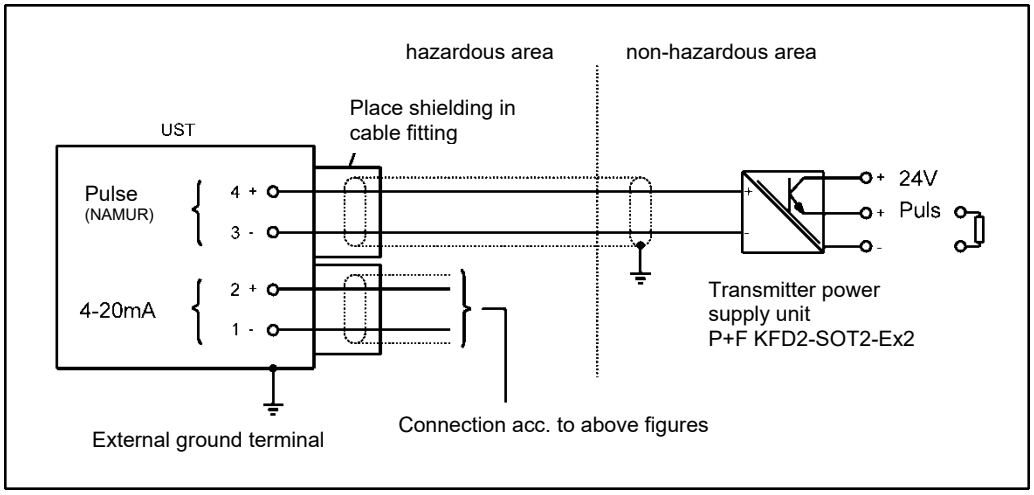




C.5 Connection Example 5

for

- Employment of the pulse output according to NAMUR in an hazardous area



D. Certificate of non-objection for contractor

Bopp Reuther Messtechnik GmbH
Am Neuen Rheinhafen 4

67346 Speyer

Germany

BOPP & REUTHER MESSTECHNIK

Telefon: +49 (0) 6232 657 420
Fax +49 (0) 6232 657 561
Mail: service@burmt.de
Web. www.bopp-reuther.de

DECLARATION ON CONTAMINATION OF PRODUCTS AND COMPONENTS

Please complete this form and return in advance by Fax to +49 (0) 6232 / 657 561 in order to receive an equipment return authorisation (ERA) number. No action to repair or examine the product will be done, until a valid declaration of contamination has been received.

ERA number: _____

Contact information

Company name + address

Contact person
Name:
Phone:
E-Mail:

Product information

Type: Id. no.: Serial no.:

Reason for return (e.g. calibration, repair). Please describe in detail.

Contamination information

The product was contaminated with:

☐	poisonous	☐	corrosive, irritant	☐	flammable
☐	hazardous	☐	oxidizing	☐	cancer-causing, health hazard
☐	explosive	☐	environmental hazardous	☐	other:

The product was cleaned with: _____

Packaging and shipping Instructions

- remove any cables, connectors, separate filters and mounting materials
- double bag each item in suitable protective foil (sealed)
- transport in suitable shipping container (e.g. original B & R shipping container) and include a copy of this declaration form at
- the shipping documents to the outside

By signing this form you are accepting full responsibility for its contents and confirming that any decontamination has taken place in accordance with legal regulations.

Print name: Date:

Legally valid signature:

E. Certificates

E.1 Explosions protection certificates

E.1.1 UST / USTI: EC Type Examination Ex Approval DMT 99 ATEX E 014 X

see Homepage: https://www.bopp-reuther.de/en/download/ EC Type Examination Ex-Approvals Bopp & Reuther Messtechnik

E.2 UST / USTI: IECEx Certificate of Conformity IECEx BVS 10.0090 USTI

siehe Homepage: https://www.bopp-reuther.de/en/download/ EC Type Examination Ex-Approvals Bopp & Reuther Messtechnik

E.3. Pressure Equipment Directive

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

TÜV SÜD Industrie Service

ZERTIFIKAT

gültig bis: 22.07.2029

CERTIFICATE

valid until: 22.07.2029

EU-Baumusterprüfung (Modul B) - Baumuster - nach Richtlinie 2014/68/EU

EU Type examination (module B) - production type - according to Directive 2014/68/EU

Zertifikat-Nr.: *Certificate No.:* **Z-IS-AN1-MAN-19-07-2681356-23083220**

Name und Anschrift des Herstellers: *Name and address of manufacturer:* **Bopp & Reuther Messtechnik GmbH, Am Neuen Rheinhafen 4, 67346 Speyer**

Hiermit wird bescheinigt, dass das unten genannte Baumuster die Anforderungen der Richtlinie 2014/68/EU erfüllt.

We herewith certify that the type mentioned below meets the requirements of the Directive 2014/68/EU.

CE 0036

Prüfbericht Nr.: *Evaluation report No.:* **P-IS-AN1-MAN-19-07-2681356-23083220**

Geltungsbereich: *Scope of examination:* **Ovalradzähler der Typen OI, OUI, OaP, OuaP, OV, OK, OT, OKT, OF, OR, OC, OP, DN 50 - 400, PN 10 - 100**

Fertigungsstätte: *Manufacturing plant:* **Bopp & Reuther Messtechnik GmbH, Am Neuen Rheinhafen 4, 67346 Speyer**

Mannheim, 23.07.2019
(Ort, Datum)
(Place, date)

TÜV SÜD Industrie Service GmbH
Zertifizierungsstelle für Druckgeräte
Ralf Brinkmann
+49 621 395-367

Echtheitsprüfung durch App TÜV SÜD Verify
Verification of Certificate by TÜV SÜD App Verify

Notifizierte Stelle, Kennnummer 0036
Notified Body, No. 0036
TÜV SÜD Industrie Service GmbH
Westendstr. 199
80686 München
GERMANY

Dokument ID: 2681356Y8193f

Seite 1 zum Zertifikat Nr. / Page 1 of the certificate No. Z-IS-AN1-MAN-19-07-2681356-23083220

ZERTIFIKAT ◆ CERTIFICATE ◆ 認証書 ◆ СЕРТИФИКАТ ◆ CERTIFICADO ◆ CERTIFICAT

TÜV SÜD Industrie Service

ZERTIFIKAT
Certificate

Konformität mit der Bauart (Modul C1)
nach Richtlinie 97/23/EG
Conformity to Type (Module C1) according to Directive 97/23/EC

Zertifikat-Nr.: **Z-IS-DDB-MAN-15-05-100067376-007**
Certificate No.:
Gültigkeit / *Validity:* 10 Jahre / *10 Years*

Name und Anschrift des Herstellers:
Name and postal address of manufacturer:
Bopp & Reuther Messtechnik GmbH
Am Neuen Rheinhafen 4
D-67346 Speyer

Der Hersteller ist nach Prüfung der Voraussetzungen berechtigt, die von ihm im Rahmen des Geltungsbereichs hergestellten Druckgeräte mit unserer Kennnummer gemäß dem abgebildeten CE-Kennzeichen zu kennzeichnen:
The manufacturer is - after examination of the prerequisites - authorised to provide his pressure equipment manufactured within the scope of the examination our identification number to the CE-mark as illustrate:

CE 0036

Prüfbericht Nr.: **P-IS-DDB-MAN-15-05-100067376-009**
Test report No.:

Geltungsbereich:
Scope of examination:
Durchfluss Messgeräte (Ovalradzähler OI, OUI, OaP, OuaP, OV, OK, OT, Turbinenradzähler RQ, Wirbeldurchflussmesser VTX2, Kompaktblende Oriflow und Oriflow PVDF, Filter (Na, NC, N, Nu)

Fertigungsstätte:
Manufacturing plant:
Bopp & Reuther Messtechnik GmbH
Am Neuen Rheinhafen 4
D-67346 Speyer

TÜV SÜD Industrie Service GmbH
Zertifizierungsstelle
für Druckgeräte

TÜV SÜD Industrie Service GmbH 00 36 Benannte Stelle

Mannheim, 08. Juni 2015
(Ort, Datum)
(Place, date)
Bitte beachten Sie die Hinweise auf der zweiten Seite.
Please note the remarks on the second page..

(Dipl.-Ing. M. John)

Benannte Stelle, Kennnummer 0036
Notified Body, No. 0036
TÜV SÜD Industrie Service GmbH
Westendstr. 199
80686 München
GERMANY

E.4 EU Declaration of conformity

BOPP & REUTHER MESSTECHNIK

EU - Konformitätserklärung
EU - Declaration of conformity
UE - Déclaration de conformité

Hiermit erklärt der Hersteller in alleiniger Verantwortung, dass die nachfolgend bezeichnete Baueinheit den Anforderungen der zutreffenden EU-Richtlinien entspricht. Bei nicht mit uns abgestimmten Änderungen verliert diese Erklärung ihre Gültigkeit.

The manufacturer herewith declares under sole responsibility that the unit mentioned below complies with the requirements of the relevant EU directives. This declaration is no longer valid if the unit is modified without our agreement.

Par la présente, le fabricant déclare que les appareils décrits ci-dessous, correspondent aux exigences de la réglementation UE qui les concerne. Toute modification des appareils sans notre accord entraine la perte de validité de cette déclaration de conformité

Hersteller *Manufacture* Fabricant	Bopp & Reuther Messtechnik GmbH Am Neuen Rheinhafen 4 D-67346 Speyer
Bezeichnung *Description* Description	Ovalradzähler *Ovalwheel meter* Compteur à roues ovales
Typ, Modell *Type, model* Type, modèle	OI / OUI / OaP / OUaP / OK mit *with* avec UST, AG, MFE, IG, SE, KSE, KSN, NK

Richtlinie *Directive* Directive	2014/30/EU /UE L 96/79 Elektromagnetische Verträglichkeit *Electromagnetic interference* Compatibilité électromagnétique
Normen und normative Dokumente *Standards and normative documents* Normes et documents normatifs	EN 61000-6-2:2005 EN 61000-6-3:2011

Richtlinie *Directive* Directive	2014/34/EU /UE L 96/309 Explosionsschutz *Explosion protection* Protection contre les explosions	
Baumusterprüfbescheinigung *Type examination certificate* Certificat d'approbation de type	DMT 99 ATEX E 014 X	USTI
	DMT 00 ATEX E 025 X	USTD
	BVS 04 ATEX E 022 X	USTX
	DMT 00 ATEX E 063 X	AG43-45 (PV11)
	PTB 99 ATEX 2219 X	AG19-20, IG (SJ3,5-N)
	TÜV 15 ATEX 131621 X	AG01-08 (01-08)
	BVS 09 ATEX E 031 X	MFE1-3
	BVS 00 ATEX 2048 X	KSN (NJ1,5-6,5-N)
	PTB 02 ATEX 1031 X	KSE, NK (8064/21)
Notifizierte Stelle *Notified Body* *Organisme Notifié*	BVS, DMT: DEKRA EXAM	0158
	PTB	0102
	TÜV	0044
Normen und normative Dokumente *Standards and normative documents* Normes et documents normatifs	EN 60079-0:2012/A11:2013	USTI, USTD, USTX, PV11, SJ3,5-N, 01-08, MFE1-3, NJ1,5-6,5-N, 8064/21
	EN 60079-1:2014	USTD, USTX, 01-08, 8064/21
	EN 60079-11:2012	USTI, USTD, USTX, PV11, SJ3,5-N, MFE1-3, NJ1,5-6,5-N
	EN 60079-26:2015	USTI

Bopp & Reuther Messtechnik GmbH, Am Neuen Rheinhafen 4, D-67346 Speyer
Telefon: +49(0)6232 657-0, **Telefax**: +49(0)6232 657-505, **Email**: info@bopp-reuther.de, **Internet**: www.bopp-reuther.de

Z-ML-KE ORZ-OI-OAP-elektrisch-V12 2020-03-17

BOPP & REUTHER MESSTECHNIK

Richtlinie *Directive* Directive	2014/68/EU /UE L 189/164 Druckgeräte *Pressure equipment* Équipements sous pression
Konformitätsbewertungsverfahren / Zertifikat *Conformity assessment procedure / Certificate* Procédures d'évaluation de la conformité / Certificat	Modul B Z-IS-AN1-MAN-19-07-2681356-23083220 Modul C1 Z-IS-DDB-MAN-15-05-100067376-007
Notifizierte Stelle *Notified Body* *Organisme Notifié*	0036 TÜV SÜD Industrie Service GmbH Dudenstraße 28, D-68167 Mannheim
Normen und normative Dokumente *Standards and normative documents* Normes et documents normatifs	AD 2000 Regelwerk *AD 2000 Code* Code AD 2000
Klassifizierung *Classification* Classification	Rohrleitungsteil *Pipe* Tuyauterie
Fluid Kategorie ; Diagramm *Fluid category ; Diagramm* Dangerosité du fluide ; Tableau	Gruppe 1 ; Anhang II / 6 *Group 1 ; Attachment II / 6* Groupe 1 ; Appendice II / 6
Angewandtes Konformitätsbewertungsverfahren *Conformity assesment procedure beeing used* Procédure d'évaluation de la conformité appliquée	Kategorie III *Category III* Catégorie III

Die Angaben zur Richtlinie 2014/68/EU ist nur gültig für Druckgeräte die unter Artikel 4 Absatz 1 und 2 fallen, alle anderen unterliegen der guten Ingenieurspraxis nach Artikel 4 Absatz 3.
The information on Directive 2014/68 / EU is only valid for pressure equipment that falls under Article 4 Paragraph 1 and 2, all others are subject to good engineering practice according to Article 4 Paragraph 3.
Les informations sur la directive 2014/68 / UE ne sont valables que pour les équipements sous pression relevant de l'article 4, paragraphes 1 et 2, tous les autres sont soumis aux bonnes pratiques d'ingénierie conformément à l'article 4, paragraphe 3.

Richtlinie *Directive* Directive	2011/65/EU /UE L 174/88 Beschränkung gefährlicher Stoffe *Restriction of hazardous substances* Limitation de substances dangereuses
Normen und normative Dokumente *Standards and normative documents* Normes et documents normatifs	EN 50581:2012

Ort, Datum / *Place, Date* / Lieu, Date: **Speyer, 2020-03-17**

Dr. J. Ph. Herzog
Geschäftsführer / *Managing director* / Directeur

i. A. B. Bähr
QS Leiter / *QA Manager* / Responsable qualité

Bopp & Reuther Messtechnik GmbH, Am Neuen Rheinhafen 4, D-67346 Speyer
Telefon: +49(0)6232 657-0, **Telefax**: +49(0)6232 657-505, **Email**: info@bopp-reuther.de, **Internet**: www.bopp-reuther.de

Z-ML-KE ORZ-OI-OAP-elektrisch-V12 2020-03-17