



Oval Wheel Meters

with Pulse Pick-up

and Mechanical Counters

Ol-Serie

AG 19/20/45

E/D/M5

Operating Manual



Table of Contents

FOREWORD	4
I. TRANSPORT, DELIVERY, STORAGE	4
II. WARRANTY	4
III. GENERAL SAFETY INSTRUCTIONS	4
IV. BASIC SAFETY INFORMATION	4
V. CMOS - COMPONENTS.....	5
VI. INTENDED USE.....	5
1. IDENTIFICATION	6
2. FIELD OF APPLICATION.....	6
3. WORKING PRINCIPLE AND SYSTEM DESIGN.....	6
3.1 MEASURING PRINCIPLE.....	6
3.2 SYSTEM DESIGN.....	7
4. INPUT	8
4.1 MEASURED VALUES.....	8
4.2 MEASUREMENT RANGE.....	8
5. OUTPUT	10
5.1 OUTPUT SIGNAL	10
5.1.1 Pulse pick-up AG 19, AG 20 and AG 45	10
5.1.2 Mechanical Counters of the M5 Series	12
5.1.3 Mechanical Single Pointer Indicator E and Double Pointer Indicator D.....	13
5.2 ELECTRICAL AND THERMAL SAFETY SPECIFICATIONS	14
6. CHARACTERISTIC PARAMETER.....	14
6.1 REFERENCE CONDITIONS.....	14
6.2 TOLERATED DEVIATION.....	14
6.3 REPEATABILITY.....	14
6.4 INFLUENCE OF AMBIENT TEMPERATURE.....	14
6.5 INFLUENCE OF MEDIA TEMPERATURE	14
7. OPERATING CONDITIONS	14
7.1 INSTALLATION CONDITIONS	14
7.1.1 Installation Instructions	14
7.1.1.1 General Information	15
7.1.1.2 Installation.....	15
7.1.2 Start-up Instructions	15
7.2 ENVIRONMENTAL CONDITIONS.....	16
7.2.1 Ambient Temperature.....	16
7.2.2 Storage Temperature	16
7.2.3 Type of Protection	16
7.2.4 Electromagnetic Compatibility	16
7.3 PROCESS CONDITIONS	17
7.3.1 Media Temperature	17
7.3.2 State of Aggregation.....	18
7.3.3 Viscosity	18
7.3.4 Media Temperature Limit	18
7.3.5 Media Pressure Limit.....	18
7.3.6 Flow Rate Limit.....	18
7.3.7 Pressure Loss.....	19
8. CONSTRUCTION DETAILS.....	20
8.1 DESIGN / DIMENSIONS	20
8.2 WEIGHT	22

8.3 MATERIAL	22
8.4 PROCESS CONNECTION.....	22
8.5 ELECTRICAL CONNECTION	23
9. DISPLAY	25
9.1 GENERAL	25
APPENDIX.....	26
A. TROUBLESHOOTING / ERROR DETECTION	26
B SERVICING, CLEANING AND REPAIR / HAZARDOUS MEDIA.....	27
B.1 SERVICING, CLEANING.....	27
B.2 REPAIR / HAZARDOUS MEDIA.....	27
C. DECLARATION ON DECONTAMINATION.....	28
D. CERTIFICATES	29
D.1. EXPLOSIONS PROTECTION CERTIFICATES	29
D.1.1 PV11: EC type examination certificate DMT 00 ATEX E 063 X	29
D.1.2 Slot-type initiators SJ (AG 19/20 und IG2): EC-Type-Examination Certificate PTB 99 ATEX 2219 X	29
D.1.3 Cylindrical inductive sensors NJ (KSN): EC-Type-Examination Certificate PTB 99 ATEX 2048 X29	29
D.1.4 Miniature limit switch (KSE): EC-Type-Examination Certificate PTB 02 ATEX 1031 X	29
D.2. PRESSURE EQUIPMENT DIRECTIVE	30
D.3. EU- DECLARATION OF CONFORMITY.....	32

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.

IV. Basic Safety Information

Description of Symbols:

	<p>IMPORTANT NOTES!</p> <p>Please consider these notes carefully to achieve a reliable functional system. The accompanying text contains important information about the product, handling the product or about a section of the document that is of particular importance.</p>
	<p>WARNING!</p> <p>Failure to take the prescribed precautions could result in death, severe bodily injury, or substantial material / product damage.</p>

V. CMOS - Components

The electronic transmitter uses CMOS chips. Therefore, when the electronics housing 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.

VI. Intended Use

Oval wheel meters series OaP are used for measuring liquid raw, intermediate and finished products such as liquefied gases, gasolines, heating oils, lubricating oils, transmission oils, solvents, bitumen, alkaline solutions, acids and other chemical liquids.

Intended User

The intended user is not a general purpose user.



The intended user is not allowed to open, manipulate or dismantle the device.
The device may be maintained, serviced or opened only by dedicated and qualified service personnel.

1. Identification

Manufacturer: Bopp & Reuther Messtechnik GmbH
Am Neuen Rheinhafen 4
67346 Speyer / Germany
Phone : + 49 6232 657-0
Fax : + 49 6232 657-505

Product type: direct volumetric meters (positive displacement flow meters)

Product name: oval wheel meter series OI with pulse pick-up AG 19/20/45 or/and mechanical counters E/D/M5

Version no.: A-EN-01211-00G

2. Field 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.

Oval Wheel Meters of the OI series are manufactured with nominal widths of 25 to 100 mm. Depending on the nominal width they can be used for up to PN 40 with a maximum operating temperature of up to 180 °C. Other models of the Oval Wheel Meters may be used for a variety of purposes e.g. in the petrochemical industry for loading tank trucks and oil tankers, in the food industry to measure milk, vegetable oils, fruit juices, wine, spirits, beer and their respective initial products.

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 measurement and flow control as well as for data processing systems. In addition, quantity pre-selection devices (with appropriate valves) of the most varied constructions and working principles are available to facilitate dosage of media.

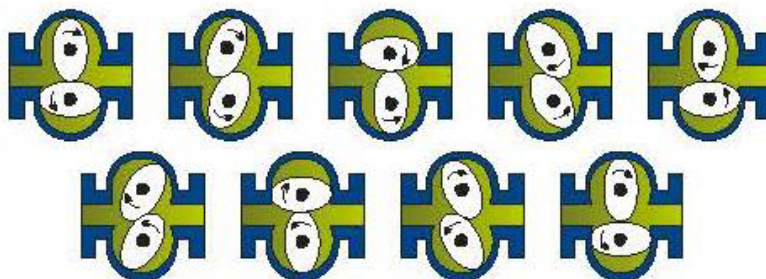
3. Working Principle and System Design

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 measurement purposes, the rotation of the oval wheels is transmitted to a mechanical counter and/or a pulse pick-up via a magnet coupling and gear device.

3.2 System Design

Oval Wheel Meters and their extensions comprise the following components:

Sensor:

Measuring is performed by the oval wheels of the series OI.

Pulse pick-up AG 19 and AG 20:

Pulse pick-up AG 19 resp. AG 20 are employed to control electro-mechanical counters, read-out devices, recorders, regulators, electronic counters, data processing equipment, as well as for remote counters for printing engines using step motors. They are approved for use in oval wheel counters for fiscal metering purposes. However, pulse pick-up model AG 19 may only be used for internal metering purposes (Number of approval AG 19: 411.007; AG 20: 411.005).

Pulse pick-up AG 45:

The pulse pick-up AG 45 is employed to control electro-mechanical counters, read-out devices, recorders, regulators, electronic counters, data processing equipment, as well as for remote counters for printing engines using step motors. They are approved for use in oval wheel counters for fiscal metering purposes (Number of approval AG 45: 5.552/88.08).

Single Pointer Indicator E:

The single pointer indicator E displays the volume flow mechanically. The device is equipped with a six digit roller set (without reset). The single pointer indicator can be combined with the above mentioned pulse pick-up.

Double Pointer Indicator D:

The double pointer indicator D displays the volume flow mechanically. The device is equipped with a six digit roller set (with zeroing lever). The double pointer indicator can be combined with the above mentioned pulse pick-up.

Roller Counter M5 and further models of this type:

The roller counters M5, M5B, M5V and M5BV display the volume flow. They can be equipped with receipt printers and valve control. They can be supplied with the actuation device at the bottom (rotating), upright or diagonal. With the actuation device at the bottom, several roller counters may be mounted above the oval wheel meter. All models are available with an upright or sloping face.

Overview of possible combinations:

Sensor	Pulse Pick-up	Mechanical counter ²⁾		
	AGxx ¹⁾	E	D	M5
Series OI OI5 – OI400	without ¹⁾	✓	✓	✓
	AG19 ¹⁾	✓	✓	✓
	AG20 ¹⁾	✓	✓	✓
	AG45 ¹⁾	✓	✓	✓

¹⁾ mechanical signal transmission (magnetic coupling)

²⁾ choice of only one counter type per Oval Wheel meter

4. Input

4.1 Measured Values

Volume and volume flow

4.2 Measurement Range

MEASUREMENT RANGE FOR MEDIA WITH NEWTONIAN FLOW PROPERTIES APPLICABLE TO OVAL WHEELS WITH SLEEVE BEARINGS

Type	DN	flow Q_{\max} [l/min]		< 0,3 mPa·s		0,3 - 1,5 mPa·s		1,5 - 150 mPa·s		up to 350 mPa·s		up to 1000 mPa·s		up to 3000 mPa·s	
				[l/min]	[m³/h]	[l/min]	[m³/h]	[l/min]	[m³/h]	[l/min]	[m³/h]	[l/min]	[m³/h]	[l/min]	[m³/h]
OI 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	2,4	50	3	50	3						
			contd. operation batch operation	16 16	1 1	33 45	2 2,7	33 45	2 2,7	25 25	1,5 1,5	12,5 12,5	0,75 0,75	4,5 4,5	0,27 0,27
OI 10	25	100	min	16	1	10	0,6	10	0,6	7	0,42	3,5	0,20	1,2	0,072
			max	80	5	100	6	100	6						
			contd. operation batch operation	33 33	2 2	66 90	4 5,4	80 90	4,8 5,4	70 70	4,2 4,2	35 35	2 2	12 12	0,72 0,72
OI 50	50	300	min	50	3	30	1,8	30	1,8	18	1,08	9,5	0,54	3	0,18
			max	250	15	300	18	300	18						
			contd. operation batch operation	100 100	6 6	200 270	12 16,2	240 270	14,4 16,2	180 180	10,8 10,8	90 90	5,4 5,4	30 30	1,8 1,8
OI 100	50	660	min	110	6,6	66	3,9	66	3,9	48	2,9	24	1,45	10	0,6
			max	550	33	660	39,6	660	39,6						
			contd. operation batch operation	230 230	13,2 13,2	440 590	26,4 35,4	530 600	31,8 39,6	480 480	29 29	240 240	14,5 14,5	100 100	6 6
OI 200	80	700	min	110	6,6	70	4,2	70	4,2	50	3	25	1,5	12	0,72
			max	560	34	700	42	700	42						
			contd. operation batch operation	230 230	14 14	420 560	25,2 33,6	525 630	31,5 37,8	500 500	30 30	250 250	15 15	120 120	7,2 7,2
OI 400	100	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						
			contd. operation batch operation	400 400	24 24	720 960	43,2 57,6	1000 1100	60 66	1000 1000	60 60	600 600	36 36	300 300	18 18

MEASUREMENT RANGE FOR MEDIA OF LOW AND HIGH VISCOSITY WITH NEWTONIAN FLOW PROPERTIES APPLICABLE TO OVAL WHEELS WITH BALL BEARINGS

Type	D N	Flow Q _{max} [ℓ /min]		1,5 - 20 mPa·s		up to 350 mPa·s		up to 2000 mPa·s		up to 5000 mPa·s		up to 10000 mPa·s		up to 20000 mPa·s		up to 60000 mPa·s	
				[ℓ /min]	[m³/h]	[ℓ /min]	[m³/h]	[ℓ /min]	[m³/h]	[ℓ /min]	[m³/h]	[ℓ /min]	[m³/h]	[ℓ /min]	[m³/h]	[ℓ /min]	[m³/h]
OI 5	25	50	Min	15	0,9	5	0,3	2,5	0,15	1,2	0,072	0,6	0,036	0,3	0,018	0,1	0,006
			Max	50	3	50	3	25	1,5	12	0,72	6	0,36	3	0,18	1	0,06
OI 10	25	100	Min	30	1,8	10	0,6	8	0,5	4	0,24	2	0,12	1	0,06	0,3	0,018
			Max	100	6	100	6	80	5	40	2,4	20	1,2	10	0,6	3	0,18
OI 50	50	300	Min	60	3,6	30	1,8	15	0,9	7,5	0,45	4	0,24	2	0,12	1	0,06
			Max	300	18	300	18	200	12	150	9	80	5	40	2,5	12	0,72
OI 200	80	700	Min	140	8,4	70	4,2	30	1,8	15	0,9	10	0,6	4	0,25	3	0,18
			Max	700	42	700	42	700	42	350	20	180	11	80	5	25	1,5
OI 400	100	1200	Min	240	14,5	120	7,2	60	3,6	35	2	17	1	10	0,6	4	0,24
			Max	1200	72	1200	72	1200	72	700	42	350	21	180	11	50	3

MEASURING RANGE FOR NON-NEWTONIAN LIQUIDS (E.G. DISPERSIONS) APPLICABLE TO OVAL WHEELS WITH BALL BEARINGS

Type	DN	Flow Q _{max} [ℓ /min]		1,5 - 20 mPas		up to 300 mPas		up to 30000 mPas		up to 60000 mPas		up to 100000 mPas	
				[ℓ /min]	[m³/h]	[ℓ /min]	[m³/h]	[ℓ /min]	[m³/h]	[ℓ /min]	[m³/h]	[ℓ /min]	[m³/h]
OI 5	25	50	Min	15	0,9	5	0,3	3,5	0,21	2,5	0,15	1,5	0,09
			Max	50	3	50	3	35	2,1	25	1,5	15	0,9
OI 10	25	100	Min	30	1,8	10	0,6	7,5	0,45	5	0,3	3	0,18
			Max	100	6	100	6	75	4,5	50	3	30	1,8
OI 50	50	300	Min	60	3,6	30	1,8	12	0,72	7,5	0,45	4,5	0,27
			Max	300	18	300	18	240	14,5	150	9	90	5,4
OI 200	80	700	Min	140	8,4	70	4,2	25	1,5	15	0,9	10	0,6
			Max	700	42	700	42	500	30	300	18	200	12
OI 400	100	1200	Min	240	14,5	120	7,2	45	2,7	30	1,8	18	1,1
			Max	1200	72	1200	72	900	54	600	36	360	22

The figures in the table are general nominal ratings. The exact range depends on measured media, viscosity and counter type and is listed in the respective sheet attached.

5. Output

5.1 Output Signal

5.1.1 Pulse pick-up AG 19, AG 20 and AG 45

AG 19 and AG 20

Technical Data

number of slots	1/2/10/20/32
max. revolutions per minute	350/min
max. pulse frequency	187 Hz depending on counter type
allowed ambient temperature	-25 to + 90°C
housing protection type	IP 54 (DIN 40 050)
Control head protection type	IP 67 (DIN 40 050)
Ex-protection	Ex II 2G Ex ia IIC T6 Ga
Connection of external devices	in compliance with EN 50227 (NAMUR) and Ex-approval

Oval wheel counter with AG 19/ 20 Data					Pulse pick-up frequency in relation to Qmax								
					≤10 HZ for: remote counting			> 10 HZ for: control, display, registration etc.					
Type	DN	Qmax	nAG	display counter	no. of slots in lug disc								
					1	2	10	10		20		32	
	mm	ℓ — min	U — min	ℓ oder m³	Imp. — ℓ			Imp. — s	Imp. — ℓ	Imp. — s	Imp. — ℓ	Imp. — s	Imp. — ℓ
OI 5	25	50	50 250	1 l	1		10	41,7	(50)	83,3	(100)	26,7 133	32 (160)
			5 50 250	10 l	0,1		1 10	41,7	(50)	83,3	(100)	133	(160)
OI 10	25	100	10 250	10 l	0,1		1						
						41,7	25	83,3	50	133	80		
OI 50	50	300	30 150	10 l	0,1		1	25	5	50	10	80	16
			3 30 150	100 l	0,01		0,1 1	25	5	50	10	80	16
OI 100	50	600	5 50	100 l	0,01		0,1 1			16,7	2	26,6	3,2
OI 200	80	700	7 70	100 l	0,01		0,1	11,7	1	23,3	2	37	3,2
			0,7 7 70	1 m³	0,001		0,01 0,1	11,7	1	23,3	2	37	3,2
OI 400	100	1200	12 60	100 l	0,01		0,1	10	0,5	20	1	32	1,6
			1,2 12 60	1 m³	0,001		0,01 0,1	10	0,5	20	1	32	1,6
			2 20 200	10 m³	0,0001		0,001 0,01	33,3	0,1	66,7	0,2	107	0,32

AG 45 with pre-amplifier PV11

Technical Data

number of control wires	100
max. revolutions per minute	285/min
max. pulse frequency	475 Hz depending on counter type
Housing protection type	IP 65 (EN 60529)
Ex-protection	Ex II 2G Ex ib IIC T6/5/4 Gb
connection of external devices	in compliance with EN 50227 (NAMUR) and Ex-approval

Temperatures and Ex-protection temperature classes

without temperature extension		
Class	T _U	T _{media}
T6	60°C	60°C
minimum	-40°C	-40°C

for all classes

with temperature extension		
Class	T _U	T _{media}
T3	70°C	170°C
T4	70°C	135°C
T5	70°C	100°C
T6	60°C	60°C
minimum	-40°C	-60°C
Temperature extensions must stick out of the thermal insulation in full length!		

for all classes

The Wiegand-pre-amplifier PV 11 in connection with pulse pick-up AG 45 is designed to sense the volume pulses in oval wheel counters. Being a category 2G device it may be employed in areas of explosion hazard zone 1.

The Wiegand sensor coils of the above mentioned pulse pick-up types are "simple electrical devices" as defined by EN 60079-14:1997, sections 12.2.1. The explosion protection approval for the Wiegand-pre-amplifier PV 11 is thus applicable for the entire meter using one of these pulse pick-up.

The needle pulses generated in the sensor head due to the Wiegand effect are transformed during the pick-up stage by the secondary multi vibrator in pulses of 500 milliseconds width. Then follows a separation into two independent NAMUR switching-stages with signals of 180° phase shift.

Oval wheel counter data				high frequency pick-up AG45 for: controlling, test loops, etc.		
type	DN	Qmax	nAg	display counter	number of wires	
	mm	ℓ — min	U — min	ℓ or m³	Imp. — s	Imp. — ℓ
				10 ℓ		
OI 5	25	50	250	1 ℓ	417	500
			250	10 ℓ		
OI 10	25	100	250	10 ℓ	417	250

OI 50	50	300	150	10 ℓ	250	50
			150	100 ℓ		
OI 100	50	660	50	100 ℓ	100	10
OI 200	80	700	70	100 ℓ	117	10
			70	1 m³		
OI 400	100 80	1200	60	100 ℓ	100	5
			60	1 m³		
			200	10 m³		

5.1.2 Mechanical Counters of the M5 Series

Roller Counter M5

The device is equipped with a five-digit roller set, which counts and displays the units of measurement. A sixth roller is covered. When the measuring process has been completed and the zero re-set lever has been operated, the cover opens and the value after the dash of the fifth roller is shown as a digit. After the measured value has been read out, the zero re-set lever is operated again. The rollers are reset to zero and the sixth digit is covered again. The device is ready for further measurement. An eight-digit totalizer, which cannot be re-set, adds all values displayed on the roller set at the same time.

Roller Counter M5B with Printer

This device is used where a print-out is required in addition to the display of the quantity delivered. After any given quantity has been delivered, the re-set lever is operated. The quantity in the roller counter is now transferred to the printer and printed out on the inserted receipt. Zeroing of the combination device is also done by operating the lever. During the printing sequence, the lever is locked.

Roller Counter M5V with Pre-Setting Device

The attachment of the pre-setting device allows the pre-setting and delivery of a five-digit quantity. It is attached to the meter M5, which is described above. Entering of the quantity is done with push-buttons after operating the zeroing lever (red marking). The setting level always corresponds to one-tenth of the cycle value of the fastest moving roller in the M5 roller counter. The set value remains during the delivery. Switching-off is performed in four stages with the numerical values of 20, 10, 3 and when the set value has been reached. Switching can be done on the right or left side of the housing. The pre-set value is preserved. This is important for the filling of cans or drums. There is a stop button to interrupt the measuring process. By pulling the start lever again the measurement may be completed.

Roller Counter M5BV with Printer and Pre-Setting Device

The roller counter M5, printer B, and pre-setting device V is a combination device and placed in one housing. Measured quantities are read out on the roller counter M5, the preparation of a printed card for the measured values are printed out in printer B, the desired quantity is pre-set in the quantity pre-setting device V.

IG 2 (Pulse pick-up, 2 Channels)

for roller counters M5, M5B, M5V and M5BV

The above mentioned roller counters can be supplied with an integrated two-channel pulse pick-up. Two slot initiators of the type SJ 3,5-N (⊕ II 2G Ex ia IIC T6 Ga) in connection with a lug disc (10 lugs) form the pulse pick-up system with an intrinsically safe control loop according to NAMUR. It is placed in the housing of the counter and driven by the coupling gearwheel. It is equipped with a reverse-run safety mechanism, which ensures that no pulses are delivered when the counter is reversing.

For each scale of the fastest counter roller in the M5 roller counter one pulse is triggered per transmitter. Both pulses are delivered delayed in phase so that the second pulse is triggered in the mid of the pulse length of the first pulse.

Optionally a linking switch (KS), designed as a proximity switch according to Namur (Typ NJ 1,5-6,5-N ; (Ex) II 2G Ex ia IIC T6 Ga)) can be added (KSN).

The connecting wire is to be fixed onto the terminal box at the back of the housing.

The electrical connection data for the pulse pick-up and the linking switch are listed on the type plates on the housing.

The value of the pulse is 1/100th of the rotation value of the fastest counter roll.

KS (Linking Switch, Electr.)

for roller counters M5, M5B, M5V and M5BV

KSP (Linking Switch, Pneum.)

for roller counters M5B and M5BV

These additional devices are used as signal output for the operational status of the roller counter. Between the red and green marks (read out, pressure and zero position) an electrical respectively pneumatic signal is provided for the total duration. This signal may be used to stop the delivery (valve) or as an acoustic respectively visual signal. Thus unwanted delivery during the "red-phase" of the counter can be prevented or at least identified.

KS: electrical quick break switch (KSE), Ex-protected (Ex) (Ex) II 2G Ex d IIC T6, 400 V ~ 2 A, 250 V - 0,15 A. Mounted in the housing onto the right side plate of roller counter M5, operated by the disconnecting coupling.

Optional a proximity switch (intrinsically safe) can be provided.

KSP: Pneumatic 3/2 distributing valve; air inlet max. 8 bar; temperature range 10 to + 60°C. air inlet connections at the back of the M5B: air inlet and control air R 1/8"-female thread, mounted into the printer, operated by printing roller.

Basic Type	Roller Counter M5					Re-settable Printer B		Pre-settable Counter V	
	re-settable counter			Roller counter		Final value	Printer Resolution	Scale	Amount
	Final value	starting roller 1 rotation	starting roller smallest scalling	Final value	smallest possible value display				
OI 5	99999 ℓ	10 ℓ	0,1 ℓ	99999999 ℓ	1 ℓ	99999,9 ℓ	0,1 ℓ	1 ℓ	99999 ℓ
OI 10									
OI 50									
OI 100	999,99 m³	0,1 m³	0,001 m³	999999,99 m³	0,01 m³	999,999 m³	0,001 m³	0,01 m³	999,99 m³
OI 200									
OI 400									

5.1.3 Mechanical Single Pointer Indicator E and Double Pointer Indicator D

Both indicators (E and D) are provided with a counter that is not re-settable, so that continuous adding up (adding-up roller counter with 6 digit rollers). The double pointer indicator can optionally be equipped with a re-settable counter.

The counter head is mounted vertically, horizontally or diagonally.

Basic Type	Single Pointer Indicator E				Double pointer indicator D			
	Pointer Indicator		Roller Counter		Pointer Indicator		Roller Counter	
	Display	smallest possible display value	Final value	smallest possible display value	Dial calibration	smallest possible display value	Final value	smallest possible display value
OI 5	0 - 1 ℓ 0 - 10 ℓ	0,01 ℓ 0,1 ℓ	99999 ℓ 999990 ℓ	1 ℓ 10 ℓ	0 - 1; 0 - 50 ℓ 0 - 10; 0 - 500 ℓ	0,01 ℓ 0,1 ℓ	99999,9 ℓ 999999 ℓ	0,1 ℓ 1 ℓ
OI 10	0 - 10 ℓ	0,1 ℓ	999990 ℓ	10 ℓ	0 - 10; 0 - 500 ℓ	0,1 ℓ	999999 ℓ	1 ℓ
OI 50	0 - 100 ℓ	1 ℓ	9999900 ℓ	100 ℓ	0 - 10; 0 - 500 ℓ 0 - 100; 0 - 5000 ℓ	0,1 ℓ 1 ℓ	999999 ℓ 9999990 ℓ	1 ℓ 10 ℓ
OI 100	0 - 100 ℓ	1 ℓ	9999900 ℓ	100 ℓ	0 - 10; 0 - 500 ℓ 0 - 100; 0 - 5000 ℓ	0,1 ℓ 1 ℓ	999999 ℓ 9999990 ℓ	1 ℓ 10 ℓ
OI 200	0 - 1 m³	0,01 m³	99999 m³	1 m³	0 - 100; 0 - 5000 ℓ 0 - 1 m³; 0 - 50 m³	1 ℓ 0,01 m³	9999990 ℓ 99999 m³	10 ℓ 0,1 m³
OI 400	0 - 1 m³	0,01 m³	99999 m³	1 m³	0 - 1 m³; 0 - 50 m³	0,01 m³	99999,9 m³	0,1 m³

5.2 Electrical and Thermal Safety Specifications

see attached „EG-Baumusterprüfbescheinigungen“ (EC Type Examination)

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 Tolerated Deviation

OI 5, OI 10, OI 50, OI 100, OI 200, OI 400: $\pm 0,1\%$ (up to $\pm 1\%$ depending on viscosity)

6.3 Repeatability

$< 0,1\%$

6.4 Influence of Ambient Temperature

$< 0.005\% / ^\circ\text{C}$

6.5 Influence of Media Temperature

Depending on viscosity of measured media.

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 type N strainer).
- Oval Wheel Meters intended for liquid food products must be cleaned thoroughly before putting them into operation (see Maintenance and Cleaning).

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 AG 19/20 and AG 45 according to the protection type „intrinsically safe“ in the Ex-area.

AG 45 with pre-amplifier PV11:  II 2G Ex ib IIC T6/5/4 Gb

AG 19, AG 20 and IG 2:  II 2G Ex ia IIC T6 Ga

Linking Switch KS:

Proximity switch according to Namur (KSN)  II 2G Ex ia IIC T6 Ga

Electrical quick break switch (KSE)  II 2G Ex d IIC T6

EMV protection can only be granted with shielded wires. The shielding must be applied at 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 the heater of the Oval Wheel Meter, the strainer and the pipe are to be switched on well ahead in time; only then the Oval Wheel Meter is to be started-up while the flow quantity is slowly increased.**

7.2 Environmental Conditions

7.2.1 Ambient Temperature

OI with AG 19 or AG 20:	-25 to +90°C
OI with AG 45:	-40 to +60°C
OI with M5 series counter:	-20 to +60°C
OI with pointer indicator:	-20 to +110°C

7.2.2 Storage Temperature

OI:	-25°C to +70°C
Pulse pick-up:	-25°C to +70°C
Roller counter M5:	-20°C to +70°C
Pointer indicator:	-20°C to +70°C

7.2.3 Type of Protection

OI with AG 19 or/and AG 20:	IP54
OI with AG 45:	IP54
OI with roller counter of the M5 series:	IP54
OI with pointer indicator:	IP54

according to IEC 529 / EN 60529

7.2.4 Electromagnetic Compatibility

Only for devices with pulse pick-up:

According to EMV guideline 2004/108/EG, EN 61000-6-3; EN 61000-6-2

Electromagnetic compatibility can only be warranted when the electronics housing is closed.
Otherwise there may be malfunctions due to the interference of electromagnetic signals.

7.3 Process Conditions

7.3.1 Media Temperature

Basic type	Pulse pick-up		Roller Counter M5	Pointer Indicator E/D	Extension	Special tolerances	Media temperature in °C
	AG19 AG20	AG45					
OI 5 OI 10	•						0-90 (60*)
		•					0-90 (60*)
	•		•				0-60
	•			•			0-90 (60*)
		•	•				0-60
		•		•			0-90 (60*)
	•				•		0-110 (60*)
		•			•		0-110 (60*)
	•		•		•		0-110 (60*)
		•	•		•		0-110 (60*)
			•				0-60
				•			0-110 (60*)
	•					•	0-90*
		•				•	0-90*
	•		•			•	0-60
	•			•			0-90*
		•	•				0-90*
		•		•			0-90*
			•			•	0-60*
				•		•	0-110*
	•				•	•	0-180 (60*)
		•			•	•	0-180
	•		•		•	•	0-180
	•			•	•	•	0-180
		•	•		•	•	0-180
		•		•	•	•	0-180

* Media temperature for material of the series F57 with ball bearing

Basic type	Pulse Pick-up		Roller Counter M5	Pointer Indicator E/D	Extension	Special tolerance ranges	Media temperature in °C
	AG19 AG20	AG45					
OI 50 OI 100 OI 200 OI 400	•						0-60
		•					0-60
	•		•				0-60
	•			•			0-60
		•	•				0-60
		•		•			0-60
			•				0-60
	•			•			0-60
		•				•	0-90
		•				•	0-90
	•		•			•	0-60
		•	•			•	0-60
			•			•	0-60
				•		•	0-110
	•				•	•	0-180
		•			•	•	0-180
	•		•		•	•	0-180
	•			•	•	•	0-180
		•	•		•	•	0-180
		•		•	•	•	0-180

* Media temperature for material of the series F57 with ball bearing

For materials of the series G2, F5 and F57 media temperature may drop below -40°C as long as $PN_{-40^{\circ}\text{C}} = 0,5 \times PN_{-10^{\circ}\text{C}}$ is maintained.

According to AD-W10 the media temperature for materials of the series G1 and A4 must not drop below -10°C.

For counters of the OI 5 and OI 10 series Oval Wheels with special tolerance ranges for media temperatures > 110°C must be used.

7.3.2 State of Aggregation

Suitable for liquids

7.3.3 Viscosity

OI 5, OI 10, OI 50, OI 100, OI 200, OI 400: 0,3 - 3000 mPa·s

OI 10, OI 50, OI 100, OI 200, OI 400 with special toothing: >150mPa·s

Meters with ball bearing (instead of carbon bearing) special toothing (OI 5 normal toothing)

Newtonian flow properties: OI 5 and OI 10: 1.5 – 60.000 mPa·s

OI 10, OI 50, OI 100, OI 200 and OI 400: 1,5 – 100.000 mPa·s

Newtonian flow properties: OI 5, OI 10, OI 50, I 100, OI 200 and OI 400: 1,5 – 100.000 mPa·s

7.3.4 Media Temperature Limit

180°C

7.3.5 Media Pressure Limit

Depending on material (see 8.3.)

	DN 25	DN 50	DN 80	DN 100
G1	PN 25	PN 16	PN 10	PN 10
G2	PN 40	PN 40	PN 25	PN 25
F5	PN 40	PN 40	PN 25	PN 25
F57	PN 40	PN 40	PN 25	PN 25



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

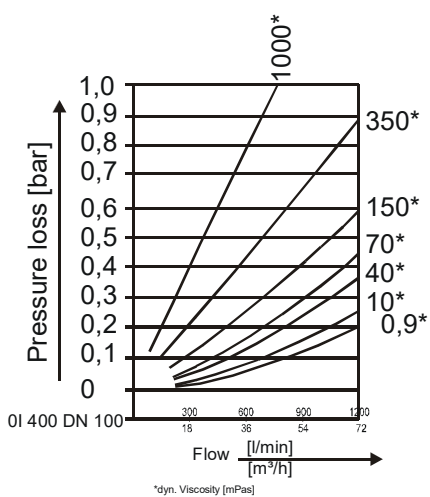
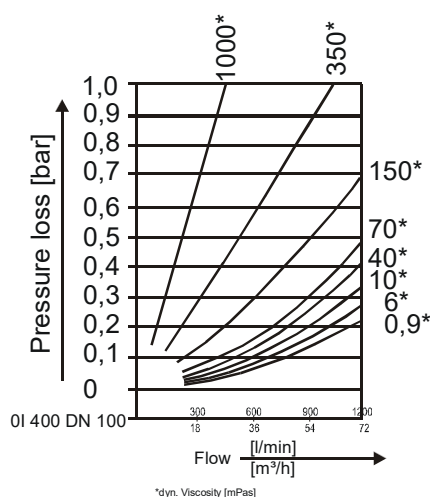
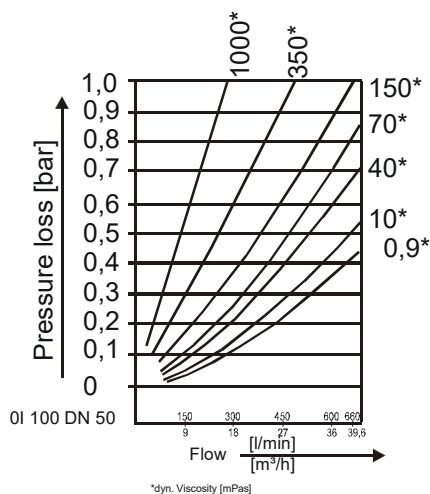
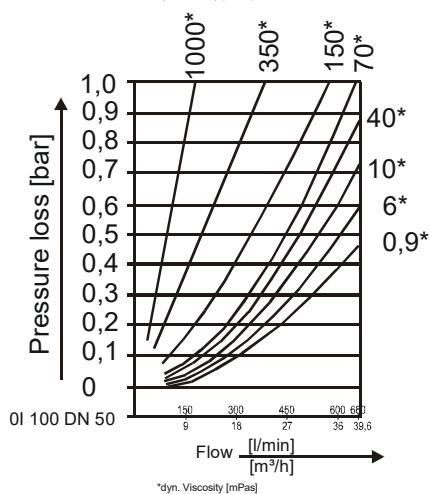
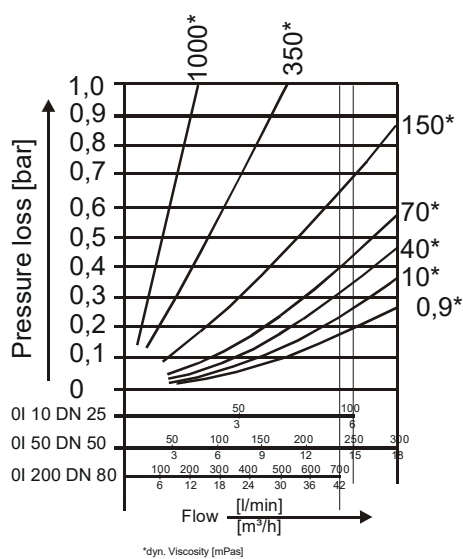
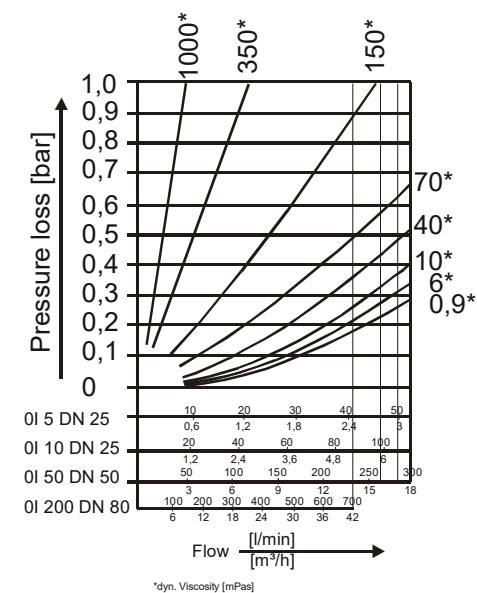
7.3.6 Flow Rate Limit

Value in l/min to max. viscosity of 150 mPa·s

OI 5	OI 10	OI 50	OI 100	OI 200	OI 400
50	100	300	660	700	1200

7.3.7 Pressure Loss

NORMAL TOOTHING



8. Construction Details

8.1 Design / Dimensions

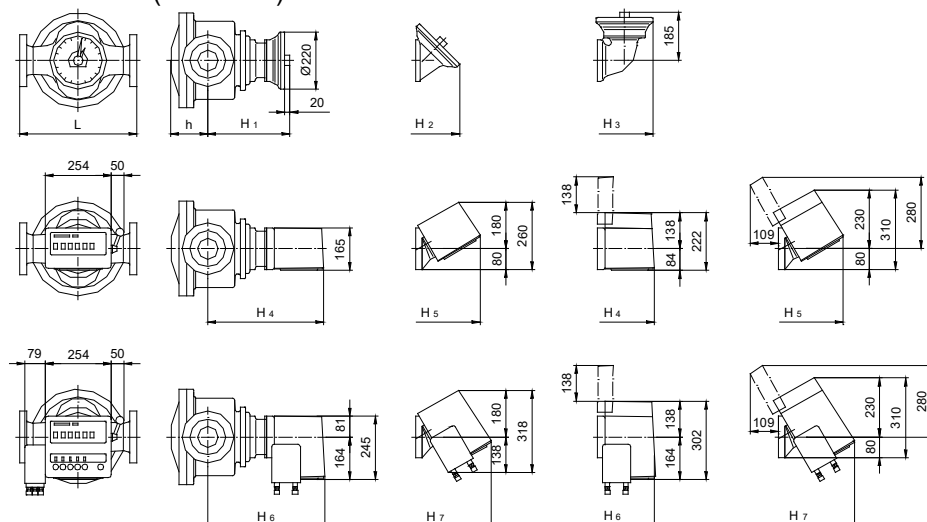
OI 5 – OI 400 with mechanical pointer indicators or roller counter M5 and optional pulse pick-up AG19, AG 20 and AG 45

Type		OI 5 DN 25	OI 10 DN 25	OI 50 DN 50	OI 100 DN 50	OI 200 DN 80	OI 400 DN 100
Nominal width							
Length L	DIN	220	220	300	370	450	550
	ANSI 150	220	220	330	370	450	550
	ANSI 300	220	220	330	390	470	560
Dimensions H _x	H ₁	229	231	249	296	313	349
	H ₂	312	314	332	379	396	432
	H ₃	357	359	377	424	441	477
	H ₄	362	364	382	429	446	482
	H ₅	392	394	412	459	476	512
	H ₆	367	369	387	434	451	487
	H ₇	437	439	457	504	521	557
	h	52	65 - 72*	104	146	145	183
Weight approx. [kg] E, D		13	16	35	66	75	120
Type OI...	M 5	17	22	36	72	81	126
	M 5 B	20	25	39	75	84	129
	M 5 V	24	29	43	79	88	133
	M 5 BV	27	32	46	82	91	136

if a temperature extension is added, the weight will increase by about 2 kg.

* depends on the material version

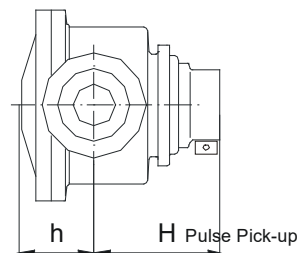
Dimensions (illustrated)



For counters with remote control, pulse pick-up AG 19/20/45 or extension dimensions H1 to H7 are:

- remote control + 42 mm
 - pulse pick-up AG 19 + 115 mm
 - pulse pick-up AG 20 + 115 mm
 - pulse pick-up AG 45 + 115 mm
 - extension + 300 mm
- Example: OI 50 with double indicator D, extension, pulse pick-up AG 19 and remote control**
- overall width H'1 = (249 + 300 + 115 + 42)mm = 706 mm**

Dimensions of the Oval Wheel Meters of the OI series with pulse pick-up (no other accessory)



Type		OI 5	OI 10	OI 50	OI 100	OI 200	OI 400
Nominal width		DN 25	DN 25	DN 50	DN 50	DN 80	DN 100
Length	DIN	220	220	300	370	450	550
	ANSI 150	220	220	330	370	450	550
	ANSI 300	220	220	330	390	470	550
Dimensions	$H_{with\ pulse\ pick-up}$	214	217	235	282	299	335
	h	52	65 - 72*	104	146	145	183
Weight approx. [kg] AG xx		12	15	34	65	74	119
Type OI...							

if a temperature extension is added, the weight will increase by about 2 kg.

* depends on the material version

8.2 Weight

see 8.1

8.3 Material

	OI 5	OI 10	OI 50	OI 100	OI 200	OI 400
Housing	cast iron cast steel CrNiMo	cast iron cast steel CrNiMo	cast iron cast steel CrNiMo	cast steel CrNiMo	cast iron cast steel CrNiMo	cast iron cast steel CrNiMo
Oval Wheel	cast iron bronze CrNiMo	cast iron bronze CrNiMo	cast iron bronze CrNiMo	cast iron CrNiMo	cast iron bronze CrNiMo	cast iron bronze CrNiMo
Bearing	hard carbon ball bearing	hard carbon ball bearing	hard carbon ball bearing	hard carbon	hard carbon ball bearing	hard carbon ball bearing

	G 1	G 2	F 5	F 57
	cast iron hard carbon	Cast steel cast iron hard carbon	CrNiMo hard carbon	CrNiMo Ball bearing
housing	•	•	•	•
Oval Wheels	•	•	•	•
cover meas. chamber	•	•	• ¹⁾	•
sliding disc		•	•	
bearing	•	•	•	•

1) cover measuring chamber made of CrNiMo not applicable for nominal widths < DN 50

8.4 Process connection

Flanges	G1	G2	F5	F57	OI 5	OI 10	OI 50	OI 100	OI 200	OI 400
DIN 2532, PN 10							x			
DIN 2532, PN 10	x								x	x
DIN 2533, PN 16	x					x	x			
DIN 2534, PN 25	x				x	x				
DIN 2544, PN 25		x	x						x	x
DIN 2545, PN 40		x	x	x	x	x	x			
DIN 2545, PN 40		x	x					x		
ANSI 150	x	x	x	x	x	x				
ANSI 150		x	x	x			x			
ANSI 150		x	x					x		
ANSI 150	x	x	x						x	x
ANSI 300 ¹⁾	x	x	x	x	x	x	x	x		
ANSI 300 ²⁾		x	x						x	x

1) but with housing PN 40

2) but with housing PN 25

8.5 Electrical Connection

Electrical connections are housed in the terminal box.

AG 19 and AG 20

devices to be connected	acc. to EN 50227 (NAMUR) and Ex-approval
control line	up to 50 Ohm/wire AG 19: 2-wires, shielded AG 20: 4-wires, twisted in pairs
line connection	Cable gland PG 13.5 in plastic blue

AG 45 with pre-amplifier PV11

devices to be connected	acc. to EN 50227 (NAMUR) and Ex-approval
control line	up to 50 Ohm/wire 2-wires, shielded (channel I+II 4-wires), twisted in pairs; shield in blue colour
line connection	Cable gland PG 13.5 in plastic blue

IG 2

devices to be connected	acc. to EN 50227 (NAMUR) and Ex-approval
control line	up to 50 Ohm/wire 2-wires, shielded
line connection	Cable gland PG 13.5 in plastic blue

KSN

devices to be connected	acc. to EN 50227 (NAMUR) and Ex-approval
control line	up to 50 Ohm/wire 2-wires, shielded
line connection	Cable gland PG 13.5 in plastic blue

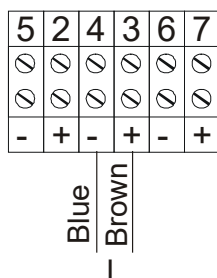


ATTENTION!

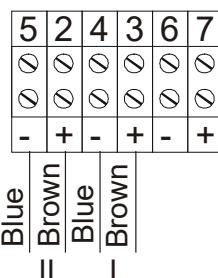
When installed in areas with potentially explosive atmospheres observe the respective country specific regulations (for Germany: EN 60079-14 resp. VDE 0165).

Terminals for AG 19 and AG 20

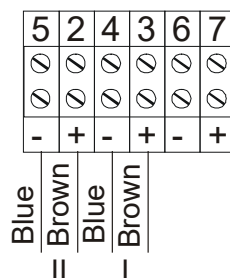
AG 19



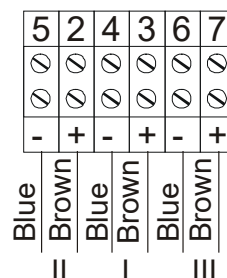
AG 20



AG 19D

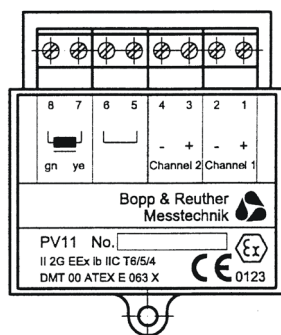


AG 19/20R



At AG 19/20R: I: Main Channel, II: Comparison Channel, III: Back Flow

Terminals for AG 45 with Pre-amplifier PV11



At the Terminals 8 and 7 the Sensor is connected internally.
At 1-channelled operation the terminals 1 and 2 are to be allocated.
The signal from channel 2 is opposite channel 1 inverted.

<p align="center">Bopp & Reuther Messtechnik</p> <p>2elektr. Impulsgebersysteme-IG2085 1Imp./Teilstrich, mit Rücklaufsperr Eingebaut: NAMUR-Initiator P+F PTB 99 ATEX 2219 X II2G EEIaICT6</p> <div style="border: 1px solid black; padding: 5px; display: inline-block;"> 5552 8004 </div> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;"> G1 $\frac{BN(2)}{BU(5)}$ $\frac{+}{-}$ </div> <div style="text-align: center;"> G2 $\frac{BN(3)}{BU(4)}$ $\frac{+}{-}$ </div> </div>	<p>2 electr. Pulse pick-up systems - IG2085 1 Pulse / scale line with return stop integrated: NAMUR-Initiator P+F</p> <p>BN = Brown BU = Blue</p>
<p align="center">Bopp & Reuther Messtechnik</p> <p>Näherungsschalter n. NAMUR U8V=(Ri≈1KΩ) Signalgeber:KSN</p> <div style="display: flex; justify-content: space-around; margin-top: 10px;"> <div style="text-align: center;"> $\leq 1mA$ $\geq 3mA$ </div> <div style="text-align: center;"> $\frac{BN(7)}{BU(6)}$ $\frac{+}{-}$ </div> </div>	<p>Proximity Switch n. NAMUR Transducer : KSN</p> <p>BN = BROWN BU = BLUE</p>

9. Display

Single Pointer Indicator E:

The Single Pointer Indicator E displays the volume mechanically. This series is equipped with an adding-up roller counter with 6 digits roller (no zeroing lever). The Single Pointer Indicator may be combined with the pulse pick-ups described above.

Double Pointer Indicator D:

The Double Pointer Indicator D displays the volume mechanically. This series is equipped with an adding-up roller counter (with zeroing lever). The Double Pointer Indicator may be combined with the pulse pick-ups described above.

Roller Counters of the M5 Series:

The Roller Counters M5, M5B, M5V and M5BV display the volume of the media and may be equipped with a receipt printer and valve control. They can be supplied with the actuation device at the bottom (rotating), upright or diagonal. With the actuation device at the bottom, several roller counters can be mounted above the oval wheel meter. All models are available with an upright or sloping face.


9.1 General

The counters are adjusted to the operation conditions specified in the order form. The pre-set values are listed in the configuration sheet.

Appendix

A. Troubleshooting / Error Detection

The Oval Wheel Meter including pulse pick-up and mechanical counters do not require servicing. If a malfunction or incorrect measuring occurs, the installation conditions mentioned in 7.1 must be checked.

	<p>WARNING! When working on electrical connections, observe local regulations and all safety instructions in the operating instructions.</p>
---	---

For Ex-devices all information and regulations from the Ex-documentation are to be observed in addition to the above.

General:

If the reason for the malfunction cannot be identified ask Bopp & Reuther Messtechnik GmbH customer service department for help or send the device for repair to Bopp & Reuther Messtechnik GmbH, Speyer / Germany. (see appendix B2).

B Servicing, Cleaning and Repair / Hazardous Media

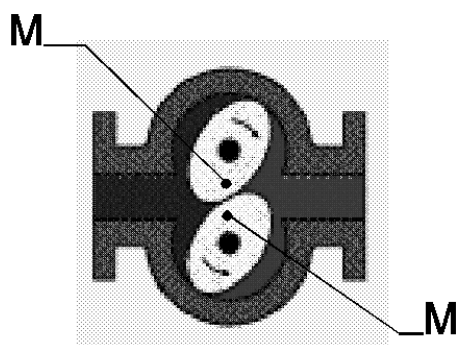
B.1 Servicing, Cleaning

If the Oval Wheel Meter will not be in operation for a longer period of time, it has to be dismantled, thoroughly cleaned and conserved with acid-free oil. Oval Wheel Meters used for liquid food may not be preserved in this way. In- and outlet are to be covered with caps. Make sure to store the Oval Wheel Meter in a dry room.

Cleaning of the Oval Wheel Meters used for liquid food

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

- Loosen tommy nut of the casing cover, lift casing cover with pressure screws, pull off oval wheels from axle, handle with great care, do not place on stone floors, use support made of wood or rubber material.
- When mounting, put on the oval wheels toothed in, i.e. in a way that the M marks on the wheel face face each other. Turn the oval wheel manually to make sure they are properly inserted (once). When inserting the gaskets, make sure it fits precisely.



B.2 Repair / Hazardous Media

Before sending the Oval Wheel Meter to Bopp & Reuther Messtechnik GmbH, 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 appendix C1).
- Remove all residues of the media and pay special attention to sealing grooves and slits. This is of extreme 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, Germany
Phone: +49 6232 657-420
Mob.: +49 15115233023
Fax: +49 6232 657 561
Email: service@bopp-reuther.com

C. Declaration on Decontamination

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

BOPP & REUTHER
MESSTECHNIK 

ERA number:

Telephone: +49 (0) 6232 / 657 420
Fax: +49 (0) 6232 / 657 561
Mail: service@bopp-reuther.com
Web: www.bopp-reuther.com

DECLARATION ON DECONTAMINATION OF METERS AND COMPONENTS

Please complete this form and return in advance by email or by Fax to +49(0)6232 / 657 561 in order to receive an Equipment Return Authorisation (ERA) number (not necessarily required). No action to repair or examine the meter will be done, until a valid declaration of decontamination has been received.

Contact information

Company Name:	<input type="text"/>	Contact Person:	<input type="text"/>
Company Address:	<input type="text"/>	Name:	<input type="text"/>
		Phone:	<input type="text"/>
		Email:	<input type="text"/>

Meter information

Type:	<input type="text"/>	Serial no.:	<input type="text"/>
Id. no.:	<input type="text"/>		

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

Contamination information

The meter was contaminated with:

☐ poisonous



☐ corrosive,
irritant



☐ flammable



☐ hazardous



☐ oxidizing



☐ cancer-causing,
harmful



☐ explosive



☐ environmental
hazardous



☐ other:

The meter was cleaned with:

Packaging and shipping Instructions

- Remove all cables, connectors, separate filters and mounting materials
- Please pack each item in two suitable sealed protective foil bags
- Transport in suitable shipping package (e.g. original Bopp & Reuther Messtechnik shipping package)
- Include a copy of this declaration form along with the shipping documents on the outside

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

Print name: Date:

Legally valid signature:

D. Certificates

D.1. Explosions protection certificates

D.1.1 PV11: EC type examination certificate DMT 00 ATEX E 063 X

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

D.1.2 Slot-type initiators SJ (AG 19/20 und IG2): EC-Type-Examination

Certificate PTB 99 ATEX 2219 X

see Homepage: <https://www.bopp-reuther.com/en/download/> EC Type Examination Certificate foreign companies

D.1.3 Cylindrical inductive sensors NJ (KSN): EC-Type-Examination

Certificate PTB 99 ATEX 2048 X

see Homepage: <https://www.bopp-reuther.com/en/download/> EC Type Examination Certificate foreign companies

D.1.4 Miniature limit switch (KSE): EC-Type-Examination Certificate

PTB 02 ATEX 1031 X

see Homepage: <https://www.bopp-reuther.com/en/download/> EC Type Examination Certificate foreign companies

D.2. Pressure Equipment Directive

<p>ZERTIFIKAT</p> <p>◆ CERTIFICADO ◆</p> <p>◆ CERTIFICAT ◆</p> <p>◆ CERTIFICATE ◆</p> <p>◆ 認証証書 ◆</p> <p>◆ ZERTIFIKAT ◆</p>	 <p>Industrie Service</p>
	<h1 style="text-align: center;">ZERTIFIKAT</h1> <p style="text-align: center;">gültig bis: 22.07.2029</p> <h1 style="text-align: center;">CERTIFICATE</h1> <p style="text-align: center;">valid until: 22.07.2029</p>
	<p style="text-align: center;">EU-Baumusterprüfung (Modul B) - Baumuster - nach Richtlinie 2014/68/EU</p> <p style="text-align: center;"><i>EU Type examination (module B) - production type - according to Directive 2014/68/EU</i></p>
	<p>Zertifikat-Nr.: Z-IS-AN1-MAN-19-07-2681356-23083220</p> <p><i>Certificate No.:</i></p>
	<p>Name und Anschrift des Herstellers: Bopp & Reuther Messtechnik GmbH</p> <p><i>Name and address of manufacturer:</i> Am Neuen Rheinhafen 4 67346 Speyer</p>
	<p>Hiermit wird bescheinigt, dass das unten genannte Baumuster die Anforderungen der Richtlinie 2014/68/EU erfüllt.</p> <p><i>We herewith certify that the type mentioned below meets the requirements of the Directive 2014/68/EU.</i></p>
	<p style="text-align: center;">CE 0036</p>
	<p>Prüfbericht Nr.: P-IS-AN1-MAN-19-07-2681356-23083220</p> <p><i>Evaluation report No.:</i></p>
	<p>Geltungsbereich: Ovalradzähler der Typen OI, OUI, OaP, OuaP, OV, OK, OT, OKT, OF, OR, OC, OP, DN 50 - 400, PN 10 - 100</p> <p><i>Scope of examination:</i></p>
	<p>Fertigungsstätte: Bopp & Reuther Messtechnik GmbH</p> <p><i>Manufacturing plant:</i> Am Neuen Rheinhafen 4 67346 Speyer</p>
<p>Mannheim, 23.07.2019</p> <p>(Ort, Datum)</p> <p><i>(Place, date)</i></p>	<p>TÜV SÜD Industrie Service GmbH</p> <p>Zertifizierungsstelle für Druckgeräte</p> <p><i>Notified Body</i></p> <p>Ralf Brinkmann</p> <p>+49 621 395-367</p>
<p>Echtheitsprüfung durch App TÜV SÜD Verify</p> <p><i>Verification of Certificate by TÜV SÜD App Verify</i></p>	<p>Notifizierte Stelle, Kennnummer 0036</p> <p>Notified Body, No. 0036</p> <p>TÜV SÜD Industrie Service GmbH</p> <p>Westendstr. 199</p> <p>80686 München</p> <p>GERMANY</p>
<p>Seite 1 zum Zertifikat Nr. / Page 1 of the certificate No. Z-IS-AN1-MAN-19-07-2681356-23083220</p>	<p>Dokument ID: 2681356Y8193f</p> 

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



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 Kenn-
nummer gemäß dem abgebildeten CE-Kennzeichen zu kennzeichnen:**

*The manufacturer is - after examination of the prerequisites - authorised to provide his pressure equip-
ment manufactured within the scope of the examination our identification number to the CE-mark as
illustrate:*

CE 0036

Prüfbericht Nr.:

Test report No.:

P-IS-DDB-MAN-15-05-100067376-009

Geltungsbereich:

Scope of examination:

**Durchfluss Messgeräte (Ovalradzähler
OI, OUI, OaP, Ouap, OV, OK, OT, Turbi-
nenradzähler RQ, Wirbeldurchflussmes-
ser 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**

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..*



D.3. 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 sous sa seule responsabilité que les appareils décrits ci-dessous, correspondent aux exigences de la réglementation UE qui les concerne. Toute modification des appareils sans notre accord entraîne la perte de validité de cette déclaration de conformité

Hersteller Manufacturer 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 / OP mit with avec UST, AG, MFE, IG, SE, KSE, KSN, NK

Richtlinie Directive Directive	2014/30/EU /UE Elektromagnetische Verträglichkeit Electromagnetic interference Compatibilité électromagnétique	L 96/79
Normen und normative Dokumente Standards and normative documents Normes et documents normatifs	EN 61000-6-2:2005 EN 61000-6-3:2012	

Richtlinie Directive Directive	2014/34/EU /UE Explosionsschutz Explosion protection Protection contre les explosions	L 96/309
Baumusterprüfbescheinigung Type examination certificate Certificat d'approbation de type	DMT 99 ATEX E 014 X DMT 00 ATEX E 025 X BVS 04 ATEX E 022 X DMT 00 ATEX E 063 X PTB 99 ATEX 2219 X TÜV 15 ATEX 131621 X BVS 09 ATEX E 031 X BVS 00 ATEX 2048 X EPS 14 ATEX 1766 X	USTI USTD USTX AG43-45 (PV11) AG19-20, IG (SJ3,5-N) AG01-08 (01-08) MFE1-3 KSN (NJ1,5-6,5-N) KSE, NK (07-2511)
Notifizierte Stelle Notified Body Organisme Notifié	BVS, DMT: DEKRA EXAM PTB TÜV, EPS: Bureau Veritas	0158 0102 0044
Normen und normative Dokumente Standards and normative documents Normes et documents normatifs	EN IEC 60079-0:2018 EN 60079-1:2014 EN 60079-11:2012 EN 60079-26:2015	USTI, USTD, USTX, PV11, SJ3,5-N, 01-08, MFE1-3, NJ1,5-6,5-N, 8064/21 USTD, USTX, 01-08, 8064/21 USTI, USTD, USTX, PV11, SJ3,5-N, MFE1-3, NJ1,5-6,5-N USTI

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Z-ML-KE ORZ-OI-OAP-OK-OP-elektrisch-V15 2023-01-30

Richtlinie <i>Directive</i> Directive	2014/68/EU /UE Druckgeräte Pressure equipment Équipements sous pression	L 189/164
Konformitätsbewertungsverfahren <i>Conformity assessment procedure</i> Procédures d'évaluation de la conformité	Modul B + Modul C2	
Notifizierte Stelle <i>Notified Body</i> Organisme Notifié	0036 TÜV SÜD Industrie Service GmbH Dudenstraße 28, D-68167 Mannheim	
Normen und normative Dokumente <i>Standards and normative documents</i> Normes et documents normatifs	AD 2000 Regelwerk AD 2000 Code Code AD 2000	
Klassifizierung <i>Classification</i> Classification	Rohrleitungsteil Pipe Tuyauterie	
Fluid Kategorie ; Diagramm <i>Fluid category ; Diagramm</i> Dangerosité du fluide ; Tableau	Gruppe 1 ; Anhang II / 6 Group 1 ; Attachment II / 6 Groupe 1 ; Appendice II / 6	
Einstufung Druckgerät <i>Classification équipement sous pression</i> Classification pressure equipment	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 <i>Directive</i> Directive	2011/65/EU /UE Beschränkung gefährlicher Stoffe Restriction of hazardous substances Limitation de substances dangereuses	L 174/88
Delegierte Richtlinie <i>Delegated Directive</i> Directive Déléguée	(EU /UE) 2015/863 Änderung Anhang II der Richtlinie 2011/65/EU Amending Annex II to Directive 2011/65/EU Modifiant l'annexe II de la directive 2011/65/UE	L 137/10
Normen und normative Dokumente <i>Standards and normative documents</i> Normes et documents normatifs	EN IEC 63000:2018	

Ort, Datum / Place, Date / Lieu, Date:

Speyer, 2023-01-30

Dr. J. Ph. Herzog
Geschäftsführer
Managing director / Gérant

i. V. J. Riedl
stv. QM Beauftragter
Deputy QM Officer / Adjoint chargé de la qualité

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

Z-ML-KE ORZ-OI-OAP-OK-OP-elektrisch-V15 2023-01-30

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 sous sa seule responsabilité que les appareils décrits ci-dessous, correspondent aux exigences de la réglementation UE qui les concerne. Toute modification des appareils sans notre accord entraîne la perte de validité de cette déclaration de conformité

Hersteller <i>Manufacturer</i> Fabricant	Bopp & Reuther Messtechnik GmbH Am Neuen Rheinhafen 4 D-67346 Speyer
Bezeichnung <i>Description</i> Description	Ovalradzähler <i>Ovalwheel meter</i> Compteur à roues ovales
Typ, Modell <i>Type, model</i> Type, modèle	OI / OUI / OaP / OUaP / OK / OP mit with avec E, D, M5

Richtlinie <i>Directive</i> Directive	2014/68/EU /UE Druckgeräte <i>Pressure equipment</i> Équipements sous pression	L 189/164
Konformitätsbewertungsverfahren <i>Conformity assessment procedure</i> Procédures d'évaluation de la conformité	Modul B + Modul C2	
Notifizierte Stelle <i>Notified Body</i> Organisme Notifié	0036 TÜV SÜD Industrie Service GmbH Dudenstraße 28, D-68167 Mannheim	
Normen und normative Dokumente <i>Standards and normative documents</i> Normes et documents normatifs	AD 2000 Regelwerk <i>AD 2000 Code</i> Code AD 2000	
Klassifizierung <i>Classification</i> Classification	Rohrleitungsteil <i>Pipe</i> Tuyauterie	
Fluid Kategorie ; Diagramm <i>Fluid category ; Diagramm</i> Dangerosité du fluide ; Tableau	Gruppe 1 ; Anhang II / 6 <i>Group 1 ; Attachment II / 6</i> Groupe 1 ; Appendice II / 6	
Einstufung Druckgerät <i>Classification équipement sous pression</i> Classification pressure equipment	Kategorie III <i>Category III</i> 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.

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Z-ML-KE ORZ-OI-OAP-OK-OP-mechanisch-V13 2023-01-30

Richtlinie <i>Directive</i> Directive	2011/65/EU /UE L 174/88 Beschränkung gefährlicher Stoffe <i>Restriction of hazardous substances</i> Limitation de substances dangereuses
Delegierte Richtlinie <i>Delegated Directive</i> Directive Déléguée	(EU /UE) 2015/863 L 137/10 Änderung Anhang II der Richtlinie 2011/65/EU <i>Amending Annex II to Directive 2011/65/EU</i> Modifiant l'annexe II de la directive 2011/65/UE
Normen und normative Dokumente <i>Standards and normative documents</i> Normes et documents normatifs	EN IEC 63000:2018

Ort, Datum / Place, Date / Lieu, Date:

Speyer, 2023-01-30


Dr. J. Ph. Herzog
Geschäftsführer
Managing director / Gérant

i. V. J. Riedl
stv. QM Beauftragter
Deputy QM Officer / Adjoint chargé de la qualité

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Z-ML-KE ORZ-OI-OAP-OK-OP-mechanisch-V13 2023-01-30

Our product portfolio:

Volume flowmeter:

- Oval wheel meter
- Turbine meter
- Electromagnetic flowmeter

Mass flowmeter:

- Vortex meter
- Compact orifice
- Coriolis mass flowmeter

Density and concentration meter (Measuring and testing equipment)

Dosing measurement technology

- Electromagnetic flowmeter
- Coriolis mass flowmeter
- Oval wheel meter
- Dosing control system

Measurement Accessories

- Processing electronics
- Mechanical indicator
- Pulse pick-ups
- Components

Measuring and testing equipment

Conformity assessment according to MID Directive 2014/32/EU

After Sales Service

Bopp & Reuther Messtechnik GmbH
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