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# Dosing Oval Wheel Meter

Flowal<sup>®</sup>

Series  
for dosing applications

OD

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## Operating manual



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## 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 case 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. 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.

## 1. Identification

Manufacturer	Bopp & Reuther Messtechnik Am Neuen Rheinhafen 4 67346 Speyer Phone : +49 6232 657-0 Fax: +49 6232 657-505
Type of product	Direct volumetric meter (displacement flow meter)
Product name	Dosing Oval Wheel Meter Flowal®, Series OD
Version number	A-EN-05804-00 Rev.B

## 2. Area of Application

The application area for Oval Wheel Meters of the series Flowal® encompasses the simple, reliable and cost-effective measurement of liquid volumes or volumetric flow rates. They have an extremely robust design and combine years of experience with state-of-the-art technologies. They can be used in various industries, e.g. mechanical engineering, plant construction, food industry, semiconductor industry, environment industry, automotive industry, etc.

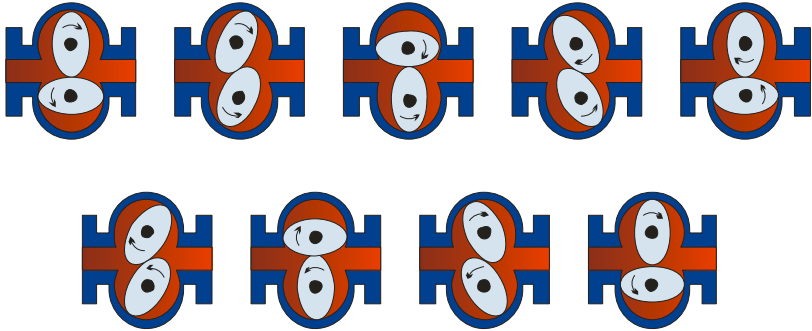
## 3. Measuring Principle and System Design

### 3.1 Measuring Principle

Oval Wheel Meters belong 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.



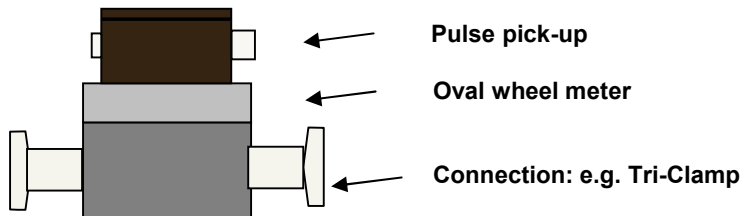
Each revolution the oval wheels displaces a discrete volume of liquid (defined by the space between the oval wheel and measurement chamber) through the chamber.

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

Dosing Oval Wheel Meter Flowal® series OD consists of the following main components:

- measuring transducer (measuring chamber with oval wheels)
- pulse pick-up



### 3.2.1 Pulse Pick-up

Pulse pick-up PNP, 24DC,

### 3.2.2 Measuring chamber

Overview: Dates of measuring chamber depending on the pick-up, and counter size

**Oval wheels: stainless steel – max. 350 mPa•s\***

\* with Newtonian flow properties

Type OD	Measuring range	Pulse Pick-Up		
		Imp/n	Imp/l	Hz <sub>max</sub>
06	0,2 - 5	20	~2000	~167
2	1 - 30	20	~1000	~500
5	2 - 50	20	~400	~333

## 4. Input

### 4.1 Measured values

Volume

## 5. Output

### 5.1 Output signal

24V pulses for the connection to PLC or counting device

Power supply 24VDC

Pulse duration: at least 500µs

High side driver



## 6. Characteristic Parameter

### 6.1 Reference conditions

All oval wheel counters are calibrated at test benches with the following reference conditions:

pressure: 2 to 7 bar, temperature: 20°C

liquid: Demi water

### 6.2 Tolerated deviation

± 0,5% of measured value with standard calibration

### 6.3 Repeatability

<b>Flowal ® Series</b>	
<b>OD</b>	<b>Repeatability</b>
<b>06</b>	0,5ml
<b>2</b>	1ml
<b>5</b>	2,5ml

### 6.4 Influence of ambient temperature

Included in the measuring deviation

### 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**.

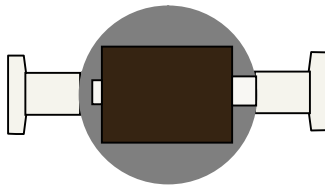
#### 7.1.1.1 General information

- Only trained personnel who have been authorized by the system operator are allowed to perform assembly, electrical installations, commissioning, maintenance and operation. You must have read and understood the instructions and follow their instructions strictly.
- 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.
- As indicated on the type plate parameters are maximum values and must not be exceeded. Operating parameters are specified in the contract documents.
- 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).

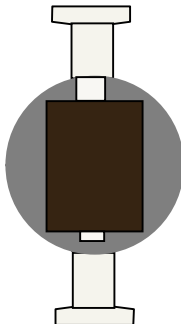
### 7.1.1.2 Installation

- Remove any impurities from the pipework. 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 the penetration of foreign substances.
- Any flow direction, if applicable note the 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.

#### Ovalradzähler correctly installed

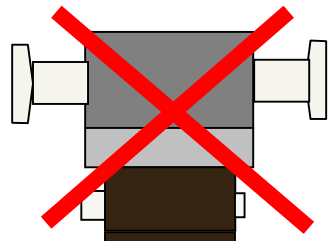
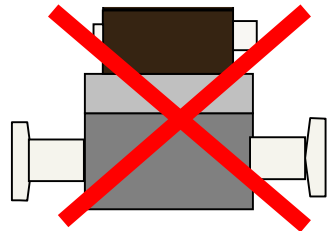


Horizontal pipework



Vertical pipework

#### Wrong!



## **7.2 Ambient Conditions**

### **7.2.1 Ambient temperature**

-20°C to +70°C

### **7.2.2 Storage temperature**

+20°C to +70°C

### **7.2.3 Degree of protection**

IP 65

According to IEC 529 / EN 60529

### **7.2.4 Electromagnetic compatibility**

According to Guideline EMV 2004/108/EG (EMV-Guideline)

EN 61000-6-2 Immunity for industrial environments

EN 61000-6-3 Immunity residential area

## **7.3 Process conditions**

### **7.3.1 State of aggregation**

Suitable for liquids

### **7.3.2 Flow limit**

Depending on the measuring chamber, see 3.2.3 Measuring Chamber

### **7.3.3 Viscosity**

0,3 - 350 mPa·s

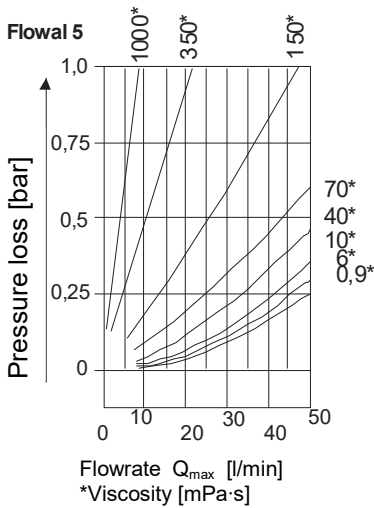
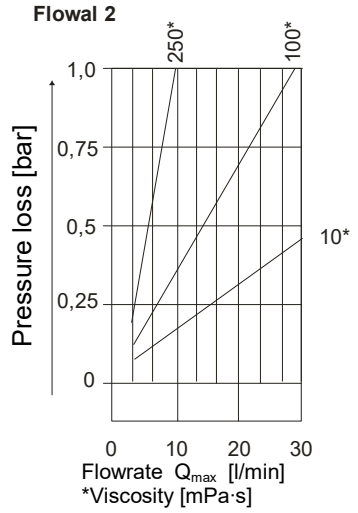
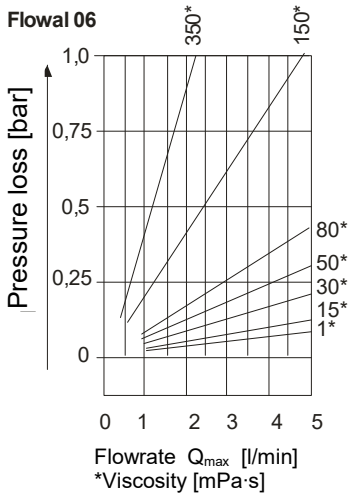
### **7.3.4 Liquid temperature limits**

-10°C to +120°C

### **7.3.5 Liquid pressure limits**

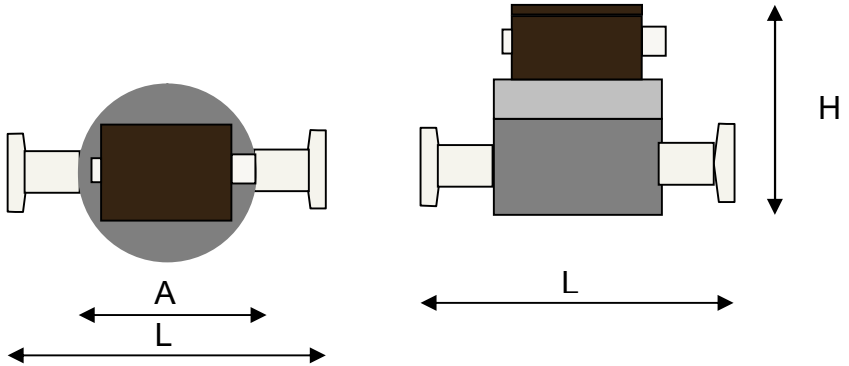
16 bar

### 7.3.6 Pressure loss



## 8. Constructive Design

### 8.1 Model/Dimensions/Weights



Type	A (mm)	H Height (mm)	L Length (mm)	Weight (kg)
OD06	78	98	150	2,4
OD2	99	115	150	2,9
OD5	112	118	150	4,4

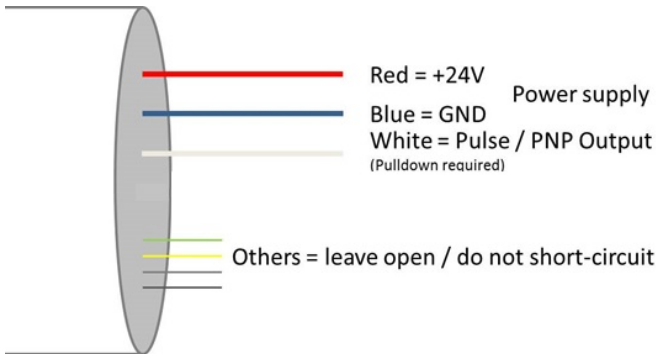
### 8.2 Materials

Code	Housing	Oval wheel	Sleeve bearing	Axle	seals
SS1SS	stainless steel	stainless steel	coal	stainless steel	Viton

### 8.3 Process connection

<b>Flowal®</b>	
<b>OD</b>	Tri-Clamp DIN 32676 or others on request

### 8.4 Electrical connection



### 9 Pulse value, K-Factor

Type OD	Measuring range  l/min	Pulse Pick-Up		
		Imp/n	Imp/l	Hz <sub>max</sub>
<b>06</b>	0,2 - 5	12	~2000	~167
<b>2</b>	1 - 30	20	~1000	~500
<b>5</b>	2 - 50	20	~400	~333

### 10. Certificates and Approvals

Electromagnetic compatibility acc. DIN EN 61000-6-2, DIN EN 61000-6-3

Pressure equipment directive:


The Oval Wheel Meter series Flowal® are suitable in accordance with Pressure Equipment Directive 97/23/EG for fluids in group 1  
Classification acc. Article 3, §3 (according to good engineering practice, designed and manufactured)



## Appendix

### A. Troubleshooting/Error Detection

The Dosing Oval Wheel Meter Flowal® series OD operates maintenance-free. If a fault occurs or there is suspicion of an incorrect message, check the installation conditions as stated in section 7.

**Warning!**

Always observe local regulations and all the safety instructions in these operating instructions when working at the electrical connections.

#### General:

If the fault cannot be detected, please contact the service department of Bopp & Reuther Messtechnik GmbH or return the device for repair work to Bopp & Reuther Messtechnik GmbH (see Appendix B2).

### B Maintenance, Cleaning, Repairs, Hazardous Substances

#### B.1 Maintenance, Cleaning

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

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

- Loosen the screws on housing cover, lift housing 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 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)
- 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 Telefon: +49 6232 657-420 Fax: +49 6232 657-561
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## C. Form

### C.1 Certificate of non-objection for the contractor

Unbedenklichkeitsbescheinigung für Auftragnehmer /  
 Certificate of non-objection for contractor/ Fiche de Renseignements /  
 Confirmación de no objeción para mandatarios

Kunde / Client / Client / Cliente: .....

Auftragsnr. / Lieferschein: Order No.: / Delivery note: No. d' ordre / Bordereau de livraison: N° da encomenda / Guia de Remessa:	Datum: Date: Date: Data:	Gerätetyp und Gerätenr.: Meter type and Serial No.: Compteur / No. de série :
..... .....	..... .....	..... .....
Auftragstext / Order text / Caractéristiques / Características: ..... .....		

### ATTENTION - GEFAHREN - HINWEISE - ATTENTION - ATENÇÃO

Letzter Stoff / Last medium / Dernier liquide mesuré / Último fluido medido: .....	Eigenschaften angeben! z.B. ätzend, brennbar, giftig ... State characteristics! i.e. corrosive, flammable, toxic ... Identification des dangers! p.e. corrosif, inflammable, toxique ... Indicar características, como p.ex. corrosivo, inflamável, venenoso ... ..... ..... .....
Gerät entleert / Unit drained / Vidangé complètement / Aparelho completamente esvaziado?  ja / yes / oui / sim            nein / no / non / não <input type="checkbox"/> <input type="checkbox"/>	..... .....
Spülung mit / drained with / liquide de rinçage / Líquido usado para a lavagem: .....	..... .....
Restverschmutzung / rest of medium / impuretés restantes / Sujidade remanescente?  ja / yes / oui / sim            nein / no / non / não <input type="checkbox"/> <input type="checkbox"/>	..... ..... .....

### SCHUTZMASSNAHMEN - PROTECTION MEASURES - MESURES DE PROTECTION - MEDIDAS DE PROTECÇÃO

	ja / yes / oui / sim	nein / no / non / não
Handschuhe / gloves / gants / luvas	<input type="checkbox"/>	<input type="checkbox"/>
Schutzanzug / protection suit / tenue de sécurité / vestuário de protecção	<input type="checkbox"/>	<input type="checkbox"/>
Gestellbrille / eye glasses / lunettes / Óculos de protecção	<input type="checkbox"/>	<input type="checkbox"/>
Korbbrille und Gesichtsschutz / Glasses with face protection / Lunettes avec protection du visage / Óculos com protecção para o rosto	<input type="checkbox"/>	<input type="checkbox"/>
Atemschutz / respirator / appareil respiratoire / Aparelho respiratório	<input type="checkbox"/>	<input type="checkbox"/>
Mit Absaugungsarbeiten / extractor cowl / travailler sous hotte aspirante / Trabalhar com aspiração	<input type="checkbox"/>	<input type="checkbox"/>
Besondere Schutzmaßnahmen / special protection / mesures de protection Particulieres / medidas especiais de protecção		
Bitte angeben / please state / à préciser / Favor indicar		
.....		
.....		
Beauftragter / Mandatory / Mandataire / Mandatario: Name in Druckbuchstaben / name in printed letters / nom en lettres capitales / Encarregado (Nome em maiúsculas)		
.....		
.....		
Ort und Datum / place and date / lieu et date / Local de data:	Unterschrift / signature / signature / assinatura:	
.....	.....	
.....	.....	