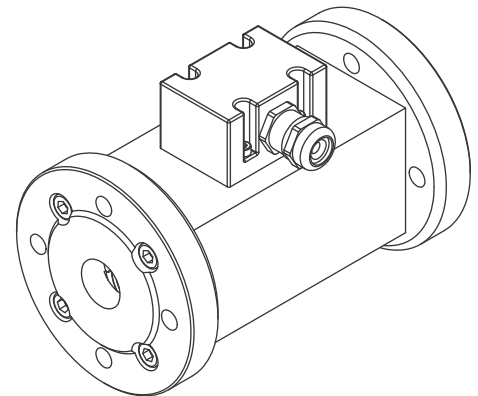
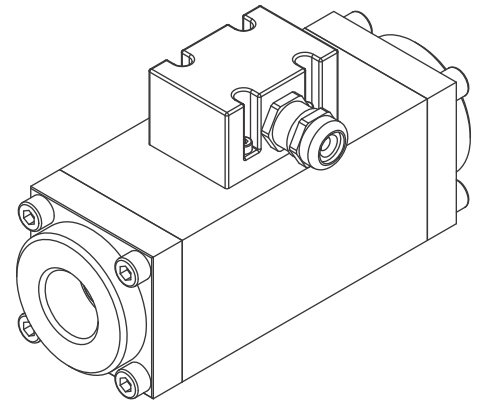




Operating Instructions
for
Screw-Type Spindle
Flowmeter
Model: OME



Manufactured and sold by:

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Target groups

The operating instructions must be kept for future reference. Furthermore please observe the associated documents.

Target groups




Target group	Tasks
Operator-owner	<input type="checkbox"/> Keep these instructions available at the installation site for future reference. <input type="checkbox"/> Ensure that employees read and observe these instructions and the associated documents, in particular the safety instructions and warnings. <input type="checkbox"/> Observe additional system-specific directives and regulations.
Specialist personnel, fitters	<input type="checkbox"/> Read, observe and follow these instructions and the associated documents, in particular the safety instructions and warnings.

Symbols

Danger levels







Warning	Danger level	Consequences of non-observances
 Danger	Immediate threat of danger	Serious personal injury, death
 Warning	Possible threat of danger	Serious personal injury, invalidity
 Caution	Potentially dangerous situation	Slight personal injury
Caution	Potentially dangerous situation	Material damage

Danger signs

Meaning	Source and possible consequences of non-observance
 Personal injury	Physical injury, death
 Electrical voltage	Electrical voltage causes serious physical injury or death
 Hot surface	Hot surface can cause physical injury

Further associated documents

Symbols in action-specific sections

Symbol	Meaning
	Warning personal injury
	Notice
	Procedures mechanical installation
	Procedures electrical installation
	Check or fault table
	Request for action

Further associated documents

Calibration certificate
Declaration of conformity as per EU Directive 2006/42/EC
Manufacturer's declaration as per EU Directive 97/23/EC
Corresponding operating instructions for electronic equipment

Proper use

Proper use

- Use volumeters of the OME series solely for flow measurement of lubricating liquids that are chemically neutral and do not contain any gas or solids content.
- Volumeters require the operation with clean liquids. If coarse contamination, solid particles in the liquid or abrasive fine particles occur during operation, the volumeter has to be protected additionally by a correspondingly dimensioned operating filter in the pipe system, see "Protect the volumeter against contamination", page 21.
- Do not use volumeters outside the operating limits specified on the rating plate and in the chapter "Technical data". Deviating operating data can result in damage to the volumeter. In the case of operating data that does not agree with the specification on the rating plate, please contact the manufacturer.
- Strong changes to the flow rate (e.g. rapid shutdown, pulsations ...) cause marked pressure differences on the volumeter and can damage the measuring unit.
 - The pressure loss of the volumeter must not exceed the values given in the chapter "Technical data", see "Load capacity", page 11.

Safety instructions

The following safety instructions must be observed:

- No liability is accepted for damage arising through non-observance of the operating instructions.
 - Read the operating instructions carefully and observe them.
 - The operator-owner is responsible for the observance of the operating instructions.
 - Installation, removal and installation work may only be carried out by specialist personnel.
- Volumeters wear to different degrees depending on the respective operating conditions (pulsations, temperature ...).
 - Do not continue to use volumeters that are operated contrary to specification or after damage.
 - Check the volumeters regularly.
 - Shut down damaged volumeters and replace worn volumeters immediately.
- In order for the warranty to remain valid, corrective maintenance carried out during the warranty period requires the express permission of the manufacturer.
- Observe the general regulations for the prevention of accidents as well as the local safety and operating instructions.
- Observe the valid national and international standards and specification of the installation location.
- In case of systems with an increased potential of danger to humans and/or machines the failure of a volumeter may not lead to injuries or damage to property.
 - Always equip systems with an increased potential of danger with alarm equipment and/or bypass.
 - Maintain and check the protective/alarm equipment regularly.
- The pumped liquids can be dangerous (e.g. hot, dangerous to health, poisonous, combustible). Observe the safety conditions for handling dangerous materials.
- Pumped liquids can be subject to pressure and can cause damage and/or personal injury should leaks occur.

Type code

Type code

Order Details (Example: OME-15R15 /60)

Flow rate [l/min]	Connection ¹⁾ G	p _{max} [bar]	Temperature [°C]	Impulse/l ²⁾	Frequency ²⁾ [Hz]	Model	Double pulse generator
0.1...10	G ½	40	-40...+125	1214	2.0...304	OME-15R15	/60 = BEG 60
0.3...30	G ¾	40	-40...+125	321	1.6...242	OME-20R20	/61 = BEG 61
1...100	G 1	40	-40...+125	78	1.3...145	OME-25R25	/62 = BEG 62
3.5...350	G 1½	40	-40...+125	17.73	1...155	OME-40R40	/62 = BEG 62
0.1...10	DIN flange DN 15	40	-40...+125	1214	2.0...304	OME-15F15	/60 = BEG 60
0.3...30	DIN flange DN 20	40	-40...+125	321	1.26...242	OME-20F20	/61 = BEG 61
1...100	DIN flange DN 25	40	-40...+125	78	1.3...195	OME-25F25	/62 = BEG 62
3.5...350	DIN flange DN 40	40	-40...+125	17.73	1...155	OME-40F40	/62 = BEG 62

¹⁾ Other connections upon request

²⁾ Please refer to the accompanying test certificate for exact values.

Upon request, flow rates may deviate by up to ±50% depending on viscosity and accuracy.

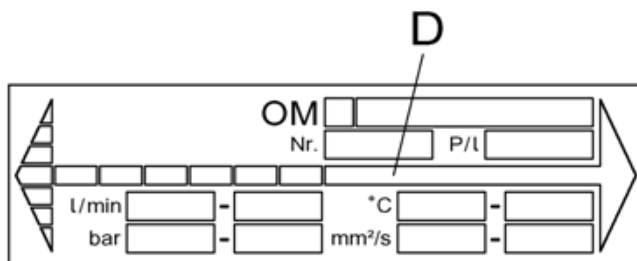


Fig. 2 Rating plate

Operational limits

Operational limits

The values specified on the rating plate and the calibration certificate apply. The permissible operational limits of individual values influence each other so that every application is checked individually by the manufacturer when selecting the volumeter.

If no operating data are provided by the orderer, standardized substitute operating data are used.

Maximum values

The following table shows the respective maximum values that, however, may not occur simultaneously. In addition, the operational limits of the corresponding end connection, of the sealing material and of the connection box are to be observed.

		OME 15	OME 20	OME 25	OME 40
Flow rate					
Q_{\max}	[l/min]	15	45	150	525
Q_{nenn}		10	30	100	350
Q_{\min}		0.1	0.3	1.0	3.5
Pressure max.	[bar]	40	40	40	40
Temperature					
min. – max.	[°C]	-20...+125			
Viskosität					
min. – max.	[mm ² /s]	1 – 1000000			
Measuring chamber volume	[ml/U]	1.65	6.24	25.6	112.8
Rotation speed					
$n (Q_{\max})$	[min ⁻¹]	9120	7260	5850	4658
$n (Q_{\text{nenn}})$		6060	4830	3900	3105
$n (Q_{\min})$		61	48	39	31
Number of poles K1		2	2	2	2
K-factor K1	[P/l]	1214	321	78	17.73
Milliliters per pulse K1	[ml/P]	0.824	3.12	12.8	56.4
Pulse frequency					
$f1 (Q_{\max})$	[Hz]	304	242	195	155
$f1 (Q_{\text{nenn}})$		202	161	130	104
$f1 (Q_{\min})$		2.0	1.6	1.3	1.0

Tab. 1 Maximum values

Noise levels

Substitute operating data

The following table shows standardized values for the flow rate, temperature and viscosity. These values can be used at the same time as maximum values without impairing the service life of the volumeter. In addition, the operational limits of the corresponding end connection, of the sealing material and of the connection box are to be observed.

		OME 15	OME 20	OME 25	OME 40
Flow rate					
Q _{max}	[l/min]	10	30	100	350
Q _{nenn}		10	30	100	350
Q _{min}		0.2	0.6	2.0	7.0
Pressure max.	[bar]	40	40	40	40
Temperature					
min. – max.	[°C]	-20...+100			
Viscosity					
min. – max.	[mm ² /s]	1 – 50			

Tab. 2 Substitute operating data

Noise levels

The sound pressure level of the volumeter amounts to less than 70 dB(A).

Heating system

The manufacturer recommends heating systems for high-viscosity liquids that do not flow sufficiently if not heated, because bearing damage and destruction of the device may otherwise result.

Auxiliary heating

If the customer's auxiliary heating systems are installed, please contact the manufacturer.

CAUTION

Defective connection box or cabling due to exceeding of the maximum temperature.

▶ Do not heat the connection box and corresponding cables above the maximum temperature.

▶ Observe the values in the corresponding table, see Tab. 5, page 15.

Dimensions and weights

OME with BSPP thread

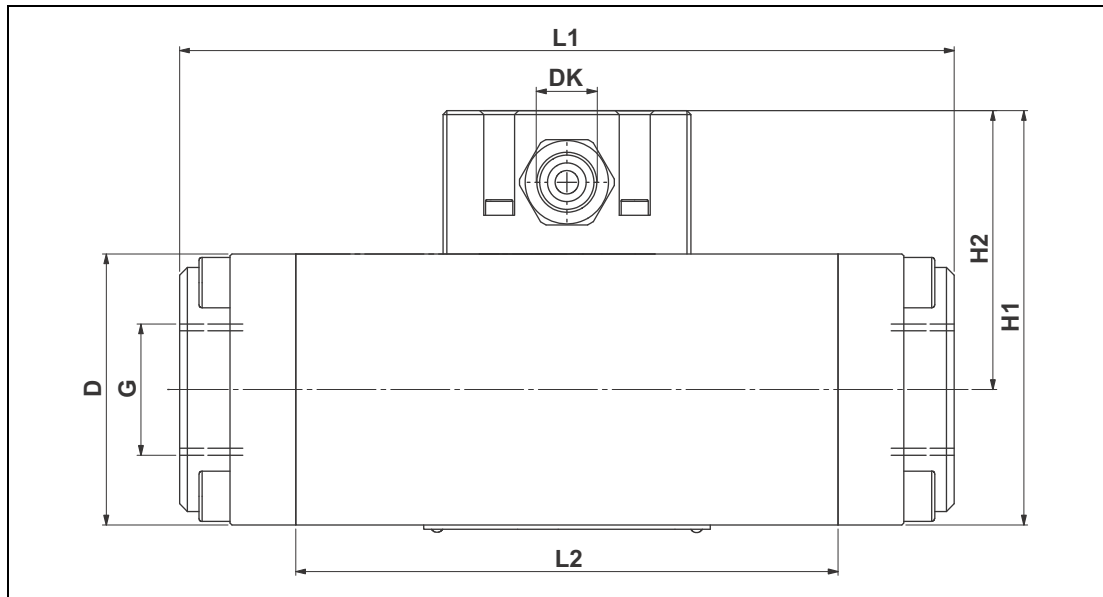


Fig. 1 Dimensional drawing OME with pipe thread

DK Diameter cable 13 mm

		OME 15	OME 20	OME 25	OME 40
G	[inch]	1/2"	3/4"	1"	1 1/2"
Pressure stage	[bar]	40	40	40	40
D	[mm]	45 x 45	55 x 55	70 x 70	110 x 110
L1	[mm]	110	145	200	310
L2	[mm]	65	95	140	225
H1	[mm]	82	92	107	147
H2	[mm]	59.5	64.5	72.0	92.0
Mass	[kg]	0.7	1.2	3.0	9.0

Tab. 3 Dimensions and weights, pipe thread connection

Dimensions and weights

OME with DIN flange

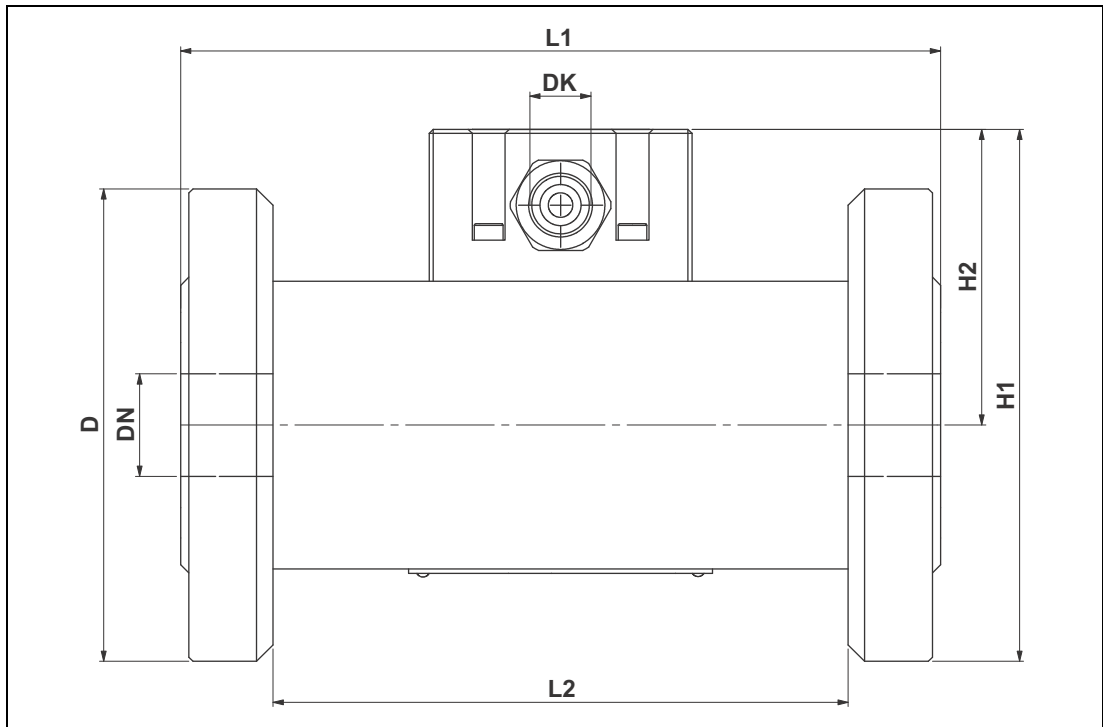


Fig. 2 Dimensional drawing OME with DIN flange

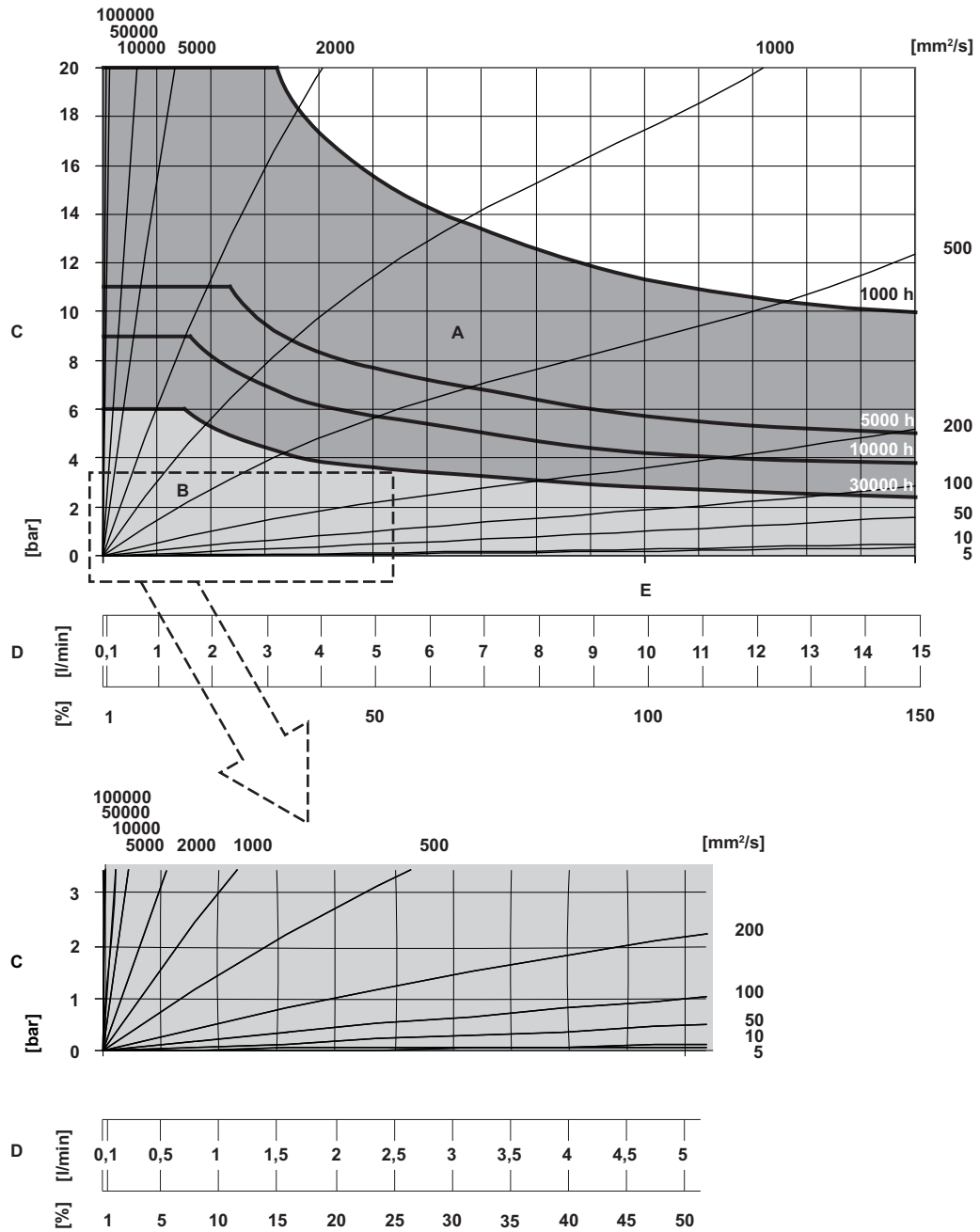
DK Diameter cable 13 mm

		OME 15	OME 20	OME 25	OME 40
DN	[mm]	15	20	25	40
Pressure stage	[bar]	40	40	40	40
D	[mm]	95	105	115	150
L1	[mm]	105	135	185	325
L2	[mm]	65	95	140	225
H1	[mm]	107.0	117.0	129.5	167.0
H2	[mm]	59.5	64.5	72.0	92.0
Mass	[kg]	1.2	1.7	3.0	11.8

Tab. 4 Dimensions and weights, DIN flange connection

Load capacity Load

capacity OME 15

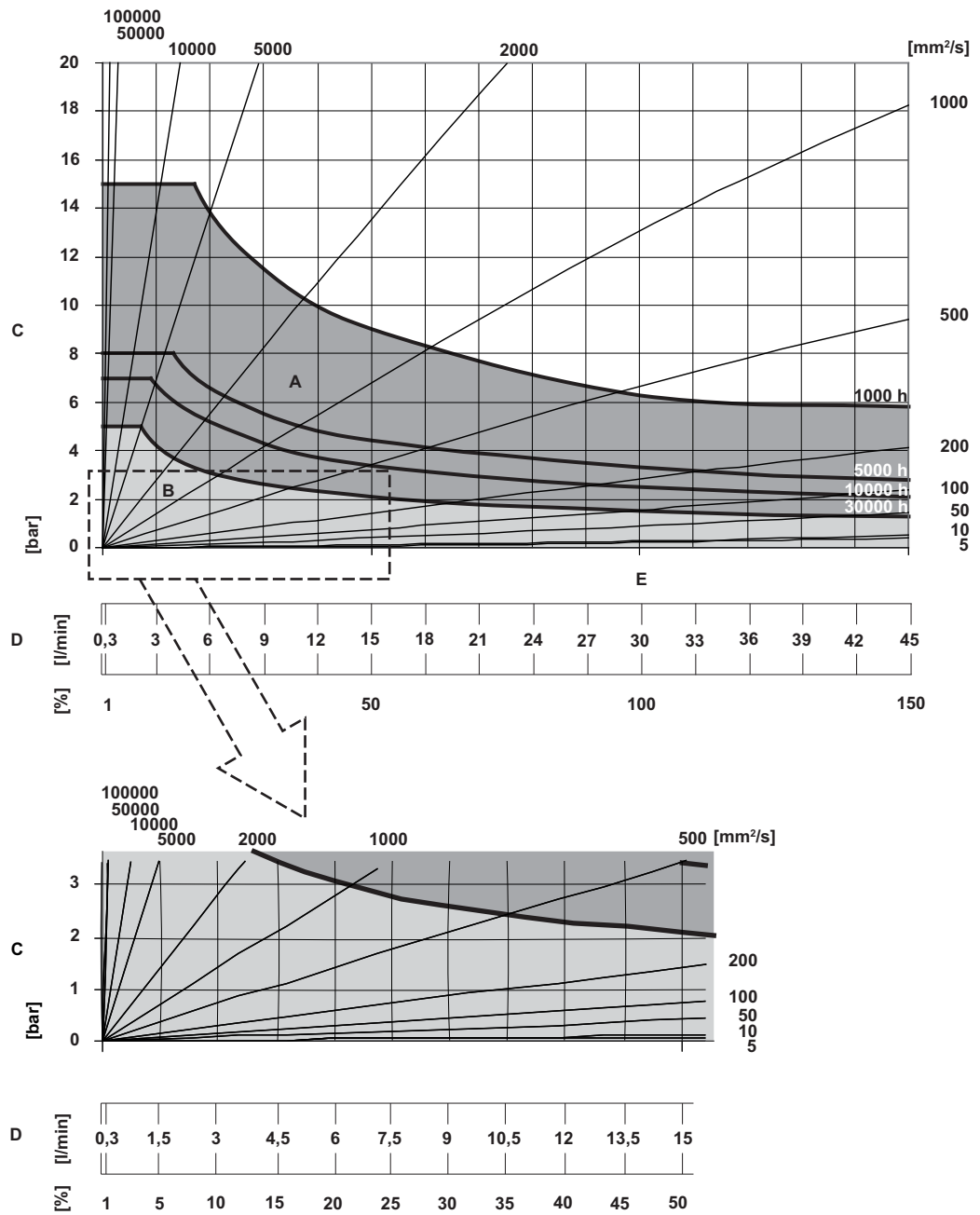


- A Short-time operation
- B Continuous operation
- C Pressure loss
- D Flow
- E Q_{nom}

The values apply for lubricating liquids at temperatures of up to 125 °C. Abrasive and aggressive liquids reduce the durability.

Load capacity

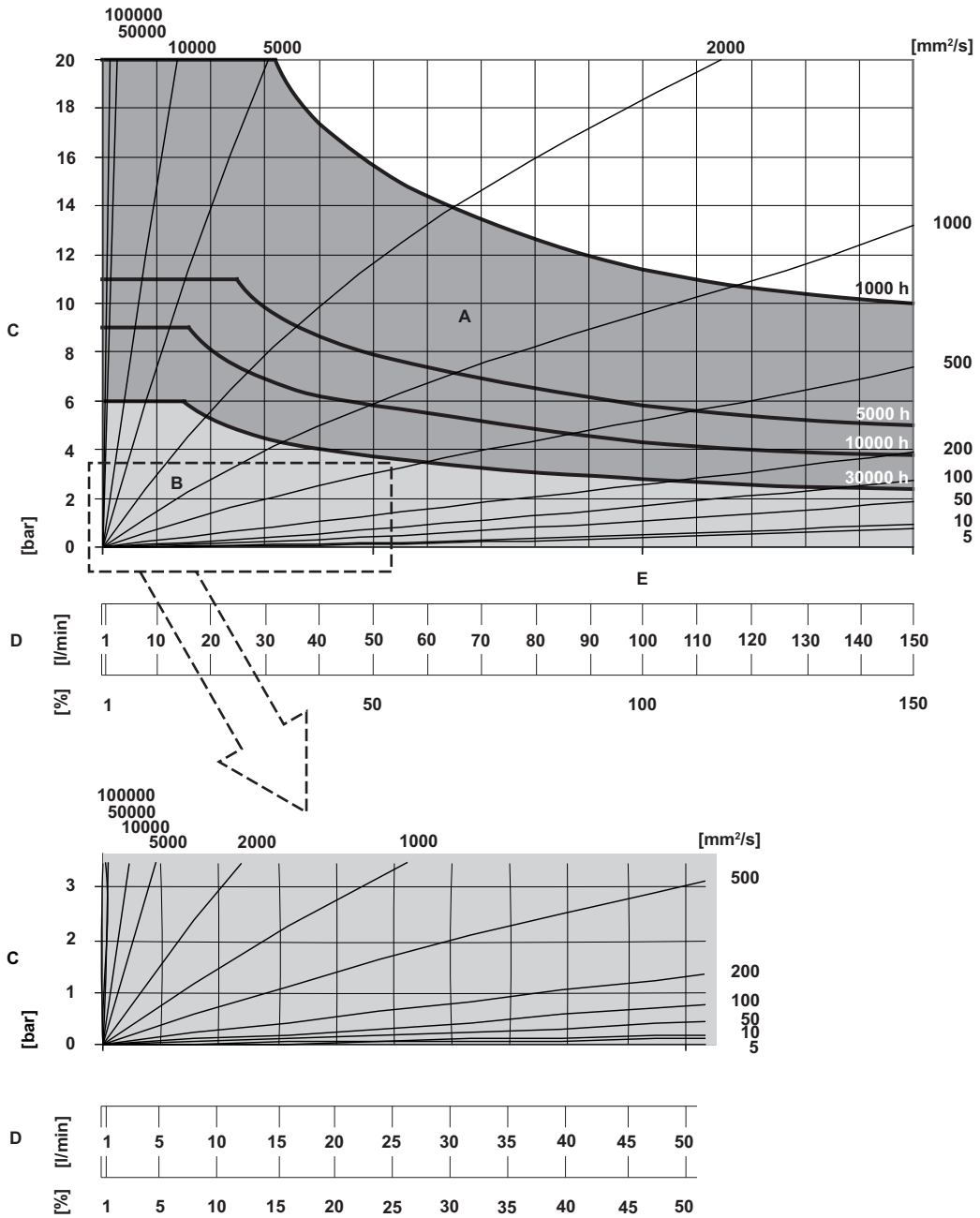
Load capacity OME 20



- A Short-time operation
- B Continuous operation
- C Pressure loss
- D Flow
- E Q_{nom}

The values apply for lubricating liquids at temperatures of up to 125 °C. Abrasive and aggressive liquids reduce the durability.

Load capacity OME 25

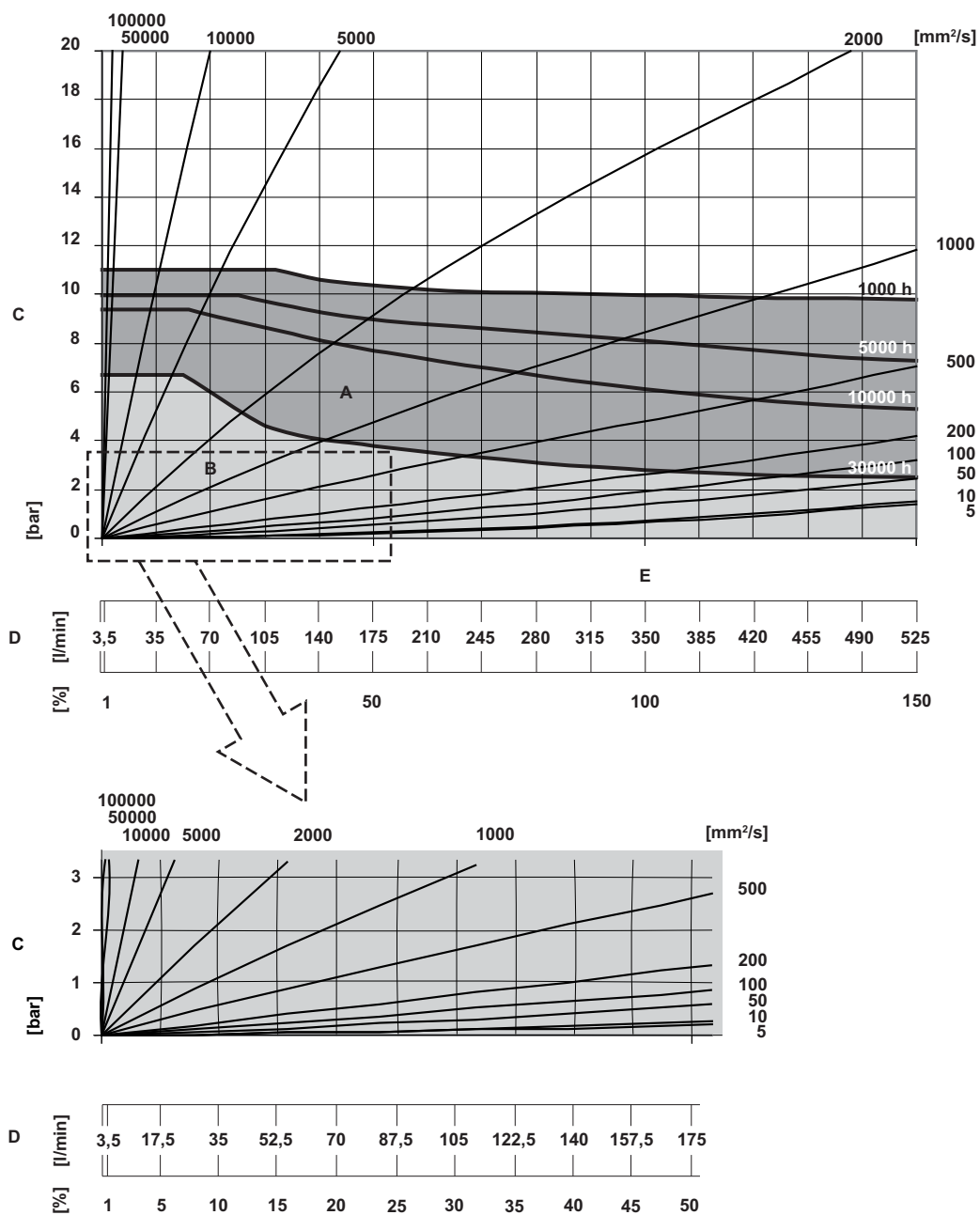


- A Short-time operation
- B Continuous operation
- C Pressure loss
- D Flow
- E Q_{nom}

The values apply for lubricating liquids at temperatures of up to 125 °C. Abrasive and aggressive liquids reduce the durability.

Load capacity

Load capacity OME 40



- A Short-time operation
- B Continuous operation
- C Pressure loss
- D Flow
- E Q_{nom}

The values apply for lubricating liquids at temperatures of up to 125 °C. Abrasive and aggressive liquids reduce the durability.

Specification of connection box

BEG 60 / BEG 61 / BEG 62		
Specification double pick up		
<input type="checkbox"/> Working principle		Magneto-resistive
<input type="checkbox"/> Output circuit		Push-pull
<input type="checkbox"/> Short-circuit protection		Yes
<input type="checkbox"/> Reverse voltage protection		Yes
<input type="checkbox"/> Load current max.	[mA]	20
<input type="checkbox"/> Frequency range	[kHz]	0 – 25
<input type="checkbox"/> Supply voltage	[V DC]	10 – 30
<input type="checkbox"/> Supply current max.	[mA]	50
<input type="checkbox"/> Voltage drop	[V]	< 1
<input type="checkbox"/> Electrical phase shift		90° ± 20°
Specification temperature sensor		
<input type="checkbox"/> Sensor type		Pt100, IEC 751
<input type="checkbox"/> Accuracy class		B
<input type="checkbox"/> Circuit		3-wire
Mechanical specification		
<input type="checkbox"/> Degree of protection		IP 65
<input type="checkbox"/> Operating temperature	[°C]	-20...+125
<input type="checkbox"/> Pressure on the surface max.	[bar]	40
<input type="checkbox"/> Cable diameter	[mm]	6 – 13
<input type="checkbox"/> Wire cross section		AWG 28 ~ 16
<input type="checkbox"/> Temperature resistance cable min.	[°C]	126
<input type="checkbox"/> Material cover		Aluminium anodised

Tab. 5 Specification of connection box

Description

Description

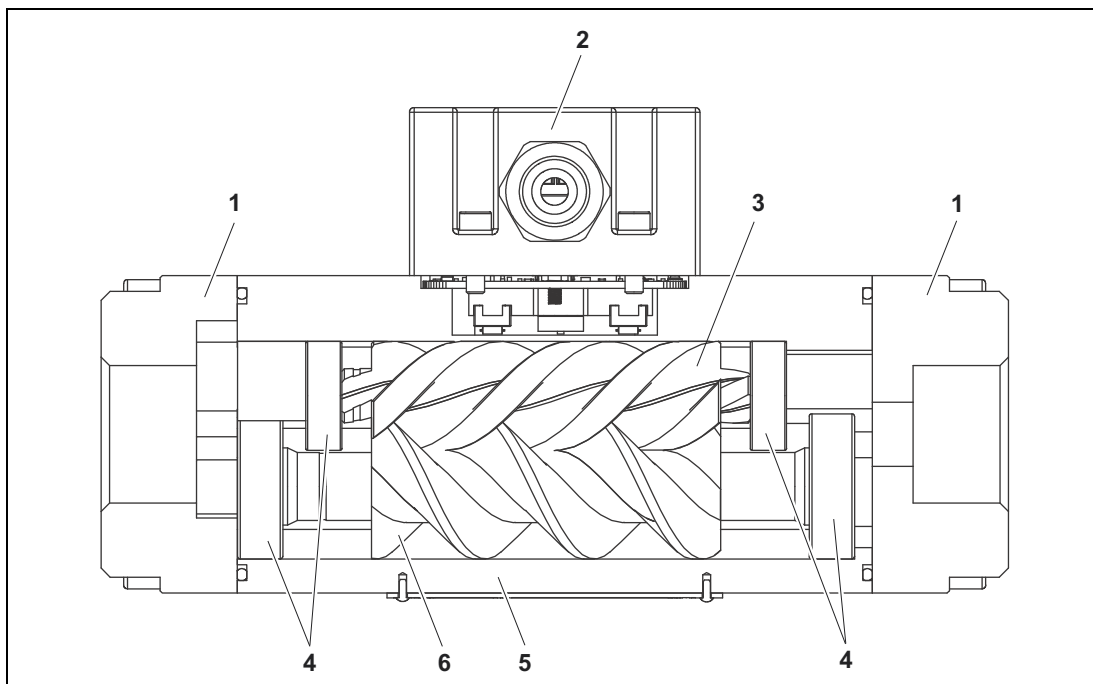


Fig. 1 Structure of the volumeter OME series

- | | |
|-------------------------|-------------------------|
| 1 Connection | 4 Ball bearing |
| 2 Connection box | 5 Measuring housing |
| 3 Measuring screw small | 6 Measuring screw large |

As screw meters volumeters belong to the group of rotating displacement meters. The fluid current makes the measuring unit rotate. The displacement effect results from the continuous filling, axial displacement and discharge of the volumes that are formed by the measuring housing and measuring unit. The measured liquid flows around and lubricates all the rotating parts. Thanks to the displacement principle, the volumeter does not require inlet and smoothing sections in its supply and discharge. Depending on the customer requirements, the volumeters can be equipped with suitable end connections for connection to various flanges.

Rolling bearing

The measuring unit is maintained without contact and with a low degree of friction in the housing of the volumeter by means of a precision rolling bearing. Single-row deep-groove ball bearings are used for series OME volumeters.

Signal generation

The connection box samples the measuring pulses directly on the screw. This connection box generates a specific number of pulses per flow volume unit - depending on the size and working point. This device-specific characteristic is called the K-factor (unit: Pulse/Liter) and is specified on the rating plate as well as on the enclosed calibration certificate.

As a consequence of the mode of assembly the connection box can be mounted without contact to the liquid to be measured.

Linearization

The rating plate of the volumeter lists a preferred flow direction. This preferred direction ensures that the connection box supplies positive signal sequences in normal operation.

Linearization

The calibration certificate contains a mean K-factor that has been determined for the flow range 10:1 and that can therefore be used across a wide flow range. However, the K-factor shows slightly different values at different flow rates. These are also documented in the enclosed calibration certificate. If highest measuring precision is required, it is therefore advisable, especially at strongly varying flow rates, to take these different values into consideration by means of a "Linearization". The K-factors are therefore fed into a suitable flow management unit across several interpolation values of the flow rate. The K-factor relevant for the flow rate being measured is then determined by means of linear interpolation between the two nearest interpolation values.

The viscosity dependence of the K-factors must also be taken into account. These are determined during calibration at a viscosity of approximately 4.2 mm²/s. The influence of the flow rate on the K-factor decreases at higher viscosities so that the mean K-factor can then also be used in a considerably larger flow range without noteworthy errors.

Connection box

The signals of the sensors are converted into rectangular impulses in the robust connection box. The phase-offset signal and the incremental encoding inputs available in the electronic unit can determine the flow direction and take it into consideration when calculating the total values. The connection box is equipped additionally with a temperature sensor. The current density of the flowing liquid can be calculated by means of the density table stored in the electronic unit. A normalized volume measurement is then possible at which the displayed values are converted to a reference temperature that can be selected freely. This ensures that measuring errors caused by changes in the density due to temperature variations are avoided.

Unpacking and checking the state of delivery

Unpacking and checking the state of delivery

1. On delivery unpack the volumeter and check for damage during transportation.
2. Report damage during transportation immediately to the manufacturer.
3. Dispose of packing material in accordance with the locally applicable regulations.

Lifting the volumeter



WARNING

Risk of injury and/or damage to equipment should the volumeter fall.

- ▶ Use intact and correctly dimensioned hoisting equipment in accordance with the total weight to be transported.
- ▶ Do not stand under raised loads.



- ▶ Depending on the locally applicable regulations, either transport the volumeter manually or using suitable lifting gear.

Storage

As a result of the calibration, the internal components of the volumeter are wetted with calibration fluid that has a preservative effect. In addition, a special anticorrosive agent is sprayed onto the interior of the devices before being dispatched. The connections of the volumeter are fitted with protective caps. Unless otherwise specified, the external parts of the volumeters are anodized. The preservation applied at the factory will protect the volumeter for up to six weeks, if it is stored in a dry and clean location. The manufacturer offers a long-term preservation for storage times of up to 60 months: The volumeter is additionally packed in hermetically sealing anti-corrosion paper.

CAUTION

Damage to device through corrosion if stored improperly and during longer standstills.

- ▶ Protect the volumeter against corrosion during long standstills.
- ▶ Observe the chapters "Storage" and "Preservation".

Preservation

Preservation has to be carried out additionally under the following conditions:



Type of delivery	Condition
Standard delivery	<input type="checkbox"/> Storage time exceeding six weeks <input type="checkbox"/> Unfavorable storage conditions such as high humidity, salty air, etc.
Delivery with long-term preservation	<input type="checkbox"/> Opened or damaged packaging

Tab. 1 Check table for preservation

Preserving the volumeter



1. Close a connection of the volumeter with a blind flange.
2. Place the volumeter vertically.
3. Fill non-corrosive and resin-free oil up to approx. 1 cm under the connection at the top, while turning the measuring unit slowly, that also the measuring unit is wetted.
4. Close the connection with a blind flange.

After about 6 months storage check the oil level in the volumeter and if necessary top up oil.

Disposal



Notice:

Store the preserved volumeter cool and dry and protect it against direct sunlight.



Notice:

After a longer storage time the manufacturer recommends a recalibration of the volumeter, see "Recalibration of the volumeters", page 25.

Removing the preservation

Aids:

- Solvents suitable for the preservative oil
- Vessels to collect the preservative oil



WARNING

Risk of injury through emitted preservative oil.

- ▶ Wear protective clothing during all the work on the volumeter.
- ▶ Open the blind flange carefully in order to reduce any pressure that may exist in the volumeter.
- ▶ Collect the emitted preservative oil safely and dispose of it in an environmentally compatible manner.



1. Remove one of the blind flanges.
2. Drain the volumeter, collecting the preservative oil in a suitable vessel.
3. Remove the second blind flange.
4. Use a solvent to remove the residual oil.
 - or -
 - ▶ Rinse the volumeter with pumped liquid.

Disposal

Aids:

- Solvents or industrial cleaners suitable for the pumped liquid



WARNING

Danger of poisoning and environmental damage from the pumped liquid.

- ▶ Wear protective clothing during all the work.
- ▶ Before disposing of the volumeter collect the discharging pumped liquid and dispose of in accordance with the locally applicable regulations.
- ▶ Before disposing of the volumeter neutralize the residues of the pumped liquid in the volumeter.



1. Disassemble the volumeter.
2. Clean residues of the pumped liquid from the individual parts.
3. Dispose of or recycle individual parts in accordance with the locally applicable regulations.

Safety instructions for installation and removal

Safety instructions for installation and removal



The following safety instructions must be observed:

- Volumeters are precision measuring devices.
- ▶ Ensure cleanliness and take care during installation and removal.
- ▶ Do not take apart the volumeter.

Installing the volumeter

Volumeters of the OME series can be operated in any installation position.



Notice:

Both flow directions are possible. The preferred flow direction is indicated on the rating plate by means of a bright arrow, see Fig. 2, page 6.

Installation types

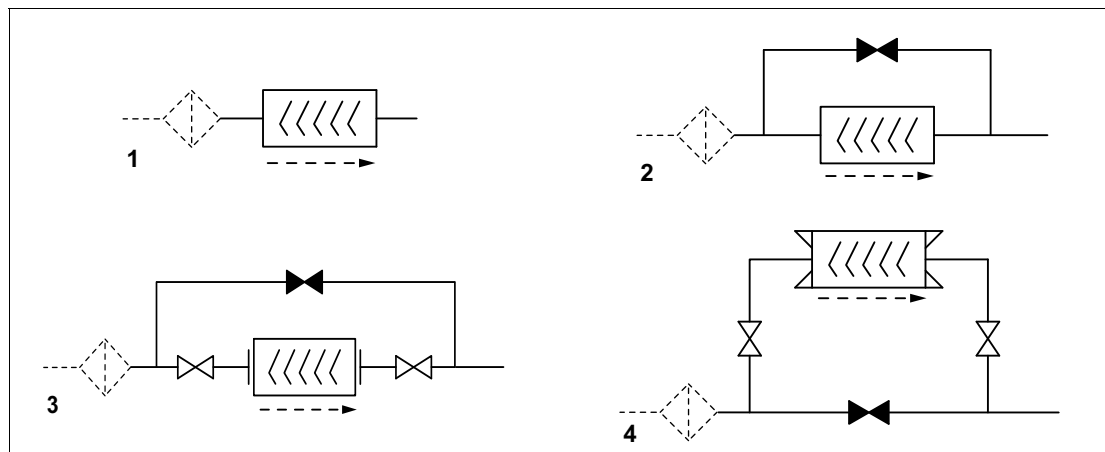


Fig. 1 OME installation types

The arrow with dashed line identifies the preferred flow direction when an operating filter is used.

Installation type	Properties
1 <ul style="list-style-type: none"> <input type="checkbox"/> Without bypass <input type="checkbox"/> With or without operating filter 	<ul style="list-style-type: none"> <input type="checkbox"/> Small space requirements <input type="checkbox"/> Dismantling of the volumeter only with interruption of operation
2 <ul style="list-style-type: none"> <input type="checkbox"/> Manual bypass <input type="checkbox"/> With or without operating filter 	<ul style="list-style-type: none"> <input type="checkbox"/> Bypass is opened manually <input type="checkbox"/> Dismantling of the volumeter only with interruption of operation
3 <ul style="list-style-type: none"> <input type="checkbox"/> Bypass with 3 shut-off valves for flange connection <input type="checkbox"/> With or without operating filter 	<ul style="list-style-type: none"> <input type="checkbox"/> Dismantling of the volumeter without interruption of operation
4 <ul style="list-style-type: none"> <input type="checkbox"/> Bypass with 3 shut-off valves for pipe thread connection <input type="checkbox"/> With or without operating filter 	<ul style="list-style-type: none"> <input type="checkbox"/> Dismantling of the volumeter without interruption of operation <input type="checkbox"/> Minimally higher pressure loss

Installing the volumeter

Protect the volumeter against contamination



Notice:

In order to protect the volumeter against contamination the manufacturer generally recommends the installation of an operating filter, mesh width see Tab. 1, page 23.

CAUTION

Damage through impurities in the pipe system.

- ▶ During welding work attach protective covers in front of the connecting flanges.
- ▶ Ensure when welding that welding beads and abrasive dust cannot get into the pipe system and the volumeter.



- ▶ After the connecting work clean the pipe system thoroughly, see "Cleaning the pipe system", page 23.

Connecting the volumeter to the pipe system

The connection of the volumeter to the pipe system must be stress-free.

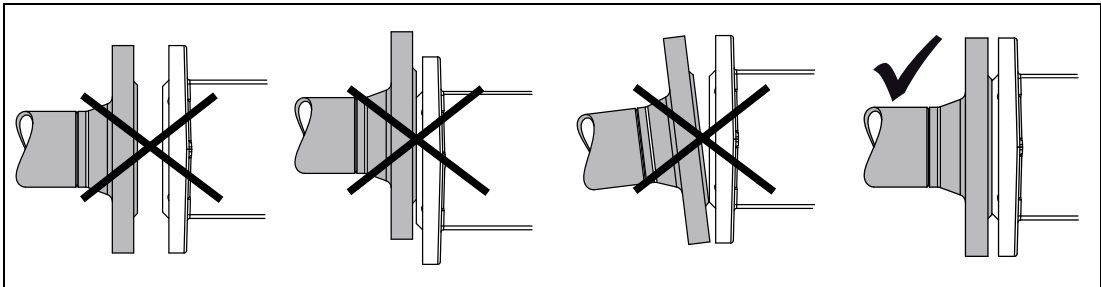


Fig. 2 Flange connections

CAUTION

Danger of damage to the device or impaired functionality through mechanical stresses.

- ▶ Ensure that the volumeter mounting on the pipe system is free of mechanical stress.

CAUTION

Damage to volumeter when the pipe threading is screwed in too far.

- ▶ Observe the thread length of the volumeter.
- ▶ Use a standard cutting ring connection.



1. Remove the protective covers and store them.
2. Install the volumeter stress-free in the circular pipeline. Take the preferred flow direction into consideration and ensure that the connection of the connection box remains accessible
3. The screw-in length of the piping may not exceed the threaded length of the volumeter, since the flow cross-section is narrowed and internal components can be damaged.

Electrical connection

Electrical connection

Safety instructions for electrical installation



The following safety instructions must be observed during the electrical installation:

- The following qualifications are required for the electrical connection:
 - Practical electrotechnical training
 - Knowledge of the safety guidelines at the workplace
 - Knowledge of the electrotechnical safety guidelines
- Standardly the OME sensors should only be connected with a BEM electronic unit, alternatively with an electronic unit released by the manufacturer.
- The connecting lines for the connection box are to be shielded and laid separately from the supply lines.
- Ensure that the supply voltage is correct.



- ▶ Observe the corresponding operating instructions for electronic equipment.

Removing the volumeter

Prerequisite:

- System switched off

Aids:

- Vessels for leaking pumped liquid



WARNING

Risk of injury through hot surface of the volumeter.

- ▶ Wear personal protective equipment and/or let the device cool down to the ambient temperature.



WARNING

Risk of injury through emitted hot, poisonous or corrosive pumped liquid when removing the volumeter.

- ▶ Observe the safety regulations for handling dangerous fluids.
- ▶ Ensure that the volumeter is not under pressure.
- ▶ Collect the emitted pumped liquid safely and dispose of it in an environmentally compatible manner.



1. In case of operation at higher temperatures wait until the device has cooled down to the ambient temperature.
2. Drain the closed circular pipeline or divert the liquid via a bypass.
3. Dismantle the volumeter.
4. Apply the protective covers.
5. Observe the chapters "Storage" and "Preservation" on the subject of storing the volumeter.

Commissioning

Commissioning

Cleaning the pipe system

To protect the volumeter against contamination clean the complete pipe system carefully before commissioning.

Possibilities:

- Rinsing via bypass
- Rinsing with volumeter

CAUTION

Damage to equipment through usage of an incorrect rinsing liquid.

▶ Under no circumstances may water or superheated steam be used to rinse the pipe system.

▶ Rinsing via bypass: Close the shut-off devices before and after the volumeter.

- or -

▶ Rinsing with volumeter: An operating filter has to be installed before the volumeter. Take the mesh width of the filter into account, see Tab. 1, page 23.

The mesh width of the operating filter is relevant to the size of the volumeter.

Volumeter size	Mesh width max.	
OME 15 – 20	[mm]	0.1
OME 25 – 40	[mm]	0.34

Tab. 1 Mesh width of the operating filter

Checking the function



Test	Procedure
Installation	<ul style="list-style-type: none"> ▶ Check the installation position of the volumeter with regard to the flow direction. ▶ Check the pipe threading/flange for leaks under operating pressure.
Electrical installation	<ul style="list-style-type: none"> ▶ Observe the corresponding operating instructions for electronic equipment.
Power supply	<ul style="list-style-type: none"> ▶ Observe the corresponding operating instructions for electronic equipment.

Tab. 2 Test table

First commissioning

Prerequisite:

- The ambient conditions correspond to the operating data, see "Technical data", page 7
- Volumeter connection to the pipe system is free of mechanical stress
- Pipe system is free of contamination
- Pipe system deaerated
- Any shut-off devices in the supply and discharge lines opened

CAUTION

Measuring error when pressure drops below the minimum pressure at the outlet.

▶ Before commissioning the volumeter, observe these operating instructions.

▶ Ensure that the liquid does not flow freely out of the volumeter.

During operation

CAUTION

Measuring error through gas inclusion in the pipe system.

- ▶ Before commissioning, make sure that the volumeter is filled.
- ▶ Deaerate the pipe system.



- ▶ Switch on the system.
The volumeter measures when the connection box generates a signal.

During operation



WARNING

Risk of injury through hot surface of the volumeter.

- ▶ Wear personal protective equipment.



- ▶ In case of operation at higher temperatures wear personal protective equipment, especially protective gloves.

Switching off the volumeter

Safety instruction for switching off the volumeter



Pay attention to the following when switching off the volumeter:

- Strong changes to the flow rate (e.g. rapid shutdown, pulsations ...) cause marked pressure differences on the volumeter and can damage the measuring unit.
 - The pressure loss of the volumeter must not exceed the values given in the chapter "Technical data", see "Load capacity", page 11.
 - The limit values shown in the following table must not be exceeded even for a short time.

	OME 15	OME 20	OME 25	OME 40
Pressure loss max. [bar]	20	20	20	20

Tab. 3 Limit values pressure loss

Switching off the volumeter

When the flow through the volumeter is stopped, the generation of the signal stops automatically. No further measures are required to switch off.

Recommissioning the volumeter

Prerequisite:

- The requirements for initial commissioning are met, see "First commissioning", page 23.

CAUTION

Damage to device through hard, gummy or crystallized liquid in the volumeter.

- ▶ Before commissioning, ensure that there is no hard, gummy or crystallized liquid in the volumeter.



1. Disassemble and clean the volumeter before recommissioning
 - or -
 - ▶ Heat up the liquid during standstill by means of a heating system.
2. Switch on the system.
Under the requirements mentioned above, the volumeter is ready for operation at any time.

Safety instructions for maintenance

Safety instructions for maintenance



The following safety instructions must be observed during all the repair work:

- ▶ All the work may only be carried out by authorized qualified personnel.
- ▶ Wear protective clothing during all the work.
- ▶ Replacement of the measuring unit consisting of the set of screws, rolling bearings and pole wheel may only be carried out in the factory.
- ▶ The volumeter has to be recalibrated after the measuring housing or the rolling bearings have been replaced.
- ▶ In case of operation at higher temperatures wait until the device has cooled down to the ambient temperature.

Required maintenance

The volumeters are fundamentally maintenance-free. Under observance of the operating limits, see "Technical data", page 7, no significant change in the characteristics could be established, even after years of use in many cases. Conditions lying clearly above the nominal flow rate can, however, result in excessive wear. In the case of liquids with higher abrasiveness (e.g. heavy oil with catalyst residues, plastic components with fillers, etc.) strongly accelerated wear can occur in the volumeter.



Notice:

In cases of doubt the manufacturer recommends already carrying out the first inspection of the volumeter after twelve weeks operation time.

Signs of progressive wear of individual volumeter elements:



Finding	Cause	Remedy
Increased running noises	Incipient damage to bearing	Replace the bearing.
Leakage	Damage to sealing	Replace the seals.
Measured values not realistic	see "Fault table", page 30	see "Fault table", page 30

Tab. 1 Check table for required maintenance



1. Check the volumeter visually and acoustically every four weeks.
2. Check for signs of wear as listed in the table above and eliminate the cause.

Recalibration of the volumeters

In order to maintain the high measuring precision of the volumeter, KRAL recommends carrying out the first recalibration after about one year of operation. The results reveal any wear starting on the measuring unit. The interval at which recalibration is actually required depends strongly on the operating conditions of the device.

The manufacturer provides the factory calibration as standard. If higher requirements are placed on the measuring instrument, an accredited calibration according to EN ISO/IEC 17025 is also possible.

Mounting instructions OME

Mounting instructions OME

Removing seals and bearings

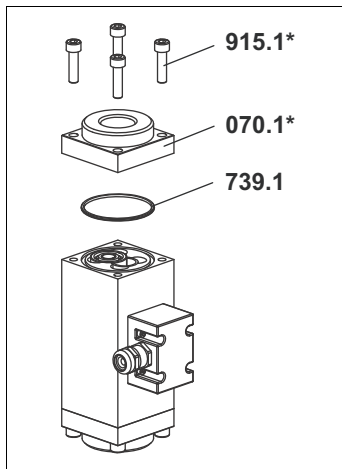


Fig. 1

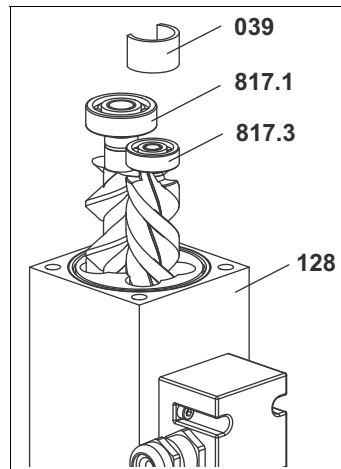


Fig. 2

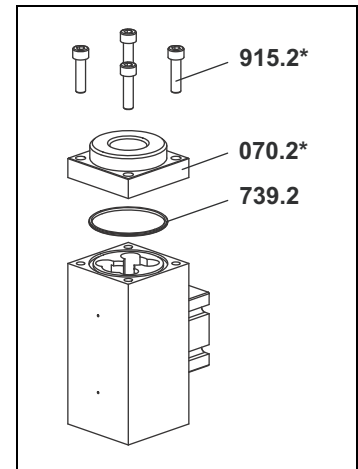


Fig. 3

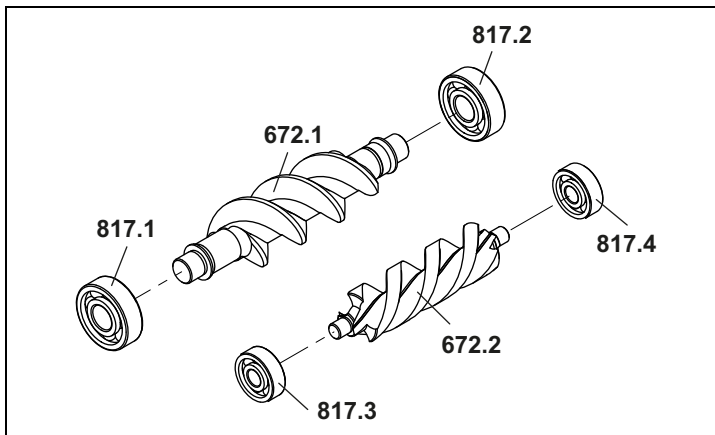


Fig. 4

- | | | | |
|---------------|-----------------------|---------------|--------------------------|
| 039 | Distance sleeve | 739.2 | O-ring |
| 070.1* | End cover | 817.1 | Deep-groove ball bearing |
| 070.2* | End cover | 817.2 | Deep-groove ball bearing |
| 128 | Measuring housing | 817.3 | Deep-groove ball bearing |
| 672.1 | Measuring screw large | 817.4 | Deep-groove ball bearing |
| 672.2 | Measuring screw small | 915.1* | Socket screws |
| 739.1 | O-ring | 915.2* | Socket screws |

* Parts for pipe threading or flange connection alternatively

Prerequisites:

- Volumeter removed from system

Mounting instructions OME



1. Remove the socket screws **915.1***, take off end cover **070.1*** and o-ring **739.1**, see Fig. 1, page 26.
2. Pull the screw set with the ball bearings and distance sleeve **039** out of the measuring housing **128**, paying attention to the configuration for later assembly, see Fig. 2, page 26. Remove the distance sleeve.
3. Pull the ball bearings **817.1**, **817.2**, **817.3** and **817.4** off the measuring screws, using a pull-off device to do so. Overview see Fig. 4, page 26.
4. Remove the socket screws **915.2***, take off end cover **070.2*** and o-ring **739.2**, see Fig. 3, page 26.
5. Clean all the parts using a suitable detergent.

Installing seals and bearings

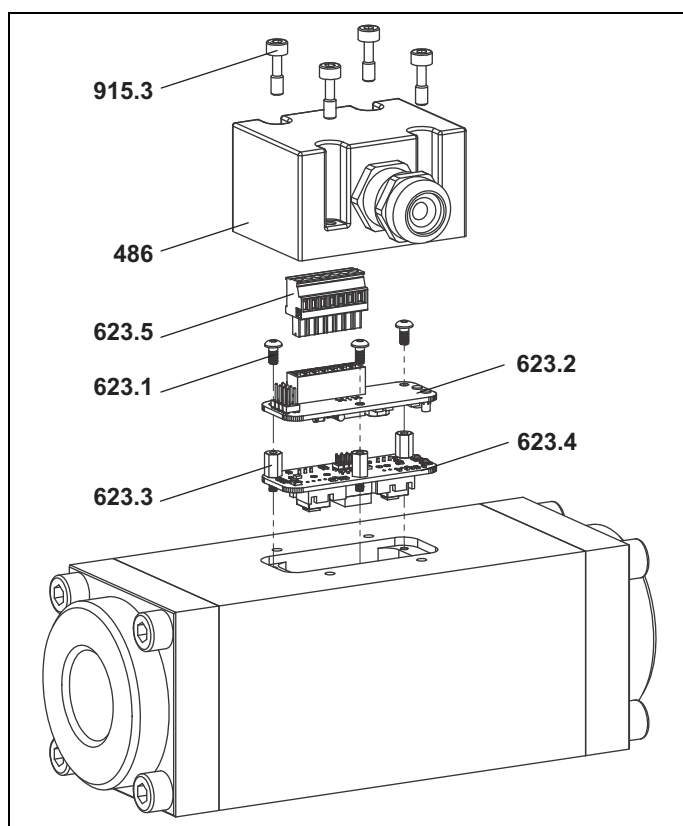


1. Insert the o-ring **739.2** into the measuring housing **128**. Place on the end cover **070.2***, tighten the socket screws **915.2*** with torque, see Tab. 1, page 32.
2. Press the ball bearings **817.1**, **817.2**, **817.3** and **817.4** onto the measuring screws.
Notice: Press on only over the inner ring!
3. Push the screw set into the measuring housing **128**, paying attention to the configuration. Slide the distance sleeve **039** flush into the hole of the measuring screw small **672.2**.
4. Insert the o-ring **739.1** into the measuring housing, place on the end cover **070.1***. Tighten the socket screws **915.1*** with torque, see Tab. 1, page 32.

Mounting instructions connection box

Mounting instructions connection box

Removing the sensor insert



- 486** Connection box (cover)
- 623** Sensor insert
- 623.1** Screws
- 623.2** Upper circuit board
- 623.3** Hex standoffs
- 623.4** Lower circuit board
- 623.5** Board connector
- 915.3** Socket screw

Fig. 5



1. Loosen the cable gland at the cover of the connection box **486**.
2. Loosen the socket screws **915.3** and remove the cover of the connection box.
3. Disconnect the board connector **623.5** from the upper circuit board **623.2**.
4. Loosen the screws **623.1** and remove the upper circuit board.
5. Loosen the hex standoffs **623.3** and remove the lower circuit board **623.4** from the sensor hole.

Installing the sensor insert



1. Clean sensor hole without removing the heat transfer paste.
2. Insert the lower circuit board **623.4** into the sensor hole and screw tight with the hex standoffs **623.3**.
3. Put on the upper circuit board **623.2** and fasten with screws **623.1**.
4. Connect the board connector **623.5** with the upper circuit board. Connection table, see Tab. 2, page 28.
5. Fasten the cover of the connection box **486** with the socket screws **915.3**.
6. Fasten the cable gland at the cover of the connection box.

Terminal strip	Designation	Terminal strip	Designation
1	0 V	5	Com. t
2	10 – 30 V	6	Com. t
3	Sig. 1 Q	7	Sig. t
4	Sig. 2 Q		

Tab. 2 Connection table connection box

Possible faults

Faults can have different causes. The following tables list the symptoms of a fault, the possible causes and measures for elimination.

Possible faults



Fault	Cause/Remedy
<input type="checkbox"/> Volumeter leaks	1, 2
<input type="checkbox"/> No flow	3, 11, 12, 24, 26, 27
<input type="checkbox"/> Negative flow	5, 19, 21
<input type="checkbox"/> Volumeter does not generate a pulse	3, 5, 6, 12, 15, 22, 24, 26, 27
<input type="checkbox"/> Pressure loss too high	13, 16, 24, 25
<input type="checkbox"/> Measured values not realistic	3, 5, 6, 11, 14, 17, 18, 19, 20, 21, 22, 23, 24, 25

Troubleshooting



No.	Cause	Remedy
1	Seal preload too low	▶ Preload the screws.
2	Seal damaged	▶ Replace the seal. ▶ Check the chemical resistance of the seal.
3	Foreign bodies in the liquid and/or volumeter	▶ Disassemble the volumeter and clean it. ▶ Use the commissioning filter.
5	Connection box not connected correctly	▶ Check the connection of the connection box. ▶ Check the supply voltage for the connection box.
6	Connection box defective	▶ Check the function of the connection box. ▶ Replace the connection box.
11	Liquid lubricates too little	▶ Use the OMK series.
12	Feed pressure too low	▶ Increase the feed pressure.
13	Viscosity of the liquid too high	▶ Increase the temperature, while observing the permissible temperature range.
14	Viscosity of the liquid too low	▶ Use the OMK series.
15	Flow rate too low	▶ Increase the flow rate. - or - ▶ Use a suitable volumeter size. - or - ▶ Use linearization, while observing the electronic operating instructions.
16	Flow rate too high	▶ Reduce the flow rate. - or - ▶ Use a suitable volumeter size.
17	Airlocks	▶ Deaerate the system and check for leaks.
18	Outgassing	▶ Increase the system pressure. ▶ Reduce the temperature.
19	Pulsations too high	▶ Use another feed pump. ▶ Carry out changes to the system. ▶ Use the OMK series.
20	Back pressure too low	▶ Increase the back pressure.

Troubleshooting

No.	Cause	Remedy
21	Flow rate fluctuations too high	<ul style="list-style-type: none"> ▶ Ensure a continuous flow rate by taking suitable measures (use of a different pump, valve, damper, etc.). - or - ▶ Smoothen the indication, while observing the electronic operating instructions.
22	Filling amount too low	<ul style="list-style-type: none"> ▶ Use a suitable volumeter size. ▶ Use the OMG series.
23	Strongly deviating operating data	<ul style="list-style-type: none"> ▶ Use a suitable volumeter. ▶ Adapt the operating data to the volumeter.
24	Wear at the measuring unit and bearing	<ul style="list-style-type: none"> ▶ Renew the measuring unit. ▶ Renew the bearing. ▶ Filter out the abrasive materials.
25	Sluggishness through deposits	<ul style="list-style-type: none"> ▶ Disassemble the volumeter and clean it carefully.
26	Flow impaired at the system end	<ul style="list-style-type: none"> ▶ Check whether the fluid flows in the system (pump in operation, slide valve opened, etc.). ▶ Check whether shut-off devices before and after the volumeter are opened.
27	Volumeter switched to bypass	<ul style="list-style-type: none"> ▶ Switch the volumeter to through-flow.

Tab. 1 Fault table

Spare parts

Maintenance kit OME 15 – 40



Notice: The maintenance kit contains only the numbered parts and is only supplied completely.

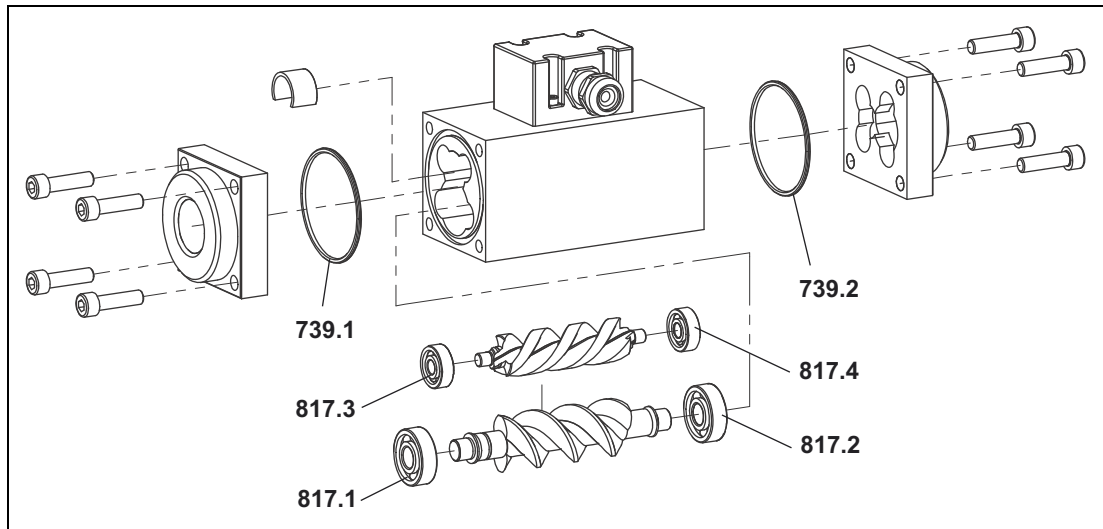


Fig. 1 Maintenance kit OME 15 – 40

Qty.	Pos. no.	Part	Qty.	Pos. no.	Part
1	739.1	O-ring	1	817.2	Deep-groove ball bearing
1	739.2	O-ring	1	817.3	Deep-groove ball bearing
1	817.1	Deep-groove ball bearing	1	817.4	Deep-groove ball bearing

Tightening torques

Sensors



Notice: The kits contain only the numbered parts and are only supplied completely.

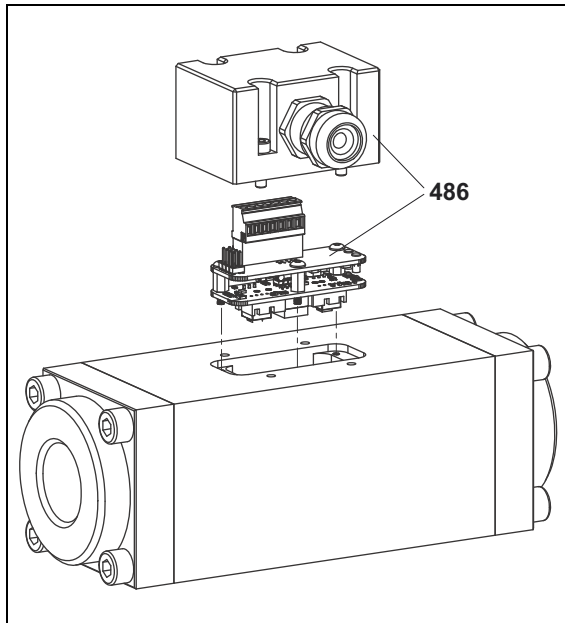


Fig. 2 Connection box (cover and sensor insert)

Qty.	Pos. no.	Part
1	486	Connection box

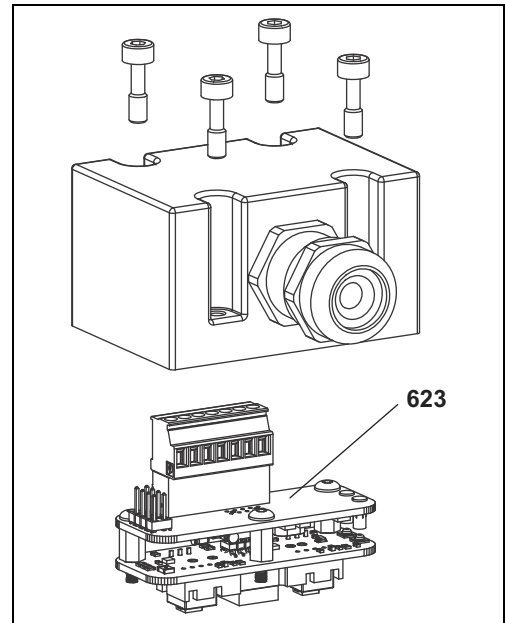


Fig. 3 Sensor insert

Qty.	Pos. no.	Part
1	623	Sensor insert

Tightening torques

Thread	Tightening torque [Nm] for screws with metric threads + head contact surfaces								With thread measured in inches	
	5.6	8.8	10.9	8.8 + Alu*	+ wedge lock washers	Rust-proof A4-70	Stainless steel screws A2 and A4	Property class 70	Property class 80	Thread
M 3	0.6	1.5	–	1.2	1.5	1.1	–	–	G 1/8"	13
M 4	1.4	2.9	4.1	2.3	3	2	–	–	G 1/4"	30
M 5	2.7	6.0	8.0	4.8	6.0	3.9	3.5	4.7	G 3/8"	60
M 6	4.7	9.5	14	7.6	10.3	6.9	6	8	G 1/2"	80
M 8	11.3	23.1	34	18.4	25	17	16	22	G 3/4"	120
M 10	23	46	68	36.8	47	33	32	43	G 1"	200
M 12	39	80	117	64	84	56	56	75	G 1 1/4"	400
M 14	62	127	186	101	133	89	–	–	G 1 1/2"	450
M 16	96	194	285	155	204	136	135	180		
M 18	133	280	390	224	284	191	–	–		
M 20	187	392	558	313	399	267	280	370		
M 24	322	675	960	540	687	460	455	605		

Tab. 1 Tightening torques

* Reduced tightening torque when screwing into aluminum

Contents of the EU Declaration of Conformity

Contents of the EU Declaration of Conformity

The volumeters described in these operating instructions are machinery in the sense of the Directive 2006/42/EC. The original of the EU Declaration of Conformity is enclosed with the machinery at delivery.

EU Declaration of Conformance

We, KOBOLD Messring GmbH, Hofheim-Ts, Germany, declare under our sole responsibility that the product:

Screw-Type Spindle Flowmeter Model: OME

to which this declaration relates is in conformity with the following EU directives:

2011/65/EU RoHS

additional for Double pulse generator:

2014/30/EU EMC Directive

Hofheim, 19. April 2017



H. Peters
General Manager



M. Wenzel
Proxy Holder

