

Operating Instructions

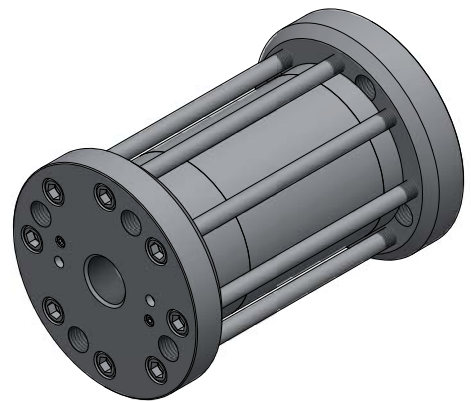
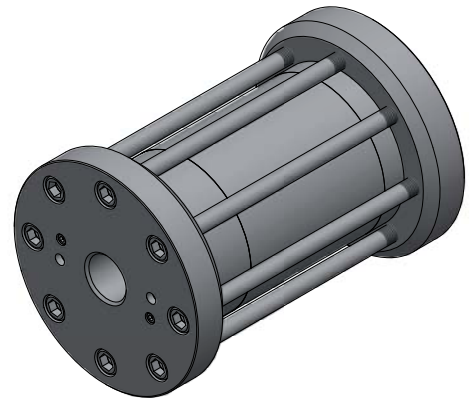


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Target groups

The operating instructions form part of the volumeter and must be kept for future reference. Furthermore please observe the associated documents. KRAL Volumeter® is a registered trademark of KRAL AG.

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

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

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

Associated documents

Associated documents

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

Proper use

Proper use

- ☐ Use KRAL volumeters of the OMH series solely for flow measurement of lubricating liquids that are chemically neutral and do not contain any gas or solids content.
- ☐ KRAL 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 "Cleaning the pipe system", page 26.
- ☐ Only use volumeters within the operating limits specified on the rating plate and in the "Technical data" section. Deviating operating data can result in damage to the volumeter. In the case of operating data that does not agree with the specifications on the rating plate, please contact KRAL.
- ☐ 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 section "Technical data", see "Load capacity", page 12.

Safety information



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 specifications 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 specifications 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.
- ☐ The pumped liquids can be subject to pressure and can cause damage and/or personal injury should leaks occur.

Type code

Type code

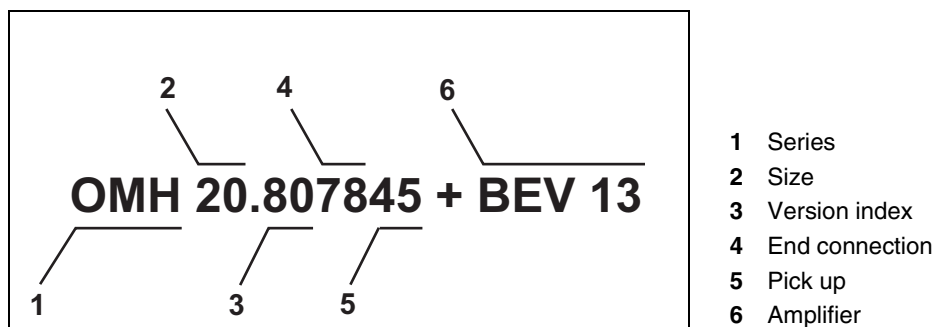


Fig. 1 Type code

Item	Designation	Description
1	Series	OMH: high pressure
2	Size	corresponds to the diameter of the large measuring screw in [mm]
3	Version index	for internal administration
4	End connection	manufacturer-specific indexing
5	Pick up	44: BEG 44 45: BEG 45 53: BEG 53A
6	Amplifier	BEV 13 (only in combination with pick up BEG 45)

Rating plate

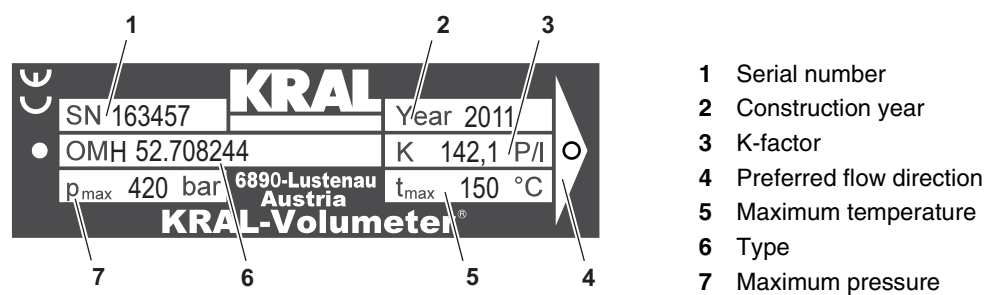


Fig. 2 Rating plate

Operating limits

Operating limits

The values specified on the rating plate and the calibration certificate apply. The permissible operating 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 operating limits of the corresponding end connection, of the sealing material and of the pick ups are to be observed.

		OMH 13	OMH 20	OMH 32	OMH 52	OMH 68	OMH100
Flow rate							
Q_{\max}	[l/min]	15	45	150	525	1 050	3 000
Q_{rated}		10	30	100	350	700	2 000
Q_{\min}		0.1	0.3	1.0	3.5	7.0	20.0
Pressure max.	[bar]	420	420	420	420	420	250
Temperature							
min. – max.	[°C]	-20...+200					
Viscosity							
min. – max.	[mm ² /s]	1 – 1 000 000					
Measuring chamber volume	[ml/U]	1.64	6.25	25.6	112.7	251.3	833.3
Rotation speed							
$n (Q_{\max})$	[min ⁻¹]	9 120	7 200	5 850	4 658	4 182	3 600
$n (Q_{\text{rated}})$		6 090	4 800	3 900	3 105	2 784	2 400
$n (Q_{\min})$		61	48	39	31	28	24

Tab. 1 Maximum values

K2		OMH 13	OMH 20	OMH 32	OMH 52	OMH 68	OMH100
Number of poles		4	8	12	16	20	28
K-factor	[P/l]	2432	1280	468	142	79.6	33.6
Milliliters per pulse	[ml/P]	0.411	0.782	2.14	7.04	12.56	29.76
Pulse frequency							
$f_2 (Q_{\max})$	[Hz]	608	960	1 170	1 243	1 393	1 680
$f_2 (Q_{\text{rated}})$		405	640	780	828	929	1 120
$f_2 (Q_{\min})$		4.1	6.4	7.8	8.3	9.3	11.2

Tab. 2 Additional maximum values using BEG 44

Sound pressure level

K3		OMH 13	OMH 20	OMH 32	OMH 52	OMH 68	OMH100
Number of poles		12	16	26	34	42	48
K-factor	[P/l]	7296	2560	1014	302	167	57.6
Milliliters per pulse	[ml/P]	0.137	0.391	0.99	3.31	5.98	17.36
Pulse frequency							
f3 (Q _{max})	[Hz]	1824	1920	2535	2640	2927	2880
f3 (Q _{rated})		1216	1280	1690	1760	1949	1920
f3 (Q _{min})		12.2	12.8	16.9	17.6	19.5	19.2
		Observe the flow range: If the value lies below Q _{min} , refer to the operating instructions of the corresponding pick-up					

Tab. 3 Additional maximum values using BEG 45

K4		OMH 13	OMH 20	OMH 32	OMH 52	OMH 68	OMH100
Number of poles		12	16	26	34	42	73
K-factor	[P/l]	7296	2560	1014	302	167	87.6
Milliliters per pulse	[ml/P]	0.137	0.391	0.986	3.311	5.988	11.416
Pulse frequency							
f4 (Q _{max})	[Hz]	1824	1920	2535	2643	2923	4380
f4 (Q _{rated})		1216	1280	1690	1762	1948	2920
f4 (Q _{min})		12.2	12.8	16.9	17.6	19.5	29.2

Tab. 4 Additional maximum values using BEG 53A

Substitute operating data

The following table shows standardized values of 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 operating limits of the corresponding end connection, of the sealing material and of the pick ups are to be observed.

		OMH 13	OMH 20	OMH 32	OMH 52	OMH 68	OMH100
Flow rate							
Q _{max}	[l/min]	10	30	100	350	700	2000
Q _{rated}		10	30	100	350	700	2000
Q _{min}		0.2	0.6	2	7	14	40
Pressure max.	[bar]	420	420	420	420	420	250
Temperature							
min. – max.	[°C]	-20...+120					
Viscosity							
min. – max.	[mm ² /s]	1 – 200					

Tab. 5 Substitute operating data

Sound pressure level

KRAL volumeters operate almost silently.

Dimensions and weights

Dimensions and weights

OMH with pipe thread

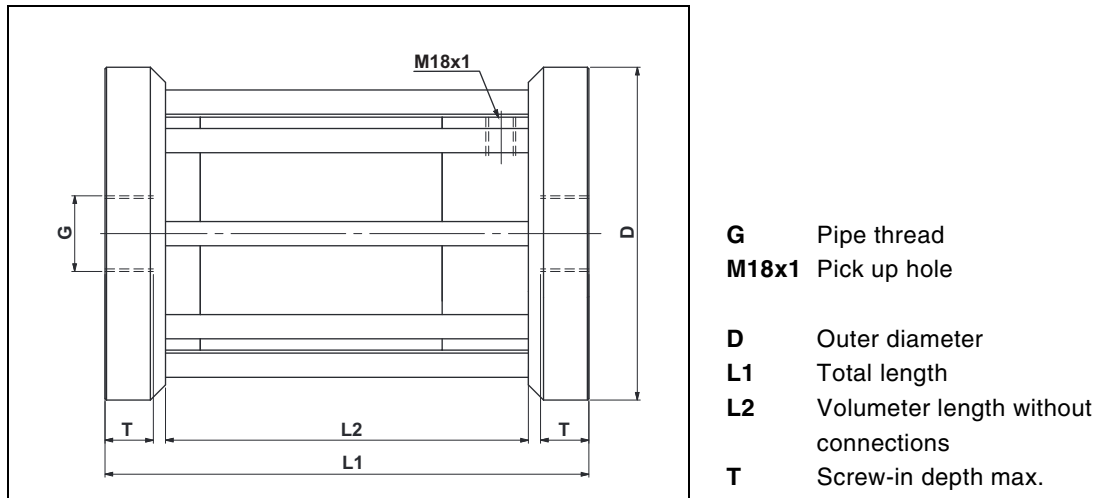


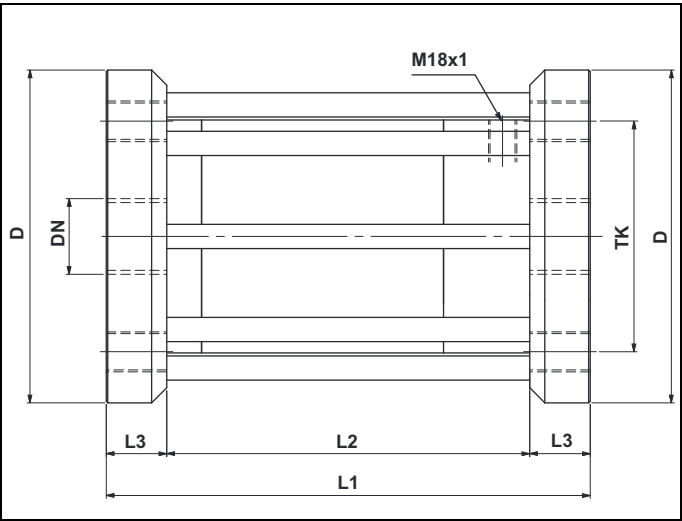
Fig. 1 Dimensional drawing OMH with pipe tread

		OMH 13	OMH 20	OMH 32	OMH 52	OMH 68	OMH100
G	[inch]	1/2"	3/4"	1"	1 1/2"	2"	4"
Pressure stage	[bar]	420	420	420	420	420	250
D	[mm]	100	145	180	220	235	247
L1	[mm]	150	185	255	320	385	500
L2	[mm]	94	115	175	240	295	400
T	[mm]	15	16	22	34	36	44
Mass	[kg]	7.0	12.0	28.0	54.5	80.5	148.0

Tab. 6 Dimensions and weights – Pipe thread connection

OMH with DIN flange

OMH with DIN flange



- DN** Nominal diameter flange
- M18x1** Pick up hole
- D** Outer diameter
- L1** Total length
- L2** Volumeter length without connections
- L3** Flange thickness
- TK** Pitch circle

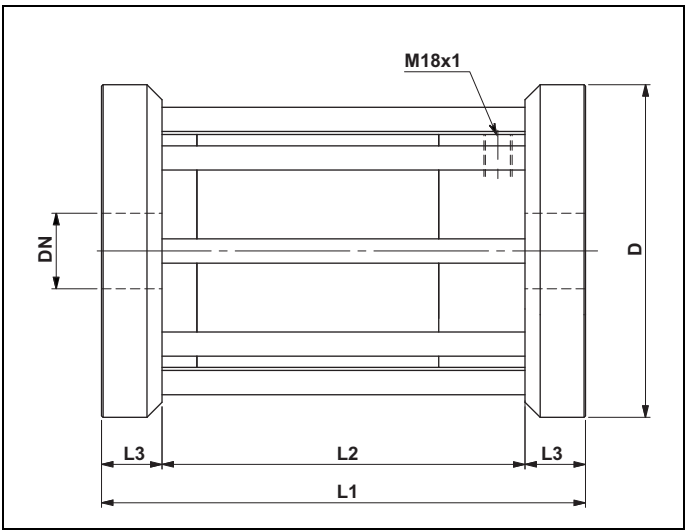
Fig. 2 Dimensional drawing OMH with DIN flange

		OMH 13	OMH 20	OMH 32	OMH 52	OMH 68	OMH100
DN	[mm]	15	15	25	40	50	100
Pressure stage	[bar]	400	400	400	400	400	250
D	[mm]	145	145	180	220	235	300
L1	[mm]	150	185	255	320	385	500
L2	[mm]	94	115	175	240	295	400
L3	[mm]	28	35	40	40	45	50
TK ø	[mm]	100	100	130	165	180	235
Mass	[kg]	9.5	12.0	28.0	54.0	80.0	170.0

Tab. 7 Dimensions and weights – DIN flange connection

OMH with DIN flange

OMH with SAE flange



- DN** Nominal diameter flange
- M18x1** Pick up hole
- D** Outer diameter
- L1** Total length
- L2** Volumeter length without connections
- L3** Flange thickness

Fig. 3 Dimensional drawing OMH with SAE flange

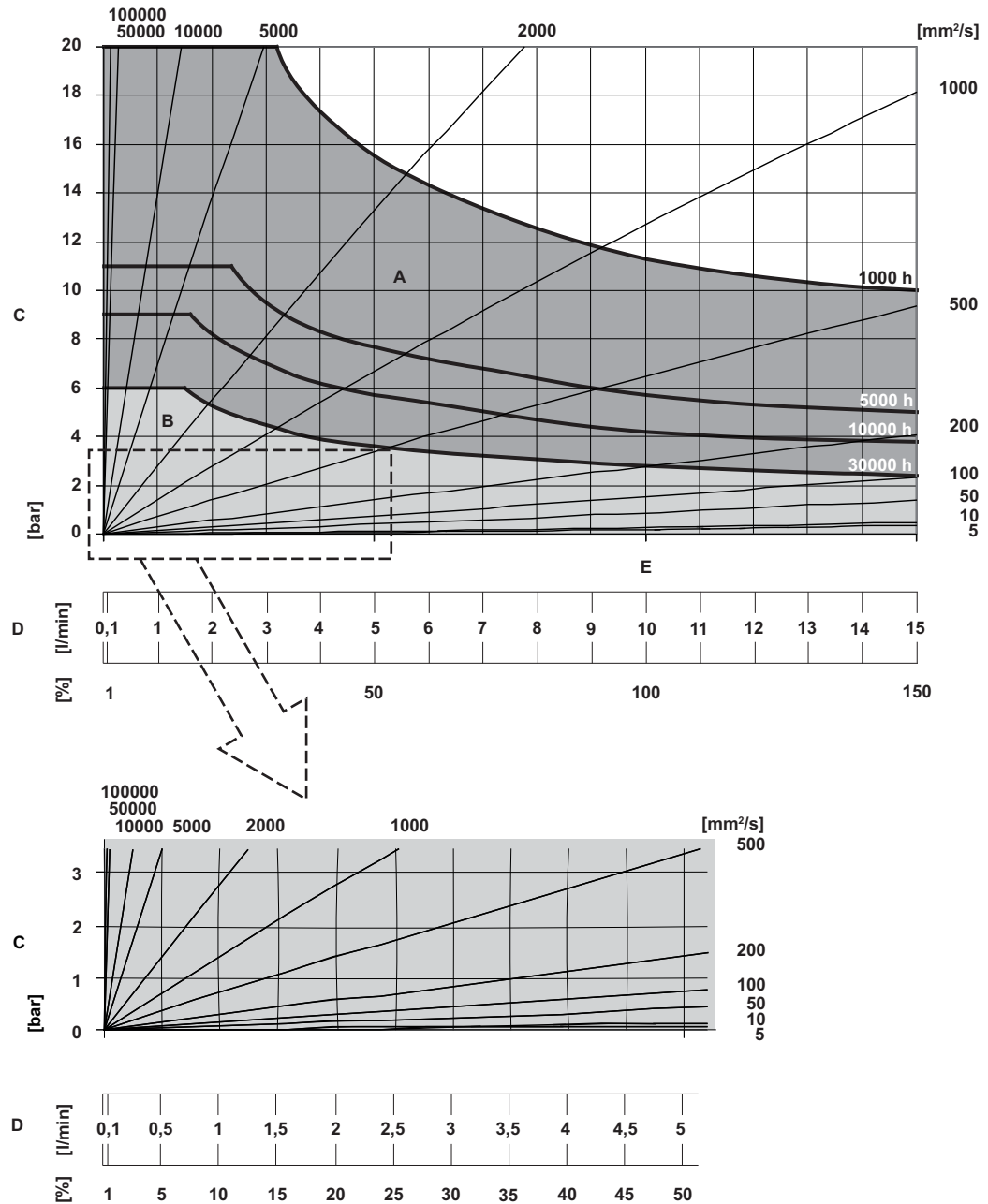
		OMH 13	OMH 20	OMH 32	OMH 52	OMH 68	
DN	[inch]	1/2"	3/4"	1"	1 1/2"	2"	
Class	[psi]	6000	6000	6000	6000	6000	
D	[mm]	100	145	180	220	235	
L1	[mm]	150	185	255	320	385	
L2	[mm]	94	115	175	240	295	
L3	[mm]	28	35	40	40	45	
Mass	[kg]	7	12	28	54	80	

Tab. 8 Dimensions and weights – SAE flange connection

Load capacity

Load capacity

Load capacity OMH 13

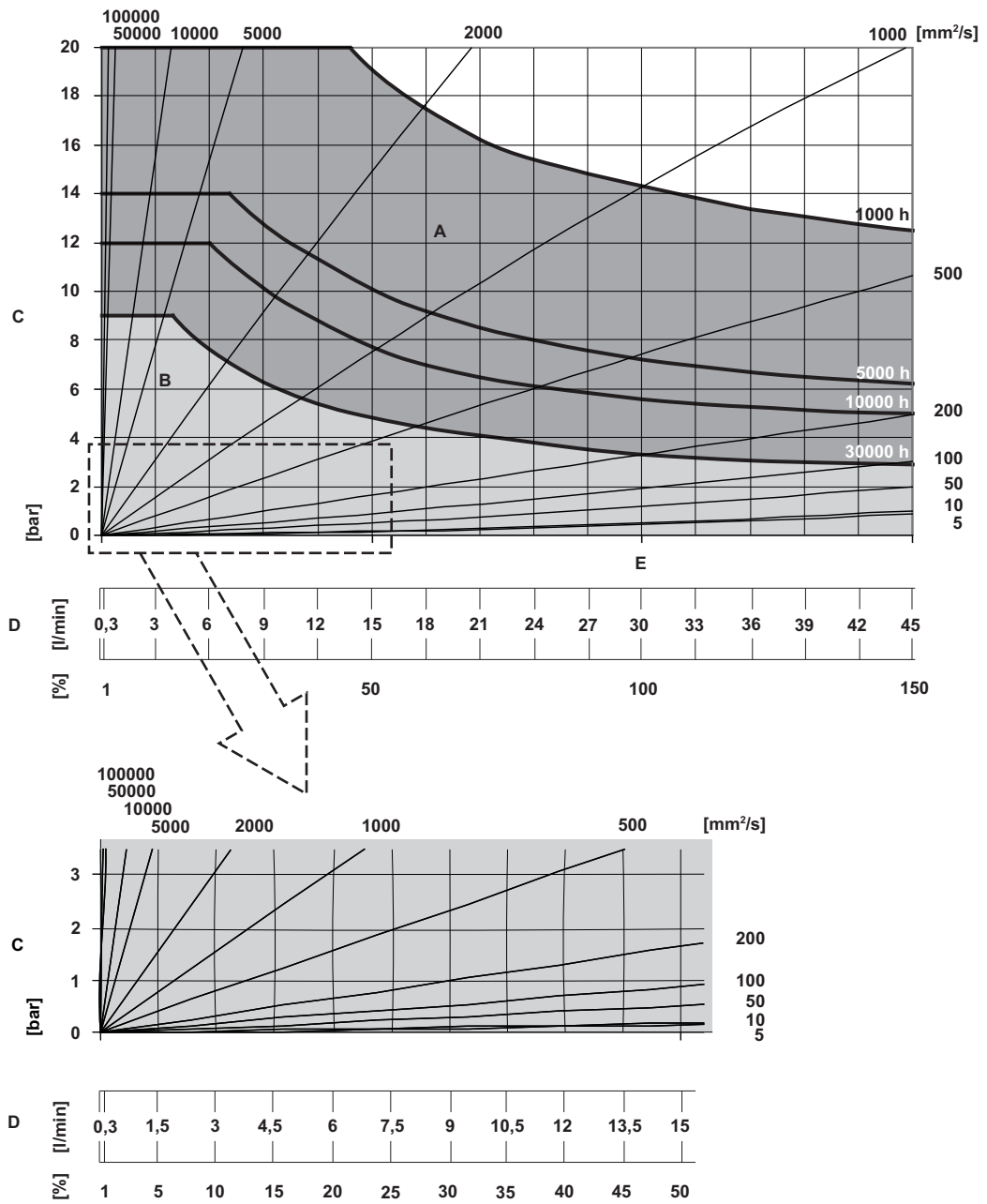


- A Short-time operation
- B Continuous operation
- C Pressure loss
- D Flow rate
- E Q_{rated}

The values apply for lubricating liquids at temperatures of up to 120 °C. Abrasive and aggressive liquids reduce the durability.

Load capacity

Load capacity OMH 20

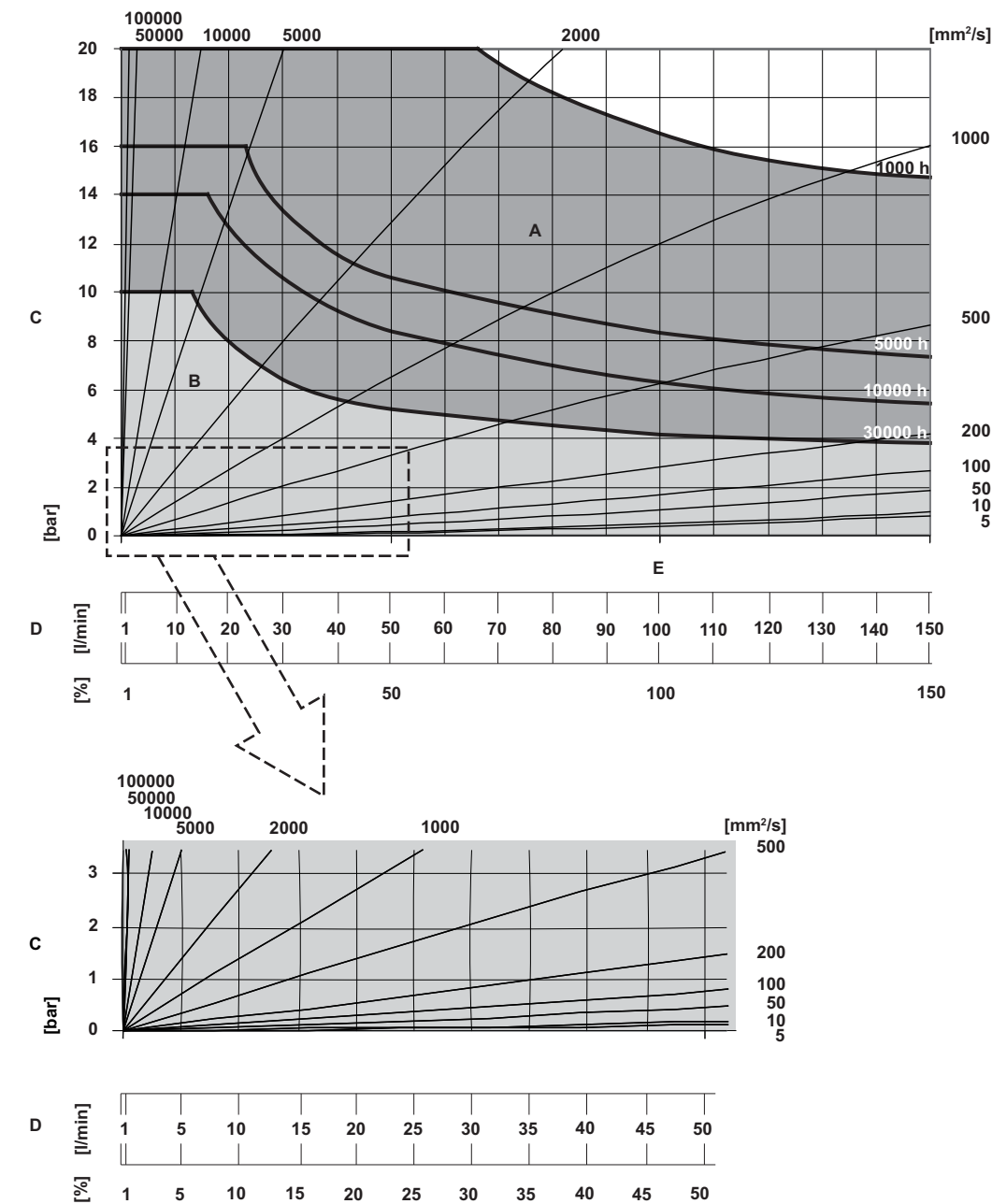


- A** Short-time operation
- B** Continuous operation
- C** Pressure loss
- D** Flow rate
- E** Q_{rated}

The values apply for lubricating liquids at temperatures of up to 120 °C. Abrasive and aggressive liquids reduce the durability.

Load capacity

Load capacity OMH 32

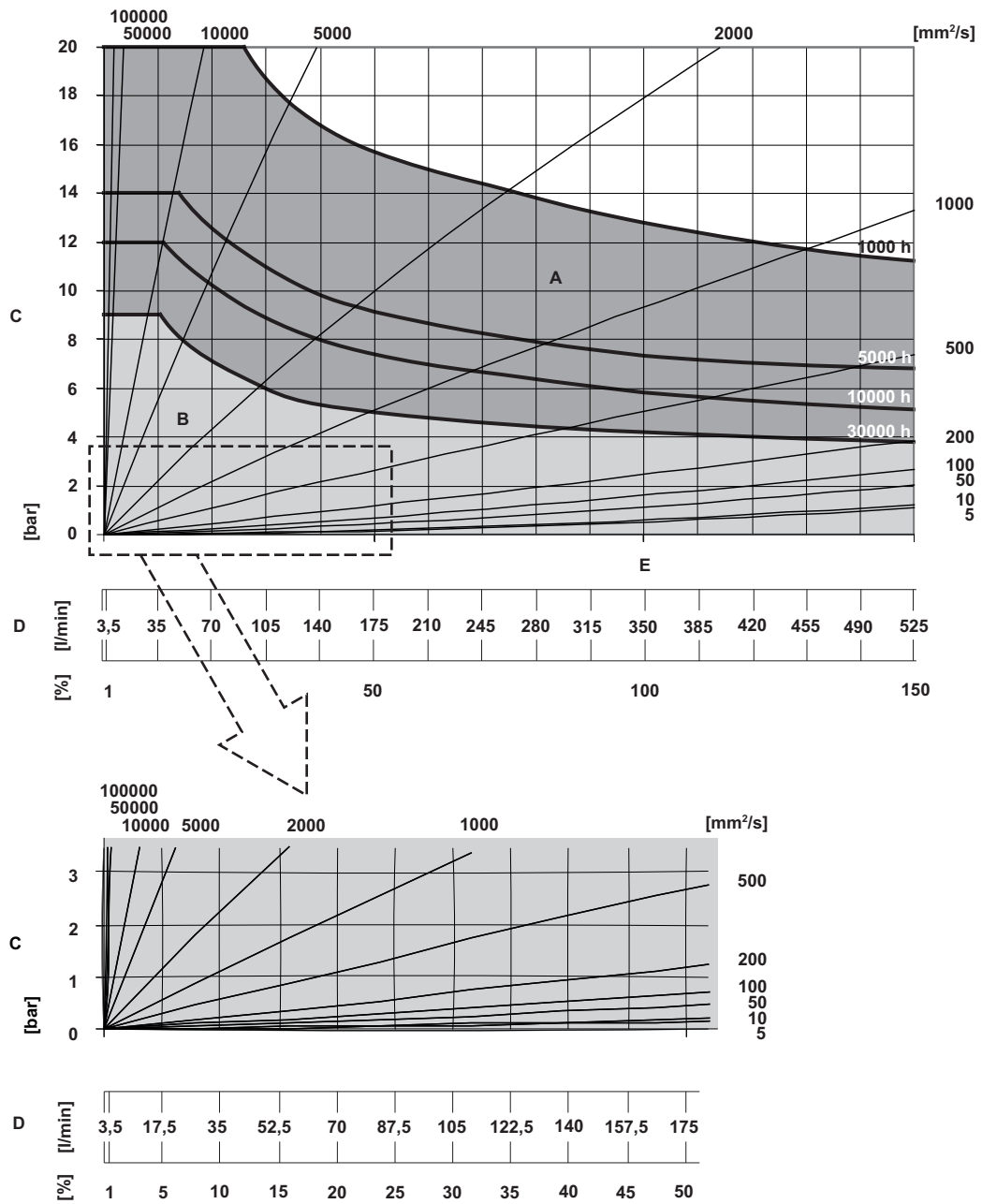


- A Short-time operation
- B Continuous operation
- C Pressure loss
- D Flow rate
- E Q_{rated}

The values apply for lubricating liquids at temperatures of up to 120 °C. Abrasive and aggressive liquids reduce the durability.

Load capacity

Load capacity OMH 52

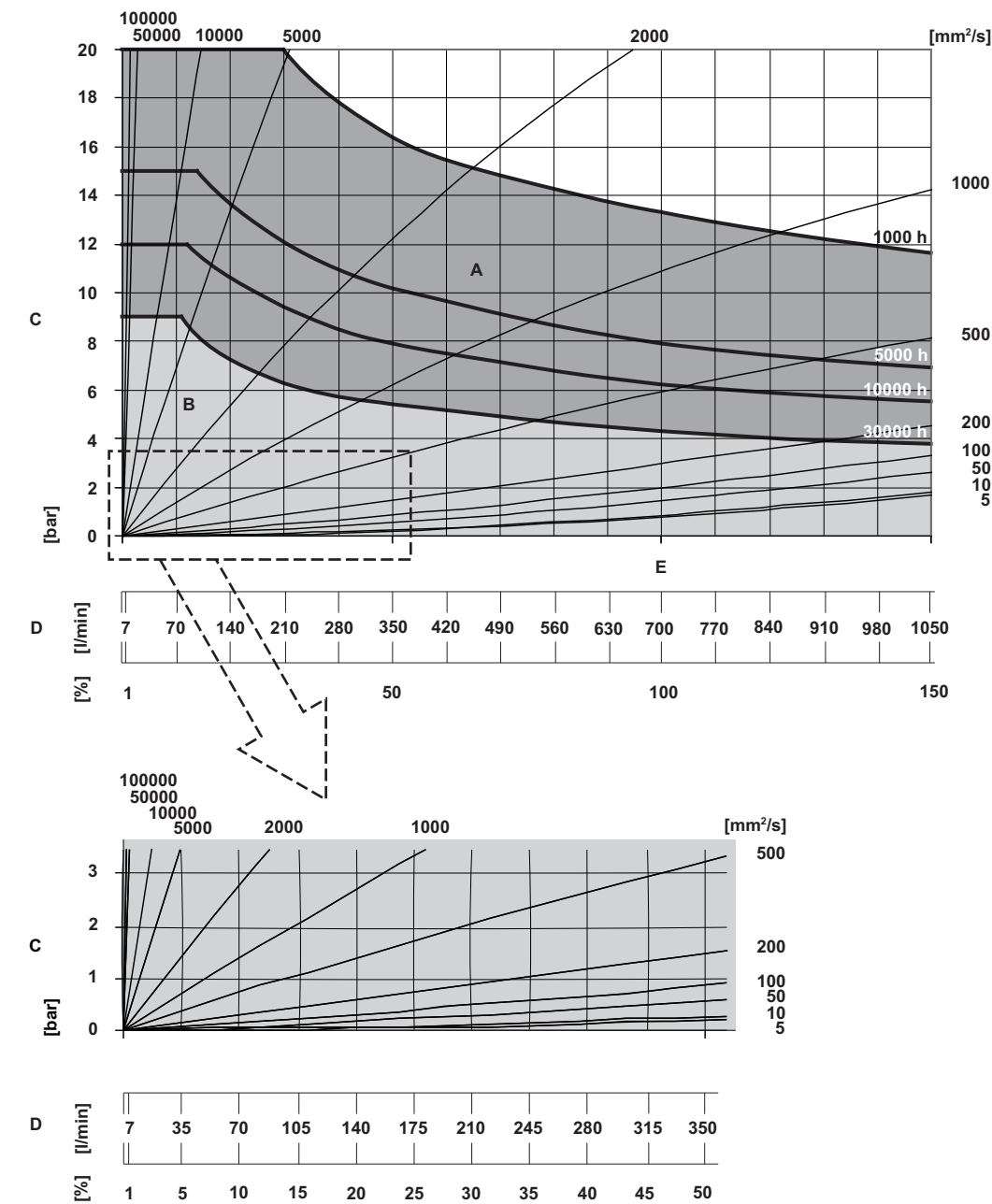


- A Short-time operation
- B Continuous operation
- C Pressure loss
- D Flow rate
- E Q_{rated}

The values apply for lubricating liquids at temperatures of up to 120 °C. Abrasive and aggressive liquids reduce the durability.

Load capacity

Load capacity OMH 68

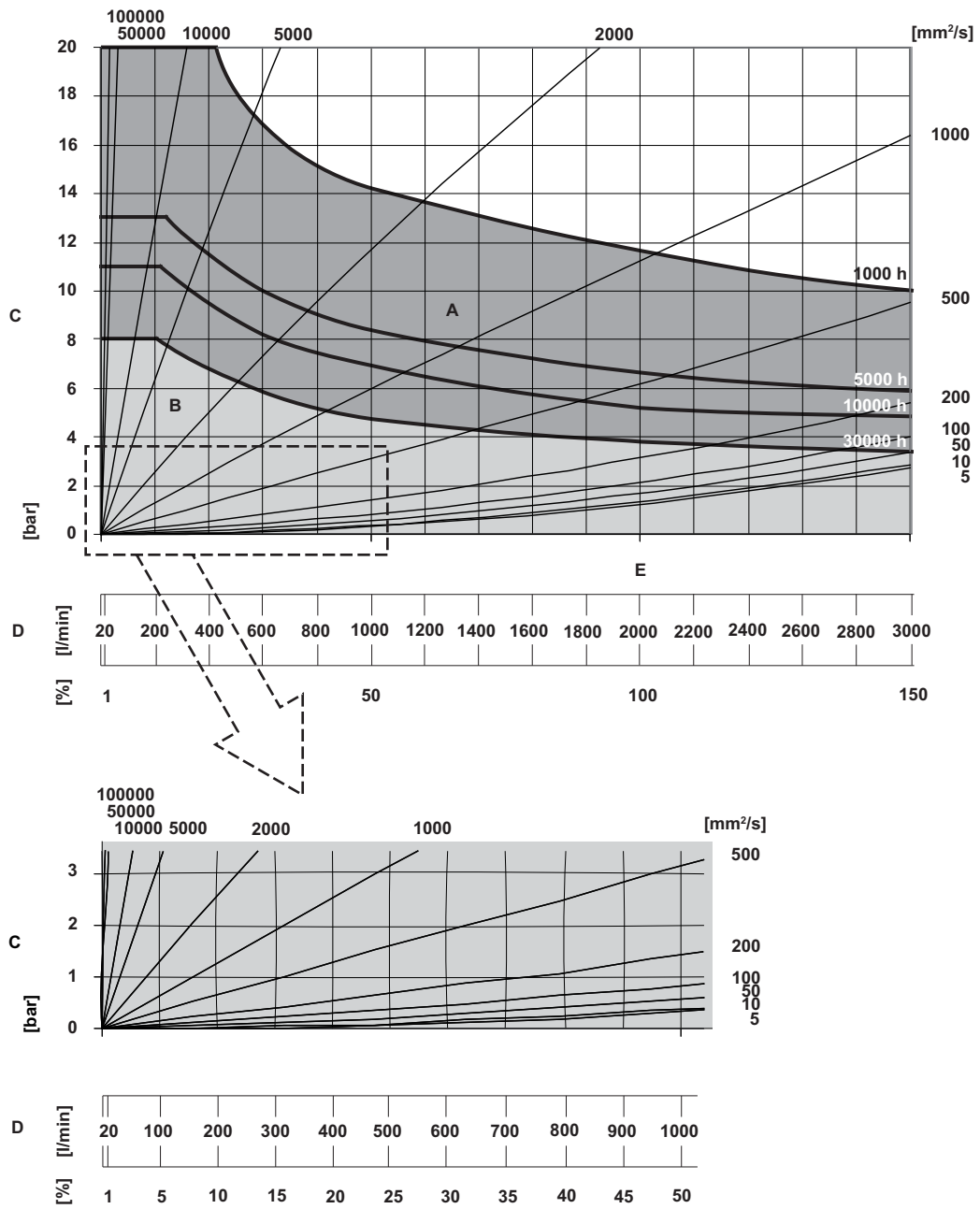


- A Short-time operation
- B Continuous operation
- C Pressure loss
- D Flow rate
- E Q_{rated}

The values apply for lubricating liquids at temperatures of up to 120 °C. Abrasive and aggressive liquids reduce the durability.

Load capacity

Load capacity OMH100



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

The values apply for lubricating liquids at temperatures of up to 120 °C. Abrasive and aggressive liquids reduce the durability.

Description

Description

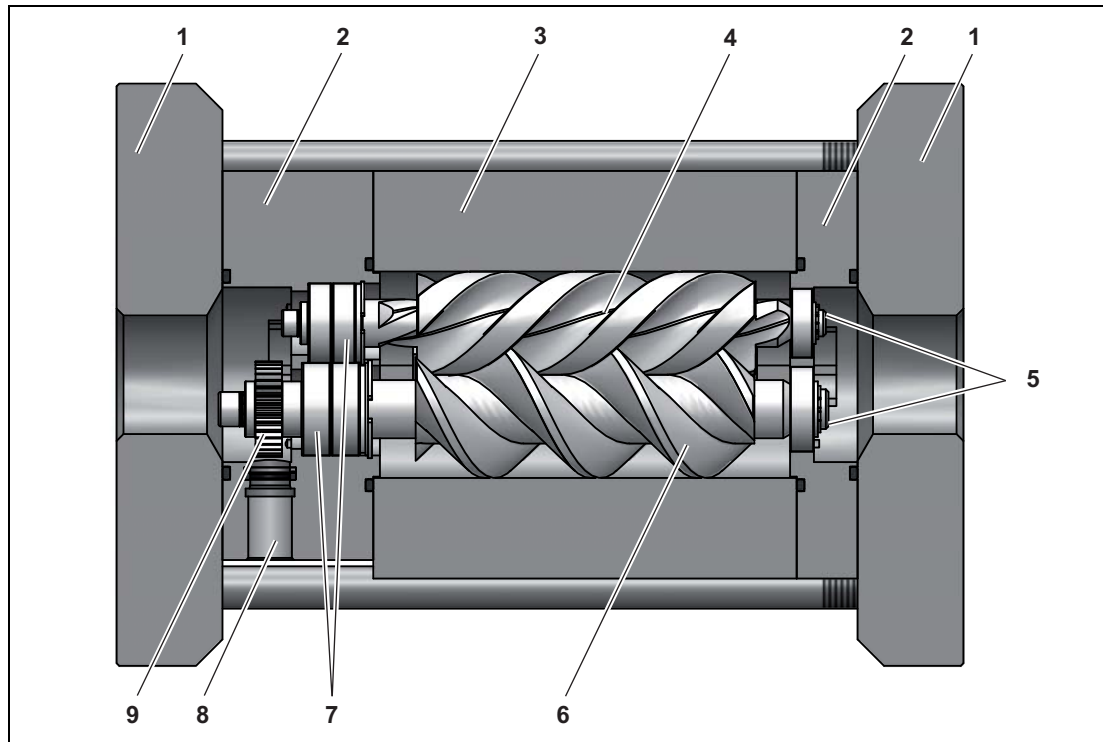


Fig. 1 Structure of the volumeter OMH series

- | | |
|---------------------------------------|------------------------------------|
| 1 Connection | 6 Measuring screw large |
| 2 Bearing cover | 7 Ball bearing, fixed bearing side |
| 3 Measuring housing | 8 Pick up hole |
| 4 Measuring screw small | 9 Pole wheel |
| 5 Ball bearing, floating bearing side | |

KRAL volumeters belong as screw meters 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 bearings

The measuring unit is maintained without contact and with a low degree of friction in the housing of the KRAL volumeter by means of precision rolling bearings. The bearing point at the pole wheel end is realized as a fixed bearing. Depending on the respective size, the following bearings are used:

- ☐ Single-row deep-groove ball bearings
- ☐ Paired angular-contact ball bearings
- ☐ Four-point bearings

The bearing point at the opposite end of the measuring unit is realized as a floating bearing with a movable deep-groove ball bearing at all sizes.

Signal generation

Signal generation

A pole wheel **9**, whose pole is sampled by a pick up, is affixed at the fixed bearing side of the large measuring screw **6**. This pick up 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.

Possible formats of the signals are:

- ☐ PNP
- ☐ Push-pull

Depending on the design of the pick up either cylindrical pole wheels with embedded magnets or toothed metal disks with varying tooth density can be used (higher number of poles = higher K-factor). Various types of pick ups can be used depending on the application (operating temperature, required frequencies):

- ☐ Pick ups based on the Hall effect
- ☐ Magnetic pick ups

The rating plate of the KRAL volumeter lists a preferred flow direction at which the pick up lies on the flow-off end. This preferred direction is based on the aim to position the pick up of the low-pressure end for the case that the volumeter is blocked.

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 electronic 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.

Flow direction detection

Systems with a changing flow direction as well as systems with pressure pulsations - that can also cause a reversal of the flow direction - require the use of a second pick up, see "Connection for the pick ups", page 25. This additional phase-offset signal and the incremental encoding inputs available in the KRAL electronic unit can be used to determine the flow direction and to take it into consideration when calculating the total values.

Unpacking and checking the state of delivery

Unpacking and checking the state of delivery



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

Lifting the volumeter

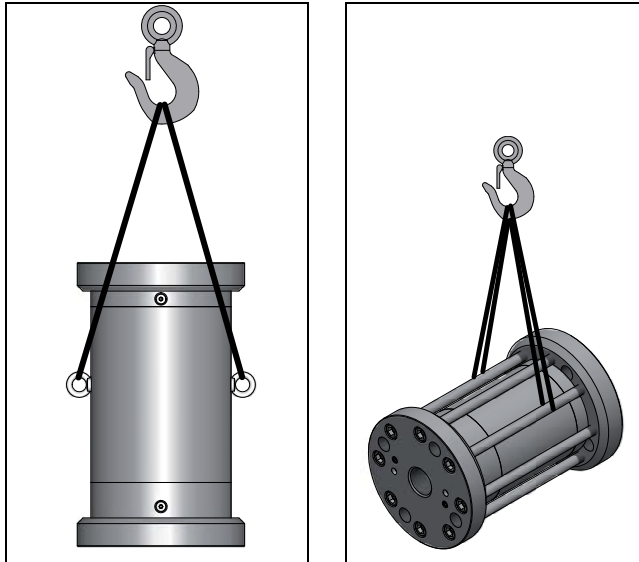


Fig. 1 Attachment of hoisting equipment – schematic diagrams



WARNING

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

- ▶ Use intact and correctly dimensioned hoisting equipment suitable for the weight to be lifted.
- ▶ Choose the attachment points of the hoisting equipment according to the center of gravity and weight distribution.
- ▶ Always use at least two slings.
- ▶ Do not stand under raised loads.



- ▶ Attach the hoisting equipment to the volumeter, see Fig. 1, page 20, and lift the volumeter.

Storage

As a result of the calibration, the internal components of the volumeter are wetted with calibration liquid 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 covers. Unless otherwise specified, the external components of the volumeter are preserved with a single-coat PU-based two-component paint. 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. KRAL offers a long-term preservation for storage times of up to 60 months. In the case of long-term preservation the volumeter is additionally packed in hermetically sealing anti-corrosion paper.

Preservation

CAUTION

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

► Protect the volumeters against corrosion during long standstills.

► Observe the sections "Storage" and "Preservation".

Preservation

Preservation has to be carried out in the following cases:

- ☐ **Standard delivery:** for storage periods exceeding six weeks and in case of adverse storage conditions such as high humidity, salty air, etc.
- ☐ **Delivery with long-term preservation:** if the packaging has been opened or damaged

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.
 4. Close the upper connection with a blind flange.
 5. Apply non-corrosive and resin-free oil to all the plain and unpainted parts of the outer housing.
- After about 6 months storage check the oil level in the volumeter and if necessary top up oil. Check the preservation of the outer housing and if necessary apply oil to the parts again.



Notice:

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



Notice:

After a longer storage time we recommend a recalibration of the volumeter, see "Recalibration of the volumeters", page 28.

Disposal

Removing the preservative

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.
- ▶ Remove the blind flange with caution to relieve any pressure inside the volumeter.
- ▶ Collect the emitted 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 on the volumeter.
- ▶ 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. Separate sealing elements made of elastomer from the volumeter and dispose of them in the residual waste.
4. Recycle cast-iron and steel parts.

Safety instructions for installation and removal



The following safety instructions must be observed:

- ☐ KRAL volumeters are precision measuring devices.
- ▶ Ensure cleanliness and take care during installation and removal.
- ▶ Do not take apart the volumeter.
- ▶ Do not remove the protective caps from the dry sleeves during installation. Put the protective caps on the dry sleeves during removal.

Installing the volumeter

KRAL volumeters of the OMH 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

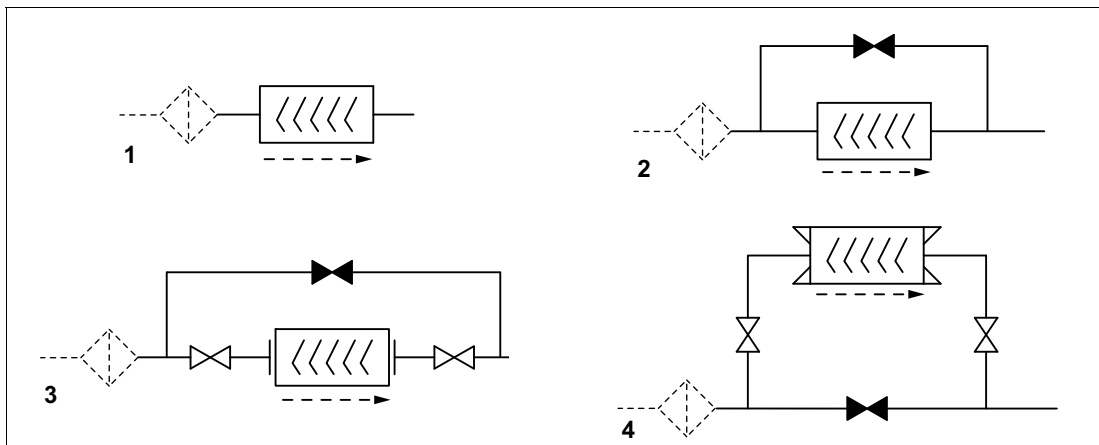


Fig. 1 OMH installation types

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

Installation type		Properties
1	<input type="checkbox"/> Without bypass <input type="checkbox"/> With or without operating filter	<input type="checkbox"/> Small space requirements <input type="checkbox"/> Dismantling of the volumeter only with interruption of operation
2	<input type="checkbox"/> Manual bypass <input type="checkbox"/> With or without operating filter	<input type="checkbox"/> Bypass is opened manually <input type="checkbox"/> Dismantling of the volumeter only with interruption of operation
3	<input type="checkbox"/> Bypass with 3 stop valves for flange connection <input type="checkbox"/> With or without operating filter	<input type="checkbox"/> Dismantling of the volumeter without interruption of operation
4	<input type="checkbox"/> Bypass with 3 stop valves for pipe thread connection <input type="checkbox"/> With or without operating filter	<input type="checkbox"/> Dismantling of the volumeter without interruption of operation <input type="checkbox"/> Minimally higher pressure loss

Tab. 1 OMH installation types

Installing the volumeter

Protect the volumeter against contamination



Notice:

In order to protect the volumeter against contamination we generally recommend the installation of an operating filter, mesh width see Tab. 1, page 26.

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 26.

Connecting the volumeter to the pipe system

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

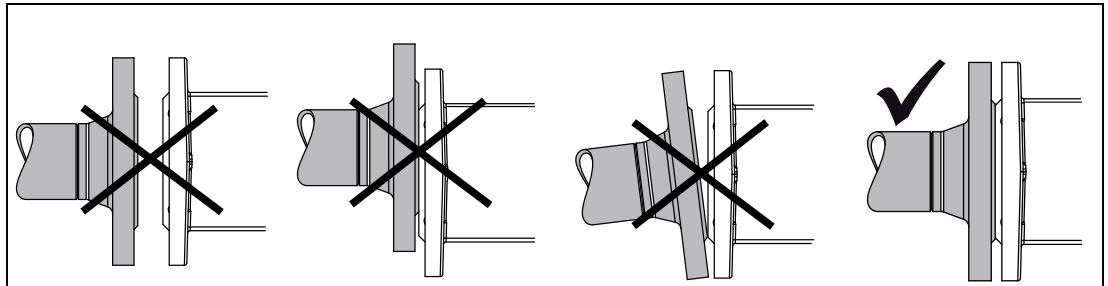


Fig. 2 Flange connections

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 device when the pipe threading is screwed in too far.

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



1. Remove the protective covers and store them.
2. Install the volumeter stress-free in the pipe system while taking the preferred flow direction into account and ensure that the connections of the pick ups remain 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



Observe the following safety instructions 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
- ▶ The connecting lines of the connections for pick ups are to be shielded and laid separately from the supply and measuring lines.
- ▶ Ensure that the power supply is correct.



- ▶ Observe the operating instructions for pick ups and electronic equipment.

Connection for the pick ups

The volumeter can be equipped with two pick ups for flow direction detection. The first signal measures the flow rate, the second signal determines the flow direction. The pick ups have to be connected correctly in order to obtain the correct values. The connections are marked on the volumeter housing with "1" and "2". This marking depends on the preferred flow direction in accordance with the arrow on the rating plate, see Fig. 2, page 6. In the case of a flow direction contrary to the preferred flow direction the connections have to be swapped in order to obtain a correct signal.

CAUTION

Measuring error through incorrectly mounted pick ups.

- ▶ Ensure that the pick ups are mounted at the correct position.



- ▶ Observe the corresponding operating instructions for pick ups.

Removing the volumeter

Prerequisite:

- ☐ System switched off

Aids:

- ☐ Vessels for leaking pumped liquid



WARNING

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

- ▶ Observe the safety regulations for handling dangerous liquids.
- ▶ 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 pipe system or divert the fuel via the bypass.
3. Dismantle the volumeter.
4. Apply the protective cover.
5. Observe the chapters "Storage" and "Preserving" 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 medium.

► 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.

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

Volumeter size		Mesh width max.
OMH 13 – 20	[mm]	0.1
OMH 32 – 100	[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 flow direction of the volumeter. ► Check the installation and installation position of the pick ups. ► Check for leaks at the pipe threading/flange under operating pressure.
Electrical installation	<ul style="list-style-type: none"> ► Observe the operating instructions for pick ups and electronic equipment.
Power supply	<ul style="list-style-type: none"> ► Observe the operating instructions for pick ups and electronic equipment.

Tab. 2 Function check table

Commissioning the volumeter

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 and dirt particles
- ☐ Pipe system deaerated
- ☐ Shut-off devices in the supply and discharge lines opened

Switching off the volumeter

CAUTION

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

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

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 pick up generates a signal.

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 12.
 - The limit values shown in the following table must not be exceeded even for a short time.

		OMH 13	OMH 20	OMH 32	OMH 52	OMH 68	OMH100
Pressure loss max.	[bar]	65	65	60	40	40	50

Tab. 3 Pressure loss limits

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 commissioning are met, see "Commissioning", page 26

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

Safety instructions



The following safety instructions must be observed during all the 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 unit or the rolling bearings have been replaced.
- ▶ Observe the pick up operating instructions when replacing the pick up insert.
- ▶ Do not twist the dry sleeve. The guarantee for the KRAL volumeter expires if the red sealing point is damaged.
- ▶ Also observe the general drawings during all the work at the volumeter, see "General drawings", page 40.

Required maintenance

KRAL volumeters are fundamentally maintenance-free. If the operating limits are observed, see "Technical data", page 7, no significant change in the characteristics can 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 case of doubt we recommend 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 bearing.
Leakage	Damage to sealing	Replace seals or dry sleeve.
Measured values not realistic	see "Fault table", page 39	see "Fault table", page 39

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 degree of measuring accuracy, 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.

KRAL provides the factory calibration as standard. If higher requirements are placed on the measuring instrument, calibration in compliance with the ÖKD Austrian Calibration Service to ISO IEC EN 17025 is also possible.

Mounting instructions OMH 13

Removing seals and bearings

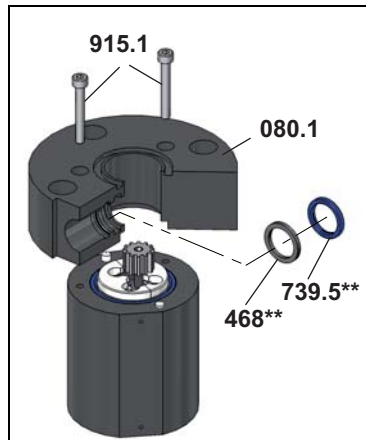


Fig. 1

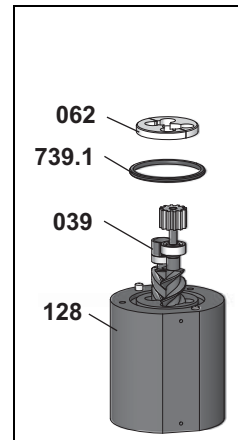


Fig. 2

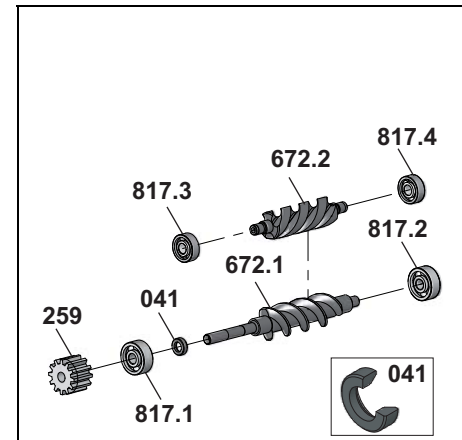


Fig. 3

039	Distance sleeve	468**	Supporting ring	817.2	Deep-groove ball bearing
041	Sleeve	672.1	Large measuring screw	817.3	Deep-groove ball bearing
062	Spacer	672.2	Small measuring screw	817.4	Deep-groove ball bearing
080.1	Bearing cover	739.1	O-ring	915.1	Socket screws
128	Measuring housing	739.5**	O-ring		
259	Pole wheel	817.1	Deep-groove ball bearing		

****** two units if two pick up holes exist

Prerequisites:

- ☐ Volumeter removed from system
- ☐ End connections consisting of socket screws, flanges and seals removed
- ☐ Pick up inserts removed



1. Remove the socket screws **915.1**, take off the bearing cover **080.1**.
2. Remove the o-ring **739.5**** and supporting ring **468**** through the hole in the middle of the bearing cover, see Fig. 1, page 29.
3. Remove the spacer **062** and o-ring **739.1**, pull the screw set together with distance sleeve **039** from the measuring housing **128**. Take the combination into account to ensure subsequent assembly, see Fig. 2, page 29.
4. Pull the pole wheel **259**, ball bearing **817.1**, sleeve **041** and ball bearing **817.2** from the large measuring screw **672.1** and the ball bearings **817.3** and **817.4** from the small measuring screw **672.2**, see Fig. 3, page 29.

Mounting instructions OMH 13

Mounting seals and bearings

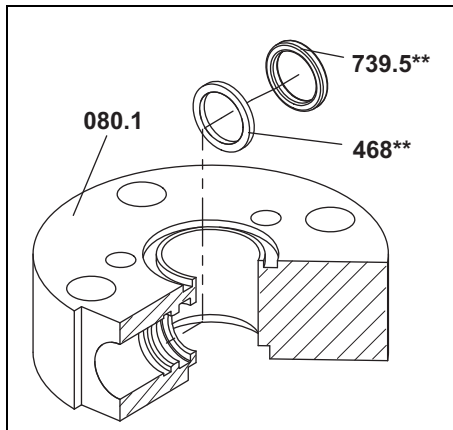


Fig. 4

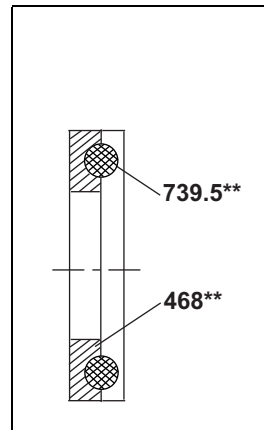


Fig. 5

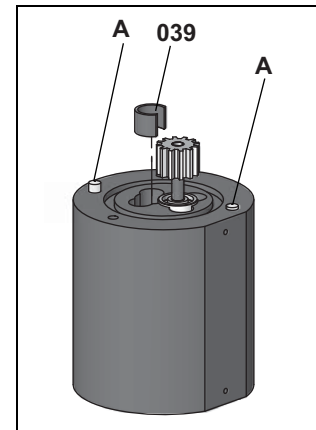


Fig. 6

- 039** Distance sleeve
080.1 Bearing cover
468** Supporting ring
739.5** O-ring

- A** Grooved insert pin

** two units if two pick up holes exist



- Slide the sleeve **041** onto the large measuring screw **672.1**, while taking the mounting direction into account, see Fig. 3, page 29.
- Press the ball bearings **817.1** and **817.2** onto the large measuring screw **672.1** and the ball bearings **817.3** and **817.4** onto the small measuring screw **672.2**. **Notice:** Press the ball bearings on only over the inner ring.
Press the pole wheel **259** onto the large measuring screw.
- Lay the supporting ring **468**** and o-ring **739.5**** through the hole in the middle of the bearing cover into the pick up hole, see Fig. 4, page 30.
Correct position of supporting ring and o-ring see Fig. 5, page 30.
- Push the screw set into the measuring housing **128**, paying attention to the configuration. Slide the distance sleeve **039** into the hole of the small measuring screw **672.2**, see Fig. 6, page 30.
- Insert the o-ring **739.1** into the measuring housing. Lay on the spacer **062**, ensuring that it is positioned correctly, see Fig. 2, page 29.
- Place the bearing cover **080.1** onto the measuring housing, ensuring that the grooved insert pins **A** in the measuring housing fit into the corresponding holes. Tighten the socket screws **915.1**.
- Mount the flange cover while pretensioning the oiled screws crosswise. Tightening torque see Tab. 2, page 45.

Mounting instructions OMH 20/32

Removing seals and bearings

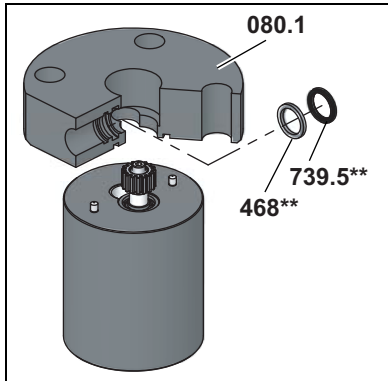


Fig. 7

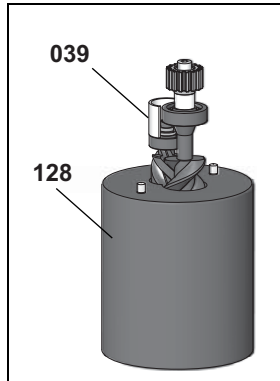


Fig. 8

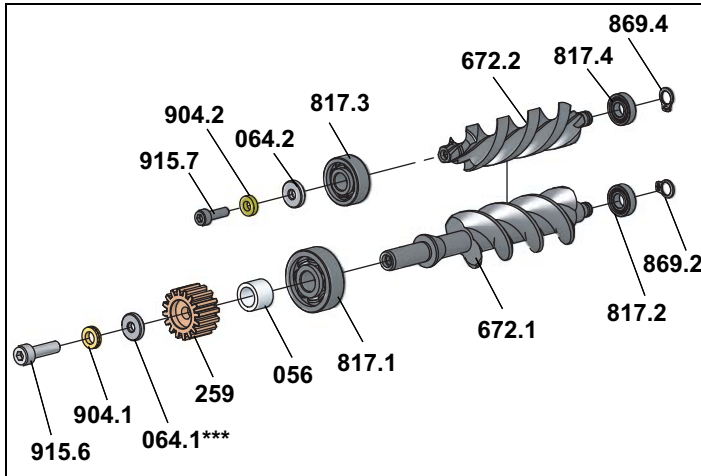


Fig. 9

039	Distance sleeve
056	Spacer ring
064.1***	Supporting disc
064.2	Supporting disc
080.1	Bearing cover
128	Measuring housing
259	Pole wheel
468**	Supporting ring
672.1	Large measuring screw
672.2	Small measuring screw
739.5**	O-ring
817.1	Deep-groove ball bearing
817.2	Deep-groove ball bearing
817.3	Deep-groove ball bearing
817.4	Deep-groove ball bearing
869.2	Circlip
869.4	Circlip
904.1	Lock washer
904.2	Lock washer
915.6	Socket screw
915.7	Socket screw

** two units if two pick up holes exist

*** only for OMH 32

Prerequisites:

- ☐ Volumeter removed from system
- ☐ End connections consisting of socket screws, flanges and seals removed
- ☐ Pick up inserts removed



1. Take off the bearing cover **080.1** and remove the o-ring **739.1**.
2. Remove the o-ring **739.5**** and supporting ring **468**** through the hole in the middle of the bearing cover, see Fig. 7, page 31.
3. Pull the distance sleeve **039** together with the set of screws out of the measuring housing, see Fig. 8, page 31.
4. Remove the circlips **869.2** and **869.4** from the large and small measuring screws.
5. Screw out the socket screws **915.6** and **915.7** and remove the lock washers **904.1**, **904.2** and supporting discs **064.1*****, **064.2**. Overview see Fig. 9, page 31.
6. Turn in the socket screw **915.6** back completely in order to pull the pole wheel **259** and spacer ring **056** from the large measuring screw **672.1** using a pulling-off device. Remove the socket screw **915.6** again.
7. Pull the ball bearings from the screws using the pulling-off device.

Mounting seals and bearings

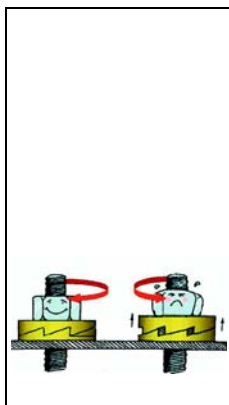


Fig. 10

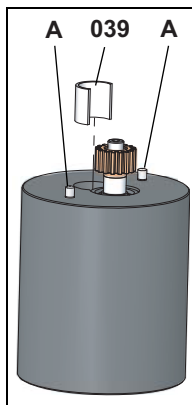


Fig. 11

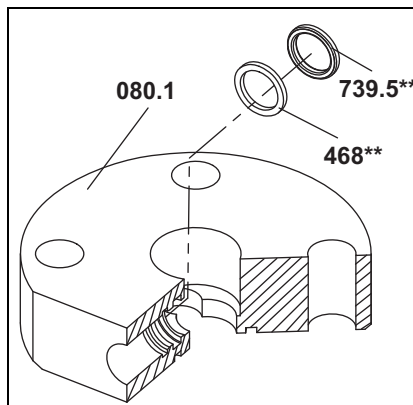


Fig. 12

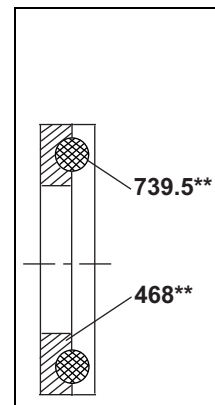


Fig. 13

039 Distance sleeve

080.1 Bearing cover

468** Supporting ring

739.5** O-ring

A Grooved insert pin

****** two units if two pick up holes exist



1. Press the ball bearings **817.1**, **817.2**, **817.3** and **817.4** onto the large **672.1** and small **672.2** measuring screw.
Notice: Press on only over the inner ring.
2. Slide the spacer ring **056** onto the large measuring screw **672.1**. Press the pole wheel **259** on.
3. Pull the NORD-LOCK wedge lock washers **904.1** and **904.2** and supporting discs **064.1***** and **064.2** onto the socket screws **915.6** and **915.7** and grease the thread.
Notice: Ensure that the NORD-LOCK wedge lock washers are positioned correctly (wedge surface to wedge surface), see Fig. 10, page 32.
4. Mount the socket screws **915.6** and **915.7** onto the large and small measuring screws and tighten using the torque wrench. Tightening torque see Tab. 2, page 45.
5. Mount the circlips **869.2** and **869.4** on the floating bearing side.
6. Slide the set of screws in the measuring housing. Slide the distance sleeve **039** into the hole of the small measuring screw **672.2**, see Fig. 11, page 32.
7. Lay the supporting ring **468**** and o-ring **739.5**** through the hole in the middle of the bearing cover into the pick up hole, see Fig. 12, page 32.
Correct position of supporting ring and o-ring see Fig. 13, page 32.
8. Insert the o-ring **739.1** into the bearing cover **080.1**.
9. Place the bearing cover **080.1** onto the measuring housing, ensuring that the grooved insert pins **A** in the measuring housing fit into the corresponding holes.
10. Mount the flange cover while pretensioning the oiled screws crosswise. Tightening torque see Tab. 2, page 45.

Mounting instructions OMH 52/68

Removing seals and bearings

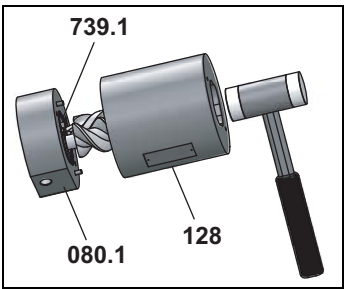


Fig. 14

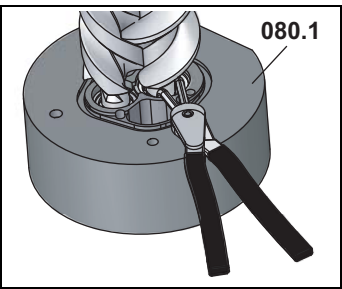


Fig. 15

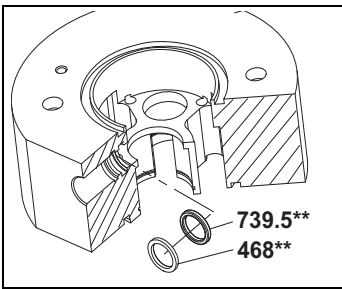


Fig. 16

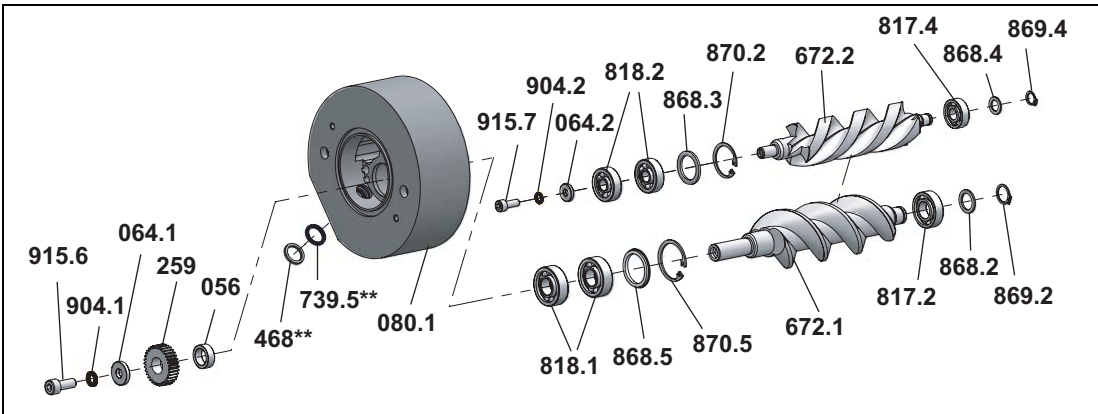


Fig. 17

056	Spacer ring	739.5**	O-ring	869.2	Circlip
064.1	Supporting disc	817.2	Deep-groove ball bearing	869.4	Circlip
064.2	Supporting disc	817.4	Deep-groove ball bearing	870.2	Circlip
080.1	Bearing cover	818.1	Angular-contact ball bearings	870.5	Circlip
128	Measuring housing	818.2	Angular-contact ball bearings	904.1	Lock washer
259	Pole wheel	818.2	Angular-contact ball bearings	904.2	Lock washer
468**	Supporting ring	868.2	Supporting ring	915.6	Socket screw
672.1	Large measuring screw	868.3	Supporting ring	915.7	Socket screw
672.2	Small measuring screw	868.4	Supporting ring		
739.1	O-ring	868.5	Supporting ring		
739.2	O-ring			**	two units if two pick up holes exist

Prerequisites

- ☐ Volumeter removed from the system
- ☐ End connections consisting of socket screws, flanges and seals removed
- ☐ Pick up inserts removed



1. Remove the socket screws **915.1** and **915.2**, take off the bearing cover **080.2**. Remove the o-ring **739.2**.
2. Use light blows of a plastic tip hammer to drive the set of screws together with the bearing cover **080.1** out of the measuring housing **128** and pull out, see Fig. 14, page 33. Remove the o-ring **739.1**.
3. Loosen the circlips **870.2** and **870.5** from recesses in the bearing cover, see Fig. 15, page 33.
4. Screw out the socket screw **915.6**. Remove the lock washer **904.1** and supporting disc **064.1**. Overview see Fig. 17, page 33.
5. Turn in the socket screw **915.6** back completely in order to pull the pole wheel **259** and bearing cover **080.1** from the set of screws using a pulling-off device. Remove the spacer ring **056**. Screw out the socket screw **915.6**.
6. Remove the measuring screws from the bearing cover **080.1**.
7. Screw out the socket screw **915.7** with lock washer **904.2** and supporting disc **064.2** at the small measuring screw **672.2**.
8. Remove the circlips **869.2** and **869.4** and supporting rings **868.2** and **868.4** from the large and small measuring screw.
9. Pull the bearings from the screws using the pulling-off device.
10. Remove the o-ring **739.5**** and supporting ring **468**** from the bearing cover **080.1**, see Fig. 16, page 33.

Mounting seals and bearings

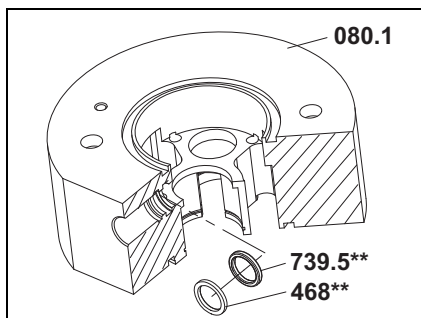


Fig. 18

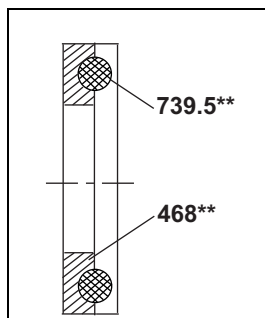


Fig. 19

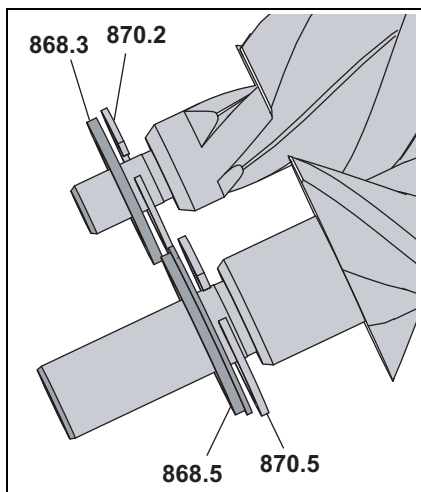


Fig. 20

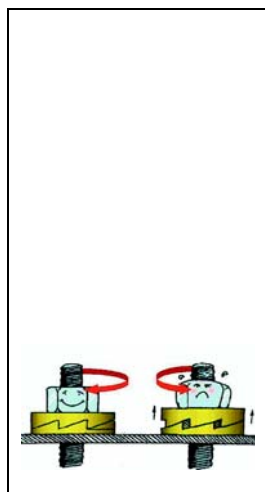


Fig. 21

080.1	Bearing cover
468**	Supporting ring
739.5**	O-ring
868.3	Supporting ring
868.5	Supporting ring
870.2	Circlip
870.5	Circlip

** two units if two pick up holes exist

Mounting instructions OMH 52/68



1. Lay the supporting ring **468**** and o-ring **739.5**** through the hole in the middle of the bearing cover into the pick up hole, see Fig. 18, page 34.
Correct position of supporting ring and o-ring see Fig. 19, page 34.
2. Slide the circlips **870.2**, **870.5** and supporting rings **868.3**, **868.5** onto the small measuring screw **672.2** and large measuring screw **672.1**. Observe the sequence.
Correct position of circlip and supporting ring at OMH 52 see Fig. 20, page 34.
3. Press the ball bearings **818.1** and **817.2** onto the large measuring screw and ball bearings **818.2** and **817.4** onto the small measuring screw.
Notice: Press the angular-contact ball bearings on in X-layout. Press the ball bearings on only over the inner ring.
4. Pull the NORD-LOCK wedge lock washer **904.2** and supporting disc **064.2** onto the socket screw **915.7** and grease the thread.
Notice: Ensure that the NORD-LOCK wedge lock washers are positioned correctly (wedge surface to wedge surface), see Fig. 21, page 34.
5. Pull the socket screw **915.7** with mounted washers onto the small measuring screw **672.2** using the torque wrench. Tightening torque see Tab. 2, page 45.
6. Slide the large and small measuring screws into the bearing cover **080.1**. Mount the circlips **870.5** and **870.2**.
7. Slide the spacer **056** onto the large measuring screw. Press the pole wheel **259** on.
8. Pull the NORD-LOCK wedge lock washer **904.1** and supporting disc **064.1** onto the socket screw **915.6** and grease the thread, see installation step 4.
9. Pull the socket screw **915.6** with mounted washers onto the large measuring screw **672.1** using the torque wrench. Tightening torque see Tab. 2, page 45.
10. Mount the supporting rings **868.2** and **868.4** and circlips **869.2** and **869.4** on the floating bearing side.
11. Lay the o-ring **739.2** into the bearing cover **080.2** and fasten with socket screws **915.2** to the measuring housing **128**.
12. Insert the o-ring **739.1** into the bearing cover **080.1**.
13. Slide the bearing cover **080.1** with premounted measuring unit, consisting of set of screws, bearings and pole wheel, into the measuring housing **128**, tighten the socket screws **915.1**.
14. Mount the flange cover while pretensioning the oiled screws crosswise. Tightening torque see Tab. 2, page 45.

Mounting instructions OMH100

Mounting instructions OMH100

Removing seals and bearings

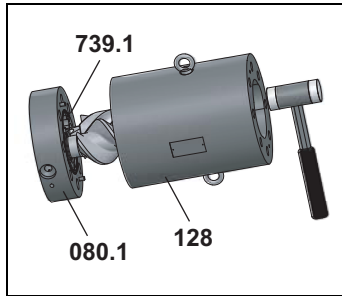


Fig. 22

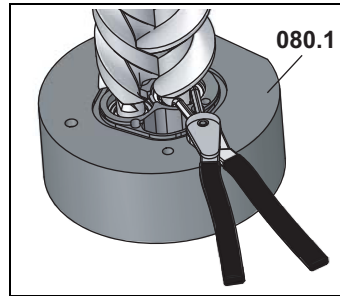


Fig. 23

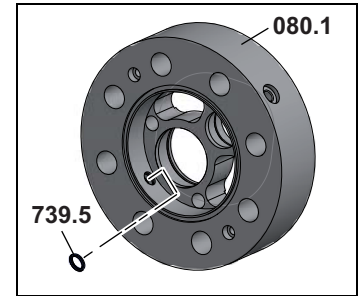


Fig. 24

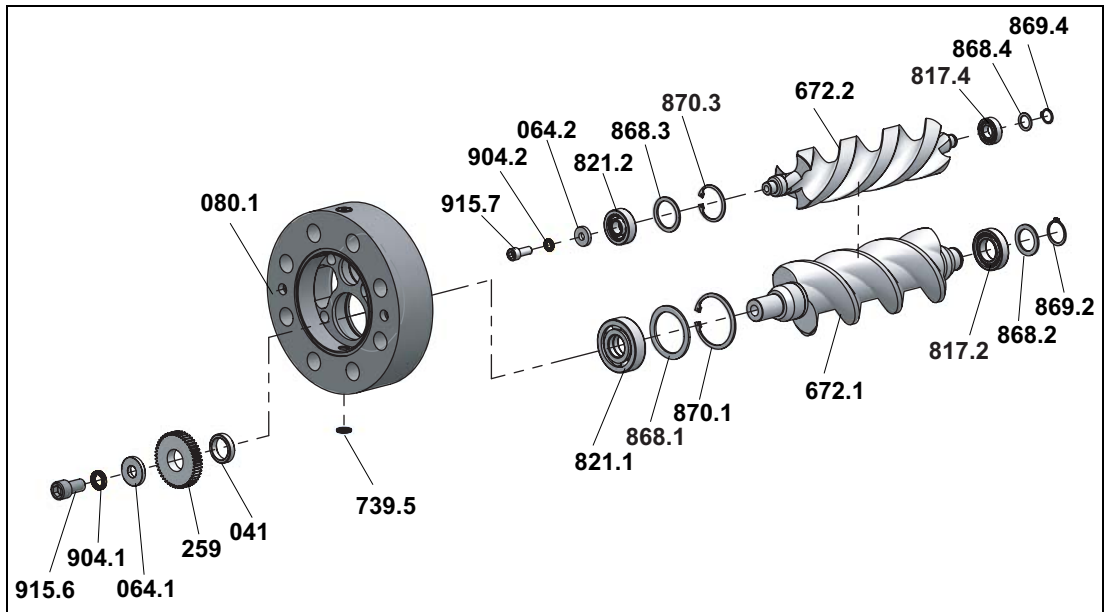


Fig. 25

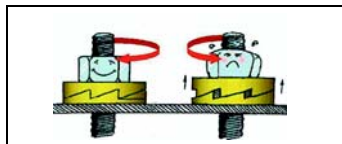


Fig. 26

041	Sleeve	739.5	O-ring	869.2	Circlip
064.1	Supporting disc	817.2	Deep-groove ball bearing	869.4	Circlip
064.2	Supporting disc	817.4	Deep-groove ball bearing	870.1	Circlip
080.1	Bearing cover	821.1	Four-point bearings	870.3	Circlip
128	Measuring housing	821.2	Four-point bearings	904.1	Lock washer
259	Pole wheel	868.1	Supporting ring	904.2	Lock washer
672.1	Large measuring screw	868.2	Supporting ring	915.6	Socket screw
672.2	Small measuring screw	868.3	Supporting ring	915.7	Socket screw
739.1	O-ring	868.4	Supporting ring		

Prerequisites:

- ☐ Volumeter removed from the system
- ☐ End connections consisting of socket screws, flanges and seals removed
- ☐ Pick up inserts removed

Mounting instructions OMH100



1. Remove the socket screws **915.1** and **915.2**, take off the bearing cover **080.2**. Remove the o-ring **739.2**.
2. Use light blows of a plastic tip hammer to drive the set of screws together with the bearing cover **080.1** out of the measuring housing **128**, see Fig. 22, page 36 and pull out. Remove the o-ring **739.1**.
3. Loosen the circlips **870.1** and **870.3** from recesses in the bearing cover, see Fig. 23, page 36, screw out the socket screw **915.6**.
4. Remove the lock washer **904.1** and supporting disc **064.1**. Turn in the socket screw **915.6** back completely in order to pull the pole wheel **259** and bearing cover **080.1** from the set of screws using a pulling-off device. Remove the sleeve **041**. Overview see Fig. 25, page 36.
5. Remove the measuring screws from the bearing cover **080.1**.
6. Screw out the socket screw **915.7** with lock washer **904.2** and supporting disc **064.2** at the small measuring screw **672.2**.
7. Remove the circlips **869.2**, **869.4** and supporting rings **868.2**, **868.4** from the measuring screws.
8. Pull the bearings from the screws using the pulling-off device.
Notice: **821.1** and **821.2** are four-point bearings. Avoid damage to the threads.
9. Screw the socket screw **915.6** out again and remove the supporting rings **868.1** and **868.3**.
10. Remove the o-ring **739.5** through the hole in the center from the bearing cover **080.1**, see Fig. 24, page 36.

Mounting seals and bearings



1. Insert the o-ring **739.5** into the pick up hole.
2. Slide the circlips **870.1**, **870.3** and supporting rings **868.1**, **868.3** onto the large **672.1** and small **672.2** measuring screws.
3. Press the ball bearings **821.1**, **821.2**, **817.2** and **817.4** onto the large and small measuring screws.
Notice: Press on only over the inner ring.
4. Pull the NORD-LOCK wedge lock washer **904.2** and supporting disc **064.2** onto the socket screw **915.7** and grease the thread. **Notice:** Ensure that the NORD-LOCK wedge lock washers are positioned correctly (wedge surface to wedge surface), see Fig. 26, page 36.
5. Mount the socket screw **915.7** with mounted wedge lock washer and supporting disc onto the small measuring screw **672.2** and tighten using the torque wrench. Tightening torque see Tab. 2, page 45.
6. Slide the large and small measuring screws into the bearing cover **080.1**. Mount the circlips **870.1** and **870.3**.
7. Slide the sleeve **041** onto the large measuring screw. Press the pole wheel **259** on.
8. Pull the NORD-LOCK wedge lock washer **904.1** and supporting disc **064.1** onto the socket screw **915.6**, grease the thread. **Notice:** Ensure that the NORD-LOCK wedge lock washers are positioned correctly (wedge surface to wedge surface), see installation step 4.
9. Tighten the socket screw **915.6** on the large measuring screw using the torque wrench. Tightening torque see Tab. 2, page 45.
10. Mount the supporting rings **868.2**, **868.4** and circlips **869.2**, **869.4** on the floating bearing side.
11. Insert the o-ring **739.2** into the bearing cover **080.2**. Place the bearing cover **080.2** onto the measuring housing **128**. Tighten the socket screws **915.2**.
12. Insert the o-ring **739.1** into the bearing cover **080.1**. Slide the bearing cover **080.1** with premounted measuring unit, consisting of set of screws, bearings and pole wheel, into the measuring housing **128**, tighten the socket screws **915.1**.
13. Mount the flange cover while pretensioning the oiled screws crosswise. Tightening torque see Tab. 2, page 45.

Possible faults

Possible faults

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



Fault	Cause/Remedy
<input type="checkbox"/> Volumeter leaks	1, 2, 8
<input type="checkbox"/> No flow rate	3, 10, 22, 24, 25
<input type="checkbox"/> Negative flow rate	5, 17, 19
<input type="checkbox"/> Volumeter does not generate a pulse	3, 4, 5, 6, 7, 8, 10, 13, 20, 22, 24, 25
<input type="checkbox"/> Pressure loss too high	11, 14, 22, 23
<input type="checkbox"/> Measured values not realistic	3, 4, 5, 6, 7, 15, 16, 17, 18, 19, 20, 21, 22, 23

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 particles in the liquid and/or volumeter	► Disassemble the volumeter and clean it. ► Use the commissioning filter.
4	Pick up not positioned correctly	► Position the pick up correctly, observing the pick up operating instructions.
5	Pick up not connected correctly	► Check the connection of the pick up. ► Check the power supply for the pick up, while observing the pick up operating instructions.
6	Pick up defective	► Check the function of the pick up, while observing the pick up operating instructions.
7	Dry sleeve not adjusted correctly	► Set the dry sleeve correctly, while observing the pick up operating instructions.
8	Dry sleeve destroyed	► Replace dry sleeve, please contact KRAL for information.
10	Feed pressure too low	► Increase the feed pressure.
11	Viscosity of the liquid too high	► Increase the temperature, while observing the permissible temperature range.
13	Flow rate too low	► Increase the flow rate. - or - ► Use a suitable volumeter size. - or - ► Use linearization, while observing the electronic operating instructions.
14	Flow rate too high	► Reduce the flow rate. - or - ► Use a suitable volumeter size.
15	Airlocks	► Deaerate the system and check for leaks.
16	Outgassing	► Increase the system pressure. ► Reduce the temperature.
17	Pulsations too high	► Use another feed pump. ► Carry out changes to the system.

Troubleshooting

No.	Cause	Remedy
18	Counter pressure too low	► Increase the counter pressure.
19	Flow rate fluctuations too high	► 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.
20	Filling amount too low	► Use a suitable volumeter size. ► Use a suitable volumeter type.
21	Strongly deviating operating data	► Use a suitable volumeter. ► Adapt the operating data to the volumeter.
22	Wear at the measuring unit and bearing	► Renew the measuring unit. ► Replace the bearing. ► Filter out the abrasive materials.
23	Sluggishness through deposits	► Disassemble the volumeter and clean it carefully.
24	Flow impaired at the system end	► 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.
25	Volumeter switched to bypass	► Switch the volumeter to through-flow.

Tab. 1 Fault table

General drawings

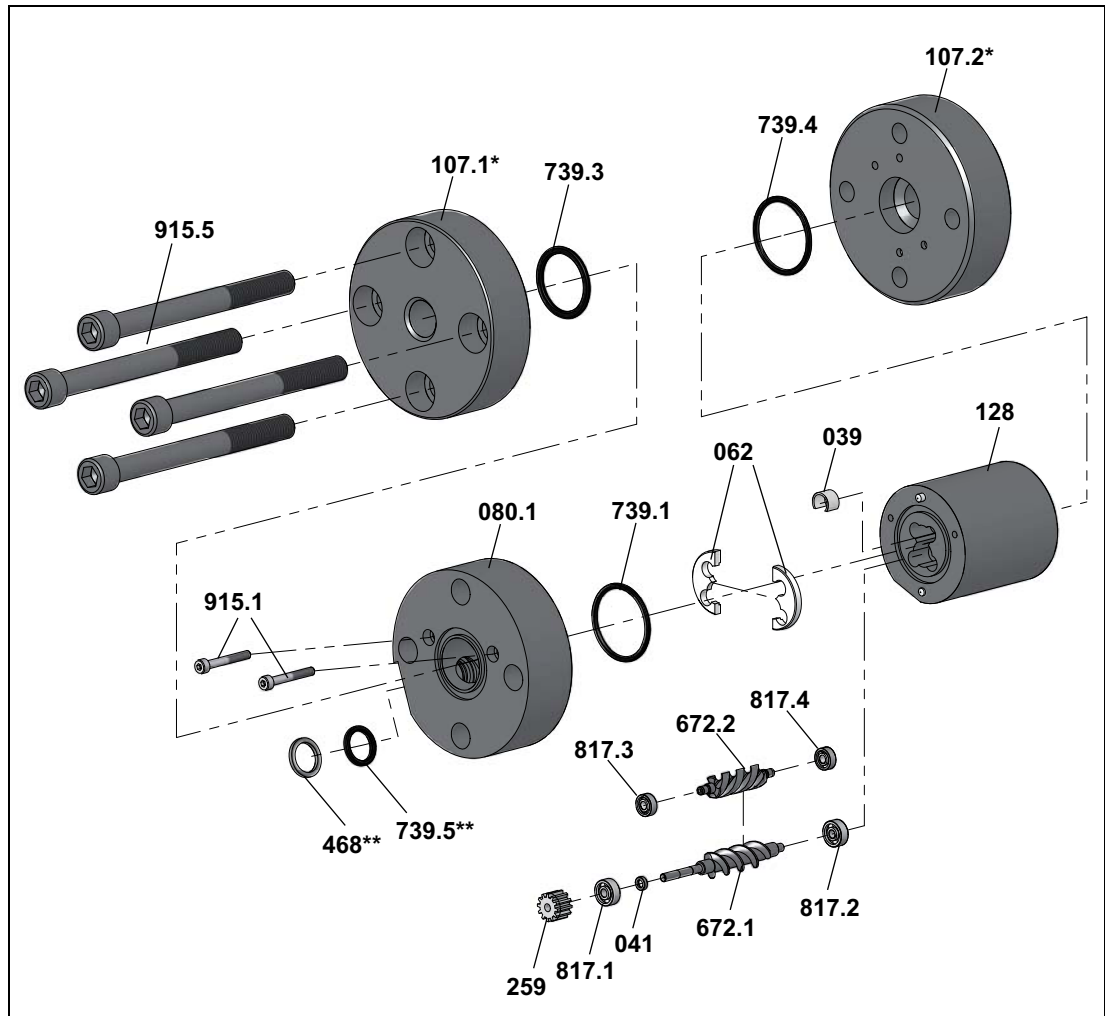


Fig. 1 Exploded view OMH 13

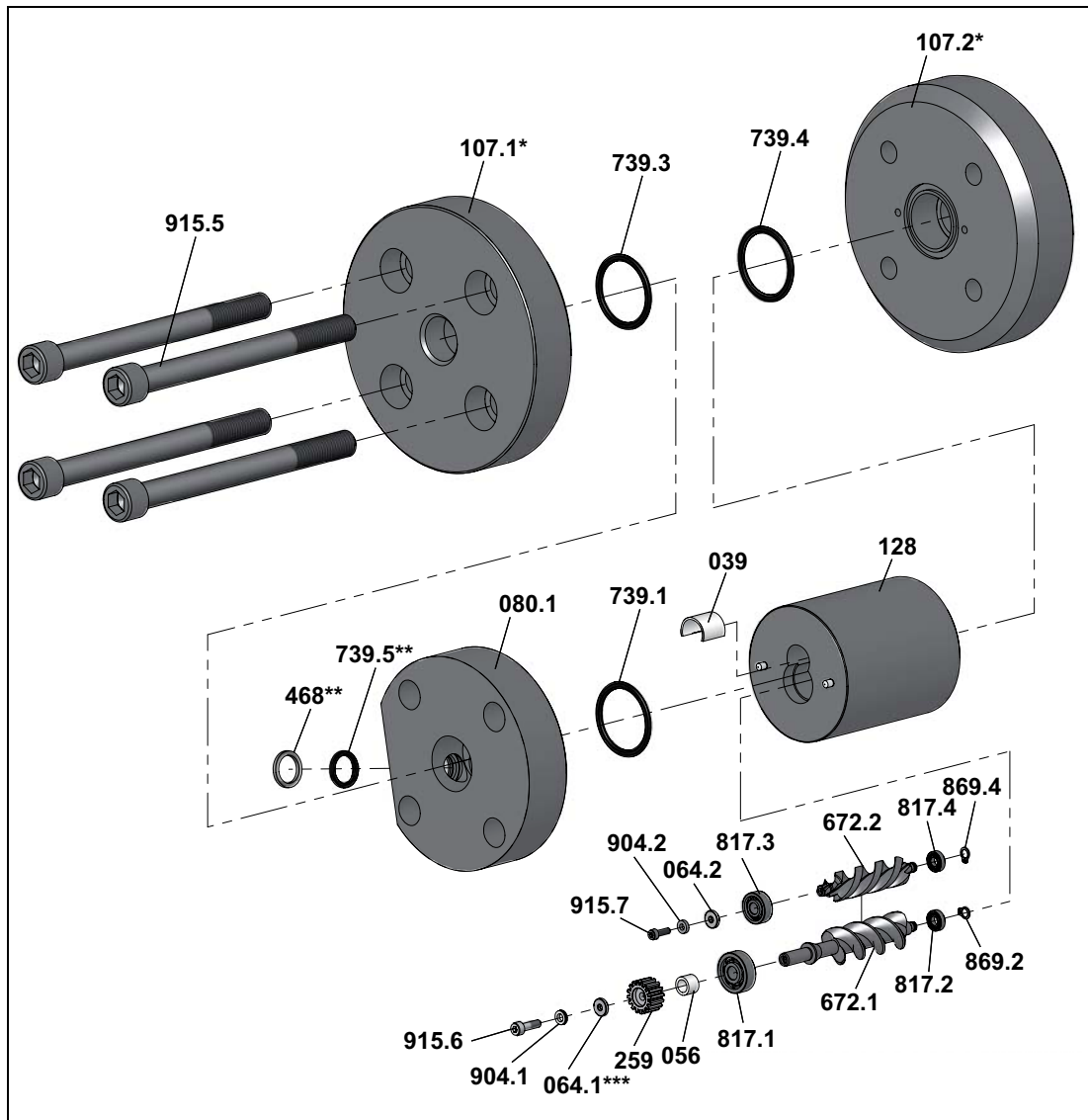


Fig. 2 Exploded view OMH 20 – 32

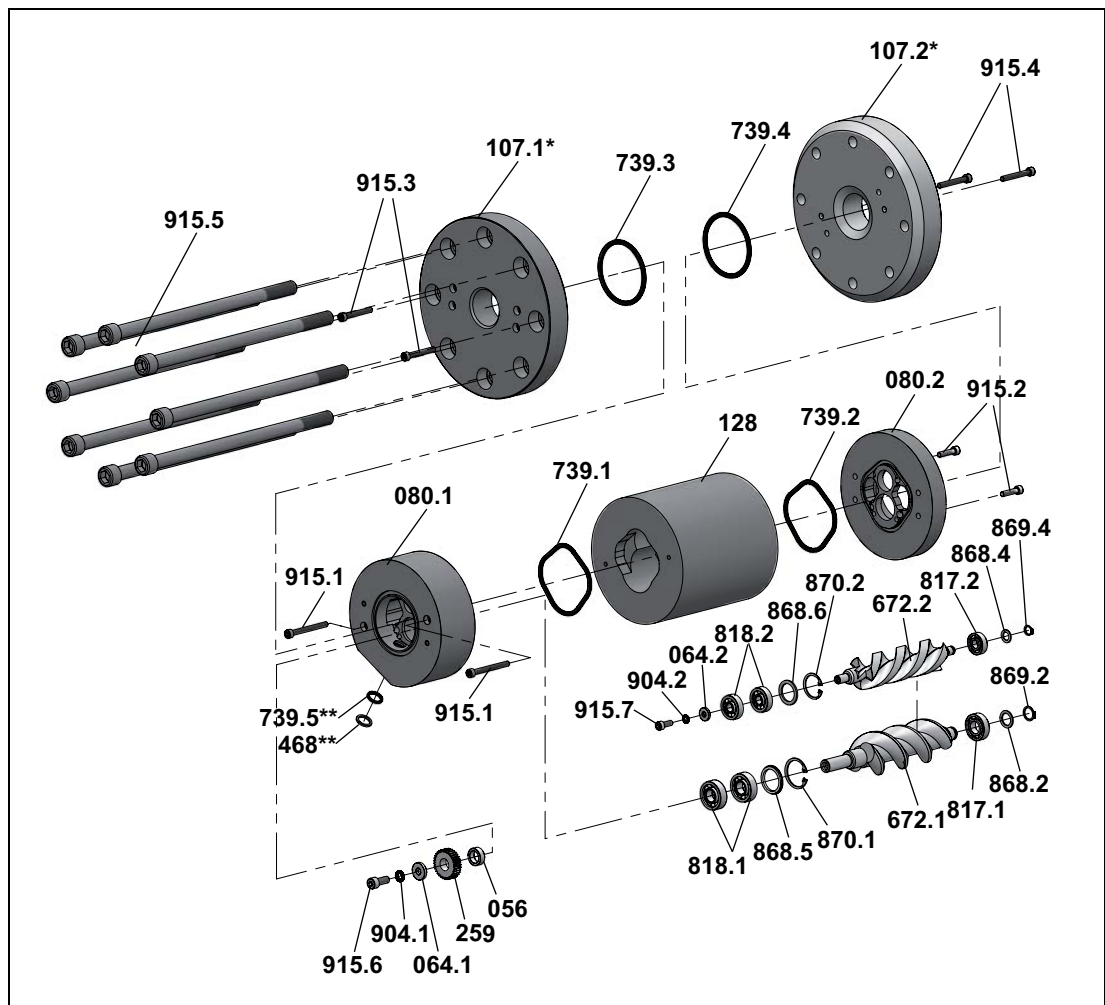


Fig. 3 Exploded view OMH 52 – 68

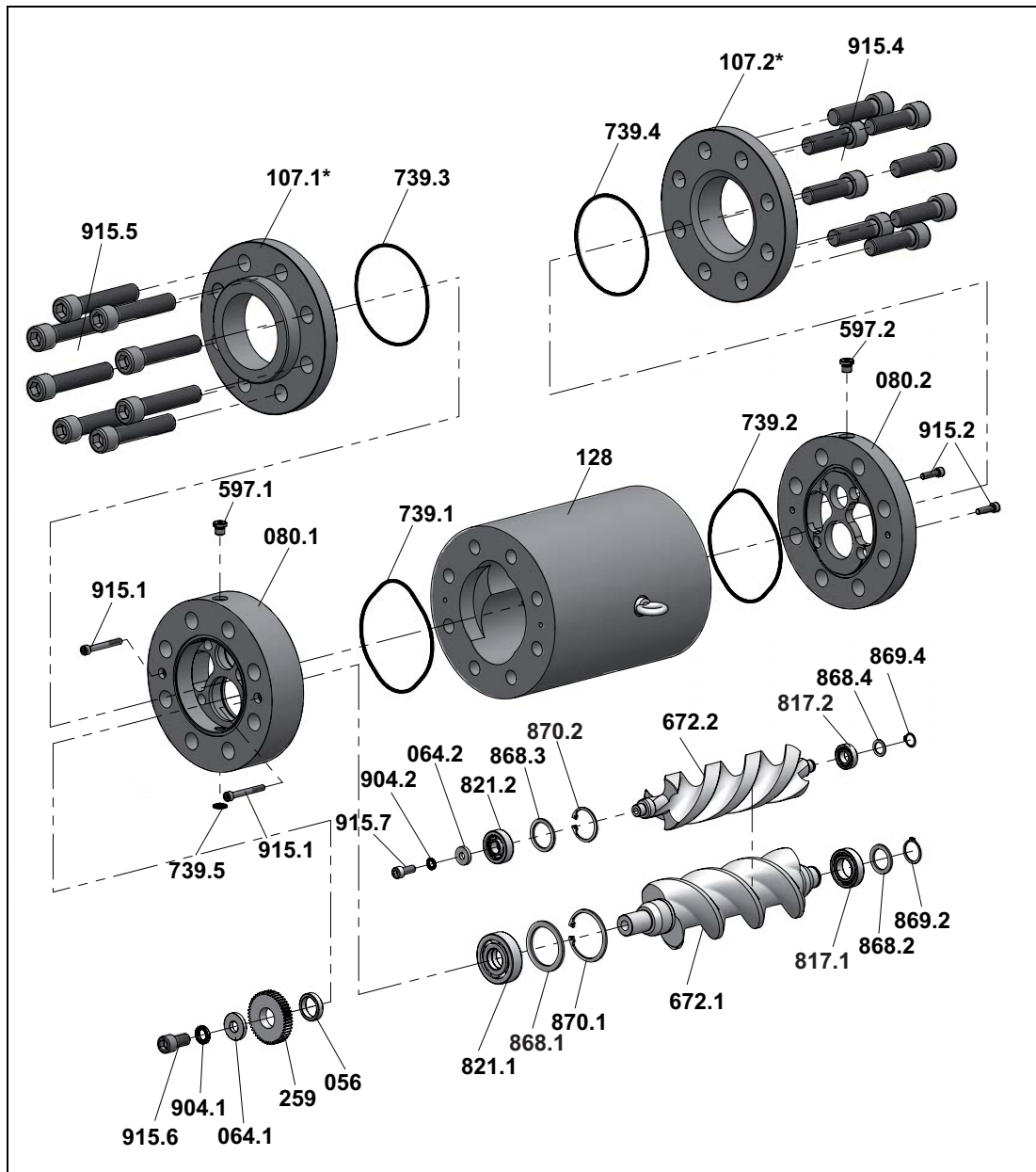


Fig. 4 Exploded view OMH100

Parts list

Parts list

Pos. no.	Part	Pos. no.	Part
039	Distance sleeve	817.2	Deep-groove ball bearing
041	Sleeve	817.3	Deep-groove ball bearing
056	Spacer	817.4	Deep-groove ball bearing
062	Spacer	818.1	Angular-contact ball bearings
064.1	Supporting disc	818.2	Angular-contact ball bearings
064.1***	Supporting disc	821.1	Four point bearing
064.2	Supporting disc	821.2	Four point bearing
080.1	Bearing cover	868.1	Supporting ring
080.2	Bearing cover	868.2	Supporting ring
107.1*	Pipe threaded flange	868.3	Supporting ring
107.2*	Pipe threaded flange	868.4	Supporting ring
115.1*	Flange	868.5	Supporting ring
115.2*	Flange	868.6	Supporting ring
128	Measuring housing	869.2	Circlip
259	Pole wheel	869.4	Circlip
468**	Supporting ring	870.1	Circlip
597.1	Screw plug	870.2	Circlip
597.2	Screw plug	904.1	Lock washer
672.1	Measuring screw large	904.2	Lock washer
672.2	Measuring screw small	915.1	Socket screws
739.1	O-Ring	915.2	Socket screws
739.2	O-Ring	915.3	Socket screws
739.3	O-Ring	915.4	Socket screws
739.4	O-Ring	915.5	Socket screws
739.5	O-Ring	915.6	Socket screw
739.5**	O-Ring	915.7	Socket screw
817.1	Deep-groove ball bearing		
* parts for pipe thread or flange connection alternatively ** two units if two pick up holes exist *** only for OMH 32			

Tab. 1 Spare Parts

Tightening torques

Tightening torques

Tightening torque [Nm] for screws with metric threads + head contact surfaces								with thread measured in inches	
Thread	+ wedge lock washers					Stainless steel screws A2 and A4		Screw plugs with elastomer seal	
	8.8	10.9	8.8 + Alu*	8.8	Rust-proof A4-70	Property class 70	Property class 80	Thread	Galvanized + stainless steel
M 3	1,5	–	1,2	1,5	1,1	–	–	G 1/8"	13
M 4	2,9	4,1	2,3	3	2	–	–	G 1/4"	30
M 5	6,0	8,0	4,8	6,0	3,9	3,5	4,7	G 3/8"	60
M 6	9,5	14	7,6	10,3	6,9	6	8	G 1/2"	80
M 8	23,1	34	18,4	25	17	16	22	G 3/4"	120
M 10	46	68	36,8	47	33	32	43	G 1"	200
M 12	80	117	64	84	56	56	75	G 1 1/4"	400
M 14	127	186	101	133	89	–	–	G 1 1/2"	450
M 16	194	285	155	204	136	135	180	* reduced tightening torque when screwing into aluminum	
M 18	280	390	224	284	191	–	–		
M 20	392	558	313	399	267	280	370		
M 24	675	960	540	687	460	455	605		

Tab. 2 Tightening torques

EC Declaration of conformity

EC Declaration of conformity

**EC DECLARATION OF CONFORMITY**

**for machinery
in accordance with Annex II, 1. A, Directive 2006/42/EC**

Translation of the original declaration

Manufacturer of the machinery:

KRAL AG, Bildgasse 40, A-6890 Lustenau

Description of the machinery:**Pump/Pump station/Volumeter:**

Type:

Serial number:

KRAL AG declares that this machinery fulfils all the relevant provisions of Directive 2006/42/EC.

Only those components are missing that are used to connect the machinery at its site of use: flanged connections with the piping system; if applicable fastening means at the base of the product and for pumps/pump stations the connection to the source of energy and motion (motor or voltage supply of the motor).

The special technical file in accordance with Annex VII, Part A of the Directive has been drawn up.

Person authorized to draw up this declaration and to compile the relevant technical file in accordance with Annex VII, Part A, Directive 2006/42/EC:

Christoph Schneider (Dr.-Ing.)
KRAL AG
Bildgasse 40, A-6890 Lustenau

Lustenau, on

i. A.

A handwritten signature in black ink, appearing to read "C. Schneider".

Dr.-Ing. Christoph Schneider
Technical Head

Notes

