

■■■■■■ Flow Measurement.

**KRAL**



## Flowmeters.

Highly accurate and robust.

## Display and Processing Unit.

Smart and configurable.

# Welcome to KRAL.

## About us.

With headquarters in Austria, KRAL GmbH was founded in 1950 and has been an independent family enterprise ever since. We therefore think and invest long-term so that we can remain a stable and reliable business partner for our customers.

KRAL develops and produces screw pumps and flow measurement technology. In addition, we offer customer-specific solutions for systems, from the initial engineering process through to commissioning. And of course our After Sales Service is available to help you after purchase. Our primary business sectors include marine, power generation, oil and gas, mechanical engineering and chemicals. Our customers include local businesses as well as global industrial concerns.

## What you can expect from us.

Since the company was founded, KRAL has established itself as a manufacturer of quality products with a fair price/performance ratio. In order to live up to our standard, we continuously invest in our employees, our manufacturing processes and our methodological expertise. A commitment to Total Quality Management (TQM) is a key component in our company philosophy. Furthermore, we are increasing the levels of automation and digitization in our company. Our customers claim that we can meet special needs. What's more, KRAL is greatly appreciated for its reliable partnerships and the fact that working together with us is professional and very straightforward. This

makes us quite proud. We will continue to strengthen these values in the future. That's why we continuously invest in innovations, both for products as well as methodology and processes.

A key component in our approach to customer-orientation is that you can rely on excellent care from our Customer Center as well as our After Sales Service. This includes both expertise and reaction speed.

We have summarized what you can expect as a KRAL customer in our company vision:

**"KRAL is quality, innovation and quick response, anytime and anywhere around the world."**

Check out our services and see for yourself. We will be happy to help you.



**DI Otmar Kräutler**  
**CEO**



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**FLOWMETERS.**






# An Overview of all our Products.

Which device for which need?

## KRAL flowmeters.

All KRAL flowmeters are distinguished by their industry-leading combination of highest precision and robustness. Because of their comparatively low maintenance costs and long lifespan, the investment in a KRAL flowmeter is a long-term, economically wise choice.

With a broad selection of models and designs, we provide diverse solutions based on customer demands and optimized for the respective application. More information can be found in the detailed descriptions of the individual series in this brochure. We are also happy to provide personal consultation.

 Series.	 Guide to the KRAL product range.	 Flow rate.	 Pressure.	 Temperature.
<b>OMG.</b>	Our universal flowmeters.	6.0 to 450,000 l/h. 0.1 to 7,500 l/min.	Up to 250 bar.	-20 to +200 °C.
<b>OMP.</b>	For fuel consumption measurement.	6.0 to 31,500 l/h. 0.1 to 525 l/min.	40 bar.	-20 to +200 °C.
<b>OME.</b>	Compact 3-in-1-device.	6.0 to 31,500 l/h. 0.1 to 525 l/min.	40 bar.	-20 to +125 °C.
<b>OMH.</b>	For high pressures.	6.0 to 180,000 l/h. 0.1 to 3.000 l/min.	Up to 420 bar.	-20 to +200 °C.
<b>Customer-specific design.</b>	We solve complex measurement tasks, such as extremely high pressures up to 630 bar and low temperature ranges up to -40 °C based on your specific requirements. KRAL flowmeters made of stainless steel are particularly suitable for abrasive media and water.			

## KRAL display and processing units.

High-precision measurement devices demand equally high-quality electronics for selectively analyzing and calculating the recorded signals. To take full advantage of the functionality

range of KRAL measurement devices, we recommend our BEM series display and processing units for the analysis and display of the data, or our compact Smart Solution.

Product.	Main feature.	Application examples.
<b>SMART SOLUTION.</b>	Easy integration.	Easily combinable processing unit for multiple motors and additional consumers.
<b>BEM.</b>	Analysis and display.	Display electronics for single-line and differential measurement.

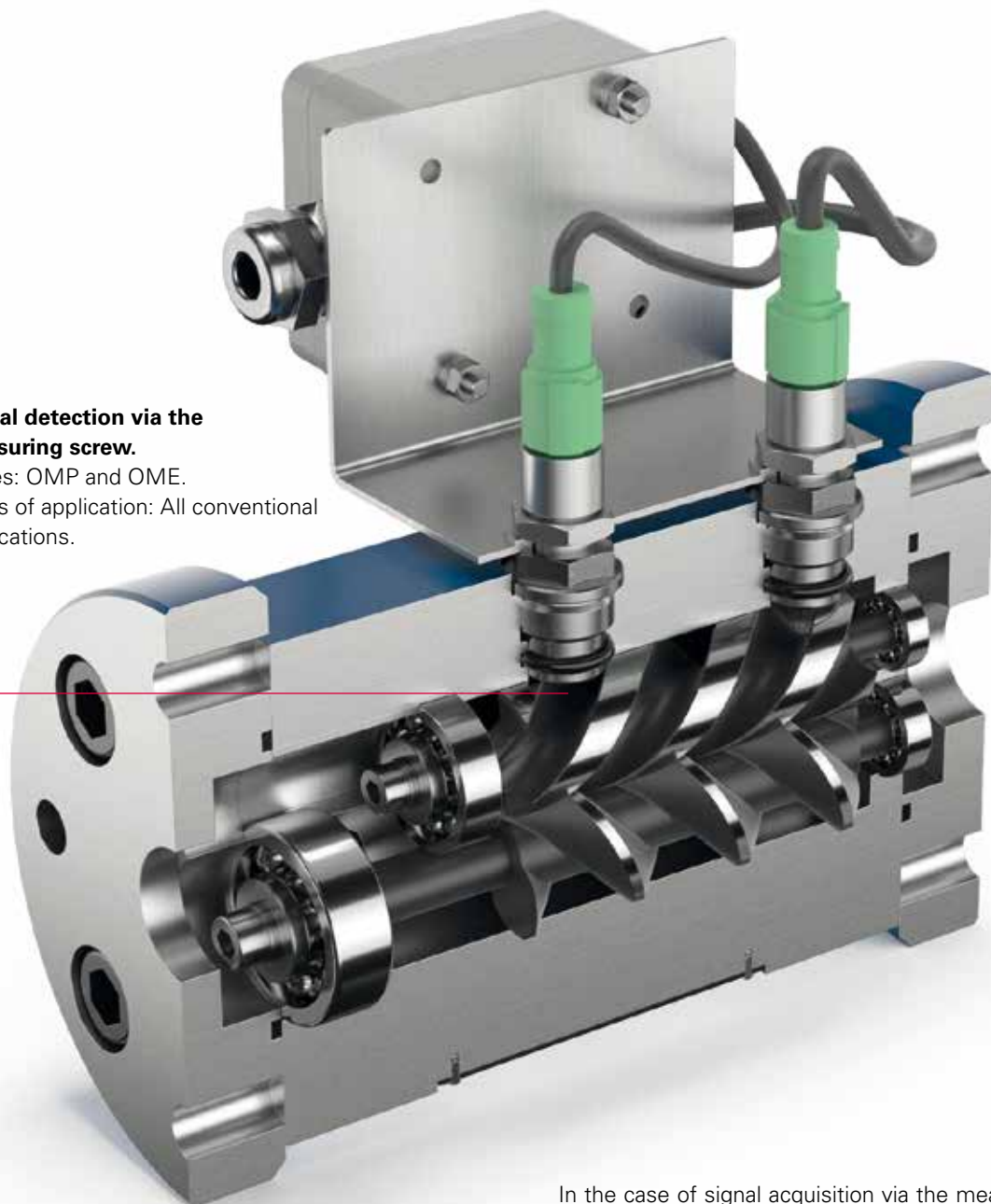


# Methods of Signal Detection.

Via the measuring screw | Via the pole wheel.

In KRAL flowmeters, signal detection is carried out based on two different methods: Either via a measuring screw or a pole wheel. The determination of which of those two methods to use is based on the area of application and the resulting demands on signal resolution.

■ **Signal detection via the measuring screw.**  
Series: OMP and OME.  
Areas of application: All conventional applications.

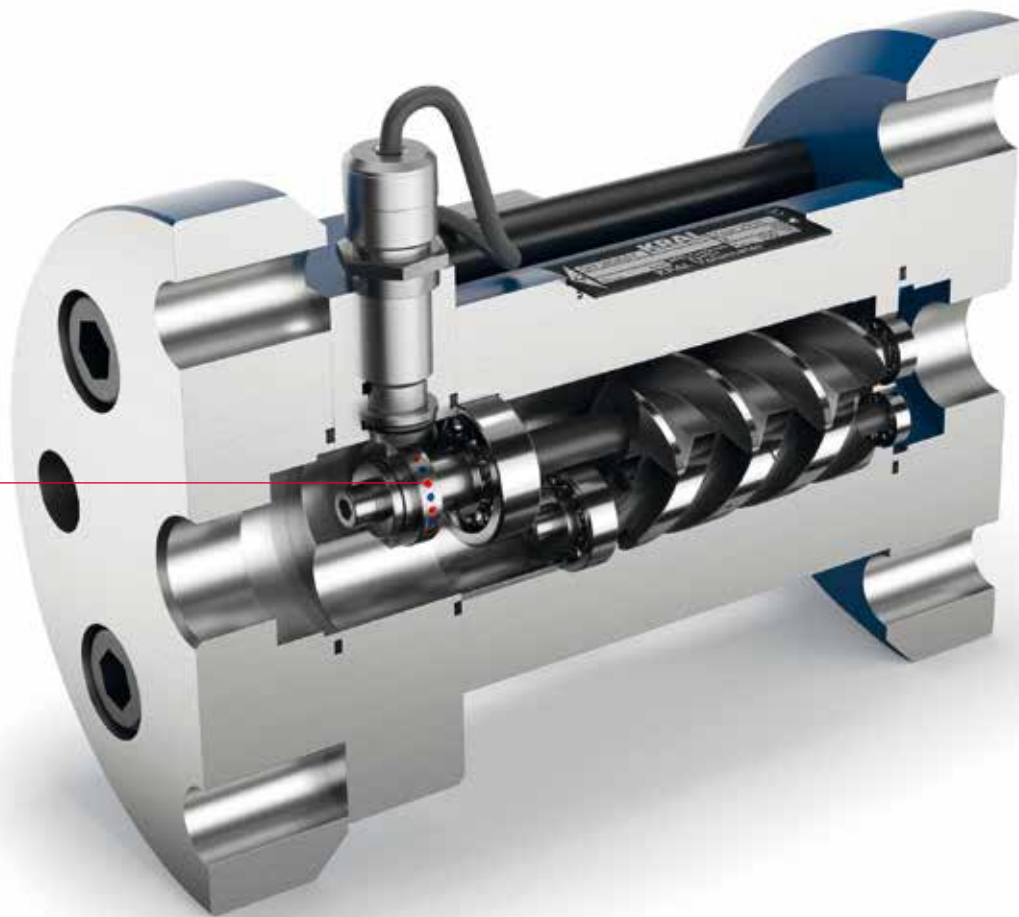


In the case of signal acquisition via the measuring screw, the screw edge is detected by an impulse transmitter. Two edges per screw revolution are detected, which causes two impulses per screw revolution. Because a screw revolution conveys the exact volume of the measurement chamber, two impulses per measurement chamber volume are generated. This type of signal detection is an affordable solution for all conventional consumption and flow measurement applications.

## ■ Signal detection via the pole wheel.

Series: OMG and OMH.

Areas of application: If there is a need for high measurement signal resolution.



With this method, the impulse transmitter detects the impulses via a pole wheel, which is attached to the measurement screw. Based on specifications and need, pole wheels with differing numbers of poles can be used. This enables a significantly higher signal transfer resolution.

Signal detection via the pole wheel is used when a high signal resolution is needed, e.g., with test and calibration benches or with the use of a flowmeter in the lower flow range.

# OMG Series.

Universal device for manifold application needs.

**Robust, precise and universally applicable.** Due to their continuous ongoing development, the highly modular OMG series covers a broad range of areas of application. OMG is therefore particularly suitable for areas of application which have a manifold need for flow measurement, such as mechanical engineering, chemical engineering and marine.

The OMG series also combines robustness with highest precision, characteristics for which KRAL flowmeters are well-

known worldwide. Due to the screw pump principle, all OMG series devices are very smooth-running and fast, and can follow quick, pulsation-related changes in flow rates. Stabilization zones are also unnecessary. Due to their extremely robust construction, the OMG series provides optimal protection against external influences, such as system vibrations and mechanical stresses in a harsh, industrial environment.



### Mechanical engineering.

Determining the position of hydraulic cylinders.



### Chemical engineering.

Measuring of plastic components.



### Marine.

Fuel consumption measurement.

Technical data.	OMG-013.	OMG-020.	OMG-032.	OMG-052.	OMG-068.	OMG-100.	OMG-140.
<b>Nominal diameter.</b> DN [mm]	15	20	25/32	40	50	100	150
DN [inch]	½	¾	1	1 ½	2	4	6
<b>Total length</b> with DIN flange. [mm]	145	185	255/265	285	340	460	610
<b>Weight</b> with DIN flange. [kg]	6	6	13/15	21	31	77	190
<b>Flow rate l/h.</b>							
Q <sub>max</sub>	900	2,700	9,000	31,500	63,000	180,000	450,000
<b>Q<sub>nom</sub></b>	<b>600</b>	<b>1,800</b>	<b>6,000</b>	<b>21,000</b>	<b>42,000</b>	<b>120,000</b>	<b>300,000</b>
Q <sub>min</sub>	6	18	60	210	420	1,200	3,000
<b>Flow rate l/min.</b>							
Q <sub>max</sub>	15	45	150	525	1,050	3,000	7,500
<b>Q<sub>nom</sub></b>	<b>10</b>	<b>30</b>	<b>100</b>	<b>350</b>	<b>700</b>	<b>2,000</b>	<b>5,000</b>
Q <sub>min</sub>	0.1	0.3	1.0	3.5	7.0	20	50
<b>Max. pressure.</b> [bar]	250	250	250	160	100	40	40
<b>Temperature.</b> [°C]	-20 to +200	-20 to +200	-20 to +200	-20 to +200	-20 to +200	-20 to +200	-20 to +200
<b>Viscosity.</b> [mm²/s]	1 to 1x10 <sup>6</sup>	1 to 1x10 <sup>6</sup>	1 to 1x10 <sup>6</sup>	1 to 1x10 <sup>6</sup>	1 to 1x10 <sup>6</sup>	1 to 1x10 <sup>6</sup>	1 to 1x10 <sup>6</sup>
<b>Precision</b> of measurement value.	±0.1 %	±0.1 %	±0.1 %	±0.1 %	±0.1 %	±0.1 %	±0.1 %
<b>Repeatability.</b>	±0.01 %	±0.01 %	±0.01 %	±0.01 %	±0.01 %	±0.01 %	±0.01 %
<b>K-factor.</b>							
K1 [P/l]	1,216	640	234	71.0	39.8	16.8	8.8
K2 [P/l]	2,432	1,280	468	142	79.6	33.6	17.7
K3 [P/l]	7,296	2,560	1,014	302	167	57.6	22.1
K4 [P/l]	7,296	2,560	1,014	302	167	87.6	45.1
<b>Frequency.</b>							
f1 at Q <sub>nom</sub> [Hz]	203	320	390	414	464	560	738
f2 at Q <sub>nom</sub> [Hz]	405	640	780	828	929	1,120	1,475
f3 at Q <sub>nom</sub> [Hz]	1,216	1,280	1,690	1,760	1,949	1,920	1,842
f4 at Q <sub>nom</sub> [Hz]	1,216	1,280	1,690	1,762	1,948	2,920	3,758





### Your benefits.

- Universally applicable.
- High precision.
- Extremely robust.
- Stabilization zones unnecessary.
- Very smooth-running and fast.
- Low friction and minimal loss of pressure.
- Easy installation.

### Technical data.

- Media: Chemically neutral, lubricating, clean, non-abrasive.
- Flow direction detection: Extended sensor range optional.
- Temperature measurement: Additional sensor optional.
- Signal: PNP, Namur and Push-pull.
- Signal detection: Via the pole wheel.
- Process fittings: DIN, ANSI, thread, further connections upon request.

### Materials.

- Housing: Spheroidal graphite iron.
- Screws: Nitrided steel.
- Bearings: Steel or hybrid ball bearings.
- Sealing: FKM, other seal materials upon request.

Sensor.	BEG 06* / BEG 06A*.	BEG 43D.	BEG 44.	BEG 45 with BEV 13.	BEG 47D** / BEG 47E**.	BEG 53A* / BEG 54A*.
<b>Application.</b>	Ex-range.	Standard.	High pressures.	High pressures, wide temperature range.	Ex-range.	Flow direction detection.
<b>K-factor.</b>	K1.	K1.	K2.	K3.	K1.	K4.
<b>Signal.</b>	Namur.	PNP.	PNP.	PNP.	Namur.	Push-pull.
<b>Temperature.</b> [°C]	-25 to +85.	-20 to +100.	-40 to +150.	-40 to +250.	-25 (-40) to +100.	-40 to +125.
<b>Max. pressure.</b> [bar]	350	250	420	420	40	650

\* Dependent on nominal diameter.    \*\* Dependent on temperature.

# OMP Series.

Robust solution for diesel oil and heavy oil.

**Affordable device, for maritime applications and more.**

The OMP series flowmeters are designed specifically for fuel consumption measurement for marine as well as others, and can be used in booster modules and burners. Another perfect combination of precision and robustness: Due to the precise measurement chamber volume, a broad range of measurements with a precision rate of 0.1 % can be achieved. Pipe bends and T-sections have no influence on the measurement precision.

The extreme robustness is achieved by the spheroidal graphite iron housing, which provides optimal protection for the precisely manufactured, fast measuring screws. KRAL measurement devices run with low friction and minimal pressure loss. Long lifespan, resistance to pulsations in the media, and efficiency across the entire product life cycle are just a few of the benefits that OMP offers.



**Marine.**

Fuel consumption measurement for motors, generators, booster modules, boiler, burners.

Technical data.	OMP-013.	OMP-020.	OMP-032.	OMP-052.
<b>Nominal diameter.</b> DN [mm] DN [inch]	15 ½	20 ¾	25/32 1	40 1 ½
<b>Total length</b> with DIN flange. [mm]	115	125	180/190	240
<b>Weight</b> with DIN flange. [kg]	4	5	11/13	19
<b>Flow rate l/h.</b> Q <sub>max</sub> <b>Q<sub>nom</sub></b> Q <sub>min</sub>	900 <b>600</b> 6	2,700 <b>1,800</b> 18	9,000 <b>6,000</b> 60	31,500 <b>21,000</b> 210
<b>Flow rate l/min.</b> Q <sub>max</sub> <b>Q<sub>nom</sub></b> Q <sub>min</sub>	15 <b>10</b> 0.1	45 <b>30</b> 0.3	150 <b>100</b> 1.0	525 <b>350</b> 3.5
<b>Max. pressure.</b> [bar]	40	40	40	40
<b>Temperature.</b> [°C]	-20 to +200	-20 to +200	-20 to +200	-20 to +200
<b>Viscosity.</b> [mm <sup>2</sup> /s]	1 to 1x10 <sup>6</sup>	1 to 1x10 <sup>6</sup>	1 to 1x10 <sup>6</sup>	1 to 1x10 <sup>6</sup>
<b>Precision</b> of measurement value.	±0.1 %	±0.1 %	±0.1 %	±0.1 %
<b>Repeatability.</b>	±0.01 %	±0.01 %	±0.01 %	±0.01 %
<b>K-factor.</b> K [P/l]	1,214	321.0	78.0	17.73
<b>Frequency.</b> f at Q <sub>nom</sub> [Hz]	202	161	130	104



### Your benefits.

- Suitable for MDO, MGO, HFO and further types of oil.
- High precision.
- Very robust and long lifespan.
- Low friction and minimal loss of pressure.
- Stabilization zones unnecessary.
- Easy installation.
- Affordable solution for harsh industrial conditions.

### Technical data.

- Media: Chemically neutral, lubricating, clean, non-abrasive.
- Flow direction detection: Expanded sensor range optional.
- Temperature measurement: Additional sensor optional.
- Signal: PNP or Namur.
- Signal detection: Via the screw.
- Process fittings: DIN, ANSI, thread, further connections upon request.

### Materials.

- Housing: Spheroidal graphite iron.
- Screws: Nitrided steel.
- Bearings: Steel or hybrid ball bearings.
- Sealing: FKM, other seal materials upon request.

Sensor.	BEG 45C with BEV 13.	BEG 47G.	BEG 56A.
<b>Application.</b>	High pressures, wide temperature range.	Ex-range.	Standard.
<b>K-factor.</b>	K1.	K1.	K1.
<b>Signal.</b>	PNP.	Namur.	PNP.
<b>Temperature.</b> [°C]	-40 to +250.	-25 to +100.	-40 to +125.
<b>Max. pressure.</b> [bar]	420	40	40

# OME Series.

Compact 3-in-1-device, ideal for light oil applications.

**Much more than just a flowmeter.** KRAL measurement-devices from the OME series in all the design sizes always measure in both flow directions. This is enabled by the 3-in-1-sensors, which automatically detect a change in the flow direction. Another additional plus is the integrated Pt100 temperature sensor, which also measures the temperature of the medium.

By using aluminum for the housing, OME series measurement

devices are offered in a light and affordable design specifically for measuring the consumption of light oils, for industries such as inland waterway transport or power generation. As in all KRAL flowmeters, measurements across a range of 1:100 are also attainable for the OME series, due to the precise measurement chamber.

OME thus stands for combined precise measurement of flow, flow direction and temperature – and all of this in the form of a compact, light, and affordable device.



### Marine.

Fuel consumption measurement in inland waterway transport.

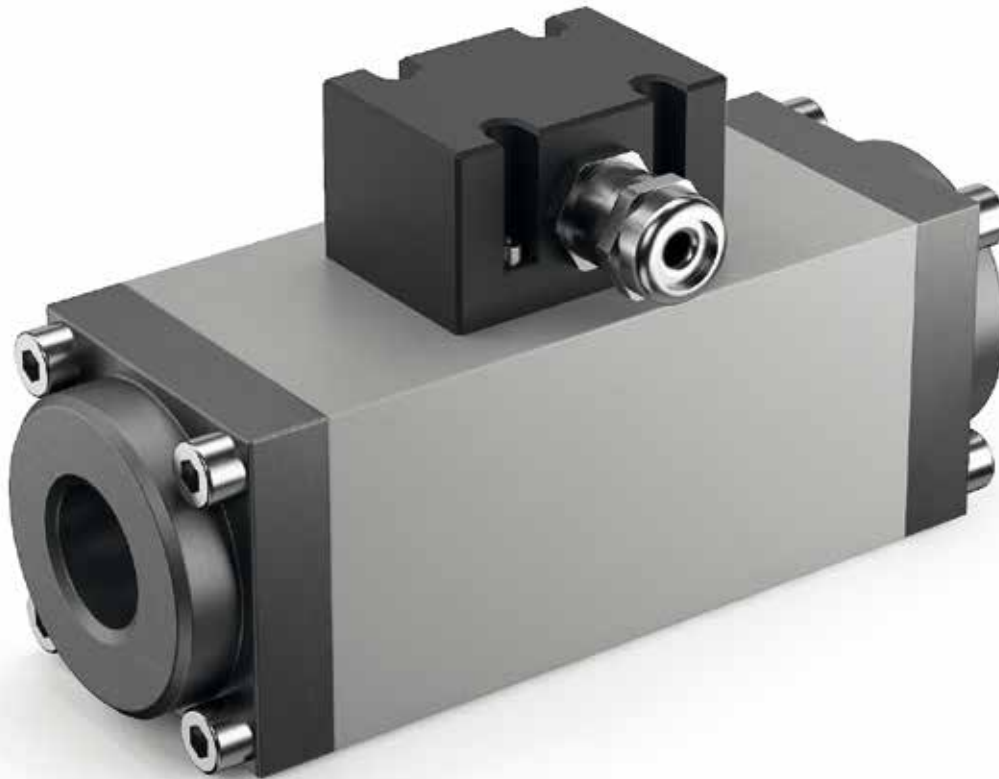


### Power generation.

Fuel consumption measurement in on-shore plants.



Technical data.	OME-013.	OME-020.	OME-032.	OME-052.
<b>Nominal diameter.</b> DN [mm]	15	20	25/32	40
DN [inch]	½	¾	1	1 ½
<b>Total length</b> with DIN flange. [mm]	105	135	185	325
<b>Weight</b> with DIN flange. [kg]	2	2	4	12
<b>Flow rate l/h.</b>				
Q <sub>max</sub>	900	2,700	9,000	31,500
Q <sub>nom</sub>	<b>600</b>	<b>1,800</b>	<b>6,000</b>	<b>21,000</b>
Q <sub>min</sub>	6	18	60	210
<b>Flow rate l/min.</b>				
Q <sub>max</sub>	15	45	150	525
Q <sub>nom</sub>	<b>10</b>	<b>30</b>	<b>100</b>	<b>350</b>
Q <sub>min</sub>	0.1	0.3	1.0	3.5
<b>Max. pressure.</b> [bar]	40	40	40	40
<b>Temperature.</b> [°C]	-20 to +125	-20 to +125	-20 to +125	-20 to +125
<b>Viscosity.</b> [mm <sup>2</sup> /s]	1 to 1x10 <sup>6</sup>	1 to 1x10 <sup>6</sup>	1 to 1x10 <sup>6</sup>	1 to 1x10 <sup>6</sup>
<b>Precision</b> of measurement value.	±0.1 %	±0.1 %	±0.1 %	±0.1 %
<b>Repeatability.</b>	±0.01 %	±0.01 %	±0.01 %	±0.01 %
<b>K-factor.</b> K [P/l]	1,214.0	321.0	78.0	17.73
<b>Frequency.</b> f at Q <sub>nom</sub> [Hz]	202	161	130	104



### Your benefits.

- 3-in-1-solution: Flow measurement, flow direction detection, temperature measurement.
- High precision.
- Aluminum housing.
- Stabilization zones unnecessary.
- Low friction and minimal loss of pressure.
- Easy installation.
- Affordable solution for diesel and light oils.

### Technical data.

- Media: Chemically neutral, lubricating, clean, non-abrasive.
- Flow direction detection: Integrated.
- Temperature measurement: Integrated.
- Signal: Push-pull and Pt100, Namur.
- Signal detection: Via the screw.
- Process fittings: DIN, ANSI, thread.

### Materials.

- Housing: Aluminum.
- Screws: Nitrided steel.
- Bearings: Steel bearings.
- Sealing: FKM, other seal materials upon request.

Sensor.	BEG 47C.	BEG 60A - 62A*.
Application.	Ex-range.	Standard compact version.
K-factor.	K1.	K1.
Signal.	Namur.	Push-pull.
Temperature. [°C]	-25 to +100.	-40 to +125.
Max. pressure. [bar]	40	40

\* Dependent on nominal value.



# OMH Series.

For high pressures with highest precision.

**High measurement precision at high pressures or high flow rates.** The KRAL OMH series was especially designed to handle high pressures of up to 420 bar that can occur in the field of mechanical engineering, at test benches and in hydraulic applications.

OMH is also designed to handle high flow rates. Such devices usually require large pipe cross sections and are therefore bulky devices. Due to the compact screw pump measuring element, the OMH series fits into a small housing and offers

the significant advantage of being compact and lightweight in this pressure class, even for high flow rates.

The pressure resistance is provided by a very rigid housing, maintaining the compact dimensions, and at the same time the proven precision of the KRAL flowmeters, even at extreme pressure stages. The measurement devices from the OMH series thus meet the high precision standard that KRAL applies to all of their products, even at extreme pressure stages and flow rates.



**Mechanical engineering.**  
Determining the position of hydraulic cylinders.



**Oil and gas.**  
Consumption measurement for gas turbines.



**Mechanical engineering.**  
Test benches (pumps, gear units, etc.).

Technical data.	OMH-013.	OMH-020.	OMH-032.	OMH-052.	OMH-068.	OMH-100.
<b>Nominal diameter.</b> DN [inch]	½	¾	1	1 ½	2	4
<b>Total length</b> with threaded flange G. [mm]	150	185	255	320	385	500
<b>Weight</b> with threaded flange G. [kg]	7	12	29	55	81	150
<b>Flow rate l/h.</b>						
$Q_{max}$	900	2,700	9,000	31,500	63,000	180,000
$Q_{nom}$	<b>600</b>	<b>1,800</b>	<b>6,000</b>	<b>21,000</b>	<b>42,000</b>	<b>120,000</b>
$Q_{min}$	6	18	60	210	420	1,200
<b>Flow rate l/min.</b>						
$Q_{max}$	15	45	150	525	1,050	3,000
$Q_{nom}$	<b>10</b>	<b>30</b>	<b>100</b>	<b>350</b>	<b>700</b>	<b>2,000</b>
$Q_{min}$	0.1	0.3	1.0	3.5	7.0	20
<b>Max. pressure.</b> [bar]	420	420	420	420	420	250
<b>Temperature.</b> [°C]	-20 to +200	-20 to +200	-20 to +200	-20 to +200	-20 to +200	-20 to +200
<b>Viscosity.</b> [mm²/s]	1 to 1x10 <sup>6</sup>	1 to 1x10 <sup>6</sup>	1 to 1x10 <sup>6</sup>	1 to 1x10 <sup>6</sup>	1 to 1x10 <sup>6</sup>	1 to 1x10 <sup>6</sup>
<b>Precision</b> of measurement value.	±0.1 %	±0.1 %	±0.1 %	±0.1 %	±0.1 %	±0.1 %
<b>Repeatability.</b>	±0.01 %	±0.01 %	±0.01 %	±0.01 %	±0.01 %	±0.01 %
<b>K-factor.</b>						
K2 [P/l]	2,432	1,280	468	142	79.6	33.6
K3 [P/l]	7,296	2,560	1,014	302	167	57.6
K4 [P/l]	7,296	2,560	1,014	302	167	87.6
<b>Frequency.</b>						
f2 at $Q_{nom}$ [Hz]	405	640	780	828	929	1,120
f3 at $Q_{nom}$ [Hz]	1,216	1,280	1,690	1,760	1,949	1,920
f4 at $Q_{nom}$ [Hz]	1,216	1,280	1,690	1,762	1,948	2,920



### Your benefits.

- Functions under high pressure up to 420 bar.
- High precision.
- Very rigid spheroidal graphite iron housing.
- Compact size, light weight.
- Low friction and minimal loss of pressure.
- Stabilization zones unnecessary.
- Universally applicable.

### Technical data.

- Media: Chemically neutral, lubricating, clean, non-abrasive.
- Flow direction detection: Extended sensor range optional.
- Temperature measurement: Additional sensor optional.
- Signal: PNP, Namur and Push-pull.
- Signal detection: Via the pole wheel.
- Process fittings: DIN, thread.

### Materials.

- Housing: Spheroidal graphite iron.
- Screws: Nitrided steel.
- Bearings: Steel bearings.
- Sealing: FKM, other seal materials upon request.

Sensor.	BEG 06 / BEG 06A*.	BEG 44.	BEG 45 with BEV 13.	BEG 53A / BEG 54A*.
<b>Application.</b>	Ex-range.	High pressures, broad temperature range.	High pressures, broad temperature range.	Flow direction detection.
<b>K-factor.</b>	K1.	K2.	K3.	K4.
<b>Signal.</b>	Namur.	PNP.	PNP.	Push-pull.
<b>Temperature.</b> [°C]	-25 to +85.	-40 to +150.	-40 to +250.	-40 to +125.
<b>Max. pressure.</b> [bar]	350	420	420	650

\* Dependent on nominal value.

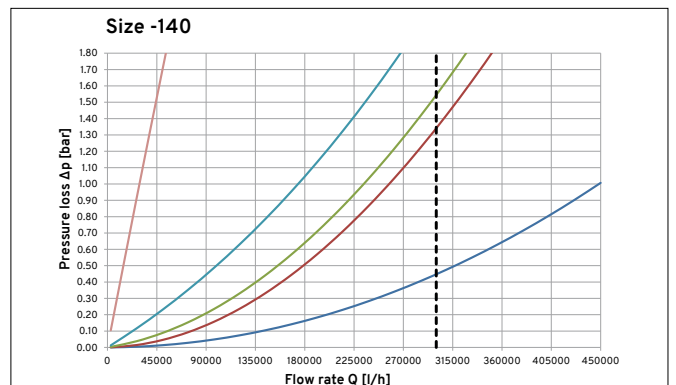
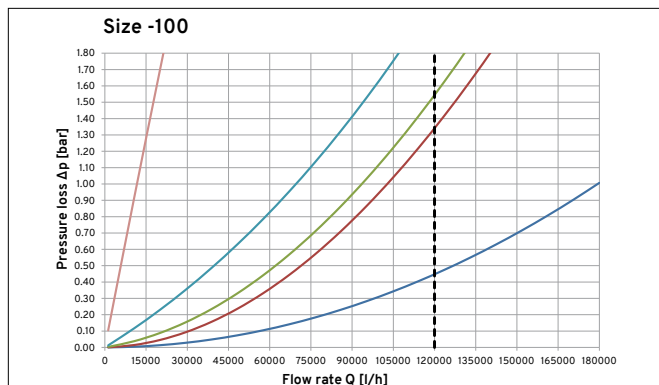
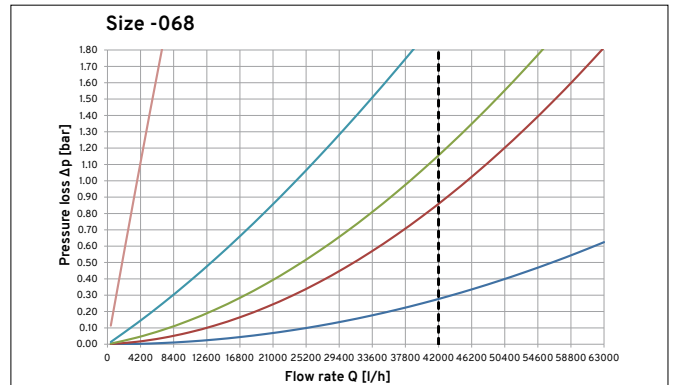
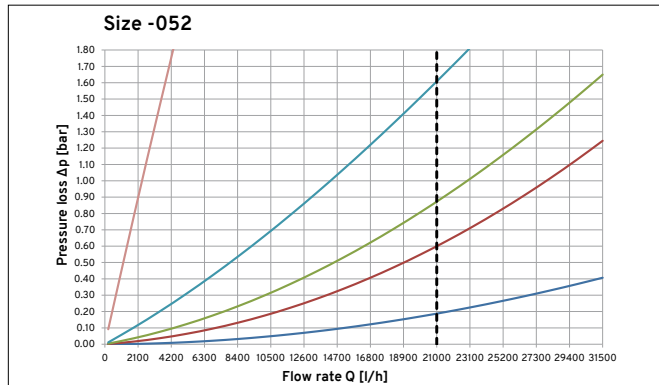
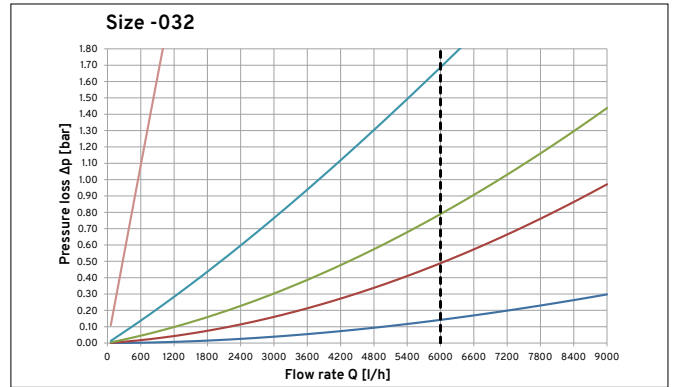
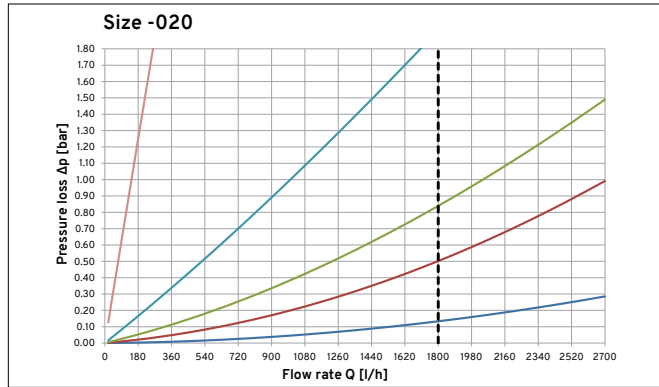
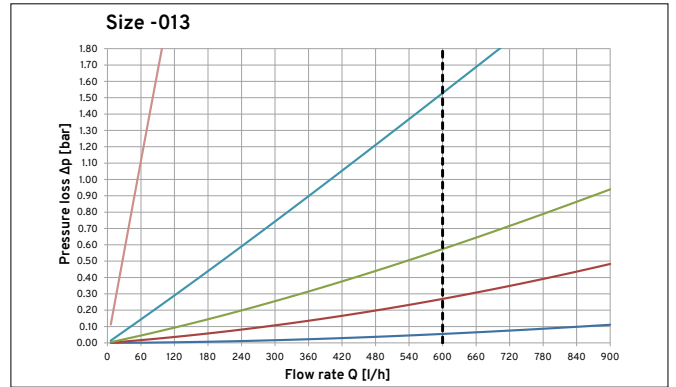
# Pressure Loss Curves.

Based on viscosity and device dimensions.

The pressure loss curves apply to series  
OMG, OMH, OMP and OME.

## Legend.

- 1 mm<sup>2</sup>/s     — 100 mm<sup>2</sup>/s
- 10 mm<sup>2</sup>/s    — 800 mm<sup>2</sup>/s
- 30 mm<sup>2</sup>/s     • 100 % Flow rate



## FAQ.

### A selection of frequently asked questions.

How does the KRAL flowmeter detect the **flow direction** of the medium?

Pulsations can cause short-term changes in the medium flow direction that can lead to incorrect measurement values in motor consumption measurements if these changes are not detected and taken into consideration. The prerequisite for flow direction detection is a second sensor. This sensor keeps a chronological log of the rotation direction of the measurement screw and is analyzed and compensated for in a KRAL display and processing unit.

A second sensor is standard in the OME series. For OMG and OMP, a sensor can be ordered or easily retrofitted. For the OMH series, a second sensor is optional, based on the size.

Are there recommendations for **filter mesh grades**?

Filters protect KRAL flowmeters from foreign particles. For device sizes -013 and -020, we recommend 140 mesh, which corresponds to a mesh grade of 0.1 mm. For device sizes -032 and -140, we recommend 60 mesh, which corresponds to a mesh grade of 0.25 mm. Further information can be found in the KRAL operating manuals.

What is the difference between a **FKM seal** and a **EPDM seal**?

FKM is the standardized international acronym for fluoroelastomers (ISO, ASTM). The previous ISO designation FPM was replaced. FKM is our seal material of choice because it is very resistant to mineral oils and suitable for temperatures from -40 to +200 °C.

EPDM stands for ethylene propylene diene monomer rubber, a synthetic rubber with high elasticity and chemical resistance that can also be used in tough surroundings such as hot water, steam and cold, and with chemically abrasive media in temperature ranges from -50 to +140 °C. EPDM seals are used when the application and the medium to be measured require them, such as polyurethane or Skydrol®.

What is the difference between **single-line and differential measurement**?

For a single-line measurement, the flowmeter can be installed before the mixing tank, and the tank refilling quantity can be measured. The flow rate of the measurement device therefore does not need to correspond with the fuel consumption of the consumer in real time (see Fig. 1). However, over a longer period of time, the total consumption measurement is accurate. For a differential measurement, the flow rate of the feed line and the return line of the consumer are measured directly (see Fig. 2). The consumption formula is therefore flow minus return. Generally, the circulation rate in this type of system is approxi-

mately three to four times greater than the consumption of the consumer.

It is important to note that in this case, the precision rate of the system is greatly dependent on the precision of the individual measurement devices. Measurement devices with "only" a 1 % precision rate can quickly lead to a system error of up to 10 % imprecision. In contrast, KRAL flowmeters have a precision rate of  $\pm 0.1\%$  of the measurement value.

**Do you have further questions?** For more information, we are happy to arrange a personal meeting. You can reach us at:  
**e-mail: [kral@kral.at](mailto:kral@kral.at) | Tel.: +43/5577/86644-0**

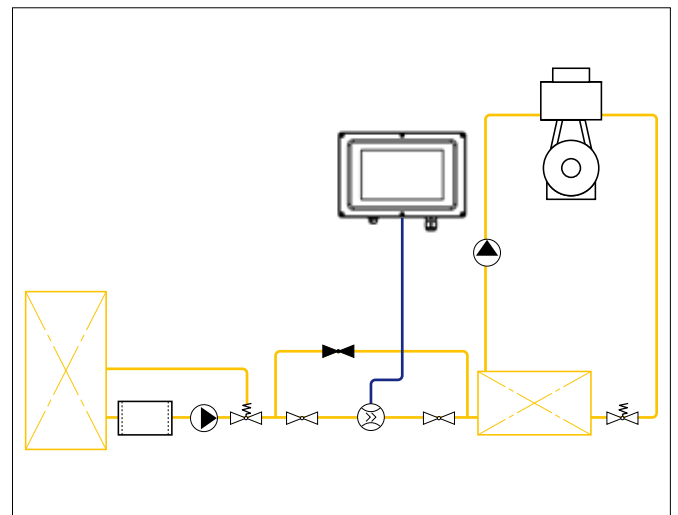


Fig. 1: Principle of single-line measurement.

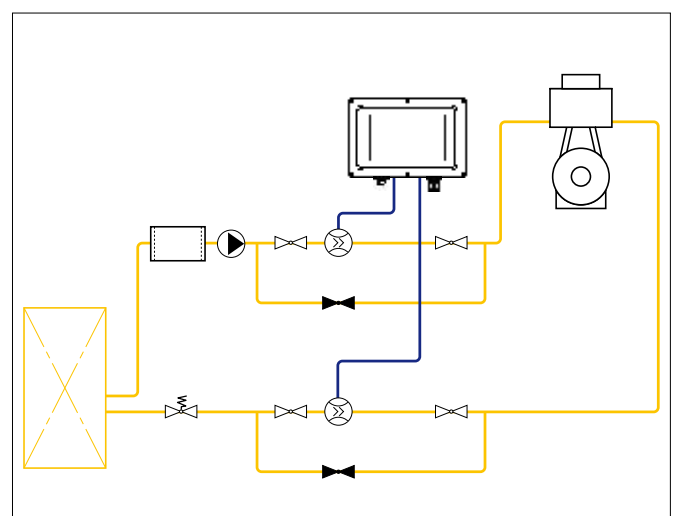


Fig. 2: Principle of differential measurement.

**ELECTRONIC  
UNITS.**



# Smart Solution Processing Unit.

Compact, cost-saving data detection for multiple users.

### The Smart Solution for up to 32 measurement devices.

The KRAL Smart Solution is a compact processing unit that processes the signals of multiple KRAL flowmeters via a single cable. Therefore, instead of individual on-site displays, the measurement values collected via a Modbus can be evaluated and displayed in a single monitoring system. In addition, a significant amount of cable and installation is saved, in comparison with conventional measurement data detection.

It is often assumed that the liquid in the pipelines flows gently and evenly. However, in many applications, this is simply not the case. It can even get rather turbulent in the pipelines: Due to pulsations – potentially caused by pumps and motors –

the flow direction can be unpredictably reversed for a brief period. In the same way, the liquid may have differing temperatures at the various measurement points.

KRAL flowmeters deliver very precise measurement values on the flow volume, the flow direction and the temperature to the KRAL Smart Solution. The Smart Solution processes the information and determines the "adjusted" flow measurement value. If the harsh conditions in the pipeline are not considered, a significant measurement error would result.



**Smart Solution BEM 100.**  
Compatible with the OME series.



**Smart Solution BEM 150.**  
Compatible with the  
OMG, OMP and OMH series.

### Your benefits.

- Information from up to 32 measurement devices via a single cable.
- Analysis of sensor signals for the detection of the flow direction.
- Temperature compensation.
- Direct determination of the mass value.
- Consideration of harsh operating conditions.
- Cost-effective and less potential error sources, due to a single cable.
- Easy installation.

Technical data.	BEM 100.	BEM 150.
Compatible with KRAL flowmeter.	OME.	OMG, OMP, OMH.
Voltage supply.	9 to 36 VDC.	9 to 36 VDC.
Operating temperature.	20 to 105 °C.	20 to 105 °C.
Protection class.	IP67.	IP67.
Interfaces.	RS 485.	RS 485.
Protocol.	Modbus RTU.	Modbus RTU.

# Display and Processing Unit.

For optimal usage of the functionality range of our measurement devices.

**Designed for KRAL flowmeters.** KRAL flowmeter users can often not reap the full benefits of their devices with conventional universal displays. Key functions are missing for specific applications. KRAL electronics fully support the performance capacity of the KRAL measurement devices. Both the hardware and the software of the BEM series is perfectly designed for the KRAL measurement devices, guaranteeing their trouble-free connection and integration. By the use of top quality electronic components and analysis algorithms, the precision of the flow measurement values in the display and at the signal outputs is maintained.



## **BEM 200.**

Basic single-line measurement with a sensor on the flowmeter.

**Error-free operation, informative monitoring.** KRAL electronics continuously shows the flow measurements with units. The display is informative and clearly legible. There is a selection of up to 4 languages. Units, calibration factors, and density tables are configured by KRAL based on customer information. Changes can be made at the computer from the intuitive menu. Contrast and brightness can also be adjusted.

**Self-diagnostics and monitoring.** The flow and temperature ranges of the flowmeters are saved in the electronics; every incidence of exceedance is displayed immediately. A bypass relay can be switched if the threshold value of the flow rate is exceeded. The function of the temperature sensors is also monitored. Based on the precise data on temperature, flow volume, flow direction and consumption.

## **Your benefits.**

- Getting the full benefit of the performance capacity of KRAL flowmeters.
- Easy connection and integration.
- Top-quality electronic components and analysis algorithms.
- Informative, clearly legible display.
- A selection of up to 4 languages.
- Configuration based on customer information.
- Modifications can be easily carried out.
- Optimal status monitoring of the system.



## **Smart Solution Display.**

Technical data.	BEM 200.	Smart Solution Display.
<b>Power supply.</b>	10 - 30 VDC.	19 - 30 VDC.
<b>Environment.</b>		
Operating temperature.	-20 to +70 °C.	0 to +60 °C.
Storage temperature.	-20 to +80 °C.	0 to +60 °C.
<b>Housing.</b>		
Dimensions.	93 x 93 x 60 mm.	160 x 240 x 76 mm.
Protection class.	IP65.	IP65.
Material.	Plastic.	Plastic.
Weight.	0.25 kg.	1.4 kg.
<b>Assembly.</b>	Direct assembly on the measurement device, wall-mounted.	Wall-mounted.
<b>Display.</b>	LCD, 2 lines.	7" Touch Panel.
<b>Signal inputs.</b>		
OMG.	BEG 43D, BEG 44, BEG 45, BEG 47D/E, BEG 53A/54A.	BEG 43E, BEG 44C, BEG 45.
OMP.	BEG 56A, BEG 64, BEG 47G.	BEG 56B, BEG 45C.
OME.	BEG 60A, BEG 61A, BEG 62A.	BEG 60A, BEG 61A, BEG 62A.
OMH.	BEG 44, BEG 45, BEG 53/54.	BEG 43E, BEG 44C, BEG 45.
Temperature sensor.	–	BET 01/BET 02.
<b>Signal outputs.</b>		
Impulse output.	1 x (max. 100 Hz).	–
Relay output.	–	–
Analogue output.	1 x (4 to 20 mA).	–
Bus output.	–	Modbus RTU.
<b>Description.</b>		
Number of sensors.	1 sensor.	2 flowmeters (2 sensors each).
Display.	Display of flow rate, Total, accum. Total.	Display of flow rate, Total, accum. Total.
Additional functions.		Flow direction detection, Reflux compensation, temperature compensation, mass calculation based on manually entered density (according to DIN 51757), linearization of the calibration curve.

# Comprehensive Service From one Source.

Quality and efficiency down to the last detail.



## **Installation and start of operation.**

Upon request, we will assist you with the installation and start of operation of your KRAL products. The proper installation and an optimally utilized measurement system are the basis for trouble-free operation. Our technicians not only know our products, they also know the effects that your system will have on the measurement system, and can configure it optimally. As a customer, you benefit from our vast experience because we have put a large number KRAL pumps, pumping stations and flowmeters into operation ourselves at our customers.

## **Training courses.**

KRAL training courses provide well-founded knowledge about the assembly, start of operation and maintenance of your KRAL products. You will receive expert information from the manufacturer about how to properly install and start up your KRAL product, and are familiarized with applications and use limitations. By viewing actual damage photographs, you learn how to recognize errors and to eliminate them. Together with you, we will carry out a detailed maintenance procedure and show you how you can reduce the operating costs of your device. Training courses can be carried out in Lustenau or at your business premises upon request.



### Maintenance and repair.

A shutdown can generate high costs. Increase operating safety and minimize the life cycle costs of your KRAL product by using the preventative maintenance services of our competent service team. In the event of a malfunction, our service technicians respond quickly and are at your place of business in the shortest time possible. In the case of a repair shipment, you will receive verification of arrival immediately upon receipt of the delivery. The repair process will begin after you have approved our cost estimate. You will receive a detailed technical report for every repair, with informative images.

Maintenance procedures and repairs are carried out in Lustenau or at your place of business upon request. Original KRAL components guarantee the highest quality standards.

### Spare parts.

KRAL flowmeters meet the highest quality standards. To maintain this high standard, only original KRAL components should be used as spare parts. You ensure that the high quality level will be maintained, and guarantee the trouble-free operation and the long lifespan of your flowmeter.



### Calibration and post-calibration.

Every KRAL flowmeter is calibrated on our own test bench. Basically, two standard calibration procedures are possible: Either based on KRAL factory calibration or based on the international standard calibration as per ISO/IEC 17025. In order to maintain high measurement precision, KRAL recommends the first post-calibration after one year of operation. However, which exact time interval for post-calibration is actually needed is heavily dependent on the operating conditions of the device. Your KRAL service team will be happy to provide transparent consultation based on your specific need.







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#### KRAL-USA, Inc.

28105 Matthews, NC  
USA

#### KRAL (Wuxi) Machinery Technology Co., Ltd.

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