KRAL Volumeter® – OMG Series.
Universal Flowmeters.

KRAL

OMG.
Flowmeters for a wide range of applications.

Operating conditions and materials.

☐ Flow Range:	0,1 to 7.500 l/min.
☐ Max. Pressure:	250 bar.
☐ Temperature Range:	-20 to 200 °C.
☐ Viscosity Range:	1 to 1 x 10^6 mm²/s.
☐ Liquid:	chemically neutral, lightly lubricative, clean, non-abrasive.
☐ Accuracy:	±0,1 % of rate.
☐ Casing:	cast iron EN-GJS-400.
☐ Spindles:	nitrided steel.
☐ Ball Bearings:	bearing steel.
☐ Seals:	Viton®.

KRAL Volumeter® – the original.

KRAL developed the Volumeter over 20 years ago as a solution to an internal requirement. We needed a precision flowmeter as part of our production test stands but could not find a flowmeter that would meet our demands of accuracy, rangebility and robustness. Since we had expertise gained from 30 years of manufacturing positive displacement pumps, we had the idea to turn around the working principle of the pumps. Instead of a motor driving the pump spindles, we used flowing liquid to rotate the spindles. We found the ideal solution to assure precision, and reduce pressure drop, even for diverse operating conditions. Since then the KRAL Volumeter® line has grown to meet a wide variety of industrial needs.

Robust and precise.

In most flow measuring instruments robustness and precision are mutually exclusive, but the OMG offers both.

At KRAL, our core competence in profiling screw spindles guarantees precision measuring chambers in the meter. Therefore extremely accurate measurements are possible and the OMG's operation is smooth and responsive. This is evident in quick recovery time when there is rapid flow fluctuation and pressure loss.

The OMG is an extremely sturdy design and protecting it against vibrations and mechanical loads that are typical in industrial plants.

Wide range of operating conditions.

Flowmeters are often specified for a given set of operating parameters. The performance of those meters may suffer if those operating parameters change.

Being a precision-made spindle PD meter, the exact measurement of the OMG covers a wide range of:
☐ liquids
☐ viscosities
☐ temperatures

Any selection of an OMG meter is therefore suitable for a wide variety of applications.

Easy installation.

There is often limited space available to install a flowmeter.

KRAL Volumeter are extremely compact devices. They are also insensitive to flow disturbances, so there are no upstream or downstream installation requirements. The OMG is also able to measure in any installation position, horizontal or vertical. Even bi-directional flow can be measured precisely.

The solution.

Wide range of applications.

As a PD meter, the OMG covers a wide range of liquids and viscosities. OMG has a turn-down ratio up to 100:1.

Compact design.

The axial arrangement of the measurement system allows laminar flow with no change in direction making it a very compact design.

Fast response measurement.

The fast response spindles can follow any rapid fluctuations in the flow causes by pulsations.

High accuracy.

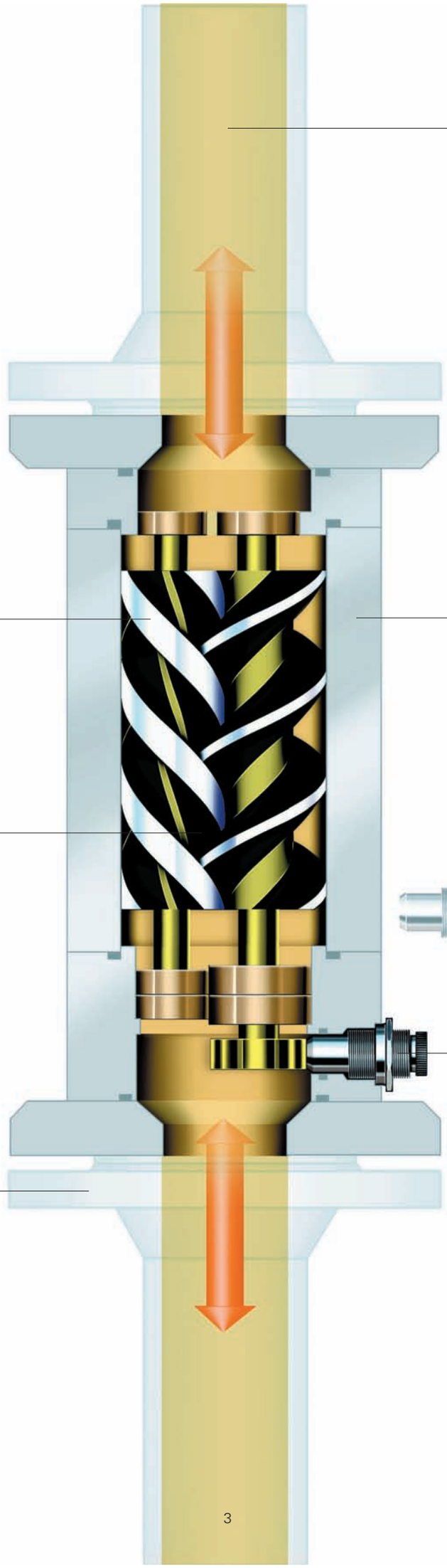
Because of the precision measurement chamber, extremely accurate measurements are possible.

Minimal pressure loss.

The precision screw design of the Volumeter operates with minimal friction and pressure loss.

Various connections.

Available are:
- ☐ Pipe thread
- ☐ DIN flange, ANSI, SAE and JIS
- ☐ Custom



No flow conditioning.

The OMG operating principle is insensitive to flow disturbances. Flow conditioners are not required. Valves and pipe elbows are allowed close to the flowmeter. That allows for easy installation in tight spaces.

Robust and precise.

The rigid casing protects precisely manufactured spindles. That is why the OMG offers both robustness and precision.

Bi-directional flow measurement.

Because of the operating principle, bi-directional flow can be measured. With a flow direction sensor, a change of the flow direction or brief reverse flow can be detected and measured.

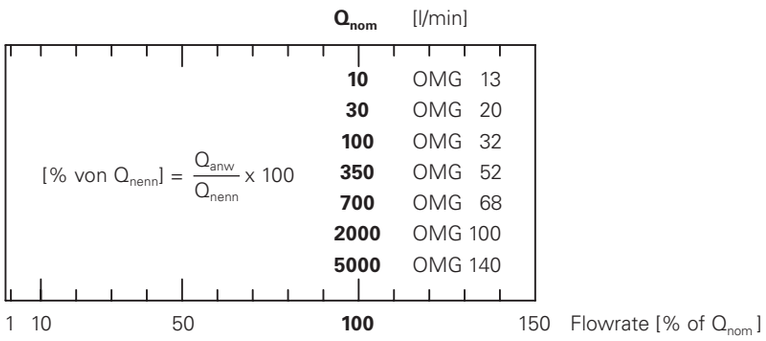
Standard output signal.

The flow sensor output signal is an industry standard square wave.

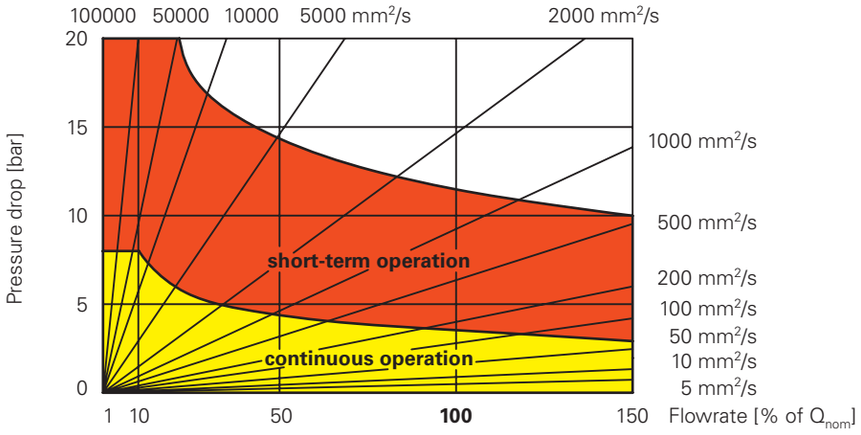
A dry sleeve seals the meter completely, for troublefree sensor installation and verification.

The following questions can assist you in selecting an OMG meter.	Explanation.	Instructions.	Notes.
Which size is suitable for the flow range to be measured?	The selection of the correct size ensures a long service life, high measuring accuracy and an excellent cost-utilization ratio.	From the **Size** table, select a size, OMG 13 - 140, whose nominal flowrate, Q_{nom}, is near that of your application, Q_{app}. Then calculate flowrate in [% of Q_{nom}] using the equation shown at right.	The value of flowrate [% of Q_{nom}] is used in the following diagrams. Draw a line downward from this value to intersect the same value in the other diagrams. Moving the line left or right shows the effects of meter size on load rating and linearity.
Does the selected unit have the required service life? **What is the pressure drop?**	Service life and pressure drop are important factors in selecting a meter size. Verify that your selection will meet your expectations of service life and pressure drop. For increased service life and reduced pressure drop, select a larger size. This will reduce the flowrate [% of Q_{nom}] for a given application.	In the **Load rating** diagram, find the intersection point of the flowrate [% of Q_{nom}] and viscosity [mm²/s] for your application. To the left of this point, find the pressure drop for the nominal flow of your application. The color range where the point lies signifies either continuous operation (yellow) or short-term operation (red). A point in the white range is not a recommended load rating for an OMG.	The range of short-term operation can be purposely used for short times, such as a load reserve or safety factor.
What is the measuring accuracy of the selected unit?	High accuracy is expected from PD meters. The OMG delivers excellent accuracy over a wide range of flows. For the highest accuracy, linearization is possible. The KRAL BEM 500 can linearize the meter's performance curve for a defined viscosity. Special calibration may be required.	With the flowrate [% of Q_{nom}] and viscosity [mm²/s] you can obtain the meter accuracy curve from the **Linearity** diagram. Yellow range signifies: The device operates within the range of maximum accuracy of ±0,1% of rate. Orange range signifies: The meter accuracy is within the limits of ± 0,3% of rate.	The OMG begins measuring at an extremely low flowrate, due to very low slippage past the spindles. As viscosity increases, so does the linear region of the accuracy curve.

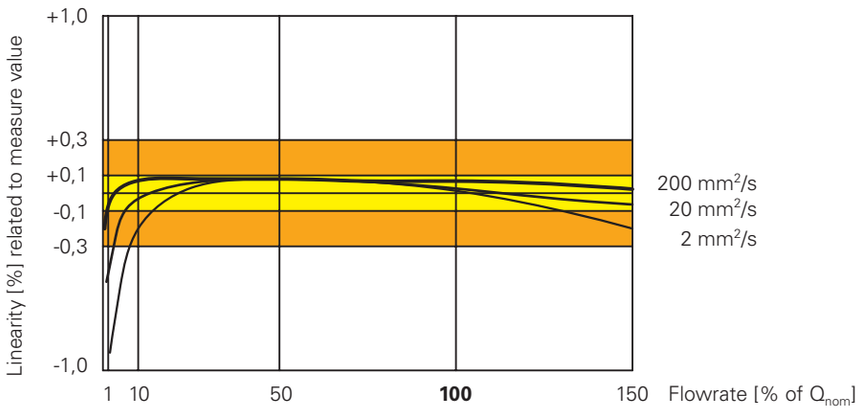
Size.



Load rating.



Linearity.



Are precision and sturdiness of the KRAL Volumeter fully utilized?

The OMG combines service life and accuracy to produce a measuring range of unmatched magnitude. Since normal flow conditions are never static, a wide range of acceptable viscosities and flows is important for precise measurement.

The **Measuring range** diagram provides a visual impression of the wide measurement range available with a Volumeter.

① This is where accurate operation of the OMG starts.

② The OMG can be operated continuously up to this line.

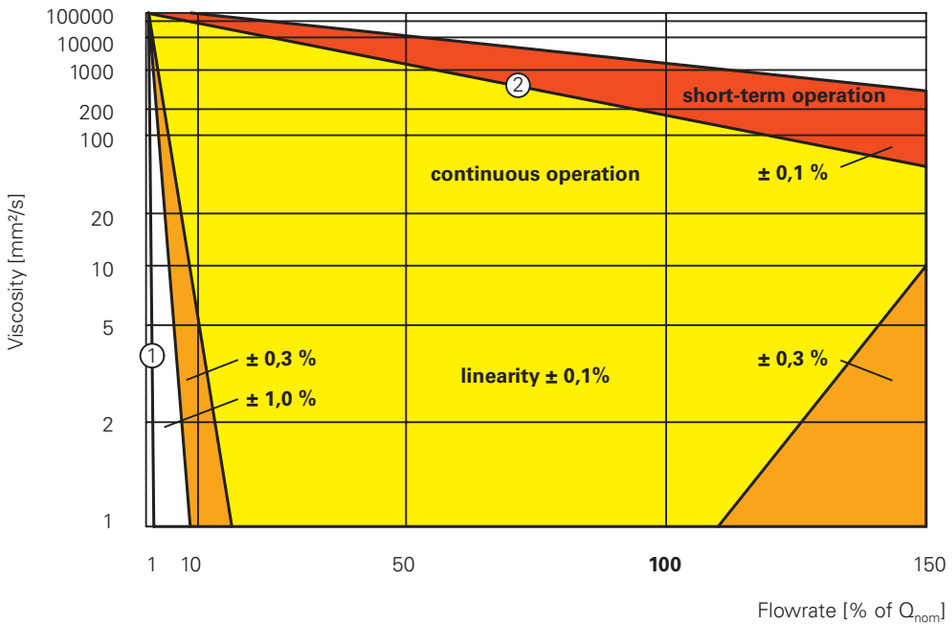
Notice the wide range of conditions where the OMG will measure with a linearity of ±0,1% of rate.

Yellow range signifies: Best combination of accuracy and service life.

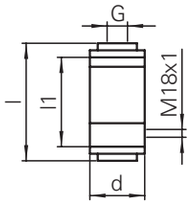
Orange range signifies: The meter is suitable for continuous operation with an accuracy of ±0,3% of rate.

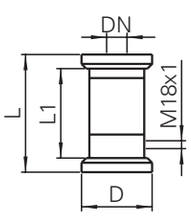
Red range signifies: Short-term operation. The linearity will be within ±0,1% of rate.

Measuring range.



Technical data.		OMG 13	OMG 20	OMG 32	OMG 52	OMG 68	OMG 100	OMG 140
Flow								
Q_{max}	l/min	15	45	150	525	1050	3000	7500
Q_{nenn}	**l/min**	**10**	**30**	**100**	**350**	**700**	**2000**	**5000**
Q_{min}	l/min	0,1	0,3	1	3,5	7	20	50
Pressure p_{max}	bar	250	250	250	160	100	40	40
Temperature t_{min} to t_{max}	°C	-20 to +200	-20 to +200	-20 to +200	-20 to +200	-20 to +200	-20 to +200	-20 to +200
Viscosity ν_{min} to ν_{max}	mm²/s	1 to 1x10⁶	1 to 1x10⁶	1 to 1x10⁶	1 to 1x10⁶	1 to 1x10⁶	1 to 1x10⁶	1 to 1x10⁶
K-Factor	K1 pulses/l	1216	640	234	71	39,8	16,8	8,85
	K2 pulses/l	2432	1280	468	142	79,6	33,6	17,7
	K3 pulses/l	7296	2560	1014	302	167	57,6	22,1
Frequency	f1 at Q_{nenn} Hz	203	320	390	414	464	560	738
	f2 at Q_{nenn} Hz	405	640	780	828	929	1120	1475
	f3 at Q_{nenn} Hz	1216	1280	1690	1760	1949	1920	1842

Dimensions/Weights.		OMG 13	OMG 20	OMG 32	OMG 52	OMG 68	OMG 100	OMG 140
	**G inch**	**1/2“**	**3/4“**	**1“**	**1 1/2“**	**2“**	**4“**	**6“**
	p bar	250	250	250	160	100	40	40
	l mm	145	145	215	295	355	480	645
	d mm	90	74	104	118	138	188	267
	l1 mm	94	145	215	240	295	400	537
	m kg	4,6	4,1	11	18	29	70	180

	**DN mm**	**15**	**15**	**15**	**20**	**15**	**15**	**32**	**25**	**25**	**40**	**40**	**50**	**50**	**100**	**100**	**150**	**150**
	PN bar	40	160	250	40	160	250	40	160	250	40	160	40	100	16	40	16	40
	L mm	145	145	145	185	185	195	265	265	275	285	295	340	355	450	460	600	610
	D mm	95	105	130	105	105	130	140	140	150	150	170	165	195	220	235	285	300
	L1 mm	94	94	94	145	145	145	215	215	215	240	240	295	295	400	400	537	537
	m kg	4,7	4,8	6,0	6,0	6,0	8,1	16	16	19	21	23	31	37	65	70	170	180

KRAL Electronics.

Sensor selection.

You have the choice between a PNP sensor for standard applications and an Ex-sensor for use in explosive areas.

Industry standard signals.

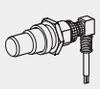
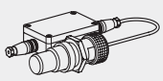
The BEG 40 sensor supplies PNP square wave signal. The BEG 41 Ex-sensor produces a Namur signal. Both of these can be processed by standard industrial interfaces.

KRAL Electronic BEM 300 and BEM 500.

For display of flowrate and consumption, the BEM 500 is an effortless solution. The compact unit is designed by KRAL to support the Volumeter as well as our various applications. BEM 300 is the economy single flowmeter device.

KRAL Industrial PC BEM 900.

For complex applications with up to 16 KRAL Volumeter connected, the pre-programmed BEM 900 is a perfect complement to OME. Beside flow and consumption measurement, this solution offers monitoring and data acquisition and evaluation.

Sensors. Amplifier.		**BEG 43D**	**BEG 44**	**BEG 45 BEV 13**	**BEG 47D**
Design M18x1					
Signal		PNP square wave inductive	PNP square wave inductive	PNP square wave inductive	Namur sine wave inductive
Material		Arcap/Ceramic	Arcap	Arcap	1.4401/Ceramic
K-Factor		K1	K2	K3	K1
Pressure p_{max}	bar	250	420	420	40
Temperature t_{min} to t_{max}	°C	-20 to 100	-40 to 150	-40 to 250	-25 to 100

Successful applications with the KRAL Volumeter OMG.

Fuel consumption measurement in boilers.

Liquid: heavy fuel oil.
Flowrate: 1,6 to 19 l/min.
Pressure: 40 bar.
Temperature: 130 to 150 °C.
Viscosity: 10 to 15 mm²/s.
Measuring device:
two OMG 20's.

The fuel consumption of the boiler is measured by determining the difference between the flow in the supply and return lines in order to:

- ☐ adjust the engine performance to an optimum
- ☐ continuously monitor the fuel consumption.

Since the fuel consumption makes up the greatest part of operating costs, high accuracy is important. Also at high temperatures, heavy fuel oil is aggressive and forms deposits.

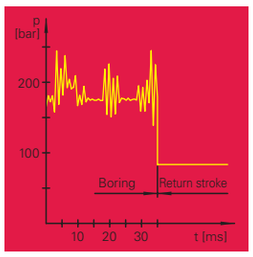
The accurate and self-cleaning OMG is perfect for this application.

Flow measurement in polyurethane blending.

Liquid: polyol, isocyanate.
Flowrate: 3,5 to 42 l/min.
Pressure: 250 bar.
Temperature: 10 to 80 °C.
Viscosity: 20 to 2.000 mm²/s.
Measuring device:
OMG 32.

Measuring task: Accurate flow measurement of components to maintain the proper blend.

Blend errors can result in flawed product, such as car dashboards that are sensitive to heat and sunlight. Problems such as these, which are not discovered until the product is delivered to the customer, can be avoided with accurate measurement before of the blending head. Precise, reliable measurements ensure proper, consistent blends, and no subsequent claims. The OMG meets these requirements.



Tunnel-boring hydraulics.

Liquid: hydraulic oil.
Flowrate: 0,3 to 45 l/min bi-directional.
Pressure: pulsating up to 250 bar.
Temperature: 40 to 80 °C.
Viscosity: 60 to 3.000 mm²/s.
Measuring device:
OMG 20.

The flowrate to the hydraulic cylinder of a tunnel-boring machine is measured in order to be able to determine the exact position of the boring bit. As the bit digs through dirt and rocks, the vibration is transmitted to the hydraulic cylinder as fluid pulsations. A diagram of these pulsations is shown above.

The OMG is trusted for reliable measurement in both flow directions although extreme vibrations and impacts occur during boring.

Returnability of measurement.

Each KRAL Volumeter is tested and calibrated on our in-house test bed. Depending on customer requirements, we perform either a factory calibration or a calibration in compliance to ÖKD (Austrian Calibration Service).

The factory calibration is KRAL Standard. Special standards requirements are also possible. As example, by adding further measurement points. ÖKD calibrated Volumeters are delivered to ISO IEC EN 17025 standards. The measured values are traceable to national standards. The measurement uncertainty of national standard to test unit is specified.

Our certified QA-system, in accordance with EN ISO 9001:2000, guarantees the highest quality and delivery reliability.

KRAL

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