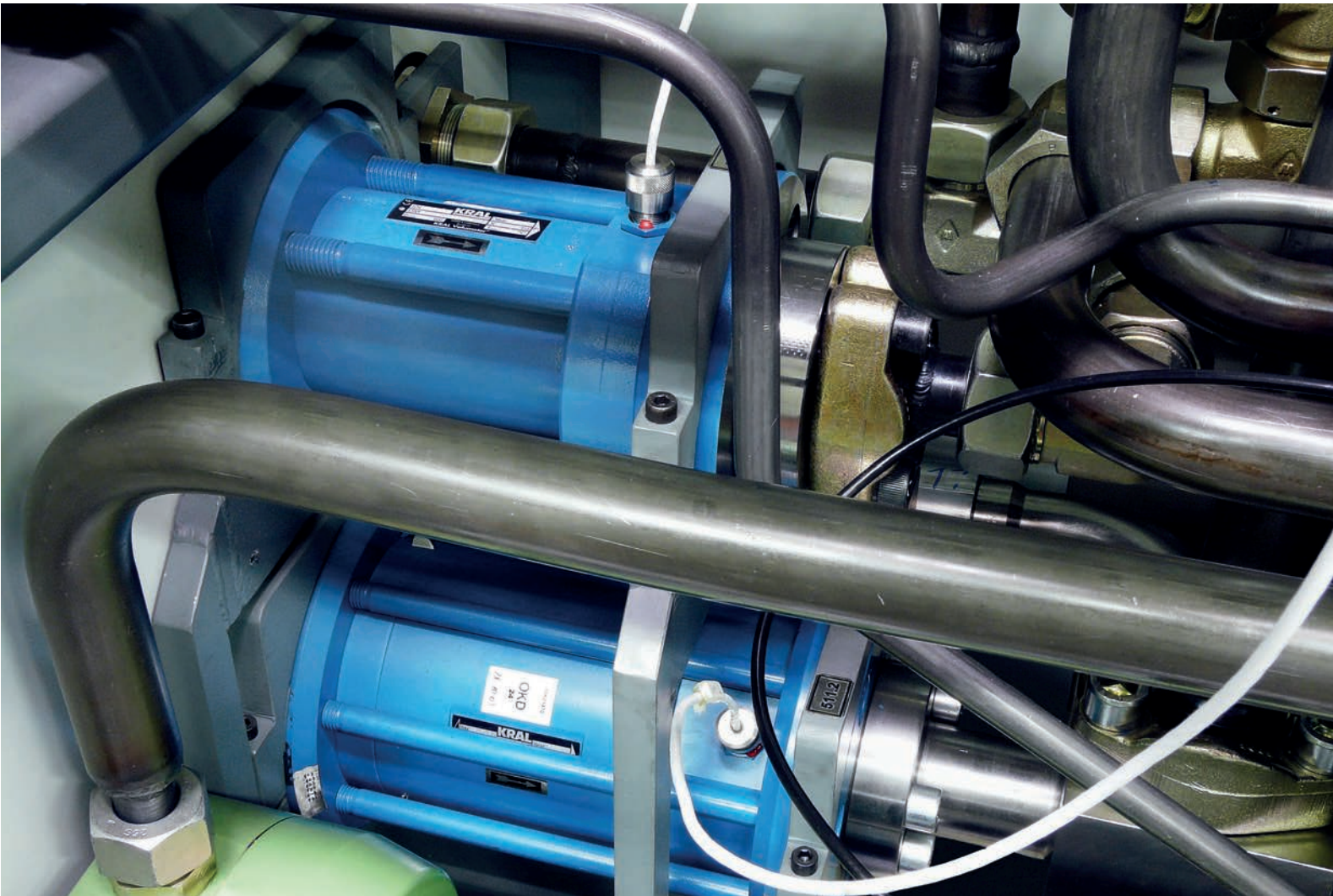


■■■■■■■ Flow Measurement.

KRAL



KRAL Flowmeters for Test Stands.
High-precision measurement of liquids.



Flow Measuring Technology for Test Stands.

KRAL flowmeters have a wide measuring range and measure bi-directional.

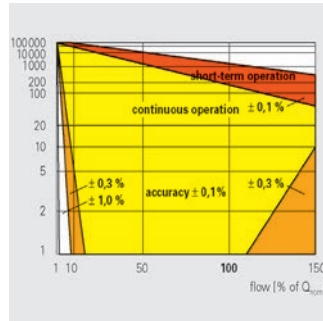


Measurements in the extreme range of -40 °C to 200 °C.

Coolant conditioning is available for a variety of applications, for example for very high or very low temperatures.

KRAL flowmeters also measure with high precision under extreme conditions.

- High-precision measurements at -40 °C to 200 °C.
- Water/glycol mixture.



High measurement precision and wide measuring range.

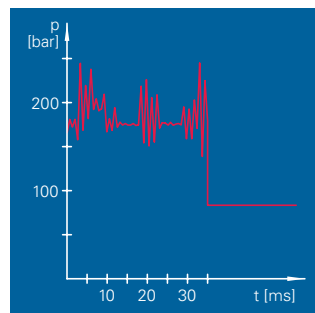
The requirements placed on the measuring precision of flowmeters are very high in the case of development and production test stands. Precise measurement has to be ensured even at the lowest flow quantities because the entire performance curve of the test specimen is tested.

In addition, different sizes are to be measured on the same test stand. This requires a wide measuring range.

KRAL flowmeters have a high-precision measuring chamber. They measure with a precision of $\pm 0.1\%$.

Typical operating parameters for KRAL test stand flow measuring systems.

Test liquids:	Hydraulic oil, gasoline, diesel fuel, skydrol, water/glycol and many more.
Flow range:	0.1 to 7,500 l/min.
Temperature range:	-40 to 200 °C.
Measuring range:	1:100.
Pressure:	Up to 630 bar.
Resolution:	Up to 0.1 ml/pulse.
Vibrations:	Do not have any influence.
Pulsations:	High pulsation stability.



Precise real-time measurement in both flow directions.

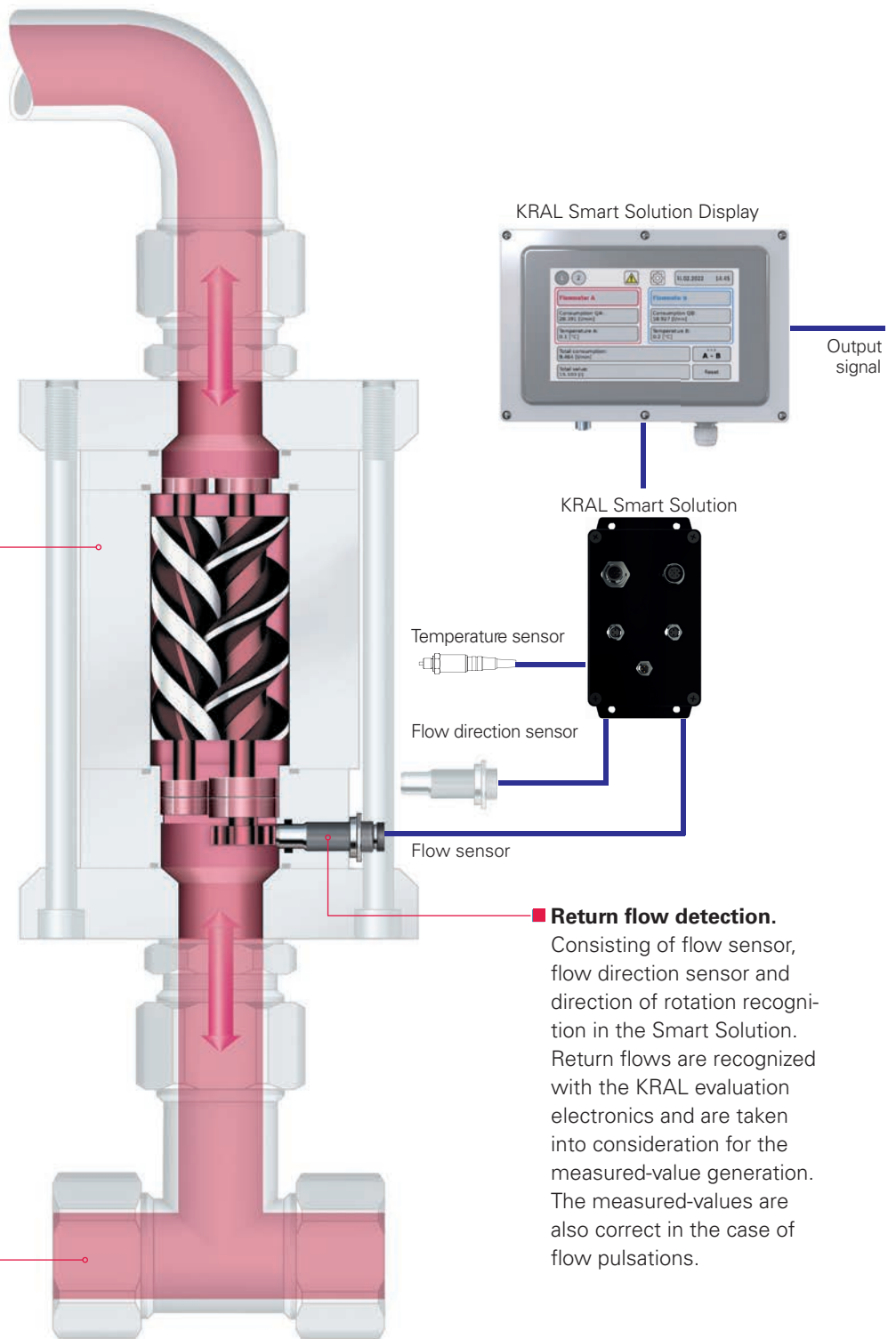
Injection or hydraulic pumps can cause pressure peaks and therefore return flows in the piping. If the flow direction is not taken into account, large measuring errors can result.

- KRAL flowmeters measure precisely in both directions. Return flows are recognized, measured and the measured value is corrected by the KRAL evaluation electronics.
- Measuring precision of $\pm 0.1\%$ of the measured value is maintained.

Cost reduction when measuring in combination with a scale.

Test stand runs with fuel scales are extremely precise because the fuel consumption is measured at every load point for a long period several times. If the test stand control system aborts the test cycle due to an error, measurement is restarted from the beginning.

- High fuel saving potential when the test stand run is preset with a KRAL flowmeter. The test cycle subsequently supplies correct values very quickly.
- The installation of KRAL flowmeters amortizes within a very short time thanks to the reduction in fuel consumption.



■ **High measuring precision.**

Together with the housing the screws form the exact measuring chamber. This means that the high measuring precision of $\pm 0.1\%$ is achieved even at a very low flow rate.

■ **No flow conditioning.**

Flow conditioning is not required before or after the flowmeter. Pipe bends and tees do not have any influence on the measuring precision.

■ **Return flow detection.**

Consisting of flow sensor, flow direction sensor and direction of rotation recognition in the Smart Solution. Return flows are recognized with the KRAL evaluation electronics and are taken into consideration for the measured-value generation. The measured-values are also correct in the case of flow pulsations.

Technical Data.

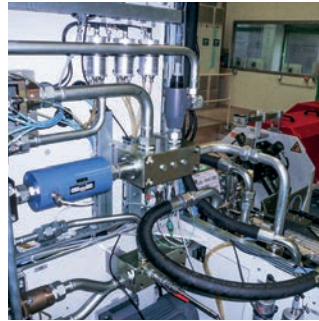
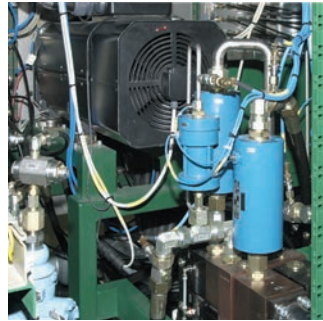
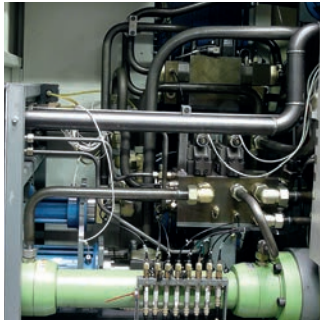
Components for the flow measurement in test stands.



Technical data.	OMG	OMH	Smart Solution
Standard	•		
High pressure		•	
Non-lubricating, aggressive			
Temperature compensation			•
Return flow detection	•	•	•
Bus connection			•

Application Examples.

KRAL applications.



Hydraulic test stands.

Medium: Hydraulic oil.
Flow rate: 7 to 700 l/min.
Pressure: 420 bar.
Temperature: 20 to 90 °C.
Viscosity: 10 to 32 mm²/s.
Flowmeters: Four OMH 68.

Piston pumps and piston motors were tested for their function and load-bearing capacity on hydraulic test stands. The automatically controlled test runs simulate the minimum and maximum values of the applications. Our OMH 68 units are integrated in the high-pressure circuit. Whereas the test specimens are only subjected to these highly demanding tests once during a test run, our KRAL flowmeters are subjected to these conditions every time. The particularly high load-bearing tests include emergency stop valve operation which creates extreme pressure pulsations.

Test stands for the aero-nautical and space industry.

Medium: Aviation fuel.
Flow rate: 3.5 to 525 l/min.
Pressure: 5 bar.
Viscosity: 0.9 to 2.0 mm²/s.
Flowmeters: OME, OMG.

Pumps and controllers of ten different jet-engine fuel systems are to be tested fully automatically.

Quote from our client: "The low viscosity, the high pressure loads, low flow values and the high measuring precision under high safety requirements (explosion protection) prevents the use of turbine and gearwheel meters. Therefore KRAL screw meters were used for flow measurement. Thanks to the high-resolution frequency measurement, outstanding repeatability and linearization could be achieved across the entire flow range."

Gear oil test stands.

Medium: Gear oil.
Flow rate: 30 to 400 l/min.
Pressure: 30 bar.
Temperature: 30 °C.
Viscosity: 1 to 200 mm²/s.
Measuring device: OMG.

The test stand serves to check the own gear oil pump as well as to determine the amount of oil required by the hydrodynamic brake in order to ensure the functional capability.

KRAL flowmeters of the OMG series are extremely robust and very reliable. The measuring precision across a wide measuring range makes our flowmeters an optimum component in every gear test stand.

Traceability of the measurement.

Every KRAL flowmeter is tested and calibrated on our in-house test stand.

Depending on the customer requirements factory calibration or an accredited calibration in accordance with ISO/IEC 17025 is carried out. Factory calibration is KRAL standard. Special customer requirements, such as the inclusion of further measuring points are possible. The accredited calibration is carried out to ISO/IEC 17025. The measured values are traceable to national standards. The measuring inaccuracy from the national standard to the test specimen is specified.

Our certified QM system in compliance with EN ISO 9001:2015 guarantees maximum quality and on time delivery.

■■■■■■■ Flow Measurement.

