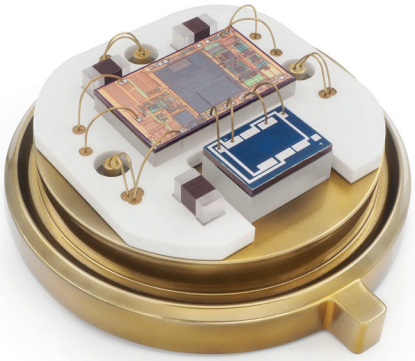
KELLER

PRODUCTS



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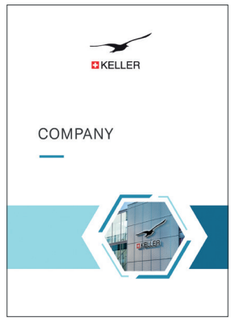


KELLER
SINCE 1974

MADE TO MEASURE **PRESSURE**

PRODUCTS

Product overview

KELLER is known for Swiss quality and precision. Ever since being established, the company has developed and produced its products at its facilities in Winterthur. For more than 45 years, we have been pairing expertise with innovative spirit to find the right solutions for each individual application. The customer‘s wishes are our key focus.

Pressure Transducers

Pressure Transmitters

Level Probes

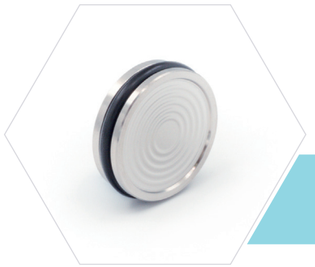
Data Loggers

Digital Pressure Gauges

Wireless Solutions

Custom Solutions

Software & Accessories



PRESSURE TRANSDUCERS

Encapsulated piezoresistive pressure transducers for absolute and gauge pressure measurement are KELLER's core competence and lie at the heart of all KELLER products for end users. They have proved their worth millions of times over and are a reliable base for any measuring system. Transducers can be adjusted and optimised according to your needs.

Pressure Transducers





	Series 4L	Series 7L	Series 9L	Series 9FL	Series 10L
PRESSURE RANGES	0…10 to 0…200 bar	0…5 to 0…200 bar	0…0,2 to 0…200 bar	0…0,2 to 0…200 bar	0…0,1 to 0…200 bar
ACCURACY	± 0,5 %FS	± 0,5 %FS	± 0,25 %FS	± 0,25 %FS	± 0,25 %FS
LONG TERM STABILITY	± 0,5 %FS	± 0,25 %FS	± 0,2 %FS	± 0,2 %FS	± 0,15 %FS
DIMENSIONS	ø 11 mm × 5,2 mm	ø 15 mm × 5 mm	ø 19 mm × 5 mm	ø 17 mm × 5,5 mm	ø 19 mm × 15 mm
TEMPERATURE RANGE	-20…85°C	-20…100 °C	-40…125 °C	-40…125 °C	-40…125 °C

OEM Pressure Transducers



	Series 6LHP	Series 7LHP	Series 10LHP
PRESSURE RANGES	0…100 to 0…2000 bar	0…100 to 0…2000 bar	0…200 to 0…1000 bar
LONG TERM STABILITY	± 0,25 %FS	± 0,25 %FS	± 0,25 %FS
MATERIAL	Steel 1.4435, Hastelloy C-276, Inconel 718	Steel 1.4435, Inconel 718, Titanium	Steel 1.4435
DIMENSIONS	ø 13 mm × 8 mm	ø 15 mm × 8 mm	ø 19 mm × 15 mm
TEMPERATURE RANGE	-40…150 °C	-55…180 °C	-20…100 °C

OEM Differential Pressure Transducers


	Series PD-10L	Series PD-10LHP
PRESSURE RANGES	0…0,1 to 0…30 bar	0…0,1 to 0…30 bar
LINE PRESSURE	200 bar	600 bar
ACCURACY	± 0,25 %FS	± 0,25 %FS
DIMENSIONS	ø 19 mm × 26 mm	ø 19 mm × 35 mm
TEMPERATURE RANGE	-40…125 °C	-40…125 °C

OEM Pressure Transducers with Thread



	Series 20	Series 20S	Series 13
PRESSURE RANGES	0…5 to 0…600 bar	0…0,3 to 0…1000 bar	0…10 to 0…400 bar
ACCURACY	± 0,5 %FS	± 0,25 %FS	± 0,5 %FS
PRESSURE CONNECTION	G1/4, 1/4-18NPT	G1/4, 1/4-18NPT	M14 x 1,2
DIMENSIONS	HEX19 × 32 mm	HEX22 × 34 mm	ø 28 mm × 48 mm
TEMPERATURE RANGE	-10…80 °C	-10…80 °C	20…350 °C

OEM Pressure Transducers Special Designs



	Series 3L	Series 6L	Series 8L
PRESSURE RANGES	0…20 to 0…200 bar	0…10 to 0…200 bar	0…0,2 to 0…200 bar
ACCURACY	± 0,5 %FS	± 0,5 %FS	± 0,5 %FS
LONG TERM STABILITY	± 0,5 %FS	± 0,35 %FS	± 0,2 %FS
DIMENSIONS	ø 9,5 mm × 4,2 mm	ø 13 mm × 4,5 mm	ø 17 mm × 7 mm
TEMPERATURE RANGE	0…50 °C	-10…80 °C	-40…125 °C

Miniature Pressure Transducers without Oil Filling




	Series M5	Series 2MI	Catheters	Tip sensors
PRESSURE RANGES	0…3 to 0…30 bar	0…1 to 0…400 bar	-0,5…0,5 bar	0…1 to 0…5 bar
ACCURACY	± 0,3 %FS	± 0,5 %FS	± 0,5 %FS	± 0,5 %FS
PRESSURE CONNECTION	M5 x 0,5 Thread	Elastomer coating	4F / 5F / 6F / 8F	4F / 5F / 6F / 8F
DIMENSIONS	ø 6,2 mm × 40 mm	ø 4,5 mm × 3 mm	ø 1,33 mm × 2,67 mm	ø 1,33 mm × 2,67 mm
TEMPERATURE RANGE	-50…180 °C	-20…80 °C	20…40 °C	20…40 °C

PRESSURE TRANSMITTERS

Pressure transmitters are sensors that use additional electronics to compensate for linearity deviations and temperature errors, outputting measurement results as standardised signals. Every transmitter is measured over the entire pressure and temperature profile and compared to the desired signal span.

Standard Pressure Transmitters

	Series 21PY	Series 21Y	Series 21C	Series 23SY	Series 23SX	Series 33X	Series 41X
PRESSURE RANGES	0…10 to 0…600 bar	0…2 to 0…1000 bar	0…2 to 0…1000 bar	0…0,1 to 0…1000 bar	0…0,16 to 0…1000 bar	0…0,3 to 0…1000 bar	0…0,03 to 0…0,3 bar
ACCURACY	± 0,5 %FS	± 0,5 %FS	± 0,25 %FS	± 0,25 %FS	± 0,1 %FS	± 0,05 %FS	± 0,1 %FS
TOTAL ERROR BAND	± 1,5 %FS @ -10…80 °C	± 1,5 %FS @ -10…80 °C	± 1,5 %FS @ -10…80 °C	± 0,7 %FS @ -10…80 °C	± 0,25 %FS @ -10…80 °C	± 0,1 %FS @ -10…80 °C	± 0,2 %FS @ 10…50 °C
INTERFACES	0,5…4,5 V	4…20 mA, 0…10 V	0,5…4,5 V ratiom.	4…20 mA, 0…10 V	RS485, 4…20 mA, 0…10 V	RS485, 4…20 mA, 0…10 V	RS485, 4…20 mA, 0…10 V
TEMPERATURE RANGE	-20…100 °C	-40…100 °C	-40…125 °C	-40…100 °C	-40…125 °C	-20…125 °C	-20…80 °C

Hydrogen Pressure Transmitters

	Series 23SY-H2	Series 23SY-Ei-H2	Series 23SX-H2	Series 23SX-Ei-H2
PRESSURE RANGES	0…4 to 0…900 bar	0…4 to 0…900 bar	0…4 to 0…900 bar	0…0,4 to 0…900 bar
ACCURACY	± 0,25 %FS	± 0,25 %FS	± 0,1 %FS	± 0,1 %FS
TOTAL ERROR BAND	± 0,7 %FS @ -10…80 °C	± 0,7 %FS @ -10…80 °C	± 0,25 %FS @ -10…80 °C	± 0,25 %FS @ -10…80 °C
INTERFACES	4…20 mA, 0…10 V	4…20 mA, 0…10 V	RS485, 4…20 mA, 0…10 V	RS485, 4…20 mA, 0…10 V
SPECIAL CHARACTERISTICS	Optimised for H2	Optimised for H2	Optimised for H2	Optimised for H2

Front-Flush Pressure Transmitters





	Series 25Y	Series 35X	Series 35XHT	Series 35XHTC	Series 35XHTT
PRESSURE RANGES	0…0,5 to 0…1000 bar	0…0,3 to 0…1000 bar	0…1 to 0…30 bar	0…3 to 0…1000 bar	0…1 to 0…30 bar
ACCURACY	± 0,25 %FS	± 0,05 %FS	± 0,05 %FS	± 0,05 %FS	± 0,05 %FS
TOTAL ERROR BAND	± 0,7 %FS @ -10…80 °C	± 0,1 %FS @ -10…80 °C	± 0,15 %FS @ 20…120 °C	± 0,5 %FS @ 20…300 °C	± 0,15 %FS @ 20…120 °C
INTERFACES	4…20 mA, 0…10 V	RS485, 4…20 mA, 0…10 V	RS485, 4…20 mA, 0…10 V	RS485, 4…20 mA, 0…10 V	RS485, 4…20 mA, 0…10 V
TEMPERATURE RANGE	-40…100 °C	-40…125 °C	-20…150 °C	0…300 °C	-20…150 °C

High Temperature Pressure Transmitters






	Series M5HB	Series M8coolHB	Series 9LC	Series 35XHT	Series 35XHTC	Series 35XHTT
PRESSURE RANGES	0…3 to 0…30 bar	0…3 to 0…30 bar	0…1 to 0…200 bar	0…1 to 0…30 bar	0…3 to 0…1000 bar	0…1 to 0…30 bar
ACCURACY	± 0,1 %FS	± 0,1 %FS	± 0,25 %FS	± 0,05 %FS	± 0,05 %FS	± 0,05 %FS
TOTAL ERROR BAND	± 0,5 %FS @ -20…125 °C	± 1,0 %FS @ -40…180 °C	± 0,8 %FS @ -10…80 °C	± 0,15 %FS @ 20…120 °C	± 0,5 %FS @ 20…300 °C	± 0,15 %FS @ 20…120 °C
INTERFACES	0…10 V	0…10 V	0,5…4,5 V ratiom.	RS485, 4…20 mA, 0…10 V	RS485, 4…20 mA, 0…10 V	RS485, 4…20 mA, 0…10 V
TEMPERATURE RANGE	-40…180 °C	-50…1000 °C	-40…150 °C	-20…150 °C	0…300 °C	-20…150 °C

Differential Pressure Transmitters




	Series PD-33X	Series PRD-33X	Series PD-39X	Series PD-41X
PRESSURE RANGES	0…0,3 to 0…30 bar	0…0,35 to 0…3 bar	0…3 to 0…300 bar	0…0,03 to 0…0,3 bar
ACCURACY	± 0,05 %FS	± 0,1 %FS	± 0,05 %FS	± 0,1 %FS
LINE PRESSURE	200 bar / 600 bar	0…40 bar	0…3 to 0…300 bar	2 bar
INTERFACES	RS485, 4…20 mA, 0…10 V	RS485	RS485, 4…20 mA, 0…10 V	RS485, 4…20 mA, 0…10 V
SPECIAL CHARACTERISTICS	Classic «wet-wet»	Line pressure measurement	Line pressure measurement	Capacitive sensor

«Thanks to our technological expertise, longstanding experience and mastery of the many processes involved in manufacturing pressure sensors, coupled with a high level of vertical integration, we can make even the impossible possible.»

Bernhard Vetterli, Technical Director

Automotive Pressure Transmitters





	Series 21PY	Series 21PHB	Series 22S	Series 22DT	Series 22M
PRESSURE RANGES	0…10 to 0…600 bar	0…10 to 0…600 bar	0…5 to 0…250 bar	0…14 bar	0…5 to 0…250 bar
TOTAL ERROR BAND	± 1,5 %FS @ -10…80 °C	± 0,5 %FS @ -10…80 °C	± 2,0 %FS @ 0…80 °C	± 2,0 %FS @ 0…90 °C	± 2,0 %FS @ 0…80 °C
INTERFACES	0,5…4,5 V	0…10 V	0,5…4,5 V ratiom., 4…20 mA	0,5…4,5 V ratiom.	0,5…4,5 mA, 4…20 V ratiom.
SPECIAL CHARACTERISTICS	Small and lightweight	20 kHz bandwidth	Steel 316L	With temperature sensor	Brass
HOMOLOGATION	None	None	None	E4-11OR, E4-10R	E4-11OR, E4-10R

Intrinsically Safe Pressure Transmitters





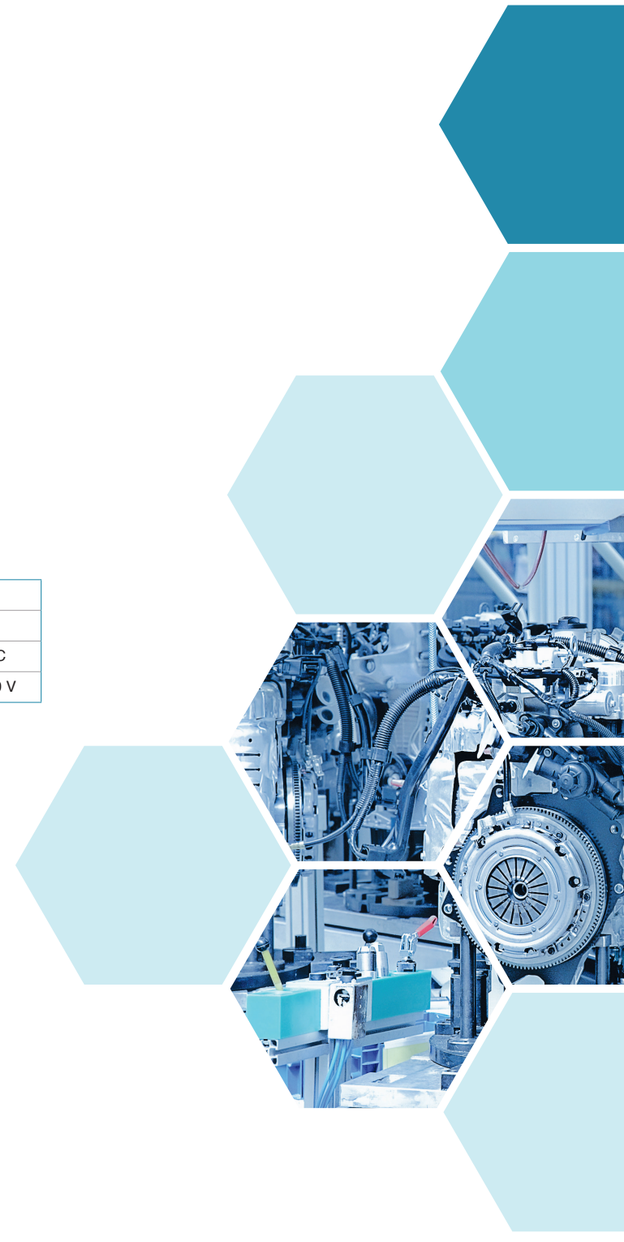


	Series 23SY-Ei	Series 25Y-Ei	Series 33X-Ei	Series 35X-Ei	Series PD-33X-Ei	Series PD-39X-Ei	Series 41X-Ei
PRESSURE RANGES	0…0,1 to 0…1000 bar	0…0,5 to 0…1000 bar	0…0,3 to 0…1000 bar	0…0,3 to 0…1000 bar	0…0,3 to 0…30 bar	0…3 to 0…300 bar	0…0,03 to 0…0,3 bar
ACCURACY	± 0,25 %FS	± 0,25 %FS	± 0,05 %FS	± 0,05 %FS	± 0,05 %FS	± 0,05 %FS	± 0,1 %FS
TOTAL ERROR BAND	± 0,7 %FS @ -10…80 °C	± 0,7 %FS @ -10…80 °C	± 0,1 %FS @ -10…80 °C	± 0,1 %FS @ -10…80 °C	± 0,1 %FS @ -10…80 °C	± 0,1 %FS @ -10…80 °C	± 0,2 %FS @ 10…50 °C
INTERFACES	4…20 mA, 0…10 V	4…20 mA, 0…10 V	RS485, 4…20 mA, 0…10 V	RS485, 4…20 mA, 0…10 V	RS485, 4…20 mA, 0…10 V	RS485, 4…20 mA, 0…10 V	RS485, 4…20 mA, 0…10 V

Flame Proof Pressure Transmitters




	Series 33X-Ed	Series 35X-Ed	Series 23-Ed	Series 25-Ed
PRESSURE RANGES	0…1 to 0…300 bar	0…1 to 0…100 bar	0…1 to 0…300 bar	0…1 to 0…300 bar
ACCURACY	± 0,05 %FS	± 0,05 %FS	± 0,5 %FS	± 0,5 %FS
TOTAL ERROR BAND	± 0,1 %FS @ -10…80 °C	± 0,1 %FS @ -10…80 °C	± 4,0 %FS @ -10…80 °C	± 4,0 %FS @ -10…80 °C
INTERFACES	RS485, 4…20 mA, 0…10 V	RS485, 4…20 mA, 0…10 V	4…20 mA, 0…10 V	4…20 mA, 0…10 V



OEM Pressure Transmitters









	Series 4LC	Series 4LD	Series 7LC	Series 7LD	Series 10LX	Series 9FLC	Series 9FLD	Series 9LC	Series 9LD
PRESSURE RANGES	0…3 to 0…200 bar	0…3 to 0…200 bar	0…2 to 0…200 bar	0…3 to 0…200 bar	0…3 to 0…200 bar	0…1 to 0…50 bar	0…1 to 0…30 bar	0…1 to 0…200 bar	0…1 to 0…200 bar
ACCURACY	± 0,25 %FS	± 0,15 %FS	± 0,25 %FS	± 0,15 %FS	± 0,05 %FS	± 0,25 %FS	± 0,15 %FS	± 0,25 %FS	± 0,15 %FS
TOTAL ERROR BAND	± 1,0 %FS @ 0…50 °C	± 0,7 %FS @ 0…50 °C	± 1,0 %FS @ -10…80 °C	± 0,7 %FS @ -10…80 °C	± 0,1 %FS @ -10…80 °C	± 0,8 %FS @ -10…80 °C	± 0,7 %FS @ -10…80 °C	± 0,8 %FS @ -10…80 °C	± 0,7 %FS @ -10…80 °C
INTERFACES	0,5…4,5 V ratiom.	I2C	0,5…4,5 V ratiom.	I2C	RS485, 4…20 mA, 0…10 V	0,5…4,5 V ratiom.	I2C	0,5…4,5 V ratiom.	I2C
DIMENSIONS	ø 11 mm × 4,2 mm	ø 11 mm × 4,2 mm	ø 15 mm × 5 mm	ø 15 mm × 5 mm	ø 19 mm × 57...96 mm	ø 17 mm × 5,5 mm	ø 17 mm × 5,5 mm	ø 19 mm × 5 mm	ø 19 mm × 5 mm

OEM High-Pressure Transmitters





	Series 6LHPC	Series 6LHPD	Series 7LHPC	Series 7LHPD	Series 10LHPX
PRESSURE RANGES	0…200 to 0…1000 bar	0…400 to 0…1000 bar	0…200 to 0…1000 bar	0…400 to 0…1000 bar	0…200 to 0…1000 bar
ACCURACY	± 0,25 %FS	± 0,15 %FS	± 0,25 %FS	± 0,15 %FS	± 0,05 %FS
TOTAL ERROR BAND	± 0,8 %FS @ -10…80 °C	± 1,0 %FS @ -10…80 °C	± 0,8 %FS @ -10…80 °C	± 1,0 %FS @ -10…80 °C	± 0,1 %FS @ -10…80 °C
INTERFACES	0,5…4,5 V ratiom.	I2C	0,5…4,5 V ratiom.	I2C	RS485, 4…20 mA, 0…10 V
DIMENSIONS	ø 13 mm × 8 mm	ø 13 mm × 8 mm	ø 15 mm × 8 mm	ø 15 mm × 8 mm	ø 19 mm × 57...96 mm

Intrinsically Safe OEM Pressure Transmitters






	Series 4LD-Ei	Series 6LHPD-Ei	Series 7LD-Ei	Series 7LHPD-Ei	Series 9LD-Ei	Series 9FLD-Ei
PRESSURE RANGES	0…3 to 0…200 bar	0…400 to 0…1000 bar	0…3 to 0…200 bar	0…400 to 0…1000 bar	0…1 to 0…200 bar	0…1 to 0…30 bar
ACCURACY	± 0,15 %FS	± 0,15 %FS	± 0,15 %FS	± 0,15 %FS	± 0,15 %FS	± 0,15 %FS
TOTAL ERROR BAND	± 0,7 %FS @ 0…50 °C	± 1,0 %FS @ -10…80 °C	± 0,7 %FS @ -10…80 °C	± 1,0 %FS @ -10…80 °C	± 0,7 %FS @ -10…80 °C	± 0,7 %FS @ -10…80 °C
INTERFACES	I2C	I2C	I2C	I2C	I2C	I2C
DIMENSIONS	ø 11 mm × 4,2 mm	ø 13 mm × 8 mm	ø 15 mm × 5 mm	ø 15 mm × 8 mm	ø 19 mm × 5 mm	ø 17 mm × 5,5 mm

Analog Pressure Transmitters

	Series 23	Series PD-23	Series 25
PRESSURE RANGES	0…0,2 to 0…1000 bar	0…0,2 to 0…20 bar	0…0,5 to 0…1000 bar
ACCURACY	± 0,5 %FS	± 0,5 %FS	± 0,5 %FS
TOTAL ERROR BAND	± 4,0 %FS @ -10…80 °C	± 4,0 %FS @ -10…80 °C	± 4,0 %FS @ -10…80 °C
INTERFACES	4…20 mA, 0…10 V	4…20 mA, 0…10 V	4…20 mA, 0…10 V
TEMPERATURE RANGE	-40…100 °C	-40…100 °C	-40…100 °C

IO-Link and CANopen Pressure Transmitters

	Series 21Zio	Series 23SXc
PRESSURE RANGES	0…4 to 0…1000 bar	0…0,16 to 0…1000 bar
ACCURACY	± 0,5 %FS	± 0,1 %FS
TOTAL ERROR BAND	± 1,5 %FS @ -10…80 °C	± 0,25 %FS @ -10…80 °C
INTERFACES	IO-Link	CANopen
TEMPERATURE RANGE	-40…125 °C	-40…125 °C

LEVEL PROBES

Submersible probes for level and fill measurement. With a special design and cable and housing materials that have been chosen for compatibility with their surroundings, these probes can be used in a wide range of liquids.

Standard Level Probes

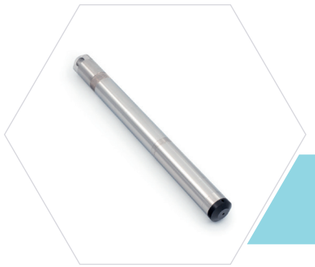
	Series 26Y	Series 26X	Series 26Xi	Series 36KyX	Series 36XS	Series 36XW	Series 36XiW	Series 46X
PRESSURE RANGES	0…0,1 to 0…10 bar	0…0,1 to 0…25 bar	0…0,3 to 0…10 bar	0…1 to 0…10 bar	0…1 to 0…30 bar	0…0,3 to 0…30 bar	0…0,3 to 0…10 bar	0…0,03 to 0…0,3 bar
ACCURACY	± 0,25 %FS	± 0,1 %FS	± 0,1 %FS	± 0,3 %FS	± 0,05 %FS	± 0,05 %FS	± 0,05 %FS	± 0,1 %FS
TOTAL ERROR BAND	± 0,5 %FS @ 0…50 °C	± 0,25 %FS @ 0…50 °C	± 0,25 %FS @ 0…50 °C	± 0,5 %FS @ 0…50 °C	± 0,2 %FS @ 0…50 °C	± 0,1 %FS @ 0…50 °C	± 0,1 %FS @ 0…50 °C	± 0,2 %FS @ 10…50 °C
INTERFACES	4…20 mA	RS485, 4…20 mA, 0…10 V	SDI-12	RS485, 4…20 mA, 0…10 V	RS485, 4…20 mA	RS485, 4…20 mA, 0…10 V	SDI-12	RS485, 4…20 mA, 0…10 V
SPECIAL CHARACTERISTICS	Compact design	High accuracy	High accuracy	Plastic diaphragm	Reduced diameter	Optimum accuracy	Maximum resolution	Ceramic measuring cell

Intrinsically Safe Level Probes

	Series 26Y-Ei	Series 36XW-Ei	Series 46X-Ei
PRESSURE RANGES	0…0,1 to 0…10 bar	0…0,3 to 0…30 bar	0…0,03 to 0…0,3 bar
ACCURACY	± 0,25 %FS	± 0,05 %FS	± 0,1 %FS
TOTAL ERROR BAND	± 0,5 %FS @ 0…50 °C	± 0,1 %FS @ 0…50 °C	± 0,2 %FS @ 10…50 °C
INTERFACES	4…20 mA	RS485, 4…20 mA, 0…10 V	RS485, 4…20 mA, 0…10 V
SPECIAL CHARACTERISTICS	Compact design	Optimum accuracy	Ceramic measuring cell

Multi-Parameter Probe

	Series 36XW-CTD	Series 36XiW-CTD
PRESSURE RANGES	0…0,3 to 0…10 bar	0…0,3 to 0…10 bar
ACCURACY	± 0,05 %FS	± 0,05 %FS
TOTAL ERROR BAND	± 0,1 %FS @ 0…50 °C	± 0,1 %FS @ 0…50 °C
INTERFACES	RS485	SDI-12
SPECIAL CHARACTERISTICS	Additional conductivity measurement	Additional conductivity measurement



DATA LOGGERS

A variety of data logger designs for recording pressure and temperature profiles. Depending on the system, the data is read out via a plug connection or remote transfer.

Level Loggers

	DCX-16	DCX-22	DCX-22AA	DCX-22-ECO	DCX-25PVDF	DCX-38
PRESSURE RANGES	0…10 to 0…100 mH2O	0…10 to 0…100 mH2O	0…5 to 0…10 mH2O	0…10 to 0…100 mH2O	0…10 to 0…100 mH2O	0…0,5 to 0…3 mH2O
TOTAL ERROR BAND	± 0,1 %FS @ -10…40 °C	± 0,1 %FS @ -10…40 °C	± 0,1 %FS @ -10…40 °C	± 0,25 %FS @ -10…40 °C	± 0,1 %FS @ -10…40 °C	± 0,2 %FS @ -10…40 °C
READING CAPACITY	114'000 measuring points	114'000 measuring points	114'000 measuring points	114'000 measuring points	114'000 measuring points	114'000 measuring points
DIMENSIONS	ø 16 mm	ø 22 mm	ø 22 mm	ø 22 mm	ø 25 mm	ø 38 mm
SPECIAL CHARACTERISTICS	Slender design	Available in different versions	With integrated barometer	With USB interface	Special plastic housing	Capacitive sensor

Multi-Parameter Loggers

	DCX-22AA-CTD	DCX-22-CTD
PRESSURE RANGES	0…10 to 0…100 mH2O	0…10 to 0…100 mH2O
TOTAL ERROR BAND	± 0,1 %FS @ -10…40 °C	± 0,1 %FS @ -10…40 °C
READING CAPACITY	114'000 measuring points	114'000 measuring points
DIMENSIONS	ø 22 mm	ø 22 mm
SPECIAL CHARACTERISTICS	Additional conductivity measurement	Additional conductivity measurement

Pressure Loggers

LEO-Record

LEO5

Series 21DC-RFID

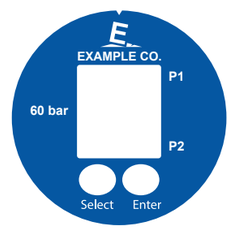
PRESSURE RANGES	-1…3 to 0…1000 bar	-1…1 to 0…1000 bar	0…3 to 0…1000 bar
ACCURACY	± 0,05 %FS	± 0,05 %FS	± 0,15 %FS
TOTAL ERROR BAND	± 0,1 %FS @ 0…50 °C	± 0,1 %FS @ 0…50 °C	± 0,7 %FS @ -10…80 °C
READING CAPACITY	57'000 measuring points	56'000 measuring points	32'000 measuring points
SPECIAL CHARACTERISTICS	Measured value recording	All-rounder	Data logger with battery

«The success of a project hinges on the exchange of information at the interfaces. We are committed to offering a wide range of protocols and electrical interfaces for seamless system integration and loss-free transmission of pressure values.»

Daniel Hofer, Head of Product Management

Customer-Specific Front Foils and Options

The front foils of KELLER manometers can be designed and printed according to customer requirements.



DIGITAL PRESSURE GAUGES

High-quality digital pressure gauges with easy to read displays and practical additional functions.
Display units for use with KELLER transmitters or for processing standard signals from other sources.

Digital Pressure Gauges

	LEX1	LEO1	LEO2	LEO3	LEO5	LEO-Record	LEO-Record-H2	ECO2
PRESSURE RANGES	-1…1 to 0…1000 bar	-1…3 to 0…1000 bar	0…4 to 0…700 bar	-1…3 to 0…1000 bar	-1…1 to 0…1000 bar	-1…3 to 0…1000 bar	-1…3 to 0…900 bar	0…31 to 0…300 bar
ACCURACY	± 0,05 %FS	± 0,1 %FS	± 0,1 %FS	± 0,1 %FS	± 0,05 %FS	± 0,05 %FS	± 0,05 %FS	± 0,5 %FS
TOTAL ERROR BAND	± 0,05 %FS @ 0…50 °C	± 0,2 %FS @ 0…50 °C	± 0,2 %FS @ 0…50 °C	± 0,2 %FS @ 0…50 °C	± 0,1 %FS @ 0…50 °C	± 0,1 %FS @ 0…50 °C	± 0,1 %FS @ -10…80 °C	± 1,0 %FS @ 0…50 °C
INTERFACES	RS485	None	None	RS485, 4…20 mA	USB	RS485	RS485	None
SPECIAL CHARACTERISTICS	Precision of up to 0,01 %FS	Peak recording	Compact and precise	4…20 mA output	All-rounder	Measured value recording	Optimised for H2	Compact and economical

Intrinsically Safe Digital Pressure Gauges

	LEO1-Ei	LEO2-Ei	LEO-Record-Ei	LEO-Record-Ei-H2	LEX1-Ei	ECO2-Ei
PRESSURE RANGES	-1…3 to 0…1000 bar	0…4 to 0…700 bar	-1…3 to 0…1000 bar	-1…3 to 0…900 bar	-1…1 to 0…1000 bar	-1…31 to 0…300 bar
ACCURACY	± 0,1 %FS	± 0,1 %FS	± 0,05 %FS	± 0,05 %FS	± 0,05 %FS	± 0,5 %FS
TOTAL ERROR BAND	± 0,2 %FS @ 0…50 °C	± 0,2 %FS @ 0…50 °C	± 0,1 %FS @ 0…50 °C	± 0 ,1 %FS @ -10…80 °C	± 0,05 %FS @ 0…50 °C	± 1,0 %FS @ 0…50 °C
INTERFACES	None	None	RS485	RS485	RS485	None
SPECIAL CHARACTERISTICS	Peak recording	Compact and precise	Measured value recording	Optimised for H2	Precision of up to 0,01 %FS	Compact and economical

WIRELESS SOLUTIONS

Devices for measuring and transmitting pressure values via wireless interfaces such as LoRa, Bluetooth, 2G, 3G, 4G and RFID. Alarm notifications, switch outputs and additional extras round out the range of functions on offer.

Remote Transmission Units

ARC1-Tube

ARC1-Box

ARC1-Box-SB

ADT1-Tube

ADT1-Box

	ARC1-Tube	ARC1-Box	ARC1-Box-SB	ADT1-Tube	ADT1-Box
CONNECTIVITY	2G / 3G / 4G / NB-IoT / LTE-M / LoRa	2G / 3G / 4G / NB-IoT / LTE-M / LoRa	2G / 3G / 4G / NB-IoT / LTE-M / LoRa	NB-IoT / LTE-M / LoRa	NB-IoT / LTE-M / LoRa
SENSOR INTERFACES	RS485, SDI-12, analog, digital	RS485, SDI-12, analog, digital	RS485, SDI-12, analog, digital	RS485, I2C	RS485, I2C
BATTERY LIFE	Up to 10 years	Up to 10 years	Up to 10 years	Up to 5 years	Up to 5 years
DIMENSIONS	ø 48 mm × 330 mm	200 × 100 × 81 mm	180 × 180 × 72 mm	ø 42,4 mm × 165 mm	162 × 82 × 55 mm
SPECIAL CHARACTERISTICS	For 2“ monitoring pipes	For wall installation	For intrinsically safe transmitters	For 2“ monitoring pipes	For wall installation

RFID

Series 21D-RFID

Series 21DC-RFID

	Series 21D-RFID	Series 21DC-RFID
PRESSURE RANGES	0…3 to 0…1000 bar	0…3 to 0…1000 bar
ACCURACY	± 0,15 %FS	± 0,15 %FS
TOTAL ERROR BAND	± 0,7 %FS @ -10…80 °C	± 0,7 %FS @ -10…80 °C
READING CAPACITY	None	32’000 measuring points
SPECIAL CHARACTERISTICS	Pressure transponder (passive)	Data logger with battery

SOFTWARE

Software and device drivers for configuring KELLER products and for reading, analysing and processing the measurement data.

KOLIBRI Suite

KOLIBRI Desktop

KOLIBRI Cloud

KOLIBRI Mobile

Desktop Applications

KELLER SOFTWARE

CANopen Calibration Tool
Conductivity Calibration Tool
Control Center Series 30
Datamanager for remote transmission units
D-Line Address Manager
GSM setup for remote transmission units
K-114 Config
Mano Config

Drivers

KELLER SOFTWARE

USB-driver K-114 / DCX-22-ECO

USB-driver for manometers and remote transmission units

Free Data Platform

KELLER myCalibration

myCalibration is a free data platform. Especially developed for the provision and transmission of sensor calibration data

ACCESSORIES

Accessories, interface converters and spare parts for KELLER products.

Converters

K-114

K-404-T

K-102 / K-102I /
K-103-A / K-107-B

INTERFACES	USB	USB	RS232
SENSOR INTERFACES	RS485, 0…40 mA, 0…12 V	I2C	RS485
SENSOR POWER SUPPLY	12 VDC	3,3 VDC	Various versions
SPECIAL CHARACTERISTICS	Compact design	For D-line products	Various versions

Calibrators With Reference Pressure Gauge LEX1

LPX

MPX

HPX

PRESSURE RANGES	-0,85…10 bar	-0,85…25 bar	0…700 bar
ACCURACY	± 0,05 %FS	± 0,05 %FS	± 0,05 %FS
INTERFACES	RS485	RS485	RS485
DISPLAY	5-digit LCD display	5-digit LCD display	5-digit LCD display
SPECIAL CHARACTERISTICS	For air pressure	For air pressure	For hydraulic oil

Hand Pumps

Hand Pump K/P

Hand Pump HTP1

PRESSURE RANGES	-0,85…25 bar	0…700 bar
ACCURACY	See ordered pressure gauge	See ordered pressure gauge
SPECIAL CHARACTERISTICS	For air Pressure	For hydraulic oil or distilled water

CUSTOM SOLUTIONS

Wherever pressure sensors are needed, a solution can normally be found in the KELLER standard product catalog. However, there are often great benefits to optimising a product specifically for integration and use in existing complete systems. In addition to outwardly identifiable components such as housing parts or plugs, this also includes the inner workings of the sensor. We produce a large number of individual parts in-house and establish close working relationships with our suppliers, enabling us to make a wide variety of modifications with ease.

Shared Expertise for the Perfect Sensor Solutions

Our customers are specialists in their field: they know the requirements and operating conditions best. Since 1974, KELLER has been harnessing the potential of piezoresistive sensor technology to see numerous challenging projects through to completion. In all of these projects, a mutual exchange of expertise was essential to their success. Sharing our knowledge is what enables us to find the best sensor solution.

Even applications that may appear trivial at first glance can prove highly complex upon closer analysis. By taking the actual usage conditions of the sensor into consideration right from the outset, we can achieve major improvements in effectiveness and durability. And this holds true whatever the application – from fill level sensors in rainwater tanks to ultra-precise laboratory instruments, and even rocket science.

No matter the task at hand, the expert advice from our sales engineers and developers is a vital piece of the puzzle. Whether an existing product can be used – possibly with suitable modifications – or a new development is needed depends entirely on the customer‘s project. Together, we look at the requirements to determine the properties needed for flawless measurement. Armed with many years of experience, we take a close look at all the factors involved and their various interdependencies.

Measuring Ranges & Performance

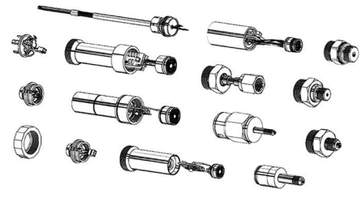
First of all, we define the basic sensor specifications such as overall measuring range, accuracy, calibration to specific measuring points and units of pressure, or scaling of the output signal. Products with a digital signal output have additional factors that also need to be determined, such as sampling rate or signal resolution. The values defined at this stage form the starting point for selecting components.

Perfectly Tuned to the Ambient Conditions

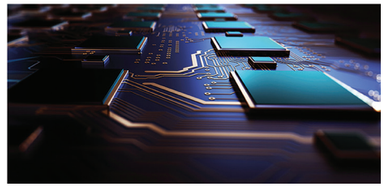
Another crucial requirement is taking the ambient conditions into consideration. Not only does this increase the service life of the sensor, it is also an essential prerequisite for correct measurements. If the pressurised system operates with a large proof pressure or with dynamic loads, the sensor design must be optimised for these particular demands. With some applications or neighbouring system parts, there is a risk of signal distortion or component failure due to vibration or shock. Temperature also has a major impact on all materials and their resistance. Complications can be caused not just by extreme temperature values but also by rapid changes in temperature. Another equally impor-tant factor is chemical resistance. The materials used for housings and seals must be carefully selected, otherwise they risk being damaged by aggressive measuring media. External factors such as petrol fumes, UV radiation, salt water or even microorganisms can also cause problems. It is therefore essential that all relevant factors be considered. Of course, even finely tuned designs still have limits, and additional protective measures may be needed.

Mechanical Design

When designing a sensor, all the above points must be taken into consideration. A device‘s performance is heavily influenced by the sensor design, from the choice of sensor chip and coupling medium through to the materials and production techniques used. In addition, customers may have particular requests concerning shape and size, pressure connections and so on. And of course, any specific requirements pertaining to the area of application must be complied with, along with all the applicable legal regulations and standards.



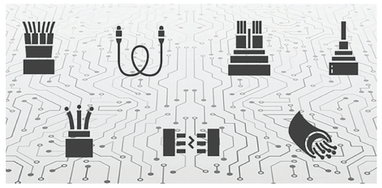
Electronics & Configuration



The main function of the electronics is to prepare the measurement signal, as well as possibly to save it and output it via a suitable interface. Customers can also request that application-specific calculations be integrated in the firmware, or ask for special device and software configurations. Once again, there are other requirements that depend on the environment, such as extended lightning protection, EMC or explosion protection. Intrinsically safe products can also be specially configured to match the parameters of the customer‘s overall system.

Electrical Interfaces & Connections

Digital interfaces can be configured for specific communication protocols, or modified to suit the customer‘s needs. Meanwhile, analog interfaces also continue to play a vital role in sensor technology. KELLER is highly experienced in developing application-specific solutions based on both of these principles, including devices with light wave and frequency outputs. For electrical connections, the necessary plugs can be integrated into the design, while cable outlets can be specified by the customer.



Marking

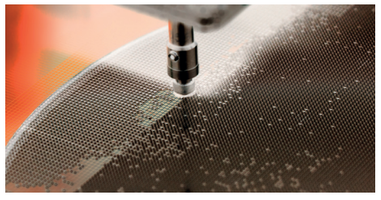
In addition to customer logos, it is also possible to have functional markings applied to the product, either by means of laser inscription or by printing information on labels. These may include part codes, serial numbers, data matrix codes or guide marks. Customers can also specify a color-coding scheme for the connecting wires. For consumer products such as manometers, a personalised design that includes the customer‘s logo can be applied to the front panel.

KELLER

CUSTOM SOLUTIONS

PIEZORESISTIVE PRESSURE MEASUREMENT TECHNOLOGY MADE IN SWITZERLAND

Pressure



Along with temperature, pressure is an essential parameter in many technical systems. In addition, a wide variety of industrial processes require precisely controlled pressure conditions. This is why, besides temperature measurement, pressure measurement is the most important and most frequently used technology for monitoring and controlling machines and plants. Additionally, atmospheric air pressure is an important environmental variable and, by measuring the gravitational pressure of the liquid column, for example, groundwater or fill levels can be determined.

Electronic pressure measurement requires a sensor that receives the pressure to be measured and converts it into an electrical signal. Resistive pressure measurement centres around an electrical resistance whose resistance value changes as a function of the pressure to be measured.

Resistive pressure measurement

In the simplest case, classic resistive pressure measurement works with a strain gauge, a thin strip of metal whose resistance value changes depending on deformation. When stretched, the strip becomes longer and thinner, increasing its electrical resistance; when compressed, the strip becomes shorter and its cross section increases, thus decreasing its resistance. In order to translate the pressure to be measured into a controlled mechanical deformation, a strain gauge is applied to an elastic membrane. Normally, this is connected using adhesive. If pressure then acts on one side of this membrane, it deforms and the strain gauge, depending on its position on the membrane, is compressed or stretched (see Figure 1). The higher the pressure, the more the membrane deforms, meaning that the extent of the change in resistance depends directly on the pressure amplitude. For a more accurate measurement, several strain gauges are combined into a Wheatstone bridge circuit and the resistance change is measured as a voltage signal.

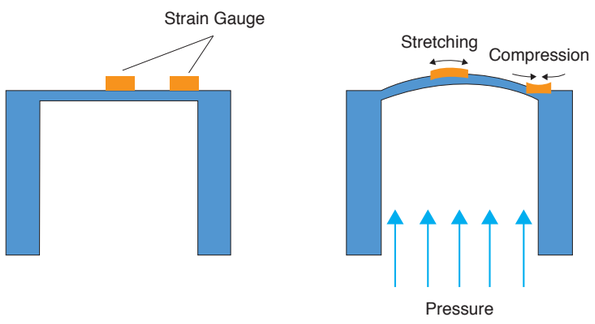


Figure 1: Positioning of strain gauges on a pressure-sensitive membrane.

Piezoresistive pressure measurement

Derived from the ancient Greek word piezein (meaning to squeeze or press), piezoresistive technology is inherently linked to pressure. The basic principle of piezoresistive pressure measurement essentially corresponds to that of resistive pressure measurement. Here too, -extension or shortening causes a change in resistance. However, in addition to this, in a piezoresistive material the mechanical tension that occurs when it is stretched or compressed also leads to a change in electrical conductivity. This piezoresistive effect is based on shifts in the atomic positions, which directly affect the electric charge transport. The change in resistance resulting from the change in electrical conductivity can be significantly greater than that caused by pure deformation.

Semiconductors are typical piezoresistive materials that exhibit a strong piezoresistive effect. The electrical conductivity of these materials lies between that of electrical conductors (metals such as silver, copper and aluminium) and insulators (such as glass). As a standard, piezoresistive pressure cells are made of Silicon, which is also used in the production of electronic circuits as well. These sensors are therefore sometimes referred to as sensor chips.

The basis for piezoresistive sensor chips is a crystalline silicon disc less than one millimetre thick, known as wafer (see Figure 2). In a process called doping, foreign atoms are introduced in its surface at certain points, which locally influences the conductivity. These doped areas in the silicon form the piezoresistive resistors. In a subsequent step, certain regions of the silicon wafer are thinned in such a way that membranes are formed directly in the silicon and the piezoresistive resistors lie in certain positions, similar to that shown in Figure 1. When a pressure then acts on one side of this membrane, it deforms and thus causes a mechanical stress in the piezoresistive resistors. Depending on the position, the resistance value then increases or decreases. The pressure sensitivity of the sensor chip is defined by the thickness of the remaining membrane.

Afterwards, the back of the silicon is bonded to a glass (see Figure 3). For absolute pressure sensors, this step creates a closed reference space in a vacuum. When measuring relative pressure, the rear glass contains a reference hole.

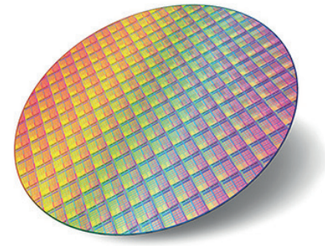


Figure 2: Silicon wafer on which various metal structures are applied.

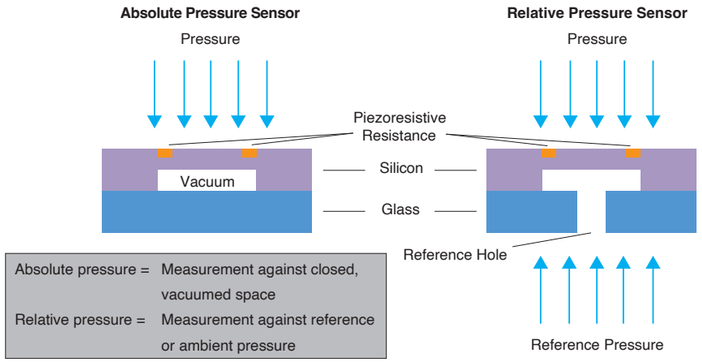


Figure 3: Structure of a piezoresistive sensor chip.

In piezoresistive pressure measuring cells, unlike in strain gauges, the measuring resistors are therefore integrated into the membrane. This technology thus eliminates the need for gluing and thus the weak point, namely the adhesive, which is an important prerequisite for stability over time and temperature as well as freedom from hysteresis (hysteresis = after-effects of the previous deformation state). In addition, the piezoresistive effect leads to a change in resistance up to 50 times larger than what can be achieved with metallic strain gauges.

Figure 5: Insulated, piezoresistive pressure sensor for universal applications.

In order to isolate the sensor chips from the medium, they are mounted in a pressure-tight -metal housing which is filled with oil and sealed at the front with a thin membrane (see Figure 4). The pressure then acts on the sensor chip via this membrane and the oil as a transmission medium. This isolated measuring cell also allows pressure measurement in aggressive liquids and gases.

Why use piezoresistive technology in pressure measurement?

Due to the large output signal and the established manufacturing processes, piezoresistive technology has become established in pressure measurement. Another major plus point is that there is no need to glue the strain gauge, which is critical for stability.

The crystalline silicon of the sensor chip deforms in a purely elastic way during operation, preventing any fatigue or stability problems, even after many pressure cycles. The sensor chips can be produced in established semiconductor technology processes, and integrating the relevant membrane for pressure measurement into the sensor chip allows for the manufacture of extremely compact and long-term stable pressure measuring cells. As piezoresistive pressure transducers are built without moving parts, they are very resilient against shocks and accelerations. The much larger change in resistance in piezoresistive measuring cells compared to conventional metal strain gauges leads to a large output signal and thus allows for a low-noise electronic conversion with high resolution. In combination with analogue or digital compensation solutions, an extremely precise, temperature-independent pressure signal is thus available.

The isolated piezoresistive pressure measuring cell distinguishes itself by its versatility: it is compatible with various media and covers wide pressure ranges. The specific construction of the housing achieves great flexibility for many industrial applications, even in critical environments. What makes KELLER stand out is the essential knowledge of designing and manufacturing isolated measuring cells. Thanks to 45 years of experience in piezoresistive pressure measurement, the company can also implement special applications. Insulated piezoresistive pressure cells from KELLER are used in demanding industrial applications and in research.

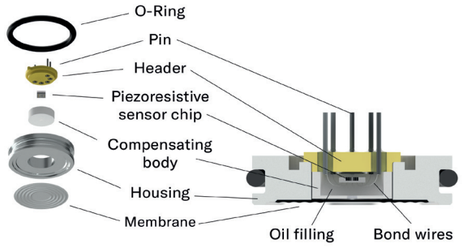


Figure 4: Construction of an insulated, oil-filled piezoresistive pressure sensor.

PRESSURE MEASUREMENT

OUR BUSINESS

KELLER – YOUR SWISS PRESSURE SENSING SPECIALIST

A market leader in the production of isolated pressure transducers and transmitters.

KELLER was established in 1974 by Hannes W. Keller, the inventor of the integrated silicon measuring cell. Today, his sons Tobias and Michael Keller run the business. The company is wholly family-owned and employs 480 staff from over 20 nations.

KELLER feels a strong connection to its home of Switzerland. Its headquarters are where the value is added and where most of our employees work. As a result, all KELLER products bear the quality seal «Made in Switzerland» and embody the Swiss values of quality, functionality and reliability.

KELLER Druckmesstechnik AG, including KELLER Gesellschaft für Druckmesstechnik mbH in Jestetten, is certified to ISO 9001. This means that our measured values can be fully traced to national standards.

INDUSTRIES

Industry Overview

Learn all about the different ways in which KELLER products can be used, whether you are interested in a standard application or are thinking about a tailor-made solution. Pressure measurement technology has potential. KELLER brings it to life.


Vehicles

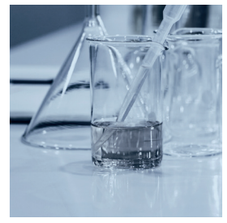

Aviation and Space Travel


Oil and Gas

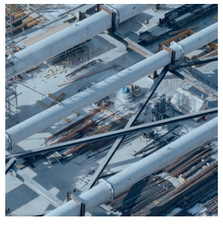

Water and Environment


HVAC


Raw Material Extraction


Chemistry, Food and Pharma


Consumer Products


Structural Measuring


System and Device Construction

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