



# KELLER

## PIEZORESISTIVE PRESSURE TRANSMITTERS STANDARD AND PROGRAMMABLE (PRO) VERSIONS

## SERIES 21 SERIES 21 PRO

The KELLER Series 21/21PRO are extremely reliable and cost effective pressure transmitters. These pressure transmitters use a programmable KELLER-ASIC microchip called "ProgRes" (programmable resistors). The "ProgRes" chip enables the transmitters to be set up and calibrated using automated test equipment, for improved product quality and lower costs. The PRO versions also have the unique feature that they can be programmed or re-ranged by the end user, via the hand held PP-96 programmer. Since its first introduction in 1989, the Series 21/21PRO was an immediate success, thousands of transmitters and hundreds of programmers are in daily service worldwide.

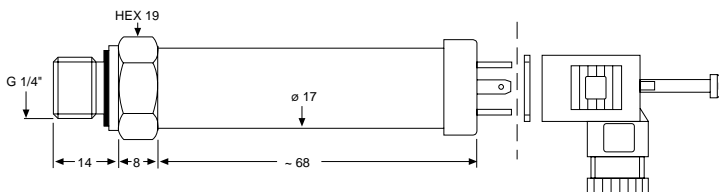
This transmitter uses the KELLER Series 6SC capsule as the core. The sensor is a piezo-resistive silicon pressure sensor, mounted in an oil filled capsule. The media pressure is isolated by a stainless steel diaphragm and transferred to the silicon sensor hydraulically via the oil. Sealed Gauge versions have a TAB (Tape Automated Bonding) sensor floating freely on a flexible print in the oil, this guarantees stability and endurance. Test have shown that even 20 million cycles of rapid changes in pressure from 10 bar to 250 bar do not cause damage to these sensors, and the Series 21 is therefore ideally suited for the toughest hydraulic applications.

The "ProgRes" circuit has programmable resistor networks, to set the Zero / Gain and thermal coefficients. All Series 21/21PRO transmitters are subjected to comprehensive test procedures which cycle both pressure and temperature, the various parameters are then automatically calibrated and set by the computer controlled test rig at the end of the run. A final test then checks that the settings are correct and within specification, only then are the transmitters are released for use. Note: The standard Series 21 transmitters are NOT user programmable.

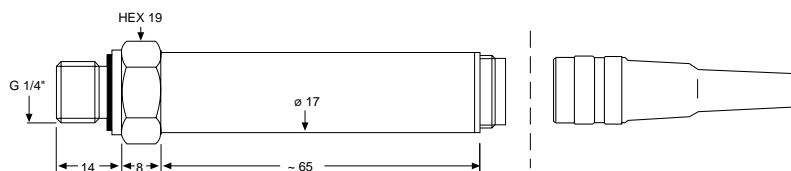
The programmable version transmitters, Series 21PRO has the data lines brought out to an Amphenol 8pin connector, allowing simple and precise adjustment of Zero and Span. The KELLER Programmer PP-96 is used to facilitate programming of individual transmitters. The PP-96-10 can handle up to 10 identical transmitter at one time. The signal output of a PRO version transmitter may be adjusted to give full-scale between 25% and 120% of the nominal range, and  $\pm 25\%$  zero adjustment.



Series 21, Cable or Plug



Series 21 Pro, Amphenol Plug C91 (8-pin)



### ELECTRICAL CONNECTIONS

Series 21, with Cable

	2-WIRE	3-WIRE
GREEN	OUT/GND	GND
WHITE	+Vcc	+OUT
BROWN		+Vcc

Series 21, with mPm 393-Connector

PIN	2-WIRE	3-WIRE
1	OUT/GND	GND
2		+OUT
3	+Vcc	+Vcc

Series 21 / 21 Pro, Amphenol C91-Connector

PIN	2-WIRE	3-WIRE
4	+Vcc	+Vcc
6		+OUT
8	OUT/GND	GND

Pin Assignment of Programming Lines (Pro)

PIN	DATA LINE
1	SIO
2	VPROG
3	DATA
5	WRITE
7	CLOCK

Subject to alterations

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## SPECIFICATIONS

(BR: **Basic Range** of transducer)(FS: adjusted **Full Scale**)

	PRESSURE RANGES (BASIC RANGE). OVERPRESSURE. IN BAR									
PR-21, PR-21PRO	-1	1	2	5	10	20				
PAA-21, PAA-21PRO		1	2	5	10	20				
PA-21, PA-21PRO				5	10	20	50	100	200	400
Overpressure	-1	3	4	10	20	30	75	150	300	500
Adjustment Range (PRO-Version)										
Minimum:	-0,25	0,25	0,5	1,25	2,5	5	12	25	50	100
Maximum:	-1	1,2	2,5	6	12	25	60	125	250	500

PR: Vented Gauge. Zero at atmospheric pressure

PAA: Absolute. Zero at vacuum

PA: Sealed Gauge. Zero at atmospheric pressure (at calibration day)

Signal Output	4...20 mA	0,5...4,5 Vdc	0...10 Vdc	0...20 mA
Supply Voltage	8...28 Vdc	5 V	13...28 Vdc	8...28 Vdc
Load Resistance	$R_{\Omega}=(U - 8 V) / 0,02 A$	> 5 k $\Omega$	> 5 k $\Omega$	$R_{\Omega}=(U - 8 V) / 0,02 A$
Current required	max. 25 mA	5 mA max.		max. 25 mA
Zero/Span Tolerance	$\pm 0,5\%$ BR (Basic Range)	$\pm 0,5\%$ BR	$\pm 0,5\%$ BR	$\pm 0,5\%$ BR
Configuration	2 Wire	3 Wire		
Electrical Connection:	OUT/GND: Pin 1 / White	GND: Pin 1 / Green		
mPm 393 or		+OUT: Pin 2 / White		
cable 2m	+Vcc: Pin 3 / Brown	+Vcc: Pin 3 / Brown		
Linearity	$\pm 0,2\%$ BR typ. / $\pm 0,5\%$ BR max.			
Total Error Band* +18...+22°C	$\pm 0,5\%$ BR max.		$\leq 2$ bar: $\pm 1\%$ BR max.	
Total Error Band* 0...+50°C	$\pm 1,0\%$ BR max.		$\leq 2$ bar: $\pm 1,5\%$ BR max.	
Total Error Band* -20...+80°C	$\pm 2,5\%$ BR max.		$\leq 2$ bar: $\pm 3\%$ BR max.	
Tightening Effect on Zero	max. 6 mbar / 20 Nm ** (14,77 lbf/ft)			

\* Total error band includes linearity, hysteresis, repeatability, zero/span offsets and temperature effects.

\*\* 20 Nm is a sufficient tightening moment for stable mounting. The moment can be reduced to 10 Nm with front-sided elastic seals.



Storage - / Operating Temperature	-40...100°C / -20...80°C	
Compensated Temperature Range	0...50°C (others on request)	
Temperature-Coefficients...		
- Zero	typ. $\leq 0,1\%$ BR / 10K	max. $\leq 0,2\%$ BR / 10K
- Sensitivity	typ. $\leq 0,1\%$ / 10K	max. $\leq 0,2\%$ / 10K
Stability	$\leq 0,2\%$ FS / year	

Electrical Connection	Series 21: mPm-Connector 393, incl. female connector or 2m screened cable Series 21 PRO: Amphenol C91 (8-pin), incl. female connector
Dead Volume Change	< 0,1 mm <sup>3</sup> / 400 bar
Pressure Connection	G1/4" male, Viton®-Eolastic® -seal
Materials in Contact with Media	Stainless steel AISI 316
Protection, CEI529	mPm-plug or cable: IP65    Amphenol-plug: IP40
Weight	$\approx 85$ g
Insulation	> 100 M $\Omega$ / 50 V
Pressure Endurance	10 Million Pressure Cycles 0...100 %FS at 25 °C
Vibration Endurance	20 g, 20 to 5000 Hz
Shock Endurance	20 g sinus 11 msec.

## OPTIONS

Pressure Connection	G1/4" female, 7/16"-20-UNF male/female, 1/4"-18-NPT male, M12x1,5 male
Electrical Connection	Plug DIN 43650, others on request
Output signals	1...5 V
Oil Filling	Halocarbon-oil for oxygen applications, olive-oil for food applications

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