# Piezoresistive Pressure Transmitters

## Standard and programmable (PRO) versions

# Series 21 / 21 PRO

The KELLER Series 21 / 21 PRO 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 / 21 PRO was an immediate success, thousands of transmitters and hundreds of programmers are in daily service worldwide.

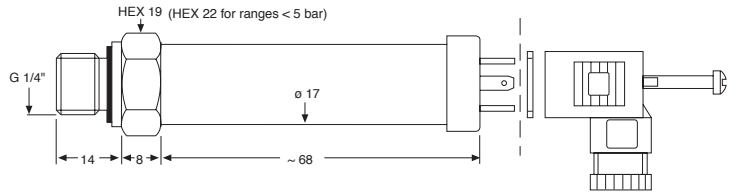
This transmitter uses the KELLER Series 6 SC capsule as the core. The sensor is a piezoresistive silicon pressure sensor, mounted in an oil filled capsule. The media pressure is isolated by a stainless steel diaphragm and transferred to the silicon sensor hydraulically via the oil.

The ”ProgRes” circuit has programmable resistor networks, to set the Zero / Gain and thermal coefficients. All Series 21 / 21 PRO 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.

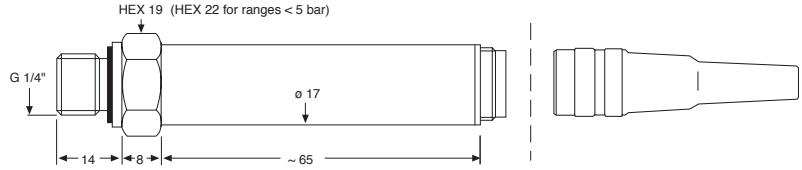
The programmable version transmitters, Series 21PRO has the data lines brought out to an Amphenol 8-pin connector, allowing simple and precise adjustment of Zero and Span. The KELLER Programmer PP-96 is used to facilitate programming of individual transmitters. The PP-96-10 can handle up to 10 identical transmitter at one time.

The signal output of a PRO version transmitter may be adjusted to give full-scale between 40% and 120% of the nominal range, and ± 20% 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 | | GND |
| WHITE | OUT/GND | +OUT |
| BROWN | +Vcc | +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

6/02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## SPECIFICATIONS

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

| | PRESSURE RANGES (BASIC RANGE). OVERPRESSURE. IN BAR | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **PR-21, PR-21 PRO** | **-1** | **1** | **2** | **5** | **10** | **20** | | | | | |
| **PAA-21, PAA-21 PRO** | | **1** | **2** | **5** | **10** | **20** | | | | | |
| **PA-21, PA-21 PRO** | | | | **5** | **10** | **20** | **50** | **100** | **200** | **400** | **600** |
| Overpressure | -1 | 3 | 4 | 10 | 20 | 30 | 75 | 150 | 300 | 500 | 700 |
| Adjustment Range (PRO-Version) | | | | | | | | | | | |
| Minimum: | -0,4 | 0,4 | 0,8 | 2 | 4 | 8 | 20 | 40 | 80 | 160 | 240 |
| Maximum: | -1 | 1,2 | 2,5 | 6 | 12 | 25 | 60 | 125 | 250 | 500 | 700 |

PR: Vented Gauge. Zero at atmospheric pressure PAA: Absolute. Zero at vacuum PA: Sealed Gauge. Zero at 1000 mbar abs.

| | | | |
|---|---|---|---|
| Signal Output | 4…20 mA | 0…10 Vdc | 0…20 mA |
| Supply Voltage | 8…28 Vdc | 13…28 Vdc | 8…28 Vdc |
| Load Resistance | $R_\Omega$ = (U - 8 V) / 0,02 A | > 5 kΩ | $R_\Omega$ = (U - 8 V) / 0,02 A |
| Current required | max. 25 mA | 5 mA max. | max. 25 mA |
| Zero/Span Tolerance | ± 0,5% BR | ± 0,5% BR | ± 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 2 m | +Vcc: Pin 3 / Brown | +Vcc: Pin 3 / Brown | |
| Linearity | ± 0,2% BR typ. | ± 0,5% BR max. | |
| Total Error Band * +18…+22°C | ± 0,5% BR max. | ≤ 2 bar: ± 1% BR max. | |
| Total Error Band * 0…+50°C | ± 1,0% BR max. | ≤ 2 bar: ± 1,5% BR max. | |
| Total Error Band * -20…+80°C | ± 2,5% BR max. | ≤ 2 bar: ± 3% BR max. | |

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

| | |
|---|---|
| Storage - / Operating Temperature | -40...100 °C / -20...80 °C |
| Compensated Temperature Range | 0...50 °C (others on request) |
| Temperature-Coefficients… | |
| · Zero | typ. ≤ 0,1% BR / 10 K max. ≤ 0,2% BR / 10 K |
| · Sensitivity | typ. ≤ 0,1% / 10 K max. ≤ 0,2% / 10 K |
| Stability | ≤ 0,2% FS / year |
| Electrical Connection | Series 21: mPm-Connector 393, incl. female connector or 2m screened cable<br>Series 21 PRO: Amphenol C91 (8-pin), incl. female connector |
| Dead Volume Change | < 0,1 $mm^3$ |
| Pressure Connection | G 1/4" male, Viton©-Eolastic©-seal |
| Materials in Contact with Media | Stainless steel AISI 316 |
| Protection, CEI529 | mPm-plug or cable: IP 65 Amphenol-plug: IP 40 |
| Weight (Plug Version) | ≈ 85 g |
| Insulation | > 100 MΩ / 500 V |
| Pressure Endurance | 10 million pressure cycles 0…100% FS at 25 °C |
| Vibration Endurance | 20 g (5...2000 Hz, max. amplitude ± 3 mm), according to IEC 68-2-6 |
| Shock Endurance | 20 g (11 ms) |

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## OPTIONS

| | |
|---|---|
| Pressure Connection | G 1/4" female, 7/16"-20-UNF male/female, 1/4"-18-NPT male, M 12 x 1,5 male |
| Electrical Connection | Plug DIN 43650, others on request |
| Output signals | 0...5 V, 0,5…4,5 V, others on request |
| Oil Filling | Halocarbon-oil for oxygen applications, olive-oil for food applications |

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