



Pressure sensors

Pressure transmitter with analog output signal

Series/Type: ALA 1.500 K VR Z15E L ST 1.0 B801
Ordering code: B58620L3200B801
Date: 2021-02-09
Version: 1.0

Applications

- Absolute pressure transmitter for industrial applications
- Typical applications are:
 - Off-road - including marine, agriculture, construction, oil and gas
 - Industrial process controls
 - Food and beverage
 - Pneumatic controls
 - Automation
 - Corrosive fluids and gas metering
 - Boilers and pumps
 - Filtration systems
 - Natural gas
- High resistance against media like diluted acids, contaminated air, exhaust gases
- Suitable for pressure ranges of 0.5 to 1.5 bar absolute like filter monitoring, flow control and fluid level measurement in extended temperature range of -40 °C to 140 °C



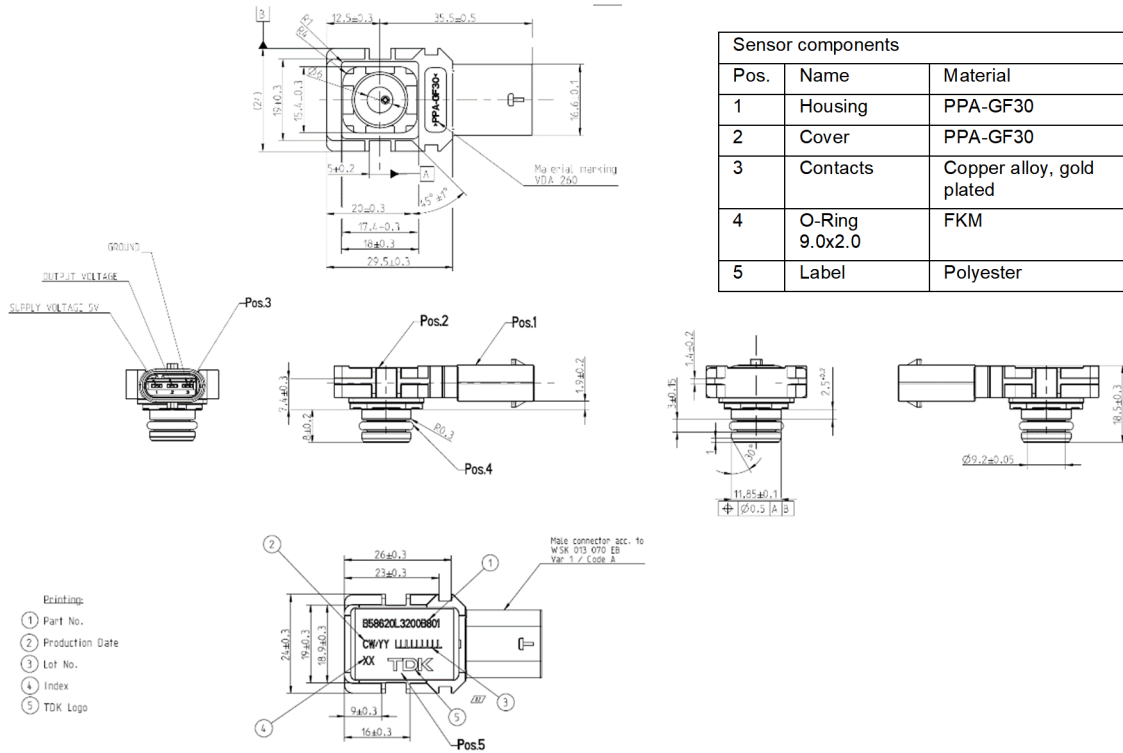
Features

- Sensing element based on piezoresistive MEMS technology
- High media resistance
- Voltage output signal (0.5 V to 4.5 V @ 5 V_{supply}) proportional to pressure and supply voltage (ratiometric)
- The integrated signal conditioner compensates non-linearity and temperature errors and supplies a precise calibrated, amplified output signal with a high immunity against electromagnetic influences
- Overvoltage and reverse voltage protection
- Short response time
- High measuring accuracy
- High resistance to large variety of media. Only unsuitable for substances which react with silicon, fluorsilicone, FKM, PPA
- Wire adapter with 1 m long cable included (temperature range of -40 °C to 125 °C)
- RoHS-compatible, halogen free according to IEC 61249-2-21 clause 3.1

Options

- Customer specific output characteristics and connectors on request

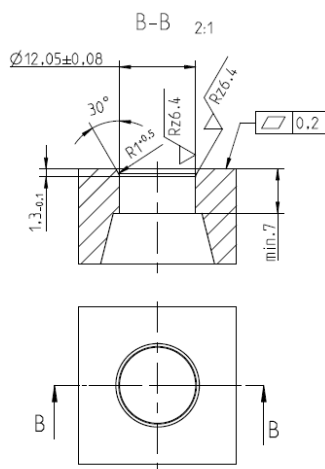
Dimensional drawings



All dimensions in mm

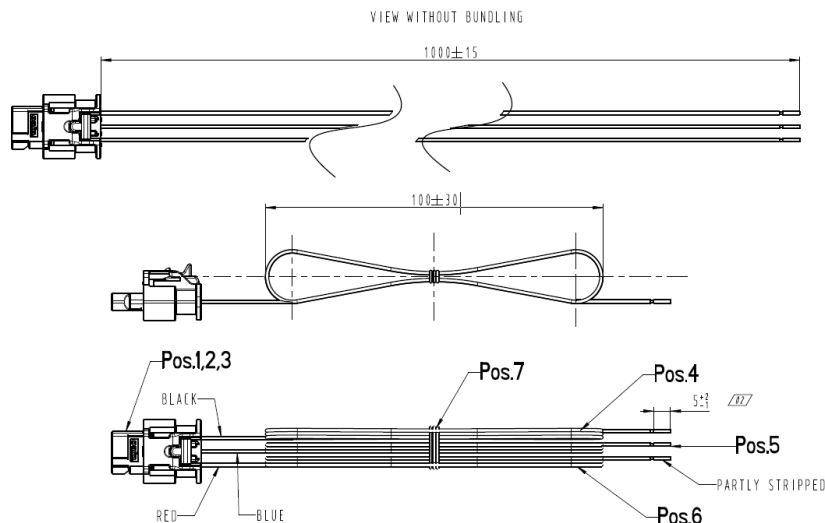
For further dimensions see product drawing B58620L3200B801.

Mounting conditions



All dimensions in mm

Wire adapter for industrial applications



Bill of materials			
Pos.	Description	Material	Comment
1	Connector	PA 6/6, PBT, Silicone	-
2	Terminal pin	copper alloy tin plated	-
3	Sealing	Silicone	-
4	Wire Black	FEP Insulated wire	AWG24
5	Wire Blue	FEP Insulated wire	AWG24
6	Wire Red	FEP Insulated wire	AWG24
7	Rubberband Red	Rubber	-

All dimensions in mm

For further dimensions see wire harness drawing Z25200N497D.

Technical data
Absolute maximum ratings

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Temperature ranges						
Sensor operating temperature range	T_{so}	1)	-40		+ 140	°C
Short time sensor operating temp. range	$T_{so,short}$	For 100 h 2)	-40		+ 150	°C
Wire adapter operating temperature range	T_{wo}	3)	-40		+ 125	°C
Pressure ranges						
Rated pressure range	p_r	Absolute pressure 4)	0.5		1.5	bar
Overpressure	p_{ov}	Absolute pressure 5)	3			bar
Burst pressure	p_{burst}	Absolute pressure 6)	4.5			bar
Supply voltage /-current						
Supply voltage	V_{supply}	7)	4.5	5.0	5.5	V
Reverse voltage, overvoltage	V_{ov}	8)	-33		+ 33	V
Supply current	I_{supply}	Without load current			9.5	mA
Signal output current	I_{out}	9)			2.5	mA
Short circuit current	$I_{out,SC}$	10)	-25		25	mA
Load						
Pull-up resistor	$R_{pull-up}$		4.7			kΩ
Pull-down resistor	$R_{pull-down}$		4.7			kΩ
Load capacity	C_{load}	Including harness capacity			95	nF

Characteristics

Output signal characteristic (at $T_o = 25\text{ °C}$, $V_{supply} = 5\text{ V}$)

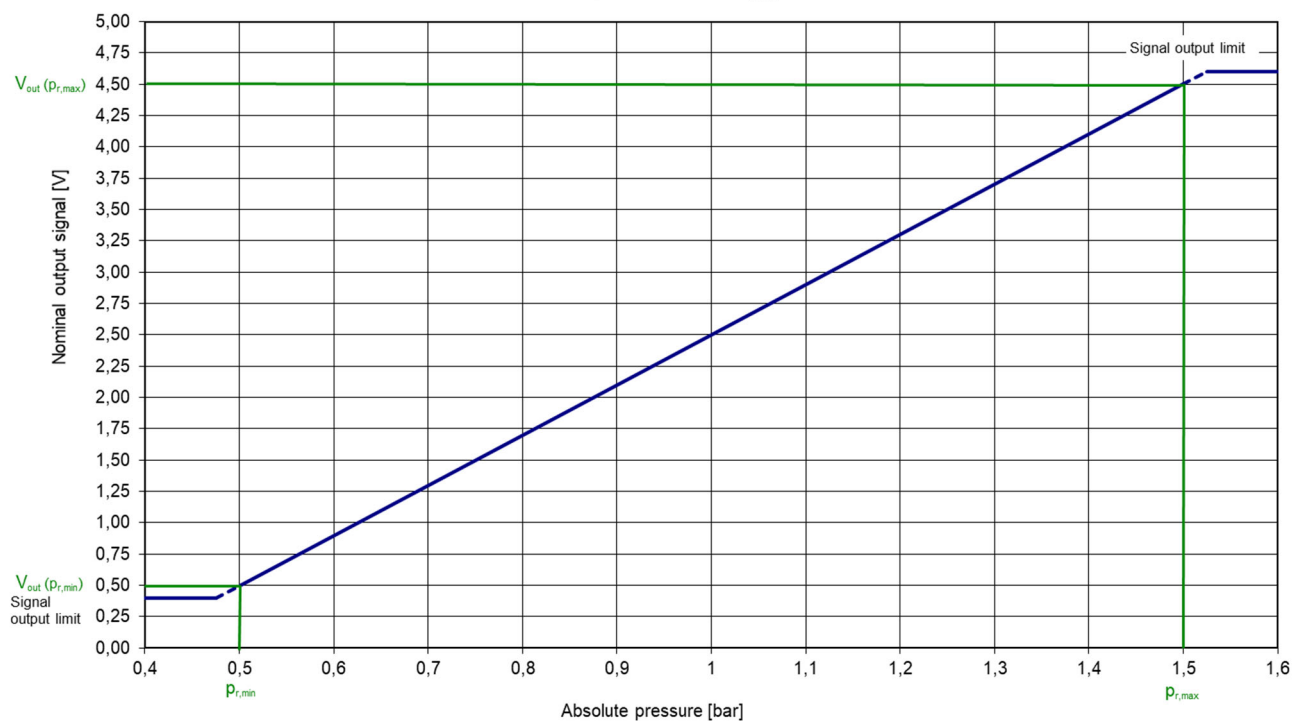
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output at $p_{r,min}$	$V_{out}(p_{r,min})$	Ratiometric ¹¹⁾		0.5		V
Signal span (Full scale)	V_{FS}	Ratiometric ^{11) / 12)}		4.0		V
Full scale output at $p_{r,max}$	$V_{out}(p_{r,max})$	Ratiometric ¹¹⁾		4.5		V
Upper output signal limit		Ratiometric ¹¹⁾	4.50	4.60	4.70	V
Lower output signal limit		Ratiometric ¹¹⁾	0.30	0.40	0.50	V
Startup time	$t_{startup}$				5.0	ms
Response time	t_{10-90}	¹³⁾		1	2	ms
Accuracy	E	Without temperature error	- 1.00		+ 1.00	%FS

Output signal characteristic as function of pressure and supply voltage

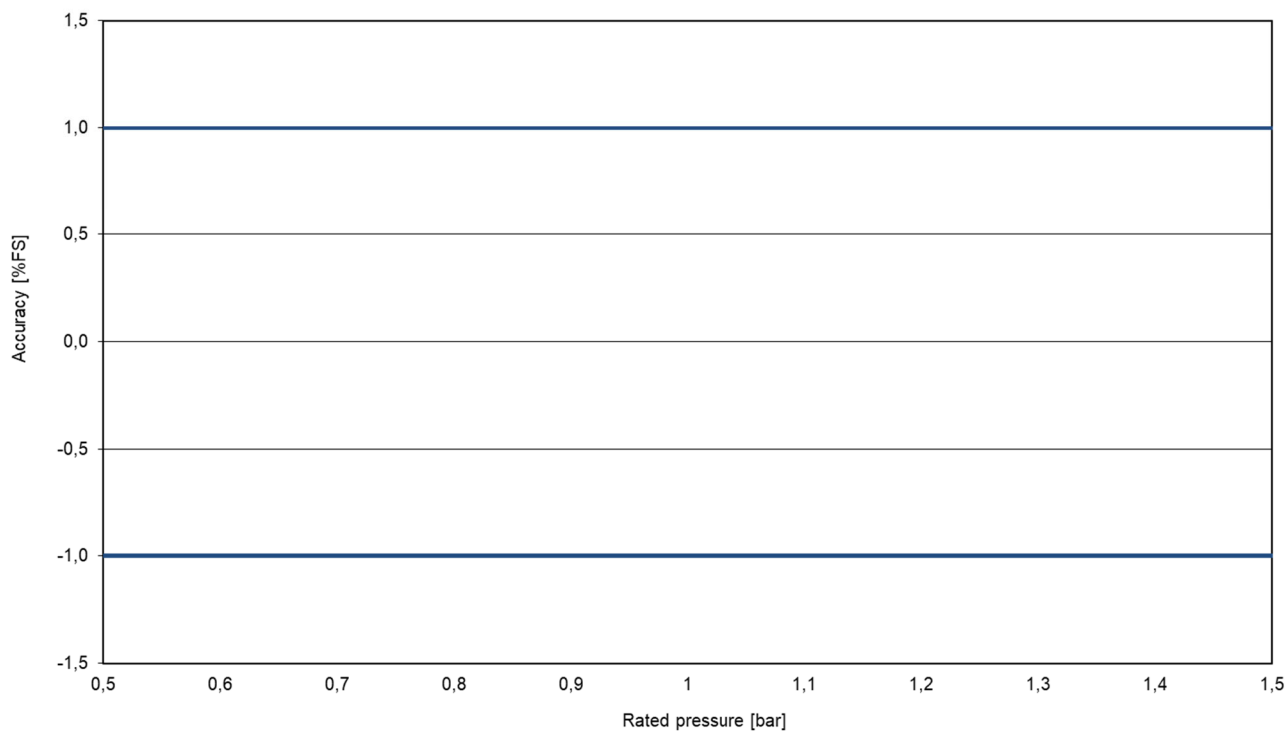
$$V_{out}(p_r, V_{supply}) = \left[\frac{p_r - p_{r,min}}{p_{r,max} - p_{r,min}} V_{FS} + V_{OUT}(p_{r,min}) \right] V_{supply}$$

$$V_{out}(p_r, V_{supply}) = \left[\frac{p_r - 0.5\text{ bar}}{1\text{ bar}} 0.8 \frac{V}{V} + 0.1 \frac{V}{V} \right] V_{supply}$$

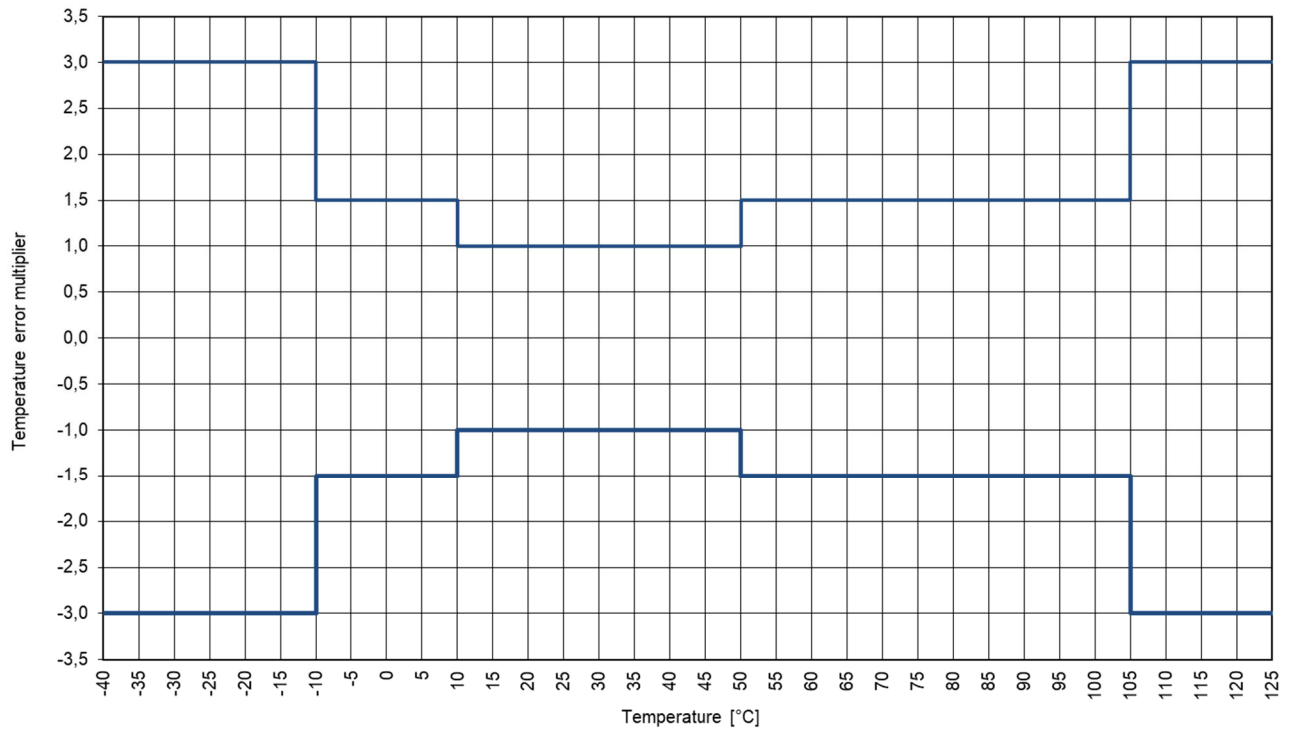
Output signal @ $T_o = 25^\circ\text{C}$, $V_{\text{supply}} = 5\text{ V}$



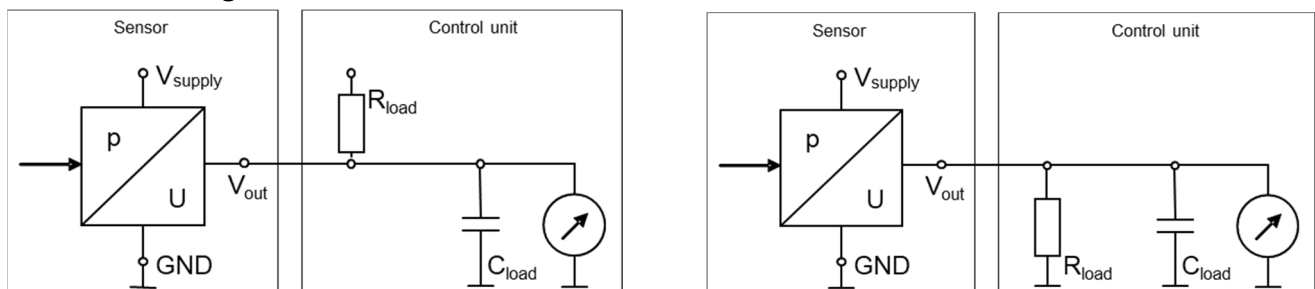
Accuracy e



Temperature error multiplier



Connection diagram



Terminal assignment

Pin	Symbol	Signal	Wire color*
1	V _{supply}	Supply voltage	red
2	V _{out}	Output signal ANALOG	blue
3	GND	Ground	black

*if using wire adapter

Symbols and terms

- 1) **Operating temperature range T_{so}**
An operation of the pressure sensor within the temperature range $T_{so,min}$ up to $T_{so,max}$ will not affect the performance of the pressure sensor.
- 2) **Short time operating temp. range, $T_{so,short}$**
An operation of the pressure sensor within the temperature range $T_{so,short,min}$ up to $T_{so,short,max}$ will not affect the performance of the pressure sensor.
- 3) **Operating temperature range T_{wo}**
An operation of the connector within the temperature range $T_{wo,min}$ up to $T_{wo,max}$ will not affect the performance of the connector.
- 4) **Rated pressure p_r**
Within the rated pressure range $p_{r,min}$ up to $p_{r,max}$ the signal output characteristic corresponds to this specification.
- 5) **Overpressure p_{ov}**
The sensor does not work correctly in the pressure range $p_{r,max}$ up to $p_{ov,min}$ but will return to normal operation after having been subjected to up to 1000 cycles of overpressure within the pressure range $p_{r,min}$ up to $p_{ov,min}$. The sensor cannot be expected to return to normal operation after having been subjected to a pressure above the overpressure $p_{ov,min}$.
- 6) **Burst pressure p_{burst}**
The sensor cannot be expected to return to normal operation after having been subjected to a pressure in the range of p_{ov} and p_{burst} . The sensor will not cause leakage of the pressure medium when exposed to pressure up to the burst pressure.
- 7) **Supply voltage V_{supply}**
 $V_{supply,max}$ is the maximum permissible supply voltage, which has to be applied for normal operation.
 $V_{supply,min}$ is the minimum required supply voltage, which has to be applied for normal operation.
- 8) **Reverse voltage, Overvoltage V_{ov}**
If supplied with a supply voltage of $V_{ov,min}$ up to $V_{supply,min}$ the sensor does not work correctly (reverse voltage). If supplied with a supply voltage of $V_{supply,max}$ up to $V_{ov,max}$ the sensor does not work correctly (overvoltage). The sensor will return to normal operation after having been subjected to reverse voltage and overvoltage in the range of $V_{ov,min}$ up to $V_{ov,max}$ for 1 hour maximum.
- 9) **Signal output current I_{out}**
Maximum output current with $R_{load} = 2.7 \text{ k}\Omega$ and supply voltage in the in the range of $V_{supply,min}$ up to $V_{supply,max}$.
- 10) **Short circuit current $I_{out,sc}$**
Maximum short circuit current at following conditions: minimum output voltage to V_{supply} or maximum output voltage to Ground
- 11) **Ratiometric output**
The output voltage V_{out} is ratiometric to the supply voltage ($V_{out} \sim V_{supply}$).
Example: $V_{out}(pr,min) = 0.04 \text{ V/V}$
with $V_{supply} = 5 \text{ V}$, $V_{out}(pr,min) = 0.04 \text{ V/V} * 5 \text{ V} = 0.2 \text{ V}$
with $V_{supply} = 5.1 \text{ V}$, $V_{out}(pr,min) = 0.04 \text{ V/V} * 5.1 \text{ V} = 0.204$
- 12) **Signal span (Full Scale)**
 $VFS = FS = V_{out(pr,max)} - V_{out(pr,min)}$
- 13) **Response time t_{10-90}**
Delay between a pressure change (10 ... 90% pr) and the corresponding signal output change (10 ... 90% FS).
Response time cannot be measured and is evaluated theoretically (it is not possible to generate an adequate pressure jump function).

Cautions and warnings

Storage

All pressure sensors should be stored in their original packaging. They should not be placed in harmful environments such as corrosive gases nor exposed to heat or direct sunlight, which may cause deformations. Similar effects may result from extreme storage temperatures and climatic conditions. Avoid storing the sensor dies in an environment where condensation may form or in a location exposed to corrosive gases, which will adversely affect their performance. Plastic materials should not be used for wrapping/packing when storing or transporting these dies, as they may become charged.

Mounting

The correct application of the sensor and the connector on the sensor must be checked. Before usage test leak tightness of mounted pressure ports. Be assure, that pressure ports fulfil temperature, media and pressure requirements.

Release all mounting processes carefully.

Operation

Media compatibility with the pressure sensors must be ensured to prevent their failure. The use of other media can cause damage and malfunction. Never use pressure sensors in atmospheres containing explosive liquids or gases.

Ensure pressure equalization to the environment, if gauge pressure sensors are used. Avoid operating the pressure sensors in an environment where condensation may form or in a location exposed to corrosive gases. These environments adversely affect their performance.

If the operating pressure is not within the rated pressure range, it may change the output characteristics. This may also happen with pressure sensor dies if an incorrect mounting method is used. Be sure that the applicable pressure does not exceed the over pressure, as it may damage the pressure sensor.

Do not exceed the maximum rated supply voltage nor the rated storage temperature range, as it may damage the pressure sensor.

Temperature variations in both the ambient conditions and the media (liquid or gas) can affect the accuracy of the output

signal from the pressure sensors. Be sure to check the operating temperature range and thermal error specification of the pressure sensors to determine their suitability for the application.

Connections must be wired in accordance with the terminal assignment specified in the data sheets. Care should be taken as reversed pin connections can damage the pressure transmitters or degrade their performance. Contact between the pressure sensor terminals and metals or other materials may cause errors in the output characteristics. This listing does not claim to be complete, but merely reflects the experience of TDK Electronics AG.

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