



Pressure sensors

Pressure transmitter with analogue output

Series/Type: AFA 11.00 VR Z15E L ST 1.0 B830
Ordering code: B58620F3800B830
Date: 2021-08-12
Version: 1.0

Applications

- Absolute pressure transmitter for industrial applications
- Typical applications are: Off-Road Vehicles, Pipeline pressure, valves, natural gas, gas meters, boilers, heat pumps, residential booster pumps, lawn & Pool pumps, circulator pumps, food and beverage equipment
- High resistance against non-freezing media like fuel, diluted acids, contaminated air
- Suitable for applications with pressure ranges of 1 bar to 11 in extended temperature range up to 125 °C

Features

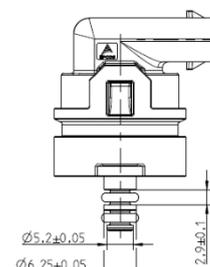
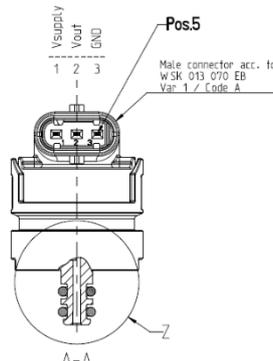
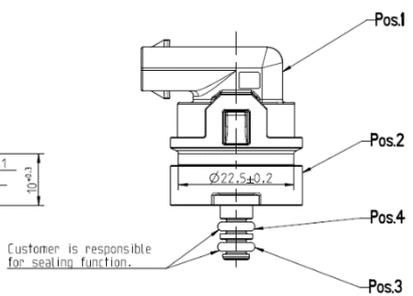
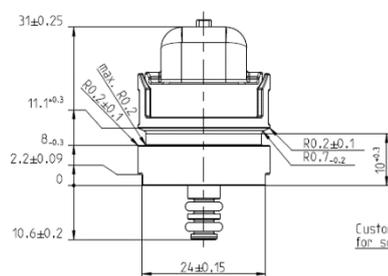
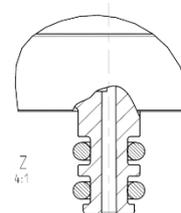
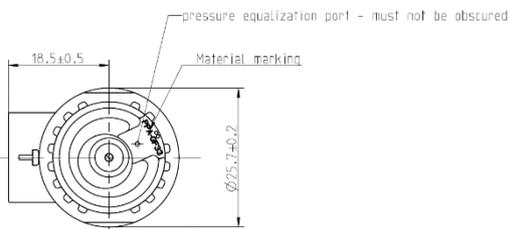
- Absolute Pressure measurement
- Pressure range 1 to 11 bar
- Analogue output
- Voltage output signal proportional to pressure and supply voltage (ratiometric)
- The integrated signal conditioner compensates non-linearity and temperature errors and supplies a precise calibrated, amplified output signal with a high immunity against electromagnetic influences
- High resistance to large variety of media. Unsuitable for substances reacting with silicon, glass, FKM, stainless steel.
- Overvoltage and reverse voltage protection
- Short response time
- High measuring accuracy
- Wire adapter with 1m long cable included

Options

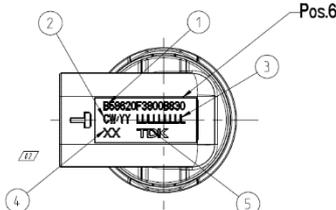
- Customer specific output characteristics and connectors on request

Dimensional drawings

Sensor components		
Pos.	Name	Material
1	Connector	PPA-GF30 black
2	Body	PPA-GF30 black
3	O-Ring	3.68x1.78 FKM black
4	O-Ring	3.68x1.78 FVMQ blue
5	Contact pin	Copper alloy, tinned
6	Label	Polyester



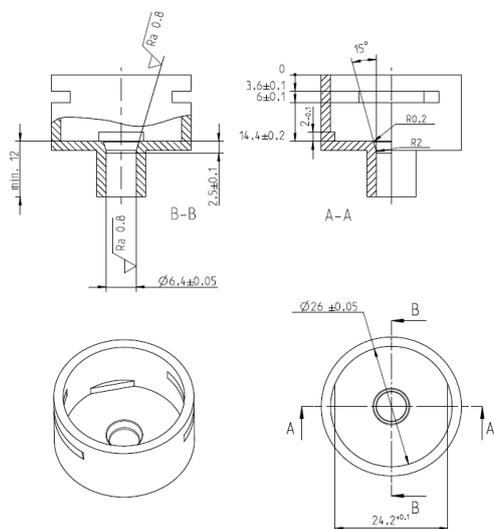
- Printing:
- ① Part No.
 - ② Production Date
 - ③ Lot No.
 - ④ Index
 - ⑤ TDK Logo



All dimensions in mm

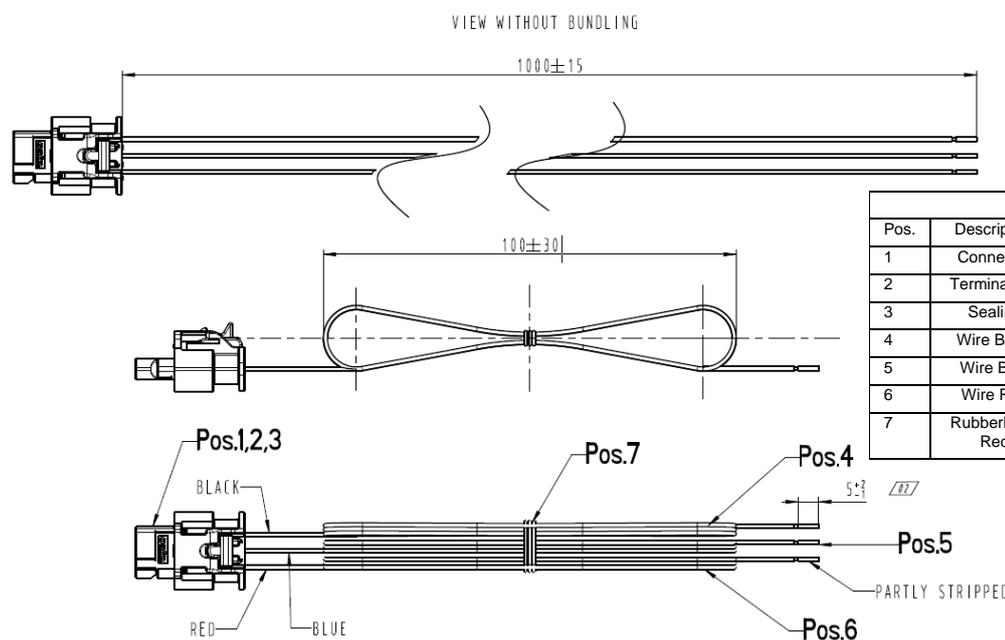
For further dimensions see product drawing B58620F3800B830.
The notch can be used to fix the sensor.

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

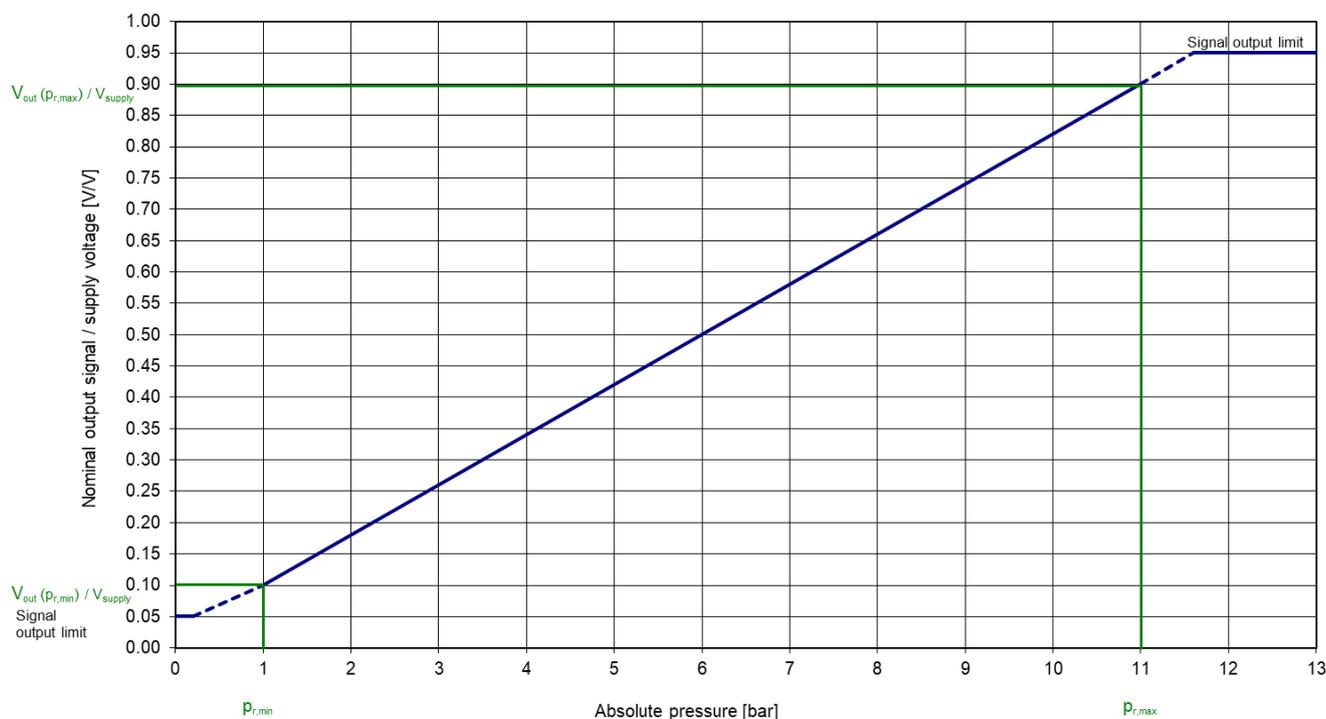
Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Temperature ranges						
Storage temperature range	T_{st}	1)	- 40		+125	°C
Operating temperature range	T_o	2)	- 40		+125	°C
Pressure ranges						
Rated pressure range	p_r	Absolute pressure ³⁾	1.0		11.0	bar
Overpressure	p_{ov}	Absolute pressure ⁴⁾	15.0			bar
Burst pressure	p_{burst}	Absolute pressure ⁵⁾	30.0			bar
Ambient pressure		Absolute pressure	100			mbar
Ambient pressure (short term)		ambient pressure short term < 10 min. during He-	0.01			mbar
Supply voltage /-current						
Supply voltage	V_{supply}	6)	4.5	5.0	5.5	V
Reverse voltage, overvoltage	V_{OV}	12)	- 33		+ 33	V
Supply current	I_{supply}	Without load current			7.0	mA
Signal output current	I_{out}	7)			2.5	mA
Short circuit current	$I_{out,SC}$	8)	- 25		25	mA
Load						
Load resistor	R_{load}		2.0			mA
Load capacity	C_{load}	Including harness capacity			95	nF

Characteristics

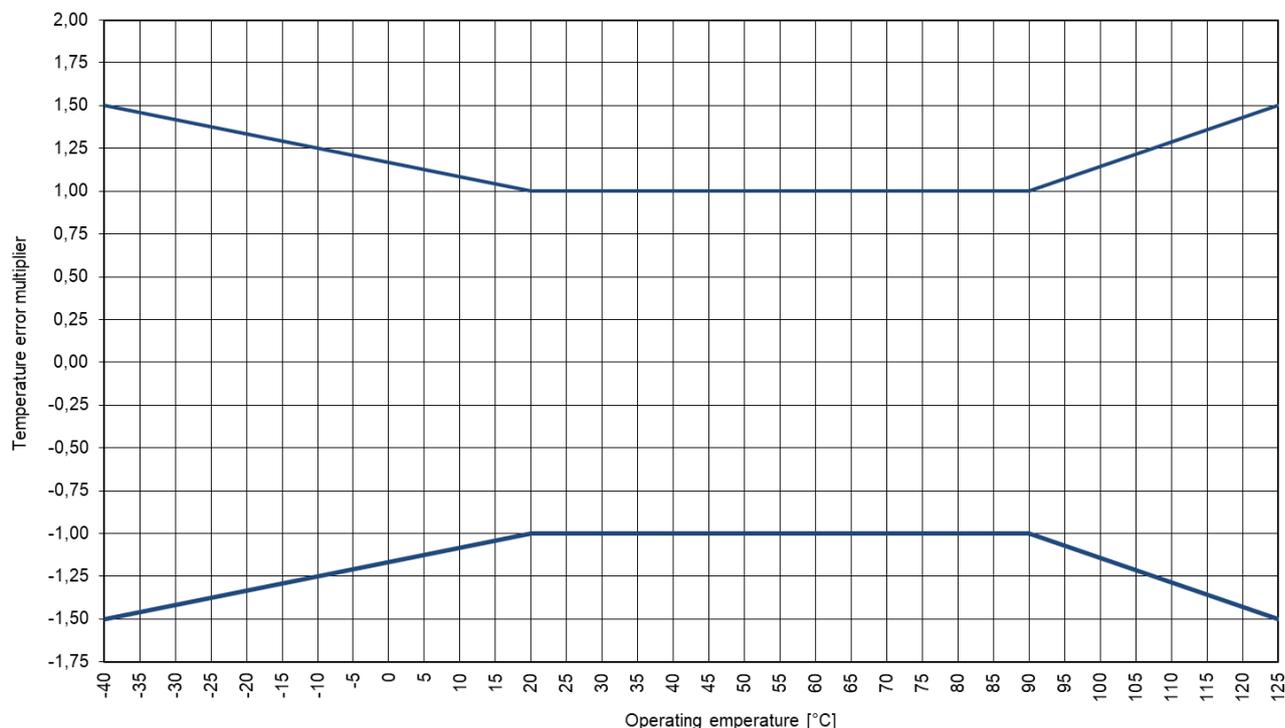
Output signal characteristic (at $T_o = 25^\circ\text{C}$, $V_{\text{supply}} = 5\text{ V}$)

Parameter	Symbol	Conditions	Min.	Typ.	Max.	Unit
Output at $p_{r,\text{min}}$	$V_{\text{out}}(p_{r,\text{min}})$	Ratiometric ⁹⁾		0.1		V/V
Signal span (Full scale)	V_{FS}	Ratiometric ¹⁰⁾		0.8		V/V
Compensated temperature range	$V_{\text{out}}(p_{r,\text{max}})$	Ratiometric ⁹⁾		0.9		V/V
Output signal limits		Ratiometric ⁹⁾	0.05		0.95	V/V
Startup time	t_{startup}	Can be reduced on request			150	ms
Response time	T10-90	¹¹⁾		1	2	ms
Total error	$E_{\text{total. 20/80}}$	at $T_o = 20\dots80^\circ\text{C}$	- 2.0		+ 2.0	% V_{supply}
	$E_{\text{total. -40/125}}$	at $T_o = -40\dots20^\circ\text{C}$, 80 ... 125°C	See graph			% V_{supply}

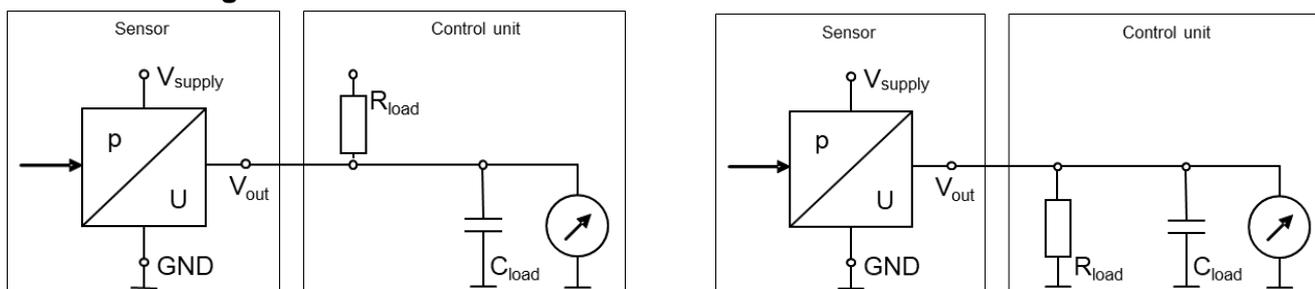
Output signal characteristics



Temperature error multiplier



Connection diagram



Terminal assignment

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

*if using wire adapter

Media compatibility

The pressure sensors high resistance was approved with the following media:

- Fuel
- Diesel
- Methanol
- Ethanol

Application with following media needs to be specifically evaluated. Please consult TDK Electronics AG:

- Engine oil
- Hydraulic fluid
- Coolant media
- Water
- Water vapor

The pressure sensor is not compatible with:

- Media that is freezing in application temperature range
- The diameter of the media path to the pressure sensing element is 0.5mm.
Usage of appropriate filters has to be considered in order to avoid blocking of the pressure sensing element when used with contaminated fluid

Symbols and terms

- 1) **Storage temperature range T_{st}**
A storage of the pressure sensor within the temperature range $T_{st,min}$ up to $T_{st,max}$ and without applied pressure and supply voltage will not affect the performance of the pressure sensor.
- 2) **Operating temperature range T_o**
An operation of the pressure sensor within the temperature range $T_{o,min}$ up to $T_{o,max}$ will not affect the performance of the pressure sensor.
- 3) **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.
- 4) **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 $p_{ov,min}$.
- 5) **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 pressures up to the burst pressure.
- 6) **Supply voltage V_{supply}**
 $V_{supply,max}$ is the maximum permissible supply voltage, which can be applied without damages.
 $V_{supply,min}$ is the minimum required supply voltage, which has to be applied for normal operation.
- 7) **Signal output current I_{out}**
Maximum output current with $R_{load} = 2.0 \text{ k}\Omega$ and supply voltage in the in the range of $V_{supply,min}$ up to $V_{supply,max}$.
- 8) **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
- 9) **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 $V_{supply} = 5.1 \text{ V}$, $V_{out}(pr,min) = 0.04 \text{ V/V} * 5.1 \text{ V} = 0.204$
- 10) **Signal span (Full Scale)**
 $VFS = FS = V_{out(pr,max)} - V_{out(pr,min)}$
- 11) **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).
- 12) **Reverse voltage, Overvoltage**
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.

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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Important notes

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