

**Operating Instructions  
for  
Pressure Sensors  
Heavy Duty Compact**

**Model: SEN-86../ SEN-87..**



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## 2. Note

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Please read these operating instructions before unpacking and putting the unit into operation. Follow the instructions precisely as described herein.

The devices are only to be used, maintained and serviced by persons familiar with these operating instructions and in accordance with local regulations applying to Health & Safety and prevention of accidents.

When used in machines, the measuring unit should be used only when the machines fulfil the EC-machine guidelines.

## 3. Instrument Inspection

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Instruments are inspected before shipping and sent out in perfect condition.

Should damage to a device be visible, we recommend a thorough inspection of the delivery packaging. In case of damage, please inform your parcel service / forwarding agent immediately, since they are responsible for damages during transit.

### **Scope of delivery:**

The standard delivery includes:

- Pressure Sensors Heavy Duty Compact model: SEN-86../87..
- Operating Instructions

## 4. Regulation Use

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Pressure sensors transmit the mechanical pressure signal into an electrical output signal. The media's which are in contact with the instrument should have no effects on the instrument materials used. Do not use standard units in hazardous areas and for oxygen applications.

## 5. Operating Principle

KOBOLD Pressure sensors model SEN-86 are inexpensive pressure sensors with thick film ceramic pressure element. With their accuracy, reliability and compact design, they are perfectly suitable for OEM applications in medium to high quantities.

The materials and technology used make these pressure sensors insensitive to chemically aggressive media and mechanical load.

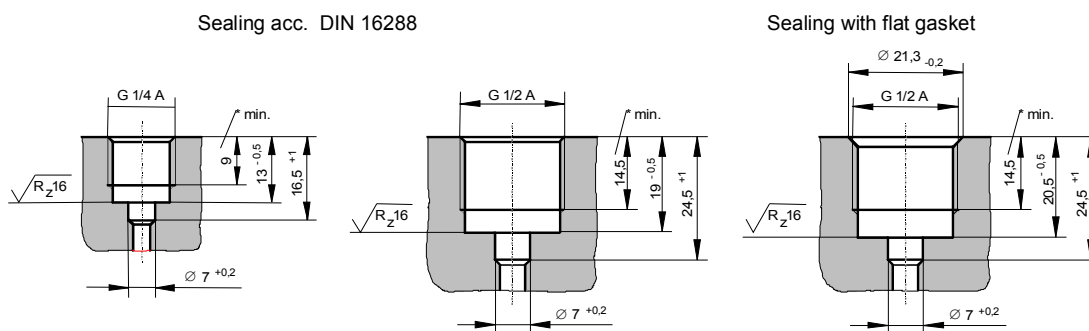
Particularly hydraulics systems with their high and fast pressure peaks are thus preferred applications.

## 6. Mechanical Connection and Putting to Operation

The place where pressure is taken should be prepared according the following specifications for the screw-in threads.

For sealing, please use sealing discs acc. DIN 16258 or profile washers. The maximum initial tension depends on the material, the shape of the used sealing and the mechanical connection of the pressure sensor.

There should be no vibrations and/or no radiation of heat near the mounting position of the sensors. Please pay attention that the given technical data's are not exceeded. After the mechanical and electrical connection the sensor works immediately.



## 7. Electrical Connection

- Ensure that the power is disconnected during connection of the cable.
- The electrical connection is made either via plug and pin or by cable.
- The exact wiring scheme is shown on the sketches hereafter or at the type plate of your sensor.

### Meaning of the different connector markings

UB+	positive pole of the supply voltage
OV	negative pole of the supply voltage
S+	positive pole of the output signal
S-	negative pole of the output signal
Shielding	Cable protection enclosure-earth

The sensor can be supplied with a non stabilised DC source with the given voltage range. The minimum supply voltage for pressure sensors with current output should be the minimum UB plus the minimum voltage, which is needed for the external indicator:

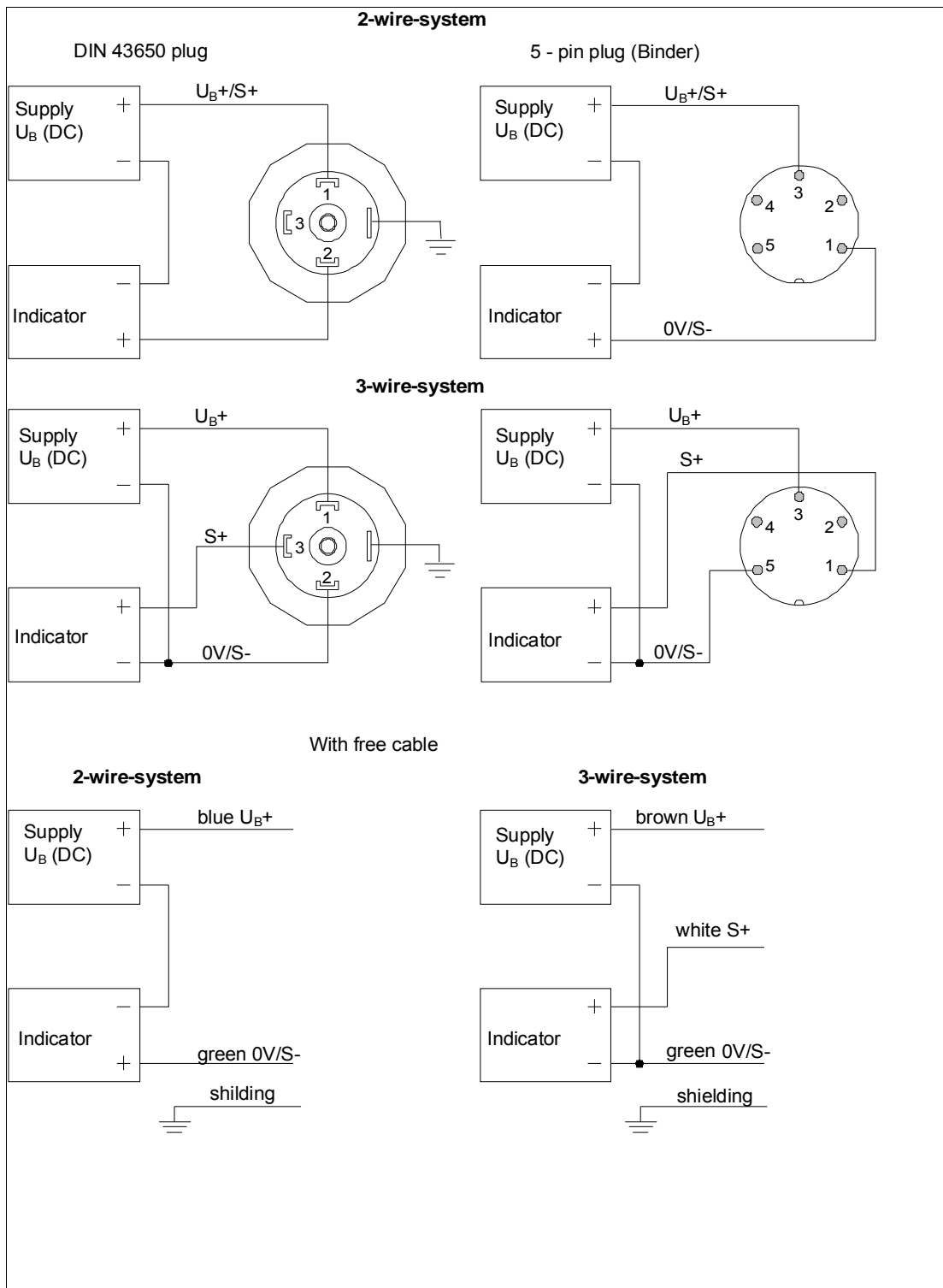
### Current output

	2-wire system	3-wire system
Output signal	4...20 mA	0...20 mA
Supply voltage	$U_B = 15 \dots 32 V_{DC}$	
Permissible load	$R_A [Ohm] = (U_B [V] - 15 V) / 0,02 A$	
Wiring	see schematic	

### Voltage output

	3-wire system	3-wire system
Output signal	0...5 V	0...10 V
Supply voltage	$U_B = 15 \dots 32 V_{DC}$	
Permissible load	$R_A > 5 k\Omega$	$R_A > 10 k\Omega$
Wiring	see schematic	

## Electrical connection, principle drawings pin assignment, cable marking



**Attention! Incorrect wiring will lead to damage of the unit's electronics.**

## 8. Maintenance

The pressure sensors described in this manual are maintenance free! They do not contain any components which may be repaired or exchanged locally. Repairs are not possible other than in our factory.

## 9. Trouble shouting

Trouble	Possible reason	What's to do
No signal	no supply voltage broken wire	Check your power supply and wiring. If necessary replace defective parts
	Sensor has been wired faulty	Check the wiring according to the sketches, adjust wiring if necessary.
	No pressure	Check your tubing , valves open?
	Defective electronics caused by to high supply voltage or by external voltage	Return sensor to us for repair
Unchanged signal by changing pressure	Pressure port is clogged	Clean the pressure port
	Defective electronic caused by to high supply voltage or by external voltage	Return sensor to us for repair
	Pressure sensor over pressurized	Return sensor to us for repair
To high, even on changing pressure unchanged signal	Defective electronics caused by to high supply voltage or by external voltage	Return sensor to us for repair
Span of signal to small	Supply voltage to low Resistance to high	Adjust supply voltage Adhere to max. allowable resistance
Zero signal to high	Mechanical overburden	Return to us for repair
Output signal non linear	Mechanical overburden	Recalibrate sensor resp. return to us for repair

## 10. Technical Information

Model	SEN-86x0	SEN -87x0
Technology	internal diaphragm	
Pressure type	gauge pressure	
Housing	stainless steel 1.4305	
Connection:	G ½ male; stainless steel 1.4301 (NPT, UNF on request)	G ¼ male; stainless steel 1.4301 (NPT, UNF on request)
Sensor element	ceramic (Al <sub>2</sub> O <sub>3</sub> )	
Measuring principle	thick film techn. (DMS)	
O-Ring	NBR	
Max. Temperature	Storage: -30...+100 °C Medium: -20...+125 °C Ambient: -30...+100 °C	Storage: -30...+100 °C Medium: -20...+ 85 °C Ambient: -30...+100 °C
Pressure limitation	< 60 bar: 2 x range ≥ 60 bar: 1.5 x range	
Accuracy class	0.5 f.s.d.)	
Repeatability	≤ ± 0.15 % (f.s.d.)	
Characteristic deviation	≤ ± 0.3 % (f.s.d.)	
Stability (annual)	≤ ± 0.2 % of full scale in rated conditions	
Electrical connection	Plug DIN 43 650 A / Plug M12x1 Cable connection	
Power supply	15...32 V <sub>DC</sub>	
Output signal	4 – 20 mA, (2-wire), 0 – 10 V <sub>DC</sub>	
Load (Ω)	≤ (U <sub>B</sub> – 15 V)/0.02 A (for 4 – 20 mA)	
Response time	≤ 1 ms (within 10 – 90% of full scale)	
Temp. comp. range	-25...+85 °C	
Temperature drift	Zero: ≤ ± 0.02% full scale/K Measuring span: ≤ ± 0.01% full scale/K	
Protection	IP 65 (SEN-860..; SEN-863..) IP 68 (SEN-865..)	
Options	Absolute pressure for ranges 1.0...25 bar Oil- and free of grease for oxygen Silicone- and LABS free Connection with 50 mm cooling fins t <sub>max</sub> 125 °C Connection and housing SS 1.4539 <sup>1)</sup> instead of 1.4305 Connection and housing SS 1.4571 instead of 1.4305 O-ring FPM instead of NBR O ring PTFE (Kalrez) instead of NBR <100 bar ½" NPT thread instead of "G"      G¼ DIN385-E inclusive seal ring <sup>3)</sup> Special connection <sup>2)</sup> on request	

<sup>1)</sup> Seawater resistant

<sup>2)</sup> Please specify in writing

<sup>3)</sup> Adapter of PSD usable



## 11. Order Codes

Sensor (Example: SEN-8600 C315)

Electrical connection	Class	Model	Output	Measuring range		Options
DIN-plug; IP 65	0.5	SEN-8600..	<b>without</b> = 4 – 20 mA  /2 = 0 –10 V	<b>C305</b> = -0.6...0 bar <b>C315</b> = -1 ...0 bar <b>C505</b> = -1...0.6 bar <b>C515</b> = -1...1.5 bar <b>C525</b> = -1...3 bar <b>C535</b> = -1...5 bar <b>C545</b> = -1...9 bar <b>C555</b> = -1...15 bar <b>B015</b> = 0...0.6 bar <b>B025</b> = 0...1 bar <b>B035</b> = 0...1.6 bar <b>B045</b> = 0...2.5 bar <b>B055</b> = 0...4 bar <b>B065</b> = 0...6 bar <b>B075</b> = 0...10 bar <b>B085</b> = 0...16 bar <b>A095</b> = 0...25 bar <b>A105</b> = 0...40 bar <b>A115</b> = 0...60 bar <b>A125</b> = 0...100 bar <b>A135</b> = 0...160 bar <b>A140</b> = 0...200 bar <b>A145</b> = 0...250 bar <b>A155</b> = 0...400 bar <b>A165</b> = 0...600 bar <b>A170</b> = 0...700 bar <b>A175</b> = 0...800 bar	<b>H 315</b> = -30...0 Hg <b>P 020</b> = 0...10 psi g <b>P 025</b> = 0...15 psi g <b>P 045</b> = 0...30 psi g <b>P 055</b> = 0...50 psi g <b>P 060</b> = 0...60 psi g <b>P 065</b> = 0...100 psi g <b>P 075</b> = 0...150 psi g <b>P 085</b> = 0...200 psi g <b>P 090</b> = 0...300 psi g <b>P 095</b> = 0...350 psi g <b>P 100</b> = 0...500 psi g <b>P 105</b> = 0...600 psi g <b>P 115</b> = 0...1000 psi g <b>P 125</b> = 0...1450 psi g <b>P 130</b> = 0...2000 psi g <b>P 135</b> = 0...2300 psi g <b>P 140</b> = 0...300 psi g <b>P 145</b> = 0...3600 psi g <b>P 150</b> = 0...500 psi g <b>P 155</b> = 0...5800 psi g <b>P 160</b> = 0...7500 psi g <b>P 165</b> = 0...10000 psi g <b>YYY</b> = special range, please specify in writing	<b>Thread</b> <b>without</b> = G ½ male <b>Y</b> = absolute pressure for ranges 1.0...25 bar <b>Y</b> = oil- and free of grease for oxygen <b>Y</b> = silicone- and LABS-free <b>Y</b> = connection with 50 mm cooling fins $t_{max}$ 125 °C <b>Y</b> = connection and housing SS 1.4539 (seewater resistant) instead of 1.4305 <b>Y</b> = connection and housing SS 1.4571 instead of 1.4305 <b>Y</b> = O-ring FPM instead of NBR <b>Y</b> = O-ring PTFE (Kalrez) instead of NBR <100 bar <b>Y</b> = special connection on request, please specify in writing <b>N</b> = ½" NPT male
M12-plug; IP 67	0.5	SEN-8630..				
Cable connection; IP67 Standard cable 1 m (other length on request)		SEN-8640..				
Cable connection; IP 68 Standard cable 1 m (other length on request)	0.5	SEN-8650..				

# SEN-86../87..

## Sensor (Example: SEN-8700 C315)

Electrical connection	Class	Model	Output	Measuring range		Options
DIN-plug; IP 65	0.5	SEN-8700..	<b>without</b> = 4 – 20 mA  <b>/2</b> = 0 – 10 V	<b>C305</b> = -0.6...0 bar <b>C315</b> = -1 ...0 bar <b>C505</b> = -1...0.6 bar <b>C515</b> = -1...1.5 bar <b>C525</b> = -1...3 bar <b>C535</b> = -1...5 bar <b>C545</b> = -1...9 bar <b>C555</b> = -1...15 bar <b>B015</b> = 0...0.6 bar <b>B025</b> = 0...1 bar <b>B035</b> = 0...1.6 bar <b>B045</b> = 0...2.5 bar <b>B055</b> = 0...4 bar <b>B065</b> = 0...6 bar <b>B075</b> = 0...10 bar <b>B085</b> = 0...16 bar <b>A095</b> = 0...25 bar <b>A105</b> = 0...40 bar <b>A115</b> = 0...60 bar <b>A125</b> = 0...100 bar <b>A135</b> = 0...160 bar <b>A140</b> = 0...200 bar <b>A145</b> = 0...250 bar <b>A155</b> = 0...400 bar <b>A165</b> = 0...600 bar <b>A170</b> = 0...700 bar <b>A175</b> = 0...800 bar	<b>H 315</b> = -30...0 Hg <b>P 020</b> = 0...10 psi g <b>P 025</b> = 0...15 psi g <b>P 045</b> = 0...30 psi g <b>P 055</b> = 0...50 psi g <b>P 060</b> = 0...60 psi g <b>P 065</b> = 0...100 psi g <b>P 075</b> = 0...150 psi g <b>P 085</b> = 0...200 psi g <b>P 090</b> = 0...300 psi g <b>P 095</b> = 0...350 psi g <b>P 100</b> = 0...500 psi g <b>P 105</b> = 0...600 psi g <b>P 115</b> = 0...1000 psi g <b>P 125</b> = 0...1450 psi g <b>P 130</b> = 0...2000 psi g <b>P 135</b> = 0...2300 psi g <b>P 140</b> = 0...300 psi g <b>P 145</b> = 0...3600 psi g <b>P 150</b> = 0...500 psi g <b>P 155</b> = 0...5800 psi g <b>P 160</b> = 0...7500 psi g <b>P 165</b> = 0...10000 psi g <b>YYY</b> = special range, please specify in writing	<b>Thread without</b> = G ¼ male <b>Y</b> = absolute pressure for ranges 1.0...25 bar <b>Y</b> = oil- and free of grease for oxygen <b>Y</b> = silicone- and LABS-free <b>Y</b> = connection with 50 mm cooling fins $t_{max}$ 125 °C <b>Y</b> = connection and housing SS 1.4539 <sup>1)</sup> (seawater resistant) instead of 1.4305 <b>Y</b> = connection and housing SS 1.4571 instead of 1.4305 <b>Y</b> = O-ring FPM instead of NBR <b>Y</b> = O-ring PTFE (Kalrez) instead of NBR <100 bar <b>Y</b> = G ¼ DIN 385-E inclusive seal ring <b>Y</b> = special <sup>3)</sup> connection <sup>2)</sup> on request, please specify in writing <b>N</b> = ½" NPT male
M12-plug; IP 67	0.5	SEN-8730..				
Cable connection; IP67 Standard cable 1 m (other length on request)	0.5	SEN-8740...				
Cable connection; IP 68	0.5	SEN-8750..				

<sup>1)</sup> Seawater resistant

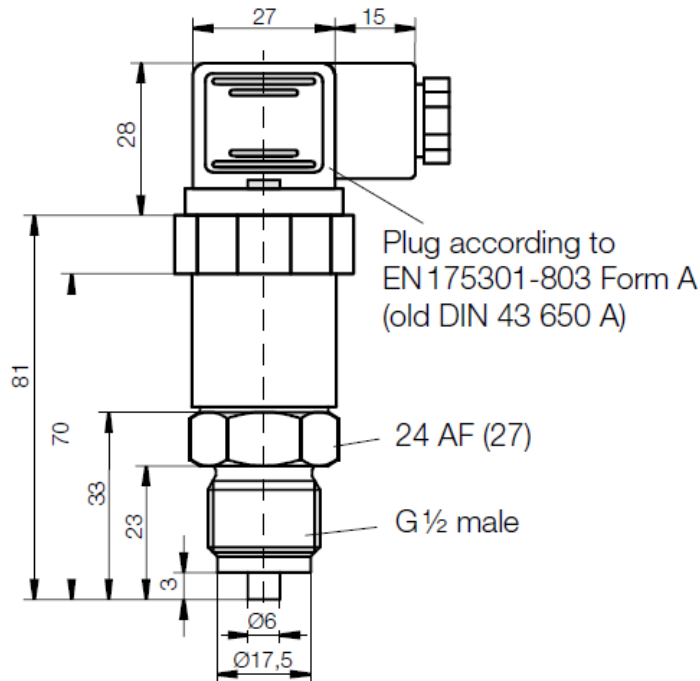
<sup>2)</sup> Please specify in writing

<sup>3)</sup> Adapter of PSD usable

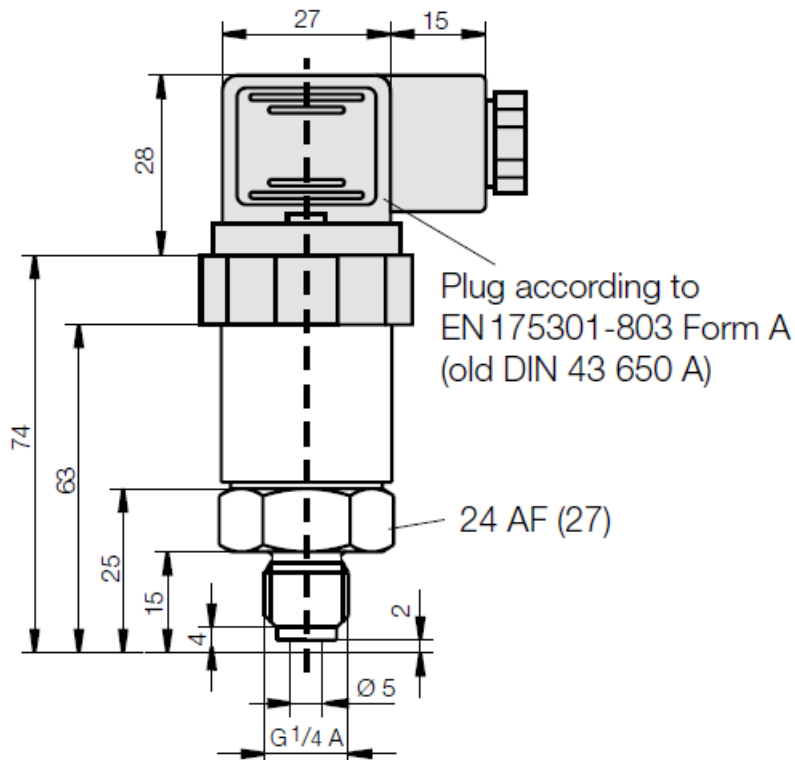
## 12. Dimensions

[in mm]

### SEN-86



### SEN-87



## 13. EU Declaration of Conformance

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We, KOBOLD-Messring GmbH, Hofheim-Ts, Germany, declare under our sole responsibility that the products:

**Pressure Sensors**                      **models: SEN-86... and SEN-87...**

to which this declaration relates in conformity with the standards noted below:

**EN 61326-1:2013**    Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements

**EN 61326-2-3:2013**    Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 2-3: Particular requirements - Test configuration, operational conditions and performance criteria for transducers with integrated or remote signal conditioning

**EN 50581:2012**        Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Also the following EC guidelines are fulfilled:

<b>2014/30/EU</b>	<b>EMC Directive</b>
<b>2014/68/EU</b>	<b>PED</b>
PS>200 bar; module A, pressure accessory	
<b>2011/65/EU</b>	<b>RoHS (category 9)</b>



H. Peters  
General Manager



M. Wenzel  
Proxy Holder

Hofheim, 23. Jan. 2018