

Instruction Manual PK15 Differential Pressure Transducer



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Purpose of instruction manual

This instruction manual describes the features of the PK15 differential pressure transducer and provides guidelines for its use.

Improper use of this instrument or failure to follow these instructions may cause injury or equipment damage. All individuals responsible for operating this instrument must therefore be properly trained and aware of the hazards, and must carefully follow these operating instructions and the safety precautions detailed within. **Contact the manufacturer if you do not understand any part of this instruction manual.**

Handle this manual with care:

- It must be readily available throughout the lifecycle of the instrument.
- It must be provided to any individuals who assume responsibility for operating the instrument at a later date.
- It must include any supplementary materials provided by the manufacturer.

The manufacturer reserves the right to continue developing this instrument model without documenting such development in each individual case. The manufacturer will be happy to determine whether this manual is up-to-date.

Conformity

This instrument corresponds to the state of the art and meets all legal requirements set forth in EC directives as evidenced by the CE label.



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The manufacturer owns the copyright to this instruction manual. This manual contains data, instructions and drawings pertaining to the features and usage of this instrument; copying this manual in part or in full or distributing it to third parties is prohibited.

1 Safety precautions

1.1 Appropriate use

In addition to differential pressure data, the PK15 differential pressure transducer also records positive and negative overpressures.

Always observe the operating requirements—particularly the permissible supply voltage—indicated on the rating plate and in the “Technical data” section of this manual.

The instrument may only be handled as indicated in this manual. Modifications to the instrument are prohibited. The manufacturer is not liable for damages caused by improper use or failure to follow these instructions. Violations of this type render all warranty claims null and void.

1.2 Shipping, assembly, electrical connections and start-up

Do not close the pressure input ports when shipping, as changes in barometric pressure could damage instruments with low measuring ranges.

Only technical personnel who are appropriately trained and authorized by the operator of the facility may assemble the instrument and set up its electrical connections.

The instrument may only be operated by appropriately trained individuals who have been authorized by the operator of the facility.

Pressurized air or breath is not to be used for performance tests, as this could damage instruments with low measurement ranges.

Measurement errors may occur if the instrument is not kept protected from sunlight.

Specific safety precautions are given in individual sections of this manual.

1.3 Troubleshooting, maintenance, repairs, disposal

The individual responsible for the electrical connections must be notified immediately if the instrument is damaged or if errors occur that cannot be corrected as indicated in section 6.

This individual must take the instrument out of service until the error has been corrected and ensure that it cannot be used unintentionally.

Always switch off the power to the instrument before opening!

This instrument requires no maintenance.

The electronic components of the instrument contain environmentally hazardous materials and materials that can be reused. For this reason the instrument must be

recycled in accordance with the environmental guidelines of the jurisdiction in question once it has been taken permanently out of service.

1.4 Symbols

The symbols given below are used throughout this manual to indicate instances when improper operation could result in the following hazards:



WARNING! This warns you of a potential hazard that could lead to bodily injury up to and including death if the corresponding instructions are not followed.



WARNING: This warns you of a potential hazard that could lead to significant property damage if corresponding instructions are not followed.



INFORMATION: This indicates that the corresponding information is important for operating the instrument properly.

2 Instrument description

The PK15 pressure transducer is a pneumatic, electrical sensor for measuring overpressures, vacuum pressures and differential pressures. As well as an output signal proportional to the pressure, it also includes a floating contact point (two floating contact points are also an option). Typical applications include, for instance, the monitoring of filters in air-conditioning and ventilation ducts. At the heart of the transducer is a pressure measurement capsule with a beryllium bronze membrane spring, which is displaced by the pressure difference between the two chambers of the measurement capsule. Inductive displacement transducers measure membrane deflection without contacting the membrane. The instrument has no frictional parts or parts subject to mechanical wear.

3 Start-up

3.1 Features

Although the PK 15 pressure transducer is highly robust, it is nevertheless a precision instrument and should be handled with care. Avoid mounting the PS11/PK11 in the direct vicinity of any sources of heat or radiation. Ideally, the instrument should be mounted vertically (pressure and vacuum ports should be pointing down) and on a wall not subject to vibration.

When connecting pressure to the transducer, use the following table to ensure that the sign of the pressure (+ or -) is correct.

Measuring task	Connect pressure to	Example
overpressure / pos. differential pressure	+ input port	0...1 kPa
vacuum / neg. differential pressure	- input port	0...- 500 Pa
symmetrical overpressure / vacuum	+ input port	± 200 Pa
asymmetrical pressure ranges	input port corresponding to the high end of the pressure range	-300 Pa...+ 1 kPa (pressure should be connected to the + input port)

3.2 Supply voltage connections in the instrument:

The supply voltage should be connected at the terminal (11..13). The pressure transducer is protected against reverse polarity of the supply voltage.

The output signal is available on the signal terminals (1...2). The output voltage is protected against short circuits for a short period.

The floating relay outputs should be connected as illustrated in figure 1.

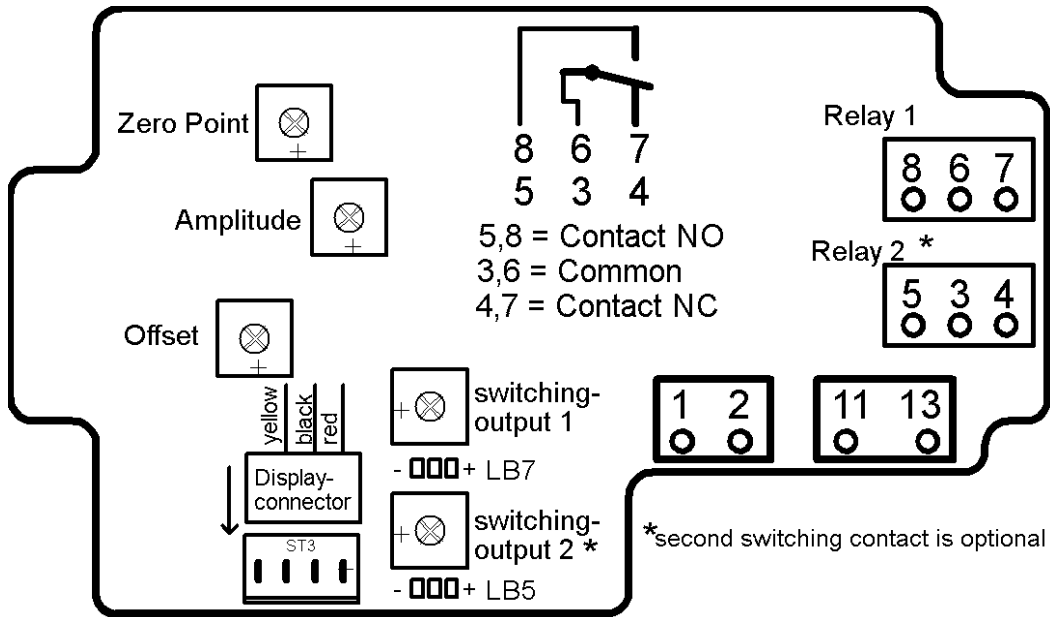


Fig. 1

Supply voltage	Terminal number	Signal
AC	11 13	24/115/230 V~ 50/60 Hz
DC	11 13	+20.5 V...28.5 V ground

Terminal number	Output signal
1	ground
2	0...10 V / 0/4...20 mA ± 5 V



Observe the required supply voltage (see rating plate).

4 Calibrating the zero point



Please remember that it takes roughly 30 to 60 minutes for the pressure transducer to warm up after it is switched on. The output signal may not remain stable during this period.

It is recommended that the zero point after a long operating time (approximately 6 months) is checked and if necessary calibrate it again.

The zero point can be calibrated with the aid of potentiometer 0 after the pressure transducer has warmed up. The following table may be used to look up the value to which the analogue output must be set when the ports are open; this value is dependent upon both the measurement range and the output signal.

Measurement range	0...10 V	0...20 mA	4...20 mA	± 5 V
0...nominal pressure	0.00 V	0.00 mA	4.00 mA	5.00 V
± nominal pressure	5.00 V	10.00 mA	12.00 mA	0.00 V
asymmetrical measurement range	the output signal corresponding to the average of both measurement range limiting values			

5 Adjusting the switching outputs

Switching outputs should be set using the potentiometers for switching outputs 1 and 2. The relay contact points should be connected as illustrated in figure 1.

Switching outputs cannot be set across the entire measurement range for instruments with ± ranges. Only the positive or negative range can be set at any one time, which can be done using the LB5 and LB7 solder bridges.

Example:

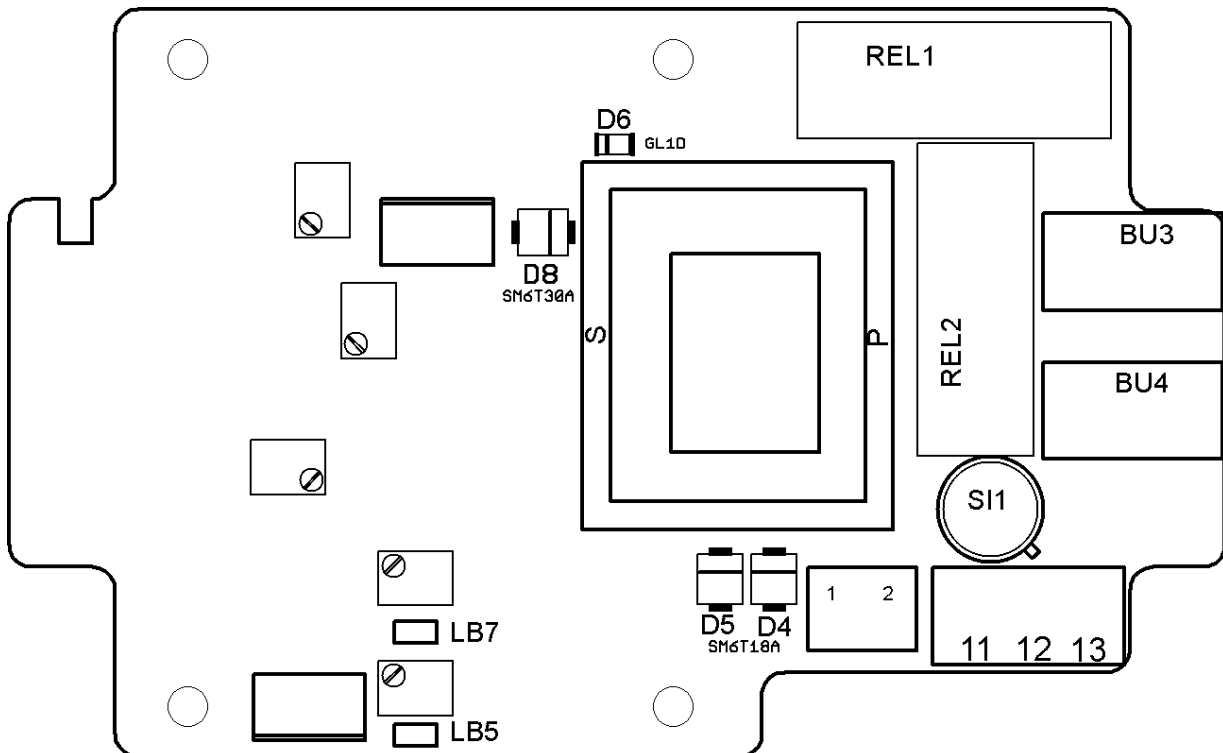
measurement range → ±5 V with two relays;

Switching output 1 for the positive range → LB7 encoded to +

Switching output 2 for the negative range → LB5 encoded to -


6 Troubleshooting

Error description	Potential cause	Corrective action
no output signal	supply voltage is not connected • defective fuse • incorrect supply voltage • defective reverse polarity protection diode	• connect correct supply voltage • replace the SI1 fuse (Wickmann model TR5 200 mA)
output signal is constant, despite change in pressure	• defective input protection diode • defective output protection diode • pressure ports reversed	• connect the correct supply voltage (see rating plate). • replace D6 (model GL1D)
output signal incorrect	• defective output protection diode • defective pressure measurement cell • defective pressure measurement cell	• replace D8 (model SM6T30A) • replace D4,5 (model SM6T18A) • connect the pressure as described in Section 3 • replace D4,5 (model SM6T18A)
zero point cannot be adjusted		• send the instrument to the manufacturer for repair • send the instrument to the manufacturer for repair



- Fig. 2 - troubleshooting

7 Technical data

Measurement data	
measurement ranges	0...50 Pa to 0...100 kPa or ±50 Pa to ±100 kPa
overload capacity	10 x the final value of the measurement range (for measurement ranges ≤ 20 kPa) 2 x the final value of the measurement range (for measurement ranges > 20 kPa)
hysteresis	0.1 %
warm-up period	approx. 30 min.
time required for adjustment	approx. 20 ms (up to 5 s available upon request)
deviation from characteristic curve (setting limiting value)	2 %, optional: 1 % or 0.5 %
temperature-dependent drift in zero point	0.1%/ K, optional: 0.04%/K (within the + 10°C...+50 °C range)
temperature-dependent drift in measurement range	0.1%/ K, optional: 0.04%/K (within the + 10°C...+50 °C range)
dead volume	approx. 2000 mm ³ (for measurement ranges ≥ 250 Pa)
control volume	max. 200mm ³
max. system pressure	100 kPa
Ambient conditions	
medium	air, all non-aggressive gases
nominal temperature	+10° C to +50° C
operating temperature	0° C to +70° C
storage temperature	-10° C to +70° C
relative humidity	0...80 %
EMC standards	corresponds to EN 50 081 part 1 and EN 50 082 part 1
conformity	 declaration of conformity available upon request
Electrical data	
power consumption	max. 1.4 W
supply voltage	24 VDC +20% / -15% (smoothed, permissible peak-to-valley ratio = 1000 mV) 230VAC, 115VAC, 24VAC +6 % / -15 %, 50/60 Hz
load resistance R_L	$R_L \geq 2 \text{ k}\Omega$ for an output voltage of 0...10 V $R_L \geq 5 \text{ k}\Omega$ for an output voltage of $\geq 5 \text{ V}$ effect of changing minimum resistance to ∞ : max. 0.2%
working resistance R_B	$R_B = 500 \Omega$ effect of change from 500 Ω to 0 Ω : max. 0.2%
display	3½ or 4½-place LCD, character height = 13 mm (optional)
output signal	0 to 10 V, 0 to 20 mA or 4 to 20 mA, ±5 V
contact points	single-pole switching relay max. load capability 230 VAC, 6 A can be adjusted over the complete measurement range using the potentiometer

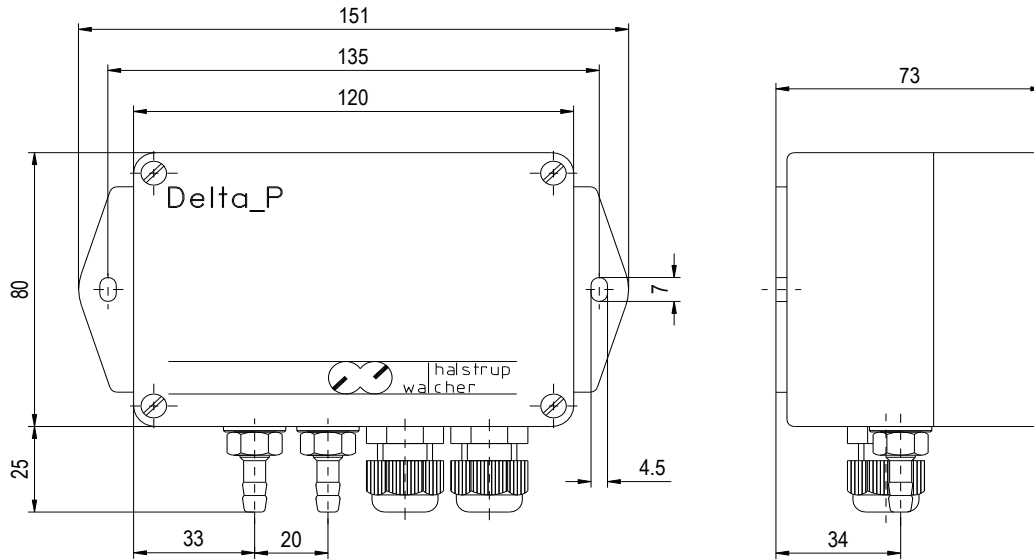
Physical data	
pressure port	Ø 6.5 mm for NW5 tubing (interior tubing diameter = 5 mm)
Electrical connections	screw terminals for cables up to 2.5 mm ²
mounting orientation	vertical (if horizontal, use potentiometer 0 to reset)
dimensions (w x h x d)	80 x 120 x 70 mm 120 x 122 x 70 mm (with optional LCD and for measurement ranges ≤250 Pa)
protection class	IP54
weight	0.7 kg
options	<ul style="list-style-type: none"> • 3½-place LCD • 4½-place LCD • linearity protocol • DAkkS calibration certificate • output signal attenuation up to 5 s • silicon-free materials for parts in contact with medium

Appendix A: Parts in contact with measurement medium

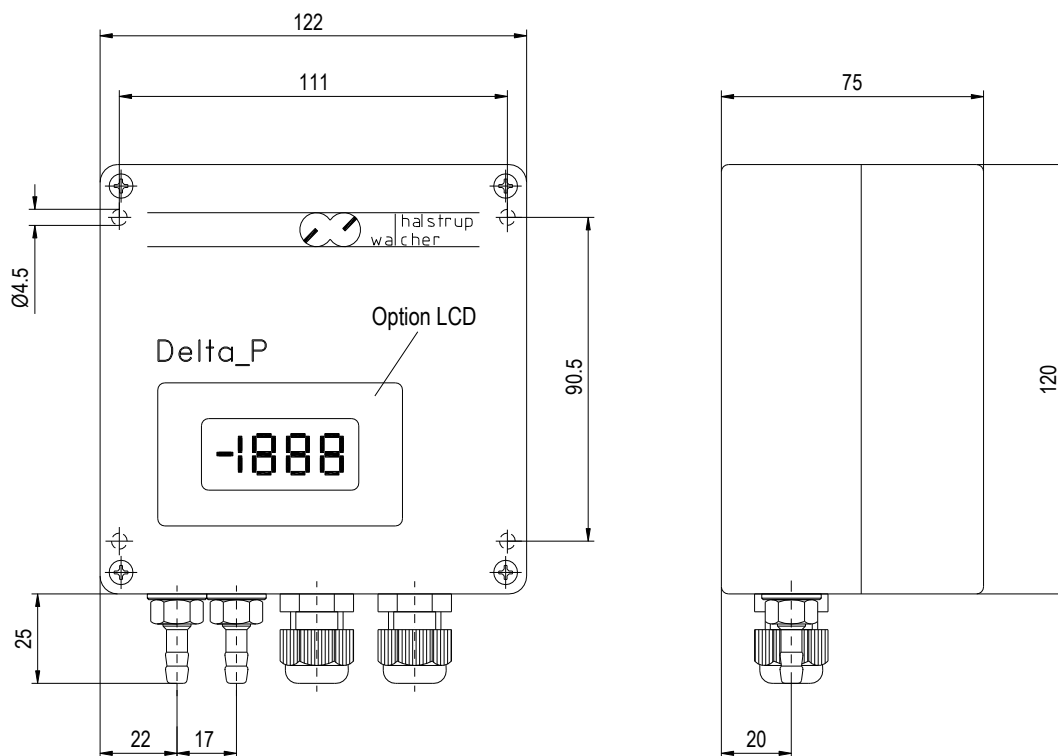
- Beryllium bronze CuBe2
- Mu metal (nickel alloy)
- Brass CuZn39Pb3
- Aluminium AlCuMgPb / AlMg3
- Silicon (tubing), optional: Viton
- Crastin (PTBP)
- Araldite CY236 / HY988
- Loctite 242e
- Carbonyl iron
- KEL (FPM: fluorinated rubber)
- Vepuran Vu 4457/51
- UHU-Plus endfest 300 binder

8 Dimension drawings

PK15 (standard)



PK15 with LCD / measurement ranges ≤ 250 Pa



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