

Instruction Manual P82R Differential Pressure Transducer with Root- Extracted Characteristic Curve



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Purpose of instruction manual

This instruction manual describes the features of the P82R 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. Every person who uses the device must therefore read the manual and understand the possible risks. The instruction manual, and in particular the safety precautions contained therein, must be followed carefully. **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 P82R 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 unplug the supply voltage before opening the instrument!

This instrument requires no maintenance.

Only the manufacturer may perform repairs that require the housing to be opened.

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

Its root-extracted characteristic curve makes this differential pressure transducer especially suitable for measuring volume flow in equipment such as air-conditioning units, fans and ventilation ducts. An optional display allows the operator to read out the volume flow / flow rate directly on site.

3 Start-up

3.1 Features

Although the P82R pressure transducer is highly robust, it is nevertheless a precision instrument and should be handled with care. Avoid mounting the instrument in the direct vicinity of any sources of radiation or heat, such as heaters, as this could result in measurement errors. Ideally, the instrument should be mounted vertically on a wall not subject to vibration. Pressure (+) and vacuum (-) ports should be pointing down in order to prevent any condensation from entering the measurement cell.

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

Type of pressure	Connect pressure to	Example
overpressure	+ input port	0...1 kPa
vacuum	- input port	0...- 500 Pa
differential pressure	higher pressure at + port lower pressure at - port	0...125 Pa, e.g. via a differential pressure transducer (e.g., a measuring orifice)

3.2 Instrument connections

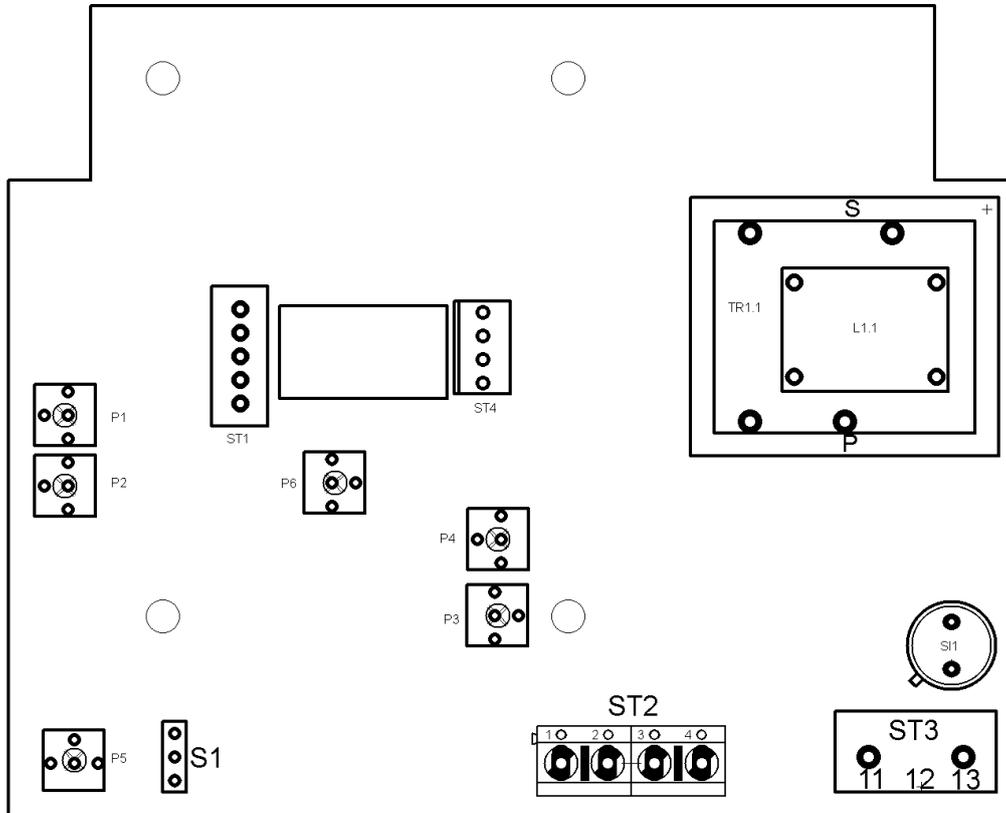


Fig. 1 (not all components are shown)

Terminal	Supply voltage
11 13	24/115/230 VAC 50/60 Hz 24/115/230 VAC 50/60 Hz
11 13	ground (GND) +20.5 V...28.5 VDC

Terminal	Analog output
1	0...10 V
2	ground (GND)
3	0...20 mA / 4...20 mA
4	ground (GND)



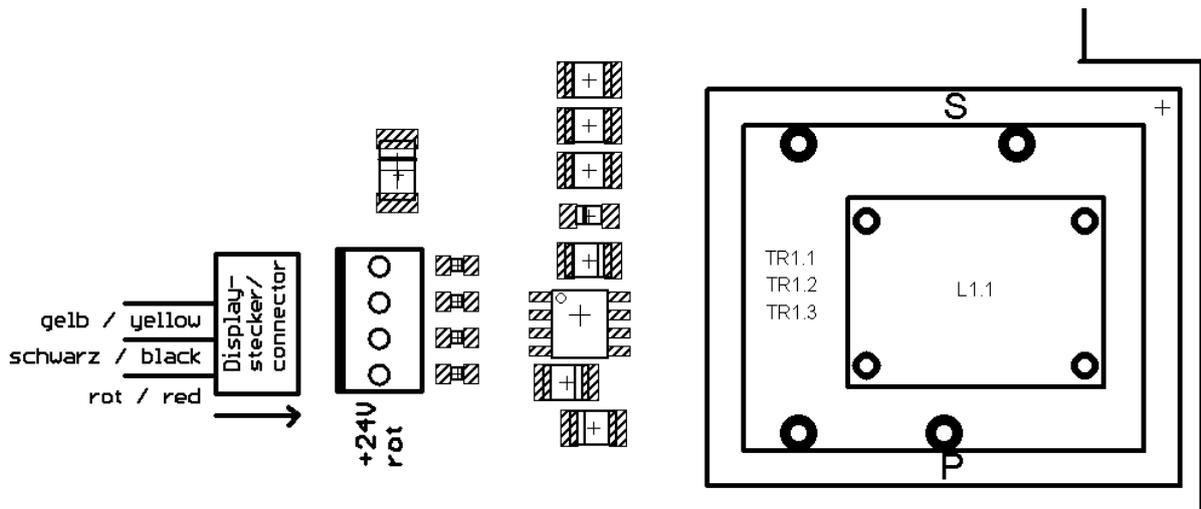
Observe the required supply voltage (see rating plate) and the connection diagram located on the housing cover.

The transducer outputs are protected from short circuits. Instruments supplied with direct current are also protected from reverse polarity.



Connecting the supply voltage to the outputs will destroy the transducer.

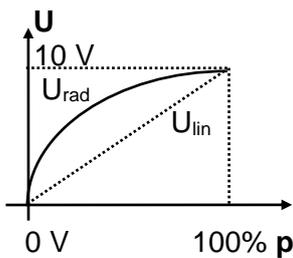
Display-connector



3.3 Output signals

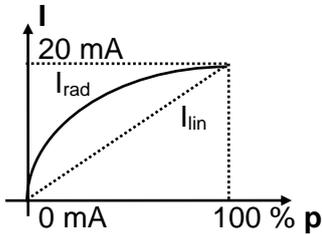
voltage output 0...10 V

$$U_{rad} = \sqrt{10V} \cdot \sqrt{U_{lin}}$$



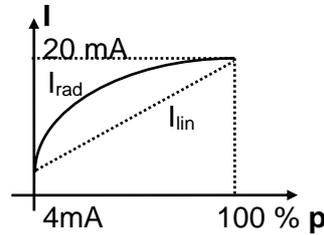
current output 0...20 mA

$$I_{rad} = \sqrt{20mA} \cdot \sqrt{I_{lin}}$$

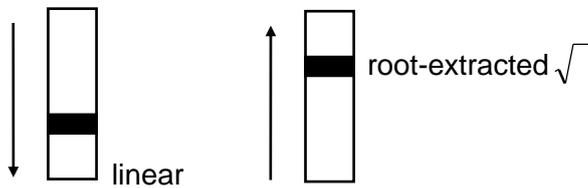


current output 4...20 mA

$$I_{rad} = \sqrt{16mA} \cdot \sqrt{I_{lin} - 4mA} + 4mA$$



The S1 sliding switch (see fig. 1) allows the operator to toggle between a root-extracted and linear curve.



S1 switch



Please note:
The LCD will not display the correct value when repositioning the S1 switch (from root-extracted to linear).

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.

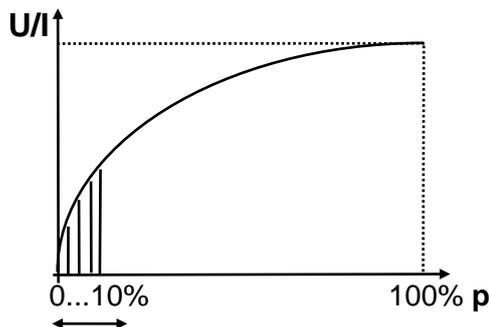
Set the S1 switch to “linear” before calibrating the zero point.

Turn the P5 trimmer (SMU =creep suppression) to the left stop position.

After the pressure transducer has warmed up, the operator may use the P1 or P4 trimmer to calibrate the zero point when current output is available (see figure 1), taking care that the transducer is not connected to a source of pressure. This may require having to disconnect the tubing from the pressure ports.

After calibrating the zero point, slide the S1 switch back to “root-extracted $\sqrt{\quad}$ ”.

5 Setting creep suppression



The creep-suppression function suppresses the pressure transducer output, i.e., keeps it at “0”, despite any existing pressure. The P5 trimmer can be used to set creep suppression to a value between 0 and 10% of the measurement range. Use of the creep-suppression function is advisable for many applications, as the instrument will otherwise fail to generate reproducible results of a measurement when the flow rate / volume flow is very low.



Use of the creep-suppression function limits the low end of the transducer measurement range by 0 ... 10%, depending on the settings. The output signal will be kept at “0” despite any pressure present.

6 Troubleshooting

Error Description	Potential Cause	Corrective Action
no output signal	<ul style="list-style-type: none"> supply voltage is not connected incorrect supply voltage defective fuse defective input protection diode 	<ul style="list-style-type: none"> connect correct supply voltage connect the correct supply voltage (see rating plate). replace the SI1 fuse (Wickmann model TR5 200 mA) Send the instrument to the manufacturer for repair
output signal is constant, despite change in pressure	<ul style="list-style-type: none"> defective output protection diodes pressure ports reversed creep suppression set too high 	<ul style="list-style-type: none"> Send the instrument to the manufacturer for repair connect pressure as outlined in section 3. "Mounting" Turn the P5 trimmer to the left until the output signal $\neq 0 \text{ V} / 0/4 \text{ mA}$
output signal incorrect	<ul style="list-style-type: none"> defective output protection diode defective pressure measurement cell <p>for current output:</p> <ul style="list-style-type: none"> output load too high <p>for voltage output:</p> <ul style="list-style-type: none"> load resistance too low 	<ul style="list-style-type: none"> Send the instrument to the manufacturer for repair Send the instrument to the manufacturer for repair observe maximum output load of 500Ω min. load resistance = $5 \text{ k}\Omega$
zero point cannot be adjusted using P1 / P4	defective pressure measurement cell	Send the instrument to the manufacturer for repair



Never use your breath to conduct a performance test, as this could destroy the measurement cell.

Simple transducer performance test:

Connect tubing to the input port for overpressure. Pinch the tubing between your index finger and thumb and carefully squeeze any existing air toward the transducer.

7 Technical data

Measurement data	
measurement ranges	0...100 Pa to 0...20 kPa (others available upon request)
overload capacity	5 x the final value of the measurement range
hysteresis	<0.1 % of the starting range
warm-up period	approx. 30 min.
time required for adjustment	approx. 20 ms (up to 5 s available upon request)
deviation from characteristic curve (starting point setting)	1 % of the starting range, root-extracted curve
temperature-dependent drift in zero point	0.04%/ K (within the +10°C...+50 °C range)
temperature-dependent drift in measurement range	0.04%/ K (within the +10°C...+50 °C range)
dead volume	approx. 2000 mm ³ (for measurement ranges ≥ 250 Pa) approx. 9000 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 +60° C
storage temperature	-10° C to +70° C
relative humidity	0...80 %
EMC standards	EN 50081 part 1 and EN 50082 part 1
conformity	 declaration of conformity available upon request
Electrical data	
power consumption	max. 0.9 W
supply voltage	24 VDC +20% / -15% (smoothed, permissible peak-to-valley ratio = 1000 mV) 230VAC, 115VAC, 24VAC +6 % / -15 %, 50/60 Hz (optional)
minimum load resistance R_L	$R_L \geq 5 \text{ k}\Omega$ for voltage output
maximum output load R_B	$R_B = 500 \Omega$ for current output
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 and ±10 V are also possible
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 for power supply screw terminals for cables up to 1.5 mm ² for output signal

mounting orientation	vertical (when placing your order, please indicate if a horizontal orientation is required)
dimensions (w x h x d)	120 x 122 x 75 mm
protection class	IP54
weight	0.8 kg
options	<ul style="list-style-type: none"> • 3½-place LCD • 4½-place LCD • linearity protocol • DKD 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

- | | |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|
| <ul style="list-style-type: none"> • Beryllium bronze CuBe2 • Mu metal (nickel alloy) • Brass CuZn39Pb3 • Aluminum AlCuMgPb / AlMg3 • Silicon (tubing) optional: Viton • Crastin (PTBP) | <ul style="list-style-type: none"> • Araldite CY236 / HY988 • Loctite 242e • Carbonyl iron • KEL (FPM: fluorinated rubber) • Vepuran Vu 4457/51 • UHU-Plus endfest 300 binder |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|-------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|

8 Dimension drawings

