



There are many applications in which it would be useful to measure both a differential pressure and a static pressure at the same time, for example in the flow rate measurement with a Laminar-Flow-Element (LFE). The combined pressure sensors of series PDP were developed specifically for this purpose. They provide space for a differential pressure cell and a measuring cell for absolute pressure or relative pressure. A wide range of different applications and a corresponding large selection of diverse housing shapes and measuring ranges are available:

- The measuring ranges for differential pressure and static pressure can be combined without restrictions.
- The differential pressure cells are fast (T_{90} approx. 5 ms) and even for the smallest measuring range they are overload-proof up to 6 bar.
- Differential pressure cells and relative pressure cells are able to operate bidirectionally.
- Special adjustments are possible for all measuring cells.
- All measuring cells have extremely low positional dependence.
- The variant with two DN5 plug-in nipples can be attached directly to specific LFE models with corresponding connector sockets.
- Variant F can be screwed onto mounting plates and many different screw fittings can be used.

There are separate data sheets for additional variants:

- Variants M and O allow for surface mounting of modules for zero adjustment and measuring section switching. They can also be connected in series.
- Variant L has been optimized for surface mounting on the test block of a leakage measuring system (LMS).

Functional Principle

The differential pressure cell consists of a double capacitor. Two chambers are separated by a metallic diaphragm. The differential pressure causes a deflection and thus a lower capacitance on the side with the higher pressure and a higher capacitance on the other side. The difference between the capacitances is a nearly linear measure of the

pressure. Since the diaphragm is in contact during above nominal operation, a high level of pressure resistance is ensured. The capacitance measurement in the capacitor charge reversal process is short-circuit-proof.

Temperature-stable piezo-resistive measuring cells are used for absolute pressure or relative pressure measurements. In this process a Wheatstone bridge consisting of strain gauges generates a voltage signal.

Both measuring cells are open, which means that the medium acts directly (i.e. without a transmission fluid) on the diaphragm. Because of this, the measuring cells are relatively fast and insensitive to positional changes.

Specifications

Differential pressure cell

Measuring principle:	Capacitive
Housing material:	Ceramic
Measuring ranges: ⁽¹⁾	1 / 2 / 10 / 20 mbar
Linearity deviation:	Type. $\pm 0.5\%$ of end value ⁽²⁾
Overload limits:	8 bar on both sides or forward, 5 x end value ⁽³⁾ on one side in reverse.
Reproducibility:	Type. $\pm 0.05\%$ of end value
Hysteresis:	Type. $\pm 0.05\%$ of end value
Zero point drift:	Type. < 100 ppm/K
Amplifier drift:	Type. < 100 ppm/K
Positional dependence:	$\pm 0.15\%$ of end value

⁽¹⁾ Nominal values of the cells, special adjustments are possible. Bidirectional adjustment is also possible.

⁽²⁾ With characteristic curve compensation typically $\pm 0.05\%$ of end value. (the characteristic curve is not stored in the sensor, it resides for example in the S320 controller)

⁽³⁾ Relative to the nominal value of the cell

Measuring cell for static pressure

Measuring principle:	Piezo-resistive
Housing material:	Nylon
Measuring ranges ⁽²⁾ , absolute:	1 / 2 / 7 bar ⁽¹⁾
relative:	0.07 / 0.35 / 1 / 2 / 7 bar ⁽¹⁾
Linearity deviation:	Type. $\pm 0.1\%$ of end value ⁽³⁾
Overload limits:	2 x end value ⁽⁴⁾ , max. 8 bar ⁽⁵⁾
Reproducibility:	Type. $\pm 0.05\%$ of end value
Zero point drift:	Type. $\pm 0.1\%$ of end value
Amplifier drift:	Type. $\pm 0.2\%$ of end value

⁽¹⁾ PDPs with a 4 bar measuring range as a standard feature are also available. In this case 7-bar cells are used and adjusted to 4 bar.

⁽²⁾ Nominal values of the cells, special adjustments are possible. For PDPs with relative pressure cell, a bidirectional adjustment is also possible. In this case the calibration into the negative range for measuring cells with 1 bar or greater is limited by the negative pressure that is technically achievable.

⁽³⁾ With characteristic curve compensation typically $\pm 0.05\%$ of end value. (the characteristic curve is not stored in the sensor, it resides for example in the S320 controller)

⁽⁴⁾ Relative to the nominal value of the cell

⁽⁵⁾ For combined sensors, note the lower overload limit of the differential pressure cell!

Permissible Operating Conditions

Storage temperature: -20 .. +60 °C
 Operating temperature: 0 .. +50 °C
 Media: Air, clean, dry, oil-free, non-condensing, non-corrosive
 Inert gases (CO₂ is not inert)

⁽¹⁾ The sensor cannot be purged.

Electrical specifications

The PDP is available with only with voltage signal:
 Output: -2...+2 V ⁽¹⁾
 Supply: 24 VDC ± 20%
 Current: approx. 30 mA
 Scaling: ⁽²⁾ 0 mbar → 0 V
 Nominal value → 1.6 V

Connector: Lumberg V70 Lumberg V50
⁽³⁾

⁽¹⁾ The measurement must be made potential-free (with a differential amplifier or instrumentation amplifier). The virtual ground is approx. 5 V. It must not be connected with 0 V or with 24 V, not even briefly!

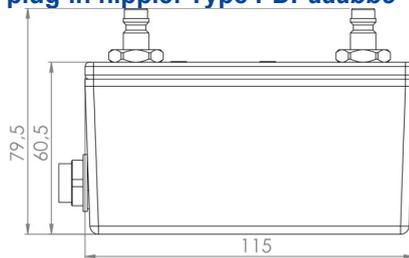
⁽²⁾ Special adjustments are possible.
 Bidirectional operation and operation above nominal up to 125% is possible.

⁽³⁾ The assignment of the pins can be found in the manual.

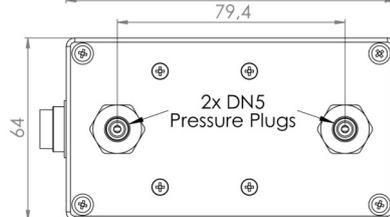
Housing

Variant with DN5 plug-in nipple: Type PDPaaabbc

Side view:



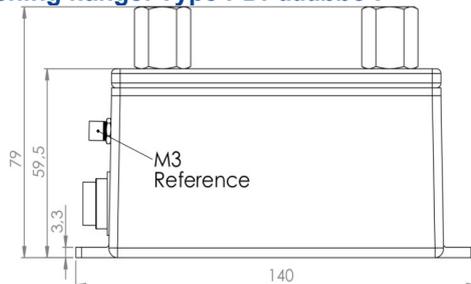
View from above:



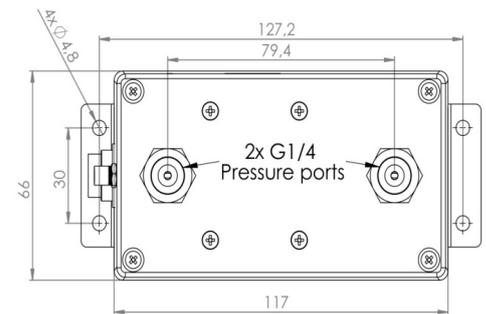
Material: Aluminum
 Weight: approx. 400 g
 Protection class: With reference connection IP40, otherwise IP43

Variant with fastening flange: Type PDPaaabbc-F

Side view:



View from above:



Material: Aluminum
 Weight: approx. 480 g
 Protection class: With reference connection IP40, otherwise IP54

Note

The reference connection is used to measure a static pressure outside of the measuring section or as a reference connection. It can also be omitted. The sinter filter can also be replaced by a fitting with M3 thread.

Order Data

Layout of the order no.: PDPaaabbc-de

aaa Static pressure measuring range

000	- .. -	Without cell for static pressure
001	0 .. 70 mbar	Relative pressure
003	0 .. 350 mbar	Relative pressure
010	0 .. 1000 mbar	Relative or absolute pressure
020	0 .. 2000 mbar	Relative or absolute pressure
040	0 .. 4000 mbar	Relative or absolute pressure
070	0 .. 7000 mbar	Relative or absolute pressure

bb Differential pressure measuring range

00	-	Without differential pressure cell
01	0 .. 1 mbar	Differential pressure
02	0 .. 2 mbar	Differential pressure
10	0 .. 10 mbar	Differential pressure
20	0 .. 20 mbar	Differential pressure

c Sensor equipment

R	Measuring cell for static pressure measures relative pressure ⁽¹⁾
A	Measuring cell for static pressure measures absolute pressure ⁽¹⁾
D	Only measuring cell for differential pressure present

⁽¹⁾ To determine whether a differential pressure cell is present see bb

d Housing option

-	with plug-in nipple DN5
F	with fastening flange

e Output option Signal

- Voltage: 0 .. 1.6 V, 4-wire, R_L > 100 kΩ
 Special adjustment and special calibration on request.
 Bidirectional operation is generally possible!

Accessories

PDP-SVK quick lock connector socket DN5 x 1/4"NPTa

Order number: PDP-21KA-AN13-MPNS-01

Zero module for sensor equipment A or D

Order number: LMF-OPTION-DP-ZERO ⁽¹⁾

Zero module for sensor equipment R

Order number: LMF-OPTION-PDP-ZERO ⁽¹⁾

⁽¹⁾ Please indicate whether the zero module will be installed so it is accessible (externally) or internally in a housing with calibrating connections. See also the data sheet for the zero module.

Connection cable

Layout of the order no.: LTG-aaaa-bbbbb-cccd-eeeeee

aaaa Sensor to be connected

PDPU PDP with voltage signal

bbbb Connection to the sensor

40KV70 Connector socket KV70 IP40 (for voltage signal)

ccc Line length in decimeters

025 2.5m

050 5m

075 7.5m

100 10m

d Material

P PVC

eeeeee Opposite side of the connection

00ADER Open line ends, with wire end ferrules

00MC24 2x MC clamps suitable for slot card terminals

40SV70 Connector SV70 IP40 (for voltage signal)

68SV70 Connector SV70 IP68 (for voltage signal)