

Features

- Two wire system
- Piezoresistive measuring element
- Output signal 4-20 mA, adjustable within 1 : 4 of the nominal pressure range
- Conformity error $\leq \pm 0.1$ % FS
- Standard DIN measuring ranges from 0 ... 100 mbar up to 0 ... 25 bar or selection of measuring ranges in mWC or psi
- Temperature compensation within $-10^{\circ}\text{C} \dots +50^{\circ}\text{C}$ [$+14^{\circ}\text{F} \dots +122^{\circ}\text{F}$]
- Optional overvoltage (lightning) protection according to EN 61000-4-5
- Compact and robust

Picture



Specifications

All specifications, unless otherwise noted, at DC 24 V supply voltage, $R_L = 100 \Omega$, $T_{\text{amb}} = 25^{\circ}\text{C}$ [77°F].

Measurement Range Independent Technical Data

| | |
|--------------------------------------|---|
| Type | Two wire current transmitter |
| Output signal | 4 ... 20 mA |
| Resolution | 12 bit (< 0.025 % FS) |
| Interface for adjustment | HART-like |
| Output 0% adjustability | -5% of orig. FS ... +105% of orig. FS (rel. measurement) 0% of orig. FS ... +105% of orig. FS (abs. measurement) |
| Output 100% adjustability | -5% of original FS ... +105% of original FS |
| Difference (0% - 100%) adjustability | $\geq 25\%$ of original FS and ≥ 50 mbar [0.725 psi] |
| Damping adjustability | ~ 30 ms (default), 100 ms, 1 s, 10 s = 30 Hz (default), 10 Hz, 1 Hz, 0.1 Hz cut-off frequency |
| Supply voltage | DC 9 ... 33 V |
| Reverse polarity protection | integrated, standard |
| Overvoltage (lightning) protection | optional |
| Supply voltage influence | < 0.1 % FS |
| Dielectric strength case / supply | 500 V |
| Load resistance limitation | $R_L [\Omega] \leq (+U_B [V] - 9 [V]) / 0.02 [A]$ |
| Load resistance influence | < 0.1 % FS |
| Protection class | IP68 (~NEMA 6P) |
| Medium temperature range | $-5^{\circ}\text{C} \dots +50^{\circ}\text{C}$ [$+23^{\circ}\text{F} \dots +122^{\circ}\text{F}$] |
| Temperature Compensation range | $-10^{\circ}\text{C} \dots +50^{\circ}\text{C}$ [$+14^{\circ}\text{F} \dots +122^{\circ}\text{F}$] |
| Storage temperature range | $-10^{\circ}\text{C} \dots +50^{\circ}\text{C}$ [$+14^{\circ}\text{F} \dots +122^{\circ}\text{F}$] |
| Acid resistance | pH5 ... pH9 |

| | |
|---|---|
| Weight | approx. 190 g [0.419 lb.] without surge protection approx. 210 g [0.463 lb.] with surge protection plus approx. 260 g [0.573 lb.] with weight extension |
| Measuring cell, diaphragm, housing | Stainless steel 1.4435 (316L) |
| Seals | Viton |
| Cable | Choice of PE / PUR / FEP cable with integrated pressure equalising pipe |
| Outer diameter | 6 mm [0.24"] PE / PUR; 5 mm [0.2"] FEP |
| Leads | 0.22 mm ² [AWG 24], Cu wire 7 x 0.20 tinned |
| Resistance | ≤ 82.9 mΩ/m [25.3 mΩ/ft.] (one conductor) |
| Minimum cable bending radius | 100 mm [4"] |
| Tensile load | < 400 N [90 lbf] (PE / PUR cables) < 15 N [3.4 lbf] (FEP cables) |
| Tensile strength | > 500 N [112 lbf] |
| Pressure equalising pipe diameter | Ø 1.4 / 0.8 mm [0.055" / 0.03"] PE / PUR; Ø 1.1 / 0.6 mm [0.04" / 0.02"] FEP |
| PE cable (foodstuffs approved / drinking water) | |
| Halogen-free | |
| Permitted environmental temperature | -20°C ... +70°C [-4°F ... +158°F] |
| Weight | Approx. 41 g/m [0.44 oz/ft] |
| PUR cable (mechanically robust) | |
| Halogen-free | |
| Permitted environmental temperature | -20°C ... +95°C [-4°F ... +203°F] |
| Weight | Approx. 45 g/m [0.48 oz/ft] |
| FEP cable (high temperature range) | |
| Permitted environmental temperature | -40°C ... +90°C [-40°F ... +194°F] |
| Weight | Approx. 55 g/m [0.59 oz/ft] |
| Electromagnetic Compatibility Emissions | |
| Basic specification emissions | EN 61000-6-3 |
| Emissions class B | EN 55022 |
| Immunity | |
| Basic specification noise immunity | EN 61000-6-2 |
| Electrostatic discharge | EN 61000-4-2 (4 kV contact, 8 kV air) |
| Radiated electromagnetic field | EN 61000-4-3 (10 V/m, 80 ... 1000 MHz, 80% AM 1 kHz) |
| Radiated electromagnetic field (GSM) | EN 61000-4-3 (10 V/m, 950 MHz, 200 Hz on/off) |
| Fast transients (burst) | EN 61000-4-4 (2 kV) |
| Conducted electromagnetic interference | EN 61000-4-6 (10 V/m, 0,15 ... 80 MHz, 80% AM 1 kHz) |
| Impulse voltage (surge) | EN 61000-4-5 (10 kA 8/20µs) [only with the option overvoltage (lightning) protection] |
| Quality Tests | |

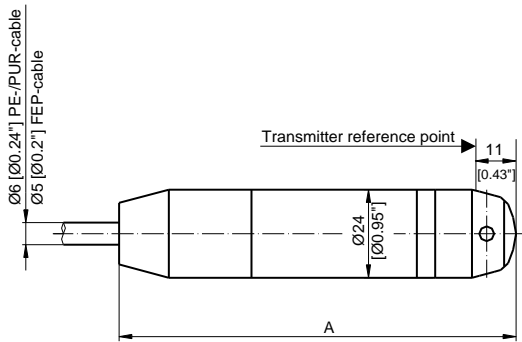


The transmitters fulfil the requirements for noise immunity and emissions of the EMC directive 89/336/EEC.

Measurement Range Specific Technical Data

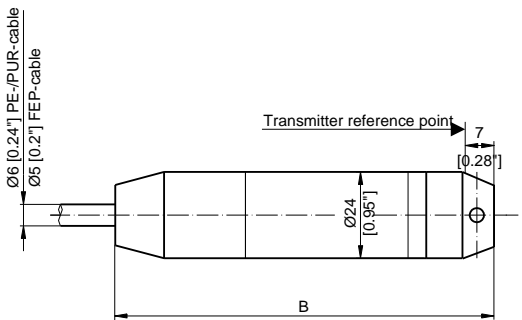
| Pressure ranges | < 0,2 bar [2.9 psi] | ≥ 0,2 ... 1 bar [2.9...14.5 psi] | ≥ 1 ... 25 bar [14.5...362.6 psi] |
|--|--|-------------------------------------|--------------------------------------|
| Overload | 3 bar [43.5 psi] | 3 bar [43.5 psi] | 3 x FS |
| Bursting pressure | > 200 bar [2900 psi] | > 200 bar [2900 psi] | > 200 bar [2900 psi] |
| Conformity error incl. hysteresis and repeatability -5°C ... +50°C [+23°F...+122°F] | ≤ ±0.2 % FS | ≤ ±0.1 % FS | ≤ ±0.1 % FS |
| Temperature error zero / span -10°C ... +50°C [+14°F...+122°F] | typ. ≤ ±100 ppm FS/°C max. ≤ ±150 ppm FS/°C | ≤ ±60 ppm FS/°C ≤ ±100 ppm FS/°C | ≤ ±60 ppm FS/°C ≤ ±100 ppm FS/°C |
| Long term drift | typ. ≤ 0.2 % FS/a | ≤ 0.2 % FS/a | ≤ 0.1 % FS/a |

Dimensions [mm]



Closed version (standard):

A = 137 mm [5.4"] with / without overvoltage protection
Plus 87 mm [3.4"] with weight extension



Open version:

B = 133 mm [5.2"] with / without overvoltage protection
Plus 87 mm [3.4"] with weight extension

Ordering Information

Table 1:

The exact order number for an article is formed from the individual options codes according to the table (with the BAAN-Configurator PCF or manually).

| MPB | PCF Order Number | | | | | | | | | | | | | | | | |
|--|------------------|---|---|---|---|---|---|---|----|----|----|----|----|----|----|---|---|
| | 1/2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 | 10 | 11 | 12 | 13 | 14 | 15 | 16 | | |
| Type | | | | | | | | | | | | | | | | | |
| MPB | PB | | | | | | | | | | | | | | | | |
| Pressure type | | | | | | | | | | | | | | | | | |
| Gauge | | 1 | | | | | | | | | | | | | | | |
| Measurement range | | | | | | | | | | | | | | | | | |
| 0 ... 100 mbar = 0 ... 1.45 psi | | | 0 | 0 | | | | | | | | | | | | | |
| 0 ... 160 mbar = 0 ... 2.32 psi | | | 0 | 1 | | | | | | | | | | | | | |
| 0 ... 250 mbar = 0 ... 3.63 psi | | | 0 | 2 | | | | | | | | | | | | | |
| 0 ... 400 mbar = 0 ... 5.8 psi | | | 0 | 3 | | | | | | | | | | | | | |
| 0 ... 600 mbar = 0 ... 8.7 psi | | | 0 | 4 | | | | | | | | | | | | | |
| 0 ... 1.0 bar = 0 ... 14.5 psi | | | 0 | 5 | | | | | | | | | | | | | |
| 0 ... 1.6 bar = 0 ... 23.2 psi | | | 0 | 6 | | | | | | | | | | | | | |
| 0 ... 2.5 bar = 0 ... 36.25 psi | | | 0 | 7 | | | | | | | | | | | | | |
| 0 ... 4.0 bar = 0 ... 58 psi | | | 0 | 8 | | | | | | | | | | | | | |
| 0 ... 6.0 bar = 0 ... 87 psi | | | 0 | 9 | | | | | | | | | | | | | |
| 0 ... 10 bar = 0 ... 145 psi | | | 1 | 0 | | | | | | | | | | | | | |
| 0 ... 16 bar = 0 ... 232 psi | | | 1 | 1 | | | | | | | | | | | | | |
| 0 ... 25 bar = 0 ... 362.5 psi | | | 1 | 2 | | | | | | | | | | | | | |
| 0 ... 1 mWC | | | 6 | 0 | | | | | | | | | | | | | |
| 0 ... 2 mWC | | | 6 | 1 | | | | | | | | | | | | | |
| 0 ... 5 mWC | | | 6 | 2 | | | | | | | | | | | | | |
| 0 ... 10 mWC | | | 6 | 3 | | | | | | | | | | | | | |
| 0 ... 20 mWC | | | 6 | 4 | | | | | | | | | | | | | |
| 0 ... 50 mWC | | | 6 | 5 | | | | | | | | | | | | | |
| 0 ... 1.5 psi | | | 7 | 0 | | | | | | | | | | | | | |
| 0 ... 3.0 psi | | | 7 | 1 | | | | | | | | | | | | | |
| 0 ... 7.5 psi | | | 7 | 2 | | | | | | | | | | | | | |
| 0 ... 15 psi | | | 7 | 3 | | | | | | | | | | | | | |
| 0 ... 30 psi | | | 7 | 4 | | | | | | | | | | | | | |
| 0 ... 75 psi | | | 7 | 5 | | | | | | | | | | | | | |
| 0 ... 150 psi | | | 7 | 6 | | | | | | | | | | | | | |
| 0 ... 300 psi | | | 7 | 7 | | | | | | | | | | | | | |
| Special range | | | 9 | 9 | | | | | | | | | | | | | |
| Version | | | | | | | | | | | | | | | | | |
| Closed version | | | | | 5 | 5 | | | | | | | | | | | |
| Electrical connection | | | | | | | | | | | | | | | | | |
| PE cable (food approved) | | | | | | | 1 | 3 | | | | | | | | | |
| PUR cable (robust) | | | | | | | 1 | 5 | | | | | | | | | |
| FEP cable (large temperature range) | | | | | | | 2 | 1 | | | | | | | | | |
| Output signal | | | | | | | | | | | | | | | | | |
| 4 ... 20 mA without overvoltage (lightning) protection | | | | | | | | | 0 | 5 | | | | | | | |
| 4 ... 20 mA with overvoltage (lightning) protection | | | | | | | | | 0 | 8 | | | | | | | |
| Accuracy | | | | | | | | | | | | | | | | | |
| ±0.2 % FS, only for FS < 200 mbar | | | | | | | | | | | | 4 | | | | | |
| ±0.1 % FS, only for FS ≥ 200 mbar | | | | | | | | | | | | 2 | | | | | |
| Temperature range | | | | | | | | | | | | | | | | | |
| Compensated -10°C ... +50°C (medium -5 ... 50°C) | | | | | | | | | | | | | 4 | | | | |
| Cable length | | | | | | | | | | | | | | | | | |
| Cable length in meter (always ≥ 001) | | | | | | | | | | | | | | | x | x | x |

Parameterisation

With the aid of the programming kit MPPKIT available as an accessory, the software of the submersible transmitter can be parameterised with a PC (see also Data Sheet 21.210.0066900.001 and Operating Instructions 21.810.0066900.001).

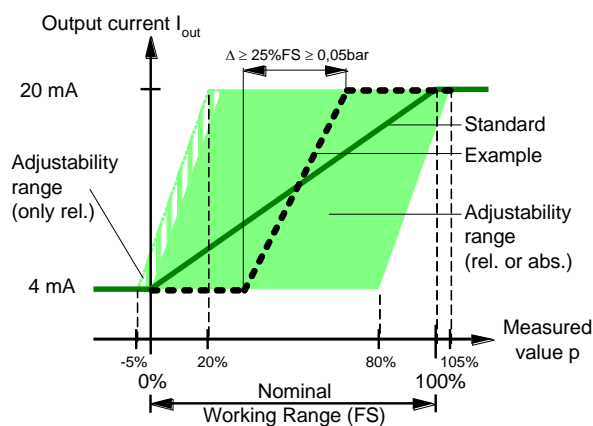
- Range selection for output current 4 ... 20 mA

With the range selection 4 ... 20 mA, the 4 mA and 20 mA current values can be assigned to measured values other than the standard 0% and 100% of the nominal measuring range. (Typically with 4 mA a value from the range -5% ... +25% of the nominal measuring range, with 20 mA, a value from the range +25% ... +105% of the nominal measuring range.) In this way, a sub-range or even a negative pressure can be measured. The difference Δ between the minimum and maximum must amount to at least 25% of the nominal measuring range and be at least 50 mbar.

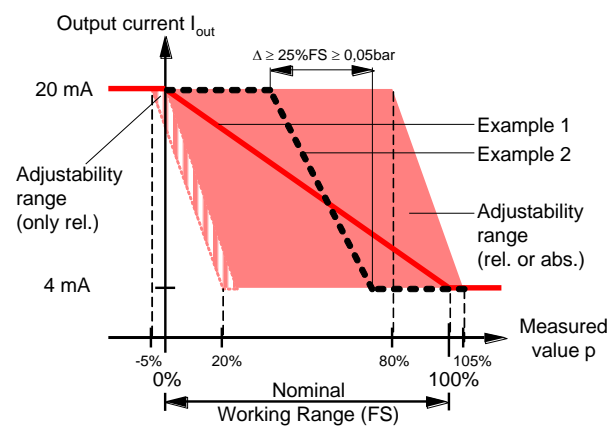
Inverted control can be achieved by exchanging the values for 4 mA and 20 mA.

The ranges of adjustability are presented graphically in the following illustrations:

Non-inverted Control:



Inverted Control:



- Programmable Damping of the Current Output

The analog output can be damped with a low pass filter of the 1st order. The adjustability enables values between ~ 33 ms (default) and 10 s.

Note: During commissioning, damping is preferably left at the minimum value.

- Recalibrating the transmitter (calibration 0 % or 100 %) enables compensation of the drift which inevitably occurs with resistive pressure transducers. The zero drift alone or the combination of zero drift and slope change can be compensated. In doing so, the original calibration of the transmitter is not lost and can be recalled as necessary.

Setting range 0%: -5% ... +5% of nominal measuring range (FS)

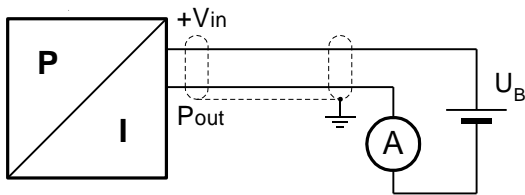
Setting range 100%: 95% ... 105% of nominal measuring range (FS)

Standard Settings

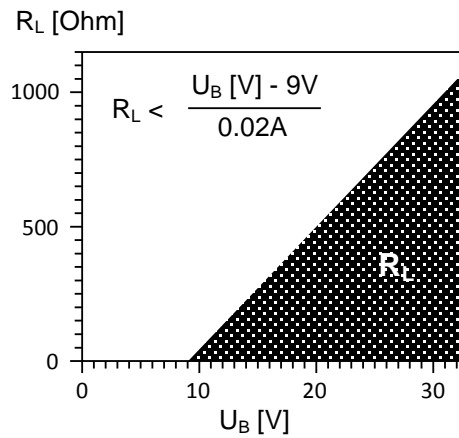
The transmitters have the following standard parameterisation:

- Current range: 4 mA ... 20 mA
- Measurement start: 4 mA = 0% of nominal measuring range (FS)
- Measurement end: 20 mA = 100% of nominal measuring range (FS)
- Damping: ~ 33 ms

Block Diagram / Electrical Connections



+Vin ↔ white
Pout ↔ yellow



Note

- The load resistance R_L is the sum of load and cable resistance.
- If the submersible transmitter is used at temperatures, where the medium can freeze over a longer time, we recommend the version with open protective cap. The version with open protective cap is recommended also in dirty water.
- In order to prevent destruction, the membrane must not be touched.
- The cable must not be tight bend or flat squeezed (because of the integrated pressure equalising pipe).
- Moisture must not be allowed to enter the pressure equalisation pipe. It is recommended that a junction box with dehumidifying agent is used.
- For applications in the field with extension cables having a cable length ≥ 5 m [16 ft.] or inside a building with cable lengths ≥ 100 m [330 ft.], a transmitter with the overvoltage protection option and an external overvoltage protection PT1x2-24DC-SET or a junction box NLAD.MPAB (at other end of the cable) must be used.
- The cable shield must be connected to a good ground potential.
- In order to compensate the long term drift an annual zero point alignment is recommended.
- Conversion table for pressure units
(value in new unit) = coefficient x (value in old unit)

| coefficient | new unit | | | | | | |
|-------------------------|-------------------------|-------------------------|-------------------------|-------------------------|------------------------|-------------------------|-------------------------|
| old unit | Pa = 1 N/m ² | bar | mWC | ftWC | mmHg (Torr) | psi | kp/cm ² = at |
| Pa = 1 N/m ² | 1 | 10 ⁻⁵ | 1.02 x 10 ⁻⁴ | 3.35 | 7.5 x 10 ⁻³ | 1.45 x 10 ⁻⁴ | 1.02 x 10 ⁻⁵ |
| bar | 10 ⁵ | 1 | 10.2 | 33.5 | 750 | 14.5 | 1.02 |
| mWC | 9.81 x 10 ³ | 9.81 x 10 ⁻² | 1 | 3.28 | 73.6 | 1.42 | 0.1 |
| ftWC | 2.99 x 10 ³ | 2.99 x 10 ⁻² | 0.305 | 1 | 22.4 | 0.433 | 3.05 x 10 ⁻² |
| mmHg (Torr) | 1.33 x 10 ² | 1.33 x 10 ⁻³ | 1.36 x 10 ⁻² | 4.46 x 10 ⁻² | 1 | 1.93 x 10 ⁻² | 1.36 x 10 ⁻³ |
| psi | 6.89 x 10 ³ | 6.89 x 10 ⁻² | 0.703 | 2.31 | 51.7 | 1 | 7.03 x 10 ⁻² |
| kp/cm ² = at | 9.81 x 10 ⁴ | 0.981 | 10 | 32.8 | 736 | 14.2 | 1 |

Application example 2 bar = ? psi:
bar = "old unit", psi = "new unit", ⇒ "coefficient" = 14.5
2 bar = 14.5 x 2 psi = 29 psi

Accessories

| | Abbreviation | Order No. |
|--|----------------|---------------|
| Programming-Kit consisting of interface box and Windows programming software (XP / VISTA / W7) | MPPKIT | 00 66 900.001 |
| Extension cable 2-wire, shielded (L [m]) | MPZVK | 04 60 502 |
| Junction box for submersible transmitter IP66 (~NEMA 6) | NLAD.TSKL8 | 00 65 190.101 |
| Junction box for submersible transmitter IP66 (~NEMA 6), 1 OVP | NLAD.MPAB | 00 65 190.102 |
| Spare desiccant bag, 2 pieces | ZWE.BEUT | 00 29 201.003 |
| OVP complete for analogue signal | PT1x2-24DC-SET | 22 50 215 |
| Suspension arrangement for submersible pressure transmitter | MPZHVT | 00 65 717.001 |
| Protection tube 2 m [6.6 ft.] (still waters) | MPZSRR | 00 65 720.001 |
| Protection tube 2 m [6.6 ft.] (running waters) | MPZSRF | 00 65 721.001 |
| Protection tube extension 2 m [6.6 ft.] for MPZSRR, MPZSRF | MPZSRV | 00 65 722.001 |
| Sensing cabinet for submersible pressure transmitter | MPZFK | 00 65 543.001 |

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|---|----------------------------|---|
|  | Data Sheet Hardware | DG DKap Stamm-Bez. Var Ind F Sp 21.210.1560203.001.05.4.4 |
|---|----------------------------|---|