

Measuring cell

# Polynom Transducer

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Version: 28.03.2012

# Technical Specifications

## Pressure measuring range (bar)

|   | 2         | 4.5       | 10        |
|---|-----------|-----------|-----------|
| <b>Overpressure</b>                           | 1.5 x FS  | 3 x FS    | 3 x FS    |
| <b>Burst pressure</b>                         | > 200 bar | > 200 bar | > 200 bar |
| <b>Total error, (1), (2), (3),</b><br>(% rdg) |           |           |           |
| 0...20 °C, 30...100% FS                       | ≤ 0.2     | ≤ 0.2     | ≤ 0.2     |
| 0...20 °C, 10...100% FS                       | ≤ 0.3     | ≤ 0.3     | ≤ 0.3     |
| -20...60 °C, 30...100% FS                     | ≤ 0.2     | ≤ 0.2     | ≤ 0.2     |
| -20...60 °C, 10...100% FS                     | ≤ 0.3     | ≤ 0.3     | ≤ 0.3     |
| <b>Long term stability, (4)</b>               | < 0.1% FS | < 0.1% FS | < 0.1% FS |

|   | 20        |
|---|-----------|
| <b>Overpressure</b>                           | 2 x FS    |
| <b>Burst pressure</b>                         | > 200 bar |
| <b>Total error, (1), (2), (3),</b><br>(% rdg) |           |
| 0...20 °C, 30...100% FS                       | ≤ 0.2     |
| 0...20 °C, 10...100% FS                       | ≤ 0.3     |
| -20...60 °C, 30...100% FS                     | ≤ 0.2     |
| -20...60 °C, 10...100% FS                     | ≤ 0.3     |
| <b>Long term stability, (4)</b>               | < 0.1% FS |

(1) Total error including non-linearity, hysteresis, repeatability and temperature influences

(2) Compensation of pressure and temperature with third degree polynomial

(3) Other temperature ranges on request

(4) 1 year (typ.)

## Sensitivity (bar)

|   | 2                      | 4.5                   | 10                  |
|---|------------------------|-----------------------|---------------------|
| <b>Current excitation, (1),</b><br>(min. / typ. / max.) | 80 / 110 / 140 mV/bar  | 30 / 60 / 90 mV/bar   | 20 / 30 / 40 mV/bar |
| <b>Voltage excitation, (2),</b><br>(min. / typ. / max.) | 110 / 170 / 240 mV/bar | 50 / 100 / 150 mV/bar | 20 / 40 / 60 mV/bar |

|   | 20                 |
|---|--------------------|
| <b>Current excitation, (1),</b><br>(min. / typ. / max.) | 4 / 7 / 10 mV/bar  |
| <b>Voltage excitation, (2),</b><br>(min. / typ. / max.) | 5 / 10 / 15 mV/bar |

(1) 1 mA, the sensitivity depends on the temperature range

(2) 2.5 V DC with 200 Ohm measurement resistor, the sensitivity depends on the temperature range

## Electrical specifications

|  |                        |
|--|------------------------|
| <b>Recommended current excitation,</b>         | 1 mA ± 0.02%           |
| <b>Recommended voltage excitation</b>          | 2.5 V DC ± 0.02%       |
| <b>Bridge resistance, (min. / typ. / max.)</b> | 2400 / 3500 / 4400 Ohm |
| <b>Frequency range</b>                         | ≥ 10 kHz               |
| <b>Natural frequency, (typ.)</b>               | ≥ 10 kHz               |
| <b>Circuit</b>                                 |                        |
| <b>Electrical connections</b>                  |                        |

## Compensation

|  |  |
|--|--|
| <b>V, (V)</b>  | Total supply voltage                   |
| <b>Vb, (V)</b>   | Bridge voltage                         |
| <b>Vs, (1), (V)</b>                                      | Current and temperature measurement    |
| <b>Rmess, (1), (2), (Ohm)</b>                            | Current and temperature measurement    |
| <b>Required measurements for polynomial compensation</b> |  |
| Bridge resistance, (3), (kOhm)                           | $R_b = V / I$<br>$R_b = (V - V_s) / I$ |
| Output signal, (4), (V)                                  | $S = +OUT - -OUT$                      |
| <b>Current excitation</b>                                |  |
| <b>Voltage excitation</b>                                |  |

- (1) Optional  
(2) Optional, recommended measurement resistor: 200 Ohm (minimum accuracy: ± 0.03%)  
(3) Calculation depends on power supply  
(4) Minimum accuracy: ± 0.01%

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**Qualifications**

|               | Description | Level                           |
|---------------|-------------|---------------------------------|
| EN 60068-2-6  | Vibration   | > 30 g                          |
| EN 60068-2-27 | Shock       | 100g<br>(impulse duration 6 ms) |

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**Physical specifications**

| <b>Materials</b> |                                 |
|------------------|---------------------------------|
| Transducer       | Stainless steel (316L / 1.4435) |
| Housing          | Stainless steel (316L / 1.4404) |
| Seals            | Viton (standard), EPDM, Kalrez  |
| Cable            | PUR                             |

## Ordering information

|                          | X. | XXXX. | XXXX. | XX. | XXX |
|--------------------------|----|-------|-------|-----|-----|
| Type                     |    |       |       |     |     |
| Pressure type            |    |       |       |     |     |
| Pressure measuring range |    |       |       |     |     |
| Model                    |    |       |       |     |     |
| Electrical connection    |    |       |       |     |     |
| Output signal            |    |       |       |     |     |
| Accuracy                 |    |       |       |     |     |
| Temperature range        |    |       |       |     |     |
| Option 1                 |    |       |       |     |     |
| Option 2                 |    |       |       |     |     |
| Option 3                 |    |       |       |     |     |

# Technical drawings

## Dimensions

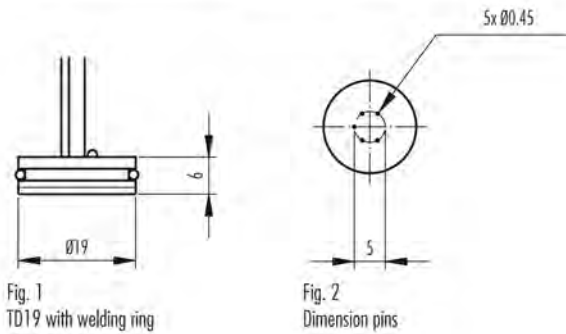


Fig. 1  
TD19 with welding ring

Fig. 2  
Dimension pins

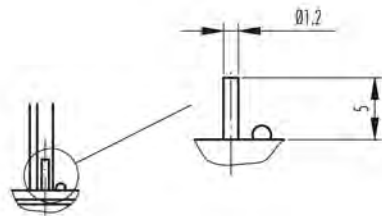
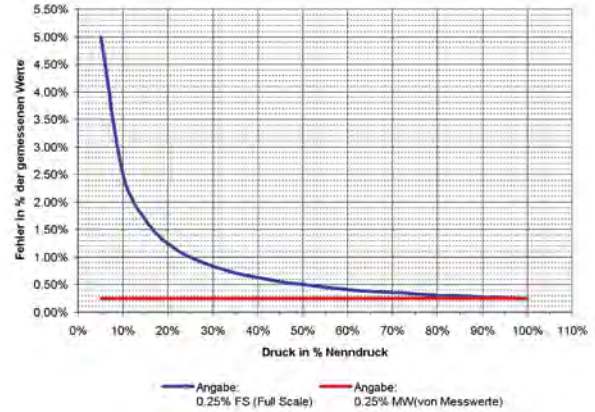


Fig. 3  
Dimensions relative tube (only gauge version)

## Full Scale versus measured value

Example:  
Precision accuracy compared to full scale accuracy of measured value.



## Formulas for the polynomial compensation

### General formula

$$P = (a_0 + b_0 \times Rb + \dots + \dots_0 \times Rb^0) + (a_1 + b_1 \times Rb + \dots + \dots_1 \times Rb^1) \times S + \dots + (a_m + b_m \times Rb + \dots + \dots_m \times Rb^m) \times S^m$$

### Variable:

- p = Desired pressure [bar]
- Rb = Bridge resistance [kOhm]
- S = Output signal [V]
- n = Polynomial in the bridge resistance direction (temperature-direction) [-]
- m = Polynomial in the output signal direction "S" (print-direction) [-]
- a, b, ... = Coefficient of resistance in the bridge direction (temperature-direction) [-]
- 0, 1, ... m = Coefficient of bridge resistance in evidence-direction (temperature-direction) [-]

### General formula

$$P = (a_0 + b_0 \times Rb + c_0 \times Rb^2 + d_0 \times Rb^3) + (a_1 + b_1 \times Rb + c_1 \times Rb^2 + d_1 \times Rb^3) \times S + (a_2 + b_2 \times Rb + c_2 \times Rb^2 + d_2 \times Rb^3) \times S^2 + (a_3 + b_3 \times Rb + c_3 \times Rb^2 + d_3 \times Rb^3) \times S^3 + (a_4 + b_4 \times Rb + c_4 \times Rb^2 + d_4 \times Rb^3) \times S^4$$

### Coefficients:

|       |       |       |       |       |
|-------|-------|-------|-------|-------|
| $a_0$ | $a_1$ | $a_2$ | $a_3$ | $a_4$ |
| $b_0$ | $b_1$ | $b_2$ | $b_3$ | $b_4$ |
| $c_0$ | $c_1$ | $c_2$ | $c_3$ | $c_4$ |
| $d_0$ | $d_1$ | $d_2$ | $d_3$ | $d_4$ |

Specifications may change without notice.

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