

## Bimetal thermometer with switch contact

bottom oder centre back connection

Type series FP2 . . .



### Application area

- General process technology
- Chemical and petrochemical industry
- Plant and mechanical engineering
- Shipping

### Features

- High quality case with bajonet ring NS 100 degree of protection IP 66
- Case and wetted parts of stainless steel
- Various connections can be supplied
- Nominal range -40...600 °C
- Micro adjustment pointer for indication correction
- Accuracy class 1 or 2 per EN 13190, depending on measuring range
- Switch contacts (electrical contact devices) per DIN 16085
  - slow acting contact
  - magnetic snap contact
  - inductive contact

### Options

- Approvals/Certificates
  - Ex-protection (ATEX/UKEX)
  - Material certificate per EN 10204-3.1
- As per UKCA regulations
- Connection to zone 0 with thermowells (upon request)

### Application

- These thermometers with switch contact are suitable for use outdoors and in aggressive environments
- The temperature detecting element is susceptible to bending, therefore, fitting with thermowell is recommended
- Suitable thermowells see product group T5
- Further information on mounting see operating instructions BA\_066

## Technical data

### Constructional design / case

|                        |   |
|------------------------|---|
| Design:                | High quality case with bajonet ring, stainless steel mat.-no. 1.4301 (304)  |
| Nominal size:          | NS 100  |
| Degree of protection:  | IP 66 per EN 60529  |
| Case seal:             | sealing ring NBR  |
| Window:                | Non-splintering laminated glass.<br>Option: Non-splintering plastic (Macro-lon), with contact lock  |
| Pointer shaft:         | Stainless steel mat.-no. 1.4571 (316Ti), with multiple bearings   |
| Scale:                 | Pure aluminium, white with black inscription  |
| Pointer:               | Pure aluminium, black<br>with micro adjustment for zero point correction  |
| Electrical connection: | Connection plug with cable gland M20 x 1.5 and removable test cover, mat. Macro-lon   |
| Weight:                | approx 0.6 kg   |
| Measuring element:     | Helix from thermostatic bimetal per DIN 1715<br>With good adjusting force and fast acting, thermally aged<br>Base and connecting piece laser welded |

### Process connection

|                                |   |
|--------------------------------|---|
| Design:                        | Rigid temperature detecting element, bottom or centre back protruding<br>Different connections available, see order details                 |
| Temperature-detecting element: | Stainless steel mat.-no. 1.4571 (316 Ti)<br>Diameter 6 or 8 mm, standard lengths available, see order details<br>Further sizes upon request |

### Nominal range

|                |   |
|----------------|---|
| Nominal range: | -40 °C...600 °C per EN 13190, see order details<br>Further designs upon request |
|----------------|---|

### Accuracy

Accuracy class per DIN 16196:

| Temp. detecting element | Inductive contacts |         |
|-------------------------|--------------------|---------|
|                         | single             | double  |
| Ø                       | class 1            | class 2 |
| 8 mm                    | class 2            | class 2 |
| 6 mm                    | class 2            | class 2 |

| Temp. detecting element | Touch contacts      |         |                       |            |
|-------------------------|---------------------|---------|-----------------------|------------|
|                         | Slow acting contact |         | magnetic snap contact |            |
| Ø                       | single              | double  | single                | double     |
| 8 mm                    | class 1             | class 2 | class 2               | class 2*   |
| 6 mm                    | class 2             | class 2 | class 2               | > class 2* |

\* Indicate switch point,

if no switch points are specified, 30 % or 70 % of the measuring range are set at the factory

### Temperature ranges

|                       |  |
|-----------------------|--|
| Ambient:              | per EN 13190,<br>ambient temperatures that deviate from EN are to be specified |
| Media:                | -30...500 °C   |
| Storage and transport | -20...60 °C  |

Further designs upon request

### Tests and certificates

|                |   |
|----------------|---|
| Ex-protection: | <u>Magnetic snap contact:</u><br>Simple electrical apparatus per EN 60079-11 suitable for intrinsically safe circuits Ex IIC TX.<br><u>Inductive contact:</u><br>Contact device suitable for intrinsically safe circuits<br>⊕ II 2G Ex ia IIC T4/T5/T6 Gb |
| ATEX           | <ul style="list-style-type: none"> <li>■ PTB 99 ATEX 2219X</li> <li>■ PTB 00 ATEX 2049X</li> </ul>  |
| UKEX:          | <ul style="list-style-type: none"> <li>■ CML 21UKEX2893X</li> <li>■ CML 21UKEX2977X</li> </ul>  |
|                | <u>Ex-protection (ATEX/UKEX) for mechanical devices:</u><br>⊕ II 2G Ex h IIC T1...T6 Gb X<br>⊕ II 2D Ex h IIIC Txx°C Db X   |

Further details see operation instruction BA\_037 and Ex Instructions XA\_005, XA\_013 and XA\_021.

## Switch contacts

Slow acting contact:

### Type L2

- max. 2 touch contacts
- Contact load: 10 W / 18 VA
- Switching up to 230 V DC
- Available with separate circuit (Type M2)

Magnetic snap contact:

### Type L4

- max. 2 touch contacts
- Contact load: 30 W / 50 VA
- Switching up to 230 V DC
- Available with separate circuit (Type M4)

Inductive contact:  
(standard)

### Type N4

- Initiator
- max. 2 contacts
- Control unit required

Inductive contact:  
(SN)

### Type N1

- Safety initiator
- max. 2 contacts, contactless
- Control unit required

Inductive contact inverse:  
(S1N)

### Type N2

- Safety initiator, inverse switching
- max. 2 contacts, contactless
- Control unit required

Inductive contact with integrated amplifier:

### Type N6

- max. 2 contacts, contactless
- 100 mA
- 3-wire technology, suitable for direct activation at a PLC

Further information see operating instruction BA\_066 and Technical Information TA\_039.

## Instructions for use

The loading capacity of the temperature detecting element depends on the following parameters:

- Media
- Media pressure
- Media temperature
- Flow velocity
- Insertion length
- Material

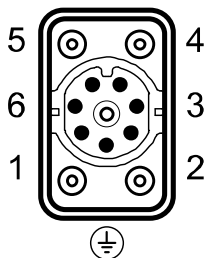
A technical examination might be necessary as well as the use of a separate thermowell (Product group D5).

Further information to mounting and operation see Operating Instruction BA\_017.

**Information on other models see order details or upon request.**

## Connection diagram

### Terminal box

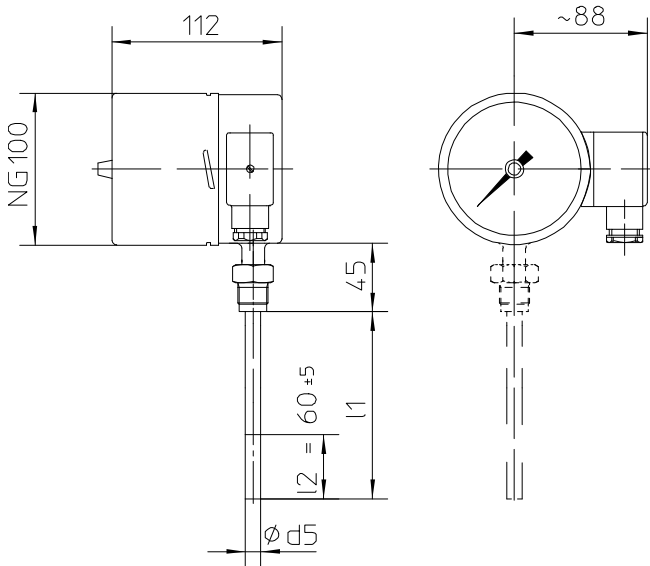


Pin assignment for switch contacts see TA\_039.

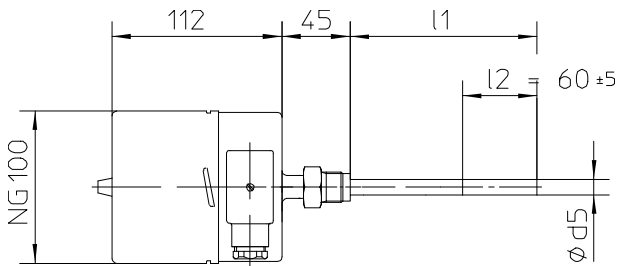
# Dimensions

## Case and process connections

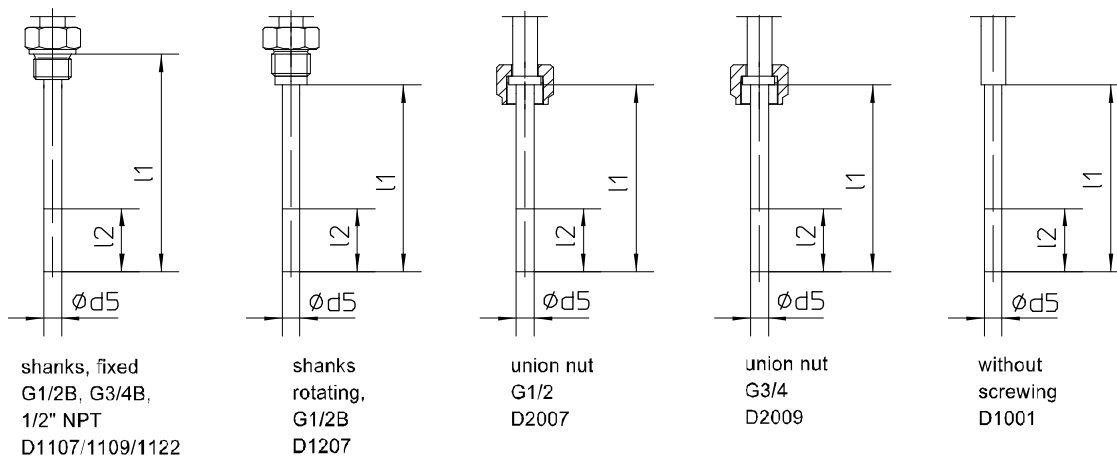
### Case with process connection bottom



### Case with process connection centre back



### Process connections for bottom connection and centre back connection:



## Order details

### Bimetal thermometer with switch contact

#### Type series FP2 . . .

| Order code FP2... |   |  |  |                         |                         |                           |
|-------------------|---|--|--|-------------------------|-------------------------|---------------------------|
| FP230 .           | case design<br>NS 100, degree of protection<br>IP 66    | process connection center back   |  |                         |                         |                           |
| FP240 .           |   | process connection bottom  |  |                         |                         |                           |
| 0                 | design  | standard   |  |                         |                         |                           |
| 1                 |   | ex-protection  |  |                         |                         |                           |
|                   |   | <b>nominal range [°C]</b>  | <b>measuring range [°C]</b>                |                         |                         |                           |
| A2346             | standard ranges °C,<br>accuracy class 1<br>per EN 13190 | -20...60   | -10...50                                   |                         |                         |                           |
| A2322             |   | -30...50   | -20...40                                   |                         |                         |                           |
| A2220             |   | -40...40   | -30...30                                   |                         |                         |                           |
| A2222             |   | -40...60   | -30...50                                   |                         |                         |                           |
| A2522             |   | 0...80   | 10...70                                    |                         |                         |                           |
| A2524             |   | 0...100  | 10...90                                    |                         |                         |                           |
| A2540             |   | 0...120  | 20...100                                   |                         |                         |                           |
| A2544             |   | 0...160  | 20...140                                   |                         |                         |                           |
| A2548             |   | 0...200  | 20...180                                   |                         |                         |                           |
| A2560             |   | 0...250  | 30...220                                   |                         |                         |                           |
| A2565             |   | 0...300  | 30...270                                   |                         |                         |                           |
| A2627             |   | 0...400  | 50...350                                   |                         |                         |                           |
| A2630             |   | 0...500  | 50...450                                   |                         |                         |                           |
| A2640             |   | 0...600  | 100...500                                  |                         |                         |                           |
| D1107             |   | process connection   | shanks fixed                               | G1/2 B                  |                         |                           |
| D1109             | G3/4 B  |  |  |                         |                         |                           |
| D1122             | 1/2 NPT   |  |  |                         |                         |                           |
| D1207             | shanks rotating   |  | G1/2 B                                     |                         |                         |                           |
| D2007             | union nut   |  | G1/2                                       |                         |                         |                           |
| D2009             |   |  | G3/4                                       |                         |                         |                           |
| D1001             | without screwing  |  |  |                         |                         |                           |
| F6                | temperature detecting element<br>Ø d5                   |  | 6 mm (l <sub>2</sub> ≈ 60 mm) <sup>1</sup> |                         |                         |                           |
| F8                |   |  | 8 mm (l <sub>2</sub> ≈ 60 mm) <sup>1</sup> |                         |                         |                           |
|                   | immersion length l <sub>1</sub> (mm) <sup>2</sup>       | D11..<br>shanks fixed  | D1207<br>shanks rotating G1/2<br>B         | D2007<br>union nut G1/2 | D2009<br>union nut G3/4 | D1001<br>without screwing |
| ...               |   | 100  | 080  | 089                     | 093                     | 100                       |
| ...               |   | 160  | 140  | 126                     | 130                     | 160                       |
| ...               |   | 250  | 230  | 186                     | 190                     | 250                       |
| ...               |   | 400  | 380  | 276                     | 280                     | 400                       |
| ...               |   | -  | -  | 426                     | 430                     | -                         |
| 999               | deviating length: pls specify                           |  |  |                         |                         |                           |
|                   | switch contact  | type of contact  | number                                     |                         |                         |                           |
| L4 . 00           | touch contact   | magnetic snap contact  | single contact                             |                         |                         |                           |
| L4 . . 0          |   |  | double contact                             |                         |                         |                           |
| L2 . 00           |   | slow acting contact  | single contact                             |                         |                         |                           |
| L2 . . 0          |   |  | double contact                             |                         |                         |                           |
| M4 . . 0          |   | magnetic snap contact<br>separated circuits  | double contact                             |                         |                         |                           |
| M2 . . 0          |   | slow acting contact<br>separated circuits  | double contact                             |                         |                         |                           |
| N4 . 00           | inductive contact                                       | initiator (N)  | single contact                             |                         |                         |                           |
| N4 . . 0          |   |  | double contact                             |                         |                         |                           |
| N1 . 00           |   | safety initiator (SN)  | single contact                             |                         |                         |                           |
| N1 . . 0          |   |  | double contact                             |                         |                         |                           |
| N2 . 00           |   | safety initiator invers (S1N) <sup>3</sup>   | single contact                             |                         |                         |                           |
| N2 . . 0          |   |  | double contact                             |                         |                         |                           |
| N6 . 00           |   | induktive contact with integrated switching<br>amplifier, 3-wire technology PNP <sup>4</sup> | single contact                             |                         |                         |                           |
| N6 . . 0          |   |  | double contact                             |                         |                         |                           |

|     |   |                                       |
|-----|---|---------------------------------------|
| ... | <b>switch function - per contact, replace point with number</b> |                                       |
| 1   | switch  | rising measured value closes contact  |
| 2   |   | rising measured value opens contact   |
| 4   |   | falling measured value closes contact |
| 5   |   | falling measured value opens contact  |

**Example of order code switch contacts N4120:**

Double inductive contact with initiator → type of contact = N4

1. Inductive contact closes on rising measured value → code number 1
2. Inductive contact opens on rising measured value → code number 2
3. Inductive contact not be used → code number 0

| Additional features (to be indicated if required) |                                      |                         |
|---|--------------------------------------|-------------------------|
| R11   | window                               | macrolon                |
| T2  | marking                              | on scale (pls. specify) |
| W2660   | as per UKCA regulations <sup>5</sup> |                         |

**Order code (example): FP2400 - A2540 - D1109 - F8100 - ...**

<sup>1</sup> the active length l2 must completely reach the process temperature that is to be measured. The depth of immersion length l1 should be increased accordingly

<sup>2</sup> standard immersion length to be specified in order code, e.g. l1 100 mm: order code 100

<sup>3</sup> with NS 100: one contact device, only

<sup>4</sup> not with ex-protection

<sup>5</sup> not possible with thermowell systems with inside pipe diameter > 25 mm