



### **Design Features**

- Case with medium-contacting parts from stainless steel
- Different connections can be supplied
- Accuracy class 1 / 2 per DIN 16196 range dependant
- Micro adjusting pointer for indication correction
- Mechanical or inductive contact devices per DIN 19234

### **Application**

These thermometers with integrated contact device are suitable for use outdoors and in aggressive environments. The bulb is susceptible to bending, therefore, fitting with thermowell is recommended. Further information on mounting these devices is to be found in data sheet no. T1-027. See data sheet no. T5-025 for suitable thermowells per DIN 43772.

### **Design and Function**

The bimetal thermometer consists mainly of a temperature detecting element with bimetal helix welded into it and an indicating unit fixed to it. The 270° rotation motion of the bimetal helix is directly transmitted to the pointer via a shaft with spiral spring joint. The instruments are constructed with a silicon movement damping as standard. The limit values can be adjusted over the complete scale range with the help of a wrench and are accessible from the front. Unless otherwise specified, the minimum immersion depth is the lower edge of the screwing.

### **Technical Data**

#### **Case**

stainless steel material no. 1.4301, nominal size 100

#### **Process connection**

rigid temperature detecting element, vertical resp. axial protruding at rear.

Different connections available, see order details

#### **Case design**

degree of protection IP 54 per EN 60529

#### **Measuring element**

helix from thermostatic bimetal per DIN 1715 with good adjusting power and fast acting, thermally aged, base and connection piece laser welded

#### **Pointer shaft**

stainless steel material no. 1.457, with multiple bearings

#### **Temperature detecting element**

stainless steel mat. no. 1.4571. Diameter 6 and 8 mm. Can be supplied in standard lengths, see order details; other sizes upon request

#### **Scale**

aluminium, white with black inscription

#### **Pointer**

aluminium, black with micro adjusting device for zero-point correction

#### **Window**

instrument glass, alternatively macrolon with contact lock

#### **Case seal**

Buna N

#### **Nominal ranges**

see order details. Special ranges upon request

#### **Accuracy**

class 1 resp. class 2 per DIN 16196 for contact devices

#### **Weight**

DN 100: approx. 0.6 kg

#### **Special design**

- with construction type approval for connection to zone 0 with protective tubes per DIN 43772 upon request
- marking on dial
- fixed reference pointer on scale
- design without screwing (D1001) also available with sliding screwing

#### **Instructions for use**

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

1. measured medium
2. measured medium pressure
3. measured medium temperature
4. flow velocity
5. immersion length
6. material

A technical test is necessary where required.

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

## Inductive contact devices

### Insulating parts

duroplastic with high dielectric strength

### Metal parts

corrosion-proof  
nickel silver or stainless steel

### Bearing

jewel hole, stainless steel axles,  
smooth-running

### EMC

per EN 60947-5-2, appendix X

initiators	SJ2-N	SJ3.5 SN
case diamter	100	160
PTB no.	Ex-83/2022X	
ex group	EEx ib IIC T6 or EEx ia IIC T6	
allowed ambient temperature for device	standard -25...+70 °C	
max. values $U_o$	$\leq 15.5$ V	
$I_k$	$\leq 50$ mA	
P	$\leq 160$ mW	
self-inductance	30 uH	160 uH
self-capacitance	20 nF	40 nF

## Touch contacts

### Allowed ambient temperature

-25...+70 °C (other values on request)

### Metal parts

corrosion-proof  
nickel silver or nickel-plated steel

### Bearing

jewel hole; stainless steel axles,  
smooth-running and wear resisting

### Contact material

silver-nickel alloy (AG80Ni20) as standard assembly. For low voltages up to 24 V and currents up to 20 mA, we recommend silver palladium contacts with 10 µm gold plating, which are always delivered with ex-proofed models. Further contact materials upon request.

Devices, which switch signals below 24 V and 20 mA, should not be specified with liquid filling, because switching reliability is reduced by liquid films between the contacts. This applies to all contact materials.

### max. contact load under resistive and inductive load and operation in air

voltage per DIN IEC 38		slow acting contact			magnetic snap contact		
DC voltage V	AC voltage V	DC voltage mA	AC voltage mA	inductive load AC voltage mA $\cos \varphi > 0.7$	DC voltage mA	AC voltage mA	inductive load AC voltage mA $\cos \varphi > 0.7$
220	230	40	45	25	100	120	65
110	110	80	90	45	200	240	130
48	48	120	170	70	300	450	200
24	24	200	350	100	400	600	250

### limit values for the contact load under resistive load and operation in air

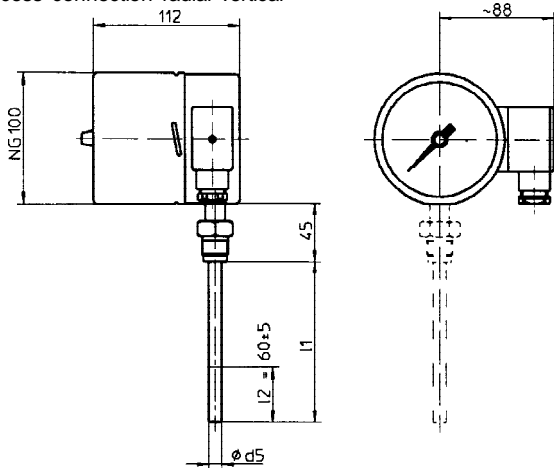
(per DIN VDE 0660, section 100 and section 200)

	slow acting contact	magnetic snap contact
rated insulation voltage U	61 - 300 V	61 - 300 V
rated voltage $U_{eff}$ max.	250 V	250 V
rated current:		
making current	0.7 A	1.0 A
cutoff current	0.7 A	1.0 A
constant current	0.6 A	0.6 A
switching capacity	10 W 18 VA	30 W 50 VA

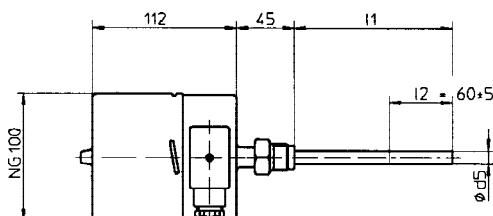
The use of contact protection relays is recommended in order to provide the greatest switching reliability possible, to prevent contact interruptions and to increase the breaking capacity. The service life of the contacts is considerably increased, because 99% of the time the contacts are opened and closed in a voltage-free state. This switching amplifier should definitely be used in measuring devices with liquid filling.

## Dimensions

process connection radial vertical



process connection axial at rear



### Switch function and connection diagram

Switch function, terminal connections and directions of effect are realized according to the DIN 16196 (draft). With regard to switches, it should be noted that a contact which closes with increasing temperature corresponds to a contact which opens with falling temperature. However, because of the switching hysteresis, they are adjusted differently.

#### Switch function and direction of effect

switching element	code number (order code)	direction of action	switch function	
			slow acting contact magnetic snap contact	inductive contact device
makers	1	increasing temperature	makes contact	makes contact; control current on
	4	decreasing temperature		
breakers	2	increasing temperature	breaks contact	breaks contact; control current off
	5	decreasing temperature		

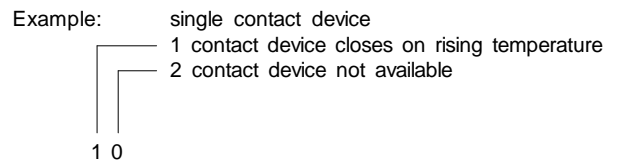
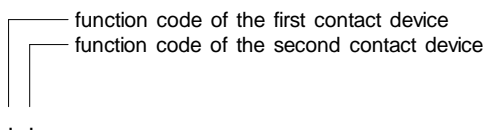
#### Connection diagram

contact device	switch function	assignment of connection terminals inductive contact device	
			polarity
1st contact	makers	1	-
		2	+
	breakers	1	-
		2	+
2nd contact	makers	3	-
		4	+
	breakers	3	-
		4	+

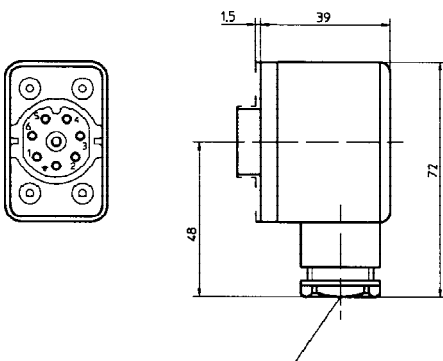
#### Identification of the switch functions

The switch functions are clearly identified by a three-digit number key. The key must be specified in the order details.

The free positions in the number code for the single and double contact devices are each to be assigned a zero.



#### Connection plug / Connection diagram



cable gland for cable diameter 7 up to 13

#### Accuracy

nominal size	temperature detecting element	type of contact					
		touch contacts				inductive contacts	
		slow acting contact		magnetic snap contact		single	double
DN 100	∅ 8	class 1	class 2	class 2	Klasse 2*	class 1	class 2
	∅ 6	class 2	class 2	class 2	> class 2	class 2	class 2
DN 160	∅ 8	class 2*	class 2*	> class 2	> class 2	class 2*	class 2*
	∅ 6	-	-	-	-	-	-

\* pls indicate switch point

**Order Details**

- please give additional specifications for models not listed -

Bimetal thermometer with rigid bulb and inductive contact device										standard measuring and nominal ranges °C per EN 13190, class 1			
case design	· IP 54 process connection axial		FP230							nominal range °C	meas. range °C	order code	
	· IP 54 process connection vertical		FP240										
design	· standard		0							-20...+40	-10...+30	340	
	· ex-protection		1							-20...+60	-10...+50	346	
measuring range	· per table		A2 ...							-30...+50	-20...+40	322	
process connection	· shanks, fixed G 1/2 B		D1107							-40...+40	-30...+30	220	
	· shanks, fixed G 3/4 B		D1109							-40...+60	-30...+50	222	
	· shanks, fixed 1/2 NPT		D1122							0...60	10...50	520	
	· shanks, rotating G 1/2 B		D1207							0...80	10...70	522	
	· union nut G 1/2		D2007							0...100	10...90	524	
	· union nut G 3/4		D2009							0...120	20...100	540	
	· without screwing		D1001							0...160	20...140	544	
temperature detecting element Ø d5	· 6 mm (l2 ~ 60 mm) <sup>2</sup>		F6							0...200	20...180	548	
	· 8 mm (l2 ~ 60 mm) <sup>2</sup>		F8							0...250	30...220	560	
immersion length l1 (mm) <sup>1</sup>	D 11... shanks fixed	D1207 shanks rotating G 1/2 B	D2007 union nut G 1/2	D2009 union nut G 3/4	D1001 without screwing						0...300	30...270	565
	100	080	089	093	100						0...400	50...350	627
	160	140	126	130	160						0...500	50...450	630
	250	230	186	190	250						0...600	100...500	640
	400	380	276	280	400								
	--	--	426	430	--								
deviating length: pls specify										999			
contact	touch contact												
	· combination contact with magnet, standard <sup>3</sup>		L4										
	· combination contact with magnet, gold-plated		L1										
	· slow acting contact <sup>3</sup>		L2										
	· sep. circuit combination contact with magnet <sup>3</sup>		M4										
	· sep. circuit combination contact with magnet, gold-plated		M1										
	inductive contact												
	· initiator (N)		N4										
	· safety initiator (SN)		N1										
	· contact with integrated switching amplifier in 3-wire circuitry PNP <sup>4</sup>		N6										
switch function <sup>5</sup>	· single contact (1st figure per table)		.00										
	· double contact (1st and 2nd figure per table)		..0										
additional features (to be indicated in case of need, only)													
window	· macrolon with contact lock		R11										
Order code (example):			FP2400	A2540	D1109	F8100	N4100						

switch function	order code
· increasing temperature makes contact	1
· increasing temperature breaks contact	2
· decreasing temperature makes contact	4
· decreasing temperature breaks contact	5

- <sup>1</sup> standard immersion length to be specified in order code, e.g. l1 100 mm: order code 100
- <sup>2</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>3</sup> not with ex-protection
- <sup>4</sup> further designs see data-sheet D6-039
- <sup>5</sup> pls indicate switch point