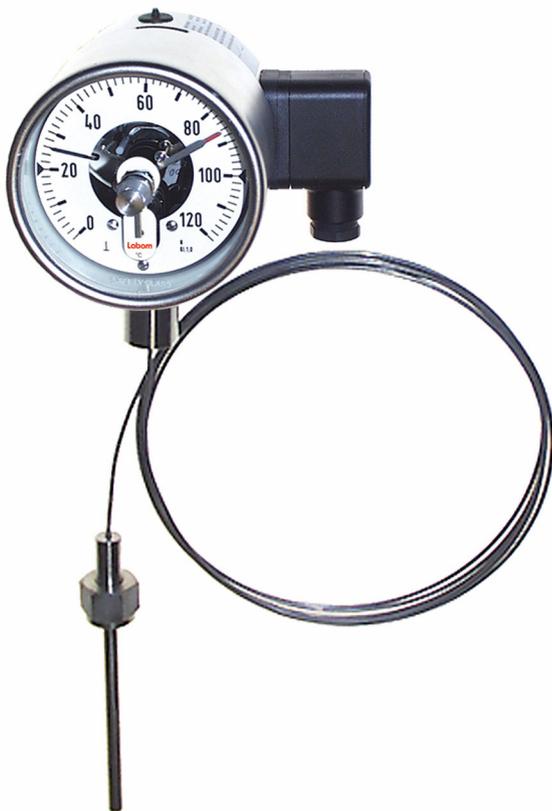


Gas expansion thermometer with switch contact and capillary Type series FU



Application area

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

Features

- High quality case with bajonet ring NS 100/160 degree of protection IP 66
- Case, measuring system and wetted parts of stainless steel
- Nominal range -40...600 °C
- Micro adjustment pointer for indication correction
- Accuracy class 1 or 2 per EN 13190, depending on measuring range
- Stem diameter 6, 8 and ≥ 10 mm
- Short immersion lengths of the stem may be used
- Switch contacts (electrical contact devices) per DIN 16085
 - slow acting contact
 - magnetic snap contact
 - inductive contact

Options

- Approvals/Certificates
 - Explosion protection (ATEX/UKEX) for mechanical devices
 - Classification per SIL2
 - Material certificate per EN 10204-3.1
- As per UKCA regulations
- Case with liquid filling
- Connection to zone 0 with thermowells (upon request)

Application

- These thermometers are suitable for use outdoors and in aggressive environments
- The devices can also be supplied with additional liquid damping for use in extreme conditions
- 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 or NS 160									
Degree of protection:	IP 66 per EN 60529									
Case filling:	Labofin Further liquid fillings upon request									
Case seal:	sealing ring NBR									
Window:	Non-splintering laminated glass. Option: Non-splintering plastic (Macro-lon), with contact lock									
Measuring element:	Bourdon tube, dead zone free with inert gas filling.									
Movement:	Stainless steel with compensation									
Scale:	Pure aluminium, white with black inscription Alternatively with marking									
Pointer:	Pure aluminium, black with micro adjustment for zero point correction									
Electrical connection:	Connection plug with cable gland M20 x 1.5 and removable test cover, mat. Macrolon									
Weights:	Connection at bottom or centre back:									
	<table border="1"> <thead> <tr> <th>NS</th> <th>without filling</th> <th>with filling</th> </tr> </thead> <tbody> <tr> <td>100</td> <td>1.1 kg</td> <td>2.0 kg</td> </tr> <tr> <td>160</td> <td>2.0 kg</td> <td>4.3 kg</td> </tr> </tbody> </table>	NS	without filling	with filling	100	1.1 kg	2.0 kg	160	2.0 kg	4.3 kg
NS	without filling	with filling								
100	1.1 kg	2.0 kg								
160	2.0 kg	4.3 kg								

Process connection

Design:	Rigid temperature detecting element, connected via capillary, protruding at bottom or centre back Different connections available, see order details
Temperature detecting element	Stainless steel mat.-no.1.4404 (316L) Diameter 6, 8 and ≥ 10 mm, available in standard lengths Active lengths, depend on temperature detecting element diameter, see order details Further values upon request
Capillary:	Stainless steel mat.-no. 1.4571 (316 Ti) resp. 1.4404 (316L) Available in different lengths with buckling protection, with protective tube upon request Alternatively with sliding screwing

Nominal range

Nominal range:	-40...600 °C per EN 13190 Measuring spans ≥ 60 °C, see order details Further nominal ranges upon request
----------------	---

Accuracy

Accuracy class per DIN 16196:

Nominal size	Inductive contact	
	single	double
NS		
100	class 1	class 1
160	class 2	class 2

Nominal size	Touch contact	
	single	double
NS		
100	\leq class 2	\leq class 2
160	class 2	-

Specifications apply to all temperature detecting elements with diameter d5 and standard immersion length l1

Temperature ranges

Ambient:	per EN 13190, 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> Simple electrical apparatus per EN 60079-11 suitable for intrinsically safe circuits Ex IIC TX.
	<u>Inductive contact:</u> Contact device suitable for intrinsically safe circuits ⊕ II 2G Ex ia IIC T4/T5/T6 Gb
	ATEX ■ PTB 99 ATEX 2219X ■ PTB 00 ATEX 2049X
	UKEX: ■ CML 21UKEX2893X ■ CML 21UKEX2977X
	<u>Ex-protection (ATEX/UKEX) for mechanical devices:</u> ⊕ II 2G Ex h IIC T1...T6 Gb X ⊕ 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.

SIL2:	Functional safety per EN 61508 Classification per SIL2 for gauges with inductive contacts only.
-------	--

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

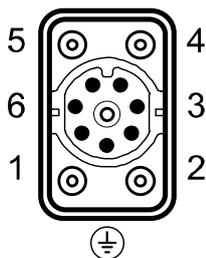
The loading capacity of the temperature detecting element depends on the following parameters:

- 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).

Connection diagram

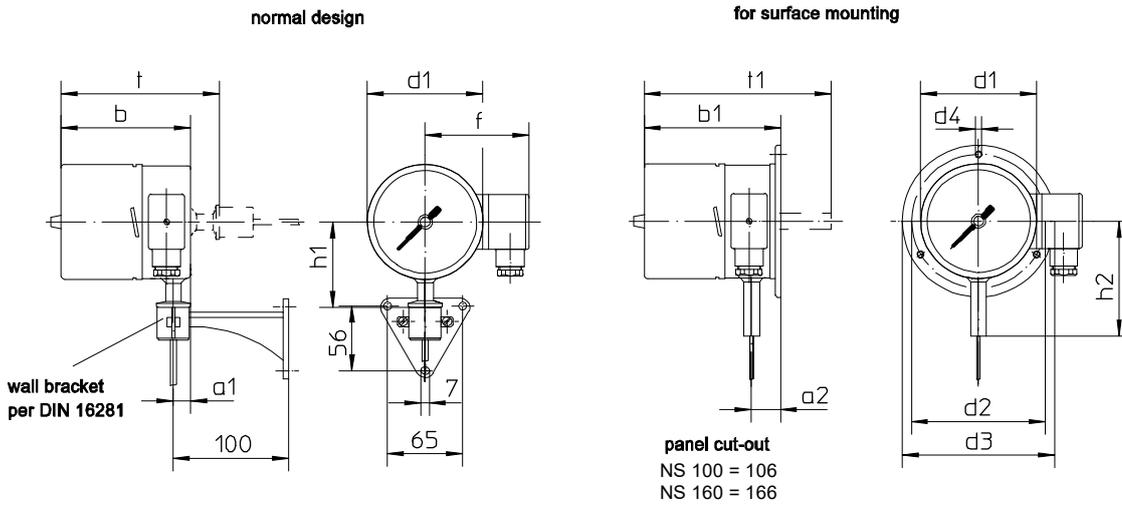
Terminal box



Pin assignment for switch contacts see TA_039.

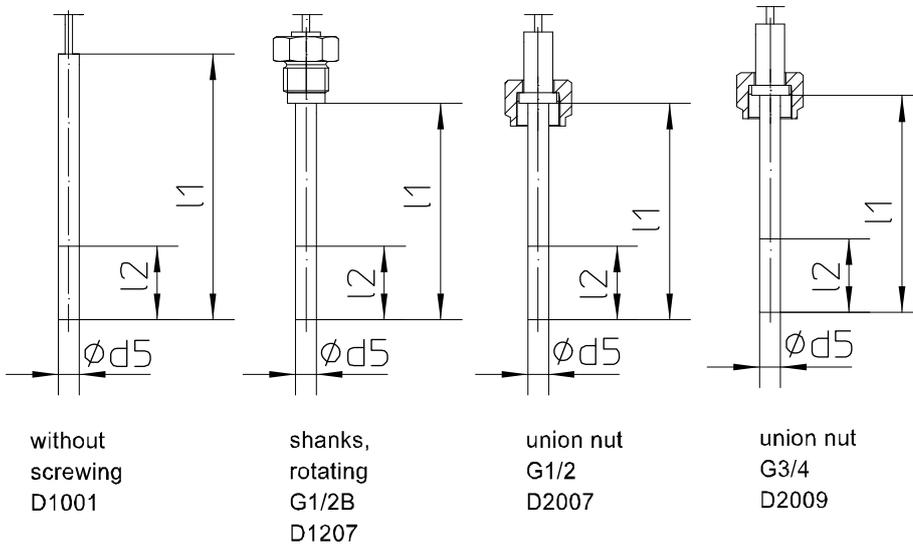
Dimensions

Connected via capillary radially protruding at bottom resp. at rear, normal and surface mounting:



Dimensions (mm)												
Case	d1	a1	b	h1	l	a2	b1	h2	l1	d2	d3	d4
NS 100	100	15	112	78	140	21	118	103	165	116	132	4.8
NS 160	160	15	112	108	140	21	118	133	165	178	196	5.8

Process connections for normal and surface mounting:



Order details

Gas expansion thermometer with switch contact and capillary

Type series FU

Order code FU....					
FU243 .	case design degree of protection IP 66	capillary bottom	NS 100		without liquid filling
FU343 .			NS 160		
FU263 .			NS 100		with liquid filling
FU363 .			NS 160		
FU233 .		capillary at back	NS 100		without liquid filling
FU333 .			NS 160		
FU253 .			NS 100		with liquid filling
FU353 .			NS 160		
0	design	standard			
1		ex-protection			
		nominal range [°C]	measuring range [°C]		
A2340	standard ranges °C, accuracy class 1 per EN 13190	-20...40	-10...30		
A2346		-20...60	-10...50		
A2322		-30...50	-20...40		
A2220		-40...40	-30...30		
A2222		-40...60	-30...50		
A2520		0...60	10...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		
D1001	process connection	without screwing			
D1207		shanks rotating	G1/2 B		
D2007		union nut			G1/2
D2009					G3/4
F6	temperature detecting element Ø d5	6 mm (l2 ≥ 180 mm) ¹			
F8		8 mm (l2 ≥ 80 mm) ¹			
F10		10 mm (l2 ≥ 50 mm) ¹			
	immersion length l1 (mm) ²	D1001 without screwing	D1207 shanks rotating G1/2 B	D2007 union nut G1/2	D2009 union nut G3/4
...		100	080	089	093
...		160	140	126	130
...		250	230	186	190
...		400	380	276	280
...		-	-	426	430
999	deviating length: pls specify				
G1	mounting	prepared for wall bracket			
G2		for surface mounting			
G3		für flush mounting			
G4		with wall bracket, aluminium			
G5		with wall bracket, stainless steel			
K39	capillary stainless steel	length acc. to specification per m			
K49		protective tube, length acc. to specification			

	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 separated circuits	double contact
M2 . . 0		slow acting contact 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) ³	single contact
N2 . . 0			double contact
N6 . 00		induktive kontakt with integrated switching ⁴	single contact
N6 . . 0			double contact

...	switch function - per contact, replace point with number		
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	
3	change-over element ⁵	rising measured value switches	
6		falling measured value switches	

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)
V10	sliding screwing on capillary ⁶	G1/2 B
V11		G3/4 B
V20		1/2 NPT
W2605	functional safety per EN 61508, classification per SIL2 ⁷	
W2660	as per UKCA regulations ⁸	

Order code (example): FU2430 - A2540 - D1207 - F8100 - ...

- ¹ 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
- ² standard immersion length to be specified in order code, e.g. l1 100 mm: order code 100
- ³ with NS 100: one contact device, only
- ⁴ not with ex-protection
- ⁵ possible with touch contacts only (slow acting contact or magnetic snap contact)
- ⁶ operating temperature max. 250 °C, but not with coated capillary
- ⁷ for devices with inductive contact only
- ⁸ not possible with thermowell systems with inside pipe diameter > 25 mm