

Gas expansion thermometer with switch contact and clip-on bulb 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
- Simple mounting without thermowell
- Accuracy class 1 or 2 per EN 13190, depending on measuring range
- Micro adjustment pointer for indication correction
- Designs:
 - bulb fixed welded
 - indicating unit positioning by rotating the bulb
 - with capillary
- Switch contacts (electrical contact devices) per DIN 16085
 - slow acting contact
 - magnetic snap contact
 - inductive contact

Options

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

Application

- These thermometers with switch function are suitable for use outdoors and in aggressive environments.
- Gas expansion thermometers with clip-on bulb offer some benefits to the user: no change in pipeline cross-section; the line thus remains piggable and retrofitting can be carried out without interfering with the process, simple mounting.
- If the exact orientation of the indicator is not known before mounting, we recommend using the positionable version.
- With this version the case may be repositioned once by $\pm 180^\circ$ with respect to the pipeline.

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:	Material 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 in- scription. Alternatively with marking or fixed reference pointer.									
Pointer:	Pure aluminium, black with micro adjustment for zero point cor- rection									
Electrical connection:	Connection plug with cable gland M20 x 1.5 and removable test cover, mat. Macrolon.									
Weights:	<table border="1"> <thead> <tr> <th>NS</th> <th>without filling</th> <th>with filling</th> </tr> </thead> <tbody> <tr> <td>100</td> <td>1.3 kg</td> <td>2.1 kg</td> </tr> <tr> <td>160</td> <td>2.1 kg</td> <td>4.4 kg</td> </tr> </tbody> </table>	NS	without filling	with filling	100	1.3 kg	2.1 kg	160	2.1 kg	4.4 kg
NS	without filling	with filling								
100	1.3 kg	2.1 kg								
160	2.1 kg	4.4 kg								
Mounting:	Stand-alone mounting with wall bracket Alternatively with flange for surface mounting or for flush mounting with DIN mounting flange									

Process connection

Design:	Rigid clip-on temperature detecting ele- ment, radially protruding at bottom or centrically at rear for horizontal resp. vertical piping. Alternatively with capillary
Measuring element:	Stainless steel mat.-no. 1.4404 (316L) The clip-on bulb is adapted to the pipe or circular shape Suited for fast installation on pipe diam- eter approx. 25...150 mm.
Capillary:	Stainless steel mat.-no. 1.4571 (316Ti) Available in different lengths, with buck- ling protection, with protective tube upon request.

Nominal range

Nominal ranges:	-40...250 °C per EN 13190
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Further nominal ranges upon request.

Accuracy

Accuracy class per DIN 16196:

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

Nominal size NS	Touch contact	
	single	double
100	≤ class 2	≤ 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...220 °C
Storage and transport:	-20...60 °C

Further temperature ranges 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

Ex-protection (ATEX/UKEX) for me- chanical devices:

⊕ 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 In-
structions XA_005, XA_013 and XA_021.

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

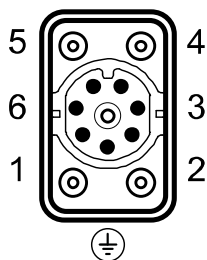
Type N6

- 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.

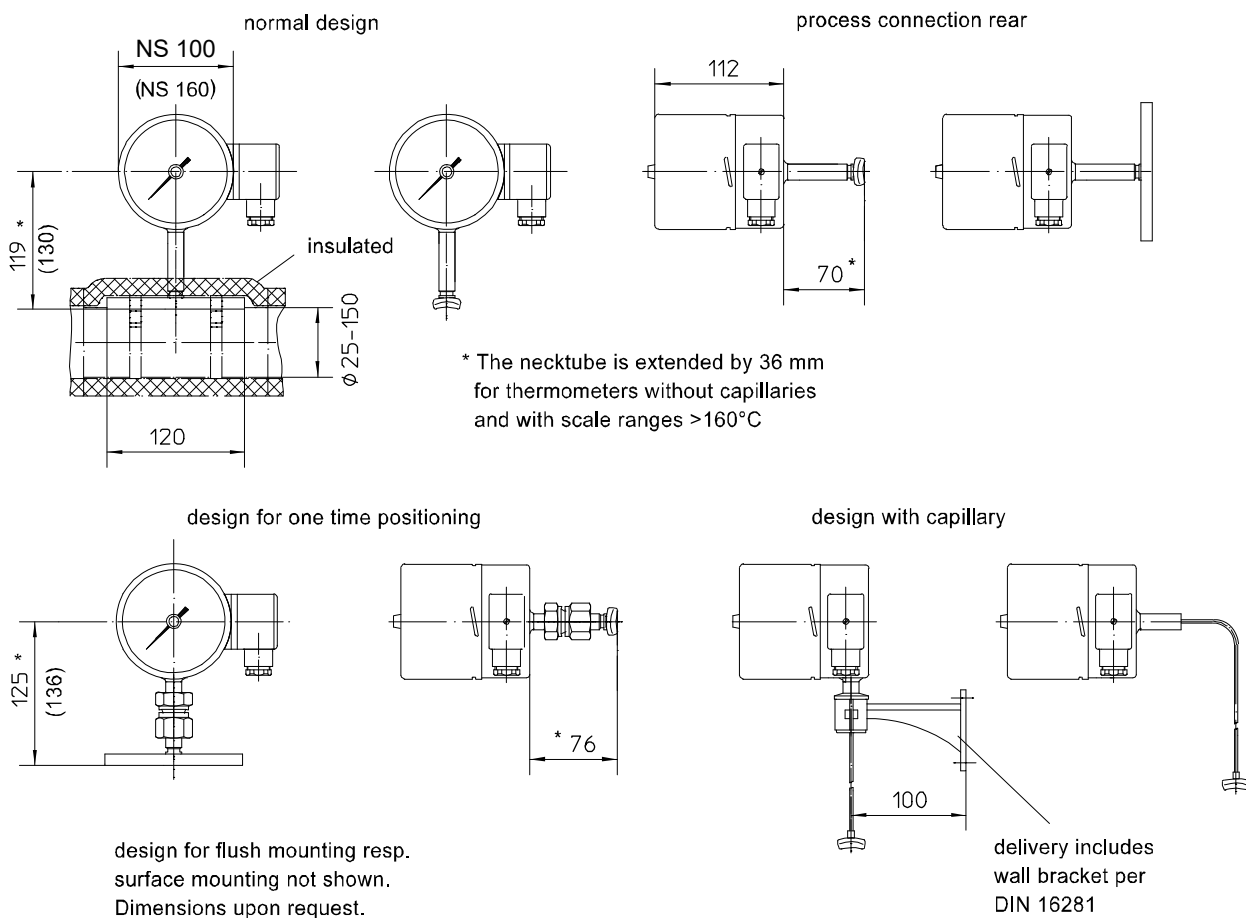
Connection diagram

Terminal box



Pin assignment for switch contacts see TA_039.

Dimensions



Order details

Gas expansion thermometer with switch contact and clip-on bulb

Type series FU

Order code FU....				
FU246 .	Case design degree of protection IP 66	connection bottom rigid	NG 100	without liquid filling
FU346 .			NG 160	
FU266 .			NG 100	with liquid filling
FU366 .			NG 160	
FU236 .		connection at back rigid	NG 100	without liquid filling
FU336 .			NG 160	
FU256 .			NG 100	with liquid filling
FU356 .			NG 160	
FU242 .		capillary at back, positioning	NG 100	without liquid filling
FU342 .			NG 160	
FU262 .			NG 100	with liquid filling
FU362 .			NG 160	
FU244 .		capillary bottom	NG 100	without liquid filling
FU344 .			NG 160	
FU264 .			NG 100	with liquid filling
FU364 .			NG 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

G4	mounting ¹	with wall bracket, aluminium, standard
G1		prepared for wall bracket
G2		for surface mounting
G3		for flush mounting
G5		with wall bracket, st. steel
K39	capillary stainless steel	length acc. to specification per m
K49		with 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 ³	single contact
L2 . . 0			double contact
M4 . . 0		magnetic snap contact separated circuits	double contact
M2 . . 0		slow acting contact ³ separated circuits	double contact

N4 . 00	inductive contact	initiator (N)	single contact
N4 . . 0			double contact ⁵
N1 . 00		safety initiator (SN)	single contact
N1 . . 0			double contact ⁵
N2 . 00		safety initiator invers (S1N) ⁴	single contact
N2 . . 0			double contact ⁵
N6 . 00		inductive contact with integrated switching amplifier, 3-wire technology PNP ³	single contact
N6 . . 0			double contact ⁵

...	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 ⁴	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)		
D1	orientation temperature detecting element	parallel to indication (standard)
D2		90° to indication
R11	window	macrolon
T2	marking	on scale (pls. specify)
W2605	functional safety per EN 61508, classification per SIL2 ⁵	
W2660	as per UKCA regulations	

Order code (example): FU2460 - A2524 - G1 - K39 (Xm) - L4100 - ..

¹ for devices with capillary only

² with NS 100: one contact device, only

³ not with ex-protection

⁴ possible with touch contacts only (slow acting contact or magnetic snap contact)

⁵ for devices with inductive contact only