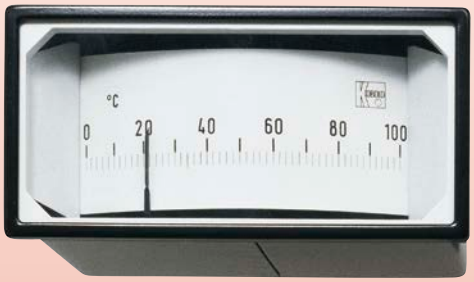
Capillary Thermometers according to DIN EN 13190

nitrogen filled · option: contacts

TNF



- Environmentally-friendly measuring system with non-toxic nitrogen
- Fast response time
- Measuring ranges: -40 ... +600 °C
- Probe material: stainless steel

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Description

The measuring system of the gas pressure thermometer comprises probe, capillary tube and Bourdon tube in a casing. These parts form a unit. The complete measuring system is filled with pressurized nitrogen. A change in temperature causes a change in inner pressure in the immersion shaft. The resulting deflection of the Bourdon tube is transferred to the pointer through a pointer element.
Display and probe are connected by a capillary tube separated by a distance up to 100 m.

A version filled with glycerine is available as an option for service at measuring points exposed to strong vibrations. The fill dampens the measuring system when exposed to mechanical vibrations and thus enables steady indication; it also provides good lubrication for moving parts.

We recommend our robust aluminium casing for rough field service conditions.

These thermometers can also be used with aggressive measuring substances when fitted with a suitable thermowell.

Areas of Application

- Chemical industry, petrochemicals
- Food industry
- Mechanical engineering and heavy goods industry
- Piping and vessel construction
- Process engineering

Technical Details

Housing:	stainless steel 1.4301 with bayonet lock aluminium (100 oder 160 mm) with steel ring cover, stainless steel or brass chromium plated profile profile housing: steel black, noryl black
Window:	instrument glass 4 mm with aluminium case: plexiglass option: safety glass
Protection:	IP 65
Dial:	aluminium, white with black inscription
Pointer:	aluminium, black
Pointer element:	brass, option for 100 or 160 mm Housing: stainless steel
Measuring range:	-40 ... +40 ... 0 ... 600 °C
Overload protection:	full scale value, option 1.3 x full scale
Accuracy class:	Ø 63 and Ø 80 classe 1.6 Ø 100, Ø 160 and Ø 250 classe 1
Nominal sizes:	Ø 63, 80, 100, 160 and 250 mm
Probe:	stainless steel 1.4301 bei 100 or 160 mm housing stainless steel 1.4571
Probe diameter:	standard: 12 mm option: 8, 9 or 10 mm
Probe length:	to customer specification
Screwing:	stainless steel 1.4301
Capillary tube:	stainless steel 1.4571 steel with PVC jacket stainless steel 1.4571 with flexible reinforced protective hose made of 1.4301 red copper (not for 100 and 160 mm Ø)

Order Details

TNF-	1D	1	24	E	A1	M12	Y

Model
Housing material
Indicating range
Capillary material
Probe / material / connection
Type of contact / function
Special version

Please specify bulb and length of capillary tube [mm] in writing.

No responsibility taken for errors;
subject to change without prior notice.

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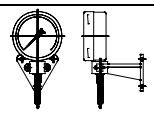
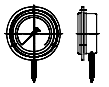
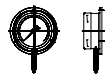
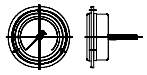
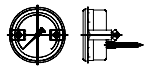
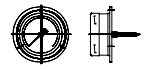
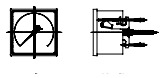
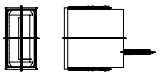
1. Design / case diameter

Housing diameter					
Design	63	80	100	160	250
	TNF-0D	TNF-0E	TNF-0F	TNF-0G	TNF-0I
	TNF-1D	TNF-1E	TNF-1F	TNF-1G	TNF-1I
	TNF-2D	TNF-2E	TNF-2F	TNF-2G	TNF-2I
	TNF-5D	TNF-5E	TNF-5F	TNF-5G*	TNF-5I
	TNF-8D	TNF-8E	TNF-8F	TNF-8G	TNF-8I
	TNF-6D	TNF-6E	TNF-6F**	TNF-6G**	-

Profile housing	96 x 96 mm		72 x 144 mm
	**TNF-Q91..** steel, black finish		**TNF-R71..** noryl black

* with 160 mm high-grade steel case eccentric probe exit

** 100 and 160 mm casing in aluminium only

2. Housing material

..**2**.. = stainless steel

..**3**.. = aluminium ring cover steel, black (for 100 / 160 mm Housing only)

..**A**.. = aluminium ring cover stainless steel (for 100 / 160 mm Housing only)

3. Scale ranges

°C	°C	°C
..**24**.. = -20 ... +40	..**08**.. = 0 ... +80	
..**26**.. = -20 ... +60	..**10**.. = 0 ... +100	..**30**.. = 0 ... +300
..**35**.. = -30 ... +50	..**12**.. = 0 ... +120	..**40**.. = 0 ... +400
..**44**.. = -40 ... +40	..**16**.. = 0 ... +160	..**50**.. = 0 ... +500
..**46**.. = -40 ... +60	..**20**.. = 0 ... +200	..**60**.. = 0 ... +600
..**06**.. = 0 ... +60	..**25**.. = 0 ... +250	

Special measuring ranges: upon request min. Δ T = 60 °C

4. Capillary tube

..**E**.. = stainless steel 1.4571 (standard) (1.4541 with 63, 80, 250 mm housing diameters)

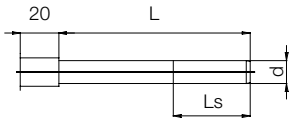
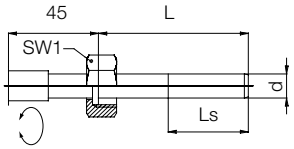
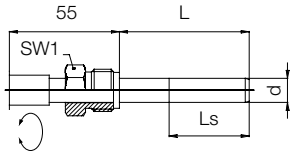
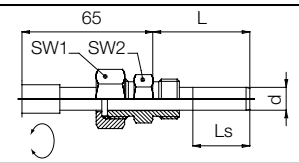
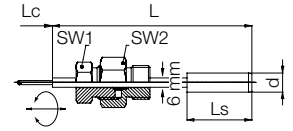
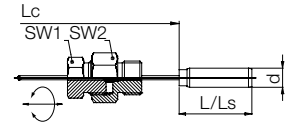
..**P**.. = steel with PVC sheathing (only NG 100 / 160 housing diameters)

..**F**.. = stainless steel with flexible stainless steel reinforced hose (1.4301)

Please specify length of capillary tube [mm] when ordering.

No responsibility taken for errors;
subject to change without prior notice.

5. Standard probe / material / connection (probe diameter 12 mm)

	Description	Material	Thread	Order code
	Smooth probe	Stainless steel	without	**..A0..**
	Union nut	Stainless steel	G ½ G ¾ G 1	**..B1..** **..B2..** **..B3..**
	Rotatable nipple for DIN sleeve	Stainless steel	G ½ G ¾ G 1	**..41..** **..42..** **..43..**
	Union nut and shoulder nipple	Stainless steel	G ½ G ¾ G 1 ½" NPT ¾" NPT 1" NPT	**..11..** **..12..** **..13..** **..1A..** **..1B..** **..1C..**
	Sliding screwing on extension tube/probe	Stainless steel	G ½ G ¾ G 1 ½" NPT ¾" NPT 1" NPT	**..91..** **..92..** **..93..** **..9A..** **..9B..** **..9C..**
	Sliding screwing on capillary tube	Stainless steel	G ½ G ¾ G 1 ½" NPT ¾" NPT 1" NPT	**..81..** **..82..** **..83..** **..8A..** **..8B..** **..8C..**
	Helix probe for gases	Stainless steel	Smooth probe	**..H0..**

Bulb length
Please specify when ordering.
Minimum length 50 mm from the sealing collar of the thread.

L_S = approx. 50 mm at Ø 12 mm
= approx. 70 mm at Ø 10 mm
= approx. 90 mm at Ø 9 mm
= approx. 120 mm at Ø 8 mm

6. Special version
(Please specify in writing when ordering)
Probe diameter 8, 9 or 10 mm (instead of Ø 12 mm)
Test certificate (5 measuring points)
Overtemperature protection (1.3 x)
Safety glass
Dual scale (°C / °F)
Measuring mechanism made of stainless steel (with 100 and 160 mm housing)
Max. pointer
Red gliding mark pointer
Casing filled with glycerine or oil
Knife edge pointer with fine graduation
Plug according to DIN 43650 with junction box (for unfilled casings only)
Tuchel-plug

No responsibility taken for errors;
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7. Contacts

(for casing with 100 or 160 mm diameter only)

Description

Electromechanical and electronic limit monitors serve to open mand close electrical switching circuits depending on the position of the instrument display. They are suitable for fitting in casings with100, 160 mm Ø.

The limit values are adjusted from outside with a setting lock. The limit monitor is set with a detachable key to the value at which the switching operation is to be carried out.

The construction of the limit monitor is such that the instrument can continue operating past the setting pointer after successful contact transfer.

The maximum setting range is approximately 270 angular degrees.

Ambient temperatures of -20 °C ... +70 °C have no effect on the reliability performance.

We strongly recommend the use of our contact protection relays in applications with high breaking capacities or vibrations, or for service in damping liquids (oil). These relays have been specially designed for electromechanical limit monitors and their use is mandatory.

The following contacts are available:

- Slow-action contacts
- Magnetic spring contacts
- Inductive contacts

Magnetic spring contacts

Magnetic spring contacts are suitable for service under almost all operating conditions. They are almost completely insensitive to vibrations.

The contact pin carrier of the setting pointer is fitted with an adjustable magnet which pulls in the wiper shortly before the set value is reached. Arcing is thus avoided and the pin is prevented from being scorched. Because the magnetic force becomes effective during the switching operation with this construction, the setting pointer must be advanced or retarded by the forming differential gap of approximately 3 - 6% of full scale value.

Switching voltage: max. 250 V_{AC}/V_{DC}

Breaking capacity: max. 30 W / 50 VA

Switching current: max. 0,6 A

with standard contact material silver-nickel (Ag 80 Ni 20)

Others on request.

Slow-action contacts

These contacting devices switch free of delay in the same way as the motion of the actual-value pointer. They should be used where no contact loading is required and the instruments are not exposed to vibrations. Due to sparking the contacting devices should not be used where there is a danger of explosion. Care should also be taken that the contacting devices are not exposed to the effects of aggressive vapours.

- Switching voltage: max. 250 V_{AC}/V_{DC}
- Breaking capacity: max. 10 Watt / 18 VA
- Switching current: max. 0,6 A

with standard contact material silver-nickel (Ag 80 Ni 20)

Inductive contacts according to DIN 19234 (Namur)

The inductive contact device comprises mainly the control head (initiator) attached to the setpoint pointer with its completely assembled encapsulated electronics and mechanical assembly with moving control vane. The control vane is moved by the instrument pointer (setpoint pointer). The control head is supplied with DC voltage.

When the control vane is immersed in the air gap of the control head, its inner resistance increases (damped condition, the initiator is high-resistive). The resulting change in current intensity is the input signal for the switching amplifier in the control unit.

Inductive contacts are suitable for service where explosion protection and high reliability and switching rate, that is, long service life, are required.

Advantages of the inductive contact device:

- Long service life with non-contact switching
- Negligible reaction on the display
- Insensitive to aggressive environments (encapsulated electronics)

Nominal voltage: 8 V_{DC} (R_i = 1 kΩ)

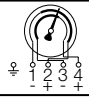
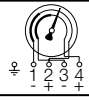
No responsibility taken for errors;
subject to change without prior notice.

8. Switching function of contacts

Magnetic spring contacts / slow-action contacts

Limit monitor with one contact			
Switching operation	**Switching function (when the limit value is exceeded)**	**Order code Magnetic spring contact**	**Order code Slow-action contact**
	Contact closes	**..M10**	**..S10**
	Contact opens	**..M20**	**..S20**
	Contact switches over, that is, contact opens contact closes	**..M30**	**..S30**
Limit monitor with two contacts			
	First and second contact closes	**..M11**	**..S11**
	1. Contact closes 2. Contact opens	**..M12**	**..S12**
	1. Contact opens 2. Contact closes	**..M21**	**..S21**
	First and second contact opens	**..M22**	**..S22**

Inductive contacts

Limit monitor with one contact			
Switching operation	**When the thermometer pointer moves clockwise and when the set limit value is exceeded it causes the following action**	**Control action**	**Order code inductive contact**
	moves the control vane out of the control head	Control circuit is closed	**..I10**
	moves the control vane into the control head	Control circuit is opened	**..I20**
Limit monitor with two contacts			
	moves the control vane of the first and second contact out of the control head	Control circuits are closed	**..I11**
	moves the control vane of the first contact out of the control head - moves the control vane of the second contact into the control head	First control circuit closes Second control circuit opens	**..I12**
	moves the control vane of the first contact into the control head - moves the control vane of the second contact out of the control head	First control circuit opens Second control circuit closes	**..I21**
	moves the control vane of the first and second contact into the control head	Control circuits are opened	**..I22**

Up to three contacts (up to four contacts in the aluminium case) can be delivered upon request. The devices are delivered with lateral connecting box as standard. Other connectors upon request.