

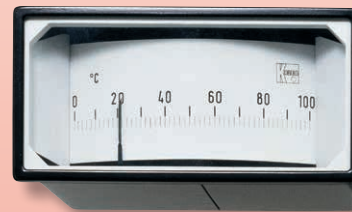
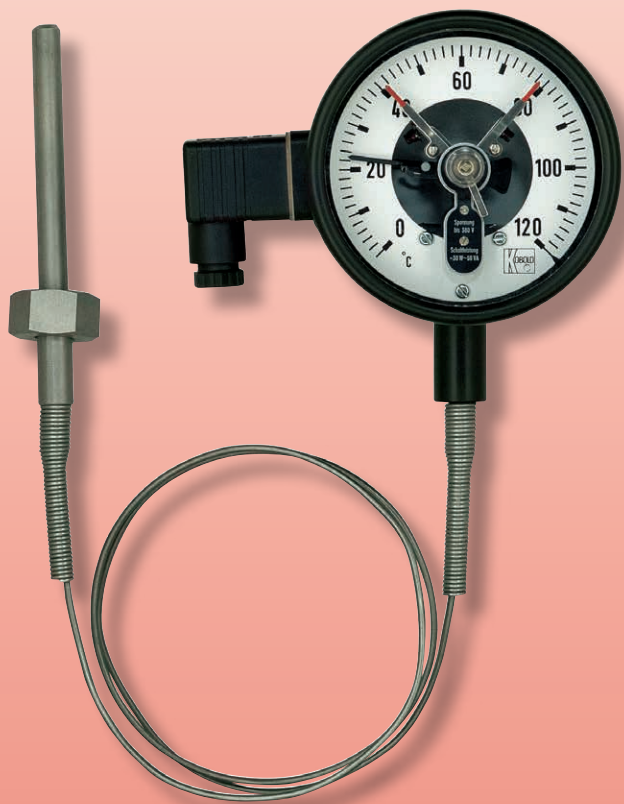
Capillary Thermometer

Nitrogen Filled, Optional Contacts



measuring
•
monitoring
•
analyzing

TNF



- Environmentally-Friendly Measuring System with Non-Toxic Nitrogen
- Fast Response Time
- Measuring Ranges:
-40...100 °F to 32...1100 °F
-20...40 °C to 0...600 °C
- Probe Material: Stainless Steel



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Description

The measuring scope of the TNF consists of a probe, a capillary tube, and a Bourdon tube within an indicating housing. 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 indicating pointer through a mechanical element. The display and the probe are connected by a capillary tube.

A version filled with glycerin is available as an option for service at measuring points exposed to strong vibrations. The fill dampens the measuring system and ensures steady indication; it also provides good lubrication for the moving parts. These thermometers can also be used with aggressive media when fitted with a suitable thermowell.

Areas of Application

- Chemical Industry, Petrochemicals
- Food Industry
- Mechanical Engineering
- Piping and Vessel Construction
- Process Engineering

Technical Details

- Measuring Range:** -40...100 °F to 32...1100 °F
 -20...40 °C to 0...600 °C
- Nominal Sizes:** Ø 2.5", 3", 4", 6", 10"
- Accuracy Class**
- Ø 2.5" and 3": Class 1.6
 - Ø 4", 6", and 10": Class 1
- Materials of Construction**
- Probe**
- Ø 2.5", 3", and 10": 304 Stainless Steel
 - Ø 4" and 6": 316-Ti Stainless Steel
- Housing:** 304 Stainless Steel with Bayonet Lock, Aluminum with Black Steel or Stainless Steel Ring Cover (Option for 4" or 6" Housing)
- Profile Housing:** Black Steel, Black PPO (Square or Rectangular Shaped for Panel Mounting)
- Window:** Instrument Glass 0.16" with Aluminum Case: Plexiglass, Safety Glass (Optional, See "Special Options" Table)
- Dial:** Aluminum, White with Black Inscription
- Pointer:** Aluminum, Black
- Pointer Element:** Brass, Stainless Steel (Option for 4" and 6" Housing, See "Special Options" Table)
- Connection:** 304 Stainless Steel
- Probe Diameter**
- Standard:** 12 mm
 - Optional:** 8 mm, 9 mm or 10 mm
- Probe Length:** To Customer Specification (Min. 2")
- Overload Protection:** Full Scale Value, 1.3 x Full Scale (Optional)



- Capillary Tube:** 316-Ti Stainless Steel, 316-Ti Stainless Steel with Flexible 304 Stainless Steel Armor, Steel with PVC Jacket (For 4" and 6" Housing only)
- Protection:** IP 65

Description of Available Contacts (4" and 6" Housing Only)

Electromechanical and electronic limit switches serve to open and close electrical switching circuits, depending on the position of the instrument display. They are available for 4" or 6" models only. The limit values are adjusted from the outside with a setting lock. The limit switch is set with a detachable key to the value at which the switching operation is to be carried out. The construction of the limit switch is such that the instrument can continue operating past the setting point after successful contact transfer. The maximum setting range is approximately 270 angular degrees. Ambient temperatures of -4 ... 158 °F have no effect on the reliability. 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 designed for electromechanical limit switches and their use is mandatory

The Following Contacts are Available:

1. Slow-action Contacts
2. Magnetic Spring Contacts
3. Inductive Contacts

1. 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 aggressive vapors.

- Max. Switching Voltage: 250 V_{AC/DC}
- Max. Breaking Capacity: 10 Watt / 18 VA
- Max. Switching Current: 0.6 A
- Standard Contact Material: Silver-Nickel (Ag 80 Ni 20)

2. Magnetic Spring Contacts

Magnetic spring contacts are suitable for most 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 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 reduced 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 Watt / 50 VA
- Switching Current: max. 0.6 A
- Standard Contact Material: silver-nickel (Ag 80 Ni 20)

3. 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, high reliability, and 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)
- Negligible Reaction on the Display
- Nominal Voltage: 8 V_{DC} (R_i = 1 kΩ)

Order Details (Example: TNF-1F 2 24 E 1B M12)

Design	Housing Diameter					Housing Material
	2.5"	3"	4"	6"	10"	
	TNF-0D..	TNF-0E..	TNF-0F..	TNF-0G..	TNF-0I..	..2.. = Stainless Steel ..3.. = Aluminum with Black Steel Ring Cover (for 4" and 6" Housing only) ..A.. = Aluminum with Stainless Steel Ring Cover (for 4" and 6" Housing only)
	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*..	-	
Housing Profile						
	TNF-Q91.. Steel, Black Finish (3.78" x 3.78")		TNF-R71.. PPO, Black (2.83" x 5.66")		TNF-R81.. PPO, Black (5.66" x 2.83")	

* 4" and 6" Housing in Aluminum Only

Order Details (Continued)

Measuring Ranges*				Capillary Tube**
Fahrenheit		Celsius		
..41.. = -40...100 °F	..23.. = 32...390 °F	..24.. = -20...40 °C	..12.. = 0...120 °C	..E.. = 316-Ti Stainless Steel (Standard) ..P.. = Steel with PVC Jacket (for 4" or 6" Housing only) ..F.. = 316-Ti Stainless Steel with Flexible 304 Stainless Steel Armor
..28.. = -20...85 °F	..34.. = 32...480 °F	..26.. = -20...60 °C	..16.. = 0...160 °C	
..31.. = 32...140 °F	..57.. = 32...570 °F	..35.. = -30...50 °C	..20.. = 0...200 °C	
..21.. = 32...210 °F	..37.. = 32...750 °F	..44.. = -40...40 °C	..25.. = 0...250 °C	
..32.. = 32...250 °F	..39.. = 32...925 °F	..46.. = -40...60 °C	..30.. = 0...300 °C	
..33.. = 32...320 °F	..11.. = 32...1100 °F	..06.. = 0...60 °C	..40.. = 0...400 °C	
		..08.. = 0...80 °C	..50.. = 0...500 °C	
		..10.. = 0...100 °C	..60.. = 0...600 °C	

* Special Measuring Range (Code E) pon Request, Min. ΔT = 140 °F

** Please Specify Length of Capillary Tube when Ordering

Order Details (Continued)

Standard Probe/Material/Connection*				
Dimensions**	Description	Material	Thread	Order Code
	Smooth Probe	Stainless Steel	Without	..A0..
	Union Nut	Stainless Steel	G 1/2 G 3/4 G 1	..B1.. ..B2.. ..B3..
	Rotatable Nipple for DIN Sleeve	Stainless Steel	G 1/2 G 3/4 G 1	..41.. ..42.. ..43..
	Union Nut and Shoulder Nipple	Stainless Steel	1/2" NPT 3/4" NPT 1" NPT G 1/2 G 3/4 G 1	..1A.. ..1B.. ..1C.. ..11.. ..12.. ..13..
	Sliding Connection on Extension Tube/Probe	Stainless Steel	1/2" NPT 3/4" NPT 1" NPT G 1/2 G 3/4 G 1	..9A.. ..9B.. ..9C.. ..91.. ..92.. ..93..
	Sliding Connection on Capillary Tube	Stainless Steel	1/2" NPT 3/4" NPT 1" NPT G 1/2 G 3/4 G 1	..8A.. ..8B.. ..8C.. ..81.. ..82.. ..83..
	Helix Probe for Gases	Stainless Steel	Without	..H0..

* Probe Length "L": Please Specify when Ordering. (Minimum Length 2" from the Sealing Collar of the Thread.)

** d = Standard Probe Diameter 12 mm (Other Diameters Available: See "Special Options" Table)

Ls ≈ 2" with Ø 12 mm Probe, Ls ≈ 2.75" with Ø 10 mm Probe, Ls ≈ 3.5" with Ø 9 mm Probe, Ls ≈ 4.75" with Ø 8 mm Probe

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

Order Details: Switching Function of Contacts for 4" and 6" Housing* (Continued)

Magnetic Spring Contacts/Slow-Action Contacts: Limit Switch 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
Magnetic Spring Contacts/Slow-Action Contacts: Limit Switch 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 Switch with One Contact			
Switching Operation	When the 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
Inductive Contacts: Limit Switch 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 Aluminum Housing Upon Request.
The Devices are Delivered with a Lateral Connecting Box as Standard. Other Connectors Upon Request.



Order Details: Special Options (Continued)

Add Suffix "Y" to Order Code and Clearly Specify in Writing which Option(s) to Add
Non-Standard Probe Diameter of 8 mm, 9 mm or 10 mm (Instead of the Standard 12 mm)
Test Certificate (5 Measuring Points According to DIN 55350)
Over Temperature Protection (1.3 x)
Safety Glass
Dual Scale (°C/°F)
Measuring Mechanism made of Stainless Steel (for 4" and 6" Housing)
Max. Pointer
Red Gliding Mark Reference Pointer
Housing Filled with Glycerine or other Materials
Knife Edge Pointer with Fine Graduation
Plug According to DIN 43650 with Junction Box (for Unfilled Housing Only)
Tuchel-Plug