# **TM1**



## **Technical Features**

- > Temperature switch with two adjustable switch points
- > Simple switching point setting by means of two setting rings allowing optimum reading
- > Mechanical locking prevents inadvertent switching point manipulation
- > Particularly good response dynamics and very short power-on delay time
- > Installation length 250 mm
- > High vibration and shock resistance
- > Certification acc. to EU direction



## **Functional Description**

Temperature switch with the measuring thermistor Pt 1000 and two adjustable temperature switching points. Two adjusting rings are provided with scale and their position is protected with a mechanical lock. The stainless-steel body is provided with connecting thread G 1/2 with FKM sealing ring. The needed installation length for the measuring stem is 250 mm. An electric connection is realized by four-pin connector M12 x 1. The temperature switch is suitable for industrial usage thanks to robust design, vibration and shock resisted.

Outputs: two switching contacts (pin 2 and pin 4)

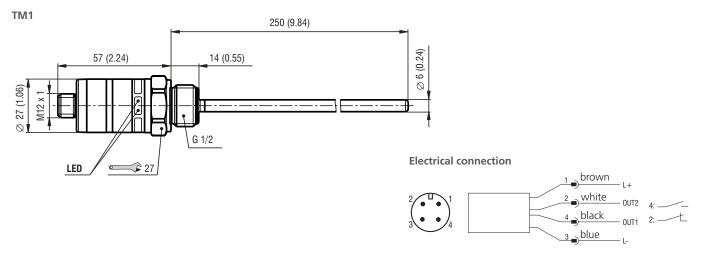
## Technical Data

Measuring range         °C (°F)         -25 +140 (-13 +284)           Set point SP         °C (°F)         -20 + 140 (-4 +284)           Median         Liquids           Medium temperature         °C (°F)         -40 +145 (-40 +293)           Ambient temperature         °C (°F)         -40 +80 (-40 +122) at medium temperature < 80 °C (+176 °F) -40 +50 (-40 +122) at medium temperature < 145 °C (+293 °F)           Storage temperature         °C (°F)         -40 +100 (-40 +212)           Pressure rating         bar (PSI)         300 (4350)           Electrical parameters         Supply voltage         V DC         9.6 32 (supply class 2 acc. to cULus)           Current consumption         mA         < 30           Protection class         III         IP67           Protection         Reverse polarity protection           Power-on delay time         s         0.5           Outputs         Switching signals; PNP switcher (contacts normally open / closed)           Max. voltage drop switching output DC         V         2           Permanent current rating of switching output DC         V         2           Permanent current rating of switching output DC         MA         500           Electric protection         Pulsed short-circuit and overload protection </th <th>Application</th> <th></th> <th></th>	Application		
Set point SP	Measuring element		1x Pt 1000 (DIN EN 60751, class A)
Media     Liquids       Medium temperature     °C (°F)     40 +145 (-40 +293)       Ambient temperature     °C (°F)     40 +180 (-40 +122) at medium temperature < 80 °C (+176 °F) (-40 +132) at medium temperature < 145 °C (+293 °F)	Measuring range	°C (°F)	-25 +140 (-13 +284)
Medium temperature  **C (°F)	Set point SP	°C (°F)	-20 + 140 (-4 +284)
Ambient temperature   **C (*F)	Media		Liquids
Altimetric temperature	Medium temperature	°C (°F)	-40 +145 (-40 +293)
Pressure rating bar (PSI) 300 (4350)  Electrical parameters  Supply voltage V DC 9.6 32 (supply class 2 acc. to cULus)  Current consumption mA < 30  Protection class III  IP protection   IP67  Protection   Reverse polarity protection  Power-on delay time   S 0.5  Outputs  Two digital outputs   Switching signals; PNP switcher (contacts normally open / closed)  Max. voltage drop switching output DC   V 2  Permanent current rating of switching output DC   Pulsed short-circuit and overload protection  Accuracy / deviations  Temperature drift per 10 K   K 0.1  Repeatability   K ± 0.1  Setting accuracy   K ± 3  Response times  Dynamic response T05/T09   s 1/3; acc. to DIN EN 60751  Adjustment of the switching point   Two setting rings with a mechanical lock  Tests / approvals  EMC   DIN EN 61000-4-2 ESD   4 kV CD / 8 kV AD EN 61000-4-3 Birst 2 kV CD / 8 kV AD EN 61000-4-3 Birst 2 kV CD / 8 kV AD EN 61000-4-4 Birst 2 kV CD / 8 kV AD EN 61000-4-6 Hir conducted 10 V V/m  Shock resistance   DIN EC 68-2-27   50 g (11 ms)	Ambient temperature	°C (°F)	
Electrical parameters  Supply voltage	Storage temperature	°C (°F)	-40 +100 (-40 +212)
Supply voltage V DC 9.6 32 (supply class 2 acc. to cULus)  Current consumption mA < 30  Protection class III  IP protection Protection Reverse polarity protection Power-on delay time s 0.5  Outputs  Two digital outputs Switching output DC V 2  Permanent current rating of switching output DC mA 500  Electric protection Pulsed short-circuit and overload protection  Accuracy / deviations  Temperature drift per 10 K K ± 0.1  Repeatability K ± 0.1  Setting accuracy K ± 3  Response times  Dynamic response T05/T09 s 1/3; acc. to DIN EN 60751  Adjusting  EMC DIN EN 61000-4-3 HF radiated EN 61000-4-4 Burst EN 61000-4-5 U V EN FER	Pressure rating	bar (PSI)	300 (4350)
Current consumption mA < 30 Protection class   III IP protection   IP67 Protection   Reverse polarity protection Power-on delay time   s   0.5  Outputs Two digital outputs   Switching signals; PNP switcher (contacts normally open / closed) Max. voltage drop switching output DC   V   2 Permanent current rating of switching output DC   MA   500 Electric protection   Pulsed short-circuit and overload protection Accuracy / deviations Temperature drift per 10 K   K   0.1 Repeatability   K   ± 0.1 Setting accuracy   K   ± 3 Response times  Dynamic response T05/T09   s   1/3; acc. to DIN EN 60751 Adjusting Adjustment of the switching point   Two setting rings with a mechanical lock Tests / approvals  EMC   DIN EN 61000-4-2 ESD   4 kV CD / 8 kV AD EN 61000-4-3 HF radiated 10 V/m EN 61000-4-4 Burst 2 kV EN 61000-4-4 Burst 2 kV EN 61000-4-4 Burst 2 kV EN 61000-4-4 Burst 5 50 g (11 ms)	Electrical parameters		
Protection class III IP protection IP67 Protection Reverse polarity protection Outputs Two digital outputs Switching output DC V 2 Permanent current rating of switching output DC MA 500 Electric protection Pulsed short-circuit and overload protection Accuracy / deviations Temperature drift per 10 K K 0.1 Repeatability K ± 0.1 Setting accuracy K ± 3 Response times Dynamic response T05/T09 S 1/3; acc. to DIN EN 60751 Adjustment of the switching point Tests / approvals  EMC  EMC  DIN EN 61000-4-3 HF radiated 10 V/m LS (V/m) S (V/m)	Supply voltage	V DC	9.6 32 (supply class 2 acc. to cULus)
P protection	Current consumption	mA	< 30
Protection Reverse polarity protection Power-on delay time s 0.5 Outputs Two digital outputs Switching output DC V 2 Permanent current rating of switching output DC Pulsed short-circuit and overload protection Accuracy / deviations Temperature drift per 10 K K 0.1 Repeatability K ± 0.1 Setting accuracy K ± 3 Response times Dynamic response T05/T09 S 1/3; acc. to DIN EN 60751 Adjusting Adjusting Adjusting Adjusting EMC  DIN EN 61000-4-2 ESD 4 kV CD / 8 kV AD EN 61000-4-3 HF radiated 10 V/ Shock resistance  DIN IEC 68-2-27 50 g (11 ms)	Protection class		III
Power-on delay time s 0.5  Outputs  Two digital outputs Switching output DC V 2  Permanent current rating of switching output DC Pulsed short-circuit and overload protection Pulsed short-circuit and overload protection  Accuracy / deviations  Temperature drift per 10 K K 0.1  Repeatability K ± 0.1  Setting accuracy K ± 3  Response times  Dynamic response T05/T09 s 1/3; acc. to DIN EN 60751  Adjusting  Adjustment of the switching point Two setting rings with a mechanical lock  Tests / approvals  EMC  DIN EN 61000-4-2 ESD 4 kV CD / 8 kV AD 10 V/m EN 61000-4-4 Burst 2 kV EN 61000-4-4 Burst 2 kV EN 61000-4-6 HF conducted 10 V  Shock resistance  DIN IEC 68-2-27 50 g (11 ms)	IP protection		IP67
Outputs Two digital outputs Switching signals; PNP switcher (contacts normally open / closed)  Max. voltage drop switching output DC V 2 Permanent current rating of switching output DC MA 500  Electric protection Accuracy / deviations  Temperature drift per 10 K K 0.1  Repeatability K ± 0.1  Setting accuracy K ± 3  Response times  Dynamic response T05/T09 S Adjusting  Adjustment of the switching point Two setting rings with a mechanical lock  Tests / approvals  EMC  DIN EN 61000-4-2 ESD EN 61000-4-2 ESD EN 61000-4-3 HF radiated EN 61000-4-4 Burst 2 kV EN 61000-4-6 HF conducted 10 V  Shock resistance  DIN IEC 68-2-27 50 g (11 ms)	Protection		Reverse polarity protection
Two digital outputs  Switching signals; PNP switcher (contacts normally open / closed)  Max. voltage drop switching output DC  Permanent current rating of switching output DC  Electric protection  Accuracy / deviations  Temperature drift per 10 K  Repeatability  K  ± 0.1  Setting accuracy  K  ± 3  Response times  Dynamic response T05/T09  Adjusting  Adjusting  Adjustment of the switching point  Two setting rings with a mechanical lock  Tests / approvals  EMC  DIN EN 61000-4-2 ESD  EN 61000-4-3 HF radiated  EN 61000-4-4 Burst  EN 61000-4-6 HF conducted  DIN IEC 68-2-27  50 g (11 ms)	Power-on delay time	S	0.5
Max. voltage drop switching output DC V 2 Permanent current rating of switching output DC mA 500  Electric protection Pulsed short-circuit and overload protection  Accuracy / deviations  Temperature drift per 10 K K 0.1  Repeatability K ± 0.1  Setting accuracy K ± 3  Response times  Dynamic response T05/T09 s 1/3; acc. to DIN EN 60751  Adjusting  Adjustment of the switching point Two setting rings with a mechanical lock  Tests / approvals  EMC  DIN EN 61000-4-2 ESD 4 kV CD / 8 kV AD EN 61000-4-3 HF radiated 10 V/m 2 kV EN 61000-4-6 HF conducted 10 V  Shock resistance  DIN IEC 68-2-27 50 g (11 ms)	Outputs		
Permanent current rating of switching output DC  Electric protection  Accuracy / deviations  Temperature drift per 10 K  Repeatability  K  ± 0.1  Setting accuracy  K  ± 3  Response times  Dynamic response T05/T09  S  Adjusting  Adjustment of the switching point  Two setting rings with a mechanical lock  Tests / approvals  EMC  DIN EN 61000-4-2 ESD EN 61000-4-4 Burst EN 61000-4-4 Burst EN 61000-4-6 HF conducted  DIN IEC 68-2-27  50 g (11 ms)	Two digital outputs		Switching signals; PNP switcher (contacts normally open / closed)
Electric protection Pulsed short-circuit and overload protection  Accuracy / deviations  Temperature drift per 10 K K 0.1  Repeatability K ± 0.1  Setting accuracy K ± 3  Response times  Dynamic response T05/T09 s 1/3; acc. to DIN EN 60751  Adjusting  Adjustment of the switching point Two setting rings with a mechanical lock  Tests / approvals  EMC  DIN EN 61000-4-2 ESD 4 kV CD / 8 kV AD EN 61000-4-3 HF radiated 10 V/m EN 61000-4-4 Burst 2 kV EN 61000-4-6 HF conducted 10 V  Shock resistance  DIN IEC 68-2-27 50 g (11 ms)	Max. voltage drop switching output DC	V	2
Accuracy / deviations  Temperature drift per 10 K K 0.1  Repeatability K ± 0.1  Setting accuracy K ± 3  Response times  Dynamic response T05/T09 s 1/3; acc. to DIN EN 60751  Adjusting  Adjustment of the switching point Two setting rings with a mechanical lock  Tests / approvals  EMC  DIN EN 61000-4-2 ESD 4 kV CD / 8 kV AD EN 61000-4-3 HF radiated 10 V/m EN 61000-4-4 Burst 2 kV EN 61000-4-6 HF conducted 10 V  Shock resistance  DIN IEC 68-2-27 50 g (11 ms)	Permanent current rating of switching output DC	mA	500
Temperature drift per 10 K K 0.1  Repeatability K ± 0.1  Setting accuracy K ± 3  Response times  Dynamic response T05/T09 s 1/3; acc. to DIN EN 60751  Adjusting  Adjustment of the switching point Two setting rings with a mechanical lock  Tests / approvals  EMC  DIN EN 61000-4-2 ESD 4 kV CD / 8 kV AD EN 61000-4-3 HF radiated 10 V/m EN 61000-4-4 Burst 2 kV EN 61000-4-6 HF conducted 10 V  Shock resistance  DIN IEC 68-2-27 50 g (11 ms)	Electric protection		Pulsed short-circuit and overload protection
Repeatability  K ± 0.1  Setting accuracy  K ± 3  Response times  Dynamic response T05/T09  S 1/3; acc. to DIN EN 60751  Adjusting  Adjustment of the switching point  Two setting rings with a mechanical lock  Tests / approvals  EMC  DIN EN 61000-4-2 ESD EN 61000-4-3 HF radiated EN 61000-4-4 Burst EN 61000-4-4 Burst EN 61000-4-6 HF conducted EN 61000-4-6 HF conducted EN 61000-4-6 HF conducted EN 61000-4-7 SO g (11 ms)	Accuracy / deviations		
Setting accuracy K ± 3  Response times  Dynamic response T05/T09 s 1/3; acc. to DIN EN 60751  Adjusting  Adjustment of the switching point Two setting rings with a mechanical lock  Tests / approvals  EMC  DIN EN 61000-4-2 ESD 4 kV CD / 8 kV AD EN 61000-4-3 HF radiated 10 V/m EN 61000-4-4 Burst 2 kV EN 61000-4-6 HF conducted 10 V  Shock resistance  DIN IEC 68-2-27 50 g (11 ms)	Temperature drift per 10 K	K	0.1
Response times  Dynamic response T05/T09 s 1/3; acc. to DIN EN 60751  Adjusting  Adjustment of the switching point Two setting rings with a mechanical lock  Tests / approvals  EMC  DIN EN 61000-4-2 ESD 4 kV CD / 8 kV AD EN 61000-4-3 HF radiated 10 V/m EN 61000-4-4 Burst 2 kV EN 61000-4-6 HF conducted 10 V  Shock resistance  DIN IEC 68-2-27 50 g (11 ms)	Repeatability	K	± 0.1
Dynamic response T05/T09 s 1/3; acc. to DIN EN 60751  Adjusting  Adjustment of the switching point Two setting rings with a mechanical lock  Tests / approvals  EMC  DIN EN 61000-4-2 ESD 4 kV CD / 8 kV AD EN 61000-4-3 HF radiated 10 V/m EN 61000-4-4 Burst 2 kV EN 61000-4-6 HF conducted 10 V  Shock resistance  DIN IEC 68-2-27 50 g (11 ms)	Setting accuracy	K	± 3
Adjustment of the switching point  Two setting rings with a mechanical lock  Tests / approvals  EMC  DIN EN 61000-4-2 ESD 4 kV CD / 8 kV AD EN 61000-4-3 HF radiated 10 V/m EN 61000-4-4 Burst 2 kV EN 61000-4-6 HF conducted 10 V  Shock resistance  DIN IEC 68-2-27 50 g (11 ms)	Response times		
Adjustment of the switching point  Two setting rings with a mechanical lock  Tests / approvals  EMC  DIN EN 61000-4-2 ESD	Dynamic response T05/T09	S	1/3; acc. to DIN EN 60751
Tests / approvals  EMC  DIN EN 61000-4-2 ESD	Adjusting		
DIN EN 61000-4-2 ESD 4 kV CD / 8 kV AD EN 61000-4-3 HF radiated 10 V/m EN 61000-4-4 Burst 2 kV EN 61000-4-6 HF conducted 10 V  Shock resistance DIN IEC 68-2-27 50 g (11 ms)	Adjustment of the switching point		Two setting rings with a mechanical lock
EMC     EN 61000-4-3 HF radiated EN 61000-4-4 Burst 2 kV EN 61000-4-6 HF conducted 10 V       Shock resistance     DIN IEC 68-2-27 50 g (11 ms)	Tests / approvals		
2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2 2	EMC		EN 61000-4-3 HF radiated 10 V/m EN 61000-4-4 Burst 2 kV
Vibration resistance         DIN IEC 60068-2-6         20 g (102000 Hz)	Shock resistance		DIN IEC 68-2-27 50 g (11 ms)
	Vibration resistance		DIN IEC 60068-2-6 20 g (102000 Hz)

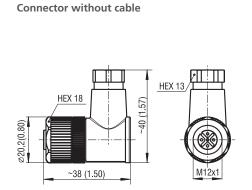
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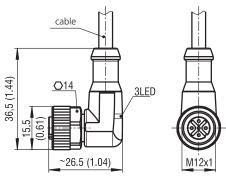
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MTTF	years	643.1		
UL approval No.		Schválení č. K018		
Mechanical parameters				
Weight	Kg (lbs)	0.141 (0.31)		
Materials		Stainless steel (1.4404/316L); PBT; PC; FKM		
Materials (wetted parts)		Stainless steel (1.4404/316L); FKM		
Tightening torque	Nm (lbf.ft)	45 (33.2)		
Circuit connection		External thread G 1/2		
Probe diameter	mm (in)	6 (0.24)		
Installation length	mm (in)	250 (9.84)		
Display, operating elements				
Display		Switching status – 2 x LED yellow		
Electrical connection				
Connector		4-pin, M12 x 1, gold-plated		

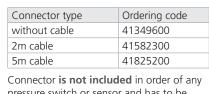


Colours acc. to standard EN 60947-5-2



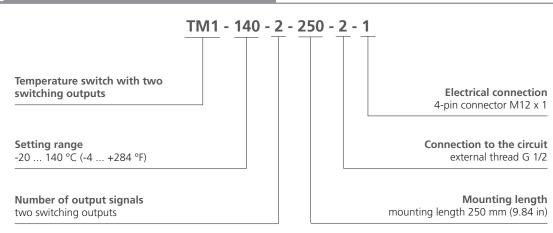
#### Connector with cable





pressure switch or sensor and has to be ordered separately.

## **Ordering Code**



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