

TFRN

RTD temperature sensor for industrial applications

TFRN-####.##0#.####.###0.####

Overview

- User-configurable according to individual requirements
- Optional with touch display
- Immersion depth 20 ... 3000 mm
- 4 ... 20 mA, HART or Pt100 output
- Convenient installation and reliable operation



Picture similar



Technical data

Performance characteristics

Pt100 accuracy class (EN 60751)	B ($\pm 0.3\text{ °C at }0\text{ °C}$) $\pm (0.3 + 0.005 \times t)\text{ °C}$ A ($\pm 0.15\text{ °C at }0\text{ °C}$) $\pm (0.15 + 0.002 \times t)\text{ °C}$ 1/3 B ($\pm 0.1\text{ °C at }0\text{ °C}$) $\pm 1/3 \times (0.3 + 0.005 \times t)\text{ °C}$ 1/6 B ($\pm 0.05\text{ °C at }0\text{ °C}$) $\pm 1/6 \times (0.3 + 0.005 \times t)\text{ °C}$
---------------------------------	---

Thermal response time, T50	$< 1.5\text{ s, } \varnothing 4\text{ mm}$ $< 6.1\text{ s, } \varnothing 6\text{ mm}$ $< 7.6\text{ s, } \varnothing 8\text{ mm}$
----------------------------	--

Process pressure	Refer to section "Operating conditions"
------------------	---

Process temperature	Refer to section "Operating conditions"
---------------------	---

Process connection

Connection variants	Refer to section "Dimensional drawings"
---------------------	---

Sensor length	20 ... 3000 mm
---------------	----------------

Sensor diameter outside	$\varnothing 6\text{ mm}$ $\varnothing 8\text{ mm}$
-------------------------	--

Mounting position	Any, top, bottom, side
-------------------	------------------------

Standard response tip	$\varnothing 6\text{ mm}$ $\varnothing 8\text{ mm}$
-----------------------	--

Fast response tip	$\varnothing 4\text{ mm}$
-------------------	---------------------------

Sensor tube material	AISI 316L (1.4404)
----------------------	--------------------

Surface roughness wetted parts	$Ra \leq 1.6\text{ }\mu\text{m}$
--------------------------------	----------------------------------

Ambient conditions

Operating temperature range	$-30 \dots 80\text{ °C}$, with DFON touch screen $-40 \dots 85\text{ °C}$, without DFON touch screen
-----------------------------	---

Storage temperature range	$-30 \dots 80\text{ °C}$, with DFON touch screen $-40 \dots 85\text{ °C}$, without DFON touch screen
---------------------------	---

Degree of protection (EN 60529)	IP67 IP69K, with appropriate cable
---------------------------------	---------------------------------------

Ambient conditions

Humidity	$< 98\text{ \% RH}$, condensing
----------	----------------------------------

Vibration (sinusoidal) (EN 60068-2-6)	1.6 mm p-p (2 ... 25 Hz), 4 g (25 ... 100 Hz), 1 octave / min.
---------------------------------------	--

Output signal

Without transmitter	1 x Pt100, 2-wire
---------------------	-------------------

	1 x Pt100, 4-wire
--	-------------------

	2 x Pt100, 2-wire
--	-------------------

With transmitter	4 ... 20 mA, 2-wire
------------------	---------------------

	4 ... 20 mA, 2-wire + HART®
--	-----------------------------

Housing

Style	Field housing, $\varnothing 55\text{ mm}$
-------	---

	FlexHousing, $\varnothing 80\text{ mm}$
--	---

Overall size	Refer to section "Dimensional drawings"
--------------	---

Material	AISI 304 (1.4301)
----------	-------------------

Electrical connection

Connector	M12-A, 5-pin, stainless steel
-----------	-------------------------------

	M12-A, 8-pin, stainless steel
--	-------------------------------

Cable	M16 plastic, cable dia. 5 ... 10 mm
-------	-------------------------------------

	M16 stainless steel, cable dia. 5 ... 9 mm
--	--

	M20 plastic, cable dia. 8 ... 13 mm
--	-------------------------------------

	M20 stainless steel, cable dia. 9 ... 13 mm
--	---

Cable gland	M16x1.5, plastic
-------------	------------------

	M16x1.5, stainless steel
--	--------------------------

	M20x1.5, plastic
--	------------------

	M20x1.5, stainless steel
--	--------------------------

ATEX II 1 G Ex ia IIC T6...T4

Maximum values for barrier selection, Ui	28 V DC, with FlexTop 2202
--	----------------------------

	30 V DC, with FlexTop 2212
--	----------------------------

	30 V DC, with FlexTop 2222
--	----------------------------

Maximum values for barrier selection, Ii	0.1 A, with FlexTop 2202
--	--------------------------

	0.095 A, with FlexTop 2212
--	----------------------------

	0.095 A, with FlexTop 2222
--	----------------------------

TFRN

RTD temperature sensor for industrial applications

TFRN-####.##0#.####.###0.####

Technical data

ATEX II 1 G Ex ia IIC T6...T4

Maximum values for barrier selection, Pi	0.7 W , with FlexTop 2202 0.75 W , with FlexTop 2212 0.75 W , with FlexTop 2222
Internal capacitance, Ci	10 nF , with FlexTop 2202 25 nF , with FlexTop 2202 and display 11 nF , with FlexTop 2212 26 nF , with FlexTop 2212 and display 11 nF , with FlexTop 2222 26 nF , with FlexTop 2222 and display
Internal inductance, Li	11 µH , with FlexTop 2202 20 µH , with FlexTop 2202 and display 24 µH , with FlexTop 2212 34 µH , with FlexTop 2212 and display 24 µH , with FlexTop 2222 34 µH , with FlexTop 2222 and display
Temperature class, T1 ... T4	-20 < Tamb < 65 °C , with DFON touch screen -40 < Tamb < 80 °C , with FlexTop 2212 -40 < Tamb < 80 °C , with FlexTop 2222
Temperature class, T5	-20 < Tamb < 60 °C , with DFON touch screen -40 < Tamb < 71 °C , with FlexTop 2212 -40 < Tamb < 71 °C , with FlexTop 2222
Temperature class, T1 ... T5	-40 < Tamb < 85 °C , with FlexTop 2202

ATEX II 1 G Ex ia IIC T6...T4

Temperature class, T6	-40 < Tamb < 50 °C , with FlexTop 2202 -40 < Tamb < 56 °C , with FlexTop 2212 -40 < Tamb < 56 °C , with FlexTop 2222
-----------------------	--

ATEX II 3 G Ex ec IIC T5...T4

Voltage supply range, Un	8 ... 30 V DC , with FlexTop 2202 6.5 ... 30 V DC , with FlexTop 2212 6.5 ... 30 V DC , with FlexTop 2222
Current rating, In	≤ 0.1 A
Temperature class, T1 ... T4	-20 < Tamb < 70 °C , with DFON touch screen
Temperature class, T1 ... T5	-20 < Tamb < 60 °C , with DFON touch screen
Temperature class, T1 ... T5	-40 < Tamb < 80 °C , with FlexTop 2202 -40 < Tamb < 80 °C , with FlexTop 2212 -40 < Tamb < 80 °C , with FlexTop 2222

Compliance and approvals

EMC	EN 61000-6-2 EN 61000-6-3 EN 61326-1
Explosion protection	ATEX II 1 G Ex ia IIC T6...T4 IECEx Ex ia IIC T6...T4 ATEX II 3 G Ex ec IIC T5...T4 Ex ia Simple apparatus, gas and dust

Display

General information

Panel type	FSTN Graphical LCD
Display range	-9999 ... 99999
Max. digit height	22 mm
Material	Polycarbonate

Ambient conditions

Optimal readability temperature range	-10 ... 70 °C
Operating temperature range	-30 ... 80 °C
Degree of protection (EN 60529)	IP 67 IP 69 K

Input signal

Input signal from transmitter	FlexTop 2202: Analog, current loop FlexTop 2212 / 2222: Digital, 2-way for communication between transmitter and display
Update time	1 s , max. 0.3 s , typ.

User configurable data

Error- / Warning-indication	Individually configurable display and backlight indication in white, green or red colour, steady or flashing light. Configurable limits over the range
Measuring unit	°C °F K
User defined measuring unit	8 × 20 pixel matrix

Relays

Contacts	2 x solid state relays
Max. load current	75 mA
Max. switching voltage	60 V

TFRN

RTD temperature sensor for industrial applications

TFRN-####.##0#.####.###0.####

Transmitter

FlexTop 2202

Input Accuracy	$\leq \pm 0.25\text{ }^{\circ}\text{C}$
Min. measuring span	25 °C
Output	4 ... 20 mA , 2-wire
Output Accuracy	$\leq \pm 0.1\%$, measuring span $\leq \pm 0.016\text{ mA}$
Power supply	8 ... 35 V DC
Programmability	With FlexProgrammer 9701
Please note	For further information please see data sheet for FlexTop 2202

FlexTop 2212

Input Accuracy	$\leq \pm 0.06\text{ }^{\circ}\text{C}$
Min. measuring span	10 °C
Output	4 ... 20 mA , 2-wire 20 ... 4 mA , programmable
Output Accuracy	$\leq \pm 0.025\%$, measuring span $\leq \pm 0.004\text{ mA}$
Power supply	7 ... 40 V DC
Programmability	With FlexProgram
Please note	For further information please see data sheet for FlexTop 2212

FlexTop 2222

Input Accuracy	$\leq \pm 0.06\text{ }^{\circ}\text{C}$
Min. measuring span	10 °C
Output	4 ... 20 mA , 2-wire + HART® 20 ... 4 mA , programmable
Output Accuracy	$\leq \pm 0.025\%$, measuring span $\leq \pm 0.004\text{ mA}$
Power supply	7 ... 40 V DC
Programmability	With FlexProgram With HART® modem
Please note	For further information please see data sheet for FlexTop 2222

Factory settings FlexTop 2202

Output range	0 ... 120 °C
Damping	0 s
Output at sensor fault	23 mA

Factory settings FlexTop 2212

Output range	0 ... 100 °C
Damping	0 s
Output at sensor fault	23 mA

Factory settings FlexTop 2222

Output range	0 ... 100 °C
Damping	0 s
Output at sensor fault	23 mA

Operating conditions

Ordering key	Process connection	BCID	Continuous			
			Process pressure	Process temperature Standard @ Tamb ≤ 20 °C	Process temperature With cooling neck @ Tamb ≤ 20 °C	Process temperature With cooling neck and spacer @ Tamb ≤ 60 °C
			(bar)	(° C)	(° C)	(° C)
TFRN-####.####.##10.####.####	Sleeve Ø 6	T65	-1 ... 40	-50 ... 250	-50 ... 400	-50 ... 400
TFRN-####.####.##11.####.####	G 1/2 A DIN 3852-E	G51	-1 ... 100	-50 ... 250	-50 ... 400	-50 ... 400
TFRN-####.####.##12.####.####	G 1/2 A DIN 3852-A	G44	-1 ... 100	-50 ... 250	-50 ... 400	-50 ... 400
TFRN-####.####.##13.####.####	R 1/2 ISO 7-1	R06	-1 ... 100	-50 ... 250	-50 ... 400	-50 ... 400
TFRN-####.####.##30.####.####	1/2-14 NPT	N02	-1 ... 100	-50 ... 250	-50 ... 400	-50 ... 400

For further information on permissible process and ambient temperatures, please refer to the operating instructions.

TFRN

RTD temperature sensor for industrial applications

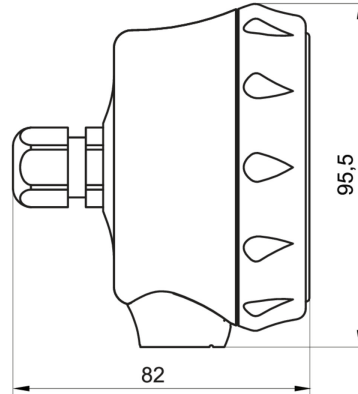
TFRN-####.##0#.####.###0.####

Dimensional drawings (mm)

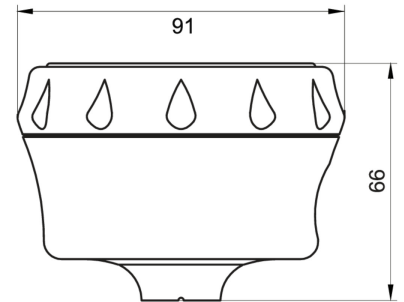
Housing



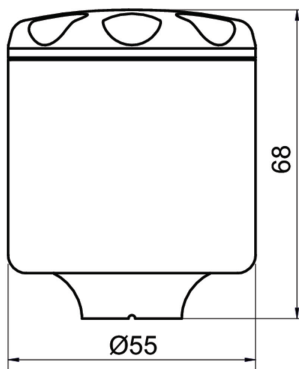
FlexHousing front view



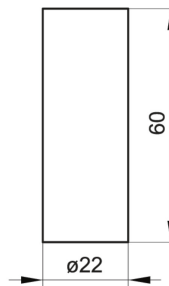
FlexHousing with bottom process connection



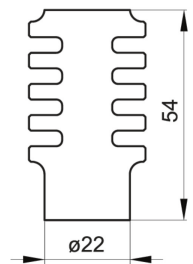
FlexHousing with rear process connection



Field housing, Ø55 mm

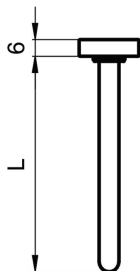


Spacer

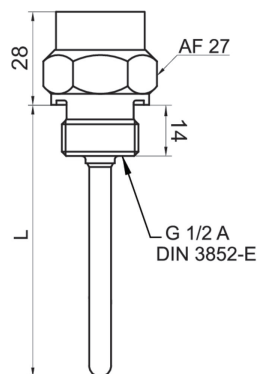


Cooling neck

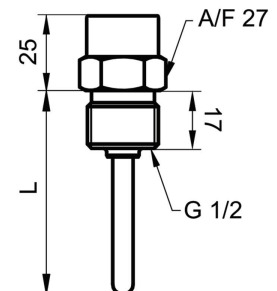
Process connection



Without thread (BCID: T65)



G 1/2 A DIN 3852-E (BCID: G51)



G 1/2 A DIN 3852-A (BCID: G44)

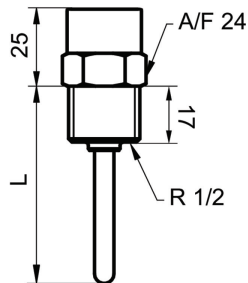
TFRN

RTD temperature sensor for industrial applications

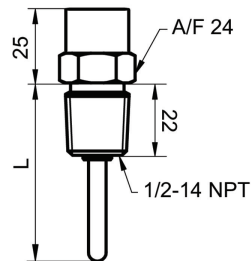
TFRN-####.#0#.#000.#000.#000

Dimensional drawings (mm)

Process connection



R 1/2 ISO 7/1 (BCID: R06)



1/2-14 NPT (BCID: N02)



Standard response tip



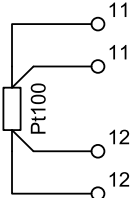
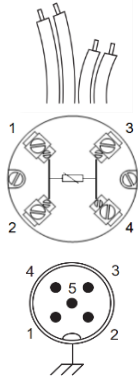
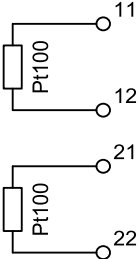
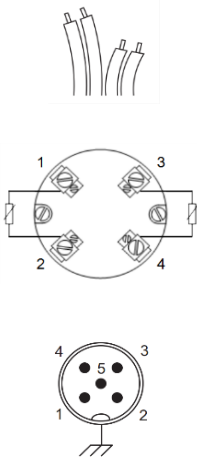
Fast response tip

TFRN

RTD temperature sensor for industrial applications

TFRN-####.##0#.####.###0.####

Electrical connection

Output type	Equivalent circuit	Electrical connection	Function	Pin assignment
Pt100 (Single element)			Pt100 11	Long
			Pt100 12	Short
			Pt100 11	1, 2
			Pt100 12	3, 4
			Pt100 11	1, 2
			Pt100 12	3, 4
			N.C.	5
Pt100 (Double element)			Pt100 11	Long
			Pt100 12	Long
			Pt100 21	Short
			Pt100 22	Short
			Pt100 11	1
			Pt100 12	2
			Pt100 21	3
			Pt100 22	4
			Pt100 11	1
			Pt100 12	2
			Pt100 21	3
			Pt100 22	4
			N.C.	5
			Frame ground	Plug thread

TFRN

RTD temperature sensor for industrial applications

TFRN-####.##0#.####.###0.####

Electrical connection

Output type	Equivalent circuit	Electrical connection	Function	Pin assignment
4 ... 20 mA, 2-wire			+Vs	1
			lout	2
			+Vs	1
			Common for relays 11, 21	2
			lout	3
			Relay 22	4
			Relay 12	5
			Frame ground	Plug thread
			N.C.	1
			+Vs	2
2 x 4 ... 20 mA, 2-wire			+Vs1	1
			lout1	2
			+Vs2	3
			lout2	4
			+Vs1	1
			lout1	2
			lout2	3
			+Vs2	4
			N.C.	5
			Frame ground	Plug thread

Ordering information

Ordering key - Configuration possibilities see website

Product	TFRN	-	#	#	#	#	.	#	#	#	.	#	#	##	.	#	#	#	0	.	####
Housing	TFRN																				
FlexHousing Ø80			5																		
Stainless steel 1.4301 / AISI304																					
Bottom process connection																					
FlexHousing Ø80			6																		
Stainless steel 1.4301 / AISI304																					
Rear process connection																					
Field housing Ø55			7																		
Stainless steel 1.4301 / AISI304																					
Electrical connection																					
M12-A, 5-pin			1																		
M12-A, 8-pin			3																		
M16x1.5 cable gland			5																		
M20x1.5 cable gland			B																		

TFRN

RTD temperature sensor for industrial applications

TFRN-####.#0#.#000.#000.####

Ordering information

Ordering key - Configuration possibilities see website

	TFRN	-	#	#	#	#	.	#	#	#	.	#	#	##	.	#	#	#	0	.	####
Material el. connection																					
Plastic																					
Stainless steel AISI 304 (1.4301)																					
Display																					
Without display, Ø55 housing																					
Without display, Ø80 housing																					
With display, relays not activated																					
With display, relays activated																					
Transmitter / socket																					
Flying leads																					
Ceramic socket Pt100																					
Transmitter 2202																					
4 ... 20 mA, accuracy ±0,25 °C																					
Transmitter 2212																					
4 ... 20 mA, accuracy < ±0.06°C																					
Transmitter 2222																					
4 ... 20 mA + HART®, accuracy < ±0.06°C																					
2 x Transmitter 2212																					
4 ... 20 mA, accuracy < ±0.06°C																					
Safety																					
Standard																					
Ex ia IIC T6/T5...T4 (Gas)																					
Ex ec IIC T5...T4 (Gas)																					
Ex ia Simple apparatus, gas and dust																					
Configuration																					
No configuration																					
Configuration of temperature range																					
Configuration of Range + Display																					
Configuration of Range																					
+ Display incl. 2 x relays																					
Sensor element																					
None																					
1 x Pt100, 1/1 B EN 60751																					
2 x Pt100, 1/1 B EN 60751																					
1 x Pt100, 1/3 B EN 60751																					
2 x Pt100, 1/3 B EN 60751																					
1 x Pt100, 1/6 B EN 60751																					
2 x Pt100, 1/6 B EN 60751																					
1 x Pt100, 1/1 A EN 60751																					
2 x Pt100, 1/1 A EN 60751																					
1 x Pt100, 1/1 B EN 60751, < 600°C																					

TFRN

RTD temperature sensor for industrial applications

TFRN-####.#0#.#0#.#0#.#0#

Ordering information

Ordering key - Configuration possibilities see website

TFRN - # # # # . # # # # . # # # # . # # # 0 . ####

Sensor insert type

Sensor tube with embedded sensor element 2-wire	1
Sensor tube with embedded sensor element 4-wire	2
Sensor tube with embedded 2x2-wire sensor element	4
Spring loaded insert, DIN 43762, 2-wire	5
Spring loaded insert, DIN 43762, 4-wire	6
Spring loaded insert, DIN 43762, 2x2-wire	7
Cable sensor Pt100 1/1 B EN 60751	A
Cable sensor Pt100 1/3 B EN 60751	B
Cable sensor Pt100 1/6 B EN 60751	C
Cable sensor Pt100 1/1 A EN 60751	D

Cooling neck

Without	0
With cooling neck	4
With cooling neck + 1 spacer	5
With cooling neck + 2 spacers	6

Process connection

Tube without connection (T65)	10
G 1/2 A DIN 3852-E (G51)	11
G 1/2 A DIN 3852-A (G44)	12
R 1/2 ISO 7/1 (R01)	13
1/2-14 NPT (N02)	30

Seal

Without	0
NBR	1
EPDM	2
FKM	3

Sensor diameter

ø 6 mm, AISI 316L	1
ø 8 mm, AISI 316L	2

Sensor tip

Standard response tip	1
Fast response tip, ø 4 mm tip	2

Approvals

Standard approvals	0
--------------------	---

Sensor tube length (mm)

20 - 3000	####
-----------	------