

Compact thermometer with Pt100 or
4 to 20 mA/ IO-Link output

iTHERM CompactLine TM311

NEW!

Successor of TMR31
and TMR35

€ 70.-
11-35 pcs.



- Small, compact design entirely made of stainless steel
- Extremely short response time
- Highest accuracy even with short immersion lengths

i Specs at a glance:

- **Measuring range:**
-50 to +200 °C (-58 to +392 °F)
- **Pressure range:**
up to 50 bar (725 psi)
- **Response time:**
Pt100: 5 s (T_{63}), 11 s (T_{90});
iTHERM TipSens: 1.0 s (T_{63}),
2.0 s (T_{90})

Application iTHERM CompactLine TM311 is developed for universal use in hygienic and aseptic applications in the food & beverages and pharmaceutical industries, and for optimum standardization for machine and skid builders.

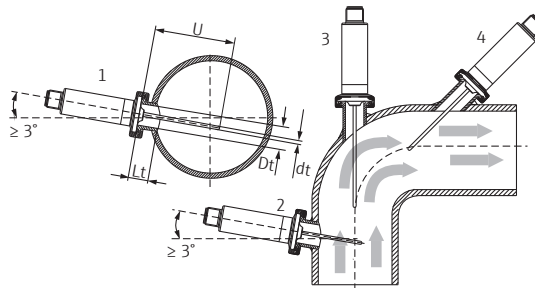
Function The compact thermometer measures the process temperature with a Pt100 sensor element (class A, 4-wire). An optional built-in transmitter converts the Pt100 input signal. The device with integrated electronics automatically detects the type of communication (IO-Link or 4 to 20 mA).

IO-Link



Complete product information:
www.e-direct.endress.com/tm311

Application example



The immersion length of the compact thermometer can considerably influence the accuracy. If the immersion length is too short, measurement errors can occur as a result of heat conduction via the process connection and the vessel wall. If installing in a pipe, the immersion length should ideally correspond to half of the pipe diameter.

Installation possibilities: pipes, tanks or other plant components.

Technical data

Input	
Measuring range	- Pt100 (TF) basic: -50 to +150 °C (-58 to +302 °F) - TipSens: -50 to +200 °C (-58 to +392 °F)
Output	
Output signal	- Sensor: Pt100, 4-wire connection, class A - Analog: 4 to 20 mA; variable measuring range - Digital: C/Q (IO-Link or switch output)
Switching capacity	- 1 × PNP switch output - Switch state ON I _a ≤ 200 mA; switch state OFF I _a ≤ 10 μA - Voltage drop PNP ≤ 2 V
Switch output	Response time ≤ 100 ms
Damping	Configurable sensor input damping 0 to 120 s
Switch-on delay	2 s
Power supply	
Supply voltage	IO-Link/4 to 20 mA: U _b = 10 to 30 V _{DC} , protected against reverse polarity

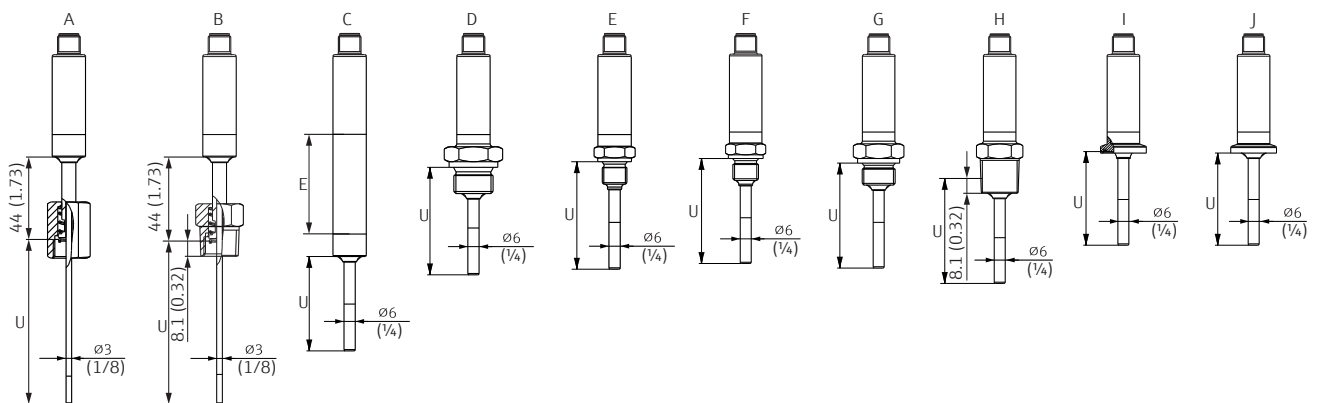
Performance characteristics	
Reference operating conditions	- Adjustment temperature (ice bath): 0 °C (32 °F) for sensor - Ambient temperature range: 25 °C ± 3 °C (77 °F ± 5 °F) for electronics - Supply voltage: 24 V _{DC} ± 10 % - Relative humidity: < 95 %
Maximum measured error	- Thermometer without electronics: 0.55 °C (0.99 °F) - Thermometer with electronics: ≤ 0.48 °C (0.86 °F) - Thermometer with electronics and sensor-transmitter-matching/increased accuracy: ≤ 0.14 °C (0.25 °F)
Response time T ₆₃ and T ₉₀	- 6 mm direct contact, straight tip Pt100 (TF) basic: T ₆₃ 5 s; T ₉₀ 11 s - 6 mm direct contact, straight tip iTHERM TipSens: T ₆₃ 1 s; T ₉₀ 2 s - 6 mm thermowell, straight tip (4.3 × 20 mm) iTHERM TipSens: T ₆₃ 1 s; T ₉₀ 3 s
Electronics response time	Max. 1 s
Sensor current	≤ 1 mA

Environment	
Ambient temperature range	-40 to +85 °C (-40 to +185 °F)
Storage temperature	-40 to +85 °C (-40 to +185 °F)
Climate class	As per IEC/EN 60654-1, Class Dx
Degree of protection	As per IEC/EN 60529 IP69
Shock and vibration resistance	The thermometer meets the requirements of IEC 60751, which specifies shock and vibration resistance of 3 g in the 10 to 500 Hz range
Electrical safety	- Protection class III - Overvoltage category II - Pollution level 2

Dimensions in mm (in)

Without thermowell

U – Variable immersion length, depending on the configuration



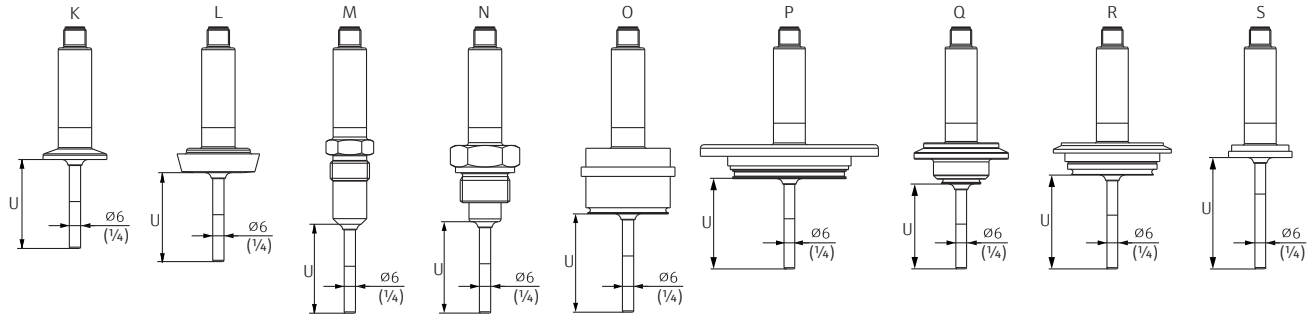
- A – Thermometer with spring-loaded cap-nut, G3/8" thread 3 mm for existing thermowell
- B – Thermometer with spring-loaded NPT1/2" male thread 3 mm for existing thermowell
- C – Thermometer without process connection for compression fitting, with extension neck
- D – Thermometer with G1/2" male thread
- E – Thermometer with G1/4" male thread

- F – Thermometer with M14 male thread
- G – Thermometer with M18 male thread
- H – Thermometer with NPT1/2" male thread
- I – Thermometer with Microclamp, DN18 (0.75")
- J – Thermometer with Tri-Clamp, DN18 (0.75")

Pay attention to the following equations when calculating the immersion length U for an existing thermowell:

Version 1 (G3/8" cap-nut): $U = U_{(thermowell)} + T_{(thermowell)} + 3 \text{ mm} - B_{(thermowell)}$

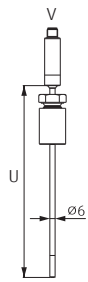
Version 2 (NPT1/2" male thread): $U = U_{(thermowell)} + T_{(thermowell)} + 11 \text{ mm} - B_{(thermowell)}$



- K – Thermometer with ISO2852 clamp for DN12 to 21.3, DN25 to 38, DN40 to 51
- L – Thermometer with milk pipe connection DIN11851 for DN25/DN32/DN40/DN50
- M – Thermometer with metal sealing system G1/2"
- N – Thermometer with G3/4" male thread ISO228 for FTL31/33/20/50 Liquiphant adapter
- O – Thermometer with D45 process adapter

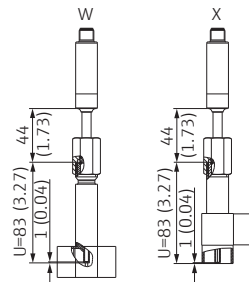
- P – Thermometer with APV in-line, DN50
- Q – Thermometer with Varivent type B, D 31 mm
- R – Thermometer with Varivent type F, D 50 mm and Varivent Typ N, D 68 mm
- S – Thermometer with SMS 1147, DN25/DN38/DN51

With compression fitting

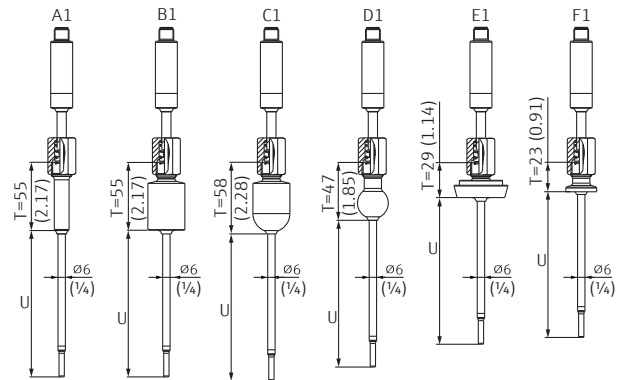


- V – Thermometer with TK40 compression fitting, cylindrical, Elastosil ferrule, ø 25 mm, for weld-in
- W – Thermometer with thermowell as T-piece
- X – Thermometer with thermowell as elbow piece

Thermowell version as T-piece or elbow piece



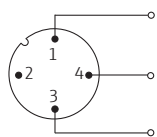
With thermowell diameter 6 mm (1/4 in)



- A1 – Thermometer with weld-in adapter, cylindrical, D 12 x 40 mm
- B1 – Thermometer with weld-in adapter, cylindrical, D 30 x 40 mm
- C1 – Thermometer with weld-in adapter, spherical-cylindrical, D 30 x 40 mm
- D1 – Thermometer with weld-in adapter, spherical, D 25 mm
- E1 – Thermometer with milk pipe connection DIN11851, DN25/DN32/DN40
- F1 – Thermometer with Microclamp, DN18 (0.75")

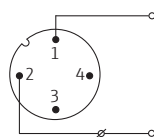
Electrical connection

IO-Link operating mode



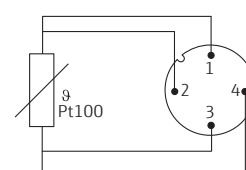
- 1 – Pin 1 - power supply 15 to 30 V_{DC}
- 2 – Pin 2 - not used
- 3 – Pin 3 - power supply 0 V_{DC}
- 4 – Pin 4 - C/Q (IO-Link or switch output)

4 to 20 mA operating mode



- 1 – Pin 1 - power supply 10 to 30 V_{DC}
- 2 – Pin 2 - power supply 0 V_{DC}
- 3 – Pin 3 - not used
- 4 – Pin 4 - not used

Without electronics



Pt100, 4-wire connection

Price table

Process connections

Code 1)	Code 3)	Code 5)	Code 7)
G1 G½ male thread ISO228, 316L	B2 Weld-in adapter cylindrical, D 30×40 mm	KA D45 process adapter	UA Tee thermowell DN20 PN25
G2 G¼ male thread ISO228, 316L	B3 Weld-in adapter cylindrical, D 12×40 mm	K1 APV Inline, DN50	UB Tee thermowell DN32 PN25
↓ 1)	B4 Weld-in adapter spherical-cylindrical, D 30×40 mm	↓ 5)	U0 Tee thermowell DN10 PN25
Code 2)	B5 Weld-in adapter spherical, D 25 mm	Code 6)	U1 Tee thermowell DN15 PN25
C1 Microclamp, DN18 (0.75")	↓ 3)	L1 Varivent type B, D 31 mm	U2 Tee thermowell DN25 PN25
C2 Tri-clamp, DN18 (0.75")	Code 4)	L2 Varivent type F, D 50 mm	↓ 7)
D1 Clamp ISO2852, DN12 - 21.3	E1 Dairy fitting DN25	L3 Varivent type N, D 68 mm	Code 8)
D2 Clamp ISO2852, DN25 - 38 (1-1.5")	E2 Dairy fitting DN32	↓ 6)	VA Elbow thermowell DN20 PN25
D3 Clamp ISO2852, DN40 - 51 (2")	E3 Dairy fitting DN40	↓ 8)	VB Elbow thermowell DN32 PN25
↓ 2)	E4 Dairy fitting DN50		V0 Elbow thermowell DN10 PN25
	↓ 4)		V1 Elbow thermowell DN15 PN25
			V2 Elbow thermowell DN25 PN25

iTHERM CompactLine TM311 (Thread Version Pt100, 4-wire class A)		Order no.	Price/pcs. in €		
Design; Diameter insert	Process connection		1 to 3	4 to 10	11 to 35
Without thermowell, direct contact; 6 mm	G½ male thread ISO228, / G¼ male thread ISO228	TM311-AAA0B <input type="checkbox"/> ¹⁾ BBX1A2	96.-	86.-	78.-
With thermowell; 3 mm	Compression fitting G½ male thread, TK40-BADA3C	TM311-AAA2BG7BBX1B2	244.-	220.-	200.-
Installation in existing thermowell; 3 mm	Not needed	TM311-AAA1AA0ABX1B2	138.-	124.-	113.-

iTHERM CompactLine TM311 (Thread Version, 4 to 20 mA / IO-Link, variable measuring range)		Order no.	Price/pcs. in €		
Design; Diameter insert	Process connection		1 to 3	4 to 10	11 to 35
Without thermowell, direct contact; 6 mm	G½ male thread ISO228, / G¼ male thread ISO228	TM311-AAB0B <input type="checkbox"/> ¹⁾ BBX1A2	136.-	122.-	111.-
With thermowell; 3 mm	Compression fitting G½ male thread, TK40-hygienic versions, Pt100 BADA3C	TM311-AAB2BG7BBX1B2	284.-	256.-	233.-
Installation in existing thermowell; 3 mm	Not needed	TM311-AAB1AA0ABX1B2	178.-	160.-	146.-

iTHERM CompactLine TM311 (Hygienic versions, Pt100)		Order no.	Price/pcs. in €		
Design; Diameter insert	Process connection		1 to 3	4 to 10	11 to 35
Without thermowell, direct contact; 6 mm	Clamp	TM311-AAA0B <input type="checkbox"/> ²⁾ BBX1A2	85.-	77.-	70.-
	Weld-in adapter	TM311-AAA0B <input type="checkbox"/> ³⁾ BBX1A2	96.-	86.-	78.-
	Dairy fitting DIN11851	TM311-AAA0B <input type="checkbox"/> ⁴⁾ BBX1A2	122.-	110.-	100.-
	D45 process adapter / APV Inline, DN50	TM311-AAA0B <input type="checkbox"/> ⁵⁾ BBX1A2	122.-	110.-	100.-
	Varivent®	TM311-AAA0B <input type="checkbox"/> ⁶⁾ BBX1A2	122.-	110.-	100.-
With thermowell; 3 mm	Clamp	TM311-AAA2B <input type="checkbox"/> ²⁾ BBX1A2	133.-	120.-	109.-
	Weld-in adapter	TM311-AAA2B <input type="checkbox"/> ³⁾ BBX1A2	143.-	129.-	118.-
	Dairy fitting DIN11851	TM311-AAA2B <input type="checkbox"/> ⁴⁾ BBX1A2	170.-	153.-	139.-
		TM311-AAA2BA1BBX1A2+CA	218.-	196.-	178.-
	Tee thermowell, DIN11865-A	TM311-AAA2B <input type="checkbox"/> ⁷⁾ BBX1A2+CA	364.-	327.-	298.-
	Elbow thermowell, DIN11865-A	TM311-AAA2B <input type="checkbox"/> ⁸⁾ BBX1A2+CA	398.-	358.-	327.-

iTHERM CompactLine TM311 (Hygienic versions, 4 to 20 mA)		Order no.	Price/pcs. in €		
Design; Diameter insert	Process connection		1 to 3	4 to 10	11 to 35
Without thermowell, direct contact; 6 mm	Clamp	TM311-AAB0B <input type="checkbox"/> ²⁾ BBX1A2	125.-	112.-	102.-
	Weld-in adapter	TM311-AAB0B <input type="checkbox"/> ³⁾ BBX1A2	136.-	122.-	111.-
	Dairy fitting DIN11851	TM311-AAB0B <input type="checkbox"/> ⁴⁾ BBX1A2	162.-	146.-	133.-
	D45 process adapter / APV Inline, DN50	TM311-AAB0B <input type="checkbox"/> ⁵⁾ BBX1A2	162.-	146.-	133.-
	Varivent®	TM311-AAB0B <input type="checkbox"/> ⁶⁾ BBX1A2	162.-	146.-	133.-
With thermowell; 3 mm	Clamp	TM311-AAB2B <input type="checkbox"/> ²⁾ BBX1A2	130.-	117.-	107.-
	Weld-in adapter	TM311-AAB2B <input type="checkbox"/> ³⁾ BBX1A2	173.-	155.-	142.-
	Dairy fitting DIN11851	TM311-AAB2B <input type="checkbox"/> ⁴⁾ BBX1A2	183.-	165.-	150.-
		TM311-AAB2BA1BBX1A2+CA	210.-	189.-	172.-
	Tee thermowell, DIN11865-A	TM311-AAB2B <input type="checkbox"/> ⁷⁾ BBX1A2+CA	257.-	232.-	211.-
	Elbow thermowell, DIN11865-A	TM311-AAB2B <input type="checkbox"/> ⁸⁾ BBX1A2+CA	404.-	363.-	331.-

* Please add code for process connection.

Prices are applicable for Latvia until 30/06/2020, in Euro per unit, net excluding value added tax (VAT), cost of packing and dispatch. Endress+Hauser retains the right to change or modify pricing at any time. The terms of sales and delivery of Endress+Hauser are applicable. Current prices and delivery times can be verified prior to ordering on www.e-direct.endress.com.

 Complete product information:
www.e-direct.endress.com/tm311

More products to complete your measuring point ...



Process transmitter RMA42



Electromagnetic flowmeter Picomag



Pressure switch Ceraphant PTP33B