

Temperature

ebro® offers a wide variety of thermometers for various applications:



EX-Thermometer

Description:

- Thermo element Type K thermometer with exchangeable probes
- Applicable to be used within potentially explosive areas

Applications:

- Temperature measurement within potentially explosive areas
- Process and facility monitoring
- Examination in laboratories
- Usage during the production or examination of e.g. solvent-based products, fuels and gases



Thermometers

Description:

- Thermometers with fixed probes or exchangeable probes
- Thermometers with rigid probes or probes with cable and hand grip
- Broad range of various probes available for certain models

Applications:

- Surface temperature measurement
- Core temperature measurement





Folding Thermometers

Description:

- Thermometers with foldable probe for safe and convenient measurement and storage
- One certain model is available with infrared measurement technology

Applications:

- Core temperature measurement
- Surface temperature measurement (via infrared)



Infrared Thermometers

Description:

- Non-contact surface temperature measurement with infrared technology
- Measurement anywhere where direct contact is not possible or convenient
- Various models with additional penetration probe or SMP connection available

Applications:

- Non-contact surface temperature measurement
- Core temperature measurement (via external probe)

EX-Thermometers

On the following pages you will find our EX thermometer TFN 520-Ex together with its accessories. The various probes, specifically examined for their aptitude for EX applications, allow for the measurement of temperature within potentially explosive areas.

Applications

- Temperature measurement within potentially explosive areas: for environmental temperatures from -5 °C ... +60 °C



II 2G Ex ia IIC T4 Gb
II 2G Ex ia IIIB T135°C Db

- Process and facility monitoring
- Examination in laboratories
- Usage during the production or examination of e.g. solvent-based products, fuels and gases



TFN 520-EX Type K Thermometer

1-channel high accuracy thermometer for EX-areas



Without probe. Probe variants can be found on the following pages.

Technical Data

Measurement range	-20 °C ... +80 °C
Accuracy at +25 °C ambient temperature	±0.3 °C
Resolution	0.1 °C
Operating temperature	-5 °C ... +60 °C
Storage temperature	-25 °C ... +60 °C
Measurement interval	0.5 sec. to 15 sec.
Sensor	External; thermo element type K
Sensor connection	LEMO size 0
Channels	1
Battery	Lithium, 3 V CR 2477
Battery life time	5 years
Dimensions (l x w x h)	115 x 54 x 22 mm
Weight	Approximately 90 g
Housing material	ABS, metalized
Protection class	IP52
Factory calibration certificate	-100 °C, 0 °C, +200 °C and +1,000 °C

The accuracy of the used probe adds to the accuracy of the device. E.g. probes with class 1 of DIN EN 60584 have ± 0,5 °C between -40 °C ... +125 °C.

The TFN 520-EX Type K Thermometer can be used both inside and outside of potentially explosive areas. Outside it can be handled just like a normal thermometer, for which we offer a broad variety of probes and accessories

Please see the respective pages of the TFN 520 and the thermo element probes.



Inside an area with a potentially explosive atmosphere only the probes listed on the following pages are allowed to use. Before purchasing, please check in any case if this thermometer is appropriate for use within your EX zone!

Please see the information on the left side in the topic "applications".

- With lemo connector
- Robust design for years of industrial use
- Approximately 5 years battery life time

Type	Description	Part No.
TFN 520-EX	1-channel EX thermometer	1340-5521-EXA

Thermo element Type K-probes for TFN 5x0 EX thermometers

EX-rod probes

Temperature measurement of air, surfaces, fluids and gases

TPN 100-EX

- Probe (L = 185 or 300 mm, Ø 0.5 mm, blunt, inconel needle, with Lemo connection)
- Accuracy: exceeds DIN EN 60584, class 2
- Response time (t_{99} water 0.2 m/s): 0.4 sec



TPN 110-EX

- Probe (L = 185, 300 or 500 mm, Ø 1 mm, blunt, inconel needle, with Lemo connection)
- Accuracy: exceeds DIN EN 60584, class 2
- Response time (t_{99} water 0.2 m/s): 1sec



TPN 120-EX

- Probe (L = 185, 300, 500, 600, 700 or 1,000 mm, Ø 1.5 mm, blunt, inconel needle, with Lemo connection)
- Accuracy: exceeds DIN EN 60584, class 2
- Response time (t_{99} water 0.2 m/s): 2sec



TPN 140-EX

- Probe (L = 185 or 300 mm, Ø 3 mm, blunt, inconel needle, with Lemo connection)
- Accuracy: exceeds DIN EN 60584, class 2
- Response time (t_{99} water 0.2 m/s): 4 sec



EX-Thermal wire probes

Temperature measurement of air, surfaces and gases

TPN 600-EX

- Probe (L = 1 m, outside 1.9 x 1.2 mm, Isolation: glass/silk meshwork, with Lemo connection)
- Accuracy: exceeds DIN EN 60584, class 2
- Response time
(t_{99} , Air 0.2 m/s): 25 sec



Additional accessories for using the TFN 5x0 EX thermometers outside the EX-area can be found from page 54.

Type	Description	Part No.
TPN 100-EX	Rod probe without cable, L = 185 mm, Ø 0.5 mm, blunt	1341-0611-EX
TPN 100-30-EX	Rod probe without cable, L = 300 mm, Ø 0.5 mm, blunt	1341-0805-EX
TPN 110-EX	Rod probe without cable, L = 185 mm, Ø 1 mm, blunt	1341-0810-EX
TPN 110-30-EX	Rod probe without cable, L = 300 mm, Ø 1 mm, blunt	1341-0812-EX
TPN 110-50-EX	Rod probe without cable, L = 500 mm, Ø 1 mm, blunt	1341-0814-EX
TPN 120-EX	Rod probe without cable, L = 185 mm, Ø 1.5 mm, blunt	1341-0609-EX
TPN 120-30-EX	Rod probe without cable, L = 300 mm, Ø 1.5 mm, blunt	1341-0400-EX
TPN 120-50-EX	Rod probe without cable, L = 500 mm, Ø 1.5 mm, blunt	1341-0406-EX
TPN 120-60-EX	Rod probe without cable, L = 600 mm, Ø 1.5 mm, blunt	1341-0409-EX
TPN 120-100-EX	Rod probe without cable, L = 1,000 mm, Ø 1.5 mm, blunt	1341-0414-EX
TPN 140-EX	Rod probe without cable, L = 185 mm, Ø 3 mm, blunt	1341-0607-EX
TPN 140-30-EX	Rod probe without cable, L = 300 mm, Ø 3 mm, blunt	1341-0415-EX
TPN 600-EX	Flexible thermal wire probe without cable, L = 1 m, outside 1.9 x 1.2 mm	1341-0646-EX

Thermometers

On the next pages you will find a broad range of thermometers with fixed probes or exchangeable probes, with rigid probes or probes with cable and hand grip. The thermometers are applicable at the broadest site of applications.

Applications

- Core temperature measurement
- Surface temperature measurement
- Temperature measurement of fluids
- Environmental temperature measurement
- Process monitoring
- Temperature regulation



Find your perfect thermometer:

Probe Thermometers	Measurement range	High accuracy	Probe type	Probe connection	Channels	Fast response time	MIN/MAX/hold	Waterproof housing	Conformity valued	Control Thermometer
TFX 430 Precision Thermometer	-100 °C ... +500 °C	X	Pt 100	Lemo , probe not included	1		X	X		
TFX 422C Laboratory Thermometer	-50 °C ... +200 °C	X	Pt 1000	Fixed	1		X	X	X	
TFX 420 Core Thermometer	-50 °C ... +400 °C	X	Pt 1000	Lemo , probe not included	1		X	X		
TFX 410-1 Core Thermometer	-50 °C ... +300 °C	X	Pt 1000	Lemo , probe not included	1			X		
TFX 410 Core Thermometer	-50 °C ... +300 °C	X	Pt 1000	Fixed	1			X		
TFE 510-1 Core Thermometer	-50 °C ... +300 °C		Thermocouple type T	Lemo , probe not included	1	X		X		
GFX 460 Electronic Control Thermometer	-50 °C ... +300 °C		Pt 1000	Fixed	1			X		X
GFX 460B Electronic Control Thermometer	-50 °C ... +300 °C		Pt 100	Lemo	1			X		X
TFN 520 Type K Thermometer	-200 °C ... +1,200 °C	X	Thermocouple type K	Lemo or SMP, probe not included	1		X			
TFN 520 Type J Thermometer	-100 °C ... +800 °C	X	Thermocouple type J	Lemo or SMP, probe not included	1		X			
TFN 520 Type T Thermometer	-50 °C ... +300 °C	X	Thermocouple type T	Lemo or SMP, probe not included	1		X			
TFN 520 Type E Thermometer	-100 °C ... +600 °C	X	Thermocouple type E	Lemo or SMP, probe not included	1		X			
TFN 530 Type K Thermometer	-200 °C ... +1,200 °C	X	Thermocouple type K	Lemo or SMP, probe not included	2		X			
TFN 530 Type J Thermometer	-100 °C ... +800 °C	X	Thermocouple type J	Lemo or SMP, probe not included	2		X			
TFN 530 Type T Thermometer	-50 °C ... +300 °C	X	Thermocouple type T	Lemo or SMP, probe not included	2		X			
TFN 530 Type E Thermometer	-100 °C ... +600 °C	X	Thermocouple type E	Lemo or SMP, probe not included	2		X			
TTX 110 Type T Thermometer	-50 °C ... +350 °C		Thermocouple type T	Fixed	1	X				
TTX 200 Type T Thermometer	-30 °C ... +199.9 °C		Thermocouple type T	Fixed cable probe	1	X		X		
TTX 210 Type T Thermometer	-30 °C ... +199.9 °C		Thermocouple type T	pluggable, probe not included	1	X		X		
TDC 110 Basic Thermometer	-50 °C ... +150 °C		NTC	Fixed	1					
TDC 150 Basic Thermometer	-50 °C ... +150 °C		NTC	Fixed	1			X		

TFX 430 Precision Thermometer

Reference thermometer with exchangeable Pt 100 probe



TFX 430 set

Various probes available
(please see page 47).

TFX 430 without probe TFX 430 + TPX 130 TFX 430 + TPX 230 TFX 430 + TPX 330

- MIN/MAX and hold options
- Approximately 5 years battery life time

Technical Data

Measurement range	-100 °C ... +500 °C (-148 °F ... +932 °F)	
Measurement accuracy:	device without probe	0.05 °C (-50 °C ... +199.99 °C) ±0.2 °C for the remaining measurement range
	device with probe and factory calibration	0.05 °C (-50 °C ... +199.99 °C) ±0.4 % for the remaining measurement range
Resolution	0.01 °C (-10.00 °C ... +199.99 °C) 0.1 °C for the remaining measurement range	
Operating temperature	-20 °C ... +50 °C	
Storage temperature	-30 °C ... +70 °C	
Sensor	Pt 100	
Sampling rate	1 sec to 15 sec	
Battery	Lithium battery 3 V / 1 Ah, Type CR 2477	
Battery lifetime	Approximately 5 years	
Deactivation	Automatic after 2 hours, deactivatable	
Dimensions (L x W x H)	109 x 54 x 22 mm	
Housing material	ABS	
Protection class	IP67	
Weight	Approximately 90 g	
Factory calibration certificate	-50 °C, 0 °C, +121 °C and +250 °C	

Type	Description	Part No.
TFX 430	Thermometer Pt 100 (without probe)	1340-5430A
TFX 430 + TPX 130	Thermometer Pt 100 with probe (needle length = 200 mm, Ø 3 mm, blunt)	1340-5437A
TFX 430 + TPX 230	Thermometer Pt 100 with probe (needle length = 200 mm, Ø 3 mm, pointed)	1340-5438A
TFX 430 + TPX 330	Thermometer Pt 100 with probe (needle length = 190 mm, Ø 8 mm, glazed)	1340-5439A
TFX 430 set	TFX set (Thermometer TFX 430, blunt probe TPX 130, extension cable AX 110, DAkKS calibration, Aluminum case AG130)	1340-5432

Accessories for TFX devices



AG 120 Synthetic leather case



AG 130 Transport case



AG 140 Protective cover for handheld devices, red



AG 150 Plastic bracket, suitable for 10 mm and 12 mm lamus tripods



AX 110 Extension cable for TFX 430 only



AG 170 Battery exchange set

Type	Description	Part No.
AG 120	Synthetic leather case (inner space 230 x 80 mm)	1341-0619
AG 130	Transport case for probes of to a length of 240 mm incl. grip	1341-3854
AG 140	Protective cover for handheld devices, red	1340-5005
AG 150	Plastic bracket	1340-5000
AX 110	Extension cable for TFX 430 (1m silicone)	1340-5020
AG 170	Battery-change set (incl. 3V lithium CR 2477 battery, needle, screws, tamping, O-ring, manual)	1100-0106

Alternate probes for TFX 430

Pt 100, 4 conductors class A, Lemo size 1

The specified accuracies are valid only for thermometers and probes that are calibrated together. Uncalibrated replacement probes might not be able to achieve those accuracies.

TPX 130 blunt probe
(Needle length= 200 mm, Ø 3 mm, stainless steel needle, up to +400 °C)



TPX 230 pointed probe
(Needle length = 200 mm, Ø 3 mm, stainless steel needle, up to +400 °C)



TPX 330 blunt, glass coated probe
(Needle length= 190 mm, Ø 8 mm, stainless steel needle, up to +400 °C)



Technical Data

Accuracy	Pt 100, 4 conductors class A, Lemo size 1
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Type	Description	Part No.
TPX 130	Blunt probe, needle length = 200 mm, Ø 3 mm	1341-5437
TPX 230	Pointed probe, needle length = 200 mm, Ø 3 mm	1341-5438
TPX 330	Blunt, glass coated probe, blunt, needle length = 190 mm, Ø 8 mm	1341-5439

TFX 422C Conformity Certified Laboratory Thermometer with fixed Pt 1000 probe



Due to the new German calibration law which became effective on January 01 2015, we were forced to stop the sales of the TFX 422 Laboratory Thermometer with PTB certification. The so called certification of conformity replaces the calibration by the measurement office. Our new Conformity Certified Laboratory Thermometer TFX 422C is the equivalent successor: same properties, same quality.

Technical Data

Measurement range	-50 °C ... +200 °C
Operating temperature	-25 °C ... +50 °C (handle: max. +120 °C)
Accuracy	± 0,3 °C
Sensor	Pt 1000, stainless steel, Ø 3 mm, L = 120 mm, pointed probe
Cable	Silicone, L = 60 cm or 150 cm, waterproof, oil resistant, food safe
Response time (t ₉₉)	Approximately 8 Sec. (moving water)
Resolution	0,1 °C
Storage Temperature	-30 °C ... +70 °C
Dimensions (L x W x H)	109 x 54 x 22 mm, without probe
Weight	90 g
Housing material	ABS
Protection class	IP67
Battery	Lithium battery (CR 2477), 3V
Battery life time	Up to 5 years, dependent pn the application
Factory calibration certificate	0 °C, +60 °C and +120 °C

- MIN/MAX and hold options
- High precision
- Approximately 5 years battery life time
- Waterproof (IP67)

Type	Description	Part No.
TFX 422C-60	Conformity Certified Thermometer, with 60 cm cable	1340-5433A
TFX 422C-150	Conformity Certified Thermometer, with 150 cm cable	1340-5434A

TFX-410/420 Series Core Thermometers



TFX 410



TFX 410-1



TFX 420

General Technical Specifications

Accuracy	±0.3 °C
Resolution	0.1 °C
Sensor	Pt 1000
Operating temperature	-25 °C ... +50 °C (handle: max. +120 °C)
Storage temperature	-30 °C ... +70 °C
Battery lifetime	Approximately 5 years
Housing material	ABS
Protection class	Waterproof (IP67)
Weight	Approximately 90 g
Dimensions (L x W x H)	109 x 54 x 22 mm (without probe)
Deactivation	Automatic after 2 hours, deactivatable

TFX 410 Core Thermometer with fixed Pt 1000 probe



- High precision
- Approximately 5 years battery life time
- Waterproof (IP67)

Technical Data

Measurement range	-50 °C ... +300 °C (-58 °F ... +572 °F)
Battery	3.0 V lithium, user replaceable
Certificate	3-point factory calibration (-20 °C, 0 °C and +120 °C)

Type	Description	Part No.
TFX 410	Thermometer with TPX 410 probe, pointed, 60 cm silicone cable	1340-5410A
AG 190	Drill for frozen food	1341-3834

TFX 410-1 Core Thermometer without Probe for various Pt 1000 probes



Various probes available
(see page 50).

- High precision
- Approximately 5 years battery life time

Technical Data

Measurement range	-50 °C ... +300 °C (-58 °F ... +572 °F)
Sensor connection	Lemos a size 0
Battery	3.0 V Lithium, replaceable
Certificate	3-point factory calibration (-20 °C, 0 °C and +120 °C)

Type	Description	Part No.
TFX 410-1	Thermometer without probe	1340-5415A
AG 190	Drill for frozen food	1341-3834
TFX 410-1 & TPX 400	Thermometer with TPX 400 probe	1340-5416
TFX 410-1 & TPX 100	Thermometer with TPX 100 probe	1340-5417
TFX 410-1 & TPX 200	Thermometer with TPX 200 probe	1340-5418
TFX 410-1 & TPX 300	Thermometer with TPX 300 probe	1340-5419

TFX 420 Core Thermometer without Probe with MIN/MAX and hold options



Various probes available
(see page 50).

- High precision
- Approximately 5 years battery life time

Technical Data

Measurement range	-50 °C ... +400 °C (-58 °F ... +752 °F)
Sensor connection	Lemos a size 0
Battery	3.0 V Lithium, replaceable
Extra functions	Hold, MIN / MAX
Certificate	3-point factory calibration (-20 °C, 0 °C, +120 °C and +250 °C)

Type	Description	Part No.
TFX 420	Thermometer without probe	1340-5425A
AG 190	Drill for frozen food	1341-3834
TFX 420 & TPX 400	Thermometer with TPX 400 probe	1340-5426
TFX 420 & TPX 100	Thermometer with TPX 100 probe	1340-5427
TFX 420 & TPX 200	Thermometer with TPX 200 probe	1340-5428
TFX 420 & TPX 300	Thermometer with TPX 300 probe	1340-5429

Probes for TFX 410-1 / TFX 420

Pt 1000 Probe (with Lemosa size 0)

The probes of the TFX 410-1 and TFX 420 core thermometers are all changeable - and yet the devices have protection class IP67, i.e. protection against immersion up to 1 m. Even little mishaps like plummeting the device into a bucket of water won't have consequences. The various probes and cables allow for a use in many different applications, e.g. heating of food (PTFE) or in rough and humid environments (silicone).

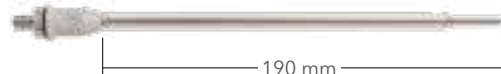
TPX 100 blunt probe
(Needle length = 120 mm, Ø 3 mm, blunt, stainless steel needle, up to +400 °C)



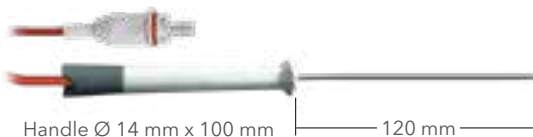
TPX 200 pointed probe
(Needle length = 120 mm, Ø 3 mm, pointed, stainless steel needle, up to +400 °C)



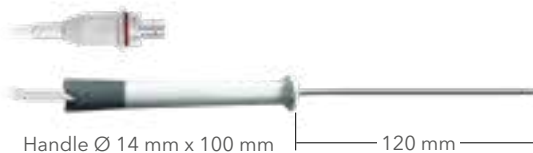
TPX 300 glass-coated probe
(Needle length = 190 mm, Ø 8 mm, glass-coated, stainless steel needle, up to +400 °C)



TPX 400 pointed probe
(Needle length = 120 mm, Ø 3 mm, pointed, with 60 cm silicone cable, stainless steel needle, up to +400 °C)
Operating temperature of the handle: max. +120 °C



TPX 440 pointed probe
(Needle length = 120 mm, Ø 3 mm, with 150 cm PTFE cable, stainless steel needle, up to +400 °C)
Operating temperature of the handle: max. +120 °C



TFX 410-1 + TPX 100-20
TFX 410-1 + TPX 200
TFX 410-1 + TPX 300



TFX 420 + TPX 400-150
TFX 420 + TPX 440

Technical Data

Accuracy Exceeds DIN EN 60584, class 1



TF 410 - still working, thanks to IP67

Type	Description	Part No.
TPX 100	Blunt probe, needle length = 120 mm, Ø 3 mm, without cable	1341-5417
TPX 200	Pointed probe, needle length = 120 mm, Ø 3 mm, without cable	1341-5418
TPX 200-20	Pointed probe, needle length = 200 mm, Ø 3 mm, without cable	1341-4182
TPX 200-30	Pointed probe, needle length = 300 mm, Ø 3 mm, without cable	1341-4183
TPX 200-40	Pointed probe, needle length = 400 mm, Ø 3 mm, without cable	1341-4184
TPX 300	Glass-coated probe, needle length = 120 mm, Ø 8 mm, without cable	1341-5419
TPX 400	Pointed probe with 60 cm silicone cable (red) and handle, needle length = 120 mm, Ø 3 mm	1341-5416
TPX 400-40	Pointed probe with 40 cm silicone cable (red) and handle, needle length = 120 mm, Ø 3 mm	1341-4164
TPX 400-150	Pointed probe with 150 cm silicone cable (red) and handle, L = 120 mm, Ø 3 mm	1341-4168
TPX 440	Pointed probe with 150 cm PTFE cable (white) and handle, L = 120 mm, Ø 3 mm	1341-4169

TFE 510-1 Core Thermometer without Probe with fast response time



TFE 510 TPE 400

- With replaceable probe
- Approximately 5 years battery life time

Technical Data

Measurement range	-50 °C ... +300 °C (-58 °F ... +572 °F)
Accuracy	±0.5 °C (0.9 °F)
Resolution	0.1 °C (0.2 °F)
Measurement probe	Thermocouple, type T
Operating temperature	-25 °C ... +50 °C (-13 °F ... +122 °F) (handle: max. +120 °C)
Storage temperature	-30 °C ... +70 °C (-22 °F ... +158 °F)
Thermal constant (t ₉₀)	3s
Battery	Lithium 3.0 V
Battery lifetime	Approximately 5 years
Dimensions (L x W x H)	109 x 54 x 22 mm
Housing material	ABS
Weight	Approximately 90 g
Protection class	IP67
Sampling rate	0.5 s to 15 s
Certificate	3-point factory calibration (-20 °C, 0 °C and +120 °C)
Automatic shut off	After 2 hours, optional

Type	Description	Part No.
TFE 510-1	Thermometer without probe	1340-5510A
TFE 510-1 + TPE 400	Thermometer with probe, with blue silicone cable, 0.6 m	1340-5516A
TPE 400	Probe with blue silicone cable, 0.6 m, for TFE 510	1341-5516
AG 140	Protective cover for handheld devices, red	1340-5005
AG 190	Drill for frozen food	1341-3834

Accessories for TFX- and TFE-Thermometers



AG 130 Transport case



AG 140 Protective cover for handheld devices, red



AG 150 Plastic bracket suitable for 10 mm and 12 mm lamus tripods



AX 100 Extension cable for TFX devices, 1m, Lemos size 0



AG 170 Battery exchange set



AG 160 Stainless steel bracket



AG 161 Stainless steel bracket for thermometers

The stainless steel brackets can only be used with TFN 520 or TFN 520-SMP

Type	Description	Part No.
AG 130	Transport case for probes of to a length of 240 mm incl. grip	1341-3854
AG 140	Protective cover for handheld devices, red	1340-5005
AG 150	Plastic bracket	1340-5000
AG 160	Stainless steel bracket	1340-0595
AG 161	Stainless steel bracket for TFX devices with protective cover AG 140	1340-0596
AG 170	Battery-change set (incl. 3V lithium CR 2477 battery, needle, screws, tamping, O-ring, manual)	1100-0106
AX 100	Extension cable 1m for TFX devices (Lemos size 0)	1340-5015

GFX 460 Series Electronic Contact Thermometers



GFX 460

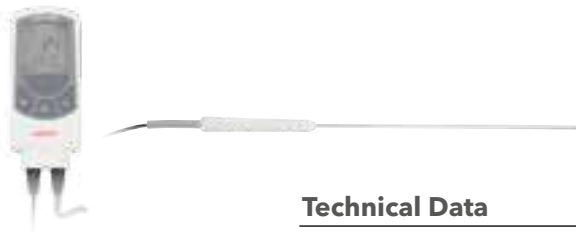


GFX 460 B

General Technical Specifications

Measurement range	-50 °C ... +300 °C (-58 °F ... +572 °F)
Resolution	1 °C
Measurement accuracy	±1 °C
Measurement interval	1 sec
Operating temperature	-5 °C ... +60 °C
Storage temperature	-30 °C ... +70 °C
Regulation	Fuzzy regulation
Security features	<ul style="list-style-type: none"> • Identification of probe breakage • Identification of probe access • Security and regulation cycle according to DIN 12878 class 1 / 2
Access	DIN 45322 Diode plug, 5-pole
Other options	Green display background lighting
Protection class	IP65

GFX 460 Electronic Contact Thermometer with fixed stainless steel Pt 1000 probe



- Fuzzy control
- Control loop according to DIN EN 12878 class 1 and 2
- Green display background light

Technical Data

Probe	Pt 1000, permanently attached, optional glass sheath for probe for usage in aggressive media is included
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Type	Description	Part No.
GFX 460	Electronic contact thermometer with fixed stainless steel Pt 1000 probe, L = 205 mm, Ø 3 mm, cable length 70 cm	1340-5460A

GFX 460 B Electronic Contact Thermometer for replaceable Pt 100 probes



- Fuzzy control
- Control loop according to DIN EN 12878 class 1 and 2
- Green display background light

Technical Data

Probe	Pt 100, replaceable, see next page, optional glass sheath for probe for usage in aggressive media is included
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Type	Description	Part No.
GFX 460 B	Electronic contact thermometer without probe	1340-5464A

Accessories for GFX 460 Series



AG 151 Stand adapter



AX 110 Extension cable for GFX 460 B only



AX 400 Relay box

Type	Description	Part No.
AG 151	Stand bracket	1340-5001
AX 110	Extension cable for GFX 460 B, silicone cable, L = 1 m	1340-5020
AX 400	Relay box	1340-0157

External Probes for GFX 460 B

Pt 100, 4 conductors class A, Lemo size 1

TPX 130 blunt probe
(Needle length = 200 mm,
Ø 3 mm, stainless steel needle,
up to +400 °C)



GFX 460 B + TPX 130

TPX 230 pointed probe
(Needle length = 200 mm,
Ø 3 mm, stainless steel needle,
up to +400 °C)



GFX 460 B + TPX 230

Technical Data

Accuracy	Pt 100, 4 conductors class A, size 1
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Type	Description	Part No.
TPX 130	Blunt probe, needle length = 200 mm, Ø 3 mm	1341-5437
TPX 230	Pointed probe, needle length = 200 mm, Ø 3 mm	1341-5438

TFN-520/530 Series 1-/2-Channel-Thermometers



General Technical Specifications

Measurement range type K	-200 °C ... +1,200 °C (-328 °F ... +2,192 °F)
Measurement range type J	-100 °C ... +800 °C (-148 °F ... +1472 °F)
Measurement range type T	-100 °C ... +300 °C (-148 °F ... +572 °F)
Measurement range type E	-100 °C ... +600 °C (-148 °F ... +1,112 °F)
Accuracy at +25 °C, type K	±0.3 °C (-99.9 °C ... +250 °C)
Accuracy at +25 °C, type J	±0.3 °C (-50 °C ... +190 °C)
Accuracy at +25 °C, type T	±0.3 °C (-50 °C ... +220 °C)
Accuracy at +25 °C, type E	±0.3 °C (-50 °C ... +150 °C) ±0.5 % for the remaining measurement range
Resolution type K	0.1 °C (-99.9 °C ... +250 °C), 1 °C for the remaining measurement range
Resolution type J	0.1 °C (-99.9 °C ... +190 °C), 1 °C for the remaining measurement range
Resolution type T	0.1 °C (-99.9 °C ... +220 °C), 1 °C for the remaining measurement range
Resolution type E	0.1 °C (-99.9 °C ... +150 °C), 1 °C for the remaining measurement range
Operating temperature	-5 °C ... +50 °C
Storage temperature	-25 °C ... +60 °C
Sampling rate	0.5 sec to 15 sec
Sensor	External; Thermocouple type K, J, T, E
Battery	Lithium, 3V CR 2477
Battery lifetime	5 years
Dimensions (l x w x h)	115 x 54 x 22 mm
Weight	Approximately 90 g
Housing material	ABS
Factory calibration certificate	-100 °C, 0 °C, +200 °C and +1,000 °C

TFN 520 Type K, J, T, E Thermometer 1-channel high accuracy thermocouple thermometer



- With Lemo connection
- Robust design for years of industrial use
- Approximately 5 year battery life time

Without probe. Please find probe variants starting on page 74.

Technical Data

Sensor connection	LEMO size 0
Channels	1 external
Protection class	IP52

The accuracy of the used probe adds to the accuracy of the device. E.g. probes with class 1 of DIN EN 60584 have $\pm 0,5$ °C between -40 °C ... +125 °C.

Type	Description	Part No.
TFN 520	1-channel thermometer with Lemo connection	1340-5520A

TFN 520-SMP Type K, J, T, E Thermometer 1-channel high accuracy thermocouple thermometer



- With SMP connection
- Robust design for years of industrial use
- Approximately 5 year battery life time

Without probe. Please find probe variants starting on page 74.

Technical Data

Sensor connection	SMP
Channels	1 external
Protection class	IP40

The accuracy of the used probe adds to the accuracy of the device. E.g. probes with class 1 of DIN EN 60584 have $\pm 0,5$ °C between -40 °C ... +125 °C.

Type	Description	Part No.
TFN 520-SMP	1-channel thermometer with SMP connection	1340-5522A

TFN 530 Type K, J, T, E Thermometer 2-channel high accuracy thermocouple thermometer



- With Lemo connections
- Robust design for years of industrial use
- Approximately 5 year battery life time

Without probe. Please find probe variants starting on page 74.

Technical Data

Sensor connection	LEMO size 0
Channels	2 external
Protection class	IP52

The accuracy of the used probe adds to the accuracy of the device. E.g. probes with class 1 of DIN EN 60584 have $\pm 0,5$ °C between -40 °C ... +125 °C.

Type	Description	Part No.
TFN 530	2-channel thermometer with Lemo connection	1340-5530A

TFN 530-SMP Type K, J, T, E Thermometer 2-channel high accuracy thermocouple thermometer



- With SMP connections
- Robust design for years of industrial use
- Approximately 5 year battery life time

Without probe. Please find probe variants starting on page 74.

Technical Data

Sensor connection	SMP
Channels	2 external
Protection class	IP40

The accuracy of the used probe adds to the accuracy of the device. E.g. probes with class 1 of DIN EN 60584 have $\pm 0,5$ °C between -40 °C ... +125 °C.

Type	Description	Part No.
TFN 530-SMP	2-channel thermometer with SMP connection	1340-5532A

Accessories for TFN devices



AG 120 Synthetic leather case



AG 170 Battery exchange set



AN 141 Adapter cable, 1 m silicone (SMP/Lemo size 0)



AG 140 Protective cover for handheld devices, red



AG 130 Transport case



AN 150 Large case (without device and accessories)



AG 160 Stainless steel bracket



AG 161 Stainless steel bracket for TFN devices

The stainless steel brackets can only be used with TFN 520 or TFN 520-SMP

Type	Description	Part No.
AG 120	Synthetic leather case (inner space 230 x 80 mm)	1341-0619
AG 130	Transport case (for probes of to a length of 240 mm incl. grip)	1341-3854
AG 140	Protective cover for handheld devices, red	1340-5005
AG 160	Stainless steel bracket	1340-0595
AG 161	Stainless steel bracket for TFN devices in protective cover AG 140	1340-0596
AG 170	Battery-change set (incl. 3V lithium CR 2477 battery, needle, screws, tamping, O-ring, manual)	1100-0106
AN 140	Extension cable, 1 m silicone, Lemo size 0	1341-2626
AN 141	Adapter cable, 1 m silicone SMP/Lemo size 0	1341-2629
AN 142	Extension cable, 1 m silicone, SMP	1343-2626
AN 143	Extension cable, 2.5 m silicone, Lemo size 0	1341-2627
AN 144	Extension cable, 2.5 m silicone, SMP	1343-2627
AN 150	Large case for TFN devices and several large sensors	1341-3857

TDC 110 Basic Core Thermometer with spare battery



Technical Data

Measurement range	-50 °C ... +150 °C (-58 °F ... +302 °F)
Resolution	0.1 °C
Measurement accuracy	± 1 °C (-10 °C ... +120 °C), ± 2 °C for the remaining measurement range
Sensor	NTC
Probe needle	Stainless steel, Ø 4 mm, L = 120 mm, pointed
Response time (t ₉₉)	19 sec (water)
Operating temperature	0 °C ... +50 °C
Storage temperature	-10 °C ... +60 °C
Display	7 mm LCD
Battery	1.5 V, G 10-A
Dimensions (L x W)	50 x 40 mm; needle length = 120 mm
Weight	Approximately 13 g

- Automatic shut off after approximately 10 minutes
- Including needle protection

Type	Description	Part No.
TDC 110	Low-Cost Thermometer, incl. needle protection and spare battery	1340-5121
AG 190	Drill for frozen food	1341-3834

TDC 150 Basic Core Thermometer with handy housing



Technical Data

Measurement range	-50 °C ... +150 °C (-58 °F ... +302 °F)
Resolution	0.1 °C (-20 °C ... + 150 °C)
Measurement accuracy	± 1 °C (-30 °C ... +150 °C)
Sensor	NTC
Probe	Stainless steel, Ø 3.5 mm, L = 125 mm, pointed
Response time (t ₉₉)	10 sec (water)
Operating temperature	0 °C ... + 50 °C
Storage temperature	-10 °C ... + 60 °C
Display	LCD-7 mm
Battery	1.5 V LR44, G13
Battery lifetime	Approximately 5,000 h
Dimensions (L x W x H)	24 x 26 x 85 mm
Housing material	ABS

- Approximately 5000 hours battery lifetime
- Waterproof housing (IP65)
- Including needle protection

Type	Description	Part No.
TDC 150	Thermometer, incl. needle protection	1340-1611
AG 190	Drill for frozen food	1341-3834

TTX 200 Type T Core Thermometer with fixed probe with cable and handle



TTX 200

Technical Data

Measurement range type T	-30 °C ... +199.9 °C (-22 °F ... +392 °F)
Accuracy type T (at +25 °C)	± 0.5 °C (-30 °C ... +100 °C) ± 1 °C for the remaining measurement range
Resolution	0.1 °C
Housing material	ABS
Operating temperature	-20 °C ... +60 °C
Storage temperature	-30 °C ... +70 °C
Response time (t ₉₀)	4 sec
Dimensions (L x W x H)	127 x 60 x 16 mm (without probe)
Battery	CR 2032, replaceable
Battery lifetime	Typically 100 hours of uninterrupted use
Temperature probe	Permanently attached to the device, with 60 cm silicone cable, probe with grip, needle Ø 3 mm, L = 120 mm, pointed
Protection class	IP65
Factory calibration certificate	-20 °C and 0 °C

- Very large display with big numbers for easy reading
- Easy to use
- Replaceable battery

Type	Description	Part No.
TTX 200	Thermometer (Thermocouple type T) with cable	1340-5150A
AG 190	Drill for frozen food	1341-3834

TTX 110 Type T Core Thermometer Thermocouple thermometer



TTX 110

Technical Data

Measurement range type T	-50 °C ... +350 °C (-58 °F ... +662 °F)
Accuracy type T (at +25 °C)	± 0.8 °C or ± 0.8 %, whichever is larger
Resolution	0.1 °C (-60 °C ... +199.9 °C) 1 °C for the remaining measurement range
Housing material	ABS
Operating temperature	-20 °C ... +50 °C
Storage temperature	-30 °C ... +70 °C
Response time (t ₉₀)	4 sec
Dimensions (L x W x H)	90 x 42 x 17 mm (without probe)
Battery	CR 2032, replaceable
Battery lifetime	Typically 100 hours of uninterrupted use
Temperature probe	Permanently attached to the device, needle Ø 3 mm, L = 90 mm, pointed
Protection class	IP55
Factory calibration certificate	0 °C

- Automatic shut off
- Replaceable battery
- Including needle protection

Type	Description	Part No.
TTX 110	Thermometer (Thermocouple type T) with fixed probe, including needle protection	1340-5110A
AG 190	Drill for frozen food	1341-3834

TTX 210 Type T Core Thermometer for changeable probes



TTX 210

Technical Data

Measurement range type T	-30 °C ... +199.9 °C (-22 °F ... +392 °F)
Accuracy type T (at +25 °C)	± 0.5 °C (-30 °C ... +100 °C) ± 1 °C for the remaining measurement range
Resolution	0.1 °C
Housing material	ABS
Operating temperature	-20 °C ... +60 °C
Storage temperature	-30 °C ... +70 °C
Response time (t ₉₀)	4 sec
Dimensions (L x W x H)	127 x 60 x 16 mm (without probe)
Battery	CR 2032, replaceable
Battery lifetime	Typically 100 hours of uninterrupted use
Temperature probe	Permanently attached to the device, with 60 cm silicone cable, probe with grip, needle Ø 3 mm, L = 120 mm, pointed
Protection class	IP65
Factory calibration certificate	-20 °C and 0 °C

The TTX 210 enhances the benefits of the TTX 200 by the flexibility of several changeable probes. As required, a blunt probe for measurement in fluids or semisolid material, or a pointed probe with grip can be used. The latter is available with two different cable lengths. Apart from serving different applications, this allows for easy replacement of a defective probe.

TPE 100 blunt probe
(Needle length= 120 mm,
Ø 3 mm, stainless steel needle)



Similar to photo

TPE 200 pointed probe
(Needle length = 200 mm,
Ø 3 mm, stainless steel needle,
grip, cable length 60 cm)



Similar to photo

Type	Description	Part No.
TTX 210	Thermometer (Thermocouple Type T) for changeable probes	1340-5151A
TPE 100	Blunt probe, NL = 120 mm, Ø 3 mm	1341-5152
TPE 200	Pointed probe, NL = 120 mm, Ø 3 mm, 60 cm silicone cable, grip	1341-5153
TPE 200-150	Pointed probe, NL = 120 mm, Ø 3 mm, 150 cm silicone cable, grip	1341-5154
TTX 210 & TPE 100	Thermometer with blunt probe	1340-5152A
TTX 210 & TPE 200	Thermometer with pointed probe, cable length 60 cm	1340-5153A
TTX 210 & TPE 200-150	Thermometer with pointed probe, cable length 150 cm	1340-5154A
AG 190	Drill for frozen food	1341-3834

Fold-Back Thermometers

On the following pages you will find various fold-back thermometers with and without infrared measurement technology. The penetration probe is foldable for a secure and convenient storage of the measurement device. The new radio thermometers allow for efficient collection and management of measurement data.

Applications

- Incoming goods inspections
- Control of refrigeration units and cooling rooms
- Core temperature measurement
- Surface temperature measurement with infrared
- HACCP compliant control and documentation of temperature events

Find your perfect fold-back thermometer:

Fold-Back Thermometers	Measurement range	High accuracy	Probe type	Channels	Fast response time	Waterproof housing	Wireless communication	Detection of users and locations
TLC 1598 Precision Fold-Back Thermometer	-50 °C ... +200 °C	x	Pt 1000	1				
TLC 700 Basic Fold-Back Thermometer	-30 °C ... +220 °C		NTC	1	x			
TLC 750 Dual Infrared/Fold-Back Thermometer	-50 °C ... +250 °C		Infrared and thermocouple type T	2	x (Infrared)	x		
TLC 750 BT Dual Radio-Thermometer	-50 °C ... +250 °C		Infrared and thermocouple type T	2	x (Infrared)	x	x	
TLC 750 NFC Dual HACCP-Thermometer	-50 °C ... +250 °C		Infrared and thermocouple type T	2	x (Infrared)	x	x	x



TLC 750 NFC Dual HACCP-Thermometer for HACCP compliant control and documentation



Technical Data

Measurement range	-50 °C ... +250 °C (-58 °F ... +482 °F)
Accuracy infrared	±4 °C at -50 °C ... -30.1 °C (±7.2 °F at -58 °F ... -22 °F) ±2.5 °C at -30 °C ... -18.1 °C (±4.5 °F at -22 °F ... -0.4 °F) ±1.5 °C at -18 °C ... -0.1 °C (±2.7 °F at -0.4 °F ... +32 °F) ±1.0 °C at 0 °C ... +65 °C (±1.8 °F at 32 °F ... +149 °F) ±2.0 °C or 2 % at +65 °C ... +250 °C (±3.6 °F at +149 °F ... +482 °F)
Accuracy penetration probe	±0.5 °C at -30 °C ... +99.9 °C (±0.9 °F at -22 °F ... +212 °F) ±1 °C (±2 °F) or 1 % for the remaining measurement range (whichever is larger)
Resolution	0.1 °C / 0.2 °F
Distance : Spot ratio	8:1
Sensor	Thermocouple type T
Operating temperature	-20 °C ... +50 °C (-13 °F ... +122 °F)
Storage temperature	-30 °C ... +70 °C (-40 °F ... +158 °F)
Battery	Rechargeable lithium polymer battery 3.7 V
Battery lifetime	Approximately 8 h of continuous use
Battery charging	Wireless or via USB C port, 500 mA
Dimensions (L x W x H)	169.5 x 44x23 mm (without probe), needle length = 100 mm
Housing material	ABS
Weight	Approximately 140 g
Protection class	IP65
Automatic deactivation	Automatically after 15 seconds, deactivatable
Certificate	Factory calibration certificate (-18 °C and 0°C)
Memory capacity	200 measurement values
Interfaces	NFC, BLE, USB-C

The **TLC 750 NFC** has an infrared sensor for **surface temperature measurement** and a penetration probe for **core temperature measurement**. The **display with backlight** can be read from both sides. This combination of features is ideal for **incoming goods inspections** and **storage monitoring**.

But it can do much more than that. The TLC 750 NFC has a memory for up to 200 measurements. With one walkabout, all measurement locations can be handled. The measurements will be saved and can be transferred to the PC at once - **no manual notes required any more!**

On top of that, it can read NFC tags, which can identify measurement locations and the users of the TLC 750 NFC. Hence the device brings together all relevant data **automatically** and **without risk of failure: what has been measured by whom, where, and when** - because the device also knows date and time.

Thanks to the Bluetooth interface, the data can be transferred to the PC wirelessly via the IF 750 or an App on a mobile device.

- Wireless data transmission via Bluetooth Low Energy
- Detection of locations and users via NFC reader
- Wireless rechargeable battery
- Display with backlight for reading in dark environments
- Display can be upside down for reading from both sides

HACCP-Software

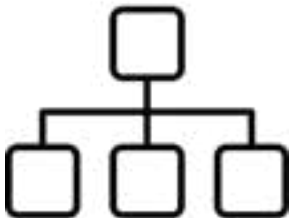


All components of our HACCP-system marked with this picture are supported by our new Bluetooth oil quality measurement device FOM 330 BT (please see page 94).

HACCP software are Digital Food Safety Management Systems that allow for defining, managing, scheduling and controlling Food Safety processes 24/7. With them it is possible to transform paper-based checklists into digital checklists to gain real-time insight and drive Food Safety process optimization.

Usually these software consist of a cloud-based application software and an app for mobile devices. ebro's Bluetooth devices are supported by the HACCP-software of various providers. Contact us for a recommendation!

Flexible and scalable



Build your own organizational structure and add users to one or more organizational unit(s). An unlimited number of locations, users (co-workers) and checklists can be added.

Create, plan and fill in a checklist



Every paper-based checklist can be digitalized (HACCP tasks, temperature measurements, cleaning registration etc.). Plan and assign the checklists to one or more organizational units and their users. The digital checklists can easily be completed using the app.

Real-time reporting and dashboards



The responsible manager can follow the tasks that have been completed and with what result, or which tasks still needs to be completed.

Cloud based application



HACCP-software are a cloud-based solutions (all data is safely stored), meaning that it can be accessed from all over the world. The app can be downloaded for free on the AppStore (iOS) or the Google PlayStore (Android).

The evaluation software Easy Data Collector



FOM 330 BT

The evaluation software EDC (Easy Data Collector) is a self-contained, windows-based application software. It offers the collection, evaluation and storage of measurement data gathered with the TLC 750 NFC, especially to customers who don't need the HACCP software. EDC focusses entirely on the measurement data, similar to the Winlog.basic.

The evaluation software EDC will be shipped together with the IF 750.



IF 750

The **IF 750** has a BLE interface, so that you can communicate with the TLC 750 NFC even without mobile device. Additionally, it has both a USB and an ethernet interface, allowing it to talk to a PC. Therefore it establishes the **connection between software and measurement device**.

It also serves as **charging station** for the TLC 750 NFC. Charging is done wirelessly, avoiding electric contacts and their common problems, like corrosion and wear.

The **NFC interface** of the IF 750 offers reading NFC tags into the software while setting up the measurement system. There the tag information can be assigned to locations and users.

The IF 750 is also there to **store** the TLC 750 NFC. It can be laid on a flat surface, or used as a wall mount.



UT 750

The **CS 750** is a combination of charging station and wall mount, and the **WM 750** is a wall mount only. Those two items are supplements to the system, in case several TLC 750 NFC devices are used. They have the same shape as an IF 750 and can be connected to it physically, so that the entire measurement system is **situated in a compact manner**.



LT 750

The user NFC tags **UT 750** can be assigned to users of the TLC 750 NFC. Similar to a time card, the user will be identified by the tag. This way the TLC 750 NFC will know who is using it. That information will then be linked to the measurement data. **Later on you can follow who measured**.

The location NFC tags **LT 750** work in a similar way. They identify the measurement locations, e. g. a rack in a cooling room, or a fridge. **This way you can follow where it has been measured**.

Type	Description	Part No.
TLC 750 NFC	Dual HACCP-Thermometer	1340-5741A
SI 750	Set: Interface IF 750 incl. charging station and evaluation software EDC	1340-5750
CS 750	Charging station for the TLC 750 BT and TLC 750 NFC	1341-5750
SH 750 NFC	Set: TLC 750 NFC, Interface IF 750 incl. charging station, evaluation software EDC, 5 User-Tags, 5 Location-Tags	1340-5752A
UT 750	Set: 5 User-Tags for TLC 750 NFC	1341-5751
LT 750	Set: 5 Location-Tags for TLC 750 NFC	1341-5752
WM 750	Wall mount for TLC 750 BT and TLC 750 NFC	1341-5753

Applications



Collecting data with TLC 750 BT and EDC

The thermometer TLC 750 BT is ideal for regular round walks to check the temperature e.g. of cooling rooms or during incoming goods inspections. The temperature and time data will be stored in the device and then transferred to the ebro® EDC software on a PC. There it can be supplemented with additional data, e.g. personnel and locations, if required. Reports and other evaluations can be made at any time.

This application of the ebro® HACCP system is ideal if it's all about controlling the temperature and storing the data.

HACCP with TLC 750 BT and HACCP software

You can define the various HACCP tasks in HACCP softwares, whereupon the app informs the responsible personnel. If it's cleaning the floor, washing the cutlery or the workwear - all can be entered, fulfilled and later checked. One of those tasks can be temperature control, and for that the TLC 750 BT is ideal. The thermometer sends the measurement data to the app, which forwards it to the cloud.

This application of the ebro® HACCP system is ideal if it's about the computer aided implementation of an HACCP concept, which includes temperature control, among other things.

Collecting data with TLC 750 NFC and EDC

The thermometer TLC 750 NFC can do anything the TLC 750 BT can do, and in addition communicates with NFC tags. These allow for a higher degree of automation and control, since the measurement locations and personnel do not need to be entered manually. The EDC software receives complete data sets.

This application of the ebro® HACCP system is ideal if it's about controlling the temperature and storing the data, with optimized processes and a high certain degree of control.

HACCP with TLC 750 NFC and HACCP software

This application comprises all options of TLC 750 BT with HACCP software. In addition, measurement locations and personnel can be identified via NFC tags. During the definition of the measurement task, who shall measure where and when has already been determined. Usually it is hard to follow if indeed this has been done as intended, though. The tags are there as an additional verification and increase the degree of control.

This application of the ebro® HACCP system is ideal if it's about the computer aided implementation of an HACCP concept, which includes temperature control, among other things, and requires the highest degree of control.

TLC 750 BT Dual Radio Thermometer for the efficient collection and documentation of measurement data



Technical Data

Like the TLC 750 NFC, with the following exception

Interfaces	BLE, USB-C
------------	------------

The TLC 750 BT supplements the TLC 750 HACCP measurement system. It has the same features as the TLC 750 NFC, except for the NFC interface. All other parts of the measurement system - IF 750, CS 750, HACCP software - also work with the TLC 750 BT. Therefore it is a cost-efficient alternative for customers who don't need the NFC functionality.

- Wireless data transmission via Bluetooth Low Energy
- Wireless rechargeable battery
- Display with backlight for reading in dark environments
- Display can be upside down for reading from both sides

Type	Description	Part No.
TLC 750 BT	Dual radio thermometer	1340-5740A
SI 750	Set: Interface IF 750 incl. charging station and evaluation software EDC	1340-5750
CS 750	Charging station for the TLC 750 BT and TLC 750 NFC	1341-5750
SH 750 BT	Set: TLC 750 BT, Interface IF 750 incl. charging station, evaluation software EDC	1340-5751A
WM 750	Wall mount for the TLC 750 BT and TLC 750 NFC	1341-5753

Digital temperature control at one glance

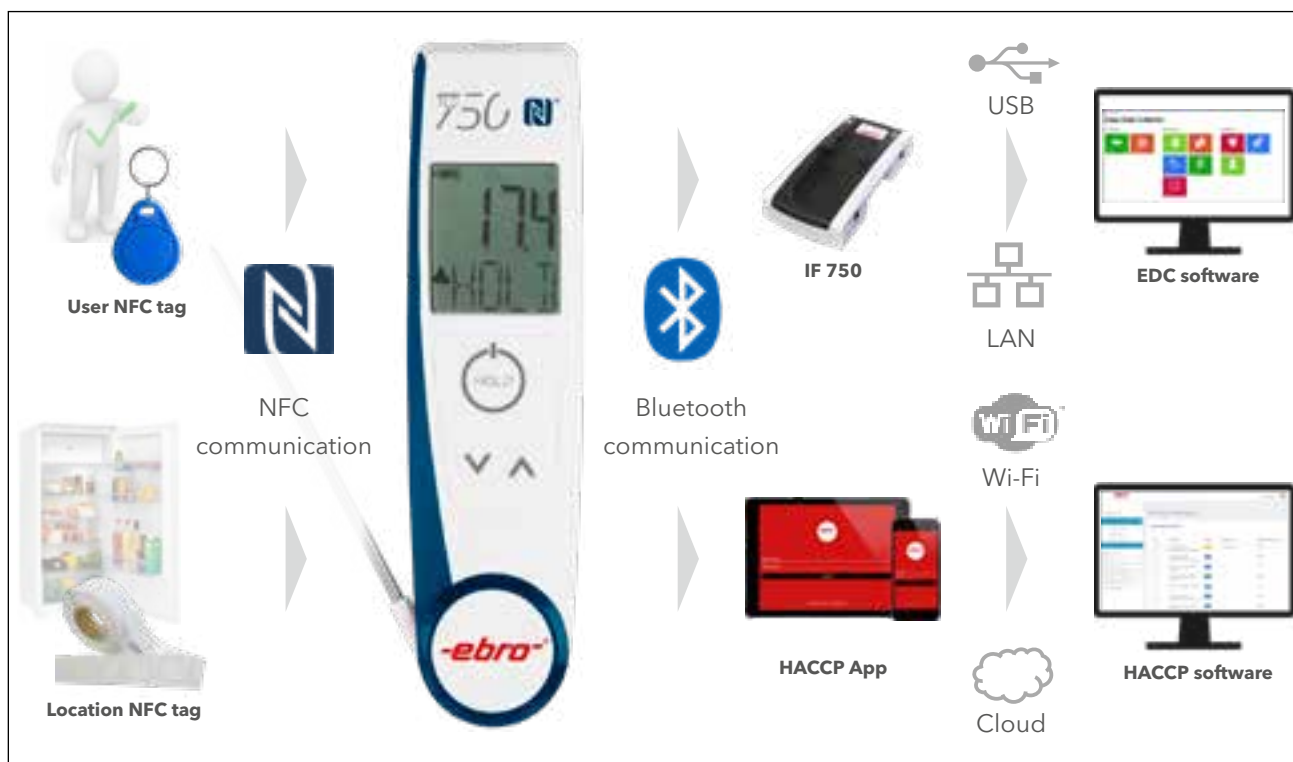


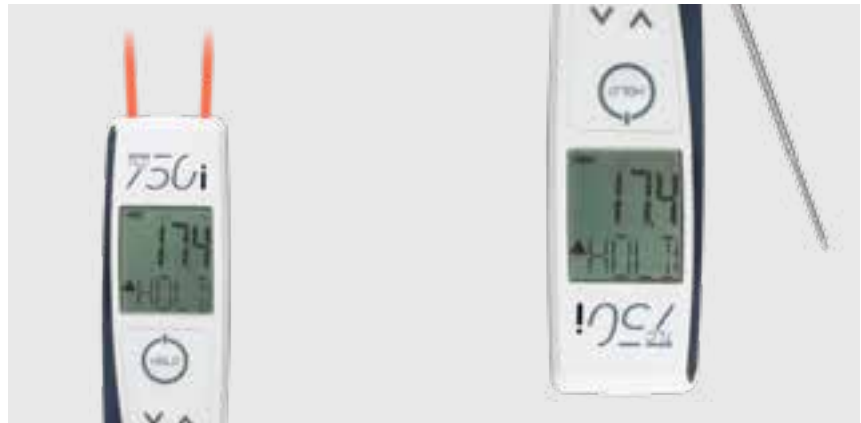
Fig. Complying to the hygiene requirements with the ebro® HACCP system

TLC 750i Dual Infrared/Fold-Back Thermometer with foldable penetration probe and infrared sensor



Technical Data

Measurement range	-50 °C ... +250 °C (-58 °F ... +482 °F)
Accuracy infrared	±4 °C at -50 °C ... -30.1 °C (±7.2 °F at -58 °F ... -22 °F) ±2.5 °C at -30 °C ... -18.1 °C (±4.5 °F at -22 °F ... -0.4 °F) ±1.5 °C at -18 °C ... -0.1 °C (±2.7 °F at -0.4 °F ... +32 °F) ±1.0 °C at 0 °C ... +65 °C (±1.8 °F at +32 °F ... +149 °F) ±2.0 °C or 2 % at +65 °C ... +250 °C (±3.6 °F at +149 °F ... +482 °F)
Accuracy penetration probe	±0.5 °C at -30 °C ... +99.9 °C (±0.9 °F at -22 °F ... +212 °F) ±1 °C (±2 °F) or 1 % for the remaining measurement range (whichever is larger)
Resolution	0.1 °C / 0.2 °F
Distance : Spot ratio	8:1
Sensor	Thermocouple type T
Operating temperature	-25 °C ... +50 °C (-13 °F ... +122 °F)
Storage temperature	-30 °C ... +70 °C (-40 °F ... +158 °F)
Battery	2 x AAA (Micro), user replaceable
Battery lifetime	Approximately 10 h of continuous use
Dimensions (L x W x H)	169.5 x 44 x 23 mm (without probe), needle length = 100 mm
Housing material	ABS
Weight	Approximately 140 g
Protection class	IP65
Automatic deactivation	Automatically after 15 seconds, deactivatable
Certificate	Factory calibration certificate (-18 °C ... 0 °C)



Surface temperature measurement

Core temperature measurement

The new TLC 750i is the successor of our top selling product: the TLC 730. Improvements were made mostly at the usability. On the one hand the new display with backlight allows for reading of the measurement in dark environments. On the other hand the display can be upside down: depending on how you hold the device, you can read it from the one or the other side. This is particularly handy when using the penetration probe - no contorted movements while reading any more!

- Display with backlight for reading in dark environments
- Display can be upside down for reading from both sides
- Double laser pointer

Type	Description	Part No.
TLC 750i	Dual Infrared / Fold-Back Thermometer	1340-5736A

TLC 1598 Precision Fold-Back Thermometer
with foldable Pt 1000 penetration probe and high accuracy



Technical Data

Measurement range	-50 °C ... +200 °C (-58 °F ... +392 °F)
Accuracy	±0.3 °C (±0.5 °F)
Resolution	0.1 °C (0.2 °F)
Sensor	Pt 1000
Response time (t ₉₉)	8 s (water)
Operating temperature	0 °C ... +50 °C (+32 °F ... +122 °F)
Storage temperature	-10 °C ... +60 °C (+14 °F ... +140 °F)
Display	LCD 9 mm
Battery	3.6 V lithium
Battery lifetime	Approximately 4 years
Dimensions (L x W x H)	44 x 18 x 158 mm, L = 105 mm
Housing material	ABS
Weight	Approximately 70 g
Protection class	IP54
Certificate	3-point factory calibration (-20 °C, 0 °C and +120 °C)

- High accuracy of ±0.3 °C
- Short response time
- Approximately 4 years battery life time

Type	Description	Part No.
TLC 1598	Precision Fold-Back Thermometer	1340-1620A
AG 121	Nylon bag for TLC 1598	1341-0624

TLC 700 Basic Fold-Back Thermometer
with foldable penetration probe



Technical Data

Temperature measurement range	-30 °C ... +220 °C (-22 °F ... +428 °F)
Accuracy	±0.5 °C (at -30 °C ... +100 °C), ±1.0 % for the remaining measurement range
Resolution	0.1 °C
Operating temperature	-25 °C ... +50 °C (-13 °F ... +122 °F)
Battery	Lithium button cell (CR 2032)
Dimensions (L x W x H)	118 x 33 x 15 mm, needle length = 70 mm
Certificate	Factory calibration certificate (-20 °C and 0 °C)

- Small size easily fits in a pocket
- Waterproof housing (IP65)
- Color ring can be changed in order to assign the device to a person, department or application

Type	Description	Part No.
TLC 700	Folding Thermometer	1340-5735A
AG 700	Color ring change set for TLC 700	1341-5735

Non-contact temperature measurement with infrared technology

On the following pages you will find various infrared thermometers for non-contact surface temperature measurements. The infrared thermometers are suitable for measurements wherever direct contact is impossible or impractical.



Applications

- Surface temperature measurement
- Core temperature measurement with penetration probe
- Process monitoring

Find your perfect infrared thermometer:

Infrared Thermometers	Measurement range	Probe type	Probe connection	Channels	Distance:spot ratio	Fast response time	Splashproof housing
TFI 550 Infrared Dual Thermometer	-60 °C ... +550 °C	Infrared and Thermoelement Typ K	SMP	2	30:1	✗ (Infrared)	
TFI 260 Basic Infrared Thermometer	-60 °C ... +550 °C	Infrared		1	12:1	✗	
TFI 54 Infrared Thermometer	-60 °C ... +550 °C	Infrared		1	12:1	✗	✗
TLC 750i Dual Infrared/Fold-Back Thermometer	-50 °C ... +250 °C	Infrared and Thermocouple Type T		2	8:1	✗ (Infrared)	✗

TFI 550 Infrared Dual Thermometer with connection for thermo elements type K



Optional external NiCr-Ni probes
with SMP connection available
(starting on page 73).

- Double laser pointer
- Distance : spot ratio = 30:1
- Alarm when MIN/MAX exceeded

Technical Data

Measurement range	-60 °C ... +550 °C (-76 °F ... +1,022 °F)
Accuracy	±2 °C at -18 °C ... +23 °C (±3.6 °F at 0 °F ... +73 °F) ±1 % of measurement ±1 °C (whichever is larger) at +23 °C ... +510 °C ±1.8 °F (whichever is larger) at 73 °F ... +950 °F
Resolution	0.1 °C at -9.9 °C ... +199 °C, otherwise +1 °C (+0.2 °F at +14 °F ... +391 °F, otherwise +1.8 °F)
Response time (t ₉₀)	Approximately 1 s
Emissivity factor	0.1 ... 1.0
Distance : spot ratio	30:1
NiCr-Ni probe measurement	
Measurement range	-64 °C ... +1,400 °C (-83 °F ... +2,552 °F)
Connection	SMP
Accuracy	±1 % of measurement value / ±1 °C (±1.8 °F), whichever is larger
Battery	2 x AAA (Micro)
Battery lifetime	Typically 180 hours
Operating temperature	0 °C ... +50 °C (+32 °F ... +122 °F)
Storage temperature	-20 °C ... +65 °C (-4 °F ... +149 °F)
Housing material	ABS
Protection class	IP20
Weight	Approximately 180 g
Certificate	Factory calibration certificate (Infrared: -18 °C, 0 °C and +120 °C; NiCr-Ni: -20 °C, 0 °C and +1,000 °C)

Type	Description	Part No.
TFI 550	Infrared thermometer with NiCr-Ni connection	1340-1786A
AN 144	Extension cable, 2.5 m silicone, SMP	1343-2627



TFI 260 Basic Infrared Thermometer with circular laser pointer



- Measurement area perfectly marked due to circular laser pointer
- Bright display backlight
- Distance : spot ratio = 12:1

Technical Data

Measurement range	-60 °C ... +550 °C (-76 °F... +1,022 °F)
Accuracy	±2 °C +0.05 °C per °C below 0 °C (at -60 °C ... 0 °C) ±2 °C (at 0 °C ... +15 °C) ±1.5 °C (at +15 °C ... +35 °C) ±2 °C or 2 %, larger value is applicable (at +35 °C ... +550 °C)
Resolution	0.1 °
Operating temperature	0 °C ... +50 °C (+32 °F ... +122 °F)
Response time	1 s
Emissivity factor	0.95 fixed
Distance : spot ratio	12:1
Battery	2 x AAA (Micro)
Battery lifetime	Approximately 7 hours of continuous use
Housing material	ABS
Dimensions (L x W x H)	115 x 162 x 40 mm
Weight	179 g (with batteries)
Protection class	IP20
Certificate	Factory calibration certificate (0 °C)

Type	Description	Part No.
TFI 260	Infrared thermometer incl. factory calibration	1340-1755A

TFI 54 Infrared Thermometer with splash proof housing



- Single laser pointer
- Distance : spot ratio = 12:1
- Replaceable battery

Technical Data

Measurement range	-60 °C ... +550 °C (-76 °F ... +1,022 °F)
Accuracy	±2 °C +0,05 °C per °C below 0 °C (at -60 °C ... 0 °C) ±2 °C (at 0 °C ... +15 °C) ±1,5 °C (at +15 °C ... +35 °C) ±2 °C or 2 %, larger value is applicable (at +35 °C ... +550 °C)
Resolution	0.1 °C (-9.9 °C ... +199.9 °C) 1 °C for the remaining measurement range
Operating temperature	0 °C ... +50 °C (+32 °F ... +122 °F)
Response time	1 s
Emissivity factor	0.95 standard, adjustable from 0.1 to 1.0
Distance : spot ratio	12:1
Battery	2 x AAA (Micro)
Battery life time	Approximately 14 hours of continuous use
Housing material	Rubberized
Dimensions (L x W x H)	144 x 117 x 43 mm
Weight	180 g (with batteries)
Protection class	IP54
Certificate	Factory calibration certificate (0 °C)

Type	Description	Part No.
TFI 54	Infrared Thermometer including factory calibration certificate	1340-1754A

TLC 750i Dual Infrared/Fold-Back Thermometer with foldable penetration probe and infrared sensor



- Display with backlight for reading in dark environments
- Display can be upside down for reading from both sides
- Double laser pointer

Technical Data

Measurement range	-50 °C ... +250 °C (-58 °F ... +482 °F)
Accuracy infrared	±4 °C at -50 °C ... -30.1 °C (±7.2 °F at -58 °F ... -22 °F) ±2.5 °C at -30 °C ... -18.1 °C (±4.5 °F at -22 °F ... -0.4 °F) ±1.5 °C at -18 °C ... -0.1 °C (±2.7 °F at -0.4 °F ... +32 °F) ±1.0 °C at 0 °C ... +65 °C (±1.8 °F at +32 °F ... +149 °F) ±2.0 °C or 2 % at +65 °C ... +250 °C (±3.6 °F at +149 °F ... +482 °F)
Accuracy penetration probe	±0.5 °C at -30 °C ... +99.9 °C (±0.9 °F at -22 °F ... +212 °F) ±1 °C (±2 °F) or 1 % for the remaining measurement range (whichever is larger)
Resolution	0.1 °C / 0.2 °F
Distance : spot ratio	8:1
Sensor	Thermocouple type T
Operating temperature	-25 °C ... +50 °C (-13 °F ... +122 °F)
Storage temperature	-30 °C ... +70 °C (-40 °F ... +158 °F)
Battery	2 x AAA (Micro), user replaceable
Battery lifetime	Approximately 10 h of continuous use
Dimensions (L x W x H)	169.5 x 44x23mm (without probe), needle length=100mm
Housing material	ABS
Weight	Approximately 140 g
Protection class	IP65
Automatic deactivation	Automatically after 15 seconds, deactivatable
Certificate	Factory calibration certificate (-18 °C and 0 °C)

Type	Description	Part No.
TLC 750i	Dual Infrared / Fold-Back Thermometer	1340-5736A



Recommendations for Infrared Measurements

Infrared Radiation Properties of Various Materials

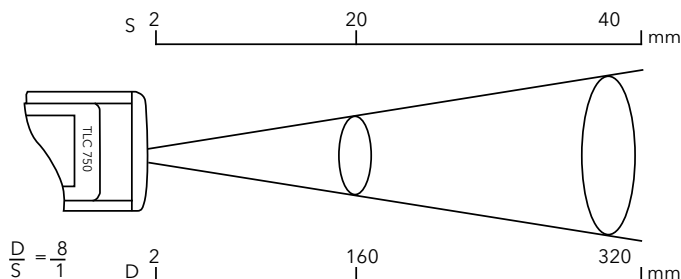
Various materials and surfaces have different infrared light emitting properties and therefore affect the temperature data being measured (emissivity). Most common products (including liquids and foodstuffs packaged in cartons or plastic containers) have an emissivity of 0.95.

Bare or metallic surfaces cause inaccurate measurements due to their reflectivity of light and heat radiation. It is possible to circumvent these problems by measuring parts of the object you are measuring that are already black (e.g. for a grill) or by painting the surface of the respective object black or by covering with matt tape. After covering the object, wait some time before performing the measurement to ensure that the material used for covering can acquire the temperature of the object being measured.

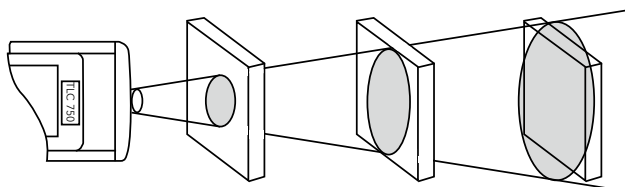
Our thermometers have a factory set emissivity of 0.95. The emissivity value can be set within a range of 0.10 (value shown on display: 10E) and 1 (display: 100E).

Tips for Precise Infrared Measurements

As the distance between the thermometer and the object being measured increases, so does the diameter of the surface being measured (spot size). You can observe this because the distance between the two red laser points projected on the measured object increases as the distance between the thermometer and the measured object increases. The ideal measuring distance is between 5 cm and 10 cm.



Please ensure that the object being measured is larger than the distance between the two laser points. The smaller the measured object is, the closer you must be to the object.



If the accuracy of the measurement is crucial, the object being measured should be at least twice as large as the distance between the two laser points. The device is not well-suited for taking temperature measurements on shiny or highly polished metallic surfaces (e.g. stainless steel, aluminum etc.). The device cannot take measurements through transparent surfaces such as glass. The device will instead measure the surface temperature of the glass. Steam, dust, smoke and other obstructions can interfere with measuring the correct temperature. If you would like to measure liquids, stir up the liquid thoroughly while taking the measurement.

Table of certain known emissivities

Material Emissivity	Emission 8-14 μm
Aluminium, oxidised	0.2 - 0.4
Aluminium, blank	0.04
Lead, scraggly	0.4
Lead, oxidised	0.2 - 0.6
Iron, oxidised	0.5 - 0.9
Iron, polished	0.24
Iron, rusted	0.5 - 0.7
Copper, polished	0.03
Copper, oxidised	0.4 - 0.8
Inconel, oxidised	0.7 - 0.95
Inconel, polished	0.3 - 0.6
Asphalt	0.95
Concrete	0.95
Ice	0.98
Cement	0.8 - 0.95
Glass pane	0.85
Rubber	0.95
Limestone	0.98
Wood	0.9 - 0.95
Cork	0.7
Graphite	0.7 - 0.8
Ceramics	0.95
Gravel	0.95
Paper	0.95
Cloth	0.95
Sand	0.9
Snow	0.9
Potter's clay	0.95
Water	0.93

Exchangeable Thermocouple Probes

To solve each of your measurement tasks perfectly, you can choose between various probe types:

- Low-cost probes
- Rod probes
- Surface probes
- High temperature probes
- Other probes

The probes are available with Lemo and/or SMP connection.
All probes are thermo element type K (NiCrNi)



Find your perfect probe on the following pages

For each application, ebro® provides the right thermometer and also offers a wide selection of precise and robust probes for the following thermometers:

Instrument		SMP-connector	Lemo-connector
TFN 520	(starting on page 55)	X	X
TFN 530	(starting on page 55)	X	X
TFI 550	(see page 70)	X	
EBI 40-TC-01	(see page 19)	X	
EBI 40-TC-02	(see page 19)	X	

The accuracy of the used probe adds to the accuracy of the device. E.g. probes with class 1 of DIN EN 60584 have ± 0,5 °C between -40 °C ... +125 °C.

Extension cables for probes



AN 140 Extension cable, 1 m silicone with Lemo connection



AN 142 Extension cable, 1 m silicone, SMP



AN 141 Adapter cable, 1 m silicone (Lemo/SMP)

AN 144 Extension cable, 2.5 m silicone, SMP



AN 143 Extension cable, 2.5 m silicone, Lemo

Type	Description	Part No.
AN 140	Extension cable, 1 m silicone, Lemo	1341-2626
AN 141	Adapter cable, 1 m silicone (Lemo/SMP)	1341-2629
AN 142	Extension cable, 1 m silicone, SMP	1343-2626
AN 143	Extension cable, 2.5 m silicone, Lemo	1341-2627
AN 144	Extension cable, 2.5 m silicone, SMP	1343-2627

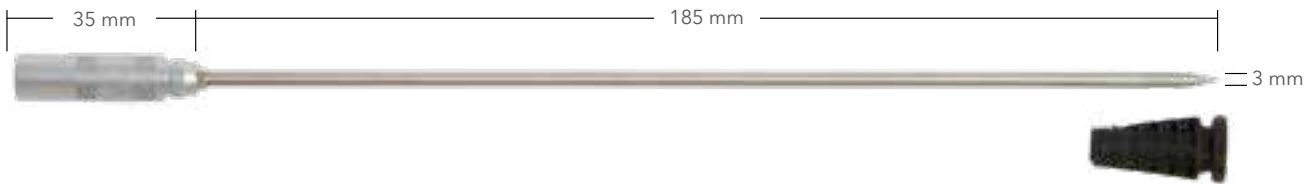
Low-cost probes

Temperature measurement of plastic masses, fluids, air and surfaces.

Penetration probes

TPN 200 *

- Probe (L = 185, Ø 3 mm, pointed, inconel needle with tip, without cable, with Lemo connection)
- Range: -40 °C ... +600 °C (-40 °F ... +2,012 °F)
- Accuracy: exceeds DIN EN 60584, class 2
- Response time (t_{99}): 3 sec



TPN 210 *

- Probe (L = 130 mm, Ø 3 mm, pointed, stainless steel, up to +400 °C (+752 °F), with 1 m silicone cable, with Lemo connection)
- Range: -40 °C ... +400 °C (-40 °F ... +752 °F)
- Accuracy: exceeds DIN EN 60584, class 2
- Operating temperature of the handle: max. 120 °C



TPN 211 **

- same as TPN 210 but with SMP connection



* for TFN 520 and TFN 530
** for TFN 520-SMP, TFN 530-SMP, TFI 550, TFI 650, EBI 40-TC-01 and EBI 40-TC-02

Type	Description	Part No.
TPN 200	Penetration probe, L = 185 mm, Ø 3 mm, pointed, Lemo	1341-0608
TPN 210	Penetration probe with 1 m silicone cable, L = 130 mm, Ø 3 mm, pointed, Lemo	1341-1005
TPN 211	Penetration probe with 1 m silicone cable, L = 130 mm, Ø 3 mm, pointed, SMP	1343-1005

Surface paddle probes

TPN 340 *

- Probe (Paddle: 40 x 7 x 0.35 mm, stainless steel sheet, for surfaces up to +400 °C (+752 °F), with 1 m silicone cable, with Lemo connection)
- Range: -50 °C ... +400 °C (-58 °F ... +752 °F)
- Accuracy: exceeds DIN EN 60584, class 2



TPN 341 **

- same as TPN 340 but with SMP connection

* for TFN 520 and TFN 530

** for TFN 520-SMP, TFN 530-SMP, TFI 550, TFI 650, EBI 40-TC-01 and EBI 40-TC-02

Type	Description	Part No.
TPN 340	Surface / Paddle probe with 1 m silicone cable, 40 x 7 x 0.35 mm paddle, Lemo	1341-1015
TPN 341	Surface / Paddle probe with 1 m silicone cable, 40 x 7 x 0.35 mm paddle, SMP	1343-1015

Immersion probes

TPN 400 *

- Probe (L = 130 mm, Ø 3 mm, blunt, stainless steel, up to +400 °C (+752 °F), with 1 m silicone cable, with Lemo connection)
- Range: -40 °C ... +400 °C (-40 °F ... +752 °F)
- Accuracy: exceeds DIN EN 60584, class 1
- Operating temperature of the handle: max. 120 °C



TPN 401 **

- same as TPN 400 but with SMP connection



* for TFN 520 and TFN 530

** for TFN 520-SMP, TFN 530-SMP, TFI 550, TFI 650, EBI 40-TC-01 and EBI 40-TC-02

Type	Description	Part No.
TPN 400	Immersion probe with 1 m silicone cable, L = 130 mm, Ø 3 mm, blunt, Lemo	1341-1000
TPN 401	Immersion probe with 1 m silicone cable, L = 130 mm, Ø 3 mm, blunt, SMP	1343-1000

Rod probes

Basic rod probes

Temperature measurement of air, ovens, fluids and gases.

TPN 100 *

- Probe (L = 185 or 300 mm, Ø 0.5 mm, blunt, inconel needle, with Lemo connection)
- Range: -40 °C ... +1,100 °C (-40 °F ... +2,012 °F)
- Accuracy: exceeds DIN EN 60584, class 2
- Response time (t_{99} water 0.2 m/s): 0.4 sec



TPN 110 *

- Probe (L = 185 or 300 mm, Ø 1 mm, blunt, inconel needle, with Lemo connection)
- Range: -40 °C ... +1,100 °C (-40 °F ... +2,012 °F)
- Accuracy: exceeds DIN EN 60584, class 2
- Response time (t_{99} water 0.2 m/s): 1sec



TPN 111 ** same as TPN 110 but

- Probe (L = 185 mm)
- with SMP connection



TPN 120 *

- Probe (L = 185, 300, 500 or 1,000 mm, Ø 1.5 mm, blunt, inconel needle, with Lemo connection)
- Range: -40 °C ... +1,100 °C (-40 °F ... +2,012 °F)
- Accuracy: exceeds DIN EN 60584, class 2
- Response time (t_{99} water 0.2 m/s): 2sec



TPN 121 ** same as TPN 120 but

- Probe (L = 185 or 300 mm)
- with SMP connection



* for TFN 520 and TFN 530

** for TFN 520-SMP, TFN 530-SMP, TFI 550, TFI 650, EBI 40-TC-01 and EBI 40-TC-02

TPN 140 *

- Probe (L = 185 or 300 mm, Ø 3 mm, blunt, inconel needle, with Lemo connection)
- Range: -40 °C ... +1,100 °C (-40 °F ... +2,012 °F)
- Accuracy: exceeds DIN EN 60584, class 2
- Response time (t₉₉ water 0.2 m/s): 4 sec



TPN 141 **

- same as TPN 140 but with SMP connection



* for TFN 520 and TFN 530

** for TFN 520-SMP, TFN 530-SMP, TFI 550, TFI 650, EBI 40-TC-01 and EBI 40-TC-02

Type	Description	Part No.
TPN 100	Rod probe without cable, L = 185 mm, Ø 0.5 mm, blunt, Lemo	1341-0611
TPN 100-30	Rod probe without cable, L = 300 mm, Ø 0.5 mm, blunt, Lemo	1341-0805
TPN 110	Rod probe without cable, L = 185 mm, Ø 1 mm, blunt, Lemo	1341-0810
TPN 110-30	Rod probe without cable, L = 300 mm, Ø 1 mm, blunt, Lemo	1341-0812
TPN 111	Rod probe without cable, L = 185 mm, Ø 1 mm, blunt, SMP	1343-0810
TPN 120	Rod probe without cable, L = 185 mm, Ø 1.5 mm, blunt, Lemo	1341-0609
TPN 120-30	Rod probe without cable, L = 300 mm, Ø 1.5 mm, blunt, Lemo	1341-0400
TPN 120-50	Rod probe without cable, L = 500 mm, Ø 1.5 mm, blunt, Lemo	1341-0406
TPN 120-100	Rod probe without cable, L = 1,000 mm, Ø 1.5 mm, blunt, Lemo	1341-0414
TPN 121	Rod probe without cable, L = 185 mm, Ø 1.5 mm, blunt, SMP	1343-0609
TPN 121-30	Rod probe without cable, L = 300 mm, Ø 1.5 mm, blunt, SMP	1343-0400
TPN 140	Rod probe without cable, L = 185 mm, Ø 3 mm, blunt, Lemo	1341-0607
TPN 140-30	Rod probe without cable, L = 300 mm, Ø 3 mm, blunt, Lemo	1341-0415
TPN 141	Rod probe without cable, L = 185 mm, Ø 3 mm, blunt, SMP	1343-0607
TPN 141-30	Rod probe without cable, L = 300 mm, Ø 3 mm, blunt, SMP	1343-0415

Glass coated rod probes

Temperature measurement in chemically aggressive stages and fluids (materials reacting with stainless steel).

TPN 132-20 *

- Probe (L = 200 or 300 mm, Ø 8 mm, coated with Duran glass, with Lemo connection)
- Range: -40 °C ... +400 °C (-40 °F ... +752 °F)
- Accuracy: exceeds DIN EN 60584, class 2
- Response time (t₉₉ water): 40 sec



* for TFN 520 and TFN 530

** for TFN 520-SMP, TFN 530-SMP, TFI 550, TFI 650, EBI 40-TC-01 and EBI 40-TC-02

Type	Description	Part No.
TPN 132-20	Rod probe without cable, L = 200 mm, Ø 8 mm, glass-coated, Lemo	1342-0200
TPN 132-30	Rod probe without cable, L = 300 mm, Ø 8 mm, glass-coated, Lemo	1342-0300

Surface probes

General purpose surface probes

Surface temperature measurement of motors, turbines, pumps, casting molds, heating tubes, heating plates, injection molding, heating boilers, incinerators etc.

TPN 360 *

- Probe (L = 30 mm, with 1 m silicone cable, with Lemo connection)
- Range: -50 °C ... +500 °C (-58 °F ... +932 °F)
- Accuracy: exceeds DIN EN 60584, class 1
- Response time (t_{99}): 1.5 sec



The sensor blade adjusts to the surface

TPN 361 **

- same as TPN 360 but with SMP connection



TPN 380 *

- Probe (L = 300 mm, with 1 m silicone cable, with Lemo connection)
- Range: -50 °C ... +800 °C (-58 °F ... +1472 °F)
- Accuracy: exceeds DIN EN 60584, class 1
- Response time (t_{99}): 1.5 sec
- Particularly suitable for hot surfaces



TPN 381 **

- same as TPN 380 but with SMP connection



* for TFN 520 and TFN 530

** for TFN 520-SMP, TFN 530-SMP, TFI 550, TFI 650, EBI 40-TC-01 and EBI 40-TC-02

Type	Description	Part No.
TPN 360	Surface probe with 1 m silicone cable, L = 30 mm, up to +500 °C (+932 °F), Lemo	1341-0710
TPN 361	Surface probe with 1 m silicone cable, L = 30 mm, up to +500 °C (+932 °F), SMP	1343-0710
TPN 380	Surface probe with 1 m silicone cable, L = 300 mm, up to +800 °C (+1,472 °F), Lemo	1341-0720
TPN 381	Surface probe with 1 m silicone cable, L = 300 mm, up to +800 °C (+1,472 °F), SMP	1343-0720

Surface probes for sensitive surfaces

Surface temperature measurement of plastic, glass, gum, paper, metal, injection molding, tubes etc. To protect sensitive surfaces, the probe heads consist of PTFE.

TPN 310 *

- Probe (Measuring tape: N-version, with 1 m silicone cable, with Lemo connection)
- Range: -50 °C ... +300 °C (-58 °F ... +572 °F)
- Accuracy: exceeds DIN EN 60584, class 1
- Response time (t_{99}): 1.5 sec
- For highly sensitive surfaces



TPN 320 *

- Probe (Measuring tape: N-version, with 1 m silicone cable, with Lemo connection)
- Range: -50 °C ... +300 °C (-58 °F ... +572 °F)
- Accuracy: exceeds DIN EN 60584, class 1
- Response time (t_{99}): 1.5 sec
- For highly sensitive surfaces



TPN 321 **

- same as TPN 320 but with SMP connection



* for TFN 520 and TFN 530

** for TFN 520-SMP, TFN 530-SMP, TFI 550, TFI 650, EBI 40-TC-01 and EBI 40-TC-02

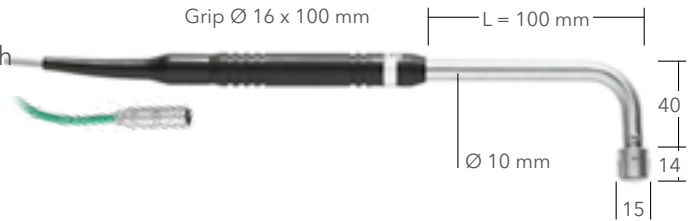
Type	Description	Part No.
TPN 310	Surface probe with 1 m silicone cable, -50 °C ... +300 °C (-58 °F ... +572 °F), Lemo	1341-0702
TPN 320	Surface probe with 1 m silicone cable, -50 °C ... +300 °C (-58 °F ... +572 °F), Lemo	1341-0717
TPN 321	Surface probe with 1 m silicone cable, -50 °C ... +300 °C (-58 °F ... +572 °F), SMP	1343-0717

Surface probes for hard to reach surfaces

Surface temperature measurement of machine parts.

TPN 350 *

- Probe (L = 100 mm, with 1 m silicone cable, with Lemo connection)
- Range: -50 °C ... +500 °C (-58 °F ... +932 °F)
Accuracy: exceeds DIN EN 60584, class 1
- Response time (t_{99}): 1.5 sec



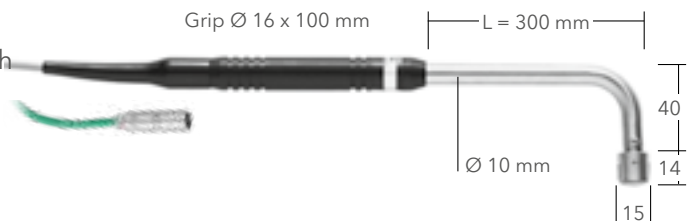
TPN 351 **

- same as TPN 350 but with SMP connection



TPN 390 *

- Probe (L = 300 mm, with 1 m silicone cable, with Lemo connection)
- Range: -50 °C ... +800 °C (-58 °F ... +1,472 °F)
- Accuracy: exceeds DIN EN 60584, class 1
- Response time (t_{99}): 1.5 sec
- Particular suitable for hot surfaces



TPN 391 **

- same as TPN 390 but with SMP connection



* for TFN 520 and TFN 530
** for TFN 520-SMP, TFN 530-SMP, TFI 550, TFI 650, EBI 40-TC-01 and EBI 40-TC-02

Type	Description	Part No.
TPN 350	Surface probe with 1 m silicone cable, L = 100 mm, up to +500 °C (+932 °F), Lemo	1341-0712
TPN 351	Surface probe with 1 m silicone cable, L = 100 mm, up to +500 °C (+932 °F), SMP	1343-0712
TPN 390	Surface probe with 1 m silicone cable, L = 300 mm, up to +800 °C (+1,472 °F), Lemo	1341-0721
TPN 391	Surface probe with 1 m silicone cable, L = 300 mm, up to +800 °C (+1,472 °F), SMP	1343-0721

Surface probes with mini sensor

Temperature measurement on very small surfaces like boards, small transformers, small heating blocks, thin tubes, rotors, as well as materials such as plastic, glass, gum and metal.

TPN 330 *

- Probe (Probe head: Econol, slightly angled, with 1m silicone cable, with Lemo connection)
- Range: -50 °C ... +250 °C (-58 °F ... +482 °F)
- Accuracy: exceeds DIN EN 60584, class 1
- Response time (t_{99}): 0.5 sec



TPN 331 **

- same as TPN 330 but with SMP connection



TPN 1100 *

- Probe (Measuring head: Ø 4.2 mm, Measuring tape: coated with polyimid film, with 1m silicone cable, with Lemo connection)
- Range: -50 °C ... +400 °C (-58 °F ... +752 °F)
- Accuracy: exceeds DIN EN 60584, class 2
- Response time (t_{99}): 2.0 sec



TPN 1101 **

- same as TPN 1100 but with SMP connection



TPN 1110 *

- Probe (Measuring head: Ø 4.2 mm, Measuring tape: coated with polyimid film, with 1 m silicone cable, with Lemo connection)
- Range: -50 °C ... +400 °C (-58 °F ... +752 °F)
- Accuracy: exceeds DIN EN 60584, class 2
- Response time (t_{99}): 2.0 sec



TPN 1111 **

- same as TPN 1110 but with SMP connection



* for TFN 520 and TFN 530

** for TFN 520-SMP, TFN 530-SMP, TFI 550, TFI 650, EBI 40-TC-01 and EBI 40-TC-02

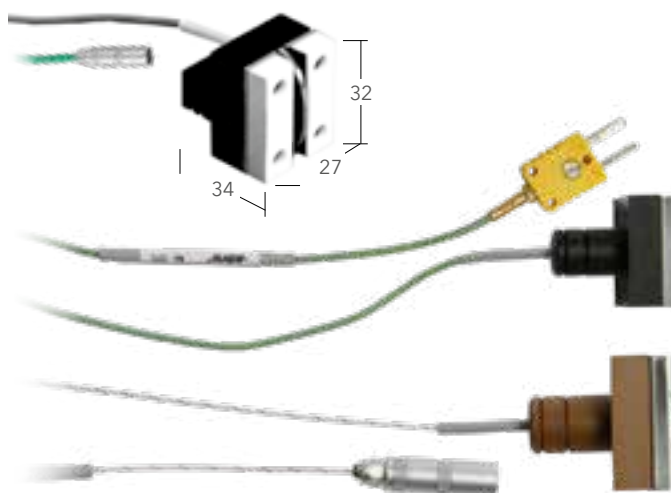
Type	Description	Part No.
TPN 330	Surface probe with 1 m silicone cable, 6 x 6 x 20 mm, Lemo	1341-0635
TPN 331	Surface probe with 1 m silicone cable, 6 x 6 x 20 mm, SMP	1343-0635
TPN 1100	Mini surface probe with 1 m silicone cable, Ø 4.2 mm, up to +400 °C (+752 °F), Lemo	1341-0653
TPN 1101	Mini surface probe with 1 m silicone cable, Ø 4.2 mm, up to +400 °C (+752 °F), SMP	1343-0653
TPN 1110	Mini surface probe with 1 m silicone cable, Ø 4.2 mm, up to +400 °C (+752 °F), Lemo	1341-0654
TPN 1111	Mini surface probe with 1 m silicone cable, Ø 4.2 mm, up to +400 °C (+752 °F), SMP	1343-0654

Magnetic surface probes

Surface temperature measurement on an extended period of ferrous containing compounds, e.g. heating plates, heating tubes, pumps, flushing tools, motors, turbines etc.

TPN 900 *

- Probe (Contact area: 27 x 32 mm, with 1 m silicone cable, with Lemo connection)
- Range: -50 °C ... +250 °C (-58 °F ... +482 °F)
- Accuracy: exceeds DIN EN 60584, class 1
- Response time (t_{99}): 2.0 sec
- Contact pressure: by magnetic force



TPN 901 **

- same as TPN 900 but with SMP connection

TPN 920 *

- same as TPN 900 but
- with 1 m glasscoated cable
- Range: -50 °C ... +400 °C (-58 °F ... +752 °F)

TPN 910 *

- Probe (Contact area: 13 x 14 mm, Thermocouple polyimid coated, with 1m glasscoated cable, with Lemo connection)
- Range: -50 °C ... +400 °C (-58 °F ... +752 °F)
- Accuracy: exceeds DIN EN 60584, class 1
- Response time (t_{99}): 2.0 sec
- Contact pressure: by magnetic force



TPN 911 **

- same as TPN 910 but with SMP connection

TPN 912 *

- same as TPN 910 but
- with 1 m silicone cable
- Range: -50 °C ... +250 °C (-58 °F ... +482 °F)
- thermo element coated with PTFE



TPN 913 **

- same as TPN 912 but with SMP connection

* for TFN 520 and TFN 530

** for TFN 520-SMP, TFN 530-SMP, TFI 550, TFI 650, EBI 40-TC-01 and EBI 40-TC-02

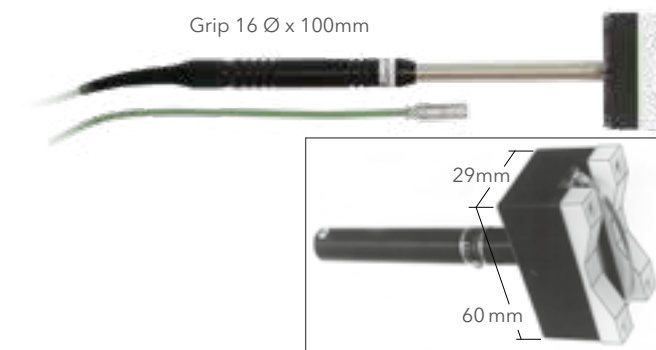
Type	Description	Part No.
TPN 900	Magnetic surface probe with 1 m silicone cable, 27 x 32 mm, up to +250 °C (+482 °F), Lemo	1341-0640
TPN 901	Magnetic surface probe with 1 m silicone cable, 27 x 32 mm, up to +250 °C (+482 °F), SMP	1343-0640
TPN 910	Magnetic surface probe, with 1 m glasscoated cable, 13 x 14 mm, up to +400 °C (+752 °F), Lemo	1341-0641
TPN 911	Magnetic surface probe, with 1 m glasscoated cable, 13 x 14 mm, up to +400 °C (+752 °F), SMP	1343-0641
TPN 912	Magnetic surface probe, with 1 m silicone cable, 13 x 14 mm, up to +250 °C (+482 °F), Lemo	1341-0644
TPN 913	Magnetic surface probe, with 1 m silicone cable, 13 x 14 mm, up to +250 °C (+482 °F), SMP	1343-0644
TPN 920	Magnetic surface probe with 1 m glasscoated cable, 27 x 32 mm, up to +400 °C (+752 °F), Lemo	1341-0645

Roller surface probes

Temperature measurement of solid, moving and rotating surfaces, such as turned parts, rollers, metal and paper blanks as well as at mold design and construction.

TPN 700 *

- Probe (Measuring head with PTFE runners (29 x 60 mm) (for rollers Ø 400 mm to flat), with 1m silicone cable, with Lemo connection)
- Range: -50 °C ... +250 °C (-58 °F ... +482 °F)
- Accuracy: exceeds DIN EN 60584, class 1
- Response time (t_{99}): 3.0 sec
- Max. speed: 800 m/min



TPN 701 **

- same as TPN 700 but with SMP connection



* for TFN 520 and TFN 530

** for TFN 520-SMP, TFN 530-SMP, TFI 550, TFI 650, EBI 40-TC-01 and EBI 40-TC-02

Type	Description	Part No.
TPN 700	Roller probe with 1 m silicone cable, 29 x 60 mm PTFE runners, Ø 400 mm to flat, Lemo	1341-0845
TPN 701	Roller probe with 1 m silicone cable, 29 x 60 mm PTFE runners, Ø 400 mm to flat, SMP	1343-0845

Sheet surface probes

Temperature measurement in stacked goods, such as wood, paper, ironing presses etc.

TPN 1010 *

- Probe (Sheet length: 100 mm, Sheet thickness: 0.05 mm at the measuring surface, with 1m silicone cable, with Lemo connection)
- Range: -50 °C ... +210 °C (-58 °F ... +410 °F)
- Accuracy: exceeds DIN EN 60584, class 1
- Response time (t_{99}): 2.5 sec



TPN 1011 **

- same as TPN 1010 but with SMP connection



* for TFN 520 and TFN 530

** for TFN 520-SMP, TFN 530-SMP, TFI 550, TFI 650, EBI 40-TC-01 and EBI 40-TC-02

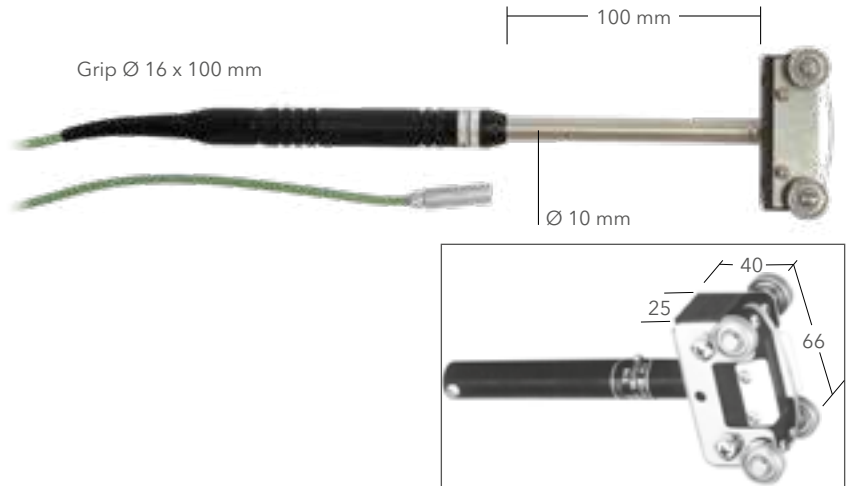
Type	Description	Part No.
TPN 1010	Sheet probe with 1 m silicone cable, up to +210 °C (+410 °F), Lemo	1341-0652
TPN 1011	Sheet probe with 1 m silicone cable, up to +210 °C (+410 °F), SMP	1343-0652

Rail surface probes

Temperature measurement of moving surfaces.

TPN 800 *

- Probe (Measuring head: (25 x 66 mm) with rollers, with 1 m silicone cable, with Lemo connection)
- Range: -50 °C ... +200 °C (-58 °F ... +392 °F)
- Accuracy: exceeds DIN EN 60584, class 1
- Response time (t_{99}): 3 sec
- Max. speed: 500 m/min



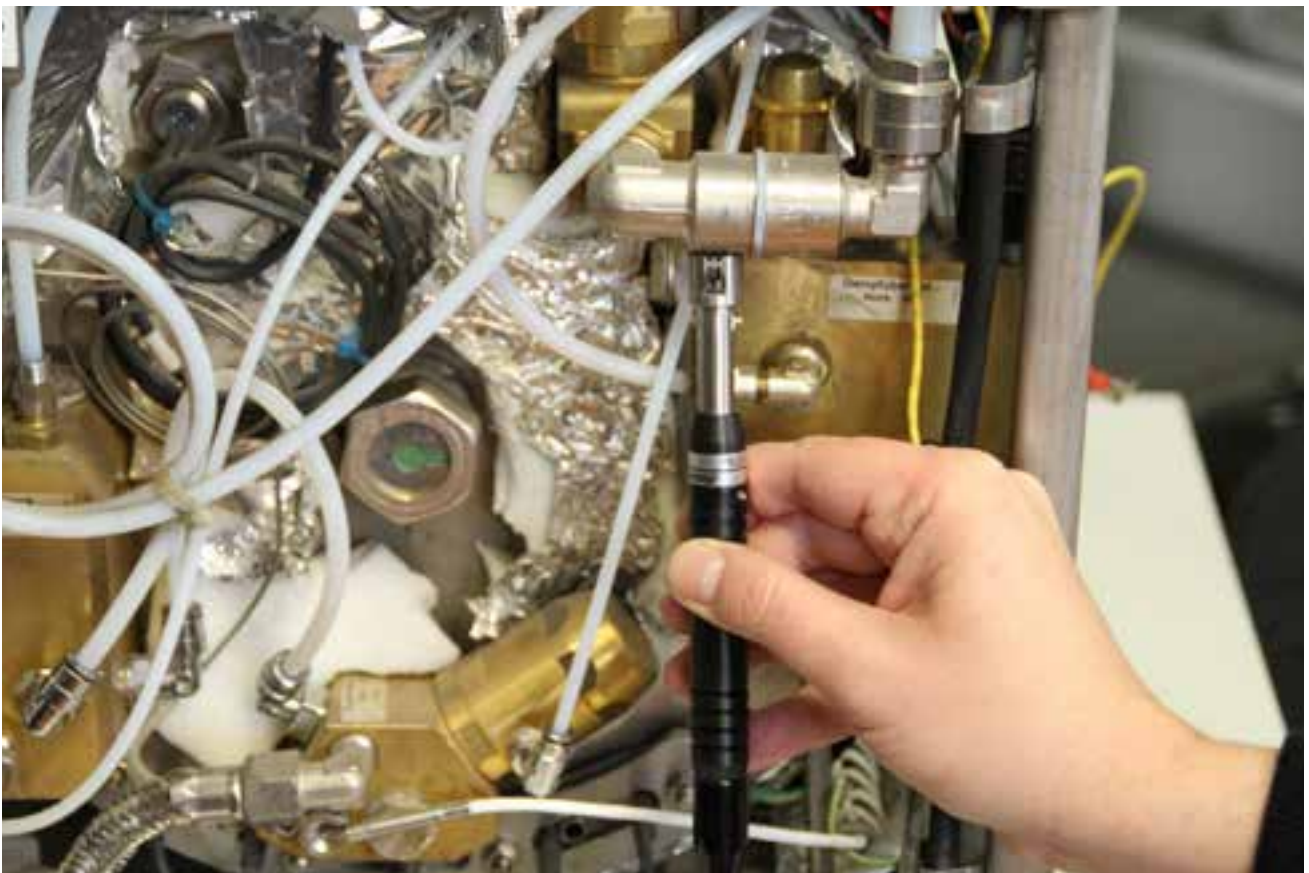
TPN 801 **

- same as TPN 800 but with SMP connection



* for TFN 520 and TFN 530
 ** for TFN 520-SMP, TFN 530-SMP, TFI 550, TFI 650, EBI 40-TC-01 and EBI 40-TC-02

Type	Description	Part No.
TPN 800	Rail probe with rollers and 1 m silicone cable, 25 x 66 mm measuring head, Lemo	1341-0639
TPN 801	Rail probe with rollers and 1 m silicone cable, 25 x 66 mm measuring head, SMP	1343-0639



High temperature probes

Flexible high temperature probes

High temperature measurement of air and gases.

TPN 1220 *

- Probe (L = 1 m, Ø 2 mm, with Lemo connection)
- Flexible coated mantle thermocouple, mantle Ø 2 mm
- Thermopile: blank
- Range: -40 °C ... +1,200 °C (-40 °F ... +2,192 °F)
- Accuracy: exceeds DIN EN 60584, class 1
- Response time (t_{99}): 2.5 sec (water)



TPN 1221 **

- same as TPN 1220 but with SMP connection



** for TFN 520 and TFN 530*

*** for TFN 520-SMP, TFN 530-SMP, TFI 550, TFI 650, EBI 40-TC-01 and EBI 40-TC-02*

Type	Description	Part No.
TPN 1220	Flexible high-temperature probe without cable, L = 1 m, Ø 2 mm, up to +1,200 °C (+2,192 °F), Lemo	1341-0927
TPN 1221	Flexible high-temperature probe without cable, L = 1 m, Ø 2 mm, up to +1,200 °C (+2,192 °F), SMP	1343-0927



Other probes

Thermal wire probes

Measurement of air, oven and gas temperatures.

TPN 600 *

- Probe (L = 1 m, outside 1.9 x 1.2 mm, Isolation: glass/silk meshwork, with Lemo connection)
- Range: -50 °C ... +400 °C (-58 °F ... +752 °F)
- Accuracy: exceeds DIN EN 60584, class 2
- Response time (t₉₉ Air 0.2 m/s): 25 sec



TPN 601 ** same as TPN 600 but

- With SMP connection



TPN 610 *

- Probe (L = 1 m, outside 0.8 x 1.2 mm, Isolation: glass/silk meshwork, with Lemo connection)
- Range: -50 °C ... +400 °C (-58 °F ... +752 °F)
- Accuracy: exceeds DIN EN 60584, class 2
- Response time (t₉₉ Air 0.2 m/s): 25 sec



TPN 611 ** same as TPN 610 but

- With SMP connection



* for TFN 520 and TFN 530

** for TFN 520-SMP, TFN 530-SMP, TFI 550, TFI 650, EBI 40-TC-01 and EBI 40-TC-02

Type	Description	Part No.
TPN 600	Flexible thermal wire probe without cable, L = 1 m, outside 1.9 x 1.2 mm, Lemo	1341-0646
TPN 601	Flexible thermal wire probe without cable, L = 1 m, outside 1.9 x 1.2 mm, SMP	1343-0646
TPN 610	Flexible thermal wire probe without cable, L = 1 m, outside 0.8 x 1.2 mm, Lemo	1341-0800
TPN 611	Flexible thermal wire probe without cable, L = 1 m, outside 0.8 x 1.2 mm, SMP	1343-0800
TPN 611 -3m	Flexible thermal wire probe without cable, L = 3 m, outside 0.8 x 1.2 mm, SMP	1343-0800-0100

Penetration probes

Temperature measurement of viscoplastic masses such as asphalt, bitumen or grounds.

TPN 220 *

- Probe (L = 100 mm, Ø 5 mm, stainless steel needle with tip, 1m silicone cable, with Lemo connection)
- Range: -200 °C ... +500 °C (-328 °F ... +932 °F)
- Accuracy: exceeds DIN EN 60584, class 2
- Response time (t₉₉): 3.0 sec



TPN 221 **

- same as TPN 220 but with SMP connection



TPN 230 *

- Probe (L = 100 mm, Ø 2.1 mm, stainless steel needle with tip, 1m silicone cable, with Lemo connection)
- Range: -200 °C ... +500 °C (-328 °F ... +932 °F)
- Accuracy: exceeds DIN EN 60584, class 2
- Response time (t₉₉): 2.5 sec



TPN 231 **

- same as TPN 220 but with SMP connection



* for TFN 520 and TFN 530

** for TFN 520-SMP, TFN 530-SMP, TFI 550, TFI 650, EBI 40-TC-01 and EBI 40-TC-02

Type	Description	Part No.
TPN 220	Penetration probe with 1 m silicone cable, L = 100 mm, Ø 5 mm, -200 °C ... +500 °C (-328 °F ... +932 °F), Lemo	1341-0664
TPN 221	Penetration probe with 1 m silicone cable, L = 100 mm, Ø 5 mm, -200 °C ... +500 °C (-328 °F ... +932 °F), SMP	1343-0664
TPN 230	Penetration probe with 1 m silicone cable, L = 100 mm, Ø 2.1 mm, -200 °C ... +500 °C (-328 °F ... +932 °F), Lemo	1341-0674
TPN 231	Penetration probe with 1 m silicone cable, L = 100 mm, Ø 2.1 mm, -200 °C ... +500 °C (-328 °F ... +932 °F), SMP	1343-0674

Refrigerator Thermometer

To monitor the sample temperature in the laboratory, but also in microbiological research facilities, a thermometer with minimum and maximum value display is required. In addition, all refrigerators, pharmaceuticals and vaccines, chemicals, greenhouses, blood banks, food and beverage must be monitored and storage facilities monitored. Minimum and maximum values must be recorded daily and documented manually.

To simplify the process and for easy monitoring in daily use in the field of application, the thermometer simultaneously displays the current measured value and Min / Max. The employee has all the information at a glance and can intervene directly if necessary. If a limit is exceeded, a warning tone sounds in addition to the measured value display, which alerts you to a current problem in maintaining the cold chain. Quick action is now necessary and helps to avoid major damage!



TMX 310 Refrigerator Thermometer Min/Max Thermometer with one external probe



Technical Data

Measurement range: Internal sensor	-20 °C ... +50 °C
Measurement range: External probe	-50 °C ... +70 °C
Resolution	0.1 °C
Accuracy	± 0.5 °C between -20 °C ... +40 °C ± 1.0 °C remaining measuring range
Cable length	3 m
Housing Material	ABS
Dimensions	100 x 110 x 23 mm
Protection Class	IP20
Battery	1 pcs. AAA (Alkaline)

- Triple display
- Monitoring of 2 Temperature zones
- Internal sensor for checking ambient conditions
- External probe for cooling temperature check

Type	Description	Part No.
TMX 310	External probe in glycol bottle	1340-2550

TMX 320 Refrigerator Thermometer Min/Max Thermometer with one external probe



Technical Data

Measurement range	-50 °C ... +70 °C
Resolution	0.1 °C
Accuracy	± 0.5 °C between -20 °C ... +40 °C ± 1.0 °C remaining measuring range
Cable Length	3 m
Housing Material	ABS
Dimensions	100 x 110 x 23 mm
Protection Class	IP20
Battery	1 pcs. AAA (Alkaline)

- Triple display
- Monitoring of 2 Temperature zones
- Internal sensor for checking ambient conditions
- External probe for cooling temperature check

Type	Description	Part No.
TMX 320	External probe 4 x 20 mm metal capsule	1340-2551

Food inspection

On the following pages you will find devices which are especially suitable for food inspections: the robust FOM 330 Food Oil Monitor for measuring the food oil quality and the EB 4401 Food Inspection Case which contains various devices for comprehensive food inspections.



FOM 330 Food Oil Monitor

Description:

- Fast and reliable measurement of the food oil quality directly in the hot food oil
- Determination of the right time to replace the food oil for consistently high frying quality and food oil savings of up to 10 %

Applications:

Food oil measurement for:

- Process optimization
- HACCP compliant quality control and documentation of the food oil quality



EB 4401 Food Inspection Case

Description:

Contains the required handhelds, data loggers and tools for comprehensive food inspections.

Applications:

- For inspecting food preparation, storage and transport as well as for hygiene



FOM 330 Food Oil Monitor with signal lamp



Back

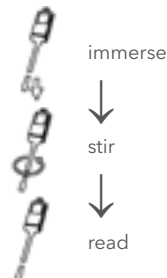
Technical Data

Measurement range: oil	0 % ... 40 % TPM* (oil temperature of +50 °C to +200 °C / +122 °F to +392 °F)
Accuracy: oil	Typically ±2 %
Resolution: oil	0.5 %
Measurement range: temperature	+50 °C ... +200 °C (+122 °F ... +392 °F)
Accuracy: temperature	±1 °C
Resolution: temperature	0.1 °C
Operating temperature	-20 °C ... +50 °C (-4 °F ... +122 °F)
Storage temperature	-25 °C ... +60 °C (-13 °F ... +140 °F)
Battery	3V lithium, replaceable
Battery lifetime	Up to 3 years
Dimensions (L x B x H)	314 x 54 x 22 mm
Housing material	ABS (food safe)
Weight	Approximately 200 g
Protection class	Waterproof IP67
Certificate	Factory calibration certificate (two calibration points, values dependent on the oil)

*TPM: Total polar materials

Signal lamp

NextStep



fresh oil



questionable oil



old oil



FOM 330-4 with four visible buttons for frequent changes of the settings



FOM 330-1 with one visible button for rare changes of the settings

- All-around visible result due to the signal lamp
- Display of the next work step
- Hand protection with backstrap
- Robust, oil-proof housing

FOM 330 BT Radio Food Oil Monitor

for the efficient collection and documentation of measurement data



Technical Data

Like the FOM 330-4, with the following exceptions and additions

Interfaces	BLE, USB-C
Memory capacity	200 measurement values
Battery	Rechargeable lithium polymer battery 3.7 V
Battery charging	Wireless or via USB-C port, 500 mA
Weight	Approximately 250g

The **FOM 330 BT Radio Food Oil Monitor** has the same features as the FOM 330-4 Food Oil Monitor. It can do much more, though. The FOM 330 BT has a memory capacity for up to 200 measurement values. Thus you can measure in multiple fryers directly one after another. The measurement values are saved and then can be transferred e.g. to a PC at once- **no manual notes required any more!**

Unlike the standard device the FOM 330 BT has a **rechargeable battery**, which can be charged either via the USB-C interface or wirelessly. You need a device supporting the Qi standard in order to do the latter.

Thanks to the Bluetooth interface, the data can be transferred **wirelessly** e.g. to an app on a mobile device. Usually the data is forwarded from there to a cloud based software, where it is saved and evaluated.

See page 62 for more information on our HACCP system.

- Wireless data transmission via Bluetooth Low Energy
- Wireless rechargeable battery

FOM 330 NFC HACCP Food Oil Monitor

for HACCP compliant control and documentation



Technical Data

Like the FOM 330 BT, with the following exception

Interfaces	BLE, USB-C, NFC
------------	-----------------

The **FOM 330 NFC HACCP-Food Oil Monitor** has the same features as the FOM 330 BT Radio Food Oil Monitor. On top of that, it can read NFC tags, which can identify measurement locations and the users of the FOM 330 NFC. Hence the device brings together all relevant data **automatically** and **without risk of failure: what has been measured by whom, where, and when** - because the device also knows date and time.

Type	Description	Part No.
FOM 330-4-set	Food Oil Monitor-Set (incl. Food Oil Monitor with four buttons, hand protection, carrying case, calibration certificate)	1340-2700A
FOM 330-1-set	Food Oil Monitor-Set (incl. Food Oil Monitor with one button, hand protection, carrying case, calibration certificate)	1340-2702A
CO 330	Reference oil for the Food Oil Monitor FOM 330, 100 ml	1341-2700
FOM 330 BT-Set	Radio Food Oil Monitor-Set (incl. Radio Food Oil Monitor, hand protection, carrying case, calibration certificate)	1340-2734A
FOM 330 NFC-Set	HACCP Food Oil Monitor-Set (incl. HACCP Food Oil Monitor, hand protection, carrying case, calibration certificate)	1340-2736A

- Wireless data transmission via Bluetooth Low Energy
- Detection of locations and users via NFC reader
- Wireless rechargeable battery

EB 4401 Food Inspection Case for inspecting food preparation, storage and transport, for hygiene



Similar to photo

The EB 4401 Food inspection case is an example for a set of measurement devices. Variants are possible, including leaving out or adding measurement devices. All food inspection cases are only available upon request.

The standard Food Inspection Case contains:

- Frying oil quality measurement device **Food Oil Monitor FOM 330**
- Conformity valued thermometer **TFX 422C**
- pH-measurement device **PHT 810** incl. accessories (penetration electrode, buffer solution)
- Dual Infrared / Fold-Back Thermometer **TLC 750i**
- **EBI 300** USB temperature data logger with Winlog.basic evaluation software
- Flashlight
- Knife, tweezers, scissors, magnifying glass



The **Food Oil Monitor FOM 330** measures frying oil quality directly in the fryer. Through regular tests, it is possible to achieve consistently good quality of fried products in accordance with the food hygiene regulations (HACCP). The user has the greatest possible assurance that he is changing the oil at the right time.

Measurement range: +50 °C ... +200 °C (+122 °F ... +392 °F)

Polar compounds (TPM): 0 % ... 40 %

see page 93

The **TFX 422C thermometer** is conformity certified and particularly suitable for measuring core temperature and the temperature of deep-frozen goods.

Measurement range: -50 °C ... +200 °C (-58 °F ... +392 °F)

see page 48

The **PHT 810 pH meter** measures pH-values in meat, cold cuts, cheese and liquids. The device features user-friendly calibration using the keypad.

The measurement range is 0 pH ... 14 pH

see page 108

The **TLC 750i Dual Infrared thermometer with laserpointer** for food is suitable for fast checks on refrigerated goods during storage, goods receipt checks and process monitoring. It avoids product contamination by using a non-contact measurement process. Its practical pocket size makes it easy to transport.

The measurement range is -50 °C ... +250 °C (-58 °F ... +482 °F)

see page 66

The **EBI 300 USB temperature data logger** monitors temperature during transport and storage. After the measurement, just plug in the data logger in the USB port of a PC and the logger automatically generates a PDF report with all important measurement data.,

Measurement range: -30 °C ... +70 °C (-22 °F ... +158 °F)

see page 24