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Professional Measurement Technology

FOOD · PHARMACEUTICAL · LABORATORY · INDUSTRIAL

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You can find more catalogues on our website:

Professionelle Messtechnik
(Part No. 1347-0109)

Professionelle Datenlogger
(Part No. 1347-0111)

Professional Data Logger
(Art. Nr. 1347-0112)

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KompetenzCentrum ebro®

Combining theory and hands on work is the basis for the successful concept for our trainings, webinars, and workshops. Our speakers are experts in their specialized fields. The aim of all seminars is that all participants will receive a sound knowledge of the hardware and software.

Seminar program and LIVE webinars 2022

Medical market

- Routine controls in the RUMED in the hospital
- Validation of reprocessing processes in the hospital
- Validation of preparation processes in the Sector, e.g. DAC Universal (Sirona), Careclave (Melag)
- Temperature monitoring in the hospital (radio monitoring system EBI 25)

Pharmaceutical market

- Refreshing GMP regulations
- Cold chain monitoring & mapping
- Qualification and validation in the pharmaceutical field
- Computer software validation

Food market

- Cold chain monitoring
- Pasteurization process monitoring
- Measuring devices for HACCP monitoring
- Training for food inspectors

You can find the current program on our homepage
www.ebro.com/en/training

Booking before **February 28th 2022** and you can avail of an early bird discount of

20 %

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Contents

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All ebro measurement devices come with a factory calibration certificate, except for the TMX, TDC thermometers, the GFX contact thermometers, the TDS 3 conductivity tester, the SSX 210 and the humidity logger EBI 300 TH.
For the EBI 330 data loggers, a batch calibration certificate is available on request.

FOOD
COOL CHAIN
ROOM CLIMATE
PHARMA-CEUTICAL
LABORATORY
INDUSTRIAL

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Pharmacy

The highly complex requirements of the GMP regulations and the diverse needs of the pharmaceutical industry require constant examination of the current laws and publications. On the following pages you will find information and product recommendations on the topics of mapping and cold chain monitoring, as well as qualification and validation.

Mapping and Cold Chain Monitoring

Pharmaceutical finished, and intermediate products have to be distributed and transported worldwide due to increasing globalization. They stay in interim storage facilities, trucks, or containers for a long time. At the same time, the number of temperature-critical biopharmaceuticals is also increasing. According to the EU GMP guidelines and the technical documents of the FDA, it is the responsibility of the final distributor to ensure that the specifications of the products are complied with throughout the entire supply chain. The attention of the inspectors during GMP and FDA audits is therefore increasingly focused on the qualification and control of warehouses and storage rooms and the transport validation of the products.

Mapping

The even distribution of temperature and humidity within a warehouse should be demonstrated using a mapping. The loggers used remain in risk-based locations within the warehouse for a defined period of time and log the parameters at a specified interval. In this way, seasonal and operational fluctuations can be recorded, assessed and remedied. The EBI 25 wireless data logger system is perfect for performing this measurement continuously over a longer period of time. The wireless monitoring of temperature and humidity and the display of the data in real time via the Winlog.web software enable rapid intervention.

From page 12 you can find out more about this logger system.

Cold Chain Monitoring

Complete evidence that both the temperature and the humidity were kept within specified ranges during the transport of the pharmaceutical product is a basic requirement for being able to bring them to market. The easy-to-use data loggers of the EBI 3x0-PDF data logger series are, due to their compact design, perfect for monitoring temperature-critical goods accompanying them in parcels or containers. The choice is yours. On the one hand, the EBI 330 single-use data logger, which can be easily configured in advance and read out at the destination without the corresponding software. On the other hand, the high-precision reusable loggers EBI 300 and EBI 310, which can also be used in a highly flexible manner via exchangeable external sensors. In all cases, the evaluation is carried out with a high level of data security and of course in compliance with FDA 21 CFR Part 11, DIN EN 12830 and ATP.

From page 20 you can find out more about this PDF data logger system.

Qualification and validation

The EU GMP Guideline Annex 15 requires a holistic approach during the qualification up to the implementation of the validation runs. Our portfolio and our employees can support you in a variety of ways. The expertise of our consultants and sales representatives will help you with the creation of specification sheets and functional specifications, as well as with the implementation of risk analyzes. The programs used enable safe work with high data integrity and conformity with FDA 21 CFR Part 11. The various logger series are suitable for the qualification of warehouses, autoclaves and other systems with temperature-critical properties, as well as the validation of transport and sterilization processes.

Please do not hesitate to contact us.

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Cold Chain and Process

EBI 20
Standard Data Logger

Description:

- Data logger versions for temperature and humidity measurements available
- With internal and external temperature probes
- Very easy to use
- Excellent price-performance ratio

Applications:

- Transport monitoring
- Storage monitoring
- Process monitoring

EBI 25
Wireless Data Logger System

Description:

- Radio data logger system for temperature and humidity measurements
- Other measurements can be integrated using Modbus over IP or other protocols
- Automatic alarm when limit is exceeded
- Automatic report generation

Applications:

- Monitoring of food in cooling or freezing areas, drugs and vaccine in drug stores, clinical trials in labs and in warehouses

Monitoring

EBI 40
Multi-Channel Temperature Data Logger

Description:

- Temperature data logger for up to 6 or 12 thermocouple sensors with SMP connection
- Current measurement values and measurement curve shown on multi-color TFT display
- With USB connection for fast programming and readout of the measurement data

Applications:

- Process monitoring
- Process validation

EBI 3x0
PDF Data Logger

Description:

- Single-use and multi-use data loggers for temperature and humidity measurement
- USB connection
- Automatic PDF report generation with all measurement data
- Easy programming of the data loggers via the free online configurator at **www.ebi300.com**, no special software required

Applications:

- Monitoring of food in cooling or freezing areas, drugs and vaccine in drug stores, clinical trials in labs and in warehouses

EBI 20 Standard Data Loggers

With a total memory capacity of 40,000 measurements the easy to use EBI 20 data loggers are suitable for the continuous documentation and monitoring of temperature and humidity. All EBI 20 data loggers are delivered with a factory calibration certificate and a user replaceable battery. The data loggers are very reliable and durable and have an excellent price-performance ratio. They are well suited for mappings e.g. of warehouses to identify critical temperature spots.

Applications:

- Transport monitoring
- Storage monitoring
- Process monitoring
- Temperature mapping

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General technical specifications: valid for all types*

Resolution: Temperature	0.1 °C (0.2 °F)
Resolution: Humidity (only humidity data loggers)	0.1 % rH
Measurement mode	• Endless measurement • Start immediately until end of memory • Start / stop measurement • Start with key press
Operating temperature	-30 °C ... +70 °C (-22 °F ... +158 °F)
Storage temperature	-40 °C ... +70 °C (-40 °F ... +158 °F)
Battery	3 V lithium (CR2450), user replaceable
Battery lifetime	Up to 24 months, at a sampling rate of 15 min. at +25 °C (77 °F)
Housing material	ABS
Dimensions (L x W x H)	69 x 48 x 22 mm**
Weight	Approximately 45 g**
Certificate	Factory calibration certificate

** Please find the exact technical data of each EBI 20 logger type on the next pages.*
*** Dimensions and weight just refer to the EBI 20 housing.*

EBI 20-T1 Standard Temperature Data Logger *with internal temperature sensor*

Technical Data

Measurement range	-30 °C ... +70 °C (-22 °F ... +158 °F) (please see the note on the next page)
Accuracy	±0.5 °C (-20 °C ... +40 °C) / ±0.9 °F (-4 °F ... +104 °F) ±0.8 °C (±1.4 °F) for the remaining measurement range
Data memory	1 channel, 40,000 measurements
Sensor	NTC
Sampling rate	1 min to 24 hours
Protection class	IP67
Factory calibration certificate	-20 °C and 0 °C

Type	Description	Part No.
EBI 20 T1	Temperature logger	1601-0042A

EBI 20-TE1 Standard Temperature Data Logger *with external probe*

Technical Data

Measurement range	-30 °C ... +70 °C (-22 °F ... +158 °F) (please see the note on the next page)
Accuracy	±0.5 °C at -20 °C ... +40 °C (±0.9 °F at -4 °F ... +104 °F) ±0.8 °C (±1.4 °F) for the remaining measurement range
Data memory	1 channel, 40,000 measurements
Sensor	NTC, 55 mm, Ø 3 mm, pointed
Sampling rate	1 min to 24 h
Cable	Silicone, L = 0.8 m
Protection class	IP67
Factory calibration certificate	-20 °C and 0 °C

Type	Description	Part No.
EBI 20-TE1	Temperature logger with external probe	1601-0043A

EBI 20-TF Standard Temperature Data Logger *with external probe up to +100 °C (+212 °F)*

Technical Data

Measurement range	0 °C ... +100 °C (+32 °F ... +212 °F)
Accuracy	±0.5 °C (+50 °C ... +100 °C) ±1 °C for the remaining measurement range
Data memory	1 channel, 8,000 measurements
Sensor	NTC, 55 mm, Ø 3 mm, pointed
Sampling rate	Adjustable from 1 sec to 24 hours
Cable	Silicone, L = 0.8 m
Protection class	IP67
Factory calibration certificate	+20 °C and +60 °C

Type	Description	Part No.
EBI 20-TF	Temperature data logger with external probe	1601-0010A

EBI 20-TH1 Standard Temperature / Humidity Data Logger *with internal humidity sensor*

Technical Data

Measurement range: humidity	0 % rH ... 100 % rH
Accuracy: humidity	±3 % rH (10 % rH ... 90 % rH)
Measurement range: temperature	-30 °C ... +70 °C (-22 °F ... +158 °F) (please see the note below)
Accuracy: temperature	±0.5 °C at -20 °C ... +40 °C (±0.9 °F at -4 °F ... +104 °F) ±0.8 °C (±1.4 °F) for the remaining measurement range
Data memory	40,000 measurements
Channels	channel 1: relative humidity, channel 2: temperature
Sensor	NTC, capacitive humidity sensor
Sampling rate	1min ... 24h
Protection class	IP52

Type	Description	Part No.
EBI 20-TH1	Temperature/Humidity Data Logger	1601-0044A

Sets and Accessories for EBI 20

EBI 20-T1-Set Temperature logger set (temperature logger, evaluation software, interface)

EBI 20-TE1-Set Temperature logger set (logger with external probe, evaluation software, interface)

EBI 20-TF-Set Temperature logger set (logger with external probe up to +100 °C (+212 °F), evaluation software, interface)

EBI 20-TH1-Set Temperature Humidity Logger Set (Logger, Evaluation software, Interface)

EBI 20-IF Interface

EBI 20-WM wall bracket

EBI 20-WM-1 truck wall bracket

The temperature measurement range of some EBI 20 models has been increased from +60 °C to +70 °C. This may require an update of the Winlog software.

Type	Description	Part No.
EBI 20-T1-Set	Temperature logger set (temperature logger, evaluation software, interface)	1601-0046A
EBI 20-TE1-Set	Temperature logger set (logger with external probe, evaluation software, interface)	1601-0047A
EBI 20-TF-Set	Temperature logger set (logger with external probe up to +100 °C (+212 °F), evaluation software, interface)	1601-0011A
EBI 20-TH1-Set	Temperature Humidity Logger Set (logger, evaluation software, interface)	1601-0048A
EBI 20-IF	Interface for EBI 20, incl. cable and evaluation software	1601-0020
EBI 20-WM	EBI 20 wall bracket with padlock	1601-0030
EBI 20-WM-1	EBI 20 truck wall bracket	1601-0033

EBI 25 Wireless Data Logger System

The EBI 25 system for wireless monitoring of temperature, humidity and other measurements assures that perishable goods are produced and stored at the right conditions at all times. Other measurements can be integrated using Modbus over IP.

Benefits:

- Continuous monitoring
- Avoid loss of goods
- Quick intervention before it is too late
- Automatic documentation
- Worldwide access to the measurement data
- Easy handling, user replaceable battery









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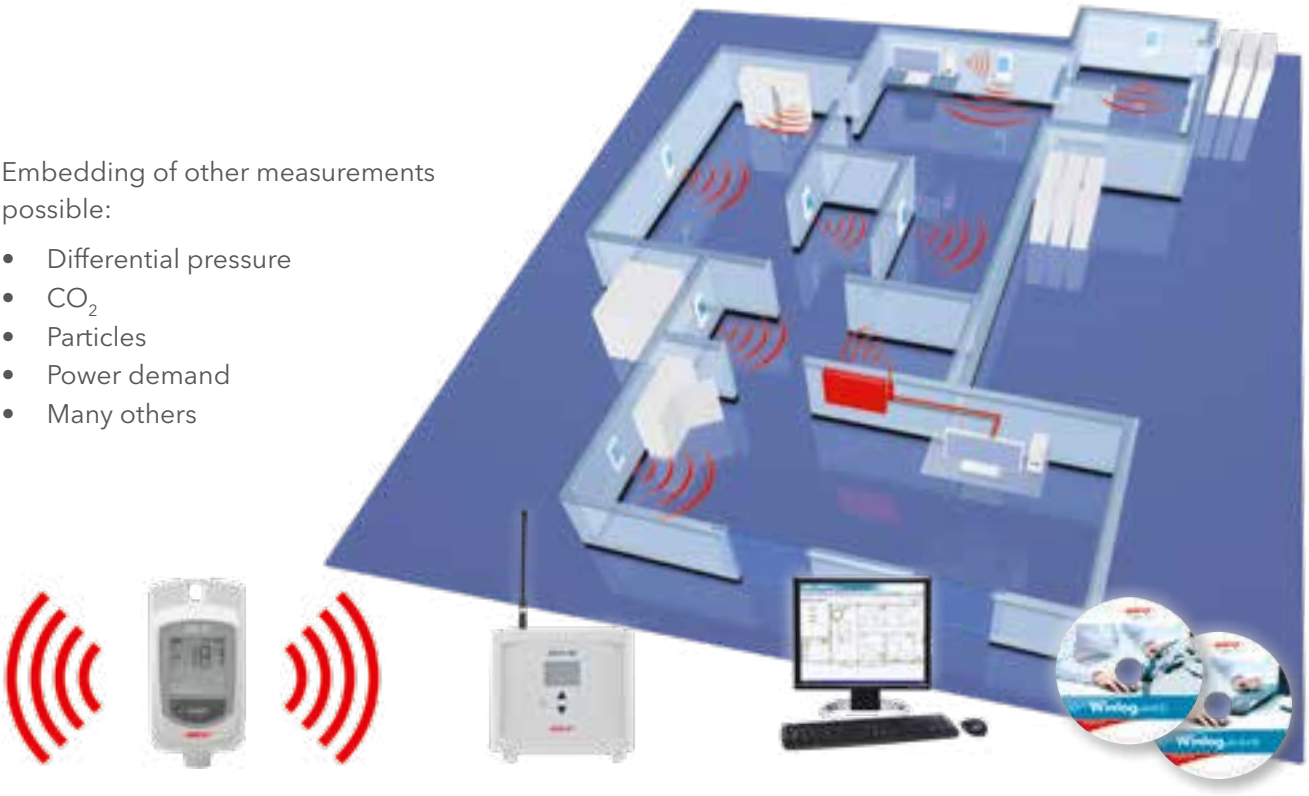
Embedding of other measurements possible:

- Differential pressure
- CO_2
- Particles
- Power demand
- Many others



EBI 25 data loggers

- Precise measurement of temperature and humidity (depends on logger type)
- Very large range of up to 500 m in a free field
- Max. Range of 100 m in buildings (depending on the building fabric)
- Long battery lifetime
- Easy installation

Base station: IF 400 interface

- Collects and stores the data of all connected EBI 25 data loggers
- Connection of up to 50 loggers per interface possible
- Stores up to 576 measurements per logger
- Direct connection of any number of interfaces to a PC or the network
- Audible alarm (with optional alarm box)

Evaluation software: Winlog.web and Winlog.wave

Winlog.wave: Basic version for local PC usage.

Winlog.web: Professional version for internet and local network based use.

Please find more information from page 35.

General technical specifications: valid for all EBI 25 data logger types*

Resolution: Temperature	0.1 °C (0.2 °F) in a range of -99.9 °C ... +199.9 °C (-147.8 °F ... +391.8 °F) 1 °C (2 °F) of the remaining measurement range
Resolution: Humidity (humidity data loggers only)	0.1 % rH
Total memory capacity	288 measurement values (per channel)
Sampling rate	1 min. to 24 hours, adjustable
Radio frequency	868 MHz in EU
Battery	3.6 V lithium (user replaceable)
Battery lifetime	Up to 2 years, depending on measurement and transmission rate
Storage temperature	-40 °C ... +85 °C (-40 °F ... +185 °F)
Operating temperature	-30 °C ... +60 °C (-22 °F ... +140 °F)
Measurement mode	Endless measurement
Housing material	ABS
Weight	Approximately 65 g

** Please find the exact technical data of each EBI 25 data logger type on the following pages.*

EBI 25-T Wireless Temperature Data Logger *with internal temperature sensor*

Technical Data

Measurement range	-30 °C ... +60 °C (-22 °F ... +140 °F)
Accuracy	±0.5 °C at -20 °C ... +40 °C (±0.9 °F at -4 °F ... +104 °F) ±0.8 °C (±1.4 °F) for the remaining measurement range
Sensor	NTC
Protection class	IP67
Dimensions (L x W x H)	95 x 48 x 27 mm
Factory calibration certificate	-20 °C and 0 °C

Type	Description	Part No.
EBI 25-T	Wireless temperature logger (with internal sensor)	1340-6200A

EBI 25-TE Wireless Temperature Data Logger *with external probe*

Technical Data

Measurement range	-40 °C ... +85 °C (-40 °F ... +185 °F)
Accuracy	±0.5 °C at -20 °C ... +40 °C (±0.9 °F at +4 °F ... +104 °F) ±0.8 °C at -30 °C ... -20 °C / +40 °C ... +60 °C (±1.4 °F at -22 °F ... -4 °F / +104 °F ... +140 °F) ±1.5 °C at -40 °C ... -30 °C / +60 °C ... +85 °C (±2.7 °F at -40 °F ... -22 °F / +140 °F ...+185 °F)
Sensor	NTC
Probe	Ø 3.8 mm, L = 65 mm, with 2 m PUR cable
Protection class	IP67
Dimensions (L x W x H)	95 x 48 x 27 mm (without probe)
Factory calibration certificate	-20 °C and 0 °C

Type	Description	Part No.
EBI 25-TE	Wireless temperature logger (with external probe)	1340-6201A

EBI 25-TX Wireless Temperature Data Logger
for high and low temperatures

Technical Data

Measurement range	-200 °C ... +199.9 °C (-328 °F ... +391.8 °F)
Accuracy*	±2 °C (-200 °C ... -100 °C) ±0.5 °C (-100 °C ... -20 °C and +60 °C ... +199.9 °C) ±0.4 °C (-20 °C ... +60 °C)
Probe	Ø 5 mm, L = 50 mm, with 3m PTFE cable
Probe connection	Binder, series 620
Sensor	Pt 1000
Protection class	IP67
Dimensions (L x W x H)	135 x 48 x 27 mm (without probe)
Factory calibration certificate	-80 °C, 0 °C and +134 °C

**Accuracy only applies when using an adjusted probe*

Type	Description	Part No.
EBI 25-TX	Temperature data logger (with probe TPX 25-3)**	1340-6204A
EBI 25-TX	Temperature data logger (without probe)	1340-0025
TPX 25-3	Pt 1000 probe for EBI 25-TX, 3 m	1341-0025
TPX 25-5	Pt 1000 probe for EBI 25-TX, 5 m	1341-0026
TPX 25-7,5	Pt 1000 probe for EBI 25-TX, 7,5 m	1341-0027
TPX 25-10	Pt 1000 probe for EBI 25-TX, 10 m	1341-0028

*** Calibration certificate valid only for logger and probe.*

EBI 25-TH Wireless Temperature / Humidity Data Logger
with external humidity sensor

Filter caps for the protection of the humidity probe available; see page 100.

Technical Data

Measurement range: Temperature	-30 °C ... +60 °C (-22 °F ... +140 °F)
Measurement range: Humidity	0 % rH ... 100 % rH
Accuracy: Temperature	±0.5 °C at -20 °C ... +40 °C (±0.9 °F at -4 °F ... 104 °F) ±0.8 °C (±1.4 °F) for the remaining measurement range
Accuracy: Humidity	±3 % rH (10 % ... 90 %)
Sensor	NTC for temperature / capacity humidity sensor
Protection class	IP20
Dimensions (L x W x H)	124 x 48 x 27 mm (with probe)
Factory calibration certificate	0 °C and +20 °C

Type	Description	Part No.
EBI 25-TH	Wireless temperature / humidity logger	1340-6202A
AH 100	PTFE filter for EBI 25-TH	1340-5627
AH 300	Stainless steel sintered filter for EBI 25-TH	1340-5625

Sets and Accessories for EBI 25

AL 250 – Protection Box for EBI 25 TE and TX

Protects the data logger from hose water, as it is the case when cleaning production sites.

Delivery Contents:
Incl. Mounting material, drill template, holder for EBI 25 logger.

Technical Data	
Protection Class	IP67
Dimensions (L x W x H)	170 x 80 x 68 mm

EBI 2 AB-2 – Alarmbox to connect to interface IF 400

If you prefer to be informed about a violation of the limit, close the alarm box to the IF 400 base station. Depending on the setting in the software, you will receive an alarm via this base station or the loggers.

The alarm box has a potential-free changeover contact which is used to connect additional devices for alarming.
Delivery Contents:
Incl. Mounting material. Power supply not included.

Technical Data	
Supply Voltage	100 to 250 V AC
max. switched power	8A, 30V DC / 250V AC
Dimensions (L x W x H)	120 x 80 x 55 mm

AL 251 – orange Flash Light and buzzer combination

You can connect the LED / buzzer combination to the potential-free contact of the alarm box for visual alarm in case of limit violations.

Delivery Contents:
Power supply AL 120 and connection cable are not included.

Technical Data	
Supply Voltage	24 V DC
loudness	92 dB
Protection Class	IP65
Dimensions (L x W x H)	120,5 x 91 x 91 mm

EBI IF 400 – Interface for EBI 25 data logger

The interface works as a communication interface between EBI 25 data logger and software Winlog.wave or Winlog.web

Delivery Contents:
Antenna, Power Supply, USB-cable.

Technical Data	
Protection Class	IP20
Dimensions (without Antenna) (L x W x H)	150 x 180 x 45 mm
Operating Temperature	-25 °C …+50 °C
USB-Connection	Typ B 100 mA USB 1.1
LAN-Connection	Ethernet 10 / 100

AG 152 – Wall Mount for EBI 25 data logger

The AG 152 is used for simple and secure attachment of the EBI 25 data loggers.

Delivery Contents:
Logger fastening, Opening tool, Mounting material (double sided tape, screws, dowel, cable ties).

Technical Data	
Material	ABS
Dimensions (L x W x H)	150 x 180 x 45 mm

AL 116 – external Antenna to connect to interface EBI IF 400

Install the antenna in the wet area and increase the range.

Delivery Contents:
Mounting material (screws / dowel).

Technical Data	
Cable length	3 m
Dimensions (L x W)	110 x 255 mm

Type	Description	Part No.
AL 250	Protection Box for EBI 25 TE and TX	1248-0250
EBI 2 AB-2	Alarm box to connect to interface IF 400	1613-1301
AL 251	Orange Flash Light and Buzzer combination	1340-6233
AL 252	Power supply 24V for AL 251 Flash Light	1220-0355
EBI IF 400	Interface for EBI 25 data logger	1340-6210
AG 152	Wall Mount for EBI 25 data logger	1340-6215
AL 116	External Antenna	1340-6211
AL 120	Power supply 12V for Interface IF 400 – for replacement	1220-0350
Winlog.wave	Evaluation software – Desktop version	1340-2391
Winlog.web	Web based Evaliation Software – Server solution	1340-2390
Battery	Battery for EBI 25 data logger	1100-0121

EBI 40 Multi-Channel Temperature Data Logger

The EBI 40 Multi-Channel Temperature Data Logger records temperatures during process monitoring and validation. Current measurement values and the measurement curve can be read on the multi-colored TFT display. The thermal insulation using the thermo isolation box allows the use of the data logger at very high temperatures. The EBI 40 is suitable for the connection of up to six or twelve thermocouple probes.

Applications:

Monitoring and validation of processes in:

- Incubators
- Refrigerators
- Climate cabinets
- Storage rooms
- Transport studies
- Freeze-dryers etc.









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EBI 40-TC Multi-Channel Data Logger
for type K and T thermocouple sensors

EBI 40-TC-01

EBI 40-TC-02

Please find various thermocouple probes starting from page 74.

Technical Data

Measurement range	-200 °C ... +1,200 °C (-328 °F ... +2,192 °F)
Accuracy	±0.5 °C (at +25 °C)
Resolution	0.1 °C (0.2 °F)
Channels	6 or 12 temperature channels
Sampling rate	Adjustable from 0.1 sec to 24 hours
Sensor	Thermocouple Type K or Type T / SMP connection
Operating temperature	0 °C ... +60 °C (0 °F ... +140 °F)
Storage temperature	0 °C ... +70 °C (+32 °F ... +158 °F)
Memory	20,000 measurements per channel (max. 240,000 measurements)
Measurement mode	• Endless measurement immediately • Measure immediately until end of memory • Start / stop measurement
Display	TFT-display 3.5" (324 x 240 pixels)
Dimensions (L x W x H)	140 x 118 x 35 mm
Housing material	ABS + PC
Protection class	IP40
Certificate	Factory calibration certificate (-100 °C, 0 °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.

Type	Description	Part No.
EBI 40-TC-01	6-channel data logger (without probes)	1340-6400A
EBI 40-TC-02	12-channel data logger (without probes)	1340-6401A

Accessories for EBI 40

Similar to photo

EBI TIB 400-01 Thermal Isolation Box for EBI 40 Sturdy thermal barrier (stainless steel and ceramic)

- Heat resistant insulation
- Replaceable sealing and cooling element
- Easy to transport
- Protects EBI 40 for 2 hours at +250°C (+482 °F)
- Dimensions (with folded handles): 247 x 210 x 131 mm

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

AN 142 Extension cable, 1 m silicone, SMP
AN 144 Extension cable, 2.5 m, silicone, SMP

Wall mount **EBI 40-WH** Bracket for 35 mm cap rail

Type	Description	Part No.
AN 141	Adapter cable, 1 m silicone SMP/Lemo size 0	1341-2629
AN 142	Extension cable, 1 m silicone, SMP	1343-2626
AN 144	Extension cable, 2.5 m silicone, SMP	1343-2627
EBI TIB 400-01	Thermal Isolation Box for EBI 40	1340-6430
EBI 40-WH	EBI 40 wall mount	1340-6431

EBI 3x0 PDF Data Loggers

Cold Chain Monitoring

The easy to use data loggers with USB connection monitor the temperature and/or humidity during transport and storage of sensitive goods like medicine, food, serums etc. Measurement reports are created automatically as PDF files when you connect the logger to a PC.

The EBI 300 and EBI 310 PDF data loggers are suitable for multi-use, the EBI 330 data loggers are single-use versions which can be ordered preconfigurated and are used especially when returning a more expensive multi-use logger to the sender after a shipment is difficult. Please contact us for more information.

The EBI 300 PDF data loggers are well suited for mappings e.g. of warehouses to identify critical temperature spots

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Program | Measure

- Programming of the logger with the help of the free online configurator at **www.ebi300.com** or optionally via the ebro software Winlog.basic or Winlog.pro
- Set optional limits and start to record the measurement data

Connect | Readout

- Connection of the logger to any PC via the USB port
- Automatic generation of a PDF report with all important measurement data

Evaluate | Archive

- Store, save or email the PDF-report
- Further processing of the measurement data with the software Winlog.basic or Winlog.pro

Benefits

- Direct USB connection
- Automatic PDF report generation
- Programmable at **www.ebi300.com**, no special software for programming and readout required but available
- Indication of alarm status via flashing LED
- Data integrity
- Conforms with FDA 21 CFR Part 11, DIN EN 12830 and ATP
- The data loggers help you to comply with GMP and VO (EG) 37/2005
- Free firmware updates at your place via software
- Excellent value-for-money

Digital interface

- Digital interface between loggers and external probes (at EBI 300 TE, EBI 300 TH, EBI 310 TE, EBI 310 TH and EBI 310 TX).
- Data logger functions as data collector with optional internal sensor
- Easy exchange of the external probes e.g. for calibration: remove and send probe, connect replacement probe, measure!
- No calibration of the data collector required, if internal probe is not used!

Which data logger is right for you?

Every EBI 3x0 PDF data logger has the afore mentioned properties. Depending on the application, claim and your purse, there are different requirements for which we have the right devices. The following overview shall help making the decision.

	EBI 330-T30	EBI 300	EBI 300 TE	EBI 300 TH	EBI 310	EBI 310 TE	EBI 310 TX	EBI 310 TH
Applications								
Monitoring of deep temperatures						✓	✓*	
Monitoring of high temperatures						✓	✓*	
Humidity monitoring				✓				✓
Storage monitoring		✓	✓	✓	✓	✓	✓*	✓
Transport monitoring	✓	✓	✓	✓	✓	✓	✓*	✓
Process monitoring			✓	✓		✓	✓*	✓
Measurement channels								
Internal temperature channel	✓	✓	✓	✓	✓	✓	✓	✓
External temperature channel			1	1		1	2 *	1
Sensor cable			✓			✓	✓*	
High precision (Pt 1000)					✓	✓	✓	✓
Humidity channel				✓				✓
Usage								
Multi-use		✓	✓	✓	✓	✓	✓	✓
Single-use	✓							
Calibration certificate								
Including factory calibration certificate		✓	✓	✓	✓	✓	✓*	✓
Batch calibration certificate available upon request	✓							
Other features								
Display		✓	✓	✓	✓	✓	✓	✓
Very flexible alarms (5 limits and MKT)					✓	✓	✓	✓
High memory capacity (120,000 measurements)					✓	✓	✓	✓

** with connected, exchangeable sensors*

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Xylem Analytics Germany Sales GmbH & Co. KG, ebro
Peringerstr. 10 · 85055 Ingolstadt, Germany · Phone +49 841 954780 · Fax +49 841 95478-80 · ebro@xylem.com · **www.ebro.com**

EBI 330 - Single-Use Temperature Data Logger

Temperature control during transport for your safety.

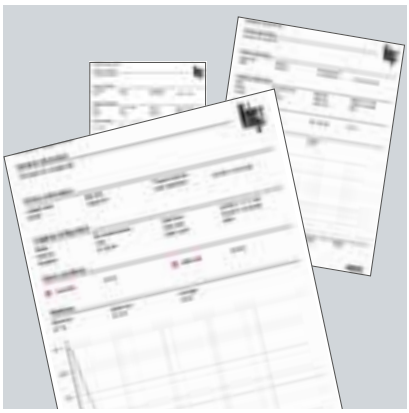
Applications:

- Logistics
- Laboratory
- Pharma – Vaccine –Drugs
- Food
- Storage control

Program | Measure

Connect | Readout

Evaluate | Archive



EBI 330-T30 Single-Use PDF Data Logger
Standard version

EBI 330-T30

- Tamper-proof
- Unerasable memory
- Automatic PDF-report generation
- Clear visual indication of alarm status

Technical Data

Temperature range:	-30 °C … +60 °C
Accuracy:	±0.5 °C (-20 °C … +40 °C) ±0.8 °C for the remaining measuring range
Resolution	0.1 °C
Total memory capacity	20.000 Measurement values
Max. Shelf time	9 months
Max. Battery Lifetime	1 year
Battery Type	Lithium battery CR2032 or TL -2450
Max. recording time	100 days, depends on shelf time and interval
Sample interval	1 min to 24 hours
Start up delay	0 ... 240 minutes
Alarm-Management	Min / Max
Alarm delay	Multiple of sample interval
Alarm indicator	Red or green flash light
Connector	USB 2.0
Weight	50 g
Dimensions	80 x 28 x 12 mm

Type	Description	Part No.
EBI 330-T30	Standard PDF Single Use Data Logger, package unit: 10 pieces	1340-6332

General technical specifications: valid for EBI 300 data logger types*

Total memory capacity	40,000 measurements
Alarm	2 limits
PDF creation	PDF
LED	Yes (red)
Storage temperature	-40 °C ... +85 °C (-40 °F ... +185 °F)
Sample rate	1 min to 24 h
Measurement modes	• Endless measurement • Start / Stop • Measurement until end of memory • Start with key press
Display	Value, MIN / MAX, until end of memory, alarm on / off
Maximum start delay	72 h
Housing material	Polycarbonate
Certificate	Factory calibration certificate
Battery	Lithium button cell (CR 2450), 3 V
Battery lifetime	Up to 2 years, depending on applications

** Please find the exact technical data of each EBI 300 data logger type on this double page.*

EBI 300 Multi-Use PDF Data Logger
Standard version

Technical Data

Measurement range/operating temperature	-30 °C … +70 °C (-22 °F ... +158 °F) *By connecting an external probe, the temperature measurement range can be extended.*
Accuracy	± 0.5 °C (-20 °C … +40 °C / -4 °F ... +104 °F) ± 0.8 °C for the remaining measurement range
Sensor	NTC
Resolution	0.1 °C
Dimensions (L x W x H)	80 x 33 x 14 mm
Protection class	IP65
Factory calibration certificate	-20 °C, 0 °C and +60 °C

Type	Description	Part No.
EBI 300	Standard PDF Data Logger	1340-6330A

Accessories for EBI 300, EBI 300 TE and EBI 300 TH

TPC 300H External temperature probe with handle

EBI 300-WM2 Wall Mount for EBI 300 / 310

EBI 300 WM3 transportation mount for EBI 300 / 310 made of stainless steel

Type	Description	Part No.
EBI 300-WM2	Wall Mount for EBI 300 / 310	1340-6341
EBI 300 WM3	Transportation mount for EBI 300 / 310	1340-6344
TPC 300H	Calibrated external probe for EBI 300 TE	1341-6370A

EBI 300 TE Multi-Use PDF Data Logger with external temperature probe
fast, flexible core temperature measurements

EBI 300 TE

Calibrated plugable external probe with Factory calibration certificate

- Simultaneous measurement of core temperature and ambient temperature
- Internal temperature probe usable additionally

Technical Data

Measurement range external temperature	-35 °C … +70 °C (-31 °F ... +158 °F)
Measurement range internal temperature / operating temperature	-30 °C … +70 °C (-22 °F ... +158 °F)
Accuracy (internal and external)	± 0.5 °C (-20 °C … +40 °C / -4 °F ... +104 °F) ± 0.8 °C for the remaining measurement range
Probe	NTC, Stainless steel, Ø 4 mm, L = 50 mm, pointed
Cable	PVC, L = 1 m, waterproof, oilproof and food safe
Resolution	0.1 °C
Dimensions (L x W x H)	91 x 33 x 14 mm
Protection class	IP65
Factory calibration certificate	-20 °C, 0 °C and +60 °C

Type	Description	Part No.
EBI 300 TE	PDF Data logger with external temperature probe	1340-6335A
TPC 300	Calibrated replacement probe for EBI 300 TE	1341-6331A
TPC 300H	Calibrated replacement probe with handle for EBI 300 TE	1341-6370A

EBI 300 TH Multi-Use PDF Data Logger with external humidity and temperature probe
relative humidity monitoring in storages and during transports

EBI 300 TH

Filter caps for the protection of the humidity probe available; see page 100.

- Internal temperature probe usable additionally

Technical Data

Measurement range temperature / operating temperature	-30 °C … +70 °C (-22 °F ... +158 °F)
Accuracy (internal)	± 0.5 °C (-20 °C … +40 °C / -4 °F ... +104 °F) ± 0.8 °C for the remaining measurement range
Accuracy (external)	± 0.5 °C (-20 °C … +40 °C / -4 °F ... +104 °F) ± 1.0 °C for the remaining measurement range
measurement range humidity	0 % rH … 100 % rH
Accuracy humidity	± 3 % between 10 % rH … 90 % rH (at 25 °C/ +77 °F) ± 5 % for the remaining measurement range
Probe humidity	Capacitive
Resolution temperature	0.1 °C
Resolution humidity	0.1 % rH
Dimensions (L x W x H)	129 x 33 x 14 mm
Protection class	IP20

Type	Description	Part No.
EBI 300 TH	PDF Data logger with external humidity probe	1340-6334A
TPH 400	Replacement probe for EBI 300 TH	1341-6336
AH 100	PTFE filter	1340-5627
AH 300	Stainless steel sintered filter	1340-5625

General technical specifications: valid for all EBI 310 data logger types*

Total memory capacity	120,000 measurements
Alarm	5 ranges
PDF creation	PDF/A 1b
LED	Yes (red and yellow)
Storage temperature	-40 °C ... +85 °C (-40 °F ... +185 °F)
Sample rate	1 s … 24 h
Measurement modes	• Endless measurement • Start / Stop • Measurement until end of memory • Start with key press
Display	Value, MIN / MAX, until end of memory, alarm on / off
Maximum start delay	72 h
Housing material	Polycarbonate
Certificate	Factory calibration certificate

** Please find the exact technical data of each EBI 310 data logger type on on the next pages.*

EBI 310 Multi-Use PDF Data Logger
high precision version

Technical Data

Measurement range/operating temperature	-30 °C … +75 °C (-22 °F ... +167 °F) *By connecting an external probe, the temperature measurement range can be extended.*
Accuracy	±0.2 °C (-30 °C … +30 °C / -22 °F ... +86 °F) ±0.5 °C for the remaining measurement range
Sensor	PT 1000
Resolution	0.1 °C
Dimensions (L x W x H)	80 x 33 x 14 mm
Protection class	IP65
Battery	Lithium button cell (CR 2450), 3 V
Battery lifetime	Up to 2 years, depending on applications
Factory calibration certificate	-20 °C, 0 °C and +60 °C

re-adjustable with Winlog.pro

Type	Description	Part No.
EBI 310	High Precision PDF Data Logger	1340-6331A

Accessories for the EBI 310, EBI 310 TE, EBI 310 TX and EBI 310 TH

EBI 300-WM2 Wall Mount for EBI 300 / 310

EBI 300 WM3 transportation mount for EBI 300 / 310 made of stainless steel

Type	Description	Part No.
EBI 300-WM2	Wall Mount for EBI 300 / 310	1340-6341
EBI 300 WM3	Transportation mount for EBI 300 / 310	1340-6344

EBI 310 TE Multi-Use PDF Data Logger with external precision temperature probe

Measurement of high and low temperatures

EBI 310 TE

- Simultaneous measurement of core temperature and ambient temperature
- Internal temperature probe usable additionally

Technical Data

Measurement range external temperature	-200 °C … +250 °C (-328 °F ... +482 °F)
Measurement range internal temperature / operating temperature	-30 °C … +75 °C (-22 °F ... +167 °F)
Accuracy (internal)	± 0.2 °C (- 30 °C … + 30 °C / -22 °F ... +86 °F) ± 0.5 °C for the remaining measurement range
Accuracy (external)	± 2.0 °C (- 200 °C … -100 °C / -328 °F ... -148 °F) ± 1.0 °C (- 100 °C … -20 °C / -148 °F ... -4 °F) ± 0.2 °C (- 20 °C … + 60 °C / -4 °F ... +160 °F) ± 0.5 °C (+60 °C … + 250 °C / +160 °F ... +482 °F)
Probe	Pt 1000, Stainless steel, Ø 5 mm, L = 50 mm, blunt
Cable	PTFE, L = 1 m, waterproof, oilproof and food safe
Resolution	0.1 °C
Dimensions (L x W x H)	91 x 33 x 14 mm
Protection class	IP65
Battery	Lithium button cell (CR 2450), 3V
Battery life time	Up to 2 years, depending on applications
Factory calibration certificate	-80 °C, 0 °C, +60 °C and +134 °C

re-adjustable with Winlog.pro

Type	Description	Part No.
EBI 310 TE	PDF Data logger with external precision temperature probe	1340-6337A
TPX 220	Replacement probe for EBI 310 TE	1341-6332A
TPX 220-3	Replacement probe with 3 m cable for EBI 310 TE	1341-6332-0100A

EBI 310 TH Multi-Use PDF Data Logger with external humidity and temperature probe

relative humidity monitoring in storages and during transports

EBI 310 TH

Filter caps for the protection of the humidity probe available; see page 100.

- Internal temperature probe usable additionally

Technical Data

Measurement range temperature / operating temperature	-30 °C … +75 °C (-22 °F ... +167 °F)
Accuracy (internal)	± 0.2 °C (- 30 °C … + 30 °C / -22 °F ... +86 °F) ± 0.5 °C for the remaining measurement range
Accuracy (external)	± 0.5 °C (0 °C … + 60 °C / +32 °F ... +140 °F) ± 0.8 °C for the remaining measurement range
Probe temperature	Pt 1000
Measurement range humidity	0 % rH … 100 % rH
Accuracy humidity	± 2 % between 10 % rH … 90 % rH (at +25 °C/+77 °F) ± 4 % for the remaining measurement range
Probe humidity	capacitive
Resolution temperature	0.1 °C
Resolution humidity	0.1 % rH
Dimensions (L x W x H)	129 x 33 x 14 mm
Protection class	IP20
Battery	Lithium button cell (CR 2450), 3V
Battery life time	Up to 2 years, depending on applications
Factory calibration certificate	0 °C and +20 °C; 32.8 % and 75.4 % rH

re-adjustable with Winlog.pro

Type	Description	Part No.
EBI 310 TH	PDF Data logger with external humidity probe	1340-6336A
TPH 500	Replacement probe for EBI 310 TH	1341-6337A
AH 100	PTFE filter	1340-5627
AH 300	Stainless steel sintered filter	1340-5625

EBI 310 TX Multi-Use PDF Data Logger with temperature-two-channel-adapter

Temperature monitoring in storages and during transport, process monitoring

EBI 310 TX

exchangeable sensors

- Up to two exchangeable probes can be connected; not included, *see the following page*
- Internal temperature probe usable additionally

Technical Data

Measurement range external temperature	-200 °C … +400 °C (-328 °F ... +752 °F), dependent on probe type
Measurement range internal temperature / operating temperature	-30 °C … +75 °C (-22 °F ... +167 °F)
Accuracy (internal)	± 0.2 °C (-30 °C … +30 °C / -22 °F ... +86 °F) ± 0.5 °C for the remaining measurement range
Probe	Pt 1000
Resolution	0.1 °C
Dimensions (L x W x H)	111 x 33 x 14 mm
Protection class	IP65
Battery	Lithium button cell (CR 2450), 3V
Battery life time	Up to 2 years, depending on applications
Factory calibration certificate	-200 °C, 0 °C and +400 °C

re-adjustable with Winlog.pro

Type	Description	Part No.
EBI 310 TX	PDF Data logger with temperature-two-channel-adapter	1340-6339A
TPX 310	Replacement adapter for EBI 310 TX	1341-6335A

Exchangeable probes for EBI 310 TX

TPX 310-P1

- Measurement range: -200 °C ... +200 °C (-328 °F ... +392 °F)
- Needle: L = 45 mm, Ø = 5 mm, blunt
- Cable: PTFE, L = 3 m

Temperature		Accuracy
-200…-100 °C	-328…-148 °F	1.7 °C
-100…-20 °C	-148…-4 °F	1.2 °C
-20…+60 °C	-4…+140 °F	1.0 °C
+60…+200 °C	+140…+392 °F	1.7 °C

TPX 310-P2

- Measurement range: -50 °C ... +180 °C (-58 °F ... +356 °F)
- Needle: L = 130 mm, Ø = 3 mm, blunt
- Cable: PTFE, L = 3 m

Temperature		Accuracy
-50…+60 °C	-58…+140 °F	0.6 °C
+60…+180 °C	+140…+356 °F	0.9 °C

TPX 310-P3

- Measurement range: -50 °C ... +180 °C (-58 °F ... +356 °F)
- Needle: L = 130 mm, Ø = 3 mm, blunt
- Cable: PTFE, L = 1 m

Temperature		Accuracy
-50…+60 °C	-58…+140 °F	0.5 °C
+60…+180 °C	+140…+356 °F	0.8 °C

TPX 310-P4

- Measurement range: +100 °C ... +400 °C (+212 °F ... +752 °F)
- Needle: L = 50 mm, Ø = 1.5 mm, blunt
- Cable: metal wrapped, L = 3 m, not waterproof

Temperature		Accuracy
+100…+250 °C	+212…+482 °F	1.1 °C
+250…+400 °C	+482…+752 °F	1.4 °C

TPX 310-P5

- Measurement range: -50 °C ... +180 °C (-58 °F ... +356 °F)
- Probe: L = 130 mm, Ø = 3 mm, blunt
- Cable: PTFE, L = 5 m

Temperature		Accuracy
-50…-20 °C	-58…-4 °F	0.5 °C
-20…+60 °C	-4…+140 °F	0.6 °C
+60…+180 °C	+140…+356 °F	0.8 °C

TPX 310-P6

- Measurement range: -50 °C ... +180 °C (-58 °F ... +356 °F)
- Probe: L = 130 mm, Ø = 3 mm, blunt
- Cable: PTFE, L = 7.5 m

Temperature		Accuracy
-50…+60 °C	-58…+140 °F	0.7 °C
+60…+180 °C	+140…+356 °F	1.0 °C

TPX 310-P7

- Measurement range: -50 °C ... +180 °C (-58 °F ... +356 °F)
- Probe: L = 130 mm, Ø = 3 mm, blunt
- Cable: PTFE, L = 10 m

Temperature		Accuracy
-50…+60 °C	-58…+140 °F	0.9 °C
+60…+180 °C	+140…+356 °F	1.1 °C

Type	Description	Part No.
TPX 310-P1	External sensor for EBI 310 TX	1341-6338
TPX 310-P2	External sensor for EBI 310 TX	1341-6339
TPX 310-P3	External sensor for EBI 310 TX	1341-6340
TPX 310-P4	External sensor for EBI 310 TX	1341-6341
TPX 310-P5	External sensor for EBI 310 TX	1341-6342
TPX 310-P6	External sensor for EBI 310 TX	1341-6343
TPX 310-P7	External sensor for EBI 310 TX	1341-6344

Software

ebro® offers exactly the software you need:

- Evaluation software for any applications: Winlog.basic and Winlog.pro
- Evaluation software for EBI 25 data loggers: Winlog.web and Winlog.wave

Installation Qualification and Operation Qualification documents (IQ/OQ) are available for the Winlog.web and Winlog.pro softwares. They are written in English and saved in an editable file format (MS Word and/or MS Excel). They contain instructions on how to check the functionality of the software features. The instructons can be expanded on demand. Our support personnel is happy to help you executing the qualification.

Software/Features	Winlog.basic	Winlog.pro	Winlog.wave	Winlog.web
Event Triggered Recording		●		●
Script-Calculations		●		●
System-Scripts		●		
Picture Manager		●		
Measure in Charts		●		
Cursor		●		
Realtime Calculations		●		●
Ranges		●		
Range-based Calculations		●		
Statistics per Range		●		
Relative Time Axis		●		
Configurations		●		
Firmware-Update		●		●
Import		●(1)		
Calibration		●		
Automatic File Name Generation		●		
21 CFR Part 11	●	●	●	●
User Administration	●	●	●	●
Audit-Trail	●	●	●	●
Advanced Chart Features		●		
Multi Document Support		●		
Export (Excel, PDF)	●	●	●	●
Customizable Company Logo	●	●	●	●
Wireless Support		●	●	●
2D Placement		●	●	●
Unit Administration	●	●		●
Split Measurements		●		
Advanced Alarm-Management (Zones)	●(2)	●(2)		
IQ/OQ		●		●

(1) From Winlog.basic
(2) EBI 310 only
(3) Since V2.5
(4) Since V2.6
(5) Since V2.63

Supported Logger Types	Winlog.basic	Winlog.pro	Winlog.wave	Winlog.web
EBI 20	●	●		
EBI 25			●	●
EBI 40		●		
EBI 300	●(3)	●(3)		
EBI 310	●(4)	●(4)		
EBI 330	●(5)	●(5)		
CT 830		●		
PHT 830		●		

System Requirements	Winlog.basic	Winlog.pro	Winlog.wave	Winlog.web
Windows 8 / 32 bit	●	●	●	●
Windows 8 / 64 bit	●	●	●	●
Windows 10 / 32 bit	●	●		●
Windows 10 / 64 bit	●	●		●
Memory	≥ 1 GB	≥ 1 GB	≥ 1 GB	≥ 4 GB
Hard Disc Memory	≥ 1 GB	≥ 1 GB	≥ 1 GB	≥ 20 GB
CD/DVD Drive	●	●	●	●
Screen Resolution	≥ 1280x768	≥ 1280x768	≥ 1280x768	≥ 1280x768
Processor	Dual Core 1,6 GHz+	Dual Core 1,6 GHz+	Dual Core 2 GHz+	Dual Core 2 GHz+

Market Overview	Winlog.basic	Winlog.pro	Winlog.wave	Winlog.web
Food	●	●	●	●
Industry	●	●	●	●
Pharmaceutical		●		●

Available Languages	Winlog.basic	Winlog.pro	Winlog.wave	Winlog.web
English	●	●	●	●
French	●	●	●	●
Italian	●	●	●	●
Spanish	●	●	●	●
Chinese	●	●	●	●
Japanese	●	●		
Korean		●		
Czech	●	●		●
Swedish	●	●		
Dutch		●		
German	●	●	●	●

Evaluation Software for Any Applications

Winlog.basic and Winlog.pro

For programming and readout of ebro data loggers and for evaluating the measurement values ebro® offers two different software versions: the **free Winlog.basic** and the **professional software Winlog.pro**.

Benefits

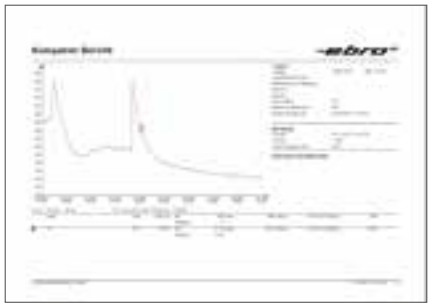
- Easy installation
- Easy programming of the data loggers, no prior knowledge required
- Extensive and custom report generation
- Suitable for all applications
- Security by compliance with FDA 21 CFR Part 11

Extensive Report Generation

The software makes it easy to generate standard and custom reports:

- Compact, one-sided report (1)
- Multi-page, detailed report (2)
- Tabular report with the measurement values (3)
- Insertion of your own company logo possible (4)
- Export data to Microsoft Excel® and PDF (5)
- Integration of pictures and graphics possible (Winlog.pro only) (6)

(1)



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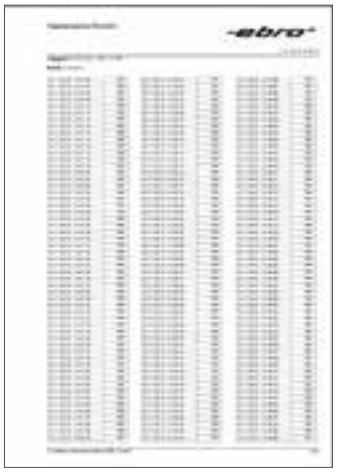

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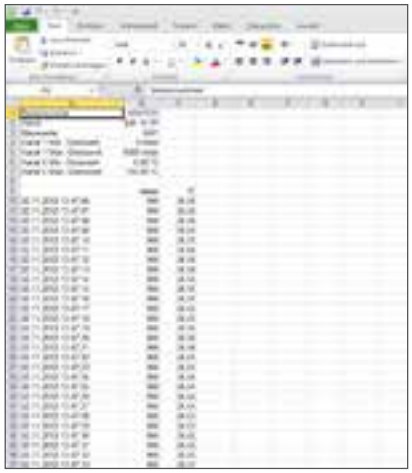
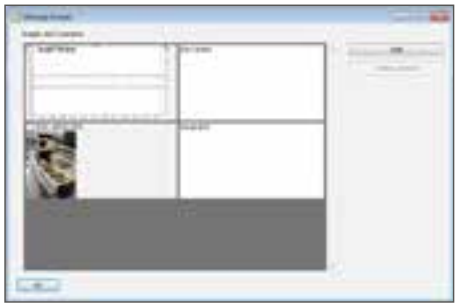


(2)

(4)



(6)

ebro a xylem brand

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Peringerstr. 10 · 85055 Ingolstadt, Germany · Phone +49 841 954780 · Fax +49 841 95478-80 · ebro@xylem.com · **www.ebro.com**

Winlog.basic

Easy to use, free software

- User friendly: intuitive and easy to use
- Graphical and numerical display of measurement data
- Protocol print (with printer and computers)
- Scan and enlarge of the measurement data
- Data export to Microsoft® Excel and PDF
- FDA 21 CFR Part 11 functionality as an option

Winlog.pro

Professional software

- Contains all the features of Winlog.basic
- Enables real-time monitoring with wireless data loggers
- Formula editor for calculating the F0-value of the absolute humidity, the PE value etc.
- Display of the timeline either absolute or relative
- Customized definition of individual areas possible (with their own statistics and calculations)
- Including calibration tool for data loggers
- Integration of pictures and graphics into reports possible
- IQ/OQ documentation optional

System Requirements
So that the software can run on your computer without any problems, your computer must meet the following requirements:

Hardware Requirements:
- At least 1 GHz processor speed
- At least 1 GB working memory
- At least 1 GB free hard disc space
- USB (Universal Serial Bus)

Software requirements:
Operating system Microsoft®
- Windows 8 (32 Bit and 64 Bit)
- Windows 10 (32 Bit and 64 Bit)

Type	Description	Part No.
Winlog.basic	Free evaluation software	as download
Winlog.pro	Professional evaluation software	1340-2355
IQ/OQ Winlog.pro	Installation and Operation Qualifications for Winlog.pro	1340-2286

Evaluation Software for EBI 25 Data Loggers

Winlog.wave and Winlog.web

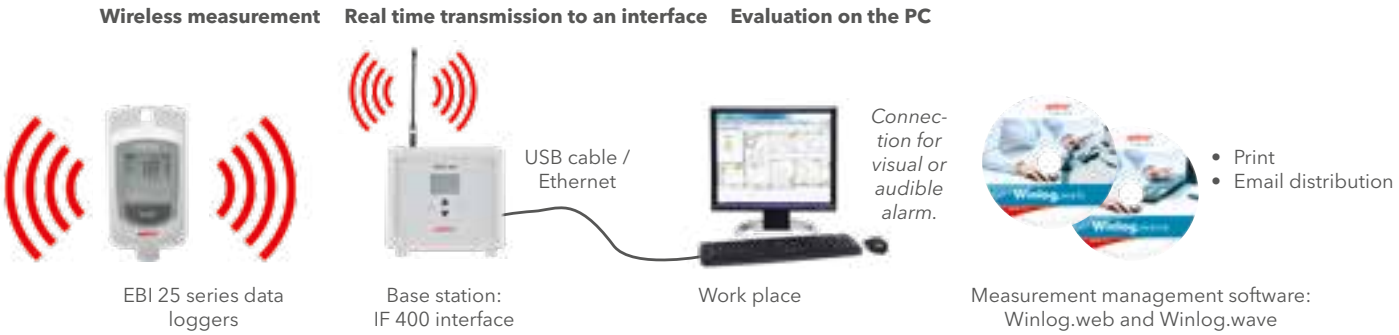
For programming and readout of EBI 25 data loggers as well as for evaluating the measurement values. The software automatically collects and evaluates data and alerts if necessary.

Functionality

The innovative EBI 25 system monitors wirelessly, transmits the data in real time to an interface (base station) and from there to the desired server or PC.

As soon as a temperature, humidity or any other measurement has exceeded a user defined limit, an alarm is immediately sent via email.

Please find the EBI 25 Data Logger Family starting on page 12.



Quick graphical overview of all measurement points including an image or floor plan view:

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Winlog.wave

Basic version for local PC usage

- Single PC solution: The basic version for easy measurement data evaluation on a single PC- no network required.
- Flexible alarm management: graphic and email alarm notifications upon user defined conditions
- Connection to the IF 400 via USB
- FDA 21 CFR Part 11 data security functionality

Winlog.web

Professional version internet and local network based use

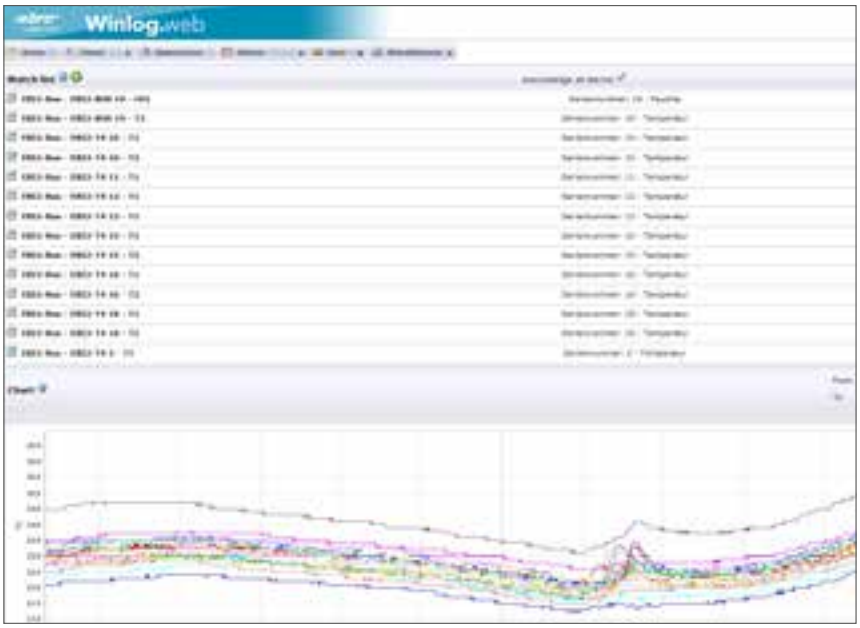
- Web based client/server solution: the measurement data can be evaluated on all PCs and smartphones via the internet or connected to the local network
- Very flexible and wide alarm management: alarm notifications upon user defined conditions, alarm notification via email; visual and audible alarm via the graphical user interface
- Connection of the interface IF 400 via USB and Ethernet
- FDA 21 CFR Part 11 data security functionality
- Management of larger data sets
- IQ / OQ documentation available

System Requirements
To enable the software to operate smoothly, your computer must meet the following requirements:

Hardware requirements:
- Processor speed minimum 2 GHz
- Working memory 4 GB
- 20 GB free hard disc space
- USB (Universal Serial Bus)

Software requirements:
Operating System Microsoft®
- Windows 8 (32 Bit and 64 Bit)
- Windows 10 (32 Bit and 64 Bit)

Further requirements:
- Mozilla Firefox 30 or higher
- Microsoft® Internet Explorer 11
- Google Chrome Version 40 or higher



Type	Description	Part No.
Winlog.wave	Evaluation software (single-user version)	1340-2391
Winlog.web	Evaluation software (web-based server version)	1340-2390
IQ/OQ Winlog.web	Installation Qualification and Operation Qualification for Winlog.web	1340-2290

Handhelds

ebro® offers handheld instruments for many different measurement tasks:

- Core thermometers
- Conformity valued thermometer
- Fold-back thermometers
- Infrared thermometers
- pH measurement devices
- Hygrometers
- Salt meter
- Food oil meter
- Refractometer

xylem

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

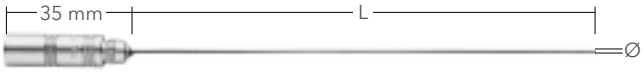
Temperature measurement of air, surfaces, fluids and gases

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

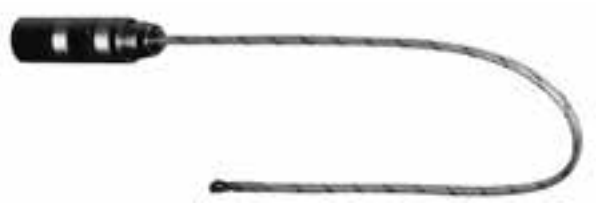
- Probe (L = 185 or 300 mm, Ø 3 mm, blunt, inconel needle, with Lemo connection)
- Accuracy: exceeds DIN EN 60584, class 2
- Response time (t_{99} water 0.2 m/s): 4 sec

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	✗	Pt 100	Lemo , probe not included	1		✗	✗		
TFX 422C Laboratory Thermometer	-50 °C … +200 °C	✗	Pt 1000	Fixed	1		✗	✗	✗	
TFX 420 Core Thermometer	-50 °C … +400 °C	✗	Pt 1000	Lemo , probe not included	1		✗	✗		
TFX 410-1 Core Thermometer	-50 °C … +300 °C	✗	Pt 1000	Lemo , probe not included	1			✗		
TFX 410 Core Thermometer	-50 °C … +300 °C	✗	Pt 1000	Fixed	1			✗		
TFE 510-1 Core Thermometer	-50 °C … +300 °C		Thermocouple type T	Lemo , probe not included	1	✗		✗		
GFX 460 Electronic Control Thermometer	-50 °C … +300 °C		Pt 1000	Fixed	1			✗		✗
GFX 460B Electronic Control Thermometer	-50 °C … +300 °C		Pt 100	Lemo	1			✗		✗
TFN 520 Type K Thermometer	-200 °C … +1,200 °C	✗	Thermocouple type K	Lemo or SMP, probe not included	1		✗			
TFN 520 Type J Thermometer	-100 °C … +800 °C	✗	Thermocouple type J	Lemo or SMP, probe not included	1		✗			
TFN 520 Type T Thermometer	-50 °C … +300 °C	✗	Thermocouple type T	Lemo or SMP, probe not included	1		✗			
TFN 520 Type E Thermometer	-100 °C … +600 °C	✗	Thermocouple type E	Lemo or SMP, probe not included	1		✗			
TFN 530 Type K Thermometer	-200 °C … +1,200 °C	✗	Thermocouple type K	Lemo or SMP, probe not included	2		✗			
TFN 530 Type J Thermometer	-100 °C … +800 °C	✗	Thermocouple type J	Lemo or SMP, probe not included	2		✗			
TFN 530 Type T Thermometer	-50 °C … +300 °C	✗	Thermocouple type T	Lemo or SMP, probe not included	2		✗			
TFN 530 Type E Thermometer	-100 °C … +600 °C	✗	Thermocouple type E	Lemo or SMP, probe not included	2		✗			
TTX 110 Type T Thermometer	-50 °C … +350 °C		Thermocouple type T	Fixed	1	✗				
TTX 200 Type T Thermometer	-30 °C … +199.9 °C		Thermocouple type T	Fixed cable probe	1	✗		✗		
TTX 210 Type T Thermometer	-30 °C … +199.9 °C		Thermocouple type T	pluggable, probe not included	1	✗		✗		
TDC 110 Basic Thermometer	-50 °C … +150 °C		NTC	Fixed	1					
TDC 150 Basic Thermometer	-50 °C … +150 °C		NTC	Fixed	1			✗		

TFX 430 Precision Thermometer

Reference thermometer with exchangeable Pt 100 probe

TFX 430 without probe

TFX 430 + TPX 130

TFX 430 + TPX 230

TFX 430 + TPX 330

TFX 430 set

Various probes available (please see page 47).

- 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

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*

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

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

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	Lemosa 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	Lemosa 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).

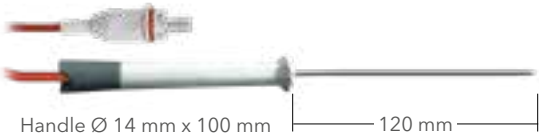
TPX 100 blunt probe
(Needle length = 120 mm, Ø 3 mm, blunt, stainless steel needle, up to +400 °C)

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

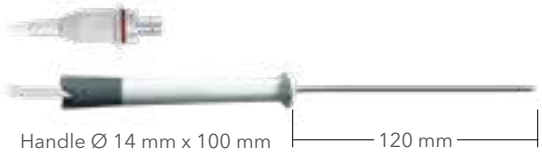
TPX 300 glass-coated probe
(Needle length = 190 mm, Ø 8 mm, glass-coated, stainless steel needle, up to +400 °C)

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

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 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 3mm	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_{99})	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, Lemosa 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 (Lemosa 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	• 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

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

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

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 ± 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 ± 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 ± 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 ± 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	✗	Pt 1000	1				
TLC 700 Basic Fold-Back Thermometer	-30 °C … +220 °C		NTC	1		✗		
TLC 750 Dual Infrared/Fold-Back Thermometer	-50 °C ... +250 °C		Infrared and thermocouple type T	2	✗ (Infrared)	✗		
TLC 750 BT Dual Radio-Thermometer	-50 °C … +250 °C		Infrared and thermocouple type T	2	✗ (Infrared)	✗	✗	
TLC 750 NFC Dual HACCP-Thermometer	-50 °C … +250 °C		Infrared and thermocouple type T	2	✗ (Infrared)	✗	✗	✗

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 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 and 0°C)
Memory capacity	200 measurement values
Interfaces	NFC, BLE, USB-C

- 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

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.

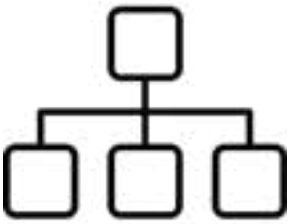
HACCP-Software

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-softwares 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-softwares 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.

FOM 330 BT

IF 750

The **IF 750** has a BLE interface, so that you can communicate with the TLC 750 NFC even without mobile device. Additionaly, 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.

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**.

FOM 330 BT

UT 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**.

FOM 330 BT

LT 750

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

- 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

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.

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

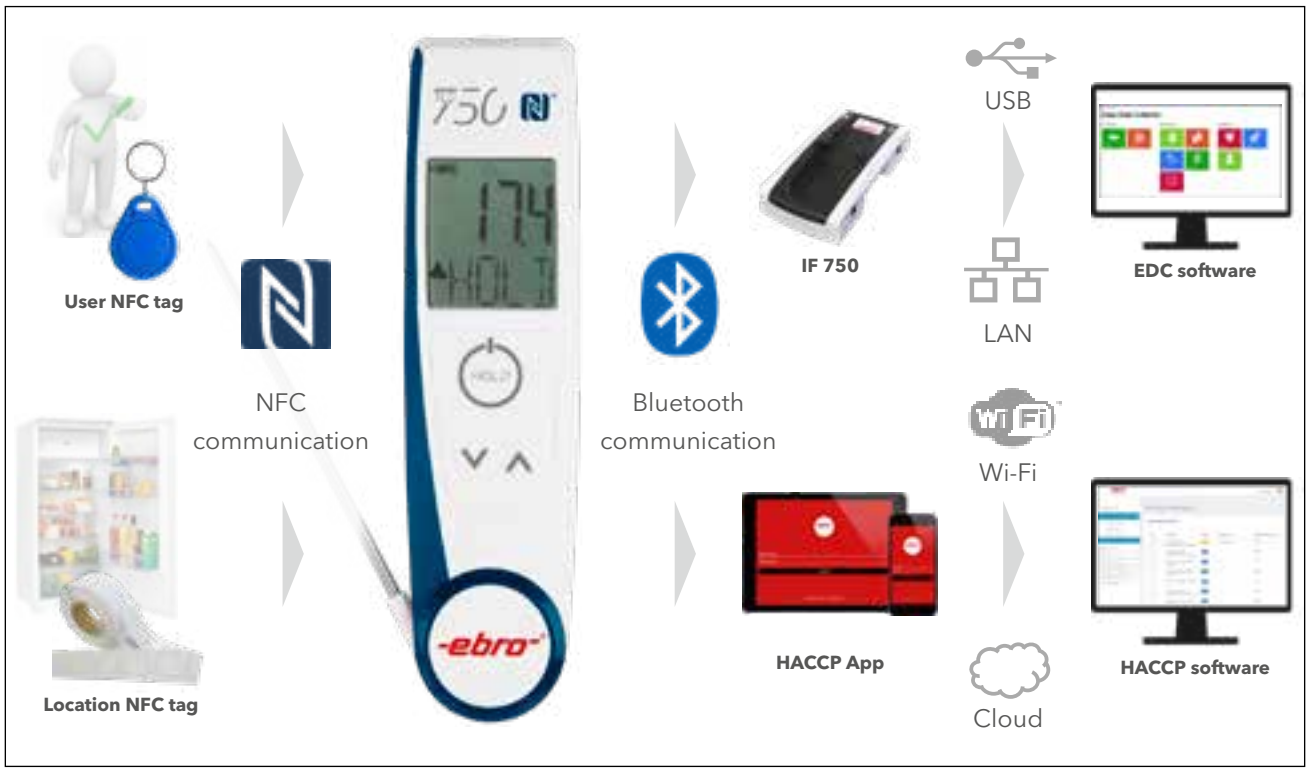


Fig. Complying to the hygiene requirements with the ebro® HACCP system

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

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

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)

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

- 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

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)

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.

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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_{99})	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 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)

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

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Recommendations for Infrared Measurements

Infrared Radiation Properties of Various Materials

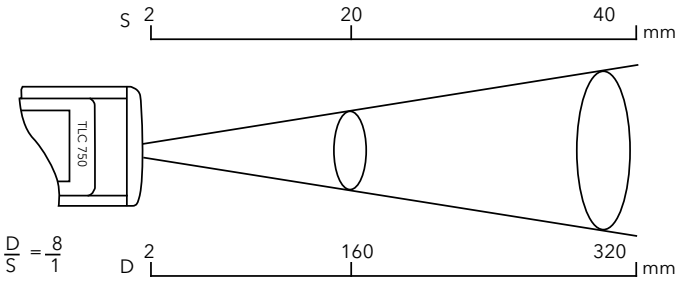
Various materials and surfaces have different infrared light emitting properties and therefore affect the temperature data being measured (emissivity). Most common products (including liquids and foodstuffs packaged in cartons or plastic containers) have an emissivity of 0.95.

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.

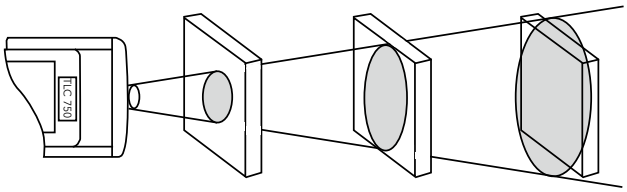
Our thermometers have a factory set emissivity of 0.95. The emissivity value can be set within a range of 0.10 (value shown on display: 10E) and 1 (display: 100E).

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)

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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)*	✗	✗
TFN 530	*(starting on page 55)*	✗	✗
TFI 550	*(see page 70)*	✗	
EBI 40-TC-01	*(see page 19)*	✗	
EBI 40-TC-02	*(see page 19*	✗	

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

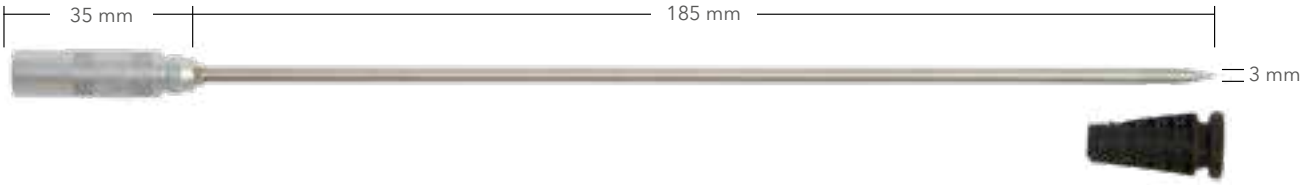
Low-cost probes

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 (t_{99} 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*

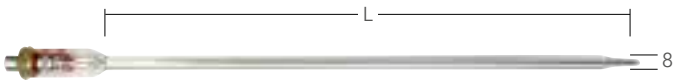
Type	Description	Part No.
TPN 100	Rod probe without cable, L = 185 mm, Ø 0.5 mm, blunt, Lemo	1341-0611
TPN 100-30	Rod probe without cable, L = 300 mm, Ø 0.5 mm, blunt, Lemo	1341-0805
TPN 110	Rod probe without cable, L = 185 mm, Ø 1 mm, blunt, Lemo	1341-0810
TPN 110-30	Rod probe without cable, L = 300 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 (t_{99} 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

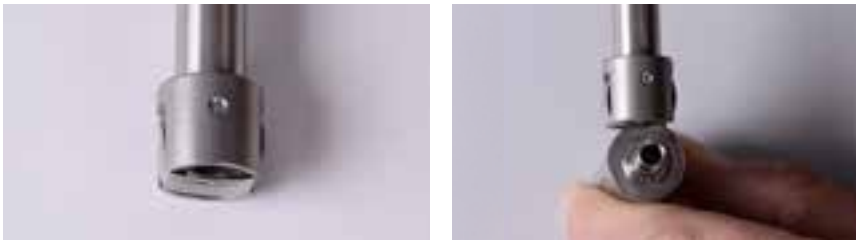
Surface probes

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



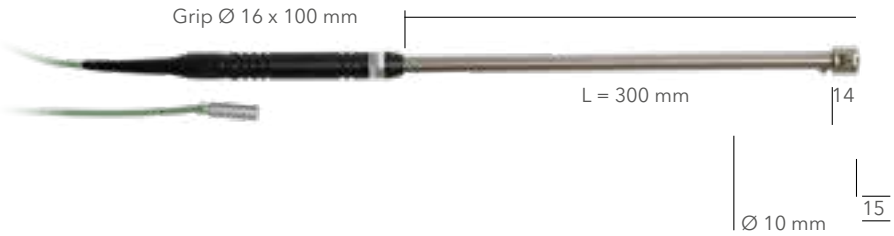
The sensor blade adjusts to the surface

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
- Particulary 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*

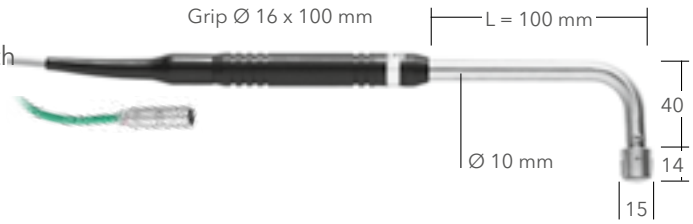
Type	Description	Part No.
TPN 310	Surface probe with 1 m silicone cable, -50 °C ... +300 °C (-58 °F ... +572 °F), Lemo	1341-0702
TPN 320	Surface probe with 1 m silicone cable, -50 °C ... +300 °C (-58 °F ... +572 °F), Lemo	1341-0717
TPN 321	Surface probe with 1 m silicone cable, -50 °C ... +300 °C (-58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

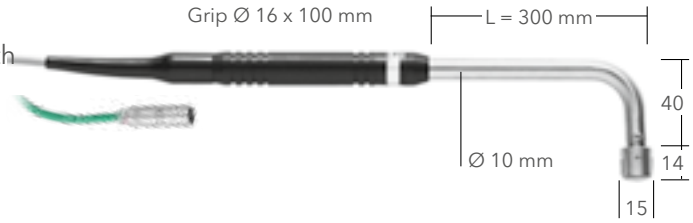


TPN 351 **

- 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
- Particulary 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

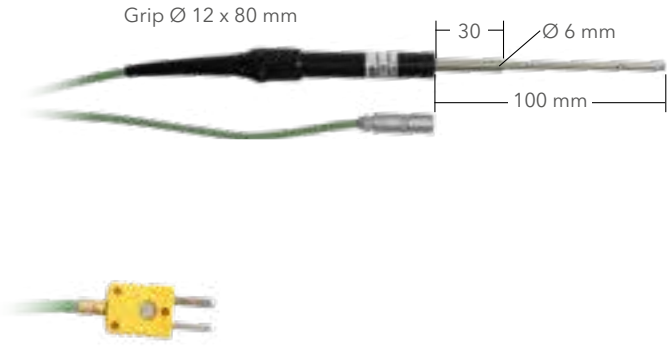
Temperature measurement on very small surfaces like boards, small transformers, small heating blocks, thin tubes, rotors, as well as materials such as plastic, glass, gum and metal.

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

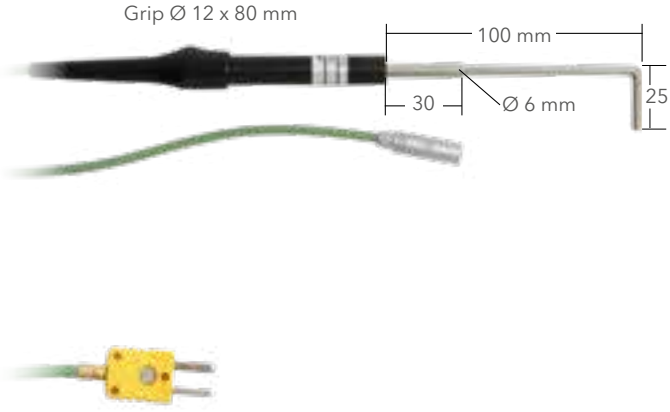
TPN 1100 *
- Probe (Measuring head: Ø 4.2 mm, Measuring tape: coated with polyimid film, with 1m silicone cable, with Lemo connection)
- Range: -50 °C ... +400 °C (-58 °F ... +752 °F)
- Accuracy: exceeds DIN EN 60584, class 2
- Response time (t_{99}): 2.0 sec

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

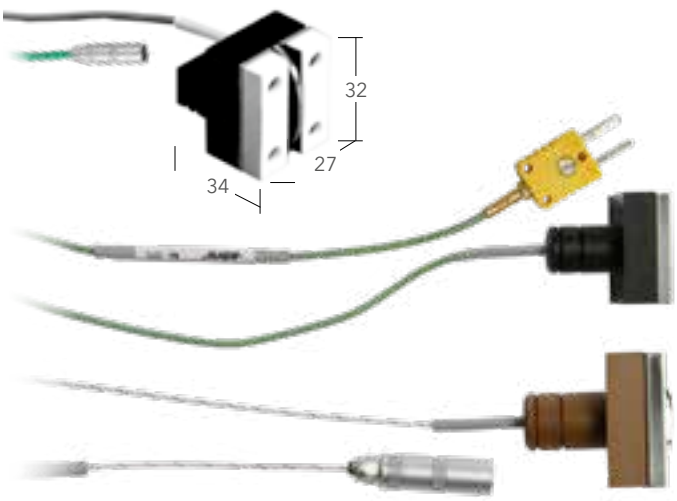
Magnetic surface probes

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 **

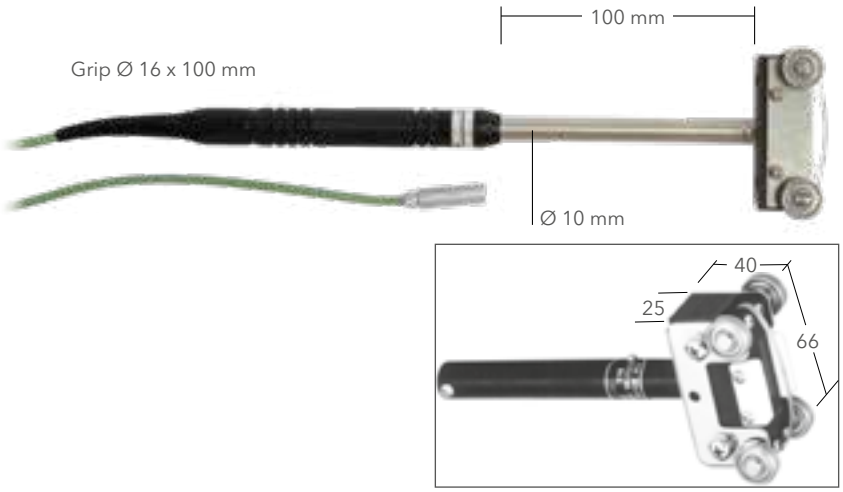
- same as TPN 1010 but with SMP connection

** 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

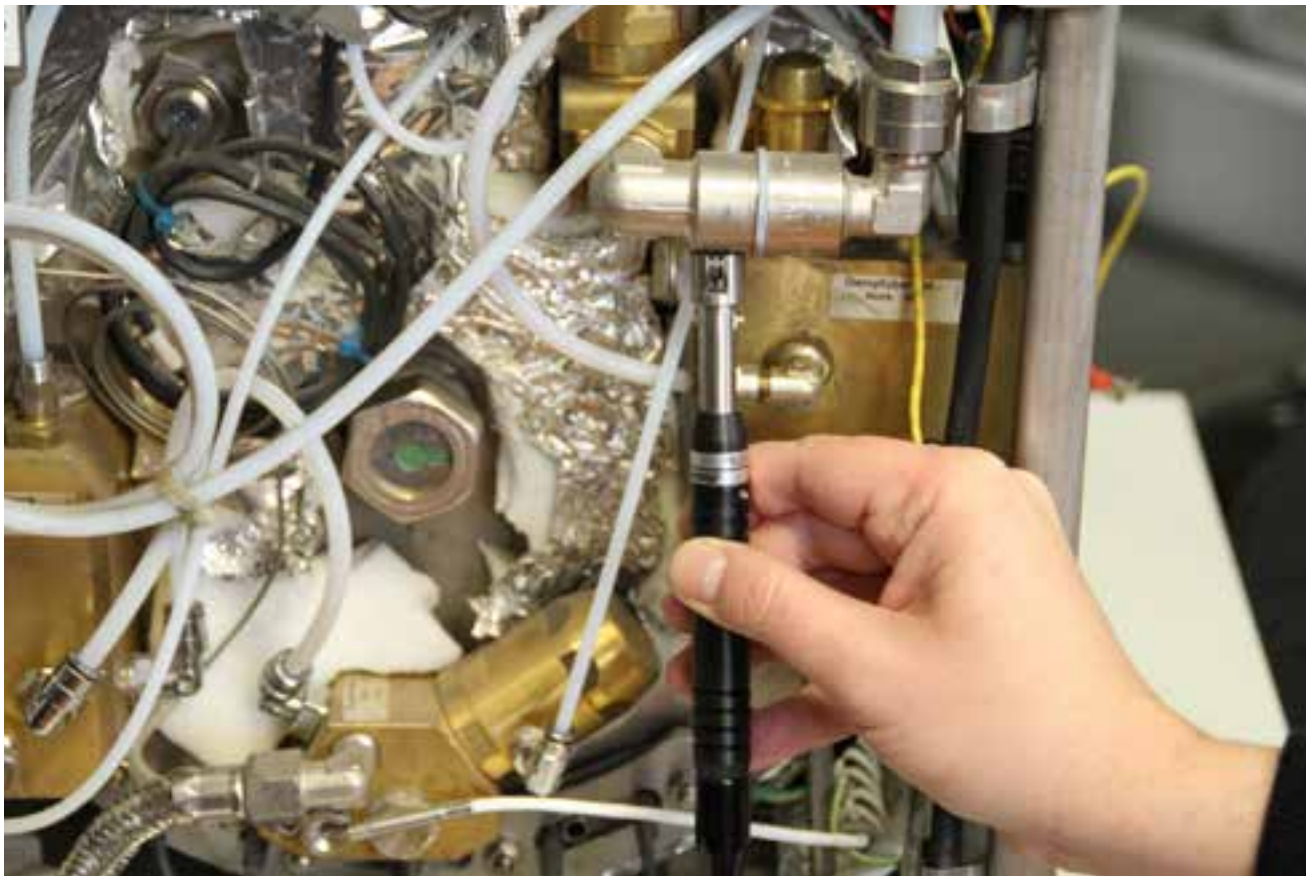
TPN 801 **

- 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 *

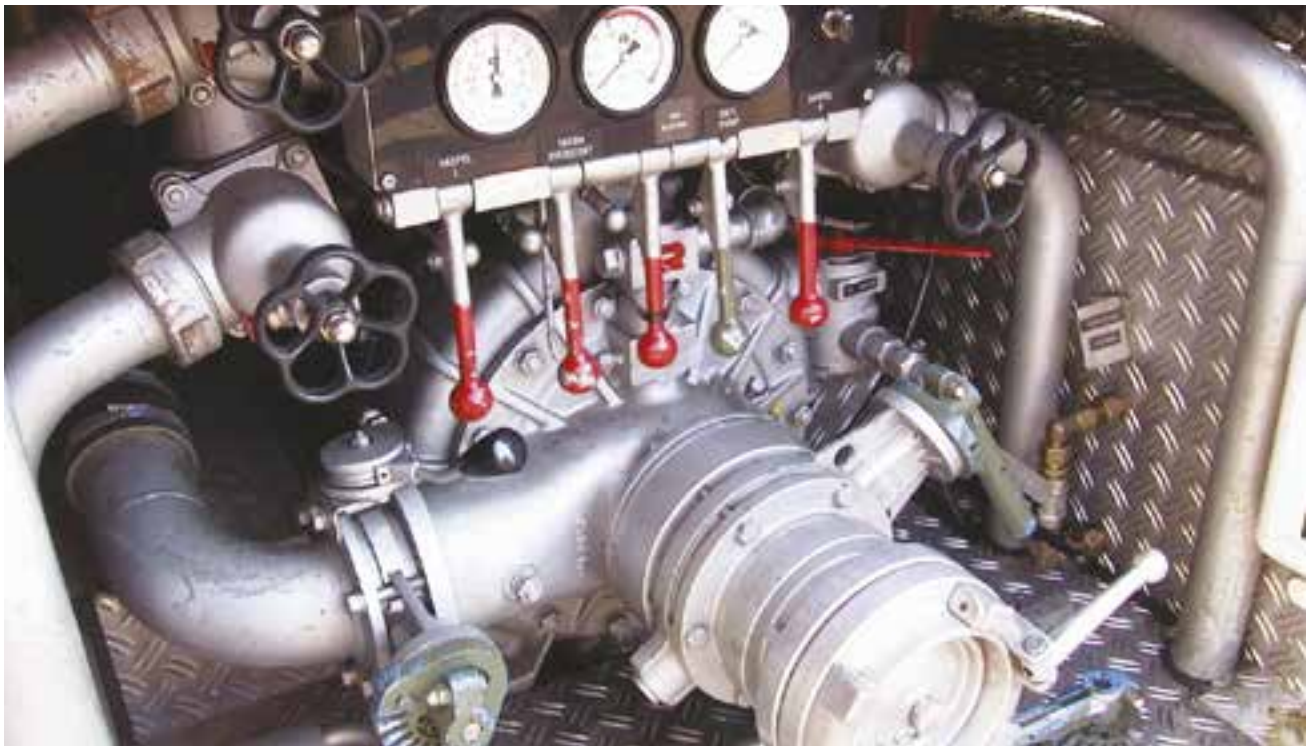
- Probe (L = 1 m, Ø 2 mm, with Lemo connection)
- Flexible coated mantle thermocouple, mantle Ø 2 mm
- Thermopile: blank
- Range: -40 °C ... +1,200 °C (-40 °F ... +2,192 °F)
- Accuracy: exceeds DIN EN 60584, class 1
- Response time (t_{99}): 2.5 sec (water)

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 (t_{99} 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 (t_{99} 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 (t_{99}): 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 (t_{99}): 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	1pcs. 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

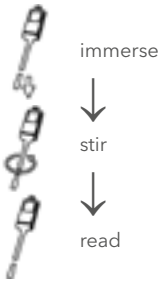
Technical Data

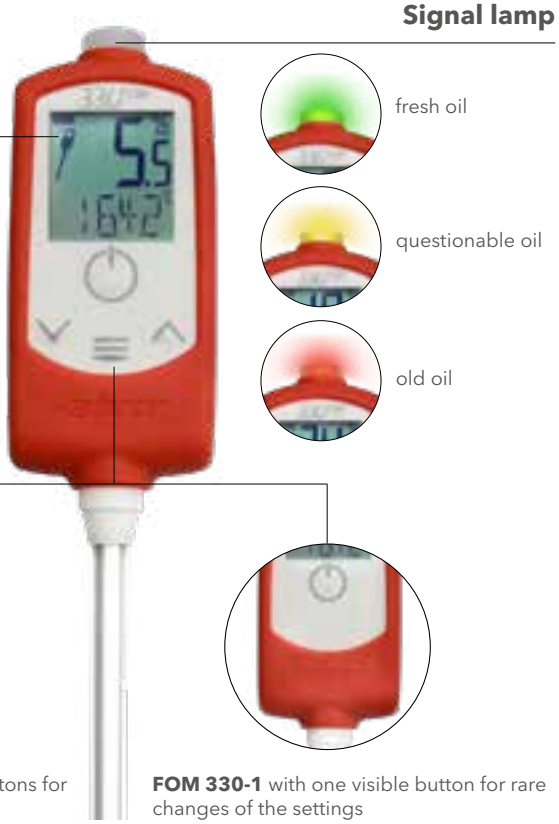
Measurement range: oil	0 % ... 40 % TPM* (oil temperature of +50 °C to +200 °C / +122 °F to +392 °F)
Accuracy: oil	Typically ± 2 %
Resolution: oil	0.5 %
Measurement range: temperature	+50 °C ... +200 °C (+122 °F ... +392 °F)
Accuracy: temperature	± 1 °C
Resolution: temperature	0.1 °C
Operating temperature	-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





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

-ebro- a xylem brand
Xylem Analytics Germany Sales GmbH & Co. KG, ebro
Peringerstr. 10 · 85055 Ingolstadt, Germany · Phone +49 841 954780 · Fax +49 841 95478-80 · ebro@xylem.com · **www.ebro.com**

FOM 330 BT Radio Food Oil Monitor

for the efficient collection and documentation of measurement data

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

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.

FOM 330 NFC HACCP Food Oil Monitor

for HACCP compliant control and documentation

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

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

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 ... +3 °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

Humidity

On the following pages you will find two different hygrometers: one hygrometer with fixed humidity probe and one with humidity probe and cable.

Hygrometers

Applications:

- Humidity and temperature measurement
- Surface temperature measurement with special probes
- Process monitoring

Hygrometers

Find your perfect hygrometer:

Hygrometers	Measurement range	Probe type	Probe connection
TFH 610 Hygrometer	0 % rH … 100 % rH	Capacitive	Fixed
TFH 620 Hygrometer	0 % rH … 100 % rH	Capacitive	Lemo

TFH 610 Hygrometer
with fixed humidity probe

Technical Data

Measurement range: Humidity	0 % rH ... 100 % rH
Measurement range: Temperature	0 °C ... +50 °C (+32 °F ... +122 °F)
Accuracy: Humidity	±2.5 % rH (from 10 % ... 90 %)
Accuracy: Temperature	±0.5 °C (±0.9 °F)
Resolution: Humidity	0.1 %
Resolution: Temperature	0.1 °C (0.2 °F)
Operating temperature	0 °C ... +50 °C (+32 °F ... +122 °F)
Storage temperature	-25 °C ... +60 °C (-13 °F ... +140 °F)
Protection class	IP40
Dimensions (L x W x H)	115 x 54 x 22 mm
Weight	Approximately 90 g
Humidity sensor	External capacitive sensor, fixed
Temperature sensor	External thermistor
Battery	Lithium battery 3.0 V / 1,000 mAh
Battery lifetime	Up to 5 years
Sampling rate	1 sec to 15 sec
Certificate	Factory calibration certificate (32.8 % rH and 75.4 % rH)

- Approximately 5 years battery life time

Type	Description	Part No.
TFH 610	Hygrometer for humidity and temperature measurement	1340-5610A

Accessories for TFH Hygrometers

AG 140 Protective cover for handheld devices, red

AH 100 PTFE filter for TFH 610 and TFH 620

AH 300 Stainless steel sintered filter for TFH 610 and TFH 620

Type	Description	Part No.
AG 140	Protective cover for handheld devices, red	1340-5005
AH 100	PTFE filter for TFH 610 and TFH 620	1340-5627
AH 300	Stainless steel sintered filter for TFH 610 and TFH 620	1340-5625

TFH 620 Hygrometer
with MIN/MAX and hold options

Technical Data

Measurement range: Humidity	0 % rH ... 100 % rH
Measurement range: Temperature	0 °C ... +60 °C (+32 °F ... +140 °F)
Accuracy: Humidity	±2 % rH (from 5 % ... 95 %)
Accuracy: Temperature	±0.3 °C (±0.5 °F)
Resolution: Humidity	0.1 %
Resolution: Temperature	0.1 °C (0.2 °F)
Operating temperature	0 °C ... +50 °C (+32 °F ... +122 °F)
Storage temperature	-25 °C ... +60 °C (-13 °F ... +140 °F)
Protection class	IP67 (device without probe)
Dimensions (L x W x H)	115 x 54 x 22 mm
Weight	Approximately 90 g
Humidity sensor	External capacitive sensor, removeable
Temperature sensor	External Pt 1000 sensor
Probe position	External, plug-in probe, cable length 90 cm
Battery	Lithium battery 3.0 V / 1,000 mAh
Battery lifetime	Up to 5 years
Sampling rate	1 sec to 15 sec
Certificate	Factory calibration certificate (32.8 % rH, 52.9 % rH and 75.4 % rH)

- High precision
- Approximately 5 years battery life time

Type	Description	Part No.
TFH 620 + TPH 100	Hygrometer for humidity and temperature measurements with air probe, cable length 90 cm	1340-5621A

Filter for the ebro humidity devices

ebro® provides convenient filters for their humidity devices in order to protect the sensitive humidity probes from mechanical strain and dust. Effectively, this enhances the protection class of the device.

Installation of the filters

Installation is very easy: unscrew the plastic protection cap – screw the filter – done!

Types of filters

ebro® provides two different filters:

The **stainless steel sintered filter** also increases the protection class to IP40. The stainless steel massively increases the mechanical protection, e.g. from crushing the filter. Nothing will happen to your probe! In addition, the stainless steel is highly resistant to corrosion even in high temperature applications.

The **PTFE-filter** provides little protection from mechanical strain but seals the probe from dust – protection class IP60. In dusty environments, unprotected humidity probes, or probes protected by sintered filters, can quickly be covered in dust. This massively affects the humidity measurement, or prohibits it entirely. It won´t happen with the PTFE filter.

Type	Description	Part No.
AH 100	PTFE filter	1340-5627
AH 300	Stainless steel sintered filter	1340-5625

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Both data loggers and handheld devices can be equipped with the filters:

- EBI 25-TH (see p. 15)
- EBI 300 TH (see p. 25)
- EBI 310 TH (see p. 28)
- TFH 610 (see p. 98)
- TFH 620 (see p. 99)

pH
& Conductivity

The following pages contain a variety of instruments for the measurement of pH values as well as conductivity in microSiemens.

PHX 800 as a standard testing device for the pH values. TDS 3 as a standard testing device for microSiemens/cm².
For professional use one can select from the following range: PHT 810 pH meter instrument and PHT 830 pH meter, temperature compensated, with a variety of different electrodes, and the CT 830 conductivity measurement instrument, temperature compensated.

PHT 810
pH Meter

PHT 830
pH Meter

CT 830
Conductivity Meter

pH and
Conductivity
Standard Tester

The extended product range of WTW® provides you with additional solutions for your major challenges in pH and conductivity measurement. For more information go to www.WTW.com.

pH and Conductivity Meter and Tester

Find your perfect meter:

Meter	Parameter	Measurement range	Probe type	Probe connection
PHT 810 pH Meter	pH	0 pH ... 14 pH	Various electrodes available	BNC
PHT 830 pH Meter	pH	0 pH ... 14 pH	pH-electrode with plastc shaft	Plug BK 6-pin
PHX 800 pH Tester	pH	0 pH ... 14 pH	Integrated electrode	–
CT 830 Conductivity Meter	Conductivity	0 … 200 µS/cm, 0 … 2,000 µS/cm, 0 … 20 mS/cm, 0 … 500 mS/cm	Graphite elelektrode	Plug BK 6-pin
TDS 3 Conductivity Tester	Conductivity	0 ... 1,999 µS, 0 … 19.99 mS	Integrated electrode	–

Accessories for PHT 830 and CT 830

Buffer bottles
Standard (DIN/NIST) buffer solutions

Type	Description	Part No.
PL 4	Standard (DIN / NIST) buffer solution, pH 4,006 – 250ml	109110
PL 7	Standard (DIN / NIST) buffer solution, pH 6,865 – 250 ml	109120
PL 9	Standard (DIN / NIST) buffer solution, pH 9,180 – 250 ml	109130
KCl-250	Reference electrolyte, KCl-solution 3 mol/l – 250 ml	109705
E-Set Trace	Calibration Standard, 0.01 mol/KCl (6x 50 ml)	300572

PHT 830 pH Meter
with temperature compensation

- Configuration directly on device using 5 buttons and display
- Graphic LCD display with backlight
- Logging function
- Temperature compensated
- Software connection by IF 830, Winlog.pro, Winlog.med, Winlog.validation

Technical Data

Measurement range	pH:	0 pH … 14 pH
	mV:	-1,999 mV … 1,999 mV
	Temperature:	-10 °C … +100 °C
Resolution	pH:	0.01 pH;
	mV:	1 mV
	Temperature:	0.1 °C
Accuracy	pH:	± 0.03 (± 2 pH-units)
	Temperature:	± 0.1 °C
Memory		4,000 values
Temperature		-10 °C … +100 °C
Display		128 x 64 Pixel, backlight
Interface		USB "Interface HMG USB"
Battery		3 Batteries Type AA, IEC R6, LR6, 1.5 V
Ambient		-10 °C ... +55 °C (+14 °F … +131 °F)
Relative humidity		< 95 % (non-condensing)
Connectors		Plug BK 6 pin (4 pin interface)
Housing		ABS plastic
Protection class		IP65
Dimension (L x W x D)		200 x 95 x 40 mm
Weight		290 g
Factory calibration certificate		pH 4.01 and pH 6.86

The set contains:

- PHT 830 pH Meter
- pH electrode, depending on Set type
- Buffer solution pH 4, pH 7, pH 9
- KCl solution
- Carrying case

Type	Description	Part No.
PHT 830 SET 1	pH Meter with plastic electrode	1340-5812
PHT 830 SET 2	pH Meter with glass electrode	1340-5813
PHT 830 SET 3	pH Meter with penetration electrode	1340-5814

CT 830 Conductivity Meter
with auto range

- Configuration directly on device using 5 buttons and display
- Graphic LCD display with backlight
- Logging function
- Temperature compensated
- Software connection by IF 830, Winlog.pro, Winlog.med, Winlog.validation

Technical Data

Measurement range		0 … 200 µS/cm 0 … 2,000 µS/cm	TDS 0 …200 mg/l TDS 0 … 2,000 mg/l
Resolution		0.1 µS/cm; 1 µS/cm	
Accuracy	Conductivity:	± 0.5 % full scale	
	Temperature:	± 0.1 °C	
Memory		4,000 values	
Temperature		-10 °C … +100 °C	
Display		128 x 64 Pixel, backlight	
Interface		USB "Interface HMG USB"	
Battery		3 Batteries Type AA, IEC R6, LR6, 1.5 V	
Ambient		-10 °C ... +55 °C (+14 °F … +131 °F)	
Relative humidity		< 95 % (non-condensing)	
Connectors		Plug BK 6 pin (4 pin interface)	
Housing		ABS plastic	
Protection class		IP65	
Dimension (L x W x D)		200 x 95 x 40 mm	
Weight		290 g	
Factory calibration certificate		5 µS/cm and 1,413 µS/cm	

The set contains:

- CT Conductivity Meter
- Conductivity electrode
- Calibration solution 1413 µS/cm
- Carrying case

Type	Description	Part No.
CT830 SET	Conductivity Meter	1340-5835

Various electrodes for PHT 830

AT 830 pH K Binder
Temperature compensated
Housing material: plastic
Cable length: 150 cm
Diameter: 12 mm
Shaft length: 120 mm

AT 830 pH G Binder, laboratory electrode
Temperature compensated
Shaft housing material: glass
Cable length: 100 cm
Shaft diameter: 12 mm
Shaft length: 120 mm

AT 830 pH E Binder, penetration electrode
Temperature compensated for measurements in semi-solid food products and other materials.
Housing material: glass
Cable length: 100 cm
Shaft/electrode diameter: 15 mm/5 mm
Shaft/electrode length: 65 mm/12 mm

Technical Data	AT 830 pH K	AT 830 pH G	AT 830 pH E
pH measurement range	0 pH ... 14 pH	0 pH ... 14 pH	2 pH ... 13 pH
Temperature measurement range	0 °C ... +100 °C (+32 °F ... +212 °F)	0 °C ... +100 °C (+32 °F ... +212 °F)	+5 °C... +80 °C (+41 °F ... +176 °F)
Electrolyte	Gel	Gel	Referid®

Type	Description	Part No.
AT 830 pH K Binder	Plastic electrode	1339-0661
AT 830 pH G Binder	Measurement electrode for laboratories	1339-0662
AT 830 pH E Binder	Penetration electrode	1339-0663

Electrode for CT 830

AT 830 C Binder
Temperature compensated
Housing material: plastic
Cable length: 150 cm
Diameter: 12 mm
Shaft length: 120 mm

Technical Data	AT 830 C
Conductivity measurement range	0 µS/cm ... 500 mS/cm
Temperature measurement range	0 °C ... +100 °C (+32 °F ... +212 °F)

Type	Description	Part No.
AT 830 C Binder	Plastic electrode	1339-0660

Interface cable for PHT 830 and CT 830

EBI IF 830
For reading out the memory of the PHT 830 and CT830

- Software connection Winlog.pro, Winlog.med, Winlog.validation

Type	Description	Part No.
EBI IF 830	Interface for PHT 830 and CT 830	1340-6011

PHX 800 Basic pH Tester *with acoustic signal*

- Automatic deactivation
- Battery charge indicator
- Replaceable battery

Technical Data

pH measurement range	0 pH ... 14 pH
pH measurement accuracy	0.1 pH
pH resolution	±0.2 pH
Operating temperature	0 °C ... +50 °C (+32 °F ... +122 °F)
Storage temperature	-25 °C ... +60 °C (-13 °F ... +140 °F)
Housing material	ABS plastic
Dimension (L x W x H)	170 x 32 x 15 mm
Weight	Approximately 70 g
Battery	1.5 V A76/LR44
Battery lifetime	Approximately 150 hours
Deactivation	Automatically after 15 minutes

Type	Description	Part No.
PHX 800	Basic pH Tester	1340-5800

TDS 3 Basic Conductivity Tester *Dual Display*

- Battery charge indicator
- Replaceable battery

Technical Data

Measurement range	0 ... 1,999 µS 0 ... 19.99 mS	0 ... 1,999 ppm 0 ... 19.99 ppt
Measurement accuracy	1 µS	
Resolution	1 µS	
Operating temperature	0 °C ... +50 °C (+32 °F ... +122 °F)	
Storage temperature	-25 °C ... +60 °C (-13 °F ... +140 °F)	
Housing material	ABS plastic	
Dimension (L x W x H)	170 x 32 x 15 mm	
Weight	Approximately 70 g	
Battery	4 x 1.5 V A76/LR44	
Battery lifetime	Approximately 150 hours	

Type	Description	Part No.
TDS 3	Basic Conductivity Tester	1340-5831

PHT 810 pH Meter
with automatic pH calibration

PHT 810

PHT 810 + AT 206

ST 1000

Technical Data

pH measurement range	0 pH ... 14 pH
pH measurement accuracy	0.03 pH
pH resolution	0.01 pH
Total memory capacity	Hold, MIN / MAX
Connector	BNC
Battery lifetime	Up to 5 years
Display	LCD, 12 mm
Operating temperature	0 °C ... +50 °C (+32 °F ... +122 °F)
Storage temperature	-25 °C ... +60 °C (-13 °F ... +140 °F)
Dimensions (L x W x H)	110 x 54 x 22 mm
Temperature compensation	Manual
Weight	Approximately 200 g
Certificate	2-point factory calibration certificate (included at pH meter set; pH 4.00 and pH 7.00)

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

Type	Description	Part No.
PHT 810	pH Meter (without electrode)	1340-5810A
ST 1000	pH Meter Set (consisting of PHT 810, penetration electrode AT 206, punching pin, buffer solutions pH 4 and pH 7, carrying case)	1339-0620A

Various electrodes for PHT 810

AT 200 plastic electrode
Housing material: plastic
Diameter: 12 mm
Shaft length: 120 mm

AT 201 laboratory electrode
Shaft housing material: glass
Shaft diameter: 12 mm
Shaft length: 120 mm

AT 206 penetration electrode
for measurements in semi-solid food products and other materials.
Housing material: glass
Shaft/electrode diameter: 25 mm/5 mm
Shaft/electrode length: 65 mm/12 mm
with 1 m cable and BNC plug

Technical Data	AT 200	AT 201	AT 206
pH measurement range	0 pH ... 14 pH	0 pH ... 14 pH	2 pH ... 13 pH
Temperature measurement range	-5 °C ... +80 °C (+23 °F ... +176 °F)	-15 °C ... +130 °C (+5 °F ... +266 °F)	+5 °C... +80 °C (+41 °F ... +176 °F)
Electrolyte	Gel	Gel	Referid®

Type	Description	Part No.
AT 200	Plastic electrode	1339-0631
AT 201	Measurement electrode for laboratories	1339-0632
AT 206	Penetration electrode	1339-0629

Accessories for PHT 810

AG 140 Protective cover for handheld devices, red

AT 100-PHT
Carrying case

AT 400
Buffer solution pH 4

AT 401
Buffer solution pH 7

AT 405
KCl solution

Type	Description	Part No.
AG 140	Protective cover for handheld devices, red	1340-5005
AT 100-PHT	Carrying case	1340-5091
AT 400	Buffer solution pH 4, 50 ml	1341-3836
AT 401	Buffer solution pH 7, 50 ml	1341-3838
AT 405	KCl solution, 50 ml	1341-3839

Concentration

On the next pages you will find various Digital Hand Refractometers which are available as single and dual scale models for a broad application range. In addition, we have a Salt Meter for measuring the salt content for example in fluid and semi solid food in our range.

Refractometer

Description:

Digital handheld refractometer for measuring the concentration of different substances in liquid and semi-solid products. The device features an automatic temperature compensation and is easy to use.

Applications:

Concentration measurement of:

- Sugar
- Salt
- Alcohol
- Various others

Salt Meter

Description:

The SSX 210 Salt Meter is used to measure the salt content in fluid and semi-solid food products, such as meat, cold cuts, cheese, salads etc. The measurement is performed by determination of the electrical conductivity, as it is dependent on the salt content.

Applications:

Concentration measurement of:

- Salt

OPTi Multiscale Hand Refractometer *with internal light source*

The digital refractometers determine the concentration of various matters, which are solved in fluid or semi-solid substances. They have two decisive advantages to the common, optical refractometers. Thanks to the internal light, they can be used independent from the ambient light. In addition, they calculate and show the measurement values automatically in the display - no reading or converting a scale is necessary any more!

Straight out-of-the box, OPTi Multiscale is programmed as a Brix refractometer, the most widely used scale covering sugar, food, beverage, wine and even some industrial applications, where it is used as an arbitrary value. But that's not it. OPTi Multiscale has a further two channels that can, if desired, be programmed by the user with application specific scales such as those used in veterinary, wine, industrial, etc. Additionally, if the Brix scale is not required, it too can be overwritten. And if you want to change the scale to something different in the future, or regularly, redefining the channels is just a matter of a few simple button presses; making the OPTi Multiscale a most versatile instrument on the market.

- Precise digital LCD readout
- Over 45 scales to choose from
- Ergonomic IP65 rated design
- Shallow stainless steel prism dish
- Rapid temperature stabilisation

Please see the following page for the available scales.

Technical Data

Measurement Performance	
Automatic Temperature Compensation (ATC)	ICUMSA (depending on model)
Working temperature range	+5 °C ... +40 °C (+41 °F ... +104 °F)
Sample temperature range	+5 °C ... +60 °C (+41 °F ... +140 °F)
Temperature sensor accuracy	±1 °C (+5 °C ... +40 °C)
Measurement time	2 sec.
Sample indicator	High, Low or No sample
Protection class	IP65 (water resistant)
Battery	3V 2 x AAA (LR03)
Battery lifetime	10,000 readings (minimum)
Construction	
Prism material	Optical glass
Prism seal	Silicon rubber and Viton
Sample dish	316 stainless steel
Sample surface diameter	8 mm
Sample volume	0.3 ml
Case material	ABS

Type	Description	Part No.
OPTi Multiscale	Universal Digital Handheld Refractometer	38-01

Each OPTi Multiscale has an extensive on-board library of scales to choose from

Application	Scale	Range	Resolution	Accuracy	ATC
General	Refractive Index (RI)	1.33 - 1.54	0.0001	±0.0003	Brix
General	Refractive Index (RI) No ATC	1.33 - 1.54	0.0001	±0.0003	None
General	Brix	0 - 95	0.1	±0.2	Brix
Food & Beverage	°Butyro	0 - 100	0.1	±0.5	Butyro
Food & Beverage	42 HFCS (high fructose corn syrup)	0 - 95	0.1	±0.2	Brix
Food & Beverage	55 HFCS (high fructose corn syrup)	0 - 95	0.1	±0.2	Brix
Food & Beverage	90 HFCS (high fructose corn syrup)	0 - 95	0.1	±0.2	Brix
Food & Beverage	Salinity % (NaCl)	0 - 28	0.1	±0.2	NaCl
Food & Beverage	Total Solids % of Waste Milk	5 - 15	0.1	±0.5	Brix
Food & Beverage	Water in Honey %	10 - 30	0.1	±0.2	Honey
Wine & Beer	Sugar % / % Mass w/w (°Brix)	0 - 95	0.1	±0.2	Brix
Wine & Beer	Sugar % /% Mass w/w (°Brix) No ATC	0 - 95	0.1	±0.2	None
Wine & Beer	Oechsle (German)	30 - 130	1	±1	Brix
Wine & Beer	Oechsle (Swiss)	0 - 130	1	±1	Brix
Wine & Beer	°Baumé	0 - 28	0.1	±0.2	Brix
Wine & Beer	Alcohol Probable (AP)	0 - 22	0.1	±0.2	Brix
Wine & Beer	KMW (Babo)	0 - 25	1	±1	Brix
Wine & Beer	°Plato	0 - 30	0.1	±0.2	Brix
Wine & Beer	Wort SG	1.000 - 1.120	0.0005	±0.001	Brix
Wine & Beer	ABV (°Zeiss)	10 - 135	0.1	±0.5	Brix
Life Science	Colostral Quality	Poor -PASS	Poor -PASS	±0.2	Brix
Life Science	Seawater PPT	0 - 180	1	±1	NaCl
Life Science	Seawater Specific Gravity	1.000 - 1.090	0.0005	±0.001	NaCl
Life Science	Serum (SG)	0 - 30	0.1	±0.2	Brix
Life Science	Urine Specific Gravity (SG) Human (not IVD)	1.000 - 1.050	0.0005	±0.0010	Brix
Life Science	Urine Specific Gravity Large Mammal	1.000 - 1.050	0.0001	±0.0010	Brix
Life Science	Urine Specific Gravity Small Mammal	1.000 - 1.050	0.0005	±0.0010	Brix
Industrial	Calcium Chloride %	0 - 40	0.1	±0.2	CaCl2
Industrial	Ethanol %	0 - 20	0.5	±1	Ethanol
Industrial	Ethylene Glycol % by volume	0 - 60	0.1	±0.4	EG
Industrial	Ethylene Glycol (wt%)	0 - 60	0.1	±0.4	EG
Industrial	FSII DiEGME (ASTM D 5006)	0.0 to 0.25	0.01	±0.02	Brix
Industrial	Methanol	0 - 40	1	±0.2	Meth
Industrial	Propylene Glycol % by volume	0 - 60	0.1	±0.4	PG
Industrial	Sodium Sulphate %	0 - 22	0.1	±0.2	Na2SO4
Industrial	Starch %	0 - 30	0.1	±0.2	Brix
Industrial	Sulfuric Acid SG (d20/20) Battery Acid	1.000 to 1.501	0.001	±0.003	SA
Industrial	Urea % (CRC data)	0 - 40	0.1	±0.2	AUS32
Automotive	AdBlue®/DEF (NOx reduction)	0 - 40	0.1	±0.2	AUS32
Automotive	Ethylene Glycol °C Protection	0 to -50	1	±1	EG
Automotive	Ethylene Glycol °F Protection	30 to -40	1	±1	EG
Automotive	Propylene Glycol °C Protection	0 to -50	1	±1	PG
Automotive	Propylene Glycol °F Protection	30 to -40	1	±1	PG

DEF is used to describe an aqueous urea solution scale for measuring diesel exhaust fluids such as AdBlue®. AdBlue® is a registered trademark of the VDA Verband der Automobilindustrie e.V.

SSX 210 Salt Meter Set
with gold-plated electrodes probe

- Automatic deactivation
- Approximately 5 years battery life time

Technical Data

Measurement range	0 ... 100
Resolution	1 Digit
Accuracy (at +25 °C / 77 °F)	±1 Digit
Operating temperature	+10 °C ... +40 °C (+50 °F ... +104 °F)
Measurement rate	1 s to 15 s, adjustable
Deactivation	Automatically after 5 min., deactivatable
Protection class	IP67
Dimensions (L x W x H)	100 x 46 x 25 mm
Housing material	ABS
Probe	2-conductor-measurement probe with gold-plated electrodes
Probe cable	Silicone
Weight	Approximately 200 g
Battery	Lithium 3 V / 1 Ah, type CR2477
Battery lifetime	Up to 5 years, depending on use

Type	Description	Part No.
SSX 210-Set	Salt meter set (consisting of salt meter and case)	1340-5211

Accessories for SSX 210

AG 140 Protective cover for handheld devices, red

AG 160 Stainless steel bracket

AG 161 Stainless steel bracket for TFN devices

Type	Description	Part No.
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 with protective cover AG 140	1340-0596

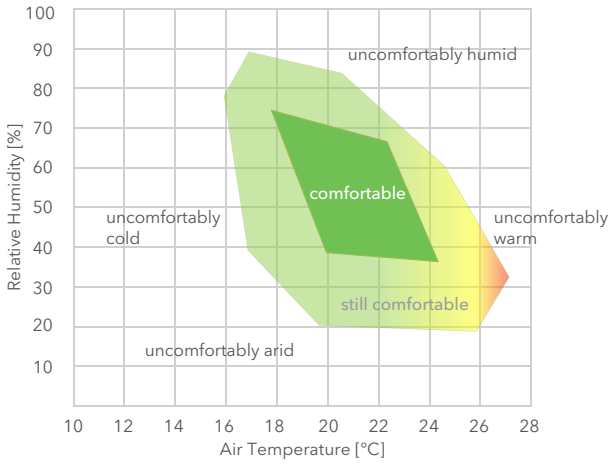
Room climate and health

The room climate describes the sum of the influences on the comfort of persons while being indoors. It is an essential component of the quality of comfort and is determined mostly by the air temperature and humidity, as well as the CO_2 value.

The climate in office rooms, medical practices and classrooms has a critical impact on the productive efficiency and health of employees. An improvement of the room climate can increase the productivity by up to 15 %, while at the same time decrease the risk of respiratory diseases dramatically.

The Technical University of Berlin found out that the risk of infection by viruses such as Corona or Influenca can be lowered by venting. They advise using CO_2 measurement devices like the RM 100 to determine when to vent.

Measures to improve the room climate can to some extent be taken quickly and straightforward, e.g. by frequent venting and vegetating the office room. The challenge is to measure the “thick air” objectively, and most of all: to be aware of it. The lingering decrease of air quality is often not perceived, although its negative impact is there.



The **room climate monitor RM 100** is putting things right. It measures air temperature and humidity as well as the CO_2 value at the same time. The measurement values are easily readable due to the large, illuminated display. In addition, the CO_2 level in the air is indicated via three LEDs as good, average or bad. When the limit is exceeded, the RM 100 will raise an acoustic alarm – then it´s high time to vent.

Room climate monitor RM 100

Applications:

- Reduction of risk of virus infections
- Objective evaluation of the room climate
- Preservation and increase of employees´ power of concentration and productive efficiency
- Increase of comfort and satisfaction

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Room climate monitor

RM 100 Room climate monitor
objective evaluation of the room climate

- Large, illuminated display
- Measurement of air temperature, humidity and CO_2 value
- Alarming when limit is exceeded

Technical Data

Measurement range CO_2	0 … 3,000 ppm
Measurement range temp.	0 °C … +50 °C
Measurement range humidity	20 % … 90 % rH
Operation temperature	0 °C … +50 °C
Storage temperature	-20 °C … +60 °C
Power supply	USB or 5V-Adapter (included)
Dimensions	137 x 99 x 29 mm
Weight	200 g
Certificate	Factory calibration certificate (CO_2: 0 ppm, 1,000 ppm and 3,000 ppm)

Type	Description	Part No.
RM 100	Room climate monitor	1348-0001

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Calibration

Precision measurement and testing equipment such as thermometers and data loggers should be checked and calibrated regularly.

Factory Calibration

Most ebro measuring equipment is supplied with a factory calibration certificate. The functionality and the tolerances indicated in the technical specifications are thus ensured. Factory calibration is completed with traceable factory etalons according to DIN EN ISO / IEC 17025.

- The calibration is carried out at metrological monitored equipment.
- All factory certificates issued by trained personnel.
- The factory calibration certificate confirms the suitability of the device for official calibration.
- This calibration is completed for all new devices and standard replacement devices.

Confirmation of Conformity

Values measured by a conformity confirmed that has been officially calibrated are legally binding. Therefore, such a device is ideal for use by government inspection authorities such as food inspectors or certified court experts.

- Currently, confirmation of conformity is completed by government gauging offices only.
- Instruments whose compliance is to be confirmed must have a special type approval from the Physikalisch-Technische Bundesanstalt (PTB) in order to be eligible for official calibration.
- The confirmation of conformity certificate indicates the display correction and duration of validity.
- ebro® offers the TFX 422C as a conformity verified thermometer.

Calibration according to ISO 9000

Modern quality assurance systems like ISO 9000, QS 9000, GxP and FDA require testing and measuring equipment checks, which also include a regular calibration of these devices. ebro® ISO calibration is an economical, fast and precise option for the fulfillment of these requirements.

- The calibration is carried out by specialized professionally trained calibration technicians.
- The results are documented in detail, including traceability information of the reference devices, in an ISO certificate.
- Manufacturer-independent calibration, devices from other manufacturers can be calibrated by prior arrangement.
- Calibration also includes device adjustment, if necessary (only for ebro® devices).

We recommend the recalibration for thermometers and pressure meters once per year and for humidity meters every 6 months.

The price for the calibration according to ISO 9000 includes certificate and **2 specified standard calibration points**. The flat rates apply to our standard calibration points.
The calibration of temperature / humidity loggers includes 2 to 3 humidity calibration points in the price. In addition, a temperature calibration in the range of -40 °C ... +75 °C (-40 °F ... 167 °F) can be completed.
As found and as left calibrations can be done on demand.

ISO Calibrations


CERTIFICATE

The Certification Body
of TÜV SÜD Management Service GmbH
certifies that

Xylem Analytics Germany Sales GmbH & Co. KG
Dr.- Karl- Slevogt- Str. 1 • 82362 Weilheim • Germany

Xylem Analytics Germany GmbH
Dr.- Karl- Slevogt- Str. 1 • 82362 Weilheim • Germany
Peringerstr. 10 • 85055 Ingolstadt • Germany
Hattenbergstr. 10 • 55122 Mainz • Germany

has established and applies
a Quality Management System for

Xylem Analytics Germany Sales GmbH & Co. KG, Site Weilheim
Trading, sales and marketing of physical-chemical measurement and analysis systems, validated data logging systems, portable instruments and controllers and related services.

Xylem Analytics Germany GmbH, Site Weilheim
Development, production and service of physical-chemical measurement and analysis systems, validated data logging systems, portable instruments and controllers.

Xylem Analytics Germany GmbH, Site Ingolstadt
Development, marketing, sales and service of validated / calibrated data loggers, portable instruments and controllers.

Xylem Analytics Germany GmbH, Site Mainz
Development, production, sales and marketing of sensors and analytical instruments, as well as associated service.

An audit was performed, Order No. **70016126**.
Proof has been furnished that the requirements according to

ISO 9001:2015

are fulfilled.
The certificate is valid from **2020-08-12** until **2023-08-11**.
Certificate Registration No.: **12 100 17506 TMS**.

Product Compliance Management
Munich, 2020-07-22

Series	Description ISO Calibration [1] at ...	Part No.
EBI 12, EBI 11 Temperature data logger	3 temperature points	1030-2203
	4 temperature points	1030-2204
	5 temperature points	1030-2205
EBI 12, EBI 11 Temperature plus another measurand data logger (Pressure, Humidity, Conductivity)	3 temperature points + another measurand	1030-2223
	4 temperature points + another measurand	1030-2224
	5 temperature points + another measurand	1030-2225
EBI 20, EBI 25, EBI 300, EBI 310, EBI 40 Temperature data logger	2 temperature points	1030-2302
	3 temperature points	1030-2303
	4 temperature points	1030-2304
EBI 20, EBI 25, EBI 300, EBI 310 Temperature plus another measurand data logger	2 temperature points + another measurand	1030-2322
	3 temperature points + another measurand	1030-2323
	4 temperature points + another measurand	1030-2324
Handhelds (TFX, TFE, TFN, TLC, TFI, GFX, TTX, TFH, FOM, CT, PHT, VAM)	3 points	1030-2403
	4 points	1030-2404
	5 points	1030-2405

ISO calibrations of other devices on request.

[1] *According to DIN ISO 9000 including certificate.*

Measurement conditions	Standard calibration points
Liquid bath (for devices with a resolution of 0.1 °C)	-80 °C, -20 °C, 0 °C, +20 °C, +60 °C, +120 °C, +121 °C, +134 °C, +170 °C, +250 °C
Liquid bath (for devices with a resolution less than 0.1 °C)	-80 °C, -20 °C, 0 °C, +60 °C, 121 °C, 134 °C
Dry block calibrator	+350 °C
Surface calibrator	+50 °C, +100 °C, +200 °C
Black body calibrator (calibration of non-contact infrared thermometers)	0 °C, +60 °C
realitive humidity in climatic chamber	32,8 %rH, 52,9 %rH, 75,4 %rF at 25 °C

- Certified according to DIN EN ISO 9001 : 2015

Accredited calibration according to DAkkS guidelines

Accredited calibration according to DAkkS guidelines is often needed for working standard measuring equipment, measuring equipment used by certified experts and for certain measurement procedures in medicine and pharmaceuticals – in other words, everywhere where an especially high degree of safety is required. This calibration is done by special accredited laboratories according to DIN EN ISO/IEC 17025 and monitored by the Deutsche Akkreditierungsstelle (DAkkS).

- Internationally recognized and comparable measurement results.
- The calibration is carried out by specialized, professionally trained calibration technicians whose competence has been confirmed by the DAkkS.
- Traceable calibration in accordance with DIN EN ISO 9001 and DIN EN ISO/IEC 17025.
- Determination and documentation of the measurement uncertainty for each calibration point of a calibration item.

We recommend the recalibration for thermometers and pressure meters once per year and for humidity meters every 6 months.

The price for accredited calibration according to DAkkS specifications including a calibration certificate includes a number of freely selectable temperature points and, in the case of a calibration of the relative humidity, **three freely selectable calibration points**. We offer calibrations in the temperature range from -90 ° C ... +250 ° C, in the range of relative humidity from 10% ... 95% and an absolute pressure from 0 bar ... 25 bar.

With a pressure calibration, the device is calibrated at nine points. The calibration points cover the entire measuring range. Calibration takes place at room temperature, is between +20 °C and +25 °C.

Accredited calibration according to DIN EN ISO/IEC 17025 to DAkkS guidelines

- Accredited calibration according to DAkkS guidelines of other devices on request.

Series	Description Accredited calibration [2] at ...	Part No.
EBI 12, EBI 11 Temperature data logger	3 temperature points	1030-3203
	4 temperature points	1030-3204
	5 temperature points	1030-3205
EBI 12, EBI 11, Temperature plus another measurand data logger (abs. pressure, rel. humidity)	3 temperature points plus other measurand	1030-3223
	4 temperature points plus other measurand	1030-3224
	5 temperature points plus other measurand	1030-3225
EBI 20, EBI 25, EBI 300, EBI 310, EBI 40 Temperature data logger	2 temperature points	1030-3302
	3 temperature points	1030-3303
	4 temperature points	1030-3304
EBI 20, EBI 25, EBI 300, EBI 310 Temperature/ Humidity data logger	2 temperature points + humidity	1030-3322
	3 temperature points + humidity	1030-3323
	4 temperature points + humidity	1030-3324
Handhelds (TFX, TFE, TFN, TLC, GFX, TTX, TFH)	3 points	1030-3403
	4 points	1030-3404
	5 points	1030-3405

[2] *According to DAkkS and traceable to international etalons (PTB, NIST).*

Calibration conditions for different calibrations

Temperature Calibrations

Calibration type	Calibration object	Measurement range	Measurement conditions
ISO	Temperature measurement devices with air and submersible sensors, Temperature data logger	-90 °C ... +400 °C (-130 °F ... +752 °F) +250 °C ... +1,000 °C (+482 °F ... 1,832 °F)	Temperature-regulated Liquid baths, Calibration source
DAkkS / DKD	Temperature measurement devices resistance thermometers, electronic thermometers and data loggers	0 °C (+32 °F) 0.01 °C (32.018 °F) -90 °C ... -35 °C (-130 °F ... -31 °F) -35 °C ... +250 °C (-31 °F ... +482 °F) -85 °C ... +200 °C (-121 °F ... +392 °F)	Ice point Water triple point Liquid bath Liquid bath Liquid bath
	Thermocouple	+200 °C ... +250 °C (+392 °F ... +482 °F)	Liquid bath

Surface Temperature Calibrations

Calibration type	Calibration object	Measurement range	Measurement conditions
ISO	Temperature measurement devices with surface probe	+40 °C ... +200 °C (+104 °F ... +392 °F)	Surface calibrator
ISO	Non-contact IR Temperature measurement devices	-35 °C ... +190 °C (-31 °F ... +374 °F)	Black emitter

Humidity Calibrations

Calibration type	Calibration object	Measurement range	Measurement conditions
ISO	Measurement devices for relative humidity	10 % ... 50 % 50 % ... 95 % Temperature range: +5 °C ... +70 °C (+41 °F ... +158 °F)	Two pressure humidity generator Temperature range: +5 °C to +70 °C (+41 °F to +158 °F)
DAkkS / DKD	Measurement devices for relative humidity	10 % ... 30 % 30 % ... 70 % 70 % ... 95 % Temperature range: +5 °C ... +70 °C (+41 °F ... +158 °F)	Two pressure humidity generator Temperature range: +5 °C to +70 °C (+41 °F to +158 °F)

Pressure Calibrations

Calibration type	Calibration object	Measurement range	Measurement conditions
ISO	Absolute pressure	0 mbar ... 10,000 mbar	Pressure calibrator
DAkkS / DKD	Absolute pressure	0 mbar ... 5,000 mbar >5,000 mbar ... 25,000 mbar	In gases In gases

ISO Standard Calibration Points for ebro Products

Measurement device	Calibration points		
EBI 310 / EBI 300	-20 °C (-4 °F)	0 °C (+32 °F)	+60 °C (+140 °F)
EBI 310 TH	32,8 % at +25 °C (+77 °F) 0 °C (+32 °F)	+20 °C (+68 °F)	75,4 % at +25 °C (+77 °F)
EBI 12 T (depends on device type)	0 °C (+32 °F)	+60 °C (+140 °F)	+134 °C (+273.2 °F)
EBI 12 TP (depends on device type)	100 mbar at +25 °C (+77 °F) 0 °C (+32 °F)	3,100 mbar at +25 °C (+77 °F) +60 °C (+140 °F)	3,100 mbar at +134 °C (+273.2 °F) +134 °C (+273.2 °F)
EBI 20 / EBI 25 (depends on device type)	-20 °C (-4 °F)	0 °C (+32 °F)	
Thermometer with penetration probe	0 °C (+32 °F)	+60 °C (+140 °F)	+120 °C (+248 °F)
Thermometer with surface probe	+50 °C (+122 °F)	+100 °C (+212 °F)	+200 °C (+392 °F)
Thermometer without probe	-100 °C (-148 °F)	0 °C (+32 °F)	+200 °C / +1,000 °C (+392 °F / +1,832 °F)

More than 100 distributors worldwide – find one near you at:
www.ebro.com/en/worldwide

a xylem brand

Xylem Analytics Germany Sales GmbH & Co. KG, ebro
Peringerstr. 10 · 85055 Ingolstadt, Germany · Phone +49 841 954780 · Fax +49 841 95478-80 · ebro@xylem.com · **www.ebro.com**

A guide to temperature limits

These temperature values insure optimum freshness:

Food	Transport and Storage Temperature
Fresh milk products	≤ +6 °C
Milk at a Dairy	≤ +6 °C
Pasteurized milk, repackaged milk	≤ +8 °C
Butter	≤ +10 °C (≤ +6 °C for transport)
Dessert	≤ +7 °C
Cheese (except hard cheese)	≤ +10 °C
Ice cream, prepackaged	≤ -18 °C (≤ -20 °C for transport)
Ice cream, scooped and served	≤ -10 °C
Eggs (if eggs to be stored over 18 days)	from +5°C to +8 °C
Egg products (deep frozen)	≤ -18 °C
Egg products (frozen)	≤ -12 °C
Egg products (fresh)	≤ +4 °C
Raw egg-containing food products (e.g. fresh mayonnaise)	≤ +7 °C
Bakery products with partially baked filling	≤ +7 °C
Fresh meat products, fresh meat (including big game)	≤ +7 °C
Fresh poultry (rabbit and small game)	≤ +4 °C
Exception: flightless birds (as approved)	≤ +7 °C
Meat preparation	≤ +4 °C
Meat preparation (production and sales on site)	≤ +7 °C
Cold cut plates	≤ +7 °C
Ground meat	≤ +2 °C
Ground meat (production and sales on site): 24 hours delivery	≤ +7 °C (≤ +2 °C for transport)
Offal / Organ meats	≤ +3 °C
Meat, poultry, fish (frozen)	≤ -12 °C
Meat, poultry, fish (deep frozen)	≤ -18 °C
Fish, fish products	in melting ice or ≤ +2 °C
Smoked fish	≤ +7 °C
Fishery products (marinaded, soured, smoked)	≤ +7 °C (≤ +6 °C for transport)
Fishery products (fresh) plus crawfish and mollusk products	in melting ice or ≤ +2 °C
Delicacies	≤ +7 °C
Raw fruit and vegetables	≤ +7 °C
Salads, fresh and / or crushed, delicacies salads	≤ +7 °C

Retained samples for testing

Save for a minimum of 10 days	≤ -18 °C

Hot Meals

Heated (core temperature)	≥ +70 °C
Food counter	≥ +65 °C

Cold Meals

Storage temperature until serving	≤ +7 °C

Disinfection facilities

Water	≥ +82 °C

German Food Inspectors recommend ebro instruments

- Thermometers
- Temperature Data Loggers
- Food Oil Quality Meter

Declarations

Hereby we declare

Xylem Analytics Germany Sales
GmbH & Co. KG, ebro
Peringerstraße 10
85055 Ingolstadt, Germany
Phone: +49 841 95478-0
Fax: +49 841 95478-80

that the following products

Product type:	**Data logger**
Type designation:	EBI 20-T1 / -TE1 / -TF, EBI 25-T / -TE / -TX, EBI 300-T, EBI 310-T / -TE / -TX, EBI 330-T30

are in compliance with the essential requirements and other relevant provisions of Directive 37 / 2005 EC.
The following harmonized standards have been used:
- **Tests, performance, suitability: EN 12830**
- **Periodic verification and calibration: EN 13486**

Estewan Preißing, Head of Research & Development, ebro

Hereby we declare

Xylem Analytics Germany Sales
GmbH & Co. KG, ebro
Peringerstraße 10
85055 Ingolstadt, Germany
Phone: +49 841 95478-0
Fax: +49 841 95478-80

that the following products

Product type:	**Thermometer**
Type designation:	TLC 700, TLC 750i, TLC 750 BT, TLC 750 NFC, TLC 1598, TFX 410, TFX 410-1, TFX 420, TFX 422 C, TFX 430, TTX 2x0, TFE 510

are in compliance with the essential requirements and other relevant provisions of Directive 37 / 2005 EC.
The following harmonized standards have been used:
- **Tests, performance, suitability: EN 13485**
- **Periodic verification and calibration: EN 13486**

Estewan Preißing, Head of Research & Development, ebro

Conditions of Delivery and Payment

January 2018. Changes reserved. Please find the latest version on our website: www.ebro.com/en/agb

1. APPLICATION

Except as otherwise expressly agreed in writing, these conditions (**"General Conditions"**) shall exclusively apply to all deliveries and services of XYLEM Analytics Germany Sales GmbH & Co. KG (in the following: Contract). Deviating conditions of the Purchaser shall not apply.

2. MINIMUM NET ORDER VALUE, VALIDITY OF QUOTATIONS, CUSTOM MADE PRODUCTS, EXCESS DELIVERIES AND CANCELLATION OF ORDERS, TRANSFER OF RISK

2.1 The minimum net order value amounts to EUR 100. For orders below this amount Supplier reserves the right to charge handling costs of EUR 20.

2.2 Quotations are valid for thirty (30) calendar days from the date of issuance unless otherwise agreed in writing by Supplier, subject to prior sale. Supplier reserves the right to cancel or withdraw the quotation at any time with or without notice or cause prior to acceptance by the Purchaser. Supplier nevertheless reserves its right to accept any contractual documents received from the Purchaser after this 30-day period.

2.3 The price for custom made products shall be separately agreed between the Parties.

2.4 Supplier shall have the right to deliver an excess quantity of up to 10% that has to be paid by Purchaser.

2.5 If the Purchaser fully or partly cancels an order for non-custom made products without justification Supplier shall be entitled, notwithstanding the right to assert a higher damage that has actually been incurred due to the cancellation, to demand 10% of the sales price for the cancelled order volume as compensation for the processing and minimum loss of profits unless Purchaser establishes proof of a lower damage. The cancellation or amendment of an order for custom made products shall not be possible.

3. PRODUCT INFORMATION

All information and data contained in general product documentation and price lists, whether in electronic or any other form, are binding only to the extent that they are by reference expressly included in the Contract.

4. DRAWINGS AND DESCRIPTIONS

4.1 All drawings and technical documents relating to the Product or its manufacture submitted by one party to the other, prior or subsequent to the formation of the Contract, shall remain the property of the submitting party.

4.2 Drawings, technical documents or other technical information received by one party shall not, without the consent of the other party, be used for any other purpose than that for which they were provided. They may not, without the consent of the submitting party, otherwise be used or copied, reproduced, transmitted or communicated to a third party.

4.3 Supplier shall, not later than at the date of delivery of Products, provide free of charge information and drawings which are necessary to permit the Purchaser to erect, commission, operate and maintain the Product. Such information and drawings shall be supplied in the number of copies agreed upon or at least one copy of each. Supplier shall not be obliged to provide manufacturing drawings for the Product or for spare parts.

5. INSPECTIONS AND TESTS

5.1 Inspections

5.1.1 If expressly agreed in the Contract, the Purchaser shall be entitled to have the quality of the materials used and the parts of the Product, both during manufacture and when completed, inspected and checked by its authorised representatives. Such inspection and checking shall be carried out at the place of manufacture during normal working hours after agreement with Supplier as to date and time, and at the Purchaser's expense.

5.2 Tests

5.2.1 Acceptance tests provided for in the Contract shall, unless otherwise agreed, be carried out at the place of manufacture during normal working hours.

5.2.2 If the Contract does not specify the technical requirements, the tests shall be carried out in accordance with the Supplier's standard practice.

5.2.3 If the Purchaser in due time has requested in writing, Supplier shall notify the Purchaser in writing of the acceptance tests in sufficient time to permit the Purchaser to be represented at the tests. If the Purchaser is not represented, the test report shall be sent to the Purchaser and shall be accepted as accurate. With regard to standard products (as defined by Supplier from time to time) only a "production card" will be delivered with the Product stating that the Product has passed the test procedure and thereby is approved. If requested by the Purchaser in writing and prior to the performance of the test, a test report will be sent to the Purchaser at an additional cost reasonably determined by Supplier.

5.2.4 If the acceptance tests show the Product not to be in accordance with the Contract, Supplier shall without delay remedy any deficiencies in order to ensure that the Product complies with the Contract. New tests shall then be carried out at the Purchaser's request, unless the deficiency in Supplier's sole opinion was insignificant.

5.2.5 Supplier shall bear all costs for acceptance tests carried out at the place of manufacture. The Purchaser shall however bear all costs and expenses for its representatives in connection with such tests. The Purchaser shall bear all costs for any optional tests requested by the Purchaser.

6. DELIVERY, PASSING OF RISK

6.1 Any agreed trade term shall be construed in accordance with INCOTERMS 2010. If no trade term is specifically agreed, the delivery ("**Delivery**") shall be DAP, Purchaser's address as set out in the Purchaser's purchase order accepted by Supplier. However, Supplier's costs for DAP delivery shall be paid by Purchaser as set out in Clause 9.6 below.

6.2 Partial shipments shall be permitted unless otherwise agreed.

7. TIME FOR DELIVERY

7.1 Time for Delivery

If the Parties, instead of specifying the date for Delivery, have specified a period of time on the expiry of which Delivery shall take place, such period shall start to run as soon as the Contract is entered into, all official formalities have been completed, payments due at the formation of the Contract have been made, any agreed securities have been given and any other preconditions have been fulfilled.

7.2 Delay on part of Supplier

7.2.1 Any time periods specified by Supplier in the Contract for Delivery are to be treated as estimates whilst the Supplier shall make reasonable efforts to deliver on time. If Supplier anticipates that it will not be able to deliver the Product at the time for Delivery ("**Delay**"), Supplier shall inform the Purchaser thereof and, if possible, the time when Delivery can be expected.

7.2.2 If Delay is caused by any of the circumstances mentioned in Clause 14 or by an act or omission on the part of the Purchaser, including suspension under Clauses 9.4 or 14, the time for Delivery shall be extended by a period which is reasonable having regard to all the circumstances in the case. This provision applies regardless of whether the reason for the Delay occurs before or after the agreed time for Delivery.

7.2.3 In case of Delay, the Purchaser may in writing demand delivery within a final reasonable period which shall not be less than ninety (90) days from the Supplier's receipt of such demand. If Supplier does not deliver within such final period and this is not due to any circumstance for which the Purchaser is responsible or a Delay covered by Clauses 7.3 or 14, then the Purchaser may by notice in writing to Supplier terminate the Contract in respect of such part of the Product that cannot, in consequence of Supplier's failure to deliver, be used as intended by the Parties. **THE PURCHASER SHALL IN NO EVENT BE ENTITLED TO ANY LIQUIDATED DAMAGES IN THE CASE OF DELAY.**

7.2.4 If the Purchaser terminates the Contract due to Delay, it shall be entitled to compensation for the loss it has suffered as a result of Supplier's Delay. The total compensation shall not exceed, except in cases of intent or gross negligence, 10 percent of that part of the purchase price which is attributable to the part of the Product in respect of which the Contract is terminated.

7.3 Delay on part of the Purchaser

7.3.1 If the Purchaser anticipates that it will be unable to accept Delivery of the Product at the Delivery time, it shall forthwith notify Supplier in writing thereof, stating the reason and, if possible, the time when it will be able to accept Delivery.

7.3.2 If the Purchaser for any reason fails to accept Delivery at the Delivery time, it shall nevertheless pay any part of the purchase price which becomes due on Delivery, as if Delivery had taken place. Supplier shall arrange for storage of the Product at the risk and expense of the Purchaser. Any other direct and/or financial costs incurred as a result of such failure to accept Delivery shall be borne by the Purchaser. Supplier shall, if the Purchaser so requires in writing, insure the Product on behalf of the Purchaser and at the Purchaser's expense.

7.3.3 Unless the Purchaser's failure to accept Delivery is due to any such circumstance as mentioned in Clause 14, Supplier may by notice in writing require the Purchaser to accept Delivery within a final reasonable period.

7.3.4 If, for any reason for which Supplier is not responsible, the Purchaser fails to accept Delivery within such period, Supplier may by notice in writing terminate the Contract in whole or in part. Supplier shall then be entitled to compensation for the loss it has suffered by reason of the Purchaser's default. The compensation shall not exceed that part of the purchase price which is attributable to that part of the Product in respect of which the Contract is terminated.

8. ALTERATIONS AND CANCELLATION

8.1 If the Purchaser requests an alteration of the Contract, and Supplier accepts such alteration (which acceptance shall not be unreasonably withheld), the alteration will be deemed as a new Contract entitling Supplier to a restart of the Delivery time which will start to run on the date of the approval in writing by Supplier of the alteration.

8.2 All additional costs incurred as a result of the alteration will be charged to the Purchaser, in addition to the purchase price.

8.3 If the Purchaser cancels the Contract in whole or in part without cause, the Purchaser shall, unless otherwise agreed in writing, reimburse Supplier for (i) all costs and expenses incurred by Supplier under the Contract up until and including the date of cancellation, and (ii) any additional costs and expenses incurred as a result of the cancellation.

9. PRICES AND PAYMENT

9.1 The purchase price shall be the price for such Products set out in Supplier's price list as of the date for Delivery if not specifically set forth in the Contract. For domestic sales, payments shall be made within 30 days of the date of the invoice in the currency stipulated in the Contract, unless otherwise agreed in writing. For export sales, full payment in advance by telegraphic transfer is required in the currency stipulated in the Contract, unless otherwise agreed in writing.

9.2 Whatever the means of payment used, payment shall not be deemed to have been effected until Supplier's account has been fully and irrevocably credited.

9.3 If the Purchaser fails to pay by the stipulated date, Supplier shall be entitled to interest from the day on which payment was due. The statutory law interest rates shall apply.

9.4 In case of late payment, Supplier may suspend its performance of the Contract until payment is received.

9.5 Notwithstanding other rights to terminate the Contract under other clauses in these General Conditions, the Supplier shall, if the Purchaser has not paid the amount due within three (3) months, be entitled to terminate the Contract by notice in writing to the Purchaser and to claim compensation for the loss it has incurred.

9.6 Unless otherwise agreed to in writing, all prices are FCA Supplier's plant, and do not, even if Delivery is DAP in accordance with Clause 6.1 above, include transportation costs or charges relating to transportation. This means that in addition to the Product price, Purchaser shall compensate Supplier for all its transportation costs and charges, as set out in invoice from Supplier to Purchaser, despite that DAP delivery applies and such costs and charges shall thus be solely the responsibility of the Purchaser. Prices exclude special packing unless otherwise agreed to by Supplier in writing. All costs and taxes for packing shall be paid by the Purchaser as an additional charge. Such costs and charges are subject to change without notice.

9.7 The price for the Products does not include any applicable sales, use, excise, GST, VAT, or similar tax. The Purchaser shall have the responsibility for the payment of such taxes if applicable.

9.8 If, during the performance of the Contract, the financial condition of the Purchaser is such that Supplier in good faith and in application of usual banking standards deems a payment in time insecure, or if a material change in the ownership of the Purchaser occurs, or if the Purchaser fails to make any payments in accordance with the terms of its Contract with Supplier, then, in any such event, Supplier is not obligated to continue performance under the Contract and may stop goods in transit and defer or decline to make delivery of goods, except upon receipt of satisfactory security or cash payments in advance.

9.9 If the Purchaser fails to make payments or fails to furnish security satisfactory to Supplier, then Supplier shall have the right to enforce payment to the full Contract price of the work completed and in process.

9.10 Upon default by the Purchaser in payment when due, the Purchaser shall immediately pay to Supplier the entire unpaid amounts for any and all shipments made to the Purchaser irrespective of the terms of said shipment and whether said shipments are made pursuant to this Contract or any other contract of sale between Supplier or any of its affiliates and the Purchaser, and Supplier may withhold all subsequent shipments until the full amount is settled. Acceptance by Supplier of less than full payment shall not be a waiver of any of its rights hereunder.

10. WARRANTY, PURCHASER'S DUTIES IN WARRANTY CASES, REIMBURSEMENT OF EXPENSES, LIABILITY

10.1 Purchaser´s warranty claims depend on his proper compliance with his statutory duties of examination and notification. Notifications have to include specific information on the alleged defect and shall be in writing. Notifications based on incomplete delivery or other obvious defects shall be notified to Supplier in writing without delay, but at the latest within 10 working days of the delivery arriving at its destination. Claims of Purchaser on account of a defectiveness or incompleteness are excluded if Purchaser fails to comply with this obligation.

10.2 In the case of product defects Supplier can elect to remove the defects or to provide a defect-free replacement. Only if this repeatedly fails or is unreasonable and the defect is not only insubstantial Purchaser is entitled to rescission or reduction of the purchase price in accordance with the statutory provisions. Sec. 445a BGB remains unaffected. Purchaser is entitled to claims for damages in accordance with Clause 10.5.

10.3 Concerning any replacement of products or removal of defects a warranty period of 3 months since delivery respectively the execution of service applies which runs, however, at least until the expiry of the warranty period of the original service (see Clause 10.7).

10.4 Purchaser has to inform Supplier immediately about each indication of product defects by his clients concerning Supplier's services. Should Purchaser not fulfil this obligation his claims for product defects against Supplier shall expire. Moreover, Purchaser has to safeguard proofs in adequate manner and to give Supplier the opportunity of examination at his request.

10.5 Supplier is liable without restriction under the Product Liability Act, in the event of an express assumption of a warranty or of a procurement risk or in the event of willful or grossly negligent violations of a duty. Supplier is also liable without restriction in the event of willful or negligent injury to life, physical well-being or health. In the event of Supplier's negligence (other than gross negligence) resulting in property or pecuniary damage, Supplier shall only be liable for a breach of essential contractual duties the fulfillment of which is inevitable for the proper performance of the contract and Purchaser can particularly rely on, however, limited to characteristic damages that were foreseeable at the time of signature.

10.6 No warranty is given for damages of all kind caused by improper treatment, change, installation and/or operation of the delivered product or by incorrect advice or instruction by Purchaser unless Supplier has caused those damages at least negligently.

10.7 Defect claims shall become time-barred after 12 months as of the statutory commencement of the limitation period. The same applies to legal defects. In the event of wilful or grossly negligent breaches of a duty, claims arising from tortious acts, the absence of a warranted quality, the assumption of procurement risks or personal injury, the statutory time periods apply. Secs. 438 para. 3, 445b and 634a para. 3 BGB remain unaffected.

10.8 A further-reaching liability for damages than that provided in the paragraphs of this Clause 10. is excluded - without regard to the legal nature of the asserted claim.

10.9 The aforementioned restrictions of liability also apply, in terms of the reason and amount, in favour of Supplier's statutory representatives, employees and other vicarious agents.

11. ALLOCATION OF LIABILITY FOR DAMAGE CAUSED BY THE PRODUCT

11.1 Supplier shall not be liable for any damage to property or the environment caused by the Product after it has been delivered to the Purchaser. Nor shall Supplier be liable for any damage to products manufactured by the Purchaser, or to products of which the Purchaser's products form a part.

11.2 The Purchaser shall indemnify, defend and hold Supplier harmless to the extent that the Supplier incurs liability towards any third party in respect of loss or damage for which the Supplier is not liable according to the preceding paragraph.

11.3 If a claim for damages as described in this Clause 12 is lodged by a third party against one of the Parties, the latter party shall forthwith inform the other party thereof in writing.

11.4 Supplier and Purchaser shall be mutually obliged to let themselves be summoned to the court or arbitral tribunal examining claims for damages lodged against one of them on the basis of damage allegedly caused by the Product.

12. CONFIDENTIALITY

The Parties agree that any information received from the other party in connection with the Contract that evidently or by its nature should reasonably be understood to be confidential, shall not be disclosed by the recipient to any third party without the prior written approval of the disclosing party, except to the extent (i) this is necessary for the receiving party to exercise rights and perform duties pursuant to the Contract, (ii) the information is available to the general public or later becomes publicly available other than through a breach of the Contract, (iii) the information is actually known to the receiving party on the date that such information is disclosed as evidenced

by written records in existence prior to the date of the receipt, (iv) the information is subsequently lawfully obtained by the receiving party from a third party or third parties, or (v) the information is independently developed by the receiving party prior to the disclosure.

13. FORCE MAJEURE

13.1 Either party shall be entitled to suspend performance of its obligations under the Contract to the extent that such performance is impeded or made unreasonably onerous by any of the following circumstances: industrial disputes and any other circumstance beyond the control of the parties such as pandemic, fire, earthquake, natural disaster, acts of God, war, extensive military mobilization, insurrection, requisition, seizure, embargo, acts of governments, strikes, lockouts, restrictions in the use of power and defects or delays in deliveries by sub-contractors ("Force Majeure").

13.2 The party claiming to be affected by Force Majeure shall notify the other party in writing without delay on the intervention and on the cessation of such circumstance.

13.3 If Force Majeure prevents the Purchaser from fulfilling its obligations, it shall compensate Supplier for expenses incurred in securing and protecting the Product.

13.4 Regardless of what might otherwise follow from these General Conditions, either party shall be entitled to terminate the Contract by notice in writing to the other party if performance of the Contract is suspended under this Clause 14 for more than six (6) months.

13.5 If the Purchaser terminates the Contract due to Force Majeure, the Purchaser shall, unless otherwise agreed in writing, reimburse Supplier for (i) all costs and expenses incurred by Supplier under the Contract up until and including the date of the termination and (ii) any additional costs and expenses incurred as a result of the termination.

14. ASSIGNMENT

The Purchaser shall not assign or transfer this Contract or any interest in it, or monies payable under it, without the prior written consent of Supplier and any assignment made without such consent shall be null and void. Supplier may assign its rights and/or delegate its duties in whole or in part to any affiliated company. Supplier shall notify Purchaser of any such assignment or delegation.

15. INVALIDITY

If any provision of this Contract is held to be illegal, invalid, or unenforceable by any court of competent jurisdiction, such provision will be of no force and effect, but the illegality, invalidity, or unenforceability will have no effect upon and will not impair the enforceability of any other provision of this Contract. The illegal, invalid or unenforceable provision shall be deemed to be substituted by a suitable provision which, to the extent legally permissible, comes as close as possible to the intent and purpose of the illegal, invalid or unenforceable provision. The same shall apply if the parties have unintentionally failed to address a certain matter in this Contract.

16. EXPORT REGULATIONS

The Purchaser has to comply with all legal provisions and administrative requirements as well as all other applicable laws, and in particular export regulations and the laws of the country in which the Purchaser operates. The Purchaser has to obtain all necessary approvals and licenses as well as all necessary permissions in good time, which are, according to all these applicable laws, required for the use or the export of the delivery item.
The Supplier is entitled to withhold his goods and services vis-à-vis the Purchaser if the Purchaser would violate those applicable laws or if not all necessary permissions are available and if this is not based on the Supplier's fault or responsibility.
The performance of the contract on the part of the Supplier is on condition that there are no opposing impediments due to national or international foreign trade legislation as well as embargos (and/or other sanctions).
The US Export Administration Regulations (EAR) are equally to be respected. Rights and duties of the Purchaser according to this clause endure after the expiration and premature termination of this Contract.

17. PLACE OF PERFORMANCE

Place of performance shall be the Supplier's place of business.

18. DISPUTES AND APPLICABLE LAW

18.1 All disputes arising out of or in connection with the Contract shall be finally settled by the competent courts of Weilheim, Germany, yet it is in the discretion of the Supplier to initiate court proceedings also at the Purchaser's place of business or, in disputes regarding bills of exchange, at the place of payment of the bills of exchange.

18.2 The Contract shall be governed by the substantive law of Germany, excluding the application of the Convention on International Sales of Goods (CISG).

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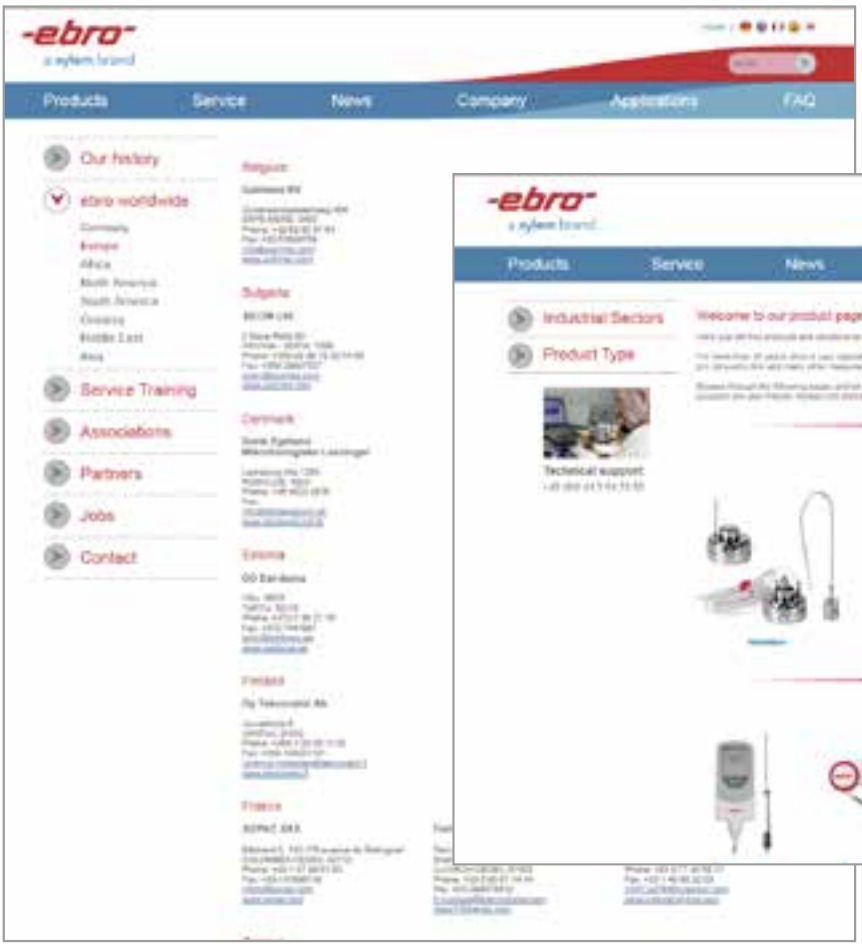
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Maintenance, Fieldservice & Calibration at customers location

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