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GREISINGER
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Operating manual

Alarm-Thermometer waterproof

As of version 1.0

Gourmet Thermometer

CE

- Please carefully read these instructions before use!
- Please consider the safety instructions!
- Please keep for future reference!

Made in Germany

WEEE-Reg.-Nr. DE

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1 Safety

1.1 General note

Read through this document attentively and make yourself familiar to the operation of the device before you use it. Keep this document in a ready-to-hand way in order to be able to look up in the case of doubt. Mounting, start-up, operating, maintenance and removing from operation must be done by qualified, specially trained staff that have carefully read and understood this manual before starting any work.
The manufacturer will assume no liability or warranty in case of usage for other purpose than the intended one, ignoring this manual, operating by unqualified staff as well as unauthorized modifications to the device. The manufacturer is not liable for misprints.

1.2 Intended Use

The device is covered to measure temperature in different mediums.

To connect different Pt1000 probes, the device is equipped with a BNC socket. By selecting a suitable temperature probe, it is possible to use the device in different applications.

You can find an extract of the available temperature probes in the following table.

Temperature probe	**Application**	**Porperties**
Robust insertion probe Ø 3 mm	• liquids • soft media	• Long-duration measuring to 400 °C
extra thin insertion probe Ø 1.5 mm	• meat (not frozen)	• Fast measuring < 1s

**) alternative for easy handling, "without cable":*

Personnel which starts up, operates and maintains the device has to have sufficient knowledge of the measuring procedure and the meaning of the resulting measured values, this manual delivers a valuable help for this. The instructions of the manual have to be understood, regarded and followed.

The manufacturer will assume no liability or warranty in case of usage for other purpose than the intended one, ignoring this manual, operating by unqualified staff as well as unauthorized modifications to the device.

1.3 Qualified staff

All instructions have to be well understood and complied with.
To be sure that there´s no risk arising due to misinterpretation of measured values, the operator must have further knowledge in case of doubt - the user is liable for any harm/damage resulting from misinterpretation due to insufficient knowledge.

1.4 Safety signs and symbols

Warnings are labeled in this document with the followings signs:

Caution! This symbol warns of imminent danger, death, serious injuries and significant damage to property at non-observance**.**

Attention! This symbol warns of possible dangers or dangerous situations which can provoke damage to the device or environment at non-observance.

Note! This symbol point out processes which can indirectly influence operation, possibly cause incorrect measurement or provoke unforeseen reactions at non-observance.

1.1 Reasonably foreseeable misuse

This device must not be used at potentially explosive areas!

Do not use these products as safety or emergency stop devices or in any other application where failure of the product could result in personal injury or material damage.
Failure to comply with these instructions could result in death or serious injury and material damage.

This device must not be used at a patient for diagnostic or other medical purpose.

1.2 Safety guidelines

This device has been designed and tested in accordance with the safety regulations for electronic devices. However, its trouble-free operation and reliability cannot be guaranteed unless the standard safety measures and special safety advises given in this manual will be adhered to when using the device.

This device must not be used at potentially explosive areas! The usage of this device at potentially explosive areas increases danger of deflagration, explosion or fire due to sparking.

If there is a risk whatsoever involved in running it, the device has to be switched off immediately and to be marked accordingly to avoid re-starting.
Operator safety may be a risk if:
- there is visible damage to the device
- the device is not working as specified
- the device has been stored under unsuitable conditions for a longer time.

In case of doubt, please return device to manufacturer for repair or maintenance.

Due to the pointed probe design there is a risk of stitch injury for devices with insertion probe.

Trouble-free operation and reliability of the device can only be guaranteed if the device is not subjected to any other climatic conditions than those stated under 13 Specification.If the device is transported from, a cold to a warm environment condensation may cause in a failure of the function. In such a case, make sure the device temperature has adjusted to the ambient temperature before trying a new start-up.

Consider when measuring in food:

According to the regulation (EG) 1935/2004 the following parts of the equipment are laid-out for the permanent contact with food:

The stainless steel tube from the temperature probe of the measuring tip till approx. 1 cm before

GF 1T	GF 2T	GF 3T
Probe handle	Plug	Stainless steel braiding

Probe handle, connector cable and the device housing are not construed for the permanent contact with food.

2 Product description

2.1 Scope of delivery

The scope of supply includes:

- Device with 2 batteries type AA
- Temperature sensor GF 3T-E3-B-BNC
- Temperature sensor GF 2T-E1,5-B-BNC (without cable)
- Operating Manual
- Calibration protocol
- Case

2.2 Operating and Maintenance

Battery operation:
If the battery has been used up and needs to be replaced, the empty frame of the battery symbol starts blinking. The device will, however, continue operating correctly for a certain time.

The battery has been completely used up, if ´ bAt ´ is shown in the main display.
Battery replacement: (see chapter 8 Adjustment of temperature input).

Temperature measuring / probe connection:
To optimize the accuracy, an offset and a slope correction can be executed, (take a look at chapter 8).

Treat device and probes carefully. Use only in accordance with above specification. (do not throw, hit against etc.). Protect plug and socket from soiling.

The battery has to be removed, when storing device above 50°C.
We recommend taking out the batteries if device is not used for a longer period of time.

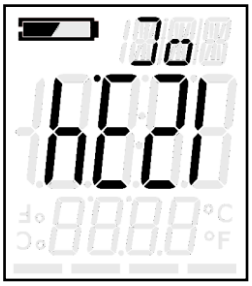
3 Operation

3.1 Display elements

Display “segment test“

1	**Battery symbol:**	Rating of battery state
2	**Units display:**	Measured value units or display for “min/max/hold”
3	**Main display:**	Current temperature measured value or value ”min/max/hold”
4	**Auxiliary display:**	Current temperature value in the mode “min/max/hold” (with according unit)
5	**No function**	

3.2 Pushbuttons



“Overhead-display“

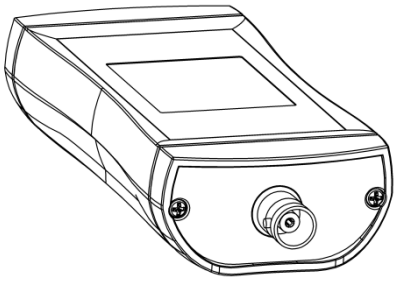
Key on/off, backlight
press shortly: switch on device
switch on/off backlight
press long: switch off device
In the menu:
press long: discard changes,
device is switched off

Function key
press shortly: hold and freeze measured value
press long: invoke menu
In the display “The saved value”:
press shortly: return to the measured value display
In the menu:
press shortly: select next parameter
press long: save settings,
exit menu

Keys up/down:
press shortly: indicated value “min. or max”
press long: reset the “min-, / max-”value (to current measuring value)
In the menu:
change the selected current parameter

Turn display (”Overhead-display“)
press both keys until display is turned
(orientation will be saved)

3.3 Connections



BNC- socket:
connection for temperature probe

Usage of BNC plug:
Lock/ unlock with turnable ring at cable socket.

ATTENTION

The connections are only waterproofed when a plug declared as waterproof is connected

4 Start operation

Be sure that suitable batteries are inserted (see chapter 10 Replacing batteries).
Turn device on via key “on/off”.
After segment test the device displays some information about his configuration in the “auxiliary display”:

t.oF If there are made a zero point correction for the temperature (see chapter 8 Adjustment of temperature input).

t.SL If there are made a slope correction for the temperature probe (see chapter 8 Adjustment of temperature input).

PoFF If “auto-power-off” is active - after the set time the instrument is switched off if no key is pressed (see chapter 7 Configuration).

When using interchangeable probes the accuracy of the whole measuring instrument can be optimized with slope- and zero point correction. (see chapter 8 Adjustment of temperature input).
Attention: If a correction is done this is only suitable for this specific probe.

After that the device is ready for measuring.

5 Basics of the measurement

5.1 Possible errors

5.1.1 Immersion depth

For measurements in liquids the probe should be immersed sufficiently deep (depending on probe diameter, at least 20 mm with Ø 3 mm and 10 mm with Ø 1.5 mm) and subsequently stirred.

When measuring gases the probe should also emerge as deep as possible in the gas to be measured (e.g. when measuring in channels/pipes) and the gas should flow around the probe at sufficient flow.

5.1.2 Surface effects and bad heat transfer

For surface temperature measurements special surface probes are necessary. Surface quality, heat transfer and ambient temperature have an influence on the measurement result.

5.1.3 Cooling (evaporation)

For air temperature measurements, the probe should be dry, otherwise it can be possible that a too low temperature could be measured.

5.1.4 Response time

Before reading the measured value at the measuring process, it is necessary to wait a sufficient time (see chapter 13 Specification – Response time 90).

6 Temperature probe

6.1 Probe accuracy/device accuracy

The device can be equipped with different interchangeable temperature probes. These are classified into the following classes (EN 60751):

Class	Maximum deviation	Are of validity
B	± 0.3 °C at 0 °C ± 0.5 % of measured value	-50 … 250 °C
A	± 0.15 °C ± 0.2 % of measured value	-30 … 250 °C
AA (=1/3 DIN B)	± 0.1 °C ± 0.17 % of measured value	0 … 150 °C

To receive high exchange accuracy without necessity of additional adjustment (see chapter 8 Adjustment of temperature input) we recommend the usage of temperature probes from the class “A” or “AA”.

Do not touch the hot temperature sensor or cable during the cooking process or directly thereafter with your bare hands. Always wear heat-resistant gloves.

6.1.1 Extra-thin insertion sensor

GF 2T Pt1000 – Precise, waterproof, extra-thin Class B insertion sensor for quick measurements. Is suitable for use in gases, liquids and soft plastic materials. The stainless steel tube of the extra-thin insertion sensor is designed for permanent contact with food.

6.1.2 Durable insertion sensor

GF 3T Pt1000 – The Class B insertion sensor is suitable for use in gases, liquids and soft plastic materials. The stainless steel tube of the insertion sensor is designed for permanent contact with foods. The 1-metre-long glass fibre insulated cable is encased with a stainless steel braided jacket, heat-resistant to 400 °C and equipped with a BNC plug connector. Ideal for long-term measurements in ovens or grills.
It can be cleaned with a damp cloth.

Water or moisture in the cable can cause produce faulty measurements. The error can be corrected by drying the cable.

7 Configuration

Some menu points depend on current device settings.

invoke menu	next parameter	change parameter	confirm settings	discard changes
		 press shortly: single step hold key: fast change		

Press the “function key” long, until the menu is invoked and the first parameter is displayed (auxiliary display shows “RL.“).

Press the “function key” shortly to select the next parameter. The parameter can be changed by pressing the keys “up/down”. After the last parameter or by pressing the “function key” long the settings will be confirmed and the menu exits. In order to discard changes switch off the instrument. When the device is switched on again it will start with the former configuration.

When the value “YES“ is selected for the parameter “In it“ and confirmed by pressing the “function key”, the device will be reset to the factory settings.
If no key is pressed for more than two minutes the configuration will be aborted (display: “C.End“). All changes will be discarded!

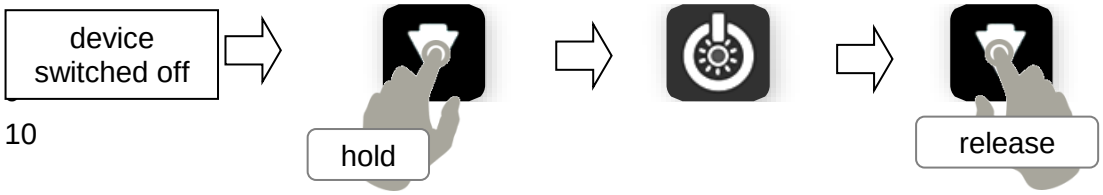
Parameter	Werte	Bedeutung
		
RL	**Alarm**	
	oFF	No alarm function
	on	Alarm via text display, buzzer and backlight flash
	bEEP	Alarm via text display and buzzer
	Li tE	Alarm via text display and backlight flash
RL.Lo	-70.0 (* … RL.Hi	Min-alarm limit Alarm starts when measuring value falls below the limit (* or -94.0 °F - on G 1700 from -200.0 °C or -328.0 °F
RL.Hi	RL.Lo … 250.0 (*	Max-alarm limit Alarm starts when measuring value exceeds the limit (* or 482.0 °F - on G 1700 to 450.0 °C or 842.0 °F
PoFF	**Auto-power-off function**	
	oFF	No auto-power-off
	15, 30, 60, 120, 240	Automatically turn of device, when no key is pressed during the selected value (in minutes)
Li tE	**Backlight**	
	oFF	Backlight disabled
	15, 30, 60, 120, 240	Automatically turn of backlight, when no key is pressed during the selected value (in seconds)
	on	Backlight will not be turned off automatically

Unit	**Temperature unit**	
	°C	Display temperature in °C
	°F	Display temperature in °F
Init	**Restore factory settings**	
	no	Keep current configuration
	YES	Load factory settings (display: "Init donE")

During menu exit, the changes are stored ("Stor") – if necessary the device will be restarted automatically.

8 Adjustment of temperature input

Invoke menu:



Hold the key "down"during **switching on** the device until "t.oF"is shown in the auxiliary display.

The menu can be used like described in chapter 7 Configuration.

Parameter	Value	Description
t.oF	**Zero point adjustment of the temperature measurement**	
	0.00 (oFF)	No zero point adjustment for temperature measurement
	-5.00 … 5.00	Offset of temperature measurement in °C (or -9.00 … 9.00 °F)
t.SL	**Slope adjustment of temperature measurement**	
	0.00 (oFF)	No slope adjustment for temperature measurement
	-5.00 … 5.00	Slope correction of temperature measurement in [%]

The temperature input can be adjusted with offset (t.oF) and scale (t.SL). A reasonable adjustment presumes reliable references (e.g. ice water, controlled precision water bath, etc.).
If the inputs are adjusted (i.e. offset and scale are different from factory settings) the device will shortly display "t.oF"/ "t.SL" after turned on.

Default setting for offset and scale are "oFF"= 0.00, i.e. inputs are not changed.

Zero point correction:

Displayed value = measured value –" t.oF"

Zero point and slope correction:

Displayed value = (measured value - t.oF) • (1 + t.SL / 100)

Displayed value °F = (measured value °F - 32°F - t.oF) • (1 + t.SL / 100)

Example: Before starting the measurement, the values for "t.oF" and "t.SL" are set to "0.00 (oFF)" – "°C" is selected for the parameter "Unit". For reference in a water bath, a clinical thermometer is used.
Display value in ice water (given value offset = 0.0 °C):
Display val. offset = -0.2 °C
Display value in water bath (given value slope = 37.0 °C):
Display val. slope = 36.6 °C

Calculation: t.oF= display value offset - given value offset= -0.2 °C – 0.0 °C = -0.2 °C
t.SL = (given value slope / (display val. slope - t.oF) - 1) * 100
= (37.0 °C / (36.6 °C - (-0.2)) - 1) * 100 ≈ 0.54 (rounded)

9 Accuracy check / adjustment service

You can send the device to the manufacturer for adjustment and inspection.
Calibration certificate - DKD certificate - official certifications:
If the measuring instrument is supposed to receive a calibration certificate, it has to be sent to the manufacturer (declare test points, e. g. –20 °C; 0°C; 70°C).
If the device is certificated together with a suitable sensor very high overall accuracies are possible.
Basic settings can only be checked and – if necessary – corrected by the manufacturer.
A calibration protocol is enclosed to the device ex works. This documents the precision reached by the production process.

10 Replacing batteries

The use of damaged or unsuitable batteries could lead to further heating, whereby the batteries can burst or in the worst case exploding.

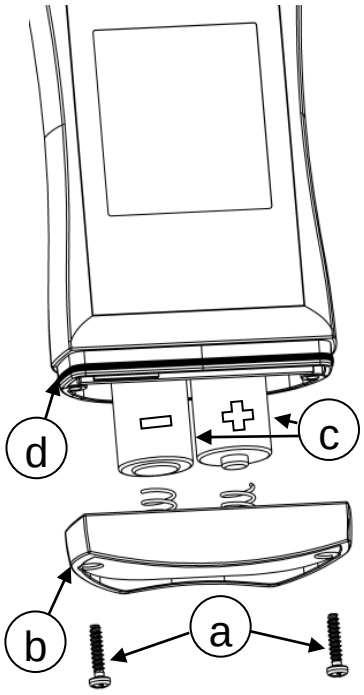
Before changing batteries, please read the following instruction and follow it step by step. Not following the instruction may cause harm to the instrument or the protection against ingress of water and dust may be lost! Avoid unnecessary opening of the instrument!

Unnecessary disassembly puts the device at risk, i.e. the water tightness of the device, and should be avoided.

Do not use different types or batteries with different state of charge. We recommend using new and high quality alkaline batteries.

10.1 Required tools: 1x Phillips screwdriver PH 1

1) Unscrew the two screws (a) and remove the cover (b).
2) Exchange the two batteries (type: AA) (c) carefully. Ensure correct polarity – the correct position of the batteries is drafted on the circuit board. The batteries must slide in without force.
3) Check: O-ring seal (d) undamaged, clean and in the intended cavity? To make the assembly easier and prevent damage, a dry O-ring can be greased with suitable grease.
4) Put on the cover (b) straight. The device is starting automatically. Note: the O-ring (d) has to been in the cavity, when pushing on the cover (b)
5) Tighten the screws (a).



11 Fault and System Messages

Error messages for measurement		
	Description	What to do?
Keine Anzeige oder wirre Zeichen, Gerät reagiert nicht auf Tastendruck	Battery empty	Replace battery (see chapter 10 Replacing batteries)
	System error	Open battery cover, wait briefly, close again (see chapter 10 Replacing batteries)
	Device defective	Return to manufacturer for repair
Err.1	Measured value above allowable range	Check: temperature not within sensor range? -> measuring value to high!
	defective probe	Return to manufacturer for repair
Err.2	Measured value below allowable range	Check: temperature not within sensor range? -> measuring value to low!
	defective probe	Return to manufacturer for repair
SYS Err	System error	Switch off the device and switch on again - when the error remains return to manufacturer for repair
bAt	battery is ultimately exhausted	(See chapter10 Replacing batteries)
----	Could not calculate display value	
	• no suitable probe connected	Check: is a suitable Pt1000 probe connected?
	• measuring range or input range exceeded	Check: is the value in the permitted range?
	• defective probe	Return to manufacturer for repair

12 Reshipment and disposal

12.1 Reshipment

All devices returned to the manufacturer have to be free of any residual of measuring media and other hazardous substances.
Measuring residuals at housing or sensor may be a risk for persons or environment

Use an adequate transport package for reshipment, especially for fully functional devices.
Please make sure that the device is protected in the package by enough packing materials.
Add the completed reshipment form of the GHM website
http://www.ghm-messtechnik.de/downloads/ghm-formulare.html.

12.2 Disposal

Dispense exhausted batteries at destined gathering places The device must not be disposed in the unsorted municipal waste! Send the device directly to us (sufficiently stamped), considering the above if it should be disposed. We will dispose the device appropriate and environmentally sound.
Private user can return the device at the municipal collection points for small electrical appliances.

13 Specification

13.1 Device

Measuring range temperature		-200.0 … +450.0 °C (-328.0 ... +842.0 °F) – Observe the allowed range of application for the probe!	
Temperature accuracy		-20... +100 °C: ± 0,1 K ± 1 digit Else: ± 0. 2 % v. MW. ± 2 digit Plus. probe deviations, e.g. class A (see chapter 5 Basics of the measurement)	
Measuring cycle		Approx. 2 measuring per second	
Probe connections		BNC connector for Pt1000 probe (EN 60751)	
Display		3-lines segment-LCD, additional symbols, illuminated (white, lighting time adjustable)	
Additional functions		Min/max/hold, alarm (optical and acoustical)	
Comparison		Offset- and slope adjustment	
		Break-proof ABS-housing	
	Protection class	Without connected probe not waterproof	With connected probe waterproof IP67 water jet protected IP65
	dimensions L*B*H [mm]	108 * 54 * 28 mm without BNC connector or. bend protection. 130 g inc. battery without sensor	
Working conditions		-20 to 50 °C; 0 to 95 % r.F. (shortly 100 % r.F.)	
Storage temperature		-20 to 70 °C	
		2*AA-batteries (scope of delivery)	
	Power consumption/ Battery life	Approx. 0.4 mA, with lighting approx. 2 mA Life time > 5000 hours for alkaline batteries (without backlight).	
	Battery indicator	4 state battery status display Exchange notice if battery is low: "bAt"	
Auto-Power-Off-Function		If activated, the device is switched off automatically	
Directives and standards		The instruments confirm to following European directives: 2014/30/EU EMV directives 2011/65/EU RoHS Applied harmonized standards: Angewandte harmonisierte Normen: EN 61326-1:2013 emissions level: class B emi immunity according to table 2 additional error: < 0.5 % FS EN 50581:2012 The device is for the mobile application or for the stationary operation in the course of specified working conditions without further restrictions construed.	

13.2 Probe

		GF 2T-E1,5-B-BNC	GF 3T-E3-B-BNC
Sensor element		Pt1000 2-conductor	Pt1000 2- conductor
Measuring range		-70 ... +250 °C (probe tip)	-70 ... +400 °C (probe tip)
Sensor tube		1.4404 (V4A)	1.4404 (V4A)
Connection		BNC connector with EPDM spout up to +75 °C	BNC connector with EPDM spout up to +75 °C
Response time T_{90}		Ø 1.5 mm: Water 0.4 m/s <1 s, air 2 m/s ca. 12 s	Ø 3 mm: Water 0.4 m/s <10 s, air 2 m/s ca. 40 s
Protection class		waterproof IP67 water jet protected IP65	not waterproof
	Class	B	B
	Maximum deviation	±0.3 °C at 0 °C ±0.5 %	±0.3 °C at 0 °C ±0.5 %
	Scope	-50 … +250 °C	-50 … +400 °C