



Operating manual

Quick-Response Double / Difference Thermometer

as of version 4.0

GMH 3221



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



WEEE-Reg.-Nr. DE 93889386

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1 General Note

Read this document carefully and get used to the operation of the device before you use it. Keep this document within easy reach near the device for consulting in case of doubt.

2 Safety

2.1 Intended Use

This device is designed for temperature measurement.

You can plug in up to 2 thermocouple sensors with Miniature-DIN-plug.

If you use two sensors, you can measure two different temperatures as well as the difference between them.

The device features a lot of useful features as for example min-/max-alarm, hold, correction factor for surface measurement, interface etc.

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.

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.

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 safety requirements (see below) have to be observed.

The device must be used only according to its intended purpose and under suitable conditions.

Use the device carefully and according to its technical data (do not throw it, strike it, ...). Protect the device from dirt.

2.2 Safety signs and symbols

Warnings are labelled 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.

2.3 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.

1. 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 chapter 11 Specification.
2.  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.
3.  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.
4.  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.
5.  This device is not constructed for use in medical applications.
6.  Temperature sensor:
There is a risk of stitch injury by using insertion probs. When measuring high temperatures there is a risk of burn, also due to residual heat of the sensor tube.
7.  Consider when measuring in food:
The device housing is not construed for the permanent contact with food.
Keep in mind to use temperature-probes which are suitable for the use in food only.

3 Product Specification

3.1 Scope of delivery

The scope of supply includes:

- Device with battery
- Operating manual

3.2 Operation and maintenance advice

- **Battery operation:**

If 'bAt' is shown in the lower display the battery has been used up and needs to be replaced. However, the device will operate correctly for a certain time. If 'bAt' is shown in the upper display the voltage is too low to operate the device; the battery has been completely used up.



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

- Treat device and sensor carefully. Use only in accordance with above specification. (do not throw, hit against etc.). Protect plug and socket from soiling.
- Connecting/changing sensors



To disconnect thermocouple sensor plug do not pull at the cable but at the plug

Selection of types of thermocouples: Prior to carrying out a measurement make sure to check if device is set to the thermocouple type used (type is shown on the display shortly after unit has been switched on). Unless the correct thermocouple is set, temperature measurements will be incorrect!

4 Handling

4.1 Display



- Main display:** measuring value of **sensor 1**
- Arrows show display options.
- Secondary display:** measuring value of **sensor 2** or **difference sensor 1 – sensor 2**
- Corr:** appears if offset- or scale correction is <> state of delivery.
- Alarm:** not in use
- Tare:** appears if tare-function is active. Only with difference measurement.
- Logg:** not in use

4.2 Basic Operation



On / Off



min/max measuring:

press short: shows the min./max. value



press again: hides min./max. value



press 2 sec.: clears particular value

Tare: (only with 'DIF'-display and two connected sensors)



press short: the difference CH1 – CH2 will be set to 0

press 2 sec.: deactivates tare-function

Set/Menu:



press short: Choose secondary display:

Sensor 2 or difference sensor 1 – sensor 2

press long: calling of configuration

Store/Quit:

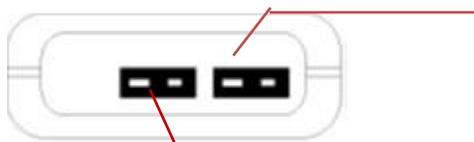


press short: hold-function, the last measuring value will be held.

press again: hold-function canceled

Please Note: Activating/deactivating tare clears the max- & min-memories.

4.3 Connections



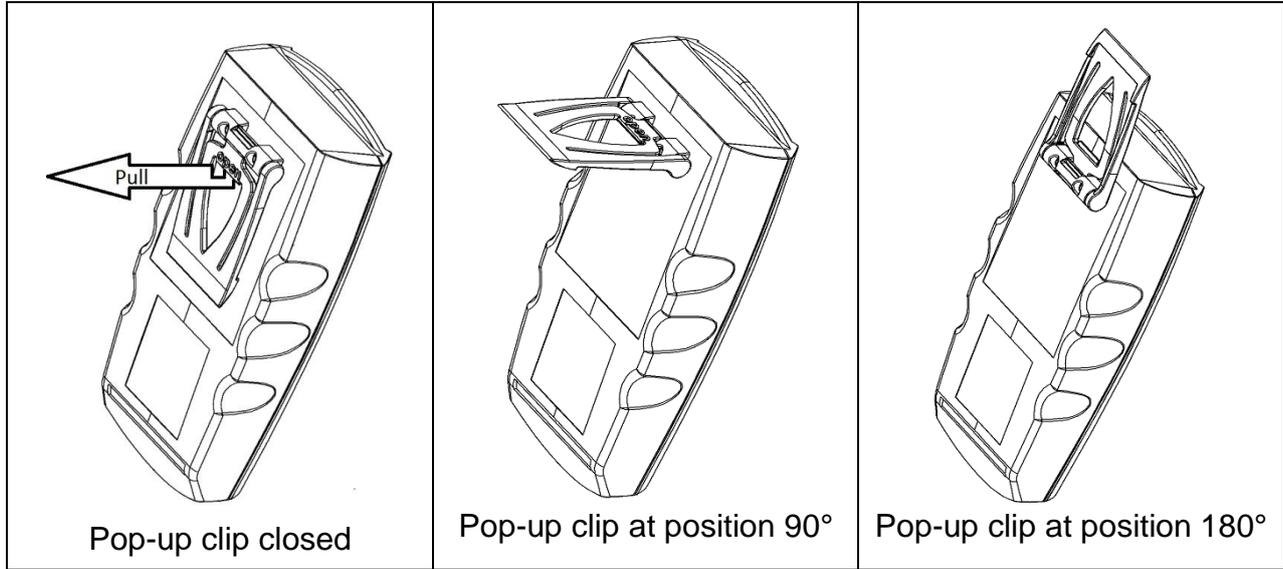
Sensor Connection CH1: channel 1

Sensor Connection CH2: channel 2

4.4 Pop-up Clip

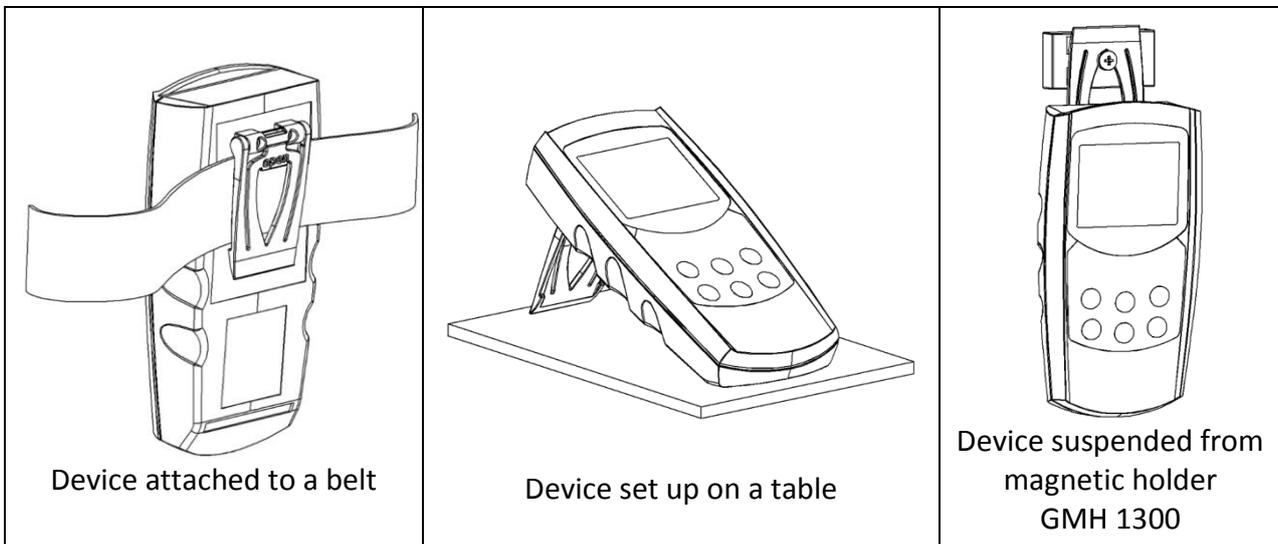
Handling:

- Pull at label “open” in order to swing open the pop-up clip.
- Pull at label “open” again to swing open the pop-up clip further.



Function:

- The device with a closed pop-up clip can be plainly laid onto a table or attached to a belt, etc.
- The device with pop-up clip at position 90° can be set up on a table, etc.
- The device with pop-up clip at position 180° can be suspended from a screw or the magnetic holder GMH 1300.



5 Start Operation

Connect sensor and turn on device via  key.

After segment test  the device is ready for measuring.

6 Configuration

To change device settings, press **Set** (key 4) for 2 seconds. This will call the configuration menu.

The parameters can be changed with **▲** (key 2) or **▼** (key 5).

Press **Set** again to go to the next setting.

Store (key 6) finishes the configuration and returns to standard measuring operation.

| Parameter | Values | Meaning |
|-----------|---------------------------------------|--|
| MENU | KEY ▲ or ▼ | |
| rES | 0.1° | Resolution: 0,1°C or °F |
| | 1° | Resolution: 1°C or °F |
| Unit | °C | Values in °C |
| | °F | Values in °F |
| P.oFF | 1-120 | Auto Power Off time in minutes |
| | oFF | Auto Power Off deactivated |
| Out | oFF | Function of the output: No output function, lowest power consumption |
| | SEr | Output is serial interface |
| Adr. | 01,11..91 | Base address of interface (if Out = SEr) |
| OFS.1 | -10.0°C..10.0°C or -18.0°F..10.0°F | The offset of sensor 1 will be displaced by this value to compensate for deviations in the Sensor or in the measuring device. |
| | oFF: | Zero point displacement is deactivated (=0.0°) |
| OFS.2 | -10.0°C..10.0°C or -18.0°F..10.0°F | The offset of sensor 2 will be displaced by this value to compensate for deviations in the Sensor or in the measuring device. |
| | oFF: | Zero point displacement is deactivated (=0.0°) |
| SCL.1 | -5.00..5.00 % | The measuring scale of sensor 1 will be changed by this factor [%] to compensate deviations of temperature probe or measuring device. |
| | oFF: | Correction factor is deactivated (=0.000) |
| SCL.2 | -5.00..5.00 % | The measuring scale of sensor 2 will be changed by this factor [%] to compensate deviations of temperature probe or measuring device. |
| | oFF: | Correction factor is deactivated (=0.000) |

7 Remarks To Special Features

7.1 Tare Function

The tare function is used to set the DIF-display to zero, which is especially important when monitoring temperature differences. If the tare key is pressed for more than 2 seconds DIF = CH1-CH2 will be restored. This function as well as the DIF-display can only be used with two sensors connected. If the tare function is activated, this will be shown by the tare arrow in the display.

7.2 Power off Time

If there won't be pressed any key and no interface communication takes place for the time of the power off time setting (P.Off), the device will be switched off automatically to save battery power.

If P.oFF = oFF then the automatic switch off is deactivated.

8 Adjustment

8.1 Zero Displacement Sensor 1 ('OFS.1') or Sensor 2 ('OFS.2')

A zero displacement can be carried out for the measured value:

$$\text{value displayed} = \text{value measured} - \text{offset}$$

Standard setting: 'off' = 0.0°, i.e. no zero displacement will be carried out. Together with the scale correction (see below) this factor is mainly used to compensate for sensor deviations. Input is in the display unit.

8.2 Scale Correction Sensor 1 ('SCL.1') or Sensor 2 ('SCL.2')

This setting influences the scale of the measuring (factor is in %):

$$\text{displayed value} = \text{measured value} * (1 + \text{Scal}/100)$$

Standard setting: 'off' = 0.000, i.e. value is not corrected. Together with the zero displacement (see above) this factor is mainly used to compensate for sensor deviations.

8.3 Calibration Services

Calibration certificates – DKD-certificates – other certificates:

If device should be certificated for its accuracy, it is the best solution to return it to the manufacturer.

Only the manufacturer is capable to do efficient recalibration if necessary to get results of highest accuracy!

9 Fault and System Messages

| Display | Meaning | What to do? |
|---|---|--|
|  | Low battery power, device will only continue operation for a short period of time | Replace battery |
|  | Battery empty | Replace battery |
| | Mains operation without battery: wrong voltage | Check power supply, replace it when necessary |
|  | No sensor connected | Connect sensor |
| | Connected sensor or device defective | If 2nd sensor available, check if device is ok. Return defective device/sensor to manufacturer for repair |
| | Value extremely out of measuring range | Check: right thermocouple selected. |
| No display or confused characters, device does not react on keypress | Battery empty | Replace battery |
| | Mains operation: wrong voltage or polarity | Check power supply, replace it when necessary |
| | System error | Disconnect battery and power supplies, wait shortly, then reconnect |
| | Device defective | Return to manufacturer for repair |
| Err.1 | Measured value above allowable range | Check: correct thermocouple selected. Temperature not within sensor range? -> measuring value to high! |
| | Sensor defective | Return to manufacturer for repair |
| Err.2 | Measured value below allowable range | Check: correct thermocouple selected. Temperature not within sensor range? -> measuring value to low! |
| | Sensor defective | Return to manufacturer for repair |
| Err.3 | Display range overflow | Check: value above 1999.9 -> too high to be displayed |
| Err.4 | Display range underflow | Check: value below -1999.9 (Tara?) -> too low |
| Er.11 | Value could not be calculated | A value, that is necessary for the calculation, is not available (no sensor) or faulty (over- / underflow) |
| | Calculation overflow happened | Choose different unit |
| Err.7 | System error | Check allowed working temperature of the device Return to manufacturer for repair |

10 Reshipment and disposal

10.1 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>.

10.2 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.

10.3 Decommissioning

When decommissioning, connections **must not** be in a condition that causes the connected evaluation electronics (e.g. interface) to trigger unexpected switching operations.

11 Specification

| | | |
|-----------------------------|--|----------------------|
| Thermocouples: | K (NiCr-Ni) | |
| Resolution: | 0.1°C or 1°C | 0.1°F or 1°F |
| Measuring range: | -220.0 ... +1372.0°C | -364.0 ... +1999.9°F |
| Accuracy: | (for thermocouples acc. to DIN EN 60584) ±1digit (at nominal temperature ± 5K) Type K ± (0.5°C. + 0.2% of measured value) | |
| Temperature drift: | 0.01%/K | |
| Point of comparison: | ±0.3°C | |
| Nominal temperature: | 25°C | |
| Measuring rate: | 4 meas./sec | |
| Sensor connection: | 2 connection sockets for miniature DIN-plug type K | |
| Display: | Two 4 ½ digit LCDs (12.4 mm high and 7 mm high) for measuring values, and for min/ max memories, hold function, etc. as well as additional functional arrows. | |
| Pushbuttons: | 6 membrane keys | |
| Power supply: | 9V battery (included in scope of supply) | |
| Power consumption: | approx. 1.2 mA | |
| Low battery warning: | ' bAt ' | |
| Working conditions: | -25 ... +50 °C, 0 ... 95 %RH (not condensing) | |
| Storage temperature: | -25 ... +70 °C | |
| Housing: | impact-resistant ABS, membrane keyboard, transparent panel, Front side IP65 | |
| Dimensions: | 142 x 71 x 26 mm (L x W x D) | |
| Weight: | approx. 155 g | |
| EMC: | The instruments confirm to following European Directives: 2014/30/EU EMC Directive 2011/65/EU RoHS Applied harmonized standards: EN 61326-1 : 2013 emissions level: class B emi immunity according to table 3 and A.1 Additional fault: <1% EN 50581 : 2012 | |