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EN

GREISINGER electronic GmbH

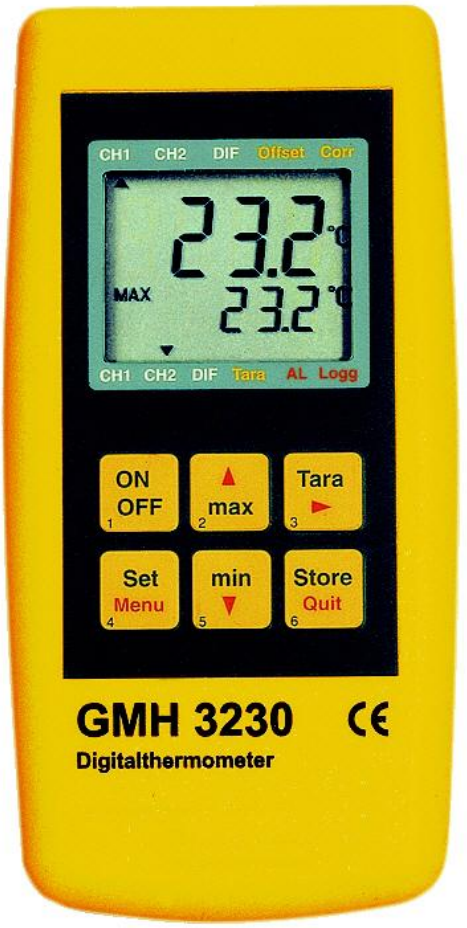
Quick-Response Double / Difference Thermometer

For Thermocouple Sensor Type J, K, N, S, T

as of version V2.9

Operating Manual

GMH 3230



CE

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1 Designated Use

This device is designed for temperature measurement.
You can plug in up to 2 thermocouple sensors with Minitur-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, real-time clock, interface etc.

2 General Note

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

3 Operating and Maintenance Advice

a) When to replace battery:
If ⚠ and ´bAt´ are shown in the lower display the battery has been used up and needs to be replaced. The device will, however, 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.

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

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

c) To disconnect sensor thermoelement plug do not pull at the cable but at the plug.

If plug is entered incorrectly the connecting pins of the plug can be damaged. => Plug can no longer be used and connecting cable needs to be replaced.

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

e) Mains operation:
When using a power supply device please note that operating voltage has to be 10.5 to 12 V DC.
Do not apply overvoltage!! Cheap 12V-power supply devices often have excessive no-load voltage. We, therefore, recommend using regulated voltage power supply devices. Trouble-free operation is guaranteed by our power supply devices. Trouble-free operation is guaranteed by our power supply, GNG10/3000.
Prior to connecting the plug power supply device with the mains supply make sure that the operating voltage stated at the power supply device is identical to the mains voltage.

4 Safety Requirements

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 "Specification".

2. 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.

3. If device is to be connected to other devices (e.g. via serial interface) the circuitry has to be designed most carefully. Internal connection in third party devices (e.g. connection GND and earth) may result in not-permissible voltages impairing or destroying the device or another device connected.

   Warning: If device is operated with a defective mains power supply (short circuit from mains voltage to output voltage) this may result in hazardous voltages at the device (e.g. sensor socket, serial interface).

4. 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.

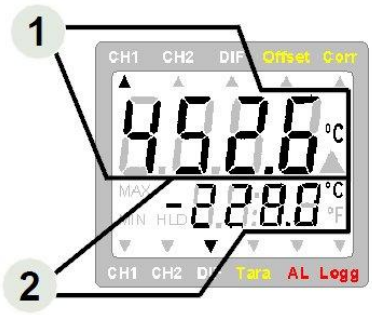
   In case of doubt, please return device to manufacturer for repair or maintenance.

5. **Warning:** 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.

5 Display and control elements

5.1 Display elements

Display with two sensors connected:



① **Main display:** possible views:

- CH1: sensor 1
- CH2: sensor 2
- DIF: sensor 1 - sensor 2

② **Secondary display**: possible views:

- CH1: sensor 1
- CH2: sensor 2
- DIF: sensor 1 - sensor 2

The desired view can be selected by pressing the Set Menu -key.

Display with one sensor connected:

① **Main display:** possible views:

- CH1: sensor 1
- CH2: sensor 2

Device automatically detects to which socket sensor is connected.

Special display elements:

① **Min/Max/Hold**:
shows if a min., max. or hold value is displayed in either the main or the secondary display.

② **Offset arrow**:
indicates that zero point offset (offset) is activated

③ **Corr arrow**:
indicates that correction factor is activated

④ **Warning triangle:**
indicates a low battery, full logger storage, etc.

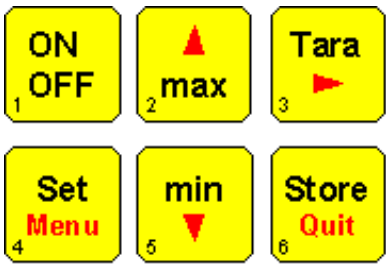
⑤ **Tare arrow:**
indicates that tare function is activated (for 'DIF'-display when working with two sensors only)

Display at reboot:

After switching on the instrument performs a segment test of 2 seconds.
Afterwards some configurations are displayed sequentially: thermocouple type and if activated: offset and scale settings. (p.r.t Chapter 6)

Tip: The display of these settings can be aborted by pressing a key after the segment test (keys 2 - 6).

5.2 Pushbuttons



On/off key

min/max when taking measurements:

press shortly: min. or max. measuring value will be displayed

\+

press for 1 sec.: the min. or max. value will be deleted

up/down for config. or selection for logger operation:

to enter values, or change settings

Tare: (for 'DIF'-display when working with two sensors only)

press shortly: the difference between CH1-CH2 will be set to zero.

press for 1 sec.: tare function will be deactivated

Set/Menu:

press (Set) shortly in case of 2 sensors:
the values displayed (CH1, CH2, DIF) can be selected

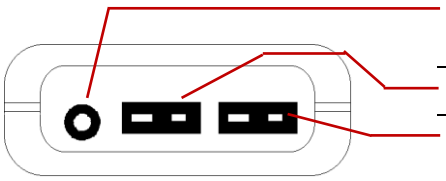
press (Menu) for 2 sec.: configuration will activated

Store/Quit:

Measurement: Hold current measuring value ('HLD' in display)

Set/Menu: Acknowledge setting, return to measuring

5.3 Connections



Interface: connection for electrically isolated interface adapter (accessory: GRS 3100, GRS3105 or USB3100)

Sensor connection CH2: channel 2

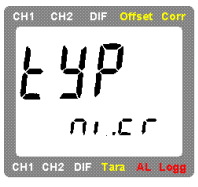
Sensor connection CH1: channel 1

The mains socket is located at the left side of the instrument.

6 Configuration

For configuration of the device press Set Menu -key for 2 seconds: the main menu of the configuration will be called up. Use key Set Menu to select a sub-menu, use the key Tara to actually go into the selected sub-menu and to change parameters.

Use the keys max and min to set the individual value for the parameter. Press the key Set Menu again to memorize the changes ant to change to the main menu. Use key Store Quit to leave the configuration.



'Typ': Selection of Thermoelement Type*[1]

max / min

ni.cr: Type K: NiCr-Ni

n: Type N: NiCrSi-NiSi

S: Type S: Pt10Rh-Pt

t: Type T: Cu-CuNi

J: Type J: Fe-CuNi

'Resolution': Selection of Display Resolution

max / min

1°: Resolution 1°C

0.1°: Resolution 0.1°C

Auto: Resolution is selected automatically

'Unit': Selection of Temperature Unit °C /°F*[1]

max

°C: All temperature values in degrees Celsius

min

°F: All temperature values in degrees Fahrenheit

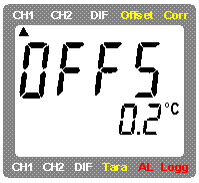
'Corr': Selection of Display Correction Factor *[1]

max

0.950 ... 1.200: The temperature value (referring to 0°C or. 32°F) will be multiplied by this factor. This factor will be applied to both sensor values.

min

off: Factor is deactivated (=1.000)



'Offset': Zero Displacement Channel 1 *[1]

max

-10.0°C ... 10.0°C
or
-18.0°F ... 18.0°F

The zero point of the measurement of channel 1 will be displaced by this value.

min

off: Zero point displacement is deactivated (=0.0°)

'Offset': Zero Displacement Channel 2 *[1]

max

-10.0°C ... 10.0°C
or
-18.0°F ... 18.0°F

The zero point of the measurement of channel 2 will be displaced by this value.

min

off: Zero point displacement is deactivated (=0.0°)

'Power.off': Selection of Power-Off Delay

max

1...120: Power-off delay in minutes. Device will be automatically switched off as soon as this time has elapsed if no key is pressed/no interface communication takes place. (automatically deactivated for cyclic loggers)

min

off: automatic power-off function deactivated (continuous operation, e.g. in case of mains operation)

'Adresse': Selection of Base Address'

max

01, 11, 21, ..., 91: Base address for interface communication. Channel 1 will be addressed by the set base address, channel 2 and 3 will have the following addresses. (Example: base address 21 - channel 1 = 21, channel 2 = 22, channel 3 = 23)

min

Using the interface converter GRS3105 it is possible to connect several devices to a single interface. As a precondition the base addresses of all devices must not be identical. In case several devices are connected via one interface make sure to configurate the base addresses accordingly.

7 Measuring Temperature With Thermoelements

- Make sure that the correct type of thermoelement is set (p.r.t. "Configuration of The Instrument")! Otherwise a wrong temperature will be displayed. The measuring device has been optimised for measurements with a type K probe.

- If other thermoelements but type K (NiCr-Ni) are used already the smallest temperature difference between plug and instrument will result in measuring errors. Therefore wait for the temperatures to adjust after plug-in or touching a sensor plug (depending on temperature ~15min.)

- Thermoelements are suitable to measure within a large temperature range. But keep in mind the allowed temperature range of your specific temperature probe!

8 Notes to Special Functions

8.1 Display Resolution (’Resolution’)

Standard setting: ’Auto’, i.e. the device automatically switches over to the optimum resolution between 1° and 0.1°. If temperatures to be measured are near the switching threashold, a fixed resolution may be better, e.g. for easy recording.
In such a case please select the optimum resolution manually.

8.2 Zero Displacement (’Offset’)

A zero displacement can be carried out for each of the two channels CH1 or CH2.

temperature displayed = temperature measured - offset

Standard setting: ’off’ = 0.0°, i.e. no zero displacement will be carried out. The zero displacement is mainly used to compensate for sensor deviations. Unless ’off’ is set, this value will be displayed shortly after the device is switched on; during operation it will be identified by means of the offset arrow in the display.

8.3 Display Correction Factor (’Corr’)

This factor is applied to both sensor channels.

temperature displayed [°C] = temperature measured [°C] * Corr
or temperature displayed [°F] = (temperature measured [°F]-32°F) * Corr + 32°F

Standard setting: ’off’ =1.000
This factor is used to compensate for losses of transfer in case of surface measurements, occurring if the object to be measured is extremely hot but will be cooled by lower ambient temperatures. The same can be true for sensors with a large mass. Unless ’off’ is set, this value will be displayed shortly after the device is switched on; during operation it will be identified by means of the Corr-arrow in the display.

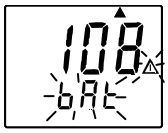
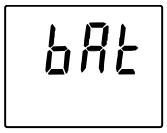
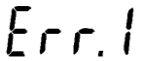
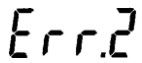
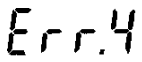
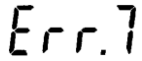
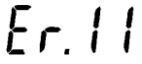
8.4 Tare Function

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 if two sensors are connected. If the tare function is activated, this will be shown by the tare arrow in the display.

8.5 Base Address (’Adr.’)

Using the interface converter GRS3105 it is possible to connect several instruments to a single interface. As a precondition the base addresses of all devices must not be identical. In case several devices will be connected via one interface make sure to configurate the base addresses accordingly. Channel 1 will be addressed by the base address set, channels 2 and 3 will have the following addresses.
(Example: base address 21 - channel 1 = 21, channel 2 = 22, channel 3 = 23)

9 Error And System Messages

Error or system messages	Description / Reason	Remedy
	No sensor connected	Connect one sensor at least
	sensor/cable damaged	Replace sensor/cable
	Low battery voltage device will only continue operation for a short time	replace battery
	Low battery voltage	replace battery
	- If mains operation: wrong voltage	replace power supply, if fault continues to exist: device damaged
No display or **mazy characters**	- Battery voltage too low	replace battery
	- If mains op.: power supply defective or wrong voltage/polarity	check/replace mains supply
	- System error	disconnect battery or power supply, wait for a short time, re-connect
	- Device defective	return to manufacturer for repair
	Values exceeding measuring range	Are there any values exceeding the measuring range specified? ->temperature too high Display resolution set to 0.1°? -> set to 'Auto'
	Sensor/cable defective	-> replace probe
	Values below measuring range	Are there any values below the measuring range specified? -> temperature too low Display resolution set to 0.1°? -> set to 'Auto' for DIF-channel and difference<-2040° -> temp. difference too low
	Sensor/cable defective	-> replace probe
	Values below display range	for DIF-channel and difference <-1999°: exchange sensors CH1<->CH2 (watch out for offset setting!)
	System fault	switch on again: if fault continues to exist, device is damaged -> return to manufacturer for repair
	Instrument not within working temperature	keep working temperature in between -25...50°C
	Value could not be calculated	One measuring variable required for calculation is missing (no sensor) or incorrect (overflow/underflow)

10 The serial interface

All measuring data and settings of the device can be read and changed by means of the serial interface and a suitable electrically isolated interface adapter (GRS3100, GRS3105 or USB3100).
In order to avoid faulty transmission, we have designed elaborate security measures for interface communication.

The following **standard software packages** are available for data transfer:

- **EBS9M** 9-channel software to display the measuring value (channel 1) and the temperature (ch. 2)
- **EASYCONTROL**: Universal multi-channel software (EASYBUS-, RS485-, or GMH3000- operation possible) for real-time recording and presentation of measuring data in the ACCESS®-data base format.

In case you want to develop your own software we offer a **GMH3000-development package** including:

- a universally applicable Windows functions library ('GMH3000.DLL') with documentation, can be used by all 'established' programming languages, suitable for:
  Windows 95™, Windows 98™, Windows NT™, Windows 2000™, Windows XP™, Windows Vista™.
- Programming examples Visual Basic 4.0, Delphi 1.0, Testpoint

10.1 The following interface functions will be supported:

Channel			Dll-Code	Name / function
1	2	3		
x	x	x	0	Read nominal value
x	x	x	3	Read system status
x	x	x	6	Read min. value
x	x	x	7	Read max. value
x			12	Read ID-no.
x			174	Delete min. value
x			175	Delete max. value
x			194	Set display unit
x			195	Set decimal point in display
x	x	x	199	Read meas. type in display
x	x	x	200	Read min. display range
x	x	x	201	Read max. display range
x	x	x	202	Read unit of display
x	x	x	204	Read decimal point of display
x			208	Read channel count
x	x		216	Read offset correction
x	x		217	Set offset correction
x			218	Read corr. factor (1000..1200)
x			219	Set corr. factor (1000..1200)
X			240	Reset unit
X			254	Read program identification

11 Specification

Thermoelements:	J, K, N, S, T	
Resolution:	0.1°C or 1°C	0.1°F or 1°F
Measuring range:		
Type K (NiCr-Ni):	-199.9 ... +999.9°C or -220 ... +1372°C	-199.9 ... +999.9°F or -364 ... +2500°F
Type J (Fe-CuNi):	-120.0 ... +700.0°C or -200 ... +1100°C	-184.0 ... +999.9°F or -328 ... +2012°F
Type N (NiCrSi-NiSi):	-199.9 ... +999.9°C or -200 ... +1300°C	-199.9 ... +999.9°F or -328 ... +2372°F
Type S (Pt10Rh-Pt):	-50.0 ... +999.9°C or -50 ... +1768°C	-58.0 ... +999.9°F or -58 ... +3214°F
Type T (Cu-CuNi):	-120.0 ... +400.0°C or -220 ... +400°C	-184.0 ... +752.0°F or -364 ... +752°F
Accuracy:	(for thermoelements acc. to DIN EN 60584) ±1digit (at nominal temperature)	
Type K: -199.9 ... +999.9°C:	±0.03%of m.v. ±0.05%FS (T≥-60°C);	±0.2% of m.v. ±0.05%FS (T<-60°C)
-220 ... +1372°C:	±0.08% of m.v. ±0.1%FS (T≥-100°C);	±1°C ±0.1%FS (T<-100°C)
Type J: -120.0 ... +700.0°C:	±0.03% of m.v. ±0.08%FS (T≥-80°C);	±0.2% of m.v. ±0.08%FS (T<-80°C)
-200 ... +1100°C:	±0.08% of m.v. ±0.1%FS (T≥-150°C);	±1°C ±0.1%FS (T<-150°C)
Type N: -199.9 ... +999.9°C:	±0.03% of m.v. ±0.05%FS (T≥-60°C);	±0.2% of m.v. ±0.05%FS (T<-60°C)
-200 ... +1300°C:	±0.08% of m.v. ±0.1%FS (T≥-100°C);	±1°C ±0.1%FS (T<-100°C)
Type S: 0.0 ... +999.9°C:	±0.05% of m.v. ±0.08%FS (T≥200°C);	±0.2% of m.v. ±0.08%FS (T<200°C)
-50 ... +1768°C:	±0.1% of m.v. ±0.1%FS (T≥200°C);	±1°C ±0.1%FS (T<200°C)
Type T: -120.0 ... +400.0°C:	±0.03% of m.v. ±0.1%FS (T≥-70°C);	±0.2% of m.v. ±0.1%FS (T<-70°C)
-220 ... +400°C:	±1°C (T≥-100°C);	±1°C ±1digit (T<-100°C)
Temperature drift:	0.01%/K	
Point of comparison:	±0.3°C	
Nominal temperature:	25°C	
Working temperature:	-25 to +50°C	
Relative humidity:	0 to 95 %RH (non-condensing)	
Storage temperature:	-25 to +70°C	
Sensor connection:	2 connection pins for miniature DIN-plug type K	
Display :	2 four digit LCDs (12.4mm high and 7 mm high) for temperature, and for min./ max values, hold function, etc. as well as additional pointing arrows.	
Pushbuttons:	6 membrane keys altogether for on/off switch, selection of thermoelements, min. and max. value memory, hold-function etc.	
Interface:	serial interface (3.5mm jack), serial interface can be directly connected to RS232 interface of a PC via interface adapter GRS3100 or GRS3105 (see accessories).	
Power supply:	9V-battery, type IEC 6F22 (included) or additional d.c. connector (internal pin Ø 1.9 mm) for external 10.5-12V direct voltage supply.  (suitable power supply: GNG10/3000)	
Power consumption:	approx. 1.6 mA	
Automatic-off-function:	Device will be automatically switched off if no key is pressed/no interface communication takes place for the time of the power-off delay. The power-off delay can be set to values between 1and 120 min.; it can be completely deactivated.	
Min-/max-value memory:	Both the max. and the min. value will be memorized for sensor 1, sensor 2 and the difference.	
Hold-function:	Press button to store current values of sensor 1, sensor 2 and their difference	
Min./max alarm:	min. and max. values set for measuring values of sensor 1, sensor 2, sensor 1 and 2 or temperature difference are constantly monitored	
Housing dimensions:	142 x 71 x 26 mm (L x W x D) impact-resistant ABS plastic housing, membrane keyboard, transparent panel. Front side IP65, integrated pop-up clip for table top or suspended use.	
Weight:	approx. 155 g	
EMC:	The device corresponds to the essential protection ratings established in the Regulations of the Council for the Approximation of Legislation for the member countries regarding electromagnetic compatibility (2004/108/EG) Additional fault: <1%	

12 Disposal instruction:

Batteries must not be disposed in the regular domestic waste but at the designated collecting points.
The device must not be disposed in the unsorted municipal waste! Send the device directly to us (sufficiently stamped), if it should be disposed. We will dispose the device appropriate and environmentally sound.