Operating Instructions

for

Precision Hand-Held Thermometer

Model: HND-T205

1. Contents

Manufactured and sold by:

2. Note

Please read these operating instructions before unpacking and putting the unit into operation. Follow the instructions precisely as described herein.
The instruction manuals on our website www.kobold.com are always for currently manufactured version of our products. Due to technical changes, the instruction manuals available online may not always correspond to the product version you have purchased. If you need an instruction manual that corresponds to the purchased product version, you can request it from us free of charge by email (info.de@kobold.com) in PDF format, specifying the relevant invoice number and serial number. If you wish, the operating instructions can also be sent to you by post in paper form against an applicable postage fee.

The devices are only to be used, maintained and serviced by persons familiar with these operating instructions and in accordance with local regulations applying to Health & Safety and prevention of accidents.

When used in machines, the measuring unit should be used only when the machines fulfil the EC-machine guidelines.

3. Instrument Inspection

Instruments are inspected before shipping and sent out in perfect condition.
Should damage to a device be visible, we recommend a thorough inspection of the delivery packaging. In case of damage, please inform your parcel service / forwarding agent immediately, since they are responsible for damages during transit.

Scope of delivery:
The standard delivery includes:
- Precision Hand-Held Thermometer   model: HND-T205

4. Regulation Use

Any use of the Precision Hand-Held Thermometer, model: HND-T205, which exceeds the manufacturer's specification, may invalidate its warranty. Therefore, any resulting damage is not the responsibility of the manufacturer. The user assumes all risk for such usage.

5. Operating Principle

The KOBOLD hand-held temperature measuring units HND-T205 are highly precise, compact thermometers for PT100 4-wire-probes that can be used universally. The high degree of accuracy of these housings makes them extremely well suited for all calibration tasks. In conjunction with the appropriate temperature probes, precise measurement results over the entire measuring range can be achieved. Various probes are available for a multitude of measuring tasks and special applications. The respective measurement task determines which combination is selected. Naturally, these first-rate KOBOLD-measuring units can display more than just the temperature values. All housings in this series allow for minimum/maximum value memory, hold function, automatic self-shut-off, and zero point/increase entry, for example.

6. Electrical Connection

6.1 Mains Operation

Attention: When using a power supply unit please note that operating voltage has to be 10.5 to 12 V$_{DC}$. Do not apply overvoltage!! Simple 12 V-power supplies often have excessive no-load voltage. We, therefore, recommend using regulated voltage power supplies. Trouble-free operation is guaranteed by our power supply HND-Z002.
Prior to connecting the plug power supply with the mains supply make sure that the operating voltage stated at the power supply is identical to the mains voltage.

- Treat device and probes carefully. Use only in accordance with above specification. (do not throw, hit against etc.). Protect plugs and sockets from soiling.
- To disconnect sensor plug do not pull at the cable but at the plug. When connecting the probe, the plug will slide in smoothly if plug is entered correctly.
- **Selection of Output-Mode**: The output can be used as serial interface or as analogue output. This choice has to be done in the configuration menu.
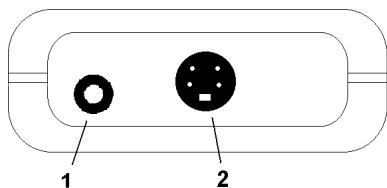
7. Operation

7.1 Safety Instructions

This device has been designed and tested in accordance to 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 it.

1. Trouble-free operation and reliability of the device can only be guaranteed if it is no subjected to any other climatic conditions than those stated under "Technical Information".
2. Transporting the device from a cold to a warm environment condensation may result 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. The circuitry has to be designed most carefully, especially if the device should be connected to other devices. 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:** Operation the device with a defective mains power supply (e.g. short circuit from mains voltage to output voltage) may result in hazardous voltages at the device (e.g. at sensor socket)
4. Whenever there may be a risk whatsoever involved 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.

Warning: Do not use this product as safety or emergency stop device 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

7.2 Connections

1. **Output:** Operation as interface: Connect to optically isolated interface adapter (accessory: HND-Z031)
   Operation as analogue output: Connection via suitable cable.
   Attention: The output mode has to be configured (p.r.t. *7.6.6)* and influences battery life!
2. **Probe connection** Pt100 4-wire
   The **mains socket** is located at the left side of the instrument

7.3 Display Elements

1 **Main Display:** Currently measured temperature

2 **Auxiliary Display:** Display of min, max or hold values

Special display elements:

3 **Min/Max/Hold:** shows if a min., max. or hold value is displayed in the auxiliary display

4 **„Offset" arrow:** indicates that zero point offset is activated

5 **„Corr" arrow:** indicates that a scale correction is activated

6 **„Logg" arrow:** Shown if logger function is selected, flashes if cyclic logger is running

7 **„Alarm" arrow:** Flashes if alarm is present

7.4 Pushbuttons

Key 1: On/Off

Key 2:
Press shortly: maximum measured value will be displayed
Press for 2 sec.: the max. value will be deleted

Key 3:
Function only during configuration: selection of parameter

Key 4:
Press (Menu) for 2 sec.: configuration will be activated (p.r.t. chapter 7.5)

Key 5:
Press shortly: minimum measured value will be displayed
Press for 2 sec.: the min. Value will be deleted

Key 6:
Measurement: Hold current measuring value ('HLD' in display) or operation of logger functions (p.r.t. chapter 7.8)

7.5 Device Configuration

> **Note: Some menu items will be shown depending on the actual device configuration (e.g. there are some items disabled when the logger contains data). Please note the hints by the menu items.**

Enter configuration:	Set Menu	Press for 2 sec. The main menu will be shown	5Et ConF	or	rEAd LoGG
Navigation:	Set Menu	Choose menu branch (*1)			
	Tara ►	Choose the parameter (*2)			
	max / min ▼	Edit the parameter values. (*2)			
	Set Menu	Stores the settings, jumps back to the main menu			
	Store Quit	Stores the sttings, leaves configuration			

Menu	Parameter	Values	Meaning		p.r.t.
key **Menu**	key ▶	key ▲ or ▼			
SEt ConF	**Set Configuration: Generic Settings**				
	Unit	°C:	All temperature values are in degrees Celsius	*	
		°F:	All temperature values are in degrees Fahrenheit		
	rES	0.1°:	Resolution 0.1 °C	*	7.6.1
		0.01°:	Resolution 0.01 °C		
		Auto:	Resolution is selected automatically		
	Lin	E.751	Measuring / sensor curve according to EN60751	*	7.6.2
		USEr	User sensor curve (Predefined to EN60751 values, changeable by software)		
	OFFS	-2.50 °C..2.50 °C resp. -4.50 °F...4.50 °F	The zero point of the measurement will be displaced by this value to compensate for deviations in the probe or in the measuring device.	*	7.6.3
		oFF:	Zero displacement inactive (=0.0°)		
	SCAL	-2.000...2.000:	The scale of the measuring will be changed by this factor (in %) to compensate deviations of temperature probe or measuring device	*	7.6.4
		oFF:	Scale correction factor inactive (=0.000)		
	t.AVG	1...30:	Average filter (period in seconds)		7.6.5
		oFF:	Average filter inactive		7.6.5
	P.oFF	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		.
		oFF	Power-off function inactive (continuous operation, e.g. mains operation)		
	Out	oFF:	Function of the output: No output function, lowest power consumption		7.6.6
		SEr:	Output is serial interface		
		dAC:	Output is analogue output 0...1 V		
	Adr.	01,11..91	Base Address when Output = Serial Interface : Base address of device for interface communication.		7.6.6
	dAC.0	-200.0...850.0 °C resp. -328.0...1562.0 °F	Enter desired temperature value at which the analogue output potential should be 0 V		7.6.6
	dAC.1	-200.0...850.0 °C resp. -328.0...1562.0 °F	Enter desired temperature value at which the analogue output potential should be 1 V		7.6.6
SEt AL.	**Set Alarm: Settings Of Alarm Function**				
	AL.	on	Alarm on, with horn-sound		7.6.8
		no.So	Alarm on, without horn-sound		
		oFF	no alarm function		
	AL.Lo	min range ...AL.Hi	Min alarm rail (not when AL. oFF)		7-6.8
	AL.Hi	AL.Lo ...max range	Max alarm rail (not when AL. oFF)		7.6.8
SEt LoGG	**Set Logger: Configuration Of Logger Function**			*	
	Func	CYCL	Cyclic: logger function 'cyclic logger'	*	7.8
		Stor	Store: logger function 'individual value logger'		
		oFF	no logger function		
	CYCL	0:01..60:00	Cycle time of cyclic logger [minutes:seconds]	*	7.8

SEt CLOC	CLOC	HH:MM	Clock: Setting of time hours:minutes		7.6.9
	YEAr	YYYY	Year		
	dAtE	TT.MM	Date: day.month		

(*)   *If the logger memory contains data already, the menus/parameters marked with (*) can not be invoked! If these should be altered the logger memory has to be cleared before!*

Hint: The settings will be set to the settings ex works, if keys 'Set' and 'Store' are pressed simultaneously for more than 2 seconds.

7.6 Special Functions

7.6.1   Display Resolution

Standard setting: 'Auto', i.e. the device automatically switches over to the optimum resolution between .01° and 0.01°.
If temperatures to be measured are near the switching threshold, a fixed resolution may be better, e.g. for easy recording. In such a case please select the optimum resolution manually.

7.6.2   User Sensor Curve ('Lin USEr')

By means of this function besides the standard conversion of resistance to temperature following EN60751 (Lin E.751) also other curves can be used. The user sensor curve can be read and edited by configuration software. The standard setting ex works is also set to the EN60751 data. The curve is defined by a table with two columns (input resistance [Ohm]/output temperature [°C]) with 50 rows.
Info: the sensor curve following EN60751 uses the international temperature scale ITS90 and following formulas:
Temperatures < 0 °C: $R_{neg}(T) := 100 \cdot [1 + 3.9083 \cdot 10^{-3} \cdot T - 5.775 \cdot 10^{-7} \cdot T^2 - 4.183 \cdot 10^{-12} \cdot (T - 100) \cdot T^3]$
Temperatures >= 0 °C: $R_{pos}(T) := 100 \cdot (1 + 3.9083 \cdot 10^{-3} \cdot T - 5.775 \cdot 10^{-7} \cdot T^2)$

Please notice: temperature measurements with the user sensor curve are allowed only within the temperature range which has been used to generate the user sensor curve. Temperature measurements with an user sensor curve beyond the checked temperature range can possibly lead to tremendous errors. Therefore, the sensor curve due to DIN EN 60751 (display: Lin E.751) has to be used for temperature measurements beyond the checked temperature range.

7.6.3   Zero Displacement ('Offset')

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

temperature displayed = temperature measured - 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. Unless the factor is set to 'off', the offset arrow in the display shows an active zero displacement.*)

7.6.4   Scale Correction ('Scale')

The scale of the measuring can be influenced by this setting (factor is in %):

displayed temperature[°C] = measured temperature[°C] * (1+Scal/100)
respectively displayed temperature[°F] = (measured temperature [°F]-32 °F)
* (1+Scal/100) + 32 °F

Standard setting: 'off' =0.000, i.e. temperature is not corrected. Together with the zero displacement (see above) this factor is mainly used to compensate for sensor deviations. Unless the factor is set to 'off', the Corr arrow in the display shows an active scale correction.*)

*) The standard curve (LIN E.751) and the user sensor curve (Lin USEr) posses separate correction settings.

7.6.5   Average filter ("tAuG")

The filter forms the arithmetic floating average over the entered time. The displayed value will be correspondingly slower in this case.

7.6.6   Output ("Out")

The output can be used as serial interface (HND-Z031 interface adapters) or as analogue output (0-1 V). If none of both is needed, we suggest switching the output off, because battery life then is extended.

7.6.6.1   Analogue Output – Scaling with DAC.0 and DAC.1

With the DAC.0 and DAC.1 values the output can be rapidly scaled to your efforts.
Example: -50 °C...250 °C should correspond to 0...1 V at the output
   Set "DAC.0" to -50.00 °C and "DAC.1" to 250.0 °C -> finished.
Keep in mind not to connect low-resistive loads to the output, otherwise the output value will be wrong and battery life is decreased. Loads above approx. 10 kOhm are uncritical.
If the display exceeds the value set by DAC.1, then the device will apply 1 V to the output
If the display falls below the value set by DAC.0, then the device will apply 0 V to the output
In case of an error (Err.1, Err.2, no sensor, etc.) the device will apply slightly above 1 V to the output.

plug wiring::
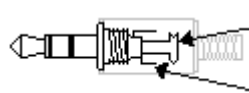
GND

+Uout

Attention!
The 3rd contact has to be left floating!
Only stereo plugs are allowed!

7.6.6.2   Operation as Interface ("Out SEr")

By using an electrically isolated interface converter HND-Z031 or HND-Z032 (accessory) the device can be connected to a PC. 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 configure the base addresses accordingly. In order to avoid transmission errors, there are several security checks implemented (e.g. CRC).
The following standard software packages are available for data transfer:

BUS-S20M: 20-channel software to record and display the measuring values

Supported interface functions:

Code	Name/Function	Code	Name/Function
0	read nominal value	201	read max. display range
3	read system status	202	read unit of display
6	read min. value	204	read decimal point of display
7	read max. value	208	read channel count
12	read ID-no.	214	read scale correction
22	read min. alarm rail (AL. - AL.Lo)	215	set scale correction
23	read max. alarm rail (AL. - AL.Hi)	216	read zero displacement
32	read configuration flag alarm function: 1; Alarm horn:3; BitLoggerOn: 50; BitCyclicLogger: 51;	217	set zero displacement
		222	Read power-off time
		223	Set power-off time
		224	Logger: read data cyclic logger
102	set min. alarm rail (AL. - AL.Lo)	225	Logger: read cycle time (LoGG - CYCL)
103	set max. alarm rail (AL. - AL.Hi)	226	Logger: set cycle time (LoGG - CYCL)
160	set configuration flag (see 32)	227	Logger: start recording
174	delete min. value	228	Logger: read #of data
175	delete max. value	229	Logger: read status
176	read min measuring range	231	Logger: read stop time
177	read max measuring range	233	read Real time clock (CLOC)
178	read measuring range unit	234	set Real time clock (CLOC)
179	read measuring range decimal point	236	Read logger memory size
180	read measuring type	240	Reset
194	set display unit	254	read program identification
199	read meas. type in display	260	Logger: read data manual logger
200	read min. display range		

Note: The measuring and range values read via interface are always in the selected display unit (°C/°F)!

7.6.7 Alarm ("AL")

There are three possible settings: Alarm off (AL. oFF), on with horn sound (AL. on), on without horn sound (AL. no.So).
Following conditions will display an alarm, when the function is activated (on or no.So):

- Value is below lower (AL. Lo) or above upper alarm rail (AL.Hi).
- Sensor error
- Low battery (bAt)
- Err.7: System error (always with sound)

In case of an alarm and when polling the interface, the prio-flag is set in the returned interface message.

7.6.8 Real Time Clock ("CLOC")

The real time clock is used for the logger function: Recorded values are also containing the point of time, when they were measured. Please check the settings when necessary.
If the battery was replaced the referring menu ‚CLOC' will automatically be started.

7.7 Probe connection

The device is constructed for the connection of a Pt100 4-wire probe via 4 pole Mini-Din connectors.
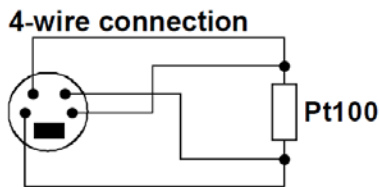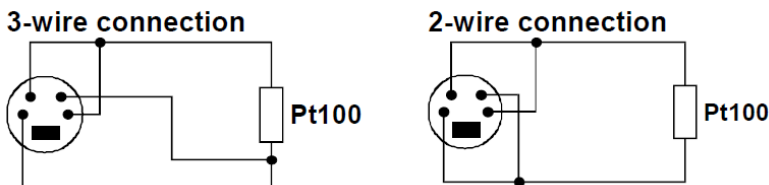

4-wire connection

Pt100

Figure shows upon probe jack pins

It is also possible to connect a 3- or 2-wire probe to the device. Please observe that in consequence of the cable resistance an increased measuring fault will occur. The connection of this probe should be carried out as follows:

3-wire connection

Pt100

2-wire connection

Pt100

7.8 Operation of Logger

The device supports two different logger functions:

„Func-Stor": each time when „store" (key 6) is pressed a measurement will be recorded.

„Func-CYCL": measurements will automatically be recorded at each interval, which was set in the logger menu ‚CYCL' until the logger will be stopped or the logger memory is full. The recording is started by pressing „Store" 2 seconds.

The logger records 1 measurement result each time

The data set consists of: -measuring value at time of recording

-time and date of recording

For the read out and evaluation of the data the software HND-Z034 (at least V. 1.7) has to be used. The software also allows easy configuration and starting of the logger.

When the logger is activated (Func Stor or Func CYCL) the hold function is no longer available, key 6 is solely used for the operation of the logger functions.

7.8.1   Storing Single Measurements („Func-Stor")

a) Record Measuring:

If the logger function "Func Stor" was activated (see chapter Device configuration), up to 99 measuring data sets can be recorded manually.

| Store Quit | Press shortly: data set will be recorded ("St.XX" will be shown shortly. XX is the number of the data set) |

If the logger memory is full, the display will show: Lo66 FULL

b) Viewing Recorded Measurings:

Stored data sets can be either read out via PC Software HND-Z034, or be viewed in the display directly.
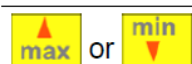
| Set Menu | **Press for 2 seconds:** The display will show: rEAd Lo66 |

> Note: "rEAd Logg" only appears, if there are already data stored! If memory is empty, the configuration menu   SEt ConF will show.

Tara ►	Press shortly: Changing between measuring value and date+time of data set
max or min	Changing between the data sets
Store Quit	Exit logger data display

c) Clear Recorded Measurings:

If there are already data sets stored, these can be deleted via the store key:

Store Quit	**Press for 2 seconds:** Calling of clear-Menu

Change selection by: **max** or **min ▼** :

⌐Lⁿᵒ	Clear nothing (cancel menu)
⌐LⱯLL	Clear all recordings
⌐LⁿLⱯSt	Clear the last recording
Store Quit	Stores the settings

7.8.2   Automatic Recording With Selectable Cycle-Time "Func CYCL"

If the logger function "Func CYCL" was activated (see chapter 8 "Device configuration"), and the logger was started, it automatically records data sets at intervals of the selected logger cycle time. The logger cycle time is selectable from 1s to 60 min (see chapter 8 "Device configuration").

Max. number of measurings: 16384

a) Starting a recording:

Store Quit	press for 2 seconds: the recording will be started.

Each recording is signalled with a short display of 'St.XXXXX'. XX is the number of the data set.

If the logger memory is full, the display will show: `Lo6.6. FuLL`

b) Stop the recording:

Store Quit	**Press for 2 seconds:** If a recording is running, the Stop menu will be shown

Change selection by: **max** or **min ▼** :

StoP nᵒ	Do not stop the recording
StoP yES	Stop the recording
Store Quit	Stores the settings

> **Note: If you try to switch off the instrument in the cyclic recording operation you will be asked once again if the recording should be stopped.**
> **The device can only be switched off after the recording has been stopped!**
> **The Auto-Power-Off-function is deactivated during recording!**

c) Clear recorded measurings:

Store Quit	**Press for 2 seconds:** If logger data are present and the recording was stopped, the clear menu will be shown

Change selection by: **max** or **min** :

|	
CLr no	Clear nothing (cancel menu)
CLr ALL	Clear all recordings

Store Quit	Stores the settings

7.9 Some Basics of Precision Temperature Measuring
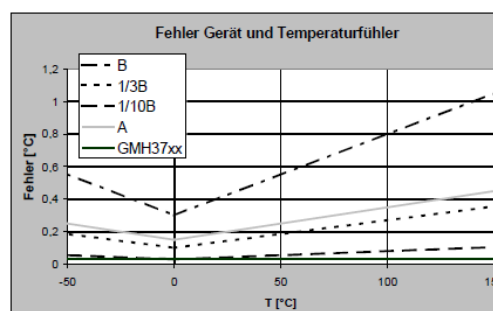
Probe Precision/Device Precision

The device is very precise (please refer to technical data). To be able to use this high precision, the connected temperature probe has to be as precise as possible, too. The following precision classes are available as a standard at reasonable prices (Platinum resistor thermometers according to EN60751):

Class	Error ranges
B	$\pm (0,3 + 0,005 \cdot |temperature|)$
1/3 B (=1/3 DIN)	$\pm (0,1 + 0,0017\,|temperature|)$
1/10 B (=1/10 DIN)	$\pm (0,03 + 0,0005 \cdot |temperature|)$
A	$\pm (0,15 + 0,002 \cdot |temperature|)$
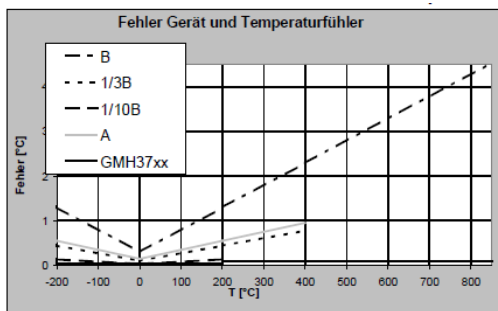
Error over measuring range

Error over range -50...150 °C

For applications demanding higher precision than given by these classes we suggest to adjust the device to the used probe or to get a calibration certificate for the device combined with the probe.

Attention: if an adjusted or calibrated probe is replaced, also the adjustment or calibration certificate has to be renewed to maintain the referring overall precision! Be careful when buying third party temperature probes: Besides the standard EN60751 there are some other obsolete or unusual standards on the market. If such a probe has to be connected, the user sensor curve (have a look to the referring chapter) can be used to adjust the instrument!

- **4-Wire-Measuring**
  When using resistance thermometers as the Pt100 a quite large measuring error can be caused by inadequate cables and connections. Using 4wire measuring avoids these kinds of errors mainly caused by unwanted resistances. It is suggested to use suitable probes and extensions only. (For pin assignment please refer to chapter *7.7 Probe connection*)

- **Heat loss caused by probe construction:**
  Especially when measuring temperatures which deviate very much from the ambient temperature, measuring errors often occur if the heat loss caused by the probe is not considered. When measuring fluids therefore the probe should be emerged sufficiently deep and be stirred continuously. When measuring gases, the probe should also emerge as deep as possible in the gas to be measured (e.g. when measuring in channel/pipes) and the gas should flow around the probe at sufficient flow.

- **Measuring Surface Temperature**
  If temperature of the surface of an object has to be measured, one should pay attention especially when measuring hot (or very cold) surfaces, that the ambient air cools (or heats) the surface. Additionally, the object will be cooled (or heated) by the probe or the probe can have a better heat flow to the ambient temperature as to the objects surface.
  Therefore, specially designed surface probes should be used. The measuring precision depends mainly on the construction of the probe and of the physics of the surface itself. If selecting a probe try to choose one with low mass and heat flow from sensor to handle. Thermally conductive paste can increase the precision in some cases.

- **Allowable temperature Range Of Probes**
  Pt100 Sensors are defined over a wide temperature range. Depending on probe materials and sort of sensor (e.g. hybrid sensors, wire wound resistors...) the allowable temperature ranges have to be considered. Exceeding the ranges at least causes a wrong measuring, it may even damage the probe permanently! Often it also has to be considered, that the temperature range is just valid for the probe tube, (plastic-) handles can't stand the same high temperatures. Therefore, the tube length should be selected long enough, that temperature keeps low at the handle.

- **Self Heating**
  The measuring current of the instrument is just 0.3 mA. Because of this comparably low current practically now self heating effect has to be considered, even at air with low movement the self heating is <= 0.01 °C.

- **Cooling by Evaporation**
  When measuring air temperature, the probe has to be dry. Otherwise, the cold due to the evaporation causes too low measurings.

7.10 Fault and System Messages

Display	Meaning	Remedy
108 bAt	low battery voltage, device will continue to work for a short time	replace battery
	If mains operation: wrong voltage	replace power supply, if fault continues to exist: device damaged
bAt	low battery voltage	replace battery
	If mains operation: wrong voltage	Check/replace power supply, if fault continues to exist: device damaged
No display or weird display Device does not react on keypress	low battery voltage	replace battery
	If mains operation: wrong voltage	Check/replace power supply, if fault continues to exist: device damaged
	system error	Disconnect battery or power supply, wait some time, re-connect
	device defective	return to manufacturer for repair
----	Sensor error: no sensor connected	Connect sensor to socket
	sensor/cable or device defective	return to manufacturer for repair
Err.1	Value exceeding measuring range	Check: Is the value exceeding the measuring range specified? ->temperature too high!
	Wrong probe connected	Check probe
	sensor/cable defective	-> replace
Err.2	Value below display range	Check: Is the value below the measuring range specified? -> temperature too low!
	Wrong probe connected	Check probe
	sensor/cable defective	-> replace
Err.3	Value exceeding display range	-> set resolution to 0.1° or Auto
Err.4	Value below display range	-> set resolution to 0.1° or Auto
Err.7	system error	return to manufacturer for repair

7.11 Calibration Services

Calibration certificates can be issued by the factory. For this the device has to be sent to the manufacturer. Just the manufacturer can check the factory settings and correct them if necessary.

8. Maintenance

Battery Operation

The battery has been used up and needs to be replaced, if „bAt" is shown in lower display. The device will, however, continue operating correctly for a certain time. The battery has been completely used up, if ´bAt´ is shown in the upper display. The battery has to be taken out, when storing device above 50 °C.

> ✎ **Hint: We recommend removing the battery if device is not used for a longer period of time!**

9. Technical Information

Measurement input:	Pt 100, 4-wire, in accordance with DIN EN 60751
Measuring range:	-199.99...+199.99 °C or -200.0...+850.0 °C (Fahrenheit values accordingly)
Accuracy:	(at nominal temperature 25 °C) ≤ 0.03 °C in the range -199.99...199.99 °C ≤ 0.1 °C ±1 digit in the range 200.0...850.0 °C
Resolution:	0.01 °C or 0.1 °C (0.01 °F or 0.1 °F)
Display:	2x 4 ½-digit LCD
Operating temperature:	-25 to +50 °C
Storage temperature:	-25 to +70 °C
Storage humidity:	0 to 95 % rH (non-condensing)
Probe connection:	4-pin shielded Mini-DIN plug
Output:	0-1 V, freely scalable or serial interface (via 3-pin jack, transformer on RS232 or USB optional)
Power supply:	9 V-monobloc battery (included in the scope of delivery), external 10.5 -12 V_{DC} via jack
Current consumption:	approx. 1 mA
Material:	housing made of impact-resistant ABS plastic
Protection:	IP 65, front
Dimensions:	142 x 71 x 26 mm (H x W x D)
Weight:	approx. 155 g

Scope of functions
- Minimum/maximum value memory
- Hold function: »freezing« of the current value
- Automatik-off function: 1...120 min (can be deactivated)
- Zero point and increase entry: zero point and increase correction can be entered digitally

Logger functions:
- Manual: 99 datasets
  Cyclic: 16.384 datasets
- Adjustable cycle time: 1s ...1 h
  Real-time clock: current time with date and year

10. Order Codes

Order-no.	Housing design
HND-T 205	Pt 100 input with additional functions (see techn. data)

10.1   PT100-measuring probe Class B

Probe type	Temperature/ response time (t_{90})	Order-no.
Immersion probe for liquids and gases, 4-wire Rustproof V4A-tube, plastic handle, approx. 1 m 4-pin PVC-cable, strain relief screw connection, 4-pin Mini-DIN plug	-50...+400 °C approx. 10 sec	**HND-TF01**
Immersion probe for liquids and gases, 4-wire Like HND-TF01, but with ½ DIN Class B (±0.1 °C at 0 °C)	-50...+400 °C approx. 10 sec	**HND-TF02**
Immersion probe for liquids and gases, 4-wire Like HND-TF01, but with 1.10 DIN Class B (±0.03 °C at 0 °C) and flexible sheath tube, Ø 3 mm	-50...+400 °C approx. 10 sec	**HND-TF03**
Insertion probe for soft, plastic media, 4-wire Techn. data like HND-TF01, but with needle-shaped knife-edge tip	-50...+400 °C approx. 10 sec	**HND-TF04**
Insertion probe for soft, plastic media, 4- wire Like HND-TF04, but with ⅓ DIN Class B (±0.1 °C at 0 °C)	-50...+400 °C approx. 10 sec	**HND-TF05**
Immersion probe for liquids and gases, 4- wire Rustproof V4A-tube, approx. 1 m 4-pin PVC-cable, 4-pin Mini-DIN-plug	-50...+400 °C approx. 10 sec	**HND-TF06**

10.2 Accessories

Description	Order no.
Plug power supply unit (220/240 V, 50/60 Hz), 10.5 V/10 mA	**HND-Z002***
Protective housing bag, nappa leather, with cut-out for round sensor connection for HND-T105, HND-T205	**HND-Z011**
Protective housing bag, nappa leather, with cut-out for square sensor connection for HND-T110, HND-T120, HND-T125	**HND-Z013**
Protective housing bag, nappa leather, with cut-out for two sensor connections for HND-T115 and HND-T215	**HND-Z014**
Case with recess (275x229x83 mm)	**HND-Z021*****
Universal case with egg crate foam (275x229x83 mm)	**HND-Z022*****
Large case with recess (394x294x106 mm)	**HND-Z023*****
Interface converter on RS232, galvanically isolated	**HND-Z031****
Interface converter on USB, galvanically isolated	**HND-Z032****
Adapter RS232 converter on USB-interface	**HND-Z033****
Windows software for setting, data read out, and printing of the data of housings of the HND-series with logger function	**HND-Z034**
Software for recording measurement data on a computer, for instruments of the HND-series without logger function	**BUS-S20M**
Flat connector type N, free of thermoelectric voltage, for connection of thermocouple element probe HND-TF21/22/23	**HND-Z041**

Additional probe accessories upon request
* not for HND-T125
** not for HND-T125, HND-T120
*** Observe instrument dimensions

11. EU Declaration of Conformance

We, KOBOLD Messring GmbH, Hofheim-Ts, Germany, declare under our sole responsibility that the product:

Double/Differential Second Portable Thermometer   Model: HND-T205

to which this declaration relates is in conformity with the standards noted below:

EN 61326-1:2013
Electrical equipment for measurement, control and laboratory use - EMC requirements - Part 1: General requirements

EN IEC 63000:2018 Technical documentation for the assessment of electrical and electronic products with respect to the restriction of hazardous substances

Also, the following EC guidelines are fulfilled:

2014/30/EU   Electromagnetic compatibility
2011/65/EU   **RoHS** (category 9)
2015/863/EU   Delegated Directive (RoHS III)

Hofheim, 23 Nov. 2021

H. Volz
General Manager

M. Wenzel
Proxy Holder