



**NIEUWKOOP**

METEN.NL

# USER MANUAL



## TP1110

TEMPERATURE METER



TO MEASURE  TO KNOW



1. Input for probes, 8-pole DIN45326 connector.
2. Battery symbol: displays the battery charge level.
3. Function indicators.
4. Secondary display line.
5. **DATA/ENTER** key: during normal operation displays the maximum (MAX), the minimum (MIN) and the average (AVG) of current measurements; in the menu, confirms the current selection.
6. **CLR/ESC** key: during normal operation resets the maximum, the minimum and the average of current measurements; in the menu, it resets the value set with the arrows.
7. **HOLD/▲** key: freezes the measurement display during normal operation; in the menu, increases the current value.
8. **UNIT/MENU** key: it allows selection of the unit of measurement; when pressed together with the DATA key, it allows to open the menu.
9. **REL/▼** key: during normal operation enables the relative measurement (displays the difference between the current value and the logged value when the key is pressed); in the menu, decreases the current value.
10. **ON-OFF/AUTO-OFF** key: turns the instrument on and off; when pressed together with the HOLD key, disables the AutoPowerOff function.
11. **MAX** (maximum value), **MIN** (minimum value) and **AVG** (average value) symbols.
12. Main display line.
13. Line for symbols and comments



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## 1. GENERAL CHARACTERISTICS

The RTD Thermometer is a portable instrument that measures the temperature.

It is fitted with a large LCD display for excellent visualization of the measured data. The RTD Thermometer measures the temperature using immersion, penetration, contact or air probes. In this case, the sensor can be a 3 or 4 wire Pt100, or 2 or 4 wire Pt1000.

The probes are fitted with the *automatic detection* module, with the factory calibration settings already being memorized inside.

The units of measurement are the following:

1. °C Celsius degrees
2. °F Fahrenheit degrees

Using the Max, Min and Avg function of this instrument respectively obtains the maximum, minimum or average values.

Other available functions are:

- the relative measurement REL;
- the HOLD function;
- the automatic turning off which can also be disabled.



## 2. DESCRIPTION OF THE FUNCTIONS

The keyboard of the RTD Thermometer Model **HD2307.0** is composed of *double-function* keys.

The function on the key is the "main function", while the one above the key is the "secondary function".

When the instrument is in standard measurement mode, the main function is active.

In the menu, the secondary function is enabled; press the **DATA+UNIT** keys together to open the menu.

The pressing of a key is accompanied by a short confirmation "beep": a longer "beep" sounds if the wrong key is pressed. Each key specific function is described in detail below.



### ON-OFF and AUTO-OFF key

This key has two functions:

- **ON/OFF**: to turn the instrument on press **ON**, to turn it off press **OFF**.

The turning on enables all display segments for a few seconds, starts an **Auto-test** including the detection of the probe connected to the input, and sets the instrument ready for normal measurement.



- **AUTO/OFF**: the **AutoPowerOff** function can be disabled by simultaneously pressing this key and the "HOLD" key when turning the instrument on.

During turning on, should no probes be connected, the "NO\_PRBE\_SER\_NUM" message is displayed in the line for symbols for a few seconds, and in the main line a series of dashes appears while the "ERR" message replaces the temperature.

When the probe is inserted into a functioning instrument, the "NEW\_PROB\_DET" (New probe detected) message appears: as the data are captured upon turning the instrument on, it is necessary to turn it off and on again.

**Caution!** Replace the probes when the instrument is off.



### DISABLING OF THE AUTOMATIC TURNING OFF

The instrument has an *AutoPowerOff* function that automatically turns the instrument off after about 8 minutes if no key is pressed during the intervening time.

Press simultaneously the **ON/OFF** key and the **HOLD** key to disable this function.

In this case, remember to turn the instrument off using the ON/OFF key: disabling of the automatic turning off is shown by the blinking battery symbol.



### **DATA/ENTER key**

The **DATA** key is used for the following functions:

- **DATA:** during normal measurement, by pressing this key once the maximum (MAX) value of the measurements captured by the probe connected to the instrument is displayed, updating it with the acquisition of new samples;
  - by pressing this key again the minimum (MIN) value is displayed;
  - by pressing this key a third time the average (AVG) value is displayed.

*The acquisition frequency is once a second.*

The MAX, MIN and AVG values remain in the memory until the instrument is on, even after exiting the DATA display function. When the instrument is off, the previously memorized data are cleared. Upon turning on, the instrument automatically starts memorizing the MAX, MIN and AVG values.

To reset the previous values and start with a new measurement session, press **CLR** until the **FUNC\_CLR** message appears.

- **ENTER:** once the MENU has been opened with the DATA+UNIT keys, the DATA key will perform the ENTER function and the MENU can be browsed and the displayed parameter confirmed.



### **CLR/ESC key**

The **CLR** key has two functions:

- **CLEAR (CLR):** allows to reset the maximum (MAX), minimum (MIN) and average (AVG) value of the captured measurements;
- **ESC:** once the MENU has been opened with the DATA+UNIT keys, the CLR key will allow to cancel the parameters set using the ▲ and ▼ arrows.



### **HOLD/▲ key**

The **HOLD** key is used for the following functions:

- **HOLD:** by pressing this key the current measurement update is stopped and the "HOLD" message will appear in the upper left-hand corner of the display. To return to the current measurement, press the key again.
- **▲:** once the MENU has been opened with the **DATA+UNIT** keys, the ▲ key will allow to increase the value of the selected parameter.

Pressed together with the ON/OFF key, during turn on, the *AutoPowerOff* function is disabled (see the description of the ON/OFF key).



### **UNIT/MENU key**

The **UNIT** key is used for the following functions:

- **UNIT**: by pressing this key the unit of measurement of the main input quantity is selected: the unit of measurement will appear in the upper part of the display; the measured value will be displayed in the central line. By repeatedly pressing the **UNIT** key, the desired unit of measurement can be selected between the following:
  1. °C Celsius degrees
  2. °F Fahrenheit degrees
- **MENU**: in the menu two items can be set (see chapter 3):
  1. Probe type
  2. **User calibration** procedure for the temperature probe connected to the instrument
- the menu is opened by pressing simultaneously **DATA+UNIT**: the first item of the instrument programming menu will appear;
- use the ▲ and ▼ arrows (respectively located above the HOLD and REL keys) to **modify** the displayed value;
- press **DATA/ENTER** to confirm the modification and go onto the next item;
- press **CLR/ESC** to cancel the modification;
- to exit the menu, press the **UNIT/MENU** key again.



### **REL/▼ key**

The REL key is used for the following functions:

- **REL**: it displays the difference between the current value and that measured on pressing the key. The "REL" message is displayed on the left. To return to the normal measurement, press the key again.
- **▼**: once the MENU has been opened with the **DATA+UNIT** keys, the key will allow to decrease the value of the selected parameter.





### 3. THE PROGRAMMING MENU

To access to the menu press simultaneously the following keys:



The items to be set are listed in this order:

**1. Probe type: the "RTD\_PRBE\_TYPE"** message is displayed in the comment line. The main line in the center of the display shows the type of probe connected to the instrument.

The following probes can be connected to the input:

- temperature probes Pt100 complete with SICRAM module
- direct 4 wire Pt100 probes complete with TP47 module
- direct 3 wire Pt100 probes complete with TP47 module
- 2 or 4 wire Pt1000 probes complete with TP47 module

Upon turning on the instrument automatically detects the probes fitted with SICRAM module: the *Probe Type* menu item is configured as **AUTO** and cannot be modified by the user.

Upon turning on the direct 4 wire Pt100, direct 3 wire Pt100, and 2 wire Pt1000 temperature probes display the **"NO\_PRBE\_SER\_NUM"** (**no serial number of the connected probe**) message; in this case the probe type must be entered manually. Select **Probe type** using the MENU key and then select the type of probe with the arrow keys; confirm using ENTER.

- use the ▲ and ▼ arrows (respectively located above the HOLD and REL keys) to **modify** the type of probe;
- press **DATA/ENTER** to confirm the modification and go onto the next item;
- press **CLR/ESC** to cancel the modification;
- to **exit** the menu, press the **UNIT/MENU** key again.

**2. Starting the User calibration procedure: the ">>>\_CAL\_MODE"** message is displayed in the comment line, and **"FACT"** is displayed in the main line.

The instrument is provided with the factory (**"FACT"**) calibration. It is also possible to perform a "USER calibration" (**"USER"**) of instrument+probe. The calibration information is saved in the instrument memory and not in the probe. The same correction is applied to any probe connected to the input: therefore the "USER calibration" should only be used with the probe used for calibration and not with other probes.

- use the ▲ and ▼ arrows (respectively located above the HOLD and REL keys) and select **USER**, to **access** the "USER calibration" procedure;
- press **DATA/ENTER** to **confirm** the modification;
- the "SEL\_MEAS\_1/2" message is displayed in the comment line;
- use the ▲ and ▼ arrows (respectively located above the HOLD and REL keys) to select **"0"**, **"1"** or **"2"** in the main line;
- press **DATA/ENTER** to **confirm** the modification;
- press **CLR/ESC** to **cancel** the modification;
- to **exit** the menu, press the **UNIT/MENU** key again.

**TP1110**

TEMPERATURE METER



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## 4. PROBES AND MEASUREMENTS

The instrument works with temperature probes fitted with SICRAM module (with a Platinum Pt100 sensor with 100 $\Omega$  resistance) or with direct 4 wire Pt100, 3 wire Pt100, or 2 wire Pt1000 sensor.

The excitation current was chosen in order to minimize the sensor self-heating effects.

The SICRAM module acts as an interface between the sensor on the probe and the instrument.

There is a microprocessor circuit with a permanent memory inside the module that enables the instrument to recognize the type of probe connected and to read its calibration information.

The probes with SICRAM module are automatically detected, while the direct probes must be set up in the Probe type menu item (please see the description of the menu, chapter 3).

**The probe is detected during turn on, and this cannot be performed when the instrument is already on, therefore if a probe is connected and the instrument is on, it is necessary to turn it off and on.**

### 4.1 TEMPERATURE MEASUREMENT

In all versions the temperature sensor is housed in the end part of the probe.

The response time for the measurement of the temperature in **air** is greatly reduced if the air is moving. If the air is still, stir the probe. The response times are longer than those for liquid measurements.

The temperature measurement by **immersion** is carried out by inserting the probe in the liquid for at least 60 mm; the sensor is housed in the end part of the probe.

In the temperature measurement by **penetration** the probe tip must be inserted to a depth of at least 60 mm, the sensor is housed in the end part of the probe.

**NOTE:** when measuring the temperature on frozen blocks it is convenient to use a mechanical tool to bore a cavity in which to insert the tip probe.

In order to perform a correct **contact** measurement, the measurement surface must be even and smooth, and the probe must be perpendicular to the measurement plane.

**So as to obtain the correct measurement, the insertion of a drop of oil or heat-conductive paste between the surface and the probe is useful (do not use water or solvents). This method also improves the response time.**

The °C or °F unit of measurement can be chosen using the UNIT/MENU key.

### 4.2 CALIBRATION OF THE PROBE

To calibrate the probes correctly, a knowledge of and abiding by the physical phenomena on which the measurement is based is fundamental: this is the reason why it is recommended to abide by what is reported below carefully, and only to perform new calibrations if technically proficient and using the suitable equipment.

**The sensor is calibrated in the factory and the Callendar Van Dusen parameters are recorded in the SICRAM module.** The probes with direct input are checked for conformity with class A tolerance according to norm IEC751 – BS1904 – DIN43760.

The instrument is provided with the **FACT** (factory) calibration.

The user is also able to perform a **USER calibration** of instrument+probe.



The calibration information is saved in the instrument memory and not in the probe. The same correction is applied to any probe connected to the input: therefore the "USER calibration" should only be used with the probe used for calibration and not with other probes.

To pass from the user to the factory calibration and back, proceed as follows (see also the menu description in chapter 3):

- press simultaneously **UNIT/MENU** and **DATA/ENTER** to open the menu;
- press **ENTER** until the menu item "**CAL\_MODE**" is selected.
- use the **▲** and **▼** arrows (respectively located above the **HOLD** and **REL** keys) to select the type of calibration;
- confirm by pressing **DATA/ENTER**.

#### 4.2.1 CALIBRATION SEQUENCE – INSTRUMENT ON LINE WITH THE PROBE(S):

The calibration can be carried out on one or two points **that should differ by at least 10°C** and be included in the probe functioning range.

1. Insert the probe into a thermostatic bath, the temperature of which is precisely known from a reading taken on a sample reference thermometer. Wait for the measurement to stabilize.
2. Press contemporarily **UNIT/MENU** and **DATA/ENTER**.
3. Press **DATA/ENTER**.
4. Use the **▲** and **▼** arrows (respectively located above the **HOLD** and **REL** keys) to select the **USER** calibration;
5. Confirm with **DATA/ENTER**.
6. The "**SEL\_MEAS\_1/2**" message is displayed in the comment line.
7. Use the **▲** and **▼** arrows to select "**1**" (first calibration point).
8. Confirm with **DATA/ENTER**.
9. The "**UP DOWN 1st MEAS**" message is displayed in the comment line: the instrument display shows the measured temperature.
10. Use the **▲** and **▼** arrows to correct the indicated value until it coincides with the value measured by the sample reference thermometer.
11. Confirm with **DATA/ENTER**.
12. To exit the procedure without performing the second point, select "**0**" and press **ENTER**.
13. To calibrate the second point, select the point "**2**" using the **▲** and **▼** arrows.
14. Press **DATA/ENTER**.
15. The "**UP DOWN 2nd MEAS**" message is displayed in the comment line.
16. Move the probe to the second thermostatic bath and wait for the measurement to stabilize.
17. The instrument display shows the measured temperature.
18. Use the **▲** and **▼** arrows to correct the indicated value until it coincides with the value measured by the sample reference thermometer.
19. Confirm with **DATA/ENTER**.
20. To exit the procedure, select "**0**" using the **▲** and **▼** arrows and press **ENTER**.

The procedure is now complete.



#### 4.2.2 CONNECTING THE TP47 CONNECTOR FOR THE 3 AND 4 WIRE PT100 AND 2 OR 4 WIRE PT1000 PROBES

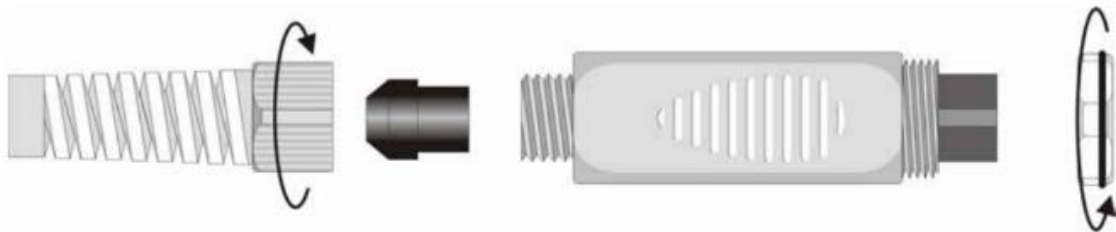
All probes are provided with a connector. The Platinum Thermometer Model **HD2307.0** also work with direct 3 and 4 wire Pt100 and 2 wire Pt1000 probes manufactured by other producers; for the instrument connection is prescribed the **TP47** connector to which the probe's wires should be welded.



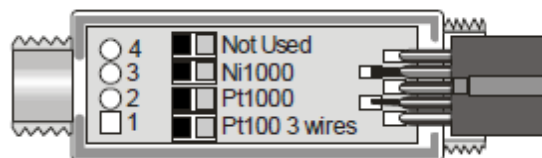
The instructions to connect the Platinum probe to the TP47 module are provided below. The **TP47** module is supplied complete with fairlead and gasket for 5 mm maximum diameter cables.

Do the following to open the module and connect a probe:

1. unscrew the fairlead;
2. extract the gasket;
3. remove the label using a cutter;
4. unscrew the ring on the opposite side as illustrated in the figure:



5. open the two module shells: the printed circuit to which the probe must be connected is housed inside. On the left there are the 1...4 points on which the sensor wires must be welded. The JP1...JP4 jumpers are in the center of the board. These must be closed with a tin bead for some type of sensors:



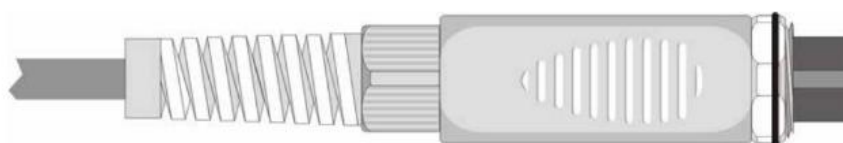
**Caution!** Before welding, pass the probe cable through the fairlead and gasket.

6. Weld the wires as shown in the table:

Pt100 4 wires		None
Pt100 3 wires		JP1
Pt1000 2 wires		JP2
Pt1000 4 wires		JP2

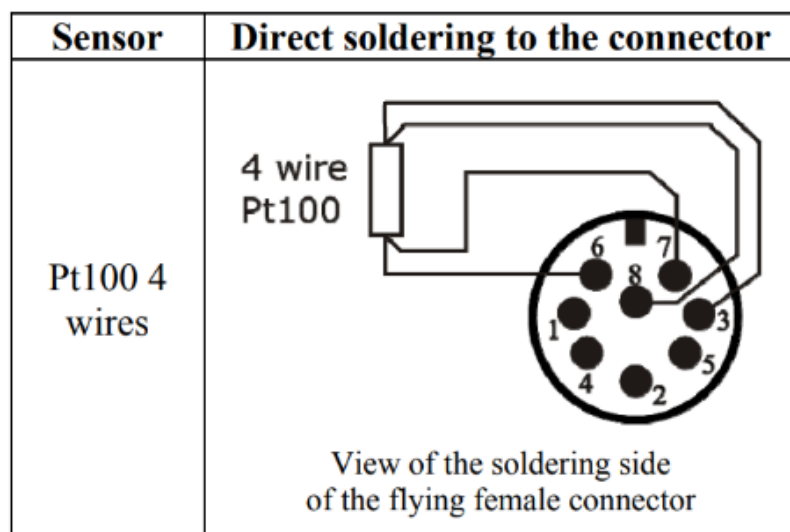
Ensure the welds are clean and perfect.

7. Once the welding operation is complete, close the two shells;
8. Insert the gasket in the module;
9. Screw the fairlead and the ring.
10. At the other end of the module, enter the ring with the O-Ring as indicated in the picture.



11. Make sure the cable is not twisted while you are screwing the fairlead. Now the probe is ready.

### 4.2.3 DIRECT CONNECTION OF 4 WIRE PT100 SENSORS



**4 wire Pt100 sensors** can be soldered directly to the pins of the flying female connector without making use of the TP47 board. The 4 wires of the Pt100 sensors have to be soldered as indicated in the figure on the left. In order to use this type of probe it is necessary to set up the menu item "Probe Type". The Pt100 probe is recognized upon turning on the instrument: connect the probe when the instrument is switched off and then turn it on.

## 5. WARNINGS

- Do not expose the probes to gases or liquids that could corrode the material of the sensor or the probe itself. Clean the probe carefully after each measurement.
- Do not bend the probe connectors or force them upward or downward.
- Do not bend or force the contacts when inserting the probe connector into the instrument.
- Do not bend, deform or drop the probes, as this could cause irreparable damage.
- Always select the most suitable probe for your application.
- Do not use the temperature probes in presence of corrosive gases or liquids. The sensor container is made of AISI 316 stainless steel, while the contact probe container is made from AISI 316 stainless steel plus silver. Avoid contact between the probe surface and any sticky surface or product that could corrode or damage it.
- Above 400°C and below -40°C, avoid violent blows or thermal shocks to Platinum temperature probes as this could cause irreparable damage.
- To obtain reliable measurements, temperature variations that are too rapid must be avoided.
- Temperature probes for surface measurements (contact probes) must be held perpendicular against the surface. Apply oil or heat-conductive paste between the surface and the probe in order to improve contact and reduce reading time. Whatever you do, do not use water or solvent for this purpose. A contact measurement is always very hard to perform. It has high levels of uncertainty and depends on the ability of the operator.
- Temperature measurements on non-metal surfaces usually require a great deal of time due to the low heat conductivity of non-metal materials.
- The sensor is not insulated from its external casing; be very careful not to come into contact with live parts (above 48V). This could be extremely dangerous for the instrument as well as for the operator, who could be electrocuted.
- Avoid taking measurements in presence of high frequency sources, microwave ovens or large magnetic fields; results may not be very reliable.
- Clean the probe carefully after use.
- The instrument is water resistant and IP67, but should not be immersed in water. The probe connectors must be fitted with sealing gaskets. Should the instrument fall into the water, check for any water infiltration. Gently handle the instrument in such a way as to prevent any water infiltration from the connectors' side.



## 6. INSTRUMENT SIGNALS AND FAULTS

The following table lists all error indications and information displayed by the instrument and supplied to the user in different operating situations:

Display indications	Explanation
>>> CAL MODE	Calibration mode
RTD PRBE TYPE	Type of probe connected
1ST MEAS UP DOWN	Correct the first point using the arrows ▲ / ▼
2ND MEAS UP DOWN	Correct the second point using the arrows ▲ / ▼
BATT TOO LOW CHNG NOW	Indication of insufficient battery charge appearing on turning on. The instrument issues a long beep and turns off. Replace the batteries.
CAL LOST	Program error: it appears after turning on for a few seconds. Contact the instrument's supplier.
CAL FACT	Factory calibration
CAL USER	User calibration
ERR	This appears if the probe has already been detected by the instrument, but is disconnected. At the same time an intermittent beep is issued.
FUNC CLRD	Max, min and average values cleared
NEW PROBE DET	This message appears when a probe is inserted into a functioning instrument. Turn the instrument off and then back on again.
NO PRBE SER NUM	The connected probe's serial number is absent
OVER or UNDR	Measurement overflow: indicates that the probe is measuring a value exceeding the measuring range.
PLS_EXIT >>> FUNC RES FOR FACT ONLY	Please exit using ESC >>> function reserved to factory calibration
PRBE SER #####	Serial number ##### of the connected probe
PROB ERR	A probe with SICRAM module has been inserted when not admissible for that specific instrument.
PROB COMM LOST	This appears if the probe has already been detected by the instrument, but is disconnected. At the same time an intermittent beep is issued.
SEL MEAS 1/2	Select measurement 1 or 2
SYS ERR #	Instrument management program error. Contact the instrument's supplier and communicate the numeric code # reported by the display.

## 7. INSTRUMENT STORAGE

Instrument storage conditions:


- Temperature: -25...+65°C.
- Humidity: less than 90%RH without condensation.
- Do not store the instrument in places where:
  - humidity is high;
  - the instrument may be exposed to direct sunlight;
  - the instrument may be exposed to a source of high temperature;
  - the instrument may be exposed to strong vibrations;
  - the instrument may be exposed to steam, salt or any corrosive gas.

The instrument case is made of ABS plastic: do not use any incompatible solvent for cleaning.





## 8. LOW BATTERY WARNING AND BATTERY REPLACEMENT

The battery symbol 

on the display constantly shows the battery charge status. To the extent that batteries have discharged, the symbol "empties". When the charge decreases still further it starts blinking.



In this case, batteries should be replaced as soon as possible.

If you continue to use it, the instrument can no longer ensure correct measurement. The memory data are maintained.

**If the battery charge level is insufficient, the following message appears when you turn the instrument on:**

**BATT TOO LOW  
CHNG NOW**

**The instrument issues a long beep and turns off. In this case, replace the batteries in order to turn the instrument back on.**

To replace the batteries, proceed as follows:

1. switch the instrument off;
2. unscrew the battery cover counter clockwise;
3. replace the batteries (3 1.5V alkaline batteries - type AA);
4. screw the cover on clockwise.



### Malfunctioning upon turning on after battery replacement

After replacing the batteries, the instrument may not restart correctly; in this case, repeat the operation.

After disconnecting the batteries, wait a few minutes in order to allow circuit condensers to discharge completely; then reinsert the batteries.

### 8.1 WARNING ABOUT BATTERY USE

- Batteries should be removed when the instrument is not used for an extended time.
- Flat batteries must be replaced immediately.
- Avoid batteries leaking.
- Always use good quality leakproof alkaline batteries. Sometimes on the market, it is possible to find new batteries with an insufficient charge capacity.



## **9. NOTES ABOUT WORKING AND OPERATIVE SAFETY**

### **Authorized use**

The technical specifications as given in chapter TECHNICAL CHARACTERISTICS must be observed. Only the operation and running of the measuring instrument according to the instructions given in this operating manual is authorized. Any other use is considered unauthorized.

### **General safety instructions**

This measuring system is constructed and tested in compliance with the EN 61010-1 safety regulations for electronic measuring instruments. It left the factory in a safe and secure technical condition.

The smooth functioning and operational safety of the measuring system can only be guaranteed if the generally applicable safety measures and the specific safety instructions in this operating manual are followed during operation.

The smooth functioning and operational safety of the instrument can only be guaranteed under the environmental and electrical operating conditions that are in specified in chapter TECHNICAL CHARACTERISTICS.

Do not use or store the product in places such as listed below:

- Rapid changes in ambient temperature which may cause condensation.
- Corrosive or inflammable gases.
- Direct vibration or shock to the instrument.
- Excessive induction noise, static electricity, magnetic fields or noise.

If the measuring system was transported from a cold environment to a warm environment, the formation of condensate can impair the functioning of the measuring system. In this event, wait until the temperature of the measuring system reaches room temperature before putting the measuring system back into operation.

### **Obligations of the purchaser**

The purchaser of this measuring system must ensure that the following laws and guidelines are observed when using dangerous substances:

- EEC directives for protective labour legislation
- National protective labour legislation
- Safety regulations



## 10. TECHNICAL CHARACTERISTICS

### 10.1 TECHNICAL INFORMATION ON THE RTD THERMOMETER

#### Instrument

Dimensions (Length x Width x Height)	140x88x38mm
Weight	160g (complete with batteries)
Material	ABS
Display	2x4½ digits plus symbols Visible area: 52x42mm

#### Operating conditions

Operating temperature	-5...50°C
Warehouse temperature	-25...65°C
Working relative humidity	0...90%RH without condensation
Protection degree	IP67

#### Power

Batteries	3 1.5V type AA batteries
Autonomy	200 hours with 1800mAh alkaline batteries
Power absorbed with instrument off	< 20µA

#### Connections

Input for probes	8-pole male DIN45326 connector
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#### Unit of Measurement

°C – °F

#### Measurement of temperature by Instrument

Pt100 measurement range	-200...+650°C
Pt1000 measurement range	-200...+650°C
Resolution	0.1°C
Accuracy	±0.05°C
Drift after 1 year	0.1°C/year



## 10.2 TECHNICAL DATA OF PROBES AND MODULES IN LINE WITH THE INSTRUMENT

### 10.2.1 TEMPERATURE PROBES PT100 SENSOR USING SICRAM MODULE

Model	Type	Application range	Accuracy
<b>TP472I</b>	Immersion	- 196°C...+500°C	$\pm 0.1^{\circ}\text{C}$ (@ 0 °C) $\pm 0.2^{\circ}\text{C}$ (-50 °C $\leq t \leq$ 250 °C) $\pm 0.3^{\circ}\text{C}$ (t < -50 °C; t > 250 °C)
<b>TP472I.O</b>	Immersion	-50°C...+300°C	
<b>TP473P.I</b>	Penetration	-50°C...+400°C	
<b>TP473P.O</b>	Penetration	-50°C...+300°C	
<b>TP474C.O</b>	Contact	-50°C...+300°C	
<b>TP475A.O</b>	Air	-50°C...+250°C	
<b>TP472I.5</b>	Immersion	-50°C...+400°C	
<b>TP472I.10</b>	Immersion	-50°C...+400°C	
<b>TP49A.I</b>	Immersion	-70°C...+250°C	
<b>TP49AC.I</b>	Contact	-70°C...+250°C	
<b>TP49AP.I</b>	Penetration	-70°C...+250°C	
<b>TP875.I</b>	Globe-thermometer Ø 150 mm	-30°C...+120°C	
<b>TP876.I</b>	Globe-thermometer Ø 50 mm	-30°C...+120°C	
<b>TP87.O</b>	Immersion	-50°C...+200°C	

#### Common characteristics

Resolution	0.01°C in the range $\pm 199.99^{\circ}\text{C}$ , 0.1°C in the remaining field
Temperature drift @20°C	0.003%/°C

### 10.2.2 PT100/PT1000 PROBES WITH TP47 CONNECTOR WITHOUT SICRAM MODULE

<b>TP47.100.O</b>	Pt100 4 wires	-50...+250°C	Class A
<b>TP47.1000.O</b>	Pt1000 4 wires	-50...+250°C	Class A
<b>TP87.100.O</b>	Pt100 4 wires	-50...+200°C	Class A
<b>TP87.1000.O</b>	Pt1000 4 wires	-50...+200°C	Class A

#### Common characteristics

Resolution	0.01°C in the range $\pm 199.99^{\circ}\text{C}$ , 0.1°C in the remaining field
Temperature drift @20°C	Pt100 0.003%/°C Pt1000 0.005%/°C



## 11. ORDER CODES

**HD2307.0** The kit is composed of the HD2307.0, 3 1.5V alkaline batteries, operating manual and case.  
**The probes must be ordered separately.**

### 11.1 PROBES COMPLETE WITH SICRAM MODULE

- TP472I** Immersion probe, sensor Pt100. Stem Ø3 mm, length 300 mm. Cable length 2 metres.
- TP472I.O** Immersion probe, sensor Pt100. Stem Ø3 mm, length 230 mm. Cable length 2 metres.
- TP473P.I** Penetration probe, sensor Pt100. Stem Ø4 mm, length 150 mm. Cable length 2 metres.
- TP473P.O** Penetration probe, sensor Pt100. Stem Ø4 mm, length 150 mm. Cable length 2 metres.
- TP474C.O** Contact probe, sensor Pt100. Stem Ø4 mm, length 230 mm, contact surface Ø 5 mm.  
Cable length 2 metres.
- TP475A.O** Air probe, sensor Pt100. Stem Ø4 mm, length 230 mm. Cable length 2 metres.
- TP472I.5** Immersion probe, sensor Pt100. Stem Ø6 mm, length 500 mm. Cable length 2 metres.
- TP472I.10** Immersion probe, sensor Pt100. Stem Ø6 mm, length 1000 mm. Cable length 2 metres.
- TP49A.I** Immersion probe, sensor Pt100. Stem Ø2.7 mm, length 150 mm. Cable length 2 metres.  
Aluminium handle.
- TP49AC.I** Contact probe, sensor Pt100. Stem Ø4 mm, length 150 mm. Cable length 2 metres. Aluminium handle.
- TP49AP.I** Penetration probe, sensor Pt100. Stem Ø2.7 mm, length 150 mm. Cable length 2 metres.  
Aluminium handle.
- TP875.I** Globe-thermometer Ø150 mm with handle. Cable length 2 metres.
- TP876.I** Globe-thermometer Ø50 mm with handle. Cable length 2 metres.
- TP87.O** Immersion probe, sensor Pt100. Stem Ø3 mm, length 70 mm. Cable length 2 metres.

### 11.2 TEMPERATURE PROBES WITHOUT SICRAM MODULE

- TP47.100.O** Immersion probe, sensor Pt100 direct 4 wires. Probe's stem Ø3 mm, length 230 mm. 4-wire connection cable with connector, length 2 metres.
- TP47.1000.O** Immersion probe, sensor Pt1000. Probe's stem Ø3 mm, length 230 mm. 4-wire connection cable with connector, length 2 metres.
- TP87.100.O** Immersion probe, sensor Pt100 direct 4 wires. Probe's stem Ø3 mm, length 70 mm. 4-wire connection cable with connector, length 2 metres.
- TP87.1000.O** Immersion probe, sensor Pt1000. Probe's stem Ø3 mm, length 70 mm. 4-wire connection cable with connector, length 2 metres.
- TP47** Only connector for probe connection: Pt100 direct 3 and 4 wires, Pt1000 and Ni1000 2 wires.



TO MEASURE  TO KNOW

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