PRESYS ®

Calibrator for Infrared Thermometer
T-30NIR-H

Technical Manual

WARNING!

Avoid electric shock risk on touching the equipment:
- Use only suitable power cable with earth connection;
- Never power the equipment to the mains socket with no earth connection.

WARNING!

High voltage is present inside these equipments. It can cause great damages and injuries.
Do not make any repair service inside the equipment without removing the plug from the supply.

WARNING!

Much electromagnetic noise can cause instability to the equipment.
The equipment is provided with electromagnetic interference filters that protect not only the mains but also the equipment itself against noise. These filters have no function if the unit is not earthed properly.

WARNING!

High temperatures are achieved in these equipments.
Risk of fire and explosion are present in case safety measures are not taken. Sign by means of warnings the hazardous areas at high temperatures.
Do not obstruct any air-vent to avoid risk of fire in the equipment.

WARNING!

Do not operate the instrument in excessively wet, oily, dusty or dirty environments.
Do not use sharp or pointed objects in the blackbody target.
Do not use abrasive materials or cleaning products on the blackbody target. These products may change the instrument properties.
Do not touch the blackbody target, skin salts and oils may damage the material properties.

WARNING!

The instruments described in this technical manual are equipment for use in specialized technical area.
The user is responsible for configuration and selection of values of the parameters of the instruments.
The manufacturer warns against the risk of incidents with injuries to both persons and property, resulting from the incorrect use of the instrument.

Disposal calibrator:

NO HOUSEHOLD WASTE!
The calibrator of the series T Calibrator consist of various different materials. It must not be disposed of with household waste.

Table of Contents

1 - Introduction

T-30NIR-H

The Calibrator for Infrared Thermometer T-30NIR-H produces temperature values in order to enable the calibration of infrared thermometers next to ambient temperature which makes it suitable for calibrating forehead thermometers. The generated temperatures have high accuracy. The calibrator also has a large area of known emissivity and uniform temperature and is therefore compatible with target sizes of most commercial infrared thermometers.

The calibrator also has an external probe input that makes it possible to control the temperature from a standard thermoresistance sensor (optional) inserted in the same measurement zone as the sensors under calibration, increasing accuracy and decreasing setpoint errors and effects of block loading.

- The T-30NIR-H calibrator generates temperatures from 20 to 45 °C.
- The calibration curve of the standard sensor follows the Callendar - Van Dusen parameterization.
- Has input for RTD.
- No use of external standard thermometer *.
- Performs automatic calibrations with or without the use of computers.
- Accuracy of up to 0.1 °C, 0.1 °C stability and resolution of 0.01 °C.
- Communication with computer and software ISOPLAN.
- Portable, compact, features handles and carrying case.

* For high performance calibration, it is possible to make use of an external sensor RTD read in the input of the calibrator, with adjustment of the Callendar-Van Dusen coefficients.

Has a wide variety of programming resources, where the calibrator is programmed to generate pre-set temperatures. Compatible with automatic and documented calibration programs, applying the ISOPLAN software on PC / Windows platform, using the serial port for connection between the PC and the calibrator that communicate via RS-232 or RS-485. With ISOPLAN software can register thermometers

and factory instruments, generate work orders, produce and print calibration certificates and reports, that is, all the computer power is brought into the calibrations environment.

The calibrator T-30NIR-H has also many other features, such as:

- The electric signal calibrator is independent from the blackbody target function.
- Internal buzzer beeps when the temperature reaches the desired value.
- Keypad that eases the operation and configuration of the calibrator.
- OLED graphic display for presenting large digits.
- Thermo-element reading scaled to ITS-90 or IPTS-68.
- RTD reading configurable with Callendar-Van Dusen coefficients adjustments.
- Independent circuitry for over-temperature protection and safety.

The calibrator operates with Nickel-Metal Hydride (Ni-MH) batteries.

1.1 - Technical Specifications

Operating Range	20 to 45 °C
Power Supply	110 Vac or 230 Vac 50/60 Hz, according to order code
Target Diameter	80 mm
Resolution	0.01 °C or 0.01 °F
Display Accuracy (^{1})	± 0.1 °C
Target Emissivity (ε)	(0.98 ± 0.01) @ 8-14 µm
Target Uniformity	± 0.2 °C
Stability	± 0.1 °C
Power Consumption	120 W
Heating Time	15 minutes (20 °C to 45 °C)
Cooling Time	15 minutes (45 °C to 20 °C)
Dimensions (H,W,D)	260 x 180 x 270 mm
Reference Sensor Input Diameter	3.0 mm
Weight	6 kg

- Note (^{1}): Accuracy referring only to external probe input. The value does not include sensor accuracy or errors arising from the sensor characterization.

1.1.1 - Input Technical Specification

	Input Ranges	Resolution	Accuracy	Notes
Resistance	0 to 400 Ω 400 to 2500 Ω	0.01 Ω 0.01 Ω	± 0.01 % FS ± 0.03 % FS	excitation current 0.9mA
Pt-100	-200 to 850 °C / -328 to 1562 °F	0.01 ° / 0.01 °F	± 0.1 °C / ± 0.2 °F	IEC-60751
Pt-1000	-200 to 400 °C / -328 to 752 °F	0.1 °C / 0.1 °F	± 0.1 °C / ± 0.2 °F	IEC-60751
Cu-10	-200 to 260 °C / -328 to 500 °F	0.1 °C / 0.1 °F	± 2.0 °C / ± 4.0 °F	Minco 16-9
Ni-100	-60 to 250 °C / -76 to 482 °F	0.1 °C / 0.1 °F	± 0.2 °C / ± 0.4 °F	DIN-43760

1.2 - Order Code

T - 30NIR-H ☐ - ☐

Power Supply
1 - 110 Vac
2 - 230 Vac
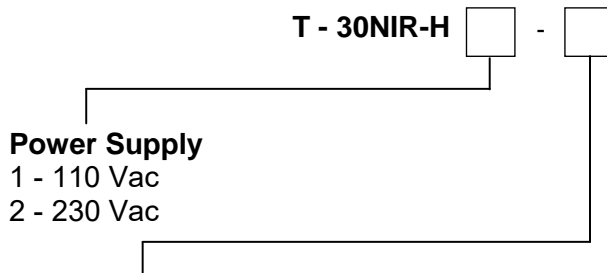
Reference Probe
0 - No Reference Thermometer
1 - Pt-100 Class A Sensor

1.3 - Accessories

- **Temperature Sensors:**

Description	Order Code
Straight Probe (170 mm X 3 mm) - Class A	04.06.0017 - 00

- **Adapter for Temperature Sensors:**

Description	Order Code
Adapter Cable for Sensor (Female terminal J121 X mini DIN 4 way Male)	06.07.0017 - 00

- **Communication Interface:**

Description	Order Code
RS-232 - DB-9F Conector (COM1)	06.02.0002 - 00
RS-232 - DB-25F Conector (COM2)	06.02.0004 - 00
RS-485	06.02.0006 - 00

- **Carrying Case.** Order Code: 06.01.1020-00.

- **ISOPLAN Software.**

- **Calibration Certificate**

2 - T-30NIR-H Calibrator Operation

The T-30NIR-H controls the temperature of the blackbody target and is suitable for calibration of infrared thermometer.

The calibrator has 3 operating modes:

- *Manual Mode* to select the block temperature straight from the keypad.

- *Programmable Mode*: 6 different programs with 11 temperature set point values. The block temperature is selected among the programmed values by the keys ⇧ and ⇩. The *Programmable Mode with Timer* scans automatically the temperature set points.

- *Automatic Mode* the calibration is performed in an automatic way by the calibrator: the schedule and the calibration results, besides the object under calibration readings are stored in the calibrator memory. For pyrometers with local indication, readings are entered manually and for pyrometers with response in mA, V or thermocouple signal, reading is performed automatically by the input of the calibrator.

When powered on (**ON/OFF** key), the calibrator goes through a self-test routine and shows the last calibration date and the value of the battery voltage. After the self-test is completed, the display shows the starting menu.

```
⇨ IN          EXEC
  CONF        CAL          COM
```

The initial set point is 25.00 ºC:

Through the keys ⇧**,** ⇩**,** ⇦ and ⇨, choose the menu options and press **ENTER**.

IN: selection of the calibrator signal input. Choose between Ohms and RTD or none. More details in item *2.1 – IN Menu*.

EXEC: The calibrator enters the manual or programmable operating mode.

CONF: Accesses the calibrator configuration options. More details in item *2.2 – CONF Menu*.

CAL: This option accesses the calibrator adjustment functions, protected by password. More details in section *5 - Calibration*.

COM: Accesses the automatic calibration parameters. It is possible to perform a calibration without a computer or using it (via ISOPLAN software). More details in item *2.5 - Automatic Operating Mode*.

2.1 - IN Menu

⇨ OHM   RTD   NO
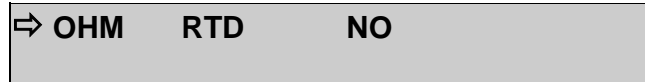
OHM: selects ohms input. Following, choose from the menu the wiring in 2, 3 or 4-wire.

⇨ 2-WIRE   3-WIRE
   4-WIRE

RTD: Selects the type of thermo resistance used. Choose from **PT100**, **NI100**, **CU10** and **PT1000** types. Choose also if the wiring is 2, 3 or 4-wire.

NO: Disables reading of external signal.

Selecting one of the options above, the calibrator goes straight to the manual operating mode, with no need to select the **EXEC** option.

2.1.1 - Input Connection Diagrams

Ohm / RTD (2-wire)
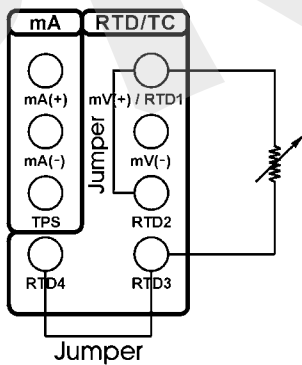
Ohm / RTD (3-wire)

Ohm / RTD (4-wire)

(*) Use same gauge and length wires

2.1.2 - External Probe Connection
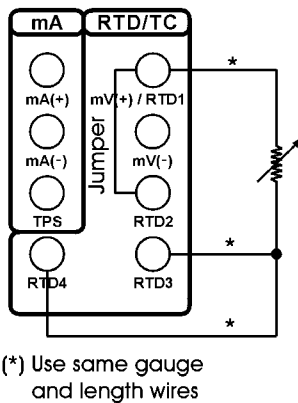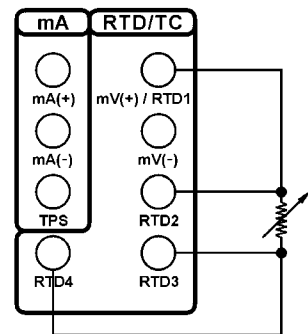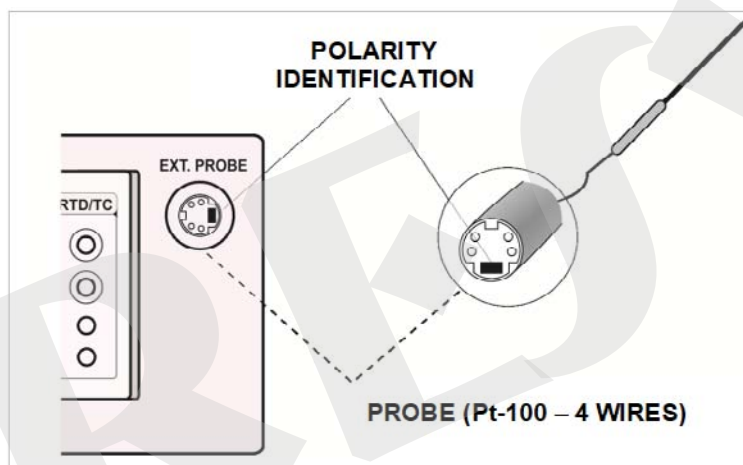

Insert the standard 4-wire Pt-100 sensor into the test block and fit its mini-DIN connector to the external probe input (EXT. PROBE) located on the front panel of the thermal bath, as shown in the figure below:

For the use of temperature control by the external probe, the function must be enabled through the PRBe option of the PRG menu.

The consultation of the values of the steps of a program must be carried out using the VARIABLE option, confirming the values shown on the display with the ENTER key. The options 10%, 20% and 25% automatically change the number of steps and recalculate their values using SETPOINT HIGH and SETPOINT LOW.

PRBe: This option allows you to enable the use of an external probe to control the temperature of the thermal bath when selecting **YES**. To use the internal probe, select **NO**. When the external probe is enabled, configure the calibration parameters in the **PARAM** menu and the temperature unit in **CF** as degrees Celsius or Fahrenheit. The calibration parameters correspond to the coefficients R0, A, B and C of the *Callendar-Van Dusen* equation:

$$R(t) = R0 \{1 + A.t + B.t2 + C.t3. (T - 100 \ ^{\circ}C)\}, \text{ with } C = 0 \text{ for } t \geq 0.$$

This equation is normally used on the IPTS - 68 temperature scale, where t refers to the temperature on this scale and R0, to resistance at 0 ºC. However, it can also be used on the ITS-90 scale.

The configuration menu for these coefficients is given below:

```
⇨R0         A          B              C
  E_A       E_B        E_C
```

When entering the value of a coefficient, it must be separated into mantissa and exponent as well as used in scientific notation. For a C coefficient of -3.151052 × 10-2, for example, type your mantissa (an integer and fractional part of six digits) in the mnemonic C and the exponent, in module, in the mnemonic **E_C**. Thus, we have **C** = -3.151052 and **E_C** = 2.

It should be noted that the sign of a number can be inverted by pressing the **ZERO** key when there is a null number on the display. This changes the + sign to - and vice versa.

The coefficients for the ITS-90 scale according to the IEC - 60751 standard are shown below:

R_0 = 100.00000	
A = +3.908300	E_A = -03
B = -5.775000	E_B = -07
C = -4.183000	E_C = -12

MD: Maximum deviation from the setpoint for temperature control with an external probe. The temperature is stabilized by the external control after entering the range limited by **SET ± MD**. If the value of the External Probe stabilizes at a value other than the setpoint ± MD value, this value can be increased. The factory setting for this parameter is 1.0 ° C.

2.2 - CONF Menu

```
⇨ CF        PRG        MEM        DSP
   SC         BT         DT        BZ
```

CF: Selects the temperature unit between ºC and ºF. The ITS-90 or IPTS-68 temperature scales are selected for both for input readings and the internal reference blackbody target

```
⇨ ºC-90                ºF-90
   ºC-68                ºF-68
```

If RTD Pt-100 input has been selected, this menu changes, adding the options °C-CVD and ºF-CVD:

```
   ºC-68                ºF-68
⇨ºC-CvD               ºF-CvD
```

DSP: This option sets the OLED display contrast. Use the key ⇧ and ⇩ until you get a better contrast and finish the operation by pressing the key **ENTER**.

BT: Indicates the battery voltage or the battery charger as the instrument's power supply is switched off or on, respectively.

Battery level	Battery state	Display
4.0 to 7.0 V	normal	----------
< 4.0 V	low	LOW BATTERY

DT: Updates the date and time of the calibrator. Thus, when the calibrator performs a calibration in the automatic mode via ISOPLAN, all data are registered together with date and time of occurrence. Every time the calibrator is powered off, the internal clock does not continue to be updated. However, the ISOPLAN software can automatically update the calibrator date and time with the computer internal clock. Otherwise, use keys ⇧ and ⇩ to change the field that blinks and the keys ⇨ and ⇦ to go to another field. The key **ENTER** confirms the last selection.

BZ: Menu that configures the piezoelectric buzzer.

```
⇨ NO          YES          ENDCAL
```

NO: Disables the buzzer.

YES: The buzzer beeps when the block reaches the set point and stabilizes.

ENDCAL: The buzzer beeps only at the end of a calibration in the automatic operating mode

PRG: Menu that programs the calibrator.

> ⇨ **DEC_IN**   **DEC_PRB**
> **SET POINT**

DEC_IN: Selects the number of decimals of the thermo-element reading. The default value depends on the input signal.

> ⇨ **DEFAULT**
> **0**   **1**   **2**   **3**   **4**

DEC_PRB: Selects the number of decimals of the blackbody target temperature and the set point value. The default number is 2.

> **0**   **1**   ⇨ **2**

SET POINT: Enables the calibrator *Programmable Operating Mode*, and allows the configuration of programmed values. The selected program is indicated by the selection arrow. Choose one of the **6** temperature programs or **NO** to disable this *Programmable Mode*.

Select any of the 6 programs and confirm with the key **ENTER.** Following, it is shown the menu of temperature set point configuration.

> ⇨ **10%**   **20%**   **25%**
> **VARIABLE**

Change the configuration to steps (STEPS) of **10%**, **20%**, **25%**, **VARIABLE** or press **C/CE** to maintain the configuration already stored in memory. The temperature range of the program must be configured through the values in **SET POINT HIGH** and **SET POINT LOW** in case of **10%**, **20%** or **25%** fixed steps of the range. The option **VARIABLE** allows the user to define from 2 to 11 values of temperature set point, not necessarily in ascending order.

To verify the step values of a program, select the **VARIABLE** option and confirm the values shown in the display with the key **ENTER**. The **10%**, **20%** and **25%** options change the number of steps automatically and recalculate the values according to **SET POINT HIGH** and **SET POINT LOW**.

SC: This function scales the input reading.

Select the option **SC** and press **ENTER**. If no input is selected in **IN**, the calibrator will show the **SELECT INPUT FIRST** message. In this case, go to menu **IN** and select the input signal type.

The function **SC** will show **IN** or **NO.** Confirm **IN** to configure the scaling or **NO** to disable the **SC** function, with the key **ENTER**.

The scaling is performed via the **INPUT HIGH** and **INPUT LOW** parameters, corresponding to the maximum and minimum values of the calibrator signal input, in the engineering unit of this signal. Following, configure the **SCALE DEC (0-4)**, **SCALE HIGH** and **SCALE LOW** parameters according to the maximum and minimum values of the transmitter scale and the desired number of decimals. The scaled value is shown on the display with the **#** unit.

For example, 0 to 50 ºC input scaled to percentage. The scaling with one decimal would be:

INPUT HIGH: 0.00 °C
INPUT LOW: 50.00 °C
SCALE DEC (0-4): 1
SCALE HIGH: 100.0 #
SCALE LOW: 0.0 #

MEM: The T-30NIR-H calibrator allows many special programs and functions that can be of frequent use. In situations like this, it would be useful to store the current configuration in memory in order to save time. Up to 8 configurations can be stored in memory.

Selecting the option **MEM**, it is possible to store the current configuration (**WRITE**), restore a previous stored configuration (**RECALL**) or erase the 8 configurations from memory (**CLEAR ALL**).

⇨ WRITE   RECALL
CLEARALL

Selecting the option **WRITE** or **RECALL** will present a new menu with numbers 1 to 8, representing each one of the memory positions. Choose one of the positions and press **ENTER**. The writing operation (**WRITE**) can be made in an already used memory position. The calibrator asks for the overwriting confirmation with the message **OVERWRITE MEMORY?**. The **CLEAR ALL** operation shows a confirming message **ARE YOU SURE?**. In both cases, press **ENTER** to confirm the operation or **C/CE** to cancel.

2.3 - Manual Operating Mode

The display indicates the value of the selected temperature of the thermal block, in addition to the current temperature value of the thermal block or thermoresistance. There are 4 ways of visualization on the display, involving the value of the calibrator input (**IN**): the temperature of the thermal block (**PRBi** or **PRBe**, measured with internal or external probe, respectively) and the temperature setpoint (**SET**). The □ key changes the way the display is presented:

IN	= 109,66 Ω
PRBi/PRBe	**= 25.01 ºC**

PRBi/PRBe	**= 25.01 ºC**
SET	**= 25.00 ºC**

109,66	**Pre (¹)** Ω

25.01	**PRi/PRe** ºC

Note (¹): Ohms indication referring only to external probe input

The temperature setpoint of the thermal block is selected directly by the numeric keypad, even if the indication SET is not appearing. The numeric keypad activates the selection of SET, in any of the forms of presentation of the display for changing the setpoint.

The setpoint value is increased by the ⇧ key and decremented by the ⇩ key. As long as the keys are kept pressed, the setpoint continues to be increased or decreased.

When the display indicates the temperature of the External Probe (PRBe), when pressing the ⇨ key, it will indicate the resistance value read, without calculating the temperature.

2.4 - Programable Operating Mode

Pre-configured programs can be loaded from the calibrator memory, enabling the programmable operating mode. The temperature programmed values of the target are used directly, with no need to enter the set point.

The display shows **STEPn** beside the target temperature set point value in the programmable mode. The number of the program is indicated by **n**. Using the keys ⇧ and ⇩, the programmed values of temperature set point are changed. The numeric keypad continues available for manual selection of the temperature in the same way of the manual operating mode.

The automatic scan over the programmed temperatures is implemented by defining the stabilization time of the thermo-element.

The key ⇨ enables the automatic scan over the points. When pressed, the message **STEPn** gives place to **0s** and the calibrator waits for the stabilization time configured from 1 to 9 minutes, by the keys **1** to **9**. The automatic scan is disabled by pressing key ⇨ again.

A countdown of the stabilization time is only started when the temperature reaches the programmed temperature and stabilizes within a range of approximately ± 0.15 ºC. At this time the buzzer beeps, in case it is configured to **YES**.

2.5 - Automatic Operating Mode

The infrared thermometer calibration is performed in an automatic way by the T-30NIR-H calibrator. The configuration, as well as the calibration verification is carried out by the calibrator itself. Also it is possible to use the ISOPLAN software and its work orders, like a CAC - Computer Aided Calibration.

The independent automatic calibration, without the use of ISOPLAN, is planned in the option **TAGMAN** from menu **COM**.

```
    TAG          EXEC          VERIF
    ADDRESS          ⇨ TAGMAN
```

Before you start programming, first configure the signal that will be read by the calibrator in the menu **IN**. To calibrate infrared thermometers with local indication, as an example, there is no electric signal to be read. In this case, option **IN** from the menu must be configured to **NO** and the calibrator will ask to enter the value indicated by the thermometer, at the end of the stabilization time of each calibration point.

The data for an automatic calibration concern:
- **TAG**: the infrared thermometer tag identification.
- **SP**: the blackbody target temperature reference values for the calibration (calibration points).
- **TOL**: the maximum tolerance for the infrared thermometer operation.
- **STB**: the stabilization time, in seconds, so that the thermometer temperature indicates correctly. This timer starts just after the target reaches and stabilizes at the set point temperature.
- **STR**: the calibration strategy of the programmed reference values. The available strategies are: ⇧ (UP), ⇩(DOWN), ⇧⇩ (UP - DOWN), ⇩⇧ (DOWN - UP), ⇧⇩⇧ (UP - DOWN - UP) and ⇩⇧⇩ (DOWN - UP - DOWN).
- **RP**: the strategy number of repetitions.
- **RGI**: the thermometer indication range.
- **RGO**: the operating temperature range that corresponds to the indication range above.

The automatic calibration begins when the option **EXEC** from menu **COM** is selected. All the operations are automatically performed by the T-30NIR-H calibrator. The keypad does not work until the end of the calibration.

At the end of the stabilization time, the calibrator stores the thermometer reading in memory and goes to the next point, in case some input signal has been previously configured in the menu **IN** and connected to the calibrator terminals.

The **CALIBRATION END** message appears on the display at the end of the automatic calibration. Press **ENTER** to confirm. The results can be verified in option **VERIF** from menu **COM**.

The first message in option **VERIF** informs the calibration result, with the number of points that have succeeded. Following, press **ENTER** to verify each one of the

readings performed by the calibrator. The keys ⇨ and ⇦ interchange 2 screens: one that displays the target and thermometer temperature value and the other displays a message indicating the calibration point number and its state (**OK** or **FAIL**), besides the error value in %.

The option **TAG** from menu **COM** can present a list of up to 4 tags that have been downloaded or uploaded with ISOPLAN software. The key **ENTER** selects the tag to be calibrated from the tag list. The automatic calibration starts by the option **EXEC** from menu **COM** and the calibration data can be verified in option **VERIF**. To calibrate automatically not using the ISOPLAN, there is a reserved place for one manual tag. The selection of the manual tag is performed by confirming the option **TAGMAN** with the key **ENTER**.

The option **ADDRESS** selects the communication address of the T-30NIR-H calibrator. The communication protocol used is ModBus - RTU, with no parity and baud rate of 9600. The calibrator communication with the computer can use RS-232 or RS-485, for network option, according to the communication interface used. In order to communicate with ISOPLAN software, configure **ADDRESS** to 1.

3 - Usage Recommendations

It is of great importance to know the instrument to be calibrated. Infrared thermometers have characteristics that must be met for the results to be correct, as the emissivity adjustment (if any), focal length and focus area, for example. These data are easily obtained on the thermometer user manual and this observation is needed to verify the compatibility between thermometers and calibrator.

The forehead infrared thermometer measures the surface temperature of the human body and corrects the value, bringing the indication closer to the internal body temperature. To perform the calibration of these thermometers, it is necessary to use it in the surface measurement function. Refer to the forehead thermometer manual for how to make this change.

To perform the readings, align the infrared thermometer with the blackbody target horizontally. Observe the distance from the thermometer to the blackbody target, respecting the size of effective target, as seen on thermometer user manual. Remember that the area targeted by the infrared thermometer to be calibrated must be less or equal to the blackbody target size in order to avoid introducing measurement errors.

The external sensor is an optional accessory that may be installed to increase the accuracy of temperature indication. This sensor can be supplied with the Callendar-Van Dusen parameters and configured in the Probe Input of T-30NIR-H calibrator.

4 - Calibrator Warning Messages

Warning	Meaning	Procedure
RAM ERROR READ MANUAL	Problem in RAM memory	Turn the calibrator off and on. If the error persists, send the instrument to the factory
EEPROM ERROR READ MANUAL	Problem in EEPROM memory	Same as the previous item
LOW BATTERY	Level of battery voltage is low	Check the calibrator power supply
UNDER / OVER	Input signal out of specifications or scaling range	See item 1.11 on Input Specifications
????.??ºC	Input sensor is open	Check input connections and sensor
Prbe = ????? °C	External Probe input open	Connect an external probe or disable the external Probe function in the menu CONF > PRG > Prbe > NO

5 - Calibration

⚠️ **ATTENTION**: **To prevent potential damage to the instrument's calibration due to improper adjustments, the access password must be requested from your local distributor.**

<u>**Adjustment procedure access password:**</u> To perform input or output adjustments, the owner of the calibrator must contact the local distributor, providing the equipment's **serial number** to receive the password that allows access to the adjustment.

WARNING: Enter the following options only after understanding them completely. Otherwise, it may be necessary to return the instrument to the factory for recalibration!

Select **CAL** option from the main menu and press the **ENTER** key. You should then enter the password (**PASSWORD**) to access the calibration menu.

The password functions as a protection to calibration ranges. After the password is entered, the menu displays the options:

⇨ IN	OUT	DATE

You should then choose the input range (**IN**) as the output range (**OUT**) is not available for the user. **DATE** is an option which allows you to record the date on which the calibration was performed and once it has been filled in, it will be displayed every time the calibrator is turned on.

Options for **IN** calibration are:

⇨ mV	OHM

5.1 - Input Calibration

The ohms/RTD input adjustment depends on the right adjustment of mV input.
Select the corresponding mnemonic and apply the signals presented in the tables below.
When calibrating inputs, the display shows on the 2nd line the value measured by the calibrator and on the 1st line the same value is expressed as a percentage.
Note that the applied signals just need to be close to the values shown in the table.
Once the signal has been applied, store the values of the 1st and 2nd calibration points, by pressing keys 1 (1st point) and 2 (2nd point).

mV Input	1st point	2nd point
G3	0.000 mV	120.000 mV
G2	0.000 mV	600.000 mV
G1	600.000 mV	2400.000 mV

Input calibration for Ω is performed in two steps:

a) Application of mV signal:
   For the calibration below, leave terminals RTD3 (+) and RTD4 (+) short-circuited.

mV Signal	Terminals	1st point	2nd point
V_OHM3	RTD3(+) and mV(-)	70.000 mV	120.000 mV
V_OHM4	RTD4(+) and mV(-)	70.000 mV	120.000 mV

b) Application of standard resistors:
   Connect a decade box or standard resistors on terminals RTD1, RTD2, RTD3 and

   RTD4 (4-wire connection).

resistors	1st point	2nd point
OHM3	20.000 Ω	50.000 Ω
OHM2	100.000 Ω	500.000 Ω
OHM1	500.000 Ω	2200.000 Ω

5.2 - Probe Calibration

The options of calibration / probe are:

⇨ ⁰C	RESTORE

⁰C: Adjust of the internal temperature sensor (internal Probe).

RESTORE: Restores the internal temperature sensor calibration parameters to the factory values.

To readjust the internal Probe it is necessary to compare the value indicated by the calibrator (Probe) and the temperature value from an external probe placed internally in the black body target. The temperature of the external probe should have high accuracy and should be measured by a standard thermometer (ST).

The option to adjust the internal sensor has seven points of adjustment. These points are recorded via keys 1 to 7.

Before starting the calibration (adjustment), record in these points the respective initial storing values, according to the table below.

Go to the manual operating mode (menu **EXEC**) and generate all the seven levels of temperature (set points from the table), writing down the value indicated by the standard thermometer (ST). Now, go back to the option Calibration/ Probe / ⁰C and record the values indicated by the standard thermometer.

Set point of the generated temperature (⁰C)	Initial value to record (⁰C)	ST indication	New value to record	New indication of the ST	key
20	20.00	19.971	19.97	20.009	key 1
25	25.00	25.123	25.12	25.005	key 2
29	29.00	28.952	28.95	29.011	key 3
33	33.00	32.932	32.93	33.008	key 4
37	37.00	36.908	36.91	37.007	key 5
41	41.00	40.873	40.87	41.006	key 6
45	45.00	44.866	44.87	45.009	key 7

6 - Maintenance

6.1 - Instructions for Hardware Maintenance

There are no parts or components in the T-30NIR-H temperature calibrator that can be repaired by the user. Only the 2 Amp fuse, placed within the socket on the rear can be replaced by the user.

The fuse may blow due to a voltage spike in the mains or a calibrator component fault. Replace the fuse once. If a second fuse blows again, it is because the fault is not that simple. Send the calibrator to the factory for repair.