Penta® Ver.01

PORTABLE DIGITAL THERMOMETER WITH FIVE SENSORS

Full Gauge CONTROLS

⚠ Have this manual in the palm of your hand through the **FG Finder**.

Portable

Power AA batteries

Five temperature sensors

Average temperature calculation $\bar{x} = \frac{\sum x}{n}$

Temperature differential calculation

1. DESCRIPTION

The **Penta** portable digital thermometer indicates the temperature of five distinct points. Furthermore, it can indicate the differential temperature of sensors **S1** and **S2** or the average temperature of the configured sensors.

Due to its great versatility, **Penta** is an excellent tool for temperature measurements in various applications, such as: split, window, central or automotive air conditioning. It is ideal for refrigeration applications such as refrigerators, freezers and cold rooms. Suitable for carrying out the refrigeration balancing of evaporators, and can also be used to measure the average temperature inside vehicles, rooms, machines, oil, water and other liquids.

Penta is designed to get the best user experience while using it. The temperature is visualized through an LCD display with large digits and the electronic circuit is optimized for low power consumption.

1.1 MAIN FEATURES

- **Automatic or manual selection of sensors;**
- **Records of maximum and minimum temperatures during the measurement period;**
- **HOLD function (locking of instantaneous indications, as well as the records of maximum and minimum temperatures);**
- **Offset insertion in temperature indications;**
- **Battery level indication;**
- **Damaged sensor indication or temperature out of range;**
- **Differential temperature indication between sensors S1 and S2;**
- **Average temperature indication;**
- **Temperature unit selection ($\mathcal{C}$ or $\mathcal{F}$);**
- **Configurable automatic shutdown.**

2. IMPORTANT CAUTIONS

- Use this product only for its intended purpose and within the parameters specified in this instruction manual.

- If the sensor temperature is outside the specified range (-50.0 to 105.0 ºC / -58.0 to 221°F) or the sensor is damaged (short or open), the indication $\boxed{Err}$ will appear on the display.

- Only indications related to the defective sensor will indicate $\boxed{Err}$. The other sensors and measurements will continue to work normally.

- Do not store the device for long periods with the batteries inside.

⚠ **Important:** *When the device is turned off, the minimum and maximum temperature records are reset, as well as the frozen indications of the HOLD function.*

3. TECHNICAL SPECIFICATIONS

Power supply	Two AA batteries
Measuring range	-50.0 to 105.0 °C -58.0 to 221.0°F
Operating temperature	-20 to 60°C -4 to 140°F
Resolution	0.1°C from -50.0 to 105.0°C 0.1°F from -58.0 to 221.0°F
Precision	**± 0.2°C** from -20.0 to 105.0°C (± 0.4°F from -4.0 to 221.0°F) **± 0.4°C** from -50.0 to -20.0°C (± 0.7°F from -58.0 to -4.0°F)
Number of sensors	Five
Cable length	1.5 m
Dimensions	130 x 73 x 30 mm (5.12" x 2.87" x 1.18")

4. PRESENTATION

4.1 DISPLAY

S1 ... S5 - Sensor selected
DIF - Differential Temperature (**S1** - **S2**)
AVR - Average temperature
$\mathcal{C}$ / $\mathcal{F}$ - Temperature unit
▮▮▮▮ - Battery level
HOLD - Lock display indication.
MAX - Maximum temperature recorded
MIN - Minimum temperature recorded

4.2 BUTTONS

⏻ Turns the instrument on/off.

HOLD Lock the instantaneous temperature indications on the display.

MAX MIN Visualizes the minimum (**MIN**) and maximum (**MAX**) temperatures recorded in the selected sensor.

SEL Selects the instrument sensors. Enables/disables automatic selection of sensors.
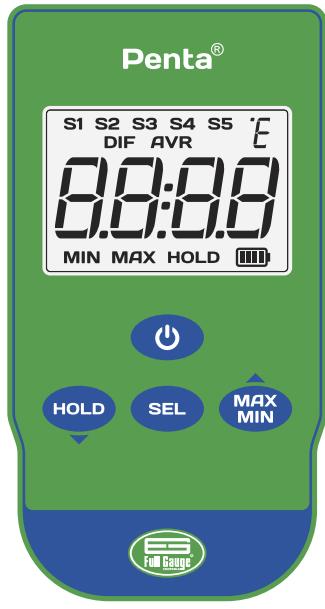
5. OPERATION

Press the key ⏻ for two seconds to turn on the **Penta**. The display will indicate the temperature measured in sensor 1, with its respective indication.

To turn off the instrument, just press and hold the key ⏻ for three seconds. After the key is kept pressed for one second, a countdown signal for shutdown ($\boxed{OFF2}$ and $\boxed{OFF1}$) is indicated on the display. Releasing the button before completing three seconds, the shutdown will be cancelled.

5.1 SELECTION OF SENSORS

Selection of sensors is done by simply pressing the key **SEL**. To activate the automatic selection of sensors, press and hold the key **SEL** for three seconds, until $\boxed{Aut}$ + $\boxed{on}$ appears.

In automatic selection mode, the temperature of each sensor is displayed for three seconds together with the corresponding sensor icon. To deactivate automatic selection, press the key **SEL** again for three seconds until $\boxed{Aut}$ $\boxed{OFF}$ appears.

Selection of sensors occurs in the following order:

Sensor 1 Sensor 2 Sensor 3 Sensor 4 Sensor 5 Average Differential

S1 → S2 → S3 → S4 → S5 → AVR → DIF

During the average temperature selection, the symbols of the sensors used in the calculation will be displayed, as set in the $\boxed{SAE}$ function. During the differential temperature display, the temperature difference between **S1** and **S2** (**S1** - **S2**) is displayed. The **DIF**, **S1** and **S2** icons will be displayed.

5.2 HOLD FUNCTION

Pressing the key **HOLD**, the instantaneous temperature displays are locked. When in **HOLD** mode, the **HOLD** indication is permanently on on the display. Even while in **HOLD** mode, the current instantaneous temperatures are recorded continuously. To exit this mode, press the key **HOLD** again.

5.3 MIN/MAX FUNCTION

To view the minimum (**MIN**) and maximum (**MAX**) temperatures recorded in the selected sensor, simply press the key **MAX MIN**. The temperature will be shown on the display together with the respective minimum and maximum indication.

📝 **Note**:*When the device is in HOLD mode, the indications of minimum and maximum temperatures are also stored relative to the moment when HOLD was pressed.*

To reset the current sensor's minimum and maximum record, hold the key [MAX MIN] until the message `rSt` appears.

During automatic selection, it is not possible to view minimum and maximum temperatures, but they continue to be recorded for possible later verification.

5.4 AVR FUNCTION

The **AVR** function displays the average temperature according to the adjustment made in the instrument's `SAE` function. The `SAE` function selects the sensors used to calculate the average temperature. During the display of the average temperature, the sensors selected for the calculation are indicated on the display.

Note: *If one of the selected sensors in fault, the respective sensor icon will keep flashing and it will be disconsidered in the average temperature calculation.*

6. FUNCTION MENU

To enter the functions menu, simultaneously press the keys [MAX MIN] and [HOLD] for three seconds until `Fun` appears on the display, then release them. the keys [HOLD] and [MAX MIN] will assume the functions of decreases ▼ and ▲ increases, respectively.

FUN	DESCRIPTION	MINIMUM	MAXIMUM	DEFAULT
`OF1`	Sensor 1 offset	-5.0°C (-9.0°F)	5.0°C (9.0°F)	0,0
`OF2`	Sensor 2 Offset	-5.0°C (-9.0°F)	5.0°C (9.0°F)	0,0
`OF3`	Sensor Offset 3	-5.0°C (-9.0°F)	5.0°C (9.0°F)	0,0
`OF4`	Sensor Offset 4	-5.0°C (-9.0°F)	5.0°C (9.0°F)	0,0
`OF5`	Sensor Offset 5	-5.0°C (-9.0°F)	5.0°C (9.0°F)	0,0
`SAE`	Sensors used to calculate the average temperature	2	5	4
`tOF`	Auto power off time (hh:mm)	0 - OFF	12:00	00:30
`Uni`	Temperature unit	°C	°F	°C

Press the key [SEL] to enter the function and then adjust its value with the keys [HOLD] and [MAX MIN]. Press the key [SEL] again to confirm the selected value. To exit the functions menu, press and hold [SEL] for two seconds.

Note: *If no key is pressed for 60 seconds, the device automatically exits adjustment mode, ignoring the changes made.*

6.1 SENSOR OFFSET

This feature allows you to compensate for possible deviations in the temperature sensor reading.

6.2 SENSORS USED TO CALCULATE THE AVERAGE TEMPERATURE

Configures which sensors will be used to calculate the average temperature.

`2` - Sensors 1 and 2
`3` - Sensors 1, 2 and 3
`4` - Sensors 1, 2, 3 and 4
`5` - Sensors 1, 2, 3, 4 and 5.

6.3 AUTO SHUTDOWN TIME

Configures the time the instrument will wait, if no key is pressed, to automatically turn itself off. To deactivate this function, simply decrease the value until the message `OFF` appears on the display.

6.4 TEMPERATURE UNIT SELECTION

Sets the temperature unit between **C** (Celsius) and **F** (Fahrenheit). When confirming this function, the message `FAC` will appear on the display.

Note: *When the temperature unit is changed, the other settings of the menu functions return to the factory default value.*

7. BATTERIES

Use two AA batteries to power the **Penta**.
To change the batteries, follow these steps:

Remove the battery compartment cover located on the back of the product.
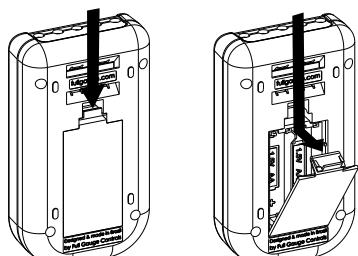
Insert the AA batteries according to the position indicated inside the compartment. **Carefully observe the position of the battery poles before inserting them.**

Close the battery compartment cover.Turn on **Penta**.

⚠️ **Important:** *Do not store the device for long periods with the batteries inside.*
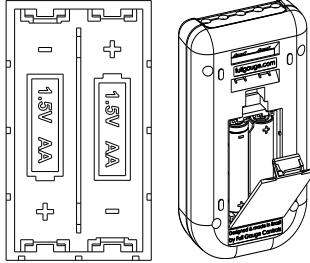
7.1 BATTERY CAPACITY

The **Penta** digital thermometer has an electronic circuit optimized for low power consumption. Using quality alkaline batteries (2700 mAh) it is expected to last more than 900 hours in full operation.

With the use of traditional batteries (1200 mAh) the expected duration is 380 hours.

🔋	100%
🔋	75%
🔋	50%
🔋	25%
🔋	0%
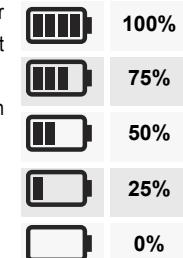
8. SIGNS

`PPPP`	**Actions:**	Reset function values.
`ECAL`	**Actions:**	Contact Full Gauge Controls.
`Err`	**Reason:**	Sensor disconnected or out of specified range.
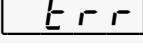
9. WARRANTY AND ENVIRONMENT

ENVIRONMENTAL INFORMATION
Packing:
The materials used in the packaging of Full Gauge products are 100% recyclable. Try to dispose of it through specialized recycling agents.
Product:
The components used in Full Gauge controllers can be recycled and reused if they are dismantled by specialized companies.
Discard:
Do not burn or dispose of controllers that have reached the end of their useful life in household waste. Observe the legislation in your region regarding the disposal of electronic waste. In case of any doubts, contact Full Gauge Controls.

WARRANTY - FULL GAUGE CONTROLS

The products manufactured by Full Gauge Controls, from May 2005, have a warranty period of 02 (two) years directly with the factory and 01 (one) year with accredited resellers/dealers, from the date of the consigned sale on the invoice. After this year with resellers, the warranty will continue to be effective if the instrument is sent directly to Full Gauge Controls. This period is valid for the Brazilian market. Other countries have a 2 (two) year warranty. The products are guaranteed in case of manufacturing failure that makes them improper or unsuitable for the applications for which they are intended. The warranty is limited to the maintenance of instruments manufactured by Full Gauge Controls, disregarding other types of expenses, such as indemnification due to damages caused to other equipment.
WARRANTY EXCEPTIONS
The Warranty does not cover transport and / or insurance costs for sending products with indications of defect or malfunction to Technical Assistance. The following events are also not covered: natural wear of parts, external damage caused by falls or improper packaging of products.
LOSS OF WARRANTY
The product will automatically lose its warranty if:
- The instructions for use and assembly in the technical description and the installation procedures present in Standard NBR5410 are not observed ;
- It is subjected to conditions beyond the limits specified in its technical description;
- It is violated or repaired by a person who is not part of Full Gauge's technical team;
- The damage is caused by a fall, blow and / or impact, water infiltration, overload and / or atmospheric discharge.
WARRANTY USE
To be covered and benefit from the guarantee, the customer must send the product properly packed, together with the corresponding purchase invoice, to Full Gauge Controls. Shipping costs for products are at customer's costs. It is also necessary to send as much information as possible regarding the detected defect, thus making it possible to streamline the analysis, testing and service.
These processes and eventual product maintenance will only be carried out by Full Gauge Controls' Technical Assistance, at the Company's headquarters- Rua Júlio de Castilhos, 250, CEP 92120-030 - Canoas - Rio Grande do Sul - Brazil.