

N320

TEMPERATURE METER – USER GUIDE – V1.8x M

1. SAFETY ALERTS

The symbols below are used in the device and throughout this manual to draw the user's attention to valuable information related to device safety and use.

	
CAUTION: Read the manual fully before installing and operating the device.	CAUTION OR HAZARD: Risk of electric shock.

All safety recommendations appearing in this manual must be followed to ensure personal safety and prevent damage to the instrument or system. If the instrument is used in a manner other than that specified in this manual, the device's safety protections may not be effective.

2. SUMMARY

1. SAFETY ALERTS.....	1
2. SUMMARY	1
3. PRESENTATION.....	1
4. SPECIFICATIONS.....	1
5. ELECTRICAL CONNECTIONS.....	2
5.1 INSTALLATION RECOMMENDATIONS.....	2
6. OPERATION.....	2
6.1 LEVEL 1 – CONFIGURATION LEVEL	2
6.2 LEVEL 2 – CALIBRATION LEVEL	2
7. CONFIGURATION PROTECTION.....	3
7.1 CONFIGURATION PROTECTION OPERATION.....	3
8. MASTER PASSWORD.....	3
8.1 HOW TO USE YOUR MASTER PASSWORD	3
9. ERROR INDICATION	3
10. WARRANTY	3

3. PRESENTATION

N320 is a temperature meter which displays the value of the temperature measured by the sensor connected to its terminals. It accepts the following input sensors: **NTC** (thermistor), **Pt100**, or **J**, **K**, and **T** thermocouples.

Each type of sensor has a specific range to measure the temperature.

The electrical features of each model are presented on the body of the controller, according to the purchase order.

4. SPECIFICATIONS

SENSOR INPUT: The choice of sensor is made at the time of purchase. The options are:

Thermistor NTC: Type 10 k Ω @ 25 °C | Measurement range: -50 to 120 °C (-58 to 248 °F) | Accuracy: 0.6 °C (1.1 °F).

Maximum error when interchanging original NTC sensors: 0.75 °C (33.35 °F). This error can be removed by using the **Offset** parameter of the equipment.

Note: For the NTC thermistor option, the sensor is supplied with the equipment. Its operating range is **-30 to 105 °C (-22 to 221 °F)**.

It has a 3 m long cable (2 x 0.5 mm²), which can be extended up to 200 meters.

Pt100: Measurement range: -50 to 300 °C (-58 to 572 °F) | α = 0,00385 | 3-wire | Accuracy: 0.7 °C (1.3 °F) | According to NBR 13773/97 standard.

Thermocouple type J: Measurement range: 0 to 600 °C (32 to 1112 °F) | Accuracy: 3 °C (5.4 °F).

Thermocouple type K: Measurement range: -50 to 1000 °C (-58 to 1832 °F) | Accuracy: 3 °C (5.4 °F).

Thermocouple type T: Measurement range: -50 to 400 °C (-58 to 752 °F) | Accuracy: 3 °C (5.4 °F).

Thermocouples according to standard NBR 12771/Jul 1999.

Measurement resolution:.....0.1 °C in the range -19.9 to
..... 199.9 °C (-3.8 to 391.8 °F).
..... 1 °C: Elsewhere.

Note: The equipment maintains accuracy over the entire range, although the low resolution of the display in a portion of the range does not allow it to be visualized.

POWER SUPPLY:

Voltage: 100~240 Vac/dc ($\pm$ 10 %).

Optionally:24 V (12~30 Vdc) (*)

Frequency:50~60 Hz

Consumption:5 VA

(*) **Note:** Models with a 24 V power supply do not have electrical isolation between the power supply, input, and RS485 communication (if any) circuits.

Dimensions:

Width x Height x Depth:75 x 33 x 75 mm

Panel cutout:70 x 29 mm

Weight:100 g

Operation conditions:

Operating temperature:0 to 40 °C (32 to 104 °F)

Storage temperature:-20 to 60 °C (-4 to 140 °F)

Relative humidity:20 to 85 % HR

UL94 V-2 Polycarbonate housing.

Protection index: Housing: IP42 | Front Panel: IP65.

Connections for wires up to 4.0 mm².

Certifications: CE, UKCA, UL.

5. ELECTRICAL CONNECTIONS

The figure below shows the connection terminals for the sensor, power supply, and output:



Figure 1 – Electrical connections

Pt100 with 3-wire connection. For 2-wire connection, you must connect terminals 11 and 13. To ensure proper cable resistance compensation, the conductors must have the same electrical resistance (same section).

5.1 INSTALLATION RECOMMENDATIONS

- Input signal conductors should run through the plant separate from output and supply conductors. If possible, in grounded conduits.
- The power supply for electronic instruments must come from a network specific to the instrumentation.
- It is recommended to use RC FILTERS (noise suppressors) in contactor coils, solenoids, etc.
- In control applications, it is essential to consider what can happen when any part of the system fails. The internal devices of the equipment do not guarantee full protection.

6. OPERATION

Before use, the temperature meter must be configured. To configure it, you must select the type of sensor (in models for Thermocouple input) and the temperature unit to be used.

These configuration parameters are organized in groups or Levels, called Parameter Levels.

LEVEL	RELATED FUNCTIONS
0	Temperature measurement
1	Configuration
2	Calibration

Table 1 – Parameter levels

When the equipment is turned on, the display will show the version of the internal software. The equipment will then display the temperature value measured by the sensor. This is level 0 or the Temperature Measurement level.

To access level 1, press **P** for **1 second**, until **Unit** parameter is displayed. To return to level 0, press **P**.

To access level 2, press **P** for **2 seconds**, until **CAL** parameter is displayed. Release the **P** key to remain at this level. To access the other parameters of this level, press **P** again. After the last parameter, the equipment will return to the temperature measurement level.

To change the parameter values, use the **▲** and **▼** keys.

Notes:

1. The equipment saves the programming when you move from one parameter to another. Only then will it be considered valid.
2. If the keys are not used for a time longer than 20 seconds, the equipment returns to the measuring level, finishing and saving the configuration done so far.

6.1 LEVEL 1 – CONFIGURATION LEVEL

It displays the sequence of parameters that must be defined. The parameters are shown alternately with their values.

Unit Unit	Temperature unit. Allows you to choose the display unit of the measured temperature. 0 Temperature in Celsius. 1 Temperature in Fahrenheit.
Typ Type	Allows you to select the type of temperature sensor to be used. 0 Thermocouple J. 1 Thermocouple K. 2 Thermocouple T. This parameter is only available in models for THERMOCOUPLE sensors.
oFS Offset	Value to correct temperature indication. Allows you to make small adjustments to the temperature indication to correct measurement errors that appear, for example, when replacing the temperature sensor.

6.2 LEVEL 2 – CALIBRATION LEVEL

The controller leaves the factory already calibrated. When a recalibration is necessary, it must be performed by a specialized professional.

To access this level, press the **P** key for more than **3 seconds**.

If you access it by accident, do not press **▲** and **▼** keys. Using the **P** key, step through all the parameters, until the equipment returns to the measurement screen.

PAS Password	Parameter to enter a password that will allow you to change other parameters.
CAL Calibration Low	Offset calibration of the measuring scale. Allows you to adjust the lower value of the sensor measurement range.
CAH Calibration High	Calibration of the measure scale gain. Allows you to adjust the upper value of the sensor measurement range.
CJL Cold Junction Calibration	Allows you to calibrate the Cold Junction Offset. Only available for thermocouples.
FAC Factory Calibration	Allows you to return to the original calibration of the equipment. When changing from 0 to 1 , the original calibration will be restored, and the changes made during the calibration will be disregarded.
PrE Protection	Allows you to set the parameter levels to be protected.
PAC Password Change	Allows to change the current password. You can set the password to a number between 1 and 999.
Sn2 Serial Number 2	Displays the first 2 digits of the electronic serial number of the temperature meter.
Sn1 Serial Number 1	Displays the middle 3 digits of electronic serial number of the temperature meter.
Sn0 Serial Number 0	Displays the last 4 digits of the electronic serial number of the temperature meter.

7. CONFIGURATION PROTECTION

The configuration protection system prevents undue changes to the parameters of the equipment and, consequently, its operating mode.

This system is composed of parameters that define the degree of protection to be adopted (full or partial).

Protection is defined by the following parameters:

PRS Parameter to enter a password that will allow you to change other parameters.

Prt Allows you to set the parameter levels to be protected:

1. Only **Calibration** level is protected (factory configuration).
2. **Calibration** and **Configuration** levels are protected.

PAC Allows you to change the current password. You can set the password to a number between 1 and 999.

7.1 CONFIGURATION PROTECTION OPERATION

The **PRS** parameter appears at the beginning of the protected level. If you enter the password correctly, it is possible to change the parameters of the protected levels.

If you do not enter the password correctly or simply pass by this parameter, the parameters of the protected levels can only be viewed.

Important notes:

1. When you enter an incorrect password 5 consecutive times, the equipment will prevent new attempts for 10 minutes.
If you do not remember the current password, you can enter a **master password**, which only allows you to set a new password.
2. The equipment leaves the factory with password **111**.

8. MASTER PASSWORD

The master password, which allows you to set a new password for the temperature meter, uses the serial number of the equipment. It is composed as follows:

$$[1] + [\text{largest number of SN2}] + [\text{largest number of SN1}] + [\text{largest number of SN0}]$$

The master password for an equipment with serial number 97123465 is: **1 9 3 6**

Example: $1 + \text{SN2} = 97$; $\text{SN1} = 123$; $\text{SN0} = 465 = 1 + 9 + 3 + 6$

8.1 HOW TO USE YOUR MASTER PASSWORD

1. In the **PRS** parameter, enter the master password.
2. In the **PAC** parameter, enter any new non-zero (0) password.
3. Use the new password.

9. ERROR INDICATION

On the display, the equipment shows messages that correspond to problems related to temperature measurement.

	The temperature has exceeded the upper limit of the sensor measurement range. Pt100 or J sensor is broken. NTC sensor short-circuited.
	The temperature has exceeded the lower limit of the sensor measurement range. Pt100 or J sensor short-circuited. Broken NTC sensor.

Table 2 – Error indications

10. WARRANTY

Warranty conditions are available on our website www.novusautomation.com/warranty.