

The N320 is a temperature meter that provides you in the frontal display the measured temperature of the sensor connected to its terminals. The temperature sensors available are NTC Thermistor, Pt100, Pt1000 and J, K, T type thermocouple, with offset correction capability.

The features of a particular model (input sensor type, sensor range, mains supply, etc) are identified by the label placed on the thermometer body.

SPECIFICATIONS

INPUT SENSOR: The sensor is chosen by the user at the time of purchase and is presented on the upper side of the equipment box. The options are:

- Thermistor NTC, 10 kΩ @ 25 °C; Range: -50 to 120 °C (-58 to 248 °F); Accuracy: 0.6 °C (1.1°F);

Maximum error in the interchangeability of original NTC sensors: 0.75 °C (33.35 °F). This error can be eliminated through the offset parameter of the equipment.

Note: For the NTC thermistor option, the sensor comes with the equipment. Its operating range is limited to **-30 to +105 °C** (-222 to +221 °F). It has cable of 3 m in length, 2 x 0.5 mm², and can be extended up to 200 meters.

- Pt100; Range: -50 to 300 °C (-58 to 572 °F); α= 0.00385; 3 wires; Accuracy: 0.7 °C (1.3 °F); according to IEC-751 standards;
- Pt1000; Range: -200 to 530 °C (-28 to 986 °F); α= 0.00385; 3 wires; Accuracy: 0.7 °C (1.3 °F);
- Thermocouple type J; Range: 0 to 600 °C (32 to 1112 °F); Accuracy: 3 °C (5.4 °F);
- Thermocouple type K; Range: -50 to 120 °C (-58 to 248 °F); Accuracy: 3 °C (5.4 °F);
- Thermocouple type T; Range: -50 to 120 °C (-58 to 248 °F); Accuracy: 3 °C (5.4 °F);

Thermocouples according to IEC-584 standards.

Measurement resolution:..... 0.1: from -19.9° to 199.9°
 1: elsewhere

Note: The equipment keeps its precision all over the range, despite the lack of display resolution in a part of the range does not allow its visualization.

POWER SUPPLY: 100~240 Vac/dc (± 10 %)
 Optionally: 12~30 Vdc/ac
 Mains frequency: 50~60 Hz
 Power consumption: 5 VA

Dimensions: Width x Height x Depth: 75 x 33 x 75 mm
 Panel cut-out: 70 x 29 mm
 Weight: 100 g

Environment: 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 %

Case: Polycarbonate UL94 V-2.

Protection: box IP42, front panel IP65.

Suitable wiring: Up to 4.0 mm².

ELECTRICAL WIRING

Fig. 1 below shows the temperature meter connections to sensor, mains and outputs.



Fig. 1 – N320 terminals

Pt100 with 3 conductors. Terminals 11, 12 and 13 must have the same wire resistance for proper cable length compensation. For 2 wire Pt100, short circuit terminals 11 and 13.

It is important to follow the recommendations below

- Signal wires should be installed in grounded conduits and away from power or contactor wires.
- The instrument should have its own power supply wires that should not be shared with electrical motors, coils, contactors, etc.
- Installing RC filters (47 R and 100 nF, series combination) is strongly recommended at contactor coils or any other inductors.
- System failure should always be taken into account when designing a control panel to avoid irreversible damage to equipment or people.

OPERATION

The temperature meter requires the internal parameters to be configured according to the intended use for the instrument. The parameters are organized in 3 groups or levels:

| Level | Function |
|-------|-------------------------|
| 0 | Temperature Measurement |
| 1 | Configuration |
| 2 | Calibration |

Upon power-up, the N320 display shows for 1 second its firmware version. This information is useful when consulting the factory.

Then, the temperature measured by the sensor is shown on the display. This is the parameter level 0 (Temperature Measurement level).

To access level 1 of parameters, press **P** for 1 second until the **Unt** message is shown. Release the **P** key to remain in this level. Each new pressing on the **P** key will advance to the next parameter in the level. Press **P** again to return to the initial screen (temperature display).

To access level 2 of parameters, press **P** for 2 seconds until the **CAL** message is shown. Release the **P** key to remain in this level. Each new pressing on the **P** key will advance to the next parameter in the level. At the end of the level, the temperature meter returns to the first level (0).

Use the **←** and **→** keys to alter a parameter value.

- Notes:**
- 1 A parameter configuration is saved when the **P** key is pressed to advance to the next parameter in the cycle. The configuration is stored in a non-volatile memory, retaining its value when the thermometer is de-energized.
 - 2 If no keyboard activity is detected for over 20 seconds, the thermometer saves the current parameter value and returns to the measurement level.

Level 1 – Configuration Level

Contains the configuration parameters to be defined by the user, according to the system's requirements. Use **←** and **→** keys to set the value. The display alternates the parameter name and respective value.

| | |
|------------|--|
| Unt | Temperature Unit - Selects display indication for degrees Celsius or Fahrenheit. 0 Temperature in degrees Celsius 1 Temperature in degrees Fahrenheit |
| tYP | Input Type - Selects the input sensor type to be connected to the temperature meter. Available only for thermocouple models , allowing selection of types J, K and T. 0 Thermocouple J 1 Thermocouple K 2 Thermocouple T |
| oFS | Sensor Offset - Offset value to be added to the measured temperature to compensate sensor error. |

Level 2 – Calibration level



The temperature meter is factory calibrated. The following parameters should be accessed only by experienced personnel. To enter this cycle, the **P** key must be kept pressed for 3 seconds.

Don't press the **← and **→** keys if you are not sure of the calibration procedures. Just press the **P** key a few times until the temperature measurement level is reached again.**

| | |
|-----------------------|---|
| PAS | Password - Enter the correct password to unlock write operations for the parameters in the following levels. |
| CAL | Calibration low - Offset value of the input. It adjusts the lower measurement range of the sensor. |
| CAH | Calibration High - Gain calibration. It adjusts the upper measurement range of the sensor. |
| CJL | Cold Junction Offset calibration - This parameter is available only for thermocouple. |
| FAC | Factory Calibration - Restores factory calibration parameters. Change from 0 to 1 to restore the calibration parameters with factory values. |
| Prt | Protection - Defines the levels of parameters that will be password protected. See "Configuration Protection" for details. |
| PAC | Password Change - Allows changing the current password to a new one. Values from 1 to 999 are allowed. |
| S_n2 | Serial number - First part of the temperature meter serial number. |
| S_n1 | Serial number - Second part of the temperature meter serial number. |
| S_n0 | Serial number - Third part of the temperature meter serial number. |

ERROR MESSAGES

The thermometer displays messages that correspond to problems related to temperature measurement.

| | |
|--|---|
|  | Measured temperature exceeded maximum allowed range for the sensor. Broken Pt1000 or T/C . Short circuited NTC sensor. |
|  | Measured temperature is below minimum measurement range of the sensor. Short circuited Pt1000 or T/C . Broken NTC . |

CONFIGURATION PROTECTION

A protection system to avoid unwanted changes to the temperature meter parameters is implemented. The level of protection can be selected from partial to full. The following parameters are part of the protection system:

PRS When this parameter is presented, the correct password should be entered to allow changes of parameters in the following levels.

PrL Defines the level of parameters that will be password protected:

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

PRC Parameter for definition of a new password. Since it is located in the calibration level, can only be changed by a user that knows the current password. Valid passwords are in the range 1 to 999.

CONFIGURATION PROTECTION USAGE

PRS parameter is displayed before entering a protected level. If the correct password is entered, parameters in all following levels can be changed. If wrong or no password is entered, parameters in the following levels will be read only.

Important notes:

- 1- After **five** consecutive attempts to enter a wrong password, new tentative will be blocked for the next 10 minutes. If the current valid password is unknown, the **master password** can be used **only** to define a new password for the temperature meter.
- 2- The password for a brand new device is **111**.

MASTER PASSWORD

The master password allows user to define a new password for the temperature meter, even if the current password is unknown. The master password is based in the serial number of the temperature meter, and calculated as following:

[1] + [higher digit of SN2] + [higher digit of SN1] + [higher digit of SN0]

For example the master password for the device with serial number 987123465 is:
1 9 3 6

As follows: $1 + Sn2 = 987$; $Sn1 = 123$; $Sn0 = 465 = 1 + 9 + 3 + 6$

How to use the master password:

- 1- Enter the master password value at **PRS** prompt.
- 2- Go to **PRC** parameter and enter the new password, which must not be zero (**0**).
- 3- Use this new password.

WARRANTY

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