Temperature Probe

Input Module for
External Temperature Probes

User Manual Version: [4.0]_c

www.zennio.com

USER MANUAL

CONTENTS

DOCUMENT UPDATES

Version	Modifications	Page(s)
[4.0]_c	Minor document updates	-
[4.0]_b	**Changes in the application program:** • Inclusion or parameter Protection Error Period.	-
[4.0]_a	**Changes in the application program:** • Support for Zennio probe 10k and second custom NTC probe.	-
[3.0]_a	**Changes in the application program:** Internal optimisation.	-
[2.0]_a	**Changes in the application program:** • Internal optimisation.	-
[1.0]_a	**Changes in the application program:** • Support for custom NTC probes.	-

1 INTRODUCTION

A variety of Zennio devices incorporate an input interface where it is possible to connect one or more Zennio temperature probes:

- 6,8k NTC Probes:
  - **ZACNTCE** – Epoxy, black colour.
  - **ZACNTCF** – Rigid epoxy, black colour.
  - **ZACNTCS** – Steel.
  - **ZACNTCW** – Epoxy, white, mini size.

  Probes for surface installation:
  - **ZAC-SQAT** – **SQ-AmbienT**, in white, grey and anthracite colours.
  - **ZACFAT** – **Flat Ambient**, in white, grey and anthracite colours.
- 10k NTC Probes:
  - **9900015** – Epoxy, black colour, mini size.

The connection of **custom NTC temperature** probes is also allowed, by configuring their specific parameters in ETS.

Please refer to the specific user manual and datasheet of each Zennio device as they may have this functionality using the **internal temperature probe** or to obtain specific instructions on connecting **external probes** to the device's input interface.

On the other hand, keep in mind that even being the probe model the same, **the functionality and the configuration in ETS may be slightly different** depending on the device and the version of the application program. Please always ensure to download from the Zennio homepage (www.zennio.com) the user manual and annexes that correspond to the specific device and application program being configured.

2 CONFIGURATION

2.1 GENERAL

Connecting a temperature probe to one of the inputs of the device will make it capable of receiving temperature measurements and monitor them, as well as of **sending those values to the bus** and of **reporting the detection of high / low temperature** events. To that end, it is necessary to configure a set of parameters, which are different depending on whether the probe model is supplied by Zennio or by third parties.

Please note that the screenshots and object names shown next may be slightly different depending on the device and on the application program.

ETS PARAMETERISATION

When an input has been configured as Temperature Probe, objects "**[Ix] Current Temperature**" (2 bytes) and "**[Ix] Probe Error**" (1 bit) become visible. The former will report the current value of the temperature (periodically or after a certain increment/decrement, according to the parameter configuration), while the latter will notify (by sending the value "1" periodically) about an unexpected reading in the input line due to a **breakdown** or an incorrect connection of the temperature probe.

Apart from that, a specific entry will become visible in the tree on the left containing the following parameters:

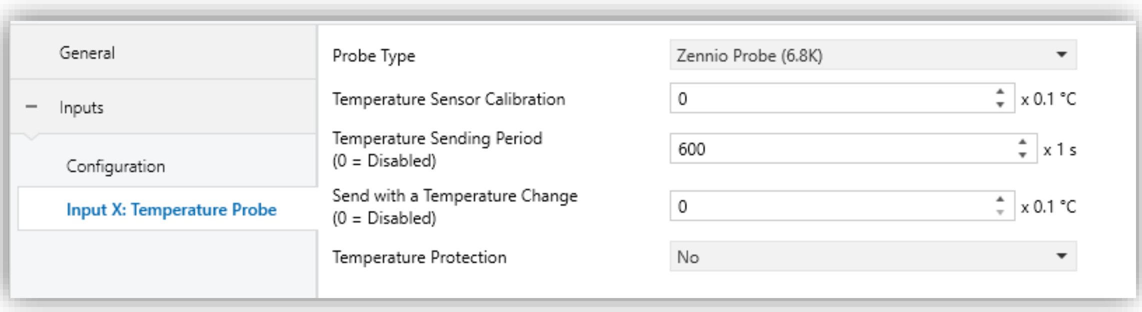

Figure 1. Temperature Probe – Configuration

- **Probe Type** [*Zennio Probe (6.8k) / Zennio Probe (10k) / Custom NTC Probe 1 / Custom NTC Probe 2*][1]. When selecting "Custom NTC Probe X", an additional parameter screen (**Custom NTC Probe X**) will be available below the **GENERAL** tab, see section 2.2.

- **Temperature Sensor Calibration** [*-50…0…50*] [*x0.1ºC*]: defines an offset to be applied to the measurement received from the probe to correct deviations due to external factors.

- **Temperature Sending Period** [*0…60…65535*] [*x1s*]: sets every how much time the value of the current temperature should be sent to the bus (through "**[Ix] Current Temperature**"). The value "0" leaves this periodical sending disabled.

- **Send with a Temperature Change** [*0…255*] [*x0.1ºC*]: defines a threshold so that whenever a new reading of the current temperature is found to differ (from the last value sent to the bus) more than such threshold, an extra sending will take place and the sending period will restart, if configured. The value "0" disables this sending.

- **Temperature Protection**: drop-down list with the following options:

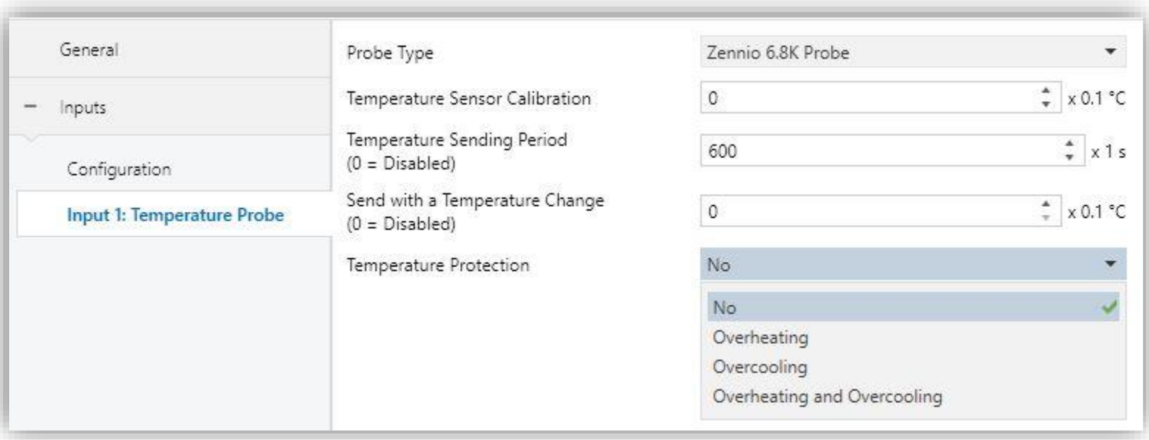

Figure 2. Options for Temperature Probe.

- *No*: no temperature protection is required.

- *Overheating*: overheating protection is required. Three extra parameters will come up:

[1] The default values of each parameter will be highlighted in blue in this document, as follows: [*default / rest of options*].

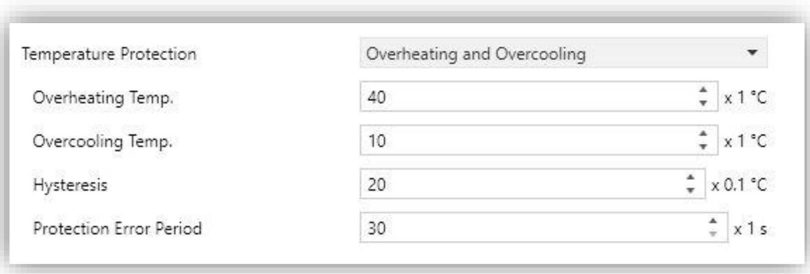

Figure 3. Temperature protection parameters.

- **Overheating Temp.** [*-30…40…125*] [*x1ºC*]: maximum temperature permitted. Temperature readings greater than this will be considered overheat, and therefore a "1" will be periodically sent through object "**[Ix] Overheat**". Once the overheat is over, a "0" will be sent (once).

- **Hysteresis** [*1…20…200*] [*x0.1ºC*]: *dead band* or threshold around the overheat temperature defined above. This dead band prevents the device from sending the overheat alarm and no-alarm over and over when the current temperature keeps fluctuating around the overheat limit (T).

  Once the overheat alarm has been triggered, the no-alarm will not be sent until the current temperature is lower than that T minus the hysteresis. After that, if the current temperature reaches T again, the alarm will be re-sent.

- **Protection Error Period** [*30…65535*] [*x1 s*]: period which the overtemperature or overcooling error will be resent while the error is active.

➢ *Overcooling*: overcooling protection is required. Two extra parameters (analogous to the above two) will come up:

- **Overcooling Temp.** [*-30…10…125*] [*x0.1ºC*]: minimum temperature permitted. Temperature readings lower than this will be considered overcool, and therefore a "1" will be periodically sent through object "**[Ix] Overcool**". After the overcool is over, a "0" will be sent (once).

- **Hysteresis** [*1…20…200*] [*x0.1ºC*]: *dead band* or threshold around the overcooling temperature. As for the overheat, once the alarm has been triggered, the no-alarm will not be sent until the current temperature is greater than T plus the hysteresis. After that, if the current temperature reaches T again, the alarm will be re-sent.

- *Overheating and Overcooling*: both overheating and overcooling protection are required. The following three parameters will come up:

    - **Overheating Temp.**
    - **Overcooling Temp.**
    - **Hysteresis.**
    - **Protection Error Period.**

  The four of them are analogous to those already explained separately.

2.2 CUSTOM NTC PROBE

When using NTC probes from other manufacturers, the integrator will need to **characterise the probe response** to different temperatures in order to let the device manage the resistance values it receives from the probe. To that end, the device implements the **Steinhart-Hart method**, which makes it possible to approximate the **temperature vs. resistance curve** of any probe by simply specifying three of its points. Therefore, characterising the probe consists in defining its resistance values for three different temperatures, such as **0ºC, 25ºC and 100ºC**, which is typically provided by the manufacturer of the probe.

This functionality has been optimised for NTC probes which offer resistance values **between 3.3 and 47 kΩ at 25ºC**.

ETS PARAMETERISATION

After selecting "Custom NTC Probe X" in **Probe Type** (see section 2.1) for at least one of the device inputs configured as temperature probes, a new tab named **Custom NTC Probe X** will be available for configuration.

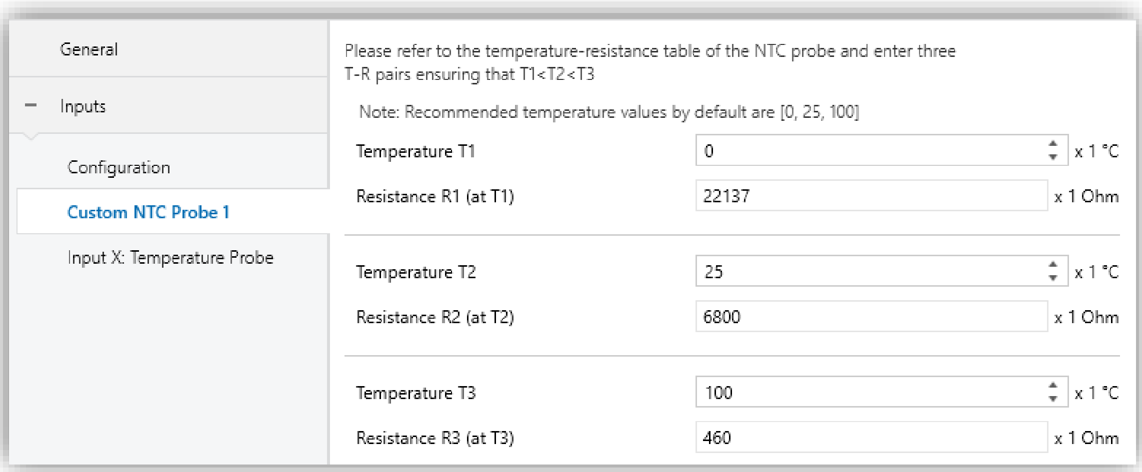

Figure 4. Custom NTC

It contains the following parameters:

- **Temperature Tx** [*-55…0…150*] [*x1ºC*]: sets the temperature value of a particular point of the temperature-resistance curve.
- **Resistance Rx (at Tx)** [*0…22137…268435456*] [*x1Ohm*]: sets the resistance value of the that particular point of the temperature-resistance curve. In other

words, this parameter sets the resistance value offered by the custom NTC probe for the above temperature value.

After defining the three {Temperature, Resistance} points of the curve, it is advisable to verify the read-only values shown in the lower section of the screen (see Figure 5), as they reflect the **expected resistance values** (in Ohms) for a set of temperature values in the range 0ºC to 90ºC, according to the curve approximation performed by the device. In the case of a wrong parameterisation or if the points do not describe a typical NTC curve, ETS will show a **warning message**.

Important: *these are general parameters – **they apply to all custom NTC probes** that may be configured in the device*.

Check if calculated values are the expected ones

Resistance Obtained at 0 °C	22137	x 1 Ohm
Resistance Obtained at 10 °C	13515,65	x 1 Ohm
Resistance Obtained at 20 °C	8492,59	x 1 Ohm
Resistance Obtained at 30 °C	5479,41	x 1 Ohm
Resistance Obtained at 40 °C	3622,6	x 1 Ohm
Resistance Obtained at 50 °C	2449,57	x 1 Ohm
Resistance Obtained at 60 °C	1691,26	x 1 Ohm
Resistance Obtained at 70 °C	1190,46	x 1 Ohm
Resistance Obtained at 80 °C	853,1	x 1 Ohm
Resistance Obtained at 90 °C	621,61	x 1 Ohm

Figure 5. Custom NTC – Expected resistance values

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