NTC probe selection guide

Part number	**89 750 174**	**89 750 184** (Piece) **89 750 180** (x10) **89 750 181** (x100)	**89 750 182**	**89 750 185** (x 25)	**89 750 186**
					
Type	PVC Flank lead ½ '' Length 68	AS 5x6 mm, Length 15mm	Stainless steel 305 ∅ 4,8mm, Length 30 mm	POM (polyoxymethylene) ∅ 6, Length 38mm	Silicone ∅ 5, Length 17mm
Description	PVC NTC2 probe for Millenium 3 (24 V DC, ± 10 %)	NTC1 probe for Millenium 3 (24 V DC, ± 10 %) (according to PN: piece, packaging unit 10 or 100)	NTC2 inox probe for Millenium 3 (24 V DC, ± 10 %)	NTC2 probe for Millenium 3 (24 V DC, ± 10 %) (Packaging unit of 25)	Silicone NTC3 probe for Millenium 3 (24 V DC, ± 10 %)
Impedance value	10 kΩ @ 25 °C	10 kΩ @ 25 °C	10 kΩ @ 25 °C	10 kΩ @ 25 °C	100 kΩ @ 25 °C
Operating temperature	-25 →+85 °C	-25 →+85 °C	-35 →+120 °C	-20 →+105 °C	0 →+180°C
Temperature resolution	-25 →+40 °C : ≤± 0,8 °C (repeatability ≤± 0,5 °C) +40 →+70 °C : ≤± 2 °C (repeatability ≤± 1 °C) +70 →+85 °C : ≤± 3 °C (repeatability ≤± 2 °C)	-25 →+40 °C : ≤± 0,8 °C (repeatability ≤± 0,5 °C) +40 →+50 °C : ≤± 1,2 °C (repeatability ≤± 1 °C) +50 →+60 °C : ≤± 1,4 °C (repeatability ≤± 1,4 °C) +60 →+70 °C : ≤± 2 °C (repeatability ≤± 2 °C) +70 →+85 °C : ≤± 3 °C (repeatability ≤± 2 °C)	-35 →+40 °C : ≤± 0,8 °C (repeatability ≤± 0,5 °C) +40 →+70 °C : ≤± 2 °C (repeatability ≤± 1 °C) +70 →+120 °C : ≤± 3 °C (repeatability ≤± 2 °C)	-20 →+40 °C : ≤± 0,8 °C (repeatability ≤± 0,5 °C) +40 →+70 °C : ≤± 2 °C (repeatability ≤± 1 °C) +70 →+105 °C : ≤± 3 °C (repeatability ≤± 2 °C)	0 →+40 °C : ≤± 3 °C (repeatability ≤± 1 °C) +40 →+140 °C : ≤± 2 °C (repeatability ≤± 1 °C) +140 →+180 °C : ≤± 3 °C (repeatability ≤± 1 °C)
Type/Cable length	PVC 3000mm	2 Wires 600mm	PVC (105°max) 3000mm	PVC (105°max) 3000mm	Silicone (200°max) 800mm
IP code	IP67	IP67	IP64	IP67	IP64
Electrical insulation code	2	2	1	2	2
Comments	Analog input configured as a potentiometer and the NTC2 function in the M3 SOFT PN : 88970111 (AC5 version minimum)	Analog input configured as a potentiometer and the NTC1 function in the M3 SOFT PN : 88970111 (AC5 version minimum)	Analog input configured as a potentiometer and the NTC2 function in the M3 SOFT PN : 88970111 (AC5 version minimum)	Analog input configured as a potentiometer and the NTC2 function in the M3 SOFT PN : 88970111 (AC5 version minimum)	Analog input configured as a potentiometer and the NTC3 function in the M3 SOFT PN : 88970111 (AC6 version minimum)

Crouzet

Technology

NTC (Negative Temperature Coefficient) probes are thermistors, whose resistance decreases uniformly (but not linearly) when the temperature rises.

NTC probes are made of transition metal oxides (Manganese, Cobalt, Copper and Nickel).

These oxides are semiconductors.

NTC probes can be used in a large temperature range, from -100°C to +250°C, and are available in different types: beaded, pressed disc, cast chip, patch, washer etc.

The rated resistances range from some Ohms to thousands of KOhms.

The response time depends on the material used.

Use of other NTC probes with the Millenium 3

The NTC function blocks included in the Millenium 3 ClsM3 software are adapted to the Crouzet NTC probe range.

For using other types, it is required to follow a calibration procedure in order to establish a link between temperature and resistance values.

The data graphs provided by the producers are only applicable for very low current (a few µA) in connection with adapted inputs.

Millenium 3 uses the NTC probes on 24V DC inputs, so the values read by the micro controller have to be scaled to the temperature measurement range of the probes.

Once scaling has been done, the NTC probes can be used with a Millenium 3 by using the transfer function bloc y=f(x).

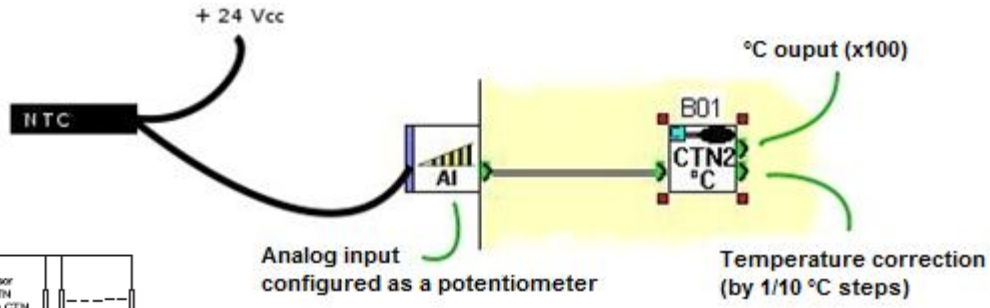
Concerning the probes, it is best to choose a resistance between 10KΩ and 100KΩ at 25°C, with a minimum power handling of 15mW and a minimum power supply of 30V DC.

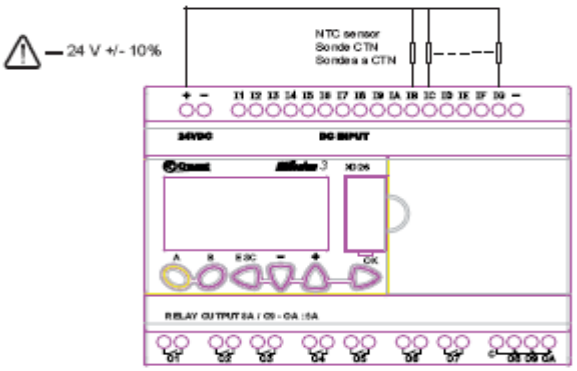
Please note that we are measuring very small electric values, implying that the system can easily be affected by interferences.

In order to avoid that, keep the wire length as short as possible. Being connected to an analog input, the wire length should not exceed 10 meters. The quality of the power supply filter can affect the resolution.

Regarding the possibility to lengthen the cables of the existing probes, we advise to use a shielded twisted pair with a total line capacity inferior to 15nF. In doing so, it might be necessary to add a correction, a possibility foreseen in the function block.

For a practical purposes…





<u>Example:</u>
CTN2 connected to a Millenium3 XD26 24V DC

Calibration procedure for NTC probes with Millenium 3

1) Select an NTC with these characteristics:
   power rating: 15mW minimum
   power supply: 30 VDC minimum

2) Connect a maximum of NTC's to an M3, and, because it is necessary to calculate the average of the values read, use 2 or more Millenium 3. Connect the NTC's to the 24VDC analog input set to "potentiometer" in the program.

3) Connect the Millenium 3 to a 24VDC +/- 10% supply.

4) Place the NTC in a heating cabinet together with a high precision temperature probe and its measuring device.

5) Note the temperature from the high precision temperature probe together with the values (0 to 1023) of each of the analog inputs.

6) Calculate the average between all the NTC values.

7) Now you have a table relating the analog value (0 to 1023) to the temperature value (°C).

8) Enter this table into the y=f(x) function block.

9) For qualification: restart with point 2), and follow through 3) and 4).

10) Now compare temperatures from the high precision temperature probe with the according values given by Millenium 3. They should be the same.

11) Adjust values if necessary.

12) Once the qualification has been done, you can send us the table and we will check with the commercial team if we will create a specific FBD for your NTC.

Note : Change the temperature of the heating cabinet in 0.5°C steps.
Wait for temperature stabilization before taking readings.
For correct results it is necessary to go through two cycles of temperature increase and decrease, which allows to verify that probes are not damaged, there are no problems with hysteresis, and that the NTC has a good repeatability.

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