5.1 ALARM INITIAL BLOCKING

Alarm blocking at power-up inhibits the relay alarm to trip when the unit is first energized. The alarm will only trip after the process variable reaches a new alarm situation.

Error alarm shows sensor defects or not properly connected.

6 PROBLEMS WITH THE CONTROLLER

Connection and configuration errors state for most of the problems in using the controller. A final revision of parameters will save time and further losses.

Error messages are displayed to help the user to identify possible problems.

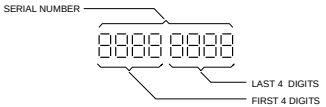
[_ _ _ _]: Process temperature is below the selected sensor range.

[¯ ¯ ¯ ¯]: Process temperature is above the selected sensor range

Erro: Controller or sensor error. Example: Broken thermocouple or Pt100. Pt100 badly connected, short-circuited or high cable resistance.

6.2 ELECTRONIC SERIAL NUMBER VISUALIZATION

To read the 8-digit serial number go to the Operation Level and press the [▲] key for 3 seconds. The display will show the first 4 digits. Then keep the [▼] key pressed for 3 seconds and the display will show the last 4 digits.



When powering the unit the display will show the software version for a few seconds.

7 PRODUCT IDENTIFICATION

The label attached to the controller case identifies the model and the optional present in the product, as described below:

MODEL: **N480I – A – B**, where:

A: Outputs: **RP** OUT A = Relay and OUT B = Relay

RF OUT A = Relay and OUT B = 24Vdc auxiliary supply

B. Voltage rating: **blank** (100-240 Vac/dc) or **24V** (24 Vac/dc)

8 TECHNICAL ASSISTANCE

If you encounter a problem with your controller, review the configuration with regard to inputs, outputs, alarms, etc. If the problem persists, contact your supplier or Novus at info@novus.com.br.

NOVUS
WWW.NOVUSAUTOMATION.COM

MICROPROCESSOR BASED TEMPERATURE INDICATOR

N 4 8 0 I - V3.1x

OPERATING MANUAL

1 SAFETY SUMMARY

The symbols below are used on the equipment and throughout this document to draw the user's attention to important operational and safety information.

CAUTION or WARNING: Read complete instructions prior to installation and operation of the unit.	**CAUTION or WARNING:** Electrical Shock Hazard

All safety related instructions that appear in the manual must be observed to ensure personal safety and to prevent damage to either the instrument or the system. *If the instrument is used in a manner not specified by the manufacturer, the protection provided by the equipment may be impaired.*

2 SPECIFICATIONS

- Dimensions: 48 x 48 x 110 mm (1/16 DIN). Panel cut-out: 45,5 x 45,5 mm. Weight: 150 g (max.);
- Power: 100 to 240 Vac / dc (± 10 %), 50 / 60 Hz or 24 Vdc / ac (± 10 %); Max. Consumption: 9 VA;
- Pt100: α=385. 3-wire connection. Excitation current: 0.170 mA;
- Accuracy: 0.2 % of full scale for Pt100 and 0,25 % of full scale ±1 °C for T/C
- Thermocouple input impedance: 10 MΩ
- A/D converter resolution: 15000 steps
- Sampling rate: 10 measurements per second
- Environmental conditions: 5 to 50 °C; Relative humidity (maximum): 80 % up to 30 °C. For temperatures above 30 °C, decrease 3 % per °C. Installation category II. Pllution degree 2. Altitude < 2000 m.
- Front panel: Polycarbonate UL94 V-2; Back panel:ABS + PC UL94 V-0
- EMC: EN 61326-1:1997 and EN 61326-1/A1:1998
- SAFETY: EN 61010-1: 1993 e EN 61010-1/A2: 1995

INPUT TYPE	CODE	RANGE
Termocouple J	0	-50 to 760 °C (-58 to 1400 °F)
Termocouple K	1	-90 to 1370 °C (-130 to 2498 °F)
Termocouple T	2	-100 to 400 °C (-148 to 752 °F)
Termocouple E	3	-30 to 720 °C (-22 to 1328 °F)
Termocouple N	4	-90 to 1300 °C (-130 to 2372 °F)
Termocouple R	5	0 to 1760 °C (32 to 3200 °F)
Termocouple S	6	0 to 1760 °C (32 to 3200 °F)
Pt100 (Resolution 0.1 °C)	7	-199.9 to 530.0 °C (-199.9 to 986.0 °F)
Pt100 (Resolution 1 °C)	8	-200 to 530 °C (-328 to 986 °F)
4 to 20 mA	9	Linearized J. Maximum range -110 to 760 °C
4 to 20 mA	10	Linearized K. Maximum range -150 to 1370 °C
4 to 20 mA	11	Linearized T. Maximum range -160 to 400 °C
4 to 20 mA	12	Linearized E. Maximum range -90 to 720 °C
4 to 20 mA	13	Linearized N. Maximum range -150 to 1300 °C
4 to 20 mA	14	Linearized R. Maximum range 0 to 1760 °C
4 to 20 mA	15	Linearized S. Maximum range 0 to 1760 °C
4 to 20 mA	16	Linearized Pt100. Max. range -199.9 to 530.0 °C
4 to 20 mA	17	Linearized Pt100. Max. range -200 to 530 °C
0 to 50 mV	18	Linear. Programmable range from -1999 to 9999
4 to 20 mA	19	Linear. Programmable range from -1999 to 9999
0 to 10 V	20	Linear. Programmable range from -1999 to 9999

Table 1 – Types of sensors accepted by the indicator

3 INSTALLATION

The indicator should be installed in a panel cut out as specified. First remove the mounting clamp and insert the controller into the panel cut out. Place the unit into the panel cut-out and slide the mounting clamp from the rear to a firm grip at the panel.

The internal circuitry can be fully removed from the housing without disconnecting any wiring. By using the thumb just press the tab in the lower part of the front panel, grab firmly the front panel and pull out the circuitry from the housing.

3.3 POWER

Mains power is connected to terminals 1 and 2. Check the upper side of the housing for proper power indication. Figure 1 shows the electrical terminals of the indicator.

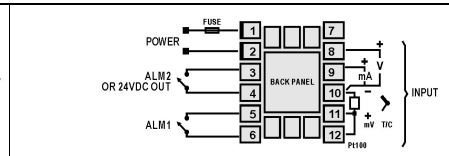


Figure 1 - Electrical connections

3.4 INPUT WIRING

The different input signals are connected according Figure 2.

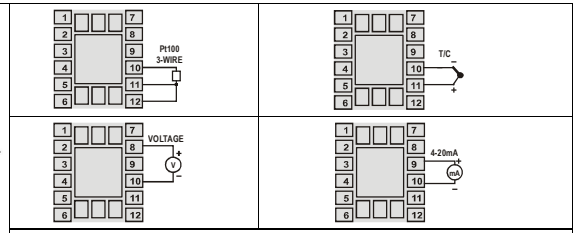


Figure 2 – Input Wiring

Notes: 1 For proper wire lenght compensation, all Pt100 wires should have the same electrical resistance.

2 For 2 wire Pt100, short circuit terminals 11 and 12. Cable length is not compensated.

3 Thermocouples must be connected with the proper extension wire.

3.5 USING THE PROVIDED AUXILIARY DC VOLTAGE SUPPLY FOR POWERING 2-WIRE FIELD TRANSMITTERS

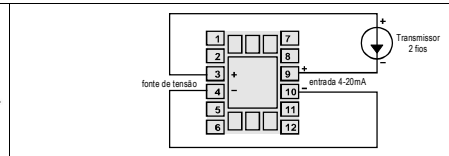


Figure 3 – 4-20 mA input wiring of a field transmitter powered by the N480i 24 V Auxiliary Power Supply

4 CONFIGURATION AND OPERATION

Prior to first operation the controller should be fully configured. The user must set basic parameters as temperature type ("tYPE"), the desired control set point ("SP"), the alarms set points ("A 1SP" and "A2SP"), etc.

4.1 PARAMETERS FLOW CHART

The programming parameters are organized in 4 different sets or levels:

Mensuration Level / Alarms Level / Configuration Level / Calibration Level

At power up the controller displays a prompt at the Operation Level and remains in this level while under normal operation.

The other levels are only accessed when a change of parameters is necessary. To reach these other parameters the user must keep the P key pressed for about three seconds. After this time the controller will show the first parameter of the next level. By keeping the P key pressed for another 3 seconds the next level will be accessed.

Release the P key when the desired level is reached. Press once the P key to go to the next prompt in the same level. Use the ◄ key to go back to the previous displayed parameter.

The upper display (red) shows the parameter name while the lower display (green) shows its value. The keys ▲ and ▼ allow changing the parameter value.

The indicator will resume and show the operation level after all prompts have been accessed or whenever the keyboard is not used for more than 20 seconds.

Any changed parameter is only saved into non-volatile memory after moving to the next parameter or when no key is touched for 20 seconds.

4.2 PROGRAM SECURITY

To avoid tampering, parameter "Prot" and a hardware jumper can be used to disable access to programming parameters.

With the jumper in the **OFF** position, all program levels are unprotected. The "Prot" parameter can only be changed with the jumper in the **OFF** position.

With the jumper in the **ON** position or **removed**, the protection level is defined by the current value of the "Prot" parameter:

- **0** No protection. All parameters can be accessed;
- **1** No access to the calibration level;
- **2** No access to calibration and configuration levels;
- **3** No access to calibration, configuration and tuning and alarms levels;

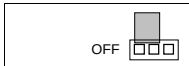


Figure 4 – Protection **Disabled**

Figure 3 – Protection **Enabled**

4.3 OPERATION LEVEL

8888	After power up the indicator displays the measured valued proportional to the input signal.

4.4 ALARMS LEVEL

A 1SP **SP A**larm **1**	**SETPOINT for Alarm 1**: Triping point for alarm 1
A2SP **SP A**larm **2**	**SETPOINT for Alarm 2**: Triping point for alarm 2
AL.rE **A**larm **R**eference	**REFERENCE VALUE FOR DIFFERENTIAL ALARM**: a value in respect to which the differential, differential low and differential high alarms will be set.

4.5 CONFIGURATION LEVEL

tYPE **tYPE**	**INPUT TYPE**: Selects the input sensor type to be connected to the indicator (refer to **Table 1**). ***This is the first parameter to be set.***
dP.Po **D**ecimal **P**oint **Po**sition	**DECIMAL POINT**: Available only for input types 18, 19 or 20. Defines the number of digits to be shown after the decimal point. Programmable from 0 to 3.
un it **unit**	**TEMPERATURE UNIT**: Selects display indication for degrees Celsius or Farenheit. **0** – degrees Celsius (°C); **1** - degrees Farenheit (°F);
In.LL **I**nput **L**ow **L**imit	**INPUT LOW LIMIT**: Available for input types from 9 to 20. Defines the lowest value to be displayed when the input signal is at its lower value. For input types from 0 to 8 it defines the lowest alarm set point value.
In.HL **I**nput **H**igh **L**imit	**INPUT HIGH LIMIT**: Available for input types from 9 to 20. Defines the highest value to be displayed when the input signal is at its upper value. For input types from 0 to 8 it defines the highest alarm set point value.
OFFS **OFFS**ET	**SENSOR OFFSET**: *Offset* value to be added to the PV to compensate sensor error. Default value: zero
A 1Fu **A**larm **1** **Fu**nction	**FUNCTION OF ALARM 1**: Refer to ***Table 2*** for function description and respective codes to set at this prompt.
A2Fu **A**larm **2** **Fu**nction	**FUNCTION OF ALARM 2**: Refer to ***Table 2*** for function description and respective codes to set at this prompt.
A 1HY **A**larm **1** **HY**steresis	**ALARM 1 HYSTERESIS**: Defines the difference between the point at which the alarm is activated and the point at which it is desactivated.
A2HY **A**larm **2** **HY**steresis	**ALARM 2 HYSTERESIS**: Defines the difference between the point at which the alarm is activated and the point at which it is desactivated.
Prot	**PARAMETER PROTECTION:** Refer to ***Table 2*** for description of functions for this prompt.

4.6 CALIBRATION LEVEL

A T E N T I O N

These parameters are used to calibrate the temperature measurement and should only be dealt with by experienced and well equipped personnel.

InLC **I**nput **L**ow **C**alibration	**SENSOR OFFSET CALIBRATION**. Sets the temperature sensor low calibration (*offset*). The display shows only the corrected temperature and not the *offset* added. A signal simulator should be used to inject a low value signal to properly adjust the *offset*.
InHC **I**nput **H**igh **C**alibration	**INPUT HIGH CALIBRATION**. Sets the sensor input circuit gain or high calibration. A signal simulator should be used to inject a high value signal to properly adjust the *offset*.
CJ L **C**old **J**unction **L**ow **C**alibration	**COLD JUNCTION OFFSET CALIBRATION**: Sets the cold junction *offset* calibration. A good thermometer or a temperature simulator should be used to properly adjust this parameter.

5 ALARM FUNCTIONS

Low and high alarms are used to signal minimum and maximum temperature values as programmed in the "A 1SP" and "A2SP" prompts.

Differential alarms are used to indicate deviations from the desired set point (SP) temperature. These deviations are programmed at the "A 1SP" and "A2SP" prompts.

Table 2 shows each alarm function operation with their respective code. Alarm 1 is used as an example.

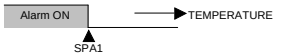
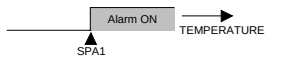
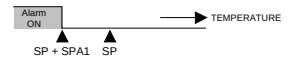
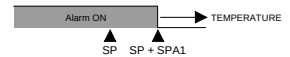
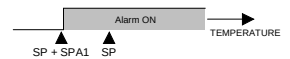
TYPE	CODE	ACTION	
LOW	0		
HIGH	1		
LOW differential	2	A 1SP Negative	
		A 1SP Positive	
HIGH differential	3	A 1SP Negative	
		A 1SP Positive	
differential or deviation	4	A 1SP Negative	
		A 1SP Positive	
Input sensor error	5	Alarm is ON whenever: • Temperature is below selected range; • Temperature is above selected range; • Termocouple or Pt100 is broken; • Pt100 is shorted, badly connected or wire impedance is too high;	
Alarm Functions With alarm inhibition at power-up	6	Low limit alarm disabled at power-up	
	7	High limit alarm disabled at power-up	
	8	Differential low limit alarm disabled at power-up	
	9	Differential high limit alarm disabled at power-up	
	10	Differential alarm disabled at power-up	

Table 2 - Alarm functions and their identification codes