MICROPROCESSOR BASED

N480i

OPERATING MANUAL - 5001162 V3.0x

PRODUTOS ELETRÔNICOS LTDA

Rua Álvaro Chaves, 155 CEP 90035-004 Porto Alegre-RS - BRAZIL

Tel.:+55-51-3323-3600 Fax:: +55-51-3323-3644e-mail: info@novus.com.br

1 INSTALLATION

The indicator should be installed in a panel cut out as specified in item 2.1. 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.

2 SPECIFICATIONS

- Dimensions: 48x48x110mm (1/16 DIN).
- Panel cut-out: 45,5x45,5mm
- Weight: 150g
- Power: 85 to 264Vdc/ac, 50/60Hz, 3VA max. Optional: 24Vdc/ac
- Operation: 0 to 55°C, humidity 20 to 85%

2.1 ALARM OUTPUT

Up to 2 alarms with SPST-NO relay. Maximum load 3A/250Vac

2.2 SENSOR INPUT

- Pt100: 3-wire connection,.α=385. Excitation current: 170µA
- Thermocouple and mV input impedance: 10MΩ
- 4 to 20mA input impedance 100Ω.
- A/D converter resolution: 15000 levels
- Display update: 1 measurement per second
- Accuracy: Thermocouple J, K, T, E and N: 0.25% of full scale ±1°C
  Thermocouple R and S: 0.25% of full scale ±3°C
  Pt100, voltage and current: 0.2% of full scale

Thermocouples are connected to terminals 10 and 11 with positive in terminal 11.

Pt100 sensors are connected to terminals 10, 11 and 12, as indicated in figure 1. For full compensation of cable resistance only cables with equal wire electrical resistance should be used.

Voltage signals up to **10Vdc should be connected to terminals** 8(+) and 10(-). 4 to 20mA currente signals should be connected to terminals 9 (+) and 10 (-).

Table 1 shows the sensor types accepted and their respective codes via keyboard.

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 20mA	9	Linearized J. Maximum range -110 to 760°C
4 to 20mA	10	Linearized K. Maximum range -150 to 1370°C
4 to 20mA	11	Linearized T. Maximum range -160 to 400°C
4 to 20mA	12	Linearized E. Maximum range -90 to 720°C
4 to 20mA	13	Linearized N. Maximum range -150 to 1300°C
4 to 20mA	14	Linearized R. Maximum range 0 to 1760°C
4 to 20mA	15	Linearized S. Maximum range 0 to 1760°C
4 to 20mA	16	Linearized Pt100. Max. range -199.9 to 530.0°C
4 to 20mA	17	Linearized Pt100. Max. range -200 to 530°C
0 to 50mV	18	Linear. Programmable range from -1999 to 9999
4 to 20mA	19	Linear. Programmable range from -1999 to 9999
0 to 10V	20	Linear. Programmable range from -1999 to 9999

Table 1 – Types of sensors accepted by the indicator

3 ELECTRICAL CONNECTIONS

Figure 1 shows the electrical terminals of the indicator.

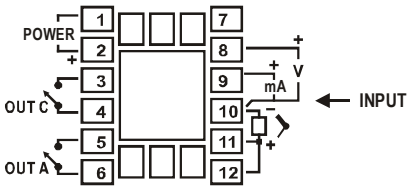


Figure 1 - Electrical connections

3.1 INPUT WIRING

The different input signals are connected according figure 2.

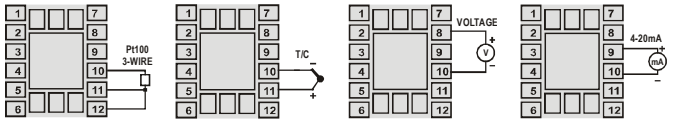


Figure 2 – Input Wiring

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.

3.2 24VDC AUXILIAR POWER – 24VDC OUT

The indicator can be supplied with an auxiliary voltage output for powering remote transmitters in terminals 3 and 4. This option must be defined when ordering and voids alarm 2.

Specification: 24Vdc ±10%, electrically isolated, 25mA maximum current **25mA**.

The plastic case will identify this option when available.

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 ("A1SP" and "A2SP"), etc.

4.1 PARAMETERS FLOW CHART

The programming parameters are organized in 4 different sets or levels

- Operation 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.

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 2 – Protection **Disabled**

Figure 3 – Protection **Enabled**

4.3 OPERATION LEVEL

INDICATION	**INDICATION**: After power up the indicator displays the measured valued proportional to the input signal.

4.4 ALARMS LEVEL

SP Alarm 1	**SETPOINT for Alarm 1**: Triping point for alarm 1
SP Alarm 2	**SETPOINT for Alarm 2**: Triping point for alarm 2
Alarm Reference	**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	**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.***
Decimal Point Position	**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.
unit	**TEMPERATURE UNIT**: Selects display indication for degrees Celsius or Farenheit. 0 – degrees Celsius (°C); 1 - degrees Farenheit (°F);
Input Low Limit	**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.
Input High Limit	**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.
OFFSET	**SENSOR OFFSET**: Offset value to be added to the PV to compensate sensor error. Default value: zero
Alarm 1 Function	**FUNCTION OF ALARM 1**: Refer to table 2 for function description and respective codes to set at this prompt.
Alarm 2 Function	**FUNCTION OF ALARM 2**: Refer to table 2 for function description and respective codes to set at this prompt.
	PARAMETER PROTECTION: Refer to table 2 for description of functions for this prompt.
Alarm 1 HYsteresis	**ALARM 1 HYSTERESIS**: Defines the difference between the point at which the alarm is activated and the point at which it is desactivated.
Alarm 2 HYsteresis	**ALARM 2 HYSTERESIS**: Defines the difference between the point at which the alarm is activated and the point at which it is desactivated.

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.

Input Low Calibration	**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.
Input High Calibration	**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.
Cold Junction Low Calibration	**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. 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.

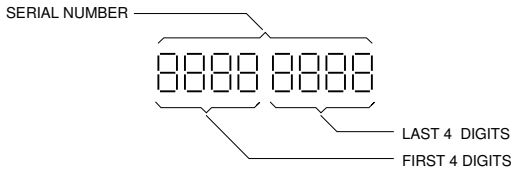
: Process temperature is above the selected sensor range

: Controller or sensor error. Example:

- Broken thermocouple or Pt100.
- Pt100 badly connected, short-circuited or high cable resistance.

5.1 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.

6. ALARM FUNCTIONS

Low and high alarms are used to signal minimum and maximum temperature values as programmed in the "A1SP" and "A2SP" prompts.

Differential alarms are used to indicate deviations from the desired set point (SP) temperature. These deviations are programmed at the "A1SP" and "A2SP" prompts.

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.

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

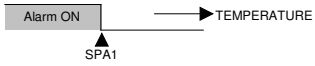
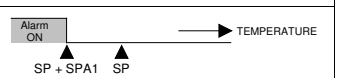
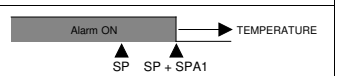
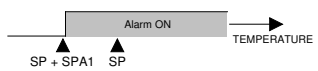
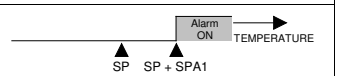
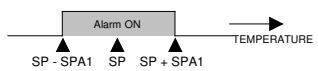
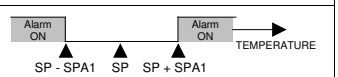
TYPE	CODE	ACTION
LOW	0	
HIGH	1	
LOW differential	2	A1SP Negative 
		A1SP Positive 
HIGH differential	3	A1SP Negative 
		A1SP Positive 
differential or deviation	4	A1SP Negative 
		A1SP Positive 
Input sensor error	5	Alarm is ON whenever: • Temperature is below selected range; • Temperature is above selected 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