

# N1540 Digital Panel Meter

UNIVERSAL DIGITAL PANEL METER

INSTRUCTIONS MANUAL – V2.1x F



## SAFETY ALERTS

The symbols below are used on the equipment and throughout this manual to draw the user's attention to essential information related to the equipment safety and operation.

<b>CAUTION:</b> Read the manual thoroughly before installing and operating the instrument.	<b>CAUTION OR DANGER:</b> 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.

## PRESENTATION

**N1540** is a quite versatile process digital panel meter. With a wide list of input types – thermocouples, thermo-resistance, voltage and current – the **N1540** can measure most of the variables and sensors encountered in industrial processes.

It contains two alarms (six functions), sensor offset, configuration of parameters protected by password, serial communication, indication in degrees Celsius (°C) or Fahrenheit (°F), among others.

Configuration can be performed either directly on the digital panel meter or via the USB interface once **QuickTune** software has been installed on the computer to be used. Once connected to USB, the device will be recognized as a serial communication (COM) port operating with Modbus RTU protocol.

Through the USB interface, even if disconnected from the power supply, the configuration performed in a piece of equipment can be saved in a file and repeated in other pieces of equipment that require the same configuration.

## FEATURES

### SIGNAL INPUT (TYPE)

The input type to be used by the **N1540** is defined in the equipment configuration. **Table 1** presents the input options available for the user:

TYPE	CODE	MEASUREMENT RANGE
J	<b>LC J</b>	Range: -110 to 950 °C (-166 to 1742 °F)
K	<b>LC P</b>	Range: -150 to 1370 °C (-238 to 2498 °F)
T	<b>LC E</b>	Range: -160 to 400 °C (-256 to 752 °F)
N	<b>LC n</b>	Range: -270 to 1300 °C (-454 to 2372 °F)
R	<b>LC r</b>	Range: -50 to 1760 °C (-58 to 3200 °F)
S	<b>LC S</b>	Range: -50 to 1760 °C (-58 to 3200 °F)
B	<b>LC b</b>	Range: 400 to 1800 °C (752 to 3272 °F)
E	<b>LC E</b>	Range: -90 to 730 °C (-130 to 1346 °F)
Pt100	<b>PE</b>	Range: -200 to 850 °C (-328 to 1562 °F)

0-20 mA	<b>LC.20</b>	Analog Linear Signal Indication programmable from -2000 to 30000.
4-20 mA	<b>LC.20</b>	
0-50 mV	<b>LC.50</b>	
0-5 VDC	<b>LC.5</b>	
0-10 VDC	<b>LC.10</b>	
4-20 mA NON- LINEAR	<b>LC.J</b>	Non-Linear Analog Signal Indication range according to the associated sensor.
	<b>LC.P</b>	
	<b>LC.E</b>	
	<b>LC.n</b>	
	<b>LC.r</b>	
	<b>LC.S</b>	
	<b>LC.b</b>	
<b>LC.E</b>		
	<b>LC.PE</b>	

Table 1 – Input types

## ALARMS

The digital panel meter has two alarms. Each alarm is associated with an output with the same name: AM1 and ALM2.

The alarms can assume the functions described on **Table 02**.

<b>oFF</b>	Alarm off.	
<b>Lo</b>	Alarm of the absolute minimum value. It triggers when the <b>PV</b> value is <b>below</b> the value defined by the alarm Setpoint ( <b>SPA1</b> or <b>SPA2</b> ).	
<b>Hi</b>	Alarm of the absolute maximum value. It triggers when the <b>PV</b> value is <b>above</b> the value defined by the alarm Setpoint.	
<b>dIF</b>	Alarm of the differential value. In this function, the <b>SPR1</b> and <b>SPR2</b> parameters represent errors (difference) between the PV and one reference value <b>ALrF</b> .	
	SPA1 positive	SPA1 negative
<b>dIFL</b>	Alarm of the minimum differential value. It triggers when the PV value is <b>below</b> the point defined by: <b>ALrF-SPA1</b> (using alarm 1 as an example).	
	SPA1 positive	SPA1 negative

<b>dIFH</b>	Alarm of the maximum differential value. It triggers when the PV value is <b>above</b> the point defined by: <b>ALrF+SPA1</b> (using alarm 1 as an example).
	<div style="display: flex; justify-content: space-around;"> <span>SPA1 positive</span> <span>SPA1 negative</span> </div>
<b>IErr</b>	Sensor breaks alarm. It is activated when the Input presents problems such as interrupted sensor, bad connection, etc.

Table 2 – Alarm functions

**Note:** The figures are also valid for Alarm 2 (SPA2).

**Important note:** Alarms configured with the **HI**, **dIF** and **dIFH** functions also trigger their associated output when a sensor fault is identified and signaled by the digital panel meter. A relay output, for example, configured to act as a High Alarm (**HI**), will operate when the SPAL value is exceeded and when the sensor connected to the input is broken.

**ALARM BLOCKING INITIAL**

The **Initial Blocking** option inhibits the alarm from being recognized if an alarm condition is present in the process when the digital panel meter is first energized. The alarm will be enabled only after the occurrence of no alarm condition.

The initial blocking is useful, for example, when one of the alarms is set up as a minimum value alarm, which may cause the activation of the alarm soon upon the process start-up; an occurrence that may be undesirable in many cases.

The initial blocking is not valid for the **IErr** (Sensor Break) function.

**OFFSET**

Allows fine adjustments to the PV indication, correcting measurement errors that appear, for example, after the replacement of the temperature sensor.

**MAXIMUM AND MINIMUM**

The digital panel meter memorizes the measured maximum and minimum values (peak and valley). The operator can observe these extreme values at any time. These two values are shown when pressing the **F1** (maximum) and **F2** (minimum) keys. Pressing both keys simultaneously will clear the memory for a new peak and valley detection.

To clear the stored values and begin a new cycle of monitoring endpoints, just press the **F1** and **F2** keys **simultaneously**. When turn off, the digital panel meter this information is not saved.

**CUSTOM LINEARIZATION**

This feature allows accurate measurement of the input signals with non-linear features.

Linearization consists in dividing the calibration curve of the input signal into segments of variable gain. Each segment consists of a start and an end. For each input value (**InP.xx**), a respective output indication (**ouP.xx**) is defined.

The input signal must present an always-crescent.

Applied to 0-20 mA, 4-20 mA, 0-50 mV, 0-5 V and 0-10 V input types.

**24 VDC AUXILIARY VOLTAGE SOURCE**

The standard version of the **N1540** provides an auxiliary power supply for exciting field transmitters (terminals 11 and 13 on the rear panel).

**SERIAL COMMUNICATION**

Follows a description of the usual communication registers. For full documentation, download the **Registers Table N1540 for Serial Communication** on our web site: [www.novusautomation.com](http://www.novusautomation.com).

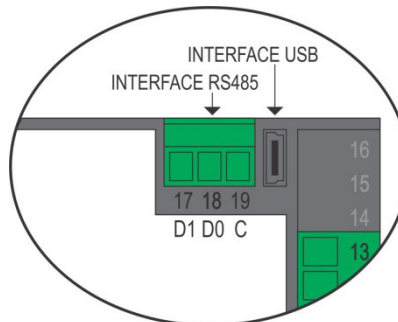


Figure 1 – Serial communication

**RS485 INTERFACE: ELECTRICAL CONNECTION**

The RS485 signals are:

<b>D1</b>	<b>D</b>	<b>D +</b>	<b>B</b>	Bidirectional data line.	Terminal 17
<b>D0</b>	<b>D̄</b>	<b>D -</b>	<b>A</b>	Inverted bidirectional data line.	Terminal 18
<b>C</b>				Optional connection that improves the communication performance.	Terminal 19
<b>GND</b>					

Table 3 – RS485

**USB INTERFACE**

The USB interface is used to CONFIGURE, MONITOR or UPDATE the controller FIRMWARE. The user should use **QuickTune** software, which offers features to create, view, save, and open settings from the device or files on the computer. The tool for saving and opening configurations in files allows the user to transfer settings between devices and perform backup copies.

For specific models, **QuickTune** allows to update the firmware (internal software) of the controller via the USB interface.


For MONITORING purposes, the user can use any supervisory software (SCADA) or laboratory software that supports the Modbus RTU communication over a serial communication port. When connected to a computer USB, the controller is recognized as a conventional serial port (COM x).

The user must use **QuickTune** software or consult the DEVICE MANAGER on the Windows Control Panel to identify the COM port assigned to the controller.

The user should consult the mapping of the Modbus memory in the controller communication manual and the documentation of the supervision software to start the MONITORING process.

Follow the procedure below to use the USB communication of the device:

1. Download **QuickTune** software from our website and install it on the computer. The USB drivers necessary for operating the communication will be installed with the software.
2. Connect the USB cable between the device and the computer. The controller does not have to be connected to a power supply. The USB will provide enough power to operate the communication (other device functions may not operate).
3. Run the **QuickTune** software, configure the communication and start the device recognition.



The USB interface IS NOT SEPARATE from the signal input (PV) or the digital inputs and outputs. It is intended for temporary use during CONFIGURATION and MONITORING periods.

For the safety of people and equipment, it must only be used when the equipment is completely disconnected from the input/output signals. Using the USB in any other type of connection is possible but requires a careful analysis by the person responsible for installing it.

When MONITORING for extended periods of time and with connected inputs and outputs, we recommend using the RS485 interface, which is available or optional in most of our products.

**PV RETRANSMISSION**

The digital panel meter may include an analog output which performs the retransmission of the measured process variable (PV) values. The analog retransmission can be scaled, i.e., there are minimum and maximum limits to establish the retransmission range, defined in the  $r_{ELL}$  and  $r_{EHL}$  parameters.

The digital panel meter allows a ratio between indication range and output current with inversely proportional behavior ( $r_{ELL} > r_{EHL}$ ).

The analog output is available on terminals 18 (+) and 19 (-) for N1540-RT and N1540-RT-24V models.

The user sets the relay signal between 0 to 20 mA and 4 to 20 mA.

To obtain retransmission at an electrical voltage of 0 to 10 V, the user shall install a shunt resistor (500 Ω max.) across the analog output terminals and select the 0 to 20 mA signal as the electrical relay signal.

The analog retransmission output is electrically isolated the other circuits.

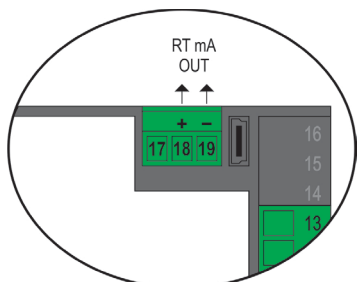


Figure 2 – PV retransmission terminals (RT mA OUT)

**Note:** RS485 Communication and PV Retransmission features are mutually exclusive.

**INSTALLATION / CONNECTIONS**

The digital panel meter is meant for panel mounting. The sequence of steps is:

- Prepare a cut-out of 93.0 by 45.5 mm on the panel.
- Remove the mounting clamp from the digital panel meter.
- Insert the digital panel meter into the cut-out from the front side of the panel.
- Place the clamp on the digital panel meter again, pressing until firm grip to the panel.

**ELECTRICAL CONNECTIONS**

The terminals configurations are shown in Figure 3:

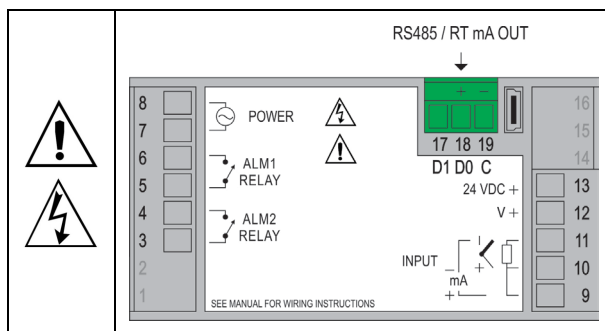


Figure 3 – Inputs connections and power supply

It is necessary to observe the existence of polarity in the connection of power supply line in 24 V models: Terminal 18 = (+) and terminal 19 = (-).

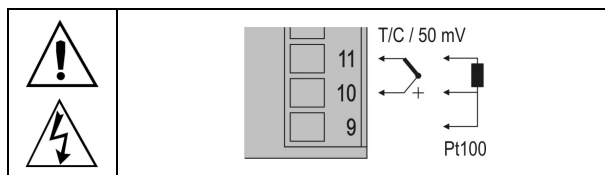


Figure 4 – Thermocouple, Pt100, and 50 mV signal connection

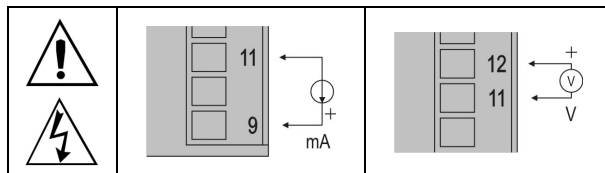


Figure 5 – Current (mA) and Voltage (V) signal connection

This digital panel meter offers an auxiliary 24 Vdc power supply which is typically applied to power up 2-wire 4-20 mA field transmitters. The Figure 6 presents the wiring for this application:

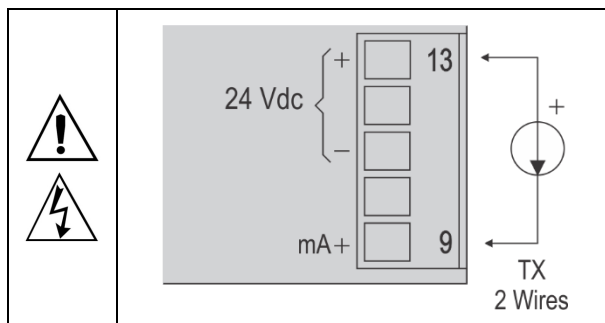


Figure 6 – 24 Vdc source with a 2-wire transmitter (passive, Sink type)

**INSTALLATION RECOMMENDATIONS**

- To minimize the pick-up of electrical noise, the low voltage DC connections and the sensor input wiring should be routed away from high-current power conductors. If this is impractical, use shielded cables. In general, keep cable lengths to a minimum.
- The input signals conductors shall be positioned throughout the factory separate from the output and the power supply conductors, in grounded conduits if possible.
- The power supply of the electronic instruments shall come from a proper source for the instrumentation network.
- It is recommended to use RC FILTERS (0,1 uF in series with 100 ohms) to suppress the noise generated by contactors coils, solenoids, etc.

**OPERATION**

The front panel can be seen on **Figure 7**:



Figure 7 – Identification of the front panel parts

**Display:** Shows the process variable **PV**, the configuration parameters prompts and their respective values/conditions.

**Indicators A1 and A2:** Signalize the occurrence of an alarm condition.

**Key P:** Used to walk through the parameters in the menu cycles.

**F1 / ▲ key and F2 / ▼ key:** Used to change parameter values.

**Key ◀:** Used to back to the previous displayed parameter.

**START-UP**

When the digital panel meter is powered up, the digital panel meter displays the number of the software version in the first 3 seconds, then the value of the measured process variable (PV) is shown in the display. This is the **Indication Screen**.

To be used, the digital panel meter must be previously configured. The configuration consists of the definition of each of the various parameters displayed. The user must understand the importance of each parameter and determine a valid condition or a valid value for each one of them.

The configuration parameters are grouped in levels according to their affinity. The 5 parameters levels are:

- Operation
- Alarms
  - Input
  - Linearization
  - Calibration

The **P** key provides the access to the levels and to the parameters of these levels.

Keeping the **P** key pressed, at every 2 seconds, the digital panel meter jumps from one level to another, presenting the first parameter of each level:

**PV >> FuR1 >> tYPE >> LEnbL >> PRSS >> PV ...**

To enter a particular level, simply release the **P** key when the first parameter in that level is displayed.

To walk through the parameters in a level, press the **P** key with short strokes. To go back to the previous parameters, use the ◀ Key.

After the last parameter of the cycle, the digital panel meter always returns to the **PV Indication** screen.

The display alternates the presentation of the parameter prompt and its value. The parameter value is displayed with a light blinking to differentiate it from the parameter prompt.

Depending on the level of parameter protection adopted, the **PRSS** parameter precedes the first parameter in the level where the protection is active. See [CONFIGURATION PROTECTION](#) section.

**PARAMETERS DESCRIPTION**

**OPERATION CYCLE**

<b>PV</b>	<b>PV Display Indication.</b> The value of the measured variable (PV) is shown on the upper display (red).
<b>SP1</b> <b>SP2</b> <i>Setpoint Alarm</i>	Alarm SP. Value that defines the alarm activation point. For the alarms set up with the <b>Differential</b> functions, these parameters define the maximum differences accepted between <b>PV</b> and a reference value defined in the parameter <b>ALrF</b> . For the <b>IErr</b> alarm function, this parameter is not used. Parameters shown in this level only when enabled in the <b>SP1E</b> and <b>SP2E</b> parameters.

**ALARMS CYCLE**

<b>FuR1</b> <b>FuR2</b>	Alarm functions. It defines the functions of the alarms among the options in <b>Table 2</b> .
<b>ALrF</b> <i>Alarm Reference</i>	Reference value used for the alarms with differential function, minimum differential, or maximum differential.
<b>SP1</b> <b>SP2</b> <i>Setpoint Alarm</i>	Alarm SP. Value that defines the point of activation of the alarm outputs. For the alarms programmed with the <b>Differential</b> functions, these parameters represent the deviations. For the <b>IErr</b> alarm function, this parameter has no meaning.
<b>SP1E</b> <b>SP2E</b> <i>SP Enable</i>	It allows the SPA1 and SPA2 parameters to be displayed also in the Operation Cycle. <b>YES</b> Shows the SPA1/SPA2 parameters in the Operation Cycle. <b>no</b> Does not show the SPA1/SPA2 parameters in the Operation Cycle.
<b>bLR1</b> <b>bLR2</b> <i>Blocking Alarm</i>	Alarms Initial Blocking. <b>YES</b> Enables the initial blocking. <b>no</b> Inhibits the initial blocking.
<b>HYR1</b> <b>HYR2</b> <i>Hysteresis of Alarm</i>	Alarm hysteresis. It defines the difference between the value of PV at which the alarm is triggered and the value at which it is turned off.
<b>FLSh</b> <i>Flash</i>	It allows signalization of an alarm conditions occurrence by flashing the PV indication on the indication display. <b>YES</b> Enables alarm signalization by flashing <b>PV</b> . <b>no</b> Disables the flashing <b>PV</b> .

**INPUT CYCLE**

<b>tYPE</b> <i>Type</i>	Input Type. Selection of the input type, used by the digital panel meter. Refer to <b>Table 01</b> .
<b>FLtF</b> <i>Filter</i>	Digital Input Filter. Used to improve the stability of the measured signal (PV). Adjustable between 0 and 20. At 0 (zero) it means filter turned off and at 20 means maximum filter. The higher the filter value, the slower is the response of the measured value.
<b>dPPo</b> <i>Decimal Point</i>	It determines the position of the decimal point on the display.
<b>un t</b> <i>Unit</i>	It defines the temperature unit to be used: <b>C</b> Indication in Celsius. <b>F</b> Indication in Fahrenheit.
<b>OFFS</b> <i>Offset</i>	Parameter that allows the user to make fine adjustments to the indicated PV value.

<b>mLL</b> <i>Input Low Limit</i>	It defines the <u>lower</u> value of the indication range when the input types of 0-20 mA, 4-20 mA, 0-50 mV, 0-5 V and 0-10 V are used.
<b>mHL</b> <i>Input High Limit</i>	It defines the <u>upper</u> value of the indication range when the input types of 0-20 mA, 4-20 mA, 0-50 mV, 0-5 V and 0-10 V are used.
<b>rEtE</b> <i>Retransmission</i>	It allows the definition of the PV retransmission mode. <b>P020</b> Determines retransmission in 0-20 mA. <b>P420</b> Determines retransmission in 4-20 mA. Parameter showed when there is PV retransmission available on the digital panel meter.
<b>rELL</b> <i>Retransmission Low Limit</i>	It defines the <u>lower</u> limit of the PV retransmission range. Parameter shown there is PV retransmission available on the digital panel meter.
<b>rEHL</b> <i>Retransmission High Limit</i>	It defines the <u>upper</u> limit of the PV retransmission range. Parameter shown there is PV retransmission available on the digital panel meter.
<b>bAud</b> <i>Baud Rate</i>	Baud Rate of the serial communication. In kbps. 1.2, 2.4, 4.8, 9.6, 19.2, 38.4, 57.6 and 115.2
<b>PrEtY</b> <i>Parity</i>	Serial communication parity. <b>nonE</b> Without parity <b>EuEn</b> Even parity <b>Odd</b> Odd parity
<b>Addr</b> <i>Address</i>	Communication address. A number between 1 and 247 that identifies the digital panel meter in the serial communication network.

**CUSTOM LINEARIZATION CYCLE**

<b>LEnbl</b>	Enables custom linearization. When you enable this parameter, the display shall meet the requirements set points defined in the parameters below.
<b>InP00</b> <b>InP. 10</b>	Defines the extreme points of the ten possible segments for custom linearization. Values in input signal unit: mA, mV, or V.
<b>ouP00</b> <b>ouP. 10</b>	Defines the indications corresponding to the extreme points of the ten segments of the custom linearization defined in the parameter ( <b>InP.xx</b> ) above. Values displayed in the desired display unit.

**CALIBRATION CYCLE**

All types of input are calibrated in the factory. In case a recalibration is required; it shall be carried out by a specialized professional. In case this cycle is accidentally accessed, do not perform alteration in its parameters.

The factory calibration can be restored in the **r5EtE** parameter.

<b>PRSS</b>	<u>Password</u> . Entering the Access password. This parameter is presented before the protected cycles. See <a href="#">CONFIGURATION PROTECTION</a> section.
<b>CR1b</b>	<u>Calibration</u> . Enables the possibility for calibration of the digital panel meter. When the calibration is not enabled, the related parameters are hidden.
<b>InLC</b>	<u>Input Low Calibration</u> . Indication of the low scale calibration signal applied to the input.
<b>InHC</b>	<u>Input High Calibration</u> . Indication of the full-scale calibration signal applied to the input.
<b>r5EtE</b>	<u>Restore</u> . It restores the factory calibrations of the input, disregarding any modifications carried out by the user.
<b>CJ</b>	<u>Cold Junction</u> . Cold junction temperature.

<b>PR5C</b>	<u>Password Change</u> . It allows the definition of a new access password, always different from zero.
<b>Prot</b>	<u>Protection</u> . It allows the definition of a Protection Level. See <a href="#">Table 4</a> .
<b>FrEQ</b>	<u>Frequency</u> . Frequency of the local electrical network.
<b>Sn H</b>	First part of the serial number.
<b>Sn L</b>	Second part of the serial number.

**CONFIGURATION PROTECTION**

The digital panel meter provides means for protecting the parameters configurations, not allowing modifications to the parameters values, avoiding tampering or improper manipulation.

The **Protection (Prot)** parameter in the Calibration level determines the protection strategy, limiting the access to certain levels, as shown in the table below:

PROTECTION LEVEL	PROTECTED LEVELS
1	Only the Calibration level is protected.
2	Custom Linearization and Calibration levels are protected.
3	Input, Custom Linearization, and Calibration levels are protected.
4	Alarms, Input, Custom Linearization, and Calibration levels are protected.

Table 4 – Configuration protection levels

**ACCESS PASSWORD**

When accessed, the protected levels request the user to provide the **Access Password** for granting permission to change the configuration of the parameters on these levels.

The **PR55** screen precedes the parameters on the protected levels. If no password is entered, the parameters of the protected levels can only be visualized.

The Access Password is defined by the user in the parameter **Password Change (PR5C)**, present in the Calibration Level. **The factory default for the password code is 1111.**

**PROTECTION OF THE ACCESS PASSWORD**

The protection system built into the digital panel meter blocks for 10 minutes the access to protected parameters after 5 consecutive frustrated attempts of guessing the correct password.


**MASTER PASSWORD**

The Master Password is intended for allowing the user to define a new password in the event of it being forgotten. The Master Password does not grant access to all parameters, only to the **Password Change** parameter (**PR5C**).

After defining the new password, the protected parameters may be accessed (and modified) using this new password.

The master password is made up by the last three digits of the serial number of the digital panel meter **added** to the number 9000.

As an example, for the equipment with serial number 07154321, the master password is 9 3 2 1.

The serial number can be obtained by pressing the  key for 5 seconds.

**INPUT CALIBRATION**

All inputs are factory calibrated and recalibration should only be done by qualified personnel. If you are not familiar with these procedures, do not attempt to calibrate this instrument.

The calibration steps are:

1. Configure the input type to be calibrated.
2. Configure the lower and upper indication limits for the maximum span of the selected input type.
3. Connect to the input terminals a signal corresponding to a known indication value a little above the lower display limit.
4. Access the **InLc** parameter. With the **▲** and **▼** keys, adjust the display reading to match the applied signal. Then press the **P** key to store it.
5. Inject a signal that corresponds to a value a little lower than the upper limit of indication.
6. Access the **Inhc** parameter. With the **▲** and **▼** keys, adjust the display reading to match the applied signal. Then press the **P** key to store it.
7. Validate the calibration.

**Note:** When checking the calibration with a Pt100 simulator, pay attention to the simulator minimum excitation current requirement, which may not be compatible with the 0.170 mA excitation current provided by the digital panel meter.

**ANALOG OUTPUT CALIBRATION**

1. Configure the retransmission type (**rEtr = P.020**).
2. Install a milliamper meter at the terminals 18(+) and 19(-).
3. Enter the Calibration Cycle.
4. Select the **ouLc** screen.
5. Press the key **▲** or the key **▼**.
6. Read the current value displayed on the milliamper meter. Through the **▲** and **▼** keys, adjust the value displayed on the digital panel meter to match the value displayed on the milliamper meter.
7. Press the **P** key to save and access the **ouHc** parameter.
8. Press the key **▲** or the key **▼**.
9. Reread the new current value displayed by the milliamper meter. Through the **▲** and **▼** keys, adjust the value displayed on the digital panel meter to match the value displayed on the milliamper meter.
10. Read the current displayed in the milliamper meter and indicated in the **ouHc** screen through the **▲** and **▼** keys.
11. Exit the Calibration Cycle.
12. Validate the performed calibration.

**SPECIFICATIONS**

**DIMENSIONS:**.....96 x 48 x 35 mm (1/16 DIN)  
 Panel cut-out.....93.0 x 45.5 mm  
 Approximate weight: ..... 110 g  
**POWER SUPPLY:**..... 100 to 240 Vac/dc (±10 %), 50/60 Hz  
 Optional 24 V:..... 12 to 24 Vdc / 24 Vac (-10 % / +20 %)  
 Maximum consumption:..... 6 VA

**ENVIRONMENTAL CONDITIONS:**

Operation temperature: ..... 0 to 50 °C  
 Relative humidity: ..... 80 % @ 30 °C  
 For temperatures above 30 °C, reduce 3 % per °C. Indoor use;  
 Installation Category II, Pollution Degree 2; altitude < 2000 m.

**INPUT** .....According to **Table 01**  
 Internal resolution: .....32767 levels (15 bits)  
 Display resolution: ..... 32000 levels (from -2000 to 30000)  
 Temperature resolution: ..... 0.1 / 1 °F / °C

Input reading rate: ..... Up to 55 per second  
 Accuracy: ... Thermocouples **J, K, T, E**: 0.25 % of the span ±1 °C  
 ..... Thermocouples **N, R, S, B**: 0.25 % of the span ±3 °C  
 ..... Pt100: 0.2 % of the span  
 ..... 0-20 / 4-20 mA, 0-50 mV, 0-5 V, 0-10 V: 0.2 % of the span  
 Input impedance: ..... Pt100, thermocouples, 0-50 mV: > 10 MΩ  
 ..... 0-5 V, 0-10 V: > 500 kΩ  
 .....0-20 / 4-20 mA: 100 Ω  
 Pt100 measuring: ..... 3-wire type, (α=0.00385)  
 With compensation of the cable length, max 50 meters,  
 excitation current of 0.170 mA.

**OUTPUT ALARM1:**.....Relay SPST; 240 Vac / 30 Vdc / 1.5 A  
**OUTPUT ALARM2:**.....Relay SPST; 240 Vac / 30 Vdc / 1.5 A  
**RETRANSMISSION (mA RT – OUTPUT):**..... 0-20 mA / 4-20 mA  
 Accuracy.....0.15 % FS  
 Maximum impedance ..... 500 Ω (10 V max.)  
 Thermal coefficient .....0.004 mA / °C  
 Resolution..... < 0.005 mA

**AUXILIARY VOLTAGE SOURCE:** .....24 Vdc (±10 %) / 20 mA max.  
**HOUSING:**.....Polycarbonate (PC) UL94 V-2  
**BACK PANEL:**..... ABS+PC UL94 V-0  
**CONNECTIONS (WIRING):**..... Plug-in block terminals, 5 mm pitch  
**USB INTERFACE:** 2.0, CDC class (virtual communications port),  
 Modbus RTU protocol.

**START-UP OPERATION:** 3 seconds after connecting the power supply.

**CERTIFICATIONS:**   

**IDENTIFICATION**

<b>N1540</b>	Basic version.
<b>N1540-24V</b>	Basic version with power supply 24 V.
<b>N1540-485</b>	With serial communication RS485.
<b>N1540-485-24V</b>	Version with RS485 and power 24 V.
<b>N1540-RT</b>	Version with PV retransmission.
<b>N1540-RT-24V</b>	Version with PV retransmission and power supply 24 V.

**Note:**

1. Communication signals are electrically isolated from the other of the circuits.
2. The analog output circuit is electrically isolated from the other circuits.
3. RS485 Communication and PV Retransmission features are mutually exclusive.

**MAINTENANCE**

**PROBLEMS WITH THE DIGITAL PANEL METER**

Connection errors and inadequate programming are the most common problems encountered during the operation. A final revision can avoid loss of time and damages.

The digital panel meter displays some messages to help the user identify the problems.

MESSAGE	PROBLEM DESCRIPTION
---	Open input. Without sensor or signal.
<b>Err 1</b> <b>Err 6</b>	Connection and/ or configuration problems. Check the wiring and the configuration.

**Table 5 – Error messages**

Other error messages may indicate hardware problems requiring maintenance service.

## **WARRANTY**

Warranty conditions are available on our website [www.novusautomation.com/warranty](http://www.novusautomation.com/warranty).