N150

ELECTRONIC TEMPERATURE CONTROLLER

USER GUIDE – V2.0x / V3.0x G

1. SAFETY ALERTS

The following symbols are used on the equipment and throughout this manual to draw the user's attention to important information related to the safety and use of the equipment.

⚠	⚡
CAUTION:	**CAUTION OR HAZARD:**
Read the manual completely before installing and operating the equipment.	Risk of electric shock.

All safety recommendations appearing in this manual must be followed to ensure personal safety and prevent damage to the instrument or system. If the instrument is used in a manner other than that specified in this manual, the device safety protections may not be effective.

2. INTRODUCTION

N150 is an electronic temperature controller, suitable for commercial refrigerators. It controls the temperature of refrigeration chambers.

It also monitors the evaporator, condenser, or compressor temperatures for protection and energy saving actions such as alarms, defrost, among others.

It features a LED display, perfect for keeping track of the controller's operation and configuration.

It provides all the features required for the refrigerator control process.

Its main features are:

- 3 x Inputs for temperature sensors.
- 1 x 16 A relay output for compressor control.
- 3 x 3 A relay outputs for resistance, fan, and lighting control.
- Digital input to monitor the refrigerator door.
- Functions to control the defrosting process.
- Several timings to configure the compressor start-up.
- Functions to control the fan.
- Mains voltage monitoring to protect the compressor.
- Temperature measurements in °C or °F.
- Adjustments to the measured temperature values.
- Protection of the controller configuration with password protection.
- Data availability via wireless communication channels: Wi-Fi, GSM, LTE, etc.
- Type 1.C automatic action controller.
- Configuration software.

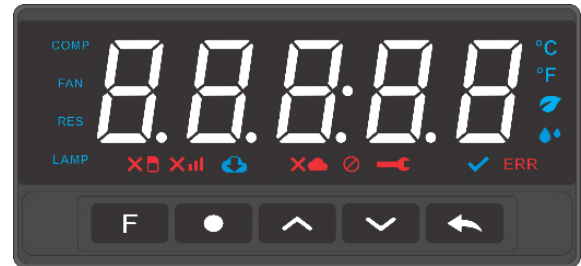## 3. IDENTIFICATION

The front panel can be seen below:

Figure 1 – Front panel and display

3.1. FUNCTION OF THE FLAGS

COMP	Indicates that the compressor output is on.
FAN	Indicates that the fan output is on.
RES	Indicates that the resistance or inversion output is on.
LAMP	Indicates that the lighting output is on.
🌱	Indicates that the controller is adopting the Ecological SP as the control SP.
ERR	Indicates that an error condition has occurred.
✔	Indicates that the controller can operate. When blinking, indicates that the controller is in idle mode.
💧	Controller in Defrost mode.
⊘	Non-registered controller.
🔧	Device without configured parameters or error when connecting the device to the cloud.
✕☁	No connection to the cloud.
☁	Software update in progress.
✕📶	No signal.
✕▯	SIM Card error.

4. ELECTRICAL CONNECTIONS

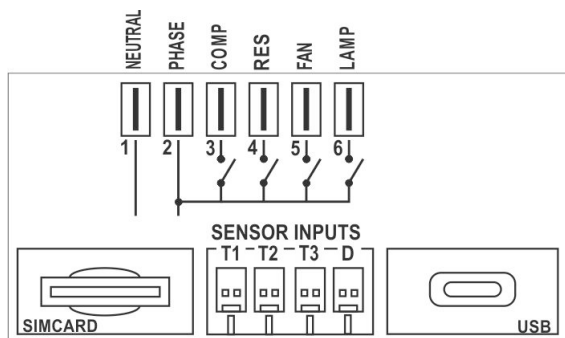The figure below indicates the electrical connections:

Figure 2 – Electrical connections
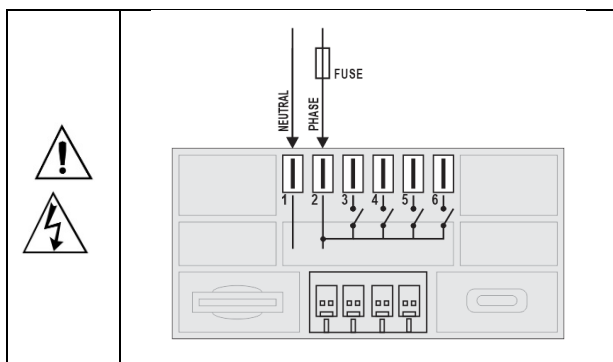
4.1. POWER SUPPLY CONNECTION

Figure 3 – Controller power supply connections

The Neutral, Phase, Compressor, Resistor, Fan, and Lamp connections of the controller are made through 5.0 mm FASTON terminals.

5. INSTALLATION

The controller should be attached to a panel, following the sequence of steps below:

- Make a panel cutout, as shown in the SPECIFICATIONS section.
- Remove the mounting clamp from the controller.
- Insert the controller into the panel cutout.
- Reattach the mounting clamp on the controller, pressing until a firm hold is obtained.

5.1 INSTALLATION RECOMMENDATIONS

- Input signal conductors must run through the plant separately from the supply and output conductors. If possible, in grounded conduits.
- The power supply for the electronic instruments must come from a proper instrumentation network.
- It is recommended to use RC FILTERS (noise suppressors) at contactor coils, solenoids, etc.
- In control applications, it is essential to consider what can happen when any part of the system fails. The internal devices of the equipment do not guarantee full protection.

6. OPERATION

When you turn on the controller, the display will quickly show the internal software version. It then displays the temperature value measured by **NTC1** input (identified as temperature T1 in this manual) and starts the control operation.

However, to be used in a refrigeration process, you need to configure the controller.

The controller has 2 operation modes:

- Operation Mode
- Configuration Mode

6.1. OPERATION MODE

Mode where the display of the temperature value T1 prevails. The controller remains in this mode throughout the operation in the refrigerator control.

Also in Operation mode, depending on the configuration, access to the **SP1** parameter value and display of the mains voltage value may be available.

You can access these parameters by pressing the ⬛ key for a short time (<1 s).

↓	ᴸ 1
⬛	5P 1
↓	UAC

Table 1 – Operation mode cycle

6.2. CONFIGURATION MODE

The Configuration mode parameters are gathered by affinity into 5 Configuration Cycles:

Configuration Cooling Cycle	CF.CL
Configuration Defrost Cycle	CF.dF
Configuration LVD Cycle	CF.Ud
Configuration INPUT Cycle	CF. ın
Configuration Commissioning Cycle	CF.d ı

You can access the Configuration cycles by continuously pressing the ⬛ key. The first cycle (CF.CL) will be displayed after 5 seconds.

By continuing to press the ⬛ key, the remaining cycles will be accessed every 2 seconds and sequentially. First, the cycle's identifying header will always be shown: CF.CL, CF.dF, CF.Ud, CF. ın, and CF.d ı.

When you keep the key pressed after the last cycle, the controller will return to displaying **T1**.

While the header of the desired cycle is being displayed, simply release the ⬛ key.

At the desired cycle, you can access the parameters of this cycle by giving short touches to the ⬛ key.

The table below presents an overview table with the cycles and their respective parameters:

OPERATION CYCLE		COOLING CYCLE	DEFROST CYCLE	LVD CYCLE	INPUT CYCLE	COMISSIONING CYCLE
				● (2 s) →→		
T1	→→ ● key (5 s) →→	CF.CL	CF.dF	CF.Ud	CF.in	CF.di
SP1 / UAC	↓ ● ↓	SP1	dF.tY	Ud.En	in.un	PASS
		SP1.E	dF.in	Ud.LL	in.dP	t1
		CL.HY	dF.t	Ud.HL	SP.LL	t2
		CL.dL	dF.St	Ud.oF	SP.HL	t3
		CL.on	dF.En	Ud.t	oF.t1	UAC
	↑ ← ↑	CL.oF	dF.FA		oF.t2	ACt.E
		CL.E1	dF.CP		oF.t3	out.1
		CL.F1	dF.dn		dr.AL	out.2
		tr.on	dF.Hd		dr.Hd	out.3
		tr.oF			dr.FA	out.4
		SP2				dF.tt
		SP3				t2.En
						t3.En
						dr.En
						SP.EC
						rStr
						Prot
						dY.P
						PAS.C
						Sn.H
						Sn.L

Table 2 – Cycles

7. PARAMETER DESCRIPTION

7.1. CONFIGURATION COOLING CYCLE

SP1	Control setpoint of **T1**. Desired temperature value for the refrigerated environment. In degrees.
SP1.E	Allows you to display **SP1** parameter in the Operation Cycle. YES — Displays **SP1** in the Operation Cycle. no — DOES NOT display **SP1** in the Operation Cycle.
CL.HY	Hysteresis for compressor operation. In degrees.
CL.dL	Delay time at compressor start-up (mm:ss).
CL.on	Minimum time the compressor stays on (mm:ss).
CL.oF	Minimum time the compressor stays off (mm:ss).
CL.E1	Compressor behavior when there is an error at T1. on — The compressor turns on continuously. oFF — The compressor turns off continuously.
CL.F1	Fan behavior during T1 control. CP — The fan acts with the compressor. on — The fan remains continuously on. Timed action. It acts by turning on and off according to the tr.on and tr.oF settings. tr — Turns on and turns off according to the definitions of tr.on and tr.oF.

tr.on	Time that the fan remains on. (hh:mm). It is used when CL.F1 parameter is set to tr.
tr.oF	Time that the fan remains off. (hh:mm). It is used when CL.F1 parameter is set to tr.
SP2	Limit value of **T2** to automatically turn off the fan when the evaporator temperature rises. The SP2 parameter is only displayed when enabling T2 measurement (t2.En = YES). This parameter overrides the settings defined for the CL.F1 parameter.
SP3	Value of the compressor protection temperature, considering the T3 temperature measured in the compressor or condenser. • When the value of the compressor temperature (T3) exceeds SP3, the compressor will be turned off. • When the temperature T3 falls below SP3 minus 5 °C (41 °F), the compressor will be allowed to run. • The minimum off time (CL.oF) for switching on the compressor will be respected.

7.2. CONFIGURATION DEFROST CYCLE

dF.tY	Allows you to configure the defrost type.
	hYbr Defrost by time/temperature.
	t iME Defrost by time. It uses **dF. in** and **dF.t**.
	t iME Defrost by temperature. It uses **dF.St** and **dF.En**.
dF. in	Interval between defrost cycles. Adjustable between 00:00 and 24:00 (hh:mm). Parameter available when configuring **Defrost by Temperature** or **Hybrid Defrost**.
dF.t	Defrost duration. Adjustable between 00:01 and 24:00 (hh:mm). Parameter available when configuring **Defrost by Temperature** or **Hybrid Defrost**.
dF.St	Parameter to set the **T2** temperature to start defrosting when in **tEMP** mode (evaporator temperature). Adjustable to C° or F°. Parameter available when configuring **Defrost by Temperature** or **Hybrid Defrost**.
dF.En	Parameter to set the **T2** temperature to end defrosting when in **tEMP** or **hYbr** mode (evaporator temperature). The duration of the defrost is set in parameter **dF.t**. However, the defrosting process can be interrupted if the evaporator temperature (**T2**) reaches the value defined in the **dF.En** parameter. Adjustable to C° or F°. Parameter available when configuring **Defrost by Temperature** or **Hybrid Defrost**.
dF.FA	Fan behavior during defrost.
	on The fan turns on during defrost.
	oFF The fan turns off during defrost.
dF.CP	Compressor behavior during defrost.
	on The compressor turns on during defrost.
	oFF The compressor turns off during defrost.
	FREE The compressor follows the configuration of the controller, which considers the T1 x SP1 relation to turn the compressor on/off.
dF.dn	Time to drain the water accumulated in the evaporator. Adjustable between 00:00 and 24:00 (hh:mm).
dF.Hd	Holding time for the **T1** indication after starting to defrost. When defrosting, the temperature inside the refrigerator (**T1**) can vary significantly. This parameter defines a time interval in which the **T1** temperature indication will remain unchanged from the beginning of the defrosting process. Adjustable between 00:00 and 24:00 (hh:mm).

7.3. CONFIGURATION LVD CYCLE

Ud.En	Allows you to enable monitoring of the mains voltage and the LVD function.
	YES The controller monitors the mains voltage and the LVD function.
	no The controller DOES NOT monitor the mains voltage and the LVD function.
Ud.LL	Lower limit of the mains voltage for LVD function actuation.

Ud.HL	Upper limit of the mains voltage for LVD function actuation.
Ud.oF	Offset to the measured mains voltage value. Allows you to adjust the value of the measured electrical voltage.
Ud.t	Filter time for the LVD function. Time interval that the controller will wait to make sure that an electrical voltage limit value is set. Adjustable between 00:05 and 05:00. (mm:ss).

7.4. CONFIGURATION INPUT CYCLE

in.un	Temperature unit for **T1**, **T2**, and **T3** measurements: °C or °F.
in.dP	Allows you to display decimals in **T1**, **T2**, and **T3** measurements:
	0.0 Decimal values are displayed.
	0 Decimal values are NOT displayed.
SP.LL	Minimum adjustment limit for SPs. Adjustable between -40 and 90 °C (-40 to 194 °F).
SP.HL	Maximum adjustment limit for SPs. Adjustable between -40 and 90 °C (-40 to 194 °F).
oF.t 1	Offset for **T1** measurement. Allows you to adjust the measured temperature values. Adjustable between -10 and 10 °C (14 to 50 °F).
oF.t2	Offset for **T2** measurement. Allows you to adjust the measured temperature values. Adjustable between -10 and 10 °C (14 to 50 °F).
oF.t3	Offset for **T3** measurement. Allows you to adjust the measured temperature values. Adjustable between -10 and 10 °C (14 to 50 °F).
dr.AL	Open door alarm. This parameter sets a maximum time interval for the door to remain open. Adjustable between 00:00 and 10:00 (mm:ss). When set to 00:00, the door open alarm function is disabled. If the equipment is set to an interval other than 00:00 and this value is exceeded, the message "**door**" will be displayed alternately with the value of **T1**. This signals a problem with the door or the door sensor. When the door open alarm is triggered, the lighting and fan will return to the condition before the door was opened. The update of the **T1** temperature display will also be restarted.
dr.Hd	Parameter that prevents the **T1** indication from being updated when the refrigerator door is open. Adjustable between 00:00 and 10:00 (mm:ss). When setting to 00:00, the **T1** indication will NOT be fixed when opening the door. If the equipment is set to a value other than 00:00, the **T1** indication will be fixed as long as the door is open, plus the interval defined in this parameter. Time counting will start the instant the door is closed.
dr.FA	Allows you to set the fan to turn off automatically if the door is opened.
	oFF The fan is turned off when you open the door.
	on The fan is NOT turned off when you open the door.

7.5. CONFIGURATION COMISSIONING CYCLE

PASS	Allows you to enter the password. The initially adopted password is 1111.
t1	It displays the measured value of **T1**.
t2	It displays the measured value of **T2**.
t3	It displays the measured value of **T3**.
UAC	It displays the measured mains voltage value.
ACt.E	Allows you to enable the operation. **YES** The controller can operate. **no** The controller is NOT able to operate. When not enabled for operation, the ✔ flag will flash on the display.
out.1	Direct action to turn **OUT1** (COMP) on/off. **on** Turns on OUT1. **oFF** Turns off OUT1.
out.2	Direct action to turn **OUT2** (RES) on/off. **on** Turns on OUT2. **oFF** Turns off OUT2.
out.3	Direct action to turn **OUT3** (FAN) on/off. **on** Turns on OUT3. **oFF** Turns off OUT3.
out.4	Direct action to turn **OUT4** (LAMP) on/off. **on** Turns on OUT4. **oFF** Turns off OUT4.
dF.tt	Direct action to turn defrost on/off. **on** Start defrosting. **oFF** Ends defrosting.
t2.En	Allows you to enable **T2** measurement and related actions. **YES** T2 measurement is enabled. **no** T2 measurement is NOT enabled.
t3.En	Allows you to enable **T3** measurement and related actions. **YES** T3 measurement is enabled. **no** T3 measurement is NOT enabled.
dr.En	Allows you to enable the door sensor. **YES** The door sensor is enabled. **no** The door sensor is NOT enabled.
SP.EC	Allows you to set the Ecological SP value. The controller will adopt this SP value according to remote commands. Adjustable between -40 and 90 °C (-40 to 194 °F).
rStr	Allows you to restore the factory settings. **YES** Restore factory settings. **no** DOES NOT restore factory settings.
Prot	Allows you to set the Protection Level. **1** Only the CF.di Cycle is protected against configuration change. **2** The CF.ud, CF.in, and CF.di Cycles are protected. **3** The CF.CL, CF.dF, CF.ud, CF.in, and CF.di Cycles are protected. **4** All cycles are protected.

PAS.C	Allows you to change the Access Password.
dY.P	Allows you to adjust the brightness duration of the display. Adjustable between 1 and 100 seconds.
Sn.H	Displays the higher part of the controller's serial number.
Sn.L	Displays the lower part of the controller's serial number.

8. FEATURES

8.1. SUSPENDING CONTROLLER OPERATION

Using the ACt.E parameter, it is possible to put the controller into Suspended Operation mode.

In Suspended mode, the controller only measures and indicates the temperatures measured by **T1**, **T2**, and **T3** sensors (if enabled) on its display.

In this mode, the **COMP**, **RES**, **FAN**, and **LAMP** outputs remain off. Monitoring of the refrigerator door is also disabled.

8.2. DEFROST

Ice build-up on the evaporator of the system reduces the energy efficiency of the refrigeration process. It should be strongly avoided.

The process of eliminating or preventing ice from accumulating on the evaporator is defined as **Defrost**.

The dF.tY parameter offers three options for setting the Defrost mode input:

1) **Evaporator Temperature Defrost (T2) – tEMP**

   In this option, the user determines 2 limit values for the evaporator temperature (**T2**) which, when reached, switch the controller into or out of Defrost mode.

   The dF.t and dF.in parameters set the duration of the defrost process and the interval between defrosts.

2) **Defrost by Time – tEMP**

   The defrost occurs periodically. The user determines the duration of the defrost and the interval between events.

   The dF.St and dF.En parameters define the temperatures to start and end the defrosting process.

3) **Defrost by Time and Temperature – Hybrid**

   The controller offers features for the user to configure defrosting both periodically (time) and by evaporator temperature behavior.

   In Defrost mode, the compressor and fan operations are changed according to the configuration set in the **Configuration Defrost** (CF.dF) cycle.

   In this mode, the **OUT2** (RES) output is always turned on.

8.2.1. DEFROST BY COMPRESSOR STOP

In Defrost mode, the refrigerator compressor can be switched off. When the compressor stops, the temperature of the evaporator tends to rise, preventing excessive cooling and the consequent accumulation of ice.

8.2.2. DEFROST WITH HEATING ELEMENTS

In Defrost mode, the **OUT2** (RES) output is switched on. This output can then turn on heating elements located next to the evaporator and thus prevent it from overcooling.

8.2.3. DEFROST WITH REVERSE CYCLE

In Defrost mode, the **OUT2** (RES) output is switched on. This output can then reverse the direction of flow of the system's refrigerant gas and thus heat the evaporator.

8.3. PROCESS PROTECTION

These are features that protect the refrigerator and its load, helping to preserve the installation and the refrigerated products.

- The **SP2** parameter allows you to determine how the fan should react to the temperature behavior of the evaporator (**T2**), preventing heated air from being blown into the refrigerator.

- The **NTC3** sensor can be installed directly on the metal body of the system's condenser. Thus, **T3** monitors the temperature. The **SP3** parameter determines the limit temperature for the condenser. Beyond this value, the compressor is compulsorily shut down, preventing damage to the process.

- The **dF.dn** parameter allows you to set a delay when the compressor restarts after defrosting, so that the last drops of water are eliminated from the evaporator.

- The **dF.Hd** parameter determines a time interval after defrosting without updating the **T1** temperature value on the controller display to avoid misinterpretations about the temperature in the refrigerator.

- The **dr.AL** parameter signals when the door is open.

- Economic operation. Feature that puts the refrigerator into a less energy-demanding operating condition. At suitable times, where there is limited access to the refrigerator, another control SP value is applied to the controller via remote commands (Wi-Fi, GSM, or LTE).

8.4. COMPRESSOR PROTECTION

The controller also provides a feature to protect the compressor:

- Adjustable delay to start operation.

- Minimum time the compressor remains on and off.

- Definition of the compressor behavior in case of **T1** failure.

- It is possible to install the **NTC3** sensor directly on the metal body of the compressor. Thus, **T3** starts monitoring the temperature. The **SP3** parameter determines the limit temperature for the compression body. Beyond this value, the compressor will be compulsorily shut down.

8.5. MAINS VOLTAGE MONITORING FUNCTION (HLVD)

Monitors the mains voltage that feeds the controller. If the measured electrical voltage value is outside the limits set by **ud.LL** and **ud.HL**, the controller will force the compressor to shut down immediately by turning the **OUT1** output off.

In this condition, the controller display will show the measured electrical voltage value and, alternately, the **LVD** message.

Using the ▭ key, it is possible to display the **T1** temperature value in the display again.

Compressor protection features like **Minimum Compressor On Time** (**CL.on**) and **Minimum Compressor Off Time** (**CL.oF**) take precedence over the **LVD** function.

8.6. CONFIGURATION PROTECTION

The controller allows you to protect your configuration and prevent undue changes.

In the **CF.di** Cycle, the **Protection** (**PROt**) parameter defines the protection level to be adopted, limiting access to the cycles, as shown in the table below:

PROTECTION	PROTECTED CYCLES
1	Only the **CF.di** Cycle is protected against configuration change.
2	The **CF.ud**, **CF.in**, and **CF.di** Cycles are protected.
3	The **CF.CL**, **CF.dF**, **CF.ud**, **CF.in**, and **CF.di** Cycles are protected.
4	All cycles are protected.

Table 3 – Configuration protection

The **Configuration Commissioning** (**CF.di**) Cycle is permanently protected. It is the only one that requires you to enter the password. To change this cycle, you must enter the access password in the **PASS** parameter.

Without entering the password in the **PASS** parameter, the cycle parameters can be viewed, but cannot be changed.

To protect the other controller configuration cycles, you must access the **CF.di** Cycle and, in the **PROt** parameter, select the desired protection, according to **Table 1**.

To release configuration changes in these cycles again, you must go back to the **CF.di** Cycle and adjust the **PROt** parameter according to the desired protection.

The password initially adopted (Factory password) is **1111**.

In the **Password Change** parameter (**PAS.C**), which is also present in the **CF.di** cycle, you can set a new password.

8.7. ERROR INDICATION

When experiencing errors during the measurements of the **T1**, **T2**, and **T3** temperature sensors, the controller will show the respective messages **Er1**, **Er2**, and **Er3** in the display.

The **ERR** flag will also light up when any error occurs during the operation of **N150**.

When the compressor temperature protection (**SP3**) is active, the **Er5** message will be displayed

8.8. REFRIGERATOR DOOR MONITORING

On its rear panel, the controller features a **D** Digital Input. It is suitable for connecting an open-door sensor. With the door open, the **LAMP** output will be triggered, and the refrigerator lighting will be turned on.
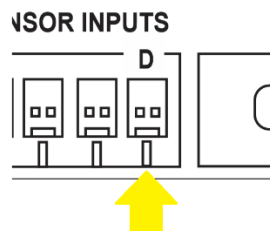

Figure 4 – **D** Digital Input

The **D** Digital Input is suitable for a Dry Contact, whose connections must have no electrical potential at all.

Its logic is: Contact closed; door open.

8.9. MANUAL COMMAND FOR THE LIGHTING

If pressed for more than 3 seconds, the [F] key, located on the front panel, turns on the lighting permanently, regardless of the condition of the open-door sensor.

To turn off the lighting, simply press the [F] key for 3 seconds.

8.10. CONFIGURATION RESTORE

Allows you to restore the factory settings.

RESE	Restore the factory settings.	
	YES	Restore factory settings.
	no	DOES NOT restore factory settings.

8.11. CONNECTIVITY

N150 features Wi-Fi, GSM, and LTE communication. This connectivity allows you to monitor and configure the device.

The Wi-Fi connectivity module used is the ESP32-WROOM-32D, from the **Espressif** manufacturer.

To use the GSM/LTE connection, you need a SIM card with an active data plan.

There is a lot of information about the controller available for reading:

- Monitoring the **T1**, **T2**, and **T3** temperatures.
- Monitoring the error signals from these sensors.
- Monitoring the status of the **OUT1**, **OUT2**, **OUT3**, and **OUT4** outputs.
- Monitoring the status of the refrigerator door sensor.
- Monitoring the status of the defrosting process.
- Monitoring the protection features of the compressor.
- Monitoring the electrical voltage values measured by the **LVD** feature.
- Activation of the economic operating mode.
- Lighting control via **OUT4**.
- Command the set of outputs (**OUT1**, **OUT2**, **OUT3**, and **OUT4**) by enabling controller operation with the REE.E parameter.

9. SOFTWARE

Available free for download from **NOVUS'** website, **QuickTune** software is the ideal tool for configuring **N150**. In addition, it also has diagnostic tools.

To configure the device, simply follow the procedure:

1. Download and install **QuickTune** on the computer to be used.
2. Run **QuickTune**, connect the USB cable to the computer's USB interface and start the device recognition process.
3. Click on the **Read Device** button and proceed with the configuration.

More information can be found in the software manual, also available on **NOVUS'** website.

10. SPECIFICATIONS

POWER SUPPLY:

Voltage: .... 100 to 240 Vac/dc, ±10 %, 50/60 Hz

Maximum consumption:..8 VA

OPERATING RANGE:............................. -40 to 90 °C (-4 to 194 °F).

ACEPTED SENSOR:...NTC, R25 = 10 kΩ, 1%, β25/85 = 3435 K 1%.

MEASUREMENT RANGE: .... 0.6 °C / 1.1 °F @ 25 °C (*).

Maximum sensor cable length..3 meters

WARM-UP TIME: ....20 minutes.

DIGITAL INPUT (DI): ....Dry Contact or NPN

OUTPUTS:

COMP:.. SPDT Relay, 1 HP 250 Vac

RES / FAN / LAMP: .... SPST-NO, 3 A 250 Vac

VOLTAGE SUPERVISOR:

Measurement range: ....90 to 250 Vac / 60 Hz

WI-FI CONNECTION: .... ESP32 module, protocol 802.11 b/g/n

.... Internal antenna

MOBILE DATA CONNECTION: ....GSM, LTE Cat M1,

.... and LTE Cat NB1/2

.... Internal antenna

USB INTERFACE: .... 2.0, CDC class, Modbus RTU protocol

START-UP: .....4 seconds after being connected to the power supply.

DIMENSIONS:...48 x 96 x 92 mm (1/8 DIN)

Panel cut-out: ....45.5 x 93.5 mm

Approximated weight:.. 250 g

FRONT PANEL:..IP65, PC UL94 V-2

HOUSING:..IP20, PA6 + 30 % FV, V-0

Ball pressure test temperature: .... Frontal: 75 °C (167 °F)

Support of the power terminals and outputs: ....125 °C (257 °F)

ENVIRONMENTAL CONDITIONS FOR INTALLATION:

Operating temperature: .... -10 to 50 °C (14 to 122 °F)

Relative humidity................................... Max. 80 % up to 30 °C

Maximum temperature of the assembly surfaces: .60 °C (140 °F)

For temperatures above 30 °C (86 °F), reduce by 3 % for each °C.

Indoor use, overvoltage category II (2500 V), pollution degree 2, altitude < 2000 m.

CERTIFICATIONS:

Anatel 21487-23-07089

FCC...ID: XMR201910BG95M3

FCC...IC: 10224A-2019BG95M3

According to IEC60730-1 / 60730-2-9.

(*) In evaluations of the Measurement Accuracy specification of the controller, you should consider the accuracy specification of the temperature sensor and the minimum time for auto heating.

10.1. ANATEL CERTIFICATION

This device is homologated by ANATEL, according to the regulated procedures for conformity assessment of telecommunications products, and meets the technical requirements applied.

This equipment is not subject to the protection from harmful interference and may not cause interference with duly authorized systems.

For more information, see the ANATEL website: www.gov.br/anatel.

10.2. FCC CERTIFICATION

It contains FCC ID: XMR201910BG95M3

It contains FCC IC: 10224A-2019BG95M3

This equipment has been tested and found to comply with the limits for a Class A digital device, pursuant to Part 15 of the FCC Rules. These limits are designed to provide reasonable protection against harmful interference when the equipment is operated in a commercial environment. This equipment generates, uses, and can radiate radio frequency energy and, if not installed and used in accordance with the instruction manual, may cause harmful interference to radio communications.

Any changes or modifications not expressly approved by the party responsible for compliance could void the user's authority to operate this equipment.

RF Exposure: A distance of 20 cm shall be maintained between the antenna and users, and the transmitter module may not be co-located with any other transmitter or antenna.

This device complies with part 15 of the FCC Rules. Operation is subject to the following two conditions: (1) This device may not cause harmful interference, and (2) this device must accept any interference received, including interference that may cause undesired operation.

11. WARRANTY

Warranty conditions are available on our website www.novusautomation.com/warranty.