Electron

Thermal Protection Relay – EP4-IoT

Manual.

INDEX

INTRODUCTION

The EP4 IOT **Thermal Protection Relay** was developed to simultaneously supervise up to 4 (four) temperature channels. It is used to protect and monitor dry transformers, motors, bearings, machinery, and industrial processes, as specified in the **ANSI table**. The **EP4 IOT** is a high precision and reliability instrument, controlling transformer ventilation (ON/OFF), alarms and shutdowns (TRIP), with timing options.

The EP4 IOT **Thermal Protection Relay** was built following strict quality standards and uses high-quality electronic components and state-of-the-art technology (SMD). Its hardware is designed to withstand harsh working conditions and can be installed directly in transformers, panels in power substation yards, offshore platforms and chemical industries. It meets the levels of demand, supportability and reliability established by the IEC, DIN, IEEE and ABNT standards.

With signal inputs, the **EP4 IOT** allows the connection of up to 4 PT100 temperature sensors (EN60751-DIN 43760) and up to 1 universal and configurable 2-wire 15 VDC active analog output, with a range of 0 to 1mA, 0 to 5mA, 0 to 10mA, 0 to 20mA, or 4 to 20mA. This output can be used to reflect the highest temperature recorded at the time. The analog output also has the SCAN function, which simultaneously reflects all the values of the temperature channels. This configuration can be carried out directly on the **EP4 IOT** dashboard or via the **EP4 IOT™ software** with **BLUETOOTH** or **USB connection.**

The EP4 IOT **Thermal Protection Relay** has a built-in **WiFi** modem with a built-in 3 dBi antenna. When **enabled by the user**, this feature allows the Internet connection. Once the connection is established, the **EP4 IOT** immediately makes the collected and measured data available on an **MQTT Broker Server**. This is accessible through the MONITRAFO.com monitoring platform, where users can easily sign up, choose the plan that best suits their needs, and set up projects with one or multiple substations or transformers.

This way, you get full control to monitor in real time all measured quantities, triggers, alarms, maintenance, transformer health status and much more. This can be done using the platform in any internet browser or through the MONITRAFO APP, available on the **Play Store** (Android) and the **App Store** (iOS).

The **EP4 IOT** uses the **MQTT** communication protocol, integrating with the **MONITRAFO.com** platform to enable complete online monitoring of your transformer. In addition, it integrates **ARTIFICIAL INTELLIGENCE TOOLS, MACHINE LEARNING, DATABASE, PROGRAMMABLE FUNCTIONS, CALCULATIONS AND NOTIFICATIONS, MAINTENANCE SCHEDULE.** In the event of a loss of internet connection, the **EP4 IOT** stores all measurements from the period when communication was unavailable. When the connection is restored, the data is sent to the **MONITRAFO.com** and stored in a database for querying, calculating, and more.

It is also possible to use the API available on the platform to integrate **EP4 IOT** with other platforms, such as **Azure, Google Cloud, AWS, IBM, SAP**, among others.

Thanks to the implementation of these advanced technologies, the **transformer becomes a smart device** capable of identifying changes in transformer behavior within its standard operating cycle and sending notifications via email, SMS, and apps whenever the system detects these abnormal variations. This provides you with a robust tool that significantly enhances your ability to make effective decisions.

In addition, the **EP4 IOT** Thermal Protection Relay also has an RS-485 digital output with Modbus-RTU protocol and DNP 3* (L1), which allows access to all parameters, including remote commands for real-time triggers using a SCADA supervisory. 3 independent temperature setpoints are available for each sensor and 4 relays, 3 isolated, independent and potential-free actuation relays (NO) that can be used for alarms, shutdowns (TRIP) and FAN activation (ventilation), and 1 isolated, independent and potential-free relay (NC) to indicate faults (watchdog).

The display mode is fully user configurable, allowing you to maintain the highest temperature on the display at the time, any of the temperatures selected by the operator or use the SCAN function that features a continuous scan of all temperature channels. The front indicator LEDs and the data communication port make it possible to identify the channel

that caused the alarm, shutdown or activation of the fans. All functions and parameterizations can be easily configured directly on the device panel or via the **EP4 IOT™** software with **BLUETOOTH** or **USB connection.**

The EP4 IOT Thermal Protection Relay is built in a high mechanical strength aluminum box, measuring 98x98x37mm, following DIN IEC 61554 standards for panel fixing.

KEY FEATURES

Communication Protocols

- MQTT – TLS/SSL - WIFI
- DNP3 – Level 1 (SERIAL)
- DNP3 – Level 1 (TCP/IP) - WIFI
- Modbus-RTU (SERIAL)
- Modbus-RTU (TCP/IP) - WIFI

Communication Ports

- **Built-in WIFI modem**
  - Padrões 802.11 b/g/n/e/i;
  - WPA/WPA2/WPA-Enterprise security protocol;
  - AES/RSA/ECC/SHA encryption;
  - Data rate up to 150 Mbps;
  - 3 dBi (isotropic decibel) recessed antenna
  - Transmit Power up to 21 dBm (decibel milliwatt);
- **Bluetooth**
  - Class 2 – 2.5 mW (4 dBm);
  - FIPS encryption;
  - Version 4.2 BR / EDR and BLE (Low Energy);
- **USB**
  - Version 2.0;
  - Transfer rate 480Mbps;
  - Type-C connector
- **RS 485**
  - ANSI/TIA/EIA-485-A standard;
  - Max. 32 equipments;
  - Half duplex;
  - Multipoint;
  - Max. distance 1,200 meters;
  - 2 metallic wires;
  - Auto speed from 1,200 to 57,600 bps

Dimensions and Power

- Compact Equipment with a depth of 37mm;
- Universal Power Supply 24-275 Vdc / Vac;

Human Machine Interface (HMI)

- Red high-brightness numeric display with 3 digits;
- Simultaneous indication of the 4 monitored temperatures;
- 4 Navigation keys;
- 13 LED's on the front for event indications;
- Intuitive menus for consultation and parameterization

Measurement Input

- 4 inputs for temperature measurement with PT100 3-wire sensor (EN60751-DIN43760);
- 0.5% Accuracy (FS)
- Temperature measurement range 0ºC to 200°C;

Digital Relay Outputs

- 01 Relay (NAF) with a capacity of 10 amperes for Temperature Alarm;
- 01 Relay (NAF) with a capacity of 10 amperes for FAN (cooling);
- 01 Relay (NAF) with a capacity of 10 amperes for TRIP (shutdown);
- 01 Relay (NAF) with a capacity of 10 amperes for Fault Indication (watchdog);
- Intuitive menus for consultation and parameterization.
-

Analog Output

- 01 Analog Output (Active 15Vdc) from 0 to 1mA, 0 to 5mA, 0 to 10mA, 0 to 20mA or 4 to 20mA user configurable;

TIPO trials met

- Applied Voltage (IEC 60255-5): 2kV / 60Hz / 1 min. (against land);
- Voltage Impulse (IEC 60255-5): 1.2/50 μsec. / 5kV / 3 sec. and 3 sec. / 5 sec. Interval;
- Electrostatic Discharges (IEC 60255-22-2): Air mode = 8KV / Counted mode = 6 KV;
- Immunity to radiated electromagnetic disturbance (IEC61000-4-3): 80 to 1000 MHz / 10V/m;
- Immunity to Fast Electrical Transients (IEC60255-22-4): Alim/Input/Outputs=4KV/common 2Kv;
- Imunity to Surtos (IEC60255-22-5): phase/neutral 1KV, 5 by polar (±) – phase-earth/neutral-earth 2KV, 5 by polar (±);
- Immunity to conducted Electromagnetic disturbances (IEC61000-4-6): 0.15 to 80 MHz / 10V/m;
- Climate Test (IEC60068-21-14): – 40°C + 85°C / 72 hours;
- Vibration Resistance (IEC60255-21-1): 3 axes / 10 to 150Hz / 2G / 160min/axis;
- Vibration Response (IEC60255-21-1): 3-axis / 0.075mm-10 at 58 Hz / 1G from 58 to 150 Hz / 8min / axis.

TECHNICAL DATA

THERMAL PROTECTION RELAY EP4-IoT	
Operating Voltage	24 a 275 Vcc/Vca 50/60 Hz

Operating Temperature	-40ºC to + 85ºC
Power Consumption	< 15 W
Temperature Measurement Input	Rated 4 Sensors - PT100 Ohm at 0°C, 2 and 3 fios **(EN 60751 - DIN 43760)**
Measurement Range	0ºC to 200ºC
Active Analog Output 15Vdc and Maximum Load.	0 ... 1mA - 8000 Ohms
	0 ... 5mA - 1600 Ohms
	0 ... 10mA - 800 Ohms
	0 ... 20mA - 400 Ohms
	4 ... 20mA - 400 Ohms
Maximum Measurement Input Error	0.5% end of scale
Maximum Analog Output Error	0.5% end of scale
Outgoing Contacts	4 (NAF) – Potential Free
Maximum Switching Power	70 W / 250 VA
Maximum Switching Voltage	250 Vac/125Vdc
Maximum Driving Current	10 Amps
Front Communication Port	USB 2.0 - Type-C connector
Serial Communication Port	RS 485 – 2 fios (ANSI/TIA/EIA-485A)
WI-FI	Padrões b/g/n/e/i
	WPA/WPA2/WPA-Enterprise;
	Up to 150Mbps data rate
	3dBi recessed antenna
	Up to 21dBm Transmit Power
Bluetooth	Version 4.2 BR/EDR and BLE (Low Energy)
Communication Protocol	Modbus RTU, Modbus TCP (WI-FI), DNP3 L1, DNP3 L1 – TCP (WI-FI) e MQTT TLS/SSL – (WIFI)
Auto Baud Rate	1,200 to 57,600bps
IEC 61554 DIN Box	98 x 98 x 37 mm or 98 x 98 x 57 mm
Fixation	Panel Door with Steel Clip
Protection	IP40 (Front), IP 20 (Connectors)

Table 1 – Technical Data of the EP4-IOT Thermal Protection Relay

DIMENSIONS AND CONNECTION DIAGRAM

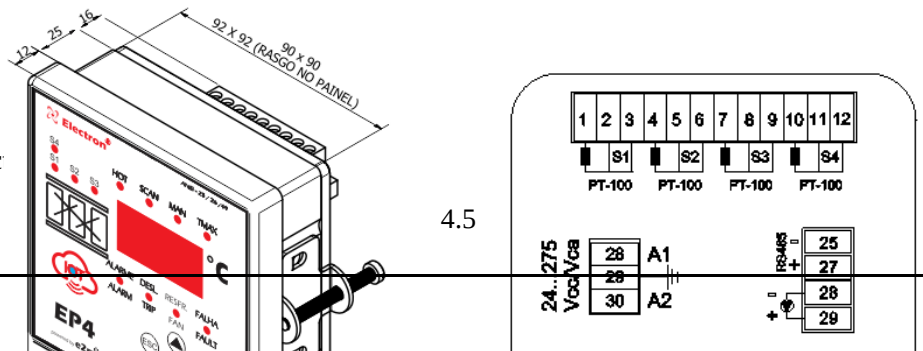
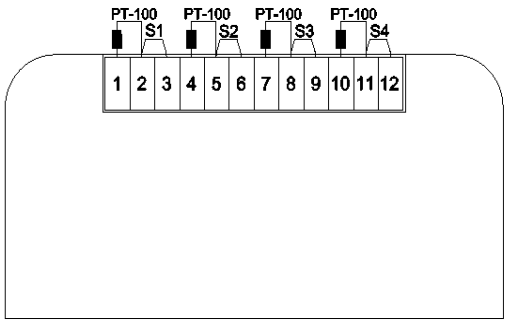


Fig. 1 – EP4-IoT Dimensions Fig. 2 – EP4-IoT IoT Connection Diagram



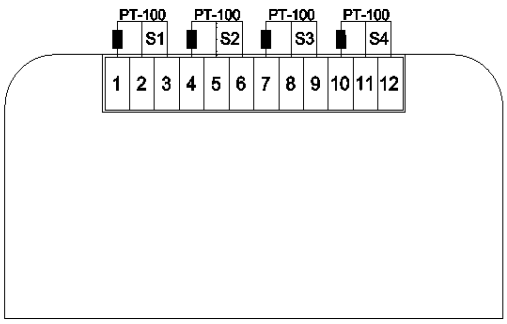


Fig. 3 – Diagram 2-wire connection sensors Fig. 4 – Diagram 3-wire connection sensors

APPLICATION EXAMPLE

Fig. 5 – Example of Application sending data to MONITRAFO.com

OPERATION CHART

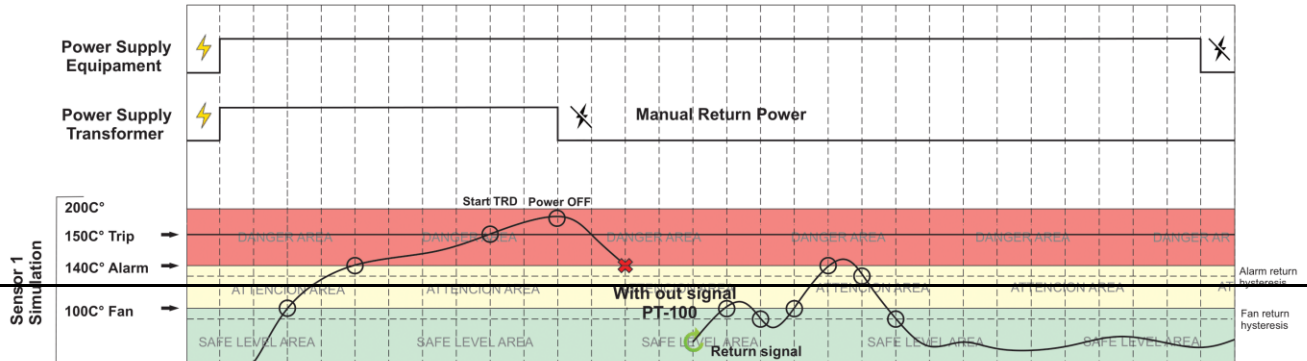


Fig. 6 – Operation Chart

PREVENTIVE MAINTENANCE

PREVENTIVE AND CORRECTIVE MAINTENANCE		
Items to be checked preventively	**Verification Frequency**	**Corrective action**

SHARE	Verification Elements	ACTIVITIES	Every Month	Every 3 Months	Every 6 Months	Every 1 Year	When Needed
VERIFICATION	Fastening clip and snapping to the rail	Fixing to the panel door or panel bottom		X			Retightening, Fitting, Terminal Change, or Screw Change
	Terminal blocks and connector pente	Attachment and attachment to equipment		X			
		Tightening of the screws in the fastening of the conductors		X			
	Sensors	Integrity / Positioning / Fastening			X		Replacement, repositioning and/or fixing of sensors
	Sensor well in oil transformers	Oil level in the well			X		Oil filling to indicated level
TESTS & MEASUREMENTS	Relays and Digital Outputs	Individual drive test			X		Forward to Electron do Brasil technical assistance
	Led's e Displays	Test Triggering Led's and Display Segments			X		
	Navigation buttons	Navigation test of the navigation buttons			X		
	Sensor Input	Gauge sensor inputs using a standard				X	
	Input voltage of equipment supply	Measure Supply Input Voltage			X		Override voltage input values according to equipment model
	RS-485 Communication Outputs	Communication and command testing in the supervisory system			X		Forward to Electron do Brasil technical assistance
	Milliampere running Sinal inputs	Measure, compare and measure input signal in passive and/or active mode			X		
	Signal Outputs of milliampere current	Measure, compare and measure input signal in passive and/or active mode			X		
CLEANING	Terminal blocks and connector comb and connection box	Debris, Impurities and Moisture	X				Cleaning with a dry cloth, compressed air and vacuum cleaner
	Aluminum Equipment Enclosure		X				
	Front of the Equipment Display		X				
ATENÇÃO	**1 - Keeping the equipment within the ideal working temperature (50°C to 60°C) extends the useful life and avoids corrective maintenance.** **2 - The accumulation of dust and impurities in the facilities can cause short-circuiting and burning of equipment and sensors.** **3 - After 10 years of use, it is recommended to replace the equipment.**						

Table 2 – Preventive maintenance

INSTALLATION ACCESSORIES

Electron do Brasil has a line of accessories that can be purchased together aiming to offer a complete solution to meet your application with practicality. We have listed some of the main accessories that can be used for EP4-IoT operation.

PT-100 STFE Temperature Sensor: This sensor can be constructed with silicone, stainless steel, or Teflon bulb. With electrical insulation capacity options of 2 kV, 10 kV or 15 kV. The PT-100 STFE temperature sensor has as its measurement principle to evaluate the variation of electrical resistance with temperature using the temperature coefficient of pure platinum (0.385 Ohm/K), according to IEC 751 (DIN 43760). Ideal for temperature monitoring of windings of dry-type transformers due to its high precision and quality of materials, the PT-100 3-wire sensor is widely used in the market, as it greatly reduces the possibility of measurement error due to the compensation principle of the third terminal of the sensor.

Link da página do sensor de temperatura PT100 STFE da Electron:
https://electron.com.br/site/produtos/rtd-pt100-2/

PT-100 STE Temperature Sensor: This sensor is constructed of AISI-304 stainless steel bulb, injected aluminum pumphead (IP 65) and adjustable gland with 3/4" and 1/2" BSP threads, or can be manufactured according to design. Its measurement principle is to evaluate the variation of electrical resistance with temperature using the temperature coefficient of pure platinum (0.385 Ohm/K), according to IEC 751 (DIN 43760). Ideal for installations subject to weather and electrical disturbances for temperature monitoring of transformers and machines that require high measurement accuracy in environments subjected to electrical noise and weather. The PT-100 3-wire sensor is widely used in the market, as the possibility of measurement error is greatly reduced due to the compensation principle of the third terminal of the sensor.

Link da página do sensor de temperatura PT100 STFE da Electron:
https://electron.com.br/site/produtos/rtd-pt100/

Double door panel for outdoor/outdoor use: Box for outdoor use with double port for mounting instruments, accessories and passing control wires and power of the power transformer. The external door contains a glass display with UV protection for viewing the quantities measured by the temperature monitor and the panel contains special paint that is resistant against weather and its degree of protection is IP 55, as per NBR IEC 60529:2017.

Link da página do painel de porta dupla para uso externo – IP 55:
https://electron.com.br/site/produtos/painel-para-uso-externo-ip55/

PT-100 signal reference card: This accessory was developed to verify the temperature value displayed by equipment with PT-100 3-wire RTD sensor input. It consists of precision resistors that send an equivalent fixed and constant resistance signal for selection between 3 different ranges, 0 °C (100 Ohms), 26 °C (110.9 Ohms) and 200 °C (175.86 Ohms).

Link da página do Cartão Referência para sinal de PT-100:
https://electron.com.br/site/produtos/

SPECIFICATIONSFOR ORDER

- Temperature Monitor for Dry Type Transformer model : ***EP4-IOT***

GETTING TO KNOW EP4 IOT

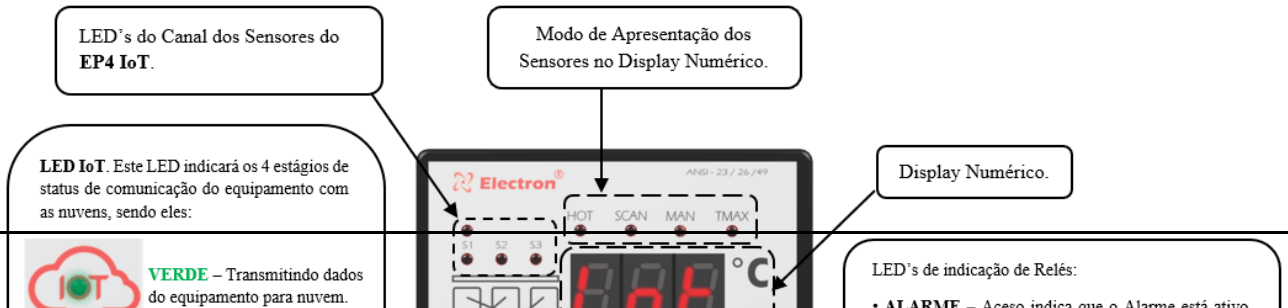
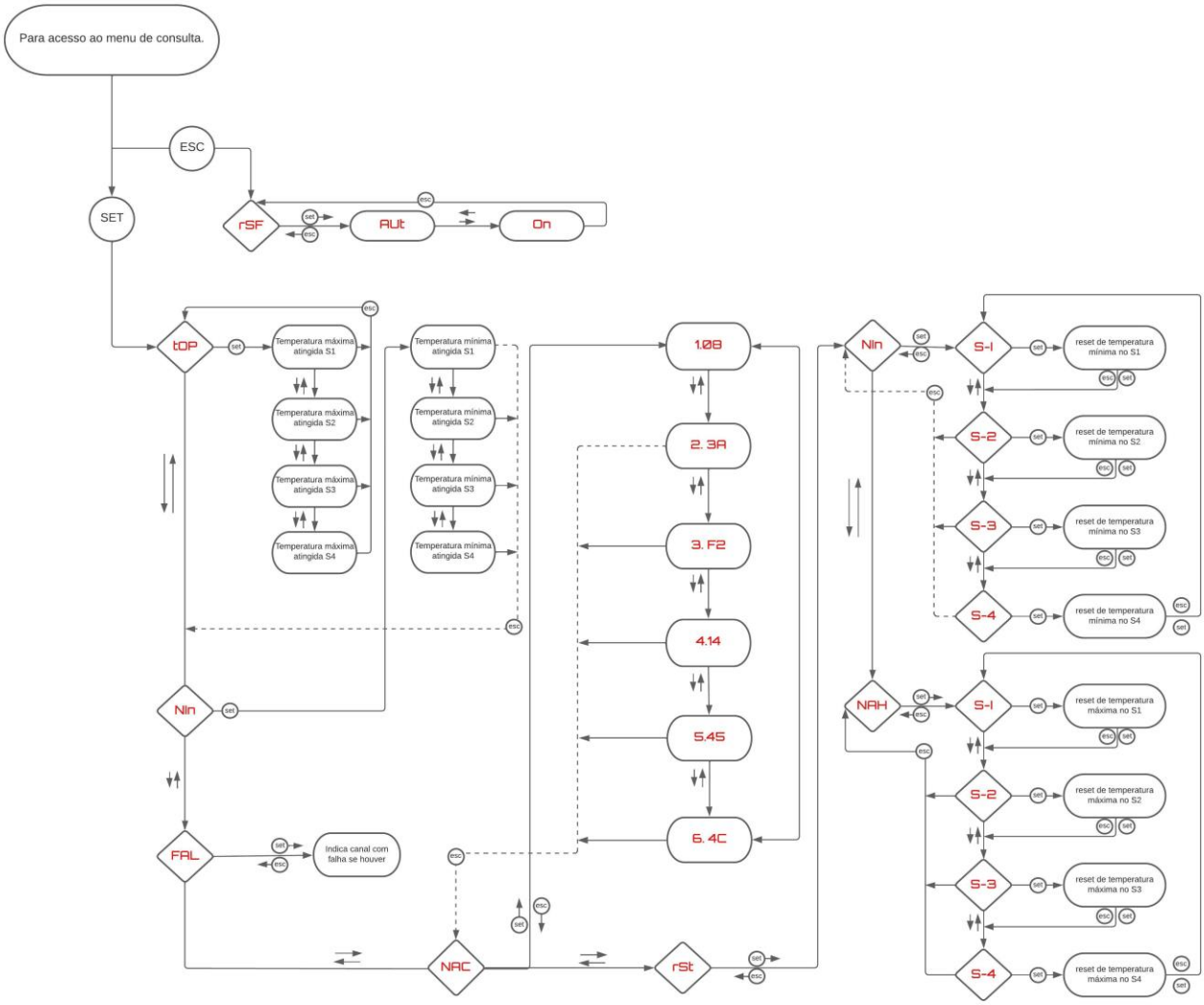


*Fig. 8 – Front **EP4-IoT** with serial input.*

QUERY MENU FLOWCHART

In the query and parameterization menu, use the **SET** key to confirm, the **ESC** key to go back/out, and the increment and decrement keys" ˅ ˄ to navigate.



CONSULTATION MENU

To enter the query menu, press the "**SET**" key. For better navigation in the query menu, use the "Increment and decrement" keys, press "**SET**" to enter the menu and set parameter and the "**ESC**" key to return to the previous menu and without changing the parameter.

→ Menu to view the maximum temperature reached		
Menu	**Parameter**	**Description**
top	**S1** to S4	Use the increment and decrement keys to select the desired sensor and view its maximum temperature.

→ Menu to view the minimum temperature reached		
Menu	**Parameter**	**Description**
Nin	**S1** to S4	Use the increment and decrement keys to select the desired sensor and view its minimum temperature.

To access the menu (RSF) Press the "ESC" button.

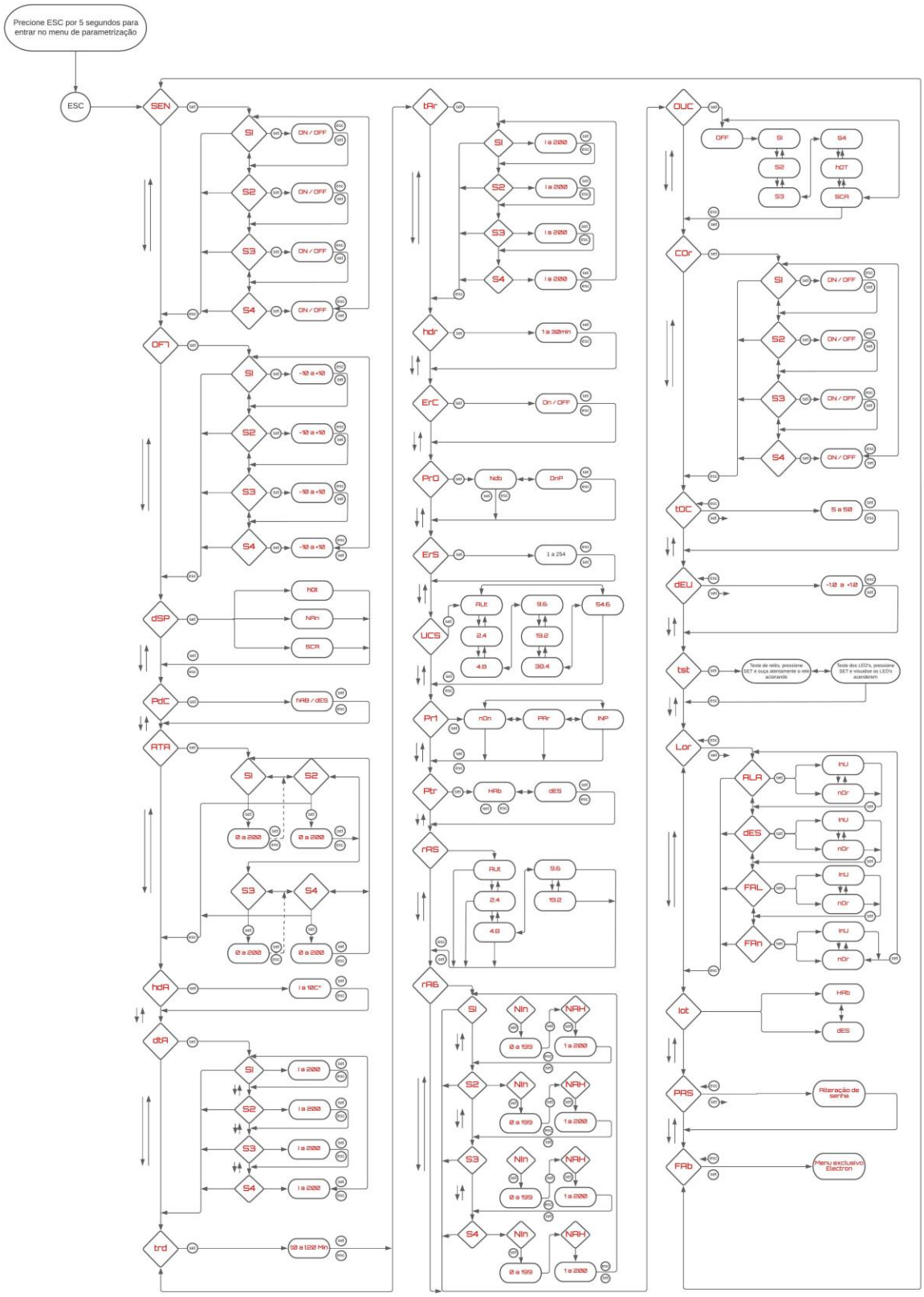
→ Menu to view which temperature channel is failing		
Menu	**Parameter**	**Description**
FAL	**S1** to S4	The display will display which temperature channel is showing the fault reading.

→ MAC Adress ID Menu	
Menu	**Description**
NAC	Displays the MAC number of the equipment that identifies your network card.

→ Menu de reset	
Menu	**Description**
rSt	Press SET for the equipment to reset the recorded value of max and min temperature;
NOTE: When deleting the current maximum and or minimum values, the current record automatically becomes the memorized value	

→ Menu to enable/disable forced ventilation		
Menu	**Parameter**	**Description**
rSF	**Hab**	Enables forced ventilation.
	des	Disables forced ventilation.

CONFIGURATION FLOWCHART


Precione ESC por 5 segundos para entrar no menu de parametrização
ESC
SEN
S1
S2
S3
S4
ON / OFF
OF1
-10 a +10
hOt
dSP
nAn
SCR
PdC
nAB / dES
ATA
0 a 200
hdA
1 a 180°
dtA
1 a 200
trd
10 a 120 Min
tAr
1 a 200
hdr
1 a 30min
ErC
On / OFF
PrO
Ndb
OnP
ErS
1 a 254
UCS
AUt
9.6
19.2
38.4
54.6
2.4
4.8
Pr1
nOn
FAr
INP
Ptr
HAb
dES
nAS
nA6
NIn
NAH
0 a 199
1 a 200
OUC
OFF
HOT
SCR
COr
tOC
5 a 50
dEU
tst
Teste de relés, pressione SET e ouça atentamente o relé acionando
Teste dos LED's, pressione SET e visualize os LED's acendendo
Lor
ALA
FAL
FAn
InU
nOr
Iot
HAb
dES
PAS
Alteração de senha
FAb
Menu exclusivo Electron

PARAMETERIZATION MENU

→ Shutdown Delay Time Menu	
Menu	**Description**
trd	Set a value to trigger the TRIP relay between 0 to 20 minutes.
NOTE: When any sensor reaches the temperature set by the "dtA" the TRIP LED on the front of the equipment starts flashing indicating that TRIP has started counting for shutdown, as soon as the time runs out, the TRIP relay is activated and the LED on the front of the equipment will be on flashing.	

→ Menu to view the maximum temperature reached		
Menu	**Parameter**	**Description**
Sen	**S1** to S4	Menu to enable or disable the temperature channel for sensor reading (On/OFF).

→ Refrigeration Drive Temperature Menu		
Menu	**Parameter**	**Description**
tar	**S1** to S4	Set temperature for FAN activation in the 4 temperature channels.
NOTE: When any sensor reaches the set temperature, the FAN relay is activated and the FAN LED on the front of the equipment lights up indicating that the FAN is active.		

→ Temperature channels display mode		
Menu	**Parameter**	**Description**
Dsp	**Hot**	Viewing the channel with the highest temperature;
	In	Viewing temperature channels manually;
	SCA	Scan mode that checks all temperature channels.

To access the configuration menu, press the "**ESC**" key for approximately 5 seconds. For better navigation in the query

→ Menu to increment or decrement temperature display values		
Menu	**Parameter**	**Description**
OF7	**S1** to S4	Set between (-10 and +10) to increment or decrement values in the temperature display.

menu, use the "Increment and decrement" keys, press "**SET**" to enter the menu and set parameter and the "**ESC**" key to

→ Menu to enable/disable decimal place on sensor reading		
Menu		**Description**
PdC	**Hab**	Enables decimal place in sensor reading;
	des	Disables decimal place on sensor reading.

return to the previous menu and without changing the parameter.

→ High temperature alarm menu		
Menu	**Parameter**	**Description**
Minutes	**S1** to S4	Set temperature for alarm activation in the 4 temperature channels.
NOTE: When any sensor reaches the set temperature, the ALARM relay is activated and the ALARM LED on the front of the equipment starts flashing indicating that the alarm is active.		

→ Alarm Off Hysteresis Menu	
Menu	**Description**
Hda	Set the time for the alarm to turn off between 0 to 10 degrees.
NOTE: When the temperature drops between 0 to 10 degrees in relation to the temperature parameterized in "AtA" the ALARM relay will deactivate and the LED ALARM will turn off.	

→ High Temperature Shutdown Menu		
Menu	**Parameter**	**Description**
dtA	**S1** to S4	Set temperature for TRIP activation on the 4 temperature channels.
NOTE: When any sensor reaches the configured temperature, the TRIP LED on the front of the equipment starts flashing indicating that TRIP has started the countdown for shutdown defined in the "trd" menu, as soon as the time runs out, the TRIP relay is activated and the LED on the front of the equipment will be on flashing.		

→ Menu for parameterization of communication speed		
Menu	**Parameter**	**Description**
ErS	**Aut**	Automatic;
	2.4	2.400;
	4.8	4.800;
	9.6	9.600;
	19.2	19.200;
	38.4	38.400;
	54.6	54.600.
NOTE: Important menu for communication via RS485.		

→ Communication parity parameterization menu		
Menu	**Parameter**	**Description**
In	**Not**	No;
	By	By;
	INP	Odd.
NOTE: Important menu for communication via RS485.		

→ Cooling Hysteresis Menu	
Menu	**Description**
Hdr	Set Hysteresis Value for FAN Relay Trigger Between 0 and 6 Degrees
NOTE: When the value set in the "tAr" menu declines the value set in this menu, the FAN relay will deactivate and the FAN LED will turn off.	

→ Cooling Hysteresis Menu		
Menu	**Parameter**	**Description**
ERC	**ON**	Enables forced ventilation exercise
	OFF	Disables forced ventilation exercise
NOTE: After 1 minute of the confirmation of programming in "ON" the ventilation exercise will be activated for the first time for 5 minutes (FAN LED flashing), this cycle will be repeated every 24 hours interval after the first activation. If the equipment is de-energized, the cycle will be repeated.		

→ Menu to select communication protocol		
Menu	**Parameter**	**Description**
Pro	**Ndb**	Enables communication protocol in ModBus RTU;
	dnP	Enables communication protocol in DNP 3.0.
NOTE: Important menu for communication via RS485.		

→ Menu for serial network parameterization	
Menu	**Description**
Ers	Select the serial network address
NOTE: Important menu for communication via RS485.	

→ Current Output Menu		
Menu	**Parameter**	**Description**
Colour	**S1aS4**	**ON** - Enables current output;
		OFF – Disables current output.

→ Current Output Menu	
Menu	**Description**
Ocd	Parameterization menu to configure the time (seconds) of stabilization of the analog output, when using the "**OUC**" menu in "**SCA**" mode.

→ Parameter Recording Protection Menu		
Menu	**Parameter**	**Description**
Ptr	**Have**	Enables parameter write protection;
	some	Disables parameter write protection.

→ Menu to set the scale on the current output		
Menu	**Parameter**	**Description**
Gave	**4.2**	4a20mA;
	0.2	0a20mA;
	0.1	0a10mA;
	0.5	0a5mA;
	0.1	0a1mA.

→ Menu adjustment display current output

Menu	**Description**
Gave	Set a display correction value of the read current value between -10 and +10.

NOTE: Check if the "rAS" menu, the "rAG" menu and the "OUC" menu are correctly parameterized.

→ Current Output Range Menu		
Menu	**Parameter**	**Description**
Rag	**S1aS4**	Set maximum and minimum current output range to mirror read temperature.

→ Led's e Reles Test Menu

Menu	**Variable**	**Description**
Tst	Led's	Press "SET" and observe the LED's lit up;
	Cheap	Alarm – Press "SET" and hear the relay actuate;
		Trip – Press "SET" and hear the relay actuate;
		Fault – Press "SET" and hear the relay actuate;
		Fan – Press "SET" and hear the relay actuate.

→ Mirrored channel menu on analog output

Menu	**Parameter**	**Description**
OUC	**OFF**	Disable the analog temperature transmission output;
	S1	Enables sensor temperature 1 on analog output;
	S2	Enables sensor temperature 2 on analog output;
	S3	Enables sensor temperature 3 on analog output;
	S4	Enables sensor temperature 4 on analog output;
	Hot	Enables higher temperature on analog output;
	SCA	Enables the mirroring of the analog output in scan mode, to enable the sensors see the "iot" menu. And setup presentation time in the "tOC" menu.

NOTE:
Be very careful with the relay test because they can cause Trafo to shut down if they are connected to the system.

→ Relay Trigger Logic Menu			
Menu	**Parameter**		**Description**
Lor	**WING**	**nOr**	Initial conditions of the "Normal" relay.
		InU	Initial conditions of the "Inverse" relay.
	des	**nOr**	Initial conditions of the "Normal" relay.
		InU	Initial conditions of the "Inverse" relay.
	FAL	**nOr**	Initial conditions of the "Normal" relay.
		InU	Initial conditions of the "Inverse" relay.
	FAN	**nOr**	Initial conditions of the "Normal" relay.
		InU	Initial conditions of the "Inverse" relay.
NOTE: This menu interferes with the direct operation of the equipment.			

→ Menu to Enable Wi-Fi Communication		
Menu	**Parameter**	**Description**
Iot	**Hab**	Enables communication via Wi-Fi;
	des	Disables communication via Wi-Fi.

→ Menu for Password Change	
Menu	**Description**
PAS	Set the new password.

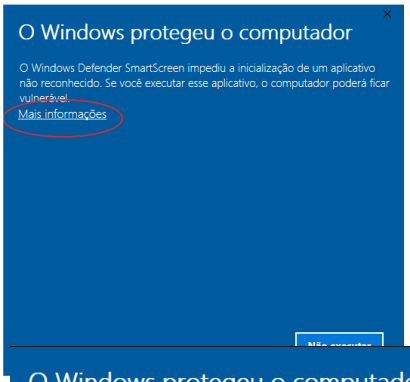
→ Menu Electron	
Menu	**Description**
Fab	Exclusive menu for Electron

DOWNLOAD DO SOFTWARE EP4 IOT NO WINDOWS 10

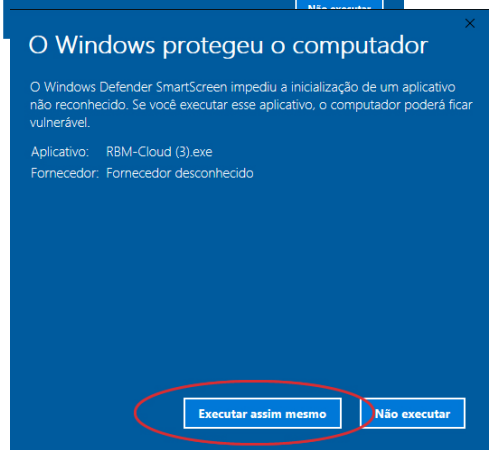
2) After downloading the application, run the file '**EP4 IOT-IoT.exe**'.

IMPORTANT: Allow your browser or your anti-virus for a few minutes to complete the download. The same procedure must be repeated when running the file because some anti-viruses or even Windows Defender block functions of our software.

If you are using Windows 10, the same windows should appear on your computer requiring the appropriate permissions to continue and access our application. Our applications and files are completely safe and free from malicious resources.

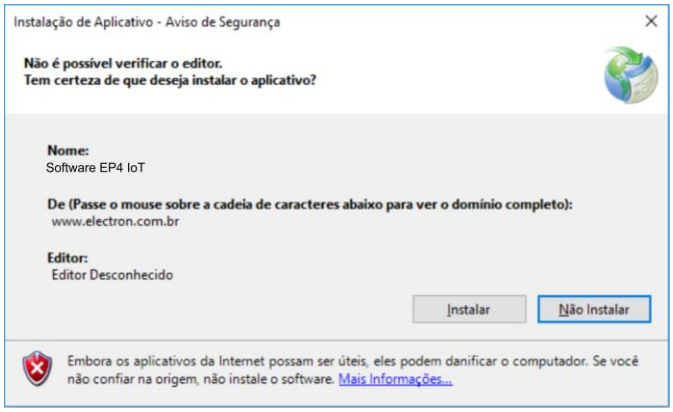


3) If this window has appeared on your computer, click on the underlined "**More information**" option and then, proceed to step 4.

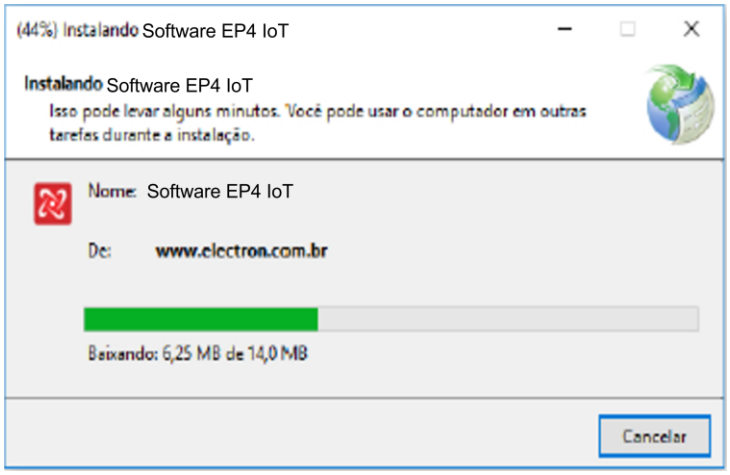


4) Now click on the 'Run Anyway' button allowing the features of our application to be accessed.

EP4 IOT SOFTWARE INSTALLATION ON WINDOWS 10



5) In this step, click on the "**Install**" *button.*



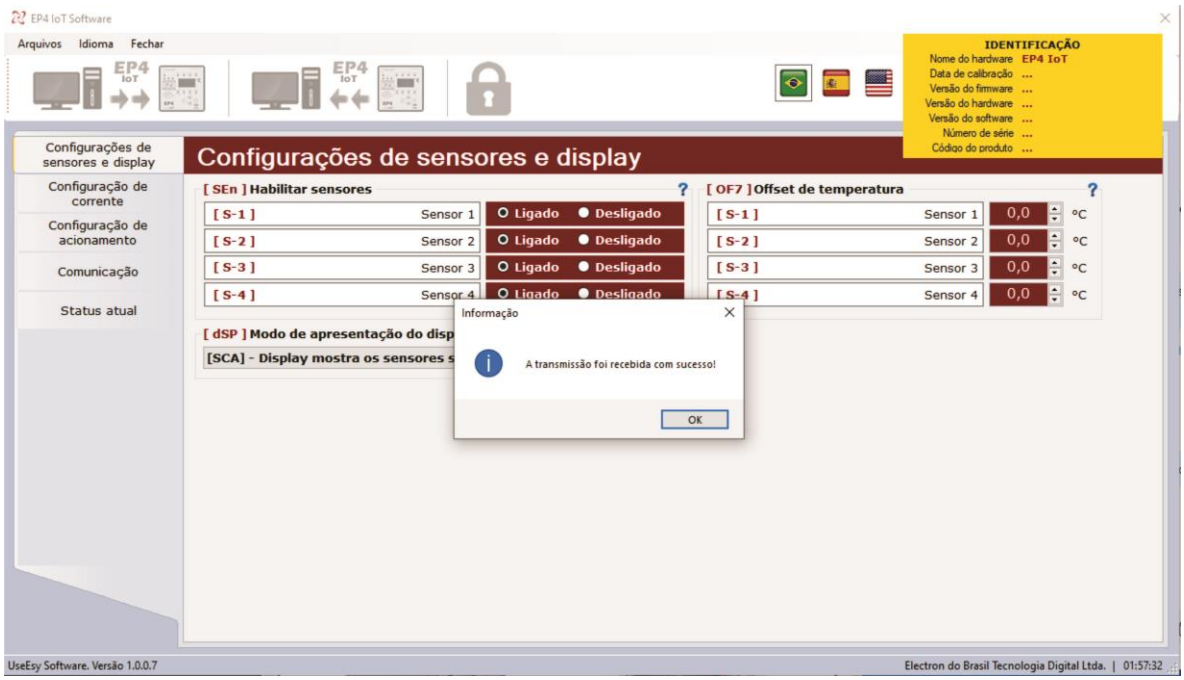
6) Aguarde a finalização do término do download.

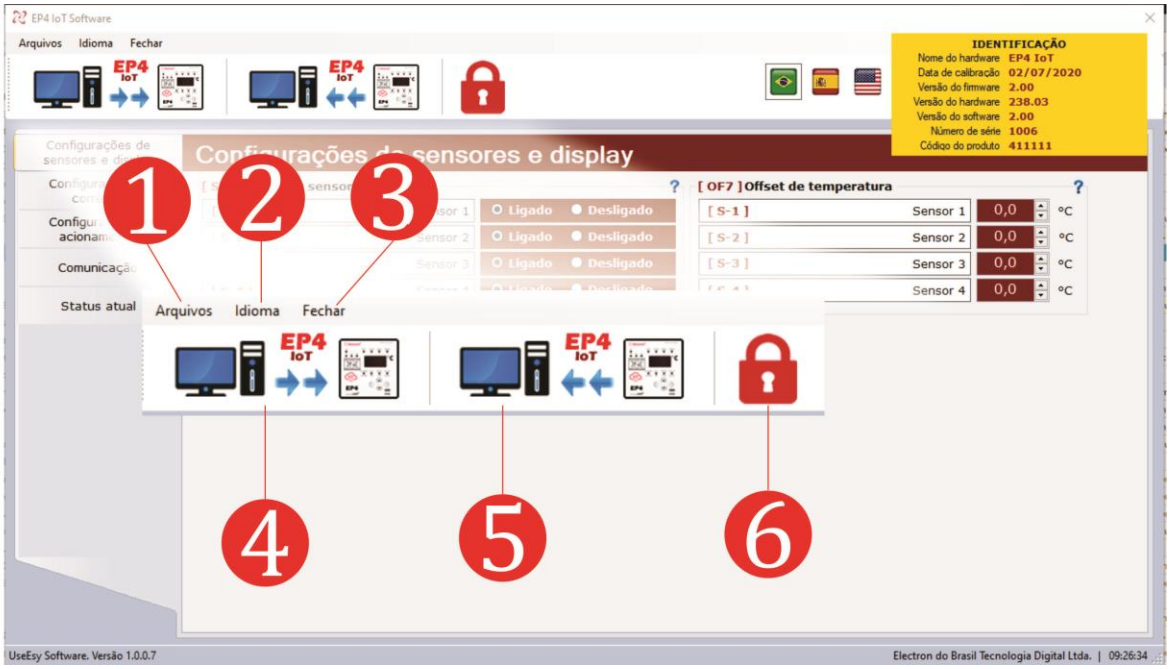
CONFIGURING OR EP4 IOT VIA SOFTWARE

Connect your EP4 IOT IoT equipment using the micro-B USB cable: After plugging it into your equipment, plug the USB end into a computer or notebook so that the software can identify it.

When you connect the machine, the software will display an Information window with the following message: **The broadcast was successfully received"**, as shown in the figure below. Click **OK**.

Note that the settings options at the top of the software that were previously unavailable will be available for the configuration of the equipment.





1 – Archives

Open parameters file...

Allows you to open a file of parameters of the EP4_IOT equipment in the software.

Save parameters file...

Exports the current parameters of your equipment by creating a file in the format . EP4_IOT.

Print the EP4 Parameter Values IOT_IoT.

Allows printing with the parameters of the equipment.

2 – Languages

Portuguese – Standard

Define the software with the Portuguese language.

Spanish

Sets the software to the Spanish language.

English

Sets the software to the English language.

3 – Date or software

Date or software.

4 – Send parameters

Sends parameters from the equipment to the Software.

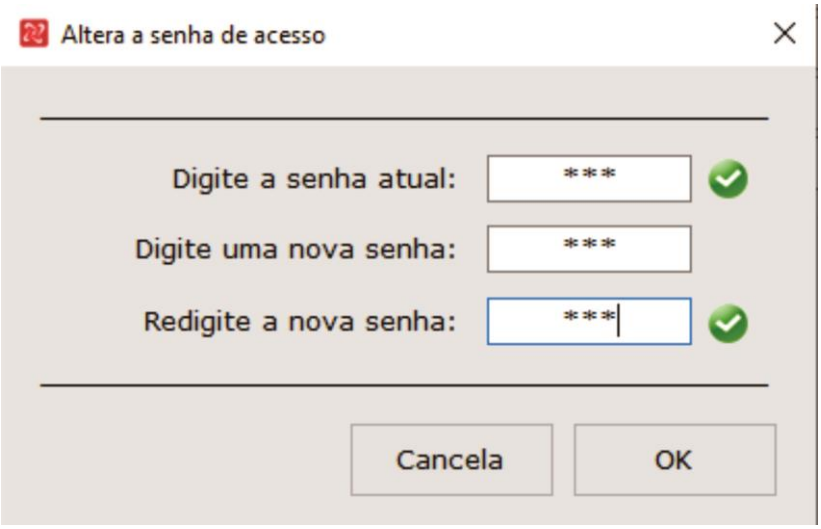
NOTE: A window will appear asking for the password, by manufacturing default, the password is 0000. If the password entered is incorrect, no parameter will be sent to the Software.

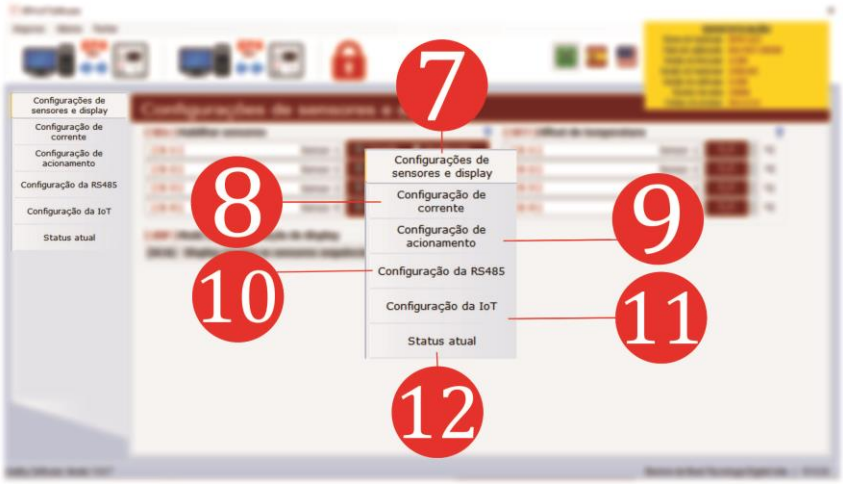
5 – Receive parameters

Receives parameters from the equipment in the Software.

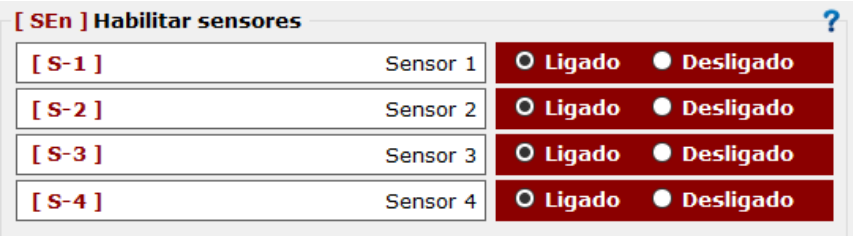
6 – Change access password

Change your passkey to a new passcode. To do this, enter the current password and in the following fields, enter your new password and click on the OK button, as illustrated in the figure below.





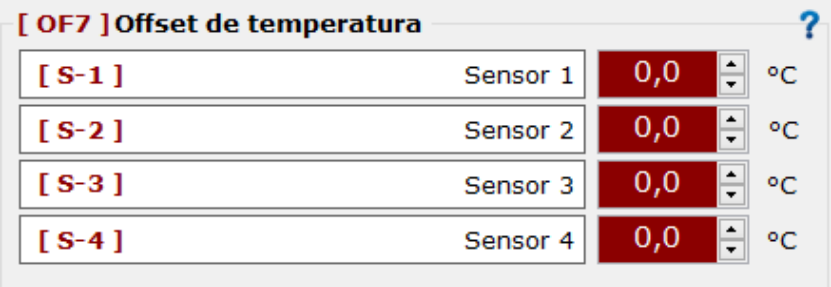
7 – Drive settings



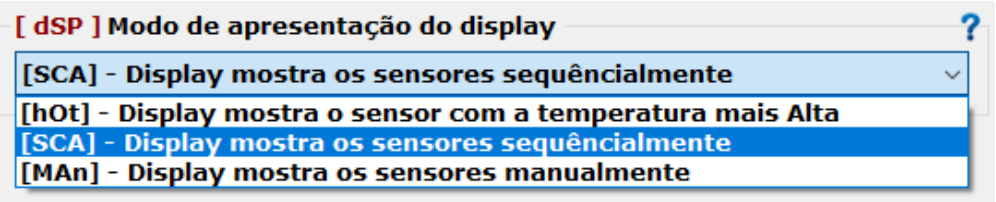
[SEn] Enable Sensors:

On: Sensor readout enabled

Off: Sensor readout disabled



[OF7] Temperature Offset: Allows you to make a correction in the measurement of the sensors by adding or subtracting temperature values.



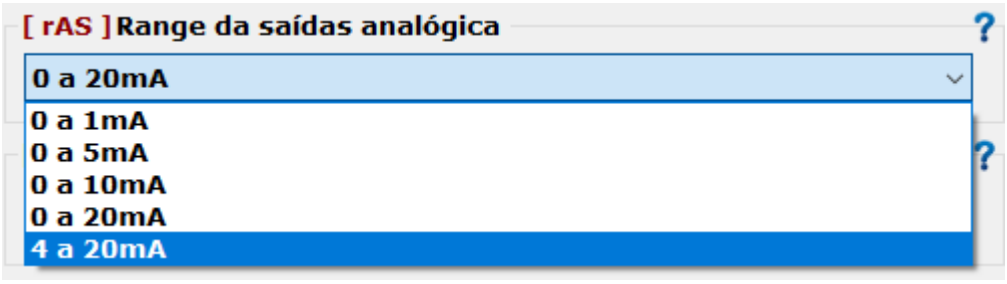
[dSP] Display Display Mode: Select one of the 3 temperature display modes on the EP4 – IoT display, namely:

[hOT] – The display will display the sensor that is registering the highest temperature;

[SCA] – The display will display the temperature of each sensor sequentially;

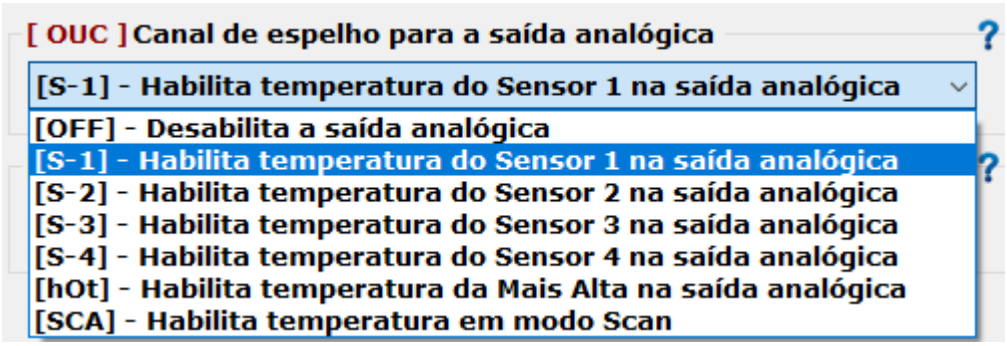
[MAn] – The display will display the temperature of the sensor by manually selecting the increment and decrement keys

8 – Current Configuration:



[rAS] Analog Output Range:

Menu for choosing the current output range value



[OUC] Mirror Channel for Analog Output: Menu to adjust the channel you want to transmit to the analog output, including:

[OFF] disables analog temperature transmission output

[S-1] enables Sensor 1 temperature;

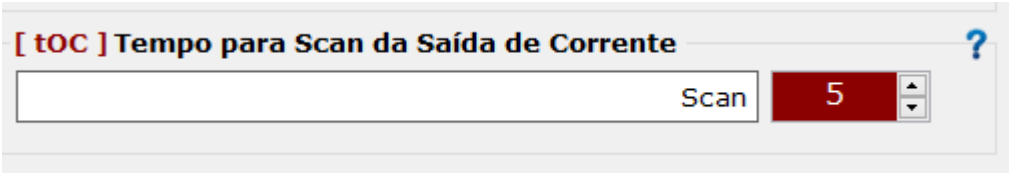
[S-2] enables Sensor 2 temperature**;**

[S-3] enables Sensor 3 temperature**;**

[S-4] enables Sensor 4 temperature;

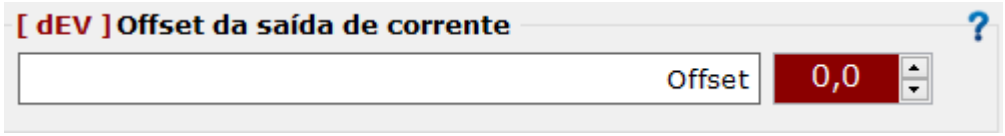
[hOt] enables higher temperature on analog output;

[SCA] enables the display of the temperature of all sensors on the analog output;

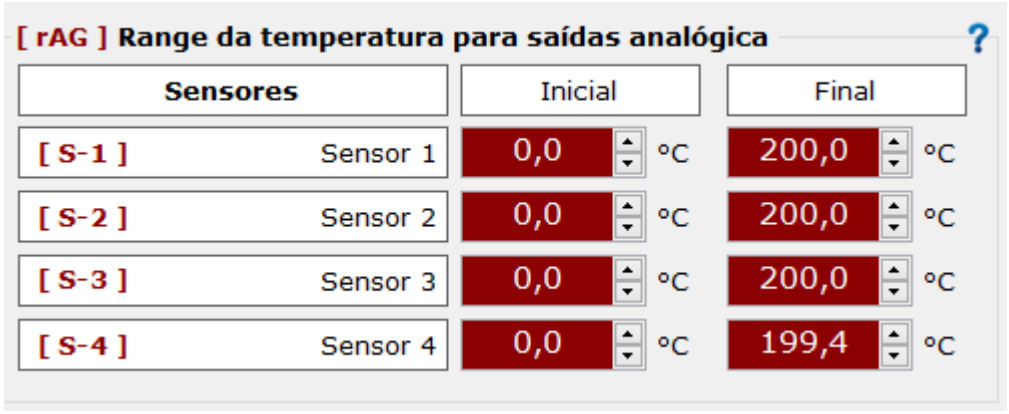


[tOC] Mirror Channel for Analog Output:

Select the scan time of the analog output channels.



[dEV] allows you to make correction to the current output, adding or subtracting the desired value.



[rAG] select the maximum and minimum temperature value of each sensor to be mirrored to the analog outputs.

9 – Drive Configuration:

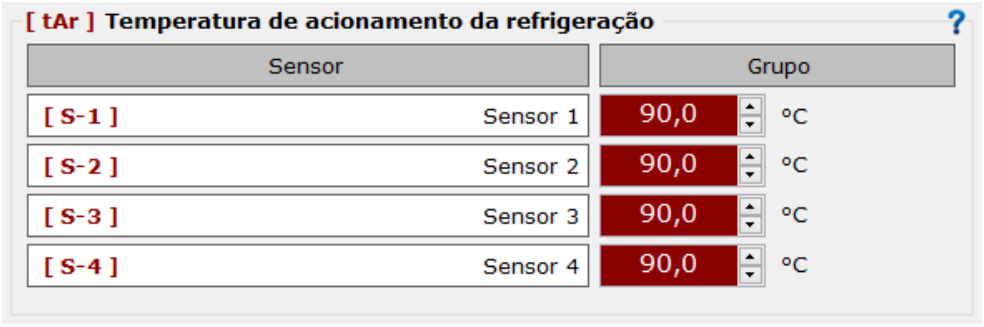
[LOr] Logic of the activation of the Alarm: Menu to choose the initial conditions of each Relay.

[AtA] Select between "Reverse" and "Normal" the initial conditions for triggering the Alarm Relay;

[dES] Select between "Reverse" and "Normal" the initial conditions for triggering the Shutdown Relay;

[FAn] Select between "Reverse" and "Normal" the initial conditions for triggering the Fault Relay;

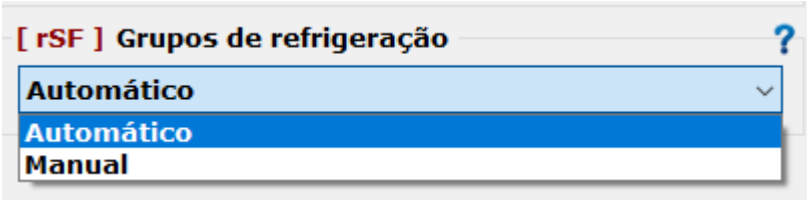
[FAL] Select between "Reverse" and "Normal" the initial conditions for triggering the Relay of the cooling group;



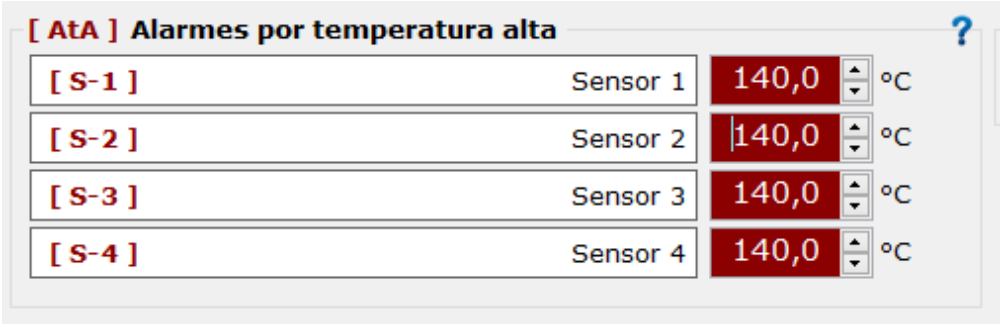
[tAr] Coolant drive logic: To adjust the coolant drive temperature.

[hdr] Refrigeration Shutdown Hysteresis: Select the differential value to shut down the transformer vent;

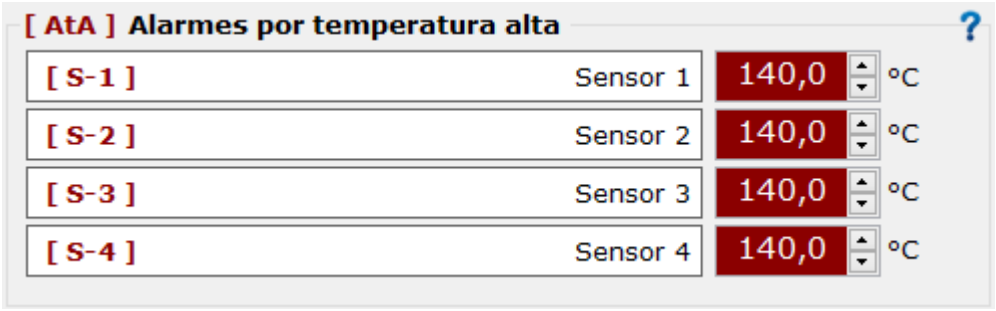
[ErC] Cooling exercises: Programming of the daily exercise of transformer ventilation;



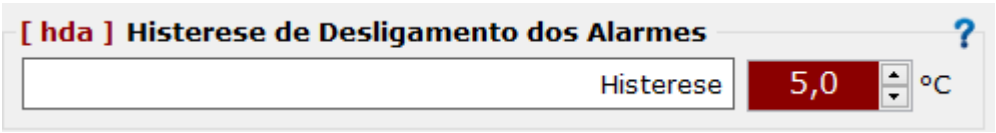
[rSF] Cooling exercises: Set up automatic or manual coolant activation;



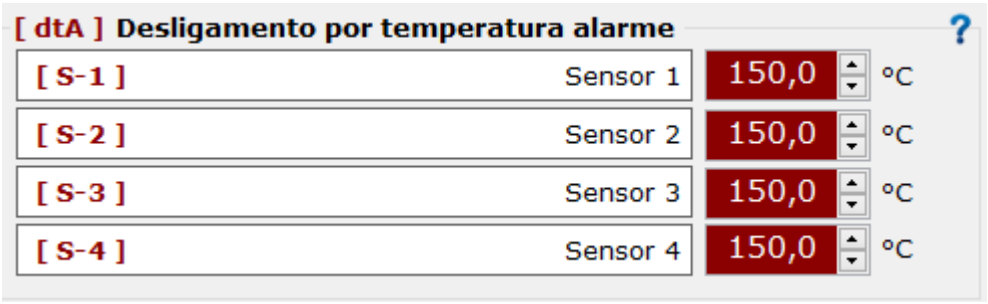
[AtA] High Temperature Alarms: Configure the High Temperature Alarm Relay Trigger Setpoint;



[hda] Alarm Shutdown Hysteresis: Configure the Alarm Relay Activation Setpoint for High Temperature;

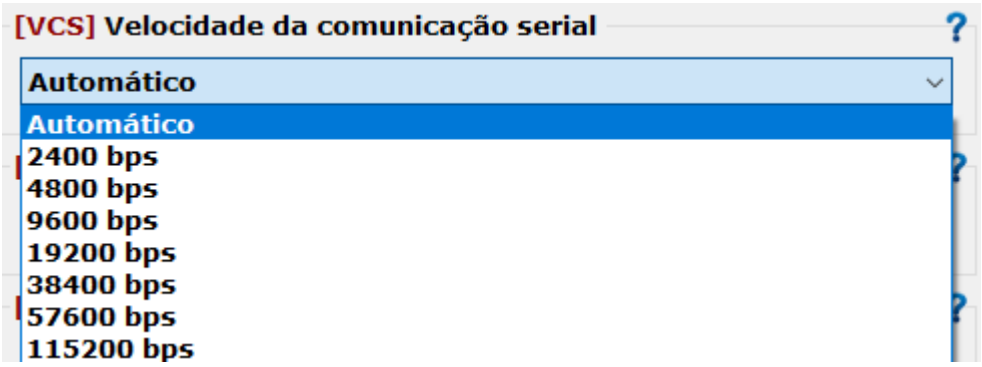


[dTa] High Temperature Shutdown: Configure the High Temperature Shutdown Relay (TRIP) trigger Setpoint;

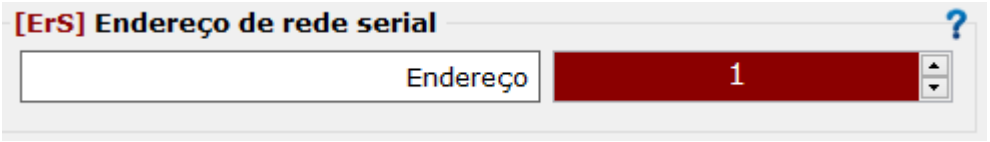


[trd] Shutdown Delay Time: Set the trigger delay time count of the High Temperature Shutdown Relay (TRIP);

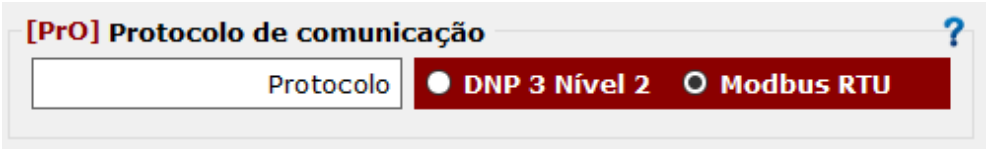
10 – RS485 Configuration:



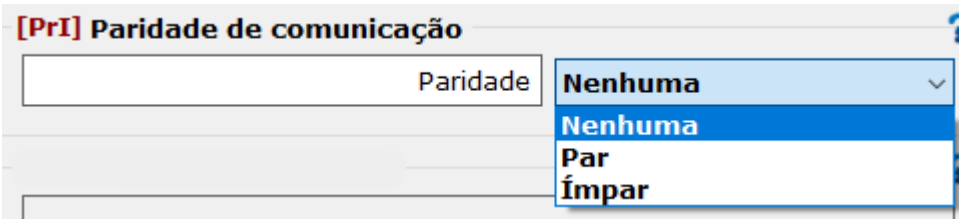
[VCS] Serial Communication Speed: Select one of the serial communication speed (BaudRate) options;



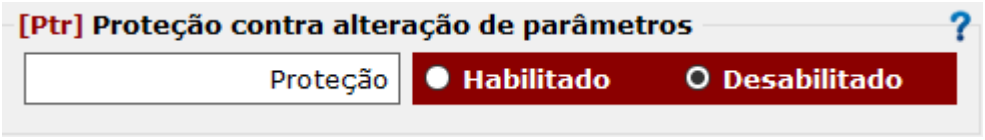
[ErS] Serial Network Address: Select a unique number for the identification of the equipment in the serial network;



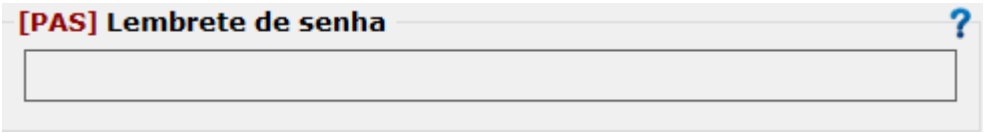
[PrO] Communication Protocol: Enable communication protocol, DNP3.0 level 1 or Modbus RTU;



[PrI] Communication Parity: Select the last bit to be transmitted for data integrity check between Even and Odd or disable this function.



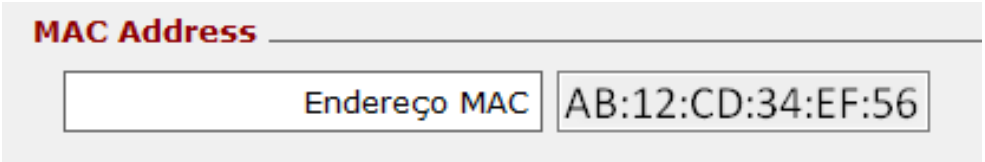
[Ptr] Parameter Change Protection: Serial network configuration against parameter change.



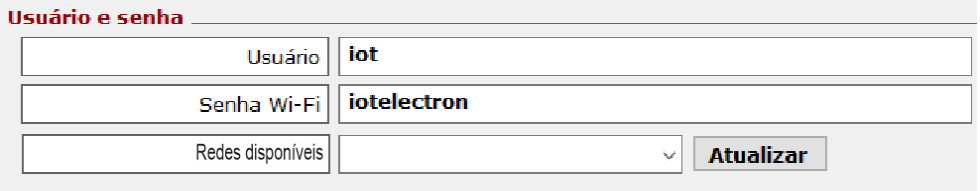
[PAS] Password reminder: In case of lost or forgotten password, please contact Electron da Brasil.

11 – IoT configuration:

Enable WIFI Communication: Enable or disable the WIFI communication function of the equipment.



MAC Address: When connecting the equipment to your notebook or computer, this field will display its MAC Address;

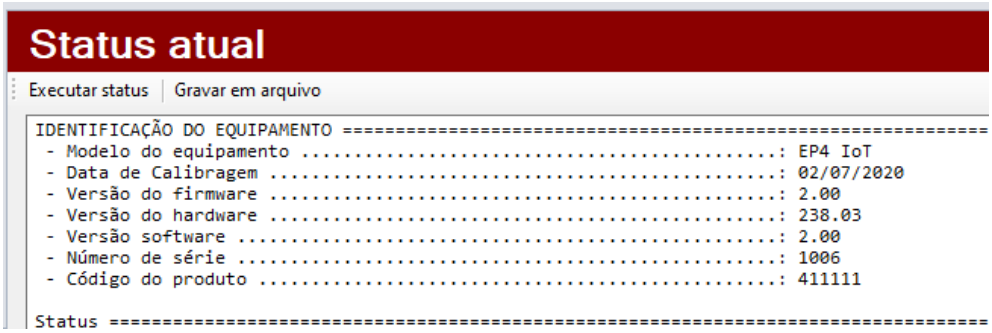


User: This field will display the name of the internet point selected under **Available Networks.**

Wi-Fi password: Enter the access password of the selected internet point.

Available networks: Select the internet point you want to connect to.

12 – Current Status:



Run status: Click on this option to check all the information of the equipment.

Record Status: Click this option to save this information to file.

DEFECT SOLUTION

The sensor will automatically return to the reading mode when the error is normalized, to reset the **EP4 IOT** press the **SET key** for approximately 5 seconds until the word rST appears on the display, then release and the **EP4 IOT Protection Relay** will restart. The **EP4 IOT** will trigger the **FAULT** relay (terminals 37, 38 and 39) in case the display shows the **OFF** parameter or if there is a power outage.

Display	Cause	Solution
Off	**EP4 IOT** receives no signal Reliable sensor	• Check and Replace the sensor cable if it is not shielded. • Check the grounding of the sensor cable. • Check and eliminate possible bad contact in the connectors. • Replacement of the temperature sensor if it is damaged.

IMPORTANT RECOMMENDATIONS

Before putting the equipment into operation, check the following recommendations:

1. All sensors as well as the equipment must be grounded, do not use the same grounding point for power supply and for the sensor if it is used, ensure that there is no potential difference between them. Properly grounded sensors and power prevent malfunctions or damage in cases of disturbances, surges, and inductions in the equipment.

2. Do not use the **EP4 IOT** directly in the sun, whenever it is installed in the field it is important that it has a panel with smoked glass, in order to filter the ultraviolet rays that attack the front polycarbonate, in this way the life of the equipment will be prolonged.

IMPORTANT RECOMMENDATIONS CABLING

Recommended Cabling for connection (NBR-5410 and NBR-14039 Standards)		
Connection	**Material**	**Quality**
Grounding	NU Copper	High Electrical Conductivity.
	Tinned Copper	Corrosion resistance.
	Copper Tape	Lightning Protection.
	Grounding Mesh	Uniform fault current distribution.
	Grounding Rod	Creates a path of Low resistance to the earth.
RS-485 Communication	Belden 9841 (24AWG)	Twisted pair, shielded and Low Capacitance.
	Alpha Wire (22AWG)	
Feeding	EPR	Resistance to heat, humidity, chemical agents and withstand up to 90°C.
	XLPE	
Sensors	PT-100 Blindado (3x24 AWG) - Electron	Mechanical resistance and noise protection.
Relay Output	Armored Multiway Rope	Mechanical resistance and noise protection.

Cabling Recommended for connecting current inputs/outputs					
Connection	**Material**	**Range**	**Impedance**	**Distance**	**Minimum Gauge**
Analog Outputs / TC / Tap Inputs	Armored Multiway Rope	0...1mA	8kΩ	<100m	0.14 to 0.25mm²
				>100m	0.35 to 0.5mm²
		0...5mA	1.6kΩ	<100m	0.2 to 0.35mm²
				>100m	0.5 to 0.75mm²
		0...10mA	800Ω	<100m	0.25 to 0.5mm²
				>100m	0.75 to 1.0mm²
		0...20mA	400Ω	<100m	0.5 to 0.75mm²
				>100m	1.0 to 1.5mm²
		4...20mA	400Ω	<100m	0.5 to 0.75mm²
				>100m	1.0 to 1.5mm²

Table 3 – Cabling Recommendation

WARRANTY TERM

The **EP4 IOT** Electron has a warranty period of two years from the date of sale stated on the invoice, with coverage for any manufacturing defects that make it unsuitable or unsuitable for the applications it is intended for.

Disclaimer of Warranty

The warranty does not cover transportation expenses for technical assistance, freight and insurance for shipment of a product with evidence of defect or malfunction. The following events are also not covered: Natural wear and tear of parts due to continuous and frequent use, damage to the outside caused by falls or improper packaging; attempt to repair/break a seal with damage caused by persons not authorized by Electron and in disagreement with the instructions that are part of the technical description.

Loss of Warranty

The product will automatically lose its warranty when:

• The instructions for use and assembly contained in this manual and the installation procedures contained in the NBR 5410 Standard are not observed;

• Subjected to conditions outside the limits specified in the respective technical descriptions;

• Violated or repaired by a person other than Electron's technical team;

• The damage is caused by a fall or impact;

• Infiltration of water or any other liquid occurs;

• Overload occurs that causes degradation of the components and parts of the product.

Use of the warranty

To enjoy this warranty, the customer must send the product to Electron along with a copy of the purchase invoice properly packaged so that there is no damage in transport. For an emergency service, it is recommended to send as much information as possible, regarding the defect detected. This will be analyzed and subjected to full functional tests.

The analysis of the product and its eventual maintenance will only be carried out by the technical team at the headquarters of Electron do Brasil.

DECLARATION OF CONFORMITY

Available for download at the following electronic address:

https://electron.com.br/pt-br/produtos/EP4 IoT/

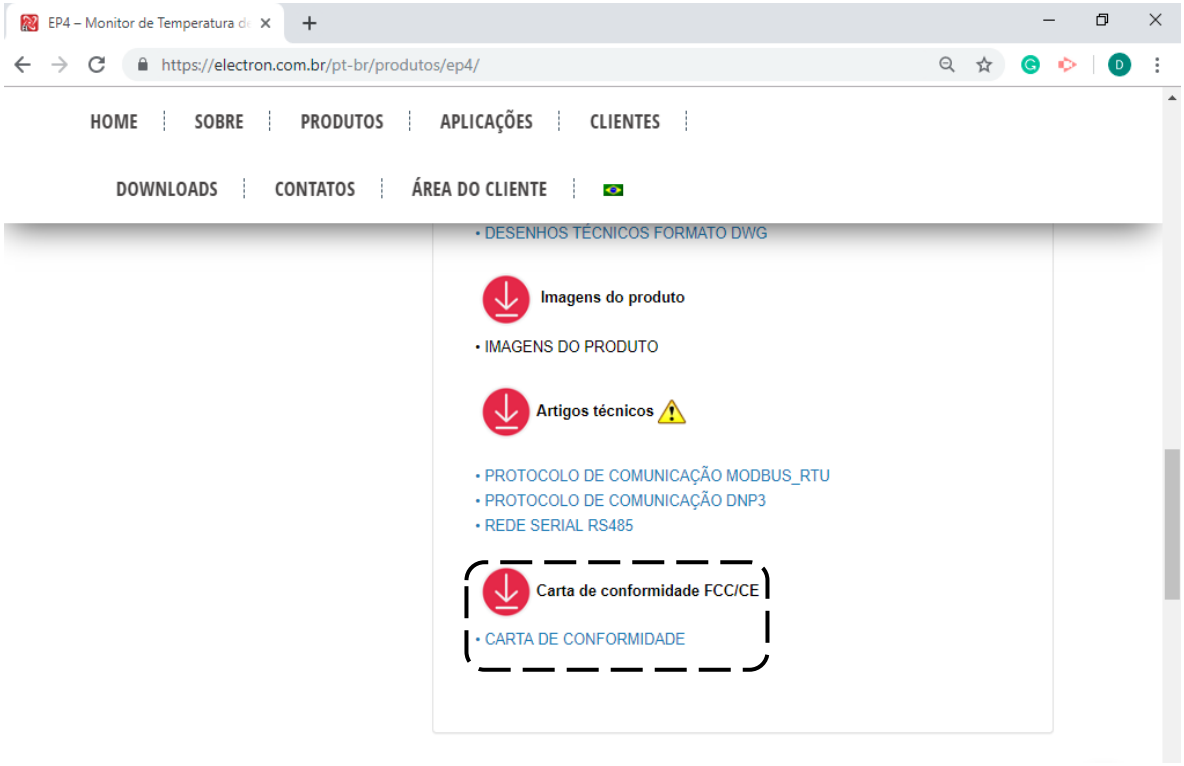


Figure 9 - Download Declaration of Conformity