



THERMAL PROTECTION RELAY EP3

Manual

INDEX

INDEX	1
INTRODUCTION.....	2
MAIN FEATURES	3
TECHNICAL DATA	3
TYPE TESTS ATTENDED.....	4
ANSI/IEEE FUNCTION CODES MET	4
EP3 CONNECTION DIAGRAM	4
PHYSICAL DIMENSIONS	5
SENSOR INPUT - SENSOR CIRCUIT (EM 60751 – DIN 43760)	5
OPERATION CHART	6
PREVENTIVE MAINTENANCE	7
EP3 INFORMATION LABELS	8
APPLICATION EXAMPLE.....	9
EQUIPMENT IN OPERATION	9
INSTALLATION ACCESSORIES.....	10
SPECIFICATION FOR ORDER	12
SUPPORT & CONTACT.....	12
GETTING TO KNOW EP3.....	13
QUERY MENU FLOWCHART.....	14
QUERY MENU	15
SETUP MENU FLOWCHART	16
CONFIGURATION MENU	17
DEFECT SOLUTION	20
IMPORTANT RECOMMENDATIONS.....	21
WARRANTY TERM.....	21
<i>Disclaimer of Warranty</i>	21
<i>Loss of Warranty</i>	21
DECLARATION OF CONFORMITY.....	22

INTRODUCTION

The EP3 **Thermal Protection Relay**, manufactured by Electron do Brasil, is a microprocessor digital monitor widely used by designers in the temperature monitoring and thermal protection system of dry-type transformers of the main manufacturers in Brazil and the world.

Electron do Brasil's **EP3** monitors and protects dry-type transformers that are part of the power system in electrical installations in Brazil and several countries, such as:

- Industrial Plants,
- Oil rigs,
- Electric power substations (Low, Medium and High Voltage),
- Commercial Buildings,
- Shopping Centers,
- Hospitals
- Football stadiums,
- Medium voltage booths,
- Hydroelectric Power Plants,
- Photovoltaic Power Plants,
- Wind Power Plants,

The EP3 **Thermal Protection Relay** is a reference among professionals and scholars in the electricity sector and is in accordance with the technical specifications of the main electric power utilities in the world and in compliance with the requirements of ABNT NBR 5356-11, IEC 60076-11 and IEEE C57.12.01 standards that regulate the use of accessories in the temperature monitoring and thermal protection system of dry-type transformers and/or with resin-encapsulated windings epoxy.

The EP3 **Thermal Protection Relay** is produced strictly obeying the standards of national and international quality standards, its hardware is designed to withstand severe working conditions, weather, noise, electromagnetic disturbances, tested and approved by specialized laboratories and with accreditation of standards such as IEC, DIN, IEEE and ABNT.

Its casing is made of aluminum with electrostatic paint to protect the printed circuit boards from noise and electromagnetic disturbances, the front (IP 40) and the connectors (IP 20) comply with the NBR IEC 60529 degree of protection standard for electrical equipment. The EP3 hardware boards are used with very high quality electronic components and state-of-the-art technology (SMD) that are stored, handled according to the international standard JEDEC/ESDA control JESD625 for the manufacture and handling of electronic components.

As a signal input allows up to 3 PT-100 RTD temperature sensors (EN 60751 - DIN 43760), it also has an RS-485 digital output with Modbus RTU protocol and DNP 3.0 (L1) that allows access to all parameters and even remote commands of the drives in real time, it also has 2 setpoints (Alarm and Shutdown) of independent temperature for each sensor and 3 (three) isolated trigger relays (NAF), independent and potential-free that can be used for alarm, TRIP (shutdown) also has 1 (One) isolated, independent and potential-free relay (NAF) for fault indication (FAULT - Watchdog).

The display mode is fully configurable by the user, being able to keep the highest temperature at the moment fixed on the display, the temperature that the operator selects, or using the SCAN function that presents a complete scan of all channels continuously. Through the front indicative LED's and through the data communication port it is possible to identify which of the channels caused the alarm, TRIP, all functions and parameterizations are easily configured directly on the front of the equipment. The **EP3** Thermal Protection Relay is built in an aluminum housing of high mechanical resistance, in the measures of 98x98x37mm, within the DIN IEC 61554 standards for panel fixing.

MAIN FEATURES

- Universal Power Input 24-275 Vdc/Vac.
- Luminous red 3-digit numeric display with a height of 14 mm.
- 3-digit red high-brightness numeric display.
- Reading accuracy of 0.25% (FS).
- Temperature measurement range from 0 °C to 200 °C.
- Compensated input for PT100 2 or 3-wire sensors (EN 60751 - DIN 43760).
- RS-485 Digital Output (ANSI/TIA/EIA-485-A) with Modbus RTU and DNP 3 Level 1 communication protocol selection option;
- Auto Baud Rate 1,200 to 57,600 bps (Automatically detects the speed of the communication network);
- Stores in memory the value of maximum temperatures reached by each sensor.
- 01 Relay (NAF) with a capacity of 10 amperes for high temperature alarm.
- 01 Relay (NAF) with a capacity of 10 amperes for TRIP (Shutdown) with programmable trigger timing.
- 01 Relay (NAF) with a capacity of 10 amperes for Fault Indication (Watchdog).
- Didactic interface for easy use and parameterization.
- 2 Years Warranty.

TECHNICAL DATA

THERMAL PROTECTION RELAY – EP3	
Operating Voltage Range	24 to 275 Vdc/Vac.
Operating Frequency Range	50/60 Hz.
Operating Temperature	-40°C to 85°C
Power Consumption	< 15 Watts.
Temperature Measurement Input	Supports up to 3 PT-100 2- and 3-wire RTD-type sensors (EN 60751 - DIN 43760).
Measuring range	0 °C to 200 °C.
Maximum Measurement Input Error	0.25% end-of-scale.
Relay output contacts	3 (NAF) Potential-free for Alarm, Shutdown and Fault indication.
Maximum Switching Power	70 W / 250 VA.
Maximum Switching Voltage	125 V DC / 250 V AC.
Maximum Driving Current	10 Amps.
Serial Communication Port	2-wire RS-485 standard (ANSI/TIA/EIA-485-A).
Serial Communication Protocol	Modbus RTU / DNP 3.0 Level 1.
Auto Baud Rate	1,200 to 57,600bps.
Physical dimensions of the enclosure (DIN IEC 61554)	98 x 98 x 37 mm.
Attachment	2 Steel cleats.
Degree of Protection (NBR IEC 60529:2017)	Front = IP 40 / Connectors = IP 20.

Table 1 – Technical data of the EP3 thermal protection relay.

TYPE TESTS ATTENDED

- Applied Voltage (IEC 60255-5): 2 kV / 60 Hz / 1 min. (against the ground),
- Voltage Impulse (IEC 60255-5): 1.2 / 50 μ sec. / 5 kV / 3 neg. and 3 pos. / 5 sec. Interval
- Electrostatic Discharges (IEC 60255-22-2): Air mode = 8 kV / Counted mode = 6 kV,
- Immunity to radiated electromagnetic disturbance (IEC61000-4-3): 80 to 1000 MHz / 10 V/m,
- Immunity to Fast Electrical Transients (IEC 60255-22-4): Alim/Input/Outputs = 4 kV/Common 2 Kv,
- Surge Immunity (IEC 60255-22-5): phase/neutral 1 kV, 5 per polar (\pm) - phase-to-ground/neutral-to-ground 2 kV, 5 per polar (\pm),
- Immunity to conducted electromagnetic disturbances (IEC 61000-4-6): 0.15 to 80 MHz / 10 V/m,
- Climate Test (IEC 60068-21-14): - 40°C + 85°C / 72 hours,
- Vibration Resistance (IEC 60255-21-1): 3-axis / 10 to 150 Hz / 2G / 160 min/axis,
- Vibration Response (IEC 60255-21-1): 3-axis / 0.075 mm-10 at 58 Hz / 1G from 58 to 150 Hz / 8min/axis,

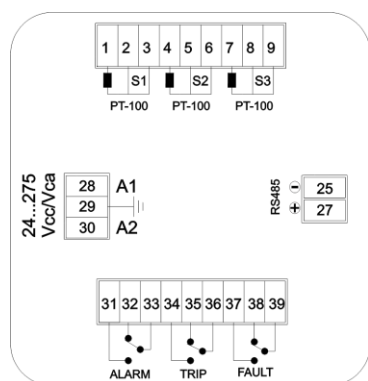
ANSI/IEEE FUNCTION CODES MET

The EP3 Thermal Protection Relay is designed to meet the following device functions and acronyms (IED) specified by the ANSI/IEEE C37.2–2008 Electrical Power System Device Function Numbers, Acronyms, and Contact Designation Standard.

FUNCTION NUMBER/ACRONYM	FUNCTION NAME/ACRONYM
2	Timed Start or Close Relay
11	Multi-function device.
16S	Serial Data Communication Device.
23	Temperature Control Device.
26	Equipment Thermal Device.
30	Annunciator Relay.
49	Thermal Relay.
74	Alarm Relay.
77	Telemetry Device.
94	Digital Output for TRIP.
HMI	Human Machine Interface.
TCM	TRIP monitoring scheme.

Table 2 – ANSI/IEEE codes met by EP3.

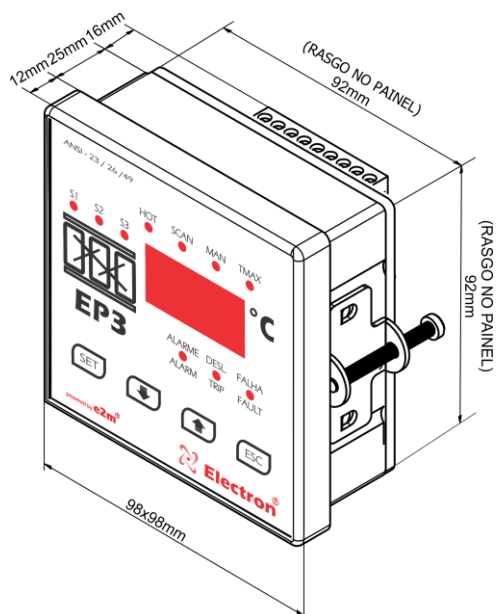
EP3 CONNECTION DIAGRAM



Page link to download the DWG drawing file:
<https://electron.com.br/site/produtos/ep3/>

Figure 1 – Diagram EP3.

PHYSICAL DIMENSIONS



Page link to download the DWG drawing file:
<https://electron.com.br/site/produtos/ep3/>

Figure 2 - Illustration of physical dimensions of EP3.

SENSOR INPUT - SENSOR CIRCUIT (EM 60751 – DIN 43760)

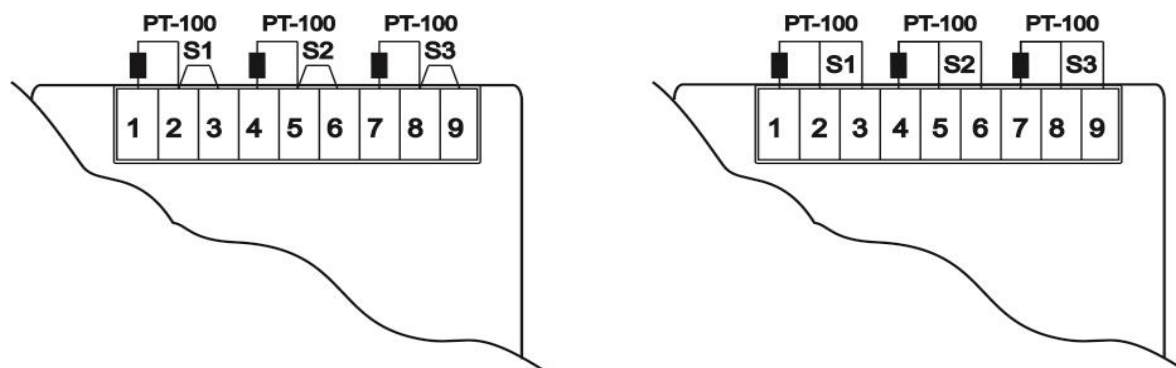


Figure 3 – Connection diagrams for 2-wire and 3-wire RD PT-100.

Electron PT100 STFE Temperature Sensor Page Link:
<https://electron.com.br/site/produtos/rtd-pt100-2/>

OPERATION CHART

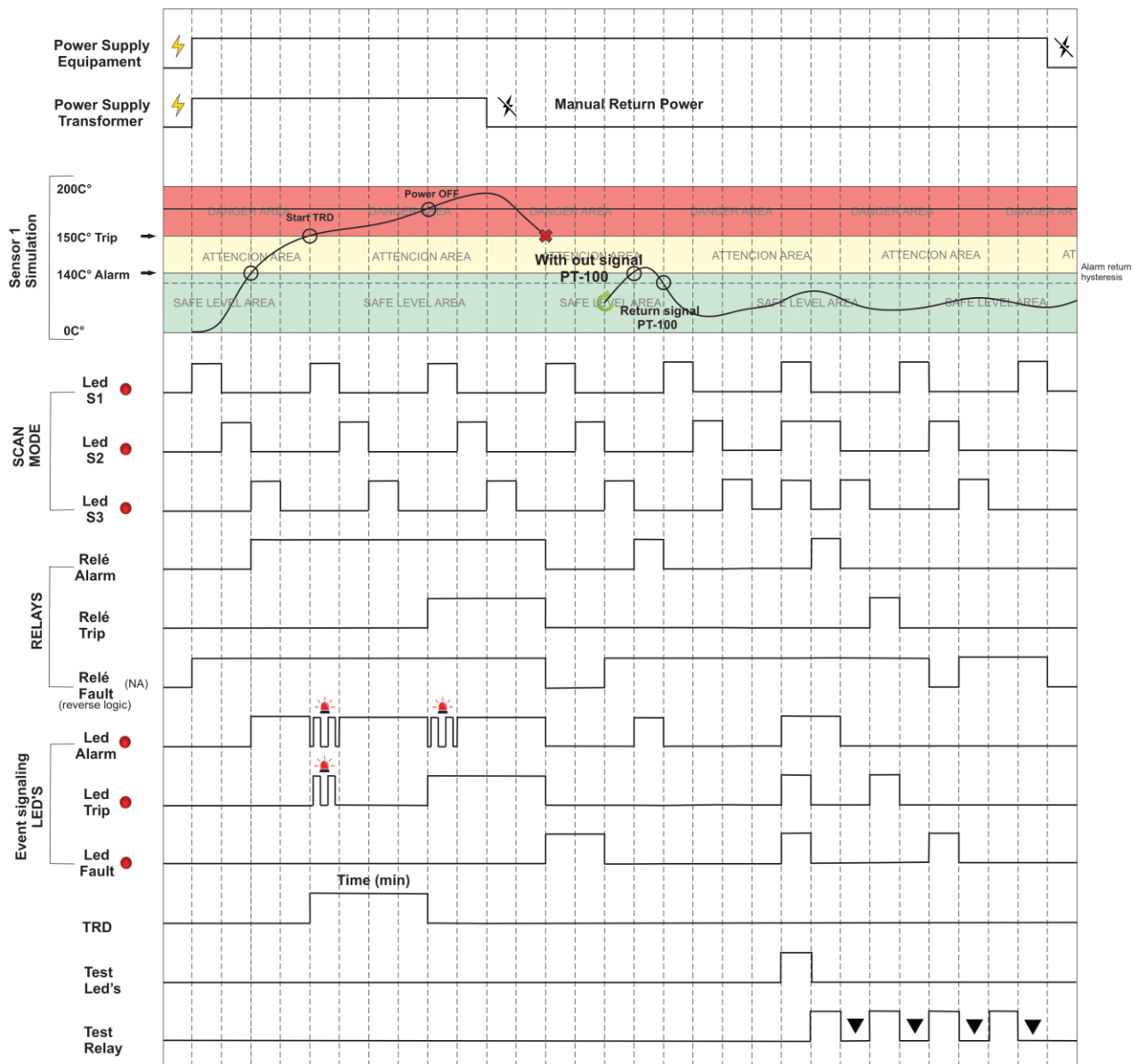


Figure 4 – Operation Chart

PREVENTIVE MAINTENANCE


PREVENTIVE AND CORRECTIVE MAINTENANCE							
Items to be checked preemptively			Frequency of Verification				Corrective action
SHARE	Verification Elements	ACTIVITIES	Every Month	Every 3 Months	Every 6 Months	Every 1 Year	When Needed
VERIFICATION	Fastening clip and snap to the rail	Fixing to the panel door or panel bottom		X			Retightening, Fitting, changing terminal or changing screws
	Terminal blocks and connector comb	Attachment and attachment to the equipment		X			
		Tightening the screws in fixing the conductors		X			
	Sensors	Integrity / Positioning / Fixation			X		Replacement, Repositioning and/or Attachment of Sensors
	Sensor Well in Oil Transformers	Oil level in the well			X		Filling with oil to the indicated level
TESTS & MEASUREMNTS	Digital Relays and Outputs	Individual drive test			X		Refer to technical assistance from Electron do Brasil
	Led's and Displays	Test Lead Led's and Display Segments			X		
	Navigation buttons	Navigation test of navigation buttons			X		
	Sensor Input	Benchmarking sensor inputs using a standard				X	
	Input voltage Supply equipment	Measure Power Input Voltage			X		Override voltage input values according to equipment model
	RS-485 communication outputs	Communication and command testing in the supervisory system			X		Refer to technical assistance from Electron do Brasil
	Milliampere Current Signal Inputs	Measuring, comparing, and gauging input signal in passive and/or active mode			X		
	Signal outputs of milliampere current	Measuring, comparing, and gauging input signal in passive and/or active mode			X		
CLEANING	Terminal blocks and connector comb and junction box	Debris, Impurities and Moisture	X				Cleaning with a dry cloth, compressed air and vacuum cleaner
	Aluminum Equipment Enclosure		X				
	Front Display of the equipment		X				
<div> ATENÇÃO</div>	1 - Keeping the equipment within the ideal working temperature (50°C to 60°C) prolongs the useful life and avoids corrective maintenance.						
	2 - The accumulation of dust and impurities in the installations can cause short circuits and burnout of equipment and sensors.						
	3 - After 10 years of use, it is recommended to replace the equipment.						

Table 6 – Preventive maintenance

EP3 INFORMATION LABELS

The EP3 Thermal Protection Relay from Electron do Brasil contains two laser engravings on its around the aluminum with important information that aims to facilitate its identification and characteristics and figures 4 and 5 illustrate the location of each label. The technical data label, which is engraved on the top of the relay, contains the important technical information, and the serial number label is engraved on the bottom of the enclosure, as shown in figures 4 and 6.



Figure 5 – Location of the technical data label.

EP3	Tensão de Operação Operation Voltage	24 ~ 275 Vdc / Vac - 50 / 60 Hz
	Entrada de Sensores Sensors Input	3 inputs Type RTD-PT-100 - 3 wires EN 60751 - DIN 43760
	Contato de Saída (relés) Output Contact (relay)	10 Amper - 70W / 250 VA
	Cod. PA0048	
	Comunicação Serial Serial Communication	RS 485 - 2 wires Modbus RTU and DNP3 - L1



EP3 name and
product code.

Technical Data

Figure 6 – EP3 Technical Data Label Detail



Figure 7 – QR Code Label Location

 made in Brazil		Serial number of the machine.	 Electron www.electron.com.br CNPJ: 07.643.915/0001-64 - FONE +55 11 4496 3627
		Serial Number 12345678 Production Date 01-2023	

QR CODE access
product data.

Date of manufacture
Week/Year.

Figure 8 – Serial number label and date of manufacture of the EP3.

APPLICATION EXAMPLE

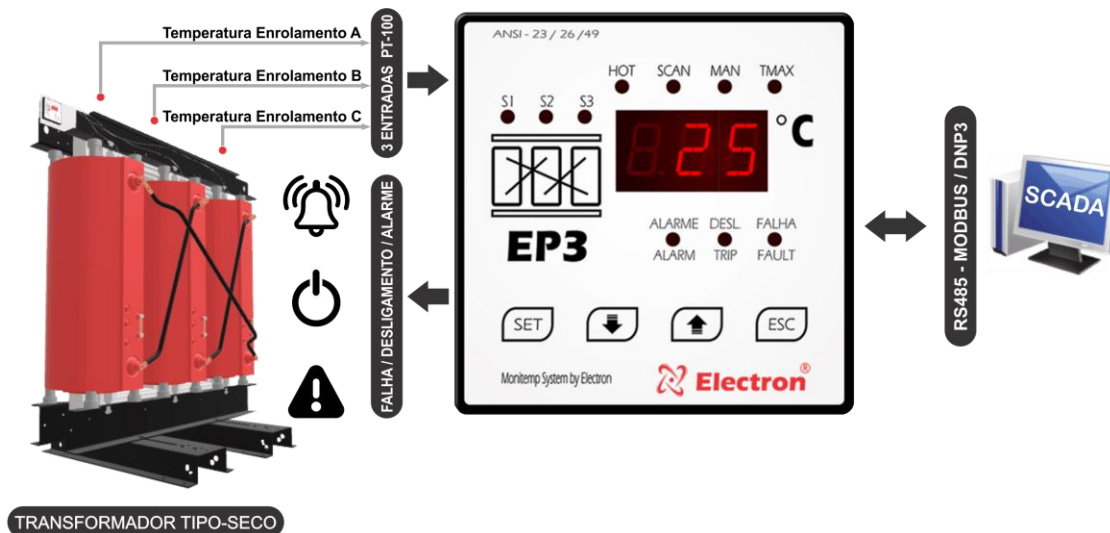


Figure 9 – Illustration of EP3 application.

EQUIPMENT IN OPERATION



Figure 10 – EP3 installed in a medium-voltage dry-type transformer.

INSTALLATION ACCESSORIES

Electron do Brasil has a line of accessories that can be purchased together in order to offer a complete solution to meet your application with practicality. We have listed some of the main accessories that can be used for EP3 operation.



PT-100 STFE Temperature Sensor: This sensor can be constructed with silicone, stainless steel or Teflon bulb. With a choice of 2 kV, 10 kV or 15 kV electrical insulation capacity. The PT-100 STFE temperature sensor has as its measuring principle the evaluation of the variation of electrical resistance with temperature using the temperature coefficient of pure platinum (0.385 Ohm/K) in accordance with IEC 751 (DIN 43760). Ideal for temperature monitoring of dry-type transformer windings 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.

Electron PT100 STFE Temperature Sensor Page Link:

<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 head (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 inclement weather and electrical disturbances for temperature monitoring of transformers and machines that require high measurement accuracy in environments subject to electrical noise and weathering. 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.

Electron PT100 STFE Temperature Sensor Page Link:

<https://electron.com.br/site/produtos/rtd-pt100/>



Double Door Panel for Outdoor/Outdoor Use: Box for external use with double door for mounting instruments, accessories and passing control and power wires 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 weather resistant and its degree of protection is IP 55, as per NBR IEC 60529:2017.

Outdoor Dual Door Panel Page Link – 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 a fixed and constant equivalent resistance signal for selection between 3 different ranges, 0 °C (100 Ohms), 26 °C (110.9 Ohms) and 200 °C (175.86 Ohms).

Reference Card page link for PT-100 signal:

<https://electron.com.br/site/produtos/>

SPECIFICATION FOR ORDER

Equipment: **EP3 Thermal Protection Relay.**

Product Code: **PA0048.**

Click on the link below to request a quote directly through our website:

<https://electron.com.br/site/produtos/ep3/>

EP3 – Temperature Monitor for Dry Traffic - 3 Sensors PT100 - Electron - Digital Technology

SUPPORT & CONTACT

For further doubts, suggestions, questions or for any other matter related to this or other products manufactured by Electron do Brasil, please contact us through the following contacts:



→ **Address:** Avenida Brasil n. 2436, Bairro Lagoa, Itupeva–SP - 13.296-122



→ **Phone:** (11) 4496-3627



→ **Mobile:** +55 (11) 94133-7472 (Sales) / +55 (11) 93745-6828 (Technical Support)



→ **Website:** www.electron.com.br



→ **e-mail:** vendas@electron.com.br (For commercial purposes)



→ **e-mail:** tecnico@electron.com.br (For questions, information and technical/application queries)

GETTING TO KNOW EP3

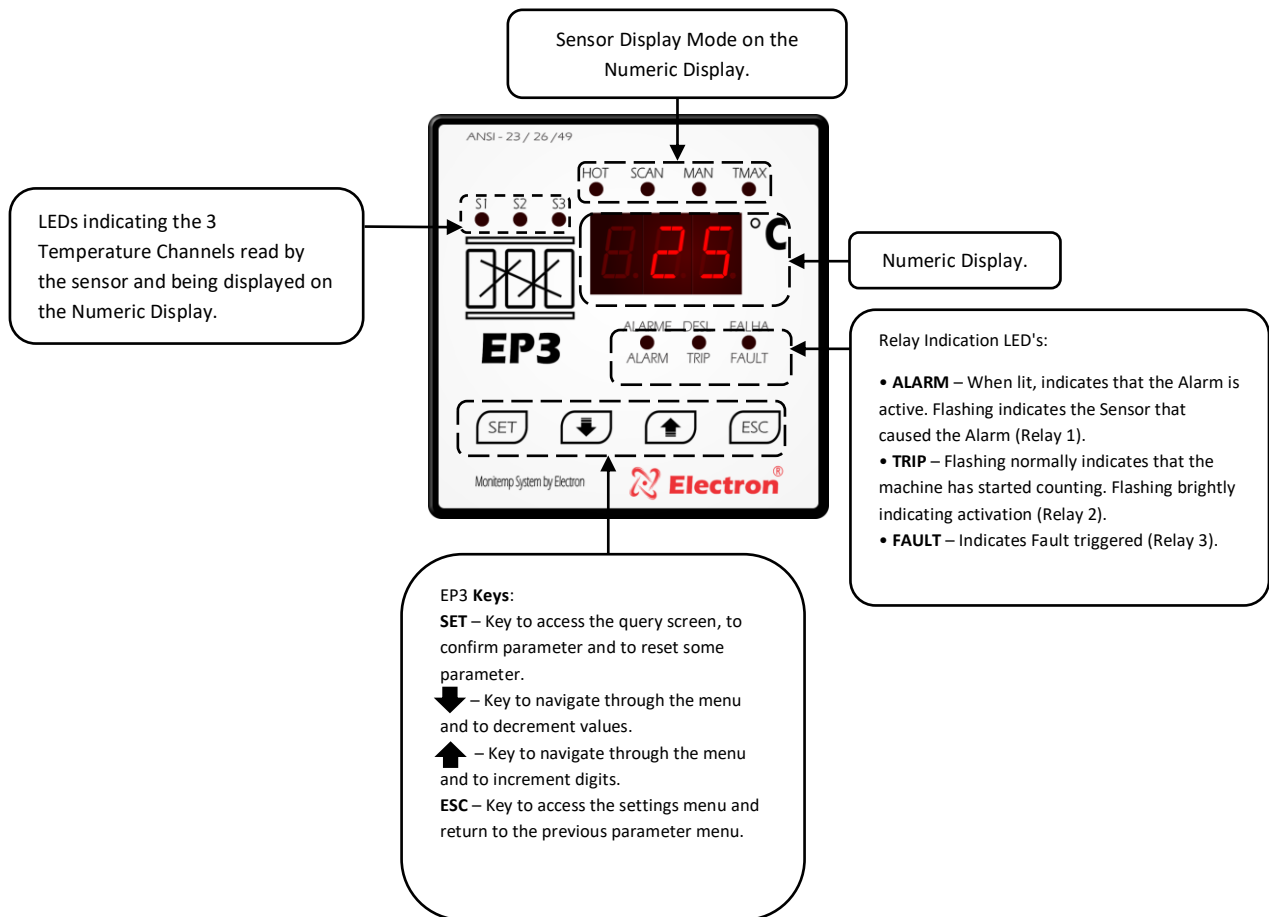


Figure 11 – Front EP3.

QUERY MENU FLOWCHART

To view the maximum temperatures reached in each sensor, press the **SET** key and then use the increment or decrement keys to navigate the menu, to consult the desired parameter press the **SAT** key once, to return to the previous menu press the **ESC** key.

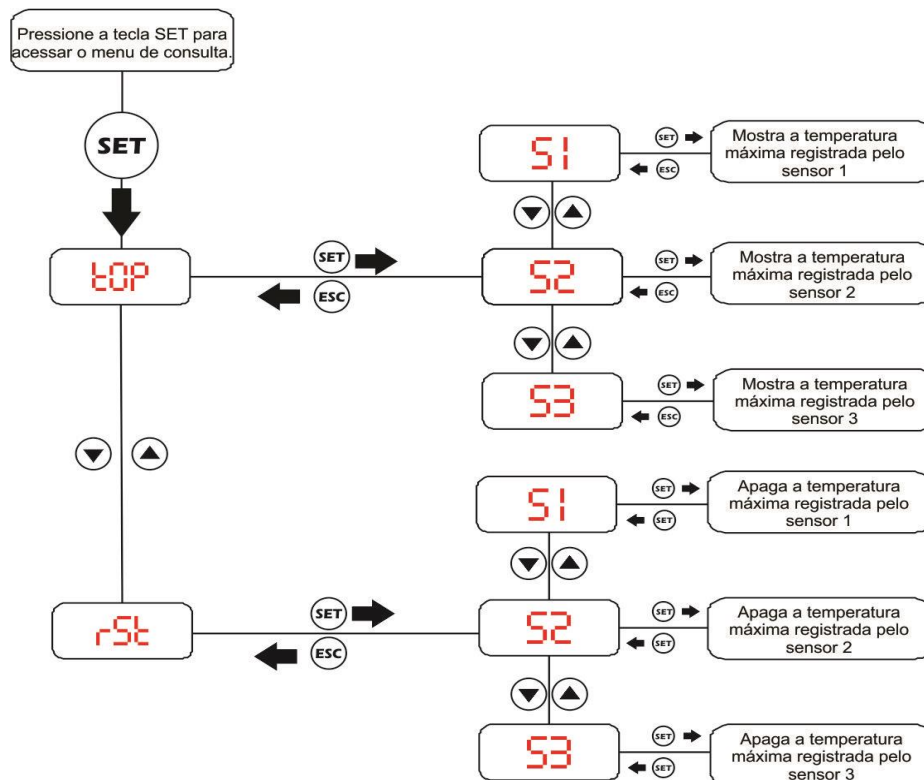


Figure 12 – Flowchart of the EP3 query menu.

QUERY MENU

Menu	Parameters	Description
top	SI S2 S3	<p>Menu to view the maximum temperature reached by each sensor. Use the increment and decrement keys to select the desired sensor and view its maximum temperature. To exit this menu, press the ESC key.</p> <p>Watch the video tutorial to consult this menu at the link: https://youtu.be/N11Cka3DwSI?t=12</p>
rSt	SI S2 S3	<p>Menu for resetting (erasing) the last maximum temperature record recorded on the respective sensor. Confirm the Reset command by pressing the SET key for each sensor. To exit this menu, press the ESC key.</p> <p>See the video tutorial on parameterization of this menu at the link: https://youtu.be/N11Cka3DwSI?t=91</p>

Table 3 – Configuration and access to the query menu.

SETUP MENU FLOWCHART

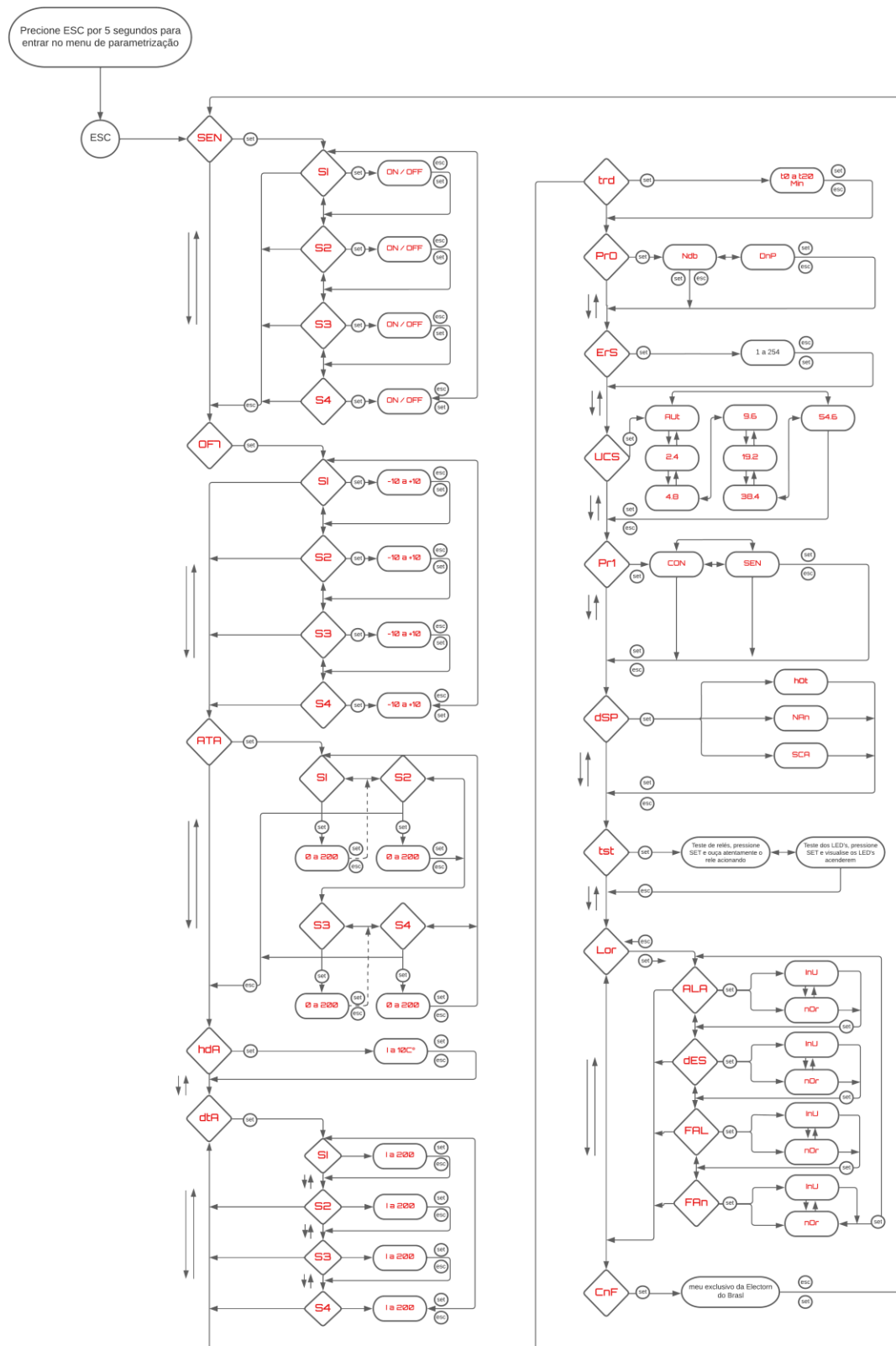



Figure 12 – Flowchart of the configuration menu.

CONFIGURATION MENU

Menu	Parameters	Variable	Description
SEn	S1 S2 S3	ON - OFF	<p>Menu to enable and/or disable sensor input. Select the ON or OFF option from the menu and confirm it by pressing the SAT key.</p> <p>See the video tutorial on parameterization of this menu at the link: https://youtu.be/AtiSmgHfRuE?t=16</p>
OF1	S1 S2 S3	+20 to -20	<p>Increase or decrease temperature values to values for temperature measurement adjustment.</p>
AlA	S1 S2 S3	0°C / 200°C	<p>Menu to set the temperature to trigger the Alarm (High Temperature Alarm). When the PT-100 sensor registers the temperature reading configured in this menu, the output of the ALARM relay is triggered (terminals 31, 32 and 33) and the ALARM LED on the front of the equipment starts flashing indicating that the alarm is active.</p> <p>Set the desired ALARM relay trigger temperature for each sensor and confirm it by pressing the SAT key.</p> <p>See the video tutorial on parameterization of this menu at the link: https://youtu.be/AtiSmgHfRuE?t=80</p>
hdA	- - -	0°C / 10°C	<p>Menu for setting Hysteresis (Alarm Shutdown Hysteresis). Temperature difference for deactivating the ALARM relay (terminals 31, 32 and 33), which can be adjusted with values between 0°C and 10°C.</p> <p>Example: If the temperature (AlA) is programmed at 100°C and the difference (hdA) is programmed at 5°C, the ALARM relay LED is blinking between the 95°C and 100°C ranges and will turn off only when the temperature reaches any value below 94°C.</p> <p>Set the desired Alarm Hysteresis value and confirm it by pressing the SAT key.</p> <p>See the video tutorial on parameterization of this menu at the link: https://youtu.be/AtiSmgHfRuE?t=132</p>
dtA	- - -	0°C / 200°C	<p>Menu for setting Shutdown Temperature (High Temperature Shutdown). When the sensor reaches the temperature set in this menu (dtA), the TRIP relay LED (terminals 34, 35 and 36) will start flashing, starting the time count (trd) for switch-off. During the countdown, the time set in trd will also be shown on the numerical display.</p>

dtA			<p>Example: If the Display displays dt it means that the shutdown will occur within 1 minute.</p> <p>At the end of the count, the LED of the TRIP relay will be flashing intensely on the front of the equipment indicating its activation and the equipment that the system is protecting will be turned off. In case the set value is 0, the TRIP relay will trigger immediately.</p> <p>Set the shutdown temperature of each sensor and confirm by pressing the SAT key.</p> <p>See the video tutorial on parameterization of this menu at the link: https://youtu.be/F4T8WWu0R9k?t=13</p>
trd	---	0-20 years	<p>Menu to adjust the Timer for the shutdown from 0 to 20 minutes. When the temperature of the dtA 52 or 53 reaches the set value, the EP3 will start counting the time to perform the shutdown. In case the configured value is '0', the TRIP relay will trigger immediately.</p> <p>Set the desired Shutdown time and confirm by pressing the SAT key.</p> <p>See the video tutorial on parameterization of this menu at the link: https://youtu.be/F4T8WWu0R9k?t=86</p>
Pro	---	mdb dnp	<p>Menu to enable one of the two Communication Protocol options:</p> <ul style="list-style-type: none"> - Press the SET key on mdb to enable the Modbus RTU Communication Protocol. - Press the SET key on dnp to enable DNP Communication Protocol 3.0 <p>See the video tutorial on parameterization of this menu at the link: https://youtu.be/T921sJoH-kE?t=15</p>
ErS	---	---	<p>Enter the machine's address in the Serial Network.</p> <p>See the video tutorial on parameterization of this menu at the link: https://youtu.be/T921sJoH-kE?t=65</p>
UCS	Aut 1.2 2.4 4.8 9.6 19.2 38.4 57.6	---	<p>Serial Communication Speed Menu:</p> <p>Aut Automatically detects the communication speed of the network;</p> <p>1.2 Communication speed fixed at 1,200bps.</p> <p>2.4 Communication speed fixed at 2,400bps.</p> <p>4.8 Communication speed fixed at 4,800bps.</p> <p>9.6 Communication speed fixed at 9,600bps.</p> <p>19.2 Communication speed fixed at 19,200bps.</p> <p>38.4 Communication speed fixed at 38,400bps.</p> <p>57.6 Communication speed fixed at 57,600bps.</p>

			See the video tutorial on parameterization of this menu at the link: https://youtu.be/T921sJoH-kE?t=120
Prl	CON SEN	---	Enable or disable the bit parity of the equipment, being: CON – With parity; SEN – No parity;
dSP	Hot ScA nAn	---	Menu to select temperature display mode: Hot – HOT mode, displays only the sensor with the highest temperature. ScA – SCAN Mode, displays the temperature of the 3 sensors sequentially and automatically. nAn – MANUAL mode, displays the temperature of the 3 sensors only through the navigation keys. See the video tutorial on parameterization of this menu at the link: https://youtu.be/1xzCtC-LR_U?t=9
tSt	rL1 rL2 rL3 LEd	---	 Attention: when using this menu, it activates the relay outputs and lights up the EP3 LEDs so that the operator can make sure they work. However, if the monitor is in operation and the TRIP (shutdown) relay is connected to the system protection, it will trigger and the protection and the system will operate by shutting down the transformer or the machine it is protecting. rL1 - "Activates relay 1 after pressing the SET button" (ALARM Relay). rL2 - "Activates relay 2 after pressing the SAT key" (TRIPe Relay). rL3 - "Activates relay 3 after pressing the SET button" (FAULT Relay). LEd - "Activates all LED's on the display when pressing the SAT key". See the video tutorial on parameterization of this menu at the link: https://youtu.be/ZHkvKdsT3Yo
Lor	rL1 rL2 rL3	dO dI	Menu to choose Relay Logic. dO – Initial Conditions of the "Off" Relay. dI – Initial Conditions of the "Triggered" Relay. Select the desired Logic and confirm by pressing the SAT key. See the video tutorial on parameterization of this menu at the link:

			https://youtu.be/iyYJIrwjth4
CnF	---	---	Electron do Brasil Exclusivity Menu. To exit the menu, press the SAT key.

Table 4 – EP3 relay setup menu functions.

DEFECT SOLUTION

The sensor will automatically return to reading mode when the error is normalized, to reset the **EP3** press the **SET** key for approximately 5 seconds until the word **rSt** show in the display then release and the **EP3 Protection Relay** will reset. The **EP3** will trigger the FAULT relay (terminals 37, 38 and 39) in the event that the display shows the **OFF** parameter or if there is a power outage

Display	Cause	Solution
OFF	EP3 Receives No Signal Reliable Sensor	<ul style="list-style-type: none"> • Check and replace the sensor cable if it is not shielded. • Check the grounding of the sensor cable. • Check and eliminate possible miscontact in the connectors. • Replacement of the temperature sensor if it is damaged.

Table 5 – Troubleshooting.

IMPORTANT RECOMMENDATIONS

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

1. All sensors as well as equipment must be grounded, do not use the same grounding point for power and for the sensor if used ensure that there is no potential difference between them. Correctly grounded sensors and power prevent malfunctions or damage in cases of disturbances, surges, and inductions in the equipment.
2. Do not use the **EP3** directly in the sun, whenever it is installed in the field it is important that it has a panel with tinted glass, in order to filter the ultraviolet rays that attack the front polycarbonate, in this way the life of the equipment will be prolonged.

WARRANTY TERM

The **EP3** 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 for which it is intended.

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/breach 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;
- Tampered with or repaired by a person other than Electron's technical team;
- The damage is caused by a fall or impact;
- Water or any other liquid infiltrates;
- Overload occurs that causes degradation of the components and parts of the product.

Use of the Warranty

To take advantage of this guarantee, the customer must send the product to Electron along with a copy of the purchase invoice, properly packaged, so that no damage occurs during transport. For an emergency service, it is recommended to send as much information as possible regarding the detected defect. The equipment will be analysed 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 website:

<https://electron.com.br/pt-br/produtos/ep3/>