



# Thermal Protection Relay – EPU-loT

Catalogue



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#### INTRODUCTION

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

The **EPU IOT Thermal Protection Relay** has been 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 IEC, DIN, IEEE and ABNT standards.

With signal inputs, the **EPU 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 analogue output also features the SCAN function, which simultaneously reflects all temperature channel values. This configuration can be carried out directly on the EPU IOT panel or **via the EPU IOT**<sup>™</sup> software **with** BLUETOOTH **or** USB connection.

The EPU 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 connection to the Internet. Once the connection is established, **the EPU 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.

In this way, you get full control to monitor in real time all measured quantities, drives, 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 EPU 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, MACHINE LEARNING, DATABASE, PROGRAMMABLE FUNCTIONS, CALCULATIONS AND NOTIFICATIONS, MAINTENANCE SCHEDULE tools. In case of loss of Internet connection, the EPU IOT stores all measurements for the period in which communication was unavailable. When the connection is restored, the data is sent to the MONITRAFO.com and stored in a database for queries, calculations, and more.

It is also possible to use the API available on the platform to integrate the EPU 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 the transformer's 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 **EPU 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 of which are isolated, independent and potential-free drive relays (NO) that can be used for alarms, shutdowns (TRIP) and FAN (ventilation) triggering, and 1 isolated, independent and potential-free relay (NC) to indicate faults (watchdog).

The display mode on the display 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 indicative LEDs and the data communication port



They 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 **EPU IOT**<sup>™</sup> software with **BLUETOOTH** or **USB connection.** 

The **EPU IOT** Thermal Protection Relay is built in a high mechanical strength aluminum housing, with measurements of 98x98x37mm, following DIN IEC 61554 standards for panel fixing.

#### MAIN FEATURES

#### **Communication Protocols**

- MQTT TLS/SSL;
- DNP3 Level 1;
- Modbus-RTU;

#### **Communication Ports**

- Built-in WIFI modem
  - Standards: 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-type cryptography;
  - Version 4.2 BR / EDR and BLE (Low Energy);
- USB
  - Version 2.0;
  - Transfer rate 480 Mbps;
  - Micro-B type connector;
- RS-485
  - Standard ANSI/TIA/EIA-485-A;
  - Max. 32 equipments;
  - Half Duplex;
  - Multipoint;
  - Distance: Max.1,200 meters;
  - 2 metal wires;
  - Automatic speed from 1,200 to 57,600 bps;

#### **Dimensions & Power Supply**

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

#### Human Machine Interface (HMI)

- 4 Navigation keys;
- 9 or 10 LEDs on the front for event indications (see order);
- Intuitive menus for consultation and parameterization;

#### Measurement Input

- Up to 16 temperature measurement inputs for PT100 sensor, 100  $\Omega$  0 °C (EN60751 DIN43760) or Cu10 type Temperature Sensors, 10  $\Omega$  to 25 °C;
- Accuracy of 0.5 % (FE);
- Intuitive menus for consultation and parameterization;

#### **Digital Outputs to Relays**

- 01 Relay (NAF) with a capacity of 10 amps for Temperature Alarm
- Up to 02 Relays (NAF) with a capacity of 10 amperes for FAN (cooling) with programmable trigger timing;
- O1 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 (Fault) with programmable trigger timing;
- Intuitive menus for consultation and parameterization.

#### **Analog Outputs**

• Supports up to 05 (five) analog outputs (Active 15 Vdc) with range options of: 0 to 1 mA, 0 to 5 mA, 0 to 10 mA, 0 to 20 mA and 4 to 20 mA;

#### 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 μsec. / 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 (IEC60255-22-4): Alim/Input/Outputs = 4 KV/common 2 Kv;
- Surge Immunity (IEC 60255-22-5): phase/neutral 1 KV, 5 per polar (±) phase-ground/neutral-ground 2 KV, 5 per 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 (IEC 60255-21-1): 3-axis / 10 to 150 Hz / 2 G / 160 min/axis;
- Vibration Response (IEC60255-21-1): 3-axis / 0.075mm -10 to 58 Hz / 1 G from 58 to 150 Hz / 8min / axis.





TECHN	ICAL	DATA

EPU - UNIVERSAL THERMAL PROTECTION					
RELAY					
Operating Voltage	24 to 275 Vdc/VAC 50/60 Hz				
Operating Temperature	-40 °C to + 85 °C / -10 °C to +70 °C				
Power Consumption	< 15 W				
	Up to 16 Sensors - PT100 Ohm at 0°C,				
Temperature Measurement Input	2 and 3 wires (EN 60751 - DIN 43760) /				
	Cu10 10 Ω				
	at 25 °C.				
Measuring Range	-50 °C to 250 °C				
	0 1 mA - 8000 Ohms				
	0 5 mA - 1600 Ohms				
Active Analog Output 15 Vdc and	0 10 mA - 800 Ohms				
Maximum Load.	0 20 mA - 400 Ohms				
	4 20 mA - 400 Ohms				
Maximum Input Measurement Error	0.5 % end-of-scale				
Maximum Analog Output Error	0.5 % end-of-scale				
Output Contacts	4 (NAF) – Potential-Free				
Maximum Switching Power	70 W / 250 VA				
Maximum Switching Voltage	250 Vac/125 Vdc				
Maximum Driving Current	10 Amps				
Front Communication Port	Micro USB				
Serial Communication Port	RS 485 – 2-wire (ANSI/TIA/EIA-485A)				
	Standards B/G/N/E/I				
	WPA/WPA2/WPA - Enterprise				
WI-FI	Up to 150 Mbps data rate				
	3 dBi recessed antenna				
	Up to 21 dBm transmit power				
Bluetooth	Version 4.2 BR / EDR and BLE (Low				
	Energy)				
Communication Protocol	Modbus RTU, DNP 3.0-L1 and MQTT –				
	TLS/SSLok				
Auto Baud Rate	1 200 to 57 600 bps				
	1,200 to 57,000 ups				
Caixa DIN IEC 61554	98 x 98 x 98 mm				
Fixation	Panel Door with Steel Cleat				
Protection	IP40 (front), IP 20 (connectors)				

Table 1 – Technical Data of EPU-IOT Thermal Protection Relay

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#### 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 Dec. / 5 kV / 3 neg. and 3 pos. / 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 / 10 V/m;
- Immunity to Fast Electrical Transients (IEC60255-22-4): Alim/Input/Outputs=4 KV/common 2Kv;
- Surge Immunity (IEC60255-22-5): phase/neutral 1 KV, 5 per polar (±) phase-to-ground/neutral-to-ground 2KV, 5 per polar (±);
- Immunity to conducted electromagnetic disturbances (IEC61000-4-6): 0.15 to 80 MHz / 10V/m;
- Climate Test (IEC60068-21-14): 40 ºC + 85 ºC / 72 hours;
- Vibration Resistance (IEC60255-21-1): 3-axis / 10 to 150Hz / 2G / 160min / axis;
- Vibration Response (IEC60255-21-1): 3-axis / 0.075mm -10 to 58Hz / 1G from 58 to 150Hz / 8min/axis;



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DIMENSIONS AND CONNECTION DIAGRAM



Figure 1 - EPU Dimensions



#### **EPU CONNECTION DIAGRAMS**



Figure 2 - EPU with 3 temperature inputs with up to 5 analog outputs, 1 analog output, and 1 and up to 2 ventilation groups



Figure 3 - EPU with 4 temperature inputs with up to 5 analog outputs, 1 RS485 output and 1 and up to 2 ventilation groups

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**.** 

24...275 Vdc/Vac

64 65 66

A1\_\_A2

TRIP

•

Figure 4 - 6-input EPU with up to 5 analog outputs, 1 RS485 output and 1 and up to 2 ventilation groups

TRIP

58 59 60 61 62 63

•

FAULT

24...275 Vdc/Vac

64 65 66

A1\_A2



Figure 5 - EPU with 8 temperature inputs with up to 5 analog outputs, 1 RS485 output and 1 and up to 2 ventilation groups



Figure 6 - EPU with 9 temperature inputs, 1 RS485 output and 1 and up to 2 ventilation groups



Figure 7 - EPU with 12 temperature inputs, 1 RS485 output and 1 and up to 2 ventilation groups

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Figure 8 - EPU with 16 Temperature inputs, 1 RS485 output and 1 ventilation group.

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



Figure 9 - Diagram with 2-Wire Sensor and 3-Wire Sensor Connections



Fig. 10-EPU monitoring dry transformer



Figure 11 - EPU with up to 16 temperature channels monitoring induction motor



Figure 12 - EPU with up to 16 temperature channels monitoring Engine Control Center (MCC)



Figure 13 - EPU with up to 16 temperature channels monitoring generator



APPLICATION WITH UP TO 16 TEMPERATURE CHANNELS – HYDROELECTRIC TURBINE



Figure 14 - EPU with up to 16 temperature channels monitoring Hydroelectric Turbine

APPLICATION WITH UP TO 16 TEMPERATURE CHANNELS – BOW THRUSTERS



Figure 15 - EPU with Up to 16 Temperature Channels Monitoring Bow Thruster



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**OPERATION CHART** 



Fig. 17 – Operation Chart



### PREVENTIVE MAINTENANCE

Items to be checked be treempliedy       Functional structure of the structure of th	PREVENTIVE AND CORRECTIVE MAINTENANCE							
SHARE     Verification Elements     CATIVITIES     Every bit of the part door or part of the part door		Items to be checked	Frequency of Verification			Corrective action		
Number of the series of the series of fixing of the panel door or paneli.e.xi.e.i.e. $Permeter or combinedAnalysis of the series of fixing the care of fixing the $	SHARE	Verification Elements ACTIVITIES		Every Month	Every 3 Months	Every 6 Months	Every 1 Year	When Needed
Mean       Autochnem and attachment to the independent of the indep		Fastening clip and snap to the rail	Fixing to the panel door or panel bottom		x			
VERTICAL       intensity       Tathetning the screws in fixing the       x		Terminal blocks and	Attachment and attachment to the equipment		x			Retightening, Fitting, changing terminals or changing screws
Senon       Integrity / Positioning / Fixation       Image: Constraints of the senon weight of t	VERIFICAT ION	connector comb	Tightening the screws in fixing the conductors		x			
Sensor Well n Oil       Oil level in the well       Image: Constraint of the constraint		Sensors	Integrity / Positioning / Fixation			x		Replacement, Repositioning and/or Attachment of Sensors
Digital Relays and OutpusIndividual drive testIn		Sensor Well in Oil Transformers	Oil level in the well			x		Filling with oil to the indicated level
Left or DisplaysTest Lead Lad's and DisplayIII <t< td=""><td></td><td>Digital Relays and Outputs</td><td>Individual drive test</td><td></td><td></td><td>x</td><td></td><td></td></t<>		Digital Relays and Outputs	Individual drive test			x		
Navigation buttonsNavigation test of navigation buttonsImage: Constraint of the sensitive sensor inputs using a line sensor input voltageImage: Constraint of the sensitive sensor input voltageImage: Constraint of the sensitive voltage input voltage sensor input voltageImage: Constraint of the sensitive voltage input voltage sensor input voltageImage: Constraint of the sensitive voltage input voltage sensor input voltageImage: Constraint of the sensitive voltage input voltage sensor input voltageImage: Constraint of the voltage voltage input voltage sensor input voltageImage: Constraint of the voltage		Led's e Displays	Test Lead Led's and Display Segments			x		Refer to technical assistance from
MassesMoode and the sense input sense in		Navigation buttons	Navigation test of navigation buttons			x		Electron do Brasil
TESIS & MEASURE		Two-Sensor Input Benchmarking sensor inputs using a standard					X	
RS-485 communication       Communication and command       Image: Communication and command testing in the supervisory system       Image: Communication and command testing in the supervisory system       Image: Communication and command testing in the supervisory system       Image: Communication and command testing in the supervisory system       Image: Communication and command testing in the supervisory system       Image: Communication and command testing in the supervisory system       Image: Communication and command testing in the supervisory system       Image: Communication and command testing in the supervisory system       Image: Communication and command testing in the supervisory system       Image: Communication and command testing in the supervisory system       Image: Communication and command testing in the supervisory system       Image: Communication and command testing in the supervisory system       Image: Communication and command testing in the supervisory system       Image: Communication and command testing in the supervisory system       Image: Communication and communication and communication testing in the supervisory system       Image: Communication and communication and communication testing in the supervisory system       Image: Communication and communication and communication and communication testing in the supervisor and communication and communication and communication and communication testing in the supervisor and communication and communication and communication testing in the supervisor and communication and communication and communication and communication testing in the supervisor and communication and communicatits and testing in the supervisore and com	TESTS & MEASURE MENTS	Input voltage Supply equipment	Measure Power Input Voltage			x		Override voltage input values according to equipment model
Milliampere Current Signal ulputs       Measuring, comparing, and gauging mode       Image: Comparing and gauging and accumulation comparing and gauging mode       Image: Comparing and gauging mode       Image: Comparing and gauging and accumulation compar		RS-485 communication outputs	Communication and command testing in the supervisory system			x		
Signal outputs of milliampere current       Measuring, comparing, and gauging mode       x       x       x         Terminal blocks and junction box       Terminal blocks and junction box       Depring and Moisture       x       a       a       a         Atuminum Equipment Forti Display of the equipment       Debris, Impurities and Moisture       x       a       a       a       a         Image: All colorare       All minum Equipment Forti Display of the equipment       Debris, Impurities and Moisture       x       a       <		Milliampere Current Signal Inputs	Milliampere Current Signal Inputs Measuring, comparing, and gauging input signal in passive and/or active mode			x		Refer to technical assistance from Electron do Brasil
CLEANING       Terminal blocks and connector comb and junction box.       Debris, Impurities and Moisture       x       Image: Cleaning with a dry cloth, compressed a and vacuum cleaner         Auminum Equipment       Debris, Impurities and Moisture       x       Image: Cleaning with a dry cloth, compressed a and vacuum cleaner         Front Display of the equipment       Toth Display of the equipment       Image: Cleaning with a dry cloth, compressed a and vacuum cleaner         Image: Cleaning with a dry cloth, compressed a and vacuum cleaner       x       Image: Cleaning with a dry cloth, compressed a and vacuum cleaner         Image: Cleaning with a dry cloth, compressed a and vacuum cleaner       x       Image: Cleaning with a dry cloth, compressed a and vacuum cleaner         Image: Cleaning with a dry cloth, compressed a and vacuum cleaner       x       Image: Cleaning with a dry cloth, compressed a and vacuum cleaner         Image: Cleaning with a dry cloth, compressed a and vacuum cleaner       x       Image: Cleaning with a dry cloth, compressed a and vacuum cleaner         Image: Cleaning with a dry cloth, compressed a cleaning wit		Signal outputs of milliampere current Measuring, comparing, and gauging input signal in passive and/or active mode				x		
CLEANING       Aluminum Equipment       Debris, Impurities and Moisture       x       a       a       Cleaning with a dry cloth, compressed a and vacuum cleaner         Front Display of the equipment       Front Display of the equipment       x       a		Terminal blocks and connector comb and junction box		x				
Front Display of the equipment       x       x       x         Image: A ten pair of the equipment within the ideal working temperature (50°C to 60°C) prolongs the useful life and avoids corrective maintenance.       1 - Keeping the equipment within the ideal working temperature (50°C to 60°C) prolongs the useful life and avoids corrective maintenance.         Image: Imag	CLEANING	Aluminum Equipment Enclosure	Debris, Impurities and Moisture	x				Cleaning with a dry cloth, compressed air and vacuum cleaner
<ul> <li>ATENÇÃO</li> <li>1 - Keeping the equipment within the ideal working temperature (50°C to 60°C) prolongs the useful life and avoids corrective maintenance.</li> <li>2 - The accumulation of dust and impurities in the installations can cause short circuits and burnout of equipment and sensors.</li> <li>3 - After 10 years of use, it is recommended to replace the equipment.</li> </ul>		Front Display of the equipment		x				
Table 2 – Preventive maintenance	<ul> <li>ATENÇÃO</li> <li>1 - Keeping the equipment within the ideal working temperature (50°C to 60°C) prolongs the useful life and avoids corrective maintenance.</li> <li>2 - The accumulation of dust and impurities in the installations can cause short circuits and burnout of equipment and sensors.</li> <li>3 - After 10 years of use, it is recommended to replace the equipment.</li> </ul>							
			Table 2 – Pre	ventive n	naintenan	се		

Version 3.1



#### 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 EPU-IoT 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/

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**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/



### User Manual Universal Thermal Protection Relay - EPU

#### GETTING TO KNOW THE EPU





Figure 1 - Human-Machine Interface (HMI)



#### CONSULTATION FLOWCHART AND ACCESS TO CONFIGURETION MENUS

Press the **SET** key and the initial **COF** will appear. Then, use the increment or decrement keys to navigate through the menu, to consult the desired parameter, press SET key to return to the previous menu, press the ESC key.



Figure 2 - Setup menu Flowchart





#### MISCELLANEOUS SETTINGS FLOWCHART



Figure 3 - Fluxograma 1

CONFIGURETION MENU					
Menu	Parameter	Variable	Description		
		•	·		

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R Ele	ectron		User Manual Universal Thermal Protection Relay – EPU ANSI – 23 / 26 / 38 / 45 / 49 / 74 / 77 / 94
SEn	S-ISI8	00 - OFF	Menu to enable and or disable the input of sensors. Select the ON or OFF option in the menu and confirm it by pressing the SET key.
dSP	იმა 508 იმი		Menu to select temperature display mode: HOE HOT mode, displays only the sensor with the highest temperature; SCR SCAN mode, displays the temperature of the sensors sequentially and automatically; RRn MANUAL mode, displays the temperature of the sensors only through the navigation keys;
OFT	S-1S-18	+ 10 10	Menu to adjust the reading offset for each sensor. It allows making a correction in the temperature measured by the sensors by adding or subtracting the configured value. For example: <b>5-1</b> Set the value to add or subtract from sensor 1; <b>5-2</b> Set the value to add or subtract from sensor 2; Before making any changes to the sensors offset, check: • If the FLS sensor reading range menu setting is correctly configured. • In order for this correction parameterization to be carried out, the deviation must be linear, that is, the same deviation from the beginning to the end of the scale.



The equipment has menus that depend on the model purchased to be available.



Figure 4 - Flowchart 2

2	<b>e Elect</b>	r <b>on</b>	User Manual Universal Thermal Protection Relay – EPU ANSL – 23 / 26 / 38 / 45 / 49 / 74 / 77 / 94
FLU	UXOGRAMA DE	CONFIGUREÇÕES	DIVERSAS
858	S-IS-I8	50.0°C250.	Menu para conFigurer a temperatura de acionamento do Alarme (Alarme por Temperatura Alta). Quando algum sensor atingir a temperatura conFigureda, o relé <b>ALARM</b> é acionado (bornes 31, 32 e 33) e o LED <b>ALARM</b> no frontal do equipamento começa a piscar indicando que alarme está ativo.
		°°C	Configure a temperatura de acionamento do relé <b>ALARM</b> desejada para cada sensor e a confirme pressionando a tecla <b>SET</b> .
			Menu para conFigureção de Histerese (Histerese de Desligamento de Alarme). Diferença de temperatura para desativar o relé ALARM (bornes 31, 32 e 33), podendo ser ajustável com valores entre 0°C e 10°C.
hdR	ъdЯ	0°C/I0°C	Example: If the temperature (RCR) is programmed at 100°C and the difference (hoR) programmed at 5°C, the ALARM relay LED will be flashing between 95°C and 100°C and will turn off only when the temperature reaches any value below 94°C.
			Set the desired Alarm Hysteresis value and confirm it by pressing the SET key.
		; 50.0°C2SO. 0°C	Menu for setting the Shutdown Temperature (High Temperature Shutdown). When the sensor reaches the temperature set in this menu (dch) the TRIP relay LED (terminals 34, 35 and 36) will start to flash, starting the time count (croil for shutdown. During the count, the time set in croil will also be shown on the numeric display.
858	5-15-10		Example: If d means shutdown will occur within 1 minute.
			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 off. If the configured value is $0^{\circ}$ , the TRIP relay will trip immediately.
			Set the shutdown temperature for each sensor and confirm by pressing the SET key.
۲rd		0-20	Menu to adjust the Shutdown Timer from 0 to 20 minutes. When the temperature of the sensors of the $\frac{dER}{dER}$ reaching the configured value, the EPU will start counting the time to make the shutdown. If the configured value is '0', the TRIP relay will activate immediately.
			Set the desired OFF time and confirm by pressing the SET key.
ხჩი	S-IS-I8	3°a82 258a°C	Menu to adjust the Cooling On Temperature (Fan). When reaching the value programmed in this parameter, the FAN Relay (terminal 40, 41 and 42) will activate and its respective LED will light up.

SHSH8	50.º°C 250.º°C	Menu to adjust the Cooling On Temperature (Fan). When reaching the value programmed in this parameter, the FAN Relay (terminal 40, 41 and 42) will activate and its respective LED will light up, indicating the activation of the cooling.
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8	Elect	ron	User Manual Universal Thermal Protection Relay – EPU ANSI – 23 / 26 / 38 / 45 / 49 / 74 / 77 / 94
			Cooling Hysteresis Menu, temperature difference to turn on and off the Cooler.
hdr		0°C/30°C	Example: If the temperature set in the menu $\begin{array}{c} & & \\ & &$
185	8 당 당 징		<ul> <li>Menu to enable or disable Automatic Inversion of fan groups.</li> <li>diables inversion of the ventilation group.</li> <li>di it enables inversion, that is, at each new departure of the groups, an inversion is performed, making the group that had previously started first become the 2nd group.</li> <li>di will start the 2 groups of fans simultaneously.</li> <li>Select the desired option and confirm by pressing the SET key.</li> </ul>
84S		1254	Choose the ID Network address to the equipment between 1 to 254.
	8L8 8E5 LOn F8L 6H 6F2	Menu for choosing pressing the SET ke	Relays Trigger Logic. Select the desired Logic and confirm by y.
10.		5 nor "Normal" Relay Initial	"Normal" Relay Initial Conditions.
		lnU	"Inverse" Relay Initial Conditions.



#### **TESTS MENU FLOWCHART**



Figure 5 - Fluxograma 3

$\bigotimes$	Electr	on	User Manual Universal Thermal Protection Relay – EPU ANSI – 23 / 26 / 38 / 45 / 49 / 74 / 77 / 94
٤S٤	8L8 885 881 84 84 84		Attention when using this menu, it activates the relay outputs and lights up the EPU LEDs so that the operator can make sure they are working. However, if the monitor is in operation and the TRIP relay (shutdown) is connected to the system protection, it will activate and the protection and the system will operate, turning off the transformer or the machine it is protecting <b>RLR</b> - "Activates relay 1 after pressing the SET " key (ALARM relay). <b>dES</b> - "Activates relay 2 after pressing the SET" key (OFF relay). <b>FRL</b> - "Activates relay 3 after pressing the SET key (Relay FAIL). <b>Srl</b> - "Activates relay 4 of the first Ventilation group after pressing the SET " key (FAN relay). <b>Sr2</b> - "Activates relay 5 of the first Ventilation group after pressing the SET " key (FAN relay). <b>LEd</b> - "Activates all LEDs on the display when pressing the SET key".

TESTS MENU



The equipment has menus that depend on the model purchased to be available.

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CURRENT OUTPUTS CONFIGURETION MENU FLOWCHART



Figure 6 - Fluxograma 4



FLUXOGRAMA DO MENU DE CONFIGUREÇÃO DE SAÍDAS DE CORRENTE

rRS	0.1 0.5 0.10 0.20 4.20	 Current Output Range Menu (Terminals 21 and 22) where the user can select one of the first 3 options following options:3 0.01 Enables the current output from 0 to 1mA; 0.05 Enables the current output from 0 to 5mA; 0.10 Enables the current output from 0 to 10mA; 0.20 Enables the current output from 0 to 20mA; 4.20 Enables the current output from 4 to 20mA;
OUC	0FF 5-1 5-2 5-3 5-3 5-3 5-3 5-3 5-3 5-10 5-10 5-10 5-10 5-10 5-10 5-10 5-10	Menu to set the channel to be transmitted on the analog output: OFF Disables the temperature transmission analog output; S - I Enables the temperature of Sensor 1 on the Analog Output; S - 2 Enables the temperature of Sensor 2 on the Analog Output; S - 3 Enables the temperature of Sensor 3 on the Analog Output; S - 4 Enables the temperature of Sensor 4 on the Analog Output; S - 5 Enables the temperature of Sensor 5 on the Analog Output; S - 6 Enables the temperature of Sensor 6 on the Analog Output; S - 7 Enables the temperature of Sensor 7 on the Analog Output; S - 8 Enables the temperature of Sensor 7 on the Analog Output; S - 9 Enables the temperature of Sensor 9 on the Analog Output; S - 9 Enables the temperature of Sensor 10 on the Analog Output; S - 10 Enables the temperature of Sensor 11 on the Analog Output; S - 12 Enables the temperature of Sensor 13 on the Analog Output; S - 13 Enables the temperature of Sensor 13 on the Analog Output; S - 14 Enables the temperature of Sensor 14 on the Analog Output; S - 15 Enables the temperature of Sensor 15 on the Analog Output; S - 16 Enables the temperature of Sensor 14 on the Analog Output; S - 18 Enables the temperature of Sensor 15 on the Analog Output; S - 18 Enables the temperature of Sensor 14 on the Analog Output; S - 19 Enables the temperature of Sensor 15 on the Analog Output; S - 18 Enables the temperature of Sensor 14 on the Analog Output; S - 18 Enables the temperature of Sensor 15 on the Analog Output; S - 18 Enables the temperature of Sensor 16 on the Analog Output; S - 18 Enables the temperature of Sensor 16 on the Analog Output;

8	2 EI	ectron	User Manual Universal Thermal Protection Relay – EPU ANSI – 23 / 26 / 38 / 45 / 49 / 74 / 77 / 94
	Olo	-S00°C2S00°C	Maximum and minimum current output range conFiguretion menu to mirror the read Temperature. <b>Example</b> : Analog Output 1 from 4 to 20mA with a range from 0 to 150 mirroring Sensor 1:
r86			- Set RAS to 4-20, and RANG>>UT1 Minimum to (0) and Maximum to (150) and OUC >>UT1 as <b>5-1</b> .
			In this conFiguretion, the analog output will mirror the value from 0 to 150 corresponding to sensor 1 (when it is 0 the signal will be 4 mA and when it is 150 the signal will be 20 mA).
		JOW-CCJOW-C	Use the inclement and declement keys to change the values. At the end of the adjusted parameter, press the SET key to record the chosen value.
			Menu to adjust current output deviation. Allows you to correct the current outputs by adding or subtracting the configured value. UC - Set the value to add or subtract from the magnitude mirrored by the current output
356	68	oB -10.5., 10.5	Before making any changes to the current output offset, check:
			If the menu setting <b>PS</b> 0-1mA, 0-5mA, 0-10mA, 0-20mA or 4-20mA is correct if menu the rA6 is configured with the correct start and end of scale and if in the menu <b>DUC</b> is configured to mirror the correct sensor.
			In order for this correction parameterization to be carried out, the deviation must be linear, that is, the same deviation from the beginning to the end of the scale.



The equipment has menus that depend on the model purchased to be available.



#### SERIAL COMMUNICATION SETUP FLOWCHART



Figure 7 Fluxograma 5

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SERIAL COMMUNICATION SETUP MENU					
Enc		0n <b>/</b> 0FF	Fans daily exercise schedule menu. Daily exercise disabled. OFF Daily exercise enabled. Select the desired option and confirm by pressing the SET key. After 1 minute of programming confirmation 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 after the first activation. NOTE: If the equipment is de-energized, the cycle will be repeated.		
UCS	80 12 78 78 78 78 78 78 78 78 75		<ul> <li>Serial Communication Speed Menu:</li> <li>Automatically detect communication speed;</li> <li>Fixed communication speed at 1,200bps;</li> <li>Fixed communication speed at 2,400bps;</li> <li>Fixed communication speed at 4,800bps;</li> <li>Fixed communication speed at 9,600bps;</li> <li>Fixed communication speed at 19,200bps;</li> <li>Fixed communication speed at 38,400bps;</li> <li>Fixed communication speed at 57,600bps;</li> </ul>		
₽-0		606	<ul> <li>Menu to enable one of the two Communication Protocol options:</li> <li>Press the SET key on the acronym habilitar o Protocolo de comunicação Modbus RTU.</li> <li>Press the SET key on the acronym on to enable the DNP3 communication protocol.</li> </ul>		
Pri		n0n 28r 102	Menu for choosing the parity, that is, the last bit after the data bits to be transmitted in the message to verify data integrity:		
Բեր		ძნი ჩნი	Parameter Write Protection Menu: Disable Write Protection. Disable Write Protection. Select the Output option and confirm it by pressing SET.		

The equipment has menus that depend on the model purchased to be available.



FLUXOGRAMA DE MENU DE SENHA



Figure	8	-	Fluxograma	6
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MENU DE SENHA						
PRS		0.00/999	Set a new password in a range of here digits			

#### **DEFECT SOLUTION**

The sensor automatically returns to reading mode when the error is normalized, to reset the **EPU** press the **SET** key for approximately 5 seconds until the word **EPU** press the SET key for approximately 5 seconds until the initials **rST**, then release and the **EPU** Protection Relay will reset. The **EPU** will activate the **FAULT** relay (terminals 37, 38 and 39) in case the display shows the parameter OFF or if there is a power failure

Display	Cause	Solution
OFF	Equipment is not receiving reliable signal from Sensor	<ul> <li>Check and replace the sensor cable if it is not shielded.</li> <li>Check sensor cable grounding.</li> <li>Check for possible bad contacts in the connectors.</li> </ul>
		• 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 used, ensure that there is no potential difference between them. Properly grounded sensors and power supply prevent malfunction or damage from equipment disturbances, surges, and inductions.

2. Do not use the Universal Thermal Protection Relay EPU directly in the sun, whenever it is installed in the field it is important that it has a panel with smoked glass, so that the ultraviolet rays that attack the frontal polycarbonate are filtered, in this way the life of the equipment will be prolonged.

#### WARANTY TERM

The Universal EPU Electron Thermal Protection Relay has a two-year warranty period from the date of sale stated on the invoice, with coverage for any manufacturing defects that make it inappropriate or inadequate for the intended applications.

#### Warranty Exclosion

The warranty does not cover transport costs for technical assistance, freight and insurance for the shipment of a product with evidence of a defect or malfunction. The following events are also not covered: Natural wear of parts due to continuous and frequent use, damage to the outside caused by falls or improper packaging; attempt to repair/break

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the 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 void the warranty when:

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

- Subject to conditions outside the limits specified in the respective technical descriptions.
- Violated or repaired by a person other than Electron's technical staff.
- The damage is caused by a fall or impact.
- Infiltration of water or any other liquid occurs.
- Overloading occurs that causes degradation of components and parts of the product.

#### Use of Warranty

Electron do Brasil technical assistance warranty covers only the equipment repair service. That is, the costs of sending and receiving the equipment are borne by the customer.

To take advantage of this guarantee, the customer must send the product to Electron together with a copy of the purchase invoice, properly packaged so that there is no damage during transport. For an emergency service, it is recommended to send as much information as possible, referring to the detected defect. The equipment will be analyzed and subjected to complete functioning 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.

#### CONFORMITY DECLARATION

Available for download at the following email address:

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