MoniTemp

Manual

INDEX

INTRODUCTION

The MoniTemp **Temperature Monitor** was developed to supervise 3 (three) temperature channels simultaneously, it is used to protect and monitor transformers (ANSI 49) Dry or oil, machines, furnaces or any other type of process that requires high precision and reliability equipment, Monitemp also commands ventilation and heating (on / off), Alarms and Trip (shutdown) .

The **MoniTemp** was built obeying strict quality standards and uses state-of-the-art electronic components (SMD), its hardware was designed to withstand severe working conditions, and can be installed directly in power transformers and reactors, in panels in the yard of power substations, offshore platforms and chemical industries. Meets the levels of requirements, supportability and reliability according to IEC, DIN, IEEE, ABNT standards.

As signal input the **MoniTemp** allows 3 (three) Pt100 temperature sensors, 1 (one) universal analog output configurable between 0 to 10, 0 to 20 or 4 to 20 mA, which mirrors the highest temperature measured at the moment or any of the channels, just configure directly on the display, digital output (RS485) with Modbus RTU or DNP 3.0 protocol that allows access to all MoniTemp parameters including remote control of the drives in time It also has 3 (three) independent temperature setpoints for each sensor and 3 (three) isolated (NAF) and independent drive relays that can be used for alarm, shutdown and activation of fans or pumps, and also has 1 (one) relay for fault indication (watchdog).

The display mode on the **MoniTemp** display is fully configurable, being able to show the highest temperature at the moment, or fix on the display the channel temperature that the operator wants, or using the "SCAN" function, which is made a complete scan in all channels continuously. Through the front indicative LEDs and through the data communication port it is possible to identify which of the channels caused the alarm, the shutdown or the activation of the fans, all the functions and parameterizations are easily configured directly on the instrument panel or through the RS-485 communication port.

The MoniTemp is built in aluminum housing measuring 48x96x140mm, within the DIN standards for panel fixing.

MAIN FEATURES

- 4-digit high-luminosity LED display (red);
- Accuracy of 0.5% (FS) and indication of 1 decimal place;
- Temperature measuring range from 0 to 200ºC;
- Compensated input for Pt100 3-wire sensors;
- RS-485 Digital Output with Modbus RTU or DNP 3.0 protocol;
- Auto Baud Rate from 1,200 to 57,600 bps (Automatically Detects Communication Network Speed)
- Analog output from 0 to 1, 0 to 5, 0 to 10, 0 to 20 and 4 to 20 mA configurable for any of the measured channels;
- Drive of fans, pumps or heaters directly on the front;
- Stores in memory the maximum temperatures reached;
- NAF Alarm Contact for temperature that reaches the configured value;
- Timed PAL Shutdown Contact, for temperature that reaches the configured value;
- Contact of ventilation drive or NAF pump, with programmable hysteresis;
- Contact for Fault Indication (watchdog);
- High mechanical strength box, built entirely in aluminum;
- Reduced size 48x96x140mm;
- Easy parameterization and use;
- 2 years warranty.

TECHNICAL DATA

Operating Voltage	48 to 265 Vdc/Vac 50/60 Hz
Operating Temperature	-40 to +85°C
Consumption	<15 W
Temperature Measurement Input	3 - Pt100 Ohm at 0°C at 3 wires
Measuring Range	0 to 200°C
Analog Outputs and Maximum Load Options (see note below)	0 ... 1 mA - 8000 Ω
	0 ... 5 mA - 1600 Ω
	0 ... 10 mA - 800 Ω
	0 ... 20 mA - 400 Ω
	4 ... 20 mA - 400 Ω
Maximum Error of Measurement Inputs	0.25% of the end of the scale
Maximum Analog Output Error	0.25% of the end of the scale
Outgoing Contacts	4 – Free of Potential
Maximum Switching Power	70 W / 250 VA
Maximum Switching Voltage	250 Vac/Vdc
Maximum Driving Current	6.0 A
Communication Port	RS485
Communication Protocol	Modbus RTU and DNP 3.0 (Slave)
Auto Baud Rate	2,400 to 57,600 bps (autom. / manual
Box	48 x 96 x 140 mm – Aluminium
Fixation	Built-in Panel Mount

Table 1 - Technical Ddos

CONNECTION DIAGRAM

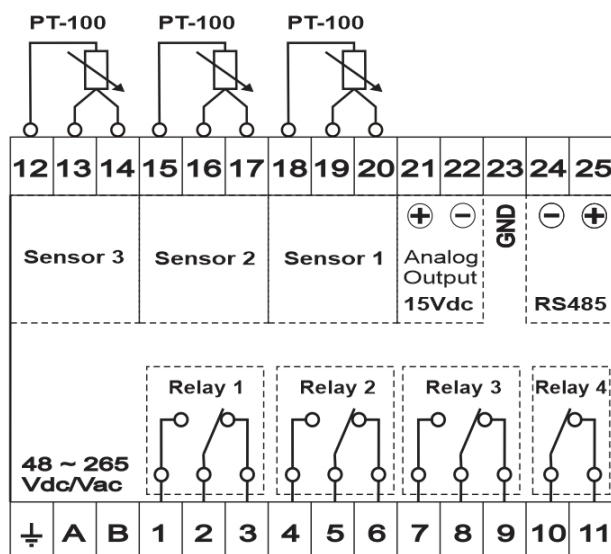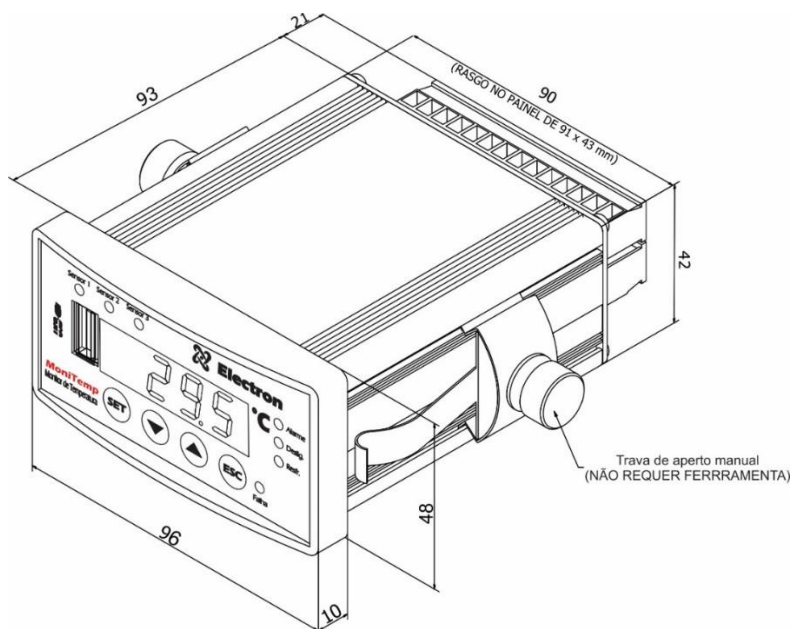*Figure 1 - Illustration of the diagram and connection and technical data*

DIMENSIONS

Figure 2 - Illustration of Monitemp Dimensions

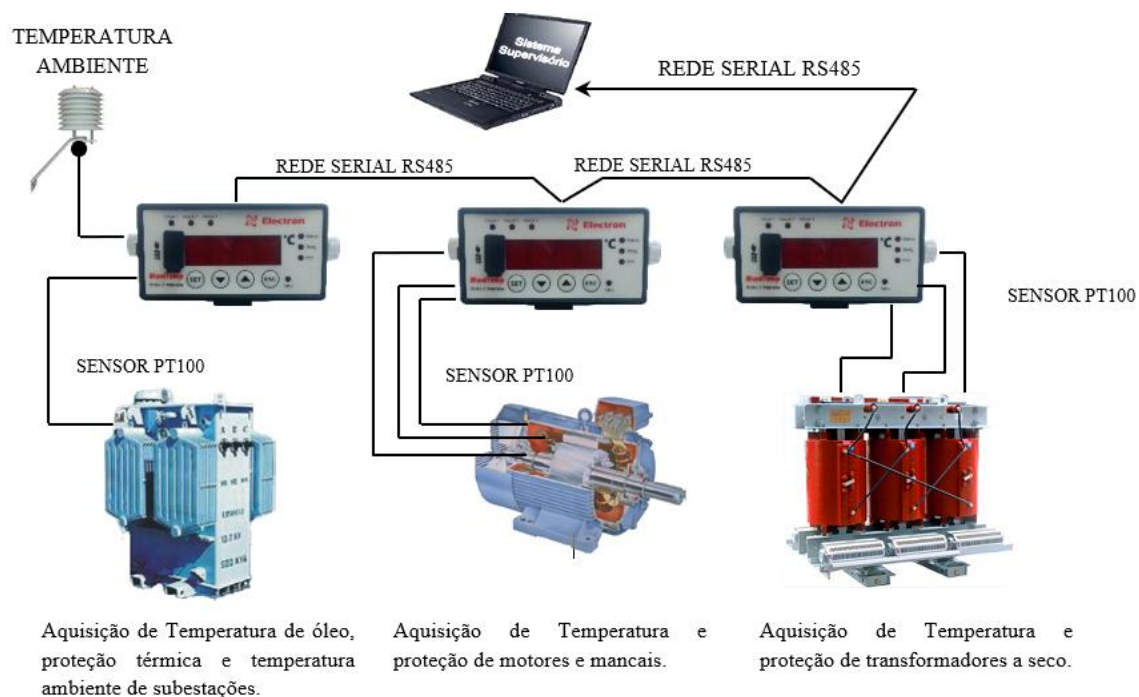www.electron.com.br

APPLICATION EXAMPLE

Figure 3 - Application Illustration
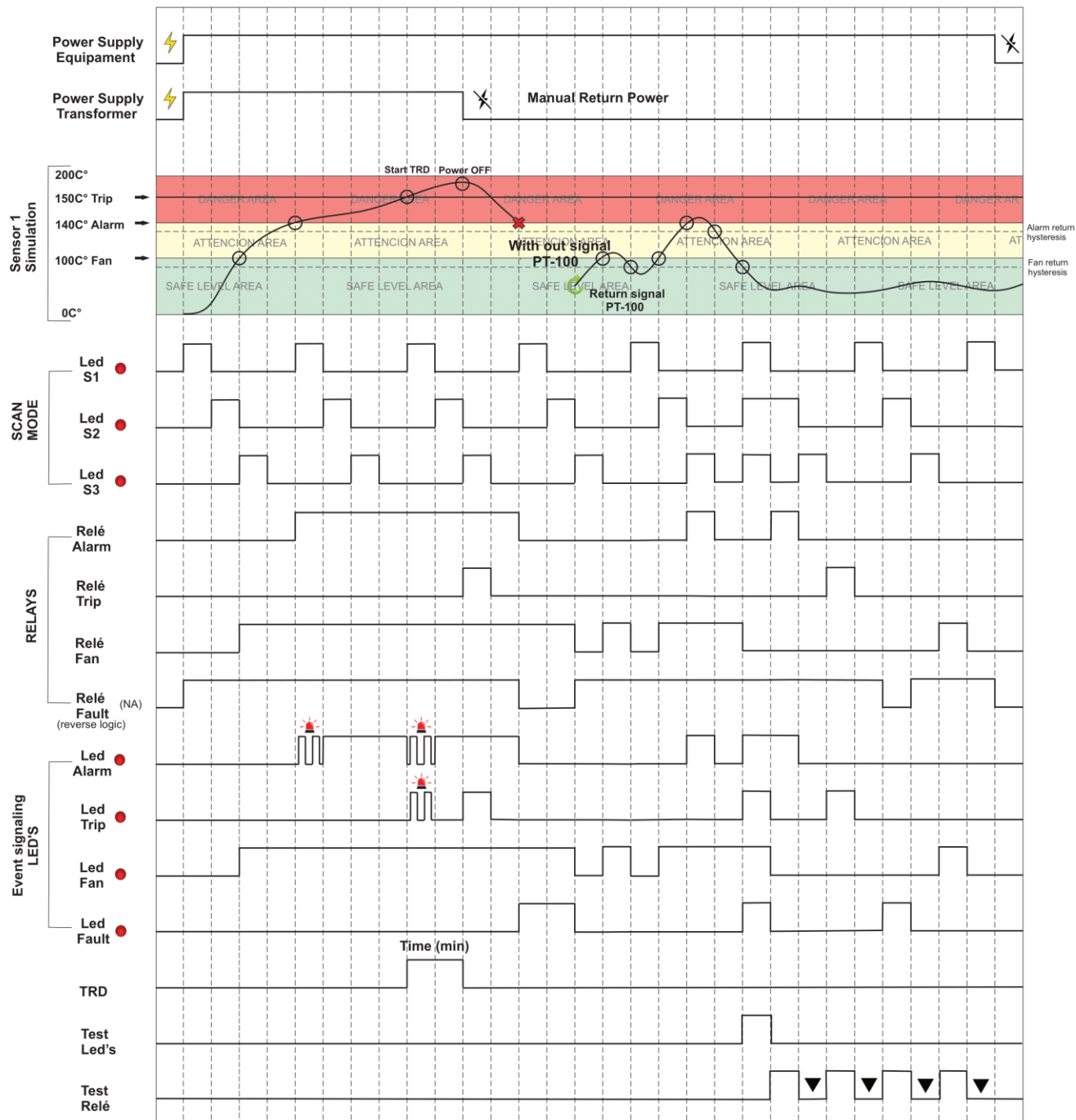
OPERATION CHART

Figure 4 – Operation Chart

PREVENTIVE MAINTENANCE

PREVENTIVE AND CORRECTIVE MAINTENANCE							
Items to be checked preemptively			Scan Frequency				Corrective action
SHARE	Verification Elements	ACTIVITIES	Every Month	Every 3 Months	Every 6 Months	Every 1 Year	When Needed
VERIFICATION	Fastening and fitting clip on the rail	Attachment to panel door or panel bottom		X			Retightening, Fitting, terminal exchange or screw exchange
	Terminals and Connector Comb	Fastening and fitting into the equipment		X			
		Tightening of the screws in the attachment 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		Filling with oil up to the indicated level
TESTS & MEASUREMENTS	Relays and Digital Outputs	Individual drive test			X		Forward to technical assistance of Electron do Brasil
	Led's and Displays	Test drive Led's and display segments			X		
	Navigation buttons	Navigation test of navigation buttons			X		
	Sensor Input	Measure sensor inputs using a pattern				X	
	Input Supply Voltage of the equipment	Measure Power Input Voltage			X		Replace voltage input values according to equipment model
	RS-485 communication outputs	Communication and command testing in the supervisory system			X		Forward to technical assistance of Electron do Brasil
	Milliampere Current Signal Inputs	Measure, compare, and measure input signal in passive and/or active mode			X		
	Milliampere Current Signal Outputs	Measure, compare, and measure input signal in passive and/or active mode			X		
CLEANING	Terminals and Comb of connectors and connection box	Debris, Impurities and Moisture	X				Cleaning with 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) prolongs the useful life and avoids corrective maintenance.

2 - The accumulation of dust and impurities in the installations can cause short circuit and burning of equipment and sensors.

3 - After 10 years of use it is recommended to replace the equipment.

Table 2 – Preventive maintenance

INSTALLATION SOFTWARE FOR PARAMETERIZATION - USEEASY

1) Access the software page on our Website https://electron.com.br/site/softwares/

2) Find your equipment and download the corresponding software
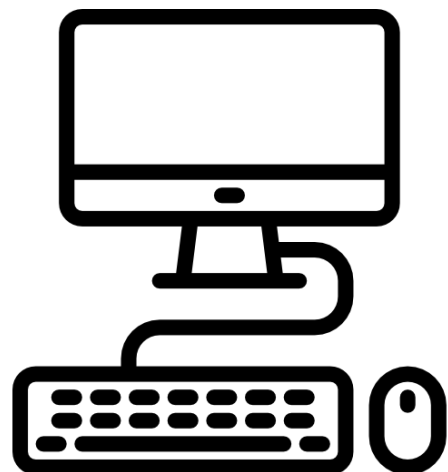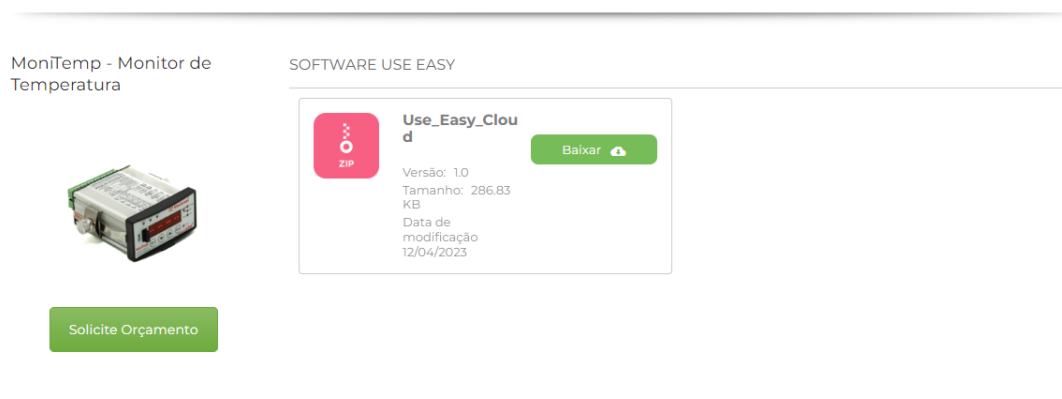
INSTALLATION ACCESSORIES

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 operation of Monitemp.

PT-100 STFE temperature sensor: This sensor can be built with silicone bulb, stainless steel or Teflon. With electrical insulation capacity options of 2 kV, 10 kV or 15 kV. The PT-100 STFE temperature sensor has as a measuring 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 dry-type transformer windings due to its high accuracy 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 sensor terminal.

Link to Electron's PT100 STFE temperature sensor page:

https://electron.com.br/site/produtos/rtd-pt100-2/

PT-100 STE temperature sensor: This sensor is built stainless steel bulb AISI-304 injected aluminum head (IP 65) and adjustable bucim with BSP 3/4" and 1/2" threads or can be manufactured according to design. Its measuring 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 subjected to electrical noise and weathering. 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 sensor terminal.

Link to Electron's PT100 STFE temperature sensor page:

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

Double door panel for outdoor use: Box for external use with double door for mounting instruments, accessories and passage of control wires and power of the power transformer. The external door contains glass display with protection against UV rays 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, according to NBR IEC 60529:2017.

Link to the page of the double port panel for external use – IP 55:

https://electron.com.br/site/produtos/painel-para-uso-externo-ip55/

Reference card for PT-100 signal: This accessory was developed to perform the verification of the temperature value displayed by equipment with input of RTD PT-100 sensors of 3 wires. 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 to the Reference Card page for PT-100 sign:

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

GETTING TO KNOW MONITEMP

Indicação do Sensor apresentado no display (luz fixa) e indicação do canal em modo de alarme (luz piscante).

Tecla para acessar telas de Consulta, Confirmação de Parâmetros. e Reset.

Tecla para navegar no menu e decrementar dígitos.

Display de LED de alto brilho

Tecla para navegar no menu e incrementar dígitos.

Indicação de Alarme Ativo.

Indicação de Desligamento em fase de contagem (piscando) ou Acionado.

Indicação de Refrigeração Acionada.

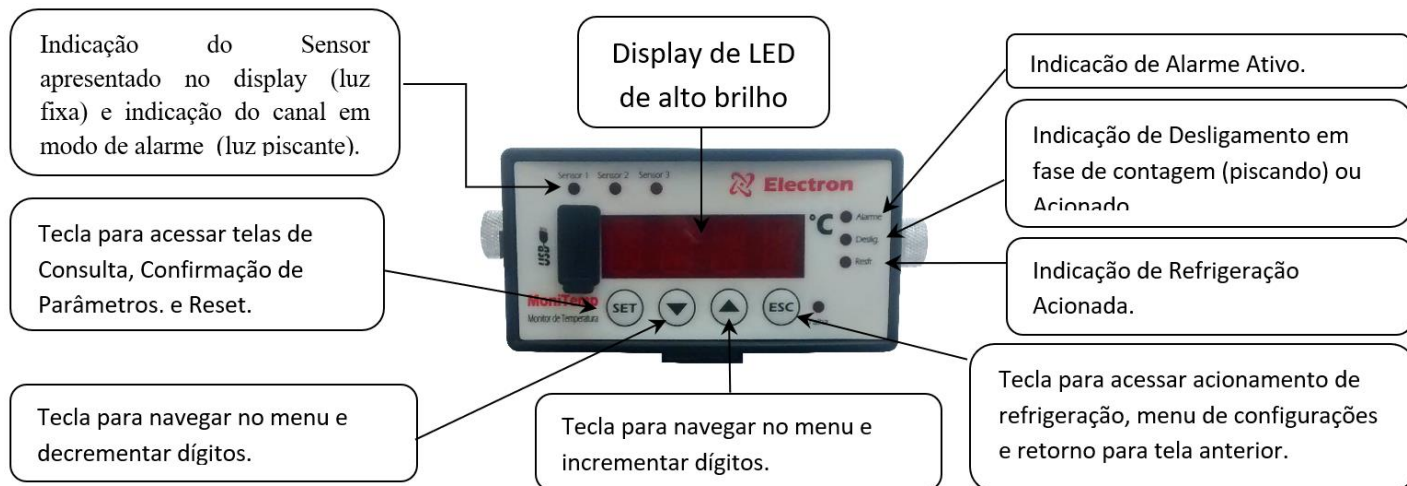Tecla para acessar acionamento de refrigeração, menu de configurações e retorno para tela anterior.
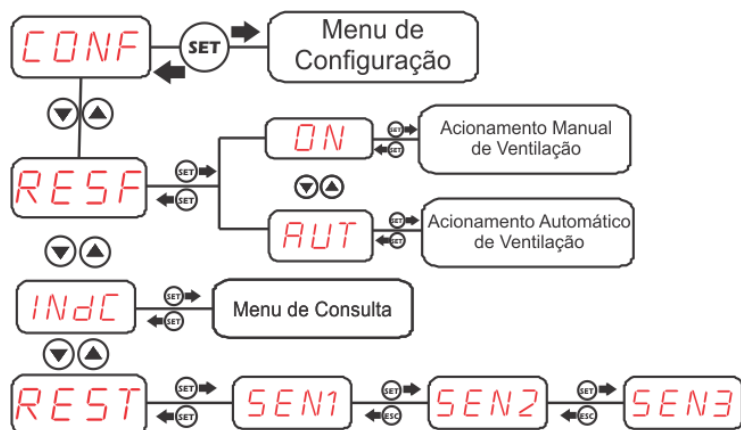
Figure 5 – Fronta Monitemp

CONSULTATION MENU FLOWCHART, RESET AND VENTILATION EXERCISE

Pressing once the **SET key** will appear on the display with the acronym **CONF.** Then use the increment and/or decrement keys to navigate through the menu. To access the desired option, press the **SET** key and to return to the previous menu, press the **ESC key**.

QUERY SCREEN

To access this menu, press the *SET key.* Using the increment key or the decrement key, select the **INdC** option, then press the SET key*.* To consult this menu use the **increment** or **decrement** keys, to view the maximum temperature of each sensor press the *SET* key and press the *ESC key* to return to the previous indicator.
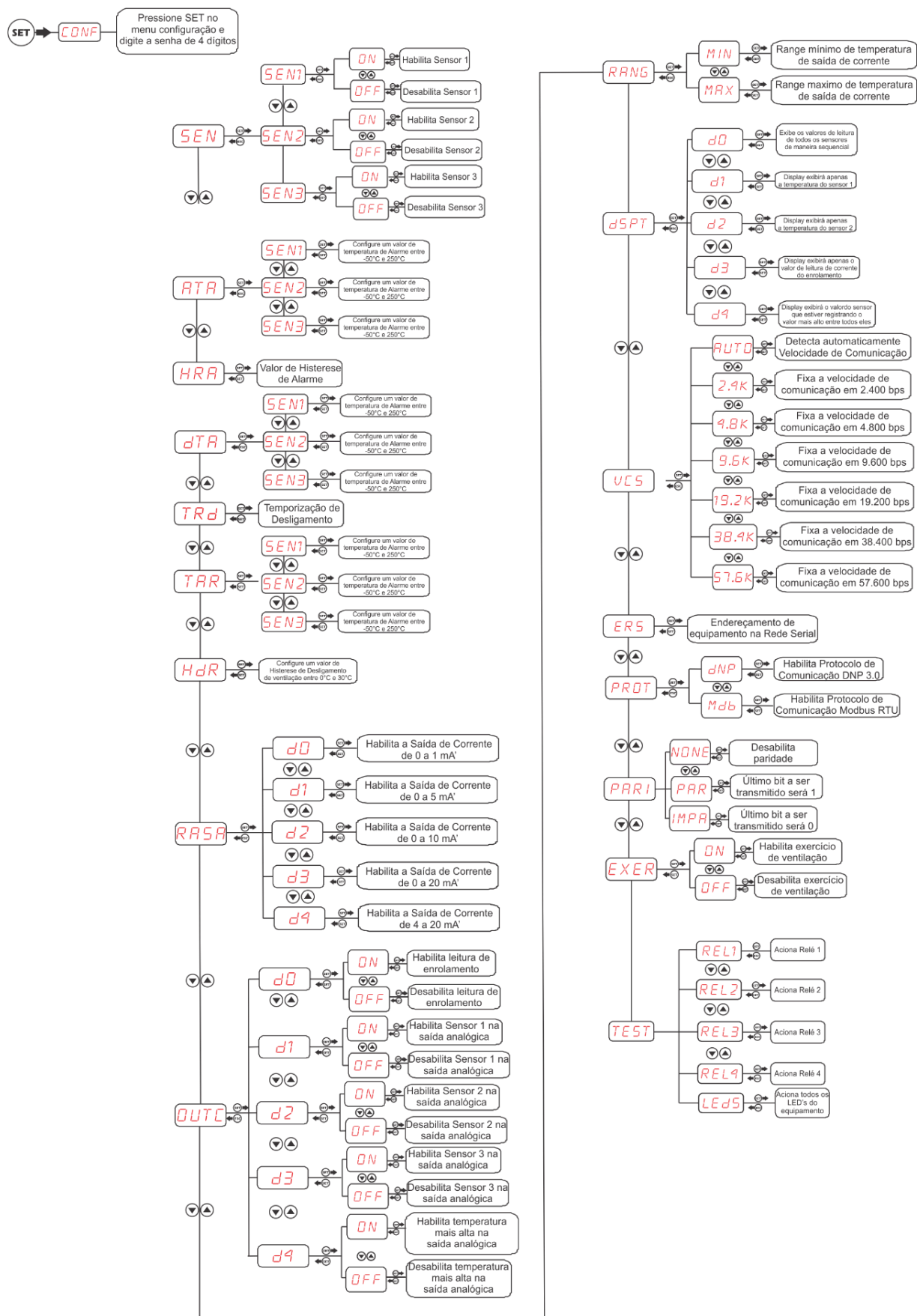
Menu	Parameter	Description
tMAH	*SEN1* *SEN2* *SEN3*	Screen to consult the maximum temperature reached by each sensor, to consult the maximum timing of the desired sensor presceive the SET key and to return to the root menu prescionado the ESC.

VENTILATION DRIVE

Pressing once the SET key will appear on the display of the equipment to the acronym CONF, navigate with the increment or decrement keys until it appears to the acronym **rESF, to choose the mode of operation of the ventilation, press Set** to enter the submenu. Navigating with the increment key or decrement key will choose **On** is for manual fan activation or **AUt** is for automatic triggering, after choosing the parameter always press the **SET key** to register the option.

Display	Variable	Solution
rESF	On / AUt	Menu for manual or automatic activation of the fans. Select On or AUt from the menu and confirm by pressing the SET key.

CONFIGURATION MENU FLOWCHART

CONFIGURATION MENU

Menu	Parameter	Variable	Description
SEN	SEN1 SEN2 SEN3	ON / OFF	Menu to enable and or disable the input of sensors 1, 2 and 3. Select the **ON** or **OFF option** from the menu and confirm by pressing the SET key.
SEE ALSO	SEN1 SEN2 SEN3	-50.0 °C a 250.0 ºC	Menu to adjust the alarm trigger temperature, when the sensor reaches the set temperature is triggered the relay 2 (terminals 4, 5 and 6), the red LED on the front of the equipment lights up indicating the active alarm and the green LED of the corresponding sensor will be flashing. Set the alarm temperature of each sensor and confirm by pressing the SET key.
GAME	------	0 TO 10ºC	Menu for Hysteresis adjustment, temperature difference between turning the alarm on and off. Example: If the ATA is programmed at 90°C and the HDA programmed at 5°C, the alarm will only be turned off when the temperature reaches 84.9°C, that is, with 5°C below the parameter. Configure Alarm Hysteresis and confirm by pressing the SET key.
dtA	SEN1 SEN2 SEN3	-50.0 °Ca 250.0 ºC	Menu to adjust the Shutdown temperature, when the sensor reaches the set temperature the **TRD** time count is started, the green LED of the corresponding sensor will be flashing and during the time count the red LED will also be flashing and at the end of the count the red LED will be fixed on the front and the relay 3 (terminals 7, 8 and 9) will be triggered. If the counting time is zero, the DTA relay will be triggered instantly after the temperature reaches the set value. Set the Shutdown temperature of each sensor and confirm by pressing the SET key.
trd	------	0' a 20' Min	Menu to adjust the Timing for shutdown, when the temperature of the parameters DTA 1, DTA 2 and DTA 3 is reached starts counting and if it is 0 the relay triggers immediately. Set the Shutdown time for each sensor and confirm by pressing the SET key.
ºtAr	SEN1 SEN2 SEN3	-50.0 °Ca 250.0 ºC	Menu to adjust the temperature for triggering the chillers (fans), upon reaching the value programmed in this parameter of the respective sensor, the relay 1 (post 1, 2 and 3) is triggered, and the red LED will light on the front of the equipment indicating active cooler and the green LED of the corresponding sensor will be flashing. Set the temperature to trigger the desired sensor cooler confirm by pressing the SET key.
Hdr	------	0 to 30ºC	Menu for Hysteresis adjustment, temperature difference between turning the cooler on and off. Example: If the TAR is programmed at 65°C and the HDR programmed at 5°C, the cooler will only be turned off when the temperature reaches 59.9°C, that is, with 5°C below the TAR parameter. Set the hysteresis to shut down the cooler and confirm by pressing the SET key.
SHALLOW	d0 d1 d2 d3	------	Menu for choosing the current output value on post 21 and 22. D0 "Enables current output (post 21e22) for 0 to 1mA." D1 "Enables current output (post 21e22) for 0 to 5mA." D2 "Enables current output (post 21e22) to 0 to 10mA." D3 "Enables current output (post 21e22) for 0 to 20mA." D4 "Enables current output (post 21e22) for 4 to 20mA."

	d4		Select the Output option and confirm by pressing the SET key.

CONFIGURATION MENU

Menu	Parameter	Variable	Description
OUtC	*d0* *d1* *d2* *d3* *d4*	------	Menu to adjust the channel you want to be transmitted in the analog output.**(Post 21 and 22).** D0 "Disables the analog temperature transmission output." D1 "Enables Sensor 1 temperature on analog output." D2 "Enables Sensor 2 temperature on analog output." D2 "Enables Sensor 3 temperature on analog output." D4 "Enables higher temperature on analog output." Confirm by pressing the SET key.
rRNG	------	**MIN** **-50.0** **•Ca250.0 ºC** **MIN** **-50.0** **•Ca250.0 ºC**	Menu setting the maximum and minimum temperature range for the Current output. **Example:** Analog signal from 4 to 20mA with temperature range from 0 to 150ºC in the analog output: -Configure the RASA in D2, and the RANG Minimum in (0) and Maximum in (150). In this configuration the analog output will mirror the temperature from 0 to 150ºC (when it is 0ºC the signal will be 4mA and when it is 150ºC the signal will be 20mA). Use the increment and decrement keys to change the values. At the end of each adjusted parameter, press the SET key again to record the chosen value.
dSPt	*d0* *d1* *d2* *d3* *d4*	------	Menu To adjust the display mode of the temperatures measured on the display, it is also possible to navigate between the sensors through the Increment or Decrease keys. D0 "Display shows sensors sequentially (SCAN)". D1 "Display fixed Sensor 1." D2 "Display fixed Sensor 2." D3 "Display fixes Sensor 3." D4 "Display shows the sensor with the highest temperature." Select the Presentation mode you want, and then confirm by pressing the SET key.
UCS	*RUtO* *2.4h* *4.8h* *9.6h* *19.2h* *38.4h*	------	Menu to configure the Serial communication speed: AUTO - Automatically detects the speed of communication; 2.4K- Fixed communication speed at 2400 bps. 4.8K- Fixed communication speed at 4800 bps. 9.6k - Fixed communication speed at 9600 bps. 19.2k - Fixed communication speed at 19200 bps. 38.4k - Fixed communication speed at 38400 bps. 57.6k - Fixed communication speed at 57600 bps.

	57.6k		
ErS	------	*1 to 254*	Menu to adjust the Network Address, each equipment connected to the RS 485 network (post 24 and 25) must have a single address different from the others, so that the computer can identify it. Configure the Serial Network address and confirm by pressing the SET key.

CONFIGURATION MENU

Menu	Parameter	Variable	Description
tESt	*rEL1* *rEL2* *rEL3* *rEL4* *LEdS*	——	⚠️ Attention when using this menu, it triggers the relay outputs and lights the leds of the monitemp so that the operator makes sure of their operation, but if the monitemp is in operation and the relay 3 (shutdown) is connected in the protection of the system it will trigger and the protection of the system will operate by turning off the transformer or the machine that it is protecting. REL1 "Triggers relay 1 after pressing the SET key." REL2 "Triggers relay 2 after pressing the SET key." REL3 "Triggers relay 3 after pressing the SET key." REL4 "Triggers relay 4 after pressing the SET key." LEDS "Triggers all LEDs on the display after pressing the SET key."
PASS	-----	*0000* *a* *9999*	Menu to change the four-digit password. This password will be used to access the configuration menu of the equipment. To change the numbers use the increment or decrement key, to confirm the chosen digit and move to the next one, press the SET key, to return to the previous digit press the ESC key. *The factory password for MoniTemp is 0000. In case of loss or forgetting of the password contact Electron do Brasil and inform the password reminder number.*
LOrL	*rEL1* *rEL2* *rEL3* *rEL4*	*d0* *d1*	Menu for choosing Relay Logic: *d0* - Initial Conditions of the "Off" Relay. *d1* - Initial Conditions of the "Triggered" Relay. Select the relay logic option and confirm by pressing the SET key.
FAbr	-----	-----	Electron Exclusivity Menu. To exit the Menu, press the SET key.

DEFECT SOLUTION

The sensor automatically returns to reading mode when normalized, to reset the Monitemp press the *SET Key* until it appears on the display to the word *REST,* then release and the Monitor will reboot without losing the previously configured parameters.

Menu	Parameter	Description
SOFF	There is no reliable signal from the sensor coming to the Monitemp	Screen to consult the maximum temperature reached by each sensor, to consult the maximum timing of the desired sensor presceive the SET key and to return to the root menu prescionado the ESC.

IMPORTANT RECOMMENDATIONS

Before putting into operation the equipment check the following recommendations:
1. All sensors as well as the equipment must be grounded, do not use the same grounding point for power and for the sensor so that there is no potential difference.
   Properly grounded sensors and power supply prevent malfunction or damage in cases of disturbances, surges, and inductions in the equipment.
2. Use in the communication network (Rs485) resistors of 120 Ohms at the 2 ends of the transmission line (beginning and end) in order to generate potential difference necessary for the correct functioning of the communication network.
3. Only use with the Monitemp the original accessories that come with the equipment (Split-core TC), as they have been rigorously tested together to ensure maximum efficiency and performance in the operation of the set.
4. Do not use the Monitemp directly in the SOL, whenever it is urged in the field it is important to have 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.

WARRANTY TERM

The MoniTemp Electron has a warranty period of two years from the date of sale consigned in the invoice, with coverage for any manufacturing defects that make it inappropriate or unsuitable for the applications it is intended.

Disclaimer of Warranty

The warranty does not cover transportation expenses for technical assistance, freight and insurance for shipment of product with evidence of defect or malfunction. The following events are also not covered: Natural wear of parts by continuous and frequent use, damage to the outside caused by falls or improper packaging; attempted repair / violation of 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 Standard NBR 5410 are not observed;

Subjected to conditions outside the limits specified in the respective technical descriptions.

Breached 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 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 duly packed 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 of Electron do Brasil at its headquarters.

REVISION CONTROL

Revision No. 1.0   July 2015.

-Emission.

Revision No. 1.3   April 2018.

- Change the description of Alarm Hysteresis (HDA to HRA);

- Implemented the choice of Serial Communication Speed;

Revision No. 1.4   February 2020.

- Standardization of layout, correction of formatting, separation of map of registers and change of layout of flowcharts.

Revision No. 1.5

- Overhaul

Revision

- Overhaul 7/19/2023

www.electron.com.br