ZYGGOT ONLINE THERMOGRAPHY

ONLINE THERMOGRAPHY - CONTINUOUS TEMPERATURE MONITORING

ETHERNET

ZYGGOT V5F ONLINE THERMOGRAPHY SYSTEM

CONTINUOUS TEMPERATURE MONITORING PROTECTION SYSTEM

CONTACTLESS ONLINE THERMOGRAPHY SYSTEM
FOR LOW AND MEDIUM VOLTAGE APPLICATIONS

OFFPRINT

World's First Online Thermography System (2004).
World Leader in Continuous Temperature Monitoring.
World's First UV Arc Protection System*.
Over 1 Million Sensors Installed Worldwide.
* Patent Letter No. PI 0903809-4

OFFPRINT ZYGGOT V5F V2.1 BUILD 158 ENGLISH May 2025

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ZYGGOT THERMOGRAPHY
TEMPERATURE MONITORING SYSTEM

Tubular Sensor

BT Sensor

VZX V5F Relay

DESCRIPTION

The low-cost ZYGGOT system was designed to allow “online” monitoring of temperatures of low and medium voltage components and internal connections, transformers, motors, etc. The ZYGGOT system introduces an important innovation in the market as the current new safety regulations prohibit the opening of energized electrical panels for any type of measurement, including temperature measurements with manual point measurement guns or thermography cameras.

The ZYGGOT system allows to monitor temperatures “On Line”, both selected targets and of the air surrounding the sensor.
An important feature is the measurement of both the target and the sensor body at the same time, which is equal to the temperature of the surrounding air.
This same characteristics also allows detecting the internal temperature rise of the panel, which can identify obstruction or ventilation failure or even temperature rise of equipment not directly monitored.

Sensors with opening angles of 7º, (other angles, on request) allow monitoring both well-defined points and areas of any dimension depending on the distance from the sensor to the area.

Each sensor has an LED that flashes on command from the relay to facilitate diagnosis and check the address.
Different Alarm and Trip levels allow optimizing the protection system. Each relay can monitor up to 125 sensors.
The Relay automatically indicates sensors not responding.

The data transmission method between sensors and relay uses RS-485 physical layer communication, with all sensors connected in parallel using shielded cables with mini-USB connectors that allow quick installation and operation without the need for any tools.

The Zyggot Temperature system relay can be connected to a communication network with a supervisory system or remote monitoring.

The ZYGGOT Relay has Ethernet communication with several protocols, and can be accessed from anywhere by mobile devices or not.

Note: Optionally available with Zyggot Arc Voltage protection system integrated in the same unit, saving space in the panel door and improving the interaction between the two protection systems.

APPLICATION

Temperature monitoring and “On Line” protection of electrical connections and components for low and medium voltage electrical panels, transformers, motors, brakes, processes, etc.

BENEFITS

* Prevents opening of the energized panel.
* Periodic thermography is not required.
* Provides target and indoor air readings.
* Non-contact measurement.
* Indicates possible sensor failure.
* Failure history.

System Features with Tubular or BT Sensors

* Applicable in low (BT or Tubular) and medium voltage (Tubular).
* RS485 network with mini USB connections.
* Smart Sensors powered by the network itself.
* Measuring angle of 7º (15º and 60º consult).
* Continuous readings.
* Relays with touch screen color graphic display with Modbus RTU and Ethernet communication.
* Fault history with “Time Stamp”.
* Reading and over- temperature protection of up to 125 points (targets) or areas.
* Reading and over-temperature protection of up to 125 air temperature points (sensor body).
* Reading and protection of up to 125 sensor supply voltage (network supplyed).
* Readings and protections related to 4 analog inputs.
* External fault monitoring.
* Monitoring of sensor states.
* 4 + 8 programmable digital imputs.
* 4 + 8 programmable digital outputs.
* Each sensor has an LED that flashes and can be controlled by the relay to facilitate its location and address on the network.
* «Fail Safe» mode operation.
* Optionally with Zyggot Arco system integrated in the same unit (Model FTA THM+ARC).
* **Protocols**:

MODBUS RTU: Modbus by serial communcation.
TCP/IP (Modbus Slave): Modbus over Ethernet).
FTP: (File Server) File Transfer Protocol.
NTP Protocol: Network Time Protocol

KEY POITS

ZYGGOT

MAIN ADVANTAGES

- TESTABLE WITH SYSTEM OFF
- WITH ETHERNET
- AVOID OPENING THE PANEL
- AVOID CONVENTIONAL THERMOGRAPHY
- EASY INSTALLATION-125 SENSORS P/ RELAY
- MEASUREMENT W/O ELECTRICAL CONTACT
- DOES NOT USE BATTERIES
- INDIRECTLY MEASURES THE WHOLE SYSTEM (AIR)
- PROVEN RELIABILITY
- EVENT HISTORY
- TEMPERATURE PLOT
- WORLD LEADING SYSTEM

The ZYGGOT system with tubular sensors was developed for low and medium voltage panels. The sensors measure temperature, without physical contact, by infrared detection and allow local and online reading and protection for up to 125 points per relay. Each sensor measures two levels of temperature: from the target and from the air surrounding the sensor (case) allowing detection of failures in unmeasured points, by indirect heating of the air. They are networked using mini USB cables, in sizes from 0.3 to 8.0 meters (supplied), allowing for quick, error-free and tool-free installation. The relay provides protection locally and also through a supervisory system. Alarm and trip levels are freely programmable for each point. An eventual failure in one of the sensors does not interrupt the operation of the other sensors. The BT Sensor is applied in low voltage MCCs, which require a high number of sensors in a small space, in addition to demanding a low cost. Its quick fixing base can be fixed by means of a screw or by means of a stainless steel fix tape directly on the bus to be monitored.

HEY POINTS

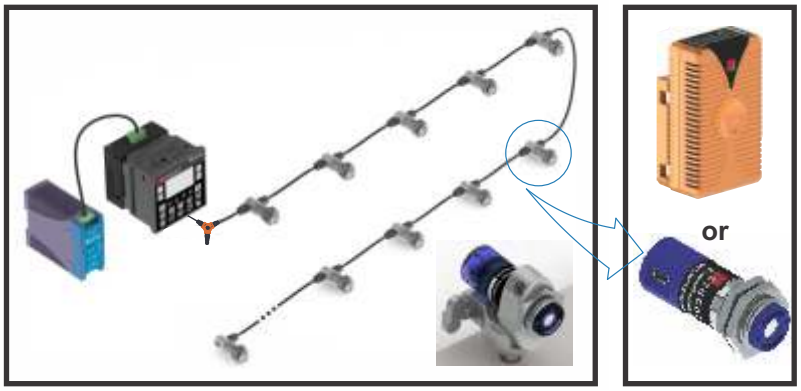
* Color Touch Screen.
* Has Ethernet communication with several protocols.
* Several built-in protections.
*Real-time graphical recording (Plot).
* History of failures and events.
* Continuous readings of target and surrounding air temperatures.
* Modbus RTU and Ethernet communication.
* Each relay presents up to 375 continuous measurements, namely: Temperature of 125 targets, Temperature of 125 sensor bodies (surrounding air), voltage of 125 temperature sensors (allowing monitoring of network integrity).
* Avoids opening of energized panel for possible thermography.
* Indirectly monitors undefined points, by increasing the temperature of the surrounding air.

APPLICATIONS

- **Internally to panels, to avoid opening for periodic thermographs.**
- **Supervision of Transformers.**
- **Engine Supervision.**
- **Brake supervision.**
- **Non-contact process supervision.**

MAIN FEATURES

- **Reads temperature of up to 125 targets per relay.**
- **Reads temperature of up to 125 sensors (body / surrounding air, allowing detection of temperature increase in points not directly monitored.**
- **Reads net supply voltage of up to 125 sensors.**
- **Configurable alarm and trip levels for temperature and analog inputs.**
- **Real-time graphic record for temperatures and analog inputs.**
- **Detection of differential temperature increase integrated into the relay and configurable by the user.**
- **Fault history and status.**
- **Continuous readings.**
- **4 analog inputs with configurable alarm and trip levels.**
- **4 + 8 digital inputs for external events or faults (ventilation, doors, etc.).**
- **4 + 8 configurable digital outputs.**
- **Modbus RTU + Ethernet TCP IP. (All data accessible via Ethernet)**



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TECHNOLOGY AND TECHNICAL DETAILS

HOW TO ENSURE ACCURATE READINGS IN BODIES OF LOW OR UNKNOWN EMISSIVITY.

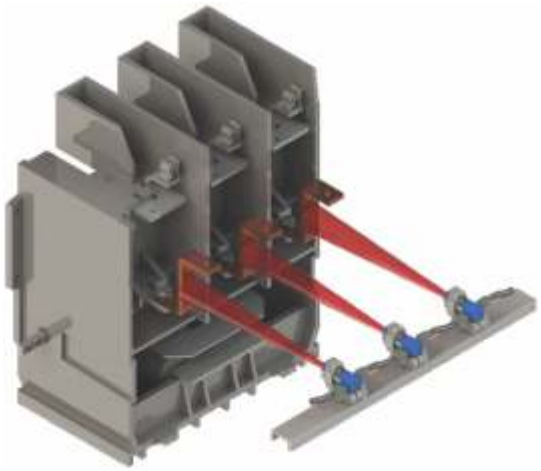
For low emissivity bodies, such as polished copper, which has an emissivity of 0.06, it would be very difficult to get an accurate reading. This is not a problem for the Zyggot system, as once the Unidex tape is pasted over the area to be measured, the emissivity of the area becomes constant at 0.95. This index, once introduced in the relay memory, becomes the correction index for the measured temperature, also avoiding variations with time, which could occur with oxidation, which would increase the emissivity index. Unidex tape on the other hand is stable, not changing over time.

If all areas of interest, whether material, copper, porcelain, PVC, etc., have the reading area covered with Unidex tape, it is easy to see that at the startup of the equipment, before putting it into operation, it is possible to It takes a few seconds to leave it fully calibrated, it is enough to program all the emissivity indices for the value of the Unidex tape and it is not necessary to calibrate different indices for each material.

On the other hand, low cost portable meters or even some high cost ones do not have the possibility to calibrate the emissivity index, being it fixed at 0.95, leading to dubious measurements. As the Zyggot system allows calibration for each target, even without the use of Unidex tape you can have reliable measurements.

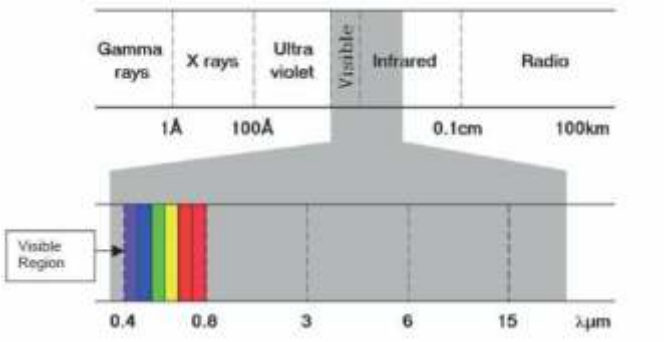
ZYGGOT VVX V5F.

- **Entradas Digitais**: 04 in the relay + 8 in the eBlock module.
- **Digital Outputs**: 04 in the relay + 8 in the eBlock module.
- **Programming of parameters and values**: “On line”.
- **Reading of Values**: Temperature of each target, Temperature of each sensor body (surrounding air), Supply voltage of each THM sensor, Analog inputs.
- **Communication**: Serial RS232C and RS485 MODBUS RTU protocol for “Point to Point” connection, for use in network (Droop Out). CAN port with optional Devicenet protocol.
- **Protections and Indications**: Alarm due to target over-temperature, Trip due to target over-temperature, Alarm due to differential heating of targets, Communication failure with the THM sensor network, Modbus communication failure, THM sensors not responding, Alarm due to over-temperature of sensor body (surrounding air), Trip due to over-temperature of sensor body (surrounding air), Alarm and Trip for up to 5 groups of independent sensors, Alarm and Trip due to external failure, Alarm and trip due to analog input levels, Alarm due to memory card failure, Active alarm screens, History screen with “Time Stamp”, Bargraph with sensors being read, Alarm and trip statistics, Digital input and digital output status, Analog input levels, Temperature plot for each sensor and analog input, Indication of Temperature Differential and Percentage of each sensor in relation to programmable time. Sensor voltage out of acceptable range.
- **Fault actions**: Programmable for each fault in “None”, “Log”, “Alarm”, “Trip”.
- **Real-time clock**: Included.
- **Fault history**: with date and time.
- **Event storage**: Unlimited events, stored indefinitely until cleared with a password, for security.
- **Fail Safe System**: Yes
- **Memory Card**: Automatic and manual recording of temperature reading data on the memory card for transfer to computers.
- **Active screens**: over 200 multiple screens.
- **Parameter programming**: By the relay itself, with passwords, by PC software (Free), by replication via the memory card (program one and replicate it in all relays in the system) or by Modbus (optional).
- **Multi System**: Also available in the THM+ARC version, which integrates monitoring and protection against ultraviolet arc flash and can work with up to 40 arc Gateways, each with up to 100 arc sensors.

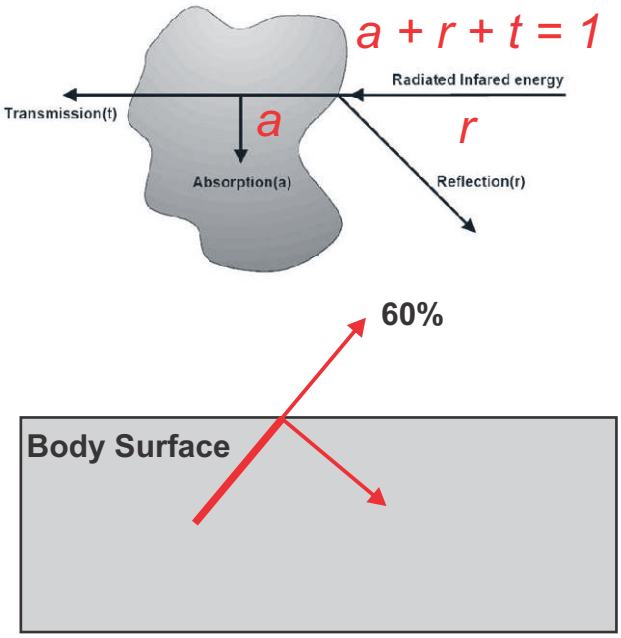


CAPTURING THE TEMPERATURE MEASUREMENT AND INFLUENCE OF EMISSIVITY

Every object with a temperature above absolute zero radiates electromagnetic energy. This radiation in the infrared range is not visible, as can be seen in the figure below.



When radiation from one object reaches another object, some of the energy is absorbed, some is reflected, and if the body is not opaque, a portion is transmitted. The sum of the parts must always be equal to the total value that fell on the object. In view of these facts, in order to capture the temperature of desired targets, you must have sensors that capture such electromagnetic energy.



When a material is heated, its surface does not absorb all the energy and ends up emitting infrared energy. In practice, there is no material that is an ideal emitter of infrared radiation. The ideal emitter is called a black body. Objects tend to radiate less energy than black bodies even though they are at the same temperature.

The emissivity of an object is defined by: **ε = t/b**
ε = Emissivity;
t = Radiation emitted at a certain temperature;
b = Radiation emitted by a black body at the same temperature

The table below shows the emissivity range for various materials.

MATERIAL	EMISSIVIDADE (1μm)
Iron and Steel	0,35
Iron and oxidized steel	0,85
Aluminum	0,13
Oxidized Aluminum	0,40
Polished copper	0,06
Oxidized copper	0,80
Brick	0,80
Asphalt	0,85
Asbestos	0,90

There are some portable meters that do not have the possibility of varying the emissivity index, which leads to erroneous measurements since this index is fixed at 0.95. Zyggot sensors allow emissivity index configuration, ensuring accurate measurements on any material

UNIDEX TAPE
Solution for emissivity variations

Most metals have a change in emissivity due to oxidation. An example is copper, which under normal conditions has an emissivity of 0.06 and 0.80 when oxidized.
To avoid emissivity calibration readjustments of the sensors, the Zyggot System includes the supply of a special adhesive tape for temperatures up to 250ºC, whose emissivity value of 0.95 is known and guaranteed by Varixx. With the Unidex tape glued over the measurement area of a target to be measured, we will always obtain the real temperature reading, without having to worry about the emissivity of the material.
Using the tape, it is not necessary to calibrate different indexes for each material.
The tape is supplied in dimensions of 50mm x 50mm or in a roll of 30m. For each sensor purchased by the customer, a tape drive is shipped.

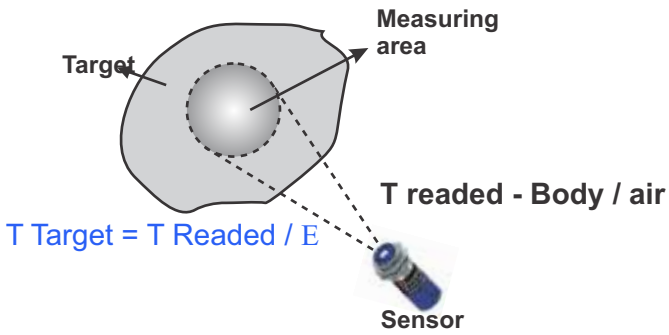
UNIDEX TAPE
ROLL
(30 meters)

units de
UNIDEX TAPE
50m x 50m
(ref. Zu50)

TEMPERATURE MEASUREMENT AND PRODUCT COMPOSITION

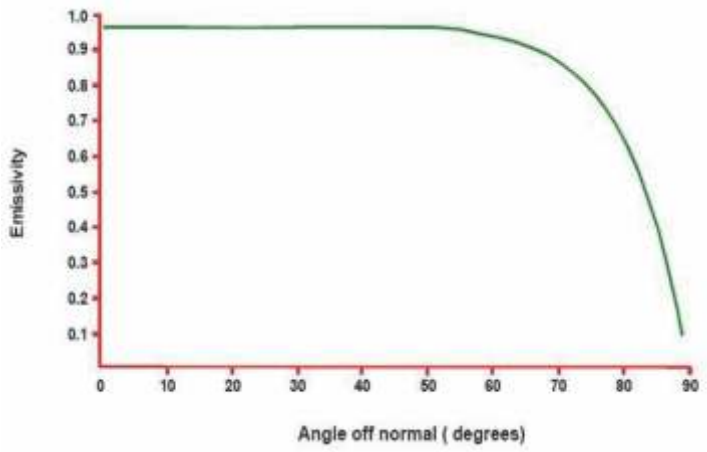
POSITIONING OF SENSORS AND TEMPERATURE READING

Each sensor measures both the target's temperature and body (air) temperature at the same time.
For the correct positioning of the sensors in the pre-defined configuration area the laser is aimed at the front of the sensor and the laser light is directed to the center of the area, as shown in the figure.
A positioning area must be defined on the desired target, having the diameter of the area defined by the sensor distance. The distance between a setup area and the sensor is a maximum of 8 times the setup area diameter value for 7° sensors. The maximum indicated distance to the target must be less than 2 meters. With the distance between the sensor and the target defined, you must enter the distance parameter in the sensor using the configuration software, which is better explained later on.



SIGHT ANGLE

Sight angle is the angle between the perpendicular of the target area and the axis that crosses the sensor longitudinally.
The curve below shows that the emissivity would only begin to decrease after an angle of 55º in relation to the perpendicular of the measured object. It is recommended to use a maximum viewing angle of 45°



Power supply

The Zyggot Tube Temperature System must be powered from an external source. The VPS12024 source is capable of supplying the 24 VDC needed to power the relay and sensors.

Input: 90~132 / 180~264 VCA // 120~375 VCC
Output: 24VCC/5A - 120W

ZTA Derivator

The ZTA derivator (T connector) makes it possible to enable various types of topologies and layouts, facilitating the installation of the system. For more information, see pages 9, 10 and 11.

Mini USB Cables

mini USB cable
The mini USB cable performs the communication between sensors and sensors/relay.
Cables are available in the following sizes:
0,3m - ZCB/4/2U/030
0,5m - ZCB/4/2U/050
1,0m - ZCB/4/2U/100
2,0m - ZCB/4/2U/200
4,0m - ZCB/4/2U/400
6,0m - ZCB/4/2U/600
8,0m - ZCB/4/2U/800

INSTALLATION AND MAINTENANCE CASE

The Zyggot Temperature Installation and Maintenance Case (ref. VLP5) contains essential tools for installing and maintaining the sensors and relay.
Such tools are: laser sight (ref. VLP2) and USB configuration cable. It is important that this case is in the possession of the Zyggot Temperature System user, in order to carry out any maintenance properly.

Laser sight

The laser sight is an essential tool to direct the sensor to the desired target. The sight makes installation easy.

Configuration Cable (USB)

The USB configuration cable (ref. ZCC180) is used to connect the tubular sensor to the PC. Allows the configuration of each sensor by the Zyggot manager software

PRODUCT COMPOSITION

COD: VZX/V5F/N ou VZX/V5F/S

RELAY 96 X 125 Touch Screen

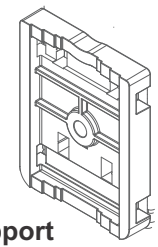
COD: VST/M/7/300/24

TUBULAR SENSOR

COD: ZSB/M/60/120/24

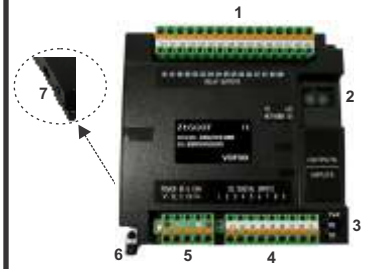
BT SENSOR

Included with each sensor



Quick Fix Support for the BT Sensor

COD: EB/88D ou EB/88R
(Para ser utilizado com o relé V5F)



EBLOCK P/ MODELO V5F

Technical information

V5F RELAY FEATURES

Power Supply	24 VDC
Moisture	5 to 95%
Sensores N.	up to 125 sensors
Resolution	1°C
Inputs	4 analogue 4 digital (24VDC)
Outputs	2 outputs for Alarme and Trip (N.O.) 2 programmable outputs (N.O.) 1 output for connection of the sensors
Comunication	Modbus RTU Devicenet (optional) Ethernet TCP-IP (Included)
Screen	Color, Touch Screen WVGA

Technical information

FEATURES: EBLOCK 88x (x=D or x=R)

Power Supply	24 VDC (10 - 30 VDC) 2W
Moisture	5 to 95%
Communication	CAN
Temperature	Oper: 0 to 60 °C /// Armaz: -10 to +60 °C
Imputs	8 Digital Imputs (12 - 24 VDC)
Outputs	Model 88D = 8 Digital Outputs (DC) Model 88R = 8 Digital Output (Relay)
Imputs	Imp.: 10K /// Treshold: 8 VDC / 3 VDC
Distance Max	1000 M
Output Current (Model 88D)	2,5 A Max per point /// 10A Total Max (model 88D)
Output (mod 88R)	3,0 A @ 250 VAC Res. Max (mod. 88R)

Technical information

FEATURES: TUBULAR SENSOR

Measurement angle:	7°
Typical read error (*):	+/- 0,5°C (trg: 0-125°C)
Normal Distribution (125 S):	0.48°C at 80°C target
Emissivity:	Programmable (0,95 std)
Resolution:	1°C
Target reading:	0 to 300 °C
Environment reading:	0 to 75 °C
Power:	24 Vcc
Diameter:	19 mm
Length:	53 mm
Communication:	Modbus RTU
Material:	Stainless Steel / Polycarbonate

(*) See test report at the end of this manual

Technical information

FEATURES: BT SENSOR

Measurement angle:	120°
Typical read error (*):	+/- 0,5°C (trg: 0-125°C)
Normal Distribution (125 S):	0.48°C at 80°C target
Emissivity:	Programmable (0,95 std)
Resolution:	1°C
Target reading:	0 to 120 °C
Environment reading:	0 to 75 °C
Power:	24 Vcc
Diameter:	54 mm
Length:	31 mm
Communication:	Modbus RTU
Material:	Polycarbonate

(*) See test report at the end of this manual

Informações Técnicas

Connectors: EB/88D & EB 88R (*)

1:	Digital Outputs / Relay Outputs
2:	NET address selection switches
3:	LEDs de status
4:	Inputs
5:	CAN & Power Supply
6:	Ground
7:	CAN RJ45

RELAY

Relays are available in 4 models

.

VZX/B1/U: with monochromatic liquid crystal display and keys (see specific manual).
VZX/V5L/N or **VZX/V5L/S**: with color touch screen, normal (end N) or Fail Safe (end S).
VZX/V5F/N or **VZX/V5F/S**: Same as VZX/V5L but with expansion modules for 12 digital inputs and 12 outputs (See Specific Manual).

SENSORS

Sensors are available in two models.

VST/M/7/300/24: tubular sensor, for medium and low voltage applications.
VSB/M/60/120/24: LV sensor, for low voltage bus applications.

Both with two mini USB connections for connecting cables.

COD: ZA232-2

Y SPLIT DERIVATOR RS232

COD: VPS6024 ou VPS 12024

POWER SUPPLY 24 VDC

COD: V5CON
(included with each Relay)

INTERFACE

ACCESSORIES AND SPARE PARTS

ZYGGOT

Accessory

COD: VPS6024 or VPS12024

POWER SOURCE

Accessory

COD: ZSF2

Support for fixing and sight for tubular

Accessory

COD: VZX/B1/U ou VZX/B1/U/P

SUITCASE WITH LASER SIGHT

Accessory

COD: ZFR

COD: ZTA

COD: ZCB4/2U/xxx

Y-split Derivator, USB cables and terminating resistor

Accessory

COD: VLP2

Laser sight attachable to tubular sensor for startup

Accessory

COD: ZA232-2

DERIVADOR RS232

Acessory

COD: V5CON (included in each Relay)

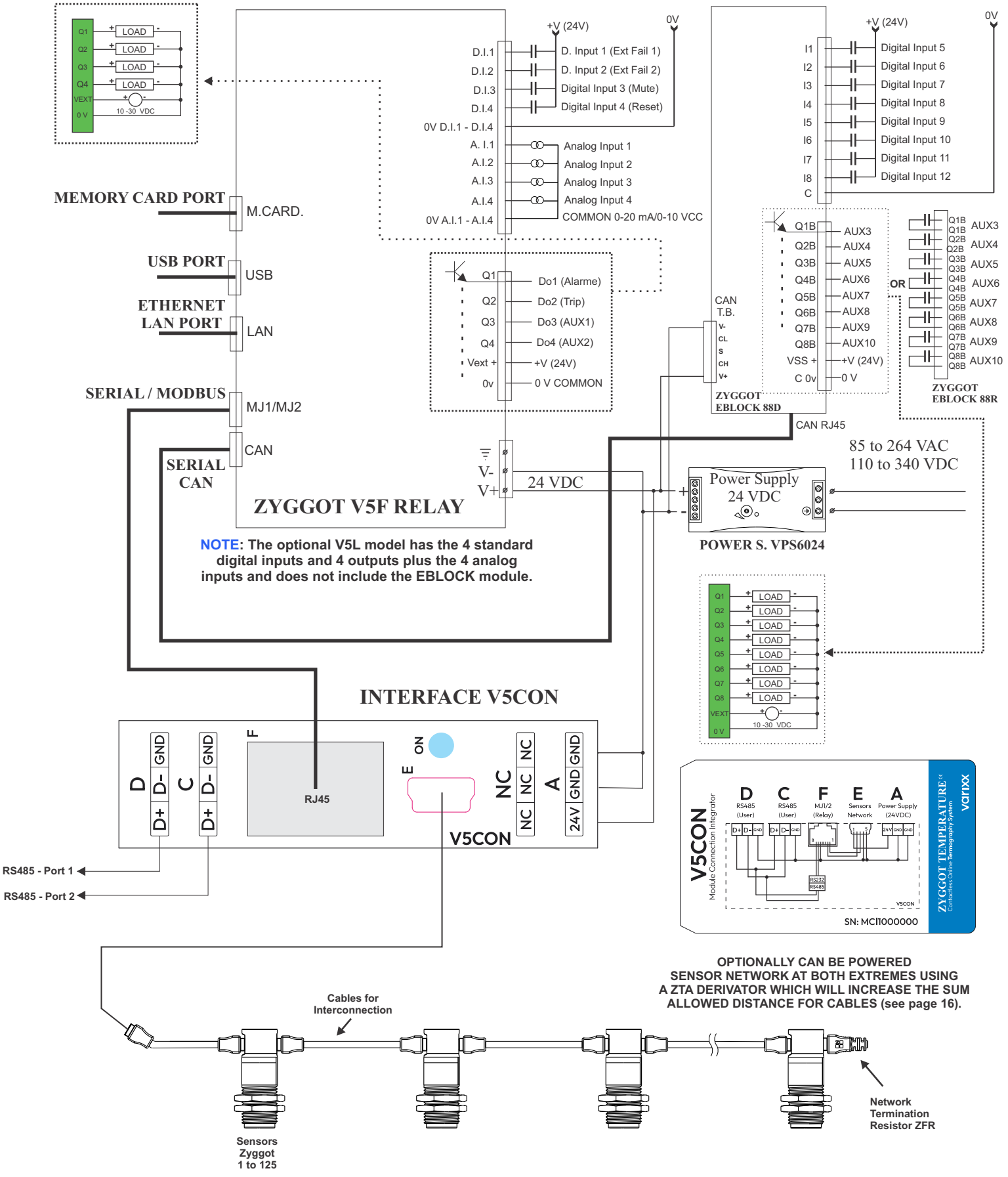
Interface

Acessório

COD: RJ45/C2 (Included in each module V5CON and each Eblock)

RJ45 CABLE

TYPICAL CONNECTIONS



TECHNICAL CHARACTERISTICS

CHARACTERISTICS RELAY V5F + EBLOCK 88x	
Power Supply	24 Vcc, 150 mA
Moisture	5 to 95%
Dimensions Relay Dimensions	96 mm x 125 mm x 31 mm
Connections Relay	1 x RS232 1 x RS485 1 x CAN (125 Kbps - 1 Mbps) 1 x Ethernet (1-10 Mbps/100 Mbps) 1 x USB Mini Program 1 x USB Flash 1 x Micro SD/SDHC
Inputs Relay + Eblock	4 analogue 0-20 mA (50 ohms) 12 Bits, Error: 1,5% FS Max 4 + 8 digital 0-24 VDC Min On= 8VDC. Max Off: 3VDC
Outputs Relay + Eblock	4 + 8 (10 Programmable), Half-Bribge 0.5A max, 10 to 30 VDC, C. Source + Protection: Short and Overvoltage. or 8 Relay 3A @ 250 VAC Resist. Load
Communication Relay	Modbus RTU, CsCAN Ethernet, Devicenet (Optional)
Communication Eblock	CAN
Relay Screen	Color Screen, WVGA (480 x 272) Colors = 64K Resistive Touch Screen 4,3'' 450 cd/m²
Certificates	CE / FCC Compliance - Part 15 of FCC
Connectors	3,5 mm - Pluggable
Weight	Relay: 270 g /// Eblock: 340 g
Temperature	Operation: -10°C to 60°C Stored: -30 °C to 70 °C
Battery RTC Relay	Operation: > 10 Years Stored: 5 to 10 years Clock Error: 8 s / month at 25 °C max

CONFIGURATION AND TESTING OF SENSORS

A sensor configuration program, free of charge, once installed on a PC, allows correctly configuring each sensor, before installing them in the panels or even after they are installed. The sensor can be reconfigured many times as necessary. More details in the chapter «Sensor Configuration» later in this manual.

RELAY VZX V5F:

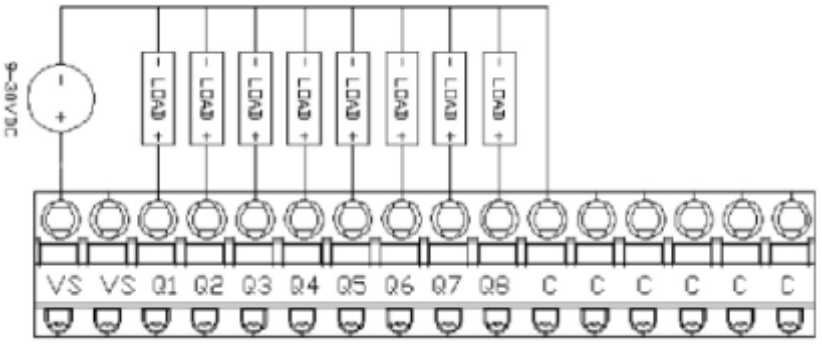
- Ambient Operating Temperature: 0 to 45ºC.
- Storage ambient temperature: -40 to 85ºC.
- Relative Humidity: 5 to 95% N.C.
- NEMA Rating: NEMA 4X.
- Relay weight: 270 Grams.
- Dimensions: 125 x 96 x 31 mm.
- Noise immunity (EMC Immunity): EN61000-4-2 / EN61000-4-4 / EN61000-4-5 / EN61000-4-12 / ENV50140/50141
- Emissions:EN50081-2 / EN55022 / CISPR11. Class A.

CAN NETWORK:

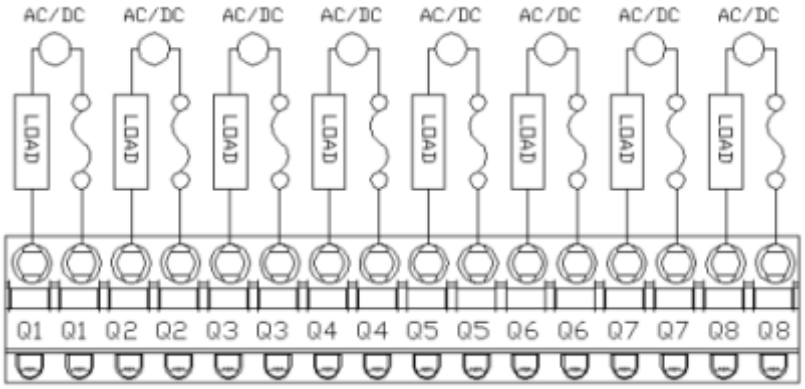
1: V+
2: CAN H
3: SHIELD
4: CAN L
5: V -

CAN POWER RANGE:

12 to 25 VCC / 75 mA MAXIMUM.



EBLOCK EB/88D OUTPUTS



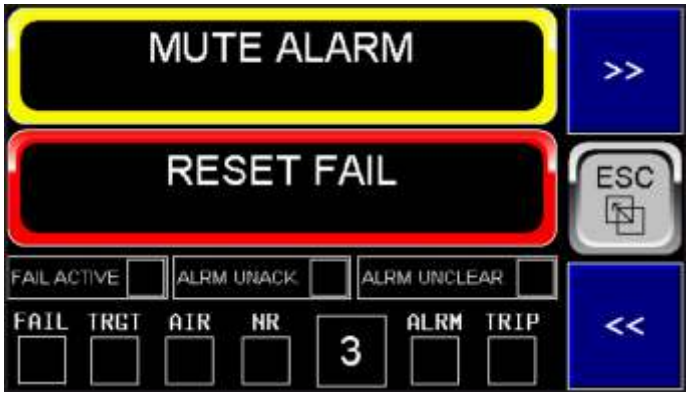
EBLOCK EB/88R OUTPUTS

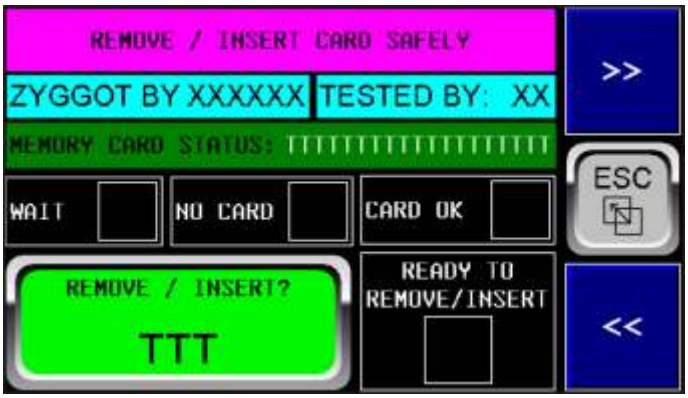
ONLINE THERMOGRAPHY WITHOUT CONTACT OF ACTIVE PARTS WITH THE BUS. THE TUBULAR SENSOR TYPE IS POSITIONED AT A DISTANCE, BEING INDICATED FOR MEDIUM AND HIGH VOLTAGE AND THE BT SENSOR IS FIXED ON THE BUS, BUT ONLY THE POLYCARBONATE PLASTIC BOX, RESISTANT TO 200 ° C, STAY IN CONTACT. THE MEASUREMENT SENSOR IS NOT IN CONTACT, MEASURING ALSO BY IRRADIATED INFRARED. THE SENSORS ARE POWERED BY THE NETWORK CABLE.

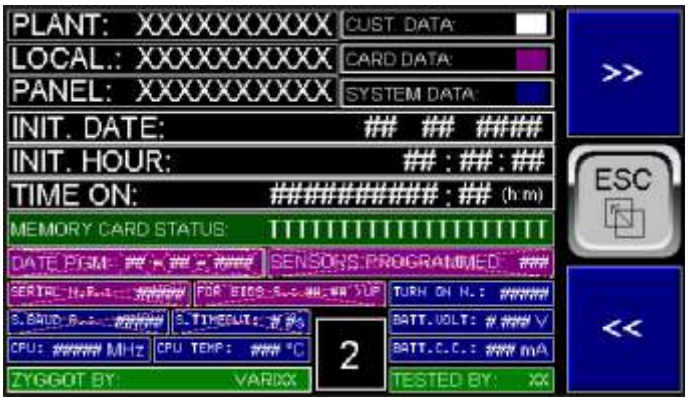
SOME SCREENS FOR OPERATION

a- MAIN MENU, (ESC) INFO SCREENS

MAIN MENU:
Screen from which all other system screens are accessed. From there, all operating and programming screens are accessed.
Note that, to eventually call the operator's attention, the «ALARM» field will flash and have a red border to inform that there is an not visualized (not Acknowledged) or Cleared (Cleared) alarm on the alarm screen. By tapping this field, the alarm screen is entered and the alarm can be acknowledged and reset. More details ahead.







ATTENTION: THE RELAY ZYGGOT V5F LEAVES THE FACTORY WITH A PASSWORD TO ENTER THE PROGRAMMING MENU = «827499» CHANGE IT WITHIN THE «RELAY CONFIG» MENU TO ANY OTHER VALUE (RECOMMENDED).

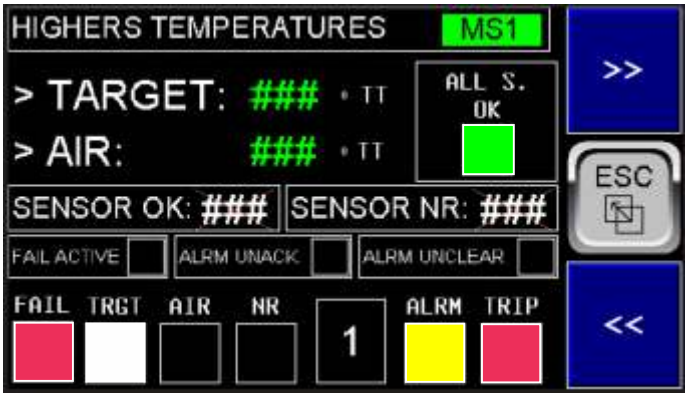
INFO SCREENS 1 to 5:

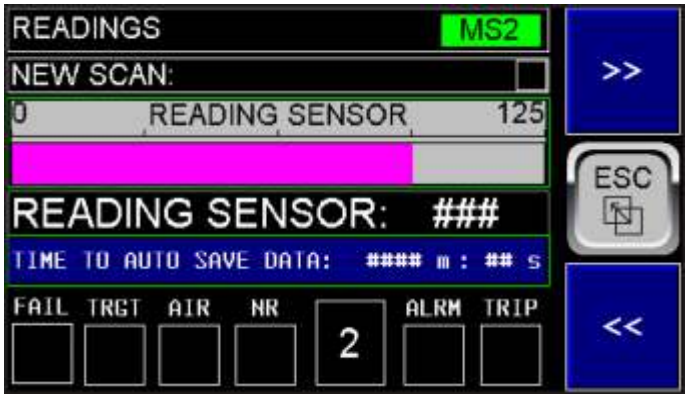
There are 3 screens paged by the >> and << keys and accessed through the ESC key on the main menu.

INFO SCREEN 1: There is a lot of information. When powering up the system this is the splash screen. Pressing ESC takes you to the main menu above.
VERS: Software version
S.COMM OK: Indicates that the sensor network is communicating OK.
S.COMM ERROR: Indicates that the sensor network is in error communication.
DATE, TIME and **DAY OF THE WEEK**: from the internal real-time clock.
FAIL: Indicates failure not reseted.
TRGT: Indicates target-related failure.

SOME SCREENS FOR OPERATION

1a- MAIN SCREEN





MAIN SCREEN MS1 to Ms12:

MS1:
> TARGET: Shows the highest measured target temperature among all sensors.
> **AIR**: Shows the highest Air/Sensor Body temperature measured among all sensors.
SENSOR OK: Shows the number of sensors responding and in OK state in the network (Must be equal to the number of sensors in the network).
SENSOR NR: Shows the number of sensors not responding in the network (Must be zero always).
FAIL: Indicates Active Failure.
TRGT: Indicates Over-Temperature on any target.
AIR: Indicates Over-Temperature in any of the sensor bodies (surrounding air)
NR: Indicates failure by any number of sensors not responding.
ALRM: Indicates active ALARM output (no mute).
TRIP: Indicates active TRIP output, without Reset.
Fail Active: Indicates that there is an active failure.
Alarm Unacknowledged and Alarm Uncleared: They indicate that there is an acknowledged alarm (Ack) and not cleared (cleared) respectively, still by the operator on the alarm screen and depending on what is programmed in the Reset on Fail Unacknowledged or Reset on fail Active parameters will be able to reset the faults and cancel the trip output.
All S. OK: Active in green if all sensors are OK and responding correctly.

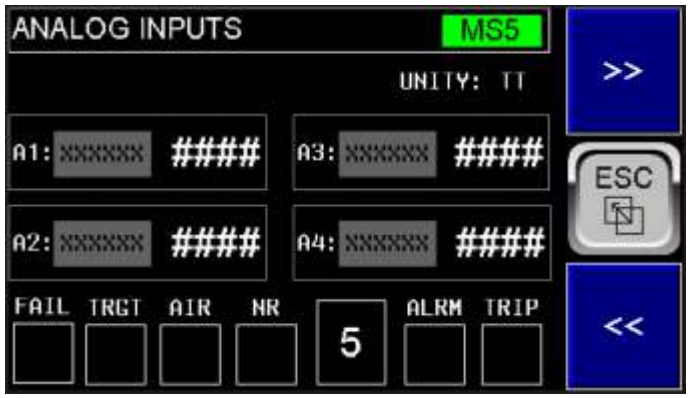
MS2:
NEW SCAN: Indicates a new reading scan of the sensors on the network. This is done continuously.
READING SENSOR: Shows the sensor number being read and a bar graph corresponding to the sensor number currently being read. It serves to show activity and build confidence that the sensors are being read continuously. It also shows the time remaining to re-save target and air temperature data from all sensors if programmed to perform this action. If not programmed, it will always show zero.
The other fields as in MS1.

MS3:
PROGRAMMED: Shows the total number of sensors in the network.
RESPONDING: Shows the number of responding sensors in the network.
NOT RESPONDING: Shows the number of unresponsive sensors on the network.
TOTAL ALARMS: Shows the total number of alarms that have occurred since the last resetting of this number from the programming menu.
TOTAL TRIPS: Ditto for the number of trips that have taken place.
The other fields as in MS1.

SOME SCREENS FOR OPERATION

1b- MAIN SCREEN

MS4:
DIGITAL INP.1 to 4 and **Digital Input EB1 (Aux 1) to EB8 (Aux 8)**: Indicates status of the digital inputs.
DIGITAL OUT 1 to 4 and **Digital Output EB1 (Aux 1) to EB8 (Aux 8)**: Indicates states of the digital outputs
The other fields as in MS1.

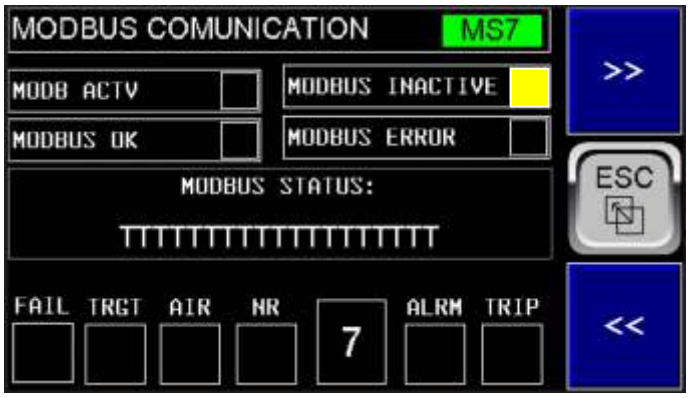


MS5:
ANALOG INP.1 a 4: Shows Analog input values 1 to 4 if used.
It also shows the name assigned to each entry for easy identification.

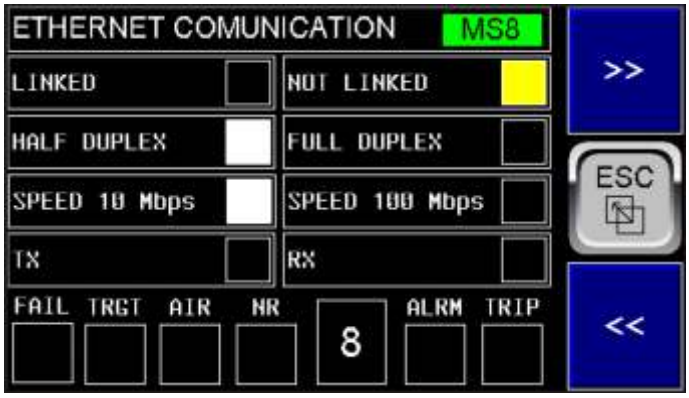
The other fields as in MS1.

MS6: **Relative to communication with sensors.**
S. COMM OK: Indicates if communication is OK, no error.
S. COMM ERROR: Indicates if there is a communication error with the sensor network.
TIMEOUT: Indicates if there is a timeout error with the sensors.
FRAME/PARITY: Indicates whether there is a Frame or Parity error on the network.
RESP FORM: Indicates and there is an error for an unexpected response.

CRC/CHECKSUM: Indicates if there is an error by CRC (Cyclic Redundancy Check or by Checksum).
REJECT ADDR: Indicates whether the address was rejected.



MS7: **Relative to Modbus communication**
MODB ACTIV:Indicates if MODBUS is active.
MODBUS INACTIVE: Indicates if MODBUS is inactive.
MODBUS OK: Indicates if Modbus is OK, no error.
MODBUS ERROR: Indicates if there is a Modbus error.
MODBUS STATUS: (STANDBY, TIMEOUT, VALID MESSAGE, PARITY ERROR, FRAME ERROR, OVERRUN ERROR, CHECKSUM ERROR, INACTIVE) Indicates one of the possible states
.
The other fields as in Ms1.

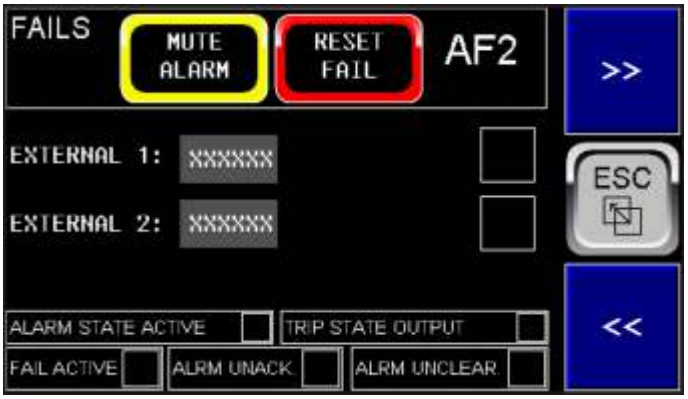


MS8: **Relative to Ethernet communication**
LINKED: Indicates that the Ethernet cable is connected.
NOT LINKED: Indicates Ethernet cable disconnected.
HALF DUPLEX and **FULL DUPLEX**: Indicates the current communication mode.
SPEED 10 Mbps e SPEED 100 Mbps: Indicates the current communication speed.
RX: Indicates receiving data.
TX: Indicates transmitting data.

The other fields as in Ms1.

SOME SCREENS FOR OPERATION

5-FAILS

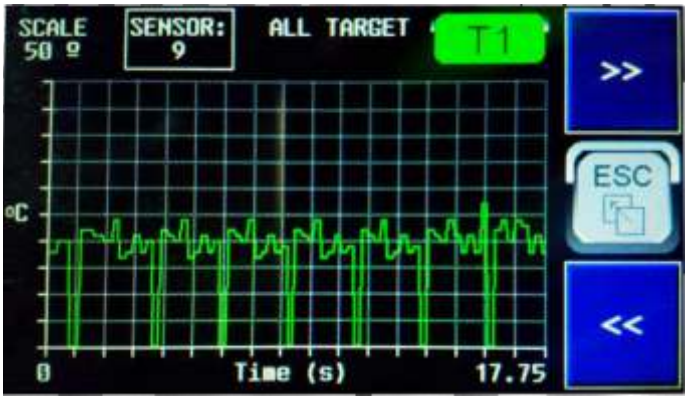


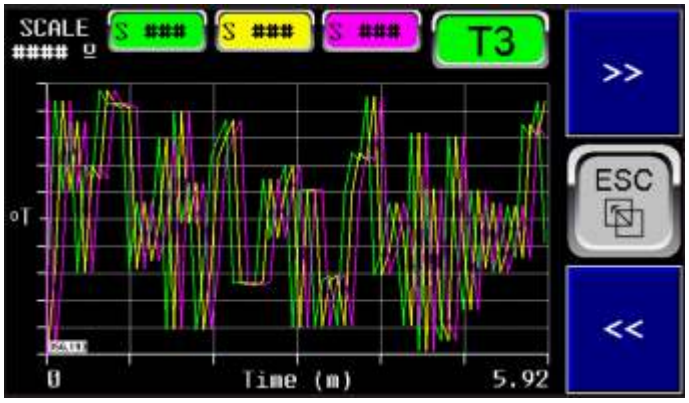
FAILS AF1 to Af7:

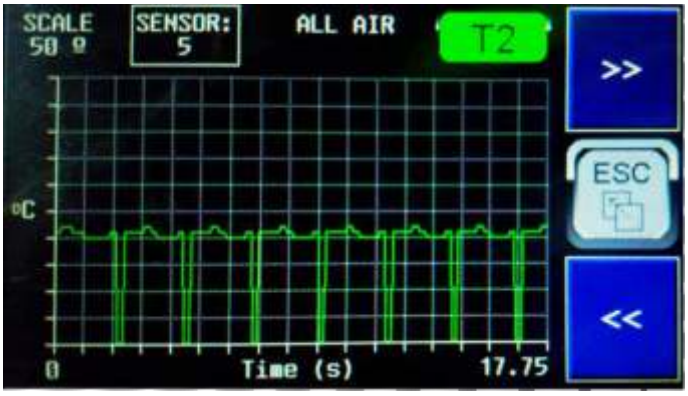
There are 7 screens paged by the >> and << keys.
AF1 to AF1: Screen Index.
Indicate the currently active faults (Alarm and Trip) if selected in the programming menu. Screens 6 and 7 indicate faults for specific sensor groups as programmed for the appropriate groups in the menu.
The **Mute Alarm** and **Reset Fail** Buttons on each screen allow you to silence the alarm (digital alarm output) or Reset the fault, respectively. Note that to reset the fault it is necessary to mute it first and also that the fault no longer exists if the 'Reset On Fail' parameter is not enabled in the Programming menu.
They also show the conditions: Alarm State Active and Trip State Output.
Fail Active, Alarm Unacknowledged and Alarm Uncleared: as detailed in screen MS1

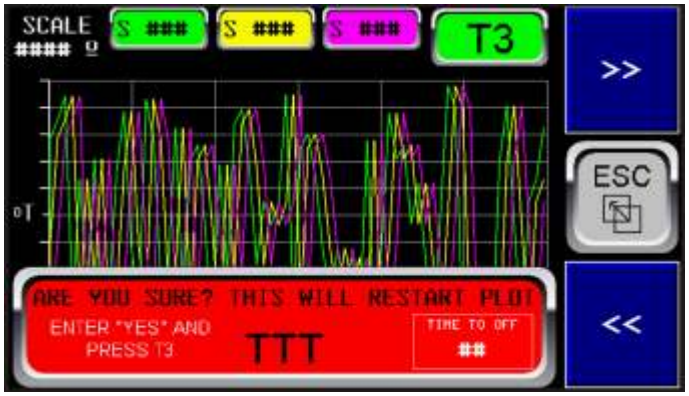
SOME SCREENS FOR OPERATION

6a- TRENDINGS









TRENDINGS T1 and T2 (Continuous Scope):

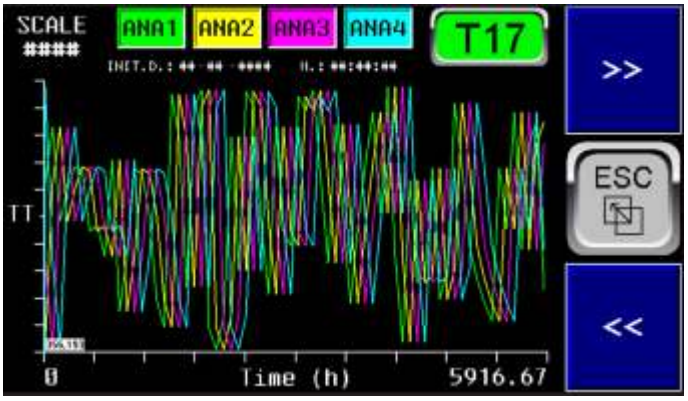
There are 18 screens paged by the >> and << keys. These are the first two.
T1 and T2: Display Index and curve reset button (Plot reset) if programmed to be active in the programming menu.
The first two show all the temperatures of Target and Air respectively, of the sensors programmed in the network. With each 'scan' of all temperatures the curve repeats this continuously as if it were an electrocardiogram. The "scan" never stops and the curve is continuously shifted to the left.
The sampling time is 50 mS and each screen can show 17.75 seconds. When leaving this screen and coming back, the curves restart, unlike the curves from T4 to T18.

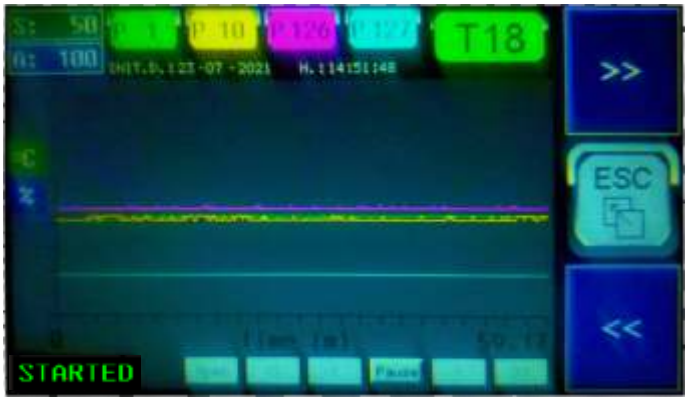
TRENDINGS T3 (Continuous Scope):

This is the third screen of the 18 plot screens, paginated by the >> and << keys.
T3: Display Index and curve reset button (Plot reset) if programmed to be active in the programming menu.
In this screen, the indexes of 3 sensors can be entered, from 1 to 125, if entering «0» (Zero) the trace remains zero. With each 'scan' the curve goes down to zero and repeats this continuously as if it were an electrocardiogram. The "scan" never stops and the curve is continuously shifted to the left.
The sampling time is 1000 mS and each screen can show 5.92 minutes in total. When leaving this screen and coming back, the curves restart, unlike the curves from T4 to T18.
When pressing the T3 key, the button appears in red, asking if you are sure you want to restart the curves on this screen. If yes, the operator will have 10 seconds to enter the answer «Yes» in the button and touch T3 again. Otherwise, the red button disappears and the curves are not reset.

SOME SCREENS FOR OPERATION

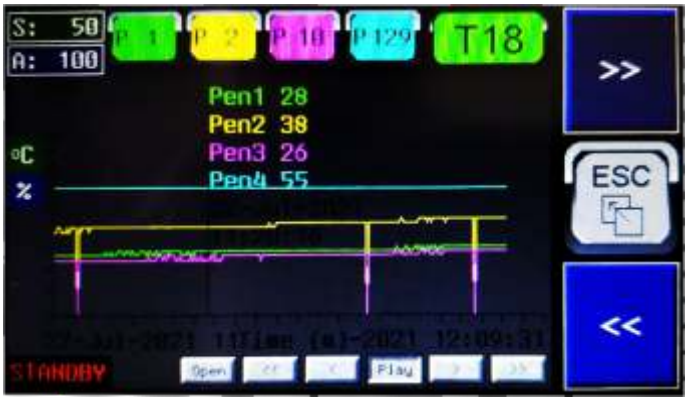
6c- TRENDINGS





TRENDINGS T13 to T17 (Trending Plot):

These are screens 13 to 17 of the 18 screens paged by the >> and << keys.
T13 to T17: Display Index and Curvature Reset button (Reset Plot) if programmed to be activated in the programming menu.
The different screens from T13 to T17 show 4 curves each, corresponding to the 4 analog inputs, with comparison times (See Table).
On the X axis, it is counter whether the scale is in temperature (°C or °F or percentage %).
These changes are not shown to be automatically reset when exiting them. However, when the tracing is finished, it does not continue to remain inactive, but even so, without having finished the screen, the and reconnect memorized and reconnect.
At the top regardless of the other screens displayed and start time on each of the screens in the screen.
If the power is disconnected and reconnected, it does not lose the previous reconnection and the new one is separated by a vertical black.
To touch the T17 buttons.
When pressing keys T13 to T17, the button appears in red, here you can be sure that you want to keep the curves of the screen. If yes, the operator will have 10 seconds to enter the answer «Yes» on the button and touch T13 to T17 again. Otherwise the red button will disappear and the curves will not be reset.
If the red button is counting down for 10 seconds and if you exit the screen, it is automatically extinguished as well.



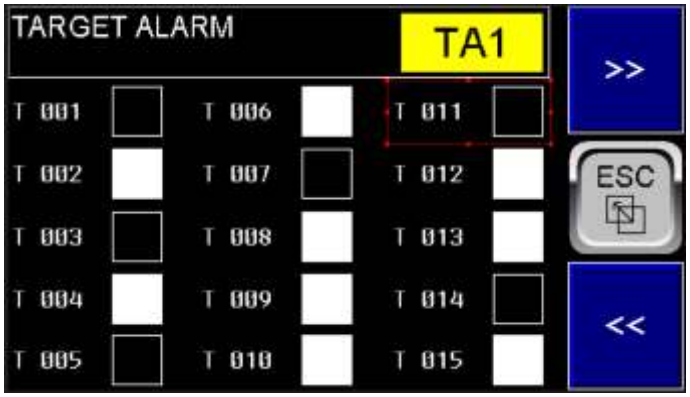
TRENDINGS T18 (Retentive Trending Plot):

It is screen 18 of the 18 screens paged by the >> and << keys.
This feature allows the recording of curves and data plotted on the same on the memory card of up to 32 Gb inserted in the appropriate slot on the relay.

When initialized in the programming menu, the screen will display in the lower left corner the information in green letters of «**STARTED**» or «**INITIATED**» and a file folder will be automatically created on the card with the name Plotzxx where xx is the end of the current no. If it does not start, the message will be «**STANDBY**».
When in «**Started**», every hour a new file with csv extension will be created, inside this file, with the name composed of the day, month and full hour, without the minutes. Each file contains data denoted by commas, which can be opened in Excel using the «**Get data**» function within the «**Data**» tab and graphs can be generated. Each file is automatically saved hourly and will contain 360 readings of each of the 4 variables (4 dashes). Each reading is taken every 10 seconds. These are lightweight files of approximately 18 Kb each. Even if you exit the screen, recording continues and if recording is interrupted by power off and on again, a vertical black line appears at this point and recording continues.

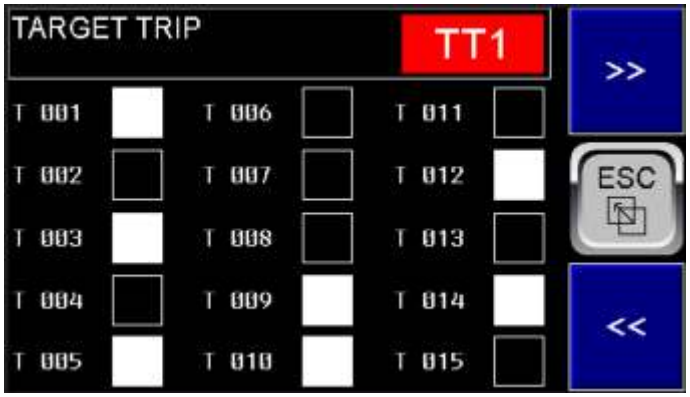
SOME SCREENS FOR OPERATION

7-TARGET ALRM, 8- TARGET TRIP, 9- AIR ALARM, 10- AIR TRIP



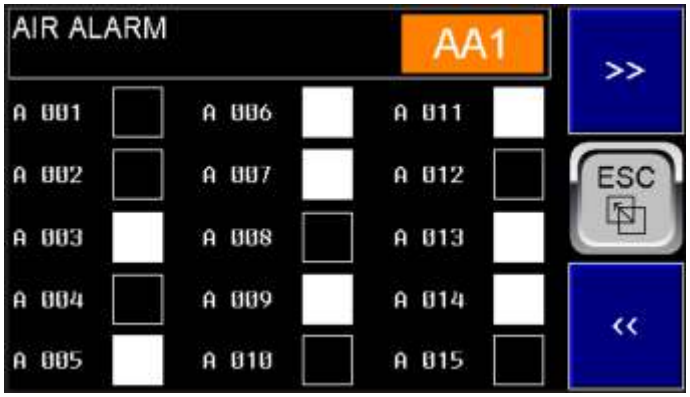
TARGET ALARM TA1 to Ta9:

There are 9 screens paged by the >> and << keys.
TA1 to TA9: Screen Index. Flashes if any of the Target values are above the programmed alarm value.
T001 to T125 (from screens TA1 to Ta9): Indicates whether the temperature of each Target(Target) is above the programmed alarm value.



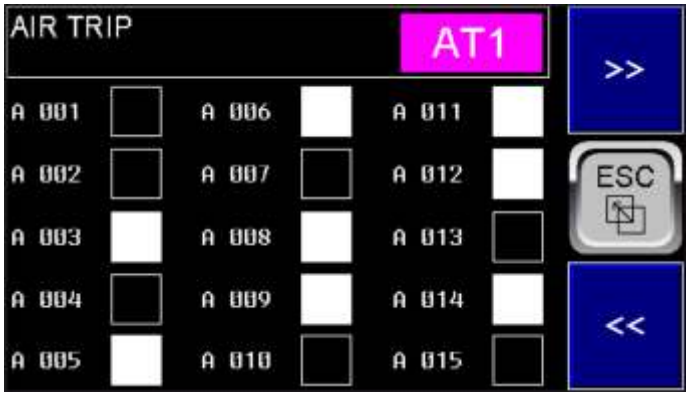
TARGET TRIP TT1 to Tt9:

There are 9 screens paged by the >> and << keys.
TT1 to TT9: Screen Index. Flashes if any of the Target values are above the programmed Trip value.
T001 to T125 (from screens TA1 to TA9): Indicates whether the temperature of each Target is above the value programmed for Trip.



AIR ALARM AA1 to Aa9:

There are 9 screens paged by the **>>** and **<<** keys.
AA1 to AA9: Screen Index. Flashes if any of the Air (Body) values are above the programmed alarm value.
A001 to A125 (from screens AA1 to AA9): Indicates whether the temperature of each Air (Body) is above the programmed alarm value.



AIR TRIP AT1 to At9:

There are 9 screens paged by the >> and << keys.
AT1 to AT9: Screen Index. Flashes if any of the Air (Body) values are above the value programmed for Trip.
A001 to A125 (from screens AT1 to AT9): Indicates whether the temperature of each Air (Body) is above the value programmed for Trip.

SOME SCREENS FOR OPERATION

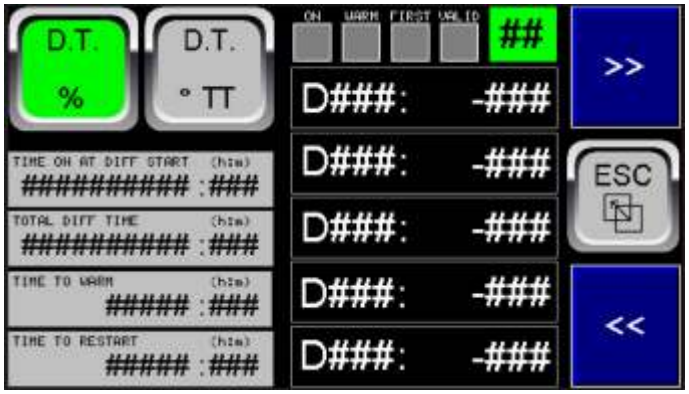
11- NOT RESPONDING, 12- DIFFERENTIAL

NOT RESPONDING NR1 to NR9:

There are 9 screens paged by the >> and << keys.
NR1 to NR9: Screen Index.
S001 to S125 (from screens NR1 to NR9): Indicates whether the respective sensor has stopped responding to the relay on the network. Indication only occurs after 2, 3 or 4 scans of all sensors, as selected in the corresponding menu.

THM SENSORS VOLTAGE LEVEL TV01 to TV05:

There are 5 screens that can be scrolled by pressing the >> and << keys.
V001 to V100 (screens TV01 to Tv04): Shows the power supply voltage reaching each THM sensor via the communication network with shielded cables and mini USB connectors. Note that there are 3 factory-set voltage levels, which are shown in 3 different colors: Green if it is within the optimal range (Nominal is 24 VDC, but much lower voltages are allowed), Yellow if it is within an acceptable range in which stable operation is safe or Red if the voltage is below a safe level for operation.
Note that since the communication network can have different lengths, depending on the cabling used by each user, the sensors that are further away from the V5CON) device (Interface) and therefore from the power supply may have a greater voltage drop in the wiring. In this case, the user simply needs to divide the network into more than one branch, since this is possible because the sensors are in parallel and as many branches as necessary can be used for better distribution in the cubicles of each MCC or Switchgear, using the accessory device code ZTA. It is also possible to supply power from both ends of the network. See wiring suggestions in the chapter “Typical Interconnections” earlier in this manual.
In this way, by observing the voltage at each sensor, the user can be sure that the network is operating under safe conditions and it also serves to demonstrate that the sensor is communicating correctly, since it transmits voltages in the same way that it transmits temperature information (and arc-flash depending on the type).
A fourth color, Violet, shows that the sensor is not responding and the voltage indicated in the sensor voltage field will be 0.00.



DIFFERENTIAL 1 to 21:

There are 21 screens paged by the keys of >> and <<

When activated, the sensor indexes are paged 5 to 5 from D1 to D125 and the other fields remain on the screen.

(1) to **## (9)**: Screen Index.

DT%: Button that selects to show the values in percentage of variation in the programmed time. When selected, it changes color from gray to green.

TEMP (°TT): Button that selects the option to show the values in differential temperature variation in the programmed time. When selected, it changes from gray to green. °TT shows whether it is in Centigrade or Fahrenheit.

ON: Indicator that the system has initiated the differential function (if programmed to do so in the programming menu).

WARM: Indicates that the programmed heating period has already passed, during which the system disregards the readings to calculate the differential variation, waiting for the system to stabilize in a normal operating temperature condition.

FIRST: Indicates that the first reading was performed, after the 'Warm' period, on which the differential variations for each new reading will be calculated

VALID: Indicates whether the new reading is valid for differential calculations.

TIME ON AT DIFF. START: Shows for information the time in 'On' in hours and minutes since the system was started, according to screen 2 of the information screens.

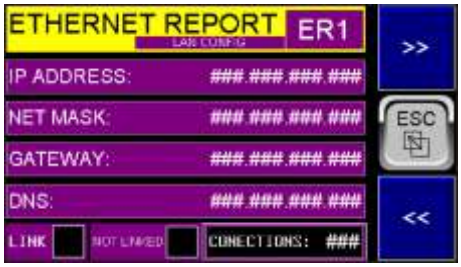
TOTAL DIFF. TIME: Shows the total time since the first valid reading was performed and over which the differential is calculated.

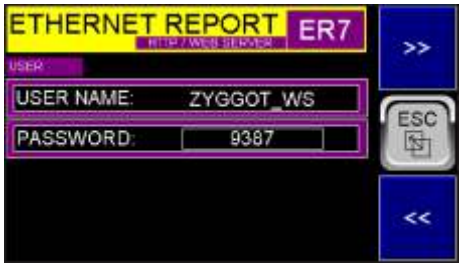
TIME TO WARM: Displays a countdown to zero of the time remaining to complete the «**Warm**» period as programmed.

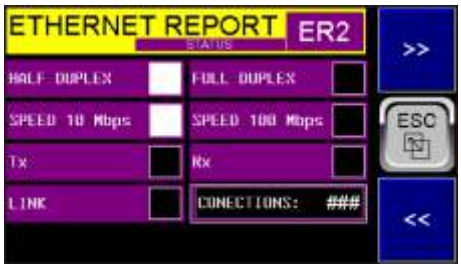
TIME TO RESTART: (only appears if set to “Valid”) Displays a counter back to zero of the time remaining in hours and minutes, for automatic resetting of a new differential period, if programmed for this in the programming menu. If not programmed for automatic restart, the system remains indefinitely considering the first reading taken after Warm. If it is restarted, manually or automatically, when the system is already in a stable condition (after Warm), a new Warm period is not expected and a new initial reading is performed for future differential calculations. While the differential calculation is not started, after Warm, this field is shown as 0:0
D### to **D###**: Sensor indices from 1 to 125 if the system is operating with active and valid differential, otherwise D0 is shown in all 5 fields.
###: Differential value in % or temperature (°C or °F) for each index from D1 to D125, as selected on the **%** or **Temp** selection buttons. described above. This value is white if it is below the differential value programmed for alarm or yellow if it is above the differential level programmed for alarm or red if it is above the differential level programmed for Trip. In both cases it also flashes in addition to changing color.

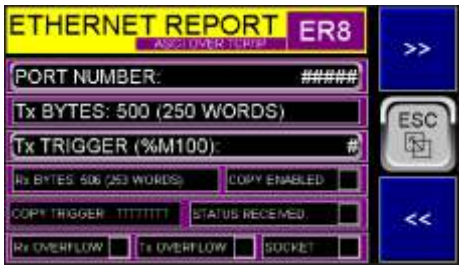
SOME SCREENS FOR OPERATION

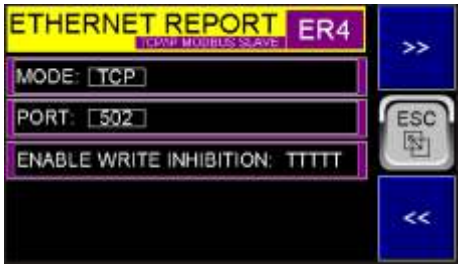
17- ETHERNET REPORT

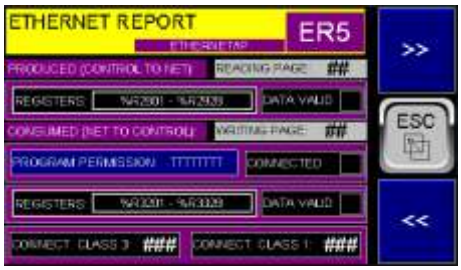


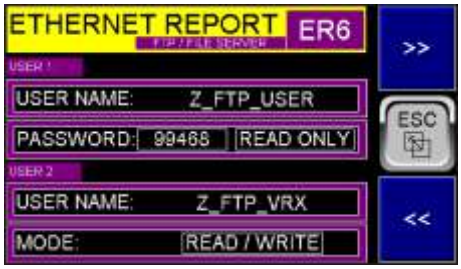












ETHERNET REPORT SCREEN 1 a 9:

There are 9 screens that reproduce the Ethernet Programming Menu, where you can check the different programming conditions without being able to change the programming inadvertently. None of the screens allows commands or changes, with the exception of the **ER3** screen, where you can choose an address and command a **PING** action to check if a certain network equipment is responding.

Further on, the fields of all these screens will be detailed. Here we will only comment on the function of each of them.

Screens **ER1** and **ER2** refer to the main Ethernet configuration parameters. On the **ER1** screen are the parameters and on the **ER2** screen are the Connection Status.

Screen **ER3** refers to the **ICMP protocol - Internet Control Message Protocol** and it is possible to Ping with the address of a certain device.

The **ER4** screen refers to the **TCP/IP - Transmission Control Protocol (Modbus TCP Server or Modbus Slave)**. Through this protocol, Modbus Over Ethenet communication can be carried out, using all the parameters and addresses described in the Modbus Map at the end of this manual.

The **ER5** screen refers to the **IP protocol - Internet Protocol (Ethernet IP Server)**.

The **ER6** screen refers to the **FTP - File Transfer Protocol**. Through which it is possible to read and have access to the files of the memory card inserted in the respective slot of the relay and where the temperature readings, etc., are recorded through a Browser.

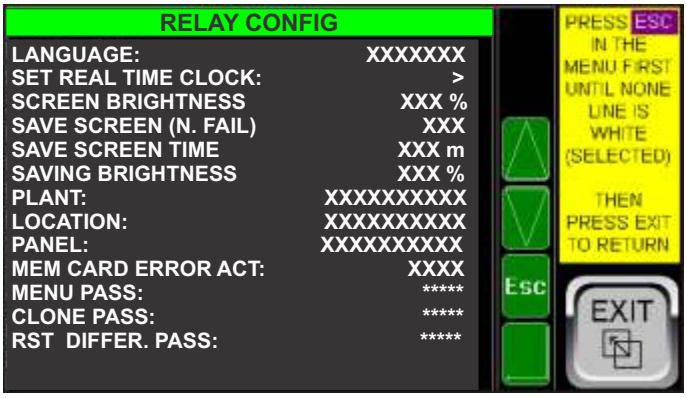
The **ER7** screen refers to the **HTTP protocol - Hypertext Transfer Protocol**.

The **ER8** screen refers to the **ASCII Over TCP/IP - ASCII Transmission Control Protocol**.

The **ER9** screen refers to the **NTP protocol - Network Time Protocol** through which precise times can be obtained from pre-defined NTP servers.

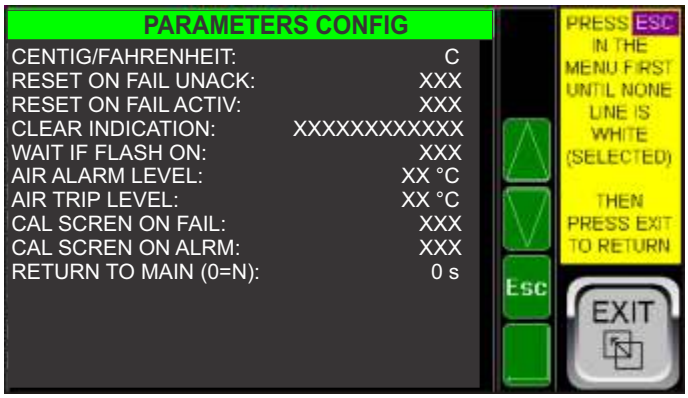
SOME SCREENS FOR OPERATION

16b- MENU



M01- RELAY CONFIG

01.1- Language: (English, Portuguese, Spanish).
01.2- Set Real Time Clock: Enter correct date and time if necessary.
01.3- Screen Brightness: Adjust the screen brightness between 50 and 100% for normal operating condition.
01.4- Save Screen (N. Fail): Select «Yes» to start reducing the screen brightness after the time programmed below or «No» to not perform this action. Will not perform this action if it is at fault. (N. Fail). And if it is in "Screen saver" and failure occurs, the screen will return to its normal brightness until the failures are reset.
01.5- Save Screen Time: Adjust the screen's inactivity time so that it has reduced brightness. When touching the screen, the brightness returns to normal and this time is counted again.
01.6- Saving Brightness: Adjust the screen brightness between 0 and 50% for the screen saving condition.
0.1.7- Plant: Enter the description of the Plant with a maximum of 10 letters.
01.8- Location: Enter the location description of the facility with a maximum of 10 letters.
0.1.9- Panel: Enter the description of the panel with a maximum of 10 letters.
01.4- Mem Card Error Act: (None, Log). Select None if you do not want the Card Error Alarm to occur or Log if you want the fault to occur.
0.1.10- Menu Pass: Enter the new Password if necessary, with a maximum of 5 numbers. If set to zero, the programming menu can be accessed by the operator without a password, which entails a risk and is not advisable.
0.1.11- Clone Pass: Enter a new Password if necessary, with a maximum of 5 numbers to access the Relay Clone menu.
0.1.12- RST Differ. Pass: Enter a new Password if necessary, with a maximum of 5 numbers to access the Restart Differential Data menu. This request is made to the operator each time the relay is reconnected with active differential data. You can start a new differential cycle from this moment or keep the initial readings of the currently valid differential system.



M02- PARAMETERS CFG

02.1- Centig/Fahrenheit: (C or F). Choose the Temperature unit.
02.2- Reset On Fail Unacknowledged: (Yes, No). Choose **Yes** to enable Unacknowledged Fault Reset (Ack). Fault acknowledgment is done on the Alarm screen. It is flashing and with a red border in case there is no Acknowledged alarm.
02.3- Reset On Fail Uncleared: (Yes, No). Choose **Yes** to enable Reset with unrecognized fault cleared or reset (Clr). Fault reset is done on the Alarm screen. It flashes and has a red border if there is a non-Cleared alarm.
02.4: Wait if Flash On: (Yes, No). Condition to return to the main screen automatically, as explained in the parameter «Return to Main» further on. If you select «Yes», it will not automatically return to the main screen if you have Flash On.
02.5- Clear Indication: (Auto, After Reset). If "Auto" is chosen, the yellow and red color indications on the main temperature screens return to white if the temperature returns to a value below the alarm or trip point, but the squares indicating Alarm or Trip remain on until the button is pressed. «Reset». If «After Reset» is chosen, the yellow and red colors continue to indicate an alarm or trip that has occurred even if the temperatures have returned to normal, as well as the little squares remain active. The colors and fault indicators only return to normal after «Reset» is activated. This is the factory condition and is safer to indicate temperature faults that have already returned to normal conditions.
02.6: Air Alarm Level: Alarm level for air or sensor body (air). Valid for all sensors.
02.7: Air Trip Level: Trip level for air or sensor body. Valid for all sensors.
02.8: Cal Screen On Fail: (Yes, No). If set to «Yes», in case of trip failure, the alarm screen will be automatically shown.
02.9: Cal Screen On Alarm: (Yes, No). If set to «Yes», in the event of an Alarm, the alarm screen will be automatically displayed.
02.12: Return to Main: Time in seconds after which the relay will automatically show the main screen 1. If set to zero, there will be no automatic return. There will also be no automatic return if you are in programming menu screens or with Flash activated according to parameter 02.5 above.

TESTING THE ETHERNET CONNECTION

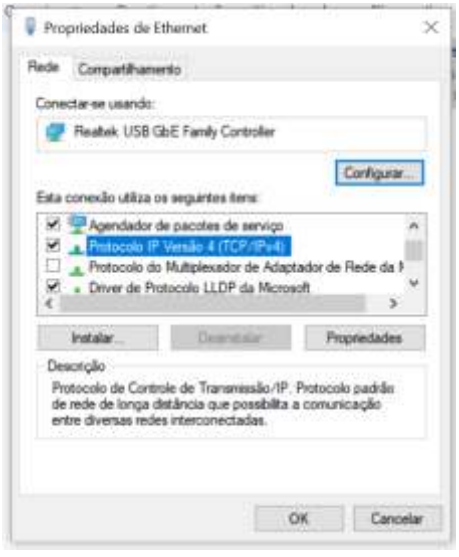
USING A WINDOWS COMPUTER

A simplified way to test the ETHERNET connection is described below, using a simple executable software provided by Varixx (or using the Superger software (see end of this manual), also provided free of charge by Varixx or any similar program available on the world wide web). Let's consider here the explanation using the **pyModbusTCPV5** executable

1- Initially connect the appropriate RJ45 cable between the computer and the LAN port of the Zyggot V5F relay and open the Windows Settings and select the Network and Internet option, which will open the properties screen that will contain content as below, among others.

2- Click on the option «**Change adapter options**». The following screen will open, in which an unidentified Ethernet connection should appear, in addition to the other existing connections.

3- Right-click the unidentified Ethernet connection. The following screen will open.



4- Double-click on the IP Protocol Version 4 (TCP/IPv4) option. The following screen will open.

4- Enter an IP address that is different from your local network, for example if your network is **192.168.0.1** and press OK. You must use a network that has the third digit different from it. For example, we use **192.168.1.11** and in the **pyModbusTCPV5** program we use **192.168.1.10** so the computer's address on the network will be terminated with 11 and the Zyggot V5F relay will have a termination with 10. At this point the two devices should already be connected and exchanging data. On the Zyggot relay, on the Menu screen, choose the option **16. REPORT** and then the option **ETHERNET REPORT / STATUS**. Then go to the ER3 screen and activate the START option to test the connection with PING.

If the connection is OK, it will indicate a response time in the **PING RESPONSE TIME** field which should be around 0.01 mS. If the connection is not OK, it will indicate **PING TIMEOUT** and the PING RESPONSE TIME field will be all **++++++**.

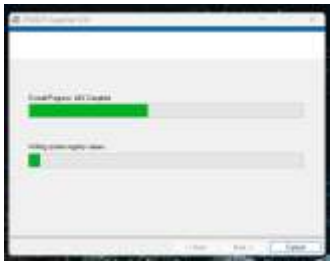
If the connection is OK, open the executable program **pyModbusTCPV5** and put the chosen address, in this example 192.168.1.10 and click on Save Settings. Choose a register to be read, for example %R2001, which will contain the target temperature of Sensor 1, plus the required offset according to the Modbus tables in this manual and click **Read**. The current temperature should appear in the Value field. In the same way, flags of type **%M** can be read.

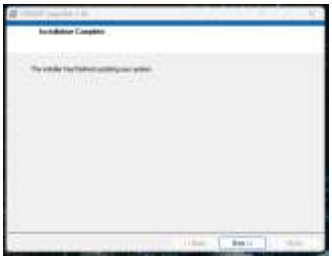
Attention: You can write to registers as well, but avoid this if you don't know that a certain register can be overwritten, as it may change Zyggot relay configuration parameters.

COMPUTER PARAMETERIZATION

ZYGGOT SUPERGER

Zyggot SuperGer is configuration software for the Zyggot family.
The software is available free of charge on the Varixx website (http://www.varixx.com.br). The main screen of the program is shown next to it.
It is possible to parameterize the relay directly on it and also carry out complete programming on a relay and clone this relay to several others using a memory card or pendrive, as previously explained.
Install Superger Software on Windows computer. All files needed to run, including “Runtime” files, are already included in the package, meaning no additional software is required. Once installed it will be ready to run.

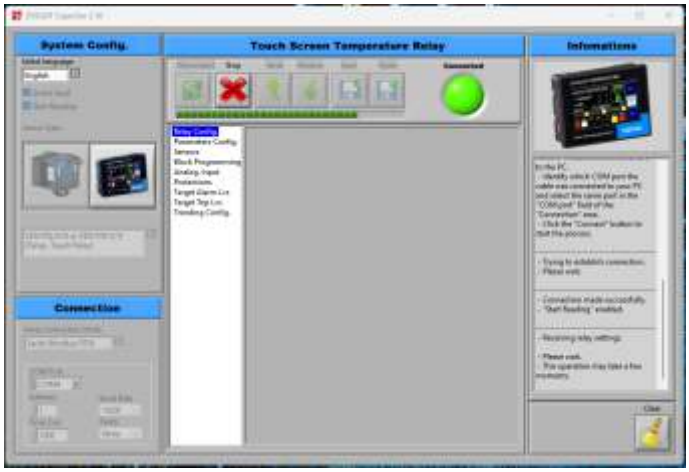




Note: With the Zyggot Superger you can easily clone the parameters of one relay to another (this can also be done via the uSD card). To program a series of relays with the same parameters, simply save them (using the «Save» button in the Superger software) and load the file later if necessary so that all the parameters are ready to «Send» to the relay.

1- The first step is to connect the relay. To do so, adjust the Modbus communication values on the relay and activate it in RS-232 mode. For details on how to activate Modbus, see the programming menu section. Use an RS-232 / RJ45 cable to connect the relay to a computer.
You can also use the Ethernet port and do all the programming via Ethernet communication. In this case, program the correct address as programmed on the relay in the Ethernet programming section (Modbus TCP/IP).

2- The next step in the software is to choose the language and working mode on the system configuration screen:
Once you have chosen the language, choose the Zyggot VZX or Zyggot V5FTA system relay. Once you have chosen the language and the type of relay, by clicking on its image, select the correct parameters for your computer (COM port 1, COM2, etc.) and the parameters that were programmed on the screen regarding Modbus in the relay (For example: Address: 1, Baudrate: 19200, Timeout: 1000 mS, Parity: None or in the case of Ethernet communication the IP Address, for example: 192.168.1.1
Make sure that Modbus is in the «Active» condition in the relay. Normally, once any parameters related to Modbus in the relay have been changed, it is necessary to turn the relay off and on for the changes to take effect, as these are parameters related to the relay BIOS.



MODBUS OVER ETHERNET ETHERNET IP SERVER COMMUNICATION WILL WORK WITH PLCS AND ALLEN BRADLEY PROTOCOL OR ALLEN BRADLEY LIKE
Maximum connection = 2 /// PORT = 44818 TCP or 2222 UDP
SEND (PRODUCED) FIRST REGISTER = %R2801 /// LAST REGISTER = %R2928 /// WORDS COUNT = 128
RECEIVE (CONSUMED) FIRST REGISTER = %R3201 /// LAST REGISTER = %R3328 /// WORDS COUNT = 128
The Status word provides Ethernet/IP connection status. The upper byte of the word
contains the Class 3 (Explicit) connection count and the lower byte contains the Class 1 (IO) connection count.
NOTE: When the Status word indicates no connections, the Consumed OCS registers contain old data
As up to 128 words are allowed in each communication, a pagination scheme is used to access all important and available data.
In this version, parameter programming via the Ethernet connection is not allowed, so the variable on the corresponding screen is permanently set to "Disabled"
However, it is allowed to send some commands via the Ethernet connection, in addition to specifying the page to be read.
IN THE PLC CONNECTION PARAMETER, USE "100" FOR THE ASSEMBLY INSTANCE INPUT WITH SIZE = 128 AND USE "101" FOR THE ASSEMBLY INSTANCE OUTPUT WITH SYZE =128

V5L V5F VERSION

CONSUMED	Controller Tags	WRITE PAGE	FUNCTION	DATA	NOTE	WARNING
%R3201 - %3300		XXX	RESERVED			
%R3301	O.Data[100]	0	MUTE	1= MUTE // 0 = DO NOTHING	SEND COMAND MUTE TO RELAY	
%R3302	O.Data[101]	0	RESET	1= RESET // 0 = DO NOTHING	SEND COMAND RESET TO RELAY	
%R3303	O.Data[102]	0	SAVE TARGET	1= SAVE // 0 = DO NOTHING	SAVE TARGET DATA TO MEMORY CARD	
%R3304	O.Data[103]	0	SAVE AIR	1= SAVE // 0 = DO NOTHING	SAVE AIR DATA TO MEMORY CARD	
%R3305		0	RESERVED			
%R3306		0	RESERVED			
%R3307		0	RESERVED			
%R3308		0	RESERVED			
%R3309	O.Data[104]	0	RESET DIFFERENTIAL WARM	1= RESET DIFFERENTIAL // 0 = DO NOTHING	RESET DIFFERENTIAL WITH A NEW WARM PERIOD	CAUTION
%R3310	O.Data[105]	0	RESET DIFFERENTIAL NO WARM	1= RESET DIFFERENTIAL // 0 = DO NOTHING	RESET DIFFERENTIAL WITHOUT A NEW WARM PERIOD	CAUTION
%R3311		0	RESERVED			
%R3312		0	RESERVED			
%R3313		0	RESERVED			
%R3314		0	RESERVED			
%R3315		0	RESERVED			
%R3316		0	RESERVED			
%R3317		0	RESERVED			
%R3318		0	RESERVED			
%R3319		0	RESERVED			
%R3320		0	RESERVED			
%R3321		0	RESERVED			
%R3322		0	RESERVED			
%R3323		0	RESERVED			
%R3324		0	RESERVED			
%R3325		0	RESERVED			
%R3326	O.Data[106]	0	PAGE TO WRITE	NOTE USED IS THIS VERSION		
%R3327	O.Data[107]	0	PAGE TO READ	SET PAGE FROM 0 TO 15 TO BE READED FROM RELAY	0 = DO NOTTHING // 1 TO 15 SET PAGE TO BE READED	
%R3328	O.Data[108]	0	WRITING DATA VALID	1= DATA TO BE WRITE = VALID // 0 = DO NOTHING	NOTE USED IN THIS VERSION	

PRODUCED	Controller Tags	READ PAGE	FUNCTION	DATA	NOTE	WARNING
%R2927	I.Data[126]	0 - 16	PAGE READED	0 - 16	0 = READED NONE // 1 TO 15 DATA WILL BE READED	
%R2928	I.Data[127]	0 - 16	DATA READED VALID	1= DATA VALID // 0 = WAIT NEW DATA	CONSIDER THE DATA READED ONLY IF %R2928 = 1	
%R2801 - %R2900		1 TO 16	DATA PAGES	SEE BELOW		
%R2801 - %R2925	I.Data[0] - I.Data[125]	1	TARGET TEMPERATURES 1 TO 125	x 10 - AS READED (FORMAT XXX.X)	THE DATA NEED TO BE DIVIDED BY 10 TO INSERT THE COMA	
%R2801 - %R2925	I.Data[0] - I.Data[125]	2	AIR TEMPERATURES 1 TO 125	x 10 - AS READED (FORMAT XXX.X)	THE DATA NEED TO BE DIVIDED BY 10 TO INSERT THE COMA	
%R2801 - %R2925	I.Data[0] - I.Data[125]	3	TARGET ALARM LEVELS 1 TO 125	x 10 - AS READED (FORMAT XXX.X)	THE DATA NEED TO BE DIVIDED BY 10 TO INSERT THE COMA	
%R2801 - %R2925	I.Data[0] - I.Data[125]	4	TARGET TRIP LEVELS 1 TO 125	x 10 - AS READED (FORMAT XXX.X)	THE DATA NEED TO BE DIVIDED BY 10 TO INSERT THE COMA	
%R2801 - %R2925	I.Data[0] - I.Data[125]	5	THM SENSORS VOLTAGE	X100 - AS READED (FORMAT XX.XX)	THE DATA NEED TO BE DIVIDED BY 100 TO INSERT THE COMA	
%R2801 - %R2925		6	RESERVED	X100 - AS READED (FORMAT XX.XX)		
%R2801 - %R2925	I.Data[0] - I.Data[125]	7	TARGET ALARM ACTIVE 1 TO 125	146 = ACTIVE // 0 = INACTIVE		
%R2801 - %R2925	I.Data[0] - I.Data[125]	8	TARGET TRIP ACTIVE 1 TO 125	162 = ACTIVE // 0 = INACTIVE		
%R2801 - %R2925	I.Data[0] - I.Data[125]	9	AIR ALARM ACTIVE 1 TO 125	146 = ACTIVE // 0 = INACTIVE		
%R2801 - %R2925	I.Data[0] - I.Data[125]	10	AIR TRIP ACTIVE 1 TO 125	162 = ACTIVE // 0 = INACTIVE		
%R2801 - %R2925		11	RESERVED			
%R2801 - %R2925		12	RESERVED			
%R2801 - %R2925		13	RESERVED			
%R2801 - %R2925		14	REERVED			
%R2801	I.Data[0]	15	THM COMM OK	0 = NOT OK // 1 = OK		
%R2802	I.Data[1]	15	THM COMM NOT OK	0 = OK // 1 = NOT OK		
%R2803	I.Data[2]	15	RESERVED			
%R2804	I.Data[3]	15	RESERVED			
%R2805	I.Data[4]	15	RESERVED			
%R2806	I.Data[5]	15	RESERVED			
%R2807	I.Data[6]	15	RESERVED			
%R2808	I.Data[7]	15	RESERVED			
%R2809	I.Data[8]	15	RESERVED			
%R2810	I.Data[9]	15	RESERVED			
%R2811	I.Data[10]	15	RESERVED			
%R2812	I.Data[11]	15	ETHERNET NOT LINKED	0 = ETHERNET LINKED // 1 = NOT LINKED		
%R2813	I.Data[12]	15	ANY FAIL ACTIVE	0 = NO // FAIL ACTIVE =1		
%R2814	I.Data[13]	15	TARGET FAIL	0 = NO // FAIL ACTIVE =1		
%R2815	I.Data[14]	15	AIR FAIL	0 = NO // FAIL ACTIVE =1		
%R2816	I.Data[15]	15	ALARM ACTIVE	0 = NO // ALARM ACTIVE =1		
%R2817	I.Data[16]	15	TRIP ACTIVE	0 = NO // TRIP ACTIVE =1		
%R2818	I.Data[17]	15	ALARM UNACKNOWLEDGED	0 = NO // 1 = YES		
%R2819	I.Data[18]	15	ALARM UNCLEARD	0 = NO // 1 = YES		
%R2820	I.Data[19]	15	TARGET FAIL ACTIVE	0 = NO // 1 = YES		
%R2821	I.Data[20]	15	TARGET TRIP ACTIVE	0 = NO // 1 = YES		
%R2822	I.Data[21]	15	AIR ALARM ACTIVE	0 = NO // 1 = YES		
%R2823	I.Data[22]	15	AIR TRIP ACTIVE	0 = NO // 1 = YES		

PRODUCED	Controller Tags	READ PAGE	FUNCTION	DATA	NOTE	WARNING
%R2824	I.Data[23]	15	EXTERNAL FAIL 1 ACTIVE	0 = NO // 1 = YES		
%R2825	I.Data[24]	15	EXTERNAL FAIL 2 ACTIVE	0 = NO // 1 = YES		
%R2826	I.Data[25]	15	ANALOG 1 ALARM ACTIVE	0 = NO // 1 = YES		
%R2827	I.Data[26]	15	ANALOG 2 ALARM ACTIVE	0 = NO // 1 = YES		
%R2828	I.Data[27]	15	ANALOG 3 ALARM ACTIVE	0 = NO // 1 = YES		
%R2829	I.Data[28]	15	ANALOG 4 ALARM ACTIVE	0 = NO // 1 = YES		
%R2830	I.Data[29]	15	ANALOG 1 TRIP ACTIVE	0 = NO // 1 = YES		
%R2831	I.Data[30]	15	ANALOG 2 TRIP ACTIVE	0 = NO // 1 = YES		
%R2832	I.Data[31]	15	ANALOG 3 TRIP ACTIVE	0 = NO // 1 = YES		
%R2833	I.Data[32]	15	ANALOG 4 TRIP ACTIVE	0 = NO // 1 = YES		
%R2834	I.Data[33]	15	EXCESS LIFE ACTIVE	0 = NO // 1 = YES		
%R2835	I.Data[34]	15	DIFFERENTIAL ALARM ACTIVE	0 = NO // 1 = YES		
%R2836	I.Data[35]	15	DIFFERENTIAL TRIP ACTIVE	0 = NO // 1 = YES		
%R2837	I.Data[36]	15	RESERVED			
%R2838	I.Data[37]	15	RESERVED			
%R2839	I.Data[38]	15	G1 TARGT ALARM ACTIVE	0 = NO // 1 = YES		
%R2840	I.Data[39]	15	G2 TARGT ALARM ACTIVE	0 = NO // 1 = YES		
%R2841	I.Data[40]	15	G3 TARGT ALARM ACTIVE	0 = NO // 1 = YES		
%R2842	I.Data[41]	15	G4 TARGT ALARM ACTIVE	0 = NO // 1 = YES		
%R2843	I.Data[42]	15	G5 TARGT ALARM ACTIVE	0 = NO // 1 = YES		
%R2844	I.Data[43]	15	G1 AIR ALARM ACTIVE	0 = NO // 1 = YES		
%R2845	I.Data[44]	15	G2 AIR ALARM ACTIVE	0 = NO // 1 = YES		
%R2846	I.Data[45]	15	G3 AIR ALARM ACTIVE	0 = NO // 1 = YES		
%R2847	I.Data[46]	15	G4 AIR ALARM ACTIVE	0 = NO // 1 = YES		
%R2848	I.Data[47]	15	G5 AIR ALARM ACTIVE	0 = NO // 1 = YES		
%R2849	I.Data[48]	15	G1 TARGT TRIP ACTIVE	0 = NO // 1 = YES		
%R2850	I.Data[49]	15	G2 TARGT TRIP ACTIVE	0 = NO // 1 = YES		
%R2851	I.Data[50]	15	G3 TARGT TRIP ACTIVE	0 = NO // 1 = YES		
%R2852	I.Data[51]	15	G4 TARGT TRIP ACTIVE	0 = NO // 1 = YES		
%R2853	I.Data[52]	15	G5 TARGT TRIP ACTIVE	0 = NO // 1 = YES		
%R2854	I.Data[53]	15	G1 AIR TRIP ACTIVE	0 = NO // 1 = YES		
%R2855	I.Data[54]	15	G2 AIR TRIP ACTIVE	0 = NO // 1 = YES		
%R2856	I.Data[55]	15	G3 AIR TRIP ACTIVE	0 = NO // 1 = YES		
%R2857	I.Data[56]	15	G4 AIR TRIP ACTIVE	0 = NO // 1 = YES		
%R2858	I.Data[57]	15	G5 AIR TRIP ACTIVE	0 = NO // 1 = YES		
%R2859	I.Data[58]	15	REERVED			
%R2860	I.Data[59]	15	REERVED			
%R2861	I.Data[60]	15	REERVED			
%R2862	I.Data[61]	15	REERVED			
%R2863	I.Data[62]	15	REERVED			
%R2864	I.Data[63]	15	REERVED			

PRODUCED	Controller Tags	READ PAGE	FUNCTION	DATA	NOTE	WARNING
%R2865	I.Data[64]	15	SCREEN ALARM UNCLEARED	0 = NO // 1 = YES		
%R2866	I.Data[65]	15	SCREEN ALARM UNACKNOULEDGED	0 = NO // 1 = YES		
%R2867	I.Data[66]	15	SCREEN ALARM ANY FAIL ACTIVE	0 = NO // 1 = YES		
%R2868	I.Data[67]	15	RESERVED			
%R2869	I.Data[68]	15	RESERVED			
%R2801	I.Data[0]	16	MAX TARGET TEMPERATURE	x 10 - AS READED (FORMAT XXX.X)	THE DATA NEED TO BE DIVIDED BY 10 TO INSERT THE COMA	
%R2802	I.Data[1]	16	MAX AIR TEMPERATURE	x 10 - AS READED (FORMAT XXX.X)	THE DATA NEED TO BE DIVIDED BY 10 TO INSERT THE COMA	
%R2803	I.Data[2]	16	MEMORY CARD STATUS	0=OK// 1= UNKNOW FORMAT// 2=NO CARD//	3= NOT SUPPORTED//4=ILEGAL SWAP//5=UNKNOW//PROTECTED	
%R2804	I.Data[3]	16	DIFFERENTIAL TIME TO WARM HOUR	AS READED		
%R2805	I.Data[4]	16	DIFFERENTIAL TIME TO WARM MINUTE	AS READED		
%R2806	I.Data[5]	16	DIFFERENTIAL TIME TO RESTART HOUR	AS READED		
%R2807	I.Data[6]	16	DIFFERENTIAL TIME TO RSTRT MINUTE	AS READED		
%R2808	I.Data[7]	16	DIFFERENTIAL ON	0 = NO // 1 = YES		
%R2809	I.Data[8]	16	DIFFERENTIAL WARM OK	0 = NO // 1 = YES		
%R2810	I.Data[9]	16	DIFFERENTIAL FIRST READ OK	0 = NO // 1 = YES		
%R2811	I.Data[10]	16	DIFFERENTIAL VALID (OPERATING)	0 = NO // 1 = YES		
%R2812	I.Data[11]	16	REDING THM SENSOR NUMBER	AS READED (1 TO 125)		
%R2813	I.Data[12]	16	RESERVED			
%R2814	I.Data[13]	16	RESERVED			
%R2815	I.Data[14]	16	TOTAL THM SENSOR RESPONDING	0 TO 125		
%R2816	I.Data[15]	16	TOTAL THM SENSOR NOT RESPONDING	0 TO 125		
%R2817	I.Data[16]	16	TOTAL ALRM ACTIVE			
%R2818	I.Data[17]	16	TOTAL TRIP ACTIVE			
%R2819	I.Data[18]	16	RESERVED			
%R2820	I.Data[19]	16	RESERVED			
%R2821	I.Data[20]	16	RESERVED			
%R2822	I.Data[21]	16	RESERVED			
%R2823	I.Data[22]	16	REAL TIME CLOCK DAY	1 TO 31		
%R2824	I.Data[23]	16	REAL TIME CLOCK MONTH	1 TO 12		
%R2825	I.Data[24]	16	REAL TIME CLOCK YEAR			
%R2826	I.Data[25]	16	REAL TIME CLOCK HOUR	0 TO 24		
%R2827	I.Data[26]	16	REAL TIME CLOCK MINUTE	0 TO 60		
%R2828	I.Data[27]	16	REAL TIME CLOCK SECONDS	0 TO 60		
%R2829	I.Data[28]	16	RESERVED			

ABOUT VARIXX

For over 40 years, Varixx has followed its vocation for the development of high technology products and focuses its efforts on serving the industrial market with quality and speed. The know-how in power electronics has allowed us to offer the market a wide range of products that have become known for their long service life and reliability. We were the creators of the global online thermography market, with the Zyggot line, which is becoming a world reference in the market for temperature monitoring and diagnostics and arc-flash detection, in electrical systems in general.

Also part of our product portfolio are the LED lighting fixtures from our ONNO division, developed and manufactured 100% in Brazil with cutting-edge technology. Varixx values the introduction of innovative concepts worldwide.

AREAS OF EXPERTISE

- MANUFACTURERS OF MACHINE GENERATORS AND SYNCHRONOUS MOTORS
  Static Exciters, Control Box Controllers, Low and Medium Voltage Soft
- ALUMINUM AND HYDROGEN / OXYGEN PRODUCTION
  High Current Rectifiers, Solid State Contactors, Smart Relay for CCM, Online Thermography System and Arc Voltage Detection and Onno LED Luminaires.
- BASE INDUSTRY, MINING AND STEEL INDUSTRY
  Smart Relays for CCM's, Low and Medium Voltage Soft Starters, Solid State Contactors, AC/DC Converters for Electromagnets, High Current Rectifiers, Online Thermography System, Arc Voltage Detection and Protection and Onno LED Luminaires.
- OIL COMPANIES
  Smart Relays for CCM's, Static Excitation, Low and Medium Voltage Soft Starters, Solid State Contactors, Online Thermography System, Arc Voltage Detection and Protection and Onno LED Luminaires.
- PANEL ASSEMBLY COMPANIES
  Smart Relays for CCM's, Online Thermography, Arc Voltage Detection and Protection System, Semiconductors, Power Supplies and Onno LED Luminaires.

Why ZYGGOT Thermography?

- **SINGLE CABLE / EASY TO INSTALL**
- **PREDICTIVE / DIFFERENTIAL PROTECTION**
- **ADEQUACY TO NR-10 AVOID ACCIDENTS**
- **AVOID OPENING PANEL / AVOID CATASTROPHIC FAILURES**
- **WAIVER CONVENTIONAL THERMOGRAPHY / MEASURE AIR TEMP. TOO**
- **NO CONTACT / WITH ETHERNET COMMUNICATION**

KNOW MORE!

ZYGGOT ARC

ARC FLASH PROTECTION SYSTEM

- **Low Cost // Up to 50 sensors per relay.**
- **First in the market // Faster (300 uS vs 6 mS)**
- **Ultraviolet arc-flash detection**
- **Does not work with ambient light (False Alarm)**
- **No current reading**

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ZYGGOT THERMOGRAPHY

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