



# ZYGGOT ARC FLASH PROTECTION SYSTEM

ONLINE ULTRA SELECTIVE ARC FLASH PROTECTION SYSTEM

## ZYGGOT V5F/S ARC FLASH MONO GATEWAY ZYGGOT V5F/A ARC FLASH MULTI GATEWAY



## ONLINE ULTRAVIOLET ARC FLASH PROTECTION SYSTEM

MANUAL

# varixx

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**Nota:** Este Manual é redigido em Inglês USA e também está disponível no site [Varixx.com](http://Varixx.com) e [Varixx.com.br](http://Varixx.com.br) o mesmo manual em Português Brasil (PT-BR). O relé Zyggot sai de fábrica com 3 linguas selecionáveis, Inglês, Português e Espanhol podendo também ser fornecido com outras linguas, sob consulta.

**Note:** This manual is written in English USA and the same manual is also available on the website [Varixx.com](http://Varixx.com) and [Varixx.com.br](http://Varixx.com.br) in Brazilian Portuguese (PT-BR). The Zyggot relay leaves the factory with 3 selectable languages, English, Portuguese and Spanish, and can also be supplied with other languages, upon request.

# ZYGGOT THERMOGRAPHY

## ARC FLASH PROTECTION SYSTEM



### DESCRIPTION

Varixx was the world's first company to introduce a Continuous, Online, Networked Temperature Monitoring System in 2008 and is a market leader in this area. The low-cost ZYGGOT system was designed to allow online monitoring of the temperatures of low and medium voltage components and internal connections, transformers, motors, etc., replacing old methods of periodic thermography with cameras.

The ZYGGOT system introduced an important innovation to the market because current safety standards prohibit the opening of energized electrical panels for any type of measurement, including temperature measurements with manual point-of-care guns or thermography cameras, without the use of appropriate protective clothing.

An important feature of the ZYGGOT system is that it simultaneously measures both the target and the sensor body, which is equal to the temperature of the surrounding air.

This feature also allows the detection of an increase in the internal temperature of the panel, which can identify obstructions or ventilation failures or even an increase in the temperature of equipment not directly monitored.

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

Varixx also introduced the world's first and only Ultraviolet arc detection system in 2014, which does not require confirmation of current rise and inhibits arc formation at its onset due to its extremely fast action (<250 μs), detecting the arc in its initial phase and not in the fourth phase of the arc, unlike existing systems that detect light and current, which only reduce the effect of the arc, already formed, thereby reducing the Incident Energy by around 80 to 150 times compared to the competition. It is a system that has already been widely approved, with hundreds of real cases of detection and action, with minimal or no damage to the protected systems, with a return to operation time of minutes to a few hours.

Furthermore, as it does not require current monitoring, it is very easy to implement and costs much less than light and current detection

systems.

In addition to the independent CTM and Arc Flash systems, which continue in the product portfolio, Varixx is introducing the integrated Continuous Temperature Monitoring + Arc Flash system, which saves panel door space and facilitates integration with the user's DCS system, featuring Modbus and Ethernet communication.



Gateway

Sensor UVB



Sensor UVA



Sensor UV Octagonal



### APPLICATION

Low and medium voltage electrical panels, transformers, motors, brakes, processes, etc., offering and integrated protection against electric arcs (Arc Flash).

### BENEFITS

- \* Arc detection in phase 1 (pre-arc).
- \* Reduction in incident energy between 80 and 150 times compared to the competition.
- \* Indicates any sensor failure.
- \* Failure history.
- \* Modbus and Ethernet communication

### System Features

- \* Applicable in low and medium voltage.
- \* Up to 100 UV arc sensors in RS485 network with mini USB connections.
- \* Smart Sensors powered by the network itself.
- \* Measuring angle of 90°.
- \* Relay with color graphic touch screen display and Modbus and Ethernet communication.
- \* Fault history with "Time Stamp".
- \* Arc Flash protection with up to 40 triggering Gateways, each with up to 100 sensors for Ultraviolet detection.
- \* Readings and protections related to 4 analog inputs.
- \* External fault monitoring.
- \* Sensor status monitoring.
- \* 4 programmable digital outputs.
- \* Each sensor has a flashing LED and can be controlled by the relay to facilitate its location and address on the network.
- \* Operation in «Fail Safe» mode
- \* Ethernet protocols:
  - TCP/IP (Modbus Slave): Modbus over Ethernet.**
  - Ethernet/IP: ODVA CIP over Ethernet.**
  - FTP: (File Server) File Transfer Protocol.**
  - ASCII over TCP/IP: ASCII Data over Ethernet.**
  - NTP Protocol: Network Time Protocol HTTP (Web Server): Hypertext Transfer Protocol (Web Server).**



## MAIN ADVANTAGES

- TESTABLE WITH SYSTEM OFF
- WITH ETHERNET
- INTEGRATES ARC PROTECTION
- WORLD'S MOST ADVANCED ARC PROTECTION
- HIGH SELECTIVITY FOR ARC (VERSION MULTI GATEWAY)
- ARC ACTUATION IN LESS THAN 250uS
- REDUCES INCIDENT ENERGY BY UP TO 150X
- DISPENSES CURRENT MEASUREMENT FOR ARC
- CAN MEASURE NON-VISIBLE POINTS
- DOES NOT USE BATTERIES
- PROVEN RELIABILITY
- HISTORY OF EVENTS
- TEMPERATURE PLOT
- WORLD LEADING SYSTEM

- ## APPLICATIONS
- Internally to panels for arc flash protection.
  - Power cabins.
  - Substations

- ## KEY POINTS
- Color Touch Screen.
  - Has Ethernet communication with several protocols.
  - Several built-in protections.
  - UV arc protection, the most advanced in the world (Patent N° PI 0903809-4).
  - Reduces incident energy by up to 150 times compared to light and current detection systems.
  - Does not require current measurement to confirm an arc.
  - Also available is a Multi Gateways version, which allows high selectivity for arc tripping, using a low-cost triggering Gateway per cubicle or per associated circuit breaker.
  - Real-time graphical recording (Plot).
  - History of failures and events.
  - Modbus RTU communication (and others).
  - Arc sensor networks on high-speed CAN networks
  - Each relay can monitor up to 4000 arc sensors.

- ## MAIN FEATURES
- Reads supply voltage from up to 4000 sensors.
  - Up to 100 arc sensors per gateway.
  - Monitors Arc Flash by UV detection.
  - Dispenses current measurement for arc confirmation.
  - Actuation in less than 250uS, in the pre-arc phase, reduces incident energy by up to 150x in relation to systems by light and current detection.
  - Also available is a Multi Gateways version that allows high selectivity for arcing, allowing each circuit breaker to be tripped independently of the others, using a low-cost gateway per cubicle and a single relay per system.
  - Configurable alarm and trip levels for temperature.
  - Real-time graphic for analog inputs.
  - Fault and status history.
  - Continuous readings.
  - 4 analog inputs with configurable alarm and trip levels.
  - 8 digital inputs for external events or faults (ventilation, doors, etc.).
  - Modbus RTU + Ethernet.



ALSO AVAILABLE IN THE THM+ARC SYSTEM WITH RELAY INTEGRATING CONTINUOUS MEASUREMENT OF UPTO 100 POINT, WITHOUT CONTACT, TO THE MONO ARC SYSTEM AND MULTI GATEWAY. FIND OUT MORE THROUGH THE LINK BELOW:

## DESCRIÇÃO DA TOPOLOGIA.

Each sensor has an LED that flashes under relay command to facilitate diagnosis and check the addressing.

The Relay automatically indicates sensors that are not responding and also checks the supply voltage level reaching each one, allowing the detection of potential problems in the network, such as cabling exceeding the permitted length.

The ultraviolet arc sensors are connected via 1 Gateway (or more Gateways (up to 40 ZGA1R), allowing selectivity never before available worldwide for tripping specific circuit breakers in each cubicle).

The relay has the function of indicating the occurrence of an arc, arc sequence, sensor status, such as supply voltages and communication.

The triggering Gateway has the function of communicating with the sensor network and providing ultra-fast trip triggering, independent of the relay, i.e. the system operates safely regardless of communication with the V5F relay.

The relay has four or twelve digital outputs available. Four digital inputs and four analog inputs are also available.

The data transmission method between gateway sensors uses a high-speed CAN network using shielded cables with mini-USB connectors that allow for quick installation and operation without the need for any tools other than powering the sensors through the network cable itself.

The Zyggot V5F/S Mono Gateway or V5F/A Multi Gateways system relay can be connected to a communication network with a supervisory system or remote monitoring.

The ZYGGOT Relay has Ethernet communication with various protocols, and can be accessed from anywhere by mobile or non-mobile devices..

## ZYGGOT RELAY VZF/x.

- **Digital Outputs:** 04 Programmable.
- **Programming of parameters and values:** "On line".
- **Reading of Values:** Supply voltage of each ARC 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 CsCAN Protocol or optional Devicenet.
- **Protections and Indications:** Communication failure with the Gateway, Modbus communication failure, Arc sensors not responding, Arc Flash trip, Alarm due to Gateway not programmed correctly, Alarm or trip due to ARC Chain, Alarm and Trip due to External Fault, Alarm and trip due to analog input levels, Fault Detection by the Gateway, Alarm due to fault related to the memory card, Active alarm screens, History screen with "Time Stamp", Alarm and trip statistics, Digital input and digital output status, Analog input levels, Analog input plot.
- **Actions on faults detected by the relay:** Programmable for each fault in "None", "Log", "Alarm", "Trip".
- **Real Time Clock: Included.**
- **Fault History:** with Date and Time.
- **Event Memorization:** Unlimited events, memorized indefinitely until they are cleared with a password, for security.
- **Programmable Digital Outputs:** 4 on the Zyggot relay plus 8 on the optional EBLOCK module.
- **Programmable Digital Inputs:** 4 on the Zyggot relay plus 8 on the optional EBLOCK module.
- **Fail Safe System:** Yes
- **Memory Card:** Automatic and manual recording of arc occurrence on the memory card for transfer to computers.
- **Active screens:** over 150 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 on all the relays in the system) or by Modbus.
- **Multi Gateways:** Yes for high selectivity of arc tripping, which can be connected to up to 40 Gateways, each with up to 100 arc sensors by Ultraviolet.



# TECHNOLOGY AND MAIN FEATURES OF THE ARC SYSTEM

The ZYGGOT Arc Flash Protection System, integrated in this product with the Zyggot V5F/x THM+ARC Temperature Monitoring Relay, was designed to allow full-time monitoring and protection against arc flash of low and medium voltage electrical equipment such as panels, transformers, motors and generators.

The ZYGGOT Arc Flash Protection System introduces an important innovation to the market due to the fact that it detects ultraviolet (UV) radiation from the beginning of the arc, that is, from the pilot path, in phase 1 of the arc, before the detection of light from other systems. The light phase is already the final phase of the arc, with expansion of gases and vaporization of copper and other metals. Another important advantage is that selective monitoring of ultraviolet radiation eliminates the need for simultaneous monitoring of the current to confirm the occurrence of the arc, which is required by visible light detection systems.

If ultraviolet radiation is emitted at certain levels, the system can be safely tripped. Systems that detect visible light could be activated by door openings or light entering through cracks, which requires simultaneous current monitoring to avoid undue tripping.

The ZYGGOT Arc Flash Protection System, unlike light detection systems, can be applied even under direct sunlight\*, thus opening up the possibility of using it in external systems (outdoor substations, transformers, motors, etc.).

The sensors have a 90° opening angle that allows monitoring large areas and practically an entire cubicle with a single sensor, since it even detects UV reflected on the internal walls of the panel, thus detecting the start of arcs in areas not directly targeted.

The effective monitoring distances are high due to the high sensitivity of the sensors. Each arc sensor, up to 100 per relay, is connected to a high-speed CAN network and this network is connected to a triggering Gateway, which is responsible for providing the trip signal at 300  $\mu$ S, regardless of the speed of the Zyggot relay on the panel port. A single gateway and Zyggot relay can monitor up to 100 arc sensors per UV (plus 100 temperature sensors in the case of this system).

The interconnection of the sensors to the detection and triggering gateway uses a high-speed CAN network with clean and efficient wiring, unlike star systems, with analog or non-analog signals, which require each sensor to be independently connected to concentrator or interface modules. The high speed of detecting the occurrence of an electric arc and sending the trip signal (300  $\mu$ s) ensures safety, because in the event of an electric arc, the sooner the energy is removed from the system, the less damage will be caused by the incident energy (up to 105 times less than systems with visible light).

Even when using circuit breakers with an opening time of tens of milliseconds, the system is guaranteed to trip, even if the network interconnection cable were destroyed by the arc, because before the destruction, the signal would have already reached the relay and the circuit breaker (in dozens of real protection cases that occurred over many years of use, no system was damaged, due to the high speed of operation, inhibiting the arc and not mitigating it). Another important difference is that the transmitted signals are digital, already processed in the microprocessor sensor and transmitted by shielded cables, therefore being immune to extremely strong electromagnetic fields generated by the arc current, unlike what can occur with visible light detection systems, with photocells, which transmit an analog signal to the interface.

## BENEFITS

- \* Monitors ultraviolet radiation in bands A and B.
- \* Detects phase 1 of the arc, before the visible light phase (i.e. expansion and destruction).
- \* Dispenses with simultaneous current monitoring to configure the occurrence of an arc.
- \* Sends the trip signal in less than 300  $\mu$ s.
- \* A single Gateway + intelligent ZYGGOT relay with latest-generation ARM CORTEX microprocessors monitors up to 100 arc sensors per gateway (+100 temperature sensors per Zyggot relay).
- \* Reduction of up to 150 times in incident energy.
- \* Low implementation cost.
- \* High reliability.
- \* Allows for high selectivity, if necessary (Multi Gateways Version).
- \* "Open" system, does not depend on proprietary software, and can be interconnected to the DCS.

## PHASES OF THE ARC

**Pre-Arc:** Ionization of the air and formation of the path for the occurrence of an electric arc. In this phase, ultraviolet light is released (0 to 1 mS). This is the phase in which the arc sensor operates.

**Compression:** The energy of the arc is discharged into the air contained in the room, with a consequent increase in pressure (5 to 15 ms).

**Expansion:** The increase in pressure caused by the previous stage activates the relief mechanism and the air begins to be expelled to the outside, reducing the internal pressure (15 to 40 ms).

**Expulsion:** The pressure inside the room decreases, but the hot air continues to be expelled at an approximately constant pressure. The temperature potentially increases. The expulsion of air tends to be extinguished when the room's environment reaches the temperature of the arc (40 to 60 ms);

**Thermal:** The arc completely affects the insulating materials. The temperature reaches thousands of degrees Celsius and the conductive and structural materials begin to melt. This phase continues until energy dissipation occurs.

## MAIN SYSTEM FEATURES

- > Intelligent trigger gateway and relay (with ARM CORTEX microprocessors). Up to 100 gateways can be connected per relay.
- > Applicable in low and medium voltage.
- > High-speed CAN network for sensors.
- > Relay with Modbus RTU port for connection to PLCs.
- > Intelligent arc sensors powered by the CAN network itself.
- > 90° measuring angle.
- > Voltage and sensor status monitoring.
- > Does not require analog interfaces.
- > Gateway, sensors and relays can be configured and tested by PC with free software.
- > Allows high selectivity for tripping, using a low-cost triggering Gateway per cubicle/circuit breaker and a single Zyggot relay per system, or even dispensing with the relay (Multi Gateways Version).
- > Possibility of using only the Gateway, without the Zyggot relay, since the Gateway has Modbus communication and can be connected directly to the user's DCS system.
- > Up to 100 sensors connected to a single Gateway + Zyggot Relay. (Network with plug-in sensors).
- > Each sensor has an LED that flashes when commanded by the relay, to detect faults or their identification.
- > Trigger gateway with 3 digital outputs, one TRIP (solid state and mechanical) and two programmable.
- > Zyggot relay with 4 or 12 programmable digital outputs and 4 digital inputs for external faults, etc., in addition to 4 analog inputs.
- > Easy testing with ArcSafe hand-held tester (arc generator)

# PRINCIPLE OF OPERATION OF THE ARC SYSTEM

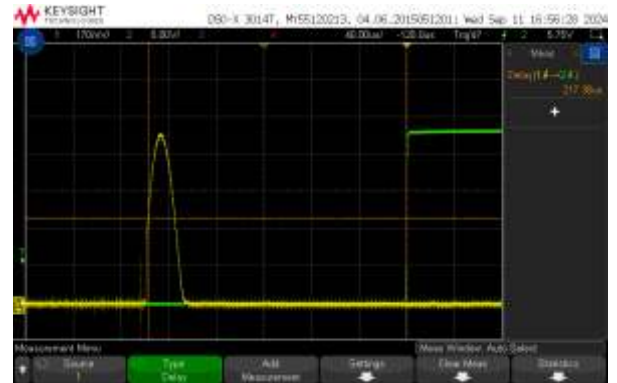
## PRINCIPLE OF OPERATION

Each sensor in the system has a high-speed, high-performance ARM CORTEX microprocessor. The firmware embedded in the sensor will operate communication and other tasks, but if an arc is detected, a high-priority interruption will occur and the arc detection data transmission routine, with the sensor number, will be immediately transmitted to the triggering Gateway and the Zyggot relay. The time from the detection of the arc by the sensor until the activation of the Gateway's TRIP output is approximately 300  $\mu$ s, activating a solid-state contact that supports 12 A continuously and up to 200 Amps peak for 5 cycles, plus a dry contact in parallel, allowing rapid actuation and a guarantee of permanence through the mechanical contact.

The Zyggot relay, with a color touch screen, has the function of acquiring data from the Gateway, without the need for speed since the trip occurs through the Gateway. After detection, the relay will show the sequence of arc occurrence, if more than one sensor is actuated.

The high-speed CAN network of arc sensors, connected to the Gateway, provides high detection speed and also the fact that the sensors detect the initial phase of the arc guarantees that even if the network cable were destroyed by the arc itself, the trip sequence will be terminated, protecting the system from catastrophic destruction (Note: in hundreds of real cases already reported by users, this has never happened. The system itself has never been destroyed, unlike light and current detection systems, which frequently suffer from this and there has also never been catastrophic destruction in real cases protected by Ultra-violet). The system will be protected even during the LED flash time or any other communication, because the CAN protocol has communication priorities, that is, more than one or even all network elements can generate communication at the same time and the one with the highest priority for all communication of lower priority packets is served immediately. Since the arc detection data packet is the one with the highest priority, the arc detection signal will be read immediately by the intelligent Gateway. If one or more sensors detect an arc, a list of these sensors will be displayed on the Zyggot V5F/x relay or even without the relay, this list will be available to the user on the Gateway via Modbus communication (and can therefore be used with or without the Zyggot relay, and in this case the Gateway can be configured using free software available on the Varixxx website).

## Gateway Trip Output



— Ocorrência do arco      — Saída de trip

## READING ANGLES AND REFLECTION

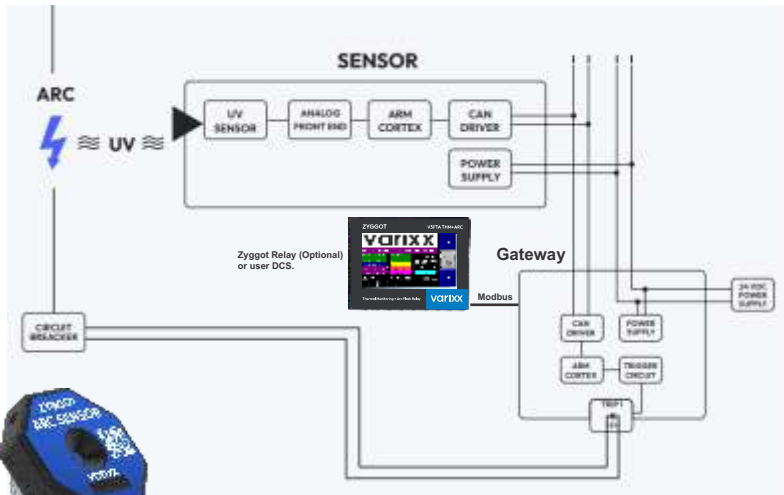
The sensor's opening (detection) angle defines the UV measurement area, i.e. the area where the occurrence of the arc can be detected.

UVA and UVB sensors have an opening angle of 90°, covering practically the entire area of a panel, depending on the attachment point. In a single-compartment cubicle, a single sensor installed at a suitable point, such as in one of the corners, may be sufficient.

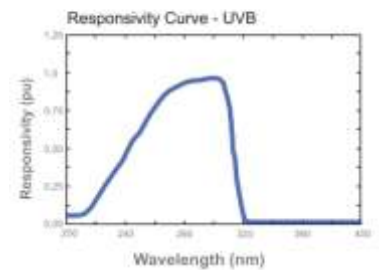
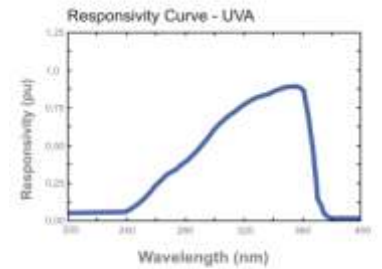
Two sensors at opposite angles leave the entire volume without shadow areas. Ultraviolet radiation is reflected from surfaces like visible light (although it can be attenuated). Zyggot sensors can capture reflected UV radiation (depending on the reflected intensity), which facilitates detection throughout the volume of interest.

## SYSTEM RELATED TO THE ARCH

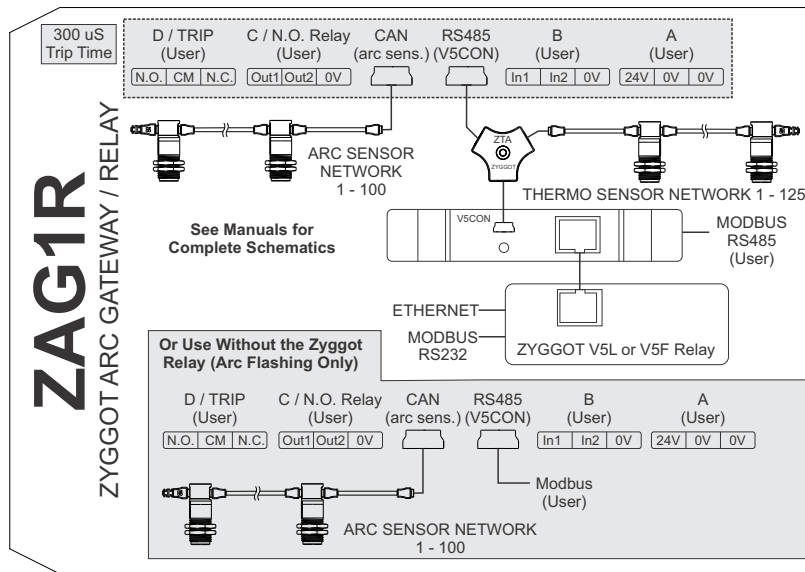
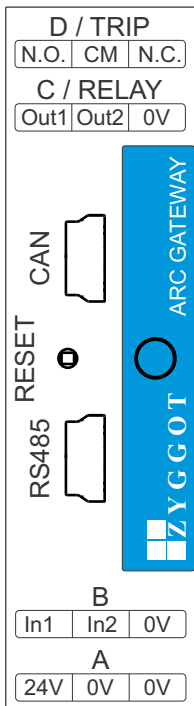
- A) 90° Arc sensor - ZSA/90/24/UVA
- B) 90° Arc sensor - ZSA/90/24/UVB
- C) 90° ARC sensor - ZSA/90/24/UV/OCT
- D) ZAG1R gateway
- E) V5CON Interface for Zyggot relay
- F) Zyggot V5F/S or V5F/A ARC FLASH PROTECTION RELAY
- G) Interconnection cable with mini-USB connector-ZCB/4/2U/...
- H) 24 VDC power supply VPS12024
- I) Tester (test arc generator) ZSA
- J) Termination resistor ZFR



Arc Safe tester



# OVERLAY AND SIDE LABEL ZAG1R GATEWAY



**ZYGOT THM / ARC SYSTEM**  
Autonomous or Integrated Arc Flashing Relay  
**ZYGOT**  
**varixx**

## ZSA/90/24/UV/OCT Sensor Features

- > Power supply: 24VDC via standard cable.
- > Opening angle: 90°.
- > LED indicator for location and faults.
- > Network addressing configurable via PC.
- > Detects UVA radiation and a small portion of visible light (240 to 340 nm).
- > Applicable in panels over 4160 VCA to 30.000 VCA and sheltered environments.
- > Does not operate with ambient light or internal light from panels. (It may operate if pointed directly at UV light sources, such as clear sky, sun, flash or intense light).
- > Sensitivity to 2 cm electric arc produced by test device at a distance of 50 to 80 cm or real arc at up to 20 meters\*
- \* Depends on arc intensity (with 200A and 1 cm arc path the detection distance is 5 meters)

## ZSA/90/24/UVA Sensor Features

- > Power supply: 24VDC via standard cable.
- > Opening angle: 90°.
- > LED indicator for location and faults.
- > Network addressing configurable via PC.
- > Detects UVA radiation and a small portion of visible light (240 to 340 nm).
- > Applicable in panels to 2400 VAC.
- > Does not operate with ambient light or internal light from panels. (It may operate if pointed directly at UV light sources, such as clear sky, sun, flash or intense light).
- > Sensitivity to 2 cm electric arc produced by test device at a distance of 1 to 1.5 m or real arc at up to 30 meters\*
- \* Depends on arc intensity (with 200A and 1 cm arc path the detection distance is 7 meters)



## ZSA/90/24/UVB Sensor Features

- > Power supply: 24VDC via standard cable.
- > Opening angle: 90°.
- > LED indicator for location and faults.
- > Network addressing configurable via PC.
- > Detects UVB radiation (220 to 320 nm).
- > Applicable in panels to 4160 VAC, open environments or monitoring equipment outdoors.
- > Does not operate even with strong visible light (except if pointed directly at the sun, whose rays contain UVB).
- > Sensitivity to a 2 cm electric arc produced by a test device at a distance of 80 cm to 1 m or a real arc of up to 20 meters\*.
- \* Depends on the intensity of the arc (with 200A and a 1 cm arc path, the detection distance is 4 meters).

## CABLES

The ease of assembling the sensor network lies in the two mini USB connectors present on the sensors and in the shielded mini USB cables supplied in different sizes by Varixx, ready to use.

## PROGRAMMING TOOLS

APC program is provided free of charge by Varixx and allows the parameterization and testing of the Gateway, Relay (which can also be programmed via the screen or online) and also the parameterization of each sensor.

## GATEWAY COMMUNICATION PORT

The ZAG1R Gateway has 2 communication ports: One RS485 port with Modbus RTU protocol, for communication with supervisory systems or with Zyggot V5F/x relay or for connection to a PC for parameterization and one mini USB port with CAN protocol, for communication with networked sensors.

## GATEWAY DIGITAL INPUTS

The Gateway has 2 digital inputs, 1 for Reset and 1 programmable by the relay or by the PC software. The "Reset" contact, if closed momentarily, performs the function of erasing the Gateway's alarms and trips, also erasing the Arc Flash occurrence sequence data.

## DIGITAL GATEWAY OUTPUTS

The Gateway has 3 digital outputs, 1 for TRIP and 2 programmable by the relay or by the PC software. The trip output has an ultra-fast acting solid state relay and another N.A. dry contact in parallel. The programmable outputs are normally open dry contact type.

## GATEWAY INDICATOR LED

The Gateway has 1 RGB LED, which will be «Green» if the gateway is programmed, configured and without alarms or trips. It will be «Yellow» in case of occurrence of alarms or trips that have not been reset or will be «Red» in case of a Trip that has not been reset.

**NOTE:** An alarm condition due to "Sensor not responding" or any other occurrence does not deactivate the "Armed" condition and the consequent detection in the event of an arc flash. For safety reasons, the system will be active for Arc Flash detection even in alarm.

## MINI USB MULTI-FUNCTION SENSOR CONNECTOR

The mini-USB connectors on the sensor are used for both parameterization, using a standard mini USB / USB cable (supplied separately) and a PC, and for communication with the Gateway via the network cable (supplied separately). The sensor's mini USB ports are parallel, so there is no difference between which port to connect the cable to. The dual mini-USB ports make it easy to set up the network. For details on how to parameterize the sensor, see the programming section.

## CAUTION

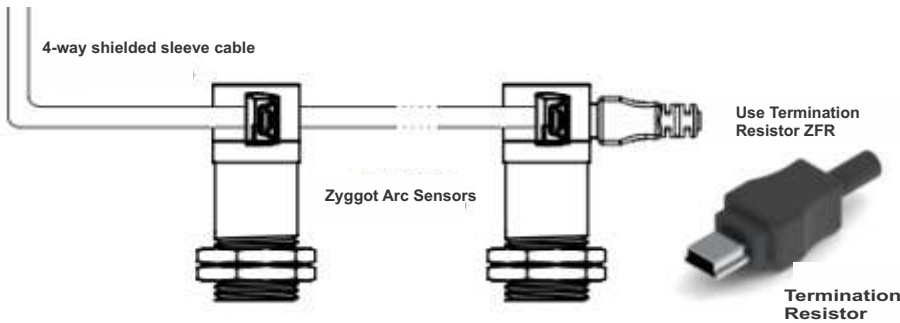
Do not connect the sensor to the computer with the other end of the sensor connected to the sensor network. This may damage the sensor and the computer!  
For parameterization, one sensor per month must be connected to the computer.

# SYSTEM DETAILS RELATING TO THE ARC SYSTEM

## CABLE LENGTH SELECTION OF EACH SENSOR AND THE NEXT

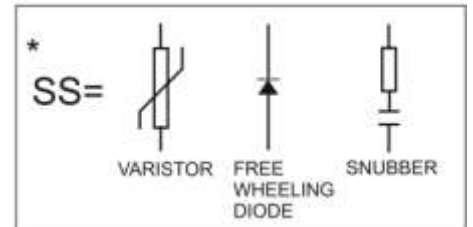
The sensors are connected to the network using a shielded sleeve-type cable, without the need for any tools. These cables, which already have a mini USB connector on both ends, are supplied by Varixx in various lengths. Below are the available codes and sizes.

CODE	CABLE LENGTH
ZCB/4/2U/030	CONNECTION CABLE WITH 0.3 M
ZCB/4/2U/050	CONNECTION CABLE WITH 0.5 M
ZCB/4/2U/100	CONNECTION CABLE WITH 1 M
ZCB/4/2U/200	CONNECTION CABLE WITH 2 M
ZCB/4/2U/400	CONNECTION CABLE WITH 4 M
ZCB/4/2U/600	CONNECTION CABLE WITH 6 M
ZCB/4/2U/800	CONNECTION CABLE WITH 8 M



## TRANSIENT SUPPRESSOR IN THE GATEWAY TRIP CONNECTION

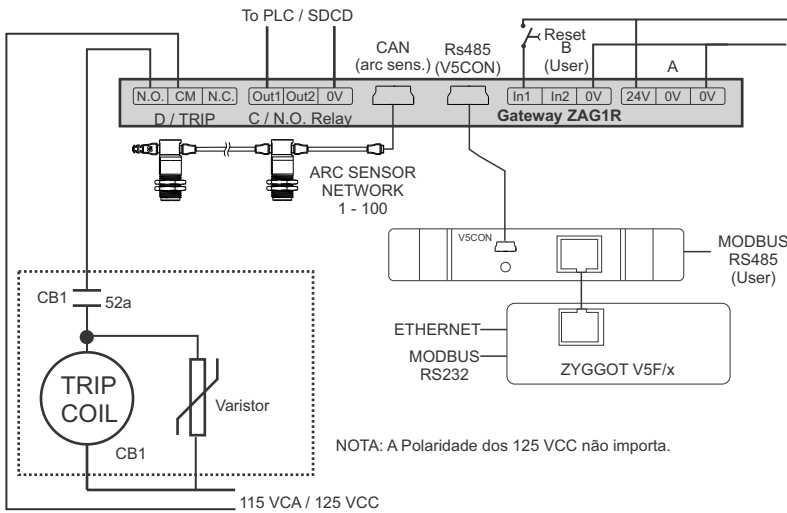
It is mandatory to use a type of transient suppressor compatible with the type of load. For trip coils (highly inductive), it is recommended to use a Varistor with appropriate characteristics. Possible variations for this circuit are "Free Wheeling Diode" (for DC power) and "Snubber" circuit composed of Resistor and Capacitor. This minimizes the generation of arcs in the 52a contact of CB1 and noise, increasing the useful life of the system and avoiding interference and improper operation of other equipment. If in doubt between the types of circuit, use the varistor. Consult the Circuit Breaker Manual.



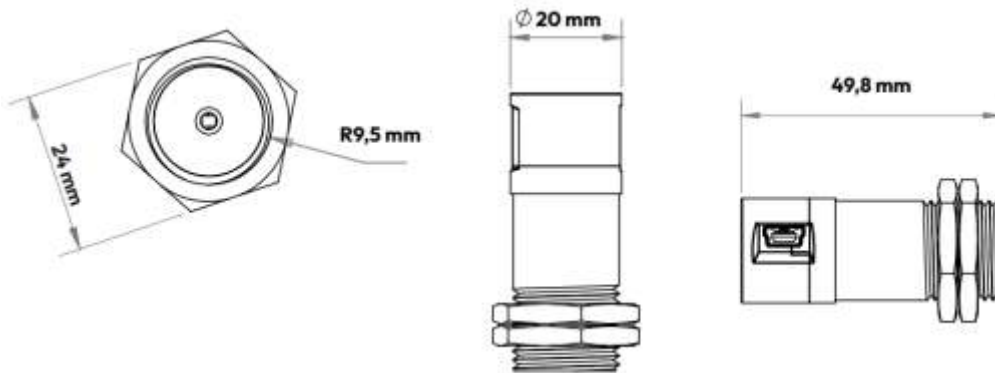
Reliability in the presence of strong electromagnetic fields. Stainless steel body and Faradex® polycarbonate with steel particles. Electromagnetic compatibility certification by the CPQD laboratory \* Sabic Trade Mark

ZYGOT SPECIFICATIONS	
Arcing Sensors	(No Contact)
Tightening	2 x Nuts
Power Supply Types	By CAN Network
UV Wavelength	200 to 320 nm
Case Type	Stainless Steel
Sensor Measurement Angle	90°
Radiation Rages	UVA and UVB Insensible to visible and IR
Sensor Transmission Type	High Speed CAN
Temperature Operation	-20 to 89 °C
Temperature Storage	-40 to 125 °C
Maximum Measurement Range (distance from sensor to target)	30 m depending on the Arc Power
Max. CAN Cable Length	500 m
Configuration (Address, Sensitivity)	By Computer with Free Program
Indication	Led at rear face
Max. Sensors per Relay	100
CE	Compliant

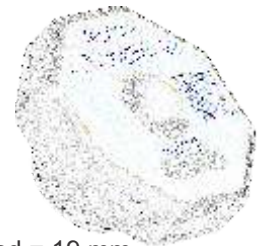
# EXAMPLE OF TYPICAL APPLICATION WITH 115 VAC / 125 VDC TRIP COIL



NOTA: A Polaridade dos 125 VCC não importa.



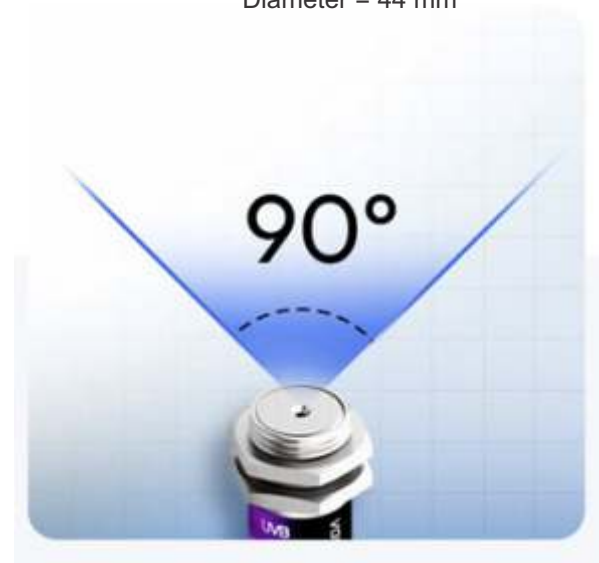
yellow led



Thread = 19 mm  
Height = 25 mm  
Diameter = 44 mm

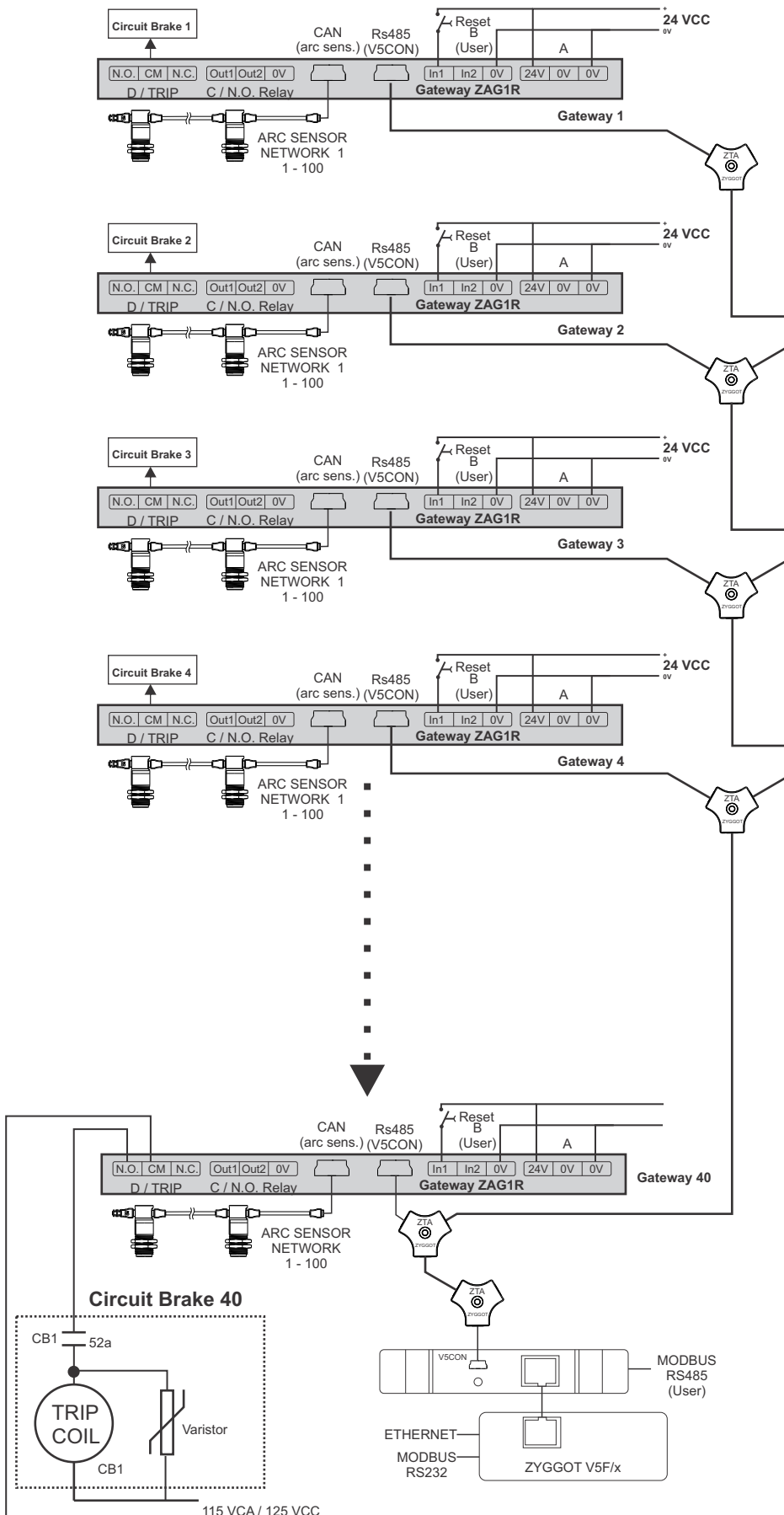
## PROGRAMMING THE SENSORS

- 1 - Download and install the free software "Zyggot Arco Configurador" from the Varixx website (<http://www.varixx.com.br>).
- 2 - Open the configuration program.
- 3 - Connect the sensor to the computer's USB port using a mini USB / USB cable (connect one sensor at a time). When the sensor is connected, its back light will turn on. The program automatically detects the sensor. If this does not happen, you can choose manual connection, choose the serial port corresponding to the USB to which the sensor cable is connected and press the Connect key to attempt a connection. When connecting (in both manual and automatic mode), a green light will turn on in the program indicating that the connection was successful.
- 4 - Program the sensor address (from 1 to 100) in the corresponding window and press Send to save the information to the sensor. Disconnect the sensor by simply removing it from the cable.
- 5 - It is advisable to label the sensor with its programmed address to make it easier to assemble in the field. If you wish to configure another sensor, return to step 3. Then check that there are no duplicate addresses between the sensors.
- 6 - Once all the sensors have been programmed with the addresses, fix the sensors in the defined positions using the two nuts on the front of the sensor. As a suggested assembly, we recommend using our metal "adjustable fixing bracket" (REF. ZSF2), with adjustable angle, which allows the use of just one Boelhoff rivet or similar in the chosen location, to fix the sensor and direct it.



**Ultraviolet Arc Sensor**  
**Wide Detection Area (90°)**  
**Detects at long distances (>7 meters**  
**with 200 A / 1 cm arc)**

# EXAMPLE OF A TYPICAL APPLICATION USING MULTIPLE GATEWAYS AND A SINGLE RELAY



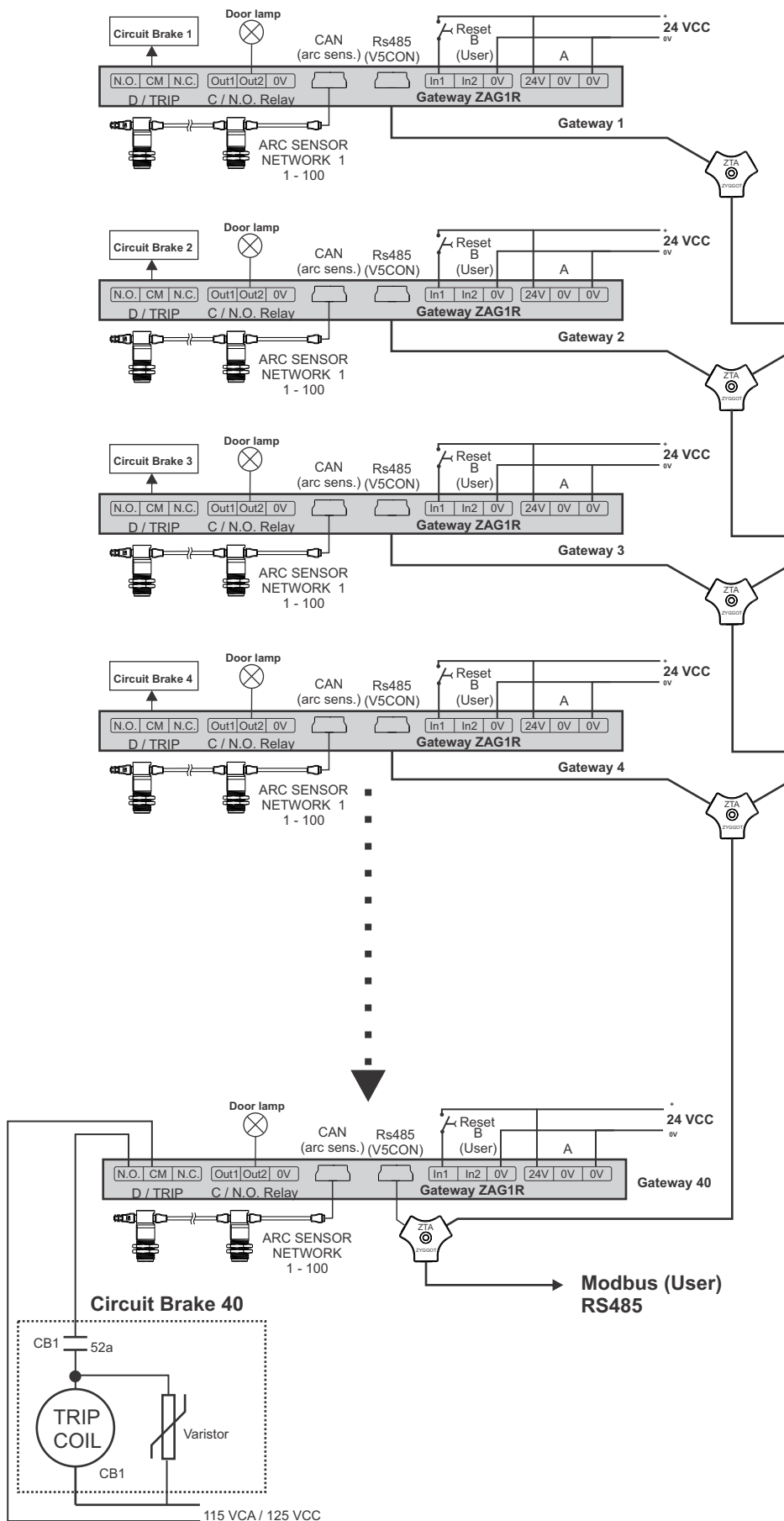
NOTA: A Polaridade dos 125 VCC não importa.

In cases where high selectivity is required, such as in cases of distribution branches with one circuit breaker per branch, the side topology can be used with multiple triggering Gateways, each one triggering its own associated circuit breaker and using the relay to page information from up to 40 Gateways, each with up to 100 arc sensors, i.e. configuring a low-cost, high-efficiency system.

Even if several Gateways are associated with a single Zyggot relay, this relay can still monitor up to 100 target temperatures and up to 100 surrounding air temperatures, since the continuous temperature monitoring system is predictive, not requiring a "TRIP" but rather an "Alarm", unlike the ARC protection system where each Gateway sends the "TRIP" signal to its circuit breaker in less than 300  $\mu$ s.

# EXAMPLE OF A TYPICAL APPLICATION USING ONE OR MORE GATEWAYS WITHOUT RELAY

Note that it is possible to use only one Gateway with its sensors, which can be from 1 to 100, Zyggot. Typically, one Gateway per cubicle, associated with its circuit breaker, and 1 or two Zyggot UV Arc sensors would be enough to have each cubicle fully protected against Arc-voltaic.

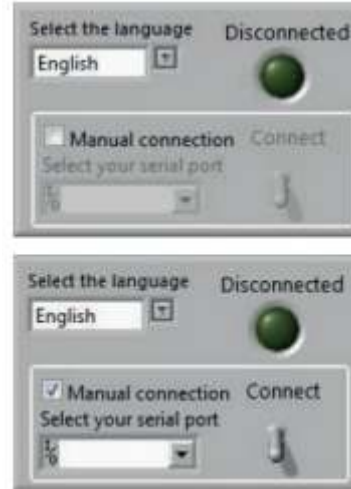


NOTE: The Polarity of the 125 VDC does not matter.

# PROGRAMMING SENSORS WITH ZYGGOT SUPERGER SOFTWARE

## ZYGGOT ARCH SOFTWARE PROGRAMMING

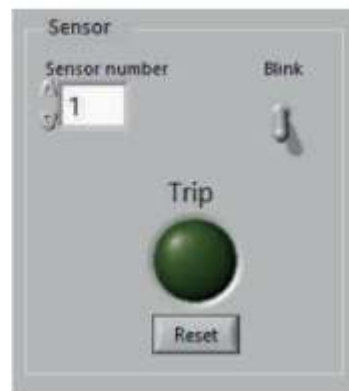
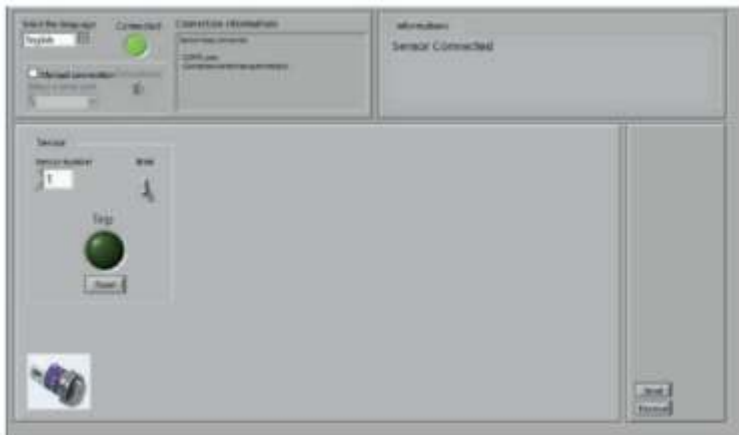
Zyggot Arco is a configuration software that addresses and tests sensors, as well as parameterizes and configures relays. The software is available for free download from the Varixx website (<http://www.varixx.com.br>). The figure below shows the home screen of the Zyggot Arco software.



NUNCA conectar dois sensores simultaneamente ao PC.



The software automatically recognizes the device and the port to which it is connected to the computer. If the port is not recognized, you can manually select the port using the Manual Connection box. When choosing to connect manually, you must select the serial port to which the device is connected and press the Connect button. When a sensor is connected to the computer, the program screen automatically changes to the image below. When connecting a sensor, the program automatically reads the address settings.



To set a new address for the sensor, you must change the sensor number in the Sensor tab. When you do this, the sensor number will flash red, indicating that the modification has not yet been sent to the sensor. To save the modification, press the Send button. The sensor's Trip indicator is also available on the Sensor tab. Use the ArcSafe tester to generate an arc in front of the sensor. When an arc is detected, the Trip indicator will change to red, and the LED on the back of the sensor will flash for a few moments. To restore the sensor's status, press the Reset button. Use the Blink key to make the LED on the back of the sensor flash indefinitely. Press again to stop. When you want to disconnect the sensor, simply remove it from the mini USB port.

# USING THE ARCSAFE ZSA TESTER

## OPERATION TEST USING ARCSAFE TESTER (ZSA)

The ArcSafe tester generates very low current arcs, which represents a low risk of injury. However, the risk is not zero, and can cause serious muscle damage and even death, especially if the operator is in special conditions such as high places or confined spaces, which can lead to falls or collisions with objects or live parts and involuntary movements in the event of an impact. Use the ZSA with extreme care and attention.

Always turn off the slide switch when it is not in operation. Only turn on the switch just before each test and turn it off immediately afterwards. Each time the switch is turned on, the front light will flash and the LED to indicate that it is on will light up.

The figure on the side shows the ArcSafe Varixx tester (supplied separately) for testing system operation. The ArcSafe is rechargeable in a 110 or 220 VAC outlet. The equipment generates an extra high voltage (3,800,000 Volts) generating small low-energy electric arcs between its electrodes, which are detected by the sensor up to an average distance of 1 meter (UVA sensor) within its viewing angle. You can hold down the trigger button to generate a sequence of arcs (the arc detection by the sensor and relay will always be on the first arc) or quickly press the button to generate a single arc.



## HOW TO RUN SYSTEM TEST WITH ARCSAFE GENERATOR

- Assemble the system completely and make sure that the relay is indicating Armed, that is, monitoring the occurrence of an arc. In this condition, there will be no indication of previous trips.

Note that the condition of sensors not responding only activates the Alarm output, not preventing the Armed condition, since even with some sensors in the network not responding, others may be operational and active. It is highly recommended to use the Alarm output for indication on the DCS system or panel door.

- For each sensor to be tested, position the ZSA arc generator in front of the sensor, within the 90° viewing angle, that is, up to 45° from the straight line extending from the center of the sensor.

Remember to comply with the maximum detection distance of the tester for UVA (1.5 m) and UVB (0.2 m) sensors.

Note: in the case of a real arc, the detection distances are greater due to the large amount of energy released in UV radiation. Real arcs can be detected at a distance of up to 30 m\*.

- Preferably generate a single arc by quickly pressing the ArcSafe trigger button.

- The arc will be detected and the Trip output will be activated, with the Trip LED on the relay and the corresponding sensor indicating the arc. (The rear LED on the sensor will also flash for a few moments).

- After checking that it is operating correctly, reset the relay by pressing and holding the front RESET/ENTER button or the RESET/INHIBIT contact for a few moments.

- Repeat the test operation for each sensor in the system.

\* Maximum detection limit for sensors. The actual detection distance of an arc depends on the intensity at which the arc occurs.



## CAMERA FLASH TEST

Common camera flashes are also a spark gap in an inert gas bulb, and so most flashes emit ultraviolet light in addition to visible light. More modern LED flashes also have a percentage of ultraviolet light.

UVA sensors can detect some of these flashes, while UVB sensors have a lower detection spectrum and are therefore more immune to photographic flashes.

Note: Not all photographic flashes emit UV radiation.

COD: V5F/S ou V5F/A



**RELAY 96 X 125 Touch Screen**

**Technical information**

**FEATURES: V5F/x ARC RELAY**

Power Supply	24 VDC
Humidity	5 to 95%
No. of sensors	up to 100 sensors
Resolution	1°C
Inputs	4 analog 4 digital (12 to 24VDC)
Outputs	2 Alarm and Trip outputs (N.O.) 2 programmable outputs (N.O.) 1 output for connection to sensors
Communication	Modbus RTU Devicenet (optional) Ethernet TCP-IP (optional)
Screen	Color, Touch Screen WVGA

COD: V5CON  
(Comes with each Relay)



**INTERFACE**

COD: ZSA/90/24/UV/OCT



**UV TYPE ARC SENSOR OCTO**

**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
Inputs	8 Digital Inputs (12 - 24 VDC)
Outputs	Model 88D = 8 Digital Outputs (DC) Model 88R = 8 Digital Output (Relay)
Inputs	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)

COD: ZAG1R



**GATEWAY PARA ARCO**

COD: ZSA/90/24/UVA



**UVA TYPE ARC SENSOR**

**Technical information**

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

- Digital Outputs / Relay Outputs
- NET address selection switches
- LEDs de status
- Inputs
- CAN & Power Supply
- Ground
- CAN RJ45

**Technical information**

**FEATURES: ARC UVA SENSOR**

Measuring angle:	90°
Power Supply:	24 VCC by the NET
Detection range:	UVA (240 to 380 nm)
Test sensitivity:	1 to 1,5 m (w/tester ZSA)
Real Arc Sensitivity:	up to 30 m
LED status indicator:	Included
Settings:	By PC software
Diameter:	19mm
Length:	53mm
Communication:	Rede CAN 512 MBs
Material:	Stainless Steel and Polycarbonate

COD: ZSA/90/24/UVB



**UVB TYPE ARC SENSOR**

**Technical information**

**FEATURES: ARC UV SENSOR OCTO**

Measuring angle:	90°
Power Supply:	24 VCC by the NET
Detection range:	UVA (240 to 380 nm)
Test sensitivity:	50 to 80 Cm (w/test. ZSA)
Real Arc Sensitivity:	up to 20 m
LED status indicator:	Included
Settings:	By PC software
Diameter:	19mm
Length:	53mm
Communication:	Rede CAN 512 MBs
Material:	Stainless Steel and Polycarbonate

**Technical information**

**FEATURES: ARC UVB SENSOR**

Measuring angle:	90°
Power Supply:	24 VCC by the NET
Detection range:	UVB (220 to 320 nm)
Test sensitivity:	0.8 to 1 m (w/tester ZSA)
Real Arc Sensitivity:	up to 20 m
LED status indicator:	Included
Settings:	By PC software
Diameter:	19mm
Length:	53mm
Communication:	Rede CAN 512 MBs
Material:	Stainless Steel and Polycarbonate

**Accessory**

COD: VPS6024 ou VPS12024

**POWER SUPPLY**

**Accessory**

COD: ZSF2

**Support for fixing and sight for tubular**

**Accessory**

COD: RJ45/C2  
(Comes with each V5CON module and each Eblock)

**RJ45 CABLE**

**Accessory**

COD: ZFR      COD: ZTA

COD: ZCB4/2U/xxx

**Y-split Derivator, USB cables and terminating resistor**

**Accessory**

COD: V5CON  
(Comes with each Relay)

**INTERFACE**

COD: EB/88D ou EB/88R  
(For use with V5F/x relay)

**EBLOCK (Optional Use)**

COD: ZSA

**ARCSAFE Arc Tester**

# V5CON AND EBLOCK INTERFACE DETAILS



The V5CON interface simplifies the connection of the Zyggot V5F/x relay to the sensor network, power supply and also integrates the sensor network termination resistor at the end of the relay and two RS232C to RS485 converters, more suitable for long distance communication. It must be installed on a quick fixing rail at the base in the same cubicle where the Zyggot relay is installed.

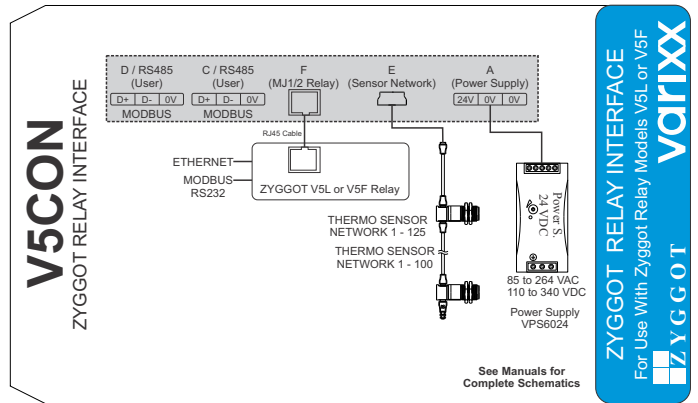
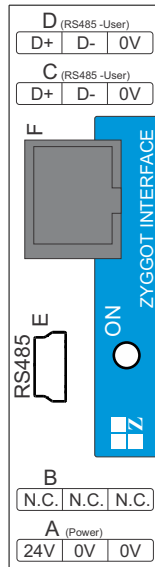
### V5CON INTERFACE CONNECTIONS (All on top)

- Port A (Power): Connection for the system's 24 VDC power supply. VPS6024 OR VPS 12024 power supplies.
- Port F (Relay): Connection with RJ45 cable between the Interface and the Zyggot relay.
- Port E (Sensor Network): Connection with cable and mini USB connector between the Interface and the sensor network.
- Port C (Rs485): RS485 serial connection between the relay and the user's DCS system.
- Port D (Rs485): RS485 serial connection between the relay and the user's DCS system.



Label

### V5CON Interface



The EBLOCK 88D module adds 8 digital outputs and 8 programmable digital inputs to the Zyggot V5F/x relay. The EBLOCK 88R module adds 8 relay outputs (dry contacts) and 8 programmable digital inputs to the Zyggot V5F/x relay. These modules are optional.



EBLOCK 88R

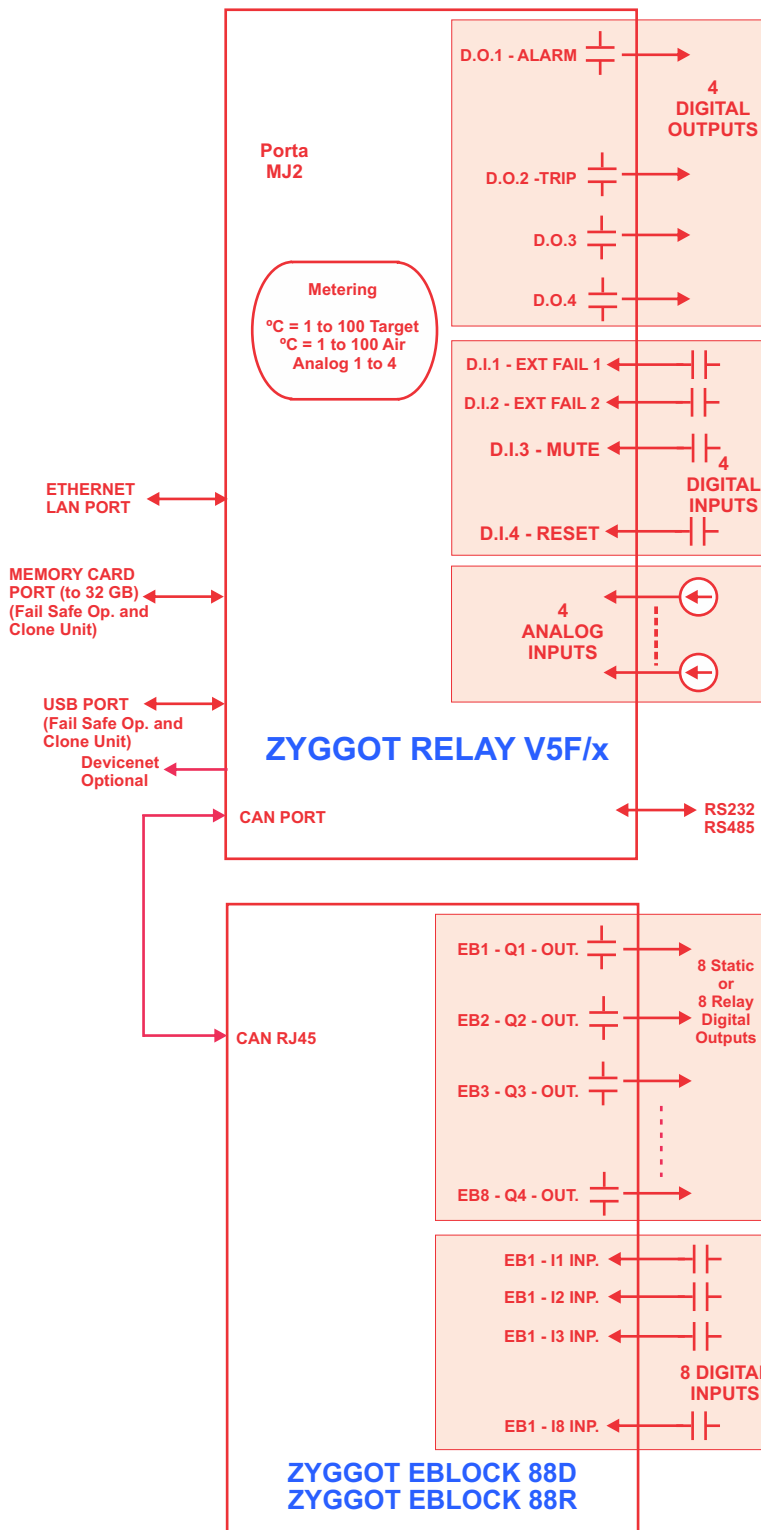
Digital Outputs		
D. OUT. 1	ALARM	Q1 RELAY
D. OUT. 2	TRIP	Q2 RELAY
D. OUT. 3	D.O. 3	Q3 RELAY
D. OUT. 4	D.O. 4	Q4 RELAY
D. OUT. EB1	AUX 1	Q1 EBLOCK
D. OUT. EB2	AUX 2	Q2 EBLOCK
D. OUT. EB3	AUX 3	Q3 EBLOCK
D. OUT. EB4	AUX 4	Q4 EBLOCK
D. OUT. EB5	AUX 5	Q5 EBLOCK
D. OUT. EB6	AUX 6	Q6 EBLOCK
D. OUT. EB7	AUX 7	Q7 EBLOCK
D. OUT. EB8	AUX 8	Q8 EBLOCK

Digital Inputs		
D. INP. 1	EXT. F. 1	I1 RELAY
D. INP. 2	EXT. F. 2	I2 RELAY
D. INP. 3	MUTE	I3 RELAY
D. INP. 4	RESET	I4 RELAY
D. INP. EB1	AUX 1	I1 EBLOCK
D. INP. EB2	AUX 2	I2 EBLOCK
D. INP. EB3	AUX 3	I3 EBLOCK
D. INP. EB4	AUX 4	I4 EBLOCK
D. INP. EB5	AUX 5	I5 EBLOCK
D. INP. EB6	AUX 6	I6 EBLOCK
D. INP. EB7	AUX 7	I7 EBLOCK
D. INP. EB8	AUX 8	I8 EBLOCK



Detail of the EBLOCK RJ45 connector for communication with the relay (CAN)

# SINGLE-LINE DIAGRAM USING EBLOCK AND MAIN FEATURES



## Measurement

The Zyggot Relay provides accurate measurement of:

- \* Up to 100 target or area temperatures.
- \* Up to 100 air temperatures surrounding the sensor.
- \* 4 12-bit analog inputs for measurement and protection of external variables, such as other temperatures acquired by thermocouples etc.
- \* Operating hours.
- \* Integrity of sensors on the network (Not Responding or OK).

## Display

Touch Screen graphic display, with trending capability. Trending shows in real time in graphs of up to 3 sensors per screen the real behavior of any temperature or analog input. 64k colors.

## Aiming tool

A laser pointer can be screwed onto the front of the sensor body only during installation, allowing quick and safe attachment of the sensors, then being removed. A single pointer is both necessary and sufficient.

## Programming tools

A free program developed with graphical windows is provided free of charge by Varixx to further facilitate the parameterization of the relay. Even without this program, it is very easy to parameterize the relay via the HMI, with interactive and user-friendly menus. Another program tests and parameterizes each sensor (emissivity and address). You can also clone one relay to another.

## Event memory

The relays allow the memorization and indication of the last 120 faults with date and time of occurrence. These indications are not lost even if the relay is turned off.

## Communication ports

The ZYGGOT V5F/x relay has 1 RS232 or RS485 programmable communication port with converter, which can be used for communication with supervisory systems or PLCs with Modbus RTU communication protocol. Another CAN port with CsCAN or Devicenet protocol (Optional) allows communication and expansion. There is a USB port and a Memory Card port up to 32 GB. An ETHERNET LAN port is also available.

## Analog Inputs

The Zyggot V5F relay has 4 12-bit analog inputs that can be used for measurement and protection, linked to external temperature and other transducers.

## Digital Inputs

Zyggot V5F/x relays have 4 configurable digital inputs, which can for example be connected to panel door micro switches or ventilation airflow sensors.

## Digital outputs

4 digital static outputs are available on the relay and 8 digital static outputs (model Eblock 88D) or 8 relay outputs (dry contact) (model Eblock 88R), all configurable for alarm or trip, to indicate any of the faults. Digital outputs are available to indicate any of the faults.

## Topology

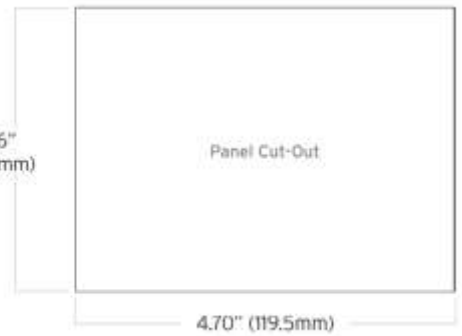
Tubular sensors allow quick and easy installation and parameterization.

# MECHANICS



- 1- POWER 24 VCC
- 2- D.I. / A.I. CONNECTOR
- 3- D.O. / A.QO. CONNECTOR
- 4- CAN PORT
- 5- RS232/RS485 SERIAL PORTS
- 6- CONFIGURATION SWITCHES
- 7- ETHERNET LAN PORT
- 8- MICRO SD SLOT
- 9- USB PORT

## Panel Cut Out

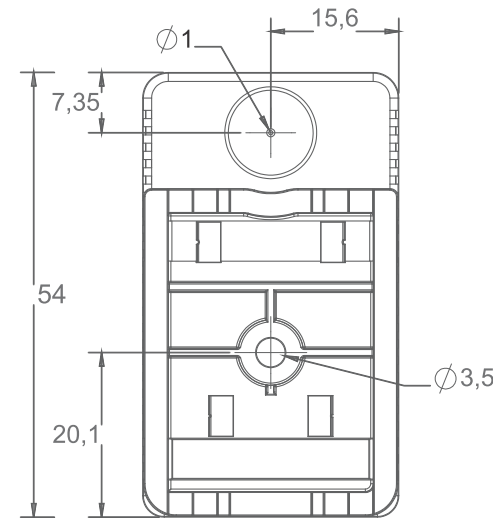
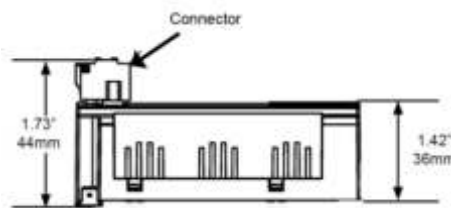
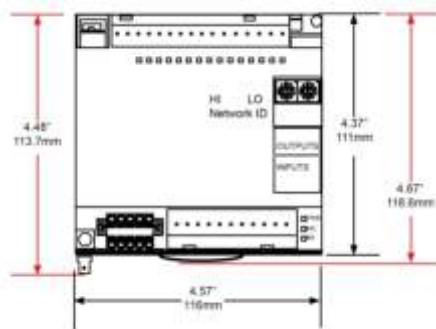


## EBLOCK 88R



- 1- DIGITAL DC OUTPUTS
- 2- NETWORK ID SELECTOR SWITCHES
- 3- STATUS LEDs
- 4- DIGITAL DC INPUTS
- 5- CAN and POWER
- 6- EARTH GROUND
- 7- CAN PORT - RJ45

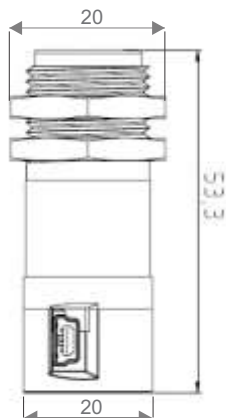
EBLOCK 88D or EBLOCK 88R



SENSOR BT

DIP SWITCHES			
PIN	NAME	FUNCTION	DEFAULT
1	RS-485 Termination	ON = Terminated	OFF
2	CAN Termination	ON = Terminated	OFF
3	Bootload	Always Off	OFF

DIP Switches at Relay



Tubular Sensor



Address Rotary Switches for CAN at Eblock 88x fro 1 to 253 (decimal) or 01 to FD (Hexadecimal)

# TECHNICAL CHARACTERISTICS

## CHARACTERISTICS RELAY V5F/x + EBLOCK 88x

Power Supply	24 Vcc, 150 mA
Moisture	5 to 95%
Dimensions Relay	96 mm x 125 mm x 31 mm
Dimensions Eblock	
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-Bridge 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/m <sup>2</sup>
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:

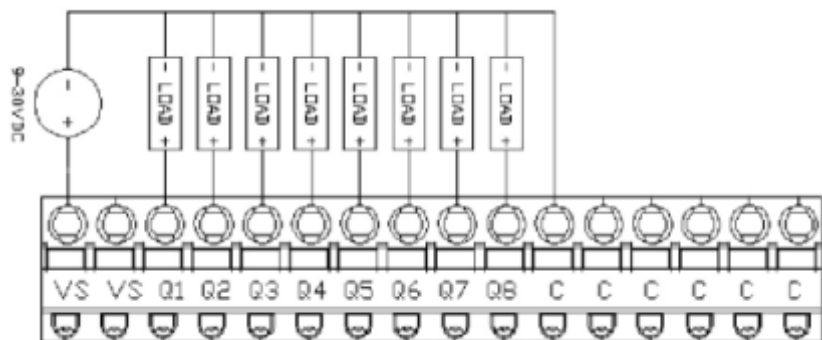
- Ambient Operating Temperature: 0 to 45°C.
- Storage ambient temperature: -40 to 85°C.
- Relative Humidity: 5 to 95% N.C.
- NEMA Rating: NEMA 4X.
- Relay weight: 270 Grams.
- Dimensions: 125 x 96 x 31 mm.
- Noise immunity (EMC Immunity): EN61000-4-2 / EN61000-4-4 / EN61000-4-5 / EN61000-4-12 / ENV50140/50141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

## CAN NETWORK:

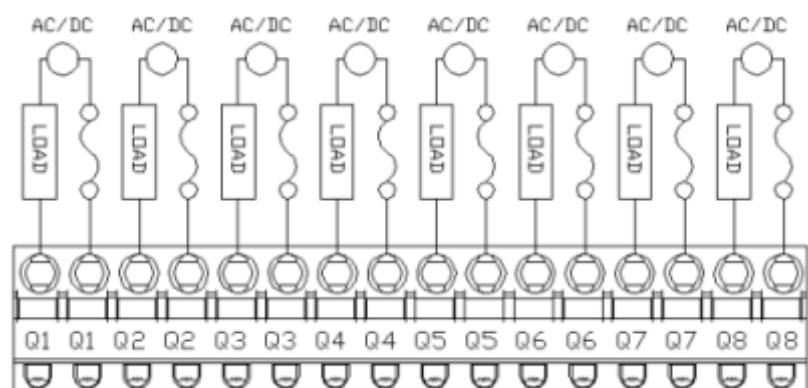
- 1: V+
- 2: CAN H
- 3: SHIELD
- 4: CAN L
- 5: V -

## 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.

# TECHNICAL SPECIFICATIONS - RELAY V5F/x

## POWER SUPPLY

Signal Pin	Description
V+	Input power supply voltage
V-	Input power supply ground
Gnd	Frame Ground

## GENERAL CHARACTERISTICS

- ! Graphical LCD Touch Screen w/ Backlight.
- ! 24 VDC
- ! RS-232 / RS-485 Serial Ports.
- ! Integrated Bezel.
- ! Real-Time Clock.
- ! Flash Memory for easy field upgrades.
- ! Ethernet LAN Port.
- ! USB port e Memory Card (to 32GB) available.

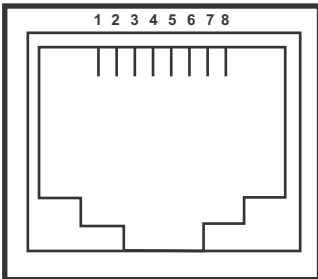
## CAN or CsCAN (OPT)

Peer-to-peer network. CAN-based network hardware is used in the controllers because of CAN's automatic error detection, ease of configuration, low-cost of design and implementation and ability to operate in harsh environments. Networking abilities are built-in to the control Module and require no external or additional modules.

## CAN Network Baudrate vs. Total Cable Length

Network Data Rate Maximum	Total Cable Length
1Mbit / sec.	40m (131 feet)
500Kbit / sec.	100m (328 feet)
250Kbit / sec.	200m (656 feet)
125Kbit / sec.	500m (1,640 feet)

## Mj1/ MJ2 PORT MODULAR JACK



## MJ 1 PORT

PIN	SIGNAL
1	-
2	-
3	CTS
4	RTS
5	+5 V
6	0 V
7	RXD
8	TXD
Output Power Supply Max 150 mA	

## Characteristics

Display Type (LCD Touch Screen):	64K Color Touch Screen
Display Size:	4,3"
Display Screen:	480 x 272 pixels
Touch Screen Type:	Resistive
Number of Colors:	64K
Power Current:	150mA @ 24VDC
Inrush Current:	(20A @ 24VDC) for 1ms.
Height:	96.0 mm)
Width:	125 mm)
Mounting Depth:	31 mm)
Weight	270 g)
Keypad Material:	Lexan HP92 by GE Plastics.
Protocols supported Serial Ports:	CsCAN, Modbus Master, Modbus Slave, and ASCII
Read and Write	
CAN Ports:	CsCAN (up to 253 drops)
Serial Ports:	2: RS-232 / RS-485 Ports.
Network Ports:	1: CAN (CsCAN peer)
Temperature & Humidity:	10 - 60°C,
5 to 95% Non-condensing	
CE	Compliant

## CAN PORT PINS

PIN	SIGNAL	DESCRIPTION
1	V-	POWER -
2	CN_L	SIGNAL -
3	NC	NC
4	CN_H	SIGNAL +
5	V+	POWER +

Note: To optimize CAN network reliability in electrically noisy environments, the CAN power supply needs to be isolated (dedicated) from the primary power. The CAN Shield must be attached to the panel as close to the Relay as possible.

## MJ 2 PORT

PIN	SIGNAL
1	RX+/TX+
2	RX-/TX-
3	-
4	-
5	+5 V
6	0 V
7	-
8	-
Output Power Supply Max 150 mA	

# MAIN SCREENS FOR OPERATION

## MAIN MENU, (ESC) INFO SCREENS



### MAIN MENU:

Screen from which all other system screens are accessed. Depending on whether the system is configured for THM+ARC, THM only or ARC only, one of the 3 screens above will be accessed.

From here, all operating and programming screens are accessed.

Note that, to eventually draw the operator's attention, the «ALARM» field will flash and have a red border to indicate that there is an Acknowledged or Cleared alarm on the Alarm screen. By touching this field, you enter the alarm screen and can acknowledge and reset the alarm.

### INFO SCREENS 1 to 5:

There are 5 screens, the one above, and the four below. They are paged through the >> and << keys and accessed through the ESC key on the main menu.

**INFO SCREEN 1:** Contains various information. When the system is powered on, this is the initial screen. Pressing ESC takes you to the main menu above.

**VERS:** Software version

**ARC S.COMM OK:** Indicates that the ARC sensor network is communicating OK.

**LINK ETHERN.OK:** Indicates that the Ethernet connection is OK.

**ETHERN.n. LINKED:** Indicates that the Ethernet connection is OK.

**GTWY PGM:** Indicates that the ARCO system Gateway is properly configured.

**GTWY ARMED:** Indicates that the ARC system Gateway has no active faults and is ready to "trip" in the event of an Arc or other faults.

**GATEW. ALRM:** Indicates that the ARC system Gateway is in an active Alarm condition (not reset).

**GATEW. TRIP:** Indicates that the ARC system Gateway is in an active Trip condition (not reset).

**GATEW. CHAIN:** Indicates that the ARC system Gateway has the Chain input active and a Chain trip has probably occurred (it depends on the Gateway configuration).

**INHIBITED:** Indicates that the ARC system Gateway has the INHIBIT input active and cannot trip even in the event of an ARC FLASH (it depends on the Gateway configuration).

**DATE, TIME and DAY OF THE WEEK:** from the internal real time clock.

**FAIL:** Indicates a fault that has not been reset.

**TRGT:** Indicates a fault related to Targets.

**ARC:** Indicates that there is an active arc occurrence (not reset).

**ANR:** Indicates the existence of 1 or more ARC sensors not responding on the network.

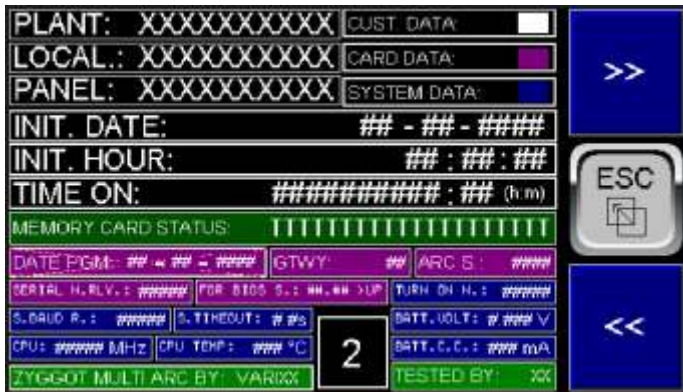
**ALRM:** Indicates the alarm condition not silenced (without Mute) and the alarm output active.

**TRIP:** Indicates the Trip failure condition (Trip output active, not reset)

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

# MAIN SCREENS FOR OPERATION

## MAIN MENU, (ESC) INFO SCREENS



**INFO SCREEN 2:** It shows information about the plant, location and panel names, date and time of start of operation, total system operation time, relay serial number, software serial number, number of times the relay was turned on, baud rate and timeout of the sensor communication network, number of programmed sensors and finally it also shows some hardware information.

Other fields as described in Info Screen 1.



**INFO SCREEN 3: Mute Alarm and Reset Fail Buttons.**

When the alarm is active, the Mute button silences it (turns off the Alarm Output).

When the Mute condition is active (Mute has already been executed), the Reset button clears the fault and turns off the Trip Output.

**Fail Active:** Indicates that there is an active fault.

**Alarm Unacknowledged:** Indicates that there is an alarm that has not yet been acknowledged by the operator on the alarm screen and, depending on what is programmed in the **Reset on Fail Unacknowledge** parameter, it will not be possible to reset the faults and cancel the trip output.

**Alarm Uncleared:** Indicates that there is an alarm that has not yet been cleared by the operator on the alarm screen and, depending on what is programmed in the **Reset on Fail Active** parameter, it will not be possible to reset the faults and cancel the trip output.

Software interface and Autoload Fail indicate whether there was a restoration failure.

Other fields as described in Info Screen 1.



**INFO SCREEN 4:** «Fail Safe» system information such as Autoload Enabled, Autorun Enabled, Flash Backup Done (these 3 fields must be active, in green for the «Fail Safe» system to operate correctly if necessary. Flash Backup Cleared: It will indicate in yellow if there is no Backup file in the Flash memory. To create the backup file, enter the programming menu and create it after having all the parameters programmed and with the relay operating correctly.

Auto Restore Done, Indicates whether there was an automatic software restoration and Autoload Fail indicates whether there was a restoration failure.



**INFO SCREEN 5:**

On this screen, you can control the write and read protection on the memory card for safe removal and insertion of the card, with the relay in operation, preventing it from being manipulated during writing operations that could corrupt it.

**Remove/Insert:** This button is invisible if the relay is in writing or reading operation so that the Remove/Insert command is not entered at an inappropriate time.

**Wait:** If active, it indicates that the relay is in writing or reading operation.

**No Card:** It is active if the relay does not have a memory card inserted.

**Card OK:** Indicates that the card is inserted and operating properly.

**Ready to Remove/Insert:** After the Remove/Insert command is selected in the «Yes» option, this indication becomes active, indicating that the card can now be removed or inserted.

Memory Card Status: May display one of the following messages depending on the current system condition:

- 1- Card OK - Operational
- 2- Unknow Format
- 3- No card in slot
- 4- Card Not Supported
- 5- Illegal Swapped
- 6- Unknow Error
- 7- Access Protected

After the Insert/Remove command is selected as «Yes», the message will be 6- Access Protected.

**Attention:** Removing the card without the Insert/Remove command inserts the Alarm condition in the alarm and history screen if the action for this fault is selected as «Log» in the programming menu. If the action is selected as «None», this alarm will not be logged.

If the card is removed after the Insert/Remove command, the alarm will not be triggered even if programmed for «Log»

# MAIN SCREENS FOR OPERATION

## 1- MAIN SCREEN



### MS1: READING ARC GATEWAY (Mono and Multi-Gateways Version Screens)

**GTWY:** Shows the number of the gateway currently being read  
**READING SENSOR:** Bargraph with the number of the sensor read.  
**AUTO and MAN:** Indicates the gateway scanning condition.  
**FIRST FAIL ON GTWY:** Shows which gateway detected the first failure.  
**ARMED, ALARM, TRIP:** Indicates the conditions of at least one of the system gateways. If all Gateways are OK, there will be no ALARM or TRIP indication and there will be an ARMED indication.  
 Other indications: as described in INFO SCREEN 01.



### MS2: STATISTIC ARC (Multi and Mono Gateway versions screens)

**PROGRAMMED:** Shows the total number of ARC sensors in the network.  
**RESPONDING:** Shows the number of ARC sensors responding in the network.  
**TOTAL SENSORS NOT RESPONDING:** Shows the number of ARC sensors not responding in the network.  
**TOTAL ARC FLASH NOT CLEARED:** Shows the total number of sensors that detected Arc Flash in all gateways and that are still memorized in the gateways before the reset command, which will clear the events from the gateways.  
**FIRST SENSOR WITH ARC FLASH:** Indicates the number of the first sensor to detect Arc Flash (only in the mono gateway version)  
 Other indications: as described in INFO SCREEN 01.

# MAIN SCREENS FOR OPERATION

## 1- MAIN SCREEN



**MS3:**  
**DIGITAL INP.1 a 4:** Indicates the status of the digital inputs of the V5F/x relay.  
**DIGITAL OUT 1 to 4:** Indicates the status of the digital outputs of the V5F/x relay



**MS5: ANALOG INPUTS**  
**ANALOG INP.1 to 4:** Shows the values of Analog inputs 1 to 4 if used. It also shows the name assigned by the user to each input to facilitate identification.  
 Other fields as described in Info Screen 1.



**MS4: DIGITAL I/O and BLOCK / ARC GATEWAY**  
**Digital Input EB1 (Aux 1) to EB8 (Aux 8):** Indicates the status of the digital inputs of the EBLOCK module, if used.  
**Digital Output EB1 (Aux 1) to EB8 (Aux 8):** Indicates the status of the digital outputs of the EBLOCK module, if used.  
 Other fields as described in Info Screen 1.



**MS6: ARC SENSOR COMMUNICATION.**  
**SENSOR COMM OK:** Indicates whether communication with the Gateway is OK.  
**S. COMM ERROR:** Indicates whether there is a communication error with the Gateway.  
**TIMEOUT:** Indicates whether there is a Timeout error with the Gateway.  
**FRAME/PARITY:** Indicates whether there is a Frame or Parity error.  
**RESP FORM:** Indicates whether there is an error due to an unexpected response.  
**ADDR REJECTION:** Indicates whether there is an error due to address rejection in the THM sensor network.  
**S. COMM ERROR:** All sensor not responding. Communication error.  
**Frame/Parity:** Error of Frame/Parity parameter.  
**CRC/CHECKSUM:** Cyclic Redundance Test or Checksum error.  
**COMM REJECTION:** Indicates whether there is an error due to communication rejection in the THM sensor network.

# MAIN SCREENS FOR OPERATION

## 1- MAIN SCREEN



### MS7: MODBUS SERIAL RS232

**MODB ACTIVE:** Indicates whether MODBUS is active.  
**MODBUS INACTIVE:** Indicates whether MODBUS is inactive.  
**MODBUS OK:** Indicates whether MODBUS is OK, without error.  
**MODBUS ERROR:** Indicates if there is an error in Modbus.  
**MODBUS STATUS:** (TIMEOUT, VALID MESSAGE, PARITY ERROR, FRAME ERROR, OVERRUN ERROR, CHECKSUM ERROR)  
 Other fields as described in Info Screen 1.



### MS9: ACTIVE FAILS

**Falhas Ativas (Não memorizadas e sim ainda estar condição de falha no momento)**  
**MODBUS FAIL:** Indica falha de comunicação com o dispositivo externo conectado a rede Modbus do relé.  
**GTWY NOT PROG:** Indica que o Gateway não foi configurado corretamente ainda.  
**GTWY COMM. FAIL:** Indica falha de comunicação com o Gateway.  
**ARC S. NOT RESP:** Indica se há um ou mais sensores de Arco não respondendo (note que é diferente de falha de comunicação geral com o Gateway).  
**ARC FLASH:** Indica se ha uma ocorrência de ARC FLASH não resetada no Gateway.  
**ARC CHAIN:** Se programado para ser usado indica Trip por entrada de CHAIN no Gateway.

Demais indicações: como descrito mas tela de INFO SCREEN 01



### MS8: ETHERNET COMMUNICATION

**LINKED:** Indicates that the Ethernet cable is connected.  
**NOT LINKED:** Indicates that the Ethernet cable is disconnected.  
**HALF DUPLEX and FULL DUPLEX:** Indicates the current communication mode.  
**SPEED 10 Mbps and SPEED 100 Mbps:** Indicates the current communication speed.  
**RX:** Indicates that data is being received.  
**TX:** Indicates that data is being transmitted.  
 Other fields as described in Info Screen 1.



### MS10: NUMBERS OF SENSORS NOT RESPONDING

**G01 - G40:** Shows the number of non-responsive sensors on each gateway in the system. If the number is «0» it will be shown in green and if it is different from zero it will be shown in red

Other indications: as described but on INFO SCREEN 01

# MAIN SCREENS FOR OPERATION

## 1- MAIN SCREEN



### Ms11: MUTE / RESET

**MUTE ALARM / RESET FAIL:** Buttons that allow you to silence (Mute Alarm) the alarm or reset (Reset Fail) the fault condition. Reset Fail will only act if it is already silenced (Mute) and if 'Reset on Fail' is programmed if there is still an existing fault.

Other fields as described in Info Screen 1.

# MAIN SCREENS FOR OPERATION

## 5-FAILS

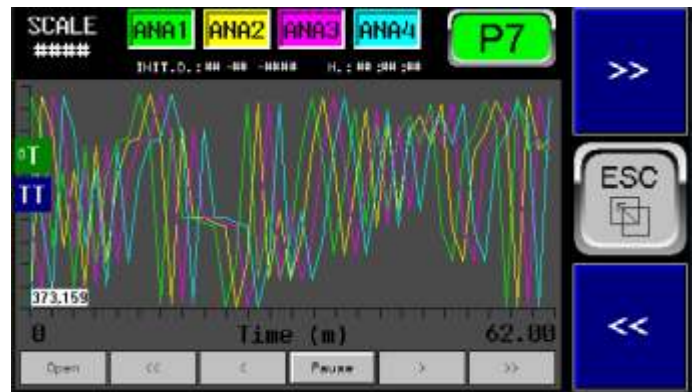
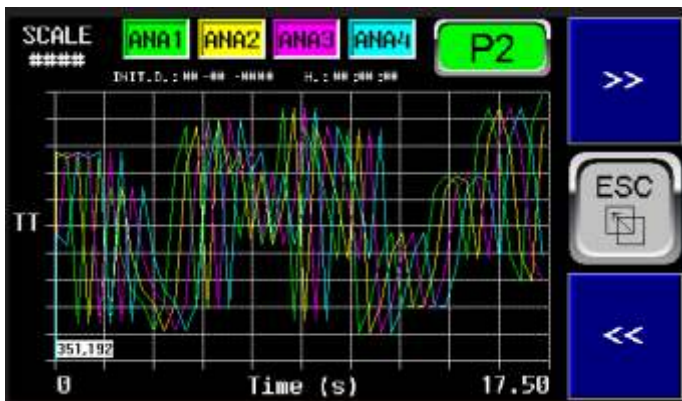
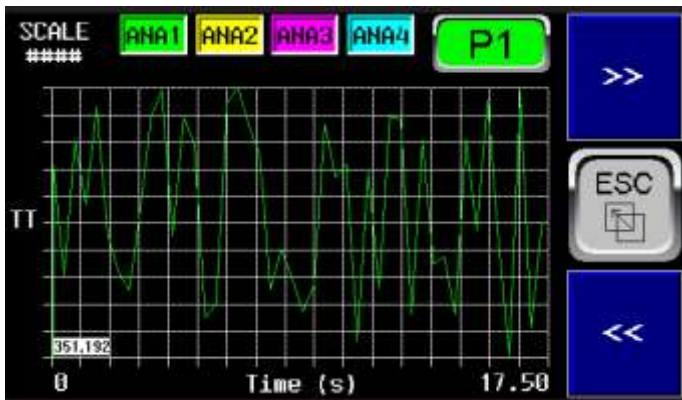


### FAILS AF1 to AF5:

There are 5 screens, scrolled by the >> and << keys. They indicate the memorized faults (active or not at the moment) if selected in the programming menu for LOG, ALARM or TRIP. They are self-explanatory. 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, you must first perform the Mute function 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.

# MAIN SCREENS FOR OPERATION

## 8- PLOT



### TRENDING PLOT P1 to P6:

There are 6 screens, scrolled by the >> and << keys. They plot the values of the analog inputs.

**P1 to P6:** Screen index and curve reset button (Plot restart) if programmed to be active in the programming menu. Screen index and curve reset button (Plot restart) if programmed to be active in the programming menu.

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 continually shifted to the left.

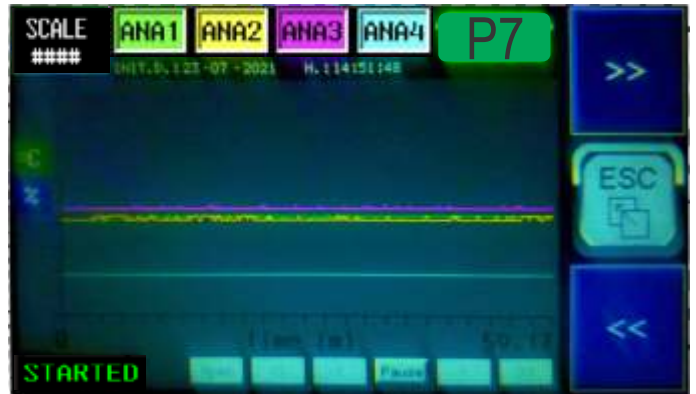
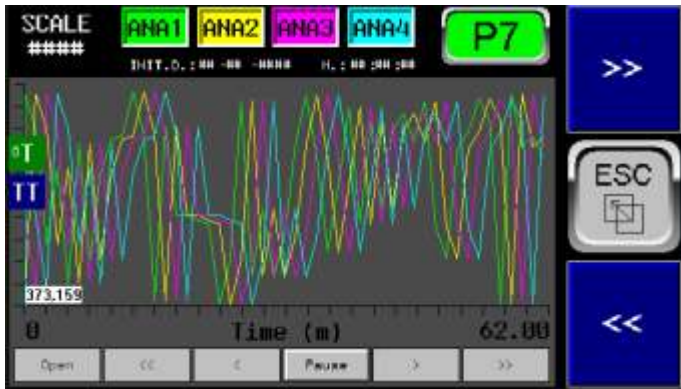
Various sampling times can be selected depending on the screen (see table). On screen P1, the sampling time is 50 ms and in total 17.5 seconds can be observed. When leaving this screen and returning, the curves restart, unlike the curves from P2 to P7.

When pressing the P2 to P6 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" on the button and touch T3 again. Otherwise, the red button disappears and the curves are not reset.

Screen	Sampling Time	Screen Cycle
1 e 2	50 ms	17,75 s
3 e 8	1000 ms	5,92 m
4 e 9	10 s	59,17 m
5 e 10	100 s	591,67 m
6 e 11	1000 s	5916,67 m
7 e 12	1000 m	5916,67 h
13	50 ms	17,75 s
14	1 s	355 s
15	10 s	59,17 m
16	100 m	591,67 h
17	1000 m	5916,67 h
18	10 s	59,17 m

# MAIN SCREENS FOR OPERATION

## 8- PLOT



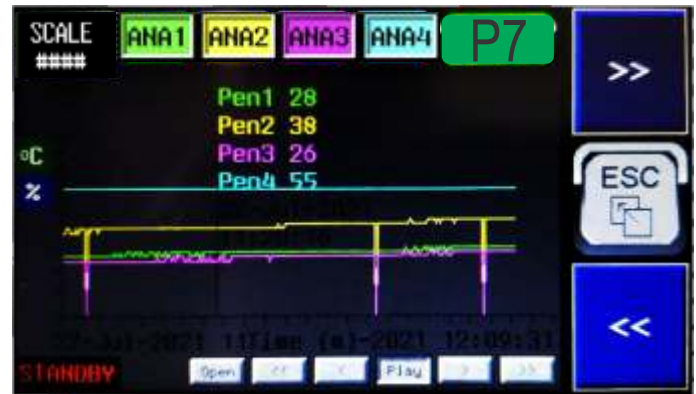
### TRENDING PLOT P7 (Retentive Trending Plot):

This is screen 7 of the 7 screens that can be scrolled by the >> and << keys.

This feature allows the recording of the curves and data plotted on it on a 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 "STARTED" and a file folder will be automatically created on the card with the name Plotzxx, where xx is the end of the current node. If it is not started, the message will be "STANDBY".

When in "Started", a new file with the csv extension will be created every hour within this file, with the name consisting of the day, month and full hour, without the minutes. Each file contains data separated by commas, which can be opened in Excel using the "Get data" function in 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 traces). Each reading is taken every 10 seconds. These are light files of approximately 18 Kb each. Even if you exit the screen, the recordings continue and if the recording is interrupted by turning the power off and on again, a vertical black line appears at this point and the recording continues.



The corresponding units are shown on the vertical Y axis.

In the upper right corner is the screen index (T7). This button does not allow for Reset or restarting the curve and, if pressed, indicates with a sentence to enter the programming menu, turn this resource off and on again to restart the curves. This is done for safety reasons so that the memory is not inadvertently lost.

The recorded curves can also be redrawn on the screen by the relay itself, for examination. While they are being re-displayed, the user can move his finger across the screen and move the cursor (a vertical black line). For each point, the index of each trace and the corresponding value are displayed, with the corresponding colors corresponding to the traces, in addition to the date and time of recording.

At the bottom are the playback control keys, namely:

«Pause» or «Play» If «Pause» is displayed, the operation is effectively in Play mode and the curves are being generated and plotted in real time. When pressed, it changes to «Play» and the operation is effectively in Pause mode and the curves displayed are previously recorded, obtained from the memory card. In other words, the button actually shows the state that will be entered when pressed.

«<<» This button allows you to search for the first recorded curve in the file.

«>>» This button allows you to search for the last recorded curve in the file.

«<» and «>» allow you to search one by one in the sequence for the recorded sequential curves.

«Open» button that allows you to select a curve to be retrieved, by date and time, by entering the start date and time and end date and time of the period of interest in the window that opens, to restrict the number of curves to be paged through using the search keys above and to make their location easier.

# MAIN SCREENS FOR OPERATION

## 8- PLOT

The top left corner shows the two scales, for sensor target temperatures in green and analog inputs in blue.

The vertical Y axis shows the two corresponding units, °C in green for sensors and % or ° for analog inputs, depending on what is programmed in the programming menu for them.

The screen index (T7) is located in the top right corner. This button does not allow for resetting or restarting the curve and, if pressed, indicates with a sentence to enter the programming menu, turn this feature off and on again to restart the curves. This is done for safety reasons so that the memory is not lost inadvertently.

The recorded curves can also be redone on the screen by the relay itself, for examination. While they are being re-displayed, the user can move their finger on the screen and move the cursor (a vertical black line). Then, for each point, the index of each line and the corresponding value are displayed, with the corresponding colors equal to the lines, in addition to the date and time of recording.



At the bottom are the playback control keys. namely.

«Pause» or «Play». If «Pause» is displayed, the operation is effectively in Play mode and the curves are being generated and plotted in real time. When pressed, it changes to «Play» and the operation is effectively in Pause mode and the curves displayed are previously recorded, obtained from the memory card. In other words, the button actually shows the state that will be entered when pressed.

«<<» This button allows you to search for the first recorded curve of the file within the date and time range selected in the Open button.

«>>» Same as above. This button allows you to search for the last recorded curve of the file.

«<» and «>» same as above, allow you to search one by one in the sequence for the sequential recorded curves. «Open» button that allows you to select a time interval for the curves to be retrieved, by date and time, by entering the start date and time and end date and time of the period of interest in the window that opens, to restrict the number of curves to be paged through using the search keys above and to make their location easier.

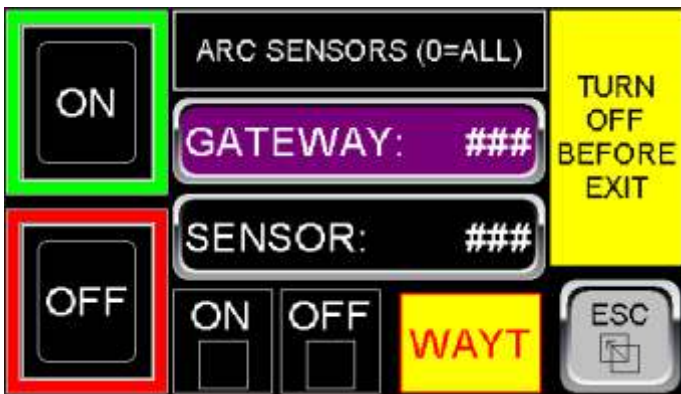
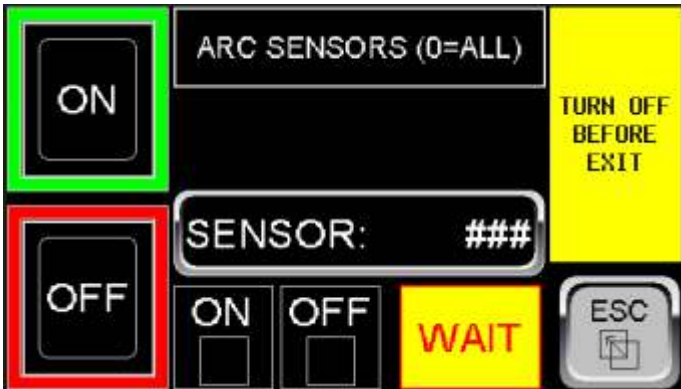
Below we see an example of the structure of Plot files on the card.

Nome	Data de modificação	Tipo	Tamanho
081809.CSV	18/08/2021 09:55	Arquivo de Valo...	11 KB
081213.CSV	12/08/2021 13:57	Arquivo de Valo...	16 KB
081212.CSV	12/08/2021 12:59	Arquivo de Valo...	18 KB
081211.CSV	12/08/2021 11:59	Arquivo de Valo...	18 KB
081210.CSV	12/08/2021 10:59	Arquivo de Valo...	16 KB
081209.CSV	12/08/2021 09:50	Arquivo de Valo...	14 KB

	A
1	Date,Time,Pen1,Pen2,Pen3,Pen4
2	19-08-2021,10:00:03 AM,000052,000056,000000,000000
3	19-08-2021,10:00:13 AM,000052,000056,000000,000000
4	19-08-2021,10:00:23 AM,000052,000056,000000,000000
5	19-08-2021,10:00:33 AM,000052,000056,000000,000000
6	19-08-2021,10:00:43 AM,000052,000056,000000,000000
7	19-08-2021,10:00:53 AM,000052,000056,000000,000000
8	19-08-2021,10:01:03 AM,000052,000056,000000,000000
9	19-08-2021,10:01:13 AM,000052,000056,000000,000000
10	19-08-2021,10:01:23 AM,000052,000056,000000,000000
11	19-08-2021,10:01:33 AM,000052,000056,000000,000000

# MAIN SCREENS FOR OPERATION

## 7- IDENTIFY / TEST SENSORS



<Arc Sensors> screen for Mono and Multi versions Gateway

### ON OFF FLASH SENSOR SCREEN

On this screen, you can control the change in the pattern between continuous on and flashing of the LED on the back of each sensor to facilitate its identification on the network and also to check communication with it.

In the current system configuration, each sensor has an LED on the back that remains constantly on in the case of the ARC network, while it is active and communicating with the relay.

When commanding the ON action for one or more ARC sensors, they start to flash. This also serves to identify sensors and to ensure that they are communicating properly. When commanding the OFF action, they return to the normal state.

This command can be executed with the system operating normally.

Each sensor on the network has an address from 1 to 100 as programmed at startup, by a computer with the Zyggot management system installed (Free).

**ON:** Flash On Button (ON).

**OFF:** Flash Off Button (OFF).

**GATEWAY:** Selects the Gateway to be activated for flashing.

**SENSOR:** Button where you can enter the sensor number from 1 to 100. If 0 is entered, all sensors in the network will execute the Flash command (this is used to check whether all sensors responded and recognized the command, and are therefore intact).

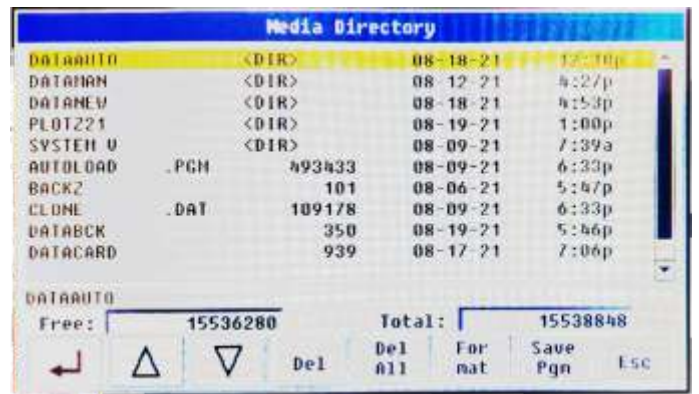
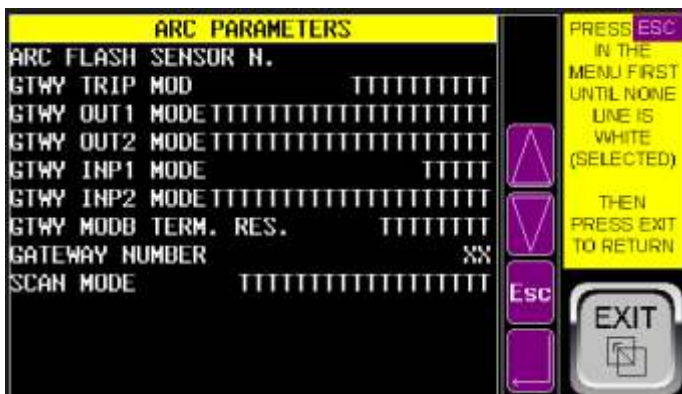
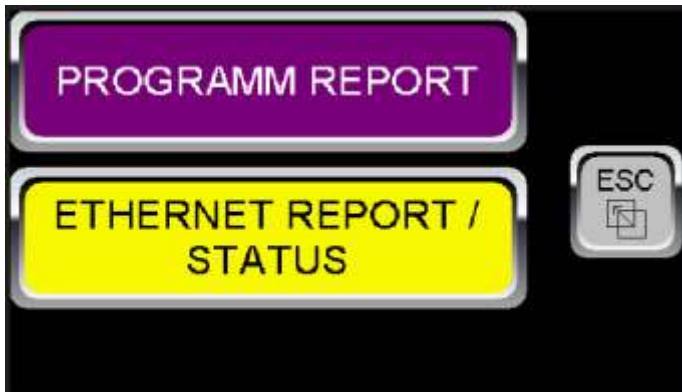
**ON:** Indicates that one or all sensors have the Flash command active.

**OFF:** Indicates that no sensor has the Flash command active.

The «ESC» button will not be visible if any sensor has the Flash command active to avoid forgetting to turn off the command before exiting the screen.

# MAIN SCREENS FOR OPERATION

## 6A- PROGRAMM REPORT.

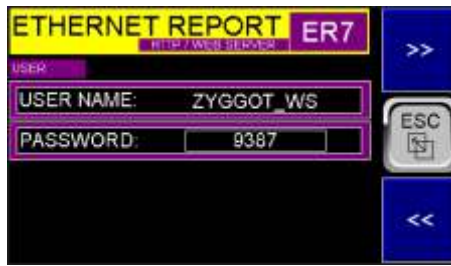
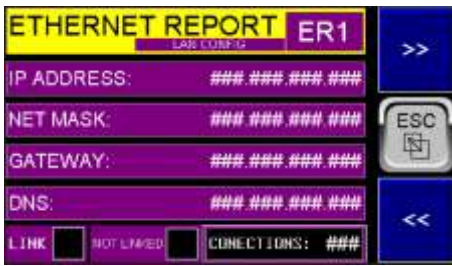


### REPORT SCREEN 1 to 4:

There are 4 screens that reproduce the Programming Menu and two more screens with system information, where you can check the various programming conditions without accidentally changing the programming. Note that the two system screens do not allow any data changes since they are only for viewing existing files and not for programming. The screen that shows the directories, although it presents change commands, will not work for security reasons. The user can, however, open the files on the computer and read and change them, but should refrain from changing the files in the root as this may compromise the operation. The files within the directories can be freely changed or deleted without risk. See details of the following parameters in the Programming Menu screens.

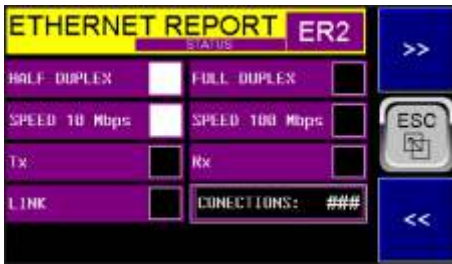
# MAIN SCREENS FOR OPERATION

## 6B- ETHERNET REPORT



ETHERNET REPORT SCREEN 1 to 9:

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



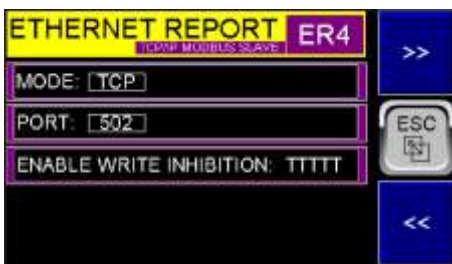
The fields on all these screens will be detailed later. Here we will only comment on the function of each one.

Screens ER1 and ER2 refer to the main Ethernet configuration parameters. Screen ER1 shows the parameters and screen ER2 shows the connection status.



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

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

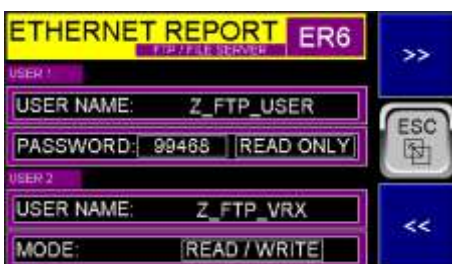


Screen ER4 refers to the **TCP/IP - Transmission Control Protocol (Modbus TCP Server or Modbus Slave)**. This protocol allows Modbus Over Ethernet communication, using all the parameters and addresses described in the Modbus Map at the end of this manual.



Screen ER4 refers to the **TCP/IP - Transmission Control Protocol (Modbus TCP Server or Modbus Slave)**. The ER5 screen refers to the **IP protocol - Internet Protocol (Ethernet IP Server)**.

The ER6 screen refers to the **FTP protocol - File Transfer Protocol**. Through which you can read and access the files on the memory card inserted in the respective slot of the relay and where the temperature readings etc. are recorded using a browser.



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

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

The ER9 screen refers to the **NTP protocol - Network Time Protocol** through which you can obtain precise times from predefined NTP servers.

# MAIN SCREENS FOR OPERATION

## 2- ARC FLASH, 3- ARC SEQUENCE



### ARC FLASH - OCCURRENCE INDICATION AF1 to AF7:

There are 7 screens that indicate whether an ARC FLASH has occurred. The indication is by color and the indicated color will be white if an ARC FLASH has occurred and will remain in this condition until it is reset by the relay reset keys, or by the Gateway reset input or by Modbus communication. Note that if a Flash has occurred, the circuit breaker connected to the Gateway/Trigger will have already tripped instantly and on the Menu screen (Main) the «ARC FLASH» key and also the «ALARM» key will be flashing to draw the operator's attention. If an alarm output connected to a buzzer is programmed in the corresponding protection menus and used, the buzzer will be active and the sound can be silenced by the «MUTE» key present on several relay screens, before a possible «RESET» command. If a «RESET» is commanded before checking for the occurrence of ARC FLASH on the screens above or the sequence of arc occurrences on the screens further ahead, the indication of which sensor was activated will be lost, leaving only that there was an activation in the History, therefore, care must be taken when checking for a possible occurrence.

The screens also indicate the Gateway currently being scanned.

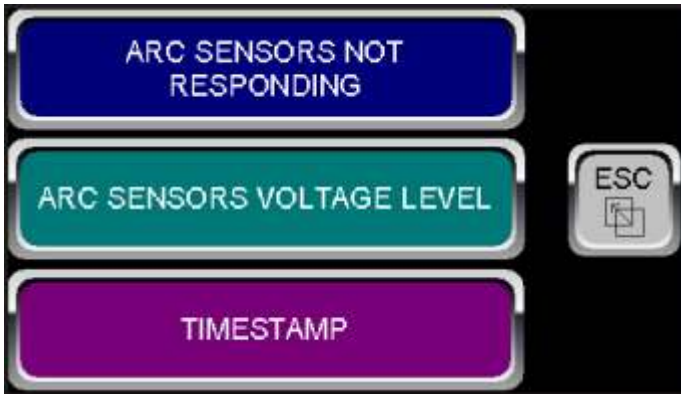


### ARC FLASH SEQUENCE - (ORDER OF OCCURRENCE) - AFS1 to AFS3

There are 4 screens that indicate the sequence of occurrence in case of an ARC FLASH. The first sensor to detect the arc will be marked with the indication "1", the second, if any, will be marked with the indication "2" and so on, so it is necessary to page through the 3 screens to check the indexes of all sensors, to be sure of the order of occurrence. As explained in the previous item, these indications remain until they are reset by the relay's RESET keys or by the Gateway's Reset input or by a command via Modbus.

# MAIN SCREENS FOR OPERATION

## 4- ARC STATUS / TIMESTAMP



NOT RESPONDING NRA1 to NRA7: (Mono and Multi Gateway)  
Accessed by pressing <ARC SENSOR NOT RESPONDING>

There are 7 screens that are scrolled by the >> and << keys.  
S001 to S100 (from screens **NRA1** to **NRA7**): Indicates whether the respective arc sensor has stopped responding to the gateway on the network.  
Note that the correct indication may take some time depending on the number of sensors on the THM and ARC networks, which is why there is the «WAIT» indication, which informs that you must wait for it to turn off in order to have a correct indication.  
Sensors that are responding correctly are indicated in Green, and if a sensor does not respond, its indication will be in red on the network.  
The «Gateway» field indicates the Gateway currently being scanned, in the Multi Gateway version. With each Scan, the screen will be updated with the current conditions of each Gateway. With each Scan, the screen will be updated with the current conditions of each Gateway if the Scan is in «AUTO» mode or will remain static on the Gateway selected on the «SCAN» screen if it is in «MANUAL» mode.  
When in «Manual» mode, the «UP» and «DOWN» keys are used to change the gateway displayed in static condition in the case of the Multi Gateways version.



ARC SENSORS VOLTAGE LEVEL AV01 to AV04:

There are 4 screens that are scrolled by the >> and << keys.  
**AV001** to **AV100**: Shows the power supply voltage reaching each sensor via the communication network with shielded sleeved 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, sensors that are further away 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 the voltages in the same way that it transmits the arc-flash information.  
A fourth color, Violet, shows that the sensor is not responding and the voltage indicated in the sensor voltage field will be 0.00.  
The same previous observations apply regarding the scanning mode and the «Up» and «Down» keys.



GATEWAY STATUS GF1 to Gf3: (Multi Gateways version only)  
Accessed by pressing <MULTI GATEWAY STATUS>

There are 3 screens, scrolled by the >> and << keys.  
**GF1** to **GF3**: Indicates whether the respective gateway has detected any failure. Note that regardless of the indication on this screen, the Gateway has already activated the corresponding alarm or trip output, according to its programming. In the case of arc tripping, the trip output is activated in less than 300 uS.  
The «Gateway» field indicates the Gateway currently being scanned. With each Scan, the screen will be updated with the current conditions of each Gateway if the Scan is in «AUTO» mode or will remain statically selected on the «SCAN» screen if it is in «MANUAL» mode.

# MAIN SCREENS FOR OPERATION

## 4- ARC STATUS / TIMESTAMP



### TIMESTAMP TS1: (Mono e Multi Gateway) Accessed by pressing <TIMESTAMP>

The last 50 ARC FLASH or CHAIN events are memorized by each Gateway in the system and can be scrolled through using the UP or DOWN keys or selected directly by their index entered in the EVENT key. Event number 1 is the last one that occurred and is marked as <Last Event> and event 50 is the oldest and will be marked as <Older Event>.

The events can be deleted in the menu (Screen below). As long as they are not deleted, they will be memorized in the Gateway even if the power is turned off. If more than 50 events occur, the newest events are added and the oldest ones are removed from the event queue.

In the case of the Multi Gateway version, you must first select the <Manual> mode and then select the Gateway to be read.

As a result, the occurrence field will indicate one of two possibilities:

- A) ARC FLASH > SENSOR NUMBER: ###
- B) CHAIN INPUT

and the date and time each event occurred.

In case of empty event memory, the dates and times will be zero and the cause field will have no indication whatsoever.



### SCAN GS1: Accessed by pressing <SCAN> (Multi Gateway version only)

On this screen, the operator can select the Scan Mode between «AUTO» and «MANUAL». The system will always be in <AUTO> mode unless the operator selects «MANUAL» on this screen. «First Fail On Gateway» field will indicate the Gateway that detected the first fault.

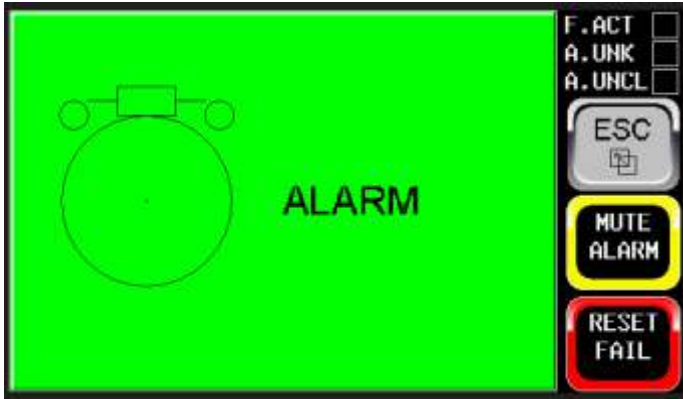
The mode will return to «AUTO» if the elapsed time indicated in «Time to Return to Auto» reaches zero. This time can be programmed in the menu between 20 and 600 seconds.

The «Manual» mode is basically used so that the operator can observe the status of «Not Responding», «Voltage Levels», etc. in more detail, without the indication page being renewed with each scan.

**IMPORTANT NOTE:** Even if the mode is in "Manual" and the scan is stopped on a single Gateway, the Arc Flash, Chain protection, etc., is not disabled on any gateway in the system, since they operate independently of the relay. The relay only shows, non-synchronously, the events and indications stored or current on each gateway. The activation of faults and alarms originated on the relay by reading the conditions and status of the gateways, these may stop acting while the system is scanning a given gateway and an alarm or trip condition programmed on the relay occurs on another gateway. Note that these possible faults, programmed on the relay, are not critical to safety, such as sensors "not responding", or "voltage levels" outside the ideal condition, etc., which can be detected in a complete scan of the system and generate an "Alarm" or "Trip" independent of the "Trip" and "Output 1 or 2" outputs of the Gateways. In this case, it is always preferable to program the faults detected by the relay in "Alarm" and not "Trip" to avoid unnecessary system shutdowns, as these are only predictive conditions and can be managed during the system's normal shutdown time.

# MAIN SCREENS FOR OPERATION

## 9- ALARM, 10- HISTORY



### ALARM SCREEN:

**ALARM:** This is a screen where you can check all Alarms, Faults and events that have occurred, with date and time (Time Stamp), in addition to being able to acknowledge them (Acknowledge) or (ACK) or clear them (Clear). To do this, touch any point on the Alarm screen that is green in the normal condition or red in the condition of activated and unacknowledged (ACK) or cleared (CLR) faults or yellow if there are faults with ACK but not Clear.

**F.ACT:** Indicates that there is an active fault that has not been reset.

**A.UNK:** Indicates that there is an unrecognized fault (Unacknowledge).

**A.UNCL:** Indicates that there is a fault that has not been returned or cleared (Uncleared).

**MUTE:** Alarm mute button. Turns off the alarm output.

**RESET:** Fault reset and tripping shutdown button. Only works after Mute.



### HISTORY SCREEN:

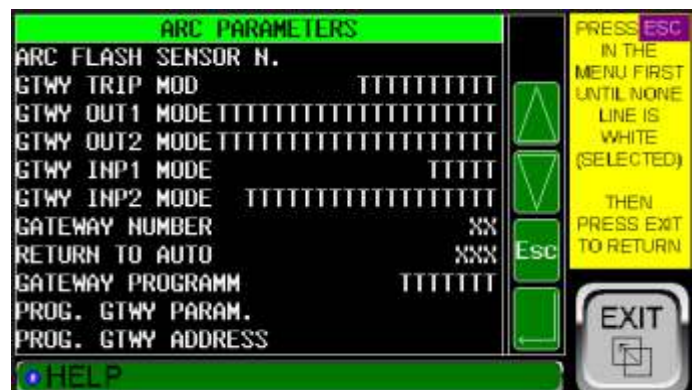
**HISTORY:** This is a screen where you can check all the events that have occurred, with date and time (Time Stamp), but you cannot acknowledge or clear them. For this, there is another screen, accessed from within the programming menu. Tap anywhere on the History screen.

The events stored include the Ack and Clear actions performed on the Alarm Screen above, as well as the deactivation of the fault that occurred (Return).

The other fields are the same as those on the Alarm screen above.

# PROGRAMING

## 11- MENU



“Arc Parameters” Sub Menu Screens (Mono and Multi Gateway)

In the “Programming Menu” MAIN (Main) there are 10 Sub-items or Submenus available, namely:

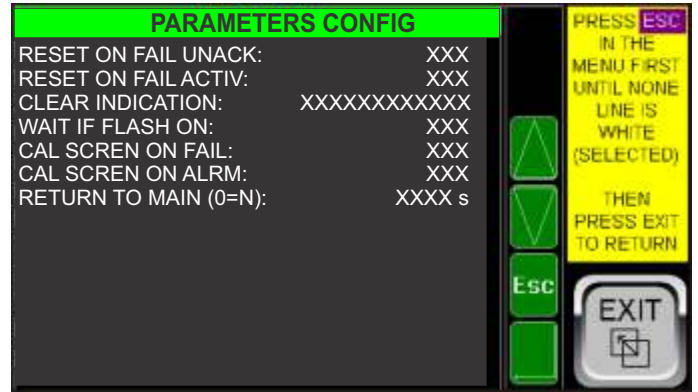
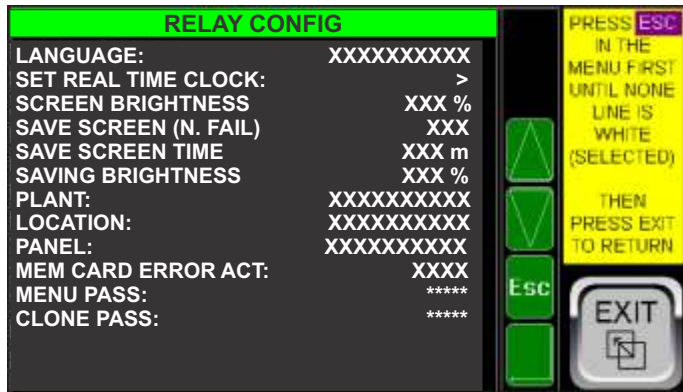
- M01: Relay Config.
- M02: Parameters Cfg.
- M03: Arc Parameters.
- M04: Analog Inputs.
- M05: Modbus Cfg.
- M06: Protections.
- M07: Trending Config.
- M08: Clear Data
- M09: Backup/Restore Data
- M10: Ethernet

And sub-item 6 is subdivided into two others, namely:

- M06: Protections 1/2
- M06: Protections 2/2

# PROGRAMING

## 11- MENU



### M01-RELAY CONFIG

- 01.1- Language:** (English, Portuguese, Spanish).
- 01.2- Set Real Time Clock:** Enter the correct date and time, if necessary.
- 01.3- Screen Brightness:** Adjust the screen brightness between 50 and 100% for normal operating conditions.
- 01.4- Save Screen (N. Fail):** Select Yes to start reducing the screen brightness after the time programmed below. No to not perform this action. This action will not be performed if it is in failure. (N. Fail) and if it is in screen saving mode and a failure occurs, the screen will return to its normal brightness until the failures are reset.
- 01.5- Save Screen Time:** Adjust the screen inactivity time so that the brightness is reduced. When the screen is touched, the brightness returns to normal and this time starts counting again.
- 01.6- Saving Brightness:** Adjust the screen brightness between 0 and 50% for the screen saving mode.
- 01.7- Plant:** Enter the description of the Plant with a maximum of 10 letters.
- 01.8- Location:** Enter the description of the installation location with a maximum of 10 letters.
- 01.9- Panel:** Enter the description of the panel with a maximum of 10 letters.
- 01.10- Mem Card Error Act:** (None, Log). Select the options None if you do not want a card error alarm to occur or Log if you want the failure to occur.
- 01.11- 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.
- 01.12- Clone Pass:** Enter the new Password if necessary, with a maximum of 5 numbers to access the Relay Clone menu.

### M02-PARAMETERS CFG

- 02.1- Reset On Fail Unacknowledged:** (Yes, No). Choose Yes to enable Reset with an unacknowledged fault (Ack). The fault is acknowledged on the Alarm screen. It will flash if there is a non-Ack alarm.
- 02.2- Reset On Fail Active:** (Yes, No). Choose Yes to enable Reset with an unacknowledged fault cleared or reset (Clr). The fault is reset on the Alarm screen. It will flash if there is a non-Clr alarm.
- 02.3- Clear Indication:** (Auto, After Reset). If «Auto» is selected, the yellow and red indications on the main temperature screens will return to white if the temperature returns to a value below the alarm or trip point, but the squares indicating Alarm or Trip will remain on until the «Reset» key is pressed. If «After Reset» is selected, the yellow and red colors continue to indicate an alarm or trip that has occurred even if the temperatures have returned to normal, and the indicator squares remain active. The colors and fault indicators only return to normal after «Reset» is activated. This is the factory condition and the safest, to indicate faults that have already returned to normal conditions.
- 02.4- Wait if Flash On:** (Yes, No). Condition to return to the main screen automatically, as explained in the «Return to Main» parameter below. If «Yes» is selected, it will not automatically return to the main screen if Flash is On.
- 02.5- Cal Screen On Fail:** (Yes, No). If set to «Yes», in the event of a fault with Trip, the alarm screen will be automatically displayed.
- 02.6- Cal Screen On Alarm:** (Yes, No). If set to «Yes», in the event of an Alarm, the alarm screen will be automatically displayed.
- 02.7- 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 on programming menu screens or with Flash activated as per parameter 02.4 above.



# PROGRAMING

## 11- MENU



«Arc Parameters» screen Mono Gateway version



«Arc Parameters» screen Multi Gateway version



### M04-ARC PARAMETERS

**03.1- Arc Flash Sens.N°:** Enter the number of arc flash sensors in the network between 1 and 100 for each of the up to 40 possible gateways.

**03.2- Gateway Trip Mode:** (Retentive, Pulse 3s). Choose the desired option.

**03.3- Gateway Output 1 Mode:** (Trip, Armed, Alarm, Remote1). The Gateway already has a «Trip» output with static and mechanical contact, but if you want to replicate the Trip output with another mechanical N.O. contact, choose the «Trip» option (Note: this contact is not fast, like the dedicated one that operates at 250 uS). If «Armed» is selected, this output will be active (closed) if the relay is correctly programmed and without a trip that has not been reset. If «Alarm» is selected, this output will be activated in the event of a fault programmed for alarm or trip. If «Remote 1» is selected, this output will be activated, depending on the Zyggot relay programming, also replicating any fault detected by the Zyggot relay.

**03.4- Gateway Output 2 Mode:** (Trip, Armed, Alarm, Remote2): Same details as described above in 05.3.

**03.5- Gateway Input 1 Mode:** (None, Reset). If «Reset» is selected, an

active input (24 VDC) will clear the Gateway's active faults, reverting any normal or programmed output to the normal state, without fault. If «None» is selected, this input will be unused.

**04.6- Gateway Input 2 Mode:** (None, Reset, Inhibit - DSBL Trip, Chain). If «None» is selected, this input will be deactivated. If «Reset» is selected, this input will operate in the same way as described above for input 1. If «Inhibits - Disable Trip» is selected, an active signal will be activated. (24VDC) on this input will inhibit the activation of the Trip due to Arc or any other fault.

**ATTENTION:** Use with extreme caution and only for commissioning tests, normally with temporary wiring or by means of a Yale type switch, since if left closed, it will leave the system without protection. If «Chain» is selected, an active input (24 VDC) will cause the TRIP output to be activated, if the Gateway is programmed for Chain active. It can be used to trip an upstream circuit breaker, for example, in the event of an Arc Flash in another relay downstream.

**03.7- Gateway Number: (1 to 100).** Enter the number of gateways connected to the relay, from 1 to 100. In the case of a single gateway, it is necessary to enter the number 1 in this parameter.

**03.8- Return to Auto: (20 to 600 s):** Time that starts when the scanning mode changes to «Manual» and when it ends, it commands the scanning mode to change to «Automatic».

**04.9- Gateway Programm:** (Disable, Enable): «Enable» must be selected so that parameter programming can be performed on the system gateways.

**03.10- GTWY PARAM.:** (Only in the Multi Gateways version) This feature must be activated after the first data programming and every time parameters related to the arc gateways are changed. To perform programming, select the Gateway to be programmed (0 to program all with the same parameters) and press «Proceed». **ATTENTION:** If «0» is selected, all selected gateways will be programmed with the same parameters. If you wish to use different parameters, you must change them in the main menu before each group of Gateways is programmed with such parameters or use the Superger software to previously program each gateway and not use this feature on the relay.

**04.11- PROG. GTWY ADDRESS:** (Only in the Multi Gateways version). This feature should only be used to change the Modbus address of each gateway, in the case of systems with multiple gateways. In the case of a single Gateway system, it should be at address 200 and in the case of Multiple Gateways, the addresses should be 200, 201, 202, etc. up to a maximum of 239. The gateways are shipped from the factory with the default address 200. Therefore, in the case of more than one gateway on the same relay, their addresses should be changed as described in the relay's «Help» screens. Optionally, you can use the Superger software to previously program each gateway with the correct addresses.

### IMPORTANT NOTES:

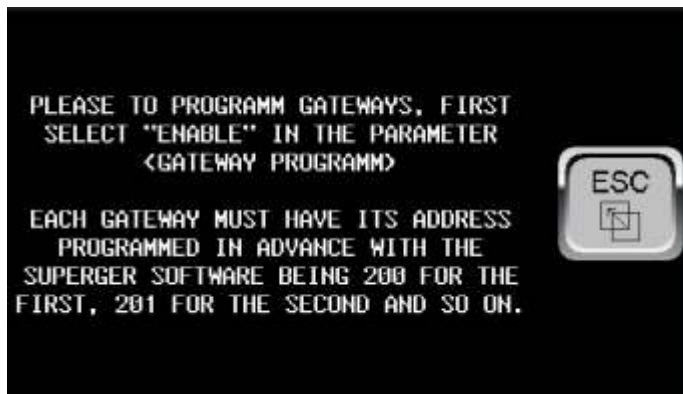
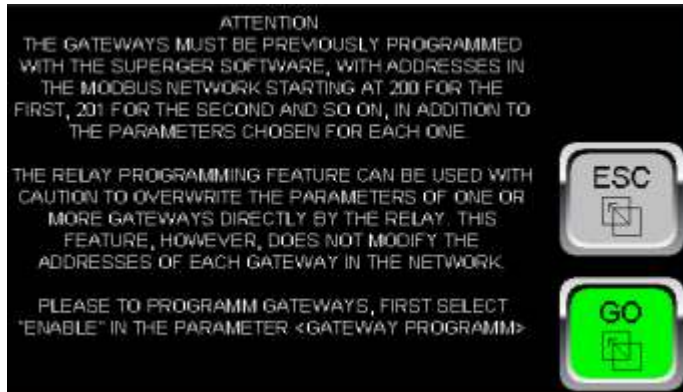
1- Although this feature is present here for convenience when modifying a specific gateway, it is always preferable to leave the programming parameter in "Disable" and use the "Superger" software to program each gateway only once during Startup.

2- In the Mono gateway version, the parameters are automatically sent to the only gateway in the system when the system starts or when exiting the programming menu. In this version, the gateway must be previously configured for Modbus address 200.

3- If you do not know which address a specific gateway is configured for, simply press the "Reset" key on the gateway through the front hole using a paper clip. When this key is pressed, the front LED changes color for one second and the address returns to 200. The other parameters are not changed.

# PROGRAMING

## 11- MENU



### M03- ARC PARAMETERS (details of item 3.10) (Multi Gateway Version Only - See note 2 below)

**03.10- Prog. GTWY PARAM.:** When selecting this option, the screen above will appear with safety warnings and instructions to first select «Enable» in the «Gateway Programm» parameter.

When pressing «GO», one of the following two screens will be displayed. If the programming parameter is set to «Disable», the second screen will be displayed. If it is set to «Enable», the third screen, for actual programming, will be displayed.

On the actual programming screen (third screen on the side), it will be necessary to initially select «MANUAL», then enter the number of the gateway to be programmed (0 to program all at the same time and with the same parameters). Then press the «Proceed» key, entering «YES» and «ENTER». Programming will then start and the «Programming GTWY» field will show which gateway is currently being programmed. Once the «YES» indication on the «Proceed» key has finished, it will return to «NO».

You will not be able to exit this screen until all gateways have been programmed.

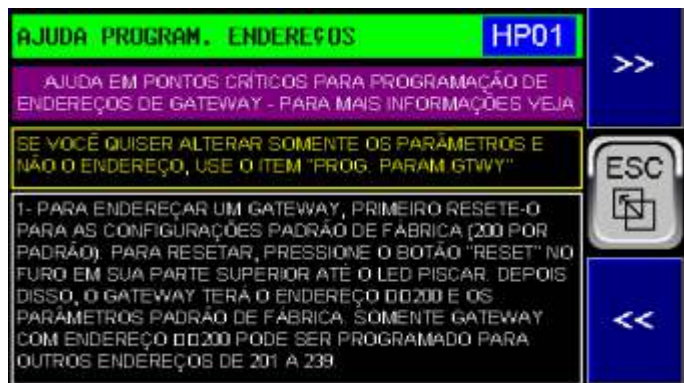
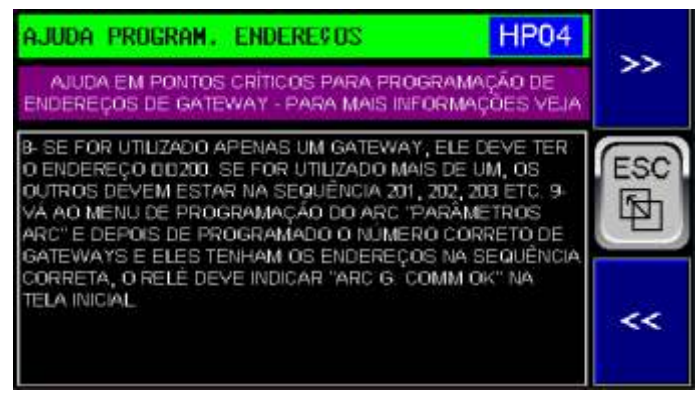
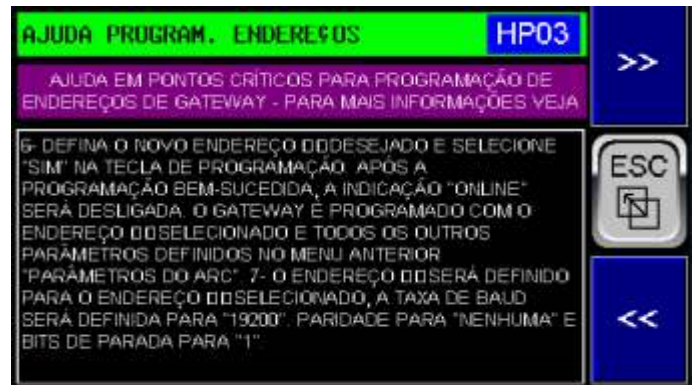
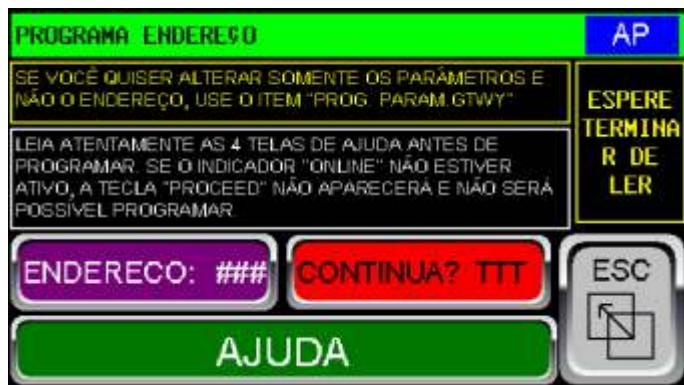
**Notes:**

1- The parameters saved are those entered in the «ARC PARAMETER» menu. The gateway network address or the gateway's Modbus communication factory parameters are not changed during this procedure.

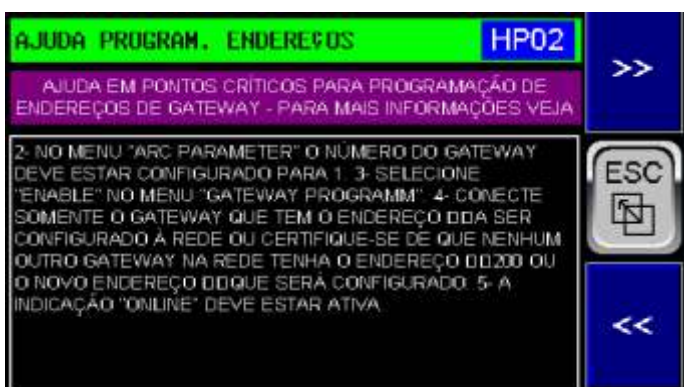
2- In the Mono Gateway Version, the parameter «Prog. GTWY PARAM.» simply needs to be selected in «Enable» so that any new parameters changed in the arc menu are saved in the system's only gateway.

# PROGRAMING

## 11- MENU



**M03- ARC PARAMETERS > PROG ADDRESS (Only in the Multi Gateways version). (Details of option 3.11)**

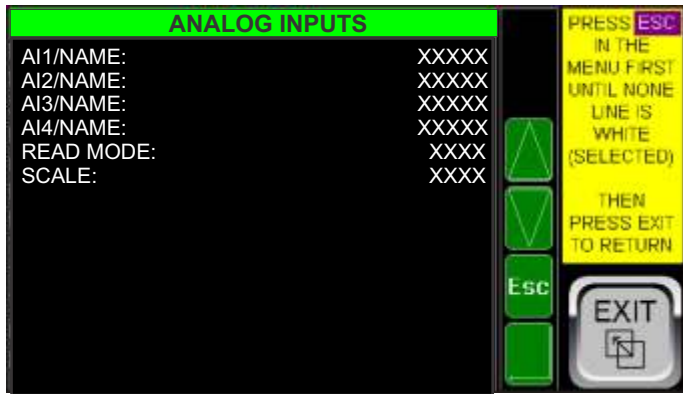


**03.11- PROG. GTWY ADDRESS.:** When selecting this option, the guidance screen will appear to select only one gateway and set «**Enable**» as the parameter that enables programming. If these conditions are OK, pressing «**GO**» will display the AP screen, which has the option of pressing the «**Help**» button. When pressing «**HELP**», 4 screens can be accessed with instructions regarding this action. Once you have read and understood the instructions, select the new address of the Gateway to be programmed, always starting from the reset gateway (which ensures that it will have address 200 and will be communicating). Then, using the «**Address**» key, you can select from 201 to 239. If address **200** is selected, it will not be changed on the gateway but will be used to test the action. Note that the «**Proceed**» key only appears if the gateway to be programmed is «**Online**» (with address **200**, therefore). Once you have selected the new address and the «**Proceed**» key is displayed, simply select «**YES**» on it and the gateway will be programmed with the new address. Note that this action does not change the parameter data previously programmed on the gateway in question. When a new address is programmed, the gateway loses communication with the relay. This is normal and means that the address has effectively been changed. Programming will begin after this and as soon as the «**Yes**» indication on the key is finished, «**Proceed**» will return to «**NO**». The remaining instructions are on screens HP01 through HP04 above.

**Note:** In the mono gateway version there is no option to record the Modbus address on it, as it will always be **200**. If it is different, simply perform the «**Reset**» operation using a clip in the small hole at the top. When the reset switch is pressed, the top LED changes color momentarily and the address will be changed to **200**, making it ready for use. The other parameters are automatically recorded when the gateway is connected to the relay and eventually rewritten if they are changed in the programming menu.

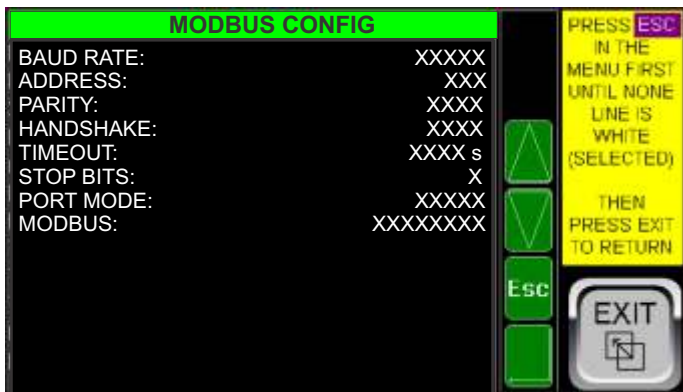
# PROGRAMING

## 11- MENU



### M04-ANALOG INPUTS

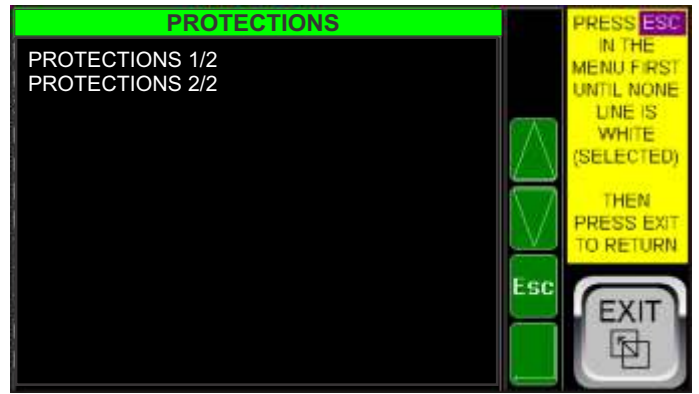
- 04.1- **AI1/NAME:** Enter the name of the analog input, with up to 5 characters, to facilitate its identification.
- 04.2- **AI2/NAME:** Same.
- 04.3- **AI3/NAME:** Same.
- 04.4- **AI4/NAME:** Same.
- 04.5- **Read Mode:** (% , Temp). Reading mode and display on screens, as a percentage in relation to the full scale (5V) or Temperature. The next parameter defines the full scale for the temperature.
- 04.6- **Scale:** xxxx. Enter the temperature that is equivalent to the full scale (5V) of the analog inputs.



### M05-MODBUS CONFIG

This menu is related to the Modbus communication port for the user to optionally connect to the DCS system. (It is not related to the communication port with the sensors)

- 05.1- **Baud Rate:** (9600, 19200, 38400) Enter the required Baud Rate.
- 05.2- **Address:** (1 to 247): Enter the network node address for this relay.
- 05.3- **Parity:** (None, Odd, Even). Choose the required parity.
- 05.4- **Handshake:** (None, XON/XOFF, CTS/RTS, MD/HALF), Choose the required Handshake.
- 05.5- **Timeout:** (0 to 1023 s). Enter the required Timeout.
- 05.6- **Stop Bits:** (1 or 2). Choose the required value.
- 05.7- **Port Mode:** (Rs232, Rs485). Select the mode used.
- 05.8- **Modbus:** (Active, Inactive). To turn Modbus on or off. If not used, leave it in «Inactive».



### M06-PROTECTIONS

Detailed further below.



### M06-PROTECTIONS 1/2

In this menu, the parameters relating to the protections shown above will be programmed.

**ACTION:** The selection possibilities for the Action parameter of each of the faults may include one or more options as follows and informed in the parenthetical part of each fault described below and will not be further detailed: (**None, Log, Alarm, Trip**). In «None» this fault will not be considered. In «Log», it will be logged on the Alarm screen but the Alarm condition will not be triggered. In «Alarm» the fault will be logged and the Alarm condition will be triggered. In «Trip», the fault will be logged, the Alarm condition will be triggered and the Trip condition will be triggered. **AUX OUTPUT:** The options for all faults are «None», «D.O.3», «D.O.4», «EB1:Aux1», «EB2:Aux2», «EB3:Aux3», «EB4:Aux4»,..... «EB8:Aux8». This will not be detailed in each fault description below, as what is described here applies to all of them. Note that the outputs «D.O.1» and «D.O.2» are dedicated to «Alarm» and «Trip» and the outputs **D.O.3** and **D.O.4** are programmable and are located on the relay, while the others, also programmable, are located on the EBLOCK 88x expansion block.

Note: More than one fault can be assigned to the same output and it will switch if any of the faults assigned to it occurs.

# PROGRAMING

## 11- MENU



### M06.1.1-ANALOG 1 ALARM

This fault will occur if the fault is programmed to be executed in «Action» and the value of analog input 1 exceeds the programmed level.

**Action: (None, Log, Alarm).** Choose the desired option. Note that there is no Trip option.

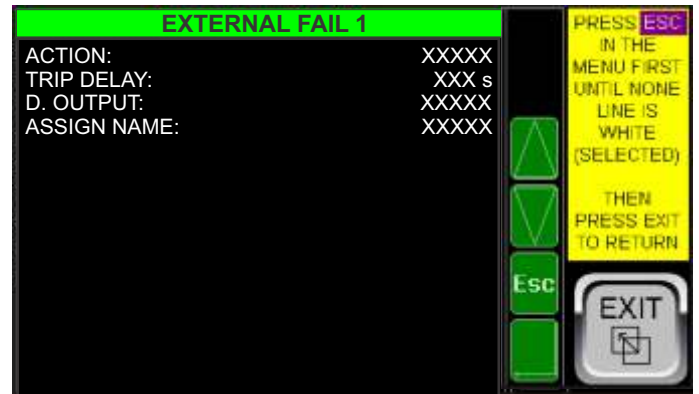
**Level High:** Enter the level in % of full scale.

**D. Output: (None, D.O.3, D.O.4, EB1: Aux1 to EB8: Aux8).** Choose the desired option.

**M6.1.2-ANALOG 2 ALARM** - same as M6.1

**M6.1.3-ANALOG 3 ALARM** - same as M6.1

**M6.1.4-ANALOG 4 ALARM** - same as M6.1



### M06.3.1- EXTERNAL FAIL 1

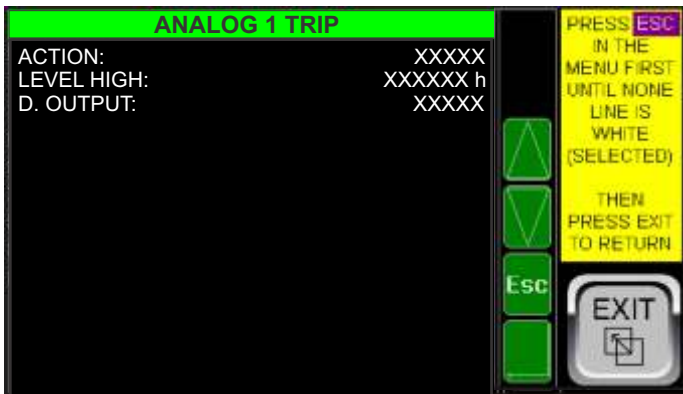
This fault will occur if the fault is programmed to be executed in «Action» and the corresponding digital input becomes active.

**Action: (None, Log, Alarm, Trip).** Choose the desired option. Note that in the Alarm option, the Trip will not be activated, and in the Trip option, the Trip output and also the Alarm output will be activated if configured for this. If «Log» is chosen, only the fault will be logged on the «Alarms» and «History» screens, but the alarm or trip condition will not be activated.

**Trip Delay:** Delay time that occurs after the digital input becomes active and the fault is detected.

**Aux Output: (None, D.O.3, D.O.4, EB1: Aux1 to EB8: Aux8).** Choose the desired option.

**Assign Name:** Enter the name of the Digital Input with up to 5 characters to facilitate its identification in the system.



### M06.2.1-ANALOG 1 TRIP

This fault will occur if the fault is programmed to be executed in «Action» and the value of analog input 1 exceeds the programmed level.

**Action: (None, Log, Alarm).** Choose the desired option. Note that there is no Alarm option which will occur together with the Trip.

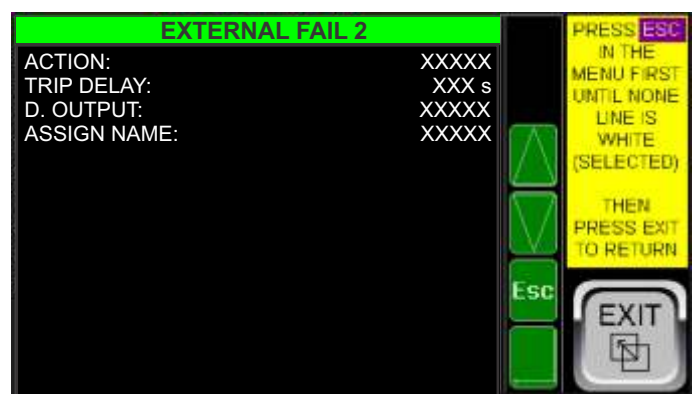
**Level High:** Enter the level in % of full scale.

**Aux Output: (None, D.O.3, D.O.4, EB1: Aux1 to EB8: Aux8).** Choose the desired option.

**M6.2.2-ANALOG 2 TRIP** - idem M6.2.1 acima

**M6.2.3-ANALOG 3 TRIP** - idem M6.2.1 acima

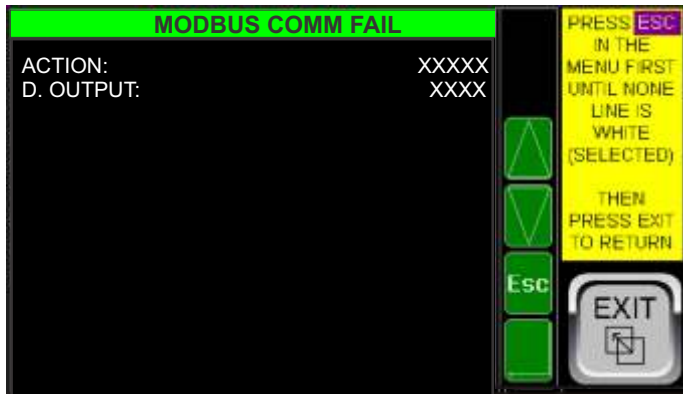
**M6.2.4-ANALOG 4 TRIP** - idem M6.2.1 acima



### M06.3.2 - EXTERNAL FAIL 2 - same as M6.3.1 acima.

# PROGRAMING

## 11- MENU



### M06.4.1- MODBUS COMM FAIL

This fault will occur if the sensor network presents a fault, which is shown on the main screen (MS6) as already described in the section corresponding to this screen and whose fault type is shown on this screen.

**Action:** (None, Log, Alarm). Choose the desired option. Note that there is no Trip option because this is not a major fault that could trip the system, and therefore can be corrected.

**Aux Output:** (None, D.O.3, D.O.4, EB1: Aux1 to EB8: Aux8). Choose the desired option.

### M06.5.1- OPERATING TIME

This fault will occur if the fault is programmed to be executed in «Action» and the On Time is greater than the programmed one. This fault serves to schedule eventual preventive maintenance in the system, although the Zyggot system itself does not require any preventive maintenance for at least 10 years.

**Action:** (None, Log, Alarm). Choose the desired option. Note that there is no Trip option.

**Hours:** Enter the number of On hours to activate this protection (max = 250000 h).

**Aux Output:** (None, D.O.3, D.O.4, EB1: Aux1 to EB8: Aux8). Choose the desired option.

# PROGRAMING

## 11- MENU



### M6.6.1- GATEWAY NOT PROGRAMED

This signal will occur if the Gateway is powered without being properly programmed by the Zyggot relay or by the PC software.

Action: (None, Log, Alarm). Choose the desired option. Note that there is no «Trip» option because it is not a critical failure.

D. Output: (None, D.O.3, D.O.4, EB1: Aux1 to EB8: Aux8). Choose the desired option.

### M6.7.1- GATEWAY COMMUNICATION FAIL

This signal will occur if the relay is unable to communicate with the Gateway.

Action: (None, Log, Alarm). Choose the desired option. Note that there is no «Trip» option because it is not a critical failure.

D. Output: (None, D.O.3, D.O.4, EB1: Aux1 to EB8: Aux8). Choose the desired option.

### M6.8.1- ARC SENSOR NOT RESPONDING

This signal will occur if the Gateway is unable to communicate with one or more arc sensors.

Action: (None, Log, Alarm). Choose the desired option. Note that there is no «Trip» option since it is not a critical failure.

D. Output: (None, D.O.3, D.O.4, EB1: Aux1 to EB8: Aux8). Choose the desired option.

### M6.9.1- ARC FLASH

This signal will occur if one or more arc sensors detect the occurrence of an arc flash.

Action: (None, Log, Alarm, Trip). Choose the desired option. ATTENTION: Note that there are no «None», «Log» and «Alarm» options since the Gateway already has a dedicated «Trip» output, which should always be used to trip the circuit breaker that cuts off the system power supply. This Arc Flash output, via the relay, can be used, for example, to send a signal to other systems or to trip auxiliary systems.

D. Output: (None, D.O.3, D.O.4, EB1: Aux1 to EB8: Aux8). Choose the desired option. NOTE: These outputs are auxiliary, in case you want to duplicate the trip output, for example, since the Gateway already has a dedicated Trip output.

### M6.10.1- CHAIN INPUT

This signal will occur if one or more arc sensors detect the occurrence of an arc flash.

Chain Input Action: (None, Arc Flash, Alarm Relay, Trip Relay). Select the desired option. Select the desired option. If «Arc Flash» is selected, its activation will be treated as an Arc Flash occurrence, causing the activation of the Gateway trip output. If «Alarm Relay» is selected, it will only activate a corresponding alarm indication on the Zyggot relay. If «Trip Relay» is selected, its activation will cause a Trip and Alarm fault on the Zyggot relay, activating its Trip and Alarm output contacts. Note that these activations are slow and should not be confused with the Gateway's dedicated trip output, which will occur in less than 250 uS.

D. Output: (None, D.O.3, D.O.4, EB1: Aux1 to EB8: Aux8). Select the desired option. NOTE: These outputs are auxiliary, in case you want to duplicate the trip output, for example, since the Gateway already has a dedicated Trip output.

### M6.11.1- REMOTE 1 OUTPUT MODE

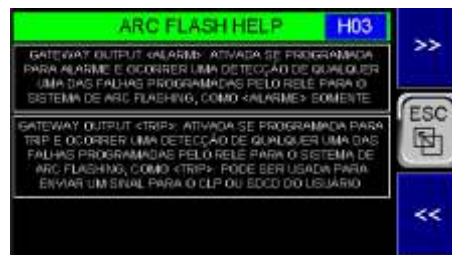
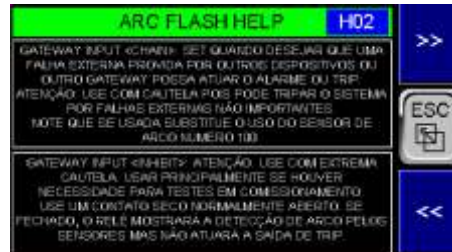
This option can be used to activate Gateway output 1 in the event of any fault detected by the Zyggot relay. It depends on the programming of each relay fault.

**Remote 1 Output Mode:** (None, Alarm From Relay, Trip From Relay). Choose the desired option. Select the desired option. If «Alarm From Relay» is selected, an alarm output from the Gateway will be activated by a command from the Zyggot relay in «Alarm» condition. If «Trip From Relay» is selected, a Trip output from the Gateway will be activated by a command from the Zyggot relay in «Trip» condition. Note that this action does not activate the Gateway's dedicated ultra-fast Trip output, but rather Gateway output 1 if programmed to do so.

### M6.12.1- REMOTE 2 OUTPUT MODE

This option can be used to activate the Gateway's output 2 in case of any fault detected by the Zyggot relay. It depends on the programming of each relay fault.

**Remote 2 Output Mode:** (None, Alarm From Relay, Trip From Relay). Select the desired option. Select the desired option. If «Alarm From Relay» is selected, an alarm output from the Gateway will be activated by a command from the Zyggot relay in «Alarm» condition. If «Trip From Relay» is selected, a Trip output from the Gateway will be activated by a command from the Zyggot relay in «Trip» condition. Note that this action does not activate the Gateway's dedicated ultra-fast Trip output, but rather Gateway output 2 if programmed to do so.



Pressing the «HELP» key displays 4 screens that can be paged through using the keys >> e << para se ver detalhes de operação do sistema de arco.

# PROGRAMING

## 11- MENU



### M7- TRENDING CONFIG

This menu allows you to configure the parameters related to the curves (Plot) shown previously in this manual.

**Scale:** Enter the temperature scale equivalent to the full scale or 100% of the vertical axis of each Trending shown on screens T1 to T12. This number appears in the left corner of each screen from 1 to 12 of the curves.

**HMI Reset:** (Enable, Disable). If "Enable" is selected, the operator will be able to command the reset of the curves on the display of each one. If "Disable", the curves will not be reset.

**Enable Retentive:** (No, Yes). Enables or disables the recording of curves related to the Plot of Screen T18, as detailed in the operating screens section.



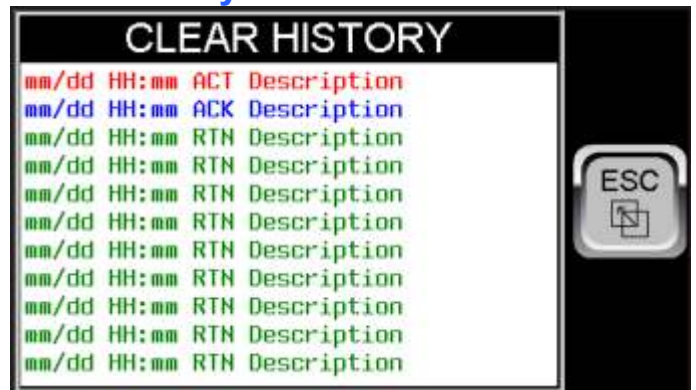
### M8- CLEAR DATA

This menu directs you, through items, to Clear screens (data reset).

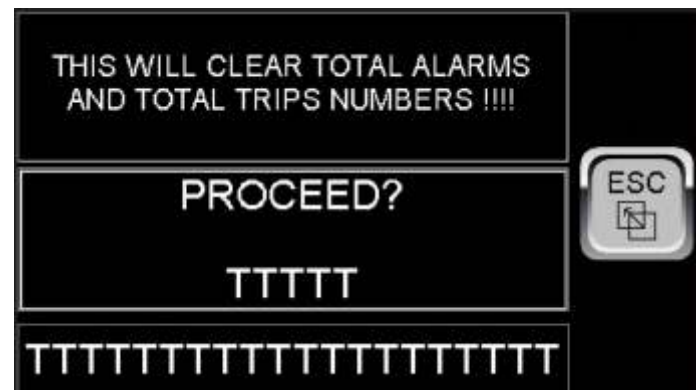
**Clear History:** Where you can clear the fault and event report that is displayed on the HISTORY screen and that cannot be done directly on the screen, so that an operator who does not have the menu password can erase this data. It is recommended that only engineering personnel have access to the programming menu for this reason and also to avoid inadvertently changing important parameters.

**Clear Statistics:** Where you can reset the total number of Alarms and Trips that appear on the MS3 screen (Main Screen 3). The same observations regarding the password apply as in the item above.

### Clear History Screen



### Clear Statistics Screen



# PROGRAMING

## 11- MENU



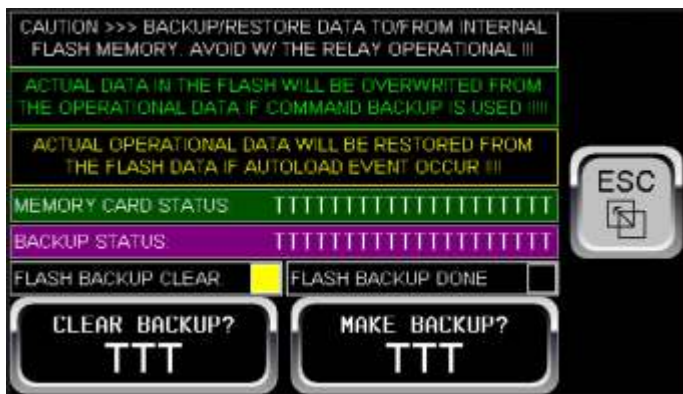
### M9- BACKUP / RESTORE DATA

**M9.1- Enable Autorun:** Auto Run must be enabled as well as Auto Load if it is desired to have the Fail-Safe system operational. After Auto Load has been executed, if the relay detects that the program is missing or corrupted.

**M9.2- Enable AutoLoad:** Must be enabled in the same way as described above.

**M9.3- Flash Backup:** This submenu directs you to the screen below where you can clear the previously executed backup or perform a first or new backup of the entire RAM memory to the internal Flash memory. This internal backup is used in the event of a Fail-Safe action with Auto Load and Auto Run.

Only execute the Make Backup command after having programmed all the parameters and being sure that the relay is operating correctly and without active or uncleared faults on the alarm screen.



In addition to the Clear Backup and Make Backup buttons and the Cleared or Done indications, there is a memory card status field, as previously described, and a Backup Status field, with the messages described previously on the MS10 Screen, which can be: 1- STANDBY / 2- OK - PROCEED / 3- ERROR - CHECK CARD / 4- DONT BACKUP ON FAIL / 5- OK - DONE / 6- WRITING / 7- READING / 8- BUSY.

Note that the Clear Backup and / Make Backup command buttons are invisible if the conditions for these commands are not suitable at the time.

**M9.4- Clone Parameters:** This submenu takes you to the Clone Parameters screen below.

**WARNING:** This action, if «Restore» is commanded, will overwrite all programming parameters with those contained in the memory card, in the specific file.

To use this function, a previously formatted memory card, with a maximum of 32 Gb, must be inserted in the upper slot of the relay. You can command «Backup» to save a new file with the data or «Restore» to restore the same.

In this way, if several Zyggot V5F/x ARC Relays are used with the same programming, simply program one of them and clone the data in the other relays.

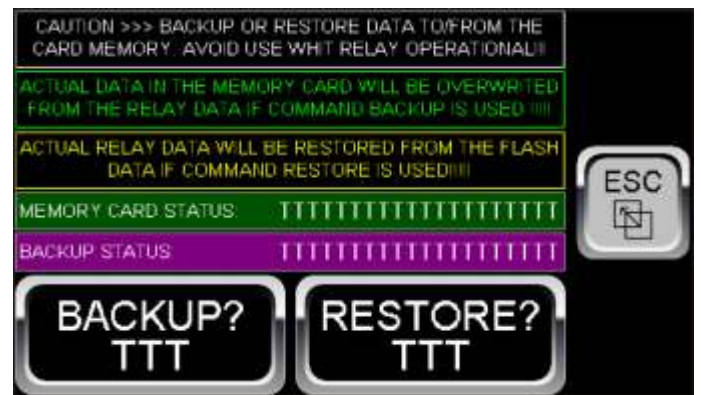
This action does not save or restore the programming password, which is in fact one of the parameters.

On the screen below, you can see that there are two fields, one with the card status messages as described in the explanation of the Info 4 screen and another with the Backup status messages as described previously on the MS10 Screen, which are: 1- STANDBY / 2- OK - PROCEED / 3- ERROR - CHECK CARD / 4- DONT BACKUP ON FAIL / 5- OK - DONE / 6- WRITING / 7- READING / 8- BUSY.

Note that the Backup and Restore command buttons are invisible if the conditions for these commands are not suitable at the time.

Note: Unlike the Flash Backup command, which copies the entire Ram memory to a non-volatile internal memory, the Clone Parameters command described here only saves the values of the parameters entered in the programming menu and serves as documentation to be saved, such as possible restoration of parameters to a previous condition when changes are made to the programming or, as already mentioned, cloning the same parameters in other relays of the same plant, for example.

To clone the parameters to other relays, copy the «Datacard» file from the memory card of the relay that generated the file to be cloned to the cards of the other relays onto a computer and then run the Restore command on each of them. Attention: In this case, be careful not to run the Backup command on the other relays before running the Restore command.



# PROGRAMING

## 11- MENU

### ETHERNET

The ZYGGOT V5F/x Relay has **ETHERNET** communication and can be accessed from anywhere on the planet. Several communication protocols are incorporated, and the user simply needs to define the communication parameters in the programming screens below and use it.

For example, it is possible to obtain all temperature readings and flag statuses from a computer or mobile device or even interface with a DCS system anywhere, as long as there is access to Ethernet and the relay is connected to a local LAN network with access to an external WAN network and the addresses programmed in the relay are known.

It is possible to perform remote parameterization of the relay if necessary, such as alarm and trip levels, etc.

It is also possible for the manufacturer to perform eventual firmware updates remotely, if necessary.

**The available protocols are:**

**ICMP** - Internet Control Message Protocol.

**SRTP** - Service Request Transport Protocol.

**TCP/IP** - Transmission Control Protocol (Modbus TCP Server or Modbus Slave).

**ETHERNET/IP** - Internet Protocol (Ethernet IP Server).

**FTP** - File Transfer Protocol

**HTTP** - Hypertext Transfer Protocol.

**ASCII Over TCP/IP** - ASCII Transmission Control Protocol.

**NTP** - Network Time Protocol.

This manual does not intend to cover each protocol in depth. It is up to the user to know the protocol they intend to use.

Below is a brief description of each Protocol and their limitations in this application.

**ICMP - Internet Control Message Protocol.** Internet Control Message Protocol (ICMP) is a protocol that is part of the IP Protocol, defined by RFC 792. It is used to communicate network layer information, and its most common use is to provide error reports to the original source. Any computer that uses IP must accept ICMP messages. Although several tools are possible in this protocol, the Zyggot V5F/x relay only implements the Ping function, which can be used to check whether a device is responding to commands, i.e. is accessible on the network.

**SRTP - Service Request Transport Protocol.** Service Request Transfer Protocol (SRTP) is a GE Fanuc Automation protocol that allows a remote SRTP client to request services from an SRTP server. In this case, the ZYGGOT V5F/x relay acts as an SRTP server that responds to requests from one or more SRTP Clients.

Since SRTP was originally designed to support the services provided by the GE Fanuc Series 90, the ZYGGOT V5F/x SRTP protocol does not support all possible SRTP services. The ZYGGOT V5F/x Relay's implementation of SRTP is mainly limited to the services required for the exchange of registration data.

**Configuration:**

**Port Used:** 18245 TCP

**Maximum Number of Connections:** 16

The following SRTP service requests are supported by ZYGGOT V5F/x Relay.

- 0 PLC\_SSTAT
- 1 PLC\_LSTAT
- 4 READ\_SMEM
- 7 WRITE\_SMEM
- 33 CHG\_PRIV\_LEVEL
- 67 RET\_CONFIG\_INFO
- 79 SESSION\_CONTROL
- 97 PLC\_FEATURES\_SUPP

**Tipos de Registro:**

- 8 %R 16 bit
- 10 %AI 16 bit
- 12 %AQ 16 bit

- 16 %I 8 bit
- 18 %Q 8 bit
- 20 %T 8 bit
- 22 %M 8 bit
- 30 %S 8 bit
- 70 %I 1 bit
- 72 %Q 1 bit
- 74 %T 1 bit
- 76 %M 1 bit
- 84 %S 1 bit

**TCP/IP** - Transmission Control Protocol (Modbus TCP Server). The TCP/IP protocol is an acronym for Transmission Control Protocol, used to send and receive data on the web.

The TCP/IP protocol is the language of computers and specifies how data is exchanged over the Internet.

Most computers communicate using TCP/IP, providing end-to-end communications.

Highly scalable and widely used, this protocol requires little central management and was designed to make networks reliable, with the ability to automatically recover in the event of a device failure.

Each device has an IP address that identifies it, allowing it to communicate and exchange data with other connected devices.

**Configuration:**

**Port Used:** 502 TCP

**Maximum Number of Connections:** 16

**Note:** Modbus must be enabled on the Zyggot V5F/x relay.

# PROGRAMING

## 11- MENU

### ETHERNET/IP - Internet Protocol (Ethernet IP Server).

The Internet Protocol (IP) is the network layer communications protocol in the Internet protocol suite for relaying datagrams across network boundaries (Maintained by ODVA.org). Its routing function enables the interconnection of networks and essentially establishes the Internet.

IP is tasked with delivering packets from the source host to the destination host based solely on the IP addresses in the packet headers. To do this, IP defines packet structures that encapsulate the data to be delivered. It also defines addressing methods that are used to label the datagram with source and destination information.

**Configuration:**

**Ports Used: 44818 TCP or 2222 UDP**

**Maximum Number of Connections: 2**

**Start Send (Produced) Register = R2001 /// Words Count = 248**

**Start Received (Consumed) Register = R2501 /// Words Count = 199 ///**

**Status Register = R5513**

### FTP - File Transfer Protocol

This is the protocol that allows file transmission over the network. Through it, you can read and access files on the memory card inserted in the respective slot of the relay, where temperature readings, etc., are recorded. It is a standard/generic protocol that is independent of hardware for transferring files and is also a transfer program.

Data transfer in computer networks usually involves transferring files and accessing remote file systems (with the same interface used for local files). FTP is based on TCP, but predates the TCP/IP protocol stack, and was later adapted to it. It is the standard for transferring files.

**Configuration:**

**Ports Used: 20 and 21 TCP**

**Maximum Number of Connections: 4**

**User Name 1 (Read Only) = Z\_FTP\_USER /// Password = 899468 ///**

**User Name 2 (Read / Write) = Z\_FTP\_VRX /// Password = xxxx**

### HTTP - Hypertext Transfer Protocol.

The Hypertext Transfer Protocol is a communication protocol (at the application layer according to the OSI Model) used for distributed and collaborative hypermedia information systems. It is the basis for data communication on the World Wide Web.

Hypertext is structured text that uses logical connections (hyperlinks) between nodes containing text. HTTP is the protocol for the exchange or transfer of hypertext.

**Configuration:**

**Port Used: 80 TCP**

**Maximum Number of Connections: 1**

**User Name: = ZYGGOT\_WS**

**Password: 9387**

### ASCII Over TCP/IP - ASCII Transmission Control Protocol.

The ASCII Transmission Control Protocol, or ASCII TCP, is a query/response/question-and-response communication protocol in which a host PC uses ASCII characters to send commands to a device and receive responses from the device.

This protocol is designed to send and receive ASCII data over the Zyggot Relay's Ethernet port. The Relay acts as a server when using this protocol.

**Configuration:**

**Port Used:** Entered in Configuration.

**Tx Trigger: %M100 (transmits 500 Bytes when set = 1**

**Tx Bytes (8 bits) 500 Bytes (250 Words)** in the sequence Bytes 1 and 2 form Word 1 containing the temperature of Target 1, Bytes 2 and 3 containing the temperature of Target 2 and so on until completing 100 sensors, when the Air temperatures of Sensor 1, Sensor 2 etc. are completed until completing 100 sensors, therefore completing 400 Bytes (200 Words).

**Rx Copy Trigger: %M99** (copies 504 Bytes (252 Words) when set = 1 for the alarm and Trip parameters. Before being set, the user must transmit all the Bytes already configured as half a Word each, referring to the integer value of the alarm levels for each sensor.

**Rx Bytes (8 Bits) 504 Bytes (252 Words):** The first 500 Bytes must form 250 Words referring to the target alarm levels for 100 sensors, then Trip levels for 100 sensors and the last 4 Bytes must form the 2 words referring to the alarm and trip levels for all sensors (always the same for all).

**Maximum number of Connections: 1**

### NTP - Network Time Protocol.

NTP is a protocol for synchronizing equipment clocks based on the UDP protocol on port 123. It is used to synchronize the clock of a set of equipment and devices in data networks with variable latency. NTP allows you to keep the clock of an equipment synchronized with the correct time at all times and with great accuracy.

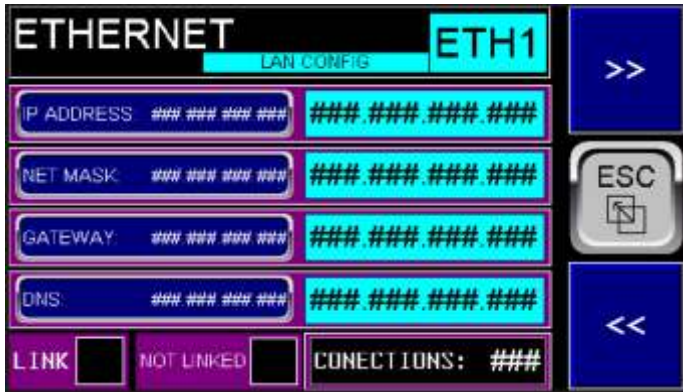
Configuration: Five NTP server addresses are predefined in Brazil. Upon request, we can define any other server worldwide.

The factory predefined servers are as follows:

- a.st1.ntp.br
- b.st1.ntp.br
- c.st1.ntp.br
- d.st1.ntp.br
- gps.st1.ntp.br

# PROGRAMING

## 11- MENU



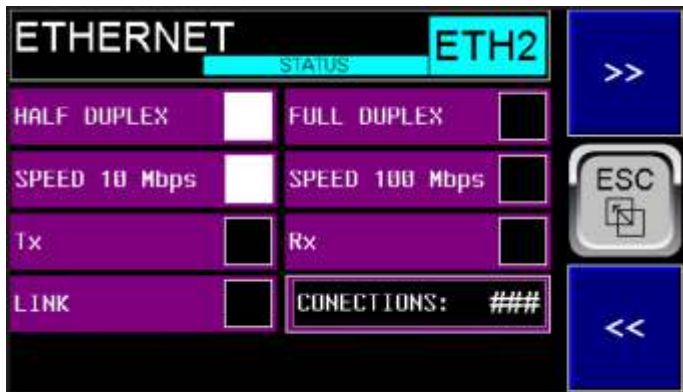
### M10A- ETHERNET - LAN CONFIG

**M10A.1- IP ADDRESS:** Enter the address of the Zy6got V5F/x relay on the LAN network.  
**M10A.2- NET Mask:** Enter the number corresponding to the network mask. Normally 255.255.255.0  
**M10A.3- Gateway:** Enter the number corresponding to the Gateway if necessary. If not necessary, leave it at 0.0.0.0  
**M10A.4- DNS:** Enter the address of the Domain Name Server if necessary. If not used, leave it at 0.0.0.0  
 This screen also shows whether the Ethernet cable is connected or not and the number of connections. **Note:** the number of connections may eventually show «zero» even though it is connected if the transmissions are not repetitive and because it is very fast, there is not enough time to show it on the screen.



### M10C- ETHERNET - ICMP (PING)

This screen, like the corresponding screen in the Report Menu, allows you to test whether a specific device on the network is responding, i.e., is active on the network.  
**M10C.1- PING ADDRESS:** Enter the address to perform the ping.  
**M10C.2- PING RESPOND TIME:** Shows the time in milliseconds that the device took to respond.  
**M10C.3- Tx and Rx:** Shows whether it is transmitting or receiving data.  
**M10C.4- PING TIMEOUT:** If the device does not respond in less than 1 second, it will indicate Timeout, i.e., it is not responding.  
**M10C.5- STAR and STOP:** Starts and stops the PING. When exiting the screen, a Stop is automatically given.



### M10B- ETHERNET - STATUS

This screen only shows the various connection statuses, and does not have any fields to be entered.

The statuses shown are:

**M10B.1- HALF DUPLEX or FULL DUPLEX:** Shows the connection mode.  
**M10B.2- SPEED 10 Mbps or 100 Mbps:** Shows the connection speed.  
**M10B.3- Tx and Rx:** Shows whether data is being transmitted or received.  
**M14B.4- LINK:** Whether the Ethernet cable is connected (Link) or not and the number of connections. Note: the number of connections may eventually show "zero" but it is connected if the transmissions are not repetitive and because they are very fast there is not enough time to show it on the screen.



### M10D- ETHERNET - TCP/IP PROTOCOL - MODBUS SLAVE

This screen refers to the main protocol of the Zyggot V5F/x relay, which allows full Modbus operation, with all functionalities and valid addresses, as well as offsets, etc.

The **SUPERGER** program provided free of charge by Varixx allows, among other features, complete testing of the Modbus Over Ethernet connection with a computer connected to the Zyggot V5F/x relay.

# PROGRAMING

## 11- MENU



**M10E.6- PROGRAM PERMISSION:** It can be set to "Enabled" or "Disable" to allow or not programming of the relay parameters via Ethernet IP. Not enabled in this version so it is always set to "Disable"

**M10E.7- CONNECTED:** Indicates that the Ethernet connection is OK.

**M10E.8 - DATA VALID (at consumed section):** Informational only. For information purposes only on this screen. The corresponding word in the Ethernet IP server table (%R3328) have to be set to value 1, i.e. its bit 1 set when the data is valid to be write to the relay after a new writing page be selected. (Note enabled in this version. Only page 0 will be effective - see table).

**M10E.9 and M10E10 - CONNECT CLASS 3 e CONNECT CLASS 1:** Information Only.

### M10E-ETHERNET IP PROTOCOL

This screen refers to the Ethernet IP protocol. Unlike the TCP/IP (Modbus Over Ethernet) protocol described above, the data read and written will be transferred all at once, respecting the maximum number of Words, as described below.

**M10E.1- READING PAGE:** From 0 to 16 for reading until 128 words each page. Corresponds to record %R2927 in the Ethernet IP Server table.

**M10E.2- REGISTERs (PRODUCED):** For information purposes only. Always %R2801 to %R2928: will contain the several words with data according the table ETHERNET IP SERVER ahead in this manual.

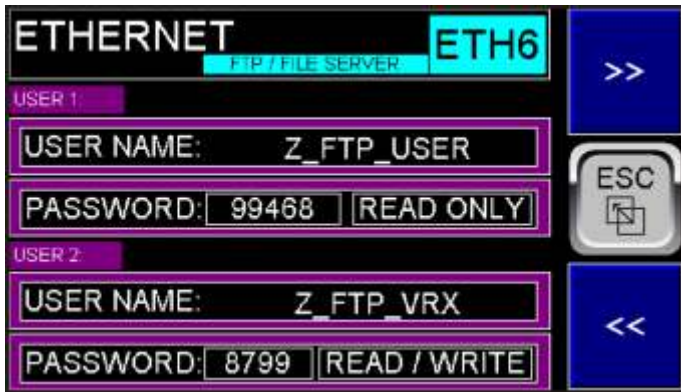
**M10E.3- DATA VALID (at produced section):** For information purposes only on this screen. The corresponding word in the Ethernet IP server table (%R2928) will have the value 1, i.e. its bit 1 will be set when the data is valid after the page to be read has been changed. If there is no page change this bit will remain set indefinitely and if there is a page change it will briefly go to zero and then to 1 again when the data read has been changed.

**M10E.4- WRITING PAGE:** From 0 to 16 for writing until 128 words each page. Corresponds to register %R3226 in the Ethernet IP Server table. (Note enabled in this version. Only page 0 will be effective - see table).

**M10E.5- REGISTERs (CONSUMED):** For information purposes only. Always %R3201 to %R3328: will contain the several words to be write to relay with data according the table ETHERNET IP SERVER ahead in this manual. (Note enabled in this version. Only page 0 will be effective - see table).

# PROGRAMING

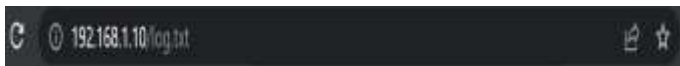
## 11- MENU



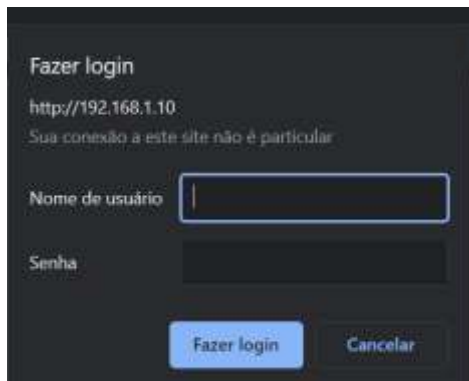
### M10F- ETHERNET - FTP PROTOCOL - FILE TRANSFER PROTOCOL

This screen refers to the protocol that enables reading and copying of files stored on the ZYGGOT relay memory card, allowing you to obtain historical data records of temperature readings, for example. To access any file on the card, you must know its name as recorded on the card. You must use the file name and its full path (with directories and subdirectories, if any), as in the examples below.

Assuming that the relay IP is **192.168.1.10** and you want to read the log.txt file, which is in the root directory of the card  
Then type in the search field:  
192.168.1.10/log.txt and press Enter.



A screen will appear asking for your login and password. Once you have entered the correct login and password details, the file will be read and can be saved on your computer.



- M10F.1- USER 1 - USER NAME:** Informational only. Always Z\_FTP\_USER.
- M10F.2- PASSWORD:** Informational only. Always 99468
- M10F.3- READ ONLY.** Informational only.
- M10F.4- USER 2 - USER NAME:** Informational only. Always Z\_FTP\_VRX
- M10F.5- PASSWORD:** Informational only. Always 8799.



### M10G- ETHERNET - HTTP PROTOCOL - WEB SERVER

This screen refers to the HTTP or HTTPS protocol that allows communication with Browsers using Hypertext Transfer Protocol.

- M10G.1- USER NAME:** For information only. Always ZYGGOT\_WS.
- M10G.2- PASSWORD:** For information only. Always 9387



### M10H- ETHERNET IP

This screen refers to the ASCII OVER TCP/IP protocol.

- M10H.1- BY NUMBER:** Enter the desired port.
  - M10H.2- Tx BYTES:** For informational purposes only. Always 500 (250 Words).
  - M10H.3- Tx TRIGGER (%M100):** When this flag is set to one, 500 Bytes will be transmitted in ASCII format, which must be combined (transformed into 200 16-bit Words that will contain the target and air temperatures of up to 100 sensors).
  - M10H.4- Rx BYTES:** For informational purposes only. Always 506 (253 Words).
  - M10H.5- COPY ENABLED:** Indicates whether copying of buffer records to real records is currently enabled. To indicate «enabled», the «Status Received» must be ok and there must be no «Rx Overflow» or «Socket» errors.
  - M10H.6- STATUS RECEIVED:** Indicates that a successful reception of 504 Bytes (252 Words) occurred.
- After writing the data to be programmed, as per the table at the end of this manual, when setting the Flag corresponding to «Copy Trigger» the data is copied to the corresponding parameters of the Zyggot V5F/x relay.

This data will be transferred to the parameters according to the table at the end of this manual.

**M10H.6- COPY TRIGGER:** In this field choose the method to execute the Copy of the data from the Buffer region to the real parameter records. You can choose two options, namely: «%M99» or «BYTET». If %M99 is selected, at the end of data transmission to the relay, the %M99 flag must be set to validate the data, when the relay will copy the data to the real parameter registers and reset the %M99 flag. To set the %M99 flag, the normal TCP/IP protocol must be used.

# PROGRAMING

## 11- MENU

If BYTE T (Byte Termination) is selected, the last bit of the second transmitted word (composed of Bytes 3 and 4) must be set. The first word (Bytes 1 and 2) must contain the number of bytes to be transmitted to the relay (always 506).

After writing the data to be programmed, starting from Byte 5 and 6, according to the table at the end of this manual, when setting the «Copy Trigger» Flag (%M99 or BYTE T) the data is copied from the internal buffer region to the real parameters of the Zyggot V5F relay.

**M10H.7- Rx OVERFLOW STATUS:** Indicates Overflow error in reception.

**M10H.8- Tx OVERFLOW STATUS:** Indicates Overflow error in transmission.

**M10H.9- SOCKET STATUS:** Indicates Socket error.

**IMPORTANT NOTE:** Always prefer to program the parameters directly on the relay or through the memory card, as described in this manual, for safety reasons. This protocol is accessible mainly because it allows you to read up to 250 target and air temperature readings. The part related to writing data is operational but should be avoided due to the possibility of programming errors and the possibility of even overwriting important data and rendering the relay inoperative, requiring factory maintenance. Therefore, either do not use the programming function using this method or use it with extreme caution.

It is more practical and simple to obtain temperature data, etc., using the TCP/IP Protocol, described above, where you can implement all Modbus over Ethernet communication and obtain all internal data from the Zyggot V5F/x Relay, in addition to writing all parameters. However, it is possible to use the ASCII Over TCP/IP protocol to obtain temperature data from the sensors, but the user will have to convert each 2 ASCII bytes into an Integer word, to obtain the numerical values for the temperatures according to the corresponding table at the end of this manual. In the same way, all alarm and trip levels for each sensor can be transferred at once up to 100 sensors and two more alarm and trip levels for air temperatures, but the user should also be responsible for transforming the data from Integer words into 2 bytes in ASCII. However, we do not recommend this method due to the risk of incorrect programming and obtaining erroneous data.

**Note that with a single programming of parameters in a relay, the identical programming can be replicated in other relays using the memory card.**



### M10I- ETHERNET NTP PROTOCOL

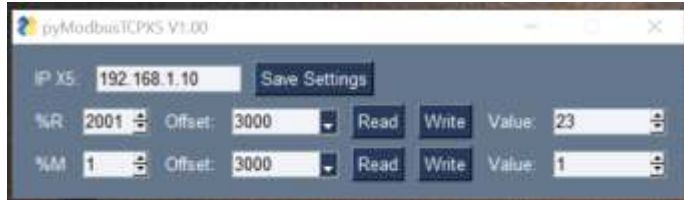
This screen refers to the Ethernet Network Time Protocol, through which devices can obtain exact time data from previously established servers.

**M16I.1 to M16I.7** - List of pre-established servers.

# 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 **ZYGOT Thermography Supervisory 2.00** software (see the end of this manual), also provided free of charge by Varixx, or any similar program found on the world wide web). We will consider here the explanation using the executable **pyModbusTCPV5**



1- Initially connect the appropriate **RJ45** cable between the computer and the LAN port of the **Zyggot V5F/x** relay and open 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 "Change adapter options" option. The following screen will open, in which an unidentified Ethernet connection should appear, in addition to the other existing connections.



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



4- De um duplo clique na opção Protocolo IP Versão 4 (TCP/IPv4). Abrirá a seguinte tela.



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 a different third digit. 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 end in **11** and the **Zyggot V5F/x** relay will end in **10**. At this point, the two devices should already be connected and exchanging data. On the Zyggot relay, on the Menu screen, choose option **16. REPORT** and then the **ETHERNET REPORT / STATUS** option. Then go to screen **ER3** 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 +++++.

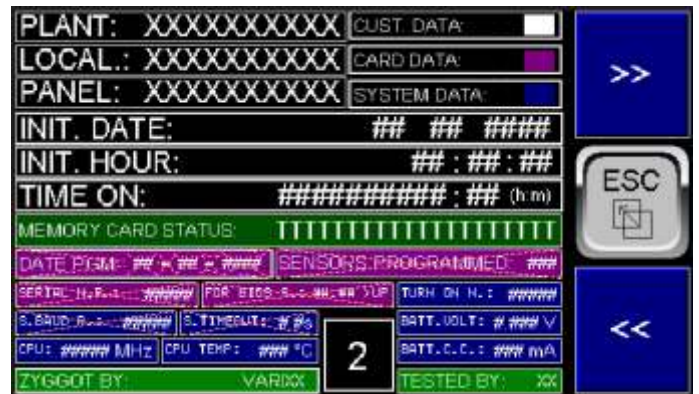
If the connection is OK, open the executable program **pyModbusTCPV5** and enter the chosen address, in this example **192.168.1.10**, and click Save Settings. Choose a register to be read, for example **%R2001**, which will contain the target temperature of Sensor 1, plus the necessary offset according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



**Attention:** You can also write to the registers, but avoid this if you do not know that a particular register can be overwritten, as it may change the configuration parameters of the Zyggot relay.

# OPERATION

## IDENTIFICATION SCREEN



When energized, the relay will display the identification screen above and then perform a self-test, the results of which can be seen in the reports under the item «System Data».

Next, if the Start of Operation has already been commanded (See next page), the relay will display the initial screen below, the first of 3 that can be paged through using the >> and << keys. These same screens can be accessed at any time from the Main Menu, using the «Esc» key.

## INFORMATION SCREENS



The first information screen, above, shows the system identification, embedded software version, date and time of the internal real-time clock, communication status with the S. Comm OK or S. Comm Error sensors and some indications at the bottom that are repeated on several screens to facilitate the overview of the Alarm and Trip system, namely: **FAIL**, which will be filled in red if there is an active fault, **ARC** if which will be filled in white if there is an Arc flash detection, **ANR** which will be filled in white if there is an arc sensor not responding and **ALRM** which will be filled in red if there is an active alarm output and **TRIP** which will be filled in red if there is an active Trip output.



INFO screens 1 to 5 show system data and commands for inserting and removing the memory card safely, as previously described in the **Main Screens** section.

# OPERATION

## Normal Operation:

The operation is completely intuitive and can be easily learned in a matter of minutes.

It is understood that the sensors are already fully addressed by the program on the PC and correctly networked as described elsewhere in this manual.

1- When the system is powered on, the start-up confirmation screen will appear only once, where the user confirms this by pressing the Proceed button, with the «Yes» option, and the Time ON counter will start.



2- After the procedure in item 1 or when the system is powered on, the main screen 1 (MS1) will appear a second time and the >> and << keys can be used to navigate through the 9 main screens (MS1 to Ms9), as already described. Pressing «ESC» takes you to the Main menu (below). Before operating or activating the system, have the parameter values and options you wish to enter in the Programming menu at hand and carry out all the programming, without permanently connecting the Alarm, Trip or Auxiliary outputs to avoid an inadvertent tripping of the system. The first thing to do in the first operation is to check whether all the sensors are flashing correctly and responding. You can also command the «Flash» of all of them at the same time or one at a time to check addresses and whether they are active on the network. This is done using the Flash key in the Main Menu below.



3- This menu allows you to access all the system screens, in addition to the Programming Menu. Pressing «ESC» on this screen will display the first System Information screen (below) and you can navigate through the 5 screens using the keys described above, such as >> and <<. The «ESC» key returns you to the Main Menu above.

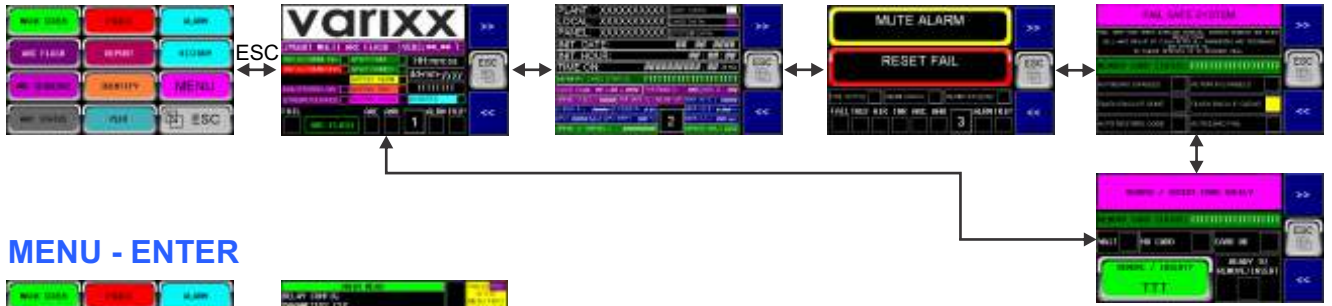
4- Using the corresponding keys, access all the Sub screens of each resource and interact or enter values on each screen, if necessary, as described in the Main Screens for Operation section, previously.

5- Note that the «Alarm» key may or may not have a flashing red outline. If it does, press it and enter the **ALARM** screen to acknowledge and eventually clear the fault indications.

6- Note that the relay can optionally be connected to the user's DCS system via a Modbus port as described. However, this connection is not necessary for the system to be fully protected.

# SCREEN FLOW

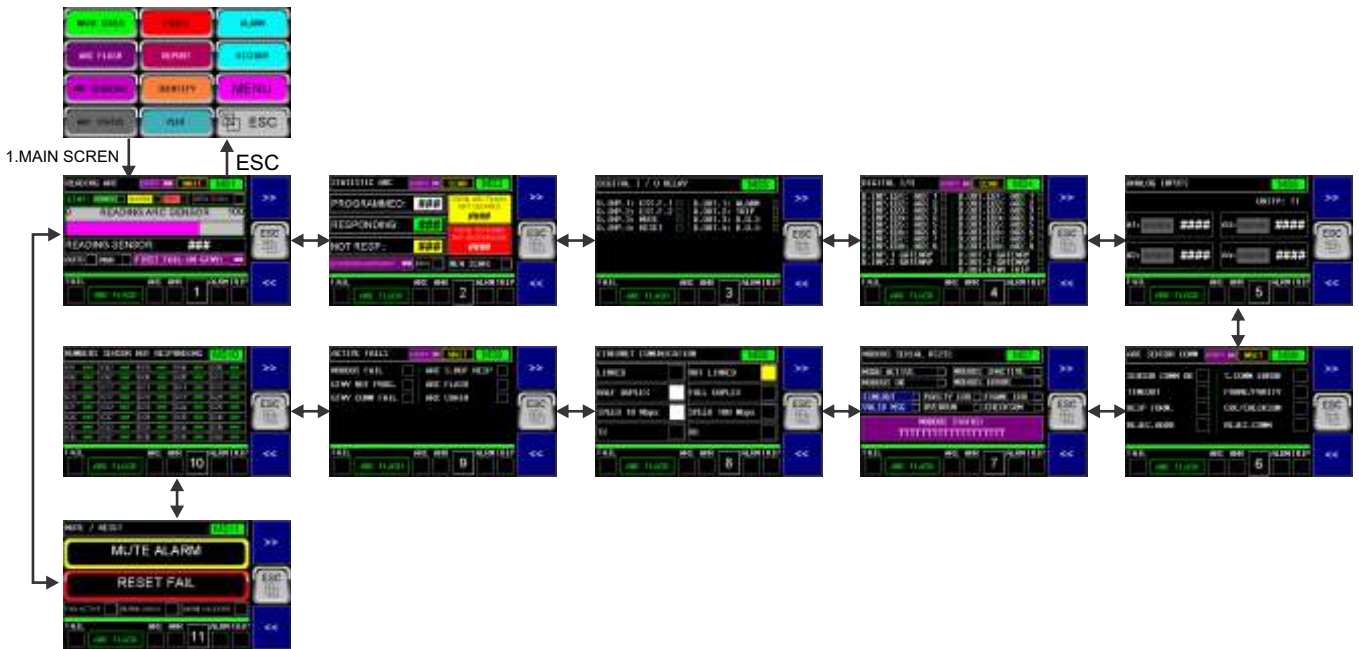
## INFO SCREENS



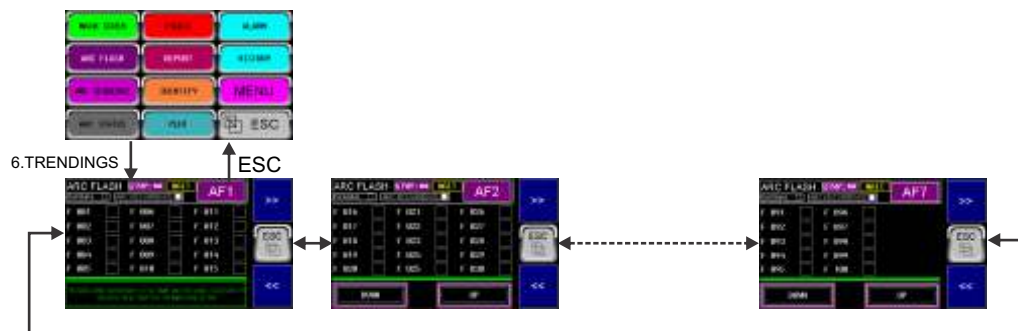
## MENU - ENTER



## 1. MAIN SCREEN



## 2. ARC FLASH

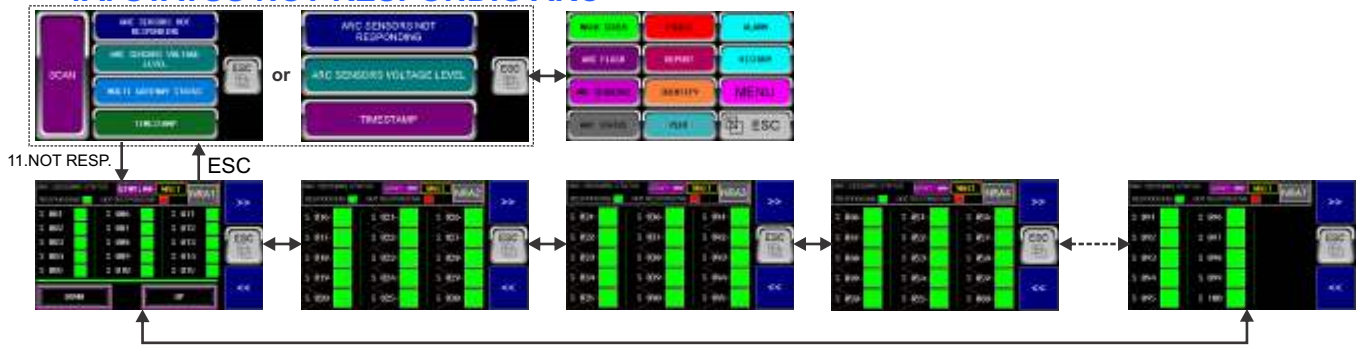


# SCREEN FLOW

## 3. ARC SEQUENCE



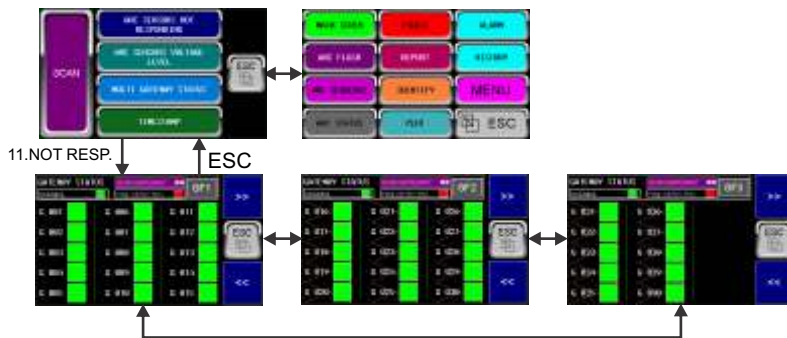
## 4A. STATUS NOT RESPONDING ARC



## 4B. STATUS VOLTAGE LEVEL ARC

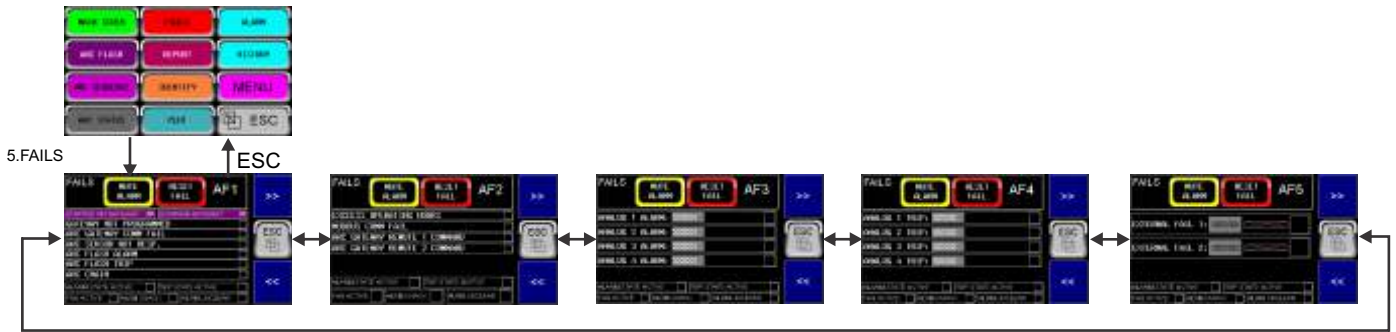


## 4C. MULTI GATEWAY STATUS

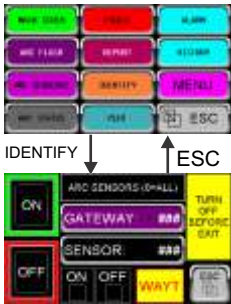


# SCREEN FLOW

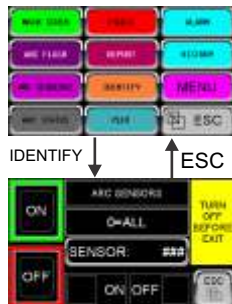
## 5. FAILS



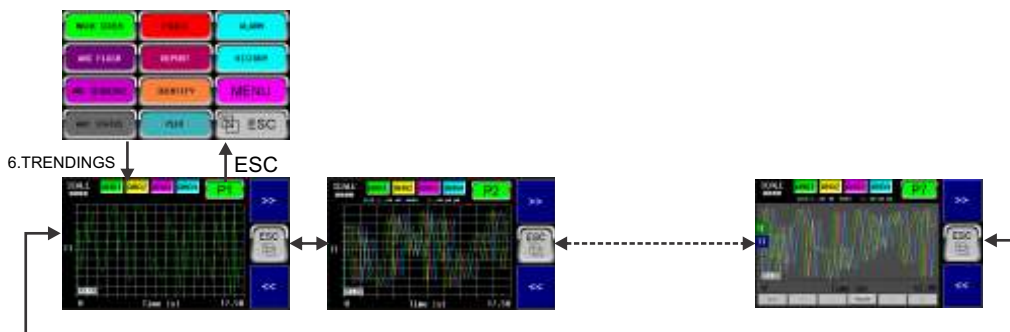
## 7. IDENTIFY



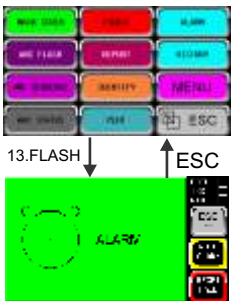
## 7. IDENTIFY



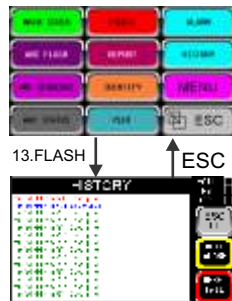
## 8. PLOT



## 9. ALARM



## 10. HISTORY



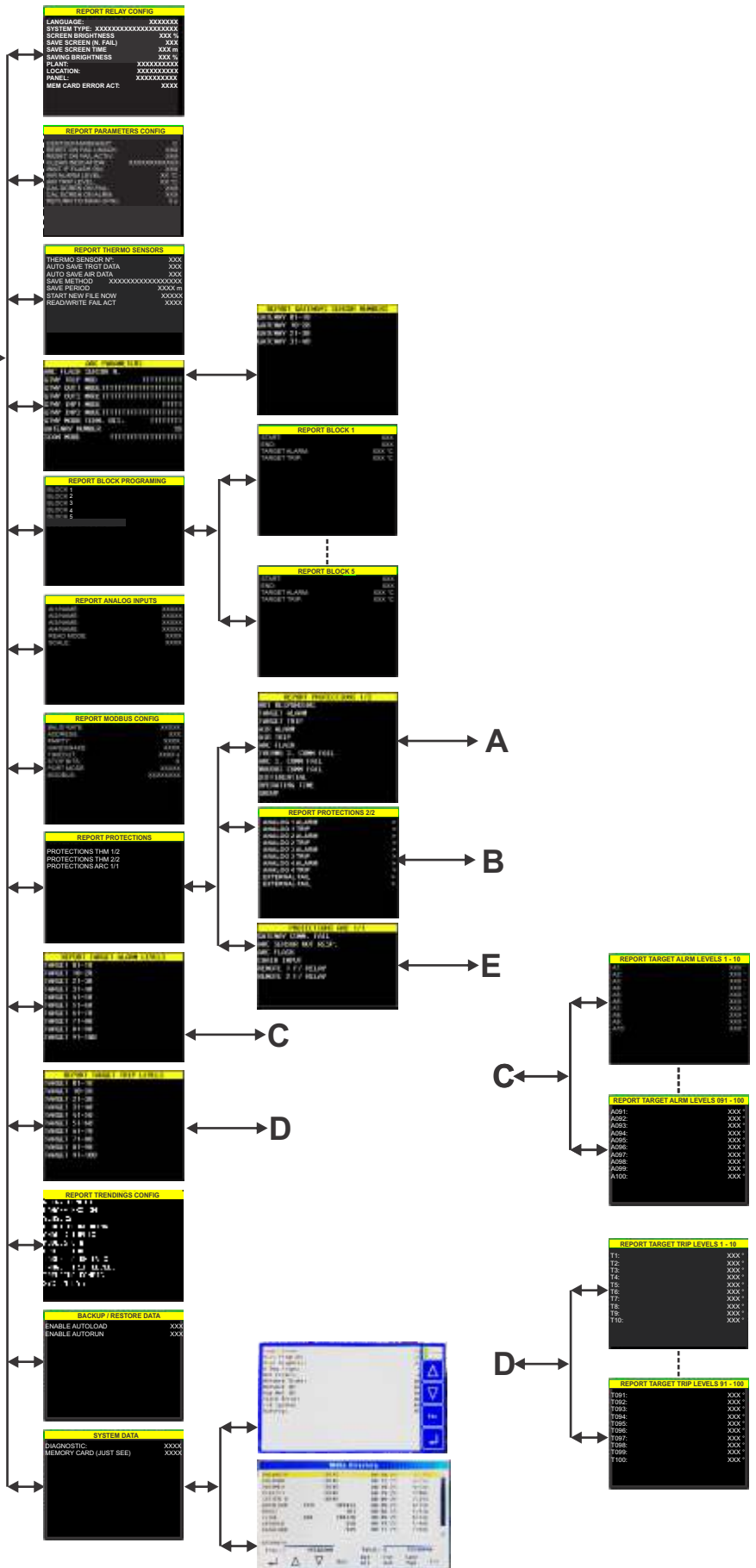
## 6A1. PROGRAM REPORT



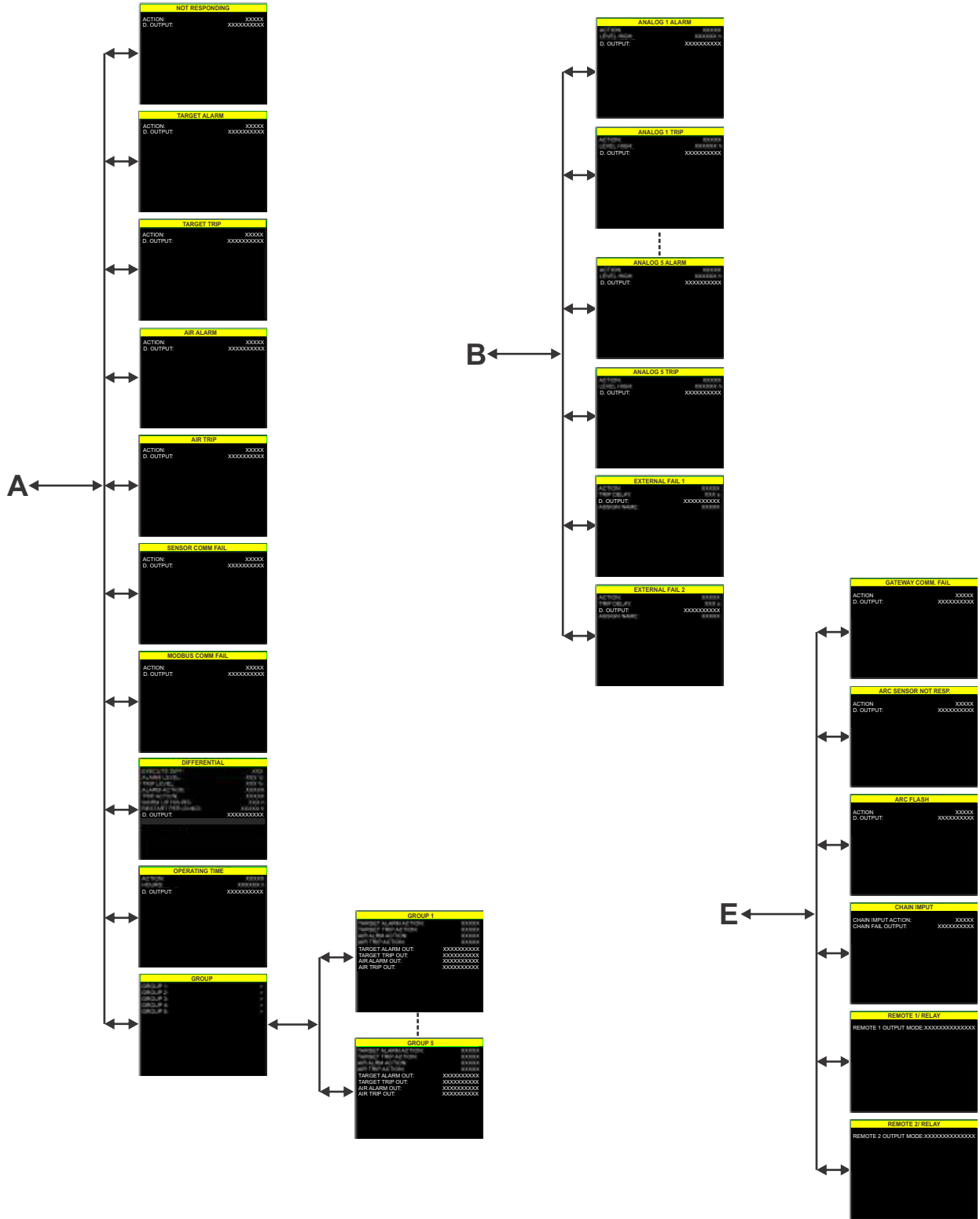
### PROGRAM REPORT



ETHERNET REPORT / STATUS  
(see other page)



## 6A2. PROGRAM REPORT

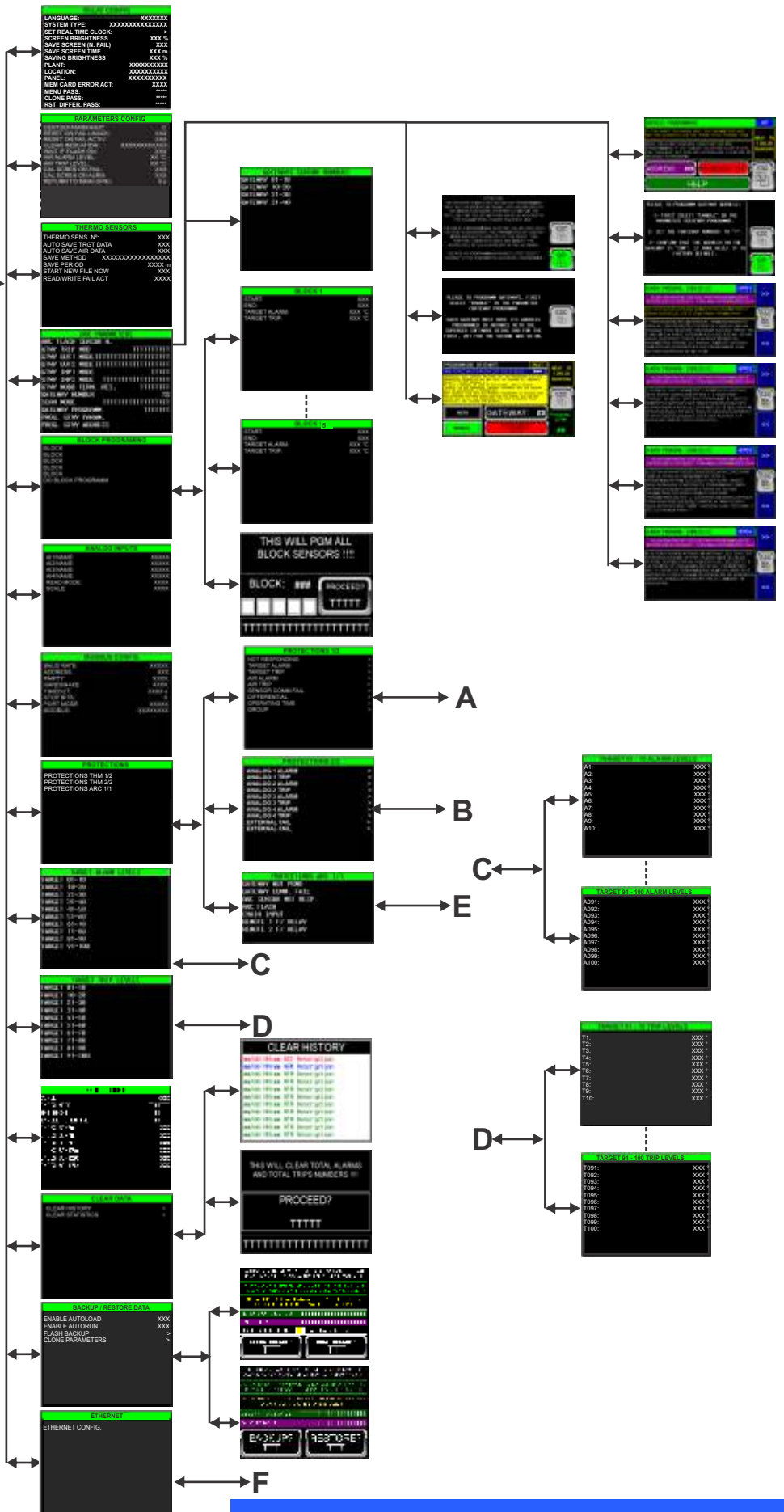


## 6B. ETHERNET REPORT



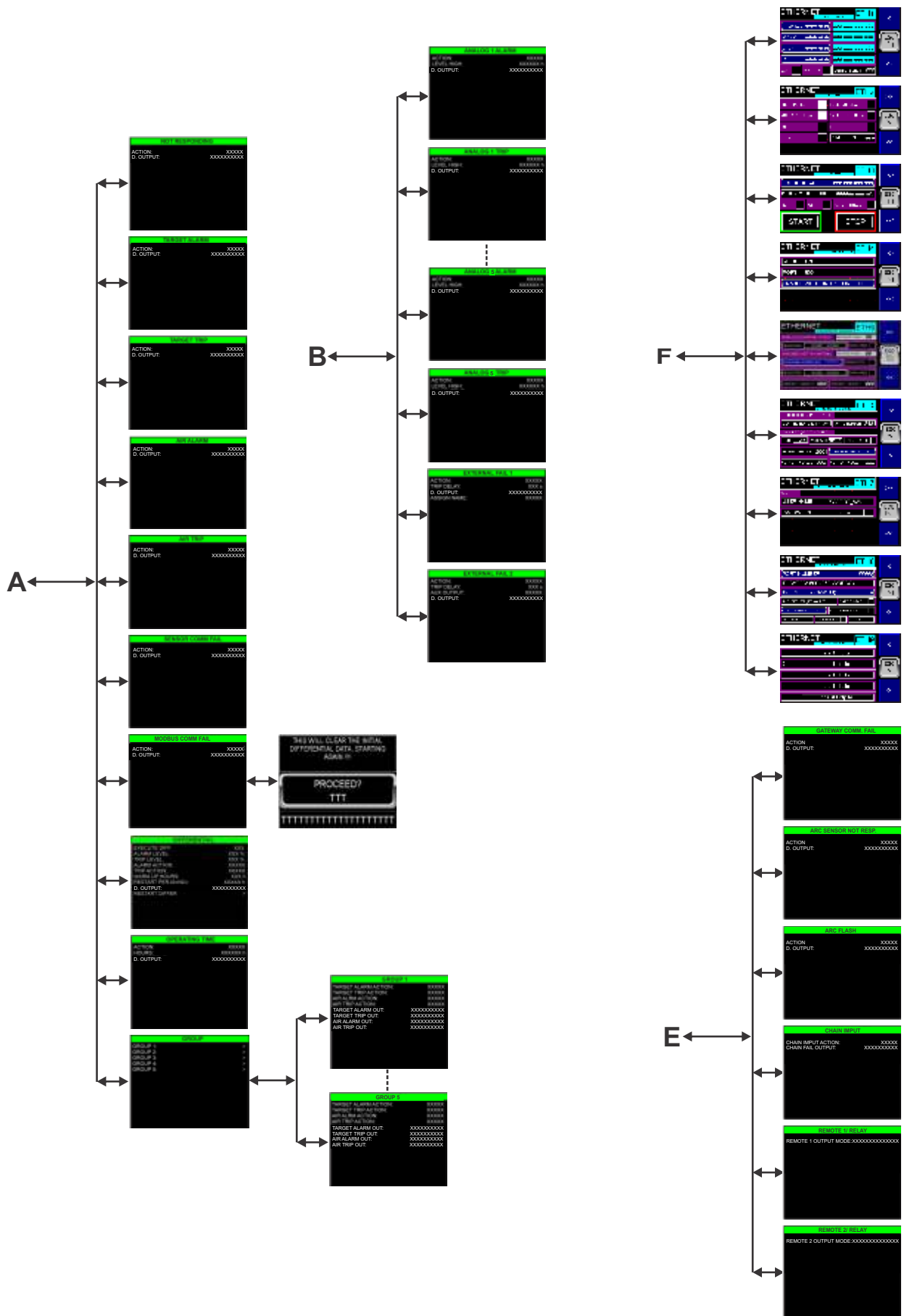
# PROGRAMMING

## 9. PROGRAMMING MENU 1/2



# PROGRAMMING

## 9. PROGRAMMING MENU 2/2



# COMPUTER PARAMETERIZATION

## ZYGOT SUPERGER

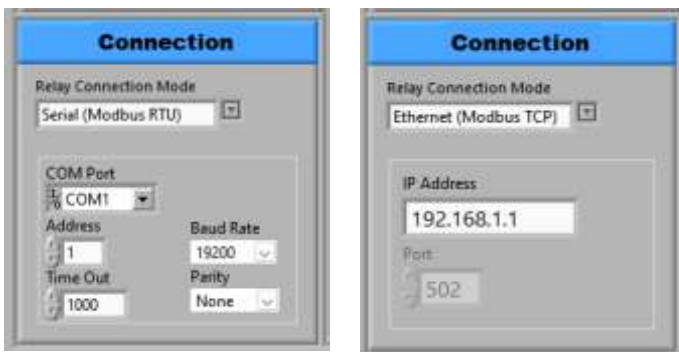
Zygot SuperGer is a configuration software for the Zygot family. The software is available free of charge on the Varixx website (<http://www.varixx.com.br>). The main screen of the program is shown on the side.

It is possible to configure the relay directly on the relay itself and also to perform the complete programming on a relay and to clone this relay to several others using a memory card or pen-drive, as explained previously. install the Superger Software on the Windows computer. All the files necessary to run it, including the «Runtime» files, are already included in the package, so no additional software is required. Once installed, it will be ready to run.



**Note:** With Zygot Superger you can easily clone the parameters of one relay to another (this can also be done via the uSD card in the case of the V5F/x model relay). 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 Zygot V5F/x 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 again for the changes to take effect, as these are parameters related to the relay BIOS.



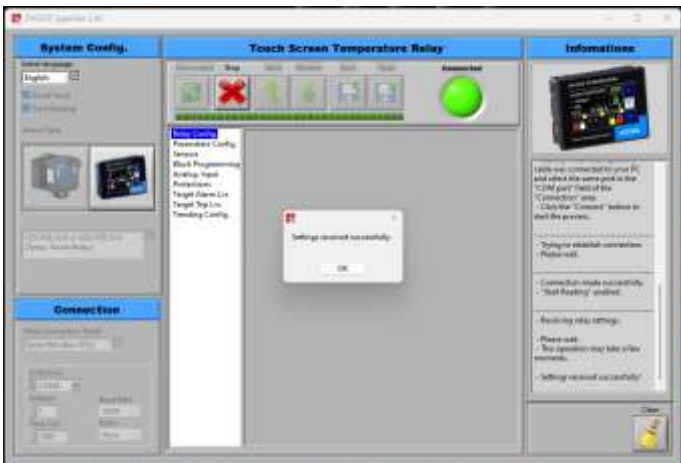
# COMPUTER PARAMETERIZATION

## ZYGGOT SUPERGER

3- Once the parameters are correct and the relay has Modbus enabled, click on «**Connect**». The «**Connected**» indicator should light up and the current parameter reading bar will indicate that the parameters are being read on the relay. This is because you can save them and also indicate in red in each parameter window that is changed that the respective parameter will be changed if you use the «**Save**» key. You can also use the «**Receive**» key at any time to read the current parameters again. The window on the right shows all the LOG messages to facilitate any communication corrections.



4- When the connection is made, the connected light will light up. If the initial reading box is checked, immediately after connecting to the relay, all the relay parameters will be transferred to the program. When finished, a success message will be displayed. Use the save and open buttons to save the information from a relay to a file on the computer and download the same information to other Zygot relays.



5- Você está pronto para programar todos os parâmetros nas telas subsequentes. Note que em cada janela disponível, ao ser alterado um parâmetro o mesmo fica em vermelho como alerta que ele será alterado ao enviar os dados para o relé.



# COMPUTER PARAMETERIZATION

## ZYGGOT SUPERGER



# COMPUTER PARAMETERIZATION

## ZYGGOT SUPERGER

6- Once the parameters are correctly programmed, they can be saved to a disk file for later use using the «**Save**» button. Previously saved files can also be loaded using the «**Receive**» button.

To send new data to the relay, use the «**Send**» button and at any time, the current relay parameters can be loaded using the «**Receive**» button.

When sending data to the relay, at the end of the transmission, a screen appears confirming that the data was transmitted successfully.



# SENSOR CONFIGURATION

## ZYGGOT MANAGEMENT SOFTWARE

Zyggot Manager is a configuration software that performs the addressing and testing of sensors. The software is available free of charge through the Varixx website (<http://www.varixx.com.br>).

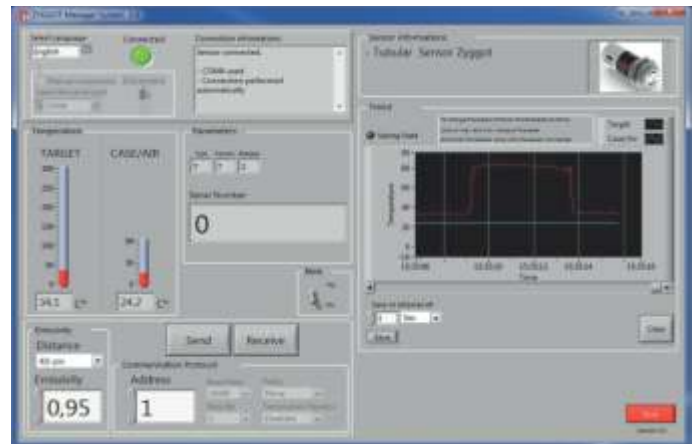
Install the software on your Windows computer. All the files needed to run it, including the "Runtime" files, are already included in the package, so no additional software is required. Once installed, it will be ready to run.

The program allows you to check and define important parameters before using the sensor on the network.

Using it, you can define the sensor address.

You can also send a command to make the sensor LED blink or remain on statically.

## Software Manager Main Window

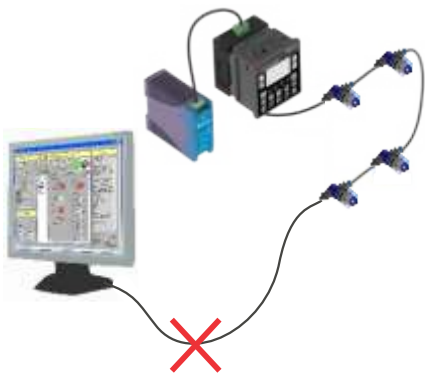


# ! CAUTION !

Do not connect the sensor to the PC while the other mini USB port is connected to the network.

NEVER connect two sensors to the PC simultaneously.

ALWAYS address one sensor at a time.



# SENSOR CONFIGURATION

## ADDRESSING SENSORS

To ensure that the system does not compromise its proper functioning, it is essential that all instructions for configuring the sensors, which will be explained below, are followed.

Each sensor must be configured before installing them mechanically.

- A) Install the software on the computer and run it in sequence;
- B) Connect the configuration cable (provided with the Installation and Maintenance Case) to a USB port on the PC and to one of the sensor's mini USB ports.
- C) The program automatically detects the port corresponding to the sensor. If desired, it is also possible to manually select the sensor port. To do so, check the Manual Connection box, select the COM port corresponding to the sensor and press Connect. If there is no sensor connected to the selected port, an error message will appear.



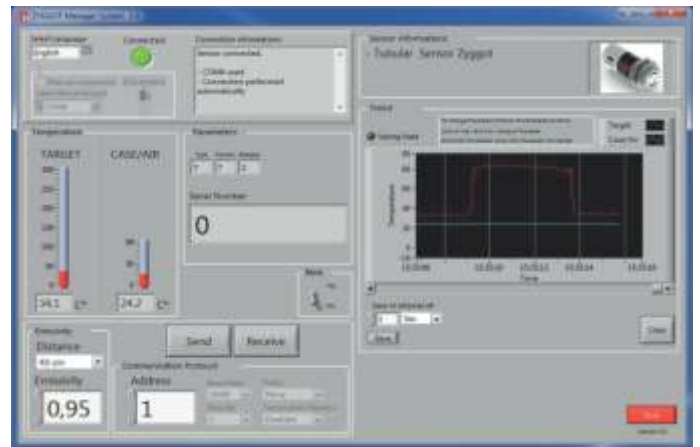
D) When connecting the sensor, the program will recognize it and indicate with a green button that it is connected.

E) Set the sensor address (1 to 100). By default, all sensors leave the factory with address 1 and correct network parameters for communication with the Zyggot relay. When finished, press the Send button.

**Note:** Each sensor must have a unique address on the network (from 1 to 100). When more than one sensor has the same address on the network, conflicts occur and the system will not operate.

**Note:** Wired sensor networks must have two termination resistors: one on the first sensor in the network and one on the last. If other resistors are added to the network, the network may become unstable and may not function. Varixx provides physical termination resistors, encapsulated in a mini USB connector, for use in its sensor networks; simply insert them into the last sensor in the network.

H) Note down the sensor address to have a map of its location on the panel or installation site. This is the address that will be shown on the relay screen for this sensor, for its correct identification.



## FAIL SAFE SYSTEM

The Fail Safe System is a feature that allows the Zyggot relay to continue operating in the event of certain types of "soft" failures. These "soft" failures include:

- Loss of backup battery power.
- Corruption of the register RAM, or corruption of the firmware Flash due to, for example, an excessive EMI event.

Nome	Data de modificação	Tipo	Tamanho
■ PLOTZ21	17/08/2021 09:09	Pasta de arquivos	
■ DATANEW	18/08/2021 16:53	Pasta de arquivos	
■ DATAMAN	12/08/2021 16:27	Pasta de arquivos	
■ DATAAUTO	12/08/2021 10:38	Pasta de arquivos	
■ DEFAULT.PGM	09/08/2021 18:32	Arquivo PGM	482 KB
■ AUTOLOAD.PGM	09/08/2021 18:33	Arquivo PGM	482 KB
■ CLONE.DAT	09/08/2021 18:33	Arquivo DAT	107 KB
■ DATACARD	17/08/2021 19:06	Arquivo	1 KB
■ DATABCK	18/08/2021 09:51	Arquivo	1 KB
■ BACKZ	06/08/2021 17:47	Arquivo	1 KB

The Fail Safe System must have a file structure on the Memory Card similar to the one shown in the screen above.

**Attention:** With the exception of files within directories, which can be freely changed or deleted, files in the root directories cannot be modified or deleted, as this will interrupt the relay's operation.

The failsafe system encompasses the following features:

- Manually back up current registry settings from battery-backed RAM to Flash memory.
- Manually restore registry settings from previously saved values in Flash to battery-backed RAM.
- Detect corrupted registry settings at boot and then automatically restore them from Flash memory.
- Detect corrupted or empty Firmware in Flash memory at boot and then automatically load the **AUTOLOAD.PGM** file from removable media (CompactFlash / microSD).
- If an automatic registry restore or application load occurs, Zyggot V5F/x will automatically be put into RUN mode.

## HOW TO PROGRAM THE RELAY.

There are three ways: Using the HMI itself, or using the free PC configuration program, or using the Backup/Clone function from a memory card. To use the PC program, see the specific manual. To program using the **HMI**:

! Press «Menu», enter the correct password and follow the user-friendly submenus.

! If the programming password is Zero, you will enter the menu directly; if it is different from zero, a screen will appear asking for the password. Enter it and press **ENTER**

! Within the **Param. Config.** menu, you can change this password. The factory password is 1.

! To program using the PC Software, see the specific manual for the software.

! To Clone the data using a memory card, use option 12. Backup/Clone from the Main menu.

! Backup the data of a previously programmed relay using the «Backup» function

! For a relay without programming, use the «Restore» function from this menu.

## HOW TO CHOOSE THE LANGUAGE.

For the screens and menus, the relay is available in 3 languages: English, Portuguese and Spanish. Any fourth language can be requested at the time of purchase (Custom) by prior agreement with the manufacturer.

To select the language:

Enter the Menu, Relay Configuration Submenu,

Select the Language item,

Press Enter,

Select the required language by pressing Enter again to confirm and ESC to exit the menu.

## HOW TO CONFIGURE SENSORS (“SENSOR” MENU)

! Enter the **Programming Menu** and then the **Sensors** submenu.

Choose the item to change and press **ENTER**,

Choose the option from the list of each parameter or enter the data if it is numeric,

Press **ENTER** to confirm,

Choose the next item and repeat the operation.

## HOW TO CHANGE THE PROGRAMMING PASSWORD (“RELAY CONFIG” MENU).

! Enter the **Main Menu** and then the **Relay Config** submenu.

! Choose the item to change and press **ENTER**.

! **Menu Pass:** Enter the new password if you wish to change it. The factory password is **827499**. If you enter “0” as the new password, you can enter the Menu without a password by simply pressing the Menu key.

! Press **ENTER** to confirm.

## HOW TO NAME THE PLANT, LOCATION AND PANEL AND ENTER THE START DATE OF OPERATION.

For information purposes, the above items can be named with up to 5 characters. Proceed as follows:

Enter Menu, **Relay Config Submenu**,

Select the desired item,

Press **Enter**, Enter the new data using the numeric keys, press **Enter** to confirm and **ESC** to exit the menu.

## HOW TO CHECK SENSORS NOT RESPONDING.

To view the map of non-responsive sensors, press 4.ARC STATUS, then press the «Arc Sensors Not Responding» button to call up the NRA1 screen and use the arrows to view all NR screens if necessary. Non-responsive sensors will be highlighted in red.

In the Multi Gateway version, use the «Up» and «Down» keys to page through the gateways after switching to manual scanning on the previous screen by pressing the «SCAN» key.

## HOW TO CHECK SENSORS SUPPLY VOLTAGES.

To view the map of unresponsive sensors, press **ARC STATUS** and then press the «**Arc Sensors Voltage Levels**» button to call up the AV01 screen and use the arrows to view all the AV screens if necessary. The sensors may be in 3 different colors depending on the voltage range or in purple if they are not responding.

In the Multi Gateway version, use the «**Up**» and «**Down**» keys to page through the gateways after going to manual scanning on the previous screen by pressing the «**SCAN**» key.

## HOW TO SET THE REAL TIME CLOCK.

If necessary, due to daylight saving time or other reason, proceed as follows:

Enter **Menu, Relay Config Submenu**,

Select the **Set Real Time Clock** item,

Press **Enter**, Enter the new data, using the small arrows below the display, press **Enter** to confirm and **ESC** to exit the menu.

## HOW TO SET PARAMETERS (“PARAMETERS” MENU).

! Enter the Main Menu and then the **Config Parameters** submenu.

! Choose the item to change and press **ENTER**,

! Choose the option in the list for each parameter or enter the data if it is numeric,

! Press **ENTER** to confirm,

! Choose the next item and repeat the operation.

## HOW TO CONFIGURE MODBUS COMMUNICATION. (“MODBUS” MENU).

The names for this menu are the classic ones and there is nothing to explain, since the user must know the protocol to use Modbus communication. The port for Modbus communication is Rj1.

Enter the **Programming Menu** and then the **Modbus CFG** submenu.

Choose the item to change and press **ENTER**

Choose the option from the list for each parameter or enter the data if it is numeric.

Press **ENTER** to confirm.

Choose the next item and repeat the operation.

**The parameters are as follows:**

Baud Rate, Address, Parity, Handshake, Timeout, Port Mode (RS232 or RS 245), Stop Bits and Modbus (Active, Inactive)

## HOW TO CHECK MULTI GATEWAY STATUS.

To view the map of gateways with fault detection, click **ARC STATUS** and then press the «Multi Gateway Status» button to call up the GF01 screen and use the arrows to scroll through all the screens if necessary. The indicators can be in 2 different colors: Green if OK or Red if a fault is detected.

## HOW TO DO...

### HOW TO CONFIGURE THE CURVES (PLOT). (MENU "TRENDING PLOT CONFIG").

The curves related to analog inputs must be configured in this menu.

! Enter the Main Menu and then the Config Trending submenu.

! Select the item to change and press ENTER.

! Select the option from the list for each parameter or enter the data if it is numeric or alphanumeric.

! Press ENTER to confirm.

! Select the next item and repeat the operation.

The parameters are as follows:

**Scale:** Enter the scale to be used for all curves.

**HMI Reset:** (No, Yes). Enables or disables the operator's ability to reset or restart each curve using the ESC command (to do this, hold down the ESC key for 3 seconds and the curve will restart).

**Enable Retentive:** For the T18 screen, which is retentive and can save the time and date curves in Excel format on the memory card, select the Enable Retentive item and choose «Yes».

See more details in the Programming chapter.

### HOW TO CONFIGURE ANALOG INPUTS. (MENU "ANALOG INPUT").

For the analog inputs, you can enter the name of each one (5 characters), facilitating the identification, choosing the reading mode and the scale.

Enter the **Main Menu** and then the Input submenu **Analog Inputs**.

Choose the item to change and press ENTER.

Choose the option from the list of each parameter or enter the data if it is numerical or alphanumeric. Press ENTER to confirm.

Choose the next item and repeat the operation.

### HOW TO DEFINE THE ACTIONS AND AUXILIARY RELAYS ACTIVATED FOR EACH PROTECTION. (MENU "PROTECTIONS").

The action to be taken, which can be: Nothing (disables the protection), Log (the event is entered in the history and alarms list but no output relay is activated (not even the Alarm relay or the Trip relay), Alarm (the Alarm output relay is activated) and Trip (the "Alarm" and "Trip" outputs are activated).

There are 2 protection submenus: Protections 1/2 and Protections 2/2.

The first contains the general protections, the second the protections referring to analog inputs and external faults.

Enter the **Main Menu** and then the Protections submenu.

A menu with 3 submenus is displayed.

Select one of them and press ENTER.

Select the protection sub-item to be programmed and press ENTER.

Select the action and auxiliary relay.

### HOW TO PROGRAM SEVERAL RELAYS WITH THE SAME PARAMETERS MORE EASILY.

! First, program and test a relay with the desired parameters.

! In the main menu, choose the «Backup/Restore Data» submenu.

! In the «Backup/Restore Data» submenu, choose the «Clone Parameters» option.

! On the following screen, press the «Backup?» button and select «Yes». In this action, the parameters are saved on the memory card inserted in the upper part of the relay.

! Exit the programming menu and in the main menu, choose the «ESC» option.

! On the information screens displayed, press the paging buttons until the «Remove/Insert Card Safely» screen is displayed.

! Press the «Remove/Insert» button and choose the «Yes» option. The «Ready to Remove/Insert» signal will be displayed.

! Remove the card from the relay.

! Insert this card into the new relay to be programmed, after repeating the above actions, from the «Remove / Insert Card Safely» screen.

! Return to the programming menu and repeat the above steps until you reach the «Backup/Restore Data» screen.

! Press the «Restore» button and select «Yes». At this point, the parameters recorded on the card will be copied to the new relay.

! Repeat the above recording operation for each new relay.

! Return the original card to the first relay used for initial programming.

**NOTE:** The relay only operates with its personalized card inserted, so for each relay to be programmed, initially turn it on, wait 30 seconds after the screens stabilize (with the proper reading of the relay's personalized card) before removing it after the «Remove / Insert» screen and inserting the card with the data to be copied into the new relay. After copying the parameters, return the original card to the new relay.

### HOW TO PROGRAM ARC FLASH PARAMETERS.

In the Main Menu, select the **ARC PARAMETER** option. A sub-menu with 11 items is displayed.

! Choose each item to be changed and enter the new values.

! To program the system gateways, select the «Gateway Programm» option and select «Enable».

! Then select the «Prog. GTWY Param.» option.

! Choose the «GO» option on the alert screen.

The «Programming Gateways» screen is displayed.

! Press the «Manual» key.

! Press the «GATEWAY» key and the numeric keypad will appear.

! Enter «0» to program all Gateways with the same parameters or enter the number of the gateway to be programmed (previously program the parameters in the items above the menu).

! Press the «Proceed» button and select the «YES» option.

The screen will show the programming progress and the Proceed key will return to «NO»

### HOW TO PROGRAM GATEWAY ADDRESSES (Multi versions only).

The gateways leave the factory with address 200, which is the address to be used in the first gateway of the system, with the next ones being 201, 202, etc. In the case of the Mono Gateway system, address 200 must be used.

You can use the Superger software or the relay itself to program the addresses. Make sure that only one gateway is connected to the network and that it has the address 200 (if you are not sure of the address set on it, simply reset it using a paper clip in the small hole on the front of the gateway).

If you are using relays, in the Main Menu, choose the **ARC PARAMETER** option. The sub-menu with 11 items is displayed.

! Choose the «Gateway Programm» option and select «Enable».

! Choose the «Gateway Number» option and enter «1».

! Then choose the «Prog. GTWY Address» option.

! Choose the «GO» option on the alert screen.

The «Address Programming» screen is displayed.

! Enter «201» to «239» as appropriate for the new address to be set on the gateway.

! Press the «Proceed» button and choose the «YES» option.

! When you return to «NO», remove the gateway from the network and repeat the procedure with others if necessary.

# ASCII OVER TCP/IP DATA TABLE

## ASCII OVER TCP/IP PROTOCOL



**DATA Received 500 bytes (8 Bits) (250 Words 16 bits)**  
**ASCII: 8Bits**

This data can be used to set the Alarm and Trip levels independently for each of the 100 sensors.

To copy the received data to the corresponding parameters after successful reception, the **%M99** Flag or the Byte T (Bytes 3 and 4) must be set, depending on what is selected in the «Copy Trigger» parameter on the **ETH8** screen (Byte T (Byte Termination) and Flag **%M99** options).

To start the transmission, the **%M100** flag must be set on the corresponding screen either through the normal TCP/IP protocol or through serial communication with Modbus.

After copying the Records, if Copy Enabled, these Bytes (Byte 3 and Byte 4) return to zero automatically (See details in the respective chapter in this manual).

Note that to set the **%M100** flag it will be necessary to do so through the TCP/IP (Modbus Over Ethernet) protocol. The only advantage of using the ASCII OVER TCP/IP protocol, as described here, is to transmit all the data at once, but for security reasons, it should be avoided. In addition, the user will have to convert two bytes into 1 word to obtain the values.

Note that to set the **%M99** Flag it will be necessary to do so via the TCP/IP protocol (Modbus Over Ethernet) or via serial communication with Modbus.

Note that through the TCP/IP (Modbus Over Ethernet) protocol the same data can be read normally.

In the **ASCII OVER TCP/IP** protocol, as described here, all data is transmitted at once. For safety reasons, this method should be avoided. Furthermore, the user will have to convert two Bytes into 1 Word to obtain the values.

**NOTE:** This protocol is described here because it can optionally be used but it is always preferable to use Modbus in a serial connection directly or Modbus Over Ethernet TCP IP discussed below and much more practical and direct.

Prefer to use Modbus Over Ethernet directly, according to the Modbus tables in this Manual or programming directly on the Zyggot Relay screen or programming by transferring data from the Memory Card when programming more than one relay with the same parameters.

**DATA TRANSMITTED 500 bytes (8 Bits) (250 Words 16 bits)**  
**ASCII: 8Bits**

**Note:** as 500 Bytes (8 Bits) are transmitted, which is equivalent to 250 Words (16 Bits), the user must convert 2 Bytes into a word to obtain the transmitted data. Byte 1 = Set to 500 (indicates the number of Bytes to be transmitted). Byte 2 = Byte T = 0 or 1 - Set to 1 if the Byte T (Byte Termination) option is selected in the «Copy Trigger» parameter and not Flag **%M99**.

Note that the same data can be written normally using the TCP/IP Protocol (Modbus Over Ethernet).

**Note:** since 506 Bytes (8 Bits) will be received, which is equivalent to 253 Words (16 Bits), the user must convert a word (16 Bits) into 2 Bytes (8 Bits) before transmitting the data.

After copying the Records, if it is allowed (Copy Enabled), this Byte returns to zero automatically (See details in the respective chapter in this manual).

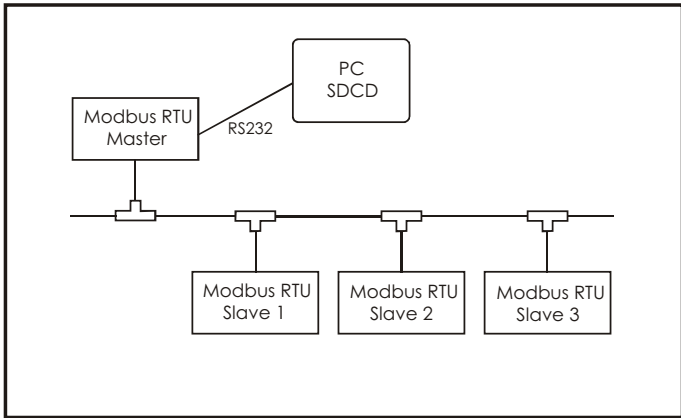
- Byte 3** = LSB Temp. Target of Sensor 1
- Byte 4** = MSB Temp. Target of Sensor 1
- Byte 5** = LSB Temp. Target of Sensor 2
- Byte 6** = MSB Temp. Target of Sensor 2
- ===
- Byte 202** = LSB Temp. Target of Sensor 100
- Byte 203** = MSB Temp. Target of Sensor 100
- Byte 204** = LSB Temp. Air Sensor 1
- Byte 205** = MSB Temp. Air Sensor 1
- ===
- Byte 402** = LSB Temp. Air Sensor 100
- Byte 403** = MSB Temp. Air Sensor 100
- Bytes 404 to 500** = N.U.

- Byte 1** = LSB Alarm Level Sensor 1,
- Byte 2** = MSB Alarm Level Sensor 1
- Byte 3** = LSB Alarm Level Sensor 2
- Byte 4** = MSB Alarm Level Sensor 2
- ===
- Byte 199** = LSB Trip Level Sensor 100
- Byte 200** = MSB Trip Level Sensor 100
- Byte 201** = LSB Air Alarm Level Sensor 1
- Byte 202** = MSB Air Alarm Level Sensor 1
- ===
- Byte 399** = LSB Air Trip Level Sensor 100
- Byte 400** = MSB Air Trip Level Sensor 100
- Bytes 401 to 506** = N.U.

A complete explanation of the Modbus RTU or ASCII protocol is not within the scope of this manual. It is assumed that the user who will apply the same using this protocol, must have sufficient knowledge for this.

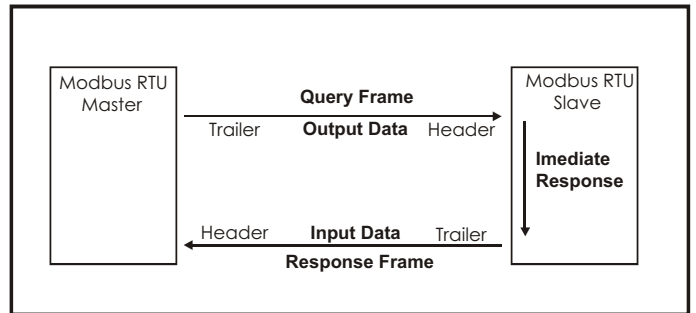
Also, in this manual we will only provide the basic addresses of the memory map to perform the usual operations of reading faults and others. Any parameter programming must be performed on the device itself, as it is normally done only once, during Startup.

Next, there will be a short introduction to the Modbus communication network before the memory map presentation.



Devices communicate using a master-slave technique, in which only one device (the master) can initiate transactions (called 'queries'). The other devices (the slaves) respond by supplying the requested data to the master, or by taking the action requested in the query. Typical master devices include host processors and programming panels. Typical slaves include programmable controllers, motor controllers, load monitors etc, see Fig

The master can address individual slaves. Slaves return a message (called a 'response') to queries that are addressed to them individually. The Modbus protocol establishes the format for the master's query by placing into it the device address, a function code defining the requested action, any data to be sent, and an error checking field. The slave's response message is also constructed using Modbus protocol. It contains fields confirming the action taken, any data to be returned and an error-checking field. If an error occurred in receiving the message, or if the slave is unable to perform the requested action, the slave will construct an error message and send this as its response, see Fig.



## Address field

The address field of a message frame contains eight bits. The individual slave devices are assigned addresses in the range of 1 - 247. A master addresses a slave by placing the slave address in the address field of the message.

When the slave sends its response, it places its own address in this address field of the response to let the master know which slave is responding.

## Function field

The function code field of a message frame contains eight bits. Valid codes are in the range of 1 - 6, 15, 16 and 23. When a message is sent from a master to a slave device, the function code field tells the slave what kind of action to perform.

Examples are:

- to read the ON/OFF states of a group of inputs;
- to read the data contents of a group of parameters;
- to read the diagnostic status of the slave;
- to write to designated coils or registers within the slave.

When the slave responds to the master, it uses the function code field to indicate either a normal (error-free) response or that some kind of error occurred (called an exception response). For a normal response, the slave simply echoes the original function code. For an exception response, the slave returns a code that is equivalent to the original function code with its most significant bit set to a logic 1.

In addition to its modification of the function code for an exception response, the slave places an unique code into the data field of the response message. This tells the master what kind of error occurred, or the reason for the exception.

The master device's application program has the responsibility of handling exception responses. Typical processes are to post subsequent retries of the message, to try diagnostic messages to the slave and to notify operators. Additional information about function codes and exceptions comes later.

## Data field

The data field is constructed using sets of two hexadecimal digits (8 bits), in the range of 00 to FF hexadecimal.

The data field of messages sent from a master to slave devices contains additional information which the slave must use to take the action defined by the function code. This can include items like discrete and register addresses, the quantity of items to be handled and the count of actual data bytes in the field.

For example, if the master requests a slave to read a group of holding registers (function code 03), the data field specifies the starting register and how many registers are to be read. If the master writes to a group of registers in the slave (function code 10 hexadecimal), the data field specifies the starting register, how many registers to write, the count of data bytes to follow in the data field, and the data to be written into the registers.

If no error occurs, the data field of a response from a slave to a master contains the data requested. If an error occurs, the field contains an exception code that the master application can use to determine the next action to be taken.

## CRC Error checking field

The error checking field contains a 16 bit value implemented as 2 bytes. The error check value is the result of a Cyclical Redundancy Check (CRC) calculation performed on the message contents.

The CRC field is appended to the message as the last field in the message. When this is done, the low-order byte of the field is appended first, followed by the high-order byte. The CRC high-order byte is the last byte to be sent in the message. Additional information about CRC calculation are found in this manual.

## Funções (Functions)

### Standard MODBUS function codes.

Function name	Function code
Read Coil (Bit) Status	1 (01h)
Read Input Status	2 (02h)
Read Holding Registers	3 (03h)
Read Input Registers	4 (04h)
Force Single Coil (Bit)	5 (05h)
Force Single Register	6 (06h)
Force Multiple Coils (Bits)	15 (0Fh)
Force Multiple Registers	16 (10h)
Force/Read Multiple Holding Registers	23 (17h)

## Lendo Status de Entrada (Read Input Status)

Lendo o status das informações digitais - somente leitura.

EXEMPLO: Solicitar a entrada digital 2. Supondo que não esteja ativa.

Status: Modbus no = 2.

### Request message.

Field name	Hex value
Slave address	01
Function	02
Start address HI	00
Start address LO	02
Number of Inputs HI	00
Number of Inputs LO	01
CRC LO	18
CRC HI	0A

### Response message.

Field name	Hex value
Slave address	01
Function	02
Byte count	01
Input no.2 (02h)status	00
CRC LO	A1
CRC HI	88

## Lendo registros de retenção (Read Holding Registers)

Leia o valor das informações variáveis analógicas.

### Exemplo,

Solicitando alguma Tensão, Frequência e Corrente. Seus valores são 400,0V, 60 Hz e 15,5A.

400,0V, unidade 0,1V - 4000 (0FA0h)

Unidade de 60Hz 1Hz - 60 (003Ch)

15,5A, unidade 0,1A - 155 (009Bh)

### Request message.

Field name	Hex value
Slave address	01
Function	0
Start address HI	00
Start address LO	00
Number of Registers HI	00
Number of Registers LO	03
CRC LO	05
CRC HI	CB

### Response message

Field name	Hex value
Slave address	01
Function	03
Byte count	06
Reg no. 0, (0h) data HI	0F
Reg no. 0, (0h) data LO	A0
Reg no. 1, (1h) data HI	00
Reg no. 1, (1h) data LO	3C
Reg no. 2, (2h) data HI	00
Reg no. 2, (2h) data LO	9B
CRC LO	20
CRC HI	34

## Lendo status da bobina (Read Coil Status)

Leia o status dos parâmetros digitais mutáveis.

### Exemplo

Solicitando o estado de entrada da bobina (Bit) 29. Suponha que esteja ligado

30 entrada: Modbus no = 29 (1Dh)

Ligado = Sim = 1      Bobina = 0001

1 byte de dados:      Contagem de bytes=01

### Request message.

Field name	Hex value
Slave address	01
Function	01
Start address HI	00
Start address LO	1D
Number of Coils HI	00
Number of Coils LO	01
CRC LO	6D
CRC HI	CC

### Response message.

Field name	Hex value
Slave address	01
Function	01
Byte count	01
Coil no.29 (1Dh) status	01
CRC LO	90
CRC HI	48

## Lendo registros de entrada (Read Input Registers)

Leia o conteúdo das informações analógicas somente leitura.

### Exemplo

Solicite o valor do Modbus 30011 - Nº 10. Suponha que seja 452,0. É representação longa. 2 registradores são usados (30011 palavra alta e 30012 palavra baixa)  
452.0, unidade 0.1 - 4520 (000011A8h).

#### Request message.

Field name	Hex value
Slave address	01
Function	04
Start address HI	00
Start address LO	0A
Number of Registers HI	00
Number of Registers LO	02
CRC LO	51
CRC HI	C9

#### Response message.

Field name	Hex value
Slave address	01
Function	04
Byte count	04
Reg no. 10 (0Ah) data HI	00
Reg no. 10 (0Ah) data LO	00
Reg no. 11 (0Bh) data HI	11
Reg no. 11 (0Bh) data LO	A8
CRC LO	F6
CRC HI	6A

## Forçando Bobina Única (Bit) (Force Single Coil (Bit))

Defina o status de um parâmetro digital alterável.

### Exemplo

Defina um comando para ON. Isso causará algum tipo de ação.  
Modbus no = 1 - endereço LO 1 (01h)  
Executar = 1 - 0 Dados HI = 255 (0FFh), Dados LO = 00 (00h)

#### Request message..

Field name	Hex value
Slave address	01
Function	05
Start address HI	00
Start address LO	01
Data HI	FF
Data LO	00
CRC LO	DD
CRC HI	FA

#### Response message.

Field name	Hex value
Slave address	01
Function	05
Start address HI	00
Start address LO	01
Data HI	FF
Data LO	00
CRC LO	DD
CRC HI	FA

## Forçando Múltiplas Bobinas (Force Multiple Coil)

Defina o status de vários parâmetros digitais mutáveis.

### Exemplo

Defina um sinalizador para ON e outro para ON. Isso causará algumas ações ou alterará os parâmetros. Bobina n. = 0-1 Reset -> 1 // Rodar (Run) = 1 -> 00000011 (03h)

#### Request message.

Field name	Hex value
Slave address	01
Function	0F
Start address HI	00
Start address LO	00
Number of Coils HI	00
Number of Coils LO	02
Byte count	01
Coil no. 0-1 status (0000 0011B)	03
CRC LO	9E
CRC HI	96

#### Response message.

Field name	Hex value
Slave address	01
Function	0F
Start address HI	00
Start address LO	00
Number of Coils HI	00
Number of Coils LO	02
CRC LO	D4
CRC HI	0A

## Forçando Múltiplos Registros (Force Multiple Register)

Defina o conteúdo de vários parâmetros analógicos alteráveis.

### Exemplo

Defina o registro 40018 (Modbus Nº 17) para 25.0 (250 / 10) e 40019 (Modbus Nº 18) para 55. 25,0, unidade 0,1 -> -250 (00FAh) // 55, unidade 1% -> 55 (0037h)

#### Request message.

Field name	Hex value
Slave address	01
Function	10
Start address HI	00
Start address LO	11
Number of Registers HI	00
Number of Registers LO	02
Byte count	04
Data HI reg 17 (11h)	00
Data LO reg 17 (11h)	FA
Data HI reg 18 (12h)	00
Data LO reg 18 (12h)	37
CRC LO	52
CRC HI	88

#### Response message.

Field name	Hex value
Slave address	01
Function	10
Start address HI	00
Start address LO	11
Number of Registers HI	00
Number of Registers LO	02
CRC LO	11
CRC HI	CD

## Forçando/lendo múltiplos Registros (Force/Read Multiple Register)

Definir e ler o conteúdo de vários analógicos alteráveis parâmetros na mesma mensagem.

### Exemplo

Defina um parâmetro para 2 (40022 = Modbus Nº 21) e outro para 1 (40023 = Modbus Nº 22) e leia os outros dois. Eles são 1450 e 17000.

1450, unidade 1 -> 1450 (05AAh)  
17000, unidade 1 -> 17000 (4268h)

#### Request message.

Field name	Hex value
Slave address	01
Function	17
Start read address HI	00
Start read address LO	03
Number of read Regs HI	00
Number of read Regs LO	02
Start write address HI	00
Start write address LO	15
Number of write Regs HI	00
Number of write Regs LO	02
Byte count	04
Data HI Reg 21 (15h)	00
Data LO Reg 21 (15h)	02
Data HI Reg 22 (16h)	00
Data LO Reg 22 (16h)	01
CRC LO	62
CRC HI	77

#### Response message.

Field name	Hex value
Slave address	01
Function	17
Byte count	04
Reg no. 3, (3h) data HI	05
Reg no. 3, (3h) data LO	AA
Reg no. 4, (4h) data HI	42
Reg no. 4, (4h) data LO	68
CRC LO	E8
CRC HI	85

## Mensagem de resposta de exceção. (Exception response message).

Field name	Hex value
Slave address	01
Function	84
Exception code	02
CRC LO	C2
CRC HI	C1

### Exception codes.

Exc. code	Name	Description
01	Illegal function	This unit doesn't support the function code.
02	Illegal data address	The data address is not within its boundaries.
03	Illegal data value	The data value is not within its boundaries.
06	Busy	The unit is unable to perform the request at this time. Retry later.

## No caso de usar um Conversor RS232 / RS485:

Um RS485 é adequado para uma rede multi-droop. Na rede Modbus multi-droop é necessária uma terminação com resistores na última unidade escrava do cabo de rede a dois ou 4 fios. Esses resistores aumentam a imunidade a ruídos e sua não colocação compromete a confiabilidade. Os cabos de conexão da rede devem ser de boa qualidade e blindados a blindagem (shield) deve ser ligada ao terra em apenas um ponto. Em redes que utilizam cabo de dois fios em curtas distâncias é aceitável o uso de par trançado. Existem no mercado duas versões de conversores: uma com «DIP switch» para fechar os resistores de terminação e outra sem «DIP switch» ou resistores. Na versão sem os resistores de terminação é de responsabilidade do usuário a colocação dos resistores diretamente no cabo conector do último dispositivo escravo da rede. O valor desses resistores deve ter um valor de ohm adequado e deve ser conectado entre as linhas A / Terra e B / Terra.

## Usando Comunicações Escravas Modbus (Using Modbus Slave Communications)

### Visão geral:

O ZYGGOT V5F/x permite que a porta serial atue como um escravo Modbus/RTU. A função Modbus suporta os modos ASCII e RTU (RTU configurado de fábrica, ASCII sob solicitação) de operação em uma variedade de taxas de transmissão e quadros de protocolo. Também é suportado o status de atividade da porta, um cronômetro de atividade e suporte para operação de chamada em exceção.

### Operação básica:

Antes que a função Modbus aceite mensagens, o Modbus deve ser ativado no menu correspondente.

#### Temporizador de inatividade (Time Out):

A função Modbus contém um temporizador que é zerado na recepção de uma mensagem válida endereçada a esta função. Se as comunicações cessarem entre o mestre e esta função, esse temporizador expira, o que define um bit de tempo limite de inatividade na palavra de status. Assim que as comunicações forem restabelecidas, tanto o timer quanto o bit de tempo limite de inatividade na palavra de status serão redefinidos.

### Relatório de exceção:

Relatório de exceção é um método de informar imediatamente ao mestre que o escravo tem informações importantes pendentes. Este método é normalmente usado em aplicações onde os «modems» são usados como canal de comunicação, e os escravos são pesquisados para dados entre longos intervalos. Uma vez que a conexão é estabelecida, o mestre e o escravo requerem alguma funcionalidade cooperativa para determinar o endereço do escravo que está chamando. Como esta funcionalidade não é padronizada ou faz parte do protocolo Modbus, a função Modbus contém dois métodos alternativos de forma que o mais adequado para o mestre seja selecionado.

O primeiro método envolve a resposta do escravo à solicitação Modbus não padrão «Get Slave Address», que é transmitida pelo mestre depois que a conexão é estabelecida. Uma vez que esta é apenas uma resposta a uma solicitação Modbus, este método não requer que o «Exception Messaging» esteja ativado. Este é o método usado pelo ZYGGOT. O uso desse método com um mestre de terceiros pode exigir que esse mestre seja modificado para suportar esse comando. Os quadros de solicitação e resposta do Modbus são apresentados a seguir:

### Request:

ADDR	FUNC
0	65 (41H)

### Response:

ADDR	FUNC	DATA
(SLAVE ADDR)	65(41H)	(SLAVE ADDR)

O segundo método envolve o envio pelo escravo de uma resposta não solicitada (mensagem de exceção) ao mestre assim que a conexão é estabelecida (disponível apenas por solicitação). O padrão de byte específico usado para a Mensagem de Exceção depende daquele suportado pelo mestre. Quando enviado, o cabeçalho apropriado e as somas de verificação são inseridos automaticamente pela função Modbus. A contagem de bytes atua como o gatilho que inicia a transmissão da resposta. Quando a contagem de bytes passa de zero para um número específico, esse número de bytes é enviado. Uma vez transmitida, a função Modbus responde às solicitações do mestre conforme o esperado.

### Mapeamento mestre:

Para acessar um ponto de memória ou flag de memória via Modbus, o mestre deve ser configurado quanto ao tipo e offset do ponto. Isso geralmente é feito com um dos dois métodos. O primeiro método usa o esquema de endereçamento tradicional onde o dígito mais alto representa o tipo do ponto e os dígitos mais baixos representam o deslocamento do ponto (começando com o ponto 1). Como apenas quatro tipos podem ser representados dessa maneira, a função Modbus agrupa várias tabelas de dados em uma única matriz de tipo de ponto.

A coluna tradicional «RTU Reference» abaixo especifica o endereço inicial de cada tabela. O segundo método requer que o mestre seja configurado com o comando Modbus específico e offset. Os comandos Modbus suportados e o deslocamento associado também são ilustrados abaixo.

Reference	Maximum Range	Modbus Reference	Modbus Command(s)	ModbusOffset
%I1	2048	10001	Read Input Status (2)	00000
%IG1	256	13001		03000
%S1	13	14001		04000
%K1	4	15001		05000
%Q1	2048	00001	Read Flag Status (1) Force Flag (5) Force Multiple Flags (15)	00000
%M1	2048	03001		03000
%T1	2048	06001		06000
%QG1	256	09001		09000
%AI1	512	30001	Read Input Register (4)	00000
%AIG1	32	33001		03000
%SR1	192	34001		04000
%Aq1	512	40001		04000
%R1	8192 (1024 Retentive)	43001	Read Holding Register (3) Load Register (6) Load Multiple Registers (16)	00000
%AQG1	32	46001		06000

### Como conectar um dispositivo escravo MODBUS.

As características físicas do dispositivo escravo em particular determinam os parâmetros de comunicação necessários para a conexão. MODBUS é um protocolo de comunicação multiponto (software), mas as conexões seriais RS-232 típicas não são. O RS-232 é basicamente um protocolo de hardware ponto a ponto com a linha de transmissão de um dispositivo conectada à linha de recebimento de outro dispositivo. Várias combinações de conversores de protocolo e/ou modems podem ser usadas para links de dados multidrop RS-232. Além disso, algumas placas seriais podem ser configuradas para suportar loop de corrente de 20 mA para operação multiponto.

Se um único dispositivo escravo for conectado, o hardware RS-232 padrão pode ser usado. Dependendo dos requisitos do dispositivo mestre, alguns sinais de controle podem ser necessários. Estes são tipicamente RTS/CTS, (pinos 4 e 5), ou DTR/DSR/DCD, (pinos 6, 8 e 20). O ZYGGOT suporta esses sinais de controle.

### Buffer da porta de comunicação

O firmware ZYGGOT mantém um buffer de transmissão e um buffer de recepção. Quando uma tarefa Send ou Receive é executada, os dados são transferidos entre o buffer apropriado e os registradores do programa. Para um elemento «Comm Port Transmit», a palavra «TX Count» contém o número de caracteres movidos dos registros do programa para o buffer de transmissão. Esse número pode ser menor que o número solicitado se o buffer da porta de comunicação estiver cheio.

Para um elemento «Comm Port Receive», a palavra «RX Count» contém o número de caracteres movidos do buffer de recebimento na área do programa. Esse número pode ser menor que o número solicitado se o buffer da porta de comunicação contiver menos caracteres do que o solicitado.

### Porta Serial (Serial Port)

A porta serial fisicamente presente na unidade ZYGGOT é referida como COMM1.

### Handshaking

Handshaking é um método pelo qual o destino final de uma transmissão pode controlar quanto e quando os dados são enviados a ele.

**NOTA:** Para os propósitos desta discussão, «source end» é definido como a unidade que está transmitindo dados. Fim de destino é definido como a unidade que realmente recebe os dados.

O «handshake» é configurado no menu ZYGGOT V5F/x. Existem cinco (5) tipos possíveis mas somente NONE, XON/XOFF e CLS/RTS são implementados neste dispositivo.

NONE -- Não há «handshake». A unidade de origem envia tantos bytes de dados quanto possível o mais rápido possível para uma determinada taxa de transmissão. Nenhuma consideração é dada às capacidades da extremidade de destino.

**XON/XOFF** -- (Também chamado de handshaking de software) A extremidade de destino controla quantos caracteres recebeu e o tamanho de seus buffers internos. Se o buffer ficar cheio ou a unidade for incapaz de receber mais caracteres, ela deve transmitir o caractere XOFF (transmit off). A extremidade de origem deve então parar de transmitir dados até que um caractere XON subsequente seja enviado pela extremidade de destino.

Como há alguma sobrecarga pesada de software envolvida, o tempo das transmissões é variável. O destino deve primeiro determinar que está cheio e então transmitir o sinal XOFF. A extremidade da fonte deve ler o sinal XOFF e reagir a ele. Nesse meio tempo, vários bytes de dados adicionais podem ser enviados. Cabe ao destino final garantir que ele envie o sinal XOFF logo o suficiente para que o buffer não seja saturado.

Os caracteres XON e XOFF são predefinidos pelo conjunto de caracteres ASCII. XON é 11 hexadecimais ou 17 decimais. XOFF é 13 hexadecimais ou 19 decimais. O handshaking XON/XOFF é usado com mais frequência onde apenas valores ASCII estão sendo enviados. XON/XOFF não pode ser facilmente usado onde dados binários estão envolvidos, porque os códigos XON/XOFF também são códigos binários válidos.

Observe que o handshaking XON/XOFF geralmente implica um canal de comunicação full duplex (ambas as extremidades podem transmitir simultaneamente), pois a extremidade de destino precisa transmitir os caracteres XOFF a qualquer momento (inclusive no meio de uma transmissão da extremidade de origem).

A vantagem do handshaking XON/XOFF é que ele pode ser implementado usando um cabo de três fios (TX/RX/Comum) fácil e barato.

**HARDWARE** -- Also called **RTS/CTS handshaking**. Hardware handshaking requires extra signals to be sent between the two units, so it is more expensive to implement due to the increased number of wires in the interconnect cables.

In operation, the destination end determines that it is idle and asserts its **CTS (Clear To Send)** signal. In response, the source end sends data as long as the CTS signal remains active.

Many devices have the RTS/CTS signals hardwired directly into the hardware. Thus, an inactive CTS signal from the destination end can instantly shut down the source end. These hardware operations can be very fast because no software control is required in this case. Furthermore, this form of handshaking can be used regardless of the nature of the data being transmitted, ASCII or binary encoded.

**Full Duplex Multi-Drop** -- In a full-duplex multi-drop situation, all available units are connected in parallel. For the receiver circuitry, this is not a problem as long as the load on the network is not excessive. All units have their receivers enabled at all times.

Every message sent by the system is somehow identified by a receiving address. All units will receive all messages. All units check the delivery address against their own address and only the unit with the matching address responds.

When a unit determines that it has something to transmit, it turns on its transmitter, sends the necessary data packet, and then turns off its transmitter.

Full Duplex Multi-drop is typically found in multi-master or peer-to-peer systems where all units have a roughly equal chance of needing to transmit a message. Often, units need to verify that the message sent was sent correctly so that the receiver is on at all times.

The advantage of this system is that many units can be connected to a simple three-wire cable (RX/RX/Common). The disadvantage of this system is the increased complexity of the firmware and software.

**Half Duplex Multi-Drop** -- Half-Duplex Multi-Drop operation is identical to Full-Duplex, except that the transmitting unit's receiver is disabled when the unit is transmitting.

All units keep their transmitters disabled and receivers enabled at all times, except when they need to transmit. Typically, protocols dictate that only the unit corresponding to the drop address can transmit. This unit turns on its transmitter, turns off its receiver, sends the required data packet, then disables its transmitter and enables its receiver.

Half Duplex Multi-Drop is typically found in Master/Slave systems where one unit is designated the Master and all other units are Slaves. The Master transmits a message to a Slave, then disables its transmitter. All slaves hear the message, but only the slave with the matching "drop address" will turn on its transmitter and respond.

### Using RS-485 with ZYGGOT

ZYGGOT does not provide RS-485-compatible signals. You must purchase and install a third-party RS-232 to RS-485 converter or a Varixx converter.

In this mode, the transmitter is controlled by the ZYGGOT CTS signal, available on the DB-9 connector, Pin 8. When the ZYGGOT activates this signal, the converter enables its transmit section.

## DATA TYPES

In ZYGGOT V5F/x, data can be stored or used in several different formats. The format used depends on how the information is to be interpreted. Typical interpretations are binary bit patterns, unsigned numbers, signed numbers, floating point values, and strings.

Tipo	Nome	Descrição
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**BOOL: Boolean** - A single BIT. Can contain only the values '0' or '1'.

**BYTE: Byte** - A string of 8 consecutive bits. Byte values are used where the data value is not as important as the bit patterns (shifts and rotations).

**WORD: Word** - A string of 16 consecutive bits. Word values are used where the data value is not as important as the bit patterns (shifts and rotations).

**DWORD: Double Word** - A string of 32 consecutive bits. DWORD values are used where the data value is not as important as the bit patterns (shifts and rotations).

**INT: Integer** - A 16-bit signed value. Integers are used where the data value is expected to be in the range -32,768 to +32,767

**SINT: Short Integer** - An 8-bit signed value. Short integers are used where the data value is expected to be in the range -128 to +127. **DINT: Double Integer** A 32-bit signed value. Double integers are used where the data value is expected to be in the range -2,147,483,648 to +2,147,483,647.

**UINT: Unsigned Integer** - A 16-bit unsigned value. Unsigned integers are used where the data value is expected to be in the range 0 (zero) to 65,535.

**USINT: Unsigned Short Integer** - An 8-bit unsigned value. Unsigned short integers are used where the data value is expected to be in the range 0 (zero) to 255.

**UDINT: Unsigned Double Integer** - A 32-bit unsigned value. Unsigned double integers are used where the data value is expected to be in the range 0 (zero) to 4,294,967,296.

**REAL Floating Point:** A 32-bit value. Values are stored and operated on in IEEE single-precision (six-digit) format. Values range from -3.40282E+38 to +3.40282E+38.

**STRING:** A variable-length sequence of characters. Each character is represented by one byte.

Bits in word registers can be used as boolean values. In this case, Bit Offset Addressing is used to specify the Register Type, Offset, and Bit Offset for the required bit.

Using boolean registers to represent real numbers is generally inefficient.

## STORAGE ORDER

32-bit values (DWORD, DINT, UDINT) occupy 32 consecutive bits of data or two (2) consecutive 16-bit registers. For example, if a DINT is defined in Register %R43, the 32-bit value is contained in both %R43 and %R44.

For 32-bit values, the data is stored low-order first. For example, if a DINT is defined in Register %R43 and contains the value "65540", (000000000000000001 0000000000000100) then Register %R43 will contain "4" and %R44 will contain "1".

Byte values (such as STRINGS) are stored high-order first. For example, to store the string "31" in Register %R43, store the HEX value 3133 (decimal 12595).

## Real Numbers

A number which contains an explicit decimal point is known as a REAL or Floating Point number. The numbers are termed "real" because they reflect the real value of a measurement (to the accuracy of the system) in whole units and fractional parts of units without artificial truncation to some less-precise format such as integers.

The location of the decimal point (thus determining the number of whole units and fractional parts) is contained with the number itself. Since for any given real number the decimal point can be in a different position, real number are often called floating point. In ZYGGOT, the terms real and floating point are used interchangeably.

## FORMAT

Real numbers are usually input and displayed as a six digit field:

3.12159                      654321

If the number is too large or too small to be represented using only six digits, the number is displayed as a six-digit field plus an exponent:  
1.03647e+12                      9.73157e-22

For display purposes, the format consists of a six-digit value with floating decimal point, and an optional exponent. If the number to be displayed can be displayed in six digits or less, there is no exponent:

+3.14159      -654321      12                      .001357                      -.000032

The sign, '+' or '-', is optional. If the sign is not included, then '+' is assumed.

Numbers with more decimal places are displayed using Scientific Notation. This displays a six-digit number with decimal point and an exponent. The exponent part is indicated by the letter 'E' or 'e', the sign of the exponent ('+' or '-') and a two-digit number that is the exponent. For example:

.000000004567 = 4.567e-10                      3143286945 = 3.14329e+09

Note that in the second example some precision is lost, because there are only six significant digits possible.

Internally, floating point numbers are stored in single-precision 32-bit IEEE format. This format uses a 23-bit mantissa (the value portion), an 8-bit exponent, and a single sign bit.

It is important to note that 32 bits are required for storage. In the ZYGGOT V5F this requires two (2) consecutive 16-bit word registers, presumably %R.

## RANGE

Given the single precision 32-bit IEEE format, acceptable values range from +/-3.40282E+38 (a very small fractional number) to +/-3.40282E+38 (a very large integer number).

## SIGNIFICANT DIGITS

The real number format supports six (6) significant digits. When more than six (6) significant digits are displayed, only the first six can be counted on for accuracy.

3.14159265 = 3.14159                      2535.00000045 = 2535

## ENTERING FLOATING POINT VALUES

All floating numbers must adhere to the above format.

If an exponent is included, the mantissa (value) portion must also contain a decimal point. Note that if the entered format is other than x.yyy, the decimal point is moved and the exponent adjusted accordingly:

123.456e+3 = 123456                      [The actual value can be displayed with six digits and no exponent]

143.643E-12 = 1.43643E-10                      [Decimal point is moved and exponent adjusted]

A decimal point must be included to reduce any ambiguities. For example, 123e10 should be entered as 123.0e10, or better still 1.23e12.

Neither the mantissa nor the exponent may contain spaces.

"123 45e-12" and "4.3256e -23" will not be interpreted correctly because of the embedded spaces.

Both the mantissa and the exponent may contain a sign, + or -; i.e.:

"-1.3245e+12" or "4.243e-8". If the sign is missing then the associated part is assumed to be positive, "1.2345e10".

## ERRORS

**OVERFLOW** is the most common error. This occurs when the result of a real number operation is greater than +3.40282E+38 or less than -3.40282E-38. For example, the equation

1.2345E-20 \* 2.3456E-20  
certainly causes this problem.

## INFINITY

In case of an overflow result, power flow through the offending element is OFF, and the resulting value is set to Positive Infinity (if the value is greater than +3.40282E+38) or Negative Infinity (if the value is less than -3.40282E+38).

## NOT A NUMBER (NAN)

If an infinity result is passed through to other calculations, the result can be undefined. This is known as Not a Number (NAN).

In the case of a NAN result, power flow through the offending element is OFF.

If a NAN result is passed through to another element, it feeds through to successive elements.

## Register Types

Controllers offer a wide variety of Register Types. In most cases, the controller treats register types as if they were memory locations. The following is a list of register types implemented normally available but not all are available for the user.

### **%AI Analog Input**

16-bit input registers used to gather analog input data such as voltages, temperatures, and speed settings coming from an attached device.

### **%AQ Analog Output**

16-bit output registers used to send analog information such as voltages, levels or speed settings to an attached device.

### **%I Digital Input**

Single-bit input registers. Typically, an external switch is connected to the registers.

### **%K Key Bit**

Single-bit flags used to give the programmer direct access to any front panel keys appearing on a unit. Only the OCS series has keypads.

### **%Q Digital Output**

Single-bit output registers. Typically, these bits are connected to an actuator, indicator light or alarm annunciator.

### **%R General Purpose Register**

Retentive 16-bit registers.

### **%S System Bit**

Single-bit bit coils predefined for system use.

### **%SR System Register**

16-bit registers predefined for system use.

### **%T Temporary Bit**

Non-retentive single-bit registers.

## Bit-Mapped Addressing of 32-bit Registers

Bit-mapped addressing of 32-bit registers is not allowed. Bit offset values range from 1 to 16.

In order to access all 32 bits in a double register it is necessary to address the upper word of the register separately. Storage is such that the lower word is stored in the first (base) register, and the upper word is stored in the next consecutive register.

For example, if the 32-bit binary 0000000000000001 000000000000100 value (65540 decimal) is loaded into register %R43, %R43 contains 0000000000000100 and %R44 contains 0000000000000001. Therefore, to check Bit 17 of the DWORD stored at %R43, one must check Bit 1 of %R44, addressed as %R44.1.

### Numbering Base

In ZYGGOT all offsets begin with 1 (one). 0 (zero) is not valid for register offset nor bit offset addressing.

Register offsets are thus in the range of 1 to X, where X is the maximum number of register in this model. For example, if the selected type has 2048 %R registers, they are addressed as %R01 through %R2048.

### Bit Offsets are in the range of 1 to 16.

Groups of Boolean registers can be accessed as a 16-bit register. In this case, though, the Bit offset must lie on a 16-bit boundary, 1, 17, 33, etc.

# RELAY ZYGGOT V5F/x MODBUS MAP

## MEMORY MAP FOR SERIAL AND ETHERNET COMMUNICATION TCP/IP AND HTTP

### READING STATE FLAGS (Coil M) -

1 Bit (ativo = 1)

Ofsett Padrão = 3000

Reference - 3001

(Read Only)

(ACTIVE STATE)

%M1 THM Sensor Net Comm. OK  
 %M2 THM SenS. Net Comm. Error  
 %M3 Clear Data  
 %M4 Restart Differential Data  
 %M5 On Flash (Liga Flash)  
 %M6 Reading Sensors  
 %M7 Off Flash (Desliga Flash)  
 %M21 Net Mute Command  
 %M22 Net Reset Command  
 %M23 Diff. Read. Temp.  
 %M24 Reserved  
 %M30 Modbus Error  
 %M32 Modbus OK  
 %M42 State Alarm Active  
 %M43 State Trip Active  
 %M47 State Fail Active  
 %M81 DI1 Input On  
 %M82 DI2 Input On  
 %M83 DI3 Input On  
 %M84 DI4 Input On  
 %M91 Mute Input On  
 %M92 Reset Input On  
 %M189 Gateway Inhibited  
 %M190 Gateway Output Trip ON  
 %M191 Gateway Nor Programmed  
 %M192 Gateway Armed  
 %M193 Gateway Alarm Active  
 %M194 Gateway Trip Active  
 %M195 Gateway Chain Input Active  
 %M196 Gateway Output 1 Active  
 %M197 Gateway Output 2 Active  
 %M198 Gateway Input 1 Active  
 %M199 Gateway Input 2 Active  
 %M200 Gateway Comm. Error  
 %M201 Gateway Comm. OK  
 %M230 Arc Sensor Not Resp. Active  
 %M232 Gateway Not prog. Active  
 %M233 Arc Flash Active  
 %M236 Chaim Command Active  
 %M251 to %M254 Reserved  
 %M252 Reserved  
 %M253 Reserved  
 %M254 Reserved  
 %M255 State Ext Fail 1 Alarm  
 %M256 State Ext Fail 2 Alarm  
 %M257 State Sensor Not Resp Alarm  
 %M278 State Analog 1 Alarm  
 %M279 State Analog 1 Trip  
 %M280 State Analog 2 Alarm  
 %M281 State Analog 2 Trip  
 %M282 State Analog 3 Alarm  
 %M283 State Analog 3 Trip  
 %M284 State Analog 4 Alarm  
 %M285 State Analog 4 Trip  
 %M286 to %M293 Reserved  
 %M294 State System Operat. Hour  
 %M295 Modbus Error Alarm  
 %M296 Sensor Communication Fail  
 %M299 Memory Card Error  
 %M669 Identify Arc S. ON  
 %M670 Identify Arc S. Off

### READING/WRITING STATE FLAGS

(Coil M) - 1 Bit (ativo = 1)

Ofsett Padrão = 3000

Reference - 3001

(Read / Write)

%M101 Plot 1 Restart  
 %M102 Reserved  
 %M103 Reserved  
 %M104 Reserved  
 %M105 Reserved  
 %M106 Reserved  
 %M107 Reserved  
 %M108 Reserved  
 %M109 Reserved  
 %M110 Reserved  
 %M111 Reserved  
 %M112 Reserved  
 %M113 Plot 13 Restart  
 %M114 Plot 14 Restart  
 %M115 Plot 15 Restart  
 %M116 Plot 16 Restart  
 %M117 Plot 17 Restart

Tipo de dado MODBUS	Tamanho
Coil	1 bit
Holding Register	16 bits

Tipos de dados MODBUS	Função	Código
Coil	Leitura	0x01
	Escrita	0x05
Holding Register	Leitura	0x03
	Escrita	0x06

# RELAY ZYGGOT V5F/x MODBUS MAP

## MEMORY MAP FOR SERIAL AND ETHERNET COMMUNICATION TCP/IP AND HTTP

### READING STATE FLAGS (Coil M) - 1

Bit (ativo = 1)  
Ofseto Padrão = 3000  
Reference - 3001  
(Read Only)  
(PROGRAMMED FAILS)

%M237 Chaim Fail  
%M238 Remote 1 Command Fail  
%M239 Remote 2 Command Fai  
%M287 Arc Sensor N. Resp Fail  
%M289 Arc Flash Alarm Fail  
%M290 Arc Flash Trip Fail  
%M300 Gateway Not Prog Fail  
%M301 Fail Operating Hour  
%M302 Fail Sensor Comm.  
%M303 Fail Not Responding  
%M304 Reserved  
%M305 Reserved  
%M306 Reserved  
%M307 Reserved  
%M308 Reserved  
%M309 Reserved  
%M310 Reserved  
%M311 Fail Analog 1 Alarm  
%M312 Fail Analog 2 Alarm  
%M313 Fail Analog 3 Alarm  
%M314 Fail Analog 4 Alarm  
%M315 Fail Analog 1 Trip  
%M316 Fail Analog 2 Trip  
%M317 Fail Analog 3 Trip  
%M318 Fail Analog 4 Trip  
%M319 Fail Ext Fail 1  
%M320 Fail Ext Fail 2  
%M321 Reserved  
%M322 Gateway Comm. Fail

### READING STATE FLAGS (Coil M) - 1

Bit (ativo = 1)  
Ofseto Padrão = 3000  
Reference - 3001  
(Read Only)

%M401 Sensor Comm. OK  
%M402 Sensor Comm. Error  
%M403 Sensor Net Timeout  
%M404 Sensor Net Frame Parity  
%M405 Sensor Net CRC Check  
%M406 Sensor Net Unespect. Resp.  
%M407 Sensor Net Reject Comm.  
%M408 Sensor Net Reject Data  
%M409 Alarm Not Acknowledged  
%M410 Alarm Not Cleared  
%M411 Reserved  
%M412 Reserved  
%M413 Reserved  
%M414 Reserved  
%M415 Reserved  
%M416 Reserved  
%M417 Reserved  
%M418 Reserved  
%M419 Reserved  
%M420 Reserved  
%M421 Digital Input 1 On  
%M422 Digital Input 2 On  
%M423 Digital Input 3 On  
%M424 Digital Input 4 On  
%M425 EB1: Digital Input 1  
%M426 EB2: Digital Input 2  
%M427 EB3: Digital Input 3  
%M428 EB4: Digital Input 4  
%M429 EB5: Digital Input 5  
%M431 EB6: Digital Input 6  
%M431 EB7: Digital Input 7  
%M432 EB8: Digital Input 8  
%M433 to %M440 Reserved  
%M441 Digital Output 1 MUTE  
%M442 Digital Output 2 RESET  
%M443 Digital Output 3 D.O.3  
%M444 Digital Output 4 D.O.4  
%M445 EB1: AUX 1  
%M446 EB2: AUX 2  
%M447 EB3: AUX 3  
%M448 EB4: AUX 4  
%M449 EB5: AUX 5  
%M450 EB6: AUX 6  
%M451 EB7: AUX 7  
%M452 EB8: AUX 8  
%M453 to %M 460 Reserved  
%M1101 to %M1140 Gateways Status

### READING STATE FLAGS(Coil M) - 1

Bit (ativo = 1)  
Ofseto Padrão = 3000  
Reference - 3001  
(Read Only)

%M701 to %M800 ARC S. Status (0=OK,1=NR)  
%M801 to %M900 (S.Arc Flash(0=OK,1=Flash)

### DATA READINGS (Register R)

Ofseto Padrão = 3000  
Reference = 43001  
(Read Only)

%R981 Reserved (32 Bit)  
%R987 Reserved (16 Bit)  
%R985 Reserved (32 Bit)  
%R988 Reserved (16 Bit)  
%R1915 Reserved (16 Bit)  
%R1007 Reserved (16 Bit)  
%R1003 Reserved (16 Bit)  
%R1081 Reserved(16 Bit)  
%R1082 Reserved (16 Bit)  
%R1330 Reserved (16 Bit)  
%R1333 Reserved (16 Bit)  
%R1707 Total Sensores Not Resp. all GTWY  
%R1079 Reserved (16 Bits)  
%R1083 Reserved (16 Bits)  
%R1411 Total Sensores Responding p/GTWY  
%R1412 Total Sensores Not Resp. p/ GTWY  
%R1429 Total Arc Flash Not Cleared All GTWY  
%R3051 Analog 1 Value (16 Bit)  
%R3053 Analog 2 Value (16 Bit)  
%R3053 Analog 3 Value (16 Bit)  
%R3054 Analog 4 Value (16 Bit)  
%R1192 =1 // Unity = % (16 Bit)  
%R1192 =2 // Unity = °C (16 Bit)  
%R1192 =4 // Unity =°F (16 Bit)  
%R4401 to %R4500 Arc Sensor Voltage (xx.xx)  
%R6401 to %R6400 Arc Flash Sequence Index

# RELAY ZYGOT V5F/x MODBUS MAP

## MEMORY MAP FOR SERIAL AND ETHERNET COMMUNICATION TCP/IP AND HTTP

### PARAMETERS (Register R)

Menu: RELAY CONFIG  
Ofset Padrão = 3000  
Reference = 43001  
(Read / Write)

%R801 Language  
(0=English/1=Português/2=Espanhol)  
%R879 Screen Brightness (50-100%)  
%R790.2 Save Screen (0=No/1=Yes)  
%R860 Save Screen Time (5-200 min)  
%R881 Saving Brightness (5-50%)  
%R760 - %R764 Plant (10 Bytes ASCII)  
%R770 - %R774 Location (10 Bytes ASCII)  
%R780 - %R784 Panel (10 Bytes ASCII)  
%R809 Memory Card Error Action  
(0=None/1=Log)

### PARAMETERS (Register R)

Menu: PARAMETERS CONFIG  
Ofset Padrão = 3000  
Reference = 43001  
(Read / Write)

%R790.1 Reserved  
%R802 Reset On Fail Unacknowledged  
(0=No/1=Yes)  
%R840 Reset On Fail Active (0=No/1=Yes)  
%R803 Wait If Flash = On (0=No/1=Yes)  
%R804 Reserved  
%R805 Reserved  
%R806 Call Screen On Fail (0=No/1=Yes)  
%R807 Call Screen On Alarm (0=No/1=Yes)  
%R1010.1 Reserved  
%R1010.2 Reserved  
%R808 Return to Main Time (0=no/0-3600 s)

### PARAMETERS (Register R)

Menu: MODBUS CONFIG  
Ofset Padrão = 3000  
Reference = 43001  
(Read / Write)

%R841 Baud Rate (1=9600/2=19200/4=38400)  
%R842 Address (1-247)  
%R843 Parity (1=None/2=Odd/4=Even)  
%R844 Handshake  
(1=None/2=XON/XOF/4=CTS/RTS/8=MD/Half)  
%R845 Timeout (0-1023 s)  
%R846 Stop Bits (1=1/2=2)  
%R847 Port Mode (1=RS232)  
%R848 Modbus (0=Inactive/1=Active)

### PARAMETERS (Register R)

Menu: TRENDING PLOT CONFIG  
Ofset Padrão = 3000  
Reference = 43001  
(Read / Write)

%R835 Scale (0-9999)  
%R836 Reserved  
%R837 HMI Reset (0=Disable/1=Enable)  
%R838.1 Enable Retentive (0=No/1=Yes)  
%R851 Reserved  
%R852 Reserved  
%R853 Reserved  
%R854 Reserved  
%R855 Reserved  
%R856 Reserved

### PARAMETERS (Register R)

Menu: ANALOG INPUTS  
Ofset Padrão = 3000  
Reference = 43001  
(Read / Write)

%R751 - %R753 Ai1 Name (6 Bytes ASCII)  
%R754 - %R756 Ai2 Name (6 Bytes ASCII)  
%R757 - %R759 Ai3 Name (6 Bytes ASCII)  
%R787 - %R790 Ai4 Name (6 Bytes ASCII)  
%R831 Read Mode (0=%/1=Temp)  
%R832 Scale (10 - 99999)

### PARAMETERS ARC (Register R)

Menu: PARAMETERS CONFIG  
Ofset Padrão = 3000  
Reference = 43001  
(Read / Write)

**Options to Digital Output** (0 = None, 1 = D.O.3, 2 = D.O.4, 2 = EB1:AUX 1, 4 = EB2:AUX2, 8 = EB3:AUX 3, 16 = EB1:AUX, 32 = EB4:AUX 4, 64 = EB5:AUX 5, 128 = EB6:AUX 6, 256 = EB7:AUX 7, 512 = EB8:AUX8)

%R200 Gateway Number (1 - 49)  
%R206 Remote 1 Out Mode (0 = None, 1 = Alarm From Relay, 2 = Trip From Relay)  
%R207 Remote 2 Out Mode (0 = None, 1 = Alarm From Relay, 2 = Trip From Relay)  
%R208 Chain Input Action (None, 1 = Arc Flash, 2 = Alarm Relay, 4 = Trip Relay)  
%R209 Chain Fail D. Out (0 = none, 1 = Log, 2 = Alarm)  
%R214 Reserved  
%R789 Gateway Modbus Term Res. (0 = Disable, 1 = Enable)  
%R941 Reserved  
%R942 ARC Sensor Number (1 to 100)  
%R943 Gateway Comm Action (0 = None, 1 = Log, 2 = Alarm)  
%R944 Gateway Comm. D. Out (see above)  
R957 Gateway Not Prog Action (0 = None, 1 = Log, 2 = Alarm)  
%R945 Arc Flash Action (0 = None, 1 = Log, 2 = Alarm, 4 = Trip)  
%R946 Arc Flash D. Out (see above)  
%R957 Gateway Not Prog Action.  
%R958 Gateway Not Prog D. Out (see above)  
%R989 Gateway Trip Mode (0 = Retentive, 1 = Pulse 3s)  
%R990 Gateway Out 1 Mode (1 = Trip, 2 = Armed, 4 = Alarm, 8 = Remote 1)  
%R995 Gateway S. N.R. Action (0 = none, 1 = Log, 2 = Alarm)  
%R996 Gateway S. N.R. D. Out (see above)  
%R997 Gateway Programm (0 = Disabel, 1 = Enable)  
%R1000 Gateway Out 2 Mode (1 = trip, 2 = Armed, 4 = Alarm, 8 = Remote 2)  
%R1001 Gateway Imp 1 Mode (0 = None, 1 = Reset)  
%R1002 Gateway Imp 2 Mode (0 = None, 2 = Reset, 4 = Inhibit, 8 = Chain)  
%R1411 Arc S. Responding Number  
%R1412 Arc S. Not Resp. Number  
%R1465 Total Arc Flash Not Cleared  
%R3201 to %R3240 Sensor Number each Gateway

# RELAY ZYGGOT V5F/x MODBUS MAP

## MAPA DE MEMÓRIA PARA COMUNICAÇÃO SERIAL E ETHERNET TCP/IP E HTTP

### PARAMETERS (Register R)

Menu: PROTECTIONS

Ofset padrão = 3000

Reference = 43001

(Read / Write)

**Opções p/ Alarm Action:** (0=None / 1=Log / 2=Alarm)

**Opções para Trip Action:** (0=None / 1=Log / 4=Trip)

**Opções p/ D. Output:** (0=None / 1=D.O.3 / 2=D.O.4 / 4=Aux1 / 8=Aux2 / 16=Aux3 / 32=Aux4 / 64=Aux5 / 128=Aux6 / 256=Aux7 / 512=Aux8)

%R877 Sensor Comm. Fail Action

%R878 Sensor Comm Fail D. Output

%R857 Modbus Comm. Fail Action

%R858 Modbus Comm. Fail Aux Output

%R880 Operating Time Action

%R893 Operating Time Level (0- 250000 h)

### PARAMETERS (Register R)

Menu: PROTECTIONS ANALOG

Ofset padrão = 3000

Reference = 43001

(Read / Write)

**Opções p/ Alarm Action:** (0=None / 1=Log / 2=Alarm)

**Opções para Trip Action:** (0=None / 1=Log / 4=Trip)

**Opções p/ Aux Output:** (0=None / 1=D.O.3 / 2=D.O.4 / 4=Aux1 / 8=Aux2 / 16=Aux3 / 32=Aux4 / 64=Aux5 / 128=Aux6 / 256=Aux7 / 512=Aux8)

%R961 Analog 1 Alarm Action

%R883 Analog 1 Alarm Level High (0-100 %)

%R969 Analog 1 Alarm D. Output

%R965 Analog 1 Trip Action

%R887 Analog 1 Trip Level High (0-100 %)

%R973 Analog 1 Trip D. Output

%R962 Analog 2 Alarm Action

%R884 Analog 2 Alarm Level High (0-100 %)

%R970 Analog 2 Alarm D. Output

%R966 Analog 2 Trip Action

%R888 Analog 2 Trip Level High (0-100 %)

%R974 Analog 2 Trip D. Output

%R963 Analog 3 Alarm Action

%R854 Analog 3 Alarm Level High (0-100 %)

%R971 Analog 3 Alarm D. Output

%R967 Analog 3 Trip Action

%R889 Analog 3 Trip Level High (0-100 %)

%R975 Analog 3 Trip D. Output

%R964 Analog 4 Alarm Action

%R855 Analog 4 Alarm Level High (0-100 %)

%R972 Analog 4 Alarm D. Output

%R968 Analog 4 Trip Action

%R890 Analog 4 Trip Level High (0-100 %)

%R976 Analog 4 Trip D. Output

### PARAMETERS (Register R)

Menu: PROTECTIONS EXTERNAL FAIL

Ofset padrão = 3000

Reference = 43001

(Read / Write)

**Opções para Alarm Action** (0=None/1=Log/2=Alarm)

**Opções para Trip Action** (0=None/1=Log/4=Trip)

**Opções p/ D. Output** (0=None / 1=D.O.3 /

2=D.O.4 / 4=Aux1 / 8=Aux2 / 16=Aux3 /

32=Aux4 / 64=Aux5 / 128=Aux6 / 256=Aux7 /

512=Aux8)

%R977 External Fail 1 Action

%R983 External Fail 1 Trip Delay (0-999 x 0,1 s)

%R979 External Fail D. Output

%R767 - %R769 External Fail Assign Name (6 Bytes ASCII)

%R978 External Fail 1 Action

%R984 External Fail 1 Trip Delay (0-999 x 0,1 s)

%R980 External Fail D. Output

%R777 - %R779 External Fail Assign Name (6 Bytes ASCII)

# ARC GATEWAY MODBUS SPEC

## GENERAL SPECIFICATIONS

### Input Register (Modbus function 04) (read-only)

OFFSET	WORD = 16 BIT										0 a 100 sensores							
	32768	16384	8192	4096	2048	1024	512	256	128									
1	16	15	14	13	12	11	10	9	8									
1	Version (value 100 = 1.00)																	
2	Serial Number 32bits - LSB																	
3	Serial Number 32bits - MSB																	
4	Manufacture Day																	
5	Manufacture Month																	
6	Manufacture Year																	
7	Manufacture Lot																	
8	Manufacture User 1																	
9	Manufacture User 2																	
10	Manufacture User 3																	
11	Manufacture User 4																	
12	Sensor Number (Last Sensor Of Network)																	
13	Trip List Size																	
100	OUT TRIP	OUT 2	OUT 1	IN 2	IN 1	Any Sensor Not Responmding	Any Sensor Configured	Any Sensor Trip	CHAIN 0= None , 1= Chain)	Trip Sequence Size (0=none)								
101	OUT TRIP	OUT 2	OUT 1	IN 2	IN 1	Sensor 1 Not Responding	Sensor 1 Configured	Sensor 1 Trip		Sensor 1 Trip Sequence (0=No 1=First N=Position)								
102	TRIP	OUT 2	OUT 1	IN 2	IN 1	Sensor 2 Not Responding	Sensor 2 Configured	Sensor 2 Trip		Sensor 2 Trip Sequence (0=No 1=First N=Position)								
199	TRIP	OUT 2	OUT 1	IN 2	IN 1	Sensor 99 Not Responding	Sensor 99 Configured	Sensor 99 Trip		Sensor 99 Trip Sequence (0=No 1=First N=Position)								
200	TRIP	OUT 2	OUT 1	IN 2	IN 1	Sensor 100 Not Responding	Sensor 100 Configured	Sensor 100 Trip		Sensor 100 Trip Sequence (0=No 1=First N=Position)								
201	Trip List 1 (0=None N=Sensor)																	
202	Trip List 2 (0=None N=Sensor)																	
299	Trip List 99 (0=None N=Sensor)																	
300	Trip List 100 (0=None N=Sensor)																	
301	Sensor 1 Version (100=1.00)																	
302	Sensor 2 Version (100=1.00)																	
399	Sensor 99 Version (100=1.00)																	
400	Sensor 100 Version (100=1.00)																	
401	Sensor 1 Level																	
402	Sensor 2 Level																	
499	Sensor 99 Level																	
1010	0																	
1011	Event 1 - Sequence ID																	
1012	Event 1 - Sensor Number																	
1013	Event 1 - Timestamp Day																	
1014	Event 1 - Timestamp Month																	
1015	Event 1 - Timestamp Year																	
1016	Event 1 - Timestamp Hour																	
1017	Event 1 - Timestamp Minute																	
1018	Event 1 - Timestamp Seconds																	
1019	Event 1 - Repeat Count																	
1500	0																	
1501	Event 50 - Sequence ID																	
1502	Event 50 - Sensor Number																	
1503	Event 50 - Timestamp Day																	
1504	Event 50 - Timestamp Month																	
1505	Event 50 - Timestamp Year																	
1506	Event 50 - Timestamp Hour																	
1507	Event 50 - Timestamp Minute																	
1508	Event 50 - Timestamp Seconds																	
1509	Event 50 - Repeat Count																	

# ARC GATEWAY MODBUS SPEC

## GENERAL SPECIFICATIONS



OFFSET	WORD = 16 BIT												Default Hex					
	16	15	14	13	12	11	10	9	8	7	6	5		4	3	2	1	
1	Trip Mode	OUT_2 Mode B2	OUT_2 Mode B1	OUT_1 Mode B2	OUT_1 Mode B1	IN_2 Mode B2	IN_2 Mode B1	IN_1 Mode	Sensor Network Size (0...100) (Last Sensor Of Network)								0x0000	
	0 → Keep On	B2=0 B1=0 → Trip	B2=0 B1=0 → Trip	B2=0 B1=0 → Trip	B2=0 B1=0 → Trip	B2=0 B1=0 → None	B2=0 B1=0 → None	0 → None										
	1 → Pulse 3 Sec	B2=0 B1=1 → Alarm (No Trip)	B2=0 B1=1 → Armed (No Trip)	B2=0 B1=1 → Armed (No Trip)	B2=0 B1=1 → Armed (No Trip)	B2=1 B1=0 → Alarm	B2=1 B1=0 → Inhibits/Disable Trip	B2=1 B1=0 → Inhibits/Disable Trip	1 → Reset									
		B2=1 B1=0 → Alarm	B2=1 B1=0 → Alarm	B2=1 B1=0 → Alarm	B2=1 B1=0 → Alarm	B2=1 B1=1 → Remote 2	B2=1 B1=1 → Chain	B2=1 B1=1 → Chain										
2	x	x	x	x	x	x	x	Blink Active	Sensor to Blink (0=All)								0x0000	
								0=no / 1=Blink	BIT 1 - 8 = 0 a 100 sensores									
3	Unlock Bits 12 to 15	Force Out/Trip SCR	Force Out/Trip Relay	Force OUT 2	Force OUT 1	Remote 2	Remote 1	x	x	x	x	x	x	x	x	x	Reset Trip	
	0=no / 1=Unlock	0=no / 1=force	0=no / 1=force	0=no / 1=force	0=no / 1=force	0=Off / 1=On	0=Off / 1=On	0=Off / 1=On									0=no / 1=Reset	
4	Unlock	Terminator RS485	Baudrate Mode B3	Baudrate Mode B2	Baudrate Mode B1	Parity Mode B2	Parity Mode B1	Stop Bit Mode	RS485 Gateway Modbus Address - SLAVE ID (Initial = 200)								0x20C8	
	0 → Read-only	0 → No Resistor	B3=0 B2=0 B1=0 → 1200	B3=0 B2=0 B1=0 → 1200	B3=0 B2=0 B1=0 → None	B2=0 B1=0 → None	0 → 1 stop bits											
	1 → Enable Bits 1 to 14	1 → 120R Resistor	B3=0 B2=0 B1=1 → 2400	B3=0 B2=0 B1=1 → 2400	B2=0 B1=1 → Even	B2=0 B1=1 → Even	1 → 2 stop bits											
			B3=0 B2=1 B1=0 → 4800	B3=0 B2=1 B1=0 → 4800	B2=1 B1=0 → Odd	B2=1 B1=0 → Odd												
			B3=0 B2=1 B1=1 → 9600	B3=0 B2=1 B1=1 → 9600														
			B3=1 B2=0 B1=0 → 19200	B3=1 B2=0 B1=0 → 19200														
		B3=1 B2=0 B1=1 → 38400	B3=1 B2=0 B1=1 → 38400															
		B3=1 B2=1 B1=0 → 57600	B3=1 B2=1 B1=0 → 57600															
		B3=1 B2=1 B1=1 → 115200	B3=1 B2=1 B1=1 → 115200															
5	Clock Control (0=KEEP, 1=READ, 2=WRITE)																	
6	Clock Day (1...31)																	
7	Clock Month (1..12)																	
8	Clock Year (1..3000)																	
9	Clock Hour (0..24)																	
10	Clock Minute (0...60)																	
11	Clock Second (0...60)																	
12	Manufacture Write Unlock Password (Enable change registers 21 to 30)																	
13	Serial Number 32bits - LSB																	
14	Serial Number 32bits - MSB																	
15	Manufacture Day																	
16	Manufacture Month																	
17	Manufacture Year																	
18	Manufacture Lot																	
19	Manufacture User 1																	
20	Manufacture User 2																	
21	Manufacture User 3																	
22	Manufacture User 4																	
23	Clear All Saved Event																	

# MODBUS OVER ETHERNET TCP IP SERVER

## GENERAL SPECIFICATIONS (PART 1 / 4)



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.

CONSUMED	Controller Tags	WRITE PAGE 1 TO 16	FUNCTION RESERVED FOR FUTURE USE	MULTIPLE GATEWAY VERSION DATA	NOTE	WARNING
%R3201 - %3300						
%R3301	O.Data[100]	0	MUTE	1= MUTE // 0 = DO NOTHING	SEND COMMAND MUTE TO RELAY	
%R3302	O.Data[101]	0	RESET	1= RESET // 0 = DO NOTHING	SEND COMMAND RESET TO RELAY	
%R3303	O.Data[102]	0	RESERVED			
%R3304	O.Data[103]	0	RESERVED			
%R3305	O.Data[104]	0	GATEWAY SCAN AUTO	1= CHANGE TO SCAN AUTO // 0 = DO NOTHING	TRANSITION SENSITIVE - CHANGE FROM MAN TO AUTO	
%R3306	O.Data[105]	0	GATEWAY SCAN MANUAL	1= CHANGE TO SCAN MANUAL // 0 = DO NOTHING	TRANSITION SENSITIVE - CHANGE FROM AUTO TO MAN	
%R3307	O.Data[106]	0	SCAN GATEWAY NUMBER	SET 1 TO 40	CHANGE TO MANUAL FIRST TO READ THE SETTLED GATEWAY	
%R3308	O.Data[107]	0	TIME STAMP EVENT	SET 1 TO 50	CHANGE TO MANUAL FIRST TO READ THE SETTLED GATEWAY	
%R3309	O.Data[108]	0	RESERVED		RESET DIFFERENTIAL WITH A NEW WARM PERIOD	
%R3310	O.Data[109]	0	RESERVED		RESET DIFFERENTIAL WITHOUT A NEW WARM PERIOD	
%R3311	O.Data[110]	0	FORCE GATEWAY OUTPUT 1	1= FORCE // 0 = DO NOTHING	CHANGE TO MANUAL FIRST AND SET THE GATEWAY TO BE FORCED	AVOID IF POSSIBLE
%R3312	O.Data[111]	0	FORCE GATEWAY OUTPUT 2	1= FORCE // 0 = DO NOTHING	CHANGE TO MANUAL FIRST AND SET THE GATEWAY TO BE FORCED	AVOID IF POSSIBLE
%R3313	O.Data[112]	0	FORCE GATEWAY TRIP RELAY	1= FORCE // 0 = DO NOTHING	CHANGE TO MANUAL FIRST AND SET THE GATEWAY TO BE FORCED	AVOID IF POSSIBLE
%R3314	O.Data[113]	0	FORCE GATEWAY TRIP THYRISTOR	1= FORCE // 0 = DO NOTHING	CHANGE TO MANUAL FIRST AND SET THE GATEWAY TO BE FORCED	AVOID IF POSSIBLE
%R3315	O.Data[114]	0	RESERVED			
%R3316	O.Data[115]	0	RESERVED			
%R3317	O.Data[116]	0	RESERVED			
%R3318	O.Data[117]	0	RESERVED			
%R3319	O.Data[118]	0	RESERVED			
%R3320	O.Data[119]	0	RESERVED			
%R3321	O.Data[120]	0	RESERVED			
%R3322	O.Data[121]	0	RESERVED			
%R3323	O.Data[122]	0	RESERVED			
%R3324	O.Data[123]	0	RESERVED			
%R3325	O.Data[124]	0	RESERVED			
%R3326	O.Data[125]	0	PAGE TO WRITE	NOTE USED IN THIS VERSION		
%R3327	O.Data[126]	0	PAGE TO READ	SET PAGE FROM 0 TO 15 TO BE READ FROM RELAY	0 = DO NOTHING // 1 TO 15 SET PAGE TO BE READ	
%R3328	O.Data[127]	0	WRITING DATA VALID	1= DATA TO BE WRITE = VALID // 0 = DO NOTHING	NOTE USED IN THIS VERSION	

# MODBUS OVER ETHERNET TCP IP SERVER

## GENERAL SPECIFICATIONS (PART 2 / 4)

PRODUCED	READ PAGE	FUNCTION	DATA	NOTE	WARNING
%R2927	0 - 16	PAGE READ	0 - 16	0 = READED NONE // CORRESPONDENT 1 TO 15 DATA WILL BE READED	
%R2928	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 - %R2900	1	RESERVED			
%R2801 - %R2900	2	RESERVED			
%R2801 - %R2900	3	RESERVED			
%R2801 - %R2900	4	RESERVED			
%R2901	3	RESERVED			
%R2901	4	RESERVED			
%R2801 - %R2900	5	RESERVED			
%R2801 - %R2900	6	ARC SENSORS VOLTAGE	X100 - AS READED (FORMAT XX.XX)	CHANGE TO MANUAL AND SET THE GATEWAY FIRST AT %R3307	
%R2801 - %R2900	7	RESERVED			
%R2801 - %R2900	8	RESERVED			
%R2801 - %R2900	9	RESERVED			
%R2801 - %R2900	10	RESERVED			
%R2801 - %R2900	11	RESERVED			
%R2801 - %R2900	12	ARC SENSORS STATUS	0 = RESPONDING // 1 = NOT RESPONDING	CHANGE TO MANUAL AND SET THE GATEWAY FIRST	
%R2801 - %R2900	13	GATEWAYS STATUS	0 = RESPONDING // 1 = NOT RESPONDING	SEE ALL GATEWAYS RESPONDING OR NOT (1 TO 40)	
%R2801 - %R2900	14	ARC SEQUENCE	AS READED - SAME AS THE DISPLAY	CHANGE TO MANUAL AND SET THE GATEWAY FIRST AT %R3307	
%R2801	15	RESERVED			
%R2802	15	RESERVED			
%R2803	15	ARC COMM OK	0 = NOT OK // 1 = OK		
%R2804	15	ARC COMM NOT OK	0 = OK // 1 = NOT OK		
%R2805	15	GATEWAY PGMD	0 = NO // 1 = PROGRAMMED	CHANGE TO MANUAL AND SET THE GATEWAY FIRST AT %R3307	
%R2806	15	GATEWAY READY	0 = NO // 1 = READY	CHANGE TO MANUAL AND SET THE GATEWAY FIRST AT %R3307	
%R2807	15	GATEWAY ALARM	0 = NO // 1 = ALARMED	CHANGE TO MANUAL AND SET THE GATEWAY FIRST AT %R3307	
%R2808	15	GATEWAY TRIP	0 = NO // 1 = TRIPPED	CHANGE TO MANUAL AND SET THE GATEWAY FIRST AT %R3307	
%R2809	15	GATEWAY CHAIN INPUT	0 = NO // 1 = CHAIN ACTIVE	CHANGE TO MANUAL AND SET THE GATEWAY FIRST AT %R3307	
%R2810	15	INHIBITED	0 = NO // 1 = INHIBITED		
%R2811	15	LINK STATE	0 = ETHERNET NOT LINKED // 1 = LINKED		
%R2812	15	RESERVED			
%R2813	15	ANY FAIL ACTIVE	0 = NO // FAIL ACTIVE		
%R2814	15	RESERVED			
%R2815	15	RESERVED			
%R2816	15	ALARM ACTIVE	0 = NO // ALARM ACTIVE		
%R2817	15	TRIP ACTIVE	0 = NO // TRIP ACTIVE		
%R2818	15	ALARM UNACKNOWLEDGED	0 = NO // 1 = YES		
%R2819	15	ALARM UNCLEARD	0 = NO // 1 = YES		
%R2820	15	RESERVED			
%R2821	15	RESERVED			
%R2822	15	RESERVED			
%R2823	15	RESERVED			

# MODBUS OVER ETHERNET TCP IP SERVER



## GENERAL SPECIFICATIONS (PART 3 / 4)

PRODUCED	READ PAGE	FUNCTION	DATA	NOTE	WARNING
%R2824	15	RESERVED			
%R2825	15	EXTERNAL FAIL 1 ACTIVE	0 = NO // 1 = YES		
%R2826	15	EXTERNAL FAIL 2 ACTIVE	0 = NO // 1 = YES		
%R2827	15	ANALOG 1 ALARM ACTIVE	0 = NO // 1 = YES		
%R2828	15	ANALOG 2 ALARM ACTIVE	0 = NO // 1 = YES		
%R2829	15	ANALOG 3 ALARM ACTIVE	0 = NO // 1 = YES		
%R2830	15	ANALOG 4 ALARM ACTIVE	0 = NO // 1 = YES		
%R2831	15	ANALOG 1 TRIP ACTIVE	0 = NO // 1 = YES		
%R2832	15	ANALOG 2 TRIP ACTIVE	0 = NO // 1 = YES		
%R2833	15	ANALOG 3 TRIP ACTIVE	0 = NO // 1 = YES		
%R2834	15	ANALOG 4 TRIP ACTIVE	0 = NO // 1 = YES		
%R2835	15	EXCESS LIFE ACTIVE	0 = NO // 1 = YES		
%R2836	15	RESERVED			
%R2837	15	RESERVED			
%R2838	15	REMOTE 1 ACTIVE	0 = NO // 1 = YES		
%R2839	15	REMOTE 2 ACTIVE	0 = NO // 1 = YES		
%R2840	15	RESERVED			
%R2841	15	RESERVED			
%R2842	15	RESERVED			
%R2843	15	RESERVED			
%R2844	15	RESERVED			
%R2845	15	RESERVED			
%R2846	15	RESERVED			
%R2847	15	RESERVED			
%R2848	15	RESERVED			
%R2849	15	RESERVED			
%R2850	15	RESERVED			
%R2851	15	RESERVED			
%R2852	15	RESERVED			
%R2853	15	RESERVED			
%R2854	15	RESERVED			
%R2855	15	RESERVED			
%R2856	15	RESERVED			
%R2857	15	RESERVED			
%R2858	15	RESERVED			
%R2859	15	RESERVED			
%R2860	15	GATEWAY NOT PROGRAMMED	0 = NO // 1 = YES		
%R2861	15	ANY ARC GATEWAY COMM FAIL	0 = NO // 1 = YES		
%R2862	15	ARC SENSOR NOT RESPONDING FAIL	0 = NO // 1 = YES		
%R2863	15	ARC FLASH ALARM ACTIVE	0 = NO // 1 = YES		
%R2864	15	ARC FLASH TRIP ACTIVE	0 = NO // 1 = YES		
%R2865	15	ARC CHAIM ACTIVE (TRIP)	0 = NO // 1 = YES		

# MODBUS OVER ETHERNET TCP IP SERVER

## GENERAL SPECIFICATIONS (PART 4 / 4)

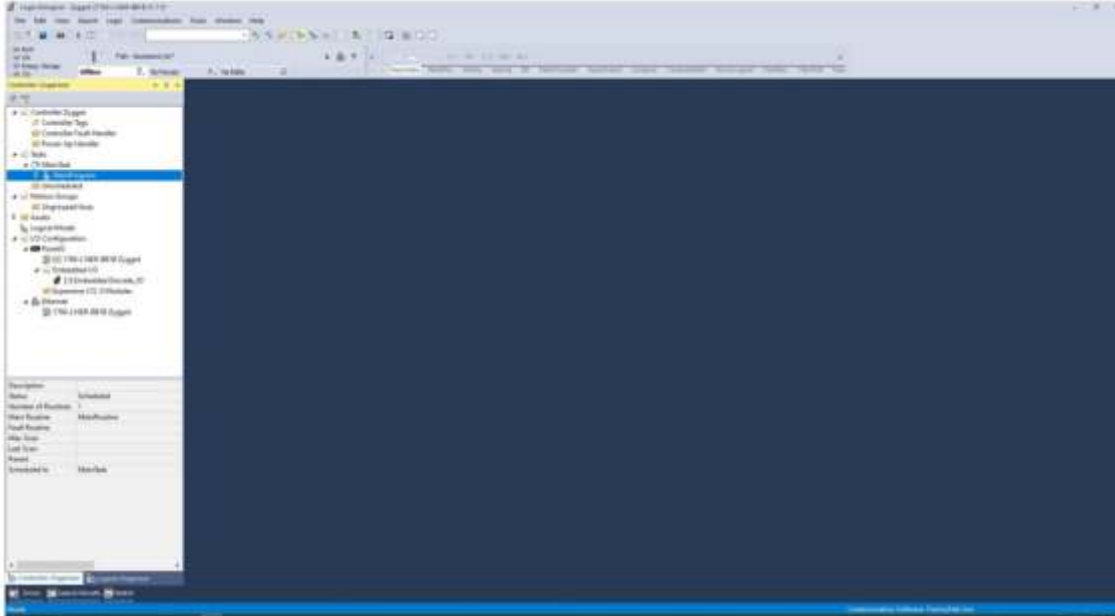
PRODUCED	READ PAGE	FUNCTION	DATA	NOTE	WARNING
%R2866	15	SCREEN ALARM UNCLEAR	0 = NO // 1 = YES		
%R2867	15	SCREEN ALARM UNACKNOWLEDGED	0 = NO // 1 = YES		
%R2868	15	SCREEN ALARM ANY FAIL ACTIVE	0 = NO // 1 = YES		
%R2869	15	SCANNING GATEWAY AUTO	0 = NO // 1 = YES		
%R2870	15	SCANNING GATEWAY MANUAL	0 = NO // 1 = YES		
%R2801	16	RESERVED	x 10 - AS READED (FORMAT XXX.X)	THE DATA NEED TO BE DIVIDED BY 10 TO INSERT THE COMA	
%R2802	16	RESERVED	x 10 - AS READED (FORMAT XXX.X)	THE DATA NEED TO BE DIVIDED BY 10 TO INSERT THE COMA	
%R2803	16	MEMORY CARD STATUS	0=OK// 1= UNKNOWN FORMAT// 2=NO CARD//	3= NOT SUPPORTED//4=ILEGAL SWAP//5=UNKNOWN//PROTECTED	
%R2804	16	RESERVED			
%R2805	16	RESERVED			
%R2806	16	RESERVED			
%R2807	16	RESERVED			
%R2808	16	RESERVED			
%R2809	16	RESERVED			
%R2810	16	RESERVED			
%R2811	16	RESERVED			
%R2812	16	RESERVED			
%R2813	16	SCANNING GATEWAY NUMBER	AS READED (1 TO 40)	CHANGE TO MANUAL AND SET THE GATEWAY FIRST AT %R3307	
%R2814	16	REDING ARC SENSOR NUMBER	AS READED (1 TO 100)		
%R2815	16	RESERVED			
%R2816	16	RESERVED			
%R2817	16	TOTAL ALRM ACTIVE			
%R2818	16	TOTAL TRIP ACTIVE			
%R2819	16	TOTAL ARC SENSOR RESPONDING			
%R2820	16	TOTAL ARC SENSOR NOT RESPONDING			
%R2821	16	TOTAL ARC FLASH NOT CLEARED			
%R2822	16	TIME TO RETURN TO SCAN AUTO	AS READED (600 TO 0 s)		
%R2823	16	REAL TIME CLOCK DAY	1 TO 31		
%R2824	16	REAL TIME CLOCK MONTH	1 TO 12		
%R2825	16	REAL TIME CLOCK YEAR			
%R2826	16	REAL TIME CLOCK HOUR	0 TO 24		
%R2827	16	REAL TIME CLOCK MINUTE	0 TO 60		
%R2828	16	REAL TIME CLOCK SECONDS	0 TO 60		
%R2829	16	FIRST FAIL ON GATEWAY NUMBER	1 TO 40		

# MODBUS OVER ETHERNET TCP IP SERVER

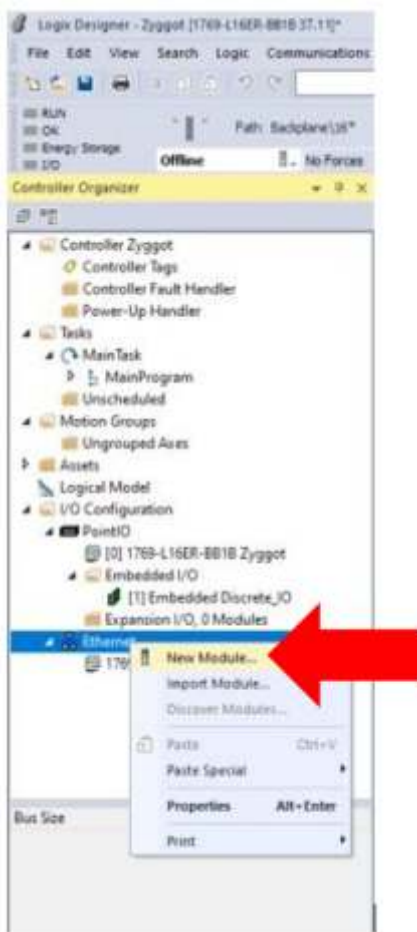
## ETHERNET MODULE IN STUDIO 5000/LOGIX DESIGNER ALLEN BRADLEY

Steps to create an Ethernet module in a project in Studio 5000/Logix Designer – Allen Bradley PLCs / Zyggot Relays Connection. Let's consider that we have only 5 sensors connected to the Relay.

### 1- OPEN YOUR PROJECT



### 2- RIGHT CLICK ON "ETHERNET" AND THEN CLICK ON "NEW MODULE..."

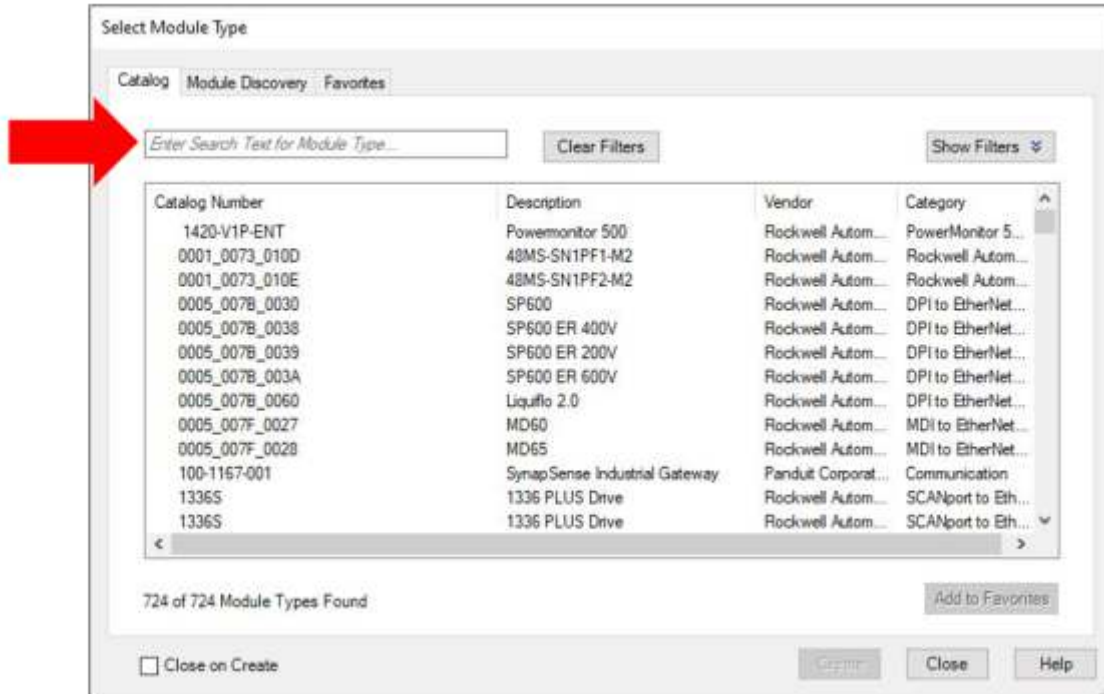


# MODBUS OVER ETHERNET TCP IP SERVER

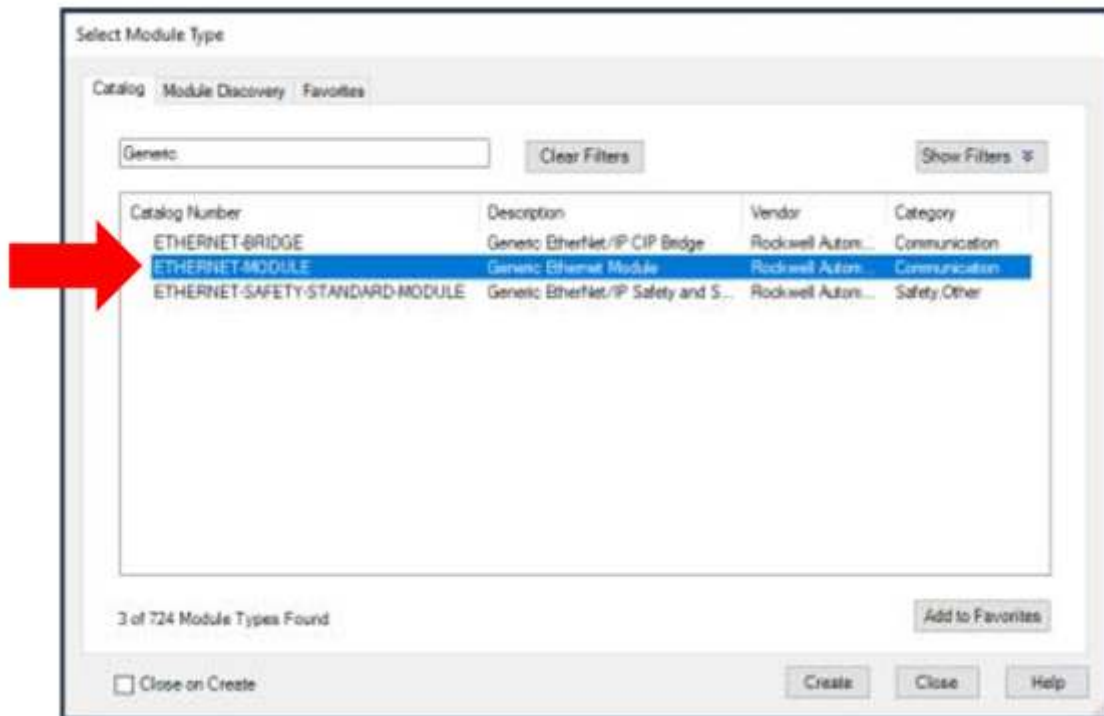
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3- NA JANELA “SELECT MODULE TYPE” SELECIONE A ABA “CATALOG” E DIGITE “GENERIC” NO CAMPO DE BUSCA.



4- ENTÃO SELECIONE “ETHERNET-MODULE” E CLIQUE EM “CREATE”



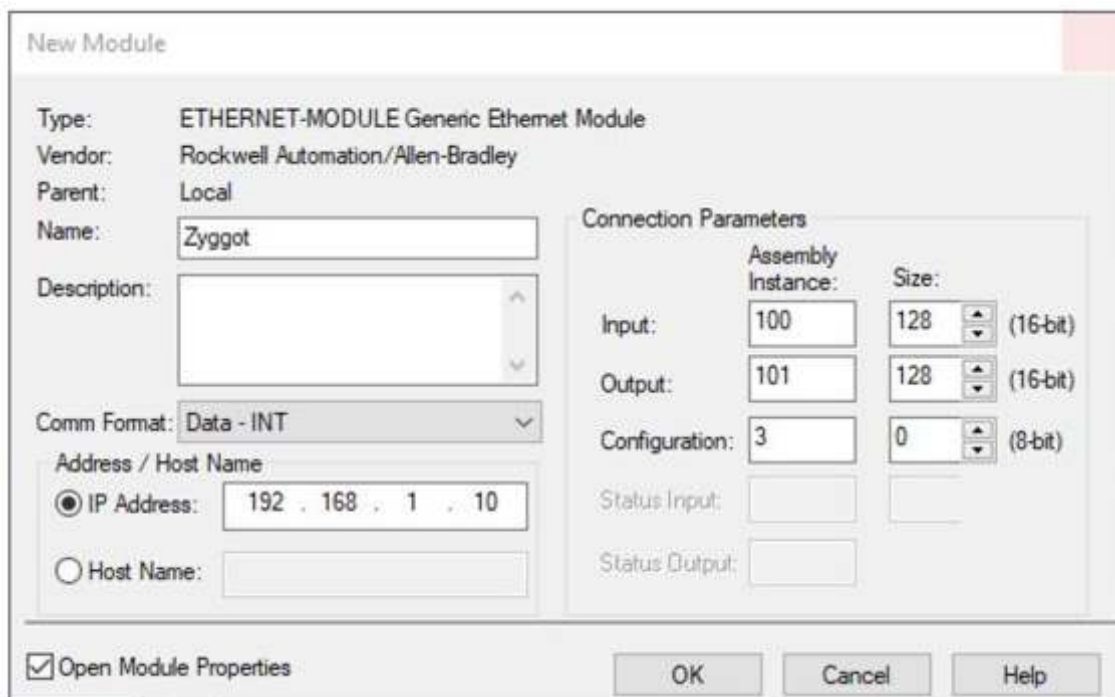
# MODBUS OVER ETHERNET TCP IP SERVER

## ETHERNET MODULE IN STUDIO 5000/LOGIX DESIGNER ALLEN BRADLEY

Steps to create an Ethernet module in a project in Studio 5000/Logix Designer – Allen Bradley PLCs / Zyggot Relays Connection. Let's consider that we have only 5 sensors connected to the Relay.

### 5- IN THE “NEW MODULE” WINDOW:

- IN THE “COMM FORMAT” FIELD, CHOOSE THE “DATA – INT” OPTION
  - IN “IP ADDRESS”, ENTER THE IP THAT WAS CONFIGURED IN THE ZYGGOT F/x VARIXX RELAY
  - IN “ASSEMBLY INSTANCE” OF THE INPUT, ENTER “100”
  - IN “SIZE” INPUT, ENTER “128”
  - IN “ASSEMBLY INSTANCE” OUTPUT, ENTER “101”
  - IN “SIZE” OUTPUT, ENTER “128”
  - IN “ASSEMBLY INSTANCE” CONFIGURATION, ENTER “3”
  - IN “SIZE” CONFIGURATION, ENTER “0”
- THEN CLICK “OK”.



**New Module**

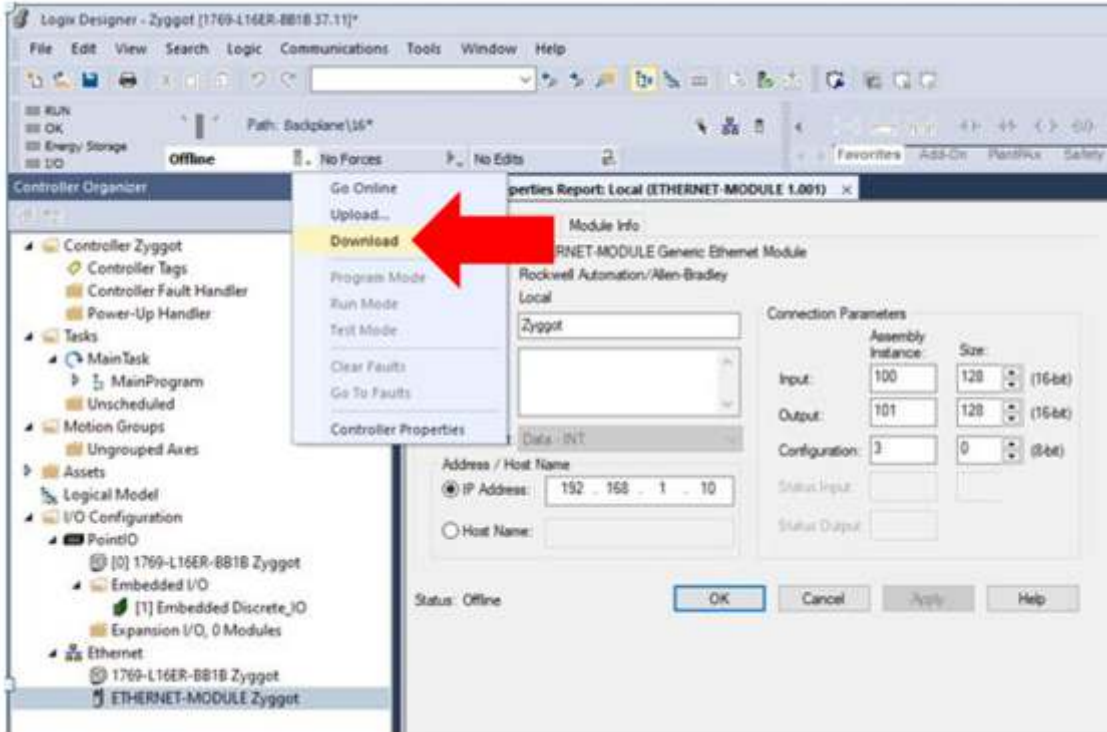
Type: ETHERNET-MODULE Generic Ethernet Module  
 Vendor: Rockwell Automation/Allen-Bradley  
 Parent: Local  
 Name: Zyggot  
 Description:   
 Comm Format: Data - INT  
 Address / Host Name  
 IP Address: 192 . 168 . 1 . 10  
 Host Name:   
**Connection Parameters**  
 Input: Assembly Instance: 100, Size: 128 (16-bit)  
 Output: Assembly Instance: 101, Size: 128 (16-bit)  
 Configuration: Assembly Instance: 3, Size: 0 (8-bit)  
 Status Input:   
 Status Output:   
 Open Module Properties  
 OK Cancel Help

# MODBUS OVER ETHERNET TCP IP SERVER

## ETHERNET MODULE IN STUDIO 5000/LOGIX DESIGNER ALLEN BRADLEY

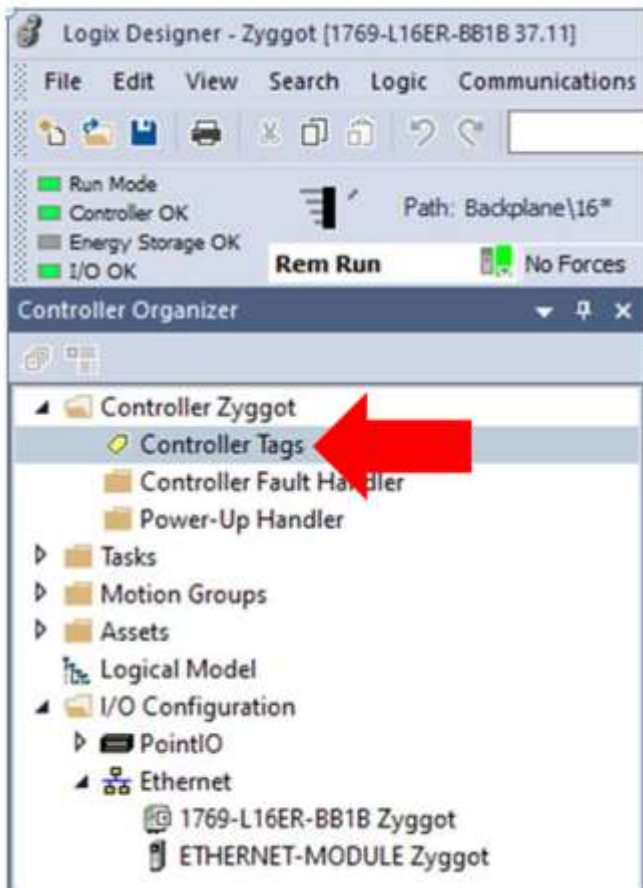
Steps to create an Ethernet module in a project in Studio 5000/Logix Designer – Allen Bradley PLCs / Zyggot Relays Connection. Let's consider that we have only 5 sensors connected to the Relay.

### 6- DOWNLOAD THE PROJECT TO THE PLC.



### 7- TESTING: READING 5 SENSORS CONNECTED TO THE RELAY.

7a- LEAVE THE PLC IN RUN MODE BY THE SYSTEM AND DOUBLE CLICK ON “CONTROLLER TAGS”.

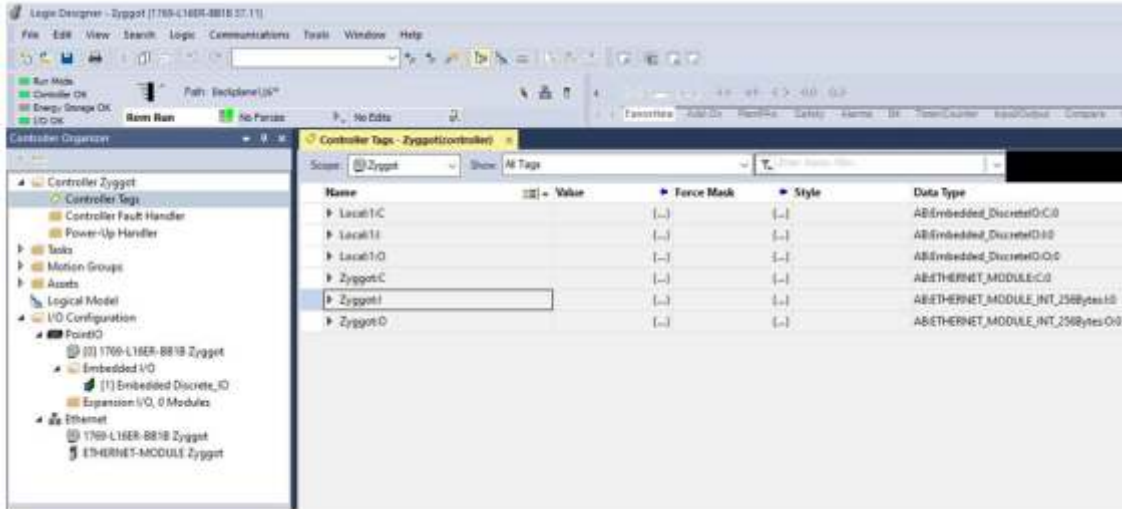


# MODBUS OVER ETHERNET TCP IP SERVER

## ETHERNET MODULE IN STUDIO 5000/LOGIX DESIGNER ALLEN BRADLEY

Steps to create an Ethernet module in a project in Studio 5000/Logix Designer – Allen Bradley PLCs / Zyggot Relays Connection. Let's consider that we have only 5 sensors connected to the Relay.

7b- SELECT AS SHOWN.



7c- FIND THE OUTPUT RECORD "...0.DATA[126]" (%R3327) AND MAKE SURE IT HAS THE VALUE "1," OTHERWISE, ASSIGN IT THE VALUE "1" (THIS WILL SELECTE PAGE 1, THIS «PAGE» IS REFERENT TO THE SYSTEM TARGET TEMPERATURE VALUES).

Zyggot:O.Data[120]	0	Decimal	INT
Zyggot:O.Data[121]	0	Decimal	INT
Zyggot:O.Data[122]	0	Decimal	INT
Zyggot:O.Data[123]	0	Decimal	INT
Zyggot:O.Data[124]	0	Decimal	INT
Zyggot:O.Data[125]	0	Decimal	INT
Zyggot:O.Data[126]	1	Decimal	INT
Zyggot:O.Data[127]	0	Decimal	INT

7d - ENCONTRE AGORA O REGISTRO DE INPUT "...I.DATA[0]" (%R2801), DIVIDINDO O VALOR RECEBIDO POR 10, TEREMOS A TEMPERATURA ALVO DO SENSOR 1. NO REGISTRO "...I.DATA[1]" (%R2802) TEMOS A TEMPERATURA ALVO DO SENSOR 2 E ASSIM POR DIANTE. NA IMAGEM A BAIXO TEMOS OS VALORES DE TEMPERATURA DOS 5 PRIMEIROS SENSORES LIDOS PELO RELÉ (AINDA NÃO DIVIDIDO POR 10).

Name	Value	Force Mask	Style	Data Type
Local:I:C	[...]	[...]	[...]	AB:Embedded_DiscreteI:C:0
Local:I:I	[...]	[...]	[...]	AB:Embedded_DiscreteI:I:0
Local:I:O	[...]	[...]	[...]	AB:Embedded_DiscreteI:O:0
Zyggot:C	[...]	[...]	[...]	AB:ETHERNET_MODULE:C:0
Zyggot:I	[...]	[...]	[...]	AB:ETHERNET_MODULE_INT_256Bytes:I:0
Zyggot:I.Data	[...]	[...]	Decimal	INT[128]
Zyggot:I.Data[0]	233		Decimal	INT
Zyggot:I.Data[1]	232		Decimal	INT
Zyggot:I.Data[2]	224		Decimal	INT
Zyggot:I.Data[3]	211		Decimal	INT
Zyggot:I.Data[4]	245		Decimal	INT
Zyggot:I.Data[5]			Decimal	INT
Zyggot:I.Data[6]	0		Decimal	INT
Zyggot:I.Data[7]	0		Decimal	INT
Zyggot:I.Data[8]	0		Decimal	INT
Zyggot:I.Data[9]	0		Decimal	INT

**Note:** these values shown in the reading, circled in red, are only examples and may vary depending on the record being read.

## ABOUT VARIXX

For over 40 years, Varixx has pursued its vocation for developing high-tech products and focuses its efforts on serving the industrial market with quality and speed. Our 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 global reference in the market for temperature monitoring and diagnostics and arc flash detection in electrical systems in general.

Our product portfolio also includes LED luminaires from our ONNO division, developed and manufactured 100% in Brazil with cutting-edge technology. Varixx values the introduction of innovative concepts worldwide.

## AREAS OF ACTIVITY

- ✓ **MANUFACTURERS OF GENERATOR MACHINES AND SYNCHRONOUS MOTORS**  
Static Exciters, Control Box Controllers, Low and Medium Voltage Soft Starters, Semiconductors
- ✓ **PRODUCTION OF ALUMINUM AND HYDROGEN / OXYGEN**  
High Current Rectifiers, Solid State Contactors, Smart Relay for CCM, Online Thermography System and Arc Flash Detection and Onno LED Luminaires.
- ✓ **BASE INDUSTRY, MINING AND STEEL INDUSTRY**  
Smart Relays for CCMs, Low and Medium Voltage Soft Starters, Solid State Contactors, AC/DC Converters for electromagnets, High Current Rectifiers, Online Thermography System, Arc Flash Detection and Protection and Onno LED Luminaires.
- ✓ **OIL COMPANIES**  
Smart Relays for CCMs, Static Excitation, Low and Medium Voltage Soft Starters, Solid State Contactors, Online Thermography System, Arc Flash Detection and Protection and Onno LED Luminaires.
- ✓ **ELECTRIC PANEL ASSEMBLERS**  
Smart Relays for CCMs, Online Thermography, Arc Flash Detection and Protection System, Semiconductors, Power Supplies and Onno LED Luminaires.

### Why ZYGGOT Thermography And Arc Flash Protection?



**SINGLE CABLE / EASY TO INSTALL**



**PREDICTIVE / DIFFERENTIAL PROTECTION**



**EFFECTIVE PROTECTION AGAINST ARC DESTRUCTION**



**WORLDWIDE UNIQUE BY UV DETECTION / NO CURRENT READINGS REQUIRED**



**DOES NOT NEED CONVENTIONAL THERMOGRAPHY / ALSO MEASURES AIR TEMP.**



**WITHOUT CONTACT / WITH NETWORK COMMUNICATION**

## LEARN MORE!

### ZYGGOT ARC FLASH SYSTEM

- ✓ **Low Cost // Up to 100 sensors per gateway.**
- ✓ **Innovative in the market // Faster (<300 uS versus up to 500 mS)**
- ✓ **Ultraviolet arc detection**
- ✓ **Does not operate with ambient light (False Alarm)**
- ✓ **No need for current readings**

# varixx

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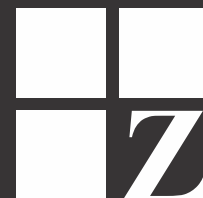
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