STATVAR LINE - VED905 V5L
SYNCHRONOUS MOTOR EXCITER

STATVAR EXCITERS

EXCITATION SYSTEM FOR SYNCHRONOUS MOTORS

OFFPRINT

First Excitation Systems Manufactured in Brazil (1978).
Leader in Excitation Systems Installed in Brazil (+2100).
First Control Box Systems Manufactured in Brazil.
First in the World to Use Crowbar in Synchronous Motors.

Offprint VED905 V5L 01.6 - Build 95 (Eng) July 2025 (from the manual w/ 78 pages)

varixx

VED905 V5L
SYNCHRONOUS MOTOR EXCITER SYSTEM

MAIN ADVANTAGES

- DIGITAL CONTROL
- WITH ETHERNET
- COMPACT AND EASY TO USE
- TOUCH SCREEN - FRIENDLY
- DIGITAL MEASUREMENTS
- EVENT HISTORY
- PLOT OF VARIABLES
- TWO CONTROL CHANNELS
- WITH ETHERNET

The VED905 V5L Static Exciter / Power Factor Regulator is the newest model in Varixx's advanced family of exciters for Synchronous Motors. The VED905 is a Digital Regulator with a touch screen, which, together with the specific Power Module, composes a Static Exciter for excitation currents between 1 and 2000 Amperes, which can operate fully automatically.
The VED905 V5L can be programmed via keyboard or Modbus network or by Ethernet.
The VED905 has dozens of built-in protections and functions, all programmable.
Dozens of variable and status readouts are available on the liquid crystal display and via Modbus.
Faults are memorized, with date and time of occurrence.
The last event or first fault that occurred is also memorized, as well as various data, such as the time of the last excitation, number of hours excited, number of total hours, etc.
Several intelligent functions facilitate application, such as switching without disturbances (Bounceless) between "Automatic" and "Manual Open Loop" or "Manual Constant Field Current" or even between different modes of "Settings". Other functions available, such as "PID Auto-tune", Calibration of readings, Fault Indication, Active Operating Modes and others facilitate application and operation.
Several types of operation point setting are available individually or in combination, such as "Up/Down", "Keyboard" (Touch Screen), Potentiometer, 0 to 5 VDC, 0 to 20 mA or Modbus network.

The VED905 V5L features great response time (10 mS) with built-in Power Factor Sensing and low first-order delay.
The VED905 V5L can work in several modes such as: Constant Field Current, Constant Power Factor or Constant KVAR or Constant Field Current with "Droop" by Power Factor or by KVAR (allowing to work in "tandem" configuration, with more than a motor on the same shaft).
One of the main characteristics of the VED905 V5L is the automatic dual-channel system with dual setpoint of work point and dual PID (Primary and Secondary) in addition to the manual channel, which allows switching to "Constant Field Current" mode that can be used in start-up and synchronization, for "Constant Power Factor" without the need for intervention at the work point, being able to work completely without operator supervision.
It has programmable automatic limitation functions of Leading and Delaying Polar Angle and Minimum and Maximum Excitation Current.
It also has a "Pull In Booster" function with a current ramp up to the setpoint, facilitating synchronization with heavy loads.
The semiconductors in the power module are "isolated base module" type allowing for clean and reliable construction.
A specific "Control" input facilitates operation in selectable "Force Open Loop" and "Force Field Current" modes. The digital inputs and outputs can be programmed for different functions.

APPLICATIONS

- **Excitation systems for brushless synchronous motors.**
- **Excitation systems for slip ring synchronous motors.**
- **Excitation systems for synchronous motors with external auxiliary rotary exciter.**

The **VED905 V5L** relay has Ethernet communication with several protocols, and can be accessed from anywhere by mobile devices or not.
Ethernet protocols:
TCP/IP (Modbus Slave): Modbus over Ethernet).
Ethernet / IP: ODVA CIP over Ethernet.
FTP: (File Server) File Transfer Protocol.
NTP Protocol: Network Time Protocol
HTTP (Web Server): Hypertext Transfer Protocol (Web Server).

TECHNICAL DETAILS

• **Application**: High performance Digital Static Exciter with color touch screen, for Synchronous Motors, with Modbus RTU protocol communication.

• **Channels**: Two channels with independent and switchable PID and setpoint.

• **Control Signals**: “Up/Down”, “Keyboard” or Modbus Network.

• **Modes**: “Automatic”, “Manual Open Loop”, “Manual Field Current”.

• **Regulation**: Constant Power Factor or KVAR, Constant Field Current with or without "Droop" by P.F. or KVAR.

• **Programmable protections** (21 total): Line Over and Under Voltage, Stator Over and Undercurrent, Lead and Lag Polar Angle Trip and Limitation, Minimum and Maximum Field Current Limitation and Trip, Over and Under-power, Long Start, Over-temperature , External Fault, Loss of Field, Delay for restart after hot and cold stop and Loss of Control (Self-monitoring).

• **Additional programmable functions**: Pull In Booster with “Soft Ramp”, Dual automatic channel with independent setpoint (PID1 for Icte and PID2 for PF cte, Input limit in PF cte, Change from PID1 to PID2 automatic or commanded, “Reset” and Manual/automatic “Mute”, Memory of the 1st fault, fault history, “PID Auto Tune”, “FAR” (Field Application Relay) and “FCX” (Loading) signal inputs and outputs, and others.

• **Signals and Measurements** (31 Total): Line Voltage and Current, KVA, KVAR, Power Factor, KW, Field Current, “Lead” or “Lag”, “Setting Range”, % of Current “Setting”, Limits Active, Active Clamping, “Mode/Droop” Status, “Droop Range”, Operation Mode, Regulation Mode, “Setting Mode”, “Forcing Mode”, Forcing Setting”, Fault Signaling, “Modbus Status”, “ Modbus Messages”, Time and Date, Last Event, Last Excitation and De-excitation Time, 1st Fault, Fault and Event History, Excited Hours, Total Hours and Cycles.

• **Programming**: via touch screen or network.

• **Inputs and Outputs**: 4 digital inputs and 4 digital outputs, all programmable.

• **Ethernet communication:** with several available protocols.

VED905 V5L RELAY CHARACTERISTICS

Power Supply	24 VDC, 150 mA
Moisture	5 - 95%
Dimensions	96 mm x 125 mm x 31 mm
Connectios	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	4 analog 0-20 mA (50 ohms) 12 Bits, Error: 1,5% FS Max 4 digital Programmable - 0-24 VDC Min On= 8VDC. Max Off: 3VDC (Starting, FAR, FCX, Up, Down, Force Field Curr, Force Open Loop, Reset, External Fail)
Outputs	4 Programmable outputs, Half-Bribge 0,5A max, 10 - 30 VDC, C. Source + Protections: Short-circuit / Over Voltage. (PWM - Firing, Start Permission, FAR, FCX, Alarm, Trip, Opman)
Communication	Modbus RTU, CsCAN Ethernet, Devicenet (Optional)
Screen	Color, WVGA (480 x 272) Colors 64K Touch Screen Resistive 4,3” 450 cd/m²
Certificates	CE / FCC Compliance - Part 15 of FCC
Connectors	3,5 mm - pluggable
Weight	270 Grams
Temperature	Operation: -10 °C - 60 °C Stored: -30 °C - 70 °C
RTC battery (only for the Real Time Clock)	Operation: > 10 Anos Stored:: 5 - 10 anos Clock error: 8 s / mês at 25 °C max

MAIN BENEFITS

- **Color Touch Screen.**
- **Ethernet Communication**
- **Operates in 3 programmable modes.**
- **Several built-in protections.**
- **Real-time graphical recording (Plot).**
- **Failure and event history.**
- **Continuous readings.**
- **Built-in Modbus RTU serial communication (other protocols on request).**
- **Two independent PID control channels.**
- **Built-in Autotune function**

FEATURES

• System Components:

System: VED905 V5L/xxxA/yyyV/m/n/p/r/zzz

Control module: VED905 V5LC.

Power Module: VED905 V5LP/xxxA/yyyV/m/n/p/r/zzz.

• Rated Currents: 25 to 2000 Amp.

• **Power Control**: Compact, fully controlled, three-phase thyristor bridge or PWM from 1000 Hz to 16000 Hz, with IGBT.

• **Isolation**: 1200 VDC (between Command/Power and between Power and Mass).

• **Power Control Type**: Phase angle with thyristors or PWM with IGBT.

• **Response Time**: Maximum 10mS.

• **Control loop**: Fully programmable Independent PID type - "Bias", P (Proportional gain), I (Integral), D (Derivative), "Derivative Term" (Error=PV-SP or PV=Process Value), "Dead Band" (Lower and Upper), "Slew Time" and others.

• **"Droop" / "Compound" Adjustment Range**: 0 to 10% / 10 to 100%.

• **Operation Modes**: I field cte, I field cte with droop, Power Factor cte, KVAR cte (with dual channel for independent adjustment of F.P. or KVAR).

• **Operation Point Setting**: "Up/Down", "Keyboard", "Up/Down" + "Keyboard".

• **Digital Outputs**: 04 Programmable for "Starting Permission", "FAR Output", "FCX Output", "Alarm" or "Trip".

• **Pull In Booster**: with ramp to setpoint.

• **Adjustment Scales**: +/- 20% and +/- 120%.

• **Initial Setting**: Programmable for "Last Value", 0%, 50%, 100% and "Nominal".

• **Operation Modes**: "Automatic", "Manual Field Current", "Manual Open Loop".

• **Switching between Operating Modes**: "Bounceless" type, without disturbance.

• **Switching between Setting Modes**: "Bounceless" type, without disturbance.

• **Programming of parameters and values**: "On line".

• **Reading Values**: Line Voltage, Line Current, Power (KW), Apparent Power (KVA), Reactive Power (KVAR), Power Factor, Field Current.

• **Programmable limits**: Leading Polar Angle, Lagging Polar Angle, Minimum Excitation Current, Maximum Excitation Current and P.F. cte.

• **Power Factor Reading**: By built-in internal transducer or optional external transducer.

• **Manual to Automatic Transfer Modes**: Programmable for "Mantain Process Value", "Setting = 0%", "Setting = 50%", "Setting = 100%", "Setting = Nominal".

• **Analog I/O Filters**: Programmable.

• **Calibration of Readings**: Zero and Scale, all independent and fully digital and can be performed "On Line".

• **Calibration of Scale, TP, TC and Nominal Values**: All digital and "On line".

• **Autotune Function**: Available, to facilitate and optimize PID calibration.

• **Communication**: Serial RS232C MODBUS RTU protocol (optional ASCII) for "Point to Point" connection or with external RS232C/RS485 converter, for network use. (Droop Out). CAN port with optional CsCAN or Devicenet protocol.

• **Protections**: Overvoltage, Undervoltage, Leading Polar Angle, Lagging Polar Angle, Field Undercurrent, Field Overcurrent, Field Overtemperature, Field Loss, Line Overcurrent, Line Undercurrent, Overload, Underpower, Long Start, Overtemperature, External Fault, Loss of Control (Self-monitoring) and (Delay for restart - Cooling.)

• **Actions on faults**: Independently programmable for each fault in "None", "Alarm", "Inhibition", "Trip" and "Both (Trip + Inhibition", "Force Field Current" and "Force Open Loop".

• **Delays for fault detection: Programmable.**

• **Real Time Clock: Included.**

• **Programming**: With user-changeable password.

• **Forcing**: Operating Mode and Setting Mode with programmable password.

• **Operating mode in Power Factor cte or KVAR cte**: "Compound" from 10 to 100% to optimize stability.

• **Fault History**: with Date and Time.

• **Memorization of Events**: 1st Failure, Last Event with time and date, Time and Date of the last start and Time and Date of the last stop, Total running hours, Total energized hours and Number of starts.

• **Programmable outputs**: static type for activating relay terminals (Starting permission, FAR, FCX, Alarm and Trip)

• **Active Screens**: 100+ multiple screens.

• **Repeatability and Uniformity of adjustment**: 100% (Free of analog adjustments - no "Trimpot" used externally or internally).

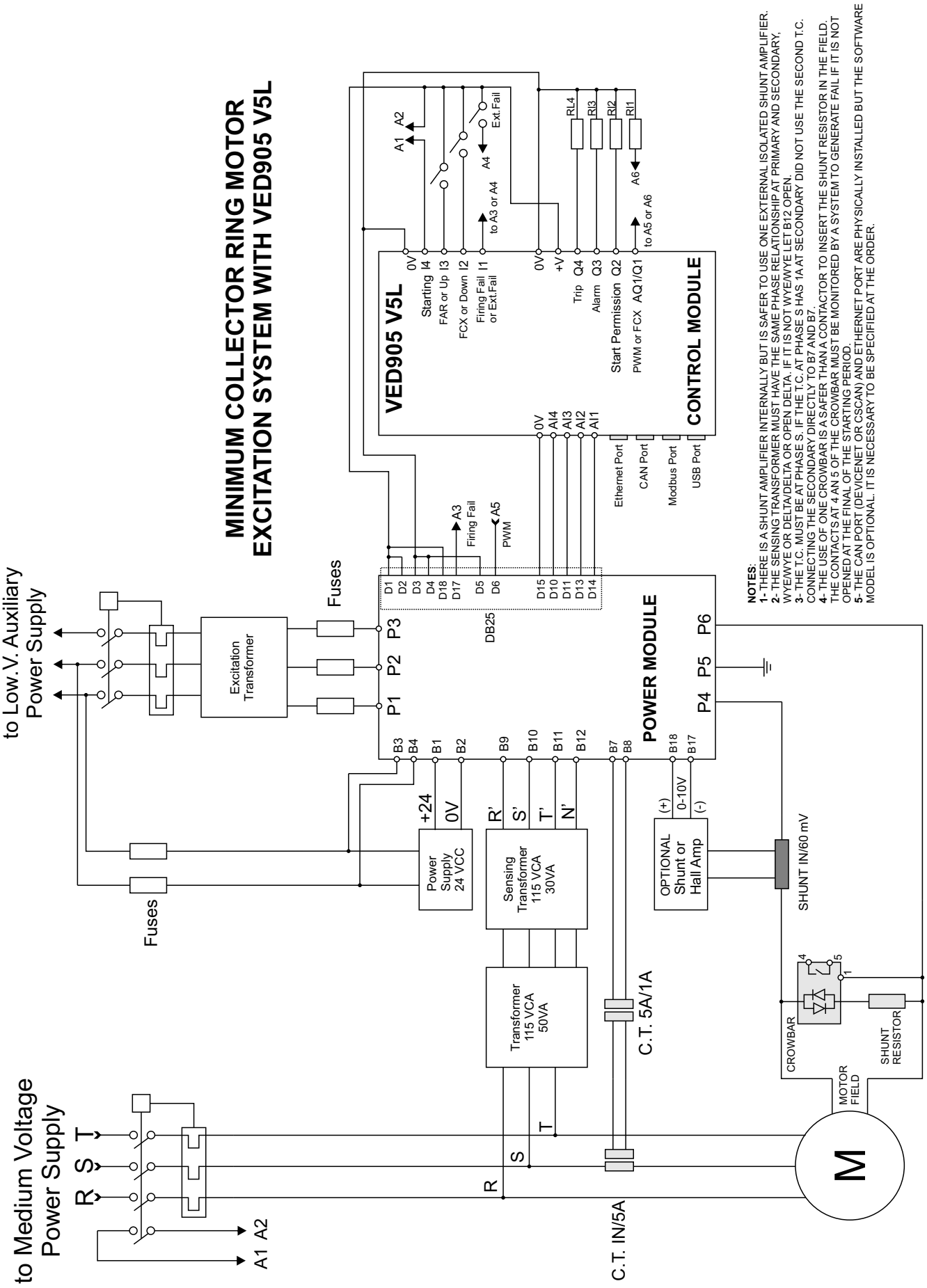
• **Up/Down adjustment resolution**: 0.01%.

• **Up/Down Adjustment Speed**: 3 speeds automatically selected every 2 seconds that the keys are kept pressed.

• **Programmable inputs**: Starting, UP, Down, FAR, FCX, Reset, Force Open Loop, Force Field Current.

TYPICAL APPLICATION

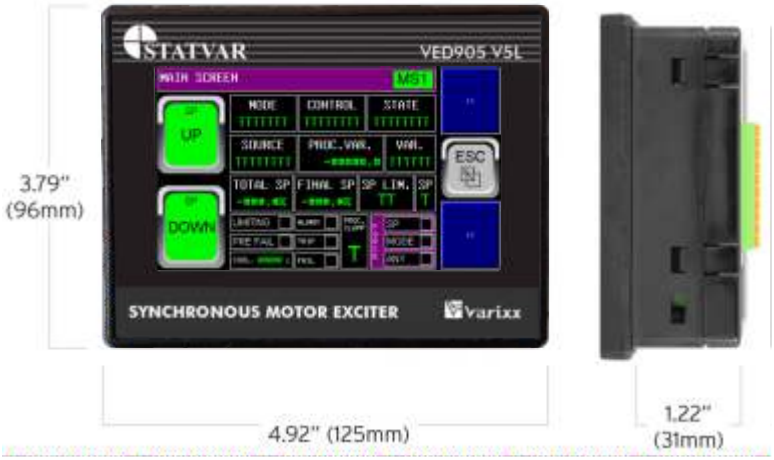
Minimum System for Slip Ring Motor



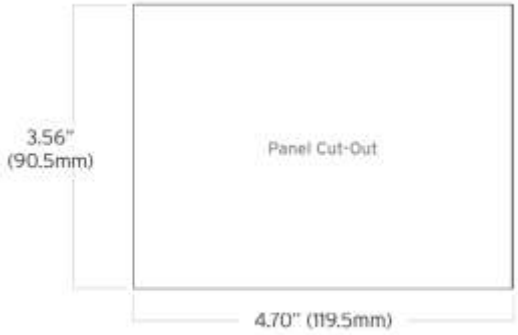
VED905 V5L

MECHANICS

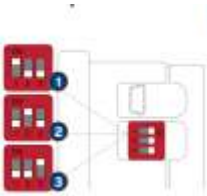
1- POWER 24 VCC
2- D.I. / A.I. CONNECTOR
3- D.O. / AQO. CONNECTOR
4- CAN PORT
5- RS232/RS485 SERIAL PORTS
6- CONFIGURATION SWITCHS
7- ETHERNET LAN PORT
8- MICRO SD SLOT
9- USB PORT



PANEL CUTTING

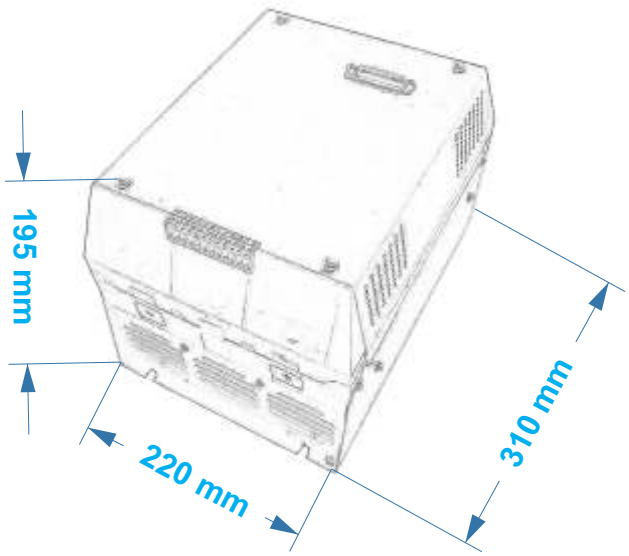


DIP Switchs in the Relay



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

25 A Converter Mechanics (Available up to 1200 A)



TECHNICAL CHARACTERISTICS

VED905 V5L RELAY CHARACTERISTICS	
Power Supply	24 VDC, 150 mA
Moisture	5 - 95%
Dimensions	96 mm x 125 mm x 31 mm
Connectios	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	4 analog 0-20 mA (50 ohms) 12 Bits, Error: 1,5% FS Max 4 digital Programmable - 0-24 VDC Min On= 8VDC. Max Off: 3VDC (Starting, FAR, FCX, Up, Down, Force Field Curr, Force Open Loop, Reset, External Fail)
Outputs	4 Programmable outputs, Half-Bribge 0,5A max, 10 - 30 VDC, C. Source + Protections: Short-circuit / Over Voltage. (PWM - Firing, Start Permission, FAR, FCX, Alarm, Trip, Opman)
Communication	Modbus RTU, CsCAN Ethernet, Devicenet (Optional)
Screen	Color, WVGA (480 x 272) Colors 64K Touch Screen Resistive 4,3” 450 cd/m²
Certificates	CE / FCC Compliance - Part 15 of FCC
Connectors	3,5 mm - pluggable
Weight	270 Grams
Temperature	Operation: -10 °C - 60 °C Stored: -30 °C - 70 °C
RTC battery (only for the Real Time Clock)	Operation: > 10 Anos Stored:: 5 - 10 anos Clock error: 8 s / mês at 25 °C max

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

MODULO DE POTÊNCIA 25A COM IGBT	
POWER OUTPUT	
Output Type	Filtered PWM
PM Frequency	1/2/4/8/16 khz
Power Converter Type	Buck Converter
Max. Output Voltage	1.35 x VAC Input / 250 VCC max
Max. Output Current	25 A Continuous
Load Type	Machine Field (inductive)
Min. Output Voltage	0 V DC
Max. Output Ripple	5%
Galvanic Isolation	Yes provided by the power transformer)
Final Response Time	10 mS max
BUCK Active switch component	IGBT
Protections at Power Converter	IGBT Monitoring

MODULO DE POTÊNCIA 25A a 1200 A COM TIRISTORES	
POWER OUTPUT	
Output Type	Phase Angle Pulse
PM Frequency	120 Hz
Power Converter Type	Full Bridge w/ Thiristors
Max. Output Voltage	1.35 x VAC Input / 600 VCC max
Max. Output Current	25 A a 1200 A Continuous
Load Type	Machine Field (inductive)
Min. Output Voltage	0 V DC
Max. Output Ripple	4,2% at 100% Output
Galvanic Isolation	Yes provided by the power transformer)
Final Response Time	16 mS max
Active Switch Component	Thyristors
Protections at Power Converter	None

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

CAN POWER RANGE:
12 - 25 VDC / 75 mA MÁXIMUM.

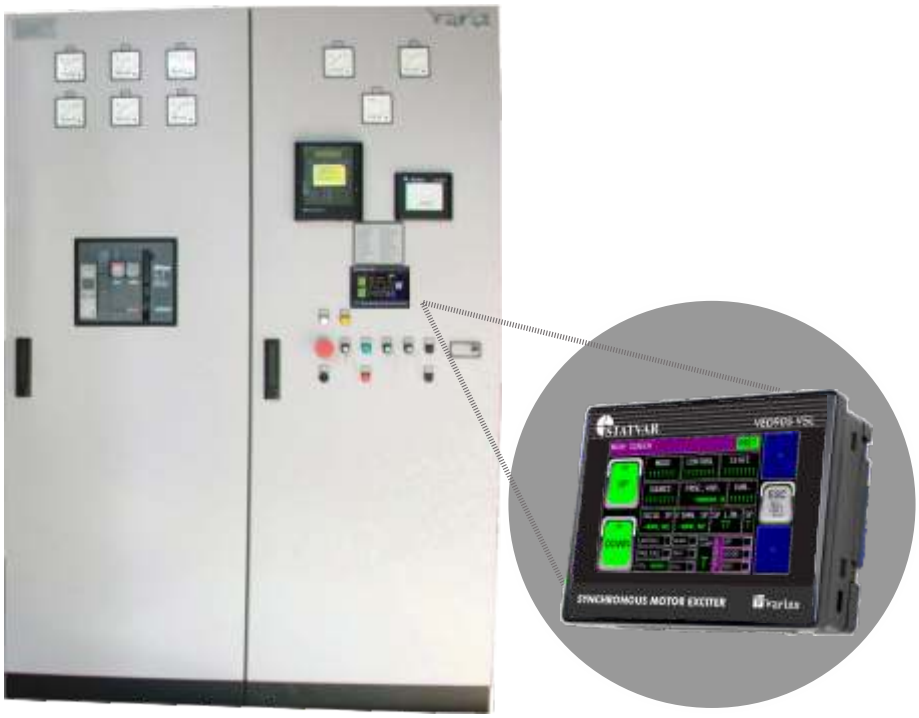
BASIC COMPONENTS OF THE SYSTEM

Controller Module

Cable Connection Example

Power module

Interconnection Cable



TECHNICAL SPECIFICATIONS

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

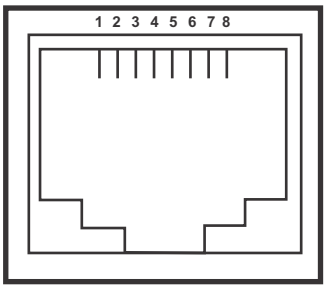
CAN or CsCAN (OPT)

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.

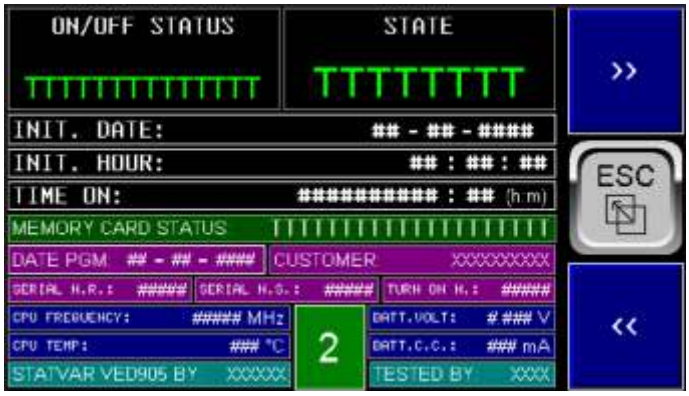
MJ 2 PORT	
PIN	SIGNAL
1	RX+/TX+
2	RX-/TX-
3	-
4	-
5	+5 V
6	0 V
7	-
8	-
Output Power Supply Max 150 mA	

MAIN SCREENS FOR OPERATION

MAIN MENU, (ESC) INFO SCREENS

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

INFORMATION SCREENS



ATTENTION: THE VED905 V5L RELAY LEAVES THE FACTORY WITH A PASSWORD TO ENTER THE PROGRAMMING MENU = «1» CHANGE IT, INSIDE THE MENU «RELAY CONFIG» TO ANY OTHER VALUE (ADVISABLE).

INFO SCREENS 1 to 5:

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

INFO SCREEN 1: There is a lot of information. When powering up the system this is the initial screen. Pressing ESC takes you to the main menu above.
VERS: Software version
ETHERNET LINK OK: Indicates that the Ethernet cable is properly connected to the RJ45 LAN port.
ETHERNET NOT LINKED: Flashes if the Ethernet cable is not properly connected and not communicating.
DATE, TIME and DAY OF WEEK: from the internal real time clock.
FAIL: Indicates fault not reset.
ALRM: Indicates Alarm active and Mute has not yet been executed (alarm output active).
TRIP: indicates that a trip has occurred and has not yet been reset (Trip output active.

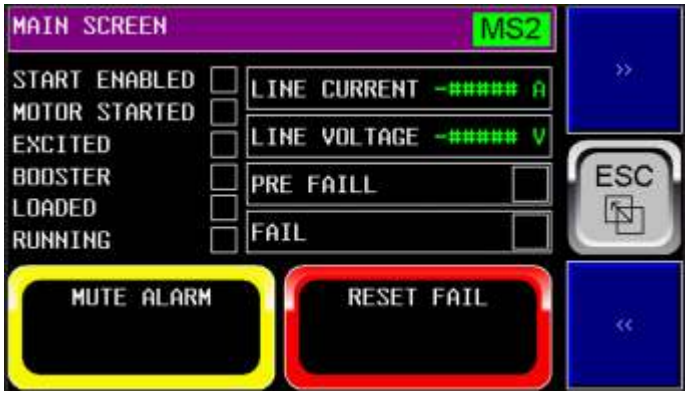
MAIN SCREENS FOR OPERATION

MAIN SCREEN MS1: Shows 20 fields:

MODE: Shows the regulation mode: Automatic, Man.Fld.Cur. or Man.Open Loop.
CONTROL: Displays the current variable or control mode: FLD AMP, PWR FACTOR, KVAR or MVAR, FLD AMP/PF, FLD AMP/VAR, OPEN LOOP, BLOCK TM, FORCE FLD.
STATE: Shows the state at the moment: STANDBY, STARTING, BOOSTER, FAIL, ALARM, EXCITED, LOADED, BLOCKED.
SOURCE: Shows the control source of the setpoints: UP/DOWN, KEYBOARD, U/D+KBD.
SEARCH VAR.: Shows the value of the variable being controlled.
VAR.: Shows the dimension or condition of the variable being controlled: LAG, LEAD, FORCED, A, FC, PF.
TOTAL SP: Shows the commanded setpoint value between 0 and 100%
FINAL SP: Shows the values of the actual setpoint after eventual 'forcing' or 'limiting', automatic from the system.
SP LIM: Shows if the setpoint is suffering automatic limitation to avoid operator error: NO, < , >. NO for no limitation, < for limiting lower value and > for limiting upper value.
SP: Shows which PID is currently operating: P or S. P for primary (constant current) and S for secondary (other modes).
LIMITING: Indicates whether any automatic limiting is currently in effect.
PRE FAIL: Indicates if a fault is about to be triggered after the programmed delay.
COOL.: Indicates the time for restarting to avoid overheating in the motor. This time is calculated automatically depending on operating conditions.

ALARM: Indicates active alarm
TRIP: Indicates active trip.
FAIL: Indicates active failure (not cleared on the clear fails screen.
PROC. CLAMP: Indicates if control clamping is taking place by calculations in the process and not by a value manually entered in the clamping program in the programming menu. N, < , >. N normal operation without clamping, < for lower value clamping and > for higher value clamping.
FORCE SP: Indicates that the setpoint value is forcing at the moment.
FORCE MODE: Indicates whether there is forcing in 'manual open loop' or 'manual field current' mode at the moment.
FORCE ANY: Indicates if there is any type of forcing at the moment, including Booster.
SP UP: Keyboard setpoint increase button.
SP DOWN: Keyboard setpoint decrease button.

MAIN SCREENS FOR OPERATION



MAIN SCREEN MS2: Show 10 fields:

START ENABLED: (if the engine is already cold enough to restart and there is no active fault at the moment).
MOTOR STARTED: on closing the Starting contact coming from the motor circuit breaker.
EXCITED: Whether the field was applied by the FAR contact and other conditions.
BOOSTER: Whether it is in conditions for Booster application during start-up or load coupling.
LOADED: If the FCX contact and/or the line current is above the programmed value.
RUNNING: If the starting sequence is finished.
LINE CURRENT: Shows the motor line current value.
LINE VOLTAGE: Shows the motor line voltage.
PRE FAIL: Flashes if a fault is about to be detected, before the programmed delay time elapses.
FAIL: if there is an active fault that is not acknowledged and not reset.
MUTE: Alarm silencing button.
RESET: Fault Reset button.

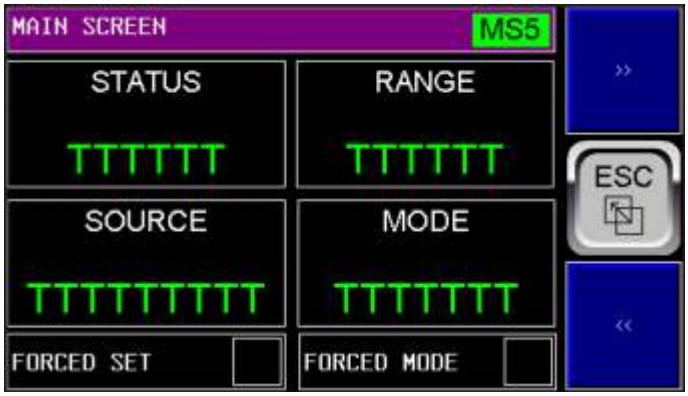
MAIN SCREEN MS4: Show 6 fields

TIME TO NEW START = 'COOL TIME': Indicates the time for a new start and a function of the motor cooling time depending on the operating conditions, starting and stopping.
ON/OFF STATUS: Shows the starting and stopping conditions of the motor according to the programmed cooling time in the programming menu: **Running - Cold** (if it started and the

MAIN SCREEN MS3: It shows 10 fields, 8 of which are measurements and readings, self-explanatory.
PF FORCED: Indicates whether there is currently a 'Force' of 'Power Factor' in order not to exceed a minimum value both in LAG and in LEAD.
COOL TIME: It indicates the time for a new start and the function of the motor cooling time depending on the operating, starting and stopping conditions.

programmed time has passed), **Running - Hot** (if it started and the programmed time has not yet passed) programmed time), **Stopped - Cold** (if stopped while already in the Running - Cold condition and the programmed time has passed) and **Stopped - Hot** (if stopped in the Running - Hot condition and the programmed cooling time has not yet elapsed..

MAIN SCREENS FOR OPERATION

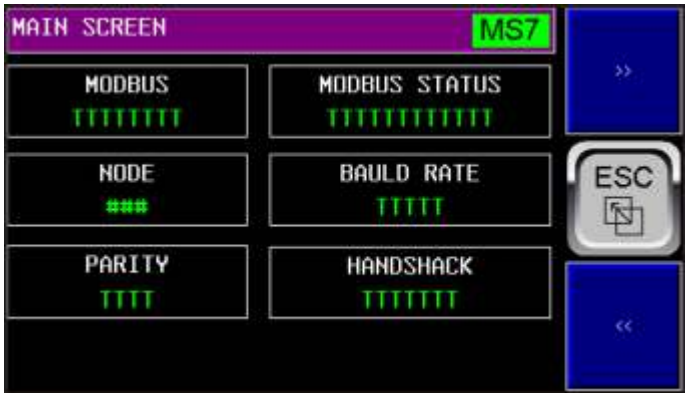


MAIN SCREEN MS5: Show 6 fields

STATUS: Shows operating conditions:
NORMAL: If there is no active fault
ALARM: If the alarm output is active
FAIL: If there is an active fault.
MUTED: If there is an active fault but the alarm has already been muted.
RANGE: shows the programmed range for the setpoints. 20% or 100%
SOURCE: Shows the control source of the setpoints: UP/DOWN, KEYBOARD, U/D+KBD.
MODE: Shows the regulation mode: Automatic, Man.Fld.Cur. or Man.Open Loop.
FORCE SET: Indicates that the setpoint value is forcing at the moment.
FORCE MODE: Indicates that manual forcing is taking place openloop or manual field current at the moment.

MAIN SCREEN MS6: Shows 9 fields of limiting, forcing and clamping conditions.

FORCED MODE: whether there is a forced mode of 'Manual Open Loop' or 'Manual Field Current'.
FORCED SET: If there is currently a forced setpoint value, calculated internally to protect against operator error.
The other fields are self explanatory.

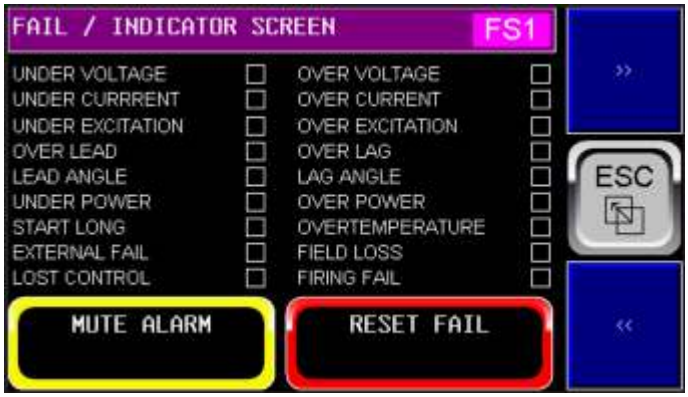


• **MAIN SCREEN MS7**: Shows 6 fields of Modbus communication parameters, as programmed. It is informational only.

MAIN SCREEN MS8: Shows 7 bargraphs - bars of values from 0 to 100% or 0 to 32000

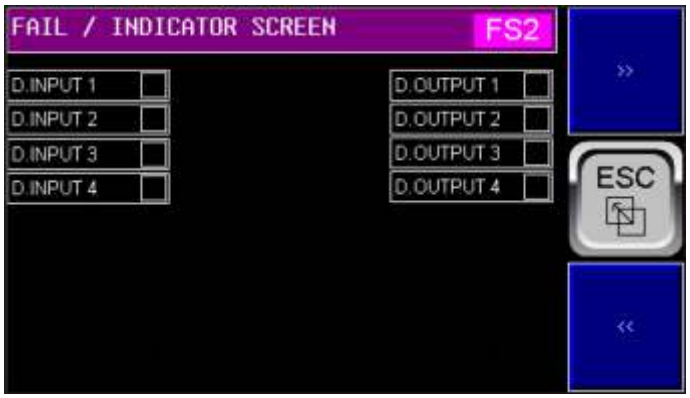
SP1: Primary Setpoint from 0 to 100%
Process 1: Value of the controlled variable read for actuation by Setpoint P and Primary PID.
SP2: Secondary Setpoint from 0 to 100%
Process 2: Value of the controlled variable read for actuation by Setpoint S and Secondary PID.
PID 1/2 SPF: Final SetPoinf value for the PID that is currently active. The final value may be different from the set value due to limitation, forcing and clamping calculated by the system. 0 to 32000
PID 1/2 PVF: Final Process Value for the PID that is currently active. The final value may be different from the value read due to Limiting, Forcing and Clamping calculated by the system. 0 to 32000.
PID 1/2 CVF: Refers to the value of the control output for the power module as a function of the error between SP and PV. 0 to 32000.
This information helps in the startup to establish the best stability of the system.

MAIN SCREENS FOR OPERATION



FAIL / INDICATOR SCREEN FS1: Shows the currently active faults.

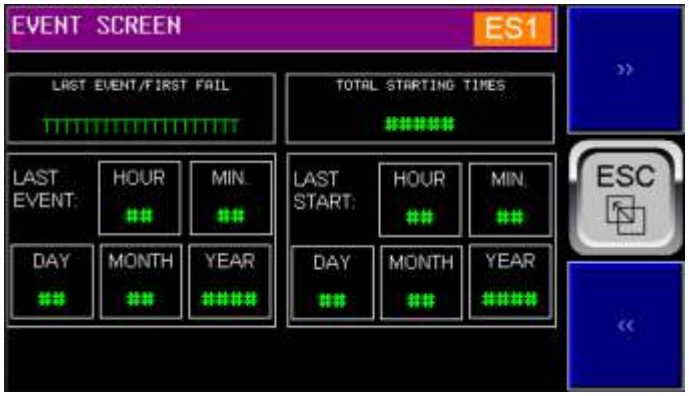
There is a **MUTE** button to silence the alarm output and a **RESET** button to reset it.



FAIL / INDICATOR SCREEN FS2: Shows the states of the digital inputs and digital outputs.

EVENT SCREEN ES2:

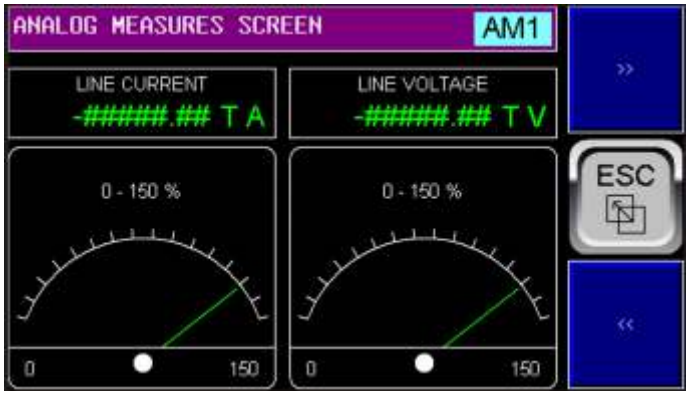
LAST STOP: Date and time of last stop.
TOTAL RUNNING HOURS: Total number of running hours. It can be reset by the user with the proper password.

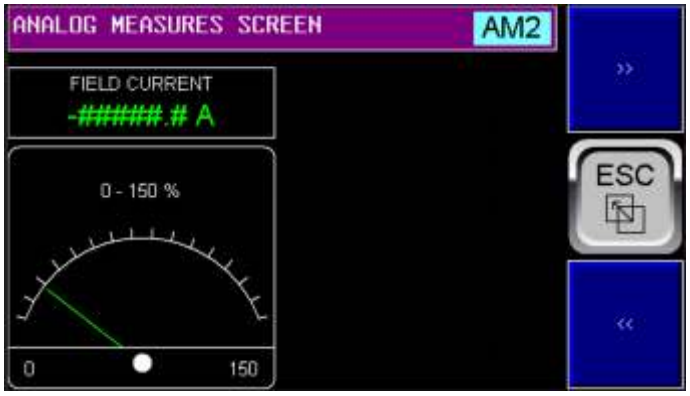


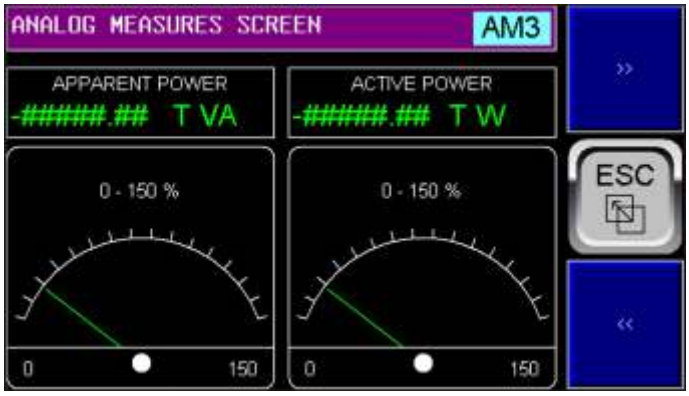
EVENT SCREEN ES1:

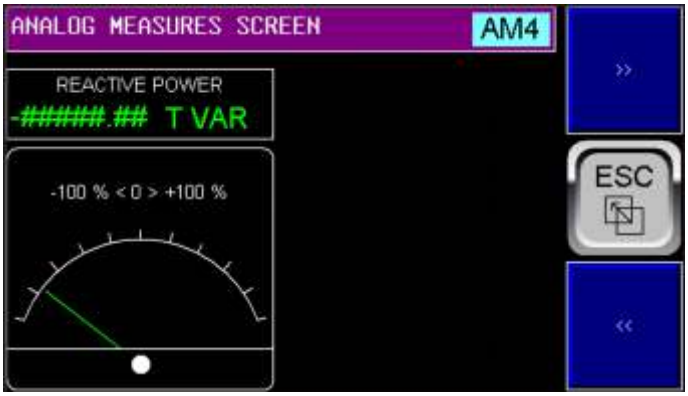
LAST EVENT / FIRST FAIL: It shows the last event or first fault: it can be Normal Starting or Normal Stopping or the programmed faults. Shows the date and time of the occurrence.
LAST START: Date and time of the last start
TOTAL STARTING TIMES: Number of total starts. Can be reset by user with password.

MAIN SCREENS FOR OPERATION



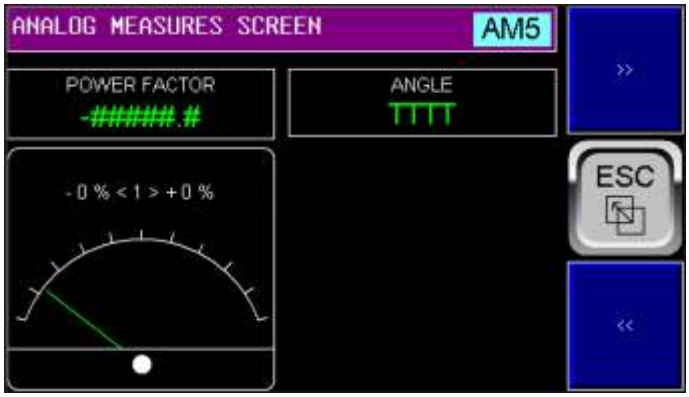




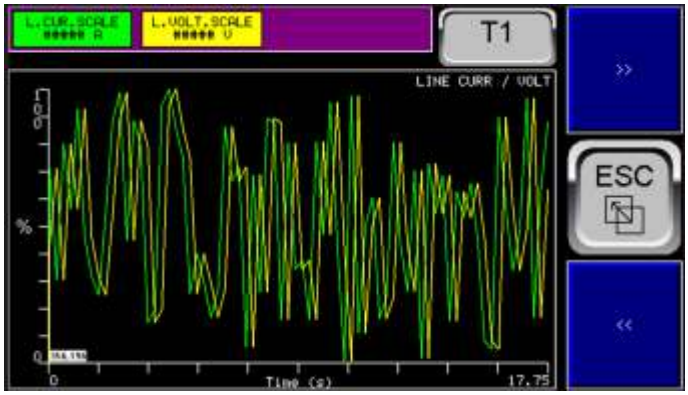


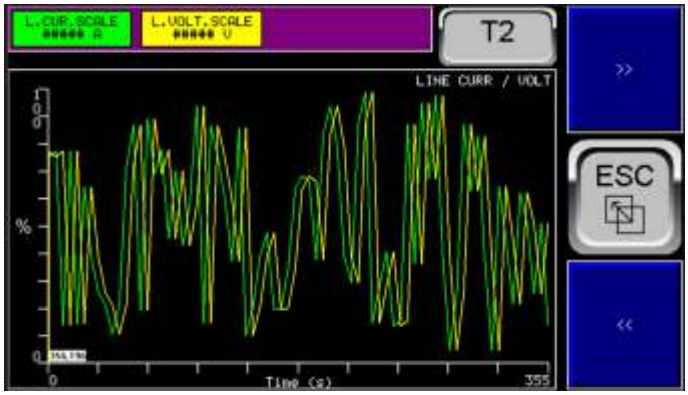
ANALOG MEASURES SCREEN AM1 to AM5:

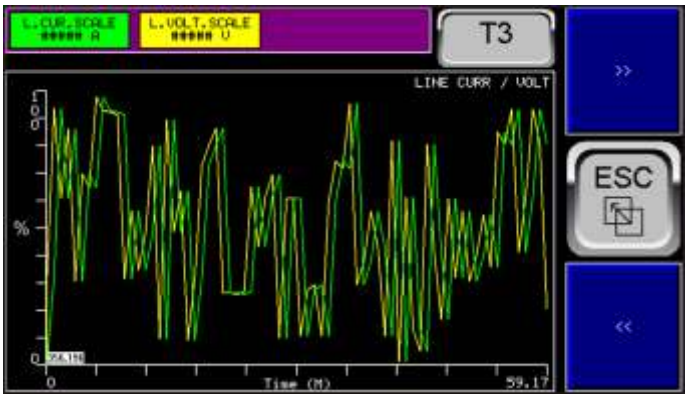
Shows main readings in analog mode, facilitating interpretation under certain analysis conditions. Scales and variables are indicated on each screen. The digital value is also shown.

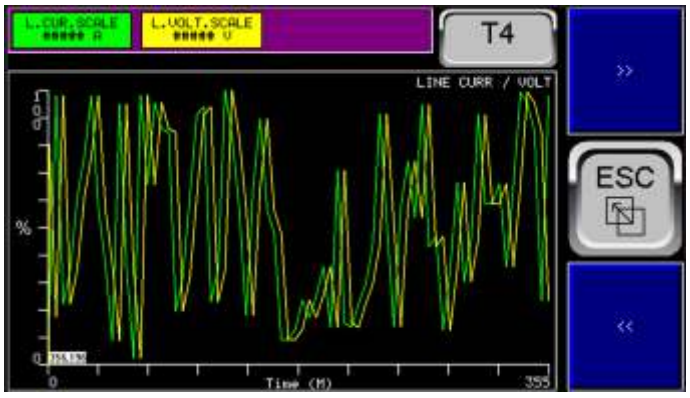


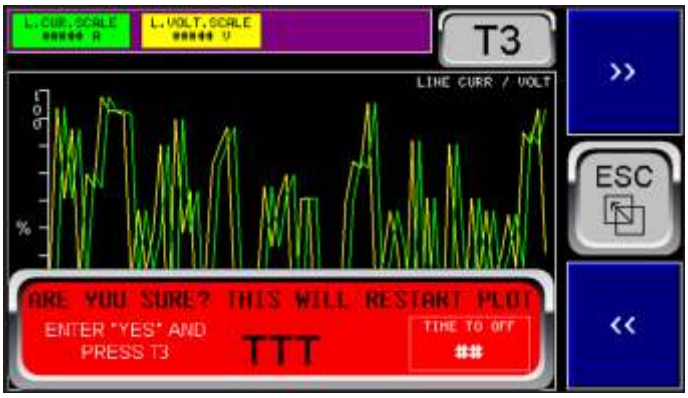
MAIN SCREENS FOR OPERATION

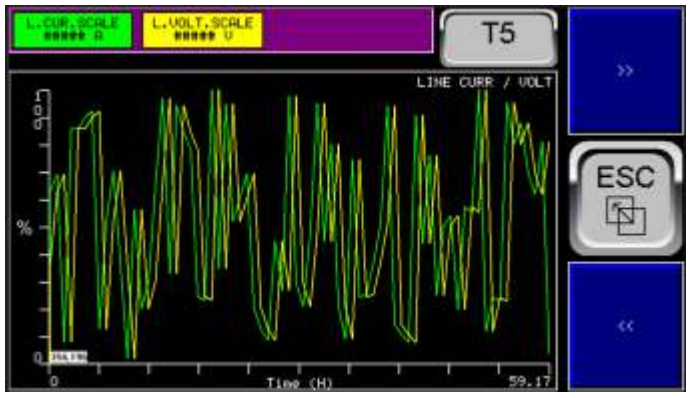












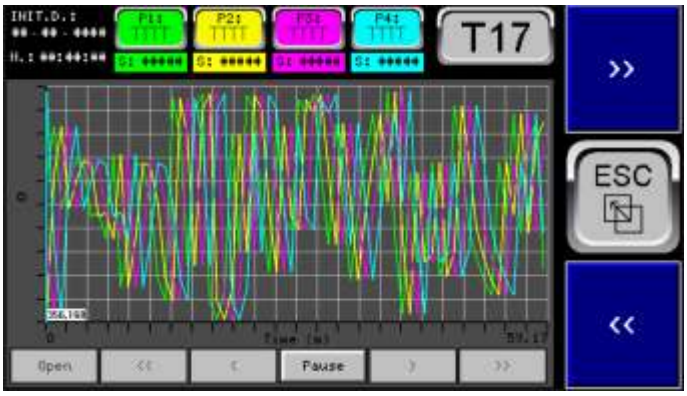
TREND SCREEN T1 to T5:

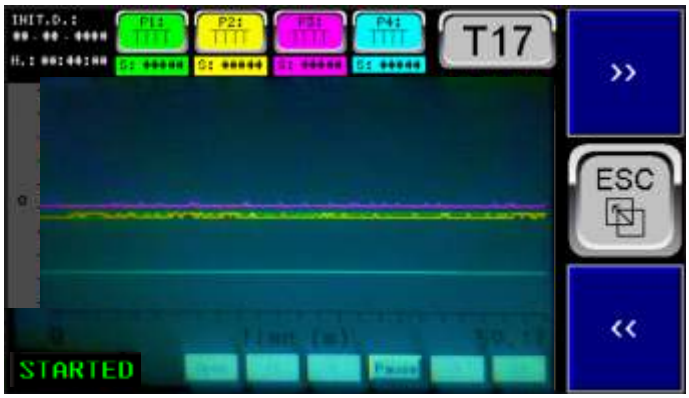
Shows the curves for Line Current and Line Voltage on different timescales (shown on the x-axis). On the Y axis, the scale is always from 0 to 100% of the scale value programmed in the Menu and shown above. For example, if the Line Current scale is 3000 A and the curve is at 50% it means that at this instant the current is 1500 A.

RESET OF CURVES

To restart, touch buttons T3 to T16.
When leaving screens T1 and T2 and returning, the curves restart, unlike the curves from T3 to T17.
When pressing the T3 to T16 key, a red button appears, asking if you are sure you want to restart the curves on the respective screen. If yes is entered, the operator will have 10 seconds to enter the answer «Yes» into the button and touch T3 to T16 again. Otherwise, the red button disappears and the curves are not reset.
This is intended to prevent inadvertently resetting a curve that has been plotted for a long time, thus losing observable data. See Example T3 Screen above.

MAIN SCREENS FOR OPERATION





TRENDINGS T17 (Retentive Trending Plot):

It is screen 17 of the 17 screens paged by the >> and << keys.
This resource provides the recording of the curves and data plotted in the same in the memory card of up to 32 Gb inserted in the appropriate slot in the relay.

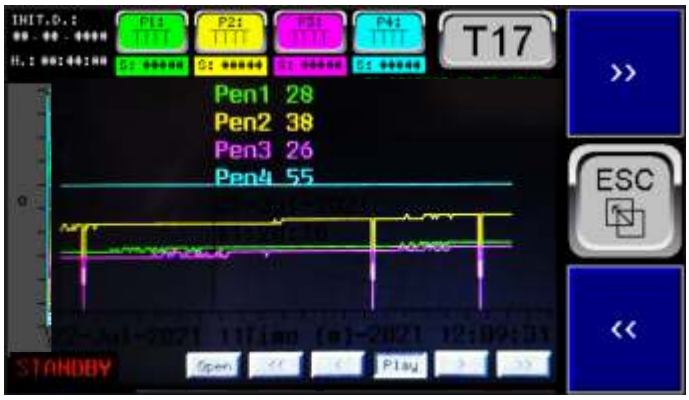
When initialized in the programming menu, the screen will display in the lower left corner the information in green letters of «**STARTED**» and a file folder will be automatically created on the card with the name Plotvxx where xx is the end of the year in progress . If it is not started, the message will be «**STANDBY**».
When in «Started», every hour a new file with extension csv will be created, inside this file, with the name composed of the day, month and full hour, without the minutes. Each file contains data separated by commas, which can be opened in Excell using the «Get Data» function within the «Data» tab and graphs can be generated. Each file is automatically saved hourly and will contain 360 readings of each of the 4 variables (4 traces). Each reading is taken every 10 seconds. They are light files of approximately 18 Kb each. Even if you leave the screen, the recordings continue and if the recording is interrupted by switching the relay off and on, a vertical black line appears at this point and the recording continues.

On the screen you can directly insert the plotted variables read and registered, one in each upper button with the colors corresponding to the trace (Line Current, Line Voltage, KW, KVA, KVAR, Field Current).

In the upper left corner, the date and time of the current plot start are shown.

Under each of the 4 variable insertion buttons the corresponding vertical scale is shown.

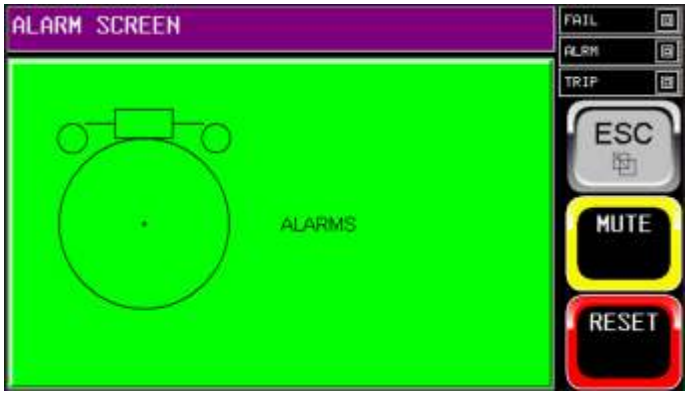
In the upper right corner is the screen index (T17). This button does not allow the Reset or restart of the curve and if touched it indicates with a sentence to enter the programming menu, turn off and on this resource to restart the curves. This is done to ensure that you do not inadvertently lose memory.

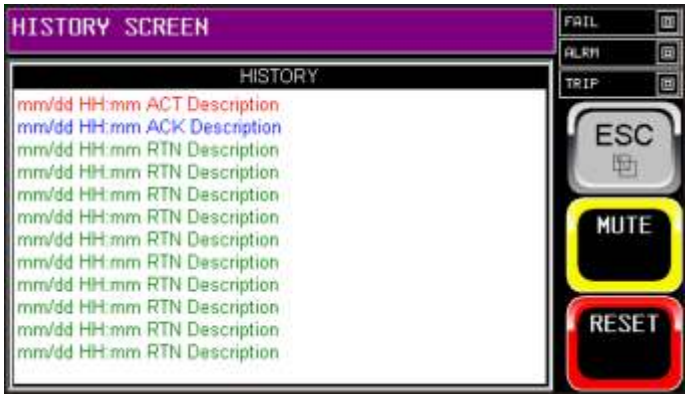


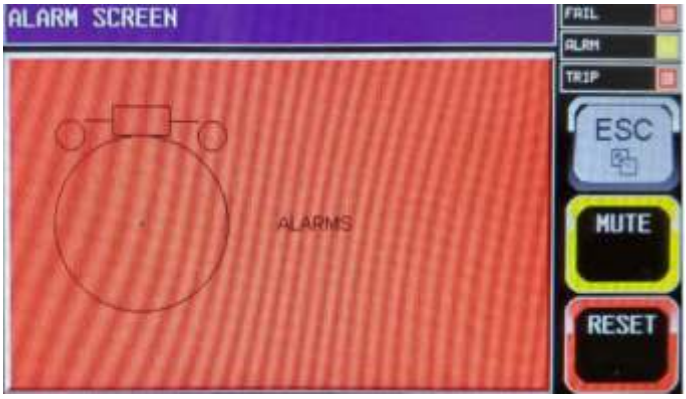
The recorded curves can be replayed on the screen by the relay itself too, to be examined. While they are being re-displayed, the user can pass the finger on the screen and moving the cursor (a vertical black line) being displayed then, for each point, the index of each trace and the corresponding value, with the due colors equal to the dashes beyond the date and time of recording.

At the bottom are the playback control keys. to know.
«**Pause**» or «**Play**» If it is showing «**Pause**», the operation is effectively in Play and the curves are being generated and plotted in real time and when pressing it changes to «**Play**» and the operation is effectively in Pause and the curves shown are previously recorded, obtained from the memory card. That is, the button actually shows the state it will enter when pressed.
«**<<**» This button allows you to search for the first curve recorded in the file.
«**>>**» This button allows you to search for the last curve recorded in the file.
«**<**» and «**>**» allow you to search the recorded sequential curves one by one in the sequence.
«**Open**» button that allows selecting a curve to be retrieved, by date and time, by informing in the window that opens the start date and time and end date and time of the period of interest, to restrict the number of curves to be browsed by the search keys above and facilitate its location.

MAIN SCREENS FOR OPERATION







ALARM SCREEN:

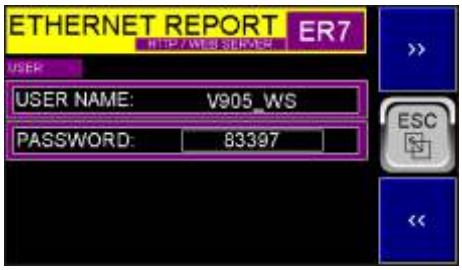
If it is green when entering, it means that there is no active alarm. If it is red, tap anywhere on the screen and the alarm list will open. The date and time of the occurrence can then be verified and, when Tapping the Ack or Ack All button, each fault or all faults can be recognized respectively. This will change the text color from red to blue and the alarm screen color will change to yellow on exiting with the Esc key while faults are not cleared.
You cannot clear the faults on this screen, only on the Clear screen where you can enter a specific password for this.

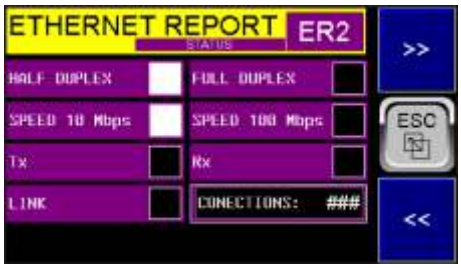
HISTORY SCREEN:

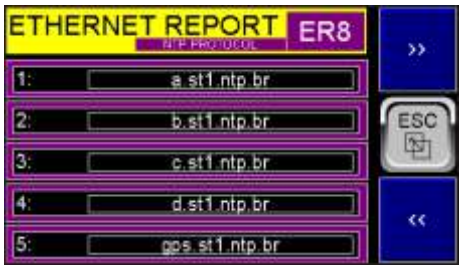
There will be the sequence of failures with day and time. When touching any point on the screen it will open to show more details.
Events will be in red. Acknowledged faults on the Alarm screen will be in blue and denials (RTN - Return) of faults will be in green.
Faults with Acknowledge - Ack) (acknowledged) will be in blue.
You cannot clear the faults on this screen, only on the Clear screen where you can enter a specific password for this.

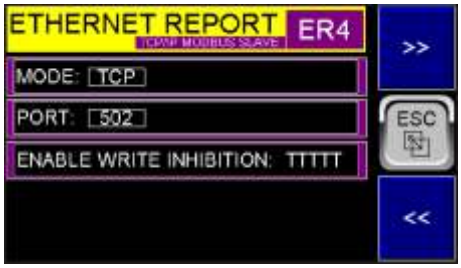
MAIN SCREENS FOR OPERATION

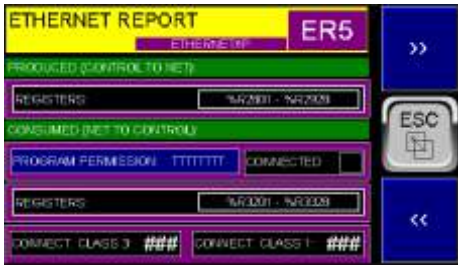
ETHERNET REPORT

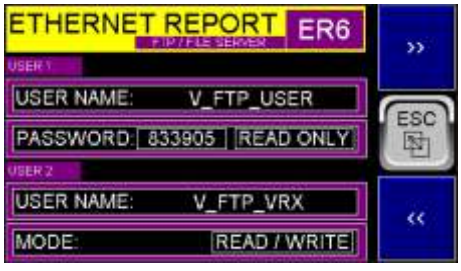












ETHERNET REPORT SCREEN 1 to 8:

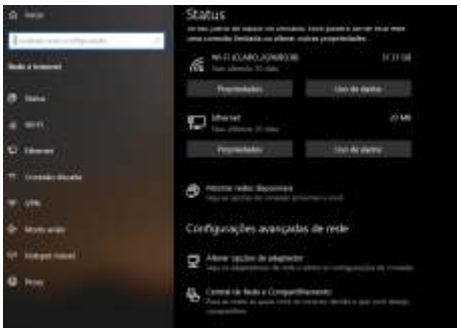
There are 8 screens that reproduce the Ethernet Programming Menu, where you can check the different programming conditions without being able to inadvertently change the programming. None of the screens allow commands or changes, with the exception of the **ER3** screen, where you can choose an address and command a PING action to check if a certain device on the network is responding.
Later on, the fields of all these screens will be detailed. Here we will only comment on the function of each one of them.
The **ER1** and **ER2** screens refer to the main Ethernet configuration parameters. On the **ER1** screen are the parameters and on the **ER2** screen are the Status of the connection.
The **ER3** Screen refers to the **ICMP - Internet Control Message Protocol** and it is possible to Ping the address of a certain equipment.
The **ER4** screen refers to the **TCP/IP protocol** - Transmission Control Protocol (Modbus TCP Server or Modbus Slave). Through this protocol, Modbus Over Ethernet communication can be carried out, using all the parameters and addresses described in the Modbus Map at the end of this manual.
The **ER5** screen refers to the Internet Protocol (Ethernet IP Server).
The **ER6** screen refers to the **FTP - 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 **NTP protocol - Network Time Protocol** through which you can obtain precise times from predefined NTP servers.

TESTING THE ETHERNET CONNECTION

USING A WINDOWS COMPUTER

A simplified way to test the ETHERNET connection is described below, using simple executable software provided by Varixx or any similar program available on the world wide web). Let's consider here the explanation using the executable **pyModbusTCPV5**

1- Initially connect the suitable RJ45 cable between the computer and the **LAN** port of the **VED905 V5L** relay and open the Windows Settings and select the **Network** and **Internet** option, which will open the properties screen that will contain content as shown below, among others.



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

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

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

4- Enter an IP address that is different from your local network, for example if your network is **192.168.0.1** and press OK. you must use a network that has the third digit different from it. For example, we use 192.168.1.11 and in the **pyModbusTCPV5** program we use 192.168.1.10 so the computer's address on the network will have the termination 11 and the **VED905 V5L** relay will have the termination 10. At this point the two devices should already be connected and exchanging data. On the **VED905 V5L** relay, on the Menu screen, choose option **16. REPORT** and then the option **ETHERNET REPORT / STATUS**. Then go to the **ER3** screen and activate the **START** option to test the connection with **PING**.

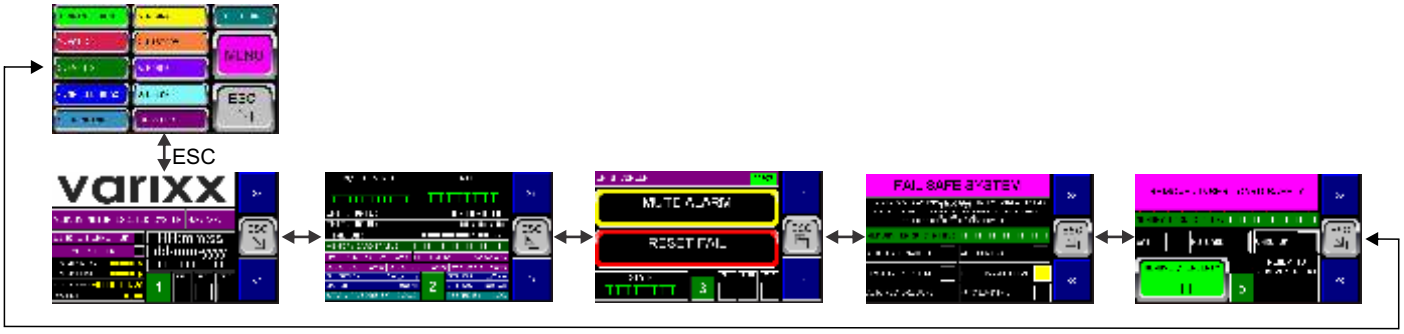
If the connection is OK, it will indicate a response time in the **PING RESPONSE TIME** field, which should be around 0.01 mS. If the connection is not OK, it will indicate **PING TIMEOUT** and the **PING RESPONSE TIME** field will be all ++++++.

If the connection is OK, open the **pyModbusTCPV5** executable program and enter the chosen address, in this example **192.168.1.10** and click Save Settings. Choose a register to be read, for example **%R4001**, which will contain the value of the first reading, 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, flags of type **%M** can be read.

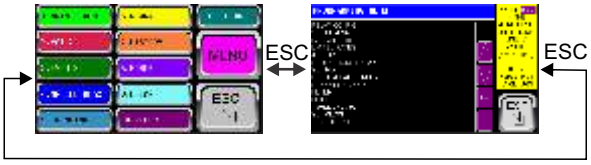
Attention: You can also write to the registers, but avoid this if you don't know that a certain register can be overwritten, as it could change configuration parameters of the VED905 V5L relay.
Never use this type of test with the VED905 operating with the engine.

SCREEN FLOW

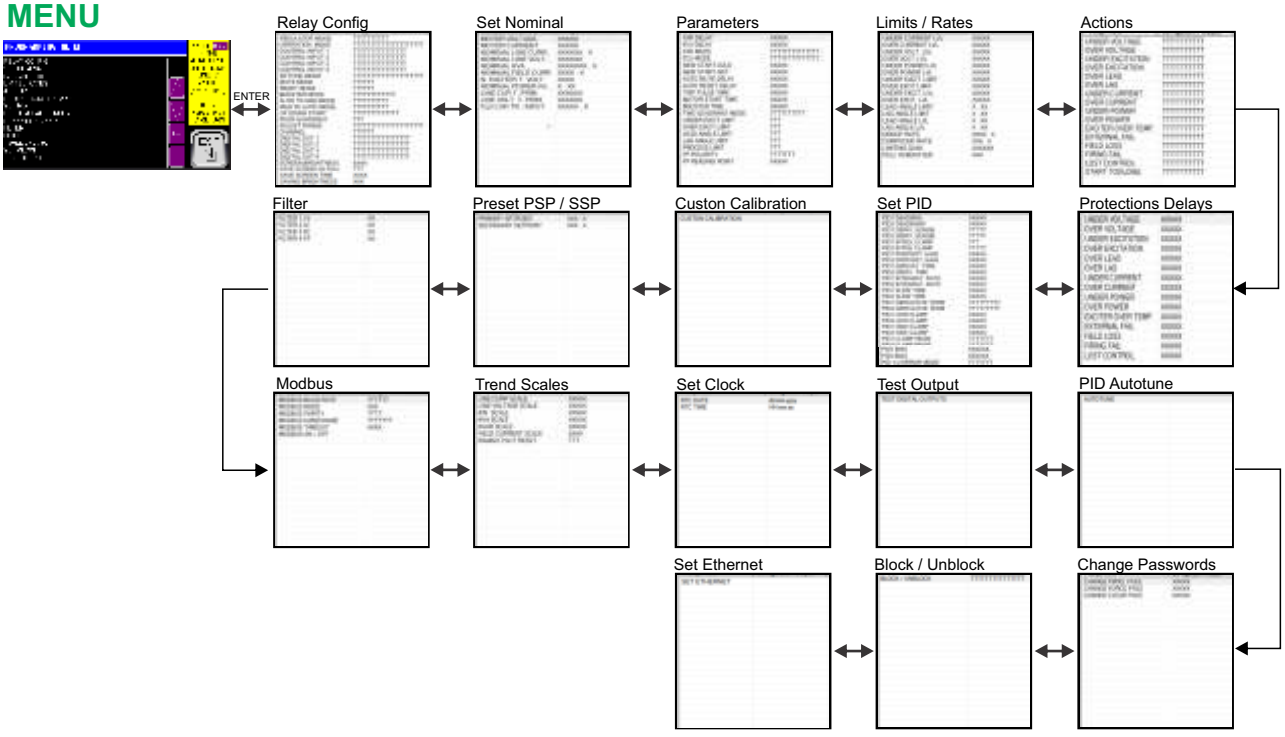
INFO SCREENS



MENU - ENTER

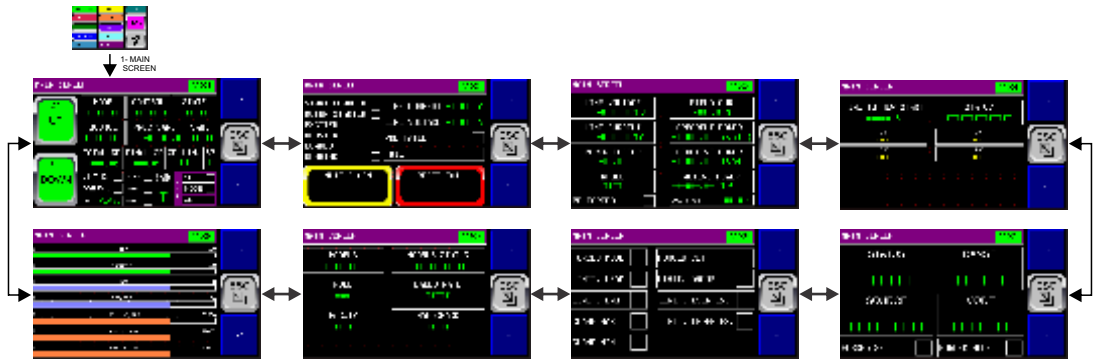


MENU



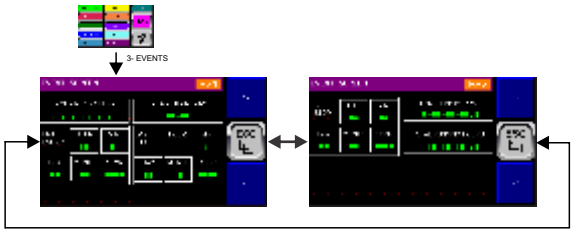
SCREEN FLOW

1- MAIN SCREN

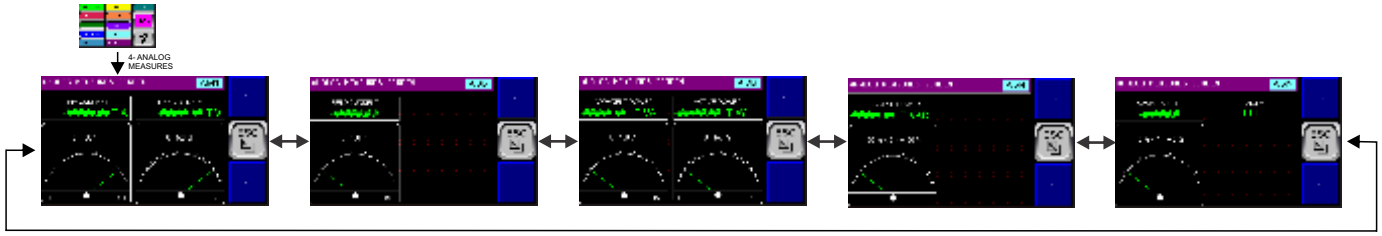


2- FAILS / INDICTOR

3- EVENTS

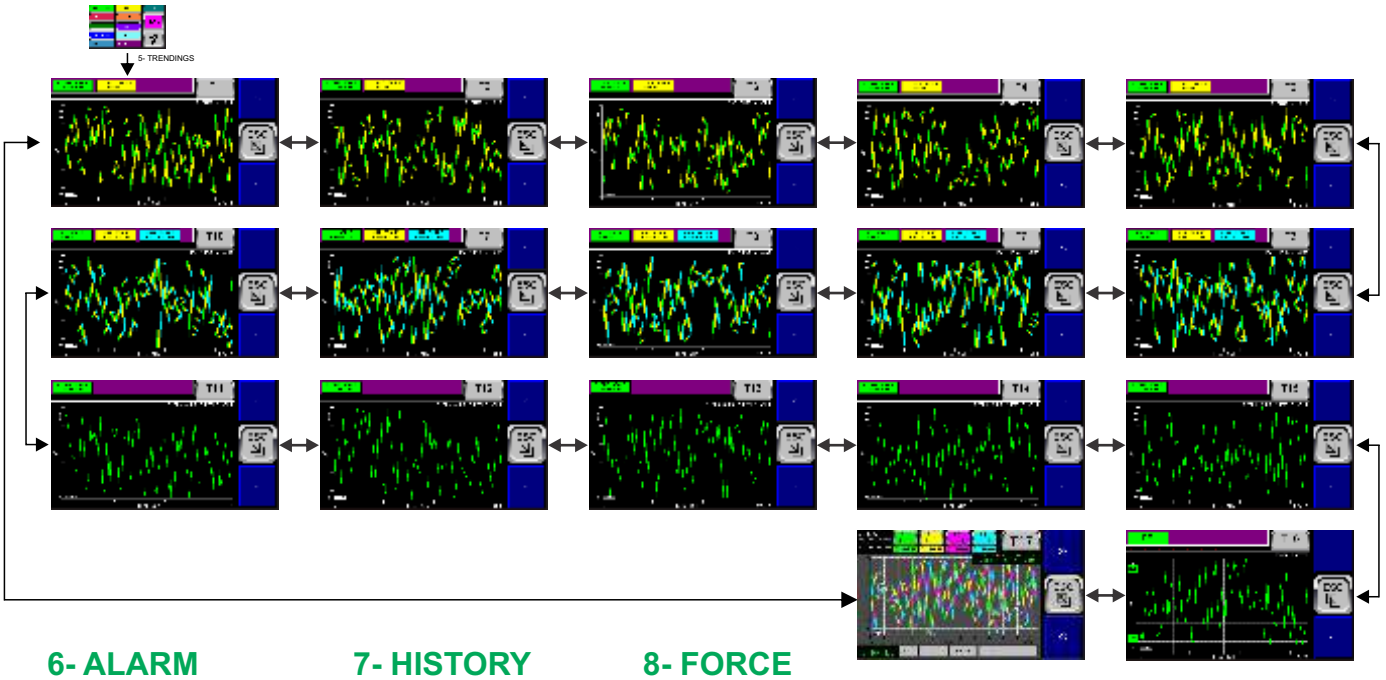


4- ANALOG MEASURES

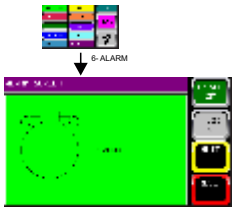


SCREEN FLOW

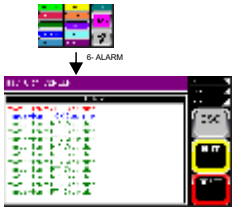
5- TRENDINGS



6- ALARM

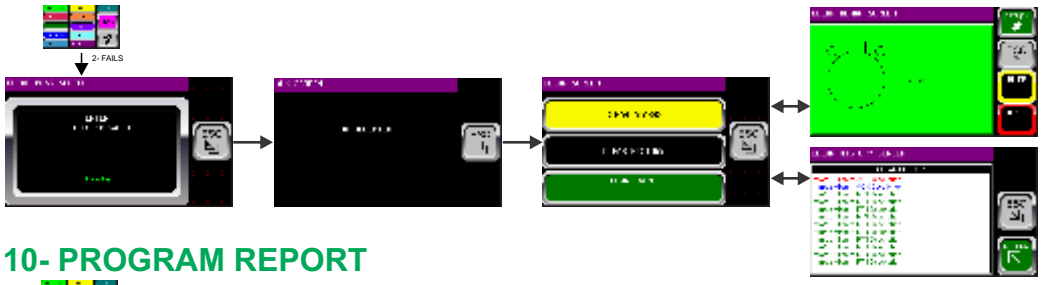


7- HISTORY



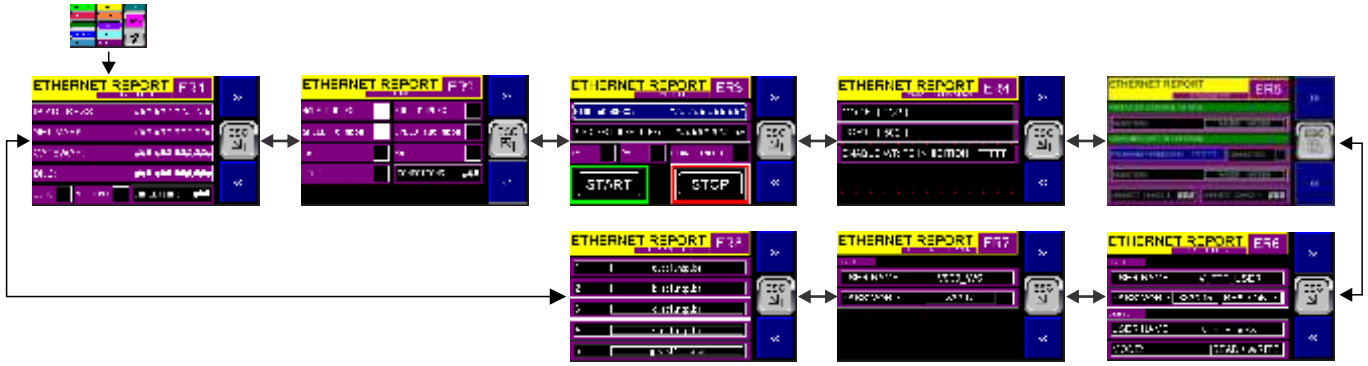
8- FORCE

9- CLEAR



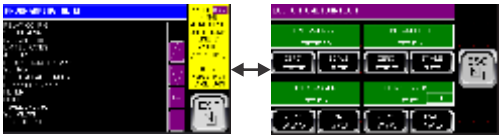
10- PROGRAM REPORT

11- ETHERNET REPORT

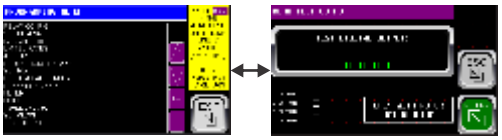


SCREEN FLOW

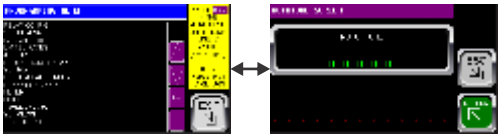
CUSTON CALIBRATION



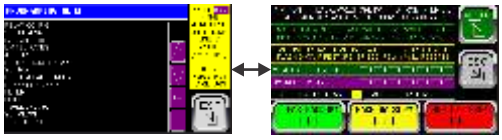
TEST DIGITAL OUTPUTS



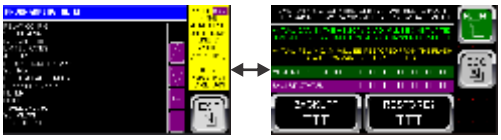
AUTOTUNE



FLASH BACKUP

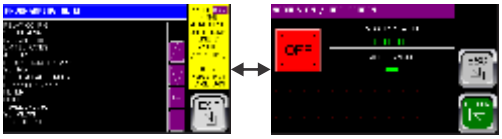


CLONE PARAMETERS



FACTORY CALIBRATION

MODBUS ON / OFF



TIME TO MUTE / RESET SCREEN

ETHERNET PROGRAMMING

MODBUS OVER ETHERNET MAP FOR VED905L SYNCRONOUS MOTOR EXCITATION RELAY						
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 Relay 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 due to segurity reasons.						
However, it is allowed to send some commands via the Ethernet connection.						
IN THE PLC CONNECTION PARAMETER, USE "100" FOR THE ASSEMBLY INSTANCE INPUT WITH SIZE = 128 AND "101" FOR THE ASSEMBLY INSTANCE OUTPUT WITH SIZE =128						
CONSUMED	CONTROLLER TAGS	REGISTER	FUNCTION	DATA	NOTE	
%R3201	O.Data[100]	INTEGER 16 BITS	TICK MUTE	1= MUTE // 0 = DO NOTHING	SEND COMAND MUTE TO RELAY	
%R3202	O.Data[101]	INTEGER 16 BITS	TICK RESET	1= RESET // 0 = DO NOTHING	SEND COMAND RESET TO RELAY	
%R3203	O.Data[102]	INTEGER 16 BITS	TICK RESET THE FORCE MODE	1= RESET THE MODE TO NORMAL // 0 = DO NOTHING	TURN OFF THE FORCE COMMAND IF IT IS ACTIVE	CAUTION
%R3204	O.Data[103]	INTEGER 16 BITS	TICK FORCE MANUAL OPEN LOOP	1= FORCE MANUAL OPEN LOOP // 0 = DO NOTHING	SEND FORCE COMMANTO TO CHANGE TO MANUAL OPEN LOOP	CAUTION
%R3205	O.Data[104]	INTEGER 16 BITS	TICK FORCE MANUAL FIELD CURRENT	1= FORCE MANUAL FIELD CURR. // 0 = DO NOTHING	SEND FORCE COMMANTO TO CHANGE TO MANUAL FIELD CURR	CAUTION
%R3206	O.Data[105]	INTEGER 16 BITS	TICK SET POINT UP	0>1 TICK INCREMENT SETPOINT BY 0.01 %	EACH ACTIVATION SENDS A SINGLE UP PULSE	CAUTION
%R3207	O.Data[106]	INTEGER 16 BITS	TICK SETPOIT DOWN	0>1 TICK DECREMENT SETPOINT BY 0.01 %	EACH ACTIVATION SENDS A SINGLE DOWN PULSE	CAUTION
%R3208	O.Data[107]	INTEGER 16 BITS	SETPOINT VELOCITY 1	CHANGE SETPOINT VELOCITY TO 0.05 %	IF <ON> THE SETPOINT INCREMENT VELOCITY IS 5X HIGHER	CAUTION
%R3209	O.Data[108]	INTEGER 16 BITS	SETPOINT VELOCITY 2	CHANGE SETPOINT VELOCITY TO 0.1 %	IF <ON> THE SETPOINT DECREMENT VELOCITY IS 5X HIGHER	CAUTION
%R3210 - %R3328		INTEGER 16 BITS	RESERVED			

PRODUCED	CONTROLLER TAGS	REGISTER	FUNCTION	DATA	NOTE	
%R2801	I.Data[0]	INTEGER 16 BITS	ALARM ACTIVE	0 = NO // 1 = YES		
%R2802	I.Data[1]	INTEGER 16 BITS	TRIP ACTIVE	0 = NO // 1 = YES		
%R2803	I.Data[2]	INTEGER 16 BITS	FAIL ACTIVE	0 = NO // 1 = YES		
%R2804	I.Data[3]	INTEGER 16 BITS	SETPOINT FORCED	0 = NO // 1 = YES		
%R2805	I.Data[4]	INTEGER 16 BITS	OPERATION MODE FORCED	0 = NO // 1 = YES		
%R2806	I.Data[5]	INTEGER 16 BITS	RESERVED			
%R2807	I.Data[6]	INTEGER 16 BITS	LIMITING	0 = NO // 1 = YES		
%R2808	I.Data[7]	INTEGER 16 BITS	OPERATION MODE	0= AUTOMATIC // 1= MANUAL OPEN LOOP // 1 = MANUAL FIELD CURRENT		
%R2809	I.Data[8]	INTEGER 16 BITS	MAIN VARIABLE AT THE MOMENT	1= FIELD AMP // 2=PWR FACTOR // 3= KVAR // 4= MVAR // 5= FLD A/PF // 6 = FLD A/ VAR //	7= OPEN LOOP // 8= TIME BLOCKED // FORCED FIELD CURRENT	
%R2810	I.Data[9]	INTEGER 16 BITS	ACTUAL STATE	1= INHIBIT // 2= STANDBY // 3= STARTING // 4= BOOSTER // 5= FAIL // 6= ALARM ACTIVE //	7- EXCITED // 8= LOADED // 9= BLOCKED	
%R2811	I.Data[10]	INTEGER 16 BITS	MAIN VARIABLE UNITY / INDICATOR	1= LAG //1= LEAD // 2= NONE // 3= FORCED // 4= AMP // 5= FILD CURR // 6= PF	7- LINE VOLT // 8 = S // FIELD VOLT	
%R2812	I.Data[11]	INTEGER 16 BITS	SETPOINT LIMIT REACHED	0= NO // 1= LOWER LIMIT REACHED // 2= UPPER LIMIT REACHED		
%R2813	I.Data[12]	INTEGER 16 BITS	ACTUAL SETPOINT ACTIVE	0= (P) PRIMARY // 1= (S) SECONDARY		
%R2814	I.Data[13]	INTEGER 16 BITS	START PERMISSION	0= NO // 1= YES		
%R2815	I.Data[14]	INTEGER 16 BITS	MOTOR STARTED	0= NO // 1= YES		
%R2816	I.Data[15]	INTEGER 16 BITS	EXCITED (FAR ACTIVE)	0= NO // 1= YES		
%R2817	I.Data[16]	INTEGER 16 BITS	BOOSTER ACTIVE	0= NO // 1= YES		
%R2818	I.Data[17]	INTEGER 16 BITS	LOADED (FCX ACTIVE)	0= NO // 1= YES		
%R2819	I.Data[18]	INTEGER 16 BITS	MOTOR RUNNING (END OF STARTING)	0= NO // 1= YES		
%R2820	I.Data[19]	INTEGER 16 BITS	MODE FAIL ACTIVE	0= NO // 1= YES		
%R2821	I.Data[20]	INTEGER 16 BITS	PROCESS LIMIT REACHED	0= NO // 1= LOWER LIMIT REACHED // 2= UPPER LIMIT REACHED		
%R2822	I.Data[21]	INTEGER 16 BITS	RESERVED			
%R2823	I.Data[22]	INTEGER 16 BITS	ADJUST RANGE	0= +/- 20% // 1= +/-100%		
%R2824	I.Data[23]	INTEGER 16 BITS	RESERVED			
%R2825	I.Data[24]	INTEGER 16 BITS	LEAD LIMIT REACHED	0= NO // 1= YES		
%R2826	I.Data[25]	INTEGER 16 BITS	LAG LIMIT REACHED	0= NO // 1= YES		
%R2827	I.Data[26]	INTEGER 16 BITS	UPPER POD CLAMPING REACHED	0= NO // 1= YES		
%R2828	I.Data[27]	INTEGER 16 BITS	LOWER POD CLAMPING REACHED	0= NO // 1= YES		
%R2829	I.Data[28]	INTEGER 16 BITS	DROOP LIMIT REACHED	0= NO // 1= YES		
%R2830	I.Data[29]	INTEGER 16 BITS	OVER EXCITATION LIMIT REACHED	0= NO // 1= YES		
%R2831	I.Data[30]	INTEGER 16 BITS	UNDER EXCITATION LIMIT REACHED	0= NO // 1= YES		
%R2832	I.Data[31]	INTEGER 16 BITS	ALARM UNACKNOWLEDGED	0= NO // 1= YES		
%R2833	I.Data[32]	INTEGER 16 BITS	ALARM UNCLEARED	0= NO // 1= YES		
%R2834	I.Data[33]	INTEGER 16 BITS	NO CARD IN SLOT FAIL	0= NO // 1= YES		
%R2835	I.Data[34]	INTEGER 16 BITS	CARD OK	0= NO // 1= YES		
%R2836	I.Data[35]	INTEGER 16 BITS	UNDER VOLTAGE FAIL	0= NO // 1= YES		
%R2837	I.Data[36]	INTEGER 16 BITS	OVER VOLTAGE FAIL	0= NO // 1= YES		

PRODUCED	CONTROLLER TAGS	REGISTER	FUNCTION	DATA	NOTE	
%R2838	I.Data[37]	INTEGER 16 BITS	UNDER CURRENT FAIL	0= NO // 1= YES		
%R2839	I.Data[38]	INTEGER 16 BITS	OVER CURRENT FAIL	0= NO // 1= YES		
%R2840	I.Data[39]	INTEGER 16 BITS	UNDER EXCITATION FAIL	0= NO // 1= YES		
%R2841	I.Data[40]	INTEGER 16 BITS	OVER EXCITATION FAIL	0= NO // 1= YES		
%R2842	I.Data[41]	INTEGER 16 BITS	LEAD ANGLE FAIL	0= NO // 1= YES		
%R2843	I.Data[42]	INTEGER 16 BITS	LAG ANGLE FAIL	0= NO // 1= YES		
%R2844	I.Data[43]	INTEGER 16 BITS	RESERVED	0= NO // 1= YES		
%R2845	I.Data[44]	INTEGER 16 BITS	RESERVED	0= NO // 1= YES		
%R2846	I.Data[45]	INTEGER 16 BITS	UNDER POWER FAIL	0= NO // 1= YES		
%R2847	I.Data[46]	INTEGER 16 BITS	OVERPOWER FAIL	0= NO // 1= YES		
%R2848	I.Data[47]	INTEGER 16 BITS	START TOO LONG FAIL	0= NO // 1= YES		
%R2849	I.Data[48]	INTEGER 16 BITS	OVERTEMPERATURE FAIL	0= NO // 1= YES		
%R2850	I.Data[49]	INTEGER 16 BITS	EXTERNAL FAIL	0= NO // 1= YES		
%R2851	I.Data[50]	INTEGER 16 BITS	FILED LOSS FAIL	0= NO // 1= YES		
%R2852	I.Data[51]	INTEGER 16 BITS	LOST OF CONTROL FAIL	0= NO // 1= YES		
%R2853	I.Data[52]	INTEGER 16 BITS	FIRING IGBT FAIL	0= NO // 1= YES		
%R2854	I.Data[53]	INTEGER 16 BITS	EXCESS OPERATINH HOURS ALARM	0= NO // 1= YES		
%R2855	I.Data[54]	INTEGER 16 BITS	MEMORY CARD FAIL	0= NO // 1= YES		
%R2856	I.Data[55]	INTEGER 16 BITS	MOTOR STATUS	0= COOLED // 1= RUNNING COLD // 2= RUNNING HOT // 3= STOPPED COLD // 4= STOPPED HOT		
%R2857	I.Data[56]	INTEGER 16 BITS	TIME TO NEW START	IN SECONDS		
%R2858	I.Data[57]	INTEGER 16 BITS	PRIMARY SETPOINT %	AS READED		
%R2859	I.Data[58]	INTEGER 16 BITS	SECONDARY SETPOINT %	AS READED		
%R2860	I.Data[59]	INTEGER 16 BITS	PRIMARY PROCESS VALUE %	AS READED		
%R2861	I.Data[60]	INTEGER 16 BITS	SECONDARY PROCESS VALUE %	AS READED		
%R2862	I.Data[61]	INTEGER 16 BITS	NOMINAL MOTOR VOLTAGE (V)	AS READED		
%R2863	I.Data[62]	INTEGER 16 BITS	NOMINAL MOTOR CURRENT (A)	AS READED		
%R2864	I.Data[62]	INTEGER 16 BITS	LINE CURRENT %	AS READED		
%R2865	I.Data[63]	INTEGER 16 BITS	LINE VOLTAGE %	AS READED		
%R2866	I.Data[64]	INTEGER 16 BITS	FIELD CURRENT %	AS READED		
%R2867	I.Data[65]	INTEGER 16 BITS	(VA) APARENTE POWER %	AS READED		
%R2868	I.Data[66]	INTEGER 16 BITS	(W) ACTIVE POWER %	AS READED		
%R2869	I.Data[67]	INTEGER 16 BITS	(VAR) REACTIVE POWER %	AS READED		
%R2870	I.Data[68]	INTEGER 16 BITS	POWER FACTOR %	AS READED		
%R2871	I.Data[69]	INTEGER 16 BITS	TOTAL EXCITATION TIMES	AS READED		
%R2872	I.Data[70]	INTEGER 16 BITS	LAST EVENT HOUR	AS READED		
%R2873	I.Data[71]	INTEGER 16 BITS	LAST EVENT MINUTES	AS READED		
%R2874	I.Data[72]	INTEGER 16 BITS	LAST EVENT DAY	AS READED		
%R2875	I.Data[73]	INTEGER 16 BITS	LAST EVENT MONTH	AS READED		
%R2876	I.Data[74]	INTEGER 16 BITS	LAST EVENT YEAR	AS READED		

PRODUCED	CONTROLLER TAGS	REGISTER	FUNCTION	DATA	NOTE	
%R2877	I.Data[75]	INTEGER 16 BITS	LAST EXCITATION HOUR	AS READED		
%R2878	I.Data[76]	INTEGER 16 BITS	LAST EXCITATION MINUTES	AS READED		
%R2879	I.Data[77]	INTEGER 16 BITS	LAST EXCITATION DAY	AS READED		
%R2880	I.Data[78]	INTEGER 16 BITS	LAST EXCITATION MONTH	AS READED		
%R2881	I.Data[79]	INTEGER 16 BITS	LAST EXCITATION YEAR	AS READED		
%R2882	I.Data[80]	INTEGER 16 BITS	LAST DESEXCITATION HOUR	AS READED		
%R2883	I.Data[81]	INTEGER 16 BITS	LAST DESEXCITATION MINUTES	AS READED		
%R2884	I.Data[82]	INTEGER 16 BITS	LAST DESEXCITATION DAY	AS READED		
%R2885	I.Data[83]	INTEGER 16 BITS	LAST DESEXCITATION MONTH	AS READED		
%R2886	I.Data[84]	INTEGER 16 BITS	LAST DESEXCITATION YEAR	AS READED		
%R2887	I.Data[85]	INTEGER 16 BITS	RESERVED	AS READED		
%R2888	I.Data[86]	INTEGER 16 BITS	TIOTAL ALARMS	AS READED		
%R2889	I.Data[87]	INTEGER 16 BITS	TOTAL TRIPS	AS READED		
%R2890	I.Data[88]	INTEGER 16 BITS	REAL TIME CLOCK DAY	AS READED		
%R2891	I.Data[89]	INTEGER 16 BITS	REAL TIME CLOCK MONTH	AS READED		
%R2892	I.Data[90]	INTEGER 16 BITS	REAL TIME CLOCK YEAR	AS READED		
%R2893	I.Data[91]	INTEGER 16 BITS	REAL TIME CLOCK HOUR	AS READED		
%R2894	I.Data[92]	INTEGER 16 BITS	REAL TIME CLOCK MINUTES	AS READED		
%R2895	I.Data[93]	INTEGER 16 BITS	REAL TIME CLOCK SECONDS	AS READED		
%R2896	I.Data[94]	INTEGER 16 BITS	OPERATING TIME MINUTES	AS READED		
%R2897 -%R2898	I.Data[95]-I.Data[96]	DWORD 32 BITS	OPERATING TIME HOURS	AS READED	ATTENTION: <DWORD> TYPE WITH 32 BITS	
%R2899 - %R2900	I.Data[97]-I.Data[98]	REAL 32 BITS	TOTAL SET POINT %	AS READED	ATTENTION: <REAL WORD> TYPE WITH 32 BITS	
%R2901 - %R2902	I.Data[99]-I.Data[100]	REAL 32 BITS	LINE CURRENT (A)	AS READED	ATTENTION: <REAL WORD> TYPE WITH 32 BITS	
%R2903 - %R2904	I.Data[101]-I.Data[102]	REAL 32 BITS	LINE VOLTAGE (V)	AS READED	ATTENTION: <REAL WORD> TYPE WITH 32 BITS	
%R2905 - %R2906	I.Data[103]-I.Data[104]	REAL 32 BITS	FIELD CURRENT (A)	AS READED	ATTENTION: <REAL WORD> TYPE WITH 32 BITS	
%R2907 - %R2908	I.Data[105]-I.Data[106]	REAL 32 BITS	APARENT POWER (VA)	AS READED	ATTENTION: <REAL WORD> TYPE WITH 32 BITS	
%R2909 - %R2910	I.Data[107]-I.Data[108]	REAL 32 BITS	ACTIVE POWER (W)	AS READED	ATTENTION: <REAL WORD> TYPE WITH 32 BITS	
%R2911 - %R2912	I.Data[109]-I.Data[110]	REAL 32 BITS	REACTIVE POWER (VAR)	AS READED	ATTENTION: <REAL WORD> TYPE WITH 32 BITS	
%R2913 - %R2914	I.Data[111]-I.Data[112]	REAL 32 BITS	POWER FACTOR	AS READED	ATTENTION: <REAL WORD> TYPE WITH 32 BITS	
%R2915 - %R2916	I.Data[113]-I.Data[114]	REAL 32 BITS	NOMINAL APARENTE POWER (KVA)	AS READED	ATTENTION: <REAL WORD> TYPE WITH 32 BITS	
%R2917 - %R2918	I.Data[115]-I.Data[116]	REAL 32 BITS	NOMINAL LINE CURRENT (A)	AS READED	ATTENTION: <REAL WORD> TYPE WITH 32 BITS	
%R2919 - %R2920	I.Data[117]-I.Data[118]	DWORD 32 BITS	TOTAL LIFE HOUR	AS READED	ATTENTION: <DWORD> TYPE WITH 32 BITS	
%R2921	I.Data[119]	INTEGER 16 BITS	TOTAL LIFE MINUTES	AS READED		
%R2922	I.Data[120]	INTEGER 16 BITS	RESERVED			
%R2923 - %R2924	I.Data[121]-I.Data[122]	DWORD 32 BITS	TOTAL EXCITED HOUR	AS READED	ATTENTION: <REAL WORD> TYPE WITH 32 BITS	
%R2925	I.Data[123]-I.Data[124]	INTEGER 16 BITS	TOTAL EXCITED MINUTES	AS READED		
%R2926	I.Data[125]-I.Data[126]	INTEGER 16 BITS	RESERVED			
%R2927	I.Data[127]-I.Data[128]	INTEGER 16 BITS	RESERVED			

CODE

ORDER CODE
• Excitation System for Synchronous Motors: **VED905 V5L/xxxA/yyyV/m/n/p/r/zzz**
• **xxx** is the rated current of the power module.
• **yyy** is the ceiling voltage for the machine field.
• **m** is the power control mode: **T**=thyristors or **I**=IGBT
• **n** is the protocol inclusion option: **N**=No, **D**=Devinenet, **C**=Cscan
• **p** is the add Ethernet server option: **N**=No, **E**=Yes
• **r** is the option to include a memory card for operation in 'Fail Safe Mode': **0**=No, **F**= Yes
• **zzz** is the voltage of the cooling fans (127Vac or 220Vac).
• Interconnection Cable: **DB25-V5L**
• Replacement controller only: **VED905 V5LC**
• Replacement power module only: **VED905 V5LP/xxxA/yyyV/m/n/zzzVca/**

Complete System Example: **VED905 XL5/25A/200V/I/N/N/E/0/220VCA**
It would be a system with VED905 V5L controller + 25A Power Module and 200V field voltage, with IGBT control, without Devicenet or Cscan, without Ethernet, with memory card for 'Fail Safe' operation and with 220 VAC fans .

OTHER EXCITATION LINE ITEMS AVAILABLE:

• **STATVAR**:Complete panel for low voltage synchronous motor excitation control.
• **POWERAMP**: Complete Starting and Excitation System for Medium Voltage Synchronous Motors.
• **PLC605**: PLC with Touch Screen to control excitation systems.
• **VSA605A** - Shunt Amplifier (60 mV/5V isolated).
• **VP1020E** - Panel with Multiturn Potentiometer and digital scale.
• **VR8020** - Start Supervision Relay.
• **VR9045** - Field Application Relay.
• **VR9030A** - Earth Fault Relay.
• **VR9031A** - Field Overvoltage Relay.
• **VR9032A** - Field Overcurrent Relay.
• **VR9035A** - Synchronism Loss Relay (“Step Out”).
• **VR9034A** - Field Loss Relay.
• **M1** - M1 type Synchronism Module for internal use in Synchronous Motors.
• **M2** - Synchronism module type M2 for internal use in Synchronous Motors.
• **M3** - Synchronism Module type M3, Microprocessed, for internal use in Synchronous Motors.
• **Crowbar symmetrical**: from 50 to 1000 Amps.
• **Crowbar symmetrical**: from 50 to 1000 Amps.
• Other protection relays.
• Ultra-fast fuses.
• Power Transformers.
• Sensing transformers.
• Current Transformers.

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 are a pioneering company in Brazil and one of the first worldwide to manufacture digital excitation systems for Generators and Synchronous Motors, as well as Solid State Contactors. 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 GENERATORS AND SYNCHRONOUS MOTORS**
  Static Exciters, Control Box Controllers, Low and Medium Voltage Soft Starters, Semiconductors and Onno LED Luminaires.
- **PRODUCTION OF ALUMINUM AND HYDROGEN / OXYGEN**
  High Current Rectifiers, Solid State Contactors, Intelligent Relay for CCM, Online Thermography System and Arc Voltage Detection and Onno LED Luminaires.
- **BASE INDUSTRY, MINING AND STEEL ENGINEERING**
  Intelligent Relays for MCC's, Low and Medium Voltage Soft Starters, Solid State Contactors, AC/DC Converters for electromagnets, High Current Rectifiers, Online Thermography System, Arc Voltage Detection and Protection and Onno LED Luminaires.
- **OIL**
  Intelligent Relays for MCC's, Static Excitation, Low and Medium Voltage Soft Starters, Solid State Contactors, Online Thermography System, Arc Voltage Detection and Protection and Onno LED Luminaires.
- **PANEL BUILDERS**
  Intelligent Relays for CCM's, Online Thermography, Arc Voltage Detection and Protection System, Semiconductors, Power Supplies and Onno LED Luminaires.

Why Use STATVAR line?

- **FÃCIL PARA INSTALAR**
- **PROTEÇÕES INCORPORADAS**
- **ADEQUAÇÃO À MÁQUINA**
- **EVITA FALHAS POR ERRO DE OPERADOR**
- **TROPICALIZADO**
- **COMUNICAÇÃO EM REDE Modbus - Ethernet**

KNOW MORE!

EXCITATION SYSTEMS FOR SYNCHRONOUS MOTORS AND GENERATORS

- **Fully Digital**
- **Analog Versions Available**
- **Fully Programmable**
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