Electron

DVR – VOLTAGE REGULATOR RELAY

Catalog

INDEX

INTRODUCTION

Or ***Digital Voltage Regulator Relay - DVR*** it is designed to automatically monitor and regulate the voltage of changers under load from up to 51 TAP positions (ANSI 90); measure and display the deviation from the reference voltage; and control, through commands on the switch, the mains line voltage considering the compensations according to the previously programmed load profiles with up to 8 sets of different values with input by pre-established time or by external command.

As a reference, the **DVR** Can:

- Monitor up to 3 TP's (3 phases);
- Measure the flow of electric current up to 3 TC's (3 phases);
- Measure and indicate the position of the current, maximum, minimum and previous TAP;
- Indicate the Active, Reactive and Apparent Powers;
- Calculate the Power Factor (cos ϕ) of each phase measured with lag between TP and CT from 0° to 330° with automatic recognition and calculation;
- To act the interlock protection of the switch when there is overcurrent, overvoltage, undervoltage and inversion of the flow of electric current;
- Monitor the amount of switching and wear of the switchgear contacts by interrupted current and number of switching with the switchgear monitoring function;

The DVR Hardware uses state-of-the-art SMD type electronic components with reduced sizes of up to 0.04"x0.02" that are inserted into the boards with an automatic Pick**'n Place machine** with laser alignment, in order to ensure the quality of the assemblies, the boards are inspected by automatic cameras (**AIO)** without human interference to ensure that all technology implemented in the product has the best performance for the user for a long time. much longer life span. The main components are military grade for use in extreme application conditions, withstanding severe working conditions, they can be installed directly in the power transformer panel or reactors in panels in the yard of power substations (-20°C to 70°C), offshore platforms, chemical industries (resin and protected plates) or even places subject to seismic shocks. All these benefits used are the result of many years of experience and research. Our designs meet the levels of demand, supportability and reliability according to the most demanding standards in the world: **IEC, DIN, IEEE and ABNT.**

KEY FEATURES

- OLED **display** with a graphic capacity of 128 x 61 pixels, with contrast adjustment and inversion of background colors and letters, readable in any lighting condition, including directly exposed to the sun;
- Supply voltage from ± 48 to 260 Vdc or Vac 50/60Hz;
- Operating temperature from -20C to 70°C;
- Storage temperature from -50°C to 40°C;
- Multimeter function, voltage indication (Vca) of the 3 phases on the screen, current indication (AC) of the 3 phases, percentage deviation and value of the reference voltage, active, reactive and apparent power of the 3 phases, transformer load percentage, power factor (cos ϕ) and frequency of the 3 phases;
- Adjustable TP/CT lag from 0 to 330°, allowing TP and CT connections in different phases or in the 3 phases;
- 3 current inputs that use Split-Core sectionable CTs to measure up to 10 Amperes (AC);
- 1 resistive input (3 wires) for up to 5K Ohms or analog from 4 to 20 mA for indication of up to 51 TAP positions with automatic potentiometric crown pitch recognition;
- Front Micro USB for parameterization via UseEasy™ software;
- 1 RS-485 Digital Output **(ANSI/TIA/EIA-485-A)** in optical fiber or 2 wires with **MODBUS RTU** and **DNP3** (Level 2) slave Communication Protocol for remote access to all measured parameters;
- Auto Baud Rate from 2,400 to 57,600bps (Automatically Detects the Speed of the Communication Network);
- 1 RS485 Digital Output **(ANSI/TIA/EIA-485-A)** with **Proprietary** protocol (Slave/master) for parallelism management of up to 32 **DVRs** or **IPTP devices**;
- 8 sets of adjustment for line drop compensation by resistance and reactance adjustments or by the simplified voltage drop percentage method, (Z compensation) with programming by time or external command;
- Independent actuation times for raising and lowering voltage, with linear, step-linear, or intense curve timing modes;
- CDC lockout in case of user-configurable overcurrent, reverse current, and undervoltage;
- CDC blockage and/or rapid voltage decrease;
- Automatic switch lock triggered;
- 14 Programmable Relays of 6 Amperes/250 Vac;
- 3 programmable digital inputs (Dry Contact);
- 5 configurable analog outputs that can be from 0 to 1, 0 to 5, 0 to 10, 0 to 20 or 4 to 20 mA;
- Full reading of the resistance of the potentiometric crown and automatic calibration of the number of steps;
- Indication of simple numerical, bilateral numeric and alphanumeric reading;
- Remote commands through wired connections of the digital inputs or **MODBUS RTU** and **DNP3 L2** communication to give the RAISE / LOWER voltage commands or select the regulation set;
- Event warnings on the display with display of the alarm name and the relay that triggered;
- Through the UseEasy™ software, all equipment parameters can be saved in manipulable files that can be reconfigured other equipment;
- 14 LEDs for indication of the performance of the programmable relays with indication on the display of the acting event;
- Watchdog that supervises the integrity of the connection to the potentiometric crown, as well as the change of TAP when the command is sent;
- High mechanical strength housing, built entirely in DIN IEC **61544 standard aluminum;**
- Reduced size 98x98x98xmm;
- 2 years warranty;

TECHNICAL DATA

VOLTAGE REGULATOR RELAY – DVR	
Operating Voltage	48 to 265 Vdc/VAC 50/60Hz;
Operating Temperature	-20°C to +70°C;
Consumption	<15W;
Voltage Measurement Input	3 Phases – 0~280 Vac – 46/64 Hz;
Position measurement input;	From 1~51 positions – Crown up to 5,000 Ohms;
Dry Contacts Input	3 inputs for dry contacts (potential-free);
Input for Electrical Current Measurement	3 Split Core TC's from 0 to 10A;
Analog Output and Maximum Loads Options (5 outputs configurable on the device)	0 ... 1mA – 8000 Ohms;
	0 ... 5mA – 1600 Ohms;
	0 ... 10mA – 800 Ohms;
	0 ... 20mA – 400 Ohms;
	4 ... 20mA – 400 Ohms;
Maximum Error of Measurement Inputs	0.25% of the end of the scale;
Maximum Analog Output Error	0.25% of the end of the scale;
Outgoing Contacts	14 – Potential-free and programmable;
Maximum switching power	40W/250VA;
Maximum Switching Voltage	250 Vac/Vac;
Maximum Driving Current	6.0 A;
Network Serial Communication Port	**MODBUS RTU** and **DNP3 L2** (slave);
Auto Baud Rate and/or Fixed Speed	2,400 to 57,600 bts;
Front USB Port	Micro USB;
Datalogger	Micro SD 8GB v10 for data acquisition;
IEC 61554 DIN Box	98x98x98x mm – Aluminum;
Fixing the equipment	Flush Panel Mounting;
Degree of Protection (NBR IEC 60529)	IP 40 (Front), IP 20 (Connectors);
CURRENT TRANSFORMER – TC SPLITCORE/CLAMP	
Measurement Range	0 to 10 A;
Maximum Error of Measurement Inputs	1% of the end of scale;
Linearity	1% of the end of scale;
Operating Temperature	-40°C to +85°C;
Storage Temperature	-50°C to +60°C;

Table 1 – Technical Data

TYPE TRIALS MET

- Applied Voltage (IEC 60255-5): 2kV / 60Hz / 1 min. (against land);
- Voltage Impulse (IEC 60255-5): 1.2/50 µsec. / 5kV / 3 sec. and 3 sec. / 5 sec. Interval;
- Electrostatic Discharges (IEC 60255-22-2): Air mode = 8kV / Counted mode = 6 kV;
- Immunity to radiated electromagnetic disturbance (IEC61000-4-3): 80 to 1000 MHz / 10V/m;
- Immunity to Fast Electrical Transients (IEC60255-22-4): Input/Outputs=4kV/common. 2kV;
- Immunity to radiated electromagnetic disturbance (IEC61000-4-3): 80 to 1000MHz/10V/m;
- Immunity to fast electrical transients (IEC60255-22-4): Voltage/Input/Outputs=4kV/common. 2kV;
- Surge Immunity (IEC60255-22-5): phase/neutral 1kV, 5 per polar. (=) – phase-to-ground/neutral-to-ground 2kV, 5 per polar (±);
- Immunity to conducted Electromagnetic disturbances (IEC61000-4-6): 0.15 to 80 MHz / 10V/m;
- Climate Test (IEC60068-21-14): -40°C +85°C / 72 hours;
- Vibration Resistance (IEC60255-21-1): 3-axis / 10 to 150 Hz / 2G / 160 min/axis;
- Vibration Response (IEC60255-21-1): 3-axis / 0.075mm-10 at 58 HZ / 1G from 58 to 150 Hz / 8 min / axis;

APPLICATION EXAMPLE

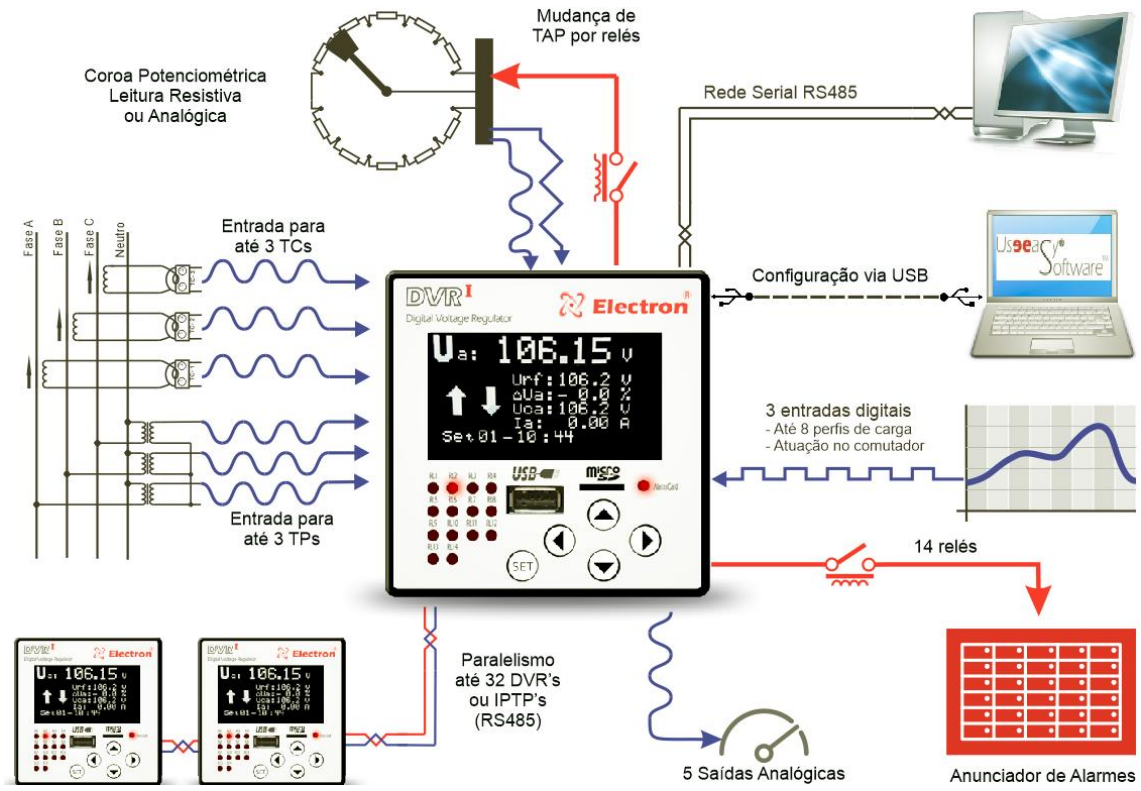

Figure 1- Application Example

DIMENSIONS

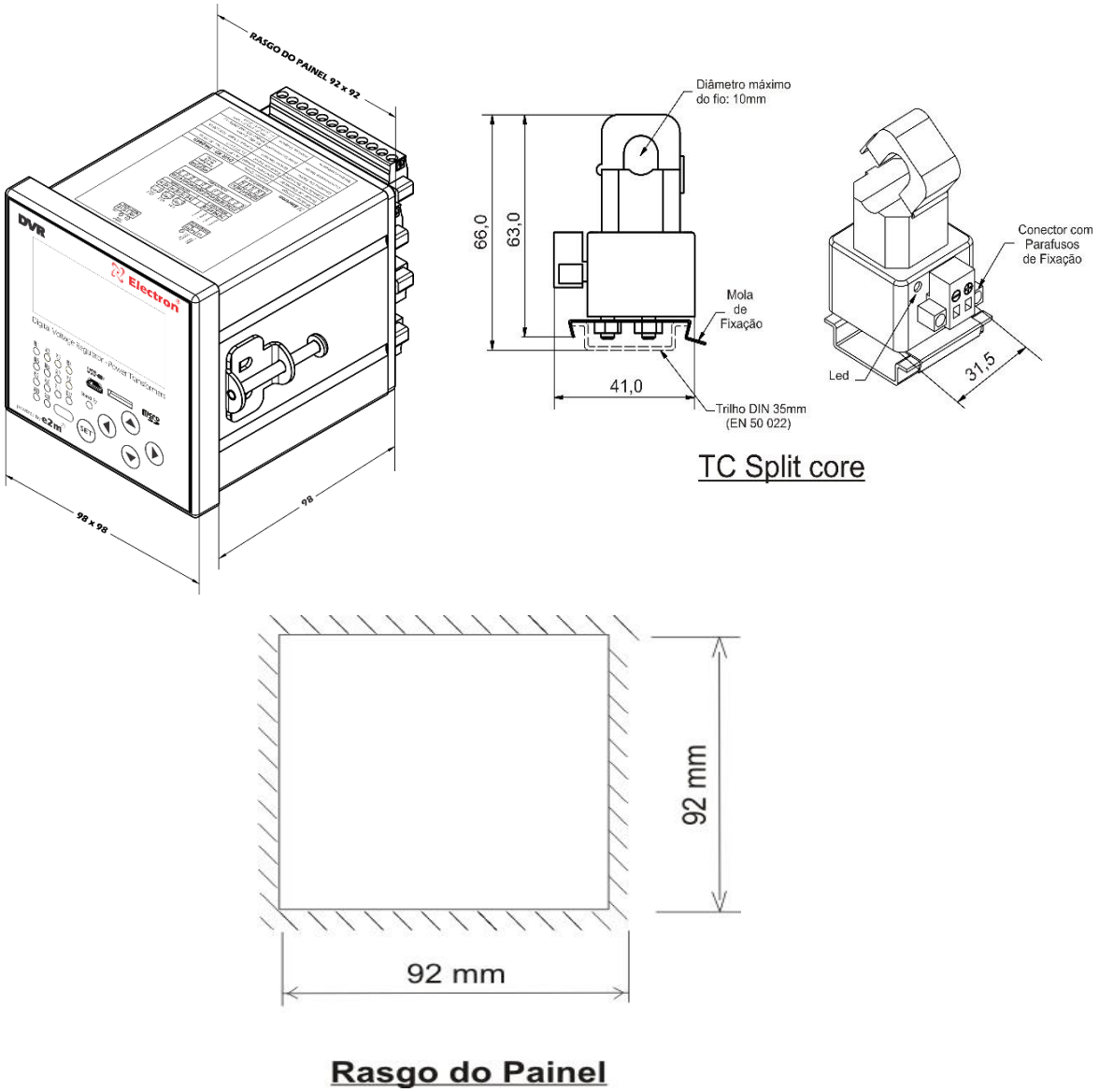

Figure 2 – Dimensions

CONNECTION DIAGRAM

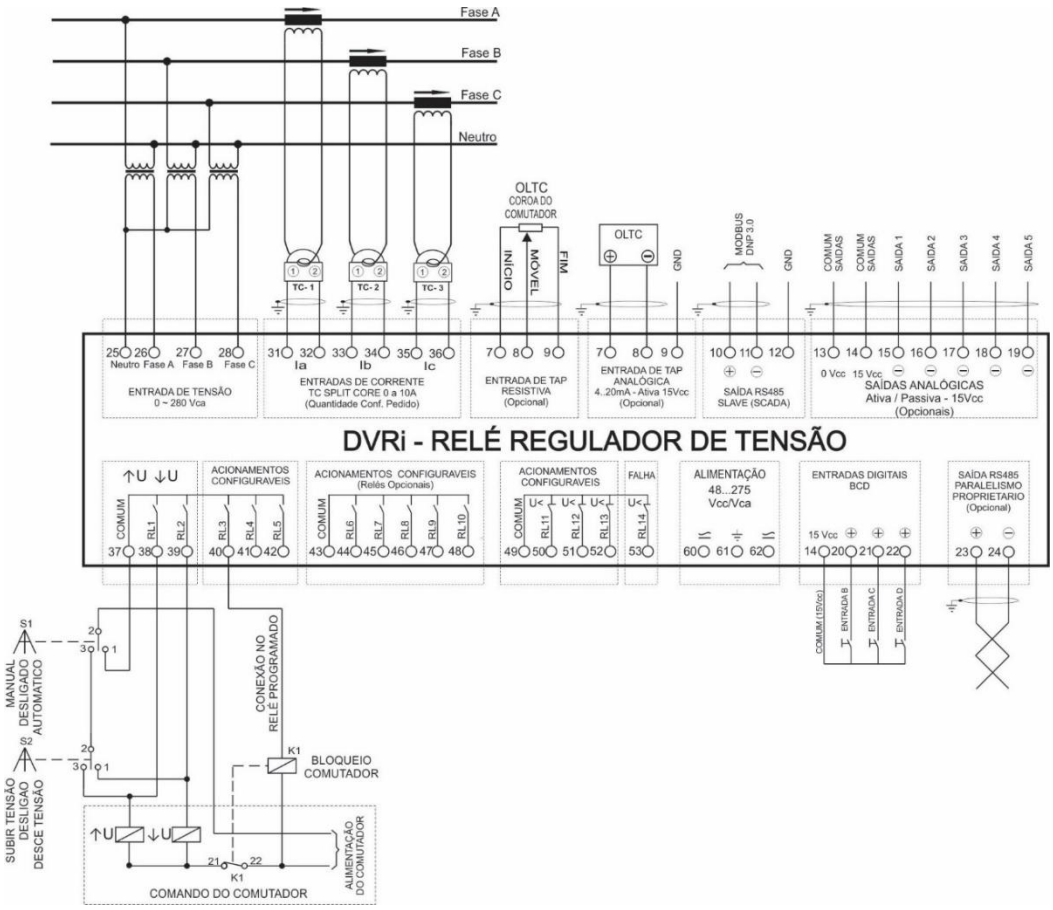

Figure 3 – Connection Diagram

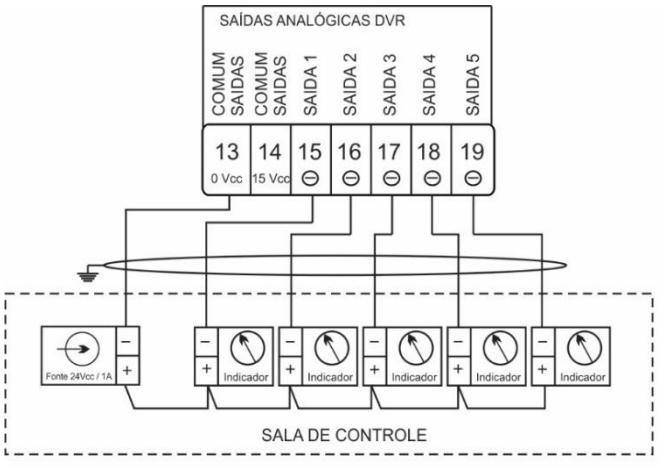

Diagrama para conexões de Indicadores Analógicos com fonte externa.

Figure 4 – Indicator connection diagram with external source

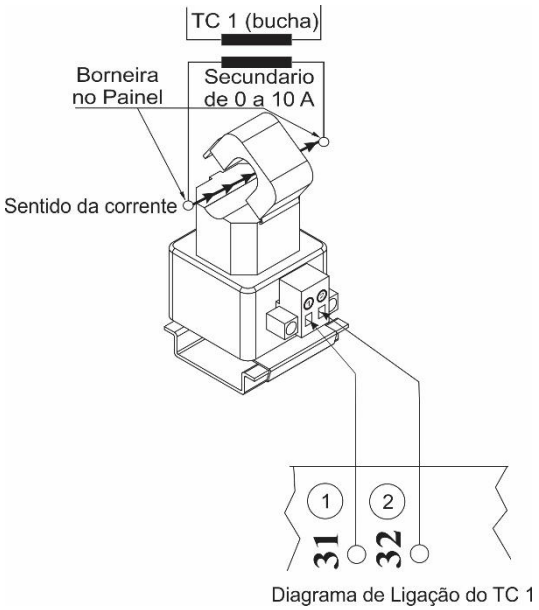

Diagrama de Ligação do TC 1

Figure 5 – TC connection diagram

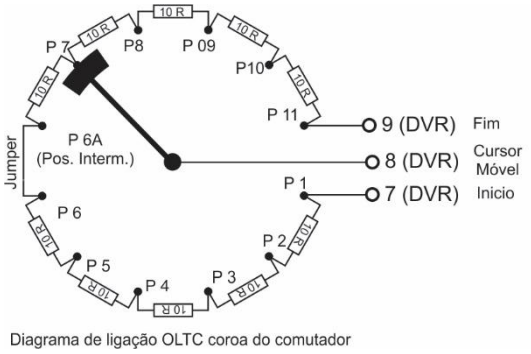

Diagrama de ligação OLTC coroa do comutador

Figure 6 – Crown Switch Connection Diagram

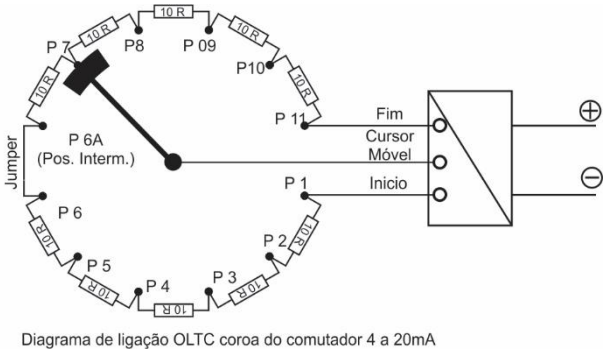

Diagrama de ligação OLTC coroa do comutador 4 a 20mA

Figure 7 – Crown Switch Connection Diagram 4ª20mA

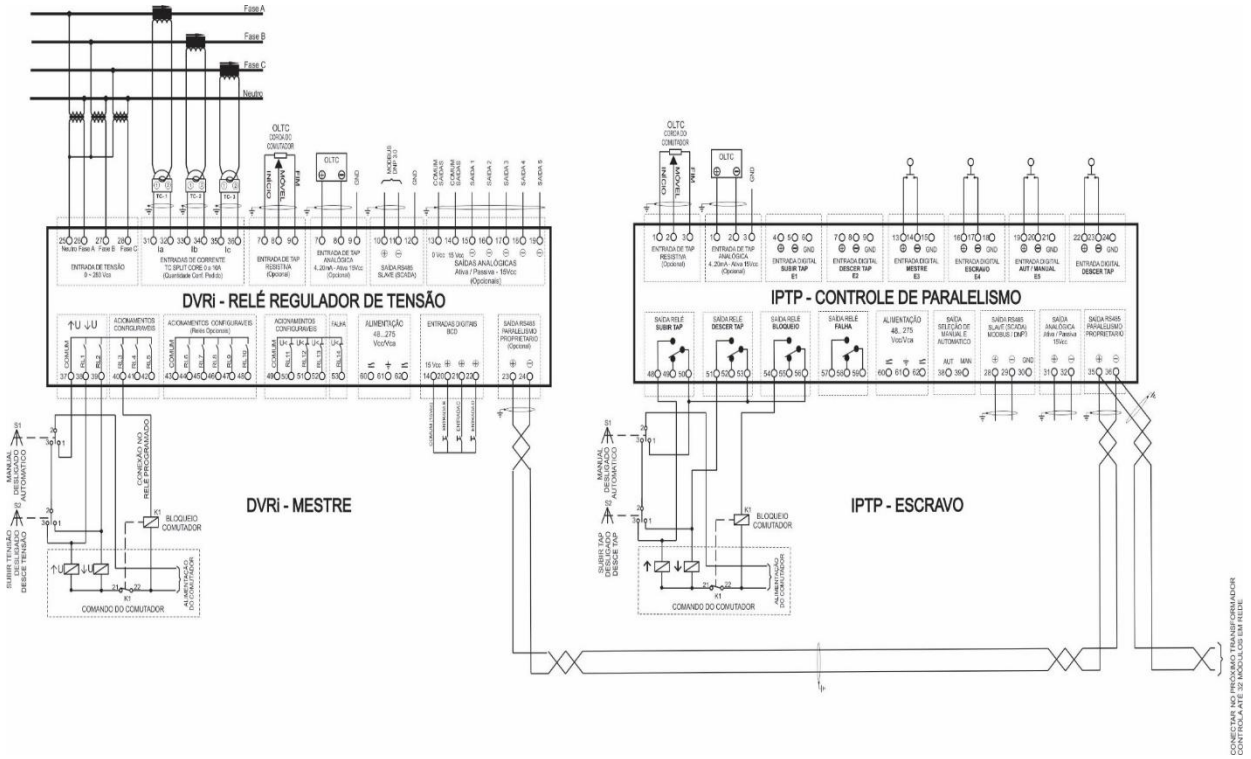

Figure 8 – DVR Master/IPTP Slave Link Diagram

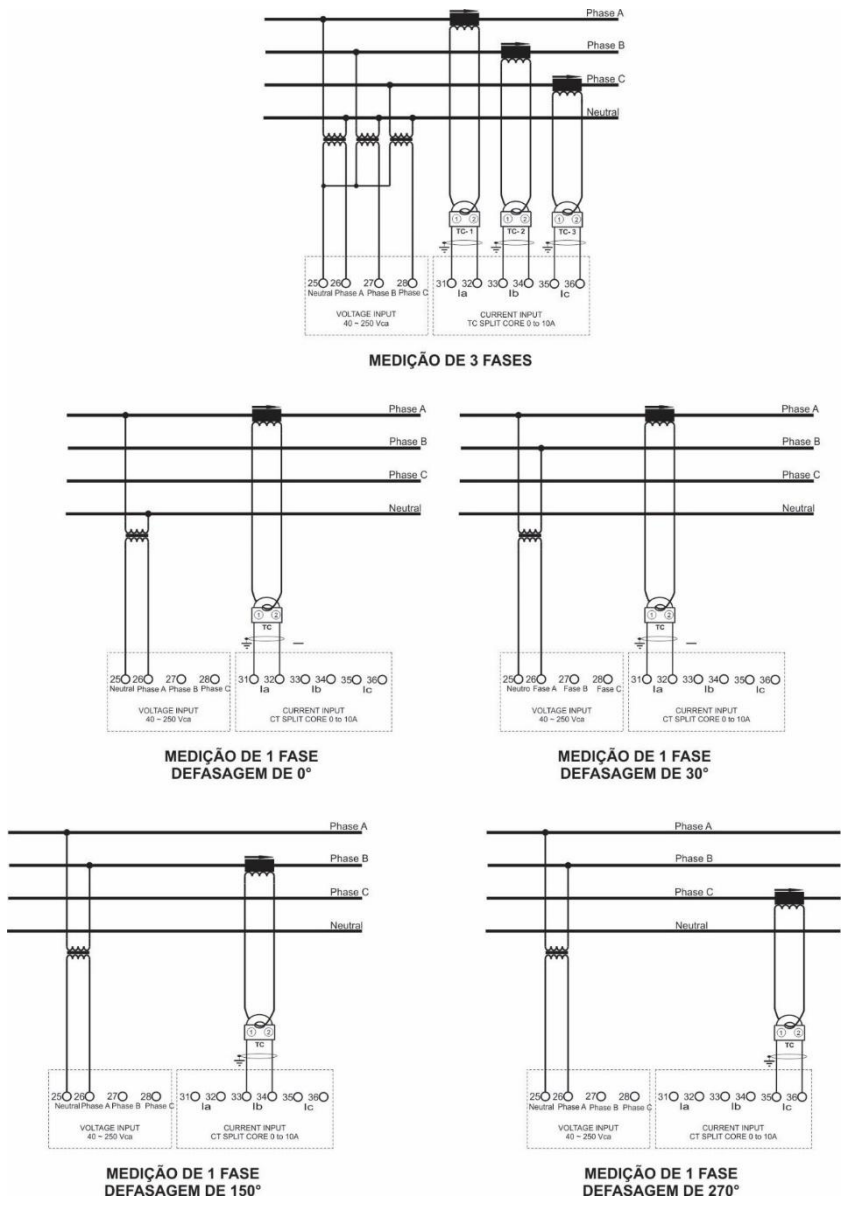

Figure 9 – 3-phase measurement diagram

SPECIFICATION FOR ORDER

RELÉ REGULADOR DE TENSÃO DIGITAL

DVR - [ ] [ ]

Medição de Corrente	
1	1 TC Splitcore
2	2 TC's Splitcore
3	3 TC's Splitcore

Entrada de Medição de TAP	
0	Sem Entrada
1	Entrada Resistiva
2	Entrada Analógica

GETTING TO KNOW THE DVR

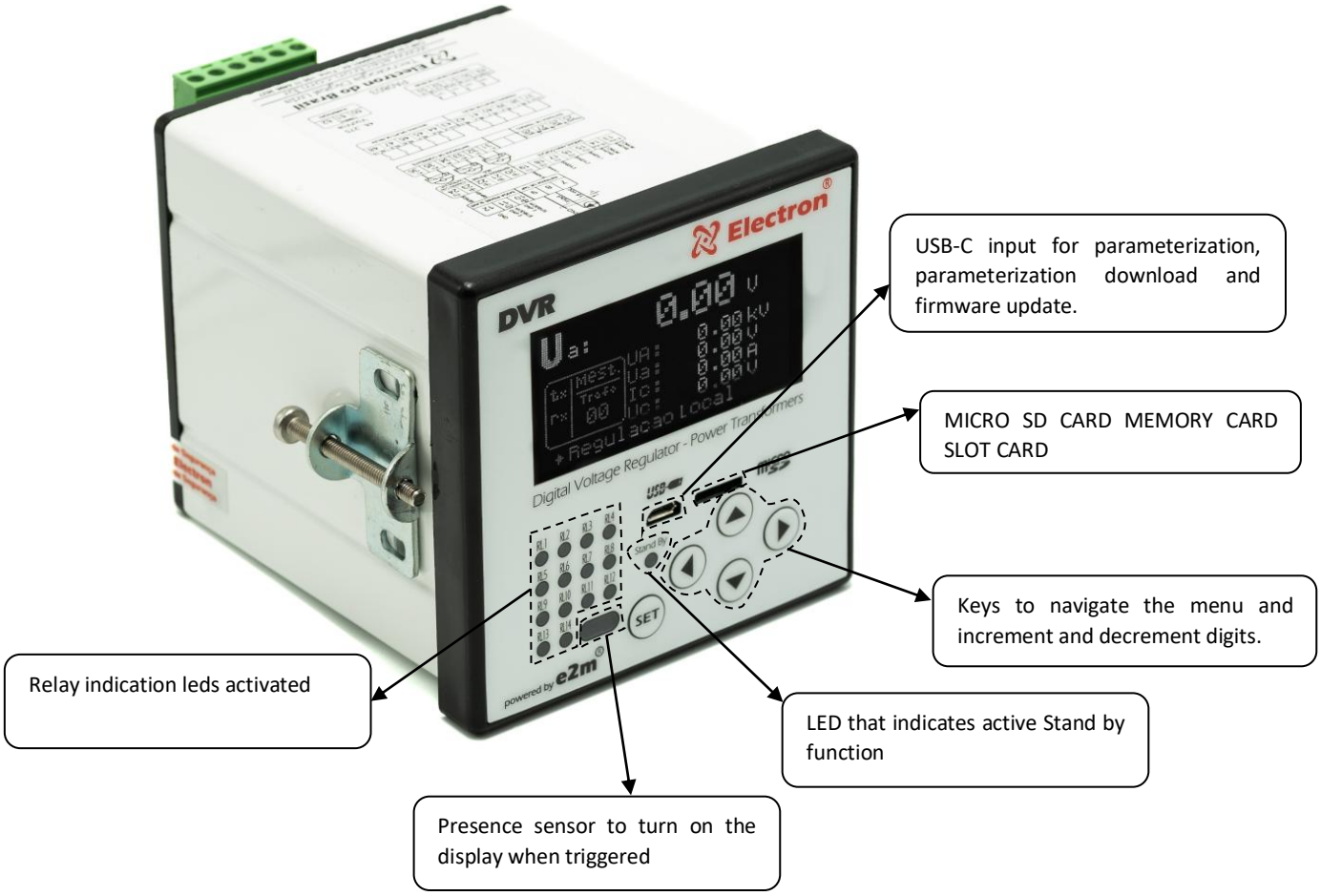

Figure 10 – Getting to know the DVR

WARRANTY TERM

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

Disclaimer of Warranty:

The warranty does not cover transportation expenses for technical assistance, freight and insurance for shipment of a product with evidence of defect or malfunction. The following events are also not covered: Natural wear and tear of parts due to continuous and frequent use, damage to the outside caused by falls or improper packaging; attempt to repair/break a seal with damage caused by persons not authorized by Electron and in disagreement with the instructions that are part of the technical description.

Loss of Warranty:

The product will automatically lose its warranty when:

- The instructions for use and assembly contained in this manual and the installation procedures contained in the NBR 5410 Standard are not observed;
- Subjected to conditions outside the limits specified in the respective technical descriptions.
- Tampered with or repaired by a person other than Electron's technical staff;
- The damage is caused by a drop or impact;
- Infiltration of water or any other liquid occurs;
- Overload occurs that causes degradation of the components and parts of the product.

Use of the Warranty:

To enjoy this warranty, the customer must send the product to Electron along with a copy of the purchase invoice properly packaged so that there is no damage in transport. For emergency care, it is recommended to send as much information as possible regarding the defect detected. This will be analyzed and subjected to full functional tests.

The analysis of the product and its eventual maintenance will only be carried out by the technical team of Electron do Brasil at its headquarters.

Available for Downloads on the Website:

http://www.electron.com.br/downloads/artigos-tecnicos/