CATALOG

DIGITAL VOLTAGE REGULATOR - DVR

SUMMARY

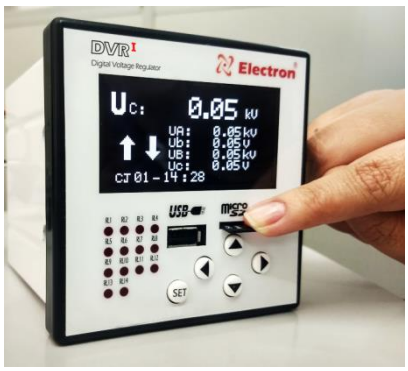
INTRODUCTION

The Digital Voltage Regulator Relay – DVR is designed to monitor and regulate the automatic voltage of on-load TAP changers up to 51 positions (ANSI 90); measure and indicate the deviation of the reference voltage; and control, through commands on the switch, the line voltage of the network considering the compensations according to previously programmed load profiles with up to 8 different value sets with input by pre-set time of by external command.

As reference, The **DVR** can:

- Monitor up to 3 PT's (3 phases);
- Measure the electric current flow up to 3 CT's;
- Measure and indicate the actual TAP position, maximum, minimum and the previous;
- Indicate active, reactive and apparent powers;
- Calculate the power factor of each phase measured with lag between PT and CT from 0°C to 330°C with automatic recognition and calculation;
- Actuate the switch block protection when there is overcurrent overvoltage, indicate the active, reactive and Apparent undervoltage and inversion of electric current flow powers;
- Monitor how many operations and contact wear of the TAP Changer by current interruption and the numbers of operations with the function of TAP Changer monitoring

The **DVR** Hardware uses electronic components SMD type, last generation, with reduced size down to 0,04"x 0,02" which are inserted on the boards by an automatic machine **Pick'n place** type with laser alignment, in order to ensure quality of assemblies, the boards are inspected by machine (**AIO**) automatic cameras without human interference to ensure that all product according with implemented technology have the best yield to the customer for a longer life period.
The main components are from military class for use on extreme application condition, resistant to extreme work conditions. It can be installed directly on the potency transformer panel or on reactors panels on the energy substations halls (-40°C a +85°C), maritime platform, chemical plants, (Resin and shielded boards) or yet, on sites subject to earthquakes. All those utilized benefits come from many researching and experience years. Our projects attend to requirement levels, supportability and reliability according with the world's higher demands: **IEC, DIN, IEEE e ABNT.**



MAIN CHARACTERISTICS

- Display 128-by-61-pixel OLED graphics with contrast adjustment and invert of background cores and letters, readable in any lighting condition, including exposure to direct sunlight;
- Supply voltage from ± 48 to 260 Vdc or Vac, 50 / 60Hz;
- Operating temperature from -40°C to 85°C;
- Storage temperature from -50°C to 40°C;
- Multi-meter function, 3-phase voltage indication (Vac) on display, 3-phase current indication (AC), percentage deviation and reference voltage value, 3-phase active, reactive and apparent power, transformer, power factor (cos ϕ) and frequency of the 3 phases;
- PT / CT offset adjustable from 0 to 330 °, allowing PT and CT connections in different phases or in 3 phases;
- 3 current inputs using split-core sectional CTs to measure up to 10 Amps (AC):
- 1 resistive input (3 wires) for up to 5K Ohms or 4 to 20 mA analog to indicate up to 51 TAP positions with automatic potentiometer pitch recognition;
- USB 2.0 frontal for parameterization through UseEasy ™ software;
- 1 RS-485 (ANSI / TIA / EIA-485-A) Digital 2-wire fiber optic output with MODBUS RTU and DNP3 (Level 2) slave Communication Protocol for remote access to all measured parameters;
- Auto Baud Rate from 2,400 to 57,600 bps (Automatically detects Communication network speed);
- 1 **RS485** Digital Output (**ANSI / TIA / EIA-485-A**) WITH PROTOCOL Proprietary (**Slave / master**) for parallel management of up to 32 **DVR's** or **IPTP** devices
- 8 adjustment sets for line drop compensation by resistance and reactance adjustments or by the simplified method of voltage drop percentage, (Z compensation) with time programming or external command;
- Independent actuation times for rising and falling voltage, with linear, step linear or intense curve timing modes;
- User-configurable overcurrent, reverse current and undervoltage release of the CDC;
- CDC block and / or rapid decrease in voltage;
- Automatic lockout of the triggered TAP Changer;
- 14 Programmable 6 Amp / 250 Vac AC Relays;
- 3 programmable digital inputs (Dry Contact);
- 5 configurable analog outputs can be from 0 to 1, 0 to 5, 0 to 10, 0 to 20 or 4 to 20 mA;
- Total potentiometer resistance reading and automatic step number calibration;
- Indication of simple numerical reading, bilateral numeric and alphanumeric;
- Remote commands via wired connections of the digital inputs or **MODBUS RTU** and **DNP3 L2** communication to give the RAISE / LOWER TAP Change commands or select the regulation set;
- Event warnings on the display showing the alarm name and the relay that tripped;
- Using UseEasy ™ software all device parameters can be saved in manipulable files that can reconfigure other equipment;
- 14 LED's to indicate the actuation of programmable relays with indication on the active event display;
- Watchdog that oversees 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, made entirely from standard **DIN IEC 61544** aluminum**;**
- Reduced size 98x98x98xmm;
- 2 years warranty;

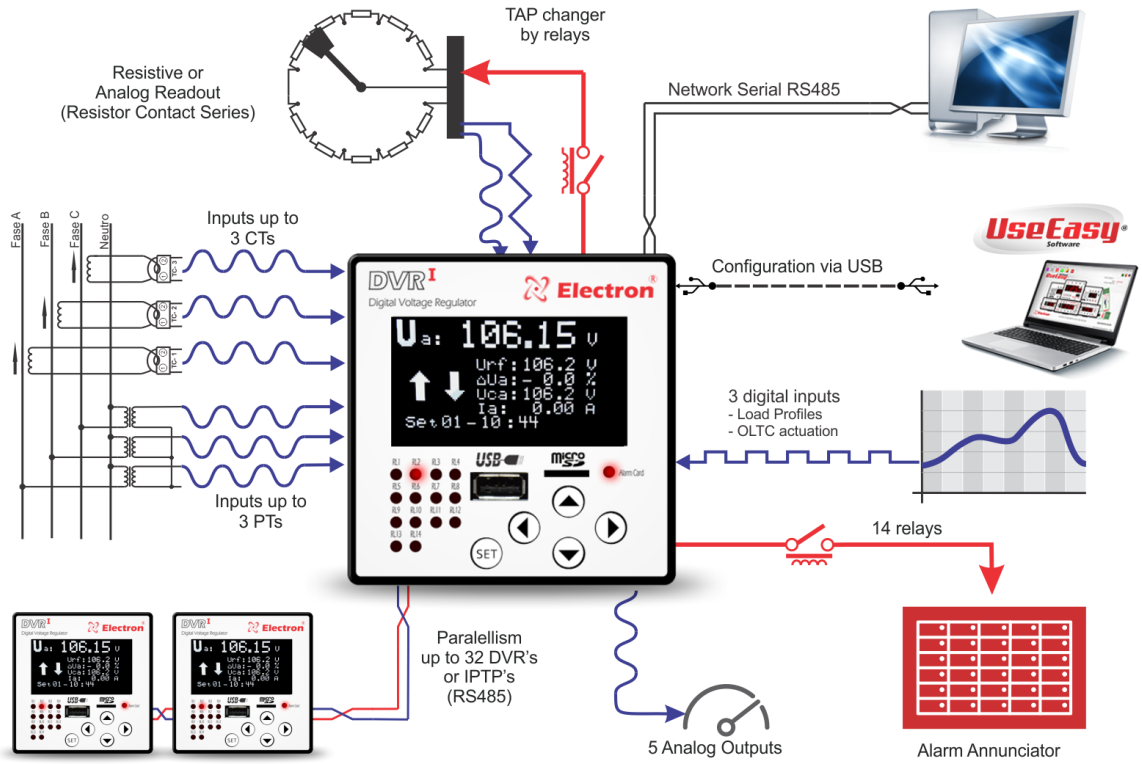
TECHNICAL DATA

DIGITAL VOLTAGE REGULATOR – DVR	
Operating Voltage	48 a 265 Vdc/Vac, 50/60Hz;
Operating Temperature	-40°C to +85°C;
Consume	<15W;
Voltage measurement input;	3 phases – 0~280 Vac – 46/64 Hz;
Position measurement input;	1~51 positions – potentiometric crown 5.000 Ohms;
Digital inputs;	3 dry contact inputs (potential free);
Input for Electrical Current Measurement;	3 TC's Split Core de 0 to 10 A;
Analog Outputs and Maximum Loads Options (5 Configurable outputs on the equipment)	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% end of scale;
Maximum Analog Output error;	0,25% end of scale;
Digital Inputs	14 – Potential free and programmable;
Maximum switching power	40W / 250VA;
Maximum Switching Voltage	250 Vac/Vdc;
Electrical current Maximum driving	6,0 A;
Network Serial Communication Port	**MODBUS RTU** e **DNP3 L2** (slave);
Auto Baud Rate and / or Fixed Speed	2.400 a 57.600 bps;
USB Frontal Port	USB 2.0;
Datalogger	MicroSD 2GB for data acquisition;
Box DIN IEC 61554	98x98x98x mm – Aluminum;
Equipment fixation	Recessed Panel Mounting;
Degree of protection (NBR IEC 60529)	IP 40 (Frontal), IP 20 (Connections);
ELECTRIC CURRENT TRANSFORMER – CT SPLITCORE/CLAMP	
Measuring range	0 to 10 A;
Maximum Error of Measurement Inputs	1% end of scale;
Linearity	1% end of scale;
Operating Temperature	-40°C to +85°C;
Storage Temperature	-50°C to +60°C;

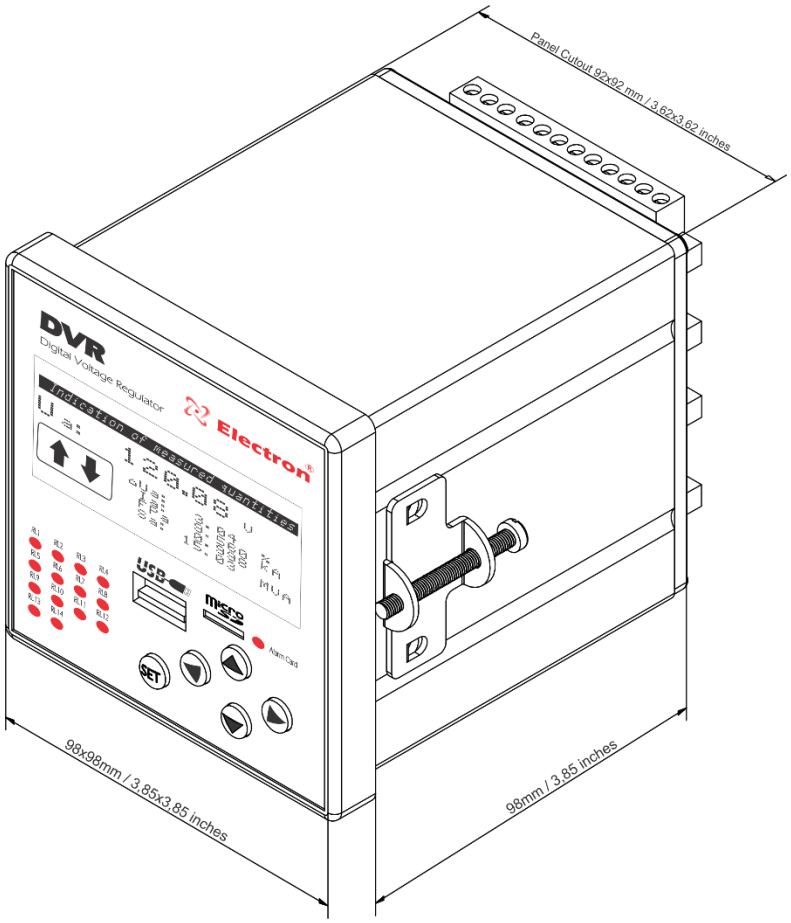
TYPE TEST MEASURED

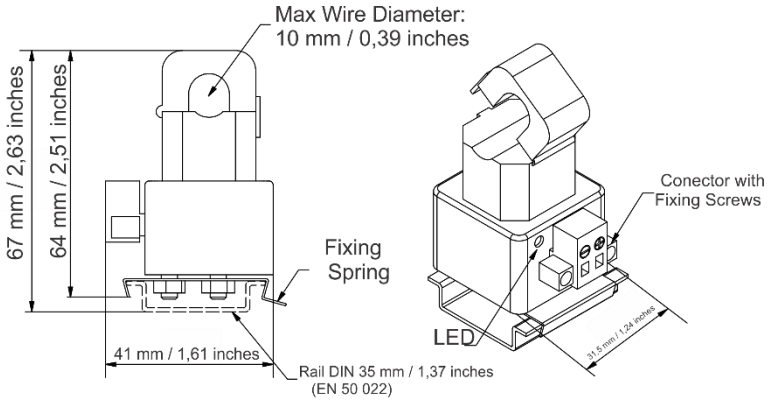
- Applied Voltage (IEC 60255-5): 2kV / 60Hz / 1 min. (against land);
- Voltage Boost (IEC 60255-5): 1.2 / 50 sec. / 5kV / 3 neg. and 3 pos. / 5 sec Interval;
- Electrostatic Discharges (IEC 60255-22-2): Air Mode = 8kV / Counted Mode = 6kV;
- Immunity to radiated electromagnetic disturbance (IEC61000-4-3): 80 to 1000 MHz / 10V / m;
- Immunity to Fast Electrical Transients (IEC 60255-22-4): Feed / In / Outs = 4KV / common. 2kV;
- Immunity to radiated electromagnetic disturbance (IEC 61000-4-3): 80 to 1000MHz / 10V / m;
- Immunity to fast electrical transients (IEC 60255-22-4): Feed / In / Outs = 4KV / common. 2KV;
- Surge Immunity (IEC 60255-22-5): 1KV phase / neutral, 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 (IEC 60068-21-14): -40 ° C + 85 ° C / 72 hours;
- Vibration Resistance (IEC 60255-21-1): 3 axis / 10 to 150 Hz / 2G / 160 min / axis;
- Vibration Response (IEC 60255-21-1): 3 axis / 0.075mm-10 to 58 HZ / 1G from 58 to 150 Hz / 8 min / axis;

APPLICATION EXAMPLES

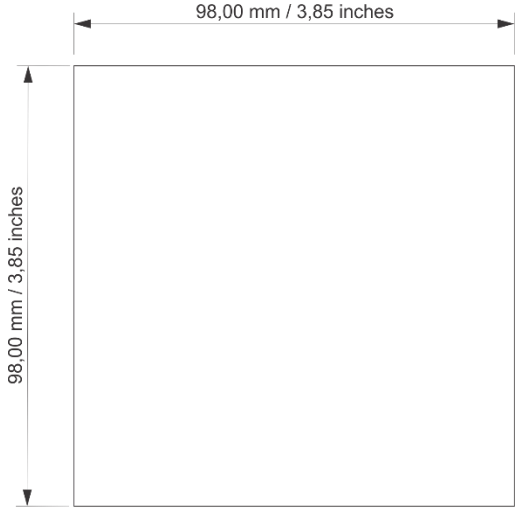


DVR & CT DIMENSIONS



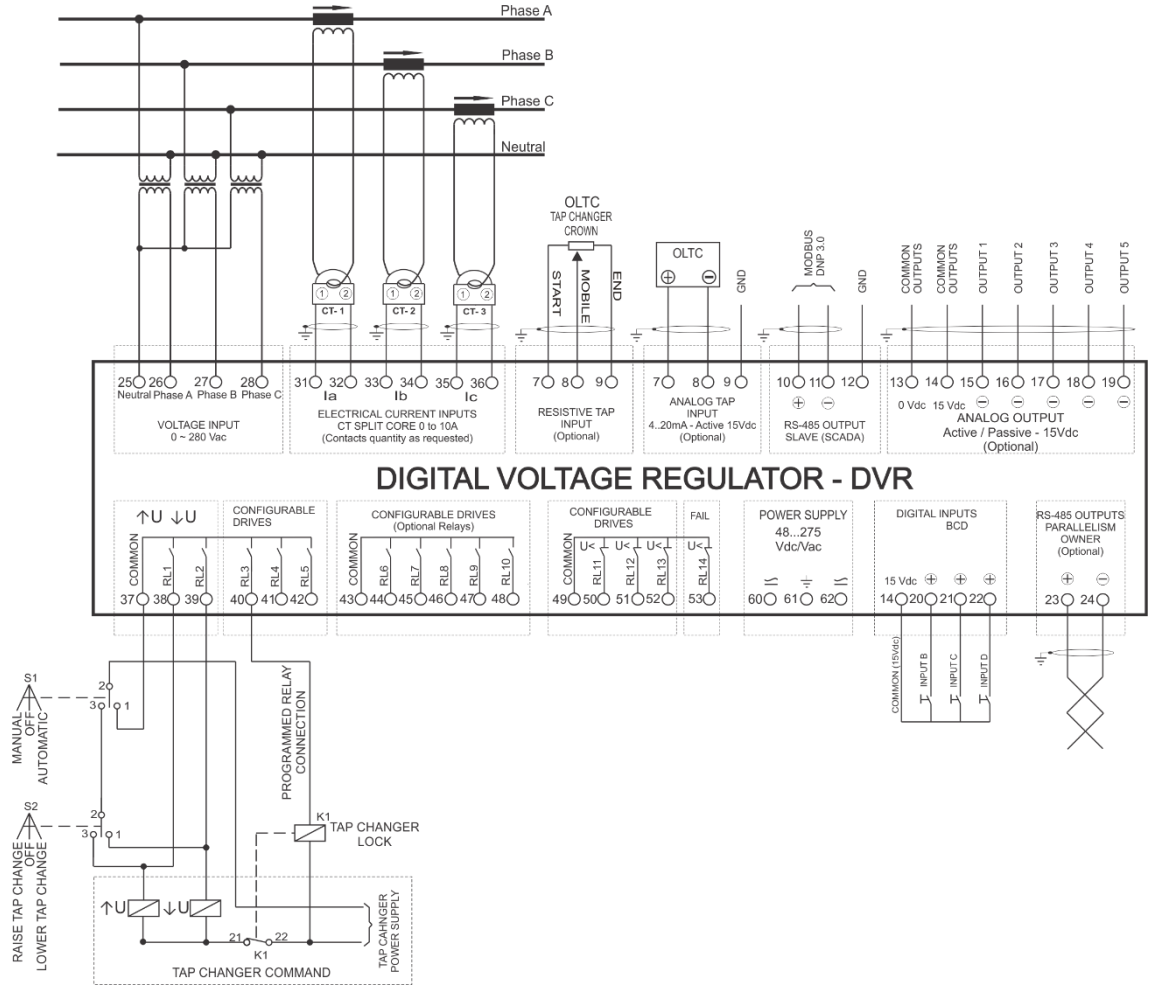


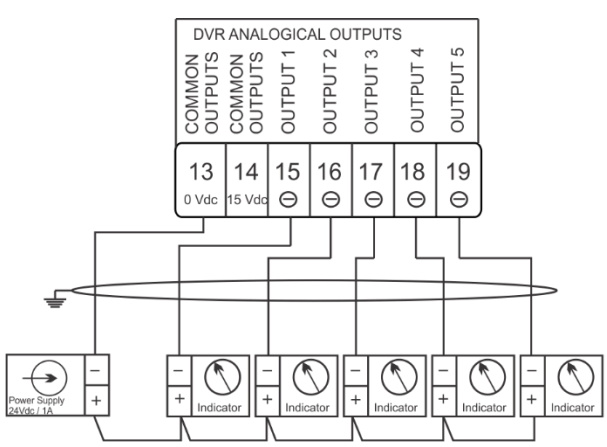
TC Split core



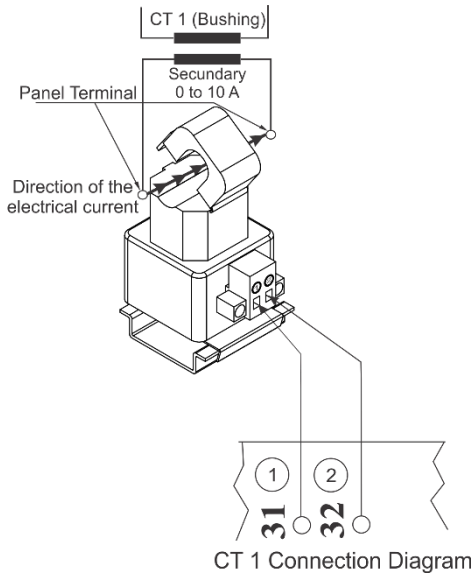
Panel Cutout

CONNECTION DIAGRAMS



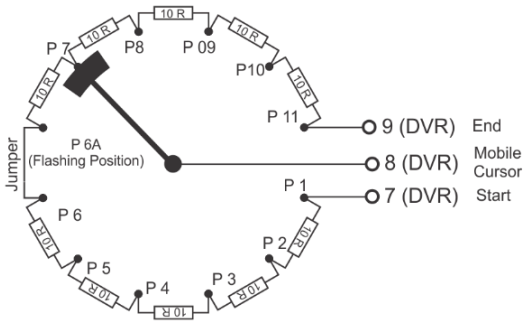


Analogical indicators connections diagram with external power supply

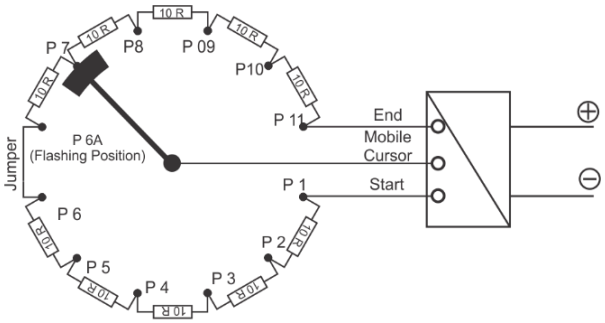


CT 1 Connection Diagram

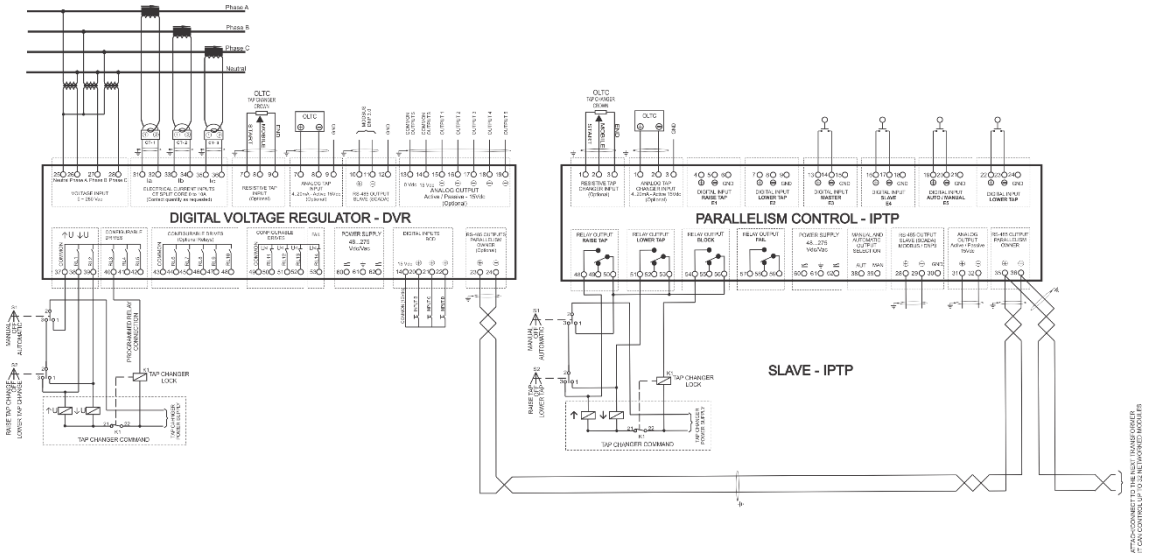
CONNECTION DIAGRAMS



OLTC TAP Changer Crown Connection Diagram



OLTC TAP Changer Crown 4 to 20 mA Connection Diagram



ORDER SPECIFICATION

DVR - Digital Voltage Regulator:

Electrical Current Measurement	
1	1 - Tc Split Core
2	2 - Tc Split Core
3	3 - Tc Split Core

TAP Measurement Input	
0	Without Input
1	Resistive Input
2	Analog Input