

COMPREHENSIVE SOLUTIONS FROM DESIGN TO DELIVERY



STEP VOLTAGE REGULATOR

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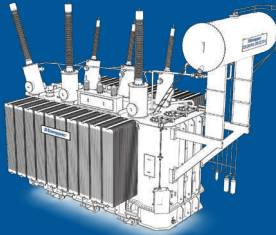
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POWER TRANSFORMER



DISTRIBUTION TRANSFORMER
(OIL FILLED)



DISTRIBUTION TRANSFORMER
(DRY TYPE)



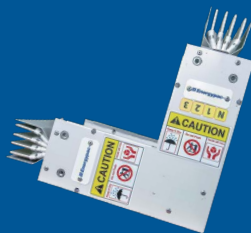
INSTRUMENT TRANSFORMER



VACUUM CIRCUIT BREAKER



SWITCHGEAR



BUSBAR TRUNKING SYSTEM



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INTRODUCTION

The Step Voltage Regulator takes an incoming voltage that will change with load settings and maintain a constant output voltage. The voltage will drop as the loading rises along the distribution feeder. This voltage drop decreases the amount of power used by the lighting portion of the load. By increasing the voltage to this lighting load, more power is used up. They control distribution line voltages from 10% increase (boost) to 10% lower (buck) in thirty-two steps of approximately 5/8% each. The 5/8% step voltage is now a typical industry standard. There is a full range from 2400 volts (60 kV BIL) to 34,500 volts (200 kV BIL) for 60 Hz and 50 Hz system voltages and current uses. These voltage regulators can be used in more than one system voltage due to internal potential winding taps and an external ratio correction transformer on all ratings. Smaller kVA sizes are provided with support lugs for pole mounting and with substation or platform tie down provisions. Larger sizes are delivered with substation bases with pad-mounting provisions. Static controls and the microprocessor based control panels keep voltage within desired limits.

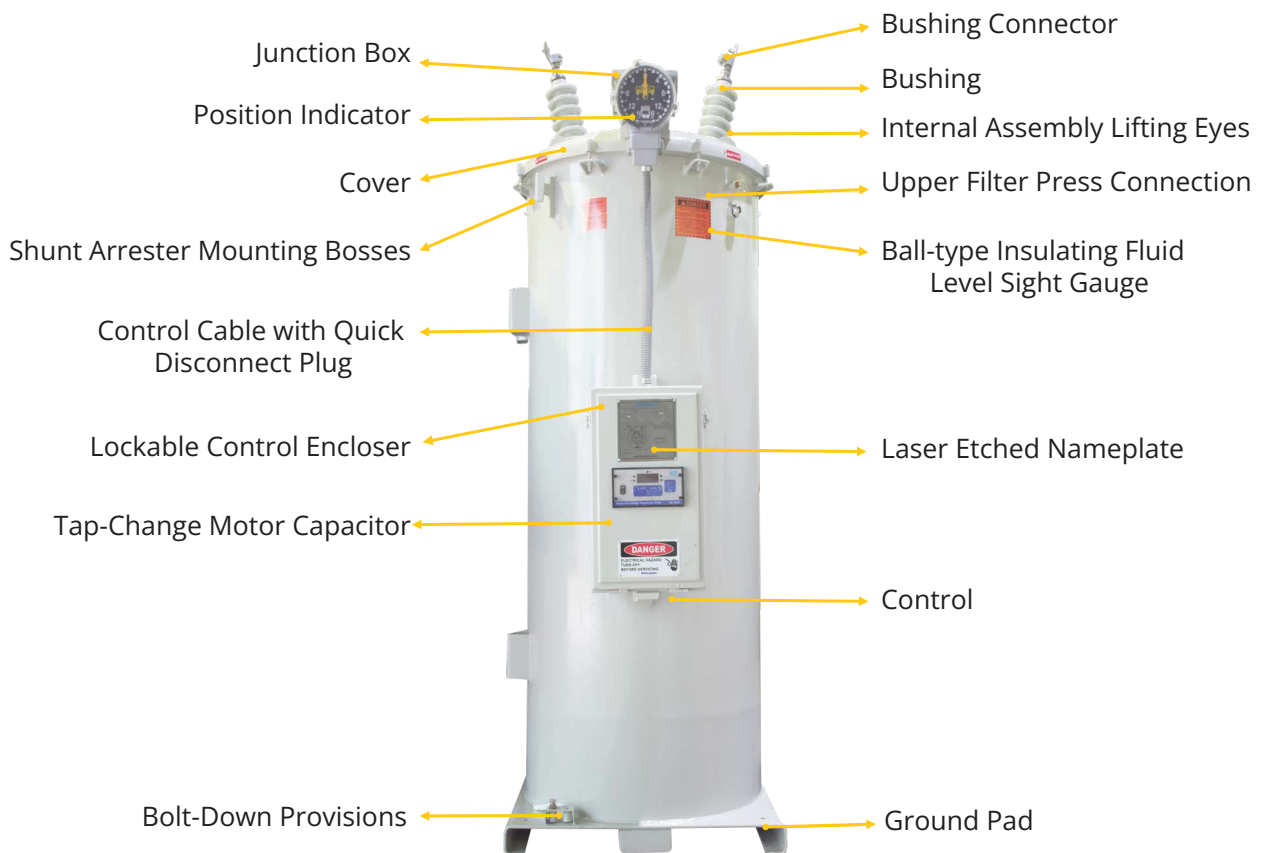


Figure 1: External features of Step Voltage Regulator

STANDARD FEATURES

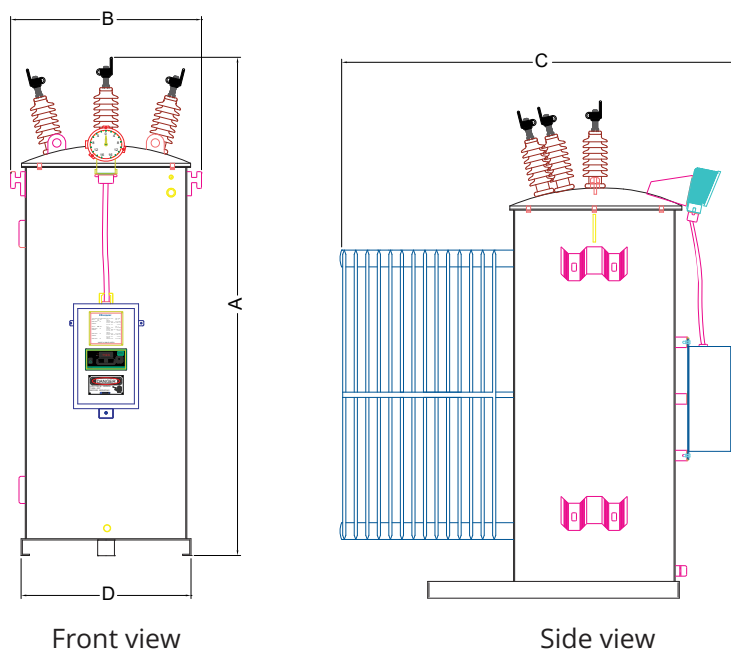
01. Stainless steel tank construction that provides zero corrosion
02. Sealed tank with pressure relief device for gases to escape during tap changes
03. Oil sight gauge to check oil levels and oil conditions without de-energizing the regulator
04. Motor capacitor installed in the control cabinet which gives replacement without bypassing and taking the regulator out of service
05. Polarized disconnect switch (PDS) facilitates quick control installation or change out without taking the regulator out of service
06. Cover mounted terminal block gives easier access to wiring without going under oil to change tap connections

OPTIONAL FEATURES

01. Shunt arresters
02. Extra length control cables
03. Elevating structure
04. 4-hole NEMA® H-spades
05. Cooling fans
06. Nameplates in alternate languages or metric units
07. Internal differential potential transformer for complete reverse power flow with metering
08. Controller accessories
09. Multiphase functionality
10. Front panel overlays in alternate languages
11. Communications protocols:
 - DNP
 - IEC 61850 - IEC 60870-5 - 2179 - MODBUS
12. 13.5 VDC radio power supply
13. External MOV-type bypass arrester that allows higher protection to the regulator series winding from surge and system transients
14. 120V AC external source



SIZE AND WEIGHT



Front view

Side view

Overall Size and Weight (Approx.)								
Voltage (kV)	Load Current (Ampere)	kVA	A(Inch)	B (Inch)	C (Inch)	D (Inch)	Oil (Inch)	Total Weight (Kg/Unit)
6.35kV, 95kV, BIL	50	32	68	28	42	26	280	810
	100	63.5	72	32	47	28	310	875
	150	95	72	35	52	29	380	950
	219	139	78	37	55	30	550	1410
	328	208	79	38	56	31	620	1470
	438	278	98	50	58	34	850	2340
	546	347	102	52	60	36	1210	2850

SPECIFICATIONS

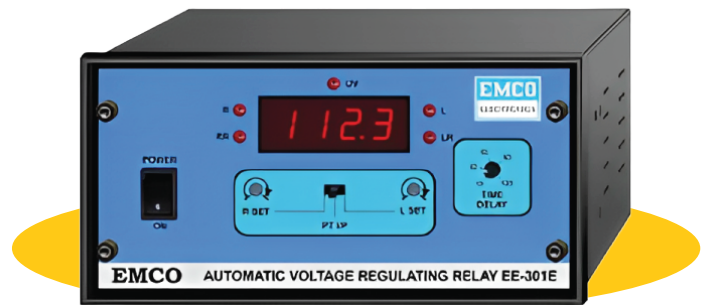
Sl No.	Description	Specification
01	Rated capacity	50 Amps to 1093 Amps
02	Input voltage fluctuation	11 KV/6.35 kV \pm 10%, 50 Hz
03	Output voltage	11 KV/6.35 kV \pm 1 %, 50 Hz
04	Tapping	On-load, 32 equal steeps
05	Cooling	ONAN
06	Load pointer factor effect	Nil
07	Wave form distortion	Nil
08	Phase control system	Individual/Single phase
09	Temperature range	5° C to 55° C
10	Correction respond time	1 sec. to 60 sec. (Adjustable)
11	Operation	Continuous
12	Basic insulation level (Bil)	95 kV
13	Winding	Copper windings
14	Type of service	Indoor/Outdoor
15	No-load current	Not more than 0.2% of full load current
16	Supply for control unit	110 Volts/120 Volt, 50 Hz
17	Microprocessor based control	Yes
18	Position indicator	Shall be on the front
19	Tap position showing capacity	Present, minimum & maximum
20	Control option	Automatic/Manual
21	Brand	Energypac, Bangladesh

CONTROLLER

FEATURES

1. Independent raise/Lower settings
2. Independent undervoltage & overvoltage settings
3. Variable time delay settings
4. LED indications for raise, lower, UV, OV and time delay operations

VOLTAGE CONTROLLER

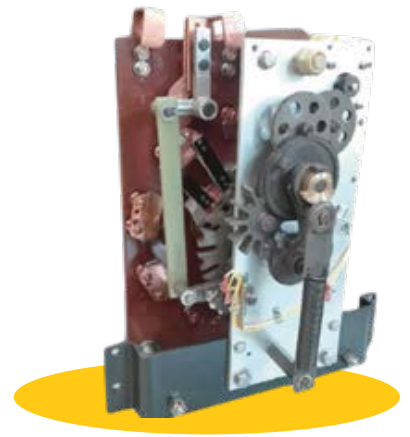


CONSTRUCTION

The Step Voltage Regulator with step switching mechanism is an automatically-controlled, tapped, autotransformer. It consists of a core, coil, and switch assembly mounted inside a liquid-filled sealed tank. Voltage regulation is obtained by changing taps on a series or regulating winding. Continuity of service is guaranteed by service-proven tap changers and core and coil assemblies working with the control. These voltage regulators are offered with standard features for regular applications and options for accessories that provide unique applications.

CORE AND COIL ASSEMBLY

Due to the design of the core and coil, tap-changer, and reactor assembly, service is very easy. The complete assembly is cover suspended for comfort of removal from the tank for inspection or maintenance. The coil assembly features an aluminum strip in the series winding that achieves the optimum in ampere turn balance for exceptional strength under through fault conditions. The core is grain-oriented steel with a low reluctance lap joint. The rugged core clamp assembly secures the coil effectively and positions the core for the optimum in quiet operation and low core loss. With sealed-tank construction, the external oxygen supply is eliminated from the tank environment.



RELATED ACCESSORIES OF ON LOAD TAP CHANGER



Position Indicator



Flexible Shaft



Wire Harness

TAP CHANGER AND ACCESSORIES

The products include: reactance on load tap changer, position indicator, flexible shaft, and wire harness. They are designed and used for the step voltage regulator which permits voltage regulation from 10 percent above to 10 percent below line voltage in (32) 5/8 percent steps.

Type		200A	300A	640A	640A HV
Rated Current (A)		200	300	640	640
Max. Rated through current (A)		300	480	668	668
Rated short circuit withstand current (kA)	2Srsm	6	7.5	16	16
	0.8Srsm	10	12	20	20
	Peak value	15	27.12	45.2	45.2
Rated Voltage (kV)		24	27.6	27.6	35
Step Voltage (V)		150	172.5	172.5	219
Insulation to ground	Rated lighting impulse withstand voltage 1.2/50µs	125KV	150kV	150kV	200kV
	Rated Power frequency withstand voltage 50Hz, 1min	50kV	50kV	50kV	85kV
Number of phases		Single Phase	Single Phase	Single Phase	Single Phase
Frequency (Hz)		60Hz	60Hz	60Hz	60Hz
Max. operating positions		33	33	33	33
Mechanical life (times)		Not less than 2,000,000	Not less than 2,000,000	Not less than 2,000,000	Not less than 2,000,000
Electrical life (times)		Not less than 300,000	Not less than 180,000	Not less than 180,000	Not less than 180,000
Operating temperature		-30°C ~ 90°C	-30°C ~ 90°C	-30°C ~ 90°C	-30°C ~ 90°C



Hotline Number
01777 781188

Energypac[®]

Engineering



Head Office

Energy Center, 25 Tejgaon I/A,
Dhaka-1208, Bangladesh
Phone: +880-2-8879395
Sales: +880 1777 781188
Email: marketing@energypac.com.bd
www.energypac.com.bd

Chittagong Office

House 2, Lane 5, Road 1, Block L,
Halishahar Housing Estate,
Chittagong-4216, Bangladesh
Phone: +880-3-1723807
Fax: +880-3-12514341, +880-3-1715473

Khulna Office

84, Khan Jahan Ali Road,
Khulna-9100, Bangladesh
Phone: +880 1777 781188

Rajshahi Office

35, Terokhadia, Cantonment Road,
Rajshahi Cantonment-6202, Bangladesh
Phone: +880 1713 147022

Bogura office

Shamsunnahar Plaza, College Road,
Kalitola, Bogura-5800
Phone: +880 1713 147041

India Office

KB-22, Bhakta Tower, 4th Floor, Sector 3,
Salt Lake, Kolkata-700098, India
Phone: +91 833 692 02 58
Email: marketing@energypacindia.in
sales@energypacindia.in

Nepal Office

Aayusha Colony, House 4, Kalanki 13,
Kathmandu, Nepal
Phone: +97 798 03 64 57 01
Email: export@energypac.com.bd

Italy Office

Via Dei Prati, 27-25073 Bovezzo (BS)
Phone: +39 030 205 91 49
Fax: +39 030 209 66 02
Email: alessandro.gallo@energypac-europe.com
export@energypac.com.bd

Works

Baroipara, Savar
Dhaka-1750, Bangladesh
Phone: +880 1713 285625

Dakshin Joypur Bill,
PO: Ananda Nagar,
Liluah, Howrah-711227
West Bengal, India
Phone: +91 833 690 69 34
+91 833 690 69 35

Via Conicchio, 49/A,
Brescia-25136, Italy
Phone: +39 030 205 91 49



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