GE's Substation Voltage Regulator

A common challenge for network utilities is managing voltage profiles within operating limits along the feeder. This can be extremely difficult to do with substation unit transformers, especially in substations that were built and designed for lower and more static load profiles.

In today's environment, the average load profiles have radically increased and are more dynamic. In this scenario, the unit transformers alone can no longer efficiently support voltage profiles across the circuits. A substation based voltage regulator is a cost-effective solution to solve this problem without bearing new infrastructure costs.

The GE Substation Voltage Regulator (VR-SS) is a single phase voltage regulator that is intended to support this type of application within a substation. The advantages of single phase units are twofold; they provide the ability to manage each phase independently in the event of unbalanced loads, and they provide redundancy when compared to an individual 3-phase unit.

As with all GE Voltage Regulator products, the VR-SS regulator provides best-in-class total cost of ownership and the robust design does not require maintenance, allowing for years of reliable operational service.

Key Benefits of the VR-SS:

- One of the lowest total costs of ownership when compared to other single phase or 3-phase voltage regulators.
- Best in class Load Tap Changer (LTC) switch life, with up to two million operations resulting in up to 20 years of maintenance free usage.
- Superior internal arrester provides optimum surge protection against abnormal voltage surges by leveling the internal stresses in the winding during surge and fault events. Compared to externally mounted arresters, this results in higher reliability and a more stable design as it extends the service life of the unit.
- Adheres to the latest IEEE C57.15-2009 standards (40x rated current). GE performs Short Circuit testing every year to validate performance.
- Newly designed control cabinet configurable for most major control and communications options; meets NEMA 3R/4 and UL50 requirements and testing.
- Seismic certified and can be installed in most applications around the world.
- Forward and reverse power flow measurements for volt/var management on distributed generation feeders

GE's Substation Voltage Regulator (VR-SS) installed on a distribution network

The Substation Voltage Regulator (VR-SS)

Lowest Total Cost of Ownership

Maintenance Free Usage

Global Installations

Technical Specifications

	STANDARD OFFERING	OPTIONAL OFFERING
Power Ratings	100 - 833kVA (Single Phase Only)	Type A and B Designs
Voltage Ratings	Primary Voltages from 2.5kV through 19.9kV	
BIL Ratings	Primary BIL ratings 60kV to 150kV BIL	110kV BIL
Thermal Rating	Thermal rating of 55°C/65°C rise	
Frequency	60 Hz frequency	50 Hz frequency
Special Ratings		• Designs for elevations higher than 3300 feet • Low loss designs available in all ratings
Insulating Fluid	ANSI Type 2 Mineral Oil	
Tank & Features	• Steel construction per C57.15-2009, C57.12 & C57.90 • Round, sealed carbon steel tank with durable weather-resistant powdercoat-finish (ANSI No. 70 Gray) • Three cover bushings (S, L, SL) with ANSI clamp-type terminals • Two heavy duty lifting lugs on tank and cover • Black diagrammatic anodized aluminum nameplate on tank and control cabinet • Universal, waterproof, 3/8 inch lockable pad lock, and heavy duty constructed NEMA 3R carbon steel control cabinet with handle • Control cabinet equipped with universal connector for accepting various control options without modifications • 18" to 36" GE designed creep procelain bushings • 15" radiator panels, 3 and 4 bank maximum • Removable, sealed hand-hole cover • One cabinet available control modules by all suppliers • Square base - unit can be used in sub station or on above platform mounting. Hanger brackets included for pole mounting. Tank grounding (Qty 2 - diagonal opposite on all bases)	• Stainless • Zinc primer and epoxy topcoat finish for corrosive enviornments • NEMA 2 or 4 hole spade, SEFCOR 2 or 4 hole, clamp type terminals, 1.00 threaded stud, & H&J vertical or horizontal terminals. • Laser-etched stainless steel namplate • Standard communications available with the control module, and located in the same cabinet • Adjustable control cabinet heater for condensation removal. Bottom entry control cable. • Bird guard for bushings and lightning arresters • Ability to integrate most control modules within the Flex-Connect cabinet. (M6200A, GE 2011B, C, & E, SEL and ICMI) • Seismic certified galvanized adjustable sub-base; heights available from 15.5" to 42.5"
Internal Features	• Load Tap Changer (LTC) Switch with expected life of 2,000,000 operations • 65°C rated oven-bonded, patterned, epoxy-coated insulation paper for core and coil assembly • Superior short circuit withstand ability (40x rated current in accordance with latest ANSI C57.15-2009 requirements) • Center-tapped, internally mounted, zinc-oxide series winding bypass arrester with very low failure rate provides superior distribution of voltage stresses across the series winding and protects arrester from physical damage during transportation and service	• 668 Amperage Max • Reverse power flow measurement
Gauges & Valves	• Liquid level sight gauge • 15 Degree Dial-type position indicator with drag hand and load bonus adjustment for additional current carrying ability • 1" brass oil drain valve, brass mimimum oil sight gauge and upper fillter press connection for cycling oil • Pressure relief valve (10 psig vent pressure)	• Stainless steel drain valves and oil sampling valves • Temperature gauge (0 to 160°C)