Voltage Regulation & Power Quality

Servo Voltage Stabilizers

Servo-driven voltage correction for single-phase and three-phase loads up to 500 kVA.

Rating band: Up to 500 kVA

Document servo-voltage-stabilizers / Revision 2.0 / 19 October 2026

A servo voltage stabilizer senses its output voltage continuously and drives a variable transformer with a servo motor, which feeds a buck-boost transformer in series with the load. Invitrona manufactures air-cooled and oil-cooled units for single-phase and three-phase supplies up to 500 kVA. The input window, phase control arrangement, protection settings and enclosure are agreed for each requirement from the load schedule and recorded supply conditions.

Class summary

Typical values for the class

Rating range
Up to 500 kVA

Supply
Single or three phase, 50 Hz

Output accuracy
±1% of set voltage (typical)

Cooling
Air or oil cooled

Typical specification

Parameter	Value or range	Conditions and basis
Rating range	Up to 500 kVA	Continuous duty; single-phase units typically up to 25 kVA
Input voltage window	340–480 V AC three phase; 170–270 V AC single phase	Typical wide windows; narrower windows such as 360–450 V AC suit steadier supplies
Nominal output	400 or 415 V AC three phase; 230 V AC single phase	Phase-to-phase and phase-to-neutral respectively; set point agreed for each unit
Output accuracy	±1% of set voltage	Steady state, within the stated input window
Correction speed	Typically 6–25 V/s	Lower rates apply to higher ratings; the rate for a unit is stated in the quotation
Frequency	50 Hz	Operation typically within 47–53 Hz
Cooling	Air cooled or oil cooled	Oil cooling is usual for higher ratings and hot or dusty rooms
Efficiency	Typically 95–98%	At rated load and nominal input
Phase control	Independent per phase or balanced (common) control	Independent control for unbalanced supplies or loads
Protection	Under-voltage and over-voltage trip; overload and short-circuit trip; single-phasing and phase-reversal trip	Thresholds set at commissioning; fitted devices stated in the quotation

Figures are typical values for the class and rating band; the quotation states the values for a specific unit.

Parameter	Value or range	Conditions and basis
Bypass	Manual bypass switch	Automatic bypass by assessment
Ambient temperature	0–45 °C	Derating above 45 °C or above 1,000 m altitude
Enclosure and mounting	Powder-coated sheet steel, floor standing; IP21 indoor	Outdoor enclosures such as IP54 by assessment
Metering and indication	Digital input and output voltage, output current; status lamps	Communication interfaces by assessment

Selection and application

Features

Feature	What it means in use
Continuous servo correction	A servo motor moves the variable transformer smoothly, so the output follows the set point without stepping between taps.
Independent phase control	On three-phase units each phase can be corrected on its own, which matters where the supply or the load is unbalanced.
Protection set for the load	Voltage, overload and phase-fault trips are set for the connected equipment and recorded at commissioning.
Bypass for maintenance	A bypass switch keeps the load supplied from the mains while the stabilizer is isolated for inspection.
Air or oil cooling	Air-cooled units suit clean, ventilated rooms; oil-cooled units suit higher ratings, higher ambient temperatures and dusty sites.

Selection questions

Question	Answer
How is a servo voltage stabilizer sized?	Start from the connected load in kVA, add the starting demand of the largest motors and a margin for planned additions, then check the rating at the lowest expected input voltage. An engineer confirms the rating against the load schedule before a quotation is issued.
What input window should I specify?	Specify the window the site actually sees, ideally from voltage recordings over at least a working week. A wider window than needed increases size and cost; a window that is too narrow causes nuisance trips.
Balanced or independent phase control?	Independent control suits sites where the three phase voltages differ from one another or the load is unbalanced. Balanced control suits supplies whose phases rise and fall together.
Air cooled or oil cooled?	Air-cooled units are lighter and suit clean, ventilated indoor rooms. Oil-cooled units are usual for higher ratings, higher ambient temperatures and dusty locations, and need periodic oil checks.
Which standard applies to servo voltage stabilizers?	The Indian standard for servo voltage stabilizers is IS 9815. The standards, inspections and warranty terms that apply to an order are stated in the quotation.

Figures are typical values for the class and rating band; the quotation states the values for a specific unit.

Typical applications

Application context
Commercial buildings and retail sites
Large residences, villas and farmhouses
Production machinery and CNC equipment
Pumping, HVAC and refrigeration plant
Medical and laboratory equipment rooms
Multi-site facilities on variable grid supplies

Where the class fits

	Duty or project context
01	Corporate and multi-site power-quality programmes
02	Large residential and architect-led electrical projects
03	Industrial duties where supply variation affects equipment or process continuity

Documents for an agreed scope

	Document
01	Technical proposal for the agreed scope
02	General arrangement drawing and configuration details
03	Operating and maintenance instructions
04	Inspection, test, commissioning or handover records when included in scope

Information needed for selection

	Input
01	Connected and operating load, including motor starting and load behaviour
02	Observed incoming-voltage range and site conditions
03	Critical equipment, operating priorities and protection expectations
04	Installation location, ventilation, access, noise and environmental constraints
05	Project responsibilities for supply, installation, commissioning and service

How a requirement is handled

	Activity
01	Review the load schedule and recorded supply conditions
02	Propose the rating, input window, cooling and protection with stated assumptions
03	Agree scope, exclusions, documents and acceptance checks
04	Manufacture and inspect against the agreed configuration
05	Commission and record settings where commissioning is in scope

Document control

Field	Entry	Field	Entry
Document ID	servo-voltage-stabilizers	Revision	2.0
Document type	Technical data sheet	Date	19 October 2026
Product class	Servo Voltage Stabilizers	Owner	Invitrona Engineering
Product family	Voltage Regulation & Power Quality	Change	Issued with typical values for the product class and rating band.
Issued by	INVITRONA ELECTRICALS LIMITED, A-56, Naraina Industrial Area, Phase 1, New Delhi 110028, India		

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