CATERPILLAR®

SR4B Generators

820 Standby

50 Hz 1000-2250 kV•A 1500 rpm
60 Hz 1000-2250 kW 1800 rpm

CATERPILLAR ENGINE FACILITIES ISO 9001 CERTIFIED

CATERPILLAR® SR4B GENERATOR

Type . . . . . Brushless, revolving field, solid-state automatic voltage regulator
Construction . . . . . Single bearing, two bearing three phase, wye connected
Insulation . . . . . Class H
Enclosure . . . . . Drip proof IP 22, guarded
Alignment. . . . . Caterpillar pilot shaft
Overspeed capability 150%
Waveform . . . . . less than 5% deviation
Paralleling capability . . . Standard with adjustable voltage droop
Voltage regulator . . . . . 3-phase sensing with Volts-per-Hertz response
Voltage regulation. . . . . Less than ±1%
Voltage gain . . . . . Adjustable to compensate for engine speed droop and line loss
TIF. . . . . Less than 50
THD. . . . . Less than 5%
Number of leads 6

STANDARD FEATURES

General

Class H insulation (rotor, stator, and leads)
Improved efficiency
Motor starting capability in excess of 1.9 SkVA per continuous kW
Improved wire & terminal identification ensuring reliable connections
New compact size – reduction in length
Performance and design matched to Caterpillar engines
Radio frequency noise suppression better than industry standards
Six leads standard for differential protection
Standards: meets or exceeds the requirements of IEC 34-1, NEMA MG 1-22, BS4999, BS5000, VDE0530, UTE5100, CSA22.2, ISO8528-3
Superior construction and testing

Mechanical

Full cage construction
Six-hole power bus bars for convenient customer load connection
Terminal box with DIN rail mounted terminal blocks
Wet, layer wound rotors individually tested to 125% of rated speed; prototypes to 150% @ 170° C for two hours

Stator

Anticondensation heaters standard
Optimum winding pitch for minimum total harmonic distortion
Standard voltages: 380V, 480V, & 600V @ 60 Hz; 380V, 400V, 415V, & 500V @ 50 Hz
Vacuum impregnation insulation system
Windings coated with a fungus resistant resin

Excitation System

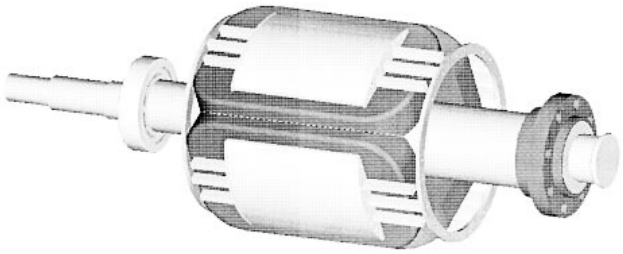
Adjustable voltage droop and paralleling capability
Improved transient response with a standard V/Hz regulator
Self excited
VR3 automatic voltage regulator with three phase sensing

OPTIONAL FEATURES

2/3 stator winding pitch
Bearing temperature detectors – 100Ω Pt or 10Ω Cu
Custom voltages
Manual voltage control
Oversized, generator mounted circuit breaker box (1009 H x 685 W x 406 D mm)
Paralleling kit with sensing and power isolation transformers
RFI filter – 82/499/EEC, VDE 875/10.84 A2 Level N, BS800 standards, and MIL-STD-461B (conducted, radiated, and susceptibility)
Stator temperature detectors – Type J (iron-constantan) thermocouples
Terminal box extension with:
separate compartment for control devices
modular design allowing RH or LH mount
optimized for use with or without circuit breakers
dimensions are 1009 H x 685 W x 304 D mm
VR3F for enhanced transient response and block loading

ROTOR CONSTRUCTION

The main rotor uses a precision "wet" layer wound process, with epoxy painted on the bare rotor and on each layer. This ensures bonding of all the wire layers together, bonding of the coils to the rotor laminations, and a sealed insulation system. The rotor epoxy is then oven-cured.
The exciter rotor is machine wound and receives two dips and bakes of a fungus-resisting resin.
Numerically controlled turning and grinding machines produce rotor shafts with close repeatable tolerances. Grade-8 bolts are used wherever joints are subject to induced stresses.
A complete coating of red sealer is applied to protect the rotors and shaft from moisture corrosion.
All rotor designs are prototype tested to 150% of rated speed at 170° C for two hours without any movement of material. Every production rotor is dynamically balanced in two planes to within 0.025 mm peak-to-peak amplitude and run at 125% of rated speed before assembly into the stator.



MAIN STATOR CONSTRUCTION

New square lamination stator design
Stator coil pitch, coil distribution, and skew are designed to produce optimum waveform and minimum total harmonic content.
Stator slots are insulated by slot liners and coil separators. Slot liners, coil separators, and top sticks provide a minimum of 25 mm (1 in) distance from the coil to ground. The thickness of liners, separators, and phase sheets provides superior protection between phases and ground.
Low voltage stator windings are given a 3000 volt "high pot" test (150% of the NEMA and IEC requirements for 480 volt generators) before the insulation is applied. The stators are then given a vacuum impregnation treatment of polyester material followed by an application of epoxy resin. This sealed stator is then given a final 2000 volt "high pot" test.

	60 Hz 1800 rpm			
Frame	822	824	825	826
Voltage	480	480	480	480
Ratings				
130° C Rise				
kV•A	1875	2187	2500	2812
kW	1500	1750	2000	2250
Eff (%)	95.7	96.3	96.3	96.5
Reactances (per unit)				
Subtransient-Direct Axis X"d	0.22339	0.24048	0.22469	0.18596
Subtransient Quadrature Axis X"q	0.20462	0.21030	0.19775	0.16348
Transient Saturated X'd	0.31731	0.31658	0.29874	0.26162
Synchronous Direct Axis Xd	4.20525	4.03396	3.91502	3.83542
Synchronous Quadrature Axis Xq	1.98541	1.91458	1.85451	1.80246
Negative Sequence X2	0.21401	0.22539	0.21122	0.17472
Zero Sequence Xo	0.00471	0.00562	0.07839	0.04690
Time Constants (seconds)				
Open Circuit Transient Direct Axis T'do	6.24900	6.45553	6.65120	7.30187
Short Circuit Transient Direct Axis T'd	0.47152	0.50663	0.50753	0.49807
Open Circuit Subtransient Direct Axis T"do	0.01600	0.01695	0.01673	0.01549
Short Circuit Subtransient Direct Axis T"d	0.00249	0.00218	0.00205	0.00191
Open Circuit Subtransient Quad Axis T"qo	0.01146	0.01147	0.01157	0.01088
Short Circuit Subtransient Quad Axis T"q	0.00007	0.00006	0.00005	0.00004
Armature Ta	0.03618	0.05491	0.04791	0.04157

	50 Hz 1500 rpm			
Frame	822	824	825	826
Voltage	400	400	400	400
Ratings				
130° C Rise kV•A kW	 1500 1200	 1750 1400	 2000 1600	 2250 1800
Eff (%)	96.1	96.1	96.1	96.2
Reactances (per unit)				
Subtransient-Direct Axis X"d	0.21446	0.23086	0.21571	0.17852
Subtransient Quadrature Axis X"q	0.19644	0.20189	0.18984	0.15694
Transient Saturated X'd	0.30461	0.30392	0.28679	0.25115
Synchronous Direct Axis Xd	4.03704	3.87261	3.75842	3.68201
Synchronous Quadrature Axis Xq	1.90599	1.83800	1.78033	1.73036
Negative Sequence X2	0.20545	0.21638	0.20277	0.16773
Zero Sequence Xo	0.00452	0.00539	0.07526	0.04502
Time Constants (seconds)				
Open Circuit Transient Direct Axis T'do	6.24900	6.45553	6.65120	7.30187
Short Circuit Transient Direct Axis T'd	0.47152	0.50663	0.50753	0.49807
Open Circuit Subtransient Direct Axis T"do	0.01600	0.01695	0.01673	0.01549
Short Circuit Subtransient Direct Axis T"d	0.00298	0.00261	0.00245	0.00228
Open Circuit Subtransient Quad Axis T"qo	0.01146	0.01147	0.01157	0.01088
Short Circuit Subtransient Quad Axis T"q	0.00008	0.00007	0.00006	0.00004
Armature Ta	0.03618	0.05491	0.04791	0.04157