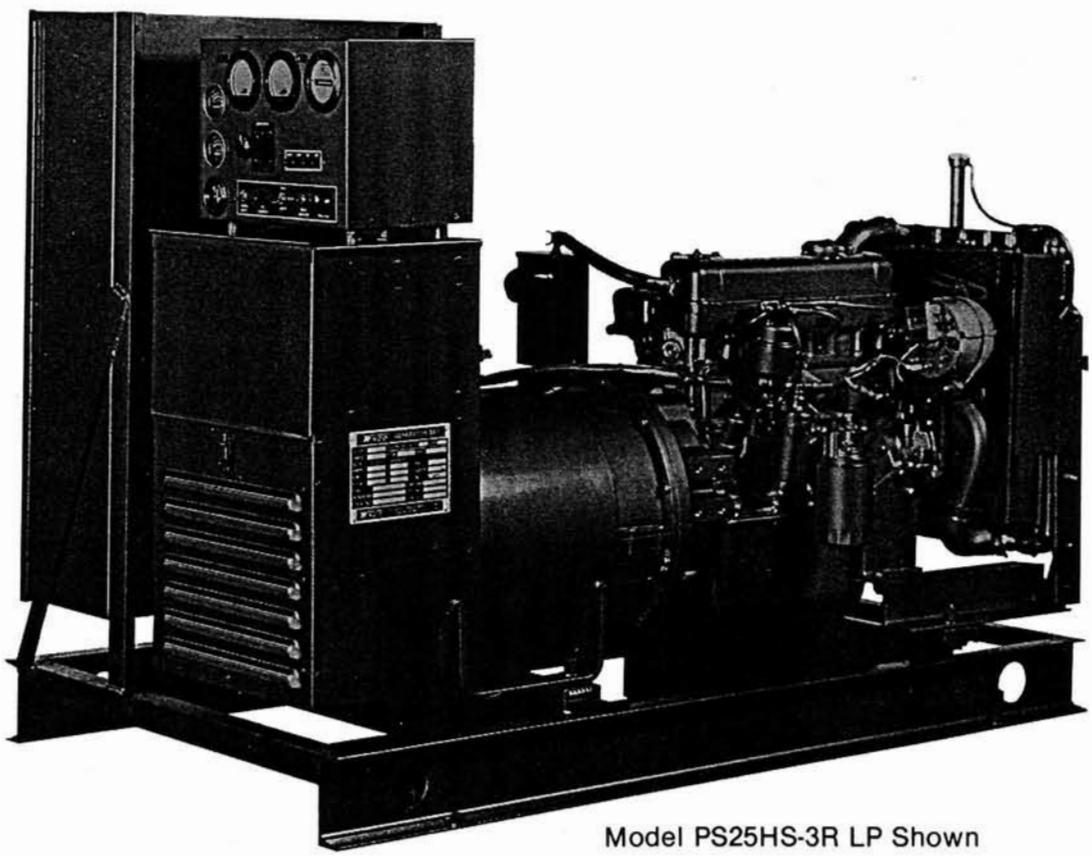
WINCO®

GENERATORS

320 SERIES TYPE "XTR" EXTERNALLY REGULATED

SERVICE INFORMATION



Model PS25HS-3R LP Shown

EGSMA ELECTRICAL GENERATING SYSTEMS MARKETING ASSOCIATION

WOM-74-1

WINCO® POWER PLANTS—Over 45 Years of Leadership

IM-D79

General Information

Description and Features

The XTR generator is a brushless, rotating field type generator. It provides 13-lead broad range connections for three phase, 60 Hertz voltages up to 480 volts. The generator can be used for 50 Hertz operation at 5/6 of the three phase 60 Hertz rating and single phase at 2/3 of the three phase rating. Special models are available up to 600 volts. XTR units require an external voltage regulator, such as the optional Basler KR4F, which can provide ±1% voltage regulation from no load to full generator load.

All models meet CSA, IEEE and NEMA standards and have Class F insulation. Rotors and coils are wet wound with fungus proof, thixotropic single component epoxy and then assembled and baked for permanent, rattle-free performance. All units are dynamically balanced during manufacture. Each generator is equipped with an outboard mounted, single coil Lundell exciter, which can be disassembled in a single piece to greatly simplify servicing. The exciter armature is also easily removable, fully exposing the heavy-duty rotor bearing.

All XTR generators are drip proof and come with an end mounted, weather protected control box having knockouts on both sides. The top and vertical front panels are easy to remove and allow complete access to generator for reconnection, testing, or maintenance. The recessed control panel is available blank or can be ordered with a variety of instrumentation.

Generator Side View

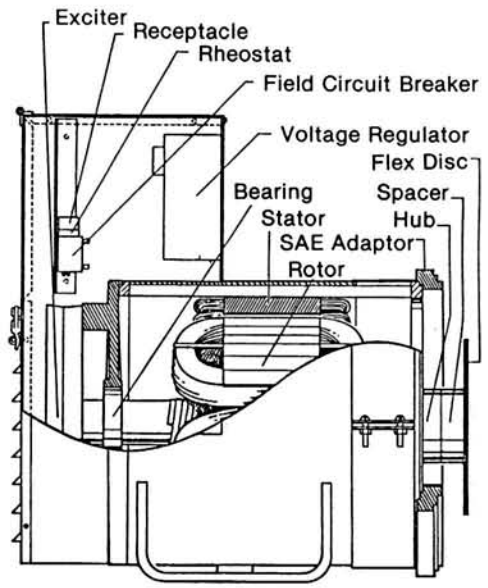


Figure 1

Safety Information

CAUTION: Possible damage to equipment

CAUTION

Caution notes indicate any condition or practice, which if not strictly observed or remedied, could result in damage or destruction of the equipment.

WARNING: Personal danger

Warning notes indicate any condition or practice, which if not strictly observed, could result in personal injury or possible loss of life.

General Safety

1. Avoid contact with live terminals or receptacles.
2. Use extreme caution if operating this unit in rain or snow.
3. Do not make or break receptacle connections under load.
4. Use only grounded receptacles and extension cords.
5. Properly ground the engine-generator set.
6. All drive systems should be provided with safety guards.
7. Keep all guards and shields in place and securely fastened.
8. Provide adequate ventilation and ducting of exhaust gas.
9. Wear hearing protection as needed.
10. Remove oily rags and any other material that may create a fire hazard.

While each generator is built to the highest standards of safety, improper operation, negligent maintenance or carelessness can result in serious personal injury or death. All operation, maintenance and safety instructions should be followed carefully. It is recommended that all service on this generator be performed only by qualified personnel. Install only factory approved replacement parts.

Unpacking and Inspection

Before accepting shipment from the transportation company, carefully inspect the crating to determine if any damage has occurred during transit. If damage is noted, have the representative of the transportation company write the nature of the damage on the freight bill so that a claim may be filed later if necessary.

Preparation for Use

Although the generator has been carefully inspected and tested before leaving the factory, it is recommended that the unit be thoroughly inspected before use. Mechanical and electrical soundness of all terminal connections should be inspected and all bolts and fasteners checked for tightness. Remove all packing material, blocks and skids used to prevent vibration and movement during shipment.

Operation

Unlike the conventional or rotating armature type generator which picks the output voltage from the armature slip rings through brushes, the brushless, rotating field type generator's output voltage is produced in the stationary windings.

The brushless, rotating field generator consists of a stator, rotor, rectifier assembly, and an exciter generator. The exciter generator is made up of a stationary field coil of the Lundell type and a rotating armature which produces the AC excitation voltage. This voltage is rectified in the rotating rectifier assembly. The rectified voltage is applied to the rotor field windings setting up an electromagnetic field. When this rotating electromagnetic field cuts the stationary windings (stator) current is produced. The voltage to the stationary exciter field coil is controlled externally by an electronic voltage regulator. The sensing voltage for this regulation is taken from the generator stator windings.

Preventive Maintenance

Timely preventive maintenance can keep costly repairs and generator down-time to a minimum. Compliance with the following list will insure long life for your generator.

1. Adequate cooling air is very important for long life and correct operation of the generator. Check regularly to insure that air intakes and vents are clear of any obstruction.
2. As a precaution against moisture and dust collecting in the generator and to keep the engine properly lubricated, the engine-generator set should be operated at least once a week. Engine-generator exercising may be required more frequently in areas of high humidity or blowing sand.
3. Check drive components and generator regularly for loose nuts, bolts and fasteners.
4. The bearings used are factory lubricated and double sealed and require no maintenance under normal conditions. Bearings should be checked if the generator is disassembled for other maintenance and should be replaced if worn.

Simplified Schematic

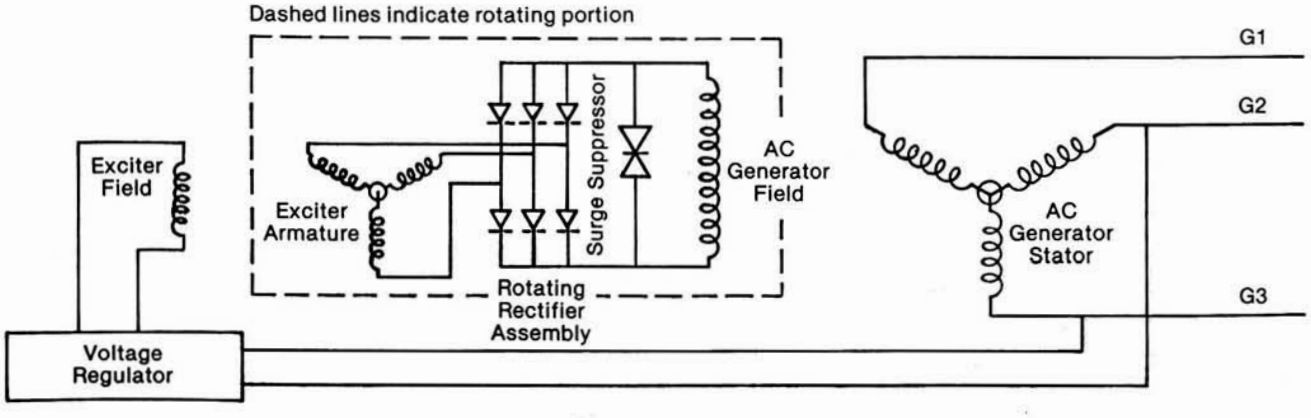


Figure 2

Trouble Shooting

As with any machine, trouble can develop in engine-generator sets and their associated control equipment. The following trouble shooting chart lists various symptoms of poor generator operation as well as possible causes and what corrective action can be taken. Engine-generator sets are under continuous vibration while running; therefore, it is advisable to check for loose wires or connectors whenever the generator control box is opened.

The following minimum test equipment should be on hand for field trouble shooting and maintenance. (See the section on test procedures when the problem area is pin-pointed.)

1. Volt-ohmmeter—20,000 ohms per volt
2. Frequency Meter—58 to 62 Hertz (cycles per second)
3. Clamp-on Ammeter—0 to 100 ampere range

The trouble shooting chart lists the following malfunctions and their possible causes and corrections.

1. No Output Voltage
2. Low Output Voltage
3. High Output Voltage
4. Fluctuating Voltage
5. Generator Overheating
6. Generator Noise and Vibration

Trouble Shooting Table

Symptom	Possible Cause	Correction
No output voltage	Load circuit breaker open	Reset/Replace
	Field circuit breaker open	Reset/Replace
	Voltage adjust rheostat dirty	Rotate knob back and forth, then reset. Test/Replace
	Loss of initial exciter residual magnetism	Flash the exciter field
	Loose or shorted wires in control box	Check all wiring and repair as needed
	Defective electronic voltage regulator	Carefully follow test procedure. Replace
	Defective rectifier	Carefully follow test procedure. Replace
	Shorted or open exciter field coil	Measure exciter field coil resistance for open or short. Replace
	Shorted or open exciter armature	Measure exciter armature resistance for open or short. Replace
	Shorted or open rotor	Measure rotor resistance for open or short. Replace
	Shorted or open stator	Measure stator resistance for open or short. Replace
Low output voltage	Engine speed too low	Check no load engine speed with a frequency meter and adjust governor to give 61.5 Hertz
	Generator overloaded	Calculate load being run and compare with name plate rating. With 3-phase generators, the load on each leg should be as evenly balanced as possible and should not exceed the rated current on any leg.
	Defective electronic voltage regulator	Carefully follow test procedure. Replace
	Defective rotating rectifier	Carefully follow test procedure. Replace
	Defective rotor winding	Measure resistance between rotor leads and compare with the unit's Technical Data Sheet. Replace
	Defective stator winding	Measure resistance between stator leads and compare with the unit's Technical Data Sheet. Replace
High output voltage	Engine speed too high	Check no load engine speed with a frequency meter and adjust governor to give 61.5 Hertz
	Defective electronic voltage regulator	Carefully follow test procedure. Replace
Fluctuating voltage	Erratic engine speed	Refer to the engine manufacturer's maintenance manual
	Loose terminal or load connection	Make better mechanical and electrical connection
	Voltage regulation unstable	Carefully follow electronic voltage regulator test procedure. Replace
	Intermittent short in exciter field coil	Measure exciter field coil resistance for short.

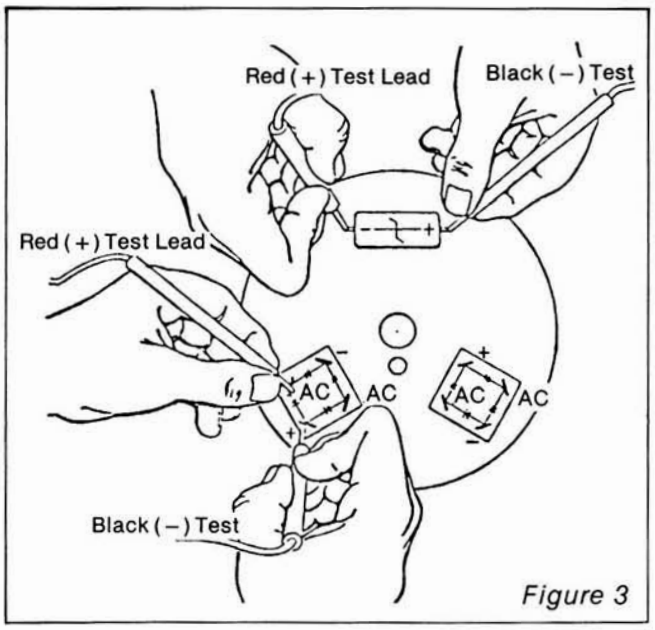


Figure 3

Testing the Rotor

1. Disconnect both rotor leads. These are connected to the surge suppressor on the rotating rectifier assembly. Measure the resistance between leads. The resistance should measure approximately 2.5 to 5 ohms. If the reading is correct, connect one ohmmeter lead to the rotor shaft and the other ohmmeter lead to one of the rotor leads. The reading should show infinite resistance. If the rotor proves to be defective, it must be returned to the factory for repair or replacement. Do not rewind.

Voltage Regulator (Optional KR4F/KR4FF)

1. Testing for Sensing Voltage: Measure the voltage between output leads T8 and T9. The voltage should be approximately 240 volts AC.
2. Regulator Voltage Output to Exciter: Using a voltmeter set to read at least 25 volts DC, connect the positive lead to F1 and the negative lead to F2. The reading should be between 10 and 20 volts DC at no load.
3. Consult voltage regulator instruction manual for testing, trouble shooting and adjustment procedures.

Testing the Stator

1. To test the stator, remove all load leads from the terminal block and open all load circuit breakers. Disconnect the grounded stator output leads from ground. The resistance measured between ground and G1, G2 and G3 in three-phase, or G1 and G2 in single phase, should be infinite. If the stator proves to be defective, it must be returned to the factory for repair or replacement. Do not rewind.

Flashing the Field

1. Disconnect the F1 (positive) and F2 (negative) leads from the electronic voltage regulator. Connect a 12 volt DC power source across the exciter field leads for 1-3 seconds. Battery positive must go to F1 (positive) lead and negative to F2 (negative) lead. Touch F1 lead to F2 lead to neutralize any stored charge. Reconnect F1 and F2 exciter field leads to the electronic voltage regulator. Be careful to maintain F1 to positive and F2 to negative.

Maintenance Record

Date	Maintenance Performed	Replacement Components Required

DYNA™ PERFORMANCE DATA

XTR Rotating Field Series 320 and 400

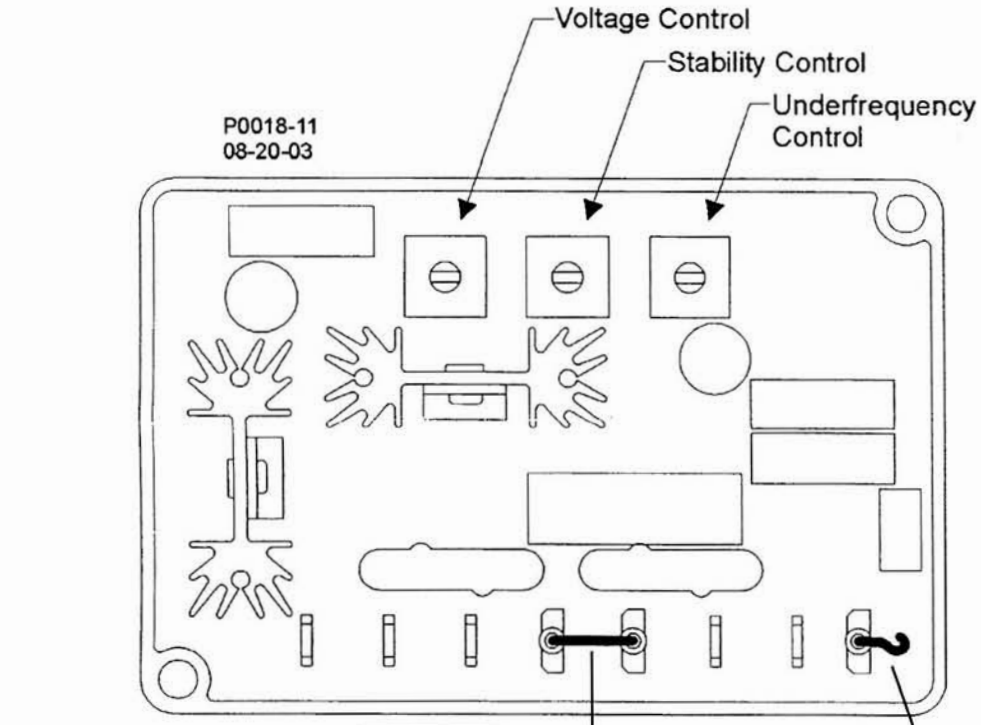
MODEL	PARAMETERS AT 105° C RISE															WINDING RESISTANCE @ 20° C				EXCITATION VOLTAGE		EXCITATION CURRENT	
	FRAME	KW	KVA	WAVE FORM DEVIATION FACTOR NO LOAD LINE TO LINE	TELEPHONE INFLUENCE FACTOR	MAX. TOTAL HARMONIC DISTORTION WYE CONN. LINE TO LINE @ FULL LOAD .8PF	MAX. SINGLE HARMONIC WYE CONN. LINE TO LINE @ FULL LOAD .8PF	REACTANCES Xd	X'd	X"d	X_2	X_0	REGULATION @ 480 V	SCR @ 480 V	NET WEIGHT	MAIN STATOR LINE TO NEUT.	MAIN ROTOR	EXCITER STATOR	EXCITER ROTOR LINE TO LINE	FL VOLTS	NL VOLTS	FL AMPS	NL AMPS
12PD4G-23	1	12	15	5%		3%	2.5%	.777	.12	.11	.09	.06	19.8%	1.29	335	.50	2.9	25	.350	38	13	1.3	.53
15PD4G-23	2	15	18.75	5%		3%	2.5%	.744	.12	.11	.094	.06	16.4%	1.32	420	.34	2.4	25	.350	43	13	1.3	.53
20PD4G-23	2	20	25	5%		3%	2.5%	.80	.12	.11	.10	.06	19.0%	1.25	500	.25	2.9	25	.350	32	15	1.2	.58
25PD4G-23	2	25	31.25	5%		3%	2.5%	.88	.13	.12	.10	.07	21.8%	1.15	525	.20	3.5	25	.350	34	15	1.3	.58
35PD4G-23	3	35	43.75	5%	LESS THAN 50	3%	2.5%	1.25	.14	.13	.12	.075	23.3%	.8	605	.110	2.6	25	.350	34	9.5	1.3	0.4
40PD4G-23	3	40	50	5%		3%	2.5%	1.20	.14	.13	.12	.075	23.3%	.815	645	.085	3.2	25	.350	36	9.5	1.3	0.4
50PD4G-23	3	50	62.5	5%		3%	2.5%	1.32	.16	.13	.13	.079	24.5%	.76	730	.075	3.6	25	.350	39	9.5	1.3	0.4
75PD2G-23	4	75	93.75	—		—	—	.65	.12	.11	.09	.06	10.5%	1.5	780	.030	6.0	25	.350	29	19	1.1	.75
65TD4G-23	400	65	81.25	5%		3%	2%	1.25	.13	.11	.078	.05	17.2%	.800	920	.065	2.60	25	.350	46	15	1.7	.59
80TD4G-23	400	80	100	5%		3%	2%	1.27	.13	.10	.075	.048	16.7%	.790	940	.050	2.85	25	.350	48	15	1.7	.59
100TD4G-23	400	100	125	5%		3%	2%	1.17	.12	.095	.072	.046	16.5%	.854	1070	.037	3.35	25	.350	50	15	1.7	.59
125TD4G-23	400	125	156	5%		3%	2%	1.32	.12	.095	.07	.045	22.5%	.75	1210	.024	3.9	25	.350	55	15	1.8	.59

Generator Efficiency

MODEL	EFFICIENCY % FULL LOAD
105D2P-1N	75%-80% Generator Efficiency based on voltage and frequency regulation within specified limits.
205D2P-1N	
307D2P-3N	
307D2P-3C	
503D2P-3N	
503D2P-3C	
8D2G-3C	
10D2G-3C	
2D4P-1N	
3D4P-1N	
3D4P-3N	
3D4P-3C	
4BD4P-3N	
4LD4P-3N	
4BD4P-3C	
6D4G-3C	
1205D3G-3N	
1205D4G-4N	
1205D4G-17N	

MODEL	EFFICIENCY % FULL LOAD
8PD4G-3	76
12PD4G-23	76
15PD4G-23	76
20PD4G-23	80
25PD4G-23	81
35PD4G-23	87.5
40PD4G-23	89
50PD4G-23	89
75PD2G-23	90.5
65TD4G-23	89.5
80TD4G-23	90.3
100TD4G-23	90.7
125TD4G-23	91.3

CONVERSION FROM KR4F AND KR4FF REGULATORS TO THE NEW BASLER AVC63-4D



CONNECT WIRE #45 FROM THE FIELD CIRCUIT BREAKER TO TERMINAL #3

REMOVE THIS JUMPER AND CONNECT WIRE #46 TO SIX AND WIRE #47 TO SEVEN

LEAVE THIS JUMPER IN PLACE IT IS SET FOR 60 HZ

CONNECT WIRE #T9 FROM THE E1 TERMINAL ON THE OLD REGULATOR TO TERMINAL #4

CONNECT F+ AND F- FROM THE GENERATOR TO THE CORRECT TERMINALS

ALL OTHER WIRES ARE JUST CAPED OFF. IF YOU HAVE MORE THAN ONE LEAD ON A TERMINAL THEY MUST BE MOVE TOGETHER OR CAPPED TOGETHER