

Engine: 3412	Generator Frame: 592	Selected Model	Genset Rating (kW): 500.0	Line Voltage: 480
Fuel: Diesel	Generator Arrangement: 9Y0440		Genset Rating (kVA): 625.0	Phase Voltage: 277
Frequency: 60	Excitation Type: Self Excited		Pwr. Factor: 0.8	Rated Current: 751.8
Duty: PRIME	Connection: SERIES STAR		Application: EPG	Status: Current

Version: 39094 /38912 /38261 /10073

Spec Information

Generator Specification			Generator Efficiency		
Frame: 592	Type: SR4B	No. of Bearings: 1	Per Unit Load	kW	Efficiency %
Winding Type: RANDOM WOUND	Flywheel: 18.0		0.25	125.0	91.5
Connection: SERIES STAR	Housing: 0		0.5	250.0	94.1
Phases: 3	No. of Leads: 12		0.75	375.0	94.4
Poles: 4	Wires per Lead: 2		1.0	500.0	94.2
Sync Speed: 1800	Generator Pitch: 0.8		1.1	550.0	94.0

Reactances	Per Unit	Ohms
SUBTRANSIENT - DIRECT AXIS X _d	0.1836	0.0677
SUBTRANSIENT - QUADRATURE AXIS X _q	0.1790	0.0660
TRANSIENT - SATURATED X _d	0.2626	0.0968
SYNCHRONOUS - DIRECT AXIS X _d	3.4375	1.2672
SYNCHRONOUS - QUADRATURE AXIS X _q	1.7499	0.6451
NEGATIVE SEQUENCE X ₂	0.1815	0.0669
ZERO SEQUENCE X ₀	0.0836	0.0308

Time Constants	Seconds
OPEN CIRCUIT TRANSIENT - DIRECT AXIS T _{d0}	2.3980
SHORT CIRCUIT TRANSIENT - DIRECT AXIS T _d	0.1832
OPEN CIRCUIT SUBTRANSIENT - DIRECT AXIS T _{d0}	0.0091
SHORT CIRCUIT SUBTRANSIENT - DIRECT AXIS T _d	0.0069
OPEN CIRCUIT SUBTRANSIENT - QUADRATURE AXIS T _{q0}	0.0069
SHORT CIRCUIT SUBTRANSIENT - QUADRATURE AXIS T _q	0.0076
EXCITER TIME CONSTANT T _e	0.1400
ARMATURE SHORT CIRCUIT T _a	0.0278

Short Circuit Ratio: 0.37	Stator Resistance = 0.0122 Ohms	Field Resistance = 1.27 Ohms
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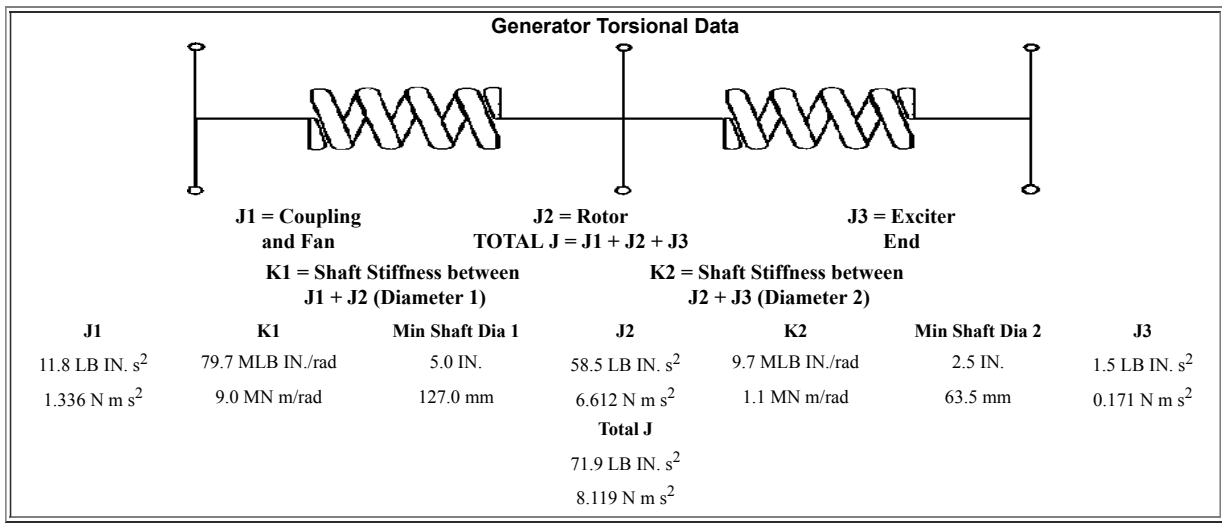
Voltage Regulation		Generator Excitation		
		No Load	Full Load, (rated) pf	
			Series	Parallel
Voltage level adjustment: +/-	5.0%			
Voltage regulation, steady state: +/-	0.5%			
Voltage regulation with 3% speed change: +/-	0.5%			
Waveform deviation line - line, no load: less than	5.0%	Excitation voltage: 7.58 Volts	39.31 Volts	Volts
Telephone influence factor: less than	50	Excitation current 1.68 Amps	7.17 Amps	Amps

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Generator Mechanical Information

Center of Gravity		
Dimension X	-662.4 mm	-26.1 IN.
Dimension Y	0.0 mm	0.0 IN.
Dimension Z	0.0 mm	0.0 IN.
<ul style="list-style-type: none"> "X" is measured from driven end of generator and parallel to rotor. Towards engine fan is positive. See General Information for details "Y" is measured vertically from rotor center line. Up is positive. "Z" is measured to left and right of rotor center line. To the right is positive. 		
Generator WT = 1549 kg * Rotor WT = 458 kg * Stator WT = 1091 kg 3,415 LB 1,010 LB 2,405 LB		
Rotor Balance = 0.0508 mm deflection PTP Overspeed Capacity = 150% of synchronous speed		



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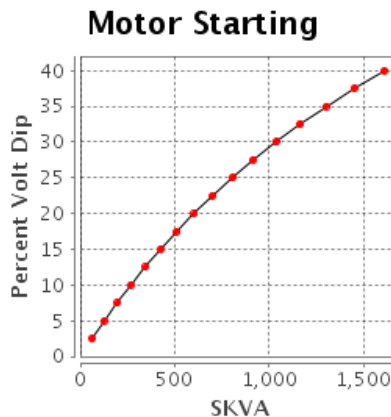
Generator Cooling Requirements - Temperature - Insulation Data	
Cooling Requirements:	Temperature Data: (Ambient 40 °C)
Heat Dissipated: 30.8 kW	Stator Rise: 105.0 °C
Air Flow: 112.2 m ³ /min	Rotor Rise: 105.0 °C
Insulation Class: H	
Insulation Reg. as shipped: 100.0 MΩ minimum at 40 °C	
Thermal Limits of Generator	
Frequency:	60 Hz
Line to Line Voltage:	480 Volts
B BR 80/40	519.0 kVA
F BR -105/40	625.0 kVA
H BR - 125/40	688.0 kVA
F PR - 130/40	688.0 kVA

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Starting Capability & Current Decrement Motor Starting Capability (0.4 pf)

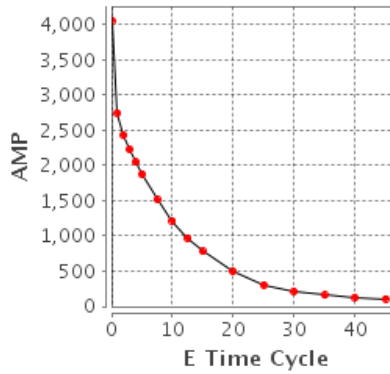
SKVA	Percent Volt Dip
62	2.5
127	5.0
196	7.5
268	10.0
345	12.5
426	15.0
512	17.5
603	20.0
701	22.5
805	25.0
916	27.5
1,034	30.0
1,162	32.5
1,300	35.0
1,448	37.5
1,609	40.0



Current Decrement Data

E Time Cycle	AMP
0.0	4,060
1.0	2,745
2.0	2,433
3.0	2,227
4.0	2,045
5.0	1,877
7.5	1,512
10.0	1,215
12.5	973
15.0	778
20.0	490
25.0	306
30.0	210
35.0	158
40.0	128
45.0	111

Current Decrement



Instantaneous 3 Phase Fault Current: 4060 Amps

Instantaneous Line - Line Fault Current: 3539 Amps

Instantaneous Line - Neutral Fault Current: 4989 Amps

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Selected Model

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Pwr. Factor: 0.8
Application: EPG

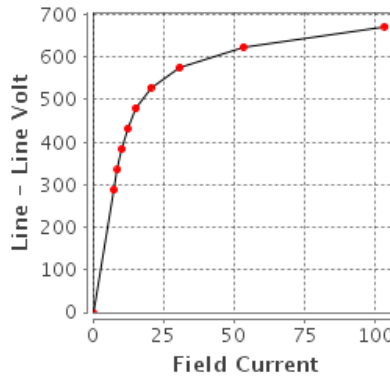
Line Voltage: 480
Phase Voltage: 277
Rated Current: 751.8
Status: Current

Version: 39094 /38912 /38261 /10073

Generator Output Characteristic Curves
Open Circuit Curve

Field Current	Line - Line Volt
0.0	0
7.4	288
8.8	336
10.3	384
12.3	432
15.3	480
20.5	528
30.9	576
53.3	624
103.2	672

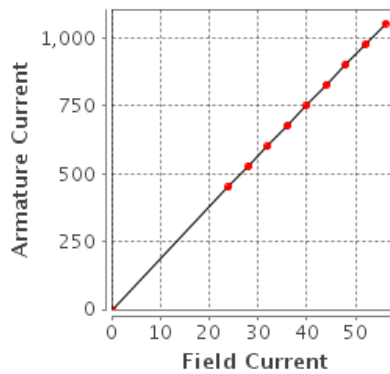
Open Circuit



Short Circuit Curve

Field Current	Armature Current
0.0	0
24.0	451
28.0	526
32.0	601
36.0	677
40.0	752
44.0	827
48.0	902
52.1	977
56.1	1,052

Short Circuit



Engine: 3412
Fuel: Diesel
Frequency: 60
Duty: PRIME

Generator Frame: 592
Generator Arrangement: 9Y0440
Excitation Type: Self Excited
Connection: SERIES STAR

Selected Model

Genset Rating (kW): 500.0
Genset Rating (kVA): 625.0
Pwr. Factor: 0.8
Application: EPG

Line Voltage: 480
Phase Voltage: 277
Rated Current: 751.8
Status: Current

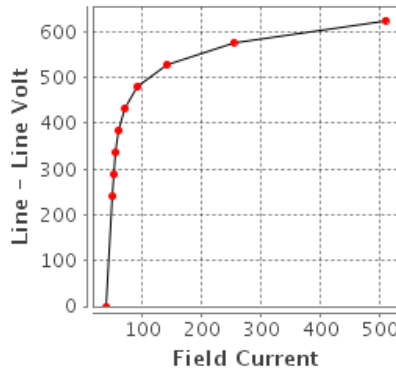
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Generator Output Characteristic Curves

Zero Power Factor Curve

Zero Power

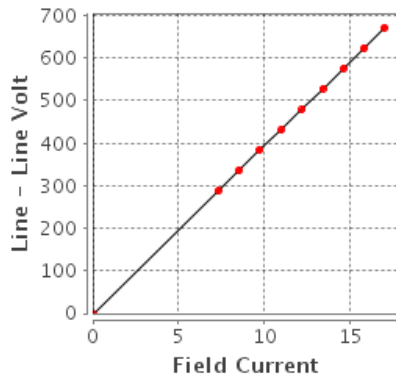
Field Current	Line - Line Volt
40.0	0
49.8	240
51.8	288
54.8	336
59.9	384
70.2	432
92.2	480
141.4	528
253.1	576
508.2	624



Air Gap Curve

Air Gap

Field Current	Line - Line Volt
0.0	0
7.3	288
8.5	336
9.7	384
11.0	432
12.2	480
13.4	528
14.6	576
15.8	624
17.0	672



Engine: 3412
 Fuel: Diesel
 Frequency: 60
 Duty: PRIME

Generator Frame: 592
 Generator Arrangement: 9Y0440
 Excitation Type: Self Excited
 Connection: SERIES STAR

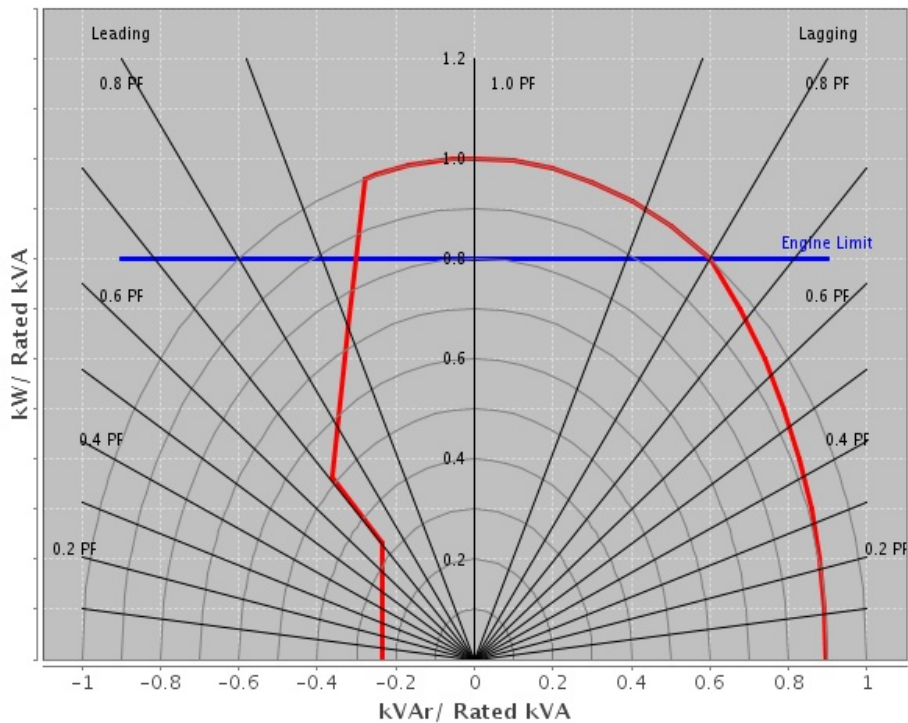
Selected Model

Genset Rating (kW): 500.0
 Genset Rating (kVA): 625.0
 Pwr. Factor: 0.8
 Application: EPG

Line Voltage: 480
 Phase Voltage: 277
 Rated Current: 751.8
 Status: Current

Version: 39094 /38912 /38261 /10073

**Reactive Capability Curve
 Operating Chart**



Engine: 3412
Fuel: Diesel
Frequency: 60
Duty: PRIME

Generator Frame: 592
Generator Arrangement: 9Y0440
Excitation Type: Self Excited
Connection: SERIES STAR

Selected Model

Genset Rating (kW): 500.0
Genset Rating (kVA): 625.0
Pwr. Factor: 0.8
Application: EPG

Line Voltage: 480
Phase Voltage: 277
Rated Current: 751.8
Status: Current

Version: 39094 /38912 /38261 /10073

General Information

DM7802

GENERATOR GENERAL INFORMATION

I. GENERATOR MOTOR STARTING CAPABILITY CURVES

A. THE MOTOR STARTING CURVES ARE REPRESENTATIVE OF THE DATA OBTAINED BY THE FOLLOWING PROCEDURE:

1. THE CATERPILLAR GENERATOR IS DRIVEN BY A SYNCHRONOUS DRIVER.
2. VARIOUS SIZE THREE PHASE INDUCTION MOTORS (NEMA CODE F) ARE STARTED ACROSS THE LINE LEADS OF THE UNLOADED GENERATOR.
3. THE RESULTING VOLTAGE DIPS ARE RECORDED WITH AN OSCILLOSCOPE.
4. MOTOR HORSEPOWER HAS BEEN CONVERTED TO STARTING KILOVOLT AMPERES (SKVA).
5. RECORDED VOLTAGE DIPS HAVE BEEN EXPRESSED AS A PERCENT OF GENERATOR RATED VOLTAGE.

II. USE OF THE MOTOR STARTING CAPABILITY CURVES.

A. CALCULATE THE SKVA REQUIRED BY THE MOTOR FOR FULL VOLTAGE STARTING ACROSS THE LINE IF THE VALUE IS NOT LISTED ON THE MOTOR DATA PLATE.

1. MOTORS CONFORMING TO NEMA STANDARDS
MULTIPLY THE MOTOR HORSEPOWER BY THE NEMA SKVA/HP FIGURE. FOR NEMA CODE F, USE 5.3 SKVA/HP; FOR NEMA CODE G, USE 6.0 SKVA/HP.

2. ALL OTHER MOTORS:
MULTIPLY THE RATED VOLTAGE BY THE LOCKED ROTOR AMPERE AND BY 0.001732. (IF THE LOCKED ROTOR AMPERES ARE NOT LISTED, MULTIPLY THE FULL LOAD (RUNNING) AMPERES BY 1.25).
B. USE THE ABOVE SKVA WITH THE MOTOR STARTING TABLE.

1. ACROSS LINE STARTING:

READ ACROSS THE ROW OF "ACROSS THE LINE STARTING SKVA" IF THE DESIRED VALUE OF SKVA IS NOT GIVEN, CALCULATE THE DIP BY FINDING THE PROPER SKVA INTERVAL AND INTERPOLATING AS FOLLOWS:

SKVA1 IS THE SKVA TABLE ENTRY JUST SMALLER THAN THE DESIRED SKVA, DIP1 IS THE DIP FOR SKVA2, AND SKVA2 IS THE SKVA TABLE ENTRY JUST GREATER THAN THE DESIRED SKVA. THE DIP (IN PERCENT) AT THE DESIRED SKVA IS:

$$\text{DIP} = \text{DIP1} + (\text{SKVA} - \text{SKVA1}) * 2.5 / (\text{SKVA2} - \text{SKVA1})$$

NOTE: VOLTAGE DIPS GREATER THAN 35% MAY CAUSE MAGNETIC CONTACTORS TO DROP OUT.

2. REDUCED VOLTAGE STARTING:

REFER TO THE FOLLOWING TABLE. MULTIPLY THE CALCULATED ACROSS LINE SKVA BY THE MULTIPLIER LISTED FOR THE SPECIFIC STARTING METHOD. APPLY THE RESULT TO THE STARTING TABLE AS IN II A, TO CALCULATE THE EXPECTED VOLTAGE DIP:

TYPE OF REDUCED VOLTAGE STARTING	MULTIPLY LINE SKVA BY
80% TAP	.80
65% TAP	.65
50% TAP	.50
45% TAP	.45
Wye start, delta run	.33

AUTOTRANSFORMER

80% TAP	.68
65% TAP	.46
50% TAP	.29

NOTE: REDUCE VOLTAGE STARTING LOWERS THE MAXIMUM REQUIRED MOTOR SKVA.

3. Part winding starting:

Most common is half-winding start, full-winding run.

Multiply the full motor, across line starting skVA by 0.6. Apply the result to the selected curve as in ii. A above. Read the expected voltage dip, for the required skVA.

III. DEFINITION:

A. GENERATOR TERMS

MODEL: Engine Sales model

ENG TYPE: DI = Direct Injection,

NA = Naturally aspirated, etc

HZ: Running frequency, hertz

RATING TYPE: PP, SB (prime power or standby)

KW: Base rating electrical kilowatts (ekW)

VOLTS: Rating terminal, line to line

GEN ARR: Cat generator arrangement part number

GEN FRAME: Generator frame size designation

CONN: Generator output connection
(star, wye, delta, ect.)

POLES: Number of pole pieces on rotor.
(eg. A 4 pole generator run at 1800)

RPM will produce 60 Hz alternating current. A 6 pole generator run at 1200 RPM will produce 60 Hz alternating current.)

B. GENERATOR TEMPERATURE RISE:

The indicated temperature rise indicated the NEMA limits for standby or prime power applications. These rises are used for calculating the losses and efficiencies and are not necessarily indicative of the actual temperature rise of a given machine.

C. CENTER OF GRAVITY

The specified center of gravity is for the generator only. For single bearing, and two bearing close coupled generators, the center of gravity is measured from the generator/engine flywheel housing interface and from the centerline of the rotor shaft.

For two bearing, standalone generators, the center of gravity is measured from the end of the rotor shaft and from the centerline of the rotor shaft.

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D. GENERATOR DECREMENT CURRENT CURVES

The generator decrement current curve gives the symmetrical current supplied by the generator for a three phase bolted fault at the generator terminals. Generators equipped with the series boost attachment or generators with PM excitation system will supply 300% of rated current for at least 10 seconds.

E. GENERATOR EFFICIENCY CURVES

The efficiency curve is representative of the overall generator efficiency over the normal range of the electrical load and at the specified parameters. This is not the overall engine generator set efficiency curve.

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