

			Selected Model		
Engine: 3306	Generator Frame: 446		Genset Rating (kW): 180.0	Line Voltage: 400	
Fuel: Diesel	Generator Arrangement: 1093787		Genset Rating (kVA): 225.0	Phase Voltage: 230	
Frequency: 50	Excitation Type: Permanent Magnet		Pwr. Factor: 0.8	Rated Current: 324.8	
Duty: PRIME	Connection: SERIES STAR		Application: EPG	Status: Current	

Version: 39094 /39723 /38261 /408

Spec Information

Generator Specification			Generator Efficiency		
			Per Unit Load	kW	Efficiency %
Frame: 446	Type: SR4	No. of Bearings: 1	0.25	45.0	91.1
Winding Type: RANDOM WOUND	Flywheel: 14.0		0.5	90.0	93.5
Connection: SERIES STAR	Housing: 1		0.75	135.0	93.4
Phases: 3	No. of Leads: 12		1.0	180.0	92.3
Poles: 4	Wires per Lead: 2		1.1	198.0	91.5
Sync Speed: 1500	Generator Pitch: 0.75				

Reactances	Per Unit	Ohms
SUBTRANSIENT - DIRECT AXIS X _d	0.1921	0.1366
SUBTRANSIENT - QUADRATURE AXIS X _q	0.2147	0.1527
TRANSIENT - SATURATED X _d	0.3454	0.2456
SYNCHRONOUS - DIRECT AXIS X _d	3.6984	2.6300
SYNCHRONOUS - QUADRATURE AXIS X _q	2.1881	1.5560
NEGATIVE SEQUENCE X ₂	0.2033	0.1446
ZERO SEQUENCE X ₀	0.0553	0.0393

Time Constants	Seconds
OPEN CIRCUIT TRANSIENT - DIRECT AXIS T _{d0}	1.7060
SHORT CIRCUIT TRANSIENT - DIRECT AXIS T _d	0.1619
OPEN CIRCUIT SUBTRANSIENT - DIRECT AXIS T _{d0}	0.0043
SHORT CIRCUIT SUBTRANSIENT - DIRECT AXIS T _d	0.0035
OPEN CIRCUIT SUBTRANSIENT - QUADRATURE AXIS T _{q0}	0.0045
SHORT CIRCUIT SUBTRANSIENT - QUADRATURE AXIS T _q	0.0037
EXCITER TIME CONSTANT T _e	0.1144
ARMATURE SHORT CIRCUIT T _a	0.0204

Short Circuit Ratio: 0.53	Stator Resistance = 0.0358 Ohms	Field Resistance = 0.961 Ohms
---------------------------	---------------------------------	-------------------------------

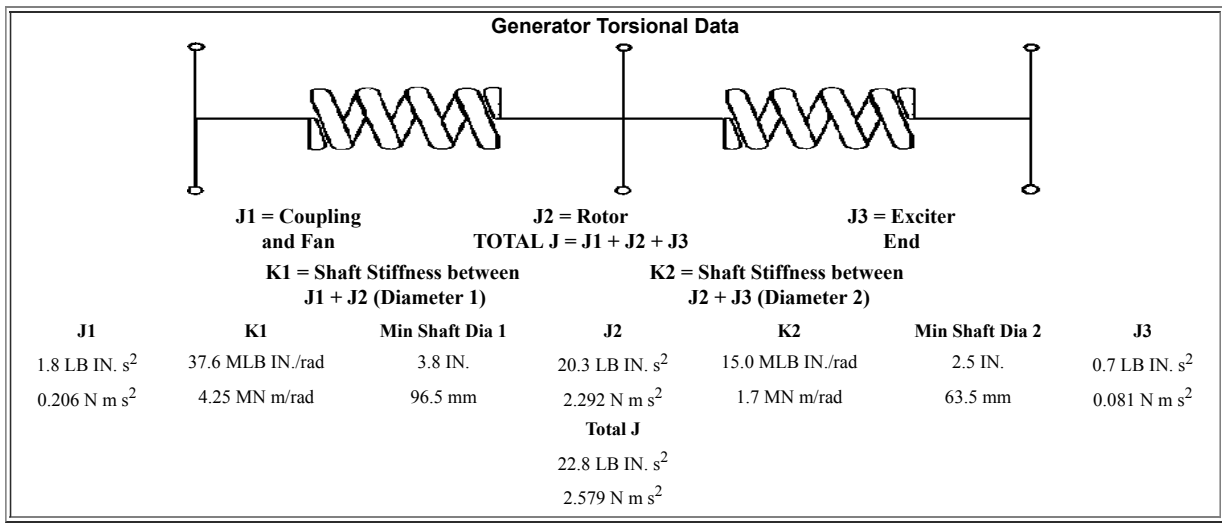
Voltage Regulation		Generator Excitation		
		No Load	Full Load, (rated) pf	
			Series	Parallel
Voltage level adjustment: +/-	5.0%			
Voltage regulation, steady state: +/-	0.5%			
Voltage regulation with 3% speed change: +/-	0.5%			
Waveform deviation line - line, no load: less than	5.0%			
Telephone influence factor: less than	50			
		Excitation voltage: 10.0 Volts	32.81 Volts	Volts
		Excitation current 2.22 Amps	5.99 Amps	Amps

			Selected Model		
Engine: 3306	Generator Frame: 446		Genset Rating (kW): 180.0	Line Voltage: 400	
Fuel: Diesel	Generator Arrangement: 1093787		Genset Rating (kVA): 225.0	Phase Voltage: 230	
Frequency: 50	Excitation Type: Permanent Magnet		Pwr. Factor: 0.8	Rated Current: 324.8	
Duty: PRIME	Connection: SERIES STAR		Application: EPG	Status: Current	

Version: 39094 /39723 /38261 /408

Generator Mechanical Information

Center of Gravity		
Dimension X	-548.6 mm	-21.6 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 = 802 kg * Rotor WT = 270 kg * Stator WT = 532 kg 1,768 LB 595 LB 1,173 LB		
Rotor Balance = 0.0508 mm deflection PTP Overspeed Capacity = 180% of synchronous speed		



Selected Model			
Engine: 3306	Generator Frame: 446	Genset Rating (kW): 180.0	Line Voltage: 400
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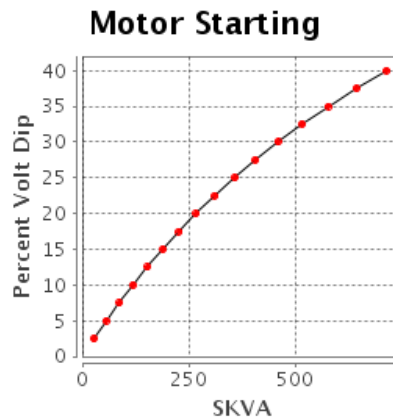
Generator Cooling Requirements - Temperature - Insulation Data	
Cooling Requirements:	Temperature Data: (Ambient 40 °C)
Heat Dissipated: 15.0 kW	Stator Rise: 105.0 °C
Air Flow: 53.4 m ³ /min	Rotor Rise: 105.0 °C
Insulation Class: H	
Insulation Reg. as shipped: 100.0 MΩ minimum at 40 °C	
Thermal Limits of Generator	
Frequency:	50 Hz
Line to Line Voltage:	400 Volts
B BR 80/40	187.0 kVA
F BR -105/40	225.0 kVA
H BR - 125/40	250.0 kVA
F PR - 130/40	250.0 kVA

Selected Model			
Engine: 3306	Generator Frame: 446	Genset Rating (kW): 180.0	Line Voltage: 400
Fuel: Diesel	Generator Arrangement: 1093787	Genset Rating (kVA): 225.0	Phase Voltage: 230
Frequency: 50	Excitation Type: Permanent Magnet	Pwr. Factor: 0.8	Rated Current: 324.8
Duty: PRIME	Connection: SERIES STAR	Application: EPG	Status: Current

Version: 39094 /39723 /38261 /408

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

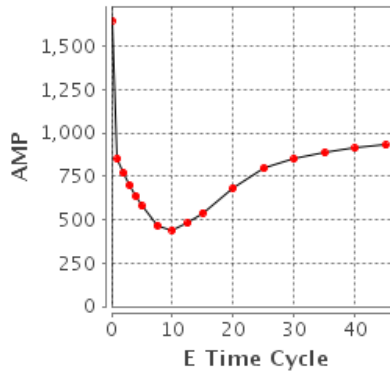
SKVA	Percent Volt Dip
27	2.5
56	5.0
87	7.5
119	10.0
153	12.5
189	15.0
227	17.5
267	20.0
311	22.5
357	25.0
406	27.5
458	30.0
515	32.5
576	35.0
642	37.5
713	40.0



Current Decrement Data

E Time Cycle	AMP
0.0	1,648
1.0	851
2.0	768
3.0	697
4.0	634
5.0	578
7.5	466
10.0	438
12.5	479
15.0	539
20.0	683
25.0	795
30.0	851
35.0	886
40.0	911
45.0	929

Current Decrement



Instantaneous 3 Phase Fault Current: 1648 Amps

Instantaneous Line - Line Fault Current: 1387 Amps

Instantaneous Line - Neutral Fault Current: 2107 Amps

Engine: 3306
Fuel: Diesel
Frequency: 50
Duty: PRIME

Generator Frame: 446
Generator Arrangement: 1093787
Excitation Type: Permanent Magnet
Connection: SERIES STAR

Selected Model

Genset Rating (kW): 180.0
Genset Rating (kVA): 225.0
Pwr. Factor: 0.8
Application: EPG

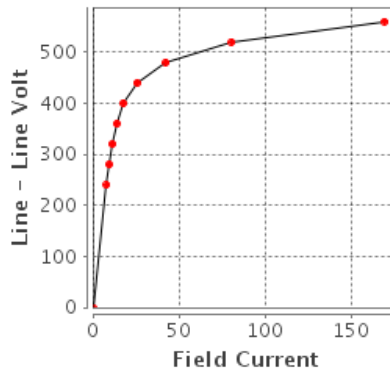
Line Voltage: 400
Phase Voltage: 230
Rated Current: 324.8
Status: Current

Version: 39094 /39723 /38261 /408

Generator Output Characteristic Curves
Open Circuit Curve

Field Current	Line - Line Volt
0.0	0
8.0	240
9.5	280
11.3	320
13.8	360
17.8	400
25.7	440
42.5	480
80.7	520
169.3	560

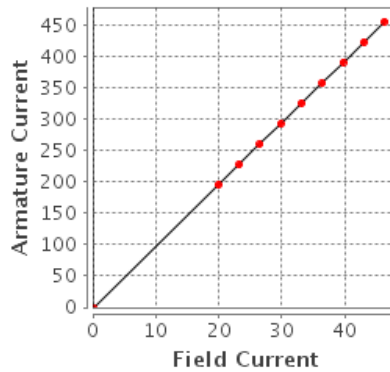
Open Circuit



Short Circuit Curve

Field Current	Armature Current
0.0	0
19.9	195
23.2	227
26.5	260
29.8	292
33.1	325
36.4	357
39.7	390
43.0	422
46.3	455

Short Circuit



Engine: 3306
Fuel: Diesel
Frequency: 50
Duty: PRIME

Generator Frame: 446
Generator Arrangement: 1093787
Excitation Type: Permanent Magnet
Connection: SERIES STAR

Selected Model

Genset Rating (kW): 180.0
Genset Rating (kVA): 225.0
Pwr. Factor: 0.8
Application: EPG

Line Voltage: 400
Phase Voltage: 230
Rated Current: 324.8
Status: Current

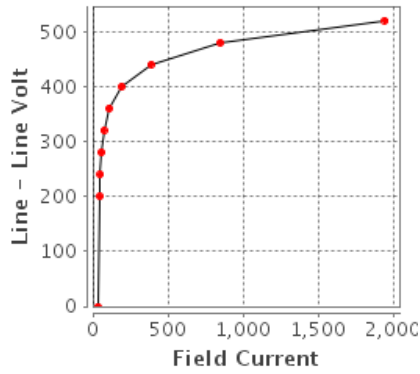
Version: 39094 /39723 /38261 /408

Generator Output Characteristic Curves

Zero Power Factor Curve

Zero Power

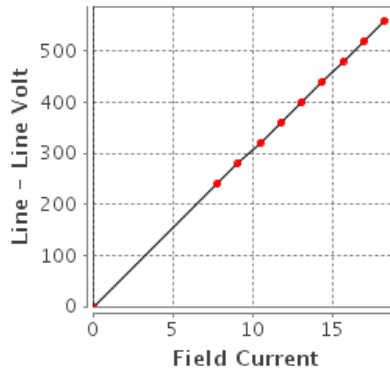
Field Current	Line - Line Volt
33.1	0
45.9	200
49.8	240
57.2	280
73.0	320
108.8	360
192.1	400
388.0	440
850.6	480
1,945.9	520



Air Gap Curve

Air Gap

Field Current	Line - Line Volt
0.0	0
7.8	240
9.1	280
10.5	320
11.8	360
13.1	400
14.4	440
15.7	480
17.0	520
18.3	560



Engine: 3306
Fuel: Diesel
Frequency: 50
Duty: PRIME

Generator Frame: 446
Generator Arrangement: 1093787
Excitation Type: Permanent Magnet
Connection: SERIES STAR

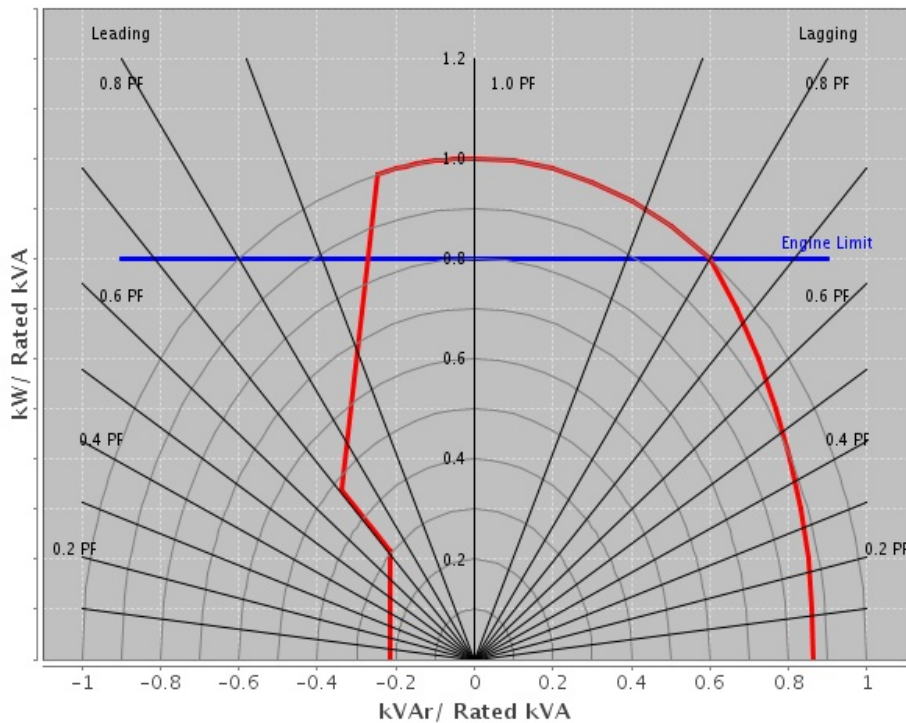
Selected Model

Genset Rating (kW): 180.0
Genset Rating (kVA): 225.0
Pwr. Factor: 0.8
Application: EPG

Line Voltage: 400
Phase Voltage: 230
Rated Current: 324.8
Status: Current

Version: 39094 /39723 /38261 /408

**Reactive Capability Curve
 Operating Chart**



Engine: 3306
Fuel: Diesel
Frequency: 50
Duty: PRIME

Generator Frame: 446
Generator Arrangement: 1093787
Excitation Type: Permanent Magnet
Connection: SERIES STAR

Selected Model

Genset Rating (kW): 180.0
Genset Rating (kVA): 225.0
Pwr. Factor: 0.8
Application: EPG

Line Voltage: 400
Phase Voltage: 230
Rated Current: 324.8
Status: Current

Version: 39094 /39723 /38261 /408

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.

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.

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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