موتور دیزل : Cummins-china	ژنراتور : Stamford

Standby		Prime		
KVA	KW	KVA	KW	
30	24	27	21.6	دیزل ژنراتور

موتور دیزل		
Manufacturer	Cummins-china	تولید کننده
Type	4B3.9G2	تیپ
Number of cylinders	4 cylinders	تعداد سیلندر ها
Cylinder arrangement	In-line	آرایش سیلندر ها
Displacement , Liters	3.92	جا به جایی
Bore × Stroke , mm	102 x 120	قطر سیلندر × کورس پیستون
Compression Ratio	17.3 : 1	نسبت تراکم
Aspiration	Natural	سیستم تنفس
Gross engine power, kWm	51	قدرت ناخالص موتور
Exhaust gas temp.(after turbo) , °C	637	دمای گاز خروجی از اگزوز
Exhaust gas flow (after turbo) , liter/s	117	جریان هوای خروجی از اگزوز
Mean Piston Speed , m/s	6.0	میانگین سرعت پیستون

ژنراتور

Manufacturer	Stamford	تولید کننده
Type	PI144F	تیپ
Standby power at rated voltage ,KVA	30	توان standby در ولتاژ نامی
Efficiency, %	86.6	راندمان
Power factor	0.8	ضریب قدرت
Phase	3	فاز
Speed, Rpm	1500	سرعت
Voltage, V	380	ولتاژ
Stator windings	Double layer concentric	سیم پیچ استاتور
Voltage Regulation, %	± 1.0 %	تنظیم ولتاژ
Over speed, Rpm	2250	حداکثر سرعت مجاز
Short circuit current	1/Xd	جریان اتصال کوتاه
Insulation class	H	کلاس عایق
Connection	Curve current value X 2	اتصال
Protection class	IP 23	کلاس حفاظتی
Cooling air volume,m^3 / sec	0.100	دبی هوای خنک کننده

	Basic Engine Model: **4B3.9-G2**	Curve Number: **FR-90382 @ 1500 RPM** **FR-90381 @ 1800 RPM**	*G-DRIVE* **B3.9** **1**
		Date: **9Mar99**	

Displacement : **3.9** litre (**239.3** in^3)	Bore : **102** mm (**4.02** in.) Stroke : **120** mm (**4.72** in.)
No. of Cylinders : **4**	Aspiration : **Naturally Aspirated**

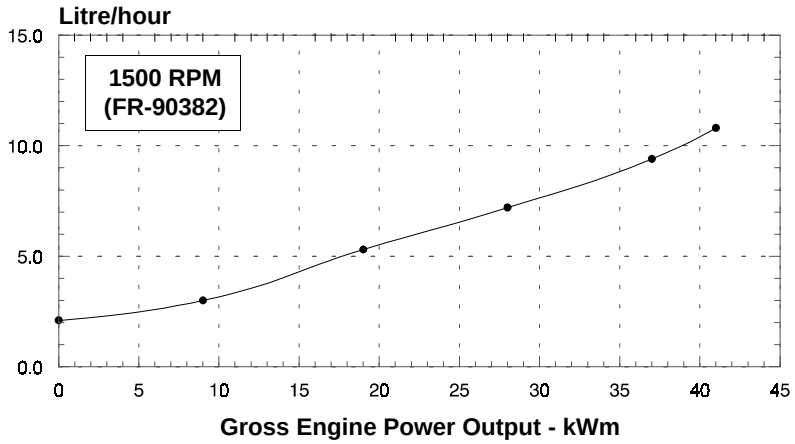
• • PRELIMINARY • •

Engine Speed	Standby Power		Prime Power		Continuous Power	
RPM	kWm	BHP	kWm	BHP	kWm	BHP
1500	41	55	37	50	30	40
1800	51	68	45	60	30	40

Emissions Certification: This engine complies with certain emissions requirements established by US EPA/CARB. See Exhaust Emissions Data Sheet for conformance specifics.

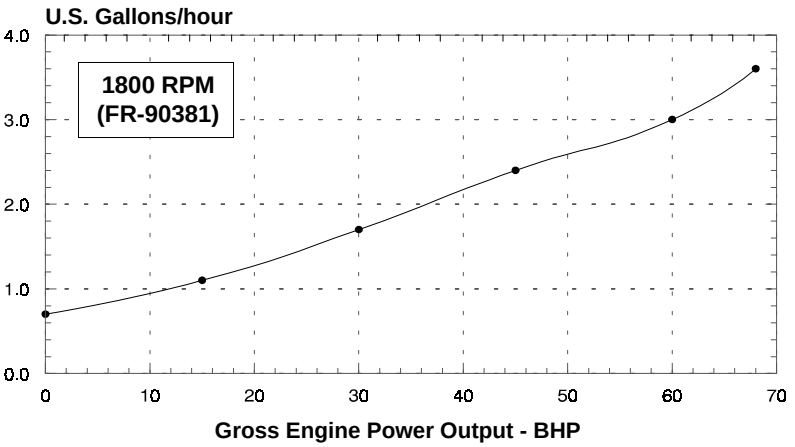
Engine Performance Data @ 1500 RPM

OUTPUT POWER			FUEL CONSUMPTION			
%	kWm	BHP	kg/ kWm·h	lb/ BHP·h	litre/ hour	U.S. Gal/ hour
STANDBY POWER						
100	41	55	0.224	0.369	10.8	2.9
PRIME POWER						
100	37	50	0.215	0.351	9.4	2.5
75	28	38	0.217	0.353	7.2	1.9
50	19	25	0.236	0.396	5.3	1.4
25	9	12	0.284	0.470	3.0	0.8
CONTINUOUS POWER						
100	30	40	0.216	0.358	7.6	2.0



Engine Performance Data @ 1800 RPM

OUTPUT POWER			FUEL CONSUMPTION			
%	kWm	BHP	kg/ kWm·h	lb/ BHP·h	litre/ hour	U.S. Gal/ hour
STANDBY POWER						
100	51	68	0.226	0.374	13.6	3.6
PRIME POWER						
100	45	60	0.217	0.359	11.5	3.0
75	34	45	0.223	0.372	8.9	2.4
50	22	30	0.247	0.400	6.4	1.7
25	11	15	0.307	0.497	4.0	1.1
CONTINUOUS POWER						
100	30	40	0.227	0.376	8.0	2.1



CONVERSIONS: (Litres = U.S. Gal x 3.785) (Engine kWm = BHP x 0.746) (U.S. Gal = Litres x 0.2642) (Engine BHP = Engine kWm x 1.34)

Data shown above represent gross engine performance capabilities obtained and corrected in accordance with ISO-3046 conditions of 100 kPa (29.53 in Hg) barometric pressure [110 m (361 ft) altitude], 25 °C (77 °F) air inlet temperature, and relative humidity of 30% with No. 2 diesel or a fuel corresponding to ASTM D2.

See reverse side for application rating guidelines.

The fuel consumption data is based on No. 2 diesel fuel weight at 0.85 kg/litre (7.1 lbs/U.S. gal).

Power output curves are based on the engine operating with fuel system, water pump and lubricating oil pump; not included are battery ~~charging alternator, fan,~~ optional equipment and driven components.

TECHNICAL DATA DEPT. **CERTIFIED WITHIN 5%** **CHIEF ENGINEER**

• • PRELIMINARY • •

Cummins Engine Company, Inc.

Engine Data Sheet

ENGINE MODEL : **4B3.9-G2** **CONFIGURATION NUMBER :** D381004GX02

DATA SHEET : DS-90381
DATE : 9Mar99
PERFORMANCE CURVE : FR-90382 @1500
FR-90381 @1800

INSTALLATION DIAGRAM
• Fan to Flywheel : 3626443

CPL NUMBER
• Engine Critical Parts List : 1522

GENERAL ENGINE DATA

Type		4-Cycle; In-line; 4-Cylinder Diesel
Aspiration		Natural
Bore x Stroke	— in x in (mm x mm)	4.02 x 4.72 (102 x 120)
Displacement	— in^3 (liter)	239.3 (3.92)
Compression Ratio		17.3 : 1
Dry Weight		
Fan to Flywheel Engine	— lb (kg)	680 (308)
Heat Exchanger Cooled Engine	— lb (kg)	N/A
Wet Weight		
Fan to Flywheel Engine	— lb (kg)	715 (324)
Heat Exchanger Cooled Engine	— lb (kg)	N/A
Moment of Inertia of Rotating Components		
• with FW 9016 Flywheel	— $lb_m \cdot ft^2$ ($kg \cdot m^2$)	33.1 (1.39)
• with FW 9017 Flywheel	— $lb_m \cdot ft^2$ ($kg \cdot m^2$)	23.5 (0.99)
Center of Gravity from Rear Face of Flywheel Housing	— in (mm)	14.7 (373)
Center of Gravity Above Crankshaft Centerline	— in (mm)	6.4 (163)
Maximum Static Loading at Rear Main Bearing	— lb (kg)	N.A. N.A.

ENGINE MOUNTING

Maximum Bending Moment at Rear Face of Block	— lb • ft (N • m)	1000 (1356)

EXHAUST SYSTEM

Maximum Back Pressure	— in Hg (mm Hg)	3 (76)

AIR INDUCTION SYSTEM

Maximum Intake Air Restriction		
• with Dirty Filter Element	— in H_2O (mm H_2O)	20 (508)
• with Normal Duty Air Cleaner and Clean Filter Element	— in H_2O (mm H_2O)	10 (254)
• with Heavy Duty Air Cleaner and Clean Filter Element	— in H_2O (mm H_2O)	12 (305)

COOLING SYSTEM

Coolant Capacity	— Engine Only	— US gal (liter)	1.9 (7.2)
	— with HX 9911 Heat Exchanger	— US gal (liter)	N/A
Maximum Coolant Friction Head External to Engine	— 1800 rpm	— psi (kPa)	5 (35)
	— 1500 rpm	— psi (kPa)	4 (28)
Maximum Static Head of Coolant Above Engine Crank Centerline		— ft (m)	46 (14)
Standard Thermostat (Modulating) Range		— °F (°C)	180 - 203 (82 - 95)
Minimum Pressure Cap		— psi (kPa)	10 (69)
Maximum Top Tank Temperature for Standby / Prime Power		— °F (°C)	220 / 212 (104 / 100)
Minimum Raw Water Flow @ 90°F to HX 9908 Heat Exchanger		— US gpm (liter / min)	N/A
Maximum Raw Water Inlet Pressure at HX 9908 Heat Exchanger		— psi (kPa)	N/A

LUBRICATION SYSTEM

Oil Pressure	@ Idle Speed	— psi (kPa)	30 (207)
	@ Governed Speed	— psi (kPa)	50 (345)
Maximum Oil Temperature		— °F (°C)	250 (121)
Oil Capacity with OP 9017 Oil Pan : High - Low		— US gal (liter)	2.5 - 2.25 (9.5 - 8.5)
Total System Capacity (Including Full Flow Filter)		— US gal (liter)	2.88 (10.9)
Angularity of OP 9017 Oil Pan	— Front Down		40°
	— Front Up		40°
	— Side to Side		40°

G-DRIVE
B3.9
4

FUEL SYSTEM

Type Injection System	Stanadyne DB4 Direct Injection	
Maximum Restriction at Lift Pump — in Hg (mm Hg)	4	(102)
Maximum Allowable Head on Injector Return Line (Consisting of Friction Head and Static Head) — in Hg (mm Hg)	20	(508)
Maximum Fuel Flow to Injection Pump — US gph (liter / hr)	8	(30)

ELECTRICAL SYSTEM

Cranking Motor (Heavy Duty, Positive Engagement) — volt	12	24
Battery Charging System, Negative Ground — ampere	63	40
Maximum Allowable Resistance of Cranking Circuit — ohm	0.00075	0.002
Minimum Recommended Battery Capacity		
• Cold Soak @ 10 °F (-12 °C) and Above — 0°F CCA	625	312

COLD START CAPABILITY

Minimum Ambient Temperature for Aided (with Coolant Heater) Cold Start within 10 seconds — °F (°C)	50	(10)
Minimum Ambient Temperature for Unaided Cold Start — °F (°C)	10	(-12)

PERFORMANCE DATA

All data is based on:
- Engine operating with fuel system, water pump, lubricating oil pump, air cleaner and exhaust silencer; not included are battery charging alternator, fan, and optional driven components.
- Engine operating with fuel corresponding to grade No. 2-D per ASTM D975.
- ISO 3046, Part 1, Standard Reference Conditions of:

Barometric Pressure : 100 kPa (29.53 in Hg) — Air Temperature : 25 °C (77 °F)
Altitude : 110 m (361 ft) — Relative Humidity : 30%

Steady State Stability Band at any Constant Load — %	+/- 0.50
Estimated Free Field Sound Pressure Level of a Typical Generator Set; Excludes Exhaust Noise; at Rated Load and 7.5 m (24.6 ft); 1800 rpm / 1500 rpm — dBA	N.A.
Exhaust Noise at 1 m Horizontally from Centerline of Exhaust Pipe Outlet Upwards at 45° — dBA	N.A.

	STANDBY POWER 60 hz		STANDBY POWER 50 hz		PRIME POWER 60 hz		PRIME POWER 50 hz	
Governed Engine Speed — rpm	1800		1500		1800		1500	
Engine Idle Speed — rpm	950 - 1150		950 - 1150		950 - 1150		950 - 1150	
Gross Engine Power Output — BHP (kW_m)	68	(51)	55	(41)	60	(45)	50	(37)
Brake Mean Effective Pressure — psi (kPa)	125	(863)	121	(835)	110	(759)	110	(759)
Piston Speed — ft / min (m / s)	1416	(7.2)	1180	(6.0)	1416	(7.2)	1180	(6.0)
Friction Horsepower — HP (kW_m)	16	(11.9)	11	(8.2)	16	(11.9)	11	(8.2)
Engine Water Flow at Stated Friction Head External to Engine:								
• 1 psi Friction Head — US gpm (liter / s)	45	(2.8)	35	(2.2)	45	(2.8)	35	(2.2)
• Maximum Friction Head — US gpm (liter / s)	35	(2.2)	26	(1.6)	35	(2.2)	26	(1.6)
Engine Data with Dry Type Exhaust Manifold								
Intake Air Flow — cfm (liter / s)	103	(49)	84	(40)	105	(50)	86	(41)
Exhaust Gas Temperature — °F (°C)	1204	(651)	1179	(637)	1071	(577)	1009	(543)
Exhaust Gas Flow — cfm (liter / s)	306	(144)	247	(117)	285	(134)	225	(106)
Air to Fuel Ratio — air : fuel	18.0 : 1		17.4 : 1		21.1 : 1		21.3 : 1	
Radiated Heat to Ambient — BTU / min (kW_m)	950	(17)	720	(13)	686	(12)	670	(12)
Heat Rejection to Coolant — BTU / min (kW_m)	1735	(31)	1440	(25)	1465	(26)	1230	(22)
Heat Rejection to Exhaust — BTU / min (kW_m)	2480	(44)	1830	(32)	2160	(38)	1620	(29)

N.A. - Data is Not Available
N/A - Not Applicable to this Engine
TBD - To Be Determined

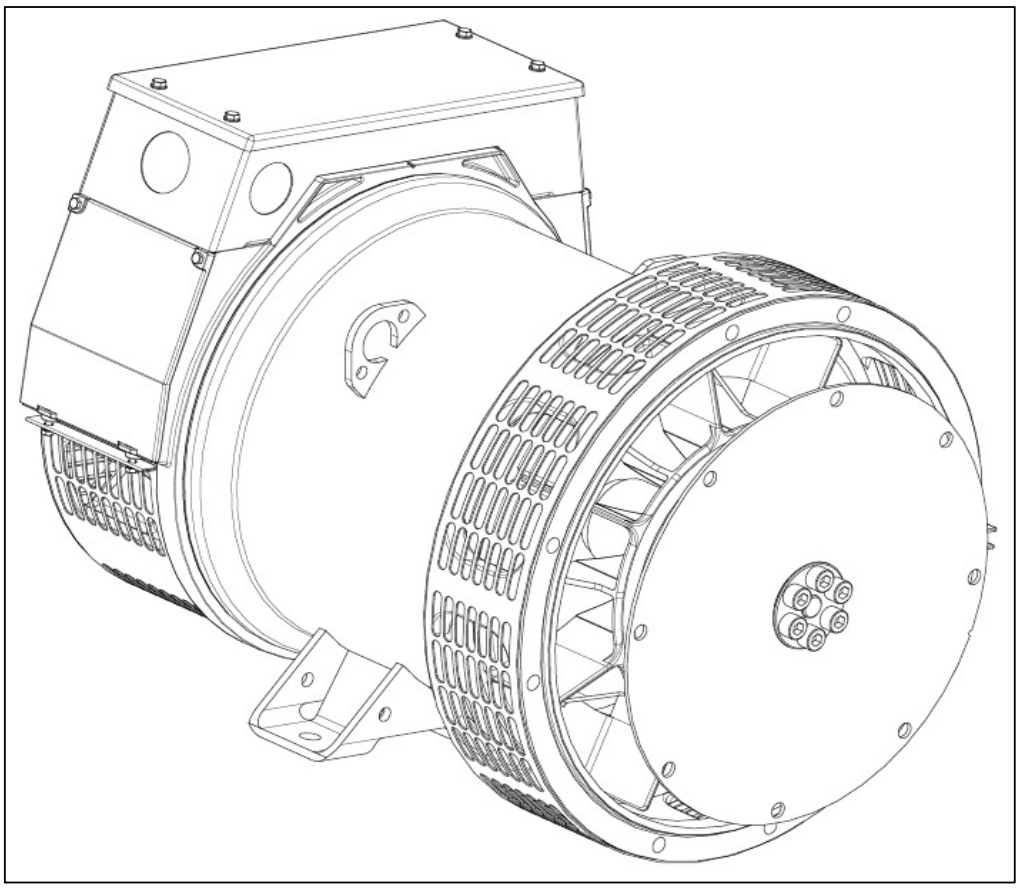
• • PRELIMINARY • •

ENGINE MODEL : **4B3.9-G2**
DATA SHEET : DS-90381
DATE : 9Mar99
CURVE NO. : FR-90382 @ 1500 RPM
FR-90381 @ 1800 RPM

CUMMINS ENGINE COMPANY, INC. Columbus, Indiana 47202-3005

STAMFORD®

PI144F - Technical Data Sheet



PI144F

STAMFORD

WINDING 311

CONTROL SYSTEM	STANDARD AS480 AVR (SELF EXCITED)
VOLTAGE REGULATION	± 1.0 %
SUSTAINED SHORT CIRCUIT	SELF EXCITED MACHINES DO NOT SUSTAIN A SHORT CIRCUIT CURRENT

CONTROL SYSTEM	AS480 AVR WITH OPTIONAL EXCITATION BOOST SYSTEM (EBS)
SUSTAINED SHORT CIRCUIT	REFER TO SHORT CIRCUIT DECREMENT CURVE (page 8)

STATOR WINDING	DOUBLE LAYER CONCENTRIC							
WINDING PITCH	TWO THIRDS							
WINDING LEADS	12							
STATOR WDG. RESISTANCE	0.265 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED							
ROTOR WDG. RESISTANCE	0.708 Ohms at 22°C							
EXCITER STATOR RESISTANCE	20.3 Ohms at 22°C							
EXCITER ROTOR RESISTANCE	0.201 Ohms PER PHASE AT 22°C							
EBS STATOR RESISTANCE	12.9 Ohms at 22°C							
R.F.I. SUPPRESSION	BS EN 61000-6-2 & BS EN 61000-6-4,VDE 0875G, VDE 0875N. refer to factory for others							
WAVEFORM DISTORTION	NO LOAD < 1.5% NON-DISTORTING BALANCED LINEAR LOAD < 5.0%							
MAXIMUM OVERSPEED	2250 Rev/Min							
BEARING DRIVE END	BALL. 6309 - 2RS. (ISO)							
BEARING NON-DRIVE END	BALL. 6306 - 2RS. (ISO)							
	1 BEARING				2 BEARING			
	WITH EBS		WITHOUT EBS		WITH EBS		WITHOUT EBS	
WEIGHT COMP. GENERATOR	143.5 kg		141.8 kg		146.5 kg		144.8 kg	
WEIGHT WOUND STATOR	58 kg		58 kg		58 kg		58 kg	
WEIGHT WOUND ROTOR	50.45 kg		48.75 kg		51.45 kg		49.75 kg	
WR² INERTIA	0.1903 kgm^2		0.1886 kgm^2		0.1904 kgm^2		0.1887 kgm^2	
SHIPPING WEIGHTS in a crate	161 kg		159.3 kg		170 kg		168.3 kg	
PACKING CRATE SIZE	85 x 51 x 67 (cm)				85 x 51 x 67 (cm)			
	50 Hz				60 Hz			
TELEPHONE INTERFERENCE	THF<2%				TIF<50			
COOLING AIR	0.100 m^3/sec 212cfm				0.122 m^3/sec 251 cfm			
VOLTAGE SERIES STAR	380/220	400/231	415/240	440/254	416/240	440/254	460/266	480/277
VOLTAGE PARALLEL STAR	190/110	200/115	208/120	220/127	208/120	220/127	230/133	240/138
VOLTAGE SERIES DELTA	220/110	230/115	240/120	254/127	240/120	254/127	266/133	277/138
kVA BASE RATING FOR REACTANCE VALUES	27.5	27.5	27.5	26.1	30.3	32.3	33.3	34.4
Xd DIR. AXIS SYNCHRONOUS	1.83	1.65	1.53	1.29	2.18	2.08	1.96	1.86
X'd DIR. AXIS TRANSIENT	0.17	0.15	0.14	0.12	0.20	0.19	0.18	0.17
X"d DIR. AXIS SUBTRANSIENT	0.12	0.11	0.10	0.09	0.15	0.14	0.13	0.13
Xq QUAD. AXIS REACTANCE	0.88	0.79	0.73	0.62	1.04	0.99	0.93	0.89
X"q QUAD. AXIS SUBTRANSIENT	0.19	0.17	0.16	0.13	0.23	0.22	0.21	0.20
X_L LEAKAGE REACTANCE	0.07	0.06	0.06	0.05	0.08	0.08	0.07	0.07
X_2 NEGATIVE SEQUENCE	0.16	0.14	0.13	0.11	0.19	0.18	0.17	0.16
X_0 ZERO SEQUENCE	0.08	0.07	0.07	0.05	0.09	0.09	0.08	0.08
REACTANCES ARE SATURATED	VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED							
T'd TRANSIENT TIME CONST.	0.021 s							
T"d SUB-TRANSTIME CONST.	0.005 s							
T'do O.C. FIELD TIME CONST.	0.48 s							
Ta ARMATURE TIME CONST.	0.007 s							
SHORT CIRCUIT RATIO	1/Xd							

PI144F

STAMFORD

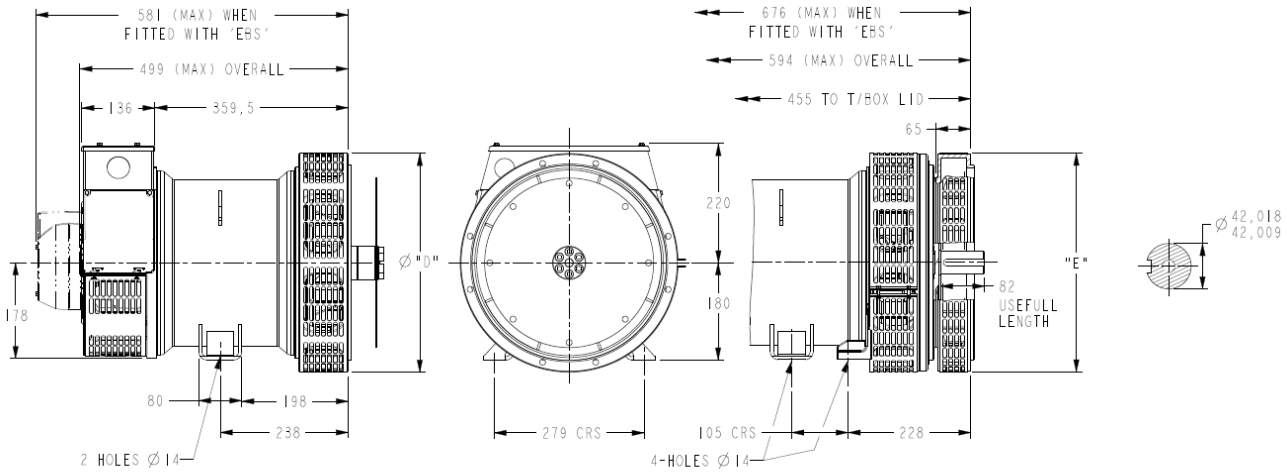
Winding 311 / 0.8 Power Factor

RATINGS

	Class - Temp Rise	Cont. F - 105/40°C				Cont. H - 125/40°C				Standby - 150/40°C				Standby - 163/27°C			
50 Hz	Series Star (V)	380	400	415	440	380	400	415	440	380	400	415	440	380	400	415	440
	Parallel Star (V)	190	200	208	220	190	200	208	220	190	200	208	220	190	200	208	220
	Series Delta (V)	220	230	240	254	220	230	240	254	220	230	240	254	220	230	240	254
	kVA	25.0	25.0	25.0	23.8	27.5	27.5	27.5	26.1	29.6	29.6	29.6	28.1	30.3	30.3	30.3	28.7
	kW	20.0	20.0	20.0	19.0	22.0	22.0	22.0	20.9	23.7	23.7	23.7	22.5	24.2	24.2	24.2	23.0
	Efficiency (%)	86.6	86.9	87.0	87.3	86.0	86.3	86.5	87.0	85.3	85.8	86.0	86.6	85.1	85.6	85.8	86.5
	kW Input	23.1	23.0	23.0	21.8	25.6	25.5	25.4	24.0	27.8	27.6	27.6	26.0	28.4	28.3	28.2	26.6

60 Hz	Series Star (V)	416	440	460	480	416	440	460	480	416	440	460	480	416	440	460	480
	Parallel Star (V)	208	220	230	240	208	220	230	240	208	220	230	240	208	220	230	240
	Delta (V)	240	254	266	277	240	254	266	277	240	254	266	277	240	254	266	277
	kVA	27.5	29.4	30.3	31.3	30.3	32.3	33.3	34.4	32.6	34.8	35.9	37.0	33.3	35.5	36.7	37.8
	kW	22.0	23.5	24.2	25.0	24.2	25.8	26.6	27.5	26.1	27.8	28.7	29.6	26.6	28.4	29.4	30.2
	Efficiency (%)	86.9	87.0	87.1	87.1	86.4	86.4	86.6	86.6	85.9	85.9	86.0	86.1	85.7	85.7	85.9	85.9
	kW Input	25.3	27.0	27.8	28.7	28.0	29.9	30.7	31.8	30.4	32.4	33.4	34.4	31.0	33.1	34.2	35.2

DIMENSIONS



COUPLING DISC	
SAE	"AN"
6.5	30.2
7.5	30.2
8	62
10	53.8
11.5	39.6

1-BRG ADAPTOR	
SAE	"D"
5	361
4	405
3	451
2	489

8-HOLES SPACED AS 12
8-HOLES SPACED AS 12

2-BRG ADAPTOR	
SAE	"E"
5	359
4	406
3	455
2	493

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