GILLETTE GENERATORS

LIQUID COOLED DIESEL ENGINE GENERATOR SET

60 HZ MODEL

SPVD-1500

Model	HZ	STANDBY 120°C RISE
SPVD-1500-60 HERTZ	60	150

All generator sets are USA prototype built and thoroughly tested. Production models are USA factory built and 100% load tested.

UL2200, UL1446, UL508, UL142, UL498

NFPA 110, 99, 70, 37
All generator sets meet NFPA-110 Level 1, when equipped with the necessary accessories and installed per NFPA standards.

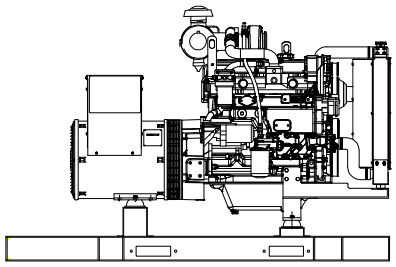
NEC 700, 701, 702, 708

NEMA ICS10, MG1, ICS6, AB1

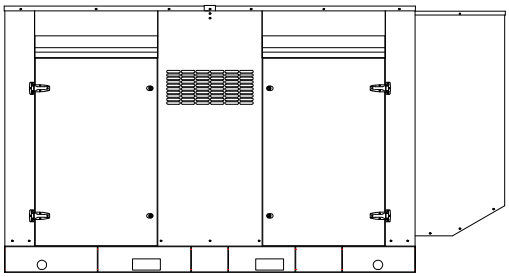
ANSI C62.41, 27, 59, 32, 480, 40Q, 81U, 360-05

ASCE 7-05 & 7-10
All generator sets meet 180 MPH rating.

EPA 40CFR Part 60, 1048, 1054, 1065, 1068



"OPEN" GEN-SET
There is no enclosure, so gen-set must be placed within a weather protected area, un-inhabited by humans or animals, with proper ventilation. Silencer not supplied, as installation requirements are not known. However, this item is available as optional equipment.



"LEVEL 2" HOUSED GEN-SET
Full aluminum weather protection and superior sound attenuation for specific low noise applications. Critical grade muffler is standard.

GENERATOR RATINGS

GENERATOR MODEL	VOLTAGE		PH	HZ	120°C RISE STANDBY RATING		POWER LEAD CONNECTIONS
	L-N	L-L			KW/KVA	AMP	
SPVD-1500-1-1	120	240	1	60	150/150	625	4 LEAD DEDICATED 1 PH
SPVD-1500-3-2	120	208	3	60	150/187	521	12 LEAD LOW WYE
SPVD-1500-3-3	120	240	3	60	150/187	451	12 LEAD HIGH DELTA
SPVD-1500-3-4	277	480	3	60	150/187	225	12 LEAD HIGH WYE
SPVD-1500-3-5	127	220	3	60	150/187	492	12 LEAD LOW WYE
SPVD-1500-3-16	346	600	3	60	150/187	180	4 LEAD DEDICATED

RATINGS: All single phase gen-sets are dedicated 4 lead windings, rated at unity (1.0) power factor. All three phase gen-sets are 12 lead windings, rated at .8 power factor. 120° C "STANDBY RATINGS" are strictly for gen-sets that are used for back-up emergency power to a failed normal utility power source. This standby rating allows varying loads, with no overload capability, for the entire duration of utility power outage. All gen-set power ratings are based on temperature rise measured by resistance method as defined by MIL-STD 705C and IEEE STD 115, METHOD 6.4.4. All generators have class H (180°C) insulation system on both rotor and stator windings. All factory tests and KW/KVA charts shown above are based 120°C (standby) R/R winding temperature, within a maximum 40°C ambient condition. Generators operated at standby power ratings must not exceed the temperature rise limitation for class H insulation system, as specified in NEMA MG1-22.40. Specifications & ratings are subject to change without prior notice.

APPLICATION & ENGINEERING DATA FOR MODEL SPVD-1500-60 HZ

GENERATOR SPECIFICATIONS

Manufacturer.....Stamford Electric Generators
Model & Type.....UCI274H-06, 4 Pole, 4 Lead, Single Phase
.....UCI274G-311, 4 Pole, 12 Lead re-connectable, Three Phase
.....UCI274F-17, 4 Pole, 6 Lead, 600 V, Three Phase
Exciter.....Brushless, shunt excited
Voltage Regulator.....Solid State, HZ/Volts
Voltage Regulation.....½%, No load to full load
Frequency.....60 HZ
Frequency Regulation.....± ½% (1/2 cycle, no load to full load)
Unbalanced Load Capability.....100% of standby amps
Total Stator and Load Insulation.....Class H, 180°C
Temperature Rise.....120°C R/R, standby rating @ 40°C amb.
1 Ø Motor Starting @ 30% Voltage Dip (240V).....560 kVA
3 Ø Motor Starting @ 30% Voltage Dip (208-240V).....580 kVA
3 Ø Motor Starting @ 30% Voltage Dip (480V).....740 kVA
3 Ø Motor Starting @ 30% Voltage Dip (600V).....665 kVA
Bearing.....1, Pre-lubed and sealed
Coupling.....Direct flexible disc.
Total Harmonic Distortion.....Max 3½% (MIL-STD705B)
Telephone Interference Factor.....Max 50 (NEMA MG1-22)
Deviation Factor.....Max 5% (MIL-STD 405B)
Ltd. Warranty Period.....24 Months from date of start-up or
.....1000 hours use, first to occur.

GENERATOR FEATURES

- World Renown Stamford Electric Generator having UL-1446 certification.
- Full generator protection with **Basler DGC-2020** controller, having UL-508 certification.
- Automatic voltage regulator with over-excitation, under-frequency compensation, under-speed protection, and EMI filtering. Entire solid-state board is encapsulated for moisture protection.
- Generator power ratings are based on temperature rise, measured by resistance method, as defined in MIL-STD 705C and IEEE STD 115, Method 6.4.4.
- Power ratings will not exceed temperature rise limitation for class H insulation as per NEMA MG1-22.40.
- Insulation resistance to ground, exceeds 1.5 meg-ohm.
- Stator receives 2000 V. hi-potential test on main windings, and rotor windings receive a 1500 V. hi-potential test, as per MIL-STD 705B.
- Full amortisseur windings with UL-1446 certification.
- Complete engine-generator torsional acceptance, confirmed during initial prototype testing.
- Full load testing on all engine-generator sets, before shipping.
- Self ventilating and drip-proof & revolving field design

ENGINE SPECIFICATIONS AND APPLICATIONS DATA

ENGINE

Manufacturer.....VOLVO-PENTA
Model and Type.....TAD751GE, 4 cycle, liquid Cooled
Aspiration.....Turbocharged
Charged Air Cooling System .....Air to Air
Cylinder Arrangement.....6 Cylinders, In-Line
Displacement Cu. In. (Liters).....436.0 (7.15)
Bore & Stroke In. (Cm.).....4.25 x 5.12 (10.8 x 13.0)
Compression Ratio.....18.0:1
Main Bearings.....Tin Overlay with Babbit Backing
Cylinder Head.....Cast Iron with overhead Cam
Pistons.....Aluminum Alloy with Graphite Coating
Crankshaft.....Induction Hardened, Heat Treated Forged
Valves.....Heat Treated and Hardened Exhaust Valve
Governor.....Electronic, EMS 2.2
Frequency Regulation.....± 1/4%
Air Cleaner.....Dry, Replaceable Cartridge
Engine Speed.....1800 rpm
Oil Filter.....1, Replaceable Spin-On
Max Power, bhp (kwm) Standby.....236 (174)
BMEP: psi (MPa) Standby.....235 (1.6)
Ltd. Warranty Period.....2 Year or 1000 hrs, first to occur

FUEL SYSTEM

Type.....Diesel Fuel Oil (ASTM No. 2-D)
Combustion System.....Direct Injection
Fuel Injection Pump.....Stanadyne Rotary Type
12 VDC Air Intake Heaters.....Standard Equipment
Fuel Filter and Water Separator.....Yes

FUEL CONSUMPTION

GAL/HR (LITER/HR)	STANDBY
100% LOAD	13.2 (49.9)
75% LOAD	10.9 (41.2)
50% LOAD	6.7 (25.3)

OIL SYSTEM

Type.....Full Pressure
Oil Pan Capacity qt. (L).....24.4 (23.0)
Oil Pan Cap. W/ filter qt. (L).....21.2 (20.0)
Oil Filter.....1, Replaceable Spin-On

ELECTRICAL SYSTEM

Ignition System.....Electronic
Eng. Alternator/Starter: 24 VDC, negative ground, 50 amp/hr.

Recommended battery to -18°C (0° F): ....(2) 12 VDC, BCI# 27, Max. Dimensions: 12"lg x 6 3/4" wi x 9" hi, with standard round posts. Min output 700 CCA. Battery tray (max. dim. at 12"lg x 7"wi). This model has (2) battery trays, (2) hold down straps, (2) sets of battery cables, and (1) battery charger. Installation of (2) 12VDC starting batteries connected in series for 24VDC output is required, with possible higher AMP/HR rating, as described above, if the normal environment temperature averages -13° F (-25°C) or cooler.

CERTIFICATIONS

All engines are CARB and EPA emissions certified. All stationary diesel engines are Tier III complaint.

APPLICATION & ENGINEERING DATA FOR MODEL SPVD-1500-60 HZ

COOLING SYSTEM

Type of System ..... Air to Air, Charged air cooler
Coolant Pump .....Pre-lubricated, self-sealing
Cooling Fan Type (no. of blades) .....Pusher (7)
Fan Diameter inches (cm)..... 23.5" (59.6)
Ambient Capacity of Radiator °F (°C).....125 (51.6)
Engine Jacket Coolant Capacity Qt. (L) 10.4 (9.8)
Radiator Coolant Capacity Qt. (L).....14 (22)
Water Pump Capacity gpm (L/min)..... .....43.2 (163)
Heat Reject Coolant: Btu/min (kw) 4339 (76)
Air to Air Heat Reject Btu/min (kw) 1717 (30)
Low Radiator Coolant Level Shutdown……..…Standard
Note: Coolant temp. shut-down switch setting at 221°F (105°C) with 50/50 (water/antifreeze) mix.

COOLING AIR REQUIREMENTS

Combustion Air cfm (m^3/min) ....…403 (11.4)
Max. Air Intake Restriction:
Clean Air Cleaner, H_2O (KPA)..... ..... 14 (3.0)
Intake Manifold Pressure, Psi (kpa)..... ..... 28 (190)
Max. Allowance Temp. Rise Amb:
Air to Engine Inlet °F (°C)..... .....…..15 (8)
Max. Temp. out of Charged Air Cooler:
@77° F (25°C) Amb. Air, °F (°C)..... ..... 140 (60)
Radiator Cooling Air, SCFM (m^3/min)……6400(181)

EXHAUST SYSTEM

Exhaust Outlet Size .... 3.5”
Max. Back Pressure in H_2O (kpa) ……30 (7.0)
Exhaust Flow, at rated KW,cfm (m^3/min) 1243 (35.2)
Exhaust Temp,, at rated KW, °F (°C)..... .....988 (531)

SOUND LEVELS MEASURED IN dB(A)

	Open Set	Level 2 Encl.
Level 2, Critical Silencer	80	75
Level 3, Hospital Silencer		70

Note: Open sets (no enclosure) have silencer system choices due to unknown job-site applications. Level 2 enclosure has installed critical silencer with upgrade to Level 3 hospital silencer. Sound tests are averaged from several test points and taken at 23 ft. (7 m) from source of noise at normal operation.

DERATE GENERATOR FOR ALTITUDE

3% per 1000 ft. (305m) above 3000 ft. (914m) from sea level

DERATE GENERATOR FOR TEMPERATURE

2% per 10°F (5.6°C) above 104°F (40°C)

DIMENSIONS AND WEIGHTS

	Open Set	Level 2 Enclosure
Length in (cm)	110 (280)	134 (341)
Width in (cm)	48 (122)	48 (122)
Height in (cm)	55 (140)	72.5 (183)
1 Ø Net Weight lbs (kg)	4067 (1845)	5087 (2308)
1 Ø Ship Weight lbs (kg)	4317 (1959)	5407 (2453)
3 Ø Net Weight lbs (kg)	3762 (1690)	4722 (2142)
3 Ø Ship Weight lbs (kg)	4012 (1820)	5042 (2287)

BASLER DGC-2020 DIGITAL MICROPROCESSOR CONTROLLER

BASLER DGC-2020

The “**2020**” controller is a highly advanced integrated gen-set control system for single gen-set applications. This controller includes a backlit LCD display which continuously displays the status of the engine and generator at all times.

Basler “**DGC-2020”** includes: Generator metering (including three phase) • Engine – Generator protections including IEEE-[27] under voltage, [32] power, [40] loss of excitation, [59] over voltage, [81] over and under frequency, Exercise timer • SAE J1939 engine ECU communications • Expansion capabilities for both inputs and outputs with expansion • Remote communications through RS-485 to Basler’s RDP110 remote Display panel • (16) programmable contact inputs • (15) programmable contact outputs- (3) for up to 30AmpDC and (12) for up to 2 Amp DC • Illuminated Text Display • Front panel menu scroll buttons • Front panel operation mode buttons for STOP, RUN and AUTO • Alarm Silence and Lamp Test buttons

This controller includes expansion features including, RS485 (using MODBUS), direct USB connection with PC, expansion optioned using BESTCOMSPlus for remote annunciation and remote relay interfacing for a distance of up to 3300FT. The controller software is freely downloadable from the internet and allows monitoring with direct USB cable, LAN, or by internet via the built in web interface.

Further expansion is available by adding the optional RDP-110 remote display panel module. This featured device will allow Four programmable LEDs (2) alarms and (2) pre-alarms • (17) alarms and pre-alarms displayed from Basler controller • audible alarm horn • lamp test and alarm silence buttons • RD100 local power supply inputs of either 12vdc or 24vdc • connects through Basler controller through RS-485 communications protocol • conduit box included for (2) mounting configurations- either surface mount or semi-flush mounting.

STANDARD FEATURES FOR MODEL SPVD-1500-60 HZ

STANDARD FEATURES

ENGINE: CONTROL PANEL:

Basler DGC-2020 digital microprocessor with logic allows programming in the field. Controller has:

- STOP-MANUAL-AUTO modes and automatic engine shutdowns, signaled by full text LCD indicators:
- Low oil pressure
- High engine temp
- Low Radiator Level
- Three auxiliary alarms
- Battery fail alarm
- Engine fail to start
- Engine over speed
- Engine under speed
- Over & under voltage

Also included is tamper-proof engine hour meter

ENGINE:

Full flow oil filter • Air filter • Oil pump • Solenoid type starter motor • Hi-temp radiator • Jacket water pump • Thermostat • Pusher fan and guard • Exhaust manifold • 24 VDC battery charging alternator • Flexible exhaust connector • "Isochronous" duty, electronic governor • Vibration isolators • Closed coolant recovery system with 50/50 water to anti-freeze mixture • flexible oil & radiator drain hose.

Design & specifications subject to change without prior notice. Dimensions shown are approximate. Contact Gillette for certified drawings.
DO NOT USE DIMENSIONS FOR INSTALLATION PURPOSES.

AC GENERATOR SYSTEM:

AC generator • Shunt excited • Brushless design • Circuit Breaker installed and wired to gen-set • Direct connection to engine with flex disc • Class H, 180°C insulation • Self ventilated • Drip proof construction • UL Certified

VOLTAGE REGULATOR:

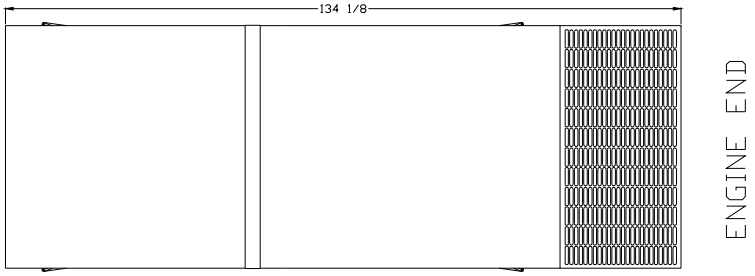
½% Voltage regulation • EMI filter • Under-speed protection • Over-excitation protection • total encapsulation

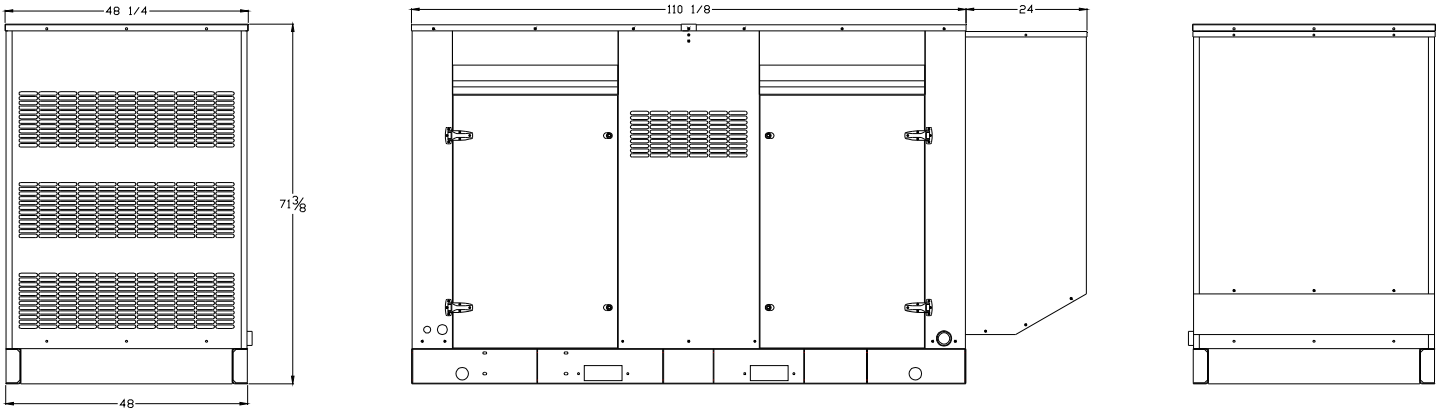
DC ELECTRICAL SYSTEM:

Battery tray • Battery cables • Battery hold down straps • 2-stage battery float charger with maintaining & recharging automatic charge stages

WEATHER/SOUND PROOF ALUMINUM HOUSING CORROSION RESISTANT PROTECTION CONSISTING OF:

- 9 Heated And Agitated Wash Stages
- Zinc Phosphate Etching-coating Stage
- Final Baked On Enamel Powder Coat
- 18/8 Stainless Steel Hardware



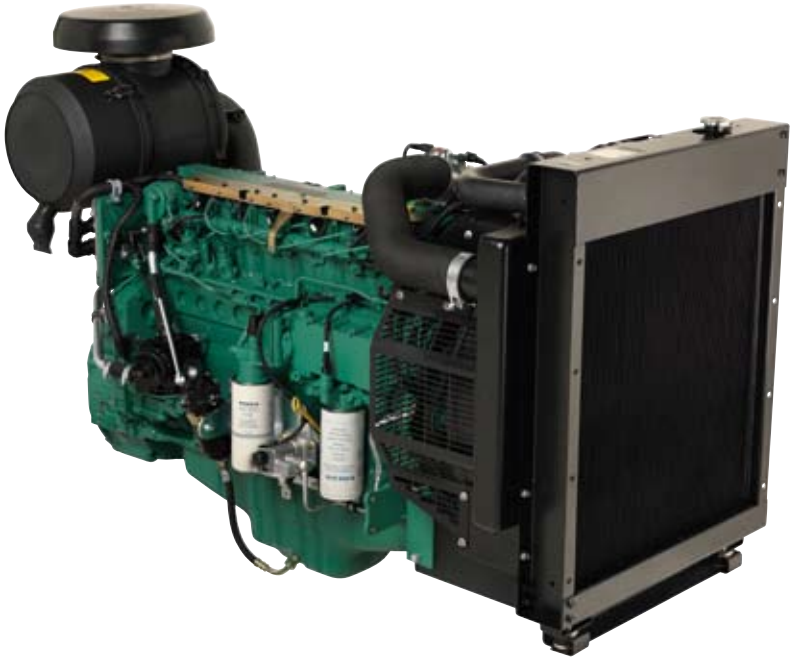


VOLVO PENTA GENSET ENGINE

TAD751GE

150 kW (204 hp) at 1500 rpm, 175 kW (238 hp) at 1800 rpm (standby power without fan)

A powerful, reliable and economical Generating Set Diesel Engine built on the dependable in-line six design.



Energy efficiency and Economy

Through careful management of the combustion process, involving precise control of air movement and injection spray Volvo Penta has been able to achieve high efficiency and reduced exhaust emission levels that comply with current requirements and which will enable the engines to satisfy future legislation.
Volvo Penta engines offer the highest kWh/Liter fuel, resulting in superior economy and performance.

Durability & low noise

Designed for easy, fast and economical installation. Field tested to ensure highest standard of durability and long life.
Well-balanced to produce smooth and vibration-free operation with low noise level. To maintain a controlled working temperature in cylinders and combustion chambers, the engine is equipped with piston cooling. The engine is also fitted with replaceable cylinder liners and valve seats/guides to ensure maximum durability and service life of the engine.

Low exhaust emission

The state of the art, high-tech injection and highly efficient charge air system with low internal losses contributes to excellent combustion and low fuel consumption. The engine is EPA/CARB Tier 3 & EU Stage 3A emission certified. These regulations are met by using V-ACT™ (Volvo Advanced Combustion technology). V-ACT includes a flexible high pressure Common-rail fuel injection system, an air management system including an internal exhaust gas recirculation device and an enhanced electronic controller.

Easy service & maintenance

Easily accessible service and maintenance points contribute to the ease of service of the engine.

Features

- Certified for US/EPA Tier 3 and EU Stage 3A
- High efficient cooling system
- Compact design
- With or without engine-mounted cooling system
- Switchable between 1500/1800 rpm
- Excellent step load performance
- Low operating cost

50 Hz/1500 rpm

Prime power			Standby			Generator efficiency
kWm	kWe	kVA	kWm	kWe	kVA	(%)
132	121	152	145	133	167	92%

60 Hz/1800 rpm

Prime power			Standby			Generator efficiency
kWm	kWe	kVA	kWm	kWe	kVA	(%)
149	137	171	166	153	191	92%

VOLVO PENTA

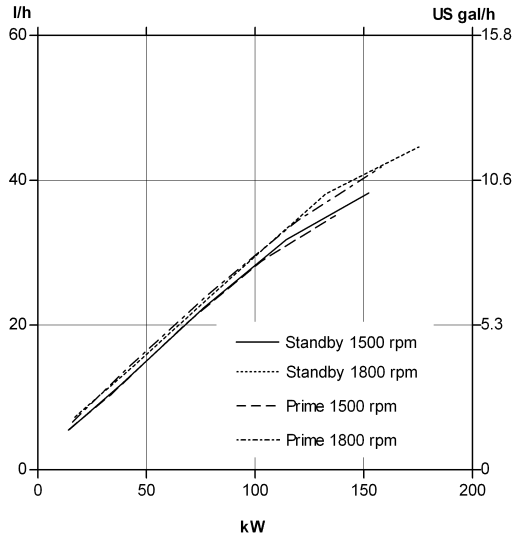
TAD751GE

Technical Data

General

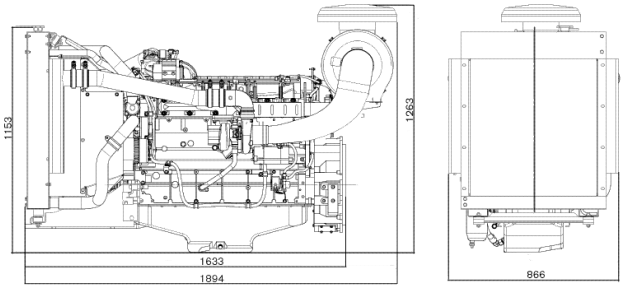
Engine designation	TAD751GE
No. of cylinders and configuration	in-line 6
Method of operation	4-stroke
Bore, mm (in.)	108 (4.25)
Stroke, mm (in.)	130 (5.12)
Displacement, l (in³)	7.15 (436)
Compression ratio	18
Dry weight, engine only, kg (lb)	764 (1684)
Dry weight with cooling system, kg (lb)	947 (2088)

Performance	**1500 rpm**	**1800 rpm**
with fan, kW (hp) at:		
Prime Power	132 (180)	149 (203)
Max Standby Power	145 (197)	166 (226)
Fan power consumption, kW (hp)	5 (7)	8.7 (12)



Dimensions TAD751GE

Not for installation



Technical description

Engine and block
- Optimized cast iron cylinder block with optimum distribution of forces
- Piston cooling for low piston temperature and reduced ring temperature
- Drop forged steel connecting rods
- Crankshaft hardened bearing surfaces with Tri-metal bearings
- Keystone top compression rings for long service life
- Replaceable valve guides and valve seats
- 2 valves per cylinder actuated via pushrods driven via camshaft
- PTO positions at flywheel end
- Lift eyelets
- Flywheel housing with connection acc. to SAE 3
- Flywheel for flex plate
- Fixed integrated radiator front engine suspension
- Transport brackets, rear

Lubrication system
- Full flow cartridge insert filter
- Rotary displacement oil pump driven by the crankshaft
- Deep front oil sump
- Oil filler on top
- Oil dipstick, short in front
- Integrated full flow oil cooler, side-mounted

Fuel system
- Common rail with two high pressure pumps
- Gear driven fuel feed pump
- Seven hole fuel injection nozzles
- Engine mounted fuel pre-filter with water separator
- Fine fuel filter of cartridge insert type

Intake and exhaust system
- Connection flange for exhaust line
- Waste gate turbo charger, centre low with exhaust flange
- Two-stage air filter, with cyclone
- Heater flange in charge air inlet (with relay)

Cooling system
- Belt driven, maintenance-free coolant pump with high degree of efficiency
- Efficient cooling with accurate coolant control through a water distribution duct in the cylinder block
- Reliable thermostat with minimum pressure drop
- Pusher fan

Electrical system
- Engine Management System 2 (EMS 2), an electronically controlled processing system which optimizes engine performance. It also includes advanced facilities for diagnostics and fault tracing
- The instruments and controls connect to the engine via the CAN SAE J1939 interface, either through the Control Interface Unit (CIU) or the Digital Control Unit (DCU). The CIU converts the digital CAN bus signal to an analog signal, making it possible to connect a variety of instruments. The DCU is a control panel with display, engine control, monitoring, alarm, parameter setting and diagnostic functions. The DCU also presents error codes in clear text.
- Sensors for oil pressure, oil temp, boost pressure, boost temp, coolant temp, water in fuel, fuel pressure and two speed sensors.

Note! Not all models, standard equipment and accessories are available in all countries.
All specifications are subject to change without notice.
The engine illustrated may not be entirely identical to production standard engines.

Power Standards
The engine performance corresponds to ISO 3046, BS 5514 and DIN 6271. The technical data applies to an engine without cooling fan and operating on a fuel with calorific value of 42.7 MJ /kg (18360 BTU/lb) and a density of 0.84 kg/liter (7.01 lb/US gal), also where this involves a deviation from the standards. Power output guaranteed within 0 to +2% at rated ambient conditions at delivery. Ratings are based on ISO 8528. Engine speed governing in accordance with ISO 3046/IV, class A1 and ISO 8528-5 class G3

Exhaust emissions
The engine complies with US/EPA Tier 3 and EU stage 3 A emission legislation, according to the Non Road Directive EU 97/68/EEC. The engine also complies with TA-luft -50% exhaust emission regulations.

Rating Guidelines
PRIME POWER rating corresponds to ISO Standard Power for continuous operation. It is applicable for supplying electrical power at variable load for an unlimited number of hours instead of commercially purchased power. A10 % overload capability for governing purpose is available for this rating.
STANDBY POWER rating corresponds to ISO Standard Fuel Stop Power. It is applicable for supplying standby electrical power at variable load in areas with well established electrical networks in the event of normal utility power failure. No overload capability is available for this rating.
1 hp = 1 kW x 1.36

Information
For more technical data and information, please look in the Generating Set Engines Sales Guide.

AB Volvo Penta
SE-405 08 Göteborg, Sweden
www.volvopenta.com

General

In-line four stroke diesel engine with direct injection. Rotation direction, anti-clockwise viewed towards flywheel.
Turbocharged

Number of cylinders			6
Displacement, total		litre in^3	7,15 436,0
Firing order			1-5-3-6-2-4
Bore		mm in	108 4,25
Stroke		mm in	130 5,12
Compression ratio			18
Wet weight	Engine only	kg lb	770 1698
	Engine incl. cooling system and air filtration system	kg lb	945 2083

Performance			**rpm**	**1500**	**1800**
Prime Power		without fan	kW hp	137 187	158 214
		with fan	kW hp	132 179	148 201
Standby Power		without fan	kW hp	151 205	174 236
		with fan	kW hp	146 198	164 223
Torque at:	Prime Power		Nm lbft	874 645	837 617
	Standby Power		Nm lbft	961 709	920 679
Mean piston speed			m/s ft/sec	6,5 21,4	7,8 25,7
Effective mean pressure at:	Prime Power		MPa psi	1,5 223	1,5 213
Effective mean pressure at:	Standby Power		MPa psi	1,7 245	1,6 235
Max combustion pressure at:	Prime Power		MPa psi	13,7 1987	14,5 2103
Max combustion pressure at:	Standby Power		MPa psi	17,1 2480	16,4 2379
Total mass moment of inertia, J (mR^2)			kgm^2 $lbft^2$	3,09 73,3	
Friction Power			kW hp	19 25,84	26 35,088
Derating see Technical Diagrams					

Engine noise emission

Test Standards: ISO 3744-1981 (E) sound power (without fan, cooler, intake and exhaust noise)

Tolerance ± 0.75 dB(A)		**rpm**	**1500**	**1800**
Measured sound power Lw	No load	dB(A)	100,6	102,5
	Prime Power	dB(A)	103,5	105,4
	Standby Power	dB(A)		
Calculated sound pressure Lp at 1 m	No load	dB(A)	86,7	88,6
	Prime Power	dB(A)	89,6	91,5
	Standby Power	dB(A)		

Unsilenced exhaust noise

Data calculated as sound pressure Lp.

Assumed microphone distance 1 m	**rpm**	**1500**	**1800**
Prime Power	dB(A)	114,5	117,1
Standby Power	dB(A)		

Test conditions for load acceptance data

Warm engine.	**Generator**	**Model**	**Type of AVR**
	mecc alte	ECP 34-2L/1	

Load acceptance performance can vary due to actual alternator inertia, voltage regulator, type of load and local ambient conditions.

Single step load performance at 1500 rpm

Load (%)	Speed diff (%)		Recovery time (s)		Remaining load	Speed diff (%)		Recovery time (s)	
	Prime	Standby	Prime	Standby	(%)	Prime	Standby	Prime	Standby
0-20	1,8	1,9	1,1	1,0	20-100	13,2	15,7	3,4	3,7
0-40	3,5	4,1	2,7	2,6	40-100	5,5	5,4	2,0	1,9
0-60	5,6	6,4	3,0	2,2	60-100	3,6	3,7	1,9	2,2
0-80	10,2	11,1	2,7	2,8	80-100	1,8	2,0	1,9	1,5
0-100	16,1	19,1	3,8	4,2					
100-0	8,7	8,7	2,0	2,0					

Single step load performance at 1800 rpm

Load (%)	Speed diff %		Recovery time (s)		Remaining load	Speed diff (%)		Recovery time (s)	
	Prime	Standby	Prime	Standby	(%)	Prime	Standby	Prime	Standby
0-20	1,4	1,5	0,6	0,7	20-100	9,1	9,8	3,1	2,9
0-40	2,8	3,1	1,0	1,2	40-100	4,6	4,4	1,6	2,5
0-60	3,9	4,6	1,4	2,7	60-100	3,3	3,0	1,7	2,3
0-80	6,7	8,2	1,9	2,5	80-100	1,6	1,3	1,2	1,4
0-100	12,3	16,5	3,3	3,6					
100-0	6,7	7,2	2,0	2,0					

Cold start performance			rpm	1500	1800
Time from start to no load speed at ambient temperature:	°C	20	s		
		5	s		
		-15*	s		
		Min start temp*	s	-30,0	-30,0
Time from start to stay within 0.5% of no load speed at ambient temperature:	°C	20	s		
		5	s		
		-15*	s		

* With manifold heater 3,6 kW engaged, lubrication oil 15W/40 and block heater.

Block heater type	Make	Power kW	Engaged hours	Cooling water temp engine block

Lubrication system			rpm	1500	1800
Lubricating oil consumption	Prime Power		litre/h	0,05	0,05
			US gal/h	0,013	0,013
	Standby Power		litre/h	0,05	0,05
			US gal/h	0,013	0,013
Oil system capacity including filters			litre	23	
			US gal	6,1	
Oil sump capacity:		max	litre	20	
			US gal	5,3	
		min	litre	16	
			US gal	4,2	
Oil change intervals/specifications:			h	500	
			h		
			h		
Engine angularity limits:		front up	°	30	
		front down	°	30	
		side tilt	°	35	
Oil pressure at rated speed			kPa	300 - 500	
			psi	44 - 73	
Lubrication oil temperature in oil sump:		max	°C	125	
			°F	257	
Oil filter micron size			µ	17	

* See also general section in the sales guide

Fuel system		rpm	1500	1800
Prime Power	25%	g/kWh	260	288
Specific fuel consumption at:		lb/hph	0,421	0,467
	50%	g/kWh	249	260
		lb/hph	0,404	0,421
	75%	g/kWh	236	243
		lb/hph	0,383	0,394
	100%	g/kWh	216	223
		lb/hph	0,350	0,361
Standby Power	25%	g/kWh	258	282
Specific fuel consumption at:		lb/hph	0,418	0,457
	50%	g/kWh	250	253
		lb/hph	0,405	0,410
	75%	g/kWh	238	238
		lb/hph	0,386	0,386
	100%	g/kWh	209	214
		lb/hph	0,339	0,347

Fuel system		rpm	1500	1800
Fuel to conform to			DIN EN590	
System supply flow at:		litre/h	240	240
		US gal/h	63,4	63,4
Fuel supply line max restriction (Measured at fuel inlet connection)		kPa	35	35
		psi	5,1	5,1
Fuel supply line max pressure, engine stopped		kPa	10	10,0
		psi	1,5	1,5
System return flow		litre/h	240	240
		US gal/h	63,4	63,4
Fuel return line max restriction (Measured at fuel return connection)		kPa	50	50
		psi	7,3	7,3
Maximum allowable inlet fuel temp (Measured at fuel inlet connection)		°C	70	70
		°F	158	158
Prefilter / Water separator micron size		µ	10	
Fuel filter micron size		µ	5	
Governor type/make, standard		EMS 2.2		
Injection pump type/make		BOSCH PF 45		

Intake and exhaust system			rpm	1500	1800
Air consumption at: (+25°C and 100kPa)	Prime Power		m^3/min	10	11
			cfm	353	388
	Standby Power		m^3/min	10,3	11,4
			cfm	364	403
Max allowable air intake restriction including piping			kPa	5	5
			psi	0,7	0,7
Air filter restriction clean Volvo Penta filter			kPa	3	3
			psi	0,4	0,4
Heat rejection to exhaust at:		Prime Power	kW	110	134
			BTU/min	6256	7620
		Standby Power	kW	116	152
			BTU/min	6597	8644
Exhaust gas temperature after turbine at:		Prime Power	°C	485	511
			°F	905	952
		Standby Power	°C	498	531
			°F	928	988
Max allowable back pressure in exhaust line		Prime Power	kPa	7	7
			psi	1,0	1,0
		Standby Power	kPa	7	7
			psi	1,0	1,0
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)		Prime Power	m^3/min	29,4	34,1
			cfm	1038	1204
		Standby Power	m^3/min	30,4	35,2
			cfm	1074	1243

Cooling system			rpm	1500	1800
Heat rejection radiation from engine at:	Prime Power		kW	14	16
			BTU/min	796	910
	Standby Power		kW	16	18
			BTU/min	910	1024
Heat rejection to coolant at:	Prime Power		kW	74	73
			BTU/min	4208	4151
	Standby Power		kW	81	76
			BTU/min	4584	4339
Coolant	Volvo Penta coolant "ready mix" or Volvo Penta coolant mixed with clean fresh water 40 / 60				
Radiator cooling system type			Closed circuit		
Standard radiator core area			m²	0,45	
			foot²	4,84	
Fan diameter			mm	596	
			in	23,46	
Fan power consumption			kW	5,5	9,6
			hp	7	13
Fan drive ratio				1,73:1	
Coolant capacity,	engine		litre	9,8	
			US gal	2,59	
	engine with std radiator and hoses		litre	23,1	
			US gal	6,10	
Coolant pump			drive/ratio	1,73:1	
Coolant flow with standard system			l/s	2,28	2,73
			US gal/s	0,60	0,72
Minimum coolant flow			l/s	1,8	2,2
			US gal/s	0,48	0,58
Maximum outer circuit restriction, including piping			kPa	25	35
			psi	3,6	5,1
Thermostat	start to open		°C	87	
			°F	189	
	fully open		°C	102	
			°F	216	
Maximum static pressure head (expansion tank height + pressure cap setting)			kPa	100	
			psi	14,5	
Minimum static pressure head (expansion tank height + pressure cap setting)			kPa	90	
			psi	13,1	
Standard pressure cap setting			kPa	60	
			psi	8,7	
Maximum top tank temperature			°C	105	
			°F	221	
Draw down capacity. The difference between min coolant level in the expansion tank and the lowest level where the engine's coolant system still are functioning			litre		
			US gal		

Charge air cooler system		rpm	1500	1800
Heat rejection to charge air cooler	Prime Power	kW	23	26
		BTU/min	1297	1484
	Standby Power	kW	25	30
		BTU/min	1393	1717
Charge air mass flow	Prime Power	kg/s	0,19	0,21
	Standby Power	kg/s	0,23	0,25
Charge air inlet temp. (Charge air temp after turbo compressor)	Prime Power	°C	158	162
		°F	316	324
	Standby Power	°C	168	170
		°F	334	338
Charge air outlet temp. (Charge air temp after intercooler)	Prime Power	°C	40	40
		°F	104	104
	Standby Power	°C	38	41
		°F	100	106
Maximum pressure drop over charge air cooler incl. piping		kPa	15	
		psi	2,18	
Charge air pressure (After charge air cooler)		kPa	197	
		psi	28,57	
Standard charge air cooler core area		m²	0,37	
		foot²	3,98	

Cooling performance

Cooling air flow and external restriction at different radiator air temperatures based on 105°C TTT and 40% coolant. Valid at 1 atm. (radiator and cooling fan, see optional equipment)

Engine speed rpm	Air on temp °C	PRIME POWER		STANDBY POWER	
		Air flow m^3/s	External restriction Pa	Air flow m^3/s	External restriction Pa
1500	50	1,4	600	2,1	410
	60	1,9	480	2,7	260
	70	2,6	280	3,7	0
	75	3,2	130		
	78	3,7	0		
1800	60	2,5	640	2,6	610
	70	3,3	370	3,6	280
	75	4,1	140		
	76			4,7	0
	78	4,7	0		

Note! External restrictions are calculated for values >0 Pa

Engine management system

Functionality	Alternatives	Default setting
Governor mode	Isochronous/droop switchable	Isochronous
Governor droop	1rpm/10Nm - 1rpm/127Nm	1rpm/25Nm
Governor response	N/A	N/A
Dual speed		
Idle speed	550-800 rpm	600 rpm
Fine speed adjustment		
Stop function	Energized to run / stop	Energized to stop
Preheating function	ON/OFF	Option
Lamp test	ON/OFF	ON

Engine sensor and switch settings

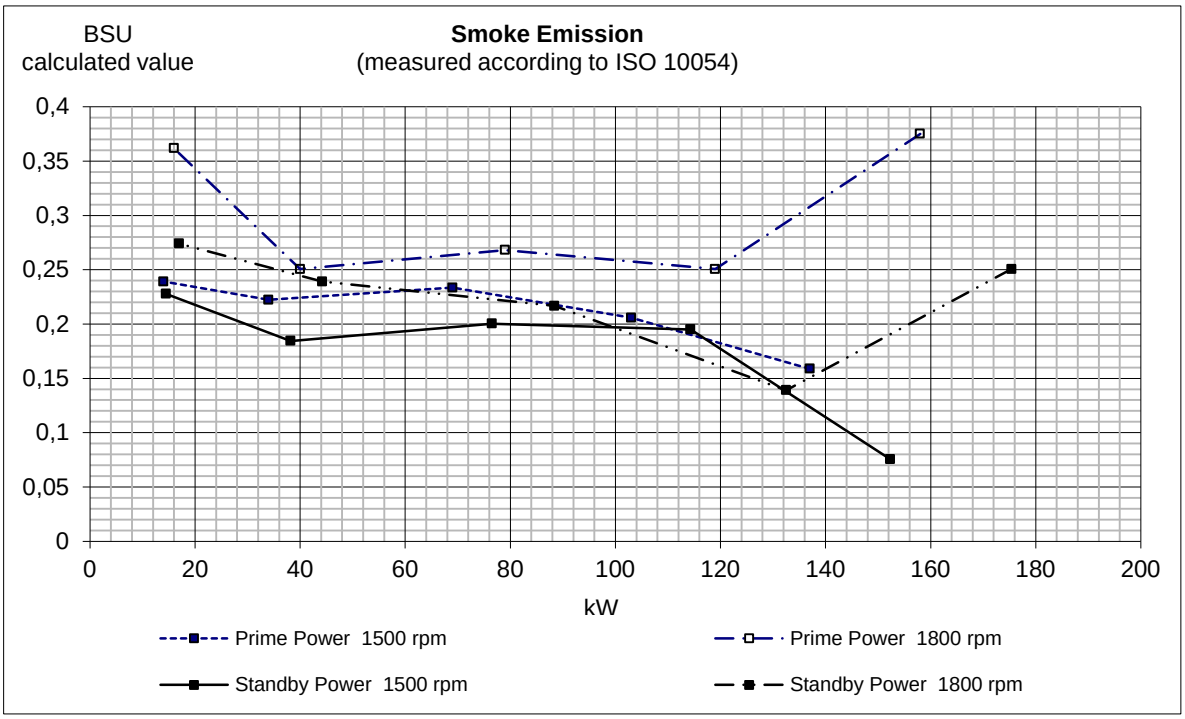
			Warning level	Alarm level	Engine protection	
			Default setting			Action.
Parameter		Unit	Yellow lamp	Red lamp	Level	Default/Alternative
Oil temp		°C	125	130	130,0	Shut down.
Oil pressure	Low idle	kPa	90	80	80	Shut down
	1500 rpm	kPa	200	170	170	Shut down
	1800 rpm	kPa	230	200	200	Shut down
Oil level						
Piston cooling pressure >1000 rpm		kPa				
Coolant temp		°C	105	110	110	Shut down.
Coolant level			On		Low level	Shut down.
Fuel feed pressure	Low idle	kPa				
	>1400 rpm					
Water in fuel						
Crank case pressure		kPa				
Air filter pressure droop		kPa				
Altitude, above sea		m	Automatic derating, see section derating			
Charge air temp		°C	75	80	80	shut down
Charge air pressure		kPa	310	320	320	shut down
Engine speed		rpm	115% of rated speed			

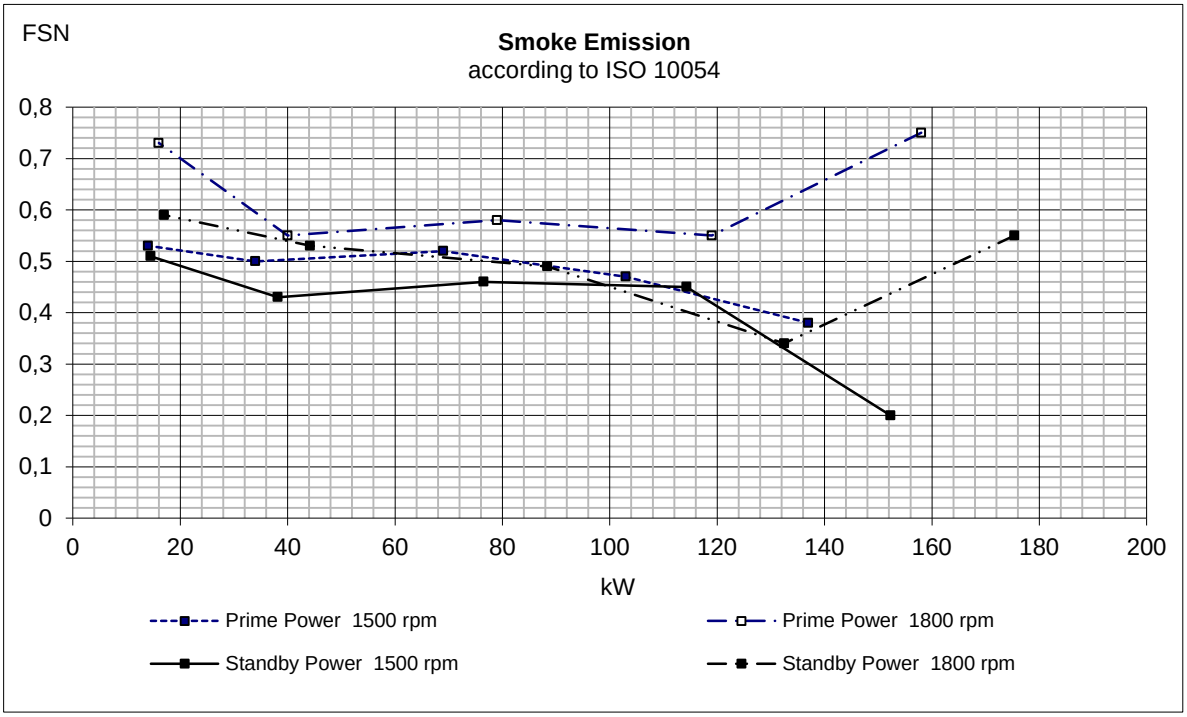
Engine protection can be disabled. For consequences please see VP International Limited Warranty Policy

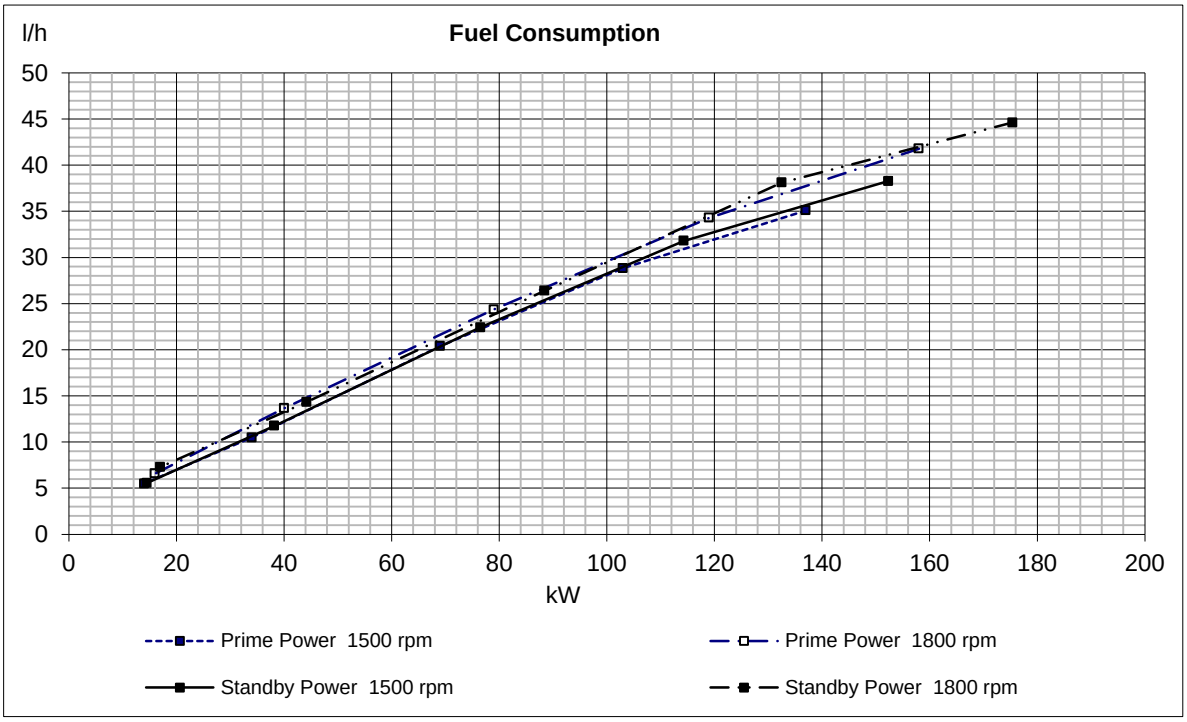
Electrical system

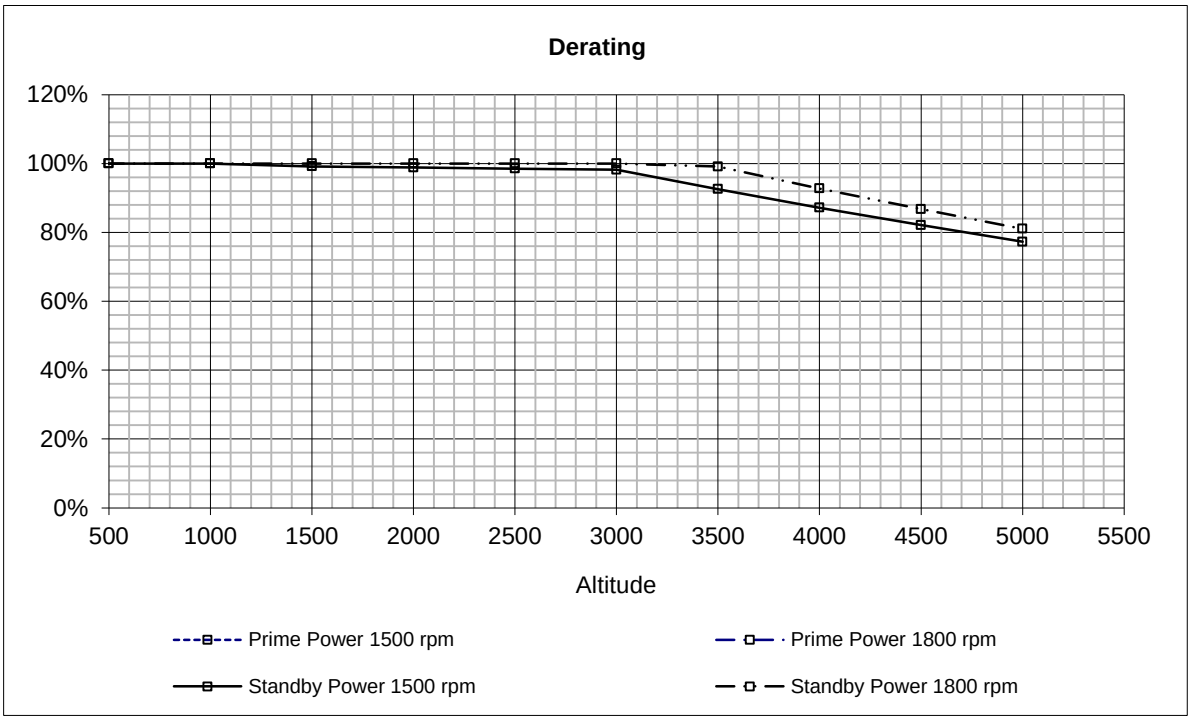
Voltage and type		24V	
Alternator:	make/output	A	Iskra/55
	tacho output	Hz/alt. Rev	
	drive ratio		
Starter motor		make	Mitsubishi
		type	M008T62471
		kW	5.0
Number of teeth on:	flywheel		129
	starter motor		10
Max wiring resistance main circuit		mΩ	
Cranking current at +20°C		A	400
Crank engine speed at 20°C		rpm	200
Starter motor battery capacity:	max	Ah/A	135
	min at +5°C	Ah/A	110
Inlet manifold heater (at 20 V)		kW	3,6
Power relay for the manifold heater		A	120

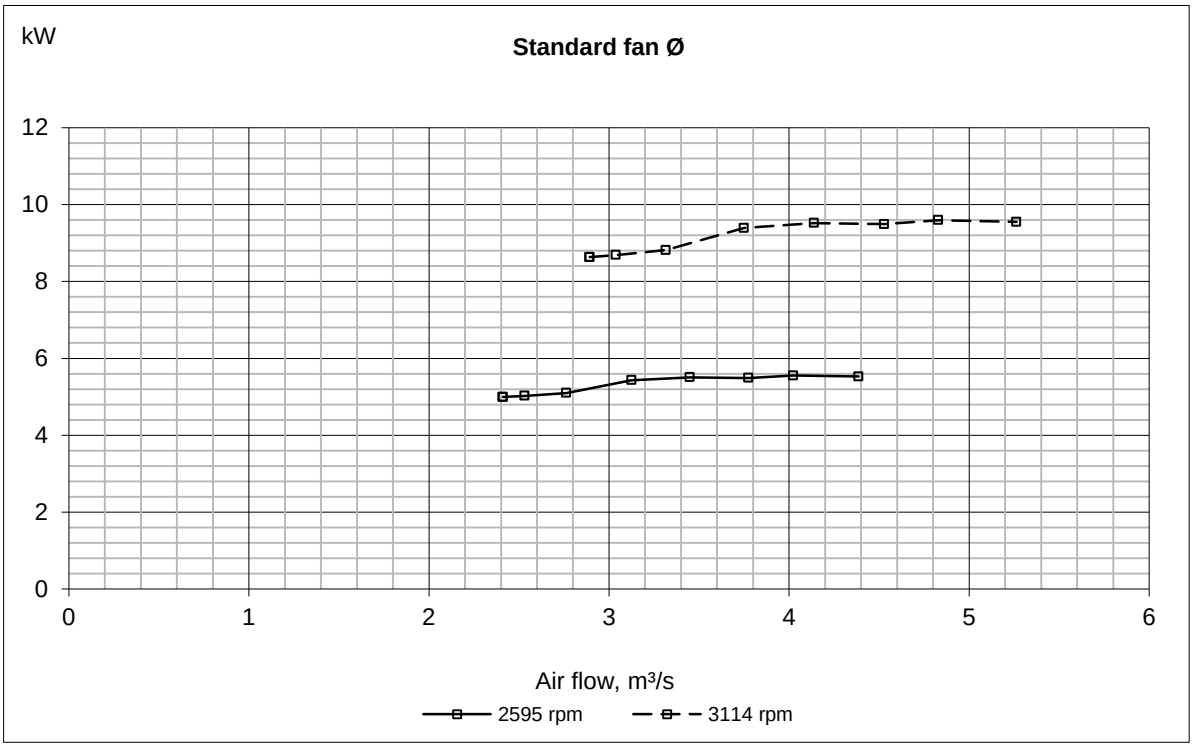
Power take off	**rpm**	**1500**	**1800**
Speed ratio direction of rotation viewed from flywheel side	0,91:1/clockwise		
Speed ratio direction of rotation viewed from flywheel side	1,58:1/clockwise		
Speed ratio direction of rotation viewed from flywheel side			
Max allowed bending moment in flywheel housing	Nm lbft	≤ ± 5000	

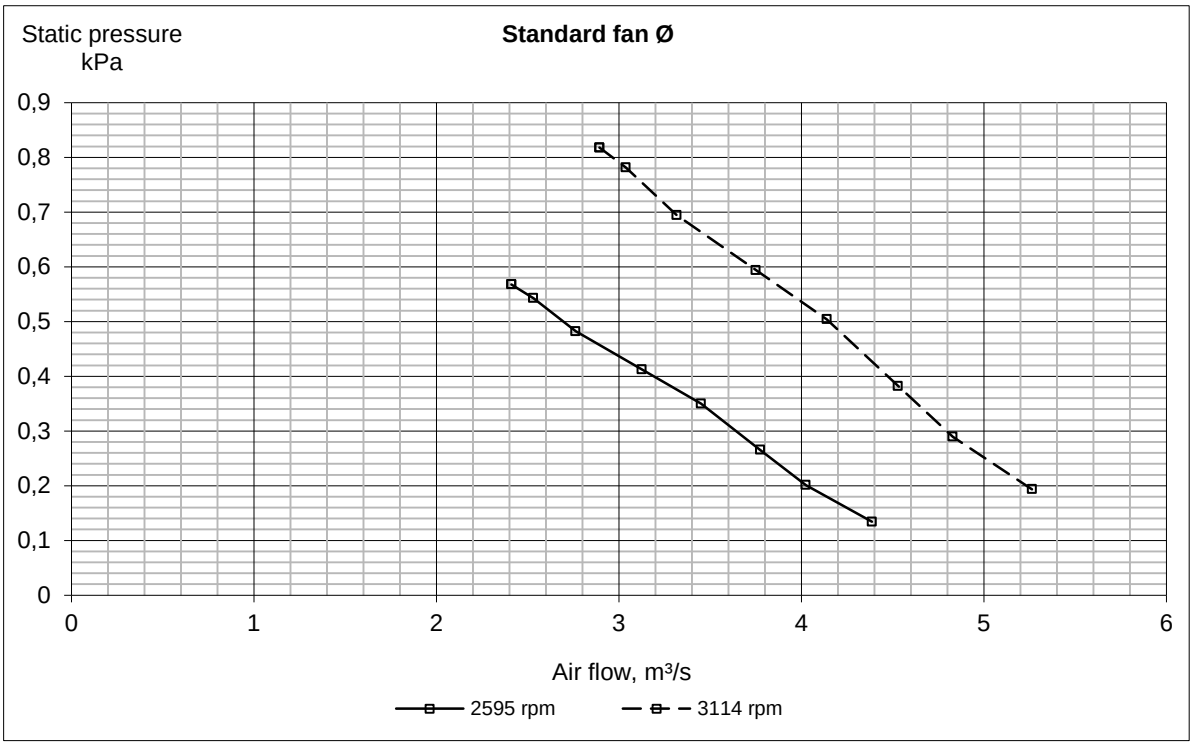

BSU
calculated value
Smoke Emission
(measured according to ISO 10054)
0,4
0,35
0,3
0,25
0,2
0,15
0,1
0,05
0
0
20
40
60
80
100
120
140
160
180
200
kW
Prime Power 1500 rpm
Prime Power 1800 rpm
Standby Power 1500 rpm
Standby Power 1800 rpm


FSN
Smoke Emission
according to ISO 10054
0,8
0,7
0,6
0,5
0,4
0,3
0,2
0,1
0
0
20
40
60
80
100
120
140
160
180
200
kW
Prime Power 1500 rpm
Prime Power 1800 rpm
Standby Power 1500 rpm
Standby Power 1800 rpm


Fuel Consumption
l/h
50
45
40
35
30
25
20
15
10
5
0
0
20
40
60
80
100
120
140
160
180
200
kW
Prime Power 1500 rpm
Prime Power 1800 rpm
Standby Power 1500 rpm
Standby Power 1800 rpm


Derating
120%
100%
80%
60%
40%
20%
0%
500
1000
1500
2000
2500
3000
3500
4000
4500
5000
5500
Altitude
Prime Power 1500 rpm
Prime Power 1800 rpm
Standby Power 1500 rpm
Standby Power 1800 rpm

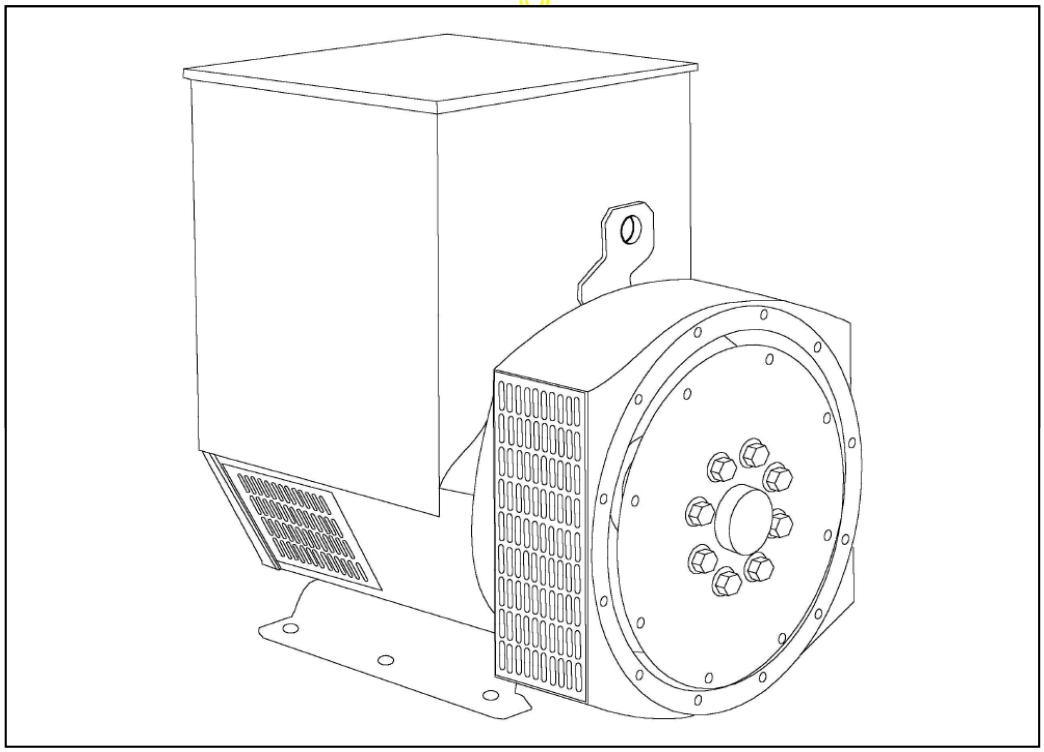

kW
Standard fan Ø
12
10
8
6
4
2
0
0
1
2
3
4
5
6
Air flow, m³/s
2595 rpm
3114 rpm


Static pressure
kPa
Standard fan Ø
0,9
0,8
0,7
0,6
0,5
0,4
0,3
0,2
0,1
0
0
1
2
3
4
5
6
Air flow, m³/s
2595 rpm
3114 rpm

STAMFORD®

UCI274H - Winding 06

Technical Data Sheet



SPECIFICATIONS & OPTIONS

STANDARDS
Stamford industrial generators meet the requirements of BS EN 60034 and the relevant section of other international standards such as BS5000, VDE 0530, NEMA MG1-32, IEC34, CSA C22.2-100, AS1359.
Other standards and certifications can be considered on request.

VOLTAGE REGULATORS

SX460 AVR - STANDARD
With this self excited control system the main stator supplies power via the Automatic Voltage Regulator (AVR) to the exciter stator. The high efficiency semiconductors of the AVR ensure positive build-up from initial low levels of residual voltage.
The exciter rotor output is fed to the main rotor through a three phase full wave bridge rectifier. This rectifier is protected by a surge suppressor against surges caused, for example, by short circuit.

AS440 AVR
With this self-excited system the main stator provides power via the AVR to the exciter stator. The high efficiency semi-conductors of the AVR ensure positive build-up from initial low levels of residual voltage.
The exciter rotor output is fed to the main rotor through a three-phase full-wave bridge rectifier. The rectifier is protected by a surge suppressor against surges caused, for example, by short circuit or out-of-phase paralleling.
The AS440 will support a range of electronic accessories, including a 'droop' Current Transformer (CT) to permit parallel operation with other ac generators.

MX341 AVR
This sophisticated AVR is incorporated into the Stamford Permanent Magnet Generator (PMG) control system.
The PMG provides power via the AVR to the main exciter, giving a source of constant excitation power independent of generator output. The main exciter output is then fed to the main rotor, through a full wave bridge, protected by a surge suppressor. The AVR has in-built protection against sustained over-excitation, caused by internal or external faults. This de-excites the machine after a minimum of 5 seconds.
An engine relief load acceptance feature can enable full load to be applied to the generator in a single step.

MX321 AVR
The most sophisticated of all our AVRs combines all the features of the MX341 with, additionally over voltage protection built-in and short circuit current level adjustments as an optional facility.

WINDINGS & ELECTRICAL PERFORMANCE

All generator stators are wound to 2/3 pitch. This eliminates triplen (3rd, 9th, 15th ...) harmonics on the voltage waveform and is found to be the optimum design for trouble-free supply of non-linear loads. The 2/3 pitch design avoids excessive neutral currents sometimes seen with higher winding pitches, when in parallel with the mains. A fully connected damper winding reduces oscillations during paralleling. This winding, with the 2/3 pitch and carefully selected pole and tooth designs, ensures very low waveform distortion.

TERMINALS & TERMINAL BOX

Dedicated Single Phase windings have 4 ends brought out to the terminals, which are mounted on a cover at the non-drive end of the generator. A sheet steel terminal box contains the AVR and provides ample space for the customers' wiring and gland arrangements. It has removable panels for easy access.

SHAFT & KEYS

All generator rotors are dynamically balanced to better than BS6861:Part 1 Grade 2.5 for minimum vibration in operation. Two bearing generators are balanced with a half key.

INSULATION/IMPREGNATION

The insulation system is class 'H'.
All wound components are impregnated with materials and processes designed specifically to provide the high build required for static windings and the high mechanical strength required for rotating components.

QUALITY ASSURANCE

Generators are manufactured using production procedures having a quality assurance level to
BS EN ISO 9001.

The stated voltage regulation may not be maintained in the presence of certain radio transmitted signals. Any change in performance will fall within the limits of Criteria 'B' of EN 61000-6-2:2001. At no time will the steady-state voltage regulation exceed 2%.

DE RATES

All values tabulated on page 7 are subject to the following reductions

5% when air inlet filters are fitted.
3% for every 500 metres by which the operating altitude exceeds 1000 metres above mean sea level.
3% for every 5 C by which the operational ambient temperature exceeds 40 C.

Note: Requirement for operating in an ambient exceeding 60 C must be referred to the factory.

NB Continuous development of our products entitles us to change specification details without notice, therefore they must not be regarded as binding.

Front cover drawing typical of product range.

WINDING 06

CONTROL SYSTEM	SEPARATELY EXCITED BY P.M.G.		
A.V.R.	MX341	MX321	
VOLTAGE REGULATION	± 1%	± 0.5 %	With 4% ENGINE GOVERNING
SUSTAINED SHORT CIRCUIT	REFER TO SHORT CIRCUIT DECREMENT CURVES (page 6)		

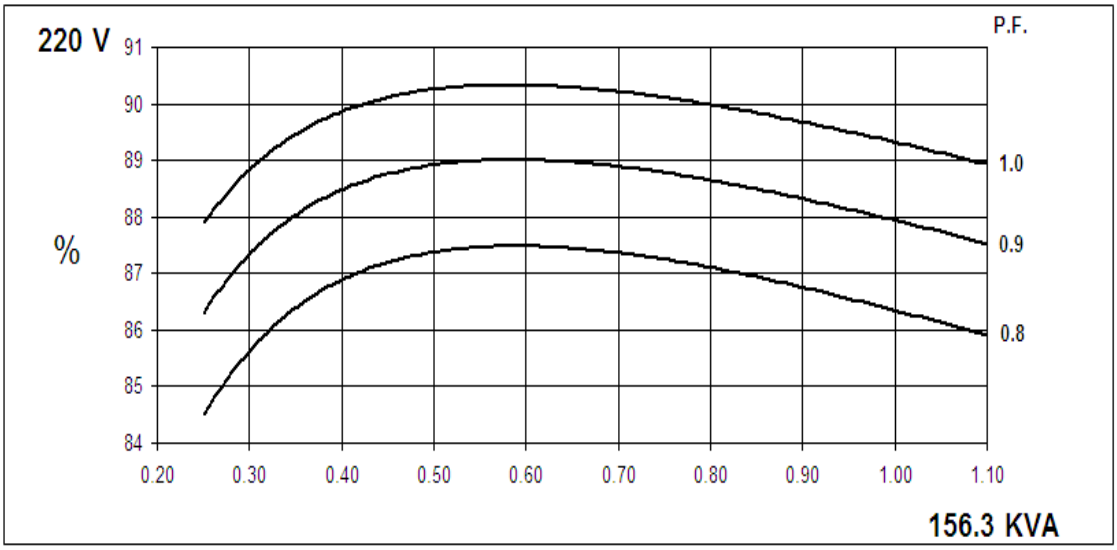
CONTROL SYSTEM	SELF EXCITED		
A.V.R.	SX460	AS440	
VOLTAGE REGULATION	± 1.0 %	± 1.0 %	With 4% ENGINE GOVERNING
SUSTAINED SHORT CIRCUIT	SERIES 4 CONTROL DOES NOT SUSTAIN A SHORT CIRCUIT CURRENT		

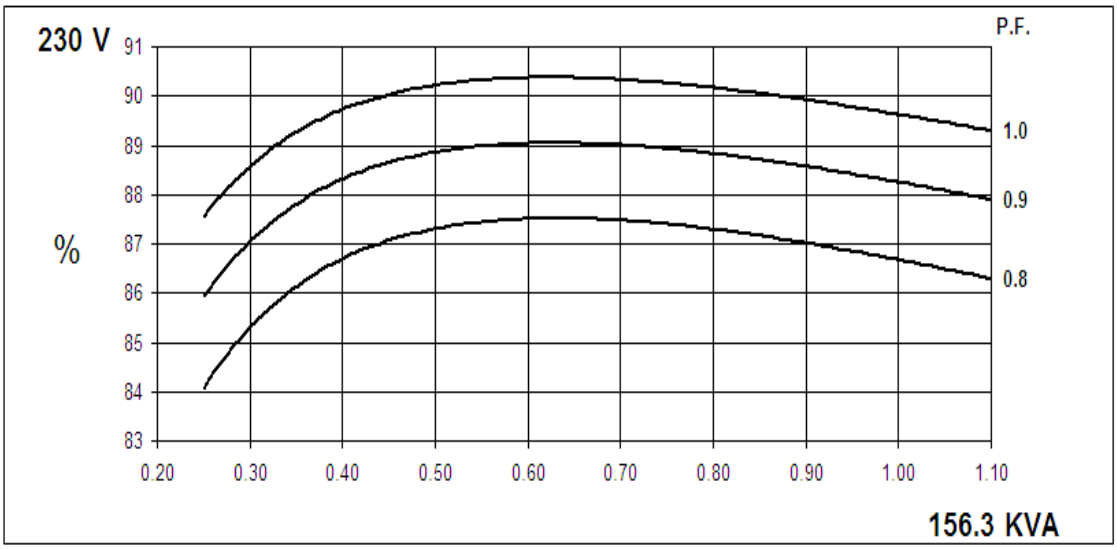
INSULATION SYSTEM	CLASS H	
PROTECTION	IP23	
RATED POWER FACTOR	0.8	
STATOR WINDING	SINGLE LAYER CONCENTRIC	
WINDING PITCH	TWO THIRDS	
WINDING LEADS	4	
MAIN STATOR RESISTANCE	0.007 Ohms AT 22°C SERIES CONNECTED	
MAIN ROTOR RESISTANCE	1.82 Ohms at 22°C	
EXCITER STATOR RESISTANCE	20 Ohms at 22°C	
EXCITER ROTOR RESISTANCE	0.091 Ohms PER PHASE 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 LINEAR LOAD < 5.0%	
MAXIMUM OVERSPEED	2250 Rev/Min	
BEARING DRIVE END	BALL. 6315-2RS (ISO)	
BEARING NON-DRIVE END	BALL. 6310-2RS (ISO)	
	1 BEARING	2 BEARING
WEIGHT COMP. GENERATOR	626 kg	641 kg
WEIGHT WOUND STATOR	253 kg	253 kg
WEIGHT WOUND ROTOR	227.53 kg	216.57 kg
WR² INERTIA	1.9349 kgm^2	1.8843 kgm^2
SHIPPING WEIGHTS in a crate	659 kg	673 kg
PACKING CRATE SIZE	123 x 67 x 103(cm)	123 x 67 x 103(cm)
TELEPHONE INTERFERENCE	THF<2%	TIF<50
COOLING AIR	0.617 m³/sec 1308 cfm	

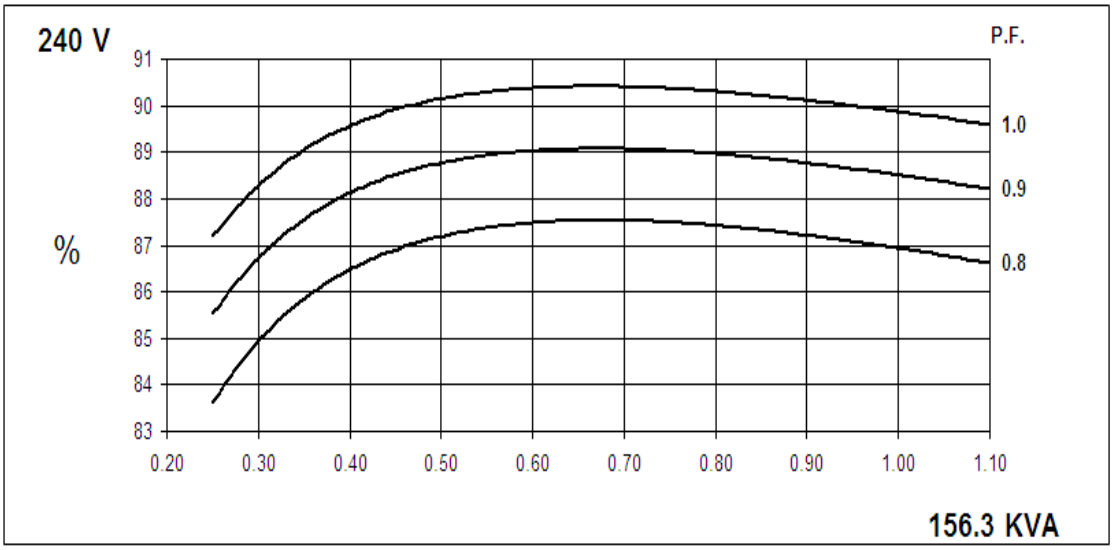
VOLTAGE SERIES	220	230	240
VOLTAGE PARALLEL	110	115	120
kVA BASE RATING FOR REACTANCE VALUES	156.3	156.3	156.3
Xd DIR. AXIS SYNCHRONOUS	2.37	2.17	1.99
X'd DIR. AXIS TRANSIENT	0.20	0.19	0.17
X''d DIR. AXIS SUBTRANSIENT	0.13	0.12	0.11
Xq QUAD. AXIS REACTANCE	1.44	1.32	1.21
X''q QUAD. AXIS SUBTRANSIENT	0.19	0.17	0.16
X_L LEAKAGE REACTANCE	0.10	0.09	0.08
X_2 NEGATIVE SEQUENCE	0.15	0.14	0.13
X_0 ZERO SEQUENCE	0.10	0.09	0.08
REACTANCES ARE SATURATED			

T'd TRANSIENT TIME CONST.	0.042 s
T''d SUB-TRANSTIME CONST.	0.012 s
T'do O.C. FIELD TIME CONST.	1.1 s
Ta ARMATURE TIME CONST.	0.012 s
SHORT CIRCUIT RATIO	1/Xd

SINGLE PHASE EFFICIENCY CURVES





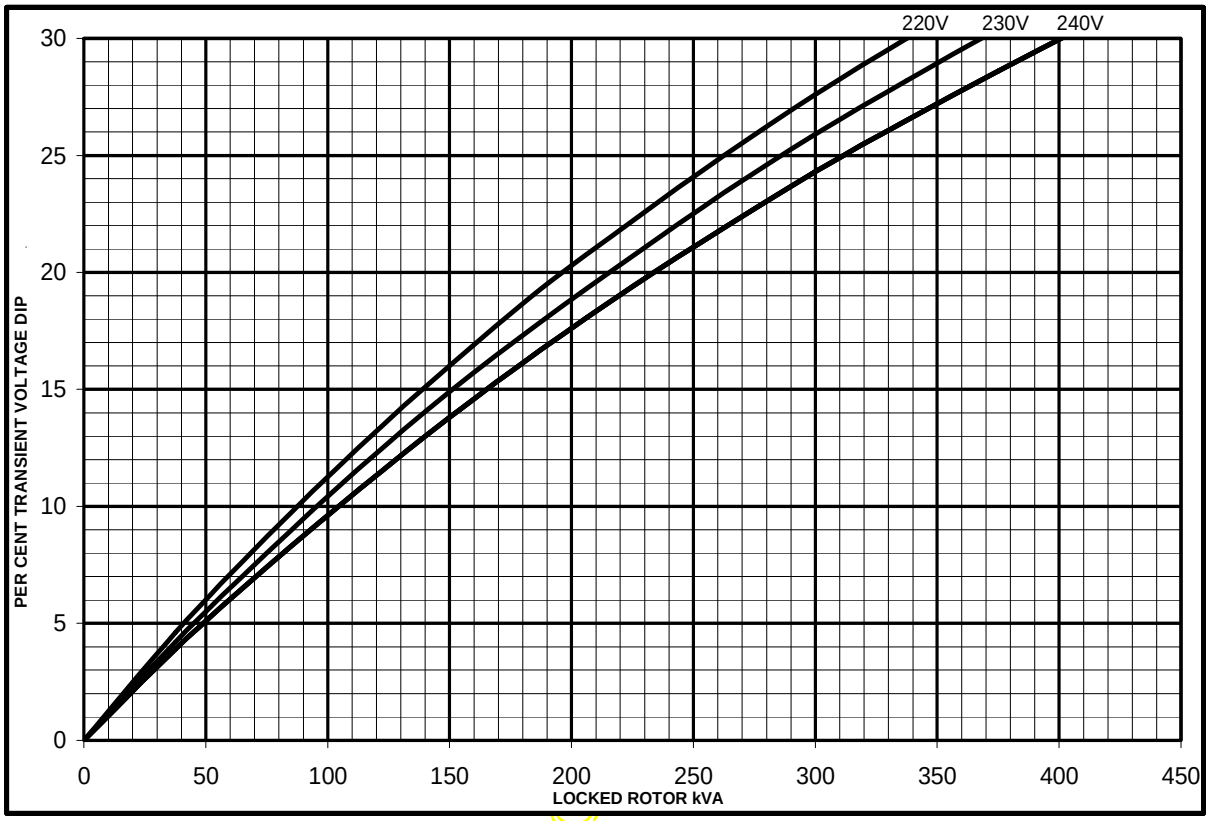


UCI274H

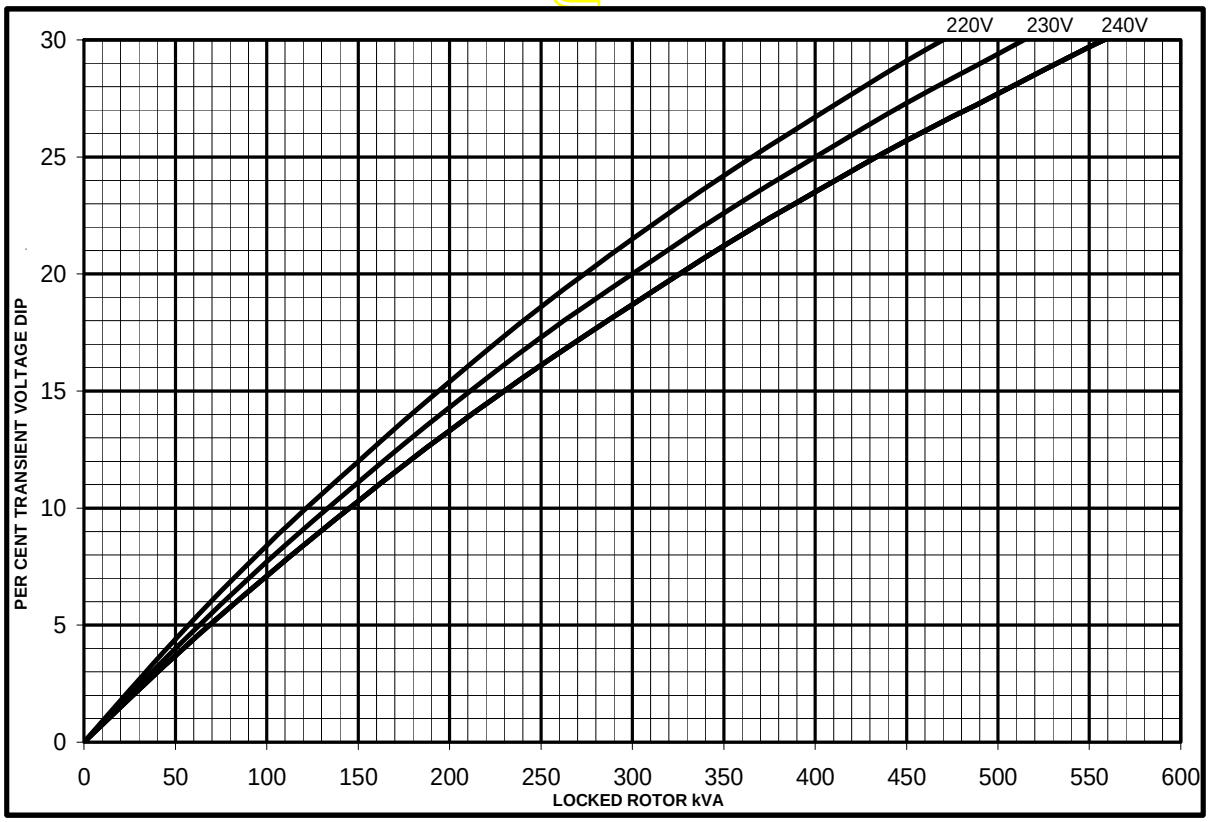
Winding 06

SX

Locked Rotor Motor Starting Curves

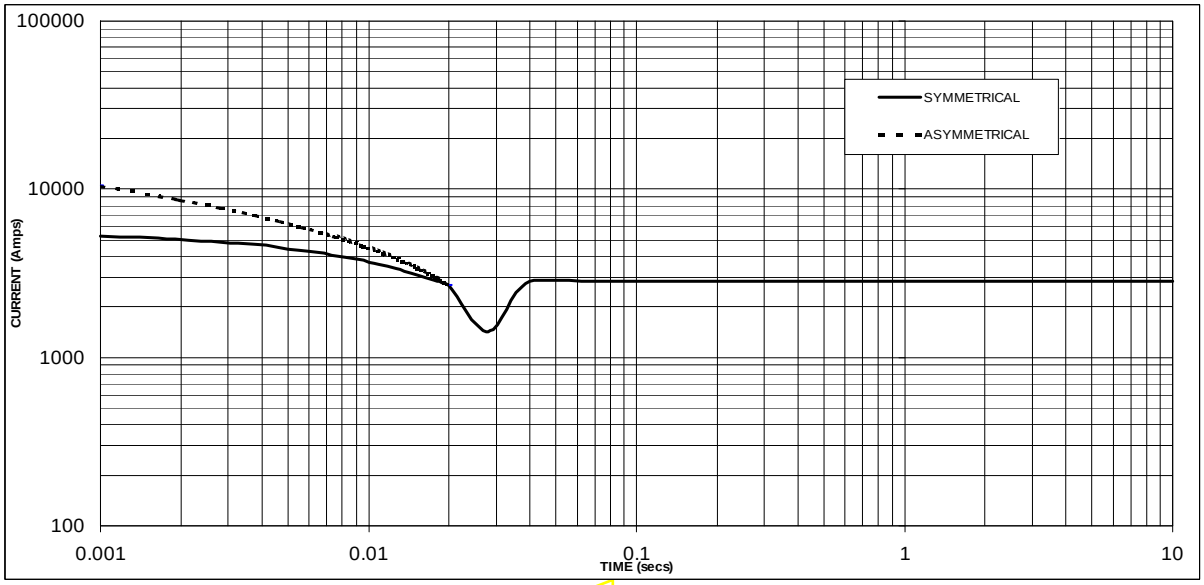


MX



STAMFORD

Short Circuit Decrement Curve. No-load Excitation at Rated Speed
Based on series connection.



Sustained Short Circuit = 2840 Amps

Note
The following multiplication factors should be used to adjust the values from curve between time 0.001 seconds and the minimum current point in respect of nominal operating voltage :

Voltage	Factor
220V	X 1.00
230V	X 1.05
240V	X 1.09

The sustained current value is constant irrespective of voltage level

UCI274H

Winding 06

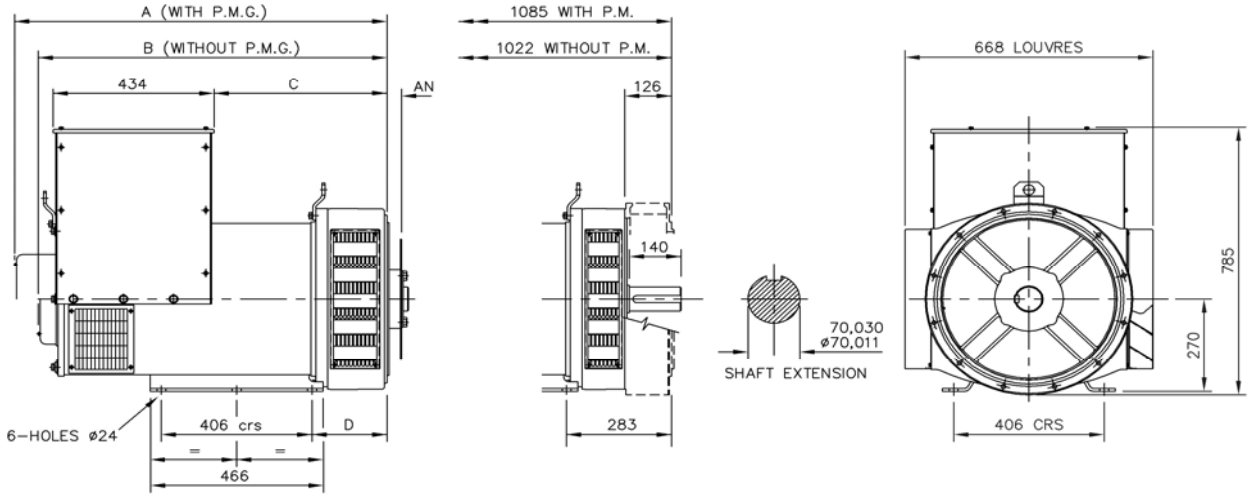
STAMFORD

60Hz

RATINGS

Class - Temp Rise	Cont. F - 105/40°C **0.8pf**			Cont. H - 125/40°C **0.8pf**			Cont. F - 105/40°C **1.0pf**			Cont. H - 125/40°C **1.0pf**		
Series (V)	220	230	240	220	230	240	220	230	240	220	230	240
Parallel (V)	110	115	120	110	115	120	110	115	120	110	115	120
kVA	143.8	143.8	143.8	156.3	156.3	156.3	143.8	143.8	143.8	156.3	156.3	156.3
kW	115.0	115.0	115.0	125.0	125.0	125.0	143.8	143.8	143.8	156.3	156.3	156.3
Efficiency (%)	86.7	86.9	87.2	86.3	86.7	86.9	89.6	89.9	90.1	89.3	89.6	89.9
kW Input	132.6	132.3	131.9	144.8	144.2	143.8	160.5	160.0	159.6	175.0	174.4	173.9

DIMENSIONS



SINGLE BEARING MACHINES ONLY						
ADAPTOR	A	B	C	D	COUPLING DISCS	AN
SAE 1	1018,3	955,3	479,3	216,3	SAE 10	53,98
SAE 2	1004	941	465	202	SAE 11,5	39,68
SAE 3	1004	941	465	202	SAE 14	25,40

APPROVED DOCUMENT

STAMFORD

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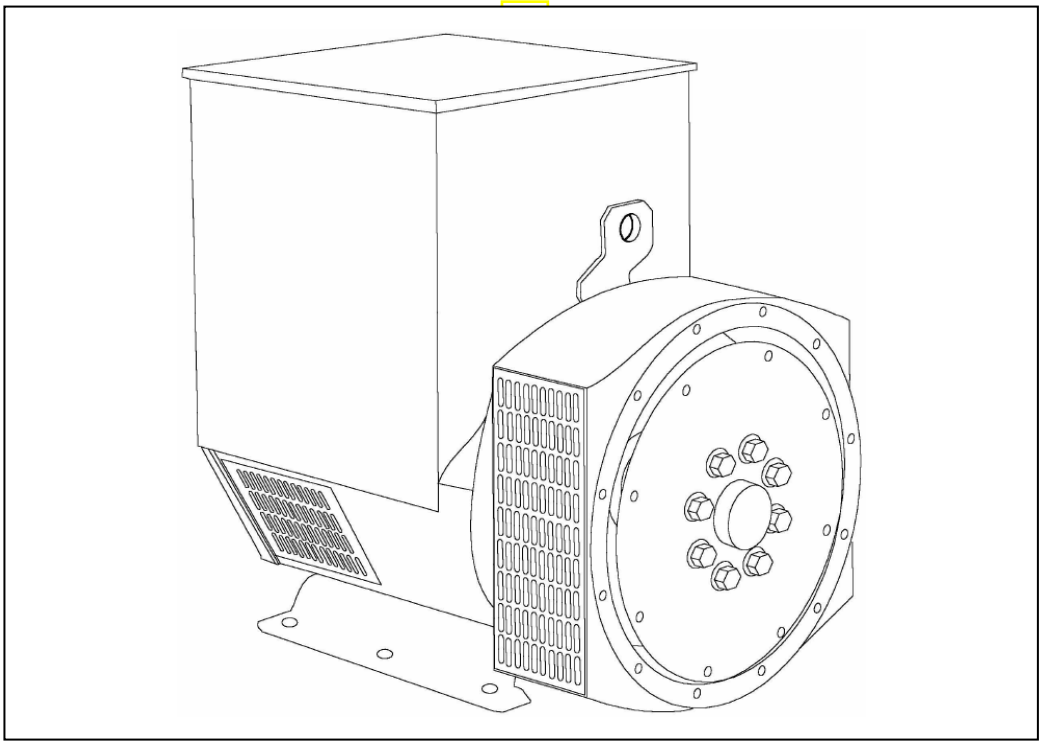
STAMFORD®

UCI274G - Winding 311

Technical Data Sheet



SPECIFICATIONS & OPTIONS

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Stamford industrial generators meet the requirements of BS EN 60034 and the relevant section of other international standards such as BS5000, VDE 0530, NEMA MG1-32, IEC34, CSA C22.2-100, AS1359.
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VOLTAGE REGULATORS

SX460 AVR - STANDARD

With this self excited control system the main stator supplies power via the Automatic Voltage Regulator (AVR) to the exciter stator. The high efficiency semiconductors of the AVR ensure positive build-up from initial low levels of residual voltage.
The exciter rotor output is fed to the main rotor through a three phase full wave bridge rectifier. This rectifier is protected by a surge suppressor against surges caused, for example, by short circuit.

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The AS440 will support a range of electronic accessories, including a 'droop' Current Transformer (CT) to permit parallel operation with other ac generators.

MX341 AVR

This sophisticated AVR is incorporated into the Stamford Permanent Magnet Generator (PMG) control system.
The PMG provides power via the AVR to the main exciter, giving a source of constant excitation power independent of generator output. The main exciter output is then fed to the main rotor, through a full wave bridge, protected by a surge suppressor. The AVR has in-built protection against sustained over-excitation, caused by internal or external faults. This de-excites the machine after a minimum of 5 seconds.
An engine relief load acceptance feature can enable full load to be applied to the generator in a single step.
If three-phase sensing is required with the PMG system the MX321 AVR must be used.
We recommend three-phase sensing for applications with greatly unbalanced or highly non-linear loads.

MX321 AVR

The most sophisticated of all our AVRs combines all the features of the MX341 with, additionally, three-phase rms sensing, for improved regulation and performance.
Over voltage protection is built-in and short circuit current level adjustments is an optional facility.

WINDINGS & ELECTRICAL PERFORMANCE

All generator stators are wound to 2/3 pitch. This eliminates triplen (3rd, 9th, 15th …) harmonics on the voltage waveform and is found to be the optimum design for trouble-free supply of non-linear loads. The 2/3 pitch design avoids excessive neutral currents sometimes seen with higher winding pitches, when in parallel with the mains. A fully connected damper winding reduces oscillations during paralleling. This winding, with the 2/3 pitch and carefully selected pole and tooth designs, ensures very low waveform distortion.

TERMINALS & TERMINAL BOX

Standard generators are 3-phase reconnectable with 12 ends brought out to the terminals, which are mounted on a cover at the non-drive end of the generator. A sheet steel terminal box contains the AVR and provides ample space for the customers' wiring and gland arrangements. It has removable panels for easy access.

SHAFT & KEYS

All generator rotors are dynamically balanced to better than BS6861:Part 1 Grade 2.5 for minimum vibration in operation.
Two bearing generators are balanced with a half key.

INSULATION/IMPREGNATION

The insulation system is class 'H'.
All wound components are impregnated with materials and processes designed specifically to provide the high build required for static windings and the high mechanical strength required for rotating components.

QUALITY ASSURANCE

Generators are manufactured using production procedures having a quality assurance level to BS EN ISO 9001.

The stated voltage regulation may not be maintained in the presence of certain radio transmitted signals. Any change in performance will fall within the limits of Criteria 'B' of EN 61000-6-2:2001. At no time will the steady-state voltage regulation exceed 2%.

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All values tabulated on page 8 are subject to the following reductions

5% when air inlet filters are fitted.
3% for every 500 metres by which the operating altitude exceeds 1000 metres above mean sea level.
3% for every 5°C by which the operational ambient temperature exceeds 40°C.
Note: Requirement for operating in an ambient exceeding 60°C must be referred to the factory.

NB Continuous development of our products entitles us to change specification details without notice, therefore they must not be regarded as binding.

Front cover drawing typical of product range.

WINDING 311

CONTROL SYSTEM	SEPARATELY EXCITED BY P.M.G.		
A.V.R.	MX321	MX341	
VOLTAGE REGULATION	± 0.5 %	± 1.0 %	With 4% ENGINE GOVERNING
SUSTAINED SHORT CIRCUIT	REFER TO SHORT CIRCUIT DECREMENT CURVES (page 7)		

CONTROL SYSTEM	SELF EXCITED		
A.V.R.	SX460	AS440	
VOLTAGE REGULATION	± 1.0 %	± 1.0 %	With 4% ENGINE GOVERNING
SUSTAINED SHORT CIRCUIT	SERIES 4 CONTROL DOES NOT SUSTAIN A SHORT CIRCUIT CURRENT		

INSULATION SYSTEM	CLASS H						
PROTECTION	IP23						
RATED POWER FACTOR	0.8						
STATOR WINDING	DOUBLE LAYER CONCENTRIC						
WINDING PITCH	TWO THIRDS						
WINDING LEADS	12						
STATOR WDG. RESISTANCE	0.0199 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED						
ROTOR WDG. RESISTANCE	1.69 Ohms at 22°C						
EXCITER STATOR RESISTANCE	20 Ohms at 22°C						
EXCITER ROTOR RESISTANCE	0.091 Ohms PER PHASE 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. 6315-2RS (ISO)						
BEARING NON-DRIVE END	BALL. 6310-2RS (ISO)						
	1 BEARING				2 BEARING			
WEIGHT COMP. GENERATOR	580 kg				598 kg			
WEIGHT WOUND STATOR	225 kg				225 kg			
WEIGHT WOUND ROTOR	210.35 kg				199.39 kg			
WR² INERTIA	1.7674 kgm²				1.7169 kgm²			
SHIPPING WEIGHTS in a crate	613 kg				630 kg			
PACKING CRATE SIZE	123 x 67 x 103 (cm)				123 x 67 x 103 (cm)			
	50 Hz				60 Hz			
TELEPHONE INTERFERENCE	THF<2%				TIF<50			
COOLING AIR	0.514 m³/sec 1090 cfm				0.617 m³/sec 1308 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	182	182	182	N/A	205	218	218	231
Xd DIR. AXIS SYNCHRONOUS	2.15	1.94	1.80	-	2.43	2.31	2.11	2.06
X'd DIR. AXIS TRANSIENT	0.19	0.17	0.16	-	0.21	0.20	0.18	0.18
X"d DIR. AXIS SUBTRANSIENT	0.13	0.12	0.11	-	0.15	0.14	0.13	0.12
Xq QUAD. AXIS REACTANCE	1.29	1.16	1.08	-	1.47	1.40	1.28	1.24
X"q QUAD. AXIS SUBTRANSIENT	0.18	0.16	0.15	-	0.18	0.17	0.16	0.15
X_L LEAKAGE REACTANCE	0.08	0.07	0.07	-	0.09	0.08	0.08	0.07
X_2 NEGATIVE SEQUENCE	0.13	0.12	0.11	-	0.16	0.15	0.13	0.13
X_0 ZERO SEQUENCE	0.08	0.07	0.07	-	0.10	0.09	0.08	0.08
REACTANCES ARE SATURATED	VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED							
T'd TRANSIENT TIME CONST.	0.038 s							
T"d SUB-TRANSTIME CONST.	0.012 s							
T'do O.C. FIELD TIME CONST.	1 s							
Ta ARMATURE TIME CONST.	0.01 s							
SHORT CIRCUIT RATIO	1/Xd							

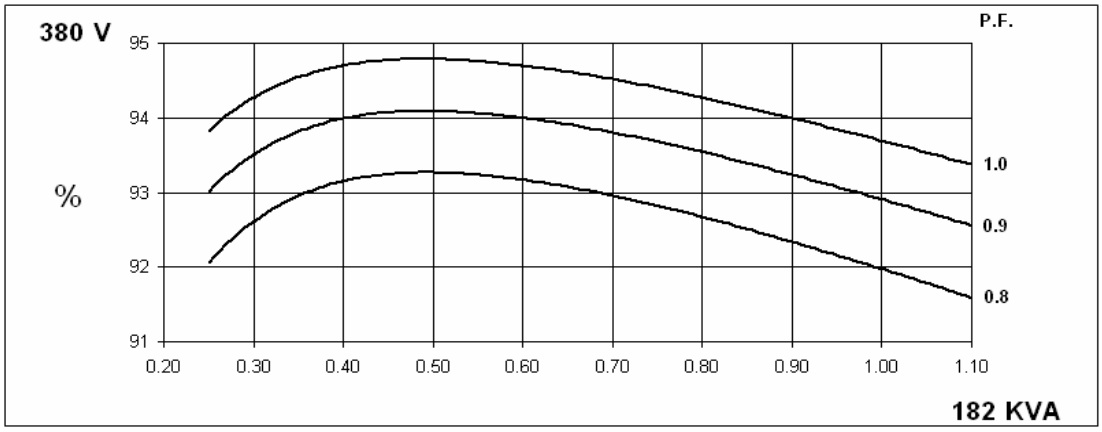
50 Hz

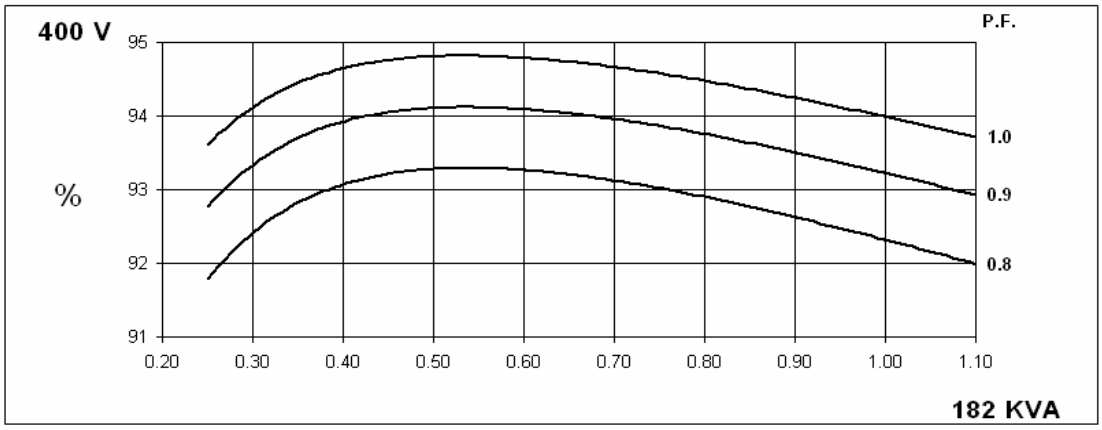
UCI274G

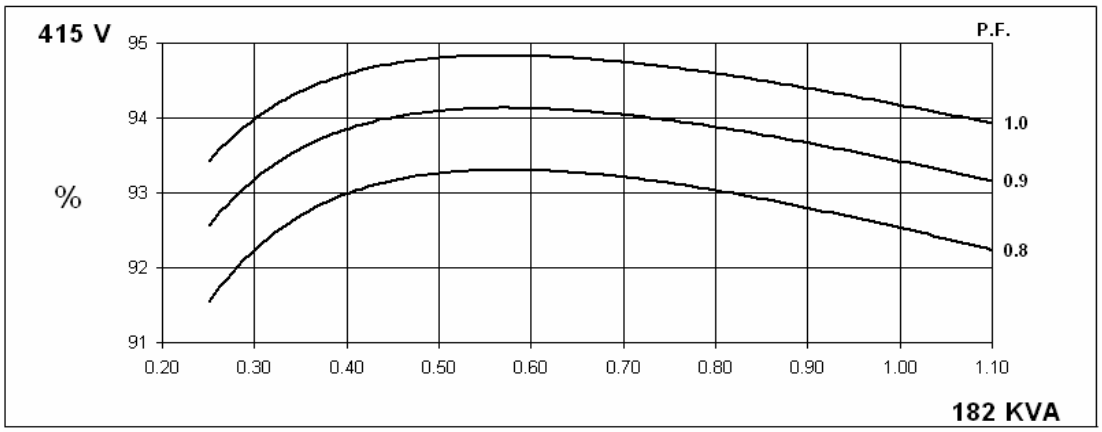
Winding 311

STAMFORD

THREE PHASE EFFICIENCY CURVES







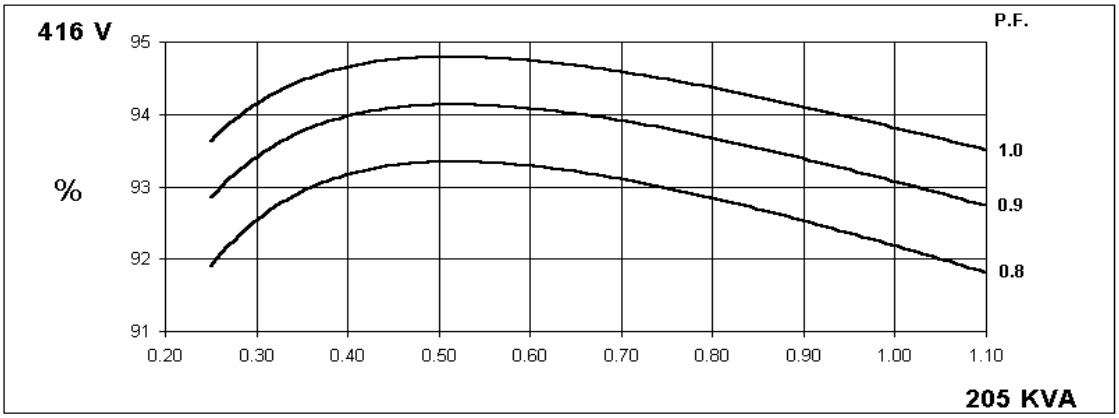
60 Hz

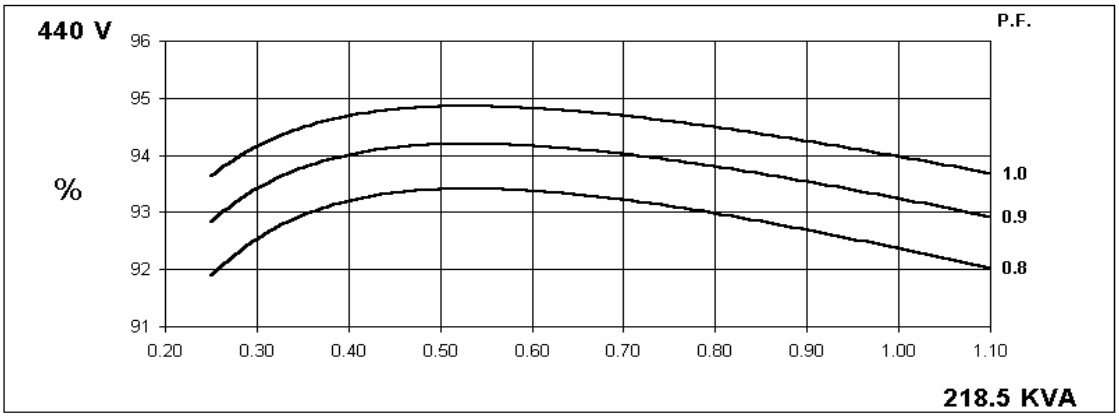
UCI274G

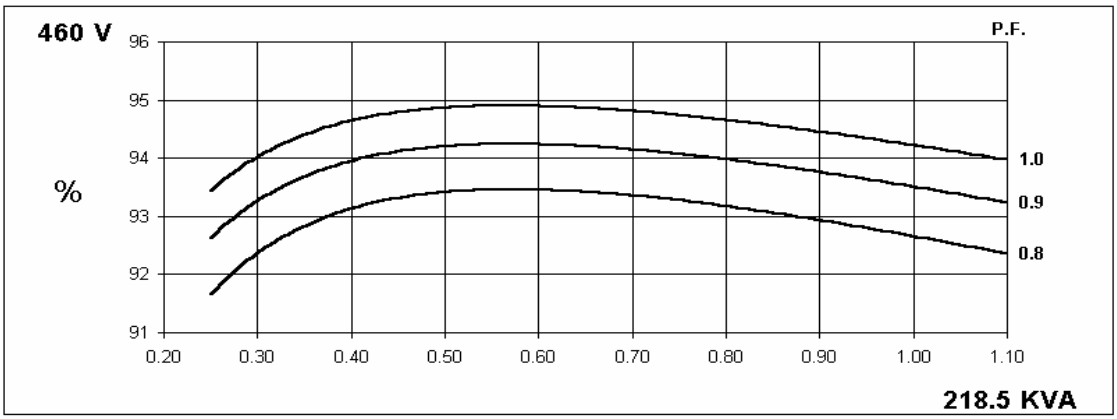
Winding 311

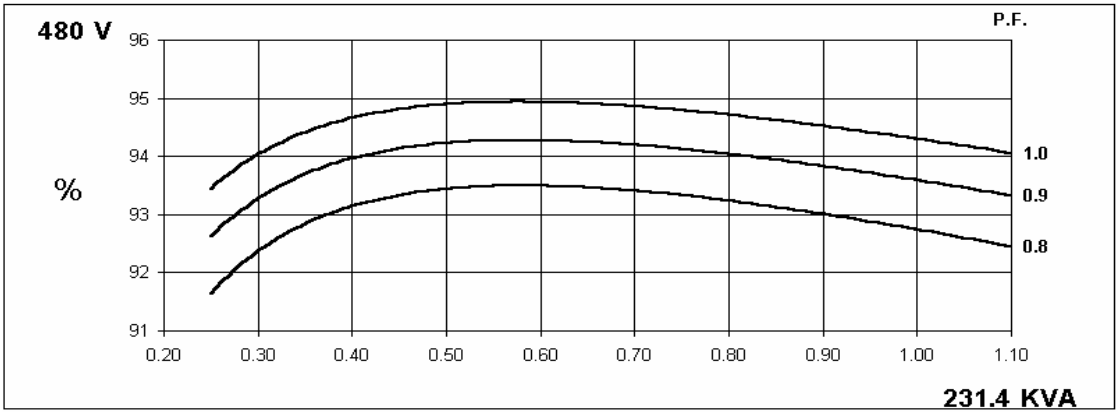
STAMFORD

THREE PHASE EFFICIENCY CURVES





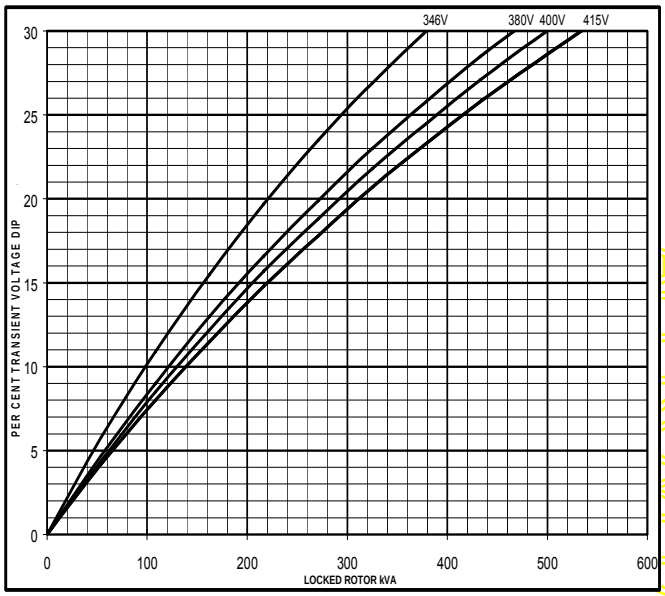




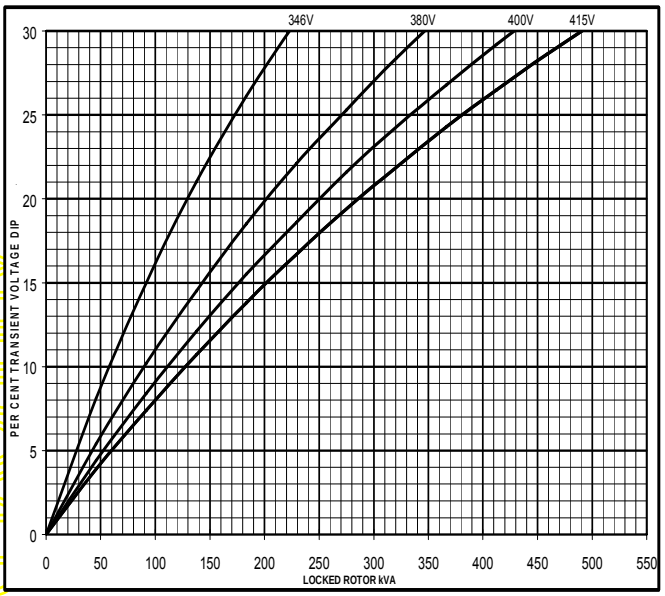
Locked Rotor Motor Starting Curve

50 Hz

MX

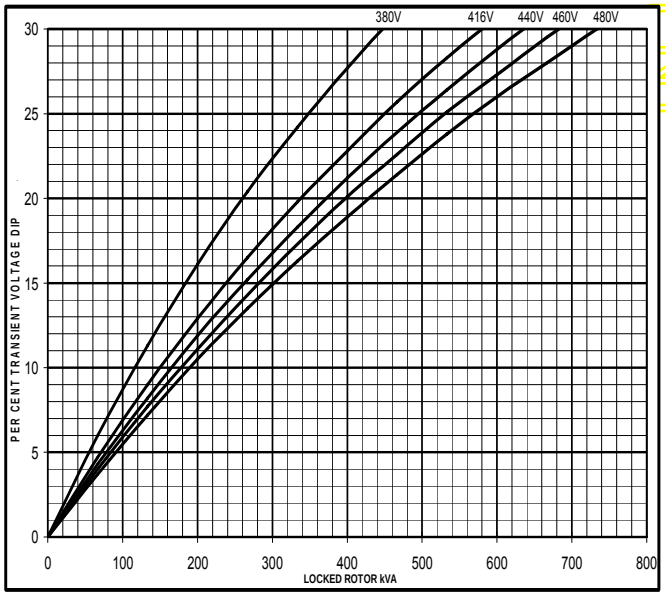


SX

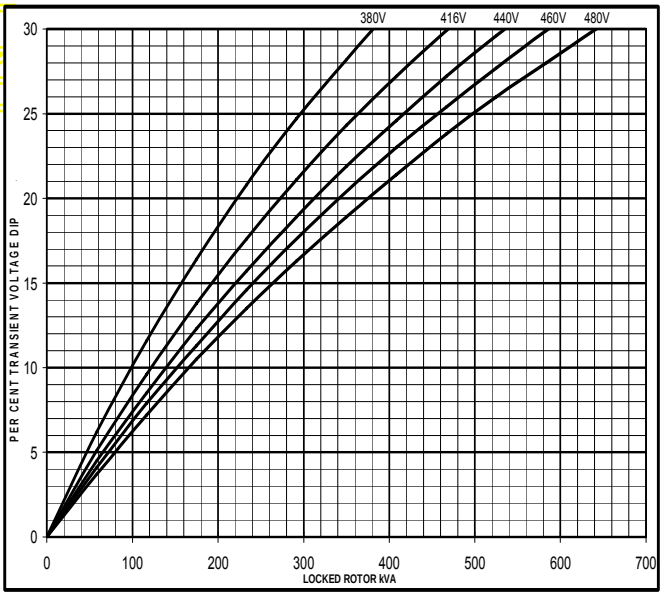


60 Hz

MX

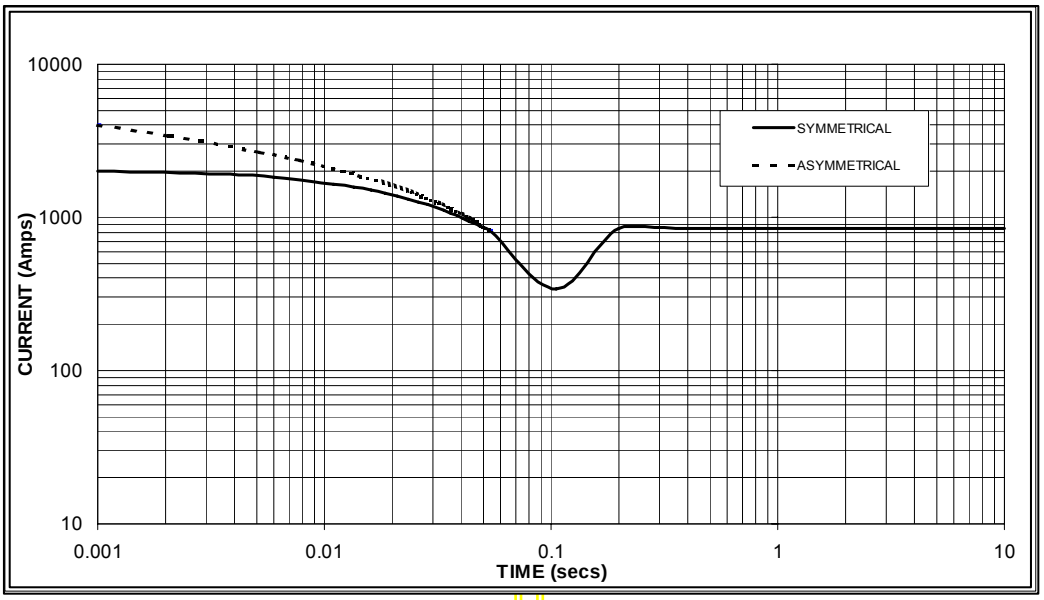


SX



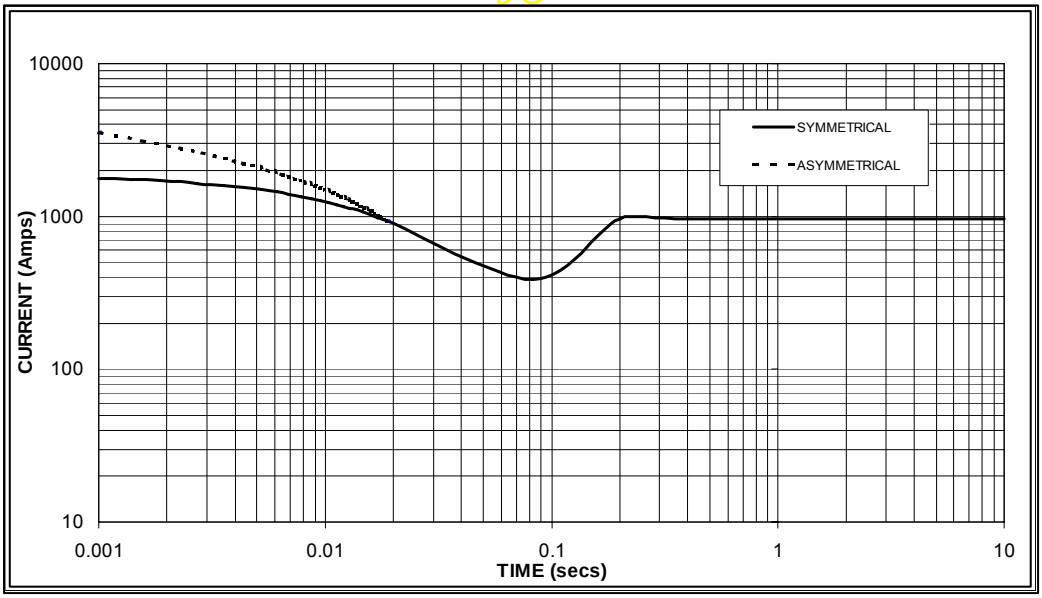
Three-phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed Based on star (wye) connection.

50 Hz



Sustained Short Circuit = 850 Amps

60 Hz



Sustained Short Circuit = 970 Amps

Note 1

The following multiplication factors should be used to adjust the values from curve between time 0.001 seconds and the minimum current point in respect of nominal operating voltage :

50Hz		60Hz	
Voltage	Factor	Voltage	Factor
380v	X 1.00	416v	X 1.00
400v	X 1.07	440v	X 1.06
415v	X 1.12	460v	X 1.12
		480v	X 1.17

The sustained current value is constant irrespective of voltage level

Note 2

The following multiplication factor should be used to convert the values calculated in accordance with NOTE 1 to those applicable to the various types of short circuit :

	3-phase	2-phase L-L	1-phase L-N
Instantaneous	x 1.00	x 0.87	x 1.30
Minimum	x 1.00	x 1.80	x 3.20
Sustained	x 1.00	x 1.50	x 2.50
Max. sustained duration	10 sec.	5 sec.	2 sec.

All other times are unchanged

Note 3

Curves are drawn for Star (Wye) connected machines. For other connection the following multipliers should be applied to current values as shown :

Parallel Star = Curve current value X 2

Series Delta = Curve current value X 1.732

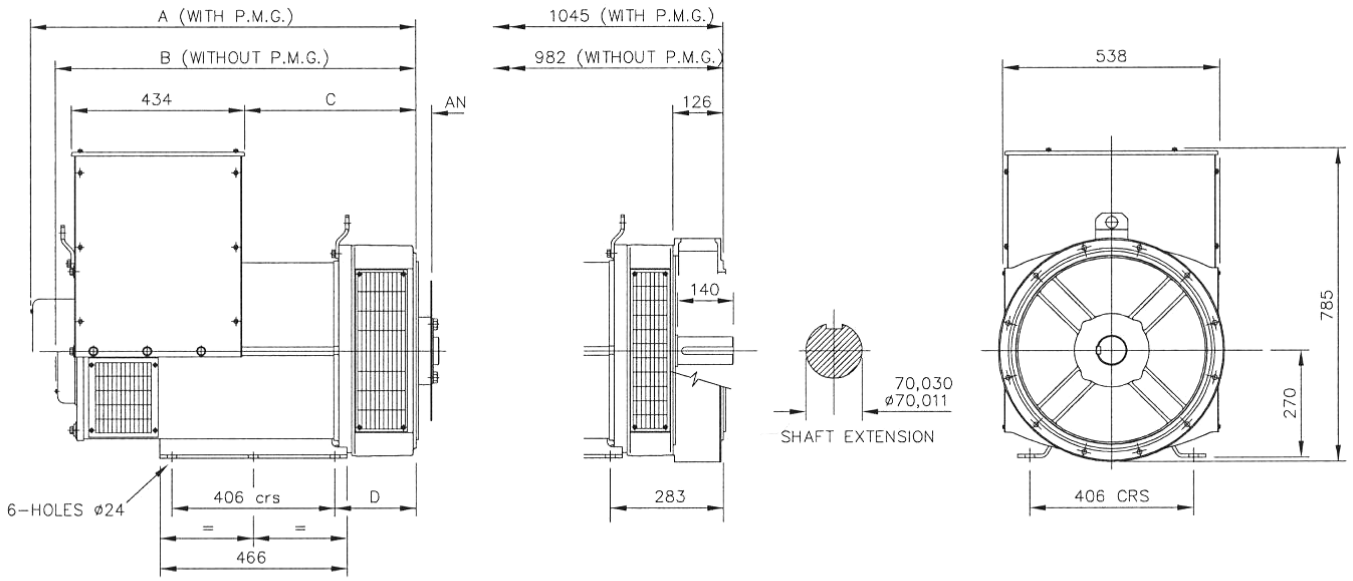
UCI274G

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	164.6	164.6	164.6	N/A	182.0	182.0	182.0	N/A	187.0	187.0	187.0	N/A	200.0	200.0	200.0	N/A
	kW	131.7	131.7	131.7	N/A	145.6	145.6	145.6	N/A	149.6	149.6	149.6	N/A	160.0	160.0	160.0	N/A
	Efficiency (%)	92.3	92.6	92.8	N/A	92.0	92.3	92.5	N/A	91.9	92.2	92.5	N/A	91.6	92.0	92.2	N/A
	kW Input	142.7	142.2	141.9	N/A	158.3	157.7	157.4	N/A	162.8	162.2	161.8	N/A	174.7	173.9	173.5	N/A
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
	Series Delta (V)	240	254	266	277	240	254	266	277	240	254	266	277	240	254	266	277
	kVA	192.8	199.0	199.0	212.2	205.0	218.5	218.5	231.4	213.0	228.8	228.8	250.0	218.5	234.0	234.0	253.3
	kW	154.2	159.2	159.2	169.8	164.0	174.8	174.8	185.1	170.4	183.0	183.0	200.0	174.8	187.2	187.2	202.6
	Efficiency (%)	92.4	92.7	92.9	93.0	92.2	92.4	92.7	92.7	92.0	92.2	92.5	92.5	91.9	92.1	92.4	92.5
	kW Input	166.9	171.7	171.4	182.5	177.9	189.2	188.6	199.7	185.2	198.5	197.9	216.2	190.2	203.3	202.6	219.1

DIMENSIONS



SINGLE BEARING ADAPTORS				
ADAPTOR	A	B	C	D
SAE 1	978,3	915,3	439,3	216,3
SAE 2	964	901	425	202
SAE 3	964	901	425	202

COUPLING DISCS	
DISC	AN
SAE 10	53,98
SAE 11,5	39,68
SAE 14	25,40

APPROVED DOCUMENT

STAMFORD

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Barnack Road, Stamford
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United Kingdom
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Fax: +44 (0) 1780 484100

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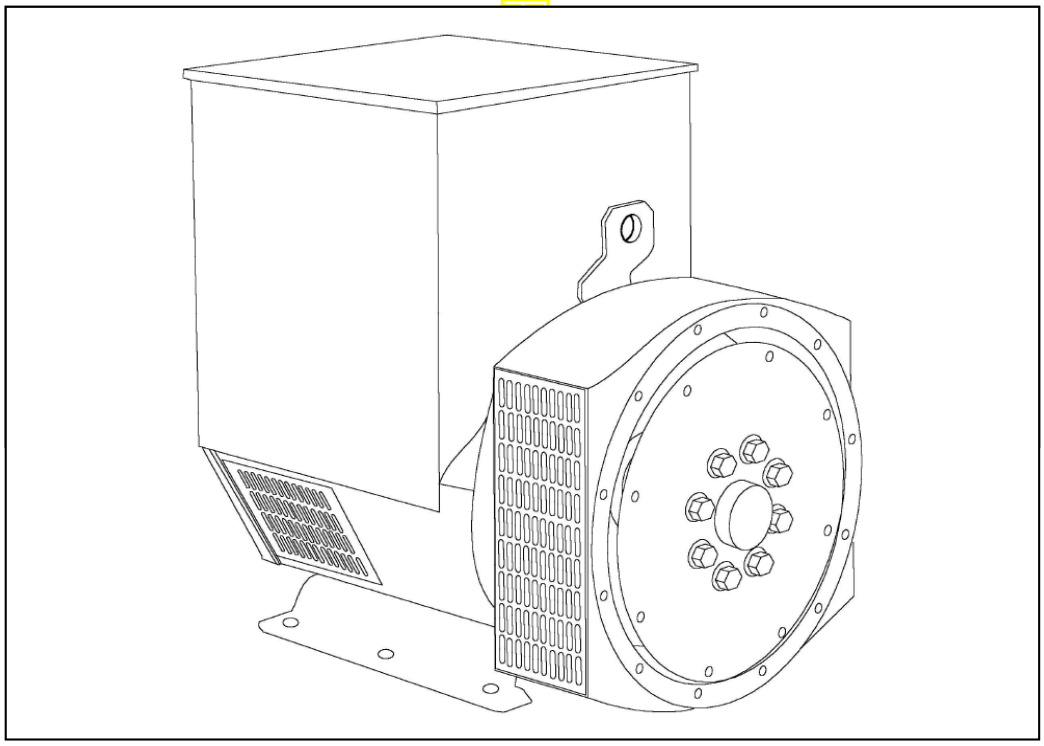
UC274G-311-TD-EN-SG-A

STAMFORD®

UCI274F - Winding 17

Technical Data Sheet



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Front cover drawing typical of product range.

WINDING 17

CONTROL SYSTEM	SEPARATELY EXCITED BY P.M.G.		
A.V.R.	MX321	MX341	
VOLTAGE REGULATION	± 0.5 %	± 1.0 %	With 4% ENGINE GOVERNING
SUSTAINED SHORT CIRCUIT	REFER TO SHORT CIRCUIT DECREMENT CURVES (page 5)		

CONTROL SYSTEM	SELF EXCITED		
A.V.R.	SX460	AS440	
VOLTAGE REGULATION	± 1.5 %	± 1.0 %	With 4% ENGINE GOVERNING
SUSTAINED SHORT CIRCUIT	SERIES 4 CONTROL DOES NOT SUSTAIN A SHORT CIRCUIT CURRENT		

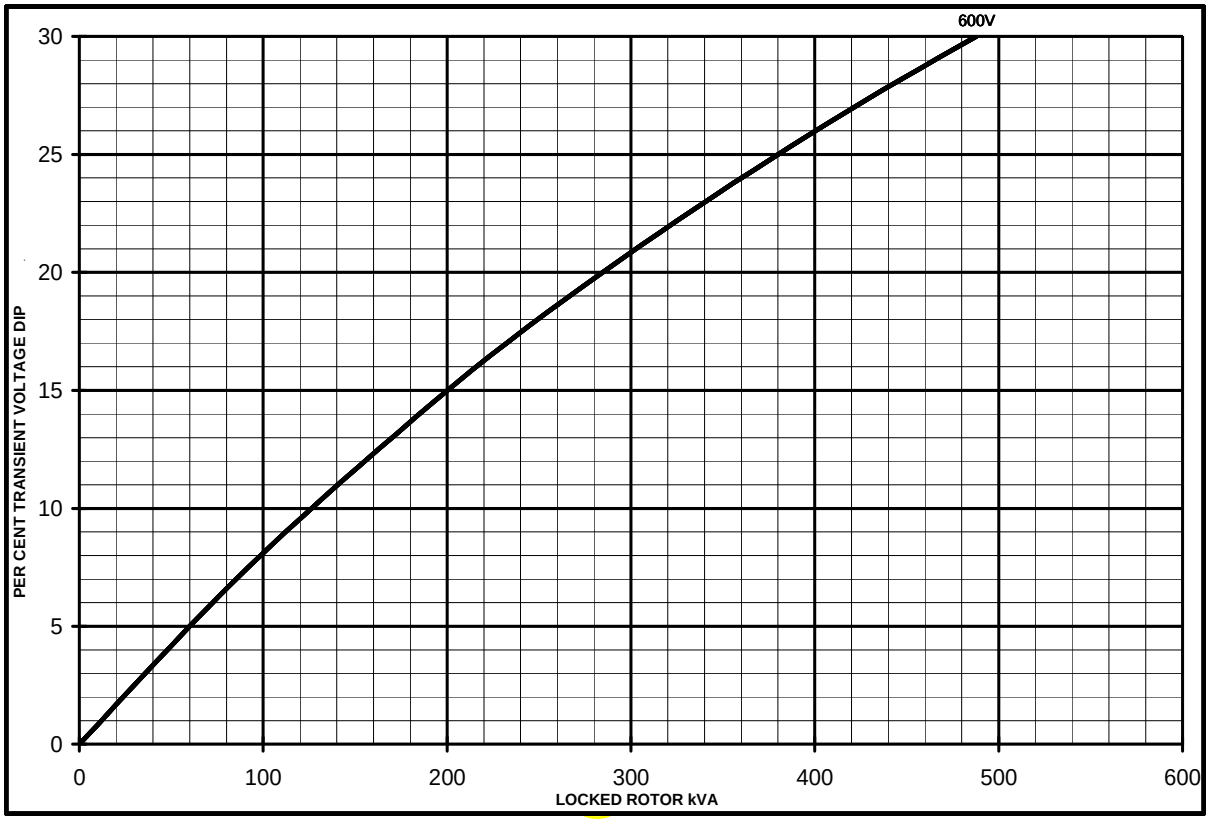
INSULATION SYSTEM	CLASS H	
PROTECTION	IP23	
RATED POWER FACTOR	0.8	
STATOR WINDING	DOUBLE LAYER CONCENTRIC	
WINDING PITCH	TWO THIRDS	
WINDING LEADS	12	
STATOR WDG. RESISTANCE	0.038 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED	
ROTOR WDG. RESISTANCE	1.52 Ohms at 22°C	
EXCITER STATOR RESISTANCE	20 Ohms at 22°C	
EXCITER ROTOR RESISTANCE	0.091 Ohms PER PHASE 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. 6315-2RS (ISO)	
BEARING NON-DRIVE END	BALL. 6310-2RS (ISO)	
	1 BEARING	2 BEARING
WEIGHT COMP. GENERATOR	530 kg	545 kg
WEIGHT WOUND STATOR	200 kg	200 kg
WEIGHT WOUND ROTOR	188.67 kg	177.71 kg
WR² INERTIA	1.555 kgm^2	1.5044 kgm^2
SHIPPING WEIGHTS in a crate	563 kg	577 kg
PACKING CRATE SIZE	123 x 67 x 103(cm)	123 x 67 x 103(cm)
TELEPHONE INTERFERENCE	THF<2%	TIF<50
COOLING AIR	0.617 m³/sec 1308 cfm	
VOLTAGE SERIES STAR	600V	
VOLTAGE PARALLEL STAR	300V	
VOLTAGE SERIES DELTA	346V	
kVA BASE RATING FOR REACTANCE VALUES	206.3	
Xd DIR. AXIS SYNCHRONOUS	2.17	
X'd DIR. AXIS TRANSIENT	0.18	
X"d DIR. AXIS SUBTRANSIENT	0.12	
Xq QUAD. AXIS REACTANCE	1.30	
X"q QUAD. AXIS SUBTRANSIENT	0.17	
X_L LEAKAGE REACTANCE	0.07	
X_2 NEGATIVE SEQUENCE	0.14	
X_0 ZERO SEQUENCE	0.08	
REACTANCES ARE SATURATED	VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED	
T'd TRANSIENT TIME CONST.	0.035s	
T"d SUB-TRANSTIME CONST.	0.011s	
T'do O.C. FIELD TIME CONST.	0.9s	
Ta ARMATURE TIME CONST.	0.009s	
SHORT CIRCUIT RATIO	1/Xd	

UCI274F

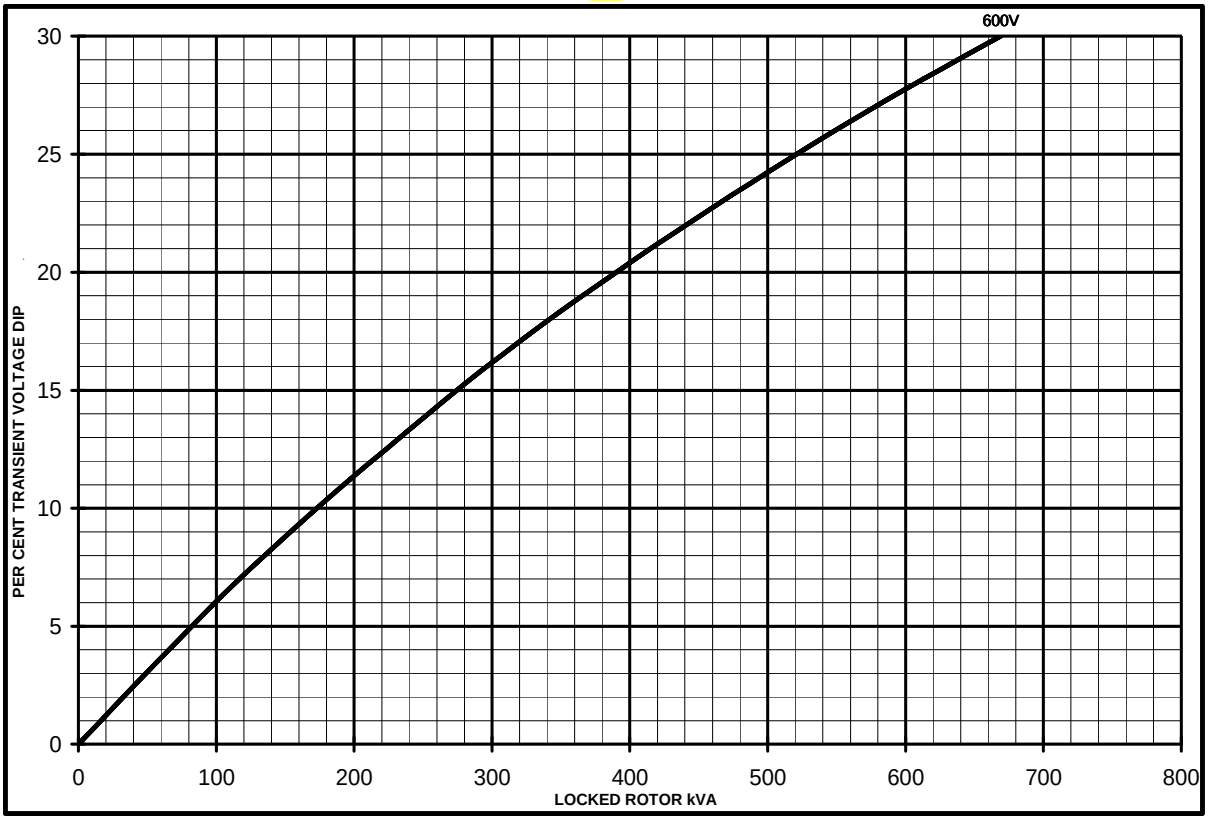
Winding 17

SX

Locked Rotor Motor Starting Curves



MX



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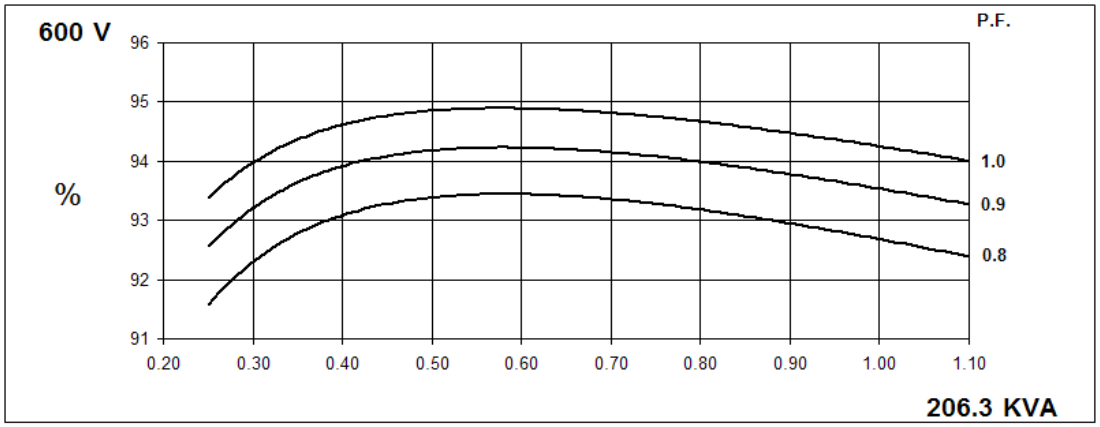
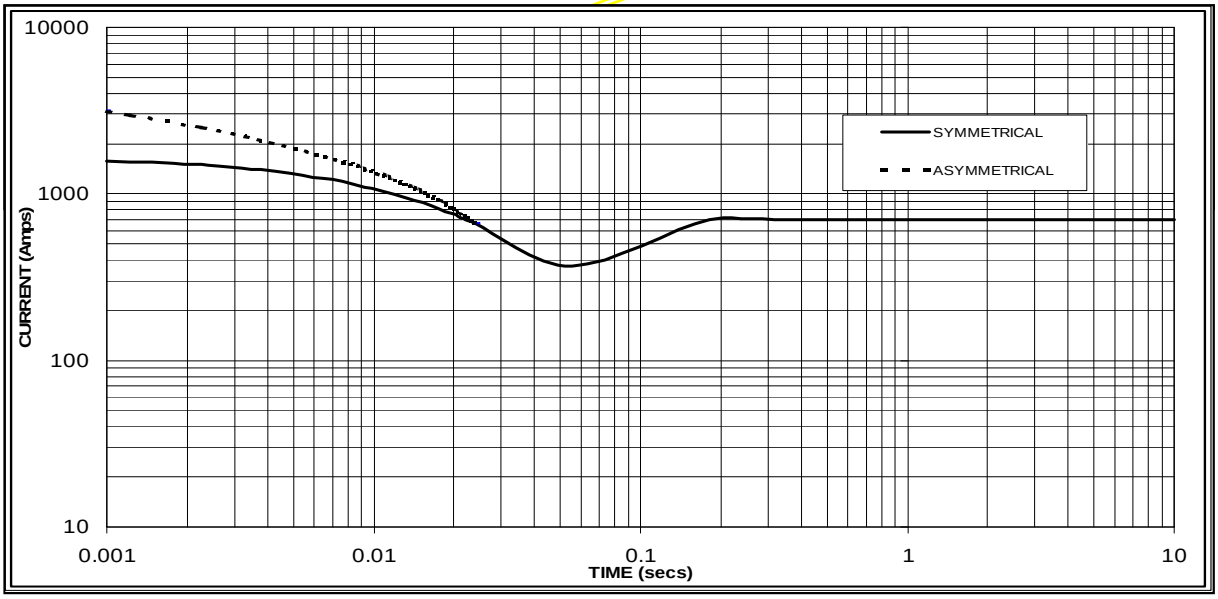
THREE PHASE EFFICIENCY CURVES



Three-phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed Based on star (wye) connection.



Sustained Short Circuit = 700 Amps

Note
The following multiplication factor should be used to convert the values from curve for the various types of short circuit :

	3-phase	2-phase L-L	1-phase L-N
Instantaneous	x 1.00	x 0.87	x 1.30
Minimum	x 1.00	x 1.80	x 3.20
Sustained	x 1.00	x 1.50	x 2.50
Max. sustained duration	10 sec.	5 sec.	2 sec.

All other times are unchanged

UCI274F

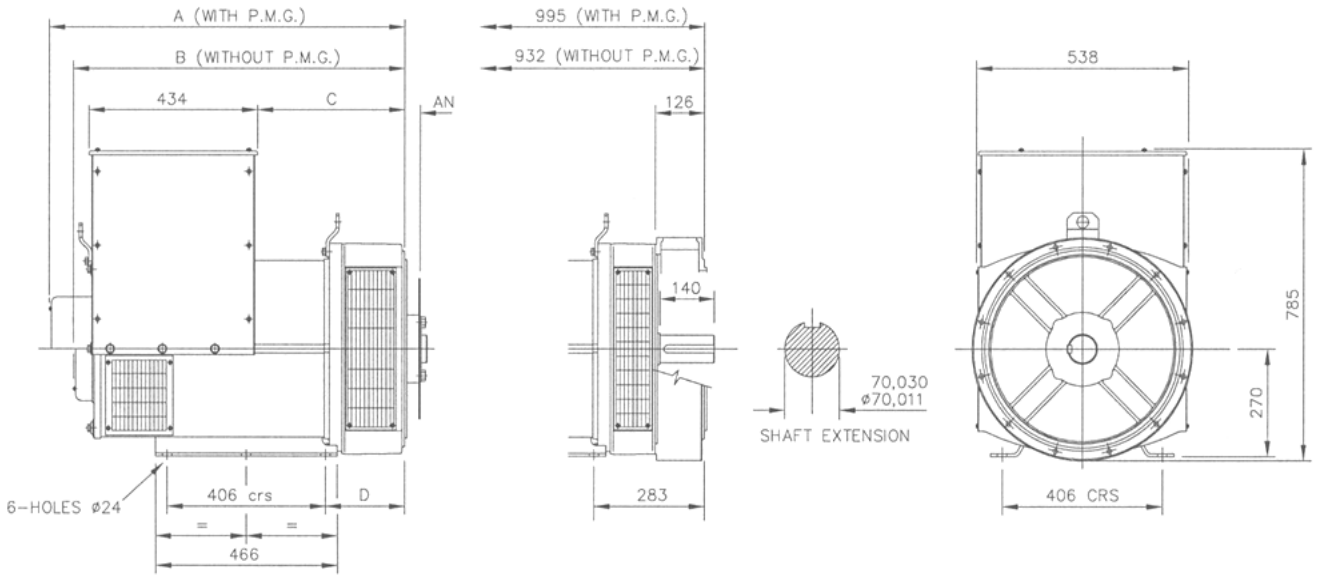
Winding 17 / 0.8 Power Factor

60Hz

RATINGS

Class - Temp Rise	Cont. F - 105/40°C	Cont. H - 125/40°C	Standby - 150/40°C	Standby - 163/27°C
Series Star (V)	600	600	600	600
Parallel Star (V)	300	300	300	300
Series Delta (V)	346	346	346	346
kVA	187.5	206.3	212.5	218.8
kW	150.0	165.0	170.0	175.0
Efficiency (%)	92.9	92.7	92.6	92.5
kW Input	161.4	178.1	183.6	189.2

DIMENSIONS



SINGLE BEARING ADAPTORS				
ADAPTOR	A	B	C	D
SAE 1	928,3	865,3	389,3	216,3
SAE 2	914	851	375	202
SAE 3	914	851	375	202

COUPLING DISCS	
DISC	AN
SAE 10	53,98
SAE 11,5	39,68
SAE 14	25,40

APPROVED DOCUMENT

STAMFORD

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www.cumminsgeneratortechnologies.com

DGC-2020 Digital Genset Controller

A highly advanced integrated genset control system, this device provides genset control, transfer switch control, metering, protection, and programmable logic in a simple, easy-to-use, reliable, rugged, and cost effective package.

Features

- Generator metering (includes three-phase mains)
- Engine and generator protection: 27, 32R, 40Q, 59, 81O/U
- Optional enhanced generator protection: 47, 51, 78, and 81ROCOF
- Load sharing and generator sequencing (via LSM-2020 Load Share Module)
- Var sharing over Ethernet (via LSM-2020)
- BESTCOMS*Plus*® Software
  - Programming and setup
  - Intuitive and powerful
  - Remote control and monitoring
  - Programmable logic
  - USB communications
- Automatic transfer switch control
- Automatic synchronizer (optional)
- Exercise timer
- SAE J1939 engine ECU communications
- Automatic generator configuration detection
- Expandable functionality via add-on modules
  - LSM-2020 Load Share Module
  - CEM-2020 Contact Expansion Module
  - AEM-2020 Analog Expansion Module
- Multilingual capability
- Remote communications to Basler's RDP-110 (remote display panel)
- Sixteen programmable contact inputs
- Up to 15 contact outputs: 3 contacts rated for 30 Adc and up to 12 programmable contacts rated for 2 Adc

Visit www.basler.com for additional information.

Benefits

- Provides integrated engine-genset control, protection, and metering in a single package.
- The Offline Simulator, provided in BESTlogic™*Plus*, helps test and troubleshoot logic without the need for expensive hardware.
- Flexible programmable logic and programmable I/O make it easy to expand the DGC-2020's inputs and outputs with the CEM-2020 (Contact Expansion Module) and the AEM-2020 (Analog Expansion Module). This saves time and money by eliminating unnecessary external PLCs and control relaying.

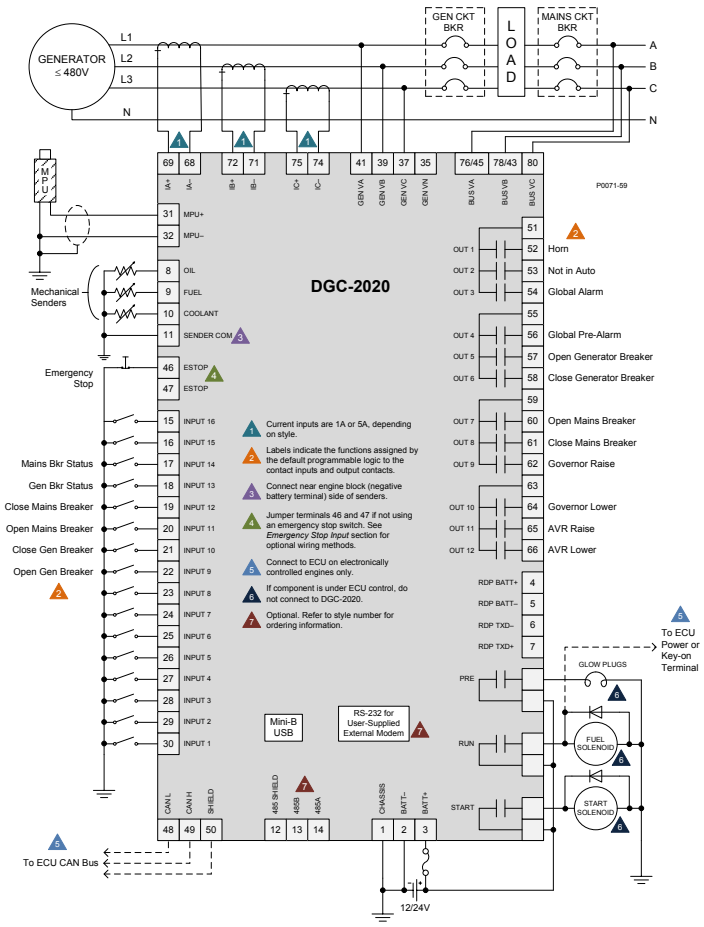


Figure 1 - DGC-2020 Connection Diagram for a Typical Application

DGC-2020 Digital Genset Controller

Specifications

Power Supply

Nominal:	12 or 24 Vdc
Range:	6 to 32 Vdc
Battery Ride Through:	Starting at 10 Vdc, withstands cranking ride-through down to 0 V for 50 ms

Power Consumption

Sleep Mode:	5 W
Normal Operational Mode:	7.9 W
Maximum:	14.2 W

Current Sensing

1 A Sensing:	0.02 to 1.0 Aac, continuous 2 Aac for 1 second
5 A Sensing:	0.1 to 5.0 Aac, continuous 10 Aac for 1 second
Burden:	1 VA

Voltage Sensing

Range:	12 to 576 Vrms L-L
Frequency Range:	10 to 72 Hz for 50/60 Hz style, 10 to 480 Hz for 400 Hz style
Burden:	1 VA
One-second Rating:	720 Vrms

Contact Sensing

Contact Inputs (16):	Accepts normally open (N.O.), Dry Contacts, programmable
Emergency Stop:	Normally closed (N.C.), Dry Contact

Engine Speed Sensing

Magnetic Pickup:	
Voltage Range:	6 to 70 Vpp
Frequency Range:	32 to 10,000 Hz
Generator Frequency:	
Generator Voltage Range:	12 to 576 Vrms
Via ECU over J1939	

Resistive Senders

Fuel Level Sender:	0 to 250 Ω nominal
Coolant Temp Sender:	10 to 2,750 Ω nominal
Oil Pressure Sender:	0 to 250 Ω nominal

Output Contacts

Fuel Solenoid, Engine Crank, Pre-Start Relays Rating:	30 Adc at 28 Vdc-make, break, and carry
Programmable Relays:	Up to 12
Rating:	2 Adc at 28 Vdc-make, break, and carry

Protection

Generator:	27, 32R, 40Q, 59, 81O/U (standard) 47, 51, 78, 81 ROCOF (optional)
Engine:	Oil pressure, coolant temperature, overcrank, ECU-specific elements, and diagnostic reporting.

Agency Approvals

CSA certified, NFPA compliant, CE compliant, UL recognized (Hazardous Location certification available upon request), EAC certified

Communication

USB Port:	USB 2.0, Mini-B jack
RS-485 (optional):	9600 baud, 8 data bits, no parity
RDP-110 (optional):	4,000 ft (1,219 m) max wire length, 20 AWG (0.52 mm²) min wire size
Modem (optional):	DB-9 connector (male)
CAN bus:	250 kb/s communication rate, 1.5 to 3 Vdc differential bus

Environmental

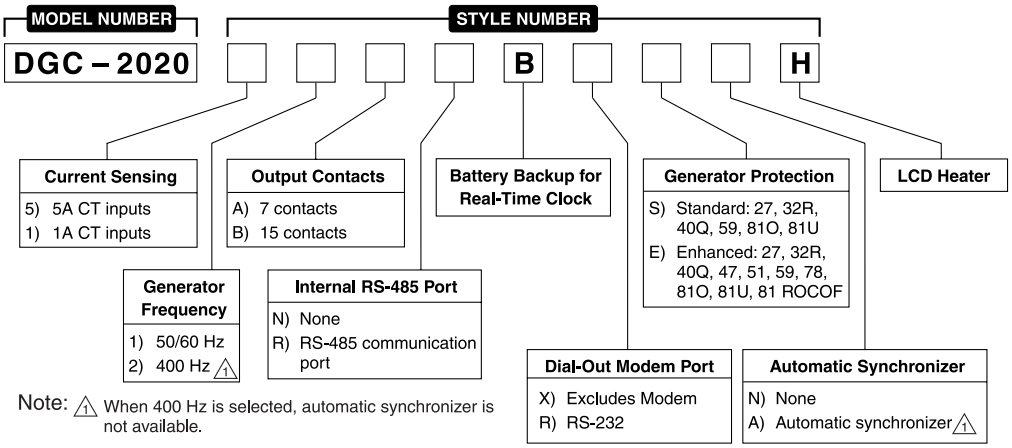
Operating Temp:	-40°C to 70°C (-40°F to 158°F)
Storage Temp:	-40°C to 85°C (-40°F to 185°F)
Humidity:	IEC 68-2-38
Salt Fog:	ASTM B 17-73, IEC 68-2-11
Ingress Protection:	IEC IP54 for front panel
Shock:	15 G in three perpendicular planes
Vibration:	
5 to 29 Hz:	1.5 G peak
29 to 52 Hz:	0.036″ (0.914 mm) double amplitude
52 to 500 Hz:	5 G peak

Physical

Weight:	4.4 lb (2 kg)
Dimensions (WxHxD):	11.77 x 8.27 x 2.69 inches (299 x 210 x 69 mm)

For complete specifications, download the instruction manual at www.basler.com.

Style Chart



Note: 1 When 400 Hz is selected, automatic synchronizer is not available.

Related Products

- BE1-11*g* Generator Protection System
  - A complete generator protection system.
- DECS-250 Digital Excitation Control System
  - Total control in a compact package provides precise voltage, var and power factor regulation, exceptional system response, and generator protection.

Accessories

- AEM-2020 Analog Expansion Module
  - Easily increases the functionality by seamlessly adding analog inputs and outputs.
- CEM-2020, CEM-2020H Contact Expansion Module
  - Each module adds 10 inputs and up to 24 outputs that are easily programmed through BESTCOMS*Plus*® for easy integration into the system.
- LSM-2020 Load Share Module
  - The simple-to-use LSM-2020 easily adds paralleling capabilities with little effort and expense.
- RDP-110 Remote Display Panel
  - Provides remote alarm and pre-alarm indication and annunciation of system status, easily meeting the annunciation requirements of NFPA-110 applications.

ISO 9001-2008
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Molded Case Circuit Breakers

Power Defense ™ UL Global Series

Part Number: PDG23G0060TFFJNNNNNN

Powering Business Worldwide

Datasheet creation date: 02/12/2019

PRODUCT VIEW *(Use Mouse to Rotate and Zoom)*

Eaton's Power Defense™ molded case circuit breakers, a globally rated platform designed to help keep your power system safe with latest protection technology. Engineered for the future: IoT and Industry 4.0 features such as built-in communications, advanced energy metering, and algorithms that signal breaker maintenance; zone selective interlock technology that clears faults quickly and locally; ArcFlash reduction options that help protect your people, and not to mention Eaton's best-inclass support and service.

Tech Data for Configured Product

Power Defense Catalog Number	PDG23G0060TFFJNNNNNN
Frame Size	Frame 2
Poles	3 Pole
Voltage	480V AC
Interruption or Breaking Capacity (Icu/Ics)	35kA
Continuous Current Rating (In)	60A
Trip Unit Type	TM Trip Unit
Trip Unit Options 1	Fixed
Trip Unit Options 2	Fixed
Indicating Accessories	None
Indicating Accessories Terminal	None
Tripping Accessories	None
Tripping Accessory Terminal	None
Tripping Accessory Voltage	None
Line Type Description	Option 1 - Standard Terminal
Line Conductor Options	(1) 14 - 1/0
Line Terminal Type	Steel Pressure/Box
Load Type Description	Option 1 - Standard Terminal
Load Conductor Options	(1) 14 - 1/0
Load Terminal Type	Steel Pressure/Box
Special Options - Type of Modification	None
Details	None
Additional Description	None

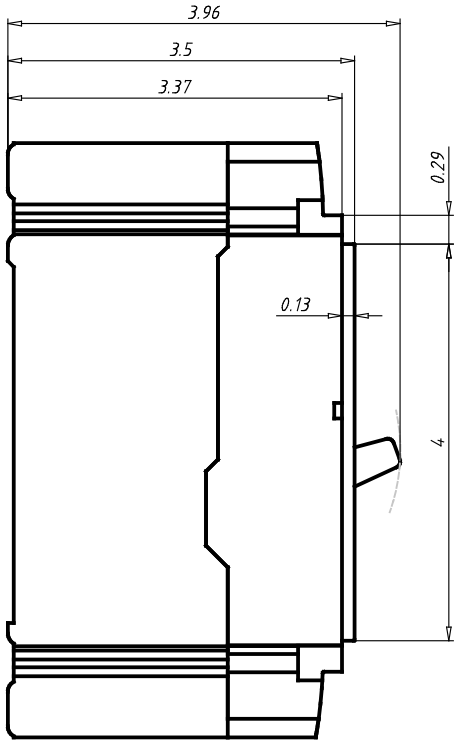
Molded Case Circuit Breakers

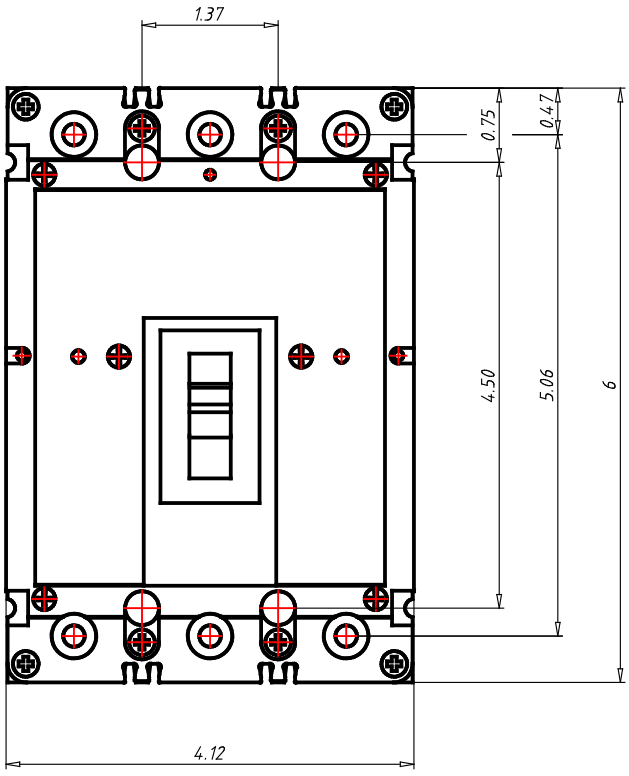
Power Defense ™ UL Global Series

Part Number: PDG23G0060TFFJNNNNNN

Datasheet creation date: 02/12/2019

Technical drawings





Molded Case Circuit Breakers

Power Defense ™ UL Global Series

Part Number: PDG23G0060TFFJNNNNNN

Powering Business Worldwide

Datasheet creation date: 02/12/2019

General Technical Data

Frame Rating (In)	60A
Reference Standard	UL489, CSA 22.2, IEC 60947-2 & GB
Number of poles	3
Neutral rating	-
Interruption Rating Designator	F / G / K / M / N / P
UL Interruption Rating to UL 489 (240Vac)	35 / 65 / 85 / 100 / 150 / 200kA
UL Interruption Rating to UL 489 (480Vac)	25 / 35 / 50 / 65(a) / 85 / 100kA
UL Interruption Rating to UL 489 (600Vac)	14 / 18 / 22 / 25 / 30 / 35kA
UL Interruption Rating to UL 489 (125/250Vdc)	10 / 10 / 10 / 22 / 22 / 22kA
UL Current Limiting	N / N / Y / Y / Y / Y
Rated breaking capacity to IEC 60947-2 (220-240 Vac Icu)	35 / 55 / 85 / 100 / 150 / 200kA
Rated breaking capacity to IEC 60947-2 (220-240 Vac Ics)	35 / 55 / 85 / 100 / 100 / 150kA
Rated breaking capacity to IEC 60947-2 (380-415 Vac Icu)	25 / 36 / 50 / 70 / 70 / 100kA
Rated breaking capacity to IEC 60947-2 (380-415 Vac Ics)	25 / 36 / 50 / 53 / 70 / 70kA
Rated breaking capacity to IEC 60947-2 (440 Vac Icu)	25 / 30 / 35 / 50 / 70 / 100kA
Rated breaking capacity to IEC 60947-2 (440 Vac Ics)	20 / 22.5 / 35 / 40 / 50 / 65kA
Rated breaking capacity to IEC 60947-2 (525 Vac Icu)	
Rated breaking capacity to IEC 60947-2 (525 Vac Ics)	15 / 15 / 15 / 15 / 15 / 18kA
Rated breaking capacity to IEC 60947-2 (690 Vac Icu)	- / 8 / 10 / 10 / 10 / 10kA
Rated breaking capacity to IEC 60947-2 (690 Vac Ics)	- / 4 / 5 / 5 / 5 / 5kA
Rated breaking capacity to IEC 60947-2 (125V DC Icu)	10 / 10 / 10 / 22 / 22 / 22kA
Rated breaking capacity to IEC 60947-2 (250V DC 2P in series Ics)	10 / 10 / 10 / 22 / 22 / 22kA
Frequency	50/60Hz
Trip Unit Type	TM Trip Unit
Continuous Current Range	Fixed
100% UL489 Rated	
Instantaneous/Short Circuit Range	Fixed
Magnetic/Instantaneous Override	600A
Dimensions H x W x D (inches)	6 x 4.12 x 3.50
Pole to pole distance inches	1,375
Approx Weight lbs	4
RoHS Compliance	Yes
UL File Number	E7819
Ambient Temp Calibration	
Derating at 50C	
Derating at 60C	95%
Derating at 70C	90%

1. 480Vac corresponds to 277Vac for 1P
2. 600Vac corresponds to 347Vac for 1P

Digital Linear Chargers

Specifications

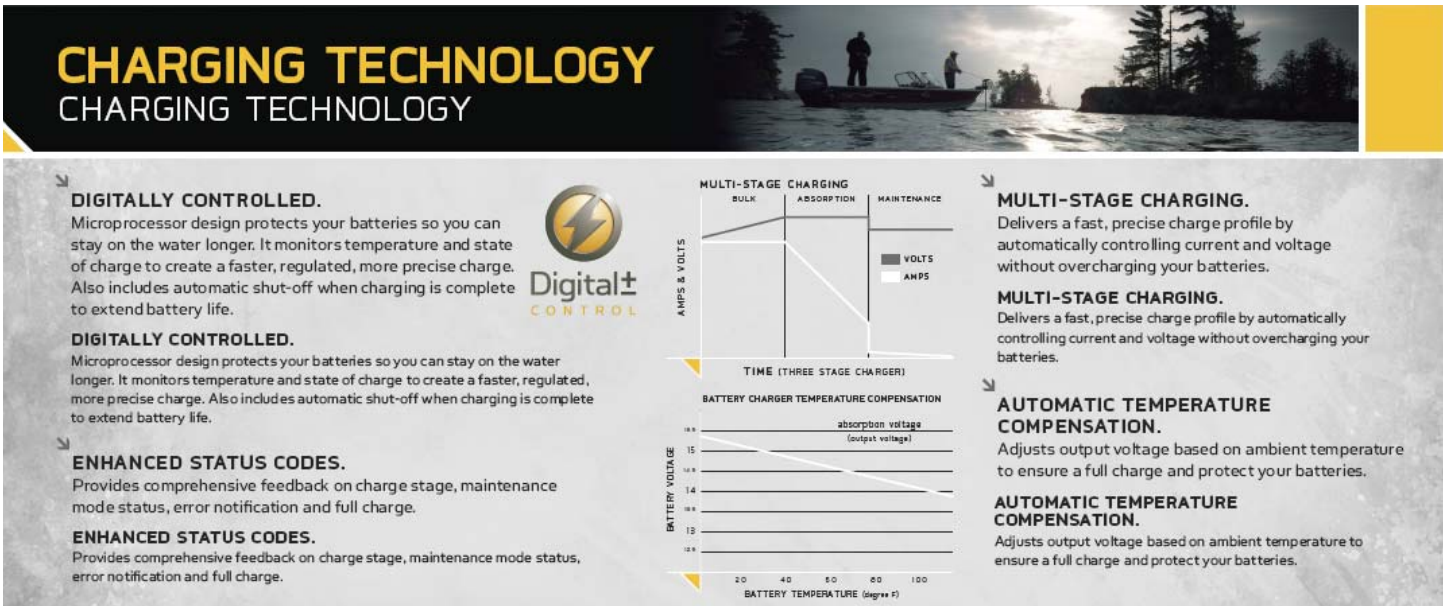
- Waterproof, shock-and vibration-resistant aluminum construction
- Saltwater tested and fully corrosion-resistant
- Short circuit, reverse polarity, and ignition protected
- For use with 12V/6 cell batteries that are flooded/wet cell, maintenance free or starved electrolyte (AGM) only
- FCC compliant
- UL listed to marine standard 1236
- 3 year warranty
- Replaces all existing current on-board chargers (excluding portables)
- No Price Increase
- Availability: November 2010

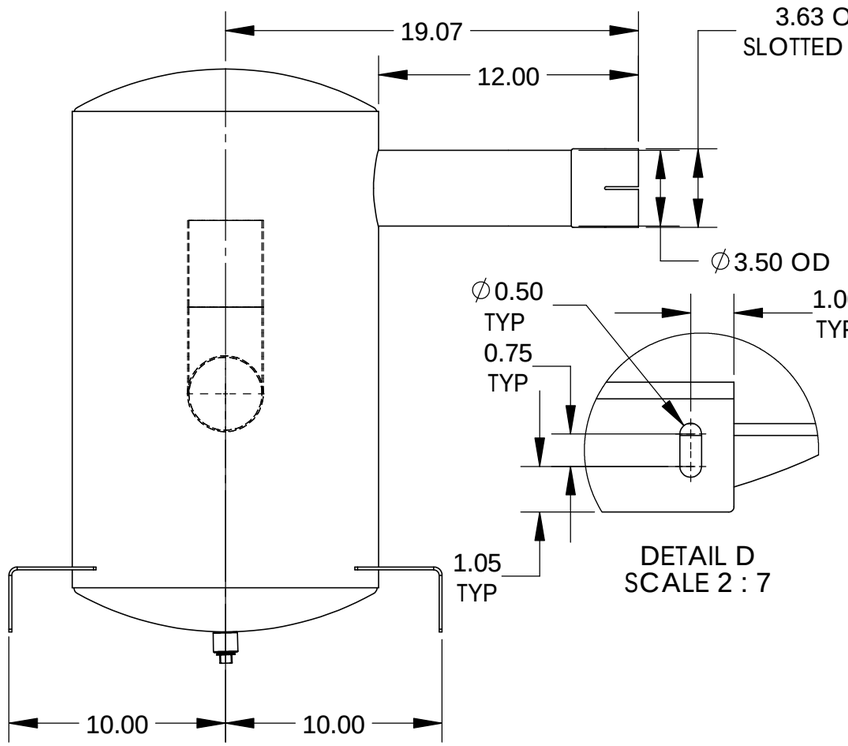
DIGITAL LINEAR ON-BOARD CHARGERS	
PRODUCT CODE	PRODUCT DESCRIPTION
1821065	MK 106D (1 bank x 6 amps)
1821105	MK-110D (1 bank x 10 amps)
1822105	MK-210D (2 bank x 5 amps)
1823155	MK-315D (3 bank x 5 amps)
1822205	MK-220D (2 bank x 10 amps)
1823305	MK-330D (3 bank x 10 amps)
1824405	MK-440D (4 bank x 10 amps)
1822305	MK-230D (2 bank x 15 amps)
1823455	MK-345D (3 bank x 15 amps)
1824605	MK-460D (4 bank x 15 amps)

Digital Linear Chargers

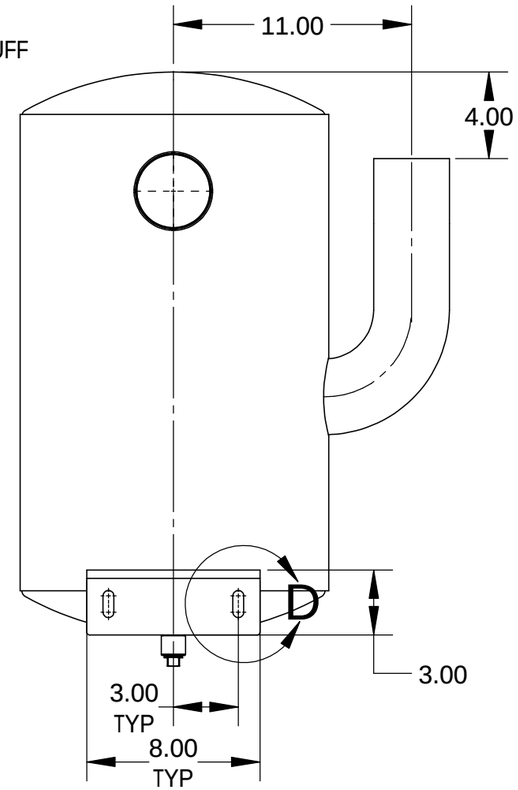
Specifications (cont.)

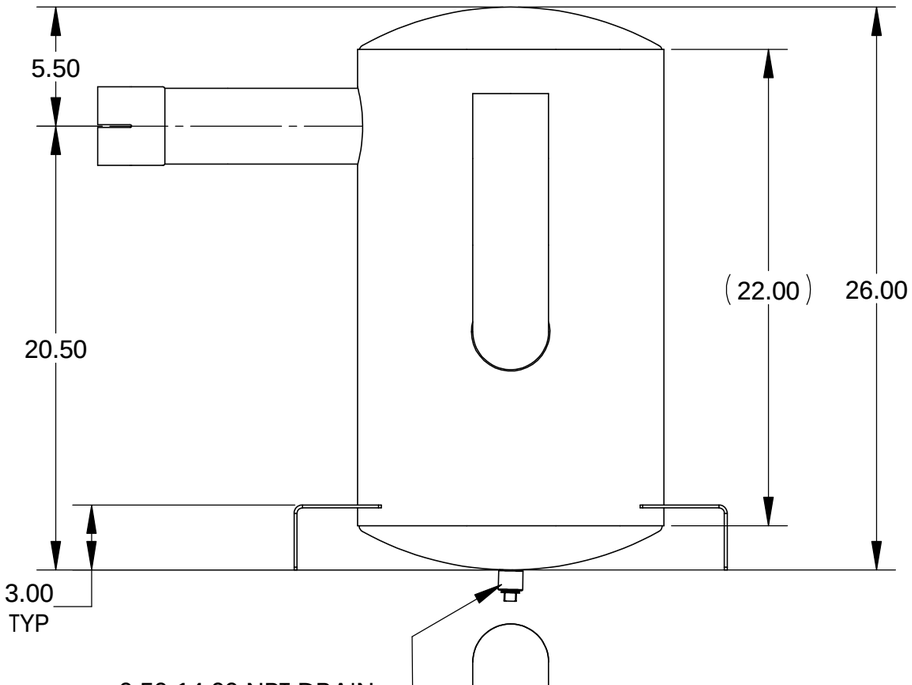
- New 4-color package design

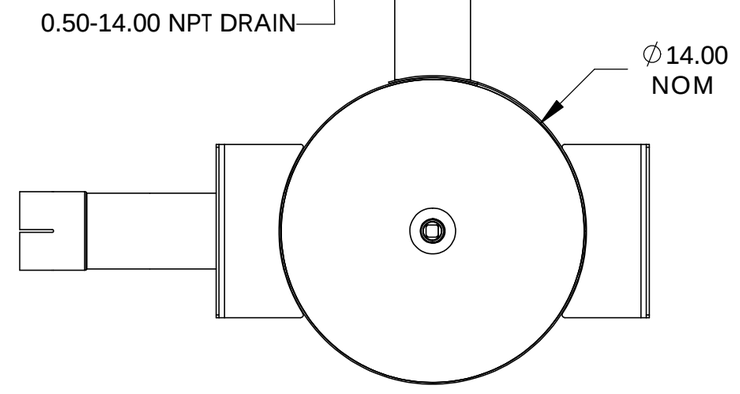


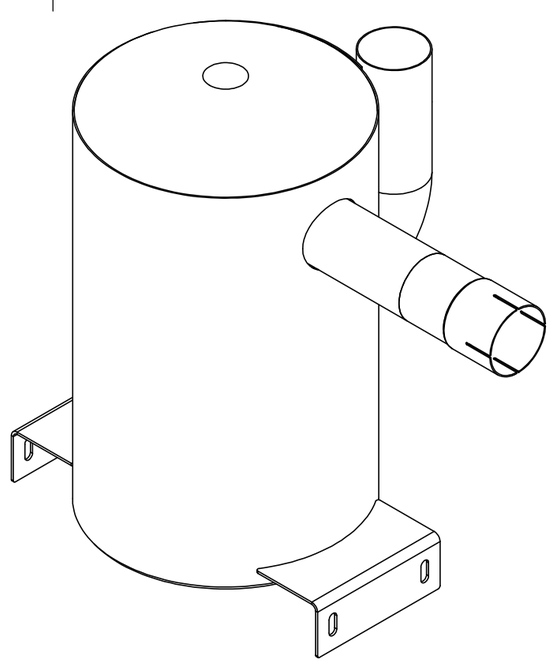


DETAIL D
SCALE 2 : 7









REV.	BY	DATE	DESCRIPTION	ECO
02	CB	09/15/2017	OVERALL HEIGHT CHANGE	---

CUSTOMER	CUSTOMER P/N
---	---

ENGINE INFORMATION		SILENCER INFORMATION	
ENGINE MAKE	PSI	RESONATOR FREQUENCY	---
ENGINE MODEL	5.7L	RESONATOR ALPHA	---
DISPLACEMENT	537	SILENCER Km	---
EXHAUST FLOW	1063	SILENCER IL	---
EXHAUST TEMPERATURE	1300	TOLERANCES DO NOT APPLY TO GAGE THICKNESS OR COMMERCIAL FEATURES	
MAX BACK PRESSURE	40	THIRD ANGLE PROJECTION	
RAW SOUND PRESSURE	---		

DRAWN BY	CB	DATE	07/13/2017
CHECKED BY	CB	DATE	09/15/2017
ENGINEERING	CB	DATE	
MANUFACTURING	CB	DATE	
TOLERANCES UNLESS OTHERWISE SPECIFIED		WEIGHT (LBS)	59
.X = ±0.25 ALL ANGLES		SHEET	3 OF 3
.XX = ±0.125 ±1°			
.XXX = ±0.0625			
.XXXX = ±0.03125			

BERGARI SOLUTIONS
member of the mandensgroup

DESCRIPTION
SIL: COMP CRIT CS S-E
3.50-3.50 Ø14.00
26.00 OAL F:5.50 ---

CONSTRUCTION MATERIAL
CS

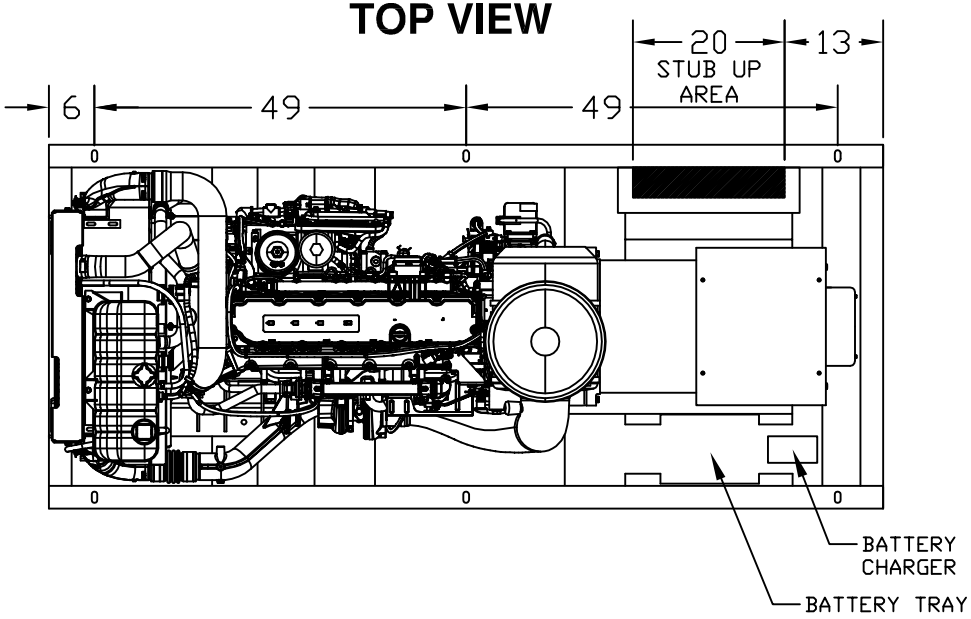
FINISH
HIGH TEMP BLACK PAINT

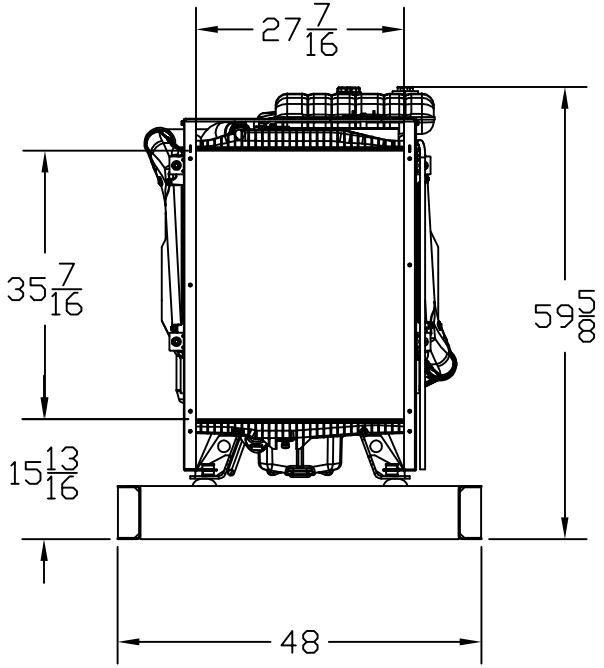
PART NUMBER	REV
500-008346	02

SCALE (DO NOT SCALE)	SHEET SIZE
1:7	B

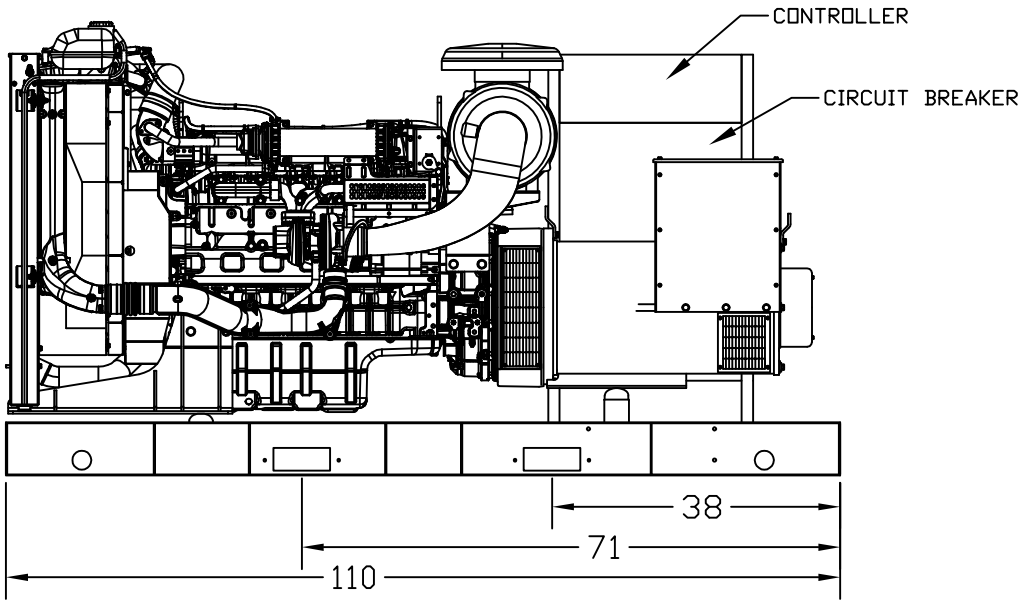
SPVD-1500 OPEN DIMENSIONAL OVERVIEW

TOP VIEW





RADIATOR VIEW

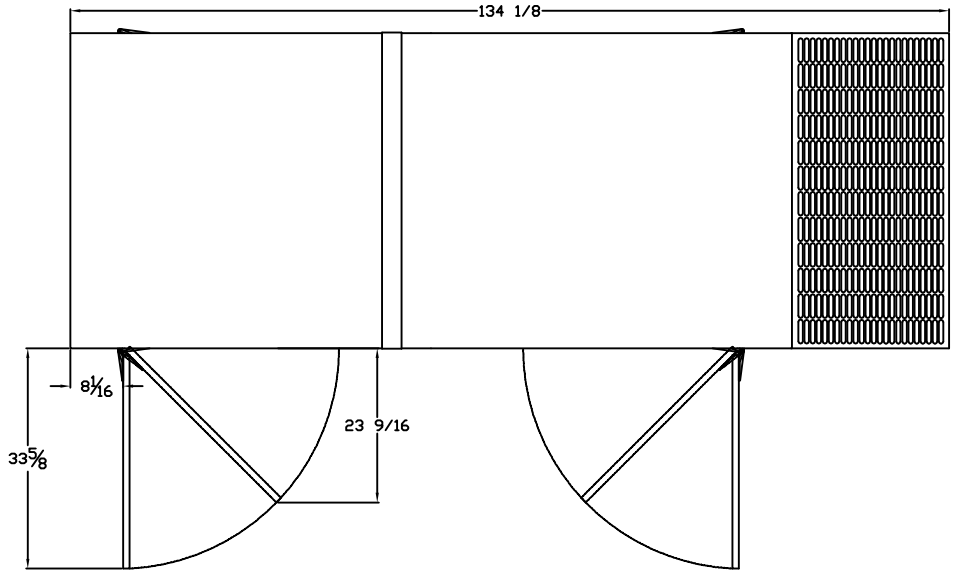


SIDE VIEW

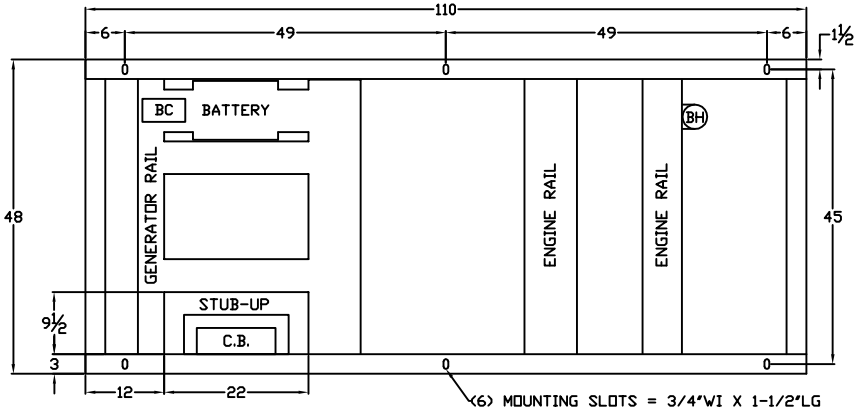
OUTLINE DIMENSIONS FOR SPVD 150 - 200 KW LEVEL 2 ENCLOSURE
(HINGED DOORS)

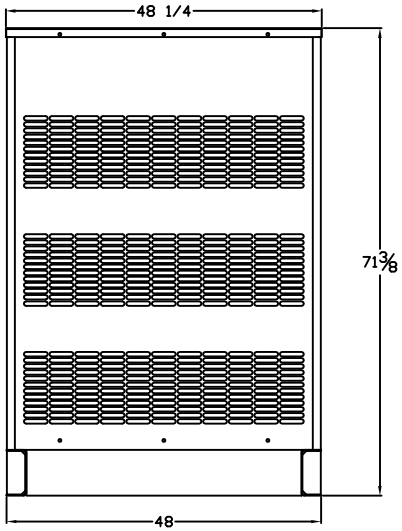
TOP VIEW

(GEN-SET HAS (4) DOORS, (2) SHOWN OPEN ARE TYPICAL FOR BOTH SIDES)

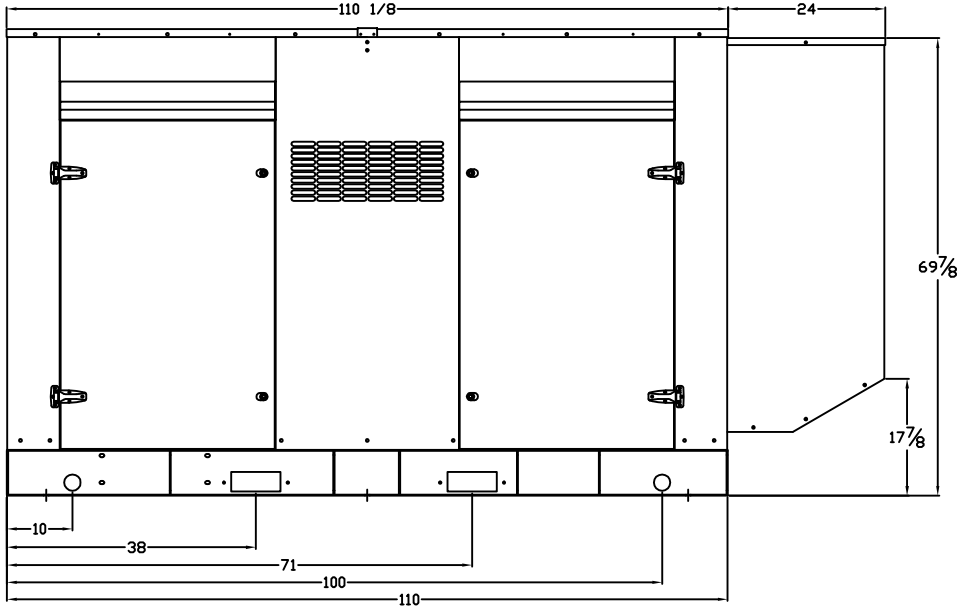


FRAME VIEW

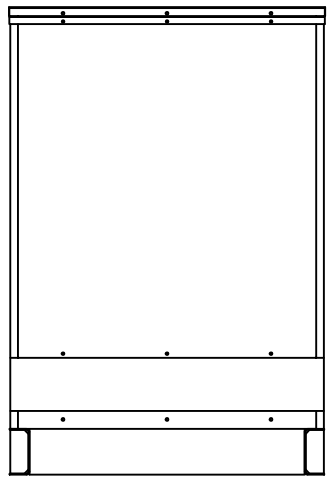




GENERATOR END VIEW



SIDE VIEW



RADIATOR END VIEW