GILLETTE GENERATORS

LIQUID COOLED DIESEL ENGINE GENERATOR SET

60 HZ MODEL

T4D-1500

Model	HZ	STANDBY 130ºC RISE	PRIME 105ºC RISE
T4D-1500-60 HERTZ	60	150	150

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

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.

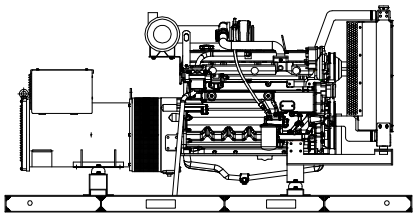
NEC 700, 701, 702, 708

NEMA ICS10, MG1, ICS6, AB1

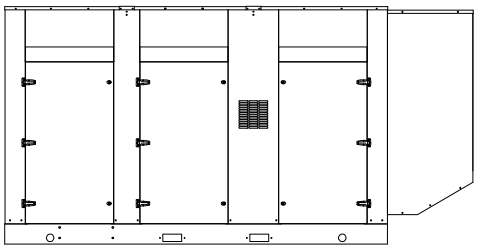
ANSI C62.41, 27, 59, 32, 480, 40Q, 81U, 360-05

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

EPA 40CFR Part 60, 89, 1039, 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	130ºC RISE STANDBY RATING		105ºC RISE PRIME RATING	
	L-N	L-L			KW/KVA	AMP	KW/KVA	AMP
T4D-1500-1-1	120	240	1	60	150/150	625	150/150	625
T4D-1500-3-2	120	208	3	60	150/187	521	150/187	521
T4D-1500-3-3	120	240	3	60	150/187	451	150/187	451
T4D-1500-3-4	277	480	3	60	150/187	225	150/187	225
T4D-1500-3-16	346	600	3	60	150/187	180	150/187	180

RATINGS: All three phase gen-sets are 12 lead windings, rated at .8 power factor. 130° 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. 105° C "PRIME RATINGS" are strictly for gen-sets that provide the prime source of electric power, where normal utility power is unavailable or unreliable. A 10% overload is allowed for a total of 1 hour, within every 12 hours of operation, on every PRIME RATED systems. 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 130°C (standby), and 105°C (prime) 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 T4D-1500-60 HZ

GENERATOR SPECIFICATIONS

Manufacturer ..... Stamford Generators
Model & Type ..... UCDI274K-311, 4 Pole, 4 Lead, Single Phase
..... UCI274G-311, 4 Pole, 12 Lead, Three Phase
..... UCI274G-17, 4 Pole, 12 Lead, 600V, 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
One Step Load Acceptance ..... 100% of nameplate rating
Total Stator and Load Insulation ..... Class H, 180°C
Temperature Rise ..... 105°C R/R, prime rating @ 40°C amb.
3 Ø Motor Starting @ 30% Voltage Dip (208-240V) ... 1500 kVA
3 Ø Motor Starting @ 30% Voltage Dip (480V-600V) 2300 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)
Alternator ..... Self ventilating and drip-proof
Ltd. Warranty Period ..... 24 Months from start-up date 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.

ENGINE SPECIFICATIONS AND APPLICATIONS DATA

ENGINE

Manufacturer ..... VOLVO-PENTA
Model and Type ..... TAD871VE, 4 cycle, liquid Cooled
Aspiration ..... Turbo After Cooler, Air to Air
Charged Air Cooled System ..... Air to Air
Cylinder Arrangement ..... 6 Cylinders, In-Line
Displacement Cu. In. (Liters) 470 (7.70)
Bore & Stroke in (Cm) ..... 4.33 x 5.31 (11.0 x 13.5)
Compression Ratio 17.5:1
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
Max Power, bhp (kwm) Standby 252 (185)
BMEP: psi (MPa) Standby 331 (2.3)
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 ..... Electronic, Delphi E3
24 VDC Coolant heaters ..... Optional Equipment
Fuel Filter ..... …….. Yes with Water Separator

FUEL CONSUMPTION

GAL/HR (LITER/HR)	STANDBY	PRIME
100% LOAD	11.5 (43.5)	11.5 (43.5)
75% LOAD	9.62 (36.5)	9.62 (36.5)
50% LOAD	6.81 (25.8)	6.81 (25.8)
DEF Consumption is 6% of fuel consumption		

OIL SYSTEM

Type ..... Full Pressure
Oil Pan Cap. W/ filter qt. (L) 28.5 (27)
Oil Filter ..... 3, Replaceable Cartridge type

ELECTRICAL SYSTEM

Ignition System ..... Electronic
Eng. Alternator/Starter: 24 VDC, negative ground, 110 amp/hr.

Recommended battery to -18°C (0° F): ....(2) 12 VDC, BCI# 31, Max. Dimensions: 14"lg x 6 3/4" wi x 10" hi, with standard round posts. Min output 1000 CCA. Battery tray (max. dim. at 15"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 EPA emissions certified. All non-emergency stationary diesel engines are Tier IV Final compliant.

APPLICATION & ENGINEERING DATA FOR MODEL T4D-1500-60 HZ

COOLING SYSTEM

Type of System ..... Air to Air, Charged Air Cooler
Coolant Pump .....Pre-lubricated, self-sealing
Cooling Fan Type .....Pusher
Fan Diameter inches (cm).....35.1 (89)
Fan drive ratio..... 1.04:1
Ambient Capacity of Radiator °F (°C).....131 (55)
Engine Jacket Coolant Capacity gal. (L).....8.70 (33)
Radiator Coolant Capacity gal. (L) 16.0 (60)
Water Pump Capacity gpm (L/min)..... .....122 (462)
Heat Reject Coolant: Btu/min ....….12,682
Air to Air Heat Reject, BTU/min. ....….11,715
Heat Radiated to Ambient, BTU/min .... ….4,253
Low Radiator Coolant Level Shutdown……..Standard
Note: Coolant temp. shut-down switch setting at 228°F (109°C) with 50/50 (water/antifreeze) mix.

COOLING AIR REQUIREMENTS

Combustion Air cfm (m^3/min) 1,646 (46.6)
Max Air Intake Restrictions:
Clean Air Cleaner, KPA (psi) 5 (1.5)
Radiator Cooling Air, SCFM (m^3/min)……....29,894 (846)

EXHAUST SYSTEM

Exhaust Outlet Size.....5"
Max. Back Pressure in KPA (in. H2O).....8 (32)
Exhaust Flow, at rated KW, CFM (m3/min)..... 886 (25.1)
Exhaust Temp, (Stack) °F (ºC) 709 (376)

SOUND LEVELS MEASURED IN dB(A)

	Open Set	Level 2 Encl.
Level 2, SCR/Residential Silencer	83	79

Note: Open sets (no enclosure) have installed selective catalytic reduction/residential silencer system. Level 2 enclosure has installed selective catalytic reduction/residential 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)	132 (335)	162 (412)
Width in (cm)	52 (132)	52 (132)
Height in (cm)	65 (165)	80 (203)
Net Weight lbs (kg)	4362 (1979)	5632 (2555)
Ship Weight lbs (kg)	4637 (2104)	5907 (2680)

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 T4D-1500-60 HZ

STANDARD FEATURES

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:

Fuel filter • Full flow Oil filter • Air filter • Fuel pump • Oil pump • Solenoid type starter motor • Hi-temp radiator • Jacket water pump • Thermostat • Pusher fan and guard • Exhaust manifold • Electronic Governor • 24 VDC battery charging alternator • Flexible fuel and exhaust connectors • Vibration isolators • Open coolant recovery system with 50/50 water to anti-freeze mixture • flexible oil & radiator hose • Shut-down sensors for low oil pressure, high coolant temp., low coolant level, high ambient temp.

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:

1% Voltage regulation • EMI filter • Under-speed protection • Over-excitation protection • total encapsulation

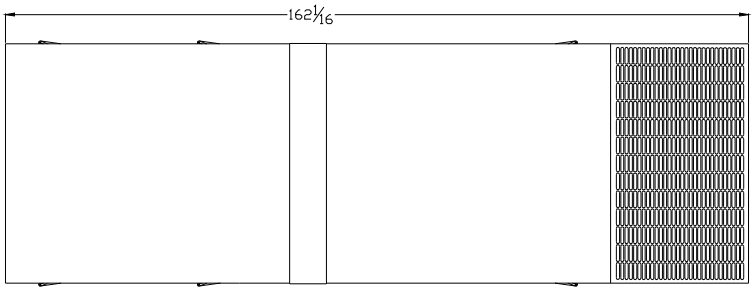
DC ELECTRICAL SYSTEM:

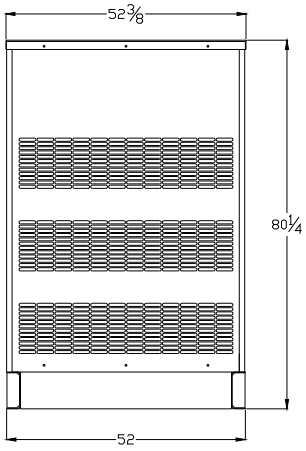
Battery trays • Battery cables • Battery hold down straps • 3-stage battery charger with float, absorption, & bulk automatic charge stages

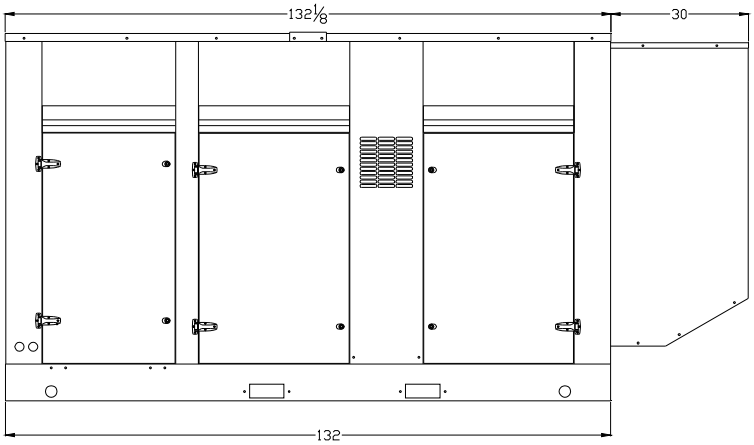
WEATHER / SOUNDPROOF ALUMINUM HOUSING:

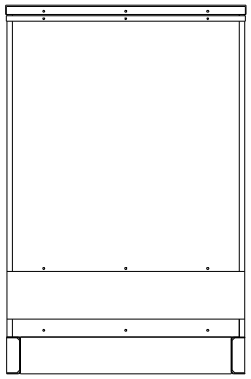
Corrosion Resistant Protection consisting of:

- (9) Heated and Agitated Wash Stages
- Zinc Phosphate Etching-Coating Stage
- Final Baked on Enamel Powder Coat
- 18/8 Stainless Steel Hardware









Important

This Technical Data Sheet and the corresponding Installation Instructions provide important information to ensure the installed engine will operate according to the design specification in the Volvo Penta application for certification.

Requirements marked with ⚠ are considered as critical for exhaust emissions compliance according to the design specification in the Volvo Penta application for certification.

Failing to follow and meet these instructions and requirements when installing a certified engine in a piece of nonroad equipment for use in the United States violates U.S. federal law (40 CFR 1068.105(b)), subject to fines or other penalities as described in the Clean Air Act.

General

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

Number of cylinders			6
Displacement, total		liters in^3	7,70 470
Firing order			1-4-2-6-3-5
Bore		mm in	110 4,33
Stroke		mm in	135 5,31
Compression ratio			17.5:1
Wet weight (Not including after treatment system)	Engine only	kg lb	737 1625
	Power pac	kg lb	947 2088

Performance				**rpm**	**1500**	**1800**	**2000**	**2200**
ICFN Power 185 kW		without fan		kW hp	181 246	185 252	185 252	185 252
		with fan 650 mm pull		kW hp	172 234	169 230	166 225	161 219
Torque at:		ICFN Power 185 kW		Nm lbf ft	1150 848	982 724	884 652	803 592
Max torque at engine speed	ICFN Power		1200 rpm	Nm lbf ft	1160 856			
Power tolerance				%	±3			
Mean piston speed				m/s ft/sec	6,8 22,1	8,1 26,6	9,0 29,5	9,9 32,5
Effective mean pressure at:		ICFN Power 185 kW		MPa psi	1,88 273	1,60 232	1,44 209	1,31 190
Total mass moment of inertia, J (mR^2) (not including flywheel)				kgm^2 $lbft^2$	0,398 9,4			
Friction Power				kW hp	17 23	23 31	29 39	35 48
Derating see Technical Diagrams								

Engine brake performance (only engines with engine brake)		rpm	1500	2200	2500	2800
Brake power:	without fan	kW	70	121	145	170
		hp	95	165	197	231
Brake torque:	without fan	Nm	448	524	555	580
		lbf ft	330	386	409	428
Engine speed range for engine brake activation:		rpm	900-2800			
Min engine speed with engine brake still active:		rpm	900			
Min oil temperature for engine brake activation:		°C	55			

Cold start performance

*Cold start limit temperature	without starting aid	°C °F	-15 5	
	with manifold heater 4 kW	°C °F	-30 -22	
	with manifold heater 4 kW and block heater	°C °F	-35 -31	
*Specify oil quality	Above -15°C; 15W40 Above -25°C; 10W30 Below -25°C; 5W30			
Block heater type	Make	Power kW	Engaged hours	Cooling water temp engine block
	Volvo	1,5		

* See also general section in the sales guide

Lubrication system

Lubricating oil consumption (average)			Vol%	0,05
Oil system capacity including filters			liter US gal	27 7,13
Oil pan capacity:		Max	liter US gal	24 6,34
		Min	liter US gal	19 5,02
Oil change intervals/specifications	VDS4		h	500
			h	
Engine angularity limits:	front up		°	40
	front down		°	45
	side tilt		°	40
Oil pressure at rated power			kPa psi	425 62

Lubrication system

Lubrication oil temperature in sump:	max	°C °F	125 257
Oil filtration efficiency (in accordance with ISO 4548-12)	97%	µ	36
	50%	µ	14

Fuel system			rpm	1500	1800	2000	2200
Urea consumption (vol% of diesel consumption)			vol%	7%			
Fuel to conform to				EU EN590 US D975, 1-D and 2-D (Max 15ppm sulphur and 7% FAME)			
System supply flow at max. speed			liter/h US gal/h	122 32,2			
Fuel supply line max. restriction (Measured at fuel inlet connection)			kPa psi	25 3,6			
Fuel supply line max. pressure, during engine stand still (meassured at fuel inlet connection)			kPa psi	20 2,9			
System return flow at max. speed			liter/h US gal/h	60,0 15,9			
Fuel return line max. restriction (Measured at fuel return connection)			kPa psi	15 2,2			
Max. allowable inlet fuel temp (Measured at fuel inlet connection)			°C °F	80 176			
Prefilter / Water separator filtration efficiency		99%	µ	30			
Main fuel filter filtration efficiency (in accordance with ISO 19438)		98%	µ	5			
		96%	µ	4			
Governor type/make, standard			Volvo/ EMS 2.3				
Injection pump type/make			Denso HP4				

Intake and exhaust system		Inlet air temp	rpm	1500	1800	2000	2200
Charge air consumption at: (+25°C and 100kPa)	ICFN Power 185 kW	25°C	m³/min	11,6	12,6	14,4	15,2
		77°F	cfm	410	445	509	537
⚠ **See front page for important information** Max allowable air intake restriction including piping			kPa psi	6 0,9			
Heat rejection to exhaust at:	ICFN Power 185 kW		kW BTU/min	90 5135	99 5653	108,6 6176	118,7 6750
Exhaust gas temperature after turbine at:	ICFN Power 185 kW		°C °F	371 700	376 709	362 684	374 705
⚠ **See front page for important information** Max allowable back pressure in exhaust line (after turbine) Pipe dimension Ø: 102 mm			kPa psi	15 2,2	17 2,5	20 2,9	22 3,2
⚠ **See front page for important information** Max allowable temperature drop between turbine and SCR muffler inlet.			Δ°C Δ°F	15 27			
SCR muffler pressure drop (at exhaust gas flow and exhaust temp given)			kPa psi	10 1,5	11 1,6	13 1,9	14 2,0
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	ICFN Power 185 kW		m³/min cfm	23,4 826	25,1 886	27,3 964	28,9 1021

Cooling system			rpm	1500	1800	2000	2200
Heat rejection radiation from engine at:		ICFN Power 185 kW	kW	5	5	4,8	5,2
			BTU/min	307	290	273	296
Heat rejection to coolant at:		ICFN Power 185 kW	kW	116	123	124	133
			BTU/min	6585	6995	7040	7581
Radiator cooling system type				Closed circuit			
Standard radiator core area		ICFN Power 185 kW	m²	0,6			
			foot²	6,46			
Fan diameter	650 mm	ICFN Power 185 kW	mm	650			
			in	25,59			
Fan power consumption	650 mm pull		kW	9,3	15,8	19,3	23,9
			hp	13	21	26	33
Fan drive ratio	fan Ø650			1.4:1			
Coolant capacity:	engine		liter	17			
			US gal	4,5			
	engine + standard radiator, hoses and expansion tank		liter	51			
			US gal	13,5			
Coolant pump			drive/ratio	belt/1,40:1			
Coolant flow with standard system			l/s	5,4	6,5	7,2	8,0
			US gal/s	1,4	1,7	1,9	2,1
Minimum coolant flow			l/s				6,0
			US gal/s				1,6
Maximum outer circuit restriction incl. piping			kPa	40,0			
			psi	5,8			
Thermostat:		start to open	°C	85			
			°F	185			
		fully open	°C	95			
			°F	203			
Maximum static pressure head (expansion tank height + pressure cap setting)			kPa	110			
			psi	16,0			
Minimum static pressure head (expansion tank height + pressure cap setting)			kPa	85			
			psi	12,3			
Standard pressure cap setting			kPa	100			
			psi	14,5			
Maximum top tank temperature			°C	107			
			°F	225			
Recommended 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			liter	2			
			US gal	0,5			

Charge air cooler system		rpm	1500	1800	2000	2200
Heat rejection to charge air cooler	ICFN Power 185 kW	kW	29,8	29,3	33,8	35,5
		BTU/min	1695	1666	1922	2019
Charge air mass flow	ICFN Power 185 kW	kg/s	0,229	0,249	0,285	0,3
Charge air inlet temp.	ICFN Power 185 kW	°C	178	166	168	167
(Charge air temp after turbo compressor)		°F	352	331	334	333
⚠ **See front page for important information** Max allowable Charge air outlet temp. (Charge air temp after charge air cooler)		°C	49	49	50	50
		°F	120	120	122	122
⚠ **See front page for important information** Maximum pressure drop over charge air cooler incl. piping		kPa	7	9	11	12
		psi	1,02	1,31	1,60	1,74
Charge air pressure (relative) (After charge air cooler)		kPa	203	182	180	174
		psi	29,44	26,40	26,11	25,24
Standard charge air cooler core area		m²	0,5			
		foot²	5,38			

Cooling performance: 0,6 m² radiator and 650mm fan, pull

Cooling air flow and maximum additional external restriction at different radiator air temperatures based on 107°C TTT and 40% coolant. Valid at 1 atm.

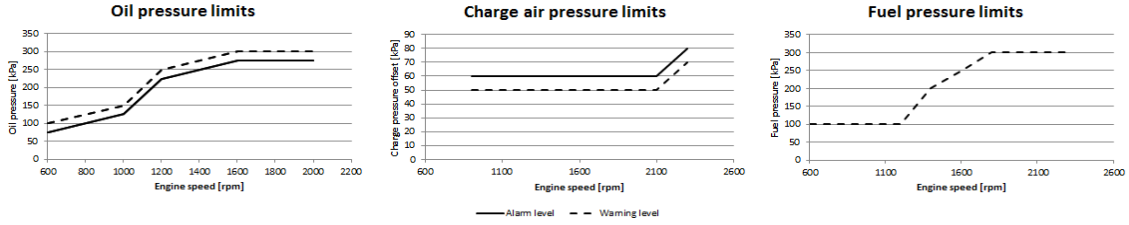
		ICFN Power 185 kW					
Engine speed	Engine power	Air on temp		Air flow		External restriction	
rpm	kW hp	°C	°F	m^3/s	ft^3/s	Pa	psi
1500	181	62	143	7,4	261,3	0	
	246	61	141	7,2	254,3	100	0,015
		58	137	6,7	236,6	200	0,029
		54	130	6,1	215,4	300	0,044
2200	185	63	146	9,4	332,0	0	
	252	63	145	9,3	328,4	100	0,015
		62	144	9	317,8	200	0,029
		61	141	8,6	303,7	300	0,044

Engine management system

Functionality	Alternatives			Default setting
Governor mode	Droop	Isochronous		Isochronous
Governor droop	10	125	Nm/rpm	
Governor response	Adjustable PI constants			
Idle speed	600	800	rpm	600
Stop function				Replaced by "Ignition of stop engine"
Preheating function	Ignition	Request	Request + temp	If preheat is available, preheat will be active at ignition on if temp low or demanded by driver.
Lamp test				No lamp test, not used any longer
Ignition of stop engine	Yes	No		No

Engine sensors and switch settings			Alarm level		Engine protection	
Parameter		**Unit**	**Setting range**	**Default setting**	**Level**	**Action. Default/Alternative**
Oil temp		°C		125	125	Derate/Shut down
Oil pressure	Low idle	kPa		75,0	75	Shut down.
	Rated speed	kPa		275	275	Shut down.
Oil level				Low level		
Coolant temp		°C		107	107	Derate/Shut down
Coolant level			See cooling system	On	Low level	Derate/Shut down
Fuel feed pressure	Low idle	kPa		100		
	Rated speed			300		
Water in fuel				Alarm when closed		
EGR temp		°C		210	210	Derate/Shut down
Air filter pressure drop				5kPa		
Altitude, above sea		m			700	Automatic derating, see section derating
Charge air temp		°C		120	120	Derate/Shut down
Charge air pressure		kPa		Alarm map value	Alarm map value	Derate/Shut down
SCR temp		°C		515	515	Derate

Parameter	Warning	Alarm	Derated 0% to engine protection map	Derated 100% to engine protection map	Forced idle after 5 sec	Forced shut down after 0 sec
Coolant temp	102°C	107°C	107°C	112°C		
Oil temp	120°C	125°C	125°C	130°C		
Low oil pressure	Warning map value	Alarm map value				Alarm map value
High charge air temp	115°C	120°C	120°C	140°C		
High charge air pressure	Warning map value	Alarm map value		Alarm map value		
EGR temp	200°C	210°C	210°C	220°C		



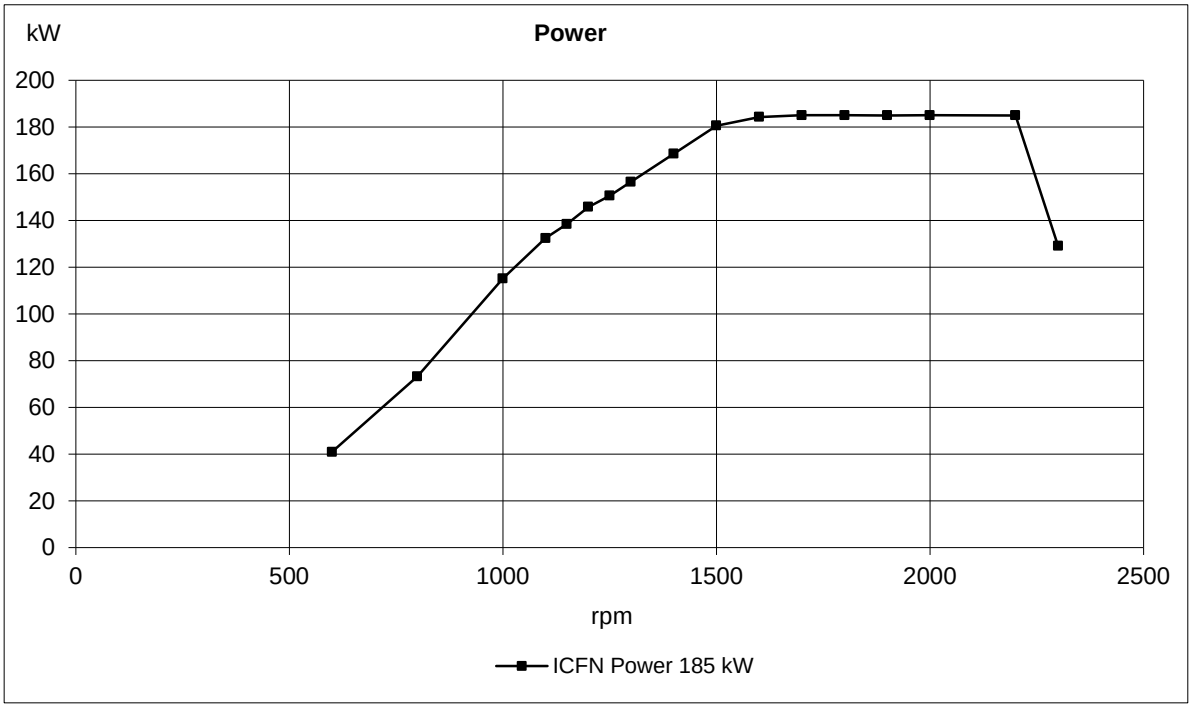
Electrical system

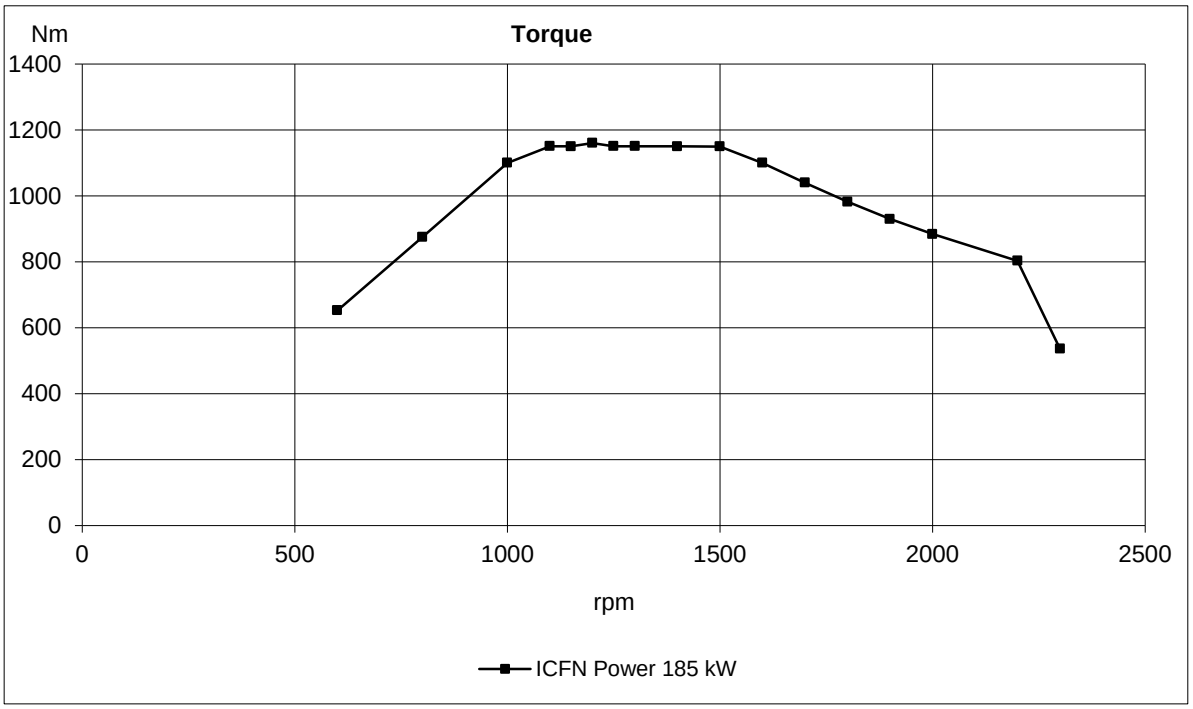
Voltage and type				24V
Alternator:	make			MELCO
	output	A		110/130
	tacho output	Hz/alternator rev.		
	drive ratio			
Starter motor:	make			MELCO
	type			85P50/90P55
	output		kW	5 / 5.5
			hp	6.8 / 7.5
Number of teeth on:	flywheel			137
	starter motor			10 / 12 teeth
Inlet manifold heater (at 20 V)			kW	4
Power relay for the manifold heater			A	200

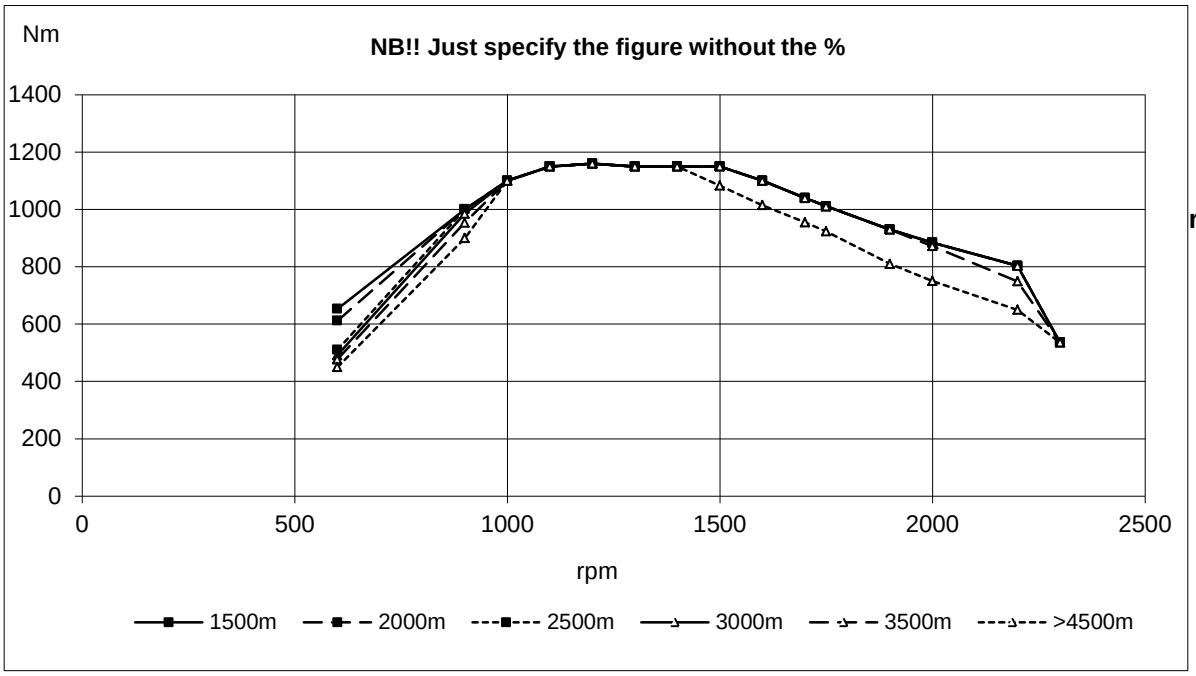
Conditions: (5 mΩ main circuit resistance@ 20°C)	**Temperature**	**°C**		**25**	**0**	**-15**
	Battery	**Ah / CCA**		**140/800**	**140/800**	**140/800**
Crank speed		rpm		185	160	120
Crank current		A		220	300	470
Starter input power during crank		kW		4,91	5,90	6,94
Battery power during crank		kW		5,15	6,31	7,50
Min battery @ 0°C		Ah / CCA				

Power take off		**rpm**	**1400**	**1800**	**2000**	**2200**
Front end in line with crank shaft max:*	0.02 kgm^2	Nm	1064,0	743,0	740	833
Flywheel		lbf ft	785	548	546	614
SAE 2, STD 10" & 11,5 ", 1.303 kgm2	0.03 kgm^2	Nm	1030,0	706,0	697	786
		lbf ft	760	521	514	580
	0.04 kgm^2	Nm	996,0	663,0	654	729
		lbf ft	735	489	482	538
Front end belt pulley load. Direction of load viewed from flywheel side:	max left	kW	45,0	57,9	64,3	70,7
		hp	61	79	87	96
	max down	kW	45,0	58,0	64,3	70,7
		hp	61	79	87	96
	max right	kW	21,1	27,2	30,2	33,2
		hp	29	37	41	45
Maximum power on Rear PTO on top of flywheel housing(REPTO):*		kW	75			
		hp	102			
Speed ratio direction of rotation viewed from flywheel side			1:1 Counter clockwise			
Maximum torque on PTO at compressor position:*		Nm	200			
		lbf ft	148			
Speed ratio direction of rotation viewed from flywheel side			1.026:1 Counter clockwise			
Timing gear at hydraulic pump PTO max:*		Nm	80			
		lbf ft	59			
Speed ratio direction of rotation viewed from flywheel side			1.3:1 Clockwise			
Max allowed bending moment in flywheel housing	SAE2	Nm	4600			
		lbf ft	3393			
Max. rear main bearing load		N	4250			
		lbf	955,4			

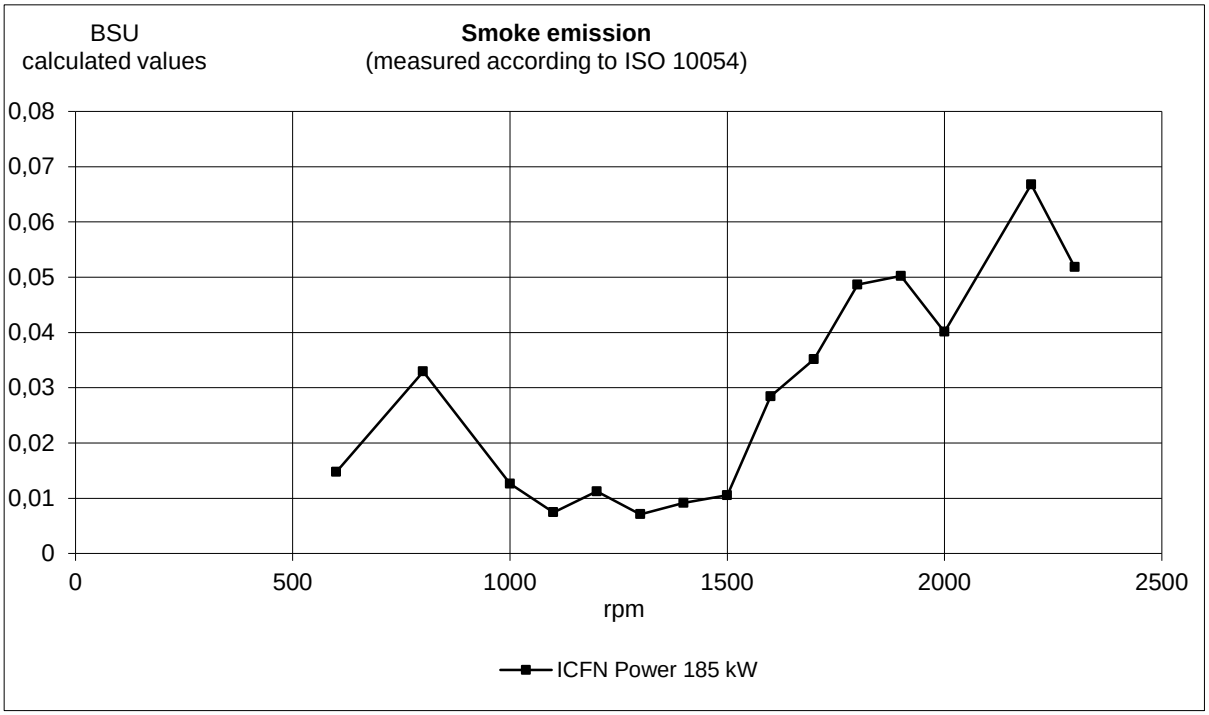
**** Maximum allowed torque at individual PTO´s.***
If more then one PTO output is used simultaniusly, calculations needs to be performed to determine available maximum. Available torque depends on application inertia.

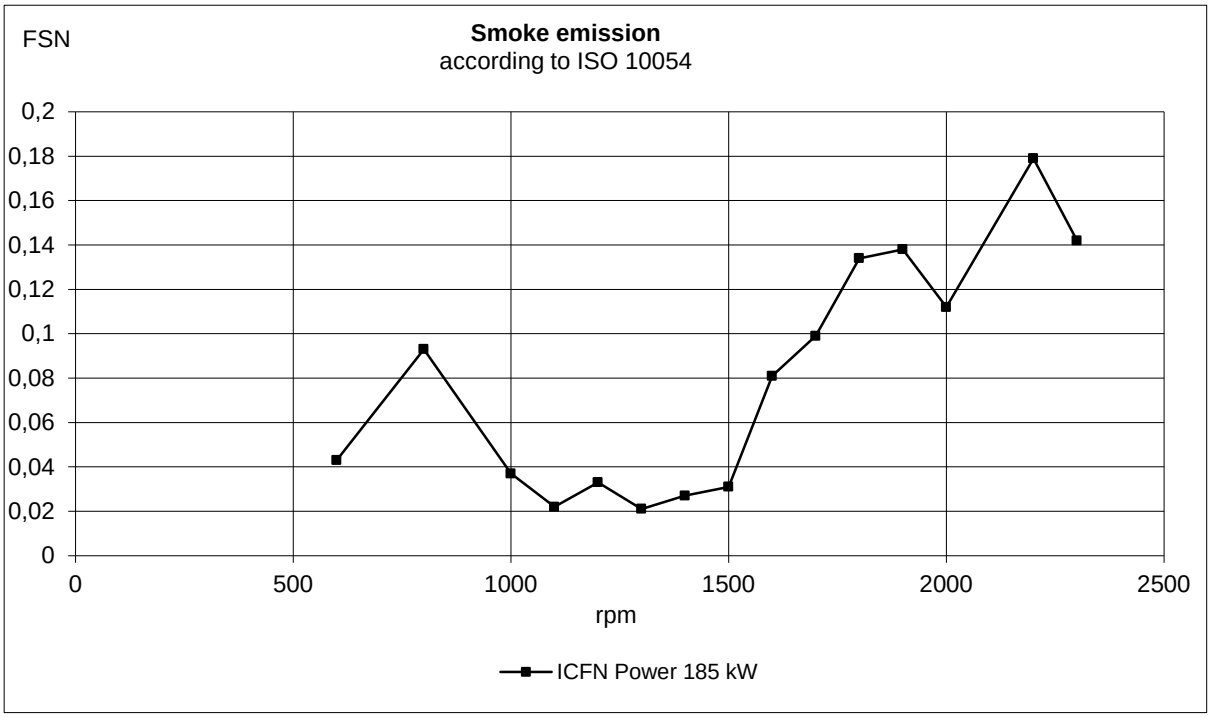

kW
Power
200
180
160
140
120
100
80
60
40
20
0
0
500
1000
1500
2000
2500
rpm
ICFN Power 185 kW

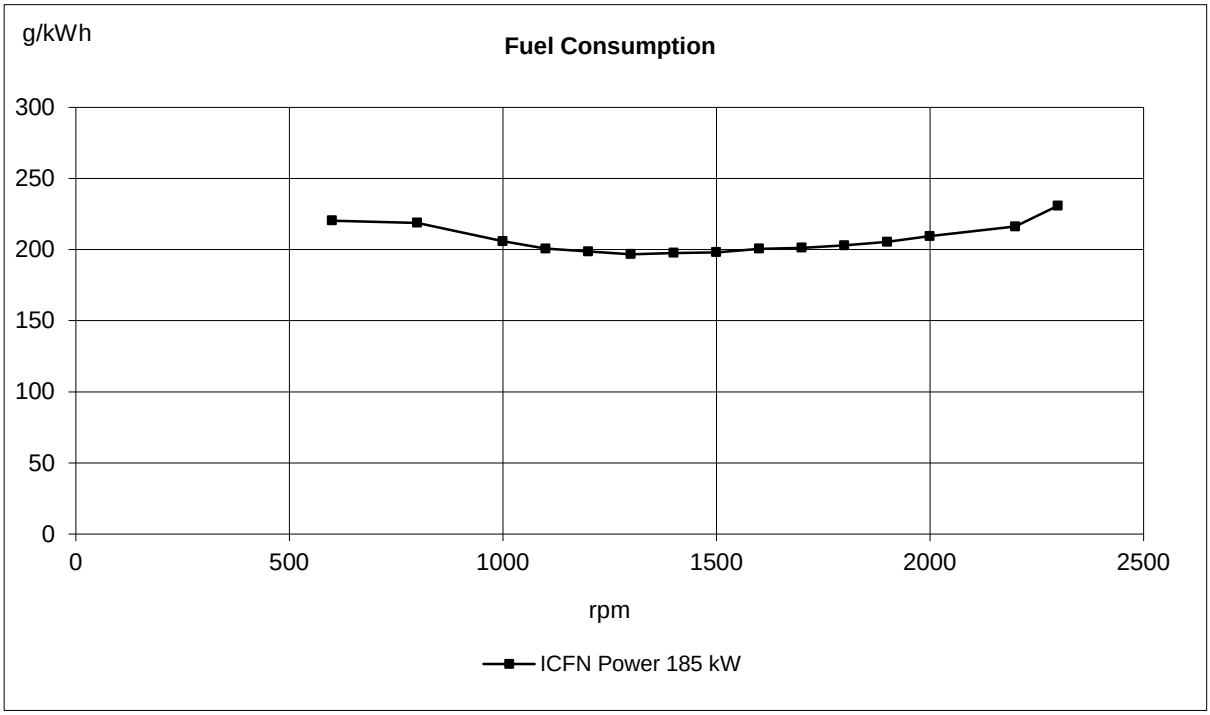

Nm
Torque
1400
1200
1000
800
600
400
200
0
0
500
1000
1500
2000
2500
rpm
ICFN Power 185 kW

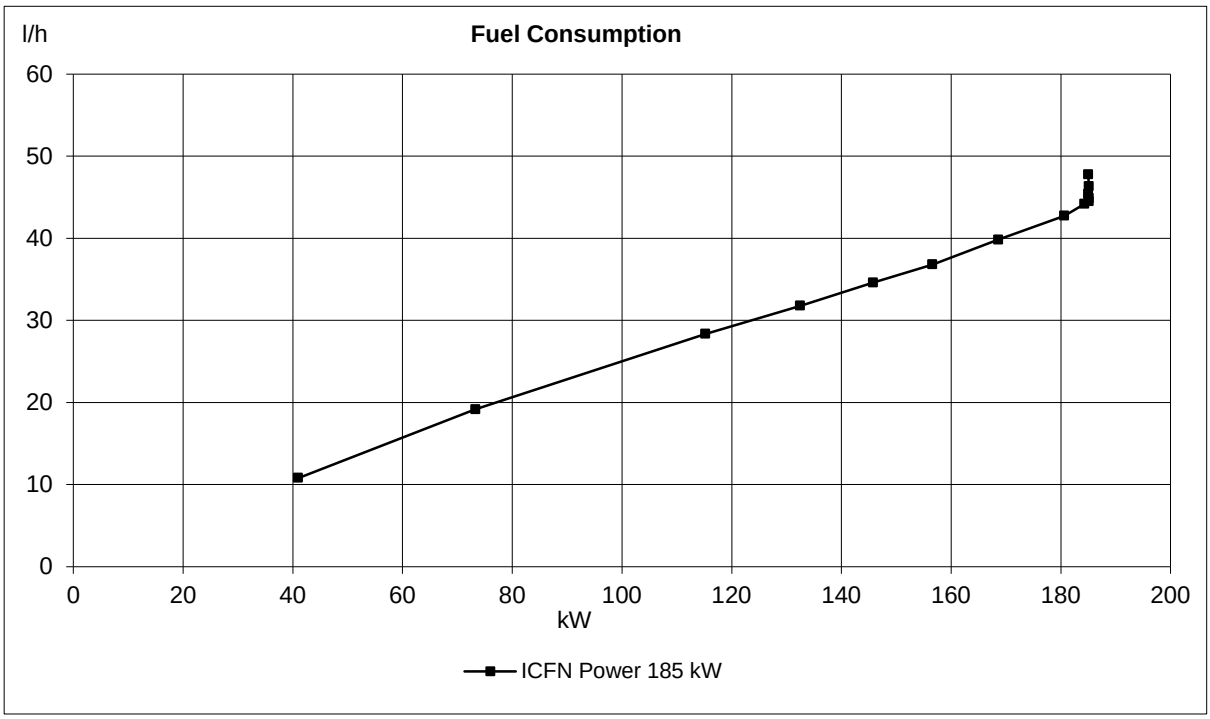

Nm
NB!! Just specify the figure without the %
1400
1200
1000
800
600
400
200
0
0
500
1000
1500
2000
2500
rpm
1500m
2000m
2500m
3000m
3500m
>4500m

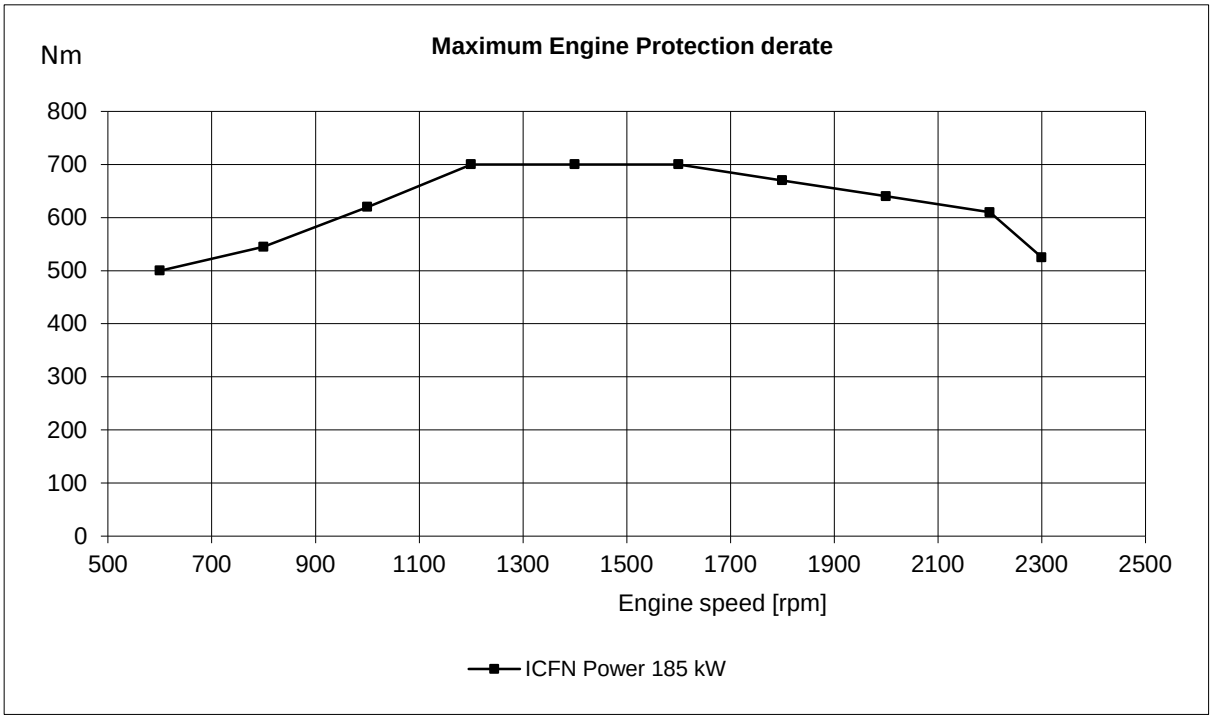
rat

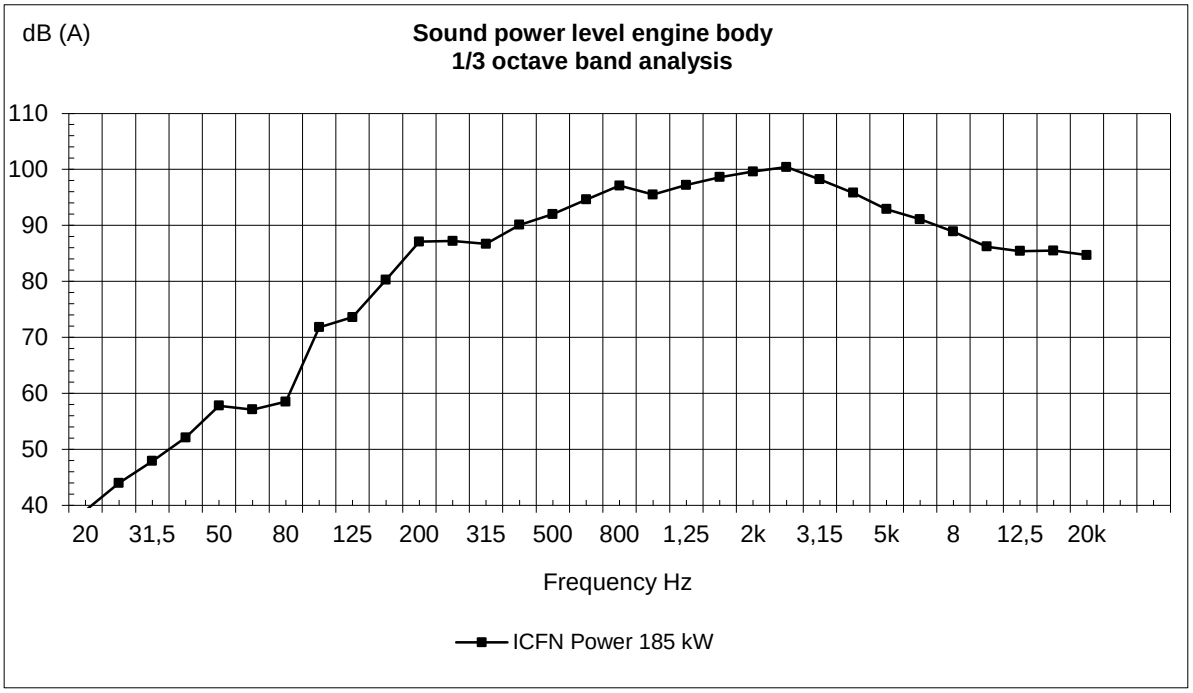

BSU
calculated values
Smoke emission
(measured according to ISO 10054)
0,08
0,07
0,06
0,05
0,04
0,03
0,02
0,01
0
0
500
1000
1500
2000
2500
rpm
ICFN Power 185 kW

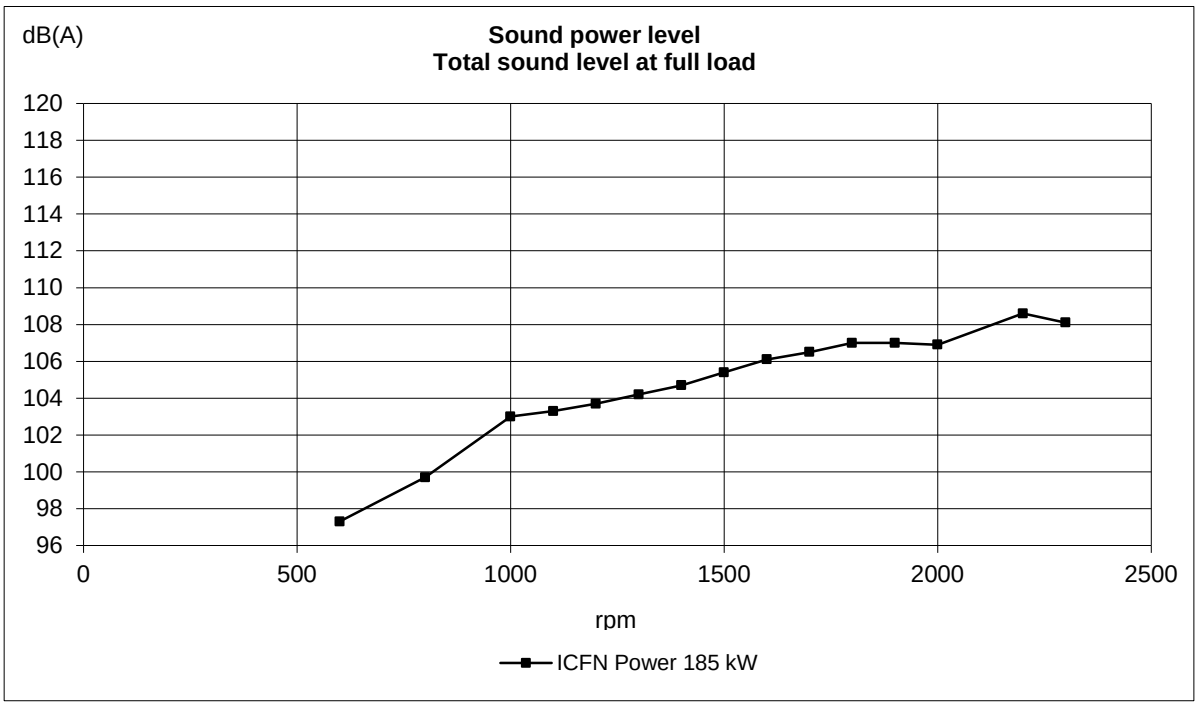

FSN
Smoke emission
according to ISO 10054
0,2
0,18
0,16
0,14
0,12
0,1
0,08
0,06
0,04
0,02
0
0
500
1000
1500
2000
2500
rpm
ICFN Power 185 kW

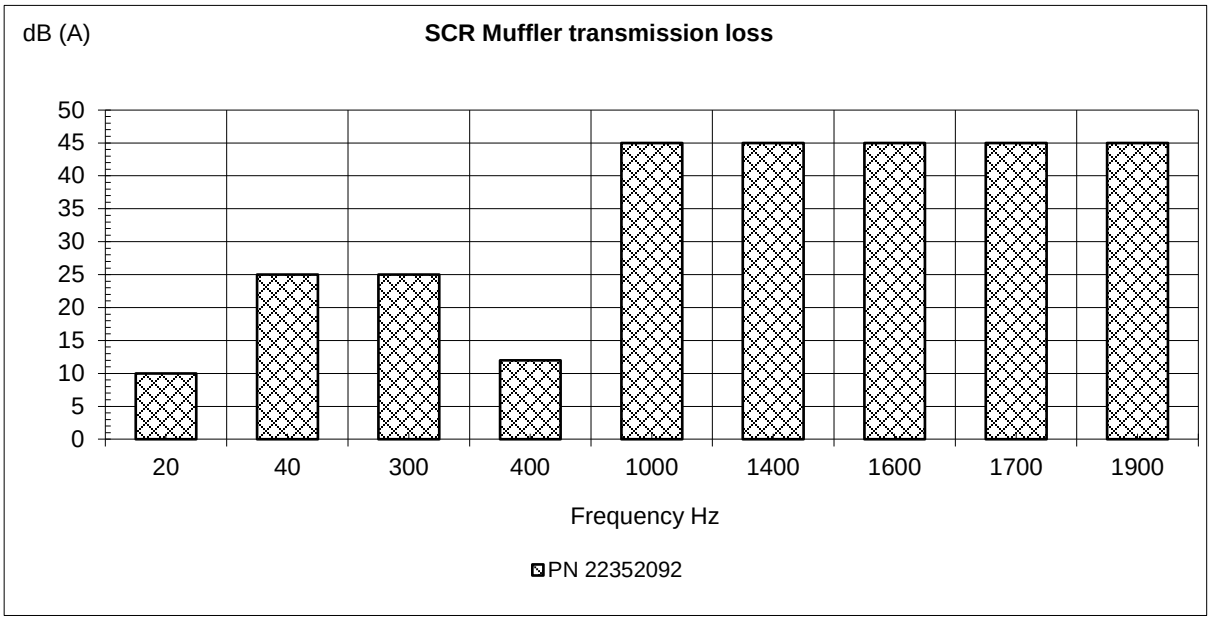

g/kWh
Fuel Consumption
300
250
200
150
100
50
0
0
500
1000
1500
2000
2500
rpm
ICFN Power 185 kW

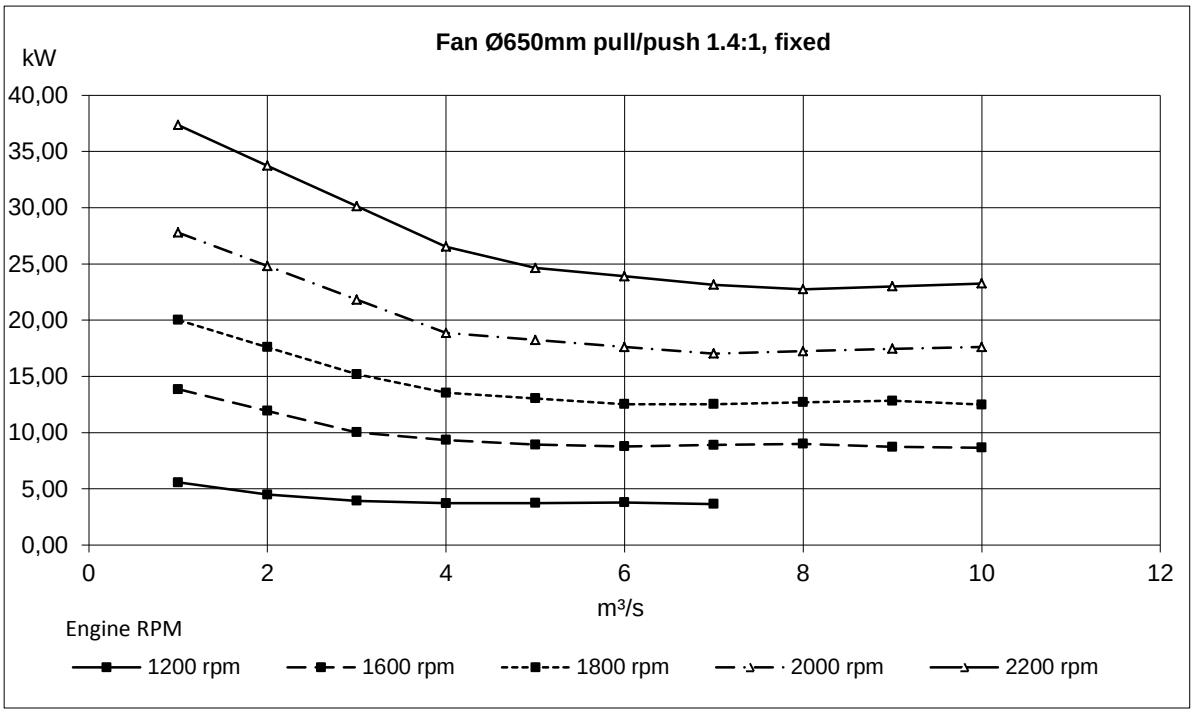

l/h
Fuel Consumption
60
50
40
30
20
10
0
0
20
40
60
80
100
120
140
160
180
200
kW
ICFN Power 185 kW

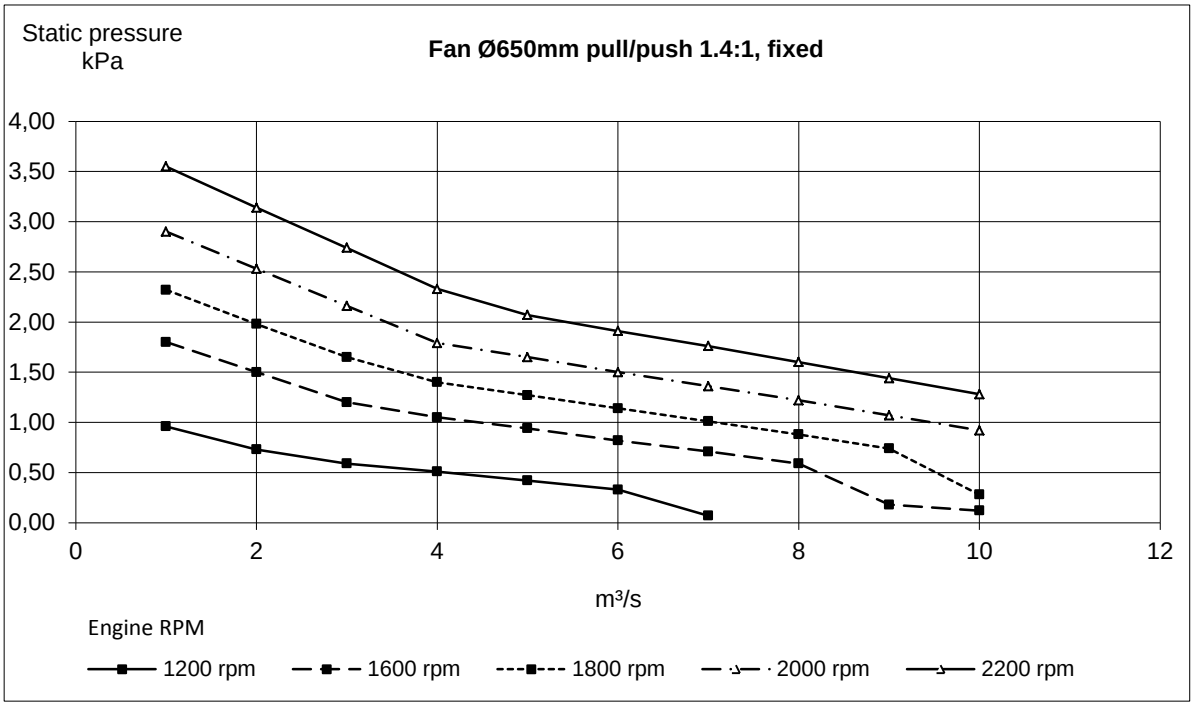

Maximum Engine Protection derate
Nm
800
700
600
500
400
300
200
100
0
500
700
900
1100
1300
1500
1700
1900
2100
2300
2500
Engine speed [rpm]
ICFN Power 185 kW

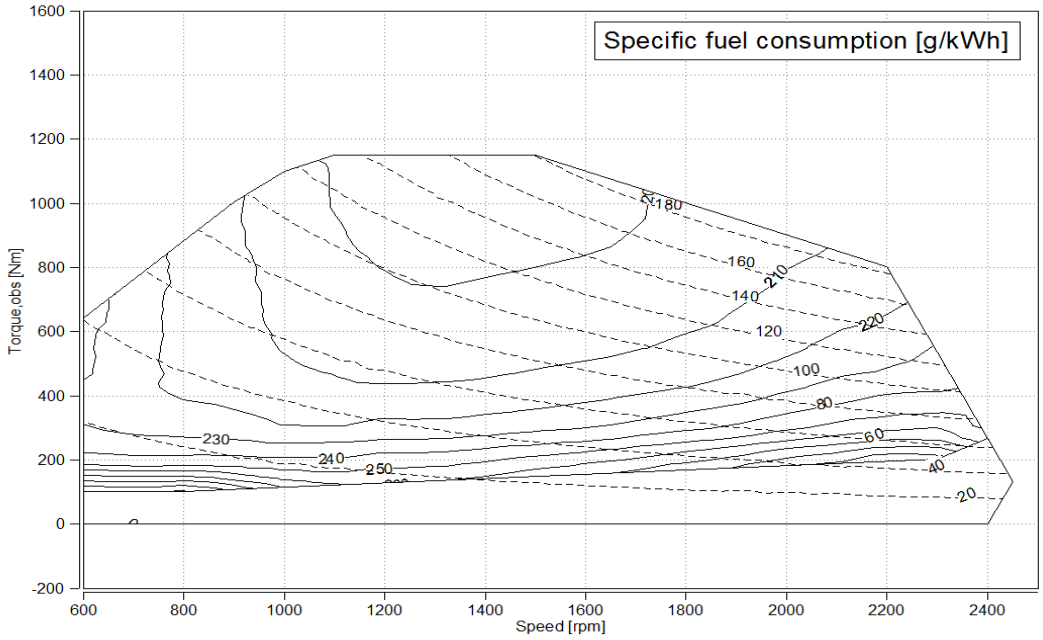

dB (A)
Sound power level engine body
1/3 octave band analysis
110
100
90
80
70
60
50
40
20
31,5
50
80
125
200
315
500
800
1,25
2k
3,15
5k
8
12,5
20k
Frequency Hz
ICFN Power 185 kW

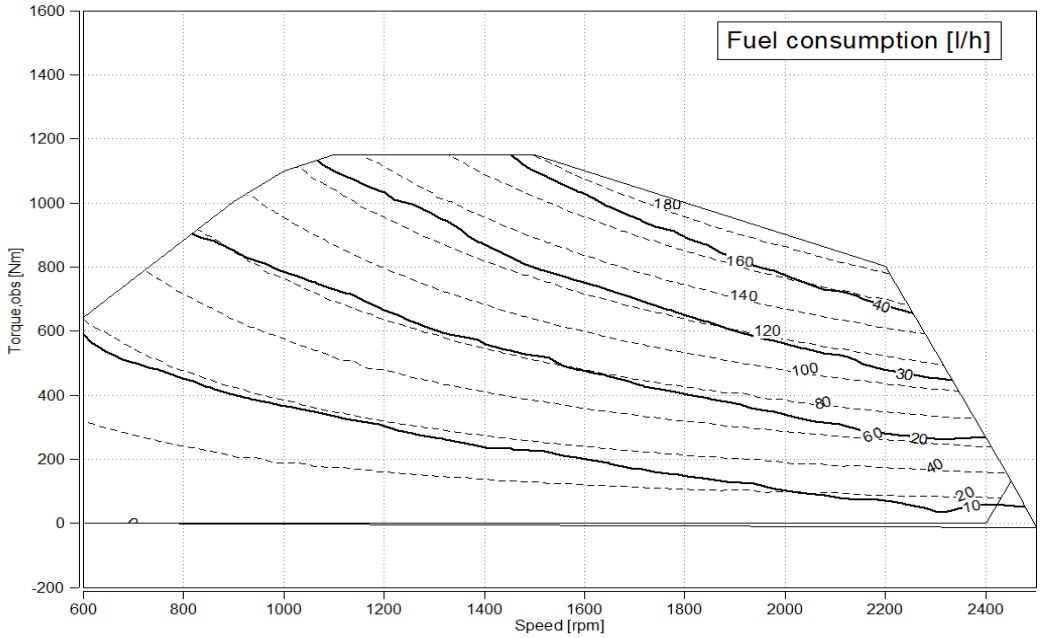

dB(A)
Sound power level
Total sound level at full load
120
118
116
114
112
110
108
106
104
102
100
98
96
0
500
1000
1500
2000
2500
rpm
ICFN Power 185 kW


dB (A)
SCR Muffler transmission loss
50
45
40
35
30
25
20
15
10
5
0
20
40
300
400
1000
1400
1600
1700
1900
Frequency Hz
PN 22352092


Fan Ø650mm pull/push 1.4:1, fixed
kW
40,00
35,00
30,00
25,00
20,00
15,00
10,00
5,00
0,00
0
2
4
6
8
10
12
m³/s
Engine RPM
1200 rpm
1600 rpm
1800 rpm
2000 rpm
2200 rpm


Static pressure
kPa
Fan Ø650mm pull/push 1.4:1, fixed
4,00
3,50
3,00
2,50
2,00
1,50
1,00
0,50
0,00
0
2
4
6
8
10
12
m³/s
Engine RPM
1200 rpm
1600 rpm
1800 rpm
2000 rpm
2200 rpm

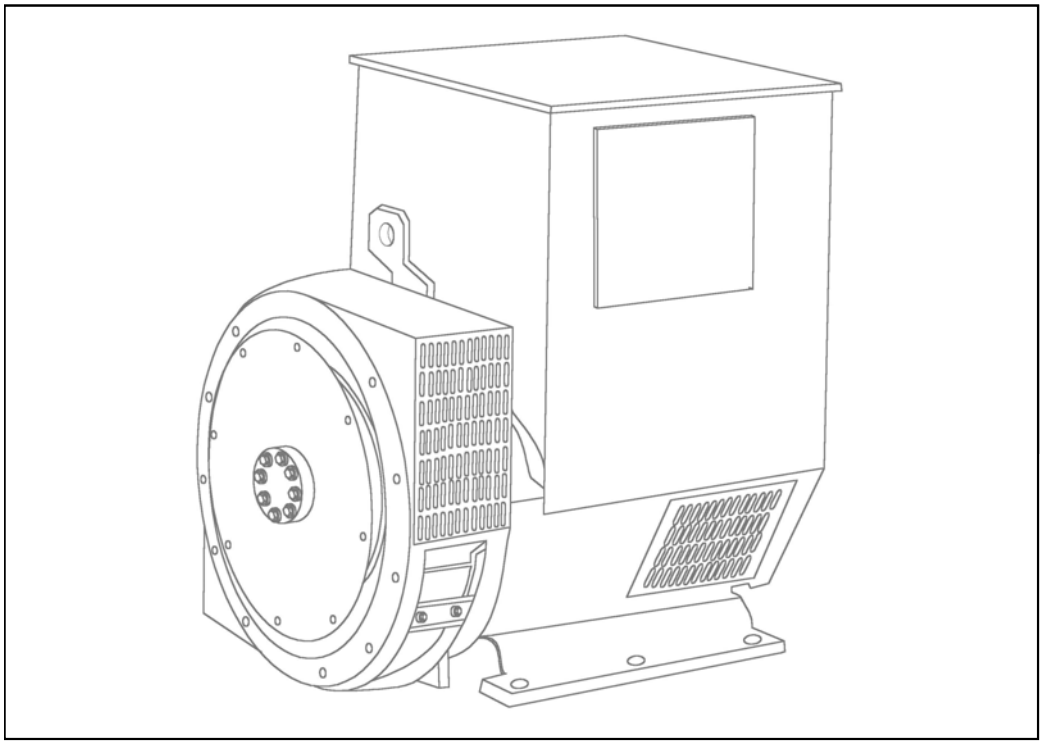

Specific fuel consumption [g/kWh]
Torque,obs [Nm]
Speed [rpm]
180
160
210
140
220
120
100
80
60
230
240
250
40
20


Fuel consumption [l/h]
Torque,obs [Nm]
Speed [rpm]
180
160
140
70
120
100
30
80
60
20
40
20
10

STAMFORD®

UCDI274K - Winding 311 Single Phase

Technical Data Sheet



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
Standard generators are 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%.

DE RATES
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.

UCDI274K

STAMFORD

WINDING 311 Single Phase

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	0.008 Ohms AT 22°C DOUBLE DELTA CONNECTED					
ROTOR WDG. RESISTANCE	2.08 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)					
WEIGHT COMP. GENERATOR	727 kg					
WEIGHT WOUND STATOR	304 kg					
WEIGHT WOUND ROTOR	272.6 kg					
WR² INERTIA	2.3934 kgm^2					
SHIPPING WEIGHTS in a crate	740 kg					
PACKING CRATE SIZE	123 x 67 x 103(cm)					
	50 Hz			60 Hz		
TELEPHONE INTERFERENCE	THF<2%			TIF<50		
COOLING AIR	0.58 m³/sec 1230 cfm			0.69 m³/sec 1463 cfm		
VOLTAGE DOUBLE DELTA	220/110	230/115	240/120	220/110	230/115	240/120
VOLTAGE PARALLEL DELTA	110	115	120	110	115	120
kVA BASE RATING FOR REACTANCE VALUES	150	150	150	155	166	175
Xd DIR. AXIS SYNCHRONOUS	2.52	2.30	2.12	2.99	2.93	2.84
X'd DIR. AXIS TRANSIENT	0.12	0.11	0.10	0.14	0.14	0.13
X"d DIR. AXIS SUBTRANSIENT	0.08	0.07	0.07	0.09	0.09	0.09
Xq QUAD. AXIS REACTANCE	1.13	1.03	0.95	1.34	1.31	1.27
X"q QUAD. AXIS SUBTRANSIENT	0.14	0.12	0.11	0.16	0.16	0.15
X_L LEAKAGE REACTANCE	0.06	0.05	0.05	0.07	0.07	0.07
X_2 NEGATIVE SEQUENCE	0.11	0.10	0.09	0.13	0.12	0.12
X_0 ZERO SEQUENCE	0.02	0.02	0.02	0.02	0.02	0.02
REACTANCES ARE SATURATED	VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED					
T'd TRANSIENT TIME CONST.	0.049 s					
T"d SUB-TRANSTIME CONST.	0.02 s					
T'do O.C. FIELD TIME CONST.	1.27 s					
Ta ARMATURE TIME CONST.	0.018 s					
SHORT CIRCUIT RATIO	1/Xd					

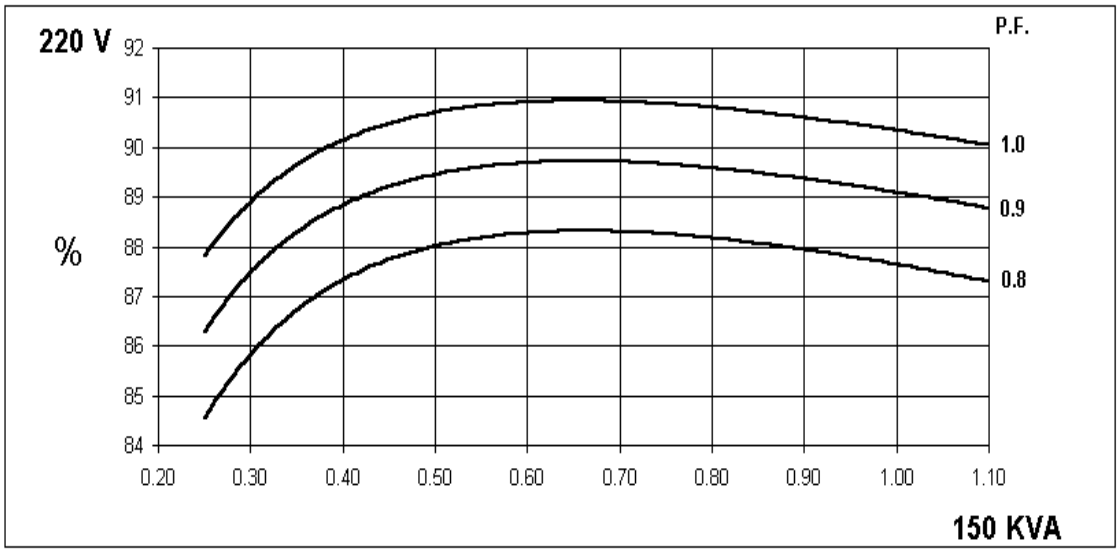
50 Hz

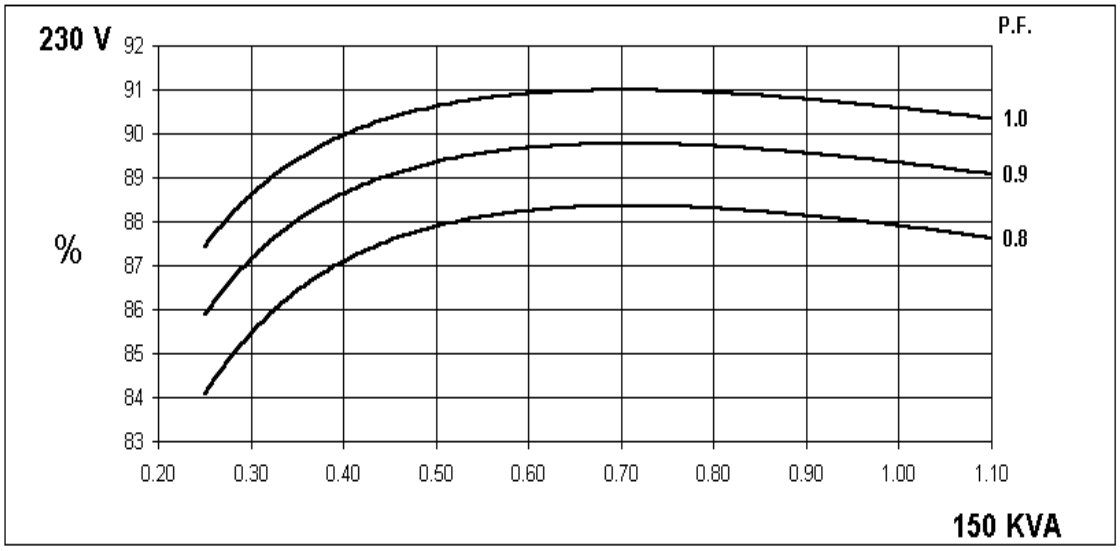
UCDI274K

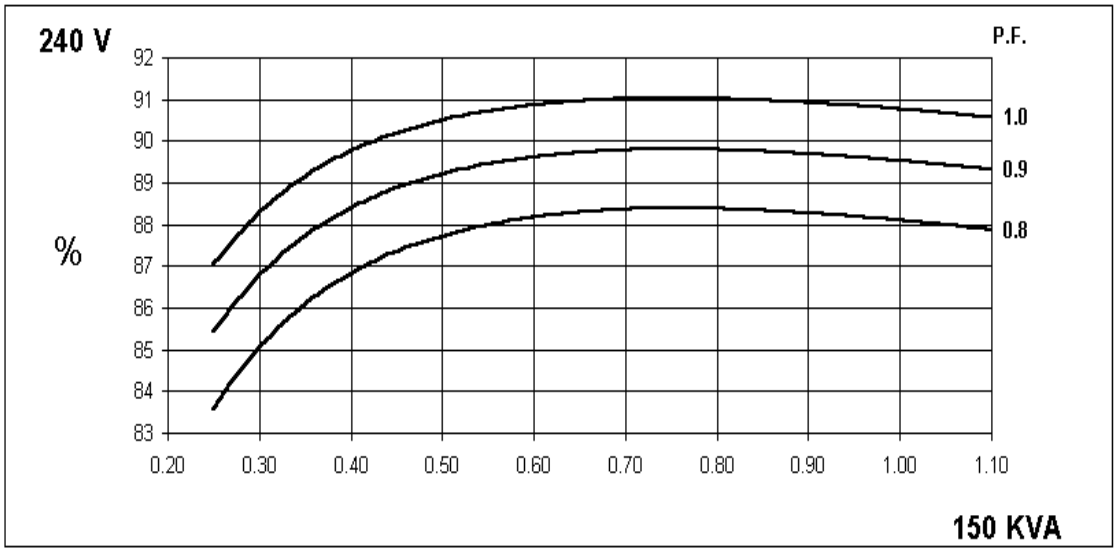
Winding 311 Single Phase

STAMFORD

SINGLE PHASE EFFICIENCY CURVES







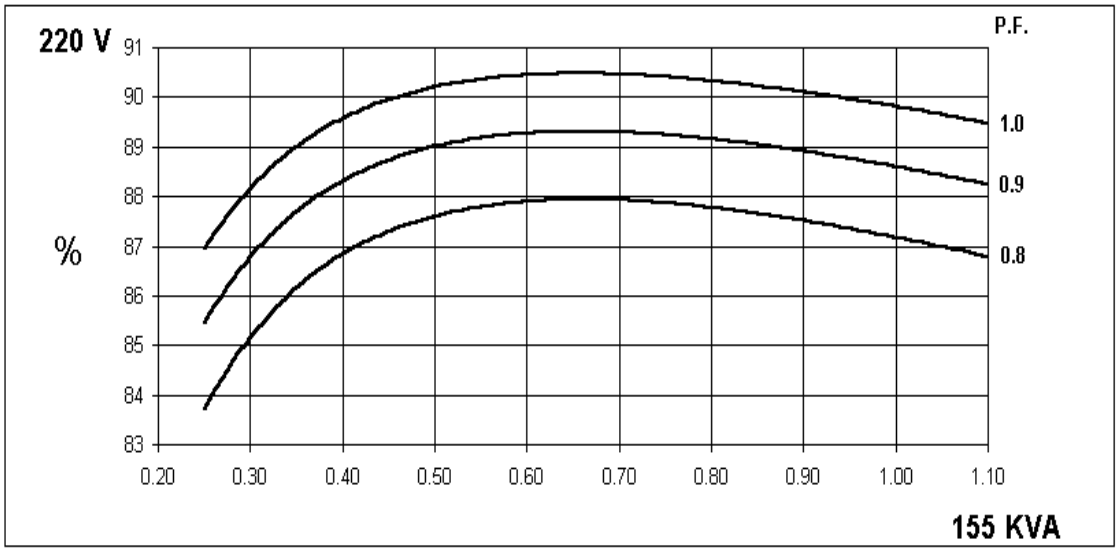
60 Hz

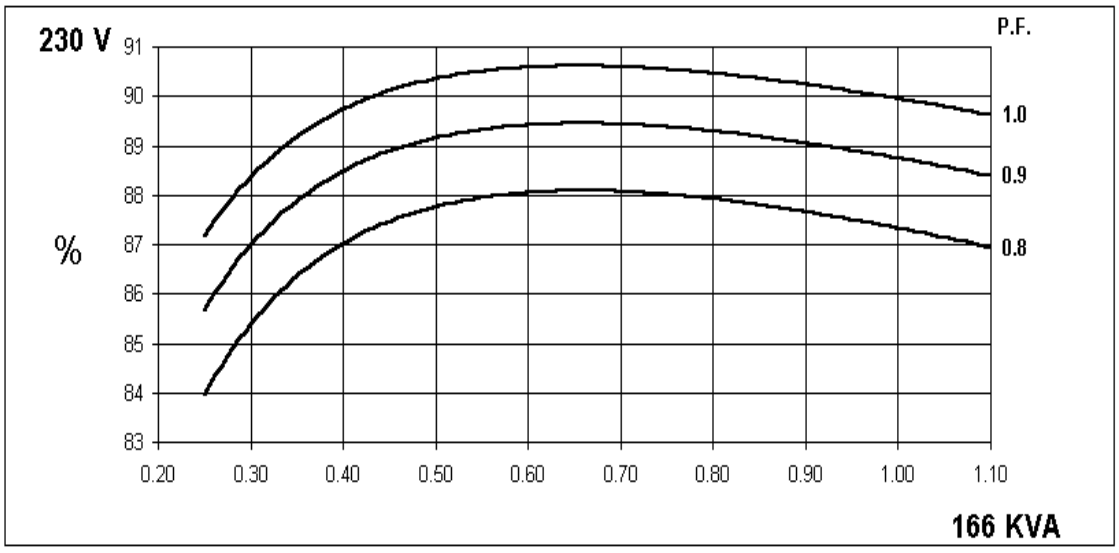
UCDI274K

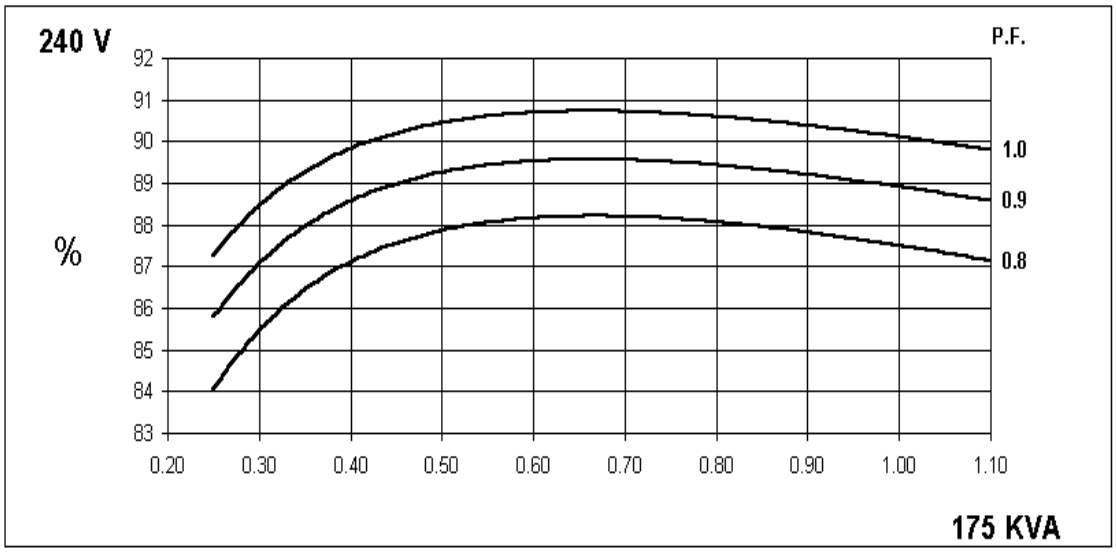
Winding 311 Single Phase

STAMFORD

SINGLE PHASE EFFICIENCY CURVES







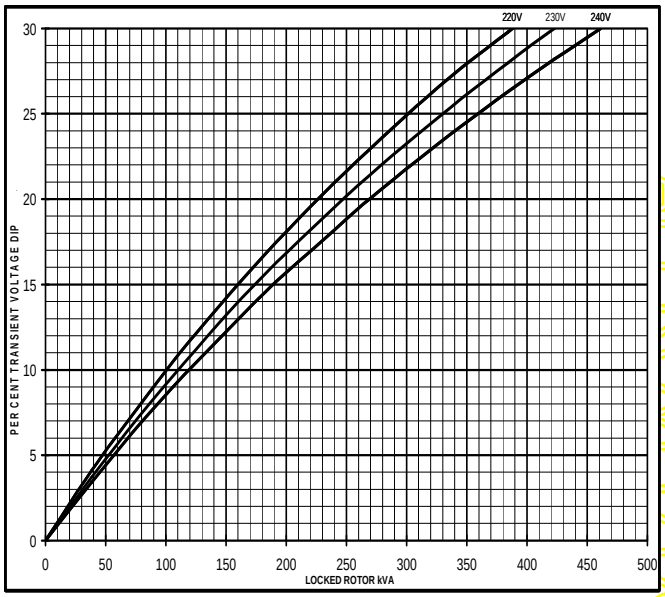
UCDI274K

Winding 311 Single Phase

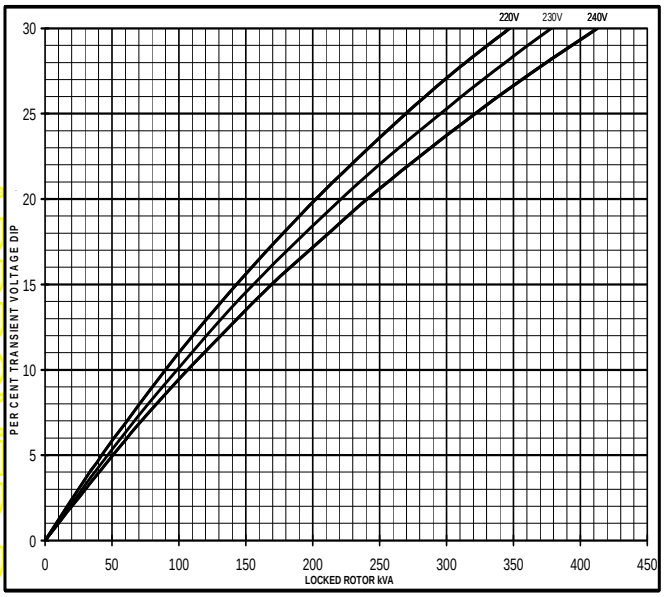
Locked Rotor Motor Starting Curve

50 Hz

MX

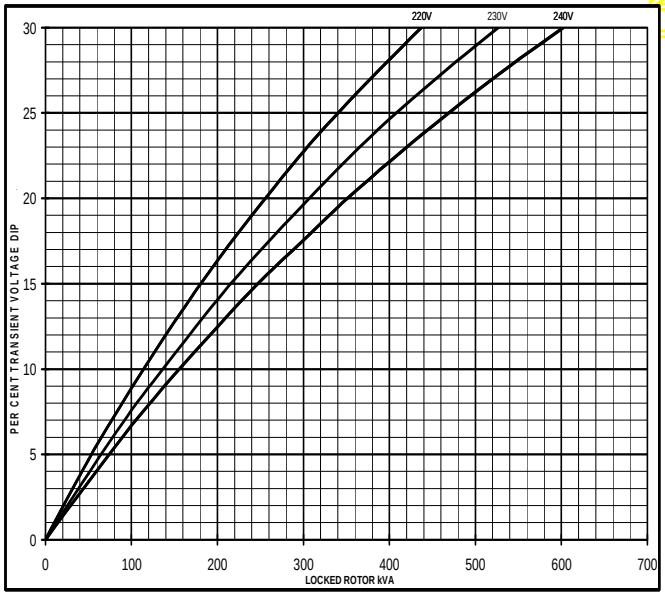


SX

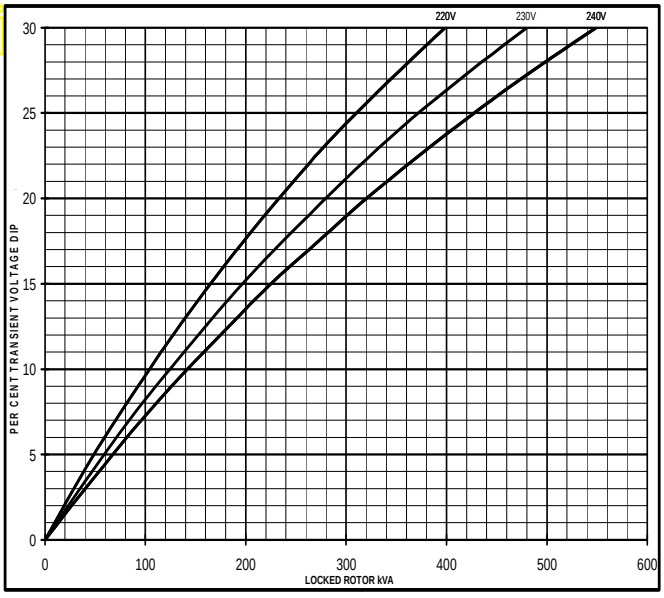


60 Hz

MX



SX



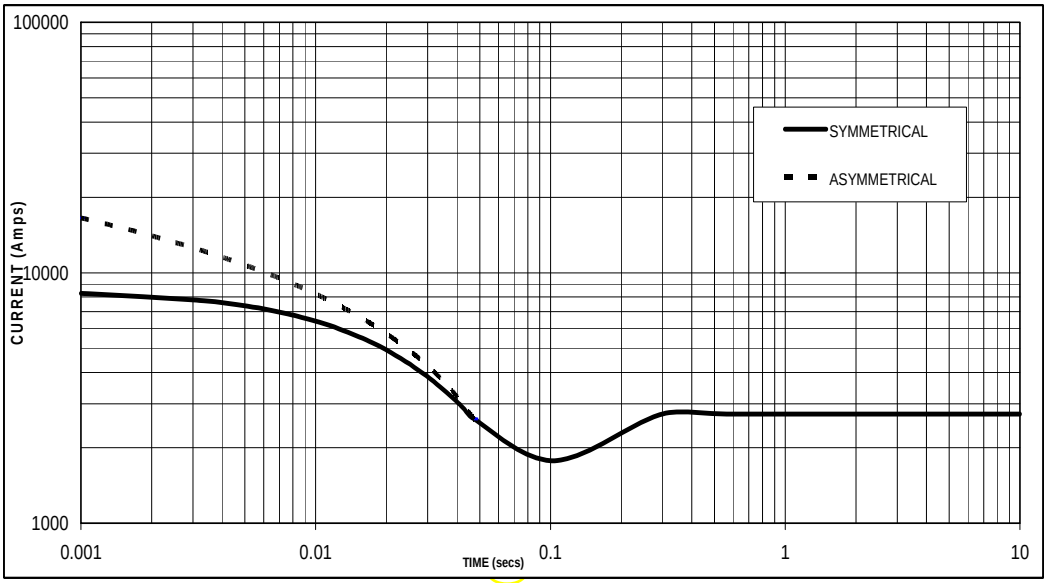
STAMFORD

Winding 311 Single Phase

Single Phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed

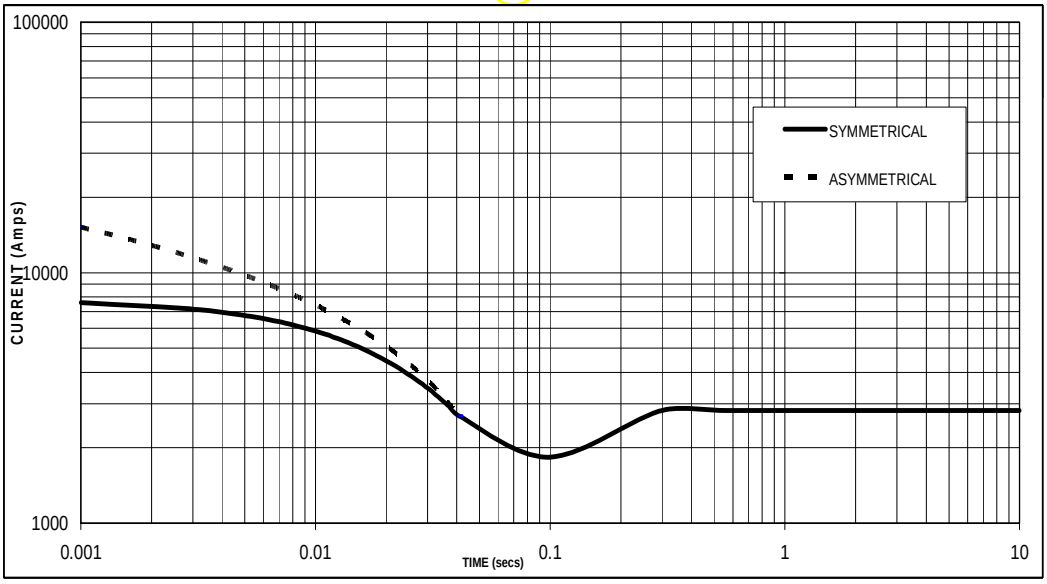
Based on Double Delta connection.

50 Hz



Sustained Short Circuit = 2730 Amps

60 Hz



Sustained Short Circuit = 2820 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

UCDI274K

Winding 311 Single Phase

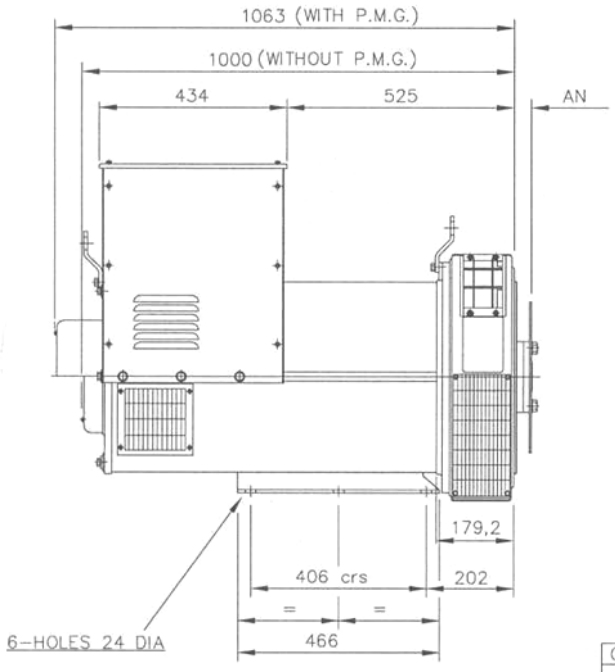
STAMFORD

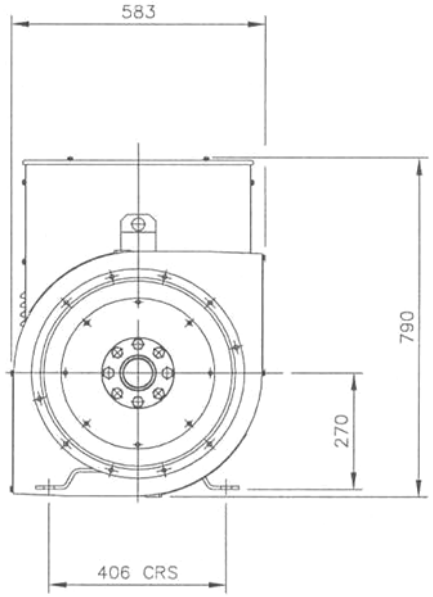
RATINGS

	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		
50	Double Delta (V)	220	230	240	220	230	240	220	230	240	220	230	240
	Parallel Delta (V)	110	115	120	110	115	120	110	115	120	110	115	120
	kVA	137.0	137.0	137.0	150.0	150.0	150.0	137.0	137.0	137.0	150.0	150.0	150.0
	kW	109.6	109.6	109.6	120.0	120.0	120.0	137.0	137.0	137.0	150.0	150.0	150.0
	Efficiency (%)	87.9	88.1	88.3	87.6	87.9	88.1	90.6	90.8	90.9	90.3	90.6	90.8
	kW Input	124.7	124.4	124.1	137.0	136.5	136.2	151.2	150.9	150.7	166.1	165.6	165.2

	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		
60	Double Delta (V)	220	230	240	220	230	240	220	230	240	220	230	240
	Parallel Delta (V)	110	115	120	110	115	120	110	115	120	110	115	120
	kVA	142.0	151.0	160.0	155.0	166.0	175.0	142.0	151.0	160.0	155.0	166.0	175.0
	kW	113.6	120.8	128.0	124.0	132.8	140.0	142.0	151.0	160.0	155.0	166.0	175.0
	Efficiency (%)	87.5	87.6	87.8	87.2	87.3	87.5	90.1	90.2	90.4	89.8	90.0	90.1
	kW Input	129.8	137.9	145.8	142.2	152.1	160.0	157.6	167.4	177.0	172.6	184.4	194.2

DIMENSIONS





COUPLING DISC	AN
SAE 11,5	39,68
SAE 14	25,4

APPROVED DOCUMENT

STAMFORD

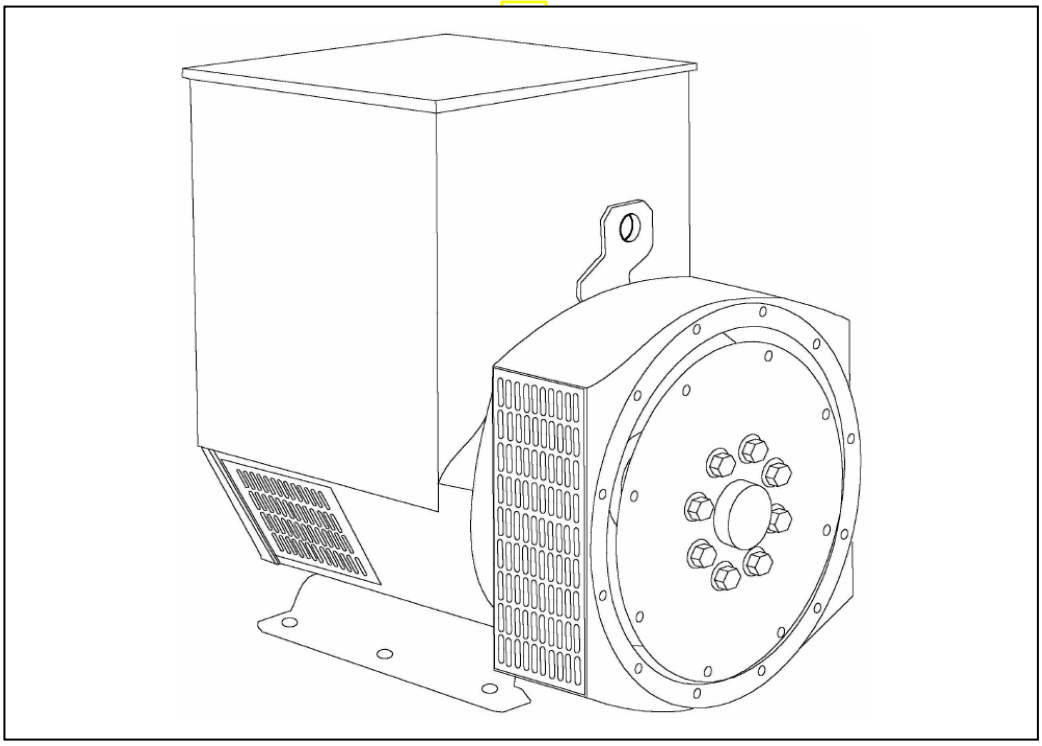
Head Office Address:
Barnack Road, Stamford
Lincolnshire, PE9 2NB
United Kingdom
Tel: +44 (0) 1780 484000
Fax: +44 (0) 1780 484100

www.cumminsgeneratortechnologies.com

STAMFORD®

UCI274G - Winding 311

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.
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%.

DE RATES

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							

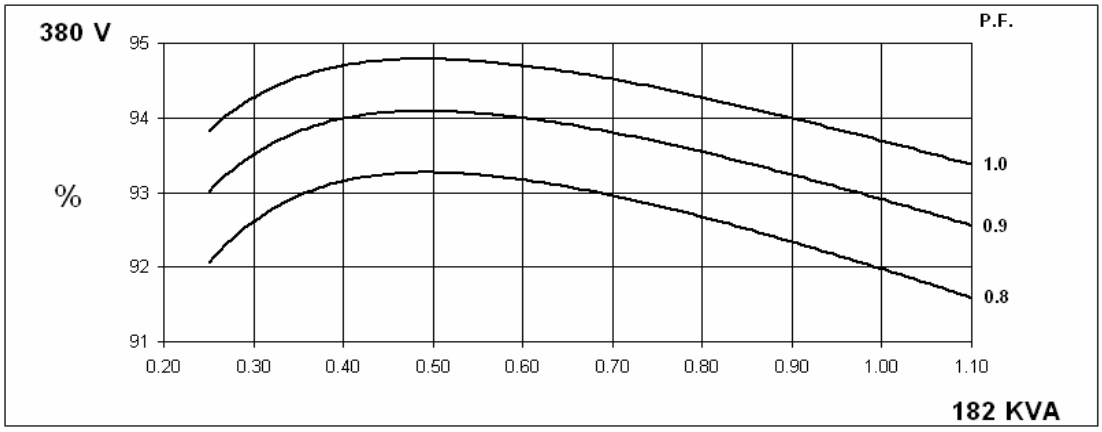
50 Hz

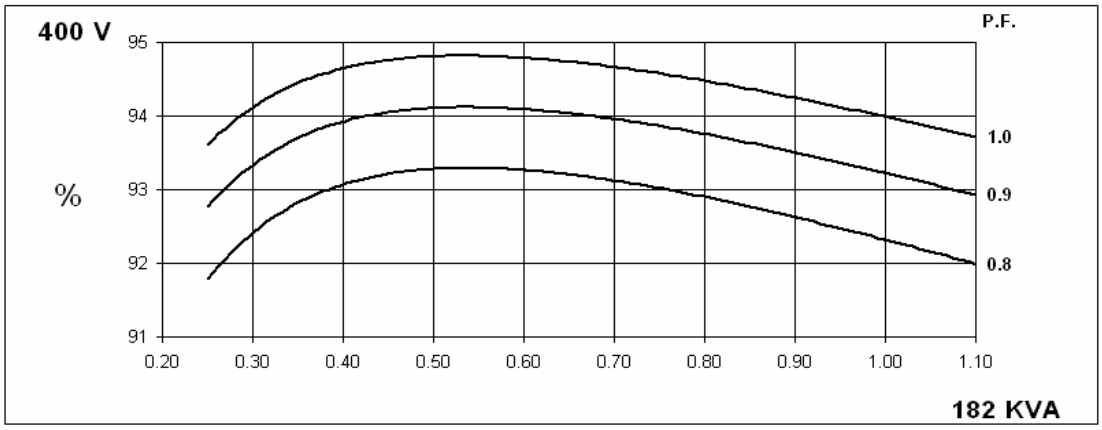
UCI274G

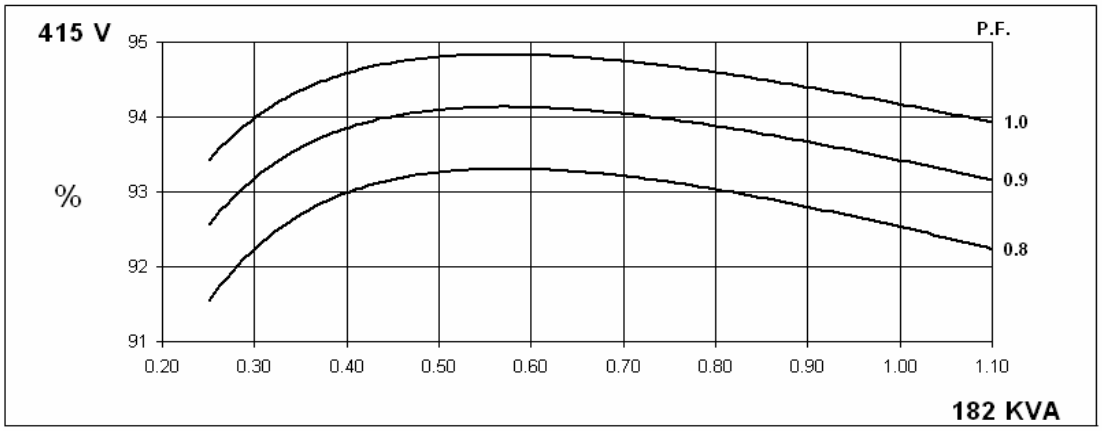
Winding 311

STAMFORD

THREE PHASE EFFICIENCY CURVES







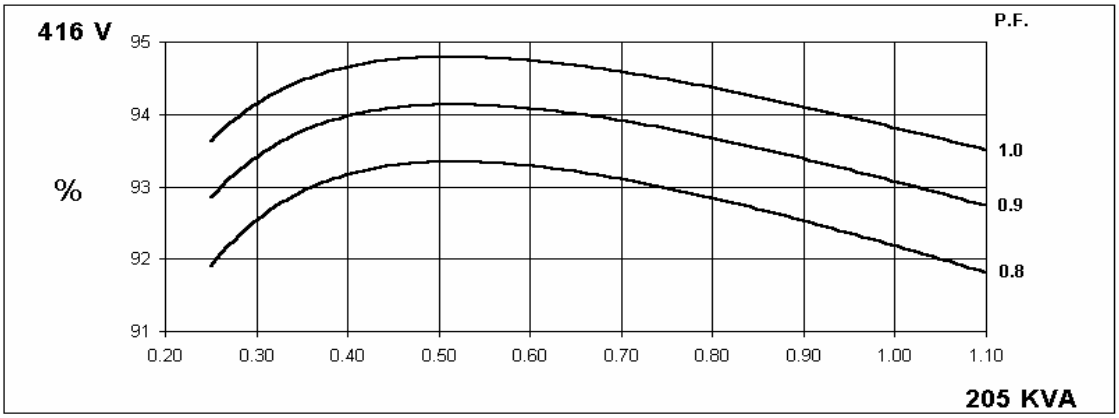
60 Hz

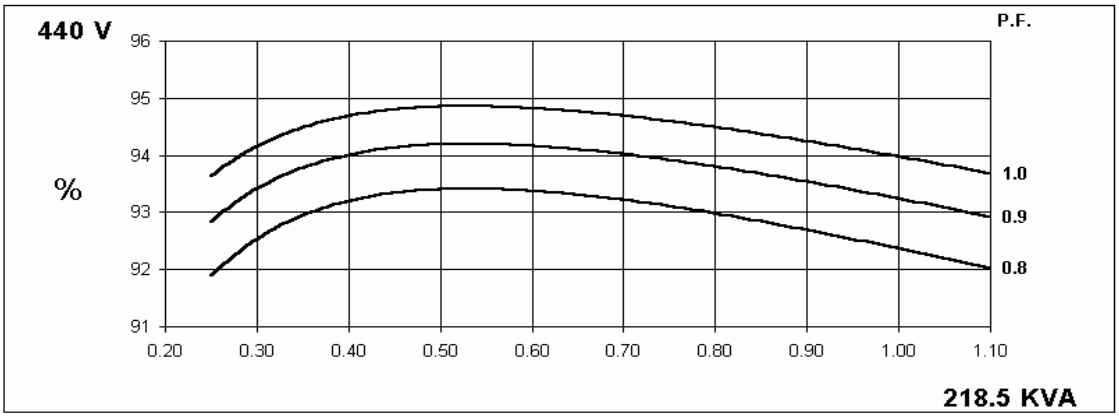
UCI274G

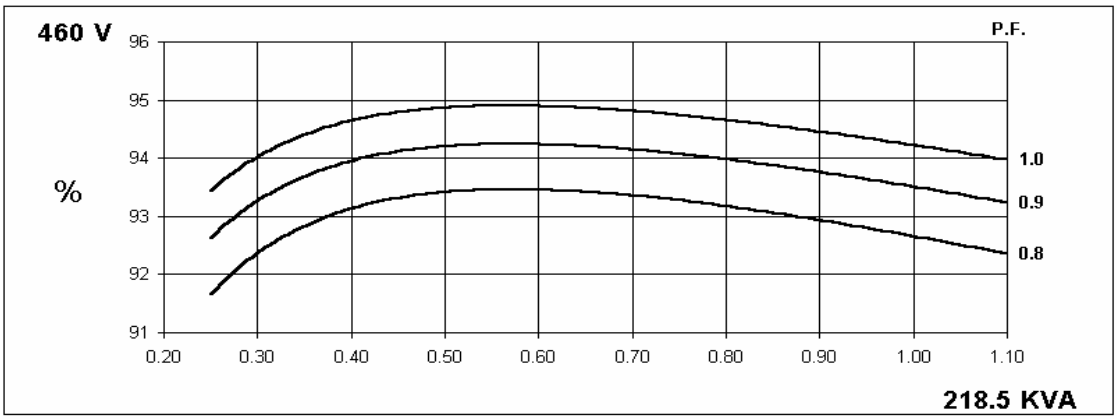
Winding 311

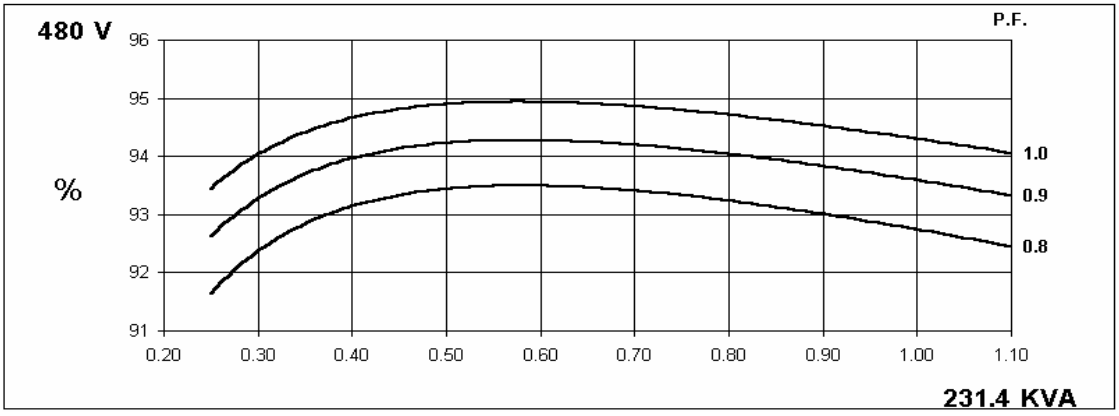
STAMFORD

THREE PHASE EFFICIENCY CURVES









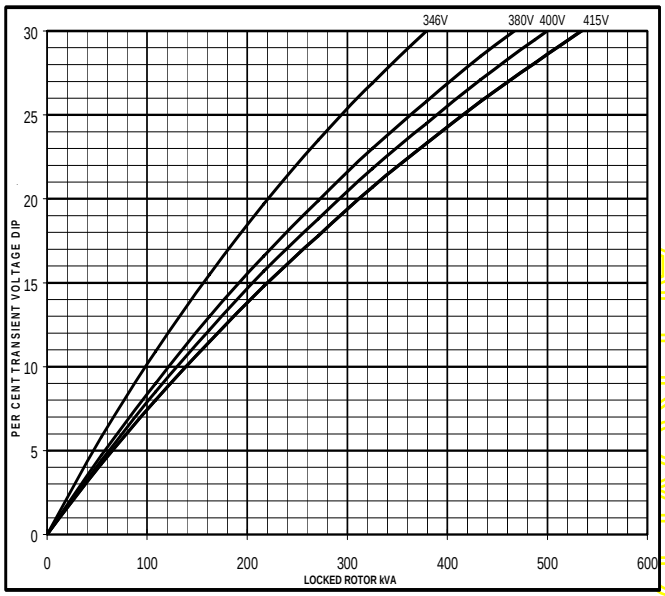
UCI274G

Winding 311

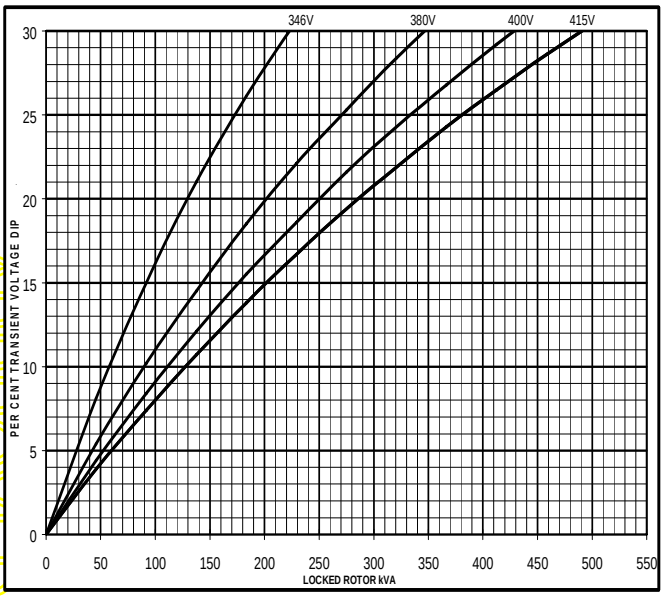
Locked Rotor Motor Starting Curve

50 Hz

MX

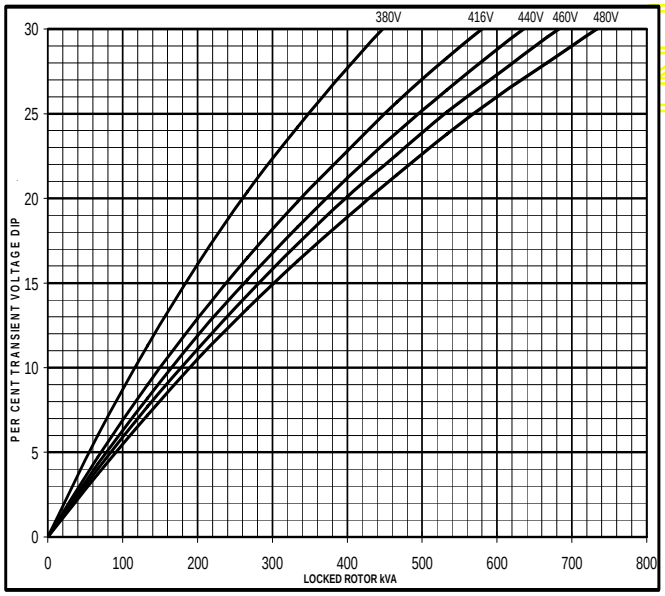


SX

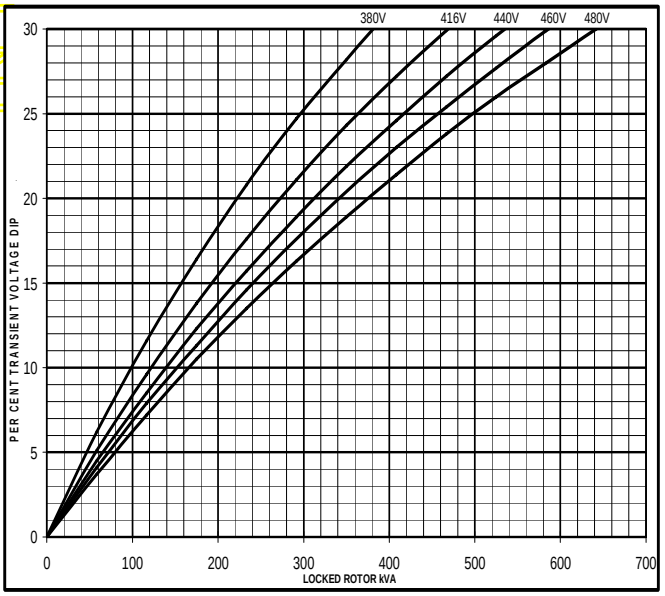


60 Hz

MX

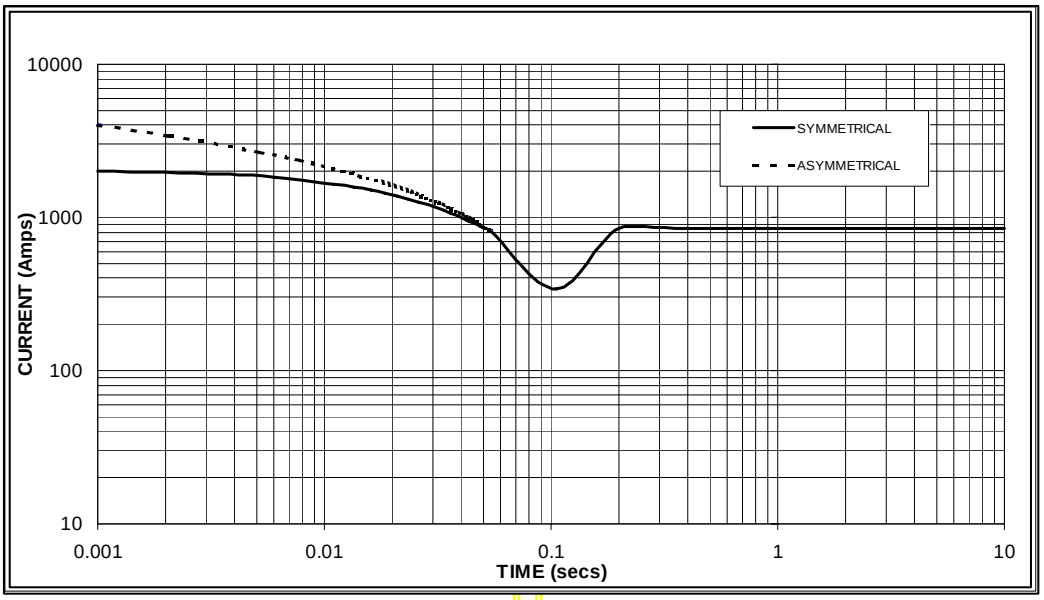


SX



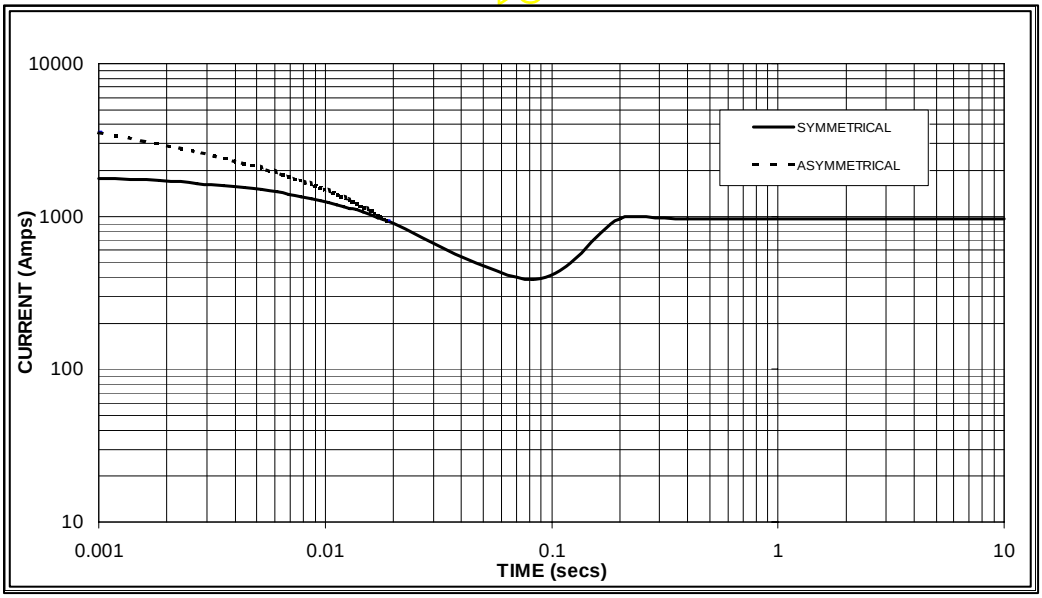
Three-phase Short Circuit Decrement Curve. No-load Excitation at Rated Speed Based on star (wye) connection.

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

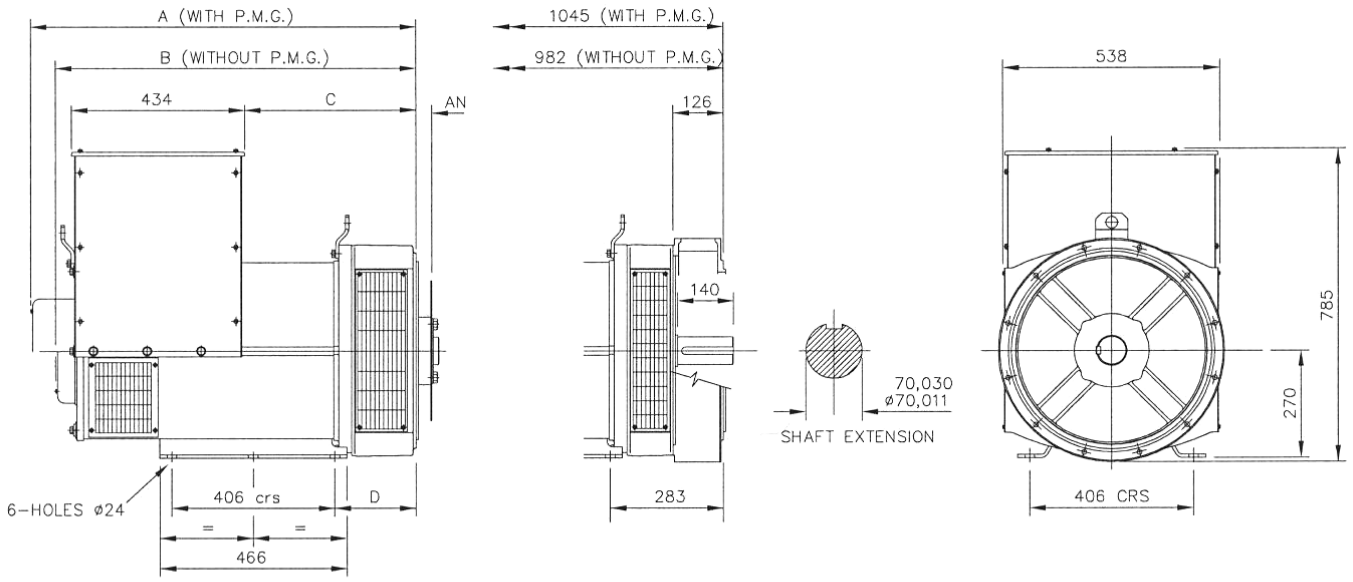
UCI274G

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

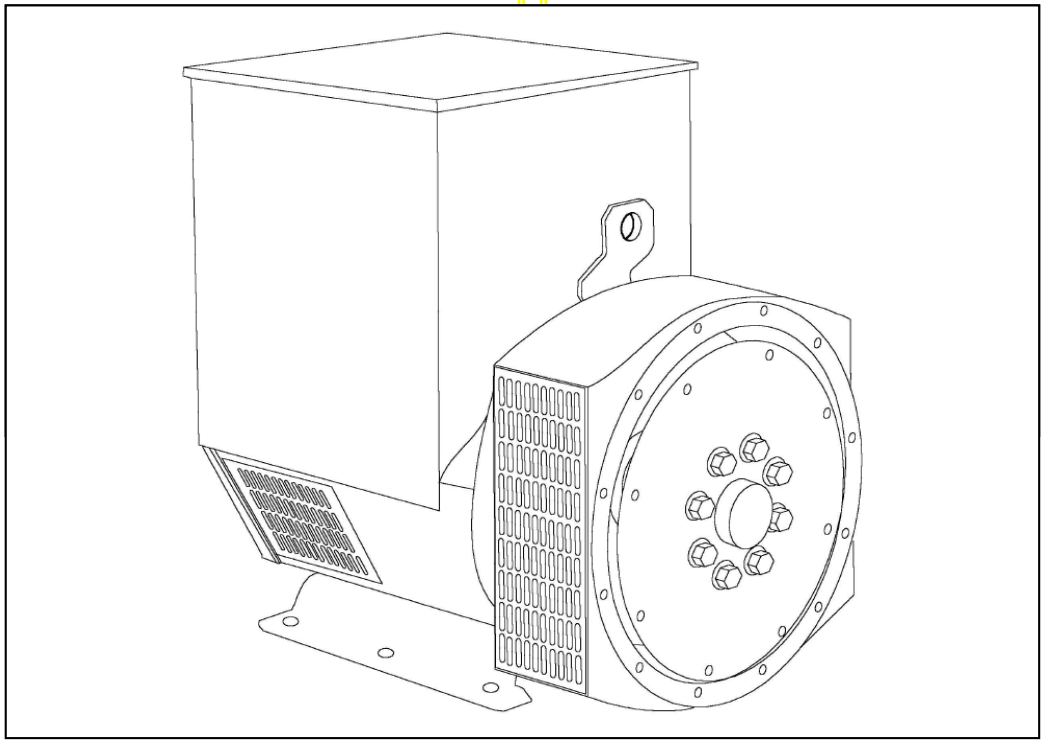
Head Office Address:
Barnack Road, Stamford
Lincolnshire, PE9 2NB
United Kingdom
Tel: +44 (0) 1780 484000
Fax: +44 (0) 1780 484100

www.cumminsgeneratortechnologies.com

STAMFORD®

UCI274G - Winding 17

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.
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.

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 6 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.

UCI274G

STAMFORD

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		

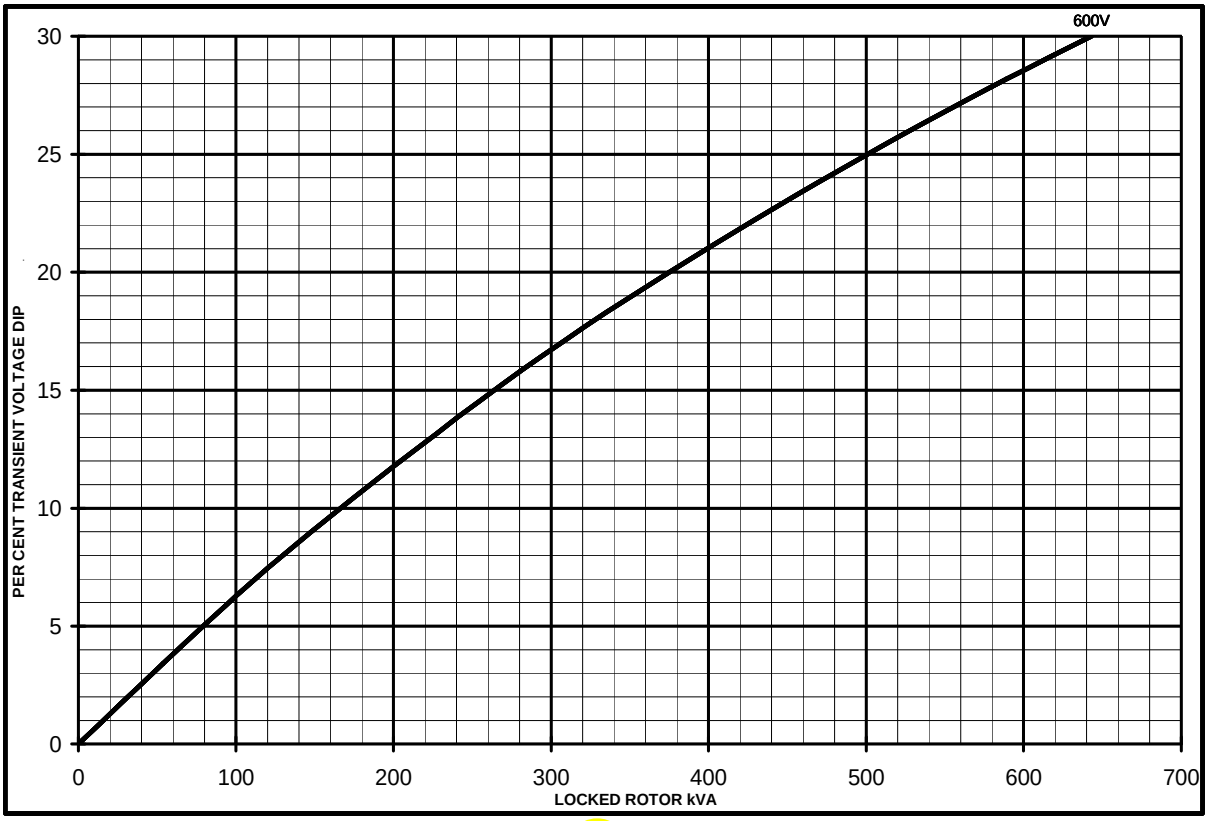
INSULATION SYSTEM	CLASS H	
PROTECTION	IP23	
RATED POWER FACTOR	0.8	
STATOR WINDING	DOUBLE LAYER CONCENTRIC	
WINDING PITCH	TWO THIRDS	
WINDING LEADS	12	
STATOR WDG. RESISTANCE	0.026 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED	
ROTOR WDG. RESISTANCE	1.69 Ohms at 22°C	
EXCITER STATOR RESISTANCE	20 Ohms 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 kgm^2	1.7169 kgm^2
SHIPPING WEIGHTS in a crate	613 kg	630 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 m^3/sec 1308 cfm	
VOLTAGE SERIES STAR	600V	
VOLTAGE PARALLEL STAR	300V	
VOLTAGE SERIES DELTA	346V	
kVA BASE RATING FOR REACTANCE VALUES	225	
Xd DIR. AXIS SYNCHRONOUS	1.77	
X'd DIR. AXIS TRANSIENT	0.15	
X"d DIR. AXIS SUBTRANSIENT	0.10	
Xq QUAD. AXIS REACTANCE	1.07	
X"q QUAD. AXIS SUBTRANSIENT	0.13	
X_L LEAKAGE REACTANCE	0.07	
X_2 NEGATIVE SEQUENCE	0.11	
X_0 ZERO SEQUENCE	0.07	
REACTANCES ARE SATURATED	VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED	
T'd TRANSIENT TIME CONST.	0.038s	
T"d SUB-TRANSTIME CONST.	0.012s	
T'do O.C. FIELD TIME CONST.	1.0s	
Ta ARMATURE TIME CONST.	0.01s	
SHORT CIRCUIT RATIO	1/Xd	

UCI274G

Winding 17

SX

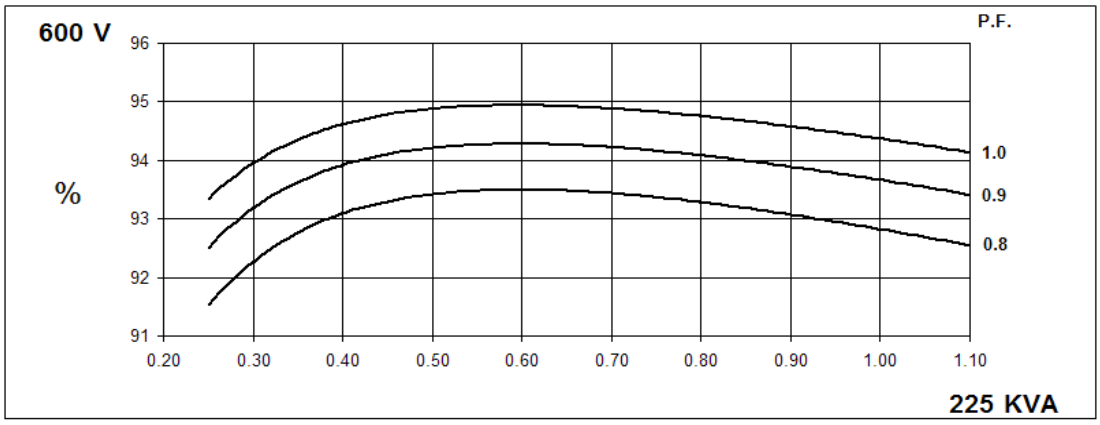
Locked Rotor Motor Starting Curves



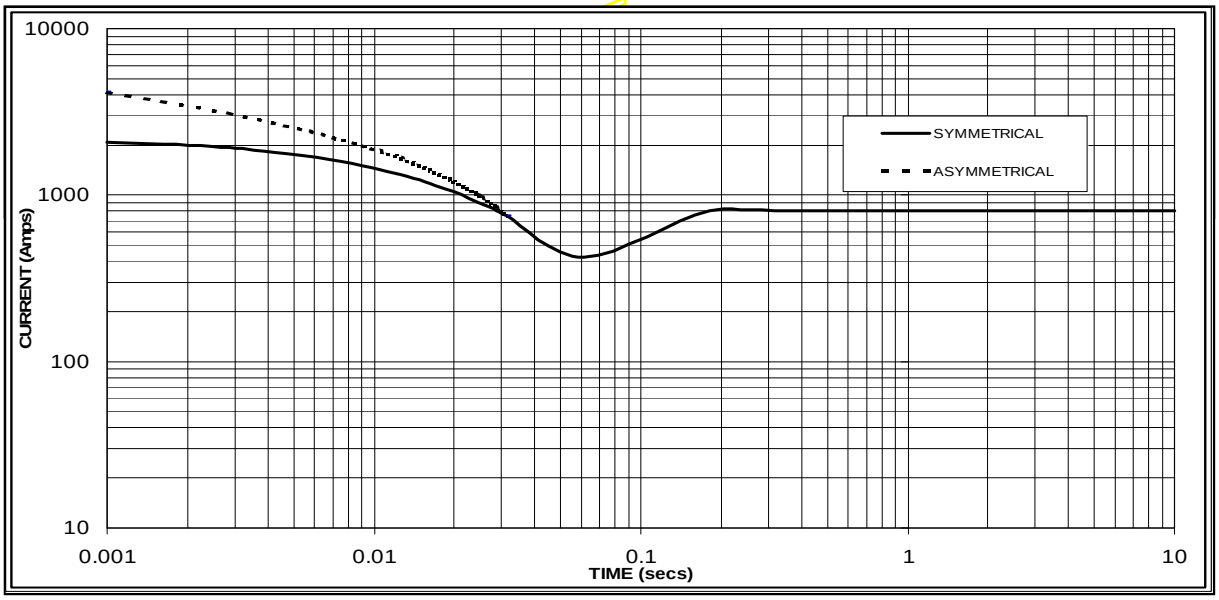
MX

STAMFORD

THREE PHASE EFFICIENCY CURVES



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



Sustained Short Circuit = 800 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

UCI274G

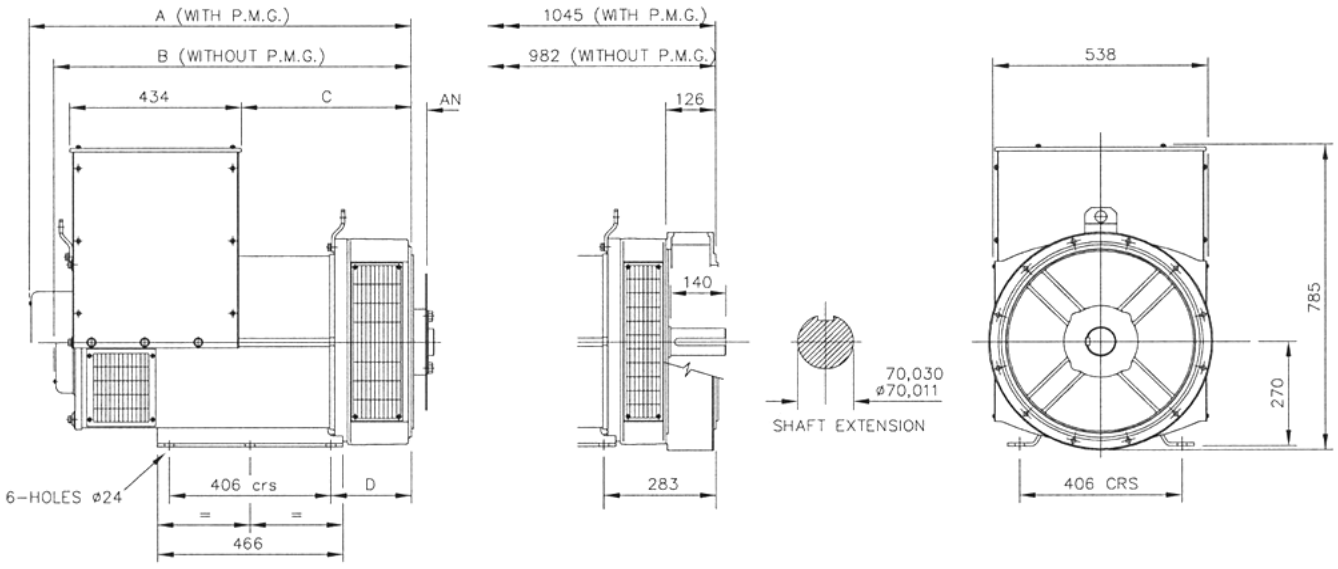
Winding 17 / 0.8 Power Factor

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	206.3	225.0	240.0	246.3
kW	165.0	180.0	192.0	197.0
Efficiency (%)	93.0	92.8	92.6	92.6
kW Input	177.4	193.9	207.3	212.9

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

Head Office Address:
Barnack Road, Stamford
Lincolnshire, PE9 2NB
United Kingdom
Tel: +44 (0) 1780 484000
Fax: +44 (0) 1780 484100

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.

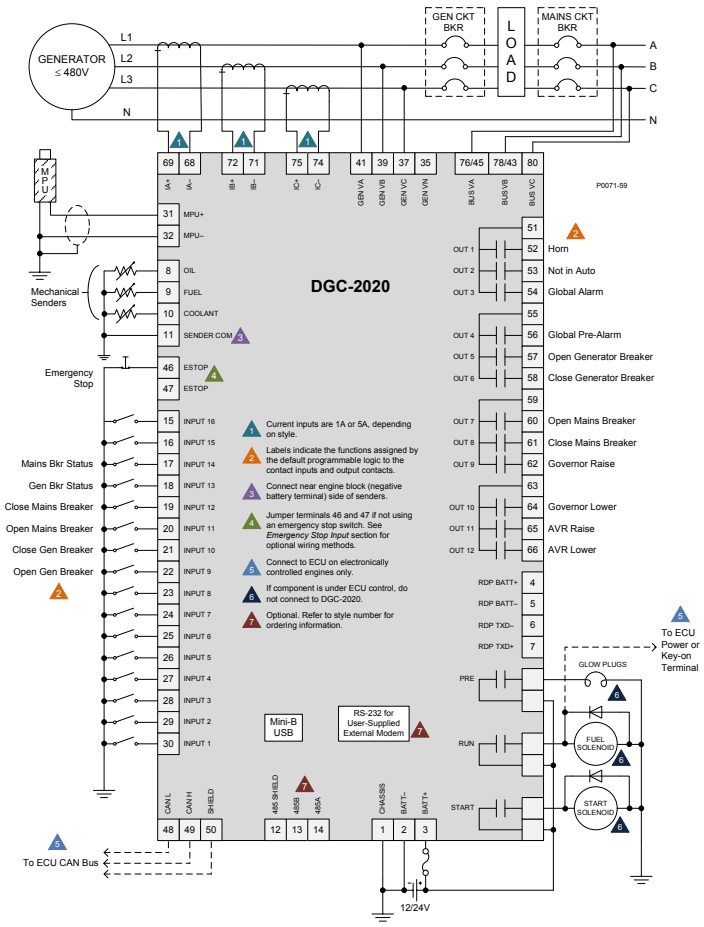


Figure 1 - DGC-2020 Connection Diagram for a Typical Application

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

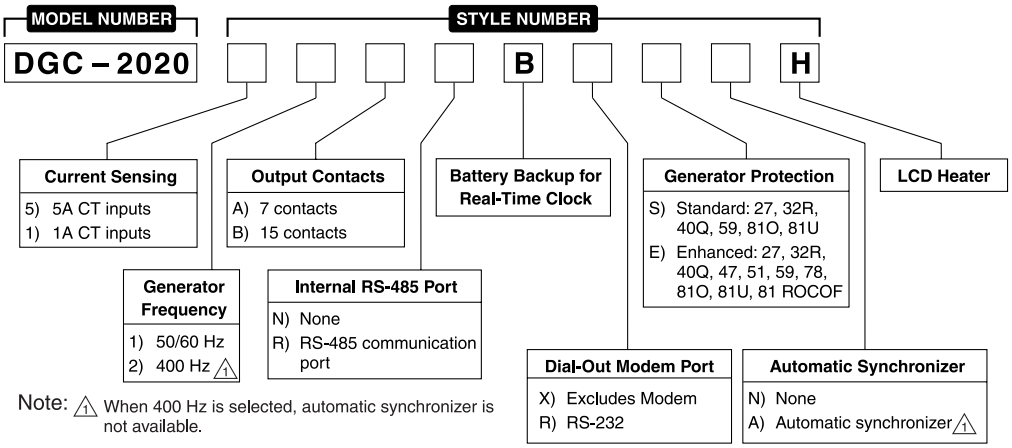
Operating Temp:	-40°C to 70°C (-40°F to 158°F)
Storage Temp:	-40°C to 85°C (-40°F to 185°F)
Humidity:	IEC 68-2-38
Salt Fog:	ASTM B 17-73, IEC 68-2-11
Ingress Protection:	IEC IP54 for front panel
Shock:	15 G in three perpendicular planes
Vibration:	
5 to 29 Hz:	1.5 G peak
29 to 52 Hz:	0.036″ (0.914 mm) 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
Highland, IL USA Wasselonne, France
Taylor, TX USA Suzhou, China
Basler Plastics, LLC

Basler Electric®
12570 State Route 143, Highland, Illinois 62249-1074 USA
Tel +1 618.654.2341 Fax +1 618.654.2351
email:info@basler.com www.basler.com

P.A.E. Les Pins, 67319 Wasselonne Cedex, FRANCE
Tel +33 3.88.87.1010 Fax +33 3.88.87.0808
e-mail: franceinfo@basler.com

No. 59 Heshun Road Loufeng District (N),
Suzhou Industrial Park, 215122, Suzhou, P.R.China
Tel +86(0)512.8227.2888 Fax +86(0)512.8227.2887
e-mail: chinainfo@basler.com

111 North Bridge Road #15-06 Peninsula Plaza
Singapore 179098
Tel +65 68.44.6445 Fax +65 68.44.8902
e-mail: singaporeinfo@basler.com

Tmax-Molded Case Circuit Breakers

T4 250A Frame

AC Circuit Breakers and Switches

DC Circuit Breakers and Switches

3 and 4 Pole

Motor Circuit Protectors

Higher Performances in Less Space

Field Installable Accessories and Trip Units

Dimensions 3P Fixed Version 8.07H x 4.13W x 4.07D

Compliance with Standards

UL 489
CSA C22.2 No.5.1
IEC 60947-2
Standards
EC directive:
– “Low Voltage Directives” (LVD) no. 73/23 EEC
– “Electromagnetic Compatibility Directive” (EMC) no.89/336 EEC

The ABB Quality System complies with the international ISO 9001 - 2000 Standard (model for quality assurance in design, development, construction, and installation and service) and with the equivalent European EN ISO 9001 and Italian UNI EN ISO 9001 Standards

Interrupting ratings (RMS sym. kAmps)		T4				
Continuous Current Rating		250A				
Number of Poles		3-4				
		N	**S**	**H**	**L**	**V**
AC						
240V		65	100	150	200	200
480V		25	35	65	100	150
600V		18	25	35	65	100
DC*						
500V	2 poles in series	25	35	50	65	100
600V	3 poles in series	16	25	35	50	65

*Thermo Magnetic Trip Only

Company Quality Systems and Environmental Systems

The new Tmax series has a hologram on the front, obtained using special anti-imitation techniques, which guarantees the quality and that the circuit breaker is an original ABB product.

Attention to protection of the environment and to health and safety in the work place is another priority commitment for ABB and, as confirmation of this, the company environmental management system has been certified by RINA in 1997, in conformity with the international ISO 14001 Standard. This certification has been integrated in 1999 with the Management System for Health and Safety in the workplace, according to OHSAS 18001 (British Standards), obtaining one of the first certification of integrated management System, QES (Quality, Environment, Safety) issued by RINA. ABB - the first industry in the electromechanical section in Italy to obtain this recognition - thanks to a revision of the production process with an eye to ecology has been able to reduce the consumption of raw materials and waste from processing by 20%. ABB's commitment to safeguarding the environment is also shown in a concrete way by the Life Cycle Assessments of its products carried out directly by the ABB Research and Development in collaboration with the ABB Research Center. Selection of materials, processes and packing materials is made optimizing the true environmental impact of the product, also foreseeing the possibility of its being recycled.

Mounting

Fixed
Plug-in
Drawout

Connections

Busbar connection or compression lugs
Pressure-type terminals for bare cables
Rear connections

Trip Unit

TMF thermo magnetic trip units, with fixed thermal and magnetic threshold (I3 = 10 x In);

TMD (up to 50 A) thermo magnetic trip units with adjustable thermal threshold (I1 = 0.7…1 x In) and fixed magnetic threshold (I3 = 10 x In).

TMA thermo magnetic trip units, with adjustable thermal threshold (I1 = 0.7…1 x In) and adjustable magnetic threshold (I3 = 5…10 x In).

PR221DS, PR222DS/P and PR222DS/PD-A electronic trip unit

Weight (lbs)	6.18

Auxiliary Devices for Indication and Control

- Auxiliary contacts - AUX
- Undervoltage release - UVR
- Shunt trip - SOR
- Terminal covers
- Front for lever operating mechanism - FLD
- Direct rotary handle - RHD
- Stored energy motor operator - MOE
- Key lock - KLF
- Early auxiliary contact - AUE
- Transmitted rotary handle - RHE
- Front terminal for copper cable - FC Cu
- Front extended terminal - EF
- Front terminal for copper-aluminum - FC CuAl
- Front extended spread terminal – ES
- Distribution lugs
- Rear orientated terminal - R
- Phase separators
- Residual current release (IEC Only)

Publication LV038
No. 1SXU 210 038 D0201
Printed in USA, November, 2005

ABB Inc.

1206 Hatton Road
Wichita Falls, TX 76302
For more information and
the location of your local
field office please go to
www.abb-control.com

Tmax-Molded Case Circuit Breakers

T5 400A and 600A Frame

AC Circuit Breakers and Switches

DC Circuit Breakers and Switches (400A Only)

3 and 4 Pole

Motor Circuit Protectors

Higher Performances in Less Space

Field Installable Accessories and Trip Units

Dimensions 3P Fixed Version 8.07H x 5.51W x 4.07D

Compliance with Standards

UL 489
CSA C22.2 No.5.1
IEC 60947-2
Standards
EC directive:
– “Low Voltage Directives” (LVD) no. 73/23 EEC
– “Electromagnetic Compatibility Directive” (EMC) no.89/336 EEC

The ABB Quality System complies with the international ISO 9001 - 2000 Standard (model for quality assurance in design, development, construction, and installation and service) and with the equivalent European EN ISO 9001 and Italian UNI EN ISO 9001 Standards

Interrupting ratings (RMS sym. kAmps)		T5				
Continuous Current Rating		400-600A				
Number of Poles		3-4				
		N	**S**	**H**	**L**	**V**
AC						
240V		65	100	150	200	200
480V		25	35	65	100	150
600V		18	25	35	65	100
DC* (400 A only)						
500V	2 poles in series	25	35	50	65	100
600V	3 poles in series	16	25	35	50	65

*Thermo Magnetic Trip Only

Company Quality Systems and Environmental Systems

The new Tmax series has a hologram on the front, obtained using special anti-imitation techniques, which guarantees the quality and that the circuit breaker is an original ABB product.

Attention to protection of the environment and to health and safety in the work place is another priority commitment for ABB and, as confirmation of this, the company environmental management system has been certified by RINA in 1997, in conformity with the international ISO 14001 Standard. This certification has been integrated in 1999 with the Management System for Health and Safety in the workplace, according to OHSAS 18001 (British Standards), obtaining one of the first certification of integrated management System, QES (Quality, Environment, Safety) issued by RINA. ABB - the first industry in the electromechanical section in Italy to obtain this recognition - thanks to a revision of the production process with an eye to ecology has been able to reduce the consumption of raw materials and waste from processing by 20%. ABB's commitment to safeguarding the environment is also shown in a concrete way by the Life Cycle Assessments of its products carried out directly by the ABB Research and Development in collaboration with the ABB Research Center. Selection of materials, processes and packing materials is made optimizing the true environmental impact of the product, also foreseeing the possibility of its being recycled.

Mounting

Fixed
Plug-in
Drawout

Connections

Busbar connection or compression lugs
Pressure-type terminals for bare cables
Rear connections

Trip Unit

TMA thermo magnetic trip units, with adjustable thermal threshold (I1 = 0.7…1 x In) and adjustable magnetic threshold (I3 = 5…10 x In).

PR221DS, PR222DS/P and PR222DS/PD-A electronic trip unit

Weight (lbs)	8.55

Auxiliary Devices for Indication and Control

- Auxiliary contacts - AUX
- Undervoltage release - UVR
- Shunt trip - SOR
- Terminal covers
- Front for lever operating mechanism - FLD
- Direct rotary handle - RHD
- Stored energy motor operator - MOE
- Key lock - KLF
- Early auxiliary contact - AUE
- Transmitted rotary handle - RHE
- Front terminal for copper cable - FC Cu
- Front extended terminal - EF
- Front terminal for copper-aluminum - FC CuAl
- Front extended spread terminal – ES
- Distribution lugs
- Rear orientated terminal - R
- Phase separators
- Residual current release (IEC Only)

Publication LV039
No. 1SXU 210 039 D0201
Printed in USA, November, 2005

ABB Inc.

1206 Hatton Road
Wichita Falls, TX 76302
For more information and
the location of your local
field office please go to
www.abb-control.com

Tmax-Molded Case Circuit Breakers

T6 800A Frame

AC Circuit Breakers and Switches

DC Circuit Breakers and Switches

3 and 4 Pole

Motor Circuit Protectors

Higher Performances in Less Space

Field Installable Accessories and Trip Units

Dimensions	3P Fixed Version	10.55H x 8.26W x 4.07D
Weight	20.9 (lbs)	

Compliance with Standards

UL 489
CSA C22.2 No.5.1
IEC 60947-2
Standards
EC directive:
– "Low Voltage Directives" (LVD) no. 73/23 EEC
– "Electromagnetic Compatibility Directive" (EMC) no.89/336 EEC

The ABB Quality System complies with the international ISO 9001 - 2000 Standard (model for quality assurance in design, development, construction, and installation and service) and with the equivalent European EN ISO 9001 and Italian UNI EN ISO 9001 Standards

Interrupting ratings (RMS sym. kAmps)		T6			
Continuous Current Rating		800			
Number of Poles		3-4			
		N	**S**	**H**	**L**
AC					
240V		65	100	200	200
480V		35	50	65	100
600V		20	25	35	42
DC*					
500V	2 poles in series	35	35	50	65
600V	3 poles in series	20	20	35	50

*Thermal Magnetic Trip Only

Company Quality Systems and Environmental Systems

The new Tmax series has a hologram on the front, obtained using special anti-imitation techniques, which guarantees the quality and that the circuit breaker is an original ABB product.

Attention to protection of the environment and to health and safety in the work place is another priority commitment for ABB and, as confirmation of this, the company environmental management system has been certified by RINA in 1997, in conformity with the international ISO 14001 Standard. This certification has been integrated in 1999 with the Management System for Health and Safety in the workplace, according to OHSAS 18001 (British Standards), obtaining one of the first certification of integrated management System, QES (Quality, Environment, Safety) issued by RINA. ABB - the first industry in the electromechanical section in Italy to obtain this recognition - thanks to a revision of the production process with an eye to ecology has been able to reduce the consumption of raw materials and waste from processing by 20%. ABB's commitment to safeguarding the environment is also shown in a concrete way by the Life Cycle Assessments of its products carried out directly by the ABB Research and Development in collaboration with the ABB Research Center. Selection of materials, processes and packing materials is made optimizing the true environmental impact of the product, also foreseeing the possibility of its being recycled.

Mounting

Fixed
Drawout

Connections

Busbar connection or compression lugs
Pressure-type terminals for bare cables
Rear connections

Trip Unit

TMA thermal magnetic trip units, with adjustable thermal threshold (I1 = 0.7…1 x In) and adjustable magnetic threshold (I3 = 5…10 x In).

PR221DS, PR222DS/P, and PR222DS/PD-A electronic trip unit

Auxiliary Devices for Indication and Control

- Auxiliary contacts - AUX
- Undervoltage release - UVR
- Shunt trip - SOR
- Terminal covers
- Front for lever operating mechanism - FLD
- Direct rotary handle - RHD
- Stored energy motor operator - MOE
- Key lock - KLF
- Early auxiliary contact - AUE
- Transmitted rotary handle - RHE
- Front extended terminal - EF
- Front terminal for copper-aluminum - FC CuAl
- Front extended spread terminal – ES
- Rear orientated terminal - R
- Phase separators
- Residual current relay (IEC Only)

Publication LV113
No. 1SXU210113D0201
Printed in USA, April, 2008

ABB Inc.

1206 Hatton Road
Wichita Falls, TX 76302
For more information and
the location of your local
field office please go to
www.abb-control.com

Digital Linear Chargers

Specifications

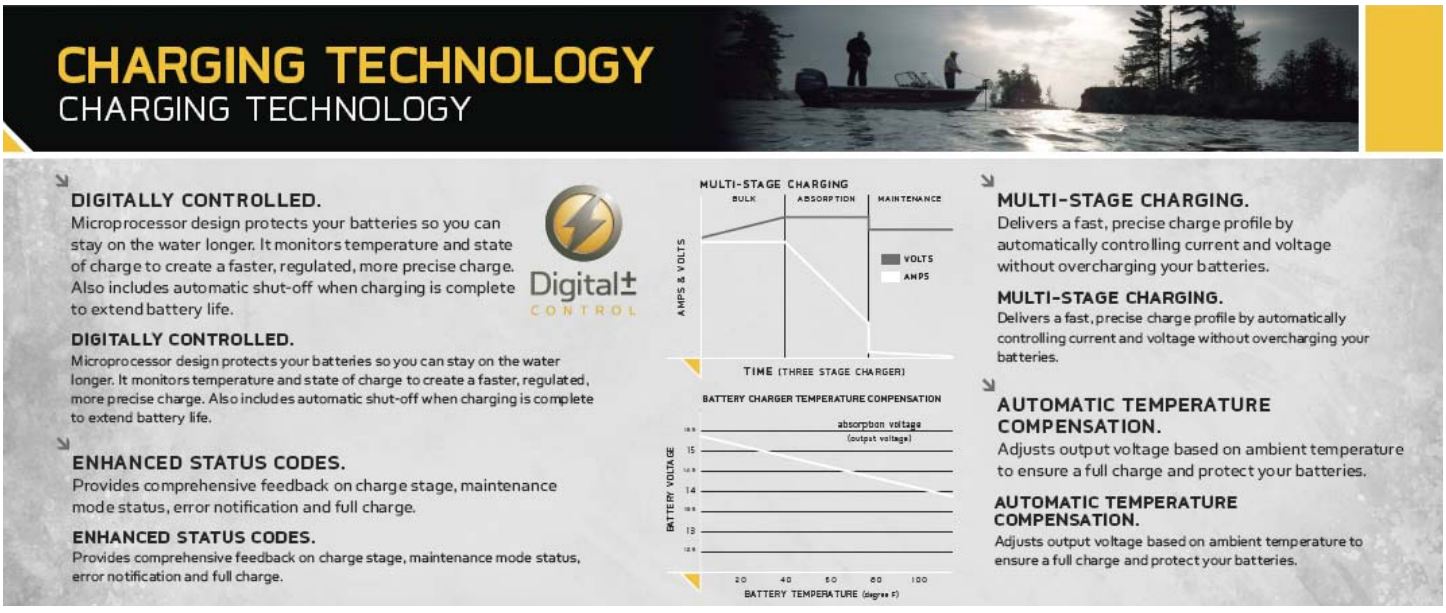
- Waterproof, shock-and vibration-resistant aluminum construction
- Saltwater tested and fully corrosion-resistant
- Short circuit, reverse polarity, and ignition protected
- For use with 12V/6 cell batteries that are flooded/wet cell, maintenance free or starved electrolyte (AGM) only
- FCC compliant
- 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

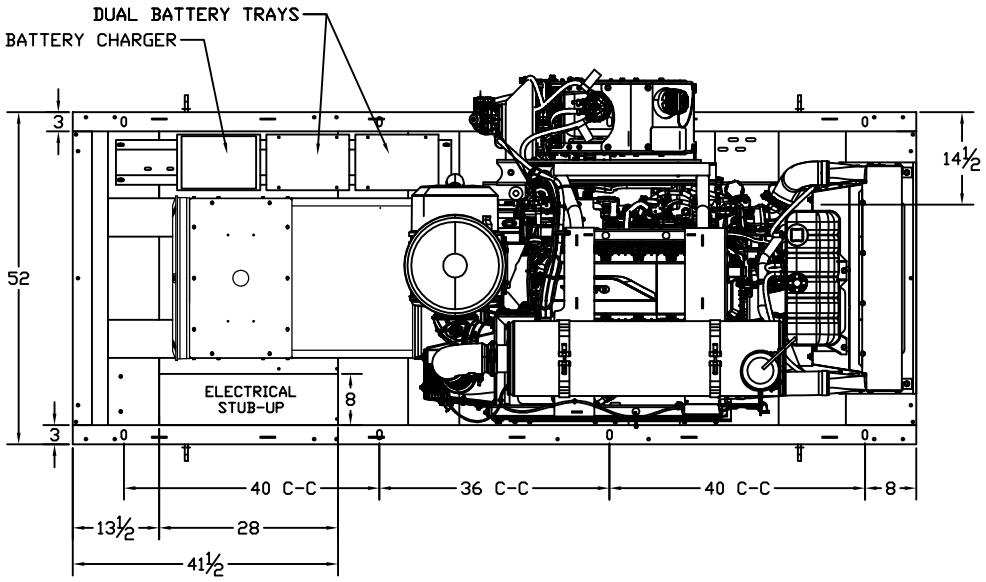
Specifications (cont.)

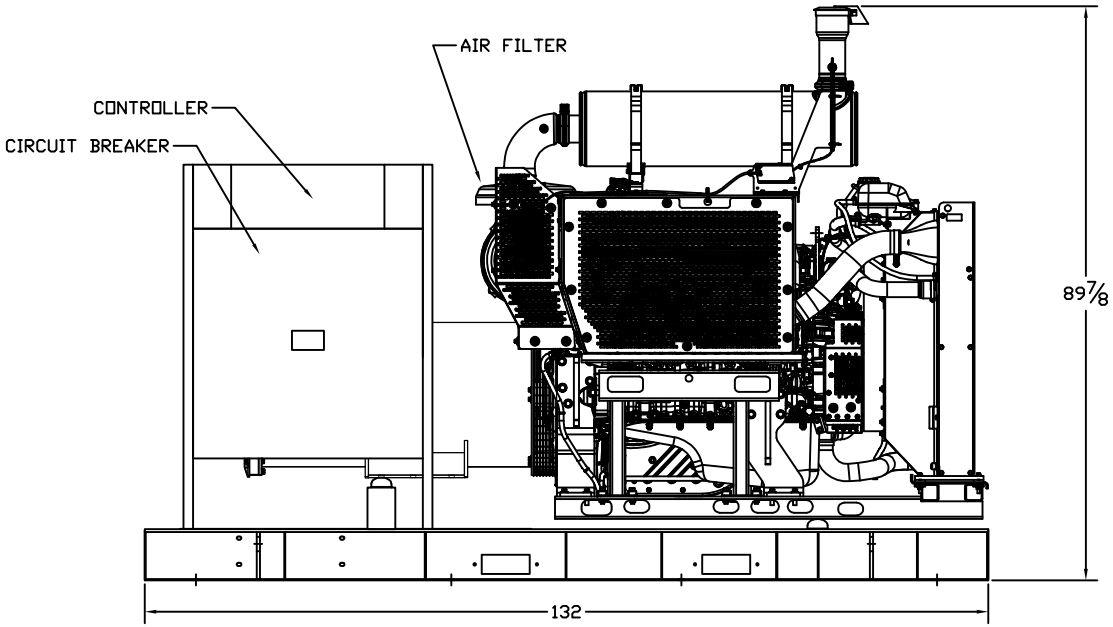
- New 4-color package design



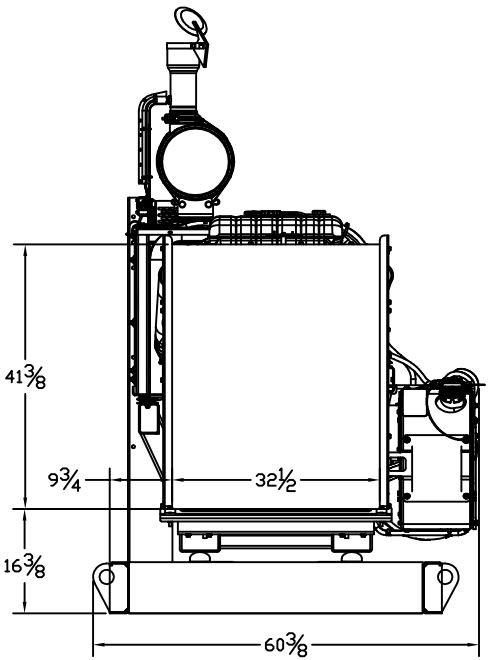
OUTLINE DIMENSIONS FOR T4D-1500 OPEN

TOP VIEW





RIGHT SIDE VIEW

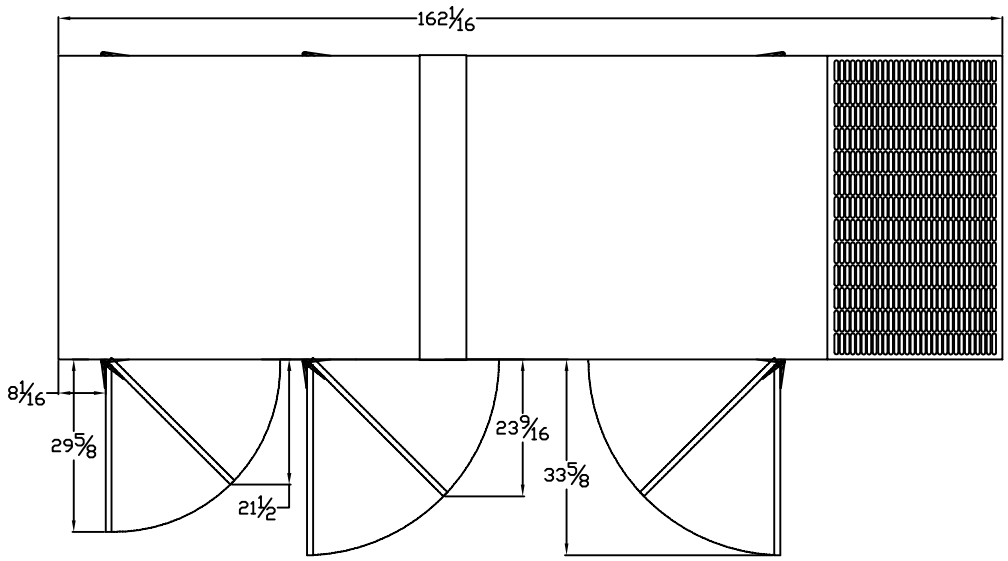


RADIATOR END VIEW

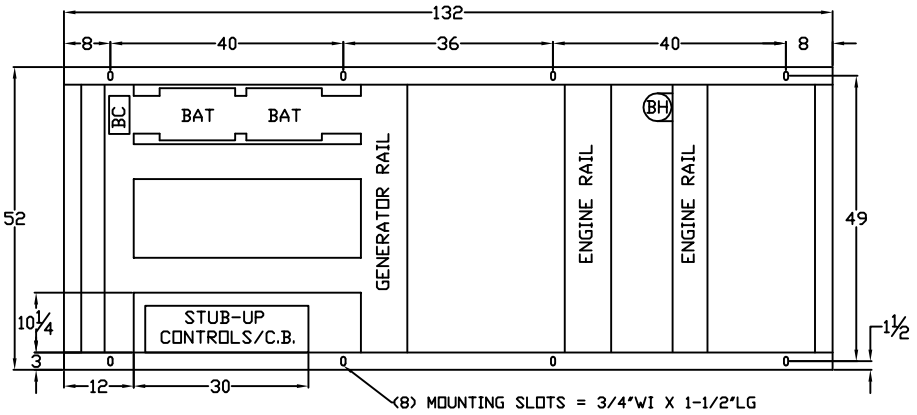
OUTLINE DIMENSIONS FOR T4D 100 - 200 KW LEVEL 2 ENCLOSURE
(HINGED DOORS)

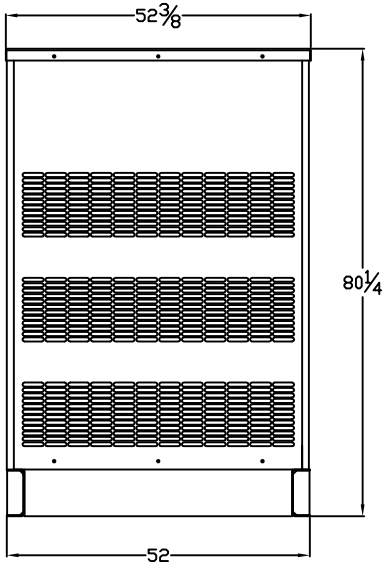
TOP VIEW

(GEN-SET HAS (6) DOORS, (3) SHOWN OPEN ARE TYPICAL FOR BOTH SIDES)

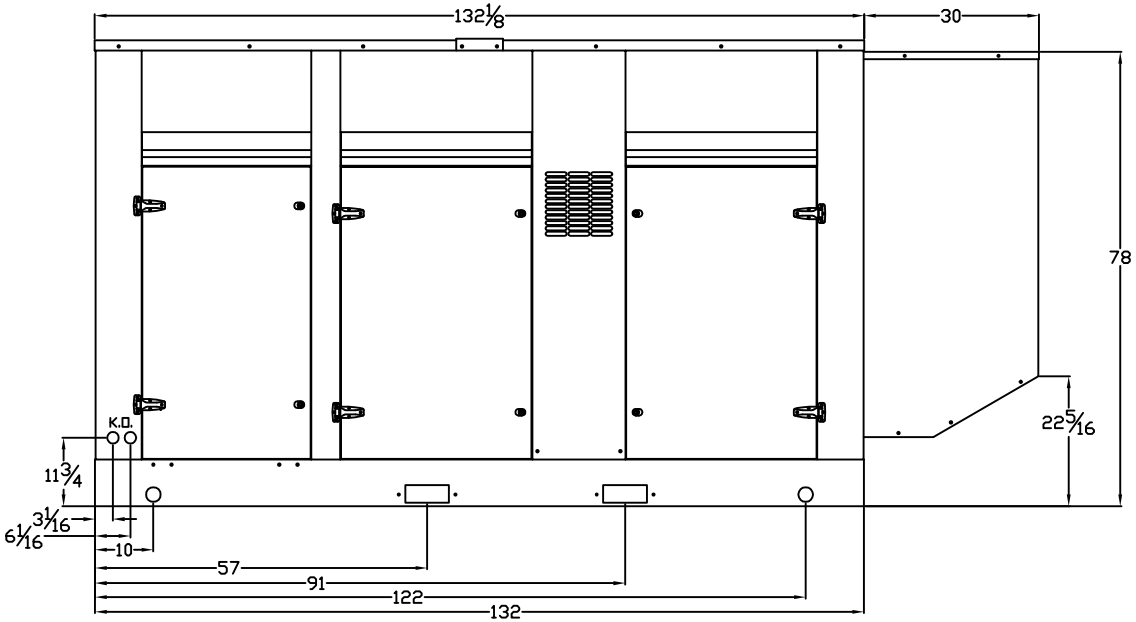


FRAME VIEW

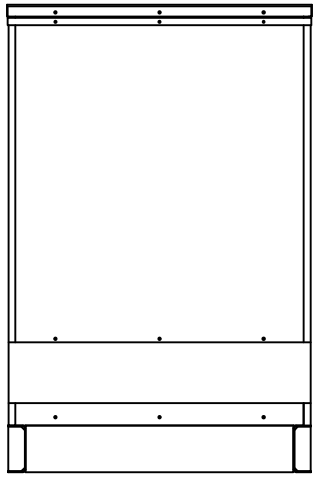




GENERATOR END VIEW



SIDE VIEW



RADIATOR END VIEW