



GILLETTE GENERATORS

LIQUID COOLED DIESEL ENGINE GENERATOR SET

60 HZ MODEL
T4D-1000

Model	HZ	STANDBY	PRIME
		130°C RISE	105°C RISE
T4D-1000-60 HERTZ	60	100	100



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

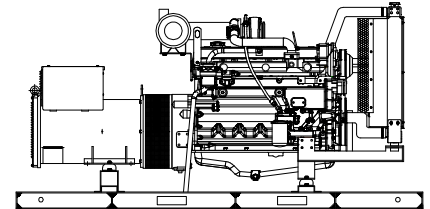


ASCE 7-05 & 7-10

All generator sets meet 180 MPH rating.

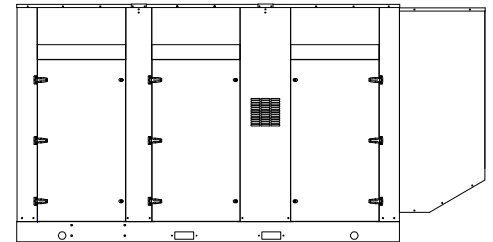


EPA 40CFR Part 60, 89, 1039, 1048, 1054, 1065, 1068



“OPEN” GEN-SET

There is no enclosure, so gen-set must be placed within a weather protected area, uninhabited 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	130°C RISE STANDBY RATING		105°C RISE PRIME RATING	
	L-N	L-L			KW/KVA	AMP	KW/KVA	AMP
T4D-1000-1-1	120	240	1	60	100/100	417	100/100	417
T4D-1000-3-2	120	208	3	60	100/125	347	100/125	347
T4D-1000-3-3	120	240	3	60	100/125	301	100/125	301
T4D-1000-3-4	277	480	3	60	100/125	151	100/125	151
T4D-1000-3-16	346	600	3	60	100/125	120	100/125	120

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-1000-60 HZ

GENERATOR SPECIFICATIONS

Manufacturer..... Stamford Generators
Model & Type..... UCI274E-311, 4 Pole, 12 Lead, Three Phase
..... HCI434D-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..... TAD571VE, 4 cycle, liquid Cooled
Aspiration..... Turbo After Cooler, Air to Air
Charged Air Cooled System..... Air to Air
Cylinder Arrangement..... 4 Cylinders, In-Line
Displacement Cu. In. (Liters)..... 291 (4.76)
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..... 175 (131)
BMEP: psi (MPa) Standby..... 331 (2.3)
Ltd. Warranty Period..... 1 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	7.5 (28.4)	7.5 (28.4)
75% LOAD	6.4 (24.1)	6.4 (24.1)
50% LOAD	4.6 (17.3)	4.6 (17.3)
DEF Consumption is 6% of fuel consumption		

OIL SYSTEM

Type..... Full Pressure
Oil Pan Cap. W/ filter qt. (L)..... 16.9 (16)
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-1000-60 HZ

COOLING SYSTEM

Type of System Air to Air, Charged Air Cooler
 Coolant PumpPre-lubricated, self-sealing
 Cooling Fan TypePusher
 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).....3.4 (13)
 Radiator Coolant Capacity gal. (L) 10.2 (38.6)
 Water Pump Capacity gpm (L/min)..... 122 (462)
 Heat Reject Coolant: Btu/min12,682
 Air to Air Heat Reject, BTU/min.11,715
 Heat Radiated to Ambient, BTU/min4,253
 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 (m³/min)332 (9.40)
 Max Air Intake Restrictions:
 Clean Air Cleaner, KPA (psi) 5 (1.5)
 Radiator Cooling Air, SCFM (m³/min).....10,954 (310)

EXHAUST SYSTEM

Exhaust Outlet Size.....4"
 Max. Back Pressure in KPA (in. H2O).....6 (24)
 Exhaust Flow, at rated KW, CFM (m³/min)..... 689 (19.5)
 Exhaust Temp, (Stack) °F (°C) 716 (380)

SOUND LEVELS MEASURED IN dB(A)

	Open Set	Level 2 Encl.
Level 2, SCR/Residential Silencer	82	78

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).....	3977 (1804)	5247 (2380)
Ship Weight lbs (kg).....	4252 (1929)	5592 (2537)

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 BESTCOMSPPlus 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-1000-60 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.

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:

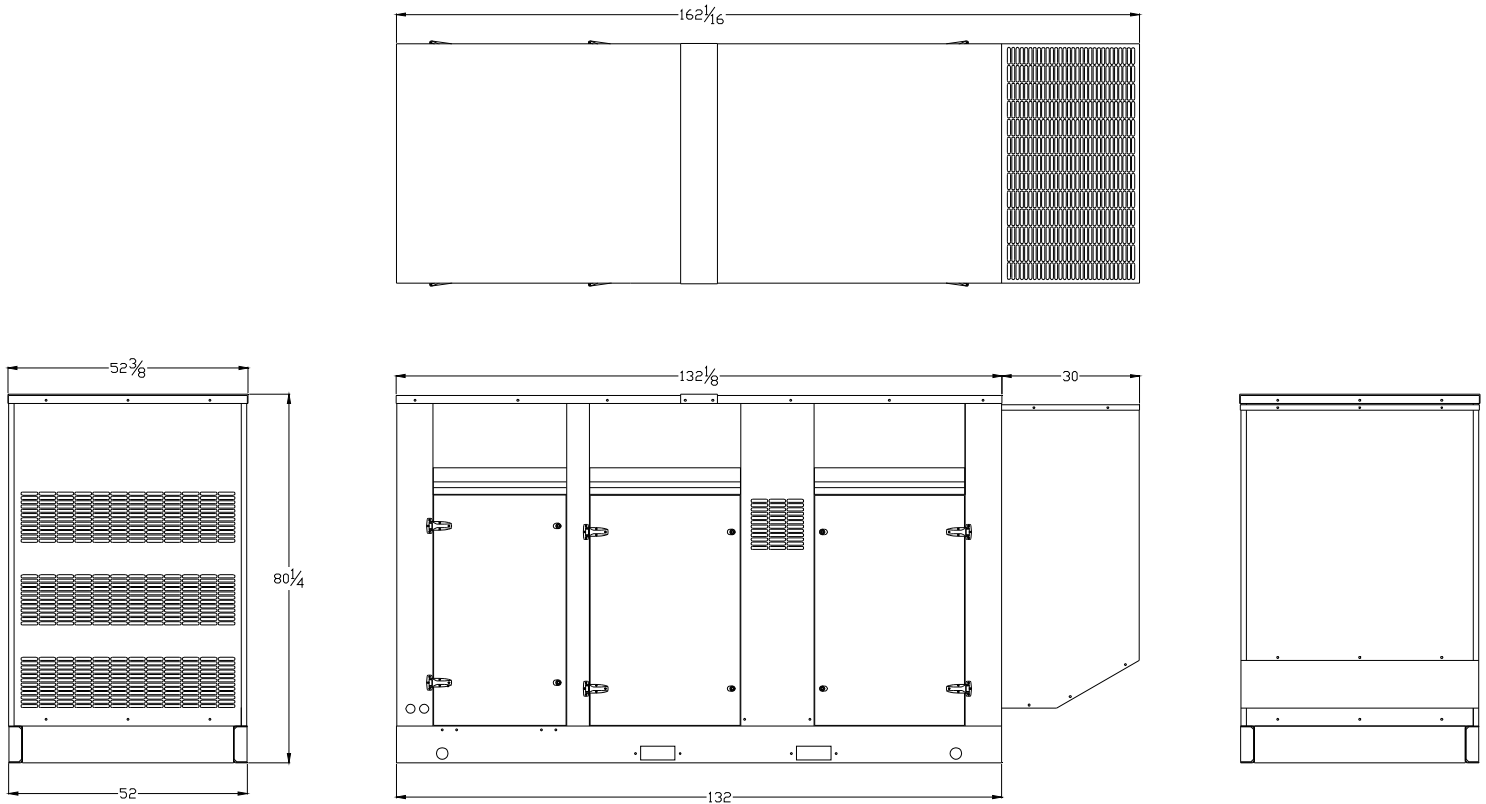
- Battery trays
- Battery cables
- Battery hold down straps
- 3-stage battery charger with float, absorption, & bulk automatic charge stages

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

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



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 penalties 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			4
Displacement, total		liters	5,13
		in ³	313
Firing order			1-3-4-2
Bore		mm	110
		in	4,33
Stroke		mm	135
		in	5,31
Compression ratio			17.5:1
Wet weight (Not including after treatment system)	Engine only	kg	583
		lb	1285
	Power pac	kg	877
		lb	1933
	Power pac, compact cooling package	kg	802
		lb	1768

Performance

				rpm	1500	1800	2000	2300
ICFN Power	129 kW	without fan		kW	126	129	129	129
				hp	171	175	175	175
			with fan	kW	123	124	123	124
		600 mm pull		hp	167	168	167	169
Torque at:	ICFN Power 129 kW			Nm	800	685	616	536
				lbf ft	590	505	454	395
Max torque at engine speed	ICFN Power		1200 rpm		810			
					597			
Power tolerance				%	±3			
Mean piston speed				m/s	6,8	8,1	9,0	10,4
				ft/sec	22,1	26,6	29,5	34,0
Effective mean pressure at:	ICFN Power 129 kW			MPa	1,96	1,68	1,51	1,31
				psi	285	243	219	190
Total mass moment of inertia, J (mR ²) (not including flywheel)				kgm ²	0,253			
				lbft ²	6,0			
Friction Power				kW	12	16	20	26
				hp	16	22	27	35

Derating see Technical Diagrams

Cold start performance

*Cold start limit temperature	without starting aid	°C	-15	
		°F	5	
	with manifold heater 4 kW	°C	-30	
		°F	-22	
	with manifold heater 4 kW and block heater	°C	-35	
		°F	-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	16
		US gal	4,23
Oil pan capacity:	Max	liter	13,5
		US gal	3,57
	Min	liter	9,5
		US gal	2,51
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	425
		psi	62




Lubrication system

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

Fuel system

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	102 26,9
Fuel supply line max. restriction (Measured at fuel inlet connection)	kPa psi	25 3,6
Fuel supply line max. pressure, during engine stand still (measured 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 HP3

Intake and exhaust system

		Inlet air temp	rpm	1500	1800	2000	2300
Charge air consumption at: (+25°C and 100kPa)	ICFN Power 129 kW	25°C	m³/min	8,5	9,4	10,2	11,7
		77°F	cfm	300	332	360	413
 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 129 kW		kW BTU/min	73 4146	74 4214	75,6 4299	86,9 4942
Exhaust gas temperature after turbine at:	ICFN Power 129 kW		°C °F	411 772	380 716	362 684	364 687
 See front page for important information							
Max allowable back pressure in exhaust line (after turbine) Pipe dimension Ø: 102 mm			kPa psi	11 1,6	11 1,6	12 1,7	13 1,9
 See front page for important information							
Max allowable temperature drop between turbine and SCR muffler inlet (in average over a typical customer cycle (not stationary points)).			Δ°C Δ°F	15 27			
SCR muffler pressure drop (at exhaust gas flow and exhaust temp given)			kPa psi	5 0,7	5 0,7	6 0,9	6 0,9
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	ICFN Power 129 kW		m³/min	18,6	19,5	20,3	23
			cfm	657	689	717	812

VOLVO PENTA

TAD571VE 129kW/2300rpm



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Cooling system		rpm	1500	1800	2000	2300	
Heat rejection radiation from engine at:	ICFN Power 129 kW	kW	7	6	4,8	5	
		BTU/min	387	318	273	284	
Heat rejection to coolant at:	ICFN Power 129 kW	kW	70	77	80,9	84,2	
		BTU/min	3981	4356	4601	4788	
Radiator cooling system type			Closed circuit				
Standard radiator core area	ICFN Power 129 kW	m ²	0,6				
		foot ²	6,46				
Compact cooling package radiator core area	ICFN Power 129 kW	m ²	0,28				
		foot ²	3,01				
Fan diameter	600 mm	ICFN Power 129 kW	mm	600			
			in	23,62			
Fan power consumption	600 mm pull		kW	3,0	5,2	6,3	4,7
			hp	4	7	9	6
Fan drive ratio	fan Ø600		1.4:1				
Coolant capacity:	engine	liter	13				
		US gal	3,4				
	engine + standard radiator with hoses and expansion tank	liter	47				
		US gal	12,4				
engine + compact cooling package radiator with hoses and expansion tank	liter	31					
	US gal	8,2					
Coolant pump		drive/ratio	belt/1,40:1				
Coolant flow with standard system		l/s	5,4	6,5	7,2	8,2	
		US gal/s	1,4	1,7	1,9	2,2	
Minimum coolant flow		l/s				4,5	
		US gal/s				1,2	
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	2300
Heat rejection to charge air cooler	ICFN Power 129 kW	kW	21,2	23,7	24,7	28,6
		BTU/min	1206	1348	1405	1626
Charge air mass flow	ICFN Power 129 kW	kg/s	0,165	0,184	0,198	0,228
Charge air inlet temp. (Charge air temp after turbo compressor)	ICFN Power 129 kW	°C	177	177	174	177
		°F	351	351	345	351
 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	8	9	10	12
		psi	1,16	1,31	1,45	1,74
Charge air pressure (relative) (After charge air cooler)		kPa	197	199	191	172
		psi	28,57	28,86	27,70	24,95
Standard charge air cooler core area		m ²	0,5			
		foot ²	5,38			
Compact charge air cooler core area		m ²	0,22			
		foot ²	2,37			

Cooling performance: 0,6 m² radiator and 600mm fan, pull

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

Engine speed	Engine power	ICFN Power 129 kW					
		Air on temp		Air flow		External restriction	
		°C	°F	m ³ /s	ft ³ /s	Pa	psi
1500	121 165	77	171	6,2	219,0	0	
		77	170	5,9	208,4	100	0,015
		76	169	5,8	204,8	200	0,029
		74	165	5,2	183,6	300	0,044
2300	129 175	76	169	7,6	268,4	0	
		76	168	7,4	261,3	100	0,015
		75	167	7,2	254,3	200	0,029
		75	166	7,1	250,7	300	0,044

Cooling performance: 0,28 m² radiator and 600mm 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.

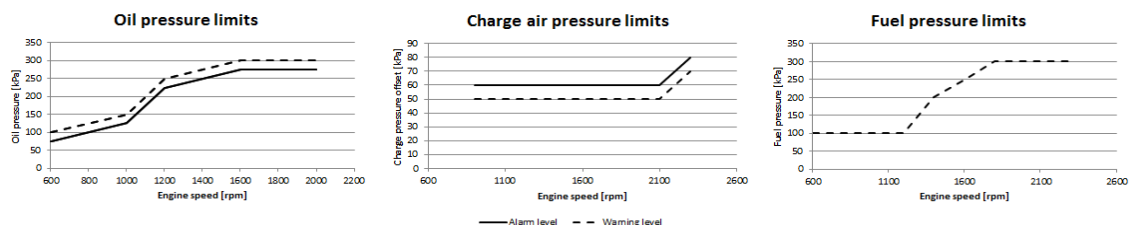
Engine speed	Engine power	ICFN Power 129 kW					
		Air on temp		Air flow		External restriction	
		°C	°F	m ³ /s	ft ³ /s	Pa	psi
1500	121 165	56	133	5,9	208,4	0	
		55	130	5,7	201,3	100	0,015
		52	126	5,4	190,7	200	0,029
		47	116	4,8	169,5	300	0,044
2300	129 175	55	131	7,0	247,2	0	
		54	130	6,9	243,7	100	0,015
		53	127	6,6	233,1	200	0,029
		51	123	6,2	219,0	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	900	rpm	700
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	Default setting	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

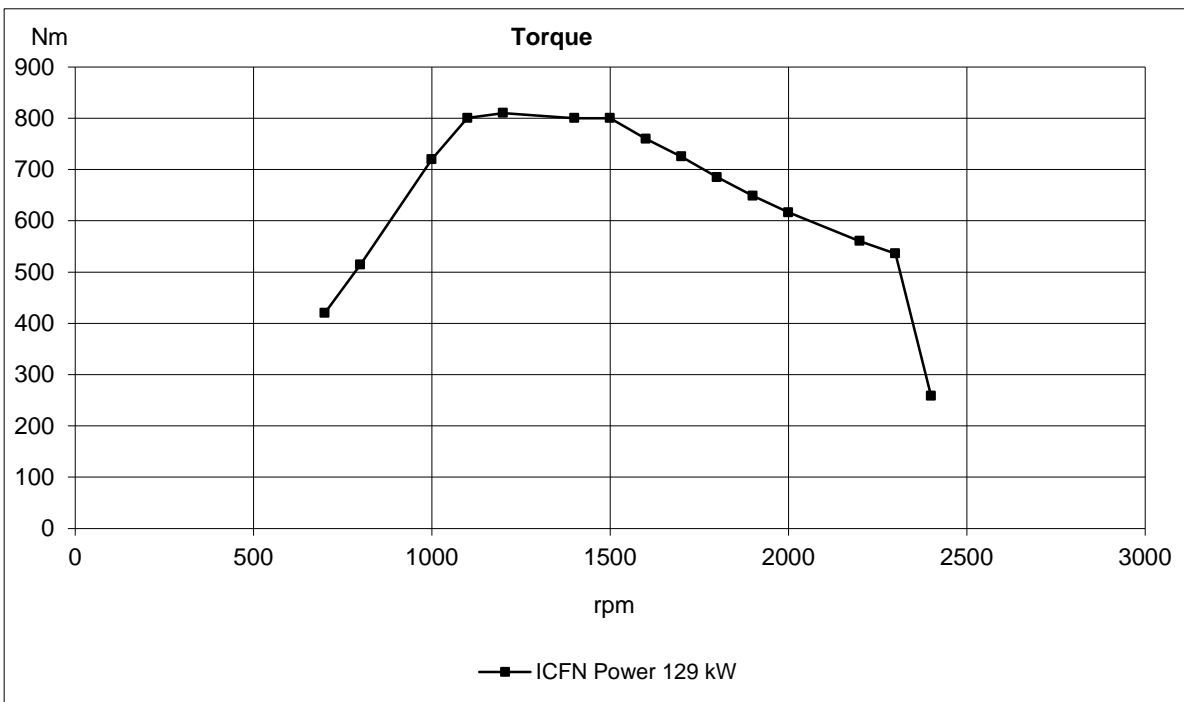
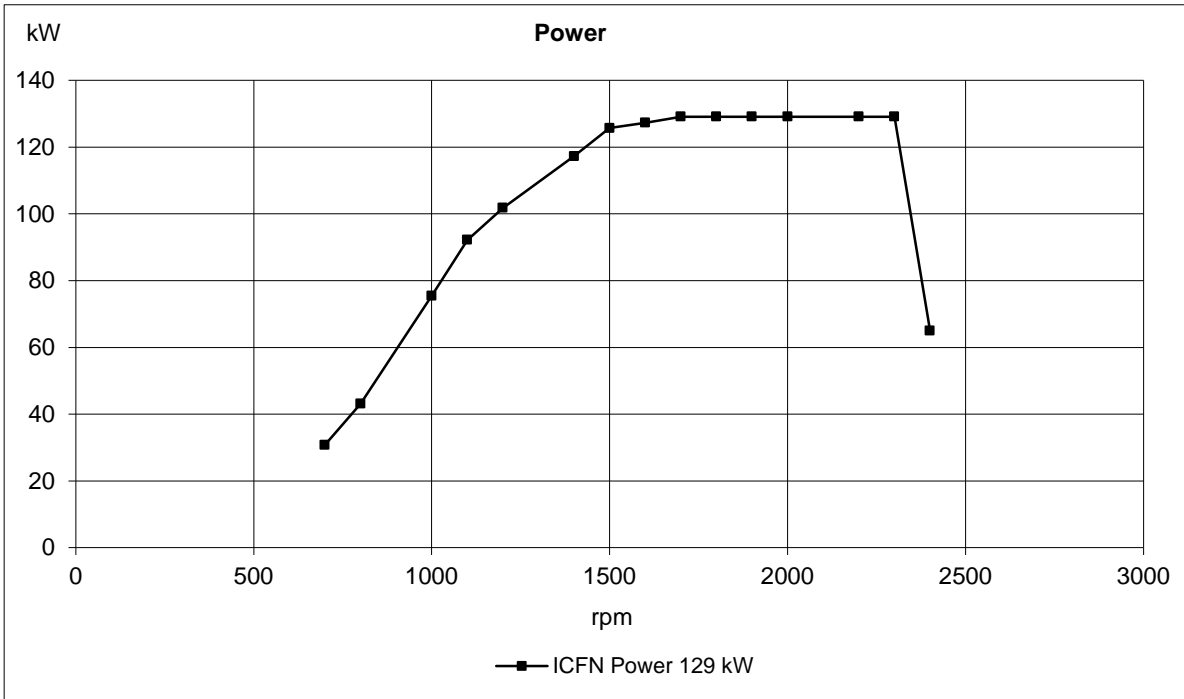
Voltage and type			24V
Alternator:	make		MELCO
	output	A	110/130
	tacho output	Hz/alternator rev.	
	drive ratio		
Starter motor:	make		MELCO
	type		85P50/90P55
	output	kW	5 / 5.5
		hp	6.8 / 7.5
Number of teeth on:	flywheel		137
	starter motor		10 / 12 teeth
Inlet manifold heater (at 20 V)		kW	4
Power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

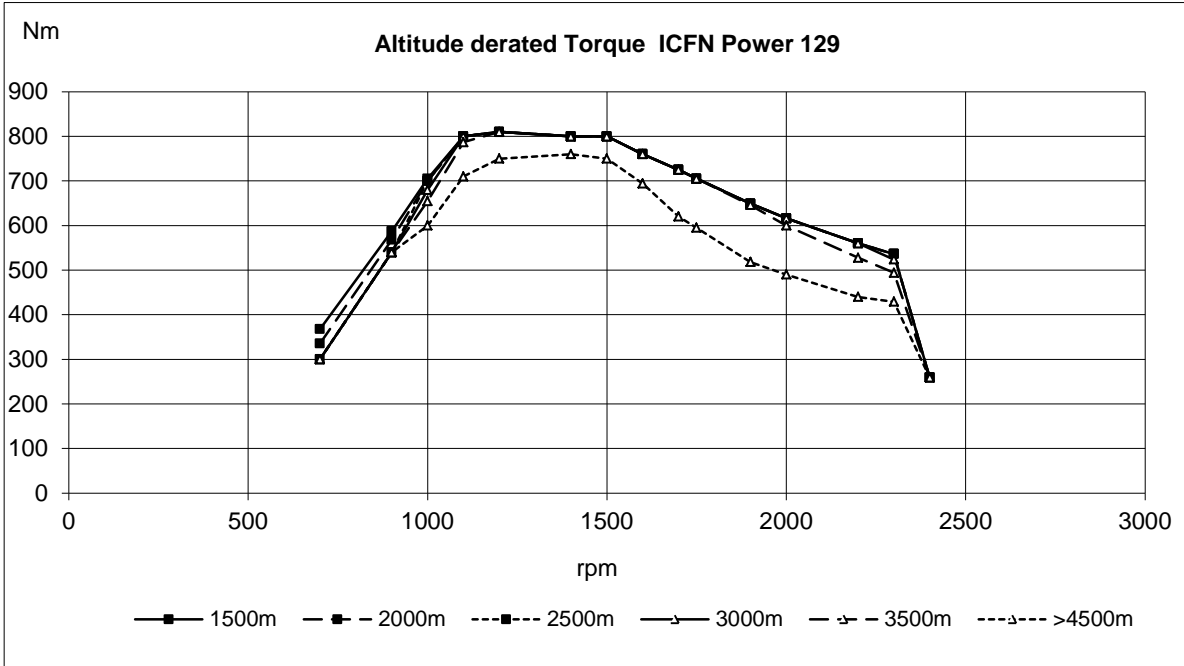
Conditions: (5 mΩ main circuit resistance@ 20°C)	Temperature	°C	25	0	-15
	Battery	Ah / CCA	100/700	100/700	100/700
Crank speed	rpm		197	150	123
Crank current	A		173	265	320
Starter input power during crank	kW		3,90	4,70	5,20
Battery power during crank	kW		4,00	5,10	5,70
Min battery @ 0°C	Ah / CCA				

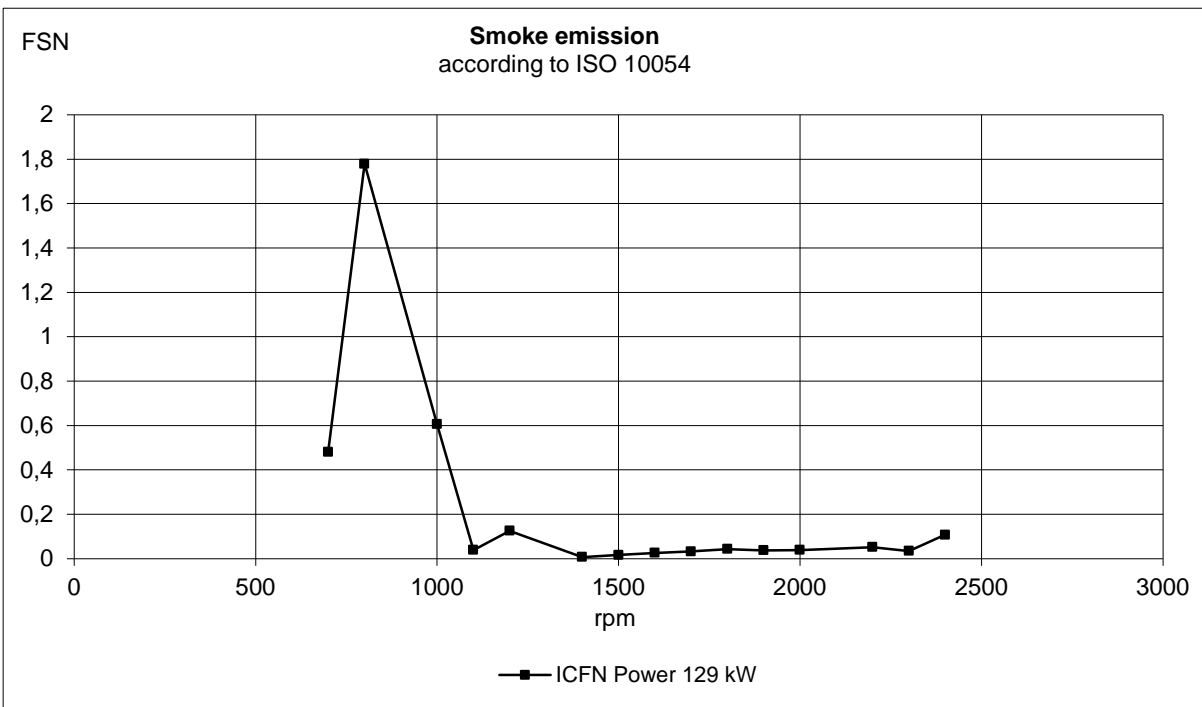
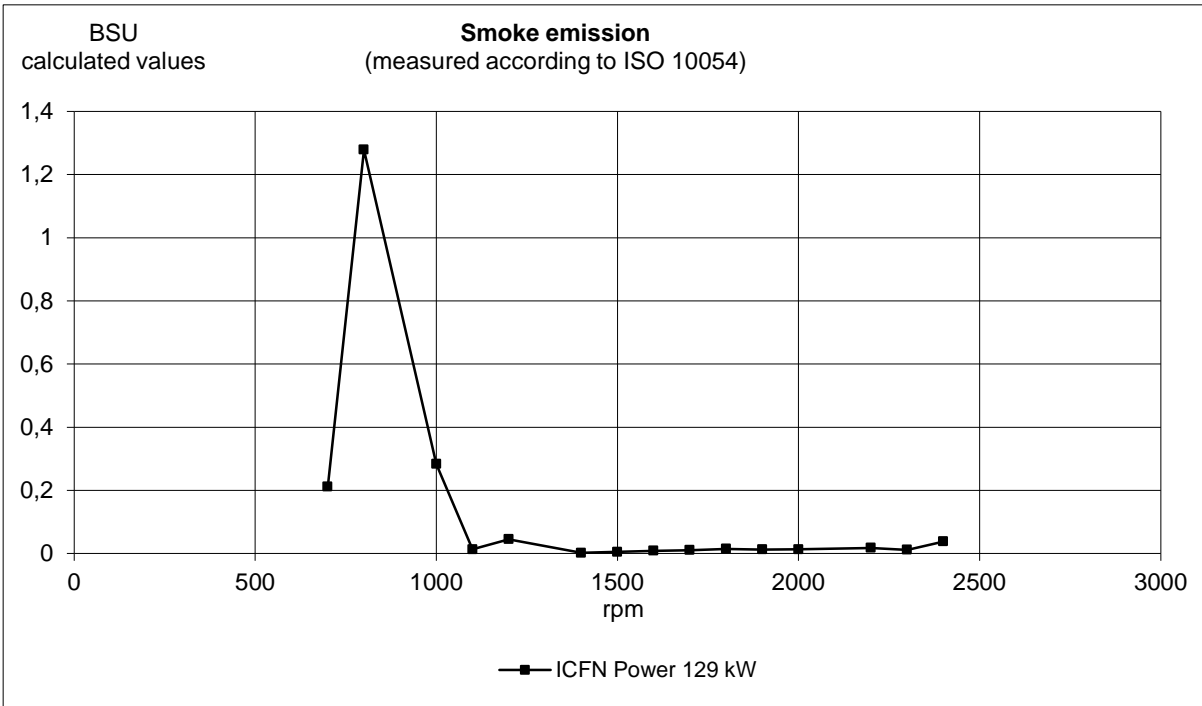
Power take off		rpm	1400	1800	2000	2300
Front end in line with crank shaft max:*	0.02 kgm ²	Nm	866	817	750	610
		lbf ft	639	603	553	450
	SAE 2, STD 10" & 11,5 ", 1.303 kgm ²	Nm	866	748	711	457
	0.03 kgm ²	lbf ft	639	552	524	337
	0.04 kgm ²	Nm	866	695	645	399
		lbf ft	639	513	476	294
Front end belt pulley load. Direction of load viewed from flywheel side:	max left	kW	46	60	66	76
		hp	63	82	90	103
	max down	kW	35	45	49	57
		hp	48	61	67	78
	max right	kW	46	60	66	76
		hp	63	82	90	103
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	5000			
		lbf	1124,0			

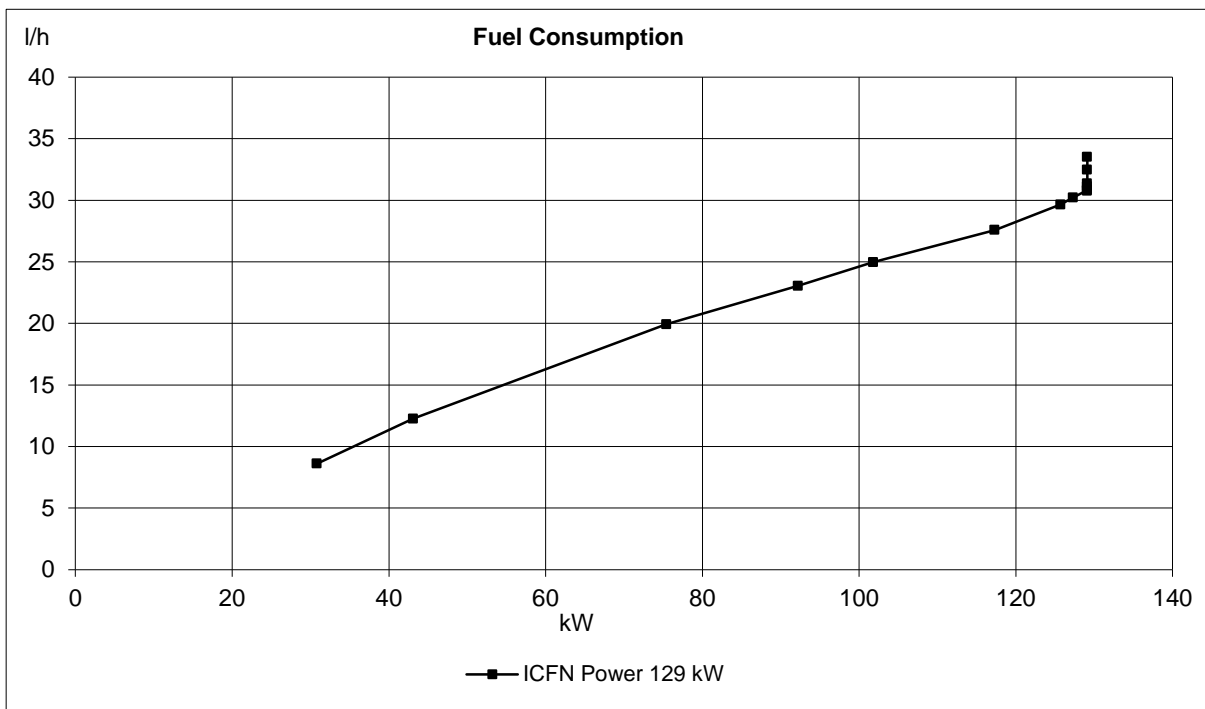
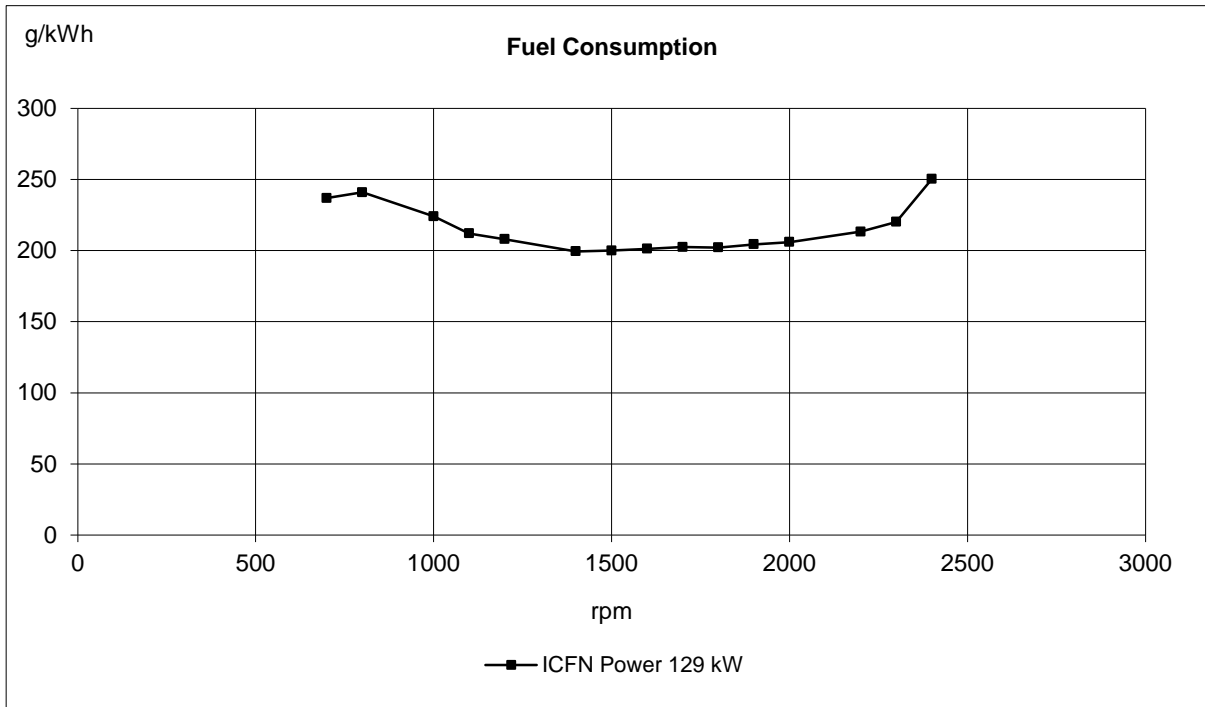
* Maximum allowed torque at individual PTO's.

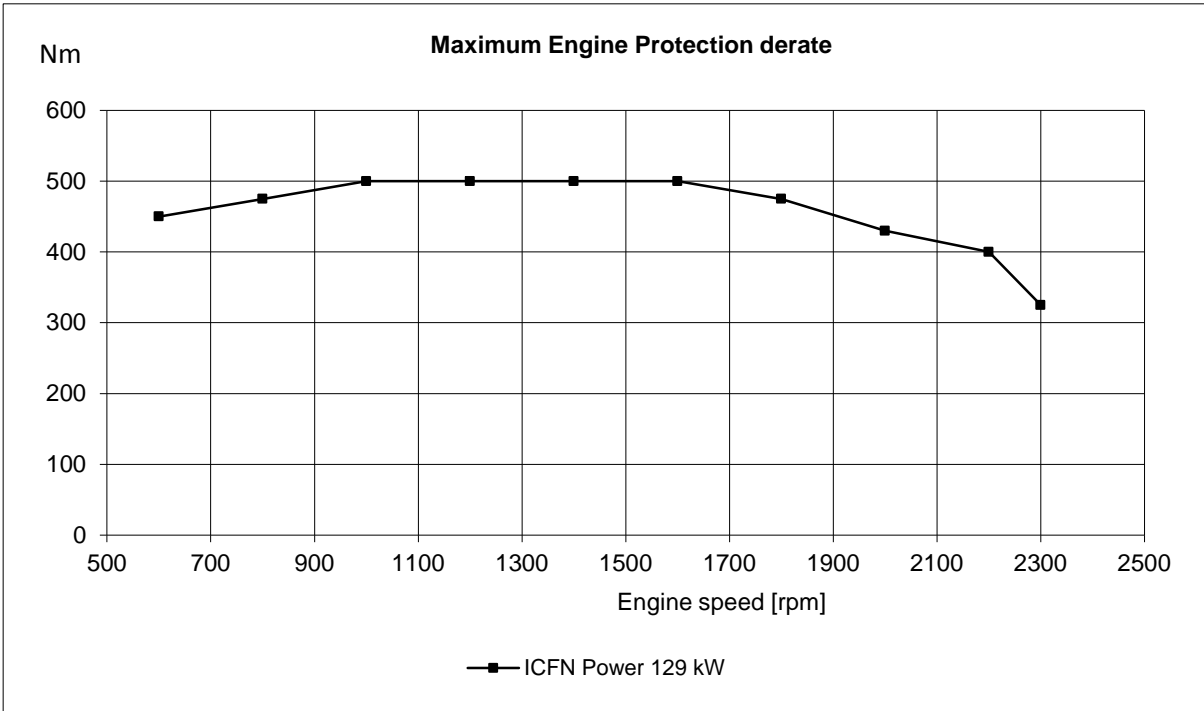
If more then one PTO output is used simultaneously, calculations needs to be performed to determine available maximum. Available torque depends on application inertia.

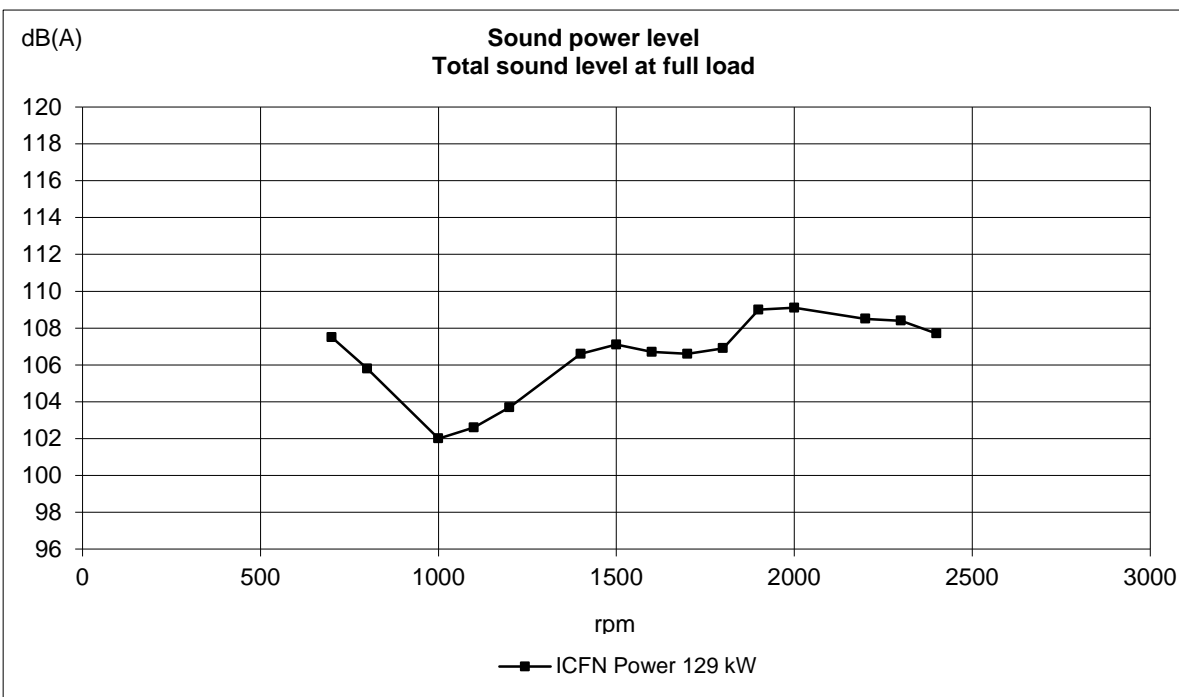
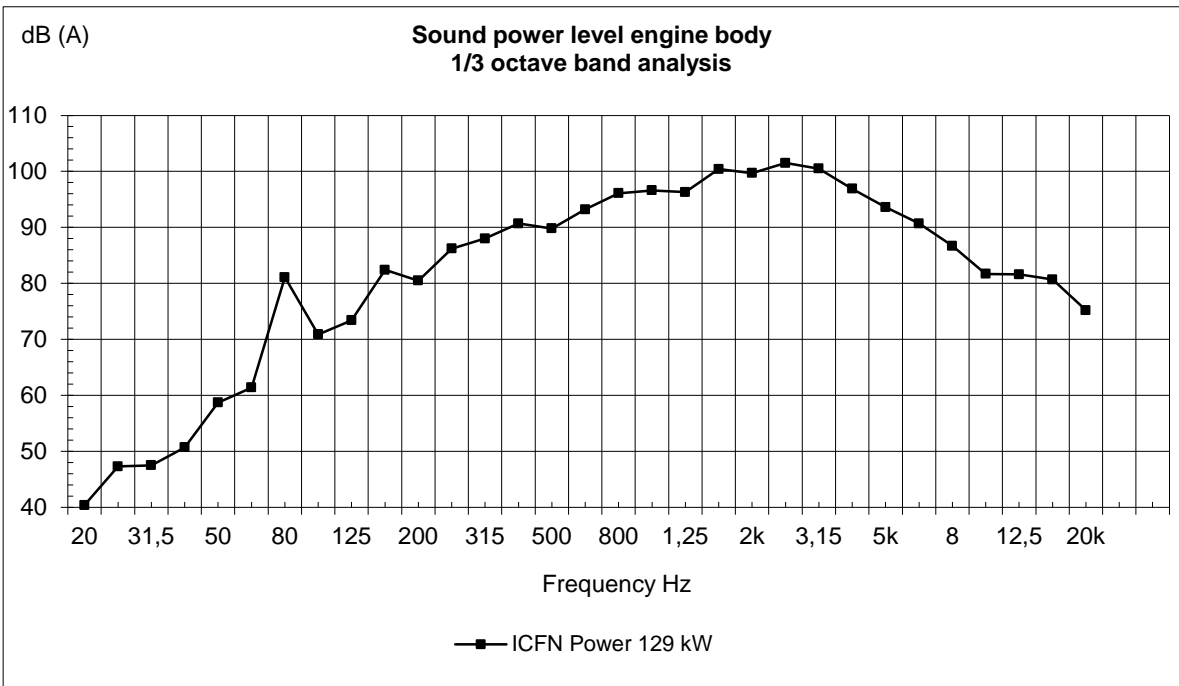


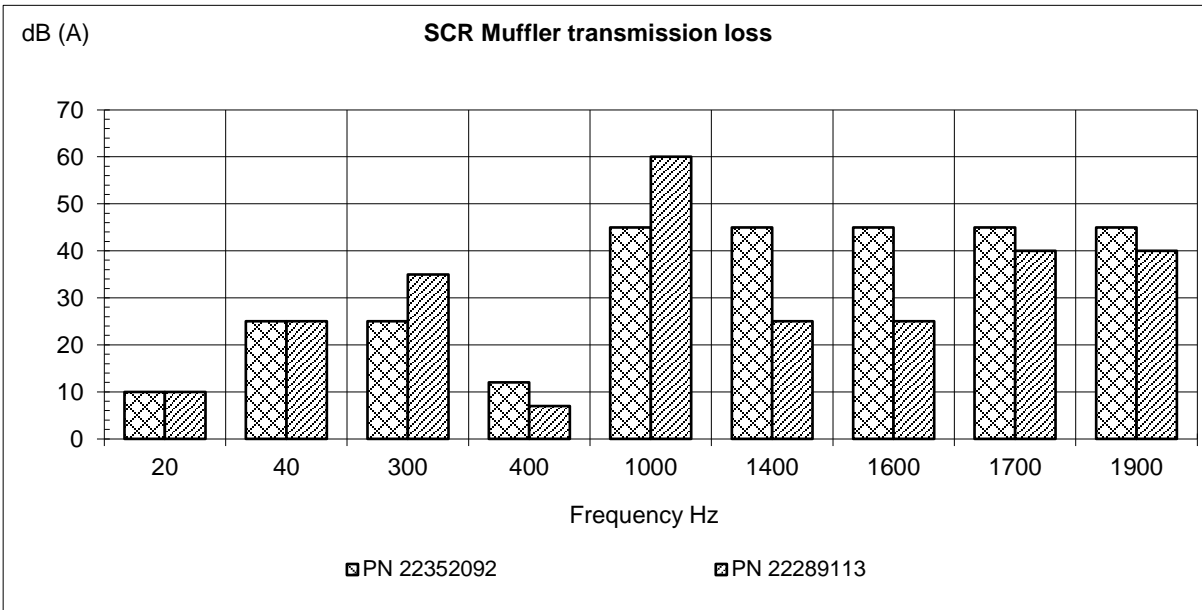


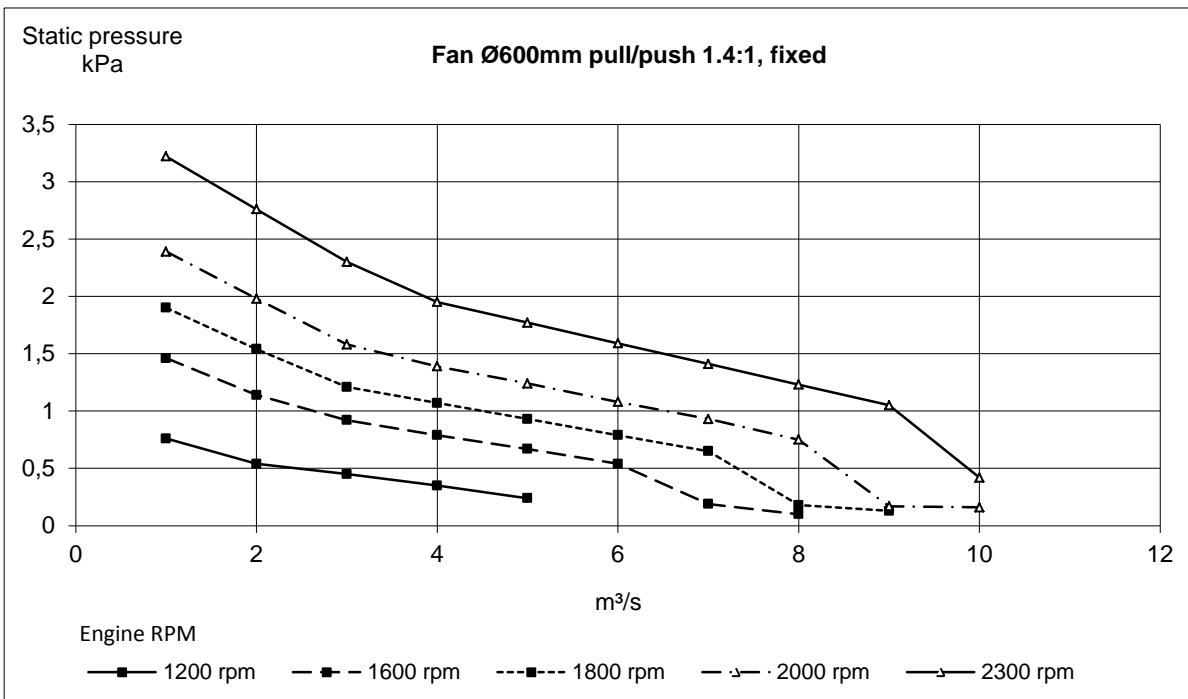
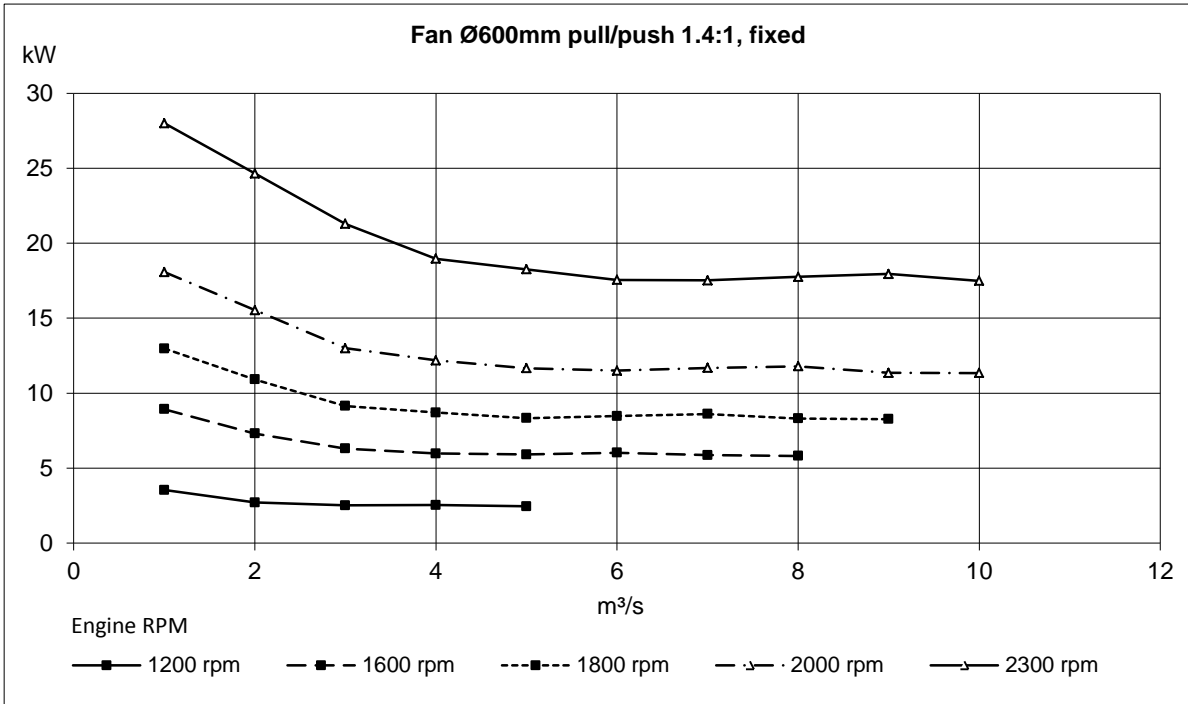


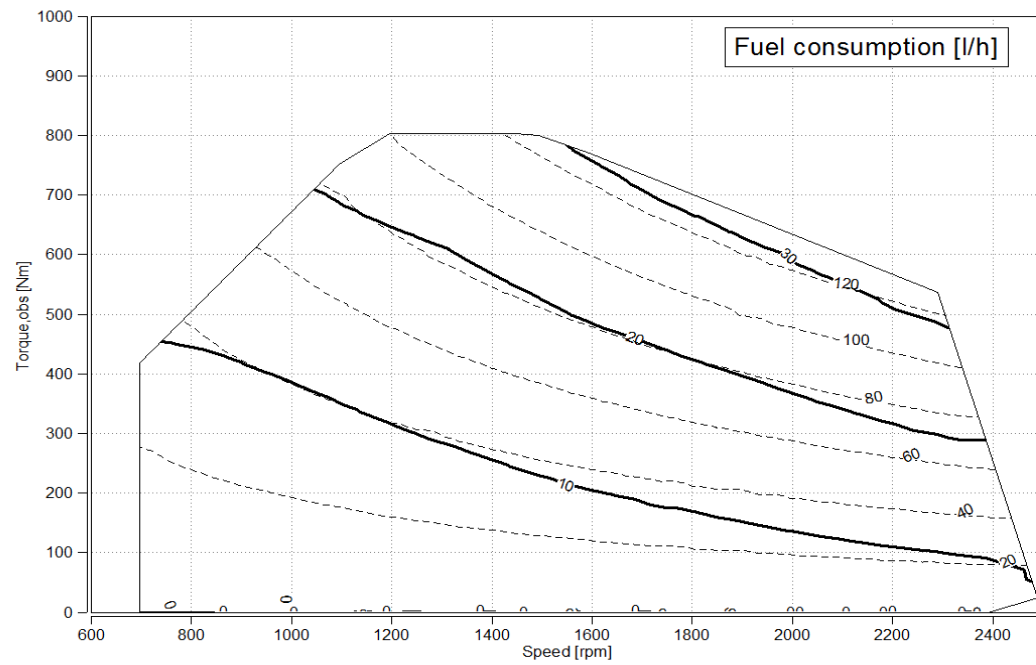
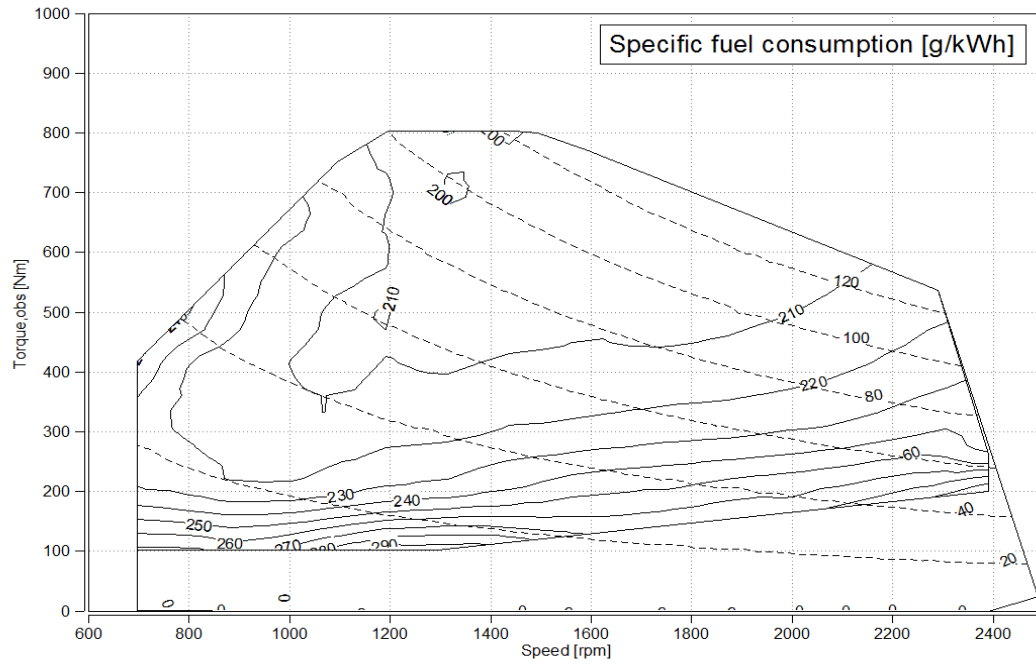








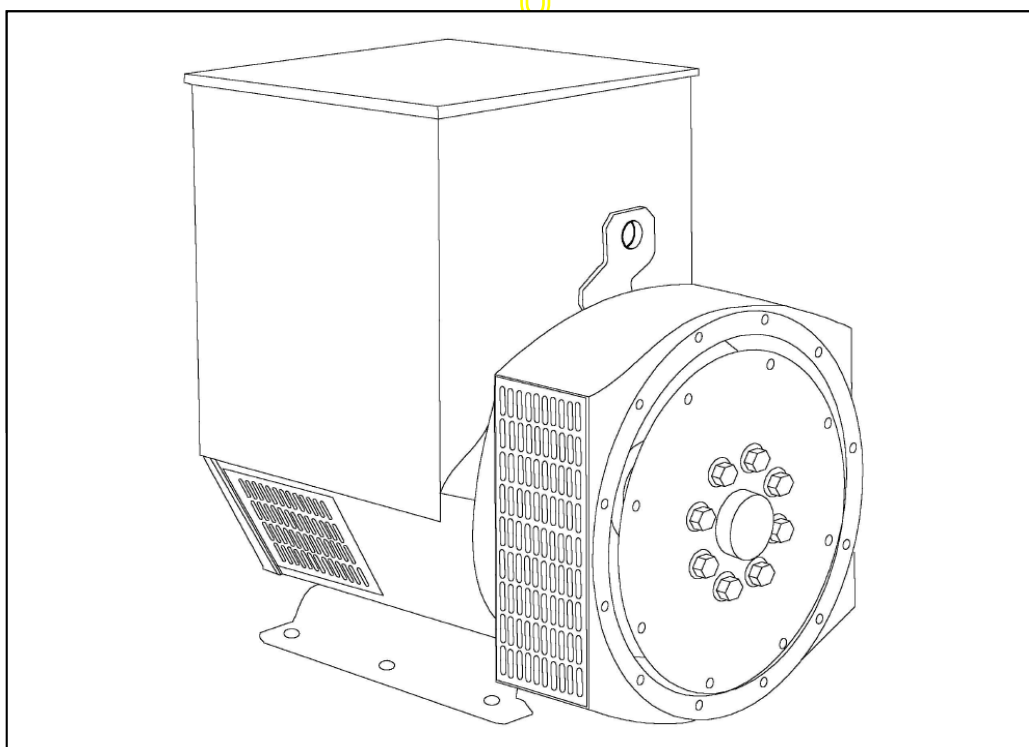




STAMFORD®

UCI274E - 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 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.

UCI274E

STAMFORD

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 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	SINGLE LAYER CONCENTRIC		
WINDING PITCH	TWO THIRDS		
WINDING LEADS	4		
MAIN STATOR RESISTANCE	0.015 Ohms AT 22°C SERIES CONNECTED		
MAIN ROTOR RESISTANCE	1.34 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	492 kg	511 kg
WEIGHT WOUND STATOR	180 kg	180 kg
WEIGHT WOUND ROTOR	167.51 kg	156.55 kg
WR ² INERTIA	1.3271 kgm ²	1.2765 kgm ²
SHIPPING WEIGHTS in a crate	525 kg	539 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	220		230		240	
VOLTAGE PARALLEL	110		115		120	
POWER FACTOR	0.8	1.0	0.8	1.0	0.8	1.0
kVA BASE RATING FOR REACTANCE VALUES	112	115	112	115	112	115
X _d DIR. AXIS SYNCHRONOUS	2.64	2.71	2.42	2.48	2.22	2.28
X' _d DIR. AXIS TRANSIENT	0.25	0.26	0.23	0.24	0.21	0.22
X'' _d DIR. AXIS SUBTRANSIENT	0.17	0.17	0.15	0.15	0.14	0.14
X _q QUAD. AXIS REACTANCE	1.71	1.76	1.57	1.61	1.44	1.48
X'' _q QUAD. AXIS SUBTRANSIENT	0.21	0.22	0.20	0.21	0.18	0.18
X _L LEAKAGE REACTANCE	0.10	0.10	0.09	0.09	0.08	0.08
X ₂ NEGATIVE SEQUENCE	0.19	0.20	0.17	0.17	0.16	0.16
X ₀ ZERO SEQUENCE	0.11	0.11	0.10	0.10	0.09	0.09

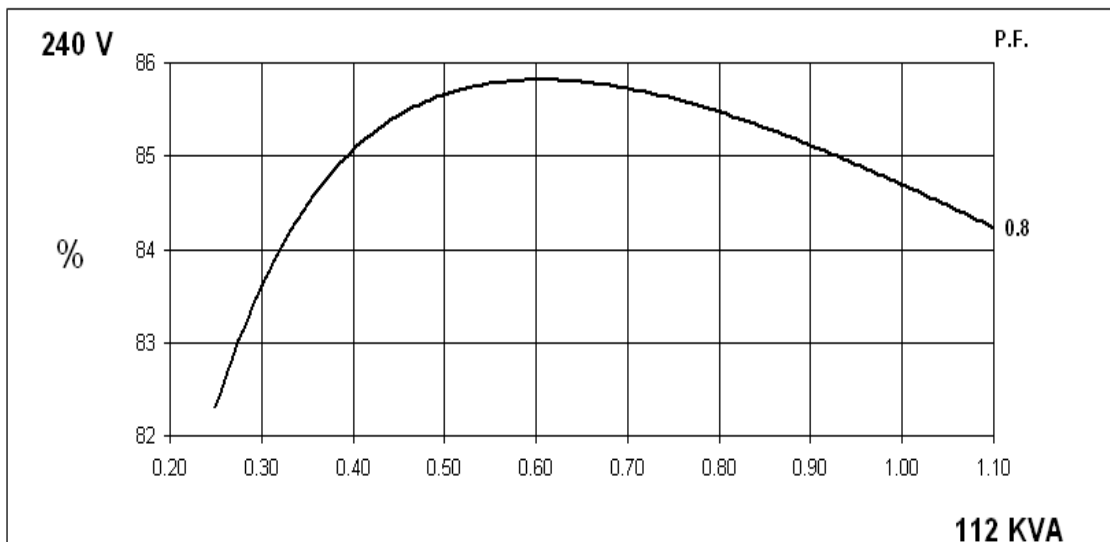
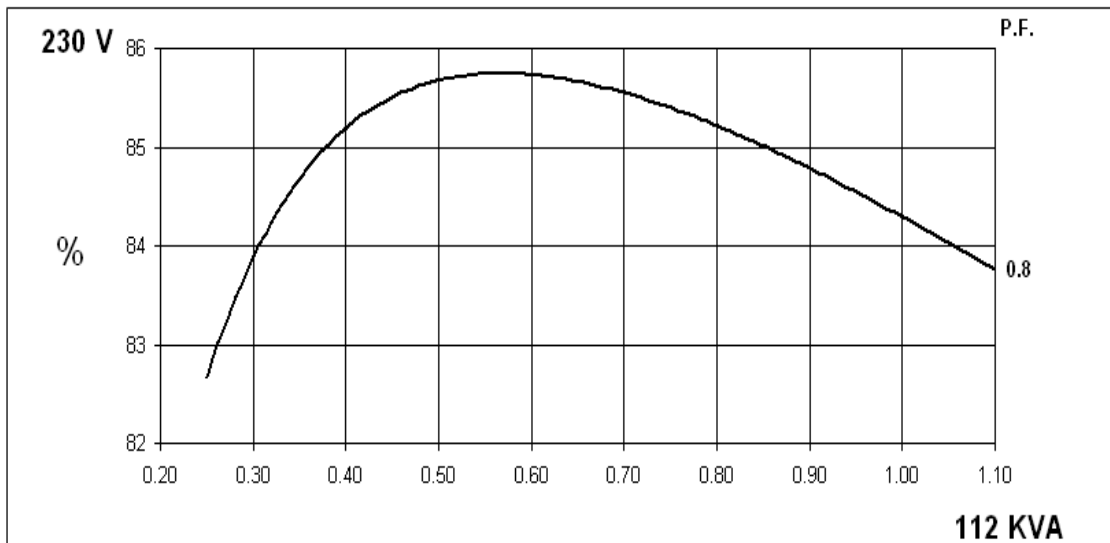
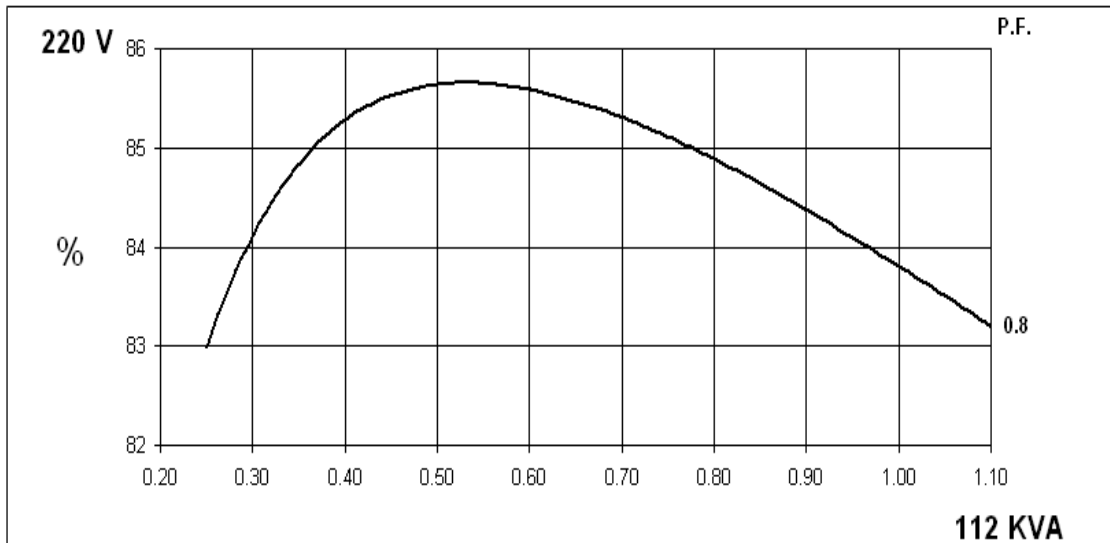
REACTANCES ARE SATURATED

T' _d TRANSIENT TIME CONST.	0.032s
T'' _d SUB-TRANSTIME CONST.	0.01s
T' _{do} O.C. FIELD TIME CONST.	0.85s
T _a ARMATURE TIME CONST.	0.007s
SHORT CIRCUIT RATIO	1/X _d

UCI274E
Winding 06 / 0.8pf

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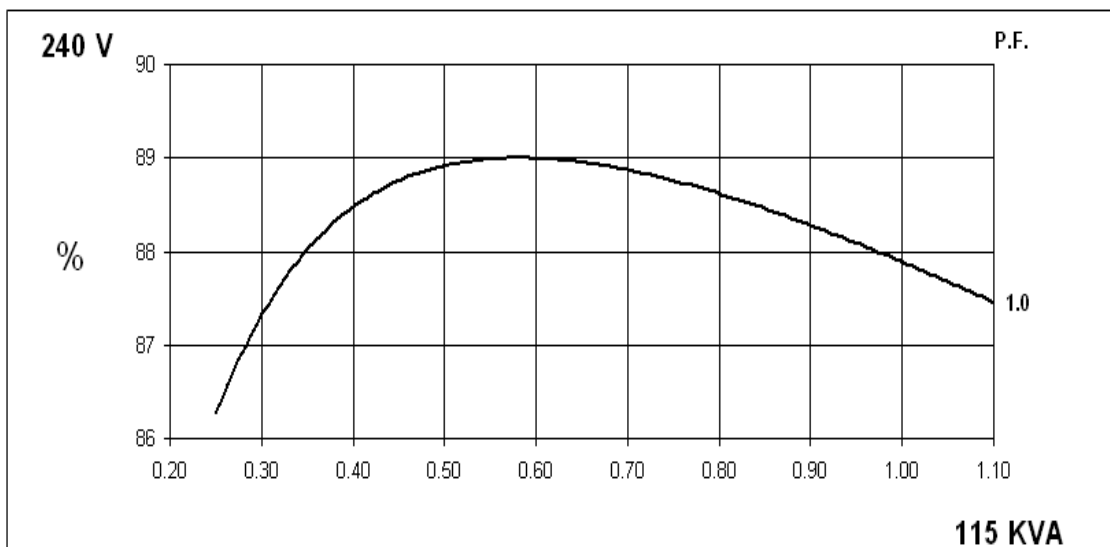
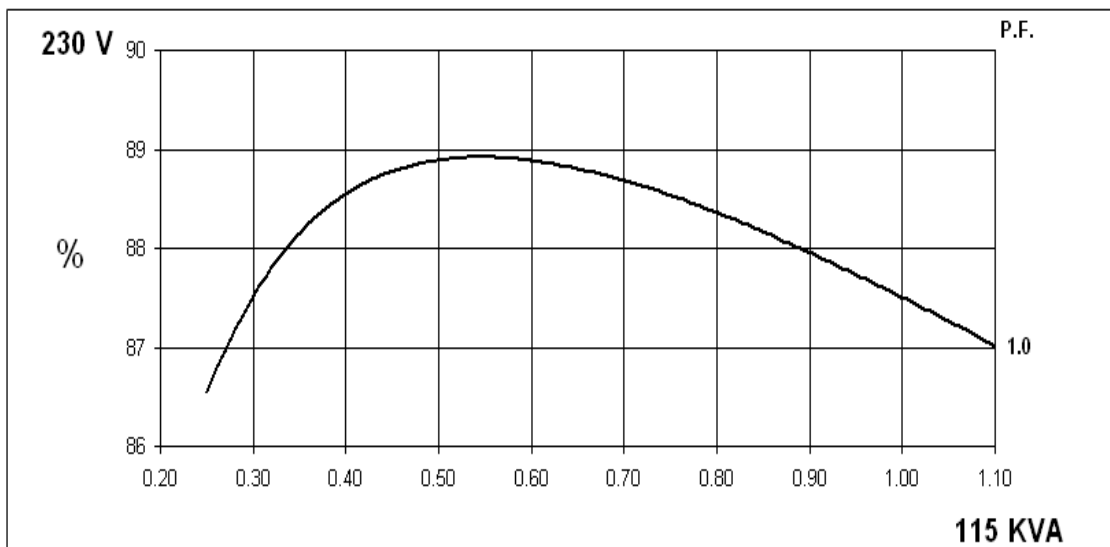
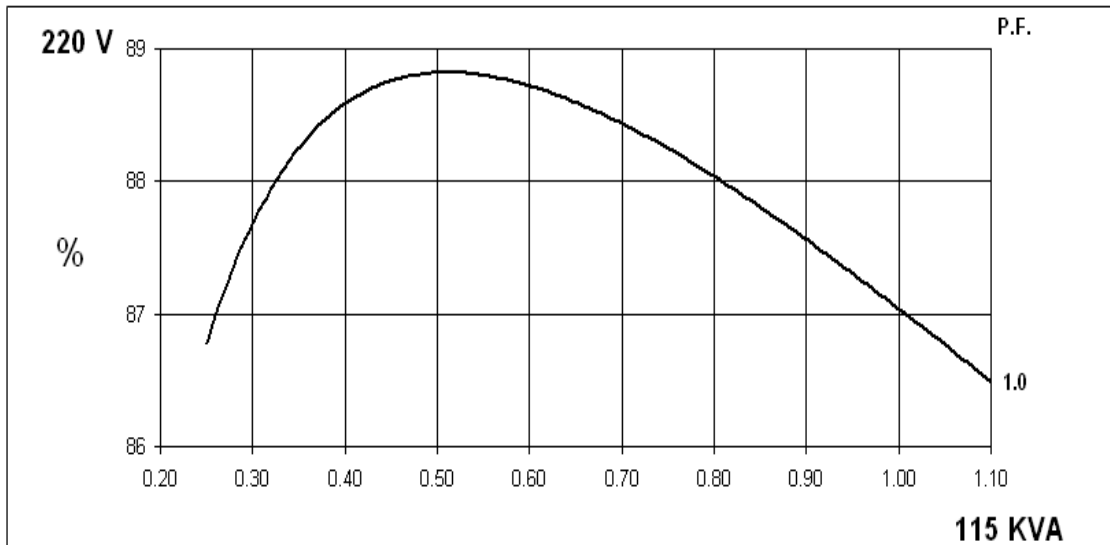
SINGLE PHASE EFFICIENCY CURVES



UCI274E
Winding 06 / 1.0pf

STAMFORD

SINGLE PHASE EFFICIENCY CURVES

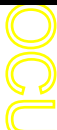
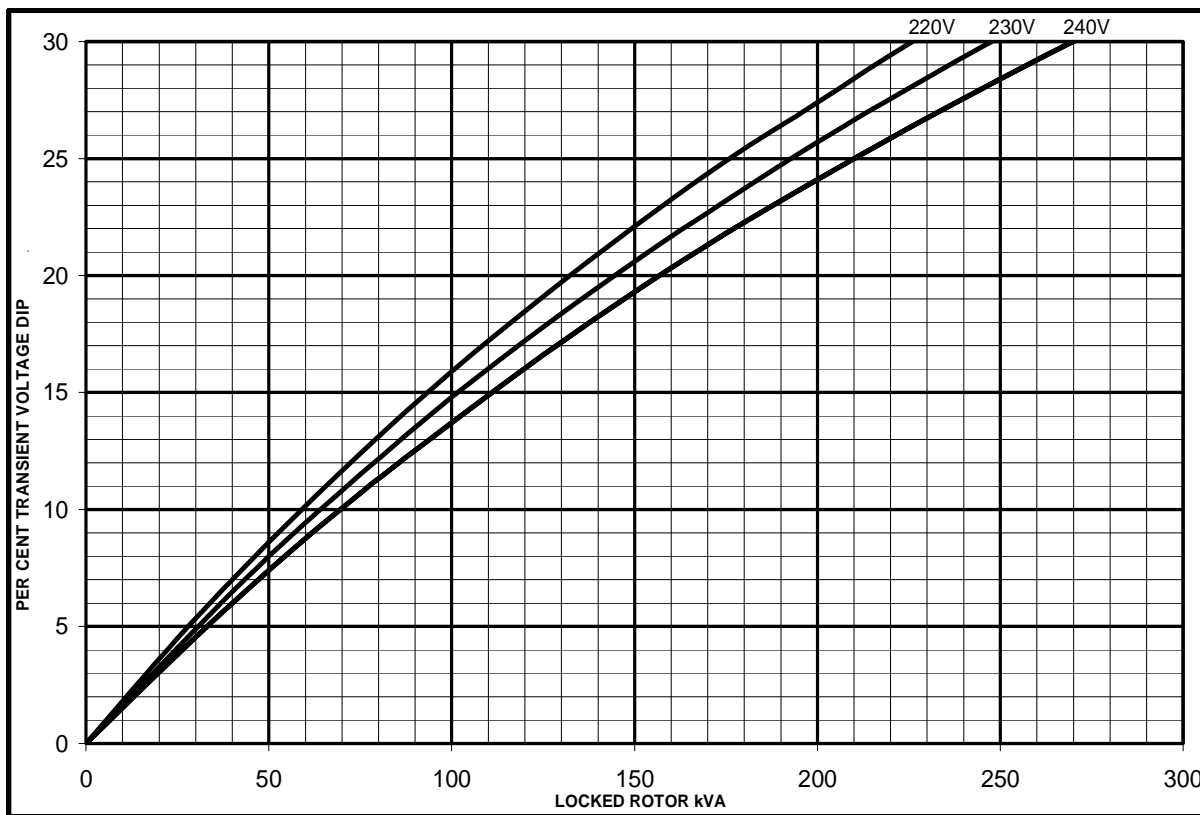


UCI274E
Winding 06

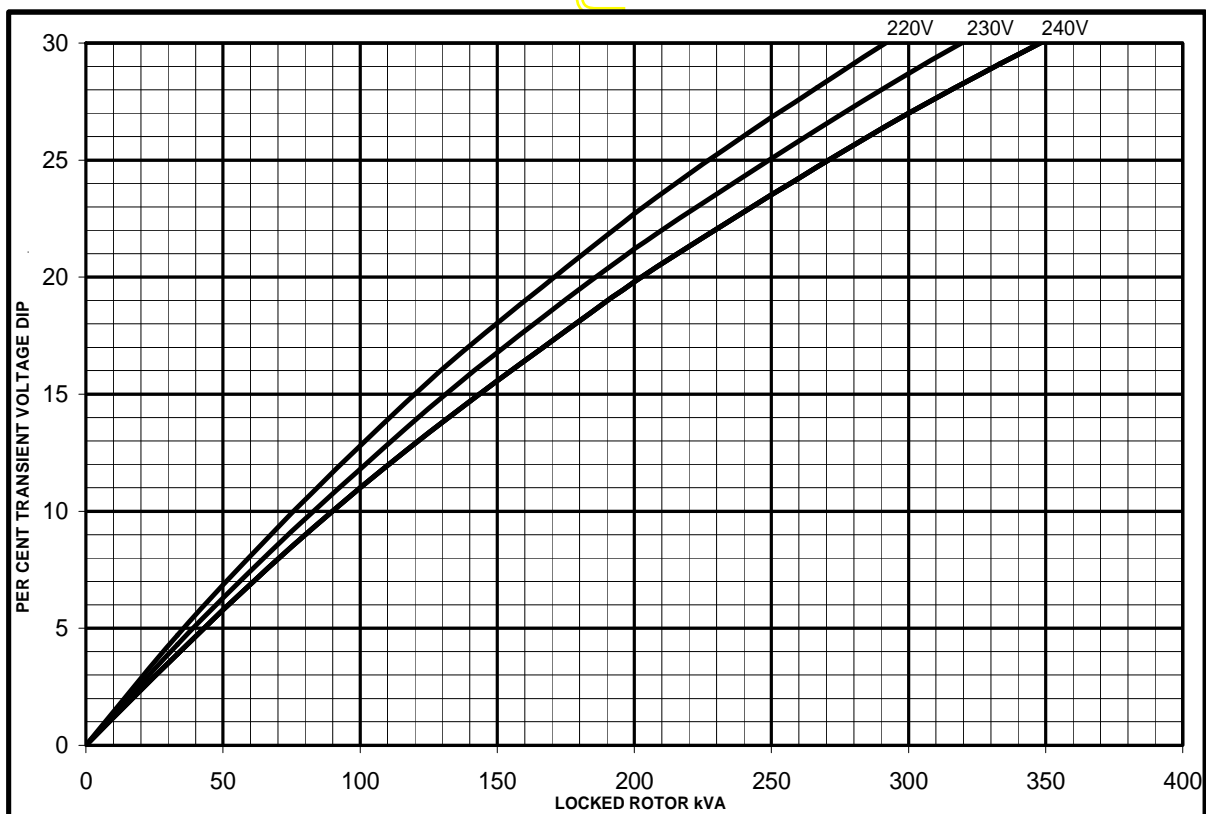
STAMFORD

SX

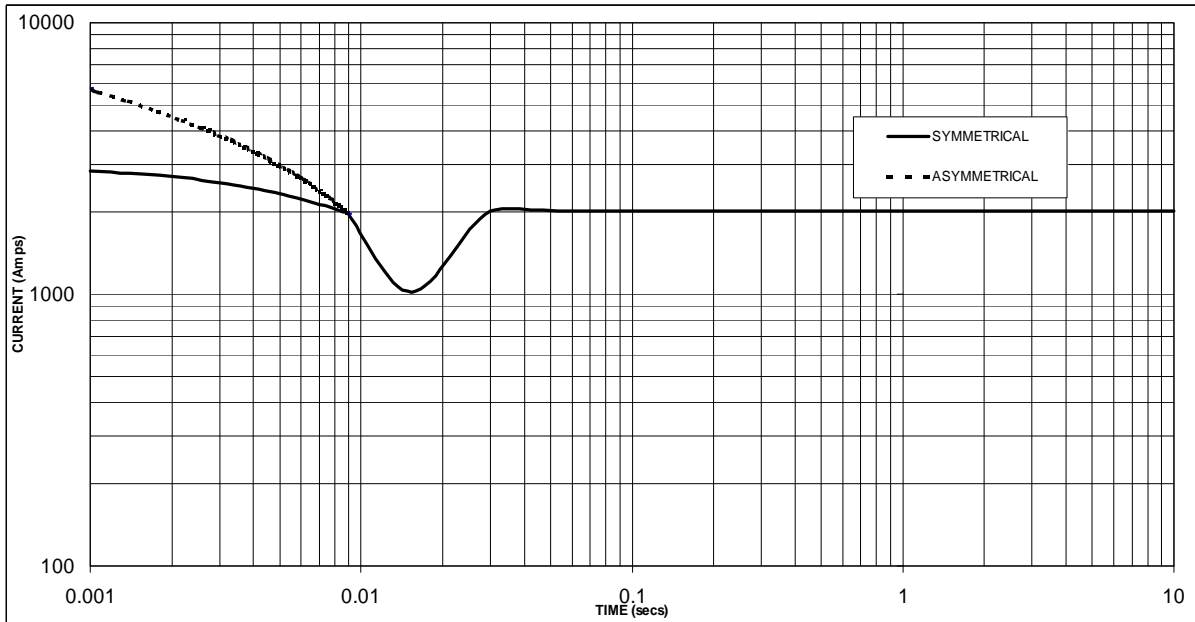
Locked Rotor Motor Starting Curves



MX



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



Sustained Short Circuit = 2030 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

UCI274E
Winding 06

STAMFORD

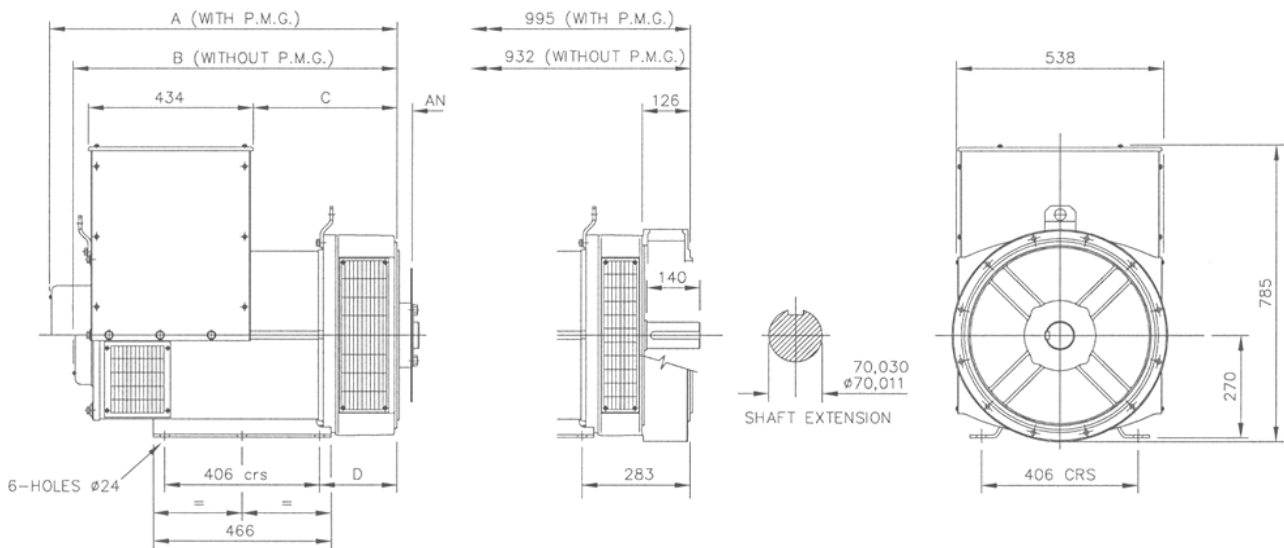
60Hz

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
Parallel (V)	110	115	120	110	115	120	110	115	120	110	115	120
kVA	100.0	100.0	100.0	112.0	112.0	112.0	100.0	100.0	100.0	115.0	115.0	115.0
kW	80.0	80.0	80.0	89.6	89.6	89.6	100.0	100.0	100.0	115.0	115.0	115.0
Efficiency (%)	84.4	84.8	85.1	83.8	84.3	84.7	87.7	88.1	88.4	87.0	87.5	87.9
kW Input	94.8	94.3	94.0	106.9	106.3	105.8	114.0	113.5	113.1	132.2	131.4	130.8

APPROVE

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

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

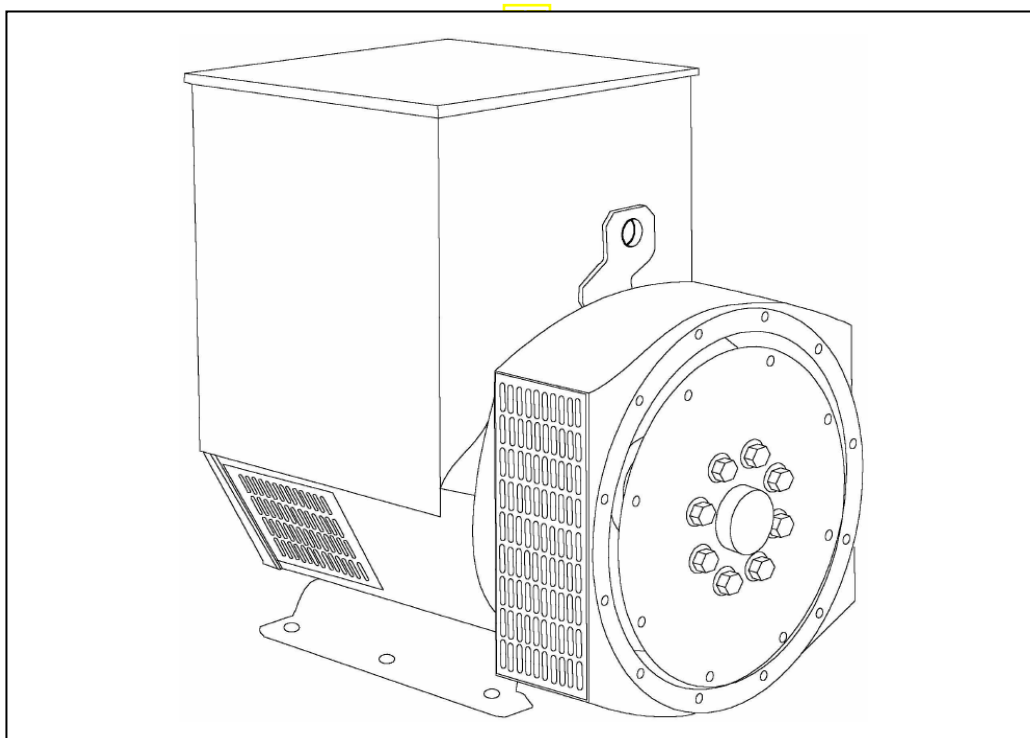
www.cumminsgeneratortechnologies.com

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STAMFORD®

UCI274E - 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 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. 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.

APPROVED DOCUMENT

UCI274E

STAMFORD

WINDING 311

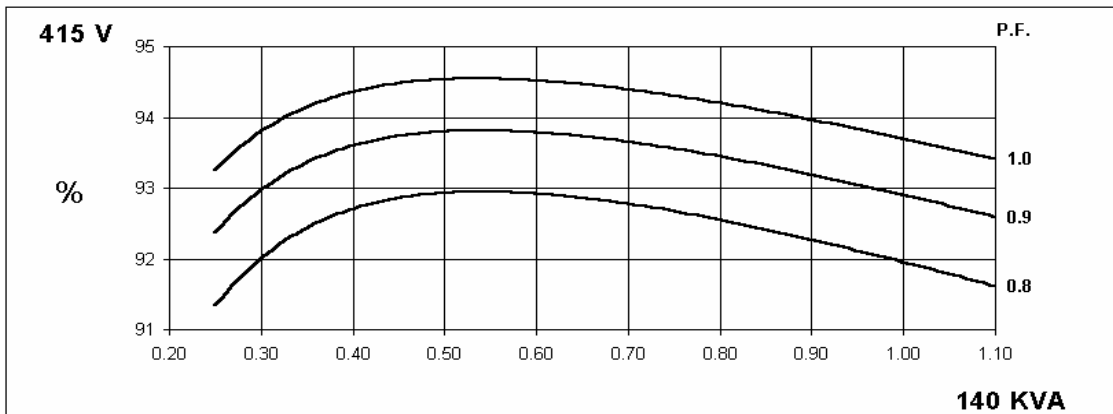
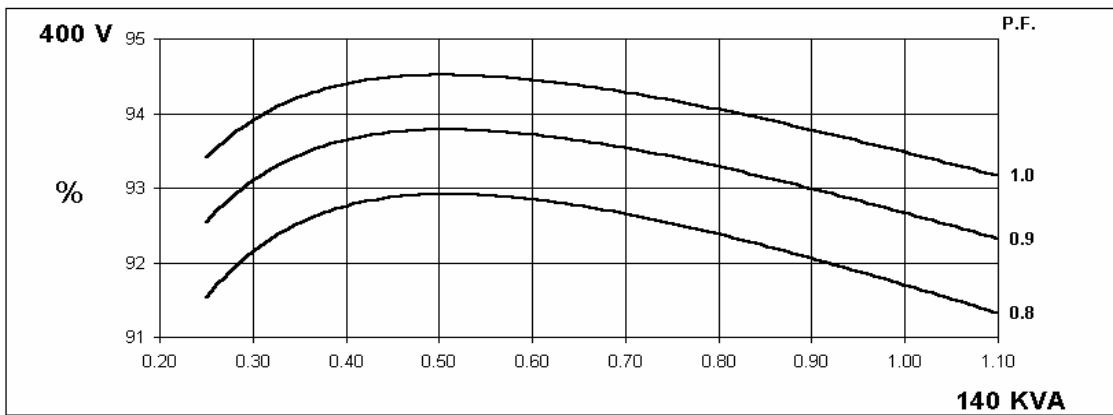
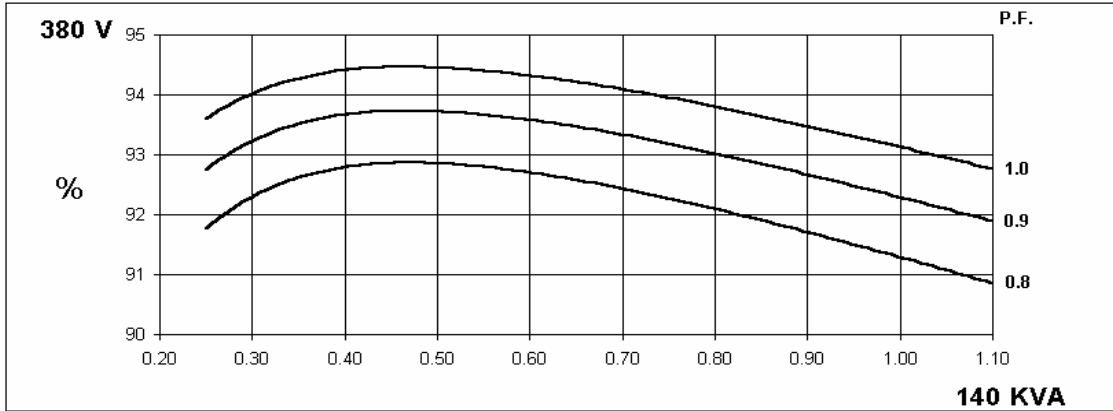
CONTROL SYSTEM	SEPARATELY EXCITED BY P.M.G.							
A.V.R.	MX321	MX341						
VOLTAGE REGULATION	± 0.5 %	± 1.0 %	With 4% ENGINE GOVERNING					
SUSTAINED SHORT CIRCUIT	REFER TO SHORT CIRCUIT DECREMENT CURVES (page 7)							
CONTROL SYSTEM	SELF EXCITED							
A.V.R.	SX460	AS440						
VOLTAGE REGULATION	± 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	0.0317 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED							
ROTOR WDG. RESISTANCE	1.34 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	492 kg				511 kg			
WEIGHT WOUND STATOR	180 kg				180 kg			
WEIGHT WOUND ROTOR	167.51 kg				156.55 kg			
WR ² INERTIA	1.3271 kgm ²				1.2765 kgm ²			
SHIPPING WEIGHTS in a crate	525 kg				539 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 m ³ /sec 1090 cfm				0.617 m ³ /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	140	140	140	N/A	160	167.5	167.5	178.8
X _d DIR. AXIS SYNCHRONOUS	2.34	2.11	1.96	-	2.68	2.51	2.29	2.25
X' _d DIR. AXIS TRANSIENT	0.21	0.19	0.18	-	0.25	0.23	0.21	0.21
X'' _d DIR. AXIS SUBTRANSIENT	0.14	0.13	0.12	-	0.17	0.16	0.15	0.14
X _q QUAD. AXIS REACTANCE	1.53	1.38	1.28	-	1.74	1.63	1.49	1.46
X'' _q QUAD. AXIS SUBTRANSIENT	0.18	0.16	0.15	-	0.22	0.21	0.19	0.18
X _L LEAKAGE REACTANCE	0.08	0.08	0.07	-	0.09	0.08	0.08	0.08
X ₂ NEGATIVE SEQUENCE	0.16	0.14	0.13	-	0.19	0.18	0.16	0.16
X ₀ ZERO SEQUENCE	0.10	0.09	0.08	-	0.11	0.10	0.09	0.09
REACTANCES ARE SATURATED				VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED				
T' _d TRANSIENT TIME CONST.	0.032 s							
T'' _d SUB-TRANSTIME CONST.	0.01 s							
T' _{do} O.C. FIELD TIME CONST.	0.85 s							
T _a ARMATURE TIME CONST.	0.007 s							
SHORT CIRCUIT RATIO	1/X _d							

50
Hz

UCI274E
Winding 311

STAMFORD

THREE PHASE EFFICIENCY CURVES

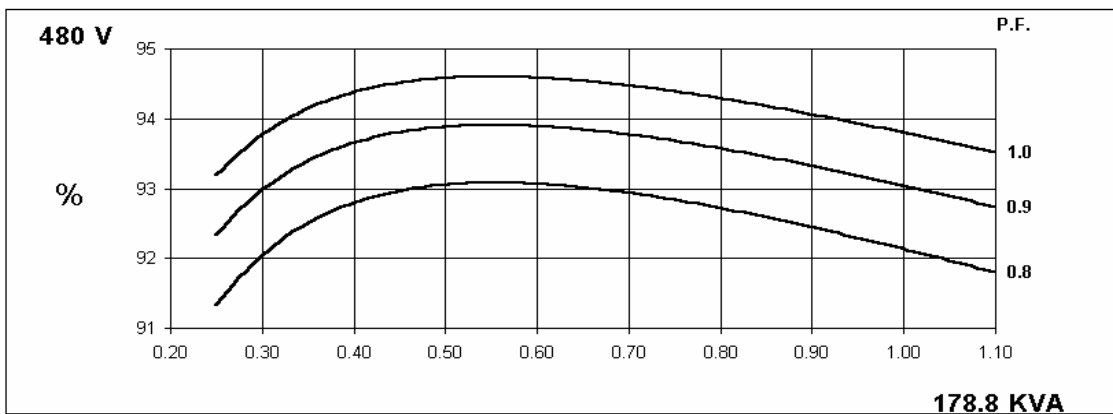
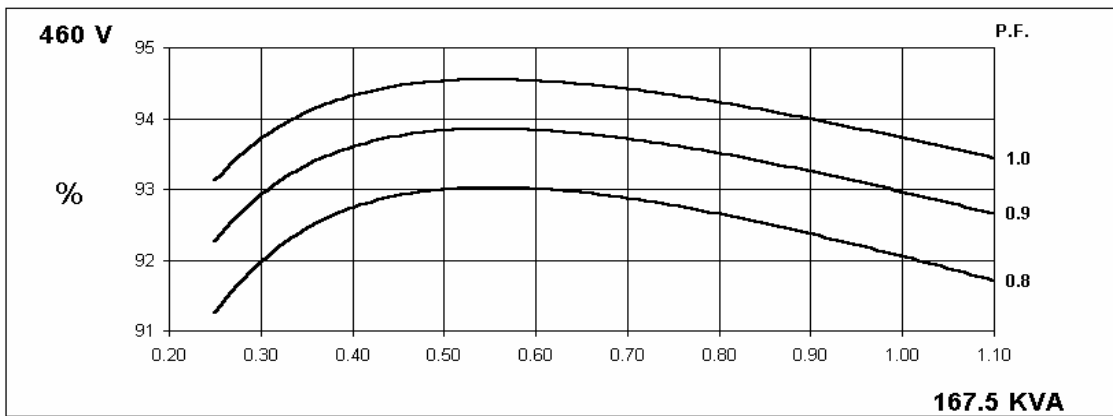
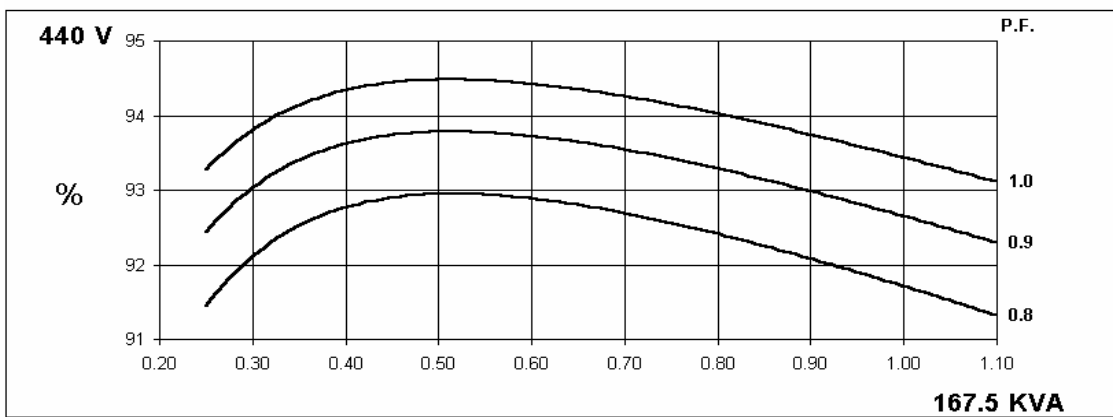
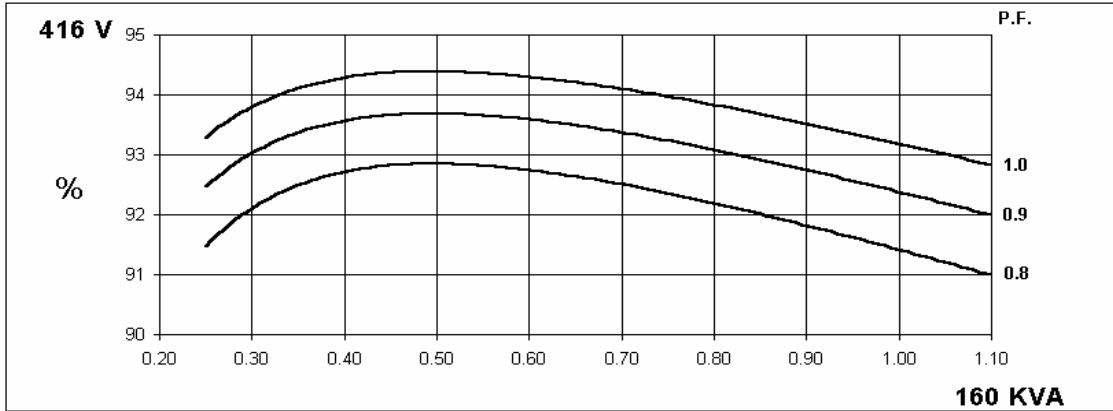


60
Hz

UCI274E
Winding 311

STAMFORD

THREE PHASE EFFICIENCY CURVES



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Winding 311

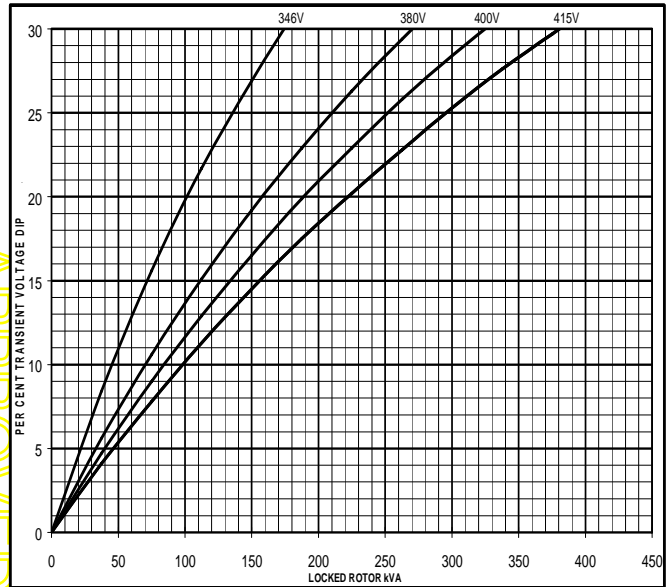
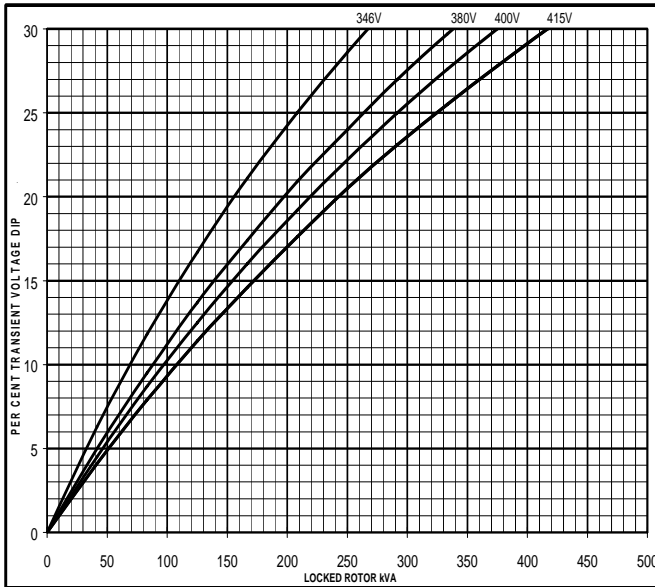
STAMFORD

Locked Rotor Motor Starting Curve

50
Hz

MX

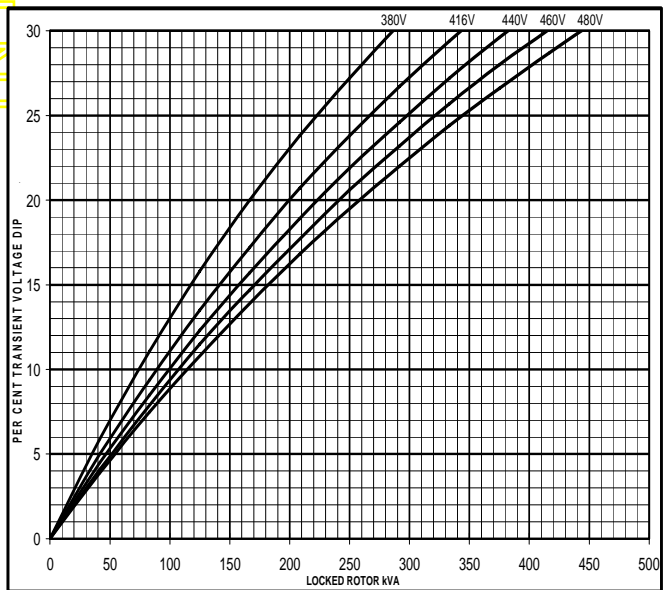
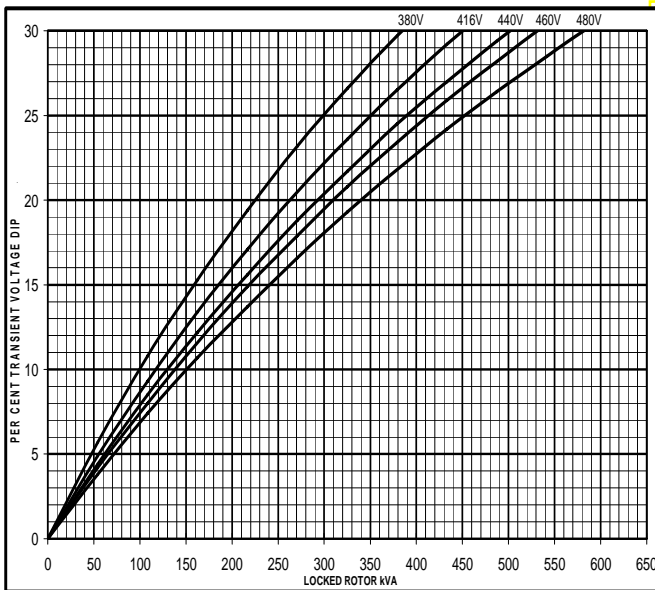
SX



60
Hz

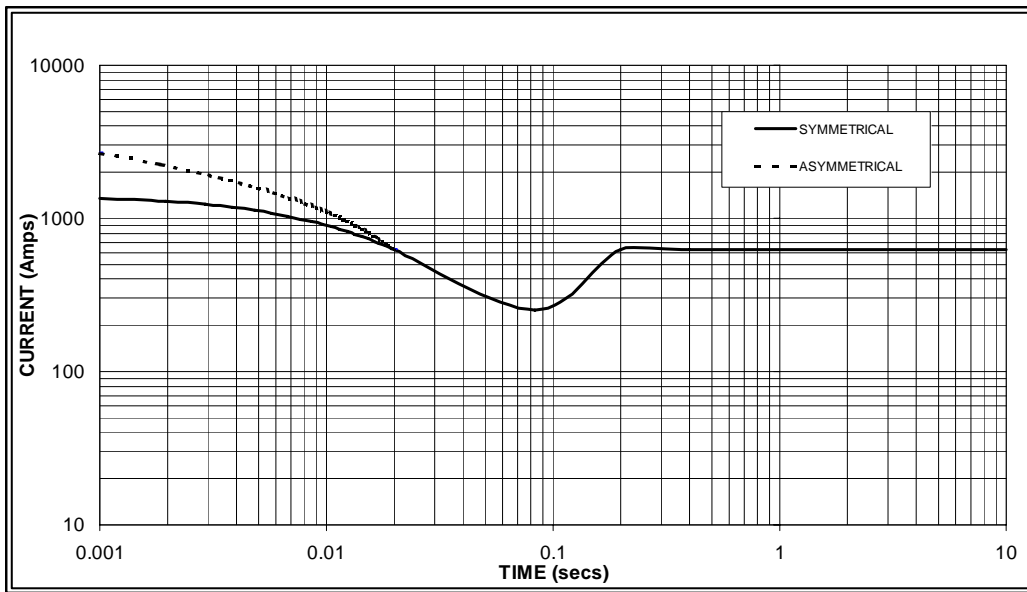
MX

SX



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

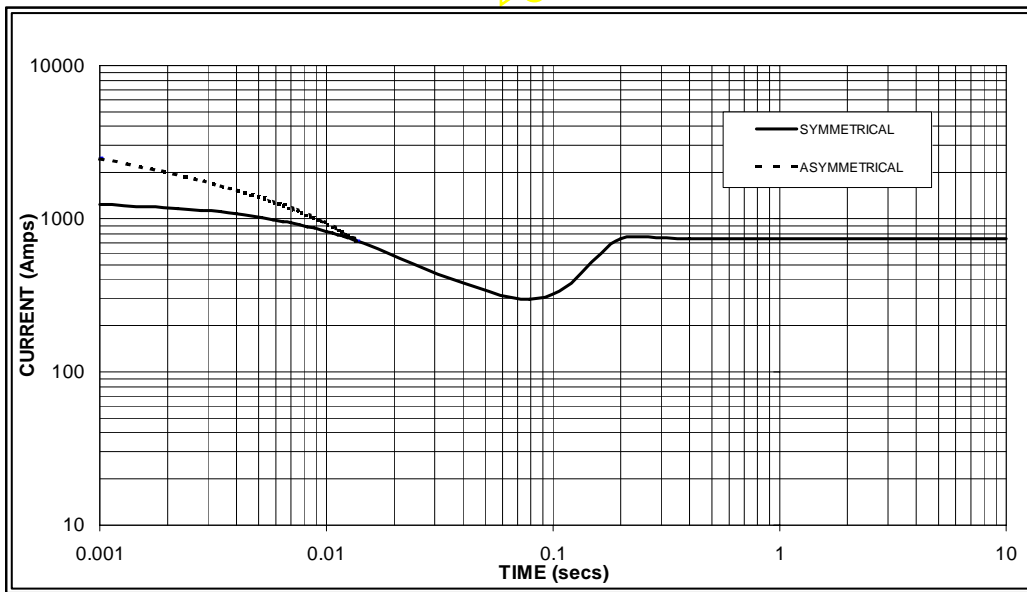
50
Hz



Sustained Short Circuit = 630 Amps



60
Hz



Sustained Short Circuit = 740 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

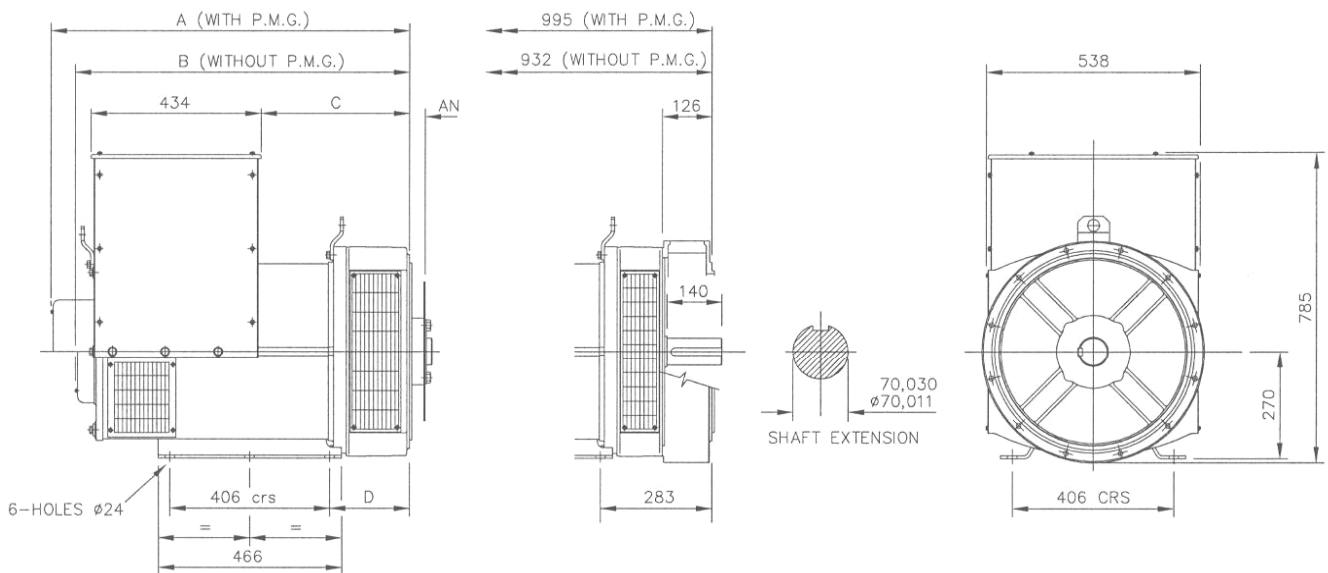
UCI274E
Winding 311 / 0.8 Power Factor

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	125.0	125.0	125.0	N/A	140.0	140.0	140.0	N/A	145.0	145.0	145.0	N/A	150.0	150.0	150.0	N/A	
kW	100.0	100.0	100.0	N/A	112.0	112.0	112.0	N/A	116.0	116.0	116.0	N/A	120.0	120.0	120.0	N/A	
Efficiency (%)	91.7	92.1	92.3	N/A	91.3	91.7	92.0	N/A	91.1	91.6	91.8	N/A	91.0	91.4	91.7	N/A	
kW Input	109.1	108.6	108.3	N/A	122.7	122.1	121.7	N/A	127.3	126.6	126.4	N/A	131.9	131.3	130.9	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	140.0	143.8	143.8	160.0	160.0	167.5	167.5	178.8	170.0	175.0	175.0	187.5	175.0	181.3	181.3	193.8	
kW	112.0	115.0	115.0	128.0	128.0	134.0	134.0	143.0	136.0	140.0	140.0	150.0	140.0	145.0	145.0	155.0	
Efficiency (%)	91.9	92.2	92.5	92.5	91.4	91.7	92.1	92.1	91.2	91.5	91.9	92.0	91.0	91.4	91.8	91.9	
kW Input	121.9	124.8	124.4	138.4	140.0	146.1	145.5	155.3	149.1	153.0	152.3	163.0	153.8	158.7	158.0	168.7	

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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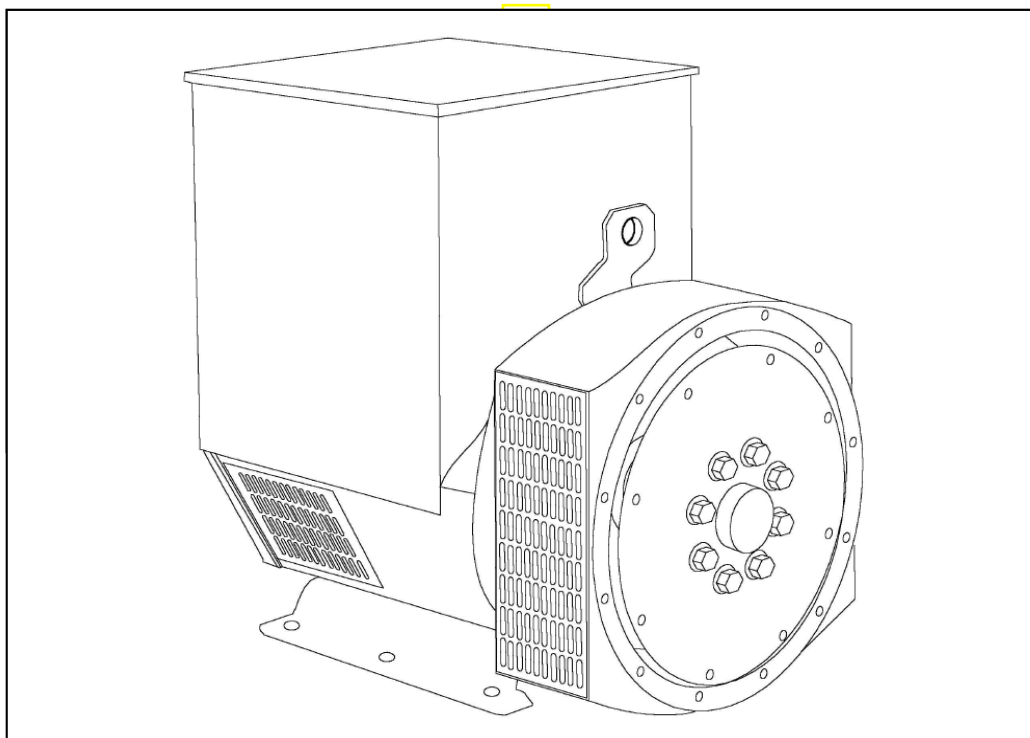
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STAMFORD®

UCI274E - 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 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. 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.

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UCI274E



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	0.05 Ohms PER PHASE AT 22°C SERIES STAR CONNECTED		
ROTOR WDG. RESISTANCE	1.34 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	492 kg	511 kg	
WEIGHT WOUND STATOR	180 kg	180 kg	
WEIGHT WOUND ROTOR	167.51 kg	156.55 kg	
WR ² INERTIA	1.3271 kgm ²	1.2765 kgm ²	
SHIPPING WEIGHTS in a crate	525 kg	539 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	178.8		
Xd DIR. AXIS SYNCHRONOUS	2.06		
X'd DIR. AXIS TRANSIENT	0.18		
X''d DIR. AXIS SUBTRANSIENT	0.13		
Xq QUAD. AXIS REACTANCE	1.34		
X''q QUAD. AXIS SUBTRANSIENT	0.17		
Xl LEAKAGE REACTANCE	0.07		
X ₂ NEGATIVE SEQUENCE	0.14		
X ₀ ZERO SEQUENCE	0.09		
REACTANCES ARE SATURATED		VALUES ARE PER UNIT AT RATING AND VOLTAGE INDICATED	
T'd TRANSIENT TIME CONST.	0.032s		
T''d SUB-TRANSTIME CONST.	0.01s		
T'do O.C. FIELD TIME CONST.	0.85s		
Ta ARMATURE TIME CONST.	0.007s		
SHORT CIRCUIT RATIO	1/Xd		

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Winding 17

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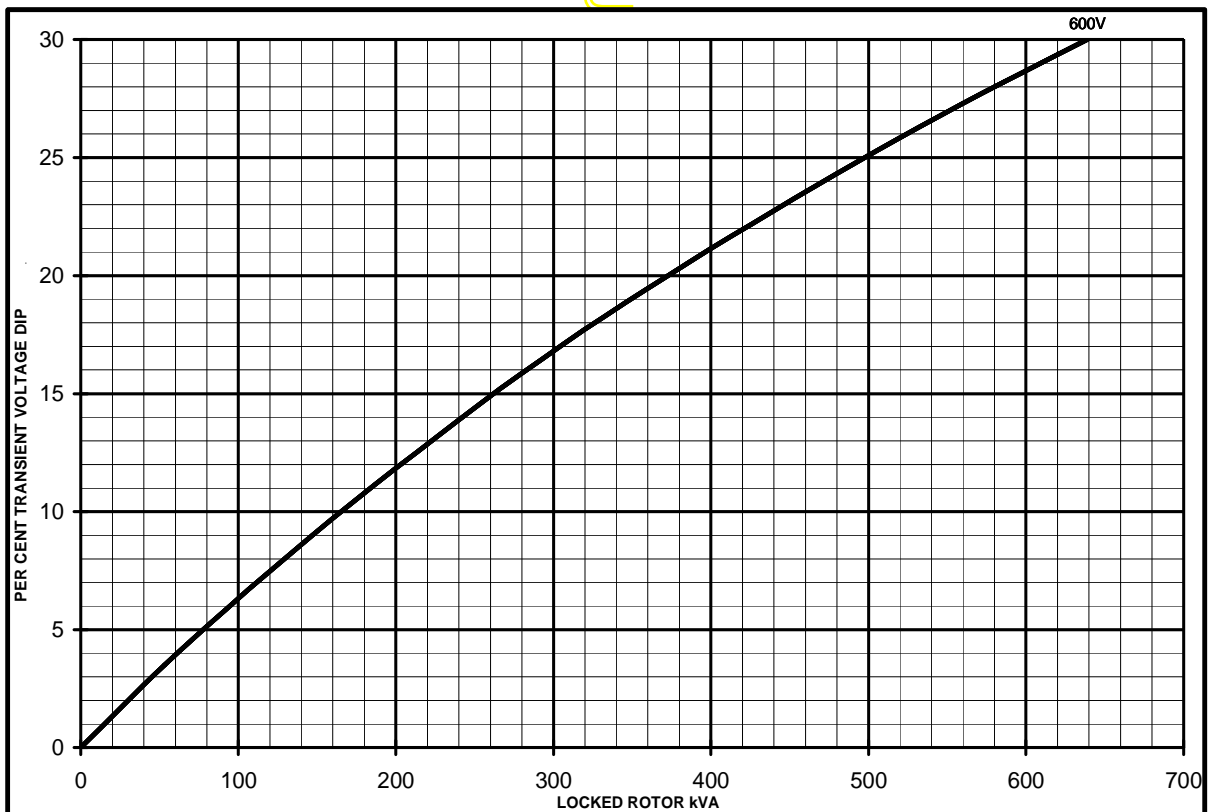
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Locked Rotor Motor Starting Curves

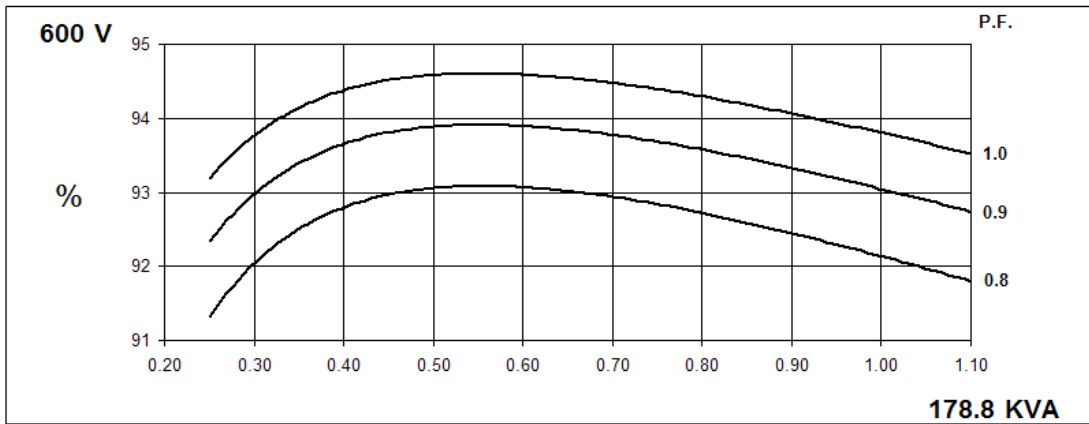


MX

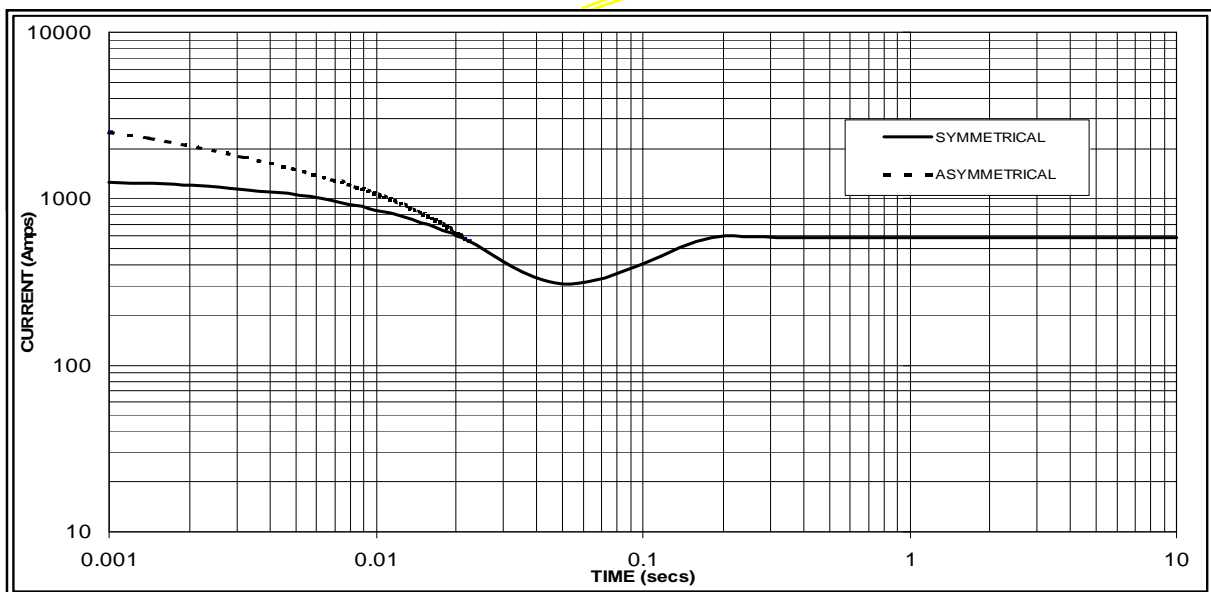
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THREE PHASE EFFICIENCY CURVES



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



Sustained Short Circuit = 580 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

UCI274E



Winding 17 / 0.8 Power Factor

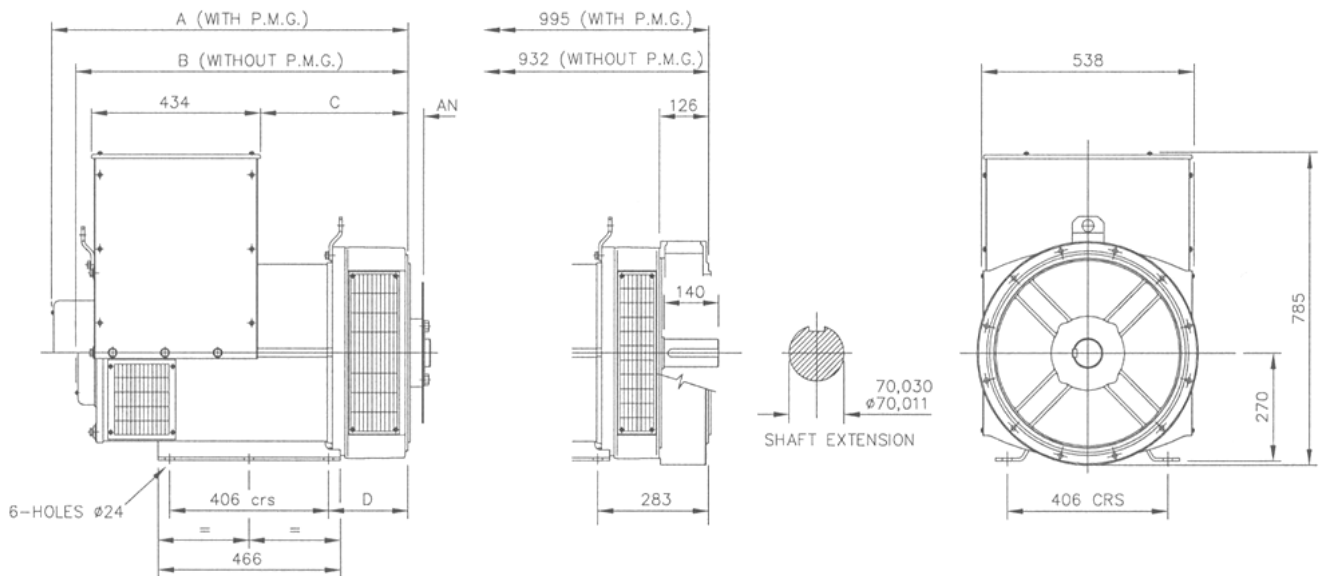
60Hz

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	160.0	178.8	187.5	193.8
kW	128.0	143.0	150.0	155.0
Efficiency (%)	92.5	92.1	92.0	91.9
kW Input	138.4	155.2	163.1	168.8

APPROXIMATE

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

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STAMFORD

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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, 810/U
- Optional enhanced generator protection: 47, 51, 78, and 81ROCOF
- Load sharing and generator sequencing (via LSM-200 Load Share Module)
- Var sharing over Ethernet (via LSM-200)
- BESTCOMSP^{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-200 Load Share Module](#)
 - [CEM-200 Contact Expansion Module](#)
 - [AEM-200 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

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-200's inputs and outputs with the CEM-200 (Contact Expansion Module) and the AEM-200 (Analog Expansion Module). This saves time and money by eliminating unnecessary external PLCs and control relaying.

Visit www.basler.com
FOR ADDITIONAL INFORMATION.

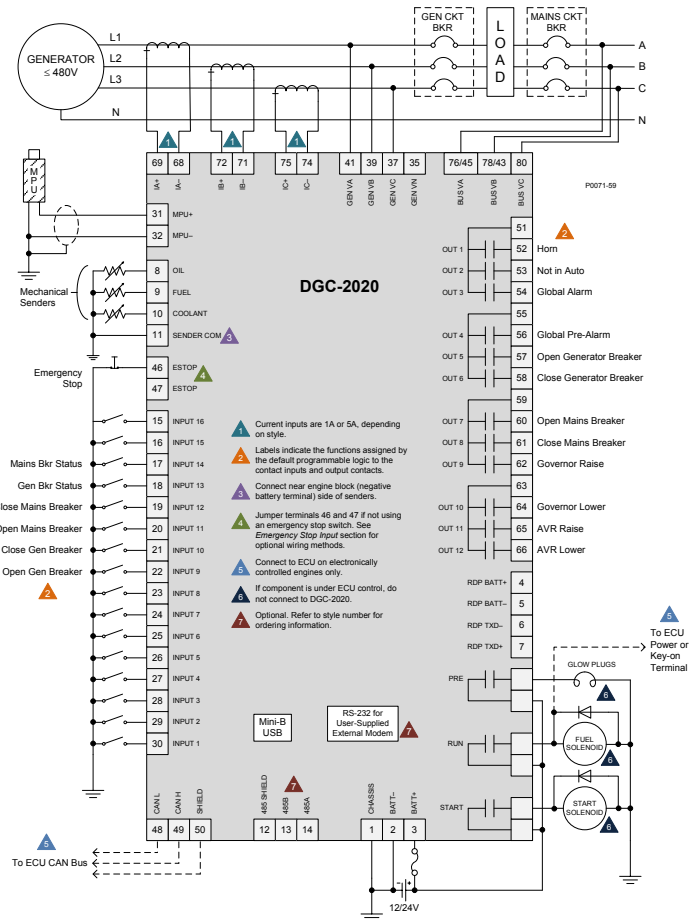


Figure 1 - DGC-200 Connection Diagram for a Typical Application

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, 810/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

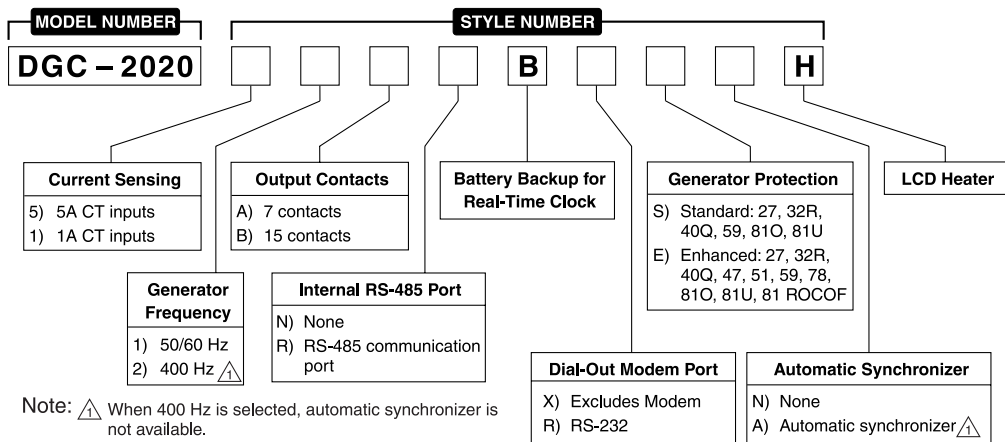
Operating Temp: -40°C to 70°C (-40°F to 158°F)
 Storage Temp: -40°C to 85°C (-40°F to 185°F)
 Humidity: IEC 68-2-38
 Salt Fog: ASTM B 17-73, IEC 68-2-11
 Ingress Protection: IEC IP54 for front panel
 Shock: 15 G in three perpendicular planes
 Vibration:
 5 to 29 Hz: 1.5 G peak
 29 to 52 Hz: 0.036" (0.914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



RELATED PRODUCTS

- [BE1-11g 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 BESTCOMSPUs[®] 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.



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Tmax-Molded Case Circuit Breakers

T3 225A 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



Dimensions 3P Fixed Version 5.9H x 4.13W x 2.76D

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)

T3

Continuous Current Rating		225A	
Number of Poles		3-4	
		N	S
AC			
240V		50	65
480V		25	35
600Y / 347V		10	10
DC			
250V	2 poles in series	25	35
500V	3 poles in series	25	35



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 electro-mechanical 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

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 ($I_3 = 10 \times I_n$);

Weight (lbs)	5.45
---------------------	------

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
- Solenoid operator
- 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)



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

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

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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 ($I_3 = 10 \times I_n$);

TMD (up to 50 A) thermo magnetic trip units with adjustable thermal threshold ($I_1 = 0.7 \dots 1 \times I_n$) and fixed magnetic threshold ($I_3 = 10 \times I_n$).

TMA thermo magnetic trip units, with adjustable thermal threshold ($I_1 = 0.7 \dots 1 \times I_n$) and adjustable magnetic threshold ($I_3 = 5 \dots 10 \times I_n$).

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)



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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

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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 ($I_1 = 0.7 \dots 1 \times I_n$) and adjustable magnetic threshold ($I_3 = 5 \dots 10 \times I_n$).

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

Weight (lbs)	8.55
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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)



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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

minnkotamotors.com

MINN-KOTA

ON-BOARD MARINE BATTERY CHARGER

DIGITALLY CONTROLLED 2X FASTER CHARGING PROTECTS BATTERIES

Digital CONTROL

MK210D

MK 210D
2 CHARGING BANKS
5 AMPS PER BANK
10 AMPS TOTAL OUTPUT

UL LISTED FC 10AMPS

CHARGING TECHNOLOGY

CHARGING TECHNOLOGY

DIGITALLY CONTROLLED.
Microprocessor design protects your batteries so you can stay on the water longer. It monitors temperature and state of charge to create a faster, regulated, more precise charge. Also includes automatic shut-off when charging is complete to extend battery life.

DIGITALLY CONTROLLED.
Microprocessor design protects your batteries so you can stay on the water longer. It monitors temperature and state of charge to create a faster, regulated, more precise charge. Also includes automatic shut-off when charging is complete to extend battery life.

ENHANCED STATUS CODES.
Provides comprehensive feedback on charge stage, maintenance mode status, error notification and full charge.

ENHANCED STATUS CODES.
Provides comprehensive feedback on charge stage, maintenance mode status, error notification and full charge.

Digital CONTROL

MULTI-STAGE CHARGING
BULK ABSORPTION MAINTENANCE
AMPS & VOLTS
TIME (THREE STAGE CHARGER)
VOLTS
AMPS

BATTERY CHARGER TEMPERATURE COMPENSATION
absorption voltage (output voltage)
BATTERY VOLTAGE
BATTERY TEMPERATURE (degrees F)

MULTI-STAGE CHARGING.
Delivers a fast, precise charge profile by automatically controlling current and voltage without overcharging your batteries.

MULTI-STAGE CHARGING.
Delivers a fast, precise charge profile by automatically controlling current and voltage without overcharging your batteries.

AUTOMATIC TEMPERATURE COMPENSATION.
Adjusts output voltage based on ambient temperature to ensure a full charge and protect your batteries.

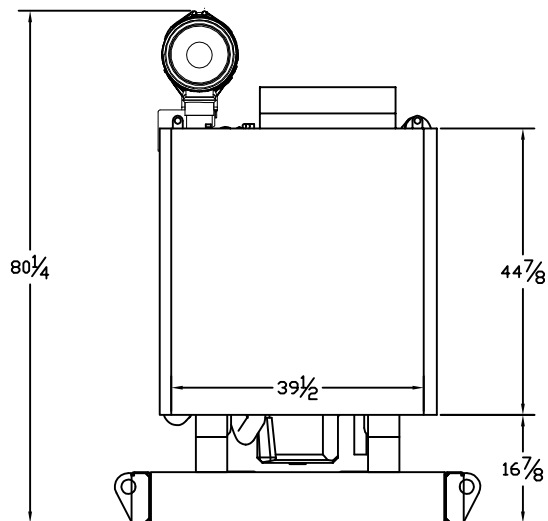
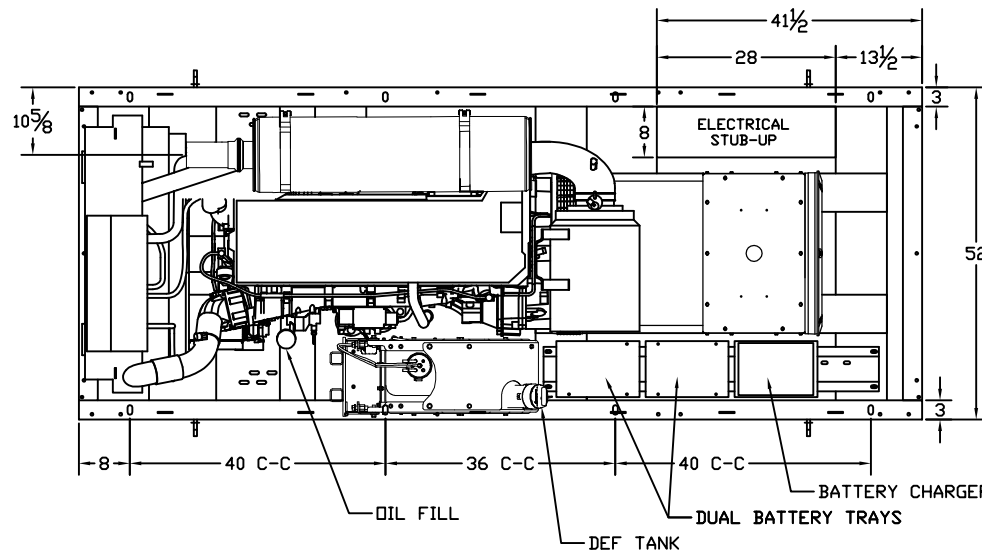
AUTOMATIC TEMPERATURE COMPENSATION.
Adjusts output voltage based on ambient temperature to ensure a full charge and protect your batteries.

2010

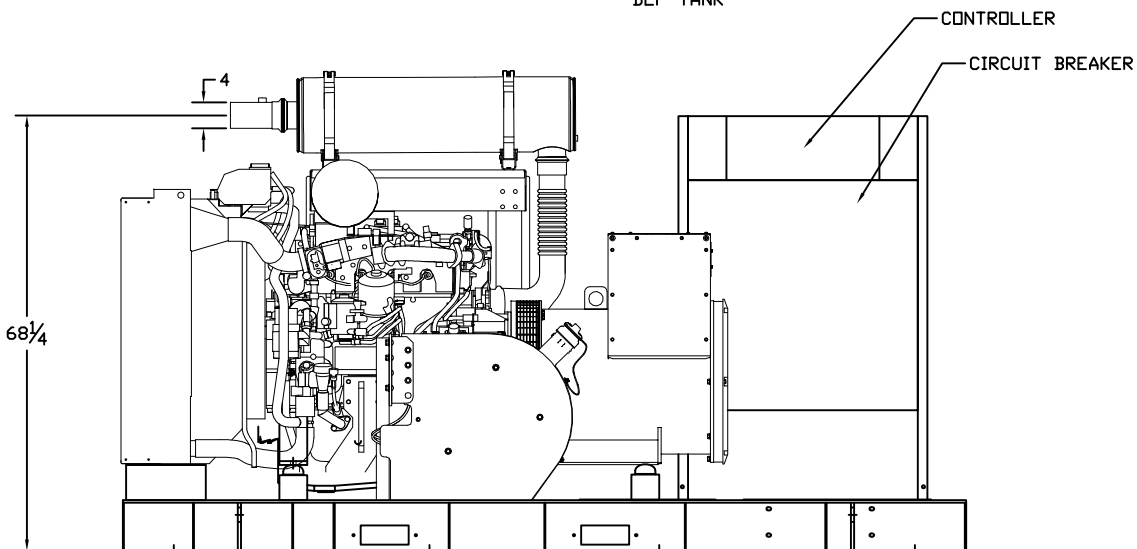


OUTLINE DIMENSIONS FOR T4D-1000 OPEN

TOP VIEW



RADIATOR END VIEW

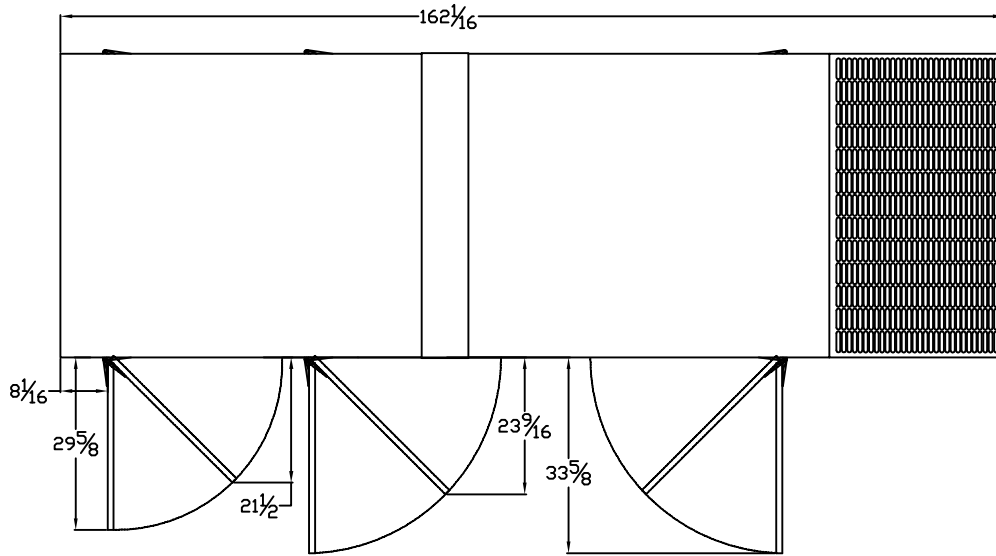


RIGHT SIDE VIEW

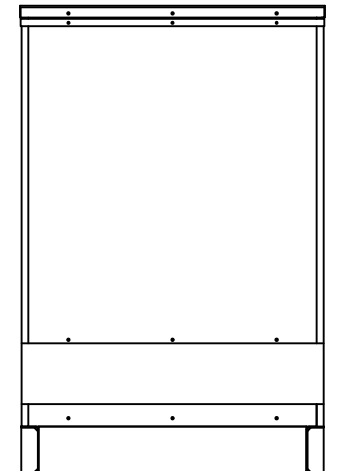
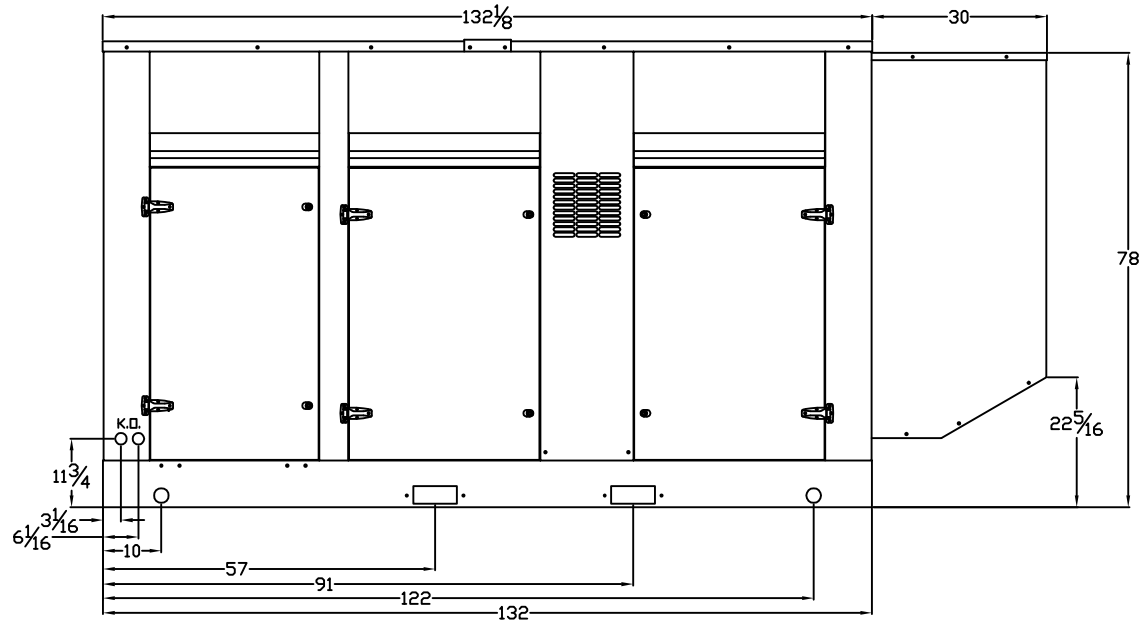
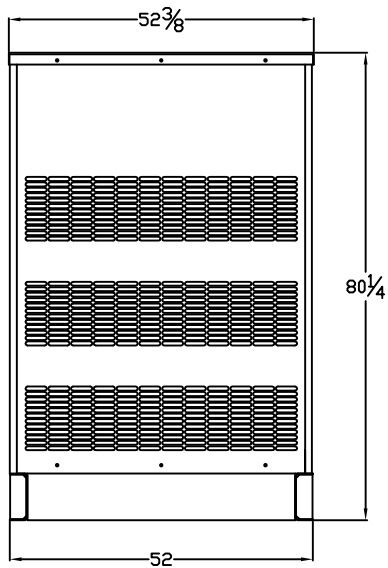
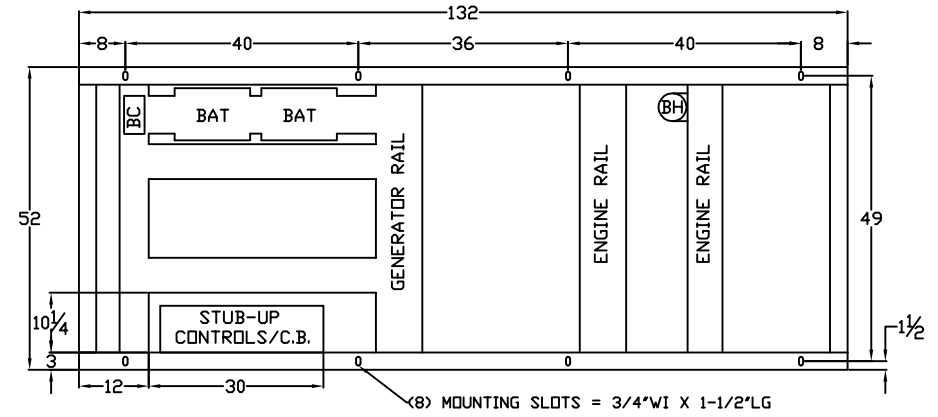
OUTLINE DIMENSIONS FOR T4D 100 - 200 KW LEVEL 2 ENCLOSURE (HINGED DOORS)

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