GILLETTE GENERATORS

LIQUID COOLED DIESEL ENGINE GENERATOR SET

60 HZ MODEL

T4D-3000

Model	HZ	STANDBY 130ºC RISE	PRIME 105ºC RISE
T4D-3000-60 HERTZ	60	300	300

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.

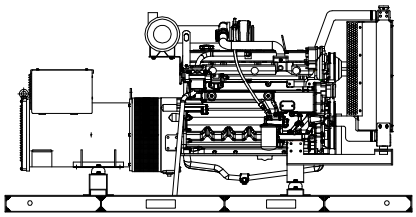
NEC 700, 701, 702, 708

NEMA ICS10, MG1, ICS6, AB1

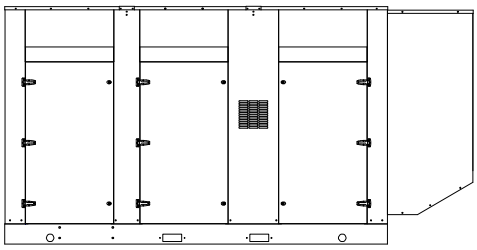
ANSI C62.41, 27, 59, 32, 480, 40Q, 81U, 360-05

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-3000-3-2	120	208	3	60	300/375	1042	300/375	1042
T4D-3000-3-3	120	240	3	60	300/375	903	300/375	903
T4D-3000-3-4	277	480	3	60	300/375	451	300/375	451
T4D-3000-3-5	127	220	3	60	300/375	985	300/375	985
T4D-3000-3-16	346	600	3	60	300/375	361	300/375	361

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-3000-60 HZ

GENERATOR SPECIFICATIONS

Manufacturer ..... Stamford Generators
Model & Type ..... S4L1D-F311, 4 Pole, 12 Lead, Three Phase
..... S4L1D-E311, 4 Pole, 12 Lead, 480V, Three Phase
..... S4L1S-E17, 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 ..... TAD1373VE, 4 cycle, liquid Cooled
Aspiration ..... Turbo After Cooler, H2O to Air
Charged Air Cooled System ..... H2O to Air
Cylinder Arrangement ..... 6 Cylinders, In-Line
Displacement Cu. In. (Liters) 780 (12.8)
Bore & Stroke in (Cm) ..... 5.16 x 6.22 (13.1 x 15.8)
Compression Ratio 17.8:1
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 469 (345)
BMEP: psi (MPa) Standby 340 (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	21.8 (82.7)	21.8 (82.7)
75% LOAD	16.6 (62.7)	16.6 (62.7)
50% LOAD	11.5 (43.5)	11.5 (43.5)

OIL SYSTEM

Type ..... Full Pressure
Oil Pan Capacity qt. (L) 31.6 (29.9)
Oil Pan Cap. W/ filter qt. (L) 38 (35.9)
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-3000-60 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..... 0.99:1
Ambient Capacity of Radiator °F (°C).....131 (55)
Engine Jacket Coolant Capacity gal. (L).....5.28 (20)
Radiator Coolant Capacity gal. (L) 11.7 (44)
Water Pump Capacity gpm (L/min)..... .....87.0 (329)
Heat Reject Coolant: Btu/min ....….10,123
Air to Air Heat Reject, BTU/min. .... ….5,346
Heat Radiated to Ambient, BTU/min .... ….3,415
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.....8"
Max. Back Pressure in KPA (in. H2O).....10 (40)
Exhaust Flow, at rated KW, CFM (m3/min)..... 4,347 (123)
Exhaust Temp, (Stack) °F (ºC) 932 (500)

SOUND LEVELS MEASURED IN dB(A)

	Open Set	Level 2 Encl.
Level 2, SCR/Residential Silencer	98	83

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)	186 (472)
Width in (cm)	52 (132)	72 (183)
Height in (cm)	65 (165)	94 (239)
Net Weight lbs (kg)	6327 (2870) ...	8097 (3673)
Ship Weight lbs (kg)	6602 (2995) ...	8462 (3839)

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-3000-60 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

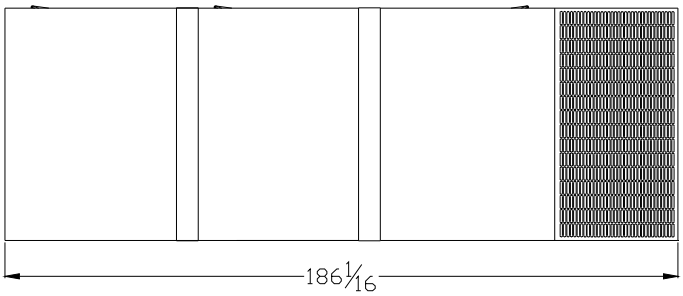
DC ELECTRICAL SYSTEM:

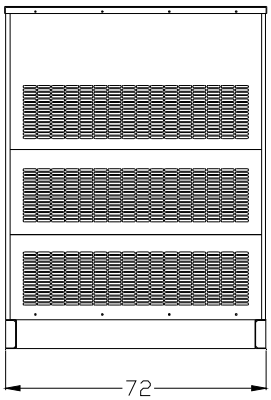
Battery trays • Battery cables • Battery hold down straps • 3-stage battery charger with float, absorption, & bulk automatic charge stages

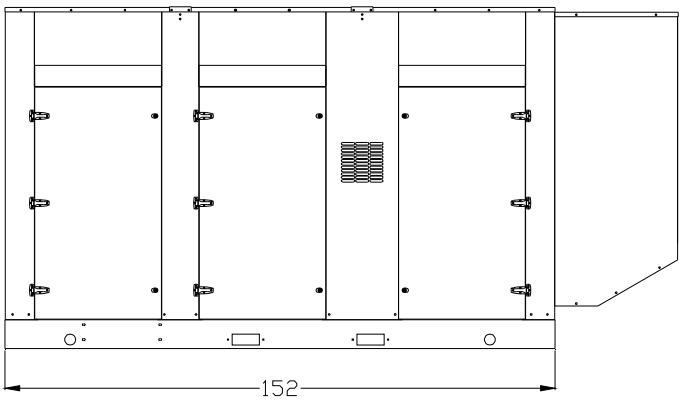
WEATHER / SOUNDPROOF ALUMINUM HOUSING:

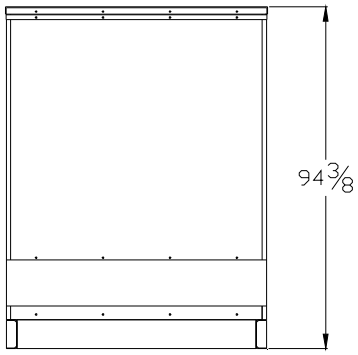
Corrosion Resistant Protection consisting of:

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





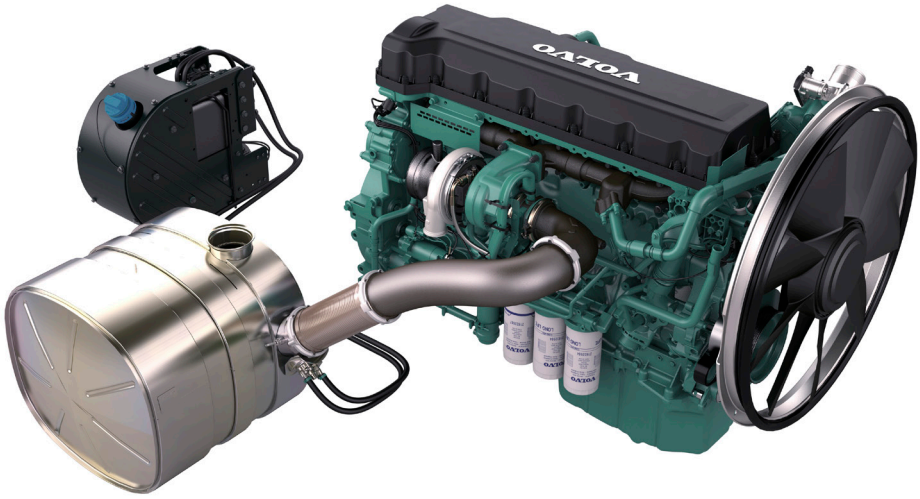




TAD1371-1375VE

12.78 litre, in-line 6 cylinder - 285, 315, 345, 375 & 405 kW

EU Stage IV / US EPA Tier 4 Final



TAD1371-1375VE is a powerful, reliable and economical off-road Diesel Engine range built on the Volvo Group in-line six concept.

Low cost of ownership

World class fuel efficiency combined with high uptime as well as low cost of ownership.

Compact & simple installation

As optional equipment all material needed in order to install the engine can be ordered from Volvo Penta. Installation guidelines as well as drawings and CAD models are easy to access. The result is an engine that is easy to install.

Durability & low noise

Long experince with base engine development reduces risk of downtime. Well-balanced to produce smooth operation with low noise.

Power & torque

Maximum power and torque available at low rpm. As a result noice as well as fuel consumption is very low. Useful engine speed for the TAD1371-1375VE is due to power and torque layout very flexible.

Low exhaust emission

Efficient injection as well as robust engine design in combination with optimised SCR technology and a light EGR contributes to excellent combustion and low fuel consumption.

Easy service & maintenance

Easily accessible service and maintenance points contribute to the ease of service of the engine. As optional equipment possible to remote mount filters and service points.

- **Proven and straight-forward design - built on Volvo Group technology**
- **Low cost of ownership and operation**
- **High power and torque already at low engine speed**
- **SCR and light EGR only - no DPF, DOC or regeneration**
- **Compact, simple installation and easy to service**
- **Similar engine footprint for all emission standards**
- **Wide range of optional equipment**

Technical description

Engine and block

- Cast iron cylinder block
- Wet, replaceable cylinder liners
- Replaceable valve guides and valve seats
- Overhead camshaft and four valves per cylinder

Lubrication system

- Full flow disposable spin-on oil filter, for extra high filtration
- Gear type lubricating oil pump, gear driven by the transmission
- Oil level sensor at startup

Fuel system

- Electronic high pressure unit injectors
- Fuel prefilter with water separator and water-in-fuel indicator / alarm
- Gear driven low-pressure fuel pump
- Fine fuel filter with manual feed pump and fuel pressure switch

Cooling system

- Available as power pack or base engine.
- Belt driven coolant pump with high degree of efficiency

Turbo charger

- Electronically controlled Waste-gate

Electrical system

- Engine Management System (EMS) 2.3, an electronically controlled processing system which optimizes engine performance. It also includes advanced features for diagnostics and fault tracing.
- The instruments and controls connect to the engine via the CAN SAE J1939 interface. Options available for engine control equipment.

Exhaust aftertreatment system

- SCR and light EGR only
- Airless urea injection
- Wide range of options available, including different sized AdBlue® / DEF tanks (also possible for OEM to design own tank).
- AdBlue/DEF Quality Level Temperature Sensor for US Market

VOLVO PENTA

TAD1371-1375VE

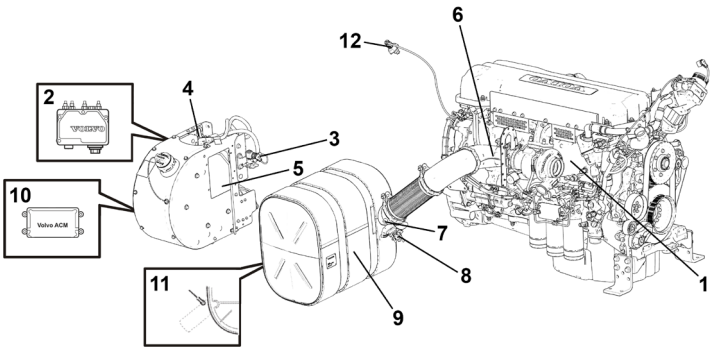
Technical data

Engine designation	TAD1371-1375VE
Configuration and no. of cylinders	in-line 6
Displacement, l (in³)	12.78 (780)
Method of operation	4-stroke
Direction of rotation (viewed towards flywheel)	anti-clockwise
Bore, mm (in.)	131 (5.16)
Stroke, mm (in.)	158 (6.22)
Compression ratio	17.8:1
Dry weight, engine only, kg (lb)	1267(2793)

Engine	kW	Hp	rpm	Max Nm
TAD1371VE	285	388	1900	1965
TAD1372VE	315	428	1900	2175
TAD1373VE	345	469	1900	2380
TAD1374VE	375	510	1900	2595
TAD1375VE	405	551	1900	2650

Main components, Principal layout

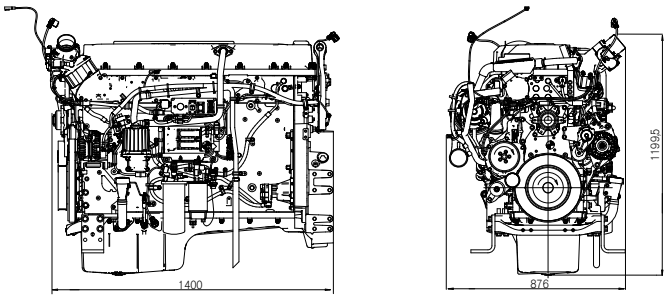
The illustration shows the main components of the aftertreatment system and its piping connections.



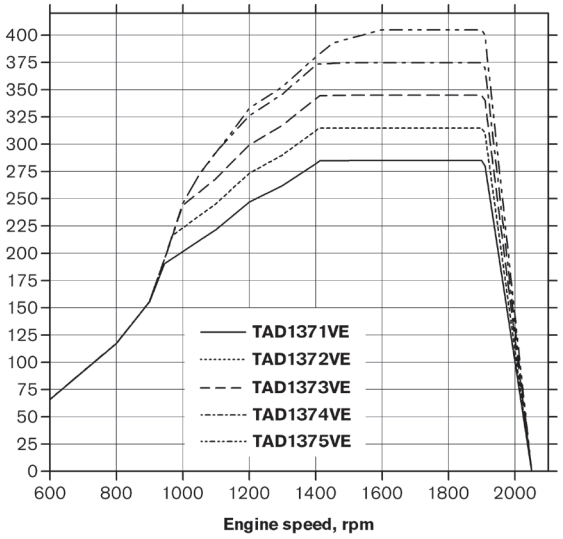
1. Engine
2. Pump Unit (PU)
3. Solenoid Valve, heating/cooling
4. AdBlue/DEF Level Temperature Sensor for EU Market
AdBlue/DEF Quality Level Temperature Sensor for US Market
5. AdBlue/DEF Solution Tank
6. NOx Sensor
7. Temperature Sensor Exhaust
8. Dosage Valve (DV)
9. Muffler with Catalytic Converter
10. Aftertreatment Control Module (ACM)
11. NOx Sensor
12. Temperature Sensor Air

Dimensions

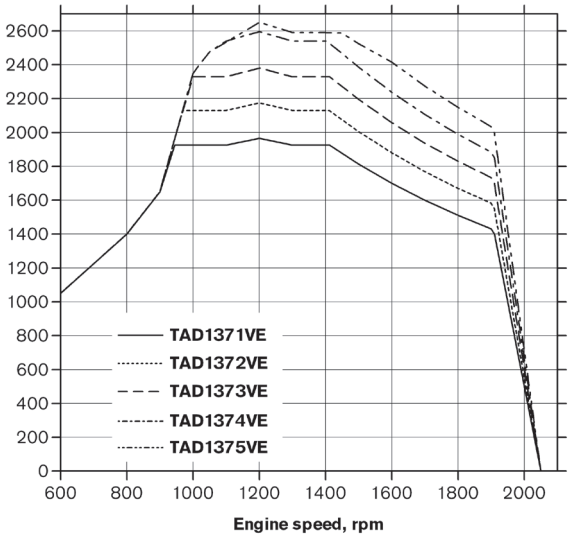
Not for installation. Dimensions in mm.



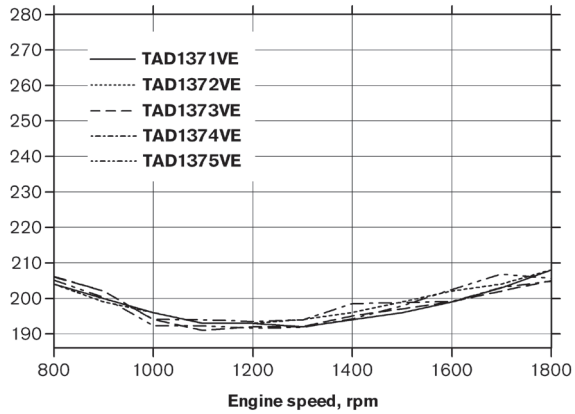
Power, kW



Torque, Nm



Fuel consumption, g/kWh



Power standards
The engine performance corresponds to ISO 3046, BS 5514 and DIN 6271. The technical data applies to an engine without cooling fan and operating on a fuel with calorific value of 42.7 MJ/kg (18360 BTU/lb) and a density of 0.84 kg/litre (7.01 lb/US gal, 8.42 lb/Imp gal), also where this involves a deviation from the standards.

Additional information
For additional information, please contact your Volvo Penta representative or visit www.volvopenta.com.

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

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, counterclockwise viewed towards flywheel

Number of cylinders			6
Displacement, total		liters in^3	12,78 780
Firing order			1-5-3-6-2-4
Bore		mm in	131 5,16
Stroke		mm in	158 6,22
Compression ratio			17,8:1
Wet weight	Engine only (Estimated) (excl after treatment comp.)	kg lb	1325 2921
	Power pac	kg lb	1790 3946

Performance				**rpm**	**1200**	**1500**	**1800**	**1900**
IFN Power 345 kW		without fan		kW hp	299 407	345 469	345 469	345 469
		with fan 890 mm		kW hp	291 396	333 453	325 442	321 437
Torque at:		IFN Power		Nm lbf ft	2380 1755	2196 1620	1830 1350	1734 1279
Max torque at engine speed		rpm	1200 rpm	Nm lbf ft	2380 1755			
Power tolerance				%	±2			
Mean piston speed				m/s ft/sec	6,3 20,7	7,9 25,9	9,5 31,1	10,0 32,8
Effective mean pressure at:		IFN Power		MPa psi	2,34 339	2,16 313	1,80 261	1,71 247
Max combustion pressure at:		IFN Power		MPa psi	16,7 2422	16,9 2451	15,6 2262	15 2175
Total mass moment of inertia, J (mR^2) (not including flywheel)				kgm^2 $lbft^2$	1,143 27,1			
Friction Power				kW hp	21 29	31 42	45 61	51 69
Derating see Technical Diagrams								

Engine brake performance (only engines with VCB)		rpm	1200	1500	1900	2200
Brake power:	without fan	kW	70	128	240	283
		hp	95	174	326	385
Brake torque:	without fan	Nm	557	815	1206	1228
		lbf ft	411	601	890	906
Engine speed range for VCB activation:		rpm	1000-2200			
Min engine speed with VCB still active:		rpm	900			
Min oil temperature for VCB activation:		°C	55			

Cold start performance

*Cold start limit temperature	without starting aid	°C	-15	
		°F	5	
	with manifold heater 3 kW	°C	-25	
		°F	-13	
	with manifold heater 3 kW and block heater	°C	-30	
		°F	-22	
*Specify oil and fuel quality	T>-15°C Oil VDS3 or VDS4 15W/40 T<-15°C Oil VDS3 or VDS4 5W/40			
Heater type	Make	Power kW	Engaged hours (-30°C)	Cooling water temp engine block
Self circulating	Volvo 21578298	2	12	-1°C 30°F

* See also general section in the sales guide

Lubrication system

Lubricating oil consumption (average)			Vol%	0,02
Oil system capacity including filters			liter	36
			US gal	9,51
Oil pan capacity: (both variants)		Max	liter	30
			US gal	7,93
		Min	liter	19
			US gal	5,02
Oil change intervals/specifications	VDS3		h	1000
	VDS4		h	1000
Engine angularity limits:		front up	°	11
		front down	°	11
		side tilt	°	11
Oil pressure at rated speed			kPa	300 - 650
			psi	44 - 94

Lubrication system

Lubrication oil temperature in sump:		max	°C	130
			°F	266
Oil filter filtration efficiency (in accordance with ISO 4548-12)		99%	µ	38
		50%	µ	14

Fuel system

System supply flow at max. Speed		liter/h US gal/h	130 34,3
Fuel supply line max. restriction (measured at fuel inlet connection)		kPa psi	30 4,4
Fuel supply line max. pressure, during engine stand still (meassured at fuel inlet connection)		kPa psi	165 23,9
Fuel supply line min. pressure, during engine stand still (meassured at fuel inlet connection)		kPa psi	-125 -18,1
System return flow at max. Speed		liter/h US gal/h	30,0 7,9
Fuel return line max. restriction (measured at fuel return connection)		kPa psi	20 2,9
Max. allowable inlet fuel temp (Measured at fuel inlet connection)		°C °F	60 140
Prefilter / Water separator micron size		µ	10
Fuel filter filtration efficiency	96%	µ	6
	75%	µ	4
Governor type/make, standard		Volvo/EMS2.3	
Specific UREA consumption in Nonroad Transient Cycle (NRTC)		Vol%	4,9
Fuel to conform to			Fuel equal to or better than EN590:2009 or ASTM D975-09 and Max sulphur 15ppm

Intake and exhaust system		**rpm**	**1200**	**1500**	**1800**	**1900**
Charge air consumption at: (+25°C and 100kPa)	IFN Power	m³/min cfm	20,0 706	25,0 883	26 918	27 954
⚠ **See front page for important information** Max allowable air intake restriction including piping		kPa psi	6 0,9			
Heat rejection to exhaust at:	IFN Power	kW BTU/min	201 11431	250 14217	270 15355	278 15810
Exhaust gas temperature after turbine at:	IFN Power	°C °F	445 833	455 851	465 869	491 916
⚠ **See front page for important information** Max allowable back pressure in exhaust line (after turbine) Pipe dimension Ø: 125 mm		kPa psi	13 1,9	17 2,5	18 2,6	19 2,8
⚠ **See front page for important information** Max allowable temperature drop between turbine and SCR muffler inlet.		Δ°C Δ°F	10 18	10 18	10 18	10 18
SCR muffler pressure drop (at exhaust gas flow and exhaust temp given)		kPa psi	9 1,3	10 1,5	10 1,5	11 1,6
Exhaust gas flow at: (temp and pressure after turbine at the corresponding power setting)	IFN Power	m³/min cfm	47,0 1660	56,0 1978	59 2084	61 2154

Cooling system			rpm	1200	1500	1800	1900
Heat rejection radiation from engine at:		IFN Power	kW	7,6	8,1	8,4	8,7
			BTU/min	432	461	478	495
Heat rejection to coolant at:		IFN Power	kW	124	143	155	161
			BTU/min	7052	8132	8815	9156
Coolant			Yellow Volvo Coolant Solution (VCS)				
Radiator cooling system type				Closed circuit			
Standard radiator core area			m²	0,8			
			foot²	8,61			
Fan diameter	890 mm		mm	890			
			in	35,04			
Fan power consumption	890 mm		kW	4,0	6,0	10,0	12,0
			hp	5	8	14	16
Fan drive ratio	fan Ø890			0,84:1 ccw			
Coolant capacity:	engine		liter	20			
			US gal	5,3			
	std. 0,8m² radiator with hoses		liter	24			
			US gal	6,3			
Coolant pump			drive/ratio	belt/1,41:1 cw			
Coolant flow with standard system			l/s	3,7	4,7	5,7	6
			US gal/s	1,0	1,2	1,5	1,6
Minimum coolant flow			l/s	3,2	4,2	5,5	5,5
			US gal/s	0,8	1,1	1,5	1,5
Maximum outer circuit restriction incl. piping			kPa	65,0			
			psi	9,4			
Thermostat:		start to open	°C	82			
			°F	180			
		fully open	°C	92			
			°F	198			
Maximum static pressure head (expansion tank height + pressure cap setting)			kPa	100			
			psi	14,5			
Minimum static pressure head (expansion tank height + pressure cap setting)			kPa	70			
			psi	10,2			
Standard pressure cap setting			kPa	75			
			psi	10,9			
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	1200	1500	1800	1900
Heat rejection to charge air cooler	IFN Power	kW	54	63	64	61
		BTU/min	3071	3583	3640	3469
Charge air mass flow	IFN Power	kg/s	0,41	0,5	0,52	0,52
Charge air inlet temp.	IFN Power	°C	175	177	172	166
(Charge air temp after turbo compressor)		°F	347	351	342	331
⚠ **See front page for important information** Max allowable Charge air outlet temp.		°C	45	50	50	50
(Charge air temp after charge air cooler)		°F	113	122	122	122
⚠ **See front page for important information** Maximum pressure drop over charge air cooler incl. piping		kPa	12			
		psi	1,74			
Charge air pressure		kPa	209	207	179	166
(After charge air cooler)		psi	30,31	30,02	25,96	24,08
Standard charge air cooler core area		m²	0,8			
		foot²	8,61			

Cooling performance: 0.8 m² radiator and pull 890 fan

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	Air on temp		Air flow		External restriction	
	kW						
rpm	hp	°C	°F	m^3/s	ft^3/s	Pa	psi
1900	345	58	136	6,4	226,0	247	0,036
0,84	469	60	140	6,9	243,7	125	0,018
		62	144	7,3	257,8	0	

Cooling performance: 0.8 m² radiator and push 890 fan

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	Air on temp		Air flow		External restriction	
	kW						
rpm	hp	°C	°F	m^3/s	ft^3/s	Pa	psi
1900	345	58	136	6,3	222,5	265	0,038
0,84	469	59	138	6,5	229,5	195	0,028
		61	142	7	247,2	0	

Engine management system

Functionality	Alternatives			Default setting
Governor mode		Isochronous		
Governor droop		0		
Governor response		Adjustable PI-constants		1
Idle speed		600-900		700
Stop function		Energized to run/Stop		
Preheating function		On/Off		
Lamp test		On/Off		

Engine sensors and switch settings			Alarm level		Engine protection	
Parameter		**Unit**	**Setting range**	**Default setting**	**Level**	**Action. Default/Alternative**
Oil temp		°C	Setting +5	125		Shut down, ON/OFF*
Oil pressure	Low idle	kPa	50	25,0		Shut down, ON/OFF*
	Rated speed	kPa	300	275		Shut down, ON/OFF*
Oil level						
Piston cooling pressure >1000 rpm		kPa				
Coolant temp		°C	107	105		Shut down, ON/OFF*
Coolant level			See cooling system	On		
Fuel feed pressure	1200rpm	kPa	100			
Water in fuel			Alarm When Closed			
Crank case pressure		kPa	Rapid Pres inc			Shut down,
Air filter pressure drop				5		
Altitude, above sea		m				Automatic derating, see section derating
Charge air temp		°C	125	120		Shut down, ON/OFF*
Charge air pressure		kPa	Alarm map value +30kPa	Warning map value +20kPa		Shut down, ON/OFF*
Engine speed		rpm	x % of rated speed	125% of rated speed	Alarm level	Shut down, ON/OFF*

* Off means no shut down, alarm only

Parameter	Warning	Alarm	Derated 0% to engine protection map	Derated 100% to engine protection map	Forced idle after sec	Forced shut down after 2 sec
Coolant temp	105°C	107°C	107°C	108°C	N/A	N/A
Oil temp	125°C	127°C	127°C	130°C	N/A	N/A
Low oil pressure	Warning map value	Alarm map value	N/A	N/A	N/A	Alarm map value
High charge air temp	120°C	125°C	125°C	126°C	N/A	N/A
High charge air pressure	Warning map value	Alarm map value	Alarm map value	Alarm map value	N/A	N/A

Electrical system

Voltage and type					24V		
Alternator:	output	A			110/150		
	tacho output	Hz/alternator rev.			6		
	drive ratio				5,25		
Starter motor:		type			105P70 / (105P70 ISS för start/stop)		
		output	kW		7		
			hp		9,5		
Number of teeth on:		flywheel			153		
		starter motor			12		
Inlet manifold heater (at 20 V)			kW		3		
Power relay for the manifold heater			A		1		
Conditions:	**Temperature**		**°C**		**25**	**0**	**-15**
(4 mΩ main circuit resistance@	**Battery**		**Ah / CCA**		**235 / 1300**	**145 / 1050**	**145 / 1050**
Crank speed			rpm		171	118	98
Crank current			A		290	400	480
Starter input power during crank			kW		6,2	7,5	7,7
Battery power during crank			kW		6,5	8,1	8,5
Min battery @ 0°C			Ah / CCA		140/800		

Power take off		**rpm**	**1200**	**1500**	**1800**	**1900**
Front end in line with crank shaft max:*		Nm	2300	2140	1560	1620
(with a total added mass moment of inertia, J (mR2)≤ 0,05 kgm²)		lbf ft	1696	1578	1151	1195
Front end belt pulley load. Direction of load viewed from flywheel side:	max left	kW	42	53	62	68
		hp	57	72	84	92
	max down	kW	36	44	52	60
		hp	49	60	71	82
	max right	kW	42	53	62	68
		hp	57	72	84	92
Timing gear at servo pump PTO max:*		Nm	100			
		lbf ft	74			
Speed ratio direction of rotation viewed from flywheel side			1,58:1/ccw			
Maximum torque on timing gear at rear PTO : *		Nm	1000			
		lbf ft	738			
Speed ratio direction of rotation viewed from flywheel side			1,31:1/ccw			
Timing gear at compressor PTO max:*		Nm	600			
		lbf ft	443			
Speed ratio direction of rotation viewed from flywheel side			1,31:1/ccw			
Max allowed bending moment in flywheel housing		Nm	15000			
		lbf ft	11063			
Max. rear main bearing load		N	4000			
		lbf	899,2			

**** 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.

Performance	Power (kW)	Rpm
IFN Power	345	1900

Sensors Alarm	Signal	Range	Alarm switch	Alarm Level	Derating level	Condition/Delay	Derating
Boost pressure	0,5-4,5 V	50 - 400 kPa	N/A	map value+30 kPa	map		Soft derate VE/
Boost temperaure	50-0 kΩ	-40° - 130 °C	N/A	120°C	125°C		Soft derate VE/
Coolant level switch	Digital		Alarm when closed	Low			
Coolant temperature	50-0 kΩ	-40° - 140 °C	N/A	105°C	107°C		Soft derate VE/
Crankcase pressure	0,5-4,5 V	0 -15 kPa	N/A	Rapid pres inc	Rapid pres inc		Shutdown
Engine Speed Cam	Frequency		N/A	Lost sign			N/A
Engine Speed Crank	Frequency		N/A	Lost sign			N/A
Exhaust gas temp			N/A	550	575		Soft derate VE/
Oil level sensor			Alarm when low level	N/A	N/A		N/A
Oil temperature	50-0 kW	-40° - 140 °C	N/A	125°C	127°C		Soft derate VE/

Sensors Alarm	Signal	Range	rpm Map					Condition	Derating
Charge Air pressure	0,5-4,5 V	50 - 400 kPa	**600**	**1000**	**1200**	**1500**	**1900**		
Warning Level			363	363	363	335	290		
Alarm Level			373	373	373	345	300		Soft derate VE/
Oil pressure	0,5-4,5 V	0-700 kPa	**0**	**500**	**1000**	**1500**	**1900**		
Warning Level			1	50	200	300	300		
Alarm Level			1	25	175	275	275		Shut down
Fuel pressure	0,5-4,5 V	0-700 kPa	**600**	**1000**	**1200**	**1800**	**1900**		
Warning Level			100	100	100	300	300		
Alarm Level			N/A	N/A	N/A	N/A	N/A		

Remarks

1) Soft derate Coolant temp	Speed / °C	105°C	107C	108°C	
Remaining torque in %	600	100%	100%	85%	
	1200	100%	100%	40%	
	1500	100%	100%	0%	

Derate map R2			
°C	105	107	108
%	0	0	100

2) Soft derate Oil temp	Speed / °C	125°C	127°C	130°C	
Remaining torque in %	600	100%	100%	85%	
	1200	100%	100%	40%	
	1500	100%	100%	0%	

Derate map R2			
°C	125	127	130
%	0	0	100

3)Soft derate Boost Temp	Speed / °C	120°C	125°C	126°C	
Remaining torque in %	600	100%	100%	85%	
	1200	100%	100%	40%	
	1500	100%	100%	0%	

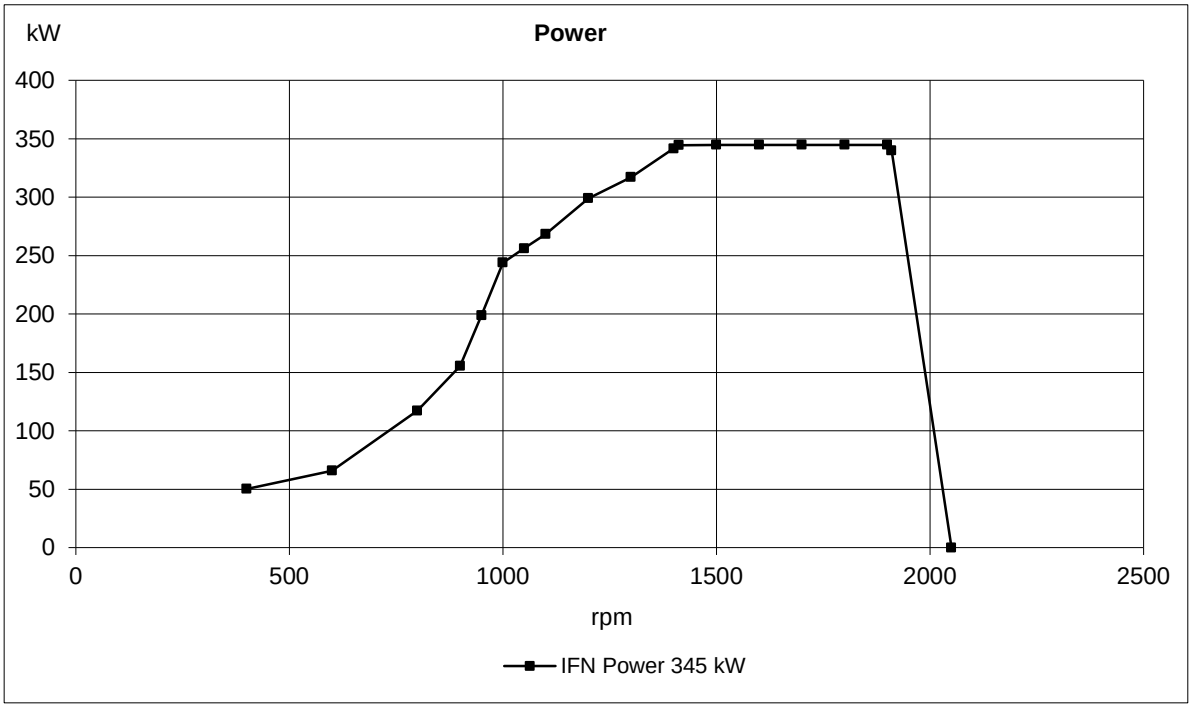
Derate map R2			
°C	120	125	126
%	0	0	100

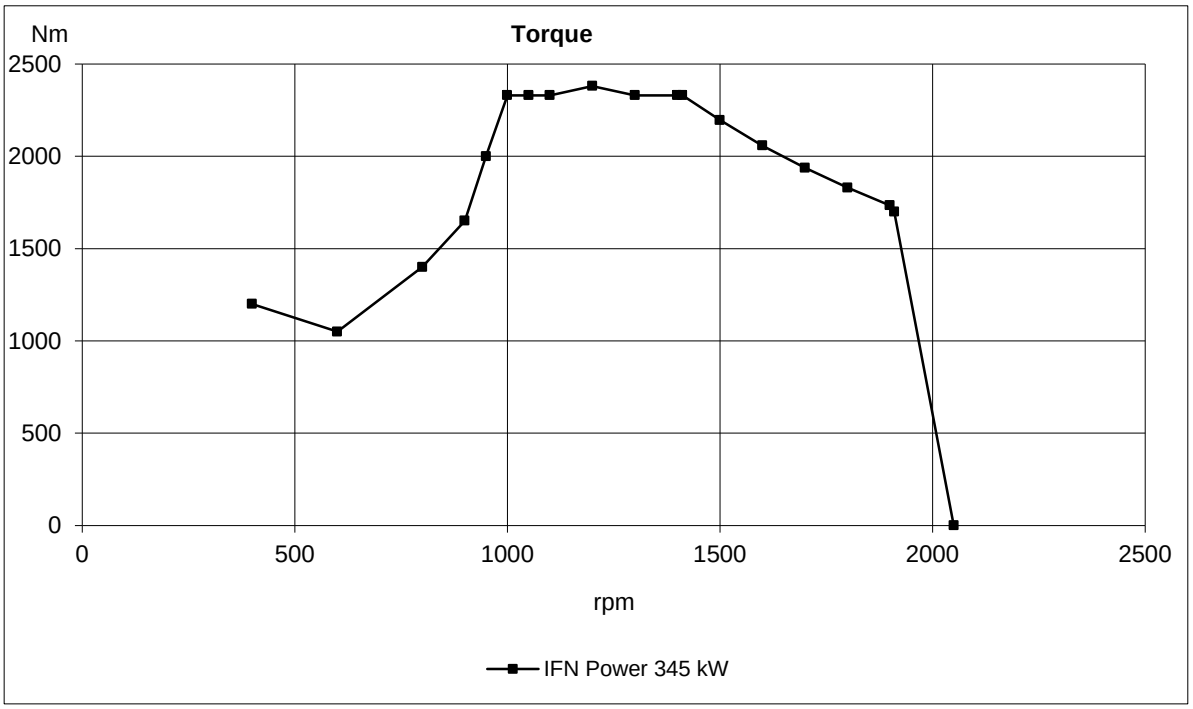
4)Soft derate Exhaust temp	Speed / °C	550°C	560°C	575°C	580°C
Remaining torque in %	600	100%	100%	100%	85%
	1200	100%	100%	100%	40%
	1500	100%	100%	100%	0%

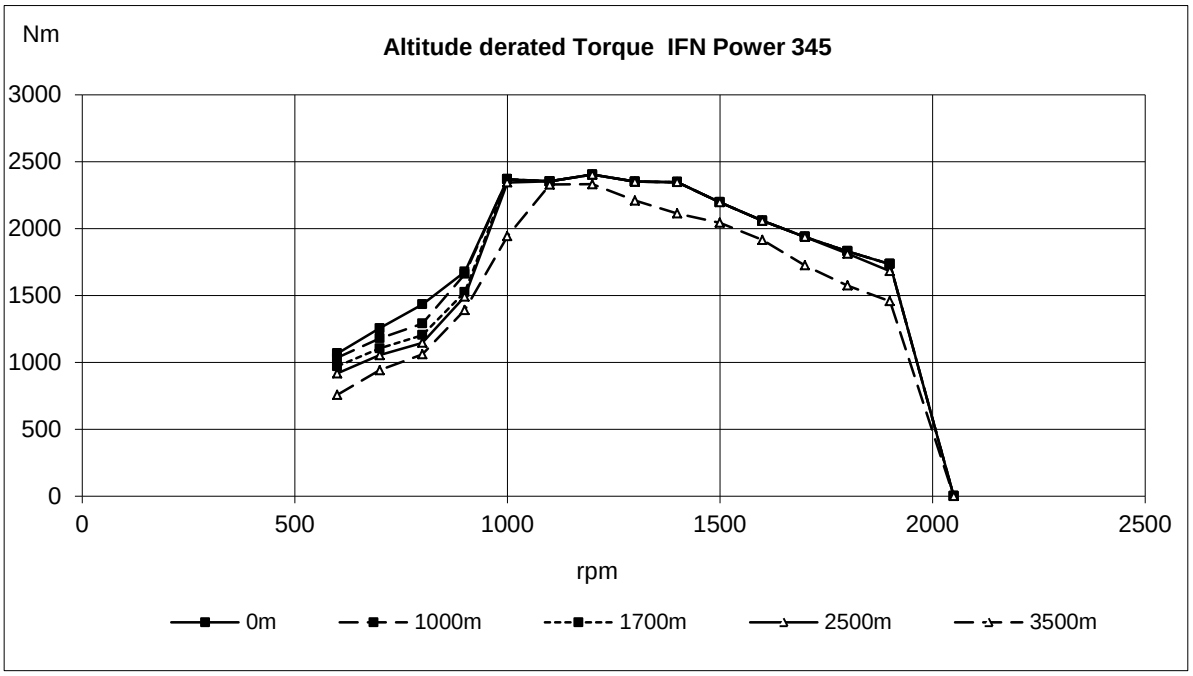
Derate map R2					
°C	550	560	575	580	
%	0	0	0	100	

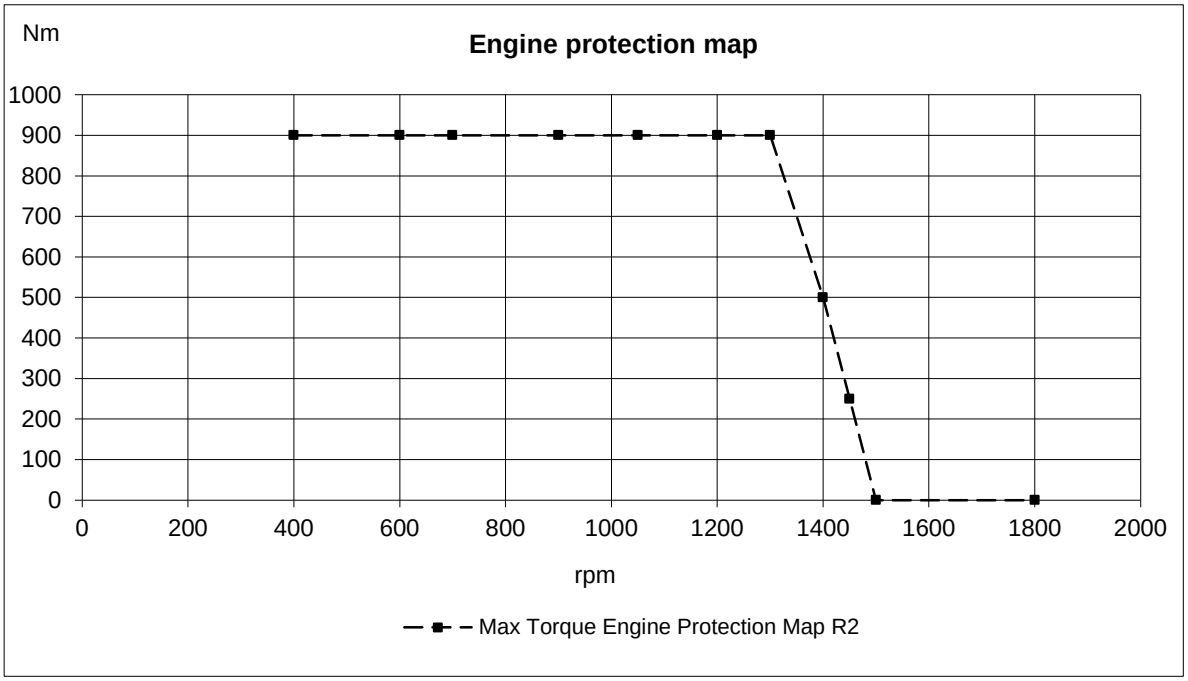
Max Torque High Map R2	400	600	700	800	900	1000	1050	1100	1200	1250	1300
	1200	1050	1225	1400	1650	2330	2330	2330	2380	2355	2330
	1400	1450	1500	1600	1700	1800	1900	1910	2009		
	2330	2272	2195	2058	1937	1830	1733	1700	500		

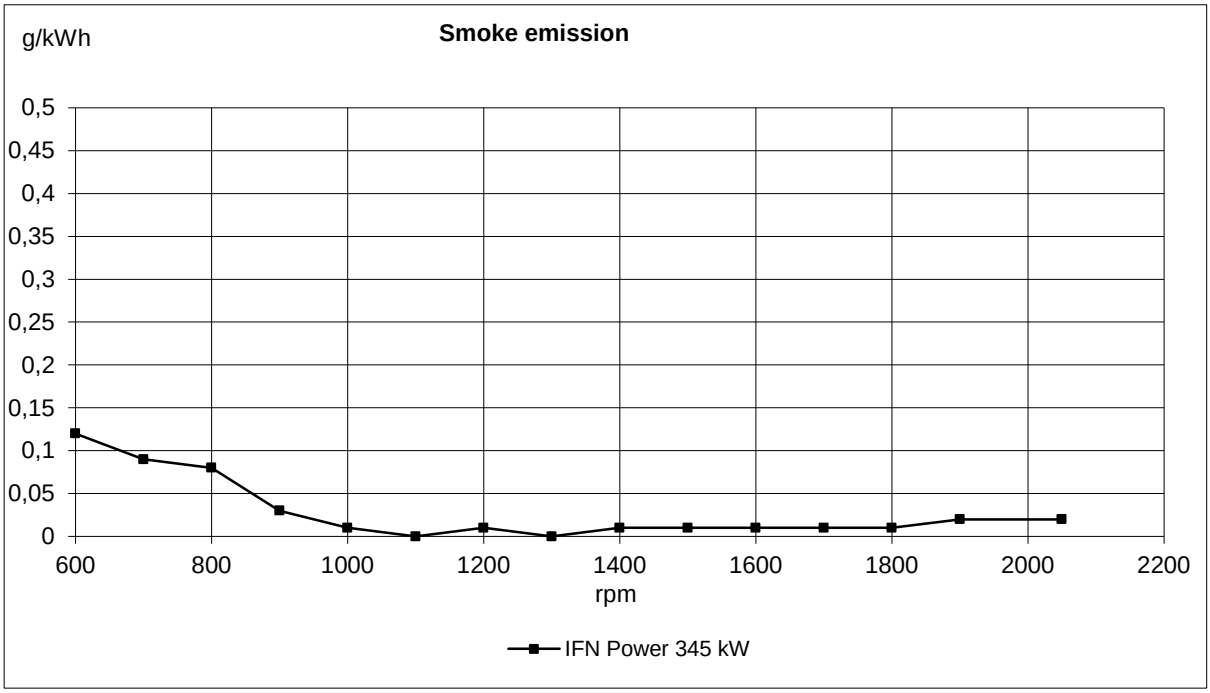
Max Torque Engine Protection Map R2	400	600	700	900	1050	1200	1300	1400	1450	1500	1800
	900	900	900	900	900	900	900	500	250	0	0

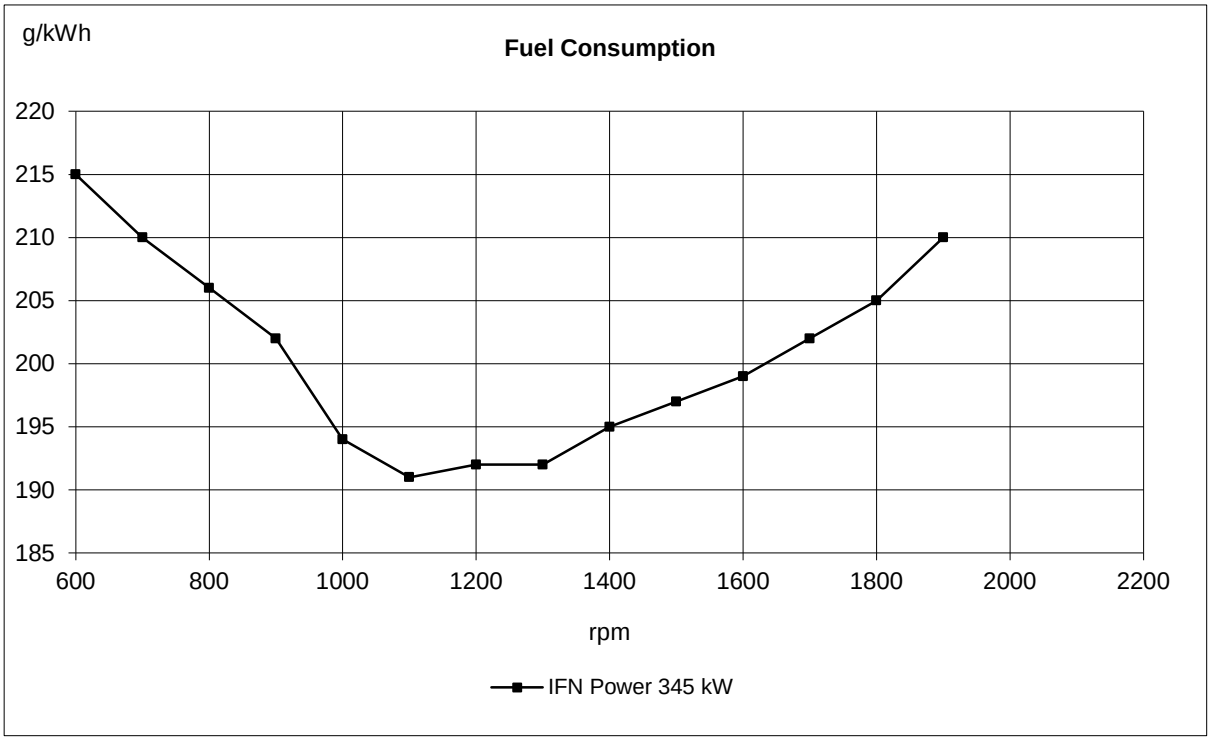

kW
Power
400
350
300
250
200
150
100
50
0
0
500
1000
1500
2000
2500
rpm
IFN Power 345 kW

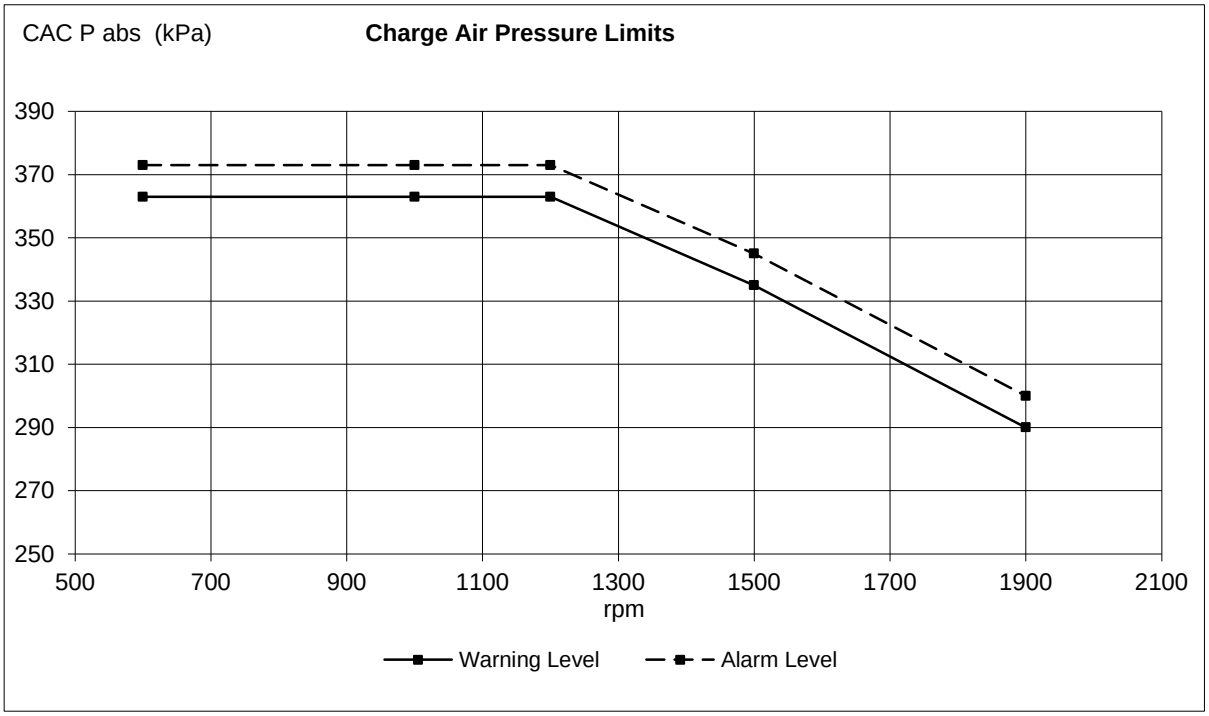

Nm
Torque
2500
2000
1500
1000
500
0
0
500
1000
1500
2000
2500
rpm
IFN Power 345 kW

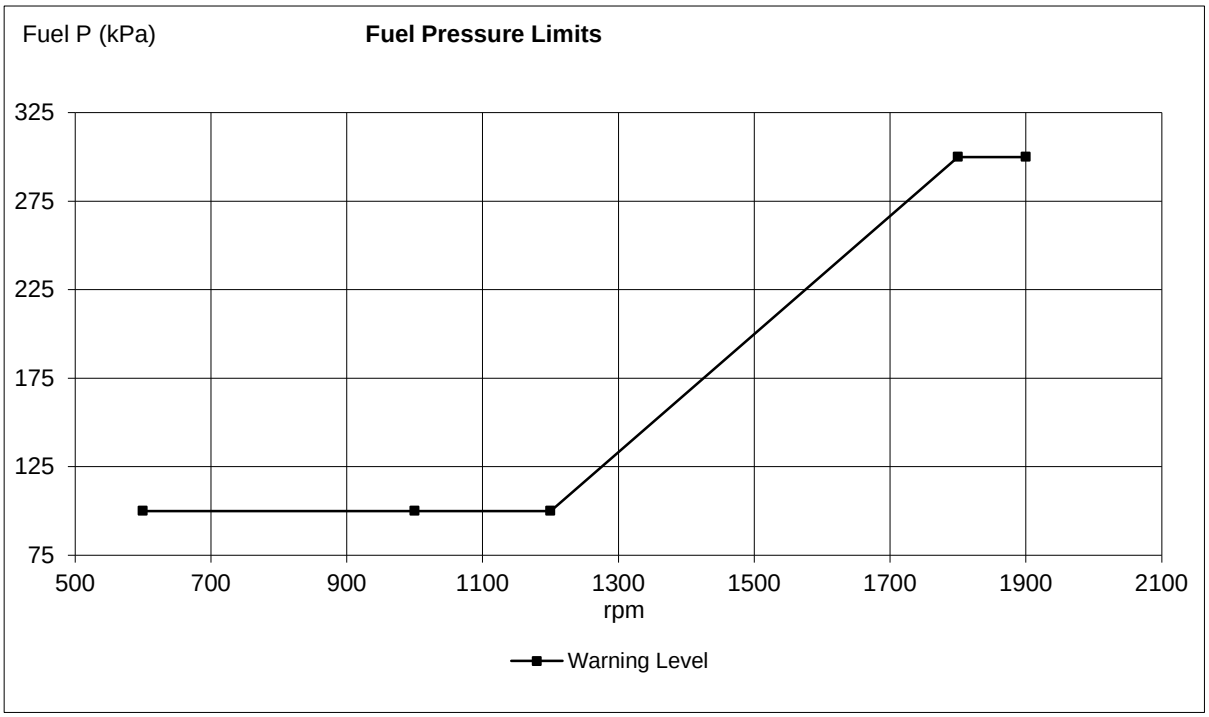

Nm
Altitude derated Torque IFN Power 345
3000
2500
2000
1500
1000
500
0
0
500
1000
1500
2000
2500
rpm
0m
1000m
1700m
2500m
3500m

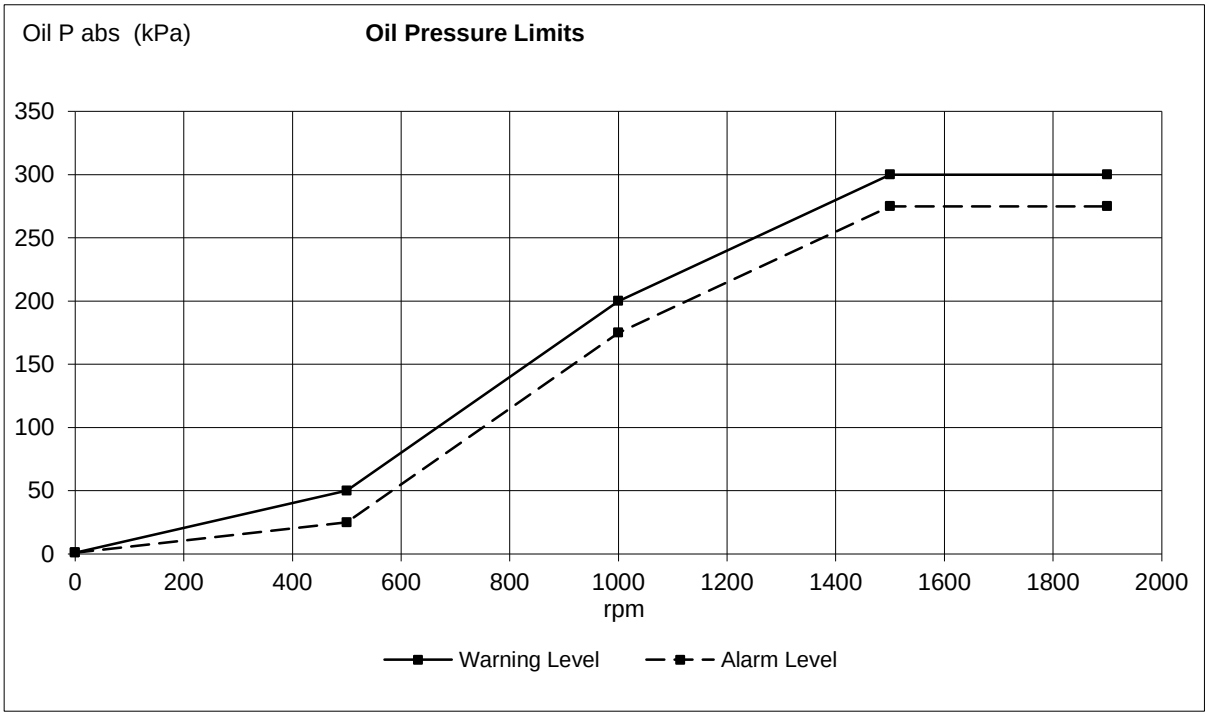

Nm
Engine protection map
1000
900
800
700
600
500
400
300
200
100
0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
rpm
Max Torque Engine Protection Map R2

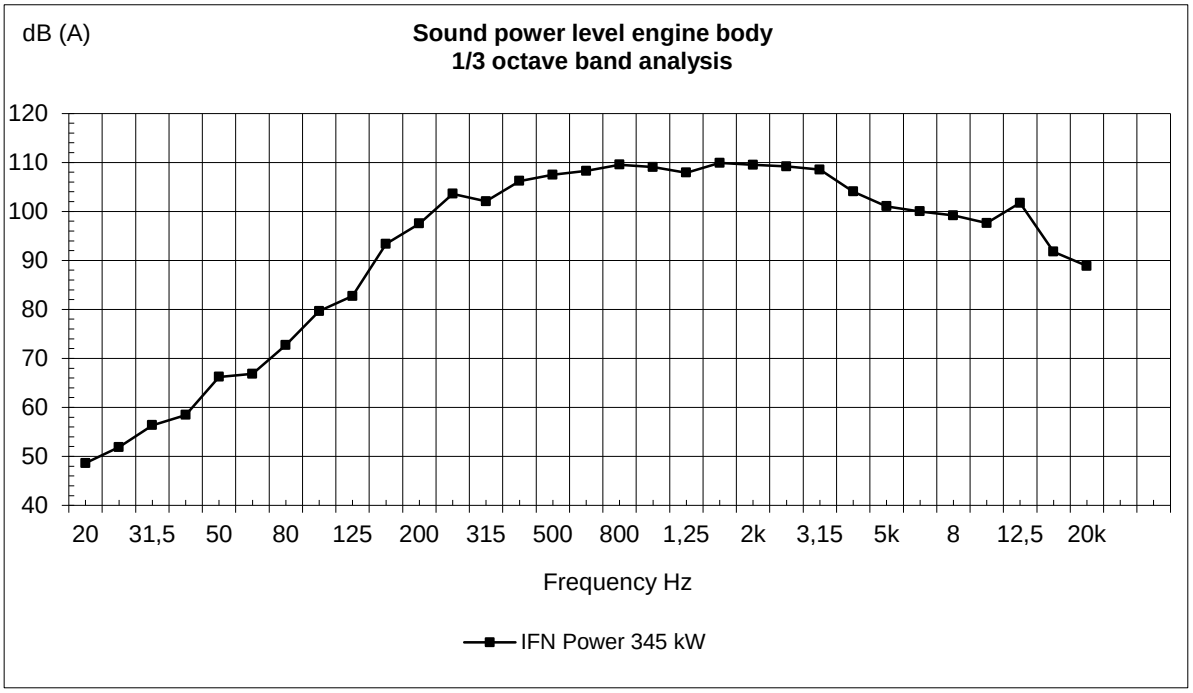

Smoke emission
g/kWh
0,5
0,45
0,4
0,35
0,3
0,25
0,2
0,15
0,1
0,05
0
600
800
1000
1200
1400
1600
1800
2000
2200
rpm
IFN Power 345 kW

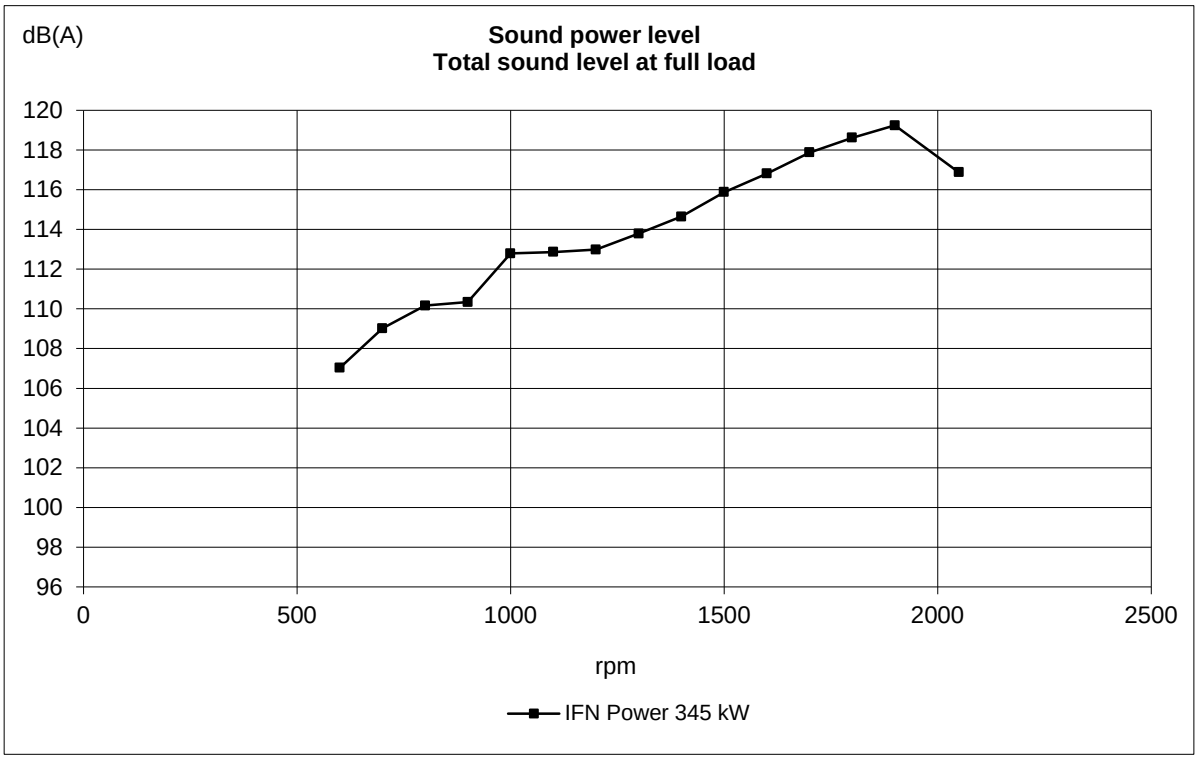

g/kWh
Fuel Consumption
220
215
210
205
200
195
190
185
600
800
1000
1200
1400
1600
1800
2000
2200
rpm
IFN Power 345 kW

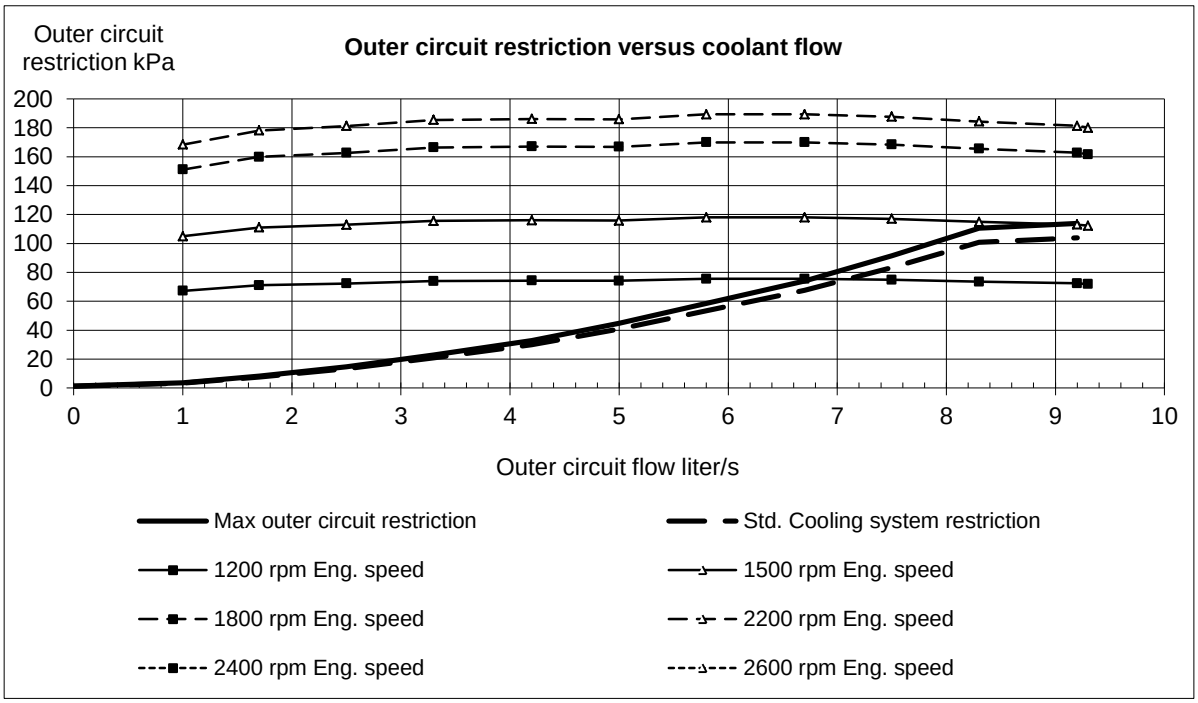

CAC P abs (kPa)
Charge Air Pressure Limits
390
370
350
330
310
290
270
250
500
700
900
1100
1300
1500
1700
1900
2100
rpm
Warning Level
Alarm Level

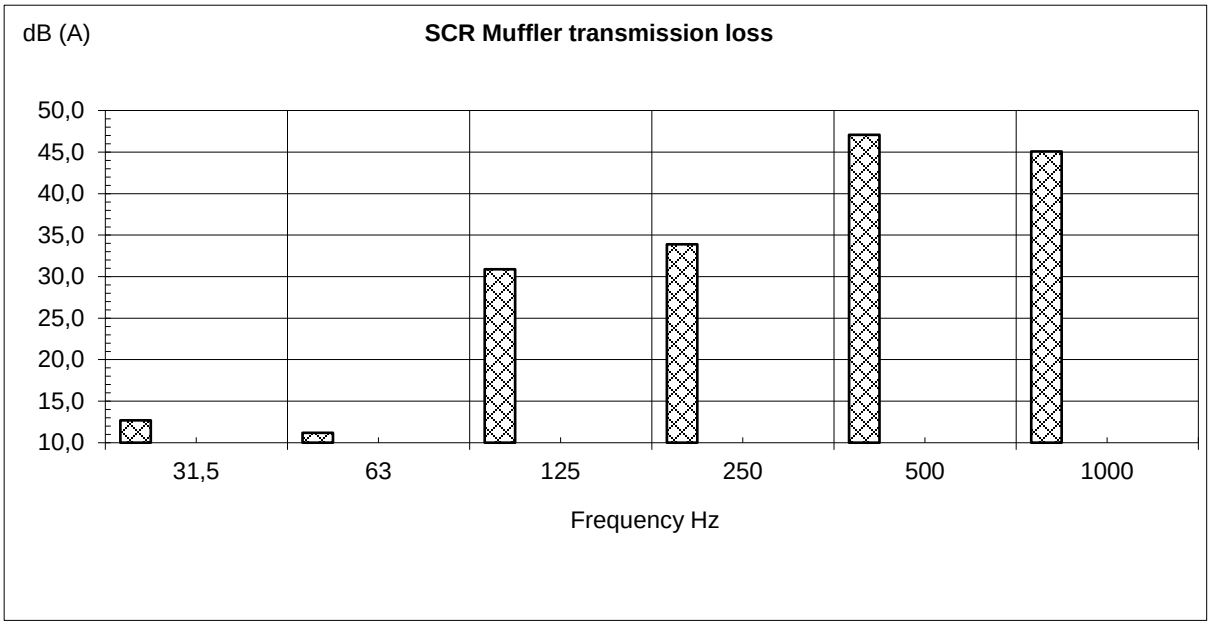

Fuel P (kPa)
Fuel Pressure Limits
325
275
225
175
125
75
500
700
900
1100
1300
1500
1700
1900
2100
rpm
Warning Level

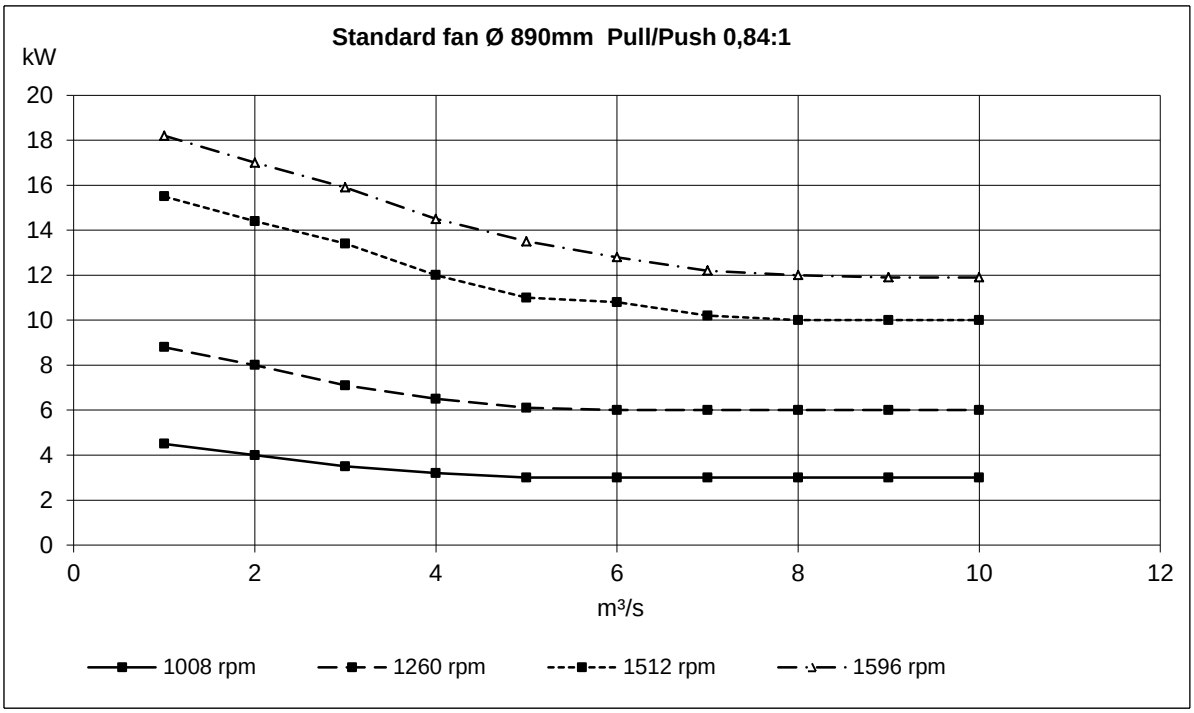

Oil P abs (kPa)
Oil Pressure Limits
350
300
250
200
150
100
50
0
0
200
400
600
800
1000
1200
1400
1600
1800
2000
rpm
Warning Level
Alarm Level

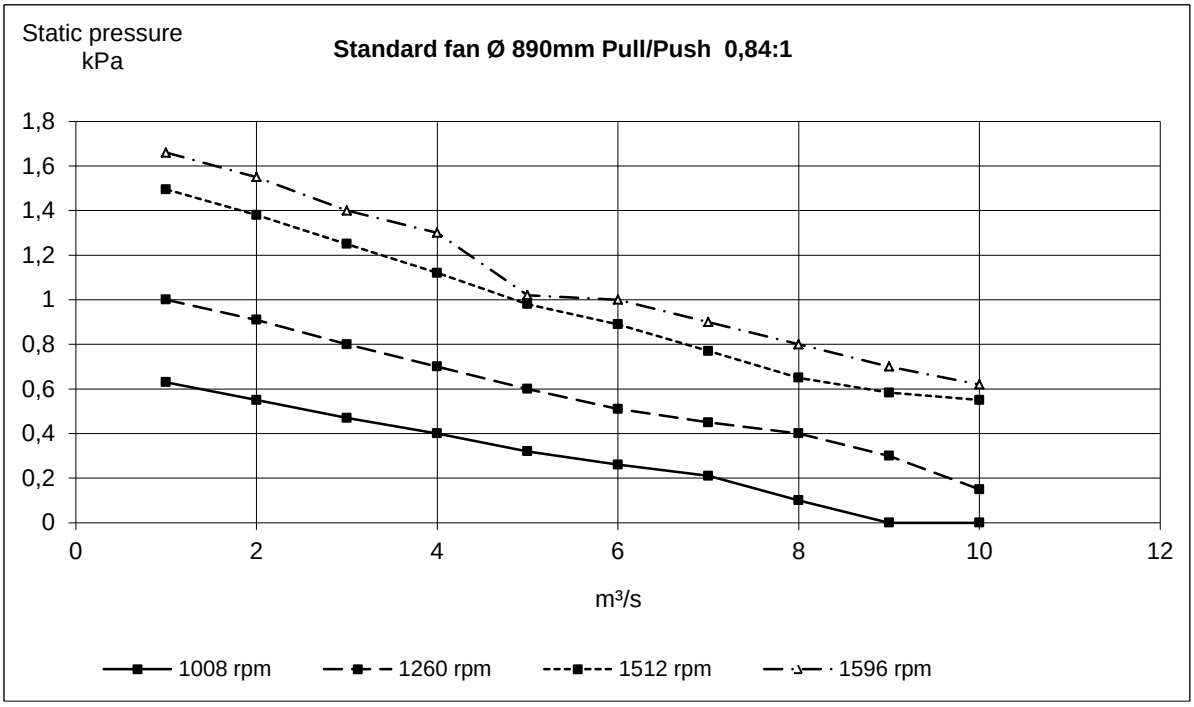

dB (A)
Sound power level engine body
1/3 octave band analysis
120
110
100
90
80
70
60
50
40
20
31,5
50
80
125
200
315
500
800
1,25
2k
3,15
5k
8
12,5
20k
Frequency Hz
IFN Power 345 kW


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
IFN Power 345 kW

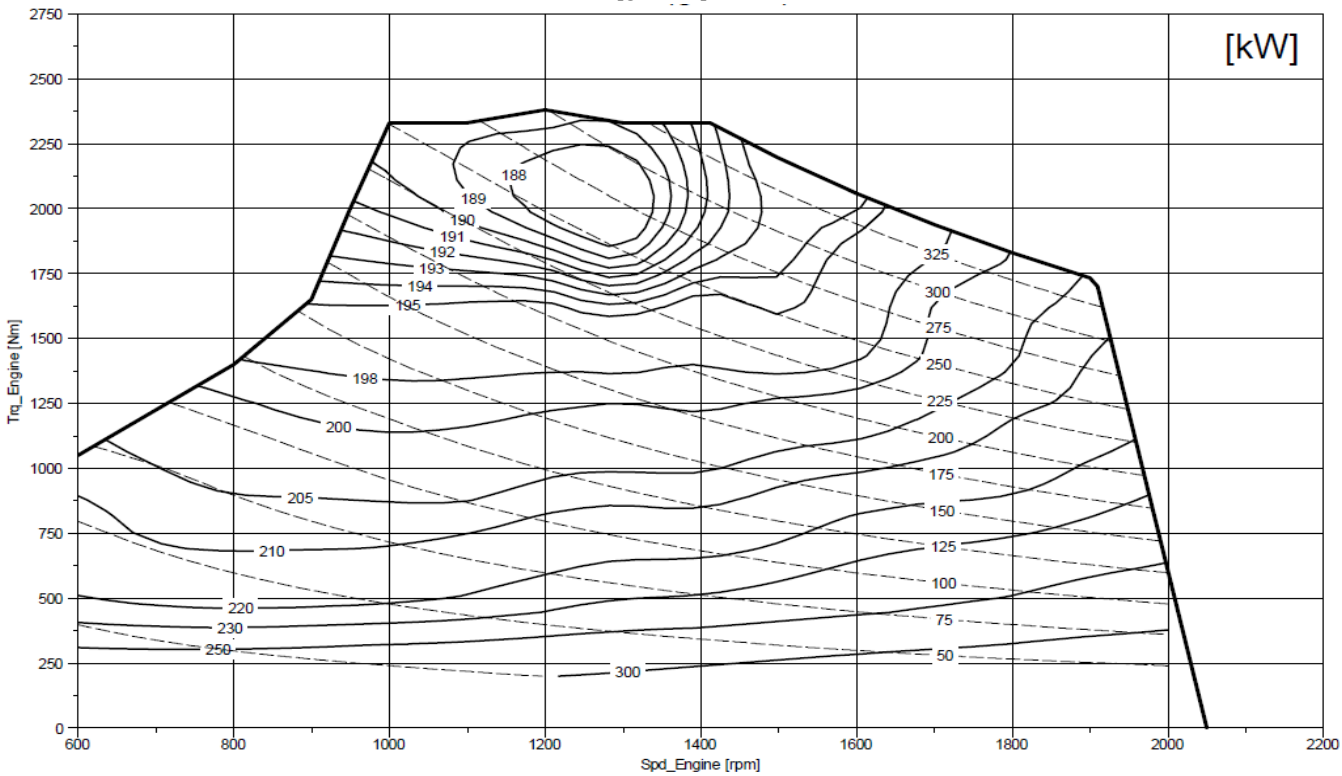

Outer circuit restriction kPa
Outer circuit restriction versus coolant flow
200
180
160
140
120
100
80
60
40
20
0
0
1
2
3
4
5
6
7
8
9
10
Outer circuit flow liter/s
Max outer circuit restriction
Std. Cooling system restriction
1200 rpm Eng. speed
1500 rpm Eng. speed
1800 rpm Eng. speed
2200 rpm Eng. speed
2400 rpm Eng. speed
2600 rpm Eng. speed


dB (A)
SCR Muffler transmission loss
50,0
45,0
40,0
35,0
30,0
25,0
20,0
15,0
10,0
31,5
63
125
250
500
1000
Frequency Hz

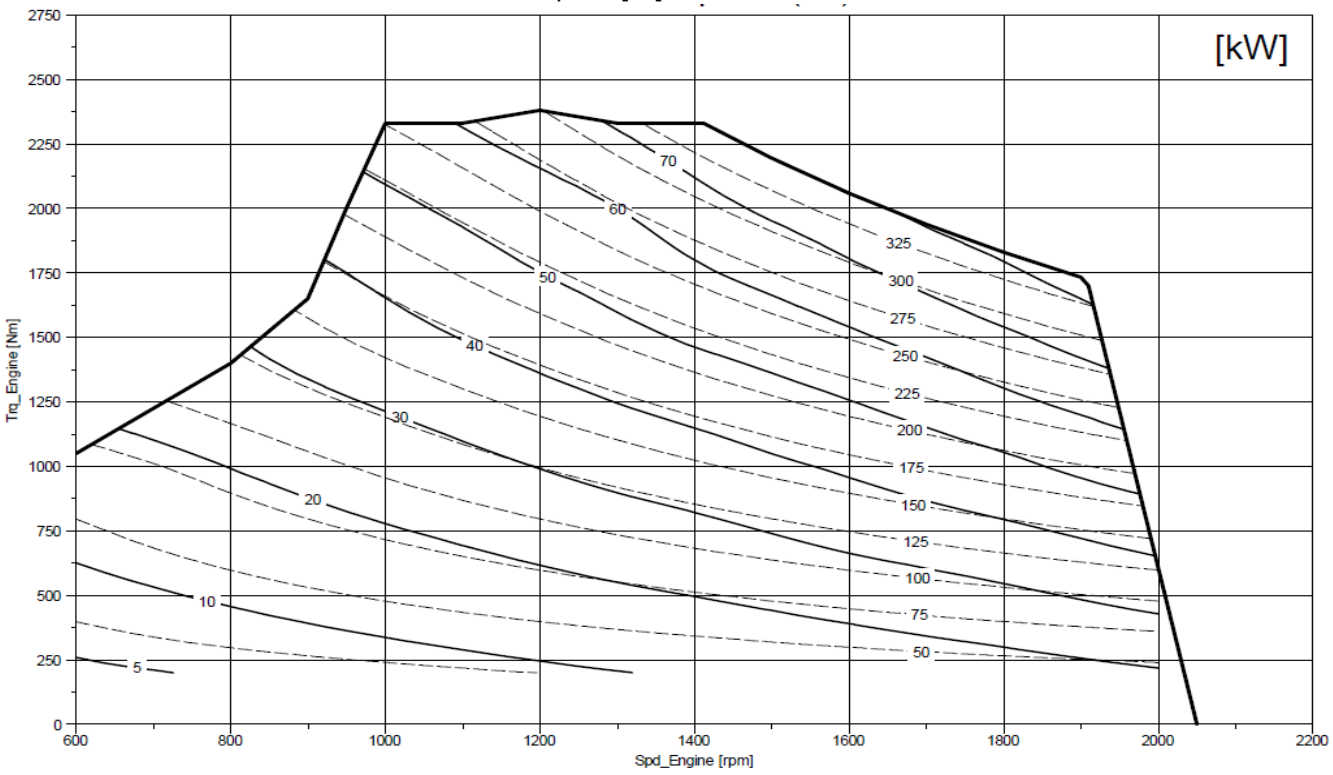

Standard fan Ø 890mm Pull/Push 0,84:1
kW
20
18
16
14
12
10
8
6
4
2
0
0
2
4
6
8
10
12
m³/s
1008 rpm
1260 rpm
1512 rpm
1596 rpm


Static pressure
kPa
Standard fan Ø 890mm Pull/Push 0,84:1
1,8
1,6
1,4
1,2
1
0,8
0,6
0,4
0,2
0
0
2
4
6
8
10
12
m³/s
1008 rpm
1260 rpm
1512 rpm
1596 rpm

BSFC [g/kWh]



Fuel consumption [l/h]



STAMFORD

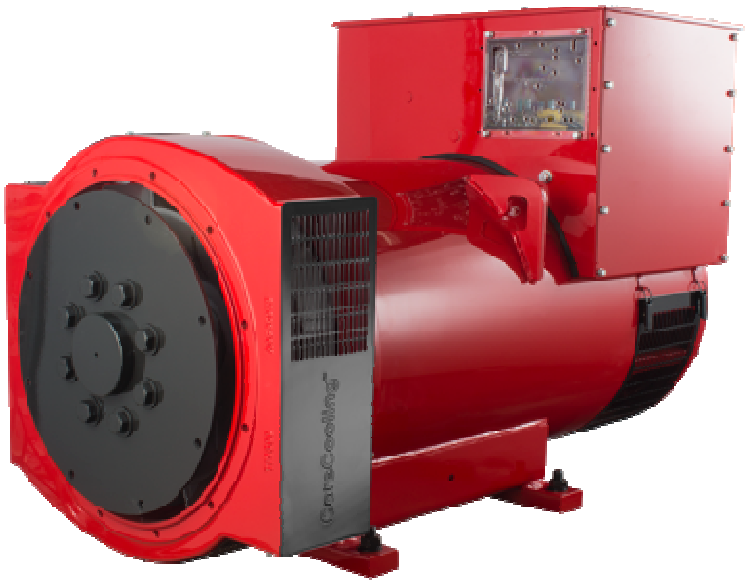
S4L1D-F41 Wdg.311 - Technical Data Sheet

Standards

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

Quality Assurance

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



Excitation and Voltage Regulators

Excitation System					
AVR Type	AS440	MX341	MX321		
Voltage Regulation	± 1%	± 1%	± 0.5%		with 4% Engine Governing
Excitation Type	Self-Excited	PMG	PMG		

No Load Excitation Voltage (V)	10 - 8
No Load Excitation Current (A)	0.7 - 0.5
Full Load Excitation Voltage (V)	41 - 37.5
Full Load Excitation Current (A)	2.3 - 2.1
Exciter Time Constant (seconds)	0.105

STAMFORD

S4L1D-F41 Wdg.311

Electrical Data								
Insulation System	Class H							
Stator Winding	Double Layer Lap							
Winding Pitch	Two Thirds							
Winding Leads	12							
Winding Number	311							
Number of Poles	4							
IP Rating	IP23							
RFI 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%							
Short Circuit Ratio	1/Xd							
Steady State X/R Ratio	13.7389							
	50 Hz				**60 Hz**			
Telephone Interference	THF<2%				TIF<50			
Cooling Air	0.76 m³/sec				0.92 m³/sec			
Voltage Star	380	400	415	440	416	440	460	480
kVA Base Rating (Class H) for Reactance Values	400	415	415	400	455	500	500	520
Saturated Values in Per Unit at Base Ratings and Voltages								
Xd Dir. Axis Synchronous	2.71	2.54	2.36	2.02	3.28	3.23	2.95	2.82
X'd Dir. Axis Transient	0.18	0.17	0.16	0.13	0.18	0.18	0.16	0.16
X"d Dir. Axis Subtransient	0.13	0.13	0.12	0.10	0.13	0.13	0.12	0.11
Xq Quad. Axis Reactance	2.34	2.19	2.03	1.74	2.90	2.84	2.60	2.49
X"q Quad. Axis Subtransient	0.31	0.29	0.27	0.23	0.42	0.42	0.38	0.36
XL Stator Leakage Reactance	0.06	0.05	0.05	0.04	0.07	0.07	0.07	0.06
X2 Negative Sequence Reactance	0.22	0.21	0.20	0.17	0.29	0.29	0.26	0.25
X0 Zero Sequence Reactance	0.09	0.08	0.08	0.07	0.10	0.10	0.09	0.08
Unsaturated Values in Per Unit at Base Ratings and Voltages								
Xd Dir. Axis Synchronous	3.26	3.05	2.83	2.43	3.94	3.87	3.54	3.38
X'd Dir. Axis Transient	0.21	0.19	0.18	0.15	0.21	0.21	0.19	0.18
X"d Dir. Axis Subtransient	0.16	0.15	0.14	0.12	0.16	0.15	0.14	0.13
Xq Quad. Axis Reactance	2.41	2.26	2.10	1.80	2.98	2.93	2.68	2.56
X"q Quad. Axis Subtransient	0.37	0.35	0.32	0.28	0.51	0.50	0.46	0.44
XL Stator Leakage Reactance	0.06	0.06	0.05	0.05	0.08	0.08	0.07	0.07
Xlr Rotor Leakage Reactance	0.10	0.09	0.09	0.07	0.11	0.11	0.10	0.10
X2 Negative Sequence Reactance	0.27	0.25	0.23	0.20	0.35	0.34	0.31	0.30
X0 Zero Sequence Reactance	0.10	0.10	0.09	0.08	0.11	0.11	0.10	0.10

STAMFORD

S4L1D-F41 Wdg.311

Time Constants (Seconds)	
T'd TRANSIENT TIME CONST.	0.08
T''d SUB-TRANSTIME CONST.	0.019
T'do O.C. FIELD TIME CONST.	1.7
Ta ARMATURE TIME CONST.	0.018
T''q SUB-TRANSTIME CONST.	0.009

Resistances in Ohms (Ω) at 22^{0}C	
Stator Winding Resistance (Ra), per phase for series connected	0.0073
Rotor Winding Resistance (Rf)	1.37
Exciter Stator Winding Resistance	18
Exciter Rotor Winding Resistance per phase	0.068
PMG Phase Resistance (Rpmg) per phase	1.9
Positive Sequence Resistance (R1)	0.009125
Negative Sequence Resistance (R2)	0.010512
Zero Sequence Resistance (R0)	0.009125

Saturation Factors	400V	480V
SG1.0	0.36	0.38
SG1.2	1.46	1.52

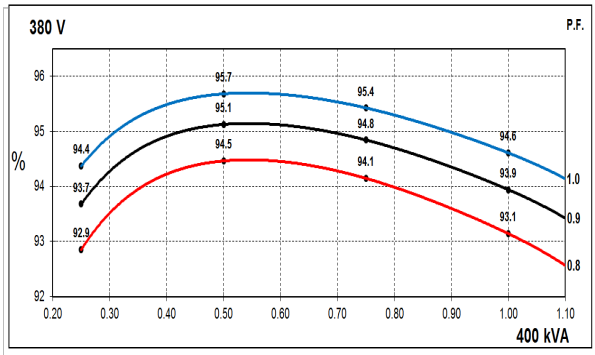
Mechanical Data		
Shaft and Keys	All alternator rotors are dynamically balanced to better than BS6861: Part 1 Grade 2.5 for minimum vibration in operation. Two bearing generators are balanced with a half key.	
	1 Bearing	2 Bearings
SAE Adaptor	SAE 0.5, 1	N/A
Moment of Inertia	5.4292kgm^2	N/A
Weight Wound Stator	535kg	N/A
Weight Wound Rotor	463kg	N/A
Weight Complete Alternator	1160kg	N/A
Shipping weight in a Crate	1230kg	N/A
Packing Crate Size	155 x 87 x 107 (cm)	N/A
Maximum Over Speed	2250 RPM for two minutes	
Bearing Drive End	N/A	N/A
Bearing Non-Drive End	Ball 6314	N/A

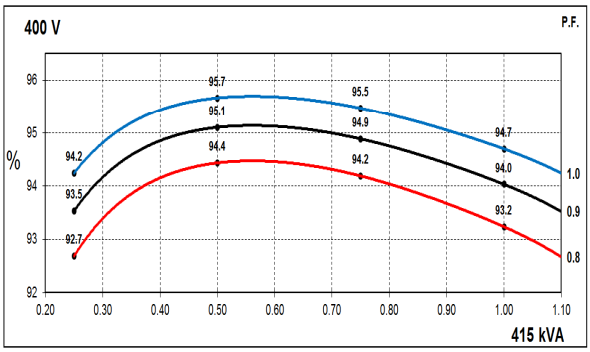
STAMFORD

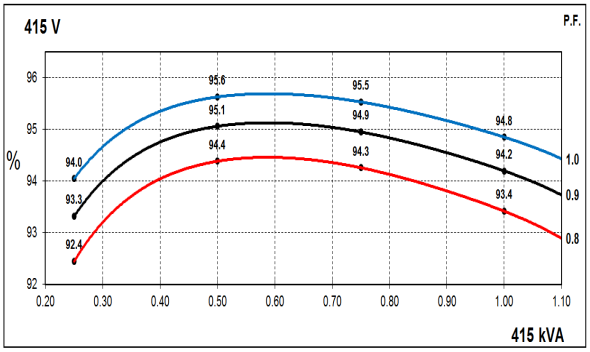
S4L1D-F41 Wdg.311

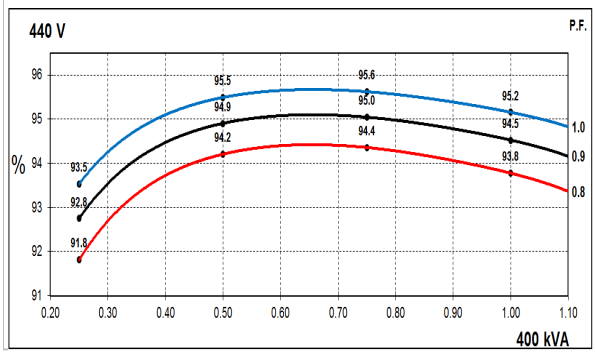
THREE PHASE EFFICIENCY CURVES

50Hz

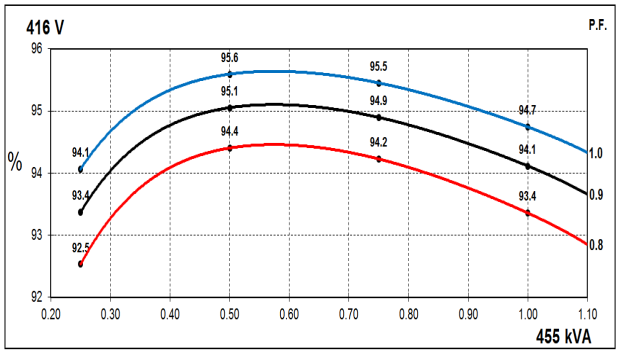


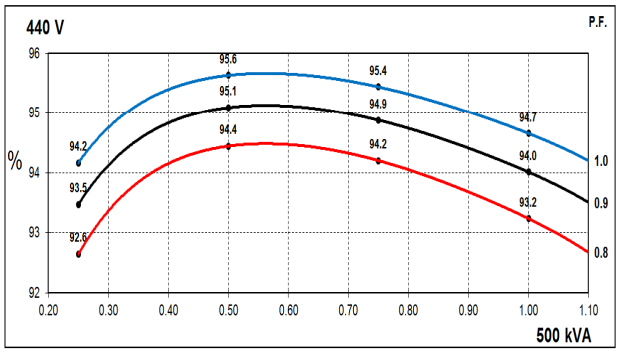


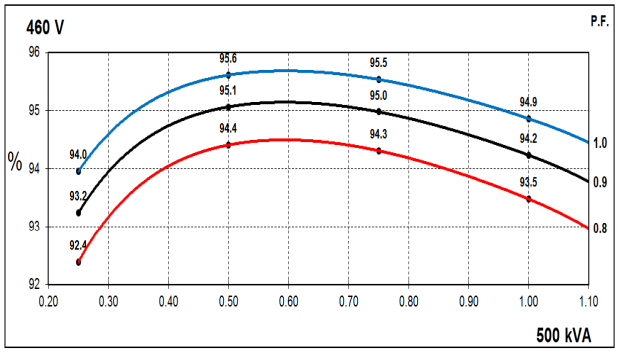


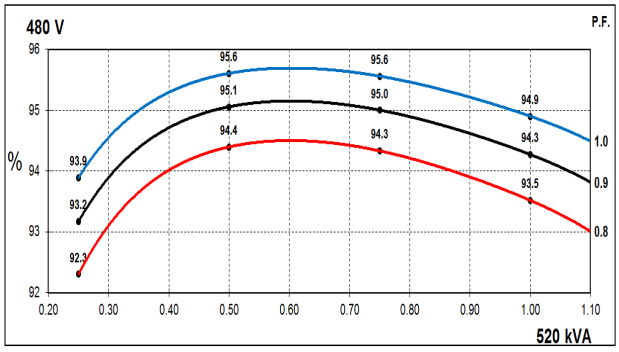


60Hz







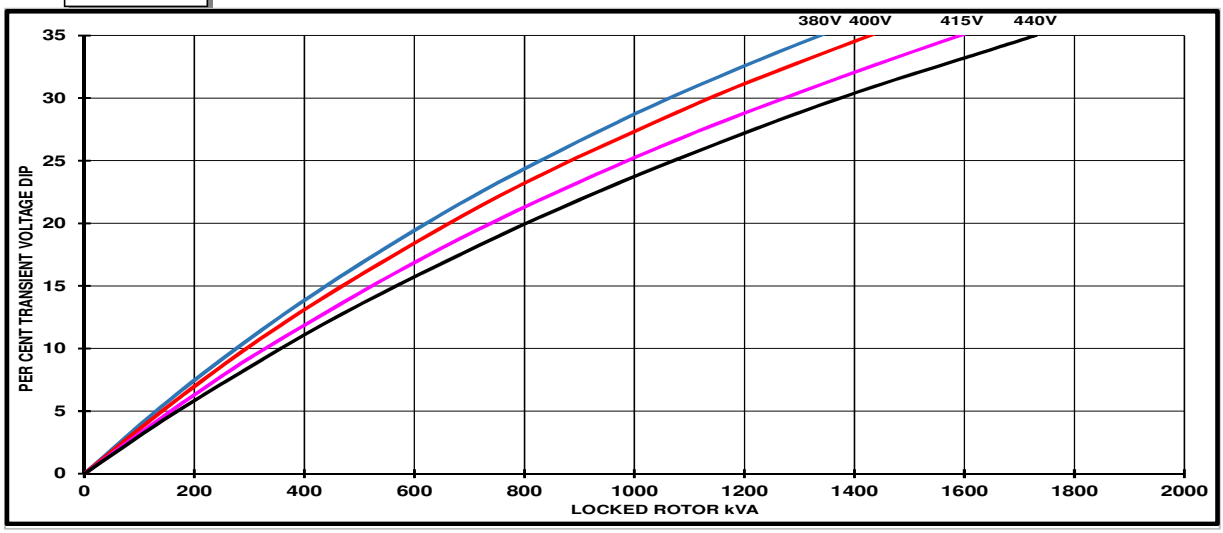


STAMFORD

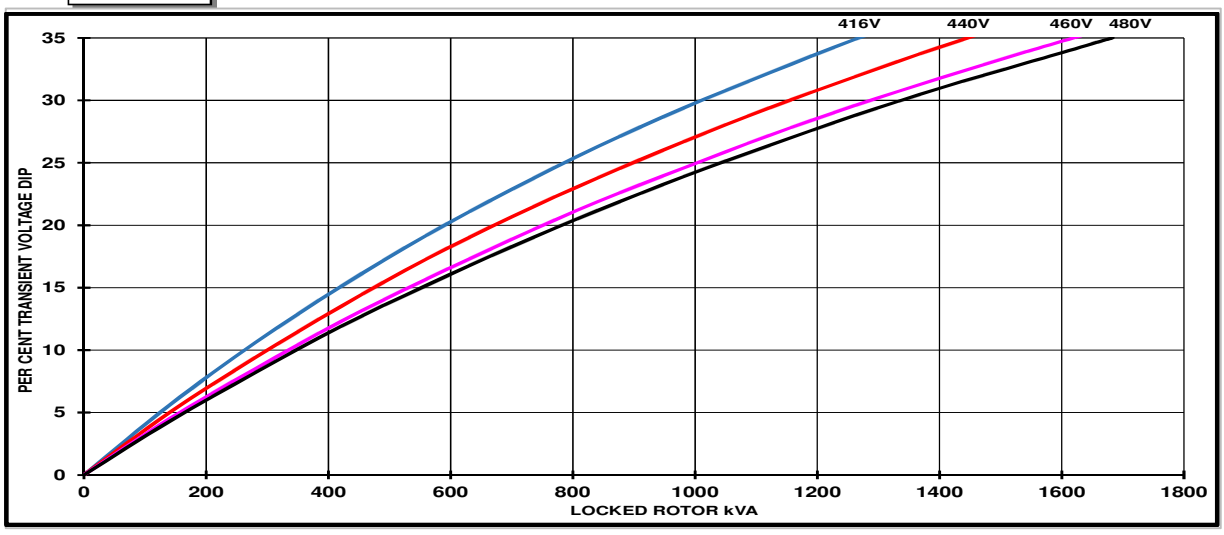
S4L1D-F41 Wdg.311

Locked Rotor Motor Starting Curves - Separately Excited

50Hz



60Hz



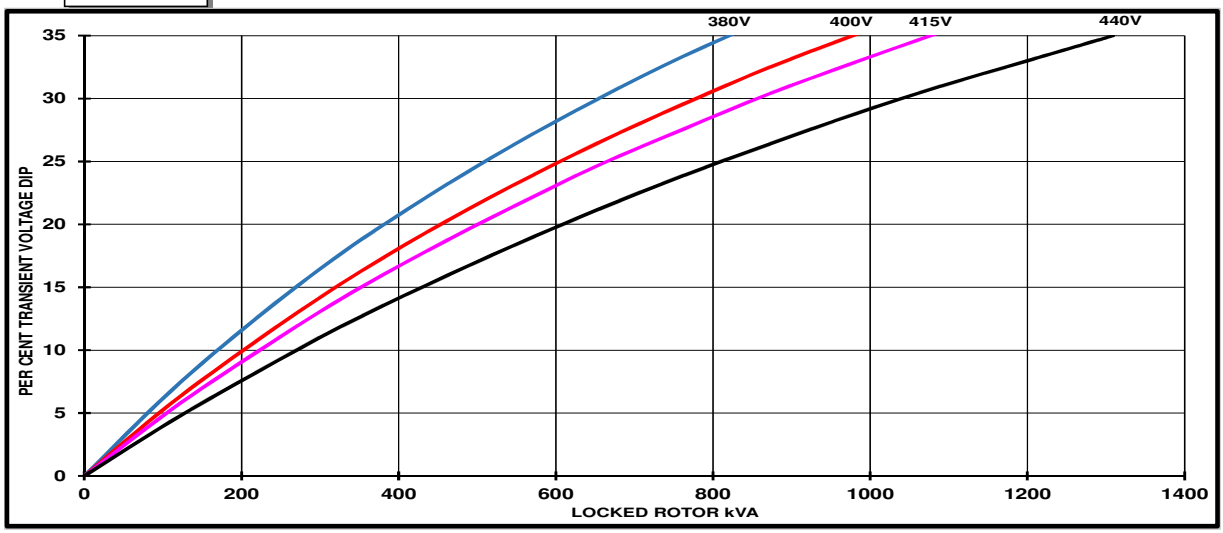
Transient Voltage Dip Scaling Factor		Transient Voltage Rise Scaling Factor
PF	Factor	For voltage rise multiply voltage dip by 1.25
< 0.5	1	
0.5	0.97	
0.6	0.93	
0.7	0.9	
0.8	0.85	
0.9	0.83	

STAMFORD

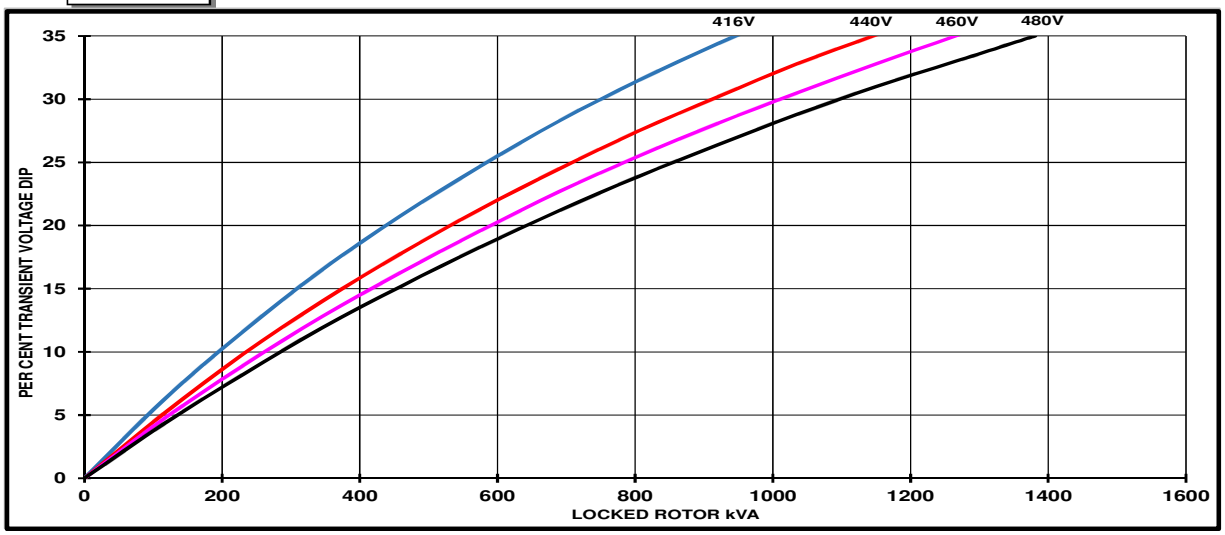
S4L1D-F41 Wdg.311

Locked Rotor Motor Starting Curves - Self Excited

50Hz



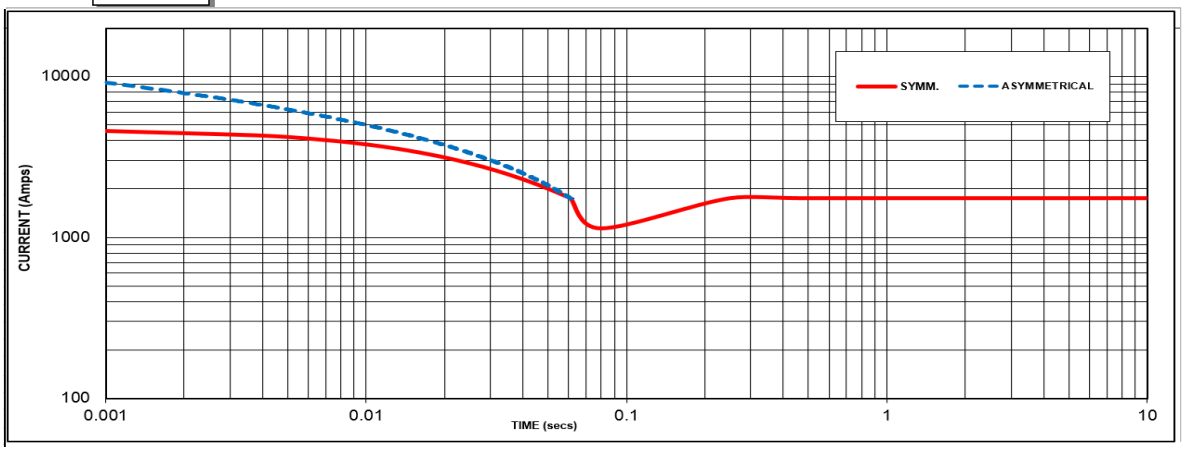
60Hz



Transient Voltage Dip Scaling Factor		Transient Voltage Rise Scaling Factor
PF	Factor	For voltage rise multiply voltage dip by 1.25
< 0.5	1	
0.5	0.97	
0.6	0.93	
0.7	0.9	
0.8	0.85	
0.9	0.83	

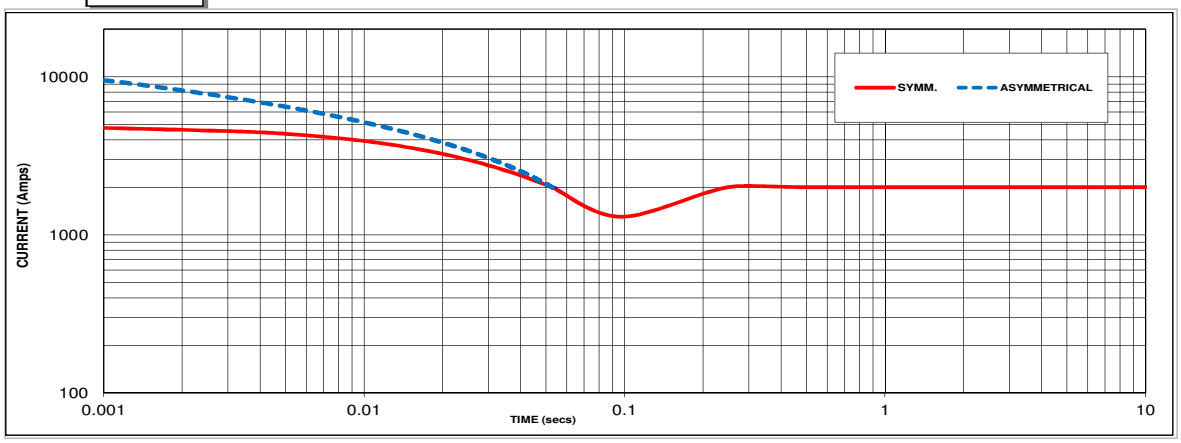
Three-phase Short Circuit Decrement Curve

50Hz



Sustained Short Circuit = 1750 Amps

60Hz



Sustained Short Circuit = 2000 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 1.05	440V	X 1.06
415V	X 1.09	460V	X 1.10
440V	X 1.16	480V	X 1.15

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 :

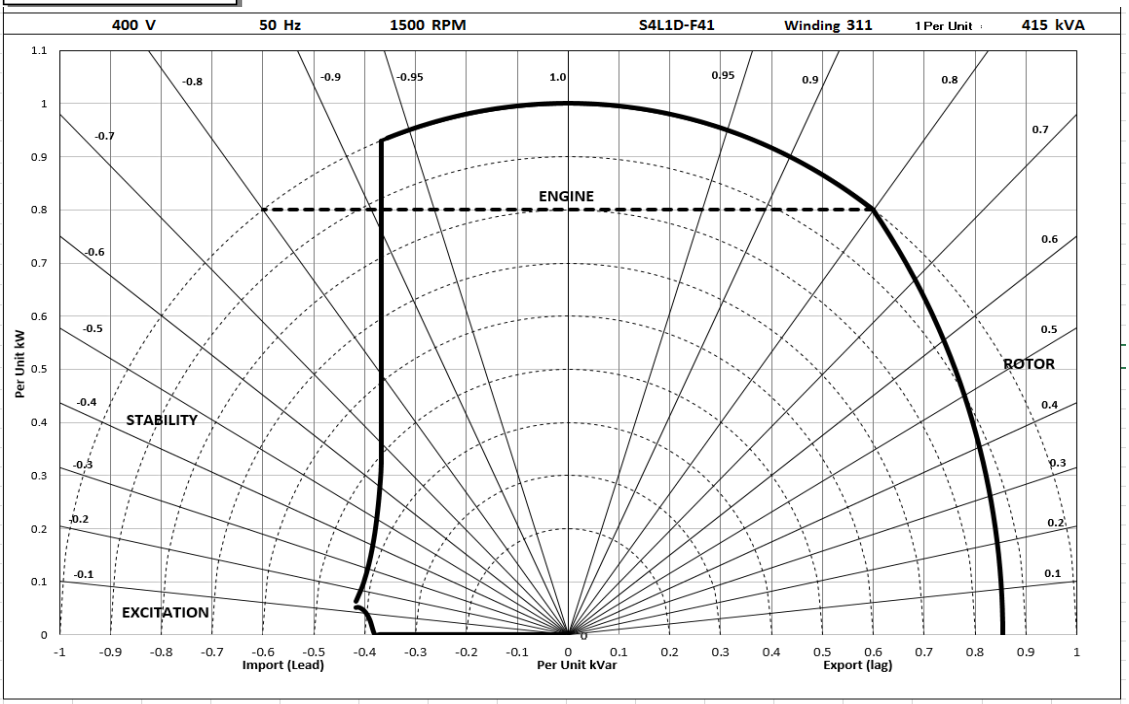
	3-phase	2-phase L-L	1-phase L-N
Instantaneous	x 1.00	x 0.87	x 1.30
Minimum	x 1.00	x 1.80	x 3.20
Sustained	x 1.00	x 1.50	x 2.50
Max. sustained duration	10 sec.	5 sec.	2 sec.

All other times are unchanged

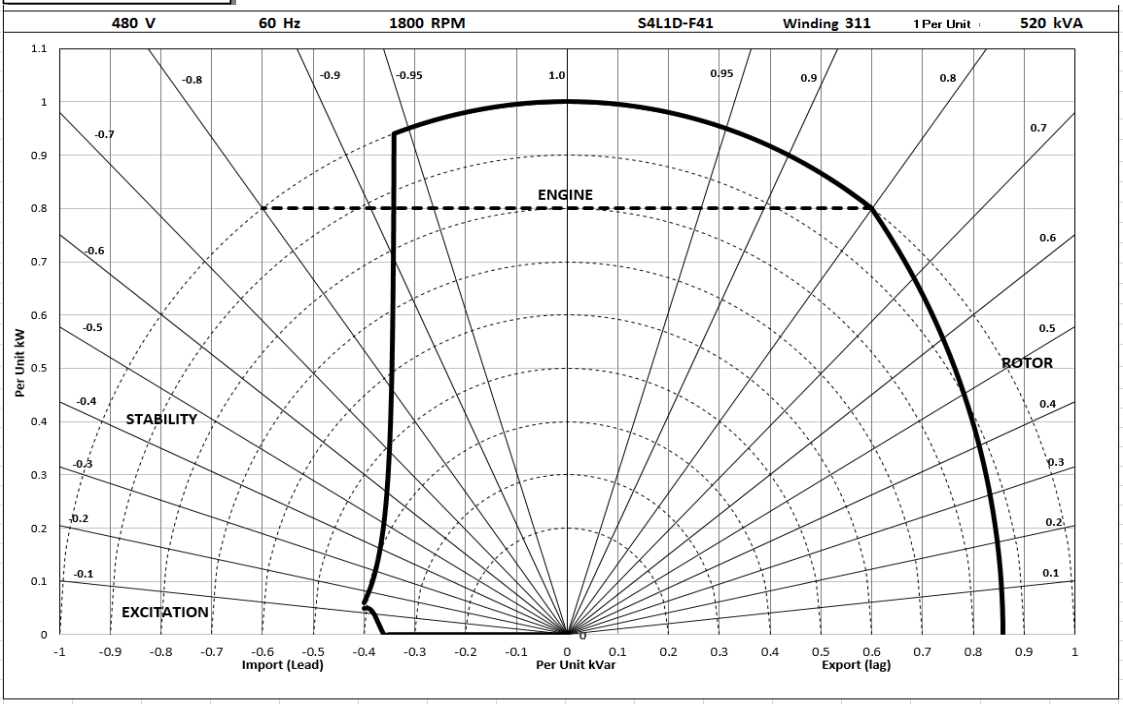
Note 3
Curves are drawn for Star connected machines under no-load excitation at rated speeds. For other connection the following multipliers should be applied to current values as shown :
Parallel Star = Curve current value X 2
Series Delta = Curve current value X 1.732

Typical Alternator Operating Charts

400V/50Hz



480V/60Hz



STAMFORD

S4L1D-F41 Wdg.311

RATINGS AT 0.8 POWER FACTOR

	Class - Temp Rise	Standby - 163/27°C				Standby - 150/40°C				Cont. H - 125/40°C				Cont. F - 105/40°C			
50 Hz	Series Star (V)	380	400	415	440	380	400	415	440	380	400	415	440	380	400	415	440
	kVA	425	465	455	440	415	445	445	430	400	415	415	400	370	380	380	370
	kW	340	372	364	352	332	356	356	344	320	332	332	320	296	304	304	296
	Efficiency (%)	92.8	92.6	92.9	93.4	92.9	92.9	93.1	93.5	93.1	93.2	93.4	93.8	93.5	93.6	93.8	94.0
	kW Input	366	402	392	377	357	383	383	368	344	356	355	341	317	325	324	315

60 Hz	Series Star (V)	416	440	460	480	416	440	460	480	416	440	460	480	416	440	460	480
	kVA	500	550	550	575	485	535	535	555	455	500	500	520	420	465	465	480
	kW	400	440	440	460	388	428	428	444	364	400	400	416	336	372	372	384
	Efficiency (%)	92.9	92.7	93.0	93.0	93.0	92.9	93.2	93.2	93.4	93.2	93.5	93.5	93.7	93.6	93.8	93.8
	kW Input	431	475	473	495	417	461	459	476	390	429	428	445	359	398	397	409

De-Rates

All values tabulated above are subject to the following reductions:

- 5% when air inlet filters are fitted
- 3% for every 500 meters by which the operating altitude exceeds 1000 meters above mean sea level
- 3% for every 5°C by which the operational ambient temperature exceeds 40°C
- For any other operating conditions impacting the cooling circuit please refer to applications

Note: Requirement for operating in an ambient exceeding 60°C and altitude exceeding 4000 meters must be referred to applications.

Dimensional and Torsional Drawing

For dimensional and torsional information please refer to the alternator General Arrangement and rotor drawings available on our website (http://stamford-avk.com/)

Note: Continuous development of our products means that the information contained in our data sheets can change without notice, and specifications should always be confirmed with Cummins Generator Technologies prior to purchase.

Follow us @stamfordavk

Cummins Generator Technologies

View our videos at youtube.com/stamfordavk

news.stamford-avk.com

For Applications Support:
applications@cummins.com

For Customer Service:
service-engineers@stamford-avk.com

For General Enquiries:
info@cumminsgeneratortechnologies.com

Generator Technologies

STAMFORD

S4LID-E41 Wdg.311 - Technical Data Sheet

Standards

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

Quality Assurance

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

Excitation and Voltage Regulators

Excitation System					
AVR Type	AS440	MX341	MX321		
Voltage Regulation	± 1%	± 1%	± 0.5%		with 4% Engine Governing
Excitation Type	Self-Excited	PMG	PMG		

No Load Excitation Voltage (V)	12 - 9
No Load Excitation Current (A)	0.7 - 0.5
Full Load Excitation Voltage (V)	41 - 39
Full Load Excitation Current (A)	2.3 - 2.2
Exciter Time Constant (seconds)	0.105

STAMFORD

S4LID-E41 Wdg.311

Electrical Data								
Insulation System	Class H							
Stator Winding	Double Layer Lap							
Winding Pitch	Two Thirds							
Winding Leads	12							
Winding Number	311							
Number of Poles	4							
IP Rating	IP23							
RFI 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%							
Short Circuit Ratio	1/Xd							
Steady State X/R Ratio	13.56							
	50 Hz				60 Hz			
Telephone Interference	THF<2%				TIF<50			
Cooling Air	0.8 m³/sec				0.96 m³/sec			
Voltage Star	380	400	415	440	416	440	460	480
kVA Base Rating (Class H) for Reactance Values	350	360	360	350	400	435	440	455
Saturated Values in Per Unit at Base Ratings and Voltages								
Xd Dir. Axis Synchronous	3.01	2.79	2.59	2.24	3.47	3.38	3.12	2.97
X'd Dir. Axis Transient	0.20	0.19	0.17	0.15	0.21	0.20	0.19	0.18
X"d Dir. Axis Subtransient	0.14	0.13	0.12	0.11	0.15	0.14	0.13	0.12
Xq Quad. Axis Reactance	2.57	2.39	2.22	1.92	2.92	2.84	2.62	2.49
X"q Quad. Axis Subtransient	0.36	0.33	0.31	0.27	0.41	0.40	0.37	0.35
XL Stator Leakage Reactance	0.07	0.06	0.06	0.05	0.08	0.08	0.08	0.07
X2 Negative Sequence Reactance	0.24	0.23	0.21	0.18	0.28	0.27	0.25	0.24
X0 Zero Sequence Reactance	0.10	0.09	0.09	0.07	0.10	0.09	0.09	0.08
Unsaturated Values in Per Unit at Base Ratings and Voltages								
Xd Dir. Axis Synchronous	3.61	3.35	3.11	2.69	4.17	4.05	3.75	3.56
X'd Dir. Axis Transient	0.23	0.21	0.20	0.17	0.24	0.23	0.21	0.20
X"d Dir. Axis Subtransient	0.17	0.16	0.15	0.13	0.17	0.17	0.15	0.15
Xq Quad. Axis Reactance	2.65	2.46	2.29	1.98	3.00	2.92	2.70	2.57
X"q Quad. Axis Subtransient	0.43	0.40	0.37	0.32	0.49	0.48	0.44	0.42
XL Stator Leakage Reactance	0.08	0.07	0.07	0.06	0.10	0.09	0.09	0.08
Xlr Rotor Leakage Reactance	0.12	0.11	0.10	0.09	0.13	0.13	0.12	0.11
X2 Negative Sequence Reactance	0.29	0.27	0.25	0.22	0.33	0.32	0.30	0.29
X0 Zero Sequence Reactance	0.12	0.11	0.10	0.09	0.11	0.11	0.10	0.10

STAMFORD

S4LID-E41 Wdg.311

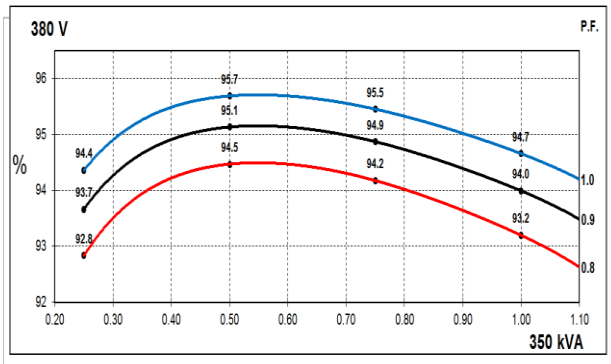
Time Constants (Seconds)		
T'd TRANSIENT TIME CONST.	0.08	
T''d SUB-TRANSTIME CONST.	0.019	
T'do O.C. FIELD TIME CONST.	1.7	
Ta ARMATURE TIME CONST.	0.018	
T''q SUB-TRANSTIME CONST.	0.0079	
Resistances in Ohms (Ω) at 22^{0}C		
Stator Winding Resistance (Ra), per phase for series connected	0.009	
Rotor Winding Resistance (Rf)	1.19	
Exciter Stator Winding Resistance	18	
Exciter Rotor Winding Resistance per phase	0.068	
PMG Phase Resistance (Rpmg) per phase	1.9	
Positive Sequence Resistance (R1)	0.01125	
Negative Sequence Resistance (R2)	0.01296	
Zero Sequence Resistance (R0)	0.01125	
Saturation Factors	400V	480V
SG1.0	0.32	0.33
SG1.2	1.3	1.32
Mechanical Data		
Shaft and Keys	All alternator 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.	
	1 Bearing	2 Bearings
SAE Adaptor	SAE 0.5, 1	N/A
Moment of Inertia	4.6331kgm^2	N/A
Weight Wound Stator	470kg	N/A
Weight Wound Rotor	400kg	N/A
Weight Complete Alternator	1024kg	N/A
Shipping weight in a Crate	1095kg	N/A
Packing Crate Size	155 x 87 x 107 (cm)	N/A
Maximum Over Speed	2250 RPM for two minutes	
Bearing Drive End	N/A	N/A
Bearing Non-Drive End	Ball 6314	N/A

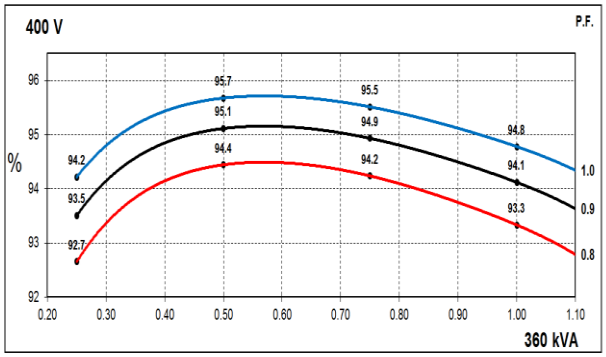
STAMFORD

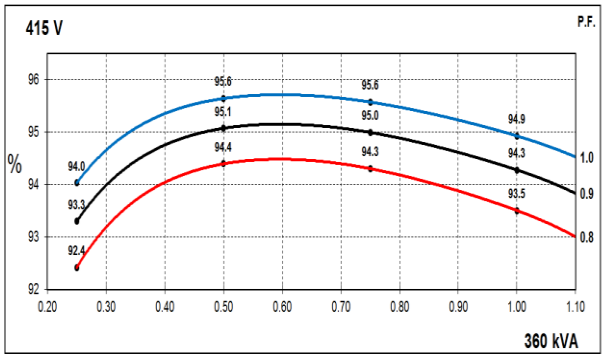
S4LID-E41 Wdg.311

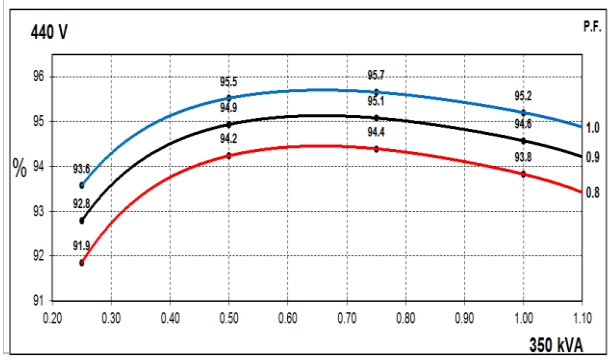
THREE PHASE EFFICIENCY CURVES

50Hz

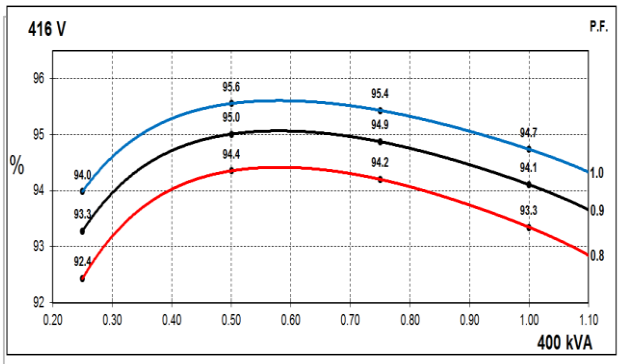


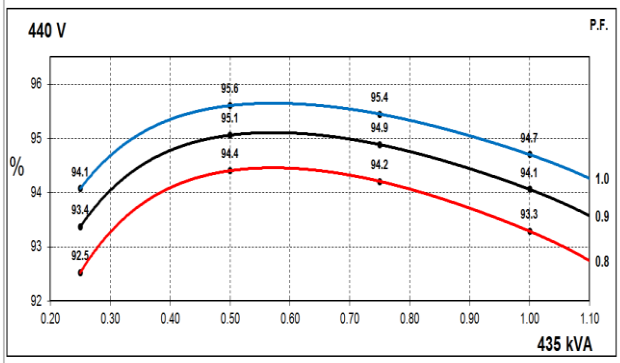


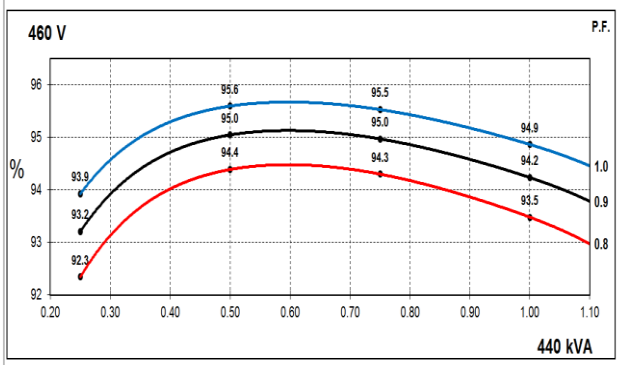


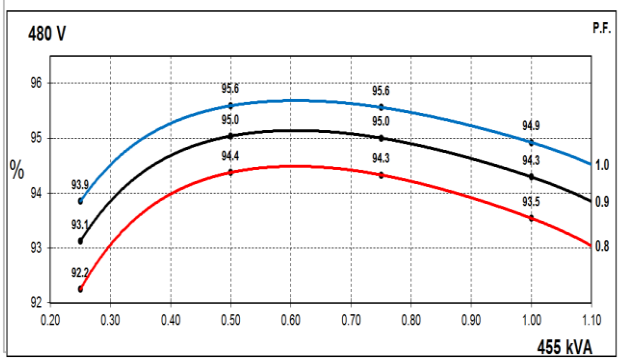


60Hz







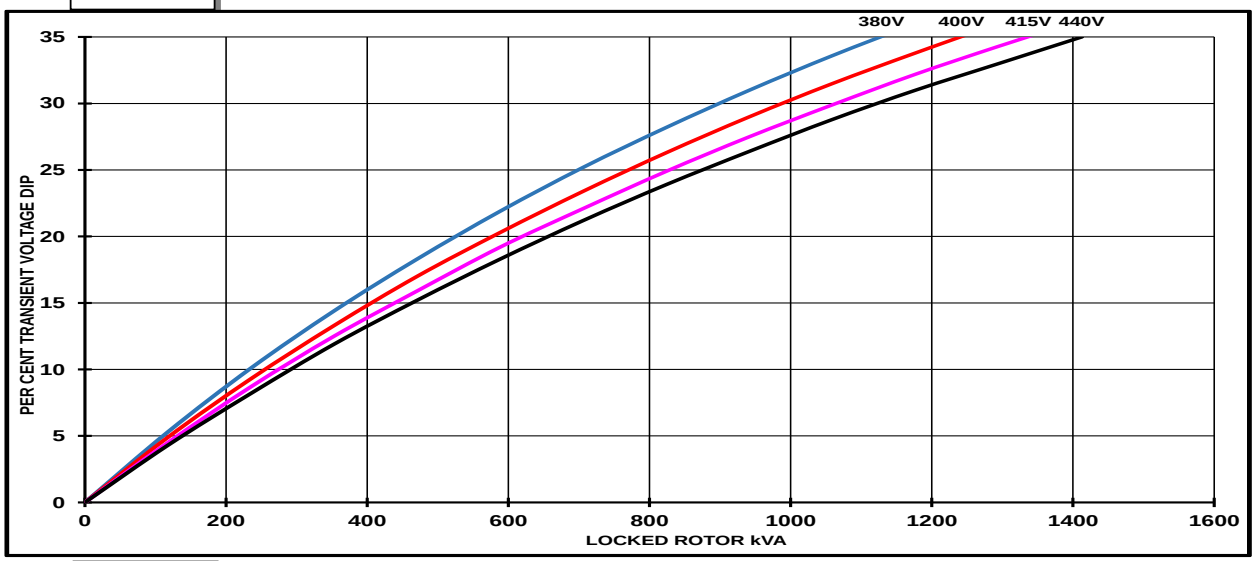


STAMFORD

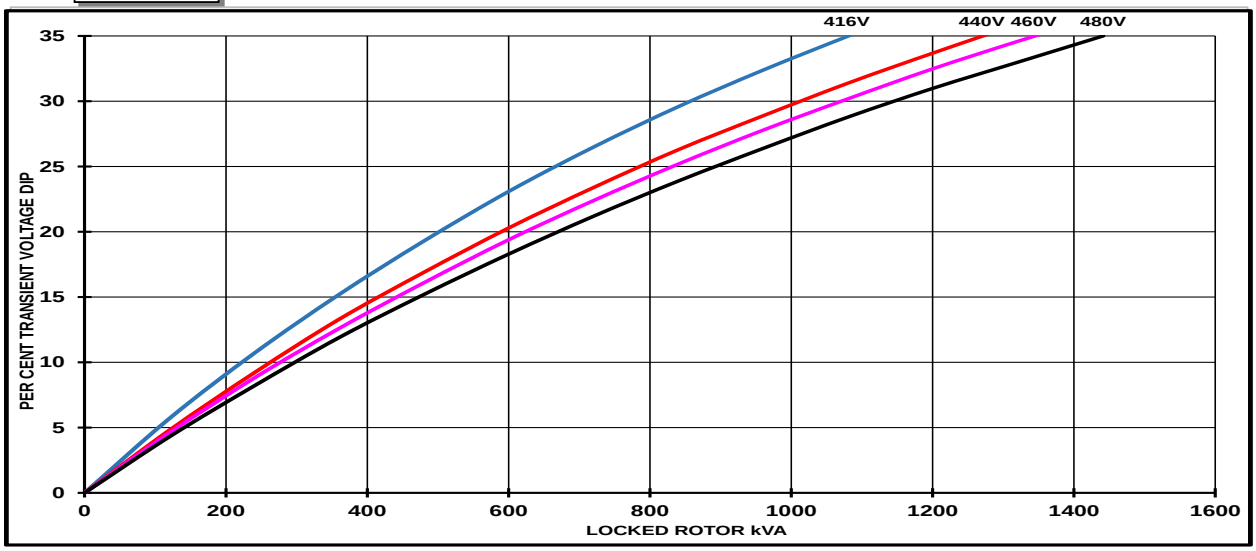
S4LID-E41 Wdg.311

Locked Rotor Motor Starting Curves - Separately Excited

50Hz



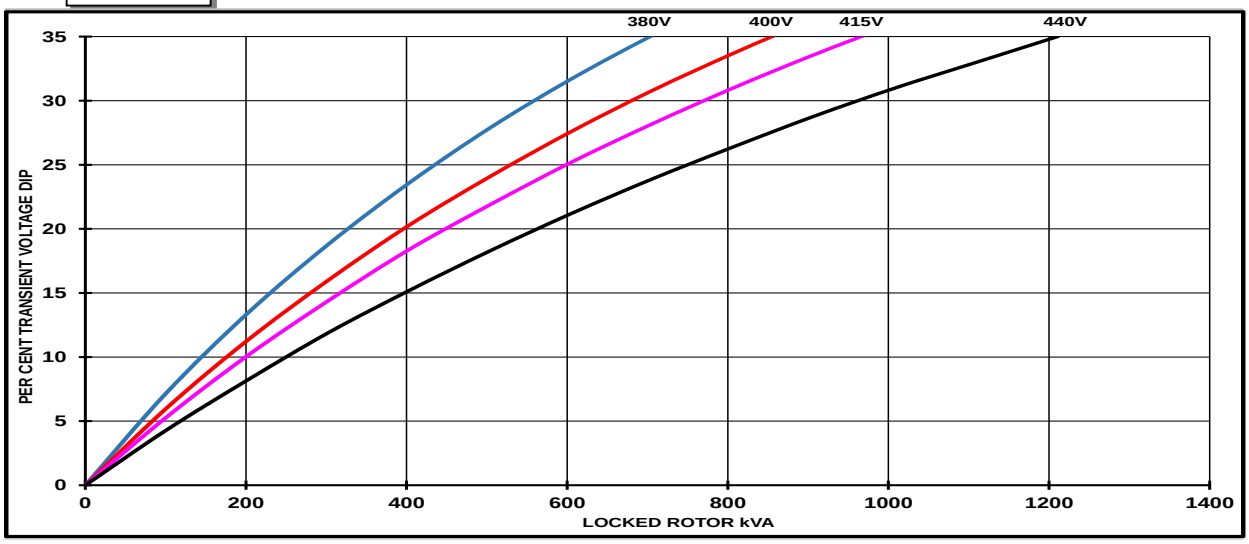
60Hz



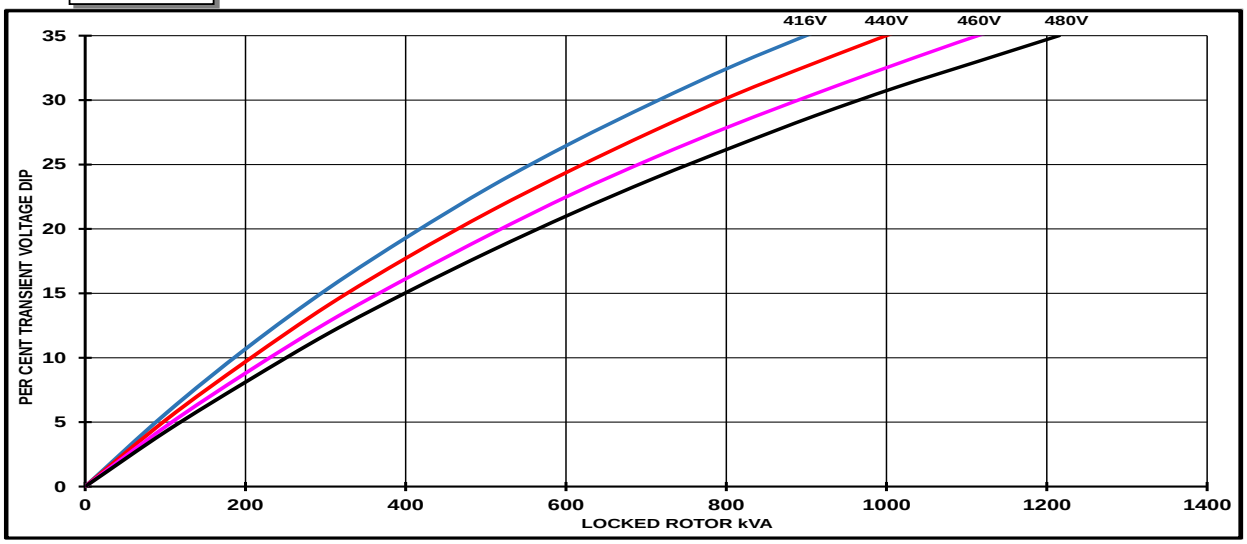
Transient Voltage Dip Scaling Factor		Transient Voltage Rise Scaling Factor
PF	Factor	For voltage rise multiply voltage dip by 1.25
< 0.5	1	
0.5	0.97	
0.6	0.93	
0.7	0.9	
0.8	0.85	
0.9	0.83	

Locked Rotor Motor Starting Curves - Self Excited

50Hz



60Hz



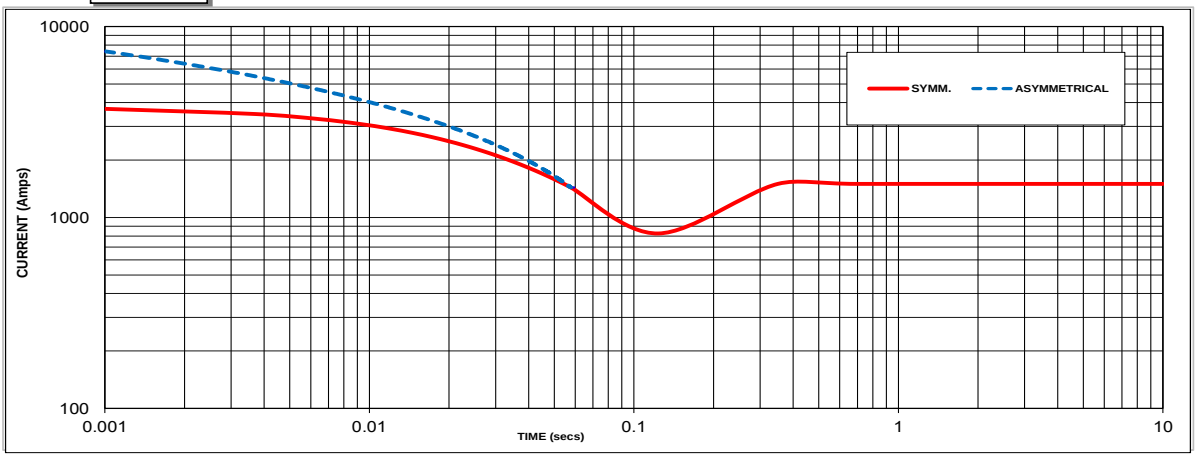
Transient Voltage Dip Scaling Factor		Transient Voltage Rise Scaling Factor
PF	Factor	For voltage rise multiply voltage dip by 1.25
< 0.5	1	
0.5	0.97	
0.6	0.93	
0.7	0.9	
0.8	0.85	
0.9	0.83	

STAMFORD

S4LID-E41 Wdg.311

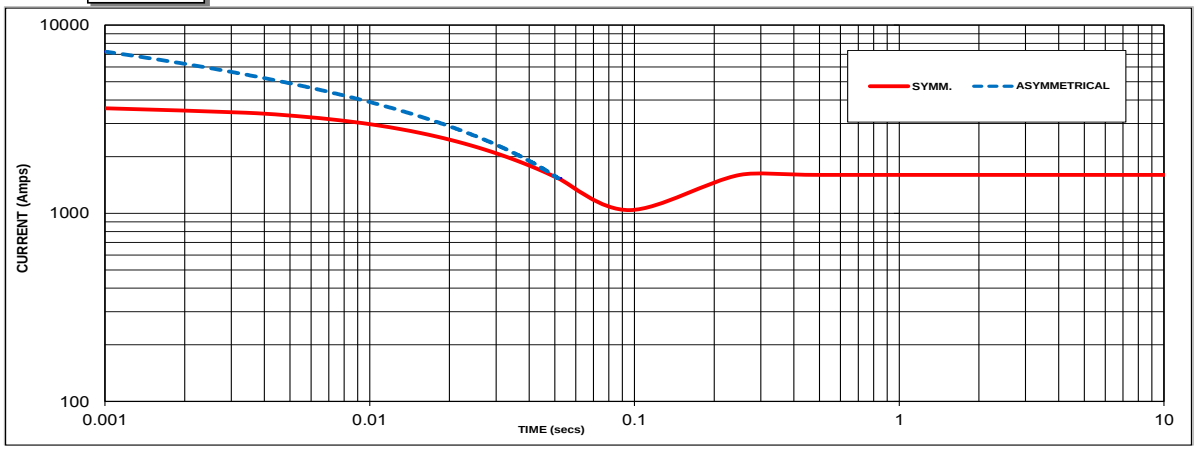
Three-phase Short Circuit Decrement Curve

50Hz



Sustained Short Circuit = 1500 Amps

60Hz



Sustained Short Circuit = 1600 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 1.05	440V	X 1.06
415V	X 1.09	460V	X 1.10
440V	X 1.16	480V	X 1.15

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

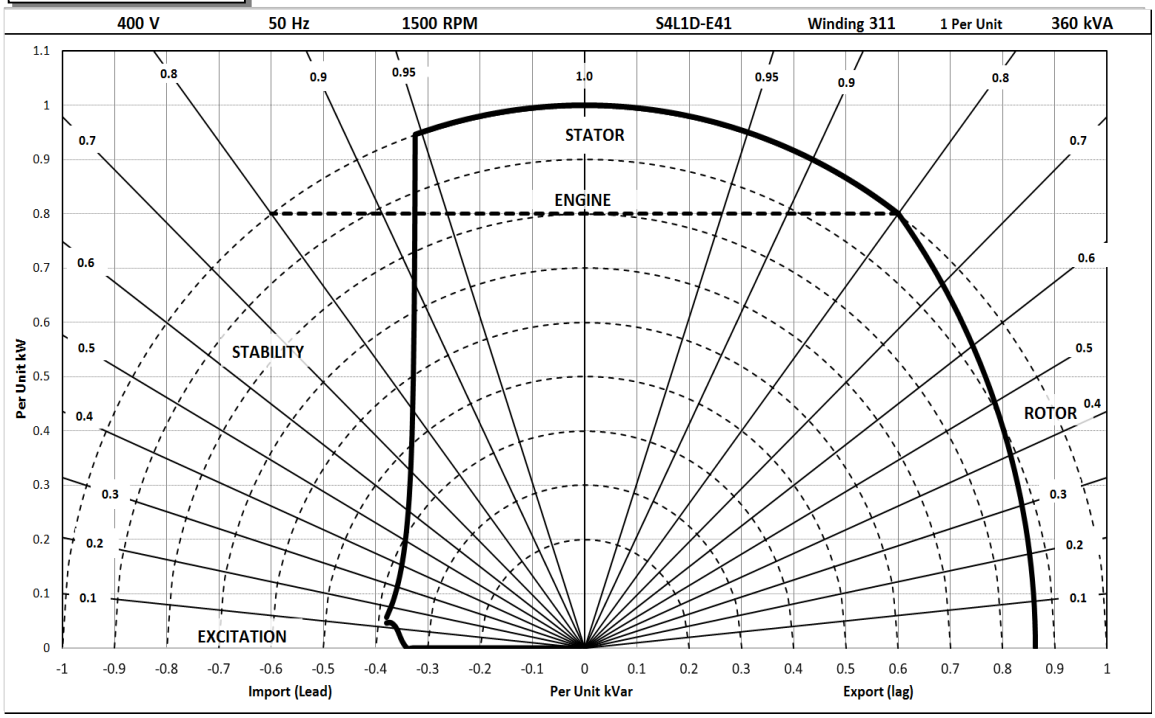
Note 3
Curves are drawn for Star connected machines under no-load excitation at rated speeds. For other connection the following multipliers should be applied to current values as shown :
Parallel Star = Curve current value X 2
Series Delta = Curve current value X 1.732

STAMFORD

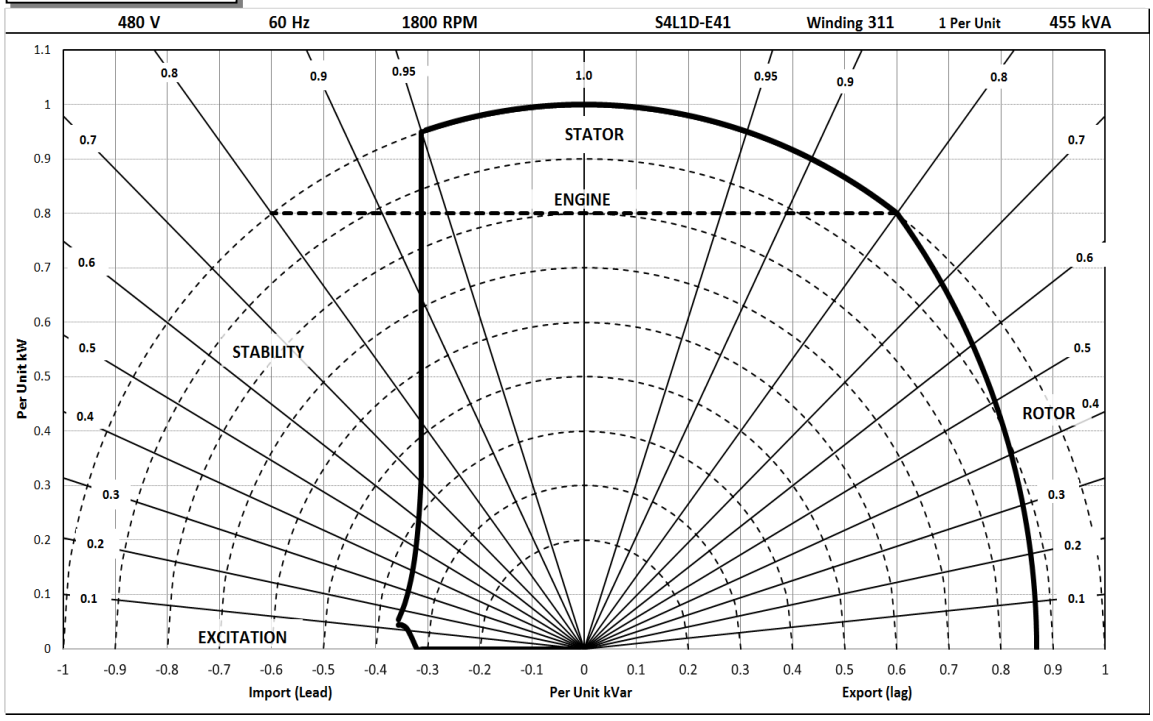
S4LID-E41 Wdg.311

Typical Alternator Operating Charts

400V/50Hz



480V/60Hz



STAMFORD

S4LID-E41 Wdg.311

RATINGS AT 0.8 POWER FACTOR

	Class - Temp Rise	Standby - 163/27°C				Standby - 150/40°C				Cont. H - 125/40°C				Cont. F - 105/40°C			
50 Hz	Series Star (V)	380	400	415	440	380	400	415	440	380	400	415	440	380	400	415	440
	kVA	380	415	400	380	370	385	385	370	350	360	360	350	320	325	325	320
	kW	304	332	320	304	296	308	308	296	280	288	288	280	256	260	260	256
	Efficiency (%)	92.7	92.5	93.0	93.5	92.9	93.0	93.2	93.6	93.2	93.3	93.5	93.8	93.6	93.8	93.9	94.1
	kW Input	328	359	344	325	319	331	331	316	300	309	308	298	274	277	277	272

60 Hz	Series Star (V)	416	440	460	480	416	440	460	480	416	440	460	480	416	440	460	480
	kVA	435	470	475	490	420	460	460	475	400	435	440	455	365	395	400	410
	kW	348	376	380	392	336	368	368	380	320	348	352	364	292	316	320	328
	Efficiency (%)	92.9	92.9	93.1	93.2	93.1	93.0	93.3	93.3	93.4	93.3	93.5	93.5	93.7	93.7	93.9	93.9
	kW Input	374	405	408	421	361	396	395	407	343	373	377	389	312	337	341	349

De-Rates

All values tabulated above are subject to the following reductions:

- 5% when air inlet filters are fitted
- 3% for every 500 meters by which the operating altitude exceeds 1000 meters above mean sea level
- 3% for every 5°C by which the operational ambient temperature exceeds 40°C
- For any other operating conditions impacting the cooling circuit please refer to applications

Note: Requirement for operating in an ambient exceeding 60°C and altitude exceeding 4000 meters must be referred to applications.

Dimensional and Torsional Drawing

For dimensional and torsional information please refer to the alternator General Arrangement and rotor drawings available on our website (http://stamford-avk.com/)

Note: Continuous development of our products means that the information contained in our data sheets can change without notice, and specifications should always be confirmed with Cummins Generator Technologies prior to purchase.

Follow us @stamfordavk

Cummins Generator Technologies

View our videos at youtube.com/stamfordavk

news.stamford-avk.com

For Applications Support:
applications@cummins.com

For Customer Service:
service-engineers@stamford-avk.com

For General Enquiries:
info@cumminsgeneratortechnologies.com

Cummins Generator Technologies

STAMFORD

S4L1S-E4 Wdg.17 - Technical Data Sheet

Standards

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

Quality Assurance

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

Excitation and Voltage Regulators

Excitation System					
AVR Type	AS440	MX341	MX321		
Voltage Regulation	± 1%	± 1%	± 0.5%		with 4% Engine Governing
AVR Power	Self-Excited	PMG	PMG		

No Load Excitation Voltage (V)	12 - 9
No Load Excitation Current (A)	0.7 - 0.5
Full Load Excitation Voltage (V)	41 - 39
Full Load Excitation Current (A)	2.3 - 2.2
Exciter Time Constant (seconds)	0.105

STAMFORD

S4L1S-E4 Wdg.17

Electrical Data	
Insulation System	Class H
Stator Winding	Double Layer Lap
Winding Pitch	Two Thirds
Winding Leads	12
Winding Number	17
Number of Poles	4
IP Rating	IP23
RFI 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%
Short Circuit Ratio	1/Xd
Steady State X/R Ratio	16.664
	60 Hz
Telephone Interference	TIF<50
Cooling Air	0.99 m³/sec
Voltage Star	600
kVA Base Rating (Class H) for Reactance Values	440
Saturated Values in Per Unit at Base Ratings and Voltages	
Xd Dir. Axis Synchronous	2.67
X'd Dir. Axis Transient	0.18
X"d Dir. Axis Subtransient	0.13
Xq Quad. Axis Reactance	2.24
X"q Quad. Axis Subtransient	0.31
XL Stator Leakage Reactance	0.06
X2 Negative Sequence Reactance	0.21
X0 Zero Sequence Reactance	0.07
Unsaturated Values in Per Unit at Base Ratings and Voltages	
Xd Dir. Axis Synchronous	3.20
X'd Dir. Axis Transient	0.21
X"d Dir. Axis Subtransient	0.15
Xq Quad. Axis Reactance	2.31
X"q Quad. Axis Subtransient	0.37
XL Stator Leakage Reactance	0.07
Xlr Rotor Leakage Reactance	0.10
X2 Negative Sequence Reactance	0.25
X0 Zero Sequence Reactance	0.08

STAMFORD

S4L1S-E4 Wdg.17

Time Constants (Seconds)	
T'd TRANSIENT TIME CONST.	0.08
T''d SUB-TRANSTIME CONST.	0.019
T'do O.C. FIELD TIME CONST.	1.7
Ta ARMATURE TIME CONST.	0.018
T''q SUB-TRANSTIME CONST.	0.0304

Resistances in Ohms (Ω) at 22^{0}C	
Stator Winding Resistance (Ra), per phase for series connected	0.015
Rotor Winding Resistance (Rf)	1.19
Exciter Stator Winding Resistance	18
Exciter Rotor Winding Resistance per phase	0.068
PMG Phase Resistance (Rpmg) per phase	1.9
Positive Sequence Resistance (R1)	0.01875
Negative Sequence Resistance (R2)	0.0216
Zero Sequence Resistance (R0)	0.01875

Saturation Factors	600V
SG1.0	0.33
SG1.2	1.62

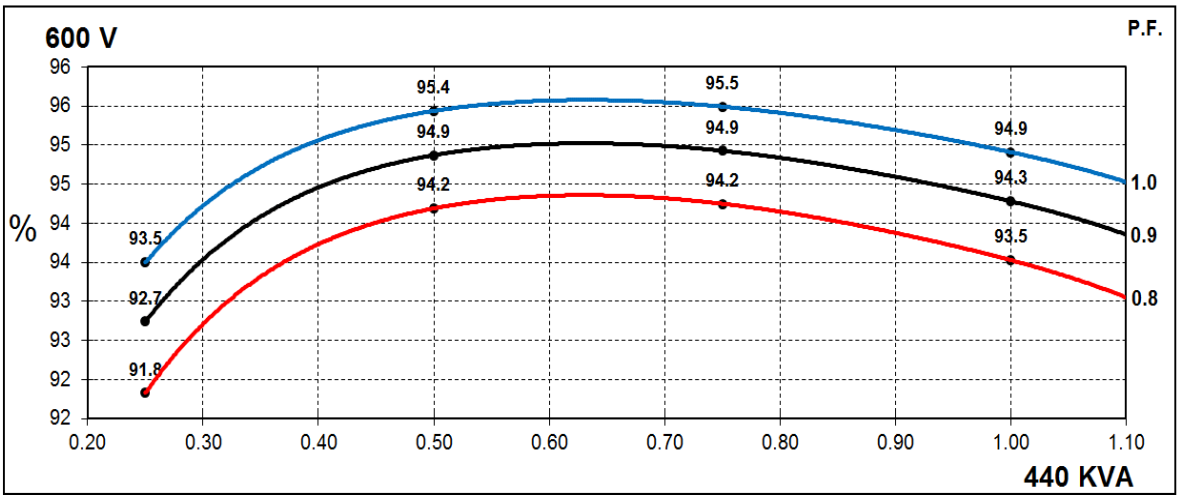
Mechanical Data		
Shaft and Keys	All alternator rotors are dynamically balanced to better than BS6861: Part 1 Grade 2.5 for minimum vibration in operation. Two bearing generators are balanced with a half key.	
	1 Bearing	2 Bearings
SAE Adaptor	SAE 0, 0.5, 1, 2, 3	SAE 0, 0.5, 1, 2
Moment of Inertia	4.6331 kgm^2	4.4343 kgm^2
Weight Wound Stator	470 kg	470 kg
Weight Wound Rotor	400 kg	377 kg
Weight Complete Alternator	1024 kg	1030 kg
Shipping weight in a Crate	1095 kg	1100 kg
Packing Crate Size	155 x 87 x 107 (cm)	155 x 87 x 107 (cm)
Maximum Over Speed	2250 RPM for two minutes	
Bearing Drive End	N/A	Ball 6317
Bearing Non-Drive End	Ball 6314	Ball 6314

STAMFORD

S4L1S-E4 Wdg.17

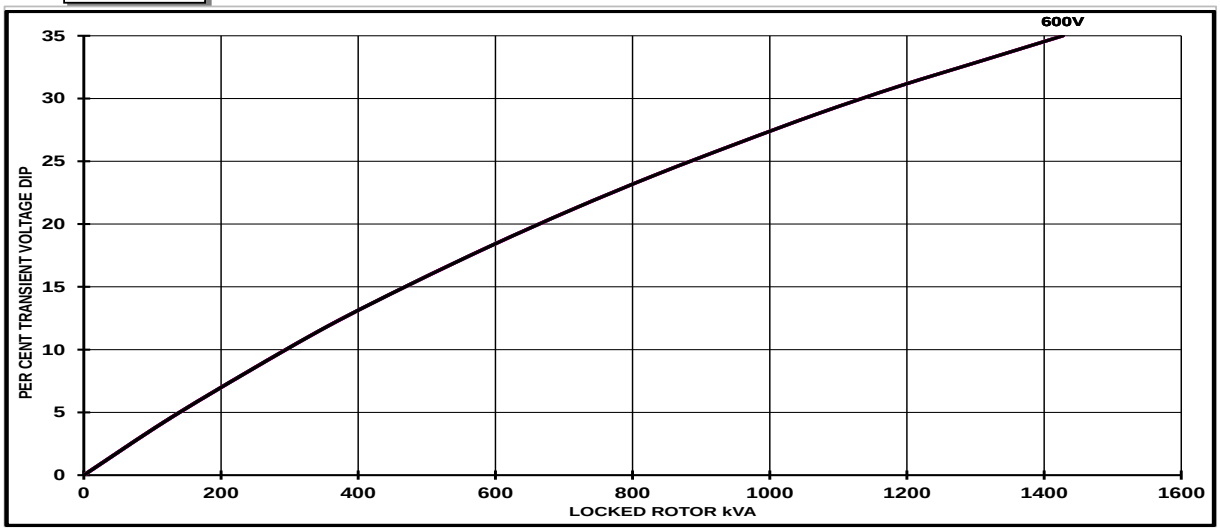
THREE PHASE EFFICIENCY CURVES

60Hz

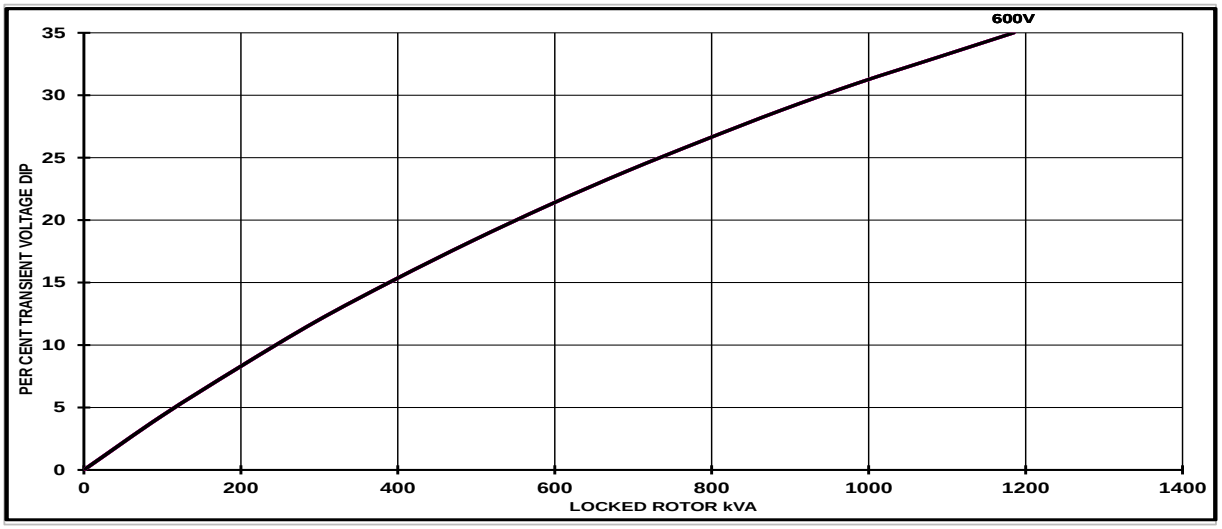


Locked Rotor Motor Starting Curves - Separately Excited

60Hz



Locked Rotor Motor Starting Curves - Self Excited

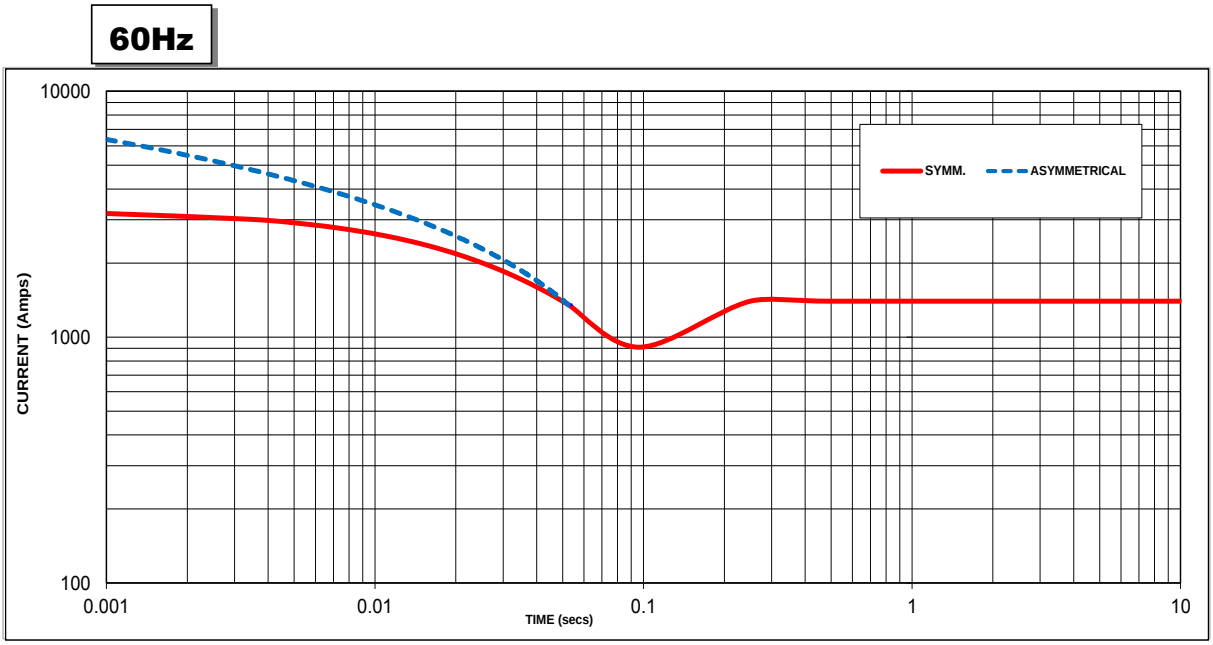


Transient Voltage Dip Scaling Factor		Transient Voltage Rise Scaling Factor
PF	Factor	For voltage rise multiply voltage dip by 1.25
< 0.5	1	
0.5	0.97	
0.6	0.93	
0.7	0.9	
0.8	0.85	
0.9	0.83	

STAMFORD

S4L1S-E4 Wdg.17

Three-phase Short Circuit Decrement Curve



Sustained Short Circuit = 1400 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 :

Voltage	Factor
600V	X 1.00

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

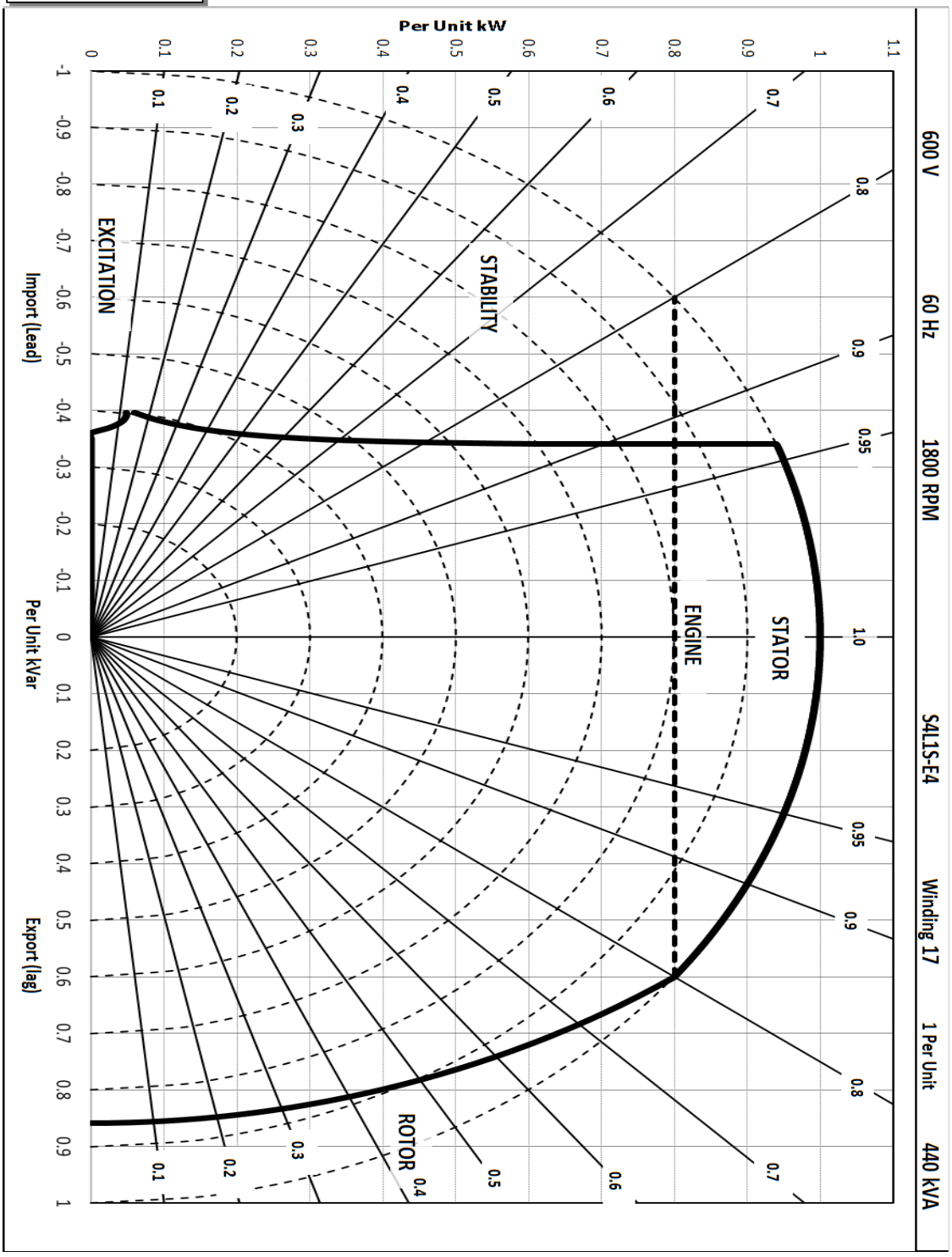
Note 3
Curves are drawn for Star connected machines under no-load excitation at rated speeds. For other connection the following multipliers should be applied to current values as shown :
Parallel Star = Curve current value X 2
Series Delta = Curve current value X 1.732

STAMFORD

S4L1S-E4 Wdg.17

Typical Alternator Operating Charts

600V/60Hz



STAMFORD

S4L1S-E4 Wdg.17

RATINGS AT 0.8 POWER FACTOR

	Class - Temp Rise	Standby - 163/27°C	Standby - 150/40°C	Cont. H - 125/40°C	Cont. F - 105/40°C
60 Hz	Series Star (V)	600	600	600	600
	kVA	475	460	440	400
	kW	380	368	352	320
	Efficiency (%)	93.2	93.3	93.5	93.9
	kW Input	408	394	376	341

De-Rates

All values tabulated above are subject to the following reductions:

- 5% when air inlet filters are fitted
- 3% for every 500 meters by which the operating altitude exceeds 1000 meters above mean sea level
- 3% for every 5°C by which the operational ambient temperature exceeds 40°C
- For any other operating conditions impacting the cooling circuit please refer to applications

Note: Requirement for operating in an ambient exceeding 60°C and altitude exceeding 4000 meters must be referred to applications.

Dimensional and Torsional Drawing

For dimensional and torsional information please refer to the alternator General Arrangement and rotor drawings available on our website (http://stamford-avk.com/)

Note: Continuous development of our products means that the information contained in our data sheets can change without notice, and specifications should always be confirmed with Cummins Generator Technologies prior to purchase.

Follow us @stamfordavk

Cummins Generator Technologies

View our videos at youtube.com/stamfordavk

news.stamford-avk.com

For Applications Support:
applications@cummins.com

For Customer Service:
service-engineers@stamford-avk.com

For General Enquiries:
info@cumminsgeneratortechnologies.com

Cummins Generator Technologies

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.

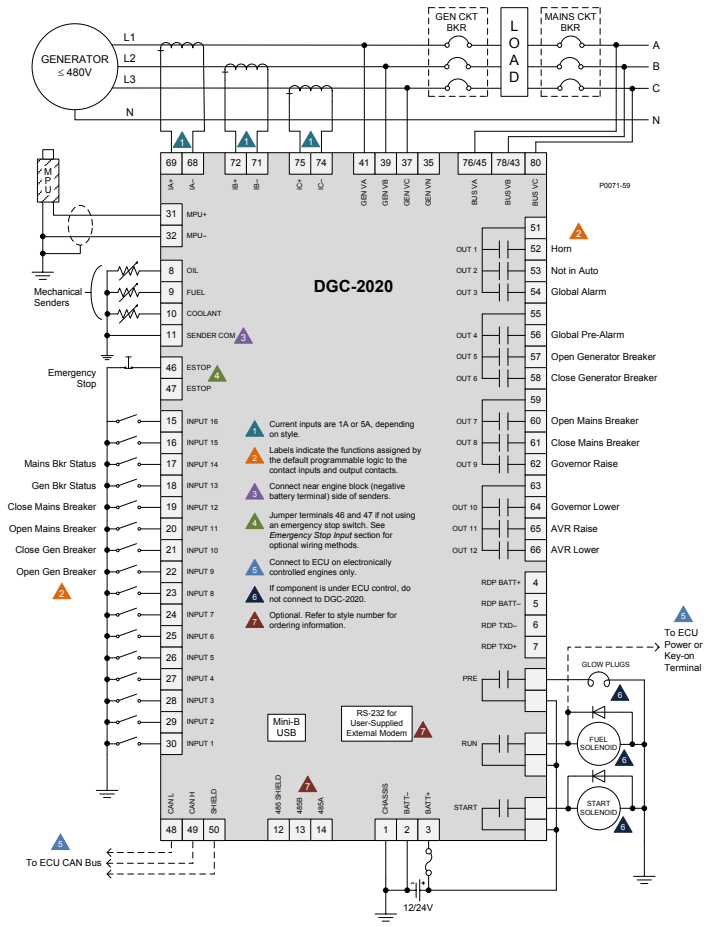


Figure 1 - DGC-2020 Connection Diagram for a Typical Application

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

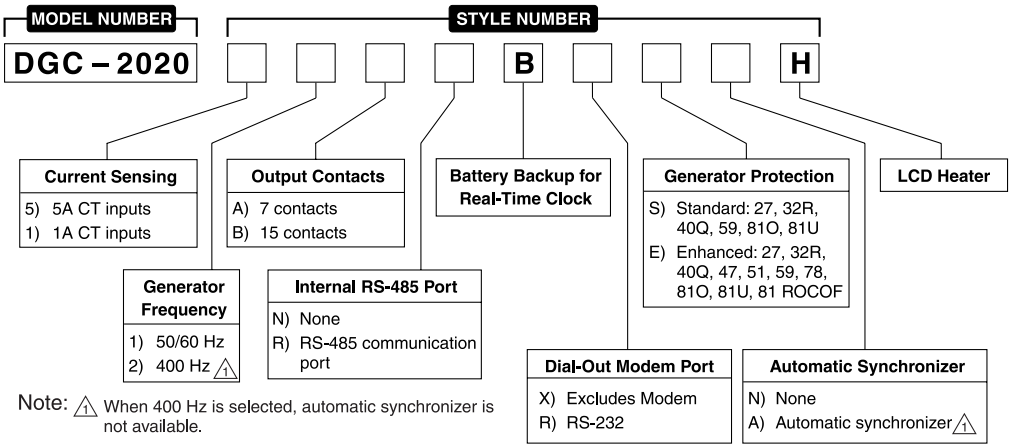
Operating Temp:	-40°C to 70°C (-40°F to 158°F)
Storage Temp:	-40°C to 85°C (-40°F to 185°F)
Humidity:	IEC 68-2-38
Salt Fog:	ASTM B 17-73, IEC 68-2-11
Ingress Protection:	IEC IP54 for front panel
Shock:	15 G in three perpendicular planes
Vibration:	
5 to 29 Hz:	1.5 G peak
29 to 52 Hz:	0.036″ (0.914 mm)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

T7 1200A Frame

AC 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 6.06D
Weight	21.4 (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)	T7		
Continuous Current Rating	1200		
Number of Poles	3-4		
	S	**H**	**L**
AC			
240V	65	100	150
480V	50	65	100
600V	25	50	65

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

PR231/P, PR232/P, PR331DS, and PR332DS/P electronic trip unit

Auxiliary Devices for Indication and Control

- Auxiliary contacts - AUX
- Undervoltage release - UVR
- Shunt trip - SOR
- Terminal covers
- Padlock provision - PLL
- Direct rotary handle - RHD
- 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 LV114
No. 1SXU210114D0201
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

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

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

Digital Linear Chargers

On-Board Chargers Today

- Current Supplier provides quality product and design services. However, services are at their pacing with limited resources; and a history of issues meeting launch dates. PC charger delays prompted a re-evaluation of our controls and processes
- Resulted in a renewed commitment to the charger category
    - Allow supplier to focus on what they do well… build product
    - All charger development controlled by Minn Kota engineering
- Minn Kota designs, tests, and qualifies
- Supplier manufactures – period
- Revised product plan
    - 2011 Digital Linear On-board chargers
    - 2012 Precision Charge On-board chargers

New Digital Linear On-Board Chargers

- Taking existing Linear On-board family of chargers and raising the bar
    - Analog to Digital designs; New “D” designation in model name

Digital± CONTROL

Digital Linear Chargers

New Digital Linear On-Board Chargers (cont.)

- New microprocessor controlled linear design provides software enriched features and functionality
    - More repeatable set points (voltage limit and current) = improved charge curves
    - Maintenance mode time-out feature (auto-off)
    - Arc protection
    - Enhanced status codes
        - System okay
        - Charge stage indication (Bulk, Absorption, or Maintenance)
        - Full charge
        - Maintenance mode status
        - Multiple specific error indications – low battery voltage, damaged temp sensor, no output lead attached, etc.
- Up to 2X Faster Charge Times in high heat conditions

LED Status Code Detail

1. A GREEN power light is lit to indicate AC power is applied
2. A YELLOW light is lit for each bank to indicate the battery is charging in the Bulk Mode
3. A flashing YELLOW light is lit for each bank to indicate the battery is charging in the Absorption Mode
4. A flashing GREEN light is lit for each bank to indicate the battery is in maintenance mode and ready to use
5. A GREEN light is lit for each bank to indicate the battery is in long term maintenance mode and ready to use
6. A RED light for each bank is lit if any of the following apply:
    a) No battery is connected to an output cord - this may also indicate a blown fuse in the fuse holder
    b) The battery is connected reverse polarity
    c) A short circuit
    d) The battery voltage is below 4 volts - the bank will not charge a battery in this condition

Digital Linear Chargers

LED Status Code Detail (cont.)

e) The battery voltage is above 18 volts - the bank will not charge a battery in this condition

7. A flashing RED light is lit for each bank if there is a damaged temperature sensor on the output cord - the bank will not operate if this occurs.
8. Flashing RED and GREEN lights are lit for each bank if any of the following apply:

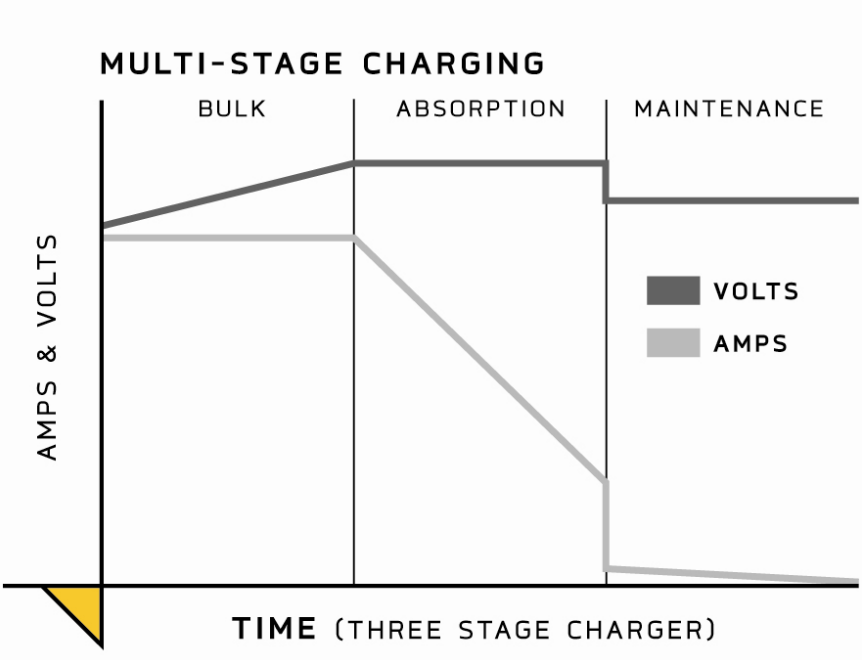
   a) The battery voltage does not rise above 10.5V after 3 hours - the battery may be damaged and will not be charged

   b) Charging in Bulk Mode exceeds 20 hours - the battery may be damaged and will not be charged

Digital Linear Charging Technologies

Automatic 3-Stage Charging

- Bulk – high amps at low voltage until battery reaches ~75% charge
- Absorption – at ~75% charge, current tapers down until the battery voltage reaches 14.4V* (full charge)
- Maintenance (or Float) – when the battery voltage reaches full charge, charger output is dropped to 13.4V* (.1A-.3A). After 24 hours, the charger automatically turns off and automatically turns on when the battery voltage drops below 12.6 volts



*** At 77 degrees Fahrenheit**

Digital Linear Charging Technologies (cont.)

Automatic Temperature Compensation

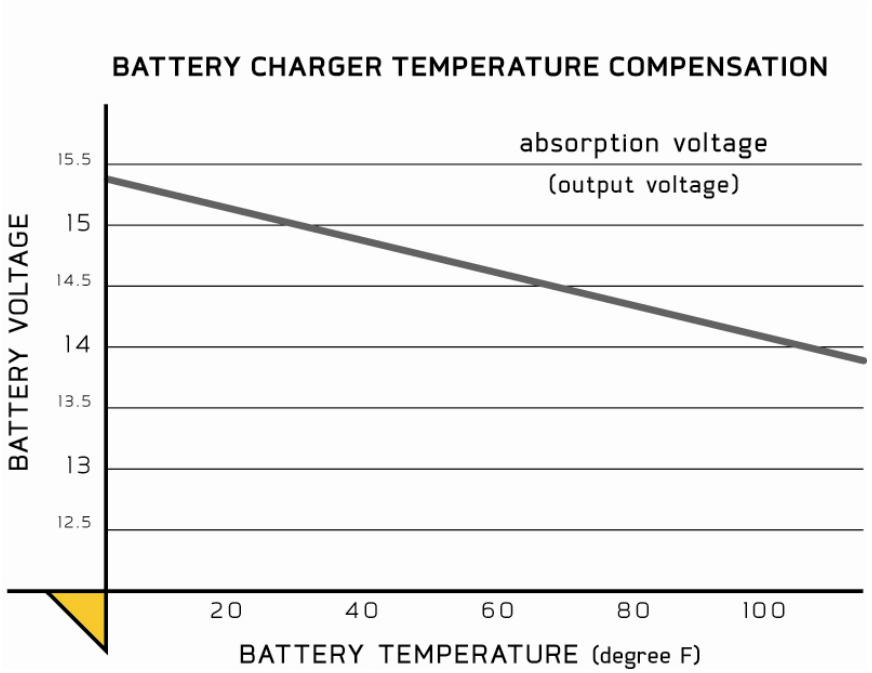
- Senses temperature and adjusts output voltage
- Protects batteries from overcharging at high temperatures
- Maintains gassing threshold for a full charge

Gassing Threshold

- Voltage level at which electrolyte begins moving within the battery
- This threshold must be reached in order to fully charge a battery

Effect of Temperature

- Gassing threshold is higher at lower temps, lower at higher temps
- Too much voltage at high temperatures can “boil” and destroy a battery



Digital Linear Chargers

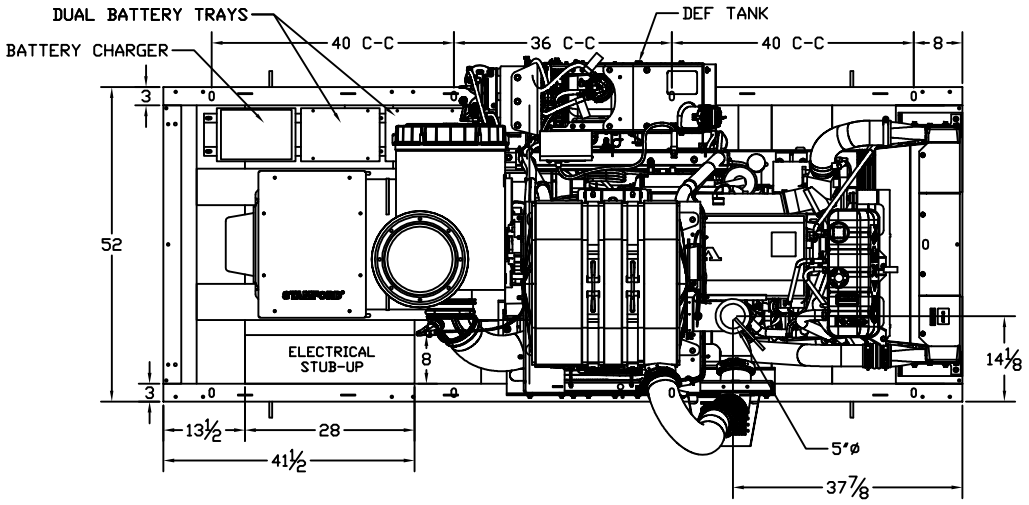
Specifications

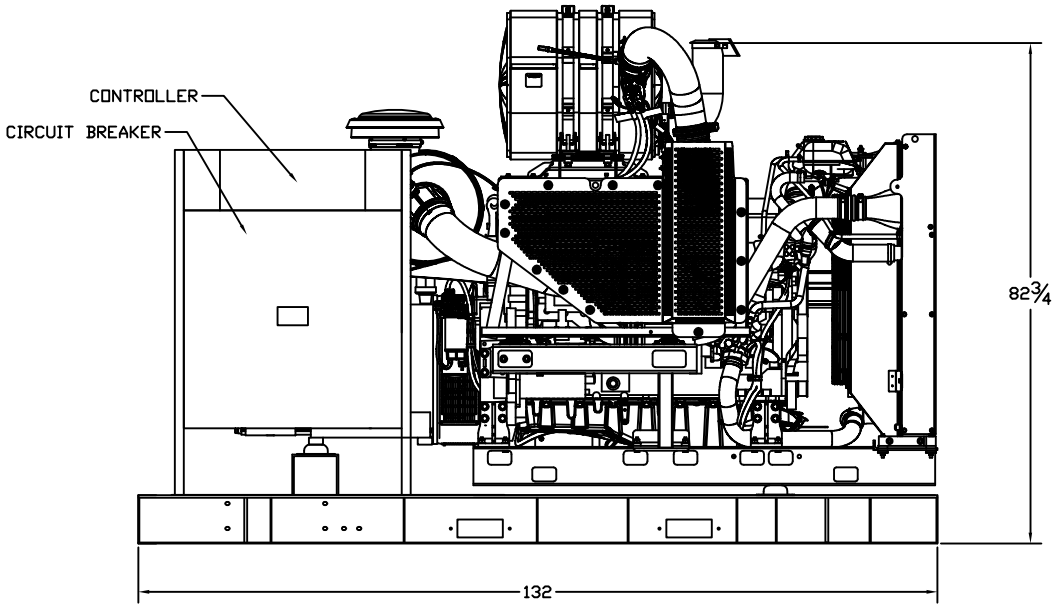
- Waterproof, shock-and vibration-resistant aluminum construction
- Saltwater tested and fully corrosion-resistant
- Short circuit, reverse polarity, and ignition protected
- For use with 12V/6 cell batteries that are flooded/wet cell, maintenance free or starved electrolyte (AGM) only
- FCC compliant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

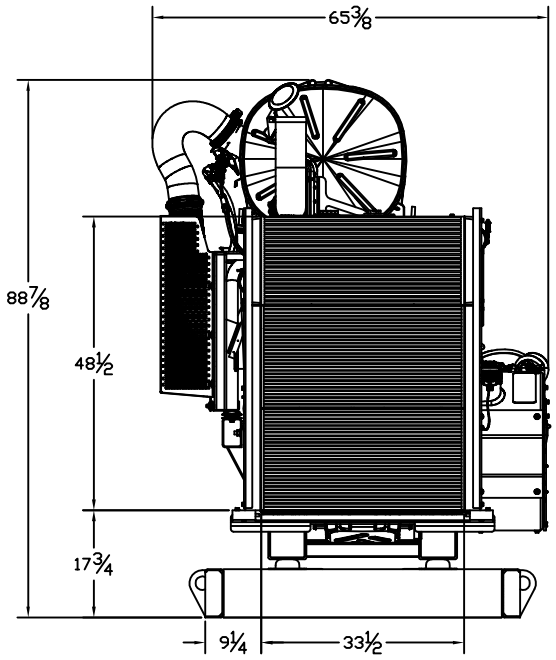
OUTLINE DIMENSIONS FOR T4D-3000 OPEN

TOP VIEW





SIDE VIEW

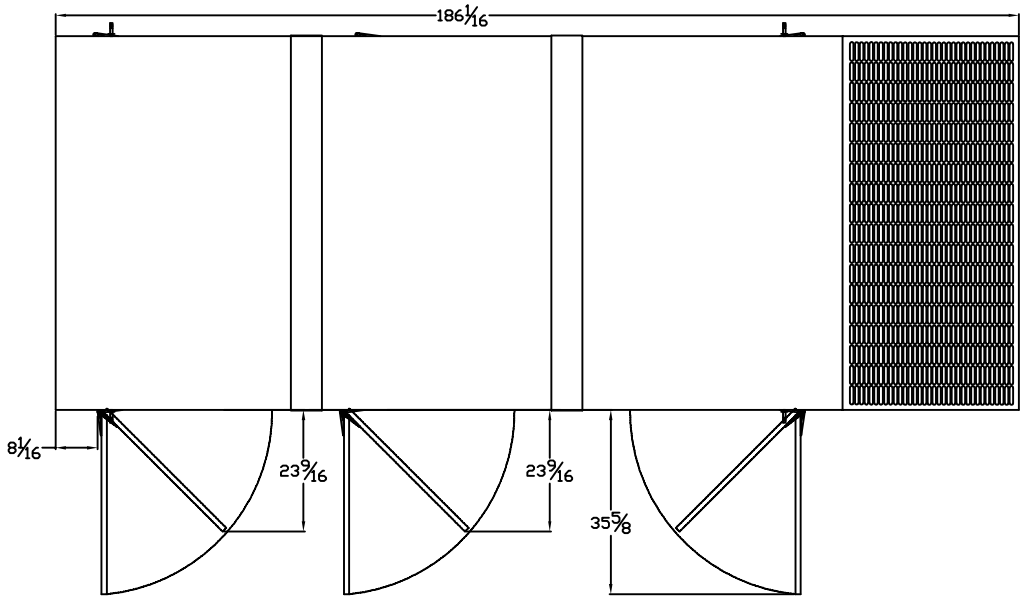


RADIATOR END VIEW

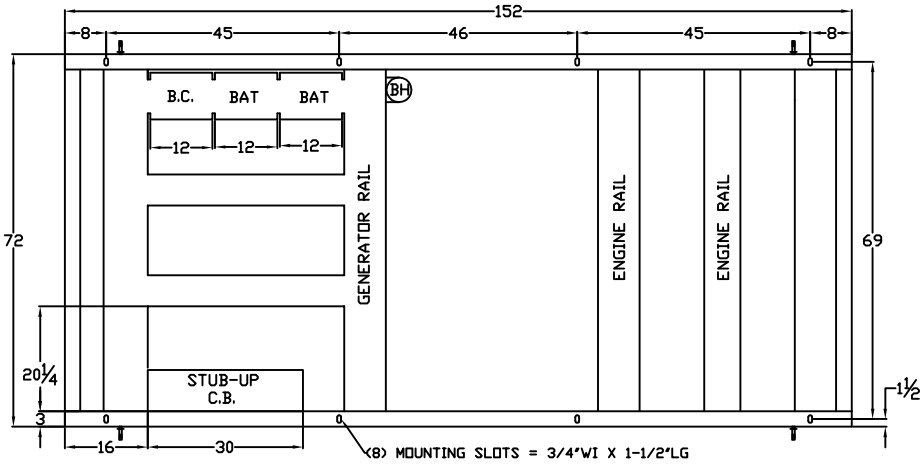
OUTLINE DIMENSIONS FOR T4D 250-400 KW LEVEL 2 ENCLOSURE

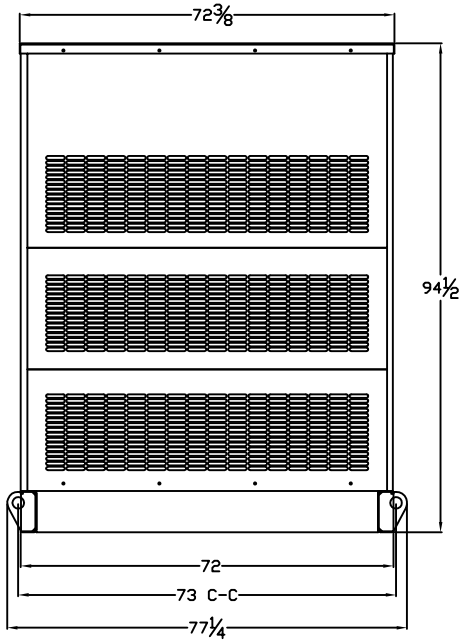
TOP VIEW

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

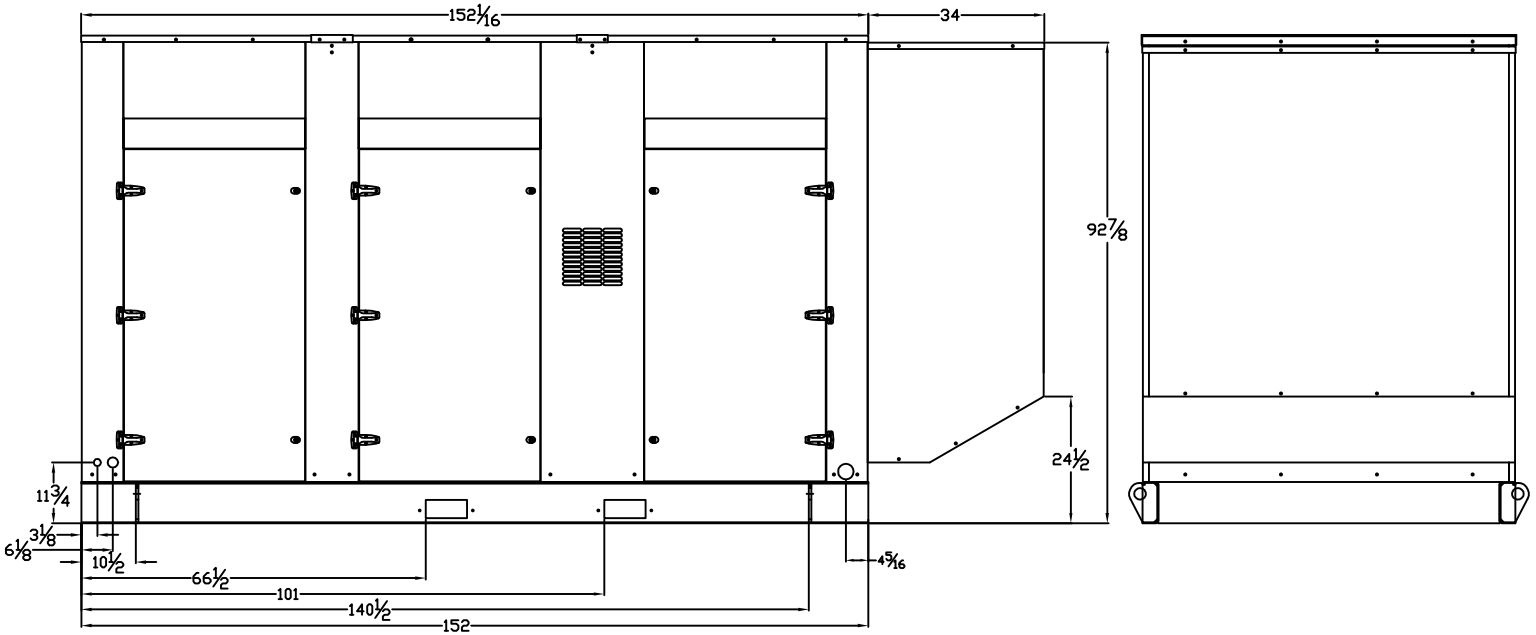


FRAME VIEW





GENERATOR END VIEW



SIDE VIEW

RADIATOR END VIEW