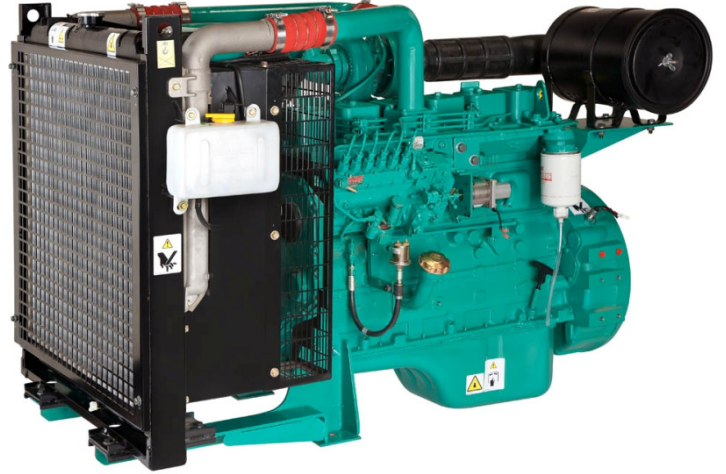


ژنراتور : Mecc alte

موتور دیزل : Cummins

Standby		Prime		دیزل ژنراتور
KVA	KW	KVA	KW	
138	110	125	100	



موتور دیزل		
Manufacturer	cummins	تولید کننده
Type	6BTAA5.9G3	تیپ
Number of cylinders	6	تعداد سیلندر ها
Cylinder arrangement	Vertical in-line	آرایش سیلندر ها
Displacement , Liters	5.9	جا به جایی
Bore × Stroke , mm	102 X 120	قطر سیلندر × کورس پیستون
Compression Ratio	16.5 : 1	نسبت تراکم
Aspiration	Turbocharged	سیستم تنفس
Gross engine power, kWb	100	قدرت نافالص موتور
Combustion air flow, L/sec	144	جریان هوای احتراق
Mean Piston Speed , m/s	6	میانگین سرعت پیستون

ژنراتور

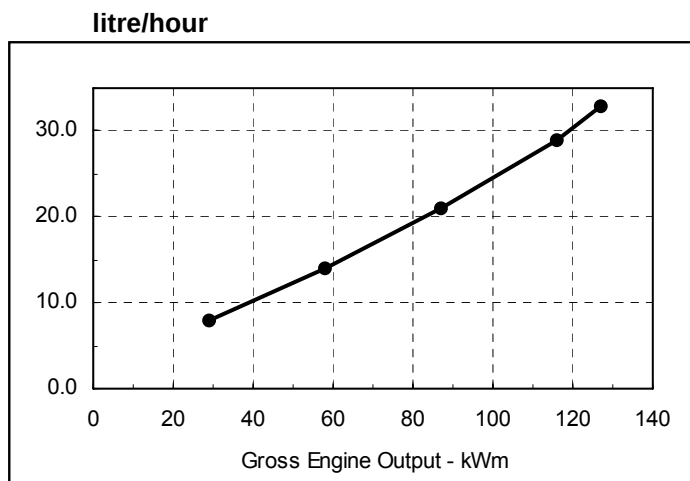
Manufacturer	Mecc alte	تولید کننده
Type	ECP _{34-1L}	تیپ
Standby power at rated voltage ,KVA	138	توان standby در ولتاژ نامی
Efficiency, %	92.8	راندمان
Power factor	0.8	ضریب قدرت
Phase	3	فاز
Frequency, Hz	50	فرکانس
Speed, Rpm	1500	سرعت
Voltage, V	380	ولتاژ
Stator windings	12 ends	سیم پیچ استاتور
Voltage Regulation, %	± % 1.0	تنظیم ولتاژ
Over speed, Rpm	2250	مداکثر سرعت مجاز
Short circuit ratio	0.39	جریان اتصال کوتاه
Insulation class	H	کلاس عایق
Protection class	IP ₂₁	کلاس حفاظتی
Rotor	with damping cage	روتور

	Cummins Inc. Columbus, Indiana 47202-3005		Basic Engine Model: 6BTAA5.9-G3	Curve Number: FR-92394	<i>G-DRIVE</i> B5.9 1
	Engine Data Sheet		Engine Critical Parts List: CPL: 2739	Date: 3Mar10	
Displacement : 5.9 litre (360 in ³)			Bore : 102 mm (4.02 in.) Stroke : 120 mm (4.72 in.)		
No. of Cylinders : 6			Aspiration : Turbocharged and Air to Air Aftercooled		

Engine Speed	Standby Power		Prime Power		Continuous Power	
	kWm	hp	kWm	hp	kWm	hp
1500	127	170	116	155	87	116

Engine Performance Data @ 1500 rpm

OUTPUT POWER			FUEL CONSUMPTION			
%	kWm	hp	kg/ kWm·h	lb/ hp·h	litre/ hour	US gal/ hour
STANDBY POWER						
100	127	170	0.219	0.360	33	8.6
PRIME POWER						
100	116	155	0.213	0.350	29	7.7
75	87	116	0.207	0.340	21	5.6
50	58	78	0.205	0.366	14	3.7
25	29	39	0.221	0.363	8	2.0
CONTINUOUS POWER						
100	87	116	0.207	0.340	21	5.6

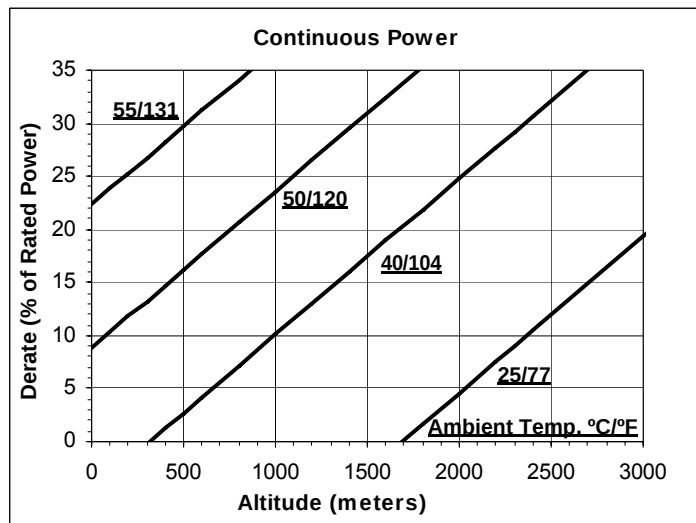
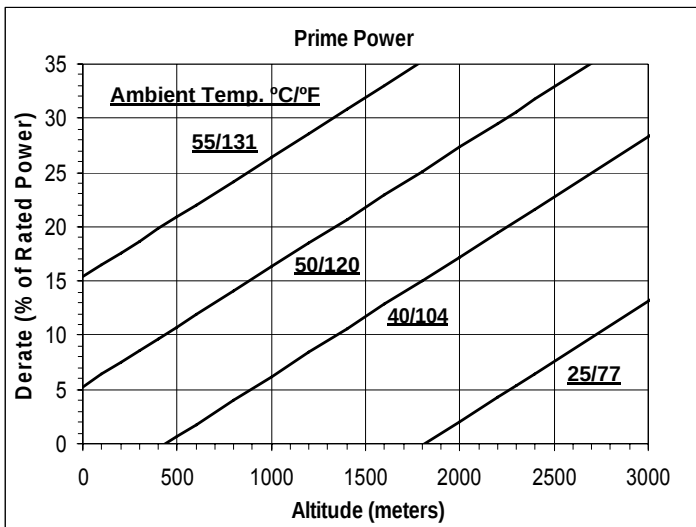
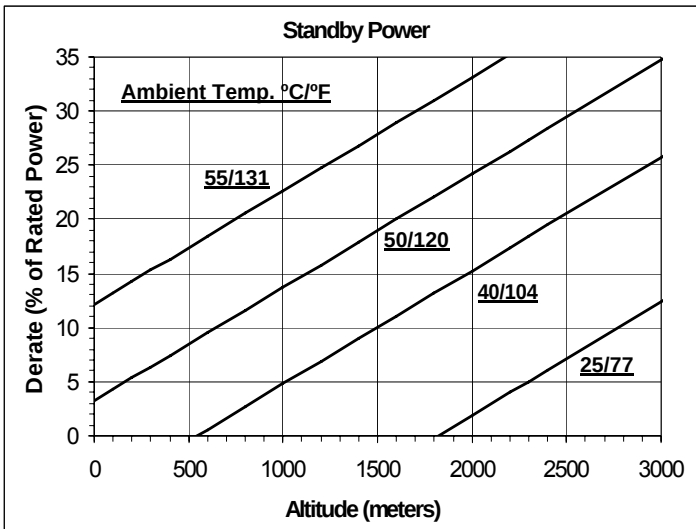


CONVERSIONS:(litres = US Gal x 3.785) (US Gal = litres x 0.2642)

Data Subject to Change Without Notice

These guidelines have been formulated to ensure proper application of generator drive engines in A.C. generator set installations. STANDBY POWER RATING: Applicable for supplying emergency power for the duration of the utility power outage. No overload capability is available for this rating. Under no condition is an engine allowed to operate in parallel with the public utility at the Standby Power rating. This rating should be applied where reliable utility power is available. A Standby rated engine should be sized for a maximum of an 80% average load factor and 200 hours of operation per year. This includes less than 25 hours per year at the Standby Power rating. Standby ratings should never be applied except in true emergency power outages. Negotiated power outages contracted with a utility company are not considered an emergency. PRIME POWER RATING: Applicable for supplying electric power in lieu of commercially purchased power. Prime Power applications must be in the form of one of the following two categories: UNLIMITED TIME RUNNING PRIME POWER: Prime Power is available for an unlimited number of hours per year in a variable load application. Variable load should not exceed a 70% average of the Prime Power rating during any operating period of 250 hours. The total operating time at 100% Prime Power shall not exceed 500 hours per year. A 10% overload capability is available for a period of 1 hour within a 12-hour period of operation. Total operating time at the 10% overload power shall not exceed 25 hours per year. LIMITED TIME RUNNING PRIME POWER: Limited Time Prime Power is available for a limited number of hours in a non-variable load application. It is intended for use in situations where power outages are contracted, such as in utility power curtailment. Engines may be operated in parallel to the public utility up to 750 hours per year at power levels never to exceed the Prime Power rating. The customer should be aware, however, that the life of any engine will be reduced by this constant high load operation. Any operation exceeding 750 hours per year at the Prime Power rating should use the Continuous Power rating. CONTINUOUS POWER RATING: Applicable for supplying utility power at a constant 100% load for an unlimited number of hours per year. No overload capability is available for this rating.	Reference AEB 10.47 for determining Electrical Output.
	Data shown above represent gross engine performance capabilities obtained and corrected in accordance with ISO-3046 conditions of 100 kPa (29.53 in Hg) barometric pressure [110 m (361 ft) altitude], 25 °C (77 °F) air inlet temperature, and relative humidity of 30% with No. 2 diesel or a fuel corresponding to ASTM D2. Derates shown are based on 15 in H₂O air intake restriction and 2 in Hg exhaust back pressure.
	The fuel consumption data is based on No. 2 diesel fuel weight at 0.85 kg/litre (7.1 lbs/US gal). Power output curves are based on the engine operating with fuel system, water pump and lubricating oil pump; not included are battery charging alternator, fan, optional equipment and driven components.
	Data Status: --Limited Production-- Data Tolerance: ± 5% Chief Engineer:

1500 rpm Derate Curves

**Operation At Elevated Temperature And Altitude:**

For **Standby Operation** above these conditions, derate by an additional 3% per 300 m (1000 ft), and 9% per 10° C (18° F).

For **Prime Operation** above these conditions, derate by an additional 3% per 300 m (1000 ft), and 10% per 10° C (18° F).

For **Continuous Operation** above these conditions, derate by an additional 4% per 300 m (1000 ft), and 14% per 10° C (18° F).

Cummins Inc.

Engine Data Sheet

ENGINE MODEL : **6BTAA5.9-G3**

CONFIGURATION NUMBER : D403091GX02

DATA SHEET : DS-92394

DATE : 3Mar10

PERFORMANCE CURVE : FR-92394

INSTALLATION DIAGRAM

• Fan to Flywheel: 0100-4223

CPL NUMBER

• Engine Critical Parts List: 2739

GENERAL ENGINE DATA

Type	Inline 6-Cylinder Diesel	
Aspiration	Turbocharged and Aftercooled	
Bore x Stroke	4.02 x 4.72 (102 x 120)	
Displacement	360 (5.9)	
Compression Ratio	16.5 : 1	
Dry Weight (Approximate), Fan to Flywheel Engine	886	(402)
Wet Weight (Approximate), Fan to Flywheel Engine	939	(426)
Moment of Inertia of Rotating Components		
• with FW 9017 Flywheel	5	(0.6)
• with FW 9134 Flywheel	11	(1.2)
Center of Gravity from Rear Face of Block	21.4	(544)
Center of Gravity Above Crankshaft Centerline	6.1	(155)
Maximum Static Loading at Rear Main Bearing	N.A.	(N.A.)

ENGINE MOUNTING

Maximum Bending Moment at Rear Face of Block	996	(1350)
--	-----	--------

EXHAUST SYSTEM

Maximum Back Pressure	3	(10)
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AIR INDUCTION SYSTEM

Maximum Intake Air Restriction		
• with Dirty Filter Element	25	(6)
• with Clean Filter Element	15	(4)

COOLING SYSTEM**Jacket Water Circuit Requirements**

Coolant Capacity — Engine Only	2.4	(9.1)
Maximum Static Head of Coolant Above Engine Crank Centerline	46	(14)
Standard Thermostat (Modulating) Range	183-203	(84-95)
Minimum Pressure Cap	7	(48)
Maximum Top Tank Temperature for Standby / Prime Power	220/212	(104/100)
Maximum Coolant Friction Head External to Engine	4	(28)

Charge Air Cooler Requirements

Maximum Temp. Rise Between Engine Air Intake and Aftercooler Air Outlet - 1500 rpm	116	(47)
Maximum Air Pressure Drop from Turbo Air Outlet to Intake Manifold - 1500 rpm	3	(10)
Maximum Intake Manifold Temperature @ 77 °F (25 °C) Ambient - 1500 rpm	140	(60)
Maximum Compressor Outlet Temperature	288	(142)
Maximum Intake Manifold Temperature for Engine Protection (Shut Down Threshold)	207	(97)

LUBRICATION SYSTEM

Oil Pressure @ Idle Speed	10	(69)
@ Governed Speed	30-50	(207-345)
Maximum Oil Temperature	250	(121)
Oil Capacity with OP 9006 Oil Pan : Low - High	3-3.8	(11.5-14.3)
Total System Capacity (Including Filter)	4.3	(16.4)

FUEL SYSTEM

Type Injection System	Bosch Mechanical
Maximum Restriction at Lift Pump (clean/dirty filter)..... — in Hg (kPa)	4/8 (14/27)
Maximum Allowable Head on Injector Return Line (Consisting of Friction Head and Static Head) — in Hg (kPa)	2.5 (8.4)
Maximum Fuel Flow to Injector Pump	11.9 (45)
Maximum Return Fuel Flow	N.A. (N.A.)
Maximum Fuel Inlet Temperature	160 (71)

ELECTRICAL SYSTEM

Cranking Motor (Heavy Duty, Positive Engagement)	12
Battery Charging System, Negative Ground	55
Maximum Allowable Resistance of Cranking Circuit	0.002
Minimum Recommended Battery Capacity	
• Cold Soak @ 0 °F to 32 °F (-18 °C to 0 °C)	0 °F CCA (950)

COLD START CAPABILITY

Minimum Ambient Temperature for Cold Start with 1500 Watt Coolant Heater to Rated Speed..... — °F (°C)	5 (-15)
Minimum Ambient Temperature for Unaided Cold Start..... — °F (°C)	23 (-5)
Minimum Ambient Temperature for NFPA 110 Cold Start (90 °F Coolant Temperature)	N.A. (N.A.)

PERFORMANCE DATA

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

Barometric Pressure	: 100 kPa (29.53 in Hg)	Air Temperature	: 25 °C (77 °F)
Altitude	: 110 m (361 ft)	Relative Humidity	: 30%
Air Intake Restriction	: 381 mm H ₂ O (15 in H ₂ O)	Exhaust Restriction	: 6.7 kPa (2 in Hg)

Steady State Stability Band at Any Constant Load	— %	+/-	0.86
Estimated Free Field Sound Pressure Level of a Typical Generator Set;			
Excludes Exhaust Noise; at Rated Load and 7.5 m (24.6 ft); @1800 rpm	— dBA		N.A.
Exhaust Noise at 1 m Horizontal from Centerline of Exhaust Pipe Outlet Upwards at 45°	— dBA		N.A.

Governed Engine Speed	rpm
Engine Idle Speed	rpm
Gross Engine Power Output.....	hp (kW)
Brake Mean Effective Pressure.....	psi (kPa)
Piston Speed	ft/min (m/s)
Friction Horsepower.....	hp (kW)
Engine Water Flow at Stated Friction Head External to Engine:	
• 2.5 psi Friction Head.....	US gpm (litre/s)
• Maximum Friction Head	US gpm (litre/s)

Engine Data

Intake Air Flow	cfm (litre/s)
Exhaust Gas Temperature	°F (°C)
Exhaust Gas Flow	cfm (litre/s)
Air to Fuel Ratio	air : fuel
Radiated Heat to Ambient	BTU/min (kW)
Heat Rejection to Jacket Coolant.....	BTU/min (kW)
Heat Rejection to Exhaust	BTU/min (kW)
Heat Rejection to *Fuel	BTU/min (kW)
Heat Rejection to Aftercooler.....	BTU/min (kW)
Turbocharger Compressor Outlet Pressure	in Hg (kPa)
Turbocharger Compressor Outlet Temperature.....	°F (°C)

STANDBY POWER		PRIME POWER	
60 hz	50 hz	60 hz	50 hz
Not Available For 1800 RPM Operation	1500	Not Available For 1800 RPM Operation	1500
	700 - 1200		700 - 1200
	170 (127)		159 (119)
	250 (1722)		195 (1344)
	1181 (6)		1416 (7.2)
	17 (12.7)		22 (16.4)
	7.5 (28.6)		38 (2.4)
	N.A. (N.A.)		N.A. (N.A.)
	304 (144)		283 (134)
	1140 (616)		1064 (574)
	875 (414)		795 (376)
	21.4 : 1		22.4 : 1
	747 (14)		663 (12)
	3112 (55)		2788 (49)
	7597 (134)		6541 (115)
	N.A. (N.A.)		N.A. (N.A.)
	1335 (23.47)		1335 (23.47)
	21 (143)		18 (122)
	288 (143)		271 (133)

* This is the maximum heat rejection to fuel.

N.A. - Not Available

N/A - Not Applicable to this Engine

TBD - To Be Determined

ENGINE MODEL : 6BTAA5.9-G3

DATA SHEET : DS-92394

DATE : 3Mar10

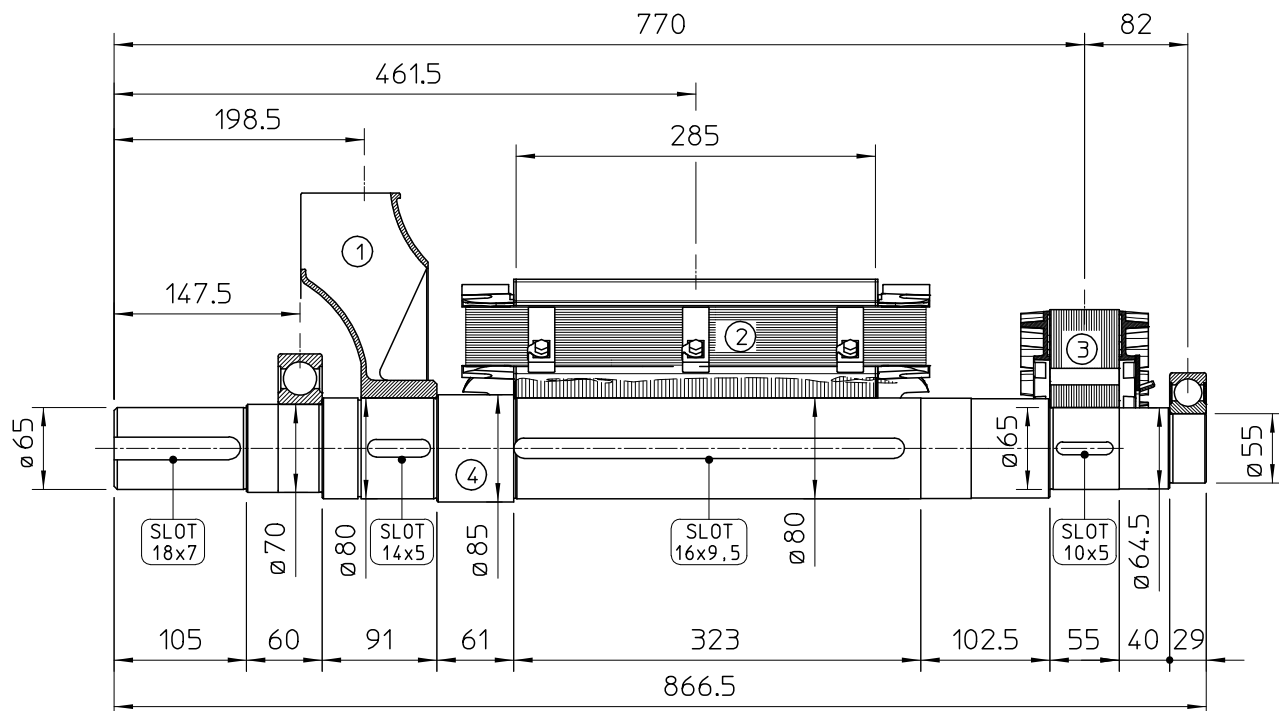
FR-92394

Electrical Characteristics										
Frequency		Hz	50				60			
Voltage (series star)		V	380	400	415	440	415	440	460	480
Rated power class H		kVA	135	135	135	114	140	150	162	162
		kW	108	108	108	91	112	120	130	130
Rated power class F		kVA	121	121	121	103	125	135	146	146
		kW	97	97	97	82	100	108	117	117
Regulation with DSR			±1% with any power factor and speed variations between -5% +30%							
Insulation class			H							
Execution			Brushless							
Stator winding			12 ends							
Rotor			with damping cage							
Efficiencies class H	4/4	%	92,8	92,9	92,6	92,4	94	94,5	94,7	94,8
(see graph. for details)	3/4	%	93,1	93,4	93,2	93	94,5	95	95,2	95,3
	2/4	%	91,6	91,7	91,7	91,6	93,1	93,3	93,5	93,6
	1/4	%	88,2	88,2	88,1	88	89,3	89,4	89,5	89,3
Reactances (f. l.cl. F)	Xd	%	245	222	202	161	257	250	241	222
	Xd'	%	16,8	15,4	14,4	11,5	19,5	18,0	16,8	15,4
	Xd''	%	8,1	7,6	6,9	5,4	9,7	8,9	8,1	7,6
	Xq	%	148	136	125	112	162	154	148	136
	Xq'	%	148	136	125	112	162	154	148	136
	Xq''	%	31,2	28,4	27,1	25,2	35,4	33	31,2	28,4
	X ₂	%	18,9	17,2	16,6	15,4	22,1	20,7	18,9	17,2
	X ₀	%	3,1	2,7	2,9	2,2	3,6	3,4	3,1	2,7
Short Circuit Ratio	Kcc		0,39	0,45	0,60	0,90	0,30	0,35	0,39	0,45
Time Constants	Td'	sec.	0,039							
	Td''	sec.	0,0085							
	Tdo'	sec.	1,85							
	Tα	sec.	0,0168							
Short Circuit Current Capacity		%	>300				>350			
Excitation at no load		Amp.	0,5	0,6	0,67	0,8	0,3	0,35	0,4	0,5
Excitation at full load		Amp.	2,1	2,1	2,2	2,4	2,3	2,1	2	2
Overload (long-term)		%	1 hour in a 6 hours period 110% rated load							
Overload per 20 sec.		%	300							
Stator Winding Resistance (20°C)		Ω	0,016							
Rotor Winding Resistance (20°C)		Ω	4,142							
Exciter Resistance (20 °C)		Ω	Rotor : 0,410				Stator : 15,28			
Heat dissipation at f.l.cl.H		W	8379	8254	8631	7501	7149	6984	7253	7109
Telephone Interference			THF < 2%				TIF < 40			
Radio interference			EN61000-6-3, EN61000-6-2. For others standards apply to factory							
Waveform Distors.(THD) at f. load	LL/LN	%	1,7 / 1,9							
Waveform Distors.(THD) at no load	LL/LN	%	2,3 / 2,5							
Mechanical characteristics										
Protection			IP 21 (other protection on request)							
DE bearing			6314.2RS							
NDE bearing			6311.2RS							
Weight of wound stator assembly		kg	152							
Weight of wound rotor assembly		kg	101,3							
Weight of complete generator		kg	467							
Maximun overspeed		rpm	2250							
Unbalanced magnetic pull at f.l.cl.F		kN/mm	5,7							
Cooling air requirement		m³/min	19,3				23			
Inertia Constant (H)		sec.	0,098				0,118			
Noise level at 1m/7m		dB(A)	79 / 65				83 / 69			

All technical data are to be considered as a reference and they can be modified without any notice.

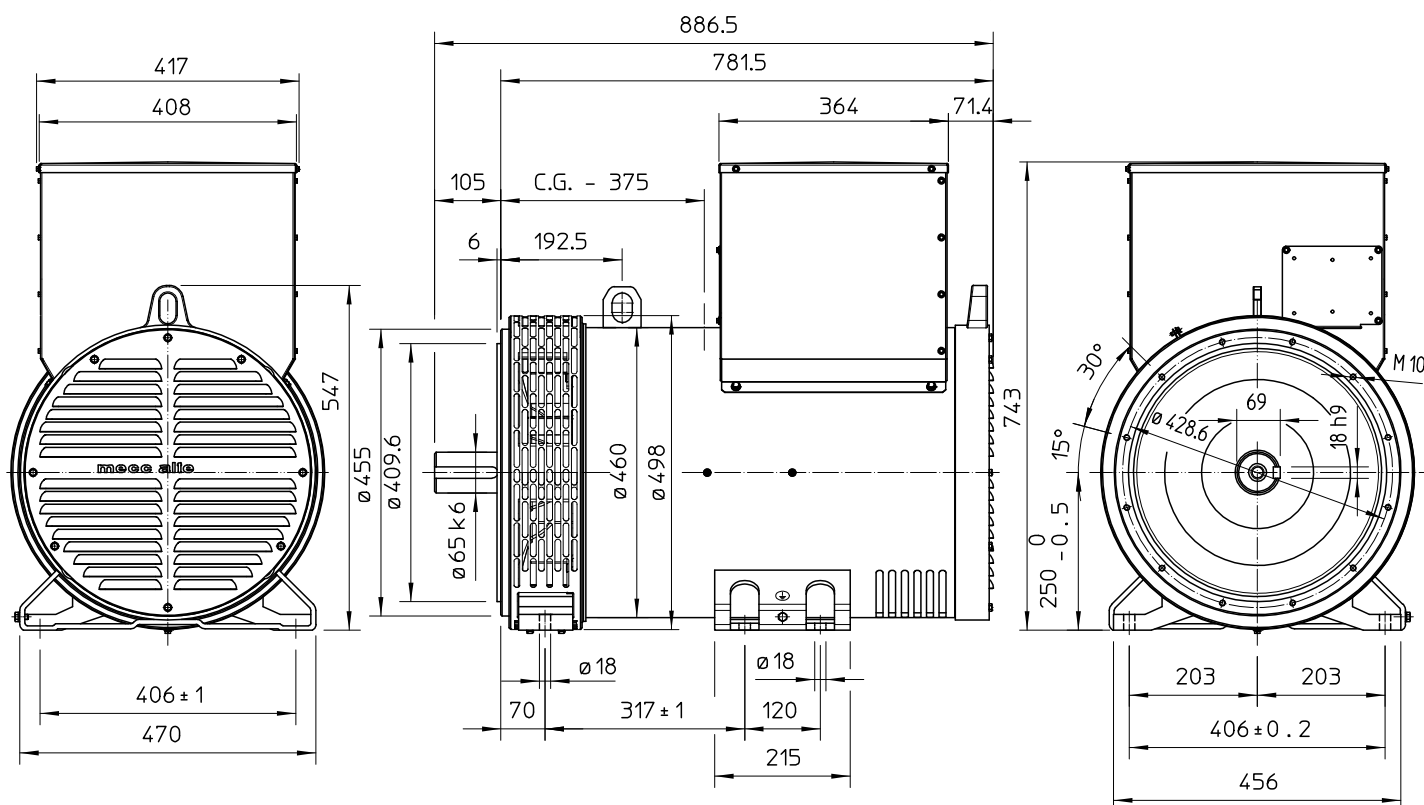
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TWO BEARING MOMENTS OF INERTIA

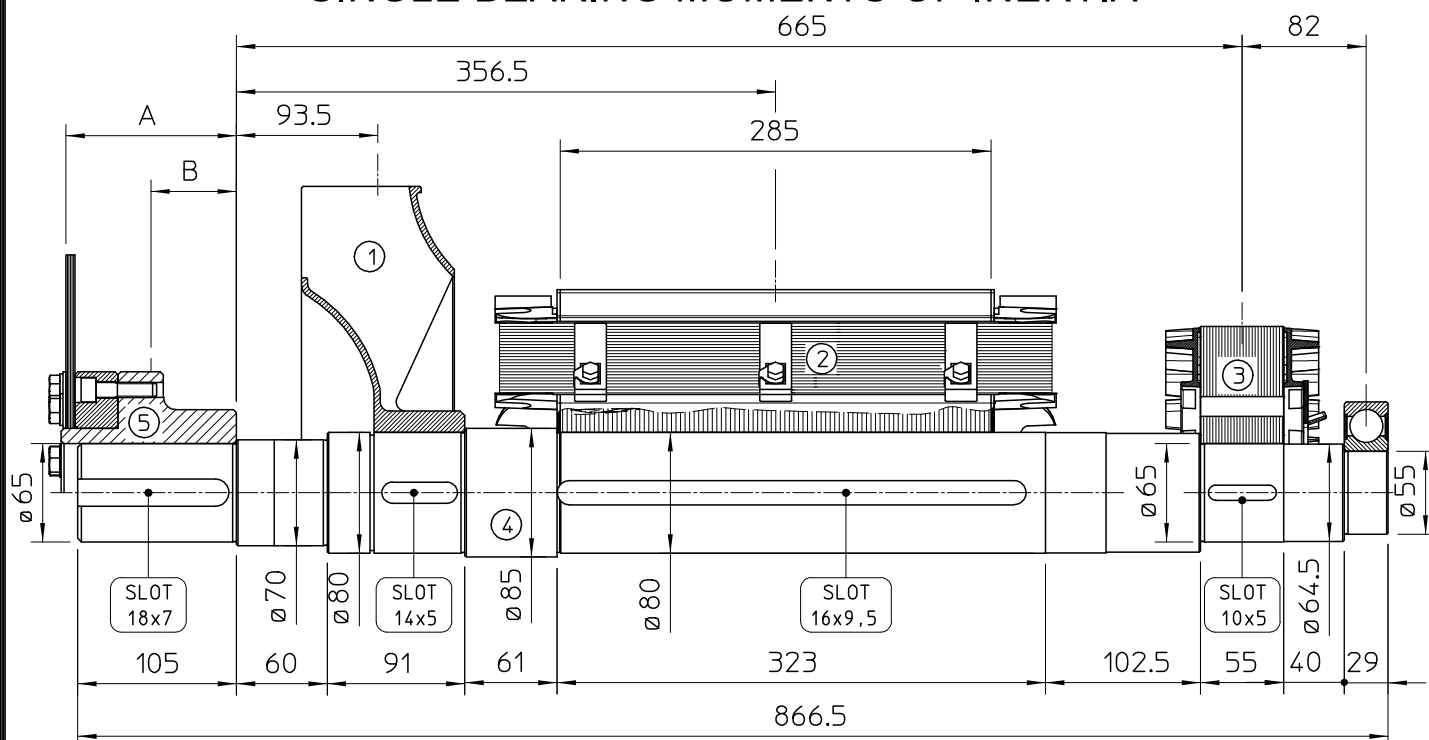


POS.	COMPONENT	WEIGHT (kg)	J (kgm ²)
1	FAN	3.6	0.0451
2	MAIN ROTOR	101.3	0.9153
3	EX. ROTOR	14.5	0.0874
4	SHAFT	29.6	0.0218
TOTAL		149	1.0696

TWO BEARING DIMENSIONS



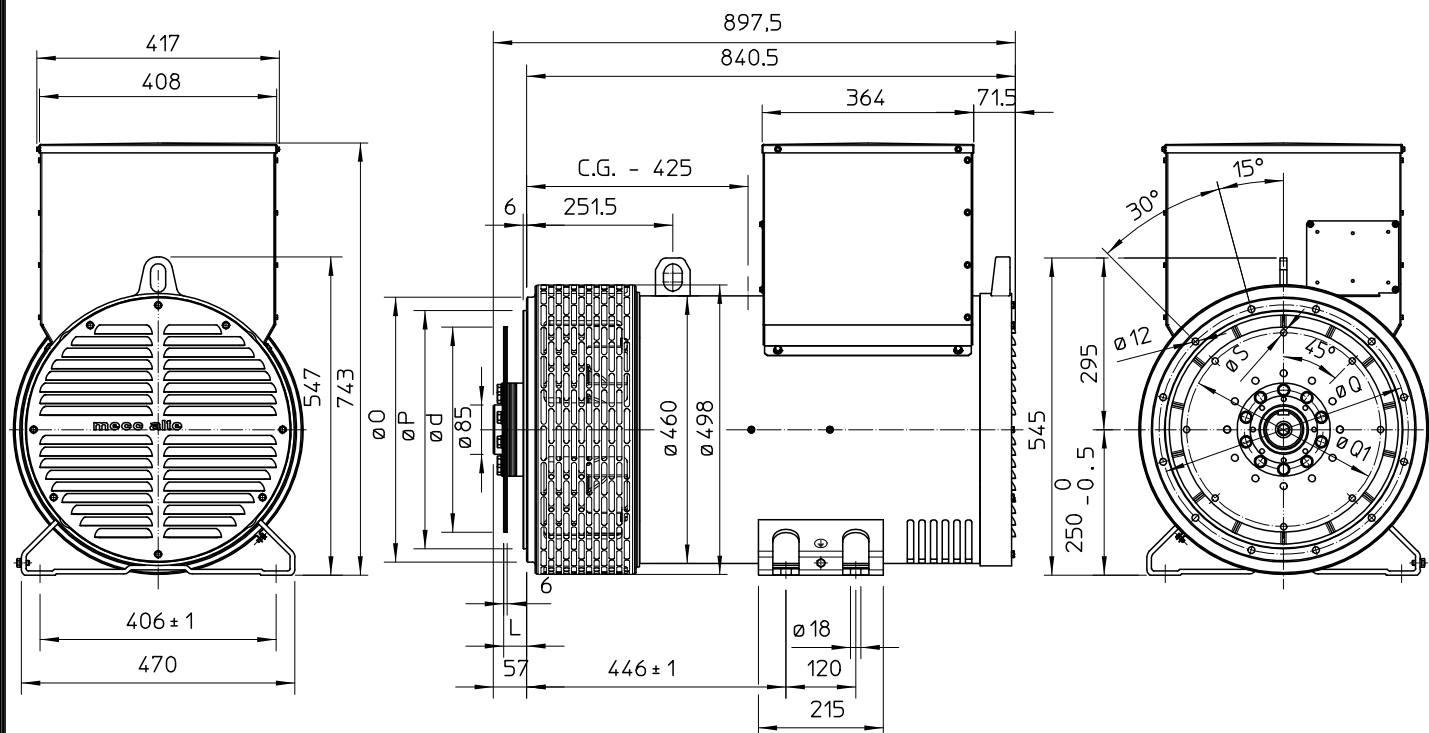
SINGLE BEARING MOMENTS OF INERTIA



POS.	COMPONENT	WEIGHT (kg)	J (kgm ²)
1	FAN	3.6	0.0451
2	MAIN ROTOR	101.3	0.9153
3	EX. ROTOR	14.5	0.0874
4	SHAFT	29.6	0.0218
TOTAL		148.8	1.0696

SAE N°	5 SHAFTS COUPLING FLEX PLATE			
	A	B	WEIGHT kg	J kgm ²
10	112.8	35.6	13.5	0.0770
11 1/2	98.6	71.5	12.4	0.0956
14	84.4	68.6	14.8	0.2360

SINGLE BEARING DIMENSIONS



SAE N.	FLANGIA / FLANGE BRIDE / FLANSCH		
	O	P	Q
3	451	409.6	428.6
2	489	447.7	466.7
1	552	511.2	530.2

SAE N.	GIUNTI A DISCHI / DISC COUPLING DISQUE DE MONOPALIER / SCHEIBENKUPPLUNG			
	<i>L</i>	<i>d</i>	<i>Q1</i>	<i>S</i>
10	53.8	314.32	295.27	11
11 1/2	39.6	352.42	333.37	11
14	25.4	466.72	438.15	14

C.G.= GRAVITY CENTER