

LSA 53.2

Low Voltage Alternator - 4 pole

400V - 50 Hz / 480V - 60 Hz
Electrical and mechanical data

LEROY-SOMER[™]

IMC | INTERNATIONAL
MACHINERY
& GENERATORS

Nidec
All for dreams

Specially adapted to applications

The LSA 53.2 alternators are designed to be suitable for typical generator applications, such as: prime power generation, cogeneration, marine applications, rental, telecommunications, data center, emergency genset, etc.

Compliant with international standards

These alternators conform to the main international standards and regulations:

- IEC 60034, NEMA MG 1.32-33, ISO 8528-3,
- CSA C22.2 n°100-14, marine regulations, UL are available as an option.

They can be integrated into a CE marked generator.

These alternators are designed, manufactured and marketed in an ISO 9001 and ISO 14001 environment.

Top of the range electrical performance

- Class H insulation
- Standard 6-wire winding, 2/3 pitch
- Each model is proposed for two frequencies:
 - Voltage range 50 Hz: 380V - 400V - 415V - 440 V
 - Voltage range 60 Hz: 380V - 416V - 440V - 480V
- High efficiency and motor starting capacity
- Other voltages are possible with optional adapted windings:
 - 50 Hz : 440V (no. 7S), 500V (no. 9S), 600V (no. 22S or 23S), 690V (no. 10S or 52S)
 - 60 Hz : 380V and 416V (no. 8S), 600V (no. 9S) 690V

Excitation and regulation system suited to the application

These alternators can be supplied with AREP + PMI or PMG excitation system, according to the alternator specification.

Standard excitation system is AREP with D 510C A.V.R.

Voltage regulator	Excitation system		Regulation options				
	AREP + PMI	PMG	Current transformer for paralleling	Mains paralleling	3-phase sensing	3-phase sensing for mains paralleling unbalanced	Remote voltage potentiometer
D510C	Std	Option	C.T.	included	included	contact factory	Option

Protection system suited to the environment

- These alternators are IP 23
- Standard winding protection for clean environments with relative humidity ≤ 95 %
- Options:
 - Filters on air inlet: derating 5%
 - Filters on air inlet and air outlet (IP 44): derating 10%
 - Winding protections for harsh environments and relative humidity greater than 95%
 - Space heaters
 - Protection or metering CTs
 - Thermal protection for stator windings and/or bearings (PT100)

Reinforced mechanical structure using finite element modelling

- Compact and rigid assembly to better withstand generator vibrations
- Steel frame
- Cast iron flanges and shields
- Twin-bearing and single-bearing versions designed to be suitable for engines on the market
- Half-key balancing
- Regreasable bearings
- Clockwise rotation in standard

Accessible terminal box proportioned for optional equipment

- Easy access to the voltage regulator and to the connections
- Possible inclusion of accessories for paralleling, protection and measurement

General characteristics

Insulation class	H	Excitation system	AREP + PMI
Winding pitch	2/3 (n° 6S)	AVR type	D 510C
Number of wires	6	Voltage regulation (*)	± 0.5 %
Protection	IP 23	Short-circuit current	300% (3 IN) : 10s
Altitude	≤ 1000 m	Total Harmonic Distortion THD (**) in no-load:	< 4 %
Overspeed	2250 R.P.M.	Waveform: NEMA = TIF (**)	< 50
Air flow	2.5 m³/s (50 Hz) - 2.8 m³/s (60 Hz)	Waveform: I.E.C. = THF (**)	< 2 %

(*) steady state (**) between phases

Ratings 50 Hz - 1500 R.P.M.

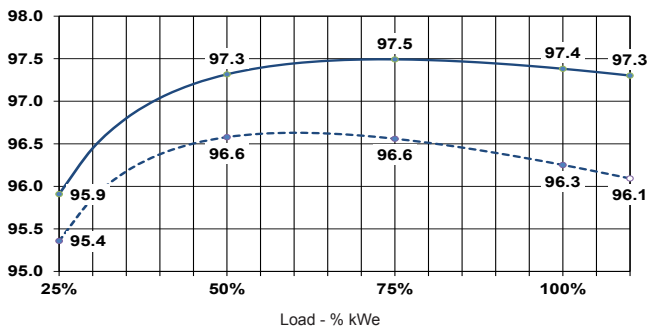
kVA / kW - P.F. = 0.8																	
Duty/T°C		Continuous duty/40°C				Continuous duty/40°C				Stand-by/40°C				Stand-by/27°C			
Class/T°K		H/125°K				F/105°K				H/150°K				H/163°K			
Phase		3 ph.				3 ph.				3 ph.				3 ph.			
Y		380V	400V	415V	440V	380V	400V	415V	440V	380V	400V	415V	440V	380V	400V	415V	440V
LSA 53.2 M7	kVA	-	2650	-	2409	-	2417	-	2197	-	2783	-	2530	-	2915	-	2650
	kW	-	2120	-	1927	-	1934	-	1758	-	2226	-	2024	-	2332	-	2120
LSA 53.2 M9	kVA	-	3000	-	2727	-	2736	-	2487	-	3150	-	2864	-	3300	-	3000
	kW	-	2400	-	2181	-	2189	-	1990	-	2520	-	2291	-	2640	-	2400
LSA 53.2 M12	kVA	3160	3300	-	3000	-	3010	-	2736	-	3465	-	3150	3475	3630	-	3300
	kW	2528	2640	-	2400	-	2408	-	2189	-	2772	-	2520	2780	2904	-	2640

Ratings 60 Hz - 1800 R.P.M.

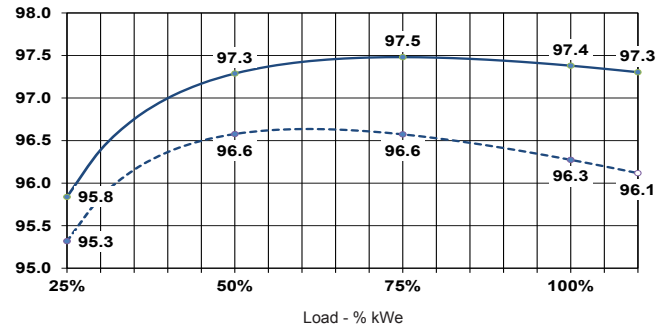
kVA / kW - P.F. = 0.8																	
Duty/T°C		Continuous duty/40°C				Continuous duty/40°C				Stand-by/40°C				Stand-by/27°C			
Class/T°K		H/125°K				F/105°K				H/150°K				H/163°K			
Phase		3 ph.				3 ph.				3 ph.				3 ph.			
Y		380V	416V	440V	480V	380V	416V	440V	480V	380V	416V	440V	480V	380V	416V	440V	480V
LSA 53.2 M7	kVA	2625	2730	2880	3150	2394	2490	2634	2873	2757	2867	3032	3308	2888	3003	3176	3465
	kW	2100	2184	2310	2520	1915	1992	2107	2298	2206	2294	2426	2646	2310	2402	2541	2772
LSA 53.2 M9	kVA	3000	3120	3300	3600	2736	2845	3009	3283	3180	3307	3498	3780	3300	3432	3630	3960
	kW	2400	2496	2640	2880	2189	2276	2407	2626	2544	2646	2798	3024	2640	2745.6	2904	3168
LSA 53.2 M12	kVA	3160	3380	3575	3900	2964	3083	3261	3557	3445	3583	3790	4095	3475	3718	3933	4290
	kW	2528	2704	2860	3120	2371	2466	2609	2846	2756	2866	3032	3276	2780	2974	3146	3432

Efficiencies 400V - 50 Hz (— P.F.: 1) (----- P.F.: 0.8)

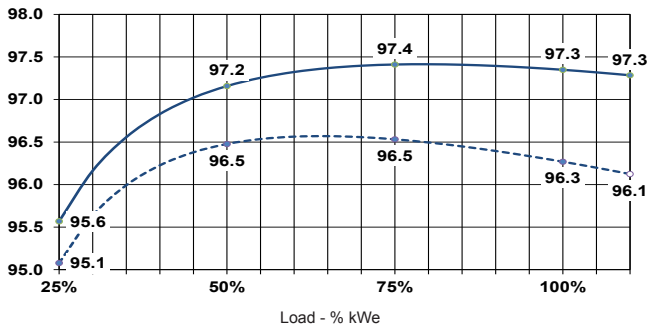
LSA 53.2 M7



LSA 53.2 M9



LSA 53.2 M12



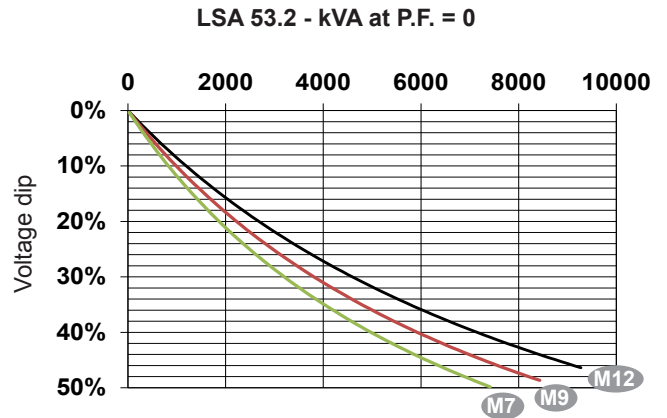
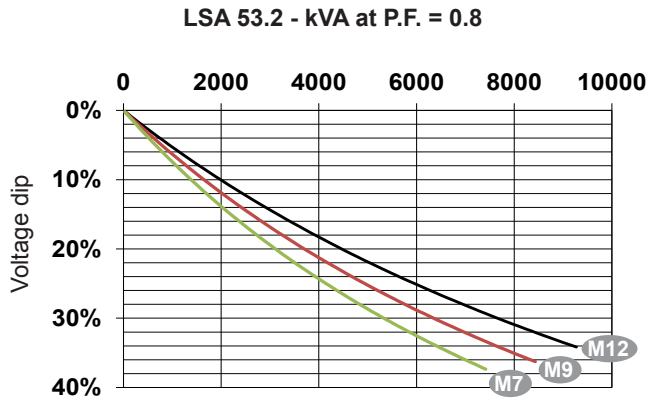
Reactances (%). Time constants (ms) - Class H / 400V

	53.2 M7	53.2 M9	53.2 M12
Kcc Short-circuit ratio	0.35	0.36	0.39
Xd Direct-axis synchronous reactance unsaturated	354	343	314
Xq Quadrature-axis synchronous reactance unsaturated	181	175	160
T'do No-load transient time constant	3.21	3.38	3.58
.X'd Direct-axis transient reactance saturated	33.4	31.9	29.1
T'd Short-circuit transient time constant	0.356	0.370	0.39
X''d Direct-axis subtransient reactance saturated	19.4	18.3	16.6
T''d Subtransient time constant	0.024	0.023	0.023
X''q Quadrature-axis subtransient reactance saturated	20.2	19.1	17.3
X0 Zero sequence reactance unsaturated	4.6	4.3	3.9
X2 Negative sequence reactance saturated	19.8	18.7	17.0
Ta Armature time constant	0.045	0.044	0.044

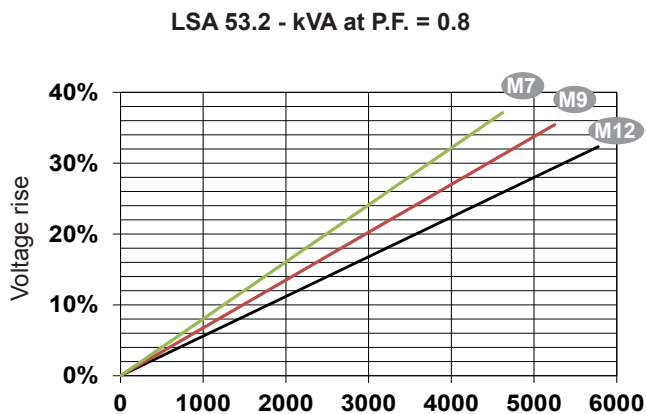
Other class H / 400V data

	53.2 M7	53.2 M9	53.2 M12
io (A) No-load excitation current	1.3	1.3	1.3
ic (A) On-load excitation current	5.3	5.2	4.9
uc (V) On-load excitation voltage	63	61	58
kW No-load losses	21	24	29
kW Heat dissipation	90	101	110

Transient voltage variation at load inrush: 400V - 50 Hz

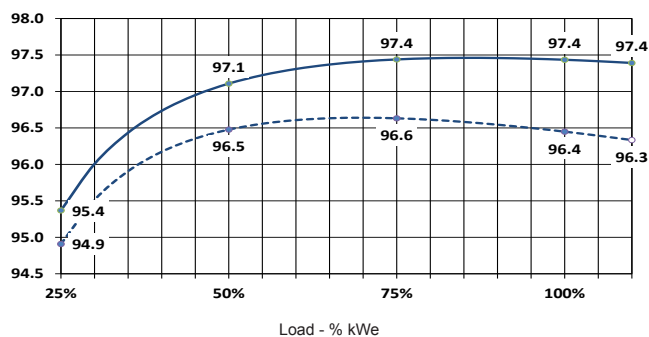


Transient voltage variation at load rejection: 400V - 50 Hz

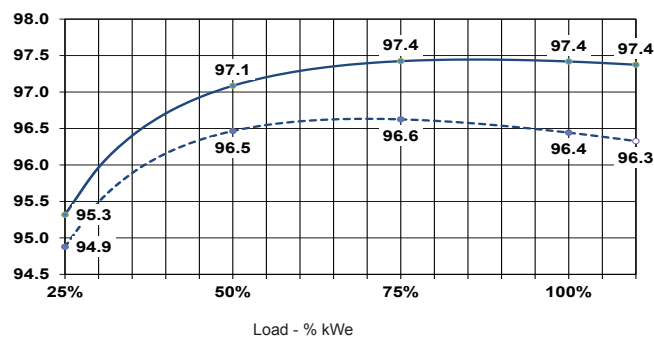


Efficiencies 480V - 60 Hz (— P.F.: 1) (----- P.F.: 0.8)

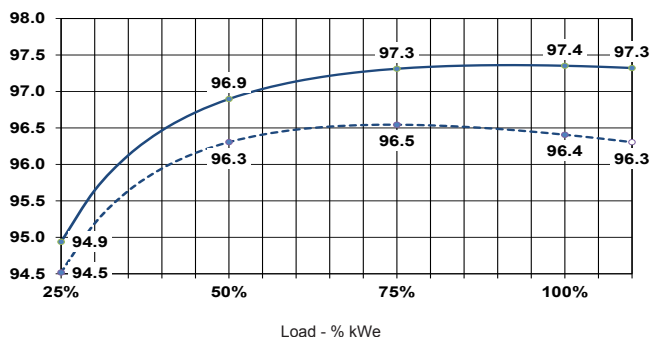
LSA 53.2 M7



LSA 53.2 M9



LSA 53.2 M12



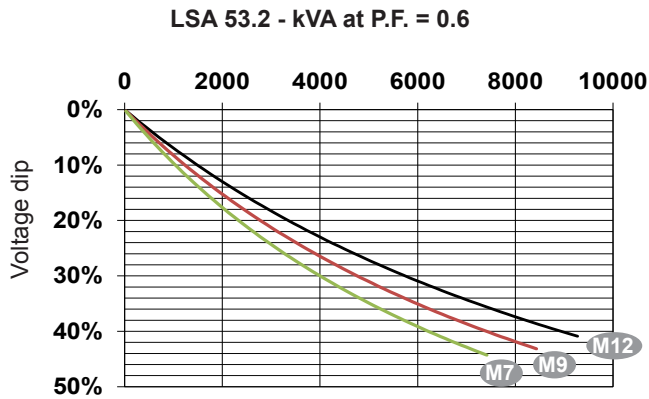
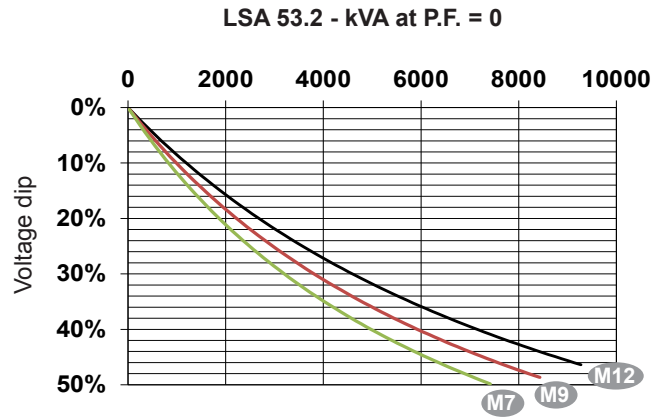
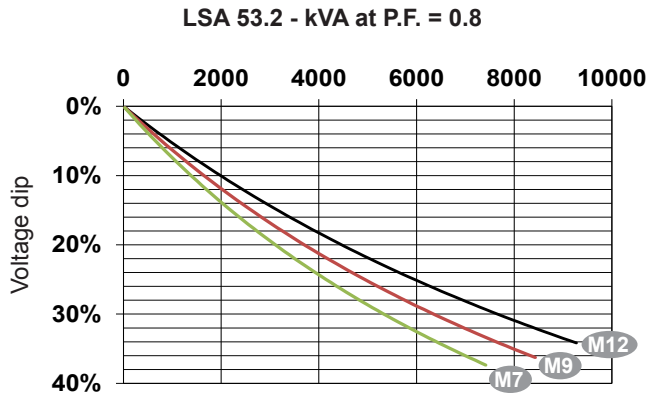
Reactances (%). Time constants (ms) - Class H / 480V

	53.2 M7	53.2 M9	53.2 M12
Kcc Short-circuit ratio	0.35	0.36	0.40
Xd Direct-axis synchronous reactance unsaturated	351	343	310
Xq Quadrature-axis synchronous reactance unsaturated	179	175	158
T'do No-load transient time constant	3.21	3.38	3.58
X'd Direct-axis transient reactance saturated	33.1	31.9	28.6
T'd Short-circuit transient time constant	0.356	0.370	0.388
X''d Direct-axis subtransient reactance saturated	19.2	18.3	16.3
T''d Subtransient time constant	0.024	0.023	0.023
X''q Quadrature-axis subtransient reactance saturated	20.1	19.1	17.1
X0 Zero sequence reactance unsaturated	4.5	4.3	3.8
X2 Negative sequence reactance saturated	19.6	18.7	16.7
Ta Armature time constant	0.043	0.042	0.042

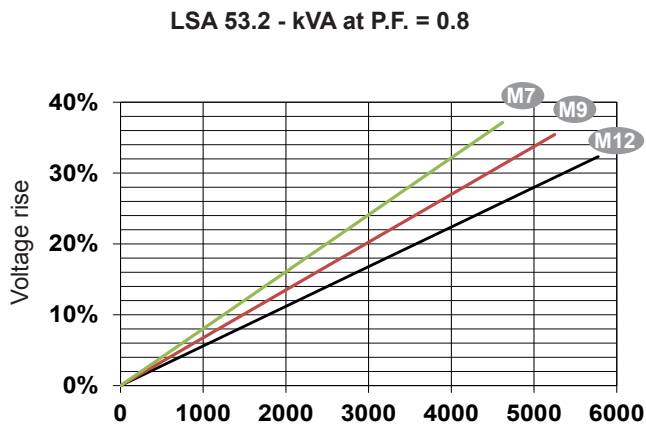
Other class H / 480V data

io (A) No-load excitation current	1.2	1.3	1.3
ic (A) On-load excitation current	5.2	5.1	4.8
uc (V) On-load excitation voltage	61	60	56
kW No-load losses	29	24	39
kW Heat dissipation	98	112	123

Transient voltage variation at load inrush: 480V - 60 Hz

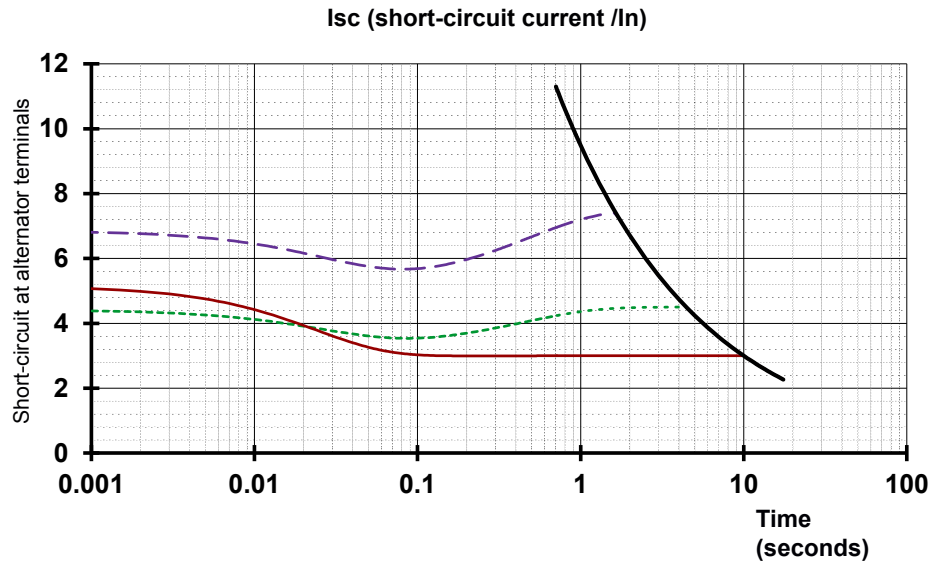


Transient voltage variation at load rejection: 480V - 60 Hz

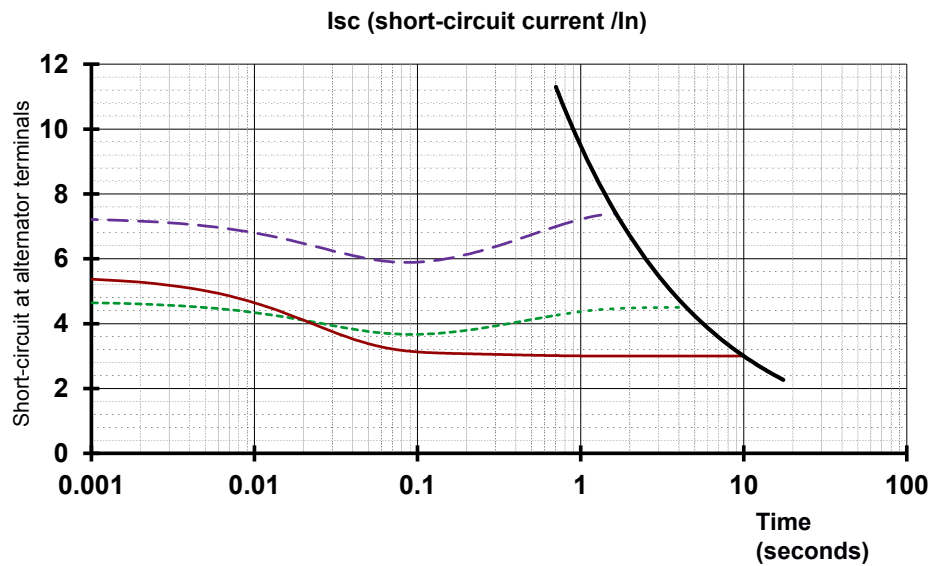


Short-circuit curves at rated speed (star connection Y)

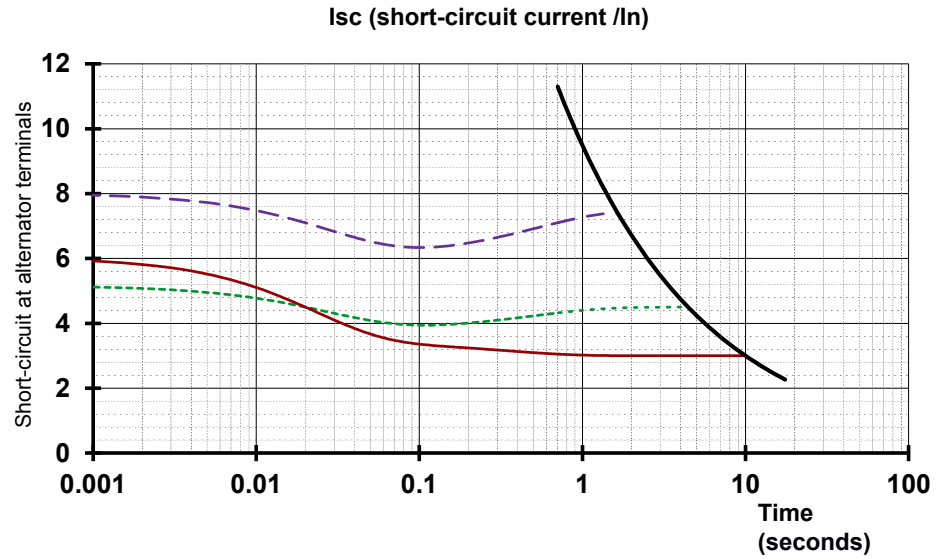
LSA 53.2 M7



LSA 53.2 M9

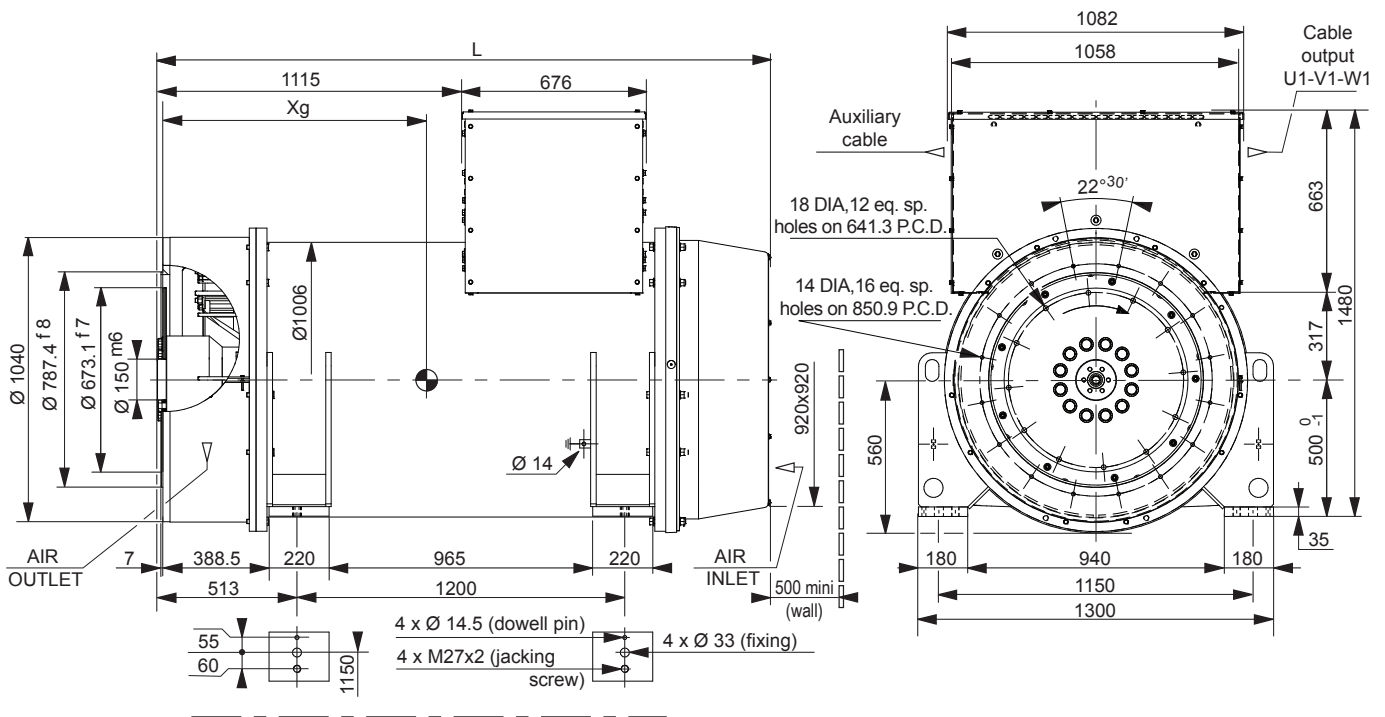


LSA 53.2 M12



- Symetrical phase to neutral short-circuit - - - - -
- Symetrical two phase short-circuit - · - · -
- Symetrical three phase short-circuit —————
- Heat damage curve limit —————

Single bearing dimensions



Dimensions (mm) and weight

Type	L	Xg	Weight (kg)
LSA 53.2 M7	2246	942	5250
LSA 53.2 M9	2246	969	5700
LSA 53.2 M12	2246	1010	6300

Coupling

Flange S.A.E.	0	00
Flex plate S.A.E. 21		X
Flex plate S.A.E. 18	X	X

3D drawing files available - Do not hesitate to contact us.

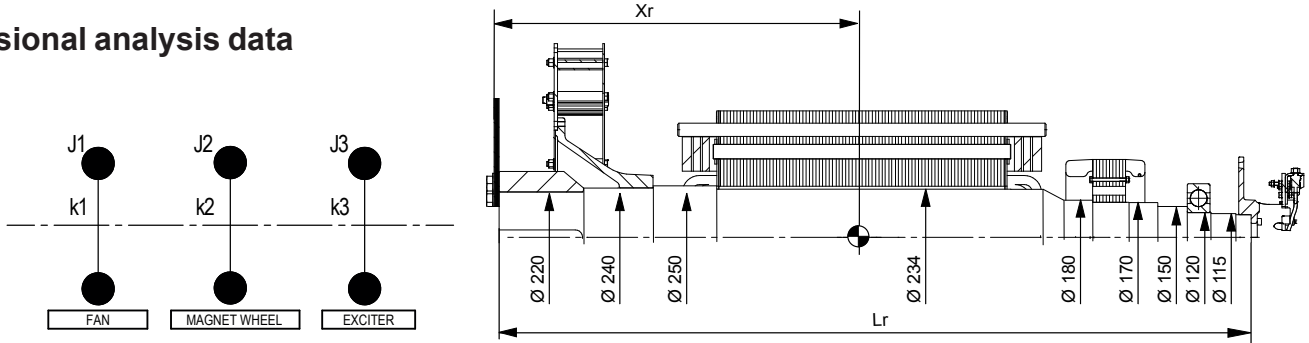
Flange (mm)

S.A.E.	N	M	XBG	S
0	647.7	679.5	16	14
00	787.4	850.9	16	14

Flex plate (mm)

S.A.E.	BX	U	X	Y	AH
21	673.1	641.3	12	18	0
18	571.5	542.9	6	18	15.8

Torsional analysis data



Centre of gravity: Xr (mm), Rotor length: Lr (mm), Weight: M (kg)

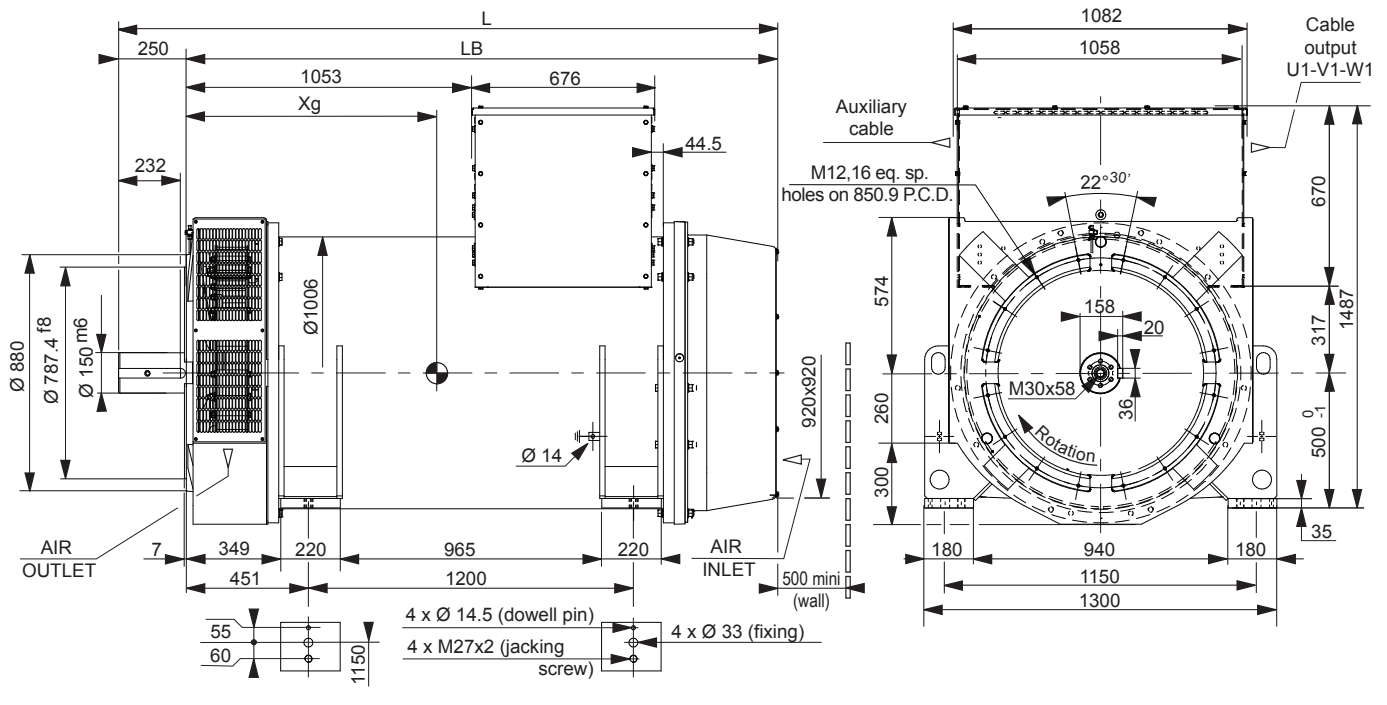
Type	Xg	Lr	M
LSA 53.2 M7	841	2056	2024
LSA 53.2 M9	874	2056	2187
LSA 53.2 M12	924	2056	2415

Torsional rigidity

[Nm/rad]			(kg.m ²)		
k1	k2	k3	J1	J2	J3
6.44 10E7	6.58 10E7	2.53 10E7	14.1	62.5	2.1
6.44 10E7	6.02 10E7	2.72 10E7	14.1	71.3	2.0
6.44 10E7	5.38 10E7	3.05 10E7	14.1	83.6	1.8

NOTE: Dimensions are for information only and may be subject to modifications. Contractual 2D drawings and 3D drawing files are available and can be downloaded from the site: www.leroy-somer.com/epg. The torsional analysis of the transmission is the responsibility of genset manufacturer.

Two bearing dimensions

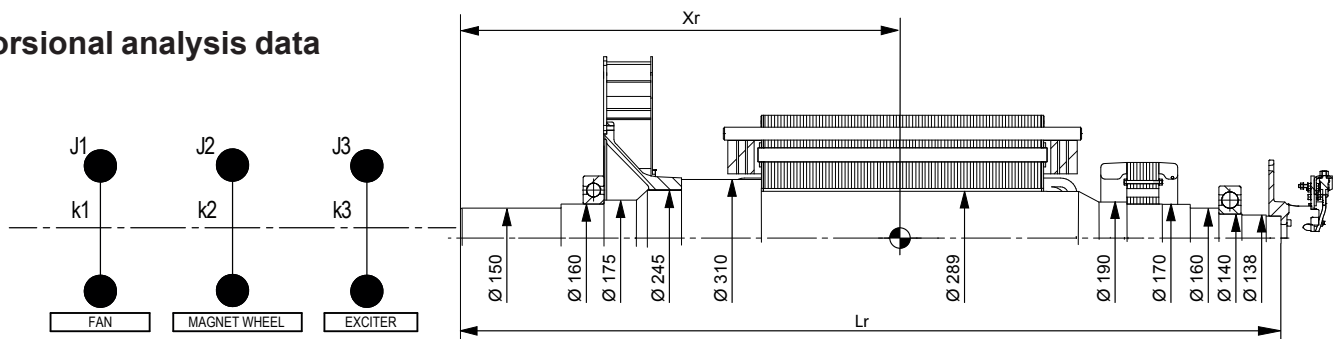


Dimensions (mm) and weight

Type	L	LB	Xg	Weight (kg)
LSA 53.2 M7	2434	2184	873	5300
LSA 53.2 M9	2434	2184	900	5750
LSA 53.2 M12	2434	2184	942	6400

3D drawing files available - Do not hesitate to contact us.

Torsional analysis data



Centre of gravity: Xr (mm), Rotor length: Lr (mm), Weight: M (kg)

Type	Xr	Lr	M
LSA 53.2 M7	1072	2224	1906
LSA 53.2 M9	1103	2224	2069
LSA 53.2 M12	1152	2224	2297

Torsional rigidity

[Nm/rad]			(kg.m ²)		
k1	k2	k3	J1	J2	J3
1.94 10E7	6.58 10E7	2.53 10E7	10.8	62.5	2.1
1.94 10E7	6.02 10E7	2.72 10E7	10.8	71.3	2.0
1.94 10E7	5.38 10E7	3.05 10E7	10.8	83.6	1.8

NOTE: Dimensions are for information only and may be subject to modifications. Contractual 2D drawings and 3D drawing files are available and can be downloaded from the site: www.leroy-somer.com/epg. The torsional analysis of the transmission is the responsibility of genset manufacturer.

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