

**LSA 53.2**

**Low Voltage Alternator - 4 pole**

2650 to 3300 kVA - 50 Hz / 3150 to 3900 kVA - 60 Hz  
Electrical and mechanical data

**LEROY-SOMER™**

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## 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 D510 C A.V.R.

Excitation system			Regulation options				
Volage regulator	AREP + PMI	PMG	Current transformer for paralleling	Mains paralleling	3-phase sensing	3-phase sensing for mains paralleling unbalanced	Remote voltage potentiometer
D510 C	Standard	Option	C.T.	included	included	contact us	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	D510 C
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.

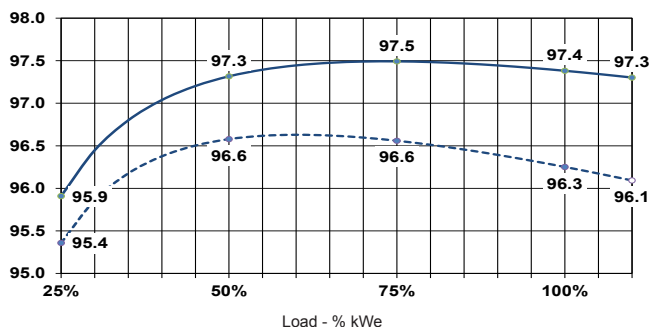
kVA / kW - P.F. = 0.8																	
Duty/T°C		Continuous duty/40°C				Continuous duty/40°C				Stand-by/40°C				Stand-by/27°C			
Class/T°K		H/125°K				F/105°K				H/150°K				H/163°K			
Phase		3 ph.				3 ph.				3 ph.				3 ph.			
Y		380V	400V	415V	440V	380V	400V	415V	440V	380V	400V	415V	440V	380V	400V	415V	440V
<b>LSA 53.2 M7</b>	kVA	-	<b>2650</b>	-	2409	-	<b>2417</b>	-	2197	-	<b>2783</b>	-	2530	-	<b>2915</b>	-	2650
	kW	-	2120	-	1927	-	1934	-	1758	-	2226	-	2024	-	2332	-	2120
<b>LSA 53.2 M9</b>	kVA	-	<b>3000</b>	-	2727	-	<b>2736</b>	-	2487	-	<b>3150</b>	-	2864	-	<b>3300</b>	-	3000
	kW	-	2400	-	2182	-	2189	-	1990	-	2520	-	2291	-	2640	-	2400
<b>LSA 53.2 M12</b>	kVA	3160	<b>3300</b>	-	3000	-	<b>3010</b>	-	2736	-	<b>3465</b>	-	3150	3475	<b>3630</b>	-	3300
	kW	2528	2640	-	2400	-	2408	-	2189	-	2772	-	2520	2780	2904	-	2640

## Ratings 60 Hz - 1800 R.P.M.

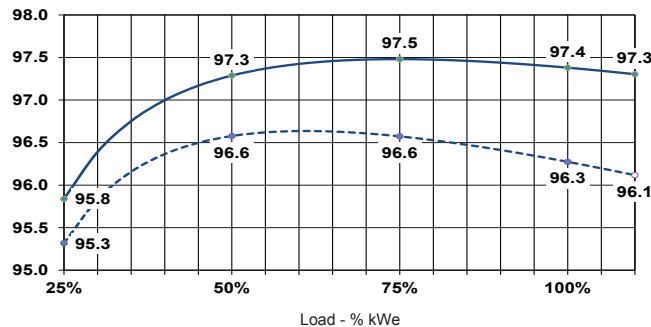
kVA / kW - P.F. = 0.8																	
Duty/T°C		Continuous duty/40°C				Continuous duty/40°C				Stand-by/40°C				Stand-by/27°C			
Class/T°K		H/125°K				F/105°K				H/150°K				H/163°K			
Phase		3 ph.				3 ph.				3 ph.				3 ph.			
Y		380V	416V	440V	480V	380V	416V	440V	480V	380V	416V	440V	480V	380V	416V	440V	480V
<b>LSA 53.2 M7</b>	kVA	2625	2730	2888	<b>3150</b>	2394	2490	2634	<b>2873</b>	2757	2867	3032	<b>3308</b>	2888	3003	3176	<b>3465</b>
	kW	2100	2184	2310	2520	1915	1992	2107	2298	2206	2294	2426	2646	2310	2402	2541	2772
<b>LSA 53.2 M9</b>	kVA	3000	3120	3300	<b>3600</b>	2736	2845	3009	<b>3283</b>	3150	3276	3465	<b>3780</b>	3300	3432	3630	<b>3960</b>
	kW	2400	2496	2640	2880	2189	2276	2407	2626	2520	2621	2772	3024	2640	2746	2904	3168
<b>LSA 53.2 M12</b>	kVA	3160	3380	3575	<b>3900</b>	2964	3083	3261	<b>3557</b>	3413	3549	3754	<b>4095</b>	3475	3718	3933	<b>4290</b>
	kW	2528	2704	2860	3120	2371	2466	2609	2846	2730	2839	3003	3276	2780	2974	3146	3432

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

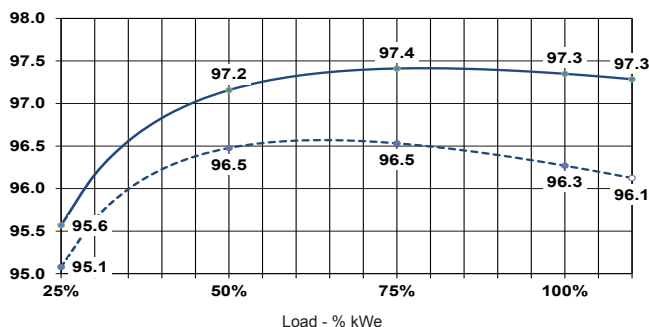
LSA 53.2 M7



LSA 53.2 M9



LSA 53.2 M12



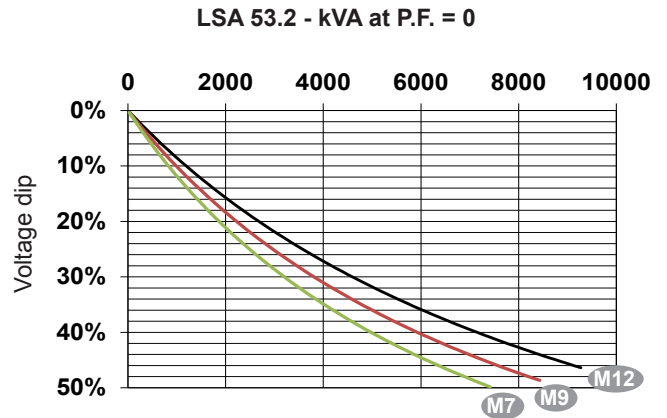
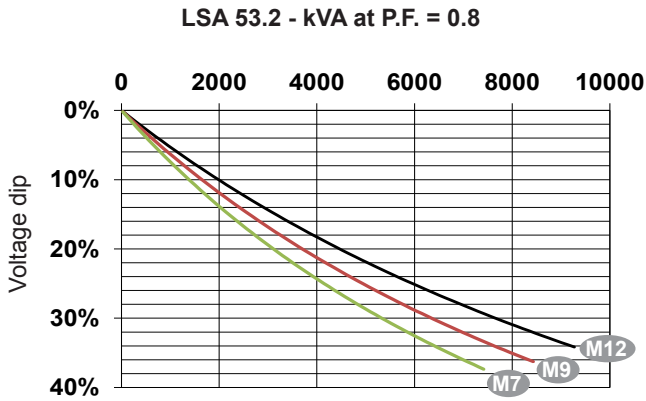
Reactances (%). Time constants (ms) - Class H / 400V

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

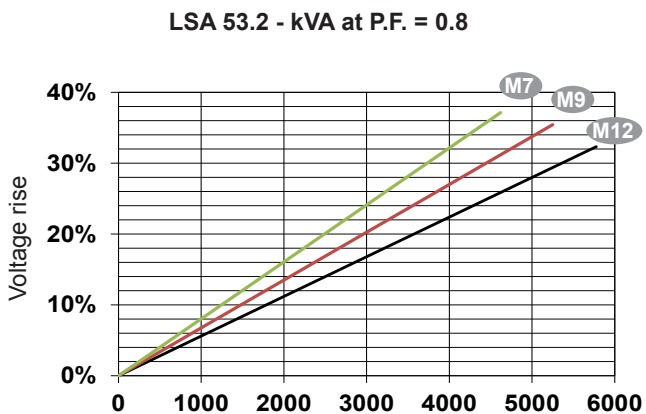
Other class H / 400V data

<b>io (A)</b> No-load excitation current	1.3	1.3	1.3
<b>ic (A)</b> On-load excitation current	5.3	5.2	4.9
<b>uc (V)</b> On-load excitation voltage	63	61	58
<b>kW</b> No-load losses	21	24	29
<b>kW</b> Heat dissipation	90	101	110

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

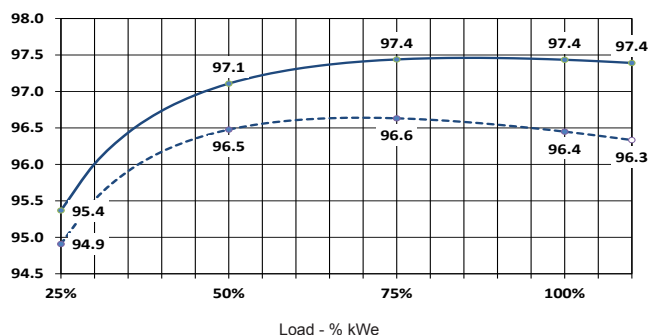


Transient voltage variation at load rejection: 400V - 50 Hz

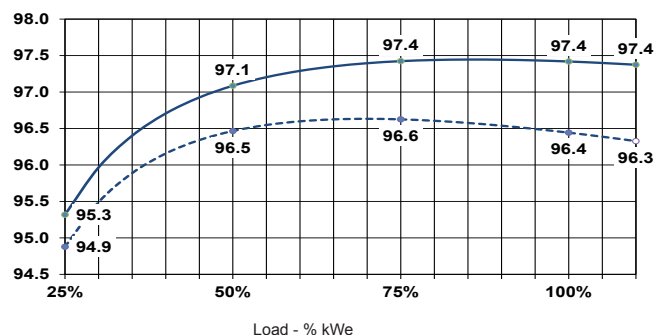


Efficiencies 480V - 60 Hz (— P.F.: 1) (----- P.F.: 0.8)

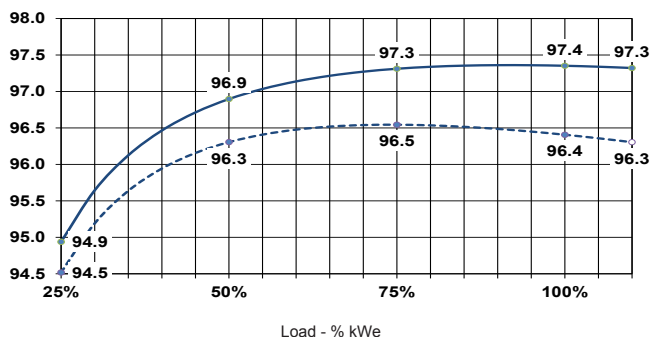
LSA 53.2 M7



LSA 53.2 M9



LSA 53.2 M12



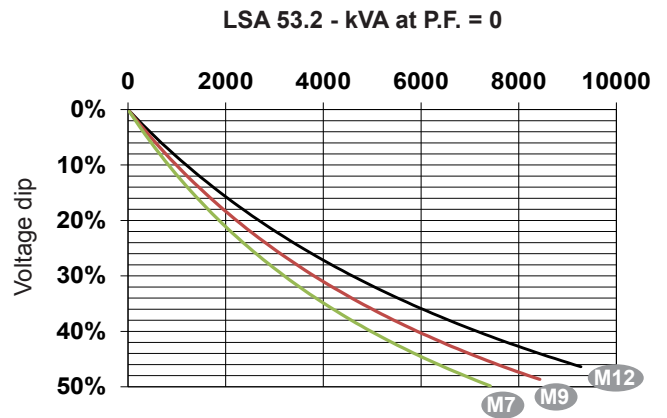
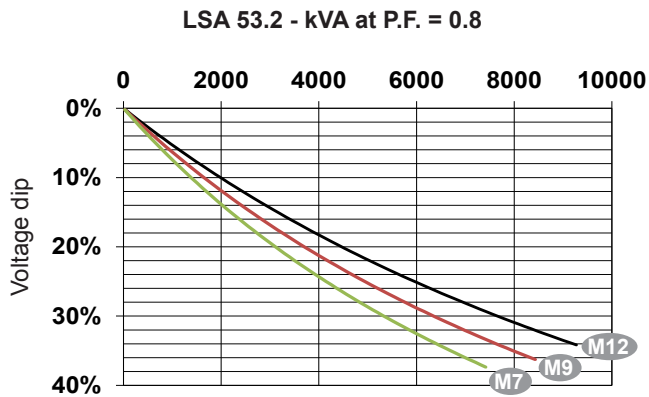
Reactances (%). Time constants (ms) - Class H / 480V

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

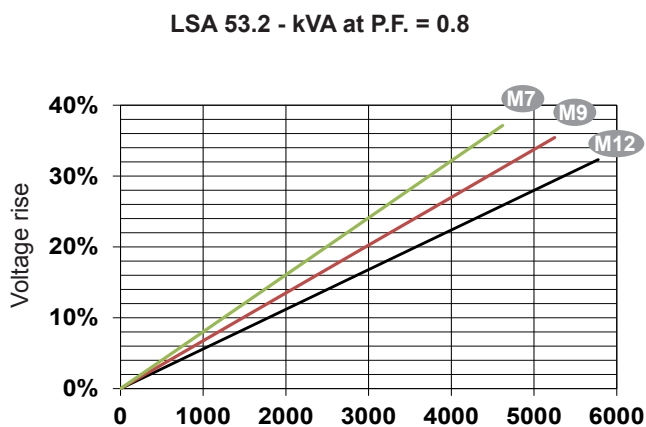
Other class H / 480V data

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

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

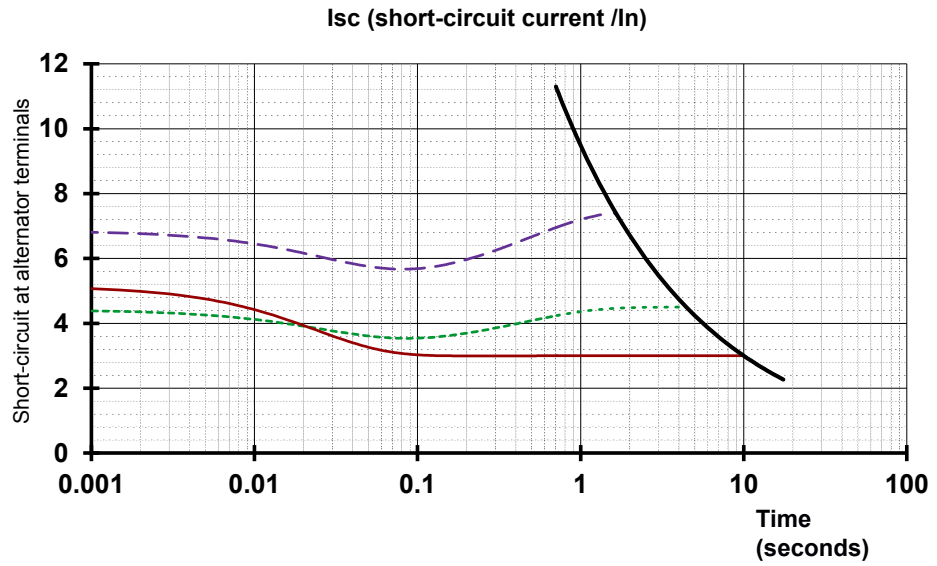


Transient voltage variation at load rejection: 480V - 60 Hz

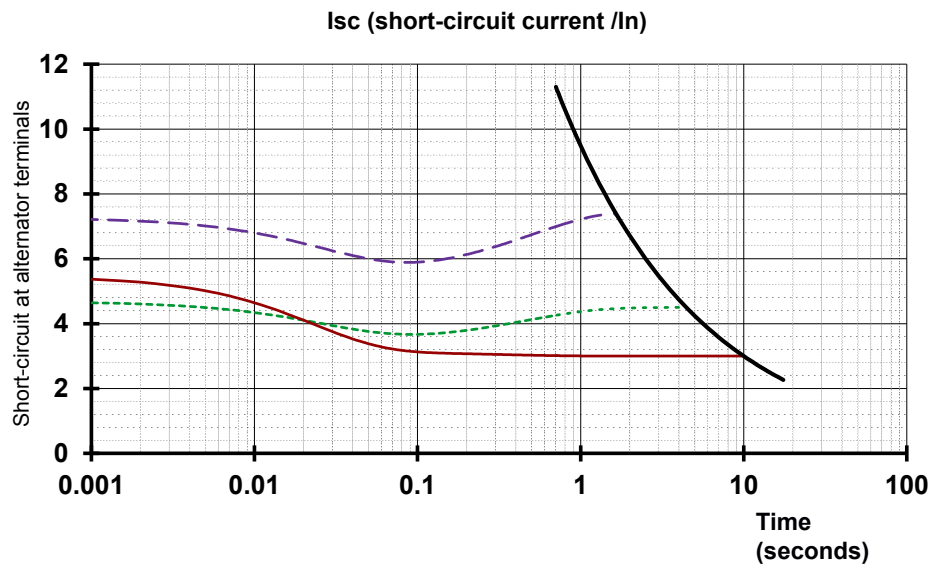


Short-circuit curves at rated speed (star connection Y)

LSA 53.2 M7

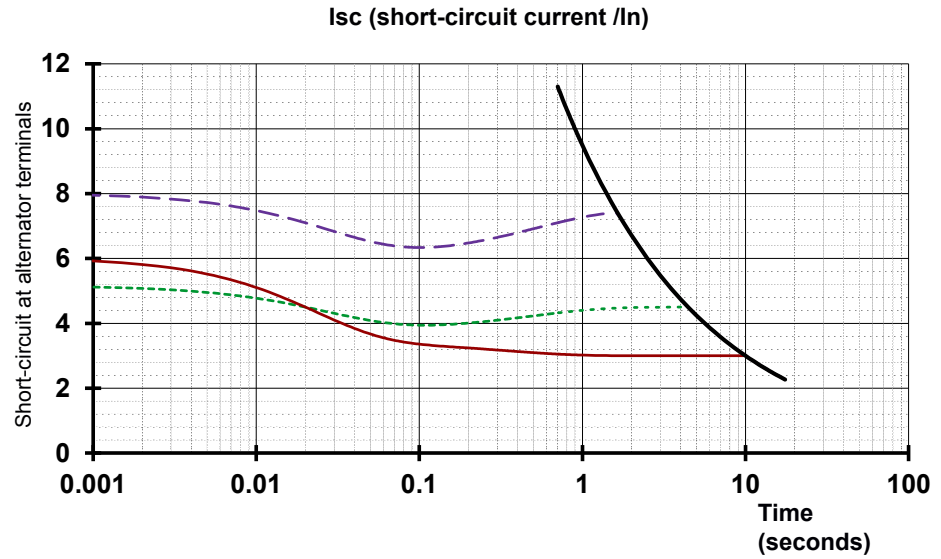


LSA 53.2 M9



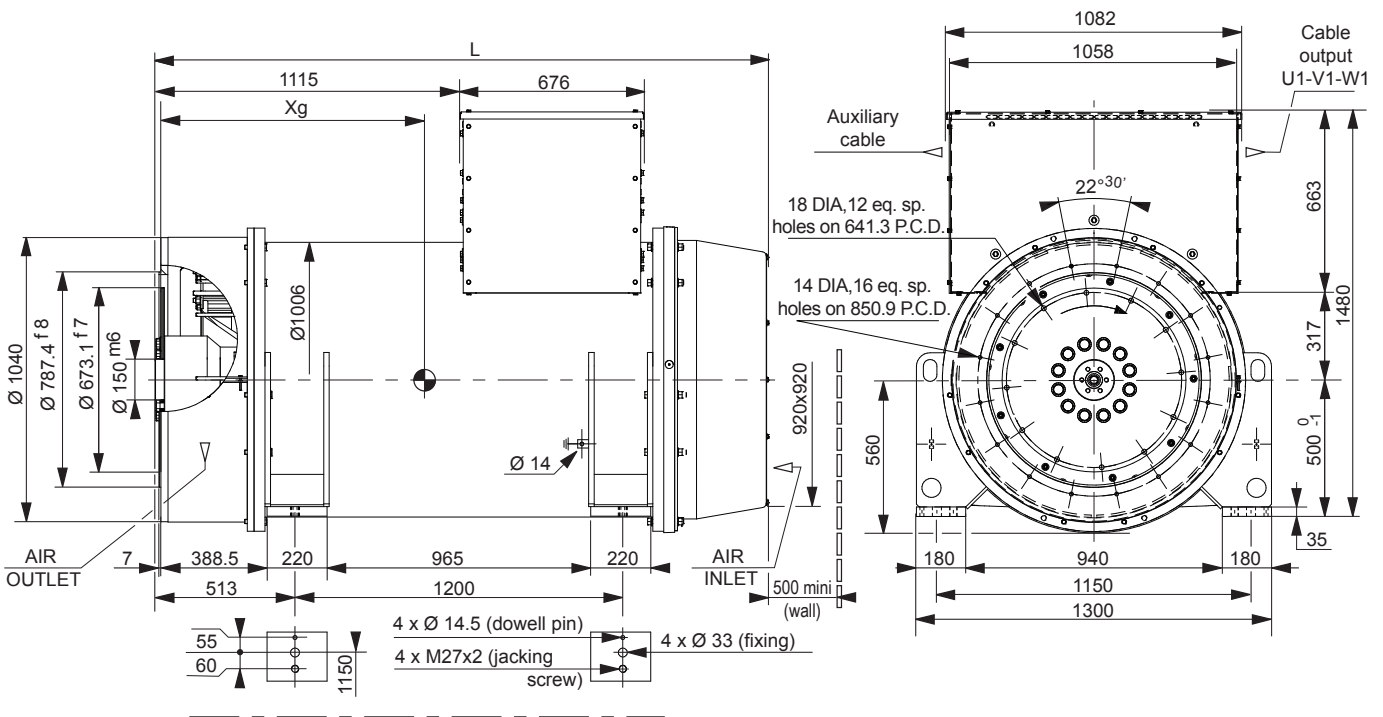


LSA 53.2 M12



- 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

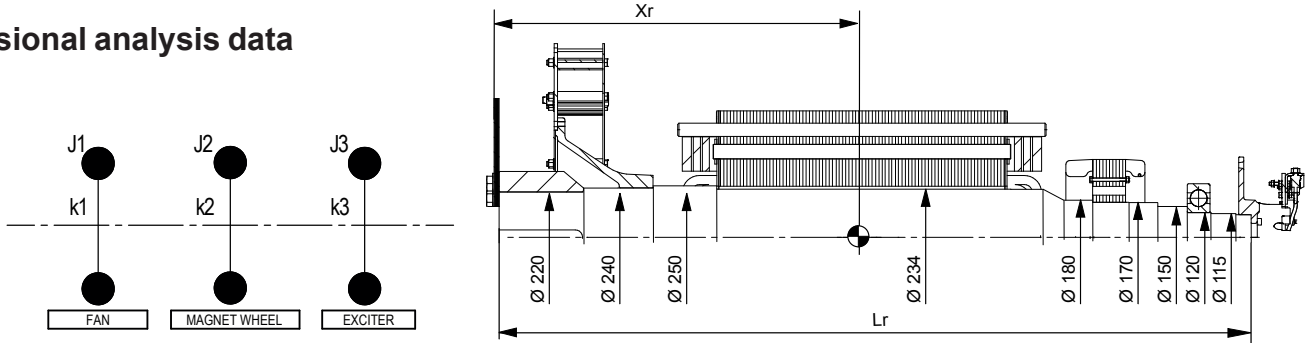
Coupling		
Flange S.A.E.	0	00
Flex plate S.A.E. 21		X
Flex plate S.A.E. 18	X	X

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



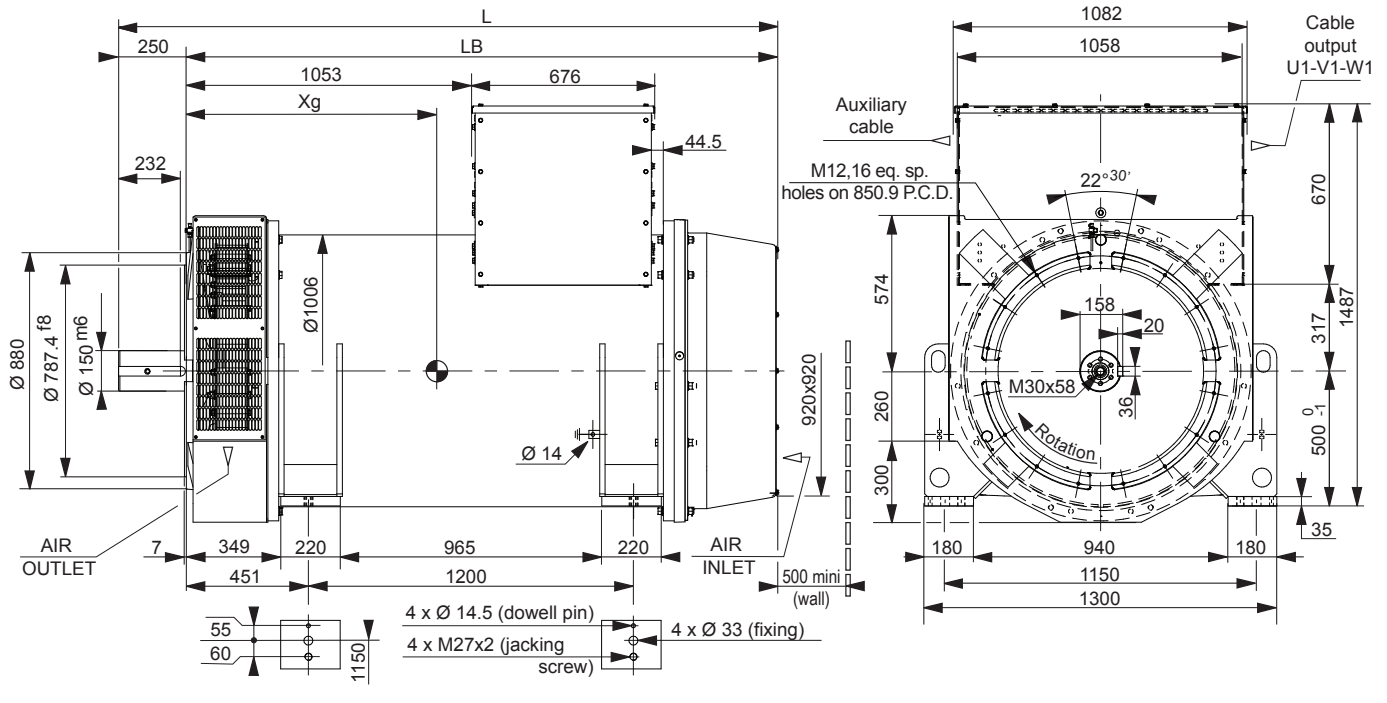
Centre of gravity: Xr (mm), Rotor length: Lr (mm), Weight: M (kg)

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 <sup>2</sup> )		
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](http://www.leroy-somer.com/epg). The torsional analysis of the transmission is the responsibility of genset manufacturer.

## Two bearing dimensions

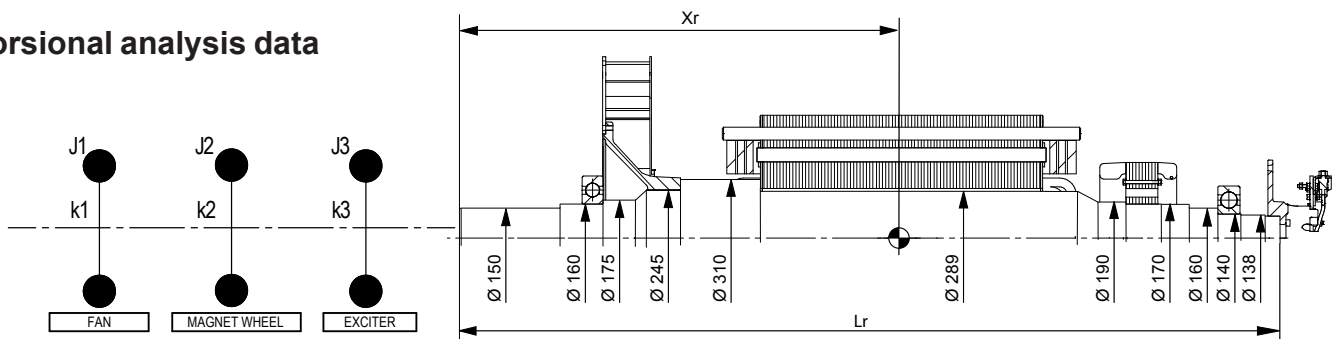


### Dimensions (mm) and weight

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: $X_r$ (mm), Rotor length: $L_r$ (mm), Weight: $M$ (kg)

Type	$X_r$	$L_r$	$M$
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 <sup>2</sup> )		
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](http://www.leroy-somer.com/epg). The torsional analysis of the transmission is the responsibility of genset manufacturer.

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Moteurs Leroy-Somer SAS. Siège : Bd Marcellin Leroy, CS 10015, 16915 Angoulême Cedex 9, France.  
Capital social : 65 800 512 €, RCS Angoulême 338 567 258.