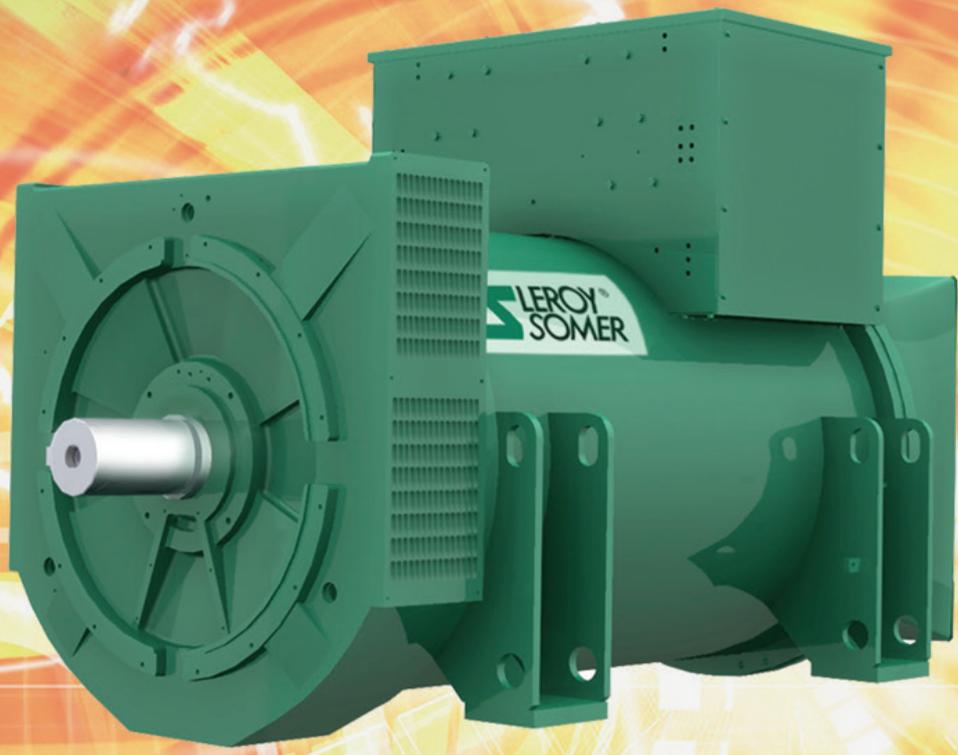# Low Voltage Alternators - 4 pole

LSA 53.2
LSA 54.2

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

Leroy-Somer™

Low Voltage Alternators - 4 pole

LSA 53.2 - LSA 54.2 - 400 V - 50 Hz / 480 V - 60 Hz

Specially adapted to applications

The LSA 53.2 and LSA 54.2 alternator 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 alternator conforms 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.
It can be integrated into a CE marked generator.
These alternator 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 : 440 V (no. 7S), 500 V (no. 9S), 600 V (no. 22S or 23S), 690 V (no. 10S or 52S)
   - 60 Hz : 380 V and 416 V (no. 8S), 600 V (no. 9S) 690V

Excitation and regulation system suited to the application

These alternator 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.

Volage 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 alternator 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

Low Voltage Alternators - 4 pole

LSA 53.2 - LSA 54.2 - 400 V - 50 Hz / 480 V - 60 Hz

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	Totale Harmonic distortion THD (**)	< 4 %
Overspeed	2250 min⁻¹	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
LSA 54.2 M8	kVA	-	**3060**	-	2780	-	**2791**	-	2537	-	**3213**	-	2921	-	**3366**	-	3060
	kW	-	2448	-	2224	-	2233	-	2030	-	2570	-	2337	-	2693	-	2448
LSA 54.2 M10	kVA	3160	**3330**	-	3080	-	**3119**	-	2835	3475	**3591**	-	3265	3475	**3650**	-	3388
	kW	2528	2664	-	2464	-	2495	-	2268	2780	2873	-	2612	2780	2920	-	2710

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
LSA 54.2 M8	kVA	3000	3120	3300	**3600**	2736	2845	3009	**3283**	3150	3276	3465	**3780**	3300	3432	3630	**3960**
	kW	2400	2496	2640	2880	2189	2276	2407	2626	2520	2621	2772	3024	2640	2746	2904	3168
LSA 54.2 M10	kVA	3160	3460	3660	**4000**	3040	3162	3344	**3648**	3475	3640	3850	**4200**	3475	3805	4024	**4390**
	kW	2528	2768	2928	3200	2432	2530	2675	2918	2780	2912	3080	3360	2780	3044	3219	3512

LSA 53.2 - LSA 54.2 - 400 V - 50 Hz / 480 V - 60 Hz

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

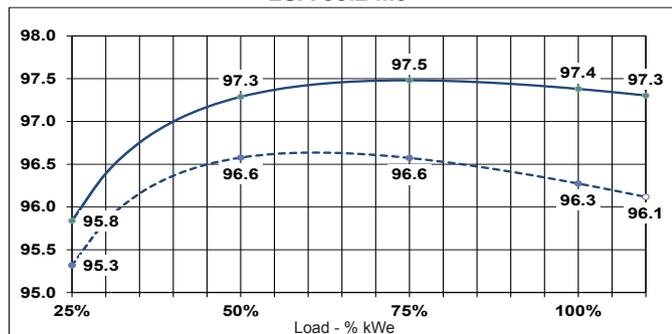### LSA 53.2 M7
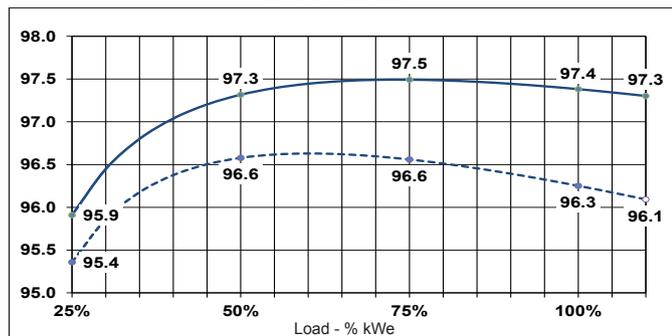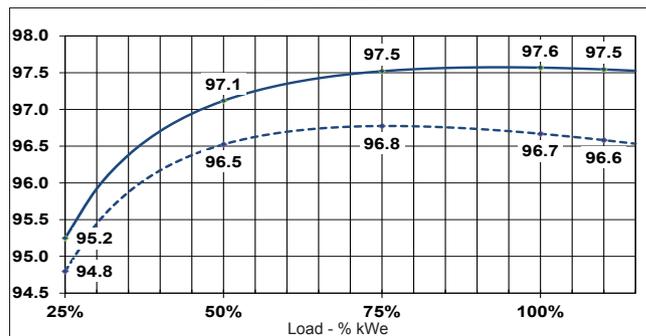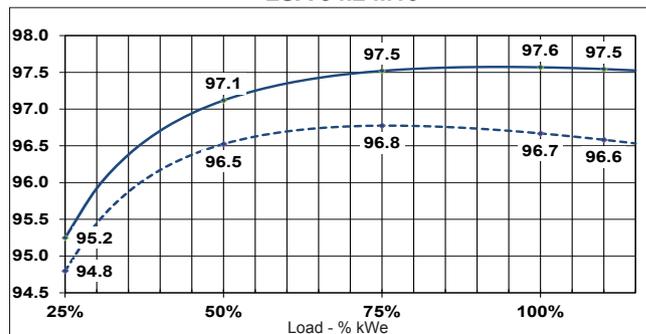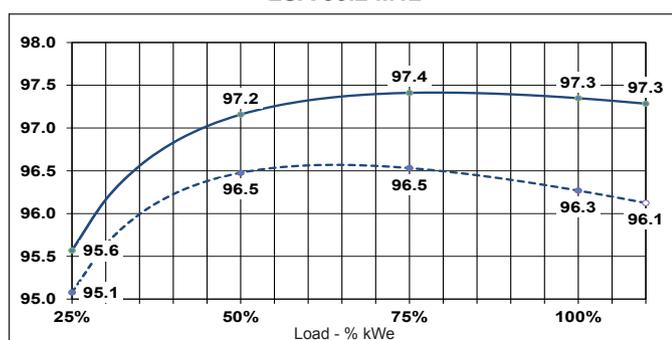

LSA 54.2 M8

LSA 53.2 M9

LSA 54.2 M10

LSA 53.2 M12

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

		53.2 M7	53.2 M9	53.2 M12	54.2 M8	54.2 M10
Kcc	Short-circuit ratio	0.35	0.36	0.39	0.42	0.47
Xd	Direct-axis synchronous reactance unsaturated	354	343	314	298	269
Xq	Quadrature-axis synchronous reactance unsaturated	181	175	160	152	137
T'do	No-load transient time constant	3.21	3.38	3.58	3.69	3.92
.X'd	Direct-axis transient reactance saturated	33.4	31.9	29.1	32.4	29
T'd	Short-circuit transient time constant	0.356	0.370	0.39	0.472	0.497
X"d	Direct-axis subtransient reactance saturated	19.4	18.3	16.6	20.7	18.3
T"d	Subtransient time constant	0.024	0.023	0.023	0.046	0.046
X"q	Quadrature-axis subtransient reactance saturated	20.2	19.1	17.3	22.5	20
X0	Zero sequence reactance unsaturated	4.6	4.3	3.9	4.9	4.3
X2	Negative sequence reactance saturated	19.8	18.7	17.0	21.6	19.2
Ta	Armature time constant	0.045	0.044	0.044	0.071	0.071

Other class H / 400 V data

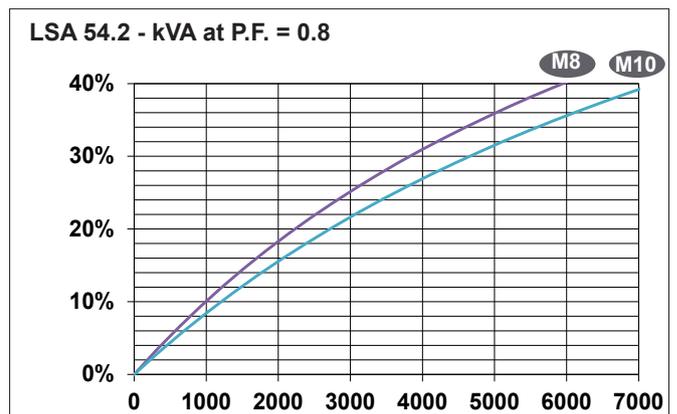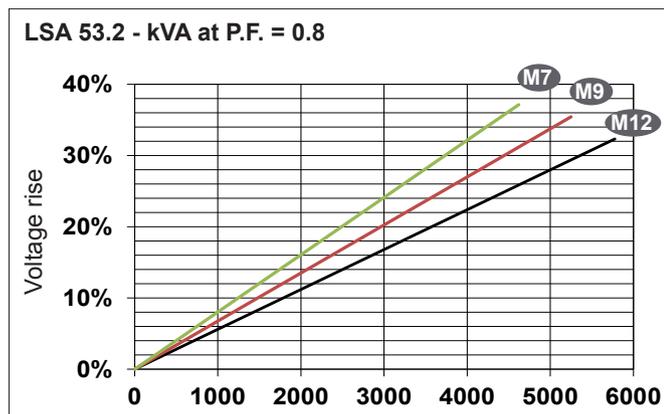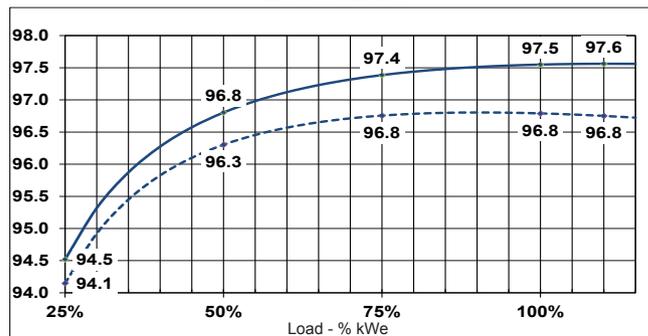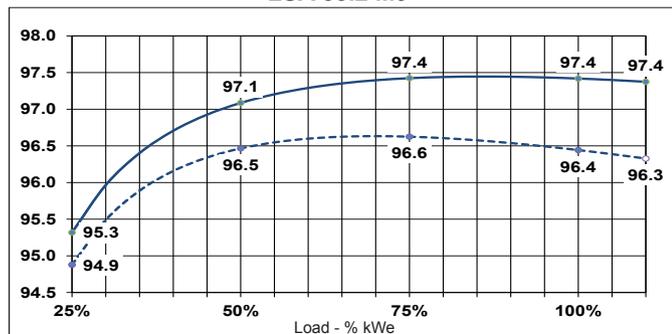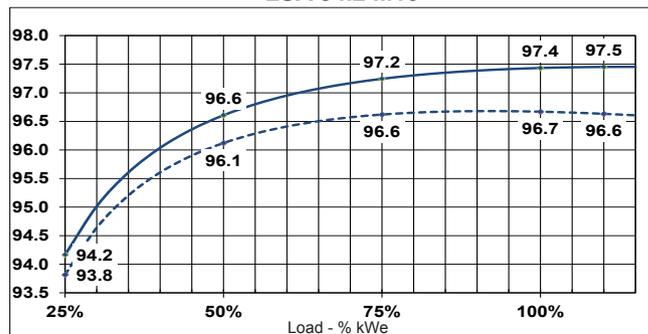|		53.2 M7	53.2 M9	53.2 M12	54.2 M8	54.2 M10
io (A)	No-load excitation current	1.3	1.3	1.3	1.1	1.1
ic (A)	On-load excitation current	5.3	5.2	4.9	3.7	3.6
uc (V)	On-load excitation voltage	63	61	58	48	46
kW	No-load losses	21	24	29	30	34
kW	Heat dissipation	9.0	10.1	11.0	9.4	10.3

Low Voltage Alternators - 4 pole

LSA 53.2 - LSA 54.2 - 400 V - 50 Hz / 480 V - 60 Hz

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

LSA 53.2 - kVA at P.F. = 0.8
(chart — Voltage dip vs kVA, curves M7, M9, M12)

LSA 54.2 - kVA at P.F. = 0.8
(chart — Voltage dip vs kVA, curves M8, M10)

LSA 53.2 - kVA at P.F. = 0
(chart — Voltage dip vs kVA, curves M7, M9, M12)

LSA 54.2 - kVA at P.F. = 0
(chart — Voltage dip vs kVA, curves M8, M10)

LSA 53.2 - kVA at P.F. = 0.6
(chart — Voltage dip vs kVA, curves M7, M9, M12)

LSA 54.2 - kVA at P.F. = 0.6
(chart — Voltage dip vs kVA, curves M8, M10)
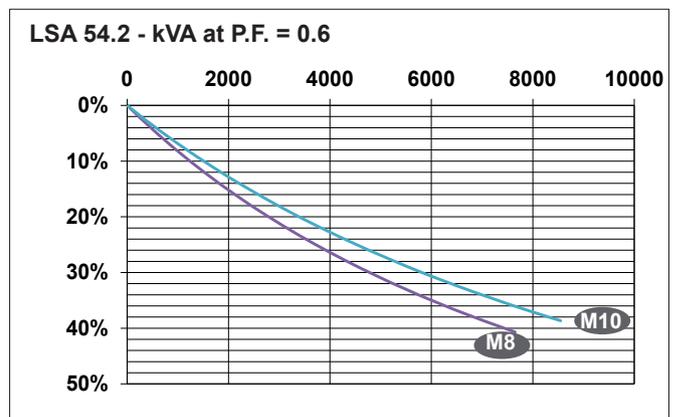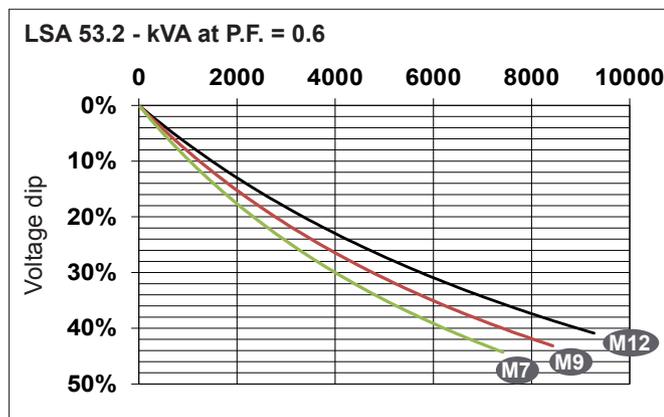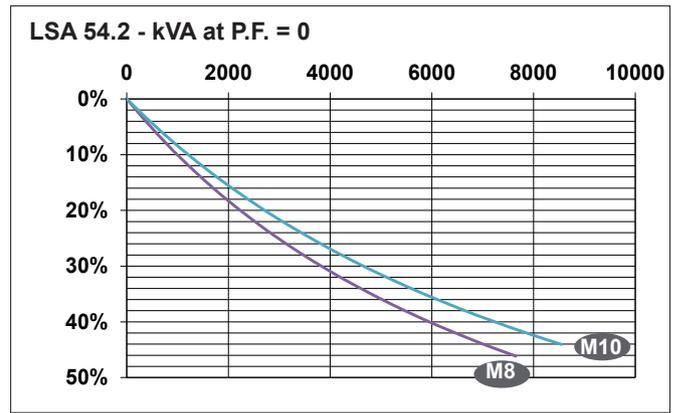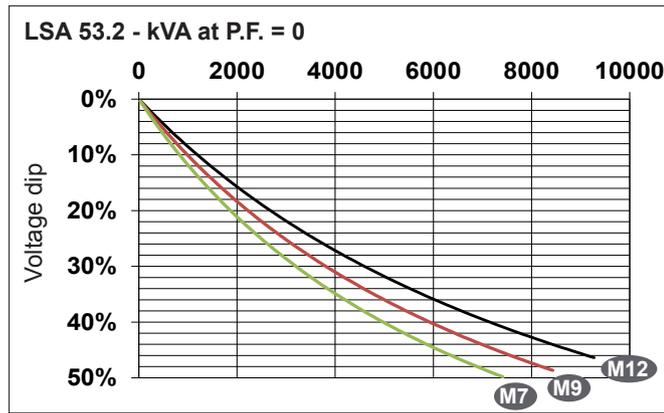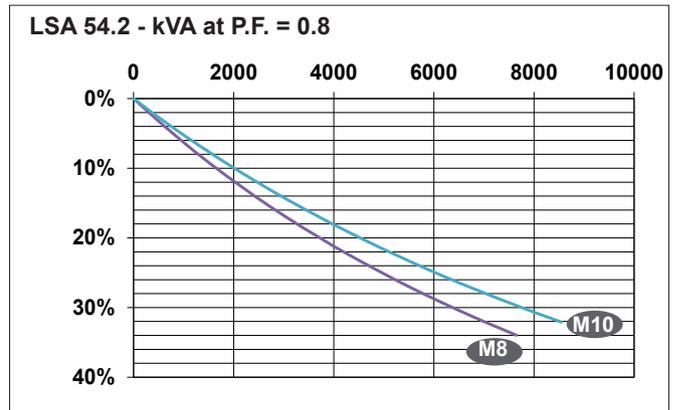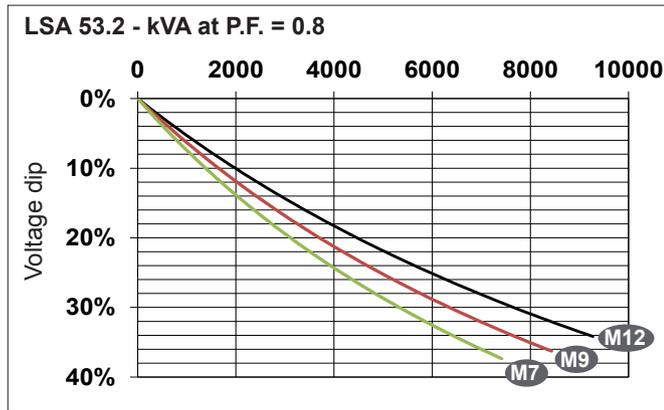
Transient voltage variation at load rejection: 400V - 50 Hz

LSA 53.2 - kVA at P.F. = 0.8
(chart — Voltage rise vs kVA, curves M7, M9, M12)

LSA 54.2 - kVA at P.F. = 0.8
(chart — Voltage rise vs kVA, curves M8, M10)

Low Voltage Alternators - 4 pole

LSA 53.2 - LSA 54.2 - 400 V - 50 Hz / 480 V - 60 Hz

Efficiencies 480V - 60 Hz (— P.F.: 1) (······ P.F.: 0.8)
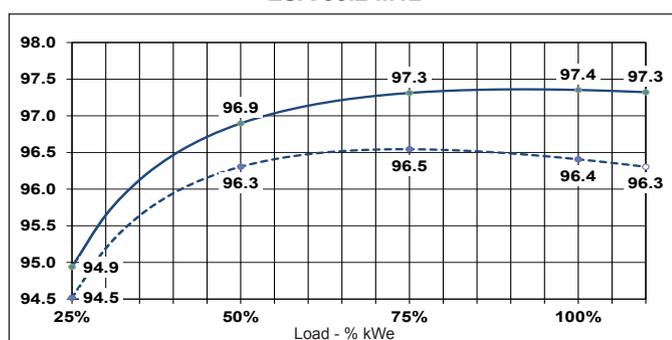
LSA 53.2 M7
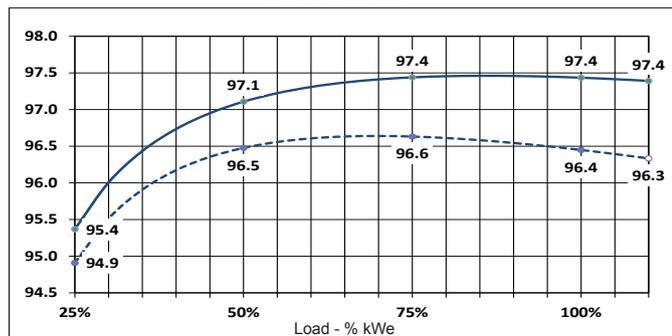
LSA 54.2 M8

LSA 53.2 M9

LSA 54.2 M10

LSA 53.2 M12

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

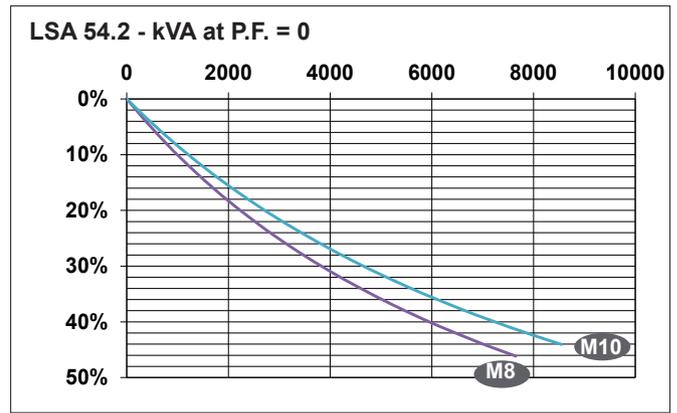|		53.2 M7	53.2 M9	53.2 M12	54.2 M8	54.2 M10
Kcc	Short-circuit ratio	0.35	0.36	0.40	0.43	0.47
Xd	Direct-axis synchronous reactance unsaturated	351	343	310	292	269
Xq	Quadrature-axis synchronous reactance unsaturated	179	175	158	149	137
T'do	No-load transient time constant	3.21	3.38	3.58	3.69	3.92
X'd	Direct-axis transient reactance saturated	33.1	31.9	28.6	31.8	29
T'd	Short-circuit transient time constant	0.356	0.370	0.388	0.473	0.497
X"d	Direct-axis subtransient reactance saturated	19.2	18.3	16.3	20.2	18.3
T"d	Subtransient time constant	0.024	0.023	0.023	0.046	0.046
X"q	Quadrature-axis subtransient reactance saturated	20.1	19.1	17.1	22.1	20.1
X0	Zero sequence reactance unsaturated	4.5	4.3	3.8	4.8	4.3
X2	Negative sequence reactance saturated	19.6	18.7	16.7	21.2	19.2
Ta	Armature time constant	0.043	0.042	0.042	0.071	0.071

Other class H / 480 V data

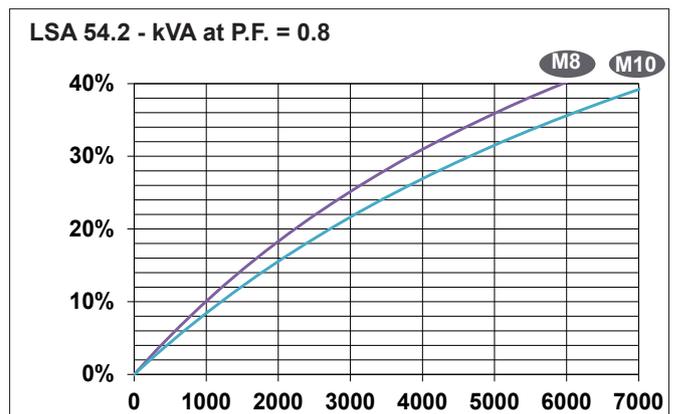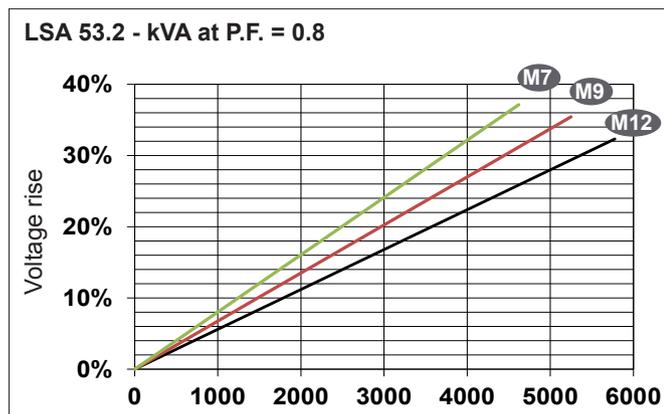|		53.2 M7	53.2 M9	53.2 M12	54.2 M8	54.2 M10
io (A)	No-load excitation current	1.2	1.3	1.3	1	1.1
ic (A)	On-load excitation current	5.2	5.1	4.8	3.6	3.4
uc (V)	On-load excitation voltage	61	60	56	46	44
kW	No-load losses	29	24	39	41	48
kW	Heat dissipation	9.8	11.2	12.3	10.5	12.1

Electric Power Generation

Low Voltage Alternators - 4 pole

LSA 53.2 - LSA 54.2 - 400 V - 50 Hz / 480 V - 60 Hz

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

LSA 53.2 - kVA at P.F. = 0.8

LSA 54.2 - kVA at P.F. = 0.8

LSA 53.2 - kVA at P.F. = 0

LSA 54.2 - kVA at P.F. = 0

LSA 53.2 - kVA at P.F. = 0.6

LSA 54.2 - kVA at P.F. = 0.6
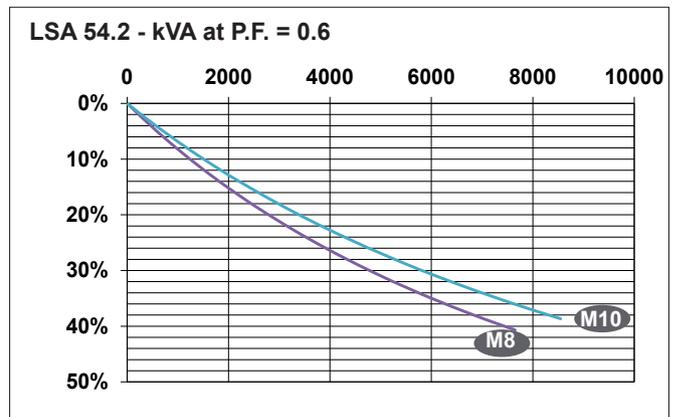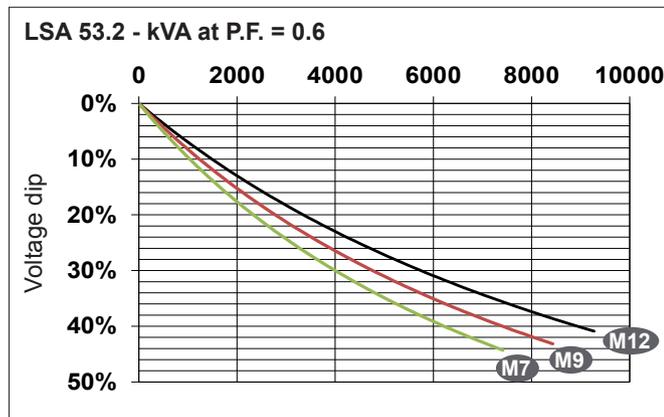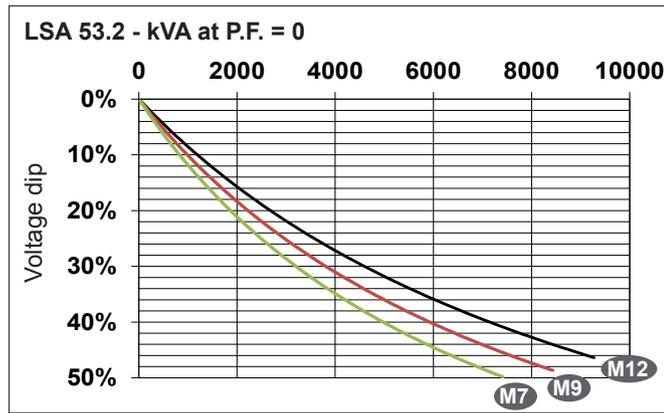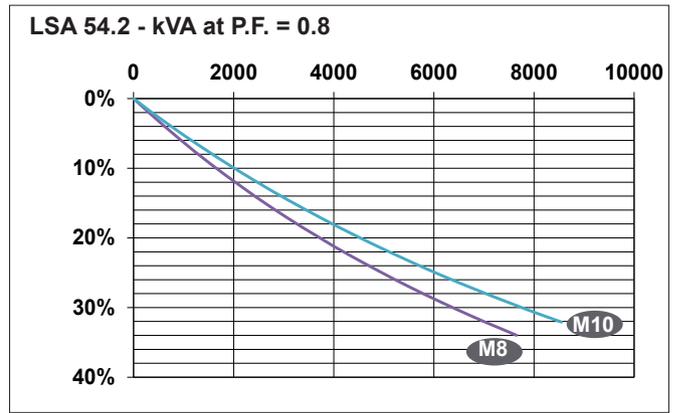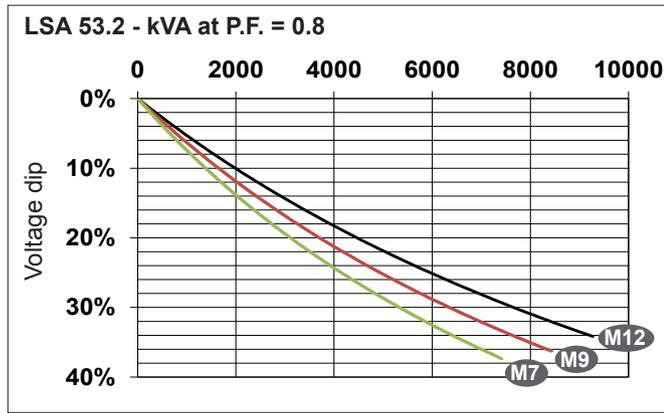
Transient voltage variation at load rejection: 480V - 60 Hz

LSA 53.2 - kVA at P.F. = 0.8

LSA 54.2 - kVA at P.F. = 0.8

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

LSA 53.2 M7

Isc (short-circuit current /In)

LSA 53.2 M9

Isc (short-circuit current /In)
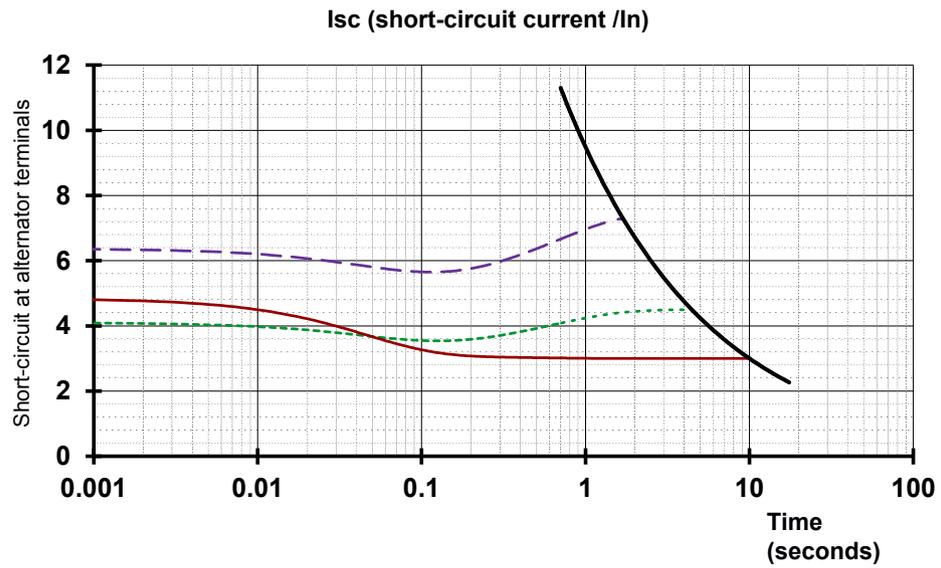

LSA 53.2 M12

Isc (short-circuit current /In)
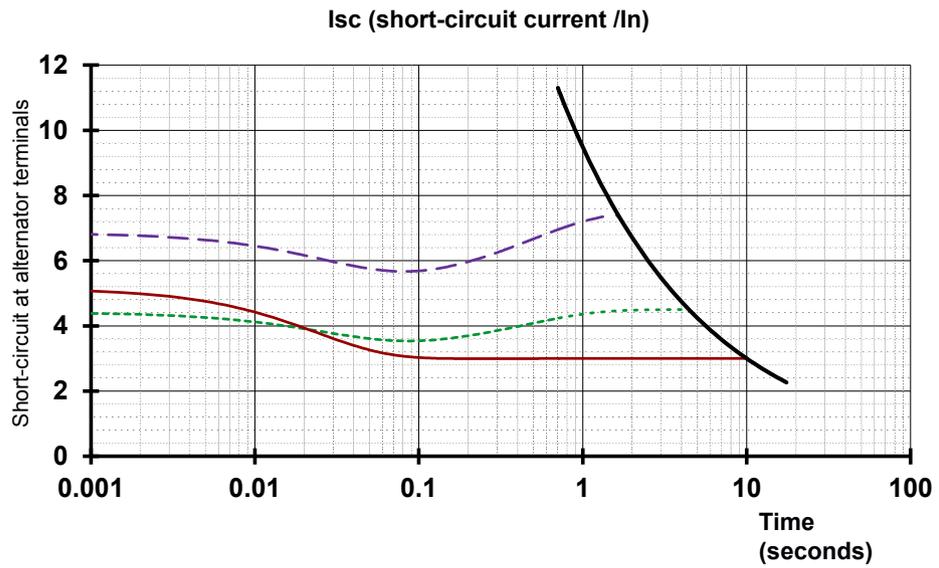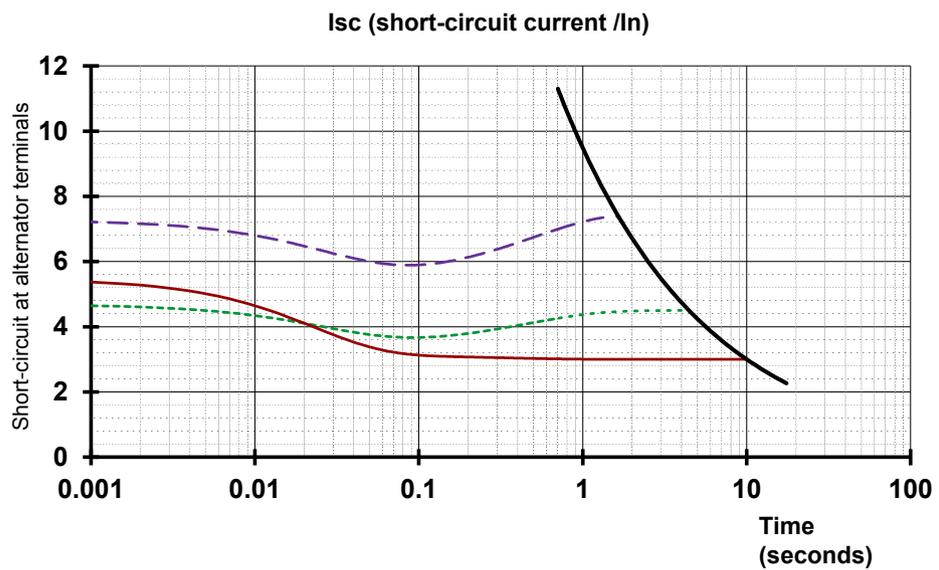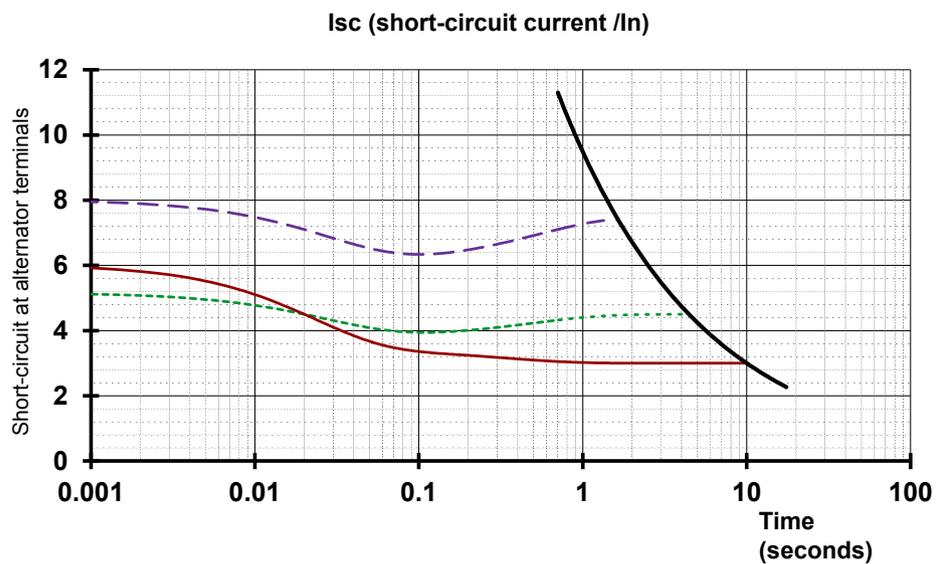
Low Voltage Alternators - 4 pole

LSA 53.2 - LSA 54.2 - 400 V - 50 Hz / 480 V - 60 Hz

Short-circuit curves

LSA 54.2 M8

Isc (short-circuit current /In)
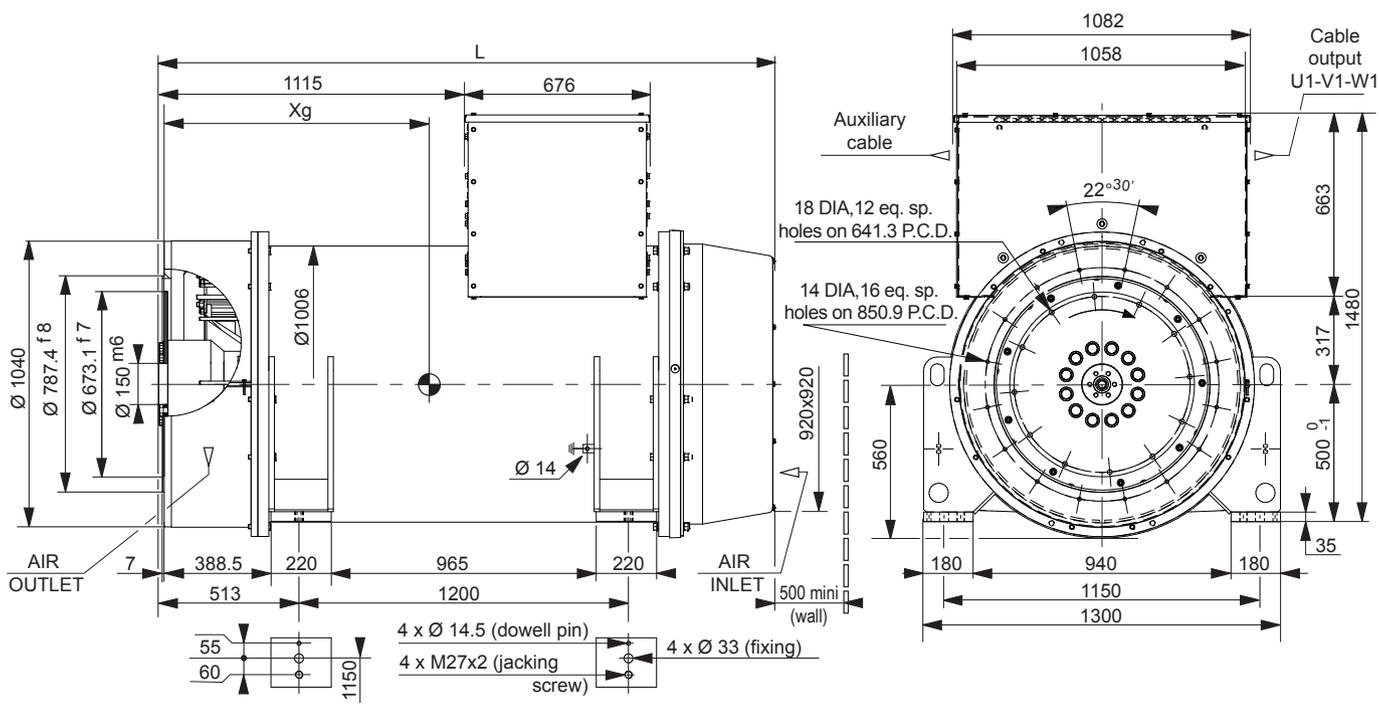

LSA 54.2 M10

Isc (short-circuit current /In)
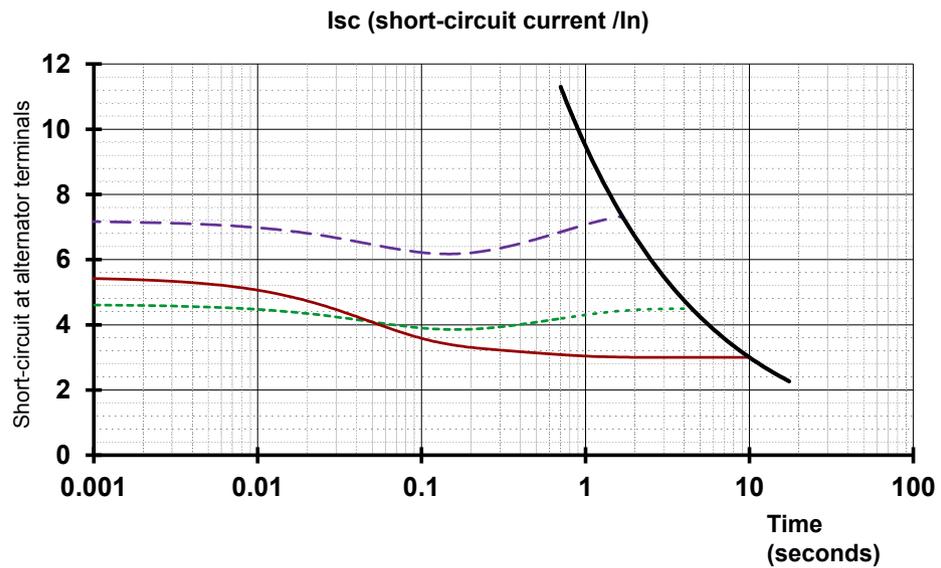
Symetrical phase to neutral short-circuit   – – – – –

Symetrical two phase short-circuit   ....

Symetrical three phase short-circuit   ———

Heat damage curve limit   ———

Low Voltage Alternators - 4 pole

LSA 53.2 - LSA 54.2 - 400 V - 50 Hz / 480 V - 60 Hz

Single bearing dimensions LSA 53.2

Dimensions (mm) and weight					Coupling		
Type	L	Xg		Weight (kg)	Flange S.A.E.	0	00
LSA 53.2 M7	2246	942		5250	Flex plate S.A.E. 21		X
LSA 53.2 M8	2246	969		5700	Flex plate S.A.E. 18	X	X
LSA 53.2 M9	2246	1010		6300			

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

Flange (mm)					Flex plate (mm)					
S.A.E.	N	M	XBG	S	S.A.E.	BX	U	X	Y	AH
0	647.7	679.5	16	14	21	673.1	641.3	12	18	0
00	787.4	850.9	16	14	18	571.5	542.9	6	18	15.8

Torsional analysis data

Centre of gravity: Xr (mm), Rotor length: Lr (mm), Weight: M (kg)				Torsional rigidity					
				[Nm/rad]			(kg.m²)		
Type	Xg	Lr	M	k1	k2	k3	J1	J2	J3
LSA 53.2 M7	841	2056	2024	6.44 10E7	6.58 10E7	2.53 10E7	14.1	62.5	2.1
LSA 53.2 M8	874	2056	2187	6.44 10E7	6.02 10E7	2.72 10E7	14.1	71.3	2.0
LSA 53.2 M9	924	2056	2415	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. Contractuel 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 responsability of genset manufacturer.

Low Voltage Alternators - 4 pole

LSA 53.2 - LSA 54.2 - 400 V - 50 Hz / 480 V - 60 Hz
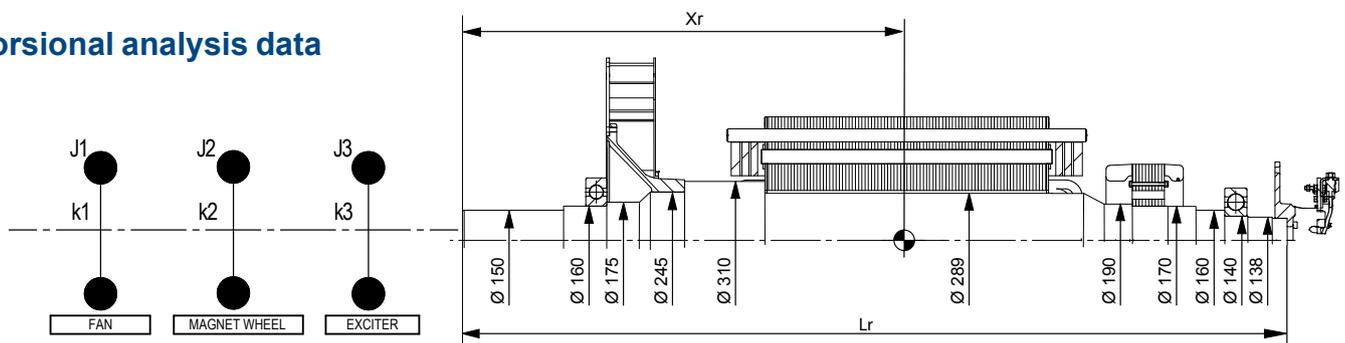
Two bearing dimensions LSA 53.2

Dimensions (mm) and weight

Type	L	LB	Xg	Weight (kg)
LSA 53.2 M7	2434	2184	873	5300
LSA 53.2 M8	2434	2184	900	5750
LSA 53.2 M9	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)				Torsional rigidity					
				[Nm/rad]			(kg.m²)		
Type	Xr	Lr	M	k1	k2	k3	J1	J2	J3
LSA 53.2 M7	1072	2224	1906	1.94 10E7	6.58 10E7	2.53 10E7	10.8	62.5	2.1
LSA 53.2 M8	1103	2224	2069	1.94 10E7	6.02 10E7	2.72 10E7	10.8	71.3	2.0
LSA 53.2 M9	1152	2224	2297	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. Contractuel 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 responsability of genset manufacturer.

Low Voltage Alternators - 4 pole

LSA 53.2 - LSA 54.2 - 400 V - 50 Hz / 480 V - 60 Hz
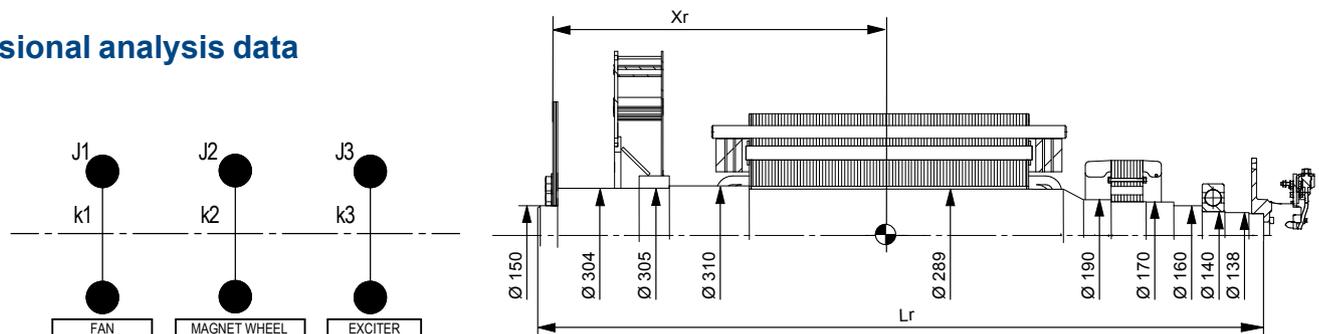
Single bearing dimensions LSA 54.2

Dimensions (mm) and weight

Type	L	Xg	Weight (kg)
LSA 54.2 M8	2307	918	6450
LSA 54.2 M10	2307	978	7100

Coupling

	0	00
Flange S.A.E.		
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)				Torsional rigidity					
				[Nm/rad]			(kg.m^2)		
Type	Xg	Lr	M	k1	k2	k3	J1	J2	J3
LSA 54.2 M8	878	2065	2553	1.39 E+8	1.34 E+8	3.83 E+7	12.6	105.4	3.7
LSA 54.2 M10	915	2065	2793	1.39 E+8	1.22 E+8	4.06 E+7	12.6	122.7	3.4

NOTE: Dimensions are for information only and may be subject to modifications. Contractuel 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 responsability of genset manufacturer.

Low Voltage Alternators - 4 pole
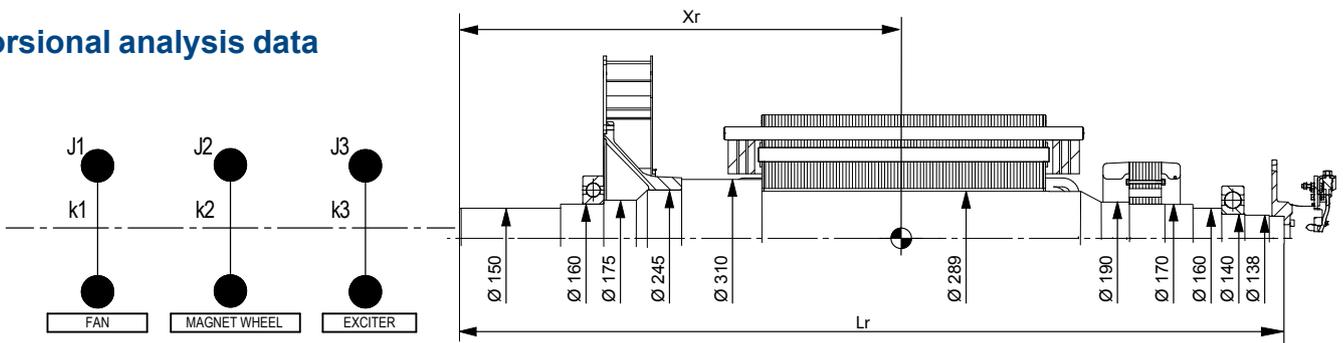
LSA 53.2 - LSA 54.2 - 400 V - 50 Hz / 480 V - 60 Hz

Two bearing dimensions LSA 54.2
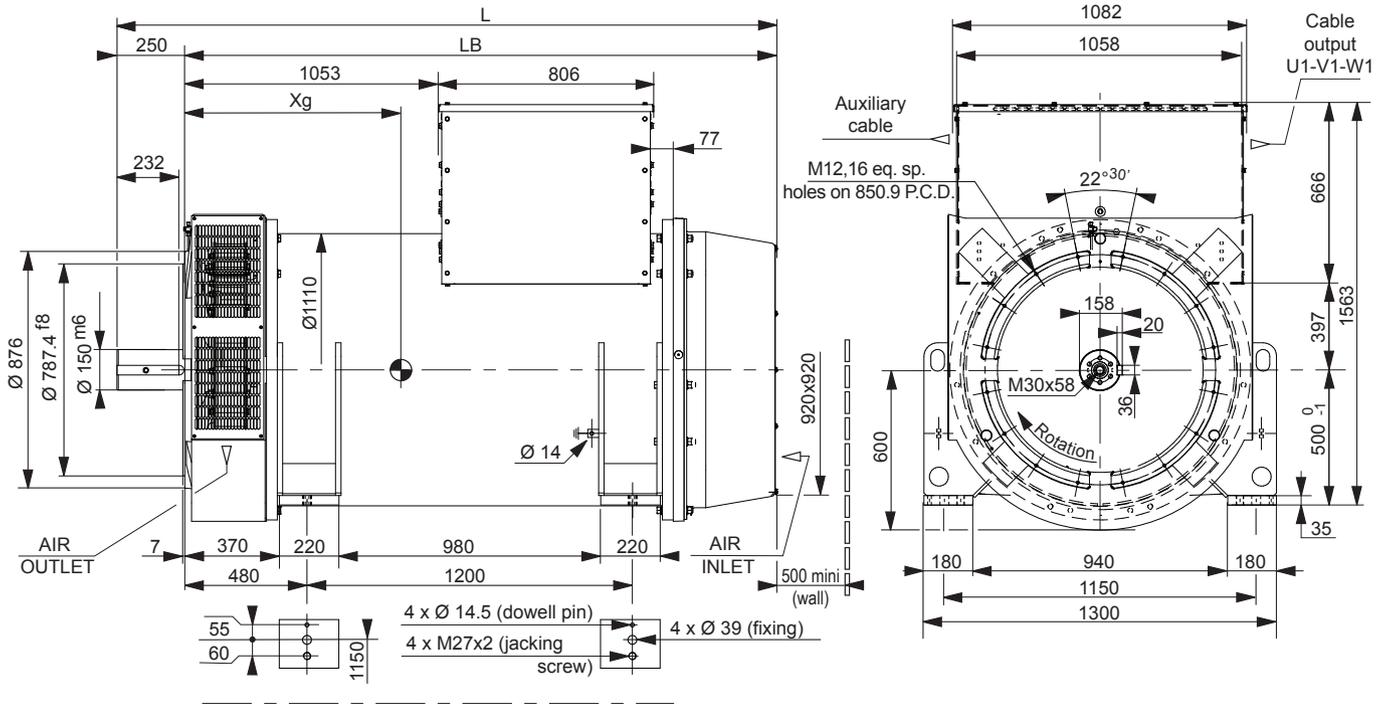
Dimensions (mm) and weight

Type	L	LB	Xg	Weight (kg)
LSA 54.2 M8	2513	2263	1098	6650
LSA 54.2 M10	2513	2263	1158	7300

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)				Torsional rigidity					
				[Nm/rad]			(kg.m²)		
Type	Xr	Lr	M	k1	k2	k3	J1	J2	J3
LSA 54.2 M8	1085	2271	2473	1.87 E+7	1.25 E+8	3.83 E+7	11.3	105.4	3.7
LSA 54.2 M10	1145	2271	2712	1.87 E+7	1.14 E+8	4.06 E+7	11.3	122.7	3.4

NOTE: Dimensions are for information only and may be subject to modifications. Contractuel 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 responsability of genset manufacturer.

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