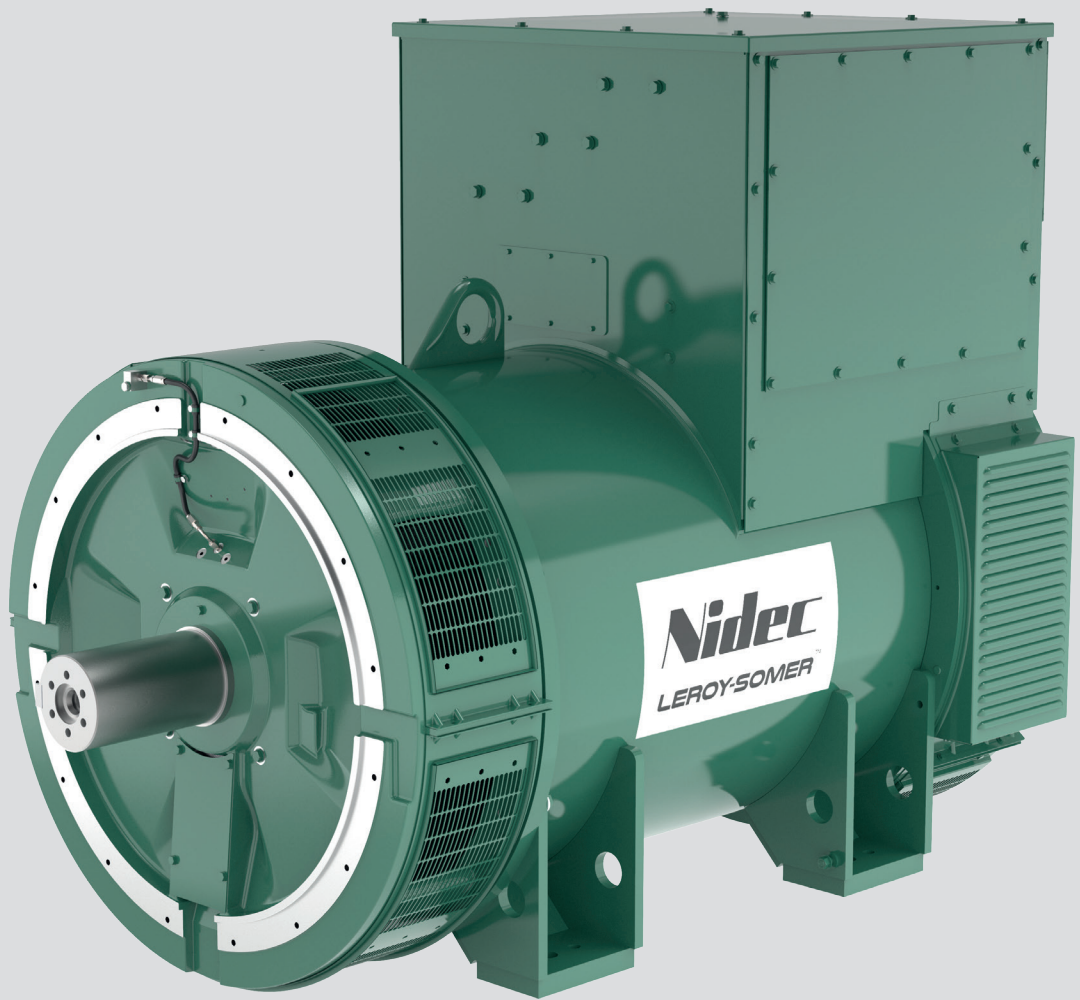




LSA 52.3

Low Voltage Alternator - 4 pole

1860 to 2750 kVA - 50 Hz / 2230 to 3400 kVA - 60 Hz
Electrical and mechanical data

The best of performance

Nidec Leroy-Somer LSA 52.3 alternator has been designed to offer you the best power generation performances. With its meticulous design and optimized architecture, the LSA 52.3 strikes the perfect balance between compactness, reliability, performance and longevity.

Whatever your application, the LSA 52.3 will meet your needs and will adapt to all situations.

Standards

Nidec Leroy-Somer LSA 52.3 alternator meets all key international standards and regulations, including IEC 60034, NEMA MG 1.32-33, ISO 8528-3, CSA C22.2 n°100-14 and UL 1446 (UL 1004 on request). Also compliant with IEC 61000-6-2, IEC 61000-6-3, IEC 61000-6-4, VDE 0875G, VDE 0875N and EN 55011, group 1 class A for European zone.

Nidec Leroy-Somer LSA 52.3 alternator can be integrated in EC marked generator set, and bears EC, UKCA and CMIM markings. It is designed, manufactured and marketed in an ISO 9001 and ISO 14001 quality assurance environment.

Electrical characteristics and performances

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

Excitation and regulation system

Excitation system			Regulation options		
AVR	AREP + PMI	PMG	C.T. Current transformer for paralleling	Mains paralleling	Remote voltage potentiometer
D550	Standard	Option	√	√	√

3-phase sensing is included as a standard with digital regulators.

Protection system and options

- The LSA 52.3 is IP 23
- Complete winding protection for clean environments with relative humidity $\leq 95\%$, including indoor marine environments
- Options:
 - Filters on air inlet (derating 5%)
 - Filters on air inlet and air outlet (IP 44) (derating 10%)
 - Reinforced winding protection for harsh environments and relative humidity greater than 95% (derating 6%)
 - Space heater
 - Protection or metering CTs
 - Thermal protection for stator winding and/or bearings (PT100)

Mechanical construction

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

Terminal box design

- 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 (wind. 6S)	AVR type	D550
Number of wires	6	Voltage regulation (*)	± 0.25%
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

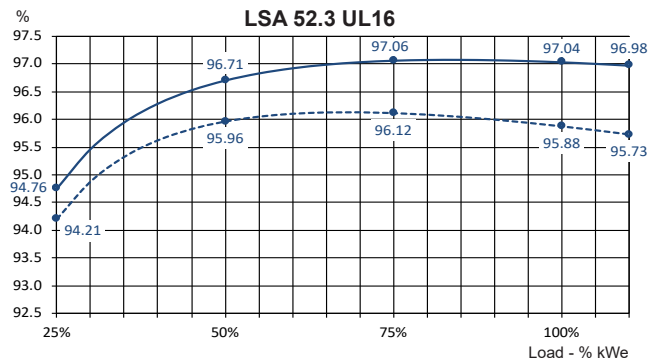
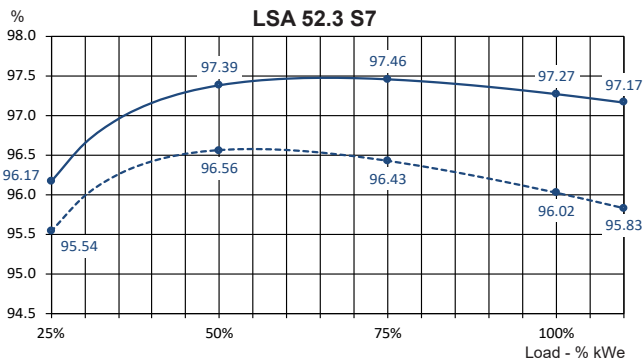
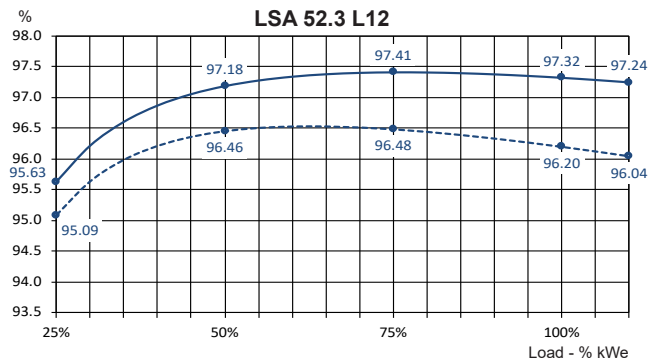
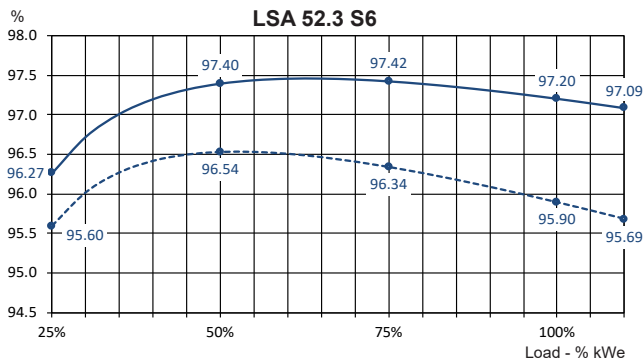
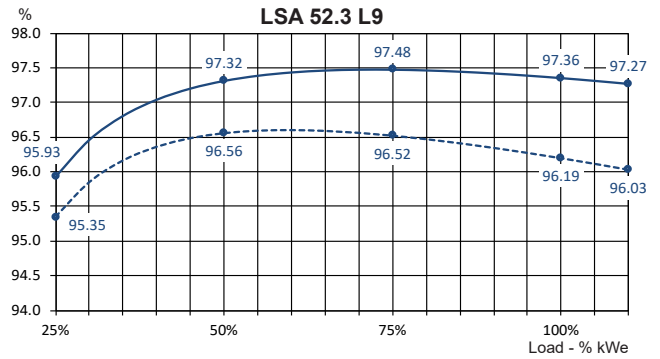
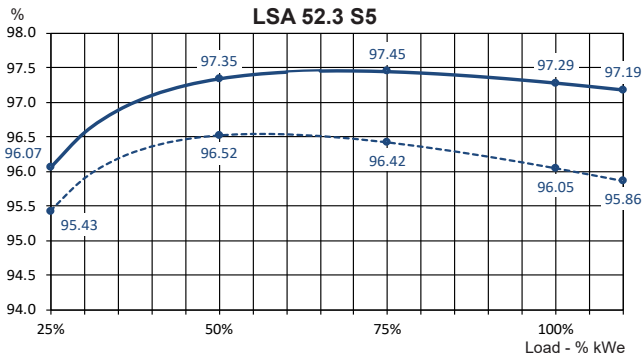
Ratings 50 Hz - 1500 R.P.M.

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	380V	400V	415V	380V	400V	415V	380V	400V	415V
LSA 52.3 S5	kVA	1860	1860	1860	1696	1696	1696	1953	1953	1953	2046	2046	2046
	kW	1488	1488	1488	1357	1357	1357	1562	1562	1562	1637	1637	1637
LSA 52.3 S6	kVA	2000	2000	2000	1824	1824	1824	2100	2100	2100	2200	2200	2200
	kW	1600	1600	1600	1459	1459	1459	1680	1680	1680	1760	1760	1760
LSA 52.3 S7	kVA	2200	2200	2200	2006	2006	2006	2310	2310	2310	2420	2420	2420
	kW	1760	1760	1760	1605	1605	1605	1848	1848	1848	1936	1936	1936
LSA 52.3 L9	kVA	2360	2360	2360	2152	2152	2152	2478	2478	2478	2596	2596	2596
	kW	1888	1888	1888	1722	1722	1722	1982	1982	1982	2077	2077	2077
LSA 52.3 L12	kVA	2560	2560	2560	2335	2335	2335	2688	2688	2688	2816	2816	2816
	kW	2048	2048	2048	1868	1868	1868	2150	2150	2150	2253	2253	2253
LSA 52.3 UL16	kVA	2750	2750	2750	2508	2508	2508	2888	2888	2888	3025	3025	3025
	kW	2200	2200	2200	2006	2006	2006	2310	2310	2310	2420	2420	2420

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		440V	480V	440V	480V	440V	480V	440V	480V
LSA 52.3 S5	kVA	2046	2232	1866	2036	2149	2344	2250	2455
	kW	1637	1786	1493	1629	1719	1875	1800	1964
LSA 52.3 S6	kVA	2200	2400	2007	2189	2310	2520	2420	2640
	kW	1760	1920	1606	1751	1848	2016	1936	2112
LSA 52.3 S7	kVA	2420	2640	2207	2408	2541	2772	2662	2904
	kW	1936	2112	1766	1926	2033	2218	2130	2323
LSA 52.3 L9	kVA	2596	2832	2368	2583	2726	2974	2855	3115
	kW	2077	2266	1894	2066	2181	2379	2284	2492
LSA 52.3 L12	kVA	2850	3250	2599	2964	2993	3413	3135	3575
	kW	2280	2600	2079	2371	2394	2730	2508	2860
LSA 52.3 UL16	kVA	3100	3400	2827	3101	3255	3570	3410	3740
	kW	2480	2720	2262	2481	2604	2856	2728	2992

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



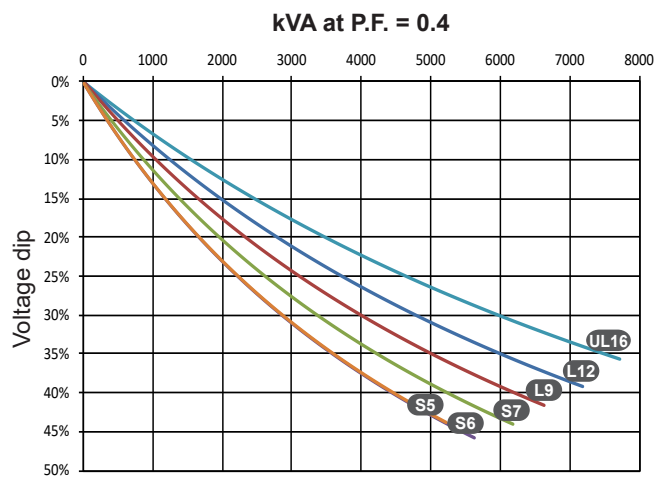
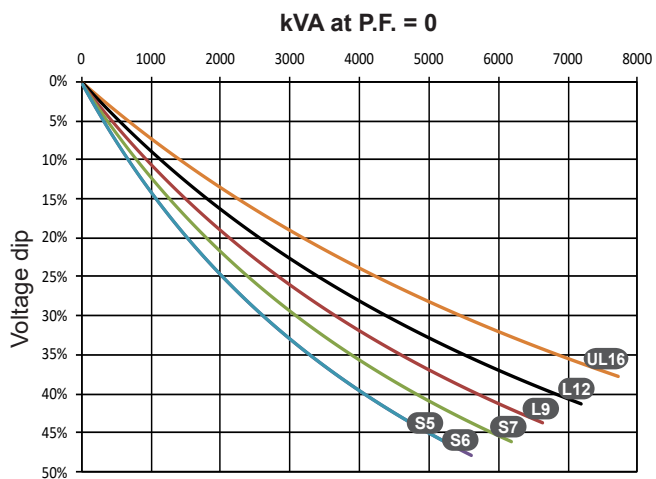
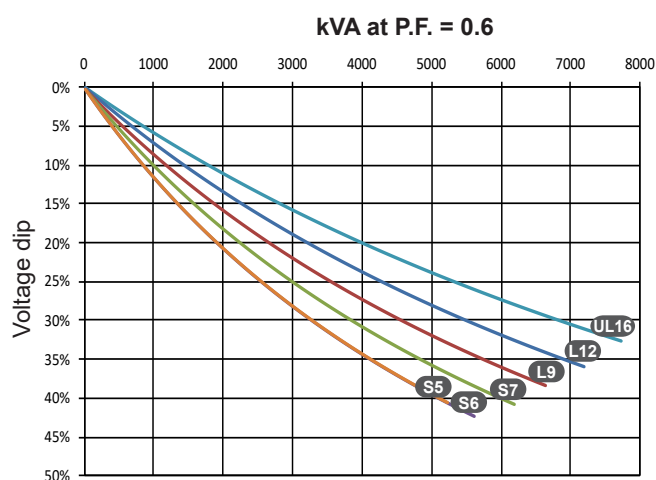
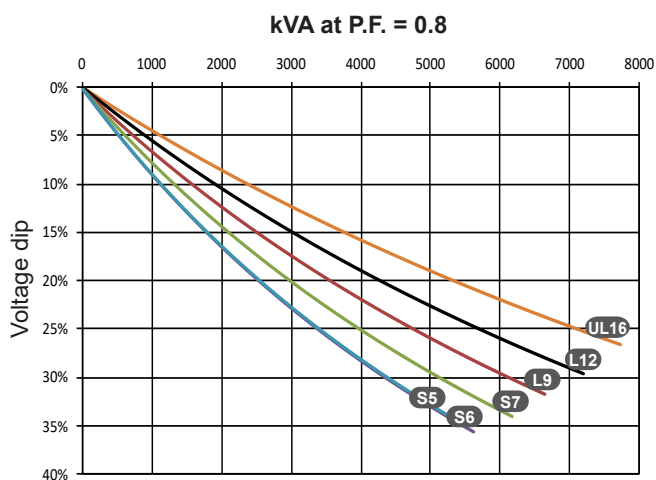
Reactances (%). Time constants (ms) - Class H / 400 V

	S5	S6	S7	L9	L12	UL16
Kcc Short-circuit ratio	0.35	0.32	0.35	0.39	0.42	0.51
Xd Direct-axis synchronous reactance unsaturated	367	380	376	344	313	267
Xq Quadrature-axis synchronous reactance unsaturated	187	194	192	175	160	136
T'do No-load transient time constant	2760	2760	2870	2990	2760	2920
X'd Direct-axis transient reactance saturated	28.7	30.9	28.9	26.1	23.6	20.3
T'd Short-circuit transient time constant	254	264	260	267	245	261
X''d Direct-axis subtransient reactance saturated	15	16.4	14.8	13.2	12.1	10.5
T''d Subtransient time constant	23	23	22	22	13	14
X''q Quadrature-axis subtransient reactance saturated	15.6	16.9	15.4	13.7	12.5	10.8
X0 Zero sequence reactance	2.3	2.5	2.6	2.5	2.7	2.6
X2 Negative sequence reactance saturated	15.3	16.7	15.1	13.4	12.3	10.6
Ta Armature time constant	28	28	28	28	29	30

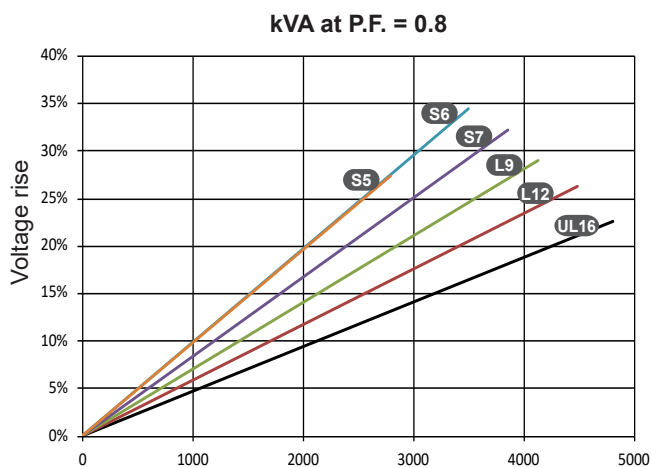
Other class H/400 V data

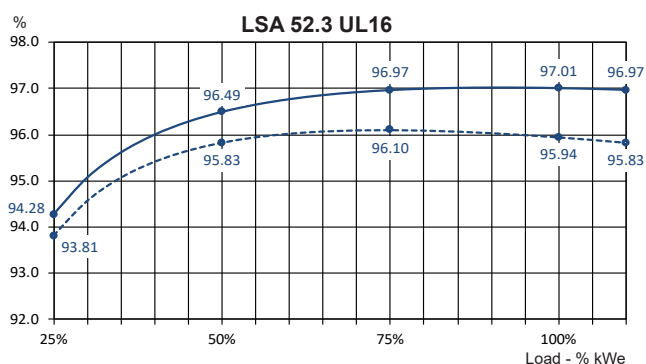
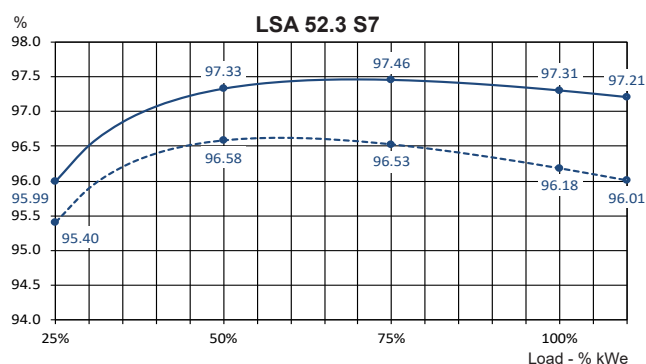
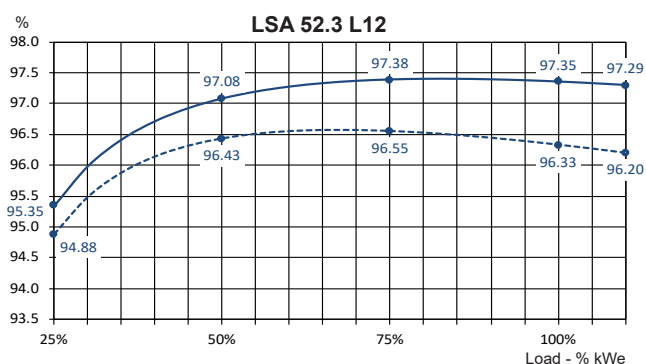
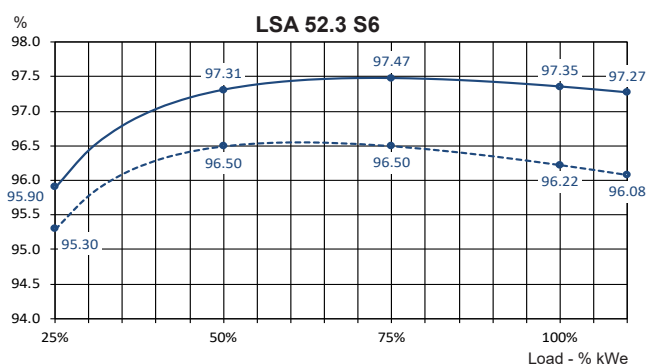
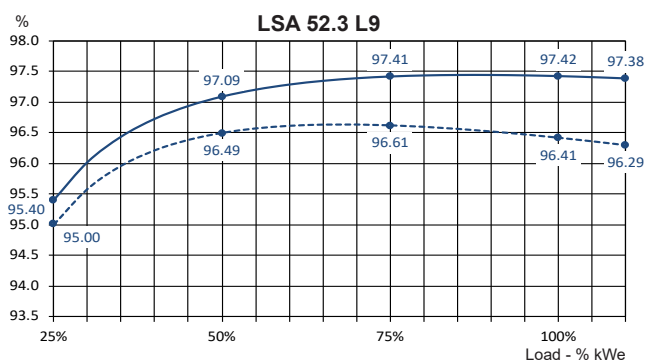
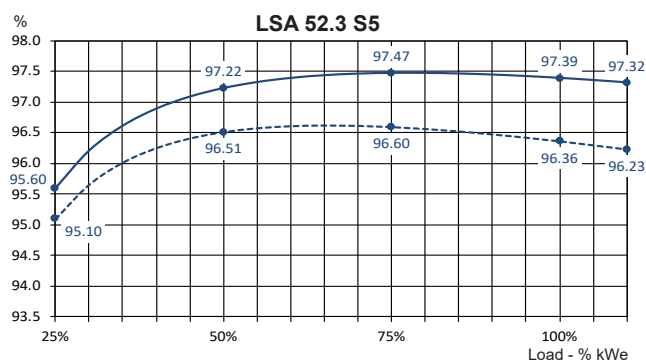
io (A) No-load excitation current	1.2	1.2	1.2	1.2	1.3	1.4
ic (A) On-load excitation current	4.4	4.7	4.6	4.4	4.1	3.9
uc (V) On-load excitation voltage	45	47	47	44	42	38
kW No-load losses	15	15	17	20	24	26
kW Heat dissipation	68	76	79.5	79.2	81	100

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



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



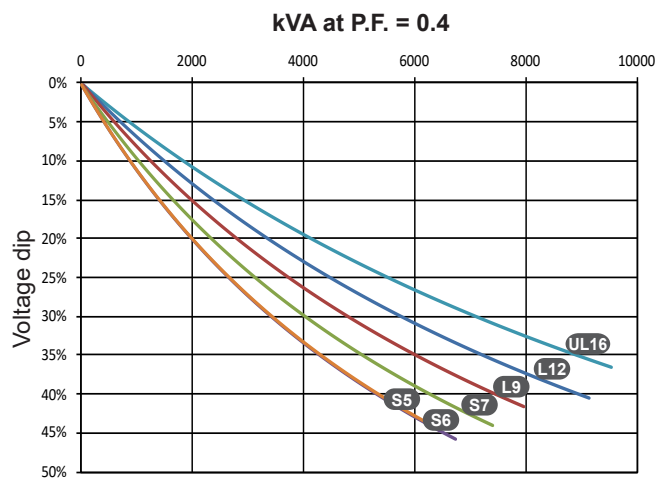
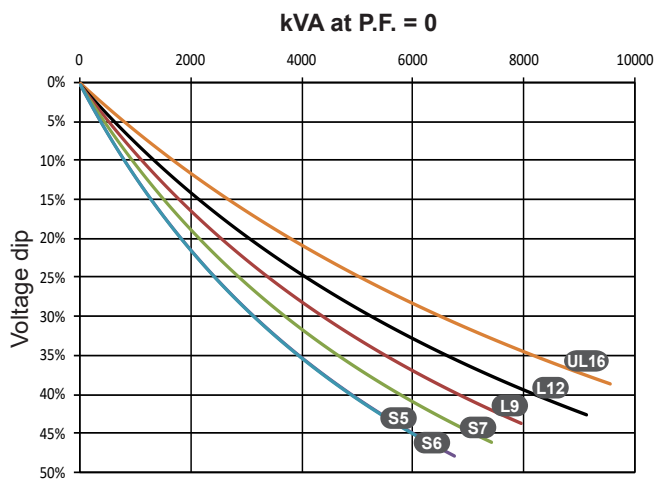
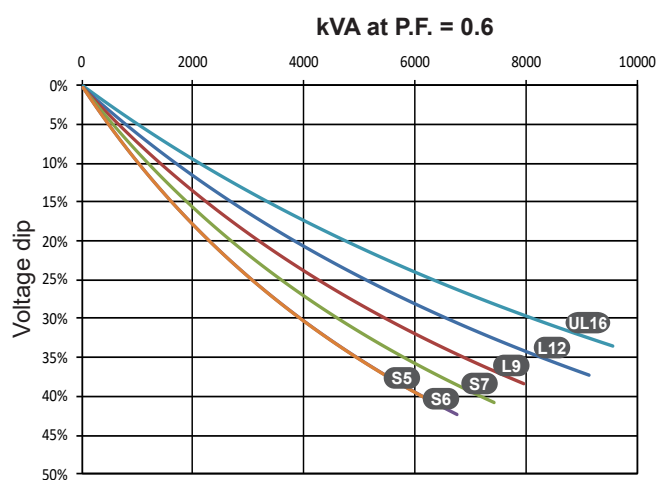
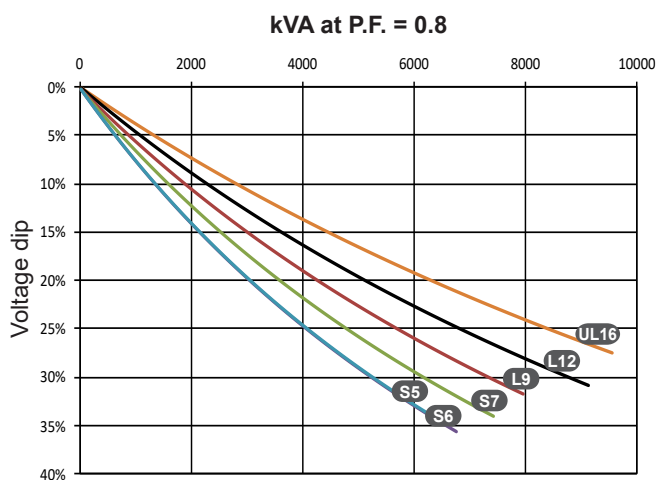
Efficiencies 480V - 60 Hz (--- P.F.: 0.8) (— P.F.: 1)

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

	S5	S6	S7	L9	L12	UL16
Kcc Short-circuit ratio	0.35	0.32	0.35	0.39	0.40	0.49
Xd Direct-axis synchronous reactance unsaturated	367	380	376	344	331	275
Xq Quadrature-axis synchronous reactance unsaturated	187	194	192	175	169	140
T'do No-load transient time constant	2760	2760	2870	2990	2760	2920
X'd Direct-axis transient reactance saturated	28.7	30.9	28.9	26.1	25	20.9
T'd Short-circuit transient time constant	254	265	260	267	245	261
X''d Direct-axis subtransient reactance saturated	15	16.4	14.8	13.2	12.8	10.8
T''d Subtransient time constant	23	23	22	22	13	14
X''q Quadrature-axis subtransient reactance saturated	15.6	16.9	15.4	13.7	13.2	11.1
X0 Zero sequence reactance	2.3	2.6	2.6	2.5	2.9	2.7
X2 Negative sequence reactance saturated	15.3	16.7	15.1	13.4	13	11
Ta Armature time constant	28	28	28	28	29	30

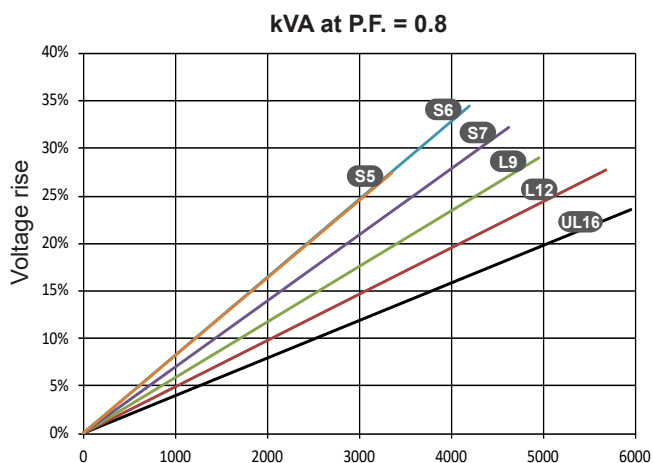
Other class H/480 V data

io (A) No-load excitation current	1.1	1.1	1.2	1.2	1.2	1.3
ic (A) On-load excitation current	4.2	4.5	4.5	4.2	4.2	3.7
uc (V) On-load excitation voltage	43	46	45	43	42	36
kW No-load losses	21	21	24	28	33	36
kW Heat dissipation	73	82	86	87	96	120

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

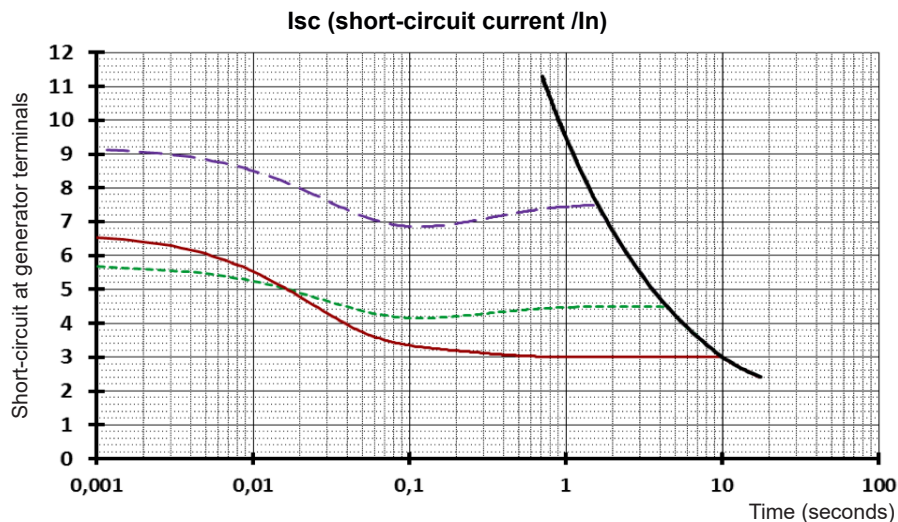


Transient voltage variation at load rejection: 480V - 60 Hz

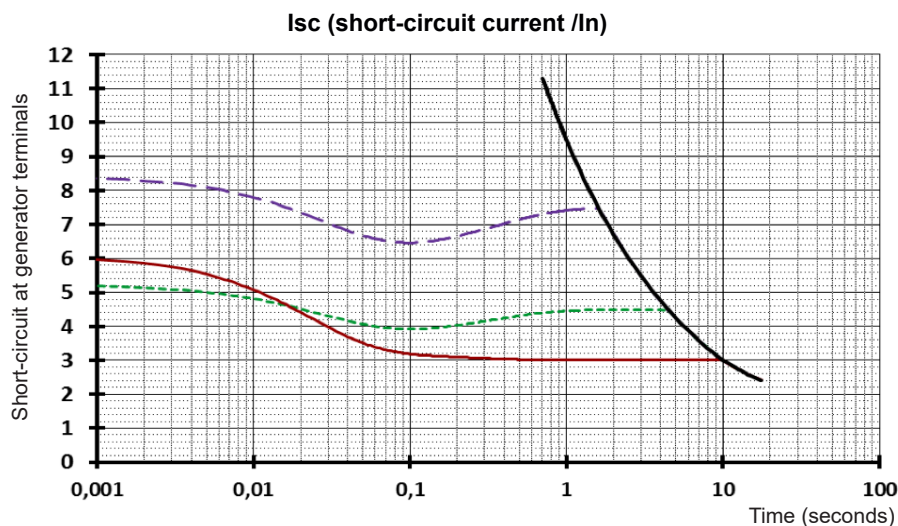


Short-circuit curves at rated speed (star connection Y)

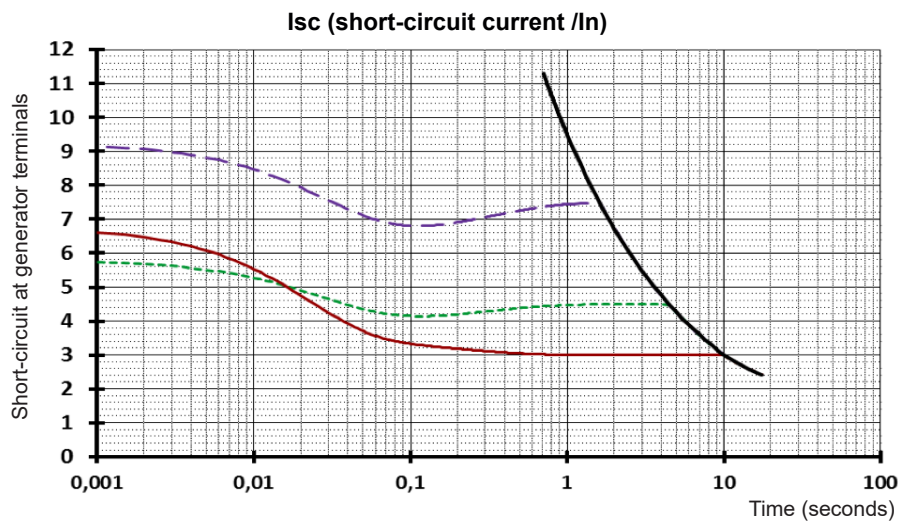
LSA 52.3 S5



LSA 52.3 S6



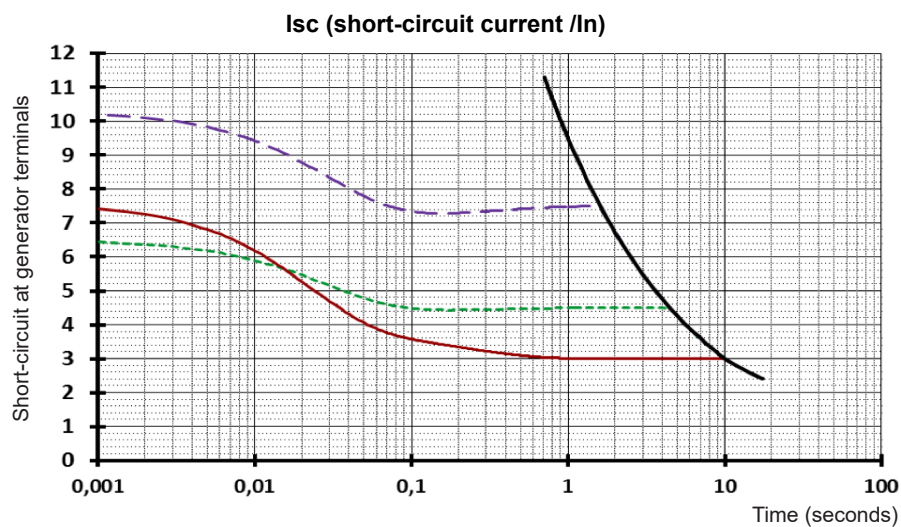
LSA 52.3 S7



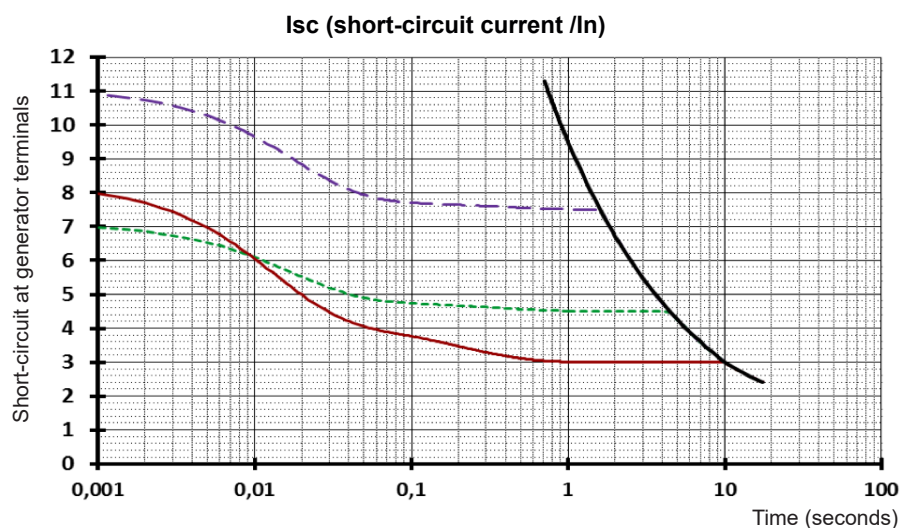
- — — Symetrical phase to neutral short-circuit
- - - Symetrical two-phase short-circuit
- — — Symetrical three-phase short-circuit
- — — Thermal limit curve

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

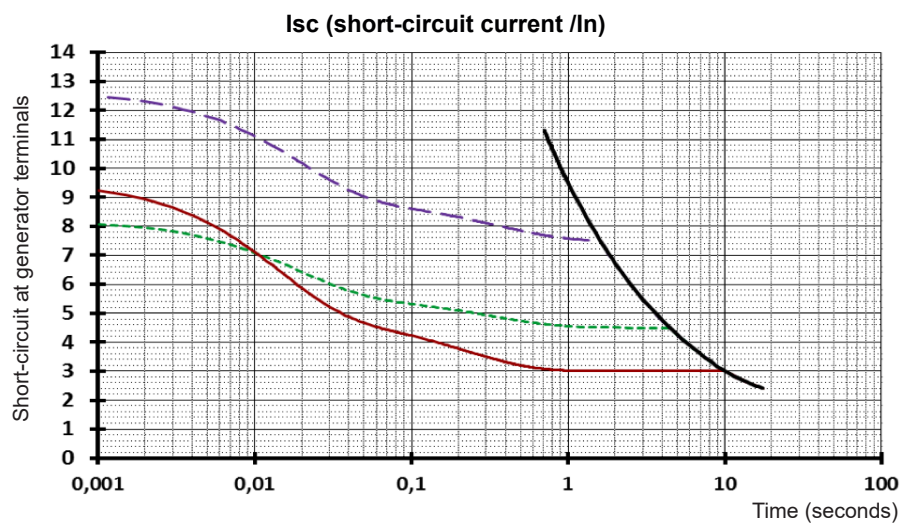
LSA 52.3 L9



LSA 52.3 L12

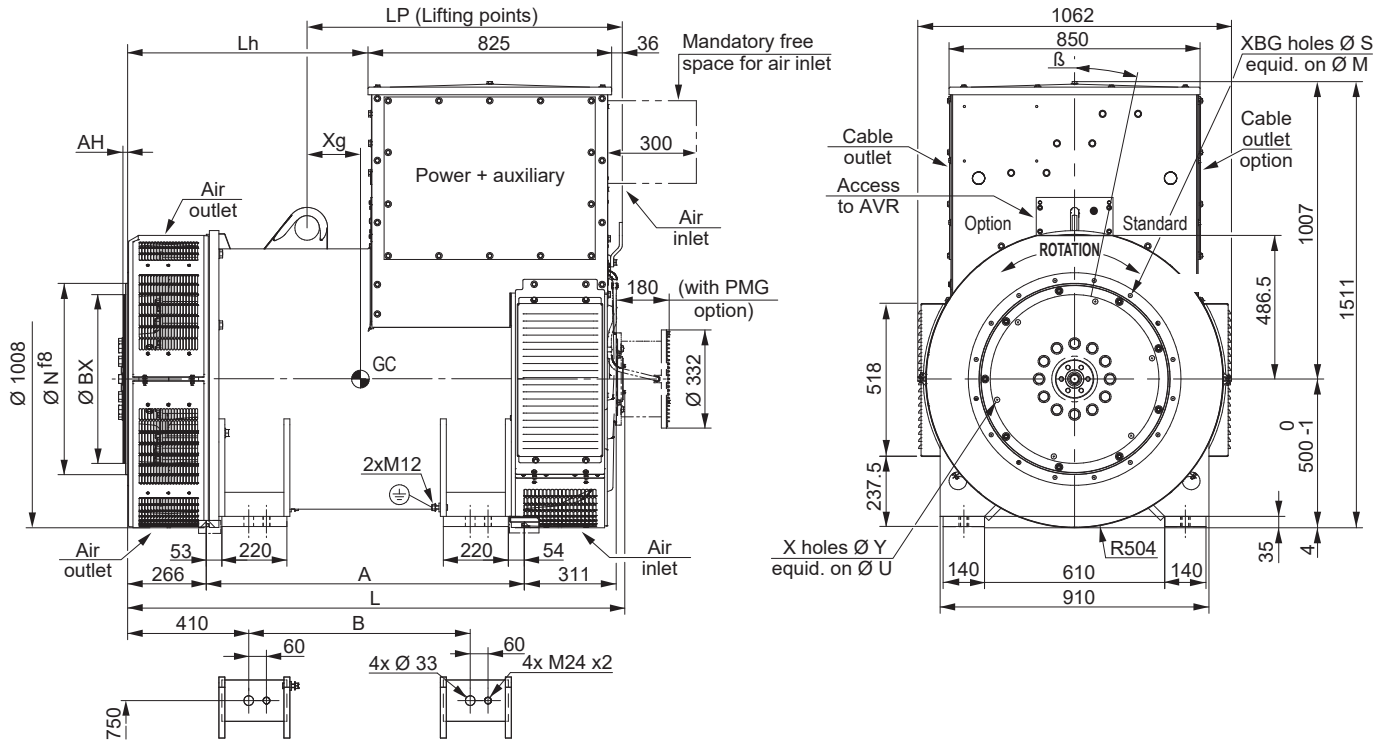


LSA 52.3 UL16



- Symetrical phase to neutral short-circuit
- - Symetrical two-phase short-circuit
- Symetrical three-phase short-circuit
- Thermal limit curve

Single-bearing dimensions



Dimensions (mm) and weight (kg)

Type	L	B	A	Lh	LP	Xg*	Weight*
LSA 52.3 S5/S6	1683	750	1077	814	1067.5	175	3748
LSA 52.3 S7	1683	750	1077	814	1067.5	194	3996
LSA 52.3 L9	1883	950	1277	1014	1067.5	64	4446
LSA 52.3 L12	1883	950	1277	1014	1067.5	106	4944
LSA 52.3 UL16	2033	1100	1427	1164	1412.5	389	5751

* Values for S.A.E. 0/18

Flange (mm)

S.A.E.	N	M	XBG	S	β°
0	647.7	679.5	16	14	11°15'
00	787.4	850.9	16	14	11°15'

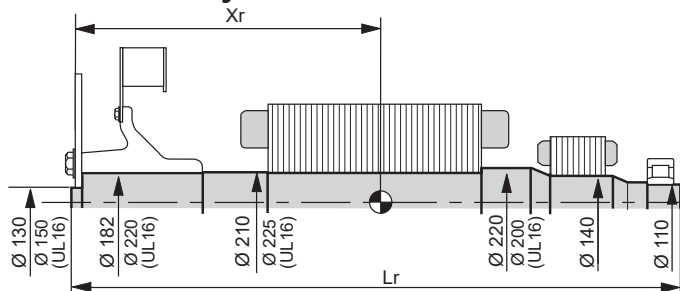
Flex plate (mm)

S.A.E.	BX	U	X	Y	AH
24	733.4	692.1	12	21	0
21	673.1	641.3	12	18	0
18	571.5	542.9	6	18	15.8

Coupling

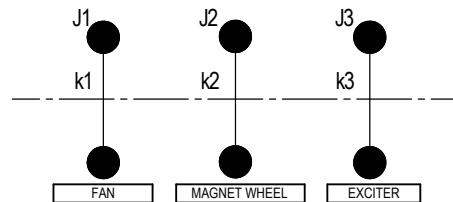
Flange S.A.E.	0	00
Flex plate S.A.E. 24		X
Flex plate S.A.E. 21		X
Flex plate S.A.E. 18	X	X

Torsional analysis data



Centre of gravity: Xr (mm), Rotor length: Lr (mm), Weight: M (kg), Moment of inertia: J (kgm²) : (4J = MD²)

Flex plate	S.A.E. 18				S.A.E. 21			
Type	Xr	Lr	M	J	Xr	Lr	M	J
LSA 52.3 S5/S6	718	1689	1408	42.2	702	1689	1412	43.1
LSA 52.3 S7	741	1689	1501	45.7	725	1689	1505	46.6
LSA 52.3 L9	810	1889	1693	51	794	1889	1697	51.9
LSA 52.3 L12	859	1889	1879	58.1	843	1889	1883	59
LSA 52.3 UL16	954	2039	2188	68.5	937	2039	2192	69.4



Type	S.A.E.	Torsional rigidity					
		[Nm/rad]			(kg.m ²)		
		k1	k2	k3	J1	J2	J3
S5/S6	18	5.47 10E7	2.98 10E7	1.60 10E7	9.5	31.1	1.5
	21	6.66 10E7	2.98 10E7	1.60 10E7	10.4	31.1	1.5
S7	18	5.47 10E7	2.92 10E7	1.68 10E7	9.5	34.7	1.4
	21	6.66 10E7	2.92 10E7	1.68 10E7	10.4	34.7	1.4
L9	18	5.47 10E7	2.83 10E7	1.52 10E7	9.5	40	1.6
	21	6.66 10E7	2.83 10E7	1.52 10E7	10.4	40	1.6
L12	18	5.47 10E7	2.71 10E7	1.67 10E7	9.5	47.2	1.4
	21	6.66 10E7	2.71 10E7	1.67 10E7	10.4	47.2	1.4
UL16	18	5.47 10E7	2.56 10E7	1.68 10E7	9.5	57.6	1.4
	21	6.66 10E7	2.56 10E7	1.68 10E7	10.4	57.6	1.4

NOTE : Dimensions are for information only and may be subject to modifications. Contractual 2D drawings can be downloaded from the Leroy-Somer site, 3D drawing files are available upon request.
The torsional analysis of the transmission is imperative. All values are available upon request.

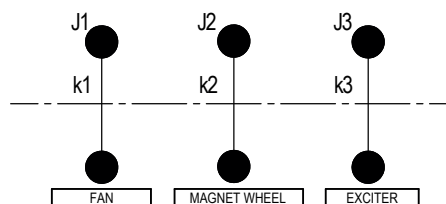
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Type	L	B	A	Lh	LP	Xg	Weight
LSA 52.3 S5/S6	1683	750	1077	814	1067.5	179	3742
LSA 52.3 S7	1683	750	1077	814	1067.5	197	3990
LSA 52.3 L9	1883	950	1277	1014	1067.5	68	4441
LSA 52.3 L12	1883	950	1277	1014	1067.5	109	4939
LSA 52.3 UL16	2033	1100	1427	1164	1412	392	5691

Technical drawing of a shaft assembly. The shaft has a total length L_r and a distance X_r from the left end to the center of the main bearing. The shaft features several components and dimensions:

- Left end: A dimension of 320 from the left end to the center of the main bearing.
- Bearing 1: A bearing with an outer diameter of $\varnothing 150$.
- Shaft Section 1: A section of the shaft with an outer diameter of $\varnothing 160$.
- Shaft Section 2: A section of the shaft with an outer diameter of $\varnothing 182$.
- Main Bearing: A large bearing with an outer diameter of $\varnothing 210$.
- Shaft Section 3: A section of the shaft with an outer diameter of $\varnothing 220$.
- Bearing 2: A bearing with an outer diameter of $\varnothing 140$.
- Shaft Section 4: A section of the shaft with an outer diameter of $\varnothing 110$.

Type	Xr	Lr	M	J
LSA 52.3 S5/S6	977.3	1917	1357	40.5
LSA 52.3 S7	999.9	1917	1450	44
LSA 52.3 L9	1069.1	2117	1642	49.4
LSA 52.3 L12	1116.4	2117	1827	56.5
LSA 52.3 UL16	1204.1	2267	2114	66.6



Torsional rigidity					
[Nm/rad]			(kg.m²)		
k1	k2	k3	J1	J2	J3
1.79 E+7	3.79 E+7	1.60 E+7	7.8	31.1	1.5
1.79 E+7	3.68 E+7	1.68 E+7	7.8	34.7	1.5
1.79 E+7	3.54 E+7	1.51 E+7	7.8	40	1.6
1.79 E+7	3.36 E+7	1.67 E+7	7.8	47.2	1.5
1.79 E+7	3.13 E+7	1.32 E+7	7.8	57.5	1.3

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