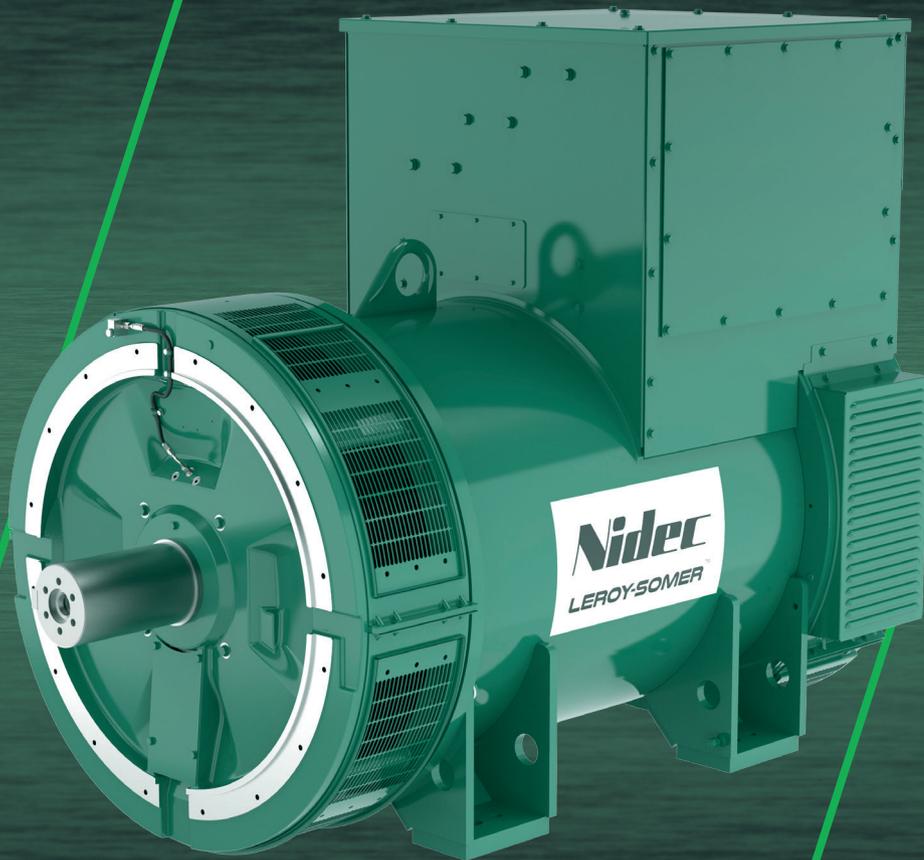# LSA 52.3

Low Voltage Alternator - 4 poles

1860 to 2750 kVA - 50 Hz / 2230 to 3400 kVA - 60 Hz

Electrical and mechanical data

LEROY-SOMER™

The best of performance

The 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 Leroy-Somer™ LSA 52.3 alternator will meet your needs and will adapt to all situations.

Standards

The 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.
The 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

- Degree of protection: IP 23
- Complete winding protection for clean environments with relative humidity ≤ 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

LEROY-SOMER ™

General characteristics

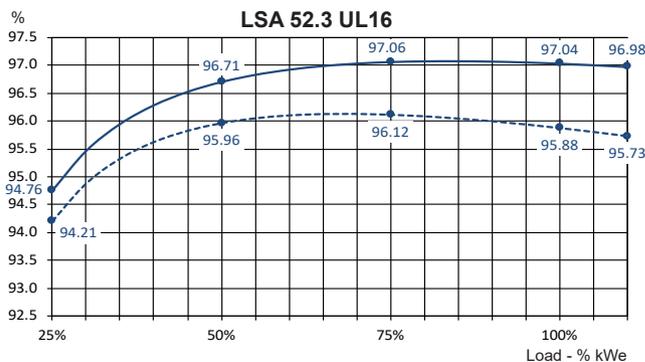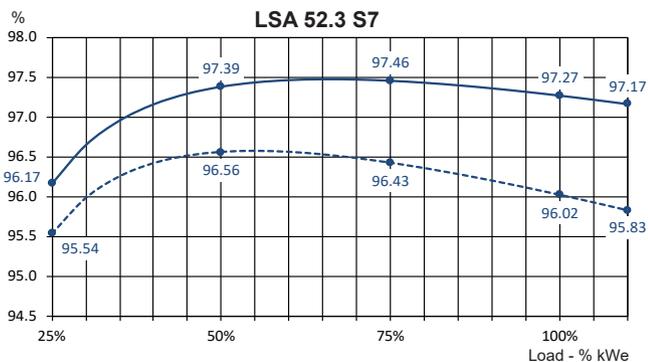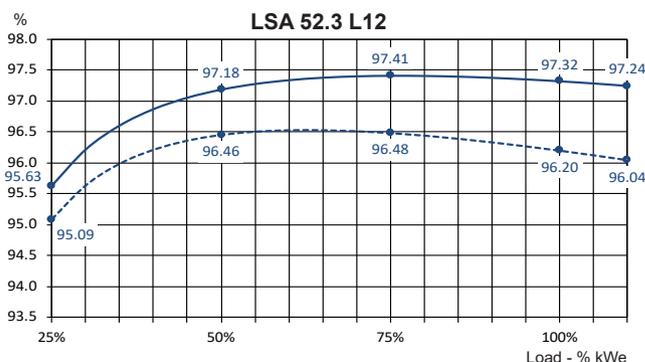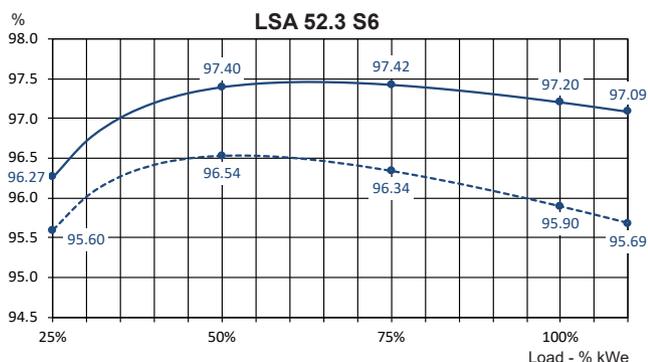|			
Insulation class	H	Excitation system	AREP + PMI
Winding pitch	2/3 (wind. 6S)	AVR type	D550
Number of wires	6	Voltage regulation (*)	± 0.25%
Protection	IP 23	Short-circuit current	300% (3 IN) : 10s
Altitude	≤ 1000 m	Total Harmonic Distortion THD (**) in no-load	< 4%
Overspeed	2250 R.P.M.	Waveform: 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*

# LSA 52.3 - 1860 to 2750 kVA - 50 Hz / 2230 to 3400 kVA - 60 Hz

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

LSA 52.3 S5
P.F.: 1 — 96.07, 97.35, 97.45, 97.29, 97.19
P.F.: 0.8 --- 95.43, 96.52, 96.42, 96.05, 95.86
(Load - % kWe: 25%, 50%, 75%, 100%)

LSA 52.3 L9
P.F.: 1 — 95.93, 97.32, 97.48, 97.36, 97.27
P.F.: 0.8 --- 95.35, 96.56, 96.52, 96.19, 96.03
(Load - % kWe: 25%, 50%, 75%, 100%)

LSA 52.3 S6
P.F.: 1 — 96.27, 97.40, 97.42, 97.20, 97.09
P.F.: 0.8 --- 95.60, 96.54, 96.34, 95.90, 95.69
(Load - % kWe: 25%, 50%, 75%, 100%)

LSA 52.3 L12
P.F.: 1 — 95.63, 97.18, 97.41, 97.32, 97.24
P.F.: 0.8 --- 95.09, 96.46, 96.48, 96.20, 96.04
(Load - % kWe: 25%, 50%, 75%, 100%)

LSA 52.3 S7
P.F.: 1 — 96.17, 97.39, 97.46, 97.27, 97.17
P.F.: 0.8 --- 95.54, 96.56, 96.43, 96.02, 95.83
(Load - % kWe: 25%, 50%, 75%, 100%)

LSA 52.3 UL16
P.F.: 1 — 96.71, 97.06, 97.04, 96.98
P.F.: 0.8 --- 94.76, 94.21, 95.96, 96.12, 95.88, 95.73
(Load - % kWe: 25%, 50%, 75%, 100%)

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

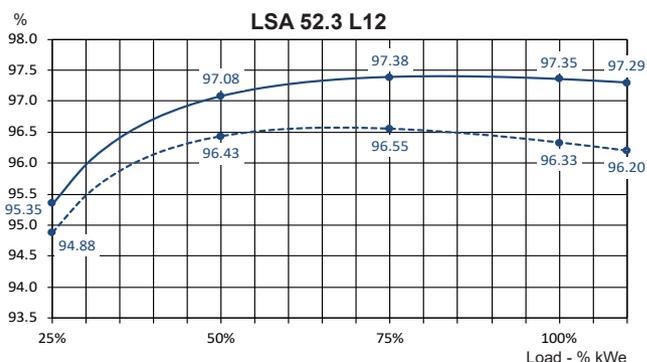|		S5	S6	S7	L9	L12	UL16
io (A)	No-load excitation current	1.2	1.2	1.2	1.2	1.3	1.4
ic (A)	On-load excitation current	4.4	4.7	4.6	4.4	4.1	3.9
uc (V)	On-load excitation voltage	45	47	47	44	42	38
kW	No-load losses	15	15	17	20	24	26
kW	Heat dissipation	68	76	79.5	79.2	81	100

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

kVA at P.F. = 0.8

kVA at P.F. = 0.6

kVA at P.F. = 0

kVA at P.F. = 0.4
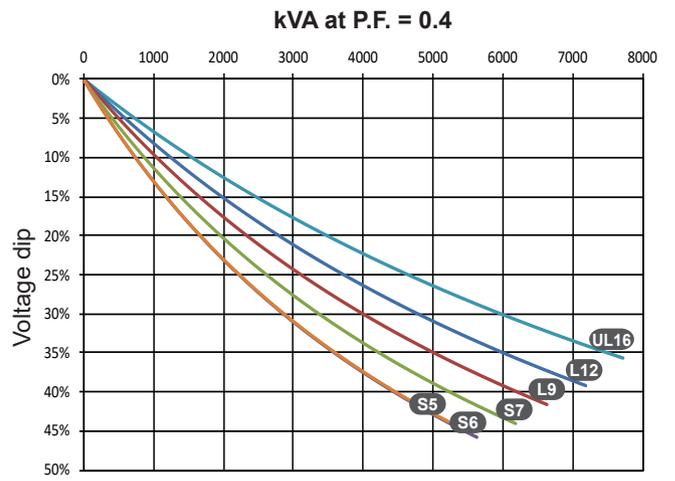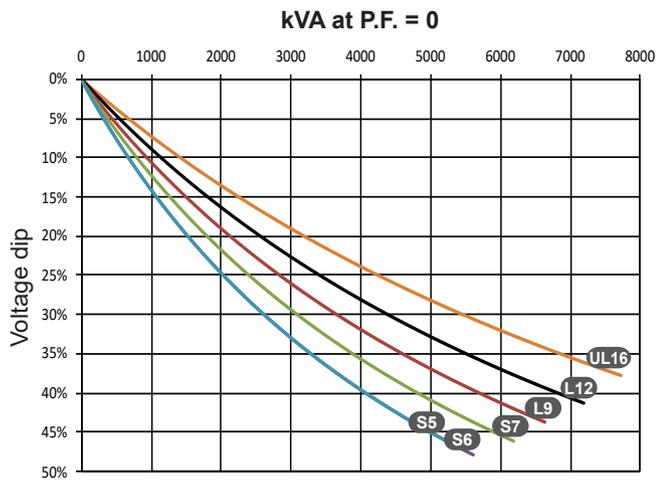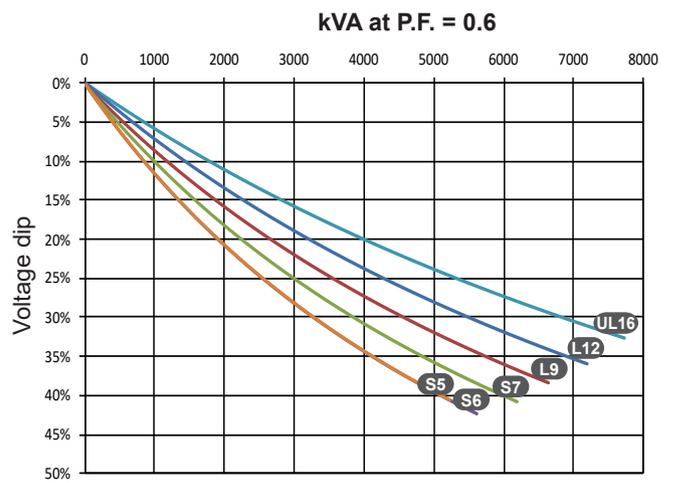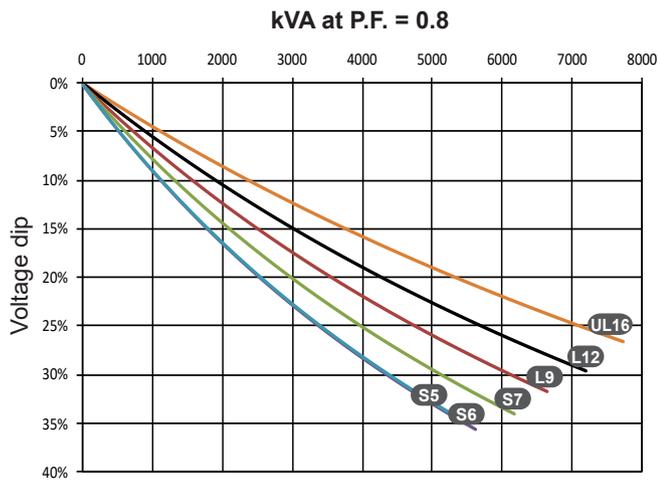
Transient voltage variation at load rejection: 400V - 50 Hz

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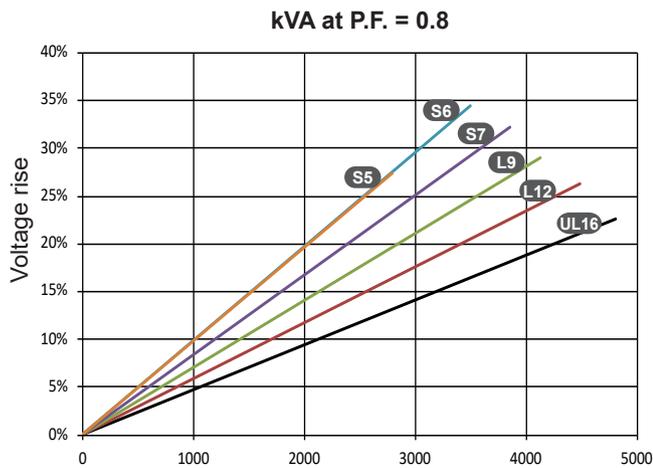
Efficiencies 480V - 60 Hz (--- P.F.: 0.8) (— P.F.: 1)


LSA 52.3 S5

LSA 52.3 L9

LSA 52.3 S6

LSA 52.3 L12

LSA 52.3 S7

LSA 52.3 UL16
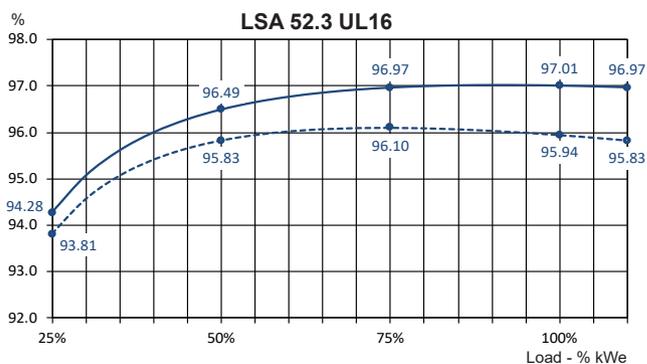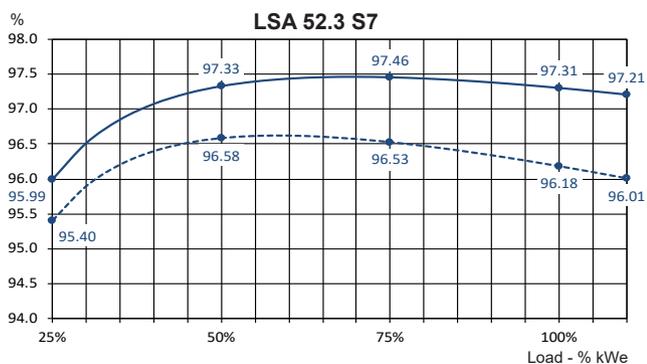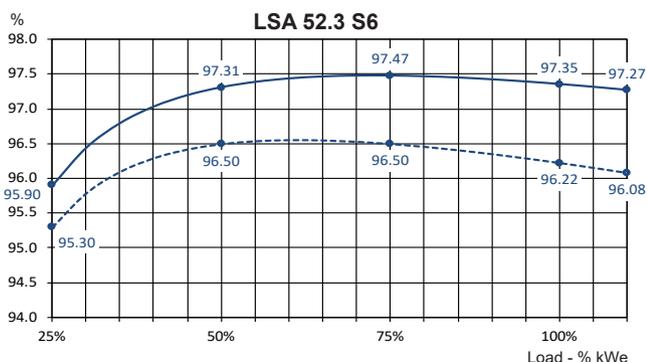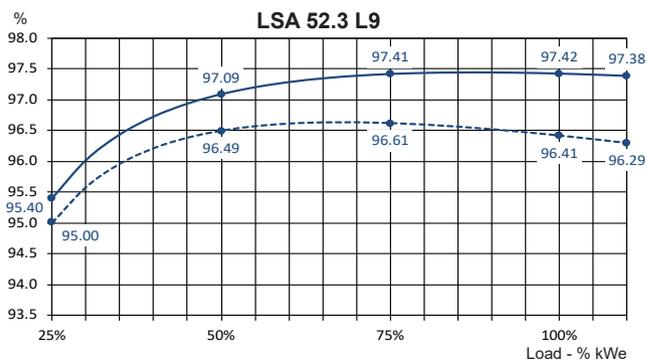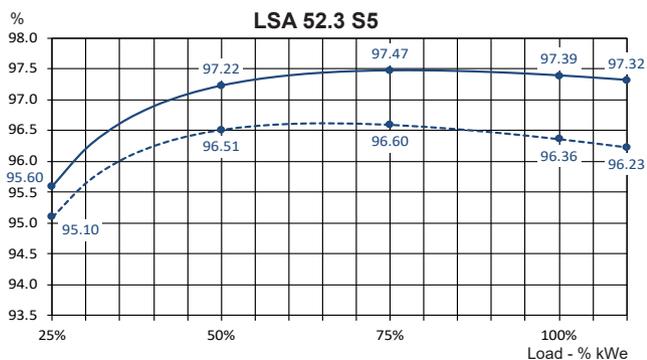
Reactances (%). Time constants (ms) - Class H / 480 V

		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

		S5	S6	S7	L9	L12	UL16
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

LEROY-SOMER™

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

kVA at P.F. = 0.8

kVA at P.F. = 0.6

kVA at P.F. = 0

kVA at P.F. = 0.4
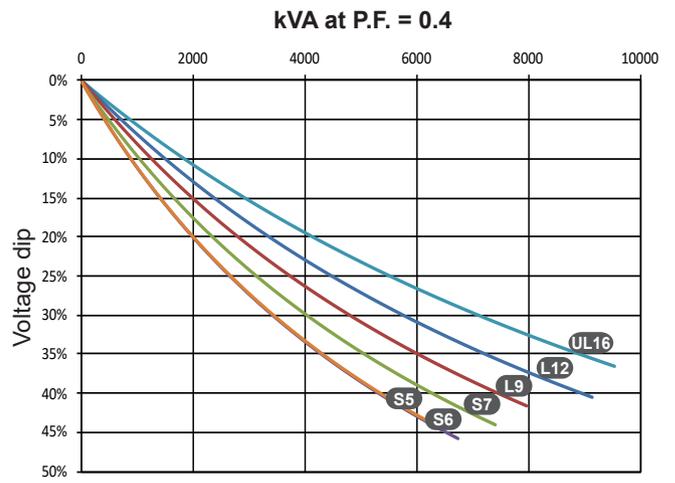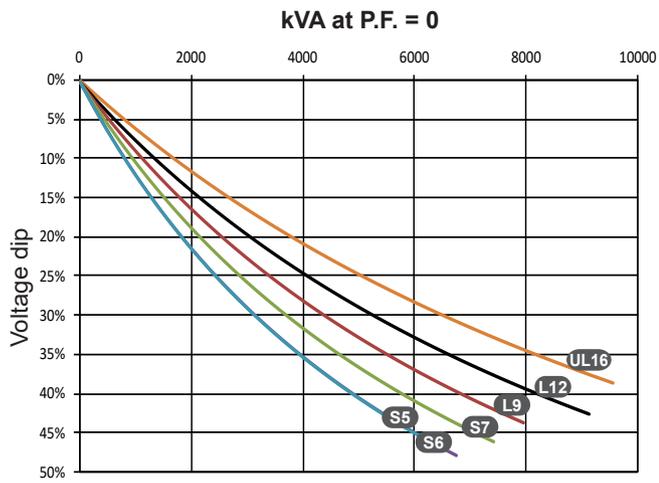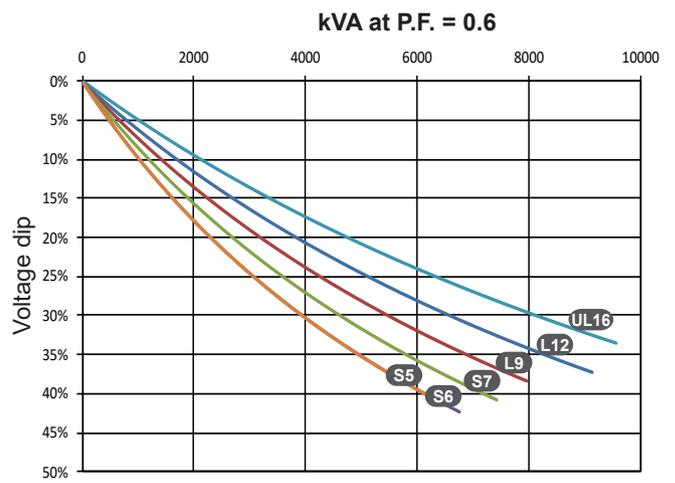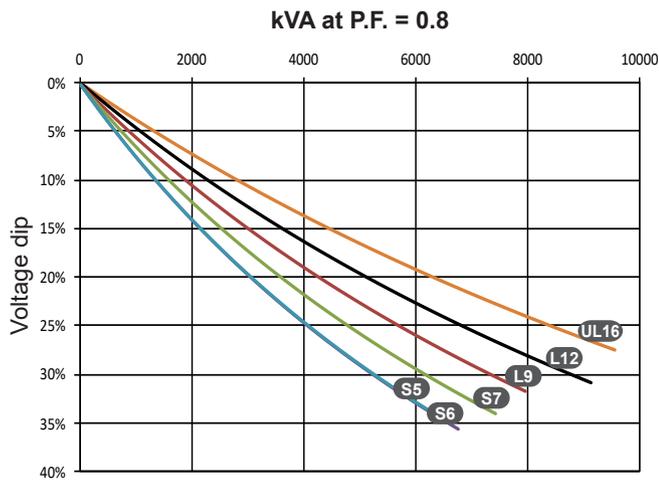
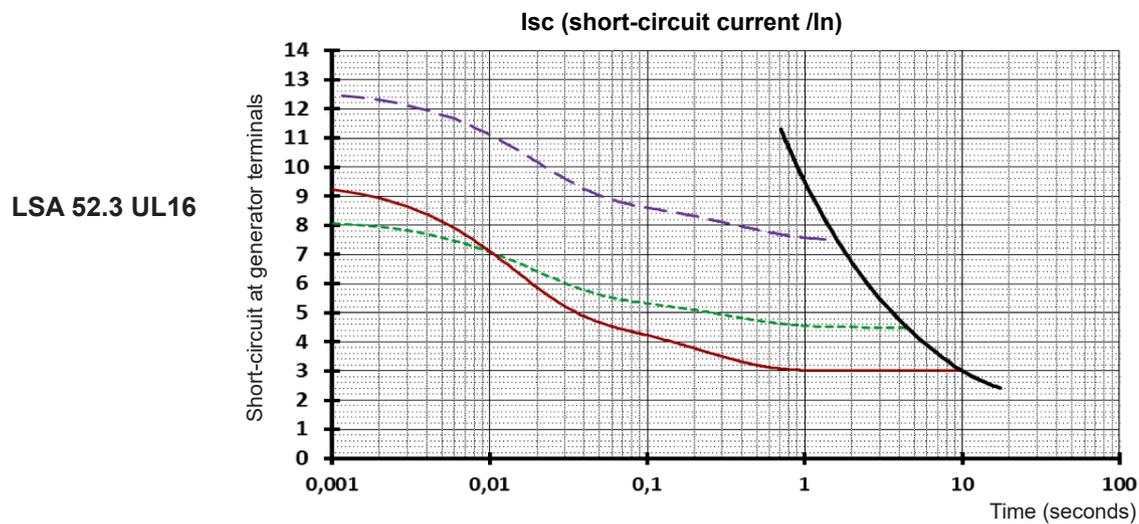## Transient voltage variation at load rejection: 480V - 60 Hz
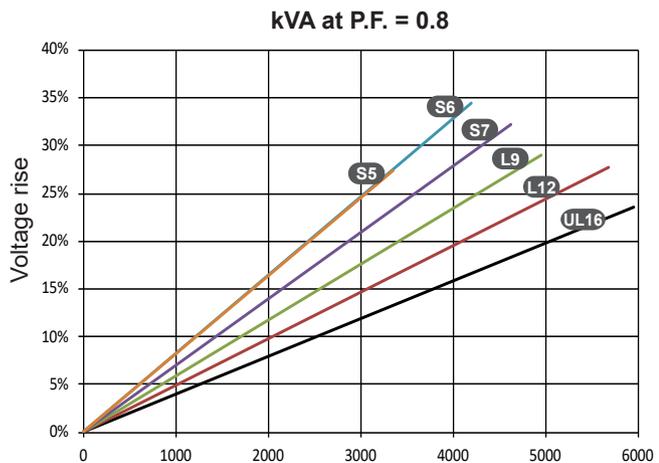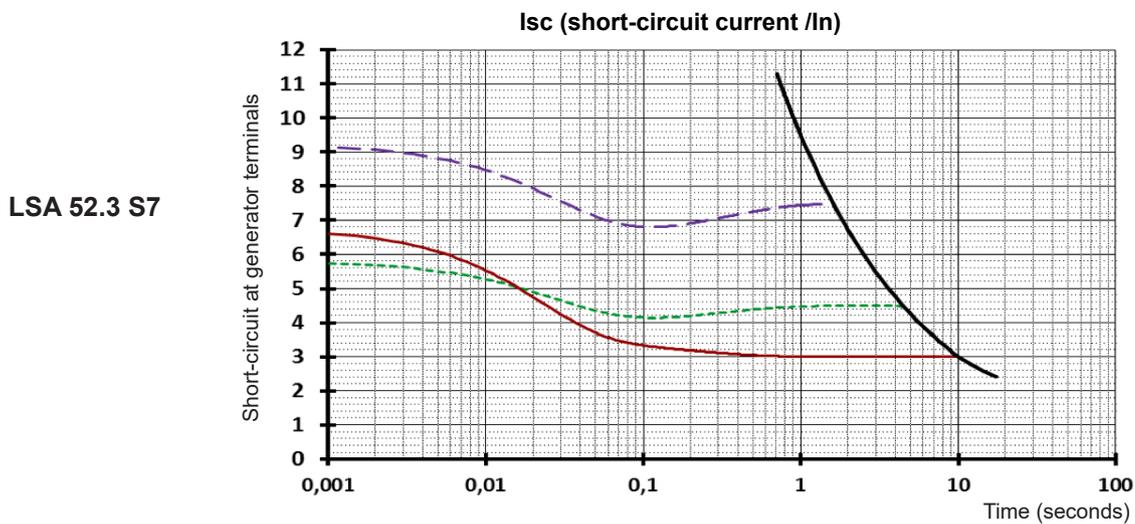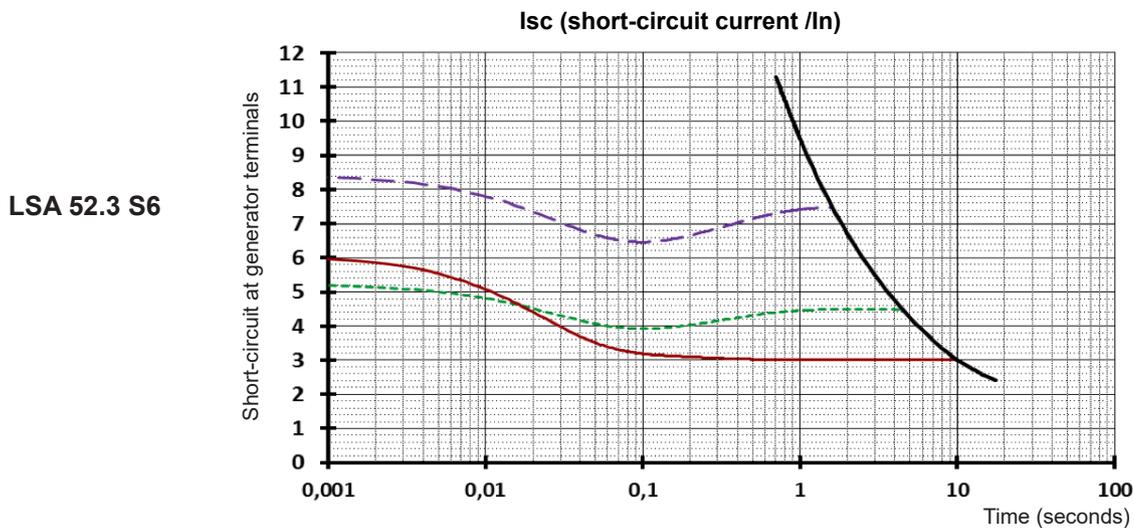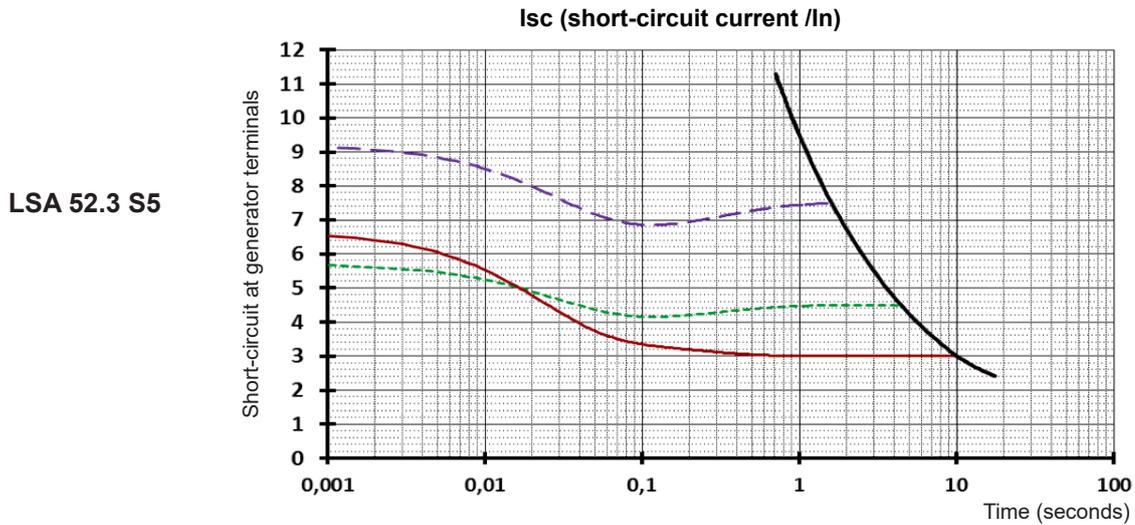
kVA at P.F. = 0.8

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

LSA 52.3 S5

Isc (short-circuit current /In)

LSA 52.3 S6

Isc (short-circuit current /In)

LSA 52.3 S7

Isc (short-circuit current /In)

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

LEROY-SOMER™

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

LSA 52.3 L9

Isc (short-circuit current /In)

LSA 52.3 L12

Isc (short-circuit current /In)

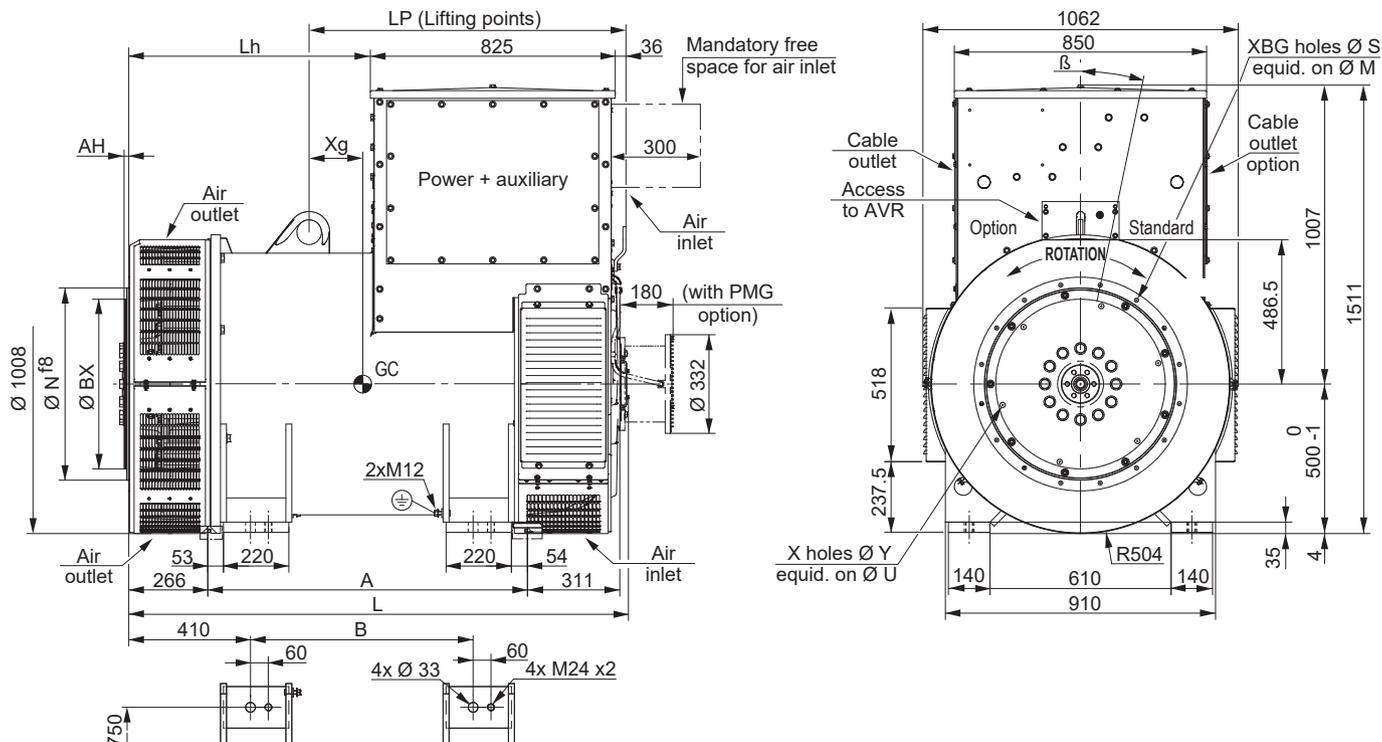**LSA 52.3 UL16**

Isc (short-circuit current /In)
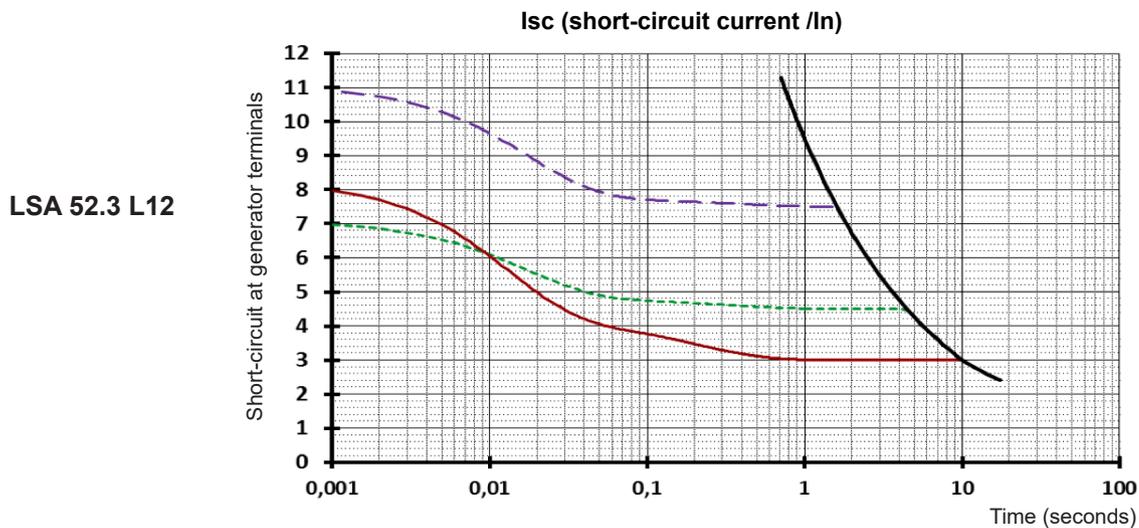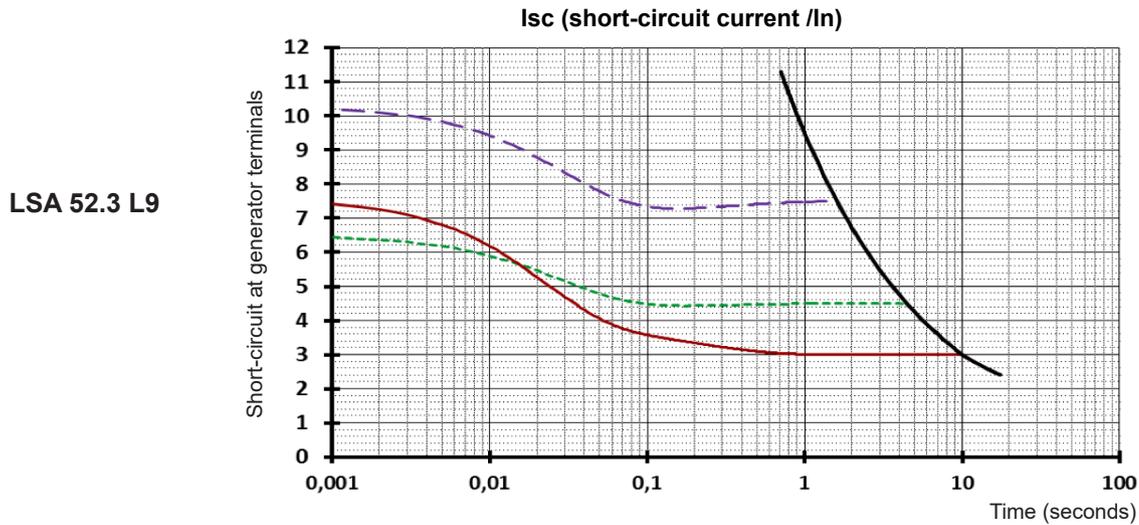
– – – Symetrical phase to neutral short-circuit
- - - Symetrical two-phase short-circuit
——— Symetrical three-phase short-circuit
——— Thermal limit curve

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

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

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

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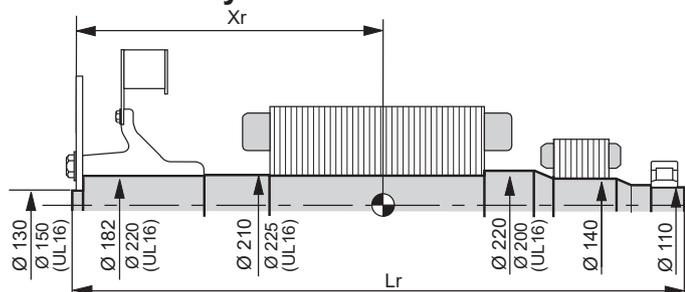
Centre of gravity: Xr (mm), Rotor length: Lr (mm), Weight: M (kg), Moment of inertia: J (kgm²) : (4J = MD²)

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
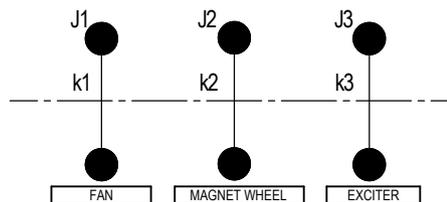
Type	S.A.E.	Torsional rigidity					
		[Nm/rad]			(kg.m²)		
		k1	k2	k3	J1	J2	J3
S5/S6	18	5.47 10E7	2.98 10E7	1.60 10E7	9.5	31.1	1.5
	21	6.66 10E7	2.98 10E7	1.60 10E7	10.4	31.1	1.5
S7	18	5.47 10E7	2.92 10E7	1.68 10E7	9.5	34.7	1.4
	21	6.66 10E7	2.92 10E7	1.68 10E7	10.4	34.7	1.4
L9	18	5.47 10E7	2.83 10E7	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 Nidec Power website, 3D drawing files are available upon request.
The torsional analysis of the transmission is imperative. All values are available upon request.
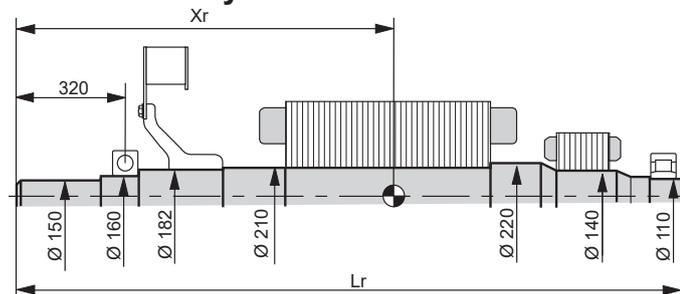
LEROY-SOMER™

Two-bearing dimensions
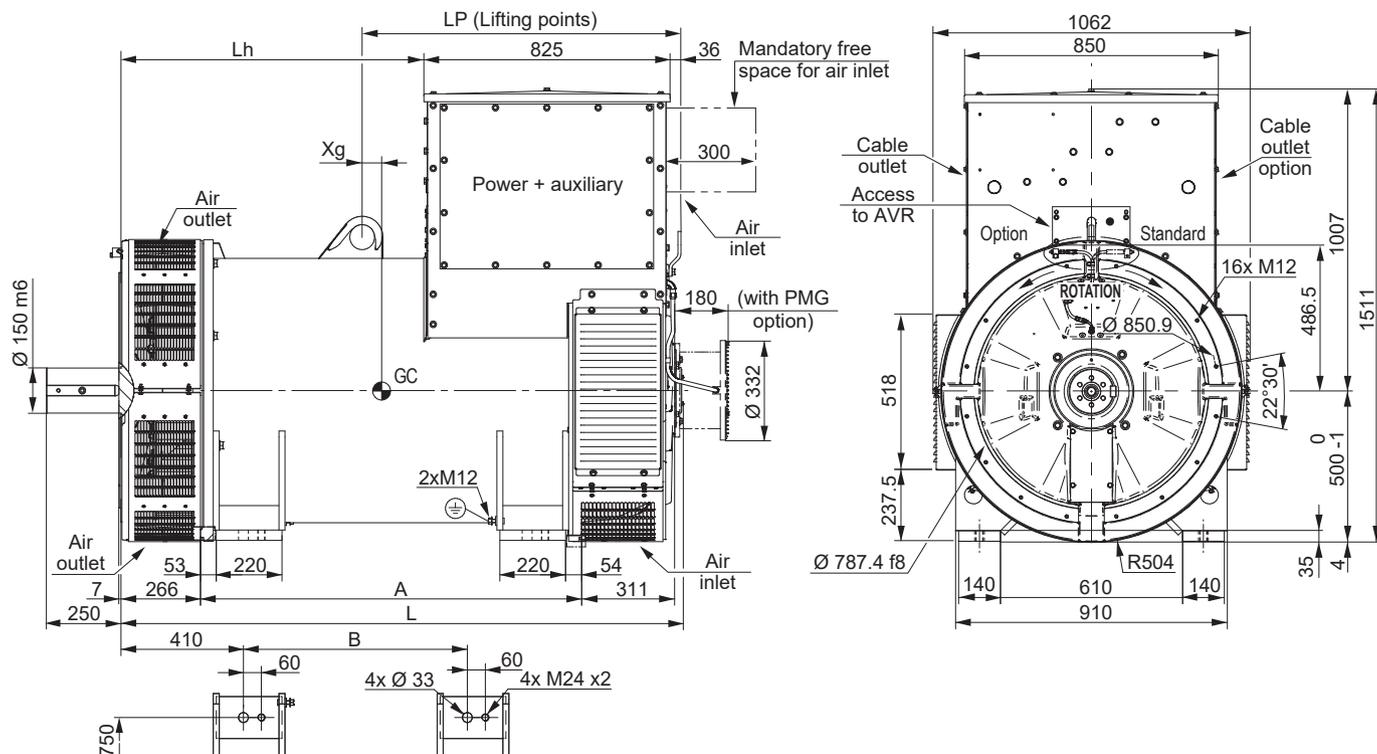
Dimensions (mm) and weight (kg)

Type	L	B	A	Lh	LP	Xg	Weight
LSA 52.3 S5/S6	1683	750	1077	814	1067.5	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

Torsional analysis data

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

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
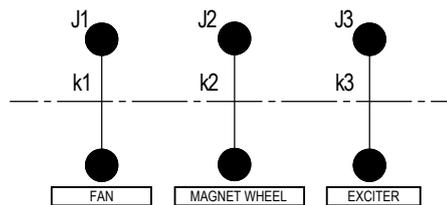
Torsional rigidity

	[Nm/rad]			(kg.m²)		
	k1	k2	k3	J1	J2	J3
LSA 52.3 S5/S6	1.79 E+7	3.79 E+7	1.60 E+7	7.8	31.1	1.5
LSA 52.3 S7	1.79 E+7	3.68 E+7	1.68 E+7	7.8	34.7	1.5
LSA 52.3 L9	1.79 E+7	3.54 E+7	1.51 E+7	7.8	40	1.6
LSA 52.3 L12	1.79 E+7	3.36 E+7	1.67 E+7	7.8	47.2	1.5
LSA 52.3 UL16	1.79 E+7	3.13 E+7	1.32 E+7	7.8	57.5	1.3

NOTE : Dimensions are for information only and may be subject to modifications. Contractual 2D drawings can be downloaded from the Nidec Power website, 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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