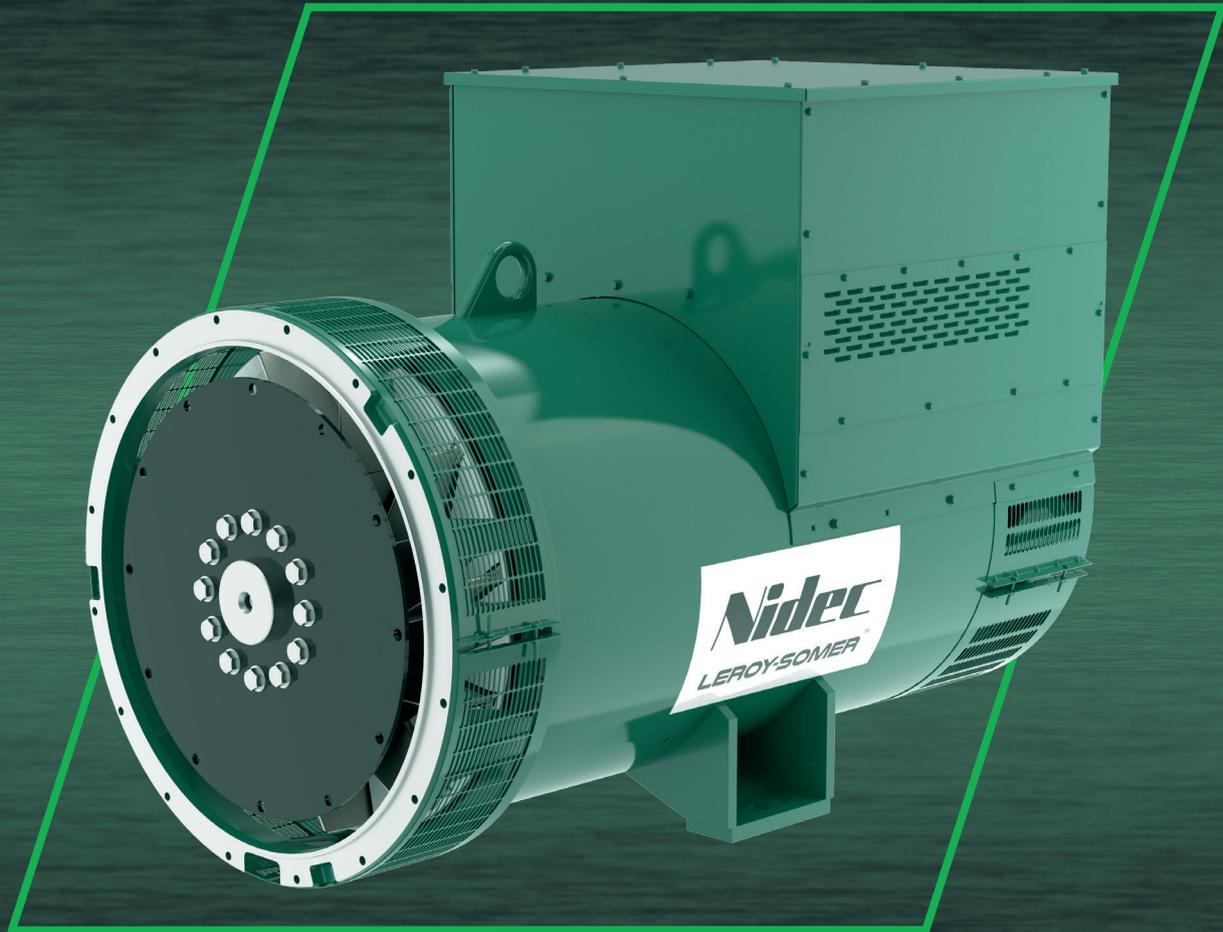# LSA 50.2

Low Voltage Alternator - 4 poles

1100 to 1640 kVA - 50 Hz / 1250 to 2000 kVA - 60 Hz

Electrical and mechanical data

LEROY-SOMER™

LSA 50.2

The best of performance

The Leroy-Somer™ LSA 50.2 alternator has been designed to offer you the best power generation performances.
With its meticulous design and optimized architecture, the LSA 50.2 strikes the perfect balance between compactness, reliability, performance and longevity.
Whatever your application, the Leroy-Somer™ LSA 50.2 alternator will meet your needs and will adapt to all situations.

Standards

The Leroy-Somer™ LSA 50.2 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 50.2 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) reconnectable or 12-wire (6) optional
- Voltage range:
  - 50 Hz: 220V - 240V and 380V - 415V (440V)
  - 60 Hz: 208V - 240V and 380V - 480V
- High efficiency and motor starting capacity
- Other voltages are possible with optional adapted windings:
  - 50 Hz: 440V (no. 7), 500V (no. 9), 550V (no. 22 or 23), 600V (no. 22 or 23), 690V (no. 52)
  - 60 Hz: 380V and 416V (no. 8), 600V (no. 9), 690V (no. 22 or 23)

Excitation and regulation system

Excitation system			Regulation options		
AVR	**AREP**	**PMG** (option)	**C.T. Current transformer for paralleling**	**Mains paralleling**	**Remote voltage potentiometer**
D350	Standard	Standard	√		√
D550	Option	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%
  - Space heater
  - Thermal protection for stator windings and shields

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
- Greased for life bearings, regreasable bearings (optional)
- Standard direction of rotation: clockwise when looking at the drive end view (for anti-clockwise, derate the machine by 5%)

Terminal box design

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

LEROY-SOMER™

LSA 50.2 - 1100 to 1640 kVA - 50 Hz / 1250 to 2000 kVA - 60 Hz

General characteristics

Insulation class	H	Excitation system	AREP / PMG
Winding pitch	2/3 (wind.6S - 6-wire / wind.6 - 12-wire option)	AVR type	D350
Number of wires	6 (12 option)	Voltage regulation (*)	± 0.25 %
Protection	IP 23	Short-circuit current	300% (3 IN) : 10s
Altitude	≤ 1000 m	Total Harmonic Distortion THD (**) in no-load	< 3.5 %
Overspeed	2250 R.P.M.	Total Harmonic Distortion THD (**) on linear load	< 3.5 %
Air flow	1.8 m³/s (50 Hz) / 2.2 m³/s (60 Hz)	Waveform: NEMA = TIF (**)	< 50

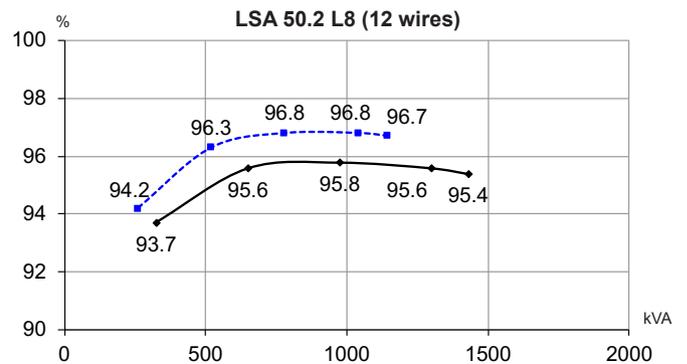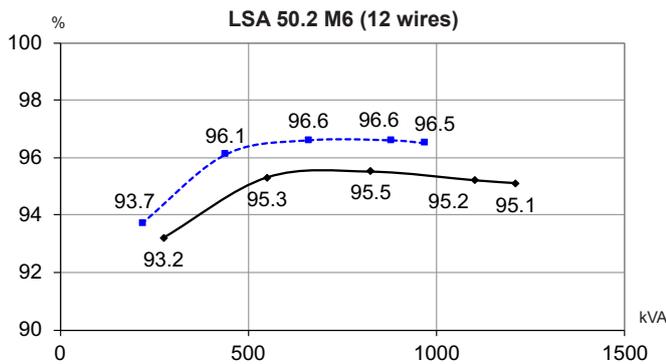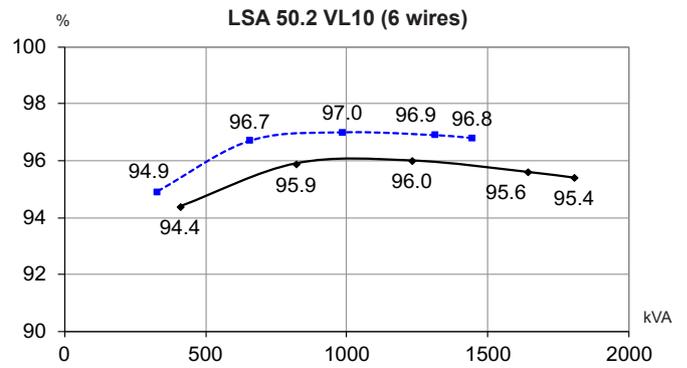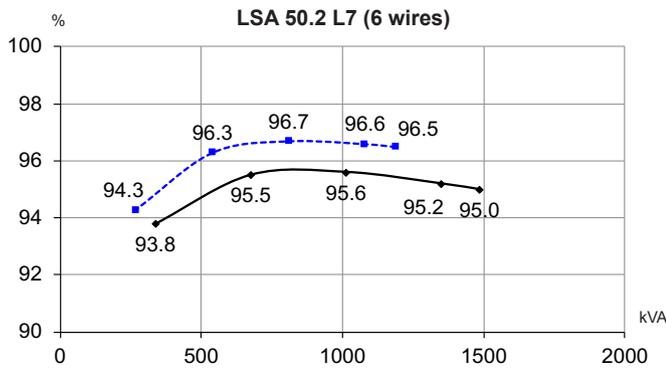(*) Steady state   (**) Total harmonic distortion between phases, no-load or on-load (non-distorting)

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
Δ		220V	**230V**	240V		220V	**230V**	240V		220V	**230V**	240V		220V	**230V**	240V	
6 wires version winding no. 6S																	
LSA 50.2 M6	kVA	1250	**1250**	1250	1190	1125	**1125**	1125	1095	1315	**1315**	1315	1275	1375	**1375**	1375	1330
	kW	*1000*	***1000***	*1000*	*952*	*900*	***900***	*900*	*876*	*1052*	***1052***	*1052*	*1020*	*1100*	***1100***	*1100*	*1064*
LSA 50.2 L7	kVA	1350	**1350**	1350	1260	1215	**1215**	1215	1150	1420	**1420**	1420	1365	1485	**1485**	1485	1425
	kW	*1080*	***1080***	*1080*	*1008*	*972*	***972***	*972*	*920*	*1136*	***1136***	*1136*	*1092*	*1188*	***1188***	*1188*	*1140*
LSA 50.2 L8	kVA	1450	**1500**	1500	1440	1320	**1350**	1350	1320	1520	**1575**	1575	1555	1595	**1650**	1650	1625
	kW	*1160*	***1200***	*1200*	*1152*	*1056*	***1080***	*1080*	*1056*	*1216*	***1260***	*1260*	*1244*	*1276*	***1320***	*1320*	*1300*
LSA 50.2 VL10	kVA	1600	**1640**	1600	1545	1455	**1475**	1455	1420	1680	**1720**	1680	1670	1760	**1800**	1760	1730
	kW	*1280*	***1312***	*1280*	*1236*	*1164*	***1180***	*1164*	*1136*	*1344*	***1376***	*1344*	*1336*	*1408*	***1440***	*1408*	*1384*
12 wires version winding no. 6 (option)																	
Y		380V	**400V**	415V	440V	380V	**400V**	415V	440V	380V	**400V**	415V	440V	380V	**400V**	415V	440V
YY			**200V**		220V		**200V**		220V		**200V**		220V		**200V**		220V
LSA 50.2 M6	kVA	1045	**1100**	1140	1210	940	**990**	1026	1089	1045	**1100**	1140	1210	1045	**1100**	1140	1210
	kW	*836*	***880***	*912*	*968*	*752*	***792***	*821*	*871*	*836*	***880***	*912*	*968*	*836*	***880***	*912*	*968*
LSA 50.2 L8	kVA	1250	**1300**	1350	1430	1125	**1170**	1215	1287	1250	**1300**	1350	1430	1250	**1300**	1350	1430
	kW	*1000*	***1040***	*1080*	*1144*	*900*	***936***	*972*	*1030*	*1000*	***1040***	*1080*	*1144*	*1000*	***1040***	*1080*	*1144*

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**
Δ		220V	240V			220V	240V			220V	240V			220V	240V		
6 wires version winding n°6S																	
LSA 50.2 M6	kVA	1285	1405	1455	**1560**	1155	1265	1310	**1405**	1350	1475	1530	**1640**	1410	1545	1600	**1720**
	kW	*1028*	*1124*	*1164*	***1248***	*924*	*1012*	*1048*	***1124***	*1080*	*1180*	*1224*	***1312***	*1128*	*1236*	*1280*	***1376***
LSA 50.2 L7	kVA	1375	1500	1555	**1680**	1240	1350	1400	**1510**	1440	1575	1630	**1765**	1510	1650	1710	**1850**
	kW	*1100*	*1200*	*1244*	***1344***	*992*	*1080*	*1120*	***1208***	*1152*	*1260*	*1304*	***1412***	*1208*	*1320*	*1368*	***1480***
LSA 50.2 L8	kVA	1485	1625	1720	**1875**	1335	1460	1550	**1685**	1560	1705	1805	**1965**	1630	1785	1890	**2060**
	kW	*1188*	*1300*	*1376*	***1500***	*1068*	*1168*	*1240*	***1350***	*1250*	*1364*	*1444*	***1572***	*1304*	*1428*	*1512*	***1650***
LSA 50.2 VL10	kVA	1635	1785	1860	**2000**	1470	1605	1675	**1800**	1715	1875	1950	**2100**	1800	1965	2050	**2200**
	kW	*1308*	*1428*	*1488*	***1600***	*1176*	*1284*	*1340*	***1440***	*1372*	*1500*	*1560*	***1680***	*1440*	*1572*	*1640*	***1760***
12 wires version winding n°6 (option)																	
Y		380V	416V	440V	**480V**	380V	416V	440V	**480V**	380V	416V	440V	**480V**	380V	416V	440V	**480V**
YY			208V	220V	**240V**		208V	220V	**240V**		208V	220V	**240V**		208V	220V	**240V**
LSA 50.2 S4	kVA	990	1080	1145	**1250**	891	972	1030	**1125**	990	1080	1145	**1250**	990	1080	1145	**1250**
	kW	*792*	*864*	*916*	***1000***	*713*	*778*	*824*	***900***	*792*	*864*	*916*	***1000***	*792*	*864*	*916*	***1000***
LSA 50.2 M6	kVA	1210	1320	1400	**1525**	1089	1188	1260	**1372**	1210	1320	1400	**1525**	1210	1320	1400	**1525**
	kW	*968*	*1056*	*1120*	***1220***	*871*	*950*	*1008*	***1098***	*968*	*1056*	*1120*	***1220***	*968*	*1056*	*1120*	***1220***
LSA 50.2 L8	kVA	1430	1565	1655	**1800**	1287	1409	1490	**1620**	1430	1565	1655	**1800**	1430	1565	1655	**1800**
	kW	*1144*	*1252*	*1324*	***1440***	*1029*	*1127*	*1192*	***1296***	*1144*	*1252*	*1324*	***1440***	*1144*	*1252*	*1324*	***1440***

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

LSA 50.2 M6 (6 wires)

LSA 50.2 L8 (6 wires)

LSA 50.2 L7 (6 wires)

LSA 50.2 VL10 (6 wires)

LSA 50.2 M6 (12 wires)

LSA 50.2 L8 (12 wires)
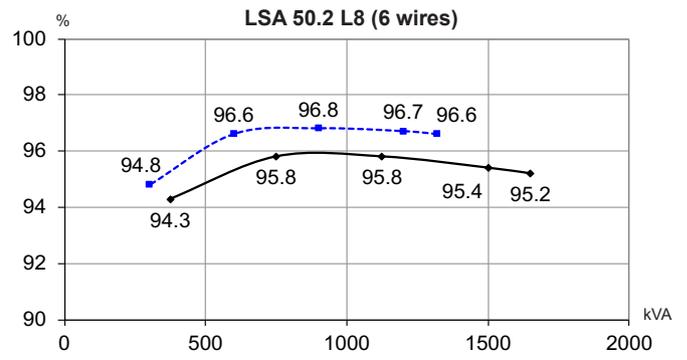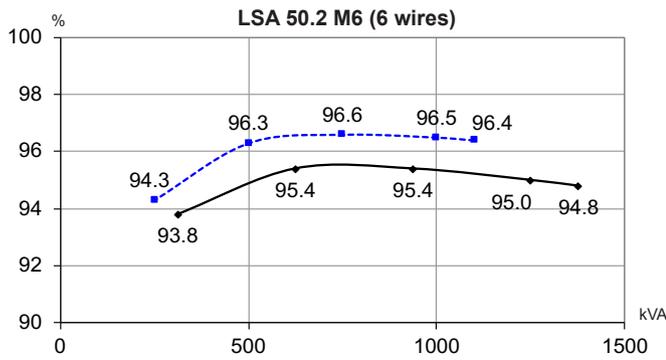
Reactances (%). Time constants (ms) - Class H / 400 V

		M6 (6w)	L7 (6w)	L8 (6w)	VL10 (6w)	M6 (12w)	L8 (12w)
Kcc	Short-circuit ratio	0.32	0.34	0.32	0.33	0.36	0.37
Xd	Direct-axis synchronous reactance unsaturated	392	364	378	362	345	329
Xq	Quadrature-axis synchronous reactance unsaturated	200	185	193	184	176	168
T'do	No-load transient time constant	3634	3750	3910	4058	3634	4247
X'd	Direct-axis transient reactance saturated	29.1	26.2	26.1	24.1	25.6	20.9
T'd	Short-circuit transient time constant	180	180	180	180	180	180
X"d	Direct-axis subtransient reactance saturated	16.5	14.8	14.8	13.6	14.5	11.8
T"d	Subtransient time constant	18	18	18	18	18	18
X"q	Quadrature-axis subtransient reactance saturated	17.3	15.5	15.4	14.2	15.2	13.4
Xo	Zero sequence reactance	0.8	0.72	0.72	0.66	0.71	0.58
X2	Negative sequence reactance saturated	16.92	15.21	15.14	13.94	14.89	12.67
Ta	Armature time constant	27	27	27	27	27	27

Other class H/400 V data

		M6 (6w)	L7 (6w)	L8 (6w)	VL10 (6w)	M6 (12w)	L8 (12w)
io (A)	No-load excitation current	0.82	0.85	0.78	0.78	0.82	0.79
ic (A)	On-load excitation current	3.6	3.48	3.38	3.26	3.21	3.02
uc (V)	On-load excitation voltage	45.2	43.7	42.4	40.8	40.4	37.9
ms	Response time (ΔU = 20% transient)	500	500	500	500	500	500
kVA	Start (ΔU = 20% cont. or 30% trans.)	2763	3324	3704	4387	2765	4003
%	Transient ΔU (on-load 4/4) - P.F.: 0.8 LAG	13.6	12.5	12.5	11.7	12.3	10.5
W	No-load losses	14039	15299	15454	16552	14039	15322
W	Heat dissipation	52218	53790	57594	59458	43714	47854

LEROY-SOMER™

Transient voltage variation 400V - 50 Hz
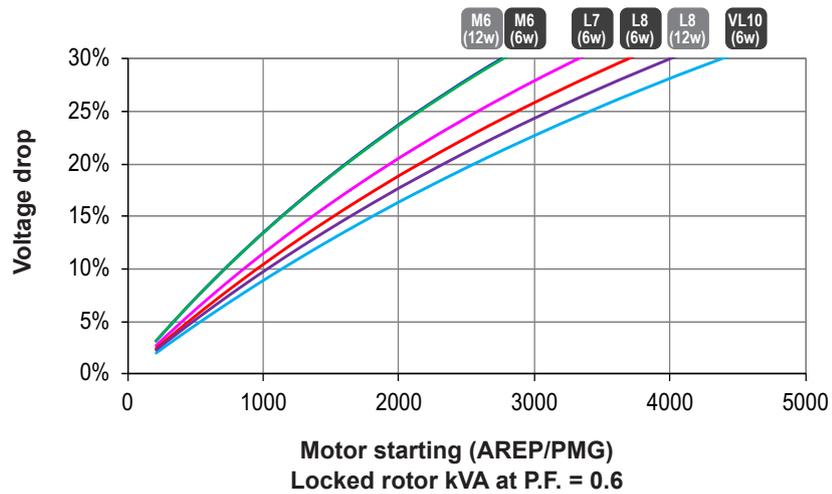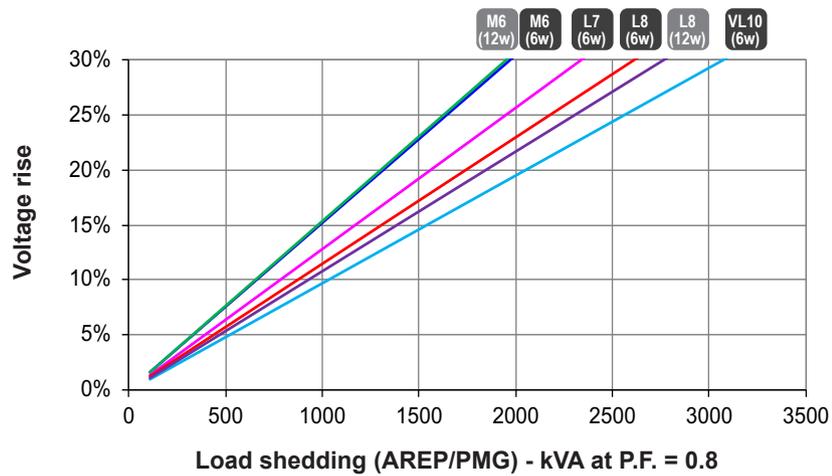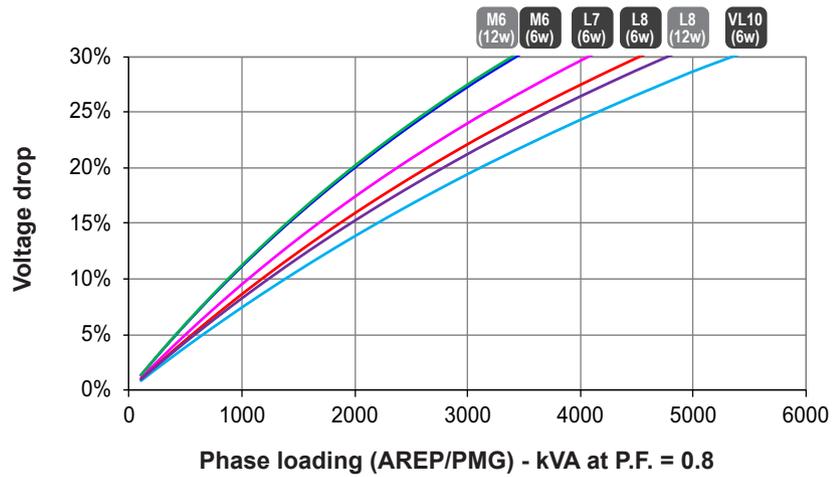
M6 (12w) M6 (6w) L7 (6w) L8 (6w) L8 (12w) VL10 (6w)

Voltage drop vs. Phase loading (AREP/PMG) - kVA at P.F. = 0.8

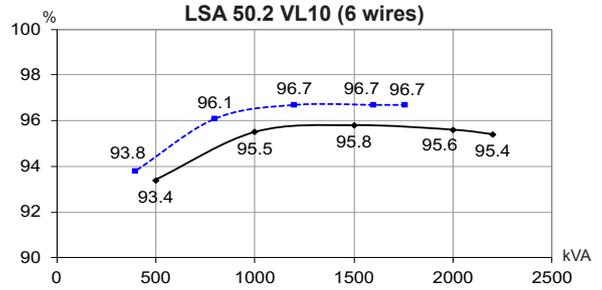M6 (12w) M6 (6w) L7 (6w) L8 (6w) L8 (12w) VL10 (6w)

Voltage rise vs. Load shedding (AREP/PMG) - kVA at P.F. = 0.8

M6 (12w) M6 (6w) L7 (6w) L8 (6w) L8 (12w) VL10 (6w)

Voltage drop vs. Motor starting (AREP/PMG)
Locked rotor kVA at P.F. = 0.6

1) For a starting P.F. other than 0.6, the starting kVA must be multiplied by K = Sine P.F. / 0.8
2) For voltages other than 400V (Y), 230V(Δ) at 50 Hz, then kVA must be multiplied by $(400/U)^2$ or $(230/U)^2$.

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

LSA 50.2 M6 (6 wires)

LSA 50.2 L8 (6 wires)

LSA 50.2 L7 (6 wires)

LSA 50.2 VL10 (6 wires)

LSA 50.2 S4 (12 wires)

LSA 50.2 M6 (12 wires)

LSA 50.2 L8 (12 wires)
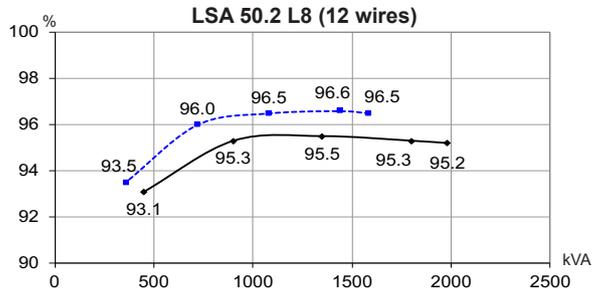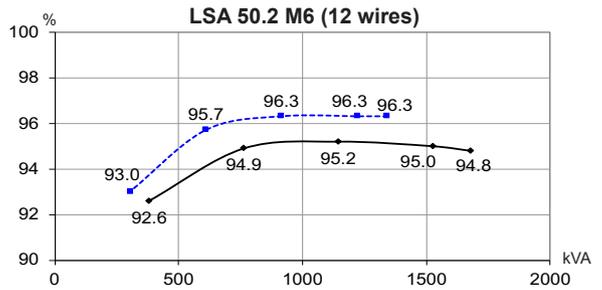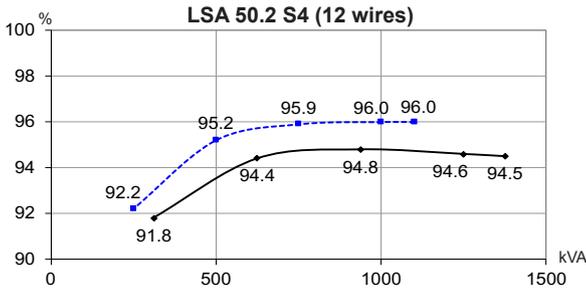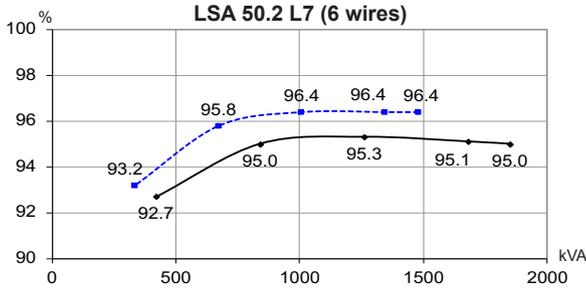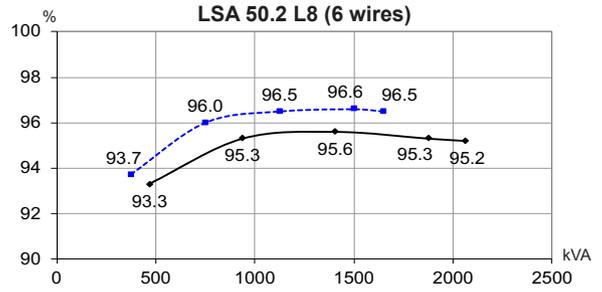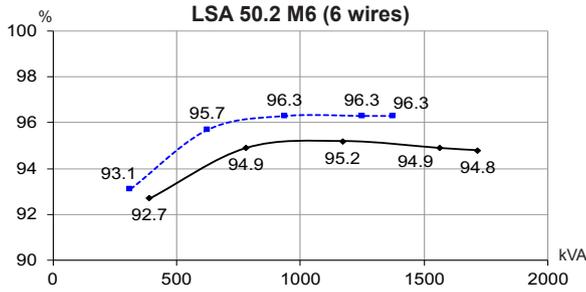
Reactances (%). Time constants (ms) - Class H / 480 V

		M6 (6w)	L7 (6w)	L8 (6w)	VL10 (6w)	S4 (12w)	M6 (12w)	L8 (12w)
Kcc	Short-circuit ratio	0.31	0.33	0.3	0.32	0.3	0.31	0.32
Xd	Direct-axis synchronous reactance unsaturated	407	377	394	368	394	398	380
Xq	Quadrature-axis synchronous reactance unsaturated	208	192	201	187	201	203	193
T'do	No-load transient time constant	3634	3750	3910	4058	3411	3634	4247
X'd	Direct-axis transient reactance saturated	30.3	27.2	27.2	24.5	31.2	29.6	24.1
T'd	Short-circuit transient time constant	180	180	180	180	180	180	180
X"d	Direct-axis subtransient reactance saturated	17.1	15.4	15.4	13.8	17.7	16.7	13.7
T"d	Subtransient time constant	18	18	18	18	18	18	18
X"q	Quadrature-axis subtransient reactance saturated	18	16.1	16.1	14.4	18.6	17.6	15.5
Xo	Zero sequence reactance	0.84	0.75	0.75	0.68	0.86	0.82	0.67
X2	Negative sequence reactance saturated	17.6	15.78	15.77	14.17	18.19	17.21	14.62
Ta	Armature time constant	27	27	27	27	27	27	27

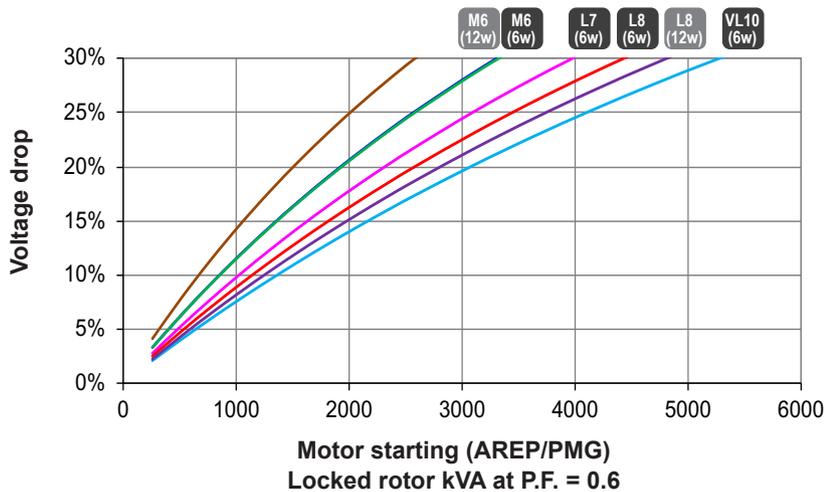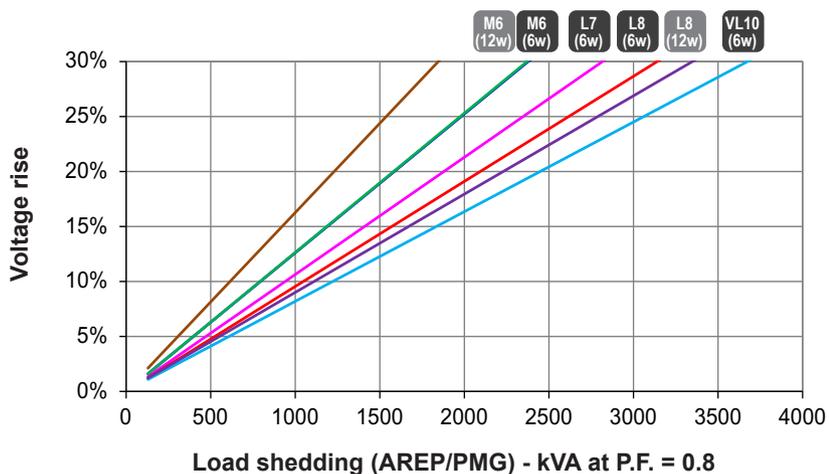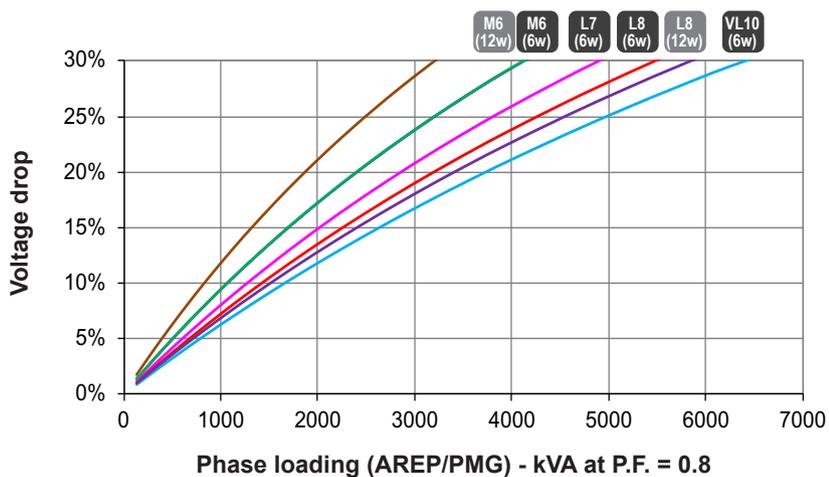### Other class H/480 V data

io (A)	No-load excitation current	0.82	0.85	0.78	0.78	0.78	0.82	0.79
ic (A)	On-load excitation current	3.69	3.56	3.47	3.27	3.49	3.61	3.38
uc (V)	On-load excitation voltage	46.4	44.8	43.6	41	44	45.5	42.5
ms	Response time (ΔU = 20% transient)	500	500	500	500	500	500	500
kVA	Start (ΔU = 20% cont. or 30% trans.)	3305	3977	4433	5272	2578	3321	4803
%	Transient ΔU (on-load 4/4) - P.F.: 0.8 LAG	14	12.9	12.9	11.9	14.3	13.7	11.7
W	No-load losses	22080	23864	24115	25675	20444	22080	23916
W	Heat dissipation	65871	67848	72952	73168	56038	63910	69953

LEROY-SOMER™

Transient voltage variation 480V - 60 Hz

M6 (12w)   M6 (6w)   L7 (6w)   L8 (6w)   L8 (12w)   VL10 (6w)

Voltage drop

Phase loading (AREP/PMG) - kVA at P.F. = 0.8

M6 (12w)   M6 (6w)   L7 (6w)   L8 (6w)   L8 (12w)   VL10 (6w)

Voltage rise

Load shedding (AREP/PMG) - kVA at P.F. = 0.8

M6 (12w)   M6 (6w)   L7 (6w)   L8 (6w)   L8 (12w)   VL10 (6w)

Voltage drop

Motor starting (AREP/PMG)
Locked rotor kVA at P.F. = 0.6

1) For a starting P.F. other than 0.6, the starting kVA must be multiplied by K = Sine P.F. / 0.8
2) For voltages other than 480V (Y), 277V (Δ), 240V (YY) at 60 Hz, then kVA must be multiplied by $(480/U)^2$ or $(277/U)^2$ or $(240/U)^2$.

3-phase short-circuit curves at no load and rated speed (star connection Y)

**LSA 50.2 M6
(6 wires)**

Symmetrical ——
Asymmetrical - - -
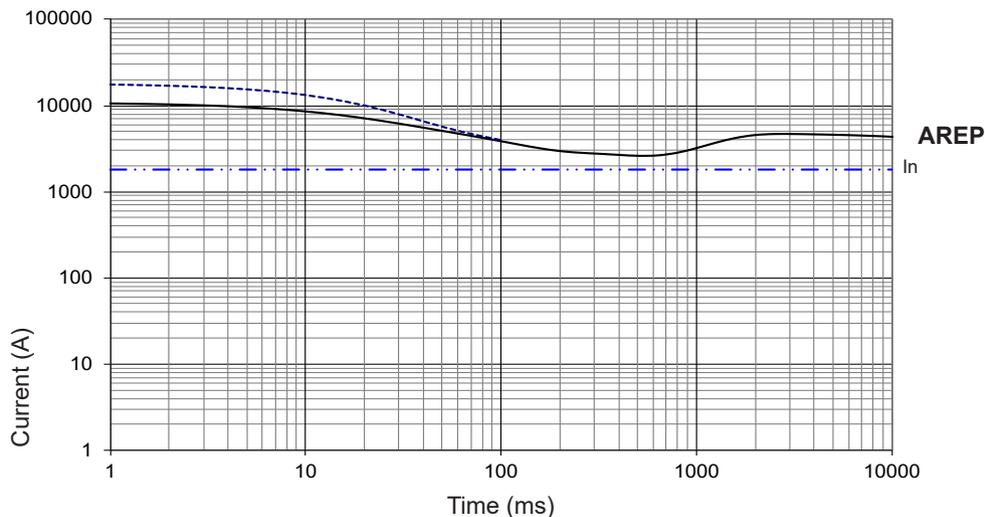
**LSA 50.2 L7
(6 wires)**

Symmetrical ——
Asymmetrical - - -
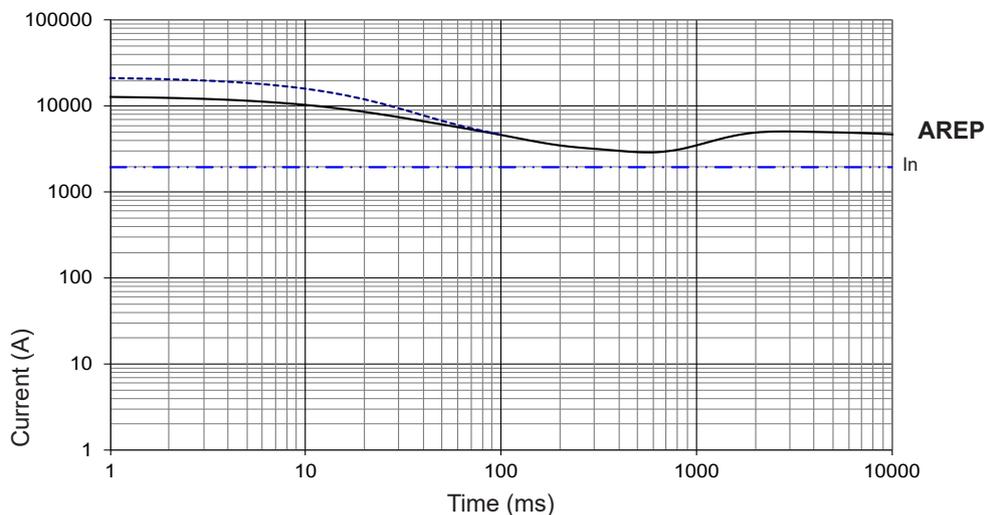
**LSA 50.2 L8
(6 wires)**

Symmetrical ——
Asymmetrical - - -
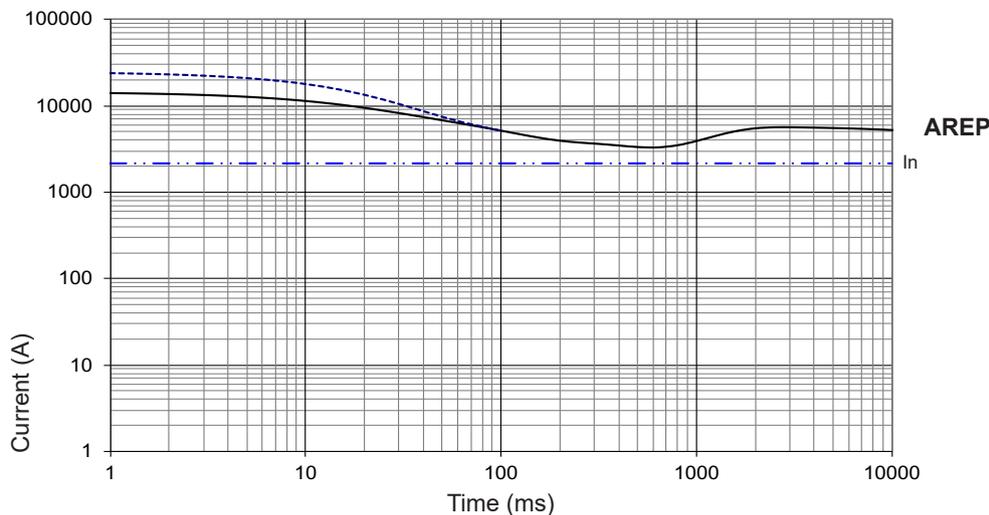
Influence due to connection
Curves shown are for star (Y) connection.
For other connections, use the following multiplication factors:
 - Series delta : current value x 1.732 - Parallel star : current value x 2

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3-phase short-circuit curves at no load and rated speed (star connection Y)

**LSA 50.2 VL10
(6 wires)**

Symmetrical ——
Asymmetrical - - -
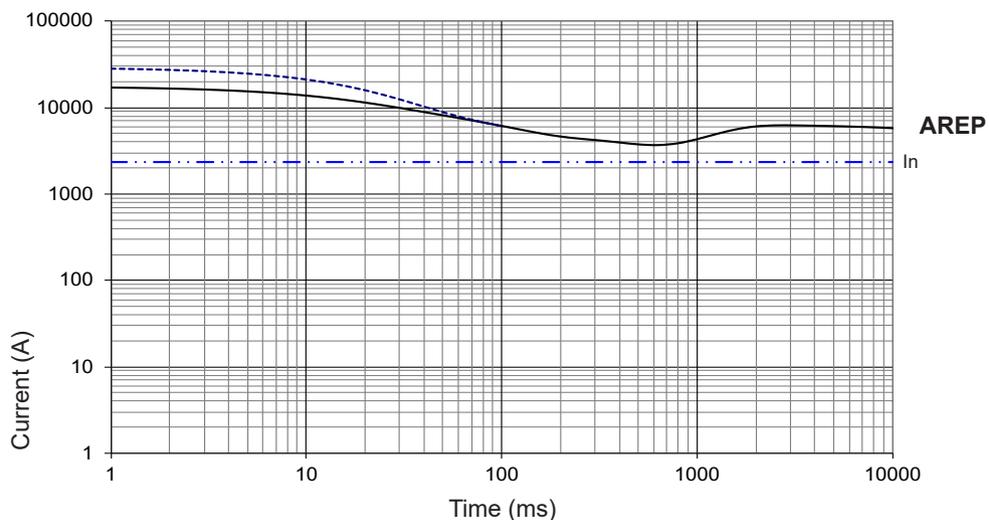
**LSA 50.2 M6
(12 wires)**

Symmetrical ——
Asymmetrical - - -
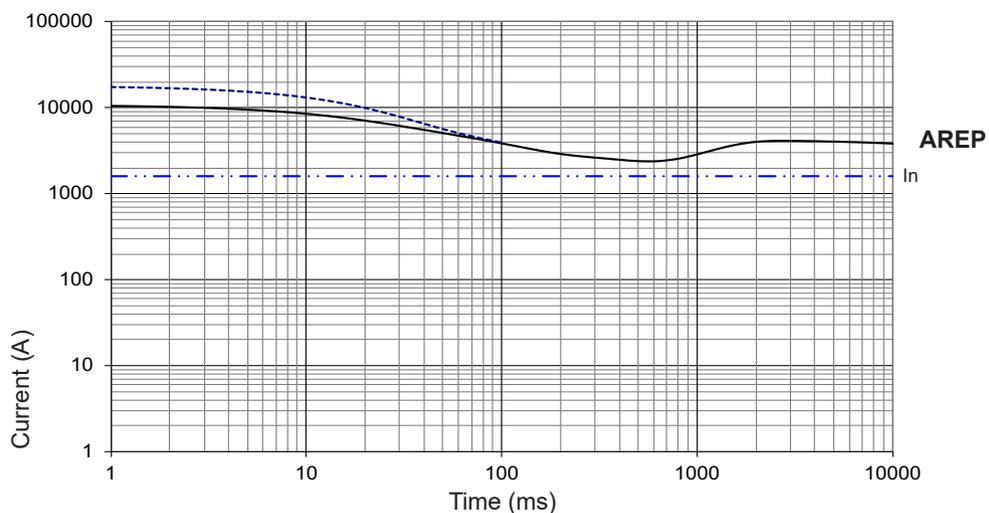
**LSA 50.2 L8
(12 wires)**

Symmetrical ——
Asymmetrical - - -
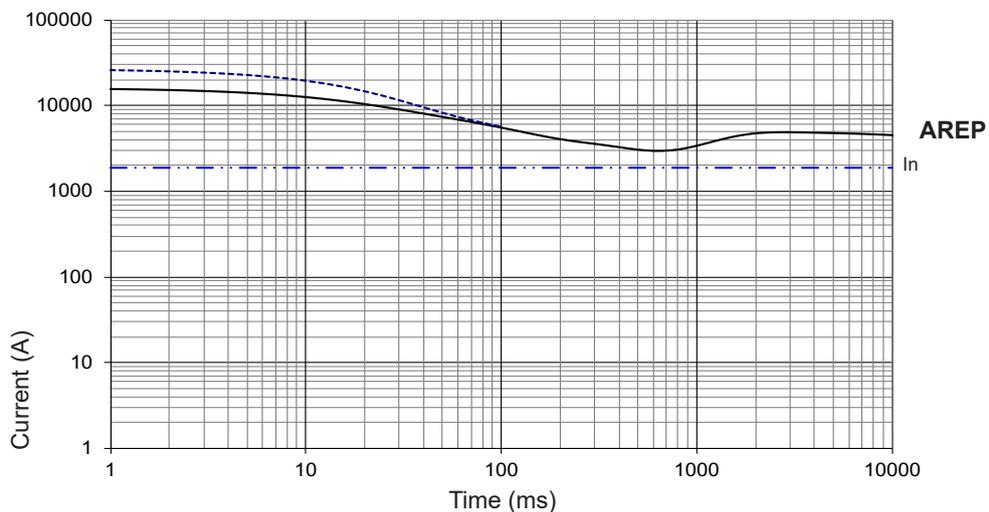
Influence due to short-circuit
Curves are based on a three-phase short-circuit.
For other types of short-circuit, use the following multiplication factors.

	3-phase	2-phase L/L	1-phase L/N
Instantaneous (max.)	1	0.87	1.3
Continuous	1	1.5	2.2
Maximum duration (AREP/PMG)	10 sec.	5 sec.	2 sec.

Single-bearing dimensions

Dimensions (mm) and weight				
Type	L without PMG maxi*	LB	Xg	Weight (kg)
LSA 50.2 S4	1302	1278	620	2290
LSA 50.2 M6	1402	1378	640	2490
LSA 50.2 L7	1502	1478	690	2760
LSA 50.2 L8	1502	1478	710	2980
LSA 50.2 VL10	1602	1578	760	3260

* L maxi = LB + AH maxi + 8

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

Flange (mm)					
S.A.E.	P	N	M	XBG	β°
0	880	647.7	679.5	16	14
00	880	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	15.7

Torsional analysis data

Centre of gravity: Xr (mm), Rotor length: Lr (mm), Weight: M (kg), Moment of inertia: J (kgm²): (4J = MD²)								
Flange	S.A.E. 18				S.A.E. 21			
Type	Xr	Lr	M	J	Xr	Lr	M	J
LSA 50.2 S4	564	1320.5	833	18.17	549	1320.5	831	18.62
LSA 50.2 M6	608	1420.5	934	20.6	593	1420.5	932	21.09
LSA 50.2 L7	643	1520.5	1005	22.23	627	1520.5	1003	22.68
LSA 50.2 L8	667	1520.5	1082	24.6	652	1520.5	1081	25.05
LSA 50.2 VL10	714	1620.5	1192	27.27	698	1620.5	1191	27.72

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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Two-bearing dimensions

Dimensions (mm) and weight				
Type	L without PMG	LB	Xg	Weight (kg)
LSA 50.2 S4	1488	1278	600	2330
LSA 50.2 M6	1588	1378	620	2530
LSA 50.2 L7	1688	1478	670	2800
LSA 50.2 L8	1688	1478	690	3010
LSA 50.2 VL10	1788	1578	740	3300

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 50.2 S4	567	1509	800	17.24
LSA 50.2 M6	610	1609	900	19.71
LSA 50.2 L7	645	1709	971	21.29
LSA 50.2 L8	668	1709	1049	23.66
LSA 50.2 VL10	715	1809	1159	26.33

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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