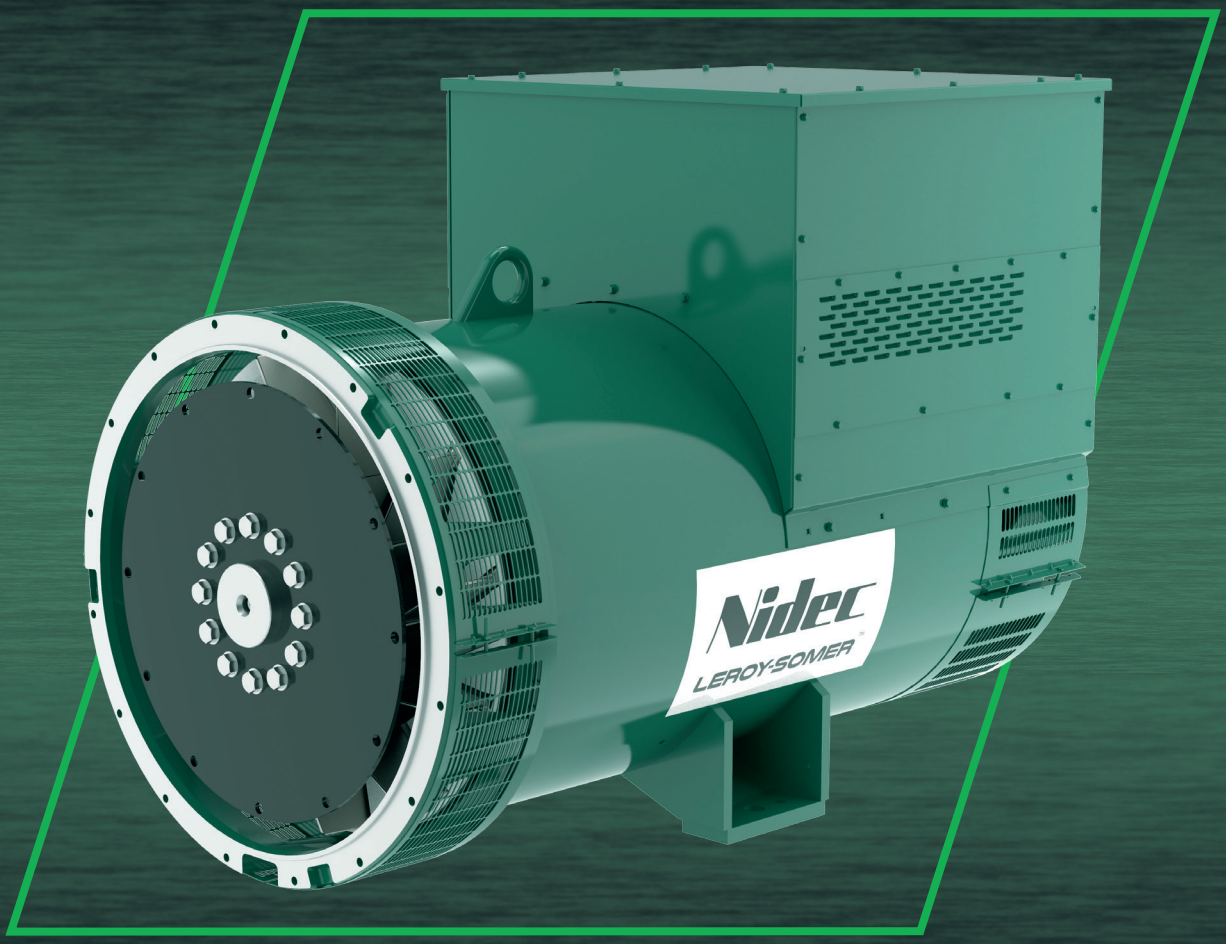
Nidec

Power



LSA 50.2

Low Voltage Alternator - 4 poles

1 100 to 1 640 kVA - 50 Hz / 1 525 to 2 000 kVA - 60 Hz

Electrical and mechanical data

LEROY-SOMER™

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 such as IEC 60034, NEMA MG 1.32-33, ISO 8528-3, CSA C22.2 n°100-14, UL 1446, UL 1004-1 and UL 1004-4.
EC, UKCA, CMIM, CSA, UL 1446, UL recognized and UL listed declarations and certifications are available for the LSA 50.2.
The standards IEC 61000-6-2, IEC 61000-6-3, IEC 61000-6-4, VDE 0875G, VDE 0875N and EN 55011 allow compliance with group 1 class A for the European zone.
The Leroy-Somer™ LSA 50.2 alternator 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

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	≤ 1 000 m	Total Harmonic Distortion THD (**) in no-load	< 3.5 %
Overspeed	2 250 R.P.M.	Total Harmonic Distortion THD (**) on linear load	< 3.5 %
Air flow	1.8 m^3/s (50 Hz) / 2.2 m^3/s (60 Hz)	Waveform: NEMA = TIF (**)	< 50

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

Ratings 50 Hz - 1 500 R.P.M.

kVA / kW - P.F. = 0.8

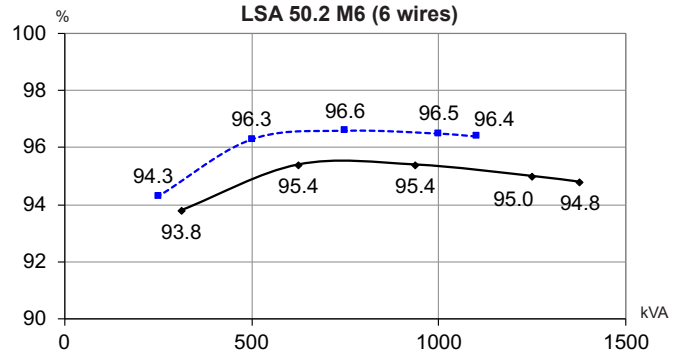
Duty/T°C		Continuous duty/40°C				Continuous duty/40°C				Stand-by/40°C				Stand-by/27°C			
Class/T°K		H/125°K				F/105°K				H/150°K				H/163°K			
Phase		3 ph.				3 ph.				3 ph.				3 ph.			
Y		380V	**400V**	415V	440V	380V	**400V**	415V	440V	380V	**400V**	415V	440V	380V	**400V**	415V	440V
Δ		220V	**230V**	240V		220V	**230V**	240V		220V	**230V**	240V		220V	**230V**	240V	
6 wires version winding no. 6S																	
LSA 50.2 M6	kVA	1 250	**1 250**	1 250	1 190	1 125	**1 125**	1 125	1 095	1 315	**1 315**	1 315	1 275	1 375	**1 375**	1 375	1 330
	kW	*1 000*	***1 000***	*1 000*	*952*	*900*	***900***	*900*	*876*	*1 052*	***1 052***	*1 052*	*1 020*	*1 100*	***1 100***	*1 100*	*1 064*
LSA 50.2 L7	kVA	1 350	**1 350**	1 350	1 260	1 215	**1 215**	1 215	1 150	1 420	**1 420**	1 420	1 365	1 485	**1 485**	1 485	1 425
	kW	*1 080*	***1 080***	*1 080*	*1 008*	*972*	***972***	*972*	*920*	*1 136*	***1 136***	*1 136*	*1 092*	*1 188*	***1 188***	*1 188*	*1 140*
LSA 50.2 L8	kVA	1 450	**1 500**	1 500	1 440	1 320	**1 350**	1 350	1 320	1 520	**1 575**	1 575	1 555	1 595	**1 650**	1 650	1 625
	kW	*1 160*	***1 200***	*1 200*	*1 152*	*1 056*	***1 080***	*1 080*	*1 056*	*1 216*	***1 260***	*1 260*	*1 244*	*1 276*	***1 320***	*1 320*	*1 300*
LSA 50.2 VL10	kVA	1 600	**1 640**	1 600	1 545	1 455	**1 475**	1 455	1 420	1 680	**1 720**	1 680	1 670	1 760	**1 800**	1 760	1 730
	kW	*1 280*	***1 312***	*1 280*	*1 236*	*1 164*	***1 180***	*1 164*	*1 136*	*1 344*	***1 376***	*1 344*	*1 336*	*1 408*	***1 440***	*1 408*	*1 384*
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	1 045	**1 100**	1 140	1 210	940	**990**	1 026	1 089	1 045	**1 100**	1 140	1 210	1 045	**1 100**	1 140	1 210
	kW	*836*	***880***	*912*	*968*	*752*	***792***	*821*	*871*	*836*	***880***	*912*	*968*	*836*	***880***	*912*	*968*
LSA 50.2 L8	kVA	1 250	**1 300**	1 350	1 430	1 125	**1 170**	1 215	1 287	1 250	**1 300**	1 350	1 430	1 250	**1 300**	1 350	1 430
	kW	*1 000*	***1 040***	*1 080*	*1 144*	*900*	***936***	*972*	*1 030*	*1 000*	***1 040***	*1 080*	*1 144*	*1 000*	***1 040***	*1 080*	*1 144*

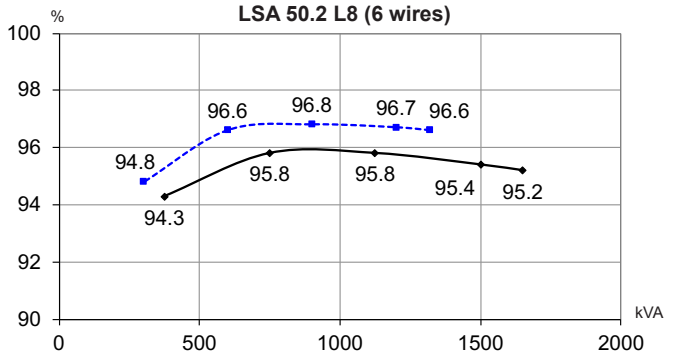
Ratings 60 Hz - 1 800 R.P.M.

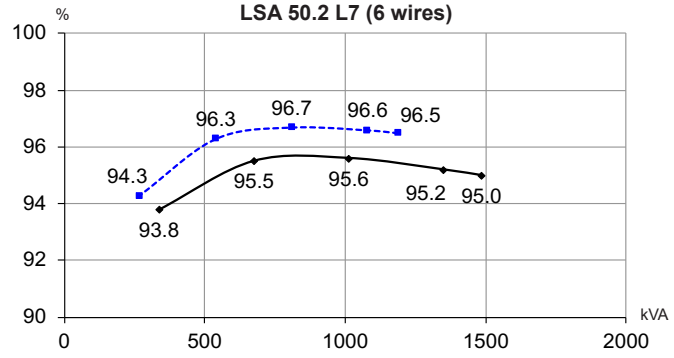
kVA / kW - P.F. = 0.8

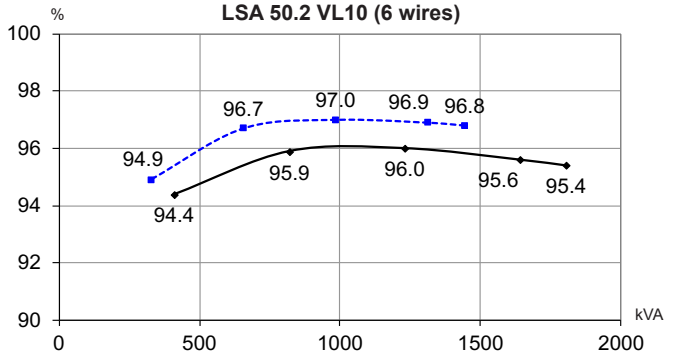
Duty/T°C		Continuous duty/40°C				Continuous duty/40°C				Stand-by/40°C				Stand-by/27°C			
Class/T°K		H/125°K				F/105°K				H/150°K				H/163°K			
Phase		3 ph.				3 ph.				3 ph.				3 ph.			
Y		380V	416V	440V	**480V**	380V	416V	440V	**480V**	380V	416V	440V	**480V**	380V	416V	440V	**480V**
Δ		220V	240V			220V	240V			220V	240V			220V	240V		
6 wires version winding n°6S																	
LSA 50.2 M6	kVA	1 285	1 405	1 455	**1 560**	1 155	1 265	1 310	**1 405**	1350	1475	1530	**1640**	1410	1545	1600	**1720**
	kW	*1 028*	*1 124*	*1 164*	***1 248***	*924*	*1 012*	*1 048*	***1 124***	*1080*	*1180*	*1224*	***1312***	*1128*	*1236*	*1280*	***1376***
LSA 50.2 L7	kVA	1 375	1 500	1 555	**1 680**	1 240	1 350	1 400	**1 510**	1440	1575	1630	**1765**	1510	1650	1710	**1850**
	kW	*1 100*	*1 200*	*1 244*	***1 344***	*992*	*1 080*	*1 120*	***1 208***	*1152*	*1260*	*1304*	***1412***	*1208*	*1320*	*1368*	***1480***
LSA 50.2 L8	kVA	1 485	1 625	1 720	**1 875**	1 335	1 460	1 550	**1 685**	1560	1705	1805	**1965**	1630	1785	1890	**2060**
	kW	*1 188*	*1 300*	*1 376*	***1 500***	*1 068*	*1 168*	*1 240*	***1 350***	*1250*	*1364*	*1444*	***1572***	*1304*	*1428*	*1512*	***1650***
LSA 50.2 VL10	kVA	1 635	1 785	1 860	**2 000**	1 470	1 605	1 675	**1 800**	1715	1875	1950	**2100**	1800	1965	2050	**2200**
	kW	*1 308*	*1 428*	*1 488*	***1 600***	*1 176*	*1 284*	*1 340*	***1 440***	*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 M6	kVA	1 210	1 320	1 400	**1 525**	1 089	1 188	1 260	**1 372**	1 210	1 320	1 400	**1 525**	1 210	1 320	1 400	**1 525**
	kW	*968*	*1 056*	*1 120*	***1 220***	*871*	*950*	*1 008*	***1 098***	*968*	*1 056*	*1 120*	***1 220***	*968*	*1 056*	*1 120*	***1 220***
LSA 50.2 L8	kVA	1 430	1 565	1 655	**1 800**	1 287	1 409	1 490	**1 620**	1 430	1 565	1 655	**1 800**	1 430	1 565	1 655	**1 800**
	kW	*1 144*	*1 252*	*1 324*	***1 440***	*1 029*	*1 127*	*1 192*	***1 296***	*1 144*	*1 252*	*1 324*	***1 440***	*1 144*	*1 252*	*1 324*	***1 440***

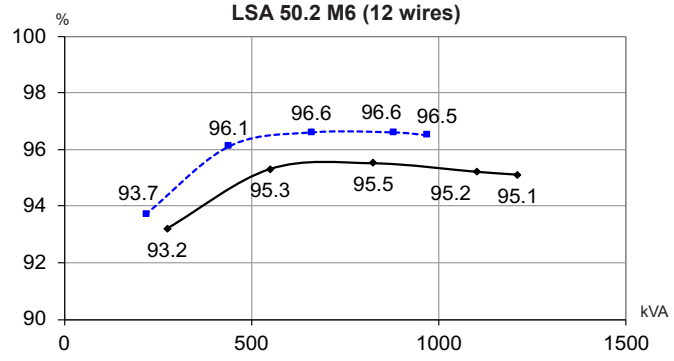
Efficiencies 400V - 50 Hz (— P.F.: 0.8) (--- P.F.: 1)

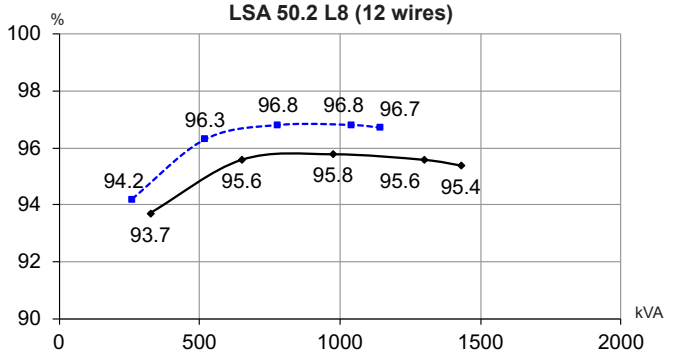








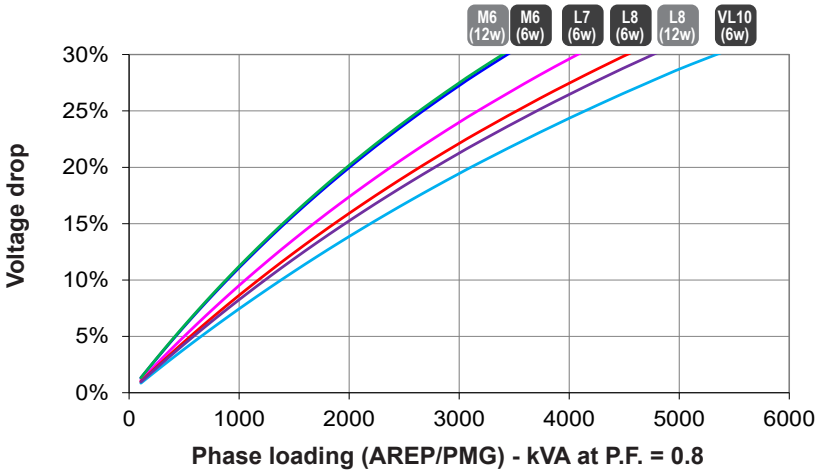


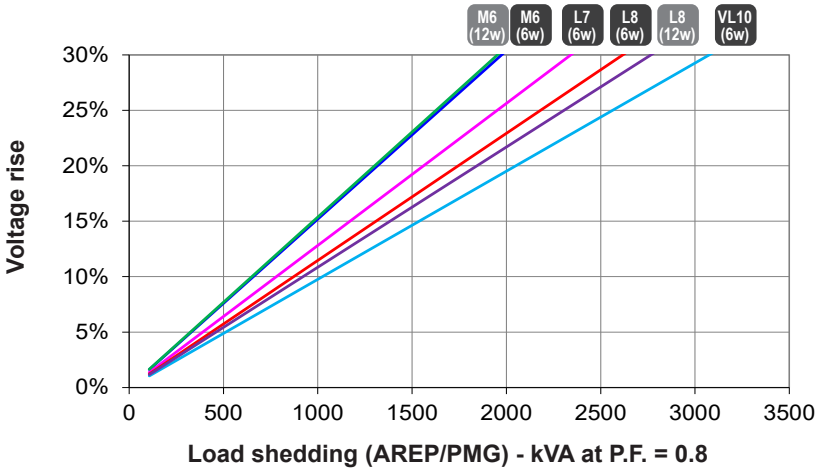


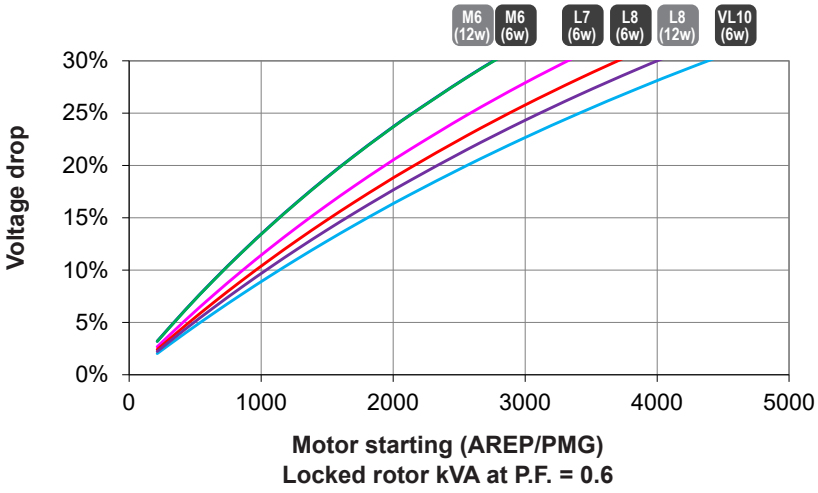
Reactances (%). Time constants (ms) - Class H / 400 V

		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	3 634	3 750	3 910	4 058	3 634	4 247
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							
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.)	2 763	3 324	3 704	4 387	2 765	4 003
%	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	14 039	15 299	15 454	16 552	14 039	15 322
W	Heat dissipation	52 218	53 790	57 594	59 458	43 714	47 854

Transient voltage variation 400V - 50 Hz

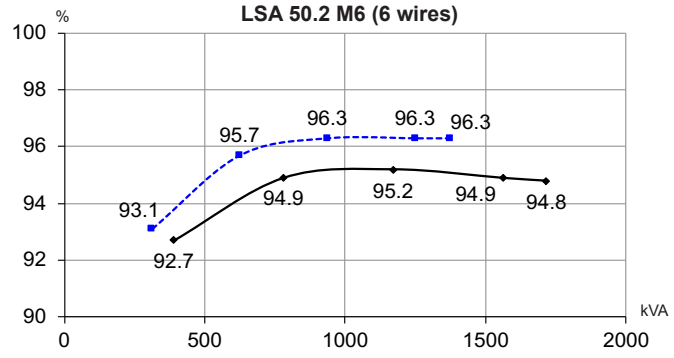


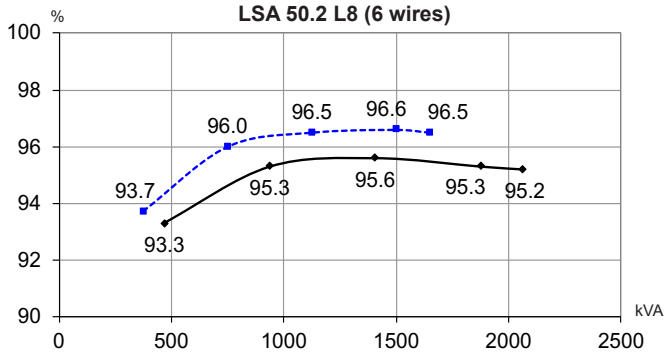


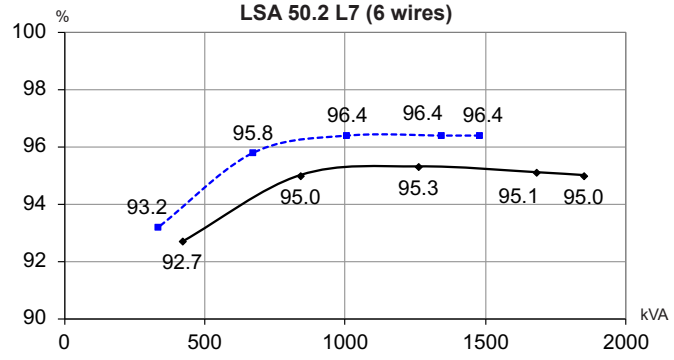


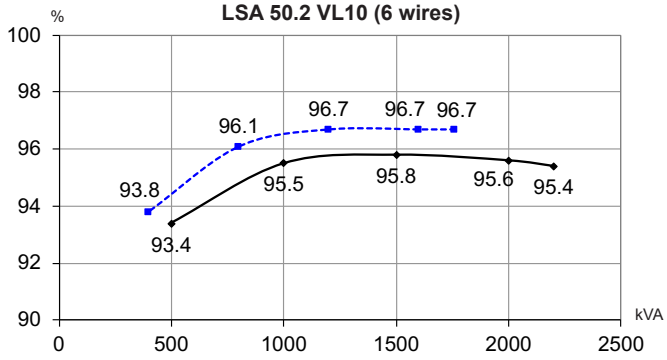
1) For a starting P.F. other than 0.6, the starting kVA must be multiplied by K = Sine P.F. / 0.8
2) For voltages other than 400V (Y), 230V(Δ) at 50 Hz, then kVA must be multiplied by $(400/U)^2$ or $(230/U)^2$.

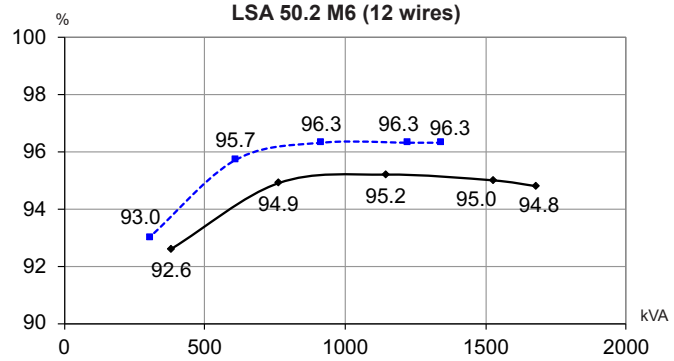
Efficiencies 480V - 60 Hz (— P.F.: 0.8) (--- P.F.: 1)

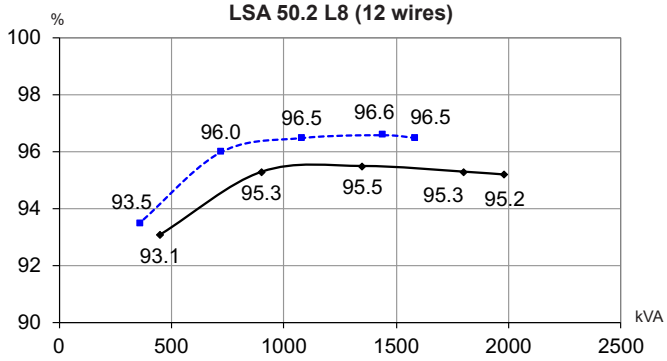








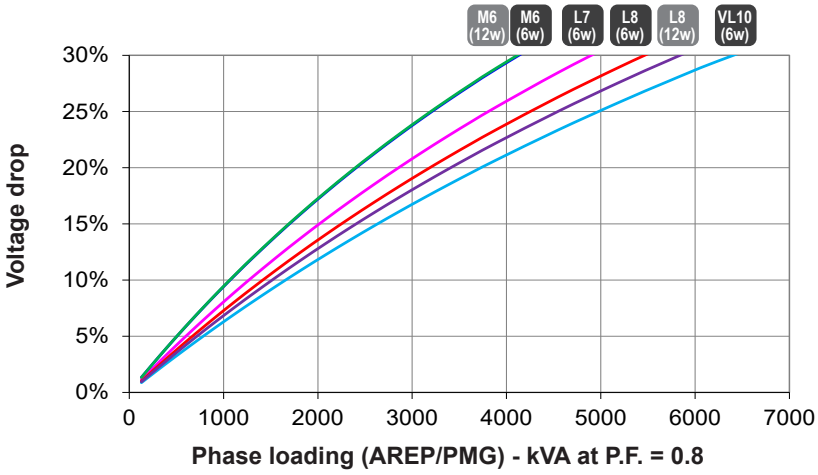


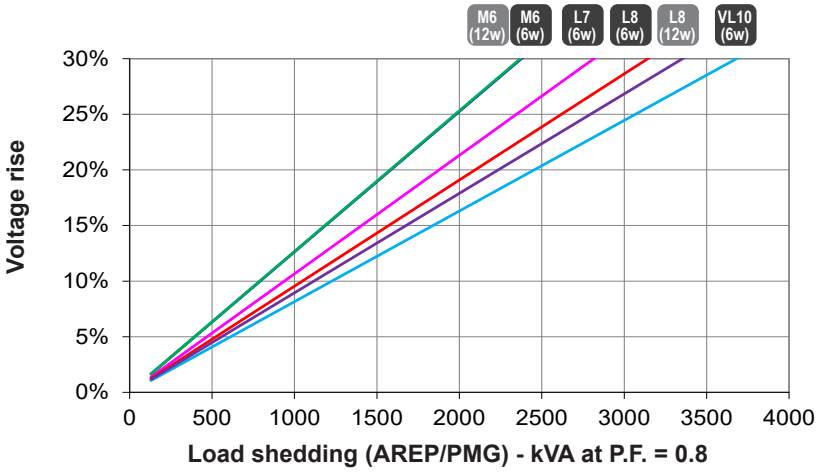


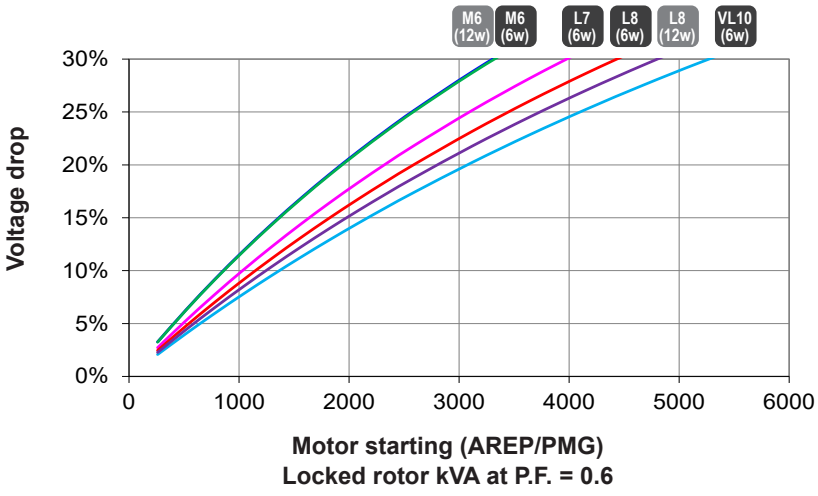
Reactances (%). Time constants (ms) - Class H / 480 V

		M6 (6w)	L7 (6w)	L8 (6w)	VL10 (6w)	M6 (12w)	L8 (12w)
Kcc	Short-circuit ratio	0.31	0.33	0.3	0.32	0.31	0.32
Xd	Direct-axis synchronous reactance unsaturated	407	377	394	368	398	380
Xq	Quadrature-axis synchronous reactance unsaturated	208	192	201	187	203	193
T'do	No-load transient time constant	3 634	3 750	3 910	4 058	3 634	4 247
X'd	Direct-axis transient reactance saturated	30.3	27.2	27.2	24.5	29.6	24.1
T'd	Short-circuit transient time constant	180	180	180	180	180	180
X"d	Direct-axis subtransient reactance saturated	17.1	15.4	15.4	13.8	16.7	13.7
T"d	Subtransient time constant	18	18	18	18	18	18
X"q	Quadrature-axis subtransient reactance saturated	18	16.1	16.1	14.4	17.6	15.5
Xo	Zero sequence reactance	0.84	0.75	0.75	0.68	0.82	0.67
X2	Negative sequence reactance saturated	17.6	15.78	15.77	14.17	17.21	14.62
Ta	Armature time constant	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	0.82	0.79
ic (A)	On-load excitation current	3.69	3.56	3.47	3.27	3.61	3.38
uc (V)	On-load excitation voltage	46.4	44.8	43.6	41	45.5	42.5
ms	Response time (ΔU = 20% transient)	500	500	500	500	500	500
kVA	Start (ΔU = 20% cont. or 30% trans.)	3 305	3 977	4 433	5 272	3 321	4 803
%	Transient ΔU (on-load 4/4) - P.F.: 0.8 $_{LAG}$	14	12.9	12.9	11.9	13.7	11.7
W	No-load losses	22 080	23 864	24 115	25 675	22 080	23 916
W	Heat dissipation	65 871	67 848	72 952	73 168	63 910	69 953

Transient voltage variation 480V - 60 Hz





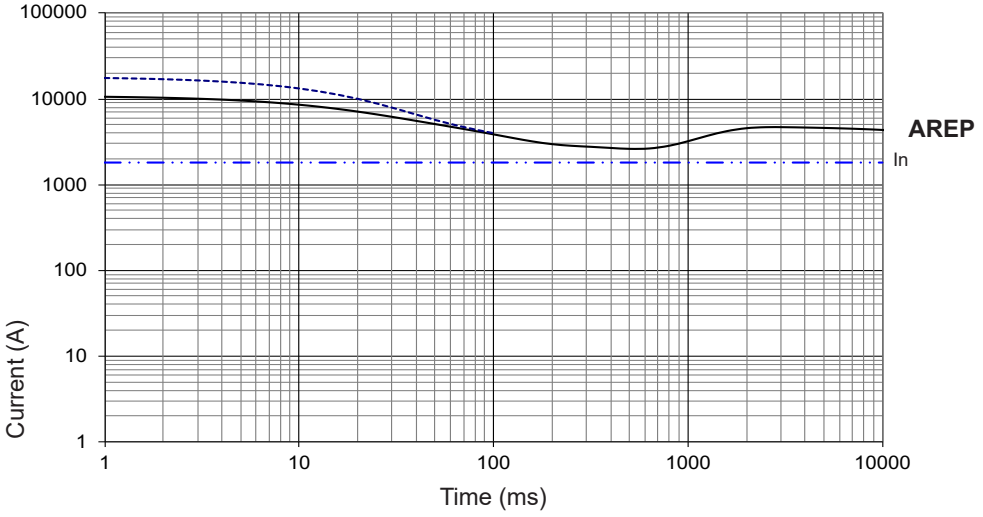


1) For a starting P.F. other than 0.6, the starting kVA must be multiplied by K = Sine P.F. / 0.8
2) For voltages other than 480V (Y), 277V (Δ), 240V (YY) at 60 Hz, then kVA must be multiplied by $(480/U)^2$ or $(277/U)^2$ or $(240/U)^2$.

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

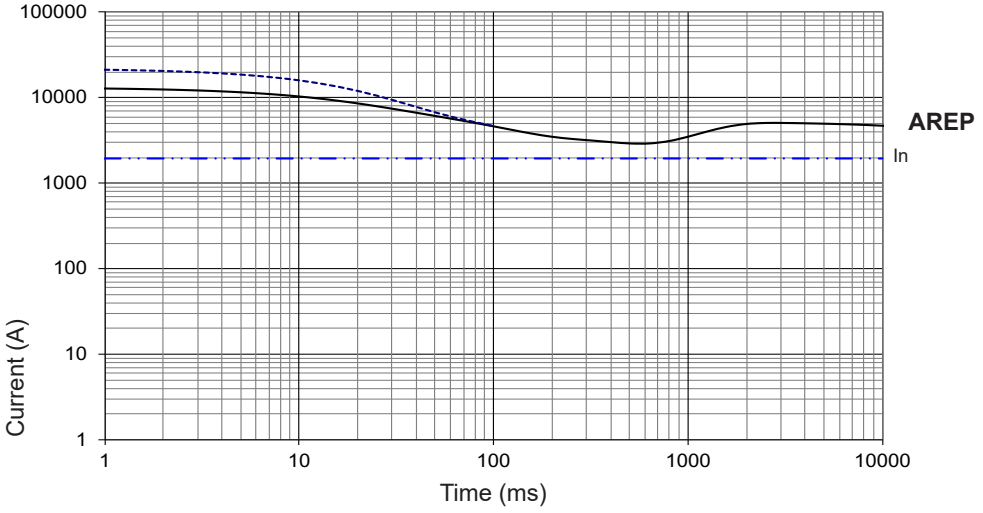
LSA 50.2 M6
(6 wires)

Symmetrical ——
Asymmetrical - - -



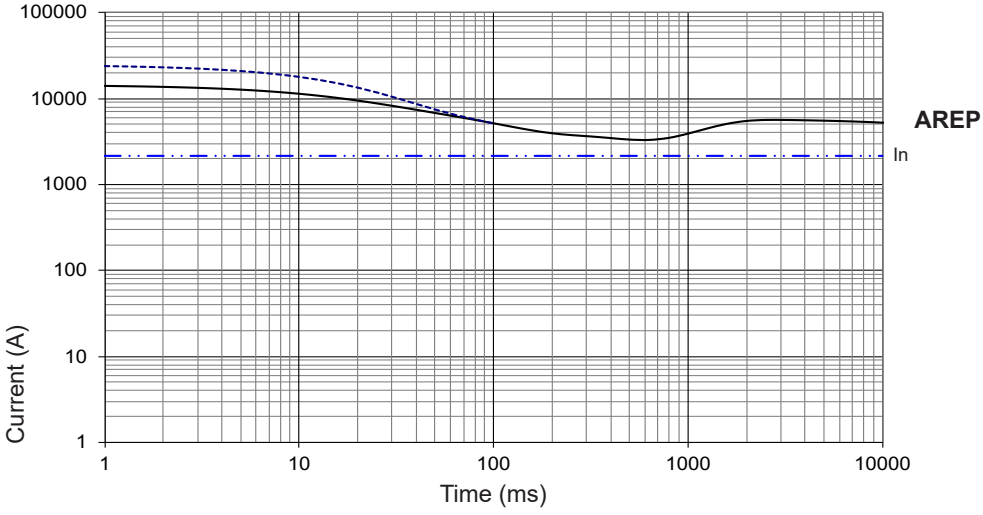
LSA 50.2 L7
(6 wires)

Symmetrical ——
Asymmetrical - - -



LSA 50.2 L8
(6 wires)

Symmetrical ——
Asymmetrical - - -

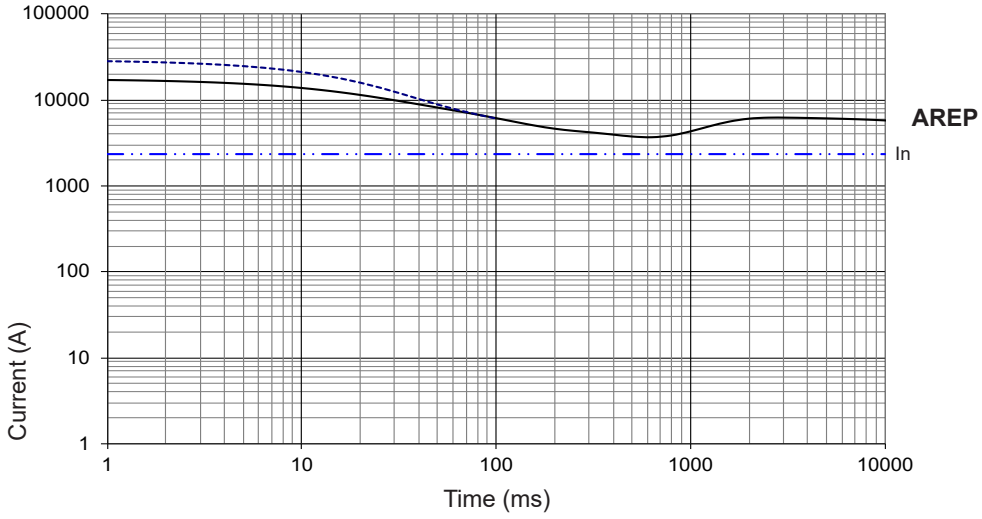


Influence due to connection
Curves shown are for star (Y) connection.
For other connections, use the following multiplication factors:
- Series delta : current value x 1.732 - Parallel star : current value x 2

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

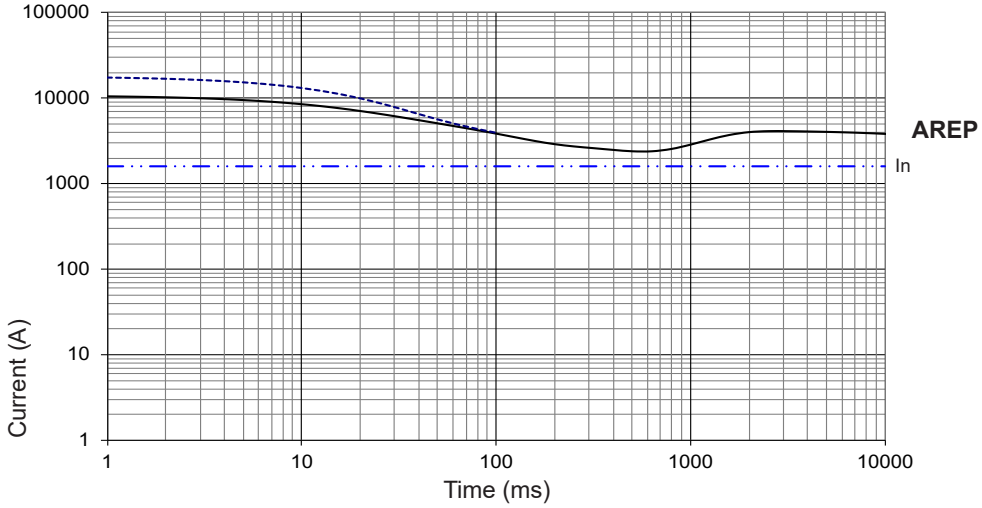
LSA 50.2 VL10 (6 wires)

Symmetrical ——
Asymmetrical - - -



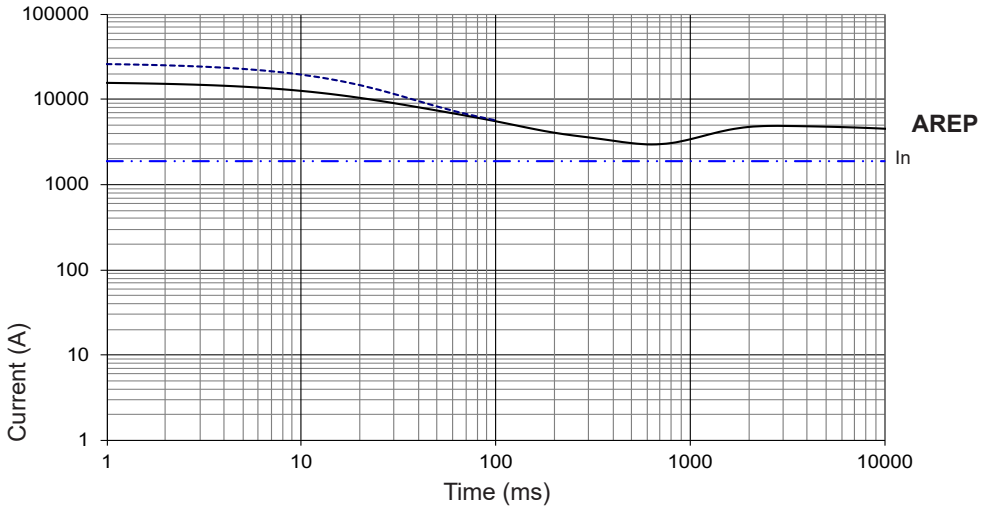
LSA 50.2 M6 (12 wires)

Symmetrical ——
Asymmetrical - - -



LSA 50.2 L8 (12 wires)

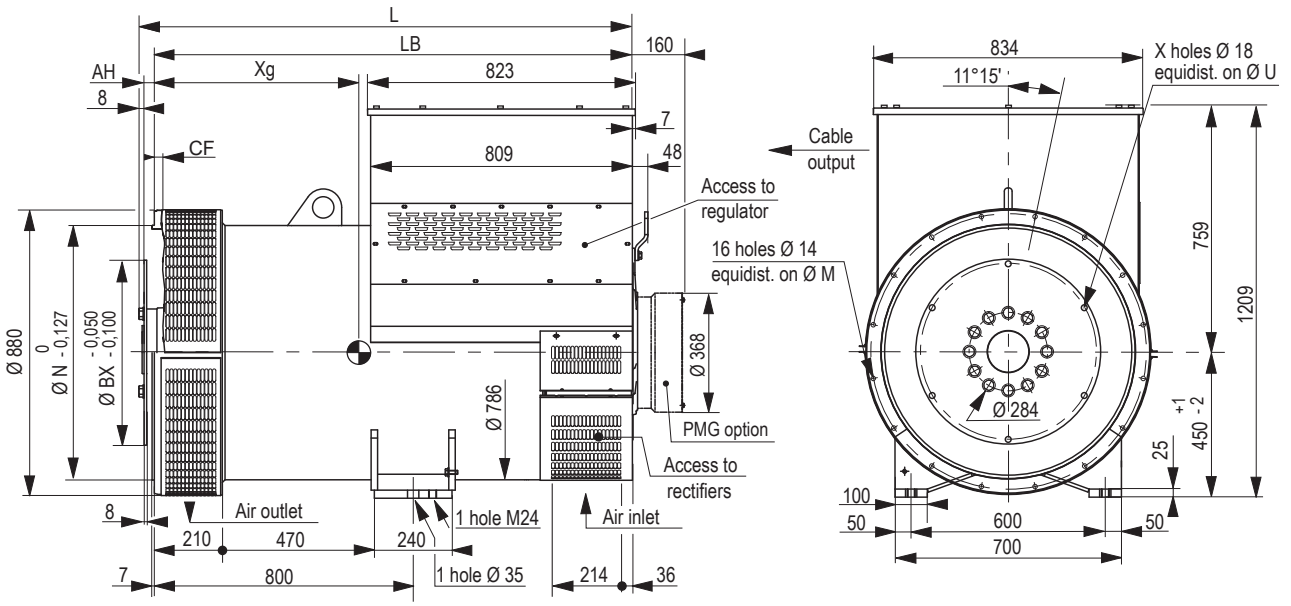
Symmetrical ——
Asymmetrical - - -



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 (kg)				
Type	L without PMG maxi*	LB	Xg	Weight
LSA 50.2 M6	1 402	1 378	640	2 490
LSA 50.2 L7	1 502	1 478	690	2 760
LSA 50.2 L8	1 502	1 478	710	2 980
LSA 50.2 VL10	1 602	1 578	760	3 260

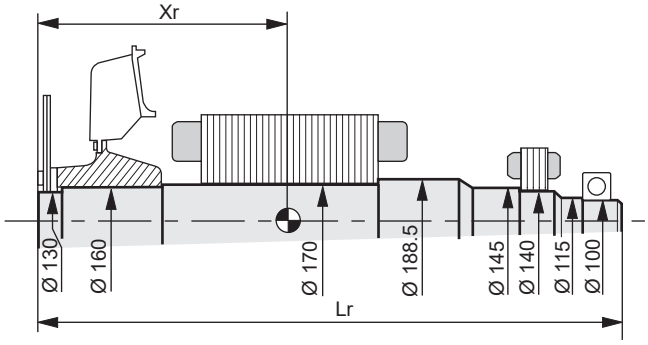
* L maxi = LB + AH maxi + 8

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

Flange (mm)			
S.A.E.	N	M	CF
0	647.7	679.5	40
00	787.4	850.9	40

Flex plate (mm)				
S.A.E.	BX	U	X	AH
21	673.1	641.3	12	0
18	571.5	542.9	6	15.7

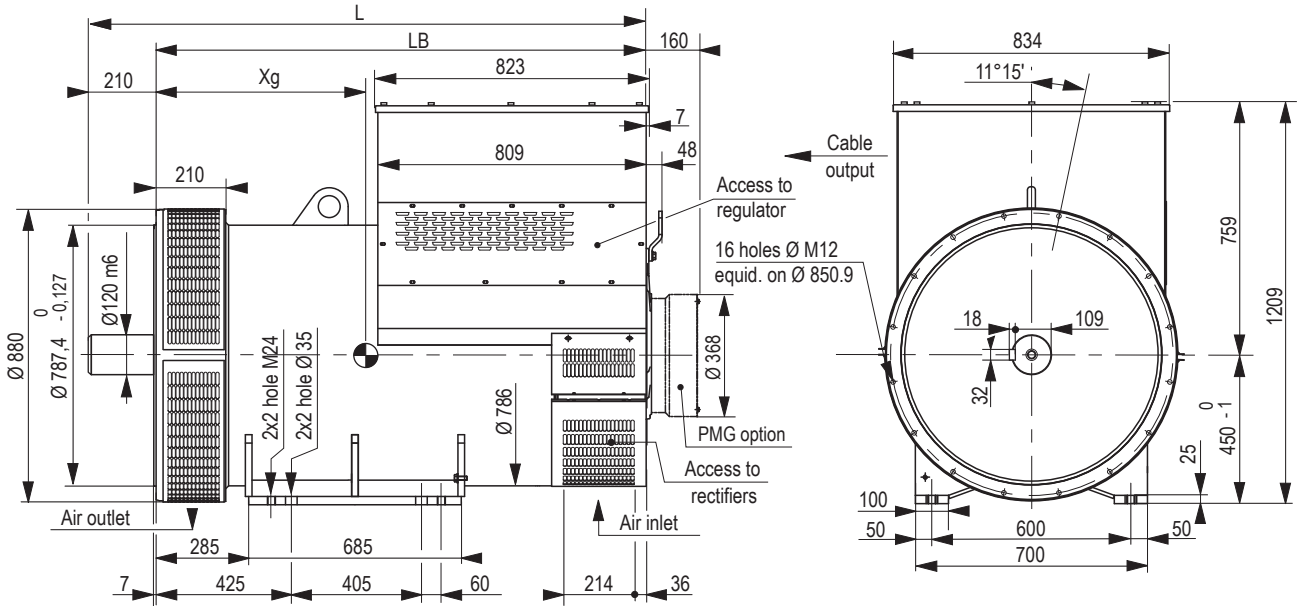
Torsional analysis data



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 M6	608	1 416	934	20.76	593	1 416	933	21.21
LSA 50.2 L7	642	1 516	1 005	22.34	627	1 516	1 004	22.80
LSA 50.2 L8	666	1 516	1 083	24.72	652	1 516	1 082	25.17
LSA 50.2 VL10	713	1 616	1 193	27.38	698	1 616	1 192	27.84

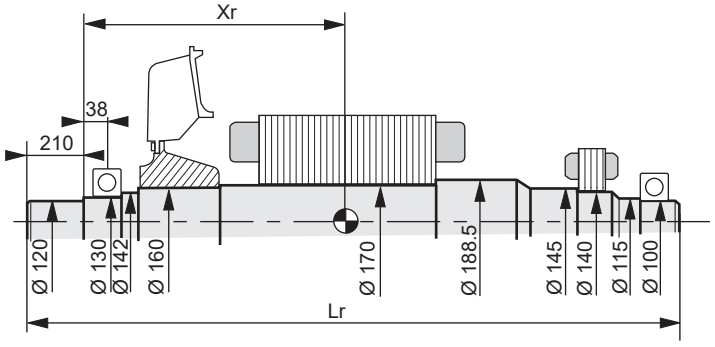
NOTE : Dimensions are for information only and may be subject to modifications. Contractual 2D drawings can be downloaded from the Nidec Power website, 3D drawing files are available upon request.
The torsional analysis of the transmission is imperative. All values are available upon request.

Two-bearing dimensions



Dimensions (mm) and weight (kg)				
Type	L without PMG	LB	Xg	Weight
LSA 50.2 M6	1 588	1 378	620	2 530
LSA 50.2 L7	1 688	1 478	670	2 800
LSA 50.2 L8	1 688	1 478	690	3 010
LSA 50.2 VL10	1 788	1 578	740	3 300

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 M6	613	1 604	886	19.37
LSA 50.2 L7	648	1 704	955	20.85
LSA 50.2 L8	671	1 704	1 030	23.12
LSA 50.2 VL10	715	1 804	1 136	25.69

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.
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