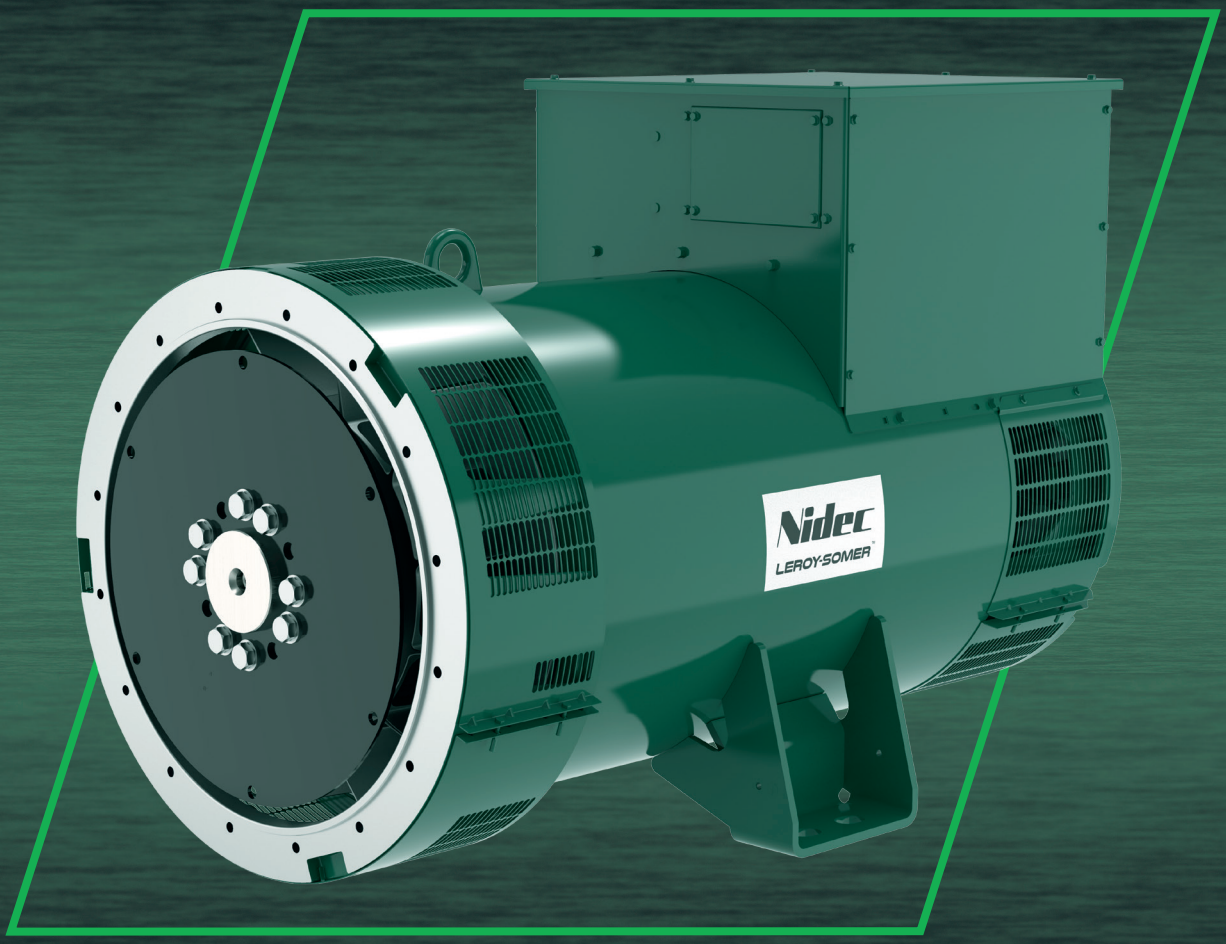
Nidec

Power



LSA 49.3

Low Voltage Alternator - 4 poles

730 to 1 000 kVA - 50 Hz / 915 to 1 250 kVA - 60 Hz

Electrical and mechanical data

LEROY-SOMER™

The best of performance

The Leroy-Somer™ LSA 49.3 alternator has been designed to offer you the best power generation performances.
With its meticulous design and optimized architecture, the LSA 49.3 strikes the perfect balance between compactness, reliability, performance and longevity.
Whatever your application, the Leroy-Somer™ LSA 49.3 alternator will meet your needs and will adapt to all situations.

Standards

The Leroy-Somer™ LSA 49.3 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 49.3.
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 49.3 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), 600V (no. 23), 690V (no. 10)
  - 60 Hz: 380V and 416V (no. 8), 600V (no. 9), 690V (no. 22)

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 (**)	at no load < 4% - on load < 4%
Overspeed	2 250 R.P.M.	Waveform: NEMA = TIF (**)	< 50
Air flow	1 m^3/s (50 Hz) / 1.2 m^3/s (60 Hz)	Waveform: IEC = THF (**)	< 2%

(*) 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

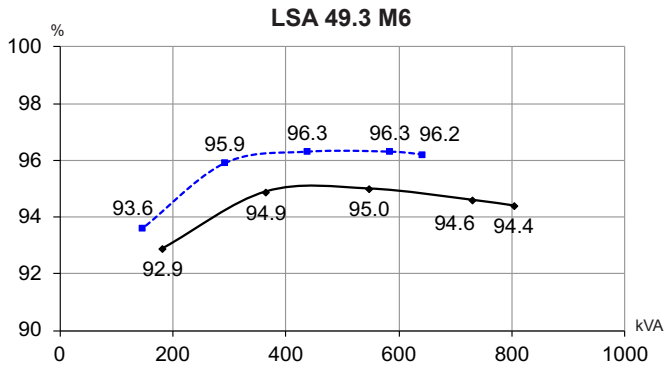
Duty/T°C		Continuous duty/40°C				Continuous duty/40°C				Stand-by/40°C				Stand-by/27°C			
Class/T°K		H/125°K				F/105°K				H/150°K				H/163°K			
Phase		3 ph.				3 ph.				3 ph.				3 ph.			
Y		380V	**400V**	415V	440V	380V	**400V**	415V	440V	380V	**400V**	415V	440V	380V	**400V**	415V	440V
Δ		220V	**230V**	240V		220V	**230V**	240V		220V	**230V**	240V		220V	**230V**	240V	
YY			**200V**		220V		**200V**		220V		**200V**		220V		**200V**		220V
LSA 49.3 M6	kVA	730	**730**	730	665	660	**660**	660	600	780	**780**	780	730	810	**810**	810	765
	kW	*584*	***584***	*584*	*532*	*528*	***528***	*528*	*480*	*624*	***624***	*624*	*584*	*648*	***648***	*648*	*612*
LSA 49.3 M8	kVA	820	**820**	820	810	760	**760**	760	710	910	**910**	910	885	945	**945**	945	925
	kW	*656*	***656***	*656*	*648*	*608*	***608***	*608*	*568*	*728*	***728***	*728*	*708*	*756*	***756***	*756*	*740*
LSA 49.3 L9	kVA	910	**910**	910	820	820	**820**	820	740	1 000	**1 000**	1 000	920	1 020	**1 020**	1 020	965
	kW	*728*	***728***	*728*	*656*	*656*	***656***	*656*	*592*	*800*	***800***	*800*	*736*	*816*	***816***	*816*	*772*
LSA 49.3 L10	kVA	1 000	**1 000**	1 000	950	900	**900**	900	840	1 085	**1 085**	1 085	1 030	1 130	**1 130**	1 130	1 080
	kW	*800*	***800***	*800*	*760*	*720*	***720***	*720*	*672*	*868*	***868***	*868*	*824*	*904*	***904***	*904*	*864*

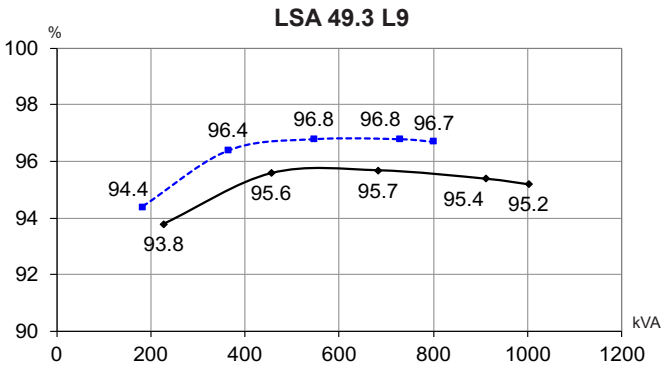
Ratings 60 Hz - 1 800 R.P.M.

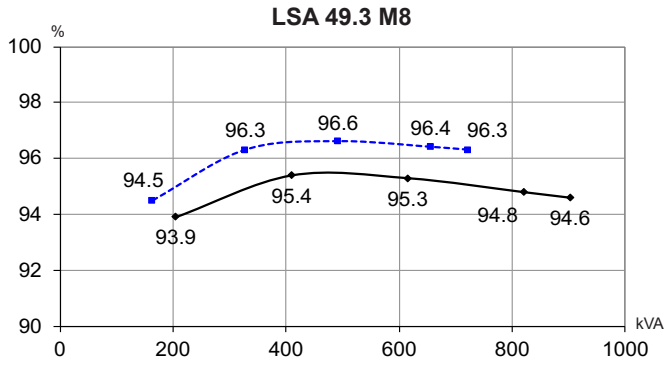
kVA / kW - P.F. = 0.8

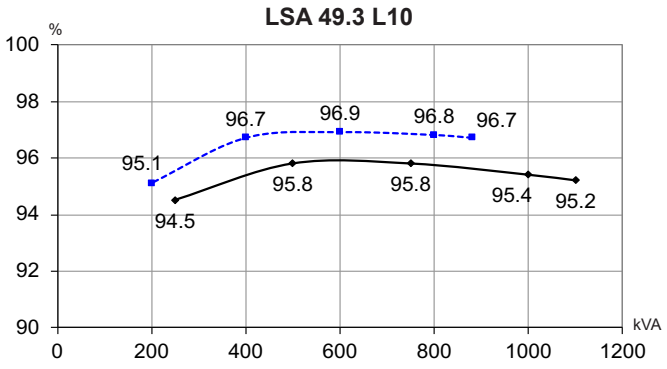
Duty/T°C		Continuous duty/40°C				Continuous duty/40°C				Stand-by/40°C				Stand-by/27°C			
Class/T°K		H/125°K				F/105°K				H/150°K				H/163°K			
Phase		3 ph.				3 ph.				3 ph.				3 ph.			
Y		380V	416V	440V	**480V**	380V	416V	440V	**480V**	380V	416V	440V	**480V**	380V	416V	440V	**480V**
Δ		220V	240V			220V	240V			220V	240V			220V	240V		
YY			208V	220V	**240V**		208V	220V	**240V**		208V	220V	**240V**		208V	220V	**240V**
LSA 49.3 M6	kVA	725	795	840	**915**	655	715	760	**825**	770	845	890	**970**	800	875	925	**1 005**
	kW	*580*	*636*	*672*	***732***	*524*	*572*	*608*	***660***	*616*	*676*	*712*	***776***	*640*	*700*	*740*	***804***
LSA 49.3 M8	kVA	815	890	940	**1 025**	735	805	850	**925**	865	945	1 000	**1 090**	895	980	1 040	**1 130**
	kW	*652*	*712*	*752*	***820***	*588*	*644*	*680*	***740***	*692*	*756*	*800*	***872***	*716*	*784*	*832*	***904***
LSA 49.3 L9	kVA	905	990	1 045	**1 140**	815	895	940	**1 025**	960	1 050	1 110	**1 210**	1 000	1 090	1 155	**1 255**
	kW	*724*	*792*	*836*	***912***	*652*	*716*	*752*	***820***	*768*	*840*	*888*	***968***	*800*	*872*	*924*	***1 004***
LSA 49.3 L10	kVA	990	1 083	1 146	**1 250**	891	975	1 031	**1 125**	1 049	1 148	1 215	**1 325**	1 089	1 192	1 260	**1 375**
	kW	*792*	*866*	*917*	***1 000***	*713*	*780*	*825*	***900***	*839*	*918*	*972*	***1 060***	*871*	*954*	*1 008*	***1 100***

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





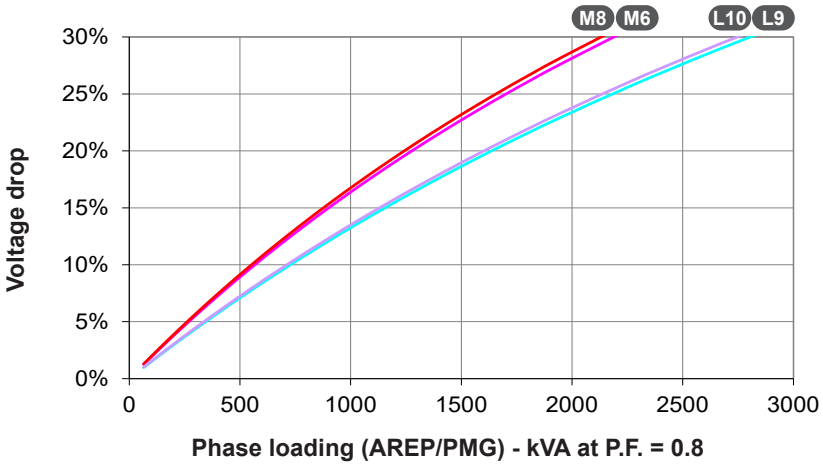


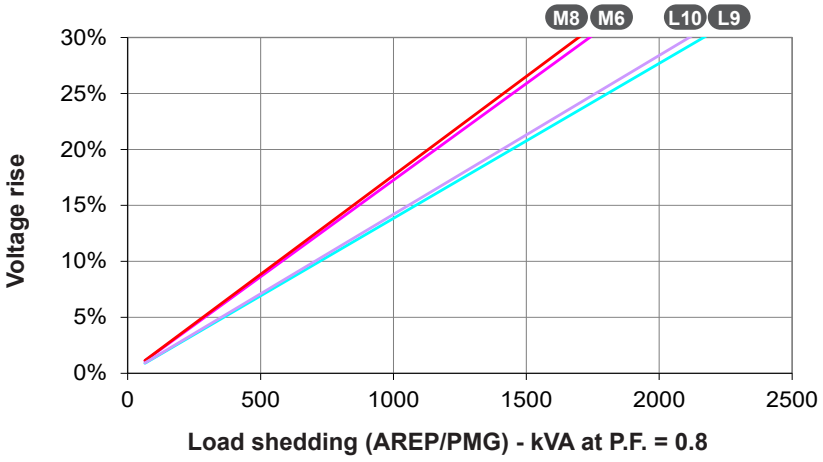


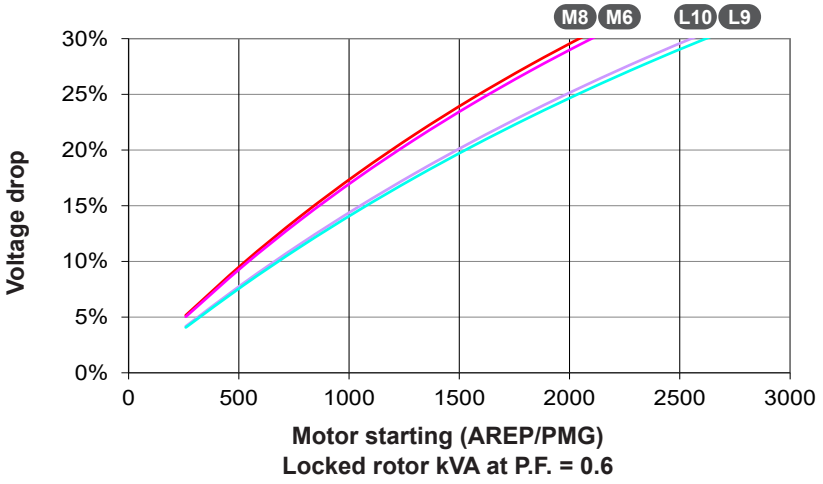
Reactances (%). Time constants (ms) - Class H / 400 V

		M6	M8	L9	L10
Kcc	Short-circuit ratio	0.42	0.34	0.41	0.34
Xd	Direct-axis synchronous reactance unsaturated	294	348	303	348
Xq	Quadrature-axis synchronous reactance unsaturated	150	177	154	177
T'do	No-load transient time constant	2 074	2 094	2 138	2 153
X'd	Direct-axis transient reactance saturated	14.2	16.6	14.1	16.1
T'd	Short-circuit transient time constant	100	100	100	100
X"d	Direct-axis subtransient reactance saturated	11.3	13.3	11.3	12.9
T"d	Subtransient time constant	10	10	10	10
X"q	Quadrature-axis subtransient reactance saturated	12.8	14.9	12.4	14.1
Xo	Zero sequence reactance	0.59	0.69	0.59	0.67
X2	Negative sequence reactance saturated	12.1	14.11	11.92	13.53
Ta	Armature time constant	15	15	15	15
Other class H / 400 V data					
io (A)	No-load excitation current	1.11	0.87	0.99	0.9
ic (A)	On-load excitation current	3.8	3.52	3.46	3.62
uc (V)	On-load excitation voltage	43.2	39.9	39.1	40.9
ms	Response time (ΔU = 20% transient)	500	500	500	500
kVA	Start (ΔU = 20% cont. or 30% trans.)	2 050	2 050	2 600	2 600
%	Transient ΔU (on-load 4/4) - P.F.: 0.8 $_{LAG}$	12.6	14.2	12.2	13.6
W	No-load losses	9 374	8 753	10 104	9 556
W	Heat dissipation	32 819	35 599	34 562	38 447

Transient voltage variation 400V - 50 Hz

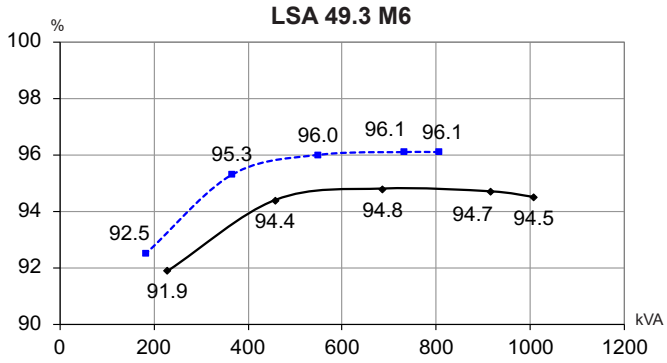


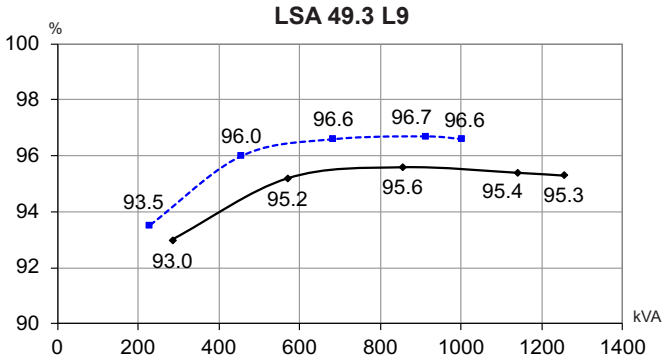


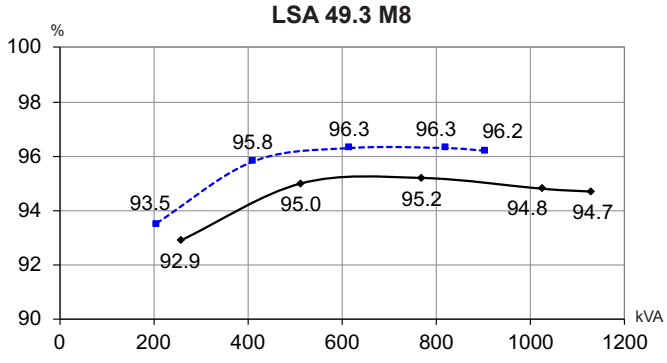


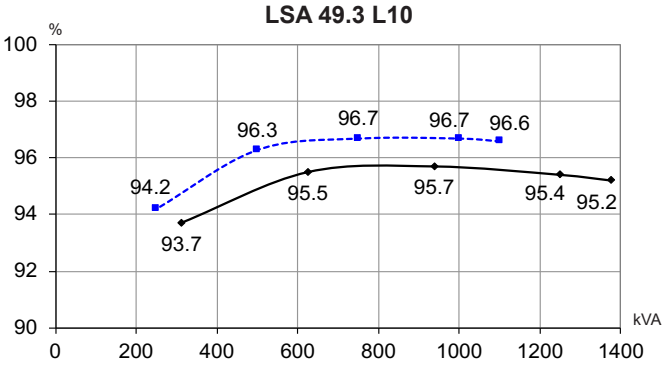
1) For a starting P.F. other than 0.6, the starting kVA must be multiplied by K = Sine P.F. / 0.8
2) For voltages other than 400V (Y), 230V(Δ) at 50 Hz, then kVA must be multiplied by $(400/U)^2$ or $(230/U)^2$.

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





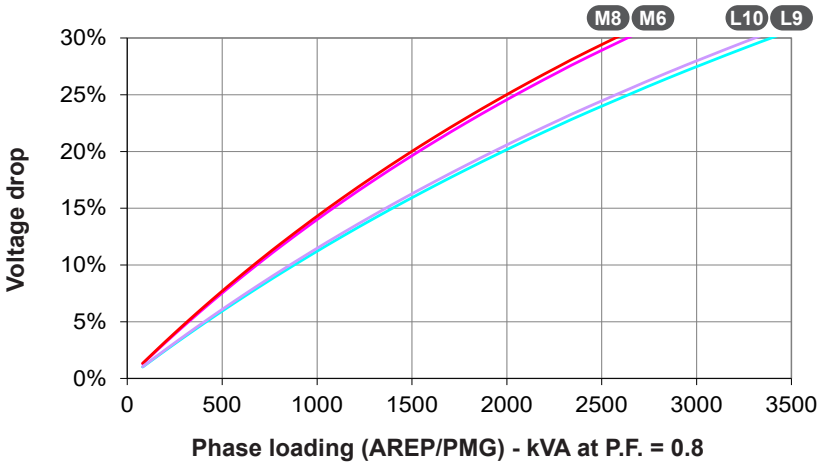


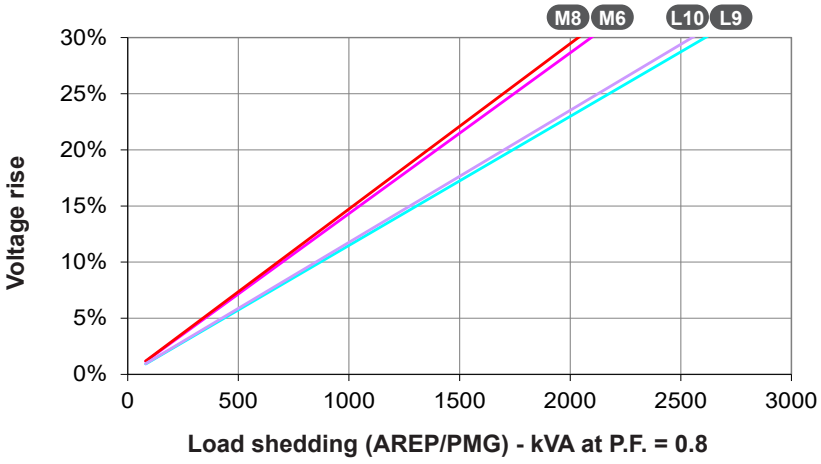


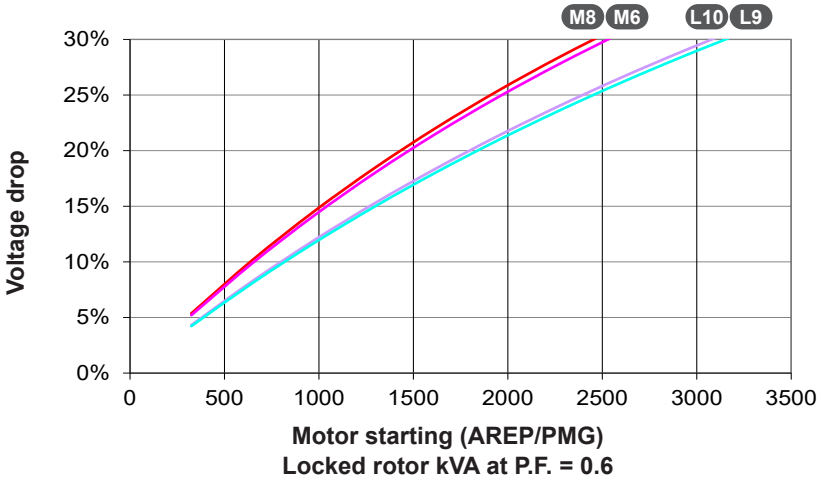
Reactances (%). Time constants (ms) - Class H / 480 V

		M6	M8	L9	L10
Kcc	Short-circuit ratio	0.4	0.32	0.4	0.33
Xd	Direct-axis synchronous reactance unsaturated	307	362	317	363
Xq	Quadrature-axis synchronous reactance unsaturated	156	185	161	185
T'do	No-load transient time constant	2 074	2 094	2 138	2 153
X'd	Direct-axis transient reactance saturated	14.8	17.3	14.8	16.8
T'd	Short-circuit transient time constant	100	100	100	100
X"d	Direct-axis subtransient reactance saturated	11.8	13.8	11.8	13.4
T"d	Subtransient time constant	10	10	10	10
X"q	Quadrature-axis subtransient reactance saturated	13.4	15.5	13	14.7
Xo	Zero sequence reactance	0.61	0.72	0.61	0.7
X2	Negative sequence reactance saturated	12.64	14.7	12.44	14.1
Ta	Armature time constant	15	15	15	15
Other class H / 480 V data					
io (A)	No-load excitation current	1.11	0.87	0.99	0.9
ic (A)	On-load excitation current	3.89	3.6	3.53	3.69
uc (V)	On-load excitation voltage	44.4	41	40.2	41.9
ms	Response time (ΔU = 20% transient)	500	500	500	500
kVA	Start (ΔU = 20% cont. or 30% trans.)	2 565	2 565	3 250	3 250
%	Transient ΔU (on-load 4/4) - P.F.: 0.8 $_{LAG}$	13	14.7	12.7	14
W	No-load losses	14 387	13 586	15 384	14 640
W	Heat dissipation	40 967	44 074	43 239	47 530

Transient voltage variation 480V - 60 Hz





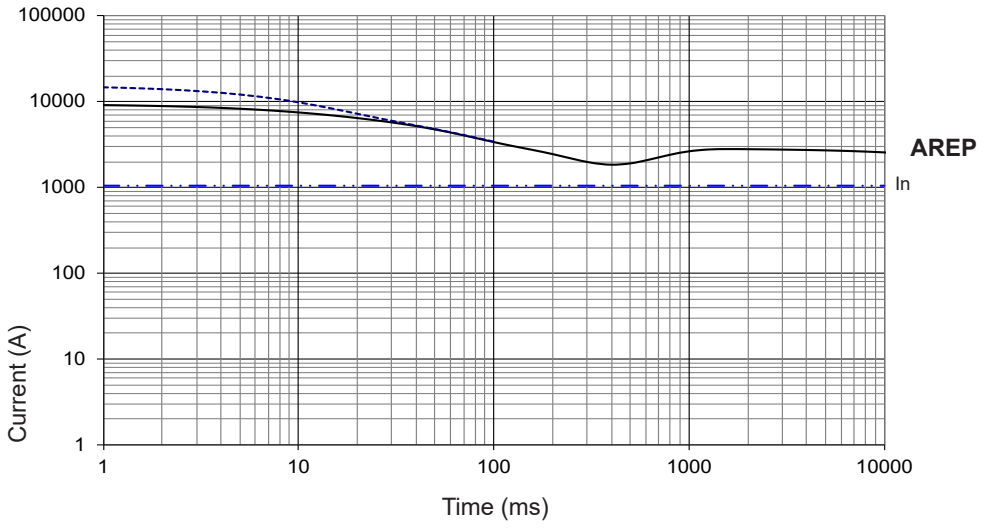


1) For a starting P.F. other than 0.6, the starting kVA must be multiplied by K = Sine P.F. / 0.8
2) For voltages other than 480V (Y), 277V (Δ), 240V (YY) at 60 Hz, then kVA must be multiplied by $(480/U)^2$ or $(277/U)^2$ or $(240/U)^2$.

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

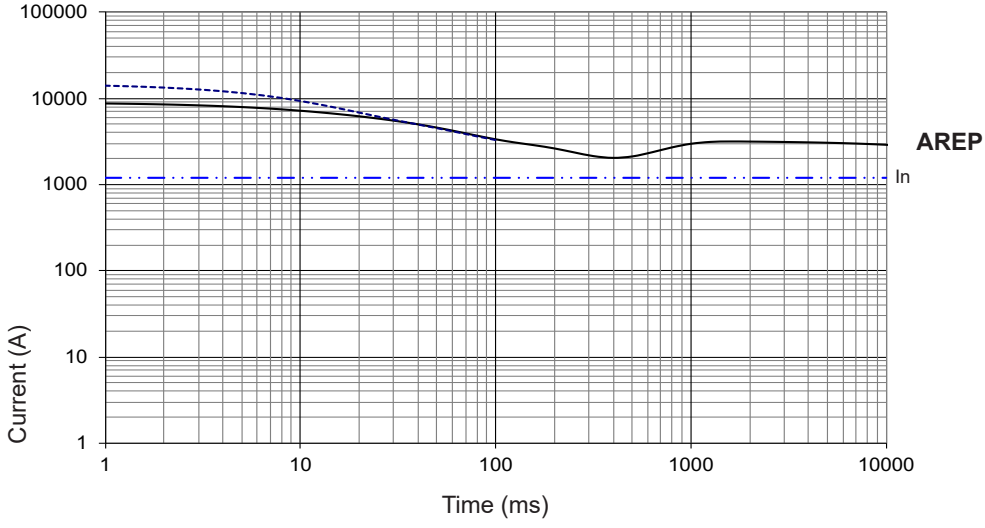
LSA 49.3 M6

Symmetrical ——
Asymmetrical - - -



LSA 49.3 M8

Symmetrical ——
Asymmetrical - - -

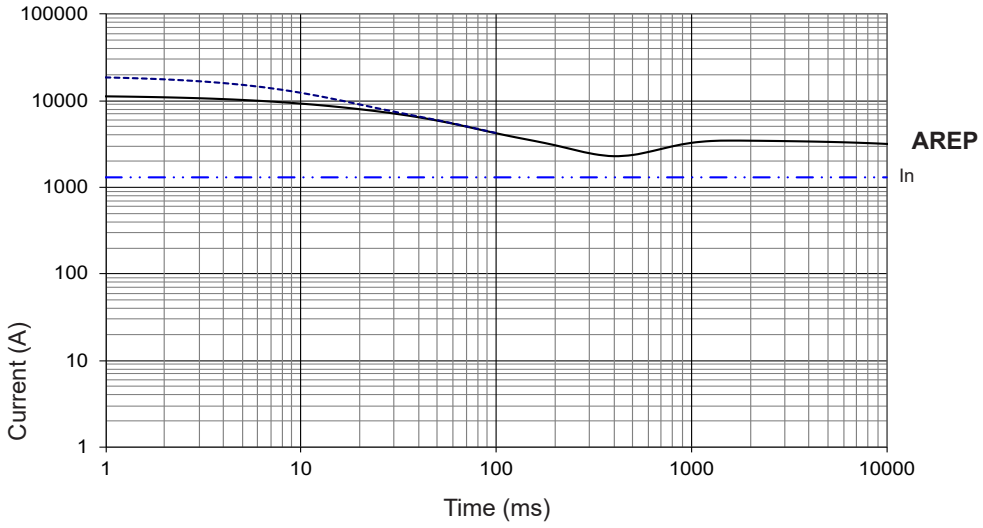


Influence due to connection
Curves shown are for star (Y) connection.
For other connections, use the following multiplication factors:
- Series delta : current value x 1.732 - Parallel star : current value x 2

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

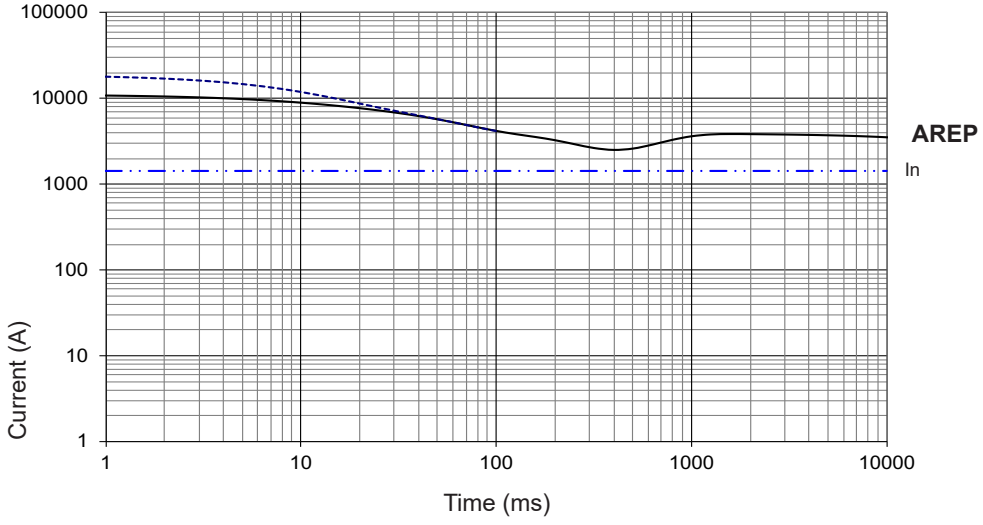
LSA 49.3 L9

Symmetrical ——
Asymmetrical - - -



LSA 49.3 L10

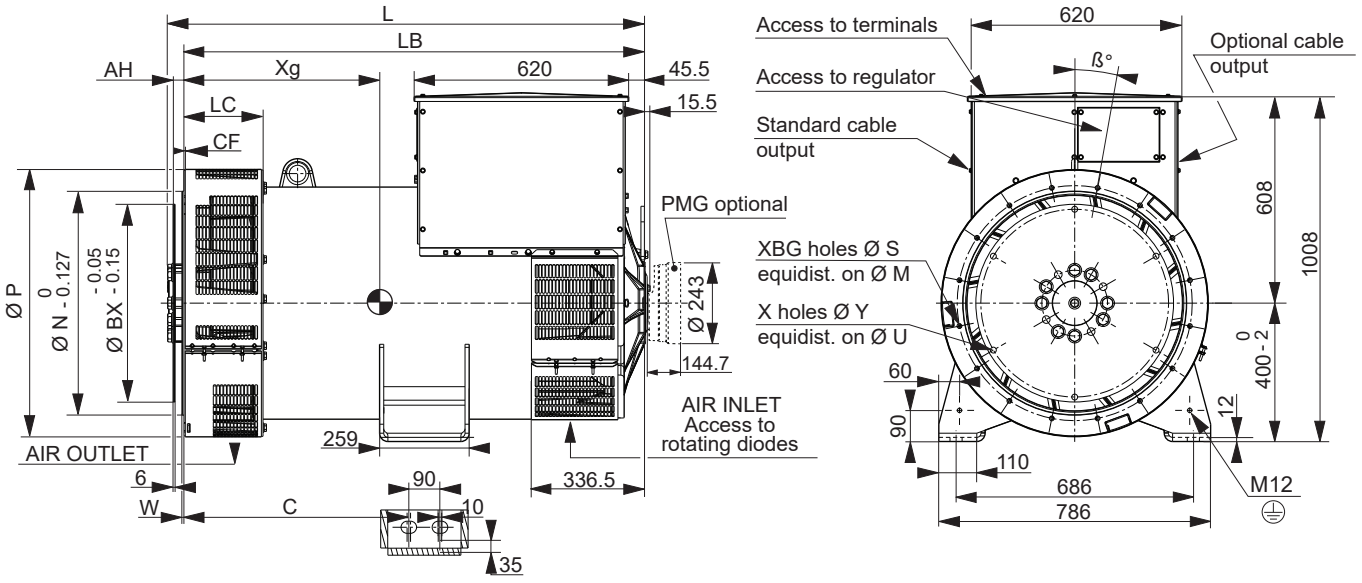
Symmetrical ——
Asymmetrical - - -



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	C	Xg	Weight
LSA 49.3 M6	1 372	1 331	650	629	1 578
LSA 49.3 M8	1 372	1 331	650	636	1 639
LSA 49.3 L9	1 462	1 421	650	673	1 792
LSA 49.3 L10	1 462	1 421	650	681	1 841

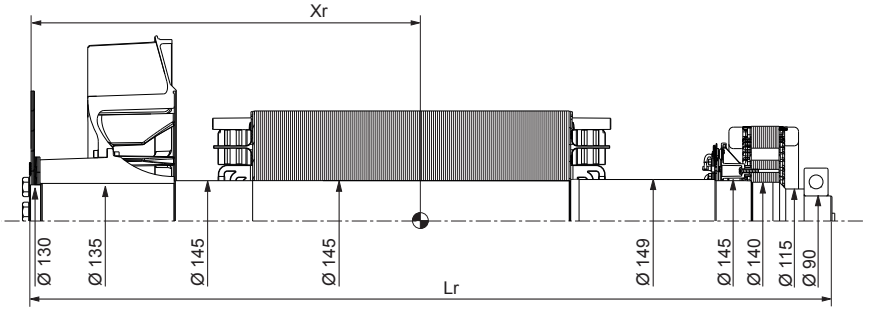
* L maxi = LB + AH maxi + 15.5

Coupling			
Flex plate	**14**	**18**	**21**
Flange S.A.E 1	X		
Flange S.A.E ½	X		
Flange S.A.E 0	X	X	
Flange S.A.E 00		X	X

Flange (mm)									
S.A.E.	P	N	M	LC	XBG	S	W	ß°	CF
1	773	511.175	530.225	228.5	12	12	6	15°	38
½	773	584.2	619.125	228.5	12	14	6	15°	17
0	773	647.7	679.45	228.5	16	14	6	11° 15'	37
00	883	787.4	850.9	245	16	14	7	11° 15'	40

Flex plate (mm)					
S.A.E.	BX	U	X	Y	AH
14	466.7	438.15	8	14	25.4
18	571.5	542.92	6	17	15.7
21	673.1	641.35	12	18	0

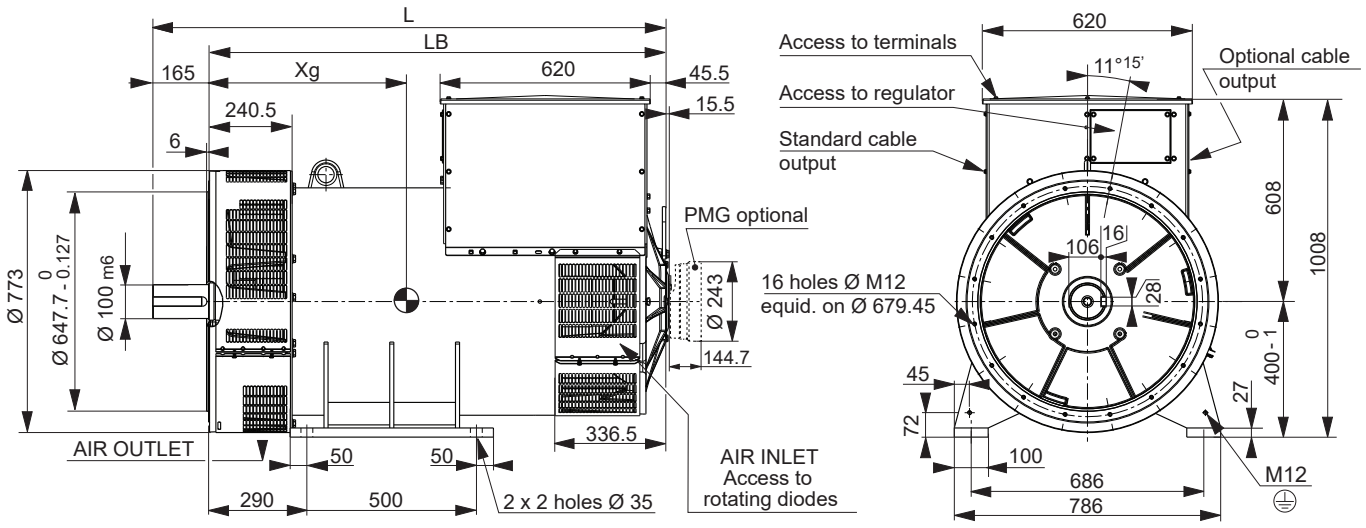
Torsional analysis data



Centre of gravity: Xr (mm), Rotor length: Lr (mm), Weight: M (kg), Moment of inertia: J (kgm²): (4J = MD²)												
Flange	S.A.E. 14				S.A.E. 18				S.A.E. 21			
Type	Xr	Lr	M	J	Xr	Lr	M	J	Xr	Lr	M	J
LSA 49.3 M6	625	1 353	623	9.99	614	1 353	625	10.25	596	1 353	644	10.98
LSA 49.3 M8	634	1 353	648	10.53	622	1 353	650	10.79	604	1 353	669	11.52
LSA 49.3 L9	671	1 443	705	11.53	659	1 443	707	11.79	642	1 443	726	12.52
LSA 49.3 L10	679	1 443	724	11.92	667	1 443	726	12.18	650	1 443	745	12.91

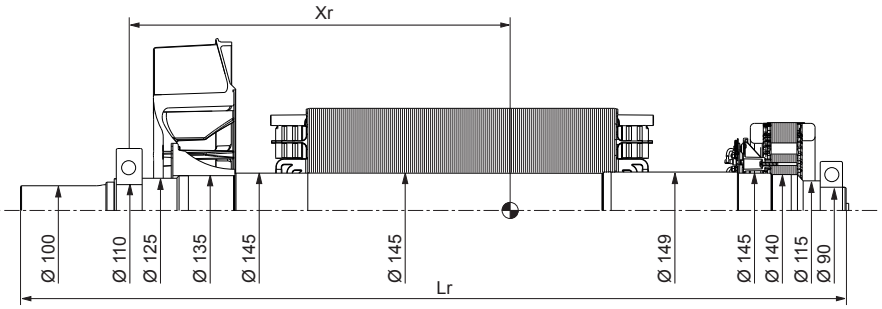
NOTE : Dimensions are for information only and may be subject to modifications. Contractual 2D drawings can be downloaded from the Nidec Power website, 3D drawing files are available upon request.
The torsional analysis of the transmission is imperative. All values are available upon request.

Two-bearing dimensions



Dimensions (mm) and weight (kg)				
Type	L without PMG	LB	Xg	Weight
LSA 49.3 M6	1 514	1 349	636	1 622
LSA 49.3 M8	1 514	1 349	643	1 683
LSA 49.3 L9	1 604	1 439	682	1 835
LSA 49.3 L10	1 604	1 439	688	1 884

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 49.3 M6	599	1 505	593	9.55
LSA 49.3 M8	607	1 505	618	10.09
LSA 49.3 L9	643	1 595	675	11.09
LSA 49.3 L10	651	1 595	694	11.48

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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