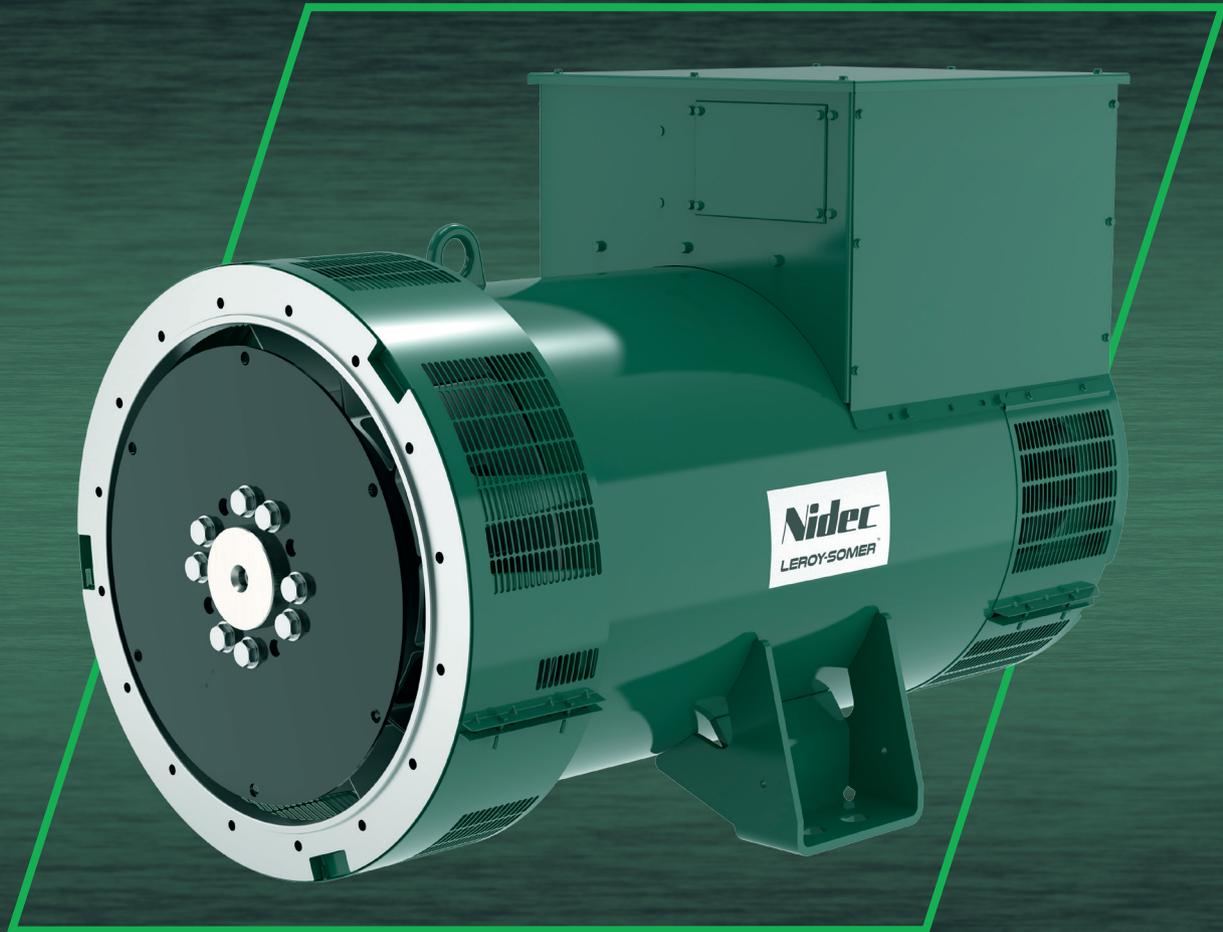


Nidec

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[™]

LSA 49.3

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, 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 49.3 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) 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 $\leq 95\%$, 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%
 - 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

LSA 49.3 - 730 to 1 000 kVA - 50 Hz / 915 to 1 250 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	≤ 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)

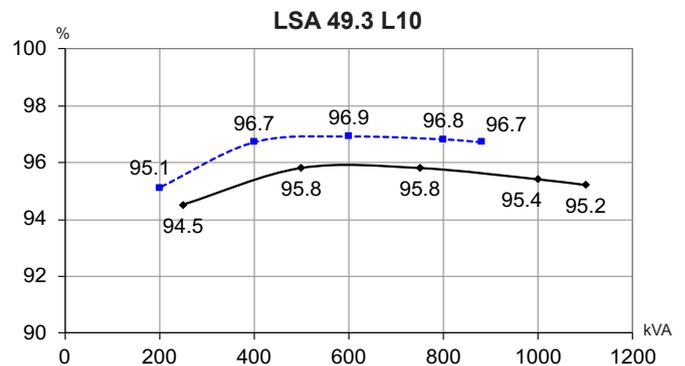
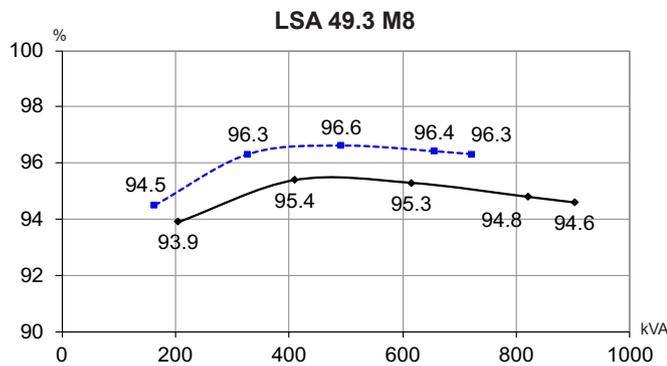
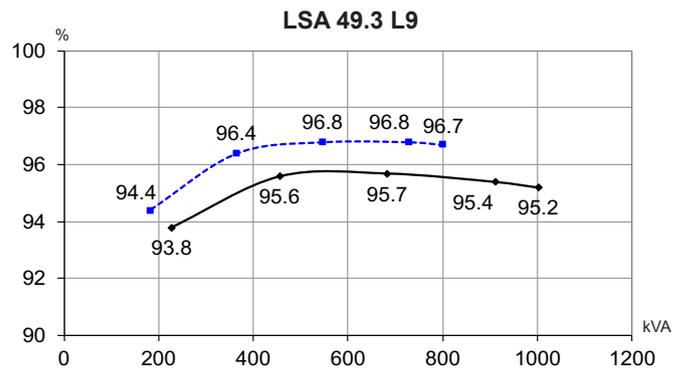
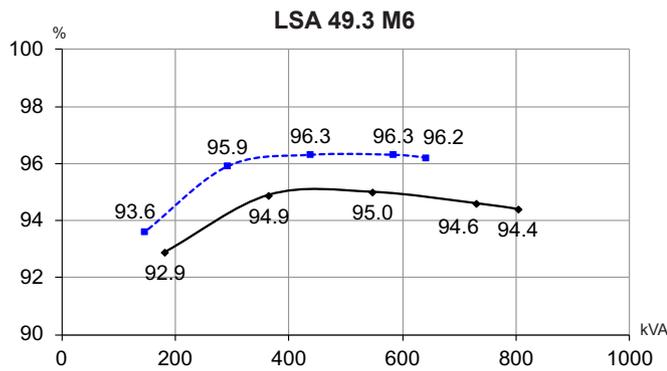
Ratings 50 Hz - 1500 R.P.M.

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	
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 - 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		
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)



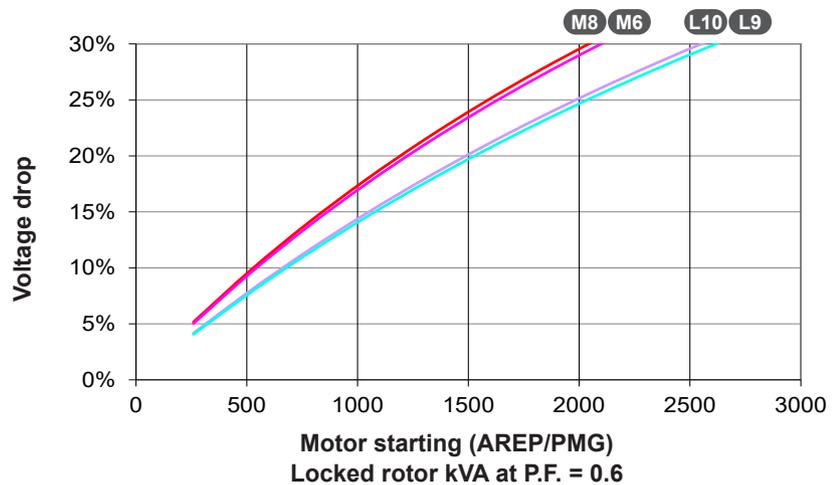
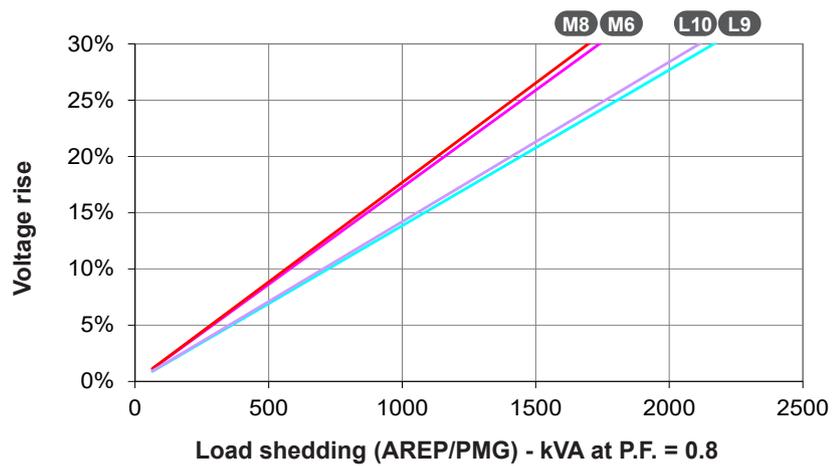
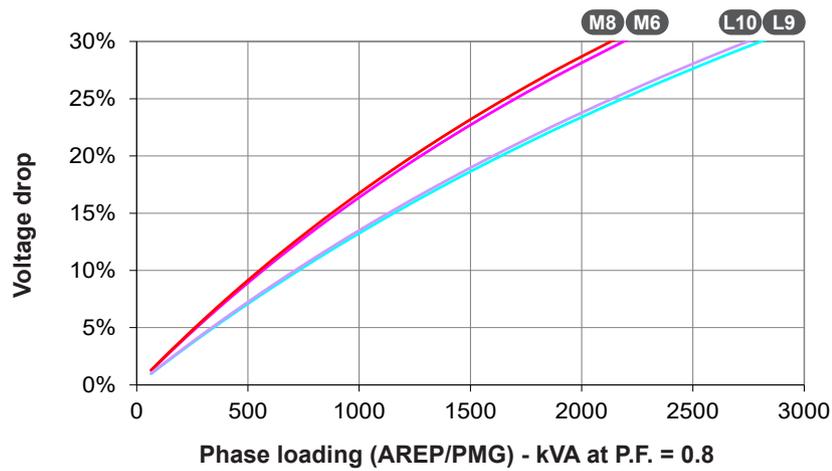
Reactances (%). Time constants (ms) - Class H / 400 V

	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

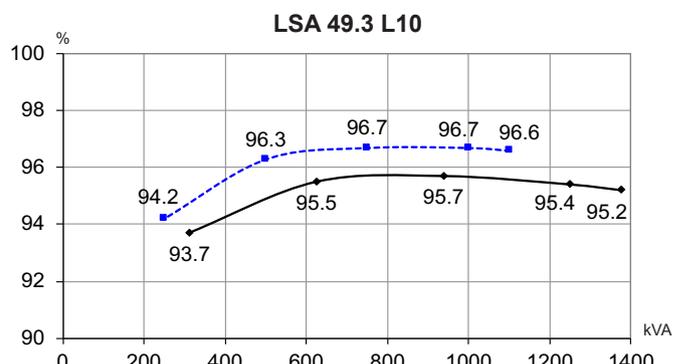
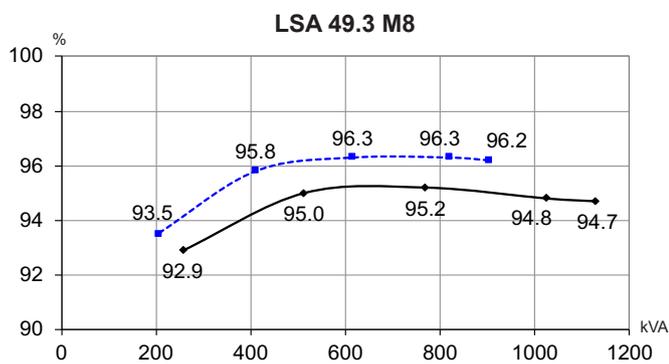
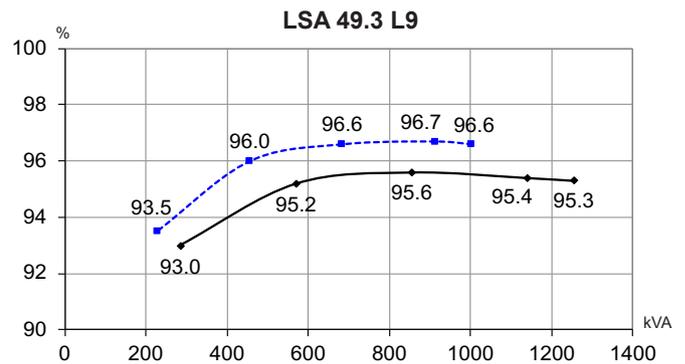
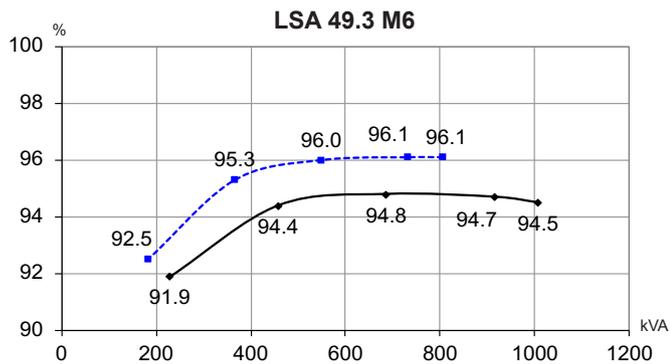
io (A) No-load excitation current	1.11	0.87	0.99	0.9
ic (A) On-load excitation current	3.8	3.52	3.46	3.62
uc (V) On-load excitation voltage	43.2	39.9	39.1	40.9
ms Response time ($\Delta U = 20\%$ transient)	500	500	500	500
kVA Start ($\Delta U = 20\%$ cont. or 30% trans.)	2 050	2 050	2 600	2 600
% Transient 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 $K = \text{Sine P.F.} / 0.8$
- 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)



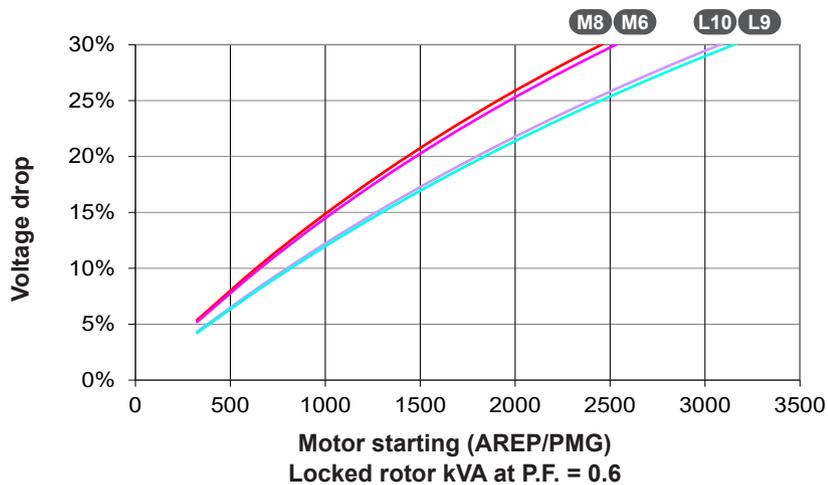
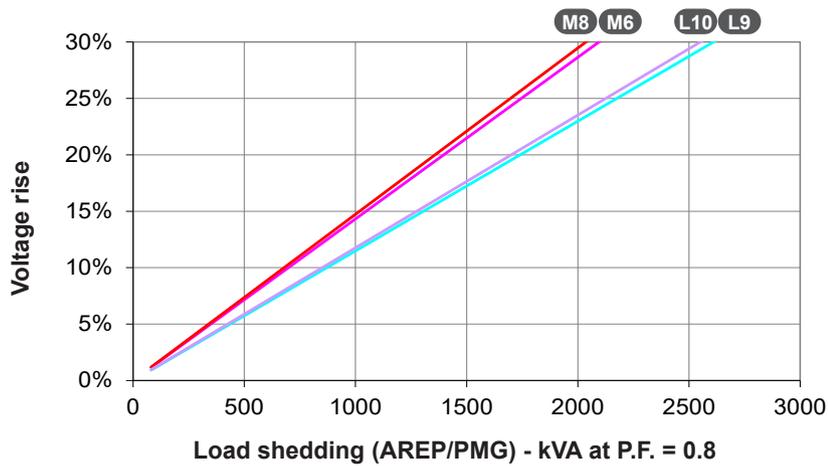
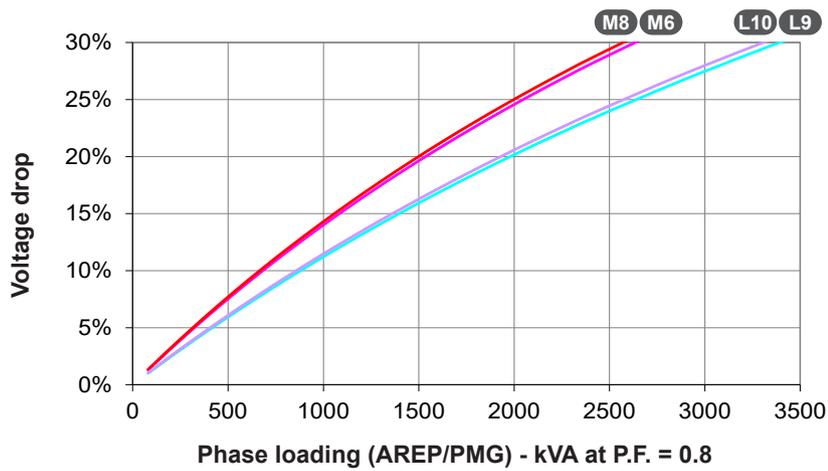
Reactances (%). Time constants (ms) - Class H / 480 V

	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 ($\Delta U = 20\%$ transient)	500	500	500	500
kVA Start ($\Delta U = 20\%$ 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

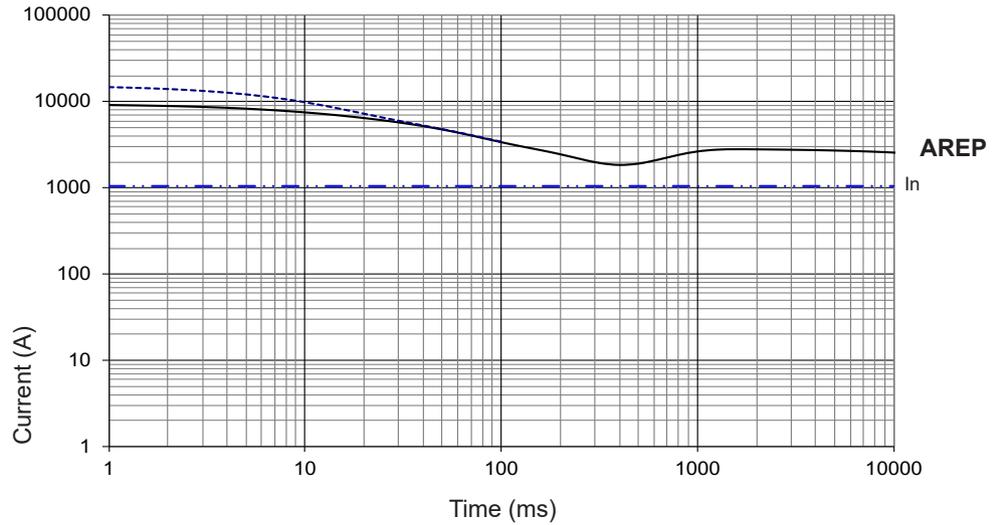


- 1) For a starting P.F. other than 0.6, the starting kVA must be multiplied by $K = \text{Sine P.F.} / 0.8$
- 2) For voltages other than 480V (Y), 277V (Δ), 240V (YY) at 60 Hz, then kVA must be multiplied by $(480/U)^2$ or $(277/U)^2$ or $(240/U)^2$.

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

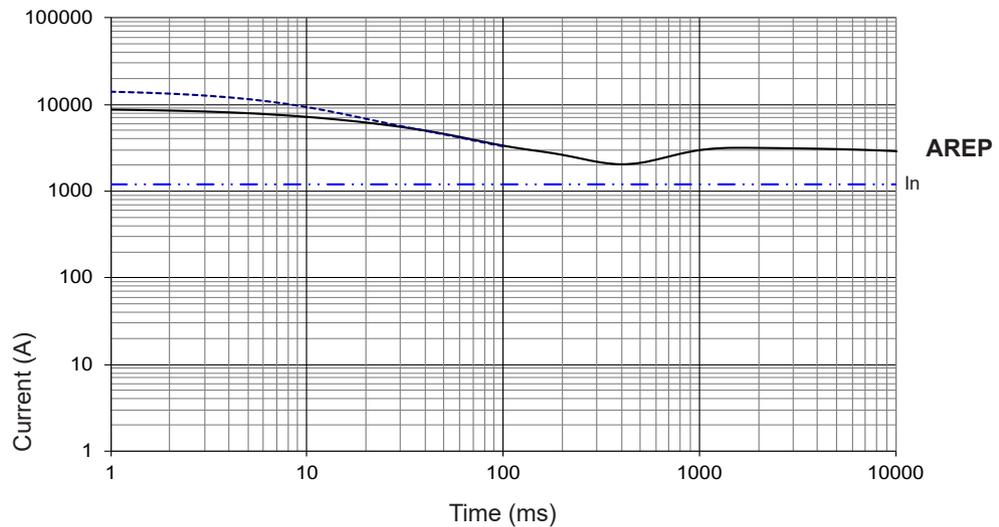
LSA 49.3 M6

Symmetrical —
Asymmetrical - - -



LSA 49.3 M8

Symmetrical —
Asymmetrical - - -



Influence due to connection

Curves shown are for star (Y) connection.

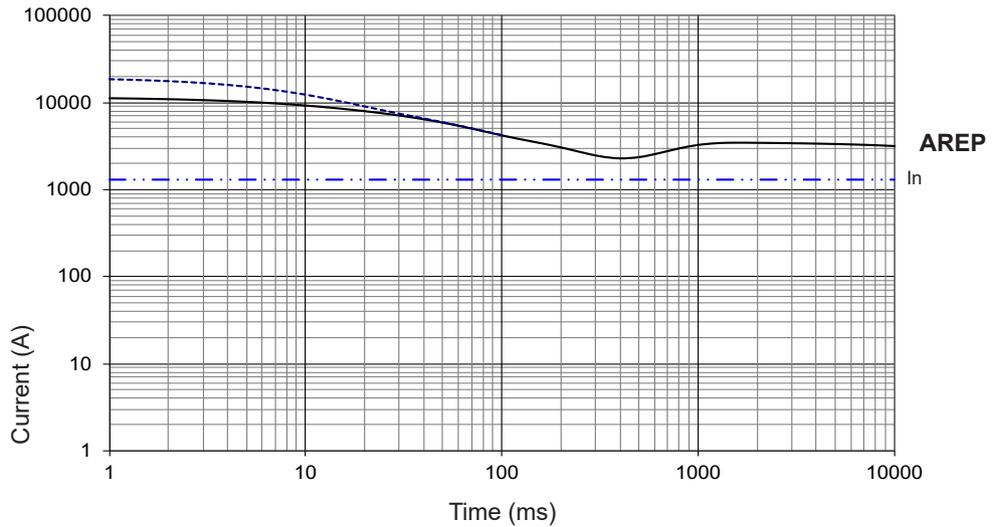
For other connections, use the following multiplication factors:

- 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)

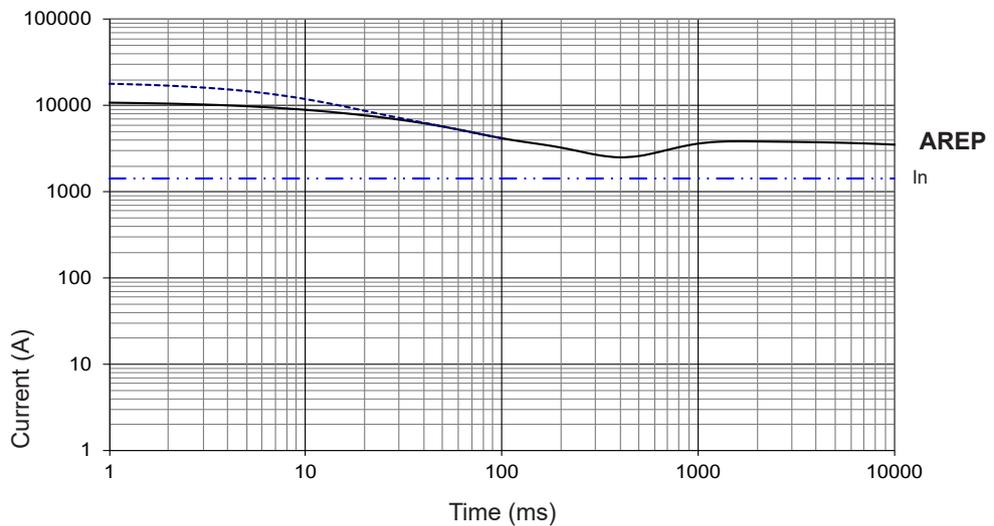
LSA 49.3 L9

Symmetrical —
Asymmetrical - - -



LSA 49.3 L10

Symmetrical —
Asymmetrical - - -



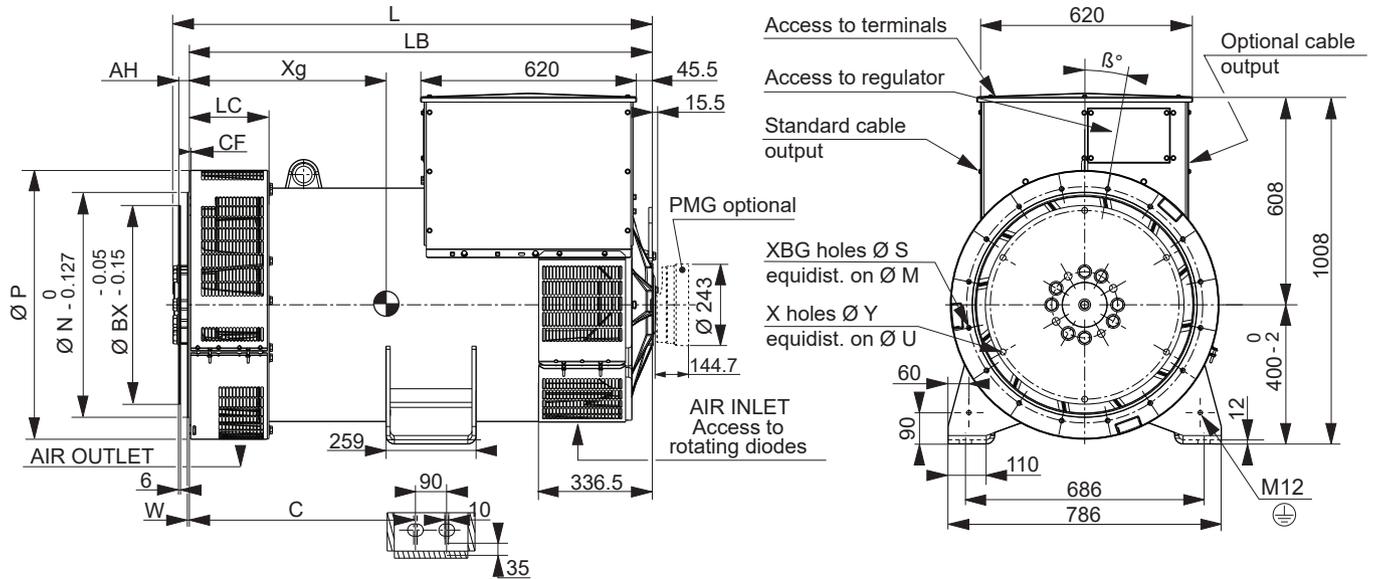
Influence due to short-circuit

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

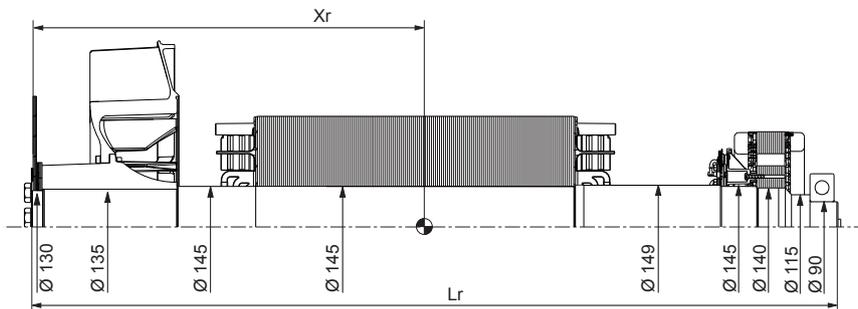


Dimensions (mm) and weight (kg)						Coupling			
Type	L without PMG maxi*	LB	C	Xg	Weight	Flex plate	14	18	21
LSA 49.3 M6	1 372	1 331	650	629	1 578	Flange S.A.E 1	X		
LSA 49.3 M8	1 372	1 331	650	636	1 639	Flange S.A.E 1/2	X		
LSA 49.3 L9	1 462	1 421	650	673	1 792	Flange S.A.E 0	X	X	
LSA 49.3 L10	1 462	1 421	650	681	1 841	Flange S.A.E 00		X	X

* L maxi = LB + AH maxi + 15.5

Flange (mm)										Flex plate (mm)					
S.A.E.	P	N	M	LC	XBG	S	W	β°	CF	S.A.E.	BX	U	X	Y	AH
1	773	511.175	530.225	228.5	12	12	6	15°	38	14	466.7	438.15	8	14	25.4
1/2	773	584.2	619.125	228.5	12	14	6	15°	17	18	571.5	542.92	6	17	15.7
0	773	647.7	679.45	228.5	16	14	6	11° 15'	37	21	673.1	641.35	12	18	0
00	883	787.4	850.9	245	16	14	7	11° 15'	40						

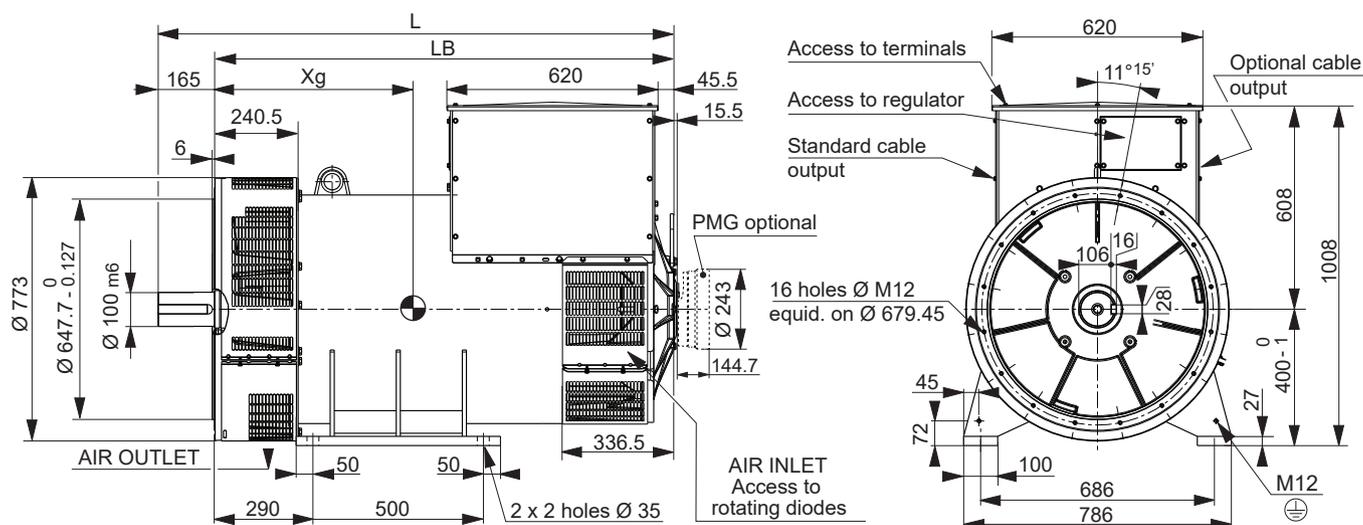
Torsional analysis data



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
LSA 49.3 M6	625	1 351	623	9.99	614	1 351	625	10.25	596	1 351	644	10.98
LSA 49.3 M8	634	1 351	648	10.53	622	1 351	650	10.79	604	1 351	669	11.52
LSA 49.3 L9	671	1 441	705	11.53	659	1 441	707	11.79	642	1 441	726	12.52
LSA 49.3 L10	679	1 441	724	11.92	667	1 441	726	12.18	650	1 441	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.

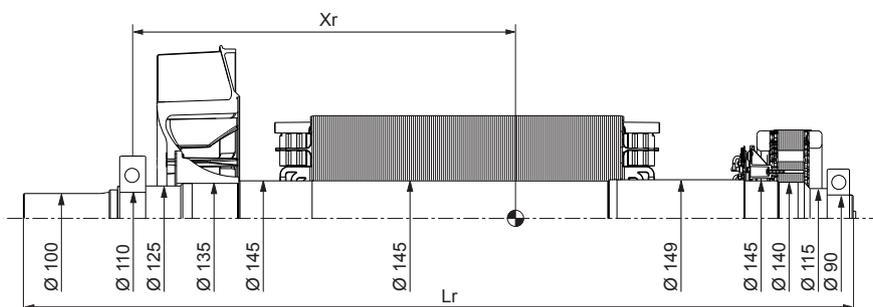
Two-bearing dimensions



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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