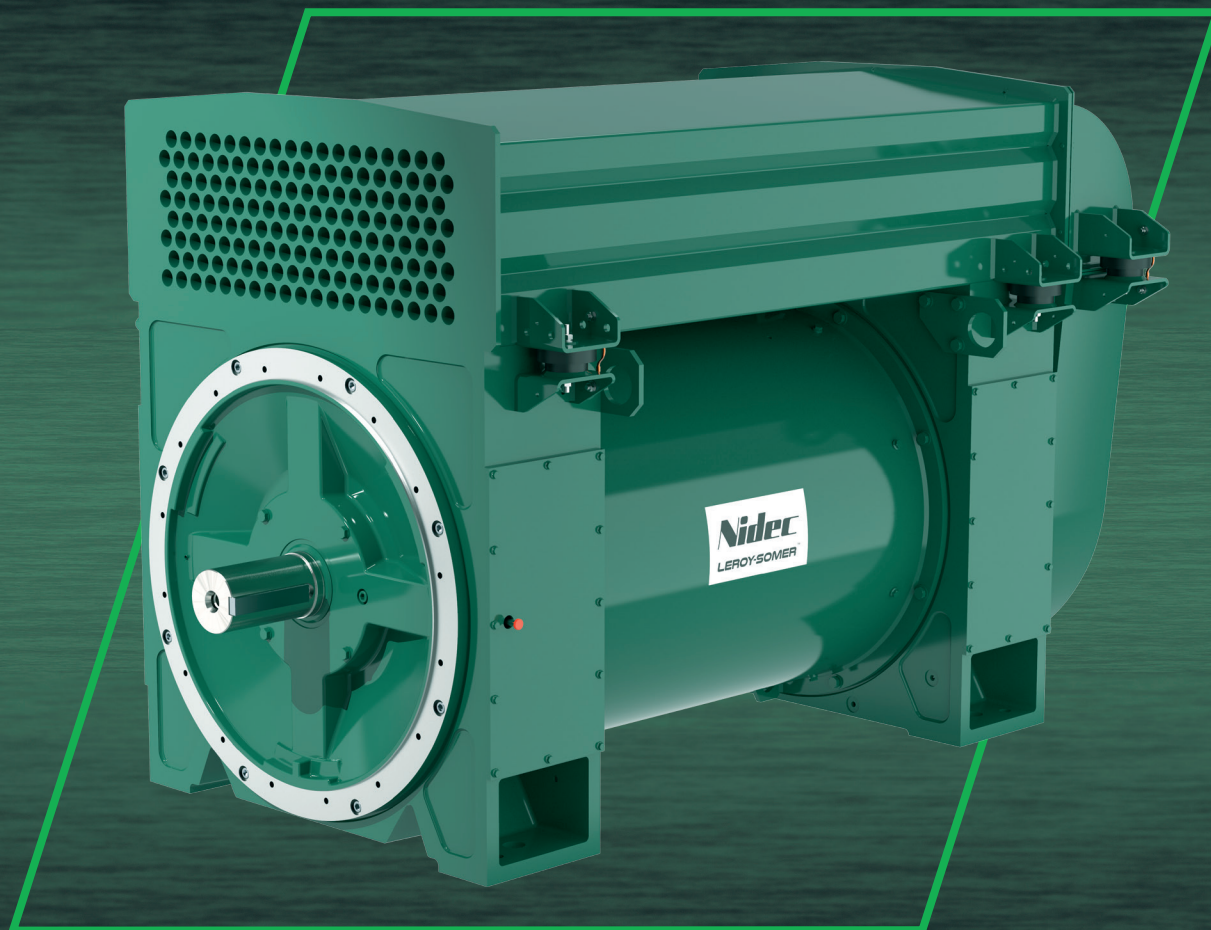


Nidec

Power



LSA 49.3

Low Voltage Alternator
IC6 / CACA / TEAAC - 4 poles

435 to 660 kVA - 50 Hz / 545 to 825 kVA - 60 Hz
Electrical and mechanical data

LEROY-SOMER[™]

The best of performance

The Leroy-Somer™ LSA 49.3 IC6 alternator is a totally enclosed air-cooled machine for special applications. Cooling is performed by an air/air exchanger (cooling index: IC6A1A1 in accordance with standard IEC 60034-6).

Standards

The Leroy-Somer™ LSA 49.3 IC6 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 and UL 1446 declarations and certifications are available for the LSA 49.3 IC6.

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 IC6 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, 6-wire (standard 6S)
- Voltage range:
 - 50 Hz: 380V - 415V (440V)
 - 60 Hz: 380V - 480V
- High efficiency and motor starting capacity
- Other voltages are possible with optional adapted windings:
 - 50 Hz: 440V (n° 7), 500V (n° 9), 550V (n° 22), 600V (n° 23), 690V (n° 10)
 - 60 Hz: 380V and 416V (n° 8), 600V (n° 9), 690V (n° 22)

Mechanical construction

- Compact and rigid assembly to better withstand generator vibrations
- Steel frame
- Cast iron endshields and bracket body
- Two-bearing configuration
- Half-key balancing
- Regreasable bearings
- Standard direction of rotation: clockwise when looking at the shaft end view (for anti-clockwise, derate the machine by 5%)

Description	Standard	Option
Excitation system	AREP	-
Regulation	D550 (external)	D700 (external)
Number of wires	6	-
Degree of protection	IP55	IP56
Space heater	1 x 250W resistor (220/240V)	-
Terminal box		
Terminal box	Right	Left
Bus bar	6 (3xPh + 3xN)	4 (3xPh + 1xN)
Droop CT	-	1 T1
Phase cable glands		
Standard cable glands	-	1 to 4 cables / phase
Marine cable glands	-	1 to 4 cables / phase
Auxiliaries		
CEM compliance	Group 1 Class A	Filter: Group 1 Class B
Stator sensors PT100	3	6 or 9
Stator sensors PTC	-	3 or 6 or 9
Rotor grounding brush	-	Rotor grounding ring
Bearing		
Bearing	Regreasable	1 or 2 insulated bearing
Ball bearing sensors	-	1 PT100 or 1 dual PT100 and/or 1 PTC
Vibration		
Vibration sensors	-	Support + sensors + converter
Protection		
Exchanger	Aluminum tubes	Stainless steel tubes
Overcoating	T26S004	T26S006

LSA 49.3 IC6 - 435 to 660 kVA - 50 Hz / 545 to 825 kVA - 60 Hz

General characteristics

Insulation class	H	AVR type	D550
Winding pitch	2/3 (wind.6S)	Voltage regulation (*)	± 0.25%
Altitude	≤ 1 000 m	Short-circuit current	300% (3 IN) : 10s
Overspeed	2 250 R.P.M.	Total Harmonic distortion THD (**) at no load < 4% - on load < 4%	
Cooling - Code	Air - IC6A1A1	Waveform: NEMA = TIF (**) < 50	
Air flow	1 m³/s (50 Hz) / 1.2 m³/s (60 Hz)	Waveform: IEC = THF (**) < 2%	

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

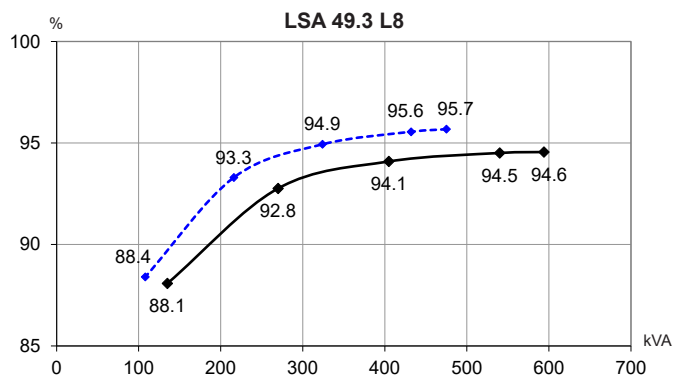
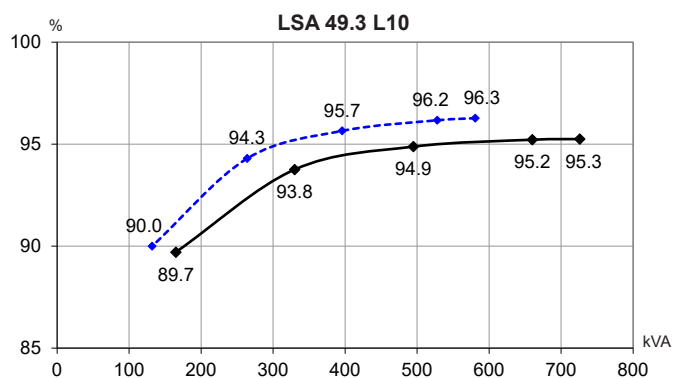
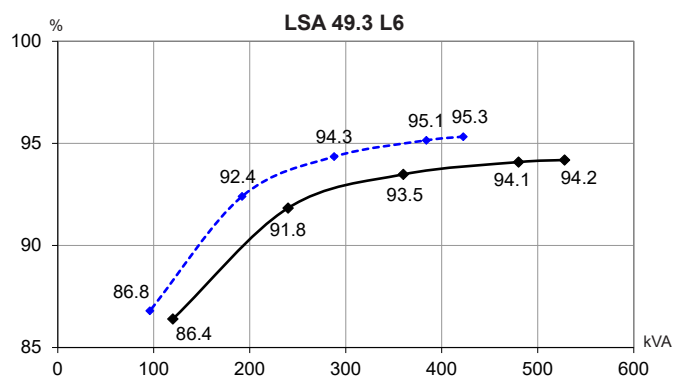
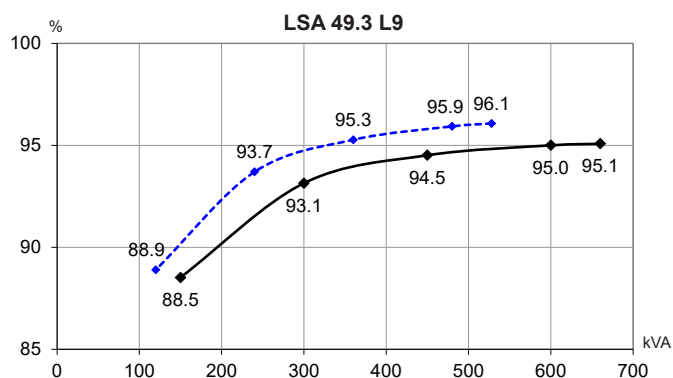
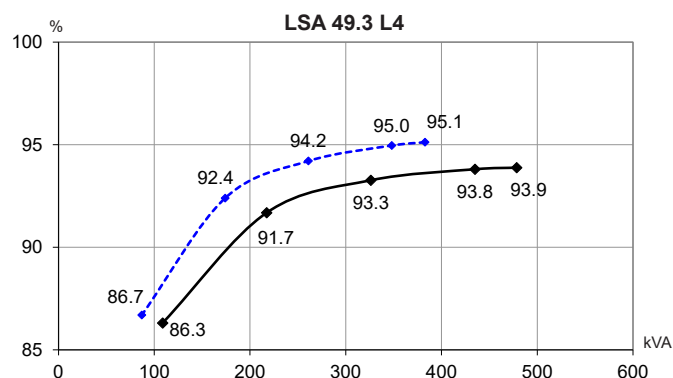
Ratings 50 Hz - 1 500 R.P.M.

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
LSA 49.3 L4	kVA	435	435	435	410	396	396	396	360	461	461	461	435	479	479	479	451
	kW	348	348	348	328	317	317	317	288	369	369	369	348	383	383	383	361
LSA 49.3 L6	kVA	480	480	480	455	437	437	437	398	509	509	509	482	528	528	528	500
	kW	384	384	384	364	349	349	349	318	407	407	407	386	422	422	422	400
LSA 49.3 L8	kVA	540	540	540	510	491	491	491	447	572	572	572	541	594	594	594	561
	kW	432	432	432	408	393	393	393	358	458	458	458	432	475	475	475	449
LSA 49.3 L9	kVA	600	600	600	570	546	546	546	496	636	636	636	604	660	660	660	627
	kW	480	480	480	456	437	437	437	397	509	509	509	483	528	528	528	502
LSA 49.3 L10	kVA	660	660	660	627	601	601	601	546	700	700	700	665	726	726	726	689
	kW	528	528	528	502	480	480	480	437	560	560	560	532	581	581	581	551

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
LSA 49.3 L4	kVA	545	545	545	545	496	496	496	496	578	578	578	578	600	600	600	600
	kW	436	436	436	436	397	397	397	397	462	462	462	462	480	480	480	480
LSA 49.3 L6	kVA	600	600	600	600	546	546	546	546	636	636	636	636	660	660	660	660
	kW	480	480	480	480	437	437	437	437	509	509	509	509	528	528	528	528
LSA 49.3 L8	kVA	675	675	675	675	614	614	614	614	716	716	716	716	743	743	743	743
	kW	540	540	540	540	491	491	491	491	572	572	572	572	594	594	594	594
LSA 49.3 L9	kVA	750	750	750	750	683	683	683	682	795	795	795	795	825	825	825	825
	kW	600	600	600	600	546	546	546	546	636	636	636	636	660	660	660	660
LSA 49.3 L10	kVA	825	825	825	825	751	751	751	751	875	875	875	875	907	907	907	907
	kW	660	660	660	660	601	601	601	601	700	700	700	700	726	726	726	726

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



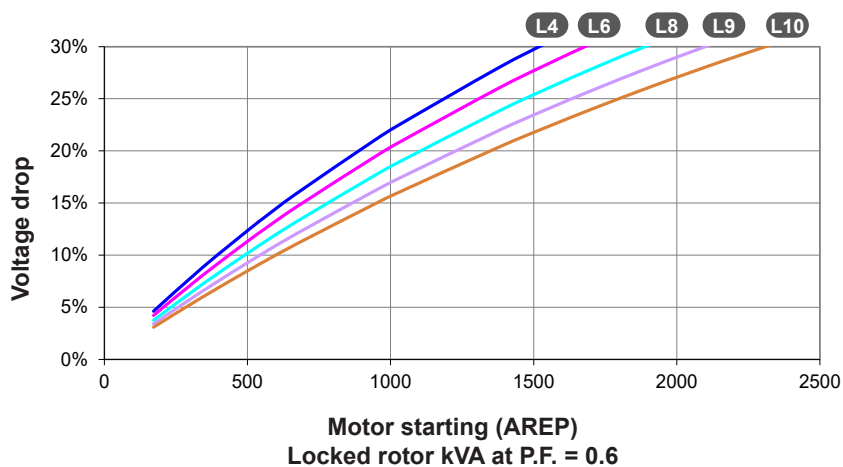
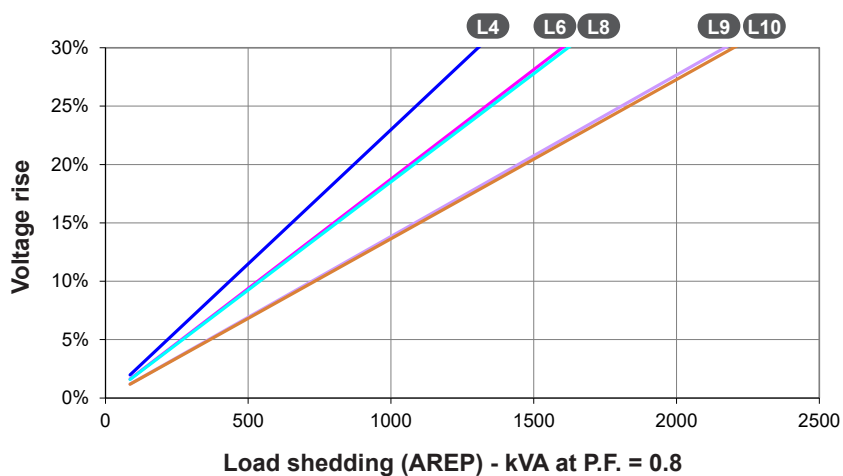
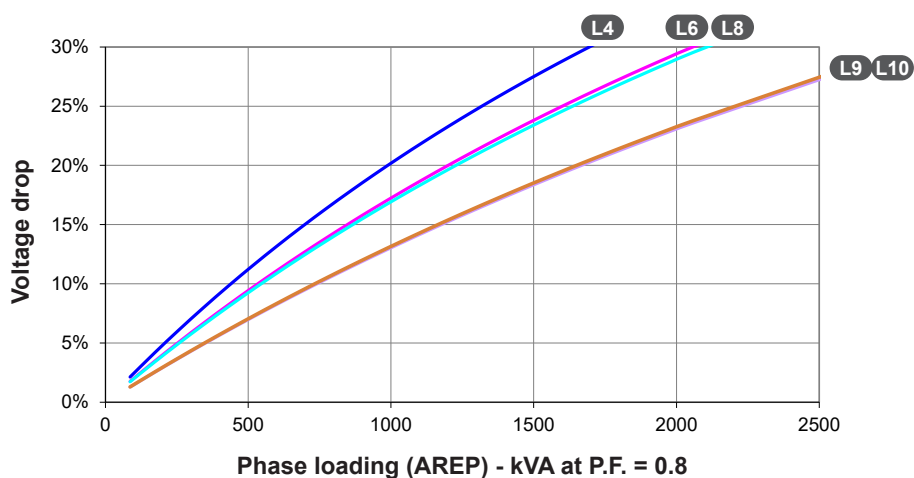
Reactances (%). Time constants (ms) - Class H / 400 V - 50 Hz

	L4	L6	L8	L9	L10
Kcc Short-circuit ratio	0.51	0.64	0.51	0.63	0.52
Xd Direct-axis synchronous reactance unsaturated	231	193	229	200	230
Xq Quadrature-axis synchronous reactance unsaturated	118	98	117	102	117
T'do No-load transient time constant	2 002	2 074	2 094	2 138	2 153
X'd Direct-axis transient reactance saturated	11.5	9.3	10.9	9.3	10.6
T'd Short-circuit transient time constant	100	100	100	100	100
X''d Direct-axis subtransient reactance saturated	9.2	7.4	8.7	7.4	8.5
T''d Subtransient time constant	10	10	10	10	10
X''q Quadrature-axis subtransient reactance saturated	10.7	8.4	9.8	8.2	9.3
Xo Zero sequence reactance	0.48	0.39	0.46	0.39	0.44
X2 Negative sequence reactance saturated	10.0	7.9	9.2	7.8	8.9
Ta Armature time constant	15	15	15	15	15

Other data class H / 400 V - 50 Hz

io (A) No-load excitation current	0.97	1.08	0.87	0.99	0.90
ic (A) On-load excitation current	2.81	2.68	2.52	2.50	2.58
uc (V) On-load excitation voltage	35.1	30.8	31.4	28.9	29.6
ms Response time ($\Delta U = 20\%$ transient)	500	500	500	500	500
kVA Start ($\Delta U = 20\%$ continuous or 30% transient)	1 520	1 680	1 890	2 100	2 310
% Transient ΔU (on-load 4/4) - P.F.: 0.8 _{LAG}	7.5	8.8	1.5	8.9	9.9
W No-load losses	14 200	15 591	15 009	16 019	15 464
W Heat dissipation	22 979	24 160	25 108	25 240	26 512

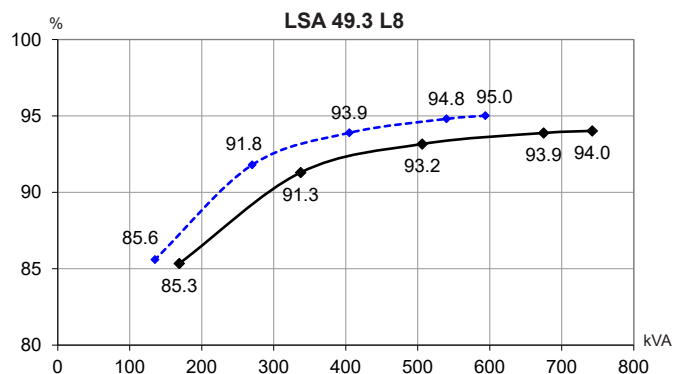
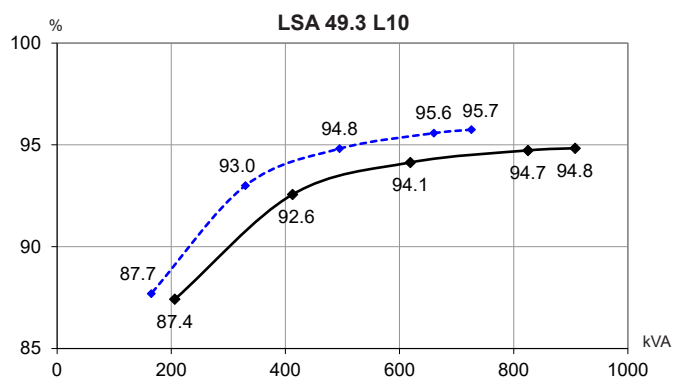
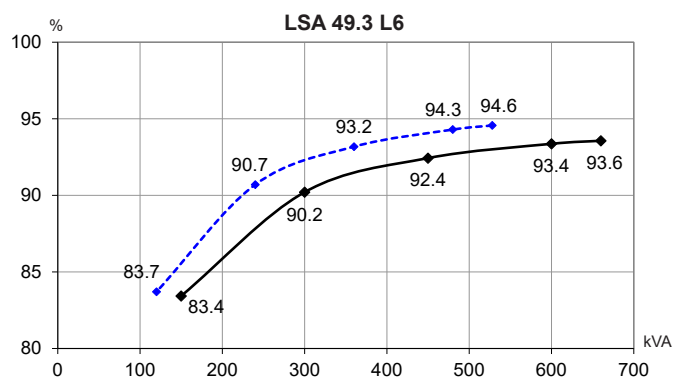
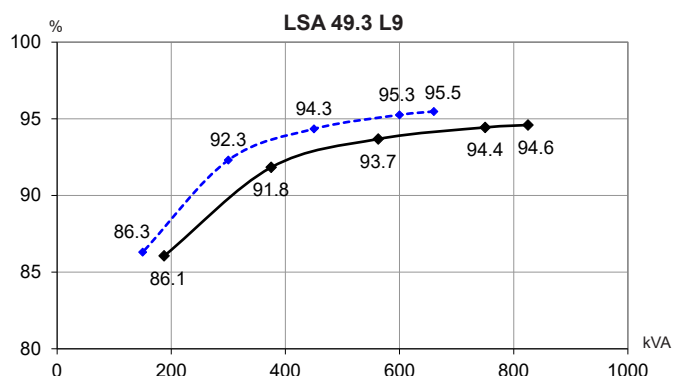
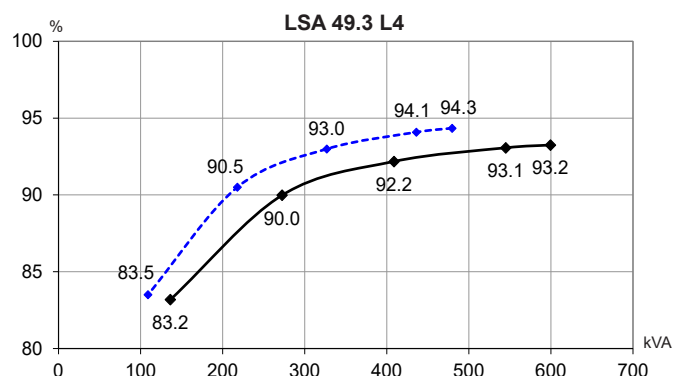
Transient voltage variation 400V - 50 Hz



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)



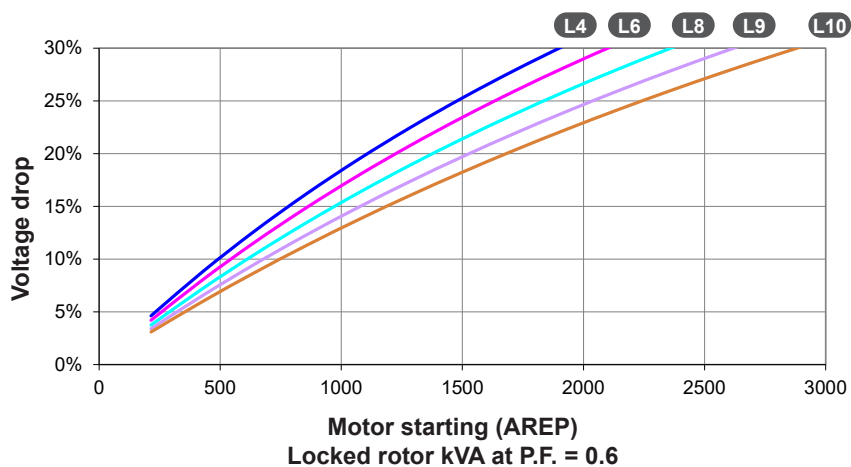
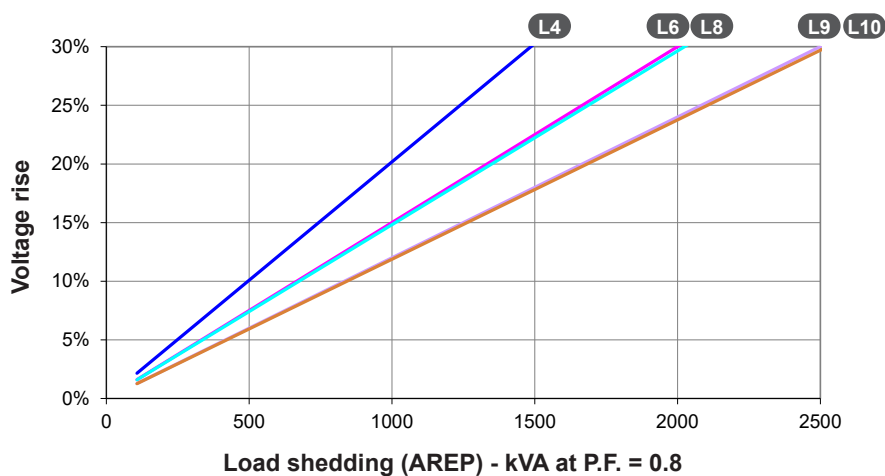
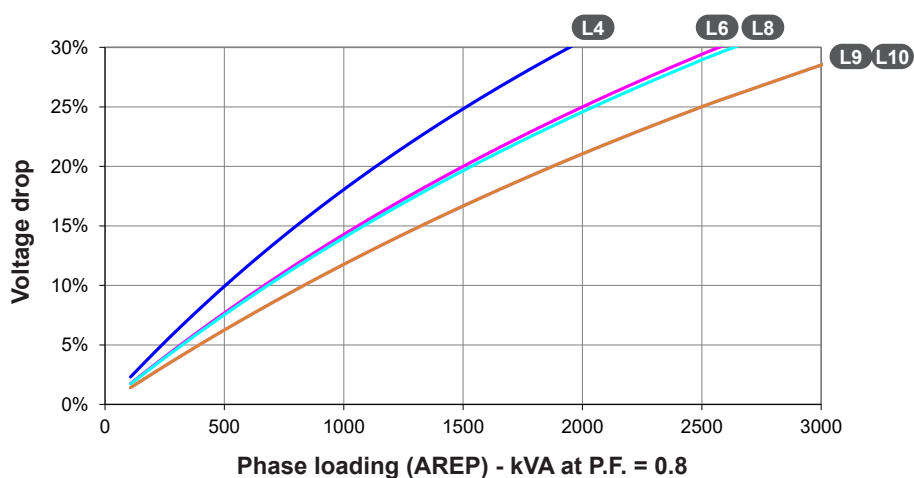
Reactances (%). Time constants (ms) - Class H / 480 V - 60 Hz

		L4	L6	L8	L9	L10
Kcc	Short-circuit ratio	0.49	0.61	0.49	0.60	0.50
Xd	Direct-axis synchronous reactance unsaturated	241	201	238	208	239
Xq	Quadrature-axis synchronous reactance unsaturated	123	103	121	106	122
T'do	No-load transient time constant	2 002	2 074	2 094	2 138	2 153
X'd	Direct-axis transient reactance saturated	12.0	9.7	11.4	9.7	11.1
T'd	Short-circuit transient time constant	100	100	100	100	100
X''d	Direct-axis subtransient reactance saturated	9.6	7.7	9.1	7.8	8.8
T''d	Subtransient time constant	10	10	10	10	10
X''q	Quadrature-axis subtransient reactance saturated	11.2	8.7	10.2	8.5	9.7
Xo	Zero sequence reactance	0.50	0.41	0.48	0.41	0.46
X2	Negative sequence reactance saturated	10.4	8.2	9.6	8.1	9.3
Ta	Armature time constant	15	15	15	15	15

Other data class H / 480 V - 60 Hz

io (A)	No-load excitation current	0.97	1.08	0.87	0.99	0.90
ic (A)	On-load excitation current	2.88	2.74	2.57	2.56	2.63
uc (V)	On-load excitation voltage	35.9	31.5	32.1	29.5	30.2
ms	Response time ($\Delta U = 20\%$ transient)	500	500	500	500	500
kVA	Start ($\Delta U = 20\%$ continuous or 30% transient)	1 900	2 100	2 360	2 620	2 880
%	Transient ΔU (on-load 4/4) - P.F.: 0.8 _{LAG}	7.8	9.1	1.5	9.2	10.2
W	No-load losses	23 243	25 175	24 412	25 619	24 868
W	Heat dissipation	32 493	34 117	35 178	35 354	36 742

Transient voltage variation 480V - 60 Hz



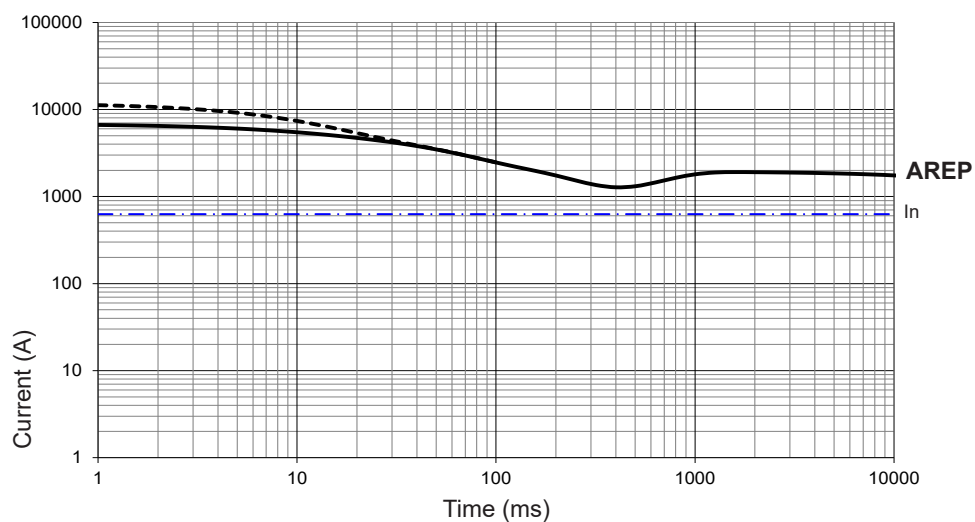
1) For a starting P.F. other than 0.6, the starting kVA must be multiplied by $K = \text{Sine P.F.} / 0.8$

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)

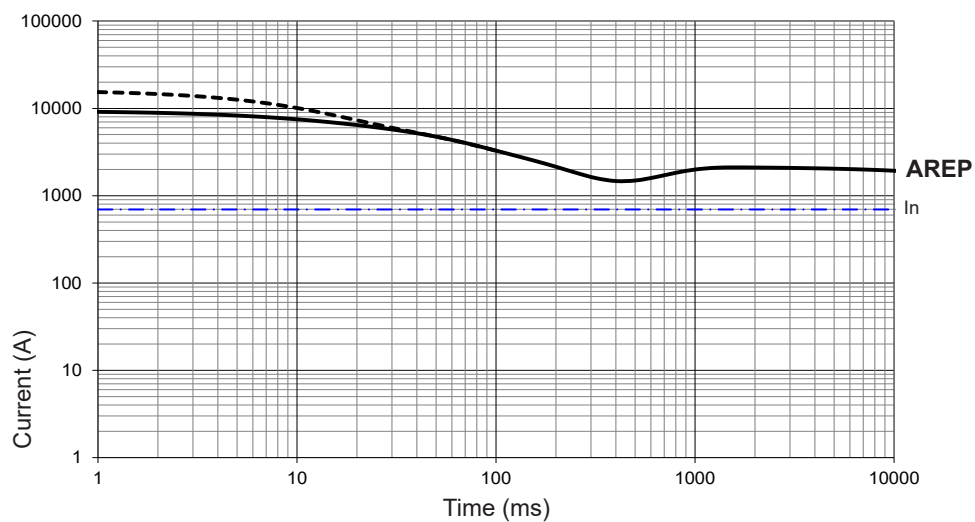
LSA 49.3 L4

Symmetrical —
Asymmetrical - - -



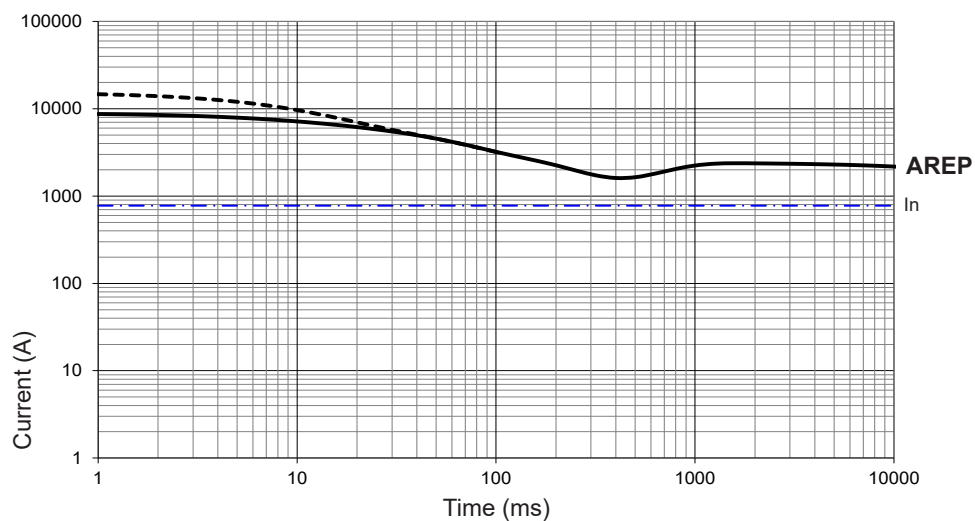
LSA 49.3 L6

Symmetrical —
Asymmetrical - - -



LSA 49.3 L8

Symmetrical —
Asymmetrical - - -



Influence due to connection

Curves shown are for star (Y) connection.

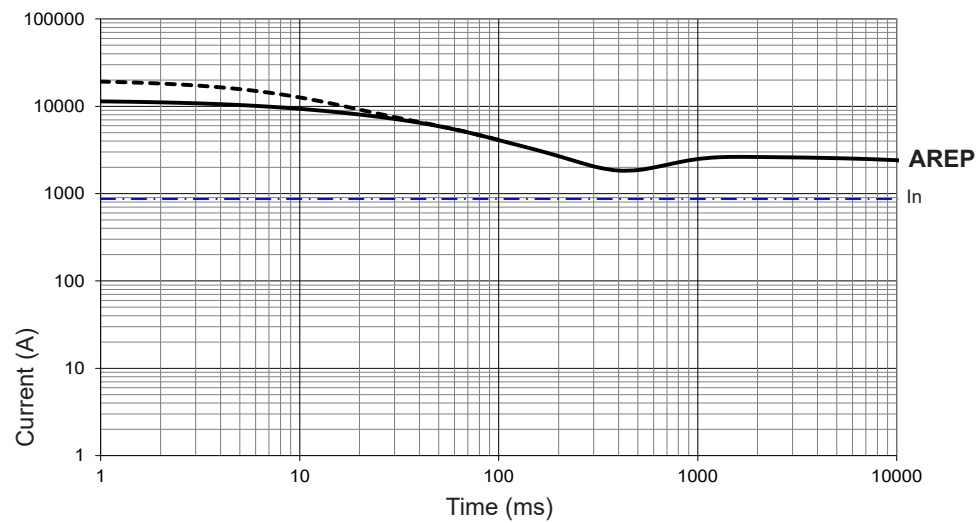
For other connections, use the following multiplication factors:

- 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)

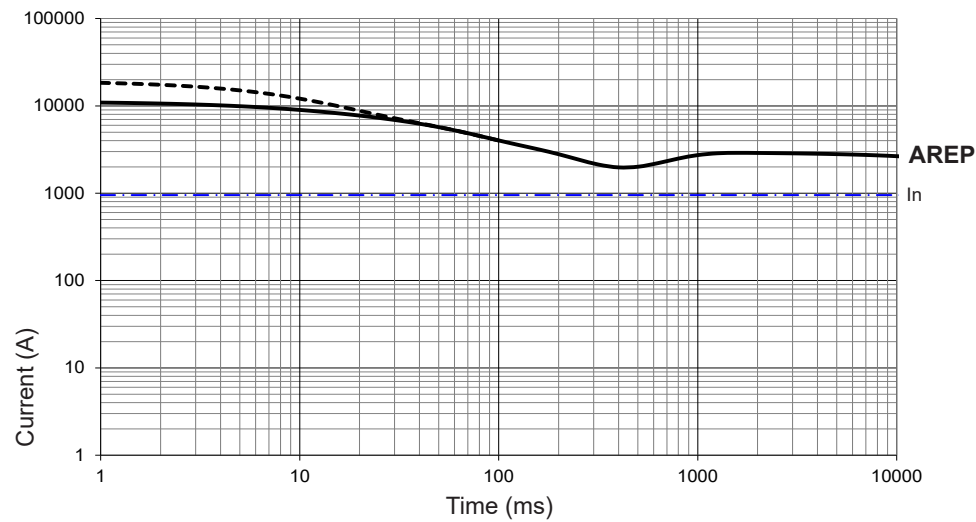
LSA 49.3 L9

Symmetrical —
Asymmetrical - - -



LSA 49.3 L10

Symmetrical —
Asymmetrical - - -

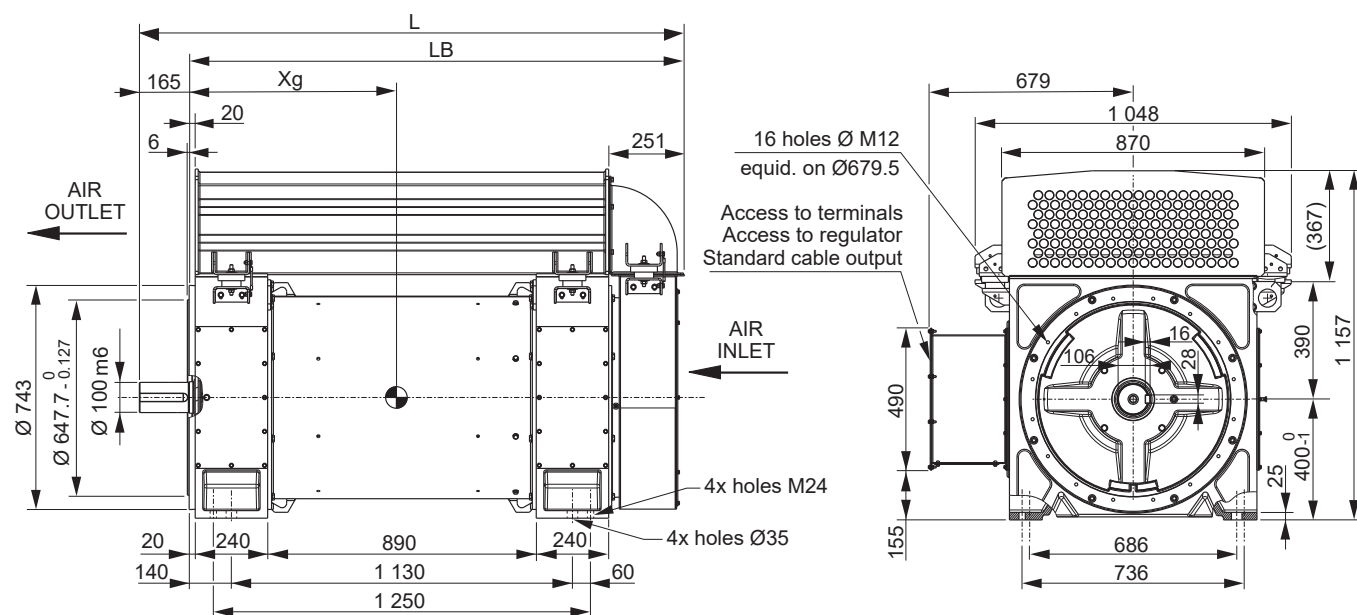


Influence due to short-circuit

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)	10 sec.	5 sec.	2 sec.

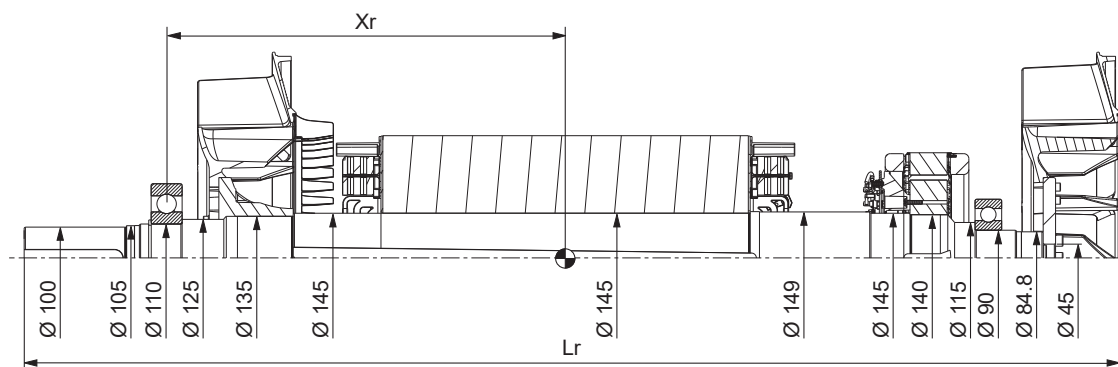
Two-bearing dimensions



Dimensions and weight: complete alternator

Type	L (mm) Alternator length	LB (mm) Alternator length	X _g (mm) Centre of gravity	M _{alt} (kg) Weight
LSA 49.3 L4	1 806	1 641	717	2 128
LSA 49.3 L6	1 806	1 641	728	2 265
LSA 49.3 L8	1 806	1 641	732	2 307
LSA 49.3 L9	1 806	1 641	743	2 450
LSA 49.3 L10	1 806	1 641	749	2 506

Torsional analysis data



Dimensions and weight: rotor

Type	Lr (mm) Rotor length	Xr (mm) Centre of gravity	M (kg) Weight	J (kgm ²) Moment of inertia (-4J = MD ²)
LSA 49.3 L4	1 770	631	576	9.43
LSA 49.3 L6	1 770	645	629	10.52
LSA 49.3 L8	1 770	650	654	11.06
LSA 49.3 L9	1 770	666	699	12.03
LSA 49.3 L10	1 770	674	717	12.40

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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