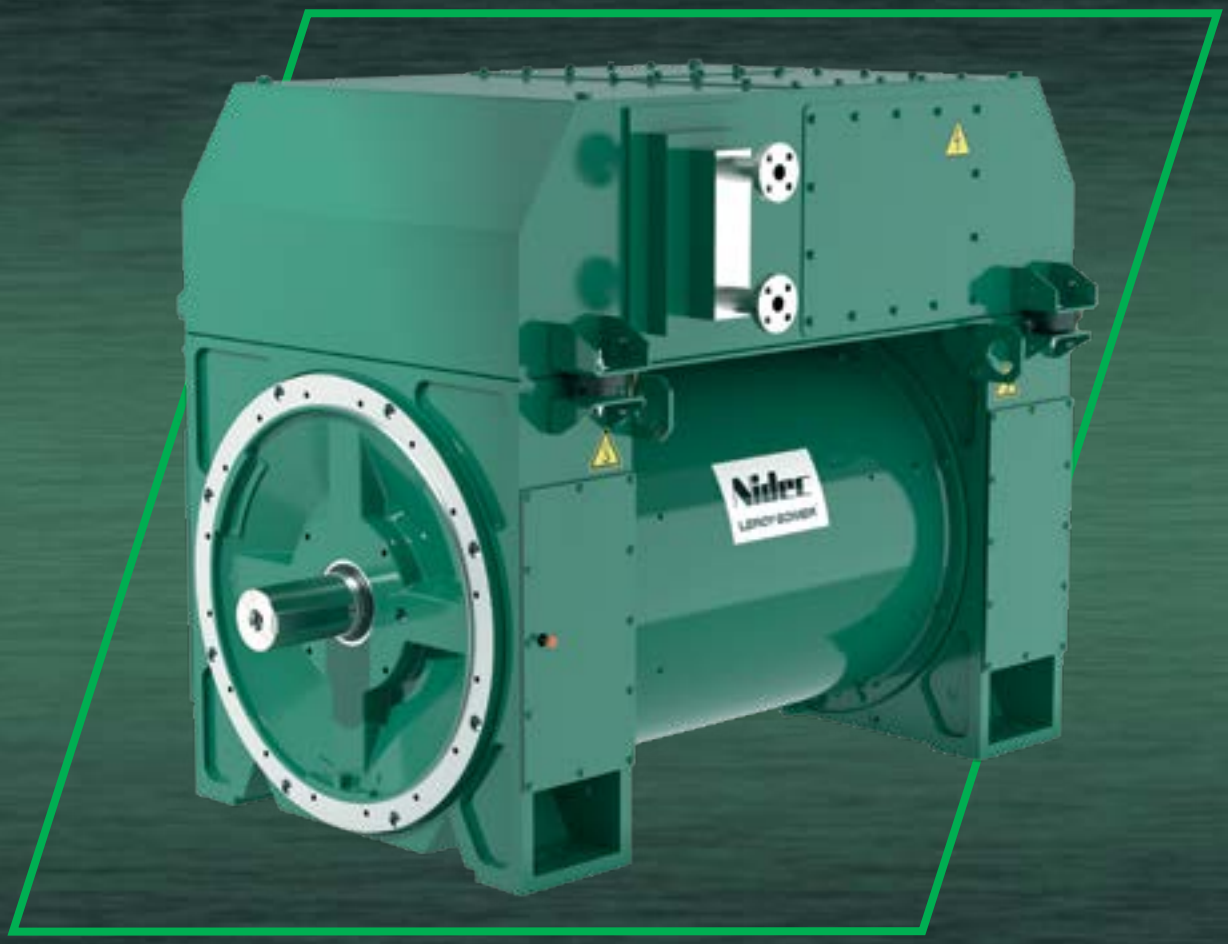
Nidec Power



LSA 49.3

Low Voltage Alternator
IC8 / CACW / TEWAC - 4 poles

462 to 800 kVA - 50 Hz / 578 to 1 000 kVA - 60 Hz

Electrical and mechanical data

LEROY-SOMER™

The best of performance

The Leroy-Somer™ LSA 49.3 IC8 alternator is a totally enclosed water-cooled machine for special applications.
Cooling is performed by an air/water exchanger (cooling index: IC8A1W7 in accordance with standard IEC 60034-6).

Standards

The Leroy-Somer™ LSA 49.3 IC8 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 IC8.
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 IC8 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 (inside terminal box)	D550 or D700 (external)
Number of wires	6	-
Degree of protection	IP55	IP56
Space heater	1 x 250W resistor (220/240V)	-
Terminal box		
Terminal box	Inside the exchanger box	-
Bus bar	4 (3xPh + 1xN)	6 (3xPh + 3xN)
Droop CT	-	1 T1
CT	-	3 CT's on neutral side
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	Double tube - marine grade material with water leakage detector	-
Overcoating	T26S004	T26S006

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%
Cooling - Code	Water - IC8A1W7	Total Harmonic distortion THD (***)	on load < 4%
Water flow (*)	4.5 m^3/h	Waveform: NEMA = TIF (***)	< 50
Air flow	0.75 m^3/s	Waveform: IEC = THF (***)	< 2%

(*) Except for L11: 7.0 m^3/h (**) 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 (environment) - 32 °C (liquid)				Continuous duty/40 °C (environment) - 32 °C (liquid)			
Class/T °K		H / 125 °K				F / 105 °K			
Phase		3 ph.				3 ph.			
Y		380V	**400V**	415V	440V	380V	**400V**	415V	440V
LSA 49.3 L4	kVA	462	**462**	462	437	419	**419**	419	381
	kW	*370*	***370***	*370*	*350*	*335*	***335***	*335*	*305*
LSA 49.3 L6	kVA	511	**511**	511	484	464	**464**	464	422
	kW	*409*	***409***	*409*	*387*	*371*	***371***	*371*	*338*
LSA 49.3 L8	kVA	574	**574**	574	546	523	**523**	523	476
	kW	*459*	***459***	*459*	*437*	*419*	***419***	*419*	*381*
LSA 49.3 L9	kVA	637	**637**	637	603	578	**578**	578	526
	kW	*510*	***510***	*510*	*482*	*462*	***462***	*462*	*421*
LSA 49.3 L10	kVA	700	**700**	700	665	637	**637**	637	580
	kW	*560*	***560***	*560*	*532*	*510*	***510***	*510*	*464*
LSA 49.3 L11	kVA	800	**800**	800	760	728	**728**	728	663
	kW	*640*	***640***	*640*	*608*	*582*	***582***	*582*	*530*

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

kVA / kW - P.F. = 0.8									
Duty/T °C		Continuous duty/40 °C (environment) - 32 °C (liquid)				Continuous duty/40 °C (environment) - 32 °C (liquid)			
Class/T °K		H / 125 °K				F / 105 °K			
Phase		3 ph.				3 ph.			
Y		380V	416V	440V	**480V**	380V	416V	440V	**480V**
LSA 49.3 L4	kVA	578	578	578	**578**	528	528	528	**528**
	kW	*462*	*462*	*462*	***462***	*422*	*422*	*422*	***422***
LSA 49.3 L6	kVA	639	639	639	**639**	582	582.4	582	**582**
	kW	*511*	*511*	*511*	***511***	*466*	*466*	*466*	***466***
LSA 49.3 L8	kVA	718	718	718	**718**	655	655	655	**655**
	kW	*574*	*574*	*574*	***574***	*524*	*524*	*524*	***524***
LSA 49.3 L9	kVA	796	796	796	**796**	728	728	728	**728**
	kW	*637*	*637*	*637*	***637***	*582*	*582*	*582*	***582***
LSA 49.3 L10	kVA	875	875	875	**875**	796	796	796	**796**
	kW	*700*	*700*	*700*	***700***	*637*	*637*	*637*	***637***
LSA 49.3 L11	kVA	1 000	1 000	1 000	**1 000**	900	900	900	**900**
	kW	*800*	*800*	*800*	***800***	*720*	*720*	*720*	***720***

Ratings comply with the Marine Classification Societies:

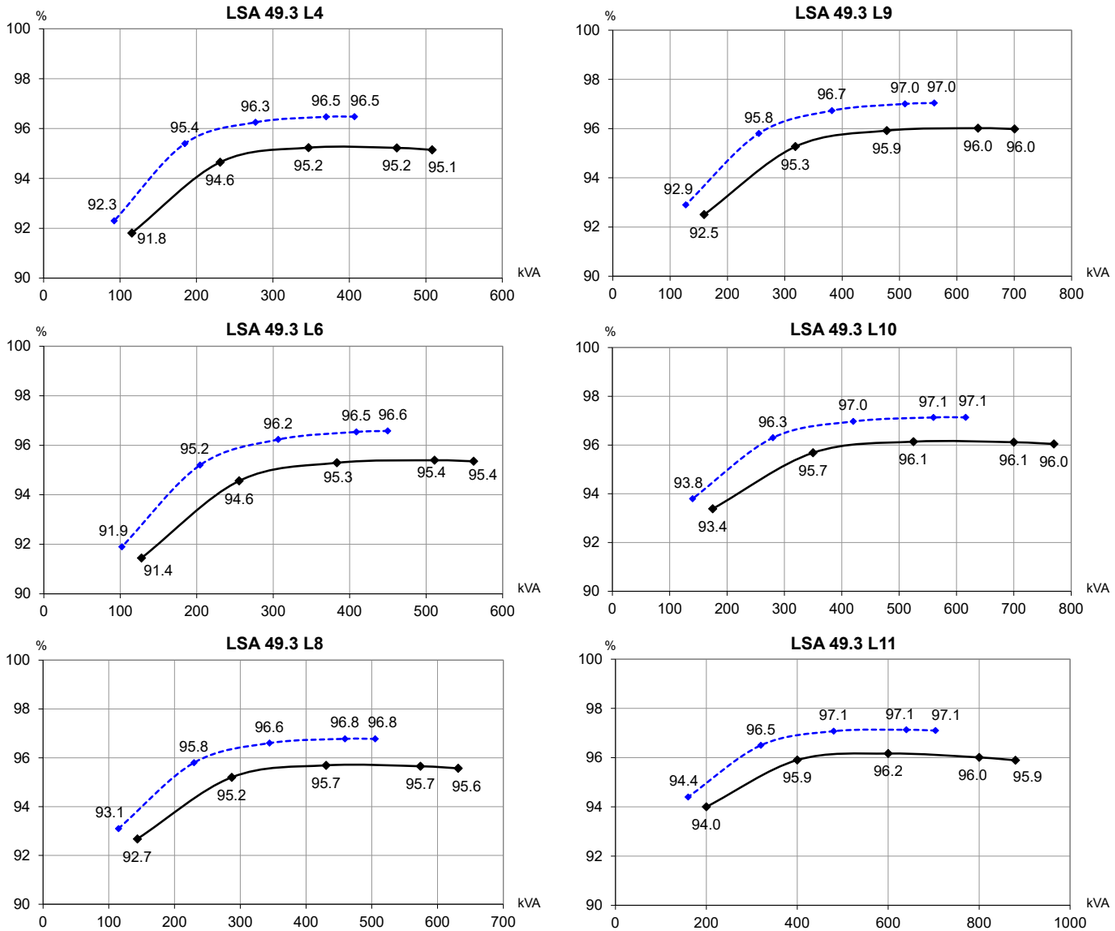
LSA 49.3 IC8 is not included in any Leroy-Somer Type Approval Certificate.

Temperature and Power

Table of deratings according to cooling water temperature:
Standard cooling: Twater = 32 °C / Glycol ≤ 30%

T °C water	20/30	30/40	40/45
Factor	1.06	1	0.97

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



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

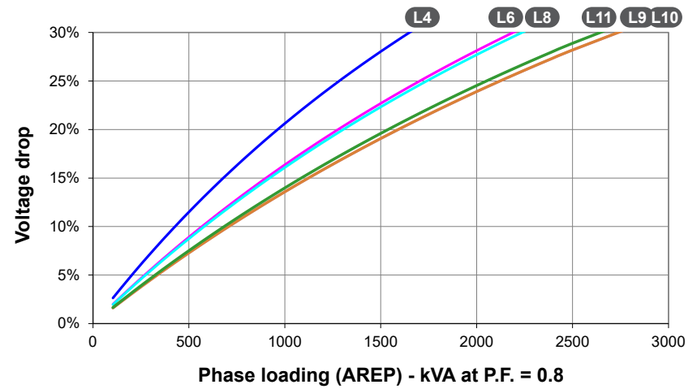
		L4	L6	L8	L9	L10	L11
Kcc	Short-circuit ratio	0.48	0.60	0.48	0.59	0.49	0.43
Xd	Direct-axis synchronous reactance unsaturated	245	206	243	212	243	278
Xq	Quadrature-axis synchronous reactance unsaturated	125	105	124	108	124	142
T'do	No-load transient time constant	2 002	2 074	2 094	2 138	2 153	2 153
X'd	Direct-axis transient reactance saturated	12.2	9.9	11.6	9.9	11.3	12.9
T'd	Short-circuit transient time constant	100	100	100	100	100	100
X"d	Direct-axis subtransient reactance saturated	9.8	7.9	9.3	7.9	9.0	10.3
T"d	Subtransient time constant	10	10	10	10	10	10
X"q	Quadrature-axis subtransient reactance saturated	11.4	8.9	10.4	8.7	9.8	11.3
Xo	Zero sequence reactance	0.51	0.41	0.49	0.41	0.47	0.54
X2	Negative sequence reactance saturated	10.6	8.4	9.8	8.3	9.4	10.8
Ta	Armature time constant	15	15	15	15	15	15

Other data class H / 400 V - 50 Hz

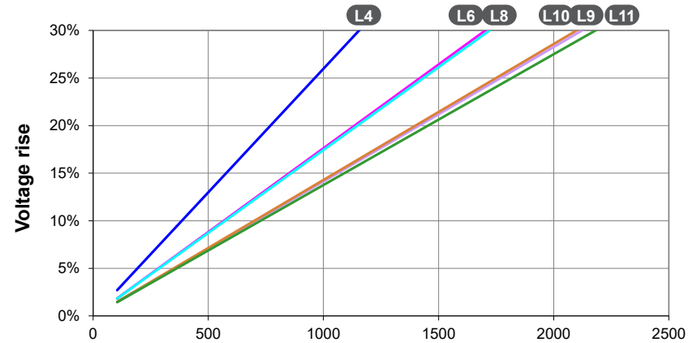
io (A)	No-load excitation current	0.97	1.08	0.87	0.99	0.90	0.90
ic (A)	On-load excitation current	2.94	2.80	2.64	2.61	2.69	3.00
uc (V)	On-load excitation voltage	36.7	32.2	32.9	30.2	31.0	34.4
ms	Response time (ΔU = 20% transient)	500	500	500	500	500	500
kVA	Start (ΔU = 20% continuous or 30% transient)	1 560	2 050	2 050	2 600	2 600	2 600
%	Transient ΔU (on-load 4/4) - P.F.: 0.8 $_{LAG}$	7.9	9.3	1.1	9.3	10.4	11.6
W	No-load losses	7 922	9 313	8 731	10 085	9 530	9 530
W	Heat dissipation	18 529	19 737	20 858	21 149	22 624	26 606

LSA 49.3 IC8 - 462 to 800 kVA - 50 Hz / 578 to 1 000 kVA - 60 Hz

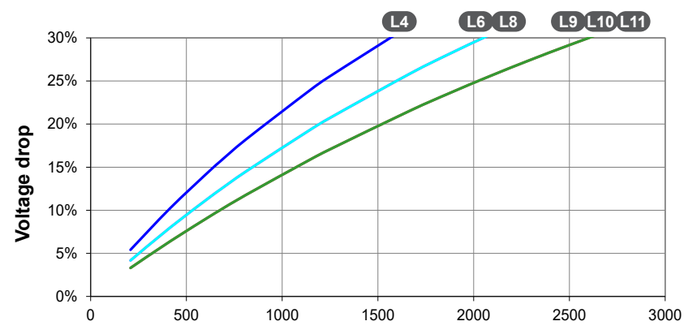
Transient voltage variation 400V - 50 Hz



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



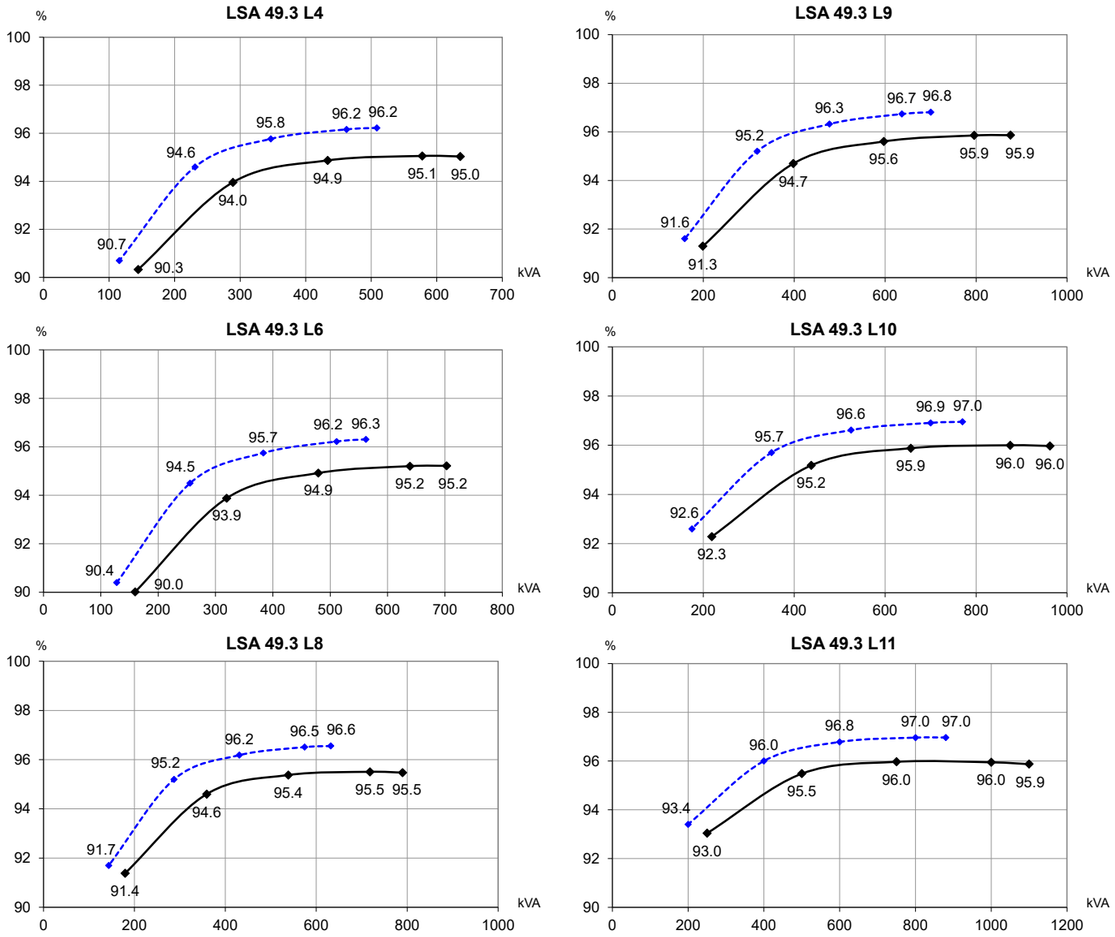
Load shedding (AREP) - kVA at P.F. = 0.8



Motor starting (AREP)
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)



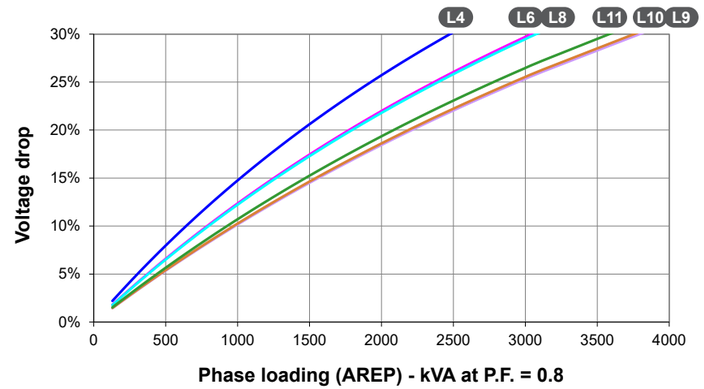
Reactances (%). Time constants (ms) - Class H / 480 V - 60 Hz

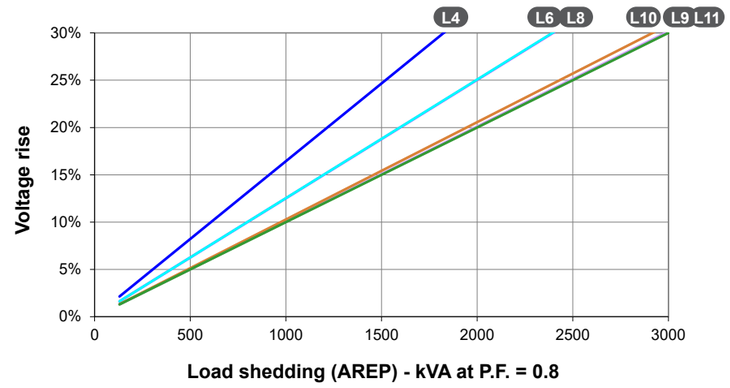
		L4	L6	L8	L9	L10	L11
Kcc	Short-circuit ratio	0.46	0.58	0.46	0.57	0.47	0.41
Xd	Direct-axis synchronous reactance unsaturated	256	214	254	221	254	290
Xq	Quadrature-axis synchronous reactance unsaturated	131	109	130	113	130	148
T'do	No-load transient time constant	2 002	2 074	2 094	2 138	2 153	2 153
X'd	Direct-axis transient reactance saturated	12.7	10.3	12.1	10.3	11.7	13.4
T'd	Short-circuit transient time constant	100	100	100	100	100	100
X"d	Direct-axis subtransient reactance saturated	10.2	8.2	9.7	8.2	9.4	10.7
T"d	Subtransient time constant	10	10	10	10	10	10
X"q	Quadrature-axis subtransient reactance saturated	11.9	9.3	10.8	9.1	10.3	11.7
Xo	Zero sequence reactance	0.53	0.43	0.51	0.43	0.49	0.56
X2	Negative sequence reactance saturated	11.0	8.8	10.2	8.6	9.8	11.2
Ta	Armature time constant	15	15	15	15	15	15

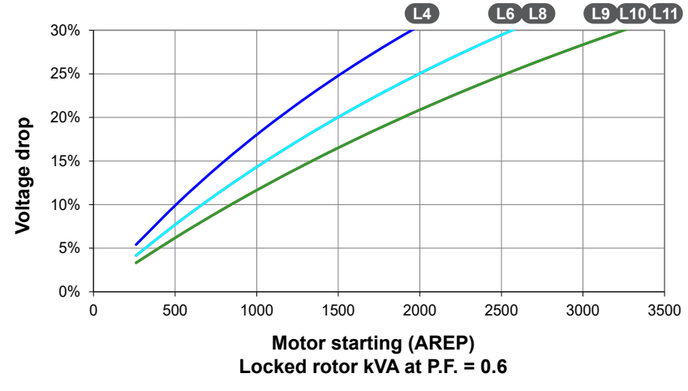
Other data class H / 480 V - 60 Hz

io (A)	No-load excitation current	0.97	1.08	0.87	0.99	0.90	0.90
ic (A)	On-load excitation current	3.01	2.87	2.69	2.67	2.75	3.06
uc (V)	On-load excitation voltage	37.6	32.9	33.6	30.8	31.6	35.1
ms	Response time (ΔU = 20% transient)	500	500	500	500	500	500
kVA	Start (ΔU = 20% continuous or 30% transient)	1 950	2 565	2 565	3 250	3 250	3 250
%	Transient ΔU (on-load 4/4) - P.F.: 0.8 $_{LAG}$	8.1	9.6	11.1	9.6	10.8	12.1
W	No-load losses	12 395	14 327	13 564	15 365	14 614	14 614
W	Heat dissipation	24 062	25 761	27 037	27 552	29 185	33 764

Transient voltage variation 480V - 60 Hz





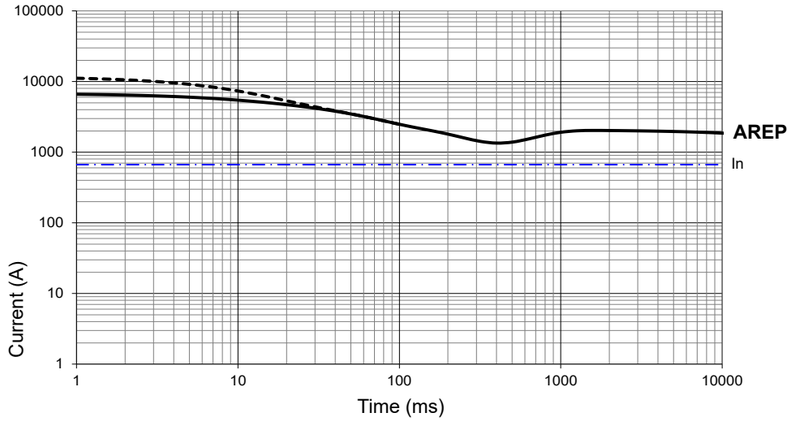


1) For a starting P.F. other than 0.6, the starting kVA must be multiplied by K = Sine P.F. / 0.8
2) For voltages other than 480V (Y), 277V (Δ), 240V (YY) at 60 Hz, then kVA must be multiplied by $(480/U)^2$ or $(277/U)^2$ or $(240/U)^2$.

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

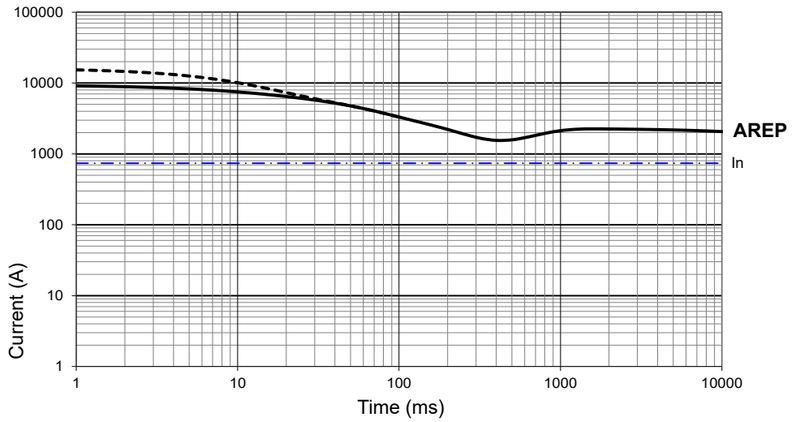
LSA 49.3 L4

Symmetrical ——
Asymmetrical - - -



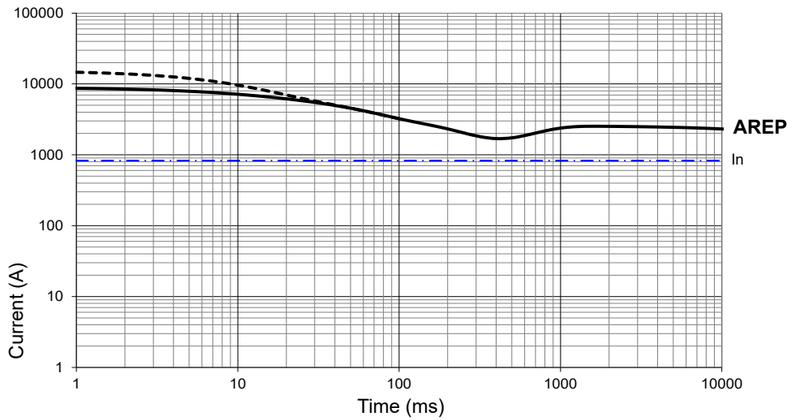
LSA 49.3 L6

Symmetrical ——
Asymmetrical - - -



LSA 49.3 L8

Symmetrical ——
Asymmetrical - - -



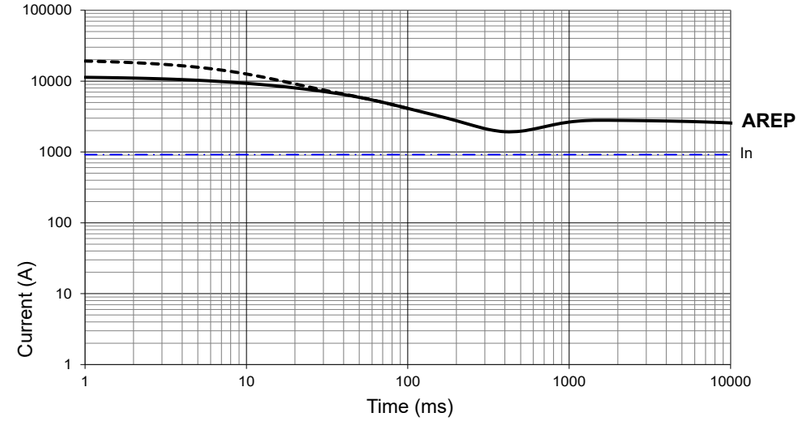
Influence due to connection
Curves shown are for star (Y) connection.
For other connections, use the following multiplication factors:
- Series delta : current value x 1.732 - Parallel star : current value x 2

LSA 49.3 IC8 - 462 to 800 kVA - 50 Hz / 578 to 1 000 kVA - 60 Hz

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

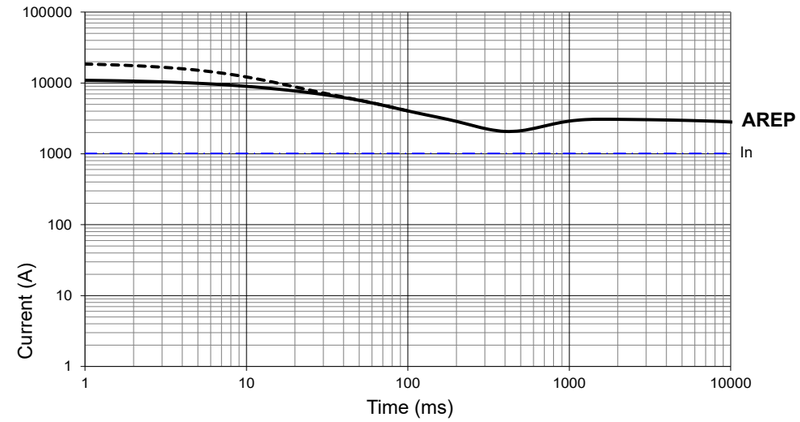
LSA 49.3 L9

Symmetrical ——
Asymmetrical - - -



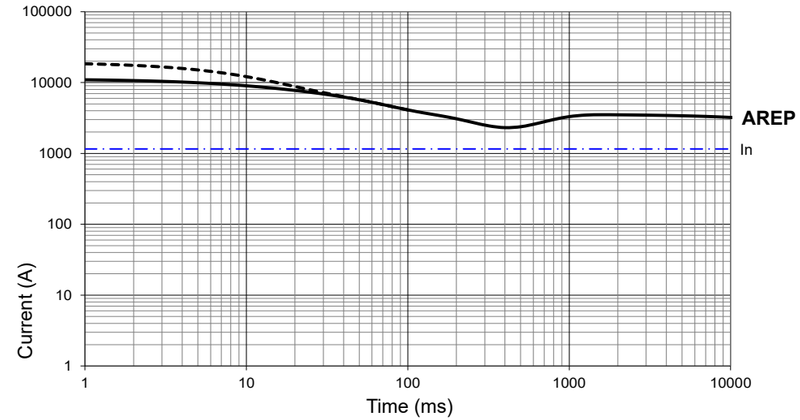
LSA 49.3 L10

Symmetrical ——
Asymmetrical - - -



LSA 49.3 L11

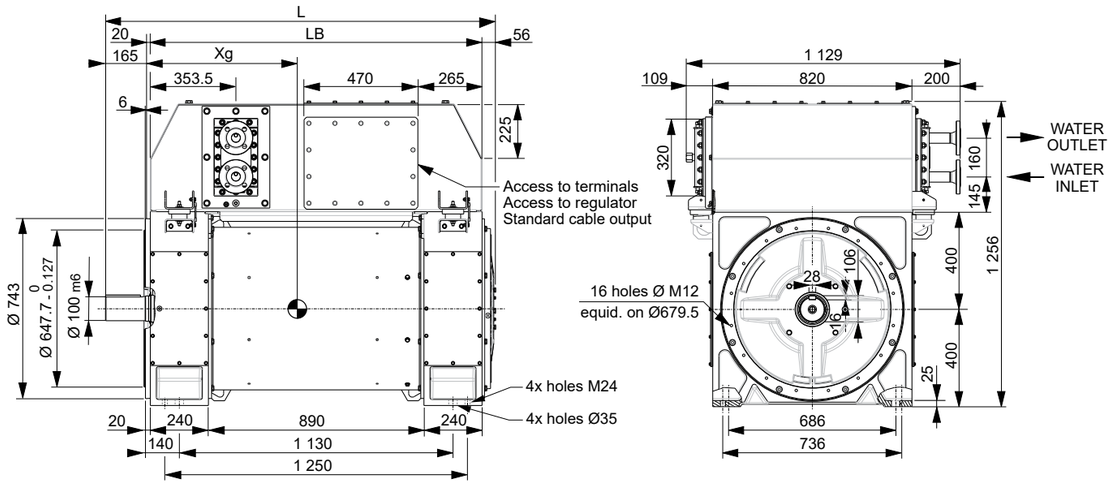
Symmetrical ——
Asymmetrical - - -



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

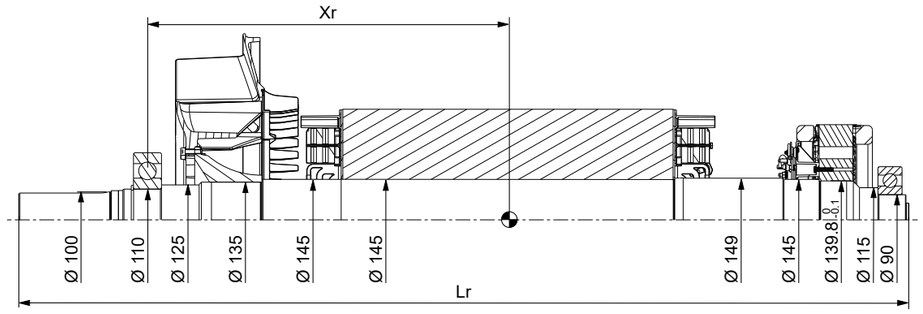


Dimensions and weight: complete alternator

Type	**L** (mm) *Alternator length*	**LB** (mm) *Alternator length*	**X_g** (mm) *Centre of gravity*	**M_{alt}** (kg) *Weight*
LSA 49.3 L4	1 611	1 370	665	1 960
LSA 49.3 L6	1 611	1 370	679	2 120
LSA 49.3 L8	1 611	1 370	684	2 180
LSA 49.3 L9	1 611	1 370	699	2 320
LSA 49.3 L10	1 611	1 370	706	2 375
LSA 49.3 L11*	1 611	1 370	677	2 440

*only with 35kW exchanger

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 = MD²)*
LSA 49.3 L4	1 590	591	550	8.50
LSA 49.3 L6	1 590	609	602	9.59
LSA 49.3 L8	1 590	617	627	10.13
LSA 49.3 L9	1 590	636	672	11.10
LSA 49.3 L10	1 590	644	690	11.47
LSA 49.3 L11*	1 590	644	690	11.47

*only with 35kW exchanger

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.

Nidec

All for dreams

www.nidecpower.com

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