LSA 49.1 IC6 / LSA 49.1 IC8

Low Voltage Alternators - 4 pole

350 to 530 kVA - 50 Hz / 420 to 635 kVA - 60 Hz
Electrical and mechanical data

LEROY-SOMER™

Nidec
All for dreams

The best of performance

The LSA 49.1 IC6 / LSA 49.1 IC8 Nidec Leroy-Somer are totally enclosed air or water-cooled alternators for special applications.
LSA 49.1 IC6 cooling is performed by an **air/air exchanger** (cooling index: IC6A1A1 in accordance with standard IEC 60034-6).
LSA 49.1 IC8 cooling is performed by an **air/water exchanger** (cooling index: IC8A1W7 in accordance with standard IEC 60034-6).
As an option, they can be ATEX (Explosive Atmosphere) certified in accordance with EEXem II T3 protection.

Standards

Nidec Leroy-Somer LSA 49.1 IC6 / LSA 49.1 IC8 alternators meet 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.
Nidec Leroy-Somer LSA 49.1 IC6 / LSA 49.1 IC8 alternators can be integrated in EC marked generator sets, and they bear EC and CMIM markings. They are 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 (3 wires + neutral), standard 6-wire (6S)
- Voltage range:
  - 50 Hz : 380V - 400V - 415V
  - 60 Hz : 440V - 480V
  Other voltages: consult us
- High efficiency and motor starting capacity

Excitation and regulation system

Excitation system		Regulation options		
AVR	**AREP**	**C.T. Current transformer for paralleling**	**Mains paralleling**	**Remote voltage potentiometer**
R450	Standard	√	√	√
D550	Option	√	√	√

3-phase sensing is included as a standard with digital regulators.

Protection system and options

- The LSA 49.1 IC6 / LSA 49.1 IC8 are enclosed alternators IP 55
- Space heater and stator thermal protection (PT100)
- Steel frame of LSA 49.1 IC6 / LSA 49.1 IC8 exchangers
- Depending on environments, several protection systems are available:
  - *For the range LSA 49.1 IC6 (Air-cooled) in standard:*
    - Exchanger with steel or aluminium tube

    Options:
    - Exchanger with stainless steel tube
    - Exchanger with stainless steel tube and stainless steel end plates
    - A complete stainless steel exchanger
  - *For the range LSA 49.1 IC8 (Hydro-refrigerated):*

    Land application / freshwater, non-saline atmosphere:
    - Exchanger with single tube Cu (SF Cu F25)

    Marine application / seawater, saline atmosphere:
    - Exchanger with double tube: Cu (SF Cu F25) outside tube and Cupronickel for inside tube

Mechanical construction

- Compact and rigid assembly to better withstand generator vibrations
- Steel frame
- Steel endshields and cast iron spacers for air intake and outlet
- Two-bearing configuration
- Half-key balancing
- Regreasable bearings
- Standard direction of rotation: clockwise when looking at the drive end view

Terminal box design

- AVR and accessories to be mounted outside the terminal box by the installer
- 1 terminal box on the left-hand side as seen from the shaft end and cables exiting downwards as standard
- Separation between the power and auxiliary circuits (space heaters + thermal protection)

“ATEX” certification for explosive atmospheres

LSA 49.1 IC6 alternators are also available in an ATEX version for zone 2 in accordance with Ex II 3G marking in EEx em II T3 protection mode. The alternators need to be certified by an external body, consult us for this certification.

General characteristics

Insulation class	H	Excitation system	AREP
Winding pitch	2/3 (wind. 6S)	AVR type	R450
Number of wires	6	Voltage regulation (*)	± 0.5 %
Protection	IP 55	Short-circuit current	300% (3 IN): 10s
Altitude	≤ 1000 m	Total Harmonic Distortion THD (**)	no-load < 4 % - on load < 4 %
Overspeed	2250 R.P.M.	Waveform: NEMA = TIF (**)	< 50
		Waveform: I.E.C. = 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

		IC6						IC8					
Duty / T° C		Continuous						Continuous					
Class / T° K		H / 125° K			F / 105° K			H / 125° K			F / 105° K		
Phase		3 ph.			3 ph.			3 ph.			3 ph.		
Y		380V	**400V**	415V	380V	**400V**	415V	380V	**400V**	415V	380V	**400V**	415V
LSA 49.1 L2	kVA	350	**350**	350	315	**315**	315	405	**405**	405	365	**365**	365
	kW	*280*	***280***	*280*	*252*	***252***	*252*	*324*	***324***	*324*	*292*	***292***	*292*
LSA 49.1 L6	kVA	435	**435**	435	390	**390**	390	505	**505**	505	455	**455**	455
	kW	*348*	***348***	*348*	*312*	***312***	*312*	*404*	***404***	*404*	*364*	***364***	*364*
LSA 49.1 L9	kVA	530	**530**	530	475	**475**	475	615	**615**	615	555	**555**	555
	kW	*424*	***424***	*424*	*380*	***380***	*380*	*492*	***492***	*492*	*444*	***444***	*444*

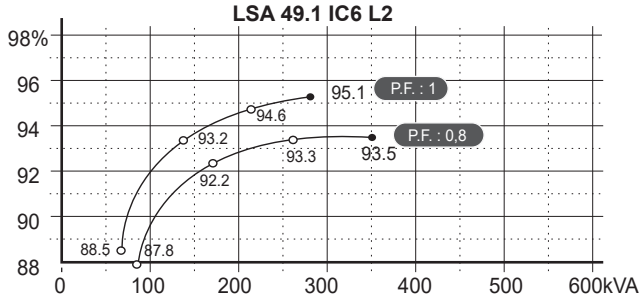
Ratings 60 Hz - 1800 R.P.M.

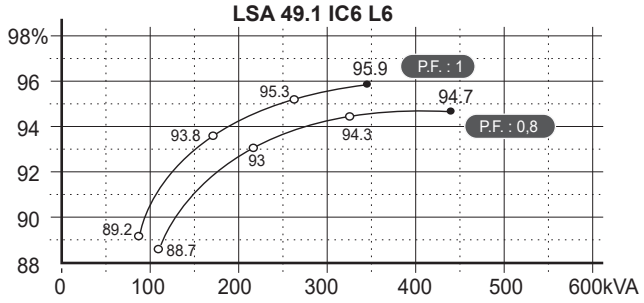
kVA / kW - P.F. = 0.8

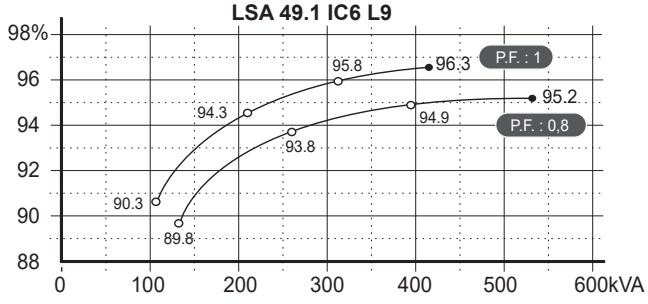
		IC6				IC8			
Duty / T° C		Continuous				Continuous			
Class / T° K		H / 125° K		F / 105° K		H / 125° K		F / 105° K	
Phase		3 ph.		3 ph.		3 ph.		3 ph.	
Y		440V	**480V**	440V	**480V**	440V	**480V**	440V	**480V**
LSA 49.1 L2	kVA	400	**420**	360	**380**	465	**500**	420	**450**
	kW	*320*	***336***	*288*	***304***	*372*	***400***	*336*	***360***
LSA 49.1 L6	kVA	480	**525**	430	**470**	560	**610**	505	**550**
	kW	*384*	***417***	*344*	***376***	*448*	***488***	*404*	***440***
LSA 49.1 L9	kVA	605	**635**	545	**570**	705	**740**	635	**665**
	kW	*484*	***507***	*436*	***456***	*564*	***592***	*508*	***532***

The power ratings are given for the following conditions:
LSA 49.1 IC6: ambient temperature: 40°C to 50°C
LSA 49.1 IC8: water temperature: 32°C

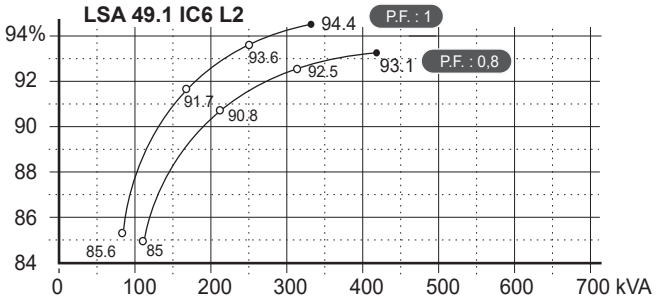
Efficiencies 50 Hz - P.F.: 1 / 0.8

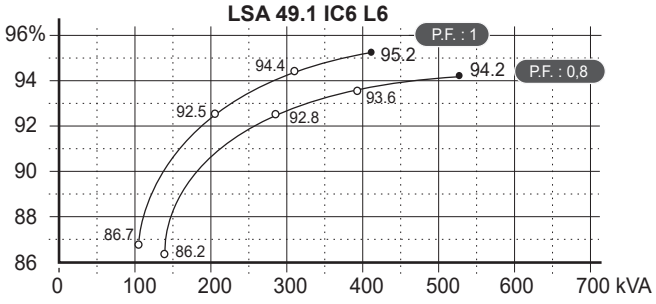


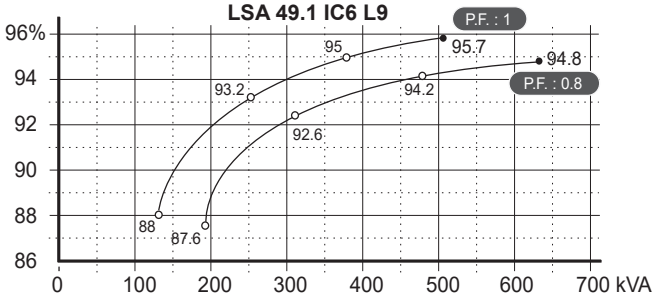




Efficiencies 60 Hz - P.F.: 1 / 0.8







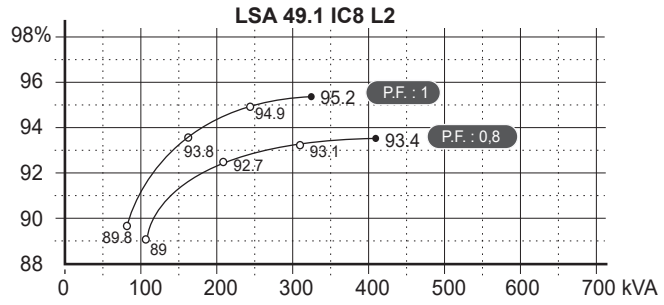
Reactances (%). Time constants (ms) - Class H

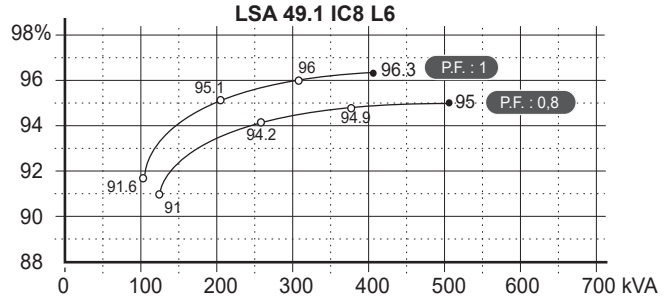
		50 Hz - Class H / 400V			60 Hz - Class H / 480V		
		L2	L6	L9	L2	L6	L9
Kcc	Short-circuit ratio	0.59	0.71	0.7	0.59	0.71	0.7
Xd	Direct-axis synchronous reactance unsaturated	219	181	183	219	182	183
Xq	Quadrature-axis synchronous reactance unsaturated	131	108	110	131	109	110
T'do	No-load transient time constant	1878	2047	2111	1878	2047	2111
X'd	Direct-axis transient reactance saturated	11.6	8.8	8.7	11.6	8.8	8.7
T'd	Short-circuit transient time constant	100	100	100	100	100	100
X"d	Direct-axis subtransient reactance saturated	9.3	7	6.9	9.3	7	6.9
T"d	Subtransient time constant	10	10	10	10	10	10
X"q	Quadrature-axis subtransient reactance saturated	11.2	7.8	7.5	11.2	7.9	7.5
Xo	Zero sequence reactance unsaturated	0.5	0.4	0.5	0.5	0.4	0.5
X2	Negative sequence reactance saturated	10.3	7.5	7.3	10.3	7.5	7.3
Ta	Armature time constant	15	15	15	15	15	15

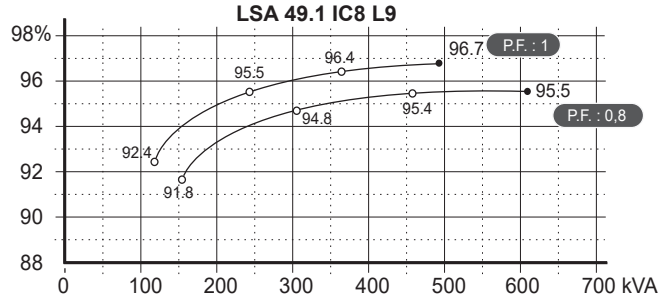
Other characteristics class H

io (A)	No-load excitation current	0.9	0.9	0.9	0.9	0.9	0.9
ic (A)	On-load excitation current	2.5	2.2	2.2	2.5	2.2	2.2
uc (V)	On-load excitation voltage	30	26	26	30	26	26
ms	Response time (ΔU = 20% transient)	500	500	500	500	500	500
kVA	Start (ΔU = 20% continuous or 50% transient)	1280	1985	2372	1420	2482	2972
%	Transient ΔU (on-load 4/4) - P.F.: 0.8 $_{LAG}$	10.5	7.4	7.3	10.5	7.4	7.3
W	No-load losses	8980	10425	11360	14300	16280	17620
W	Heat dissipation	19465	19476	21378	24900	25860	27865

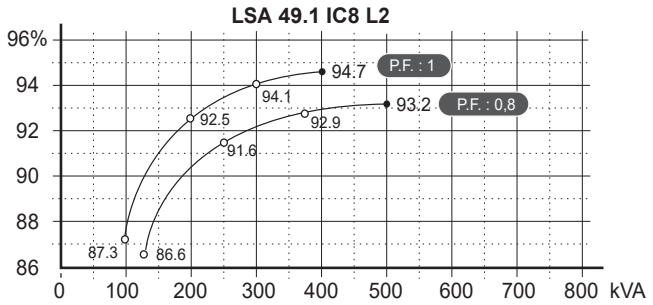
Efficiencies 50 Hz - P.F.: 1 / 0.8

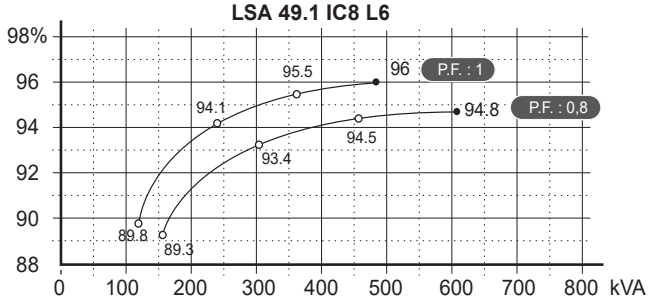


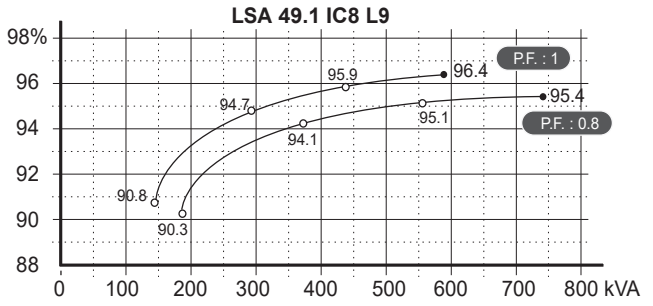




Efficiencies 60 Hz - P.F.: 1 / 0.8







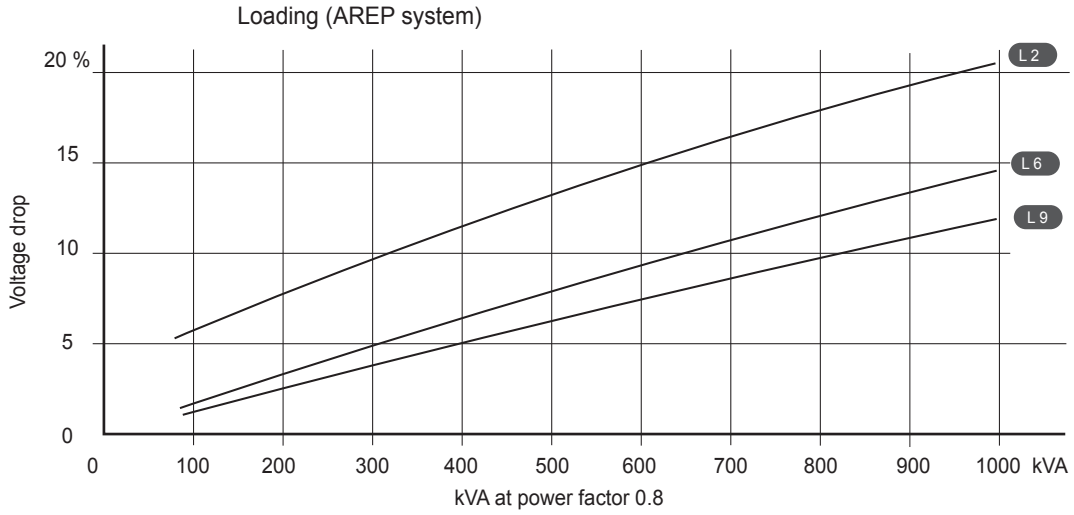
Reactances (%). Time constants (ms) - Class H

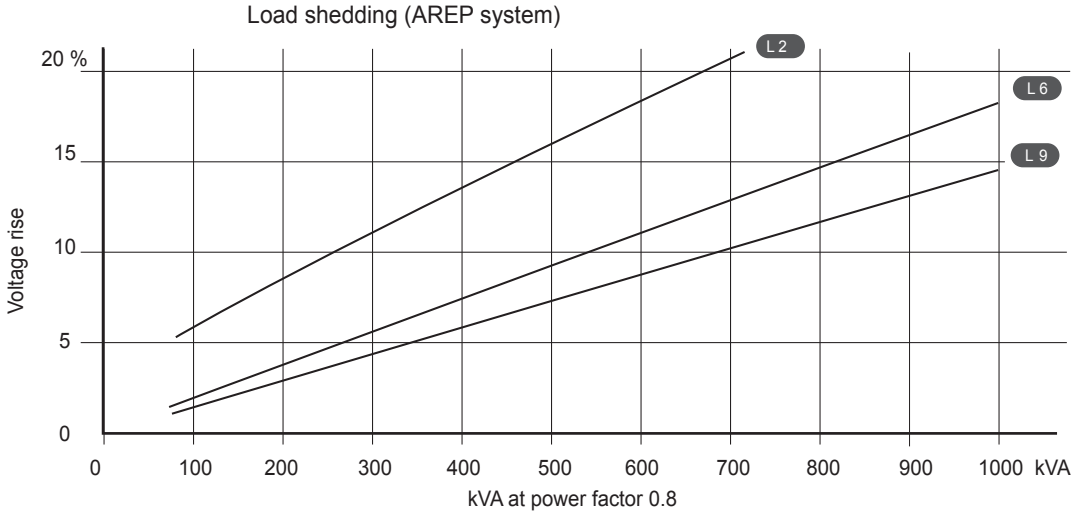
		50 Hz - Class H / 400V			60 Hz - Class H / 480V		
		L2	L6	L9	L2	L6	L9
Kcc	Short-circuit ratio	0.51	0.61	0.6	0.49	0.61	0.6
Xd	Direct-axis synchronous reactance unsaturated	253	210	212	260	211	213
Xq	Quadrature-axis synchronous reactance unsaturated	152	125	125	156	127	128
T'do	No-load transient time constant	1878	2047	2111	1878	2047	2111
X'd	Direct-axis transient reactance saturated	13.4	10.2	10.1	13.9	10.2	10.1
T'd	Short-circuit transient time constant	100	100	100	100	100	100
X"d	Direct-axis subtransient reactance saturated	10.7	8.1	8	11	8.1	8
T"d	Subtransient time constant	10	10	10	10	10	10
X"q	Quadrature-axis subtransient reactance saturated	13	9	8.7	13.3	9.2	8.7
Xo	Zero sequence reactance unsaturated	0.6	0.45	0.6	0.6	0.45	0.6
X2	Negative sequence reactance saturated	11.9	8.7	8.5	12.2	8.7	8.5
Ta	Armature time constant	15	15	15	15	15	15

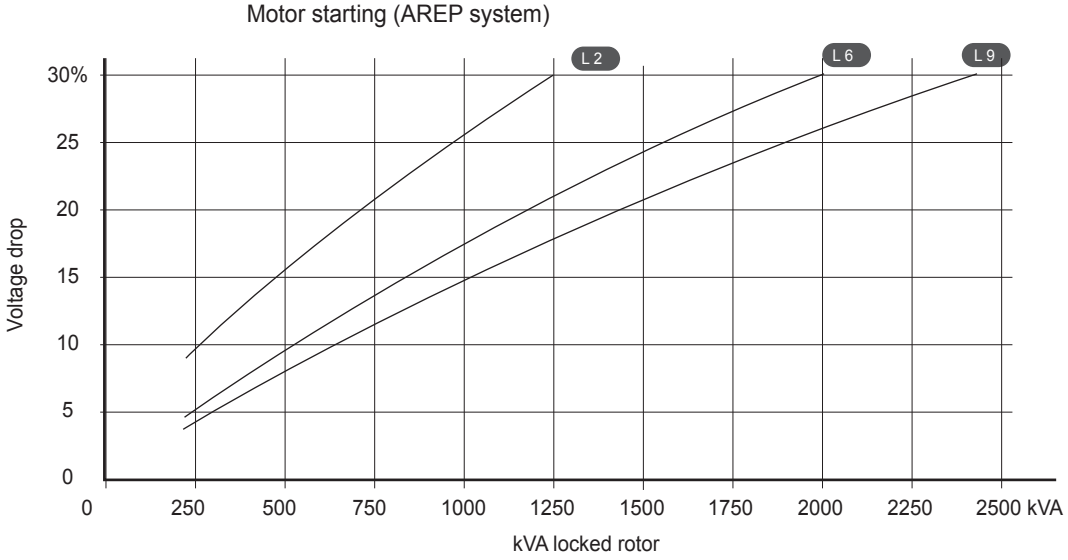
Other characteristics class H

io (A)	No-load excitation current	0.9	0.9	0.9	0.9	0.9	0.9
ic (A)	On-load excitation current	2.8	2.4	2.4	2.8	2.4	2.4
uc (V)	On-load excitation voltage	33	29	29	33	29	29
ms	Response time (ΔU = 20% transient)	500	500	500	500	500	500
kVA	Start (ΔU = 20% continuous or 50% transient)	1280	1985	2372	1420	2482	2972
%	Transient ΔU (on-load 4/4) - P.F.: 0.8 $_{LAG}$	11.5	8.1	8	11.8	8.2	8.1
W	No-load losses	7490	9000	9860	11705	13820	15030
W	Heat dissipation	22895	21260	23180	29185	26765	28545

Transient voltage variation 400V - 50 Hz



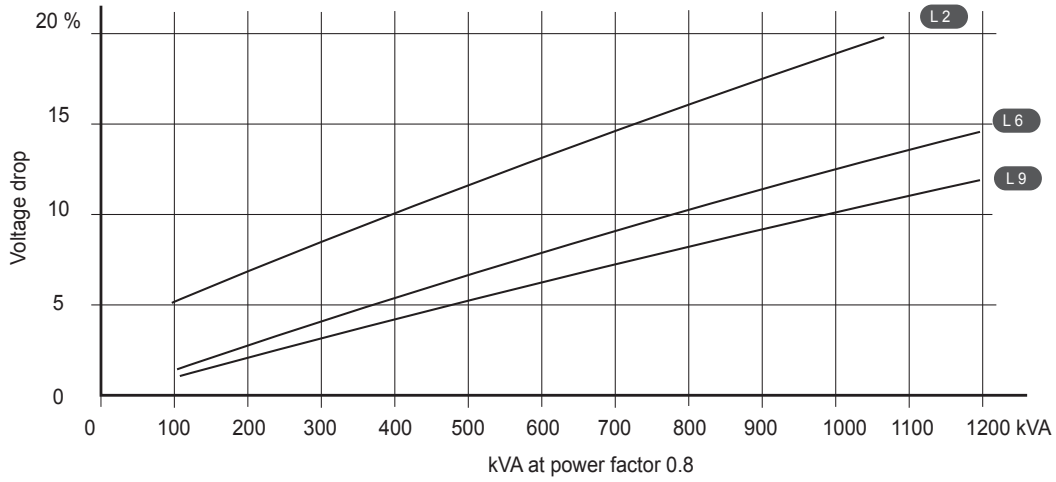




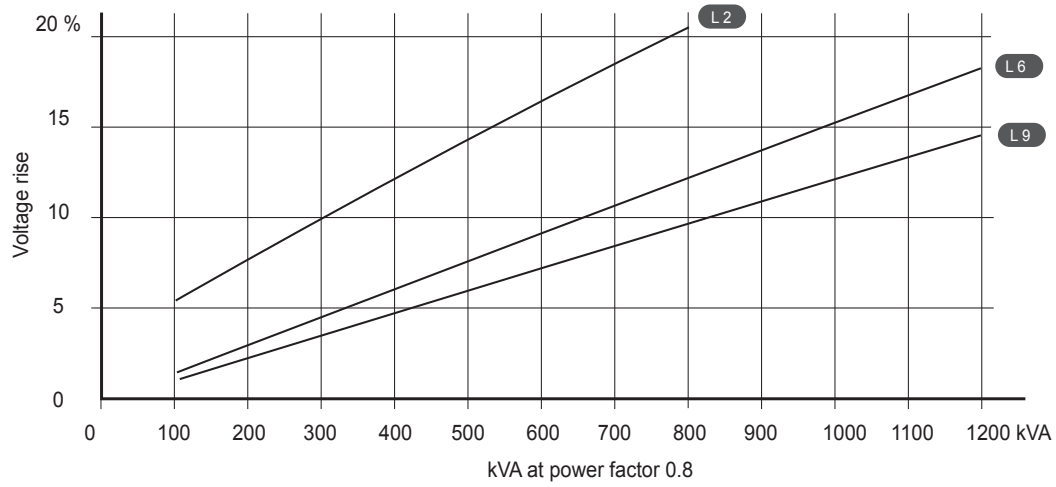
1) For a starting P.F. other than 0.6, the starting kVA must be multiplied by K = Sine P.F. / 0.8
2) For voltages other than 400V (Y), 230V (Δ) at 50 Hz, then kVA must be multiplied by $(400/U)^2$ or $(230/U)^2$.

Transient voltage variation 480V - 60 Hz

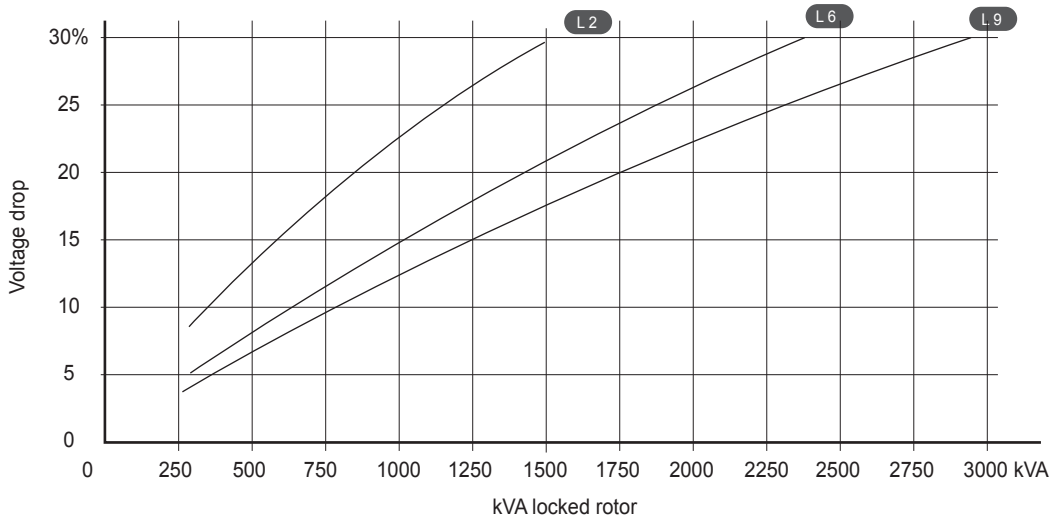
Loading (AREP system)



Load shedding (AREP system)



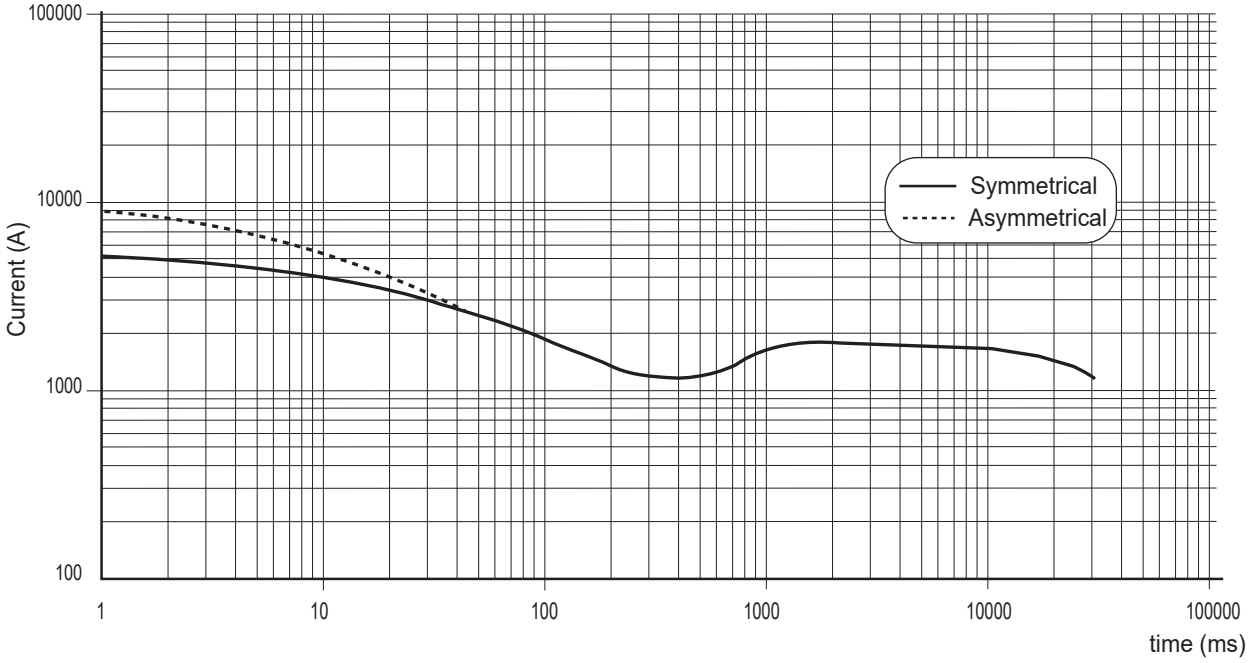
Motor starting (AREP system)



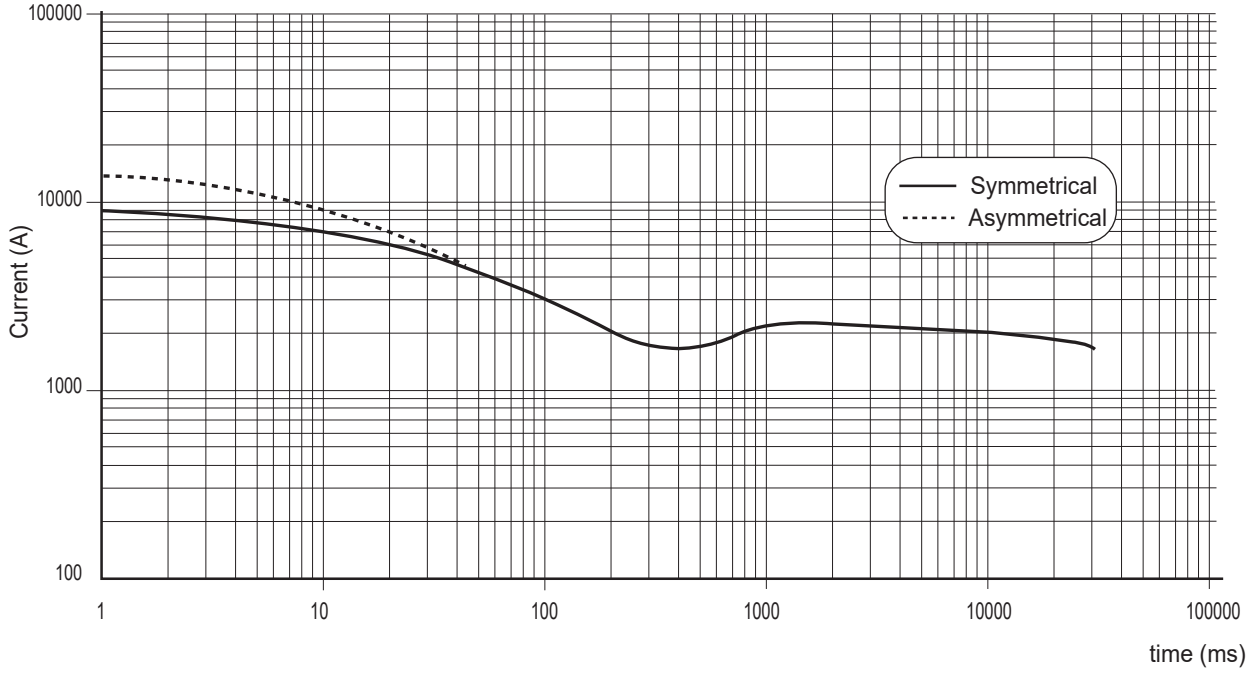
1) For a starting P.F. other than 0.6, the starting kVA must be multiplied by K = Sine P.F. / 0.8
2) For voltages other than 480V (Y), 277V (Δ), 240V (YY) at 60 Hz, then kVA must be multiplied by $(480/U)^2$ or $(277/U)^2$ or $(240/U)^2$.

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

LSA 49.1 IC6 / LSA 49.1 IC8 L2

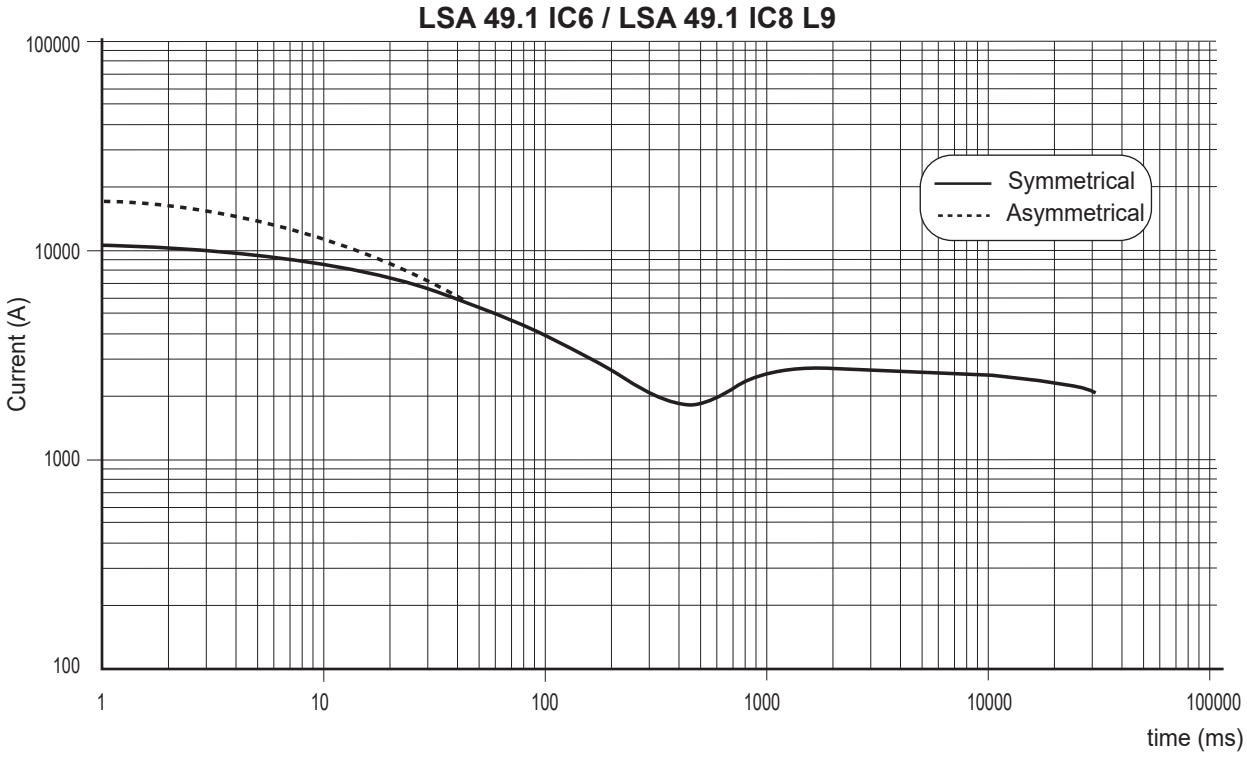


LSA 49.1 IC6 / LSA 49.1 IC8 L6



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

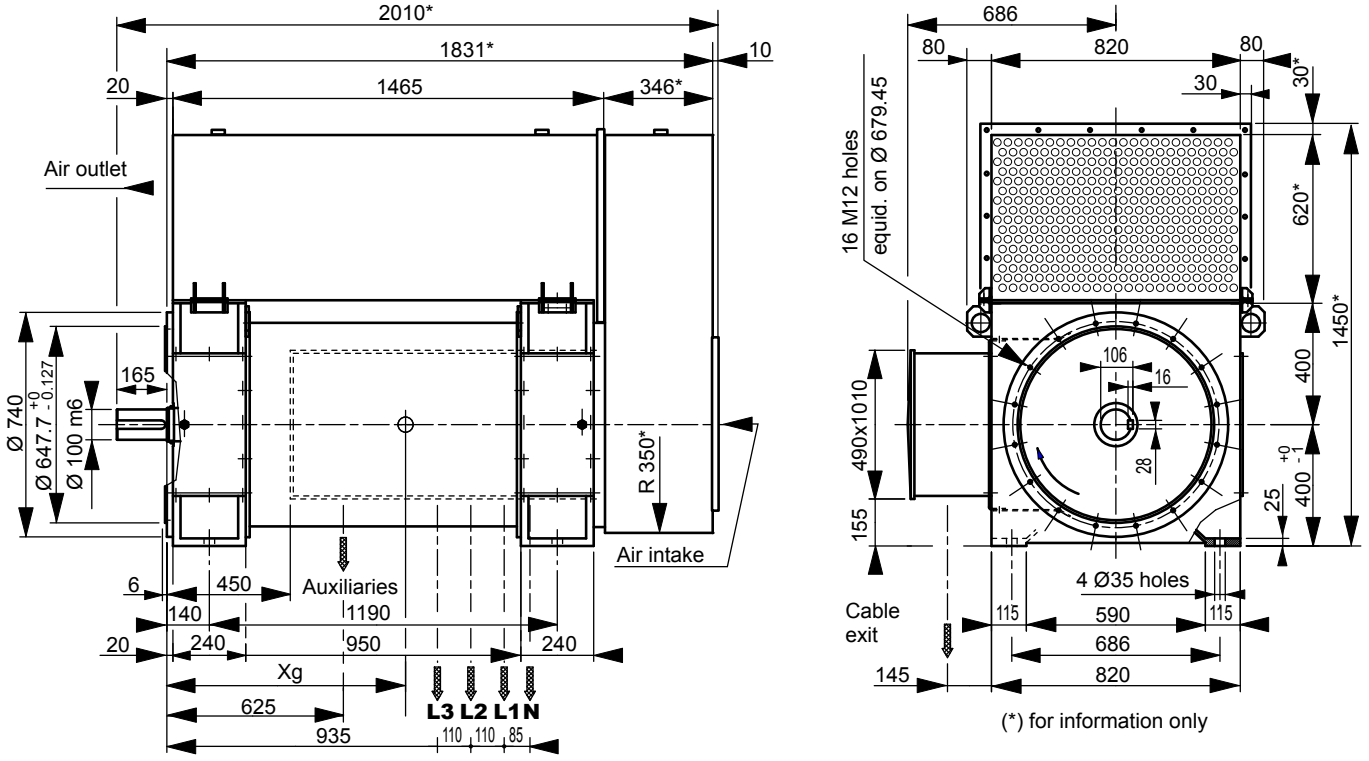
3-phase short-circuit curves at no load and rated speed (star connection Y)



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.

LSA 49.1 IC6 dimensions

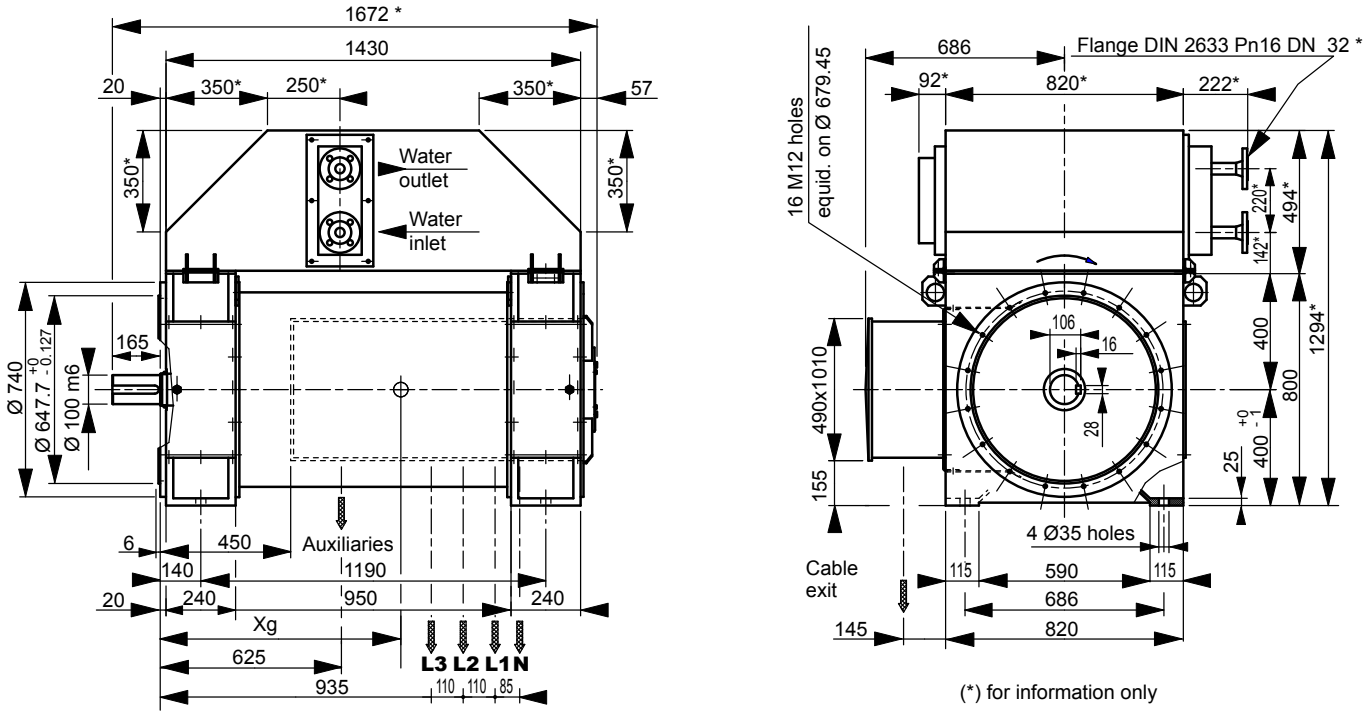


(*) for information only

Dimensions (mm) and weights (kg)*		
Type	Xg	Weight
LSA 49.1 IC6 L2	695	2281
LSA 49.1 IC6 L6	716	2610
LSA 49.1 IC6 L9	735	2815

NOTE : Dimensions are for information only and may be subject to modifications. Contractual 2D drawings can be downloaded from the Leroy-Somer site, 3D drawing files are available upon request.

LSA 49.1 IC8 dimensions



(*) for information only

Dimensions (mm) and weights (kg)*		
Type	Xg	Weight
LSA 49.1 IC8 L2	695	2000
LSA 49.1 IC8 L6	716	2330
LSA 49.1 IC8 L9	735	2530

NOTE : Dimensions are for information only and may be subject to modifications. Contractual 2D drawings can be downloaded from the Leroy-Somer site, 3D drawing files are available upon request.

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