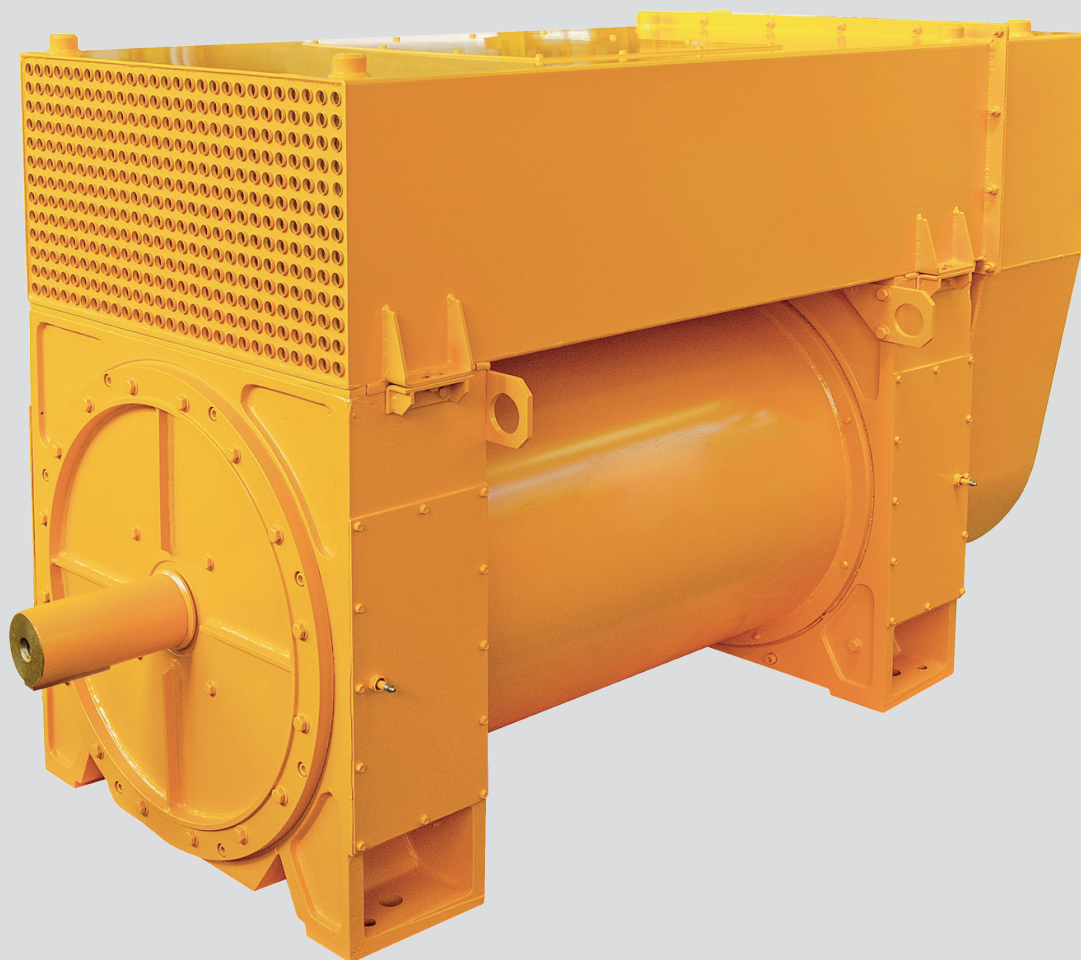




LSA R & LSA H 49.1

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

Adapted to applications

LSA R and LSA H alternators are enclosed alternators (IP 55).

In the LSA R, cooling is performed by an air/air exchanger (cooling index: IC 6.A1.A1 in accordance with standard IEC 60034-6).

In the LSA H, cooling is performed by an air/water exchanger (cooling index: IC 8.A1.W7 in accordance with standard IEC 60034-6).

They are particularly suitable for demanding applications such as: Marine, Oil & Gas, etc.

As an option, they can be ATEX (Explosive Atmosphere) certified in accordance with EEXem II T3 protection.

Conform to international standards

LSA R and LSA H alternators conform to the main international standards and regulations:

- IEC 60034, NEMA MG 1.32-33, ISO 8528-3, CSA / UL 1446 (UL 1004 on request), marine regulations, etc.

It can be integrated into a CE marked generator.

They are designed, manufactured and marketed in an ISO 9001 and ISO 14001 environment.

Top of the range electrical performance

- Class H insulation
- Standard winding (3 wires + neutral), 6 wires, 2/3 pitch, type no. 6S
- Voltage range 50 Hz: 380V - 400V - 415V and 220V - 230V - 240V
- Voltage range 60 Hz: 380V - 416V - 440V - 480V and 220 V - 240 V
- High efficiency and motor starting capacity
- Other voltages are possible with optional adapted windings:
 - 50 Hz : 440 V (no. 7), 500 V (no. 9), 600 V (no. 22 or 23), 690 V (no. 10 or 52)
 - 60 Hz : 380 V and 416 V (no. 8), 600 V (no. 9)
- R 791 interference suppression conforming to standard EN 55011 group 1 class B standard for European zone (CE marking)

Excitation and regulation system suited to the application

Excitation system		Regulation options				
Volage regulator	AREP	Current transformer for paralleling	Mains paralleling	3-phase sensing		Remote voltage potentiometer
R450	Std	C.T.	√	R731	R734	√
D510C	Option	C.T.	included	included	contact us	√

√ : possible mounting

Protection system suited to the environment

- LSA R or LSA H alternators are equipped with space heaters and stator thermal protection (PT 100)
- The frame of LSA R & H exchangers is made of steel
- Depending on environments, several protection systems are available:
 - For the range LSA R (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 H (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

Reinforced mechanical structure using finite element modelling

- Standard direction of rotation: clockwise as seen from the shaft end
- 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

Accessible terminal box proportioned for optional equipment

- 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)
- AVR and accessories to be mounted outside the terminal box by the installer

“ATEX” certification for explosive atmospheres

LSA R alternators are also available in an ATEX version for zone 2 in accordance with  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 (n° 6S)	AVR type	R 450
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 min ⁻¹	Waveform: NEMA = TIF (**)	< 50
		Waveform: IEC = FHT (**)	< 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													
		LSA R 49.1						LSA H 49.1					
Duty / T° C		Continuous duty						Continuous duty					
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.

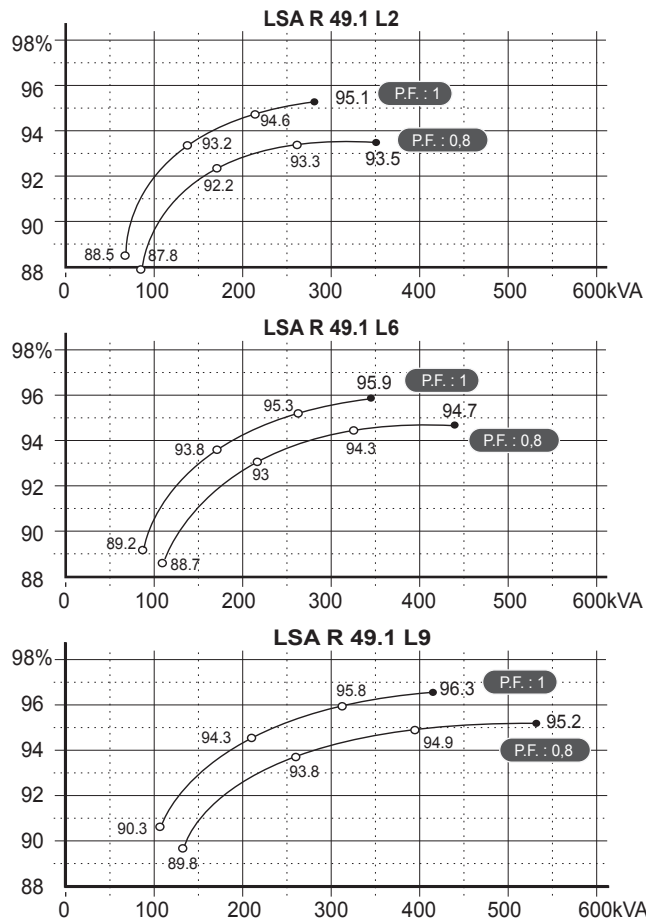
kVA / kW - P.F. = 0.8									
		LSA R 49.1				LSA H 49.1			
Duty / T° C		Continuous duty				Continuous duty			
Class / T° K		H / 125° K		F / 105° K		H / 125° K		F / 105° K	
Phase		3 ph.		3 ph.		3 ph.		3 ph.	
Y		440V	480V	440V	480V	440V	480V	440V	480V
LSA 49.1 L2	kVA	400	420	360	380	465	500	420	450
	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:

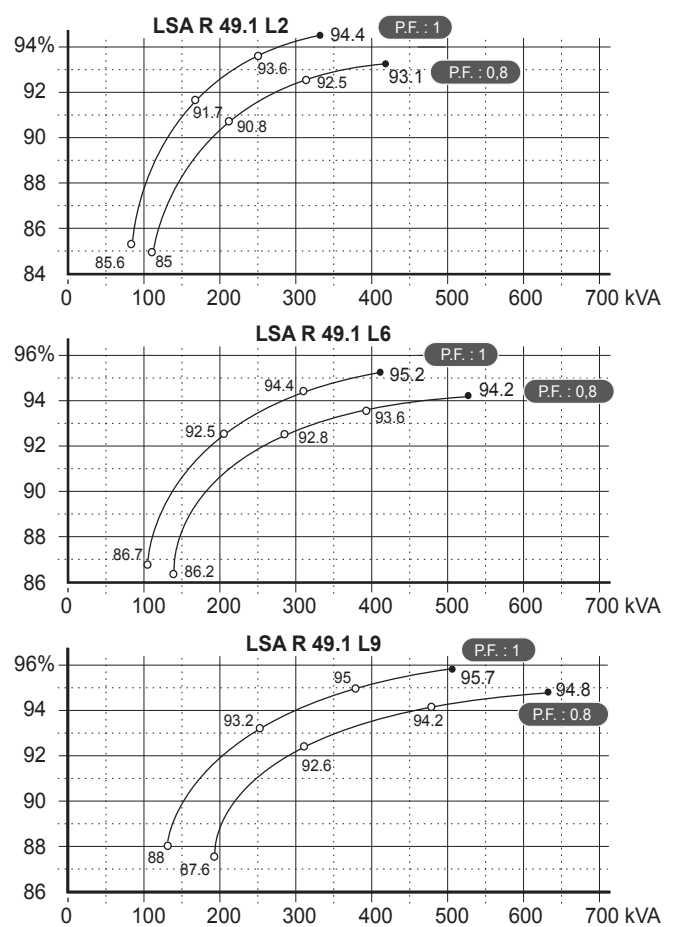
LSAR: ambient temperature: 40°C to 50°C

LSAH: water temperature: 32°C

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



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



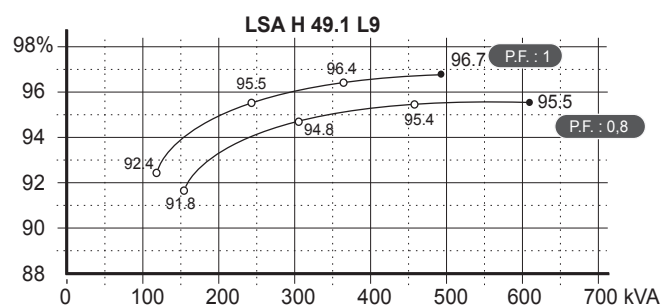
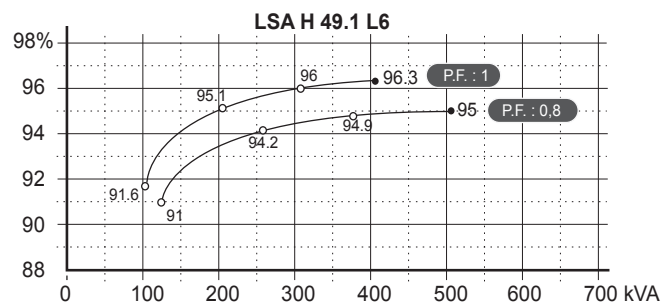
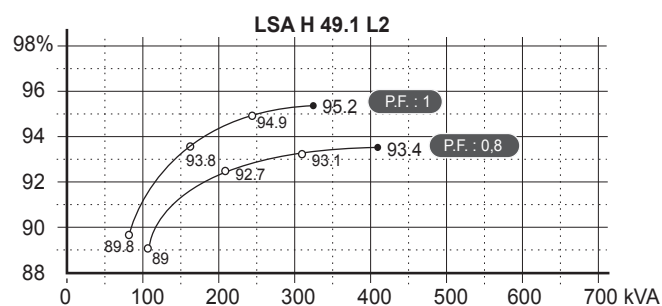
Reactances (%). Time constants (ms) - Class H

		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 synchro. reactance unsaturated	219	181	183	219	182	183
Xq	Quadrature-axis synchro. 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

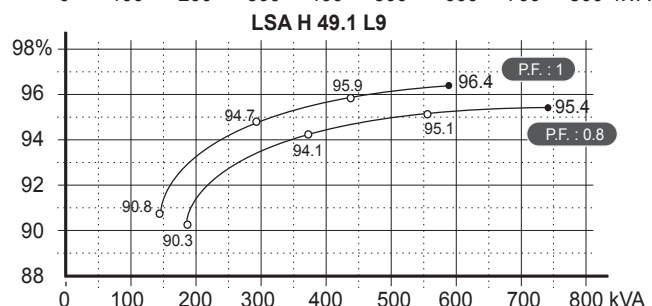
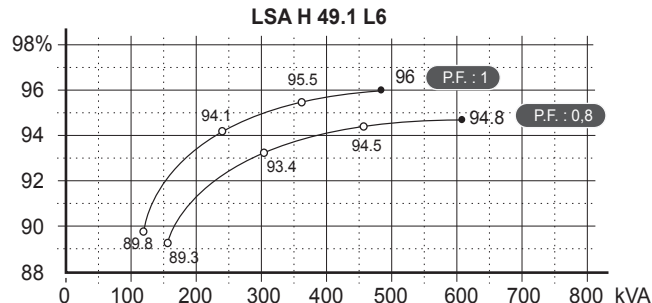
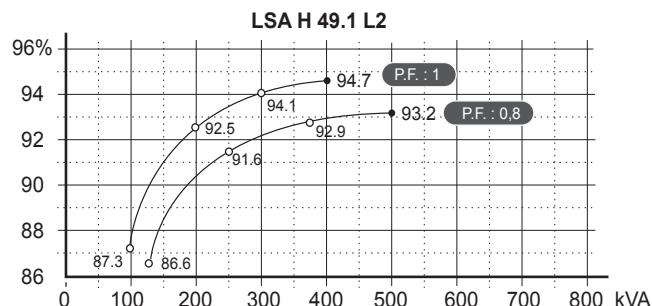
Other characteristics class H

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 ($\Delta U = 20\%$ transient)	500	500	500	500	500	500
kVA	Start ($\Delta U = 20\%$ cont. or 50% trans.)	1280	1985	2372	1420	2482	2972
%	Transient ΔU (on-load 4/4) - P.F.: 0.8 _{L6}	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



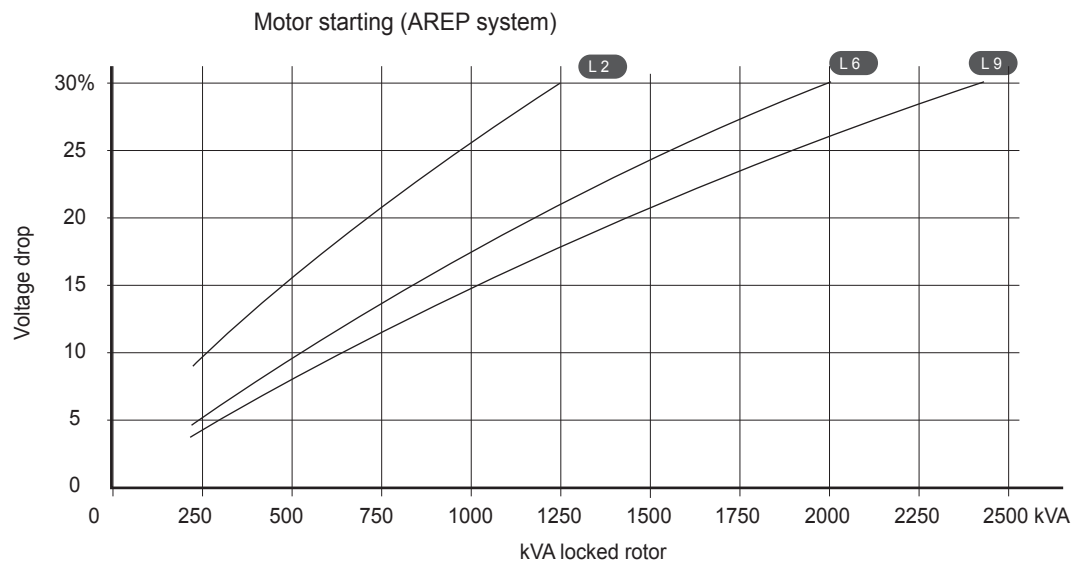
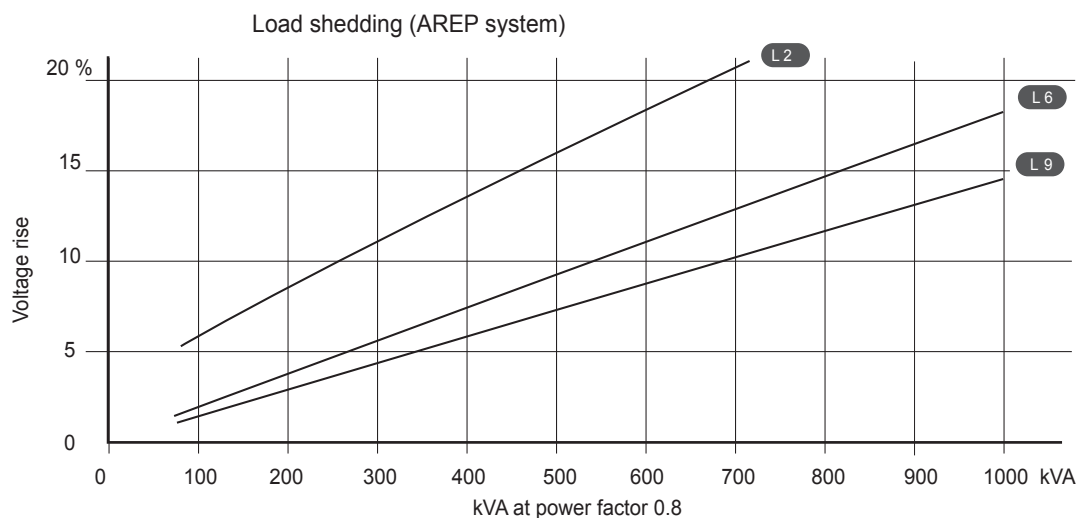
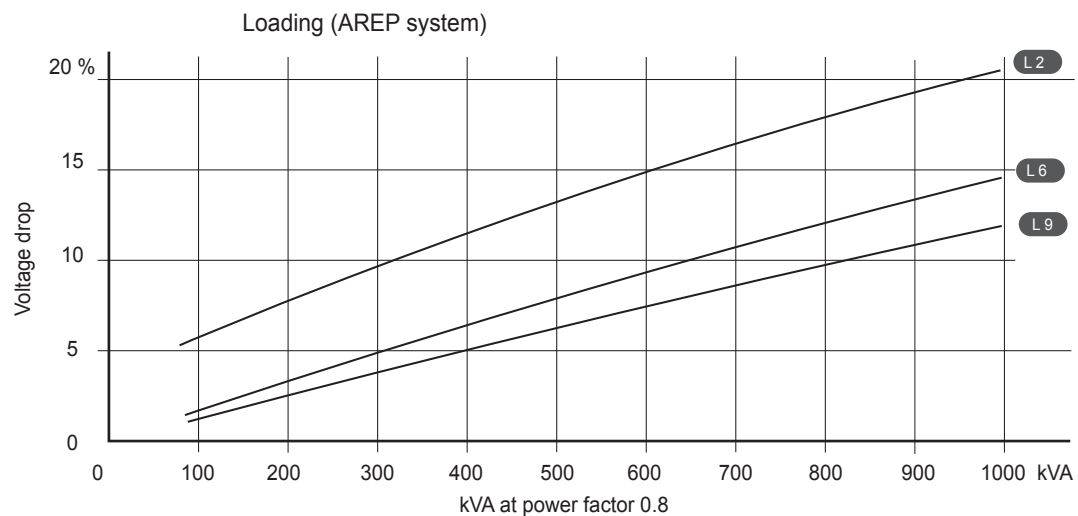
Reactances (%). Time constants (ms) - Class H

		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 synchro. reactance unsaturated	253	210	212	260	211	213
Xq	Quadrature-axis synchro. 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 ($\Delta U = 20\%$ transient)	500	500	500	500	500	500
kVA	Start ($\Delta U = 20\%$ cont. or 50% trans.)	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

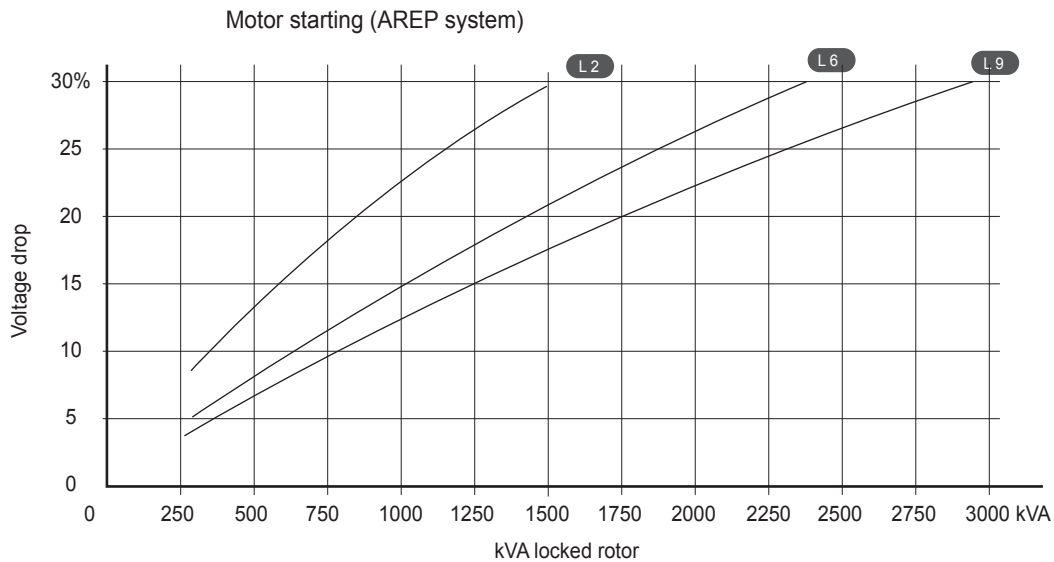
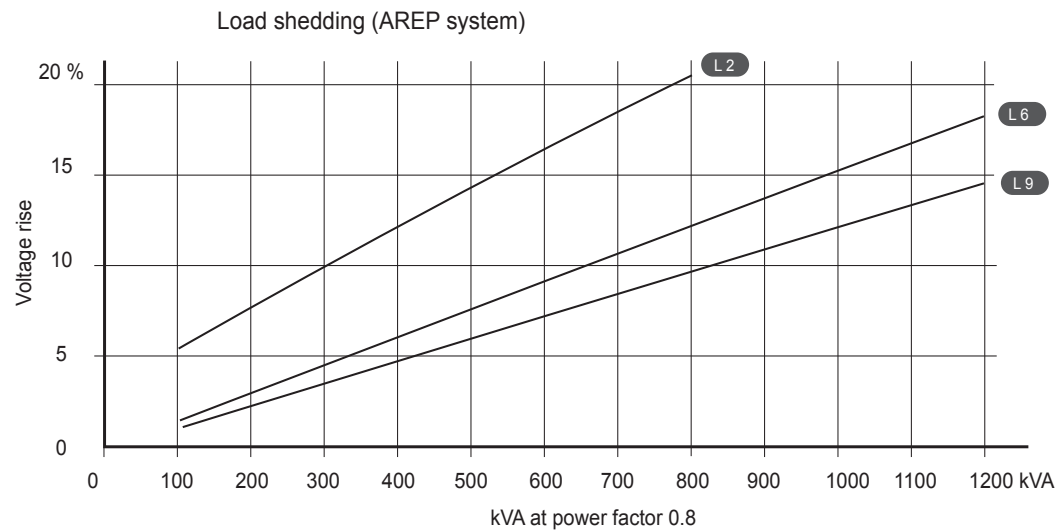
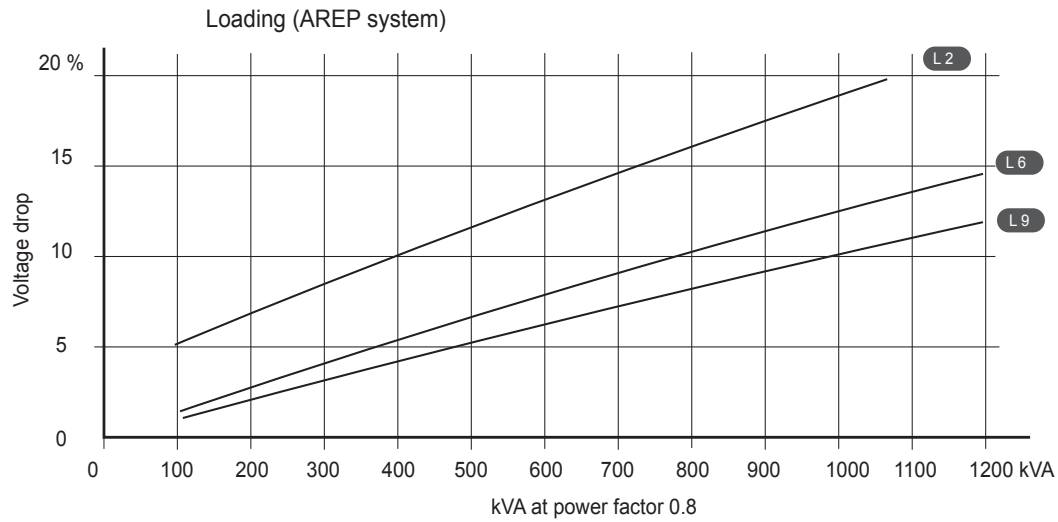
Transient voltage variation 400V - 50 Hz



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

2) For voltages other than 400V (Y), 230V (Δ) at 50 Hz, then kVA must be multiplied by $(400/U)^2$ or $(230/U)^2$.

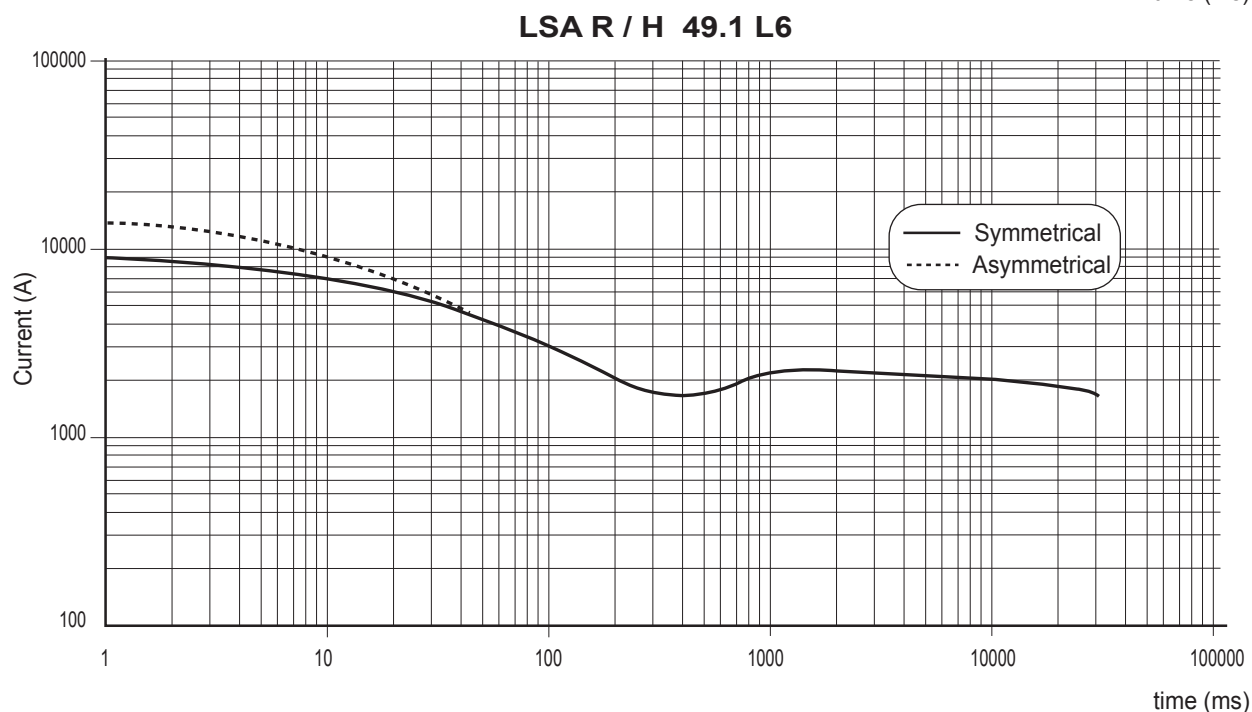
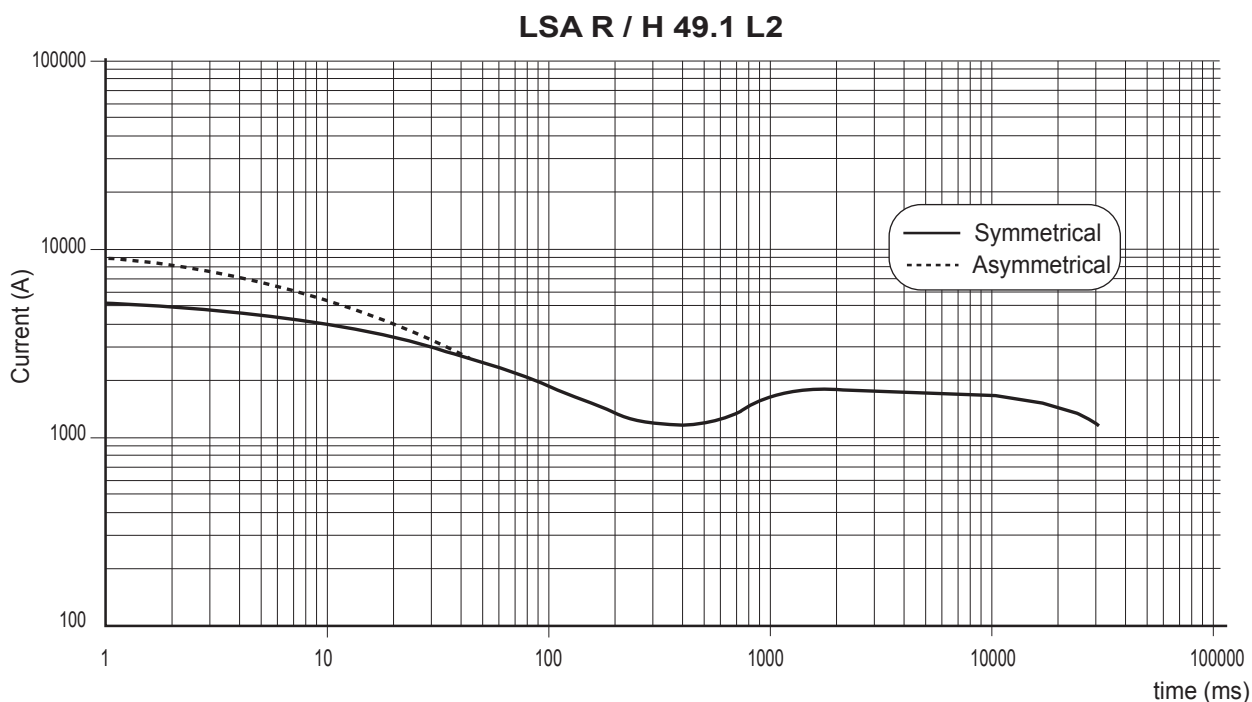
Transient voltage variation 480V - 60 Hz



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)



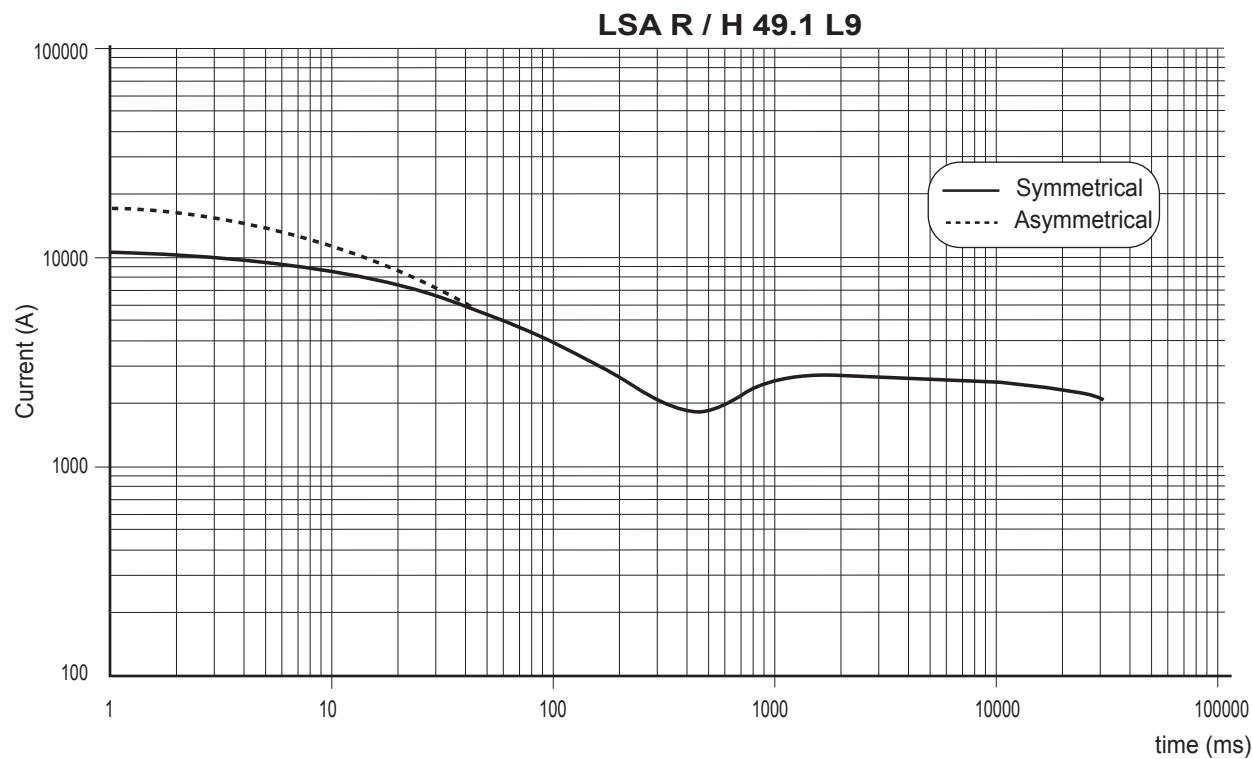
Influence due to connection

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)

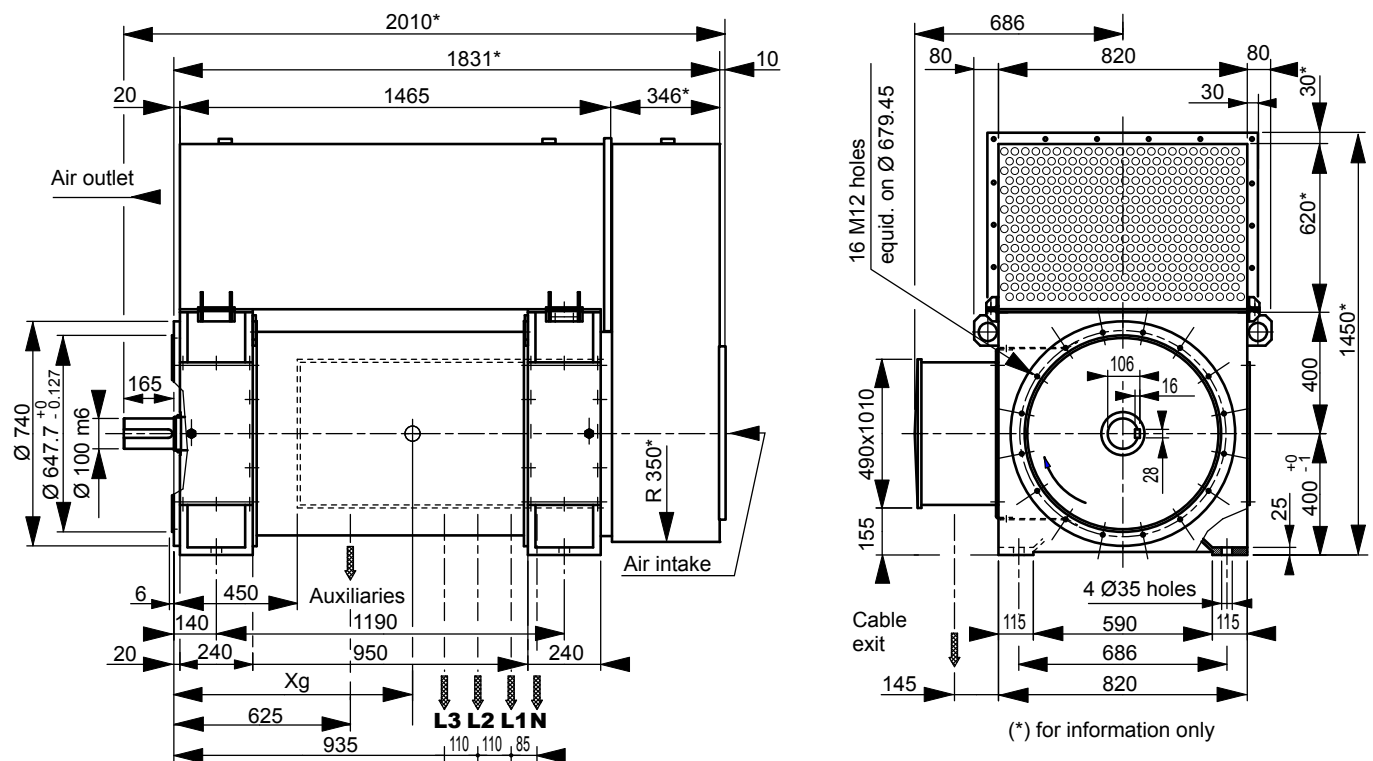


Influence due to short-circuit

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.

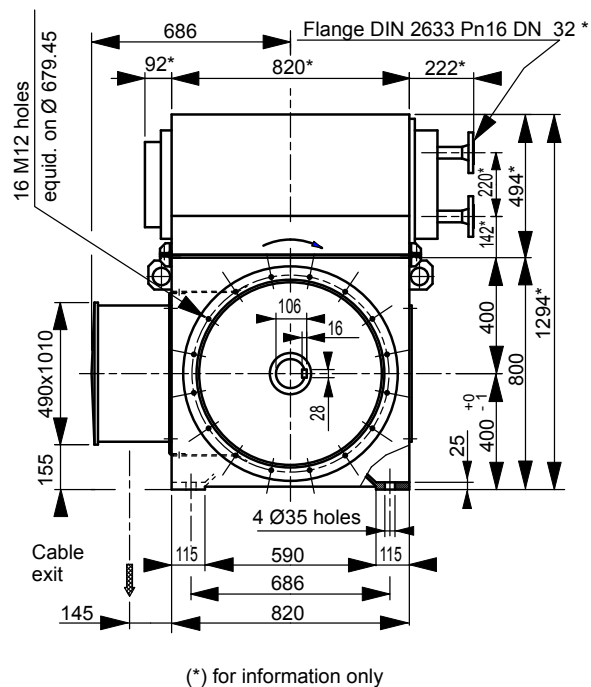
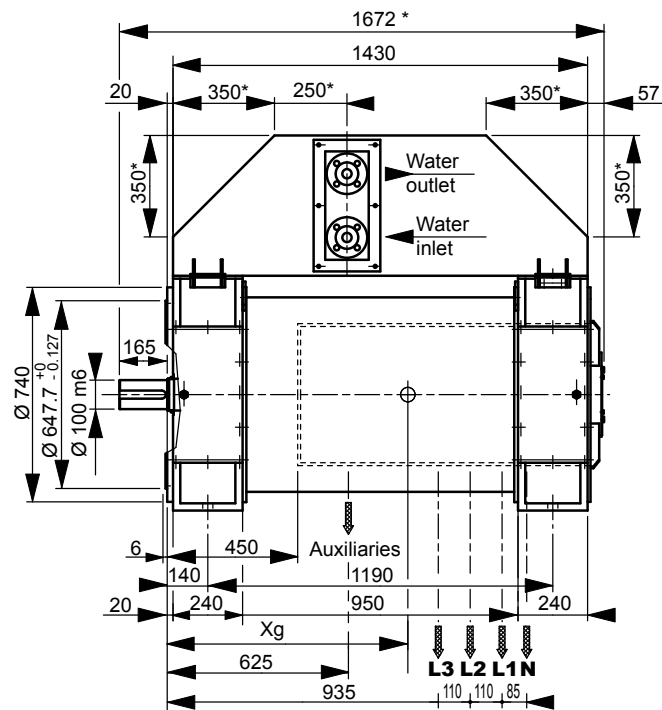
LSA R dimensions



Dimensions (mm) and weights (kg)*		
Type	Xg	Weight
LSA R 49.1 L2	695	2281
LSA R 49.1 L6	716	2610
LSA R 49.1 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 H dimensions



(*) for information only

Dimensions (mm) and weights (kg)*

Type	Xg	Weight
LSA H 49.1 L2	695	2000
LSA H 49.1 L6	716	2330
LSA H 49.1 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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