



LSA 42.3

Low Voltage Alternators - 4 pole

25 to 60 kVA - 50 Hz / 31.5 to 75 kVA - 60 Hz
Electrical and mechanical data

LEROY-SOMER™

Nidec
All for dreams

Specially adapted to applications

The LSA 42.3 alternator is designed to be suitable for typical generator applications, such as: backup, marine applications, rental, telecommunications, etc.

Compliant with international standards

The LSA 42.3 alternator conforms to the main international standards and regulations:

- IEC 60034, NEMA MG 1.32-33, ISO 8528-3, CSA C22.2 n°100-14, UL 1446 (UL 1004 on request), marine regulations, etc.

It can be integrated into a CE marked generator.

The LSA 42.3 is designed, manufactured and marketed in an ISO 9001 and ISO 14001 environment.

Top of the range electrical performance

- Class H insulation.
- Standard 12 wire re-connectable winding, 2/3 pitch, type no. 6
- Voltage range:
 - 50 Hz: 220 V - 240 V and 380 V - 415 V (440 V)
 - 60 Hz: 208 V - 240 V and 380 V - 480 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), 690 V (n°10)
 - 60 Hz: 380 V and 416 V (no. 8), 600 V (no. 9)
- R 791 interference suppression conforming to standard EN 61000-6-3, EN 61000-6-2, EN 55011 group 1 class B standard for European zone (CE marking)

Reinforced mechanical structure using finite element modelling

- Compact rigid assembly to better withstand generator vibrations
- Steel frame
- Aluminium flanges and shields
- Two-bearing and single-bearing versions designed to be suitable for commercially-available heat engines
- Half-key balancing two bearing
- Permanently greased bearings (20 000h)
- Direction of rotation : clockwise and anti-clockwise (without derating)

Excitation and regulation system suited to the application

Excitation system				Regulation options				
Voltage regulator	SHUNT	AREP	PMG	Current transformer for paralleling	Mains paralleling	3-phase sensing	3-phase sensing for mains paralleling unbalanced	Remote voltage potentiometer
R220	Std	-	-	-	-	-	-	-
R438	-	Std	Std	C.T.	R726*	R731*	R734*	√
R450*	Option	Option	Option	C.T.	R726*	R731*	R734*	√
D510C*	Option	Option	Option	C.T.	included	included	contacter factory	√

* Steel terminal box mounting only

√: Possible mounting

Compact and design terminal box

- Easy access to the AVR (lid) and to the connections
- 8 way terminal block for reconnecting the voltage
- Predrilled holes for cable gland
- Steel terminal box in option

Protection system suited to the environment

- The LSA 42.3 is IP 23
- Standard winding protection for clean environments with relative humidity ≤ 95%, including indoor marine environments
- Options:
 - Filters on air inlet : derating 5%
 - Filters on air inlet and air outlet (IP 44) : derating 10%
 - Winding protection for harsh environments and relative humidity greater than 95%
 - Space heaters
 - Thermal protection for stator windings
 - Height fixing : H = 225 mm (option) with the order



General characteristics

Insulation class	H	Excitation system	SHUNT	AREP or PMG
Winding pitch	2/3 (wdg 6)	AVR type	R 220	R 438
Number of wires	12	Voltage regulation (*)	± 0.5 %	± 0.5 %
Protection	IP 23	Short-circuit current	-	300% (3 IN): 10 s
Altitude	≤ 1000 m	Total Harmonic Distortion THD (**) in no-load	< 2%	
Overspeed	2250 min ⁻¹	Total Harmonic Distortion THD (**) on linear load :	< 4%	
Air flow	0.10m ³ /s, 50 Hz - 0.13m ³ /s, 60 Hz	Waveform: NEMA = TIF (**)	< 50	

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

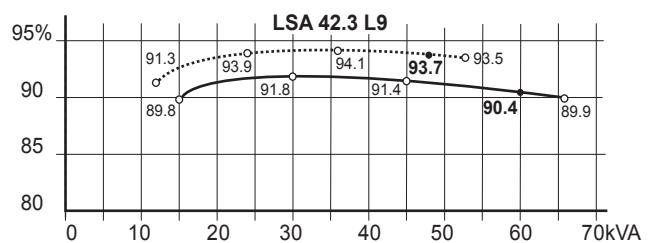
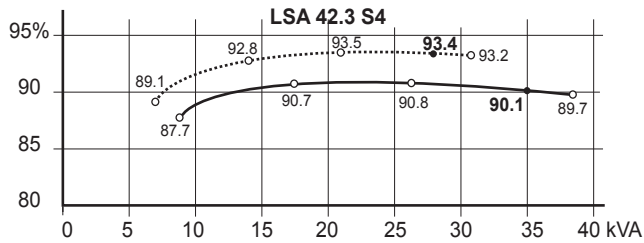
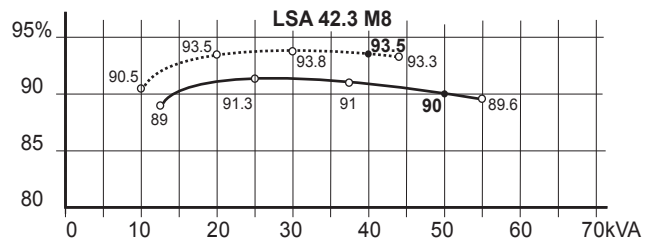
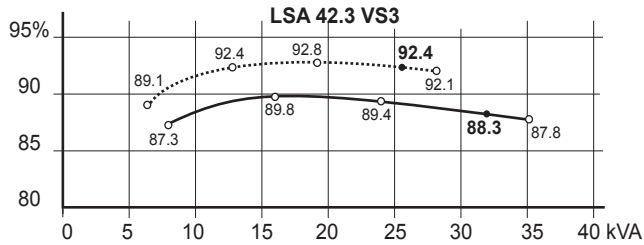
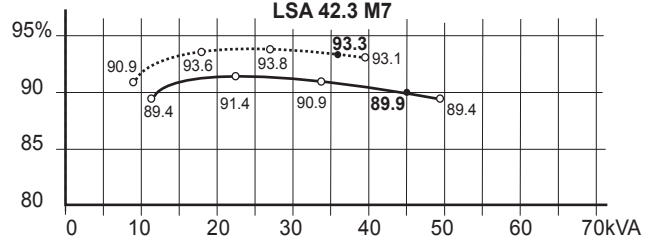
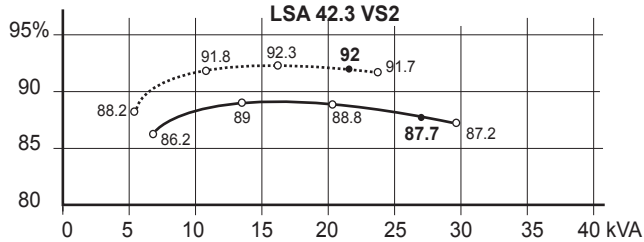
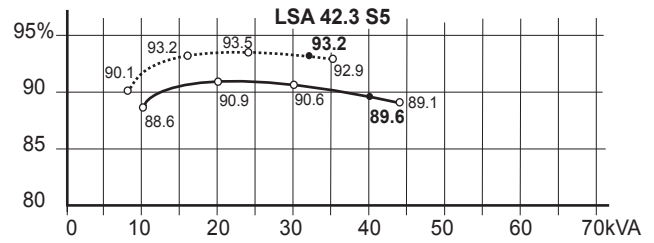
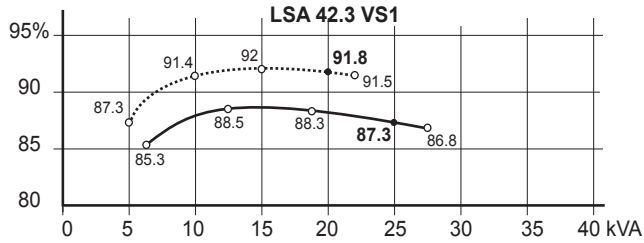
Ratings 50 Hz - 1500 R.P.M.

kVA / kW - P.F. = 0.8															
Duty/T°C	Continuous duty/40°C					Continuous duty/40°C					Stand-by/40°C				
Class/T°K	H/125°K					F/105°K					H/150°K				
Phase	3 ph.		1 ph.			3 ph.		1 ph.			3 ph.		1 ph.		
Y	380V	400V	415V	440V	ΔΔ	380V	400V	415V	440V	ΔΔ	380V	400V	415V	440V	ΔΔ
Δ	220V	230V	240V	230V		220V	230V	240V	230V		220V	230V	240V	230V	
YY				220V					220V					220V	
42.3 VS1 kVA	25		24.5	15		22.8		22.3	13.7		26.5		26	15.9	
kW	20		19.6	12		18.2		17.9	10.9		21.2		20.8	12.7	
42.3 VS2 kVA	27		26	16.2		24.6		23.6	14.7		28.9		27.6	17.3	
kW	21.6		20.8	13		19.7		18.9	11.8		23.1		22.1	13.9	
42.3 VS3 kVA	32		30	19.2		29.1		27.3	17.5		34		31.8	20.4	
kW	25.6		24	15.4		23.3		21.8	14		27.1		25.4	16.3	
42.3 S4 kVA	35		30.6	22		32		27.9	20		37.1		32.5	23.3	
kW	28		24.5	17.6		25.5		22.3	16		29.7		26	18.7	
42.3 S5 kVA	40		35	25		36.4		31.9	22.8		42.4		37.1	26.5	
kW	32		28	20		29.1		25.5	18.2		33.9		29.7	21.2	
42.3 M7 kVA	45		39	27		41		35.5	24.6		48.2		41.3	28.9	
kW	36		31.2	21.6		32.8		28.4	19.7		38.5		33.1	23.1	
42.3 M8 kVA	50		43	30		45.5		39.1	27.3		53		45.6	31.8	
kW	40		34.4	24		36.4		31.3	21.8		42.4		36.5	25.4	
42.3 L9 kVA	60		51.6	36		54.6		47.0	32.8		63.6		54.7	38.2	
kW	48		41.3	28.8		43.7		37.6	26.2		50.9		43.8	30.5	

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				
Class/T°K	H/125°K					F/105°K					H/150°K				
Phase	3 ph.		1 ph.			3 ph.		1 ph.			3 ph.		1 ph.		
Y	380V	416V	440V	480V	ΔΔ	380V	416V	440V	480V	ΔΔ	380V	416V	440V	480V	ΔΔ
Δ	220V	240V		240V		220V	240V		240V		220V	240V		240V	
YY		208V	220V	240V			208V	220V	240V			208V	220V	240V	
42.3 VS1 kVA	29.1	31.3	31.5	31.5	18.9	26.5	28.4	28.7	28.7	17.2	30.8	33.1	33.4	33.4	19.8
kW	23.3	25	25.2	25.2	15.1	21.2	22.8	22.9	22.9	13.7	24.7	26.5	26.7	26.7	15.9
42.3 VS2 kVA	29.9	31.9	33.8	33.8	19.2	26.9	29	30.7	30.7	17.5	31.4	33.8	35.8	35.8	20.2
kW	23.7	25.5	27	27	15.4	21.5	23.2	24.6	24.6	14.0	25.1	27.1	28.6	28.6	16.2
42.3 VS3 kVA	34.5	38	40	40	22.8	31.4	34.6	36.4	36.4	20.7	36.6	40.3	42.4	42.4	23.9
kW	27.6	30.4	32	32	18.2	25.1	27.7	29.1	29.1	16.6	29.3	32.2	33.9	33.9	19.1
42.3 S4 kVA	37.5	40.3	42.9	43.8	24.2	33.4	36.6	39.0	39.8	22.0	39	42.7	45.4	46.4	25.4
kW	30	32.2	34.3	35	19.3	26.8	29.3	31.2	31.9	17.6	31.2	34.1	36.4	37.1	20.3
42.3 S5 kVA	42	46	49	50	27.6	38.2	41.9	44.6	45.5	25.1	44.5	50	51.9	53	29.0
kW	33.6	36.8	39.2	40	22.1	30.6	33.5	35.7	36.4	20.1	35.6	40	41.6	42.4	23.2
42.3 M7 kVA	46	50	53.5	56.5	30	41.9	45.5	48.7	51.4	27.3	48.8	53	56.7	59.9	31.5
kW	36.8	40	42.8	45.2	24	33.5	36.4	38.9	41.1	21.8	39	42.4	45.4	47.9	25.2
42.3 M8 kVA	51.5	56.5	59.5	62.5	33.9	46.9	51.4	54.1	57	30.8	54.6	60	63.1	66.3	35.6
kW	41.2	45.2	47.6	50	27.1	37.5	41.1	43.3	45.5	24.7	43.7	48	50.5	53	28.5
42.3 L9 kVA	59	65	69	75	39	53.7	59.2	62.8	68.3	35.5	62.5	68.9	73.1	79.5	41.0
kW	47.2	52.0	55.2	60	31.2	43.0	47.3	50.2	54.6	28.4	50.0	55.1	58.5	63.6	32.8

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



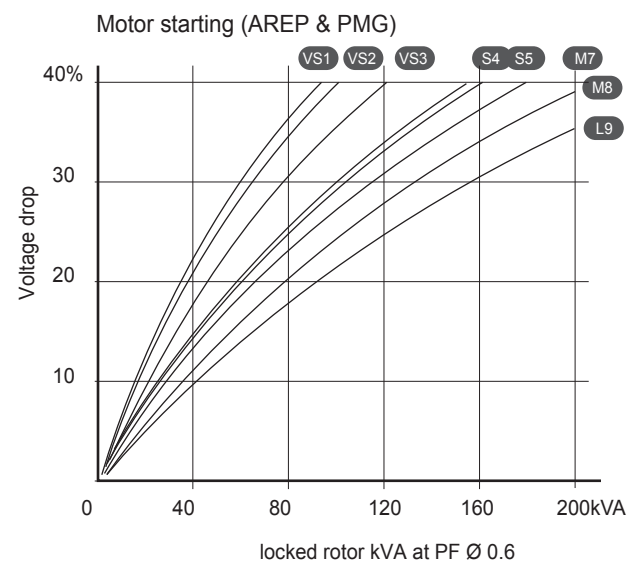
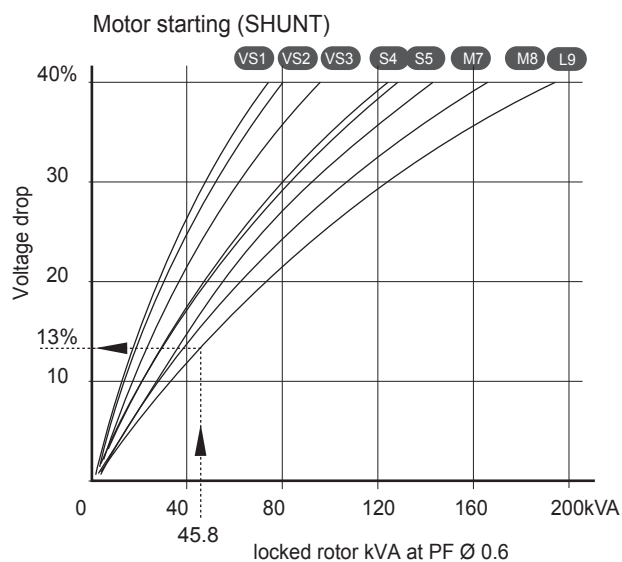
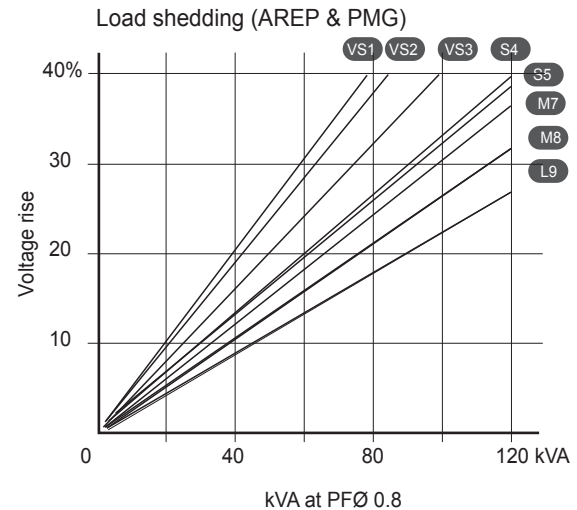
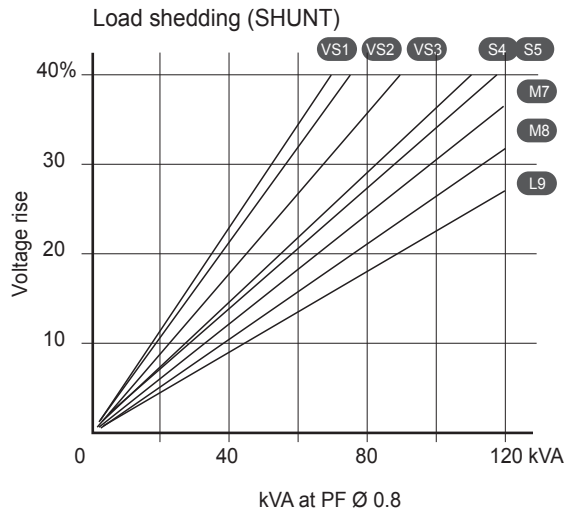
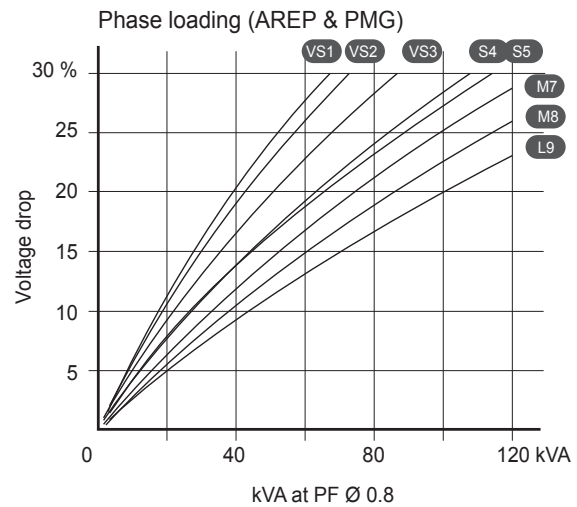
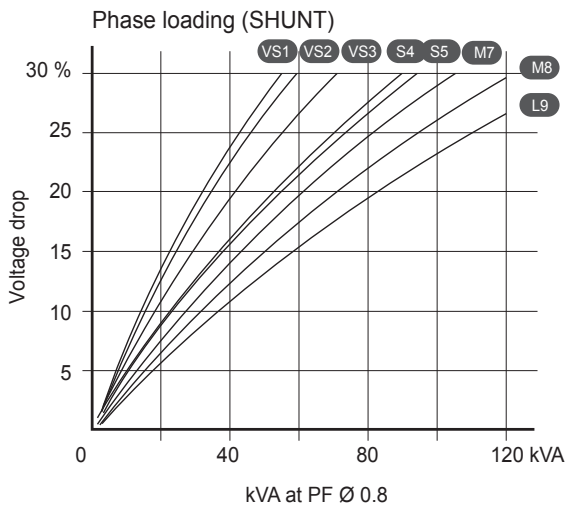
Reactances (%). Time constants (ms) - Class H / 400 V

	VS1	VS2	VS3	S4	S5	M7	M8	L9
Kcc Short-circuit ratio	0.54	0.51	0.48	0.53	0.46	0.43	0.47	0.44
Xd Direct-axis synchro. reactance unsaturated	240	249	261	229	262	275	264	283
Xq Quadrature-axis synchro. reactance unsaturated	144	149	156	137	157	165	158	169
T'do No-load transient time constant	733	759	803	880	880	914	931	962
X'd Direct-axis transient reactance saturated	16.3	16.4	16.2	13.0	14.8	15.0	14.1	14.7
T'd Short-circuit transient time constant	50	50	50	50	50	50	50	50
X''d Direct-axis subtransient reactance saturated	8.1	8.2	8.1	6.5	7.4	7.5	7.0	7.3
T''d Subtransient time constant	5	5	5	5	5	5	5	5
X''q Quadrature-axis subtransient reactance saturated	11.5	11.6	11.5	9.2	10.6	10.7	10.1	10.5
Xo Zero sequence reactance unsaturated	0.78	0.46	0.88	0.73	0.23	0.25	0.84	0.43
X2 Negative sequence reactance saturated	9.88	9.91	9.82	7.89	9.02	9.12	8.61	8.93
Ta Armature time constant	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0

Other class H/400 V data

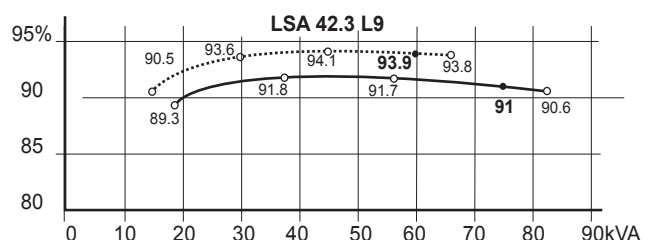
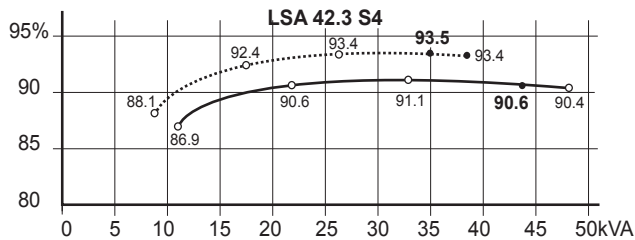
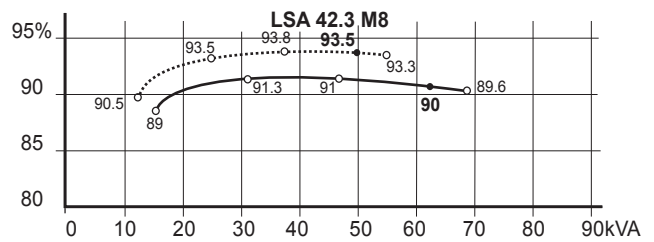
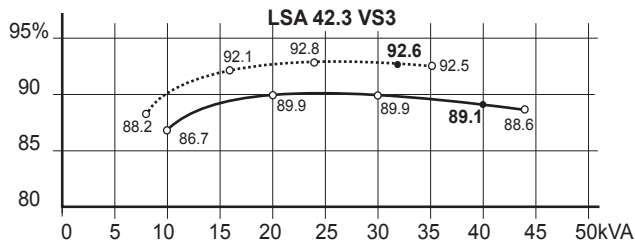
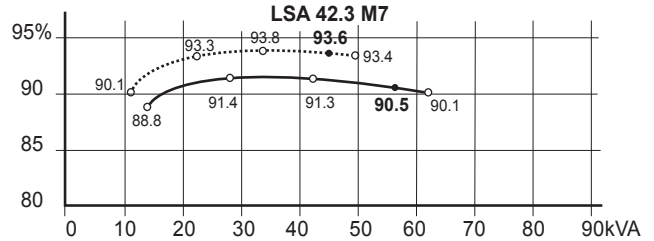
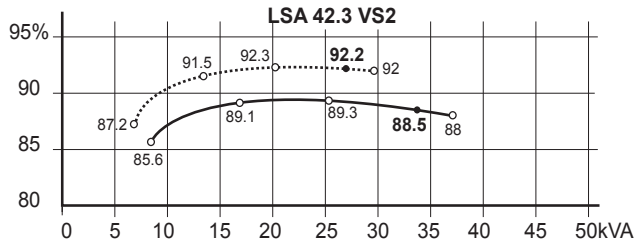
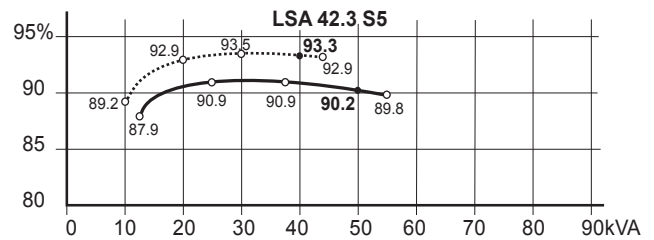
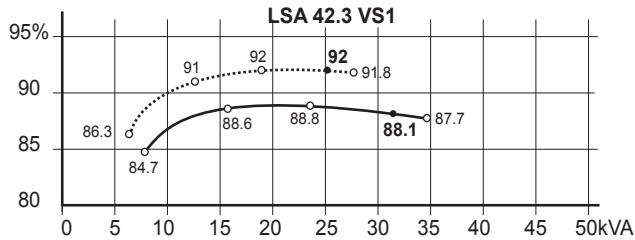
io (A) No-load excitation current (SHUNT/AREP)	0.55/0.85	0.52/0.8	0.51/0.79	0.49/0.75	0.49/0.75	0.46/0.71	0.5/0.78	0.5/0.77
ic (A) On-load excitation current (SHUNT/AREP)	1.74/2.66	1.72/2.63	1.77/2.71	1.54/2.36	1.73/2.66	1.75/2.68	1.86/2.86	2.04/3.13
uc (V) On-load excitation voltage (SHUNT/AREP)	29.6/19.2	29.2/18.9	29.9/19.3	26/16.8	29.1/18.8	29/18.8	30.6/19.8	32.8/21.2
ms Response time ($\Delta U = 20\%$ transient)	< 500ms	< 500ms	< 500ms	< 500ms	< 500ms	< 500ms	< 500ms	< 500ms
kVA Start ($\Delta U = 20\%$ cont. or ($\Delta U = 30\%$ trans.) SHUNT	51.7	56	67.7	92	92	103.5	115	138
kVA Start ($\Delta U = 20\%$ cont. or ($\Delta U = 30\%$ trans.) AREP	59.6	64.3	76.1	93.1	93.1	103.2	104.9	116.8
% Transient ΔU (on-load 4/4) SHUNT - P.F.: 0.8 _{LAG}	16.3	16.3	16.2	14.3	15.4	15.5	15	15.3
% Transient ΔU (on-load 4/4) AREP - P.F.: 0.8 _{LAG}	13.8	13.8	13.7	12.2	13.1	13.2	12.8	13
W No-load losses	719	713	762	861	861	879	1029	1120
W Heat dissipation	2894	3017	3371	3055	3704	4022	4396	5091

Transient voltage variation 400V - 50 Hz



- 1) For a starting P.F. other than 0.6, the starting kVA must be multiplied by $K = \text{Sine P.F.} / 0.6$
 Calculation example for a different P.F. other than 0.6: Starter motor kVA calculated at 0.4 P.F. = 40 kVA
 $> \text{Sin P.F. } 0.4 = 0.9165 > K = 1.145 > \text{kVA corrected} = 45.8 \text{ kVA} > \text{Voltage dip corresponding to L9} = 13\%$
- 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 480 V - 60 Hz (— P.F.: 0.8) (..... P.F.: 1)



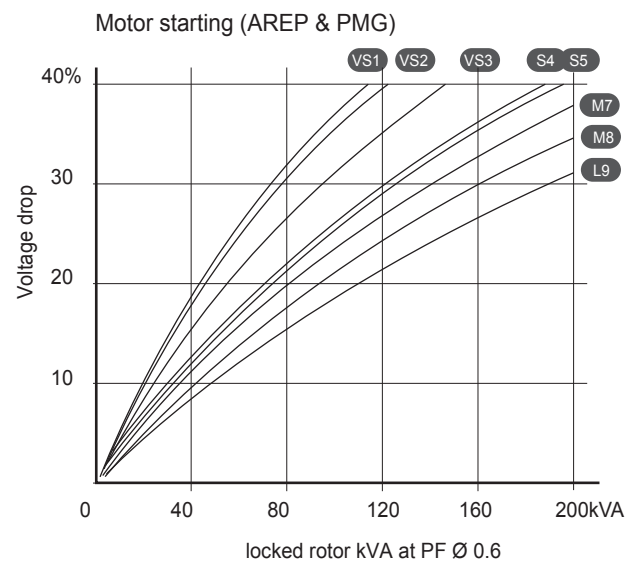
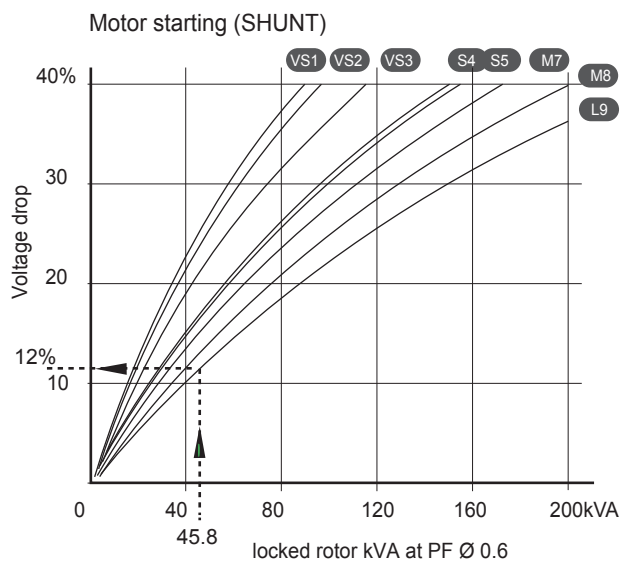
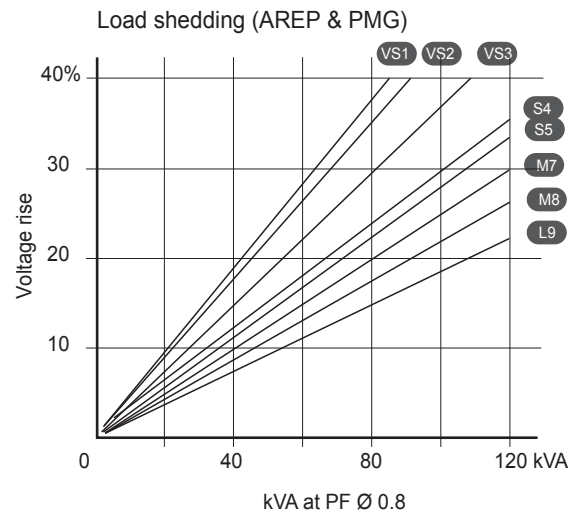
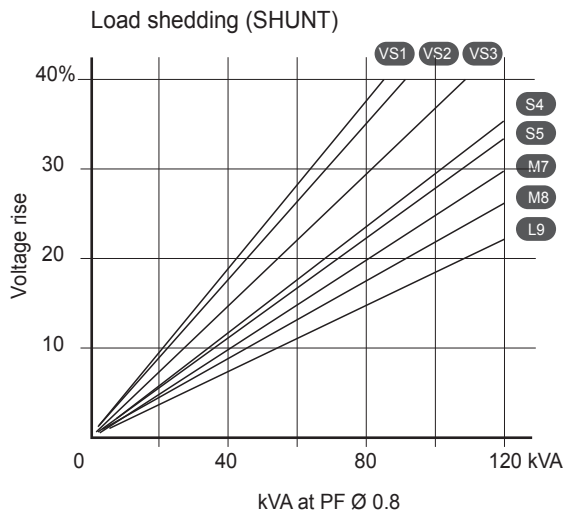
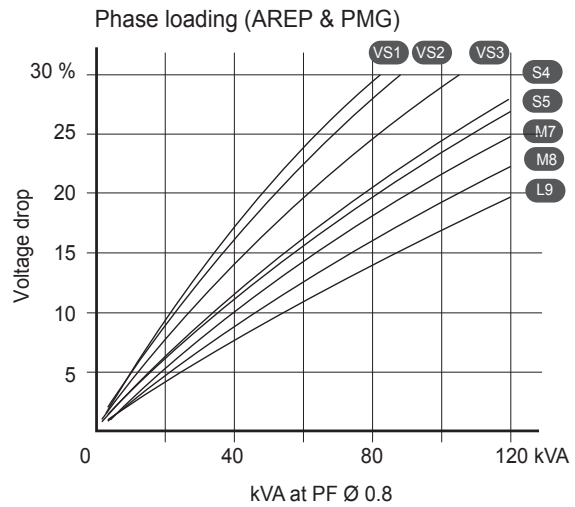
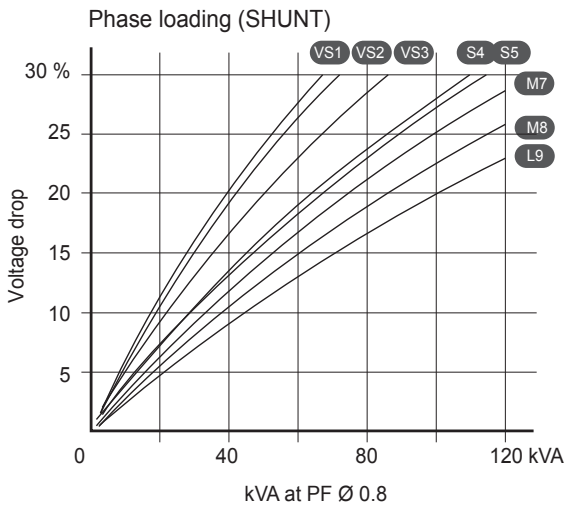
Reactances (%). Time constants (ms) - Class H / 480 V

		VS1	VS2	VS3	S4	S5	M7	M8	L9
Kcc	Short-circuit ratio	0.52	0.49	0.46	0.51	0.44	0.41	0.45	0.42
Xd	Direct-axis synchro. reactance unsaturated	252	260	272	239	273	287	275	294
Xq	Quadrature-axis synchro. reactance unsaturated	151	156	163	143	163	172	165	176
T'do	No-load transient time constant	733	759	803	880	880	914	931	962
X'd	Direct-axis transient reactance saturated	17.2	17.1	16.9	13.5	15.5	15.7	14.7	15.3
T'd	Short-circuit transient time constant	50	50	50	50	50	50	50	50
X''d	Direct-axis subtransient reactance saturated	8.6	8.5	8.4	6.7	7.7	7.8	7.3	7.6
T''d	Subtransient time constant	5	5	5	5	5	5	5	5
X''q	Quadrature-axis subtransient reactance saturated	12.1	12.1	12.0	9.6	11.0	11.2	10.5	10.5
Xo	Zero sequence reactance unsaturated	0.46	0.83	0.31	0.26	0.69	0.05	0.97	0.86
X2	Negative sequence reactance saturated	10.37	10.35	10.24	8.22	9.39	9.55	8.97	9.30
Ta	Armature time constant	8.0	8.0	8.0	8.0	8.0	8.0	8.0	8.0

Other class H/480 V data

io (A)	No-load excitation current (SHUNT/AREP)	0.55/0.85	0.52/0.8	0.51/0.79	0.49/0.75	0.49/0.75	0.46/0.71	0.5/0.77	0.5/0.77
ic (A)	On-load excitation current (SHUNT/AREP)	1.76/2.69	1.73/2.65	1.77/2.72	1.54/2.36	1.73/2.66	1.75/2.68	1.84/2.82	1.99/3.06
uc (V)	On-load excitation voltage (SHUNT/AREP)	30.2/19.3	29.7/19	30.3/19.4	26.4/16.9	29.4/18.8	29.5/18.8	30.9/19.7	32.9/21.1
ms	Response time ($\Delta U = 20\%$ transient)	< 500ms	< 500ms	< 500ms	< 500ms	< 500ms	< 500ms	< 500ms	< 500ms
kVA	Start ($\Delta U = 20\%$ cont. or ($\Delta U = 30\%$ trans.) SHUNT	63.3	68.1	82	111.8	111.8	124.7	146.9	165.6
kVA	Start ($\Delta U = 20\%$ cont. or ($\Delta U = 30\%$ trans.) AREP	71.4	76.9	92.6	121.8	121.6	133.8	137.9	152.2
%	Transient ΔU (on-load 4/4) SHUNT - P.F.: 0.8 _{LAG}	16.8	16.8	16.6	14.7	15.8	15.9	15.4	15.7
%	Transient ΔU (on-load 4/4) AREP - P.F.: 0.8 _{LAG}	14.1	14.1	14.0	12.5	13.4	13.5	13.0	13.3
W	No-load losses	1021	1016	1087	1229	1229	1258	1462	1591
W	Heat dissipation	3389	3505	3914	3597	4312	4709	5120	5917

Transient voltage variation 480V - 60 Hz



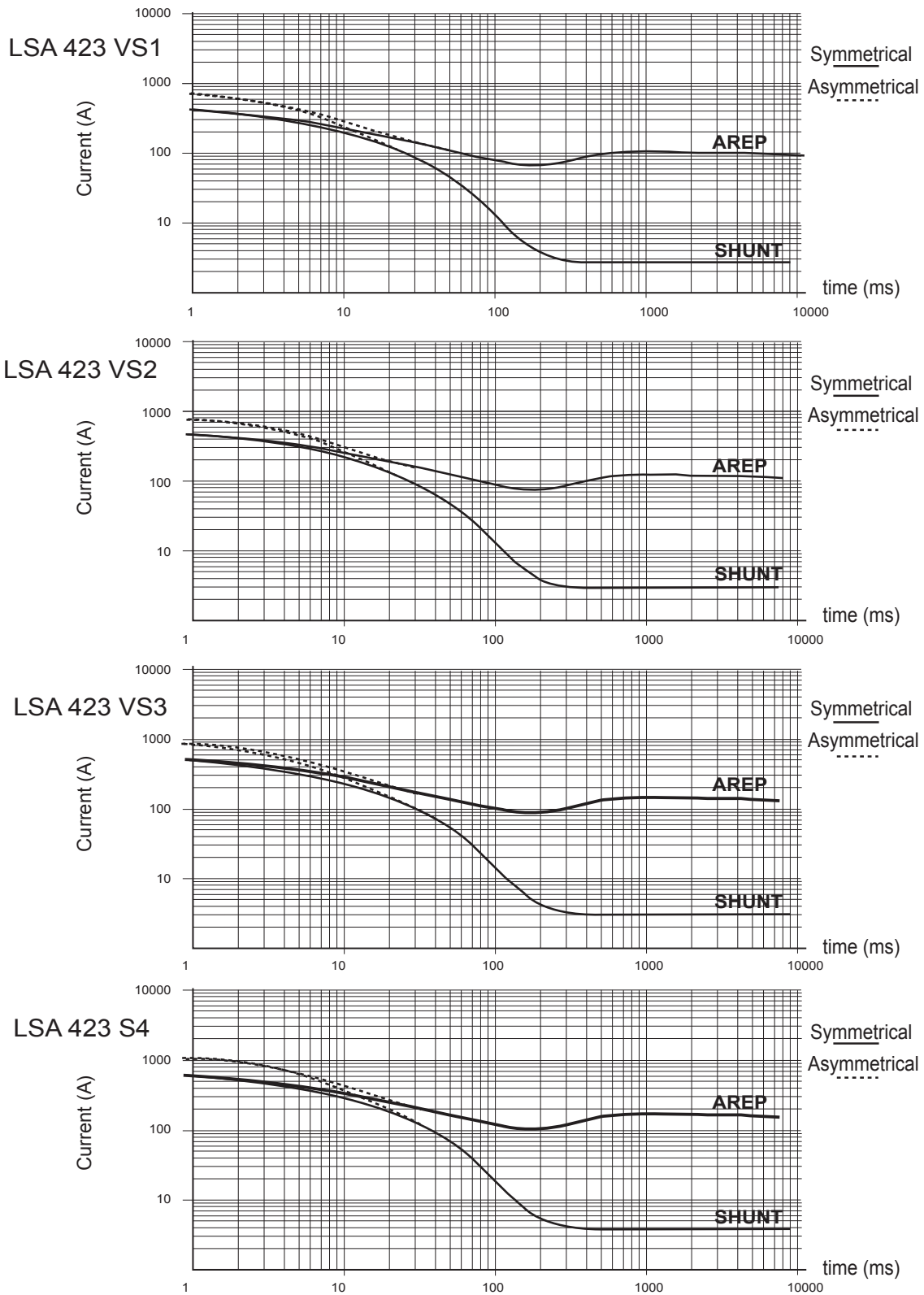
1) For a starting P.F. other than 0.6, the starting kVA must be multiplied by $K = \text{Sine P.F.} / 0.6$

Calculation example for a different P.F. other than 0.6: Starter motor kVA calculated at 0.4 P.F. = 40 kVA

> $\text{Sin P.F. } 0.4 = 0.9165$ > $K = 1.145$ > kVA corrected = 45.8 kVA > Voltage dip corresponding to L9 = 12%.

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)



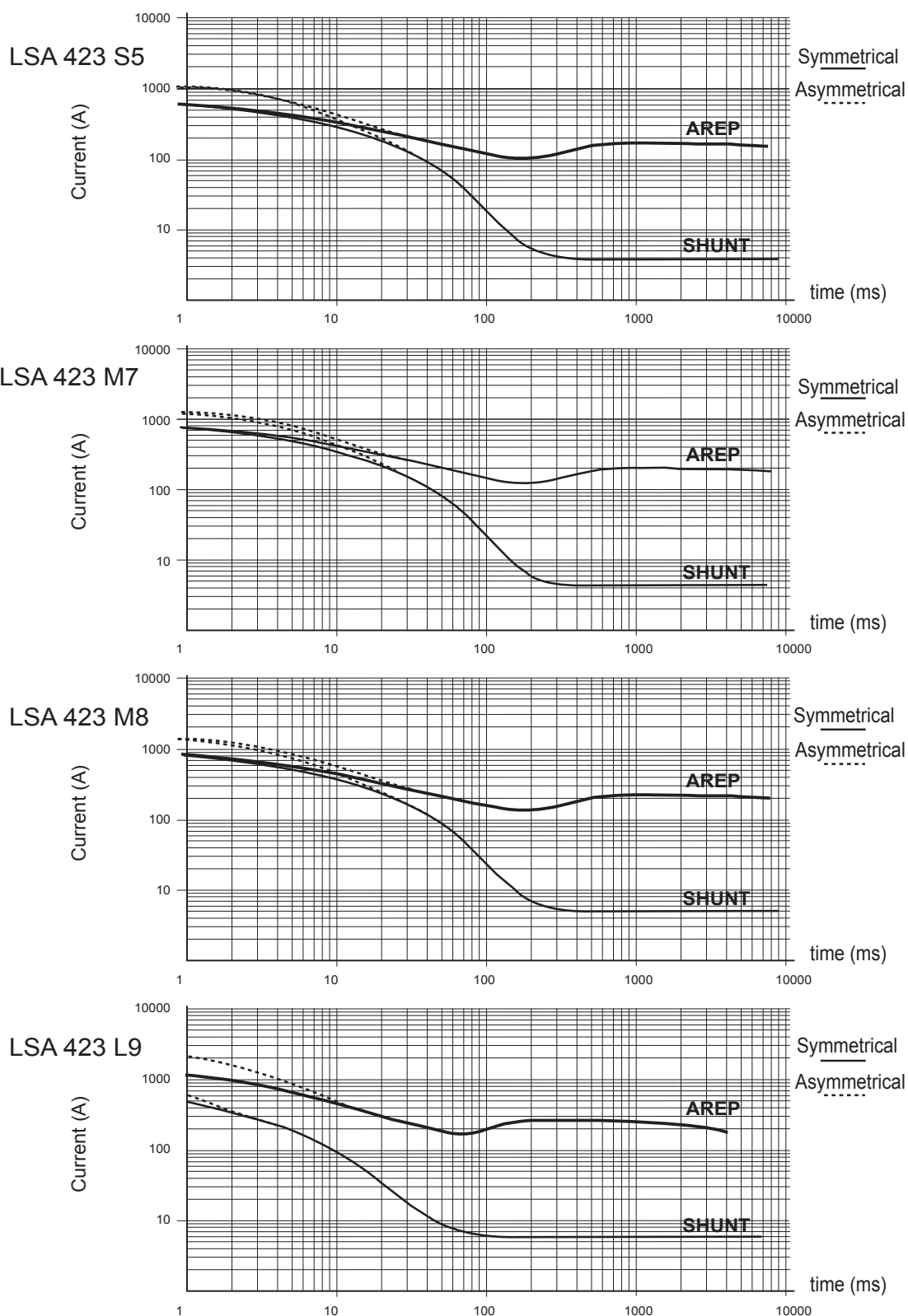
Influence due to connection

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)



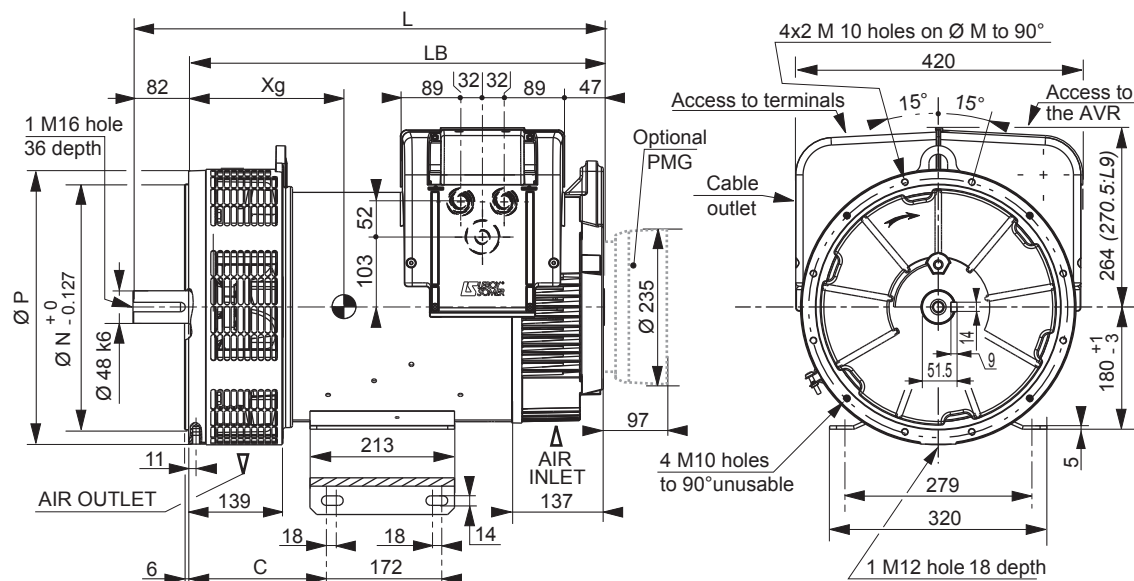
Influence due to short-circuit

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.

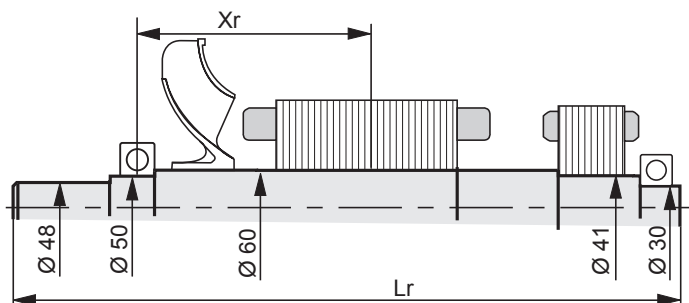
Two bearing dimensions



Dimensions (mm) and weight (kg)

Type	L	LB	N	M	P	C	Xg	Weight (kg)
LSA 42.3 VS1	610	528	361.95	381	406	189.25	242	129
LSA 42.3 VS2	610	528	361.95	381	406	189.25	247	134
LSA 42.3 VS3	610	528	361.95	381	406	189.25	257	145
LSA 42.3 S4	655	573	361.95	381	406	202.75	280	170
LSA 42.3 S5	655	573	361.95	381	406	202.75	280	170
LSA 42.3 M7	695	613	361.95	381	406	202.75	292	185
LSA 42.3 M8	695	613	361.95	381	406	202.75	300	190
LSA 42.3 L9	725	643	409.58	428.62	455	202.75	314	207

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 42.3 VS1	238	603	45.18	0.2135
LSA 42.3 VS2	240	603	47.18	0.2263
LSA 42.3 VS3	245	603	51.23	0.2518
LSA 42.3 S4	267	648	61.31	0.3096
LSA 42.3 S5	267	648	61.31	0.3096
LSA 42.3 M7	281	688	67.23	0.3417
LSA 42.3 M8	286	688	70.23	0.3609
LSA 42.3 L9	299	718	77.29	0.4066

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.
The torsional analysis of the transmission is imperative. All values are available upon request.

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