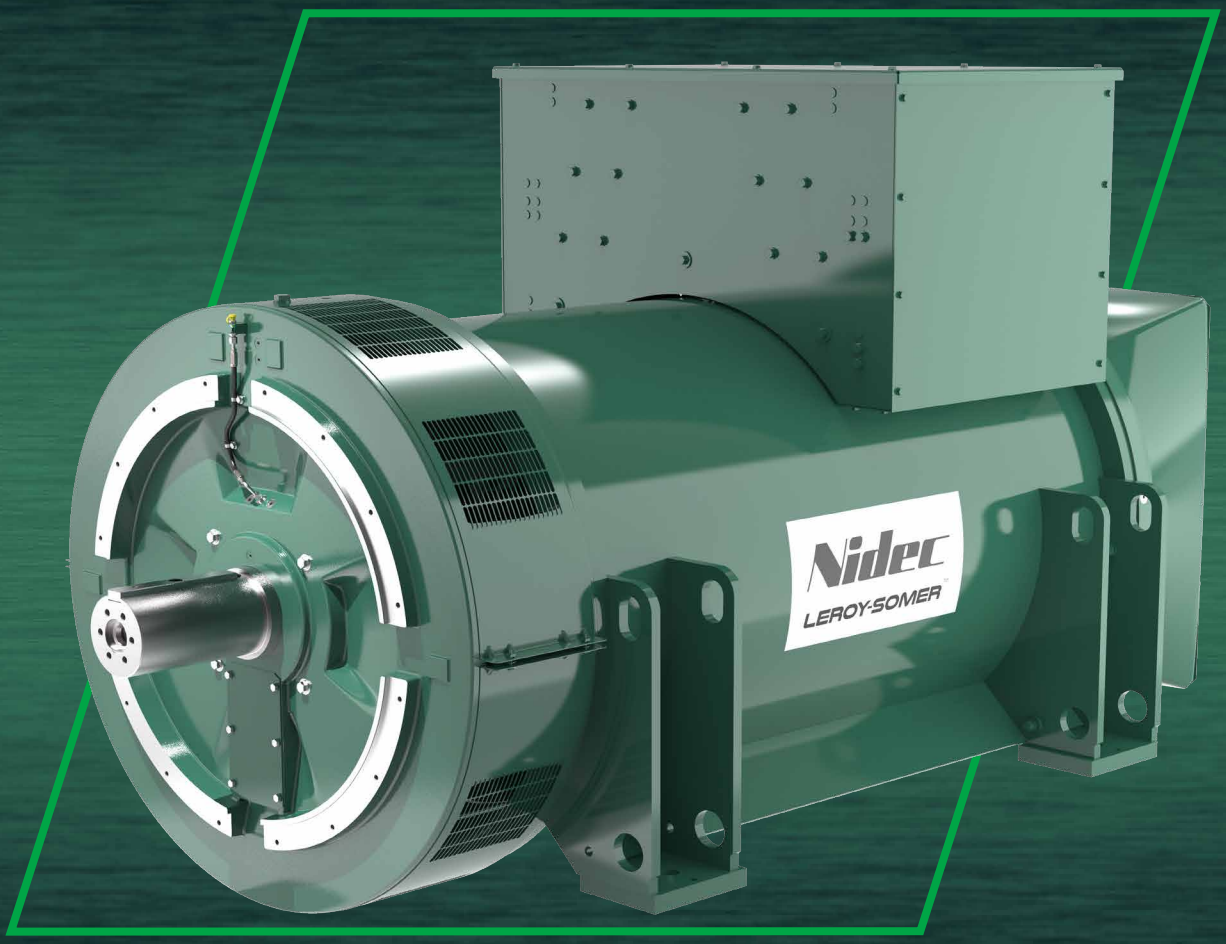
Nidec Power



LSA 53.2

Low Voltage Alternator - 4 pole

2650 to 3300 kVA - 50 Hz / 3150 to 3900 kVA - 60 Hz

Electrical and mechanical data

LEROY-SOMER™

Specially adapted to applications

The LSA 53.2 alternator is designed to be suitable for typical generator applications, such as: prime power generation, cogeneration, marine applications, rental, telecommunications, data center, emergency genset, etc.

Compliant with international standards

The LSA 53.2 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, marine regulations, etc.
It can be integrated into a EC marked generator.
The LSA 53.2 is designed, manufactured and marketed in an ISO 9001 and ISO 14001 environment.

Top of the range electrical performance

- Class H insulation
- Standard 6-wire winding, 2/3 pitch
- Each model is proposed for two frequencies:
  - Voltage range 50 Hz: 380V - 400V - 415V - 440 V
  - Voltage range 60 Hz: 380V - 416V - 440V - 480V
- High efficiency and motor starting capacity
- Other voltages are possible with optional adapted windings:
  - 50 Hz : 440V (no. 7S), 500V (no. 9S), 600V (no. 22S or 23S), 690V (no. 10S or 52S)
  - 60 Hz : 380V and 416V (no. 8S), 600V (no. 9S) 690V
- Complies with EN 61000-6-3, EN 61000-6-2, EN 55011, group 1 class B for European zone (EC marking)

Excitation and regulation system suited to the application

These alternators can be supplied with AREP + PMI or PMG excitation system, according to the alternator specification.
Standard excitation system is AREP with D550 digital automatic voltage regulator.

Excitation system			Regulation options				
Volage regulator	**AREP + PMI**	**PMG**	**C.T.** Current transformer for paralleling	Mains paralleling	3-phase sensing	3-phase sensing for mains paralleling unbalanced	Remote voltage potentiometer
D550	**Standard**	**Option**	√	**Include**	**Include**	**contact us**	√

√ : Possible option

Protection system suited to the environment

- These alternators are IP 23
- Standard winding protection for clean environments with relative humidity ≤ 95 %

Options:
- Filters on air inlet: derating 5%
- Filters on air inlet and air outlet (IP 44): derating 10%
- Reinforced winding protection for harsh environments and relative humidity greater than 95% (derating 6%)
- Space heaters
- Protection or metering CTs
- Thermal protection for stator windings and/or bearings (PT100)

Reinforced mechanical structure using finite element modelling

- Compact and rigid assembly to better withstand generator vibrations
- Steel frame
- Cast iron flanges and shields
- Twin-bearing and single-bearing versions designed to be suitable for engines on the market
- Half-key balancing
- Regreasable bearings
- Clockwise rotation in standard

Accessible terminal box proportioned for optional equipment

- Easy access to the voltage regulator and to the connections
- Possible inclusion of accessories for paralleling, protection and measurement

General characteristics

Insulation class	H	Excitation system	AREP + PMI
Winding pitch	2/3 (n° 6S)	AVR type	D550
Number of wires	6	Voltage regulation (*)	± 0.5 %
Protection	IP 23	Short-circuit current	300% (3 IN) : 10s
Altitude	≤ 1000 m	Total Harmonic Distortion THD (**) in no-load:	< 4 %
Overspeed	2250 R.P.M.	Waveform: NEMA = TIF (**)	< 50
Air flow	2.5 m³/s (50 Hz) - 2.8 m³/s (60 Hz)	Waveform: I.E.C. = THF (**)	< 2 %

(*) steady state (**) between phases

Ratings 50 Hz - 1500 R.P.M.

kVA / kW - P.F. = 0.8

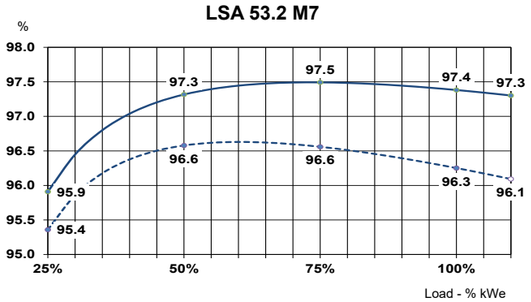
Duty/T°C		Continuous duty/40°C			Continuous duty/40°C			Stand-by/40°C			Stand-by/27°C		
Class/T°K		H/125°K			F/105°K			H/150°K			H/163°K		
Phase		**3 ph.**			**3 ph.**			**3 ph.**			**3 ph.**		
Y		380V	400V	415V	380V	400V	415V	380V	400V	415V	380V	400V	415V
LSA 53.2 M7	kVA	2650	**2650**	2650	2417	**2417**	2417	2783	**2783**	2783	2915	**2915**	2915
	kW	*2120*	*2120*	*2120*	*1934*	*1934*	*1934*	*2226*	*2226*	*2226*	*2332*	*2332*	*2332*
LSA 53.2 M9	kVA	3000	**3000**	3000	2736	**2736**	2736	3150	**3150**	3150	3300	**3300**	3300
	kW	*2400*	*2400*	*2400*	*2189*	*2189*	*2189*	*2520*	*2520*	*2520*	*2640*	*2640*	*2640*
LSA 53.2 M12	kVA	3300	**3300**	3300	3010	**3010**	3010	3465	**3465**	3465	3630	**3630**	3630
	kW	*2640*	*2640*	*2640*	*2408*	*2408*	*2408*	*2772*	*2772*	*2772*	*2904*	*2904*	*2904*

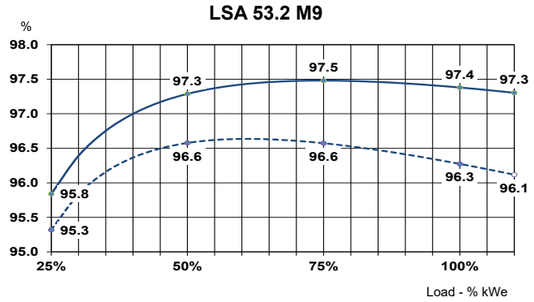
Ratings 60 Hz - 1800 R.P.M.

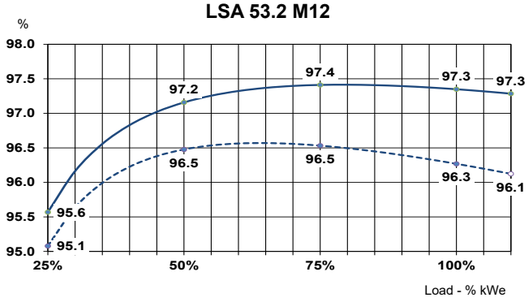
kVA / kW - P.F. = 0.8

Duty/T°C		Continuous duty/40°C		Continuous duty/40°C		Stand-by/40°C		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		440V	480V	440V	480V	440V	480V	440V	480V
LSA 53.2 M7	kVA	2888	**3150**	2634	**2873**	3032	**3308**	3176	**3465**
	kW	*2310*	*2520*	*2107*	*2298*	*2426*	*2646*	*2541*	*2772*
LSA 53.2 M9	kVA	3300	**3600**	3010	**3283**	3465	**3780**	3630	**3960**
	kW	*2640*	*2880*	*2408*	*2626*	*2772*	*3024*	*2904*	*3168*
LSA 53.2 M12	kVA	3630	**3900**	3311	**3557**	3812	**4095**	3993	**4290**
	kW	*2904*	*3120*	*2649*	*2846*	*3050*	*3276*	*3194*	*3432*

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



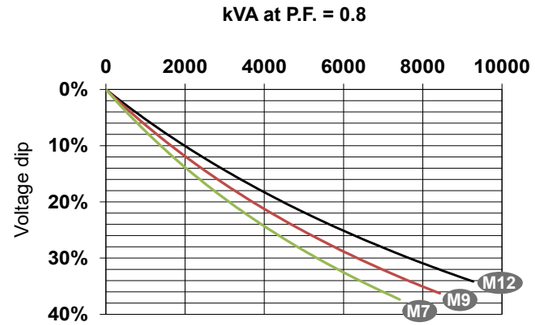


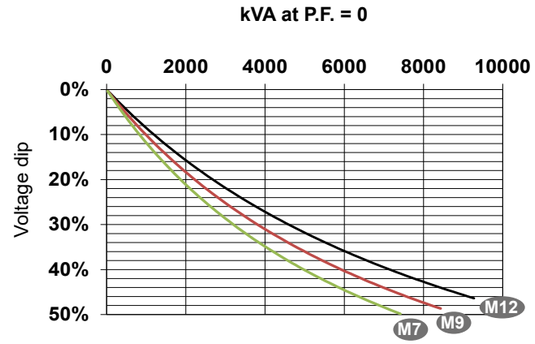


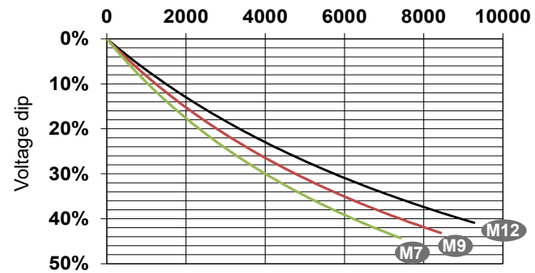
Reactances (%). Time constants (ms) - Class H / 400V

		M7	M9	M12
Kcc	Short-circuit ratio	0.35	0.36	0.39
Xd	Direct-axis synchronous reactance unsaturated	354	343	314
Xq	Quadrature-axis synchronous reactance unsaturated	181	175	160
T'do	No-load transient time constant	3.21	3.38	3.58
.X'd	Direct-axis transient reactance saturated	33.4	31.9	29.1
T'd	Short-circuit transient time constant	0.356	0.370	0.39
X"d	Direct-axis subtransient reactance saturated	19.4	18.3	16.6
T"d	Subtransient time constant	0.024	0.023	0.023
X"q	Quadrature-axis subtransient reactance saturated	20.2	19.1	17.3
X0	Zero sequence reactance	4.6	4.3	3.9
X2	Negative sequence reactance saturated	19.8	18.7	17.0
Ta	Armature time constant	0.045	0.044	0.044
Other class H / 400V data				
io (A)	No-load excitation current	1.3	1.3	1.3
ic (A)	On-load excitation current	5.3	5.2	4.9
uc (V)	On-load excitation voltage	63	61	58
kW	No-load losses	21	24	29
kW	Heat dissipation	90	101	110

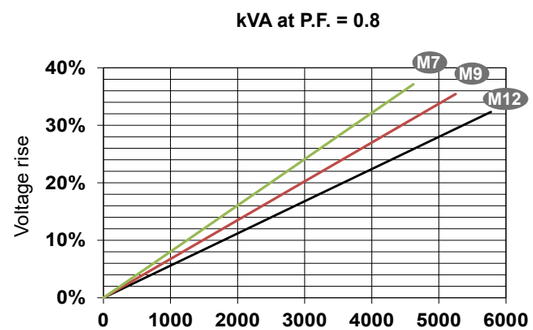
Transient voltage variation at load inrush: 400V - 50 Hz



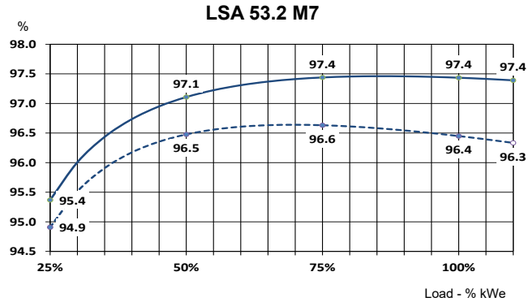


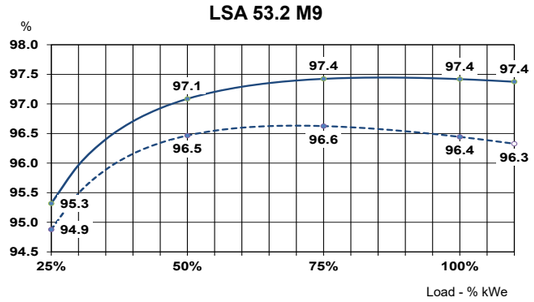


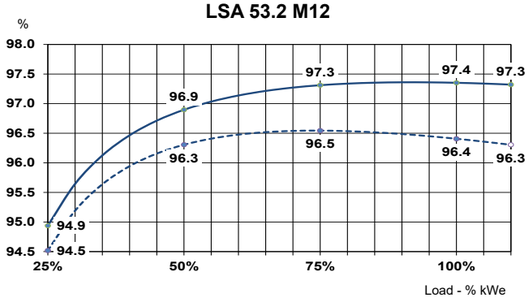
Transient voltage variation at load rejection: 400V - 50 Hz



Efficiencies 480V - 60 Hz (— P.F.: 1) (····· P.F.: 0.8)



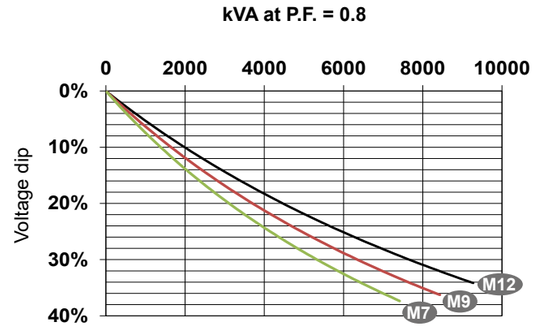


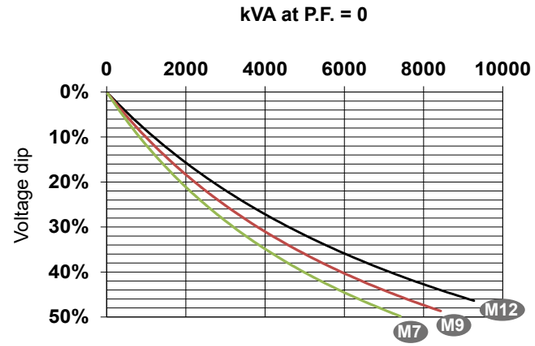


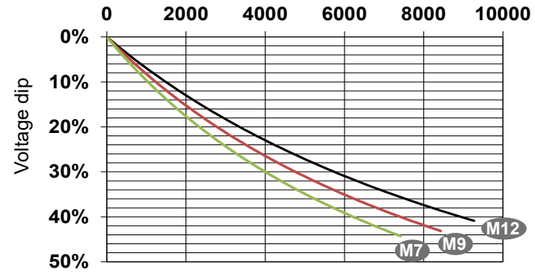
Reactances (%). Time constants (ms) - Class H / 480V

		M7	M9	M12
Kcc	Short-circuit ratio	0.35	0.36	0.40
Xd	Direct-axis synchronous reactance unsaturated	351	343	310
Xq	Quadrature-axis synchronous reactance unsaturated	179	175	158
T'do	No-load transient time constant	3.21	3.38	3.58
X'd	Direct-axis transient reactance saturated	33.1	31.9	28.6
T'd	Short-circuit transient time constant	0.356	0.370	0.388
X"d	Direct-axis subtransient reactance saturated	19.2	18.3	16.3
T"d	Subtransient time constant	0.024	0.023	0.023
X"q	Quadrature-axis subtransient reactance saturated	20.1	19.1	17.1
X0	Zero sequence reactance	4.5	4.3	3.8
X2	Negative sequence reactance saturated	19.6	18.7	16.7
Ta	Armature time constant	0.043	0.042	0.042
Other class H / 480V data				
io (A)	No-load excitation current	1.2	1.3	1.3
ic (A)	On-load excitation current	5.2	5.1	4.8
uc (V)	On-load excitation voltage	61	60	56
kW	No-load losses	29	24	39
kW	Heat dissipation	98	112	123

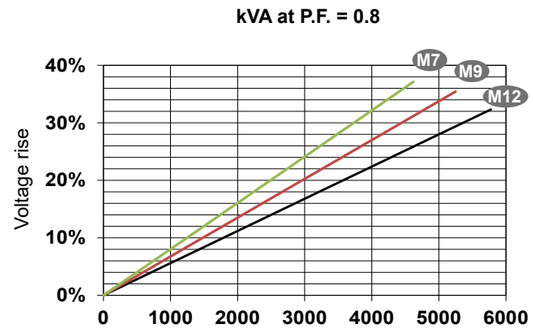
Transient voltage variation at load inrush: 480V - 60 Hz





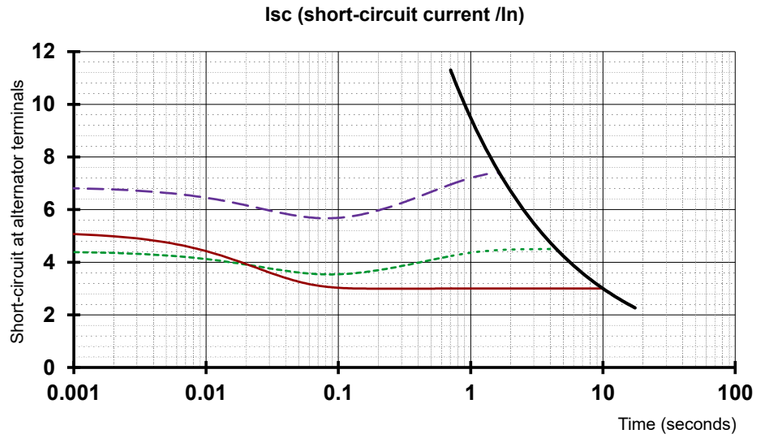


Transient voltage variation at load rejection: 480V - 60 Hz

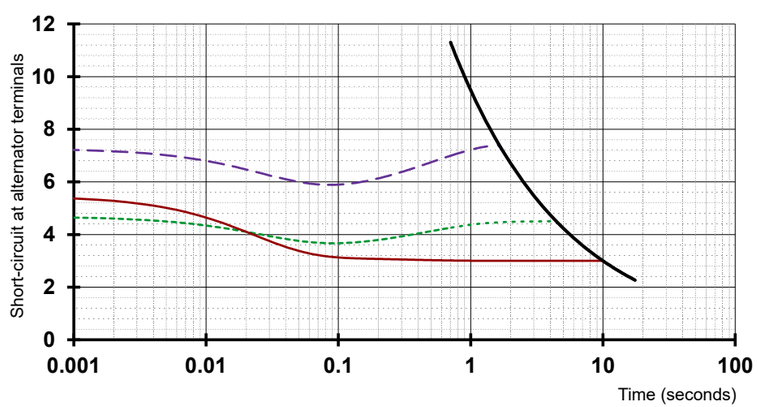


Short-circuit curves at rated speed (star connection Y)

LSA 53.2 M7



LSA 53.2 M9

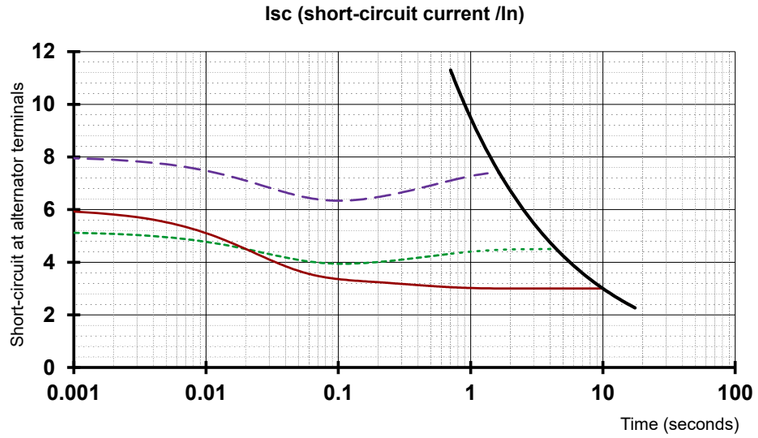


- Symetrical phase to neutral short-circuit
- Symetrical two-phase short-circuit
- Symetrical three-phase short-circuit
- Thermal limit curve

LSA 53.2 - 2650 to 3300 kVA - 50 Hz / 3150 to 3900 kVA - 60 Hz

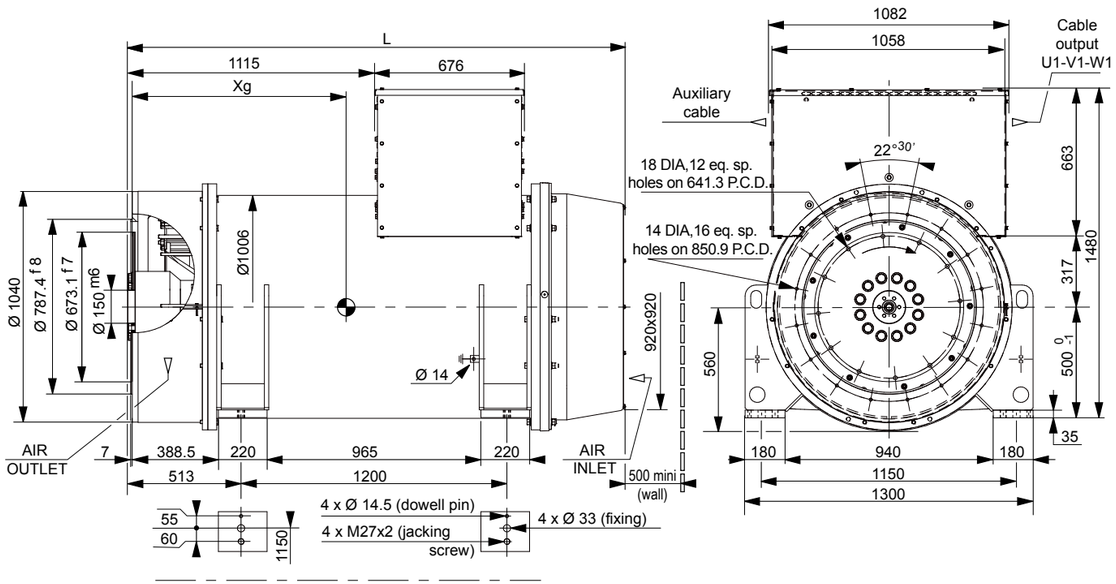
Short-circuit curves at rated speed (star connection Y)

LSA 53.2 M12



- Symetrical phase to neutral short-circuit
- Symetrical two-phase short-circuit
- Symetrical three-phase short-circuit
- Thermal limit curve

Single bearing dimensions



Dimensions (mm) and weight			
Type	L	Xg	Weight (kg)
LSA 53.2 M7	2246	942	5250
LSA 53.2 M9	2246	969	5700
LSA 53.2 M12	2246	1010	6300

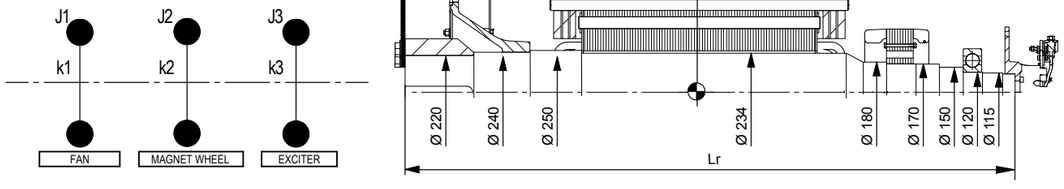
Coupling		
Flange S.A.E.	**0**	**00**
Flex plate S.A.E. **21**		X
Flex plate S.A.E. **18**	X	X

3D drawing files available - Do not hesitate to contact us.

Flange (mm)				
S.A.E.	N	M	XBG	S
0	647.7	679.5	16	14
00	787.4	850.9	16	14

Flex plate (mm)					
S.A.E.	BX	U	X	Y	AH
21	673.1	641.3	12	18	0
18	571.5	542.9	6	18	15.8

Torsional analysis data

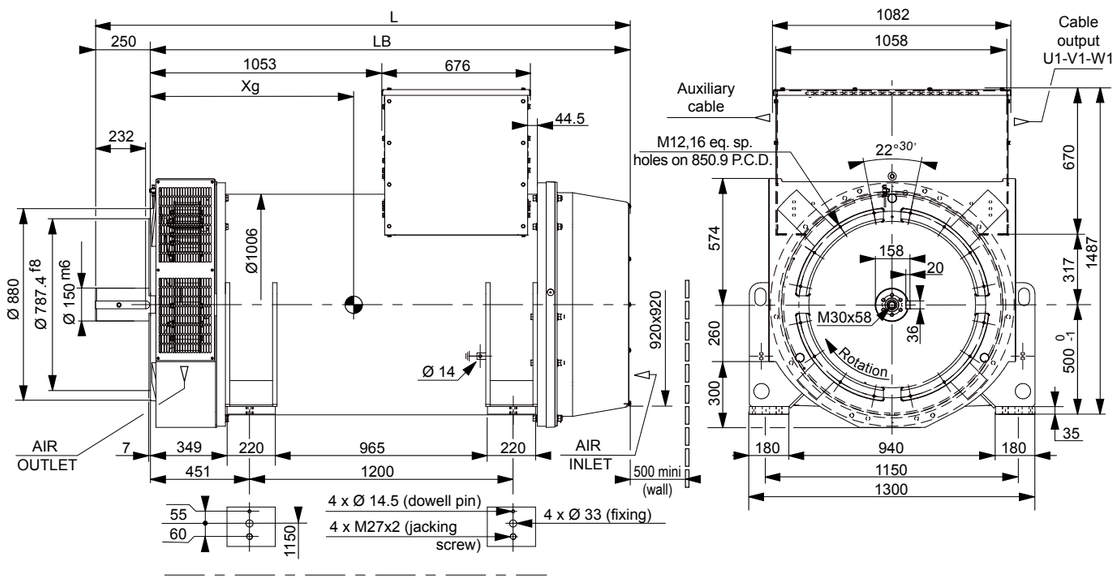


Centre of gravity: Xr (mm), Rotor length: Lr (mm), Weight: M (kg)			
Type	Xg	Lr	M
LSA 53.2 M7	841	2056	2024
LSA 53.2 M9	874	2056	2187
LSA 53.2 M12	924	2056	2415

Torsional rigidity					
[Nm/rad]			(kg.m²)		
k1	k2	k3	J1	J2	J3
6.44 10E7	6.58 10E7	2.53 10E7	14.1	62.5	2.1
6.44 10E7	6.02 10E7	2.72 10E7	14.1	71.3	2.0
6.44 10E7	5.38 10E7	3.05 10E7	14.1	83.6	1.8

NOTE: Dimensions are for information only and may be subject to modifications. Contractual 2D drawings and 3D drawing files are available and can be downloaded from the site: www.leroy-somer.com/epg. The torsional analysis of the transmission is the responsability of genset manufacturer.

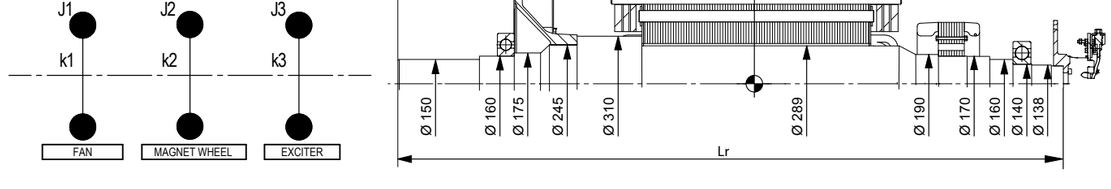
Two bearing dimensions



Dimensions (mm) and weight				
Type	L	LB	Xg	Weight (kg)
LSA 53.2 M7	2434	2184	873	5300
LSA 53.2 M9	2434	2184	900	5750
LSA 53.2 M12	2434	2184	942	6400

3D drawing files available - Do not hesitate to contact us.

Torsional analysis data



Centre of gravity: Xr (mm), Rotor length: Lr (mm), Weight: M (kg)			
Type	Xr	Lr	M
LSA 53.2 M7	1072	2224	1906
LSA 53.2 M9	1103	2224	2069
LSA 53.2 M12	1152	2224	2297

Torsional rigidity					
[Nm/rad]			(kg.m²)		
k1	k2	k3	J1	J2	J3
1.94 10E7	6.58 10E7	2.53 10E7	10.8	62.5	2.1
1.94 10E7	6.02 10E7	2.72 10E7	10.8	71.3	2.0
1.94 10E7	5.38 10E7	3.05 10E7	10.8	83.6	1.8

NOTE: Dimensions are for information only and may be subject to modifications. Contractual 2D drawings and 3D drawing files are available and can be downloaded from the site: www.leroy-somer.com/epg. The torsional analysis of the transmission is the responsability of genset manufacturer.

Nidec

All for dreams

www.nidecpower.com

Connect with us at:

Moteurs Leroy-Somer SAS. Siège : Bd Marcellin Leroy, CS 10015, 16915 Angoulême Cedex 9, France. Capital social : 38 679 664 €, RCS Angoulême 338 567 258.

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