

# **ALTERNATORS**

## **LSA 51.2 - 4 Pole**

**Electrical and mechanical data**

#### ELECTRICAL DATA

Insulation class	H	Excitation system	A R E P + PMI
Winding pitch - Code	2/3 - (N° 6S)	A.V.R. model	R 449
Leads	6	Voltage regulation (steady state)	± 0,5 %
Drip proof	IP 23	Sustained short-circuit current	300% (3 IN) : 10s
Altitude	≤ 1000 m	Total harmonic (*) TGH / THC	< 2,5 %
Overspeed	2250 min <sup>-1</sup>	Waveform : NEMA = TIF - (*)	< 50
Air flow	2,5 m <sup>3</sup> /s	Waveform : I.E.C. = THF - (*)	< 2 %

(\*) Total harmonic content line to line, at no load or full rated linear and balanced load

#### RATINGS : kVA / kW - Power factor = 0,8

Duty/Ambiant T°		Continuous / 40°C						Stand-by / 40°C			Stand-by / 27°C		
Class/T° rise		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	
Δ	220V	230V	240V	220V	230V	240V	220V	230V	240V	220V	230V	240V	
<b>51.2 S55</b>	kVA	<b>1800</b>			1620			1890			<b>1980</b>		
	kW	1440			1296			1512			1584		
<b>51.2 M60</b>	kVA	<b>2000</b>			1800			2100			<b>2200</b>		
	kW	1600			1440			1680			1760		
<b>51.2 L70</b>	kVA	<b>2150</b>			1935			2255			<b>2365</b>		
	kW	1720			1548			1804			1892		
<b>51.2 VL 85</b>	kVA	<b>2250</b>			2025			2360			<b>2475</b>		
	kW	1800			1620			1888			1980		

#### EFFICIENCIES (%) - Class H / 40° C

	Three phase : 400 V									
	P.F. = 0,8					P.F. = 1				
	1/4	2/4	3/4	4/4	St.by	1/4	2/4	3/4	4/4	St.by
<b>51.2 S55</b>	94,9	96,2	96,1	95,7	95,4	95,4	97	97,2	97,1	97
<b>51.2 M60</b>	95	96,2	96,2	95,8	95,6	95,5	97	97,3	97,2	97,1
<b>51.2 L70</b>	95	96,4	96,4	96,1	96	95,4	97,1	97,4	97,3	97,3
<b>51.2 VL 85</b>	94,8	96,5	96,7	96,5	96,4	95,2	97,1	97,5	97,6	97,5

#### REACTANCES (%) - TIME CONSTANTS (ms) - CLASS H / 400 V

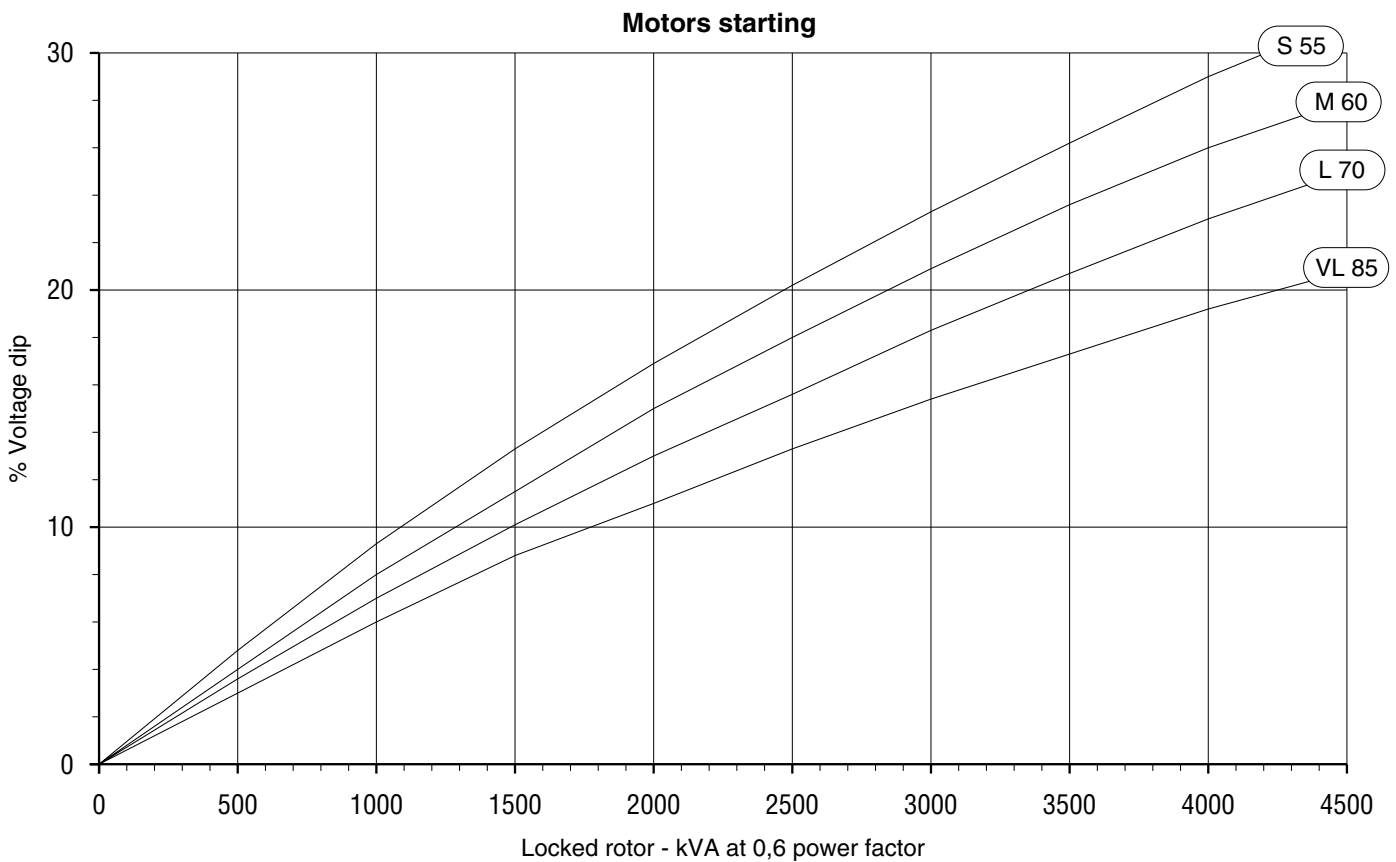
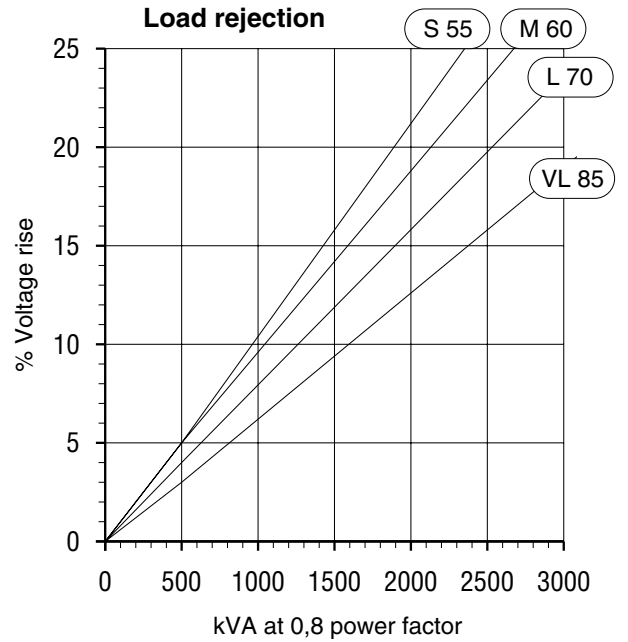
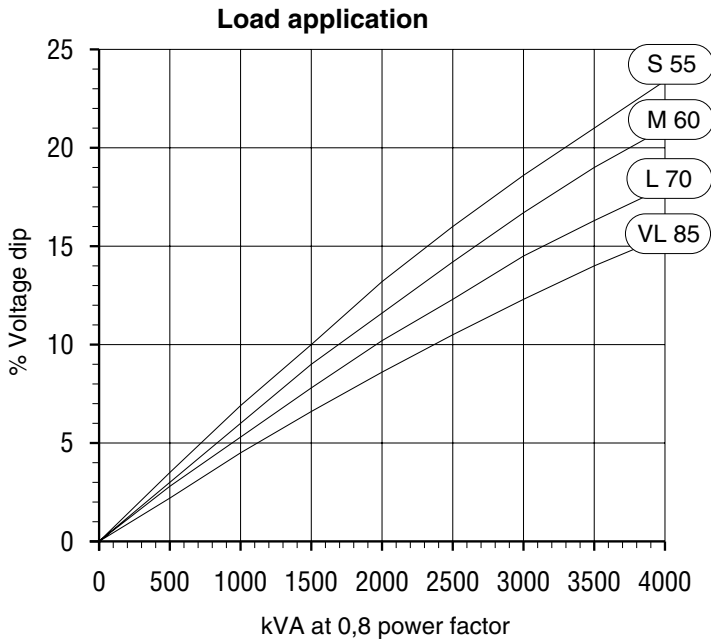
		51.2 S55	51.2 M60	51.2 L70	51.2 VL 85
<b>Kcc</b>	Short-circuit ratio	0,34	0,36	0,39	0,45
<b>Xd</b>	Direct axis synchronous reactance unsaturated	362	348	320	278
<b>Xq</b>	Quadrature axis synchronous reactance unsaturated	217	209	192	167
<b>T'do</b>	Open circuit time constant	2660	2770	2910	3050
<b>X'd</b>	Direct axis transient reactance saturated	27,4	26,2	23,8	20,4
<b>T'd</b>	Short circuit transient time constant	237	245	254	263
<b>X"d</b>	Direct axis subtransient reactance saturated	14,2	13,6	12,4	10,6
<b>T"d</b>	Subtransient time constant	22	23	24	26
<b>X"q</b>	Quadrature axis subtransient reactance saturated	17,8	17	15,5	13,2
<b>Xo</b>	Zero sequence reactance unsaturated	3,4	3,2	2,9	2,5
<b>X2</b>	Negative sequence reactance saturated	16	15,3	13,9	12
<b>Ta</b>	Armature time constant	38	41	44	48

#### OTHER DATA - CLASS H / 400 V

<b>io (A)</b>	No load excitation current	1,5	1,5	1,6	1,6
<b>ic (A)</b>	Full load excitation current	6	5,9	5,5	5
<b>uc (V)</b>	Full load excitation voltage	63	62	60	56
<b>ms</b>	Recovery time (ΔU = 20 % transient)	< 700	< 700	< 700	< 700
<b>kVA</b>	Motor start. (ΔU = 20% sust.) or (ΔU = 50% Transient)	3600	4000	4300	4500
<b>%</b>	Transient dip (rated step load) - PF : 0,8 LAG	12	12	11	10
<b>kW</b>	No load losses	16	17,5	19,2	21,7
<b>kW</b>	Heat rejection	64,7	70,1	69,8	65,2

According to : I.E.C. 34.1/34.2 - U.T.E. : NF C 51.111 - V.D.E. 0530 - B.S. 4999 & 5000 - NEMA : MG 1.22 - ISO 8528 . 3 - CSA (C22.2 + UL 2200).  
Products and materials shown in this catalogue may, at any time, be modified in order to follow the latest technological developments, improve the design or change the conditions of utilisation.  
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#### TRANSIENT VOLTAGE VARIATION - 400V



- 1) For a starting P.F. differing from 0,6 the starting kVA have to be multiplied by  $(\text{Sine } \varnothing / 0,8)$
- 2) If voltage is not 400V(Y) , 230V( $\Delta$ ) at 50 Hz then kVA must be multiplied by  $(400/U)^2$  or  $(230/U)^2$ .

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#### ELECTRICAL DATA

Insulation class	<b>H</b>	Excitation system	<b>A R E P + PMI</b>
Winding pitch - Code	<b>2/3 - (N° 6S)</b>	A.V.R. model	<b>R 449</b>
Leads	<b>6</b>	Voltage regulation (steady state)	<b>± 0,5 %</b>
Drip proof	<b>IP 23</b>	Sustained short-circuit current	<b>300% (3 IN) : 10s</b>
Altitude	<b>≤ 1000 m</b>	Total harmonic (*) TGH / THC	<b>&lt; 2,5 %</b>
Overspeed	<b>2250 min<sup>-1</sup></b>	Waveform : NEMA = TIF - (*)	<b>&lt; 50</b>
Air flow	<b>2,8 m<sup>3</sup>/s</b>	Waveform : I.E.C. = THF - (*)	<b>&lt; 2 %</b>

(\*) Total harmonic content line to line, at no load or full rated linear and balanced load

#### RATINGS : kVA / kW - Power factor = 0,8

Duty/Ambiant T°	Continuous / 40°C								Stand-by / 40°C				Stand-by / 27°C				
	H / 125° K				F / 105° K				H / 150° K				H / 163° K				
	3 ph.				3 ph.				3 ph.				3 ph.				
Class/T° rise																	
Phase																	
Y	380V	416V	440V	480V	380V	416V	440V	480V	380V	416V	440V	480V	380V	416V	440V	480V	
Δ	240V				240V				240V				240V				
<b>51.2 S55</b>	kVA	1710	1870	1980	<b>2160</b>	1540	1685	1780	1945	1795	1965	2080	2265	1880	2060	2175	<b>2375</b>
	kW	1368	1496	1584	1728	1232	1348	1424	1556	1436	1572	1664	1812	1504	1648	1740	1900
<b>51.2 M60</b>	kVA	1900	2080	2200	<b>2400</b>	1710	1870	1980	2160	1995	2185	2310	2520	2090	2285	2420	<b>2640</b>
	kW	1520	1664	1760	1920	1368	1496	1584	1728	1596	1748	1848	2016	1672	1828	1936	2112
<b>51.2 L70</b>	kVA	2045	2235	2365	<b>2580</b>	1840	2010	2130	2320	2145	2350	2485	2710	2245	2460	2600	<b>2835</b>
	kW	1636	1788	1892	2064	1472	1608	1704	1856	1716	1880	1988	2168	1796	1968	2080	2268
<b>51.2 VL 85</b>	kVA	2140	2340	2475	<b>2700</b>	1925	2105	2230	2430	2245	2455	2600	2835	2350	2575	2720	<b>2970</b>
	kW	1712	1872	1980	2160	1540	1684	1784	1944	1796	1964	2080	2268	1880	2060	2176	2376

#### EFFICIENCIES (%) - Class H / 40° C

	Three phase : 480 V									
	P.F. = 0,8					P.F. = 1				
	1/4	2/4	3/4	4/4	St.by	1/4	2/4	3/4	4/4	St.by
<b>51.2 S55</b>	93,4	95,5	95,8	95,6	95,4	93,8	96,2	96,8	96,8	96,8
<b>51.2 M60</b>	93,6	95,6	95,9	95,6	95,5	94	96,3	96,8	96,9	96,8
<b>51.2 L70</b>	93,6	95,8	96,1	96	95,8	94	96,4	97	97,1	97,1
<b>51.2 VL 85</b>	93,4	95,8	96,3	96,3	96,2	93,8	96,3	97	97,2	97,3

#### REACTANCES (%) - TIME CONSTANTS (ms) - CLASS H / 480 V

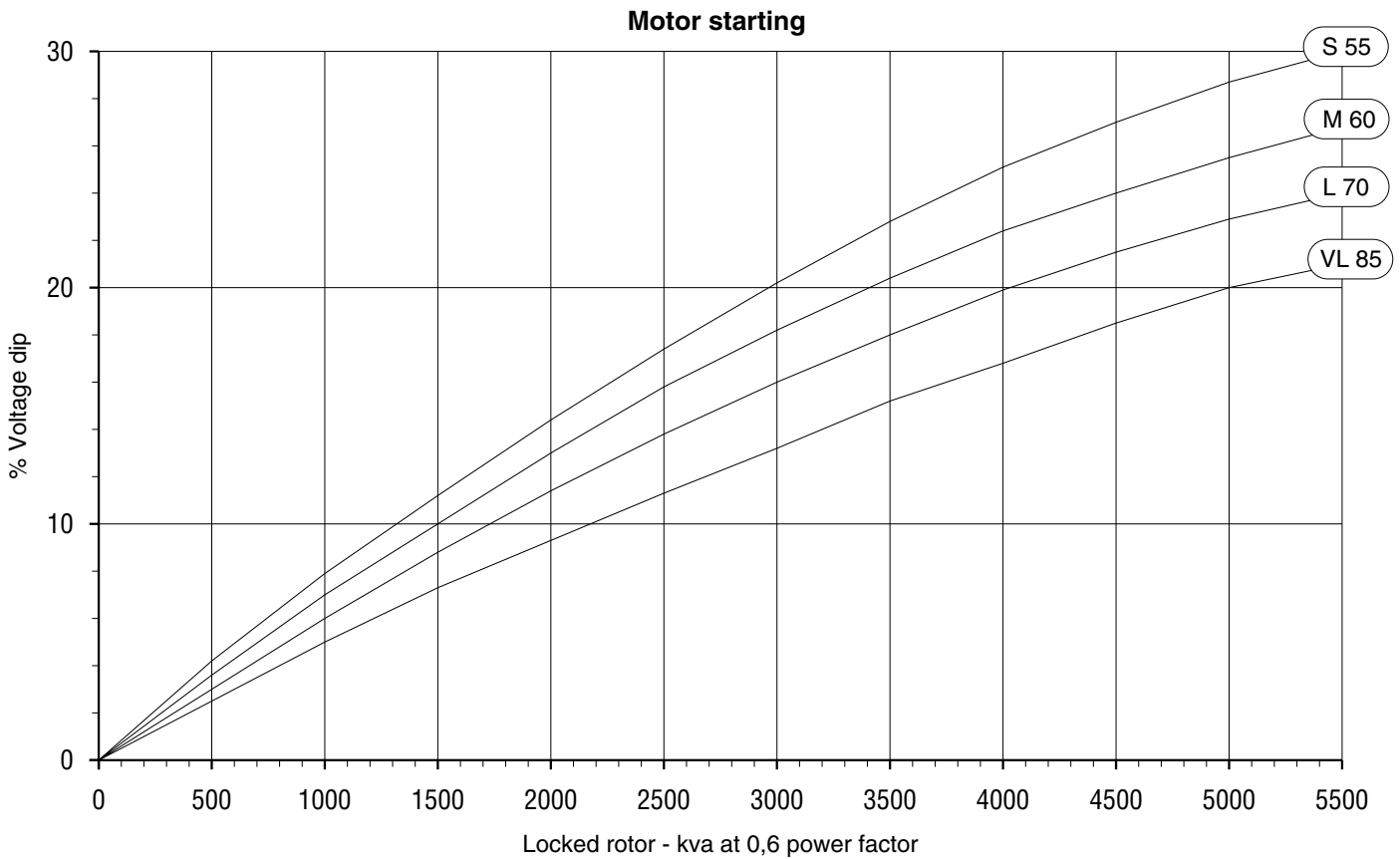
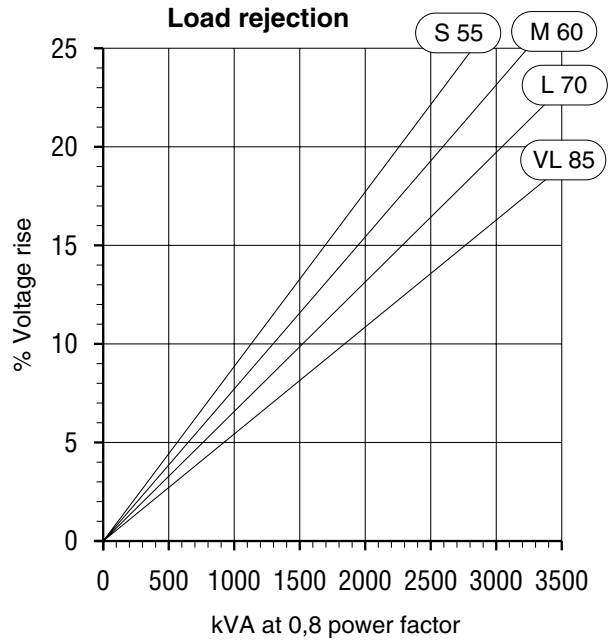
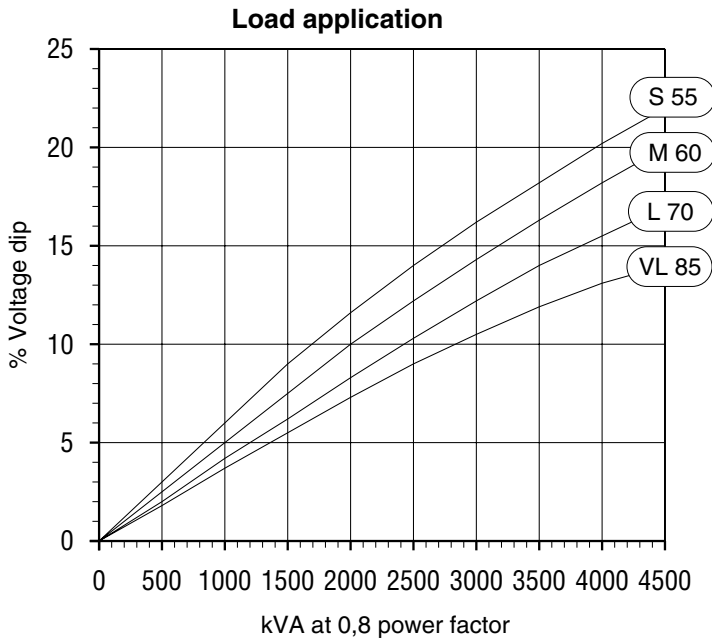
		51.2 S55	51.2 M60	51.2 L70	51.2 VL 85
<b>Kcc</b>	Short-circuit ratio	0,34	0,36	0,39	0,45
<b>Xd</b>	Direct axis synchronous reactance unsaturated	362	348	320	278
<b>Xq</b>	Quadrature axis synchronous reactance unsaturated	217	209	192	167
<b>T'do</b>	Open circuit time constant	2660	2770	2910	3050
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<b>T"d</b>	Subtransient time constant	22	23	24	26
<b>X"q</b>	Quadrature axis subtransient reactance saturated	17,8	17	15,5	13,2
<b>Xo</b>	Zero sequence reactance unsaturated	3,4	3,2	2,9	2,5
<b>X2</b>	Negative sequence reactance saturated	16	15,3	13,9	12
<b>Ta</b>	Armature time constant	38	41	44	48

#### OTHER DATA - CLASS H / 480 V

		51.2 S55	51.2 M60	51.2 L70	51.2 VL 85
<b>io (A)</b>	No load excitation current	1,5	1,5	1,6	1,6
<b>ic (A)</b>	Full load excitation current	6	5,9	5,5	5
<b>uc (V)</b>	Full load excitation voltage	63	62	60	56
<b>ms</b>	Recovery time(ΔU = 20 % transient)	< 700	< 700	< 700	< 700
<b>kVA</b>	Motor start. (ΔU = 20% sust.) or (ΔU = 50% Transient)	4320	4800	5160	5400
<b>%</b>	Transient dip (rated step load) - PF : 0,8 LAG	12	12	11	10
<b>kW</b>	No load losses	28,2	30,1	32,5	36
<b>kW</b>	Heat rejection	79,5	88,3	86	83

According to : I.E.C. 34.1/34.2 - U.T.E. : NF C 51.111 - V.D.E. 0530 - B.S. 4999 & 5000 - NEMA : MG 1.22 - ISO 8528 . 3 - CSA (C22.2 + UL 2200).  
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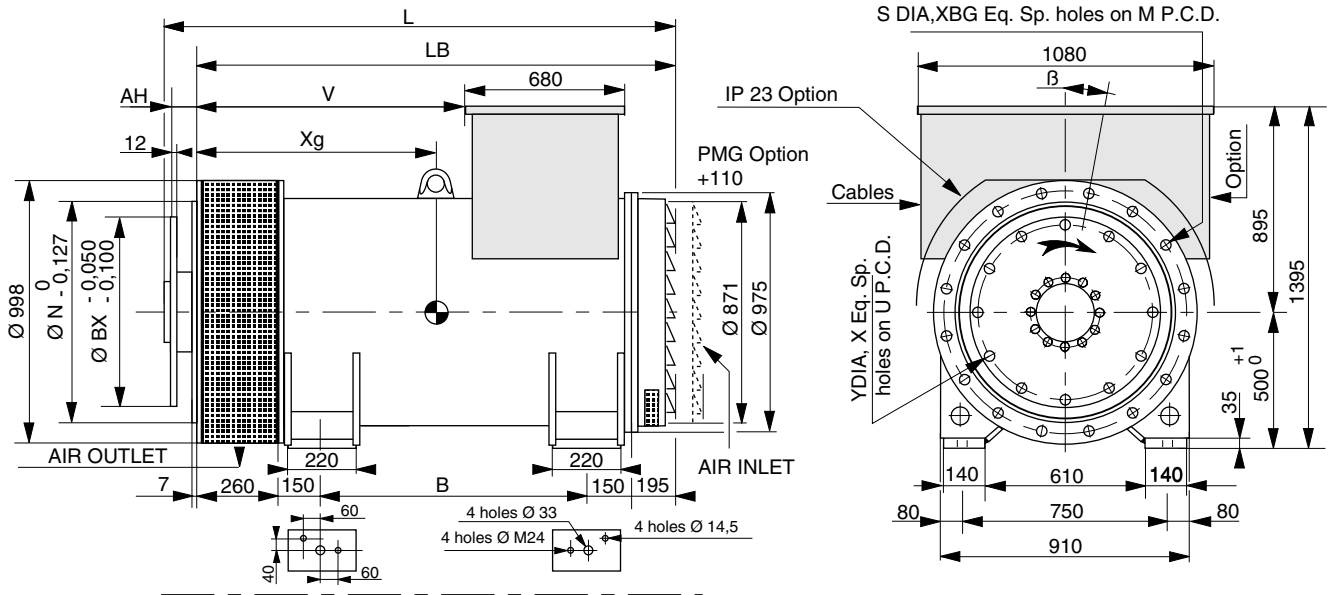
#### TRANSIENT VOLTAGE VARIATION - 480 V



- 1) For a starting P.F. differing from 0,6 the starting kVA have to be multiplied by  $(\text{Sine } \varnothing / 0,6)$
- 2) If voltage is not 480V(Y), 277V( $\Delta$ ), 240V( $\Upsilon$ ) at 60 Hz then kVA must be multiplied by  $(480/U)^2$  or  $(277/U)^2$  or  $(240/U)^2$ .

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#### DIMENSIONS



#### FRAME DIMENSIONS (mm)

TYPE	L					Mass (kg)	Coupling		
	without PMG	LB	B	V	Xg		M	Flange Flex plate	SAE 00
LSA 51.2 S55	1677	1655	900	744	735	3745	SAE 24	•	
LSA 51.2 M60	1777	1755	1000	844	770	4040	SAE 21	•	
LSA 51.2 L70	1877	1855	1100	944	825	4445	SAE 18	•	•
LSA 51.2 VL85	1977	1955	1200	1044	885	4995			

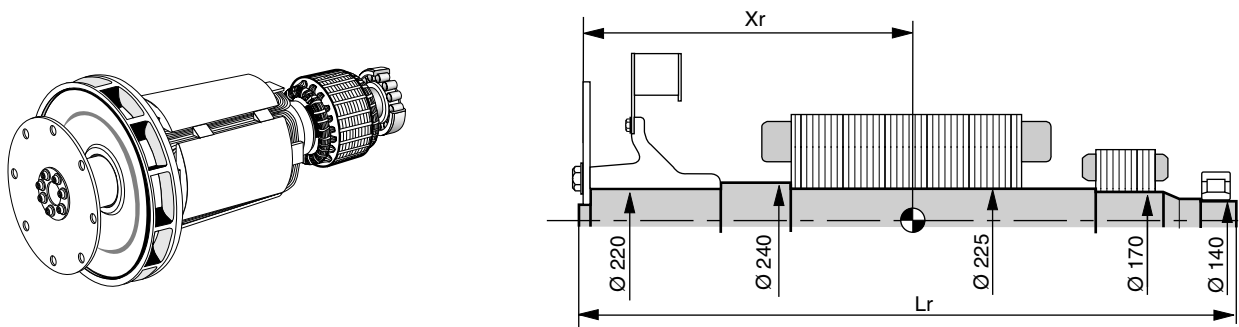
#### FLANGE DIMENSIONS (mm)

S.A.E.	N	M	XBG	S	$\beta$
00	787,4	850,9	16	14	11° 15'
0	647,7	679,5	16	14	11° 15'

#### FLEX PLATE DIMENSIONS (mm)

S.A.E.	BX	U	X	Y	AH
18	571,5	542,9	6	18	15,8
21	673,1	641,3	12	18	0
24	733,4	692,1	12	21	0

#### TORSIONAL ANALYSIS DATA

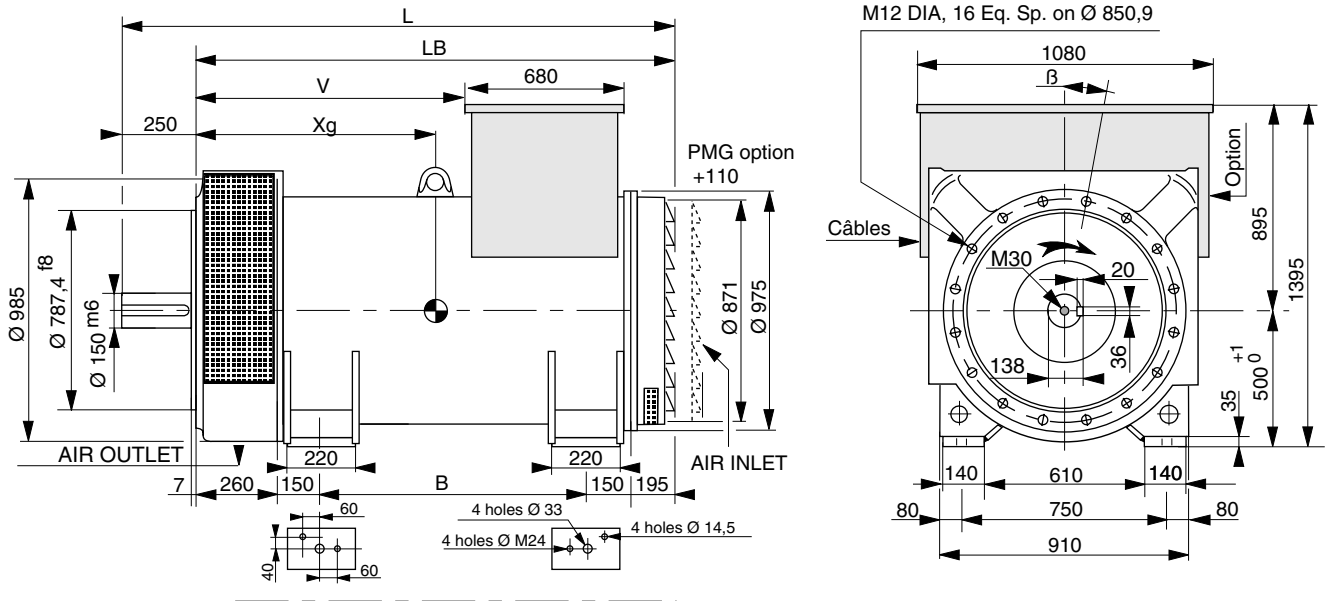


#### CENTRE OF GRAVITY : Xr (mm) - ROTOR LENGTH : Lr (mm) - MASS : M (kg) - MOMENTS OF INERTIA : J (kgm<sup>2</sup>) : (4J = MD<sup>2</sup>)

TYPE	Flex plate S.A.E. 18				Flex plate S.A.E. 21				Flex plate S.A.E. 24			
	Xr	Lr	M	J	Xr	Lr	M	J	Xr	Lr	M	J
LSA 51.2 S55	661	1555,5	1357	41,1	643	1555,5	1359	41,9	640	1555,5	1365	42,6
LSA 51.2 M60	703	1655,5	1475	44,8	685	1655,5	1479	45,6	682	1655,5	1483	46,3
LSA 51.2 L70	754	1755,5	1630	50	736	1755,5	1632	50,8	734	1755,5	1638	51,6
LSA 51.2 VL85	819	1855,5	1833	57,2	801	1855,5	1835	58	799	1855,5	1841	58,8

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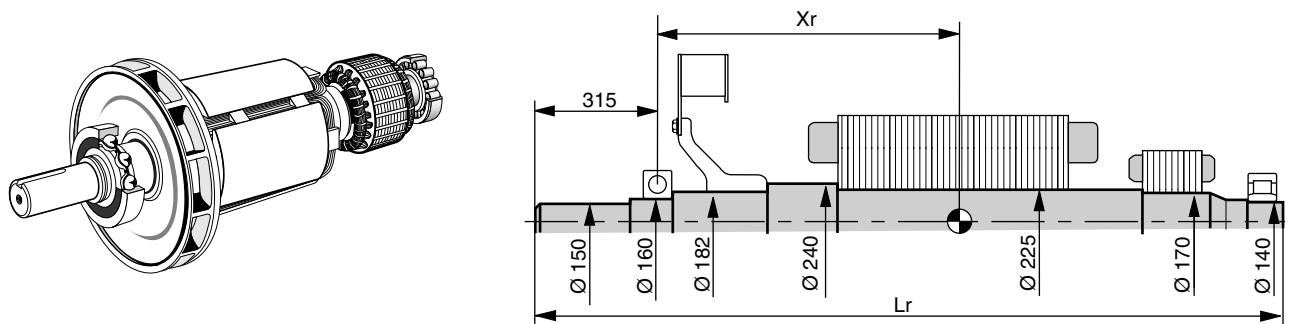
#### DIMENSIONS



#### FRAME DIMENSIONS (mm)

TYPE	L						Mass (kg)
	wihout PMG	LB	B	V	Xg	M	
LSA 51.2 S55	1905	1655	900	744	735	3725	
LSA 51.2 M60	2005	1755	1000	844	770	4020	
LSA 51.2 L70	2105	1855	1100	944	825	4425	
LSA 51.2 VL85	2205	1955	1200	1044	885	4975	

#### TORSIONAL ANALYSIS DATA



#### CENTRE OF GRAVITY : $Xr$ (mm) - ROTOR LENGTH : $Lr$ (mm) - MASS : $M$ (kg) - MOMENTS OF INERTIA : $J$ ( $kgm^2$ ) : ( $4J = MD^2$ )

TYPE	$Xr$	$Lr$	$M$	$J$
LSA 51.2 S55	605,6	1783,5	1281	38,9
LSA 51.2 M60	647,6	1883,5	1398	42,6
LSA 51.2 L70	698,8	1983,5	1553	47,8
LSA 51.2 VL85	763,3	2083,5	1766	55,1

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**MOTEURS LEROY-SOMER 16015 ANGOULÊME CEDEX - FRANCE**

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