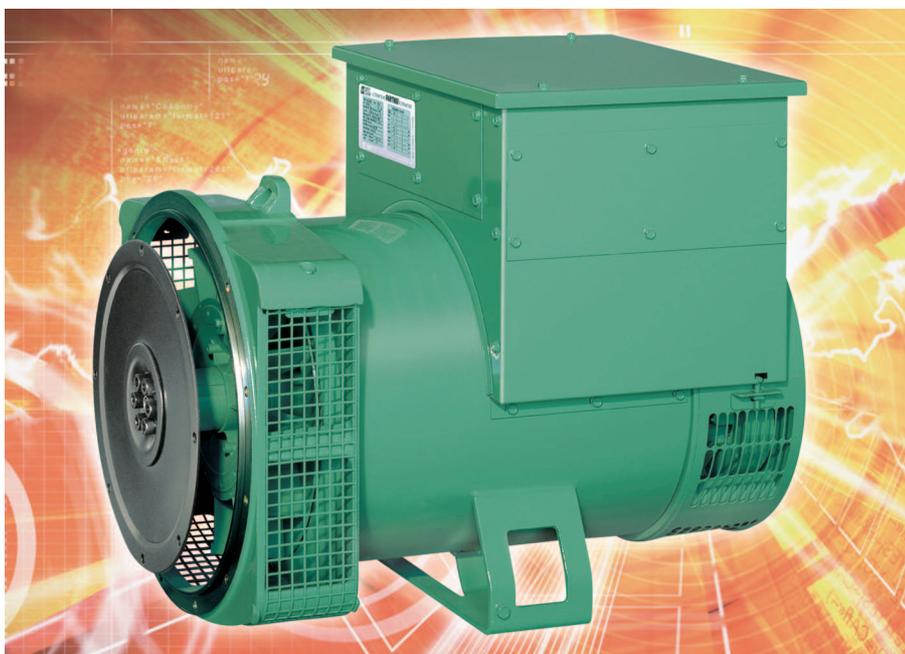




**EMERSON**<sup>™</sup>  
Industrial Automation



## Low Voltage alternators - 4 pole LSA 43.2

70 to 80 kVA - 50 Hz / 83 to 95 kVA - 60 Hz

Electrical and mechanical data

3819 en - 2013.01 / g

### SPECIALY ADAPTED FOR APPLICATIONS

The LSA 43.2 alternator is designed to be suitable for typical generator applications, such as: backup, standard production, cogeneration, marine applications, rental, telecommunications, etc.

### COMPLIANT WITH INTERNATIONAL STANDARDS

The LSA 43.2 alternator conforms 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 incorporated into a CE marked generator.

The LSA 43.2 is designed, manufactured and marketed in an ISO 9001 environment.

### TOP OF THE RANGE ELECTRICAL PERFORMANCE

- Class H insulation.
- Standard 12-wire re-connectable winding, 2/3 pitch, type no. 6 .
- Voltage range: 220 V - 240 V and 380 V - 415 V (440 V) - 50 Hz / 208 V - 240 V and 380 V - 480 V - 60 Hz.
- 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				
Voltage regulator	SHUNT	AREP	PMG	T.I. Current transformer for paralleling	R 726 Mains paralleling	R 731 3-phase sensing	R 734 3-phase sensing on mains paralleling unbalanced	P Remote voltage potentiometer
R 250	Std	-	-	-	-	-	-	√
R 438	-	Std	Std	√	√	√	√	√
D 510C	-	optional	optional	√	included	included	NA	√

Voltage regulator accuracy +/- 0.5%. - √ : possible adaptation - NA : not possible.

### PROTECTION SYSTEM SUITED TO THE ENVIRONMENT

- The LSA 43. 2 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 protections for harsh environments and relative humidity greater than 95%.
  - Space heaters.
  - Thermal protection for windings and shields.

### 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.
- Greased for life bearings.

### ACCESSIBLE TERMINAL BOX PROPORTIONED FOR OPTIONAL EQUIPMENT

- Easy access to the voltage regulator and to the connections.
- Possible clusion of accessories for paralleling, protection and measurement.
- 8 way terminal block for reconnecting voltage reconnection.

Option :

D 510C digital AVR fitted in the terminal box.

Copyright 2004 : MOTEURS LEROY-SOMER

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 conditions of utilization. Their description cannot, in any case, engage LEROY-SOMER liability. The values indicated are typical values.

## Common data

Insulation class	H	Excitation system	SHUNT	A R E P or PMG
Winding pitch Code	2/3 ( bob 6 )	A.V.R. model	R 250	R 438
Terminals Drio or	12	Voltage regulation (*)	± 0,5 %	± 0,5 %
Drip proof	IP 23	Sustained short-circuit current	-	300% (3 IN) : 10s
Altitude	≤ 1000 m	Totale Harmonic distortion THD (**) in no-load ..... : < 2% according to IEC		
Overspeed	2250 min <sup>-1</sup>	Totale Harmonic distortion THD (**) on linear load : < 3% according to IEC		
Air flow	0,27 m <sup>3</sup> /s (50Hz)/ 0,32 (60Hz)	Waveform: NEMA = TIF (**)	< 50	

(\*) Steady state. (\*\*) Total harmonic distortion between phases, in no-load or on linear load.

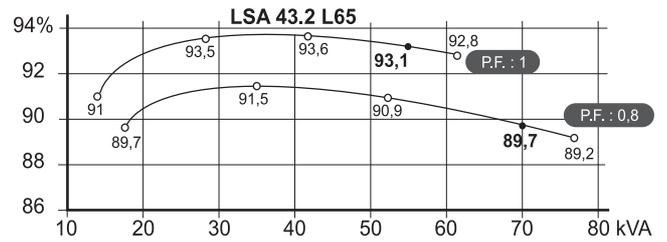
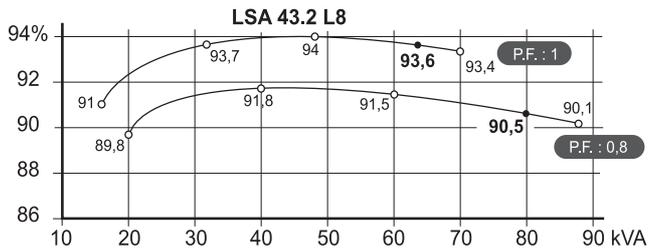
## Ratings 50 Hz - 1500 R.P.M.

kVA / kW - Power factor = 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.			1 ph.		3 ph.			1 ph.		3 ph.			1 ph.		3 ph.			1 ph.	
Y		380V	400V	415V	440V	Δ Δ	380V	400V	415V	440V	Δ Δ	380V	400V	415V	440V	Δ Δ	380V	400V	415V	440V	Δ Δ
Δ		220V	230V	240V		230V	220V	230V	240V		230V	220V	230V	240V		230V	220V	230V	240V		230V
YY					220V					220V					220V					220V	
<b>43.2 L65</b>	kVA	67	70	69	68	41	61	62	63	62	38	71	74	73	73	43	74	77	76	75	45
	kW	53	56	55	55	33	49	50	50	50	30	57	59	58	58	34	59	62	61	60	36
<b>43.2 L8</b>	kVA	78	80	78	76	48	71	73	71	70	45	83	84	83	83	53	86	88	86	84	54
	kW	62	64	63	61	38	57	58	57	56	36	66	67	66	66	42	69	70	69	67	43

## Ratings 60 Hz - 1800 R.P.M.

kVA / kW - Power factor = 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.			1 ph.		3 ph.			1 ph.		3 ph.			1 ph.		3 ph.			1 ph.	
Y		380V	416V	440V	480V	Δ Δ	380V	416V	440V	480V	Δ Δ	380V	416V	440V	480V	Δ Δ	380V	416V	440V	480V	Δ Δ
Δ		220V	240V		240V		220V	240V		240V		220V	240V		240V		220V	240V		240V	
YY			208V	220V	240V			208V	220V	240V			208V	220V	240V			208V	220V	240V	
<b>43.2 L65</b>	kVA	67	72	75	83	45	62	66	69	74	42	72	77	80	87	48	74	80	84	91	50
	kW	54	58	60	66	36	50	53	55	59	34	58	62	64	70	38	59	64	67	73	40
<b>43.2 L8</b>	kVA	80	85	88	95	53	73	78	81	87	49	86	91	95	102	57	88	95	99	107	59
	kW	64	68	70	76	42	58	62	65	70	39	69	73	76	82	46	70	76	79	86	47

## Efficiencies 50 Hz



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

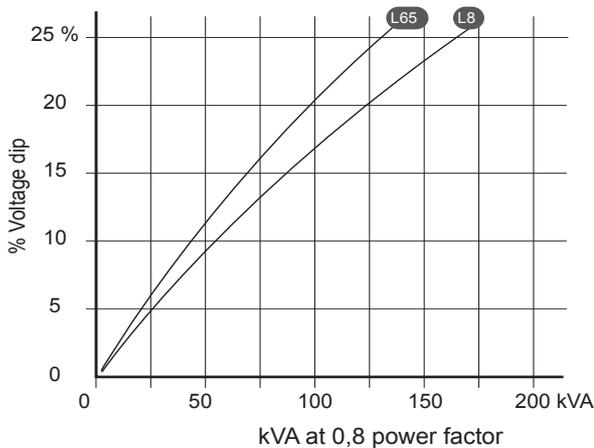
	L65	L8
<b>Kcc</b> Short-circuit ratio	0,37	0,41
<b>Xd</b> Direct axis synchro.reactance unsaturated	310	284
<b>Xq</b> Quadra. axis synchr.reactance unsaturated	186	170
<b>T'do</b> Open circuit time constant	1354	1431
<b>X'd</b> Direct axis transient reactance saturated	11,4	9,9
<b>T'd</b> Short-Circuit transient time constant	50	50
<b>X''d</b> Direct axis subtransient reactance saturated	5,7	5
<b>T''d</b> Subtransient time constant	5	5
<b>X''q</b> Quadra. axis subtransient reactance saturated	7,1	6,3
<b>Xo</b> Zero sequence reactance unsaturated	0,8	0,1
<b>X2</b> Negative sequence reactance saturated	6,4	5,7
<b>Ta</b> Armature time constant	8	8

### Others data - Class H / 400 V

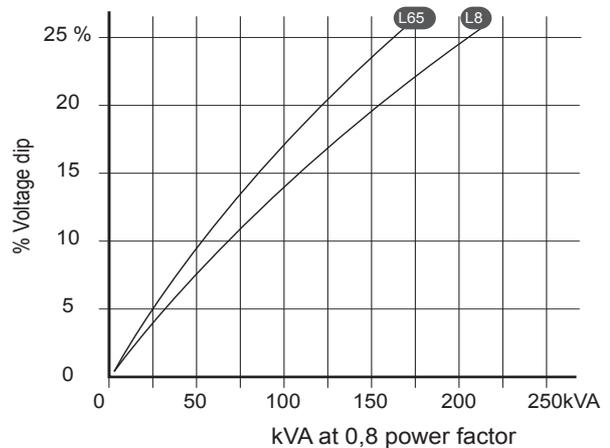
<b>io (A)</b> No load excitation current (SHUNT / AREP or PMG)	0,4/0,8	0,4/0,8
<b>ic (A)</b> Full load excitation current (SHUNT / AREP or PMG)	1,6/3,2	1,6/3,2
<b>uc (V)</b> Full load excitation voltage (SHUNT / AREP or PMG)	29/15	29/14
<b>ms</b> Recovery time ( $\Delta U = 20\%$ trans.)	500	500
<b>kVA</b> Motor start. ( $\Delta U = 20\%$ sust. or $\Delta U = 50\%$ trans.) SHUNT	184	213
<b>kVA</b> Motor start. ( $\Delta U = 20\%$ sust. or $\Delta U = 50\%$ trans.) AREP	200	240
<b>%</b> Transient dip (rated step load) SHUNT / P.F. : 0,8 LAG	15	13,9
<b>%</b> Transient dip (rated step load) AREP / P.F. : 0,8 LAG	12,5	11,6
<b>W</b> No load losses	1210	1410
<b>W</b> Heat rejection	6370	6640

## Transient voltage variation 400 V - 50 Hz

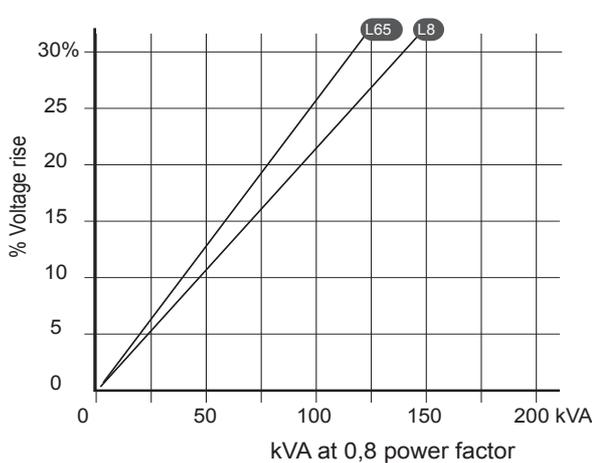
Load application (Shunt excitation)



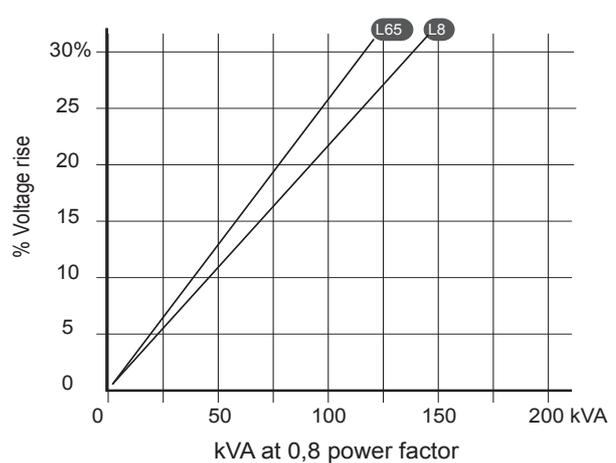
Load application (AREP ou PMG excitation)



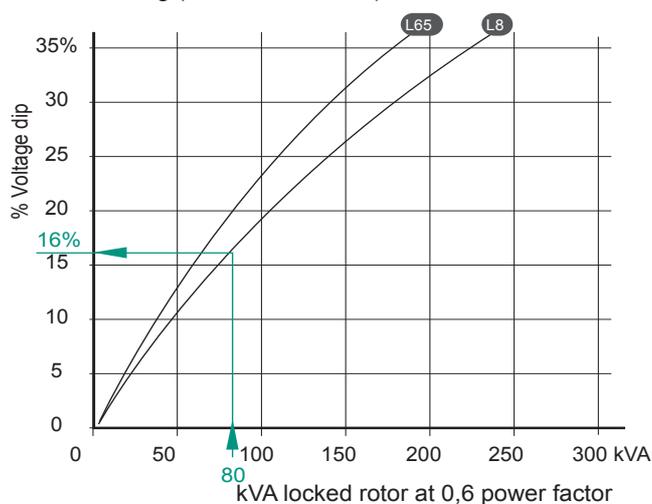
Load rejection (Shunt excitation)



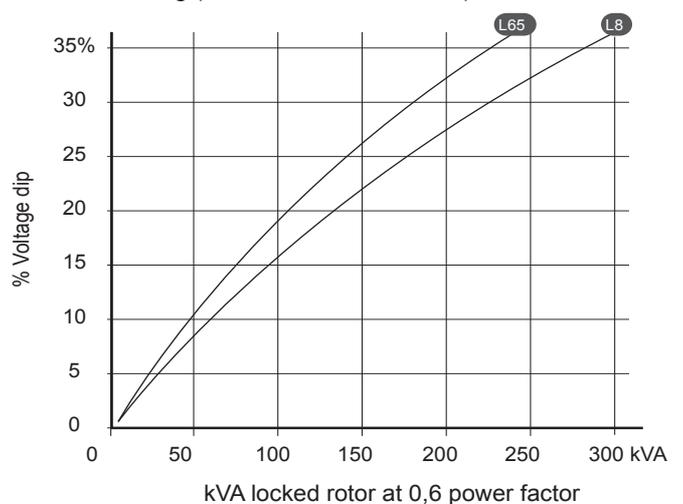
Load rejection (AREP or PMG excitation)



Motor starting (SHUNT excitation)

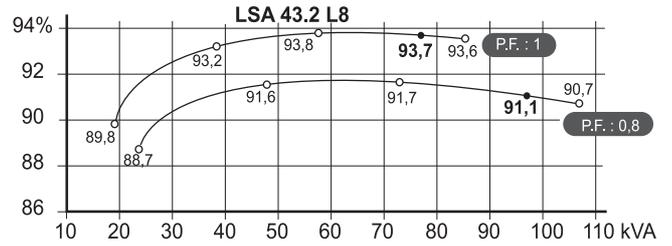
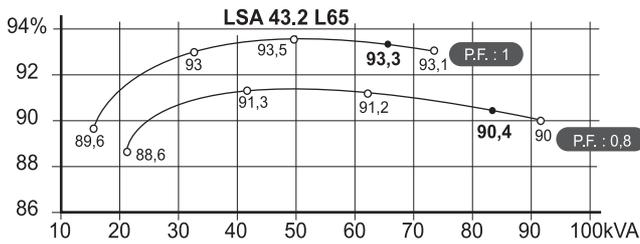


Motor starting (AREP or PMG excitation)



- 1) For a starting P.F. other than 0,6 , the starting kVA must be multiplied by  $K = \text{Sine P.F.} / 0,8$   
 Calculation example for a different P.F. : Starter motor kVA calculated at 0.4 P.F. = 70 kVA  
 $\rightarrow \text{Sin P.F. } 0,4 = 0,9165 \rightarrow K = 1,145 \rightarrow \text{kVA corrected} = 80 \text{ kVA} \rightarrow \text{Voltage dip corresponding to L8} = 16 \%$
- 2) For voltages other than 400V (Y) , 230V ( $\Delta$ ) at 50 Hz, then kVA must be multiplied by  $(400/U)^2$  or  $(230/U)^2$ .

## Efficiencies 60 Hz



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

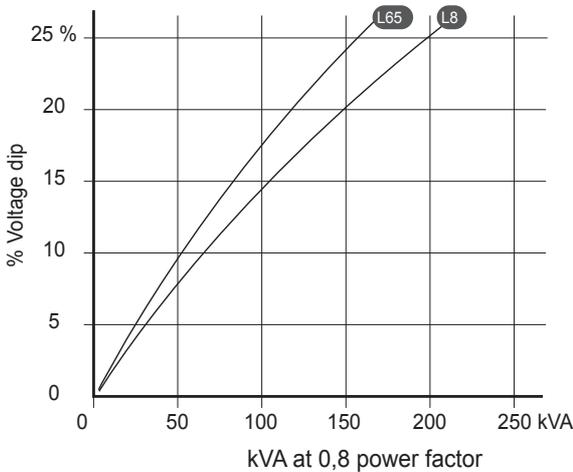
	L65	L8
<b>Kcc</b> Short-circuit ratio	0,38	0,4
<b>Xd</b> Direct axis synchro.reactance unsaturated	306	293
<b>Xq</b> Quadra. axis synchr.reactance unsaturated	184	176
<b>T'do</b> Open circuit time constant	1354	1431
<b>X'd</b> Direct axis transient reactance saturated	11,3	10,2
<b>T'd</b> Short circuit transient time constant	50	50
<b>X''d</b> Direct axis subtransient reactance saturated	5,6	5,1
<b>T''d</b> Subtransient time constant	5	5
<b>X''q</b> Quadra. axis subtransient reactance saturated	7	6,3
<b>Xo</b> Zero sequence reactance unsaturated	0,5	0,8
<b>X2</b> Negative sequence reactance saturated	6,3	5,8
<b>Ta</b> Armature time constant	8	8

### Others data - Class H / 480 V

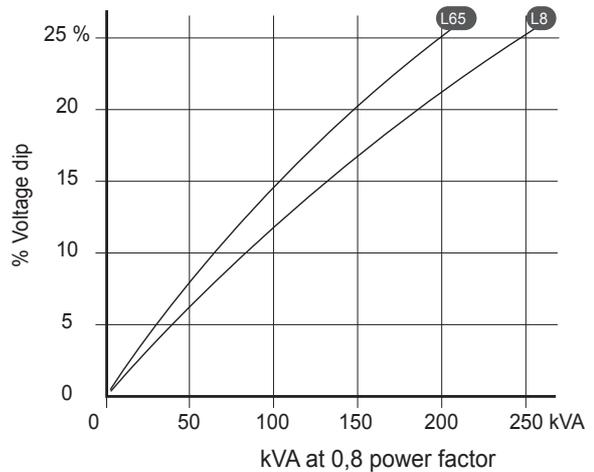
<b>io (A)</b> No load excitation current (SHUNT / AREP or PMG)	0,4/0,8	0,4/0,8
<b>ic (A)</b> Full load excitation current (SHUNT / AREP or PMG)	1,6/3,2	1,6/3,2
<b>uc (V)</b> Full load excitation voltage (SHUNT / AREP or PMG)	29/14	29/14
<b>ms</b> Recovery time ( $\Delta U = 20\%$ trans.)	500	500
<b>kVA</b> Motor start. ( $\Delta U = 20\%$ sust. or $\Delta U = 50\%$ trans.) SHUNT.	233	269
<b>kVA</b> Motor start. ( $\Delta U = 20\%$ sust. or $\Delta U = 50\%$ trans.) AREP	265	310
<b>%</b> Transient dip (rated step load) SHUNT / P.F. : 0,8 LAG	14,9	14
<b>%</b> Transient dip (rated step load) AREP / P.F. : 0,8 LAG	12,4	11,6
<b>W</b> No load losses	1770	2060
<b>W</b> Heat rejection	6970	7570

**Transient voltage variation - 480 V - 60 Hz**

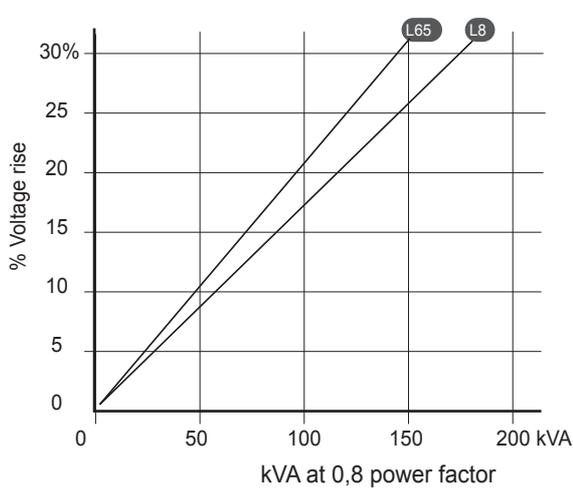
Load application (SHUNT excitation)



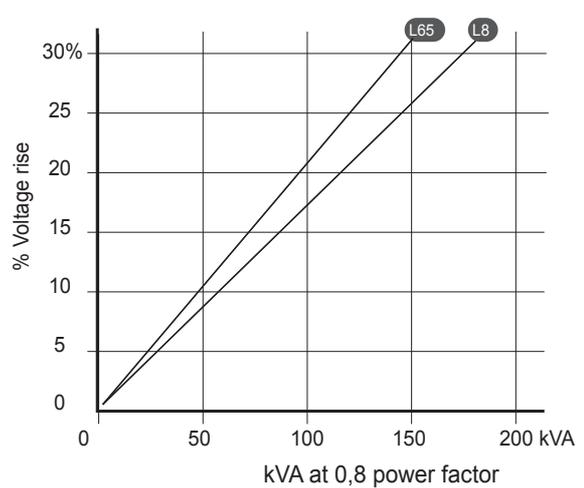
Load application (AREP or PMG excitation)



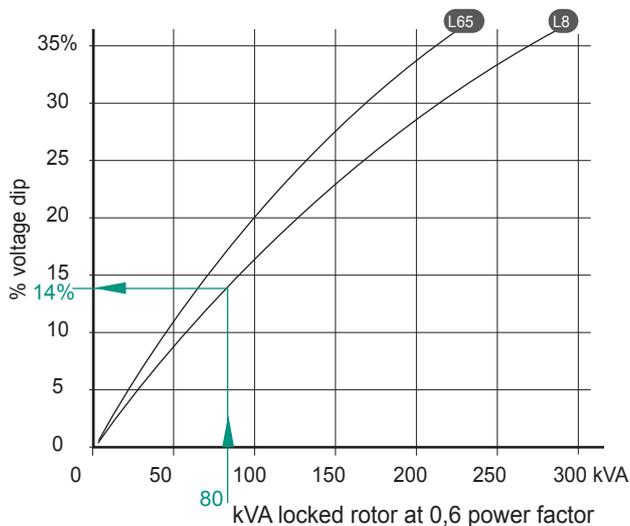
Load rejection (SHUNT excitation)



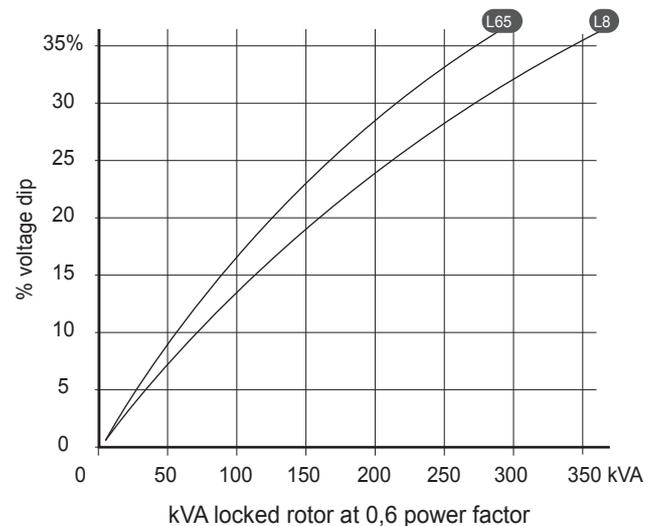
Load rejection (AREP or PMG excitation)



Motor starting (SHUNT excitation)

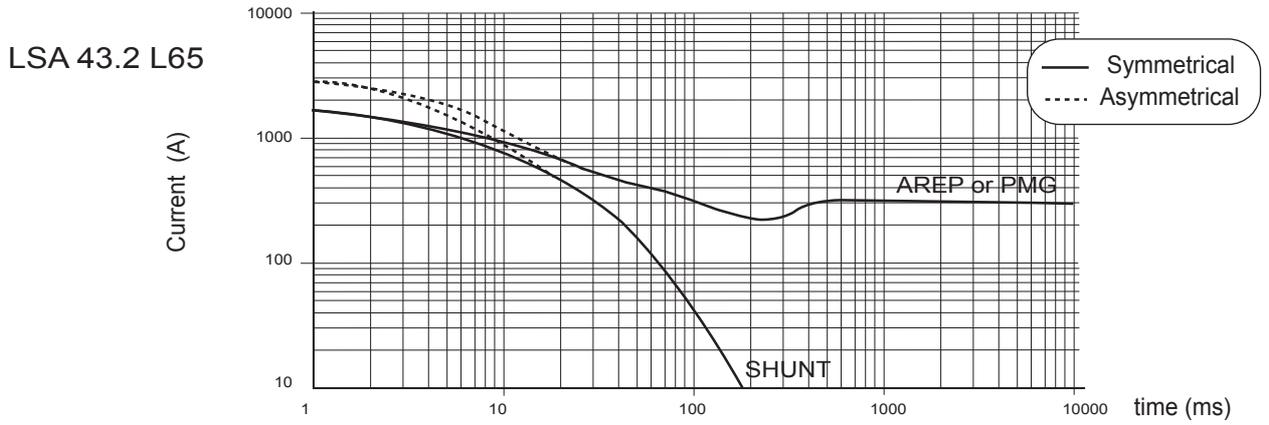


Motor starting (AREP or PMG excitation)



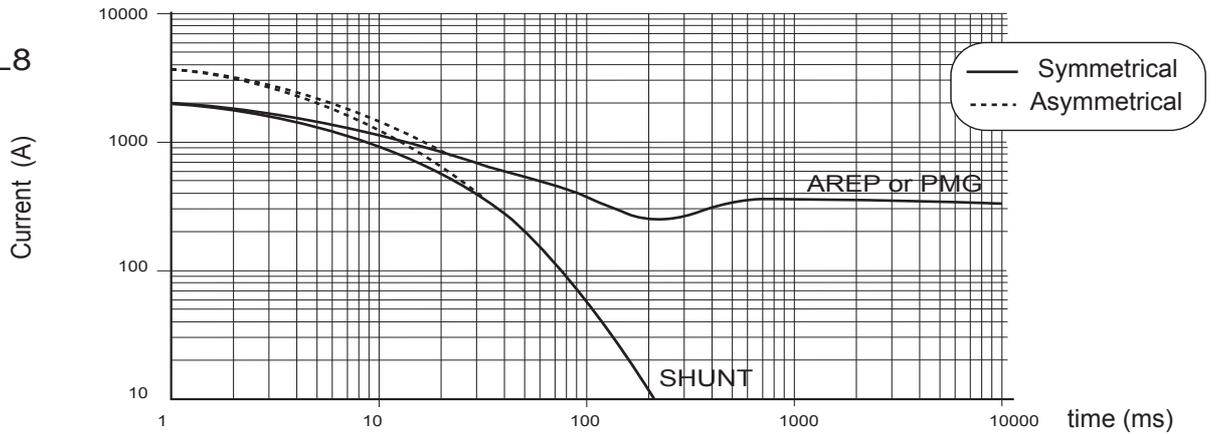
- For a starting P.F. other than 0,6 , the starting kVA must be multiplied by  $K = \text{Sine P.F.} / 0,8$   
 Calculation example for a different P.F. : Starter motor kVA calculated at 0.4 P.F. = 70 kVA  
 $\rightarrow \text{Sin P.F. } 0,4 = 0,9165 \rightarrow K = 1,145 \rightarrow \text{kVA corrected} = 80 \text{ kVA} \rightarrow \text{Voltage dip corresponding to L8} = 14 \%$
- For voltages other than 480V (Y), 277V ( $\Delta$ ), 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)**



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

LSA 43.2 L8



**Influence due to connexion.**

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

**Influence due to short-circuit.**

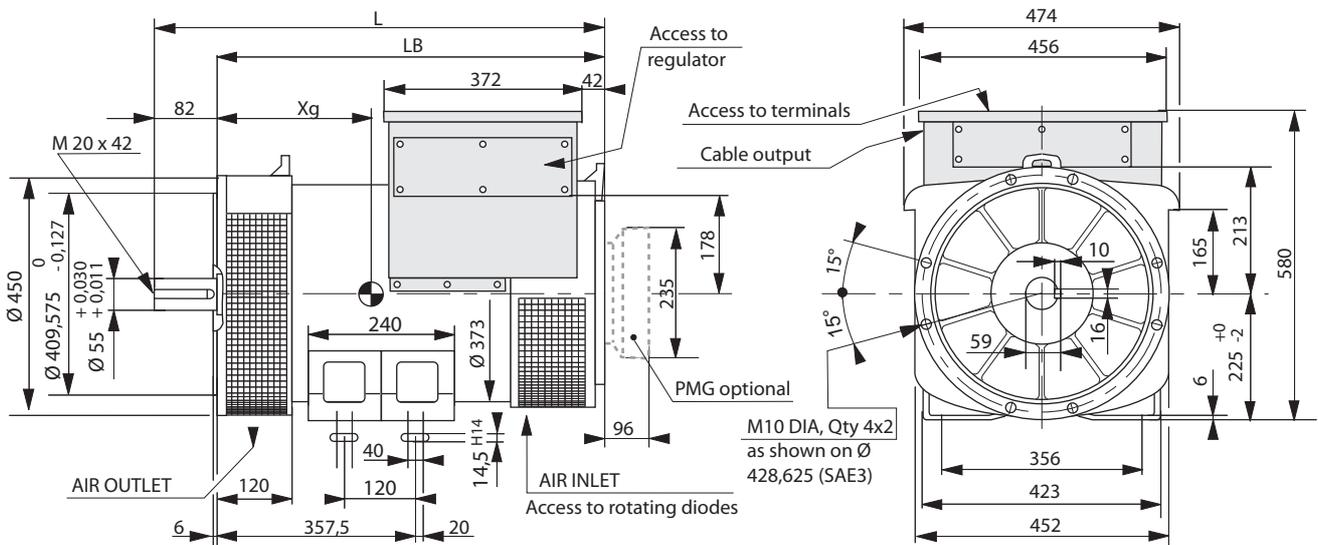
Curves are based on a three-phase short-circuit.

For other types of short-circuit, use the following multiplication factors :

	<b>3 phase</b>	<b>2 phase L - L.</b>	<b>1 phase L - N.</b>
<b>Instantaneous (Max)</b>	1	0,87	1,3
<b>Sustained</b>	1	1,5	2,2
<b>Max sustained duration (AREP/ PMG)</b>	10 sec.	5 sec.	2 sec.



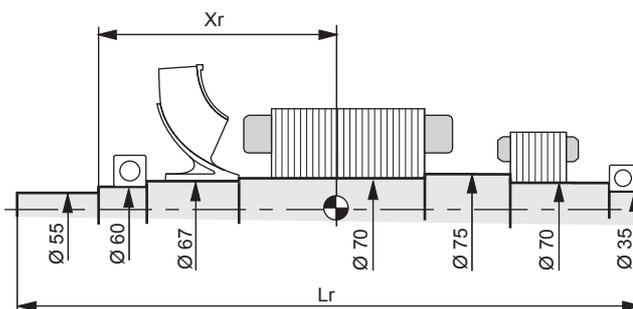
## Two bearing dimensions



### Frame dimensions

TYPE	L max without PMG	LB	Xg	Weight (kg)
LSA 43.2 L65	792	710	340	290
LSA 43.2 L8	792	710	365	330

## Torsional analysis data



Gravity center : Xr (mm), Rotor length Lr (mm), Weight : M (kg), Moment of inertia : J (kgm<sup>2</sup>) : (4J = MD<sup>2</sup>)

TYPE	Xr	Lr	M	J
LSA 43.2 L65	349	781	100.1	0.4632
LSA 43.2 L8	362	781	110.9	0.525

**WARNING:** Drawing dimensions are given as an indication and are subject to change. Certified 2D drawings are downloadable from website Leroy-somer.com and 3D files are available on request.

## Contact



[www.leroy-somer.com](http://www.leroy-somer.com)



**LERROY  
SOMER**

  
**EMERSON**<sup>™</sup>  
Industrial Automation