

LSA 52.3

Low Voltage Alternator - 4 pole

1860 to 2750 kVA - 50 Hz / 2230 to 3400 kVA - 60 Hz
Electrical and mechanical data

LEROY-SOMER[™]

Nidec
All for dreams

Specially adapted to applications

The LSA 52.3 alternator is designed to be suitable for typical generator applications, such as: backup, marine applications, rental, telecommunications, etc.

Compliant with international standards

The LSA 52.3 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 EC marked generator.

The LSA 52.3 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, type no. 6S
- 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 : 440 V (no. 7S), 500 V (no. 9S), 600 V (no. 22S or 23S), 690 V (no. 10S or 52S)
 - 60 Hz : 380 V and 416 V (no. 8S), 600 V (no. 9S)
- Complies with EN 61000-6-3, EN 61000-6-2, EN 55011, group 1 class B for European zone (EC marking)

Advanced control system

The standard excitation system for the LSA 52.3 is an AREP + PMI auxiliary winding with permanent magnets.

The system is operated by a fully configurable D550 digital automatic voltage regulator.

The system also uses three-phase detection for precise and reactive regulation.

Options:

- Equipment for mains paralleling
- PMG excitation system
- Remote voltage potentiometer

Protection system suited to the environment

- The LSA 52.3 is IP 23
- Standard winding protection for clean environments with relative humidity $\leq 95\%$, including indoor marine environments.
 - Options : - Filters on air inlet : derating 5%
 - Filters on air inlet and air outlet (IP 44) : derating 8%
 - Winding protections for harsh environments and relative humidity greater than 95%
 - Space heaters
 - Protection or metering CTs
 - Thermal protection for stator windings &/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 min ⁻¹ | Waveform: NEMA = TIF (**) | < 50 |
| Air flow | 2.5 m ³ /s (50 Hz) - 2.8 m ³ /s (60 Hz) | Waveform: I.E.C. = THF (**) | < 2% |

(*) steady state (**) between phases

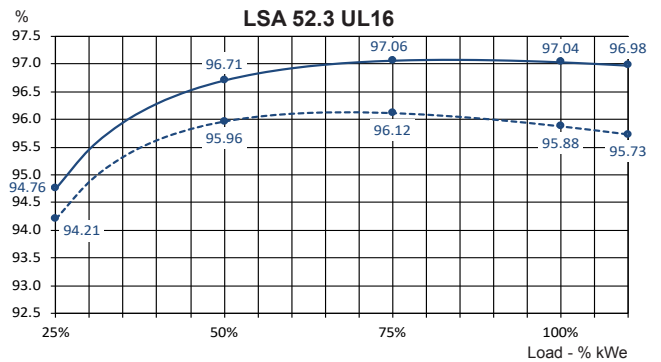
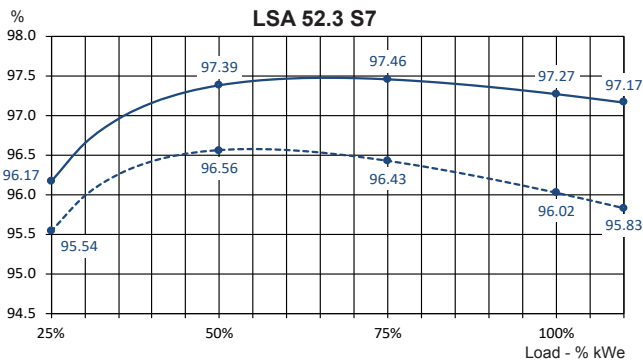
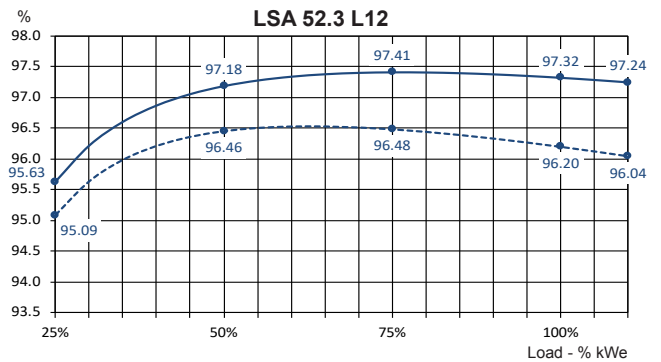
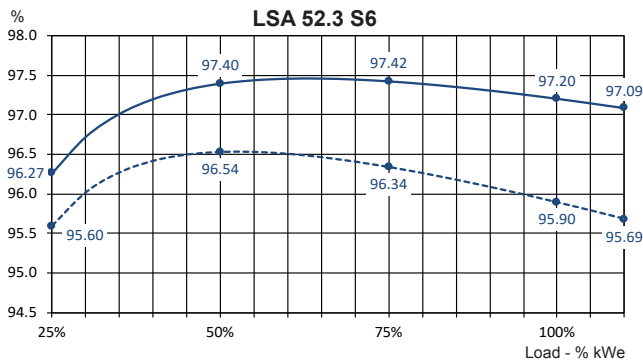
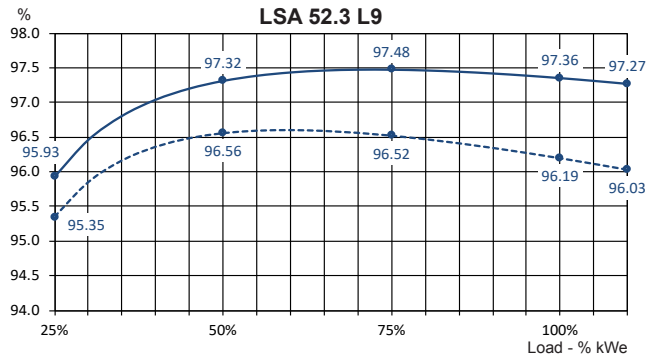
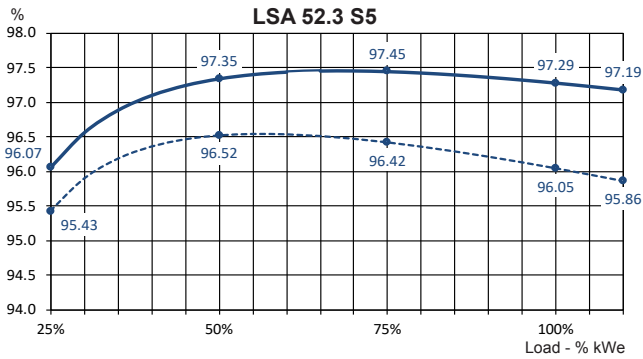
Ratings 50 Hz - 1500 R.P.M.

| 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 | 440V | 380V | 400V | 415V | 440V | 380V | 400V | 415V | 440V | 380V | 400V | 415V | 440V |
| LSA 52.3 S5 | kVA | 1860 | 1860 | 1860 | 1691 | 1696 | 1696 | 1696 | 1542 | 1953 | 1953 | 1953 | 1775 | 2046 | 2046 | 2046 | 1860 |
| | kW | 1488 | 1488 | 1488 | 1353 | 1357 | 1357 | 1357 | 1234 | 1562 | 1562 | 1562 | 1420 | 1637 | 1637 | 1637 | 1488 |
| LSA 52.3 S6 | kVA | 2000 | 2000 | 2000 | 1818 | 1824 | 1824 | 1824 | 1658 | 2100 | 2100 | 2100 | 1909 | 2200 | 2200 | 2200 | 2000 |
| | kW | 1600 | 1600 | 1600 | 1454 | 1459 | 1459 | 1459 | 1326 | 1680 | 1680 | 1680 | 1527 | 1760 | 1760 | 1760 | 1600 |
| LSA 52.3 S7 | kVA | 2200 | 2200 | 2200 | 2000 | 2006 | 2006 | 2006 | 1824 | 2310 | 2310 | 2310 | 2100 | 2420 | 2420 | 2420 | 2200 |
| | kW | 1760 | 1760 | 1760 | 1600 | 1605 | 1605 | 1605 | 1459 | 1848 | 1848 | 1848 | 1680 | 1936 | 1936 | 1936 | 1760 |
| LSA 52.3 L9 | kVA | 2360 | 2360 | 2360 | 2145 | 2152 | 2152 | 2152 | 1956 | 2478 | 2478 | 2478 | 2253 | 2596 | 2596 | 2596 | 2360 |
| | kW | 1888 | 1888 | 1888 | 1716 | 1722 | 1722 | 1722 | 1565 | 1982 | 1982 | 1982 | 1802 | 2077 | 2077 | 2077 | 1888 |
| LSA 52.3 L12 | kVA | 2560 | 2560 | 2560 | 2327 | 2335 | 2335 | 2335 | 2123 | 2688 | 2688 | 2688 | 2444 | 2816 | 2816 | 2816 | 2560 |
| | kW | 2048 | 2048 | 2048 | 1862 | 1868 | 1868 | 1868 | 1698 | 2150 | 2150 | 2150 | 1955 | 2253 | 2253 | 2253 | 2048 |
| LSA 52.3 UL16 | kVA | 2750 | 2750 | 2750 | 2500 | 2508 | 2508 | 2508 | 2280 | 2888 | 2888 | 2888 | 2625 | 3025 | 3025 | 3025 | 2750 |
| | kW | 2200 | 2200 | 2200 | 2000 | 2006 | 2006 | 2006 | 1824 | 2310 | 2310 | 2310 | 2100 | 2420 | 2420 | 2420 | 2200 |

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 | | 380V | 416V | 440V | 480V | 380V | 416V | 440V | 480V | 380V | 416V | 440V | 480V | 380V | 416V | 440V | 480V |
| LSA 52.3 S5 | kVA | 1860 | 1934 | 2046 | 2232 | 1697 | 1765 | 1866 | 2036 | 1953 | 2031 | 2149 | 2344 | 2046 | 2128 | 2250 | 2455 |
| | kW | 1488 | 1547 | 1637 | 1786 | 1358 | 1412 | 1493 | 1629 | 1562 | 1625 | 1719 | 1875 | 1637 | 1702 | 1800 | 1964 |
| LSA 52.3 S6 | kVA | 2000 | 2080 | 2200 | 2400 | 1824 | 1897 | 2007 | 2189 | 2100 | 2184 | 2310 | 2520 | 2200 | 2288 | 2420 | 2640 |
| | kW | 1600 | 1664 | 1760 | 1920 | 1459 | 1518 | 1606 | 1751 | 1680 | 1747 | 1848 | 2016 | 1760 | 1830 | 1936 | 2112 |
| LSA 52.3 S7 | kVA | 2200 | 2288 | 2420 | 2640 | 2007 | 2087 | 2207 | 2408 | 2310 | 2402 | 2541 | 2772 | 2420 | 2517 | 2662 | 2904 |
| | kW | 1760 | 1830 | 1936 | 2112 | 1606 | 1670 | 1766 | 1926 | 1848 | 1922 | 2033 | 2218 | 1936 | 2014 | 2130 | 2323 |
| LSA 52.3 L9 | kVA | 2360 | 2454 | 2596 | 2832 | 2153 | 2239 | 2368 | 2583 | 2478 | 2577 | 2726 | 2974 | 2596 | 2700 | 2855 | 3115 |
| | kW | 1888 | 1963 | 2077 | 2266 | 1722 | 1791 | 1894 | 2066 | 1982 | 2062 | 2181 | 2379 | 2077 | 2160 | 2284 | 2492 |
| LSA 52.3 L12 | kVA | 2708 | 2817 | 2979 | 3250 | 2470 | 2569 | 2717 | 2964 | 2844 | 2958 | 3129 | 3413 | 2979 | 3098 | 3277 | 3575 |
| | kW | 2166 | 2254 | 2383 | 2600 | 1976 | 2055 | 2174 | 2371 | 2275 | 2366 | 2503 | 2730 | 2383 | 2478 | 2622 | 2860 |
| LSA 52.3 UL16 | kVA | 2833 | 2947 | 3117 | 3400 | 2584 | 2688 | 2843 | 3101 | 2975 | 3094 | 3273 | 3570 | 3117 | 3241 | 3428 | 3740 |
| | kW | 2266 | 2358 | 2494 | 2720 | 2067 | 2150 | 2274 | 2481 | 2380 | 2475 | 2618 | 2856 | 2494 | 2593 | 2742 | 2992 |

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



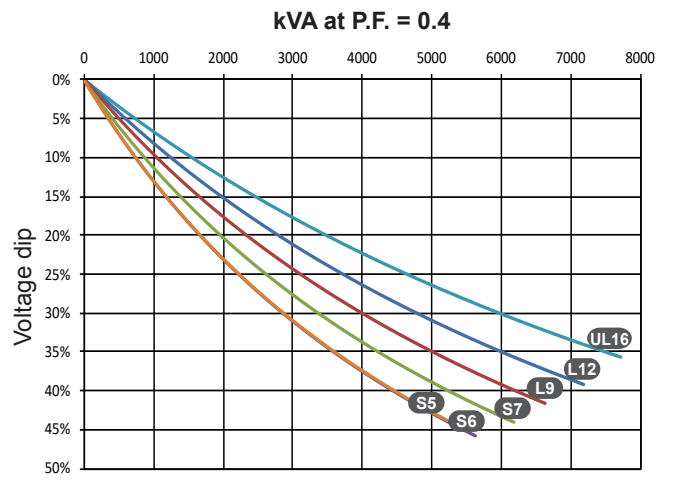
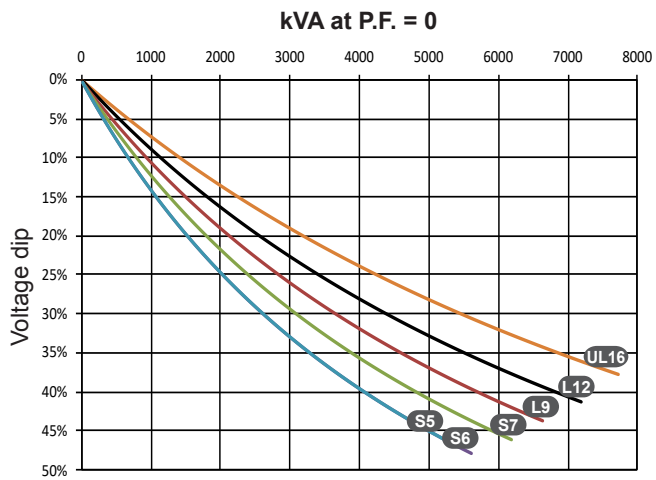
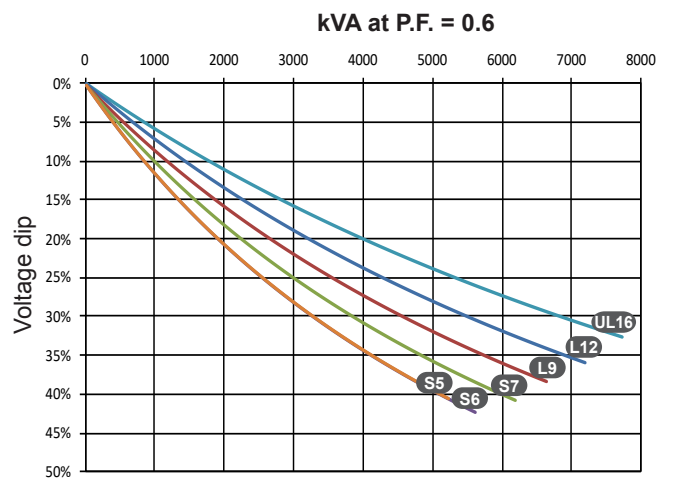
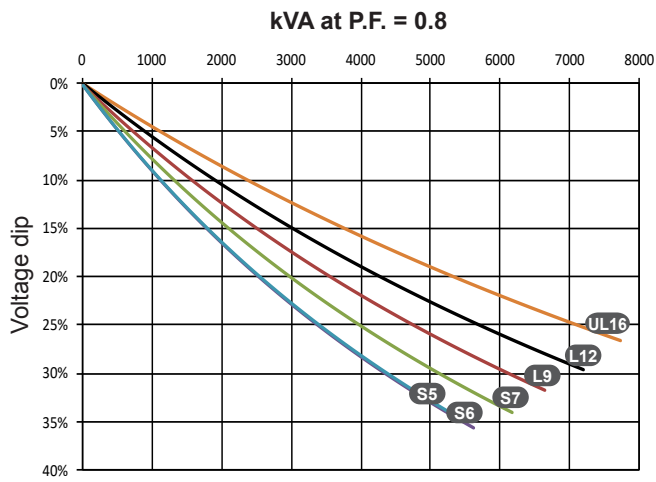
Reactances (%). Time constants (ms) - Class H / 400 V

| | S5 | S6 | S7 | L9 | L12 | UL16 |
|--|------|------|------|------|------|------|
| Kcc Short-circuit ratio | 0.35 | 0.32 | 0.35 | 0.39 | 0.42 | 0.51 |
| Xd Direct-axis synchronous reactance unsaturated | 367 | 380 | 376 | 344 | 313 | 267 |
| Xq Quadrature-axis synchronous reactance unsaturated | 187 | 194 | 192 | 175 | 160 | 136 |
| T'do No-load transient time constant | 2760 | 2760 | 2870 | 2990 | 2760 | 2920 |
| X'd Direct-axis transient reactance saturated | 28.7 | 30.9 | 28.9 | 26.1 | 23.6 | 20.3 |
| T'd Short-circuit transient time constant | 254 | 264 | 260 | 267 | 245 | 261 |
| X''d Direct-axis subtransient reactance saturated | 15 | 16.4 | 14.8 | 13.2 | 12.1 | 10.5 |
| T''d Subtransient time constant | 23 | 23 | 22 | 22 | 13 | 14 |
| X''q Quadrature-axis subtransient reactance saturated | 15.6 | 16.9 | 15.4 | 13.7 | 12.5 | 10.8 |
| X0 Zero sequence reactance | 2.3 | 2.5 | 2.6 | 2.5 | 2.7 | 2.6 |
| X2 Negative sequence reactance saturated | 15.3 | 16.7 | 15.1 | 13.4 | 12.3 | 10.6 |
| Ta Armature time constant | 28 | 28 | 28 | 28 | 29 | 30 |

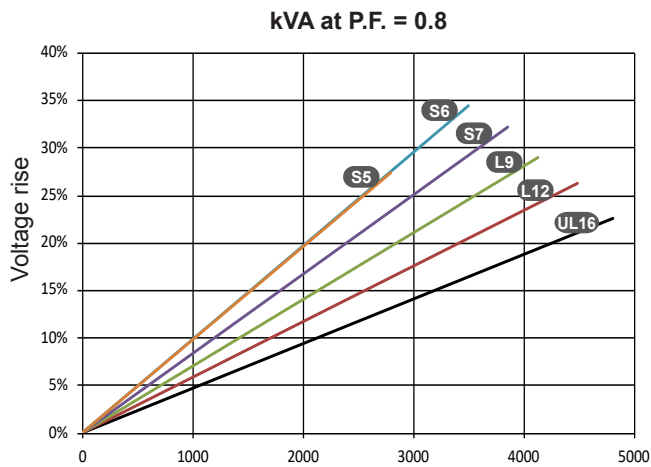
Other class H/400 V data

| | | | | | | |
|--|-----|-----|------|------|-----|-----|
| io (A) No-load excitation current | 1.2 | 1.2 | 1.2 | 1.2 | 1.3 | 1.4 |
| ic (A) On-load excitation current | 4.2 | 4.5 | 4.4 | 4.2 | 4 | 3.7 |
| uc (V) On-load excitation voltage | 45 | 47 | 47 | 44 | 42 | 38 |
| kW No-load losses | 15 | 15 | 17 | 20 | 24 | 26 |
| kW Heat dissipation | 68 | 76 | 79.5 | 79.2 | 81 | 100 |

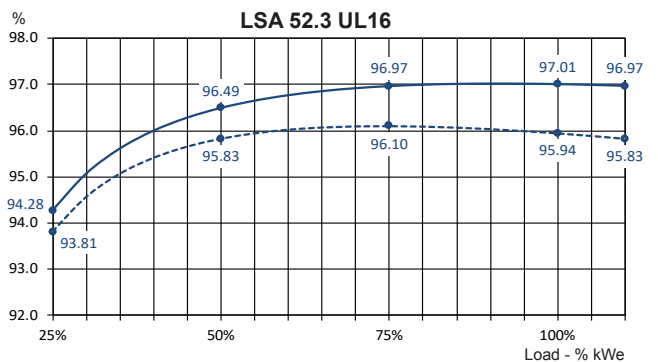
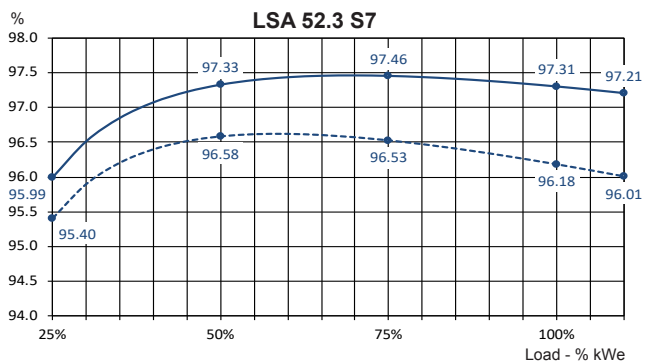
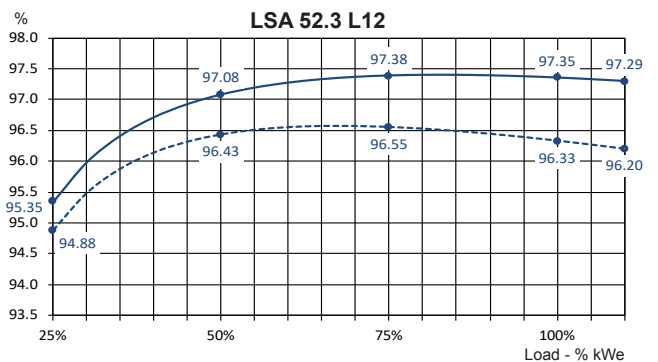
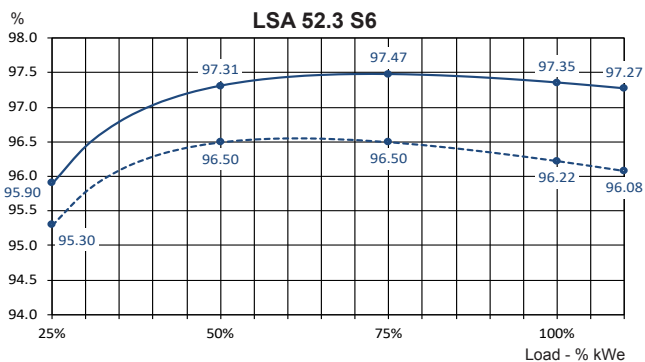
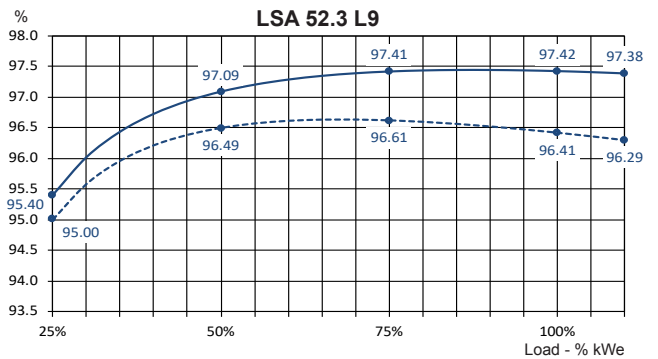
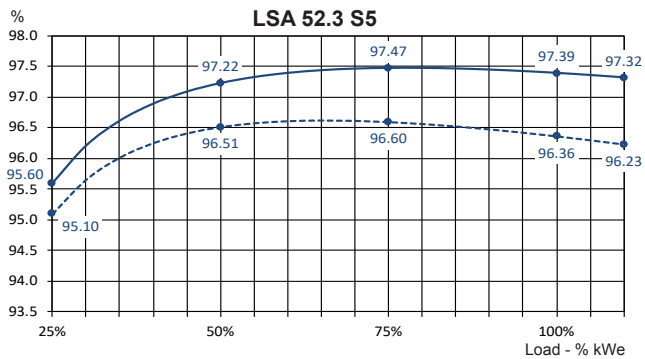
Transient voltage variation at load inrush: 400V - 50 Hz



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



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



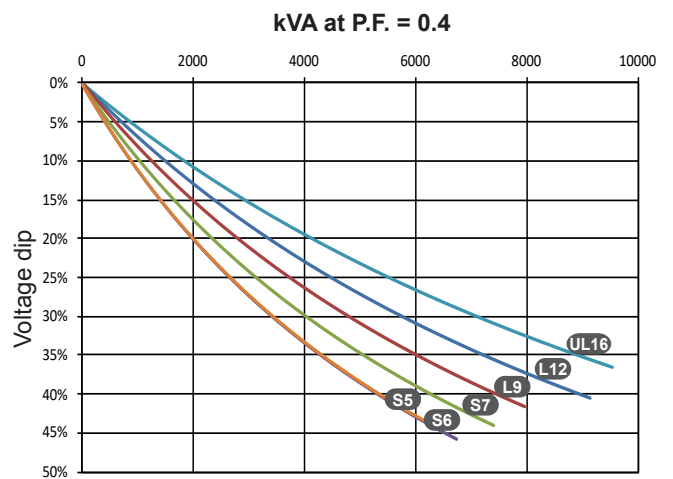
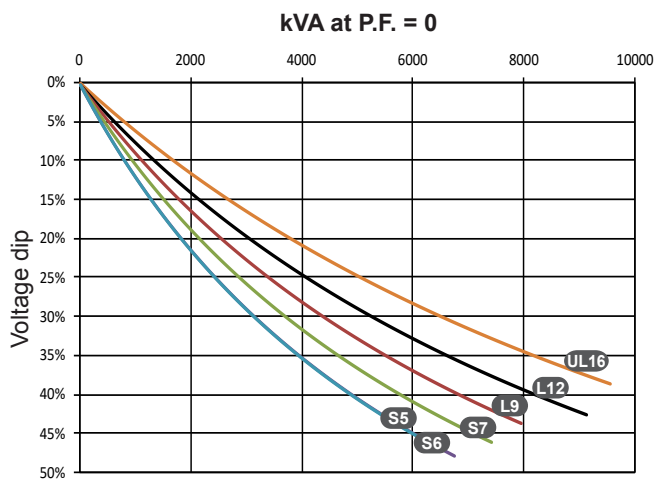
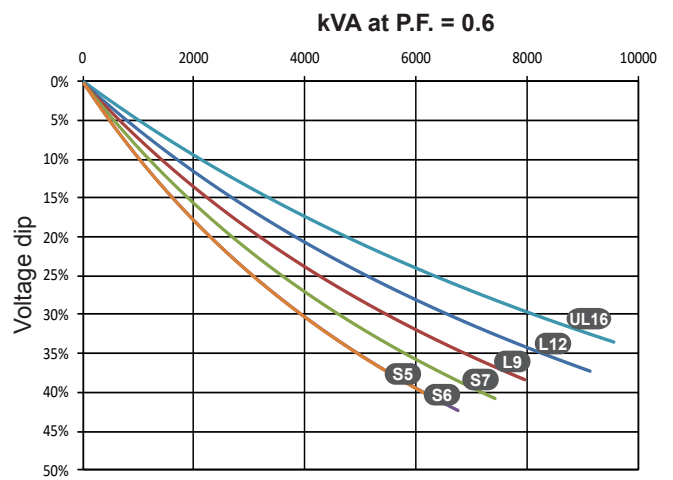
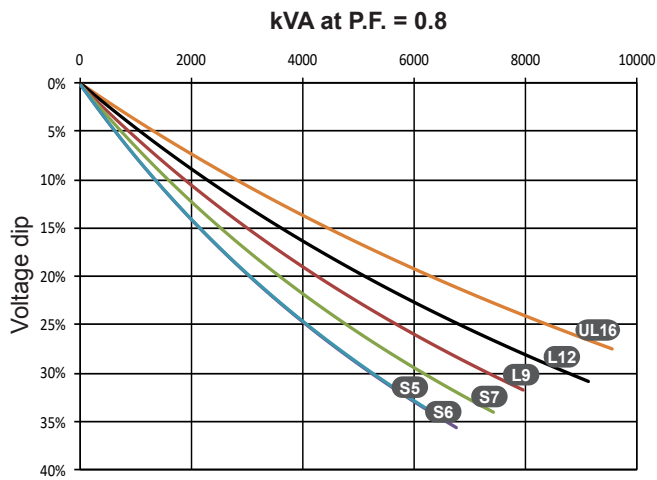
Reactances (%). Time constants (ms) - Class H / 480 V

| | S5 | S6 | S7 | L9 | L12 | UL16 |
|--|------|------|------|------|------|------|
| Kcc Short-circuit ratio | 0.35 | 0.32 | 0.35 | 0.39 | 0.40 | 0.49 |
| Xd Direct-axis synchronous reactance unsaturated | 367 | 380 | 376 | 344 | 331 | 275 |
| Xq Quadrature-axis synchronous reactance unsaturated | 187 | 194 | 192 | 175 | 169 | 140 |
| T'do No-load transient time constant | 2760 | 2760 | 2870 | 2990 | 2760 | 2920 |
| X'd Direct-axis transient reactance saturated | 28.7 | 30.9 | 28.9 | 26.1 | 25 | 20.9 |
| T'd Short-circuit transient time constant | 254 | 265 | 260 | 267 | 245 | 261 |
| X''d Direct-axis subtransient reactance saturated | 15 | 16.4 | 14.8 | 13.2 | 12.8 | 10.8 |
| T''d Subtransient time constant | 23 | 23 | 22 | 22 | 13 | 14 |
| X''q Quadrature-axis subtransient reactance saturated | 15.6 | 16.9 | 15.4 | 13.7 | 13.2 | 11.1 |
| X0 Zero sequence reactance | 2.3 | 2.6 | 2.6 | 2.5 | 2.9 | 2.7 |
| X2 Negative sequence reactance saturated | 15.3 | 16.7 | 15.1 | 13.4 | 13 | 11 |
| Ta Armature time constant | 28 | 28 | 28 | 28 | 29 | 30 |

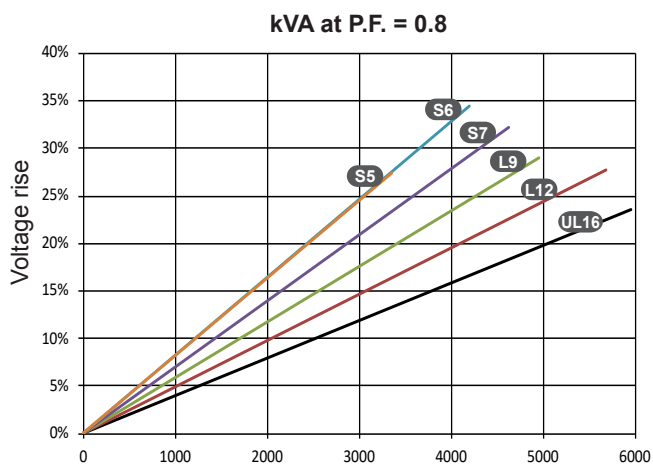
Other class H/480 V data

| | | | | | | |
|--|-----|-----|-----|-----|-----|-----|
| io (A) No-load excitation current | 1.1 | 1.1 | 1.2 | 1.2 | 1.2 | 1.3 |
| ic (A) On-load excitation current | 4 | 4.3 | 4.3 | 4 | 4 | 3.6 |
| uc (V) On-load excitation voltage | 43 | 46 | 45 | 43 | 42 | 36 |
| kW No-load losses | 21 | 21 | 24 | 28 | 33 | 36 |
| kW Heat dissipation | 73 | 82 | 86 | 87 | 96 | 120 |

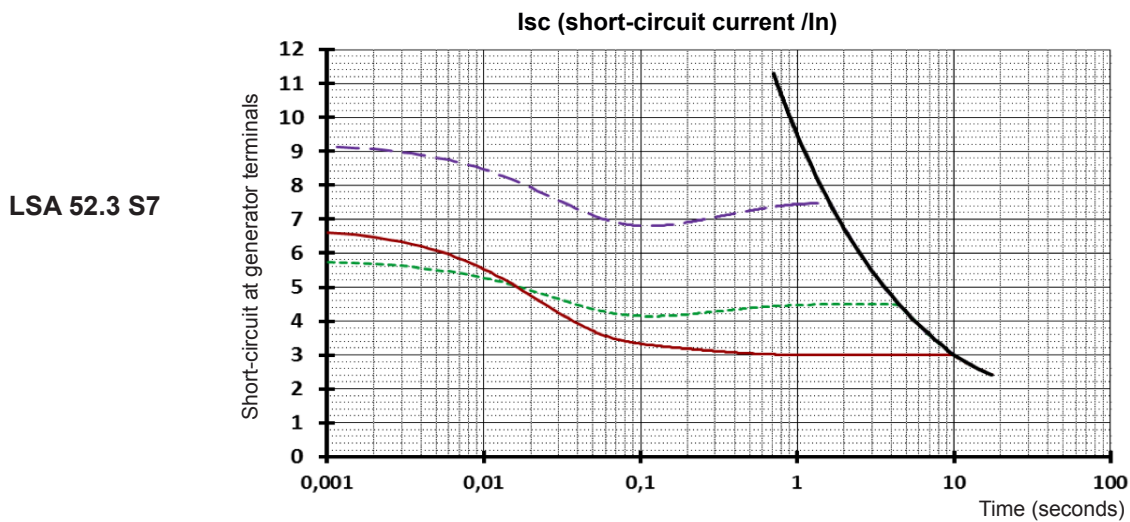
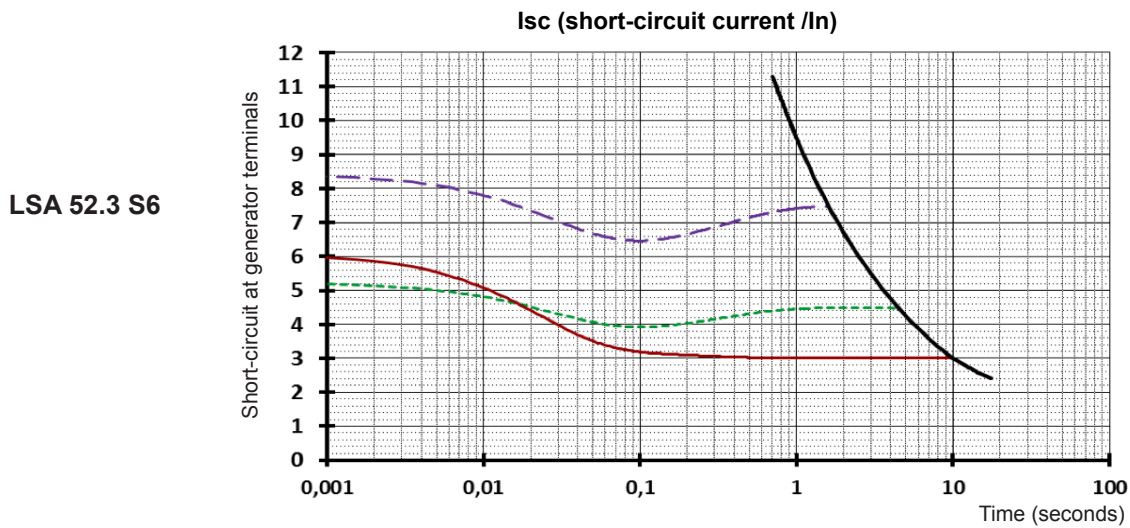
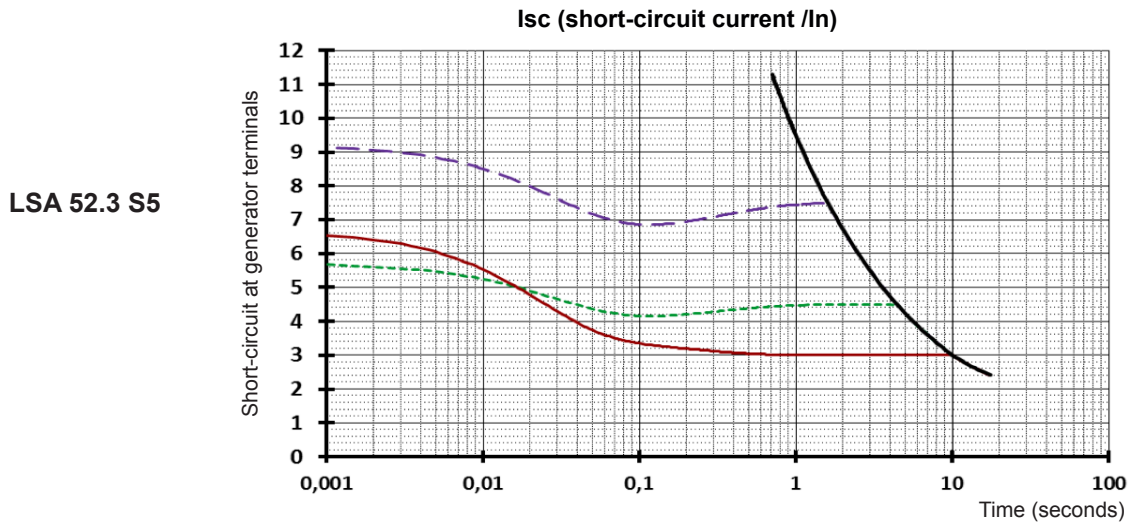
Transient voltage variation at load inrush: 480V - 60 Hz



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

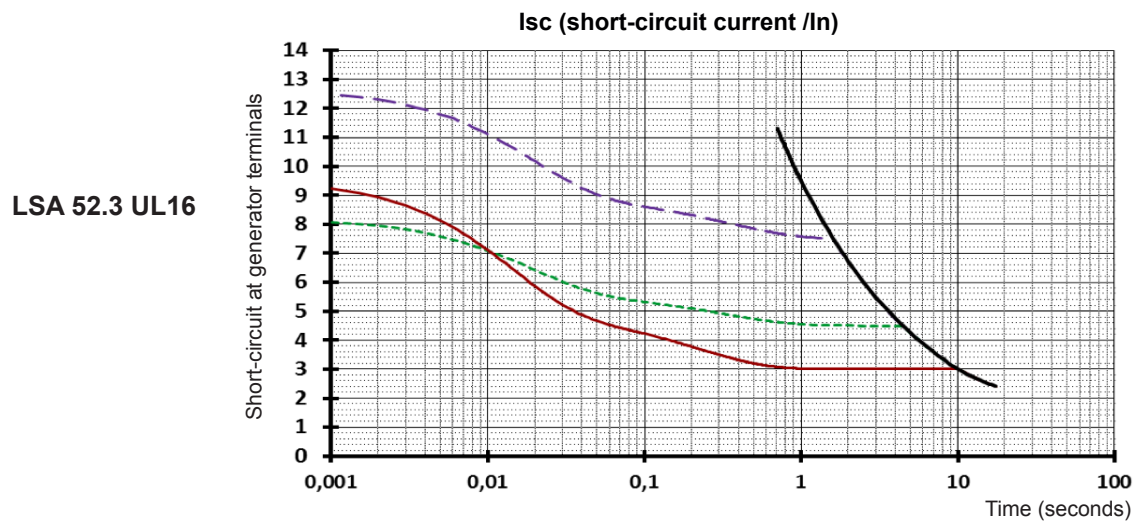
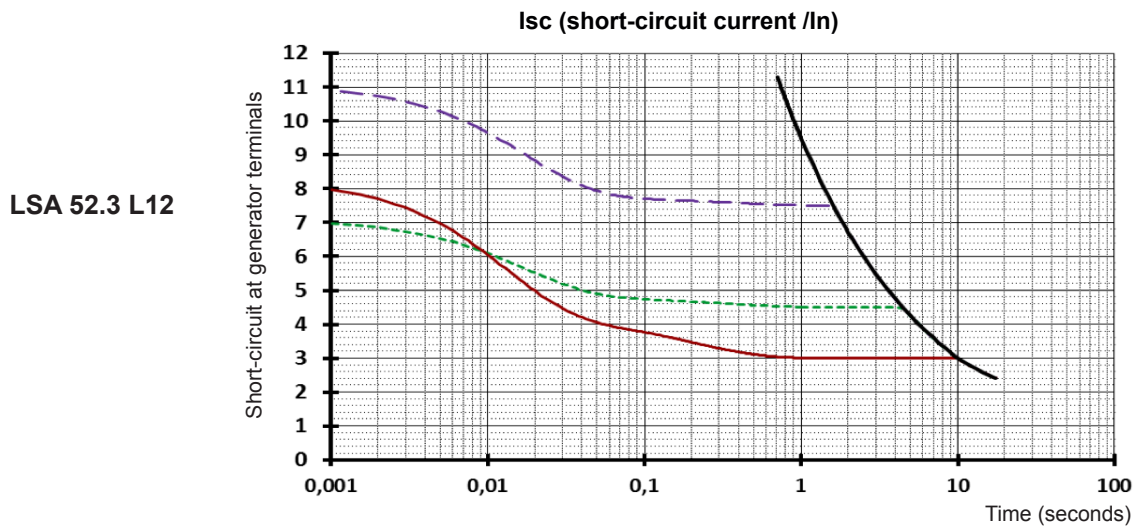
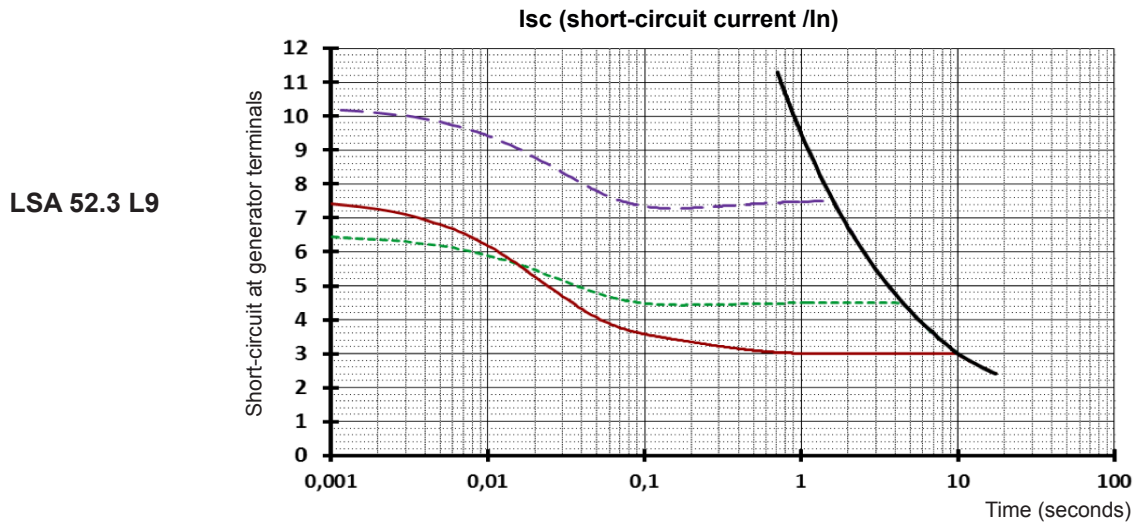


Short-circuit curves at rated speed (star connection Y)



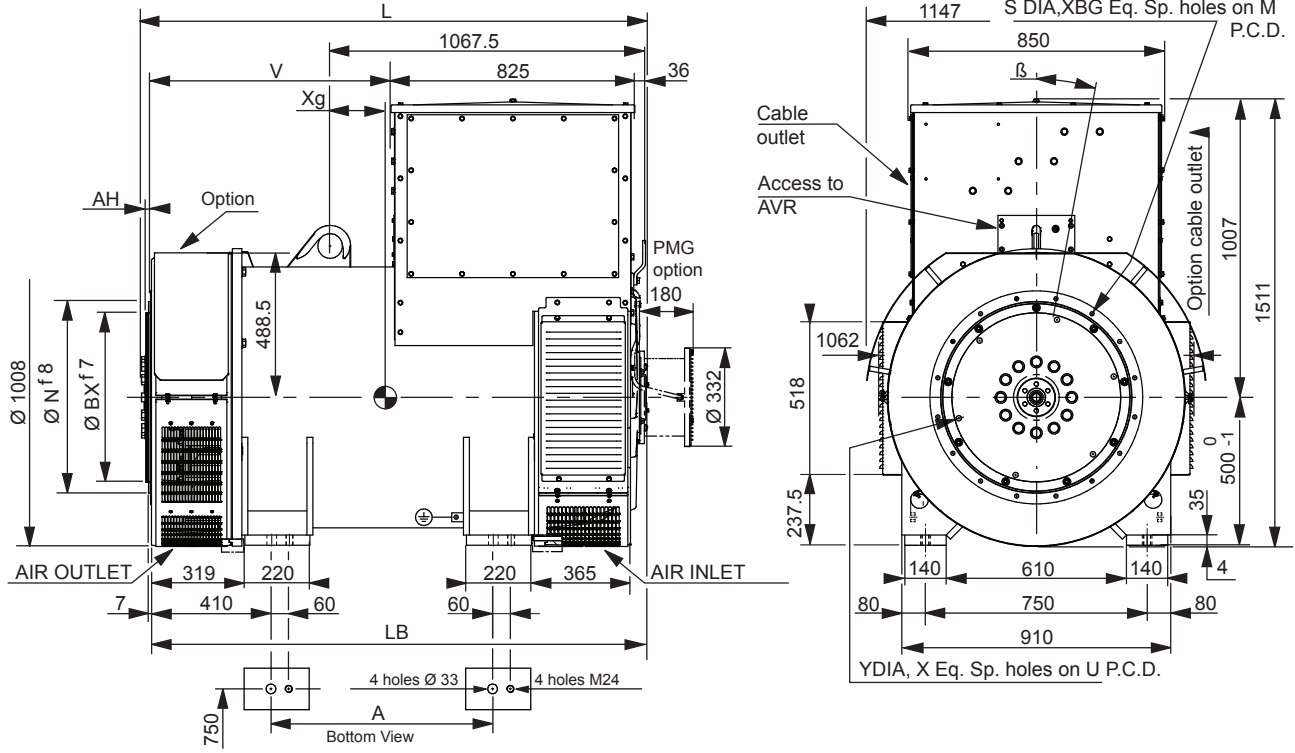
- Symmetrical phase to neutral short-circuit
- - - Symmetrical two-phase short-circuit
- Symmetrical three-phase short-circuit
- Thermal limit curve

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



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

Single bearing dimensions



| Dimensions (mm) and weight | | | | | | |
|----------------------------|---------------------|------|-----|------|-----|---------------|
| Type | L without PMG maxi* | LB | A | V | Xg | Weight** (kg) |
| LSA 52.3 S5 | 1713 | 1683 | 750 | 814 | 187 | 3705 |
| LSA 52.3 S6 | 1713 | 1683 | 750 | 814 | 187 | 3705 |
| LSA 52.3 S7 | 1713 | 1683 | 750 | 814 | 207 | 3950 |
| LSA 52.3 L9 | 1913 | 1883 | 950 | 1014 | 78 | 4433 |
| LSA 52.3 L12 | 1913 | 1883 | 950 | 1014 | 112 | 4924 |

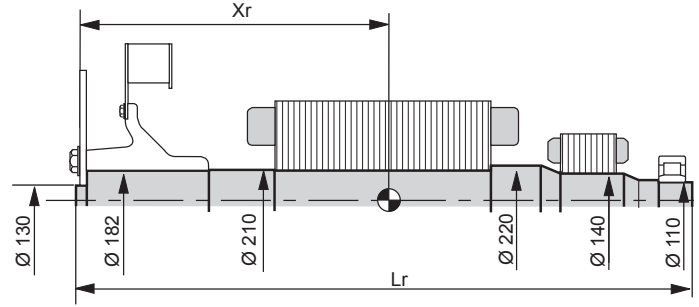
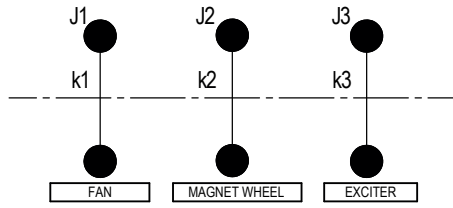
| Coupling | | |
|----------------------|---|----|
| Flange S.A.E. | 0 | 00 |
| Flex plate S.A.E. 21 | | X |
| Flex plate S.A.E. 18 | X | X |

LSA 52.3 UL16 (consult us)
 * L maxi = LB + AH maxi + 14 ** Values for S.A.E. 00/21

| Flange (mm) | | | | | |
|-------------|-------|-------|-----|----|---------|
| S.A.E. | N | M | XBG | S | β° |
| 0 | 647.7 | 679.5 | 16 | 14 | 11°15' |
| 00 | 787.4 | 850.9 | 16 | 14 | 11° 15' |

| 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

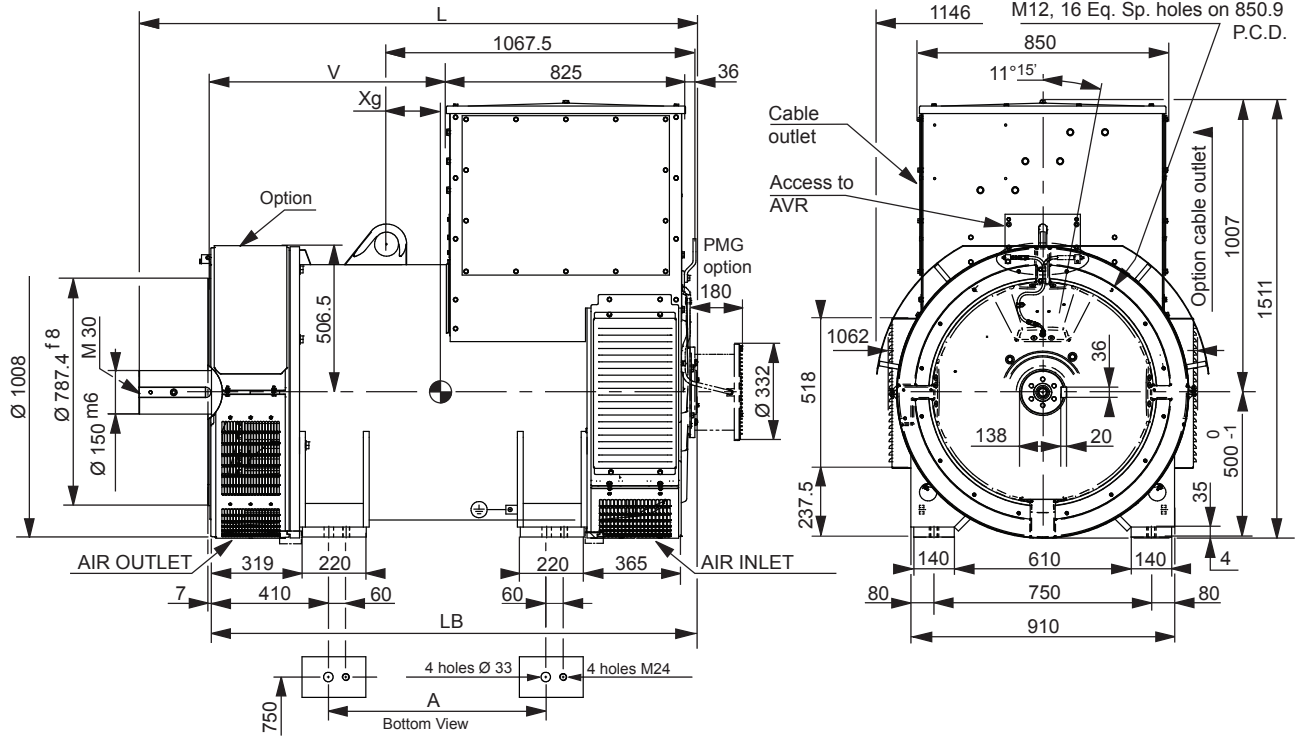


| Centre of gravity: Xr (mm), Rotor length: Lr (mm), Weight: M (kg), Moment of inertia: J (kgm ²) : (4J = MD ²) | | | | | | | | | | Torsional rigidity | | | | | |
|---|-----------|------|------|------|-----------|------|------|------|-----------|--------------------|-----------|----------------------|------|-----|--|
| Flex plate | S.A.E. 18 | | | | S.A.E. 21 | | | | [Nm/rad] | | | (kg.m ²) | | | |
| | Xr | Lr | M | J | Xr | Lr | M | J | k1 | k2 | k3 | J1 | J2 | J3 | |
| LSA 52.3 S5 | 720.4 | 1689 | 1420 | 43.4 | 702.8 | 1689 | 1424 | 44.3 | 5.00 10E7 | 2.50 10E7 | 1.54 10E7 | 10.3 | 32.4 | 1.5 | |
| LSA 52.3 S6 | 720.4 | 1689 | 1420 | 43.4 | 702.8 | 1689 | 1424 | 44.3 | 5.00 10E7 | 2.50 10E7 | 1.54 10E7 | 10.3 | 32.4 | 1.5 | |
| LSA 52.3 S7 | 741.5 | 1689 | 1453 | 45 | 723.9 | 1689 | 1457 | 45.9 | 5.00 10E7 | 2.41 10E7 | 1.59 10E7 | 10.3 | 34.1 | 1.5 | |
| LSA 52.3 L9 | 811.3 | 1889 | 1635 | 50 | 793.7 | 1889 | 1639 | 50.9 | 5.00 10E7 | 2.29 10E7 | 1.42 10E7 | 10.3 | 39 | 1.6 | |
| LSA 52.3 L12 | 858.4 | 1889 | 1808 | 56.5 | 840.9 | 1889 | 1812 | 57.4 | 5.00 10E7 | 2.14 10E7 | 1.52 10E7 | 10.3 | 45.6 | 1.4 | |

LSA 52.3 UL16 (consult us)

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.

Two bearing dimensions

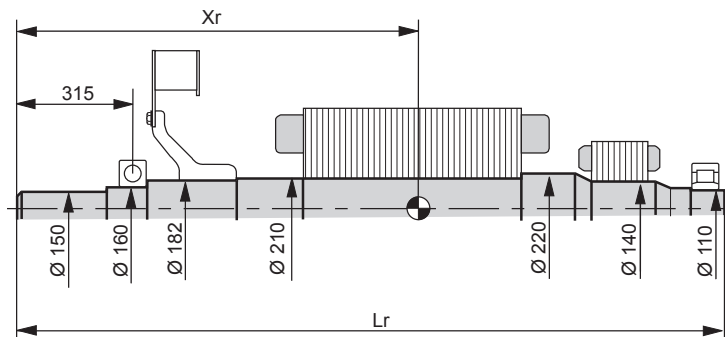
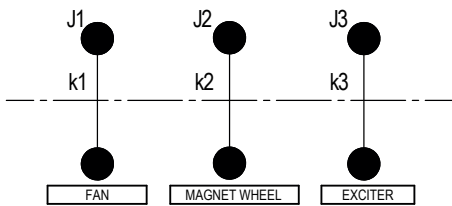


Dimensions (mm) and weight

| Type | L without PMG | LB | A | V | Xg | Weight (kg) |
|--------------|---------------|------|-----|------|-----|-------------|
| LSA 52.3 S5 | 1933 | 1683 | 750 | 814 | 192 | 3748 |
| LSA 52.3 S6 | 1933 | 1683 | 750 | 814 | 192 | 3748 |
| LSA 52.3 S7 | 1933 | 1683 | 750 | 814 | 212 | 3991 |
| LSA 52.3 L9 | 2133 | 1883 | 950 | 1014 | 83 | 4476 |
| LSA 52.3 L12 | 2133 | 1883 | 950 | 1014 | 117 | 4967 |

LSA 52.3 UL16 (consult us)

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 52.3 S5 | 973.4 | 1912 | 1363 | 41.7 |
| LSA 52.3 S6 | 973.4 | 1912 | 1363 | 41.7 |
| LSA 52.3 S7 | 994.5 | 1912 | 1396 | 43.3 |
| LSA 52.3 L9 | 1064.3 | 2112 | 1578 | 48.3 |
| LSA 52.3 L12 | 1110.6 | 2112 | 1752 | 54.8 |

Torsional rigidity

| [Nm/rad] | | | (kg.m ²) | | |
|-----------|-----------|-----------|----------------------|------|-----|
| k1 | k2 | k3 | J1 | J2 | J3 |
| 1.82 10E7 | 3.05 10E7 | 1.54 10E7 | 7.7 | 32.4 | 1.5 |
| 1.82 10E7 | 3.05 10E7 | 1.54 10E7 | 7.7 | 32.4 | 1.5 |
| 1.82 10E7 | 2.91 10E7 | 1.59 10E7 | 7.7 | 34.1 | 1.5 |
| 1.82 10E7 | 2.74 10E7 | 1.42 10E7 | 7.7 | 39 | 1.6 |
| 1.82 10E7 | 2.53 10E7 | 1.52 10E7 | 7.7 | 45.6 | 1.4 |

LSA 52.3 UL16 (consult us)

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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