EMERSON™
Industrial Automation


3782 en - 2011.03 / g

LEROY SOMER®

# PARTNER ALTERNATORS

# LSA 47.2 - 4 Pole



**SPECIALLY ADAPTED FOR APPLICATIONS**

The LSA 47.2 alternator is designed to be suitable for typical generator applications, such as: stand-by, prime power, cogeneration, marine, rental, telecommunications, etc.

**COMPLIANT WITH INTERNATIONAL STANDARDS**

The LSA 47.2 alternator conforms to the main international standards and regulations:
IEC 60034, NEMA MG 1.22, ISO 8528, CSA/UL request, marine regulations, etc.
It can be integrated into a CE marked generator-set.
The LSA 47.2 is designed, manufactured and marketed in an ISO 9001 environment and ISO 14001.

**TOP OF THE RANGE ELECTRICAL PERFORMANCE**

- Class H insulation.
- Standard 12-wire re-connectable winding, 2/3 pitch, type no. 6 (the LSA 47.2 L9 is available in two versions: 6-wire and 12-wire).
- 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. 23), 690 V (no. 52)
  - 60 Hz: 380 V and 416 V (no. 8), 600 V (no. 9).
- THD Total harmonic distortion < 2% (full load).
- 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 450** | **optional** | **Std** | **Std** | √ | √ | √ | √ | √ |
| **D 510** | **optional** | **optional** | **optional** | √ | **included** | **included** | **included** | √ |

Voltage regulator accuracy ± 0.5%

√: possible mouting

**PROTECTION SYSTEM SUITED TO THE ENVIRONMENT**

- The LSA 47. 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**

- Standard direction of rotation : clockwise when looking at the drive end view (engine side).
  Running unit anti-clockwise: a derate of 5% must be applied.
- Compact and rigid assembly to better withstand generator-set vibrations.
- Steel frame.
- Cast iron flanges and shields.
- Two bearing and single bearing versions designed to be suitable for engines on the market.
- Half-key balancing.
- Greased for life bearings (regreasable bearings optional)

**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.
- 9-way terminal block for voltage reconnection.

PARTNER®

# LSA 47.2 - 4 Pole

ALTERNATOR

## Common data

| | | | | |
|---|---|---|---|---|
| Insulation class | H | Excitation system | SHUNT (12 wire) | A R E P or PMG |
| Winding pitch | 2/3 (N° 6 or N° 6S) | A.V.R. model | R 250 | R 450 |
| Terminals | 12 (N° 6) / 6 (N° 6S) | Voltage regulation (*) | ± 0,5 % | ± 0,5 % |
| Drip proof | IP 23 | Sustained short-circuit current | - | 300% (3 IN) : 10s |
| Altitude | ≤ 1000 m | Total harmonic distortion THD (**) | at no load < 1,5 % - on load < 2 % | |
| Overspeed | 2250 min$^{-1}$ | Waveform : NEMA = TIF (**) | < 50 | |
| Air flow | 0,9 m$^3$/s (50Hz) / 1,1 (60Hz) | | | |

(*) Steady state duty. (**) Total harmonic distortion content line to line, at no load or full rated linear and balanced load.

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

**kVA / kW - Power factor = 0,8**

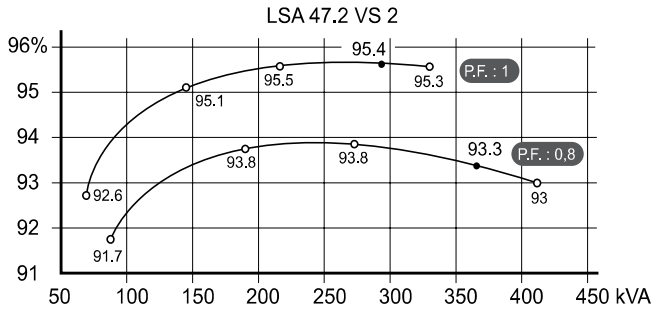
| | Duty | | Continuous duty 40°C | | | Continuous duty / 40°C | | | Stand-by/ 40°C | | | Stand-by / 27°C | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Class/T°K | | H / 125° K | | | F / 105° K | | | H / 150° K | | | H / 163° K | | |
| | Phase | | 3 ph. | | | 3 ph. | | | 3 ph. | | | 3 ph. | | |
| 12 wire | 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 |
| | YY | | | 200V | | | 200V | | | 200V | | | 200V | |
| | 47.2 VS2 | kVA | | **365** | | | 330 | | | 405 | | | **420** | |
| | | kW | | ***292*** | | | *264* | | | *324* | | | ***336*** | |
| | 47.2 S4 | kVA | | **410** | | | 370 | | | 430 | | | **450** | |
| | | kW | | ***328*** | | | *296* | | | *344* | | | ***360*** | |
| | 47.2 S5 | kVA | | **455** | | | 405 | | | 471 | | | **500** | |
| | | kW | | ***364*** | | | *324* | | | *377* | | | ***400*** | |
| | 47.2 M7 | kVA | | **500** | | | 465 | | | 550 | | | **570** | |
| | | kW | | ***400*** | | | *372* | | | *440* | | | ***456*** | |
| | 47.2 M8 | kVA | | **550** | | | 500 | | | 575 | | | **600** | |
| | | kW | | ***440*** | | | *400* | | | *460* | | | ***480*** | |
| | 47.2 L9 | kVA | | **600** | | | 535 | | | 630 | | | **660** | |
| | | kW | | ***480*** | | | *428* | | | *504* | | | ***528*** | |
| 6 wire | 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 |
| | 47.2 L9* | kVA | | **600** | | | 535 | | | 630 | | | **660** | |
| | | kW | | ***480*** | | | *428* | | | *504* | | | ***528*** | |

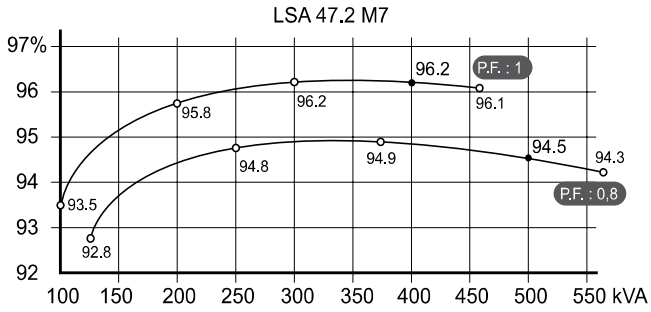
## Ratings 60 Hz - 1800 R.P.M.

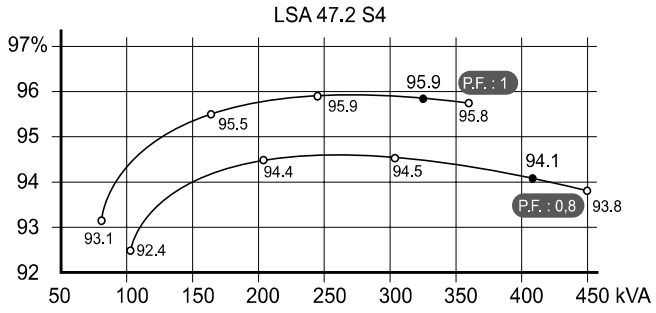
**kVA / kW - PF = 0,8**

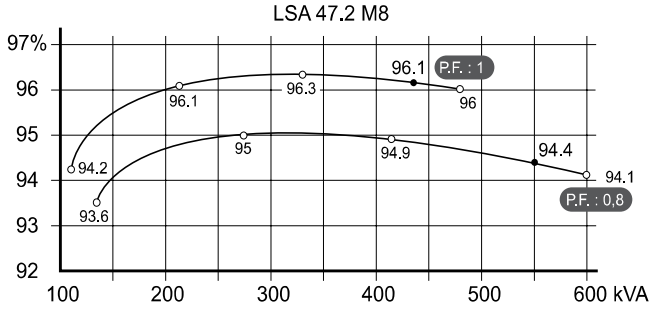
| | Duty | | Continuous duty 40°C | | | | Continuous duty 40°C | | | | Stand-by / 40 °C | | | | Stand-by / 27 °C | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Class / T° K | | H / 125° K | | | | F / 105° K | | | | H / 150° K | | | | H / 163° K | | | |
| | Phase | | 3 ph. | | | | 3 ph. | | | | 3 ph. | | | | 3 ph. | | | |
| 12 wire | Y | | 380V | 416V | 440V | 480V | 380V | 416V | 440V | 480V | 380V | 416V | 440V | 480V | 380V | 416V | 440V | 480V |
| | Δ | | 220V | 240V | | | 220V | 240V | | | 220V | 240V | | | 220V | 240V | | |
| | YY | | | 208V | 220V | 240V | | 208V | 220V | 240V | | 208V | 220V | 240V | | 208V | 220V | 240V |
| | 47.2 VS2 | kVA | 424 | 454 | 456 | **456** | 394 | 410 | 410 | 410 | 451 | 483 | 500 | 511 | 469 | 500 | 518 | **530** |
| | | kW | 339 | 363 | 365 | **365** | 315 | 328 | 328 | 328 | 361 | 386 | 400 | 409 | 375 | 400 | 414 | **424** |
| | 47.2 S4 | kVA | 450 | 480 | 500 | **512** | 396 | 442 | 442 | 465 | 475 | 513 | 533 | 550 | 500 | 530 | 550 | **581** |
| | | kW | 360 | 384 | 400 | **410** | 317 | 354 | 354 | 372 | 380 | 410 | 426 | 440 | 400 | 424 | 440 | **465** |
| | 47.2 S5 | kVA | 475 | 510 | 531 | **570** | 441 | 473 | 493 | 518 | 503 | 543 | 566 | 592 | 527 | 562 | 585 | **625** |
| | | kW | 380 | 408 | 425 | **456** | 353 | 378 | 394 | 414 | 402 | 434 | 453 | 474 | 422 | 450 | 468 | **500** |
| | 47.2 M7 | kVA | 562 | 610 | 625 | **625** | 523 | 566 | 581 | 590 | 600 | 651 | 669 | 680 | 625 | 668 | 690 | **700** |
| | | kW | 450 | 488 | 500 | **500** | 418 | 453 | 465 | 472 | 480 | 521 | 535 | 554 | 500 | 534 | 552 | **560** |
| | 47.2 M8 | kVA | 562 | 610 | 630 | **690** | 523 | 566 | 587 | 632 | 600 | 651 | 672 | 729 | 625 | 671 | 705 | **750** |
| | | kW | 450 | 488 | 504 | **552** | 418 | 453 | 470 | 506 | 480 | 521 | 538 | 583 | 500 | 537 | 564 | **600** |
| | 47.2 L9 | kVA | 602 | 661 | 685 | **750** | 556 | 609 | 634 | 675 | 643 | 707 | 734 | 780 | 667 | 728 | 763 | **825** |
| | | kW | 482 | 529 | 548 | **600** | 445 | 487 | 507 | 540 | 514 | 566 | 587 | 624 | 534 | 582 | 610 | **660** |
| 6 wire | Y | | 380V | 416V | 440V | 480V | 380V | 416V | 440V | 480V | 380V | 416V | 440V | 480V | 380V | 416V | 440V | 480V |
| | Δ | | 220V | 240V | | | 220V | 240V | | | 220V | 240V | | | 220V | 240V | | |
| | 47.2 L9* | kVA | 602 | 661 | 685 | **750** | 556 | 609 | 634 | 675 | 643 | 707 | 734 | 780 | 667 | 728 | 763 | **825** |

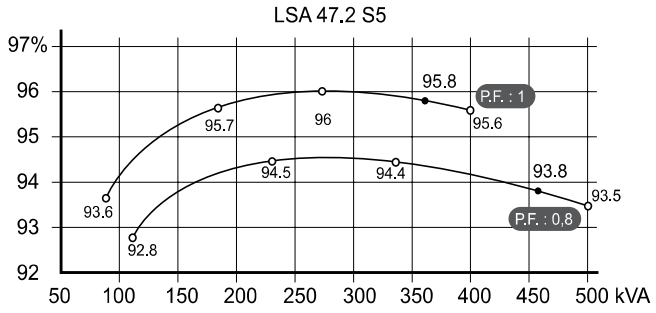
## Efficiencies 50 Hz - P.F. : 1 / P.F. : 0,8

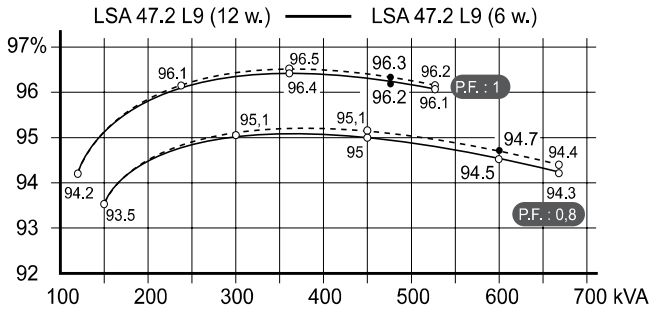



## Reactances (%) . Time constants (ms) - Class H / 400 V

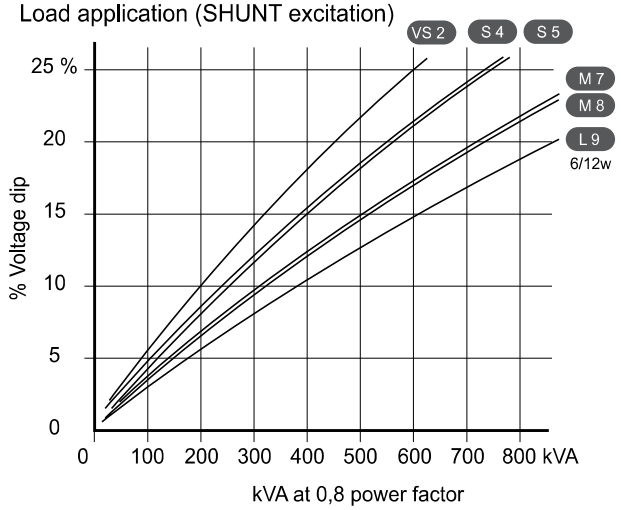
| | | VS2 | S4 | S5 | M7 | M8 | L9 | L9 (6f) |
|---|---|---|---|---|---|---|---|---|
| **Kcc** | Short-circuit ratio | 0,38 | 0,37 | 0,33 | 0,41 | 0,32 | 0,37 | 0,38 |
| **Xd** | Direct axis synchro.reactance unsaturated | 336 | 322 | 357 | 307 | 360 | 330 | 325 |
| **Xq** | Quadra. axis synchr.reactance unsaturated | 201 | 193 | 214 | 184 | 216 | 198 | 195 |
| **T'do** | Open circuit time constant | 1738 | 1855 | 1855 | 1930 | 1958 | 1997 | 1997 |
| **X'd** | Direct axis transient reactance saturated | 19,3 | 17,3 | 19,2 | 15,9 | 18,3 | 16,5 | 16,2 |
| **T'd** | Short-Circuit transient time constant | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| **X"d** | Direct axis subtransient reactance saturated | 13,5 | 12,1 | 13,5 | 11,1 | 12,9 | 11,4 | 11,6 |
| **T"d** | Subtransient time constant | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| **X"q** | Quadra. axis subtransient reactance saturated | 18,4 | 16,3 | 18 | 14,7 | 17 | 15 | 15,2 |
| **Xo** | Zero sequence reactance unsaturated | 0,9 | 0,9 | 0,9 | 0,7 | 0,6 | 0,9 | 0,2 |
| **X2** | Negative sequence reactance saturated | 16 | 14,2 | 15,8 | 13 | 15 | 13,2 | 13,4 |
| **Ta** | Armature time constant | 15 | 15 | 15 | 15 | 15 | 15 | 15 |

### Other data - Class H / 400 V

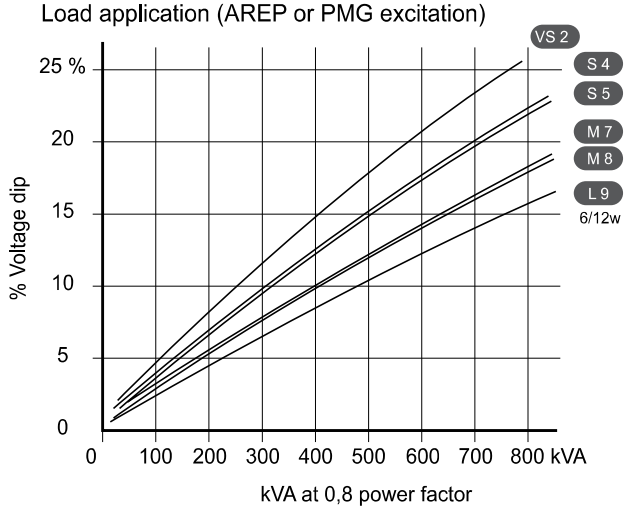
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **io (A)** | No load excitation current | 1 | 0,9 | 0,9 | 1 | 0,9 | 0,9 | 0,9 |
| **ic (A)** | Full load excitation current | 3,8 | 3,5 | 3,8 | 3,6 | 3,7 | 3,7 | 3,7 |
| **uc (V)** | Full load excitation voltage | 39 | 35 | 38 | 36 | 37 | 36 | 36 |
| **ms** | Recovery time (ΔU = 20 % trans.) | 500 | 500 | 500 | 500 | 500 | 500 | 500 |
| **kVA** | Motor start. (ΔU = 20% sust.) or (ΔU = 50% trans.) SHUNT | 722 | 928 | 928 | 1073 | 1159 | 1258 | 1258 |
| **kVA** | Motor start. (ΔU = 20% sust.) or (ΔU = 50% trans.) AREP | 805 | 1035 | 1035 | 1195 | 1294 | 1400 | 1400 |
| **%** | Transient dip (rated step load) SHUNT / PF : 0,8 LAG | 16,8 | 15,5 | 16,7 | 14,6 | 16,2 | 15 | 14,8 |
| **%** | Transient dip (rated step load) AREP / PF : 0,8 LAG | 13,7 | 12,7 | 13,6 | 11,9 | 13,2 | 12,2 | 12,1 |

## Transient voltage variation 400 V - 50 Hz

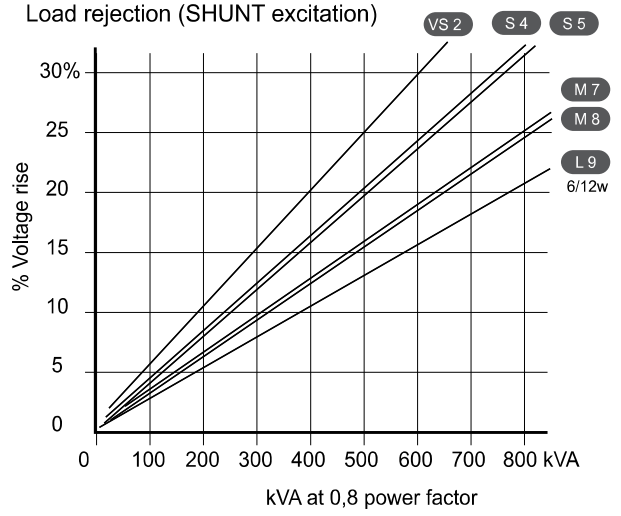
Load application (SHUNT excitation)



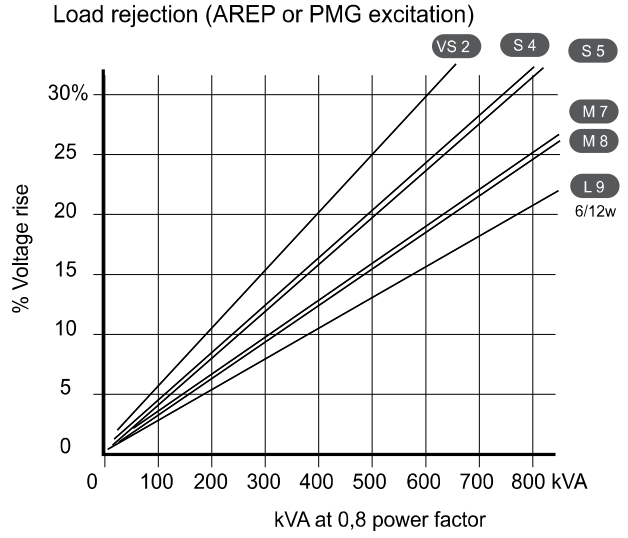

Load application (AREP or PMG excitation)



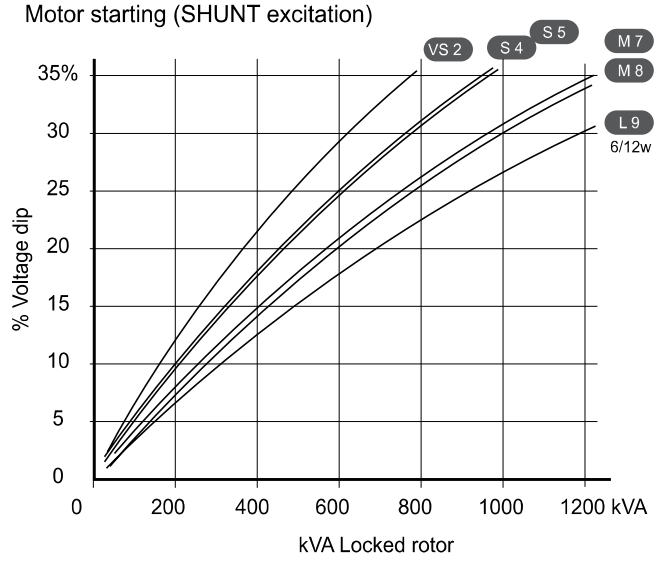

Load rejection (SHUNT excitation)



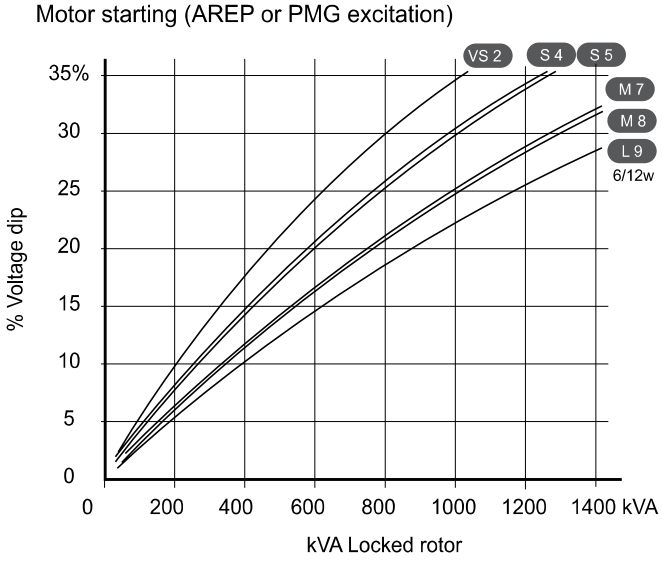

Load rejection (AREP or PMG excitation)




Motor starting (SHUNT excitation)

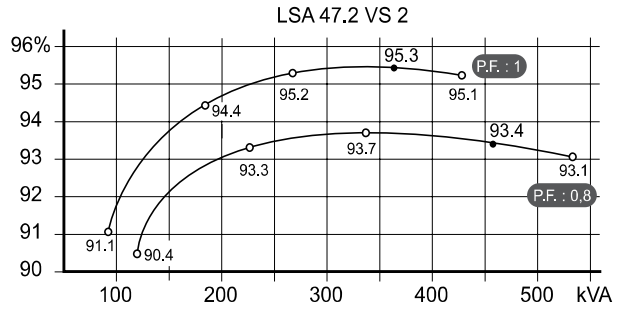


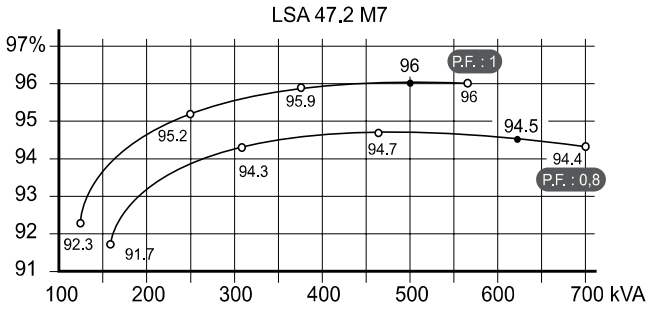

Motor starting (AREP or PMG excitation)

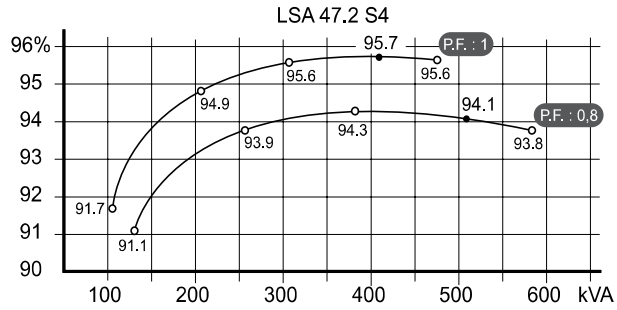


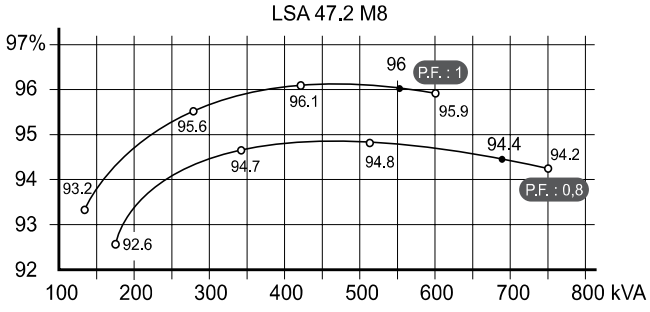

1) For a starting P.F. differing from 0,6, the starting kVA must be multiplied by (Sine Ø /0,8)

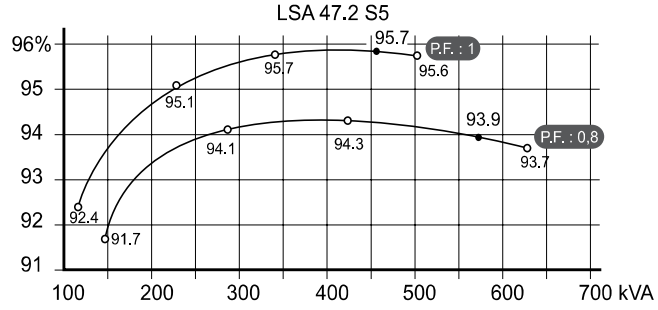
## Efficiencies 60 Hz - P.F. :1 / P.F. : 0,8

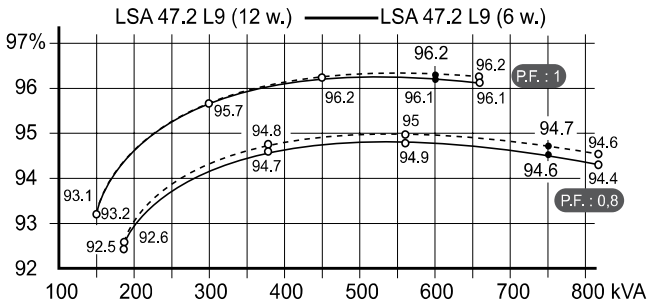



## Reactances (%) . Time constants (ms) - Class H / 480 V

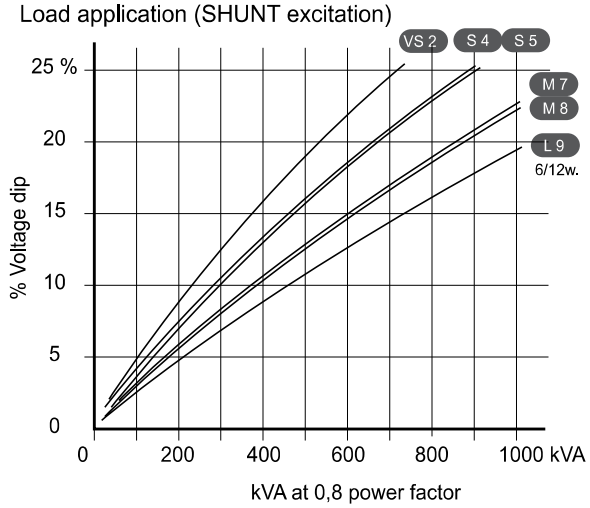
| | | VS2 | S4 | S5 | M7 | M8 | L9 | L9 (6f) |
|---|---|---|---|---|---|---|---|---|
| **Kcc** | Short-circuit ratio | 0,36 | 0,36 | 0,32 | 0,40 | 0,31 | 0,35 | 0,36 |
| **Xd** | Direct axis synchro.reactance unsaturated | 349 | 335 | 373 | 319 | 376 | 344 | 338 |
| **Xq** | Quadra. axis synchr.reactance unsaturated | 209 | 201 | 223 | 191 | 225 | 206 | 203 |
| **T'do** | Open circuit time constant | 1738 | 1855 | 1855 | 1930 | 1958 | 1997 | 1997 |
| **X'd** | Direct axis transient reactance saturated | 20,1 | 18 | 20,1 | 16,5 | 19,2 | 17,2 | 16,9 |
| **T'd** | Short circuit transient time constant | 100 | 100 | 100 | 100 | 100 | 100 | 100 |
| **X"d** | Direct axis subtransient reactance saturated | 14,1 | 12,6 | 14 | 11,6 | 13,4 | 11,8 | 12,1 |
| **T"d** | Subtransient time constant | 10 | 10 | 10 | 10 | 10 | 10 | 10 |
| **X"q** | Quadra. axis subtransient reactance saturated | 19,1 | 16,9 | 18,8 | 15,3 | 17,8 | 15,6 | 15,8 |
| **Xo** | Zero sequence reactance unsaturated | 0,1 | 0,4 | 0,1 | 0,1 | 0,9 | 0,9 | 0,4 |
| **X2** | Negative sequence reactance saturated | 16,6 | 14,8 | 16,5 | 13,5 | 15,6 | 13,7 | 14 |
| **Ta** | Armature time constant | 15 | 15 | 15 | 15 | 15 | 15 | 15 |

### Other data - Class H / 480 V

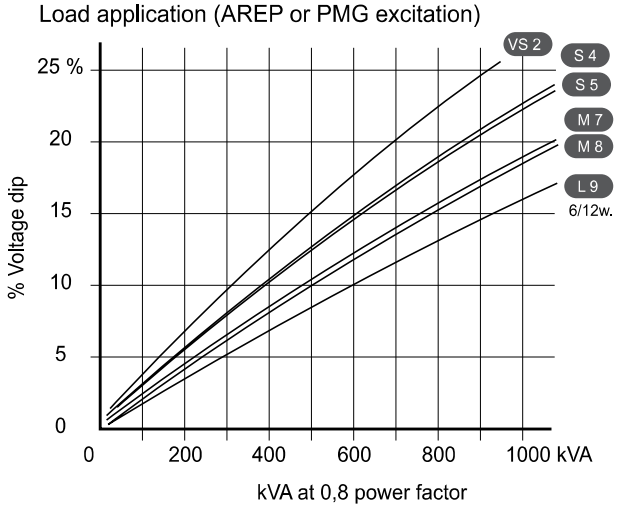
| | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **io (A)** | No load excitation current | 1 | 0,9 | 0,9 | 1 | 0,9 | 0,9 | 0,9 |
| **ic (A)** | Full load excitation current | 3,9 | 3,5 | 3,9 | 3,7 | 3,8 | 3,7 | 3,7 |
| **uc (V)** | Full load excitation voltage | 40 | 35 | 39 | 37 | 38 | 37 | 37 |
| **ms** | Recovery time (ΔU = 20 % trans.) | 500 | 500 | 500 | 500 | 500 | 500 | 500 |
| **kVA** | Motor start. (ΔU = 20% sust.) or (ΔU = 50% trans.) SHUNT | 890 | 1136 | 1136 | 1318 | 1433 | 1550 | 1554 |
| **kVA** | Motor start. (ΔU = 20% sust.) or (ΔU = 50% trans.) AREP | 994 | 1271 | 1271 | 1473 | 1606 | 1733 | 1737 |
| **%** | Transient dip (rated step load) SHUNT / PF : 0,8 LAG | 17,3 | 16 | 17,3 | 15 | 16,7 | 15,5 | 15,3 |
| **%** | Transient dip (rated step load) AREP / PF : 0,8 LAG | 14,1 | 13 | 14,1 | 12,2 | 13,6 | 12,6 | 12,4 |

## Transient voltage variation - 480 V - 60 Hz

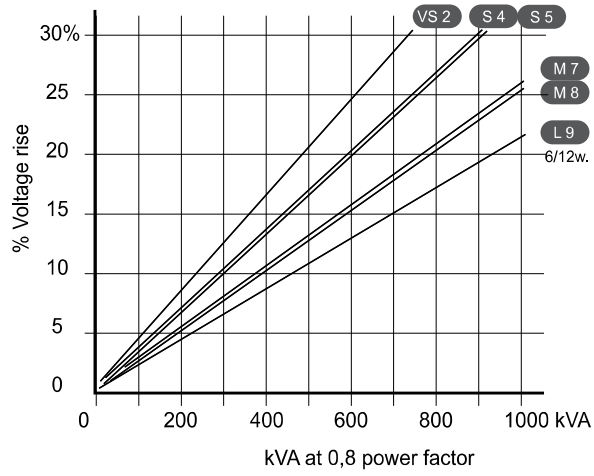
Load application (SHUNT excitation)



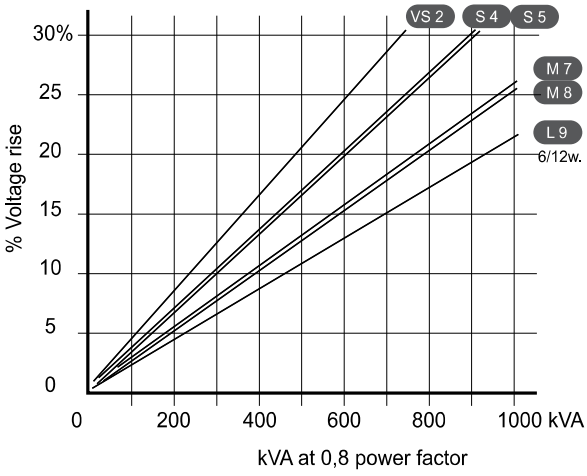

Load application (AREP or PMG excitation)



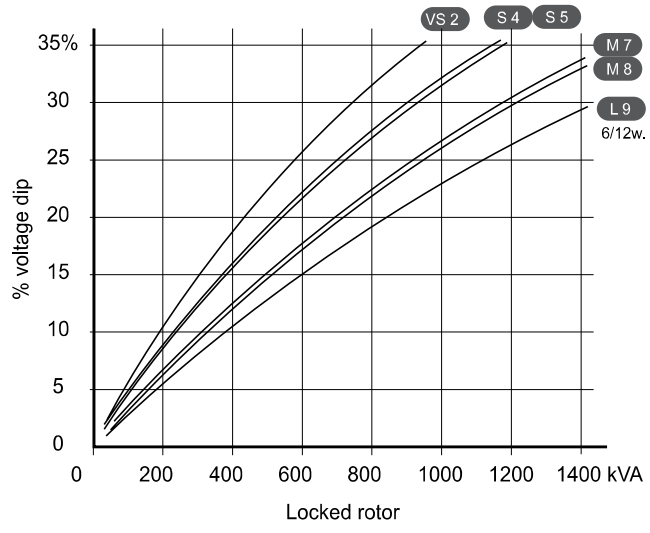

Load rejection (SHUNT excitation)



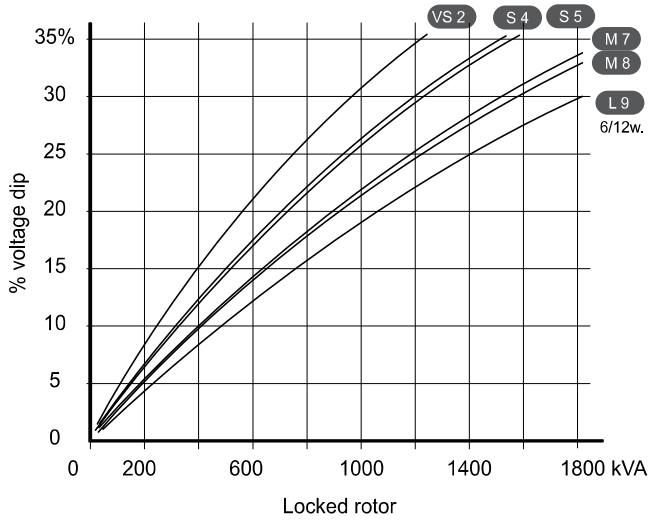

Load rejection (AREP or PMG excitation)




Motor starting (SHUNT excitation)



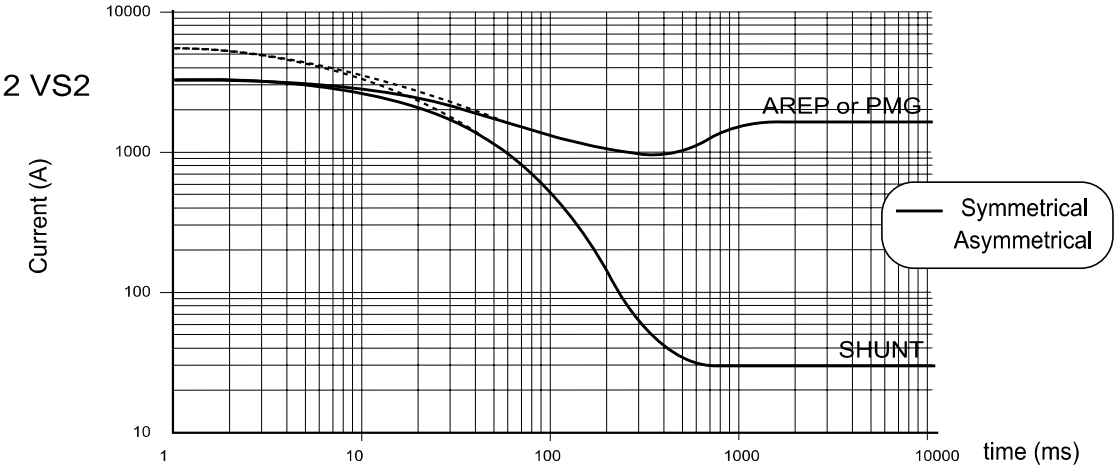

Motor starting (AREP or PMG excitation)



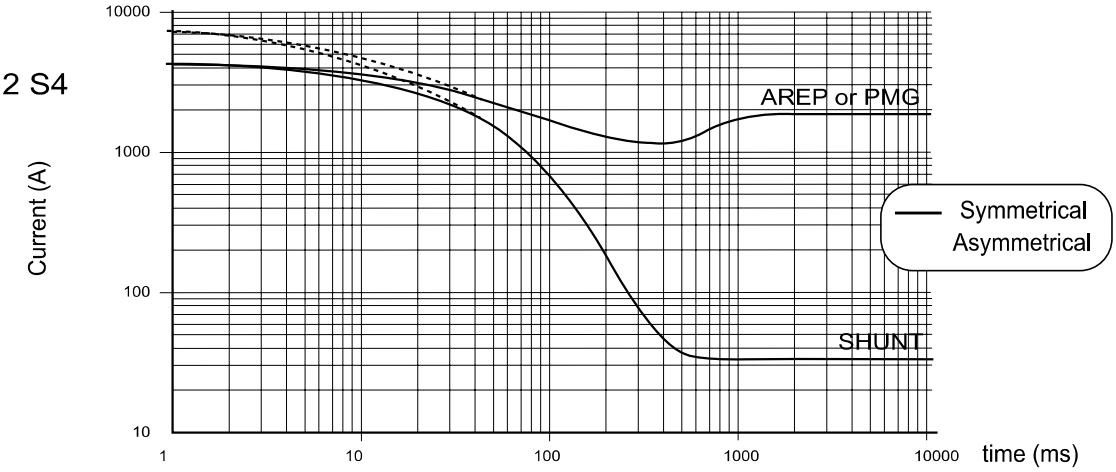

1) For a starting P.F. differing from 0,6, the starting kVA must be multiplied by (Sine Ø /0,8)
2) For voltages other than 480V(Y), 277V(), 240V(YY) at 60 Hz, then kVA must be multiplied by $(480/U)^2$ or $(277/U)^2$ or $(240/U)^2$

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

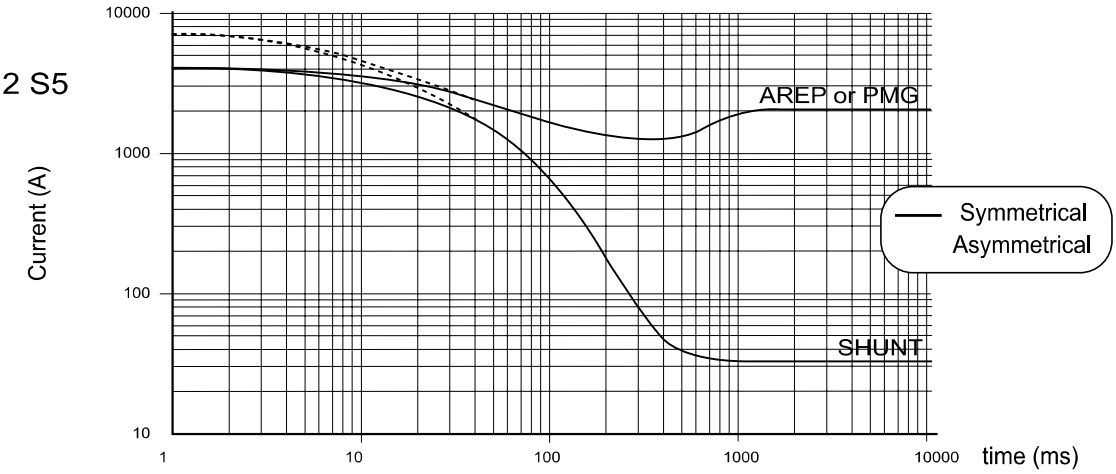
LSA 47.2 VS2




LSA 47.2 S4




LSA 47.2 S5



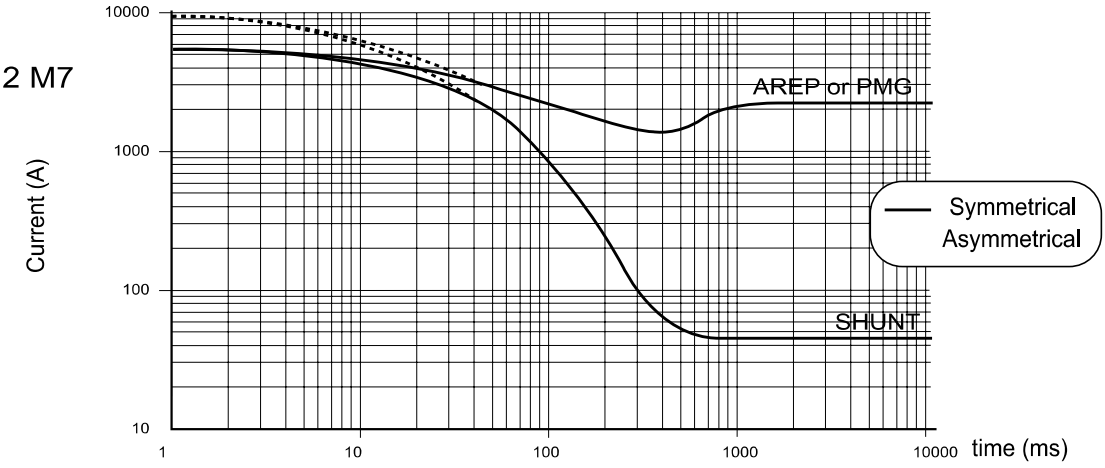

**Influence due to connexion.**

Curves shown are for star connection (Y).
For other connections, use the following multiplication factors :

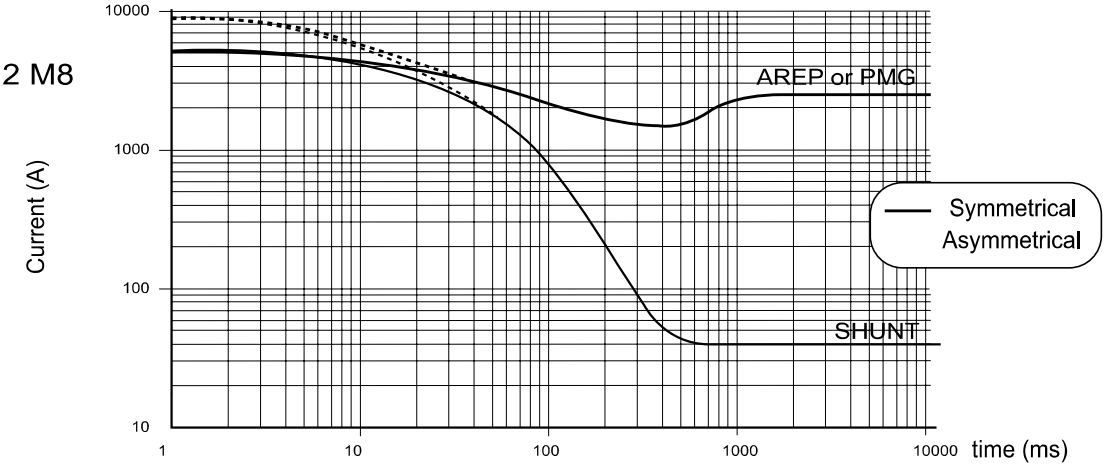
- Series delta : Current value x 1,732
- Parallel star : Current value x 2

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

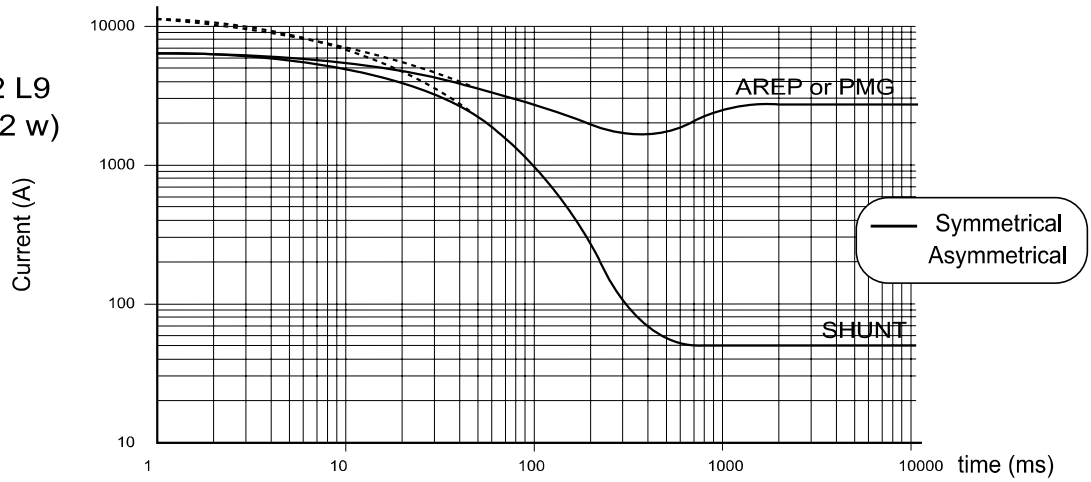
LSA 47.2 M7




LSA 47.2 M8




LSA 47.2 L9
(6w / 12 w)




**Influence due to short-circuit.**

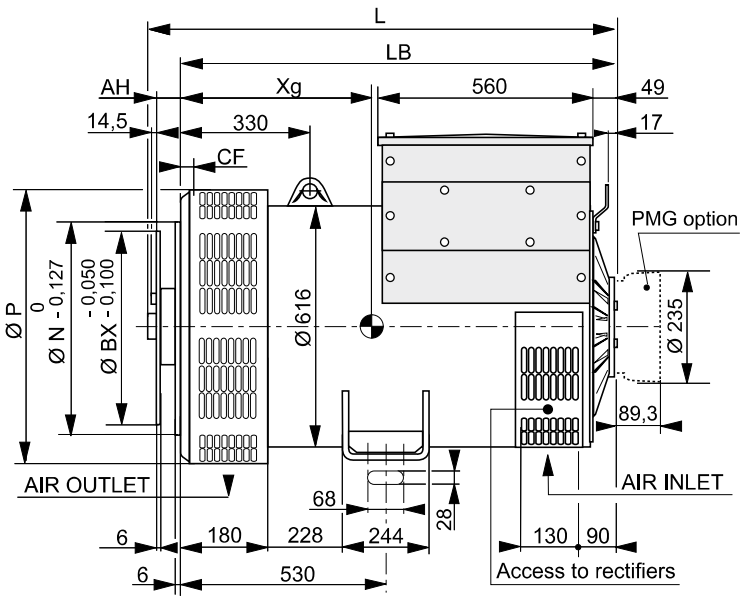
Curves are based on a three-phase short-circuit.

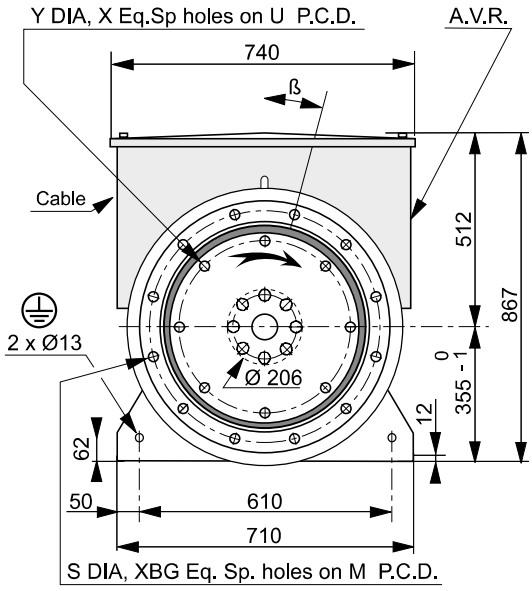
For other types of short-circuit, use the following multiplication factors :

| | 3 phase | 2 phase L - L. | 1 phase L - N. |
|---|---|---|---|
| **Instantaneous (Max)** | 1 | 0,87 | 1,3 |
| **Sustained** | 1 | 1,5 | 2,2 |

# LSA 47.2 - 4 Pole

## Single bearing dimensions



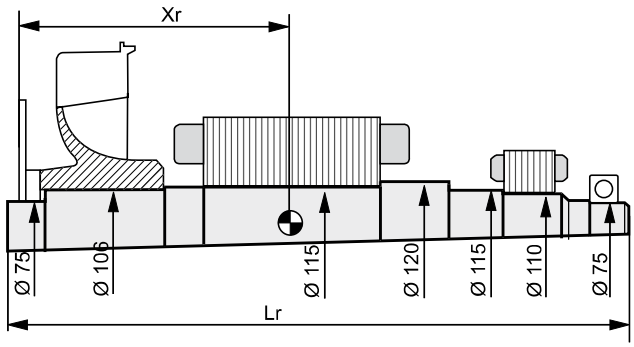

| FRAME DIMENSIONS (mm) | | | | |
|---|---|---|---|---|
| TYPE | L max without PMG | LB | Xg | Weight(kg) |
| **LSA 47.2 VS2** | 1041 | 996 | 437 | 976 |
| **LSA 47.2 S4** | 1101 | 1056 | 471 | 1113 |
| **LSA 47.2 S5** | 1101 | 1056 | 471 | 1113 |
| **LSA 47.2 M7** | 1201 | 1156 | 511 | 1240 |
| **LSA 47.2 M8** | 1201 | 1156 | 520 | 1289 |
| **LSA 47.2 L9** | 1221 | 1176 | 545 | 1372 |

| COUPLING | | | |
|---|---|---|---|
| Flex plate | 11 1/2 | 14 | 18 |
| Flange S.A.E 1 | X | X | |
| Flange S.A.E 1/2 | | X | |
| Flange S.A.E 0 | | X | X |
| | | | |
| | | | |

| Flange dimensions (mm) | | | | | | | |
|---|---|---|---|---|---|---|---|
| **S.A.E.** | P | N | M | XBG | S | ß | CF |
| **1** | 713 | 511,175 | 530,225 | 12 | 12 | 15° | 15 |
| **1/2** | 713 | 584,2 | 619,125 | 12 | 14 | 15° | 22 |
| **0** | 713 | 647,7 | 679,45 | 16 | 14 | 11°15' | 42 |

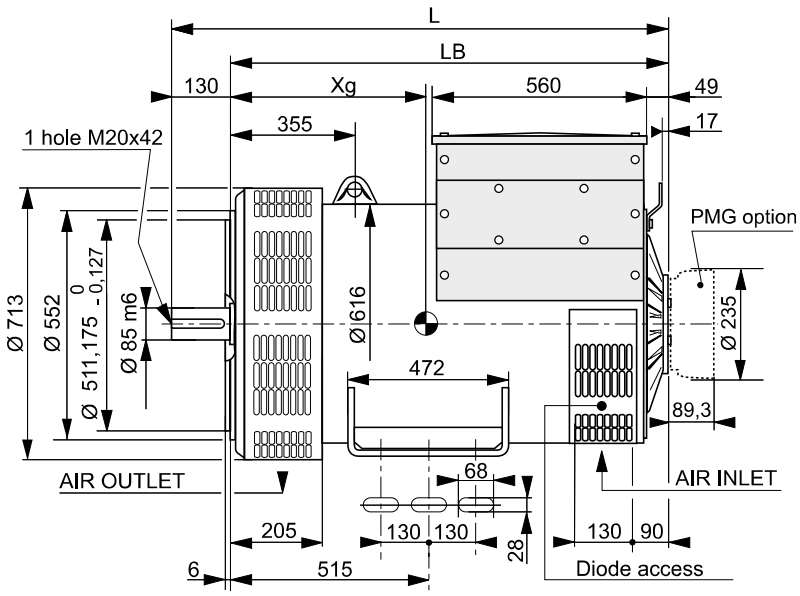
| Flex plate dimensions (mm) | | | | | |
|---|---|---|---|---|---|
| **S.A.E.** | BX | U | X | Y | AH |
| **11 1/2** | 352,42 | 333,38 | 8 | 11 | 39,6 |
| **14** | 466,72 | 438,15 | 8 | 14 | 25,4 |
| **18** | 571,5 | 542,92 | 6 | 17 | 15,7 |

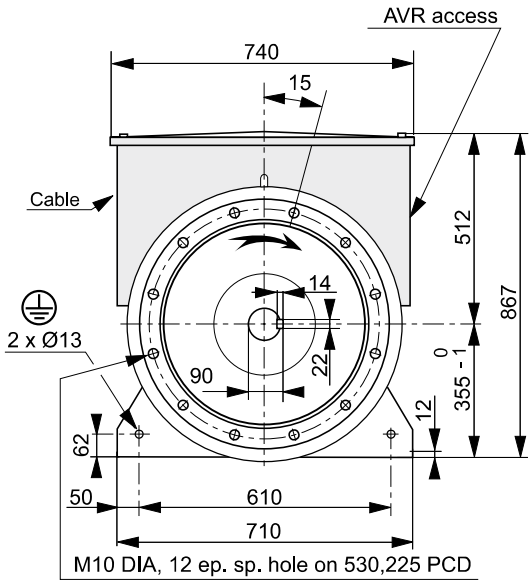
## Torsional analysis data




| Gravity center : Xr (mm), Rotor length Lr (mm), Weight : M (kg), Moment of inertia : J (kgm²) : (4J = MD²) | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Flex plate S.A.E. 11 1/2 | | | | Flex plate S.A.E. 14 | | | | Flex plate S.A.E. 18 | | | |
| TYPE | Xr | Lr | M | J (kg) | Xr | Lr | M | J (kg) | Xr | Lr | M | J (kg) |
| **LSA 47.2 VS2** | 432,5 | 1029 | 387 | 5,99 | 418,3 | 1029 | 387 | 6,12 | 408,5 | 1029 | 387 | 6,38 |
| **LSA 47.2 S4** | 470 | 1089 | 442 | 6,90 | 456 | 1089 | 442 | 7,03 | 446 | 1089 | 442 | 7,29 |
| **LSA 47.2 S5** | 470 | 1089 | 442 | 6,90 | 456 | 1089 | 442 | 7,03 | 446 | 1089 | 442 | 7,29 |
| **LSA 47.2 M7** | 510 | 1189 | 495 | 7,61 | 496 | 1189 | 495 | 7,74 | 486 | 1189 | 495 | 8 |
| **LSA 47.2 M8** | 521 | 1189 | 514 | 8,01 | 507 | 1189 | 514 | 8,14 | 497 | 1189 | 514 | 8,40 |
| | | | | | | | | | | | | |

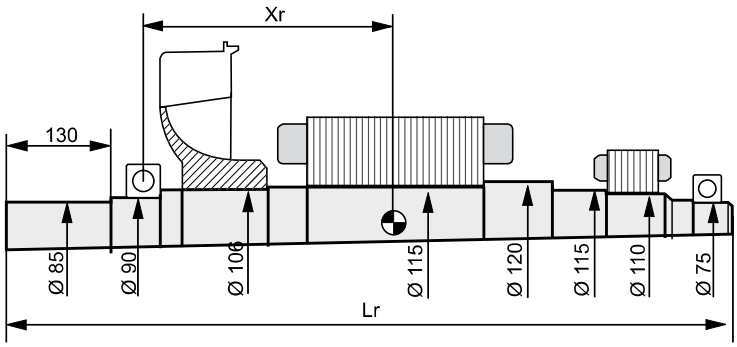
## Two bearing dimensions




| FRAME DIMENSIONS (mm) | | | | |
|---|---|---|---|---|
| TYPE | L maxi without PMG | LB | Xg | Weight (kg) |
| **LSA 47.2 VS2** | 1151 | 1021 | 457 | 996 |
| **LSA 47.2 S4** | 1211 | 1081 | 491 | 1126 |
| **LSA 47.2 S5** | 1211 | 1081 | 491 | 1126 |
| **LSA 47.2 M7** | 1311 | 1181 | 531 | 1253 |
| **LSA 47.2 M8** | 1311 | 1181 | 531 | 1302 |
| **LSA 47.2 L9** | 1331 | 1201 | 565 | 1392 |

## Torsional analysis data




| Gravity center : Xr (mm), Rotor length Lr (mm), Weight : M (kg), Moment of inertia : J (kgm²) : (4J = MD²) | | | | |
|---|---|---|---|---|
| TYPE | Xr | Lr | M | J |
| **LSA 47.2 VS2** | 396,4 | 1139 | 368,5 | 5,79 |
| **LSA 47.2 S4** | 433,2 | 1199 | 424 | 6,70 |
| **LSA 47.2 S5** | 433,2 | 1199 | 424 | 6,70 |
| **LSA 47.2 M7** | 473 | 1299 | 476,2 | 7,41 |
| **LSA 47.2 M8** | 483,5 | 1299 | 494,9 | 7,81 |
| **LSA 47.2 L9** | 504,5 | 1319 | 528 | 8,32 |

**Contact**

www.leroy-somer.com