BER·MAR ELECTRIC MOTORS BLOWERS AND DRIVES

# PM SERIES

## PERMANENT MAGNET MOTORS
## STAND ALONE MOTORS (SPM RANGE)
## INVERTED INTEGRATED (GPM RANGE)

# PM MOTORS MEET CUSTOMER NEEDS

Mandatory energy efficiency regulations for energy using products (EuPs) and energy related products (ErPs) have been enforced by the European Union.
Ber-Mar as a professional electric motors manufacturer who cares about environment and energy saving, one of our most important goals is to help our partners to reduce total life operation costs, increase profitability and make production more environmentally frindly.
To meet customer and EU needs, Ber-Mar have developed high efficiency AC motors meeting both IE2 and IE3 levels. Permanent Magnet (PM) electric motors have been developed to meet the IE4 level.

Ber-Mar's current range of permanent magnet IE4 motors, named PM, are based upon Interior Permanent Magnet (IPM) design, the product will be launched under SPM name.
Ber-Mar's PM motors use rare earth elements as Neodymium in the construction of the magnet elements.

In order to develop the PM Motor, Ber-Mar used a combination of product designs inspired by the brushless servo motor's electrical design and the AC induction motor's mechanical design.
With higher efficiencies than standard AC induction motors they also enhance the power/weight ratio, thereby allowing for significant size and weight reductions of up to 50%.

The Ber-Mar's PM Motor range is primarily targeted applications in pumps, fans, compressors, and blowers, where there is an emphasis on reducing the operating cost or weight, and size of the motors.
Ber-Mar also offer flexibility in terms of design,  customising the active and mechanical parts of the motor to suit specific customer requirements.

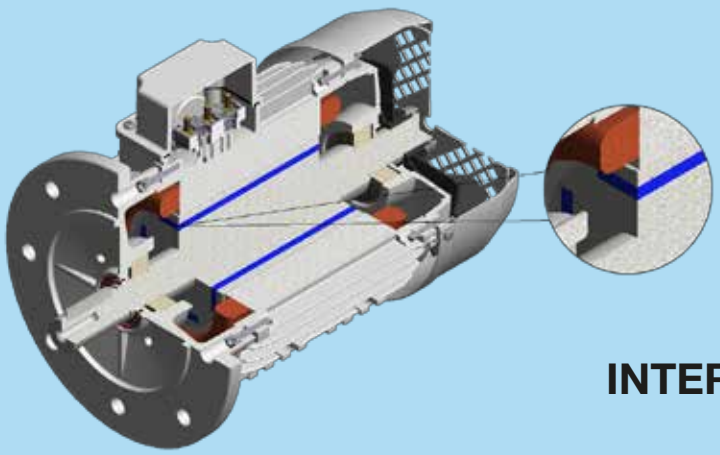
A inverter integrated motor (GPM) version of the product is also avaible, which includes an integrated drive control system.

**RANGE OF PRODUCTS**

Stand-alone motor (SPM range), Inverter integrated (GPM range)
Sensorless control or with speed transducer
Standard ventilation (IC 411) or forced ventilation (IC 416)
DC Brake option

**GENERAL SPECIFICATION**

Power output: 0.25 to 6,6 kW (Range will be extended during 2018) -380-480 V, 50/60 Hz
Torque: 3 to 15 Nm
Compact range in IEC frames: 63-71-80-90
Speed range up to 4500 rpm



**IPM DESIGN**

**INTERIOR PERMANENT MAGNETS**

# DRIVE SPECIFICATIONS

### MAIN SUPPLY

| | |
|---|---|
| Supply frequency | 50 / 60Hz |
| Supply voltage | 3 x 380/480V ± 10% |

### OUTPUT RATINGS

| | |
|---|---|
| Output rated current | 100% continuously @ 40°C |
| Overload capacity | 150% for 60 sec |
| | 200% for 4 sec |

### DIGITAL INPUT

| | |
|---|---|
| Programmable digital input | 5 |
| Voltage level | 0-24VDC (user selectable npn/pnp) |

### ANALOG INPUT

| | |
|---|---|
| Programmable analog voltage input | 1 |
| Voltage level | 0:10VDC |
| Programmable analog current input | 1 |
| Current range | 0:20mA |

### BUS COMMUNICATION

| | |
|---|---|
| RS485 or CANbus | for cascade mode |
| RS485 | serial communication |
| CANbus | CANopen |
| EtherCAT | Profibus |
| Profinet | Ethernet IP |

### RELAY OUTPUT

Programmable relay output

### PROGRAMMING

| | |
|---|---|
| Keypad | Yes |
| PC | Yes |

### CONTROL SPECIFICATION

| | |
|---|---|
| Frequency range | up to 400Hz |
| Control method | Sensorless AC Vector Control |
| Max PWM frequency | 10KHz |

### EXTERNALS

| | |
|---|---|
| Enclosure | IP55 |
| Max operating ambient temperature (Full load) | 0 - 40°C |
| Storage ambient temperature | ÷ 25°C - 60°C |

### COMPLIANCE WITH STANDARDS

| | |
|---|---|
| EN 61800-3:2004 | Adjustable speed electrical power drive systems. EMC requirements |
| IEC 61800-5-1 | Adjustable speed electrical drive systems - part 5-1: safety requirements - electrical, thermal and energy |
| EN 60204-1 | Safety of machinery - electrical EMC equipment of machines - part 1: general rules |

## REDUCTION OF WEIGHT & DIMENSIONS

Frame size comparison
4kW, 1500rpm

| Induction Motor | SPM |
|---|---|
| 112M (33kg) | 90S (12kg) |

## EFFICIENCY STANDARD

Efficiencies are harmonized to the International Standard IEC 60034-30-2:2016 that extends the efficiency levels to Super Premium Efficiency IE4

**IE4 REFERENCE LIMIT**

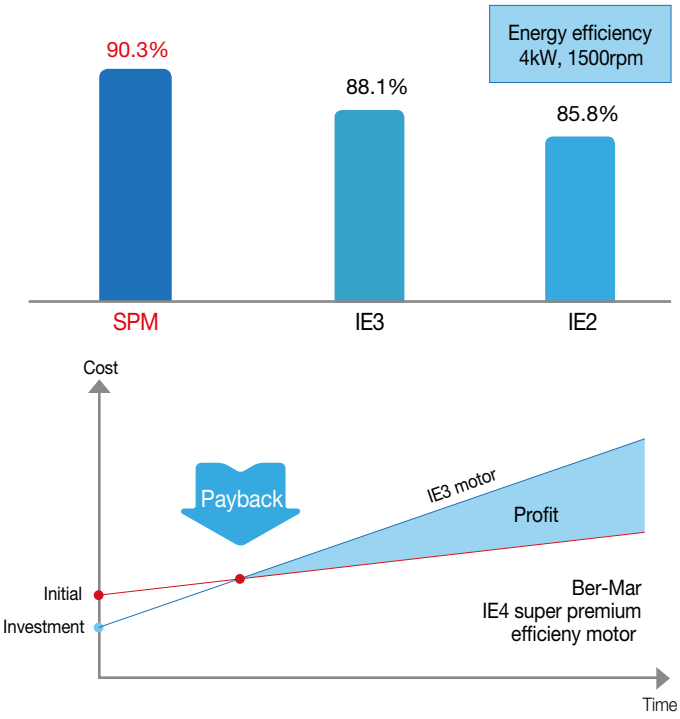
| Output kW | Rated speed within 600 to 900 /min | Rated speed within 901 to 1200 /min | Rated speed within 1201 to 1800 /min | Rated speed within 1801 to 6000 /min |
|---|---|---|---|---|
| 0.12 | 62.3 | 64.9 | 69.8 | 66.5 |
| 0.18 | 67.2 | 70.1 | 74.7 | 70.8 |
| 0.2 | 68.4 | 71.4 | 75.8 | 71.9 |
| 0.25 | 70.8 | 74.1 | 77.9 | 74.3 |
| 0.37 | 74.3 | 78 | 81.1 | 78.1 |
| 0.4 | 74.9 | 78.7 | 81.7 | 78.9 |
| 0.55 | 77 | 80.9 | 83.9 | 81.5 |
| 0.75 | 78.4 | 82.7 | 85.7 | 83.5 |
| 1.1 | 80.8 | 84.5 | 87.2 | 85.2 |
| 1.5 | 82.6 | 85.9 | 88.2 | 86.5 |
| 2.2 | 84.5 | 87.4 | 89.5 | 88 |
| 3 | 85.9 | 88.6 | 90.4 | 89.1 |
| 4 | 87.1 | 89.5 | 91.1 | 90 |
| 5.5 | 88.3 | 90.5 | 91.9 | 90.9 |
| 7.5 | 89.3 | 91.3 | 92.6 | 91.7 |
| 11 | 90.4 | 92.3 | 93.3 | 92.6 |
| 15 | 91.2 | 92.9 | 93.9 | 93.3 |
| 18.5 | 91.7 | 93.4 | 94.2 | 93.7 |
| 22 | 92.1 | 93.7 | 94.5 | 94 |
| 30 | 92.7 | 94.2 | 94.9 | 94.5 |
| 37 | 93.1 | 94.5 | 95.2 | 94.8 |
| 45 | 93.4 | 94.8 | 95.4 | 95 |
| 55 | 93.7 | 95.1 | 95.7 | 95.3 |
| 75 | 94.2 | 95.4 | 96 | 95.6 |
| 90 | 94.4 | 95.6 | 96.1 | 95.8 |
| 110 | 94.7 | 95.8 | 96.3 | 96 |
| 132 | 94.9 | 96 | 96.4 | 96.2 |

## ECONOMIC ADVANTAGES OF USING SPM MOTORS

### Working efficiently

High efficiency motors offer the following advantages:

- Reduced consumption and electricity costs;
- Greater efficiency in all load conditions, particularly with reduced loads, with smaller constant losses;
- Greater efficiency at all speeds, particularly those below the nominal speed.




## CALCULATION OF ENERGY AND COSTS SAVINGS

### Induction motor IE1 or IE2 or IE3

Energy used in a year [kWh/year]:

$$E_{INDUCTION} = \frac{P_{NOM} \times \frac{L\%}{100}}{\frac{n\%_{INDUCTION}}{100}} \times H$$

Annual energy cost [Eur/year]:

$$CA_{INDUCTION} = E_{INDUCTION} \times C$$

### SPM motor

Energy used in a year [kWh/year]:

$$E_{SPM} = \frac{P_{NOM} \times \frac{L\%}{100}}{\frac{n\%_{SPM}}{100}} \times H$$

Annual energy cost [Eur/year]:

$$CA_{SPM} = E_{SPM} \times C$$

### Savings

Energy saved in a year [kWh/year]:

$$E = E_{INDUCTION} - E_{SPM}$$

Annual savings [Eur/year]:

$$RA = CA_{INDUCTION} - CA_{SPM}$$

Payback time for the additional motor costs [Months]:

$$TR = \frac{(Pr_{SPM} - Pr_{INDUCTION})}{RA} \times 12$$

where:

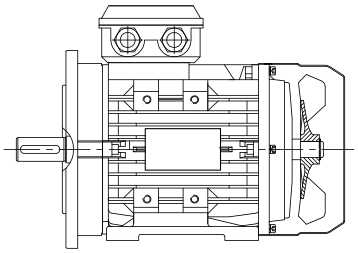
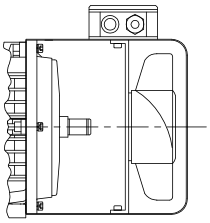
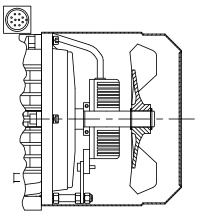
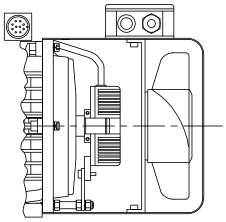
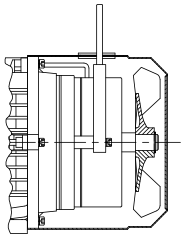
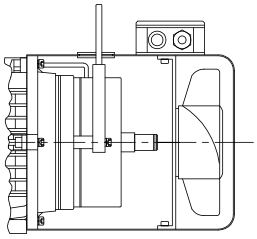
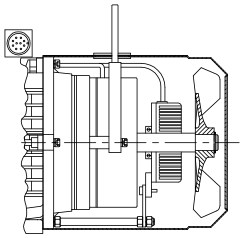
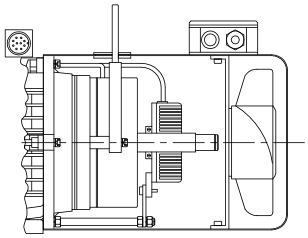
- $P_{nom}$ [kW]: Rated motor output
- L %: Coefficient (%) of use of the rated motor output
- $\eta\%_{INDUCTION}$ : Performance (%) of the induction motor (IE1/IE2/IE3)
- $\eta\%_{SPM}$ : Performance (%) of the SPM brushless motor
- H [h/year]: Annual use of the motor
- C [Eur/kWh]: Cost per kWh
- $Pr_{INDUCTION}$ [Euro]: Price of the induction motor (IE1/IE2/IE3)
- $Pr_{SPM}$ [Eur]: Price of the SPM brushless motor

## POSSIBLE MOTOR CONFIGURATIONS

SPM motors are supplied as standard in the following configuration:

- Cooling system IC411 (self-ventilated)
- Without service brake
- Sensorless speed control

Other configurations are shown in the following table, and are supplied on request:

| | |
|---|---|
|  |  |
| Standard version<br>Cooling method<br>IC411 self-ventilated | Special version<br>Cooling method<br>IC416 forced ventilation |
|  |  |
| Standard version<br>Cooling method IC411 self-ventilated<br>Speed transducer option | Special version<br>Cooling method IC416 forced ventilated<br>Speed transducer option |
|  |  |
| Standard version<br>Cooling method IC411 self-ventilated<br>DC brake option | Special version<br>Cooling method IC416 forced ventilation<br>DC brake option |
|  |  |
| Standard version<br>Cooling method IC411 self-ventilated<br>Speed transducer and DC brake option | Special version<br>Cooling method IC416 forced ventilation<br>Speed transducer and DC brake option |

## HOW TO ORDER A MOTOR

SPM F . 63 P4 1500 . B3

| PM Motor Series |
|---|
| SPM: Stand-alone motor |
| GPM: Inverter integrated motor |

| Rated Speed | |
|---|---|
| F | Brake |
| SV | Forced ventilation |
| C | Encoder |

| IEC Frame | |
|---|---|
| 63 | MEC 63 |
| 71 | MEC 71 |
| 80 | MEC 80 |
| 90S | MEC 90S |
| 90L | MEC 90L |
| 100 | MEC 100 |
| 112 | MEC 112 |
| 132 | MEC 132 |
| 160 | MEC 160 |

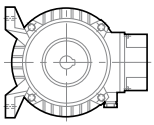
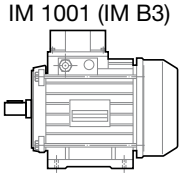
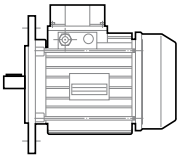
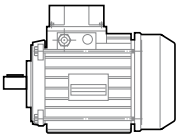
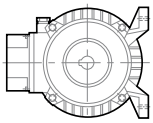
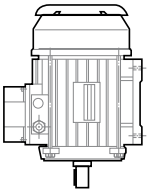
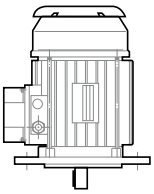
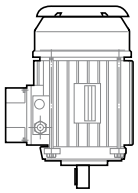
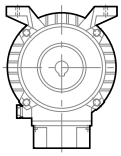
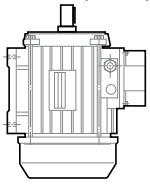
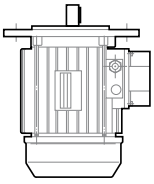
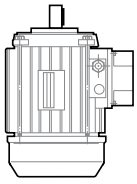
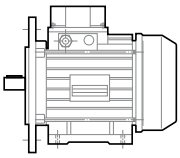
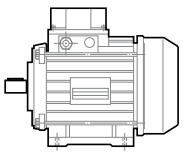
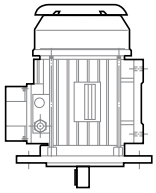
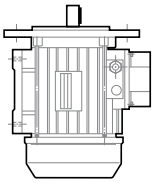
| Poles |
|---|
| 4 |

| Rated Speed |
|---|
| 1500 rpm |

| Mounting |
|---|
| B3 (Foot type) |
| B5 (Flange type) |
| B14 (Flange type) |

## CONSTRUCTION FORMS AND ASSEMBLY POSITIONS

Avaiable construction forms: IM B3, IM B5, IM B14 and combined forms IM B35 (B3/B5) and IM B34 (B3/B14).

| Motors B3 with fixing feet | | Motors with B5 flange fixing through holes | Motors with B14 flange fixing with threaded holes |
|---|---|---|---|
| IM 1051 (IM B6)  | IM 1001 (IM B3)  | IM 3001 (IM B5)  | IM 3601 (IM B14)  |
| IM 1061 (IM B7)  | IM 1011 (IM V5)  | IM 3011 (IM V1)  | IM 3611 (IM V18)  |
| IM 1071 (IM B8)  | IM 1031 (IM V6)  | IM 3031 (IM V3)  | IM 3631 (IM V19)  |
| IM 2001 (IM B35)  B3/B5 | IM 2101 (IM B34)  B3/B14 | IM 2011 (IM V15)  V1/V5 | IM 2031 (IM V36)  V3/V6 |

# SPM 63

# SPM.632P41500

| MOTOR MODEL | | | SPM.632P41500 | | | | | |
|---|---|---|---|---|---|---|---|---|
| INVERTER | | | I.LSLV0004S100-4EOFNS | | | I.LSLV0008S100-4EOFNS | | |
| INVERTER POWER | | | kW 0,40 | | | kW 0,80 | | |
| CONNECTION | | | Y | Y | Y | Δ | Δ | Δ |
| **DESCRIPTION** | **SYMBOL** | **UNIT OF MEASURE** | | | | | | |
| Rated power | P | [kW] | 0,25 | 0,33 | 0,40 | 0,8 | 0,8 | |
| Power supply | V | [V] | | | 400 | | | |
| Rated frequency | f | [HZ] | 25 | 33,3 | 50 | 100 | 150 | |
| Base frequency | V/f | [HZ] | | 50 | | | 87 | |
| Rated speed | RPM | [RPM] | 750 | 1000 | 1500 | 3000 | 4500 | |
| Inverter output voltage | | [V] | 250 | 313 | 350 | 345 | 397 | |
| Voltage constant ±5% | Ke | [Vrms/krpm] | 333,3 | 313,0 | 233,3 | 115,0 | 90,2 | |
| Torque constant ±5% | Kt | [Nm/Arms] | 5,25 | 5,25 | 3,54 | 1,82 | 1,29 | |
| Rated torque | Tn | [Nm] | 3,20 | 3,20 | 2,55 | 2,55 | 2,00 | |
| Rated current | In | [Arms] | 0,61 | 0,61 | 0,72 | 1,40 | 1,55 | |
| Efficiency | η | [%] | 79,3 | 80,0 | 83,4 | 85,8 | 86,0 | |
| Power factor | Cosf | | 0,879 | 0,896 | 0,895 | 0,896 | 0,899 | |
| Maximum torque | Tm | [Nm] | 5,9 | 5,4 | 3,8 | 3,2 | 1,8 | |
| Starting torque | Ts | [Nm] | 3,80 | 3,80 | 3,80 | 4,00 | 3,90 | |
| Maximum torque current | Im | [Arms] | 1,35 | 1,35 | 1,41 | 1,91 | 2,89 | |
| Starting torque current | Is | [Arms] | 1,42 | 1,44 | 1,53 | 2,39 | 3,03 | |
| Phase-phase resistance @ 20°C | Rff | [Ω] | | 50,30 | | | 50,30 | |
| Inverter resistance | Ri | [Ω] | | 20,07 | | | 35,81 | |
| Phase-phase inductance | Lff | [mH] | | 194 | | | 194 | |
| LD inductance | Ld | [mH] | | 105,04 | | | 105,4 | |
| LQ inductance | Lq | [mH] | | 197,1 | | | 64,1 | |
| Inductance flow | Li | [mH] | | 0,597 | | | 0,597 | |
| Ambient temperature | θa | [°C] | -20 ÷ +40 | | | | | |
| Protection class | | IP | 55 | | | | | |
| Cooling system | | IC | 411 ( OPTIONAL IC 416 ) | | | | | |
| Insulation class | | | F | | | | | |
| Overtemperature class | | | B | | | | | |
| Standard thermal protection | | | PTC 130°C | | | | | |
| Rotor inertia | J | [kgm2] | 0,000266 | | | | | |
| Motor weight | | [kg] | 4,11 | | | | | |

# SPM 63

# SPM.633P41500

| MOTOR MODEL | | | SPM.633P41500 | | | | | |
|---|---|---|---|---|---|---|---|---|
| INVERTER | | | I.LSLV0004S100-4EOFNS | | | I.LSLV0008S100-4EOFNS | | |
| INVERTER POWER | | | kW 0,40 | | | kW 0,80 | | |
| CONNECTION | | | Y | Y | Y | Δ | Δ | Δ |
| **DESCRIPTION** | **SYMBOL** | **UNIT OF MEASURE** | | | | | | |
| Rated power | P | [kW] | 0,25 | 0,33 | 0,55 | 1,00 | 1,10 | |
| Power supply | V | [V] | | | 400 | | | |
| Rated frequency | f | [HZ] | 25 | 33,3 | 50 | 100 | 150 | |
| Base frequency | V/f | [HZ] | | 50 | | | 87 | |
| Rated speed | RPM | [RPM] | 750 | 1000 | 1500 | 3000 | 4500 | |
| Inverter output voltage | | [V] | 228 | 288 | 351 | 350 | 388 | |
| Voltage constant ±5% | Ke | [Vrms/krpm] | 304.0 | 288,0 | 234,0 | 116,7 | 88,2 | |
| Torque constant ±5% | Kt | [Nm/Arms] | 5,93 | 4,93 | 3,13 | 1,52 | 1,13 | |
| Rated torque | Tn | [Nm] | 3,50 | 3,50 | 3,50 | 3,20 | 3,00 | |
| Rated current | In | [Arms] | 0,59 | 0,71 | 1,12 | 2,11 | 2,65 | |
| Efficiency | η | [%] | 81,0 | 81,2 | 84,1 | 85,8 | 86,2 | |
| Power factor | Cosf | | 0,477 | 0,579 | 0,566 | 0,615 | 0,788 | |
| Maximum torque | Tm | [Nm] | 7,55 | 7,51 | 7,53 | 5,57 | 3,12 | |
| Starting torque | Ts | [Nm] | 7,50 | 7,20 | 7,10 | 5,80 | 3,06 | |
| Maximum torque current | Im | [Arms] | 2,50 | 2,40 | 2,50 | 3,20 | 3,90 | |
| Starting torque current | Is | [Arms] | 2,70 | 2,80 | 2,90 | 3,60 | 4,20 | |
| Phase-phase resistance @ 20°C | Rff | [Ω] | | 30,64 | | 30,64 | | |
| Inverter resistance | Ri | [Ω] | | 11,37 | | 21,01 | | |
| Phase-phase inductance | Lff | [mH] | | 134 | | 134 | | |
| LD inductance | Ld | [mH] | | 63,20 | | 117 | | |
| LQ inductance | Lq | [mH] | | 197,1 | | 64,1 | | |
| Inductance flow | Li | [mH] | | 0,597 | | 0,597 | | |
| Ambient temperature | θa | [°C] | -20 ÷ +40 | | | | | |
| Protection class | | IP | 55 | | | | | |
| Cooling system | | IC | 411 ( OPTIONAL IC 416 ) | | | | | |
| Insulation class | | | F | | | | | |
| Overtemperature class | | | B | | | | | |
| Standard thermal protection | | | PTC 130°C | | | | | |
| Rotor inertia | J | [kgm2] | 0,000342 | | | | | |
| Motor weight | | [kg] | 4,71 | | | | | |

# SPM 71

# SPM.711P41500

| MOTOR MODEL | | | SPM.711P41500 | | | | | |
|---|---|---|---|---|---|---|---|---|
| INVERTER | | | I.LSLV0008S100-4EOFNS | | | I.LSLV0015S100-4EOFNS | | |
| INVERTER POWER | | | kW 0,80 | | | kW 1,50 | | |
| CONNECTION | | | Y | Y | Y | Δ | Δ | Δ |
| **DESCRIPTION** | **SYMBOL** | **UNIT OF MEASURE** | | | | | | |
| Rated power | P | [kW] | 0,45 | 0,60 | 0,85 | 1,00 | 1,10 | |
| Power supply | V | [V] | 400 | | | | | |
| Rated frequency | f | [HZ] | 25 | 33,3 | 50 | 100 | 150 | |
| Base frequency | V/f | [HZ] | 50 | | | 87 | | |
| Rated speed | RPM | [RPM] | 750 | 1000 | 1500 | 3000 | 4500 | |
| Inverter output voltage | | [V] | 343 | 307 | 343 | 350 | 388 | |
| Voltage constant ±5% | Ke | [Vrms/krpm] | 457,3 | 307,0 | 228,7 | 116,7 | 88,2 | |
| Torque constant ±5% | Kt | [Nm/Arms] | 5,00 | 4,58 | 3,93 | 1,52 | 1,13 | |
| Rated torque | Tn | [Nm] | 5,50 | 5,50 | 5,50 | 3,20 | 3,00 | |
| Rated current | In | [Arms] | 1,10 | 1,20 | 1,40 | 2,11 | 2,65 | |
| Efficiency | η | [%] | 81,0 | 89,0 | 93,0 | 85,8 | 86,2 | |
| Power factor | Cosf | | 0,554 | 0,602 | 0,605 | 0,615 | 0,788 | |
| Maximum torque | Tm | [Nm] | 14,0 | 14,0 | 14,0 | 5,57 | 3,12 | |
| Starting torque | Ts | [Nm] | 10,9 | 11,3 | 11,5 | 5,80 | 3,06 | |
| Maximum torque current | Im | [Arms] | 3,51 | 3,73 | 3,77 | 3,20 | 3,90 | |
| Starting torque current | Is | [Arms] | 3,81 | 3,88 | 4,09 | 3,60 | 4,20 | |
| Phase-phase resistance @ 20°C | Rff | [Ω] | 30,64 | | | 30,64 | | |
| Inverter resistance | Ri | [Ω] | 11,37 | | | 21,01 | | |
| Phase-phase inductance | Lff | [mH] | 134 | | | 134 | | |
| LD inductance | Ld | [mH] | 63,20 | | | 117 | | |
| LQ inductance | Lq | [mH] | 197,1 | | | 64,1 | | |
| Inductance flow | Li | [mH] | 0,597 | | | 0,597 | | |
| Ambient temperature | θa | [°C] | -20 ÷ +40 | | | | | |
| Protection class | | IP | 55 | | | | | |
| Cooling system | | IC | 411 ( OPTIONAL IC 416 ) | | | | | |
| Insulation class | | | F | | | | | |
| Overtemperature class | | | B | | | | | |
| Standard thermal protection | | | PTC 130°C | | | | | |
| Rotor inertia | J | [kgm2] | 0,000695 | | | | | |
| Motor weight | | [kg] | 7,33 | | | | | |

# SPM 71

# SPM.712P41500

| MOTOR MODEL | | | SPM.712P41500 | | | | | |
|---|---|---|---|---|---|---|---|---|
| INVERTER | | | I.LSLV0008S100-4EOFNS | | | I.LSLV0022S100-4EOFNS | | |
| INVERTER POWER | | | kW 0,80 | | | kW 2,20 | | |
| CONNECTION | | | Y | Y | Y | Δ | Δ | Δ |
| **DESCRIPTION** | **SYMBOL** | **UNIT OF MEASURE** | | | | | | |
| Rated power | P | [kW] | 0,55 | 0,75 | 1,10 | 2,20 | 2,20 | |
| Power supply | V | [V] | | | 400 | | | |
| Rated frequency | f | [HZ] | 25 | 33,3 | 50 | 100 | 150 | |
| Base frequency | V/f | [HZ] | | 50 | | | 87 | |
| Rated speed | RPM | [RPM] | 750 | 1000 | 1500 | 3000 | 4500 | |
| Inverter output voltage | | [V] | 346 | 309 | 332 | 350 | 388 | |
| Voltage constant ±5% | Ke | [Vrms/krpm] | 457 | 307 | 229 | 117 | 88 | |
| Torque constant ±5% | Kt | [Nm/Arms] | 4,51 | 4,37 | 3,68 | 1,79 | 1,05 | |
| Rated torque | Tn | [Nm] | 7,0 | 7,0 | 7,0 | 7,0 | 4,7 | |
| Rated current | In | [Arms] | 1,55 | 1,61 | 1,89 | 3,91 | 4,48 | |
| Efficiency | η | [%] | 83,1 | 85,2 | 87,4 | 88,8 | 89,1 | |
| Power factor | Cosf | | 0,879 | 0,896 | 0,895 | 0,896 | 0,899 | |
| Maximum torque | Tm | [Nm] | 11,0 | 11,0 | 11,0 | 11,0 | 11,0 | |
| Starting torque | Ts | [Nm] | 10,0 | 10,0 | 10,0 | 10,0 | 10,0 | |
| Maximum torque current | Im | [Arms] | 2,95 | 3,11 | 3,15 | 4,55 | 5,32 | |
| Starting torque current | Is | [Arms] | 3,19 | 3,28 | 3,45 | 4,77 | 5,45 | |
| Phase-phase resistance @ 20°C | Rff | [Ω] | | 11,16 | | 6,49 | | |
| Inverter resistance | Ri | [Ω] | | 12,01 | | 4,20 | | |
| Phase-phase inductance | Lff | [mH] | | 123 | | 123 | | |
| LD inductance | Ld | [mH] | | 112,3 | | 37,1 | | |
| LQ inductance | Lq | [mH] | | 209,8 | | 65,9 | | |
| Inductance flow | Li | [mH] | | 0,174 | | 0,147 | | |
| Ambient temperature | θa | [°C] | -20 ÷ +40 | | | | | |
| Protection class | | IP | 55 | | | | | |
| Cooling system | | IC | 411 ( OPTIONAL IC 416 ) | | | | | |
| Insulation class | | | F | | | | | |
| Overtemperature class | | | B | | | | | |
| Standard thermal protection | | | PTC 130°C | | | | | |
| Rotor inertia | J | [kgm2] | 0,00164 | | | | | |
| Motor weight | | [kg] | 7,33 | | | | | |

# SPM 80

# SPM.801P41500

| MOTOR MODEL | | | SPM.801P41500 | | | | | |
|---|---|---|---|---|---|---|---|---|
| INVERTER | | | I.LSLV0008S100-4EOFNS | | I.LSLV0015S100-4EOFNS | | I.LSLV0022S100-4EOFNS | |
| INVERTER POWER | | | kW 0,80 | | kW 1,50 | | kW 2,20 | |
| CONNECTION | | | Y | Y | Y | Δ | Δ | Δ |
| **DESCRIPTION** | **SYMBOL** | **UNIT OF MEASURE** | | | | | | |
| Rated power | P | [kW] | 0,55 | 0,80 | 1,10 | 2,20 | 2,20 | |
| Power supply | V | [V] | 400 | | | | | |
| Rated frequency | f | [HZ] | 25 | 33,3 | 50 | 100 | 150 | |
| Base frequency | V/f | [HZ] | 50 | | | | 87 | |
| Rated speed | RPM | [RPM] | 750 | 1000 | 1500 | 3000 | 4500 | |
| Inverter output voltage | | [V] | 244 | 320 | 344 | 350 | 355 | |
| Voltage constant ±5% | Ke | [Vrms/krpm] | 325,3 | 320,0 | 229,3 | 116,7 | 80,7 | |
| Torque constant ±5% | Kt | [Nm/Arms] | 4,66 | 4,52 | 3,73 | 2,01 | 1,18 | |
| Rated torque | Tn | [Nm] | 7,45 | 8,13 | 7,45 | 7,45 | 4,97 | |
| Rated current | In | [Arms] | 1,60 | 1,80 | 2,00 | 3,70 | 4,20 | |
| Efficiency | η | [%] | 85,1 | 85,5 | 88,8 | 91,1 | 92,4 | |
| Power factor | Cosf | | 0,534 | 0,644 | 0,651 | 0,712 | 0,662 | |
| Maximum torque | Tm | [Nm] | 13,8 | 15,0 | 13,8 | 13,8 | 9,20 | |
| Starting torque | Ts | [Nm] | 14,5 | 15,8 | 14,5 | 14,5 | 9,60 | |
| Maximum torque current | Im | [Arms] | 6,25 | 6,31 | 4,79 | 7,90 | 8,38 | |
| Starting torque current | Is | [Arms] | 6,88 | 6,94 | 5,27 | 8,69 | 9,22 | |
| Phase-phase resistance @ 20°C | Rff | [Ω] | 13,10 | | 13,10 | | | |
| Inverter resistance | Ri | [Ω] | 11,96 | | 4,86 | | | |
| Phase-phase inductance | Lff | [mH] | 179,7 | | 179,7 | | | |
| LD inductance | Ld | [mH] | 138,6 | | 50,86 | | | |
| LQ inductance | Lq | [mH] | 234,6 | | 80,1 | | | |
| Inductance flow | Li | [mH] | 0,597 | | 0,597 | | | |
| Ambient temperature | θa | [°C] | -20 ÷ +40 | | | | | |
| Protection class | | IP | 55 | | | | | |
| Cooling system | | IC | 411 ( OPTIONAL IC 416 ) | | | | | |
| Insulation class | | | F | | | | | |
| Overtemperature class | | | B | | | | | |
| Standard thermal protection | | | PTC 130°C | | | | | |
| Rotor inertia | J | [kgm2] | 0,00158 | | | | | |
| Motor weight | | [kg] | 10,20 | | | | | |

# SPM 80

# SPM.802P41500

| MOTOR MODEL | | | SPM.802P41500 | | | | | |
|---|---|---|---|---|---|---|---|---|
| INVERTER | | | I.LSLV0015S100-4EOFNS | | | I.LSLV0022S100-4EOFNS | | |
| INVERTER POWER | | | kW 1,50 | | | kW 2,20 | | |
| CONNECTION | | | Y | Y | Y | Δ | Δ | Δ |
| **DESCRIPTION** | **SYMBOL** | **UNIT OF MEASURE** | | | | | | |
| Rated power | P | [kW] | 0,75 | 1,0 | 1,50 | 3,0 | 3,0 | |
| Power supply | V | [V] | 400 | | | | | |
| Rated frequency | f | [HZ] | 25 | 33,3 | 50 | 100 | 150 | |
| Base frequency | V/f | [HZ] | | 50 | | | 87 | |
| Rated speed | RPM | [RPM] | 750 | 1000 | 1500 | 3000 | 4500 | |
| Inverter output voltage | | [V] | 233 | 300 | 337 | 352 | 345 | |
| Voltage constant ±5% | Ke | [Vrms/krpm] | 310,7 | 300,0 | 224,7 | 117,3 | 78,4 | |
| Torque constant ±5% | Kt | [Nm/Arms] | 4,13 | 4,13 | 3,39 | 1,86 | 1,12 | |
| Rated torque | Tn | [Nm] | 9,50 | 9,50 | 9,50 | 9,50 | 6,50 | |
| Rated current | In | [Arms] | 2,30 | 2,30 | 2,80 | 5,11 | 5,81 | |
| Efficiency | η | [%] | 85,1 | 86,4 | 87,6 | 90,3 | 91,5 | |
| Power factor | Cosf | | 0,554 | 0,712 | 0,667 | 0,748 | 0,688 | |
| Maximum torque | Tm | [Nm] | 22,0 | 21,0 | 23,0 | 20,0 | 13,5 | |
| Starting torque | Ts | [Nm] | 20,1 | 20,9 | 20,4 | 20,2 | 14,3 | |
| Maximum torque current | Im | [Arms] | 5,80 | 6,90 | 9,10 | 9,10 | 9,70 | |
| Starting torque current | Is | [Arms] | 6,38 | 7,59 | 10,01 | 10,01 | 10,67 | |
| Phase-phase resistance @ 20°C | Rff | [Ω] | 8,45 | | | 8,45 | | |
| Inverter resistance | Ri | [Ω] | 9,90 | | | 3,18 | | |
| Phase-phase inductance | Lff | [mH] | 69,3 | | | 69,3 | | |
| LD inductance | Ld | [mH] | 104,6 | | | 34,47 | | |
| LQ inductance | Lq | [mH] | 161 | | | 60,99 | | |
| Inductance flow | Li | [mH] | 0,147 | | | 0,147 | | |
| Ambient temperature | θa | [°C] | -20 ÷ +40 | | | | | |
| Protection class | | IP | 55 | | | | | |
| Cooling system | | IC | 411 ( OPTIONAL IC 416 ) | | | | | |
| Insulation class | | | F | | | | | |
| Overtemperature class | | | B | | | | | |
| Standard thermal protection | | | PTC 130°C | | | | | |
| Rotor inertia | J | [kgm2] | 0,002511 | | | | | |
| Motor weight | | [kg] | 10,5 | | | | | |

# SPM 90

# SPM.90SP41500

| MOTOR MODEL | | | SPM.90SP41500 | | | | | |
|---|---|---|---|---|---|---|---|---|
| INVERTER | | | I.LSLV0015S100-4EOFNS | | I.LSLV0040S100-4EOFNS | | I.LSLV0055S100-4EOFNS | |
| INVERTER POWER | | | kW 1,50 | | kW 4,0 | | kW 5,5 | |
| CONNECTION | | | Y | Y | Y | Δ | Δ | Δ |
| **DESCRIPTION** | **SYMBOL** | **UNIT OF MEASURE** | | | | | | |
| Rated power | P | [kW] | 1,10 | 1,50 | 2,20 | 4,0 | 5,5 | |
| Power supply | V | [V] | 400 | | | | | |
| Rated frequency | f | [HZ] | 25 | 33,3 | 50 | 100 | 150 | |
| Base frequency | V/f | [HZ] | 50 | | | 87 | | |
| Rated speed | RPM | [RPM] | 750 | 1000 | 1500 | 3000 | 4500 | |
| Inverter output voltage | | [V] | 218 | 264 | 358 | 346 | 350 | |
| Voltage constant ±5% | Ke | [Vrms/krpm] | 290,7 | 264,0 | 238,7 | 115,3 | 79,5 | |
| Torque constant ±5% | Kt | [Nm/Arms] | 4,14 | 4,23 | 3,73 | 1,86 | 1,21 | |
| Rated torque | Tn | [Nm] | 14,9 | 15,3 | 14,9 | 13,6 | 12,4 | |
| Rated current | In | [Arms] | 3,60 | 3,60 | 4,0 | 7,30 | 10,3 | |
| Efficiency | η | [%] | 86,2 | 89,8 | 91,8 | 91,5 | 92,4 | |
| Power factor | Cosf | | 0,505 | 0,644 | 0,707 | 0,687 | 0,662 | |
| Maximum torque | Tm | [Nm] | 30,0 | 30,0 | 28,0 | 25,0 | 18,0 | |
| Starting torque | Ts | [Nm] | 27,0 | 29,0 | 28,0 | 24,0 | 24,0 | |
| Maximum torque current | Im | [Arms] | 7,70 | 8,20 | 7,50 | 10,5 | 11,4 | |
| Starting torque current | Is | [Arms] | 7,70 | 8,30 | 8,20 | 13,3 | 14,6 | |
| Phase-phase resistance @ 20°C | Rff | [Ω] | 5,33 | | | 5,33 | | |
| Inverter resistance | Ri | [Ω] | 5,92 | | | 2,10 | | |
| Phase-phase inductance | Lff | [mH] | 50,6 | | | 50,5 | | |
| LD inductance | Ld | [mH] | 65,5 | | | 23,7 | | |
| LQ inductance | Lq | [mH] | 61,0 | | | 40,0 | | |
| Inductance flow | Li | [mH] | 0,597 | | | 0,597 | | |
| Ambient temperature | θa | [°C] | -20 ÷ +40 | | | | | |
| Protection class | | IP | 55 | | | | | |
| Cooling system | | IC | 411 ( OPTIONAL IC 416 ) | | | | | |
| Insulation class | | | F | | | | | |
| Overtemperature class | | | B | | | | | |
| Standard thermal protection | | | PTC 130°C | | | | | |
| Rotor inertia | J | [kgm2] | 0,002956 | | | | | |
| Motor weight | | [kg] | 12,8 | | | | | |

# SPM 90

# SPM.90LP41500

| MOTOR MODEL | | | SPM.90LP41500 | | | | | |
|---|---|---|---|---|---|---|---|---|
| INVERTER | | | I.LSLV0015S100-4EOFNS | | I.LSLV0040S100-4EOFNS | | I.LSLV0055S100-4EOFNS | |
| INVERTER POWER | | | kW 1,50 | | kW 4,0 | | kW 5,5 | |
| CONNECTION | | | Y | Y | Y | Δ | Δ | Δ |
| **DESCRIPTION** | **SYMBOL** | **UNIT OF MEASURE** | | | | | | |
| Rated power | P | [kW] | 1,35 | 1,90 | 2,75 | 5,5 | 5,5 | |
| Power supply | V | [V] | 400 | | | | | |
| Rated frequency | f | [HZ] | 25 | 33,3 | 50 | 100 | 150 | |
| Base frequency | V/f | [HZ] | 50 | | | 87 | | |
| Rated speed | RPM | [RPM] | 750 | 1000 | 1500 | 3000 | 4500 | |
| Inverter output voltage | | [V] | 240 | 260 | 250 | 340 | 345 | |
| Voltage constant ±5% | Ke | [Vrms/krpm] | 320,0 | 260,0 | 166,7 | 113,3 | 78,4 | |
| Torque constant ±5% | Kt | [Nm/Arms] | 4,48 | 4,42 | 3,73 | 2,15 | 1,36 | |
| Rated torque | Tn | [Nm] | 18,3 | 18,8 | 18,6 | 18,6 | 12,4 | |
| Rated current | In | [Arms] | 4,08 | 4,25 | 5,00 | 8,65 | 9,10 | |
| Efficiency | η | [%] | 87,4 | 87,6 | 90,5 | 91,6 | 91,6 | |
| Power factor | Cosf | | 0,534 | 0,698 | 0,667 | 0,735 | 0,662 | |
| Maximum torque | Tm | [Nm] | 33,8 | 34,8 | 34,5 | 34,5 | 23,0 | |
| Starting torque | Ts | [Nm] | 35,5 | 36,5 | 36,2 | 36,2 | 24,1 | |
| Maximum torque current | Im | [Arms] | 14,1 | 14,2 | 14,6 | 24,1 | 25,5 | |
| Starting torque current | Is | [Arms] | 15,5 | 15,6 | 16,1 | 26,5 | 28,1 | |
| Phase-phase resistance @ 20°C | Rff | [Ω] | 3,91 | | | 3,91 | | |
| Inverter resistance | Ri | [Ω] | 4,36 | | | 1,77 | | |
| Phase-phase inductance | Lff | [mH] | 62,2 | | | 62,2 | | |
| LD inductance | Ld | [mH] | 48,9 | | | 14,8 | | |
| LQ inductance | Lq | [mH] | 100,2 | | | 29,4 | | |
| Inductance flow | Li | [mH] | 0,147 | | | 0,597 | | |
| Ambient temperature | θa | [°C] | -20 ÷ +40 | | | | | |
| Protection class | | IP | 55 | | | | | |
| Cooling system | | IC | 411 ( OPTIONAL IC 416 ) | | | | | |
| Insulation class | | | F | | | | | |
| Overtemperature class | | | B | | | | | |
| Standard thermal protection | | | PTC 130°C | | | | | |
| Rotor inertia | J | [kgm2] | 0,003562 | | | | | |
| Motor weight | | [kg] | 15,45 | | | | | |

# SPM 90

# SPM.90L1P41500

| MOTOR MODEL | | | SPM.90L1P41500 | | | | | |
|---|---|---|---|---|---|---|---|---|
| INVERTER | | | I.LSLV0022S100-4EOFNS | | I.LSLV0040S100-4EOFNS | | I.LSLV0055S100-4EOFNS | |
| INVERTER POWER | | | kW 1,50 | | kW 4,0 | | kW 5,5 | |
| CONNECTION | | | Y | Y | Y | Δ | Δ | Δ |
| **DESCRIPTION** | **SYMBOL** | **UNIT OF MEASURE** | | | | | | |
| Rated power | P | [kW] | 1,65 | 2,20 | 3,30 | 6,6 | 6,6 | |
| Power supply | V | [V] | 400 | | | | | |
| Rated frequency | f | [HZ] | 25 | 33,3 | 50 | 100 | 150 | |
| Base frequency | V/f | [HZ] | 50 | | | 87 | | |
| Rated speed | RPM | [RPM] | 750 | 1000 | 1500 | 3000 | 4500 | |
| Inverter output voltage | | [V] | 223 | 288 | 348 | 340 | 345 | |
| Voltage constant ±5% | Ke | [Vrms/krpm] | 297,3 | 288,0 | 232,0 | 113,3 | 78,4 | |
| Torque constant ±5% | Kt | [Nm/Arms] | 4,30 | 4,30 | 3,73 | 1,86 | 1,21 | |
| Rated torque | Tn | [Nm] | 22,4 | 22,4 | 22,4 | 22,4 | 14,9 | |
| Rated current | In | [Arms] | 5,20 | 5,20 | 6,0 | 12,0 | 12,0 | |
| Efficiency | η | [%] | 86,8 | 87,6 | 90,2 | 91,4 | 91,8 | |
| Power factor | Cosf | | 0,654 | 0,698 | 0,667 | 0,735 | 0,662 | |
| Maximum torque | Tm | [Nm] | 36,9 | 37,8 | 39,1 | 36,9 | 24,6 | |
| Starting torque | Ts | [Nm] | 38,7 | 39,7 | 41,1 | 38,7 | 25,8 | |
| Maximum torque current | Im | [Arms] | 11,2 | 11,3 | 11,5 | 17,8 | 19,8 | |
| Starting torque current | Is | [Arms] | 12,3 | 12,5 | 12,6 | 19,5 | 21,8 | |
| Phase-phase resistance @ 20°C | Rff | [Ω] | 2,58 | | | 2,58 | | |
| Inverter resistance | Ri | [Ω] | 2,92 | | | 1,02 | | |
| Phase-phase inductance | Lff | [mH] | 24,8 | | | 24,8 | | |
| LD inductance | Ld | [mH] | 44,2 | | | 13,3 | | |
| LQ inductance | Lq | [mH] | 63,4 | | | 18,6 | | |
| Inductance flow | Li | [mH] | 0,147 | | | 0,597 | | |
| Ambient temperature | θa | [°C] | -20 ÷ +40 | | | | | |
| Protection class | | IP | 55 | | | | | |
| Cooling system | | IC | 411 ( OPTIONAL IC 416 ) | | | | | |
| Insulation class | | | F | | | | | |
| Overtemperature class | | | B | | | | | |
| Standard thermal protection | | | PTC 130°C | | | | | |
| Rotor inertia | J | [kgm2] | 0,003725 | | | | | |
| Motor weight | | [kg] | 16,65 | | | | | |

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