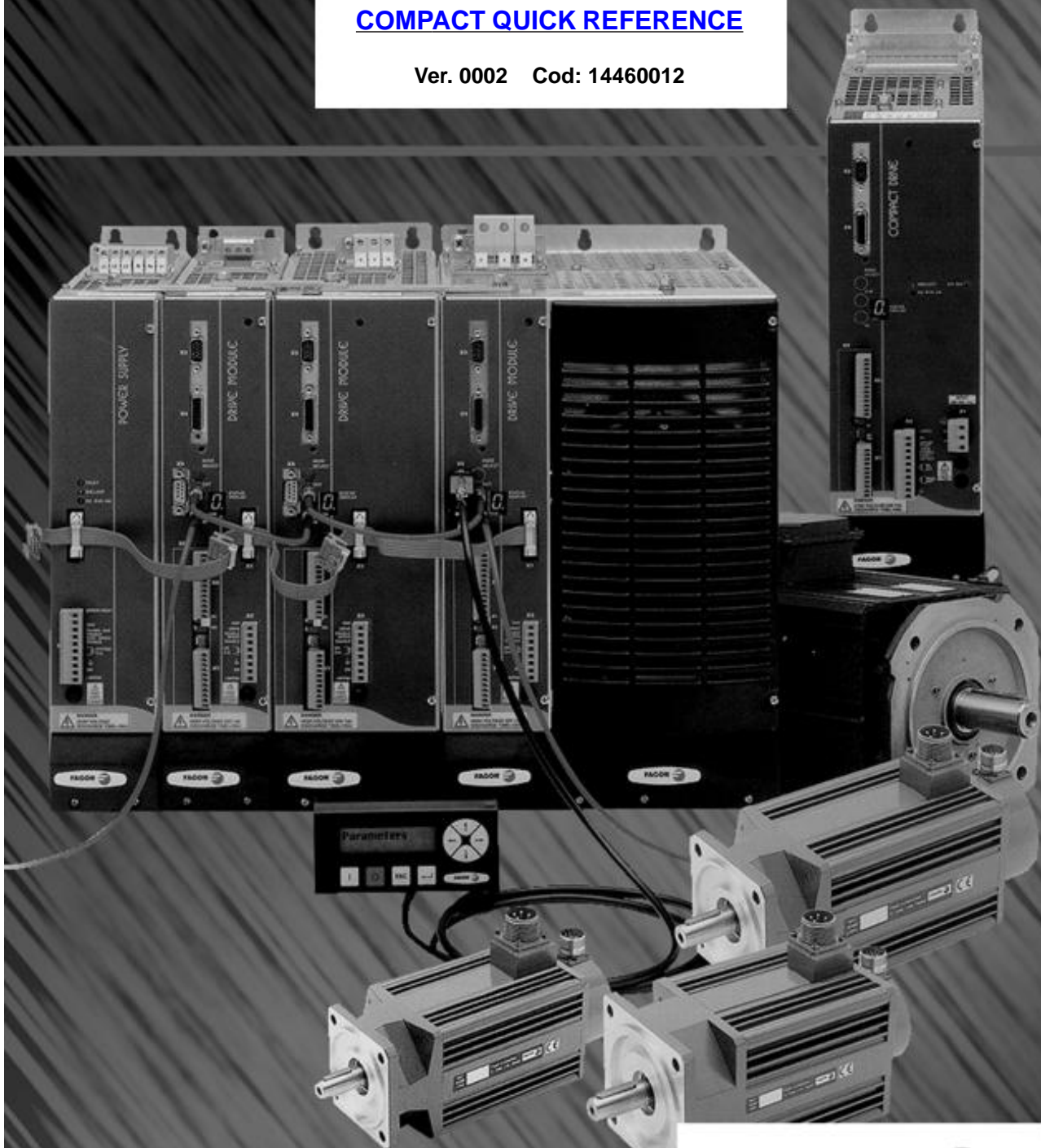


FAGOR AUTOMATION

COMPACT QUICK REFERENCE

Ver. 0002 Cod: 14460012



FAGOR 

WARRANTY TERMS

INITIAL WARRANTY

All products manufactured or marketed by FAGOR carry a 12-month warranty for the end user.

In order to prevent the possibility of having the time period from the time a product leaves our warehouse until the end user actually receives it run against this 12-month warranty, the OEM or distributor must communicate to FAGOR the destination, identification and installation date of the machine by filling out the Warranty Form that comes with each product.

The starting date of the warranty for the user will be the one appearing as the installation date of the machine on the Warranty Form.

This system ensures the 12-month warranty period to the user.

FAGOR offers a 12-month period for the OEM or distributor for selling and installing the product. This means that the warranty starting date may be up to one year after the product has left our warehouse so long as the warranty control sheet has been sent back to us. This translates into the extension of warranty period to two years since the product left our warehouse. If this sheet has not been sent to us, the warranty period ends 15 months from when the product left our warehouse.

FAGOR is committed to repairing or replacing its products from the time when the first such product was launched up to 8 years after such product has disappeared from the product catalog. It is entirely up to FAGOR to determine whether a repair is to be considered under warranty.

EXCLUDING CLAUSES

The repair will take place at our facilities. Therefore, all shipping expenses as well as travelling expenses incurred by technical personnel are NOT under warranty even when the unit is under warranty. This warranty will be applied so long as the equipment has been installed according to the instructions, it has not been mistreated or damaged by accident or negligence and has been handled by personnel authorized by FAGOR.

If once the service call or repair has been completed, the cause of the failure is not to be blamed the FAGOR product, the customer must cover all generated expenses according to current fees. No other implicit or explicit warranty is covered and FAGOR AUTOMATION shall not be held responsible, under any circumstances, of the damage which could be originated.

SERVICE CONTRACTS

Service and Maintenance Contracts are available for the customer within the warranty period as well as outside of it.

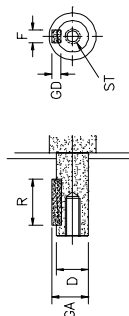
FXM SERIES SYNCHRONOUS MOTORS

General characteristics.

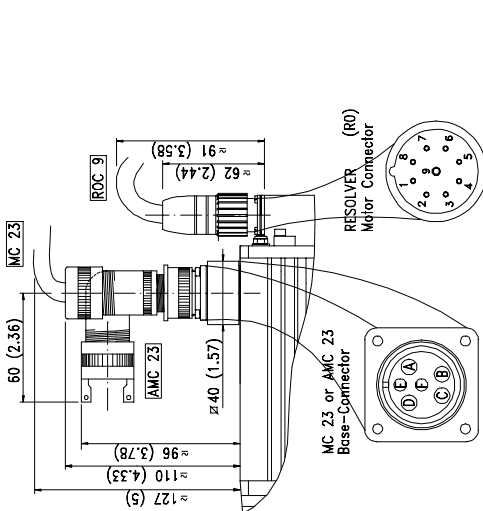
These motors have been manufactured in accordance with the European regulations EN 60204-1 and EN 60034 as instructed by the European directive 73/12/CE on Low Voltage.

| | |
|-------------------------------|--|
| Excitation | Permanent rare earth magnets (SmCo) |
| Temperature sensor | Thermistor |
| Shaft end | Cylindrical with keyway. (Option: with no keyway) |
| Mounting | Face flange |
| Mounting method | B5-V1-V3 (as recommended by IEC-34-3-72) |
| Mechanical tolerances | Normal class (IEC-72/1971) |
| Balancing | Class N (Class R optional) (DIN 45665) (balanced with the whole key) |
| Roller bearings' life | 20,000 hours |
| Noise | DIN 45635 |
| Vibration resistance | Withstands 1G along the shaft and 3G sideways (G = 10 m/s ²). |
| Electrical Insulation | Class F (155°C) (311°F) |
| Isolating resistance | 500 Vdc, 10 MOhmios or greater |
| Dielectric Strength | 1500 Vac, one minute |
| Degree of Protection | Overall: IP64 standard, IP54 with fan Axis: IP64 estandard, IP65 with oil seal |
| Storage temperature | From -20°C to +80°C (-4°F / 176°F) |
| Permitted ambient temperature | From 0°C to +40°C (32°F / 74°F) |
| Permitted ambient humidity | From 20% to 80% (non condensing) |
| Fan | Optional on models: FXM5 and FXM7. Supply voltage: 220 Vac - 50/60 Hz Consumption: 40 W - 0.25 Amp |
| Brake | Optional on all models. See section on "Brake characteristics" |
| Feedback | Sine-wave Encoder or Resolver |

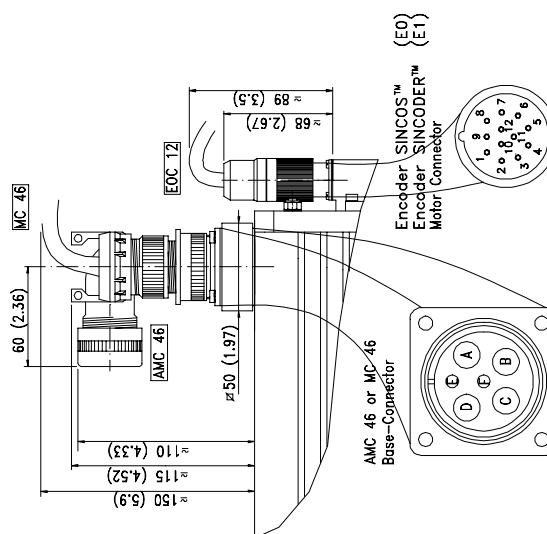
Shaft Dimensions.



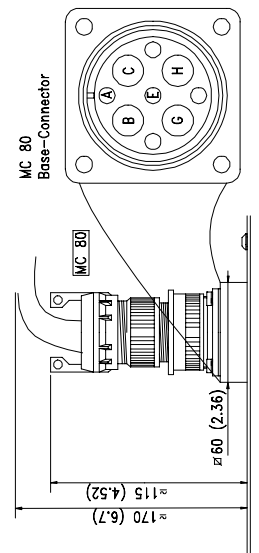
| | F | GD | R | D | GA | ST |
|------|-----------|----------|-----------|-----------|-------------|----------------|
| FXM1 | 5 (0.19) | 5 (0.19) | 20 (0.78) | 14 (0.55) | 16 (0.62) | M5x12.5 (0.49) |
| FXM3 | 6 (0.24) | 6 (0.24) | 30 (1.18) | 19 (0.75) | 21.5 (0.85) | M6x16 (0.63) |
| FXM5 | 8 (0.31) | 7 (0.27) | 40 (1.58) | 24 (0.94) | 27 (1.07) | M8x19 (0.75) |
| FXM7 | 10 (0.39) | 8 (0.31) | 50 (1.97) | 32 (1.26) | 35 (1.38) | M10x22 (0.86) |



| PIN | SIGNAL |
|-----|-----------|
| A | Phase U |
| B | Phase V |
| C | Phase W |
| D | Ground |
| E | Brake (+) |
| F | Brake (-) |



| PIN | SIGNAL |
|-----|-----------|
| A | Phase U |
| B | Phase V |
| C | Phase W |
| D | Ground |
| E | Brake (+) |
| F | Brake (-) |

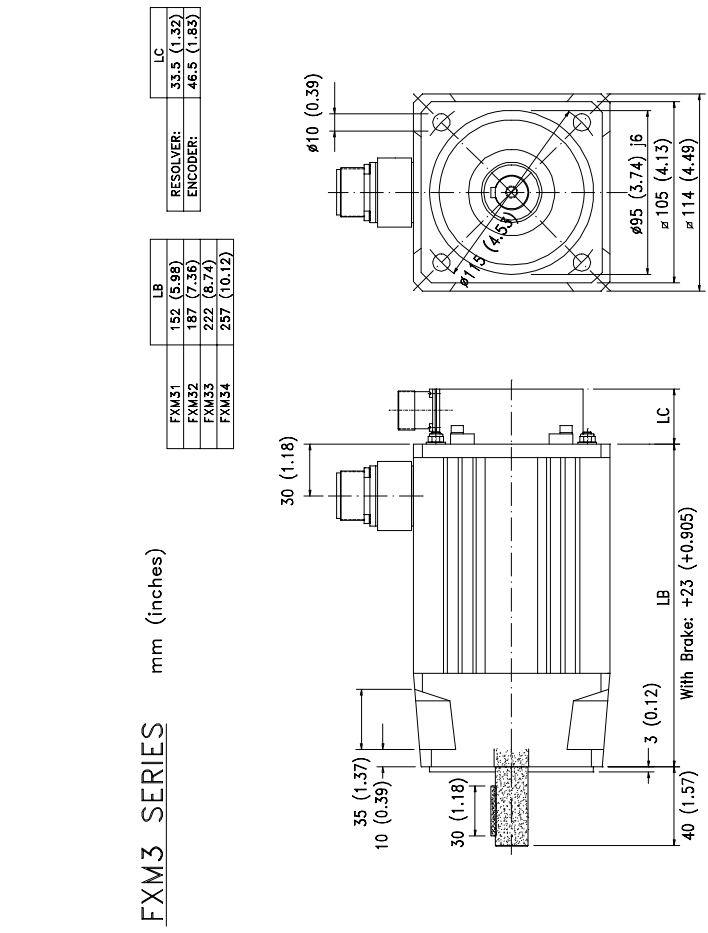
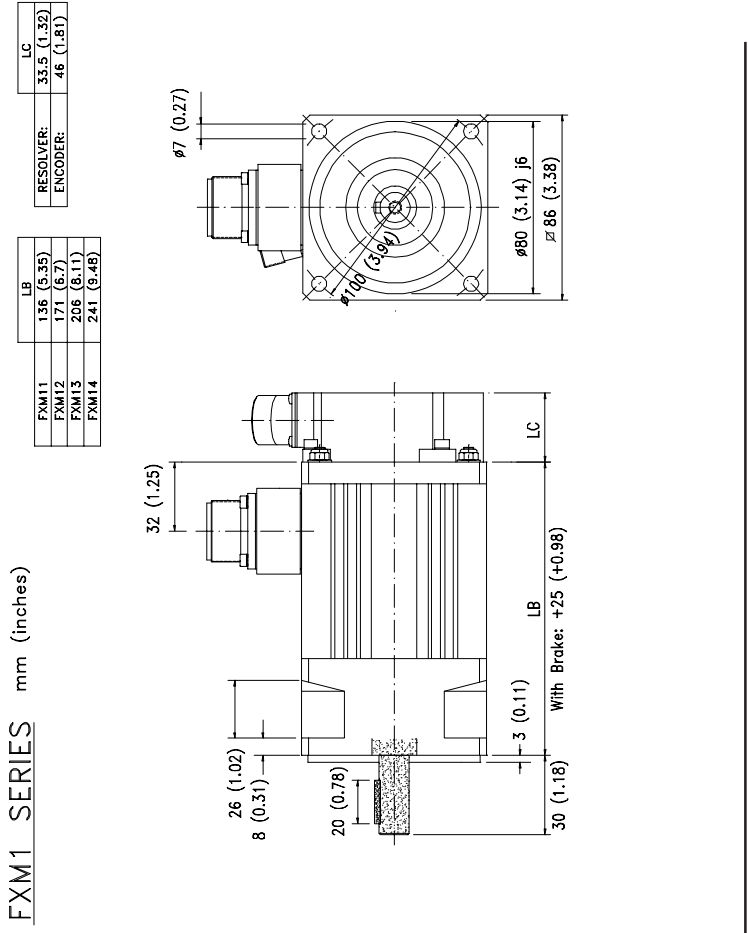


MC 80 Drawings
Sealing: IP65 standard

| PIN | SIGNAL |
|-----|-----------|
| C | Phase U |
| H | Phase V |
| G | Phase W |
| B | Ground |
| A | Brake (+) |
| E | Brake (-) |

| NON-VENTILATED MOTORS | Power conn | | Stall Torque Mo -Nm- | Peak Torque Mp -Nm- | Rated Speed nN -rpm- | Stall Current Io -A- | Peak Current Imax -A- | Power Pow -kW- | Torque Constant KT Nm/A- | Acceleration Time tac -ms- | Inductance inter-phases L -mHr- | Resistance inter-phases R Ohms | Inertia J Kg.cm2 | Weight P -Kg- | Peak Torque (Nm) for 0.5 seconds. | | | | | | | |
|-----------------------|------------|------|----------------------------|---------------------------|----------------------------|----------------------------|-----------------------------|----------------------|--------------------------------|----------------------------------|---------------------------------------|--------------------------------------|------------------------|---------------------|-----------------------------------|-------------|------|------|-------|-------|--|--|
| | 1.08 | 1.15 | | | | | | | | | | | | | 1.25 | 1.35 | 2.50 | 2.75 | 3.100 | 3,150 | | |
| | -Nm- | -Nm- | | | | | | | | | | | | | -Nm- | -Nm- | -Nm- | -Nm- | -Nm- | -Nm- | | |
| FXM11.20A.xx.xx0 | 0,65 | 3,3 | 2000 | 0,3 | 1,3 | 0,1 | 2,6 | 11,6 | 213,0 | 104,0 | 1,8 | 3,3 | 3,3 | | | | | | | | | |
| FXM11.30A.xx.xx0 | 0,65 | 3,3 | 3000 | 0,4 | 2,0 | 0,2 | 1,6 | 17,4 | 115,0 | 56,0 | 1,8 | 3,3 | 3,3 | | | | | | | | | |
| FXM11.40A.xx.xx0 | 0,65 | 3,3 | 4000 | 0,5 | 2,5 | 0,3 | 1,3 | 23,2 | 67,0 | 32,7 | 1,8 | 3,3 | 3,3 | | | | | | | | | |
| FXM12.20A.xx.xx0 | 1,3 | 6,5 | 2000 | 0,5 | 2,5 | 0,3 | 2,6 | 9,3 | 134,0 | 43,4 | 2,9 | 4,3 | 6,5 | | | | | | | | | |
| FXM12.30A.xx.xx0 | 1,3 | 6,5 | 3000 | 0,8 | 4,0 | 0,4 | 1,6 | 14,0 | 83,0 | 27,0 | 2,9 | 4,3 | 6,5 | | | | | | | | | |
| FXM12.40A.xx.xx0 | 1,3 | 6,5 | 4000 | 1,0 | 5,0 | 0,5 | 1,3 | 18,7 | 54,0 | 17,7 | 2,9 | 4,3 | 6,5 | | | | | | | | | |
| FXM13.20A.xx.xx0 | 1,9 | 9,5 | 2000 | 0,8 | 4,0 | 0,4 | 2,4 | 10,8 | 125,0 | 33,6 | 4,9 | 6,4 | 9,5 | | | | | | | | | |
| FXM13.30A.xx.xx0 | 1,9 | 9,5 | 3000 | 1,1 | 5,5 | 0,6 | 1,7 | 16,2 | 56,0 | 15,0 | 4,9 | 6,4 | 9,5 | | | | | | | | | |
| FXM13.40A.xx.xx0 | 1,9 | 9,5 | 4000 | 1,5 | 7,5 | 0,8 | 1,3 | 21,6 | 31,0 | 8,4 | 4,9 | 6,4 | 9,5 | | | | | | | | | |
| FXM14.20A.xx.xx0 | 2,6 | 13,0 | 2000 | 1,0 | 5,0 | 0,5 | 2,6 | 9,7 | 75,0 | 18,0 | 6,0 | 7,6 | 13,0 | | | | | | | | | |
| FXM14.30A.xx.xx0 | 2,6 | 13,0 | 3000 | 1,6 | 8,0 | 0,8 | 1,6 | 14,5 | 42,0 | 10,0 | 6,0 | 7,6 | 13,0 | | | | | | | | | |
| FXM14.40A.xx.xx0 | 2,6 | 13,0 | 4000 | 2,0 | 10,0 | 1,1 | 1,3 | 19,3 | 25,0 | 6,0 | 6,0 | 7,6 | 10,4 | 13,0 | | | | | | | | |
| FXM31.20A.xx.xx0 | 2,0 | 10,0 | 2000 | 0,8 | 4,0 | 0,4 | 2,5 | 9,4 | 133,0 | 37,0 | 4,5 | 5,5 | 10,0 | | | | | | | | | |
| FXM31.30A.xx.xx0 | 2,0 | 10,0 | 3000 | 1,1 | 5,5 | 0,6 | 1,8 | 14,1 | 59,0 | 16,4 | 4,5 | 5,5 | 10,0 | | | | | | | | | |
| FXM31.40A.xx.xx0 | 2,0 | 10,0 | 4000 | 1,5 | 7,5 | 0,8 | 1,3 | 18,8 | 43,0 | 11,9 | 4,5 | 5,5 | 10,0 | | | | | | | | | |
| FXM32.20A.xx.xx0 | 3,9 | 19,5 | 2000 | 1,5 | 7,5 | 0,8 | 2,6 | 7,9 | 85,0 | 15,7 | 7,4 | 7,5 | 19,5 | | | | | | | | | |
| FXM32.30A.xx.xx0 | 3,9 | 19,5 | 3000 | 2,3 | 11,5 | 1,2 | 1,7 | 11,9 | 35,0 | 6,5 | 7,4 | 7,5 | 13,6 | 19,5 | | | | | | | | |
| FXM32.40A.xx.xx0 | 3,9 | 19,5 | 4000 | 3,1 | 15,5 | 1,6 | 1,3 | 15,9 | 22,0 | 4,0 | 7,4 | 7,5 | 10,1 | 18,9 | 19,5 | | | | | | | |
| FXM33.20A.xx.xx0 | 5,8 | 29,0 | 2000 | 2,3 | 11,5 | 1,2 | 2,5 | 7,6 | 53,0 | 8,1 | 10,5 | 9,6 | 20,2 | 29,0 | | | | | | | | |
| FXM33.30A.xx.xx0 | 5,8 | 29,0 | 3000 | 3,5 | 17,5 | 1,8 | 1,7 | 11,4 | 29,0 | 4,5 | 10,5 | 9,6 | 13,3 | 24,9 | 29,0 | | | | | | | |
| FXM33.40A.xx.xx0 | 5,8 | 29,0 | 4000 | 4,6 | 23,0 | 2,4 | 1,3 | 15,2 | 16,0 | 2,5 | 10,5 | 9,6 | 9,6 | 18,9 | 29,0 | | | | | | | |
| FXM34.20A.xx.xx0 | 7,9 | 39,5 | 2000 | 3,1 | 15,5 | 1,7 | 2,5 | 7,4 | 44,0 | 6,0 | 14,0 | 11,5 | 20,4 | 38,2 | 39,5 | | | | | | | |
| FXM34.30A.xx.xx0 | 7,9 | 39,5 | 3000 | 4,7 | 23,5 | 2,5 | 1,7 | 11,1 | 22,0 | 3,0 | 14,0 | 11,5 | 11,5 | 25,2 | 39,5 | | | | | | | |
| FXM34.40A.xx.xx0 | 7,9 | 39,5 | 4000 | 6,2 | 31,0 | 3,3 | 1,3 | 14,8 | 13,0 | 1,8 | 14,0 | 11,5 | 11,5 | 19,1 | 31,9 | 39,5 | | | | | | |
| FXM53.12A.xx.xx0 | 10,0 | 50,0 | 1200 | 2,4 | 12,0 | 1,3 | 4,2 | 5,8 | 88,0 | 10,7 | 23,0 | 15,8 | 33,3 | 50,0 | | | | | | | | |
| FXM53.20A.xx.xx0 | 10,0 | 50,0 | 2000 | 4,0 | 20,0 | 2,1 | 2,5 | 9,6 | 34,0 | 4,2 | 23,0 | 15,8 | 20,0 | 37,5 | 50,0 | | | | | | | |
| FXM53.30A.xx.xx0 | 10,0 | 50,0 | 3000 | 6,0 | 30,0 | 3,1 | 1,7 | 14,4 | 16,0 | 1,9 | 23,0 | 15,8 | 25,0 | 41,7 | 50,0 | | | | | | | |
| FXM53.40A.xx.xx0 | 10,0 | 50,0 | 4000 | 8,0 | 40,0 | 4,2 | 1,3 | 19,3 | 9,0 | 1,1 | 23,0 | 15,8 | 15,8 | 31,3 | 43,8 | 50,0 | | | | | | |
| FXM54.12A.xx.xx0 | 13,6 | 68,0 | 1200 | 3,2 | 16,0 | 1,7 | 4,3 | 6,8 | 65,0 | 7,0 | 37,0 | 17,8 | 34,0 | 63,8 | 68,0 | | | | | | | |
| FXM54.20A.xx.xx0 | 13,6 | 68,0 | 2000 | 5,5 | 27,5 | 2,8 | 2,5 | 11,4 | 26,0 | 2,8 | 37,0 | 17,8 | 37,1 | 61,8 | 68,0 | | | | | | | |
| FXM54.30A.xx.xx0 | 13,6 | 68,0 | 3000 | 8,1 | 40,5 | 4,3 | 1,7 | 17,1 | 12,0 | 1,3 | 37,0 | 17,8 | 42,0 | 58,8 | 68,0 | | | | | | | |
| FXM54.40A.xx.xx0 | 13,6 | 68,0 | 4000 | 10,2 | 51,0 | 5,7 | 1,3 | 22,8 | 6,5 | 0,7 | 37,0 | 17,8 | 33,3 | 46,7 | 66,7 | 68,0 | | | | | | |
| FXM55.12A.xx.xx0 | 17,0 | 85,0 | 1200 | 4,0 | 20,0 | 2,1 | 4,3 | 6,6 | 51,0 | 5,0 | 45,0 | 20,0 | 34,0 | 63,8 | 85,0 | | | | | | | |
| FXM55.20A.xx.xx0 | 17,0 | 85,0 | 2000 | 6,8 | 34,0 | 3,6 | 2,5 | 11,1 | 20,0 | 2,0 | 45,0 | 20,0 | 37,5 | 62,5 | 85,0 | | | | | | | |
| FXM55.30A.xx.xx0 | 17,0 | 85,0 | 3000 | 10,2 | 51,0 | 5,3 | 1,7 | 16,6 | 9,0 | 0,9 | 45,0 | 20,0 | 41,7 | 58,3 | 83,3 | 85,0 | | | | | | |
| FXM55.40A.xx.xx0 | 17,0 | 85,0 | 4000 | 13,3 | 66,5 | 7,1 | 1,3 | 22,2 | 5,0 | 0,5 | 45,0 | 20,0 | 20,0 | 44,7 | 63,9 | 85,0 | | | | | | |

In bold, the combinations where the drive automatically limits its peak current to avoid damaging the motor.



NON-VENTILATED MOTORS

| | Power conn | | | | | | | | | | | | Peak Torque (Nm) for 0.5 seconds. | | | | | | | | | |
|------------------|------------|--------------|------------|-------------|-------------|-------------------------|--------------|------------|-----------------|-------------------|-------------------------|-------------------------|-----------------------------------|--------------|--------------|--------------|--------------|--------------|--------------|---------------|---------------|--------------|
| | | Stall Torque | | Peak Torque | Rated Speed | Stall Current | Peak Current | Power | Torque Constant | Acceleration Time | Inductance inter-phases | Resistance inter-phases | Inertia | Weight | 1.08 | 1.15 | 1.25 | 1.35 | 2.50 | 2.75 | 3.100 | 3.150 |
| | | Mo -Nm- | Mp -Nm- | nN -rpm- | Io -A- | I _{max} -A- | Pow -kW- | KT Nm/A | tac -ms- | L -mHr- | R Ohms | J Kg.cm ² | P -Kg- | 1.08 -Nm- | 1.15 -Nm- | 1.25 -Nm- | 1.35 -Nm- | 2.50 -Nm- | 2.75 -Nm- | 3.100 -Nm- | 3.150 -Nm- | |
| FXM73.12A.xx.xx0 | | 19,5 | 97,5 | 1200 | 4,7 | 23,5 | 2,5 | 4,1 | 11,9 | 58,0 | 4,8 | 92,0 | 29,0 | | | | | | | | | |
| FXM73.20A.xx.xx0 | | 19,5 | 97,5 | 2000 | 7,8 | 39,0 | 4,1 | 2,5 | 19,8 | 22,0 | 1,8 | 92,0 | 29,0 | | 62,2 | | 62,5 | 87,5 | 97,5 | | | |
| FXM73.30A.xx.xx0 | | 19,5 | 97,5 | 3000 | 11,3 | 56,5 | 6,1 | 1,7 | 29,6 | 10,0 | 0,8 | 92,0 | 29,0 | | | | 43,1 | 60,4 | 86,3 | 97,5 | | |
| FXM73.40A.xx.xx0 | | 19,5 | 97,5 | 4000 | 15,4 | 77,0 | 8,2 | 1,3 | 39,5 | 6,0 | 0,5 | 92,0 | 29,0 | | | | 44,3 | 63,3 | 95,0 | 97,5 | | |
| FXM74.12A.xx.xx0 | | 26,0 | 130,0 | 1200 | 6,2 | 31,0 | 3,3 | 4,2 | 11,6 | 44,0 | 3,1 | 120,0 | 31,6 | | 62,9 | | 104,8 | 130,0 | | | | |
| FXM74.20A.xx.xx0 | | 26,0 | 130,0 | 2000 | 10,4 | 52,0 | 5,4 | 2,5 | 19,3 | 16,0 | 1,2 | 120,0 | 31,6 | | | | 62,5 | 87,5 | 125,0 | 130,0 | | |
| FXM74.30A.xx.xx0 | | 26,0 | 130,0 | 3000 | 15,4 | 77,0 | 8,2 | 1,7 | 29,0 | 8,0 | 0,6 | 120,0 | 31,6 | | | | 59,1 | 84,4 | 126,6 | 130,0 | | |
| FXM74.40A.xx.xx0 | | 26,0 | 130,0 | 4000 | 20,6 | 103,0 | 10,9 | 1,3 | 38,6 | 4,0 | 0,3 | 120,0 | 31,6 | | | | | 63,1 | 94,7 | 126,2 | 130,0 | |
| FXM75.12A.xx.xx0 | | 32,0 | 160,0 | 1200 | 7,7 | 38,5 | 4,0 | 4,2 | 12,6 | 34,0 | 2,2 | 160,0 | 36,0 | | | | 103,9 | 145,5 | 160,0 | | | |
| FXM75.20A.xx.xx0 | | 32,0 | 160,0 | 2000 | 12,9 | 64,5 | 6,7 | 2,5 | 20,9 | 13,0 | 0,8 | 160,0 | 36,0 | | | | | 86,8 | 124,0 | 160,0 | | |
| FXM75.30A.xx.xx0 | | 32,0 | 160,0 | 3000 | 19,3 | 96,5 | 10,1 | 1,7 | 31,4 | 6,0 | 0,4 | 160,0 | 36,0 | | | | | 82,9 | 124,4 | 160,0 | | |
| FXM75.40A.xx.xx0 | * | 32,0 | 160,0 | 4000 | 25,3 | 126,5 | 13,4 | 1,3 | 41,9 | 3,0 | 0,2 | 160,0 | 36,0 | | | | | | 94,9 | 126,5 | 160,0 | |
| FXM76.12A.xx.xx0 | | 39,0 | 195,0 | 1200 | 9,3 | 46,5 | 4,9 | 4,2 | 12,2 | 29,0 | 1,8 | 189,0 | 40,0 | | | | 104,8 | 146,8 | 195,0 | | | |
| FXM76.20A.xx.xx0 | | 39,0 | 195,0 | 2000 | 15,4 | 77,0 | 8,2 | 2,5 | 20,3 | 12,0 | 0,7 | 189,0 | 40,0 | | | | | 88,6 | 126,6 | 189,9 | 195,0 | |
| FXM76.30A.xx.xx0 | | 39,0 | 195,0 | 3000 | 22,6 | 113,0 | 12,3 | 1,7 | 30,4 | 5,0 | 0,3 | 189,0 | 40,0 | | | | | 86,3 | 129,4 | 172,6 | 195,0 | |
| FXM76.40A.xx.xx0 | * | 39,0 | 195,0 | 4000 | 31,0 | 155,0 | 16,3 | 1,3 | 40,6 | 3,0 | 0,2 | 189,0 | 40,0 | | | | | | 94,4 | 125,8 | 188,7 | 195,0 |
| FXM77.12A.xx.xx0 | | 45,0 | 225,0 | 1200 | 10,9 | 54,5 | 5,7 | 4,1 | 13,0 | 25,0 | 1,5 | 232,0 | 43,0 | | | | 103,2 | 144,5 | 206,4 | 225,0 | | |
| FXM77.20A.xx.xx0 | | 45,0 | 225,0 | 2000 | 17,3 | 86,5 | 9,4 | 2,6 | 21,6 | 10,0 | 0,6 | 232,0 | 43,0 | | | | | 91,0 | 130,1 | 195,1 | 225,0 | |
| FXM77.30A.xx.xx0 | * | 45,0 | 225,0 | 3000 | 26,5 | 132,5 | 14,1 | 1,7 | 32,4 | 4,0 | 0,3 | 232,0 | 43,0 | | | | | | 127,4 | 169,8 | 225,0 | |
| FXM77.40A.xx.xx0 | * | 45,0 | 225,0 | 4000 | 35,7 | 178,5 | 18,8 | 1,3 | 43,2 | 3,0 | 0,1 | 232,0 | 43,0 | | | | | | 94,5 | 126,1 | 189,1 | 225,0 |
| FXM78.12A.xx.xx0 | | 52,0 | 260,0 | 1200 | 12,5 | 62,5 | 6,5 | 4,2 | 13,0 | 23,0 | 1,3 | 270,0 | 47,0 | | | | 104,0 | 145,6 | 208,0 | 260,0 | | |
| FXM78.20A.xx.xx0 | | 52,0 | 260,0 | 2000 | 20,6 | 103,0 | 10,9 | 2,5 | 21,7 | 8,0 | 0,4 | 270,0 | 47,0 | | | | | 126,2 | 189,3 | 252,4 | 260,0 | |
| FXM78.30A.xx.xx0 | * | 52,0 | 260,0 | 3000 | 31,0 | 155,0 | 16,3 | 1,7 | 32,6 | 4,0 | 0,2 | 270,0 | 47,0 | | | | | | 125,8 | 167,7 | 251,6 | 260,0 |
| FXM78.40A.xx.xx0 | * | 52,0 | 260,0 | 4000 | 41,2 | 206,0 | 21,8 | 1,3 | 43,5 | 2,0 | 0,1 | 270,0 | 47,0 | | | | | | | 126,2 | 189,3 | 260,0 |

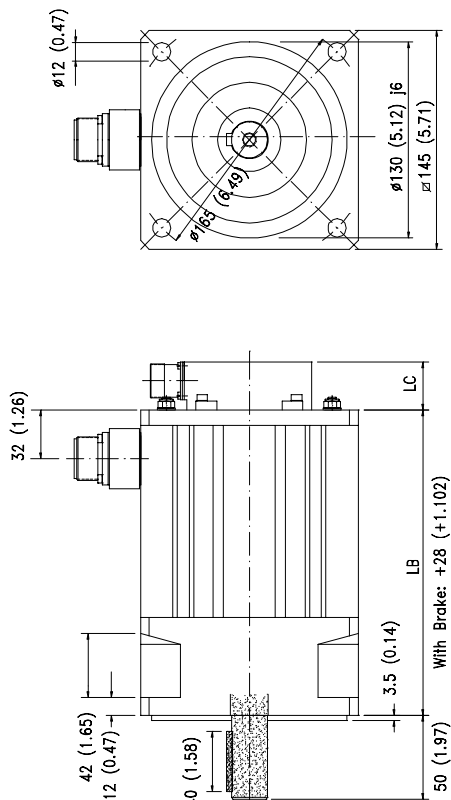
(*) Motors with a power "base" which need to be connected via MC 46 type socket. All the others with MC 23. In bold, the combinations where the drive automatically limits its peak current to avoid damaging the motor.

- Mo, Io: Stall torque, with Io current permitted without time limit
- Mp, I_{max}: Peak torque and maximum current
- Very important: I_{max} must never be exceeded, because it would demagnetize the rotor.
- n_N: Rated (nominal) turning speed.
- Pow: Rated Power = Mo • n_N / 9550
- KT: Torque constant. Torque generated depending on the supplied current.
- tac: Acceleration time of the motor from 0 rpm up to its rated speed at its maximum torque.
- L, R: Winding inductance and resistance between phases.
- J: Rotor inertia.
- P: Weight.

FXM5 SERIES mm (inches)

| | |
|-------|-------------|
| FXM53 | 237 (9.33) |
| FXM54 | 272 (10.71) |
| FXM55 | 307 (12.09) |

| | |
|--------------------|-------------|
| LC | 33.5 (1.32) |
| RESOLVER/ ENCODER: | 46.5 (1.83) |

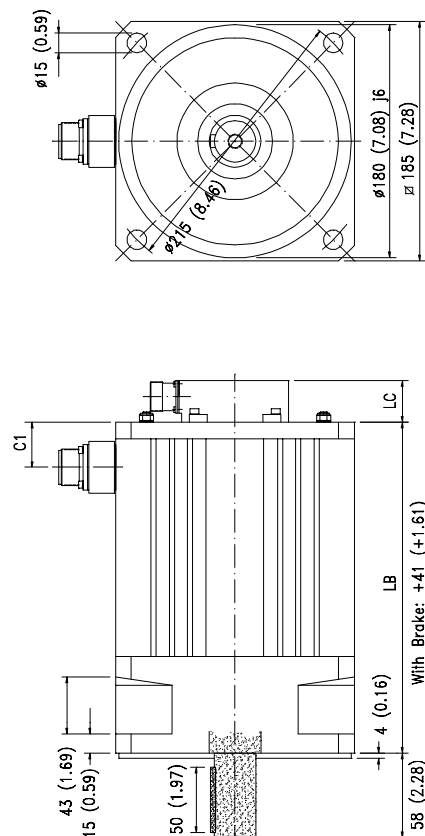


FXM7 SERIES mm (inches)

| | |
|-------|-------------|
| FXM73 | 258 (10.08) |
| FXM74 | 291 (11.46) |
| FXM75 | 328 (12.84) |
| FXM76 | 365 (14.22) |
| FXM77 | 396 (15.59) |
| FXM78 | 431 (16.97) |

| | |
|--------------------|-------------|
| LC | 33.5 (1.32) |
| RESOLVER/ ENCODER: | 46.5 (1.83) |

| | |
|------------|-----------|
| C1 | 35 (1.38) |
| MC-23 BASE | 40 (1.57) |
| MC-46 BASE | 40 (1.57) |



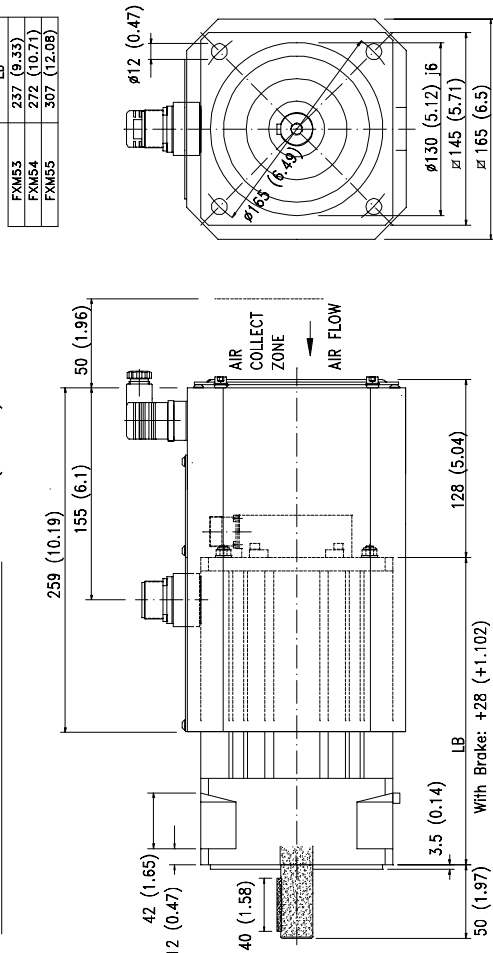
VENTILATED
MOTORS

| | Power conn | | Rated Speed nN -rpm | Stall Current I ₀ -A | Peak Current I _{max} -A | Power Pow -kW | Torque Constant KT Nm/A | Acceleration Time tac -ms | Inductance inter-phases L -mHr | Resistance inter-phases R Ohms | Inertia J Kg.cm ² | Weight P -Kg | Peak Torque (Nm) for 0.5 seconds. | | | | | | | | | |
|------------------|------------|-----------|---------------------------|---------------------------------------|--|---------------------|-------------------------------|---------------------------------|--------------------------------------|--------------------------------------|------------------------------------|--------------------|-----------------------------------|-------------|-------------|-------------|-------------|-------------|--------------|--------------|--|--|
| | Mo -Nm | Mp -Nm | | | | | | | | | | | 1.08 -Nm | 1.15 -Nm | 1.25 -Nm | 1.35 -Nm | 2.50 -Nm | 2.75 -Nm | 3.100 -Nm | 3.150 -Nm | | |
| FXM53.12A.xx.xx1 | 15,0 | 50,0 | 1200 | 3,6 | 12,0 | 1,9 | 4,2 | 5,8 | 88,0 | 10,7 | 23,0 | 20,0 | 33,3 | 50,0 | | | | | | | | |
| FXM53.20A.xx.xx1 | 15,0 | 50,0 | 2000 | 6,0 | 20,0 | 3,1 | 2,5 | 9,6 | 34,0 | 4,2 | 23,0 | 20,0 | 37,5 | 50,0 | | | | | | | | |
| FXM53.30A.xx.xx1 | 15,0 | 50,0 | 3000 | 9,0 | 30,0 | 4,7 | 1,7 | 14,4 | 16,0 | 1,9 | 23,0 | 20,0 | | 41,7 | 50,0 | | | | | | | |
| FXM53.40A.xx.xx1 | 15,0 | 50,0 | 4000 | 12,0 | 40,0 | 6,3 | 1,3 | 19,3 | 9,0 | 1,1 | 23,0 | 20,0 | | 31,3 | 43,8 | 50,0 | | | | | | |
| FXM54.12A.xx.xx1 | 20,4 | 68,0 | 1200 | 4,8 | 16,0 | 2,6 | 4,3 | 6,8 | 65,0 | 7,0 | 37,0 | 22,0 | | 63,8 | 68,0 | | | | | | | |
| FXM54.20A.xx.xx1 | 20,4 | 68,0 | 2000 | 8,3 | 27,5 | 4,3 | 2,5 | 11,4 | 26,0 | 2,8 | 37,0 | 22,0 | | 61,8 | 68,0 | | | | | | | |
| FXM54.30A.xx.xx1 | 20,4 | 68,0 | 3000 | 12,2 | 40,5 | 6,4 | 1,7 | 17,1 | 12,0 | 1,3 | 37,0 | 22,0 | | 42,0 | 58,8 | 68,0 | | | | | | |
| FXM54.40A.xx.xx1 | 20,4 | 68,0 | 4000 | 15,3 | 51,0 | 8,5 | 1,3 | 22,8 | 6,5 | 0,7 | 37,0 | 22,0 | | 46,7 | 66,7 | 68,0 | | | | | | |
| FXM55.12A.xx.xx1 | 25,5 | 85,0 | 1200 | 6,0 | 20,0 | 3,2 | 4,3 | 6,6 | 51,0 | 5,0 | 45,0 | 24,2 | | 63,8 | 85,0 | | | | | | | |
| FXM55.20A.xx.xx1 | 25,5 | 85,0 | 2000 | 12,0 | 34,0 | 5,3 | 2,5 | 11,1 | 20,0 | 2,0 | 45,0 | 24,2 | | 62,5 | 85,0 | | | | | | | |
| FXM55.30A.xx.xx1 | 25,5 | 85,0 | 3000 | 15,3 | 51,0 | 8,0 | 1,7 | 16,6 | 9,0 | 0,9 | 45,0 | 24,2 | | | 58,3 | 83,3 | 85,0 | | | | | |
| FXM55.40A.xx.xx1 | 25,5 | 85,0 | 4000 | 20,0 | 66,5 | 10,7 | 1,3 | 22,2 | 5,0 | 0,5 | 45,0 | 24,2 | | | 63,9 | 85,0 | | | | | | |
| FXM73.12A.xx.xx1 | 29,3 | 97,5 | 1200 | 7,1 | 23,5 | 3,7 | 4,1 | 11,9 | 58,0 | 4,8 | 92,0 | 33,2 | | 62,2 | 97,5 | | | | | | | |
| FXM73.20A.xx.xx1 | 29,3 | 97,5 | 2000 | 11,7 | 39,0 | 6,1 | 2,5 | 19,8 | 22,0 | 1,8 | 92,0 | 33,2 | | | 62,5 | 87,5 | 97,5 | | | | | |
| FXM73.30A.xx.xx1 | 29,3 | 97,5 | 3000 | 17,0 | 56,5 | 9,2 | 1,7 | 29,6 | 10,0 | 0,8 | 92,0 | 33,2 | | | 60,4 | 86,3 | 97,5 | | | | | |
| FXM73.40A.xx.xx1 | * | 29,3 | 4000 | 23,1 | 77,0 | 12,3 | 1,3 | 39,5 | 6,0 | 0,5 | 92,0 | 33,2 | | | | 63,3 | 95,0 | 97,5 | | | | |
| FXM74.12A.xx.xx1 | 39,0 | 130,0 | 1200 | 9,3 | 31,0 | 4,9 | 4,2 | 11,6 | 44,0 | 3,1 | 120,0 | 35,8 | | | 104,8 | 130,0 | | | | | | |
| FXM74.20A.xx.xx1 | 39,0 | 130,0 | 2000 | 15,6 | 52,0 | 8,2 | 2,5 | 19,3 | 16,0 | 1,2 | 120,0 | 35,8 | | | | 87,5 | 125,0 | 130,0 | | | | |
| FXM74.30A.xx.xx1 | 39,0 | 130,0 | 3000 | 23,1 | 77,0 | 12,3 | 1,7 | 29,0 | 8,0 | 0,6 | 120,0 | 35,8 | | | | | 84,4 | 126,6 | 130,0 | | | |
| FXM74.40A.xx.xx1 | * | 39,0 | 4000 | 30,9 | 103,0 | 16,3 | 1,3 | 38,6 | 4,0 | 0,3 | 120,0 | 35,8 | | | | | | 94,7 | 126,2 | 130,0 | | |
| FXM75.12A.xx.xx1 | 48,0 | 160,0 | 1200 | 11,6 | 38,5 | 6,0 | 4,2 | 12,6 | 34,0 | 2,2 | 160,0 | 40,2 | | | 103,9 | 145,5 | 160,0 | | | | | |
| FXM75.20A.xx.xx1 | 48,0 | 160,0 | 2000 | 19,4 | 64,5 | 10,1 | 2,5 | 20,9 | 13,0 | 0,8 | 160,0 | 40,2 | | | | | 124,0 | 160,0 | | | | |
| FXM75.30A.xx.xx1 | ** | 48,0 | 3000 | 29,0 | 96,5 | 15,1 | 1,7 | 31,4 | 6,0 | 0,4 | 160,0 | 40,2 | | | | | | 124,4 | 160,0 | | | |
| FXM75.40A.xx.xx1 | * | 48,0 | 4000 | 38,0 | 126,5 | 20,1 | 1,3 | 41,9 | 3,0 | 0,2 | 160,0 | 40,2 | | | | | | | 124,4 | 160,0 | | |
| FXM76.12A.xx.xx1 | ** | 58,5 | 195,0 | 14,0 | 46,5 | 7,4 | 4,2 | 12,2 | 29,0 | 1,8 | 189,0 | 44,2 | | | | 146,8 | 195,0 | | | | | |
| FXM76.20A.xx.xx1 | * | 58,5 | 2000 | 23,1 | 77,0 | 12,3 | 2,5 | 20,3 | 12,0 | 0,7 | 189,0 | 44,2 | | | | | 126,6 | 189,9 | 195,0 | | | |
| FXM76.30A.xx.xx1 | * | 58,5 | 3000 | 33,9 | 113,0 | 18,4 | 1,7 | 30,4 | 5,0 | 0,3 | 189,0 | 44,2 | | | | | | 129,4 | 172,6 | 195,0 | | |
| FXM76.40A.xx.xx1 | ** | 58,5 | 4000 | 46,5 | 155,0 | 24,5 | 1,3 | 40,6 | 3,0 | 0,2 | 189,0 | 44,2 | | | | | | | 125,8 | 188,7 | | |
| FXM77.12A.xx.xx1 | * | 67,5 | 225,0 | 16,4 | 54,5 | 8,5 | 4,1 | 13,0 | 25,0 | 1,5 | 232,0 | 47,2 | | | | 144,5 | 206,4 | 225,0 | | | | |
| FXM77.20A.xx.xx1 | * | 67,5 | 2000 | 26,0 | 86,5 | 14,1 | 2,6 | 21,6 | 10,0 | 0,6 | 232,0 | 47,2 | | | | | | 195,1 | 225,0 | | | |
| FXM77.30A.xx.xx1 | * | 67,5 | 3000 | 39,8 | 132,5 | 21,2 | 1,7 | 32,4 | 4,0 | 0,3 | 232,0 | 47,2 | | | | | | | 169,8 | 225,0 | | |
| FXM77.40A.xx.xx1 | ** | 67,5 | 4000 | 53,6 | 178,5 | 28,3 | 1,3 | 43,2 | 3,0 | 0,1 | 232,0 | 47,2 | | | | | | | 189,1 | 225,0 | | |
| FXM78.12A.xx.xx1 | * | 78,0 | 260,0 | 18,8 | 62,5 | 9,8 | 4,2 | 13,0 | 23,0 | 1,3 | 270,0 | 51,2 | | | | 208,0 | 260,0 | | | | | |
| FXM78.20A.xx.xx1 | * | 78,0 | 2000 | 30,9 | 103,0 | 16,3 | 2,5 | 21,7 | 8,0 | 0,4 | 270,0 | 51,2 | | | | | | 189,3 | 252,4 | 260,0 | | |
| FXM78.30A.xx.xx1 | ** | 78,0 | 3000 | 46,5 | 155,0 | 24,5 | 1,7 | 32,6 | 4,0 | 0,2 | 270,0 | 51,2 | | | | | | | 167,7 | 251,6 | | |
| FXM78.40A.xx.xx1 | ** | 78,0 | 4000 | 61,8 | 206,0 | 32,7 | 1,3 | 43,5 | 2,0 | 0,1 | 270,0 | 51,2 | | | | | | | | 189,3 | | |

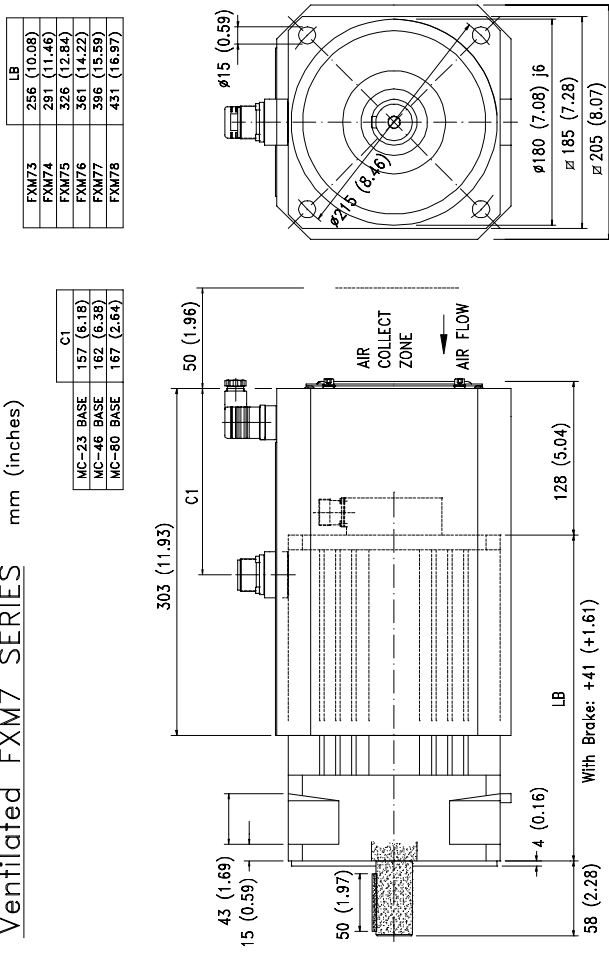
(*) Motors with a power "base" which need to be connected via MC 46 type socket.

(**) Motors with a power "base" which need to be connected via MC 80 type socket. All the others with MC 23. In bold, the combinations where the drive automatically limits its peak current to avoid damaging the motor.

Ventilated FXM5 SERIES



Ventilated FXM7 SERIES

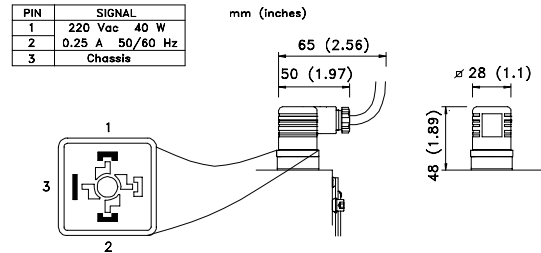


Brake characteristics.

The brake (motor shaft) must never exceed its Maximum speed. Voltage over 26 V will lock the axis.

| Motor Type | Torque | Maximum RPM | Power | On/Off Delay | Unlocking voltage margin | Inertia | Weight |
|------------|-------------|-------------|------------|--------------|--------------------------|--|------------|
| | Nm (in.lb) | rpm | W (HP) | ms | Vdc | Kg.cm ² (lb.in ²) | Kg (lbf) |
| FXM 1 | 2.5 (22.12) | 10000 | 12 (0.016) | 7/5 | 22 - 26 | 0,38 (0.13) | 0,3 (0.66) |
| FXM 3 | 5 (44.25) | 8000 | 16 (0.021) | 15/7 | | 1,06 (0.36) | 0,6 (1.32) |
| FXM 5 | 12 (106.2) | 6000 | 18 (0.024) | 30/13 | | 3,6 (1.23) | 1.1 (2.42) |
| FXM 7 | 40 (354) | 3600 | 35 (0.047) | 100/30 | | 31,8 (10.86) | 3.5 (7.71) |

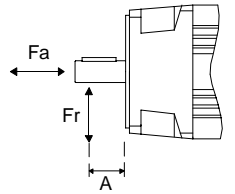
Fan connector, characteristics and dimensions.



Shaft mounting conditions.

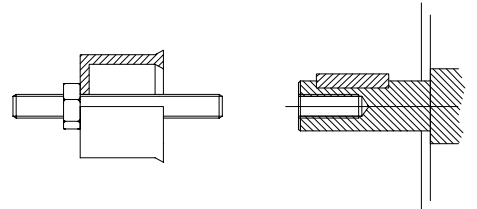
Use flexible couplings for direct coupling. Avoid radial and axial loads, see the table. For radial and axial loads combined, decrease the value of the permitted radial force F_r to 70% of the table value.

| Motor Type | Axial Force F_a | Radial Force F_r | Distance A |
|------------|-------------------|---------------------|---------------|
| FXM1 | 105 Nw (23.6 lbf) | 500 Nw (112.4 lbf) | 15 mm (0.59") |
| FXM3 | 138 Nw (31 lbf) | 660 Nw (148.3 lbf) | 20 mm (0.78") |
| FXM5 | 157 Nw (35.3 lbf) | 745 Nw (167.4 lbf) | 25 mm (0.98") |
| FXM7 | 336 Nw (75.5 lbf) | 1590 Nw (357.4 lbf) | 29 mm (1.14") |



When installing pulleys or gears for transmission, avoid hitting the shaft.

Use some tool that is supported in the threaded hole on the shaft to insert the pulley or the gear.



General mounting conditions.

Before installing it onto the machine, the anti-rust paint should be removed from the rotor shaft and the flange. It must always be in a dry and clean place. Mounted so it is easily inspected, cleaned and maintained. Free of corrosive atmosphere and/or explosive gasses or liquids. If the motor is going to be continuously exposed to oil splashes, it should be protected with a guard.

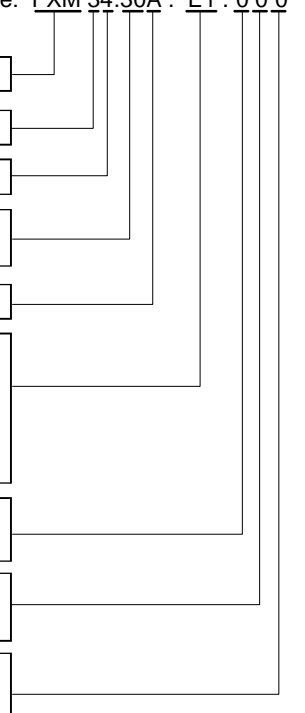
Sales reference.

The sales reference is stored in the motor encoder. From version 03.01 on, the Drive software, can automatically adjust the motor parameters by reading that "sales-reference" from the encoder memory.

AXIS MOTORS, FXM

Example: FXM 34.30A . E1 . 0 0 0

| | |
|------------------|--|
| FAGOR AXIS MOTOR | |
| SIZE | 1, 3, 5, 7 |
| LENGTH | |
| MAXIMUM SPEED | 12 1200 rpm 20 2000 rpm 30 3000 rpm 40 4000 rpm |
| WINDING | A 380 Vac |
| FEEDBACK TYPE | E0 Encoder Sincos™ (Except for FXM1 type) E1 Encoder Sincoder™ A0 Encoder Absoluto Sincos™ (Except for FXM1 type) R0 Resolver Tamagawa™ |
| FLANGE AND SHAFT | 0 With Keyway (Siemens™ 1FT5) 1 Without Keyway |
| BRAKE OPTION | 0 Without brake 1 With standard brake (24 Vdc) |
| VENTILATION | 0 Without Fan 1 With Fan (220 Vac) |



SPM SERIES ASYNCHRONOUS MOTORS

These motors have been manufactured in compliance with the EN 60204-1 and EN 60034 standards as instructed by the European Directive 89/392/CE on machine safety.

| Conversion table | | |
|-------------------|------------------------------|------------------------|
| Metric | to | Imperial |
| mm | $\div 25.4$ | inch |
| Kg·m ² | $\div 0.113$ | lb·in·sec ² |
| Nm | $\div 0.113$ | lb·in |
| °C | $\times 1.8 \rightarrow +32$ | °F |
| Kw | $\div 0.746$ | HP |

Electrical characteristics.

The maximum base time of the cycle S6-40% is 10 minutes.

(*) Maximum speed with special bearings. Optional.
(**) The maximum power in S6-40% will be 43.3 kW (SPM 160L) and 45 kW (SPM 180MA) with SPM3.150 drives.

| | |
|-----------------------------|---|
| Motor type. | Induction. Squirrel cage |
| Thermal protection | Thermistor: klixon N.C. (250 V - 2.5 A) |
| Balancing | Degree S -ISO2373-, (SR degree, upon request) (with the key mounted on the shaft) |
| Mounting | IM 2001 B3/B5, (optionally V1/V5, V3/V6) |
| Gear box | Special flange (optional) |
| Noise | Meets IEC 34-9 standard |
| Electrical Insulation | class F (155°C) (311°F) |
| Protection | IP 54 |
| Storage temperature | Between -20°C and +80°C (-4°F / 176°F) |
| Maximum ambient temperature | Between 0°C and +40°C (32°F / 74°F) |
| Maximum ambient humidity | Between 20% and 80% (non condensing) |
| Altitude | 1000 m. (3280 ft) over sea level. |
| Axial fan | Standard on all models. Independent power supply. |
| Brake | Optional for all models. 220Vac |
| Feedback | Sinewave encoder |

Class F isolation in the motor keeps its dielectric properties as long as the work temperature is kept below 155°C (311°F).

| | | SPM 90L | SPM 90P | SPM 100LBE | SPM 112ME | SPM 112LE | SPM 112XE | SPM 132L | SPM 132X | SPM 132XL | SPM 160M | SPM 160L | SPM 180MA |
|----------------------|-------------------|---------|---------|------------|-----------|-----------|-----------|----------|----------|-----------|----------|----------|-----------|
| Rated power S1 | kW | 2,2 | 3 | 4 | 5,5 | 7,5 | 11 | 15 | 18,5 | 22 | 22 | 30 | 37 |
| Rated power S6-40% | kW | 3,3 | 4 | 6 | 8 | 11 | 16 | 22 | 26 | 28 | 33 | 45 (**) | 55 (**) |
| Rated Torque S1 | Nm | 14 | 19 | 25,5 | 35 | 47,7 | 70 | 95,5 | 118 | 140 | 140 | 191 | 235 |
| Rated Torque S6-40% | Nm | 21 | 25 | 38 | 50 | 70 | 101 | 140 | 165 | 178 | 210 | 286 | 350 |
| Rated current S1 | Arms | 7,78 | 10,13 | 13,6 | 18,6 | 24 | 33,9 | 47,7 | 56,2 | 62,3 | 65,5 | | |
| Rated current S6-40% | Arms | 11,7 | 13,5 | 20,4 | 27 | 34,5 | 49,3 | 70 | 79 | 79,3 | 98,3 | | |
| Rated current S1 | Arms | 6,4 | 8,26 | 11,1 | 15 | 19,7 | 28,8 | 39 | 46 | 51 | 53,6 | 76 | 87 |
| Rated current S6-40% | Arms | 9,5 | 11 | 16,7 | 21,7 | 28,3 | 40,3 | 57,2 | 67 | 64,9 | 77,3 | 114 | 129 |
| Rated speed | rpm | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 | 1500 |
| Maximum speed | rpm | 9000 | 9000 | 9000 | 7500 | 7500 | 7500 | 7500 | 7500 | 7500 | 7500 | 6300 | 6500 |
| Maximum speed (*) | rpm | -- | -- | -- | 9000 | 9000 | 9000 | 9000 | 9000 | 9000 | 9000 | 9000 | 9000 |
| Inertia | Kg·m ² | 0,0035 | 0,0044 | 0,0061 | 0,011 | 0,014 | 0,022 | 0,062 | 0,07 | 0,07 | 0,13 | 0,17 | 0,34 |
| Weight | Kg | 19,2 | 23,8 | 35,3 | 45 | 53 | 70 | 108 | 119 | 119 | 158 | 196 | 260 |

New SPMxxx.xx.xxxx.1 motors

Fan chars.

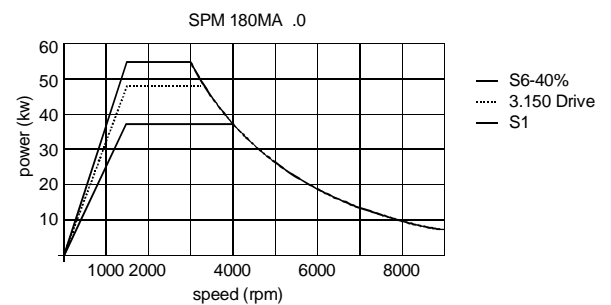
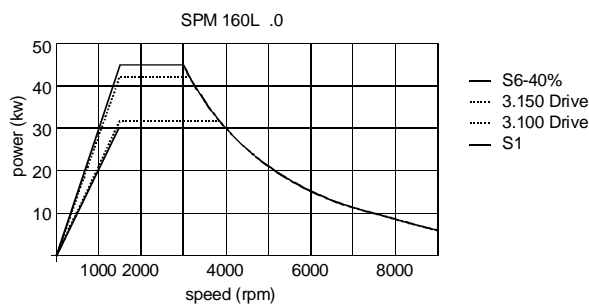
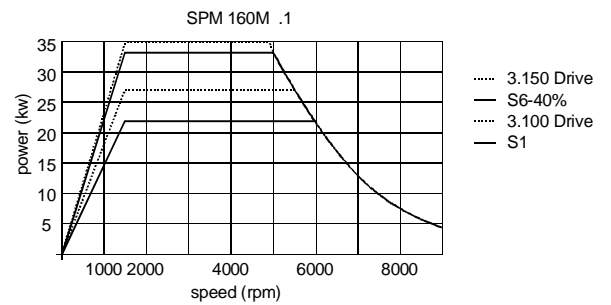
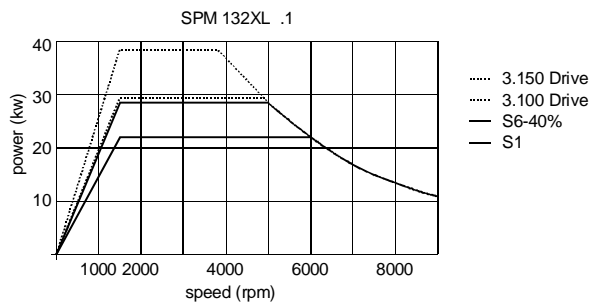
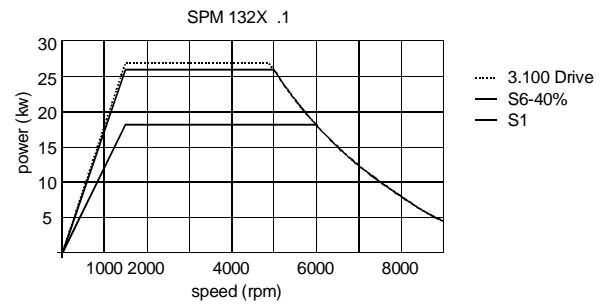
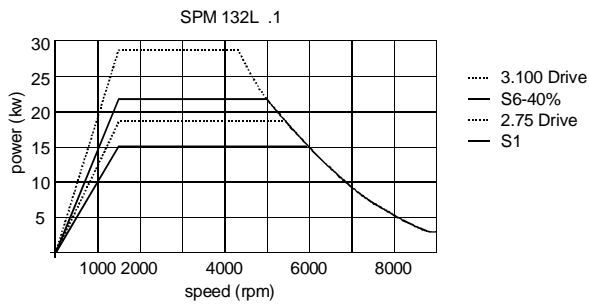
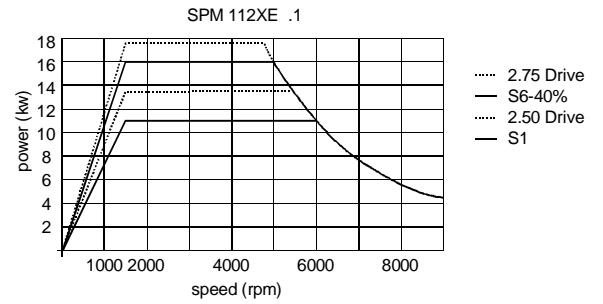
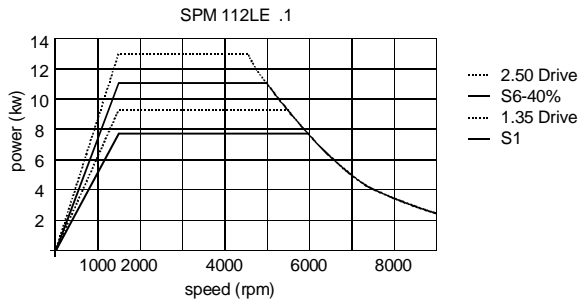
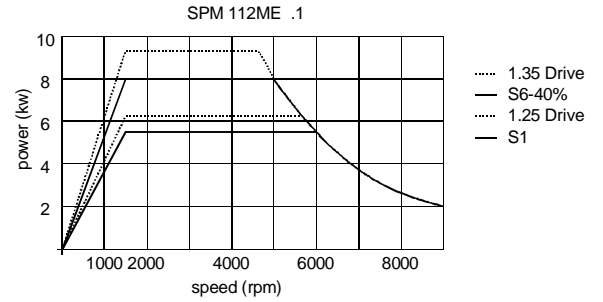
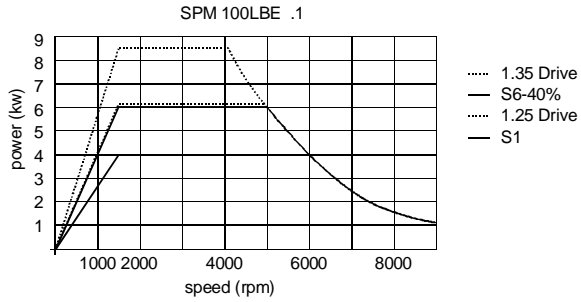
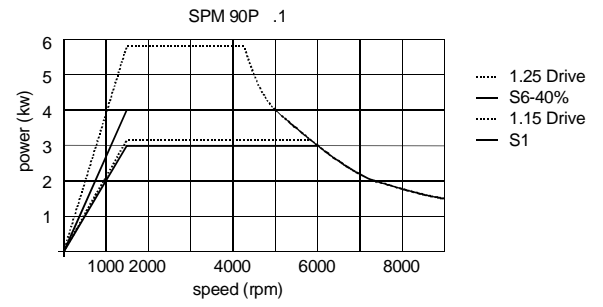
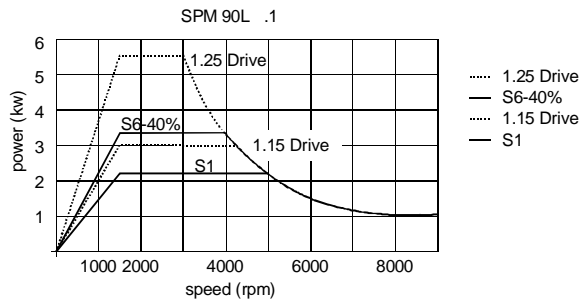
| | | SPM 90L | SPM 90P | SPM 100LBE | SPM 112ME | SPM 112LE | SPM 112XE | SPM 132L | SPM 132X | SPM 132XL | SPM 160M | SPM 160L | SPM 180MA | |
|---------------------|--------|--------------|---------|------------|-----------|-----------|-----------|----------|----------|-----------|----------|----------|-----------|-----|
| Power supply | | single-phase | | | | | | | | | | | | |
| Voltage (frequency) | V (Hz) | 220 (50/60) | | | | | | | | | | | | |
| Current | A | 0.3 | | | 0.36 | | | 0.6 | | | 0.55 | | | |
| Power | W | 40 | | | 80 | | | 130 | | | 115 | | | 120 |

Brake chars.

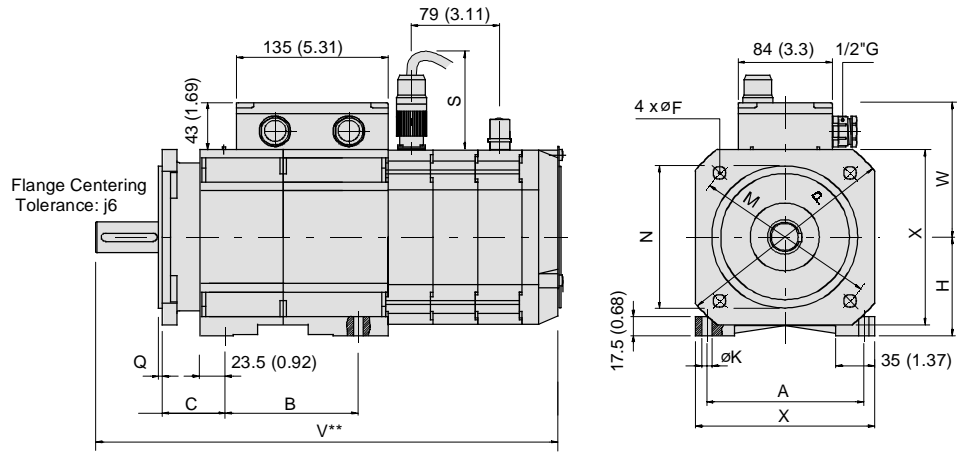
| | | SPM 90L | SPM 90P | SPM 100LBE | SPM 112ME | SPM 112LE | SPM 112XE | SPM 132L | SPM 132X | SPM 132XL | SPM 160M | SPM 160L | SPM 180MA |
|-------------------|-------------------|---------|---------|------------|-----------|-----------|-----------|----------|----------|-----------|----------|----------|-----------|
| Power supply | | 220 | | | | | | | | | | | |
| Power | W | 16 | | | 22 | | | 25 | | | 29 | | |
| Continuous torque | Nm | 10 | | | 30 | | | 50 | | | 150 | | |
| Inertia | Kg·m ² | 0.00011 | | | 0.0003 | | | 0.00057 | | | 0.0023 | | |

Roller bearings

| | | SPM 90L | SPM 90P | SPM 100LBE | SPM 112ME | SPM 112LE | SPM 112XE | SPM 132L | SPM 132X | SPM 132XL | SPM 160M | SPM 160L | SPM 180MA | |
|------------------|----|---------|---------|------------|-----------|-----------|-----------|----------|----------|-----------|----------|----------|-----------|----|
| Drive end | | 6205 Z | 6206 Z | 6207 Z | 6209 Z | | | 6209 Z | | | 6310 Z | | 6311 Z | |
| Non-drive end | | 6205 Z | 6205 Z | 6205 Z | 6205 Z | | | 6209 Z | | | 6309 Z | | 6311 Z | |
| Radial load -Fr- | N | 800 | 900 | 1300 | 1600 | 1800 | | 1800 | | | 2300 | | 3700 | |
| -X- distance | mm | 25 | | | 40 | | | 40 | | | 55 | | | 55 |
| Axial load | N | 400 | 450 | 800 | 1000 | 1100 | | 1100 | | | 1400 | | 2300 | |

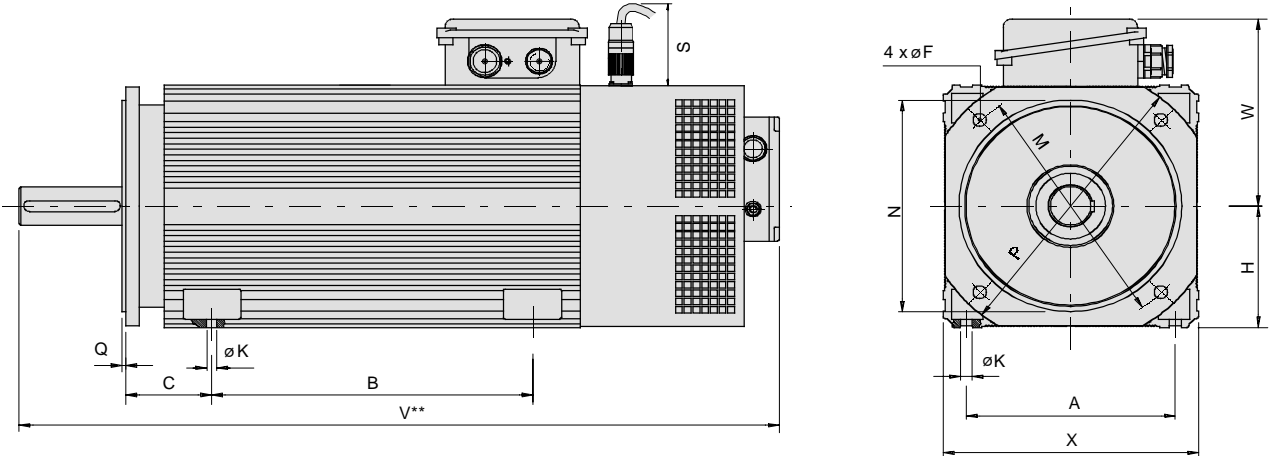


Dimensions.



| mm | H | A | X | W | M | P | F | N | Tol * | B | C | K | Q | S | V** | T |
|---------|----|-----|-----|-----|-----|-----|------|-----|-------|-----|----|---|-----|----|-----|----|
| SPM 90L | 90 | 140 | 160 | 124 | 165 | 200 | 11,5 | 130 | j6 | 125 | 56 | 9 | 3,5 | 89 | 420 | 70 |
| SPM 90P | 90 | 140 | 160 | 124 | 165 | 200 | 11,5 | 130 | j6 | 215 | 56 | 9 | 3,5 | 89 | 497 | 75 |

| inches table | * Flange centering tolerance | | | | | | | | ** For motors with brake add T quote | | | | | | | |
|--------------|------------------------------|-------|-------|------|-------|-------|-------|-------|--------------------------------------|-------|-------|-------|-------|-------|-------|-------|
| SPM 90L | 3.543 | 5.512 | 6.299 | 4.88 | 6.496 | 7.874 | 0.453 | 5.118 | j6 | 4.921 | 2.205 | 0.354 | 0.138 | 3.504 | 16.53 | 2.756 |
| SPM 90P | 3.543 | 5.512 | 6.299 | 4.88 | 6.496 | 7.874 | 0.453 | 5.118 | j6 | 8.465 | 2.205 | 0.354 | 0.138 | 3.504 | 19.56 | 2.953 |



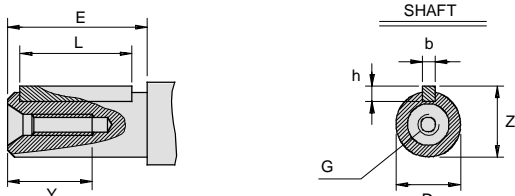
| mm | H | A | X | W | M | P | F | N | Tol * | B | C | K | Q | S | V** | T |
|------------|-----|-----|-----|-----|-----|-----|----|-----|-------|-----|----|----|---|----|-----|----|
| SPM 100LBE | 100 | 160 | 200 | 161 | 215 | 250 | 14 | 180 | j6 | 140 | 63 | 12 | 4 | 89 | 514 | 65 |
| SPM 112ME | 112 | 190 | 224 | 173 | 215 | 250 | 14 | 180 | j6 | 140 | 70 | 12 | 4 | 89 | 518 | 70 |
| SPM 112LE | 112 | 190 | 224 | 173 | 215 | 250 | 14 | 180 | j6 | 140 | 70 | 12 | 4 | 89 | 588 | 70 |
| SPM 112XE | 112 | 190 | 224 | 173 | 215 | 250 | 14 | 180 | j6 | 245 | 70 | 12 | 4 | 89 | 698 | 70 |

| inches table | * Flange centering tolerance | | | | | | | | ** For motors with brake add T quote | | | | | | | |
|--------------|------------------------------|-------|-------|-------|-------|-------|-------|-------|--------------------------------------|-------|-------|-------|-------|-------|--------|-------|
| SPM 100LBE | 3.937 | 6.299 | 7.874 | 6.339 | 8.465 | 9.843 | 0.551 | 7.087 | j6 | 5.512 | 2.480 | 0.472 | 0.157 | 3.504 | 20.23 | 2.559 |
| SPM 112ME | 4.409 | 7.480 | 8.819 | 6.811 | 8.465 | 9.843 | 0.551 | 7.087 | j6 | 5.512 | 2.756 | 0.472 | 0.157 | 3.504 | 220.39 | 2.756 |
| SPM 112LE | 4.409 | 7.480 | 8.819 | 6.811 | 8.465 | 9.843 | 0.551 | 7.087 | j6 | 5.512 | 2.756 | 0.472 | 0.157 | 3.504 | 23.15 | 2.756 |
| SPM 112XE | 4.409 | 7.480 | 8.819 | 6.811 | 8.465 | 9.843 | 0.551 | 7.087 | j6 | 9.646 | 2.756 | 0.472 | 0.157 | 3.504 | 27.48 | 2.756 |

| mm | H | A | X | W | M | P | F | N | Tol * | B | C | K | Q | S | V** | T |
|-----------|-----|-----|-----|-------|-----|-----|----|-----|-------|-----|-----|----|---|----|-----|----|
| SPM 132L | 132 | 216 | 264 | 206 | 265 | 300 | 14 | 230 | j6 | 332 | 89 | 12 | 4 | 89 | 790 | 75 |
| SPM 132X | 132 | 216 | 264 | 206 | 265 | 300 | 14 | 230 | j6 | 332 | 89 | 12 | 4 | 89 | 790 | 75 |
| SPM 132XL | 132 | 216 | 264 | 206 | 265 | 300 | 14 | 230 | j6 | 332 | 89 | 12 | 4 | 89 | 790 | 75 |
| SPM 160M | 160 | 254 | 320 | 230.5 | 300 | 350 | 18 | 250 | h6 | 254 | 108 | 14 | 5 | 89 | 819 | 75 |
| SPM 160L | 160 | 254 | 320 | 230.5 | 300 | 350 | 18 | 250 | h6 | 400 | 108 | 14 | 5 | 89 | 967 | 75 |
| SPM 180MA | 180 | 279 | 360 | 285 | 350 | 400 | 18 | 300 | h6 | 279 | 121 | 14 | 5 | 89 | 891 | - |

| inches table | * Flange centering tolerance | | | | | | | | ** For motors with brake add T quote | | | | | | | |
|--------------|------------------------------|--------|--------|--------|--------|--------|-------|--------|--------------------------------------|--------|-------|-------|-------|-------|--------|-------|
| SPM 132L | 5.197 | 8.504 | 10.394 | 8.071 | 10.433 | 11.811 | 0.551 | 9.055 | j6 | 13.071 | 3.504 | 0.472 | 0.157 | 3.504 | 31.102 | 2.953 |
| SPM 132X | 5.197 | 8.504 | 10.394 | 8.071 | 10.433 | 11.811 | 0.551 | 9.055 | j6 | 13.071 | 3.504 | 0.472 | 0.157 | 3.504 | 31.102 | 2.953 |
| SPM 132XL | 5.197 | 8.504 | 10.394 | 8.071 | 10.433 | 11.811 | 0.551 | 9.055 | j6 | 13.071 | 3.504 | 0.472 | 0.157 | 3.504 | 31.102 | 2.953 |
| SPM 160M | 6.299 | 10.000 | 12.598 | 9.07 | 11.811 | 13.780 | 0.709 | 9.843 | h6 | 10.000 | 4.252 | 0.551 | 0.197 | 3.504 | 32.24 | 2.953 |
| SPM 160L | 6.299 | 10.000 | 12.598 | 9.07 | 11.811 | 13.780 | 0.709 | 9.843 | h6 | 15.748 | 4.252 | 0.551 | 0.197 | 3.504 | 38.07 | 2.953 |
| SPM 180MA | 7.087 | 10.984 | 14.173 | 11.220 | 13.780 | 15.748 | 0.709 | 11.811 | h6 | 10.984 | 4.764 | 0.551 | 0.197 | 3.504 | 35.08 | - |

Inside thread of the shaft and keyway

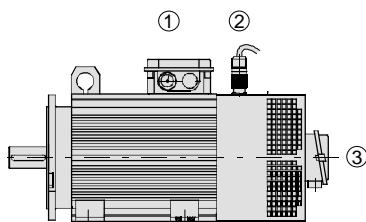


| mm | D x E | | b x h x L | | | G | Y | Z | Tolerance (microns) | | |
|------------|-------|-----|-----------|----|-----|-----|----|------|---------------------|----|----|
| SPM 90L | 24 | 50 | 8 | 7 | 40 | M8 | 19 | 27 | j6 | -4 | 9 |
| SPM 90P | 28 | 60 | 8 | 7 | 50 | M10 | 22 | 31 | j6 | -4 | 9 |
| SPM 100LBE | 28 | 60 | 8 | 7 | 50 | M10 | 22 | 31 | j6 | -4 | 9 |
| SPM 112ME | 28 | 60 | 8 | 7 | 50 | M10 | 22 | 31 | j6 | -4 | 9 |
| SPM 112LE | 38 | 80 | 10 | 8 | 70 | M12 | 28 | 41 | k6 | 2 | 18 |
| SPM 112XE | 38 | 80 | 10 | 8 | 70 | M12 | 28 | 41 | k6 | 2 | 18 |
| SPM 132L | 42 | 110 | 12 | 8 | 100 | M16 | 36 | 45 | k6 | 2 | 18 |
| SPM 132X | 42 | 110 | 12 | 8 | 100 | M16 | 36 | 45 | k6 | 2 | 18 |
| SPM 132XL | 42 | 110 | 12 | 8 | 100 | M16 | 36 | 45 | k6 | 2 | 18 |
| SPM 160M | 48 | 110 | 14 | 9 | 100 | M16 | 36 | 51.5 | k6 | 2 | 18 |
| SPM 160L | 48 | 110 | 14 | 9 | 100 | M16 | 36 | 51.5 | k6 | 2 | 18 |
| SPM 180M | 55 | 110 | 16 | 10 | 100 | M20 | 42 | 59 | j6 | 11 | 30 |

| inches table | 0.945 | 1.969 | 0.315 | 0.276 | 1.575 | M8 | 0.748 | 1.06 | thousandth of an inch | | |
|--------------|-------|-------|-------|-------|-------|-----|-------|------|-----------------------|-------|------|
| SPM 90L | 0.945 | 1.969 | 0.315 | 0.276 | 1.575 | M8 | 0.748 | 1.06 | j6 | -0.16 | 0.35 |
| SPM 90P | 1.102 | 2.362 | 0.315 | 0.276 | 1.969 | M10 | 0.866 | 1.22 | j6 | -0.16 | 0.35 |
| SPM 100LBE | 1.102 | 2.362 | 0.315 | 0.276 | 1.969 | M10 | 0.866 | 1.22 | j6 | -0.16 | 0.35 |
| SPM 112ME | 1.102 | 2.362 | 0.315 | 0.276 | 1.969 | M10 | 0.866 | 1.22 | j6 | -0.16 | 0.35 |
| SPM 112LE | 1.496 | 3.150 | 0.394 | 0.315 | 2.756 | M12 | 1.102 | 1.61 | k6 | 0.08 | 0.71 |
| SPM 112XE | 1.496 | 3.150 | 0.394 | 0.315 | 2.756 | M12 | 1.102 | 1.61 | k6 | 0.08 | 0.71 |
| SPM 132L | 1.654 | 4.331 | 0.472 | 0.315 | 3.937 | M16 | 1.417 | 1.77 | k6 | 0.08 | 0.71 |
| SPM 132X | 1.654 | 4.331 | 0.472 | 0.315 | 3.937 | M16 | 1.417 | 1.77 | k6 | 0.08 | 0.71 |
| SPM 132XL | 1.654 | 4.331 | 0.472 | 0.315 | 3.937 | M16 | 1.417 | 1.77 | k6 | 0.08 | 0.71 |
| SPM 160M | 1.890 | 4.331 | 0.551 | 0.354 | 3.937 | M16 | 1.417 | 2.02 | k6 | 0.08 | 0.71 |
| SPM 160L | 1.890 | 4.331 | 0.551 | 0.354 | 3.937 | M16 | 1.417 | 2.02 | k6 | 0.08 | 0.71 |
| SPM 180M | 2.165 | 4.331 | 0.630 | 0.394 | 3.937 | M20 | 1.653 | 2.32 | j6 | 0.43 | 1.18 |

Connectors.

- ① Terminal box for power and brake connection.
- ② Feedback connector (Encoder).
- ③ Terminal box or connector for fan.



Encoder Feedback Connector. ②

Identical to the connector for the FXM motors. See previous pages.

Installation and Mounting.

Before mounting it onto the machine, the anti-rust paint should be removed from the rotor shaft and the flange.

The motor must be fitted onto a flat, solid and sturdy surface. It must be installed in a clean, dry and well ventilated place. Easily accessible for inspection, cleaning and maintenance. Free of corrosive ambient and explosive gasses or fluids. If the motor is going to be exposed to oil splashes, it should be covered with a guard.

Electrical Installation.

Verify the connection of the following terminals: U-U1, V-V1, W-W1 and Ground-Ground when connecting the motor and its corresponding drive module.

Ventilation.

The electric fan must be turned on before powering the motor and must never be stopped while the machine is on.

Verify that the air flows freely around the motor and it is not obstructed. Make sure that the air taken in by the fan is always fresh, clean and dry. The fresh air intake and the hot air outlet must be as far apart from each other as possible.

Sealing.

The degree of protection of these motors meets the IP54 standard which means that it is protected against dust and water splashes.

Power and Brake Connector. ①

This terminal box has the following terminals:

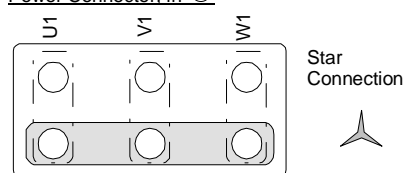
Power terminals.

Internal thermal switch contacts (Klixon 150°C, 250V/2.5A). This contact should be included in the Emergency chain.

Brake contacts.

The windings of the motor have a **star connection** (as shown here) and **it cannot be changed for any reason.**

Power Connector, in ①



Fan Connector. ③

Most motors have a terminal box.

Only "SPM90L" and "SPM90P" motors have a connector.

The motors are delivered with the complete connector.

Maximum section of the wire: 2.5 mm².

Coupling.

Avoid radial and axial loads onto the motor shaft, making sure that they do not exceed the values indicated in the table on previous pages. For combined axial and radial loads, decrease the value of the allowed radial force to 70%.

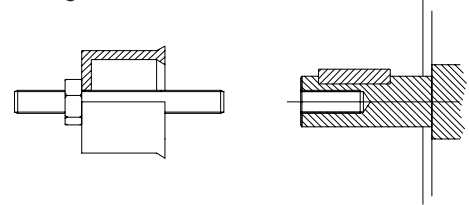
Direct coupling. Be extra careful in order to guarantee the alignment between the motor shaft and the pulled axis and between the coupling flanges. Use flexible couplings.

Coupling through transmission pulleys. Install the motor with shaft perfectly parallel and aligned with the pulley shaft. The tension must never exceed the maximum load described in the table. Always use balanced pulleys.

Coupling through gear boxes. Refer to any information provided by the manufacturer of the gear boxes.

When installing pulleys or gears for transmission, avoid hitting the shaft.

Use some tool that is supported in the threaded hole on the shaft to insert the pulley or the gear.



Balancing.

The rotor is dynamically balanced with the key inserted in the keyway. It is an "S" degree balancing and, "SR" upon request.

Mounting the gear boxes.

The motor may carry a special flange for mounting gear boxes.

Before manipulating the gear box, remove the anti-rust paint from the motor shaft by using alcohol or the proper solvent (the solvent must not get into the bearings). Do not use sandpaper or any other abrasive element to remove the paint. Lubricate the end of the shaft and the keyway before inserting the transmission and assemble it by following the manufacturer's instructions.

Motor and Drive selection.

See General Manual.

SPINDLE MOTORS, SPM xx.1

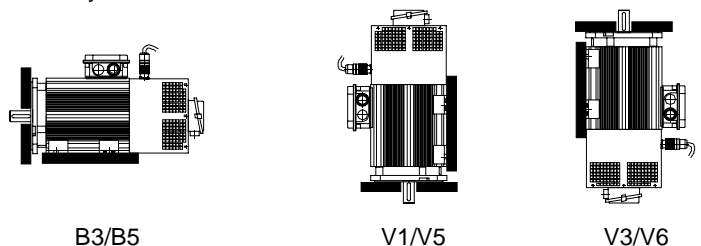
Example: SPM 100LBE . E 1 . 0 0 0 0 . 1

| | |
|---------------------|---|
| SPINDLEMOTOR | |
| MOTOR MODEL | 90L 2.2/3.3 90P 3/4 (rated power in S1/S6-40% -kW-) 100LBE 4/6 112ME 5.5/8 112LE 7.5/11 112XE 11/16 132L 15/22 132X 18.5/26 132XL 22/28 160M 22/33 |
| FEED-BACK | E0 Encoder Sincos™ E1 Encoder Sincoder™ |
| MOUNTING | 0 B3/B5 Horizontal (standard) 1 V1/V5 Vertical downward 2 V3/V6 Vertical upward |
| FLANGE AND SHAFT | 0 Standard 1 Protection Seal 2 Flange for mounting on ZF boxes 3 Without keyway 4..9 Special flange or shaft |
| BALANCING GRADE | 0 S, standard balancing grade 1 SR, balancing grade |
| BRAKE OPTION | 0 Without brake 1 With standard brake (220 Vac) |
| BEARINGS | 0 Standard 1 Special, high speed |

Sales reference.

The sales reference is stored in the encoder of the motor. From version 03.01 on, the Drive software, can automatically adjust the motor parameters by reading that "sales-reference". The letter indicating the release appears next.

Mounting methods key.



ELECTRONIC MODULES

Compact Axis Drive Module. ACD.

A fully digital module for governing a synchronous motor.

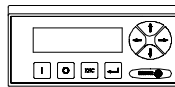
Compact Spindle Drive Module. SCD.

A fully digital module for governing an asynchronous motor.

Programming Module. DDS PROG MODULE.

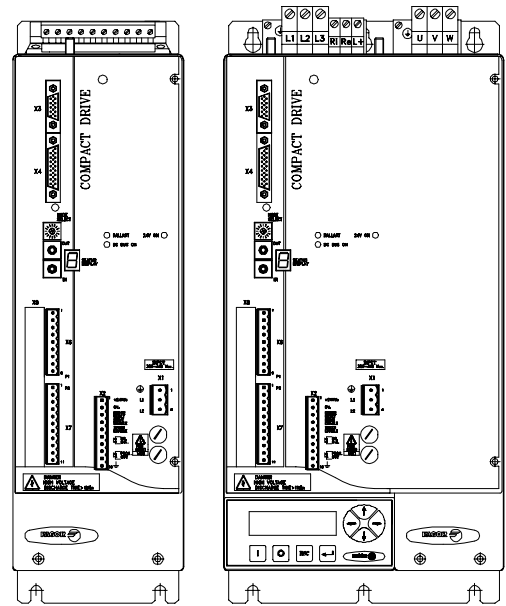
Connected to the drive module through the serial line, it allows displaying and programming its internal parameters. It has an internal non-volatile memory and the possibility to send and receive parameter tables. It may be built into any of the compact modules, installed onto metallic rails or using a frontal adapter.

DDS PROG MODULE



ACD1...
SCD1...

ACD2...
SCD2...



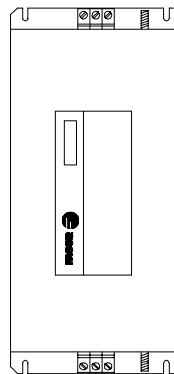
Mains Filter. EMK xxxx.

Absolutely necessary for complying with the European Directive on Electromagnetic Compatibility 89/336/CE or the international standard CEI/IEC 1800-3.

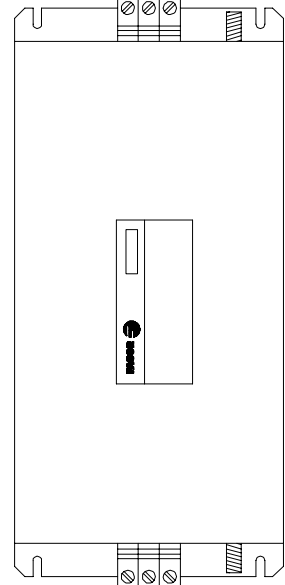
The filter "EMK 3040" is designed for ACD/SCD 1.xx

The filter "EMK 3120" is designed for ACD/SCD 2.xx

EMK 3040



EMK 3120



This system has been manufactured in accordance with the EN 60204-1 standard in compliance with European Directive 73/12/CE on Low Voltage.

| | Axis Compact Drive | | | | Spindle Compact Drive | | | | |
|---|--|---------|-----------------|----------|-----------------------|----------|-----------------|------------|-----------|
| | (Note 1) | | | | (Note 2) | | | | |
| Rated current (Amp) | 4 | 7.5 | 12.5 | 25 | 37.5 | | | | |
| Maximum peak current for 500ms in cycles longer than 10 seconds. | 8 | 15 | 25 | 50 | 75 | | | | |
| Maximum current in any duty (Note 3) | | | | | | 5.6 | 10.6 | 17.7 | 35.4 |
| Power supply | Three-phase mains 50/60 Hz, with a voltage range between 380V _{ac} -15%, and 480V _{ac} + 10% | | | | | | | | |
| Internal power bus voltage. | 540-650- Vdc | | | | | | | | |
| Filter capacity | 330 µF, 800 Vdc | | 705 µF, 800 Vdc | | 330 µF, 800 Vdc | | 705 µF, 800 Vdc | | |
| Energy stored in the capacitors. | 0.5 · C · V ² | | | | | | | | |
| Internal Ballast resistor -Ohms- (Power -W-) | 82 (60) | 41 (20) | 23 (210) | 12 (240) | 8.2 (82) | 41 (120) | 23 (210) | 23 (240) | 8.2 (240) |
| Energy pulse that can be dissipated. -kWs- (Pulse duration -sec-) | 1 (0.45) | 2 (0.4) | 3.6 (0.45) | 12 (0.7) | 12 (0.5) | 1 (0.45) | 2 (0.4) | 3.6 (0.45) | 12 (0.5) |
| Ballast circuit ON/OFF | 764 Vdc / 756 Vdc | | | | | | | | |
| Minimum external Ballast Res. -Ohms- | 82 | 41 | 23 | 12 | 8.2 | 82 | 41 | 23 | 12 |
| Feedback | Encoder /Resolver | | | | Encoder | | | | |
| Control method | PWM, sinewave AC, Vector Control | | | | | | | | |
| Communications | Serial line to connect to a PC or to the Programming Module | | | | | | | | |
| Interface | Standard analog, or digital via SERCOS | | | | | | | | |
| Status display | 7 - segment display | | | | | | | | |
| Speed range with analog input | 1:8:192 | | | | | | | | |
| Current bandwidth | 800 Hz | | | | | | | | |
| Velocity bandwidth | 100 Hz (Depends on the motor/drive combination) | | | | | | | | |
| Protections | Overvoltage, Overcurrent, overspeed, heat-sink temperature, ambient temperature, motor temperature, Ballast temperature, Hardware error, overload, See appendix E. | | | | | | | | |

- Notes:
1.- Drives for synchronous motors 2.- Drives for asynchronous motors
3.- This current must be equal to or greater than that of the corresponding spindle motor in Sg.

| | | | | |
|--------------------------------------|--|-------------|------------|-------------|
| Power for Internal circuits (24 Vdc) | Between 380V _{ac} (-15%) and 480V _{ac} (+10%): 50/60Hz | | | |
| Input voltage (X1 connector) | 160 mA (380 Vac), 130 mA (460 Vac) | | | |
| Mains consumption | 112 mA (540 Vdc), 92 mA (650 Vdc) | | | |
| Bus consumption | 780 Vdc | | | |
| Maximum voltage at the Bus | 24 Vdc (5%), 110 mA/amp. (X2 connector, pins 1 and 2) | | | |
| Output voltage, maximum current | | | | |
| Ambient conditions | | | | |
| Ambient temperature | 5°C / 45°C. (41°F / 113°F) From 40°C (104°F) See Derating tables | | | |
| Storage temperature | -20°C / +60°C (-4°F / +140°F) | | | |
| Maximum humidity | Less than 95% (non condensing at 45°C / 113°F) | | | |
| Vibration while running | 10..60 Hz, 0.1..5 G, 2 hr | | | |
| Vibration while shipping | 60..300 Hz, 5 G, 2 hr | | | |
| Sealing | IP2x | | | |
| Weight Kg (lbs) | 8.3 (18.4) | 13.2 (29.3) | 8.3 (18.4) | 13.2 (29.3) |

| | ER-43/350 | ER-24/750 | ER-18/1100 |
|-------------|----------------|-----------------|-----------------|
| Resistance | 43 Ohms | 24 Ohms | 18 Ohms |
| RMS Power | 300 Watts | 650 Watts | 950 Watts |
| Peak Energy | 50 kWs (1 sec) | 100 kWs (1 sec) | 150 kWs (1 sec) |

| | |
|-------------------------------|--|
| Operating ambient temperature | 5°C - 45°C (41°F - 113°F) |
| Storage temperature | -20°C - 60°C (-4°F - 140°F) |
| Relative Humidity | 95% non condensing at 45°C (113°F) |
| Running vibration | 10..60 Hz, 0.1..5 G, 2 hr |
| Shipping vibration | 60..300 Hz, 5 G, 2 hr |
| Sealing | IP55 |
| Weight | 460 gr (1.01 lbs) 920 gr (2.02 lbs) 1250 gr (2.75 lbs) |

COMPACT DRIVES. ACD, SCD.

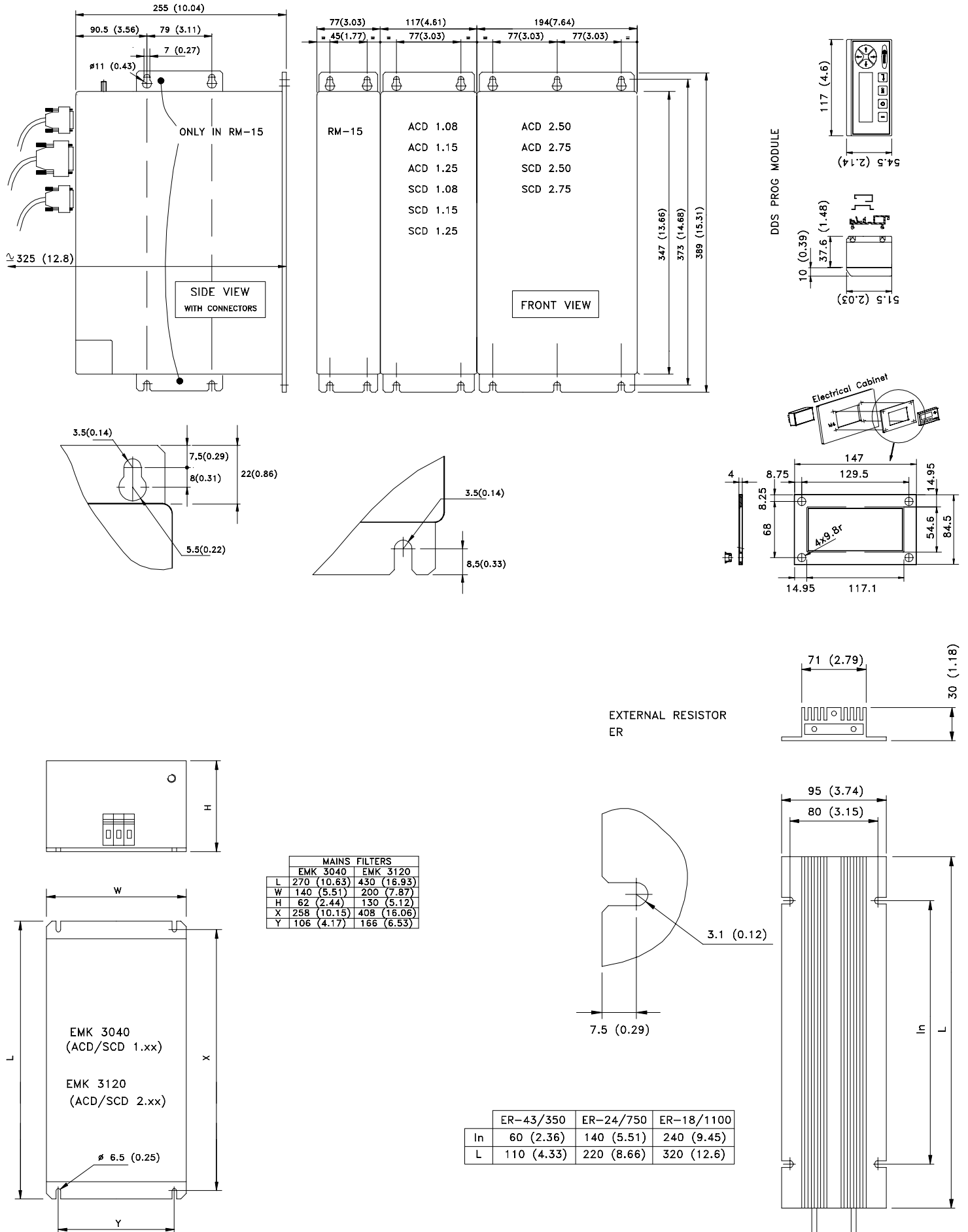
There are compact drives specific for controlling axes, ACD (synchronous motors) and the spindle SCD (asynchronous motors). This documentation is common to both models. The dimensions, connectors, etc. are the same.

OTHER MODULES

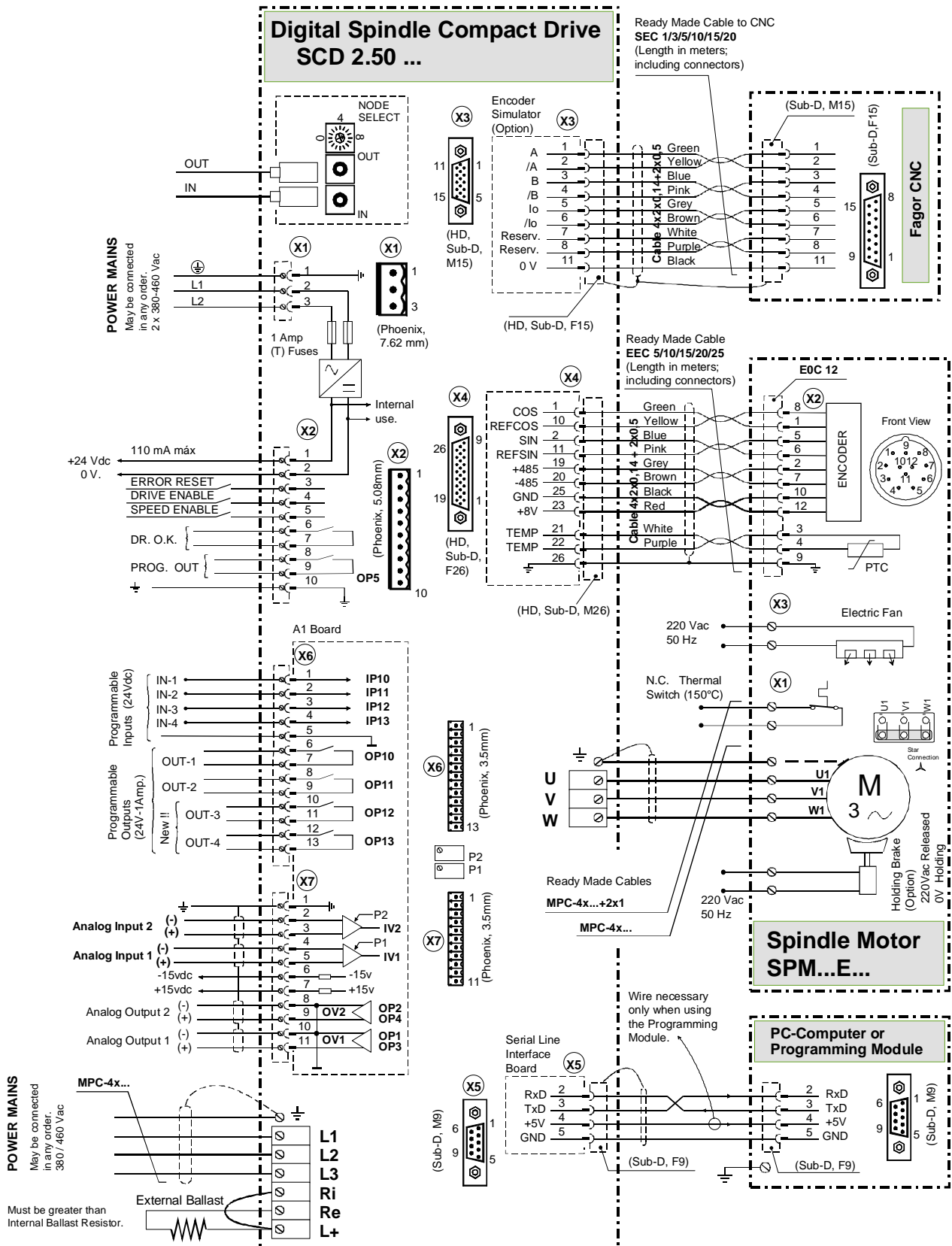
DIMENSIONS

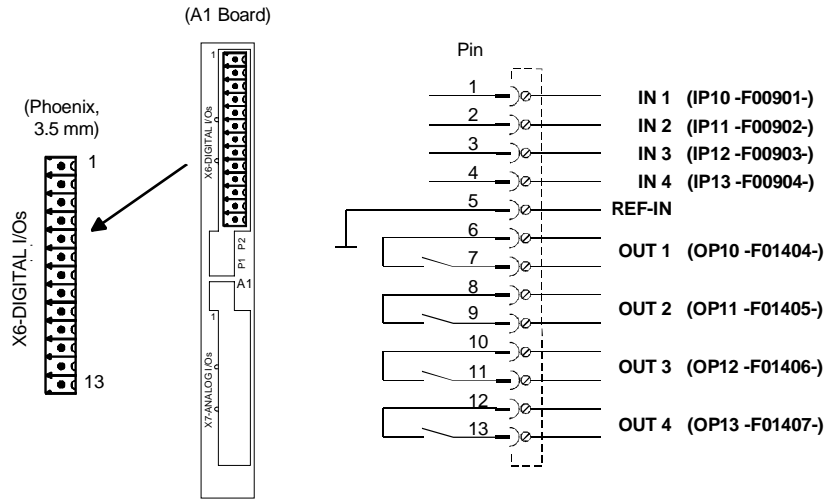
Modules and Mains Filter Dimensions.

When making the electrical cabinet, also take into account the necessary room for the connectors and their cables. Especially for the upper connectors which on the bigger modules can be up to 45 mm high.



CONNECTORS, SPINDLE MOTOR WITH ENCODER.



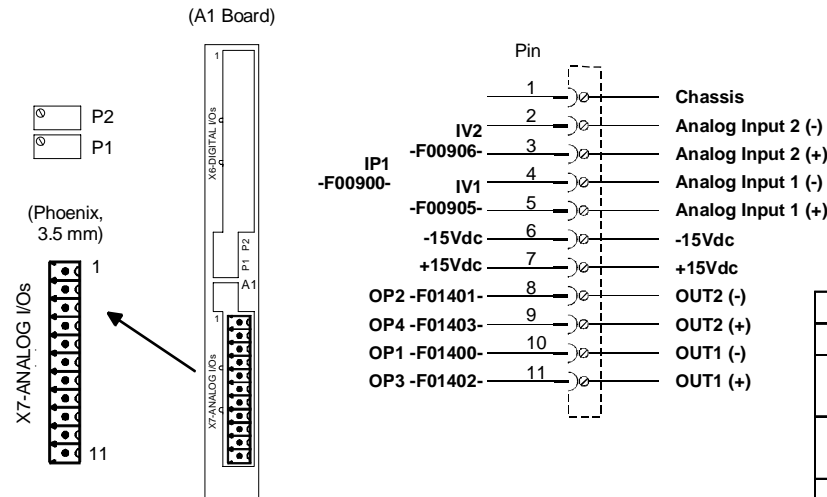


Digital Outputs Characteristics:

| | |
|-----------------------------|--------------------|
| Maximum voltage | 250 Volts |
| Maximum load current (peak) | 150 mA (500 mA) |
| Maximum internal resistance | 24 Ohms |
| Galvanic isolation voltage | 3750 Volts (1 min) |

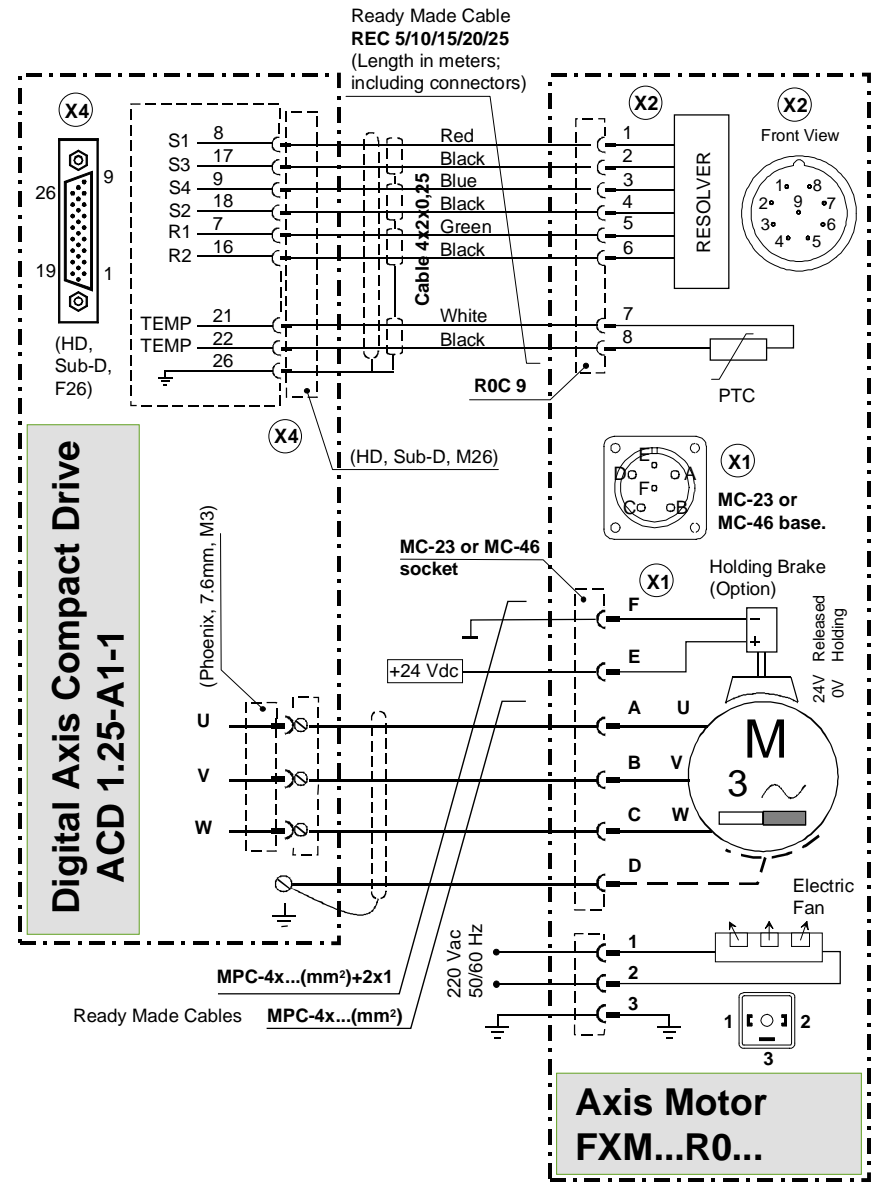
Digital Inputs Characteristics:

| | |
|-------------------------------|-----------------|
| Nominal voltage (maximum) | 24 Vdc (36 Vdc) |
| Turn-on/off Input voltage | 18 Vdc / 5 Vdc |
| Typical consumption (maximum) | 5 mA (7 mA) |



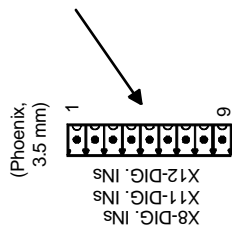
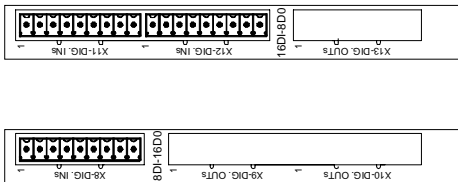
Analog Inputs Characteristics:

| | | |
|------------------------|---------------------|----------|
| Resolution | 1.22 mV | |
| Input voltage range | ±10 Vdc | |
| Input Overvoltage | Continuous mode | 80 Vdc |
| | Transients | 250 Vdc |
| Input Impedance | With respect to GND | 40 KOhms |
| | Between both inputs | 80 KOhms |
| Voltage in common mode | 20 Vdc | |

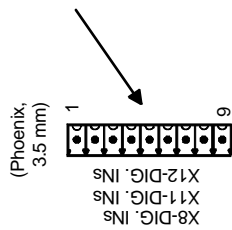
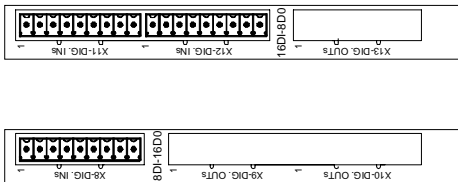


This diagram represents the connection possibility for an FXM motor with encoder feedback. The rest of the connectors are shown on the previous page.

(8DI-16DO Board)



(16DI-8DO Board)



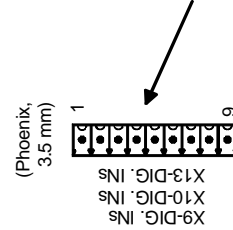
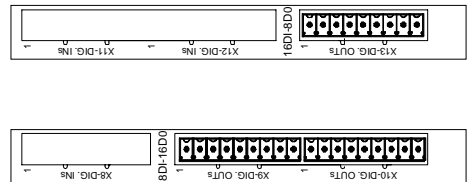
Digital inputs characteristics.
Configuration:

| | | |
|-------------------------------|-------------------|-----------------|
| Rated voltage (maximum) | 5 Vdc | 24 V |
| Turn-on/off Input voltage | 5 Vdc (40 Vdc) | 24 Vdc (40 Vdc) |
| Typical consumption (maximum) | 2.6 Vdc / 1.4 Vdc | 12 Vdc / 6 Vdc |
| | 3 mA (5 mA) | 5 mA (7 mA) |

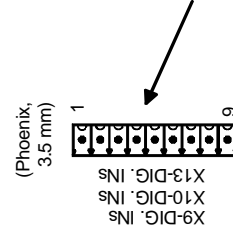
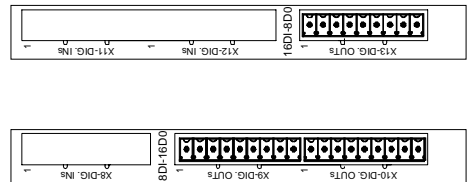
Digital outputs characteristics:

| | |
|-----------------------------|--------------------|
| Maximum voltage | 250 Volts |
| Maximum load current | 150 mA |
| Current selflimitation | 200 mA |
| Maximum internal resistance | 20 Ohms |
| Galvanic isolation voltage | 3750 Volts (1 min) |

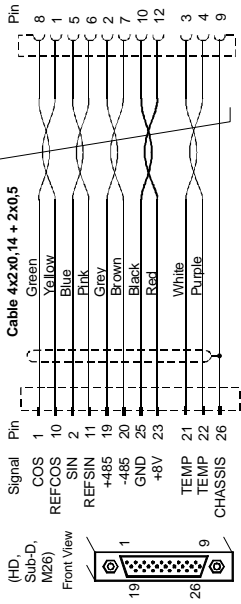
(8DI-16DO Board)



(16DI-8DO Board)



Ready-Made Cable **EEC 5/10/15/20/25**
(Length in meters; including connectors)

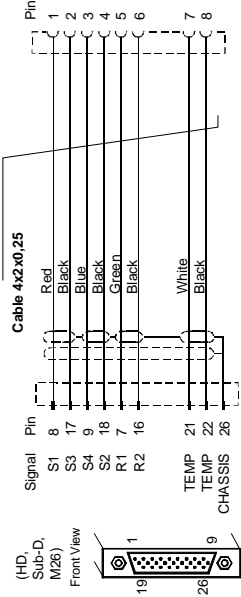


Twisted pair. Overall shield.
Metallic shield connected to CHASSIS pin
- at the Drive end and at the Motor end -

to DRIVE -X4-

to MOTOR

Ready-Made Cable **REC 5/10/15/20/25**
(Length in meters; including connectors)

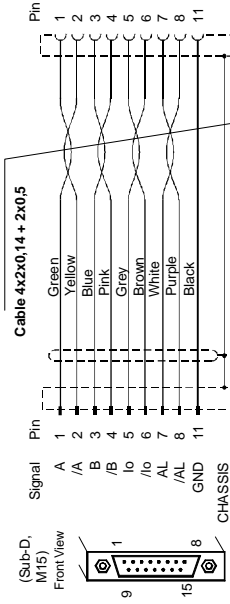


Shielded by pairs of cables, and overall shield.
All shields interconnected and connected to the same CHASSIS pin.
- only at the Drive end -

to DRIVE -X4-

to MOTOR

Ready-Made Cable **SEC 1/3/5/10/15/20**
(Length in meters; including connectors)

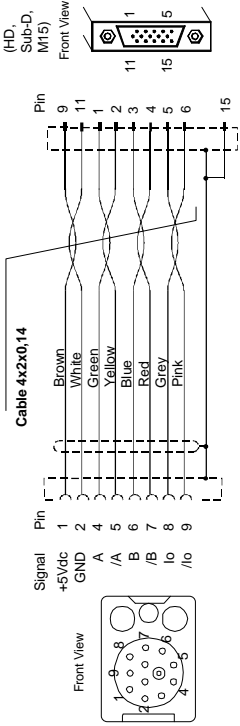


Twisted pair. Overall shield.
Metallic shield connected to CHASSIS pin
- at the CNC end and at the Drive end -

to CNC

to DRIVE -X3-

Fagor Sensor Cable **EC-PD 1/3/6/9/12**
(Length in meters; including connectors)



Twisted pair. Overall shield.
Metallic shield connected to Chassis pin
- at the Sensor end and at the Drive end -

to Feedback Sensor

to DRIVE -X3-

ELECTRICAL INSTALLATION

Mounting conditions.

The Servo drive system must be mounted vertically in the electrical cabinet with the power connectors on top. The equipment should be installed so as to leave at least 80 mm (3.15 inches) above and below it. Mount the Drive Module of greater power next to the Power Supply module and use the same criterion for the rest of the modules. The temperature around the equipment should always be under 55°C (131°F). Vibrations should be avoided. When applying external cooling to the system, make sure that water condensation does not fall on the equipment. Never install the Servo-Drive System in places where there are corrosive gases. The RM-15 and ER modules should be mounted away from the rest of the heat sensitive modules and materials. Always in the upright position. Remember that the RM-15 only guarantees a sealing protection of IP20.

Electrical inter-connection of the Servo Drive system.

See electrical drawings.

- **Connect the ground connection.**
Tightening torque, 2.3 - 2.8 Nm.
- **Connect the Internal Bus X1.**
- For connecting an External Ballast Resistor, RM-15 or ER:
Remove the wire joining "Ri" and "L+" and connect the module between "Re" and "L+" terminals. Never connect an external resistor in parallel with the internal Ballast resistor.

Motor-Drive connections.

- **Power connections.**
Connect terminal "U" of the drive with the terminal corresponding to the "U" phase of the motor. Same as terminals "V-V", "W-W" and "Ground-Ground".
The cable must be connected to the ground terminal of the Drive and NOT to that of the motor.
- **Feedback connections.**
Connect the EEC (encoder) cable or REC (resolver) cable to take the feedback from the motor to the Drive. Connect the SEC cable to take the encoder simulation from the Drive to the CNC, or connect the EC-PD cable to take the feedback from the Sensor to the Drive.

Serial line Connection.

To set up the system, connect the drive with a PC-compatible computer or with the Programming Module "DDS PROG MODULE". See previous connectors diagram.

Cabling of the system to mains.

- **Fuses.**
Fuses must be included. See the table below.

- **Cable Sections.**
The table below gathers the regulation applicable to typical installations of Drive Systems. In any case, the cables must have a greater section or the same as the ones connected to any motor.

| Section (mm ²) | Max Current (Amp RMS) |
|----------------------------|-----------------------|
| 1.5 | 12.2 |
| 2.5 | 16.5 |
| 4 | 23 |
| 6 | 29 |
| 10 | 40 |
| 16 | 53 |
| 25 | 67 |
| 35 | 83 |

CAUTION:

- Before handling the power leads:**
- 1st **Always disconnect the three-phase voltage at the electrical cabinet.**
 - 2nd **Wait, before handling these leads. (about 4 min.)**

| Manufacturer | Compact Drives | | | |
|--------------|--------------------|--------------------|--|-------------------------------|
| | ACD/SCD 1.08/15 | ACD/SCD 1.25 | ACD/SCD 2.50 | ACD/SCD 2.75 |
| BUSSMANN | FC-12 | FC-20 | FE-40 | FE-63 |
| | | RF-000-25 | RF-000-40 | RF-000-63 |
| GOULD | ST-12 10x38 | ST-20 10x38 | ST-40 14x51 | 000-63 |
| | A60x12 | A60x20 | 000-40 | 000/80-63 |
| | | | 000/80-40 | A70Q60 |
| SIEMENS | 3NE8015 3NE8003 | 3NE8015 3NE8003 | 3NE8017 3NE8020 3NE8021 3NE8018 | 3NE8020 3NE8021 3NE8018 |

ELECTRICAL DRAWINGS.

This diagram is only an orientation for the technician designing the machine and may be expanded or reduced at will.

Power-up procedure:

- (1) Supply the Compact Drives by X1(2,3), (380/460Vac) from mains. This will supply 24 Vdc to the internal control circuits, and output this 24 Vdc by X2(1,2). Each module runs an internal test. If the test is successful, the DR.OK contacts close.
- (2) Push ON button. This supplies power from mains to the Compact Drive Modules and activates the DRIVE_ENABLE, X2(4) of each Drive.
- (3) Activate the control input SPEED_ENABLE, X2(5) of each Drive from the CNC. The motors can now follow the velocity command.

Emergency line: The D1 relay confirms that the system is mechanically and electrically in working condition.

Error Reset: This circuit configuration joins the error reset and the system power-up in a single push-button.

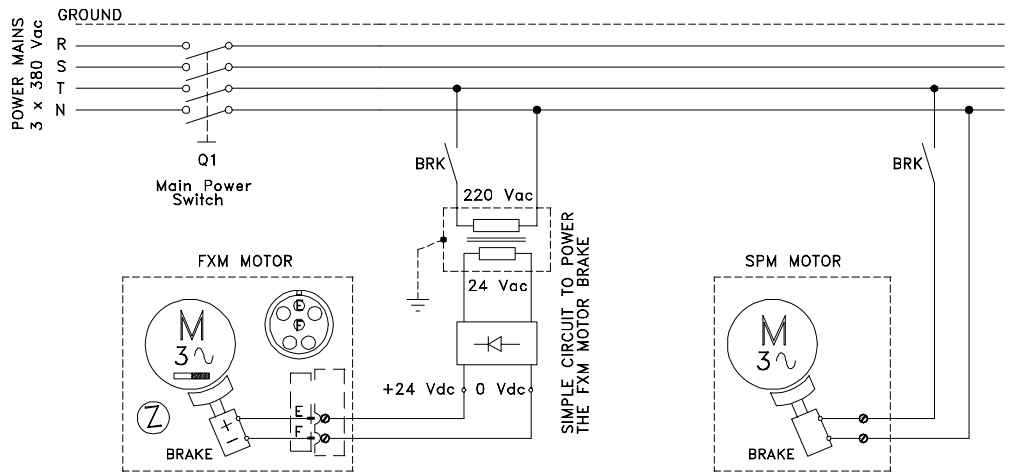
Control from CNC: The CNC enables each axis and confirms the SPEED_ENABLE signal to each drive by means of D4 and D6.

Stop: When the emergency line breaks or the OFF or Q1 keys are opened, the control circuit of the drives must keep on working to brake the motors, and the DRIVE_ENABLE signal must be kept active (24 Vdc). The 24 Vdc Compact Drive output voltage keep the power to the control circuits, and the DRIVE_ENABLE signal is kept active while braking, by delaying the deactivation of D3.

Brake supply circuit

The brake of the FXM motor is unlocked by applying 24 Vdc through a connector. The brake of the SPM motor is unlocked by applying 220Vac through its terminal box.

When installing the motor, verify that the brake releases the shaft completely before turning it for the first time.



CE Directive Compliance:

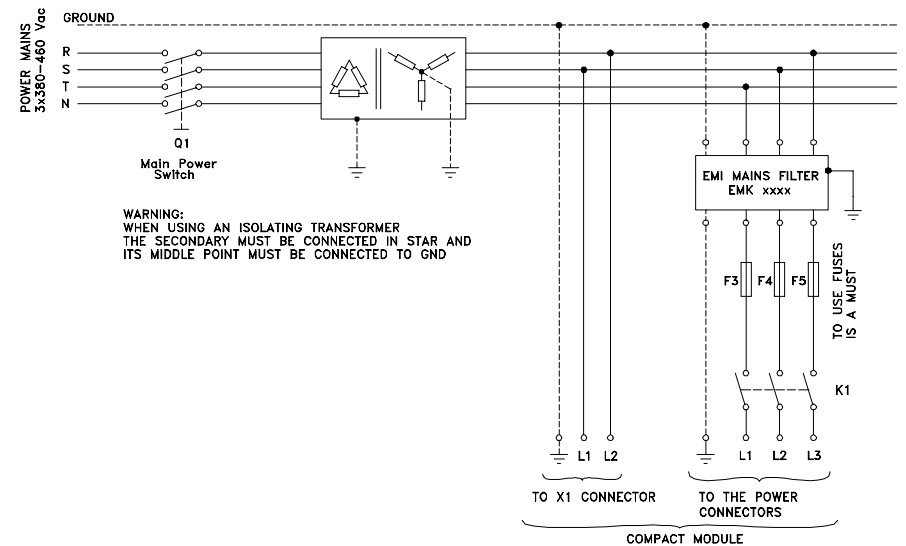
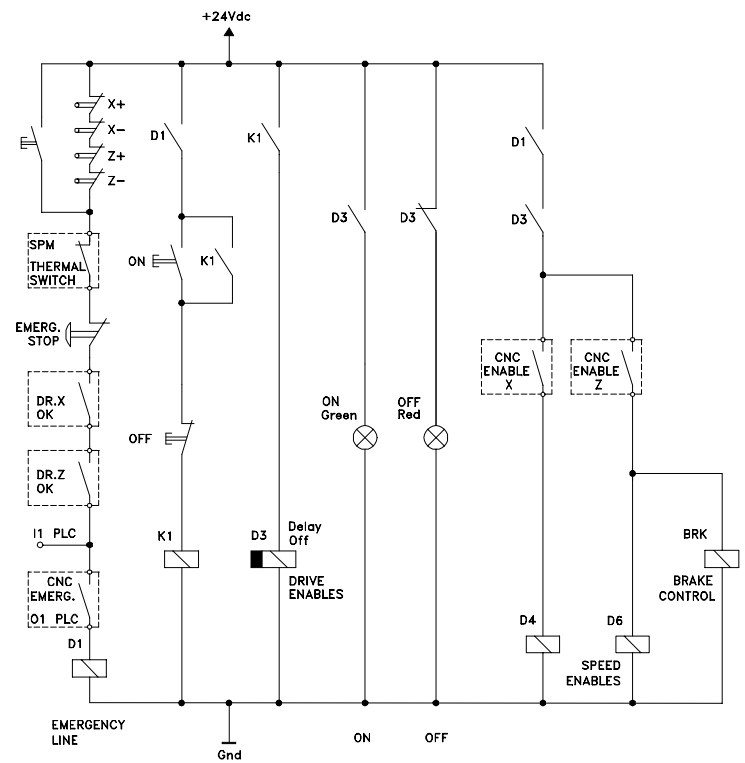
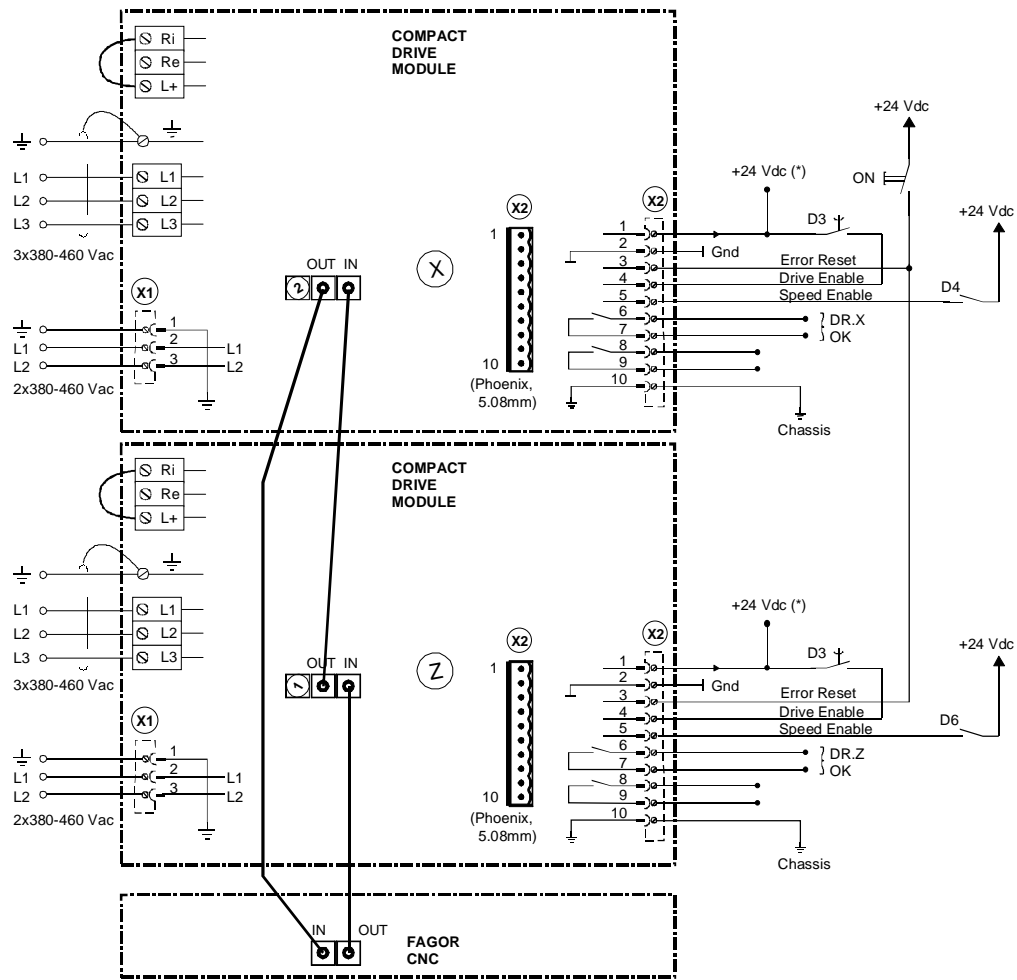
In order to ensure compliance with the European Directive on Electromagnetic Compatibility 89/336/CE, It is a must to:

- Power the system through mains filter **EMK**.
- Secure the Filter onto a metallic support with a good contact on its whole base, good ground connection and as close to the Compact Module as possible.
- Make all the **Ground connections** with a cable having a section equal to or greater than the three-phase power supply and at least 6 mm².
- Always use **shielded cables** for three-phase mains or motor connections. The cable must be connected to the ground terminal of the Drive and NOT to that of the motor.

Very important: Ground connections.

Use the bolts located at the top of the module. Tightening torque, 2.3 - 2.8 Nm.
Run a grounding cable as short as possible and with a section of 6 mm² or larger from one end to the main ground point.
When not having a separate ground point, join the plates to the terminal of the Compact Module connected to Mains Ground.
When using an isolating transformer, the secondary must have a star connection with its middle point connected to ground or the mains neuter.

If you decide not to install the Mains Filter "EMK", an electrical choke (on each of the three power lines) or a transformer or an autotransformer may be installed instead. However, It does not ensure compliance with the CE directive.



(* The 24 Vdc for the DRIVE_ENABLE signal should be taken from its own 24 Vdc Power Supply (X2, Pin 1) to meet the CE Directives. (Controlled stop on Mains Failure).

Considerations regarding Sercos connection

Set each module with a different number on the Node-Select switch. These addresses for the various axes and spindles must be sequential and starting from "1". If a driver is identified with zero, it will be ignored in the ring. However, this driver will keep the communication between the others nodes in the ring. Interconnect the modules and the CNC8050/55 through the fiber optic lines building a Sercos ring. See the drawing.

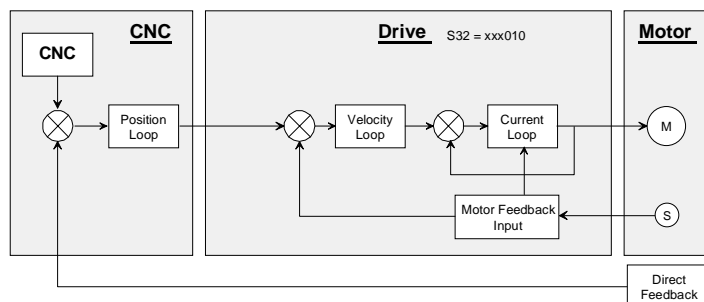
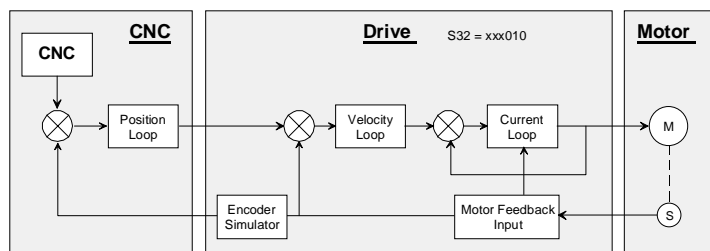
VELOCITY DRIVER SETUP.

WinDDSSetup PC software.

Set up each module from a PC or Programming module connected through the serial line.
For install the application, insert the floppy disk labeled: DDS-SETUP (1/2), Execute **setup.exe**.


Step-by-step Setup.

Set parameter AP1 -S32- to xxx010



Warning: In order for the parameters being edited to have an effect on the operation of the drive...

Save to Flash memory and **Reset** the Drive module. Certain parameters may be edited "on-line".

Motor identification through the reset button  Save to Flash and Reset.

Analog Input 1 Offset adjustment: set a position for the axis with the CNC and adjust **SP30** until getting a symmetrical amount of following error. Save to Flash and Reset. There is a potentiometer (**P2**) designed so the user can correct the slight drifts of the electrical components. Same for the **Analog Input 2** with **SP31** and **P1**.

Motor Speed parameters. Assign to **SP20** the value of the maximum voltage to be applied as velocity command (millivolts). Assign to **SP21** the desired motor speed (rpm) for that maximum analog voltage. Avoid setting **SP21** and **SP10** to similar values.

Encoder Simulator. It generates differential square TTL output signals.

EP1, number of pulses per turn generated. Program it before starting up the motor.

EP2, offset between the motor I_0 and the simulator I_0 .

EP3, Turning direction of the simulator.

Circle Adjust. To avoid the noise of synchronous motors.

Set the **RV8** variable to 1. Two minutes later (approx.) this variable will turn to 0.

Then, the automatic adjustment will be completed. Save in Flash and Reset.

Generating Internal Command (to set the Velocity Loop).

Use the "Internal Command Generator" option of the "Utilities" menu.

Oscilloscope (to watch the behavior of the Velocity Loop). Use the "Oscilloscope" option of the "Utilities" menu.

Analog Outputs (for monitoring the internal variables of the DDS).

Use the "Analog Digital Outputs" option of the "Utilities" menu.

Too large values of gain "Value/10 Volts" may cause strange shapes at the analog output. Save to Flash and Reset.

Command Filters.

-Ramps- **SP80=0**. Limits the velocity command acceleration.

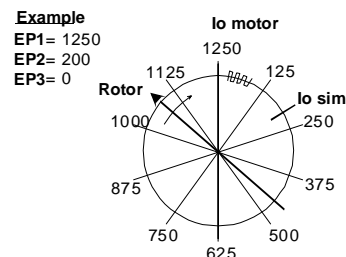
SP60, SP61, SP62, SP63, SP64.

-Jerk- (or acceleration variation limit) **SP80>0**.

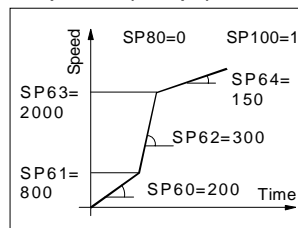
Limits the velocity command acceleration up to a value given by **SP60**. Limits the variation of the acceleration in time with **SP80**.

-Emergency ramp- **SP70=1**.

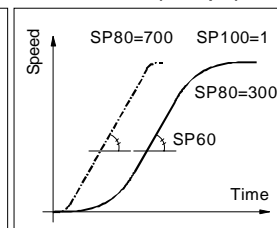
In an emergency stop, the deceleration can be limited by means of **SP65**.



Ramps effect (example):



Jerk Limit effect (example):



Parameter Sets, and Gear Ratios. Certain parameters are expanded into "arrays" of eight elements. They are Parameter Sets. NP121, NP122 and NP123, expand in "arrays" of eight elements. They are Gear Ratios.

At any time, one of those Sets and Gear Ratios determine the behavior of the motor:

GV21 is the ActualParameterSet, and **GV25** is the ActualGearRatio .

GP4 determines the number of Sets in use (from one to eight), and **GP6** determines the number of Gear Ratios in use.

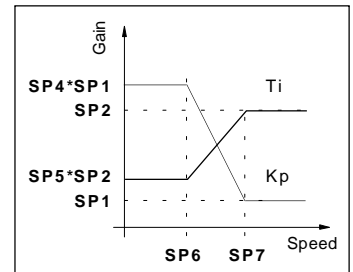
Motor identification only affects to the values of the array zero. The Backup and Restore include all the "arrays".

PI Setup. Parameters for the adjustment:

SP1 : is the proportional factor, Kp. **SP2**: is the integral factor, Ti. Careful, the greater the SP2 value, the smaller the integral effect will be.

SP4, SP5, SP6, SP7: adapt the values of the proportional and integral action at low speeds. Example: SP4=1500, SP1=30, the value of the Kp action at low speeds will be 45. See the figure Adapter-Speed-PI. Consider the effects of the previous Command Filter. Saved into Flash and Reset.

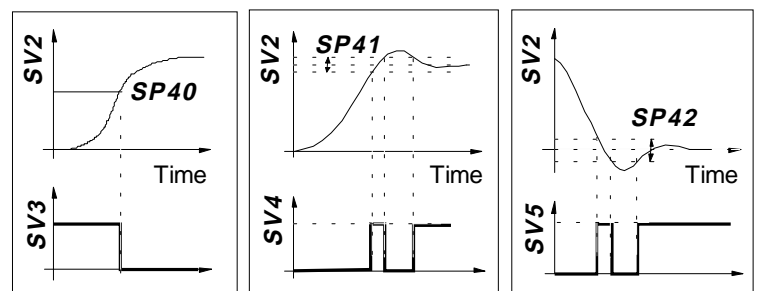
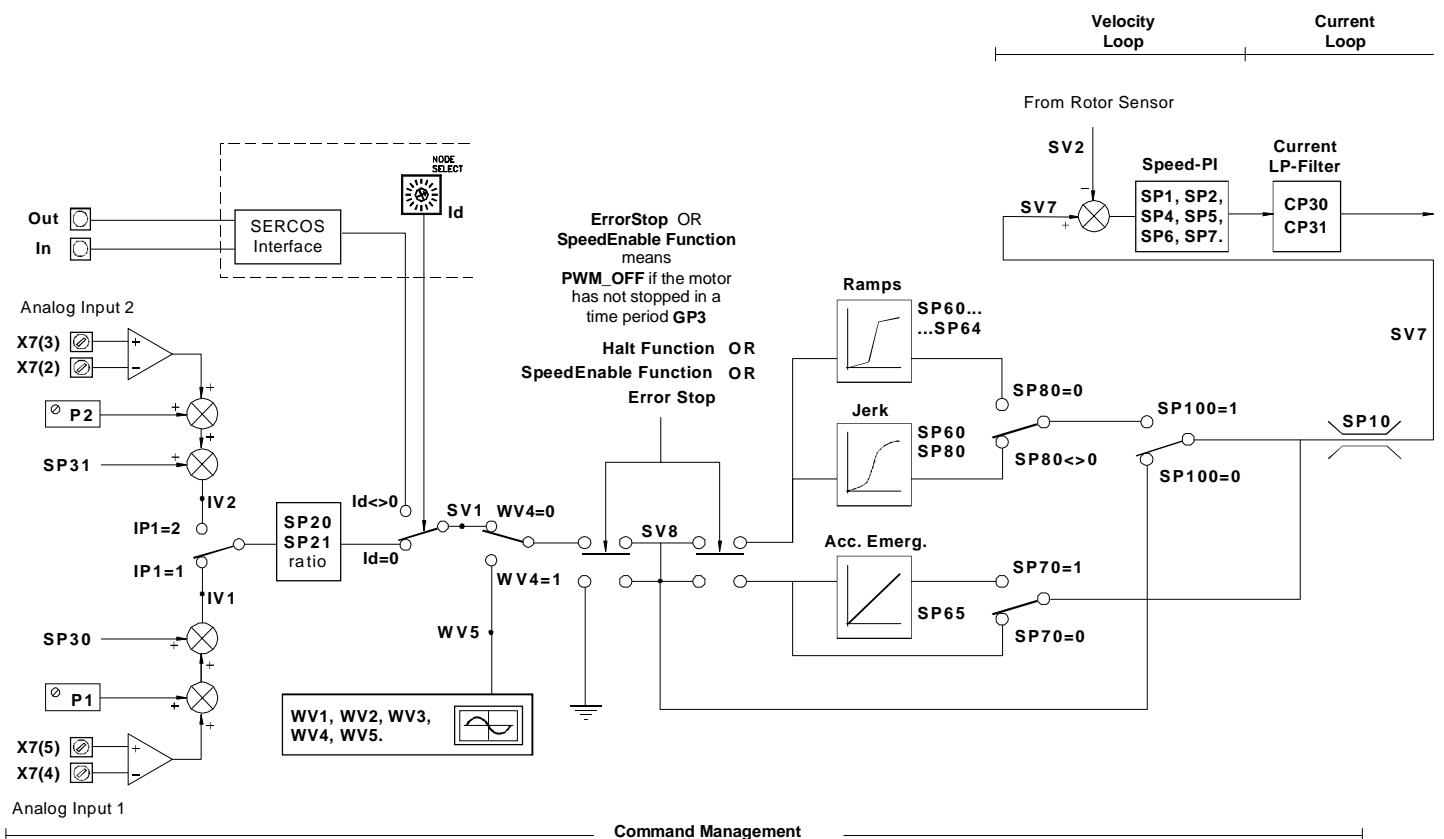
Adapter-Speed-PI:



Current Command Filter. **CP30** : defines the breakpoint of a low-pass current command filter. Its possible values are 0 through 8. a value of "0" means "no filtering". A value of "1" applies a filter with a breakpoint at 800 Hz, a "2" at 700 Hz and so on.

Sometimes this filtering is required by synchronous motors.

Halt function. Activating the Halt function has the same effect as switching the internal velocity command to "zero" thus stopping and locking the motor. By programming the Drive's internal parameters, one of the digital inputs of connector X6 can carry out the Halt function. Example: IP10=BV1, when pin 1 (referred to 5) of connector X6 receives **zero volts**, the Halt function will be activated. The Halt function can also be activated from the monitoring program (BV3=0) or through Sercos (bit 13 of DV32 = 0)



CNC8050/55 SERCOS SETUP

Make the fiber optic ring and identify the drives by means of the NodeSelect. See the Electrical Installation section.

Parameter setting of the 8050/55 CNC

SERCOSID Indicates the sercos address (0-8) into the ring. It must match the identification at the Node_Select switch.
(If a motor-drive is going to work on a "C" axis and a spindle, the SERCOSID parameters in both CNC tables must have the same value. In other words, they will have the same address in the Sercos ring).

SERCOSLE Define whether the feedback is done. 0: external feedback (Connector). 1: motor feedback (via Sercos)

$$\text{PROGAIN} = \frac{9500}{\text{EdS}} = \frac{9500 \cdot \text{Kv} \cdot 1000}{\text{G00FEED}} \text{ (mV / mm)}$$

Axis: Set MAXVOLT (P37) = 9500. Set PROGAIN (P23) as per the formula:

Feedback: SERCOSLE=0 Set: PITCH (P7), NPULSES (P8), DIFFBACK (P9), SINMAGNI (P10), FBACKAL (P11), REFPULSE (P32), IOTYPE (P52), ABSOFF (P53) and EXTMULT (P57) in the parameter table for each axis of the CNC.

SERCOSLE=1 The previous CNC parameters are ignored.

$$\text{MAXVOLTn} = \text{MAXGEARn} \cdot \text{Ratio} \cdot \frac{\text{SP20}}{\text{SP21}} \text{ (mV)}$$

Spindle: Set MAXGEARn. Set MAXVOLTn parameters as per the following formula:

Feedback: SERCOSLE=0 Set: NPULSES (P13), DIFFBACK (P14), FBACKAL (P15) y REFPULSE (P32) in the spindle parameter table of the CNC.

SERCOSLE=1 The previous CNC parameters are ignored.

$$\text{Ratio} = \text{Gear Ratio} = \frac{\text{N motor}}{\text{N tool}}$$

Important: The motor feedback is only useful to work in M19 mode and/or Rigid Tapping, when the spindle has only one gear (range) and the gear ration meets one of these two conditions:

- The Gear Ratio is 1/1. The reference mark of the spindle (I_0) is that of the motor feedback.
- The Gear Ratio is of the n/1 type where "n" is an integer. In this case, a microswitch must be used in order to select a particular reference signal I_0 among the many that the motor encoder will output when the spindle turns more than once.

Describe the manoeuver at the PLC.

To control the "Speed Enable" and "Drive Enable" functions, the PLC offers two new logic output variables:

SPENAn (SPeed ENable n) (n=1..7) (M5110, M5160, M5210, M5260, M5310, M5360 y M5410)

SPENAm (SPeed ENable m) (m=S,S2,AS) (M5462, M5487y M5449)

DRENAn (DRive ENable n) (n=1..7) (M5111, M5161, M5211, M5261, M5311, M5361 y M5411)

DRENAm (DRive ENable m) (m=S,S2,AS) (M5463, M5488y M5448)

The "Speed Enable" function at the Drive will be activated when **both** the SPENA variable **and** the electrical Speed_Enable signal at connector X2 are activated. Same for the "Drive Enable" function with DRENA and the electrical Drive_Enable signal.

Safety regulations (EN-60204-1) instruct that the Hardware control over the electrical Drive_Enable signal MUST NOT be removed even when using Sercos interface.

The Drive offers to the PLC two bits indicating the running status.

DRSTAFn (DRive STAtus First n) (n=1..7,S,S2,AS) (M5603, M5653, M5703, M5753, M5803, M5853 and M5903 for axes. M5953, M5978 and M5557 for spindles)

DRSTASn (DRive STAtus Second n) (n=1..7,S,S2,AS) (M5604, M5654, M5704, M5754, M5804, M5854 y M5904 for axes. M5954, M5979 and M5556 for spindles)

Meaning: DRSTAFn, DRSTASn = 0,0: Drive running an internal test. 0,1: Drive_OK closed. Apply power to the Power supply.
1,0: The Drive has power. 1,1: Drive running OK.

Important: The index of the PLC variables correspond to the X,Y,Z,U,V,W,A,B and C axes in that order. Those indexes are not related to the identification of the axes in the Sercos ring (SERCOSID, Node_Select).

If the machine has three axes (for example: X,Y and B); variables SPENA1, DRENA1, and bits DRSTAF1 and DRSTAS1 will correspond to the X axis, those with the index 2 to the Y axis, and those with index 3 to the B axis.

The installation manual of the 8050/55 CNC also mentions these PLC variables.

Drive parameters setting.

Parameters **NP121**, **NP122** and **NP123** must be properly set in the following cases:

- At the axis drives, ALWAYS.
- At the spindle drives, when wishing to display tool speed.

At the spindle drives with external feedback (SERCOSLE=0) the NP parameters need not be set.

SP21 and **SP20** must be set:

- At the spindle drives, ALWAYS. Set them with the maximum motor speed values for that application and 9500 millivolts respectively.

They need not be set at the axis drives.

Turn the machine on again.

Resetting the equipment is not enough.

POSITION DRIVER SETUP.

General parameters

AP1: Selects the operating mode of the drive.
= 3: motor feedback without Feedforward.
= 4: direct feedback without Feedforward.
= 11: motor feedback with Feedforward. (PP216)
= 12: direct feedback with Feedforward. (PP216)

GP10: Direct feedback signal type.
= 0 There is no direct feedback.
= 1 Square TTL signal
= 2 "1Vpp" sinewave signal or differential square TTL signal.

Check the value taken by the parameter:

GP2: Motor feedback type.
= 0 Sinewave encoder
= 1 Resolver.
= 2 Squarewave TTL encoder.
= 5 Heidenhain encoder (ERN 1387) for Siemens motors, 1FT6 family.

When using motor feedback (AP1=3 or AP1=11)

The following parameters are ignored:

GP10: Direct feedback signal type.
PP54: Refvalue with direct feedback.
PP115: Direct feedback parameter setting.
NP117: Pitch/pulses setting for direct feedback.

When using external feedback (AP1=4 or AP1=12)

The following parameters are ignored:

PP150: Refshift for motor feedback.
PP52: Refvalue with motor feedback.

Resolution related parameters:

PP115: External feedback parameter setting.
Bit 5: Structure of distance coded feedback
= 0 counting positive with positive direction
= 1 counting negative with positive direction
Bit 3: Direction polarity
= 0 not inverted
= 1 inverted
Bit 1: Feedback type
= 0 rotational feedback. See NP117.
= 1 lineal. See NP118.
Bit 0: Direct feedback type:
= 0 Rotary (encoder), (NP117 will give pulses per turn).
= 1 Linear (scale), (NP117 will give the period of the scales feedback signal).

NP117: Resolution of the rotary direct feedback in pulses per turn.

NP118: Resolution of the linear direct feedback.
- period of the scale signal. 20 microns for Fagor scales (graduated glass), S118 = 20 microns.

NP121, NP122: Indicate the gear ratio.
They only admit integer values up to

32767.

NP123: Leadscrew pitch. If it is a rotary axis, set
NP123 = 360000.

Parameters to identify a linear feedback with distance-coded reference marks:

NP165: Distance between reference marks
NP166: Distance between "coded" reference marks.

Home search parameters.

PP147: Setting of the home search.
Bit 5: = 0 The home switch is monitored (by default)
= 1 The home switch is ignored
Bit 3: = 0 Motor feedback (see PP52, PP150)
= 1 Direct feedback (see PP54, PP151)
Bit 1: = 0 Home switch normally open.
= 1 Home switch normally closed.
Bit 0: = 0 The motor shaft turns clockwise when searching home.
= 1 The motor shaft turns counterclockwise when searching home.

With the 8070 CNC take the electrical contact "home switch" to one of its digital inputs.

PP1: Slow motor speed when the home search is controlled by the Drive itself.

PP41: Fast motor speed when the home search is controlled by the Drive itself.

PP42: Acceleration of the movements when searching home.

PP52: Machine reference point position (home) with respect to Machine Reference Zero (Refvalue motor feedback).

PP54: Machine reference point position (home) with respect to Machine Reference Zero (Refvalue direct feedback).

Parameters PP52 and PP53 of the drive are equivalent to the "REFVALUE" (P53) of the 8050/55 CNC axis.

PP150: Position of the reference mark with respect to the machine reference point (home) (Refshift motor feedback).

PP151: Position of the reference mark with respect to the machine reference point (home) (Refshift direct feedback).

Parameters PP150 and PP151 of the drive are equivalent to axis parameter "REFSHIFT" (P47) of the 8050/55 CNC except that the Drive does not move to return to the "REFVALUE" (P53) position.

Homing method. The home switch may be connected directly to the PLC or to the drive, this is now irrelevant.

Gain related parameters.

PP104: Proportional gain in the position loop. It is similar to axis parameter "PROGAIN" (P23) of the 8050/55 CNC. PP104=1, means a following error of 1 mm at F1000 mm/min.

PP216.#: % of velocity FeedForward (0 to 100%). It is similar to axis parameter "FFGAIN" (P25) of the 8050/55 CNC

PP159: Maximum amount of following error permitted. If this parameter is set to "0", the following error is not monitored. It is very important to set it to a value other than "0" to prevent the axes from running away out of control. At the CNC the maximum following error permitted is also watched. This value is indicated in its relevant parameter in the parameter table for each axis at the CNC.

PV 189: Monitoring of the following error.

Various parameters for the position loop.

PP49, PP50: Indicate the maximum position that can be reached by the servo system in both positive and negative directions respectively. These limits are observed only when all the position data is referred to Machine Reference Zero. That is, Bit 0 of PV203 -S403- PositionFeedbackStatus is set to "1".

If the variable PV58 -S258 TargetPosition exceeds the position limits, the drive will activate bit 13 of DV9 -S12- Class2Diagnostics (Warnings) TargetPositionOutsideTheTravelZone.

The CNC also observes the travel limits defined in its axis parameter tables.

PP55: Controls the polarity of various position data.

- Bit4:** Position limits
 - = 0 active (by default). See PP49, PP50.
 - = 1 cancels the position limits.
- Bit3:** Direct position feedback value
 - = 0 non-inverted
 - = 1 inverted (by default)
- Bit2:** Motor position feedback value
 - = 0 non-inverted
 - = 1 inverted (by default)
- Bit0:** Position commandvalue
 - = 0 non-inverted
 - = 1 inverted (by default)

PP58: Leadscrew error. With motor feedback, the drive compensates for the backlash in changing direction. Both the drive and the CNC offer parameters to set the value of the leadscrew backlash; but this value must only be registered in either one of them. The other parameter must be set to "0".

PP76: Command application in module format. Verify that the CNC defines that axis the same way (module or absolute format).

- Bit 7:** = 0 The module format is not applied.
- = 1 The module format is applied to the axis.

PP103 : Value of the module to be applied on to rotary axes that do not work as linear axes (usually 360°).

QP1 : Loop cycle time. Read-only parameter that indicates how often the loop is being closed at the drives.

Parameters to be used only in Motion Control applications.

PP57: In-position zone. It indicates the difference allowed between the real and final position (PV58 -S258- TargetPosition) for considering that the axis is in position.

CNC8070 SETUP

The Fagor 8070 CNC has some general configuration parameters similar to those of the Fagor drive. These parameters must be set so they are consistent with the ones set at the drive.

The are:

OPMODEP

Similar to parameter AP1 -S32- PrimaryOperationMode. Give this parameter a value consistent with that of AP1 at the drive.

LOOPTIME

Similar to parameter QP1 -S1- ControlUnitCycleTime. Same.

Other parameters must also be set for each axis.

They are:

DRIVETYPE

Indicates the type of interface being used. To connect the 8070 CNC with Fagor drives, DRIVETYPE = Sercos

TELEGRAMTYPE

Telegram type used in Sercos communication. Set TELEGRAMTYPE = 4.

DRIVEID

Identifies the drive in the Sercos ring. Set this parameter with the same value as the one selected at the drive's thumbwheel.

NPULSES

PITCH

Parameters that determine feedback resolution.

The 8070 can work with a resolution of a tenth of a micron. Thus, the relationship between these two parameters must be:

$$\frac{\text{PITCH}}{\text{NPULSES} \cdot 4} = 0.1 \mu$$

PARAMETER LIST.

The terminology used in this document is as follows:

The ones starting with «S» are parameters of the IEC 61491 standard itself.

The ones starting with «F» belong to Fagor. The Sercos identifier of these parameters is obtained by adding 32768 to its index.

By the same token, the identifiers for the range extended parameters are obtained by adding 4096 to each range, for example:

Parameter VelocityLoopProportionalGain (SP1) is extended in ranges; thus the SERCOS number for SP1.0 (S100.0) will be 100, for SP1.1 (S100.1) will be 4196, for SP1.2 (S100.2) will be 8292, etc...

Fagor parameters with range extension are affected by these considerations.

#, parameter expandable in sets.

O, OEM access level required.

M, parameter set by the motor identifier MP1.

W, variables that can be modified.

*, parameter modifiable **on-line**.

F, Fagor access level required.

A, parameter only for asynchronous motors.

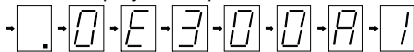
s, sign affected parameter.

| | | | | | | | |
|--------|-----|----------|-------------------------------------|-------|-----|----------|--------------------------------|
| AP1 | O | (S32) | PrimaryOperationMode | GV13 | | (F709) | PowerBusStatus |
| AP5 | O | (F2001) | PlcPrgScanTime | GV14 | F | (F710) | PowerVoltageMinimum |
| BV1 | O | (F201) | HaltDrivePin | GV20 | | (S219) | IDNListOfParameterSet |
| BV3 | O | (F202) | HaltDriveDnc | GV21 | | (S254) | ParameterSetActual |
| BV7 | O | (F203) | DriveEnableDnc | GV22 | W | (S217) | ParameterSetPreselection |
| BV14 | | (F204) | NotProgrammableIOs | GV23 | F | (F711) | ParameterSetAck |
| CP1 | OM | (S106) | CurrentProportionalGain | GV24 | W | (F712) | ParameterSetStb |
| CP3 | FMA | (F300) | CurrentDerivativeGain | GV25 | | (S255) | GearRatioActual |
| CP2 | OM | (S107) | CurrentIntegralTime | GV26 | W | (S218) | GearRatioPreselection |
| CP4 | FMA | (F301) | CurrentAdaptationProportionalGain | GV30 | W | (F713) | ParameterSetBit0 |
| CP5 | FMA | (F302) | CurrentAdaptationIntegralTime | GV31 | W | (F714) | ParameterSetBit1 |
| CP6 | FMA | (F303) | CurrentAdaptationLowerLimit | GV32 | W | (F715) | ParameterSetBit2 |
| CP7 | FMA | (F304) | CurrentAdaptationUpperLimit | GV33 | F | (F716) | TMODE_Select |
| CP20.# | O | (F307.#) | CurrentLimit | GV35 | | (F718) | PlcResourceData |
| CP30.# | *O | (F308.#) | CurrentFilter1TimeConstant | GV36 | | (F722) | KernelResourceData |
| CP31.# | O | (F312.#) | CurrentFilter1Damping | GV37 | | (F2012) | PlcErrors |
| CV1 | s | (F309) | CurrentUFeedback | GC1 | | (S264) | BackupWorkingMemoryCommand |
| CV2 | s | (F310) | CurrentVFeedback | GC2 | | (S216) | ParameterSetSwitch |
| CV3 | | (F311) | CurrentFeedback | HV1 | | (S110) | DrivePeakCurrent |
| CV10 | Fs | (F305) | CurrentUOffset | HV9 | | (F806) | ModularOrCompact |
| CV11 | Fs | (F306) | CurrentVOffset | HV10 | | (F290) | VsMSC |
| DP1 | O | (F400) | ErrorsDisables | HV11 | | (F291) | FlashManufacturerCode |
| DP142 | O | (S142) | ApplicationType | IP1.# | O | (F900.#) | AnalogReferenceSelect |
| DV1 | | (S11) | Class1Diagnostics (Errors) | IP5 | O | (F909) | DigitalInputVoltage |
| DV9 | | (S12) | Class2Diagnostics (Warnings) | IP10 | O | (F901) | I1IDN |
| DV10 | | (S13) | Class3Diagnostics (OperationStatus) | IP11 | O | (F902) | I2IDN |
| DV11 | | (F404) | FagorDiagnostics | IP12 | O | (F903) | I3IDN |
| DV14 | | (F400) | ErrorsInDncFormat | IP13 | O | (F904) | I4IDN |
| DV15 | O | (F2101) | ErrorDisable | IV1 | s | (F905) | AnalogInput1 |
| DV16 | O | (F2102) | ErrorEnable | IV2 | s | (F906) | AnalogInput2 |
| DV31 | | (S135) | DriverStatusWord | IV10 | O | (F907) | DigitalInputs |
| DV32 | | (S134) | MasterControlWord | IV11 | O | (F908) | DigitalInputsCh2 |
| DV95 | | (S95) | DiagnosticMessage | KP1 | F | (F1112) | DriveI2tErrorEffect |
| DC1 | | (S99) | ResetClass1Diagnostics | KP2 | O | (F1113) | ExtBallastResistance |
| EP1 | O | (F500) | EncoderSimulatorPulsesPerTurn | KP3 | O | (F1114) | ExtBallastPower |
| EP2 | O | (F501) | EncoderSimulatorI0Position | KP4 | O | (F1116) | ExtBallastEnergyPulse |
| EP3 | O | (F502) | EncoderSimulatorDirection | KV2 | | (F1100) | DriveTemperature |
| EC1 | O | (F503) | EncoderSimulatorSetI0 | KV4 | W | (F1101) | DriveTemperatureErrorLimit |
| FP1 | OMA | (F600) | MotorFluxProportionalGain | KV5 | W | (S201) | MotorTemperatureWarningLimit |
| FP2 | OMA | (F601) | MotorFluxIntegralTime | KV6 | | (S383) | MotorTemperature |
| FP20 | OMA | (F602) | MotorBEMFProportionalGain | KV8 | W | (S204) | MotorTemperatureErrorLimit |
| FP21 | OMA | (F603) | MotorBEMFIntegralTime | KV9 | W | (S202) | CoolingTemperatureWarningLimit |
| FP30 | FMA | (F604) | MotorInductance1 | KV12 | W | (S205) | CoolingTemperatureErrorLimit |
| FP31 | FMA | (F605) | MotorInductance2 | KV10 | | (F1102) | CoolingTemperature |
| FP32 | FMA | (F606) | MotorInductance3 | KV20 | s | (F1103) | SupplyPlus5V |
| FP33 | FMA | (F607) | MotorInductance4 | KV21 | s | (F1104) | SupplyPlus8V |
| FP34 | FMA | (F608) | MotorInductance5 | KV22 | s | (F1105) | SupplyPlus18V |
| FP35 | FMA | (F609) | MotorInductance6 | KV23 | s | (F1106) | SupplyMinus5V |
| FP36 | FMA | (F610) | MotorInductance7 | KV24 | s | (F1107) | SupplyMinus8V |
| FP37 | FMA | (F611) | MotorInductance8 | KV25 | s | (F1108) | SupplyMinus18V |
| FP38 | FMA | (F612) | MotorInductance9 | KV32 | | (F1109) | I2tDrive |
| FP40.# | FMA | (F613.#) | FluxReduction | KV36 | F | (F1111) | I2tMotor |
| GP1 | O | (F700) | PwmFrequency | KV40 | | (F1115) | ExtBallastOverload |
| GP2 | O | (F701) | Feedback1Type | MP1 | O | (S141) | MotorType |
| GP3 | O | (F702) | StoppingTimeout | MP2 | FMS | (F1200) | MotorTorqueConstant |
| GP4 | O | (F703) | SetNumber | MP3 | FM | (S111) | MotorContinuousStallCurrent |
| GP5 | | (F704) | ParameterVersion | MP4 | FMS | (S109) | MotorPeakCurrent |
| GP6 | O | (F717) | GearRatioNumber | MP5 | FM | (F1201) | MotorPolesPairs |
| GP7 | O | (F235) | OverloadTimeLimit | MP6 | FMA | (F1202) | MotorRatedSupplyVoltage |
| GP8 | O | (F236) | OverloadVelocityThreshold | MP7 | FMA | (F1203) | MotorPowerFactor |
| GP9 | O | (S207) | DriveOffDelayTime | MP8 | FMA | (F1204) | MotorConstantPowerEndVelocity |
| GP10 | O | (F234) | Feedback2Type | MP9 | FMA | (F1205) | MotorSlip |
| GV2 | | (S30) | ManufacturerVersion | MP10 | FMA | (F1206) | MotorStatorResistance |
| GV3 | s | (F705) | ParameterChecksum | MP11 | FMA | (F1207) | MotorStatorInductance |
| GV4 | | (S380) | DCBusVoltage | MP12 | FMA | (F1208) | MotorNominalPower |
| GV5 | s | (F706) | CodeChecksum | MP13 | FM | (F1209) | MotorThermalTimeConstant |
| GV7 | W | (S267) | Password | MP14 | FM | (F1210) | MotorTempSensorType |
| GV8 | | (F707) | AccessLevel | MP15 | FM | (F1211) | MotorShaft |
| GV9 | | (S140) | DriveType | MP16 | FM | (F1212) | MotorBrake |
| GV10 | O | (S262) | LoadDefaultsCommand | MP17 | FM | (F1213) | MotorFan |
| GV11 | W | (F708) | SoftReset | MP18 | FMA | (F1214) | MotorMounting |

| | | | | | | | |
|---------|-----|-----------|--|---------|-----|-----------|------------------------------------|
| MP19 | FMA | (F1215) | MotorBalancing | PV203 | | (S403) | PositionFeedbackStatus |
| MP20 | FMA | (F1216) | MotorBearings | PV204 | W | (S404) | PositionCommandStatus |
| MP22 | FMA | (F1218) | MotorPowerReduction | PV207 | | (S407) | HomingEnable |
| MP24 | FM | (F1220) | MotorMomentumOfInertia | PV208 | | (S408) | ReferenceMarkerPulseRegistered |
| NP1 | FM | (F2200) | ReducedActuatedMomentumOfInertiaPercentage | PC146 | | (S146) | NCControlledHoming |
| NP117 | O | (S117) | ResolutionOfFeedback2 | PC148 | | (S148) | DriveControlledHoming |
| NP118 | O | (S118) | ResolutionOfLinearFeedback | PC171 | | (S171) | CalculateDisplacement_C |
| NP121.# | O | (S121.#) | InputRevolutions | PC172 | | (S172) | DisplacementToTheReferenceSystem |
| NP122.# | O | (S122.#) | OutputRevolutions | QP1 | | (S1) | ControlUnitCycleTime |
| NP123 | O | (S123) | FeedConstant | QP11 | | (F2000) | SercosMbaud |
| NP165 | O | (S165) | DistanceCodedReferenceMarksA | RP1 | O | (F1500) | FeedbackSineGain |
| NP166 | O | (S166) | DistanceCodedReferenceMarksB | RP2 | O | (F1501) | FeedbackCosineGain |
| NV31 | | (S301) | RealTimeControlBit1IDN | RP3 | Os | (F1502) | FeedbackSineOffset |
| NV33 | | (S303) | RealTimeControlBit2IDN | RP4 | Os | (F1503) | FeedbackCosineOffset |
| NV35 | | (S305) | RealTimeStatusBit1IDN | RP5 | O | (F1504) | FeedbackResolverRhoCorrection |
| NV37 | | (S307) | RealTimeStatusBit2IDN | RP6.# | O | (F1505.#) | FeedbackErrorDisable |
| OP1 | *O | (F1400) | DA1IDN | RP10 | O | (F1514) | Feedback2Interface |
| OP2 | *O | (F1401) | DA2IDN | RP51 | O | (F1550) | Feedback2SineGain |
| OP3 | *O | (F1402) | DA1ValuePer10Volt | RP52 | O | (F1551) | Feedback2CosineGain |
| OP4 | *O | (F1403) | DA2ValuePer10Volt | RP53 | Os | (F1552) | Feedback2SineOffset |
| OP5 | O | (F291) | Prog_OutIDN | RP54 | Os | (F1553) | Feedback2CosineOffset |
| OP10 | O | (F1404) | O1IDN | RV1 | s | (F1506) | FeedbackSine |
| OP11 | O | (F1405) | O2IDN | RV2 | s | (F1507) | FeedbackCosine |
| OP12 | O | (F1406) | O3IDN | RV3 | F | (F1508) | FeedbackRhoCorrection |
| OP13 | O | (F1407) | O4IDN | RV4 | | (F1509) | FeedbackRadius |
| OV1 | Os | (F1408) | DA1Value | RV5 | | (F1515) | EncoderType |
| OV2 | Os | (F1409) | DA2Value | RV6 | | (F1510) | EncoderError |
| OV5 | O | (F292) | Prog_Out | RV7 | | (F1511) | StegmannMotorType |
| OV10 | O | (F1410) | DigitalOutputs | RV8 | F | (F1512) | CircleAdjust |
| OV11 | O | (F1413) | DigitalOutputsCh2 | RV51 | s | (F1556) | Feedback2Sine |
| PP1.# | O | (F1300.#) | HomingVelocitySlow | RV52 | s | (F1557) | Feedback2Cosine |
| PP10 | | (F1310) | ProcessBlockMode | RV54 | | (F1559) | Feedback2Radius |
| PP11 | | (F1311) | FeedrateOverrideLimit | RC1 | O | (F1509) | EncoderParameterStoreCommand |
| PP12 | s | (F1312) | PositioningVelocityDefault | SP1.# | * | (S100.#) | VelocityProportionalGain |
| PP22 | s | (F1322) | JogVelocity | SP2.# | * | (S101.#) | VelocityIntegralTime |
| PP23 | s | (F1323) | JogIncrementalPosition | SP4.# | * | (S211.#) | VelocityAdaptationProportionalGain |
| PP25 | | (F1325) | InPositionTime | SP5.# | * | (S212.#) | VelocityAdaptationIntegralTime |
| PP41.# | O | (S41.#) | HomingVelocityFast | SP6.# | O | (S209.#) | VelocityAdaptationLowerLimit |
| PP42.# | O | (S42.#) | HomingAcceleration | SP7.# | O | (S210.#) | VelocityAdaptationUpperLimit |
| PP49 | Os | (S49) | PositivePositionLimit | SP10.# | O | (S91.#) | VelocityLimit |
| PP50 | Os | (S50) | NegativePositionLimit | SP11 | FMA | (S113) | MotorMaximumSpeed |
| PP52 | Os | (S52) | ReferenceDistance1 | SP12 | FM | (F1600) | MotorRatedSpeed |
| PP54 | Os | (S54) | ReferenceDistance2 | SP20.# | | (F31.#) | VoltageRpmVolt |
| PP55 | O | (S55) | PositionPolarityParameters | SP21.# | | (F81.#) | RpmRpmVolt |
| PP57 | O | (S57) | PositionWindow | SP30 | *s | (F1603) | AnalogInputOffset1 |
| PP58 | Os | (S58) | Backlash | SP31 | *s | (F1604) | AnalogInputOffset2 |
| PP76 | | (S76) | PositionDataScalingType | SP40.# | O | (S125.#) | VelocityThresholdNx |
| PP103 | Os | (S103) | ModuloValue | SP41.# | O | (S157.#) | VelocityWindow |
| PP104.# | | (S104.#) | PositionKvGain | SP42 | O | (S124) | StandStillWindow |
| PP115 | O | (S115) | PositionFeedback2Type | SP43 | O | (S43) | VelocityPolarityParameter |
| PP147 | | (S147) | HomingParameter | SP44 | | (S44) | VelocityDataScalingType |
| PP150 | Os | (S150) | ReferenceOffset1 | SP60.# | O | (S138.#) | AccelerationLimit |
| PP151 | Os | (S151) | ReferenceOffset2 | SP62.# | O | (F1606.#) | AccelerationLimit2 |
| PP159 | O | (S177) | MonitoringWindow | SP64.# | O | (F1608.#) | AccelerationLimit3 |
| PP177 | O | (S177) | AbsoluteDistance1 | SP61.# | O | (F1605.#) | AccelerationLimitVelocity2 |
| PP178 | O | (S178) | AbsoluteDistance2 | SP63.# | O | (F1607.#) | AccelerationLimitVelocity3 |
| PP216.# | | (S296.#) | VelocityFeedForwardPercentage | SP65.# | O | (F1609.#) | EmergencyAcceleration |
| PP217.# | | (S348.#) | AccelerationFeedForwardPercentage | SP70 | O | (F1610) | AccelerationOnEmergency |
| PP243.# | O | (S393.#) | ModuloCommandMode | SP80.# | O | (S349.#) | JerkLimit |
| PV13 | W | (F1313) | KernelOperationMode | SP100.# | O | (F1611.#) | AccelerationLimitOn |
| PV14 | W | (F1314) | KernelAutoMode | SV1 | Ws | (S36) | VelocityCommand |
| PV15 | W | (F1315) | KernelStartSignal | SV2 | s | (S40) | VelocityFeedback |
| PV16 | W | (F1316) | KernelStopSignal | SV3 | | (S332) | nFeedbackMinorNx |
| PV17 | W | (F1317) | KernelResetSignal | SV4 | | (S330) | nFeedbackEqualINCommand |
| PV18 | W | (F1318) | KernelAbortSignal | SV5 | | (S331) | nFeedbackEqual0 |
| PV19 | W | (F1319) | KernelManMode | SV7 | s | (F1612) | VelocityCommandFinal |
| PV20 | W | (F1320) | JogPositiveSignal | SV8 | s | (F1613) | VelocityCommandBeforeFilters |
| PV21 | W | (F1321) | JogNegativeSignal | TP1 | Os | (S126) | TorqueThresholdTx |
| PV24 | | (F1324) | FeedrateOverrideEqualCero | TP2 | Os | (S158) | PowerThresholdPx |
| PV26 | Ws | (F1326) | ProgramPositionOffset | TP85 | O | (S85) | TorquePolarityParameter |
| PV27 | | (F1327) | KernelInitError | TV1 | s | (S80) | TorqueCommand |
| PV28 | | (F1328) | KernelExecError | TV2 | s | (S84) | TorqueFeedback |
| PV47 | Ws | (S47) | PositionCommand | TV3 | s | (F1701) | TorqueFeedbackPercentage |
| PV51 | s | (S51) | PositionFeedback1 | TV10 | | (S333) | TGreaterTx |
| PV53 | s | (S53) | PositionFeedback2 | TV50 | s | (F1700) | PowerFeedback |
| PV58 | Ws | (S258) | TargetPosition | TV60 | | (S337) | PGreaterPx |
| PV59 | Ws | (S259) | PositioningVelocity | TV100 | | (F1702) | TorqueStatus |
| PV60 | Ws | (S260) | PositioningAcceleration | WV1 | W | (F1800) | GeneratorShape |
| PV108 | W | (S108) | FeedrateOverride | WV2 | W | (F1801) | GeneratorPeriod |
| PV115 | | (S315) | PositioningVelocityGreaterLimit | WV3 | Ws | (F1802) | GeneratorAmplitude |
| PV123 | | (S323) | TargetPositionOutsideOfTravelRange | WV4 | O | (F1803) | GeneratorType |
| PV136 | | (S336) | InPosition | WV5 | s | (F1804) | GeneratorOutput |
| PV142 | | (S342) | TargetPositionAttained | WV6 | W | (F1805) | GeneratorDutyCycle |
| PV143 | | (S343) | InterpolatorHalted | WV7 | W | (F1806) | GeneratorWaves |
| PV173 | s | (S173) | MarkerPositionA | WV8 | W | (F1807) | GeneratorOn |
| PV175 | O | (S175) | DisplacementParameter1 | WV9 | Ws | (F1808) | GeneratorOffset2 |
| PV176 | O | (S176) | DisplacementParameter2 | XV0 | | (S0) | NullId |
| PV189 | s | (S189) | FollowingError | XV1 | | (F1900) | One |
| PV193 | Os | (S193) | PositioningJerk | XV2 | | (F1901) | Zero |
| PV200 | O | (S400) | HomeSwitch | | | | |

ERROR AND WARNING LIST.

Status Display, Example: Error 300, Warning 1



Effect of the Errors on the system.

With analog interface:

It appears on the display of the Drive module.

With Sercos interface:

It appears on the display of the Drive module.

It appears on the CNC screen.

CNC actions:

- activates bit 13 of DV31.
- activates the corresponding bit at the DV1 variable.
- interrupts program execution.
- cancels axes and spindle movement.
- The /ALARM and O1 marks are set to "0" (these marks are in the PLC program that handles that emergency without having to know which error has occurred).

List of Errors.

- 1 Internal Error**
Get in touch with Fagor Automation.
- 2 Internal Error**
Get in touch with Fagor Automation.
- 3 While having torque, there is a voltage drop at the Power Bus.**
- Having torque, a voltage drop has been detected at the Power Bus. Probably the three-phase line has dropped or any of the drives has failed. Check the proper condition of the lines and the drives and restart the system.
- 4 Emergency stop and time limit "GP3" exceeded.**
- An attempt has been made to stop the motor by disabling "Speed Enable". The system has tried to stop the motor at maximum torque, but it has not been able to stop within the time period set by parameter GP3 (DriveOffDelayTime = maximum braking time allowed before issuing an error) or the parameter which determines when the motor is considered to be stopped SP42 (MinimumMotorSpeed) is too small (bear in mind that zero speed or absolute lack of speed is impossible). There is always a small amount of speed "noise" due to feedback. The load to be stopped by the motor is too great for the time window set by GP3 (increase the value of this parameter). The threshold or speed window considered as zero SP42 is too small (increase the value of this parameter). The module's performance is poor or is unable to stop the motor. The module may be defective.
- 5 Code Checksum Error**
- The checksum for the code of the program loaded is not correct. Reload the software. If the problem persists, the Flash or Ram memories may be defective or the loaded code may be defective. Get in touch with Fagor Automation.
- 6 Error on the Sercos board.**
Change the board. If the error persists, change the Vecon card.
- 50 - 55 Internal PLC compiling error**
- See the PLC manual for the meaning of this error. Correct the program.
- 66 - 69 PLC execution error**
- See the PLC manual for the meaning of this error.
- 100 Internal +5 Voltage out of range**
- 101 Internal -5 Voltage out of range**
- 102 Internal +8 Voltage out of range**
- 103 Internal -8 Voltage out of range**
- 104 Internal +18 Voltage out of range**
- 105 Internal -18 Voltage out of range**
Get in touch with Fagor Automation.
- 106 Heatsink overtemperature. (IGBT)**
-The drive is doing something which causes the power devices to overheat. Stop the system for a few minutes and reduce the amount of effort required of the Drive.
- 107 Drive overtemperature. (Vecon)**
-The ambient temperature of the drive is too high. It must be lowered.
- 108 Motor overtemperature**
The cables measuring motor temperature (position sensor cables), or the thermistor itself are defective. The application requires high current peaks. Stop the system for a few minutes and decrease the amount of effort demanded to the motor. Ventilate the motor.
- 109 Overvoltage at digital inputs.**
- The digital inputs of the drive receive a voltage higher than what they have been set up for. Check the configuration (parameter IP5 -F00909-) and the electrical voltage applied.
- 150 Travel limit overrun.**
- The travel limits of the axis have been exceeded. Check the values of these limits and the programming of these movements.
- 152 Command module exceeded.**
- While working with a command in module format, a command has been received whose value exceeds the one set by parameter PP103. Check the value of this parameter together with its equivalent parameter at the CNC. Check that both the drive and the CNC work in the same command mode.
- 154 Excessive Feedforward velocity command.**
- The path required by the position command causes a feedforward velocity command which is too high. Decrease the path demands in terms of required feedrate.
- 155 Excessive Feedforward acceleration command.**
- The path required by the position command causes a feedforward acceleration command which is too high. Decrease the path demands in terms of required acceleration.
- 156 Excessive following error.**
- The axis follows the position command with a "following error" (axis lag) PV189 -S189- FollowingError which is greater than the maximum allowed by PP159 -S159- MonitoringWindow. Check the setting of all these factors involved in "following error". Check the value given to PP159.
- 201 Motor overload.**
- 202 Drive overload.**
- The I²t protection of the motor or of the drive has triggered. The duty cycle is greater than the system can provide.
- 203 Torque overload error.**
- The servo drive is locked up and it can not turn freely. Due to too high a torque, the turning speed has not exceeded the GP8 value for a time period greater than the GP7 value. Free the motor. If the error comes up for no apparent reason, increase the GP7 and/or GP8 values. If GP7 is set to "0", the error message is never issued.
- 211 Internal Error**
Get in touch with Fagor Automation.
- 212 Overcurrent**
- Too much current at the Drive module. Drive malfunction. Reset the error, the parameter settings might be wrong and they cause overcurrent.
- 213 Undervoltage at the IGBT drive**
- Low supply voltage is detected in the IGBT attack circuitry in the Drive module. Possible failure on the drive of the IGBT or the IGBT itself. Reset the error, and if this goes on, get in touch with Fagor Automation.
- 214 Short-circuit**
- Short-circuit at the Drive module. Reset the error. If it persists, the power cables might be connected in the wrong order or that they touch each other causing the short-circuit. The parameters might be wrong or there is a Drive malfunction. Contact Fagor Automation
- 215 Overvoltage in the Power Bus (Hard)**
Internal Ballast connection jumper missing (see power connectors). Or, when using an external Ballast, it is not connected properly. The Ballast resistor is burned out. Power it down and check for proper Ballast circuit connection.
- 250 - 253 Homing error.**
Get in touch with Fagor Automation.

- 300** Overtemperature at the heatsink of the Power Supply module.
- 301** Overtemperature at the Ballast of the Power Supply module.
- Temperature of the heat-sink or of the Ballast circuit of the Power Supply module too high. Stop the system for a few minutes and reduce the level of effort required of this module.
- 302** Shortcircuit at the Ballast of the Power Supply module.
Get in touch with Fagor Automation.
- 303** Ballast circuit supply voltage out of range
Get in touch with Fagor Automation.
- 304** Over voltage at the PS Power Bus
- Voltage at the Power Bus too high. The internal Ballast may be disconnected (see Power Supply Module) or, when using an external Ballast, it is not connected. Detected by the Power Supply.
Turn the power off and check that the lines are OK.
- 305** Protocol error at the interface between the Power Supply and the Drive.
- Communication errors between the Power Supply module and the Drive through the internal Bus.
Reset the error. If this persists, get in touch with Fagor Automation.
- 306** Overvoltage at the DDS Power Bus
Like error 304, but detected by the Drive module.
- 307** Undervoltage at the Power Bus
- The application demands high current peaks and the mains power has too much impedance.
- The mains voltage is lower than permitted (380Vac - 10%)
Turn the power off and check that the lines are OK.
- 308** Overcurrent in the regenerating circuit.
- 309** Short-circuit at the High Side IGBT.
- 310** Low voltage at the driver of the High Side IGBT.
- 311** Short-circuit at the Low Side IGBT.
- 312** Low voltage at the driver of the Low Side IGBT.
Get in touch with Fagor Automation.
- 313** Consumption overcurrent.
- The current demanded from the power supply is too high.
Decrease the demands of the duty cycle.
- 403** MST fault
- 404** MDT fault
- 405** Invalid Phase Error
- 406** Phase Upshift Error
- 407** Phase Downshift Error
- 400 series errors refer to various communication problems through the fiber optic ring. Check the connections at the ring and the identification of each module.
- 500** Inconsistent parameters.
- See error 502.
- 501** Parameter Checksum Error
- The parameter Checksum has been found to be incorrect.
The Soft version has probably been changed and the new version requires a different number of parameters.
When this error comes up the servo-drive takes the default values of the parameters.
The user has two options:
- Confirm the Default values:
To do this simply save the parameters again.
- Recover the previous values:
To do this, load the parameters into RAM and check them out with the PC. If the operator considers that they are valid, he/she can validate them by storing them.
- 502** Wrong Parameter
- The DV16 variable, indicates the code of the wrong parameter.
- Parameter NV22 (S-22) contains the wrong parameter list. For now, it can only be seen by means of the ddssetup.exe on DOS.
Correct the parameter.
- 503** Wrong default motor values table.
(This error does not come up from software version 03.01 on)
The table has not been saved. This table must be saved.
- 504** Sercos Phase 2, Wrong Parameter
- Only with Sercos interface: parameter NV21 (S-21) contains the wrong parameter list corresponding to stepping to stage 3 of the Sercos protocol. For now, it can only be seen by means of the ddssetup.exe on DOS.
Correct the parameter.
- 505** Different parameters in Ram and Flash memories
- The parameters stored in the drive Ram memory are different from

those stored in Flash memory. This match is only tested on startup. The drive may have read a new motor ID.

Save the parameters into Flash memory thus validating the new motor.

- 600** Error in the Communication with the Rotor Encoder.
- 601** Error in the Communication with the Rotor Encoder
Check the sensor cable and if it is the right one, check the sensor itself and the X4 card. Non resettable.
- 602** Motor feedback B signal saturated.
- Defective rotor sensor cabling, encoder or X4 card. RP1 (gain of the sine signal of the rotor sensor) or RP3 (offset of the sine signal of the rotor sensor) is too large.
Check the cable of the Encoder and that of the X4 card or increase the value of these parameters.
- 603** Motor feedback A signal saturated.
- Defective rotor sensor cabling, encoder or X4 card. The offset and/or gain (RP1, RP2, RP3 and RP4) of the signals is too large.
Check the cable of the Encoder and that of the X4 card or increase the value of these parameters.
- 604** Saturation of the motor feedback signal A and/or B.
- 607** Saturation of the direct feedback signal A and/or B.
- Defective cabling, feedback device or feedback board (connector X4 or X3). The value of parameter RP1, RP2, RP3, or RP4 is too high.
Check the cable, the feedback device, the cards or decrease the value of these parameters.
- 605** Motor feedback signal A and/or B too weak.
- 608** Direct feedback signal A and/or B too weak.
- Defective cabling, feedback device or feedback board (connector X4 or X3).
- The value of parameter RP1, RP2, RP3, or RP4 is too low.
Check the cable, the feedback device, the cards or increase the value of these parameters.
- 606** Excessive rotor sensor signal drift.
- The quality of the signals has dropped. Wiring of the rotor sensor faulty. Encoder faulty, X4 card faulty or ground connection faulty.
Check the state of the cable, of the Encoder or of the X4 card, or the ground connections.
- 700** Error when identifying the RS-232 board.
- 701** Error when identifying the VeCon board.
- 702** Sercos board missing. I/O board missing.
- 703** Wrong I/O board version.
- 704** Wrong AD selection on the I/O board.
- 705** Error when identifying of the Power board.
- 706** Error when identifying the encoder simulation board.
- 707** Error when identifying the motor feedback board.
The 700 series errors refer to the improper operation of the hardware or that any of the necessary boards is missing. Contact Fagor Automation.
They are errors that can be reset.
- 801** Encoder not detected.
- 802** Communication error with the encoder.
- 803** Encoder not initialized
- 804** Defective encoder.
- 805** No encoder detected at the motor.
- 806** Homing error with Sincoder
Get in touch with Fagor Automation.
- 900** MC program initialization error
Refer to the MC manual for the meaning of this error.
- 9xx** MC program execution errors
Refer to the MC manual for the meaning of this error.

List of Warnings.

A warning on the 7-segment display appears with an "A" instead of an "E" which is used to display errors. Warnings indicate that the Drive is getting to an error limit.

- 1 Inside Overtemperature prior to error 107
- 2 Motor Overtemperature prior to error 108
- 3 Heatsink Overtemperature prior to error 106

The warning temperature (KV1, KV5 or KV9, respectively) has been exceeded.

Troubleshooting.

This section is intended to be an assistance to solve some of the typical problems that come up when installing the Servo Drive system.

The synchronous motor runs away. The axis with encoder simulator runs away.

Wrong encoder absolute position offset. Change the counting direction of the encoder signals, modify EP3. Motor with sinewave encoder whose parameters have been set for a square-wave encoder. Modify GP2.

The synchronous motor does not turn smoothly, it applies force but intermittently.

The power phases between the drive and the motor are not cabled correctly. The signal phases between the drive and the rotor sensor are not cabled correctly.

The torque of the synchronous motor is low.

Check the system's current limit. CP20. Wrong encoder absolute position offset. The encoder (or resolver) has moved from the correct position.

The synchronous motor is overheated

Wrong encoder absolute position offset.

After the setup and with the Drive active the motor moves.

Resolver feedback has been selected while actually using an encoder, modify GP2.

The motor does not turn properly and makes a lot of noise.

The resolver cable shield is not connected to connector X4 of the drive module; Pin 26.

The motor moves with a lot of noise and when stopped, it seems to jerk.

The encoder cable shield is connected at the motor end.

The following error depends on motor speed.

It is due to the effect of the PI which varies depending on speed (SP1, 2, 4, 5, 6, 7). Try adjusting it so this does not happen. Remember that the minimum following error is only required for machining not for moving.

The CNC, with encoder simulator, seems to lose feedback pulses.

The lack of integral factor (SP2) could cause it no to reach position. Check SP1 and SP2.

The motor makes noise and heats up.

The resolver or encoder is positioned wrong. The encoder or resolver cable shield is not connected.

The Ballast kicks in without apparent reason.

The motor cable leaks to ground.

The motor loses torque, it does not reach the speed, it does not position properly and it does not repeat position.

The encoder is loose and its rotor shifts with respects to the rotor of the motor.

The desired motor cannot be selected, it doesn't seem to be on the motor list.

The loaded drive software is older than version V01.04 and data D01.06. These versions did not have all the possible motors.

The asynchronous motor, with a light load and requiring great acceleration (much greater than the rated value for the motor) loses control or oscillates.

The solution consists in applying an acceleration ramp providing a smoother speed transition (SP60, 61, 62, 63 and 64).

The asynchronous motor has no torque.

Low current limit value, CP20.

While the drive is activated, the spindle vibrates sporadically. Identical or opposed speeds cannot be obtained when changing the sign of the velocity command.

There is poor ground connection or a leak at the cable carrying the velocity command.

The gear box generates noise.

The motor adjustment is too sharp. Correct the values of the PI (SP1, SP2) to soften it. Apply ramps or an external filter. The velocity command must be continuous.

The spindle moves properly but it makes a lot of noise.

The electrical connection to the asynchronous motor is wrong. Instead of being a star connection it is a triangle. The encoder cable shield is loose at the motor end.

The motor makes a strange noise when turning, as if the feedback were noisy.

The rotor sensor cable has a shield in electrical contact with the body of the motor.

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