

MOTOR

FXM/FKM

Installation manual

Ref.1703



FAGOR AUTOMATION

ORIGINAL INSTRUCTIONS

Original manual. Any translation of the original manual (spanish or english) will replace the phrase ORIGINAL INSTRUCTIONS with TRANSLATION OF THE ORIGINAL INSTRUCTIONS.

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FAGOR AUTOMATION

Responsibility exemption

The information described in this manual may be subject to changes due to technical modifications. Fagor Automation S. Coop. reserves the right to change the contents of this manual without prior notice.

The content of this manual and its validity for the product described here has been verified. Nevertheless, the information, technical or otherwise, in these manuals or in any other type of documentation is not guaranteed to be integral, sufficient or up to date.

Involuntary errors are possible, hence the absolute match is guaranteed. However, the contents of manuals and documents are regularly checked and updated implementing the pertinent corrections in later editions.

Fagor Automation S. Coop. will not be held responsible for any losses or damage, direct, indirect or by chance that could result from that information and it will be the user's responsibility to use it.

Responsibility and warranty claims are excluded in case of shipping damage, wrong usage of the unit in wrong environments or when not used for the purpose for which it has been designed, ignoring the warnings and safety indications given in this document and/or legal ones that may be applied to the work place, software modifications and/or repairs made by unauthorized personnel, damage caused by the influence of other nearby equipment.

Warranty

The warranty terms may be requested from your Fagor Automation representative or through the usual commercial channels.

Registered trademarks

All registered trade marks, even those not indicated are also acknowledged. When some are not indicated, it does not mean that they are free.

Title	FXM/FKM MOTOR
Type of documentation	Description and installation of FXM/FKM synchronous axis motors. Associated with FAGOR drives.
Electronic document	man_fxm_fkm_motors.pdf
Language	English
Manual reference	Ref.1703
Web	The user must always use the latest reference of this manual, available on FAGOR'S corporate website. http://www.fagorautomation.com .
Email	info@fagorautomation.es

Version history

Manual reference	Events
0403	First version.
0712	FKM6 series. Models: FKM66.30A.□□.□□0, FKM64.40A.□□.□□0, FKM64.20F.□□.□□0
0807	FKM6 series. Models: FKM62.60A.□□.□□0
0811	FKM2 series. Models: FKM22.60A.□□.□□0 FKM4 series. Models: FKM42.60A.□□.□□0. FKM6 series. Models: FKM66.20A.□□.□□0, FKM66.20F.□□.□□0, FKM64.30F.□□.□□0, FKM62.40F.□□.□□0
1006	Serie FKM9. Models: FKM94.20A.□□.□□0, FKM95.20A.□□.□□0, FKM96.20A.□□.□□0.
1101	Modification to feedback cables EEC and EEC-SP.
1112	Corrected typos.
1301	The motor feedback cable EEC-□ has been discontinued. FKM4 series. Models: FKM44.20A.□□.□□0. The FKM44.30A.□□.□□□.2 motor replaces the FKM44.30A.□□.□□0, optimized for ACSD-16H drives. FKM6 series. Models: FKM64.20A.□□.□□0. The FKM66.20A.□□.□□□.2 motor replaces the FKM66.20A.□□.□□0, optimized for ACSD-16H drives. FKM8 series. Models: FKM82.20A.□□.□□0, FKM82.30A.□□.□□0, FKM82.40A.□□.□□0, FKM83.20A.□□.□□0, FKM83.30A.□□.□□0, FKM84.20A.□□.□□0, FKM84.30A.□□.□□0, FKM85.20A.□□.□□0.
1307	Pairs of poles. Reference to holding brake connection diagram. Tolerance levels on the blueprints of FKM motors.
1403	Tolerances in certain dimensions on FXM blueprints. Length of the power connectors MC 23 and AMC 23. FKM8/V series. Models: FKM82.40A.□□.□□1, FKM83.30A.□□.□□1, FKM84.20A.□□.□□1, FKM84.30A.□□.□□1, FKM85.20A.□□.□□1.
1409	Corrected LB dimension on FKM2/4/6 motors.
1501	FKM4 series. Models: FKM43.20A.□□.□□0, FKM43.30A.□□.□□0, FKM43.40A.□□.□□0, FKM43.30F.□□.□□0. FKM6 series. Models: FKM63.20A.□□.□□0, FKM63.30A.□□.□□0, FKM63.40A.□□.□□0, FKM63.20F.□□.□□0, FKM63.30F.□□.□□0. FKM8/V series. Models: FKM85.30A.□□.□□1.
1606	FKM8/V series. The reference of the fan connector MC-20/6 has been included in tables. EEC-SP-60 motor feedback cable. Length: 60 m. FKM1 series. Models: FKM12.45A.□□.□□0.02, FKM14.45A.□□.□□0.02.
1703	FKM4 series. Models: FKM44.20A.□□.□20, FKM44.30A.□□.□20.2, FKM44.40A.□□.□20. FKM6 series. Models: FKM66.20A.□□.□20.2, FKM66.30A.□□.□20. FKM6/V series. Models: FKM66.20A.□□.□01.2, FKM66.20A.□□.□21.2, FKM66.30A.□□.□21. Replacing the temperature sensor in FKM2/4/6/8/6V/8V motors: RTD Pt1000 thermoresistances. Temperature sensor, feedback device and holding brake. Requirements of low voltage limited energy secondary circuits DVC A according IEC/UL 61800-5-1.

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ABOUT THE MANUAL

Title	Installation manual for AC servomotors FXM/FKM.
Type of documentation	Description and installation of FXM/FKM motors. Association with modular axis drives AXD and compact drives ACD.
Internal code	It belongs to the manual directed to the manufacturer (OEM). The manual code does not depend on the software version. MAN MOTOR FXM/FKM (IN) Código 04754051

Manual reference Ref.1703.

Startup



DANGER. In order to comply with the EC seal indicated on the component, check that the machine incorporating the motor meets the specifications of Machine Directive 2006/42/EC.

Before starting the motor up, read the indications of this chapter.

Warning



WARNING. The information described in this manual may be subject to changes due to technical modifications. FAGOR AUTOMATION S. COOP. reserves the right to change the contents of this manual without prior notice.

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The contents of this manual have been verified and matched with the product described here. Even so, it may contain involuntary errors that make it impossible to ensure an absolute match. However, the contents of this document are regularly checked and updated implementing the pertinent corrections in a later edition.

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FXM/FKM

Ref.1703

EC DECLARATION OF CONFORMITY



FAGOR AUTOMATION

Manufacturer Fagor Automation S. Coop.
B.º San Andrés 19; C.P. 20500, Mondragón, Gipuzkoa - Spain.

We hereby declare, under our own responsibility that the product:

DESIGNATION: DRIVE
BRAND: FAGOR
PRODUCT: DDS
SAFETY COMPONENT (acc. 2006/42/EC)

consisting of the following modules and accessories:

APS-24, PS-25B4, PS-65A, XPS-25, XPS-65
RPS-80, RPS-75, RPS-45, RPS-20
AXD/SPD 1.08, 1.15, 1.25, 1.35, 2.50, 2.75, 2.85, 3.100, 3.150, 3.200, 3.250
ER+TH-x/x, ER+TH-18/x+FAN, CM-1.75, CHOKE XPS, CHOKE RPS, BPM
MAIN FILTER 42A-A, 75A-A, 130A-A, 180A
FXM, FKM, FS5, FM7, FM9

Note. Some additional characters may follow the model references indicated above. They all comply with the directives listed here. However, compliance may be verified on the label of the unit itself.

It complies with all applicable provisions of Directive 2006/42/EC from the European Parliament and the Council of May 17, 2006, with regard to machinery.

It also complies with all applicable provisions of the following directives:

- Directive 2014/35/EU of the European Parliament and the Council of February 26, 2014, with regard to the approximation of the legislations of the Member States in the area of electromagnetic compatibility.
- Directive 2014/30/EU of the European Parliament and the Council of February 26, 2014, with regard to the approximation of the legislations of the Member States in the area of electrical material.

It complies with the following harmonized standards:

LOW VOLTAGE DIRECTIVE

IEC 60204-1:2005 Machine safety. Electrical equipment of the machines.
/A1:2008 Part 1: General requirements.

ELECTROMAGNETIC COMPATIBILITY DIRECTIVE

IEC 61800-3:2004 Category C3. Adjustable speed electrical power drive systems.
/A1:2011 Part 3: EMC requirements and specific test methods.

IEC 61326-3-1:2008 In Safety Related Parts.
Electrical equipment for measurement, control and laboratory use ·EMC requirements· Part 3-1: Immunity requirements for safety-related systems and for equipment intended to perform safety-related functions (functional safety). General industrial applications.



MACHINERY DIRECTIVE

Safe Torque Off function satisfies the requirements:

IEC 61800-5-1:2007

IEC 61800-5-2:2007 SIL 2

IEC 61508-1:1998 SIL 2

IEC 61508-2:2000 SIL 2

IEC 61508-3:1998 SIL 2

IEC 61508-4:1998 SIL 2

ISO 13849-1:2006/Cor.1:2009 Category 3, for Performance Level PL d

EC-Type-Examination: TÜV SÜD, Notified Body 0123

Certificate No.: Z10 12 06 80353 001

In compliance with EC Directives 2014/35/EU on Low Voltage, Directive 2006/42/EC on Machinery and 2014/30/EU on Electromagnetic Compatibility.

Units whose manufacturing date is the same as or later than **2012-05** comply with this certificate. The date appears on the version label stuck on the outside of the drive.

Equipment included in the EC-Type-Examination: TÜV SÜD:

AXD X.XXX-A1-X-X	AXD X.XXX-SI-X-X	SPD X.XXX-A1-X-X	SPD X.XXX-SI-X-X
AXD X.XXX-S0-X-X	AXD X.XXX-SD-X-X	SPD X.XXX-S0-X-X	

Are excluded from the scope of the EC-Type-Examination: TÜV SÜD equipment with CAN communication and drives:

AXD X.XXX-C0-X-X	ACD X.XXX-XX-X-X	MMC X.XXX-XX-XX.XX-X-X-X
SPD X.XXX-C0-X-X	SCD X.XXX-XX-X-X	CMC X.XXX-XX-XX.XX-X-X-X

Fagor Automation, S. Coop.



Director Gerente
José Pérez Berdud

In Mondragón, March 2017

WARRANTY TERMS

FAGOR AUTOMATION guarantees its products for the period of time with the exceptions indicated below, against defects in design, materials used and manufacturing process that affect the correct operation of the product.

The warranty period will have an initial duration of 24 months, applicable to all FAGOR products from the date the material is shipped to the customer. The machine manufacturers or distributors will have a maximum period of 12 months from the time the product leaves FAGOR AUTOMATION warehouse to register the warranty. If the manufacturer, distributor and/or end user registers or informs FAGOR AUTOMATION regarding the final destination, date of installation and identification of the machine through any of the methods described by FAGOR AUTOMATION Product Warranty registration process, this warranty will commence for 24 months period from the date of registration, with a maximum limit of 36 months from the time the product leaves the facilities of FAGOR AUTOMATION; i.e., the period between the product shipping date and the date the warranty ends must not exceed a total of 36 months.

If a product has never been registered, the warranty period will end 24 months from the time the product leaves FAGOR AUTOMATION's warehouses. After this period, a warranty extension contract, for the material, must be executed or a specific agreement reached with FAGOR AUTOMATION.

In the case of new replacement parts, the applicable warranty will be 12 months. With repaired products or in those cases where the product exchange option was used, during outside product warranty period- the applicable warranty will be provided by the corresponding repair center. When a repair estimate is provided it pertains to a specific defective item/s hence the warranty only covers the replaced part.

FAGOR guarantees to provide service for all current products and until 8 years after the date they are removed from the current catalog including repair, providing replacement part service or replacing the product with another identical or equivalent model. A backward compatible solution is available for most products i.e. the product can be upgraded to a newer model.

It is entirely up to FAGOR to determine whether the repair is to be considered under warranty.

During the warranty period, and following identification and diagnosis, FAGOR AUTOMATION will only repair or replace the product/part assessed to be defective. FAGOR AUTOMATION is not liable for any other compensation.

FAGOR AUTOMATION at its sole discretion reserves the right either to repair or replace the affected product during warranty period.

This product warranty covers all costs of materials and labor to repair or correct the cause of defect. The repairs will be carried out at the facilities of FAGOR AUTOMATION, unless it is agreed between FAGOR AUTOMATION and the CUSTOMER to carry out the repairs on the premises of the CUSTOMER or end user. Unless there is a specific agreement in cases of onsite repair all expenses related to diagnosis, labor, travel expenses, shipping costs, etc. are excluded and will be billed according to FAGOR AUTOMATION's established rate. The customer/user will be notified in advance of the estimate of charges when applicable.

The part/s replaced under warranty will be a property of FAGOR AUTOMATION.

FAGOR AUTOMATION offers to its customers an extension to the standard warranty and comprehensive warranty services through SERVICE CONTRACTS that meet the diverse needs of customers.

Excluded from this warranty are:

- a) Deteriorated/Defective components as the result of mishandling, in violation of safety rules or the technical specifications of the product, inadequate monitoring or any type of negligence on behalf of the CUSTOMER.
- b) Defects caused by improper handling, assembly and/or installation by the CUSTOMER or caused by modifications or repairs carried out without the consent of FAGOR AUTOMATION.
- c) Defects caused due to specific materials, fluids/coolants, electricity power or services used by the CUSTOMER.
- d) The malfunctions caused by unforeseen circumstances or force majeure (weather or geological events) and accidents or any other type of natural disaster.
- e) In a general sense, any indirect, consequential and/or collateral damage.
- f) Damage caused during transport.

All service requests during the warranty period must be communicated to FAGOR AUTOMATION, identifying the product (Serial number), describing in detail the symptoms observed, the reason for the malfunction (if known) and its scope.

All components replaced within the warranty period are covered by the warranty until the expiration of the original warranty period of the product.

The warranty offered by FAGOR AUTOMATION will become null and void in the event that the CUSTOMER fails to comply with the installation and operation requirements and recommendations regarding preventive and corrective maintenance as indicated in product manuals.



FXM/FKM

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To ensure a long life for FXM and FKM series servomotors, read carefully the operating procedures indicated in the CONTENTS section.

This manual contains detailed documentation for FXM/FKM servomotors as well as their associated axis AC servo drives.

2.

CONTENTS

GENERAL PRECAUTIONS

This manual may be modified due to improvements to the product, modifications or changes in their specifications.

For a copy of this manual, if its issue has been lost or damaged, contact your FAGOR dealer.

FAGOR shall not be held responsible for any modification made to the product by the user. This means the cancellation of the warranty.

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FXM/FKM

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1 Notes of operating safety

2.

CONTENTS
Notes of operating safety

Symbols that may appear in this manual

Carefully read the following instructions before using the servomotor. In these instructions, the operating safety conditions are identified by the following labels.



DANGER or prohibition symbol.

It warns about an immediate dangerous situation. Ignoring this warning may cause serious, even fatal, consequences.



WARNING or caution symbol.

It warns about a potentially dangerous situation. Ignoring this warning may cause serious injuries (even fatal) or damages to the unit.



MANDATORY symbol.

It warns about actions and operations that **MUST BE** carried out. In other words, **THEY ARE NOT PLAIN RECOMMENDATIONS**. Ignoring this warning may mean not complying with some safety regulation.



INFORMATION symbol.

Notes, warnings, advises and recommendations..

Symbols that the product may carry



Ground protection symbol.

It indicates that that point must be under voltage.

2 Operating notes



DANGER.

Observe the following sections to avoid electrical discharges or any harm.

Take to ground the ground terminals of the motor and of the drive as specified by your international and/or local electrical regulation. Ignoring this warning may cause electrical discharges.

Use a ground connection according to the standard local and/or international regulation.

Do not damage the cables or apply excessive force on them. Do not load heavy items on them or crimp them with bolts or stapes. Ignoring this warning may cause electrical discharges.



WARNING.

Consider only the motor-drive combinations specified in the manual. Ignoring this warning may cause poor performance or not to work at all.

Use the shortest cables possible in the electrical installations. Separate the power cables from the signal cables. The noise on the signal cables may cause vibrations or poor performance of the unit.

Never install them in places exposed to water splashes, gasses and flammable or corrosive liquids or near flammable substances. Ignoring this warning may cause fire or poor performance.

Use it under the following ambient and work conditions:

- Interiors without corrosive or explosive gasses.
- Ventilated places without dust or metal particles.
- Ambient temperature and relative humidity indicated in this manual.
- Altitude 1000 meters above sea level.
- Locations that may be cleaned, maintained and tested.

2.**CONTENTS**
Operating notes**FAGOR** 
FAGOR AUTOMATION**FXM/FKM****Ref.1703**

3 Storage



DANGER.

Do not store the unit in places exposed to water splashes or corrosive liquids or gasses.



MANDATORY.

Store the motor horizontally and protected against any possible blow.
Store the unit avoiding direct exposure to the sun, keeping the temperature and humidity within the specified ranges.

2.

CONTENTS
Storage

4 Shipping



WARNING.

Do not pull the cables or lift the motor up from its shaft in transit. Ignoring this warning may cause personal injury or poor motor performance due to damage to the motor.

Do not load the products too much. Ignoring this warning may cause the load to break or personal injury.



MANDATORY.

Do not try to move it when it is connected to other equipment.

2.

CONTENTS
Shipping

5 Installation

2.

CONTENTS
Installation



WARNING.

Do not climb on top of the motor nor load it with heavy objects. Ignoring this warning may cause personal injury.

Do not block either the air intake or the air output in ventilated motors and prevent strange materials from getting in. Ignoring this warning may cause fire or damage to the unit.

When unpacking, use the proper tool to open the box. Ignoring this warning may cause personal injury.

Cover the rotary parts so they cannot be touched. Ignoring this warning may cause personal injury.

The motor shaft extension is covered with anti-corrosive paint. Before installing the motor, remove the paint with a cloth dampened in liquid detergent.



MANDATORY.

When connecting the motor to the machine load, special care must be taken with centering, the tension of the pulley and the parallelism of the pulley.

A flexible coupling must be used to couple the motor with the machine load.

The encoder attached to the motor shaft is a precision element. Do not apply excessive force on to the drive shaft. The machine must be designed so the axial and radial loads applied to the shaft extension while in operation must be within the range indicated in this manual for this model.

No additional machining must be carried out to the motor.



INFORMATION.

After installing the motor on the machine, we recommend that you break in the motor and the components connected to it so the system settles mechanically and thermally thus reducing possible vibrations and noises due to internal tensions.

6 Cabling



MANDATORY.

The installation must comply with Directive EMC 2014/30/EU.

The motor is component to be incorporated on machines. They must comply with Machine Safety Directive 2006/42/EC and cannot be started up until this directive is met.

Install the cables safely according to the connection diagrams. Ignoring this warning may cause the motor to run away and personal injury.

Make sure that the power input is off before doing the installation.

Foresee a protection circuit so the main machine is not connected when the motor-fan group is not running.

Carry out the right ground connection and electrical noise control (disturbances).

Use the shortest cables possible in the installation. Run the power cables as far away from the signal cables as possible. Do not run the power cables and the signal cables through same cable hose or conduit. The noise in signal cables may cause vibration or poor performance.

Use the cables specified by FAGOR. When using other cables, check the rated current of the unit and bear in mind the work environment in order to properly select the cables.

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Cabling**FAGOR** 
FAGOR AUTOMATION**FXM/FKM****Ref.1703**

7 Operation

2.

CONTENTS
Operation



WARNING.

To properly check the motor, it must be properly secured and disconnected from the machine load. Then, run the pertinent checks and connect the machine load again. Ignoring this warning may cause personal injury.

In case of error or alarm, correct its cause. First verify the safety conditions and then resume the operation after eliminating the error. See section **·SAFETY CONDITIONS·** in the “man_dds_hard.pdf” manual and chapter **·ERROR CODES AND MESSAGES·** in the “man_dds_soft.pdf” manual of the drive.

If there is a momentary power loss, disconnect the power supply. The machine may run suddenly causing personal injury.



MANDATORY.

Do not attempt to lift, move the motor while it is attached to another unit without freeing it first.

8 Maintenance and inspection



DANGER.

Only authorized personnel may take the unit apart and repair the unit. Contact your FAGOR representative before taking the motor apart. The AC axis motor only needs a simple daily inspection. Adjust the inspection periods depending on the operating conditions and work environment.

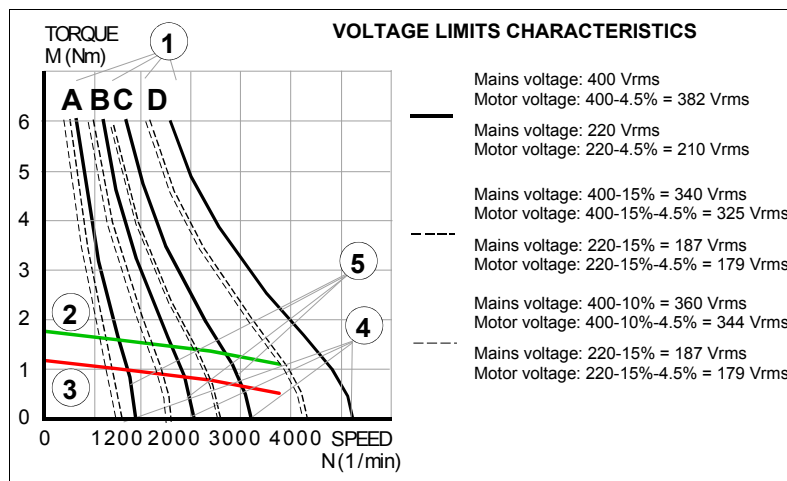
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Maintenance and inspection**FAGOR** 
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1.1 Electrical concepts

Operating limits

Electrical limitations for a synchronous servomotor

The figure shows the torque-speed diagram that shows the electrical limitations for a synchronous servomotor.



F- 1/1

Electrical limitations in synchronous servomotors.

Elements shown:

1. Curves for torque limitation by voltage depending on type of stator winding.
2. Curve for thermal torque limitation in continuous duty S1 (100 K) with fan, where 100 K is the temperature increase at the winding.
3. Curve for thermal torque limitation in continuous duty S1 (100 K) without fan, where 100 K is the temperature increase at the winding.
4. Maximum turning speed limitation (in voltage) N_{max} .
5. Voltage saturation curves.

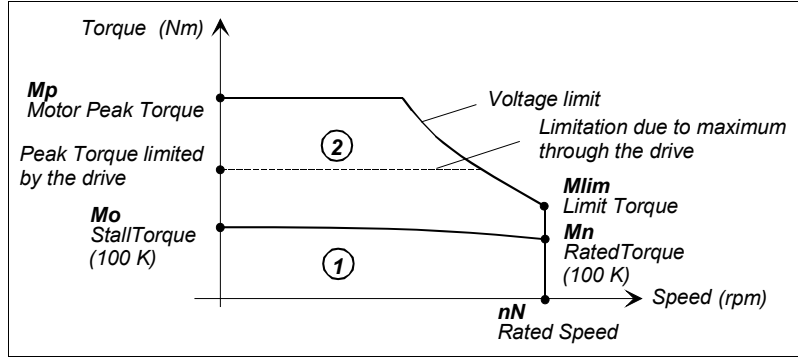


INFORMATION.

Note that this data is valid for ambient temperature or an average cooling temperature of 40°C/104°F and a maximum altitude of 1000 meters above sea level.

Electromechanical limitations for the motor-drive combination

The figure shows the electromechanical limitations for the motor-drive combination.



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Electromechanical limitations for the motor-drive combination.

where:

ZONE 1 is the permanent duty area (S1 duty) and it is delimited by the motor stall torque and the torque at rated speed.

ZONE 2 is the intermittent duty zone.

Definitions

We now define the electromechanical terminology for servomotors used in the previous section.

Stall torque (Mo)	Max. torque that the motor can supply when the rotor is locked and is thermally limited by the temperature increase at the stator winding ($\Delta T=100$ K). This torque is available for a zero motor turning speed for an unlimited time period. The stall torque M_0 is always greater than the rated torque M_n .
Stall current (Io)	Current circulating through each phase of the stator winding required to generate the stall torque. This current can circulate for an unlimited time.
Rated torque (Mn)	Torque that the motor can supply continuously at its rated speed thermally limited by the temperature increase at the stator winding ($\Delta T=100$ K).
Rated current (In)	Current circulating through each phase of the stator winding required to generate the rated torque M_n .
Rated power (Pn)	Power available at rated speed and rated torque. Its value is given by the expression:

$$P_n = \frac{M_n \cdot n_N}{9550}$$

Max. speed (Nmax)	Rotor turning speed limitation due to electrical restrictions. Note that the maximum value of this speed is shown in the graphs given in this manual.
Peak torque (Mp)	Maximum torque (limited by current). It is available for dynamic operations such as accelerations, etc. The value of this current is always limited by the drive control parameter ·CP20· in face of the risk of exceeding the destruction temperature of the insulation of the stator winding.
Acceleration time (tac) without inertia on the axis	Time it takes the motor to accelerate from rest state to its rated speed with maximum torque.
Torque constant (Kt)	Torque generated according to the current supplied. Its value may be calculated with the division of the stall torque by the stall current (M_0/I_0).

$$K_t = M_0 / I_0$$

where:

Kt	Torque constant in N·m/A
Mo	Stall torque in N·m
Io	Stall current in A

Calculating power (Pcal)	Power value given by the expression:
--------------------------	--------------------------------------

$$P_{cal} = \frac{M_0 \cdot N_n}{9550}$$

where:

Pcal	Calculating power in kW
Mo	Stall torque in N·m
Nn	Motor rated speed in rev/min

Resistance of the stator winding (R)	Value of the resistance of a phase at an ambient temperature of 20°C/68°F. The stator winding has a star configuration.
Inductance of the stator winding (L)	Value of the inductance corresponding to a phase when using three-phase power supply. The stator winding has a star (Y) configuration.

1.
GENERAL CONCEPTS
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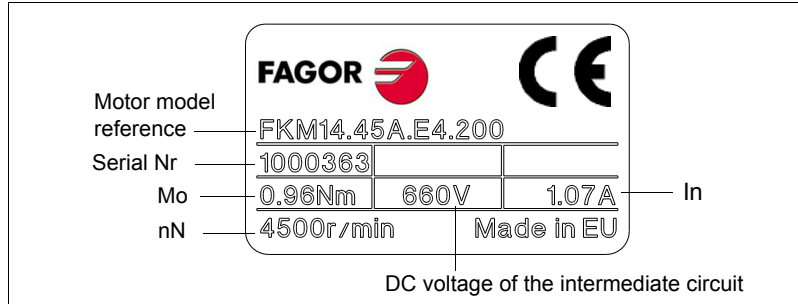
FXM/FKM

Ref.1703

Characteristics plate

The specifications label stuck on synchronous servomotors supplied by FAGOR offers the necessary data to identify the motor for the user. This characteristics plate of the motor is located on the right side of the motor viewed from its shaft.

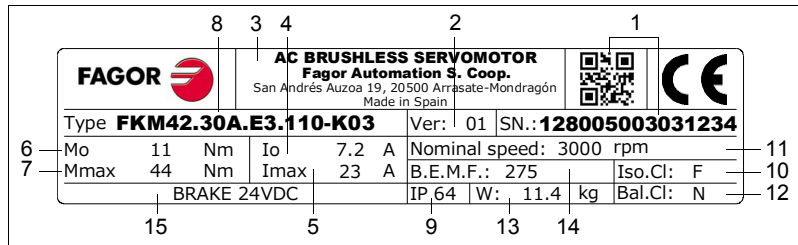
FKM1 series



F- 1/3

Identification label. FKM1 series.

FKM2/4/6/8/6V/8V series



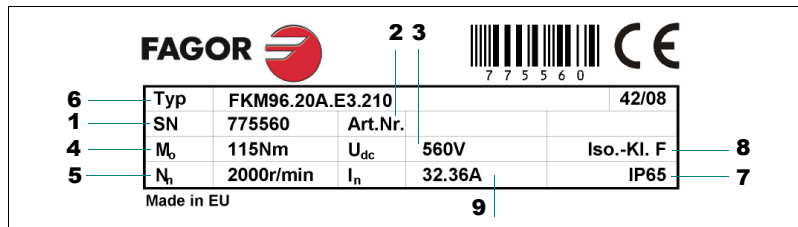
F- 1/4

Identification label. FKM2/4/6/8/6V/8V series.

T- 1/1 Meaning of the fields of the identification plate.

1 QR code / Serial Nr	9 Degree of protection
2 Version	10 Insulation class
3 Postal address	11 Rated speed
4 Current without load	12 Level of vibration
5 Maximum current	13 Mass
6 Stall torque	14 Back Electro Motor Force
7 Maximum torque	15 Holding brake.
8 Motor model reference	Unlocking voltage/power absorbed

FKM9 series



F- 1/5

Identification label. FKM9 series.

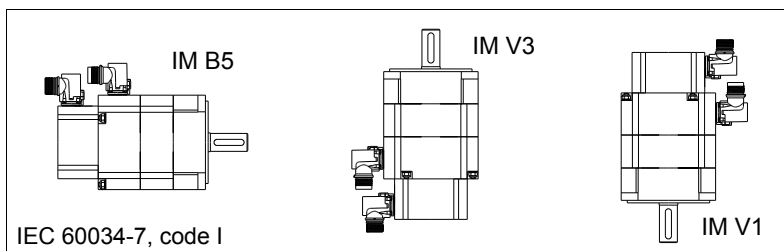
T- 1/2 Meaning of the fields of the identification plate.

1 Serial Nr	6 Motor model reference
2 Item number	7 Degree of protection
3 DC voltage of the intermediate circuit	8 Insulation class
4 Stall torque	9 Rated current
5 Rated speed	

1.2 Mechanical concepts

Construction types

FXM/FKM motors, according to the nomenclature of the IEC 60034-7 directive, admit the following mounting methods. These motors are supplied for flange mounting. They may be installed horizontally (IM B5) or vertically with the shaft facing down (IM V1) or with the shaft facing up (IM V3). See figure F- 1/6.



F- 1/6

Mounting methods.

Degrees of protection

According to the IEC 60034-5 directive, all AC servomotors of Fagor Automation's catalog have a degree of protection:

T- 1/3 Degrees of protection.

Motor model	FXM FKM2/4/6/8	FKM1/9
Configuration	Degree of protection	
Standard	IP 64	IP 65
With a seal (option)	IP 65	Irrelevant
With fan (option)	IP 65	Irrelevant

Ventilation

The ·with fan· option is only available on motors of the FXM family ·FXM5/FXM7 series· and of the FKM family ·FKM8 series and FKM66 models·.

Bearings

The bearings are closed on both sides and lubricated permanently. The bearings should be replaced after working for about 20 000 hours or after 5 years.

Shaft extension

T- 1/4 Shaft extension.

Motor family	Cylindrical shaft output · with key ·	Cylindrical shaft output · keyless ·
FXM (in all its series)	Standard	Optional
FKM (in all its series)	Optional	Standard

Seal

Meets the DIN 3760 standard.

FXM/FKM motors ·except FKM1/9 series· have the “seal” option both for keyless shafts and for shafts with key. The seal is type BA and if the standard degree of protection in the shaft is IP 64, i.e. fully protected against dust and water splashes, an IP 65 degree of protection (meeting the IEC 60034-5 standard) may be obtained with full protection against dust and water jets.

Note. FAGOR does not supply the seal as a spare part.



INFORMATION.

FAGOR shall not held responsible for any damage caused to the motor if the user has replaced the seal.

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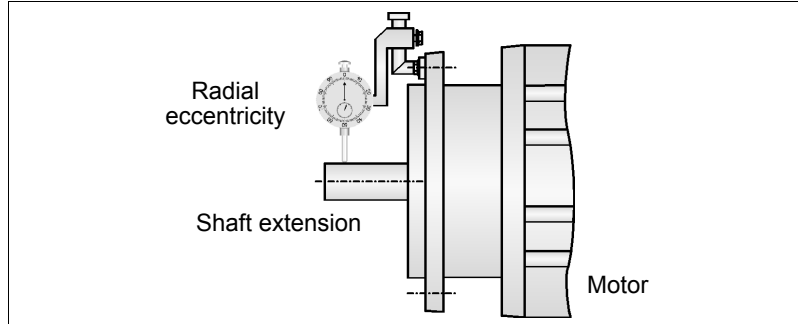
GENERAL CONCEPTS
Mechanical concepts

Eccentricity and concentricity

According to the DIN 42955 standard, the maximum deviations allowed for rotating eccentricity on the shafts are given in table T- 1/5.

T- 1/5 Radial eccentricity tolerances.

Motor series	N · standard ·	R · optional ·
FKM1	30 µm	15 µm
FXM1, FKM2	35 µm	18 µm
FXM3/5, FKM4	40 µm	21 µm
FXM7, FKM6/8/9	50 µm	25 µm



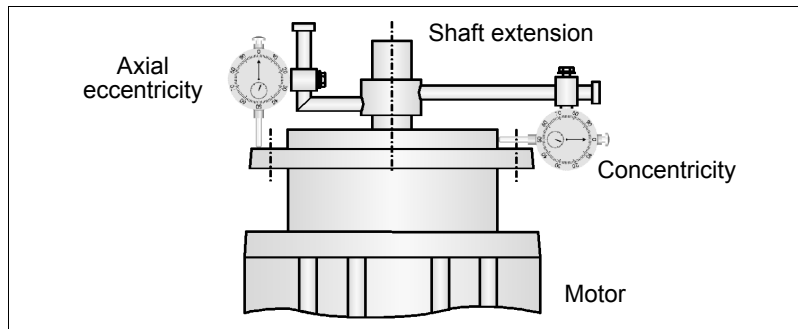
F- 1/7

Measurement of radial eccentricity.

The table T- 1/6 shows the tolerance values admitted for concentricity of the coupling diameter and for axial eccentricity of the supporting side of the flange with respect to the machine axis.

T- 1/6 Tolerances for axial concentricity and eccentricity.

Motor series	N · standard ·	R · optional ·
FXM1, FKM1/2	80 µm	40 µm
FXM3	80 µm	40 µm
FKM4	100 µm	50 µm
FXM5, FKM6	100 µm	50 µm
FXM7, FKM8/9	100 µm	50 µm



F- 1/8

Measuring axial concentricity and eccentricity.

Noise emission. Acoustic pressure level

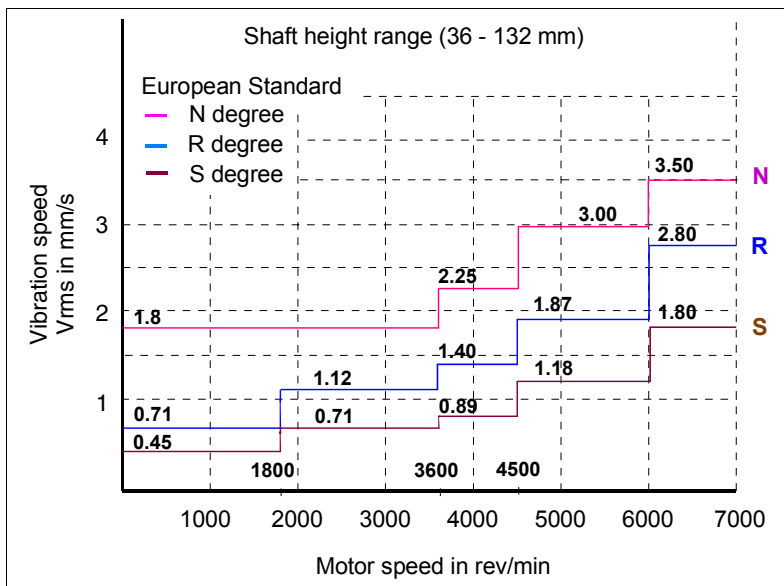
Meets the DIN 45635 standard.

Vibration magnitude

According to the IEC 60034-14 directive, the specified values are only referred to the motor and they may increase depending on the motor mounting method or on the system itself where it has been installed.

This directive sets the speed values between 1800 rev/min and 3000 rev/min and their associated limit values.

For speeds of 4500 rev/min and 6000 rev/min, the associated limit values will be set by the manufacturer of the motor.



F- 1/9

Limit values of vibration levels for shaft heights between 36 and 132 mm.

T- 1/7 Levels of vibration.

Motor family	Level of vibration
FXM	N degree · R optional ·
FKM	N degree · R opcional ·

Balancing

T- 1/8 Balancing.

Motor family	Output shaft	Balancing
FKM · standard ·	Cylindrical without keyway	Keyless shaft
FKM · option ·	Cylindrical with keyway	Half-key
FXM · standard ·	Cylindrical with keyway	Full key
FXM · option ·	Cylindrical without keyway	Keyless shaft

1.

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1.

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Radial load and axial load

A poor alignment between the motor shaft and the machine axis increases vibration of the shaft and reduces the useful life of bearings and couplings. Likewise, exceeding certain maximum radial load values on the bearings has a similar effect.

Bear in mind the following considerations in order to avoid these problems:

- Use flexible couplings for direct coupling.
- Avoid radial and axial loads on the motor shaft making sure that they do not exceed the limit values.

See these values in the following chapters for each motor model.



INFORMATION.

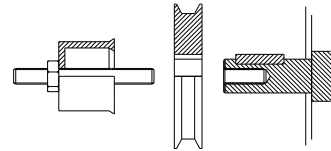
When applying a combined axis and radial load, decrease the maximum radial force allowed "Fr" to 70% of the value indicated in the table.



WARNING: DO NOT hit the motor!

AC servomotors have extremely fragile optical and electronic components. Avoid hitting the motor and especially its shaft extension when installing transmission pulleys and gear boxes. **DO NOT** hit the motor, especially on the shaft extension.

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



1.3 Installation

Mounting conditions

This section describes the precautions to be considered when installing a motor.



INFORMATION.

The flange and the motor's rotor shaft contain an anti-corrosive paint and grease. Use a solvent to clean the flange, the shaft and the keyway (if it has one) before installing the motor.

The motor must be installed under the following conditions:

- Leave some room between the motor and the machine structure, never less than 5 mm (0.1968 inch) in order to avoid possible electromagnetic disturbances and transmission of vibration.
- Install the motor in places where the environmental conditions (temperature and humidity) are the ones indicated in the general characteristics table of each motor. Bear in mind that the motor must be installed in clean and dry places, away from corrosive environments and explosive gasses or liquids. If the motor is going to be subject to oil and coolant splashes, it must be protected with a cover.
- Make it easier to access for inspection and maintenance.
- Ensure free air circulation around the motor and the best possible way for the air to go in and out for the fan (only optional on FXM5/7, FKM66 and FKM8 series).
- Secure the motor mounting base, attached to a flat, robust and solid surface. If the motor withstands excessive vibration, it may be because the base it supports it is too weak or the coupling elements or the machine are not balanced properly or it has not been aligned properly.
- Fasten the motor with the right size of self-locking bolts, nuts and washers of the right size and make sure that the tools used to fasten them neither interfere with the operation of the motor nor damage it.

Things to check before the start-up

Before the start-up, make sure that:

- The servomotor has not been damaged in transit or in storage.
- All the electrical connections (power and feedback) have been properly made.



MANDATORY.

When plugging the connector to the base connector, it is very common to position them "blindly". Make sure not to apply axial force between the base and the plug when doing it so as not to damage the pins of the base connector.

- These connections do not come loose easily.
- The protection devices of the motor are active.
- The motor is not locked up.
- There are no other dangerous items.
- The key (if there is one) will not shoot off when turning the shaft.



WARNING: HEAT DANGER!

DO NOT TOUCH the surface of the motor while running or shortly after it stops because of the high temperature reached on its whole surface! If it is easily accessible, even certain precautions must be taken to prevent involuntary contacts.



Also avoid heat sensitive elements (cables, etc) from being in contact with the motor surface to avoid damaging or destroying those items and possible more dangerous side effects.



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Cabling

Power cable

FAGOR supplies the cable to supply the electric power to FXM/FKM servomotors through three phases with ground connection and overall shield. It will also have two more wires, of a smaller section, if the servomotors have the brake option.

Section

The attached table shows the EN 60204-1 standard applicable to servo drive system installations. It determines the section through which the maximum current allowed in continuous duty can circulate on three-phase wires confined in PVC hose or installed on the machine through conduits or channels. The ambient temperature is assumed to be 40°C/104°F.

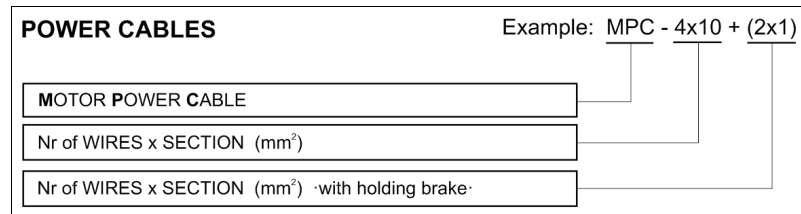
T- 1/9 Cable section / I_{max} current.

Section	I _{max} .	Section	I _{max} .
mm ²	A	mm ²	A
1.5	13.1	25	70
2.5	17.4	35	86
4	23	50	103
6	30	70	130
10	40	95	156
16	54	120	179

To determine the cable needed to connect the motor to the drive, take into account the motor/power-cable assignments given in the corresponding tables. See section, **Assignment**.

Sales reference

The sales reference of the power cable has the following format of letters and digits. It specifies the whole range of power cables offered in the catalog of FAGOR.



F- 1/10

Sales reference of the power cable.

MPC-4x□	to connect motors without holding brake
MPC-4x□+(2x□)	to connect motors with holding brake

T- 1/10 Range of power cables (without holding brake at the motor).

MPC-4x1.5	MPC-4x4	MPC-4x10
MPC-4x2.5	MPC-4x6	MPC-4x16

T- 1/11 Range of power cables (with holding brake at the motor).

MPC-4x1.5+(2x1)	MPC-4x6+(2x1)	MPC-4x25+(2x1)
MPC-4x2.5+(2x1)	MPC-4x10+(2x1)	MPC-4x35+(2x1)
MPC-4x4+(2x1)	MPC-4x16+(2x1.5)	MPC-4x50+(2x1.5)



INFORMATION.

The user must indicate the length of each of these cables when placing the order. Always in meters.



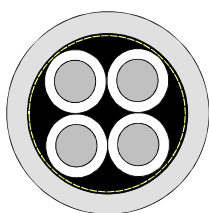
FAGOR AUTOMATION

FXM/FKM

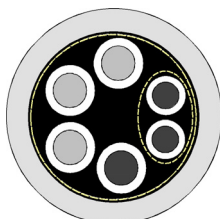
Ref.1703

Assignment

To obtain the sales reference of the power cable to be assigned to each motor model, refer to the technical data tables of each motor series in the following chapters.



MPC- 4x□



MPC- 4x□+(2x□)

Technical data

The mechanical characteristics and other technical data of the cables MPC-4x□ and MPC-4x□+(2x□) are:

T- 1/12 Technical data of the cables MPC-4x...

Type	Shield. It ensures EMC compatibility.
Approx. Dmax.	See table T- 1/13
Flexibility	High. Special to be used in cable carrying chains with a bending radius of 12 times the Dmax. under dynamic conditions (when flexed) and 4 times the Dmax. under static conditions.
Covering	PUR. Polyurethane resistant to chemical agents used in machine tools.
Temperature	Work: -10°C/80°C (14°F/176°F) Storage: -40°C/80°C (-40°F/176°F)
Rated voltages according to CEI	Uo/U: 600/1000 V

T- 1/13 Dmin./Dmax. of power cables MPC-4x... and MPC-4x...+2x... depending on the power connector.

Reference	MC 23 / AMC 23		MC 46 / AMC 46		MC 80	
	Dmin.	Dmax.	Dmin.	Dmax.	Dmin.	Dmax.
MPC-4x1.5	6 mm	16.5 mm				
MPC-4x2.5	6 mm	16.5 mm				
MPC-4x4	6 mm	16.5 mm				
MPC-4x6	6 mm	16.5 mm	19 mm	24 mm		
MPC-4x10			19 mm	24 mm		
MPC-4x16			19 mm	24 mm	19 mm	24 mm
MPC-4x25					19 mm	24 mm
MPC-4x1.5+2x1	6 mm	16.5 mm				
MPC-4x2.5+2x1	6 mm	16.5 mm				
MPC-4x4+2x1	6 mm	16.5 mm				
MPC-4x6+2x1	6 mm	16.5 mm	19 mm	24 mm		
MPC-4x10+2x1			19 mm	24 mm		
MPC-4x16+2x1.5			19 mm	24 mm	19 mm	24 mm
MPC-4x25+2x1.5					19 mm	24 mm

Connection

See the connection diagram for the power cable according to motor model in this manual.

Feedback cables

FAGOR supplies the cables ready with their corresponding connectors at both ends for motor feedback in order to guarantee the right performance and greater quality.



INFORMATION.

In order to eliminate electrical noise, the signal cable should run as far away from the power cable as possible.

The motor feedback may be done using either an encoder.



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Sales reference

The sales reference of the feedback cables has the following format of letters and digits. It specifies the whole range of feedback cables offered in the catalog of FAGOR.

SIGNAL CABLES		Example: <u>EEC-SP</u> - <u>20</u>
EEC-SP *	ENCODER EXTENSION CABLE - SHIELDED PAIR	
IECD **	INCREMENTAL EXTENSION CABLE DIGITAL	
LENGTH (m)	* 3, 5, 6, 7, 8, 9, 10, 11, 15, 20, 25, 30, 35, 40, 45, 50, 60	
	** 5, 7, 10, 15, 20, 25, 30	

F- 1/11

Sales reference of the feedback cables.

T- 1/14 Range of EEC-SP-□ cables for sinusoidal encoder. The number indicates their length in meters including the connectors.

EEC-SP-03	EEC-SP-07	EEC-SP-10	EEC-SP-15	EEC-SP-30	EEC-SP-45
EEC-SP-05	EEC-SP-08	EEC-SP-11	EEC-SP-20	EEC-SP-35	EEC-SP-50
EEC-SP-06	EEC-SP-09	EEC-SP-12	EEC-SP-25	EEC-SP-40	EEC-SP-60

T- 1/15 Range of IECD-□ cables for incremental TTL encoder. The number indicates their length in meters including the connectors.

IECD-05	IECD-07	IECD-10	IECD-15	IECD-20	IECD-25	IECD-30
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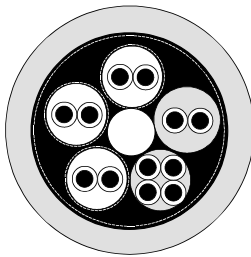
Technical data

The mechanical characteristics and other technical data of the feedback cables are:

Sinusoidal encoder cable EEC-SP-□

T- 1/16 Mechanical characteristics of the feedback cable EEC-SP-□ (with overall shield and shielded twisted pairs).

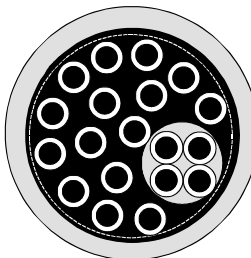
Type	Overall shield. Shielded twisted pairs.
Approx. Dmax.	8.5 mm.
Flexibility	High. Special for controlling servo drives, with a minimum bending radius under dynamic conditions (when flexed) of 12 times the Dmax. (= 100 mm).
Covering	PUR. Polyurethane resistant to chemical agents used in machine tools.
Temperature	Work: 0°C/80°C (32°F/176°F) Storage: -40°C/80°C (-40°F/176°F)
Work voltage	U: 250 V



Incremental TTL encoder cable IECD-□

T- 1/17 Mechanical characteristics of the feedback cable IECD-□ (with overall shield and unshielded twisted pairs).

Type	Overall shield. Unshielded twisted pairs.
Approx. Dmax.	8.8 mm.
Flexibility	High. Special for controlling servo drives, with a minimum bending radius under dynamic conditions (when flexed) of 12 times the Dmax. (=105 mm) and 4 times the Dmax. (= 35 mm) under static conditions.
Covering	PUR. Polyurethane resistant to chemical agents used in machine tools.
Temperature	Work: -5°C/70°C (23°F/158°F) Storage: -40°C/80°C (-40°F/176°F)
Rated voltage	Upp: 350 V
48 V CA	Urms: 48 V CA



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Feedback devices



MANDATORY.

The supply voltage of the encoder temperature sensor, shall fulfill requirements of low voltage limited energy secondary circuits DVC A according IEC/UL 61800-5-1.

Sinusoidal encoder

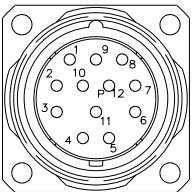
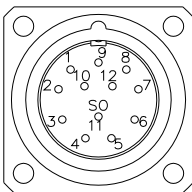
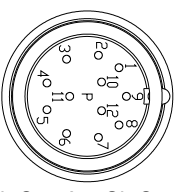
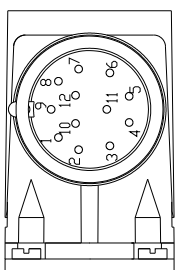
Optical disk used as position detector, coupled to the rotor shaft with a sinusoidal signal of 1042 or 128 pulses per turn, depending on the series of the motor.

Series	Encoder reference	
FXM1/3/5/7	A1, E1	1024 ppt
FKM1	A4, E4	128 ppt
FKM2/4/6/8	A3, E3	1024 ppt

It is connected to the drive through a 12-pin male Conney connector that meets the sealing standard IP 65. All sinusoidal encoder models available use this same connector. The connection cable is identified with the reference EEC-SP-□ (cable with overall shield and shielded twisted cables). All FXM/FKM motors with A (400 V AC) winding can have a sinusoidal encoder.

Note. The connection base for sinusoidal encoder (refs. A1, A3, A4, E1, E3, E4) shown in the following figures are viewed from the motor end.

T- 1/18 Base of connector EOC-12 on FXM/FKM motors with “A” winding.

	Pin	Signal	Meaning
 <p>SinCos A1 (on FXM)</p>	1	REFCOS	Reference level for the cosine signal 2.5 V DC
	2	+ 485	RS-485 serial line transmission signal
	3	TEMP -	Motor temperature sensor
	4	TEMP +	
 <p>SinCoder E1 (on FXM)</p>	5	SIN	1 Vpp sinusoidal signal generated by the encoder
	6	REFSIN	Reference level for the sine signal 2.5 V DC
	7	- 485	RS-485 serial line transmission signal
	8	COS	1 Vpp cosine signal generated by the encoder
 <p>SinCos A4, SinCos E4 (on FKM1)</p>	9	SH+CH	Shield wire Shield + chassis
	10	GND	Ground
	11	N. C.	Not Connected
 <p>SinCos A3, SinCos E3 (on FKM2/4/6/8/9)</p>	12	+8 V DC	Supply voltage



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Incremental TTL encoder

Optical disk used as position detector coupled to the rotor shaft with a square TTL signal of 2500 pulses per turn.

Series	Encode reference	
FXM1/3/5/7	I0	2500 ppv
FKM2/4/6/8	I0	2500 ppv

It is connected to the drive through a 17-pin male Connivers™ connector that meets the sealing standard IP 65. The connection cable is identified with the reference IECD-□ and it is a cable with overall shield. All FXM/FKM motors with F (220 V AC) winding can have a incremental TTL encoder.

Note. The connection base for incremental TTL encoder (ref. I0) shown in the following figures are viewed from the motor end.

T- 1/19 Base of connector IOC-17 on FXM/FKM motors.

Pin	Signal	Meaning
A	A	A signal output
B	\bar{A}	Complemented A signal output
C	+5 V DC	Supply voltage
D	GND	Ground
E	B	B signal output
F	\bar{B}	Complemented B signal output
G	Z	Z signal output
H	\bar{Z}	Complemented Z signal output
I	TEMP -	Motor temperature sensor
J	TEMP +	
K	Ucm	U signal output
L	\bar{U} cm	Complemented U signal output
M	Vcm	V signal output
N	\bar{V} cm	Complemented V signal output
O	Wcm	W signal output
P	\bar{W} cm	Complemented W signal output
CH	SH+CH	Shield wire Shield + chassis

Note. The letters must be interpreted as positions when looking at the front of the unit.

Feedback replacement

The deterioration or poor performance of the feedback device integrated in a synchronous motor with permanent-magnets forces the user to replace it.



MANDATORY.

Before replacing the feedback device integrated into the motor or drive, make sure to make a safety backup copy of all the parameters saved in the drive for future updates of the motor.

Note. When replacing an encoder, it is necessary to adjust the offset, i.e. the relative position of its reference signal (zero mark) with respect to the vector resulting from the magnetic field generated by the permanent magnets of the rotor.

An encoder may be coupled to the motor shaft in infinite positions one relative to the other. There is only one correct position and that is why, once they are coupled, it is necessary to correct the offset generated when coupling it in an arbitrary relative position unless the correct position is known in advance.

This process is known as rho adjustment and its purpose is to eliminate this offset between the zero mark and the result of the one resulting from the magnetic field generated by the magnets.



WARNING.

If no backup copy of the parameters was made before the replacement, the value of parameter RP5 (FeedbackRhoCorrectionParameter) will be unknown and, if the rho is not adjusted, it may be dangerous for the user after replacing the feedback device because the motor may run away. Not entering the right value in parameter RP5 could generate a dangerous situation identical to the previous one.

RHO adjustment

There is a command that may be executed under the conditions described later in this manual to obtain the value of the offset between the reference signal (zero mark) and the position of the vector resulting from the magnetic field generated by the magnets.

This command is:

GC3	S34291	Autophasing
------------	--------	-------------

The procedure is the following:

- ❑ Separate the motor from the machine.
- ❑ Remove the defective feedback device and insert a new identical one in an arbitrary position.
- ❑ Once the motor has been separated from the machine and free to turn (without brake), make sure that the drive that is going to control it is capable of providing the motor with its rated current.
- ❑ Without applying power, check that no errors come up at the drive or at the CNC.
- ❑ Set the CNC in DRO mode or with high following error to allow the movement generated by the command itself that will be executed next.
- ❑ Execute the GC3=3 command.
- ❑ Apply power so the motor moves searching for the existing offset generated from having mounted the feedback device arbitrarily when replacing the defective one.
- ❑ Monitor the value of GC3 until the command ends without errors.

Note. When the execution of GC3 is done, the motor will return to its origin position.



1.

GENERAL CONCEPTS
Installation

If the feedback device has memory

- Record (save) the value in the encoder memory (refs. E1 and A1 on FXM motors and E3, A3, E4, A4 on FKM motors) by executing the RC1 command* ·see note·

Note.
* When using a **feedback device ref. E1** on the motor and a **CAPMOTOR-2** card at the drive, always follow these steps before executing the RC1 command:

1. Execute the GC3 command, read the value of RV3 and write it down.
2. Execute the GV11 command.
3. Now read the RV3 value again and check if it matches the value you wrote down in step 1. If it is not the same, re-write RV3 with the value you wrote down.
4. Execute the RC1 command to record in the encoder memory.

The value of the offset generated when replacing the feedback device is now registered in parameter RP5 (FeedbackRhoCorrectionParameter) and in the RV3 (FeedbackRhoCorrection) variable of the drive.

If the feedback device has no memory

- Record (save) the value by executing the GC1 command. References (ref. I0) with TTL incremental encoder.

Then, turn the disk of the feedback device (not attached to the rotor) manually (always with the rotor locked), first having removed the screws that hold the two disks of the feedback device. The angle to rotate (in mechanical degrees) will be the one given by the formula:

$$\frac{360^\circ \text{ (electrical)}}{2^{16} \times \text{MP5}} = \text{°(mechanical)}$$

MP5: Number of pairs of poles

After rotating the disk the calculated angle, tighten the holding screws in that position. Observe that the disk attached to the shaft cannot be moved because the rotor has been previously locked.

Execute the GC3 command again in the conditions described for this procedure and record by executing GC1.

Verify that the value of RP5 is practically zero. If instead of zero, it registers a value double the rotated angle, it means that it has been rotated in the opposite direction.

Carry out the whole operation and again and now set the right rotating direction.

Note. Drive variable RV10 is also available, to FAGOR technicians only, as useful means to adjust the rho when replacing an incremental TTL encoder. Contact Fagor Automation if you have not been capable of adjusting the rho following the procedure described earlier.



INFORMATION.
Observe that any feedback device shipped out of the factory already has the RHO adjusted. Encoders that have memory carry this offset value stored in it. Therefore, They are all properly adjusted.

Note. When taking a servomotor apart, the feedback device must be adjusted again following the same procedure described earlier.

3-PHASE SERVOMOTORS. FXM

2

2.1 Description

FAGOR FXM servomotors are synchronous AC brushless with permanent magnets. They are especially designed to be used with FAGOR drives.

They are ideal for controlling feed and positioning axes in machine tool applications as well as handling systems, textile machinery, printers, robotics, etc. In general, they are ideal for any application requiring great positioning accuracy.

These characteristics are essential to many applications such as coil feeders, punch presses, etc.

In these three-phase servomotors heat is only generated in the stator and may be dissipated through the armature. Thanks to this they can meet the IP 65 protection standard and are not affected by liquids or dirt.

They incorporate a temperature sensor for monitoring the internal temperature. See section, **2.3 Temperature sensor** of this chapter.

These motors have an encoder as position feedback and optionally an holding brake.

The family of non-ventilated FXM motors, available both for 220 V AC (F winding) and 400 V AC (A winding) offers four series of different sizes. These series are:

FXM1	FXM3	FXM5	FXM7		
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The family of ventilated FXM motors, only available for 400 V AC (A winding) offers two series of different sizes. These series are:

FXM5/V	FXM7/V				
--------	--------	--	--	--	--

All these motors have been manufactured according to the standards EN 60204-1 and EN 60034 in compliance with the European Directive 2006/42/EC on machine safety.

Its features are:

- ❑ Wide range of rated power from 0.5 kW to 24 kW and rated speed from 1200 rev/min to 4000 rev/min.
- ❑ Uniform output torque.
- ❑ High torque/volume ratio.
- ❑ High reliability.
- ❑ Low maintenance.

2.2 General characteristics

T- 2/1 Standard characteristics of FXM servomotors.

Excitation	Permanent rare earth magnets (SmCo)
Temperature sensor	Triple. PTC thermistor.
Shaft extension	Cylindrical with keyway. Option: with no keyway
Mounting methods	IM B5, IM V1, IM V3 meets IEC 60034-7
Mechanical tolerances	Normal class, meet IEC 72/1971
Balancing	Class N (class R optional) meets DIN 45665. Balanced with the whole key
Useful life of roller bearings	20000 hours
Type of winding	F winding ·220 V AC· A winding ·400 V AC·
Pairs of poles	p = 3
Noise emission	DIN 45635
Vibration resistance	Withstands 1g in the direction of the shaft and 3g sideways (g=9.81 m/s ²)
Stator winding insulation class	Class F. Limit temperature 150°C/302°F according to EN 60034-1 (IEC 60034-1)
Insulation resistance	500 V DC, 10 MΩ or greater
Dielectric rigidity	1500 V AC, 1 minute.
Protection degree	Standard configuration: IP 64 Seal option: IP 65 Fan option: IP 54
Storage temperature	From -20°C to +80°C (-4°F to 176°F)
Ambient temperature allowed	From 0°C to 40°C (32°F to 104°F)
Working ambient humidity	From 20 % to 80 % (non condensing)
Fan	Optional in FXM5/7 series. See fan characteristics.
Holding brake	Optional in all models. See brake characteristics.
Feedback *	Sinusoidal encoder. Ref. E1/A1. Incremental TTL encoder. Ref. I0.

* Sinusoidal encoder (FXM with “A” winding) and incremental TTL encoder (FXM with “F” winding).



INFORMATION.

The “class F” insulation of the windings keeps its dielectric properties as long as the temperature stays under 150°C/302°F.

2.
3-PHASE SERVOMOTORS. FXM
 General characteristics

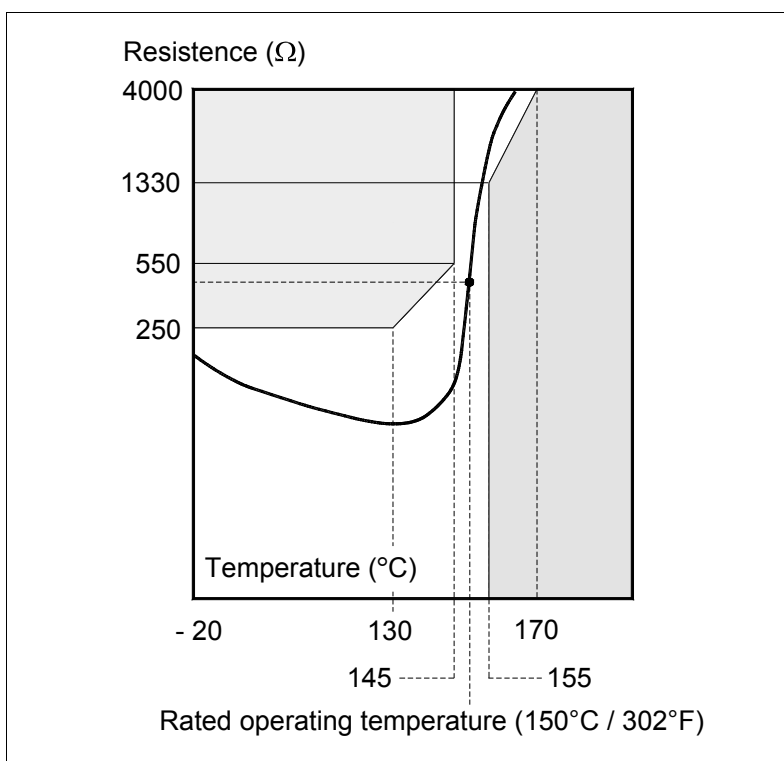
2.3 Temperature sensor

FXM motors have a thermistor as thermal protection of the motor and it is located in the stator winding. Its temperature coefficient is positive (PTC) and it is typically used in control and measurement systems. It is a triple sensor sensitive to temperatures between 130°C/266°F and 160°C/320°F.

T- 2/2 Thermistor characteristics.

Sensor type	Triple PTC thermistor
Resistance at 145°C/293°F	550 Ω
Resistance at 155°C/311°F	1330 Ω
Sensor connection	Feedback cable
Motor series	In all FXM series

The following figure shows the resistance of the sensor as a function of the ambient temperature (average values):



F- 2/1

Sensor resistance as a function of room (ambient) temperature.

Note. The two wires of the temperature sensor are included in the feedback cable.



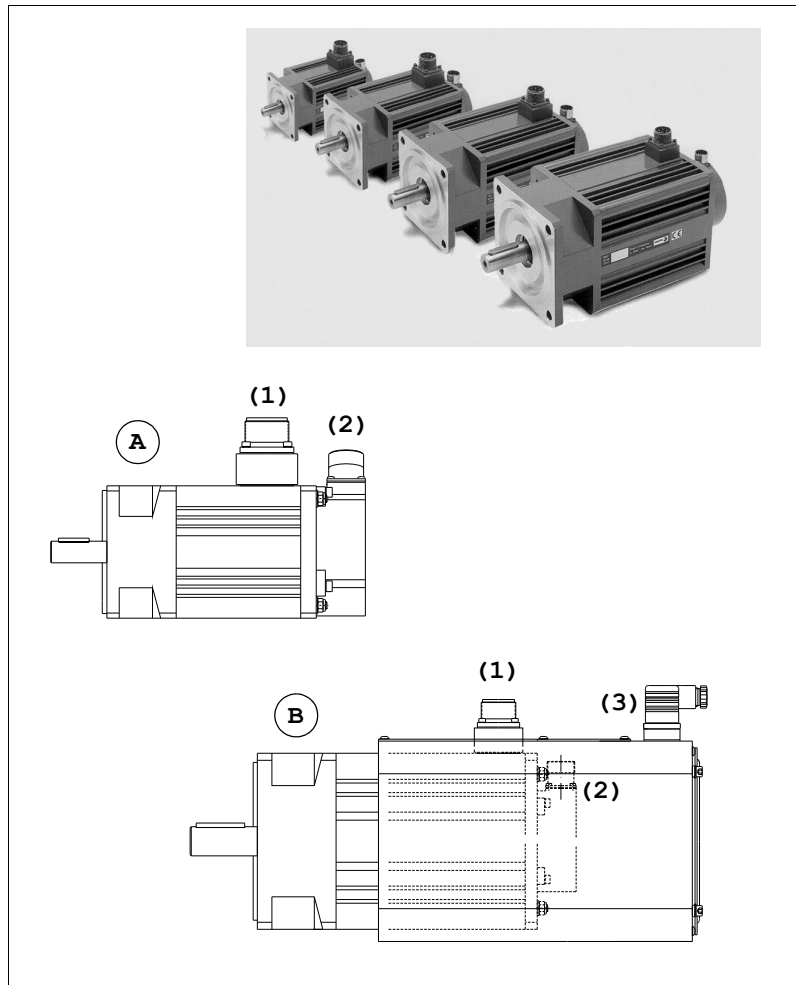
3-PHASE SERVOMOTORS. FXM
Temperature sensor

2.4 Outside appearance

The following figure shows the outside shape of these servomotors and the location of the connectors for power supply, motor feedback, holding brake and fan (when having all these options).

2.

3-PHASE SERVOMOTORS. FXM
Outside appearance



F- 2/2

Servomotor FXM. **A.** Without FAN. **B.** With FAN.

1. Voltage supply for the motor and the holding brake (if applicable).
2. Feedback on the motor. Sinusoidal or incremental TTL encoder.
3. Voltage supply for the fan (if applicable).

2.5 Technical data

Non-ventilated FXM with “A” winding · 400 V AC ·

All the data supplied here are for winding over-temperature of $\Delta T=100$ K with a room temperature of 40°C/104°F. The power cable shown in the table corresponds to motors without holding brake.

T- 2/3 Technical data of non-ventilated FXM servomotors with “A” winding and without holding brake.

nN	Mo	Mn	Motor model	Io	Pcal	Power terminal strip MOTOR	Power cable MOTOR*
1/min	N·m	N·m	FXM	A	kW	Type	Nr of wires x mm ²
1200	11.9	11.1	53.12A.□□.□00	2.8	1.5	MC 23	MPC-4x1.5
1200	14.8	13.7	54.12A.□□.□00	3.5	1.9	MC 23	MPC-4x1.5
1200	17.3	15.7	55.12A.□□.□00	4.1	2.2	MC 23	MPC-4x1.5
1200	20.8	19.2	73.12A.□□.□00	4.9	2.6	MC 23	MPC-4x1.5
1200	27.3	24.9	74.12A.□□.□00	6.6	3.4	MC 23	MPC-4x1.5
1200	33.6	30.2	75.12A.□□.□00	8.0	4.2	MC 23	MPC-4x1.5
1200	39.7	35.3	76.12A.□□.□00	9.4	5.0	MC 23	MPC-4x1.5
1200	45.6	40.0	77.12A.□□.□00	11.0	5.7	MC 23	MPC-4x1.5
1200	51.1	44.3	78.12A.□□.□00	12.6	6.4	MC 23	MPC-4x1.5
2000	1.2	1.18	11.20A.□□.□00	0.45	0.3	MC 23	MPC-4x1.5
2000	2.3	2.25	12.20A.□□.□00	0.86	0.5	MC 23	MPC-4x1.5
2000	3.3	3.22	13.20A.□□.□00	1.23	0.7	MC 23	MPC-4x1.5
2000	4.1	3.98	14.20A.□□.□00	1.53	0.9	MC 23	MPC-4x1.5
2000	2.6	2.56	31.20A.□□.□00	0.97	0.5	MC 23	MPC-4x1.5
2000	5.1	5.0	32.20A.□□.□00	1.89	1.1	MC 23	MPC-4x1.5
2000	7.3	7.12	33.20A.□□.□00	2.7	1.5	MC 23	MPC-4x1.5
2000	9.3	9.02	34.20A.□□.□00	3.4	1.9	MC 23	MPC-4x1.5
2000	11.9	10.5	53.20A.□□.□00	4.7	2.5	MC 23	MPC-4x1.5
2000	14.8	12.8	54.20A.□□.□00	5.9	3.1	MC 23	MPC-4x1.5
2000	17.3	14.7	55.20A.□□.□00	6.7	3.6	MC 23	MPC-4x1.5
2000	20.8	17.7	73.20A.□□.□00	8.2	4.4	MC 23	MPC-4x1.5
2000	27.3	22.8	74.20A.□□.□00	11.1	5.7	MC 23	MPC-4x1.5
2000	33.6	27.5	75.20A.□□.□00	13.3	7.0	MC 23	MPC-4x2.5
2000	39.7	31.9	76.20A.□□.□00	15.7	8.3	MC 23	MPC-4x2.5
2000	45.6	36.0	77.20A.□□.□00	17.8	9.6	MC 23	MPC-4x4
2000	51.1	39.6	78.20A.□□.□00	20.7	10.7	MC 23	MPC-4x4
3000	1.2	1.15	11.30A.□□.□00	0.67	0.4	MC 23	MPC-4x1.5
3000	2.3	2.18	12.30A.□□.□00	1.29	0.7	MC 23	MPC-4x1.5
3000	3.3	3.1	13.30A.□□.□00	1.85	1.0	MC 23	MPC-4x1.5
3000	4.1	3.81	14.30A.□□.□00	2.3	1.3	MC 23	MPC-4x1.5
3000	2.6	2.50	31.30A.□□.□00	1.45	0.8	MC 23	MPC-4x1.5
3000	5.1	4.79	32.30A.□□.□00	2.8	1.6	MC 23	MPC-4x1.5
3000	7.3	6.72	33.30A.□□.□00	4.1	2.3	MC 23	MPC-4x1.5
3000	9.3	8.37	34.30A.□□.□00	5.1	2.9	MC 23	MPC-4x1.5
3000	11.9	9.6	53.30A.□□.□00	7.1	3.7	MC 23	MPC-4x1.5
3000	14.8	11.6	54.30A.□□.□00	8.7	4.7	MC 23	MPC-4x1.5
3000	17.3	13.1	55.30A.□□.□00	10.3	5.4	MC 23	MPC-4x1.5
3000	20.8	15.2	73.30A.□□.□00	12.3	6.5	MC 23	MPC-4x1.5
3000	27.3	19.4	74.30A.□□.□00	16.2	8.6	MC 23	MPC-4x2.5
3000	33.6	23.2	75.30A.□□.□00	19.9	10.6	MC 23 ¹	MPC-4x4
3000	39.7	26.6	76.30A.□□.□00	23.6	12.5	MC 23 ¹	MPC-4x6
3000	45.6	29.6	77.30A.□□.□00	29.0	14.3	MC 46	MPC-4x6
3000	51.1	32.2	78.30A.□□.□00	28.4	16.1	MC 46	MPC-4x6



3-PHASE SERVOMOTORS. FXM
Technical data



FXM/FKM

Ref.1703

2.

3-PHASE SERVOMOTORS. FXM
Technical data

T- 2/3 Technical data of non-ventilated FXM servomotors with "A" winding and without holding brake.

nN	Mo	Mn	Motor model	Io	Pcal	Power terminal strip MOTOR	Power cable MOTOR*
1/min	N·m	N·m	FXM	A	kW	Type	Nr of wires x mm ²
4000	1.2	1.11	11.40A.□□.□00	0.9	0.5	MC 23	MPC-4x1.5
4000	2.3	2.09	12.40A.□□.□00	1.72	1.0	MC 23	MPC-4x1.5
4000	3.3	2.95	13.40A.□□.□00	2.5	1.4	MC 23	MPC-4x1.5
4000	4.1	3.61	14.40A.□□.□00	3.1	1.7	MC 23	MPC-4x1.5
4000	2.6	2.38	31.40A.□□.□00	1.92	1.1	MC 23	MPC-4x1.5
4000	5.1	4.49	32.40A.□□.□00	3.8	2.1	MC 23	MPC-4x1.5
4000	7.3	6.17	33.40A.□□.□00	5.5	3.1	MC 23	MPC-4x1.5
4000	9.3	7.53	34.40A.□□.□00	6.9	3.9	MC 23	MPC-4x1.5
4000	11.9	8.7	53.40A.□□.□00	9.3	5.0	MC 23	MPC-4x1.5
4000	14.8	10.2	54.40A.□□.□00	11.8	6.2	MC 23	MPC-4x1.5
4000	17.3	11.2	55.40A.□□.□00	14.1	7.3	MC 23	MPC-4x2.5
4000	20.8	11.9	73.40A.□□.□00	16.5	8.7	MC 23	MPC-4x2.5
4000	27.3	15.0	74.40A.□□.□00	22.1	11.4	MC 23	MPC-4x4
4000	33.6	17.6	75.40A.□□.□00	26.6	14.1	MC 46	MPC-4x6
4000	39.7	19.8	76.40A.□□.□00	32.1	16.6	MC 46	MPC-4x10
4000	45.6	21.7	77.40A.□□.□00	36.6	19.1	MC 46	MPC-4x10
4000	51.1	23.0	78.40A.□□.□00	42.7	21.4	MC 46	MPC-4x16

¹ Do not use the AMC angled terminal strip.

* When having the "brake" option, add to the cable denomination the factor + (2x...).

E.g. for the model FXM55.12A.□□.□10 (brake option) the power cable is MPC-4x1.5+(2x1).



INFORMATION.

Observe that AMC angled terminal strips may be used except in the cases indicated in the previous table labeled with the super index¹.

Ventilated FXM with “A” winding · 400 V AC ·

All the data supplied here are for winding over-temperature of $\Delta T=100$ K with a room temperature of 40°C/104°F. The power cable shown in the table corresponds to motors without holding brake.

T- 2/4 Technical data of ventilated FXM servomotors with “A” winding and without brake.

nN	Mo	Mn	Motor model	Io	Pcal	Power terminal strip MOTOR	Power cable MOTOR*
1/min	N·m	N·m	FXM	A	kW	Type	Nr of wires x mm ²
1200	17.8	17.0	53.12A.□□.□01	4.2	2.2	MC 23	MPC-4x1.5
1200	22.2	21.0	54.12A.□□.□01	5.3	2.8	MC 23	MPC-4x1.5
1200	25.9	24.5	55.12A.□□.□01	6.1	3.3	MC 23	MPC-4x1.5
1200	31.2	29.5	73.12A.□□.□01	7.4	3.9	MC 23	MPC-4x1.5
1200	40.9	38.5	74.12A.□□.□01	9.8	5.1	MC 23	MPC-4x1.5
1200	50.4	47.0	75.12A.□□.□01	12.0	6.3	MC 23	MPC-4x1.5
1200	59.5	55.0	76.12A.□□.□01	14.1	7.5	MC 23	MPC-4x2.5
1200	68.4	62.8	77.12A.□□.□01	16.6	8.6	MC 23	MPC-4x2.5
1200	76.6	69.8	78.12A.□□.□01	19.0	9.6	MC 23 ¹	MPC-4x4
2000	17.8	16.4	53.20A.□□.□01	7.0	3.7	MC 23	MPC-4x1.5
2000	22.2	20.2	54.20A.□□.□01	8.9	4.7	MC 23	MPC-4x1.5
2000	25.9	23.2	55.20A.□□.□01	10.1	5.4	MC 23	MPC-4x1.5
2000	31.2	28.1	73.20A.□□.□01	12.3	6.5	MC 23	MPC-4x1.5
2000	40.9	36.4	74.20A.□□.□01	16.5	8.6	MC 23	MPC-4x2.5
2000	50.4	44.3	75.20A.□□.□01	20.0	10.6	MC 23 ¹	MPC-4x4
2000	59.5	51.8	76.20A.□□.□01	23.5	12.5	MC 46	MPC-4x6
2000	68.4	58.8	77.20A.□□.□01	26.8	14.3	MC 46	MPC-4x6
2000	76.6	65.1	78.20A.□□.□01	31.0	16.0	MC 46	MPC-4x10
3000	17.8	15.5	53.30A.□□.□01	10.6	5.6	MC 23	MPC-4x1.5
3000	22.2	19.0	54.30A.□□.□01	13.1	7.0	MC 23	MPC-4x1.5
3000	25.9	21.8	55.30A.□□.□01	15.4	8.1	MC 23	MPC-4x2.5
3000	31.2	25.6	73.30A.□□.□01	18.5	9.8	MC 23 ¹	MPC-4x4
3000	40.9	33.0	74.30A.□□.□01	24.3	12.8	MC 46	MPC-4x6
3000	50.4	40.0	75.30A.□□.□01	29.9	15.8	MC 46	MPC-4x10
3000	59.5	46.4	76.30A.□□.□01	35.3	18.7	MC 46	MPC-4x10
3000	68.4	52.4	77.30A.□□.□01	43.5	21.5	MC 46	MPC-4x16
3000	76.6	57.7	78.30A.□□.□01	42.6	24.1	MC 46	MPC-4x16
4000	17.8	14.6	53.40A.□□.□01	14.0	7.5	MC 23	MPC-4x2.5
4000	22.2	17.6	54.40A.□□.□01	17.7	9.3	MC 23	MPC-4x4
4000	25.9	19.9	55.40A.□□.□01	21.1	10.8	MC 23 ¹	MPC-4x4
4000	31.2	22.4	73.40A.□□.□01	24.7	13.1	MC 46	MPC-4x6
4000	40.9	28.6	74.40A.□□.□01	33.1	17.1	MC 46	MPC-4x10
4000	50.4	34.4	75.40A.□□.□01	39.9	21.1	MC 46	MPC-4x10
4000	59.5	39.7	76.40A.□□.□01	48.2	24.9	MC 80	MPC-4x16
4000	68.4	44.5	77.40A.□□.□01	55.0	28.6	MC 80	MPC-4x25
4000	76.6	48.5	78.40A.□□.□01	63.9	32.1	MC 80	MPC-4x25

¹ Do not use the AMC angled terminal strip.

* When having the “brake” option, add to the cable denomination the factor + (2x...).

E.g. for the model FXM55.12A.□□.□10 (brake option) the power cable is MPC-4x1.5+(2x1).



INFORMATION.

Observe that AMC angled terminal strips may be used except in the cases indicated in the previous table labeled with the super index¹.

2.

3-PHASE SERVOMOTORS. FXM
Technical data



FAGOR AUTOMATION

FXM/FKM

Ref.1703

Non-ventilated FXM with “F” winding · 220 V AC ·

All the data supplied here are for winding over-temperature of $\Delta T=100$ K with a room temperature of $40^{\circ}\text{C}/104^{\circ}\text{F}$.

T- 2/5 Technical data of non-ventilated FXM servomotors with “F” winding and without brake.

nN	Mo	Mn	Motor model	Io	Pcal	Power terminal strip MOTOR	Power cable MOTOR*
1/min	N·m	N·m	FXM	A	kW	Tipo	Nr of wires x mm ²
1200	17.3	15.8	55.12F.□□.□00	9.1	2.2	MC 23	MPC-4x1.5
1200	20.8	18.9	73.12F.□□.□00	10.7	2.6	MC 23	MPC-4x1.5
1200	27.3	24.9	74.12F.□□.□00	13.5	3.4	MC 23	MPC-4x2.5
1200	33.6	29.5	75.12F.□□.□00	17.1	4.2	MC 23	MPC-4x2.5
2000	4.1	4.0	14.20F.□□.□00	3.5	0.9	MC 23	MPC-4x1.5
2000	2.6	2.5	31.20F.□□.□00	2.2	0.5	MC 23	MPC-4x1.5
2000	5.1	5.0	32.20F.□□.□00	4.3	1.1	MC 23	MPC-4x1.5
2000	7.3	7.0	33.20F.□□.□00	6.3	1.5	MC 23	MPC-4x1.5
2000	9.3	9.0	34.20F.□□.□00	7.6	1.9	MC 23	MPC-4x1.5
2000	11.9	10.5	53.20F.□□.□00	9.9	2.5	MC 23	MPC-4x1.5
2000	14.8	12.8	54.20F.□□.□00	12.7	3.1	MC 23	MPC-4x1.5
2000	17.3	14.7	55.20F.□□.□00	15.5	3.6	MC 23	MPC-4x2.5
3000	11.9	10.0	53.30F.□□.□00	14.8	3.7	MC 23	MPC-4x2.5
3000	14.8	11.6	54.30F.□□.□00	18.4	4.7	MC 23	MPC-4x4
4000	1.2	1.1	11.40F.□□.□00	2.0	0.5	MC 23	MPC-4x1.5
4000	2.3	2.1	12.40F.□□.□00	3.9	1.0	MC 23	MPC-4x1.5
4000	3.3	3.0	13.40F.□□.□00	5.6	1.4	MC 23	MPC-4x1.5
4000	4.1	3.5	14.40F.□□.□00	6.9	1.7	MC 23	MPC-4x1.5
4000	2.6	2.4	31.40F.□□.□00	4.4	1.1	MC 23	MPC-4x1.5
4000	5.1	4.4	32.40F.□□.□00	8.4	2.1	MC 23	MPC-4x1.5
4000	7.3	6.1	33.40F.□□.□00	12.0	3.1	MC 23	MPC-4x1.5
4000	9.3	7.6	34.40F.□□.□00	15.3	3.9	MC 23	MPC-4x2.5
4000	11.9	8.7	53.40F.□□.□00	19.7	5.0	MC 23	MPC-4x4

¹ Do not use the AMC angled terminal strip.

* When having the “brake” option, add to the cable denomination the factor + (2x...).

E.g. for the model FXM55.12F.□□.□10 (brake option) the power cable is MPC-4x1.5+(2x1).



INFORMATION.

Observe that AMC angled terminal strips may be used except in the cases indicated in the previous table labeled with the super index¹.

2.6 Options / Expansions

Holding brake

FXM servomotors offer an optional holding brake that applies friction on to the shaft.



WARNING.

NEVER use this holding brake to stop a moving axis!

Its purpose is to immobilize or lock vertical axes, not to brake a moving axis. Its main characteristics depending on the type of brake are:

T- 2/6 Technical data of the holding brake.

Motor series	Holding torque	Rated power absorbed	ON/OFF time	Unlocking rated voltage	Inertia	Approx. mass
	N·m	W (hp)	ms	V DC	kg·cm ²	kg (lb)
FXM1	Motor Mo	12 (0.016)	19/29	22-26	0.38	0.3 (0.66)
FXM3	Motor Mo	16 (0.021)	20/29	22-26	1.06	0.6 (1.32)
FXM5	Motor Mo	18 (0.024)	25/50	22-26	3.60	1.1 (2.42)
FXM7	Motor Mo	35 (0.047)	53/97	22-26	31.80	4.1 (9.03)

Note. The maximum turning speed of the brake for all series is 10000 rev/min except for the FXM7 series that is 8000 rev/min.

MANDATORY.

- A. Never use the brake to stop a moving axis.
- B. Never exceed its maximum turning speed. See table **T- 2/6**.
- C. Never apply a voltage higher than top V DC value given in the table that would prevent the shaft from turning. Remember that the axis is released when applying a voltage within the range given in the table for the rated unlocking voltage.
- D. When installing the motor, make sure that the brake fully releases the shaft before making it turn for the first time.



Fan

FXM5/7 series will offer the option for a fan whose main characteristics are:

T- 2/7 Technical data of the fan.

Motor series	Frequency	Voltage	Power	Flow	Noise emission	Speed
Units	Hz	V AC	W	m ³ /h	dB(A)	rev/min
FXM5/V	50	230	45	325	48	2800
	60	230	39	380	52	3250
FXM7/V	50	230	45	325	48	2800
	60	230	39	380	52	3250

2.

3-PHASE SERVOMOTORS. FXM
Options / Expansions

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2.7 Connections

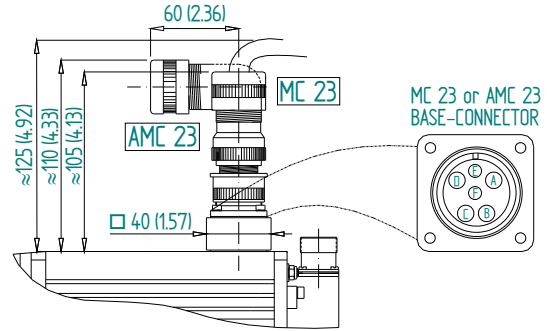
The power connection of the servomotor is made through a straight mail base connector that ensures a sealing degree of IP 65. Here are three connector models for currents up to 23 A, 46 A and 80 A described later on. The base connector of these servomotors is connected to the straight terminal strips called MC 23, MC 46 and MC 80 or angled AMC 23 and AMC 46.

NOTE. FAGOR supplies these terminal strips separately (not with the motor) and upon request.

Terminal strips MC 23 and AMC 23

Important. The range of outside diameters of the cable admitted by the aerial connector for the base connector is $D_{min.}/D_{max.} = 6/16.5$ mm.

MC 23, AMC 23 SEALING: IP 67	
PIN	SIGNAL
A	U PHASE
B	V PHASE
C	W PHASE
D	PE
E	BRAKE [+]
F	BRAKE [-]



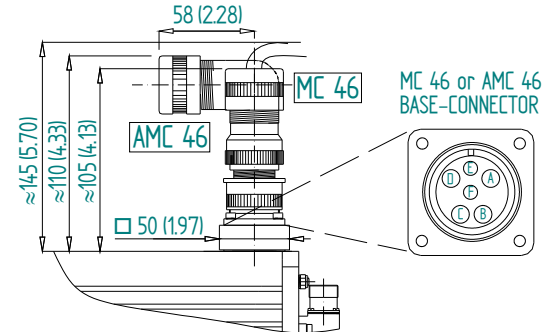
F- 2/3

Terminal strips MC 23 (straight) and AMC 23 (angled) for rated current: $I_n < 23A$.

Terminal strips MC 46 and AMC 46

Important. The range of outside diameters of the cable admitted by the aerial connector for the base connector is $D_{min.}/D_{max.} = 19/24$ mm.

MC 46, AMC 46 SEALING: IP 67	
PIN	SIGNAL
A	U PHASE
B	V PHASE
C	W PHASE
D	PE
E	BRAKE [+]
F	BRAKE [-]



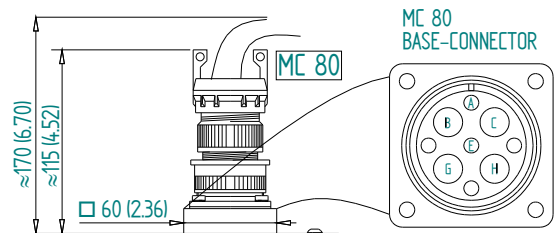
F- 2/4

Terminal strips MC 46 (straight) and AMC 46 (angled) for rated current: $23A < I_n < 46A$.

Terminal strip MC 80

Important. The range of outside diameters of the cable admitted by the aerial connector for the base connector is $D_{min.}/D_{max.} = 19/24$ mm.

MC 80 SEALING: IP 65 STAND	
PIN	SIGNAL
C	U PHASE
H	V PHASE
G	W PHASE
B	PE
A	BRAKE [+]
E	BRAKE [-]

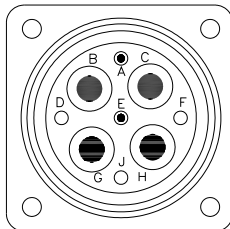
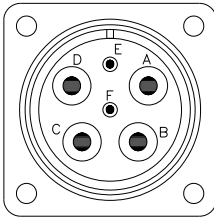
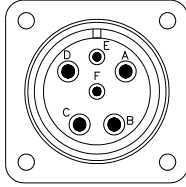


F- 2/5

Terminal strip MC 80 (straight) for rated current: $I_n > 46A$.

2.

3-PHASE SERVOMOTORS. FXM
Connections



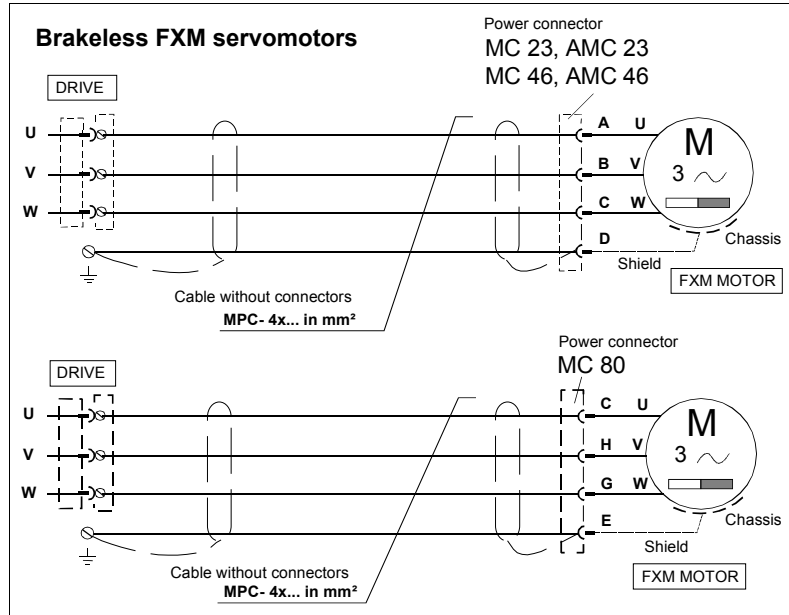
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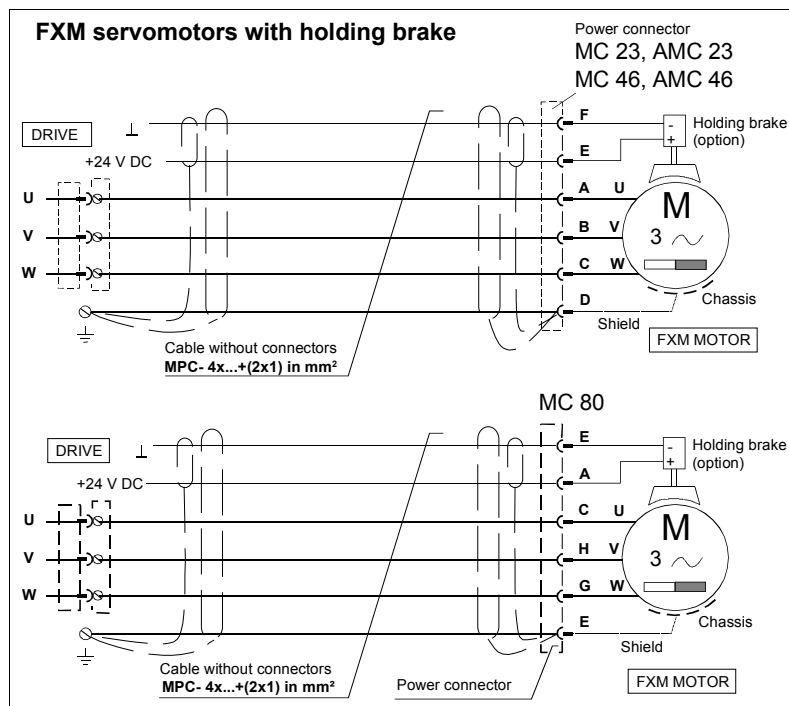
Power connection

The power connection between the motor and the drive will be made using the power cable as shown in the diagram:



F- 2/6

Power connection diagram between a brakeless FXM motor and a drive.



F- 2/7

Power connection diagram between an FXM motor with brake and a drive.



WARNING.

Never connect the servomotor directly to three-phase mains. A direct connection will destroy it.



MANDATORY.

When connecting the drive module with its corresponding motor using terminal strips MC 23, AMC 23, MC 46 or AMC 46, terminal U of the module must be connected to the terminal corresponding to the U phase (pin A) of the motor. Do the same for terminals V-V (pin B), W-W (pin C) and PE-PE (pin D). When using a brake, pin E will be supplied with 24 V DC and pin F with 0 V DC.

2.

3-PHASE SERVOMOTORS. FXM Connections



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3-PHASE SERVOMOTORS. FXM
Connections

Note. Note that for motors with an MC-80 plug, the pin names are different: U phase (pin C), V phase (pin H), W phase (pin G) and PE (pin B). When using a brake, pin A will be supplied with 24 V DC and pin E with 0 V DC.

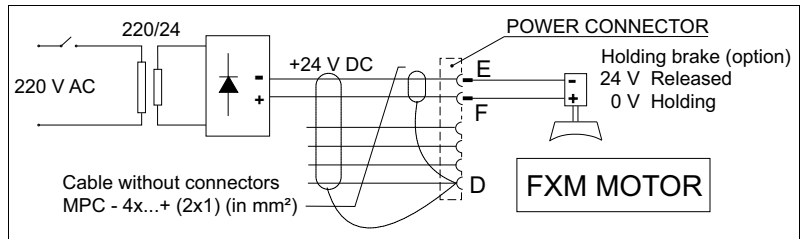
In order for the system to comply with the European Directive 2014/30/EU on Electromagnetic Compatibility, the cable grouping the wires that make up the power cable must be shielded. The shield must be connected to ground at the drive end and at the motor end as shown in figure F- 2/7. This condition is a must.

Holding brake connection

To govern the optional holding brake of FXM axis servomotors, it must be supplied with 24 V DC.

The power consumed by them and their main characteristics have already been described in the table T- 2/6.

A transformer-rectifier circuit as the one shown in figure F- 2/8 will be enough to supply the brake of an FXM servomotor.



F- 2/8

Holding brake connection diagram.

See detailed in section, **10.16 Holding brake connection diagram** of chapter **10. CONNECTION DIAGRAMS** of the “man_dds_hard.pdf” manual.

WARNING.

Voltage between 22/26 release the shaft. Make sure that no voltage over 26 V is applied that prevents the shaft from turning.



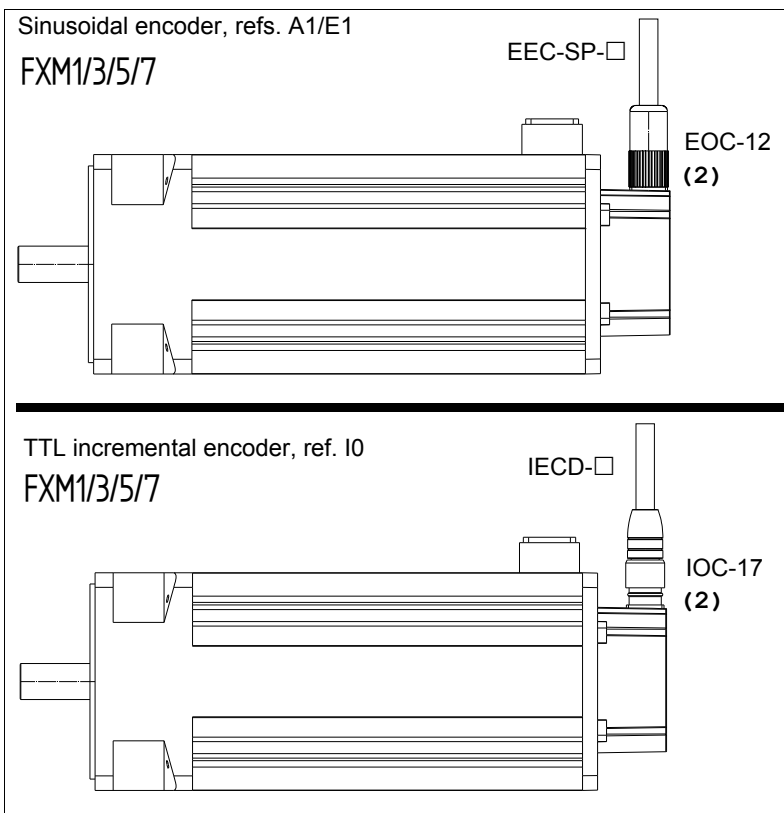
When installing the motor, make sure that the brake fully releases the shaft before making it turn for the first time.

The 24 V DC generated by modules like PS-25B4, APS-24, XPS or another power supply handle the drive control signals and must never be used to control the brake. These brakes generate voltage peaks that could damage the drive.

Connection of the motor feedback device

In all FXM series with winding A, the feedback device is a 1Vpp of 1024 ppt sinusoidal encoder (ref. A1/E1), and in the case of those with winding F, a 2500 ppt incremental TTL encoder (ref. I0).

The motor feedback device is connected to the drive through the base 2-connector of the motor. See figure **F- 2/9**.



F- 2/9

Feedback base connector. FXM1/3/5/7 series.

The pinout information of this feedback connector 2-, depending on the feedback device integrated into the motor, is provided in chapter 1. **GENERAL CONCEPTS** of this manual.

To transmit the feedback signals from the motor feedback device to the drive, use (as appropriate) one of the following cables with FAGOR connectors.

Sinusoidal encoder. EEC-SP-□ cable



INFORMATION.

Using the EEC-SP-□ cable as motor feedback cable ensures compliance with Directive 2014/30/EU on Electromagnetic Compatibility.

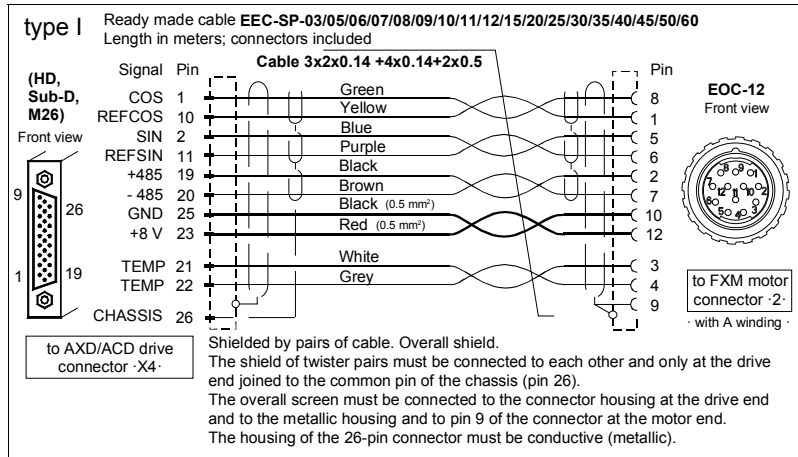
FAGOR supplies the EEC-SP-□ feedback cable upon request.

If you use to manufacture you own cable, read the following instructions carefully to understand the diagrams correctly. Observe that there are two cables indicated as type I and type II. Any of the cables shown is valid as feedback cable for a sinusoidal encoder. Only the wire colors are different, the connections are the same.

Here are the diagrams of the two cables (respecting the colors of the wires) supplied by FAGOR upon request.

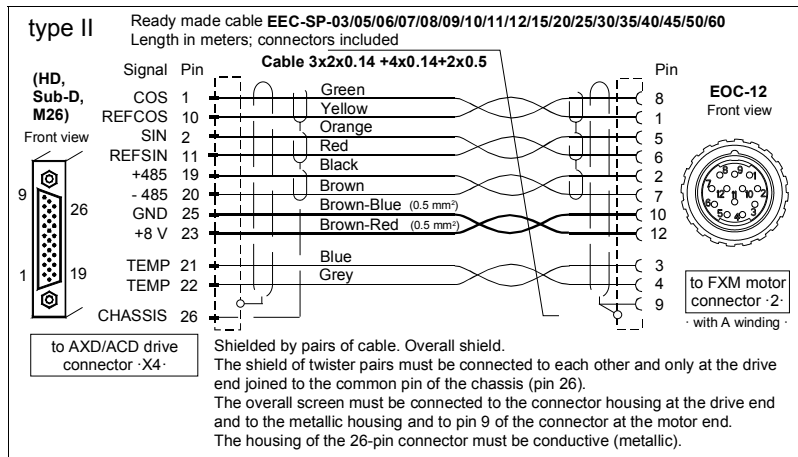
2.

3-PHASE SERVOMOTORS. FXM
Connections



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Encoder connection EEC-SP-□. Cable type I.



F- 2/11

Encoder connection EEC-SP-□. Cable type II.

Note. This cable may be connected to AXD, ACD, MMC and CMC drives as well as to ACSD-□H and MCS-□H drives. For the latter, see their corresponding manual.



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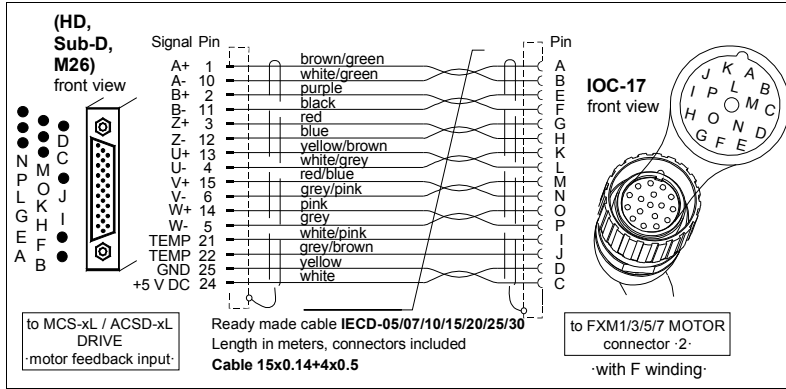
Incremental TTL encoder. IECD-□ cable

FAGOR supplies the IECD-□ feedback cable upon request. If you use to manufacture you own cable, read the following instructions carefully to understand the diagrams correctly.



INFORMATION.

Please note that the letters must be interpreted as positions when looking at the front of the unit. It is recommended to maintain the correspondence between cable color and the corresponding signal to provide the desired differential effect between complementary signals.



F- 2/12

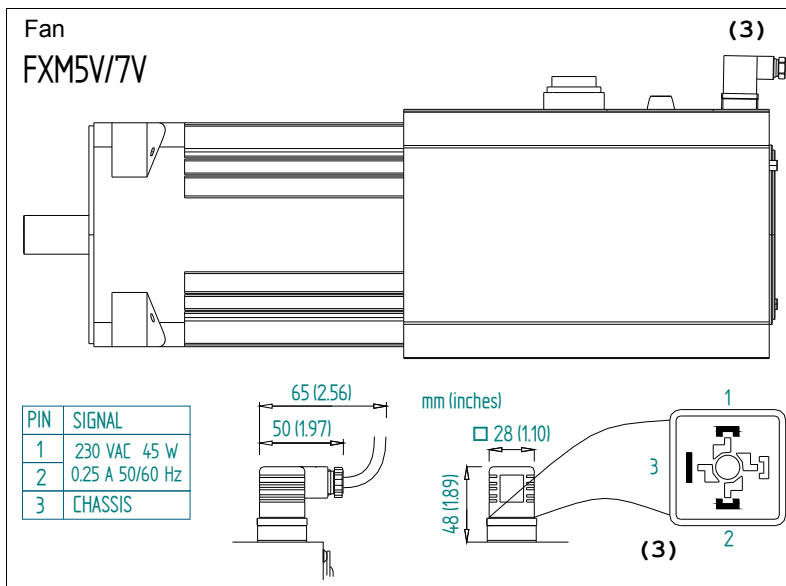
Incremental TTL encoder connection.

The incremental TTL encoder only comes on FXM servomotors with F winding (220 V AC) that will be governed by drives whose references are ACSD-□L or MCS-□L.

Note. For further details on these drives, please see the corresponding manual.

Fan connection

This connector is available on models of the FXM5/V and FXM7/V series that are the only ones having the fan option.



F- 2/13

Power connector of the fan.

2.

3-PHASE SERVOMOTORS. FXM Connections

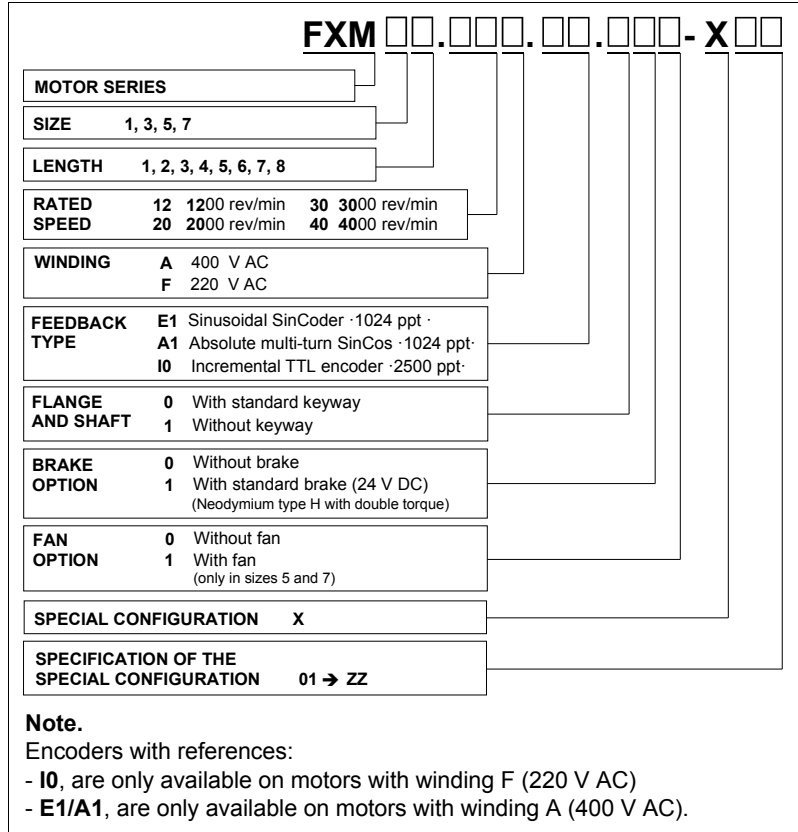


FXM/FKM

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2.8 Sales reference

The sales reference of each motor is made up of letters and digits that mean the following:



F- 2/14

Sales reference of FXM servomotors.

2.

3-PHASE SERVOMOTORS. FXM
Sales reference

2.9 Technical data. Torque-Speed curves

The following sections provide the main technical data of each model and their torque-speed graphs for motors with A winding (400 V AC) and F winding (220 V AC). Here are also the tables associating the motor model with the Fagor drives that can govern it. Bear in mind that selecting the drive to govern a particular motor depends on the requirements of the application; in other words, on the peak torque that may be demanded from the motor for brief instants.

Hence, if the motor duty cycle in the application were the rated value all the time, it would be enough to select a drive that can provide this torque. However, applications with this kind of behavior are rare. In general, there is always an instant that requires increasing the torque beyond the rated value (e.g. for a rapid tool positioning in G00 when machining) and, consequently, the peak torque must be higher than the rated (nominal) torque.

Drive selection. General criterion

The tables shown later on provide the possible motor-drive combinations. It has been assumed as **general criterion** to demand a peak torque (M_p) that the drive must provide that is 2 or 3 times the stall torque of the motor it is going to govern. See that this value is given in the tables by the M_p/M_o ratio.

Observe that motor-drive combinations whose ratio is lower than 2 have been left out although, as mentioned earlier, there could be applications that could use a smaller drive than the one shown in the tables. Therefore, it is essential to know the requirements of the application before selecting the drive. If they are unknown, we recommend to apply the general criteria mentioned earlier.

It goes without saying that drives whose M_p/M_o ratio is higher than 3 can also be selected; however, bear in mind that any oversizing (except in very particular cases) makes the system unnecessarily more expensive.

Calculation of the drive peak torque

Observe that having the M_p/M_n ratio has required getting the peak torque value of the drive (M_p). This value results from multiplying the peak current (I_{max}) of the selected drive by the torque constant (K_t) of the motor it is going to control. Remember that the values of the peak current of FAGOR drives are shown in some tables in the "man_dds_hard.pdf" manual.

Limiting the drive peak torque

Observe if result of the previous calculation is a drive peak torque value higher than the peak torque value of the motor it is going to govern, this value will limit the other one. Therefore, the drive never provides a peak torque higher than that of the motor. This fact appears in the tables with values in bold characters.

Explanatory notes

When mentioning FAGOR drives throughout this document, we mean AXD, ACD, MMC and CMC drives; i.e. drives for controlling synchronous servomotors with A winding (powered at 400 V AC)..

Remember that FAGOR also offers ACSD and MCS drives powered at 220 V AC (L series) and at 400 V AC (H series) that can also govern these servomotors (with F and A winding respectively).

If you wish to control the motor with any of them, consult the selection table for these drives shown on the first pages of its corresponding manual. Observe that each drive family mentioned here has its own manual.

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3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves

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Non-ventilated FXM with “A” · 400 V AC ·

FXM11 models

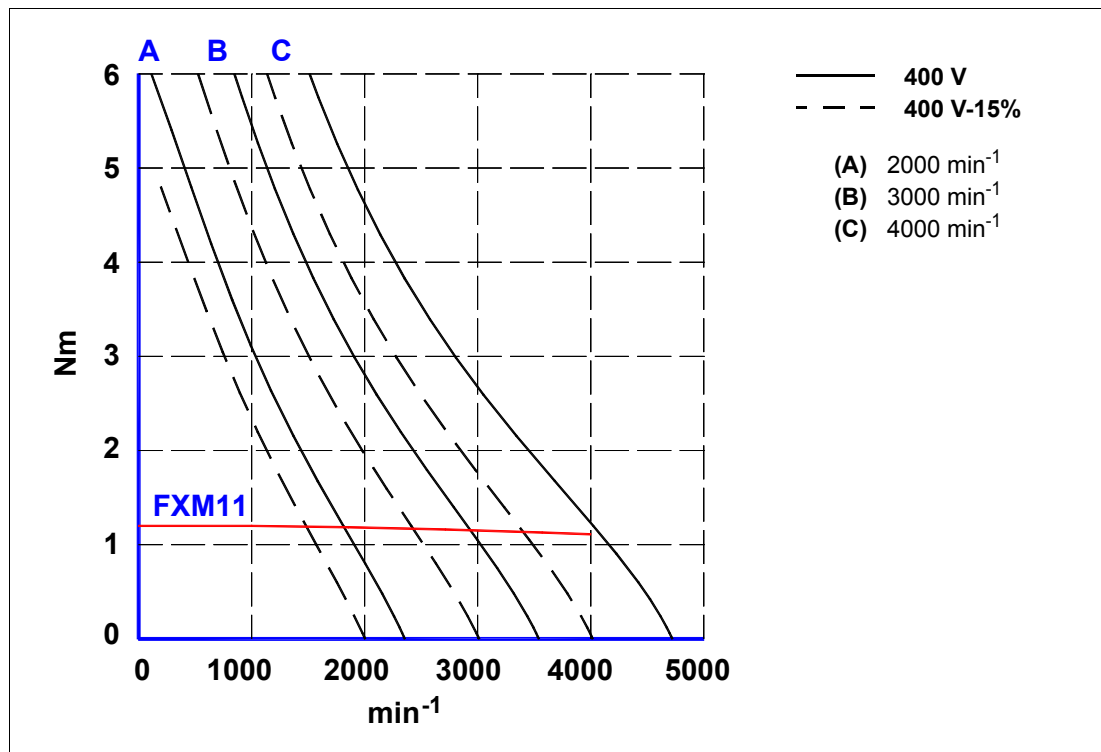
T- 2/8 Technical data of the FXM11.●●A.□□.□□0 motors.

Model			FXM11.●●A.□□.□□0		
Terminology	Notation	Units	20	30	40
Stall torque	Mo	N·m	1.2	1.2	1.2
Rated torque	Mn	N·m	1.1	1.1	1.1
Stall peak torque	Mp	N·m	6.0	6.0	6.0
Rated speed	nN	1/min	2000	3000	4000
Stall current	Io	A	0.45	0.67	0.90
Peak current	Imax	A	2.2	3.4	4.5
Calculation power	Pcal	kW	0.3	0.4	0.5
Rated power	Pn	kW	0.2	0.3	0.4
Torque constant	Kt	N·m/A	2.7	1.8	1.3
Acceleration time	tac	ms	4.2	6.3	8.4
Inductance per fase (3-phase)	L	mH	248	110	62
Resistance per phase	R	Ω	93.5	43.0	23.5
Inertia (without brake)	J	kg·cm ²	1.2	1.2	1.2
Inertia (with brake)	J*	kg·cm ²	1.6	1.6	1.6
Mass (without brake)	P	kg	3.3	3.3	3.3
Mass (with brake)	P*	kg	3.6	3.6	3.6

T- 2/9 Selection of FAGOR drives for FXM11.●●A.□□.□□0 motors.

Drive peak torque in N·m	AXD 1.08									
	Mp	Mp/Mo								
FXM11.20A	6.0	5.0								
FXM11.30A	6.0	5.0								
FXM11.40A	6.0	5.0								

Note. To select a ACSD-□H or MCS-□H drive with any motor of this series, refer to the manual of the corresponding drive.



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Torque-speed graphs. FXM11.●●A.□□.□□0 models.

2.

3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

FXM12 models

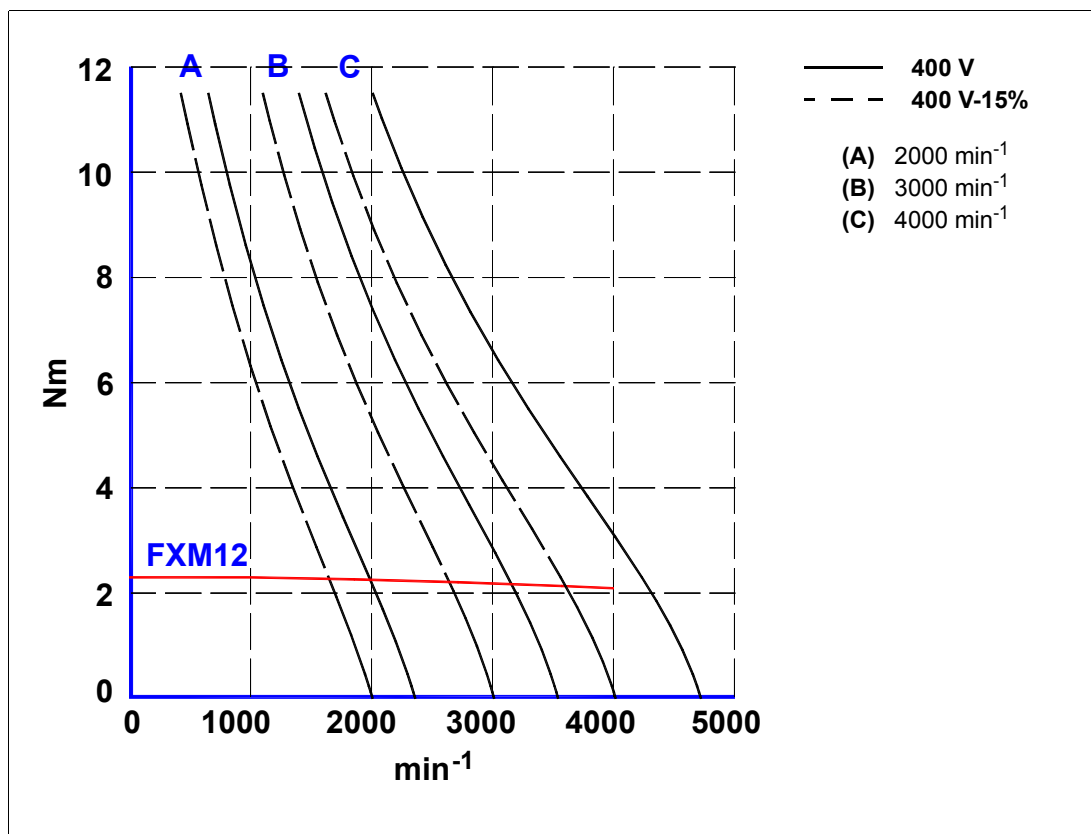
T- 2/10 Technical data of the FXM12.●●A.□□.□□0 motors.

Model	FXM12.●●A.□□.□□0					
Terminology	Notation	Units	20	30	40	
Stall torque	Mo	N·m	2.3	2.3	2.3	
Rated torque	Mn	N·m	2.2	2.1	2.1	
Stall peak torque	Mp	N·m	11	11	11	
Rated speed	nN	1/min	2000	3000	4000	
Stall current	Io	A	0.86	1.29	1.72	
Peak current	Imax	A	4.1	6.2	8.2	
Calculation power	Pcal	kW	0.5	0.7	1.0	
Rated power	Pn	kW	0.4	0.6	0.8	
Torque constant	Kt	N·m/A	2.7	1.8	1.3	
Acceleration time	tac	ms	3.6	5.4	7.2	
Inductance per fase (3-phase)	L	mH	111	49	28	
Resistance per phase	R	Ω	32.0	13.0	7.8	
Inertia (without brake)	J	kg·cm ²	1.9	1.9	1.9	
Inertia (with brake)	J*	kg·cm ²	2.3	2.3	2.3	
Mass (without brake)	P	kg	4.3	4.3	4.3	
Mass (with brake)	P*	kg	4.6	4.6	4.6	

T- 2/11 Selection of FAGOR drives for FXM12.●●A.□□.□□0 motors.

Drive peak torque in N·m	AXD 1.08		AXD 1.15							
	Mp	Mp/Mo	Mp	Mp/Mo						
FXM12.20A	11.0	4.7	-	-						
FXM12.30A	11.0	4.7	-	-						
FXM12.40A	10.4	4.5	11.0	4.7						

Note. To select a ACSD-□H or MCS-□H drive with any motor of this series, refer to the manual of the corresponding drive.



F- 2/16

Torque-speed graphs. FXM12.●●A.□□.□□0 models.

2.

3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

FXM13 models

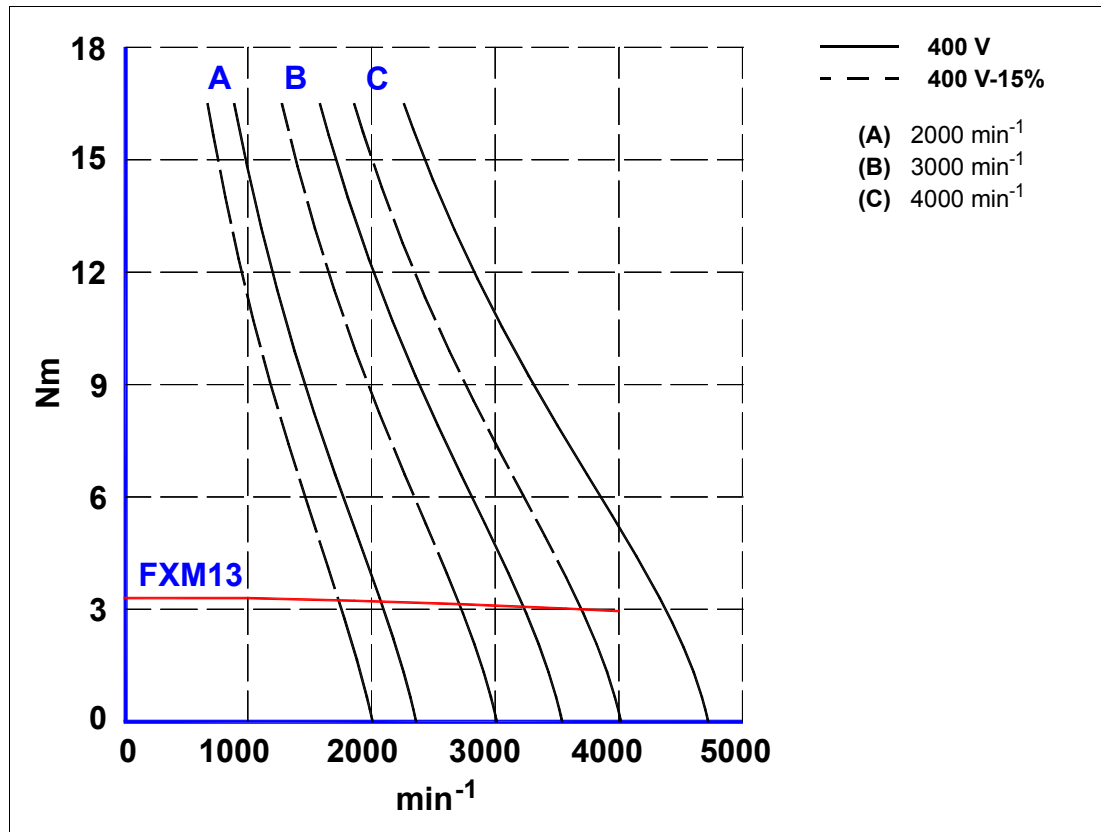
T- 2/12 Technical data of the FXM13.●●A.□□.□□0 motors.

Model	FXM13.●●A.□□.□□0					
Terminology	Notation	Units	20	30	40	
Stall torque	Mo	N·m	3.3	3.3	3.3	
Rated torque	Mn	N·m	3.2	3.1	2.9	
Stall peak torque	Mp	N·m	16	16	16	
Rated speed	nN	1/min	2000	3000	4000	
Stall current	Io	A	1.23	1.85	2.50	
Peak current	Imax	A	6.0	9.0	12.0	
Calculation power	Pcal	kW	0.7	1.0	1.4	
Rated power	Pn	kW	0.6	0.9	1.2	
Torque constant	Kt	N·m/A	2.7	1.8	1.3	
Acceleration time	tac	ms	3.4	5.1	6.8	
Inductance per fase (3-phase)	L	mH	71	32	18	
Resistance per phase	R	Ω	16.00	7.25	4.05	
Inertia (without brake)	J	kg·cm ²	2.6	2.6	2.6	
Inertia (with brake)	J*	kg·cm ²	3.0	3.0	3.0	
Mass (without brake)	P	kg	6.4	6.4	6.4	
Mass (with brake)	P*	kg	6.7	6.7	6.7	

T- 2/13 Selection of FAGOR drives for FXM13.●●A.□□.□□0 motors.

Drive peak torque in N·m	AXD 1.08		AXD 1.15							
	Mp	Mp/Mo	Mp	Mp/Mo						
FXM13.20A	16.0	4.8	-	-						
FXM13.30A	14.4	4.3	16.0	4.8						
FXM13.40A	10.4	4.3	16.0	4.8						

Note. To select a ACSD-□H or MCS-□H drive with any motor of this series, refer to the manual of the corresponding drive.



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Torque-speed graphs. FXM13.●●A.□□.□□0 models.

2.

3-PHASE SERVOMOTORS. FXM
 Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

FXM14 models

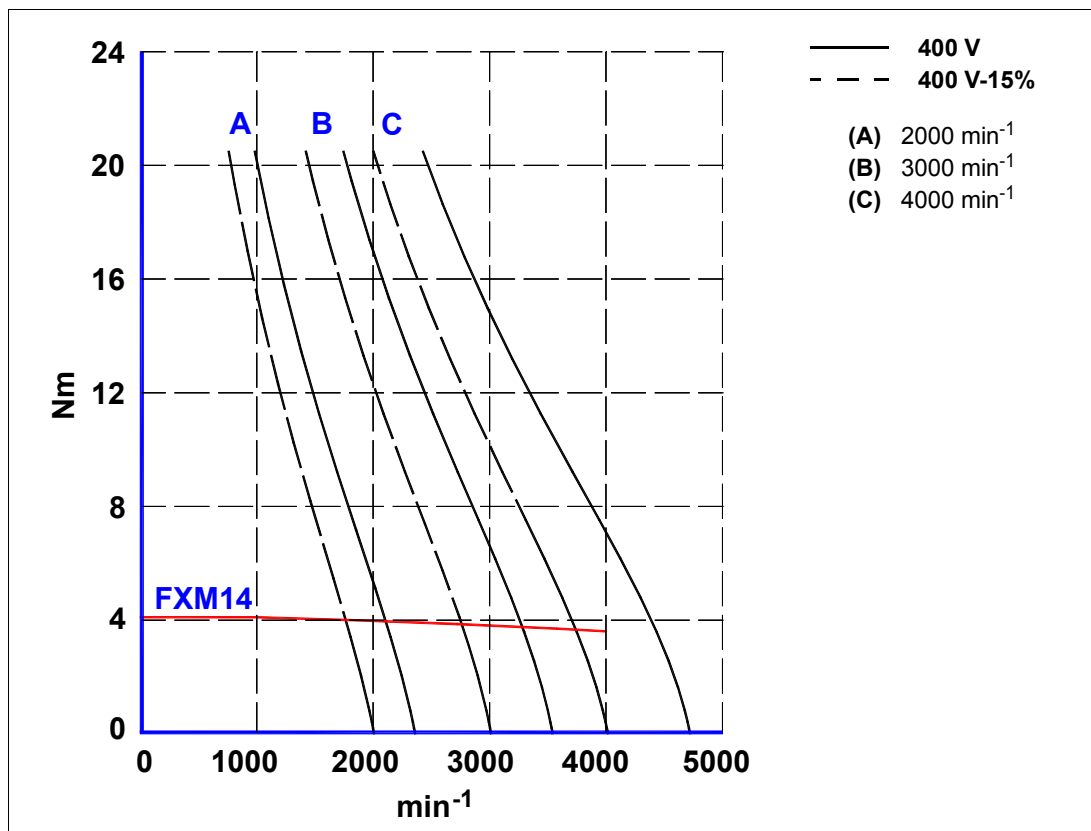
T- 2/14 Technical data of the FXM14.●●A.□□.□□0 motors.

Model			FXM14.●●A.□□.□□0		
Terminology	Notation	Units	20	30	40
Stall torque	Mo	N·m	4.1	4.1	4.1
Rated torque	Mn	N·m	3.9	3.8	3.6
Stall peak torque	Mp	N·m	20	20	20
Rated speed	nN	1/min	2000	3000	4000
Stall current	Io	A	1.5	2.3	2.1
Peak current	Imax	A	7.5	11.2	15.0
Calculation power	Pcal	kW	0.9	1.3	1.7
Rated power	Pn	kW	0.8	1.2	1.5
Torque constant	Kt	N·m/A	2.7	1.8	1.3
Acceleration time	tac	ms	3.5	5.2	6.9
Inductance per fase (3-phase)	L	mH	52	23	13
Resistance per phase	R	Ω	12.00	4.85	2.95
Inertia (without brake)	J	kg·cm ²	3.3	3.3	3.3
Inertia (with brake)	J*	kg·cm ²	3.7	3.7	3.7
Mass (without brake)	P	kg	7.6	7.6	7.6
Mass (with brake)	P*	kg	7.9	7.9	7.9

T- 2/15 Selection of FAGOR drives for FXM14.●●A.□□.□□0 motors.

Drive peak torque in N·m	AXD 1.08		AXD 1.15		AXD 1.25					
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo				
FXM14.20A	20.0	4.8	-	-	-	-				
FXM14.30A	14.4	3.5	20.0	4.8	-	-				
FXM14.40A	10.4	2.5	19.5	4.7	20.0	4.8				

Note. To select a ACSD-□H or MCS-□H drive with any motor of this series, refer to the manual of the corresponding drive.



F- 2/18

Torque-speed graphs. FXM14.●●A.□□.□□0 models.

2.

3-PHASE SERVOMOTORS. FXM
 Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

FXM31 models

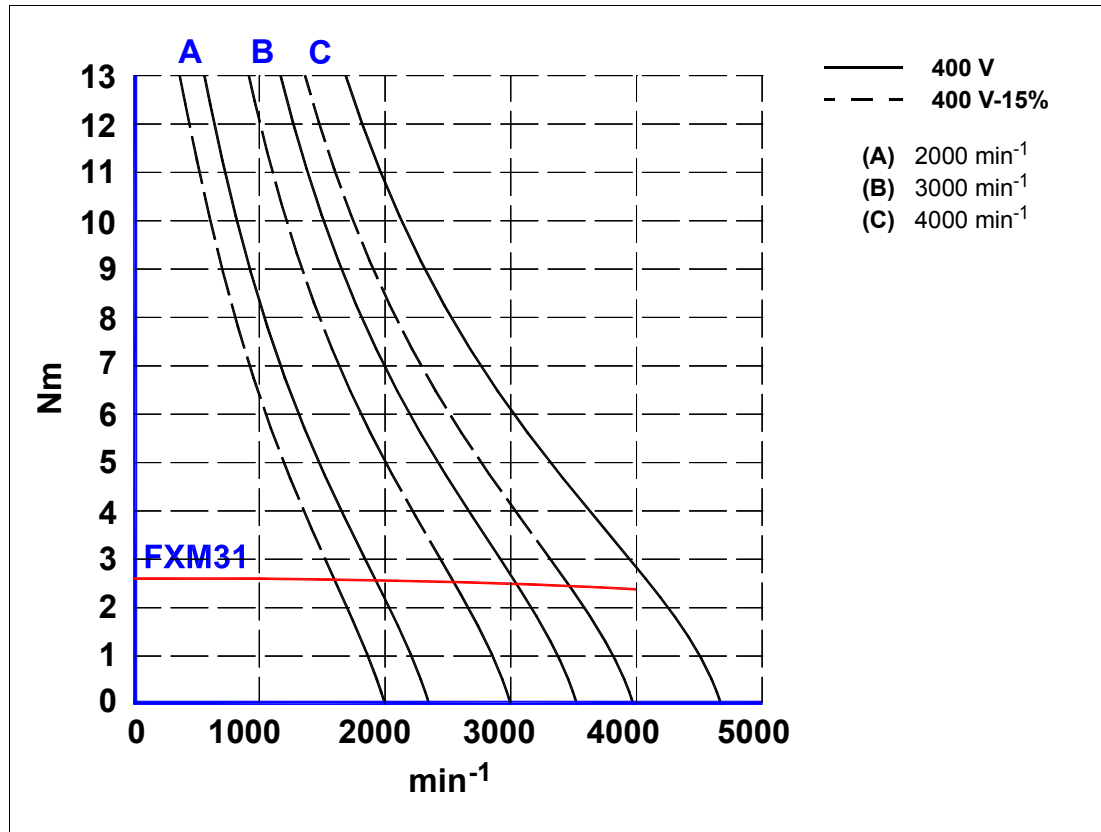
T- 2/16 Technical data of the FXM31.●●A.□□.□□0 motors.

Model	FXM31.●●A.□□.□□0					
Terminology	Notation	Units	20	30	40	
Stall torque	Mo	N·m	2.6	2.6	2.6	
Rated torque	Mn	N·m	2.5	2.5	2.3	
Stall peak torque	Mp	N·m	13	13	13	
Rated speed	nN	1/min	2000	3000	4000	
Stall current	Io	A	0.97	1.45	1.92	
Peak current	Imax	A	4.8	7.3	9.6	
Calculation power	Pcal	kW	0.5	0.8	1.1	
Rated power	Pn	kW	0.5	0.7	0.9	
Torque constant	Kt	N·m/A	2.7	1.8	1.4	
Acceleration time	tac	ms	5.6	8.5	11.3	
Inductance per fase (3-phase)	L	mH	126	56	32	
Resistance per phase	R	Ω	29	12.5	7.25	
Inertia (without brake)	J	kg·cm ²	3.5	3.5	3.5	
Inertia (with brake)	J*	kg·cm ²	4.5	4.5	4.5	
Mass (without brake)	P	kg	5.5	5.5	5.5	
Mass (with brake)	P*	kg	6.1	6.1	6.1	

T- 2/17 Selection of FAGOR drives for FXM31.●●A.□□.□□0 motors.

Drive peak torque in N·m	AXD 1.08		AXD 1.15							
	Mp	Mp/Mo	Mp	Mp/Mo						
FXM31.20A	13.0	5.0	-	-						
FXM31.30A	13.0	5.0	-	-						
FXM31.40A	11.2	4.3	13.0	5.0						

Note. To select a ACSD-□H or MCS-□H drive with any motor of this series, refer to the manual of the corresponding drive.



F- 2/19

Torque-speed graphs. FXM31.●●A.□□.□□0 models.

2.

3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

FXM32 models

T- 2/18 Technical data of the FXM32.●●A.□□.□□0 motors.

Model			FXM32.●●A.□□.□□0		
Terminology	Notation	Units	20	30	40
Stall torque	Mo	N·m	5.1	5.1	5.1
Rated torque	Mn	N·m	5.0	4.8	4.5
Stall peak torque	Mp	N·m	25	25	25
Rated speed	nN	1/min	2000	3000	4000
Stall current	Io	A	1.89	2.80	3.80
Peak current	Imax	A	9.2	14.0	18.5
Calculation power	Pcal	kW	1.1	1.6	2.1
Rated power	Pn	kW	1.0	1.5	1.9
Torque constant	Kt	N·m/A	2.7	1.8	1.4
Acceleration time	tac	ms	5.0	7.5	10.1
Inductance per fase (3-phase)	L	mH	56	25	14
Resistance per phase	R	Ω	9.55	4.05	2.30
Inertia (without brake)	J	kg·cm ²	6.0	6.0	6.0
Inertia (with brake)	J*	kg·cm ²	7.0	7.0	7.0
Mass (without brake)	P	kg	7.5	7.5	7.5
Mass (with brake)	P*	kg	8.1	8.1	8.1

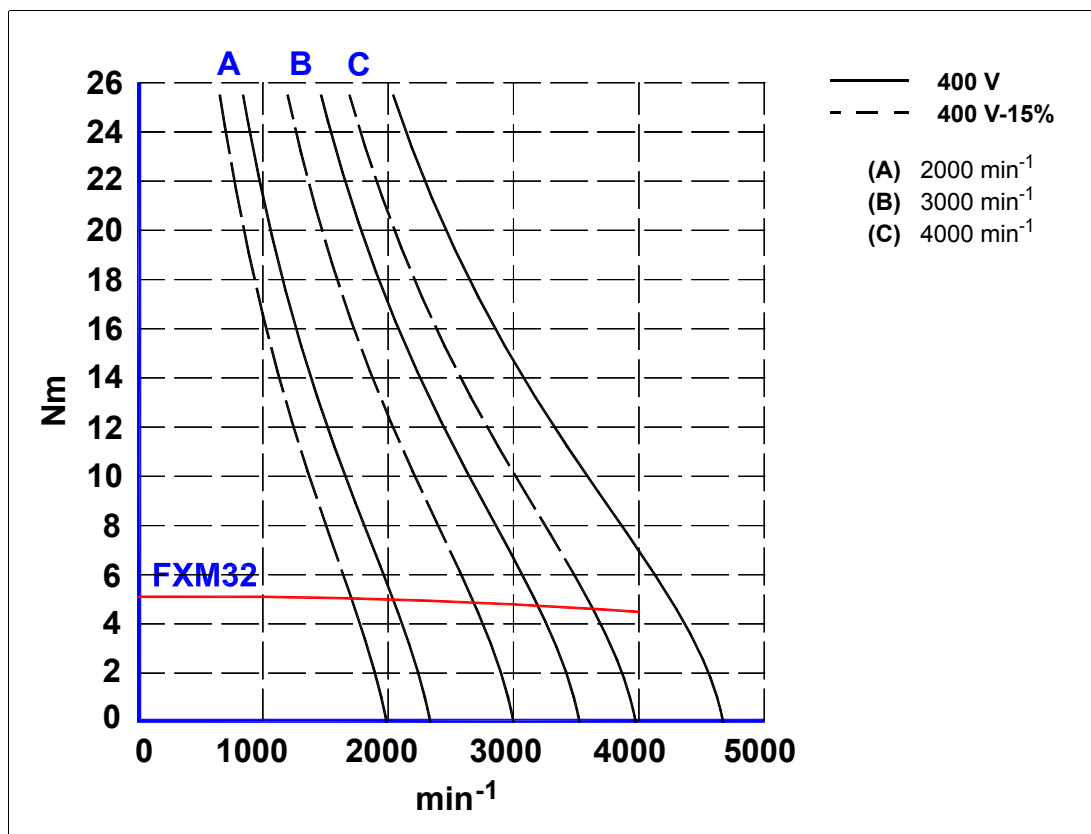
2.

3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves

T- 2/19 Selection of FAGOR drives for FXM32.●●A.□□.□□0 motors.

Drive peak torque in N·m	AXD 1.08		AXD 1.15		AXD 1.25					
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo				
FXM32.20A	21.6	4.2	25.0	4.9	-	-				
FXM32.30A	14.4	2.8	25.0	4.9	-	-				
FXM32.40A	11.2	2.2	21.0	4.1	25.0	4.9				

Note. To select a ACSD-□H or MCS-□H drive with any motor of this series, refer to the manual of the corresponding drive.



F- 2/20

Torque-speed graphs. FXM32.●●A.□□.□□0 models.



FXM/FKM

Ref.1703

FXM33 models

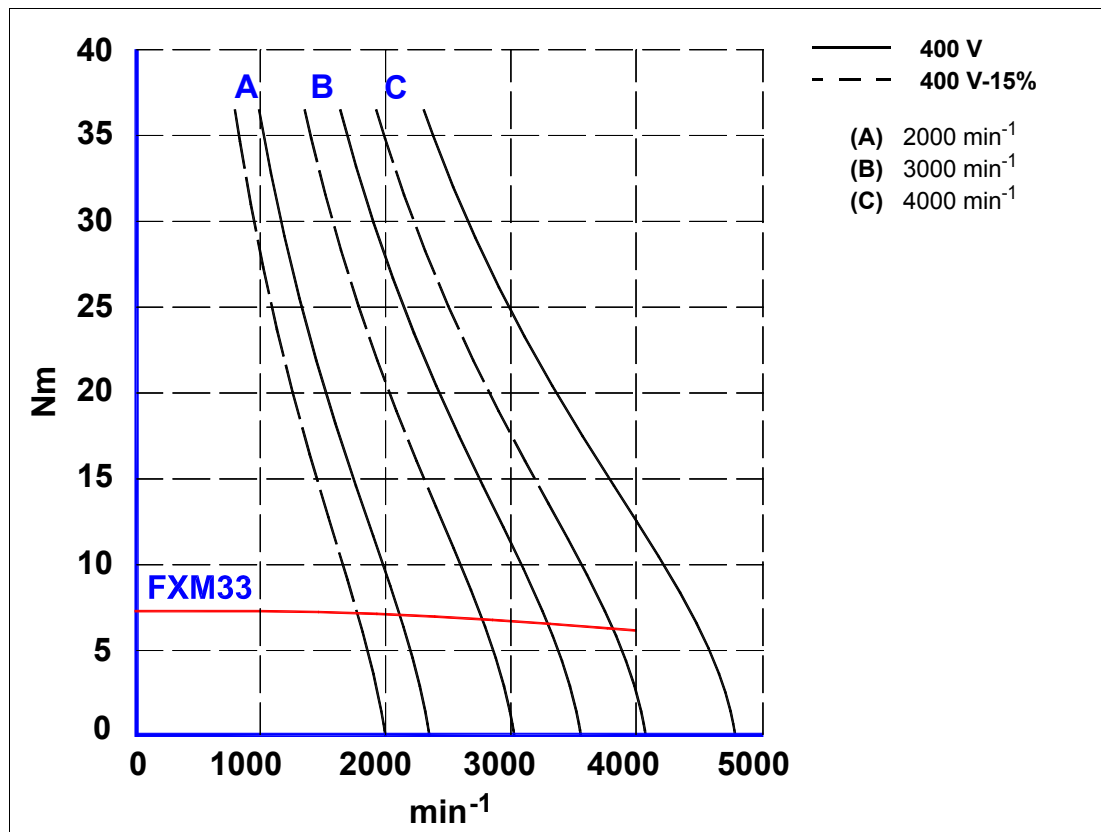
T- 2/20 Technical data of the FXM33.●●A.□□.□□0 motors.

Model	FXM33.●●A.□□.□□0					
Terminology	Notation	Units	20	30	40	
Stall torque	Mo	N·m	7.3	7.3	7.3	
Rated torque	Mn	N·m	7.1	6.7	6.1	
Stall peak torque	Mp	N·m	36	36	36	
Rated speed	nN	1/min	2000	3000	4000	
Stall current	Io	A	2.7	4.1	5.5	
Peak current	I _{max}	A	13.4	20.0	27.0	
Calculation power	P _{cal}	kW	1.5	2.3	3.1	
Rated power	P _n	kW	1.4	2.1	2.5	
Torque constant	K _t	N·m/A	2.7	1.8	1.3	
Acceleration time	t _{ac}	ms	4.9	7.4	9.9	
Inductance per fase (3-phase)	L	mH	36	16	8.6	
Resistance per phase	R	Ω	5.05	2.20	1.15	
Inertia (without brake)	J	kg·cm ²	8.5	8.5	8.5	
Inertia (with brake)	J*	kg·cm ²	9.5	9.5	9.5	
Mass (without brake)	P	kg	9.6	9.6	9.6	
Mass (with brake)	P*	kg	10.2	10.2	10.2	

T- 2/21 Selection of FAGOR drives for FXM33.●●A.□□.□□0 motors.

Drive peak torque in N·m	AXD 1.08		AXD 1.15		AXD 1.25		AXD 1.35					
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo				
FXM33.20A	21.6	2.9	36.0	4.9	-	-	-	-				
FXM33.30A	-	-	27.0	3.6	36.0	4.9	-	-				
FXM33.40A	-	-	19.5	2.6	32.5	4.4	36.0	4.9				

Note. To select a ACSD-□H or MCS-□H drive with any motor of this series, refer to the manual of the corresponding drive.



F- 2/21

Torque-speed graphs. FXM33.●●A.□□.□□0 models.

2.

3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

FXM34 models

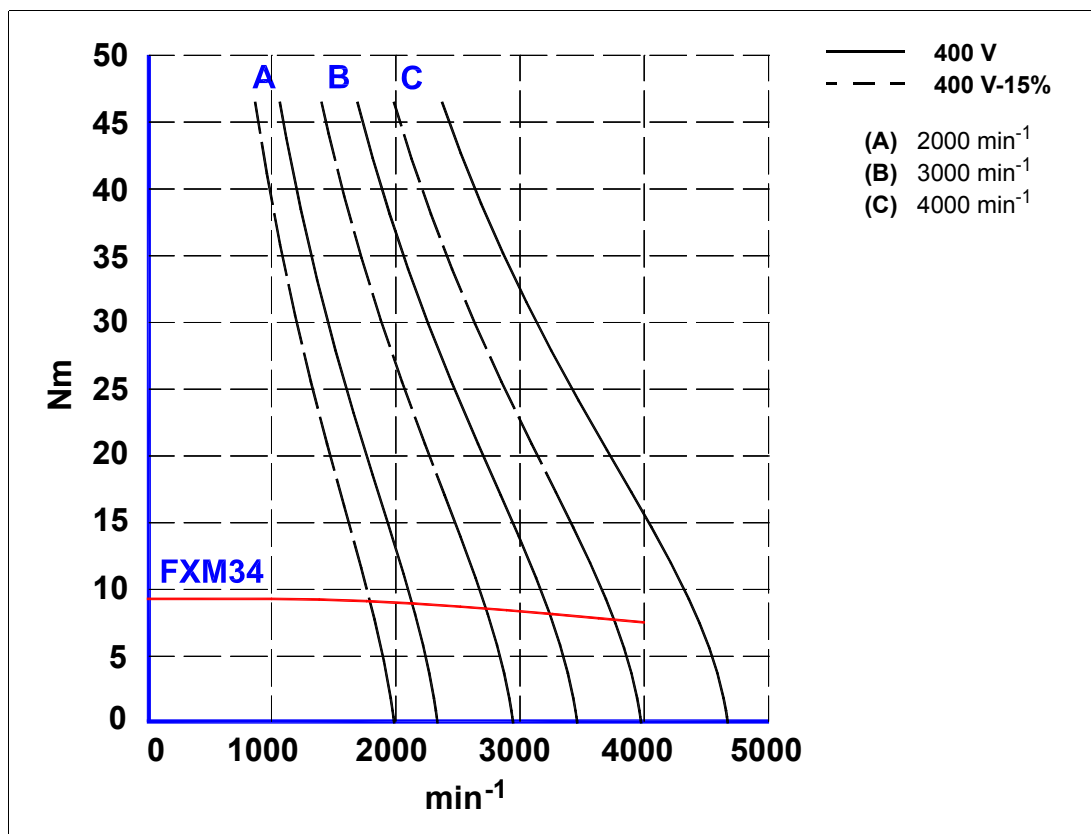
T- 2/22 Technical data of the FXM34.●●A.□□.□□0 motors.

Model			FXM34.●●A.□□.□□0		
Terminology	Notation	Units	20	30	40
Stall torque	Mo	N·m	9.3	9.3	9.3
Rated torque	Mn	N·m	9.0	8.3	7.5
Stall peak torque	Mp	N·m	46	46	46
Rated speed	nN	1/min	2000	3000	4000
Stall current	Io	A	3.4	5.1	6.9
Peak current	Imax	A	17	25	34
Calculation power	Pcal	kW	1.9	2.9	3.9
Rated power	Pn	kW	1.8	2.6	3.1
Torque constant	Kt	N·m/A	2.7	1.8	1.4
Acceleration time	tac	ms	5.0	7.5	10.0
Inductance per fase (3-phase)	L	mH	26.0	12.0	6.6
Resistance per phase	R	Ω	3.45	1.6	0.85
Inertia (without brake)	J	kg·cm ²	11.0	11.0	11.0
Inertia (with brake)	J*	kg·cm ²	12.0	12.0	12.0
Mass (without brake)	P	kg	11.5	11.5	11.5
Mass (with brake)	P*	kg	12.1	12.1	12.1

T- 2/23 Selection of FAGOR drives for FXM34.●●A.□□.□□0 motors.

Drive peak torque in N·m	AXD 1.08		AXD 1.15		AXD 1.25		AXD 1.35				
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo			
FXM34.20A	21.6	2.3	40.5	4.3	46.0	4.9	-	-			
FXM34.30A	-	-	27.0	2.9	45.0	4.8	46.0	4.9			
FXM34.40A	-	-	21.0	2.2	35.0	3.7	46.0	4.9			

Note. To select a ACSD-□H or MCS-□H drive with any motor of this series, refer to the manual of the corresponding drive.



F- 2/22

Torque-speed graphs. FXM34.●●A.□□.□□0 models.

2.

3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

FXM53 models

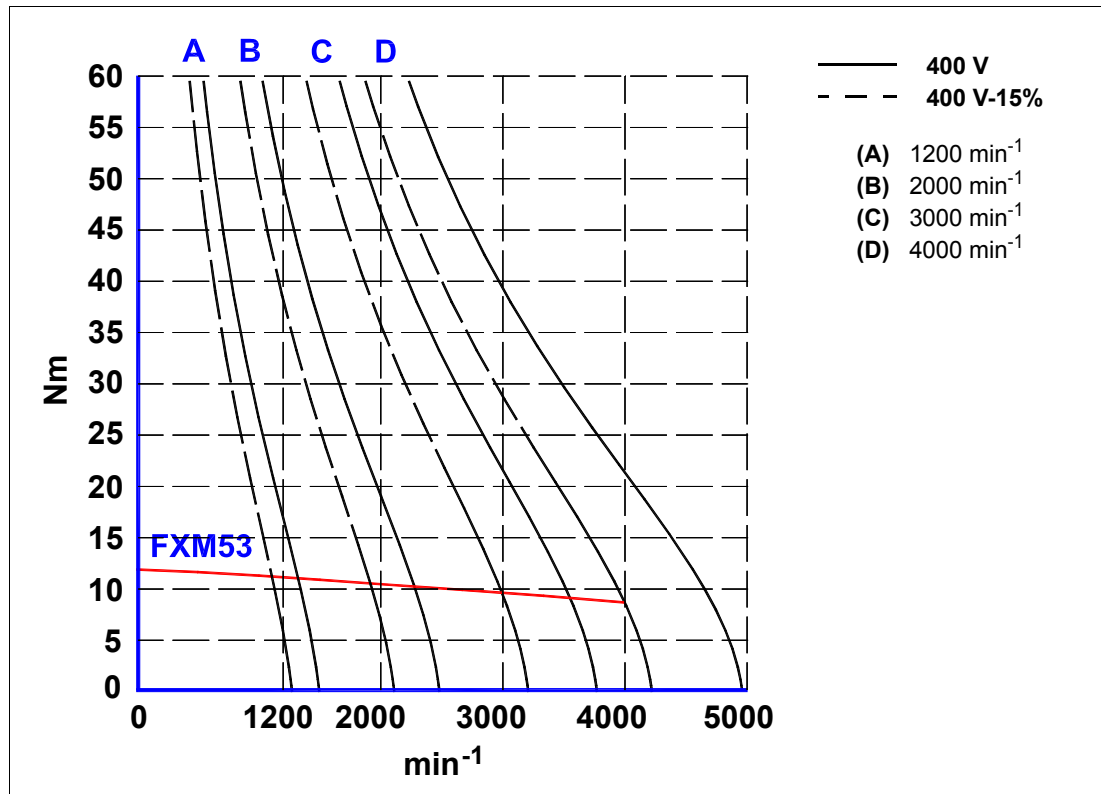
T- 2/24 Technical data of the FXM53.●●A.□□.□□0 motors.

Model	FXM53.●●A.□□.□□0					
Terminology	Notation	Units	12	20	30	40
Stall torque	Mo	N·m	11.9	11.9	11.9	11.9
Rated torque	Mn	N·m	11.1	10.5	9.6	8.7
Stall peak torque	Mp	N·m	59	59	59	59
Rated speed	nN	1/min	1200	2000	3000	4000
Stall current	Io	A	2.8	4.7	7.1	9.3
Peak current	I _{max}	A	14	23	35	46
Calculation power	P _{cal}	kW	1.5	2.5	3.7	5.0
Rated power	P _n	kW	1.4	2.2	3.0	3.6
Torque constant	K _t	N·m/A	4.2	2.5	1.7	1.3
Acceleration time	t _{ac}	ms	4.7	7.8	11.7	15.6
Inductance per fase (3-phase)	L	mH	61.0	22.0	9.6	5.6
Resistance per phase	R	Ω	5.850	2.150	0.905	0.545
Inertia (without brake)	J	kg·cm ²	22.0	22.0	22.0	22.0
Inertia (with brake)	J*	kg·cm ²	25.6	25.6	25.6	25.6
Mass (without brake)	P	kg	15.8	15.8	15.8	15.8
Mass (with brake)	P*	kg	16.9	16.9	16.9	16.9

T- 2/25 Selection of FAGOR drives for FXM53.●●A.□□.□□0 motors.

Drive peak torque in N·m	AXD 1.08		AXD 1.15		AXD 1.25		AXD 1.35		AXD 2.50			
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo		
FXM53.12A	33.6	2.8	59.0	4.9	-	-	-	-	-	-		
FXM53.20A	-	-	37.5	3.1	59.0	4.9	-	-	-	-		
FXM53.30A	-	-	25.5	2.1	42.5	3.5	59.0	4.9	-	-		
FXM53.40A	-	-	-	-	32.5	2.7	45.5	3.8	59.0	4.9		

Note. To select a ACSD-□H or MCS-□H drive with any motor of this series, refer to the manual of the corresponding drive.



F- 2/23

Torque-speed graphs. FXM53.●●A.□□.□□0 models.

2.

3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

FXM54 models

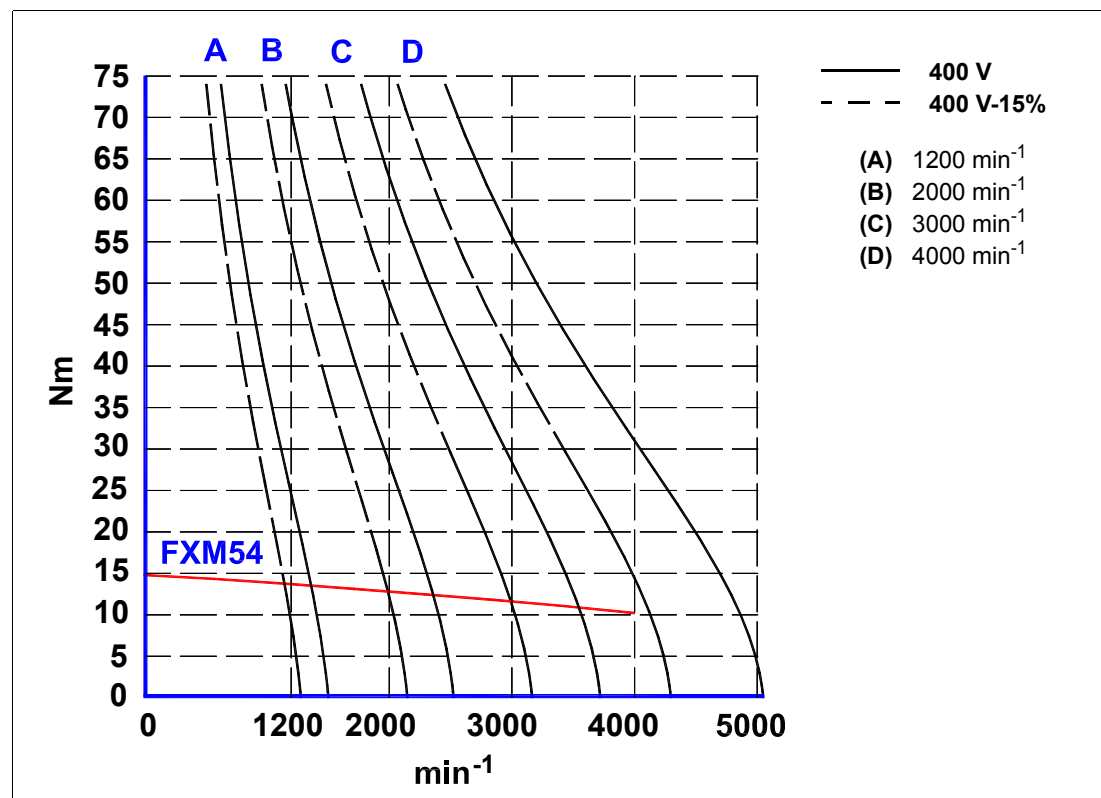
T- 2/26 Technical data of the FXM54.●●A.□□.□□0 motors.

Model		FXM54.●●A.□□.□□0					
Terminology	Notation	Units	12	20	30	40	
Stall torque	Mo	N·m	14.8	14.8	14.8	14.8	
Rated torque	Mn	N·m	13.7	12.8	11.6	10.2	
Stall peak torque	Mp	N·m	74	74	74	74	
Rated speed	nN	1/min	1200	2000	3000	4000	
Stall current	Io	A	3.5	5.9	8.7	11.8	
Peak current	Imax	A	17.6	30.0	44.0	59.0	
Calculation power	Pcal	kW	1.9	3.1	4.7	6.2	
Rated power	Pn	kW	1.7	2.7	3.6	4.3	
Torque constant	Kt	N·m/A	4.2	2.5	1.7	1.3	
Acceleration time	tac	ms	4.9	8.2	12.3	16.4	
Inductance per fase (3-phase)	L	mH	44.0	16.0	7.3	3.9	
Resistance per phase	R	Ω	3.700	1.350	0.640	0.345	
Inertia (without brake)	J	kg·cm ²	29.0	29.0	29.0	29.0	
Inertia (with brake)	J*	kg·cm ²	32.6	32.6	32.6	32.6	
Mass (without brake)	P	kg	17.8	17.8	17.8	17.8	
Mass (with brake)	P*	kg	18.9	18.9	18.9	18.9	

T- 2/27 Selection of FAGOR drives for FXM54.●●A.□□.□□0 motors.

Drive peak torque in N·m	AXD 1.08		AXD 1.15		AXD 1.25		AXD 1.35		AXD 2.50		AXD 2.75	
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo
FXM54.12A	33.6	2.2	63.0	4.2	74.0	5.0	-	-	-	-	-	-
FXM54.20A	-	-	37.5	2.5	62.5	4.2	74.0	5.0	-	-	-	-
FXM54.30A	-	-	-	-	42.5	2.8	59.5	4.0	74.0	5.0	-	-
FXM54.40A	-	-	-	-	32.5	2.2	45.5	3.0	65.0	4.4	74.0	5.0

Note. To select a ACSD-□H or MCS-□H drive with any motor of this series, refer to the manual of the corresponding drive.



F- 2/24

Torque-speed graphs. FXM54.●●A.□□.□□0 models.

2.

3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

FXM55 models

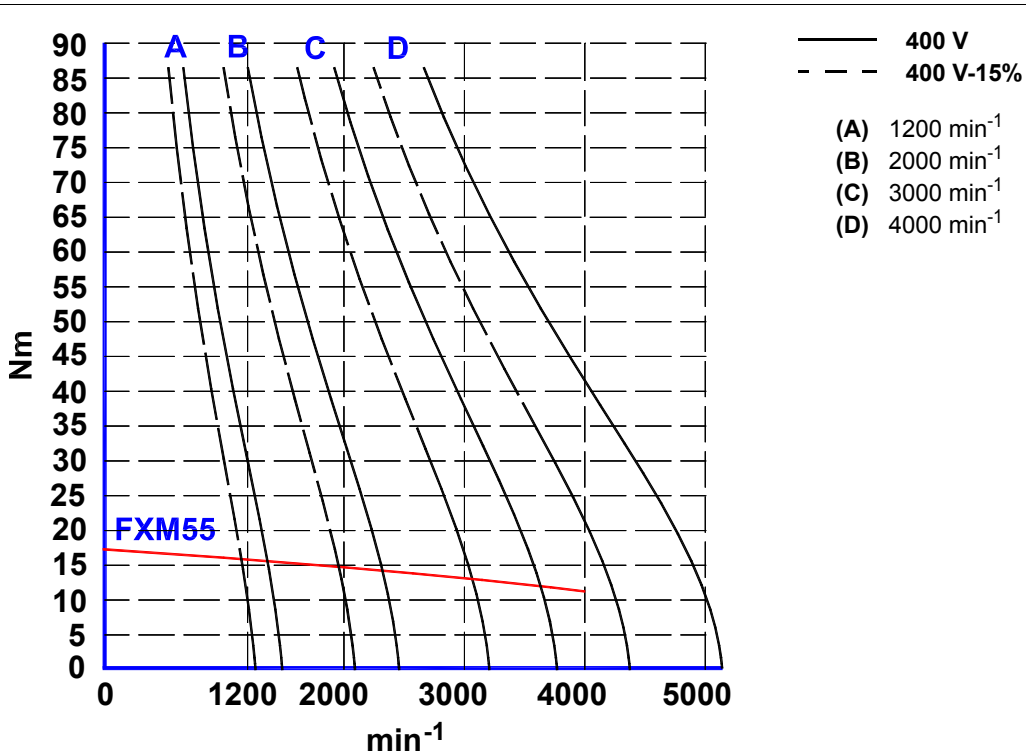
T- 2/28 Technical data of the FXM55.●●A.□□.□□0 motors.

Model	FXM55.●●A.□□.□□0						
Terminology	Notation	Units	12	20	30	40	
Stall torque	Mo	N·m	17.3	17.3	17.3	17.3	
Rated torque	Mn	N·m	15.7	14.7	13.1	11.2	
Stall peak torque	Mp	N·m	86	86	86	86	
Rated speed	nN	1/min	1200	2000	3000	4000	
Stall current	Io	A	4.1	6.7	10.3	14.1	
Peak current	Imax	A	20	33	51	70	
Calculation power	Pcal	kW	2.2	3.6	5.4	7.3	
Rated power	Pn	kW	2.0	3.1	4.1	4.7	
Torque constant	Kt	N·m/A	4.2	2.6	1.7	1.2	
Acceleration time	tac	ms	5.3	8.8	13.2	17.5	
Inductance per fase (3-phase)	L	mH	36.0	13.0	5.6	3.0	
Resistance per phase	R	Ω	2.95	1.05	0.45	0.24	
Inertia (without brake)	J	kg·cm ²	36.0	36.0	36.0	36.0	
Inertia (with brake)	J*	kg·cm ²	39.6	39.6	39.6	39.6	
Mass (without brake)	P	kg	20.0	20.0	20.0	20.0	
Mass (with brake)	P*	kg	21.1	21.1	21.1	21.1	

T- 2/29 Selection of FAGOR drives for FXM55.●●A.□□.□□0 motors.

Drive peak torque in N·m	AXD 1.15		AXD 1.25		AXD 1.35		AXD 2.50		AXD 2.75		AXD 3.100	
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo
FXM55.12A	63.0	3.6	86.0	4.9	-	-	-	-	-	-	-	-
FXM55.20A	39.0	2.2	65.0	3.7	86.0	4.9	-	-	-	-	-	-
FXM55.30A	-	-	42.5	2.4	59.5	3.4	85.0	4.9	86.0	5.0	-	-
FXM55.40A	-	-	-	-	42.0	2.4	60.0	3.4	86.0	4.9	-	-

Note. To select a ACSD-□H or MCS-□H drive with any motor of this series, refer to the manual of the corresponding drive.



F- 2/25

Torque-speed graphs. FXM55.●●A.□□.□□0 models.

2.

3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

FXM73 models

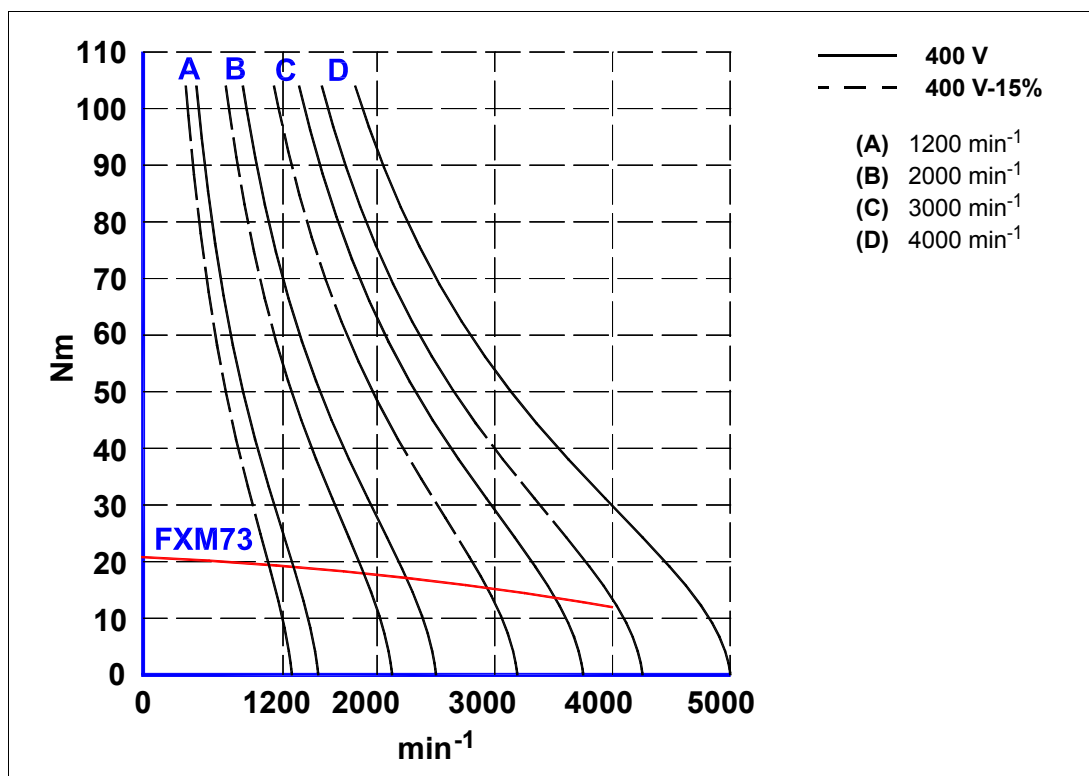
T- 2/30 Technical data of the FXM73.●●A.□□.□□□ motors.

Model		FXM73.●●A.□□.□□□					
Terminology	Notation	Units	12	20	30	40	
Stall torque	Mo	N·m	20,8	20,8	20,8	20,8	
Rated torque	Mn	N·m	19.2	17.7	15.2	11.9	
Stall peak torque	Mp	N·m	104	104	104	104	
Rated speed	nN	1/min	1200	2000	3000	4000	
Stall current	Io	A	4.9	8.2	12.3	16.5	
Peak current	Imax	A	25	41	62	82	
Calculation power	Pcal	kW	2.6	4.4	6.5	8.7	
Rated power	Pn	kW	2.4	3.7	4.8	5.0	
Torque constant	Kt	N·m/A	4.2	2.5	1.7	1.3	
Acceleration time	tac	ms	7.4	12.3	18.4	25.0	
Inductance per fase (3-phase)	L	mH	46.0	17.0	7.4	4.2	
Resistance per phase	R	Ω	3.050	1.100	0.485	0.265	
Inertia (without brake)	J	kg·cm ²	61.0	61.0	61.0	61.0	
Inertia (with brake)	J*	kg·cm ²	92.8	92.8	92.8	92.8	
Mass (without brake)	P	kg	29.0	29.0	29.0	29.0	
Mass (with brake)	P*	kg	33.1	33.1	33.1	33.1	

T- 2/31 Selection of FAGOR drives for FXM73.●●A.□□.□□□ motors.

Drive peak torque in N·m	AXD 1.15		AXD 1.25		AXD 1.35		AXD 2.50		AXD 2.75		AXD 3.100	
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo
FXM73.12A	63.0	3.0	104.0	5.0	-	-	-	-	-	-	-	-
FXM73.20A	-	-	62.5	3.0	87.5	4.2	104.0	5.0	-	-	-	-
FXM73.30A	-	-	42.5	2.0	59.5	2.8	85.0	4.1	104.0	5.0	-	-
FXM73.40A	-	-	-	-	45.5	2.1	65.0	3.1	97.5	4.7	104.0	5.0

Note. To select a ACSD-□H or MCS-□H drive with any motor of this series, refer to the manual of the corresponding drive.



F- 2/26

Torque-speed graphs. FXM73.●●A.□□.□□□ models.

2.

3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

FXM74 models

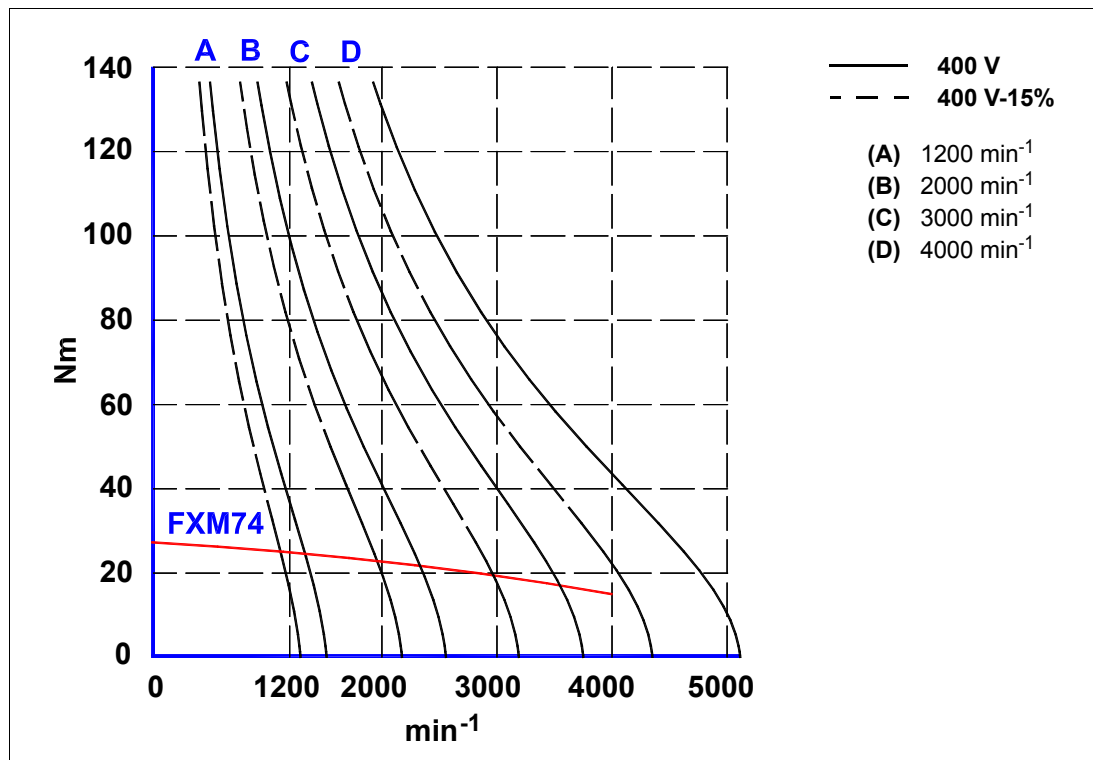
T- 2/32 Technical data of the FXM74.●●A.□□.□□0 motors.

Model	FXM74.●●A.□□.□□0					
Terminology	Notation	Units	12	20	30	40
Stall torque	Mo	N·m	27.3	27.3	27.3	27.3
Rated torque	Mn	N·m	24.9	22.8	19.4	15.0
Stall peak torque	Mp	N·m	135	135	135	135
Rated speed	nN	1/min	1200	2000	3000	4000
Stall current	Io	A	6.6	11.1	16.2	22.1
Peak current	Imax	A	32	55	80	109
Calculation power	Pcal	kW	3.4	5.7	8.6	11.4
Rated power	Pn	kW	3.1	4.8	6.1	6.3
Torque constant	Kt	N·m/A	4.2	2.5	1.7	1.2
Acceleration time	tac	ms	7.4	12.3	18.4	25.0
Inductance per fase (3-phase)	L	mH	33.0	12.0	5.4	2.9
Resistance per phase	R	Ω	1.90	0.68	0.31	0.17
Inertia (without brake)	J	kg·cm ²	79.0	79.0	79.0	79.0
Inertia (with brake)	J*	kg·cm ²	110.8	110.8	110.8	110.8
Mass (without brake)	P	kg	31.6	31.6	31.6	31.6
Mass (with brake)	P*	kg	35.7	35.7	35.7	35.7

T- 2/33 Selection of FAGOR drives for FXM74.●●A.□□.□□0 motors.

Drive peak torque in N·m	AXD 1.25		AXD 1.35		AXD 2.50		AXD 2.75		AXD 3.100		AXD 3.150	
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo
FXM74.12A	105.0	3.8	135.0	4.9	-	-	-	-	-	-	-	-
FXM74.20A	62.5	2.7	87.5	3.2	125.0	4.6	135.0	4.9	-	-	-	-
FXM74.30A	-	-	59.5	2.1	85.0	3.1	127.5	4.6	135.0	4.9	-	-
FXM74.40A	-	-	-	-	60.0	2.2	90.0	3.3	120.0	4.4	135.0	4.9

Note. To select a ACSD-□H or MCS-□H drive with any motor of this series, refer to the manual of the corresponding drive.



F- 2/27

Torque-speed graphs. FXM74.●●A.□□.□□0 models.

2.

3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

FXM75 models

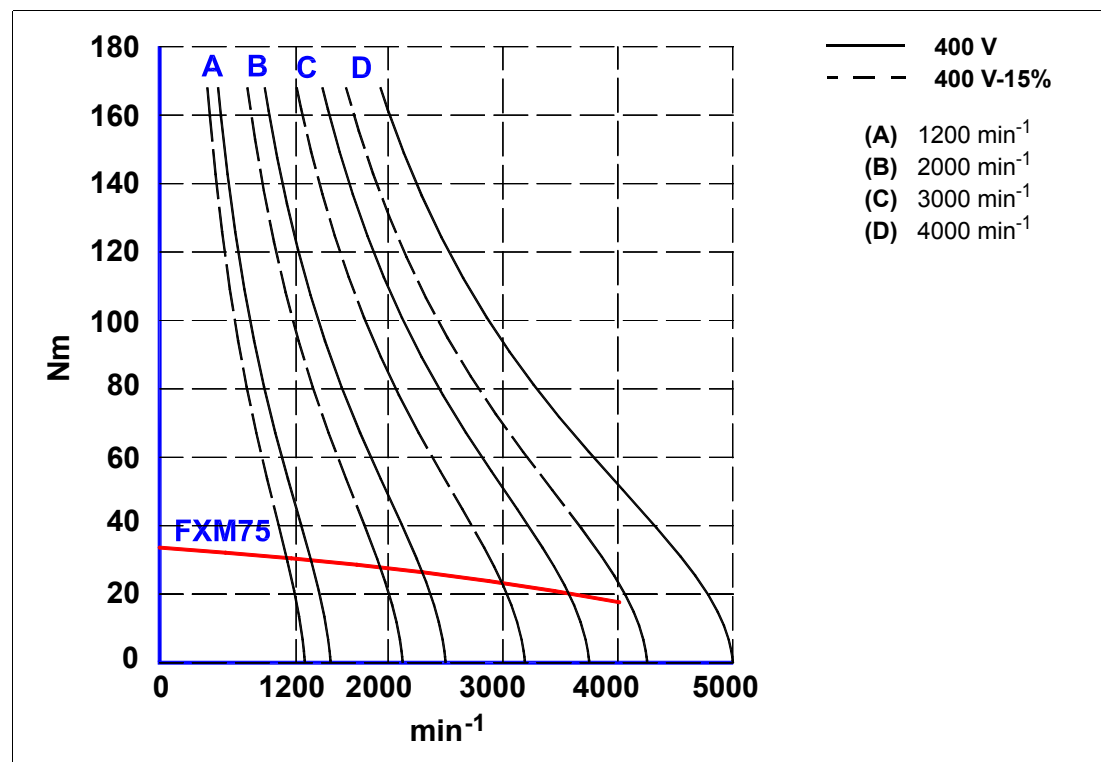
T- 2/34 Technical data of the FXM75.●●A.□□.□□0 motors.

Model		FXM75.●●A.□□.□□0					
Terminology	Notation	Units	12	20	30	40	
Stall torque	Mo	N·m	33.6	33.6	33.6	33.6	
Rated torque	Mn	N·m	30.2	27.5	23.2	17.6	
Stall peak torque	Mp	N·m	165	165	165	165	
Rated speed	nN	1/min	1200	2000	3000	4000	
Stall current	Io	A	8.0	13.3	19.9	26.6	
Peak current	Imax	A	39	65	98	131	
Calculation power	Pcal	kW	4.2	7.0	10.6	14.1	
Rated power	Pn	kW	3.8	5.7	7.3	7.4	
Torque constant	Kt	N·m/A	4.2	2.5	1.7	1.3	
Acceleration time	tac	ms	7.4	12.3	18.5	25.0	
Inductance per fase (3-phase)	L	mH	27.0	9.7	4.3	2.4	
Resistance per phase	R	Ω	1.450	0.515	0.230	0.125	
Inertia (without brake)	J	kg·cm ²	97.0	97.0	97.0	97.0	
Inertia (with brake)	J*	kg·cm ²	128.8	128.8	128.8	128.8	
Mass (without brake)	P	kg	36.0	36.0	36.0	36.0	
Mass (with brake)	P*	kg	40.1	40.1	40.1	40.1	

T- 2/35 Selection of FAGOR drives for FXM75.●●A.□□.□□0 motors.

Drive peak torque in N·m	AXD 1.25		AXD 1.35		AXD 2.50		AXD 2.75		AXD 3.100		AXD 3.150	
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo
FXM75.12A	105.0	3.1	147.0	4.3	165.0	4.9	-	-	-	-	-	-
FXM75.20A	-	-	87.5	2.6	125.0	3.7	165.0	4.9	-	-	-	-
FXM75.30A	-	-	-	-	85.0	2.5	127.5	3.8	165.0	4.9	-	-
FXM75.40A	-	-	-	-	-	-	97.5	2.9	130.0	3.8	165.0	4.9

Note. To select a ACSD-□H or MCS-□H drive with any motor of this series, refer to the manual of the corresponding drive.



F- 2/28

Torque-speed graphs. FXM75.●●A.□□.□□0 models.

2.

3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

FXM76 models

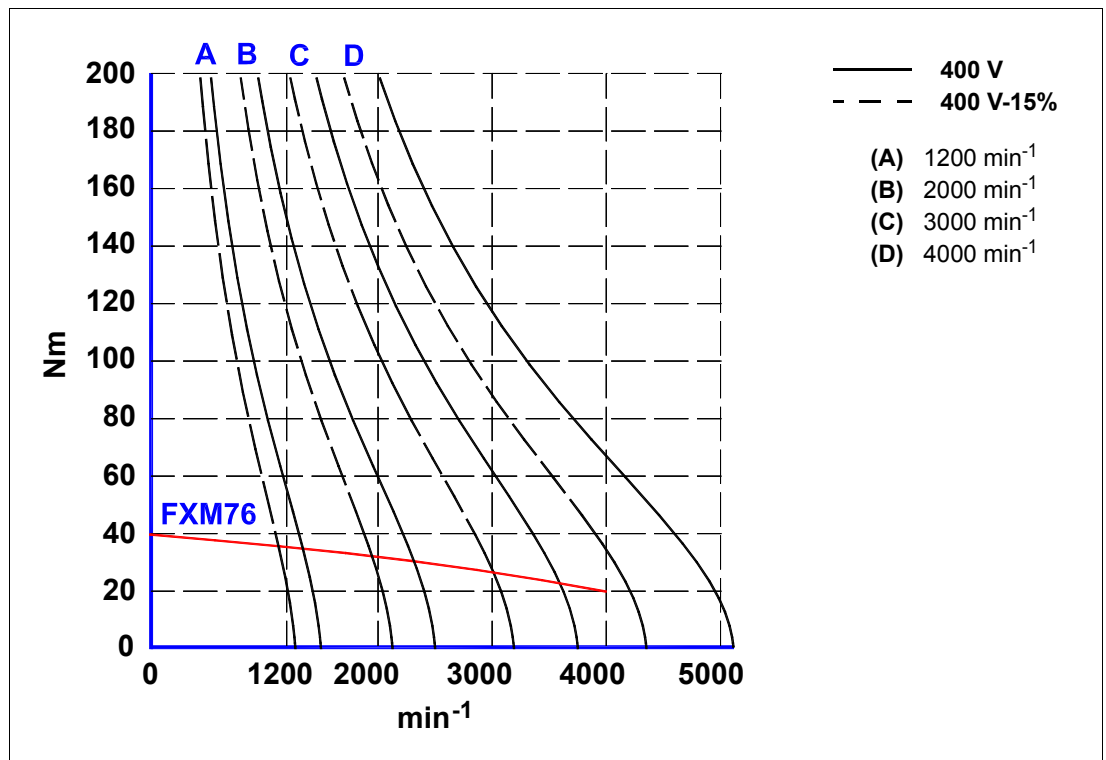
T- 2/36 Technical data of the FXM76.●●A.□□.□□0 motors.

Model	FXM76.●●A.□□.□□0						
Terminology	Notation	Units	12	20	30	40	
Stall torque	Mo	N·m	39.7	39.7	39.7	39.7	
Rated torque	Mn	N·m	35.3	31.9	26.6	19.8	
Stall peak torque	Mp	N·m	195	195	195	195	
Rated speed	nN	1/min	1200	2000	3000	4000	
Stall current	Io	A	9.4	15.7	23.6	32.1	
Peak current	Imax	A	46	77	116	158	
Calculation power	Pcal	kW	5.0	8.3	12.5	16.6	
Rated power	Pn	kW	4.4	6.7	8.4	8.3	
Torque constant	Kt	N·m/A	4.2	2.5	1.7	1.2	
Acceleration time	tac	ms	7.4	12.4	18.5	25.0	
Inductance per fase (3-phase)	L	mH	22.0	8.0	3.6	1.9	
Resistance per phase	R	Ω	1.100	0.400	0.180	0.095	
Inertia (without brake)	J	kg·cm ²	115.0	115.0	115.0	115.0	
Inertia (with brake)	J*	kg·cm ²	146.8	146.8	146.8	146.8	
Mass (without brake)	P	kg	40.0	40.0	40.0	40.0	
Mass (with brake)	P*	kg	44.1	44.1	44.1	44.1	

T- 2/37 Selection of FAGOR drives for FXM76.●●A.□□.□□0 motors.

Drive peak torque in N·m	AXD 1.25		AXD 1.35		AXD 2.50		AXD 2.75		AXD 3.100		AXD 3.150	
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo
FXM76.12A	105.0	2.6	147.0	3.7	195.0	4.9	-	-	-	-	-	-
FXM76.20A	-	-	87.5	2.2	125.0	3.1	187.5	4.7	195.0	4.9	-	-
FXM76.30A	-	-	-	-	85.0	2.1	127.5	3.2	170.0	4.2	195.0	4.9
FXM76.40A	-	-	-	-	-	-	90.0	2.3	120.0	3.0	180.0	4.5

Note. To select a ACSD-□H or MCS-□H drive with any motor of this series, refer to the manual of the corresponding drive.



F- 2/29

Torque-speed graphs. FXM76.●●A.□□.□□0 models.

2.

3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

FXM77 models

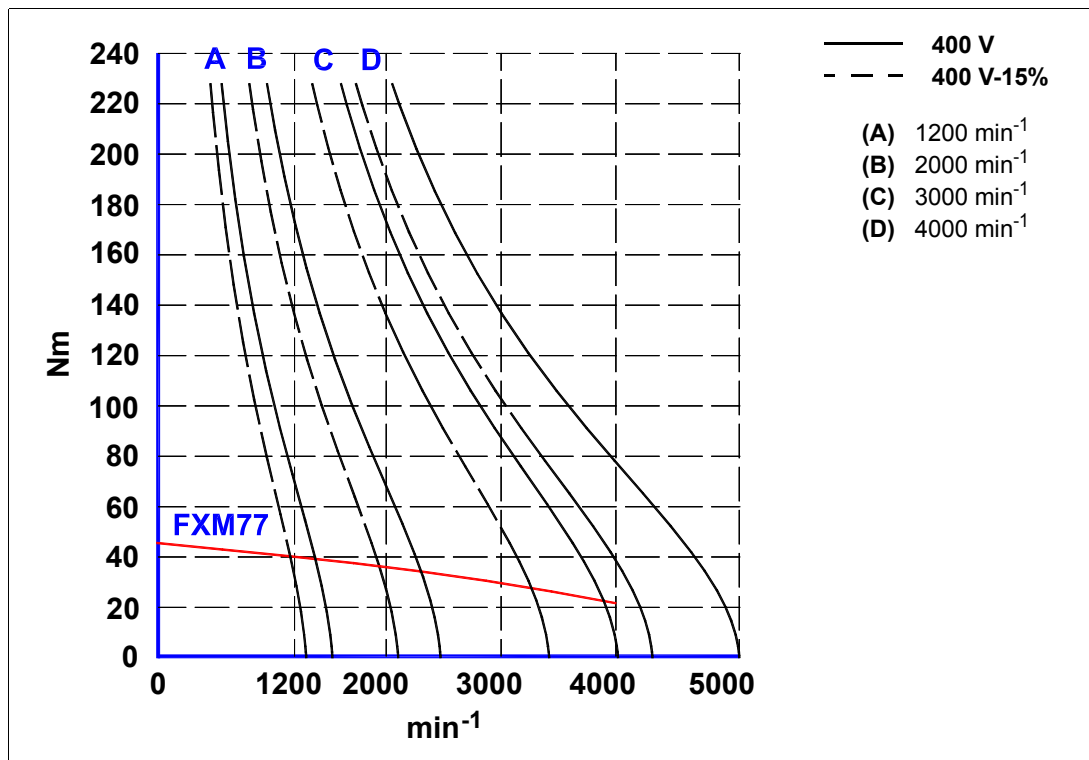
T- 2/38 Technical data of the FXM77.●●A.□□.□□0 motors.

Model	FXM77.●●A.□□.□□0						
Terminology	Notation	Units	12	20	30	40	
Stall torque	Mo	N·m	45.6	45.6	45.6	45.6	
Rated torque	Mn	N·m	40.0	36.0	29.6	21.7	
Stall peak torque	Mp	N·m	225	225	225	225	
Rated speed	nN	1/min	1200	2000	3000	4000	
Stall current	Io	A	11.0	17.8	29.0	36.6	
Peak current	Imax	A	55	88	143	181	
Calculation power	Pcal	kW	5.7	9.6	14.3	19.1	
Rated power	Pn	kW	5.0	7.5	9.3	9.1	
Torque constant	Kt	N·m/A	4.1	2.6	1.6	1.2	
Acceleration time	tac	ms	7.4	12.4	18.6	25.0	
Inductance per fase (3-phase)	L	mH	18.0	7.0	2.6	1.7	
Resistance per phase	R	Ω	0.87	0.33	0.13	0.08	
Inertia (without brake)	J	kg·cm ²	133	133	133	133	
Inertia (with brake)	J*	kg·cm ²	164.8	164.8	164.8	164.8	
Mass (without brake)	P	kg	43.0	43.0	43.0	43.0	
Mass (with brake)	P*	kg	47.1	47.1	47.1	47.1	

T- 2/39 Selection of FAGOR drives for FXM77.●●A.□□.□□0 motors.

Drive peak torque in N·m	AXD 1.25		AXD 1.35		AXD 2.50		AXD 2.75		AXD 3.100		AXD 3.150	
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo
FXM77.12A	102.5	2.2	143.5	3.1	205.0	4.5	225.0	4.9	-	-	-	-
FXM77.20A	-	-	-	-	130.0	2.8	195.0	4.2	225.0	4.9	-	-
FXM77.30A	-	-	-	-	-	-	100.8	2.2	160.0	3.5	225.0	4.9
FXM77.40A	-	-	-	-	-	-	90.0	2.0	120.0	2.6	148.8	3.2

Note. To select a ACSD-□H or MCS-□H drive with any motor of this series, refer to the manual of the corresponding drive.



F- 2/30

Torque-speed graphs. FXM77.●●A.□□.□□0 models.

2.

3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

FXM78 models

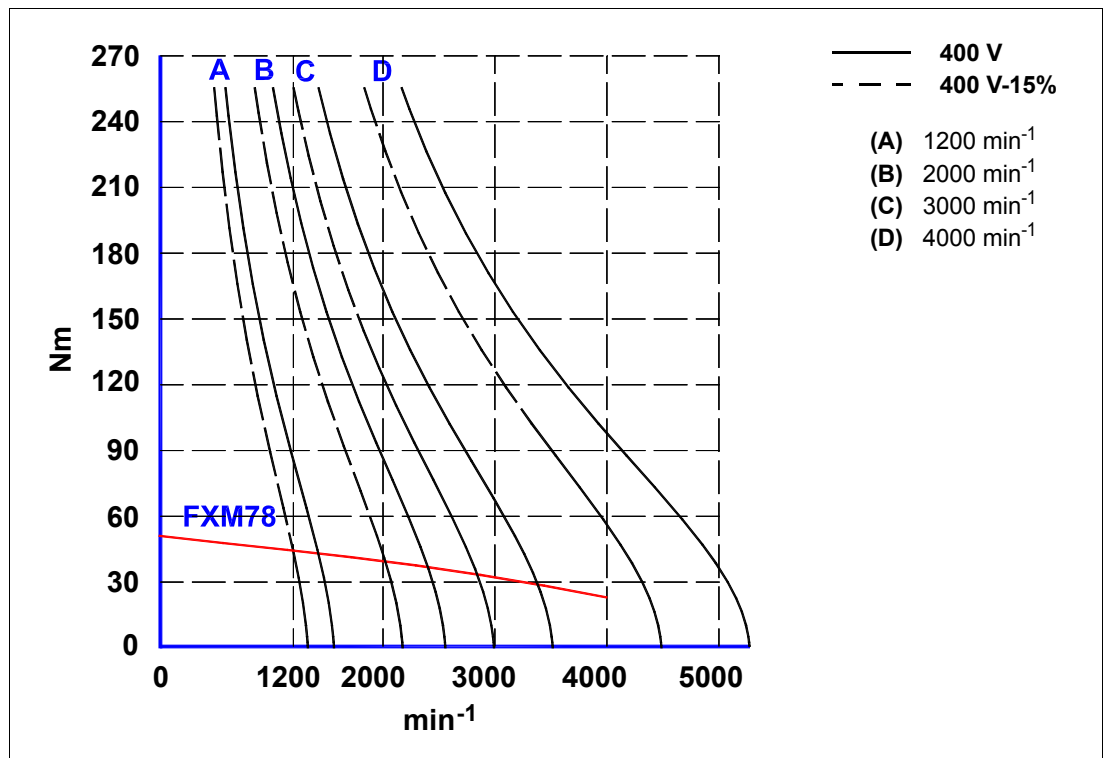
T- 2/40 Technical data of the FXM78.●●A.□□.□□0 motors.

Model	FXM78.●●A.□□.□□0					
Terminology	Notation	Units	12	20	30	40
Stall torque	Mo	N·m	51.1	51.1	51.1	51.1
Rated torque	Mn	N·m	44.3	39.6	32.2	23.0
Stall peak torque	Mp	N·m	255	255	255	255
Rated speed	nN	1/min	1200	2000	3000	4000
Stall current	Io	A	12.6	20.7	28.4	42.7
Peak current	Imax	A	63	103	142	213
Calculation power	Pcal	kW	6.4	10.7	16.1	21.4
Rated power	Pn	kW	5.6	8.3	10.1	9.6
Torque constant	Kt	N·m/A	4.0	2.5	1.8	1.2
Acceleration time	tac	ms	7.4	12.4	18.6	25.0
Inductance per fase (3-phase)	L	mH	15.0	5.7	3.0	1.3
Resistance per phase	R	Ω	0.705	0.265	0.140	0.065
Inertia (without brake)	J	kg·cm ²	151.0	151.0	151.0	151.0
Inertia (with brake)	J*	kg·cm ²	182.8	182.8	182.8	182.8
Mass (without brake)	P	kg	47.0	47.0	47.0	47.0
Mass (with brake)	P*	kg	51.1	51.1	51.1	51.1

T- 2/41 Selection of FAGOR drives for FXM78.●●A.□□.□□0 motors.

Drive peak torque in N·m	AXD 1.35		AXD 2.50		AXD 2.75		AXD 3.100		AXD 3.150	
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo
FXM78.12A	140.0	2.7	200.0	3.9	255.0	5.0	-	-	-	-
FXM78.20A	-	-	125.0	2.4	187.5	3.6	250.0	4.9	255.0	5.0
FXM78.30A	-	-	-	-	135.0	2.6	180.0	3.5	255.0	5.0
FXM78.40A	-	-	-	-	-	-	120.0	2.3	180.0	3.5

Note. To select a ACSD-□H or MCS-□H drive with any motor of this series, refer to the manual of the corresponding drive.



F- 2/31

Torque-speed graphs. FXM78.●●A.□□.□□0 models.

2.

3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

Ventilated FXM with “A” winding · 400 V AC ·

FXM53 models

T- 2/42 Technical data of the FXM53.●●A.□□.□□1 motors.

Model			FXM53.●●A.□□.□□1			
Terminology	Notation	Units	12	20	30	40
Stall torque	Mo	N·m	17.8	17.8	17.8	17.8
Rated torque	Mn	N·m	17.0	16.4	15.5	14.6
Stall peak torque	Mp	N·m	59	59	59	59
Rated speed	nN	1/min	1200	2000	3000	4000
Stall current	Io	A	4.2	7.0	10.6	14.0
Peak current	Imax	A	14	23	35	46
Calculation power	Pcal	kW	2.2	3.7	5.6	7.5
Rated power	Pn	kW	2.1	3.4	4.9	6.1
Torque constant	Kt	N·m/A	4.2	2.5	1.7	1.3
Acceleration time	tac	ms	4.7	7.8	11.7	15.6
Inductance per fase (3-phase)	L	mH	61.0	22.0	9.6	5.6
Resistance per phase	R	Ω	5.850	2.150	0.905	0.545
Inertia (without brake)	J	kg·cm ²	22.0	22.0	22.0	22.0
Inertia (with brake)	J*	kg·cm ²	25.6	25.6	25.6	25.6
Mass (without brake)	P	kg	20.0	20.0	20.0	20.0
Mass (with brake)	P*	kg	21.1	21.1	21.1	21.1

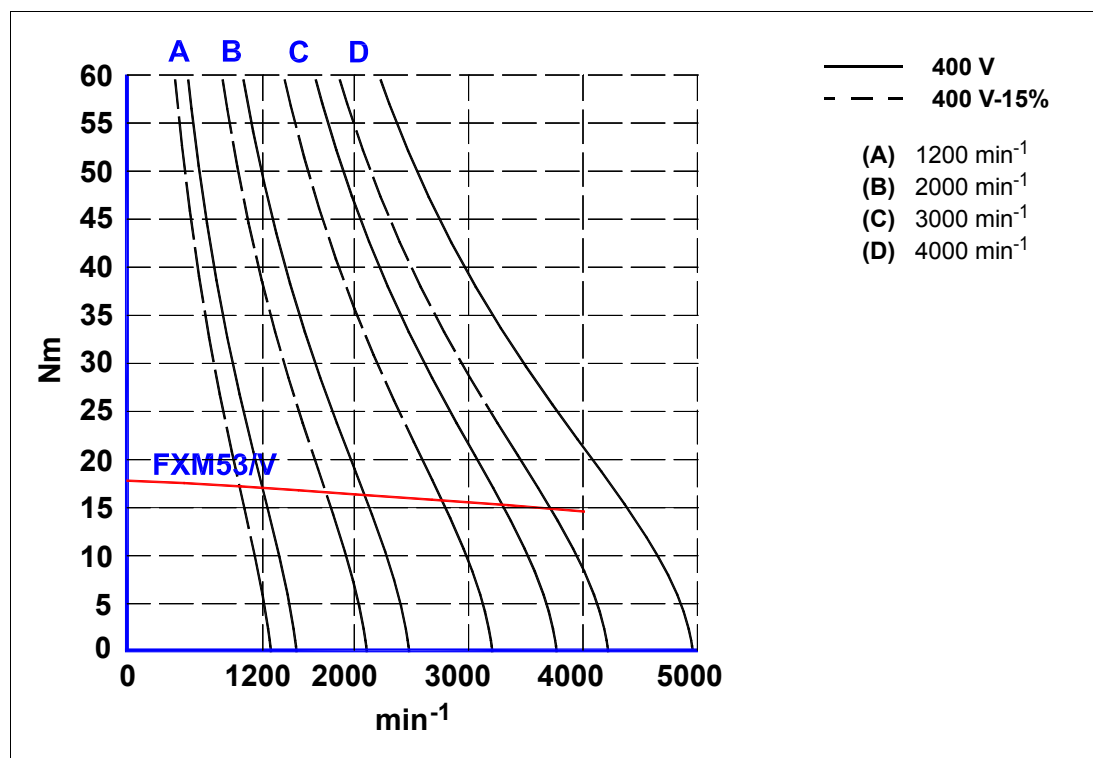
2.

3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves

T- 2/43 Selection of FAGOR drives for FXM53.●●A.□□.□□1 motors.

Drive peak torque in N·m	AXD 1.15		AXD 1.25		AXD 1.35		AXD 2.50					
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo				
FXM53.12A	59.0	3.3	-	-	-	-	-	-				
FXM53.20A	37.5	2.1	59.0	3.3	-	-	-	-				
FXM53.30A	-	-	42.5	2.3	59.0	3.3	-	-				
FXM53.40A	-	-	-	-	45.5	3.1	59.0	3.3				

Note. Controlling ventilated motors with ACSD-□H or MCS-□H drives has not been considered.



FAGOR 
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FXM/FKM

Ref.1703

F- 2/32

Torque-speed graphs. FXM53.●●A.□□.□□1 models.

FXM54 models

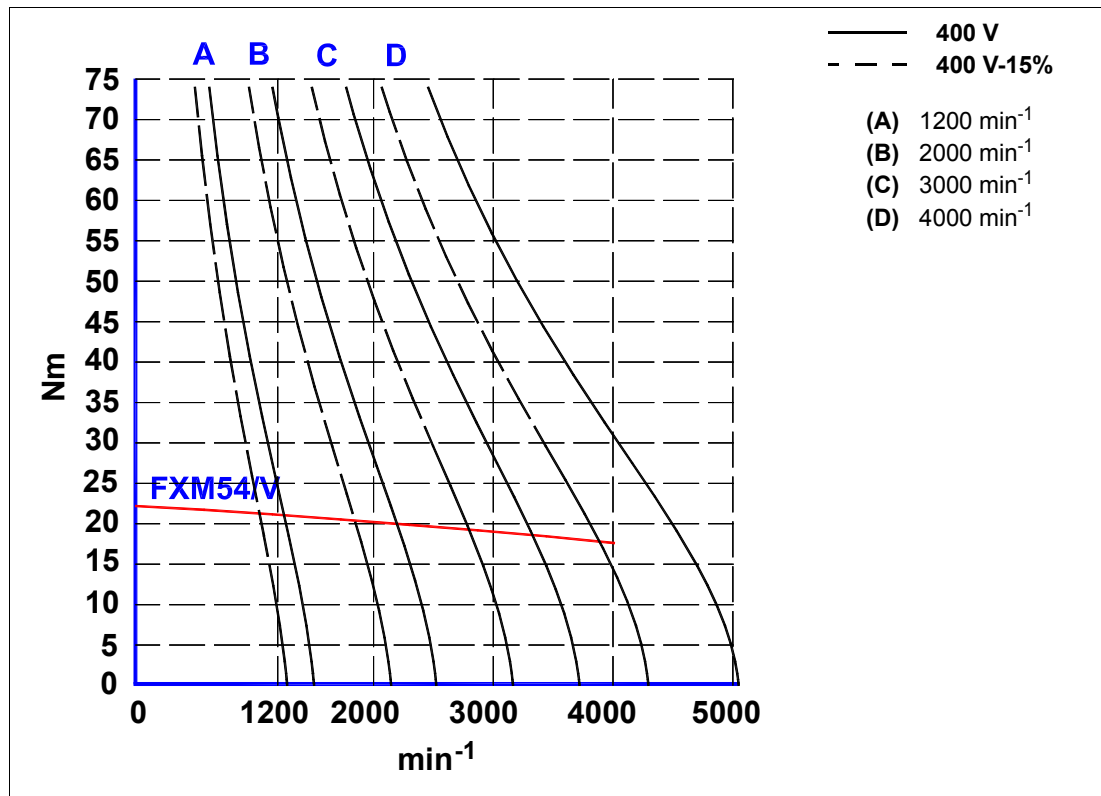
T- 2/44 Technical data of the FXM54.●●A.□□.□□1 motors.

Model	FXM54.●●A.□□.□□1					
Terminology	Notation	Units	12	20	30	40
Stall torque	Mo	N·m	22.2	22.2	22.2	22.2
Rated torque	Mn	N·m	21.0	20.2	19.0	17.6
Stall peak torque	Mp	N·m	74	74	74	74
Rated speed	nN	1/min	1200	2000	3000	4000
Stall current	Io	A	5.3	8.9	13.1	17.7
Peak current	Imax	A	17.6	30.0	44.0	59.0
Calculation power	Pcal	kW	2.8	4.7	7.0	9.3
Rated power	Pn	kW	2.6	4.2	6.0	7.4
Torque constant	Kt	N·m/A	4.2	2.5	1.7	1.3
Acceleration time	tac	ms	4.9	8.2	12.3	16.4
Inductance per fase (3-phase)	L	mH	44.0	16.0	7.3	3.9
Resistance per phase	R	Ω	3.700	1.350	0.640	0.345
Inertia (without brake)	J	kg·cm ²	29.0	29.0	29.0	29.0
Inertia (with brake)	J*	kg·cm ²	32.6	32.6	32.6	32.6
Mass (without brake)	P	kg	22.0	22.0	22.0	22.0
Mass (with brake)	P*	kg	23.1	23.1	23.1	23.1

T- 2/45 Selection of FAGOR drives for FXM54.●●A.□□.□□1 motors.

Drive peak torque in N·m	AXD 1.15		AXD 1.25		AXD 1.35		AXD 2.50		AXD 2.75	
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo
FXM54.12A	63.0	2.8	74.0	3.3	-	-	-	-	-	-
FXM54.20A	-	-	62.5	2.8	74.0	3.3	-	-	-	-
FXM54.30A	-	-	-	-	59.5	2.6	74.0	3.3	-	-
FXM54.40A	-	-	-	-	-	-	65.0	2.9	74.0	3.3

Note. Controlling ventilated motors with ACSD-□H or MCS-□H drives has not been considered.



F- 2/33

Torque-speed graphs. FXM54.●●A.□□.□□1 models.

2.

3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

FXM55

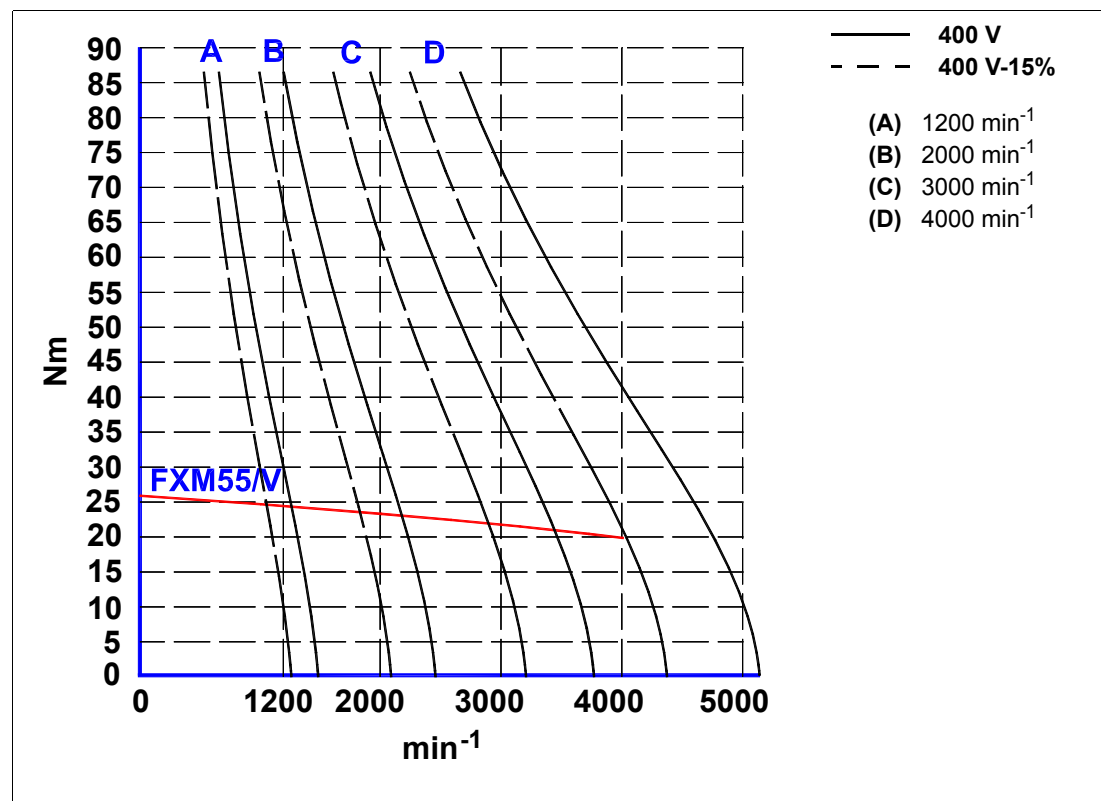
T- 2/46 Technical data of the FXM55.●●A.□□.□□1 motors.

Model		FXM55.●●A.□□.□□1					
Terminology	Notation	Units	12	20	30	40	
Stall torque	Mo	N·m	25.9	25.9	25.9	25.9	
Rated torque	Mn	N·m	24.5	23.2	21.8	19.9	
Stall peak torque	Mp	N·m	86	86	86	86	
Rated speed	nN	1/min	1200	2000	3000	4000	
Stall current	Io	A	6.1	10.1	15.4	21.1	
Peak current	Imax	A	20	33	51	70	
Calculation power	Pcal	kW	3.3	5.4	8.1	10.8	
Rated power	Pn	kW	3.1	4.9	6.8	8.3	
Torque constant	Kt	N·m/A	4.2	2.6	1.7	1.2	
Acceleration time	tac	ms	5.3	8.8	13.2	17.5	
Inductance per fase (3-phase)	L	mH	36.0	13.0	5.6	3.0	
Resistance per phase	R	Ω	2.95	1.05	0.45	0.24	
Inertia (without brake)	J	kg·cm ²	36.0	36.0	36.0	36.0	
Inertia (with brake)	J*	kg·cm ²	39.6	39.6	39.6	39.6	
Mass (without brake)	P	kg	24.2	24.2	24.2	24.2	
Mass (with brake)	P*	kg	25.1	25.1	25.1	25.1	

T- 2/47 Selection of FAGOR drives for FXM55.●●A.□□.□□1 motors.

Drive peak torque in N·m	AXD 1.15		AXD 1.25		AXD 1.35		AXD 2.50		AXD 2.75	
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo
FXM55.12A	63.0	2.4	86.0	3.3	-	-	-	-	-	-
FXM55.20A	-	-	65.0	2.5	86.0	3.3	-	-	-	-
FXM55.30A	-	-	-	-	59.5	2.3	85.0	3.2	86.0	3.3
FXM55.40A	-	-	-	-	-	-	60.0	2.3	86.0	3.3

Note. Controlling ventilated motors with ACSD-□□H or MCS-□□H drives has not been considered.



F- 2/34

Torque-speed graphs. FXM55.●●A.□□.□□1 models.

2.

3-PHASE SERVOMOTORS. FXM
 Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

FXM73 models

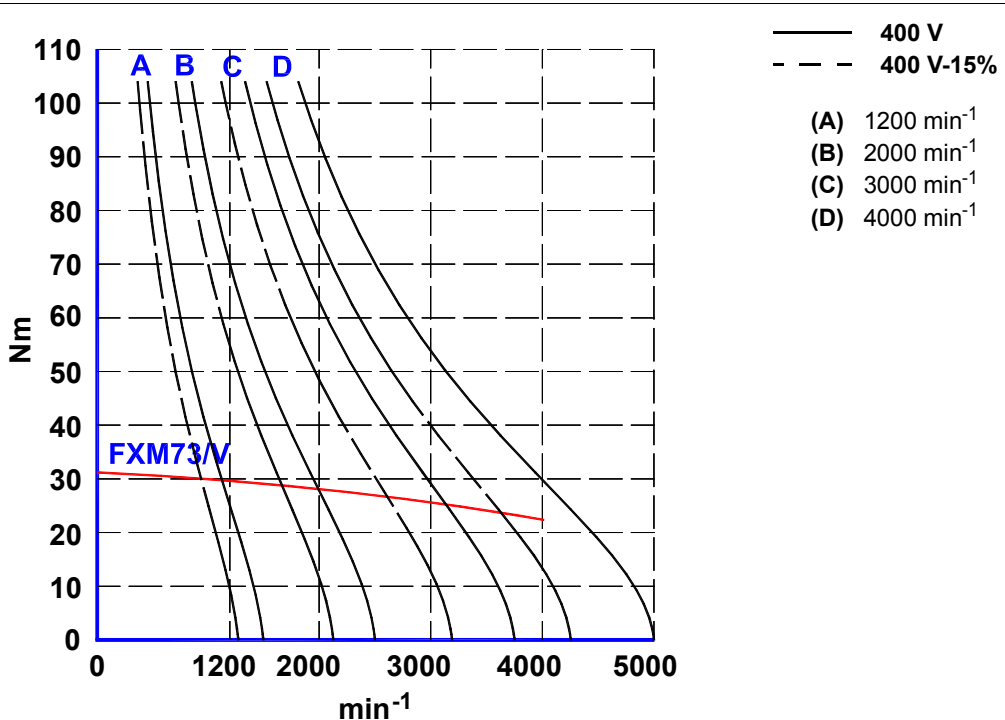
T- 2/48 Technical data of the FXM73.●●A.□□.□□1 motors.

Model	FXM73.●●A.□□.□□1					
Terminology	Notation	Units	12	20	30	40
Stall torque	Mo	N·m	31.2	31.2	31.2	31.2
Rated torque	Mn	N·m	29.5	28.1	25.6	22.4
Stall peak torque	Mp	N·m	104	104	104	104
Rated speed	nN	1/min	1200	2000	3000	4000
Stall current	Io	A	7.4	12.3	18.5	24.7
Peak current	I _{max}	A	25	41	62	82
Calculation power	P _{cal}	kW	3.9	6.5	9.8	13.1
Rated power	P _n	kW	3.7	5.9	8.0	9.4
Torque constant	K _t	N·m/A	4.2	2.5	1.7	1.3
Acceleration time	t _{ac}	ms	7.4	12.3	18.4	25.0
Inductance per fase (3-phase)	L	mH	46.0	17.0	7.4	4.2
Resistance per phase	R	Ω	3.050	1.100	0.485	0.265
Inertia (without brake)	J	kg·cm ²	61.0	61.0	61.0	61.0
Inertia (with brake)	J*	kg·cm ²	92.8	92.8	92.8	92.8
Mass (without brake)	P	kg	33.2	33.2	33.2	33.2
Mass (with brake)	P*	kg	37.3	37.3	37.3	37.3

T- 2/49 Selection of FAGOR drives for FXM73.●●A.□□.□□1 motors.

Drive peak torque in N·m	AXD 1.15		AXD 1.25		AXD 1.35		AXD 2.50		AXD 2.75		AXD 3.100	
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo
FXM73.12A	63.0	2.0	104.0	3.3	-	-	-	-	-	-	-	-
FXM73.20A	-	-	62.5	2.0	87.5	2.8	104.0	3.3	-	-	-	-
FXM73.30A	-	-	-	-	-	-	85.0	2.7	104.0	3.3	-	-
FXM73.40A	-	-	-	-	-	-	65.0	2.0	97.5	3.1	104.0	3.3

Note. Controlling ventilated motors with ACSD-□H or MCS-□H drives has not been considered.



F- 2/35

Torque-speed graphs. FXM73.●●A.□□.□□1 models.

2.

3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

FXM74 models

T- 2/50 Technical data of the FXM74.●●A.□□.□□1 motors.

Model	FXM74.●●A.□□.□□1					
Terminology	Notation	Units	12	20	30	40
Stall torque	Mo	N·m	40.9	40.9	40.9	40.9
Rated torque	Mn	N·m	38.5	36.4	33.0	28.6
Stall peak torque	Mp	N·m	135	135	135	135
Rated speed	nN	1/min	1200	2000	3000	4000
Stall current	Io	A	9.8	16.5	24.3	33.1
Peak current	Imax	A	32	55	80	109
Calculation power	Pcal	kW	5.1	8.6	12.8	17.1
Rated power	Pn	kW	4.8	7.6	10.4	12.0
Torque constant	Kt	N·m/A	4.2	2.5	1.7	1.2
Acceleration time	tac	ms	7.4	12.3	18.4	25.0
Inductance per fase (3-phase)	L	mH	33.0	12.0	5.4	2.9
Resistance per phase	R	Ω	1.90	0.68	0.31	0.17
Inertia (without brake)	J	kg·cm ²	79.0	79.0	79.0	79.0
Inertia (with brake)	J*	kg·cm ²	110.8	110.8	110.8	110.8
Mass (without brake)	P	kg	35.8	35.8	35.8	35.8
Mass (with brake)	P*	kg	39.9	39.9	39.9	39.9

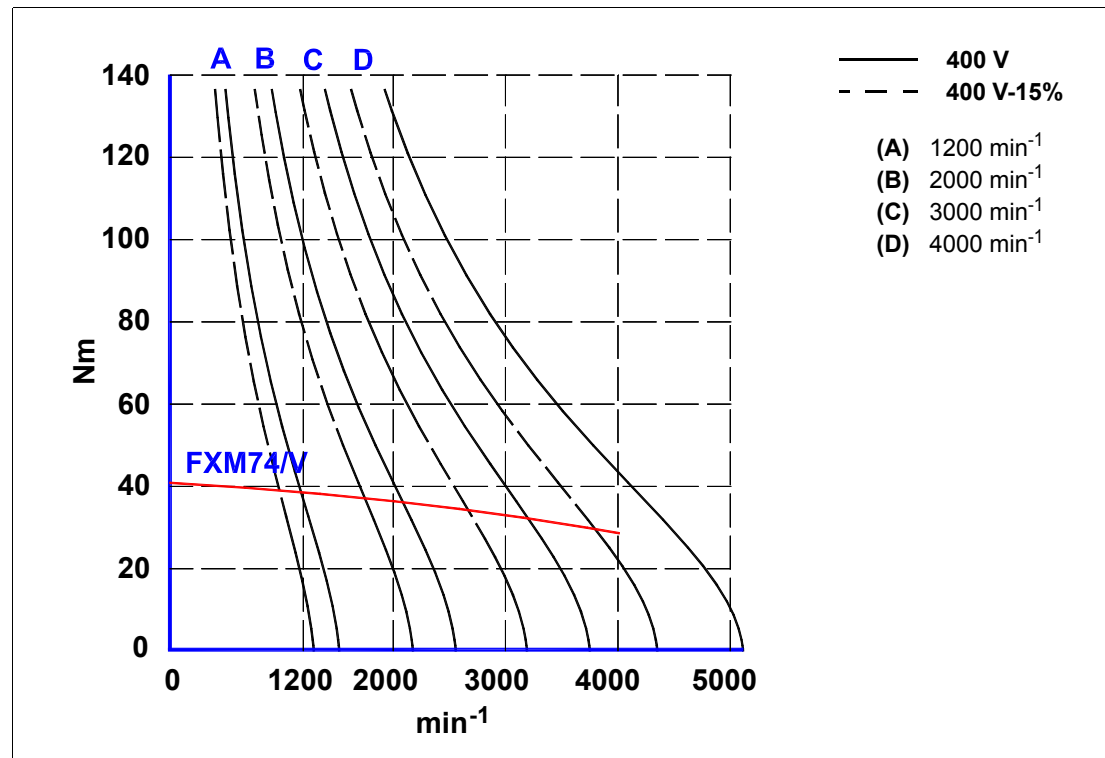
2.

3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves

T- 2/51 Selection of FAGOR drives for FXM74.●●A.□□.□□1 motors.

Drive peak torque in N·m	AXD 1.25		AXD 1.35		AXD 2.50		AXD 2.75		AXD 3.100		AXD 3.150	
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo
FXM74.12A	105.0	2.5	135.0	3.3	-	-	-	-	-	-	-	-
FXM74.20A	-	-	87.5	2.1	125.0	3.0	135.0	3.3	-	-	-	-
FXM74.30A	-	-	-	-	85.0	2.0	127.5	3.1	135.0	3.3	-	-
FXM74.40A	-	-	-	-	-	-	90.0	2.2	120.0	2.9	135.0	3.3

Note. Controlling ventilated motors with ACSD-□H or MCS-□H drives has not been considered.



F- 2/36

Torque-speed graphs. FXM74.●●A.□□.□□1 models.



FXM/FKM

Ref.1703

FXM75 models

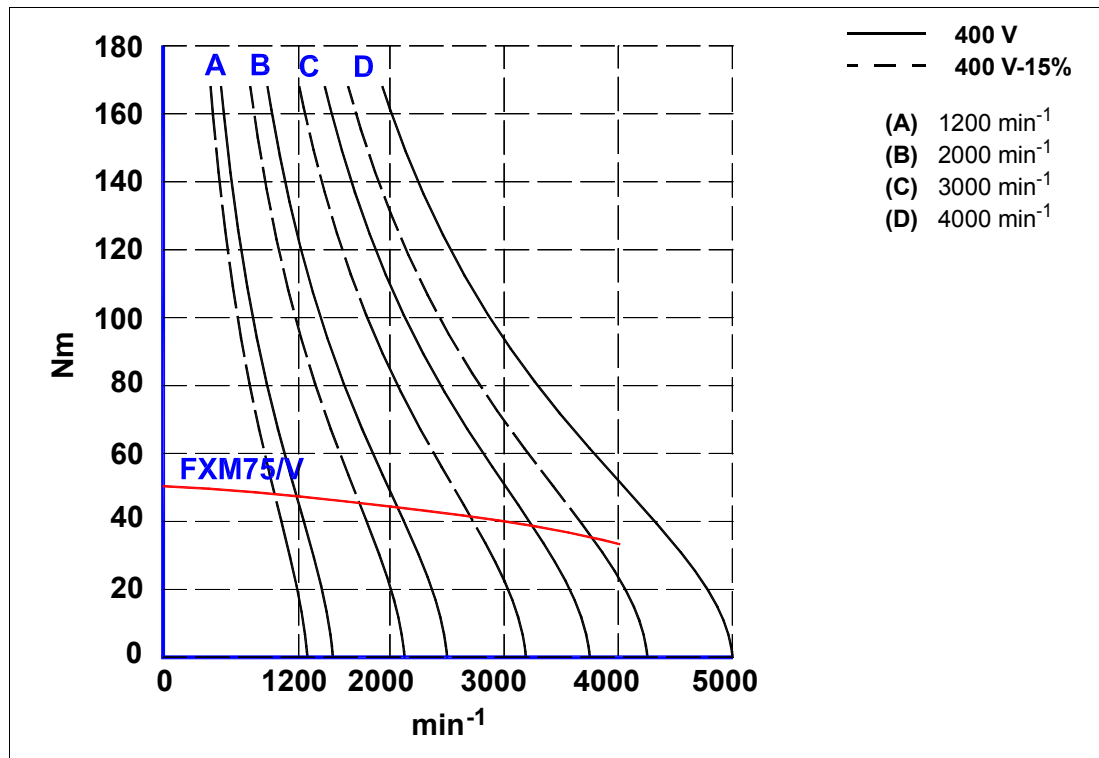
T- 2/52 Technical data of the FXM75.●●A.□□.□□1 motors.

Model	FXM75.●●A.□□.□□1					
Terminology	Notation	Units	12	20	30	40
Stall torque	Mo	N·m	50.4	50.4	50.4	50.4
Rated torque	Mn	N·m	47.0	44.3	40.0	34.4
Stall peak torque	Mp	N·m	165	165	165	165
Rated speed	nN	1/min	1200	2000	3000	4000
Stall current	Io	A	12.0	20.0	29.9	39.9
Peak current	I _{max}	A	39	65	98	131
Calculation power	P _{cal}	kW	6.3	10.6	15.8	21.1
Rated power	P _n	kW	5.9	9.3	12.6	14.4
Torque constant	K _t	N·m/A	4.2	2.5	1.7	1.3
Acceleration time	t _{ac}	ms	7.4	12.3	18.5	25.0
Inductance per fase (3-phase)	L	mH	27.0	9.7	4.3	2.4
Resistance per phase	R	Ω	1.450	0.515	0.230	0.125
Inertia (without brake)	J	kg·cm ²	97.0	97.0	97.0	97.0
Inertia (with brake)	J*	kg·cm ²	128.8	128.8	128.8	128.8
Mass (without brake)	P	kg	40.2	40.2	40.2	40.2
Mass (with brake)	P*	kg	44.3	44.3	44.3	44.3

T- 2/53 Selection of FAGOR drives for FXM75.●●A.□□.□□1 motors.

Drive peak torque in N·m	AXD 1.25		AXD 1.35		AXD 2.50		AXD 2.75		AXD 3.100		AXD 3.150	
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo
FXM75.12A	105.0	2.0	147.0	2.9	165.0	3.2	-	-	-	-	-	-
FXM75.20A	-	-	-	-	125.0	2.5	165.0	3.2	-	-	-	-
FXM75.30A	-	-	-	-	-	-	127.5	2.5	165.0	3.2	-	-
FXM75.40A	-	-	-	-	-	-	-	-	130.0	2.5	165.0	3.2

Note. Controlling ventilated motors with ACSD-□H or MCS-□H drives has not been considered.



F- 2/37

Torque-speed graphs. FXM75.●●A.□□.□□1 models.

2.

3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

FXM76 models

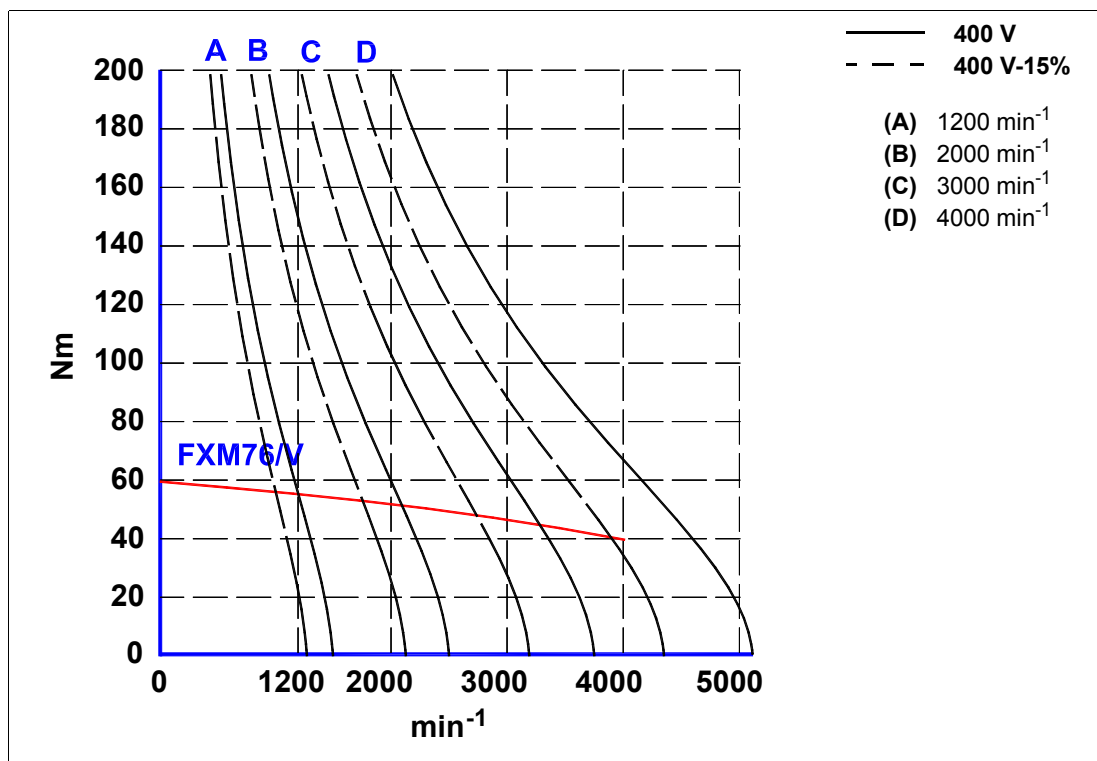
T- 2/54 Technical data of the FXM76.●●A.□□.□□1 motors.

Model			FXM76.●●A.□□.□□1			
Terminology	Notation	Units	12	20	30	40
Stall torque	Mo	N·m	59.5	59.5	59.5	59.5
Rated torque	Mn	N·m	55.0	51.8	46.4	39.7
Stall peak torque	Mp	N·m	195	195	195	195
Rated speed	nN	1/min	1200	2000	3000	4000
Stall current	Io	A	14.1	23.5	35.3	48.2
Peak current	Imax	A	46	77	116	158
Calculation power	Pcal	kW	7.5	12.5	18.7	24.9
Rated power	Pn	kW	6.9	10.8	14.6	16.6
Torque constant	Kt	N·m/A	4.2	2.5	1.7	1.2
Acceleration time	tac	ms	7.4	12.4	18.5	25.0
Inductance per fase (3-phase)	L	mH	22.0	8.0	3.6	1.9
Resistance per phase	R	Ω	1.100	0.400	0.180	0.095
Inertia (without brake)	J	kg·cm ²	115.0	115.0	115.0	115.0
Inertia (with brake)	J*	kg·cm ²	146.8	146.8	146.8	146.8
Mass (without brake)	P	kg	44.2	44.2	44.2	44.2
Mass (with brake)	P*	kg	48.3	48.3	48.3	48.3

T- 2/55 Selection of FAGOR drives for FXM76.●●A.□□.□□1 motors.

Drive peak torque in N·m	AXD 1.35		AXD 2.50		AXD 2.75		AXD 3.100		AXD 3.150	
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo
FXM76.12A	147.0	2.4	195.0	3.2	-	-	-	-	-	-
FXM76.20A	-	-	125.0	2.1	187.5	3.1	195.0	3.2	-	-
FXM76.30A	-	-	-	-	127.5	2.1	170.0	2.8	195.0	3.2
FXM76.40A	-	-	-	-	-	-	120.0	2.0	180.0	3.0

Note. Controlling ventilated motors with ACSD-□□H or MCS-□□H drives has not been considered.



F- 2/38

Torque-speed graphs. FXM76.●●A.□□.□□1 models.

2.

3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

FXM77 models

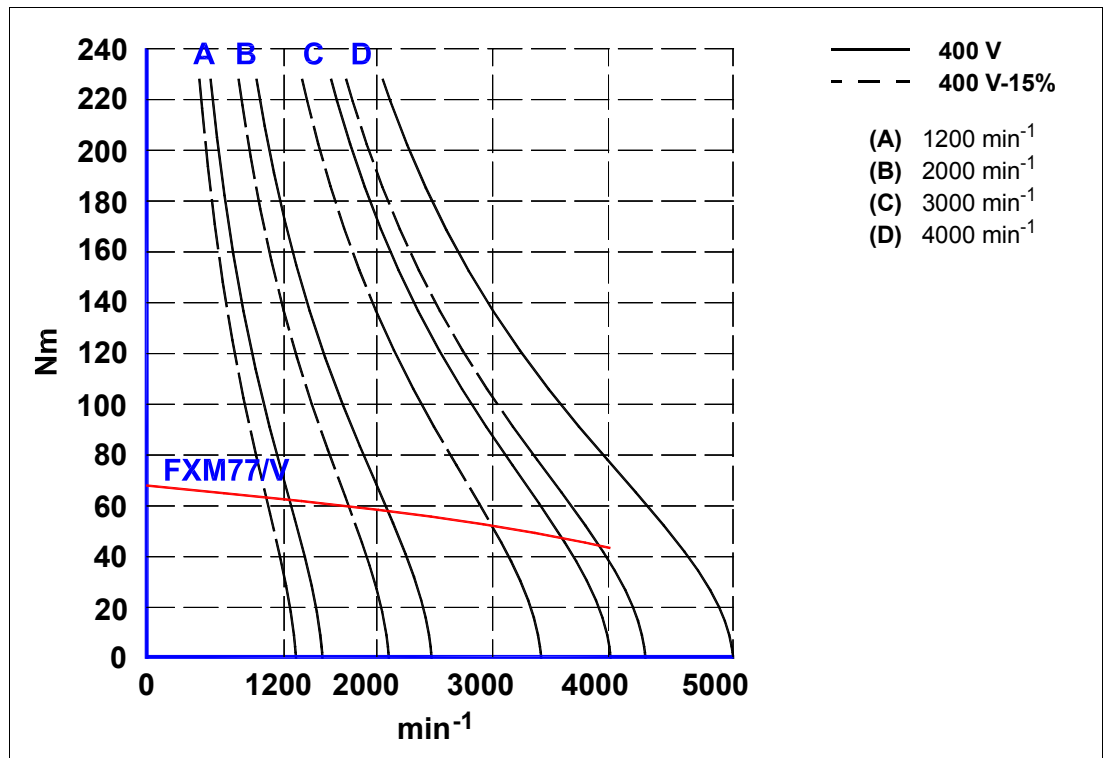
T- 2/56 Technical data of the FXM77.●●A.□□.□□1 motors.

Model	FXM77.●●A.□□.□□1						
Terminology	Notation	Units	12	20	30	40	
Stall torque	Mo	N·m	68.4	68.4	68.4	68.4	
Rated torque	Mn	N·m	62.8	58.8	52.4	44.5	
Stall peak torque	Mp	N·m	225	225	225	225	
Rated speed	nN	1/min	1200	2000	3000	4000	
Stall current	Io	A	16.6	26.8	43.5	55.0	
Peak current	I _{max}	A	55	88	143	181	
Calculation power	P _{cal}	kW	8.6	14.3	21.5	28.6	
Rated power	P _n	kW	7.9	12.3	16.5	18.6	
Torque constant	K _t	N·m/A	4.1	2.6	1.6	1.2	
Acceleration time	t _{ac}	ms	7.4	12.4	18.6	25.0	
Inductance per fase (3-phase)	L	mH	18.0	7.0	2.6	1.7	
Resistance per phase	R	Ω	0.87	0.33	0.13	0.08	
Inertia (without brake)	J	kg·cm ²	133.0	133.0	133.0	133.0	
Inertia (with brake)	J*	kg·cm ²	164.8	164.8	164.8	164.8	
Mass (without brake)	P	kg	47.2	47.2	47.2	47.2	
Mass (with brake)	P*	kg	51.3	51.3	51.3	51.3	

T- 2/57 Selection of FAGOR drives for FXM77.●●A.□□.□□1 motors.

Drive peak torque in N·m	AXD 1.35		AXD 2.50		AXD 2.75		AXD 3.100		AXD 3.150	
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo
FXM77.12A	143.5	2.1	205.0	3.0	225.0	3.2	-	-	-	-
FXM77.20A	-	-	-	-	195.0	2.8	225.0	3.2	-	-
FXM77.30A	-	-	-	-	-	-	160.0	2.3	225.0	3.2
FXM77.40A	-	-	-	-	-	-	-	-	180.0	2.6

Note. Controlling ventilated motors with ACSD-□H or MCS-□H drives has not been considered.



F- 2/39

Torque-speed graphs. FXM77.●●A.□□.□□1 models.

2.

3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

FXM78 models

T- 2/58 Technical data of the FXM78.●●A.□□.□□1 motors.

Model		FXM78.●●A.□□.□□1					
Terminology	Notation	Units	12	20	30	40	
Stall torque	Mo	N·m	76.6	76.6	76.6	76.6	
Rated torque	Mn	N·m	69.8	65.1	57.7	48.5	
Stall peak torque	Mp	N·m	255	255	255	255	
Rated speed	nN	1/min	1200	2000	3000	4000	
Stall current	Io	A	19.0	31.0	42.6	63.9	
Peak current	Imax	A	63	103	142	213	
Calculation power	Pcal	kW	9.6	16.0	24.1	32.1	
Rated power	Pn	kW	8.8	13.6	18.1	20.3	
Torque constant	Kt	N·m/A	4.0	2.5	1.8	1.2	
Acceleration time	tac	ms	7.4	12.4	18.6	25.0	
Inductance per fase (3-phase)	L	mH	15.0	5.7	3.0	1.3	
Resistance per phase	R	Ω	0.705	0.265	0.140	0.065	
Inertia (without brake)	J	kg·cm ²	151.0	151.0	151.0	151.0	
Inertia (with brake)	J*	kg·cm ²	182.8	182.8	182.8	182.8	
Mass (without brake)	P	kg	51.2	51.2	51.2	51.2	
Mass (with brake)	P*	kg	55.3	55.3	55.3	55.3	

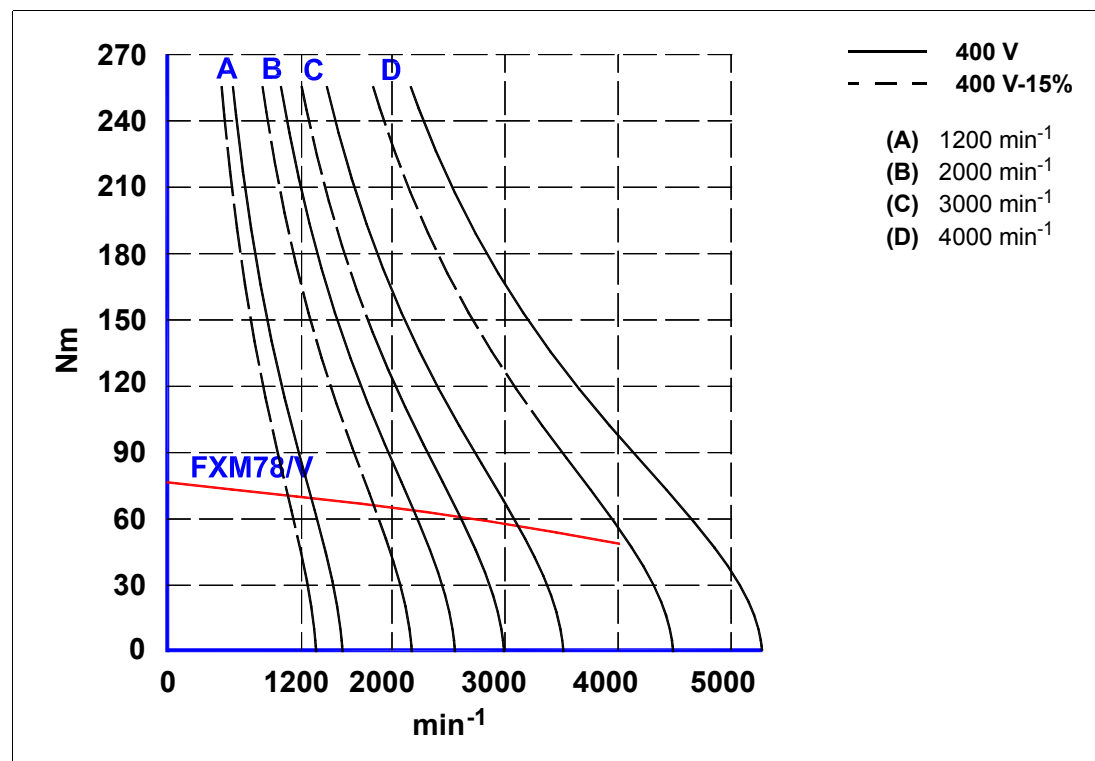
2.

3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves

T- 2/59 Selection of FAGOR drives for FXM78.●●A.□□.□□1 motors.

Drive peak torque in N·m	AXD 2.50		AXD 2.75		AXD 3.100		AXD 3.150			
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo		
FXM78.12A	200.0	2.6	255.0	3.3	-	-	-	-		
FXM78.20A	-	-	187.5	2.4	250.0	3.2	255.0	3.3		
FXM78.30A	-	-	-	-	180.0	2.3	255.0	3.3		
FXM78.40A	-	-	-	-	-	-	180.0	2.3		

Note. Controlling ventilated motors with ACSD-□□H or MCS-□□H drives has not been considered.



F- 2/40

Torque-speed graphs. FXM78.●●A.□□.□□1 models.



FXM/FKM

Ref.1703

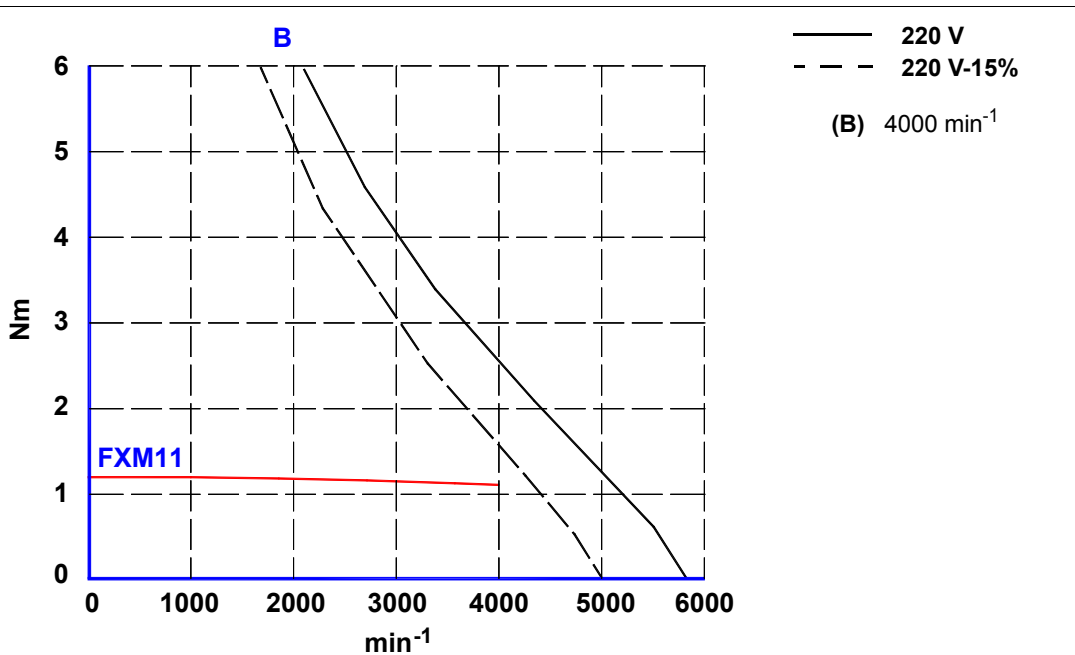
Non-ventilated FXM with “F” winding · 220 V AC ·

FXM11 models

T- 2/60 Technical data of the FXM11. ●●F.□□.□□0 motors.

Model	FXM11.●●F.□□.□□0				
Terminology	Notation	Units			40
Stall torque	Mo	N·m			1.2
Rated torque	Mn	N·m			1.1
Stall peak torque	Mp	N·m			6
Rated speed	nN	1/min			4000
Stall current	Io	A			2.0
Peak current	I _{max}	A			10.1
Calculation power	P _{cal}	kW			0.5
Rated power	P _n	kW			0.5
Torque constant	K _t	N·m/A			0.6
Acceleration time	t _{ac}	ms			8.4
Inductance per fase (3-phase)	L	mH			12
Resistance per phase	R	Ω			4.6
Inertia (without brake)	J	kg·cm ²			1.2
Inertia (with brake)	J*	kg·cm ²			1.6
Mass (without brake)	P	kg			3.3
Mass (with brake)	P*	kg			3.6

Note. These motors with “F” winding (220 V AC) can only be controlled by ACSD-□L or MCS-□L series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.



F- 2/41

Torque-speed graphs. FXM11.●●F.□□.□□0 models.

2.

3-PHASE SERVOMOTORS. FXM
 Technical data. Torque-Speed curves



FXM/FKM

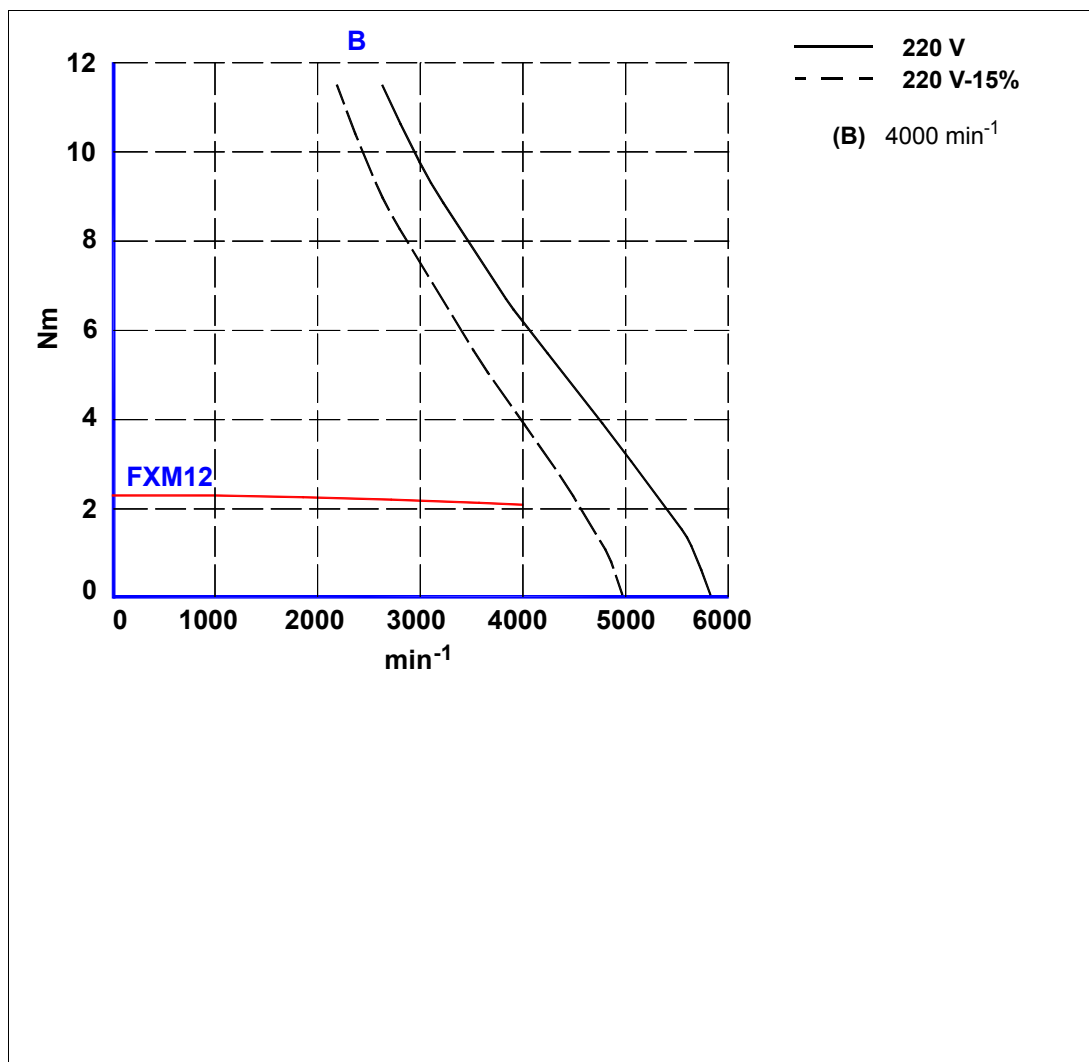
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FXM12 models

T- 2/61 Technical data of the FXM12.●●F.□□.□□0 motors.

Model		FXM12.●●F.□□.□□0				
Terminology	Notation	Units				40
Stall torque	Mo	N·m				2.3
Rated torque	Mn	N·m				2.1
Stall peak torque	Mp	N·m				11
Rated speed	nN	1/min				4000
Stall current	Io	A				3.9
Peak current	Imax	A				19.3
Calculation power	Pcal	kW				1.0
Rated power	Pn	kW				0.8
Torque constant	Kt	N·m/A				0.6
Acceleration time	tac	ms				7.2
Inductance per fase (3-phase)	L	mH				5.5
Resistance per phase	R	Ω				1.45
Inertia (without brake)	J	kg·cm ²				1.9
Inertia (with brake)	J*	kg·cm ²				2.3
Mass (without brake)	P	kg				4.3
Mass (with brake)	P*	kg				4.6

Note. These motors with “F” winding (220 V AC) can only be controlled by ACSD-□□ or MCS-□□L series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.



F- 2/42

Torque-speed graphs. FXM12.●●F.□□.□□0 models.

2.

3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

FXM13 models

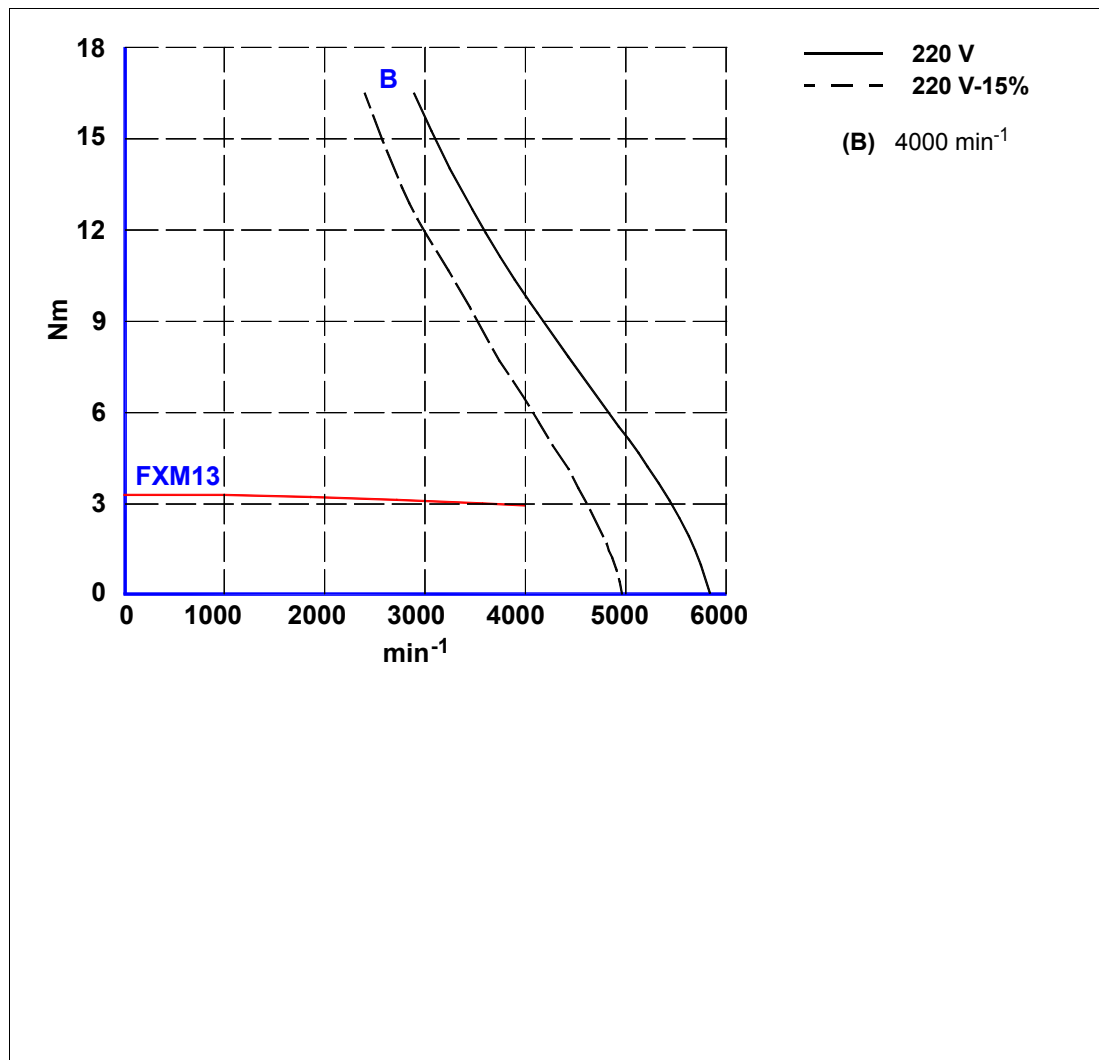
T- 2/62 Technical data of the FXM13.●●F.□□.□□0 motors.

Model	FXM13.●●F.□□.□□0				
Terminology	Notation	Units			40
Stall torque	Mo	N·m			3.3
Rated torque	Mn	N·m			3.0
Stall peak torque	Mp	N·m			16
Rated speed	nN	1/min			4000
Stall current	Io	A			5.6
Peak current	I _{max}	A			28
Calculation power	P _{cal}	kW			1.4
Rated power	P _n	kW			1.2
Torque constant	K _t	N·m/A			0.6
Acceleration time	t _{ac}	ms			6.8
Inductance per fase (3-phase)	L	mH			3.5
Resistance per phase	R	Ω			0.8
Inertia (without brake)	J	kg·cm ²			2.6
Inertia (with brake)	J*	kg·cm ²			3.0
Mass (without brake)	P	kg			6.4
Mass (with brake)	P*	kg			6.7

Note. These motors with “F” winding (220 V AC) can only be controlled by ACSD-□L or MCS-□L series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.

2.

3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves



F- 2/43

Torque-speed graphs. FXM13.●●F.□□.□□0 models.



FXM/FKM

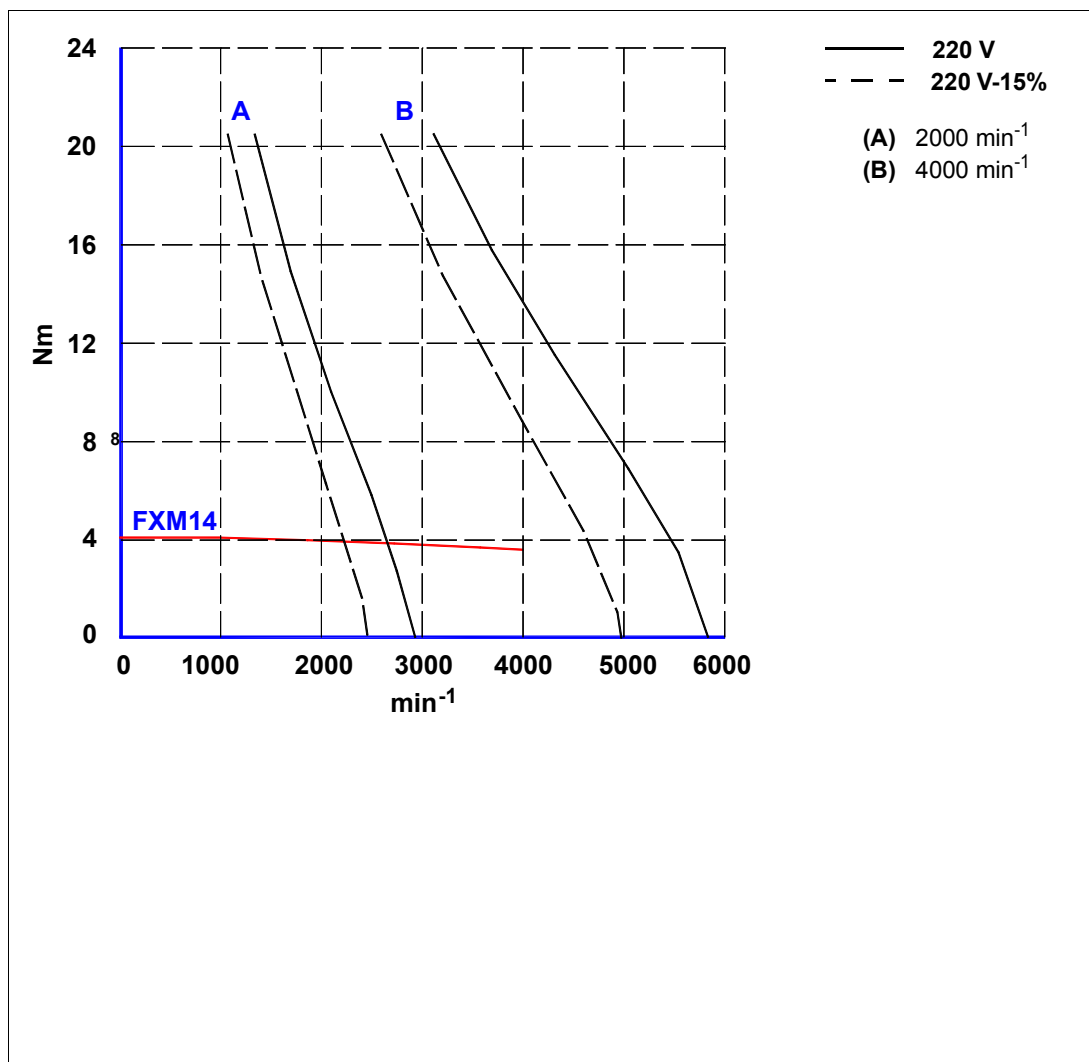
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FXM14 models

T- 2/63 Technical data of the FXM14. ●●F.□□.□□0 motors.

Model	FXM14.●●F.□□.□□0				
Terminology	Notation	Units	20	40	
Stall torque	Mo	N·m	4.1	4.1	
Rated torque	Mn	N·m	4.0	3.5	
Stall peak torque	Mp	N·m	20	20	
Rated speed	nN	1/min	2000	4000	
Stall current	Io	A	3.5	6.9	
Peak current	Imax	A	17.2	34	
Calculation power	Pcal	kW	0.9	1.7	
Rated power	Pn	kW	0.8	1.5	
Torque constant	Kt	N·m/A	1.2	0.6	
Acceleration time	tac	ms	3.5	6.9	
Inductance per fase (3-phase)	L	mH	10.0	2.6	
Resistance per phase	R	Ω	2.30	0.55	
Inertia (without brake)	J	kg·cm ²	3.3	3.3	
Inertia (with brake)	J*	kg·cm ²	3.7	3.7	
Mass (without brake)	P	kg	7.6	7.6	
Mass (with brake)	P*	kg	7.9	7.9	

Note. These motors with “F” winding (220 V AC) can only be controlled by ACSD-□□ or MCS-□□L series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.



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Torque-speed graphs. FXM14. ●●F.□□.□□0 models.

2.

3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

FXM31 models

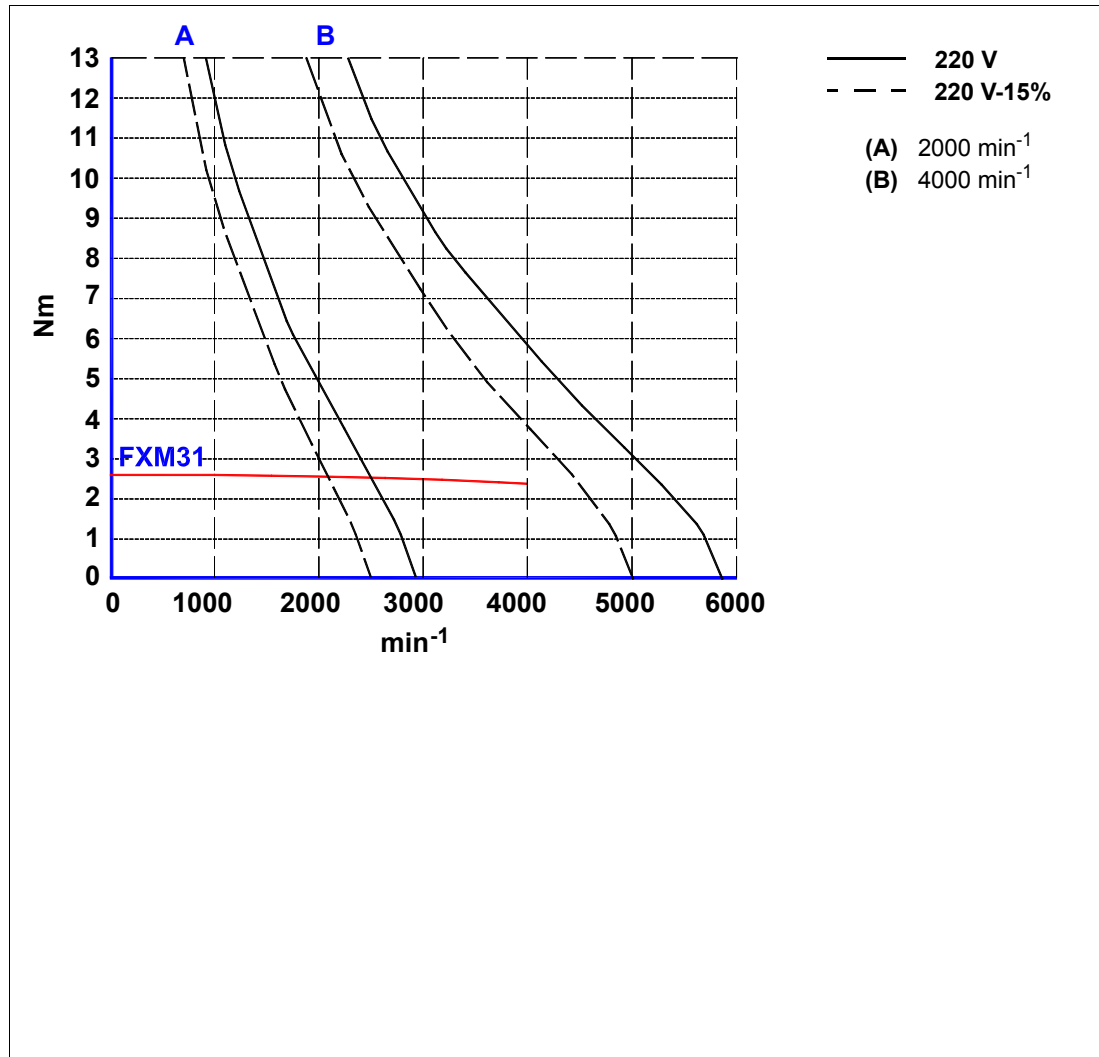
T- 2/64 Technical data of the FXM31.●●F.□□.□□0 motors.

2.

3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves

Model	FXM31.●●F.□□.□□0				
Terminology	Notation	Units		20	40
Stall torque	Mo	N·m		2.6	2.6
Rated torque	Mn	N·m		2.5	2.4
Stall peak torque	Mp	N·m		13	13
Rated speed	nN	1/min		2000	4000
Stall current	Io	A		2.2	4.4
Peak current	I _{max}	A		11	22
Calculation power	P _{cal}	kW		0.5	1.1
Rated power	P _n	kW		0.5	1.0
Torque constant	K _t	N·m/A		1.2	0.6
Acceleration time	t _{ac}	ms		5.6	11.3
Inductance per fase (3-phase)	L	mH		24	6.1
Resistance per phase	R	Ω		5.05	1.25
Inertia (without brake)	J	kg·cm ²		3.5	3.5
Inertia (with brake)	J*	kg·cm ²		4.56	4.56
Mass (without brake)	P	kg		5.5	5.5
Mass (with brake)	P*	kg		6.1	6.1

Note. These motors with "F" winding (220 V AC) can only be controlled by ACSD-□L or MCS-□L series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.



F- 2/45

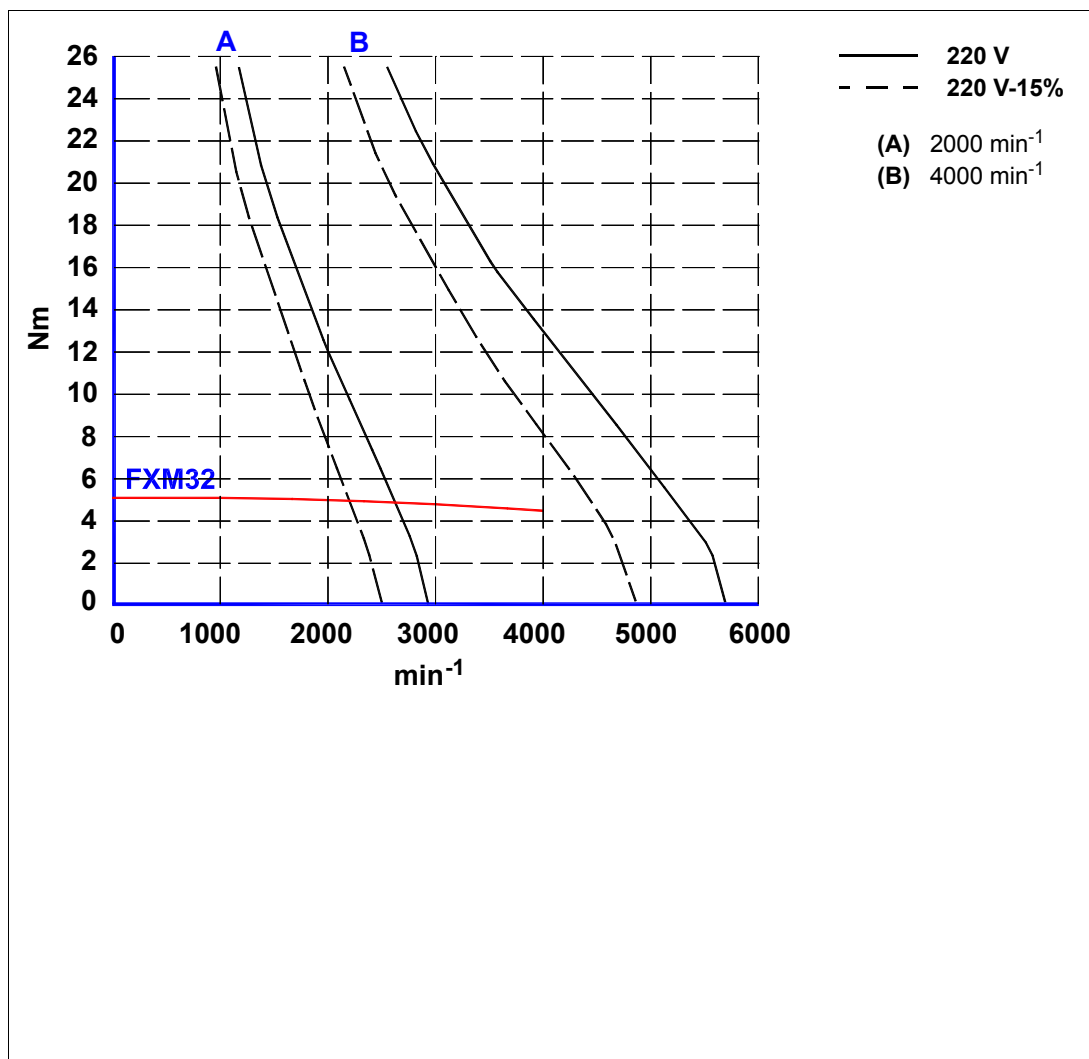
Torque-speed graphs. FXM31.●●F.□□.□□0 models.

FXM32 models

T- 2/65 Technical data of the FXM32. ●●F.□□.□□0 motors.

Model	FXM32.●●F.□□.□□0				
Terminology	Notation	Units	20	40	
Stall torque	Mo	N·m	5.1	5.1	
Rated torque	Mn	N·m	5.0	4.4	
Stall peak torque	Mp	N·m	25	25	
Rated speed	nN	1/min	2000	4000	
Stall current	Io	A	4.3	8.4	
Peak current	Imax	A	22	42	
Calculation power	Pcal	kW	1.1	2.1	
Rated power	Pn	kW	1.0	1.8	
Torque constant	Kt	N·m/A	1.2	0.6	
Acceleration time	tac	ms	5.0	10.1	
Inductance per fase (3-phase)	L	mH	11	2.9	
Resistance per phase	R	Ω	1.65	0.44	
Inertia (without brake)	J	kg·cm ²	6.0	6.0	
Inertia (with brake)	J*	kg·cm ²	7.06	7.06	
Mass (without brake)	P	kg	7.5	7.5	
Mass (with brake)	P*	kg	8.1	8.1	

Note. These motors with “F” winding (220 V AC) can only be controlled by ACSD-□L or MCS-□L series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.



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Torque-speed graphs. FXM32. ●●F.□□.□□0 models.

2.

3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves

FAGOR 
FAGOR AUTOMATION

FXM/FKM

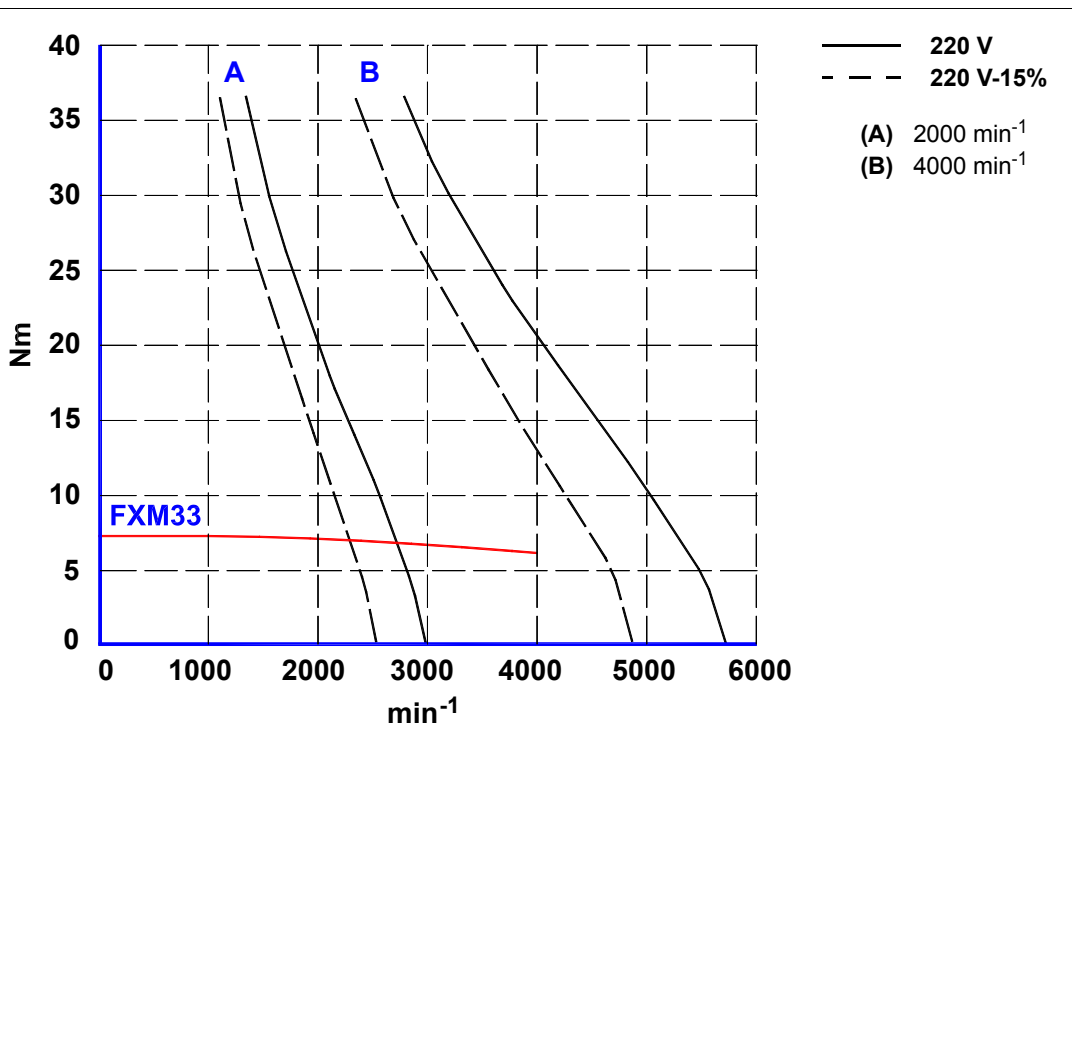
Ref.1703

FXM33 models

T- 2/66 Technical data of the FXM33.●●F.□□.□□0 motors.

Model	FXM33.●●F.□□.□□0				
Terminology	Notation	Units	20	40	
Stall torque	Mo	N·m	7.3	7.3	
Rated torque	Mn	N·m	7.0	6.1	
Stall peak torque	Mp	N·m	36	36	
Rated speed	nN	1/min	2000	4000	
Stall current	Io	A	6.3	12	
Peak current	I _{max}	A	31	60	
Calculation power	P _{cal}	kW	1.5	3.1	
Rated power	P _n	kW	1.4	2.5	
Torque constant	K _t	N·m/A	1.2	0.6	
Acceleration time	t _{ac}	ms	4.9	9.9	
Inductance per fase (3-phase)	L	mH	6.7	1.8	
Resistance per phase	R	Ω	0.9	0.245	
Inertia (without brake)	J	kg·cm ²	8.50	8.50	
Inertia (with brake)	J*	kg·cm ²	9.56	9.56	
Mass (without brake)	P	kg	9.6	9.6	
Mass (with brake)	P*	kg	10.2	10.2	

Note. These motors with “F” winding (220 V AC) can only be controlled by ACSD-□L or MCS-□L series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.



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Torque-speed graphs. FXM33.●●F.□□.□□0 models.

2.

3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves



FXM/FKM

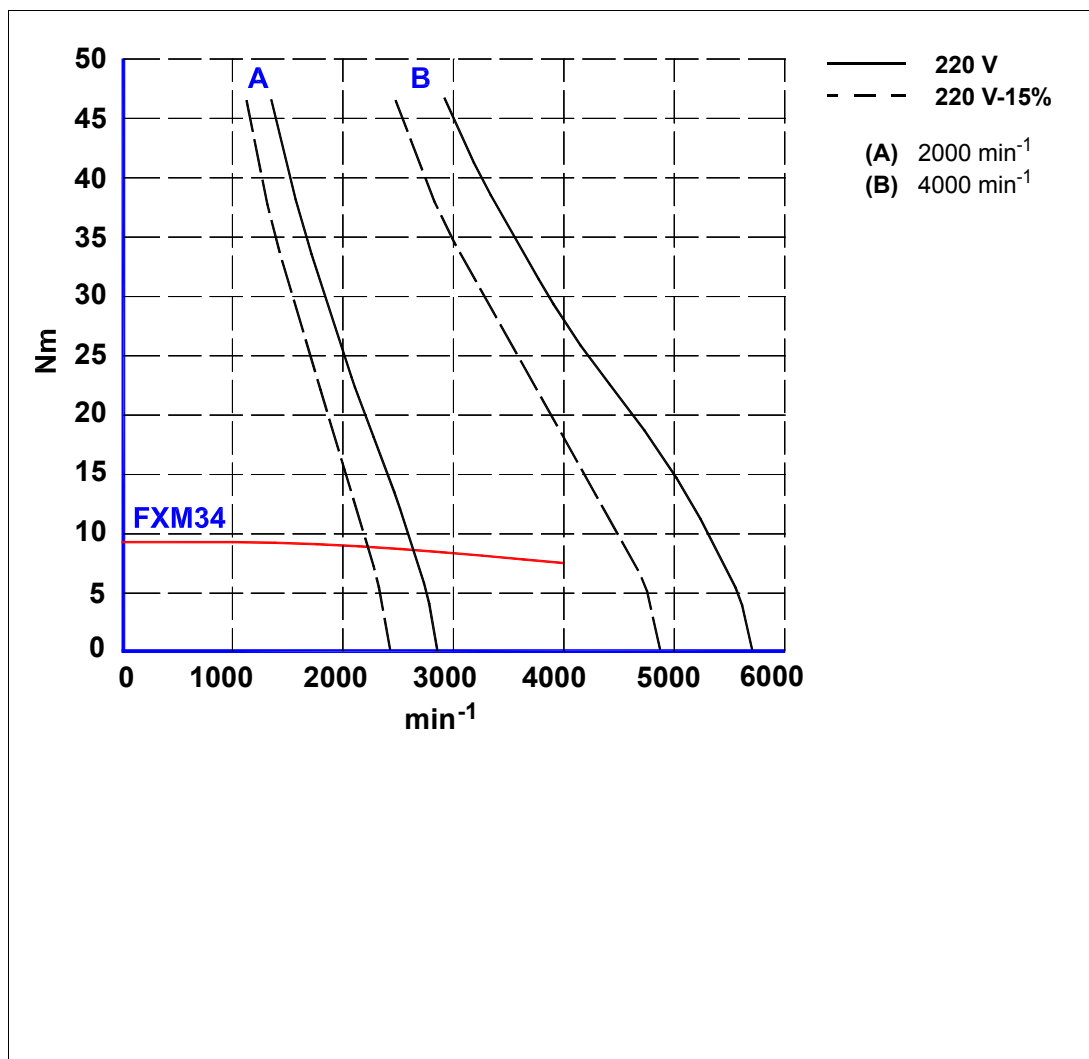
Ref.1703

FXM34 models

T- 2/67 Technical data of the FXM34. ●●F.□□.□□0 motors.

Model	FXM34.●●F.□□.□□0				
Terminology	Notation	Units	20	40	
Stall torque	Mo	N·m	9.3	9.3	
Rated torque	Mn	N·m	9.0	7.6	
Stall peak torque	Mp	N·m	46	46	
Rated speed	nN	1/min	2000	4000	
Stall current	Io	A	7.6	15.3	
Peak current	Imax	A	38	76	
Calculation power	Pcal	kW	1.9	3.9	
Rated power	Pn	kW	1.9	3.2	
Torque constant	Kt	N·m/A	1.2	0.6	
Acceleration time	tac	ms	5	10	
Inductance per fase (3-phase)	L	mH	5.3	1.3	
Resistance per phase	R	Ω	0.65	0.17	
Inertia (without brake)	J	kg·cm ²	11.00	11.00	
Inertia (with brake)	J*	kg·cm ²	12.06	12.06	
Mass (without brake)	P	kg	11.5	11.5	
Mass (with brake)	P*	kg	12.1	12.1	

Note. These motors with “F” winding (220 V AC) can only be controlled by ACSD-□□L or MCS-□□L series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.



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Torque-speed graphs. FXM34.●●F.□□.□□0 models.

2.

3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

FXM53 models

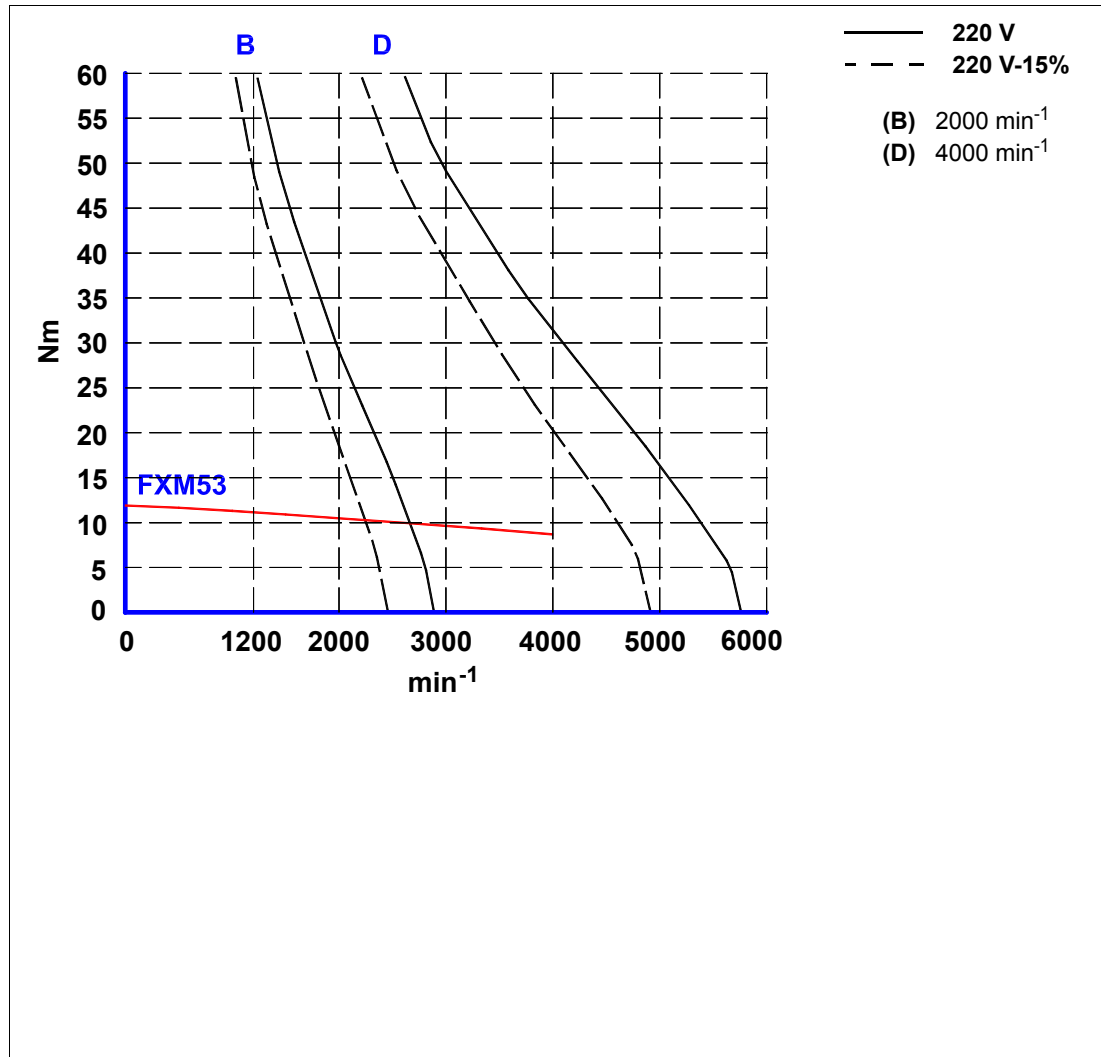
T- 2/68 Technical data of the FXM53.●●F.□□.□□0 motors.

2.

3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves

Model	FXM53.●●F.□□.□□0					
Terminology	Notation	Units		20	30	40
Stall torque	Mo	N·m		11.9	11.9	11.9
Rated torque	Mn	N·m		10.5	9.6	8.7
Stall peak torque	Mp	N·m		59	59	59
Rated speed	nN	1/min		2000	3000	4000
Stall current	Io	A		9.9	14.8	19.7
Peak current	Imax	A		49	73	98
Calculation power	Pcal	kW		2.5	3.7	5.0
Rated power	Pn	kW		2.2	3.0	3.6
Torque constant	Kt	N·m/A		1.2	0.8	0.6
Acceleration time	tac	ms		7.8	11.7	15.6
Inductance per fase (3-phase)	L	mH		5.0	2.2	1.3
Resistance per phase	R	Ω		0.445	0.200	0.110
Inertia (without brake)	J	kg·cm ²		22.0	22.0	22.0
Inertia (with brake)	J*	kg·cm ²		25.6	25.6	25.6
Mass (without brake)	P	kg		15.8	15.8	15.8
Mass (with brake)	P*	kg		16.9	16.9	16.9

Note. These motors with “F” winding (220 V AC) can only be controlled by ACSD-□L or MCS-□L series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.



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Torque-speed graphs. FXM53.●●F.□□.□□0 models.



FXM/FKM

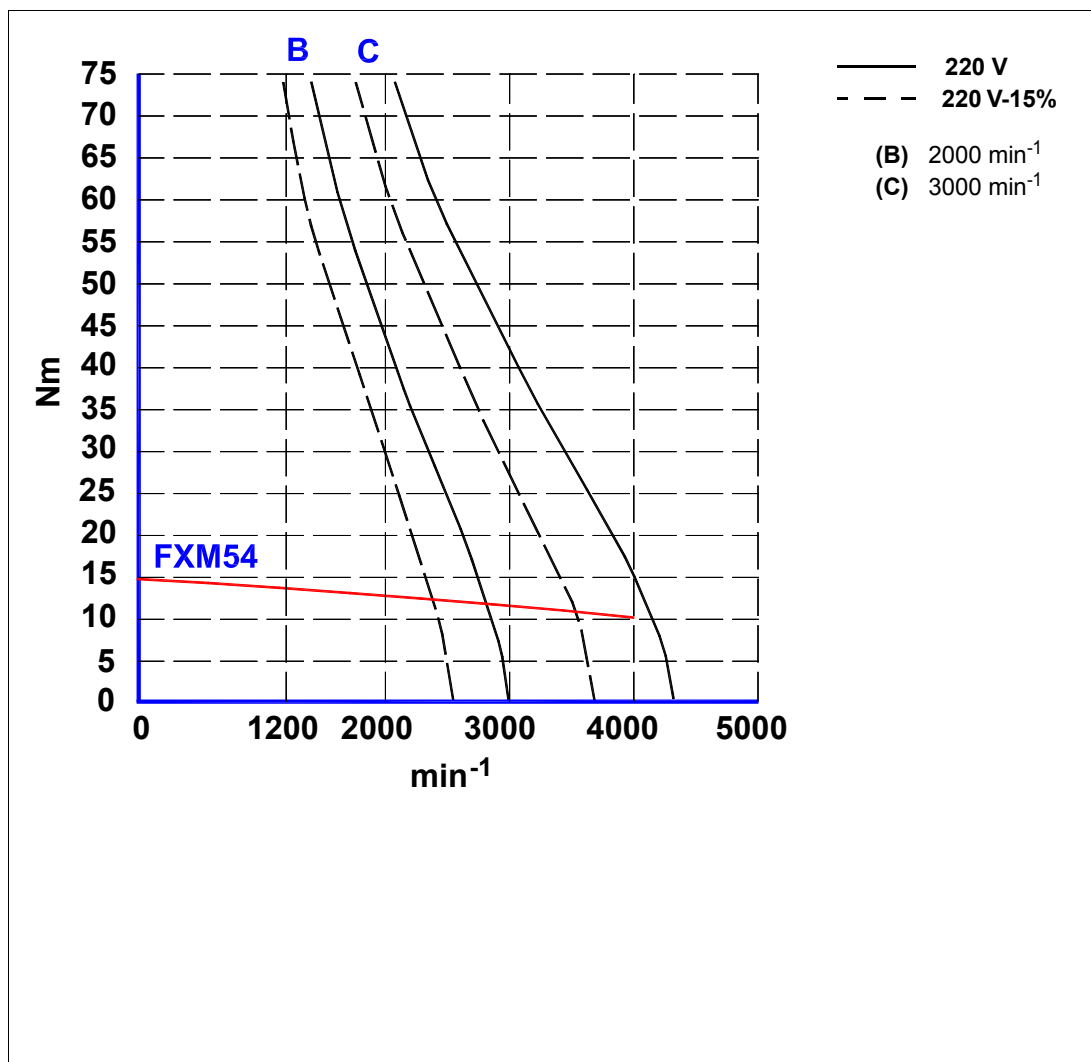
Ref.1703

FXM54 models

T- 2/69 Technical data of the FXM54. ●●F.□□.□□0 motors.

Model			FXM54.●●F.□□.□□0		
Terminology	Notation	Units	20	30	
Stall torque	Mo	N·m	14.8	14.8	
Rated torque	Mn	N·m	12.8	11.6	
Stall peak torque	Mp	N·m	74	74	
Rated speed	nN	1/min	2000	3000	
Stall current	Io	A	12.7	18.4	
Peak current	Imax	A	64	92	
Calculation power	Pcal	kW	3.1	4.7	
Rated power	Pn	kW	2.7	3.6	
Torque constant	Kt	N·m/A	1.2	0.8	
Acceleration time	tac	ms	8.2	12.3	
Inductance per fase (3-phase)	L	mH	3.4	1.6	
Resistance per phase	R	Ω	0.275	0.135	
Inertia (without brake)	J	kg·cm ²	29.0	29.0	
Inertia (with brake)	J*	kg·cm ²	32.6	32.6	
Mass (without brake)	P	kg	17.8	17.8	
Mass (with brake)	P*	kg	18.9	18.9	

Note. These motors with “F” winding (220 V AC) can only be controlled by ACSD-□□ or MCS-□□L series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.



F- 2/50

Torque-speed graphs. FXM54. ●●F.□□.□□0 models.

2.

3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

FXM55 models

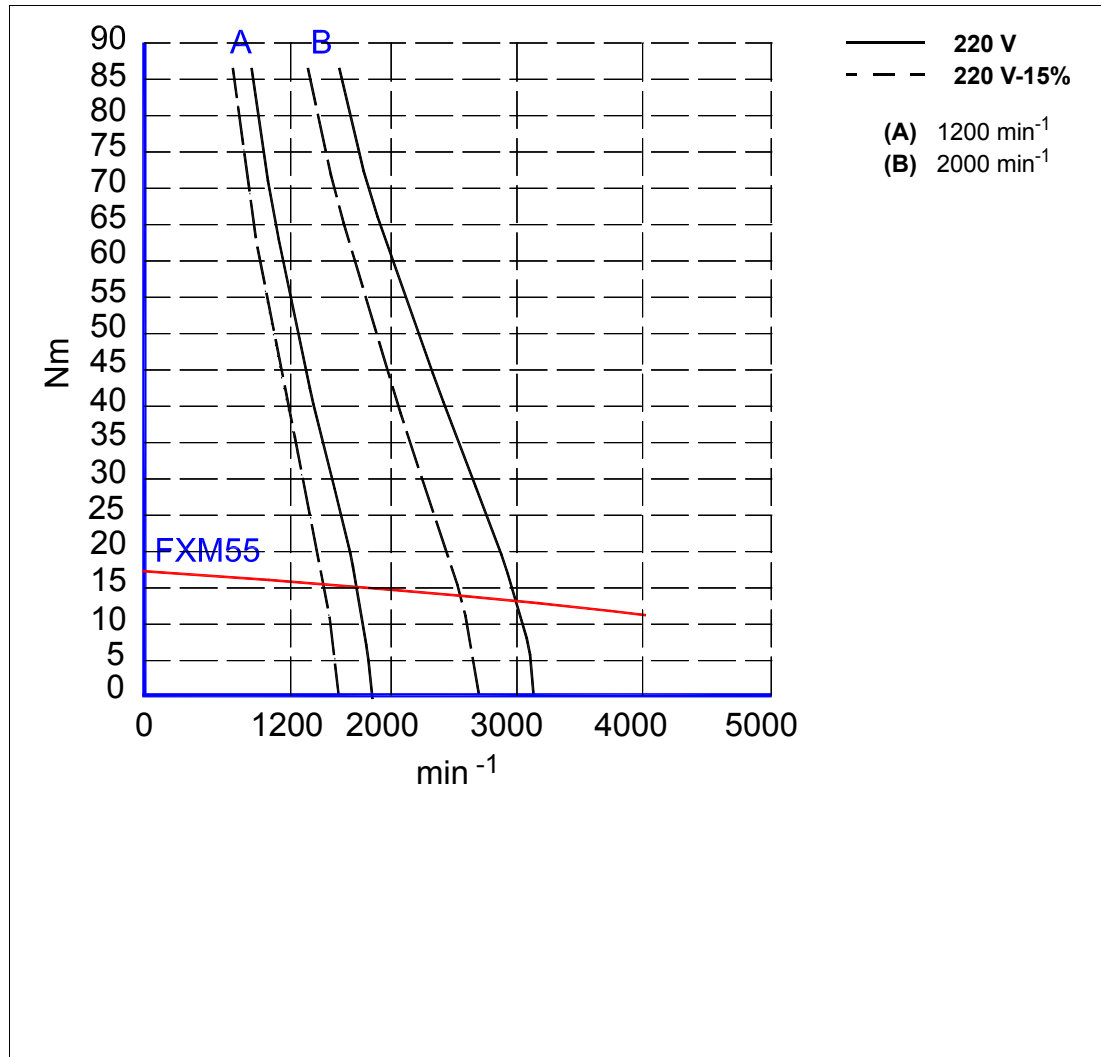
T- 2/70 Technical data of the FXM55.●●F.□□.□□0 motors.

2.

3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves

Model	FXM55.●●F.□□.□□0				
Terminology	Notation	Units	12	20	
Stall torque	Mo	N·m	17.3	17.3	
Rated torque	Mn	N·m	15.8	14.7	
Stall peak torque	Mp	N·m	86	86	
Rated speed	nN	1/min	1200	2000	
Stall current	Io	A	9.1	15.5	
Peak current	I _{max}	A	45	77	
Calculation power	P _{cal}	kW	2.2	3.6	
Rated power	P _n	kW	2.0	3.1	
Torque constant	K _t	N·m/A	1.9	1.1	
Acceleration time	t _{ac}	ms	5.3	8.8	
Inductance per fase (3-phase)	L	mH	7.2	2.5	
Resistance per phase	R	Ω	0.55	0.19	
Inertia (without brake)	J	kg·cm ²	36.0	36.0	
Inertia (with brake)	J*	kg·cm ²	36.6	36.6	
Mass (without brake)	P	kg	20.0	20.0	
Mass (with brake)	P*	kg	21.1	21.1	

Note. These motors with “F” winding (220 V AC) can only be controlled by ACSD-□L or MCS-□L series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.



F- 2/51

Torque-speed graphs. FXM55.●●F.□□.□□0 models.



FXM/FKM

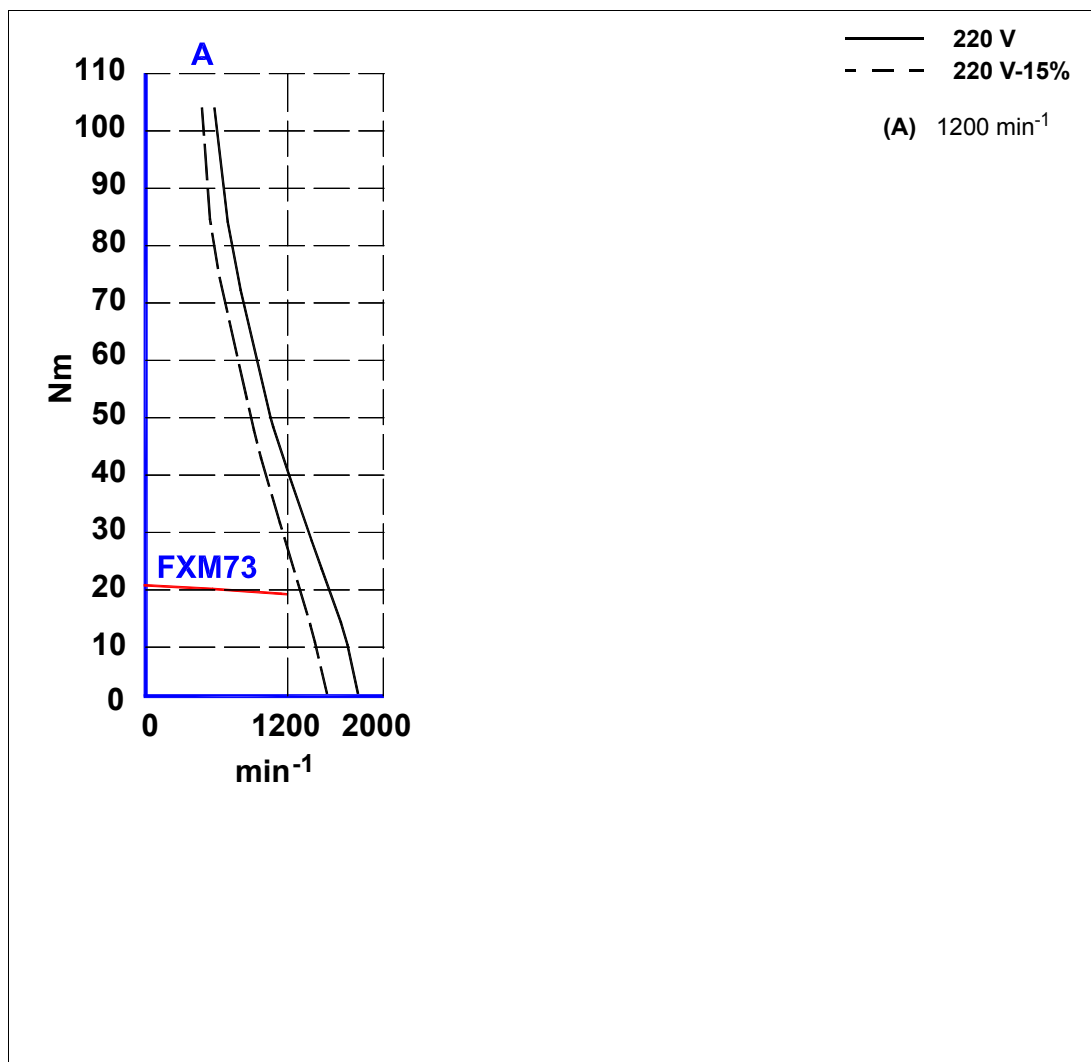
Ref.1703

FXM73 models

T- 2/71 Technical data of the FXM73.●●F.□□.□□0 motors.

Model		FXM73.●●F.□□.□□0			
Terminology	Notation	Units	12		
Stall torque	Mo	N·m	20.8		
Rated torque	Mn	N·m	18.9		
Stall peak torque	Mp	N·m	104		
Rated speed	nN	1/min	1200		
Stall current	Io	A	10.7		
Peak current	Imax	A	54		
Calculation power	Pcal	kW	2.6		
Rated power	Pn	kW	2.4		
Torque constant	Kt	N·m/A	1.9		
Acceleration time	tac	ms	7.4		
Inductance per fase (3-phase)	L	mH	9.8		
Resistance per phase	R	Ω	0.6		
Inertia (without brake)	J	kg·cm ²	61.0		
Inertia (with brake)	J*	kg·cm ²	92.8		
Mass (without brake)	P	kg	29.0		
Mass (with brake)	P*	kg	33.1		

Note. These motors with “F” winding (220 V AC) can only be controlled by ACSD-□□ or MCS-□□ series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.



F- 2/52

Torque-speed graphs. FXM73.●●F.□□.□□0 models.

2.

3-PHASE SERVOMOTORS. FXM
 Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

FXM74 models

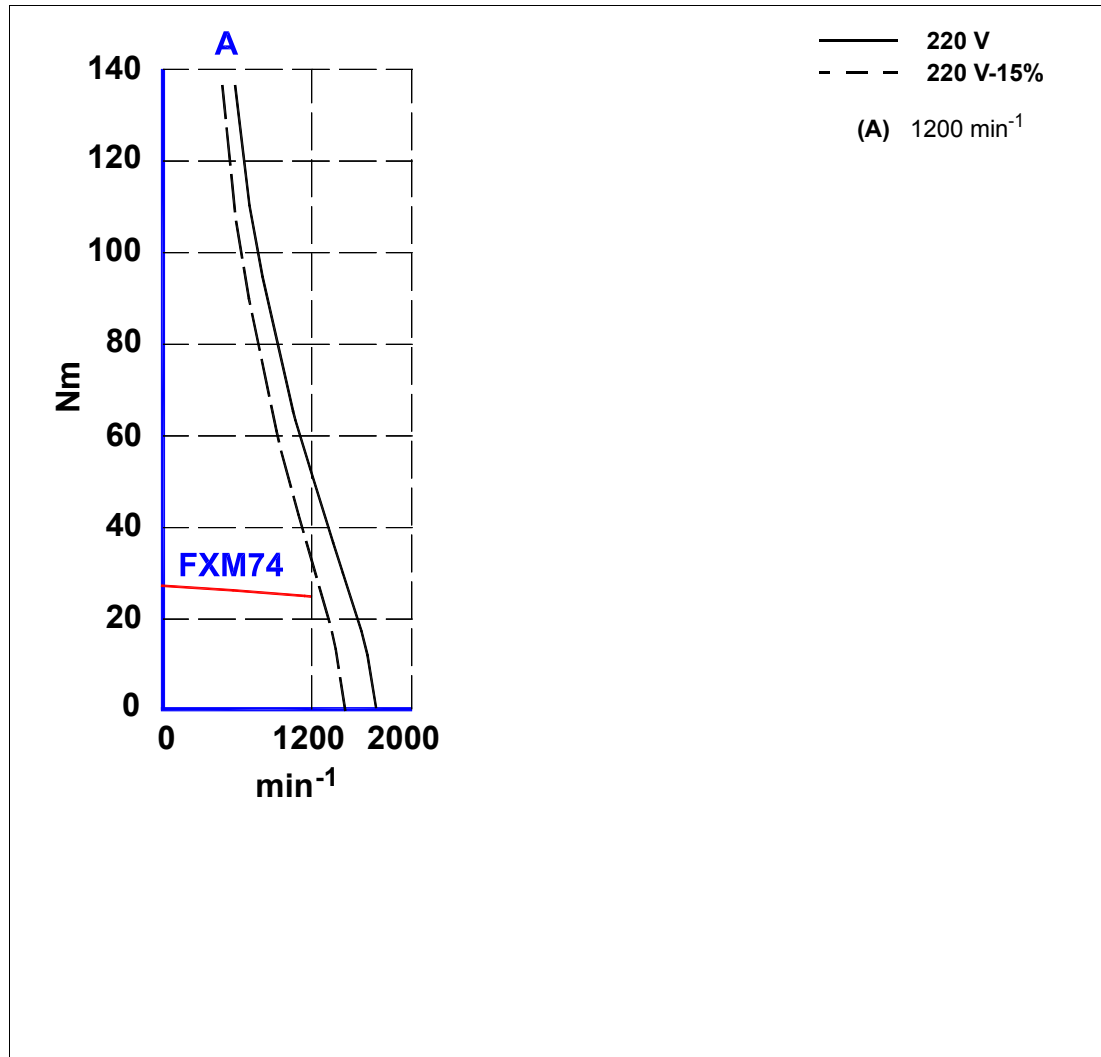
T- 2/72 Technical data of the FXM74.●●F.□□.□□0 motors.

2.

3-PHASE SERVOMOTORS. FXM
Technical data. Torque-Speed curves

Model	FXM74.●●F.□□.□□0				
Terminology	Notation	Units	12		
Stall torque	Mo	N·m	27.3		
Rated torque	Mn	N·m	24.9		
Stall peak torque	Mp	N·m	135		
Rated speed	nN	1/min	1200		
Stall current	Io	A	13.5		
Peak current	I _{max}	A	67		
Calculation power	P _{cal}	kW	3.4		
Rated power	P _n	kW	3.1		
Torque constant	K _t	N·m/A	2.0		
Acceleration time	t _{ac}	ms	7.4		
Inductance per fase (3-phase)	L	mH	7.8		
Resistance per phase	R	Ω	0.445		
Inertia (without brake)	J	kg·cm ²	79.0		
Inertia (with brake)	J*	kg·cm ²	110.8		
Mass (without brake)	P	kg	31.6		
Mass (with brake)	P*	kg	35.7		

Note. These motors with “F” winding (220 V AC) can only be controlled by ACSD-□L or MCS-□L series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.



F- 2/53

Torque-speed graphs. FXM74.●●F.□□.□□0 models.



FXM/FKM

Ref.1703

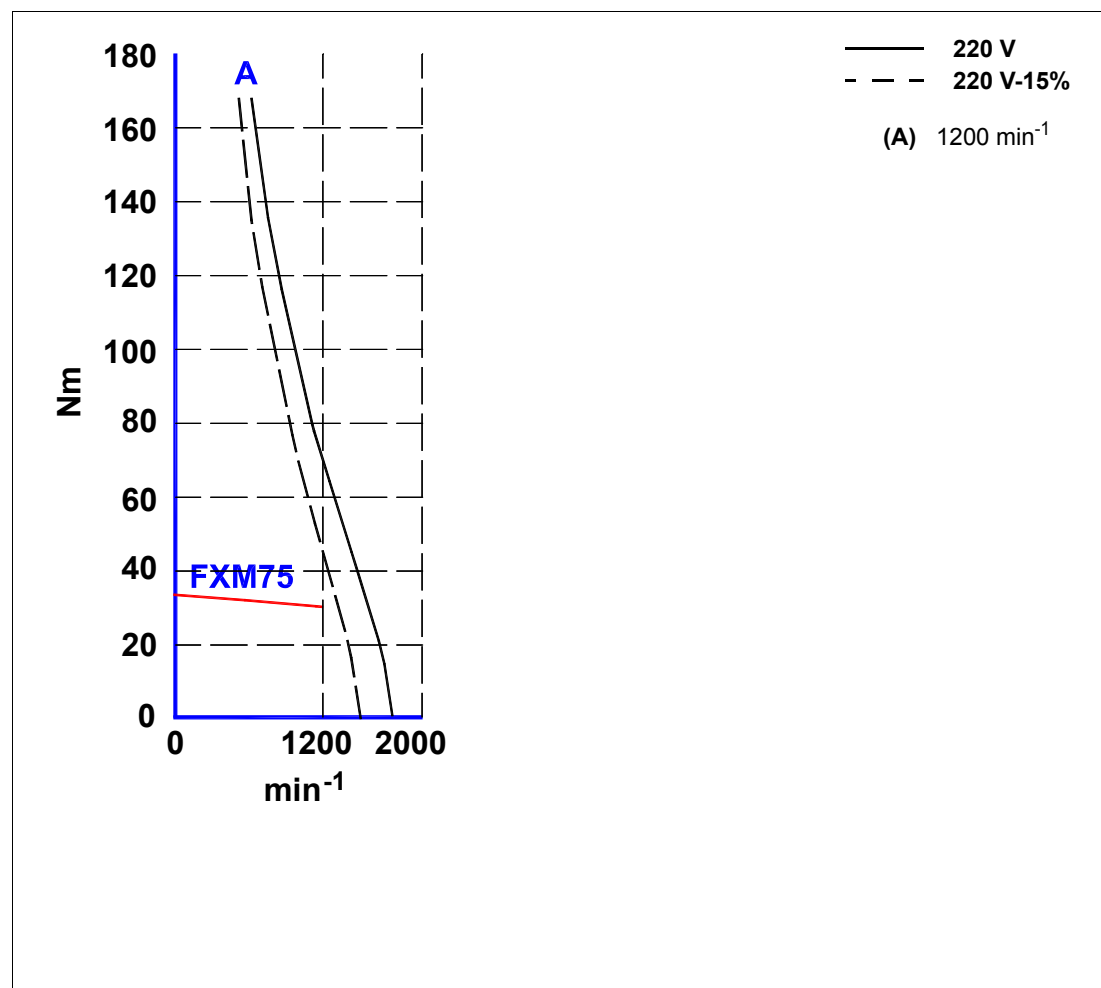
FXM75 models

T- 2/73 Technical data of the FXM75.●●F.□□.□□0 motors.

Model		FXM75.●●F.□□.□□0			
Terminology	Notation	Units	12		
Stall torque	Mo	N·m	33.6*		
Rated torque	Mn	N·m	29.5		
Stall peak torque	Mp	N·m	165		
Rated speed	nN	1/min	1200		
Stall current	Io	A	17.1*		
Peak current	Imax	A	85		
Calculation power	Pcal	kW	4.2		
Rated power	Pn	kW	3.7		
Torque constant	Kt	N·m/A	2.0		
Acceleration time	tac	ms	7.4		
Inductance per fase (3-phase)	L	mH	5.9		
Resistance per phase	R	Ω	0.31		
Inertia (without brake)	J	kg·cm ²	97.0		
Inertia (with brake)	J*	kg·cm ²	128.8		
Mass (without brake)	P	kg	36.0		
Mass (with brake)	P*	kg	40.1		

* Note that although this motor can provide a stall torque of 33.6 N·m, the largest FAGOR drive that can govern it can only get 29.5 N·m out of it.

Note. These motors with "F" winding (220 V AC) can only be controlled by ACSD-□L or MCS-□L series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.



F- 2/54

Torque-speed graphs. FXM75.●●F.□□.□□0 models.

2.

3-PHASE SERVOMOTORS. FXM
 Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

2.10 Axial and radial loads on the shaft extension

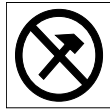
The following table shows the maximum axial and radial forces that the shaft extension can withstand:

T- 2/74 Maximum values for axial and radial loads.

Series	Axial force ·Fax·		Radial force ·Fr·		Distance ·d·	
	N	lbf	N	lbf	mm	in
FXM1	105	23.60	500	112.40	15	0.59
FXM3	138	31.02	660	148.37	20	0.78
FXM5	157	35.29	745	167.48	25	0.98
FXM7	336	75.53	1590	357.44	29	1.14

Note. When applying a combined axis and radial load, decrease the maximum radial force allowed "Fr" to 70% of the value indicated in the table.

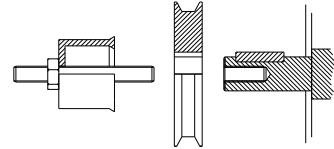
Also bear in mind that:



WARNING.

Avoid hitting the motor and especially its shaft when installing transmission pulleys or gear boxes. These motors have extremely fragile optical and electronic components.

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

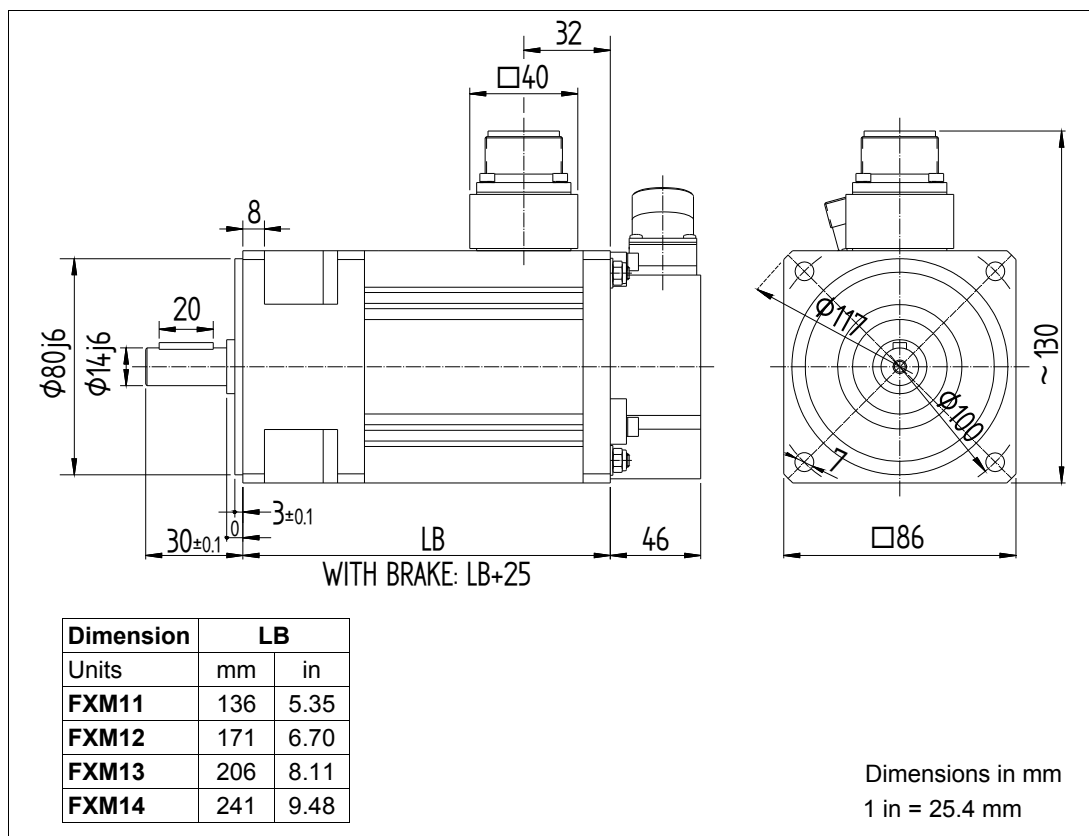


2.

3-PHASE SERVOMOTORS. FXM
Axial and radial loads on the shaft extension

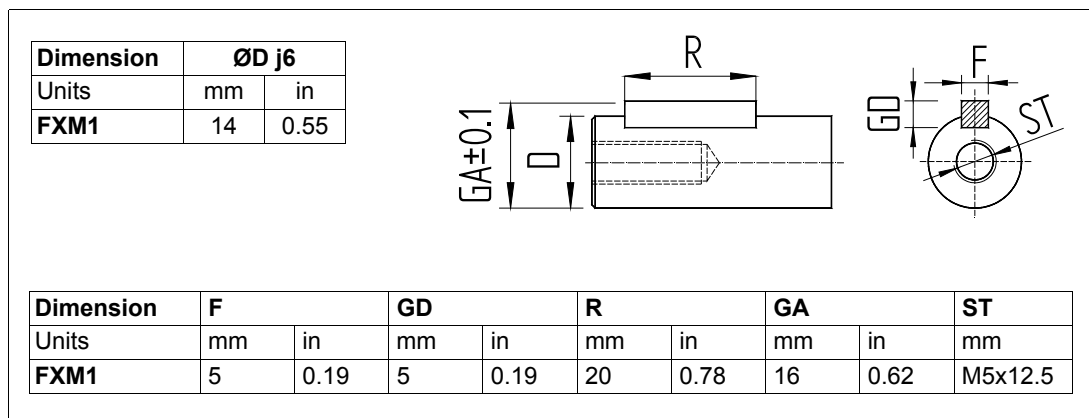
2.11 Dimensions

FXM1 series



F- 2/55

Synchronous motors. FXM1 series. Dimensions.



F- 2/56

Synchronous motors. FXM1 series. Dimensions of the shaft extension.

2.

3-PHASE SERVOMOTORS. FXM
Dimensions

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FAGOR AUTOMATION

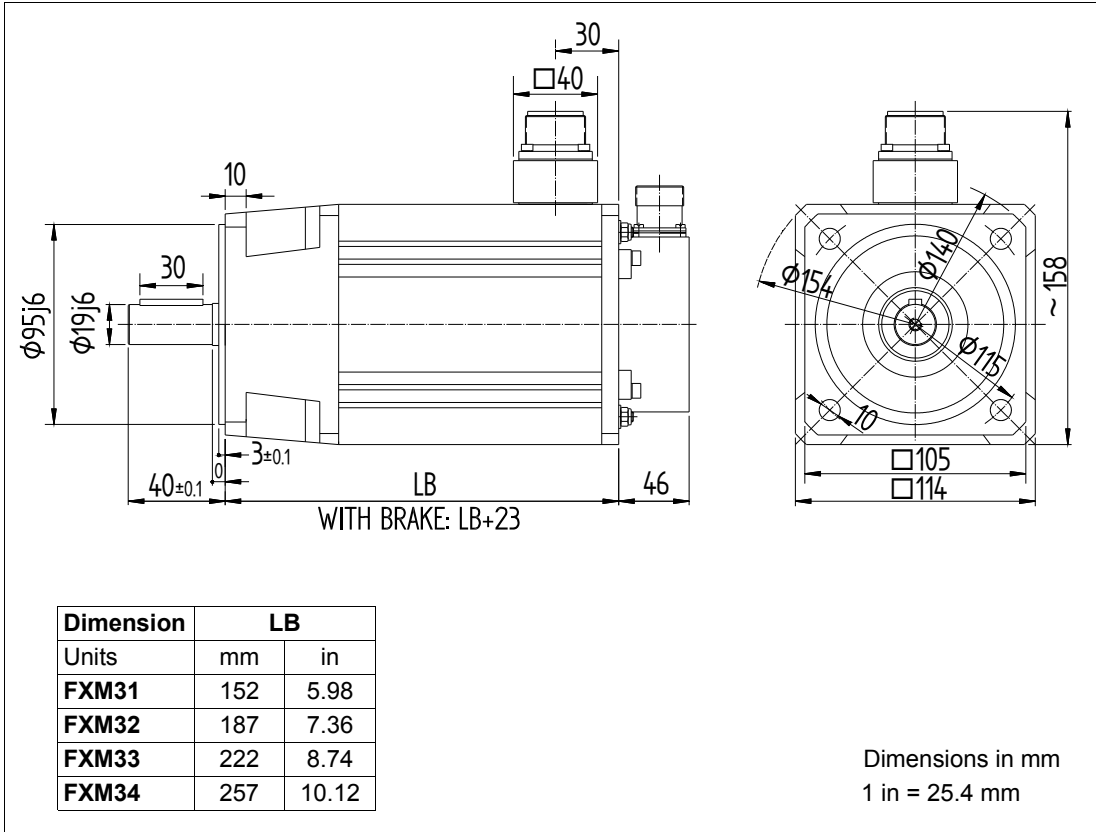
FXM/FKM

Ref.1703

FXM3 series

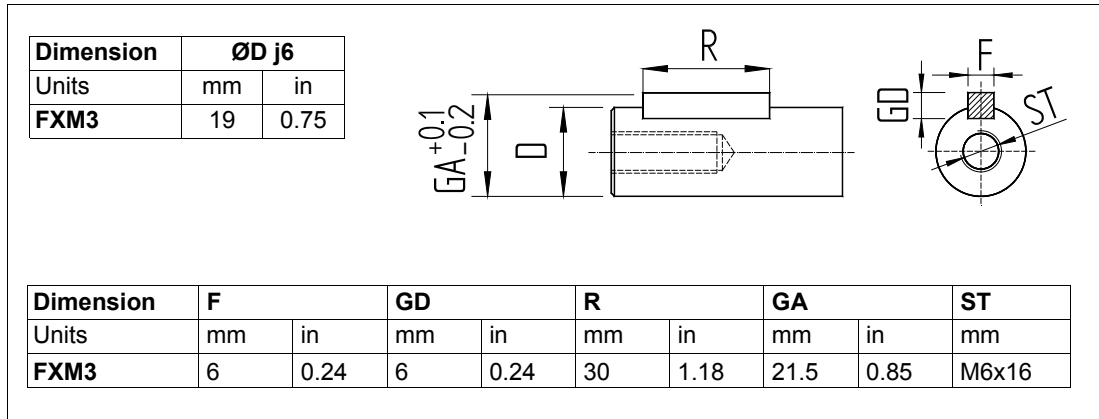
2.

3-PHASE SERVOMOTORS. FXM
Dimensions



F- 2/57

Synchronous motors. FXM3 series. Dimensions.



F- 2/58

Synchronous motors. FXM3 series. Dimensions of the shaft extension.

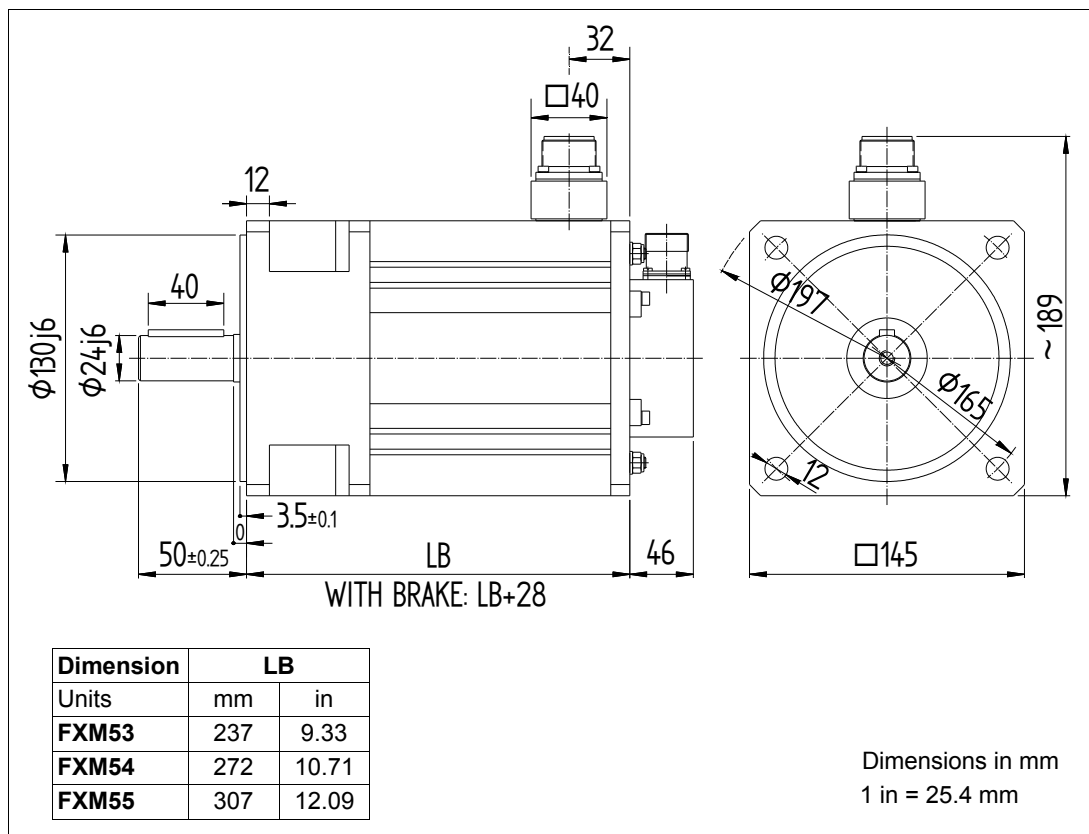


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FXM/FKM

Ref.1703

FXM5 series

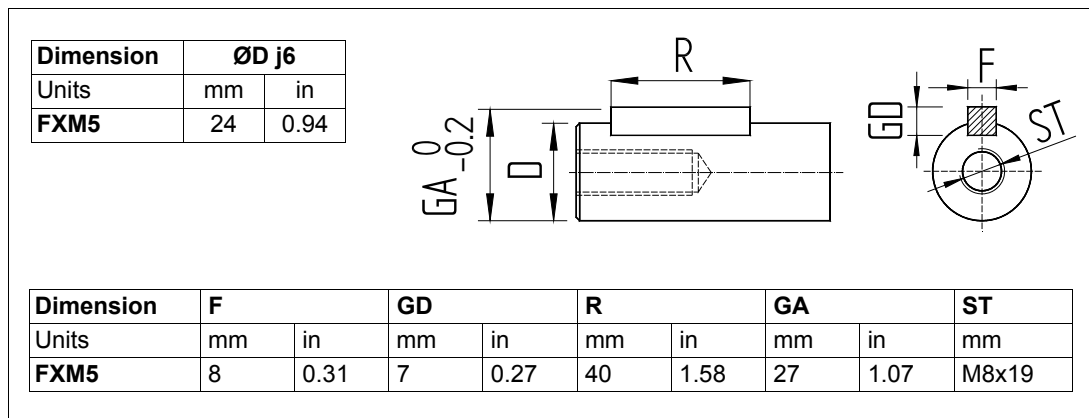


2.

3-PHASE SERVOMOTORS. FXM
Dimensions

F- 2/59

Synchronous servomotors. FXM5 series. Dimensions.



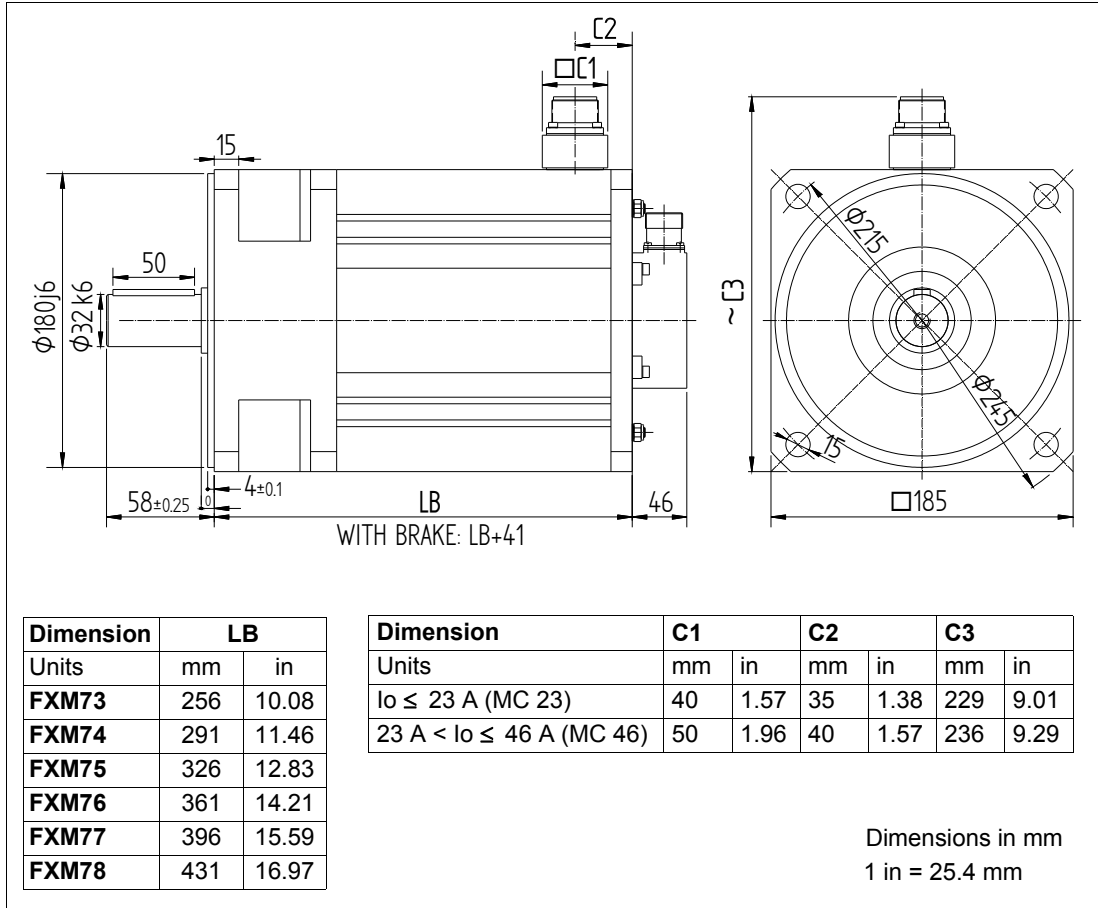
F- 2/60

Synchronous motors. FXM5 series. Dimensions of the shaft extension.

FXM7 series

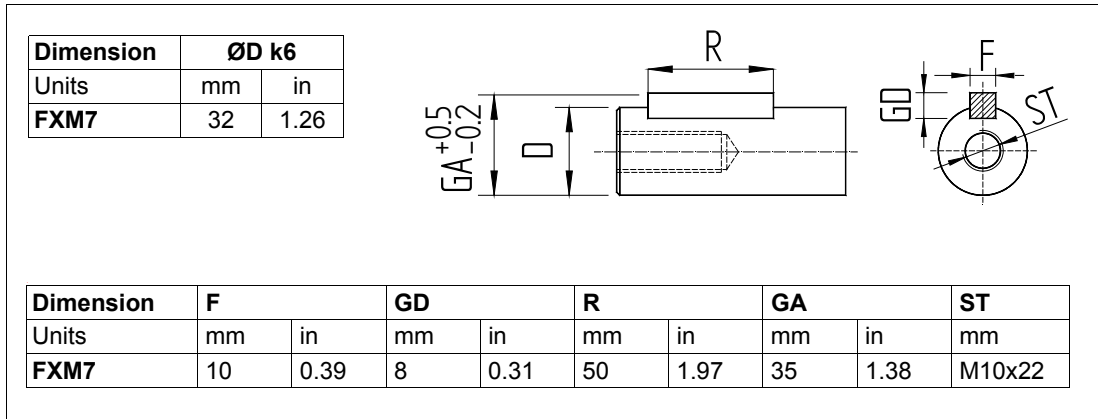
2.

3-PHASE SERVOMOTORS. FXM
Dimensions



F- 2/61

Synchronous servomotors. FXM7 series. Dimensions.



F- 2/62

Synchronous servomotors. FXM7 series. Dimensions of the shaft extension.

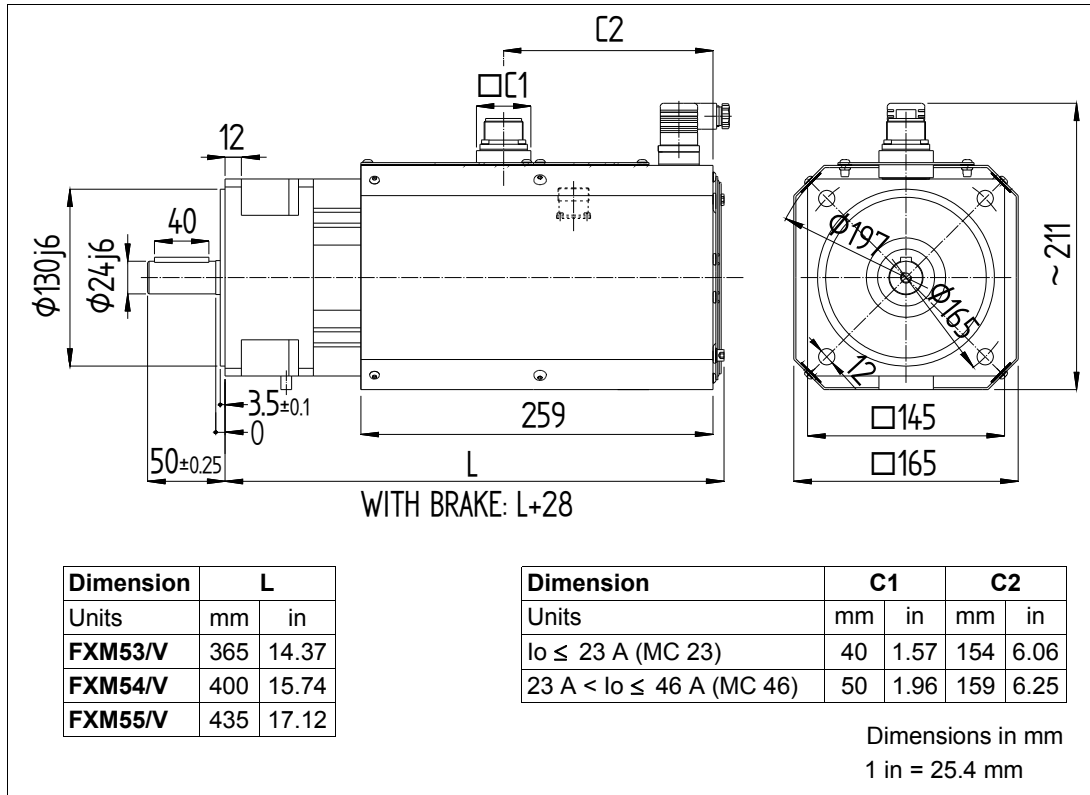


FAGOR AUTOMATION

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FXM5/V series

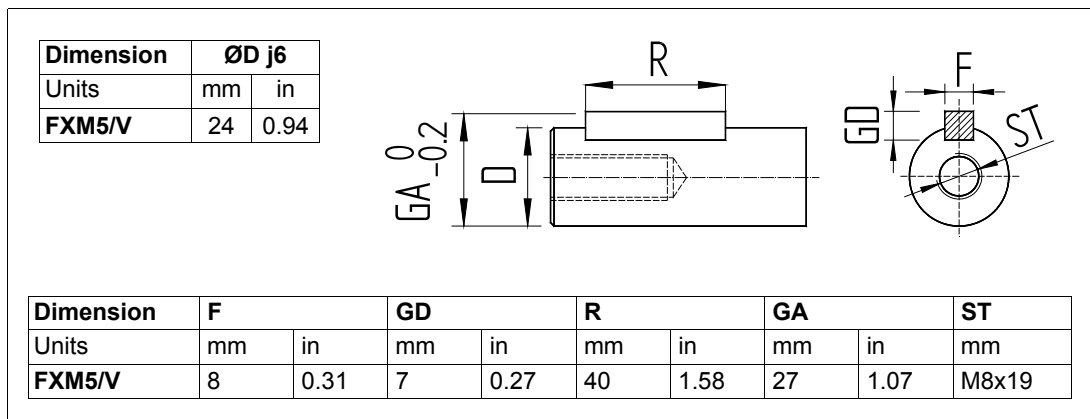


2.

3-PHASE SERVOMOTORS. FXM
Dimensions

F- 2/63

Synchronous servomotors. FXM5/V series. Dimensions.



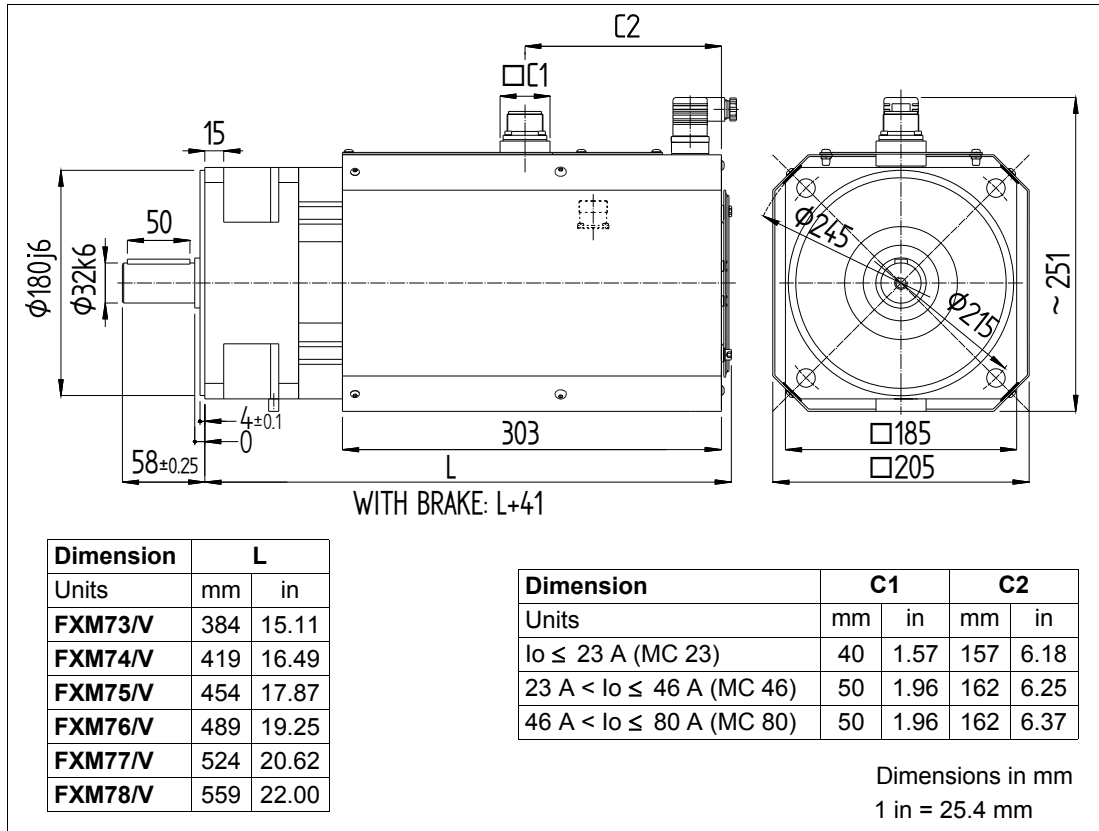
F- 2/64

Synchronous servomotors. FXM5/V series. Dimensions of the shaft extension.

FXM7/V series

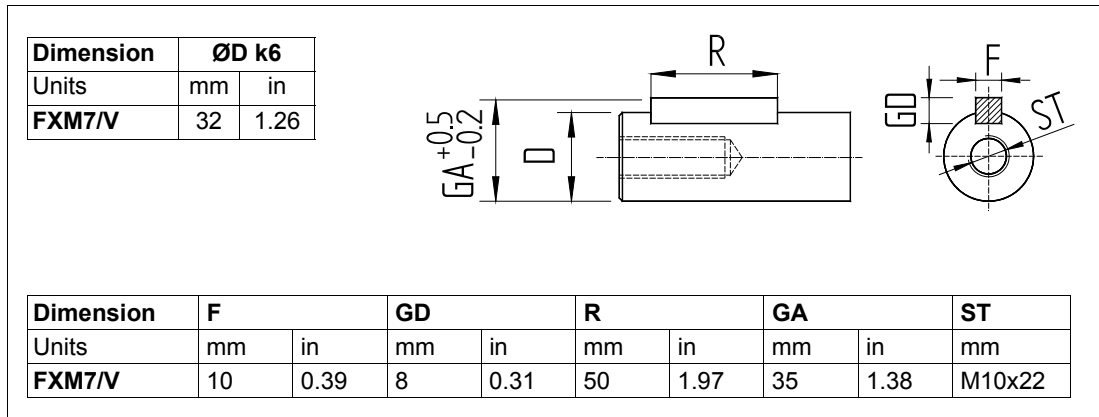
2.

3-PHASE SERVOMOTORS. FXM
Dimensions



F- 2/65

Synchronous servomotors. FXM7/V series. Dimensions.



F- 2/66

Synchronous servomotors. FXM7/V series. Dimensions of the shaft extension.



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3-PHASE SERVOMOTORS. FKM

3

3.1 Description

FAGOR FKM servomotors are synchronous AC brushless with permanent magnets. They are especially designed to be used with FAGOR drives.

They are ideal for controlling feed and positioning axes in machine tool applications as well as handling systems, textile machinery, printers, robotics, etc. In general, they are ideal for any application requiring great positioning accuracy.

These characteristics are essential to many applications such as coil feeders, punch presses, etc.

These three-phase servomotors have been designed to work without additional external cooling. Most of the heat is originated in the winding and at the pack of stator plates and it is dissipated from its surface. Thanks to this they can meet the IP 65 protection standard and are not affected by liquids or dirt.

They include a temperature probe to monitor the internal temperature of the stator winding. For further detail, see section, **3.3 Temperature sensors** in this chapter.

They carry an encoder for position feedback and, optionally, holding brake (all series) and fan (FKM8 series only).

See the tables of the section **3.2 General characteristics** for their particular restrictions in terms of feedback devices according to the motor series.

The non-ventilated FKM motor family offers six series depending on size. These series are:

FKM1	FKM2	FKM4	FKM6	FKM8	FKM9
------	------	------	------	------	------

The FKM2/4/6 series are available for 220 V AC (F winding) or 400 V AC (A winding) and the FKM1/8/9 series available only for 400 V AC (A winding).

The ventilated FKM motor family only offers two series, depending on the size. These series are:

FKM6/V	FKM8/V				
--------	--------	--	--	--	--

The FKM6/V models FKM66 and FKM8/V series are only available for 400 V AC.

All these motors have been manufactured according to the standards EN 60204-1 and EN 60034 in compliance with the European Directive 2006/42/EC on Machinery.

Its features are:

- ❑ Wide range of rated power from 0.22 to 18.8 kW and rated speed from 2000 rev/min to 6000 rev/min.
- ❑ Uniform output torque.
- ❑ High torque/volume ratio.
- ❑ High reliability.
- ❑ Low maintenance.
- ❑ Rotary connectors for feedback and power (except the FKM1 series).

3.2 General characteristics

FKM1 series

T- 3/1 Standard characteristics of FKM1 servomotors.

Excitation	Permanent Neodymium magnets (Nd)
Temperature sensor	PTC 111-K13-140°C thermistor
Shaft extension	Cylindrical without keyway. Option: with keyway
Mounting methods	IM B5, IM V1, IM V3 meets IEC 60034-7
Mechanical tolerances	Normal class N, meets IEC 72/1971
Balancing	Class N (class R optional) meets DIN 45665 Half-key balancing
Type of winding	"A" winding ·400 V AC·
Pairs of poles	p=3
Noise emission	DIN 45635
Stator winding insulation class	Class F. Limit temperature 150°C/302°F according to EN 60034-1 (IEC 60034-1)
Protection degree	Standard configuration IP 65 according to EN 60034-5
Storage temperature	From -20°C to +80°C (-4°F to 176°F)
Ambient temperature allowed	From -20°C to +40°C (-4°F to 104°F)
Working ambient humidity	From 15% to 85% (non condensing)
Fan	Not available
Holding brake	Option on all models
Feedback	Sinusoidal encoder. Ref. E4/A4.

FKM2/4/6/8 series

T- 3/2 Standard characteristics of FKM2/4/6/8 servomotors.

Excitation	Permanent rare earth magnets (Nd-Fe-B)
Temperature sensor	PTC KTY84-130 thermistor ·discontinued· RTD Pt1000 thermoresistance
Shaft extension	Cylindrical without keyway. Option: with keyway
Mounting methods	IM B5, IM V1, IM V3 meets IEC 60034-7
Mechanical tolerances	Normal class N, meets IEC 72/1971
Balancing	N class (class R optional) meets DIN 45665 Half-key balancing
Useful life of bearings	20000 hours
Type of winding **	"F" winding ·220 V AC· "A" winding ·400 V AC·
Pairs of poles	FKM2, FKM4, FKM6: p=3 FKM8: p=4
Noise emission	DIN 45635
Vibration resistance	Withstands 1g in the direction of the shaft and 3g sideways (g = 9.81 m/s ²)
Stator winding insulation class	Class F. Limit temperature 150°C/302°F according to EN 60034-1 (IEC 60034-1)
Insulation resistance	500 V DC, 10 MΩ or greater
Dielectric rigidity	1500 V AC, 1 minute.
Protection degree	Standard configuration IP 64. Seal option: IP 65 according to EN 60034-5
Storage temperature	-20°C/+80°C (-4°F/+176°F)
Ambient temperature allowed	0°C/40°C (32°F/104°F)
Working ambient humidity	From 20% to 80% (non condensing)
Fan	Option only available on FKM6 series (FKM66 models) and FKM8 series. See fan characteristics.
Holding brake	Option on all models
Feedback *	Sinusoidal encoder. Ref. E3/A3 Incremental TTL encoder. Ref. I0

* Sinusoidal encoder (FKM with "A" winding) and incremental TTL encoder (FKM with "F" winding).

** The FKM8 series only has the "A" winding.

3.
3-PHASE SERVOMOTORS. FKM
 General characteristics



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FKM9 series

T- 3/3 Standard characteristics of FKM9 servomotors.

Excitation	Permanent Neodymium magnets (Nd)
Temperature sensor	PTC KTY84-130 thermistor
Shaft extension	Cylindrical without keyway. Option: with keyway
Mounting methods	IM B5, IM V1, IM V3 meets IEC 60034-7
Mechanical tolerances	Normal class N, meets IEC 72/1971
Balancing	N class (class R optional) meets DIN 45665 Half-key balancing
Type of winding	"A" winding ·400 V AC·
Pairs of poles	p=3
Noise emission	DIN 45635
Stator winding insulation class	Class F. Limit temperature 150°C/302°F according to EN 60034-1 (IEC 60034-1)
Protection degree	Standard configuration IP 65 according to EN 60034-5
Storage temperature	From -20°C to +80°C (-4°F to 176°F)
Ambient temperature allowed	From -20°C to +40°C (-4°F to 104°F)
Working ambient humidity	From 15% to 85% (non condensing)
Fan	Not available
Holding brake	Option only on FKM94 and FKM95 models Not available on FKM96 models
Feedback	Sinusoidal encoder. Ref. E3/A3



INFORMATION.

The "class F" insulation of the windings keeps its dielectric properties as long as the temperature stays under 150°C/302°F.

3.

3-PHASE SERVOMOTORS. FKM
General characteristics

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3.3 Temperature sensors



MANDATORY.

The supply voltage of the thermal protection temperature sensor, shall fulfill requirements of low voltage limited energy secondary circuits DVC A according IEC/UL 61800-5-1.

3.

3-PHASE SERVOMOTORS. FKM
Temperature sensors

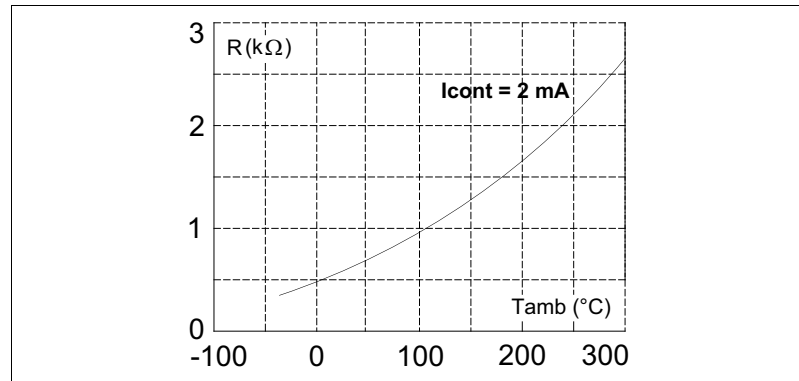
PTC KTY84-130 thermistor

All FKM motors (except the FKM1 series) have a PTC KTY84-130 thermistor as thermal protection of the motor and it is located in the stator winding. It has a positive temperature coefficient (PTC) and they should be used in control and measurement systems within a range between -40°C/-40°F) and 300°C/572°F. It is currently only available on FKM9 series motors. In FKM2/4/6/8 series has been discontinued. See RTD Pt1000.

T- 3/4 Characteristics of the temperature sensor KTY84-130.

Sensor type	PTC KTY84-130 thermistor
Resistance at 20°C/68°F	581 Ω
Resistance at 100°C/212°F	1000 Ω
Sensor connection	Feedback cable
Motor series	FKM9 FKM2/4/6/8 ·KTY84 discontinued· See RTD Pt1000 .

The following figure shows the resistance of the sensor as a function of the ambient temperature (average values):



F- 3/1

Sensor resistance as a function of room (ambient) temperature.

Note. The two wires of the temperature sensor are included in the feedback cable.

WARNING.

The temperature sensor KTY84-130 has polarity. If you wish to manufacture your own feedback cable, make sure that the polarity is correct. See the feedback cable diagrams later on. FAGOR supplies this cable upon request.



DANGER. Risk of electric shock.

Only temperature sensors that meet the safety isolation specifications described in EN 61800-5-1 may be connected to terminals “KTY84+” and “KTY84-”. If these instructions are not complied with, there is a risk of electric shock.



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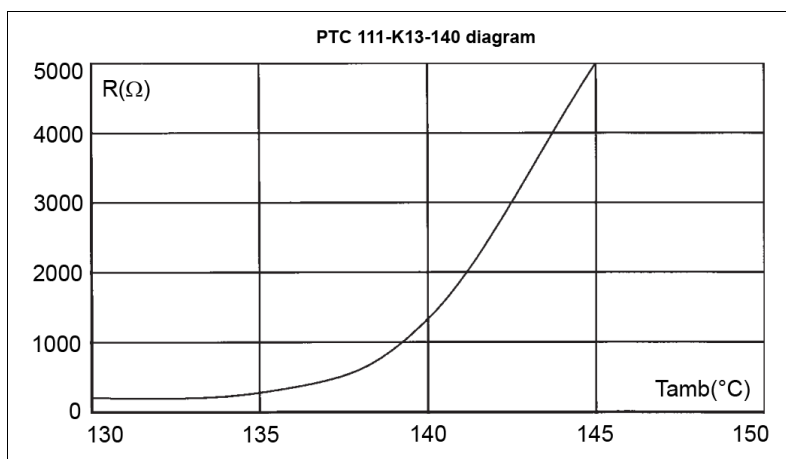
PTC 111-K13-140 thermistor

The FKM1 motor series has a PTC 111-K13-140 thermistor for the thermal protection of the motor winding. This is the positive temperature coefficient (PTC) and has no polarity.

T- 3/5 Characteristics of the temperature sensor PTC 111-K13-140°C.

Sensor type	PTC 111-K13-140 thermistor
Sensor connection	Feedback cable
Motor series	FKM1

The following figure shows the resistance of the sensor as a function of the ambient temperature (average values):



F- 3/2

Sensor resistance as a function of room (ambient) temperature.

Note. The two wires of the temperature sensor are included in the feedback cable.



3-PHASE SERVOMOTORS. FKM
Temperature sensors

3.

3-PHASE SERVOMOTORS. FKM
Temperature sensors

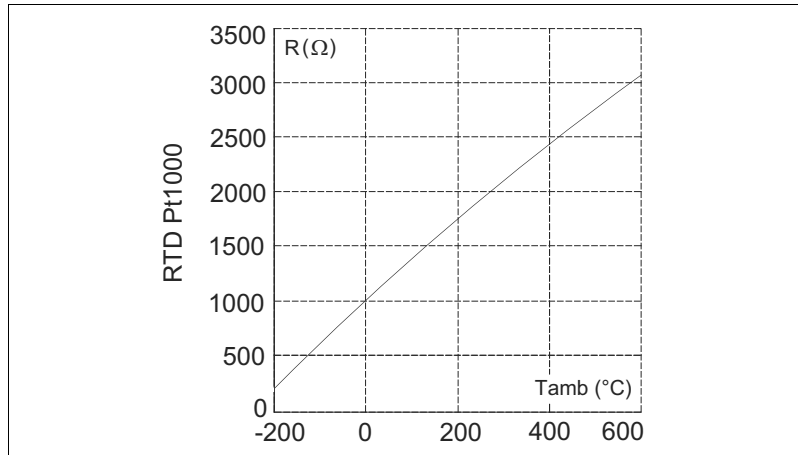
RTD Pt1000 thermoresistance

The motors in the FKM family (except for the FKM1/9 series) have a platinum **R**esistance **T**emperature **D**etector Pt1000 (R₀ = 1000 ohms at 0°C), providing thermal protection for the motor. Provides great linearity, speed and a temperature range between -200°C/-328°F and +850°C/1562°F. Its use is recommended in control and measurement systems. It has no polarity.

T- 3/6 Characteristics of the RTD Pt1000 temperature sensor.

Sensor type	RTD Pt1000 thermoresistance
Sensor connection	Feedback cable
Motor series	FKM2/4/6/8

The following figure shows the resistance of the sensor as a function of the ambient temperature (average values):



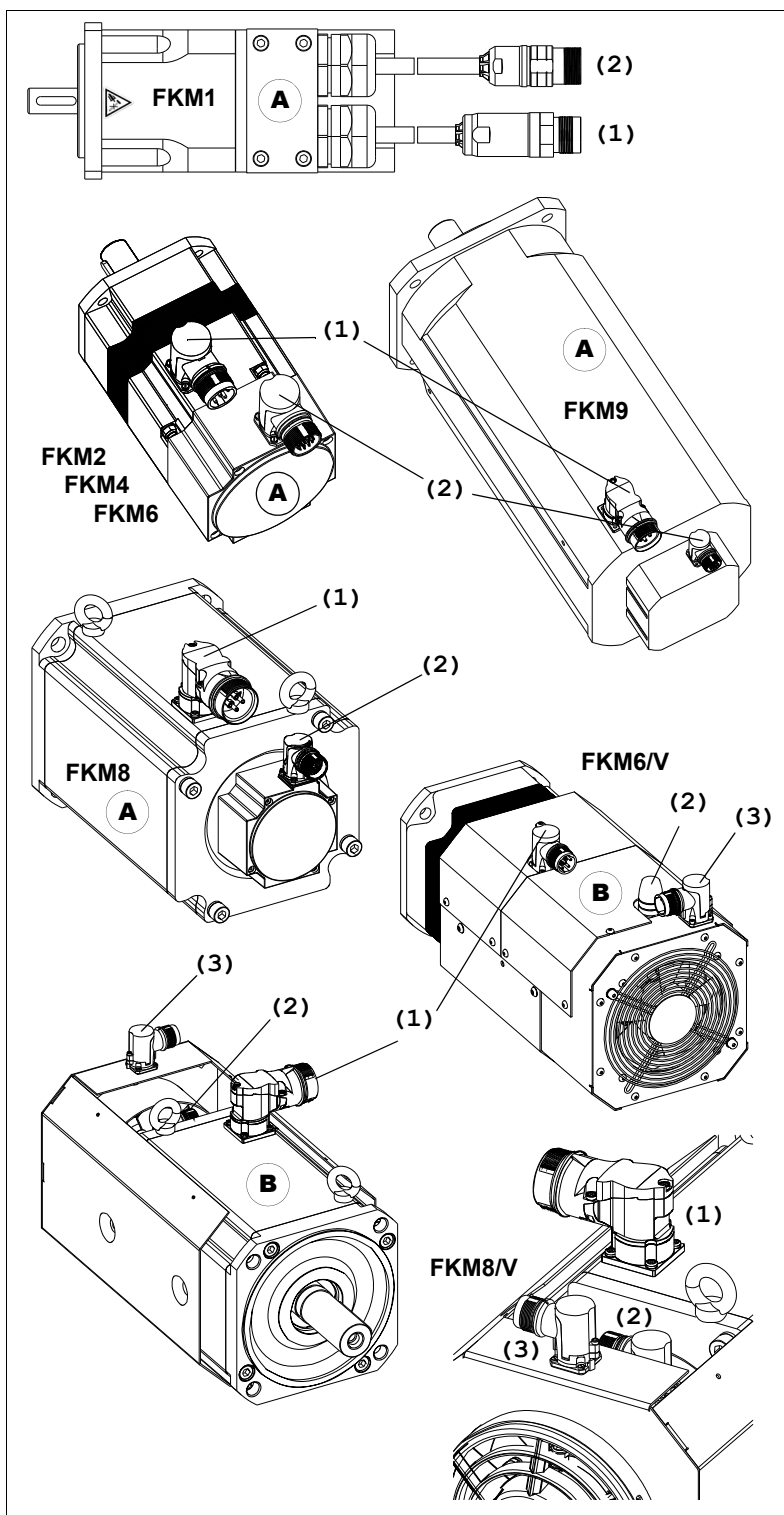
F- 3/3

Resistance of the RTD Pt100 as a function of room (ambient) temperature.

Note. The two wires of the temperature sensor are included in the feedback cable.

3.4 Outside appearance

The figure shows the outside shape of these servomotors and the location of the connectors for power supply, motor feedback, holding brake (if applicable) and for the fan (if applicable):



F- 3/4

FKM servomotors. **A.** Without FAN. **B.** With FAN.

1. Power base connector for the motor+brake (if applicable).
2. Motor feedback base connector.
3. Power base connector for the fan (if applicable).



INFORMATION.

On FKM6/V series and FKM8/V series the feedback base connector ·2· is hidden under the lid. Remove the top lid of the motor to get to it.

3.

3-PHASE SERVOMOTORS. FKM
Outside appearance

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3.5 Rotary connectors



WARNING.

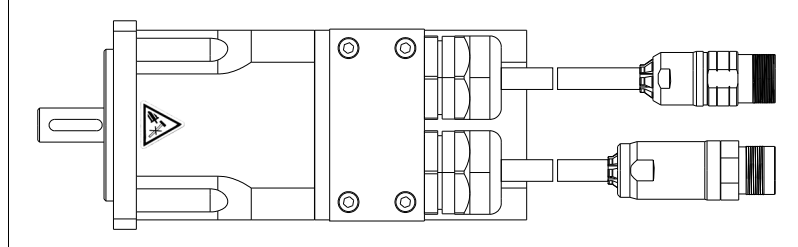
Do not remove the locking screws of any connector.

3.

3-PHASE SERVOMOTORS. FKM
Rotary connectors

FKM1 series

In the FKM1 series, the power connector and the feedback connector are built into the end of the cables leaving through the gland from the motor itself. The approximate length of these cables is 1 m. For this series, it is not appropriate to consider rotating connectors.

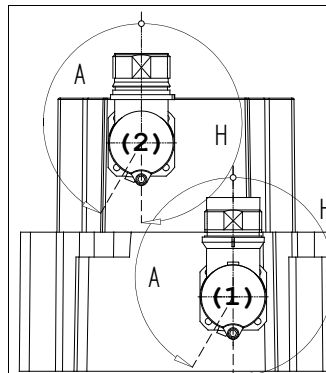


F- 3/5

Connectors on the end of the cables leaving the motor through the gland.

FKM2/4/6/8/9 series

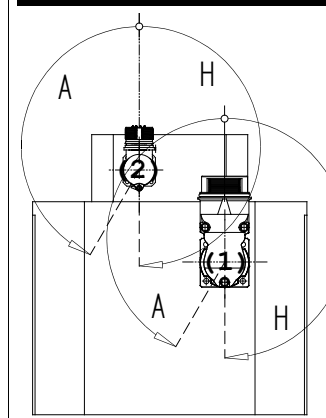
On the FKM2/4/6/8/9 series, the power connectors and those of feedback signals may be rotated making it easier to connect the cable when the installation conditions so require. The possible rotating angles are:



Connector	Motor	Amax	Hmax
Power · 1·	FKM2/4/6	150°	180°
	FKM2	150°	180°
Signal · 2·	FKM4	115°	110°
	FKM6	110°	105°

Note. Certain positions cannot be reached by rotating with the based mounted.

Approx. max. rotating torque. 8 N·m
Only 5 rotations are allowed in order to keep the degree of protection.



Connector	Motor	Amax	Hmax
Power · 1·	FKM8	200°	110°
	FKM9	200°	110°
Signal · 2·	FKM8	110°	105°
	FKM9	110°	105°

Note. Certain positions cannot be reached by rotating with the based mounted.

Approx. max. rotating torque. 8 N·m
Only 5 rotations are allowed in order to keep the degree of protection.

F- 3/6

Rotary connectors.



MANDATORY.

Do not try to exceed the indicated rotating angle values. We recommend to rotate both connectors only when necessary and very seldom. Remember that the more often it is rotated the less torque will be needed to rotate it.



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FKM6/V series

In the FKM6/V series on FKM66.□□A.□□.□□1.□□ models the power connectors and those of the fan may be rotated, making it easier to connect the cable when the installation conditions so require. However, this is not the case with the feedback signal connector, which must be kept fixed in the indicated position:

Note. Certain positions cannot be reached by rotating with the based mounted.

Approx. max. rotating torque. 8 N·m
Only 5 rotations are allowed in order to keep the degree of protection.

Connector	Motor	Amax	Hmax
Power ·1·	FKM6/V	150°	180°
Signal ·2·	FKM6/V	Keep it fixed in the position shown in the image	
Fan ·3·	FKM6/V	150°	180°

F- 3/7

Rotating connectors ·1· and ·3·.
Keep the connector ·2· fixed in the indicated position.

MANDATORY.



Do not try to exceed the indicated rotating angle values. We recommend to rotate both connectors only when necessary and very seldom. Remember that the more often it is rotated the less torque will be needed to rotate it. Remember to keep the feedback connector ·2· fixed in the position shown in the image.



INFORMATION.

Remember that the feedback base connector ·2· is hidden under the lid. Remove the top lid of the motor to get to it.

3.

3-PHASE SERVOMOTORS. FKM
Rotary connectors

3.

3-PHASE SERVOMOTORS. FKM
Rotary connectors

FKM8/V series

On the FKM8/V series, the power connectors and those of the fan may be rotated making it easier to connect the cable when the installation conditions so require. But not so the feedback signal connector that must be kept fixed in the indicated position:

Note. Certain positions cannot be reached by rotating with the based mounted.
Approx. max. rotating torque. 8 N·m
Only 5 rotations are allowed in order to keep the degree of protection.

Connector	Motor	Amax	Hmax
Power ·1·	FKM8/V	200°	110°
Signal ·2·	FKM8/V	Keep it fixed in the position shown in the image	
Fan ·3·	FKM8/V	150°	180°

F- 3/8

Rotating connectors ·1· and ·3·.
Keep the connector ·2· fixed in the indicated position.



MANDATORY.

Do not try to exceed the indicated rotating angle values. We recommend to rotate both connectors only when necessary and very seldom. Remember that the more often it is rotated the less torque will be needed to rotate it. Remember to keep the feedback connector ·2· fixed in the position shown in the image.



INFORMATION.

Remember that the feedback base connector ·2· is hidden under the lid. Remove the top lid of the motor to get to it.

Note. The corresponding cable (not another one) must be plugged in each connector. Remember that each cable has a specific flexibility and, therefore, when rotating the with the cable connected, its maximum bending radius must not be exceeded connector; this maximum bending radius is given in the corresponding mechanical characteristics tables of the cables, see section **Cabling** of chapter **1. GENERAL CONCEPTS** of this manual.

3.6 Technical data

All the data supplied here are for winding over-temperature of $\Delta T=100$ K with a room temperature of $40^{\circ}\text{C}/104^{\circ}\text{F}$. The power cable shown in the table corresponds to motors without holding brake.

Non-ventilated FKM with “A” winding · 400 V AC ·

T- 3/7 Technical data of non-ventilated FKM servomotors with “A” winding and without brake.

nN	Mo	Mn	Motor model	Io	Pcal	POWER terminal strip of the MOTOR	POWER cable of the MOTOR*
1/min	N·m	N·m	FKM	A	kW		Nr of wires x mm ²
2000	9.0	7.8	43.20A.□□.□00.□□	3.9	1.9	MC-20/6	MPC-4x1.5
2000	11.6	9.2	44.20A.□□.□00.□□	4.6	2.4	MC-20/6	MPC-4x1.5
2000	12.5	11.0	63.20A.□□.□00.□□	5.3	2.6	MC-20/6	MPC-4x1.5
2000	16.5	13.6	64.20A.□□.□00.□□	6.5	3.4	MC-20/6	MPC-4x1.5
2000	23.5	16.7	66.20A.□□.□00.□□	10.5	4.9	MC-20/6	MPC-4x1.5
2000	23.5	16.7	66.20A.□□.□00.2□	9.4	4.9	MC-20/6	MPC-4x1.5
2000	32.0	25.0	82.20A.□□.□00.□□	13.2	6.7	MC-61/6	MPC-4x1.5
2000	41.0	32.0	83.20A.□□.□00.□□	17.0	8.6	MC-61/6	MPC-4x2.5
2000	52.0	38.0	84.20A.□□.□00.□□	21.5	10.9	MC-61/6	MPC-4x4
2000	74.0	46.0	85.20A.□□.□00.□□	29.3	15.5	MC-61/6	MPC-4x6
2000	68.0	56.0	94.20A.□□.□00.□□	25.4	14.2	MC-61/6	MPC-4x6
2000	93.0	70.0	95.20A.□□.□00.□□	33.1	19.5	MC-61/6	MPC-4x10
2000	115.0	85.0	96.20A.□□.□00.□□	42.1	24.0	MC-61/6	MPC-4x16
3000	3.2	2.6	22.30A.□□.□00.□□	2.4	1.0	MC-20/6	MPC-4x1.5
3000	6.3	4.6	42.30A.□□.□00.□□	4.6	1.9	MC-20/6	MPC-4x1.5
3000	9.0	6.5	43.30A.□□.□00.□□	6.2	2.8	MC-20/6	MPC-4x1.5
3000	11.6	7.4	44.30A.□□.□00.□□	8.2	3.6	MC-20/6	MPC-4x1.5
3000	11.6	7.4	44.30A.□□.□00.2□	7.0	3.6	MC-20/6	MPC-4x1.5
3000	8.9	7.3	62.30A.□□.□00.□□	7.1	2.8	MC-20/6	MPC-4x1.5
3000	12.5	9.5	63.30A.□□.□00.□□	10.3	3.9	MC-20/6	MPC-4x1.5
3000	16.5	11.4	64.30A.□□.□00.□□	12.1	5.2	MC-20/6	MPC-4x1.5
3000	23.5	12.1	66.30A.□□.□00.□□	16.4	7.3	MC-20/6	MPC-4x2.5
3000	32.0	20.0	82.30A.□□.□00.□□	19.8	10.1	MC-61/6	MPC-4x4
3000	41.0	21.0	83.30A.□□.□00.□□	27.1	12.9	MC-61/6	MPC-4x6
3000	52.0	17.0	84.30A.□□.□00.□□	32.2	16.3	MC-61/6	MPC-4x10
4000	9.0	4.5	43.40A.□□.□00.□□	9.4	3.8	MC-20/6	MPC-4x1.5
4000	11.6	4.8	44.40A.□□.□00.□□	10.7	4.9	MC-20/6	MPC-4x1.5
4000	8.9	6.9	62.40A.□□.□00.□□	9.3	3.7	MC-20/6	MPC-4x1.5
4000	12.5	6.6	63.40A.□□.□00.□□	16.2	5.2	MC-20/6	MPC-4x2.5
4000	16.5	6.6	64.40A.□□.□00.□□	16.2	6.9	MC-20/6	MPC-4x2.5
4000	32.0	12.0	82.40A.□□.□00.□□	26.4	13.4	MC-61/6	MPC-4x6
4500	0.54	0.48	12.45A.□□.□00.02	0.93	0.25	MC-20/6	MPC 4x1.5
4500	0.95	0.85	14.45A.□□.□00.02	1.15	0.45	MC-20/6	MPC 4x1.5
4500	6.3	3.5	42.45A.□□.□00.□□	6.9	2.9	MC-20/6	MPC-4x1.5
5000	3.2	2.0	22.50A.□□.□00.□□	4.0	1.7	MC-20/6	MPC-4x1.5
6000	1.7	0.8	21.60A.□□.□00.□□	2.8	1.1	MC-20/6	MPC-4x1.5
6000	3.2	1.5	22.60A.□□.□00.□□	4.5	2.0	MC-20/6	MPC-4x1.5
6000	6.3	1.9	42.60A.□□.□00.□□	8.5	3.9	MC-20/6	MPC-4x1.5
6000	8.9	3.4	62.60A.□□.□00.□□	13.1	5.6	MC-20/6	MPC-4x1.5

* When “brake” option is available add the factor +(2x1) to the cable name.
 For example, for FKM22.30A.□□.□1□.□□ models (with standard brake) or FKM44.20A.□□.□2□.□□ (with extra-torque brake), the power cable is MPC-4x1.5+(2x1).



3-PHASE SERVOMOTORS. FKM
Technical data



FXM/FKM

Ref.1703

Ventilated FKM with “A” winding · 400 V AC ·

T- 3/8 Technical data of ventilated FKM servomotors with “A” winding and without brake.

nN	Mo	Mn	Motor model	Io	Pcal	POWER terminal strip of the MOTOR	POWER cable of the MOTOR*	POWER terminal strip of the FAN
1/min	N·m	N·m	FKM/V	A	kW		Nr of wires x mm ²	
2000	32.0	27.0	66.20A.□□.□01.2□	12.8	6.7	MC-20/6	MPC-4x1.5	MC-20/6
2000	80.0	68.0	84.20A.□□.□01.□□	33.0	16.7	MC-61/6	MPC-4x10	MC-20/6
2000	100.0	88.0	85.20A.□□.□01.□□	39.6	20.9	MC-61/6	MPC-4x10	MC-20/6
3000	32.0	23.5	66.30A.□□.□21.□□	22.3	10.0	MC-20/6	MPC-4x4+(2x1)	MC-20/6
3000	60.0	45.0	83.30A.□□.□01.□□	39.6	18.8	MC-61/6	MPC-4x10	MC-20/6
3000	80.0	60.0	84.30A.□□.□01.□□	49.5	25.1	MC-61/6	MPC-4x16	MC-20/6
3000	91.0	57.0	85.30A.□□.□01.□□	60.0	28.6	MC-61/6	MPC-4x25	MC-20/6
4000	40.0	31.0	82.40A.□□.□01.□□	33.0	16.7	MC-61/6	MPC-4x10	MC-20/6

* When “brake” option is available add the factor +(2x1) to the cable name.
E.g. for the FKM82.40A.□□.□11.□□ model (with standard brake) the power cable is MPC-4x10+(2x1).

Non-ventilated FKM with “F” winding · 220 V AC ·

T- 3/9 Technical data of non-ventilated FKM servomotors with “F” winding and without brake.

nN	Mo	Mn	Motor model	Io	Pcal	POWER terminal strip of the MOTOR	POWER cable of the MOTOR*
1/min	N·m	N·m	FKM	A	kW		Nr of wires x mm ²
2000	12.5	11.0	63.20F.□□.□00.□□	11.7	2.6	MC-20/6	MPC-4x1.5
2000	16.5	13.7	64.20F.□□.□00.□□	14.3	3.4	MC-20/6	MPC-4x2.5
2000	23.5	16.7	66.20F.□□.□00.□□	19.2	4.9	MC-20/6	MPC-4x4
3000	3.2	2.6	22.30F.□□.□00.□□	4.5	1.0	MC-20/6	MPC-4x1.5
3000	6.3	4.6	42.30F.□□.□00.□□	8.5	1.9	MC-20/6	MPC-4x1.5
3000	9.0	6.5	43.30F.□□.□00.□□	13.5	2.8	MC-20/6	MPC-4x2.5
3000	11.6	7.4	44.30F.□□.□00.□□	15.6	3.6	MC-20/6	MPC-4x2.5
3000	8.9	7.5	62.30F.□□.□00.□□	13.1	2.8	MC-20/6	MPC-4x1.5
3000	12.5	9.5	63.30F.□□.□00.□□	16.6	3.9	MC-20/6	MPC-4x2.5
3000	16.5	11.2	64.30F.□□.□00.□□	20.4	5.1	MC-20/6	MPC-4x2.5
4000	8.9	6.7	62.40F.□□.□00.□□	16.4	3.7	MC-20/6	MPC-4x2.5
4500	6.3	3.2	42.45F.□□.□00.□□	12.4	2.9	MC-20/6	MPC-4x1.5
5000	3.2	1.9	22.50F.□□.□00.□□	7.2	1.7	MC-20/6	MPC-4x1.5
6000	1.7	0.8	21.60F.□□.□00.□□	4.7	1.1	MC-20/6	MPC-4x1.5

* When “brake” option is available add the factor +(2x1) to the cable name.
E.g. for the FKM22.30F.□□.□10.□□ model (with standard brake) the power cable is MPC-4x1.5+(2x1).

3.
3-PHASE SERVOMOTORS. FKM
Technical data



FXM/FKM

Ref.1703

3.7 Options / expansions

Holding brake

FKM servomotors offer an optional holding brake that applies friction on to the shaft. Its purpose is to immobilize or lock vertical axes, not to brake a moving axis.



MANDATORY.

The supply of the holding brake shall fulfill requirements of low voltage limited energy secondary circuits DVC A according IEC/UL 61800-5-1.



INFORMATION.

The FKM96 motor model does not offer the holding brake option.



WARNING.

NEVER use this brake to stop a moving axis.

Its main characteristics depending on the type of brake are:

T- 3/10 Technical data of the standard holding brake. Unlocking rated voltage: 22/26 V DC.

Motor series	Holding torque		Rated power absorbed		on/off time	Inertia	Approx. mass	
	N·m	lbf·ft	W	hp	ms	kg·cm ²	kg	lb
FKM1	2.0	1.47	11	0.014	6/25	0.068	0.15	0.33
FKM2	4.5	3.32	12	0.016	7/35	0.18	0.30	0.66
FKM4*	9.0	6.64	18	0.024	7/40	0.54	0.48	1.06
FKM6*	18.0	13.28	24	0.032	10/50	1.66	0.87	1.92
FKM8/8V	80.0	59.00	35	0.046	53/97	31.8	4.10	9.03
FKM9	145.0	106.94	50	0.067	65/190	0.53	5.35	11.79

Note. The max. turning speed of the brake for the FKM1/2/4/6 series is 10000 rev/min and 8000 rev/min for the FKM8/8V/9 series.

* except for the references indicated in the table below.

Technical data of the extra-torque holding brake. Unlocking rated voltage: 22/26 V DC.

Motor models	Holding torque		Rated power absorbed		on/off time	Inertia	Approx. mass	
	N·m	lbf·ft	W	hp	ms	kg·cm ²	kg	lb
FKM44. ●●A...□2□.□□	18.0	13.28	24	0.032	10/50	1.66	0.87	1.92
FKM66. ●●A...□2□.□□	36.0	26.55	26	0.034	22/90	5.56	1.60	3.52

Note. The max. turning speed of the extra-torque holding brake is 10000 rev/min.



MANDATORY.

- A. Never use the brake to stop a moving axis.
- B. Never exceed its maximum turning speed.
- C. Never apply a voltage higher than top V DC value given in the table that would prevent the shaft from turning. Remember that the axis is released when applying a voltage within the range given in the table for the rated unlocking voltage.
- D. When installing the motor, make sure that the brake fully releases the shaft before making it turn for the first time.

Fan

Optionally:

- FKM6 series · only in FKM66.□□A.□□.□□1.□□ models·

T- 3/11 Technical data of the fan. Rated voltage: 24 V DC.

Motor series	Voltage	Ambient temperature min./max.	Power input	Flow	Noise emission	Speed
Units	V DC	°C	W	m³/h	dB(A)	1/min
FKM6/V	12 ... 28	-20/+75	5	170	45	2800

- FKM8 series · in FKM8□.□□A.□□.□□1.□□ models·

T- 3/12 Technical data of the fan. Rated voltage: 230 V AC.

Motor series	Frequency	Voltage	Current I _{max.}	Power P _{max.}	Flow	Noise emission	Speed
Units	Hz	V AC	A	W	m³/h	dB(A)	1/min
FKM8/V	50	230-240	0.23	55	127	55	2690
	60	230-277	0.24	67	148	59	3040

3.

3-PHASE SERVOMOTORS. FKM
Options / expansions



FXM/FKM

Ref.1703

3.8 Connections

FKM1/2/4/6/6V series

The power connection of the servomotor is made through a straight mail base connector that ensures a sealing degree of IP 65. All motor models of these series have the same power base connector, MC-20/6.

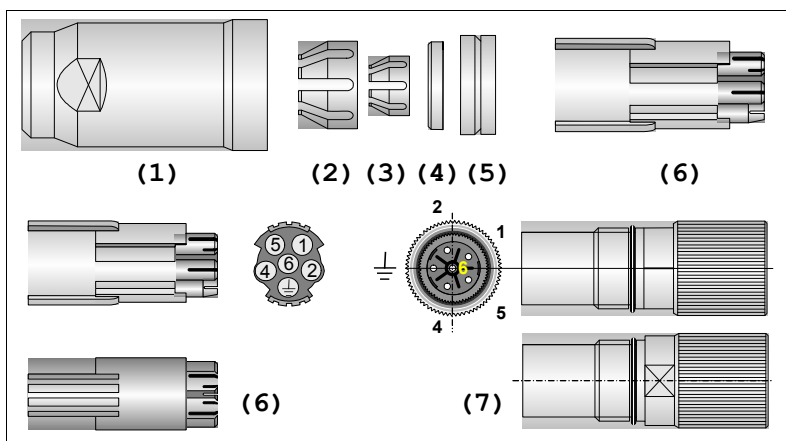
Note. For servomotors in these series, FAGOR supplies, upon request, the MC-20/6 female connector (disassembled) in a plastic bag with 6 pins. Prior to connection, the user must create a power cable by mounting this connector on a 4-wire MPC-4x□ cable (if the motor does not have a brake) or 6-wire MPC-4x□+(2x1) cable (if the motor has a brake). These cables are also supplied by FAGOR (upon request) in meters.

Once the power cable has been assembled, it is connected by screwing the female connector MC-20/6 of the power cable into the power base connector of the motor.

Instructions for assembling the MC-20/6 connector on the MPC cable

Use the figures to help you and proceed as follows:

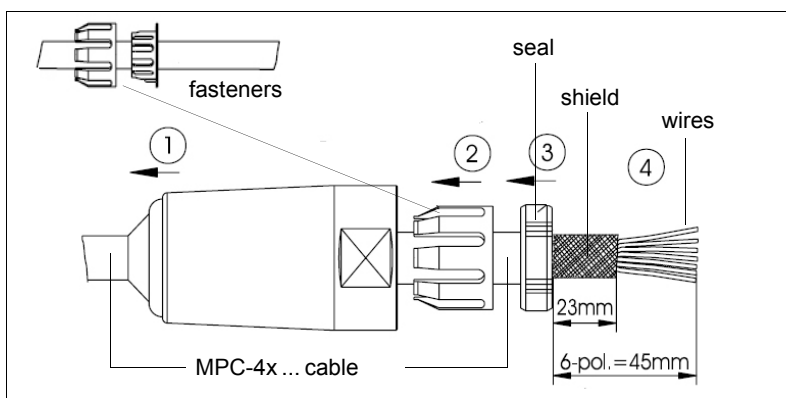
- Unscrew piece 7 from piece 1 of the MC-20/6 connector provided in the bag of accessories. You will have two sets of pieces:
 - Set 1 made up of pieces 1, 2, 3, 4 and 5.
 - Set 2 made up of pieces 6 and 7.



F- 3/9

Exploded view of MC-20/6 connector.

- Insert the power cable whose reference is MPC-4x□ (for brakeless motor) or MPC-4x□+(2x1) (for motor with brake) into the holes of the pieces shown in the figure in the order shown.



F- 3/10

Assembling the MC-20/6 connector to the MPC power cable.

- Now strip the cable with the values indicated in the previous figure for the shield and for the wires.
- Use a screwdriver to separate piece 5 into two pieces 5a and 5b. Insert the wires and the whole length of the stripped shield through the holes of the two pieces leaving the shield between them as shown in figure **F- 3/11**.

3.

3-PHASE SERVOMOTORS. FKM
Connections

(1)



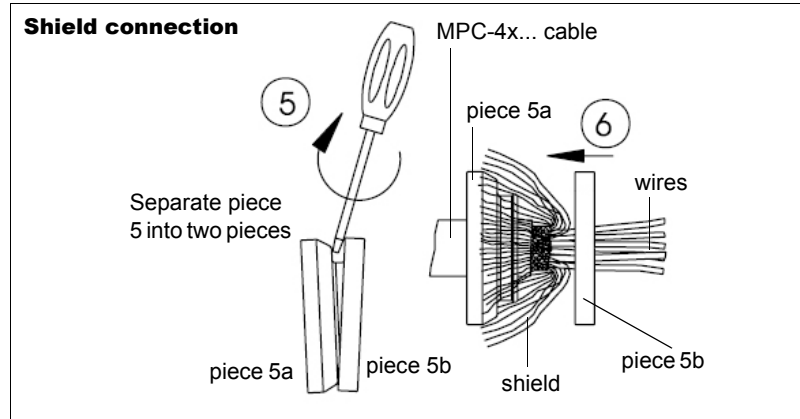
FXM/FKM

Ref.1703

3.

3-PHASE SERVOMOTORS. FKM
Connections

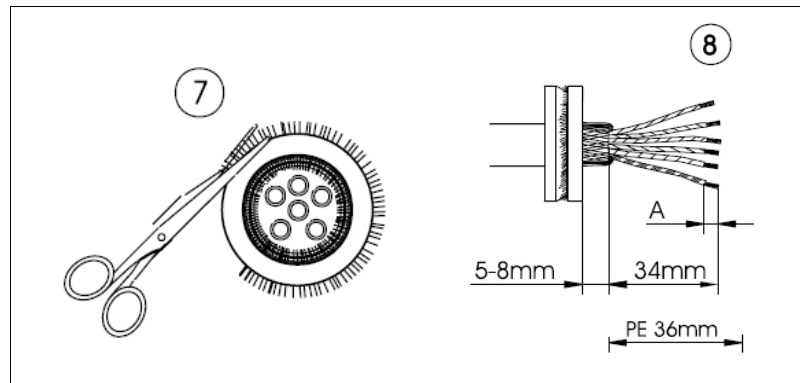
- Spread the shield back onto piece 5a and press piece 5b against the previous one securing the shield between them thus making good contact shield-piece 5. See figure F- 3/11.



F- 3/11

Shield connection.

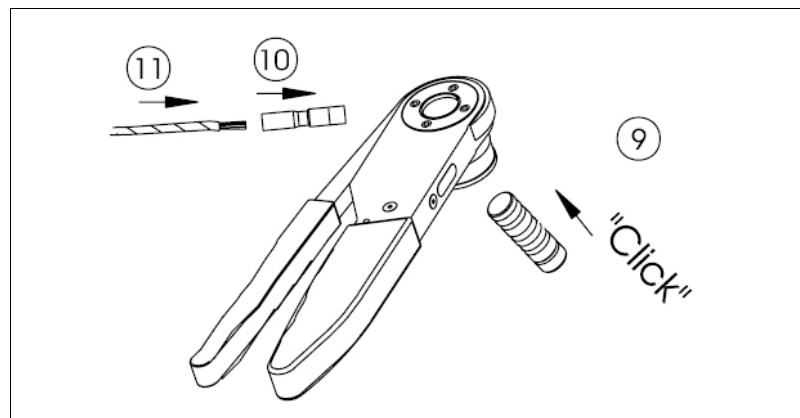
- Now cut off the excess shield with scissors along the joint of both pieces 5a and 5b.



F- 3/12

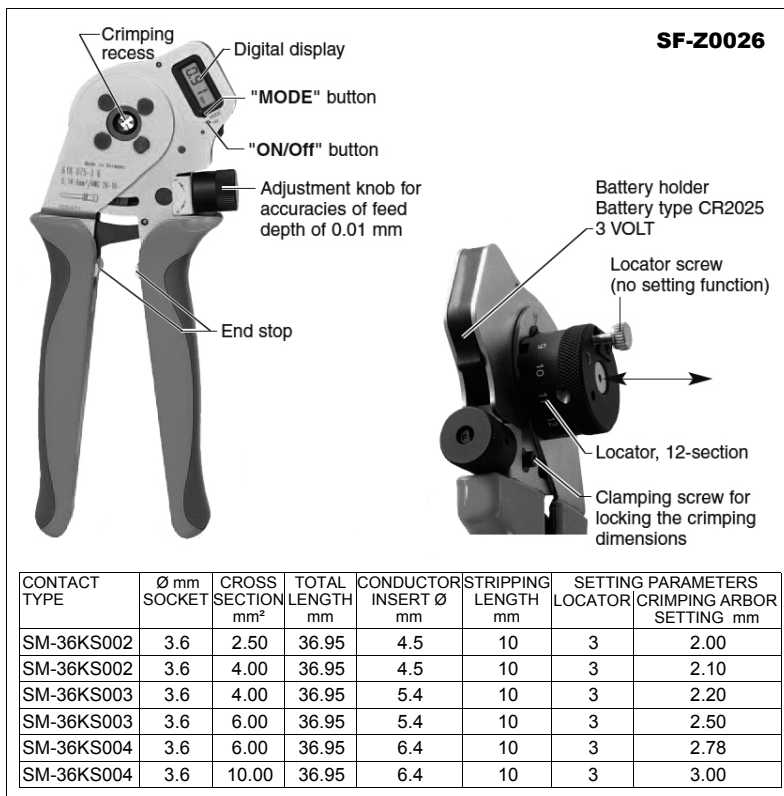
Removal of excess shield.

- Crimp each pin (supplied in the bag of accessories) at each stripped end of the 4 or 6 wires (accordingly).



F- 3/13

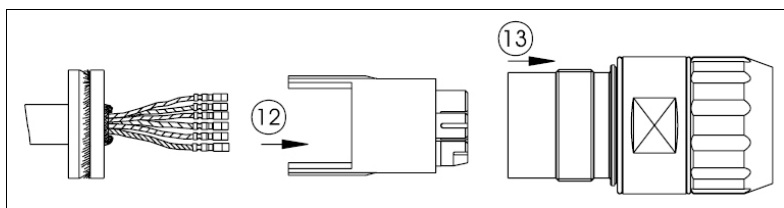
Pin crimping.



F- 3/14

"SF-Z0026" tool from Phoenix Contact.

- Extract piece 6 located inside piece 7 and insert each wire one by one with its pin already crimped into the corresponding hole (it must be inserted in the order shown in figure F- 3/15 with Nr. 12) all the way in. Observe that each hole is numbered according to figure F- 3/9.



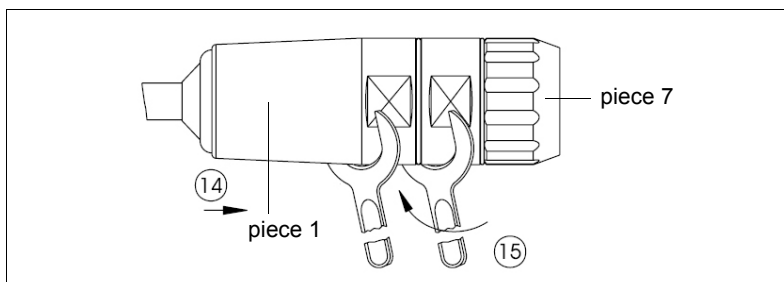
F- 3/15

Channeling the wires already crimped.

Note. Make sure that the signal transmitted by each wire corresponds with the hole numbered according to the table in figure F- 3/18.

- Finally screw pieces 1 and 7. All the pins will be guided internally and properly to their relevant output pins of the connector. All the pieces will fall perfectly into place inside. Use the right tools to properly screw both pieces.

Note. Observe that the crimped pins do not stick out once the cable has been assembled to the connector.



F- 3/16

Final power cable assembling step.

3.

3-PHASE SERVOMOTORS. FKM Connections



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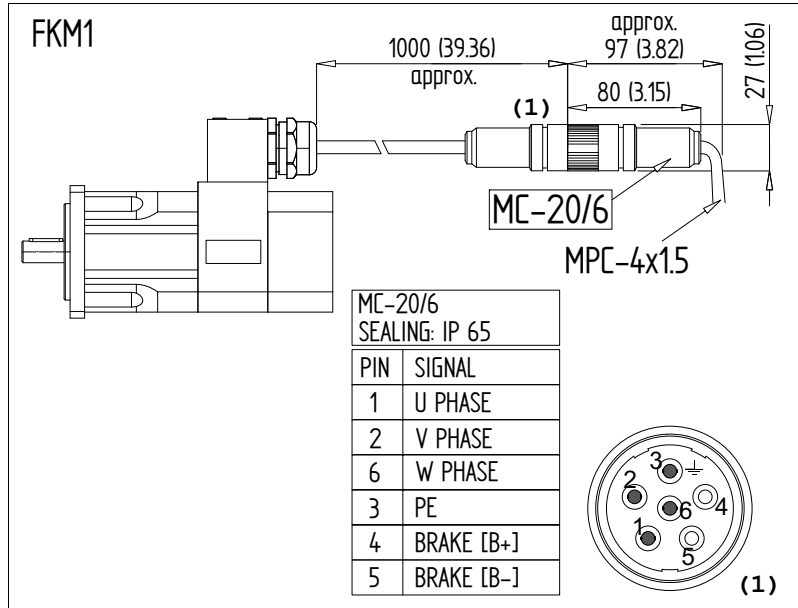
FXM/FKM

Ref.1703

3.

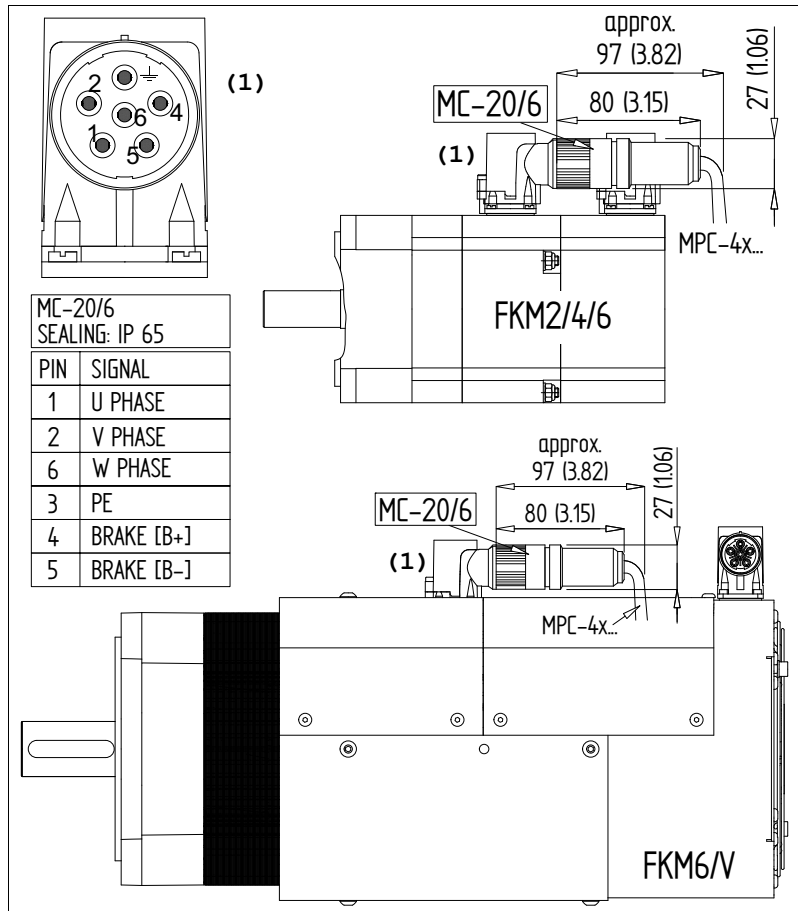
3-PHASE SERVOMOTORS. FKM
Connections

Power base connector pin-out



F- 3/17

Power base connector pinout. FKM1 series.



F- 3/18

Power base connector pin-out. FKM2/4/6/6V series.



FXM/FKM

Ref.1703



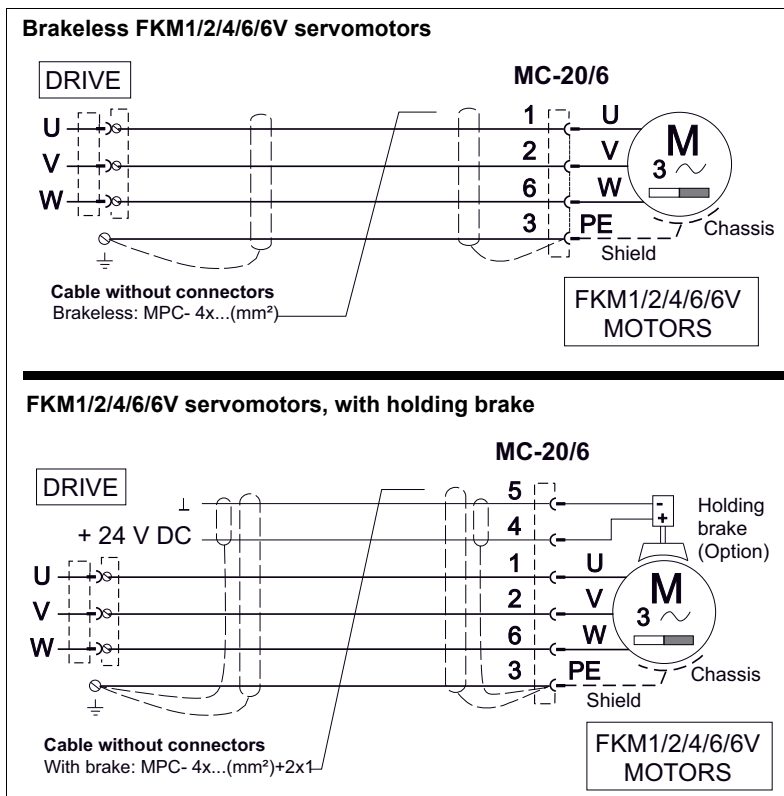
MANDATORY.

Remember that before connecting the power cable, it must be assembled. FAGOR supplies, upon request and in meters, the MPC-4x□+(2x1) cable and the MC-20/6 connector, also upon request, that must be assembled to it. Proceed as described earlier. See figure F- 3/9.

Once the power cable is put together, proceed with the connection.

Motor power connection

The power connection between the motor and the drive will be made using the MPC power cable as shown in the diagram:



F- 3/19

Power connection diagram between an FKM1/2/4/6/6V servomotor and a drive.



WARNING.

Never connect the servomotor directly to three-phase mains. A direct connection will destroy it.



MANDATORY.

When connecting the drive module and the corresponding FKM motor, connect the U terminal of the power connector to the terminal corresponding to the U phase (pin 1) of the motor. Do the same for terminals V-V (pin 2), W-W (pin 6) and PE-PE (pin 3).

If the motor has a holding brake, connect pin 4 to a 24 V DC supply and pin 5 to a 0 V DC supply from an outside stabilized power supply.

In order for the system to comply with the European Directive 2014/30/EU on Electromagnetic Compatibility, the cable grouping the wires that make up the power cable must be shielded. *The shield must be connected to ground at the drive end and at the motor end* as shown in figure F- 3/19. This condition is a must.

3.

3-PHASE SERVOMOTORS. FKM Connections



FXM/FKM

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3.

Holding brake connection

To govern the optional holding brake of FKM1/2/4/6 series axis servomotors they must be supplied with 24 V DC.

The power consumed by them and their main characteristics have already been described in the **T- 3/10** table.



WARNING.

Power the holding brake with a power supply that provides a continuous, stabilized voltage of 24 V DC. To ensure safe operation in the event of large temperature variations, the coil must be powered with stabilized direct current.

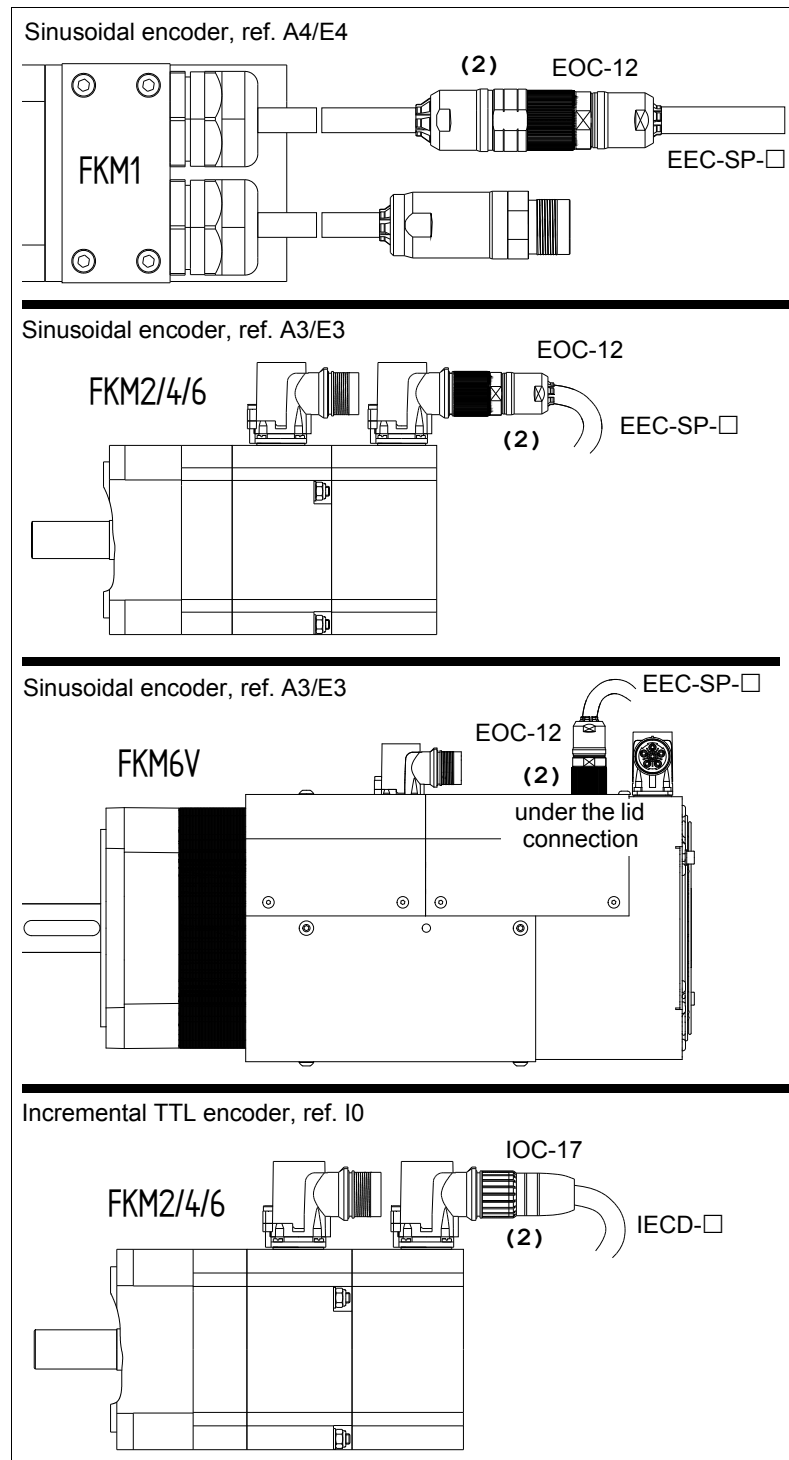
See detailed in section, **10.16 Holding brake connection diagram** of chapter **10. CONNECTION DIAGRAMS** of the `·man_dds_hard.pdf·` manual.

Connection of the motor feedback device

In the FKM1 series, the feedback is obtained by using a 1 Vpp of 128 ppt (refs. A4/E4).

In the FKM2/4/6/6V (A winding), the feedback is provided by a 1 Vpp of 1024 ppt sinusoidal encoder (refs. A3/E3) and in the FKM2/4/6 series (F winding) it is an incremental 2500 ppt TTL encoder (ref. I0).

The motor feedback device is connected to the drive through the base -2- connector of the motor. See figure **F- 3/20**.



F- 3/20

Motor feedback base connector. FKM1/2/4/6/6V series.

The pinout information of this feedback connector -2-, depending on the feedback device integrated into the motor, is provided in chapter 1. **GENERAL CONCEPTS** of this manual.

To transmit the feedback signals from the motor feedback device to the drive, use (as appropriate) one of the following cables with FAGOR connectors.

3.

3-PHASE SERVOMOTORS. FKM
Connections

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3.

3-PHASE SERVOMOTORS. FKM
Connections



Sinusoidal encoder. EEC-SP-□ cable

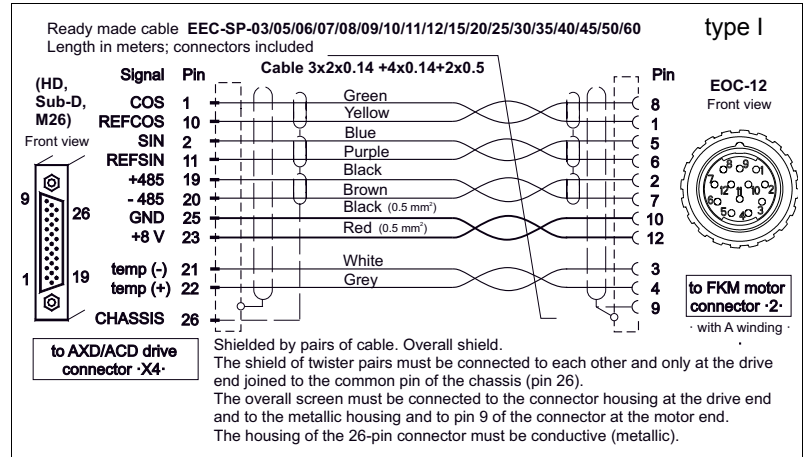
INFORMATION.

Using the EEC-SP-□ cable as feedback cable ensures compliance with the European Directive 2014/30/EU on Electromagnetic Compatibility.

FAGOR supplies the EEC-SP-□ feedback cable upon request.

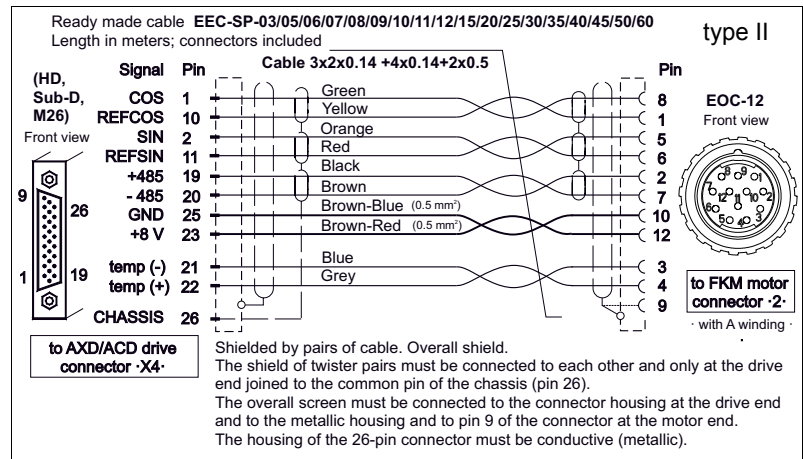
If you use to manufacture you own cable, read the following instructions carefully to understand the diagrams correctly. Observe that there are two cables indicated as type I and type II. Any of the cables shown is valid as feedback cable for a sinusoidal encoder. Only the wire colors are different, the connections are the same.

Here are the diagrams of the two cables respecting the colors of the wires supplied by FAGOR upon request.



F- 3/21

Encoder connection EEC-SP-□. Cable type I.



F- 3/22

Encoder connection EEC-SP-□. Cable type II.

Note. This cable may be connected to AXD/ACD/MMC and CMC drives as well as to ACS-D-□H or MCS-□H drives. For further details on these drives, please refer to the corresponding manual.



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Incremental TTL encoder. IECD-□ cable

FAGOR supplies the IECD-□ feedback cable upon request. If you use to manufacture you own cable, read the following instructions carefully to understand the diagrams correctly.

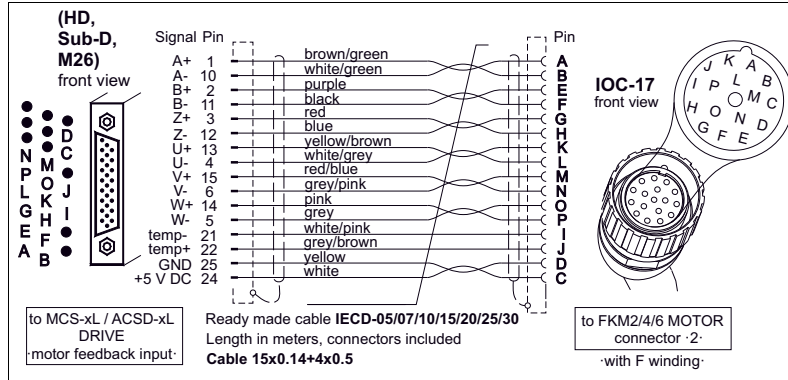


INFORMATION.

Please note that the letters must be interpreted as positions when looking at the front of the unit. It is recommended to maintain the correspondence between cable color and the corresponding signal to provide the desired differential effect between complementary signals.

3.

3-PHASE SERVOMOTORS. FKM
Connections



F- 3/23

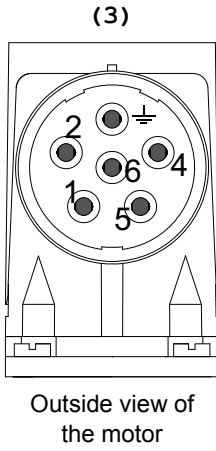
Incremental TTL encoder connection.

The incremental TTL encoder only comes on FXM servomotors with F winding (220 V AC) that will be governed by drives whose references are ACSD-□L or MCS-□L.

Note. For further details on these drives, please see the corresponding manual.

3.

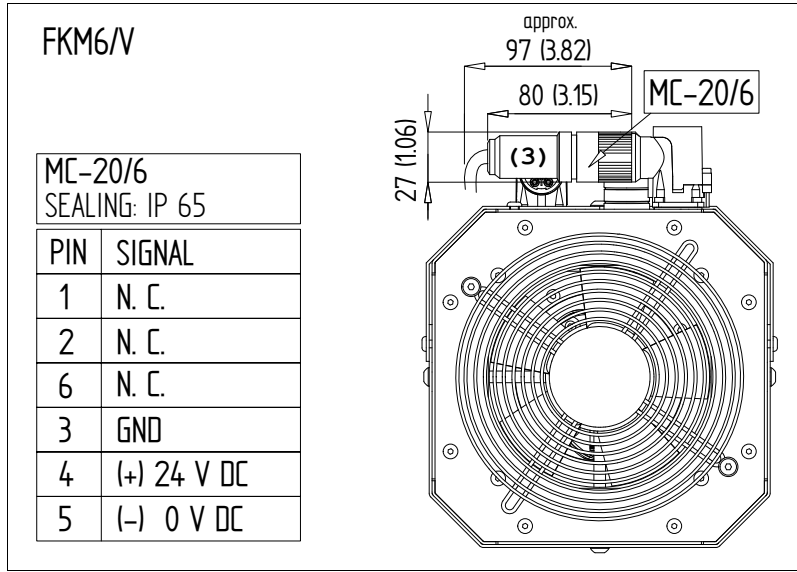
3-PHASE SERVOMOTORS. FKM
Connections



Fan connection

This connector is available on the FKM66 models of the FKM6/V series, which are the only ones with the fan option.

Fan power base connector pinout



F- 3/24

Fan power base connector pinout.



MANDATORY.

Remember that before connecting the fan power cable, it must be assembled. Get a 2x1.5+G section cable and mount the MC-20/6 connector supplied by FAGOR upon request. Proceed following the MC-20/6 connector assembling instructions See figure **F- 3/9** and followings.

Once the fan power cable has been put together, connect it to the connectorconector '3' of the ventilated motor.

FKM8/8V/9 series

The power connection of the servomotor is made through a straight mail base connector that ensures a sealing degree of IP 67 when locked.

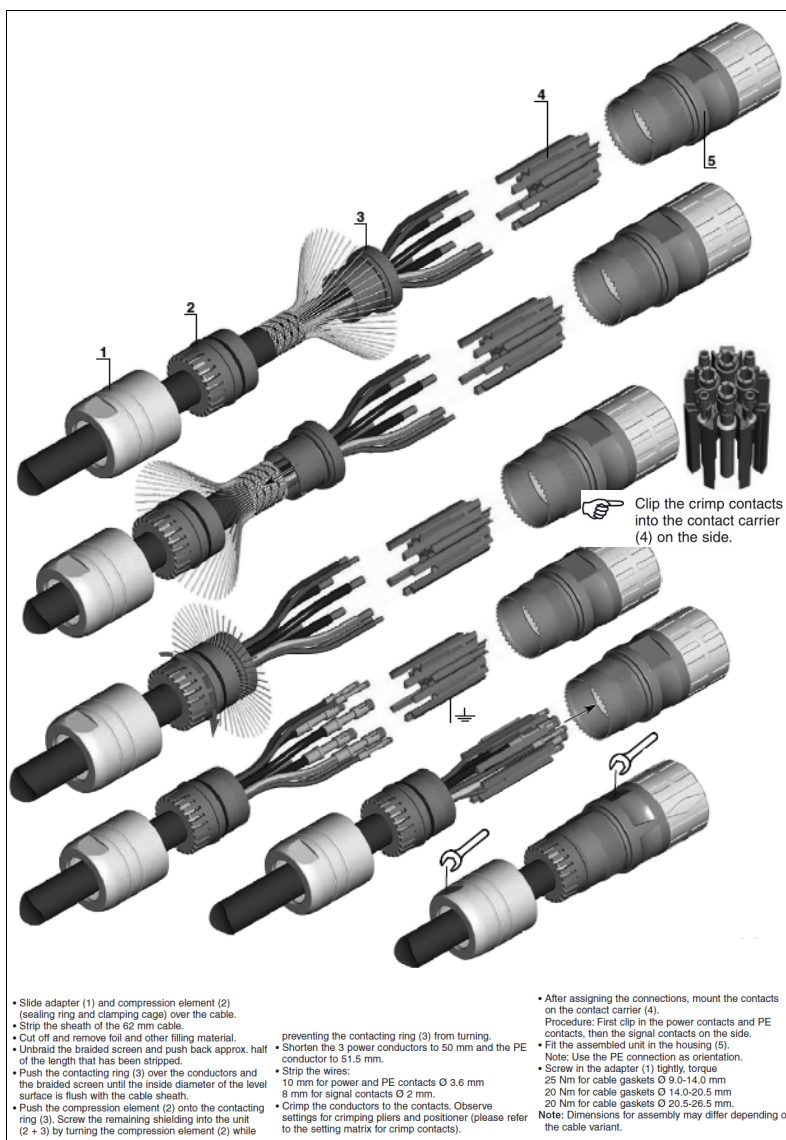
All models of these motor series have the same power base connector, MC-61/6.

Note. For servomotors in these series, FAGOR supplies, upon request, the MC-61/6 female connector in a plastic bag with 6 pins. Before connecting it, the user must assemble the power cable mounting this connector in a 4-wire cable MPC-4x□ (if the motor does not have a brake) or a 6-wire cable MPC-4x□+(2x1) (if the motor has a brake). These cables are also supplied by FAGOR (upon request) in meters.

Once the power cable has been assembled, it is connected by screwing the female connector **MC-61/6** of the power cable into the power base connector of the motor.

Assembly instructions for connecting the MC-61/6 connector on the MPC cable

Use the figure to help you and proceed as follows:



- Slide adapter (1) and compression element (2) (sealing ring and clamping cage) over the cable.
- Strip the sheath of the 62 mm cable.
- Cut off and remove foil and other filling material.
- Unbraid the braided screen and push back approx. half of the length that has been stripped.
- Push the contacting ring (3) over the conductors and the braided screen until the inside diameter of the level surface is flush with the cable sheath.
- Push the compression element (2) onto the contacting ring (3). Screw the remaining shielding into the unit (2 + 3) by turning the compression element (2) while preventing the contacting ring (3) from turning.
- Shorten the 3 power conductors to 50 mm and the PE conductor to 51.5 mm.
- Strip the wires:
 - 10 mm for power and PE contacts Ø 3.6 mm
 - 8 mm for signal contacts Ø 2 mm.
- Crimp the conductors to the contacts. Observe settings for crimping pliers and positioner (please refer to the setting matrix for crimp contacts).
- After assigning the connections, mount the contacts on the contact carrier (4).
- Procedure: First clip in the power contacts and PE contacts, then the signal contacts on the side.
- Fit the assembled unit in the housing (5).
- Note: Use the PE connection as orientation.
- Screw in the adapter (1) tightly, torque
 - 25 Nm for cable gaskets Ø 9.0-14.0 mm
 - 20 Nm for cable gaskets Ø 14.0-20.5 mm
 - 20 Nm for cable gaskets Ø 20.5-26.5 mm.
- Note: Dimensions for assembly may differ depending on the cable variant.

F- 3/25

Assembling the MC-61/6 power connector to the cable MPC-4x....

3.

3-PHASE SERVOMOTORS. FKM
Connections



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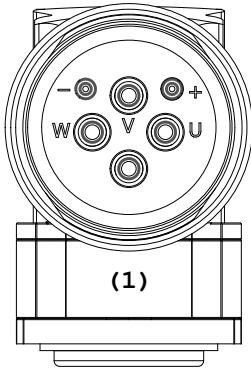
FXM/FKM

Ref.1703

3.

3-PHASE SERVOMOTORS. FKM
Connections

2+3+PE

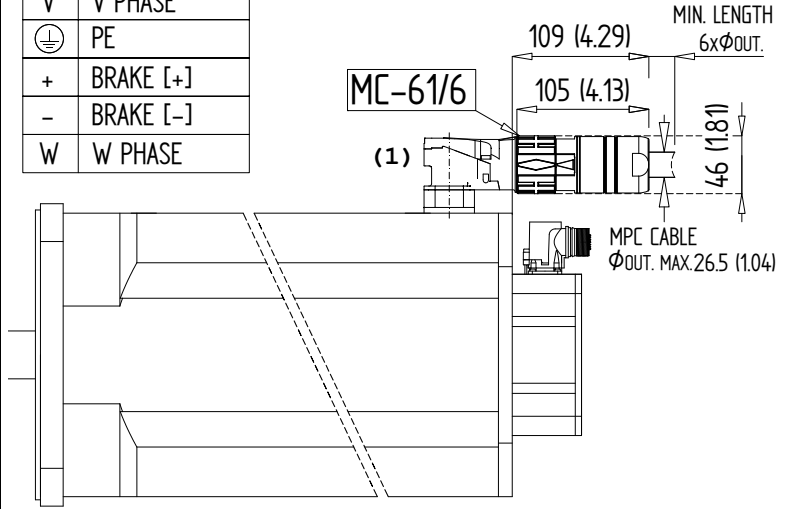


(1)
Outside view of the motor power connector

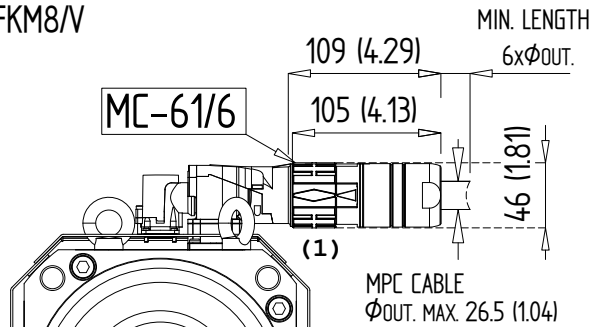
Power base connector pinout

MC-61/6	
SEALING: IP 67	
WHEN LOCKED	
PIN	SIGNAL
U	U PHASE
V	V PHASE
⊕	PE
+	BRAKE [+]
-	BRAKE [-]
W	W PHASE

FKM8/FKM9



FKM8/V



MC-61/6	
SEALING: IP 67	
WHEN LOCKED	
PIN	SIGNAL
U	U PHASE
V	V PHASE
⊕	PE
+	BRAKE [+]
-	BRAKE [-]
W	W PHASE

F- 3/26

Power base connector pinout. FKM8/8V/9 series.

MANDATORY.

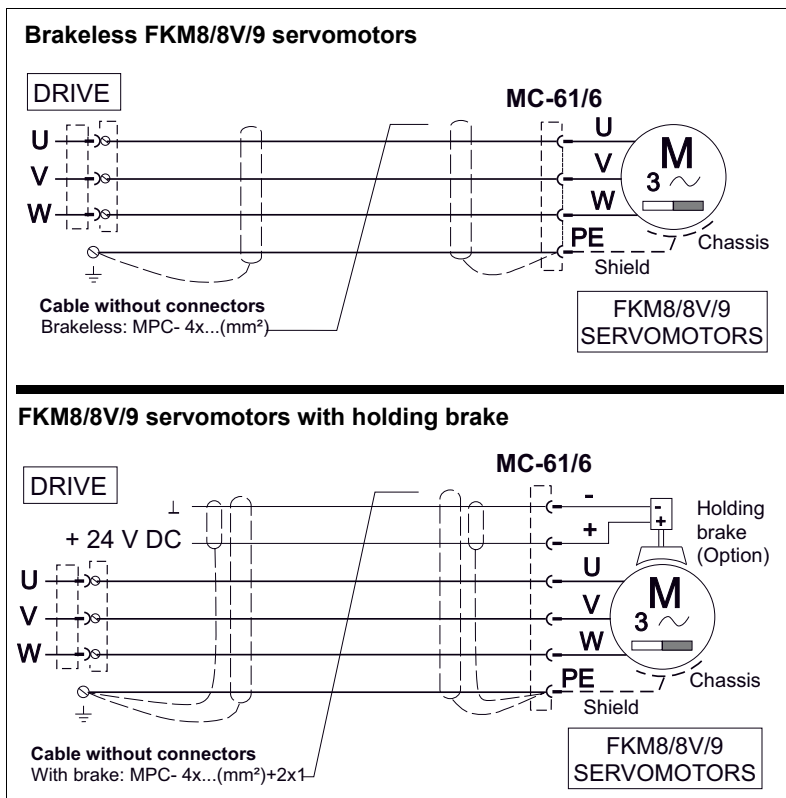
Remember that before connecting the power cable, it must be assembled. FAGOR supplies, upon request and in meters, the MPC-4x□+(2x1) cable and the MC-61/6 connector, also upon request, that must be assembled to it. Proceed as described earlier. See figure **F- 3/25**.



Once the power cable is put together, proceed with the connection.

Motor power connection

The power connection between the motor and the drive will be made using the MPC power cable as shown in the diagrams:



F- 3/27

Power connection diagram between an FKM8/8V/9 servomotor and a drive.



WARNING.

Never connect the servomotor directly to three-phase mains. A direct connection will destroy it.



MANDATORY.

When connecting the drive module to the corresponding FKM motor, connect the U terminal of the drive module power connector to the terminal corresponding to the U phase of the motor. Proceed the same way for terminals V-V, W-W and PE-PE. If the motor has a holding brake, connect the (+) terminal to a 24 V DC supply and the (-) terminal to a 0 V DC supply from an outside power source.

In order for the system to comply with the European Directive 2014/30/EU on Electromagnetic Compatibility, the cable grouping the wires that make up the power cable must be shielded. *The shield must be connected to ground at the drive end and at the motor end* as shown in figure F- 3/27. This condition is a must.



3-PHASE SERVOMOTORS. FKM Connections



FXM/FKM

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3-PHASE SERVOMOTORS. FKM
Connections

Holding brake connection

Governing the holding brake optionally carried by axis servomotor models FKM8 (all models), FKM8/V as well as FKM94 and FKM95 models requires 24 V DC. The power consumed by them and their main characteristics have already been described in the **T- 3/10** table.



WARNING.

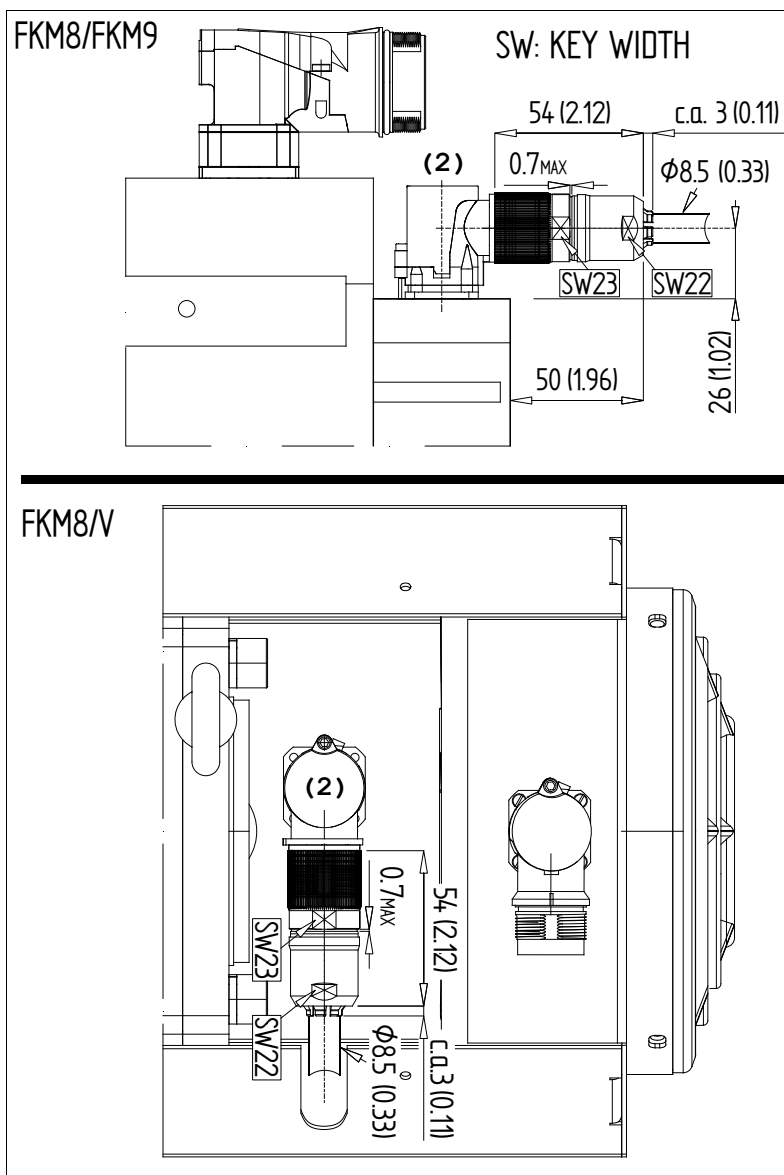
Power the holding brake with a power supply that provides a continuous, stabilized voltage of 24 V DC. To ensure safe operation in the event of large temperature variations, the coil must be powered with stabilized direct current.

See detailed in section **10.16 Holding brake connection diagram** of chapter **10. CONNECTION DIAGRAMS** of the `·man_dds_hard.pdf` manual.

Connection of the motor feedback device

In the FKM8/8V/9 series, the feedback device is a 1Vpp of 1024 ppt sinusoidal encoder (refs. A3/E3).

The motor feedback device is connected to the drive through the base ·2· connector of the motor. See figure F- 3/28.



F- 3/28

Motor feedback base connector. FKM8/8V/9 series.

The pinout information of this feedback connector ·2·, depending on the feedback device integrated into the motor, is provided in chapter 1. **GENERAL CONCEPTS** of this manual.



INFORMATION.

On FKM8/V models, the feedback base connector ·2· is hidden under the lid. Remove the top lid of the motor to get to it.

To take the feedback signals from the motor feedback device to the drive, use one of the following cables with connectors supplied by FAGOR.



3.

3-PHASE SERVOMOTORS. FKM
Connections

Sinusoidal encoder. EEC-SP-□ cable

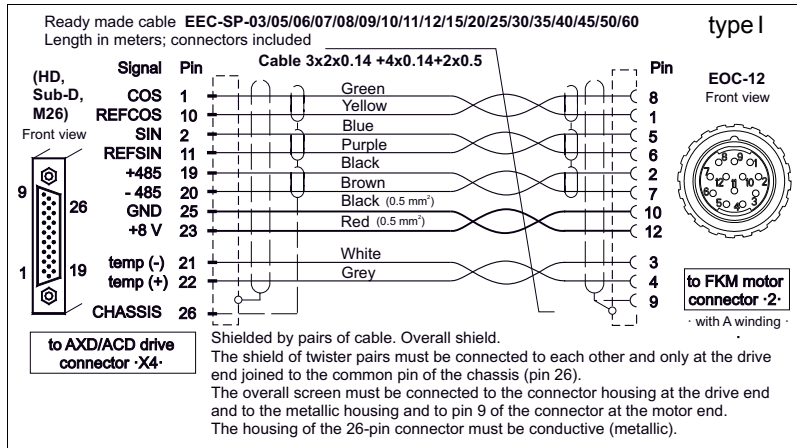
INFORMATION.

Using the EEC-SP-□ cable as feedback cable ensures compliance with the European Directive 2014/30/EU on Electromagnetic Compatibility.

FAGOR supplies the EEC-SP-□ feedback cable upon request.

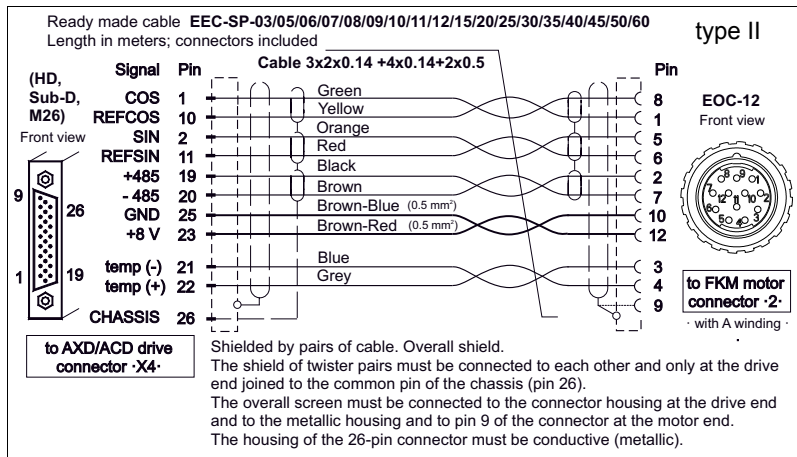
If you use to manufacture you own cable, read the following instructions carefully to understand the diagrams correctly. Observe that there are two cables indicated as type I and type II. Any of the cables shown is valid as feedback cable for a sinusoidal encoder. Only the wire colors are different, the connections are the same.

Here are the diagrams of the two cables respecting the colors of the wires supplied by FAGOR upon request.



F- 3/29

Encoder connection EEC-SP-□. Cable type I.



F- 3/30

Encoder connection EEC-SP-□. Cable type II.



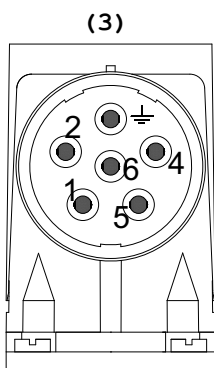
FXM/FKM

Ref.1703

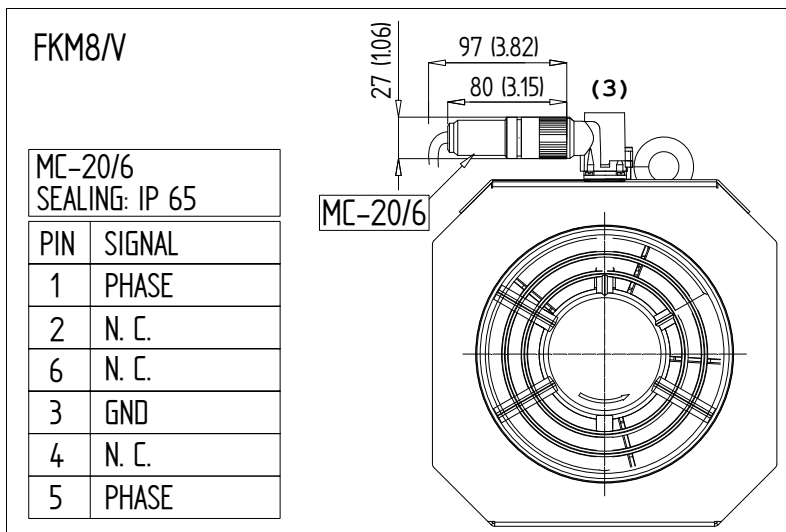
Fan connection

This connector is available on models of the FKM8/V series that are the only ones having the fan option.

Fan power base connector pinout



Outside view of the motor



F- 3/31

Fan power base connector pinout.



MANDATORY.

Remember that before connecting the fan power cable, it must be assembled. Get a 2x1.5+G section cable and mount the MC-20/6 connector supplied by FAGOR upon request. Proceed following the MC-20/6 connector assembling instructions See figure F- 3/9 and followings.

Once the fan power cable has been put together, connect it to the connectorconnector ·3· of the ventilated motor.



3-PHASE SERVOMOTORS. FKM
Connections

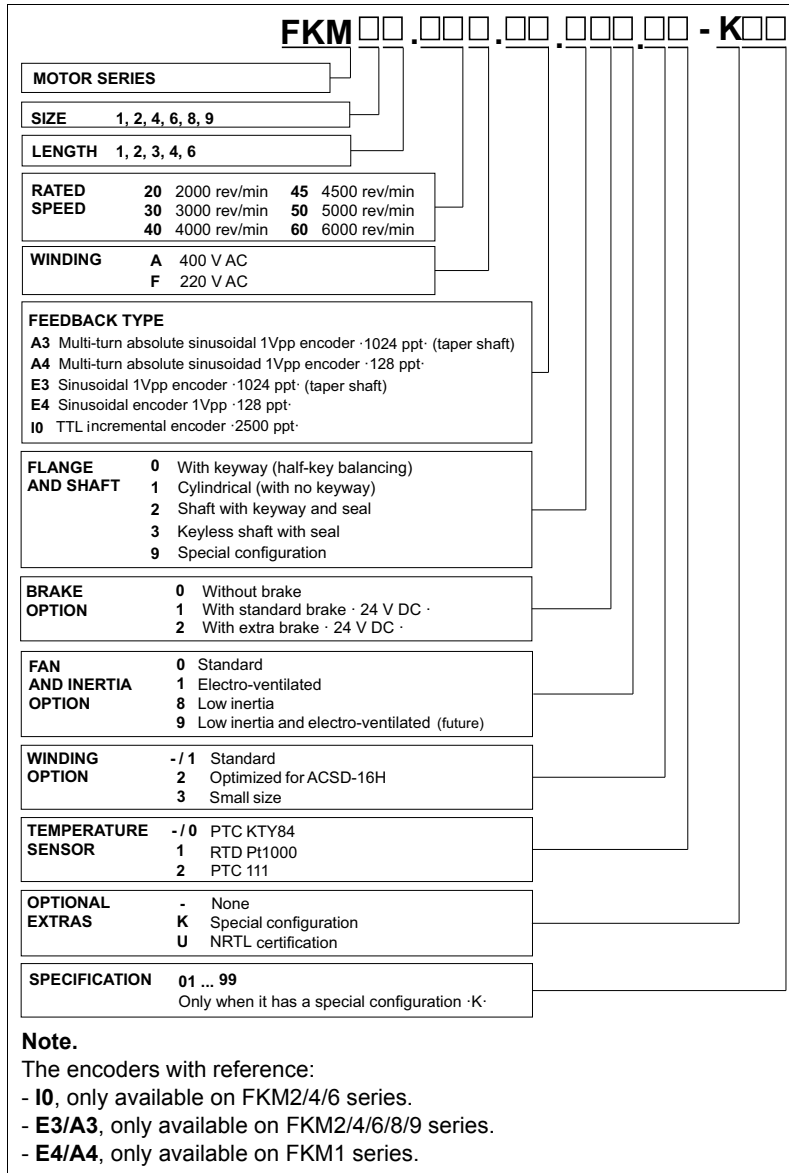
3.9 Sales reference

The sales reference of each motor is made up of letters and digits that mean the following:

3.

3-PHASE SERVOMOTORS. FKM

Sales reference



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Sales reference of FKM servomotors.

3.10 Technical data. Torque-Speed curves

The following sections provide the main technical data of each model and their torque-speed graphs for motors with A winding (400 V AC) and F winding (220 V AC). Here are also the tables associating the motor model with the Fagor drives that can govern it. Bear in mind that selecting the drive to govern a particular motor depends on the requirements of the application; in other words, on the peak torque that may be demanded from the motor for brief instants.

Hence, if the motor duty cycle in the application were the rated value all the time, it would be enough to select a drive that can provide this torque. However, applications with this kind of behavior are rare. In general, there is always an instant that requires increasing the torque beyond the rated value (e.g. for a rapid tool positioning in G00 when machining) and, consequently, the peak torque must be higher than the rated (nominal) torque.

Drive selection. General criterion

The tables shown later on provide the possible motor-drive combinations. It has been assumed as general criterion to demand a peak torque (M_p) that the drive must provide that is 2 or 3 times the stall torque of the motor it is going to govern. See that this value is given in the tables by the M_p/M_o ratio.

Observe that motor-drive combinations whose ratio is lower than 2 have been left out although, as mentioned earlier, there could be applications that could use a smaller drive than the one shown in the tables. Therefore, it is essential to know the requirements of the application before selecting the drive. If they are unknown, we recommend to apply the general criteria mentioned earlier.

It goes without saying that drives whose M_p/M_o ratio is higher than 3 can also be selected; however, bear in mind that any oversizing (except in very particular cases) makes the system unnecessarily more expensive.

Calculation of the drive peak torque

Observe that having the M_p/M_n ratio has required getting the peak torque value of the drive (M_p). This value results from multiplying the peak current (I_{max}) of the selected drive by the torque constant (K_t) of the motor it is going to control. Remember that the values of the peak current of FAGOR drives are shown in some tables in the “man_dds_hard.pdf” manual.

Limiting the drive peak torque

Observe if result of the previous calculation is a drive peak torque value higher than the peak torque value of the motor it is going to govern, this value will limit the other one. Therefore, the drive never provides a peak torque higher than that of the motor. This fact appears in the tables with values in bold characters.

Explanatory notes

When mentioning FAGOR drives throughout this document, we mean AXD, ACD, MMC and CMC drives; i.e. drives for controlling synchronous servomotors with A winding (powered at 400 V AC).

Remember that FAGOR also offers ACSD and MCS drives powered at 220 V AC (L series) and at 400 V AC (H series) that can also govern these servomotors (with F and A winding respectively).

If you wish to control the motor with any of them, consult the selection table for these drives shown on the first pages of its corresponding manual. Observe that each drive family mentioned here has its own manual.

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3-PHASE SERVOMOTORS. FKM
Technical data. Torque-Speed curves

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Non-ventilated FKM with “A” winding · 400 V AC ·

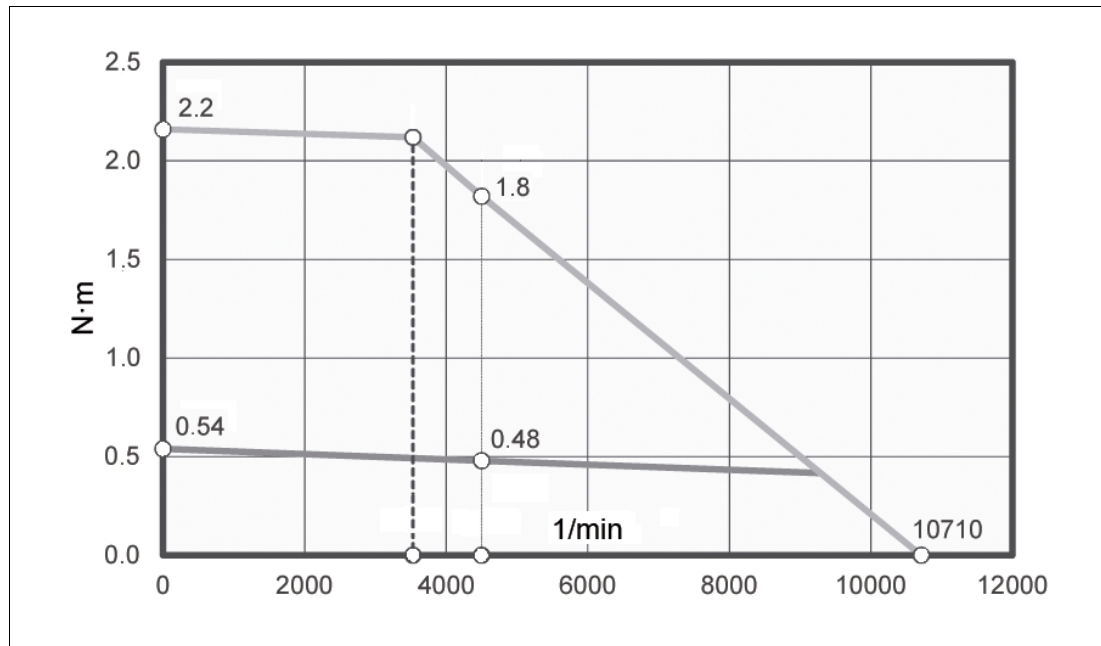
FKM12 models

T- 3/13 Technical data of the FKM12.●●A.□□.□□0.02 motors.

Model	FKM12.●●A.□□.□□0.02				
Terminology	Notation	Units		45	
Stall torque	Mo	N·m		0.54	
Rated torque	Mn	N·m		0.48	
Stall peak torque	Mp	N·m		2.20	
Rated speed	nN	1/min		4500	
Stall current	Io	A		0.93	
Rated current	In	A		0.90	
Peak current	Imax	A		4.30	
Calculation power	Pcal	kW		0.25	
Rated power	Pn	kW		0.22	
Torque constant	Kt	N·m/A		0.58	
Acceleration time	tac	ms		1.49	
Inductance per fase (3-phase)	L	mH		25.5	
Resistance per phase	R	Ω		20.55	
Inertia (without brake)	J	kg·cm ²		0.070	
Inertia (with standard brake)	J*	kg·cm ²		0.138	
Inertia (with extra-torque brake)	J**	kg·cm ²		-	
Mass (without brake)	P	kg		0.93	
Mass (with standard brake)	P*	kg		1.18	
Mass (with extra-torque brake)	P**	kg		-	

T- 3/14 Selection of FAGOR drives for FKM12.●●A.□□.□□0.02 motors.

Drive peak torque in N·m	AXD 1.08								
	Mp	Mp/Mo							
FKM12.45A	2.2	4.0							



F- 3/33

Torque-speed graphs. FKM12.●●A.□□.□□0.02 models.

3.

3-PHASE SERVOMOTORS. FKM
Technical data. Torque-Speed curves



FXM/FKM

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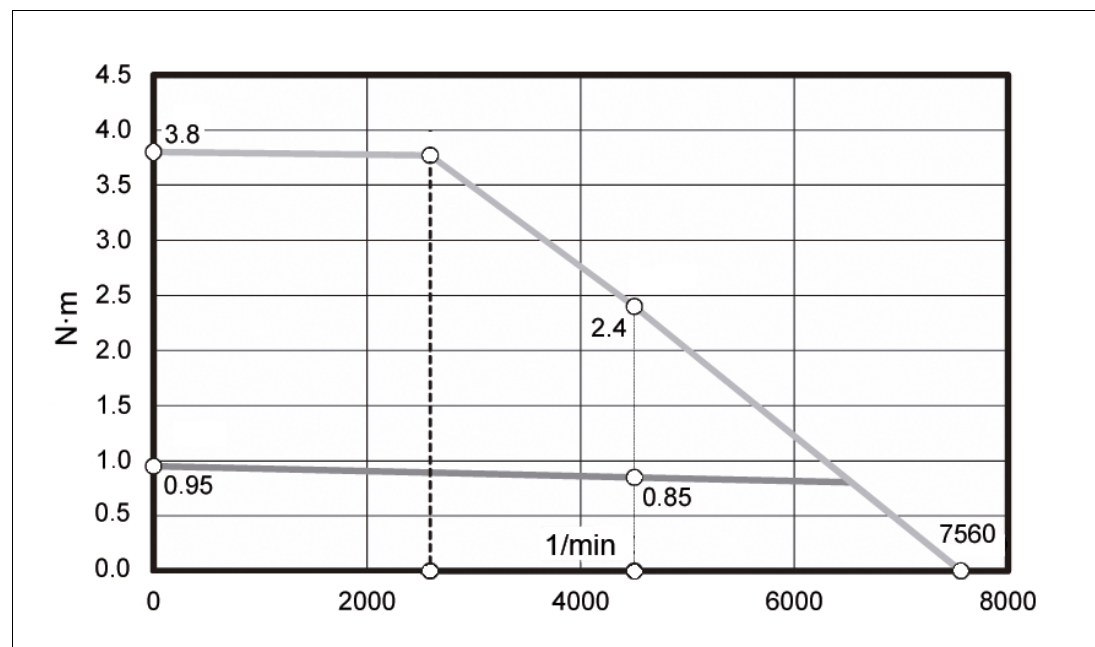
FKM14 models

T- 3/15 Technical data of the FKM14.●●A.□□.□□0.02 motors.

Model		FKM14.●●A.□□.□□0.02			
Terminology	Notation	Units		45	
Stall torque	Mo	N·m		0.95	
Rated torque	Mn	N·m		0.85	
Stall peak torque	Mp	N·m		3.8	
Rated speed	nN	1/min		4500	
Stall current	Io	A		1.15	
Rated current	In	A		1.07	
Peak current	Imax	A		5.3	
Calculation power	Pcal	kW		0.45	
Rated power	Pn	kW		0.40	
Torque constant	Kt	N·m/A		0.83	
Acceleration time	tac	ms		1.36	
Inductance per fase (3-phase)	L	mH		24.25	
Resistance per phase	R	Ω		16.80	
Inertia (without brake)	J	kg·cm ²		0.110	
Inertia (with standard brake)	J*	kg·cm ²		0.178	
Inertia (with extra-torque brake)	J**	kg·cm ²		-	
Mass (without brake)	P	kg		1.31	
Mass (with standard brake)	P*	kg		1.56	
Mass (with extra-torque brake)	P**	kg		-	

T- 3/16 Selection of FAGOR drives for FKM14.●●A.□□.□□0.02 motors.

Drive peak torque in N·m	AXD 1.08									
	Mp	Mp/Mo								
FKM14.45A	3.8	4.0								



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Torque-speed graphs. FKM14.●●A.□□.□□0.02 models.

3.

3-PHASE SERVOMOTORS. FKM
Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

FKM21 models

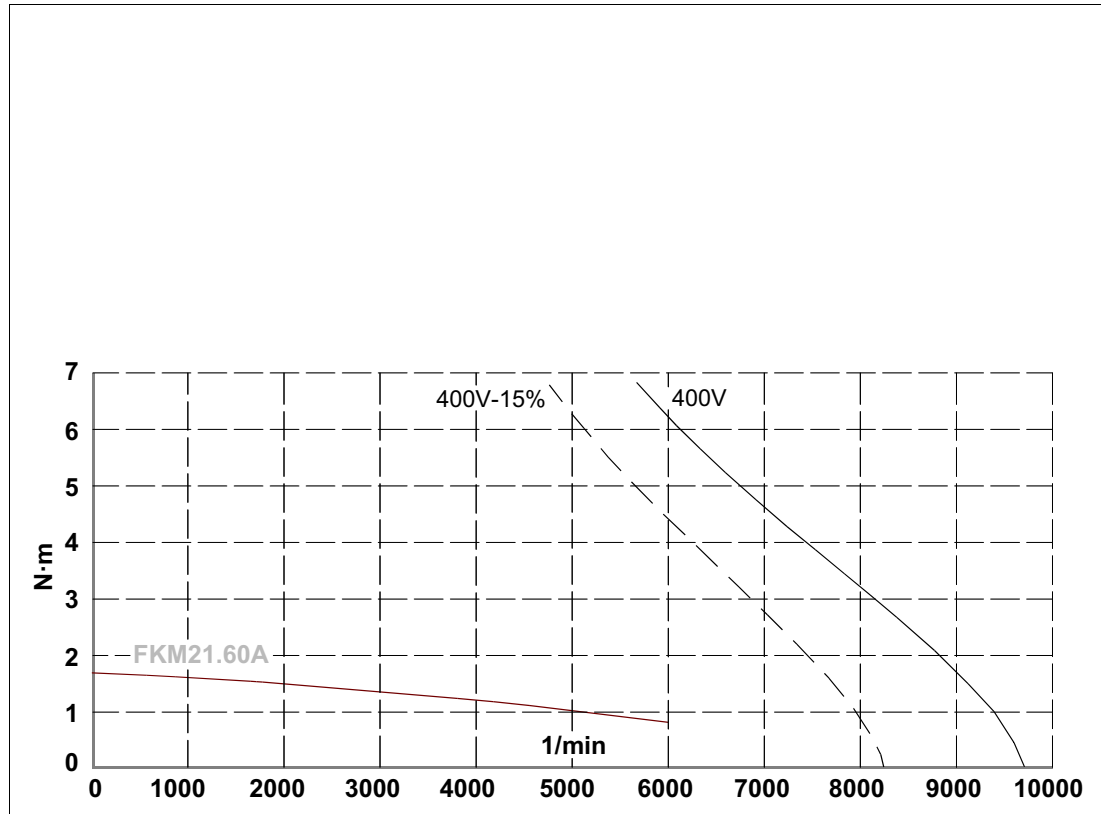
T- 3/17 Technical data of the FKM21.●●A.□□.□□0.□□ motors.

Model	FKM21.●●A.□□.□□0.□□				
Terminology	Notation	Units			60
Stall torque	Mo	N·m			1.7
Rated torque	Mn	N·m			0.824
Stall peak torque	Mp	N·m			7
Rated speed	nN	1/min			6000
Stall current	Io	A			2.8
Peak current	I _{max}	A			11
Calculation power	P _{cal}	kW			1.1
Rated power	P _n	kW			0.5
Torque constant	K _t	N·m/A			0.6
Acceleration time	t _{ac}	ms			14.3
Inductance per fase (3-phase)	L	mH			7.7
Resistance per phase	R	Ω			2.55
Inertia (without brake)	J	kg·cm ²			1.6
Inertia (with standard brake)	J*	kg·cm ²			1.72
Inertia (with extra-torque brake)	J**	kg·cm ²			-
Mass (without brake)	P	kg			4.2
Mass (with standard brake)	P*	kg			4.48
Mass (with extra-torque brake)	P**	kg			-

T- 3/18 Selection of FAGOR drives for FKM21.●●A.□□.□□0.□□ motors.

Drive peak torque in N·m	AXD 1.08		AXD 1.15							
	Mp	Mp/Mo	Mp	Mp/Mo						
FKM21.60A	4.8	2.8	7.0	4.1						

Note. To select a ACSD-□H or MCS-□H drive with any motor of this series, refer to the manual of the corresponding drive.



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Torque-speed graphs. FKM21.●●A.□□.□□0.□□ models.

3.

3-PHASE SERVOMOTORS. FKM
Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

FKM22 models

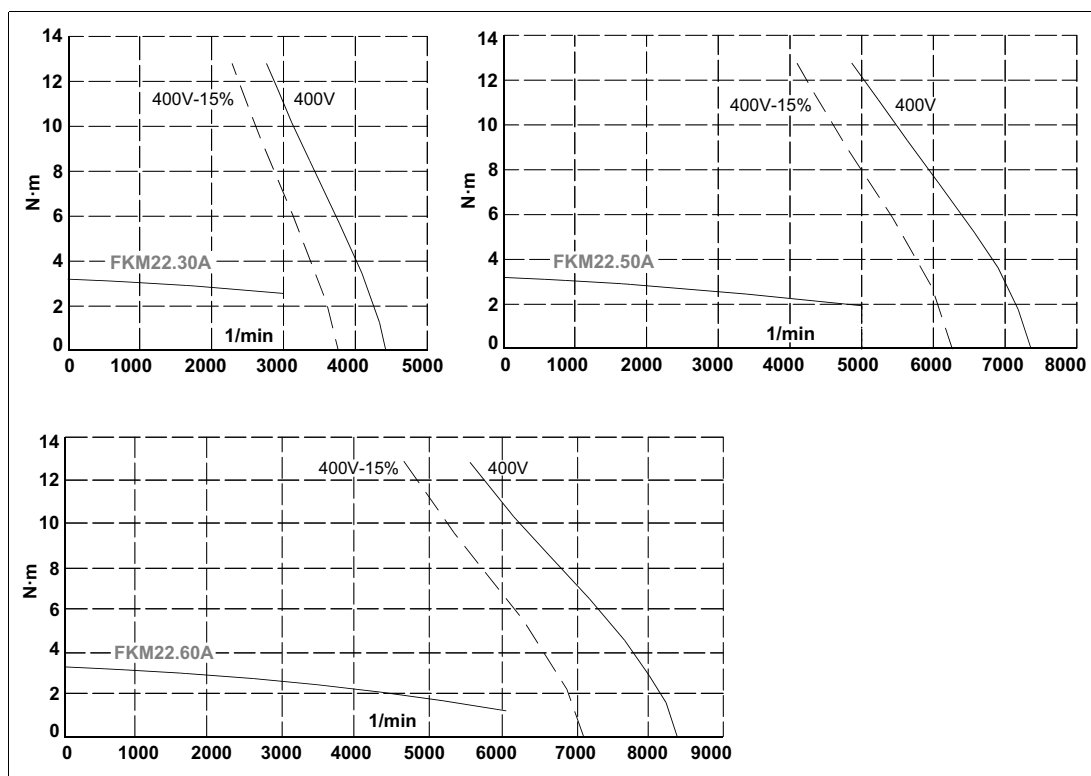
T- 3/19 Technical data of the FKM22.●●A.□□.□□0.□□ motors.

Model	FKM22.●●A.□□.□□0.□□					
Terminology	Notation	Units	30	50	60	
Stall torque	Mo	N·m	3.2	3.2	3.2	
Rated torque	Mn	N·m	2.56	1.92	1.55	
Stall peak torque	Mp	N·m	13	13	13	
Rated speed	nN	1/min	3000	5000	6000	
Stall current	Io	A	2.4	4.0	4.5	
Peak current	Imax	A	10	16	18	
Calculation power	Pcal	kW	1.0	1.6	2.0	
Rated power	Pn	kW	0.8	1.0	1.0	
Torque constant	Kt	N·m/A	1.33	0.80	0.70	
Acceleration time	tac	ms	7.0	11.7	14.0	
Inductance per fase (3-phase)	L	mH	16.0	5.8	4.6	
Resistance per phase	R	Ω	3.85	1.40	1.10	
Inertia (without brake)	J	kg·cm ²	2.90	2.90	2.90	
Inertia (with standard brake)	J*	kg·cm ²	3.02	3.02	3.02	
Inertia (with extra-torque brake)	J**	kg·cm ²	-	-	-	
Mass (without brake)	P	kg	5.30	5.30	5.30	
Mass (with standard brake)	P*	kg	5.58	5.58	5.58	
Mass (with extra-torque brake)	P**	kg	-	-	-	

T- 3/20 Selection of FAGOR drives for FKM22.●●A.□□.□□0.□□ motors.

Drive peak torque in N·m	AXD 1.08		AXD 1.15		AXD 1.25						
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo					
FKM22.30A	10.6	3.3	13.0	4.0	-	-					
FKM22.50A	6.4	2.0	12.0	3.7	13.0	4.0					
FKM22.60A	-	-	10.5	3.2	13.0	4.0					

Note. To select a ACSD-□H or MCS-□H drive with any motor of this series, refer to the manual of the corresponding drive.



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Torque-speed graphs. FKM22.●●A.□□.□□0.□□ models.

3.

3-PHASE SERVOMOTORS. FKM
Technical data. Torque-Speed curves



FXM/FKM

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FKM42 models

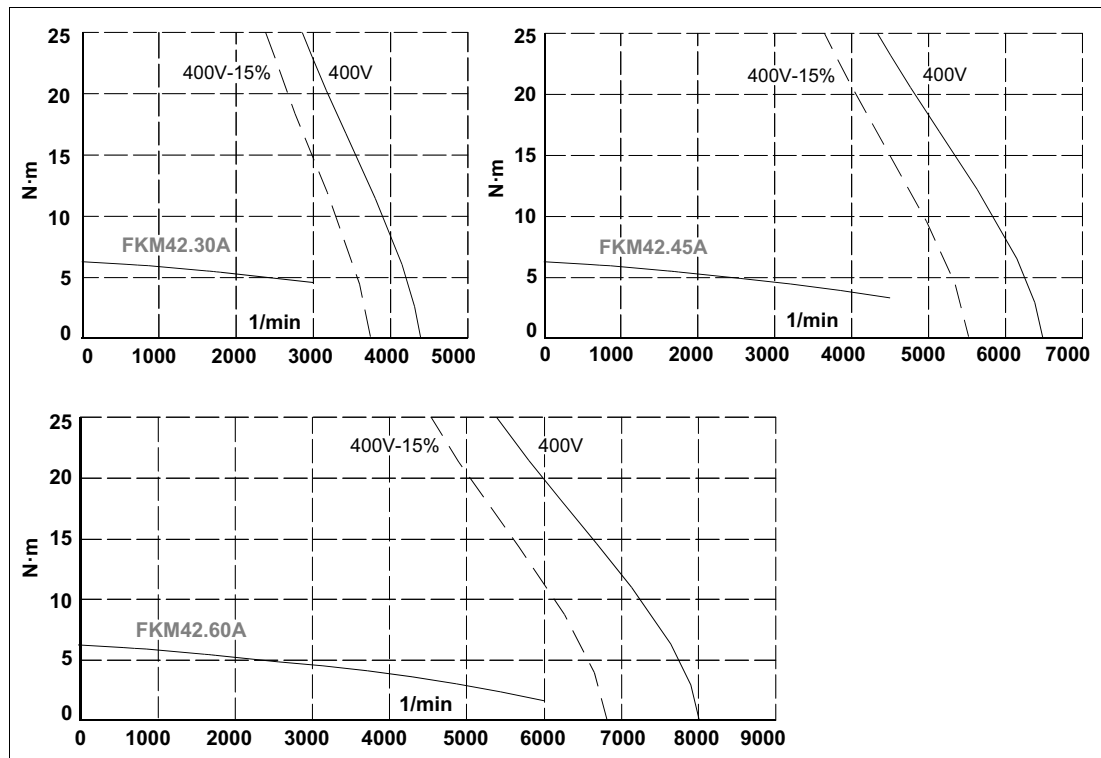
T- 3/21 Technical data of the FKM42.●●A.□□.□□0.□□ motors.

Model	FKM42.●●A.□□.□□0.□□					
Terminology	Notation	Units	30	45	60	
Stall torque	Mo	N·m	6.3	6.3	6.3	
Rated torque	Mn	N·m	4.60	3.34	1.89	
Stall peak torque	Mp	N·m	25	25	25	
Rated speed	nN	1/min	3000	4500	6000	
Stall current	Io	A	4.6	6.9	8.5	
Peak current	Imax	A	19	28	34	
Calculation power	Pcal	kW	2.0	3.0	3.9	
Rated power	Pn	kW	1.40	1.57	1.67	
Torque constant	Kt	N·m/A	1.34	0.90	0.70	
Acceleration time	tac	ms	10.7	16.0	21.3	
Inductance per fase (3-phase)	L	mH	8.6	3.9	2.6	
Resistance per phase	R	Ω	1.450	0.675	0.450	
Inertia (without brake)	J	kg·cm ²	8.50	8.50	8.50	
Inertia (with standard brake)	J*	kg·cm ²	9.04	9.04	9.04	
Inertia (with extra-torque brake)	J**	kg·cm ²	-	-	-	
Mass (without brake)	P	kg	7.80	7.80	7.80	
Mass (with standard brake)	P*	kg	8.28	8.28	8.28	
Mass (with extra-torque brake)	P**	kg	-	-	-	

T- 3/22 Selection of FAGOR drives for FKM42.●●A.□□.□□0.□□ motors.

Drive peak torque in N·m	AXD 1.15		AXD 1.25		AXD 1.35							
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo						
FKM42.30A	20.1	3.2	25.0	3.9	-	-						
FKM42.45A	13.5	2.1	22.5	3.5	25.0	3.9						
FKM42.60A	-	-	17.5	2.7	25.0	3.9						

Note. To select a ACSD-□H or MCS-□H drive with any motor of this series, refer to the manual of the corresponding drive.



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Torque-speed graphs. FKM42.●●A.□□.□□0.□□ models.

3.

3-PHASE SERVOMOTORS. FKM
Technical data. Torque-Speed curves



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FKM43 models

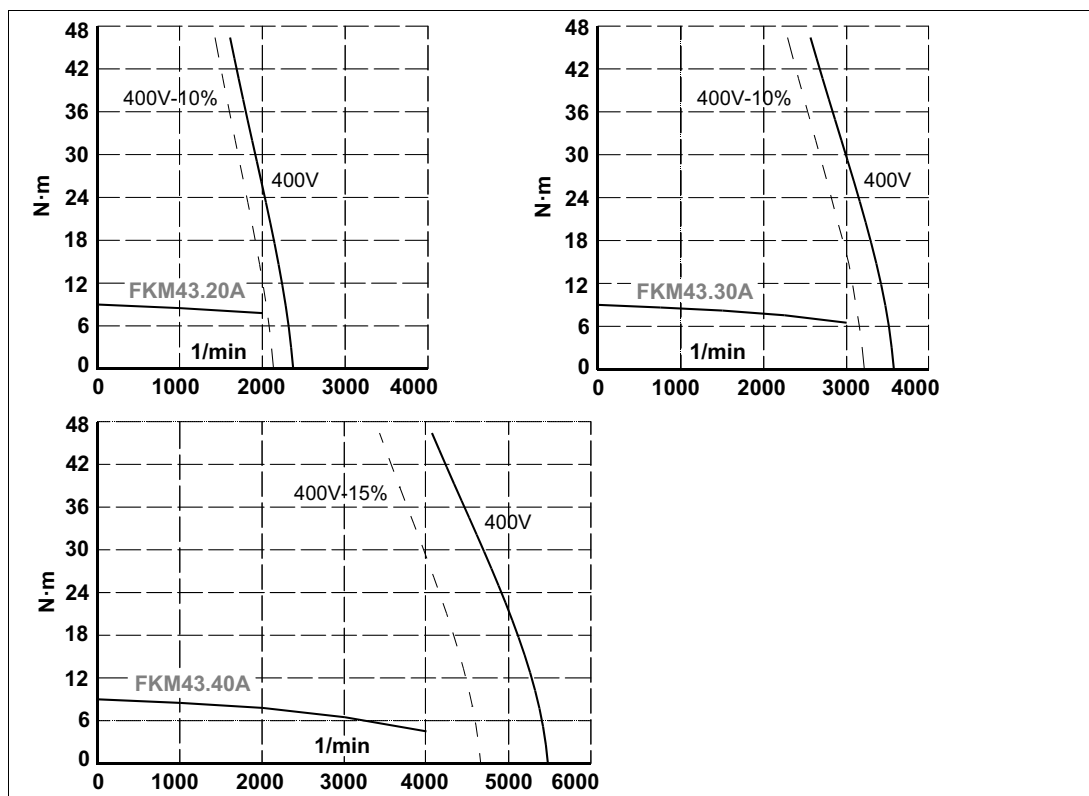
T- 3/23 Technical data of the FKM43.●●A.□□.□□0.□□ motors.

Model	FKM43.●●A.□□.□□0.□□					
Terminology	Notation	Units	20	30	40	
Stall torque	Mo	N·m	9.0	9.0	9.0	
Rated torque	Mn	N·m	7.8	6.5	4.5	
Stall peak torque	Mp	N·m	36	36	36	
Rated speed	nN	1/min	2000	3000	4000	
Stall current	Io	A	3.9	6.2	9.4	
Peak current	Imax	A	15.7	25.0	38.0	
Calculation power	Pcal	kW	1.88	2.82	3.77	
Rated power	Pn	kW	1.63	2.04	1.88	
Torque constant	Kt	N·m/A	2.30	1.45	0.95	
Acceleration time	tac	ms	9.7	14.5	19.4	
Inductance per fase (3-phase)	L	mH	14.5	6.2	2.4	
Resistance per phase	R	Ω	1.720	0.755	0.315	
Inertia (without brake)	J	kg·cm ²	16.7	16.7	16.7	
Inertia (with standard brake)	J*	kg·cm ²	17.24	17.24	17.24	
Inertia (with extra-torque brake)	J**	kg·cm ²	-	-	-	
Mass (without brake)	P	kg	11.70	11.70	11.70	
Mass (with standard brake)	P*	kg	12.18	12.18	12.18	
Mass (with extra-torque brake)	P**	kg	-	-	-	

T- 3/24 Selection of FAGOR drives for FKM43.●●A.□□.□□0.□□ motors.

Drive peak torque in N·m	AXD 1.08		AXD 1.15		AXD 1.25		AXD 1.35		AXD 2.50			
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo		
FKM43.20A	18.4	2.0	34.5	3.8	36.0	4.0	-	-	-	-		
FKM43.30A	-	-	21.7	2.4	36.0	4.0	-	-	-	-		
FKM43.40A	-	-	-	-	23.7	2.6	33.2	3.7	36.0	4.0		

Note. To select a ACSD-□H or MCS-□H drive with any motor of this series, refer to the manual of the corresponding drive.



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Torque-speed graphs. FKM43.●●A.□□.□□0.□□ models.

3.

3-PHASE SERVOMOTORS. FKM
Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

FKM44 models

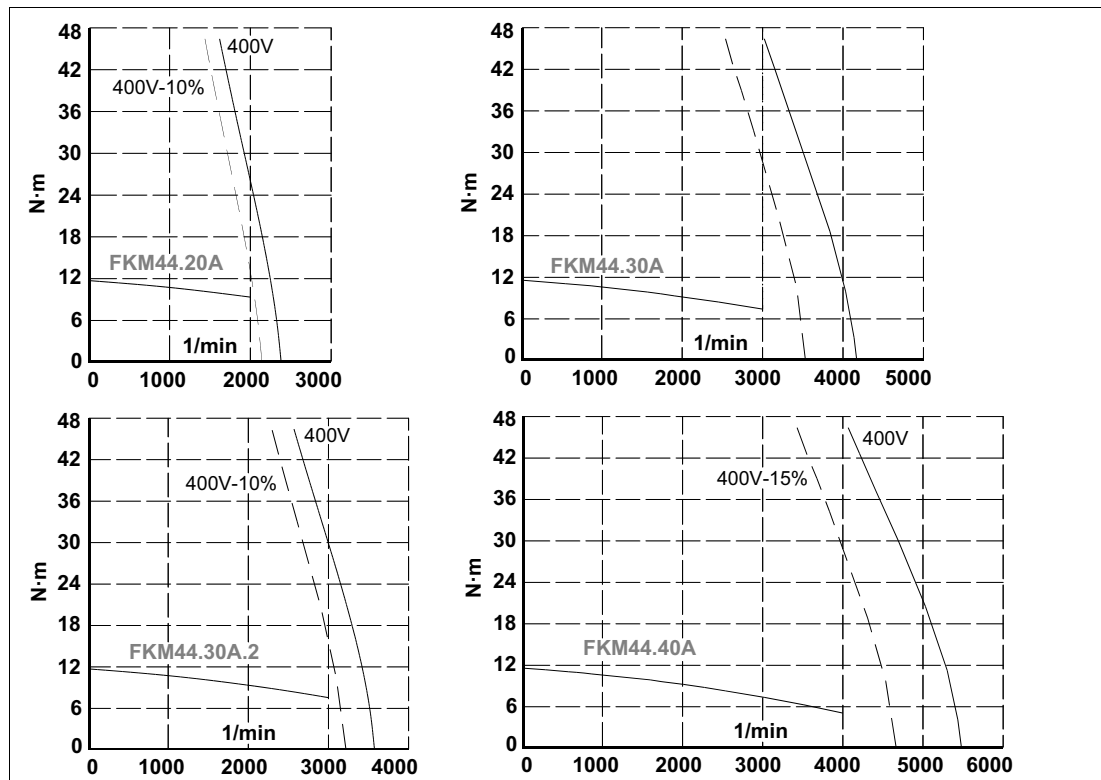
T- 3/25 Technical data of the FKM44.●●A.□□.□□0.□□ motors.

Model	FKM44.●●A.□□.□□0.●□					
Terminology	Notation	Units	20	30	30...-2	40
Stall torque	Mo	N·m	11.6	11.6	11.6	11.6
Rated torque	Mn	N·m	9.2	7.4	7.4	5.1
Stall peak torque	Mp	N·m	47	47	47	47
Rated speed	nN	1/min	2000	3000	3000	4000
Stall current	Io	A	4.6	8.2	7.0	10.7
Peak current	Imax	A	19	33	28	43
Calculation power	Pcal	kW	2.4	3.6	3.6	4.9
Rated power	Pn	kW	1.9	2.3	2.3	2.1
Torque constant	Kt	N·m/A	2.5	1.4	1.65	1.1
Acceleration time	tac	ms	7.4	11.2	11.2	14.9
Inductance per fase (3-phase)	L	mH	14.51	4.20	6.16	2.40
Resistance per phase	R	Ω	1.720	0.540	0.755	0.315
Inertia (without brake)	J	kg·cm ²	16.7	16.7	16.7	16.7
Inertia (with standard brake)	J*	kg·cm ²	17.3	17.3	17.3	17.3
Inertia (with extra-torque brake)	J**	kg·cm ²	18.4	-	18.4	18.4
Mass (without brake)	P	kg	11.7	11.7	11.7	11.7
Mass (with standard brake)	P*	kg	12.2	12.2	12.2	12.2
Mass (with extra-torque brake)	P**	kg	12.8	-	12.8	12.8

T- 3/26 Selection of FAGOR drives for FKM44.●●A.□□.□□0.●□ motors.

Drive peak torque in N·m	AXD 1.15		AXD 1.25		AXD 1.35		AXD 2.50				
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo			
FKM44.20A	37.5	3.2	47.0	4.0	-	-	-	-			
FKM44.30A	-	-	35.0	3.0	47.0	4.0	-	-			
FKM44.30A.2	24.7	2.1	41.2	3.5	47.0	4.0	-	-			
FKM44.40A	-	-	27.5	2.3	38.5	3.3	47.0	4.0			

Note. To select a ACSD-□H or MCS-□H drive with any motor of this series, refer to the manual of the corresponding drive.



F- 3/39

Torque-speed graphs. FKM44.●●A.□□.□□0.□□ models.

3.

3-PHASE SERVOMOTORS. FKM
Technical data. Torque-Speed curves



FAGOR AUTOMATION

FXM/FKM

Ref.1703

FKM62 models

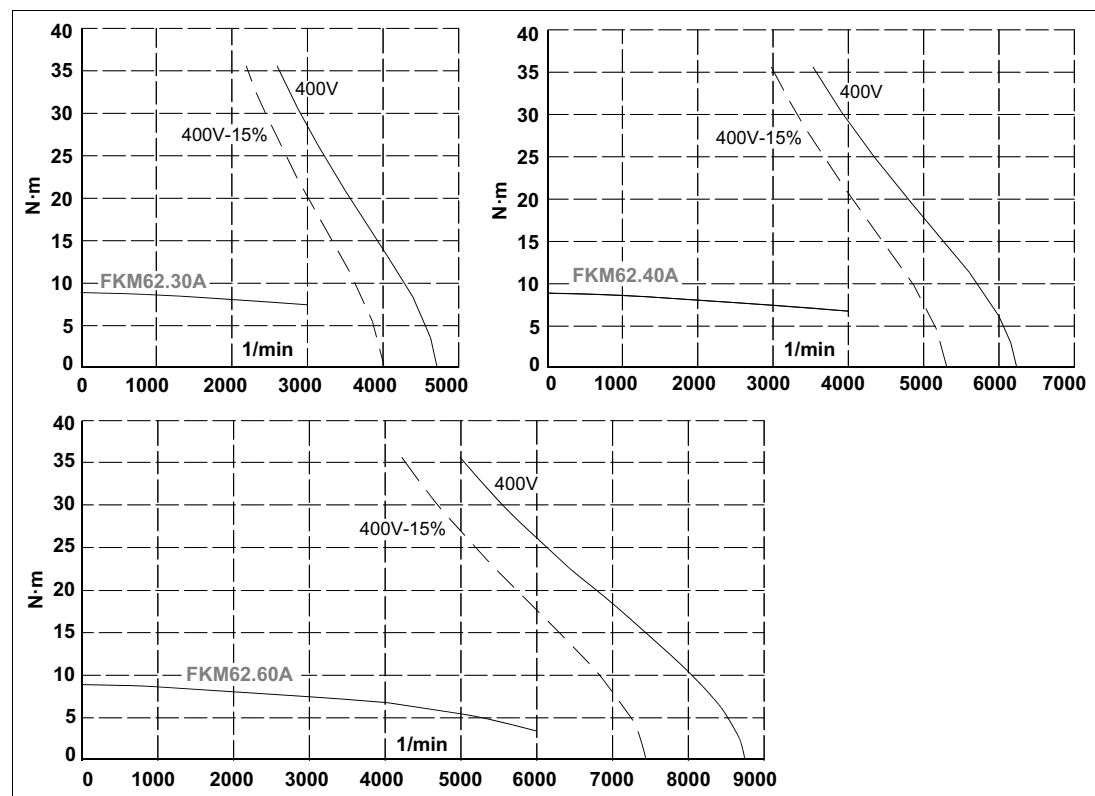
T- 3/27 Technical data of the FKM62.●●A.□□.□□0.□□ models.

Model		FKM62.●●A.□□.□□0.□□				
Terminology	Notation	Units	30	40	60	
Stall torque	Mo	N·m	8.9	8.9	8.9	
Rated torque	Mn	N·m	7.5	6.8	3.5	
Stall peak torque	Mp	N·m	35	35	35	
Rated speed	nN	1/min	3000	4000	6000	
Stall current	Io	A	7.1	9.3	13.1	
Peak current	Imax	A	28	37	52	
Calculation power	Pcal	kW	2.8	3.7	5.6	
Rated power	Pn	kW	2.4	2.8	2.2	
Torque constant	Kt	N·m/A	1.2	0.9	0.68	
Acceleration time	tac	ms	14.3	19.1	28.7	
Inductance per fase (3-phase)	L	mH	7.2	4.1	2.1	
Resistance per phase	R	Ω	0.775	0.430	0.225	
Inertia (without brake)	J	kg·cm ²	16.00	16.00	16.00	
Inertia (with standard brake)	J*	kg·cm ²	17.15	17.15	17.15	
Inertia (with extra-torque brake)	J**	kg·cm ²	-	-	-	
Mass (without brake)	P	kg	11.9	11.9	11.9	
Mass (with standard brake)	P*	kg	12.8	12.8	12.8	
Mass (with extra-torque brake)	P**	kg	-	-	-	

T- 3/28 Selection of FAGOR drives for FKM62.●●A.□□.□□0.□□ motors.

Drive peak torque in N·m	AXD 1.15		AXD 1.25		AXD 1.35		AXD 2.50		AXD 2.75	
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo
FKM62.30A	18.0	2.0	30.0	3.3	35.0	3.9	-	-	-	-
FKM62.40A	-	-	22.5	2.5	31.5	3.5	35.0	3.9	-	-
FKM62.60A	-	-	-	-	23.8	2.6	34.0	3.8	35.0	3.9

Note. To select a ACSD-□H or MCS-□H drive with any motor of this series, refer to the manual of the corresponding drive.



F- 3/40

Torque-speed graphs. FKM62.●●A.□□.□□0.□□ models.

3.

3-PHASE SERVOMOTORS. FKM
Technical data. Torque-Speed curves



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FKM63 models

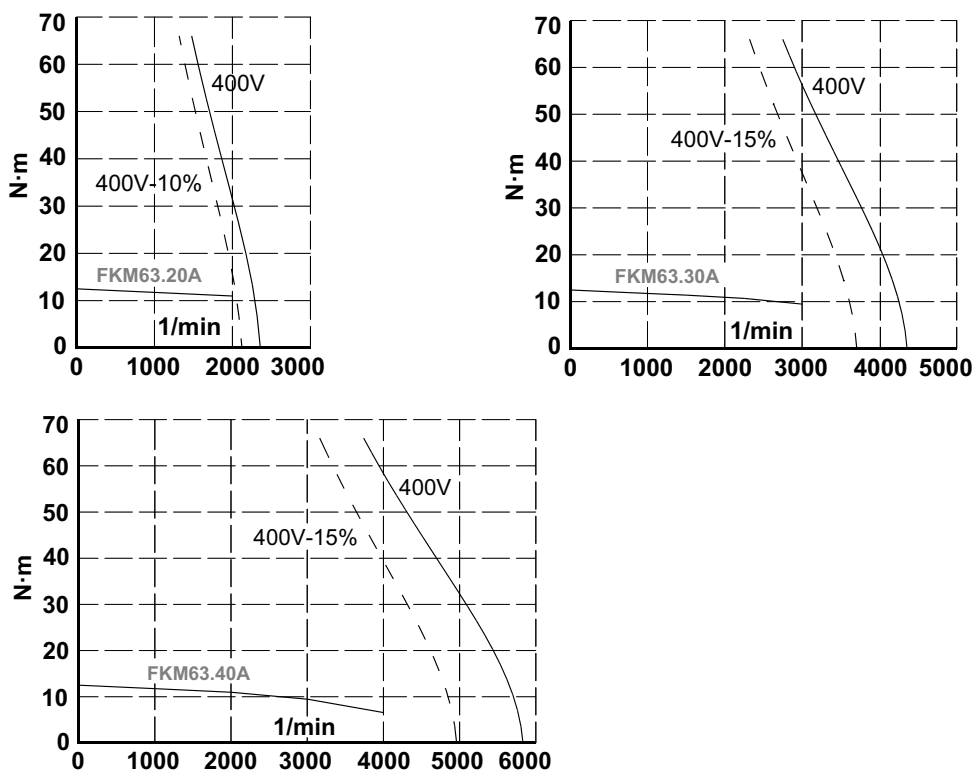
T- 3/29 Technical data of the FKM63.●●A.□□.□□0.□□ models.

Model	FKM63.●●A.□□.□□0.□□				
Terminology	Notation	Units	20	30	40
Stall torque	Mo	N·m	12.5	12.5	12.5
Rated torque	Mn	N·m	11.0	9.5	6.6
Stall peak torque	Mp	N·m	51	51	51
Rated speed	nN	1/min	2000	3000	4000
Stall current	Io	A	5.3	10.3	16.2
Peak current	Imax	A	21.3	40.6	64.0
Calculation power	Pcal	kW	2.6	3.9	5.2
Rated power	Pn	kW	2.3	2.9	2.7
Torque constant	Kt	N·m/A	2.35	1.21	0.77
Acceleration time	tac	ms	12.1	18.1	24.2
Inductance per fase (3-phase)	L	mH	13.2	3.8	2.1
Resistance per phase	R	Ω	0.935	0.280	0.160
Inertia (without brake)	J	kg·cm ²	29.5	29.5	29.5
Inertia (with standard brake)	J*	kg·cm ²	31.16	31.16	31.16
Inertia (with extra-torque brake)	J**	kg·cm ²	-	-	-
Mass (without brake)	P	kg	17.10	17.10	17.10
Mass (with standard brake)	P*	kg	17.97	17.97	17.97
Mass (with extra-torque brake)	P**	kg	-	-	-

T- 3/30 Selection of FAGOR drives for FKM63.●●A.□□.□□0.□□ motors.

Drive peak torque in N·m	AXD 1.15		AXD 1.25		AXD 1.35		AXD 2.50		AXD 2.75	
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo
FKM63.20A	35.2	2.8	51.0	4.1	-	-	-	-	-	-
FKM63.30A	-	-	30.2	2.4	42.3	3.3	51.0	4.1	-	-
FKM63.40A	-	-	-	-	26.9	2.1	38.5	3.0	51.0	4.1

Note. To select a ACSD-□H or MCS-□H drive with any motor of this series, refer to the manual of the corresponding drive.



F- 3/41

Torque-speed graphs. FKM63.●●A.□□.□□0.□□ models.

3.

3-PHASE SERVOMOTORS. FKM
Technical data. Torque-Speed curves



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FKM64 models

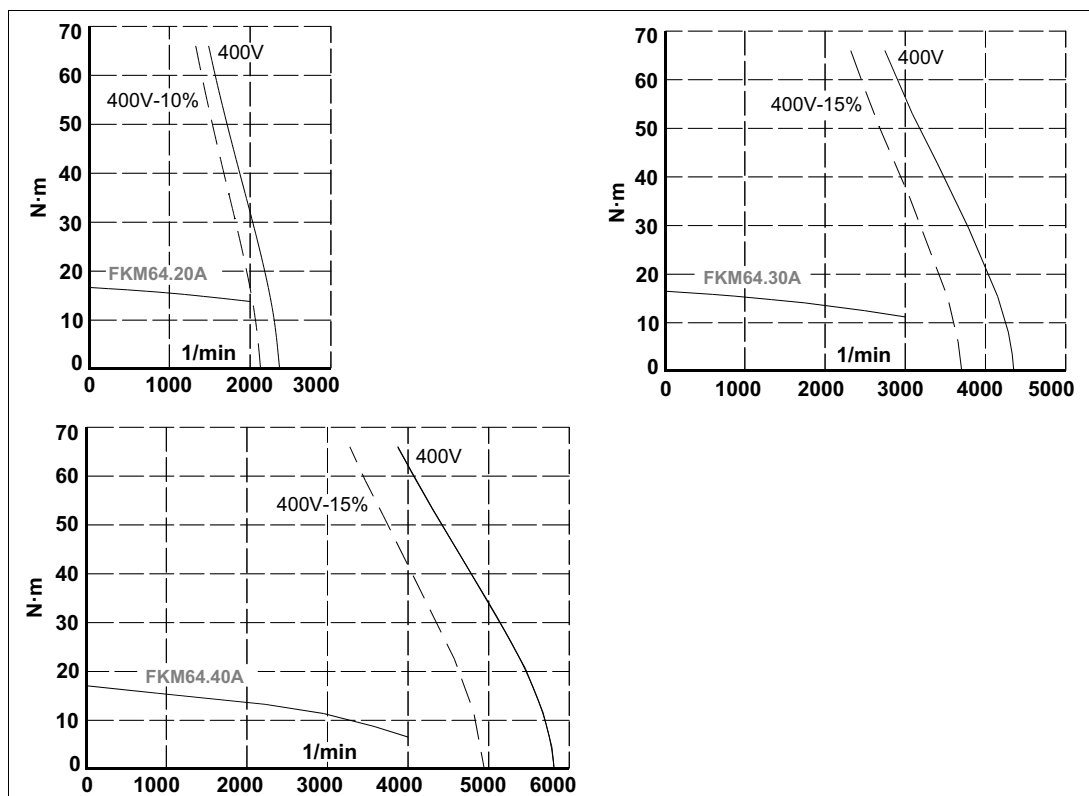
T- 3/31 Technical data of the FKM64.●●A.□□.□□0.□□ motors.

Model		FKM64.●●A.□□.□□0.□□				
Terminology	Notation	Units	20	30	40	
Stall torque	Mo	N·m	16.5	16.5	16.5	
Rated torque	Mn	N·m	13.6	11.2	6.6	
Stall peak torque	Mp	N·m	66.0	66.0	66.0	
Rated speed	nN	1/min	2000	3000	4000	
Stall current	Io	A	6.5	12.1	16.2	
Peak current	Imax	A	26.0	48.0	64.0	
Calculation power	Pcal	kW	3.4	5.2	6.9	
Rated power	Pn	kW	2.8	3.5	2.8	
Torque constant	Kt	N·m/A	2.53	1.36	1.00	
Acceleration time	tac	ms	9.3	14.0	18.7	
Inductance per fase (3-phase)	L	mH	13.16	3.80	2.10	
Resistance per phase	R	Ω	0.935	0.280	0.160	
Inertia (without brake)	J	kg·cm ²	29.5	29.5	29.5	
Inertia (with standard brake)	J*	kg·cm ²	30.65	30.65	30.65	
Inertia (with extra-torque brake)	J**	kg·cm ²	-	-	-	
Mass (without brake)	P	kg	17.1	17.1	17.1	
Mass (with standard brake)	P*	kg	18.0	18.0	18.0	
Mass (with extra-torque brake)	P**	kg	-	-	-	

T- 3/32 Selection of FAGOR drives for FKM64.●●A.□□.□□0.□□ motors.

Drive peak torque in N·m	AXD 1.15		AXD 1.25		AXD 1.35		AXD 2.50		AXD 2.75		AXD 3.100	
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo
FKM64.20A	38.0	2.3	63.2	3.8	66.0	4.0	-	-	-	-	-	-
FKM64.30A	-	-	34.0	2.0	47.6	2.8	66.0	4.0	-	-	-	-
FKM64.40A	-	-	-	-	35.0	2.1	50.0	3.0	63.0	3.8	66.0	4.0

Note. To select a ACSD-□H or MCS-□H drive with any motor of this series, refer to the manual of the corresponding drive.



F- 3/42

Torque-speed graphs. FKM64.●●A.□□.□□0.□□ models.

3.

3-PHASE SERVOMOTORS. FKM
Technical data. Torque-Speed curves



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FKM66 models

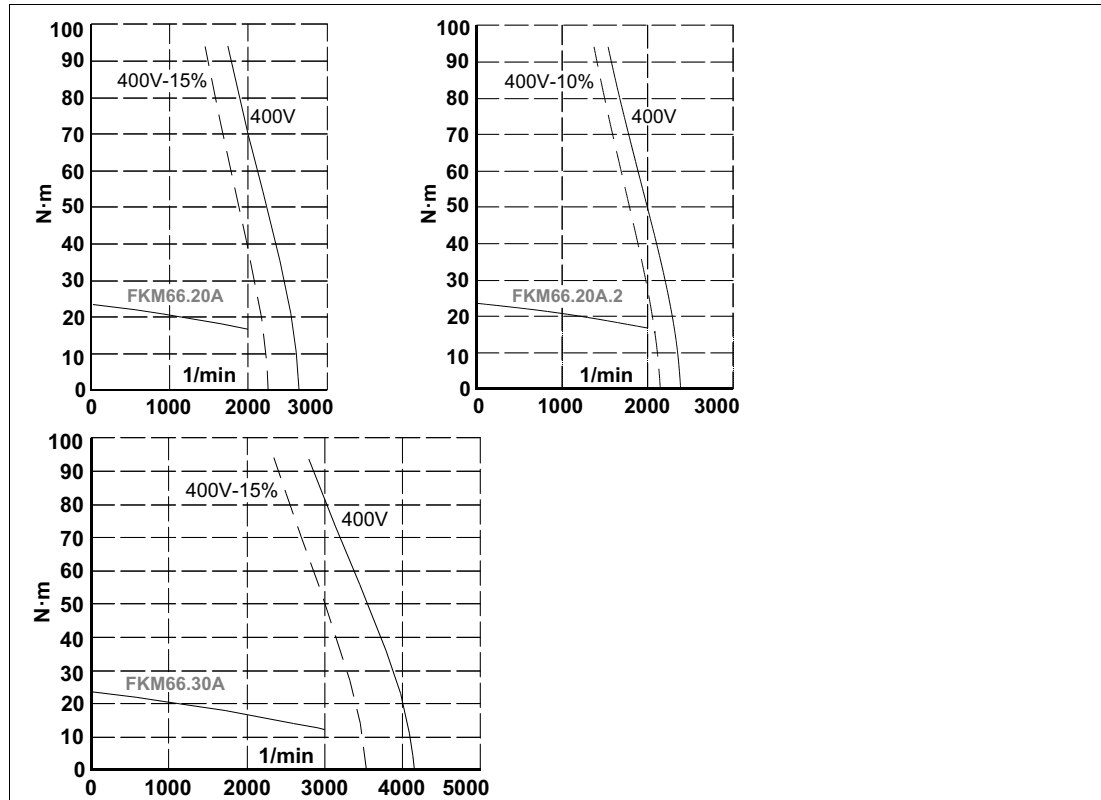
T- 3/33 Technical data of the FKM66.●●A.□□.□□0.□□ motors.

Model	FKM66.●●A.□□.□□0.●□					
Terminology	Notation	Units	20	20...-2	30	
Stall torque	Mo	N·m	23.5	23.5	23.5	
Rated torque	Mn	N·m	16.7	16.7	12.2	
Stall peak torque	Mp	N·m	94.0	94.0	94.0	
Rated speed	nN	1/min	2000	2000	3000	
Stall current	Io	A	10.5	9.4	16.4	
Peak current	Imax	A	42	37	66	
Calculation power	Pcal	kW	4.9	4.9	7.4	
Rated power	Pn	kW	3.5	3.5	3.8	
Torque constant	Kt	N·m/A	2.2	2.5	1.4	
Acceleration time	tac	ms	9.50	9.57	14.30	
Inductance per fase (3-phase)	L	mH	4.60	8.82	2.60	
Resistance per phase	R	Ω	0.41	0.52	0.17	
Inertia (without brake)	J	kg·cm ²	43.0	43.0	43.0	
Inertia (with standard brake)	J*	kg·cm ²	44.7	44.7	44.7	
Inertia (with extra-torque brake)	J**	kg·cm ²	-	48.6	48.6	
Mass (without brake)	P	kg	22.3	22.3	22.3	
Mass (with standard brake)	P*	kg	23.2	23.2	23.2	
Mass (with extra-torque brake)	P**	kg	-	24.6	24.6	

T- 3/34 Selection of FAGOR drives for FKM66.●●A.□□.□□0.●□ motors.

Drive peak torque in N·m	AXD 1.25		AXD 1.35		AXD 2.50		AXD 2.75					
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo				
FKM66.20A	55.9	2.3	78.0	3.3	94.0	4.0	-	-				
FKM66.20A.2	62.5	2.6	87.5	3.7	94.0	4.0	-	-				
FKM66.30A	-	-	50.1	2.1	70.0	2.9	94.0	4.0				

Note. To select a ACSD-□H or MCS-□H drive with any motor of this series, refer to the manual of the corresponding drive.



F- 3/43

Torque-speed graphs. FKM66.●●A.□□.□□0.□□ models.

3.

3-PHASE SERVOMOTORS. FKM
Technical data. Torque-Speed curves



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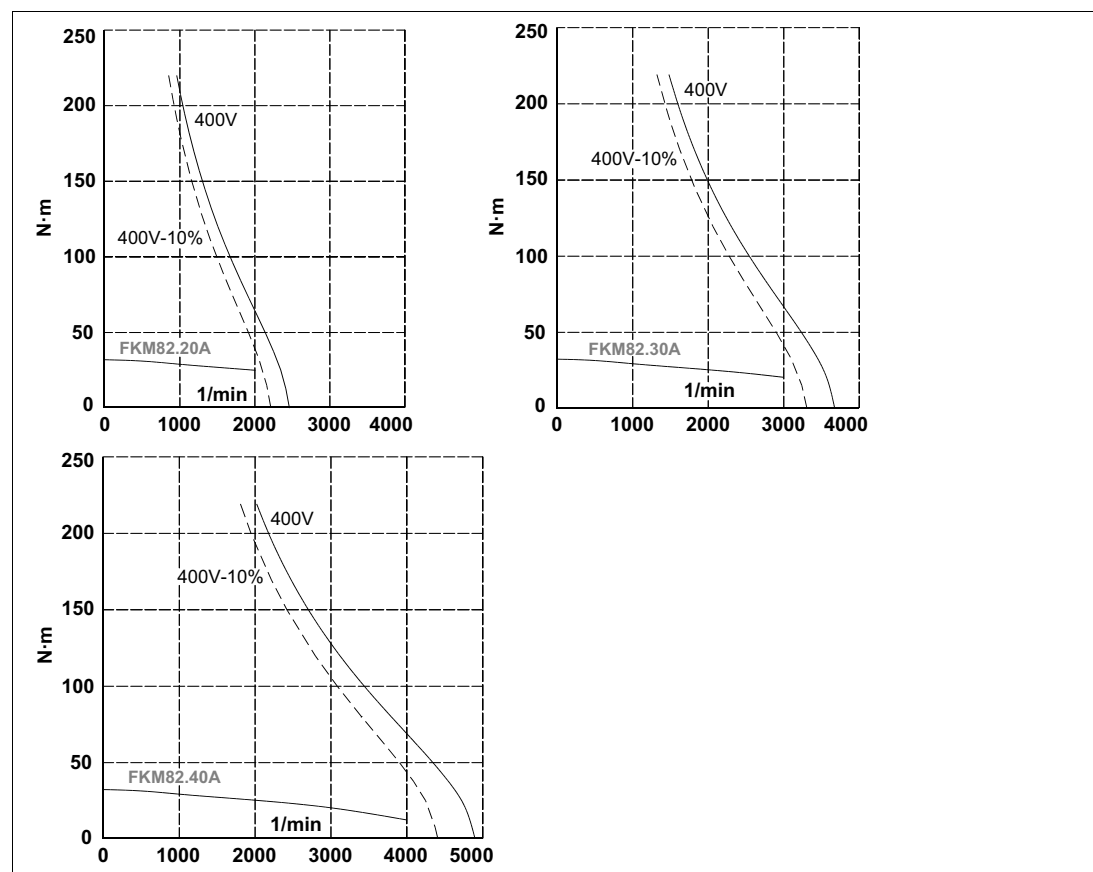
FKM82 models

T- 3/35 Technical data of the FKM82.●●A.□□.□□0.□□ motors.

Model	FKM82.●●A.□□.□□0.□□					
Terminology	Notation	Units	20	30	40	
Stall torque	Mo	N·m	32.0	32.0	32.0	
Rated torque	Mn	N·m	25.0	20.0	12.0	
Stall peak torque	Mp	N·m	96.0	96.0	96.0	
Rated speed	nN	1/min	2000	3000	4000	
Stall current	Io	A	13.2	19.8	26.4	
Peak current	Imax	A	39.0	59.0	79.0	
Calculation power	Pcal	kW	6.7	10.1	13.4	
Rated power	Pn	kW	5.2	6.3	5.0	
Torque constant	Kt	N·m/A	2.42	1.61	1.21	
Acceleration time	tac	ms	22.4	33.6	44.9	
Inductance per fase (3-phase)	L	mH	7.0	3.1	1.8	
Resistance per phase	R	Ω	0.48	0.21	0.12	
Inertia (without brake)	J	kg·cm ²	103.0	103.0	103.0	
Inertia (with standard brake)	J*	kg·cm ²	134.8	134.8	134.8	
Inertia (with extra-torque brake)	J**	kg·cm ²	-	-	-	
Mass (without brake)	P	kg	31	31	31	
Mass (with standard brake)	P*	kg	36	36	36	
Mass (with extra-torque brake)	P**	kg	-	-	-	

T- 3/36 Selection of FAGOR drives for FKM82.●●A.□□.□□0.□□ motors.

Drive peak torque in N·m	AXD 1.25		AXD 1.35		AXD 2.50		AXD 2.75		AXD 3.100			
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo		
FKM82.20A	-	-	84.7	2.6	96.0	3.0	-	-	-	-		
FKM82.30A	-	-	-	-	80.5	2.5	96.0	3.0	-	-		
FKM82.40A	-	-	-	-	-	-	90.9	2.8	96.0	3.0		



F- 3/44

Torque-speed graphs. FKM82.●●A.□□.□□0.□□ models.

3.

3-PHASE SERVOMOTORS. FKM
Technical data. Torque-Speed curves



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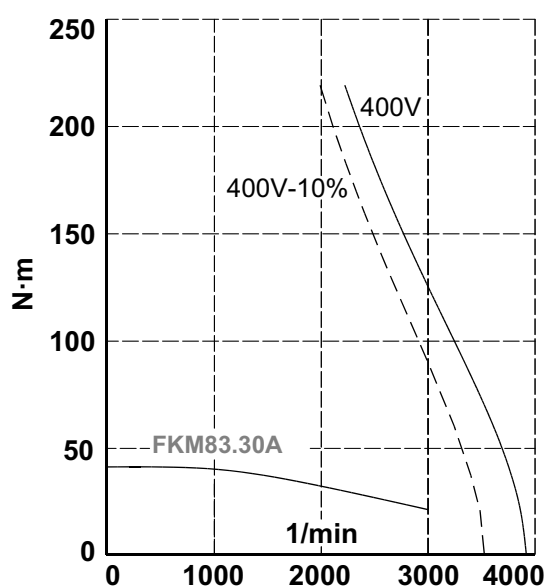
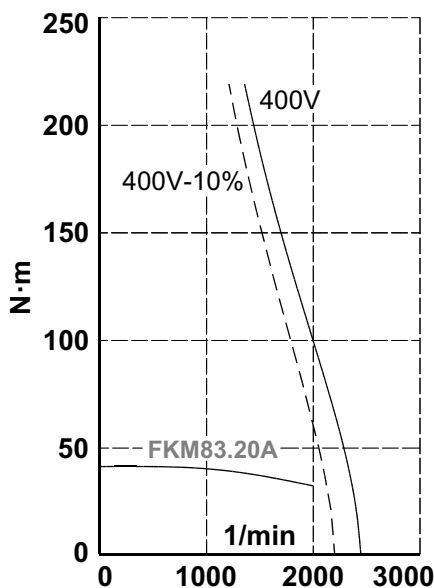
FKM83 models

T- 3/37 Technical data of the FKM83.●●A.□□.□□0.□□ motors.

Model	FKM83.●●A.□□.□□0.□□				
Terminology	Notation	Units	20	30	
Stall torque	Mo	N·m	41.0	41.0	
Rated torque	Mn	N·m	32.0	21.0	
Stall peak torque	Mp	N·m	123.0	123.0	
Rated speed	nN	1/min	2000	3000	
Stall current	Io	A	17.0	27.1	
Peak current	Imax	A	51.0	81.0	
Calculation power	Pcal	kW	8.6	12.9	
Rated power	Pn	kW	6.7	6.6	
Torque constant	Kt	N·m/A	2.41	1.51	
Acceleration time	tac	ms	25.5	38.3	
Inductance per fase (3-phase)	L	mH	4.6	1.8	
Resistance per phase	R	Ω	0.265	0.100	
Inertia (without brake)	J	kg·cm ²	150.0	150.0	
Inertia (with standard brake)	J*	kg·cm ²	181.8	181.8	
Inertia (with extra-torque brake)	J**	kg·cm ²	-	-	
Mass (without brake)	P	kg	41	41	
Mass (with standard brake)	P*	kg	46	46	
Mass (with extra-torque brake)	P**	kg	-	-	

T- 3/38 Selection of FAGOR drives for FKM83.●●A.□□.□□0.□□ motors.

Drive peak torque in N·m	AXD 1.25		AXD 1.35		AXD 2.50		AXD 2.75		AXD 3.100	
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo
FKM83.20A	-	-	84.3	2.0	120.5	2.9	123.0	3.0	-	-
FKM83.30A	-	-	-	-	-	-	113.4	2.7	123.0	3.0



F- 3/45

Torque-speed graphs. FKM83.●●A.□□.□□0.□□ models.

3.

3-PHASE SERVOMOTORS. FKM
Technical data. Torque-Speed curves



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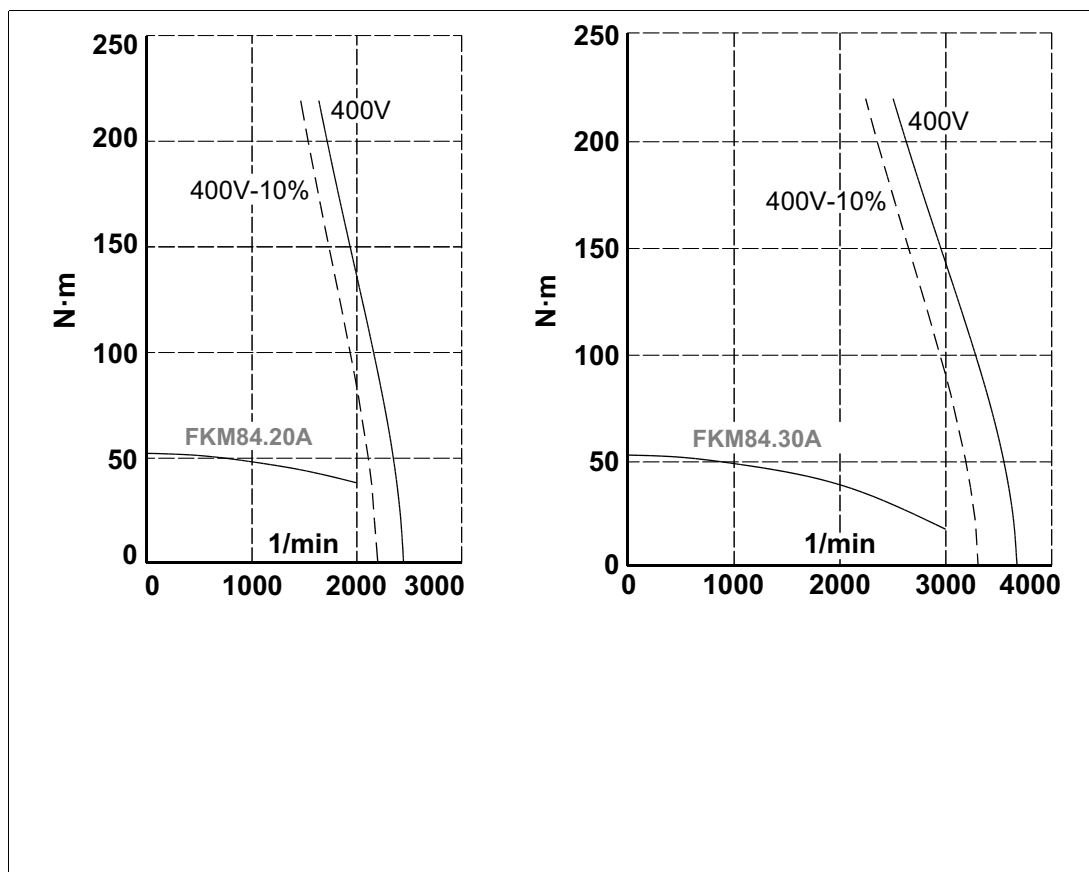
FKM84 models

T- 3/39 Technical data of the FKM84.●●A.□□.□□0.□□ motors.

Model		FKM84.●●A.□□.□□0.□□			
Terminology	Notation	Units	20	30	
Stall torque	Mo	N·m	52.0	52.0	
Rated torque	Mn	N·m	38.0	17.0	
Stall peak torque	Mp	N·m	156.0	156.0	
Rated speed	nN	1/min	2000	3000	
Stall current	Io	A	21.5	32.2	
Peak current	Imax	A	64.0	96.0	
Calculation power	Pcal	kW	10.9	16.3	
Rated power	Pn	kW	7.9	5.3	
Torque constant	Kt	N·m/A	2.41	1.61	
Acceleration time	tac	ms	26.4	39.6	
Inductance per fase (3-phase)	L	mH	3.4	1.5	
Resistance per phase	R	Ω	0.18	0.08	
Inertia (without brake)	J	kg·cm ²	197.0	197.0	
Inertia (with standard brake)	J*	kg·cm ²	228.8	228.8	
Inertia (with extra-torque brake)	J**	kg·cm ²	-	-	
Mass (without brake)	P	kg	50	50	
Mass (with standard brake)	P*	kg	55	55	
Mass (with extra-torque brake)	P**	kg	-	-	

T- 3/40 Selection of FAGOR drives for FKM84.●●A.□□.□□0.□□ motors.

Drive peak torque in N·m	AXD 1.25		AXD 1.35		AXD 2.50		AXD 2.75		AXD 3.100	
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo
FKM84.20A	-	-	-	-	120.5	2.3	156.0	3.0	-	-
FKM84.30A	-	-	-	-	-	-	121.1	2.3	156.0	3.0



F- 3/46

Torque-speed graphs. FKM84.●●A.□□.□□0.□□ models.

3.

3-PHASE SERVOMOTORS. FKM
Technical data. Torque-Speed curves



FXM/FKM

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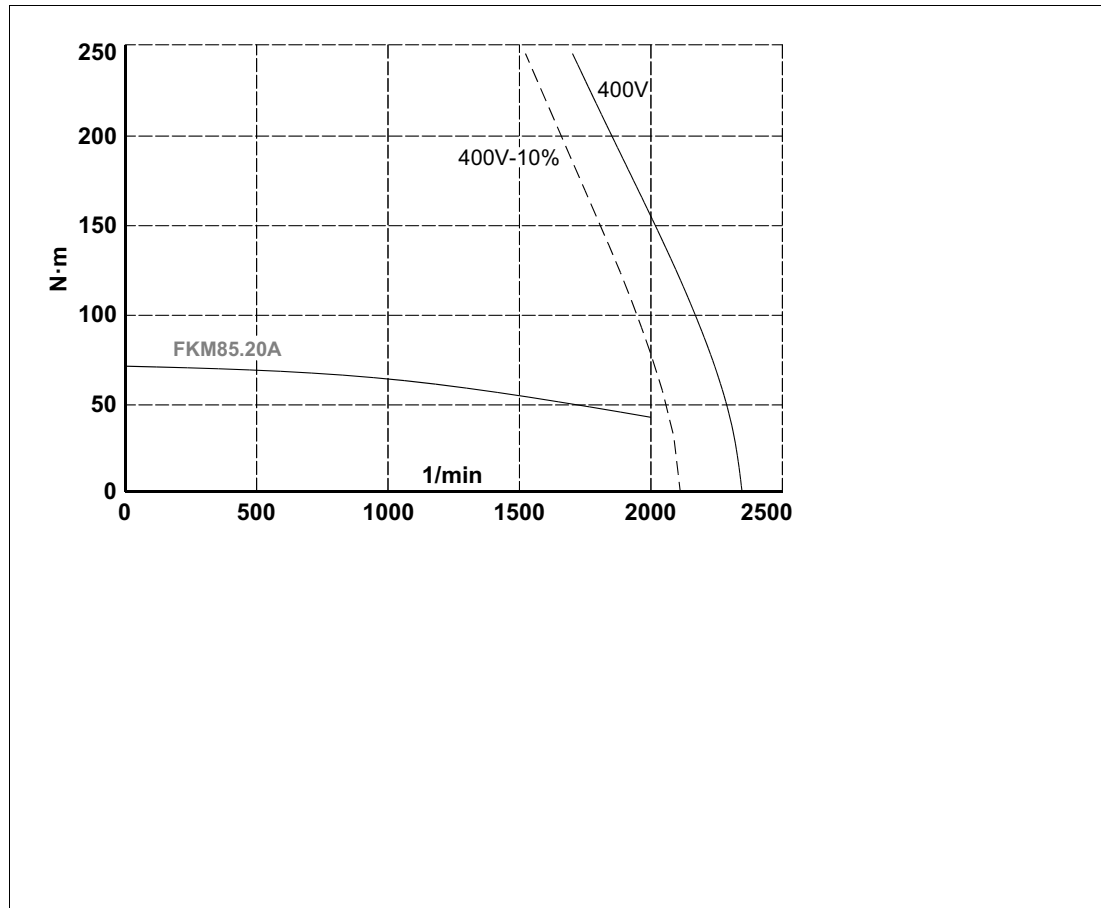
FKM85 models

T- 3/41 Technical data of the FKM85.●●A.□□.□□0.□□ motors.

Model	FKM85.●●A.□□.□□0.□□				
Terminology	Notation	Units	20		
Stall torque	Mo	N·m	74.0		
Rated torque	Mn	N·m	46.0		
Stall peak torque	Mp	N·m	222.0		
Rated speed	nN	1/min	2000		
Stall current	Io	A	29.3		
Peak current	Imax	A	87.0		
Calculation power	Pcal	kW	15.5		
Rated power	Pn	kW	15.5		
Torque constant	Kt	N·m/A	2.52		
Acceleration time	tac	ms	22.91		
Inductance per fase (3-phase)	L	mH	2.9		
Resistance per phase	R	Ω	0.14		
Inertia (without brake)	J	kg·cm ²	243.0		
Inertia (with standard brake)	J*	kg·cm ²	274.8		
Inertia (with extra-torque brake)	J**	kg·cm ²	-		
Mass (without brake)	P	kg	60		
Mass (with standard brake)	P*	kg	65		
Mass (with extra-torque brake)	P**	kg	-		

T- 3/42 Selection of FAGOR drives for FKM85.●●A.□□.□□0.□□ motors.

Drive peak torque in N·m	AXD 1.25		AXD 1.35		AXD 2.50		AXD 2.75		AXD 3.100	
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo
FKM85.20A	-	-	-	-	-	-	189.4	2.5	222.0	3.0



F- 3/47

Torque-speed graphs. FKM85.●●A.□□.□□0.□□ models.

3.

3-PHASE SERVOMOTORS. FKM
Technical data. Torque-Speed curves



FXM/FKM

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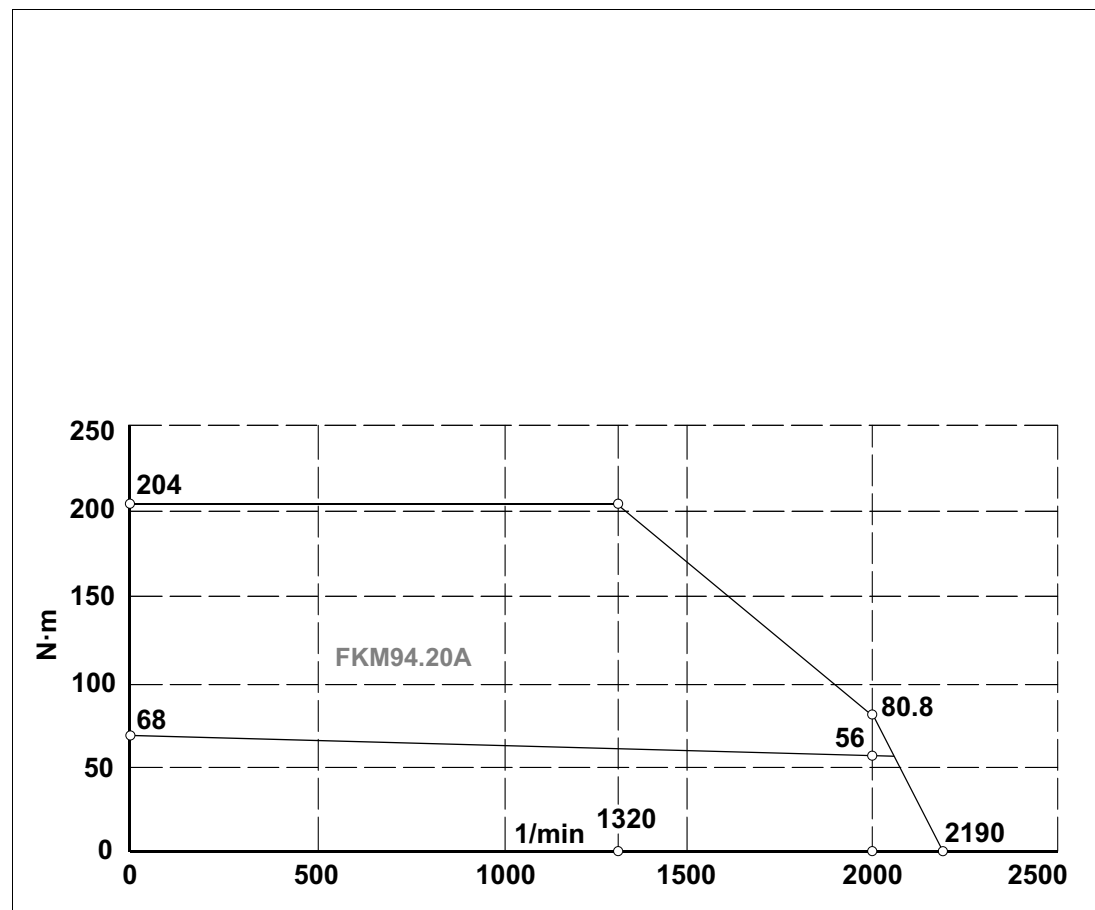
FKM94 models

T- 3/43 Technical data of the FKM94.●●A.□□.□□0.□0 motors.

Model	FKM94.●●A.□□.□□0.□0				
Terminology	Notation	Units	20		
Stall torque	Mo	N·m	68		
Rated torque	Mn	N·m	56		
Stall peak torque	Mp	N·m	204		
Rated speed	nN	1/min	2000		
Stall current	Io	A	25.4		
Peak current	Imax	A	99		
Calculation power	Pcal	kW	14.2		
Rated power	Pn	kW	11.7		
Torque constant	Kt	N·m/A	2.7		
Acceleration time	tac	ms	11.69		
Inductance per fase (3-phase)	L	mH	3.15		
Resistance per phase	R	Ω	0.12		
Inertia (without brake)	J	kg·cm ²	430		
Inertia (with standard brake)	J*	kg·cm ²	483		
Inertia (with extra-torque brake)	J**	kg·cm ²	-		
Mass (without brake)	P	kg	56.0		
Mass (with standard brake)	P*	kg	65.5		
Mass (with extra-torque brake)	P**	kg	-		

T- 3/44 Selection of FAGOR drives for FKM94.●●A.□□.□□0.□0 motors.

Drive peak torque in N·m	AXD 1.35		AXD 2.50		AXD 2.75		AXD 3.100				
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo			
FKM94.20A	-	-	-	-	170.1	2.5	204.0	3.0			



F- 3/48

Torque-speed graphs. FKM94.●●A.□□.□□0.□0 models.

3.

3-PHASE SERVOMOTORS. FKM
Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

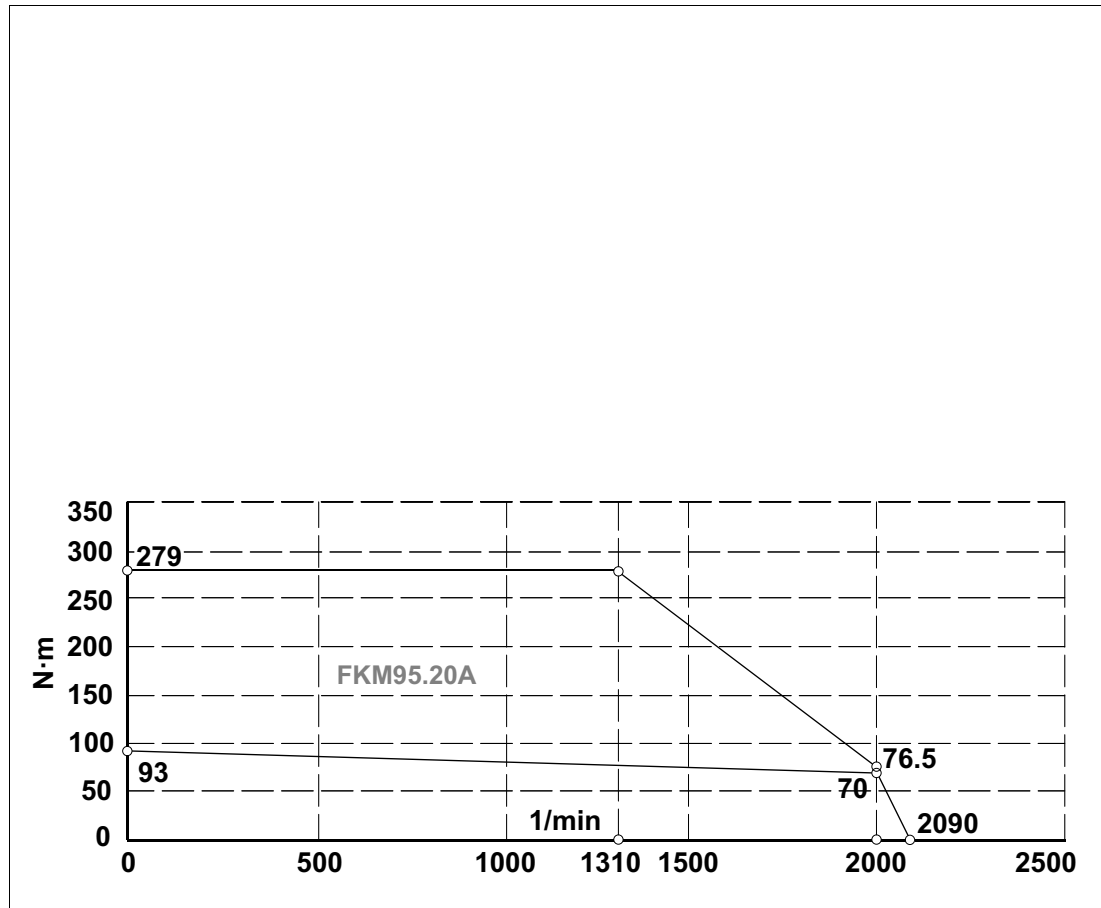
FKM95 models

T- 3/45 Technical data of the FKM95.●●A.□□.□□0.□0 motors.

Model	FKM95.●●A.□□.□□0.□0				
Terminología	Notation	Units	20		
Stall torque	Mo	N·m	93		
Rated torque	Mn	N·m	70		
Stall peak torque	Mp	N·m	279		
Rated speed	nN	1/min	2000		
Stall current	Io	A	33.1		
Peak current	Imax	A	129		
Calculation power	Pcal	kW	19.5		
Rated power	Pn	kW	14.7		
Torque constant	Kt	N·m/A	2.8		
Acceleration time	tac	ms	11.48		
Inductance per fase (3-phase)	L	mH	2.4		
Resistance per phase	R	Ω	0.075		
Inertia (without brake)	J	kg·cm ²	550		
Inertia (with standard brake)	J*	kg·cm ²	603		
Inertia (with extra-torque brake)	J**	kg·cm ²	-		
Mass (without brake)	P	kg	73.0		
Mass (with standard brake)	P*	kg	92.5		
Mass (with extra-torque brake)	P**	kg	-		

T- 3/46 Selection of FAGOR drives for FKM95.●●A.□□.□□0.□0 motors.

Drive peak torque in N·m	AXD 1.35		AXD 2.50		AXD 2.75		AXD 3.100					
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo				
FKM95.20A	-	-	-	-	176.4	1.9	279	3.0				



F- 3/49

Torque-speed graphs. FKM95.●●A.□□.□□0.□0 models.

3.

3-PHASE SERVOMOTORS. FKM
Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

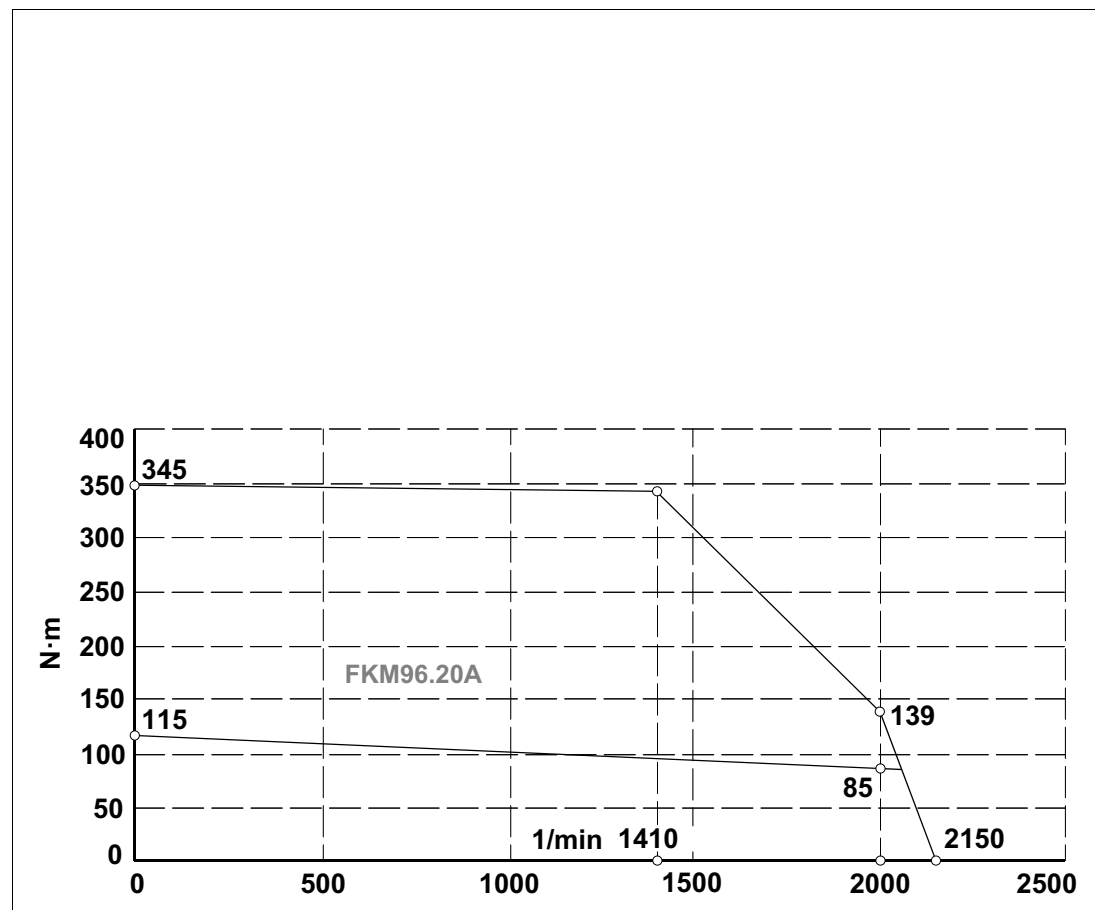
FKM96 models

T- 3/47 Technical data of the FKM96.●●A.□□.□00.□0 motors.

Model	FKM96.●●A.□□.□00.□0				
Terminology	Notation	Units	20		
Stall torque	Mo	N·m	115		
Rated torque	Mn	N·m	85		
Stall peak torque	Mp	N·m	345		
Rated speed	nN	1/min	2000		
Stall current	Io	A	42.1		
Peak current	Imax	A	164		
Calculation power	Pcal	kW	24		
Rated power	Pn	kW	17.8		
Torque constant	Kt	N·m/A	2.7		
Acceleration time	tac	ms	11.52		
Inductance per fase (3-phase)	L	mH	1.7		
Resistance per phase	R	Ω	0.055		
Inertia (without brake)	J	kg·cm ²	660		
Inertia (with standard brake)	J*	kg·cm ²	-		
Inertia (with extra-torque brake)	J**	kg·cm ²	-		
Mass (without brake)	P	kg	89		
Mass (with standard brake)	P*	kg	-		
Mass (with extra-torque brake)	P**	kg	-		

T- 3/48 Selection of FAGOR drives for FKM96.●●A.□□.□00.□0 motors.

Drive peak torque in N·m	AXD 1.35		AXD 2.50		AXD 2.75		AXD 3.100		AXD 3.150			
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo		
FKM96.20A	-	-	-	-	-	-	270	2.35	334.8	2.91		



F- 3/50

Torque-speed graphs. FKM96.●●A.□□.□00.□0 models.

3.

3-PHASE SERVOMOTORS. FKM
Technical data. Torque-Speed curves



FXM/FKM

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Ventilated FKM with "A" winding · 400 V AC ·

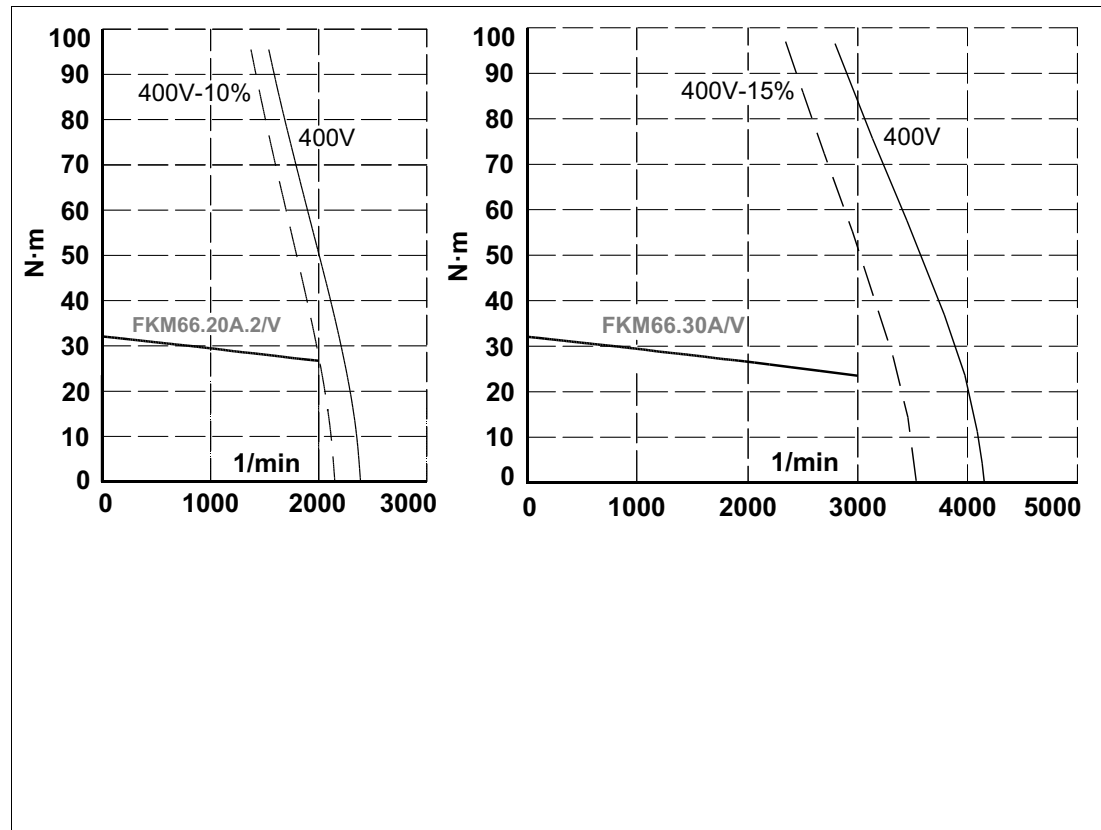
FKM66 models

T- 3/49 Technical data of the FKM66.●●A.□□.□□1.□□ motors.

Model			FKM66.●●A.□□.□□1.●□			
Terminology	Notation	Units	20...-2	30		
Stall torque	Mo	N·m	32.0	32.0		
Rated torque	Mn	N·m	27.0	23.5		
Stall peak torque	Mp	N·m	94.0	94.0		
Rated speed	nN	1/min	2000	3000		
Stall current	Io	A	12.8	22.3		
Peak current	Imax	A	37.0	66.0		
Calculation power	Pcal	kW	6.7	10.0		
Rated power	Pn	kW	5.6	7.5		
Torque constant	Kt	N·m/A	2.50	1.44		
Acceleration time	tac	ms	9.57	14.36		
Inductance per fase (3-phase)	L	mH	4.6	2.6		
Resistance per phase	R	Ω	0.52	0.17		
Inertia (without brake)	J	kg·cm ²	43.0	-		
Inertia (with standard brake)	J*	kg·cm ²	-	-		
Inertia (with extra-torque brake)	J**	kg·cm ²	48.6	48.6		
Mass (without brake)	P	kg	23.0	-		
Mass (with standard brake)	P*	kg	-	-		
Mass (with extra-torque brake)	P**	kg	27.6	27.6		

T- 3/50 Selection of FAGOR drives for FKM66.●●A.□□.□□1.●□ motors.

Drive peak torque in N·m	AXD 1.35		AXD 2.50		AXD 2.75				
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo			
FKM66.20A.2	87.5	2.7	94.0	2.9	-	-			
FKM66.30A	-	-	72.0	2.25	94.0	2.9			



F- 3/51

Torque-speed graphs. FKM66.●●A.□□.□□1.□□ models.

3.

3-PHASE SERVOMOTORS. FKM
Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

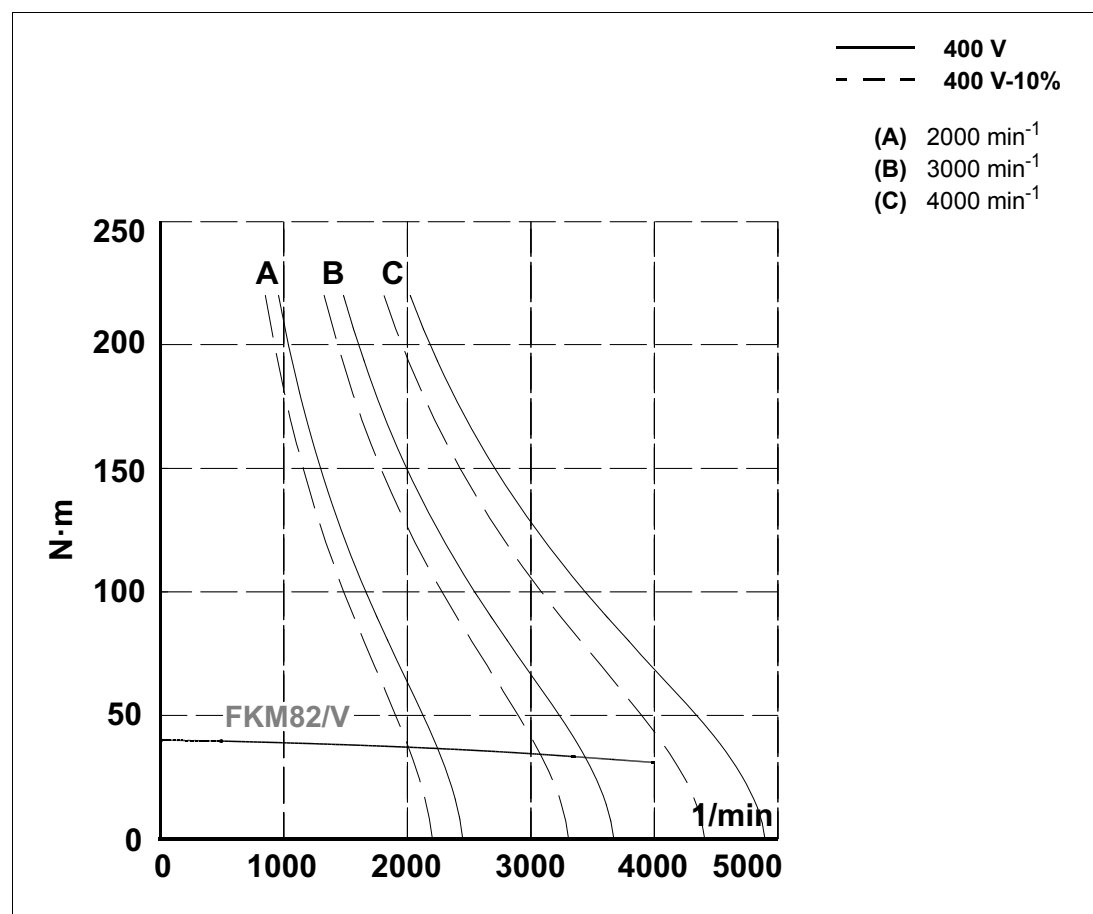
FKM82 models

T- 3/51 Technical data of the FKM82.●●A.□□.□□1.□□ motors.

Model		FKM82.●●A.□□.□□1.□□				
Terminology	Notation	Units			40	
Stall torque	Mo	N·m			40.0	
Rated torque	Mn	N·m			31.0	
Stall peak torque	Mp	N·m			96.0	
Rated speed	nN	1/min			4000	
Stall current	Io	A			33.0	
Peak current	Imax	A			79.0	
Calculation power	Pcal	kW			16.7	
Rated power	Pn	kW			13.0	
Torque constant	Kt	N·m/A			1.21	
Acceleration time	tac	ms			44.91	
Inductance per fase (3-phase)	L	mH			1.8	
Resistance per phase	R	Ω			0.12	
Inertia (without brake)	J	kg·cm ²			103.0	
Inertia (with standard brake)	J*	kg·cm ²			134.8	
Inertia (with extra-torque brake)	J**	kg·cm ²			-	
Mass (without brake)	P	kg			36	
Mass (with standard brake)	P*	kg			41	
Mass (with extra-torque brake)	P**	kg			-	

T- 3/52 Selection of FAGOR drives for FKM82.●●A.□□.□□1.□□ motors.

Drive peak torque in N·m	AXD 1.25		AXD 1.35		AXD 2.50		AXD 2.75		AXD 3.100	
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo
FKM82.40A	-	-	-	-	-	-	90.7	2.2	96.0	2.4



F- 3/52

Torque-speed graphs. FKM82.●●A.□□.□□1.□□ models.

3.

3-PHASE SERVOMOTORS. FKM
Technical data. Torque-Speed curves



FXM/FKM

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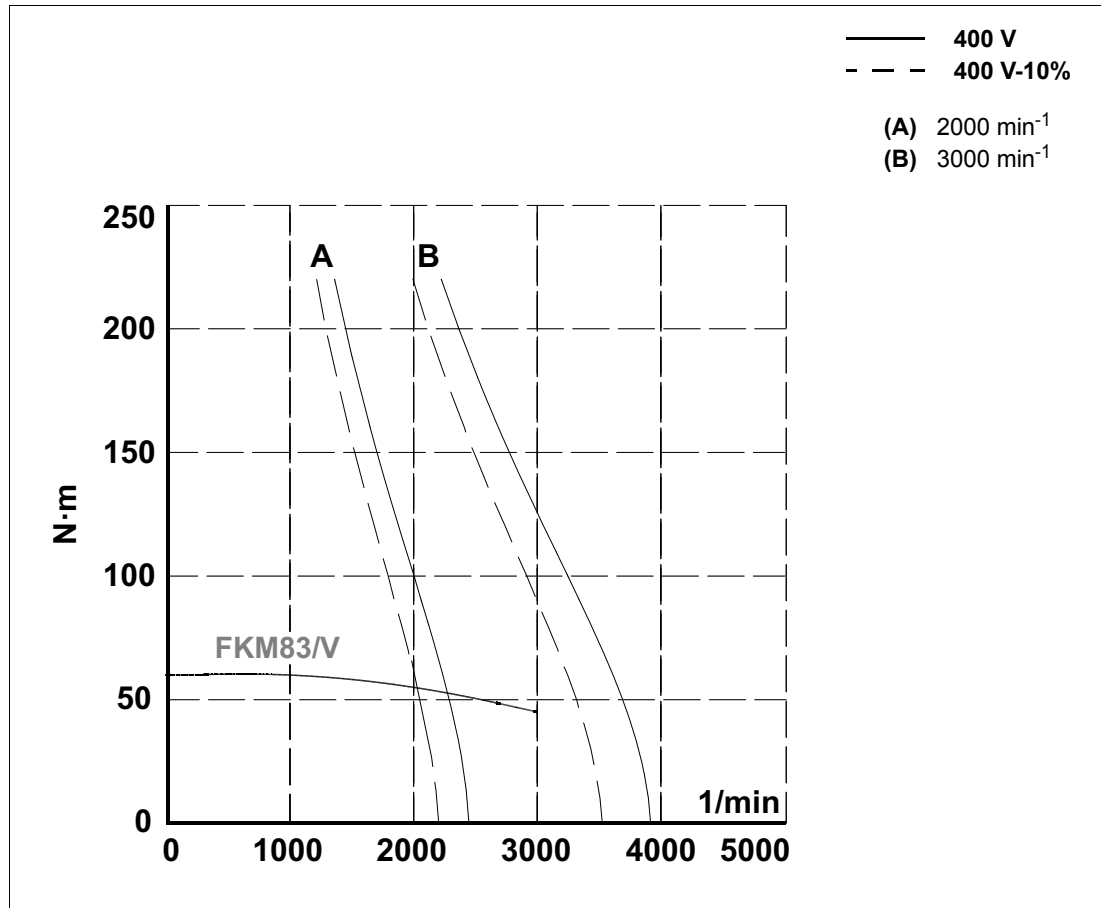
FKM83 models

T- 3/53 Technical data of the FKM83.●●A.□□.□□1.□□ motors.

Model	FKM83.●●A.□□.□□1.□□					
Terminology	Notation	Units	30			
Stall torque	Mo	N·m	60.0			
Rated torque	Mn	N·m	45.0			
Stall peak torque	Mp	N·m	123.0			
Rated speed	nN	1/min	3000			
Stall current	Io	A	39.6			
Peak current	Imax	A	81.0			
Calculation power	Pcal	kW	18.8			
Rated power	Pn	kW	14.1			
Torque constant	Kt	N·m/A	1.51			
Acceleration time	tac	ms	38.3			
Inductance per fase (3-phase)	L	mH	1.8			
Resistance per phase	R	Ω	0.100			
Inertia (without brake)	J	kg·cm ²	150.0			
Inertia (with standard brake)	J*	kg·cm ²	181.8			
Inertia (with extra-torque brake)	J**	kg·cm ²	-			
Mass (without brake)	P	kg	46			
Mass (with standard brake)	P*	kg	51			
Mass (with extra-torque brake)	P**	kg	-			

T- 3/54 Selection of FAGOR drives for FKM83.●●A.□□.□□1.□□ motors.

Drive peak torque in N·m	AXD 1.35		AXD 2.50		AXD 2.75		AXD 3.100			
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo		
FKM83.30A	-	-	-	-	-	-	123.0	2.05		



F- 3/53

Torque-speed graphs. FKM83.●●A.□□.□□1.□□ models.

3.

3-PHASE SERVOMOTORS. FKM
 Technical data. Torque-Speed curves



FXM/FKM

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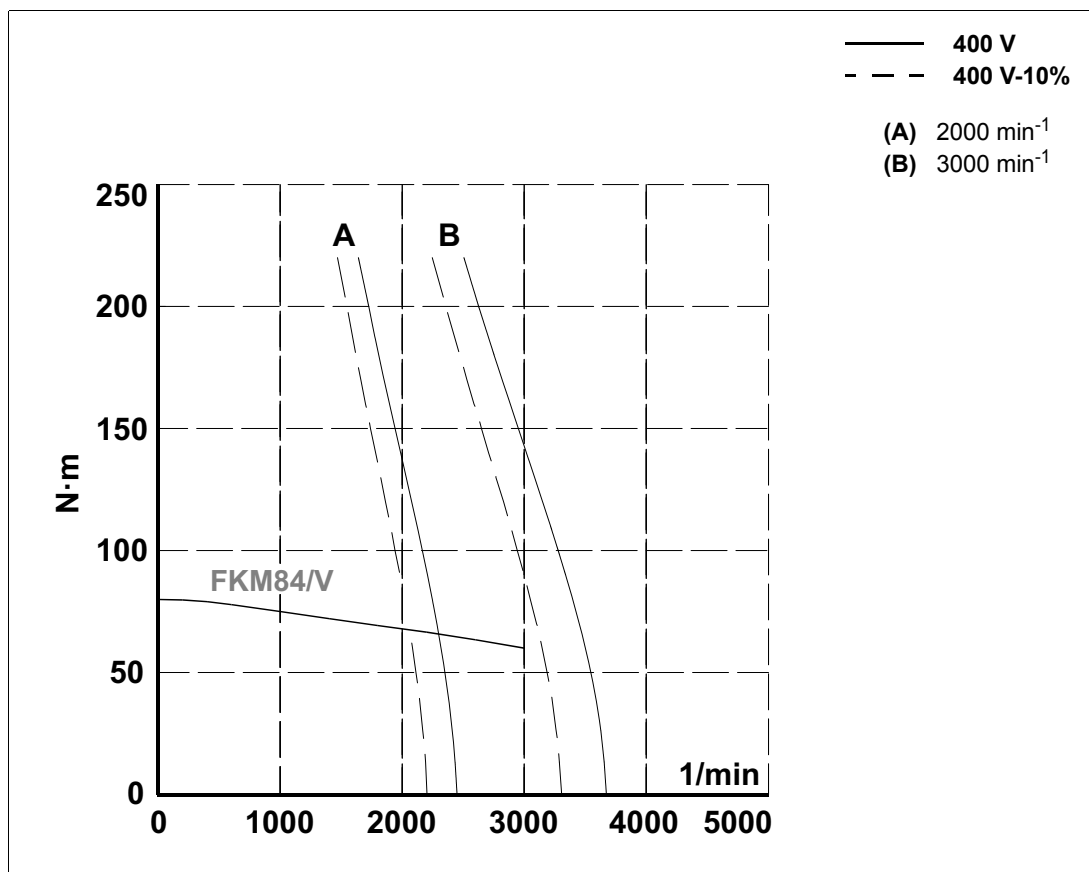
FKM84 models

T- 3/55 Technical data of the FKM84.●●A.□□.□□1.□□ motors.

Model		FKM84.●●A.□□.□□1.□□			
Terminology	Notation	Units	20	30	
Stall torque	Mo	N·m	80.0	80.0	
Rated torque	Mn	N·m	68.0	60.0	
Stall peak torque	Mp	N·m	156.0	156.0	
Rated speed	nN	1/min	2000	3000	
Stall current	Io	A	33.0	49.5	
Peak current	Imax	A	64.0	96.0	
Calculation power	Pcal	kW	16.7	25.1	
Rated power	Pn	kW	14.2	18.8	
Torque constant	Kt	N·m/A	2.42	1.61	
Acceleration time	tac	ms	26.4	39.6	
Inductance per fase (3-phase)	L	mH	3.4	1.5	
Resistance per phase	R	Ω	0.18	0.08	
Inertia (without brake)	J	kg·cm ²	197.0	197.0	
Inertia (with standard brake)	J*	kg·cm ²	228.8	228.8	
Inertia (with extra-torque brake)	J**	kg·cm ²	-	-	
Mass (without brake)	P	kg	55	55	
Mass (with standard brake)	P*	kg	60	60	
Mass (with extra-torque brake)	P**	kg	-	-	

T- 3/56 Selection of FAGOR drives for FKM84.●●A.□□.□□1.□□ motors.

Drive peak torque in N·m	AXD 2.50		AXD 2.75		AXD 3.100				
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo			
FKM84.20A	-	-	156.0	1.95	-	-			
FKM84.30A	-	-	-	-	156.0	1.95			



F- 3/54

Torque-speed graphs. FKM84.●●A.□□.□□1.□□ models.

3.

3-PHASE SERVOMOTORS. FKM
Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

FKM85 models

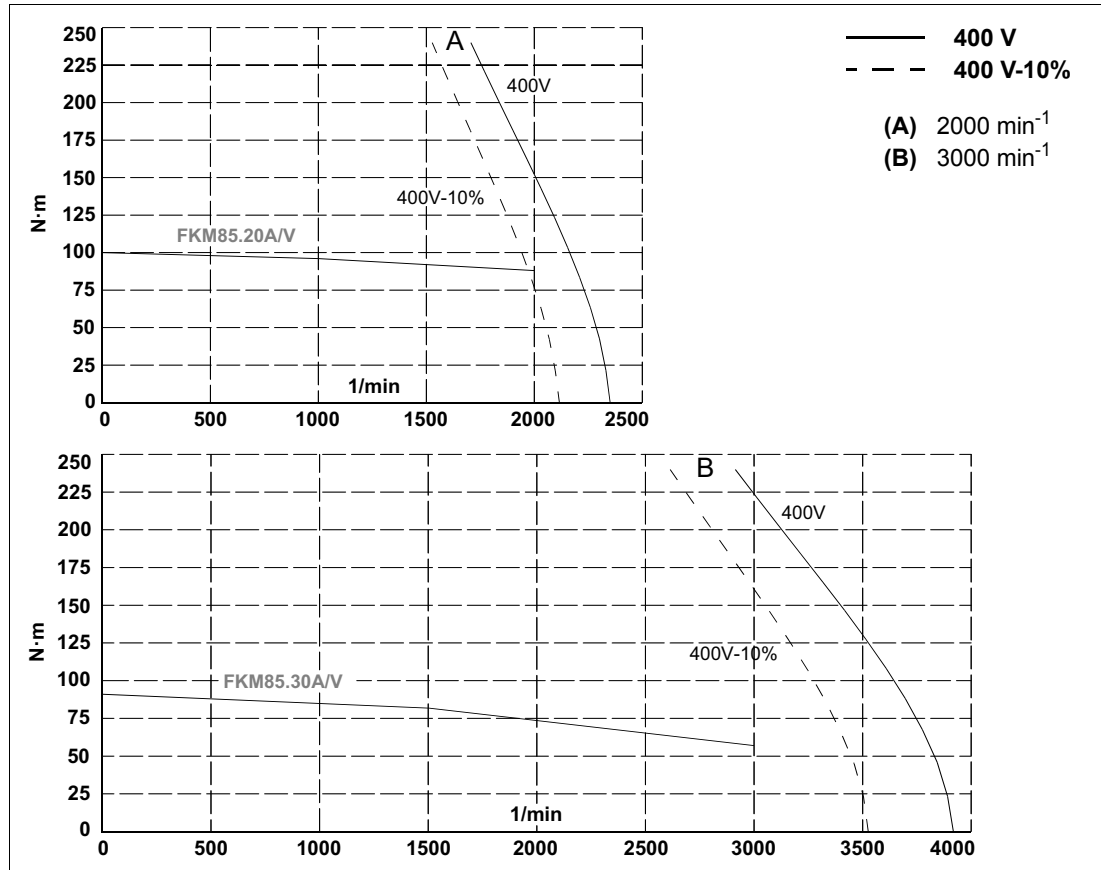
T- 3/57 Technical data of the FKM85.●●A.□□.□□1.□□ motors.

Model	FKM85.●●A.□□.□□1.□□				
Terminology	Notation	Units	20	30	
Stall torque	Mo	N·m	100.0	* 91.0	
Rated torque	Mn	N·m	88.0	57.0	
Stall peak torque	Mp	N·m	222.0	222.0	
Rated speed	nN	1/min	2000	3000	
Stall current	Io	A	39.6	60.0	
Peak current	Imax	A	87.0	145.0	
Calculation power	Pcal	kW	20.9	28.6	
Rated power	Pn	kW	18.4	17.9	
Torque constant	Kt	N·m/A	2.52	1.51	
Acceleration time	tac	ms	22.91	34.37	
Inductance per fase (3-phase)	L	mH	2.9	0.99	
Resistance per phase	R	Ω	0.140	0.0525	
Inertia (without brake)	J	kg·cm ²	243.0	243.0	
Inertia (with standard brake)	J*	kg·cm ²	274.8	274.8	
Inertia (with extra-torque brake)	J**	kg·cm ²	-	-	
Mass (without brake)	P	kg	65	65	
Mass (with standard brake)	P*	kg	70	70	
Mass (with extra-torque brake)	P**	kg	-	-	

* The FKM85.20A.□□.□□1.□□ model of 2000 rpm provides a stall torque of 100 N·m.

T- 3/58 Selection of FAGOR drives for FKM85.●●A.□□.□□1.□□ motors.

Drive peak torque in N·m	AXD 2.50		AXD 2.75		AXD 3.100		AXD 3.150			
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo		
FKM85.20A	-	-	-	-	222.0	2.2	-	-		
FKM85.30A	-	-	-	-	-	-	222.0	2.4		



F- 3/55

Torque-speed graphs. FKM85.●●A.□□.□□1.□□ models.

3.

3-PHASE SERVOMOTORS. FKM
Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

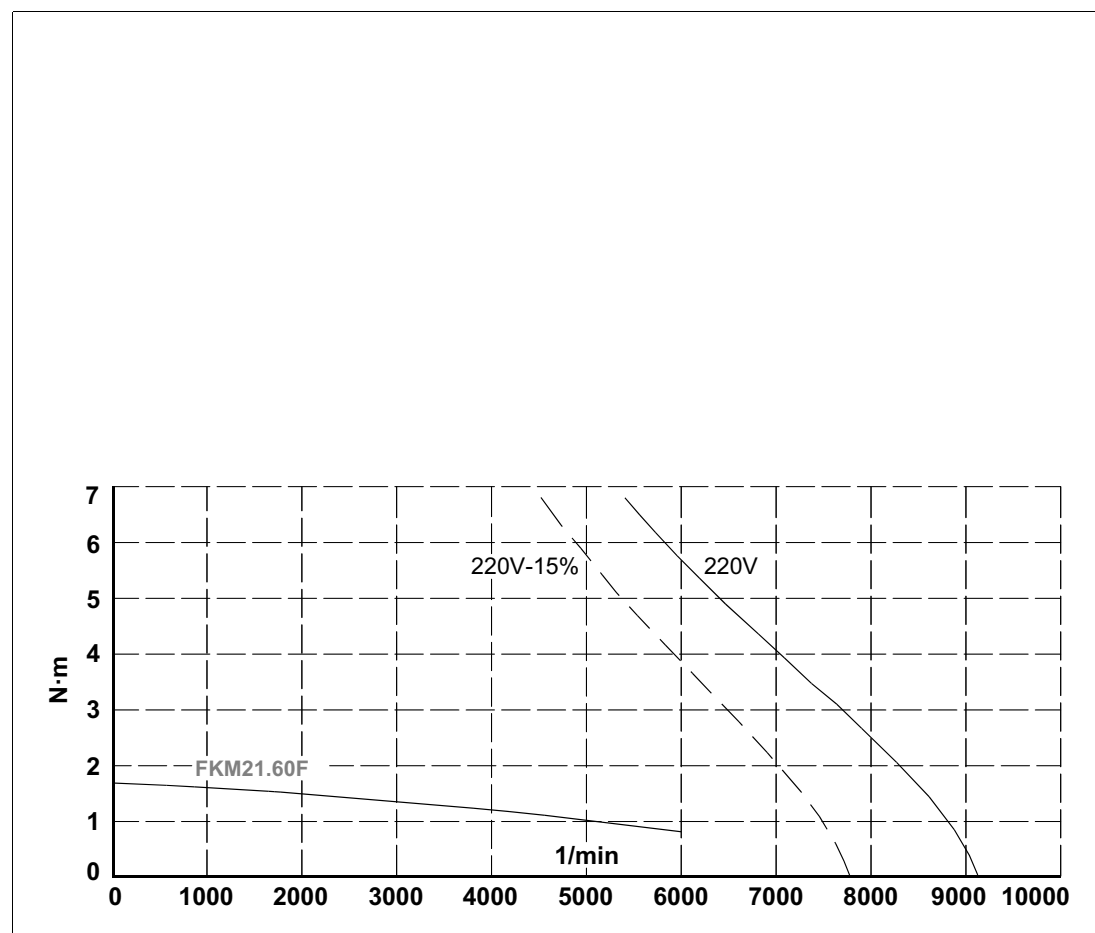
Non-ventilated with “F” winding · 220 V AC ·

FKM21 models

T- 3/59 Technical data of the FKM21.●●F.□□.□□0.□□ motors.

Model		FKM21.●●F.□□.□□0.□□				
Terminology	Notation	Units				60
Stall torque	Mo	N·m				1.7
Rated torque	Mn	N·m				0.8
Stall peak torque	Mp	N·m				7
Rated speed	nN	1/min				6000
Stall current	Io	A				4.7
Peak current	Imax	A				19
Calculation power	Pcal	kW				1.0
Rated power	Pn	kW				0.5
Torque constant	Kt	N·m/A				0.36
Acceleration time	tac	ms				14.3
Inductance per fase (3-phase)	L	mH				2.6
Resistance per phase	R	Ω				0.885
Inertia (without brake)	J	kg·cm ²				1.6
Inertia (with standard brake)	J*	kg·cm ²				1.72
Inertia (with extra-torque brake)	J**	kg·cm ²				-
Mass (without brake)	P	kg				4.2
Mass (with standard brake)	P*	kg				4.48
Mass (with extra-torque brake)	P**	kg				-

Note. These motors with “F” winding (220 V AC) can only be controlled by ACSD-□L or MCS-□L series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.



F- 3/56

Torque-speed graphs. FKM21.●●F.□□.□□0.□□ models.

3.

3-PHASE SERVOMOTORS. FKM
Technical data. Torque-Speed curves



FXM/FKM

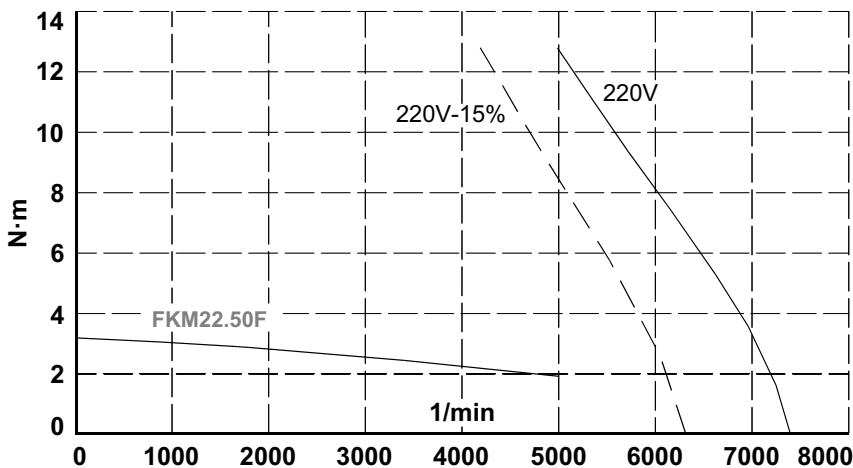
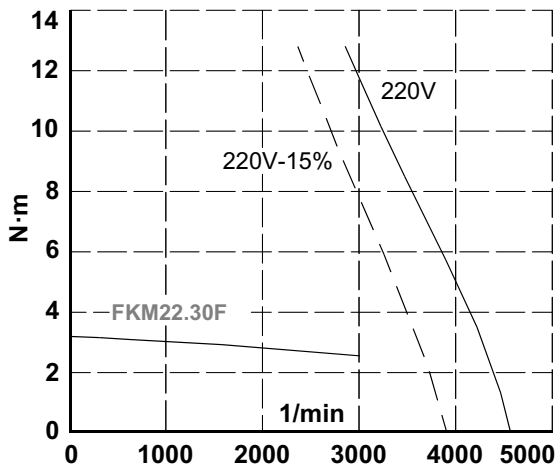
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FKM22 models

T- 3/60 Technical data of the FKM22.●●F.□□.□□0.□□ motors.

Model	FKM22.●●F.□□.□□0.□□				
Terminology	Notation	Units	30	50	
Stall torque	Mo	N·m	3.2	3.2	
Rated torque	Mn	N·m	2.6	1.9	
Stall peak torque	Mp	N·m	13	13	
Rated speed	nN	1/min	3000	5000	
Stall current	Io	A	4.5	7.2	
Peak current	I _{max}	A	18	29	
Calculation power	P _{cal}	kW	1.0	1.7	
Rated power	P _n	kW	0.8	1.0	
Torque constant	K _t	N·m/A	0.71	0.44	
Acceleration time	t _{ac}	ms	7.0	11.7	
Inductance per fase (3-phase)	L	mH	4.6	1.7	
Resistance per phase	R	Ω	1.1	0.425	
Inertia (without brake)	J	kg·cm ²	2.9	2.9	
Inertia (with standard brake)	J*	kg·cm ²	3.02	3.02	
Inertia (with extra-torque brake)	J**	kg·cm ²	-	-	
Mass (without brake)	P	kg	5.30	5.30	
Mass (with standard brake)	P*	kg	5.58	5.58	
Mass (with extra-torque brake)	P**	kg	-	-	

Note. These motors with "F" winding (220 V AC) can only be controlled by ACSD-□L or MCS-□L series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.



F- 3/57

Torque-speed graphs. FKM22.●●F.□□.□□0.□□ models.

3.

3-PHASE SERVOMOTORS. FKM

Technical data. Torque-Speed curves



FAGOR AUTOMATION

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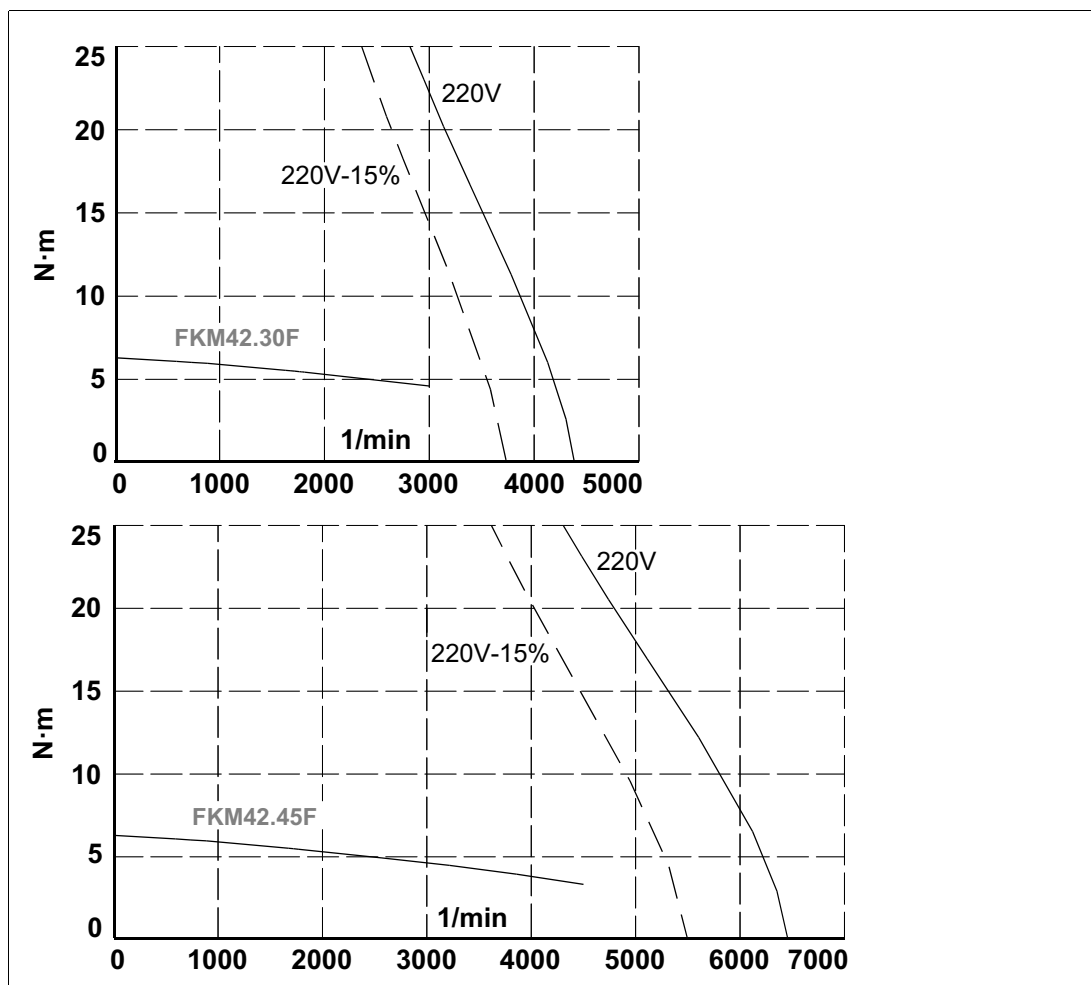
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FKM42 models

T- 3/61 Technical data of the FKM42.●●F.□□.□□0.□□ motors.

Model	FKM42.●●F.□□.□□0.□□				
Terminology	Notation	Units	30	45	
Stall torque	Mo	N·m	6.3	6.3	
Rated torque	Mn	N·m	4.6	3.3	
Stall peak torque	Mp	N·m	25	25	
Rated speed	nN	1/min	3000	4500	
Stall current	Io	A	8.5	12.4	
Peak current	Imax	A	34	50	
Calculation power	Pcal	kW	2.0	3.0	
Rated power	Pn	kW	1.4	1.5	
Torque constant	Kt	N·m/A	0.74	0.51	
Acceleration time	tac	ms	10.7	16.0	
Inductance per fase (3-phase)	L	mH	2.6	1.2	
Resistance per phase	R	Ω	0.45	0.21	
Inertia (without brake)	J	kg·cm ²	8.5	8.5	
Inertia (with standard brake)	J*	kg·cm ²	9.04	9.04	
Inertia (with extra-torque brake)	J**	kg·cm ²	-	-	
Mass (without brake)	P	kg	7.80	7.80	
Mass (with standard brake)	P*	kg	8.26	8.26	
Mass (with extra-torque brake)	P**	kg	-	-	

Note. These motors with “F” winding (220 V AC) can only be controlled by ACSD-□L or MCS-□L series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.



F- 3/58

Torque-speed graphs. FKM42.●●F.□□.□□0.□□ models.

3.

3-PHASE SERVOMOTORS. FKM
Technical data. Torque-Speed curves



FXM/FKM

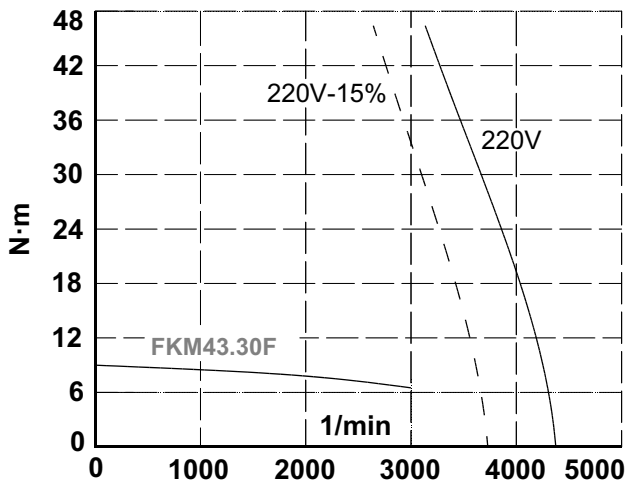
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FKM43 models

T- 3/62 Technical data of the FKM43.●●F.□□.□□0.□□ motors.

Model	FKM43.●●F.□□.□□0.□□				
Terminology	Notation	Units	30		
Stall torque	Mo	N·m	9.0		
Rated torque	Mn	N·m	6.5		
Stall peak torque	Mp	N·m	36		
Rated speed	nN	1/min	3000		
Stall current	Io	A	13.8		
Peak current	I _{max}	A	55.4		
Calculation power	P _{cal}	kW	2.8		
Rated power	P _n	kW	2.0		
Torque constant	K _t	N·m/A	0.65		
Acceleration time	t _{ac}	ms	14.56		
Inductance per fase (3-phase)	L	mH	1.2		
Resistance per phase	R	Ω	0.150		
Inertia (without brake)	J	kg·cm ²	16.7		
Inertia (with standard brake)	J*	kg·cm ²	17.24		
Inertia (with extra-torque brake)	J**	kg·cm ²	-		
Mass (without brake)	P	kg	11.7		
Mass (with standard brake)	P*	kg	12.18		
Mass (with extra-torque brake)	P**	kg	-		

Note. These motors with “F” winding (220 V AC) can only be controlled by ACSD-□L or MCS-□L series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.



F- 3/59

Torque-speed graphs. FKM43.●●F.□□.□□0.□□ models.

3.

3-PHASE SERVOMOTORS. FKM
Technical data. Torque-Speed curves



FXM/FKM

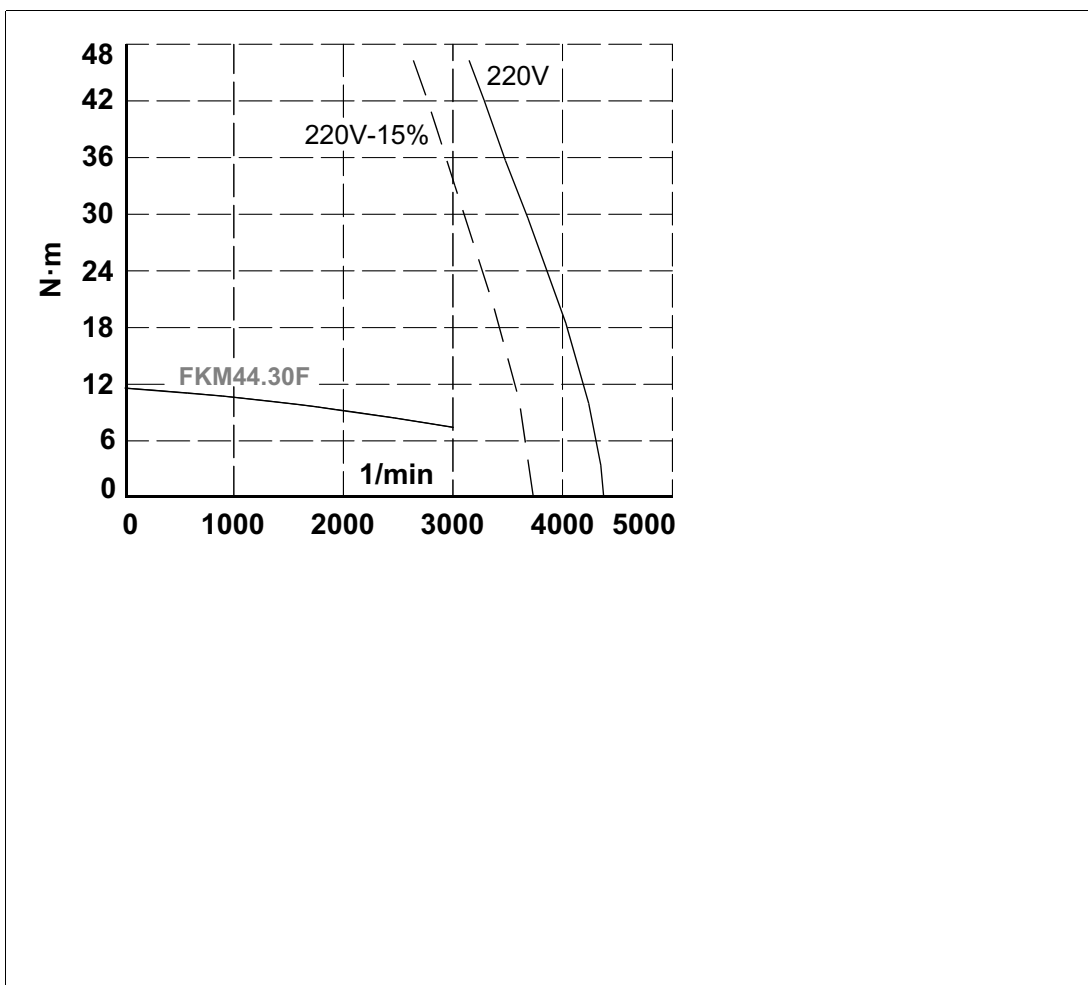
Ref.1703

FKM44 models

T- 3/63 Technical data of the FKM44. ●●F.□□.□□0.□□ motors.

Model	FKM44.●●F.□□.□□0.□□				
Terminology	Notation	Units	30		
Stall torque	Mo	N·m	11.6		
Rated torque	Mn	N·m	7.4		
Stall peak torque	Mp	N·m	47		
Rated speed	nN	1/min	3000		
Stall current	Io	A	15.6		
Peak current	Imax	A	62		
Calculation power	Pcal	kW	3.6		
Rated power	Pn	kW	2.3		
Torque constant	Kt	N·m/A	0.74		
Acceleration time	tac	ms	11.2		
Inductance per fase (3-phase)	L	mH	1.2		
Resistance per phase	R	Ω	0.15		
Inertia (without brake)	J	kg·cm ²	16.7		
Inertia (with standard brake)	J*	kg·cm ²	17.24		
Inertia (with extra-torque brake)	J**	kg·cm ²	-		
Mass (without brake)	P	kg	11.70		
Mass (with standard brake)	P*	kg	12.16		
Mass (with extra-torque brake)	P**	kg	-		

Note. These motors with “F” winding (220 V AC) can only be controlled by ACSD-□L or MCS-□L series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.



F- 3/60

Torque-speed graphs. FKM44. ●●F.□□.□□0.□□ models.

3.

3-PHASE SERVOMOTORS. FKM
Technical data. Torque-Speed curves



FXM/FKM

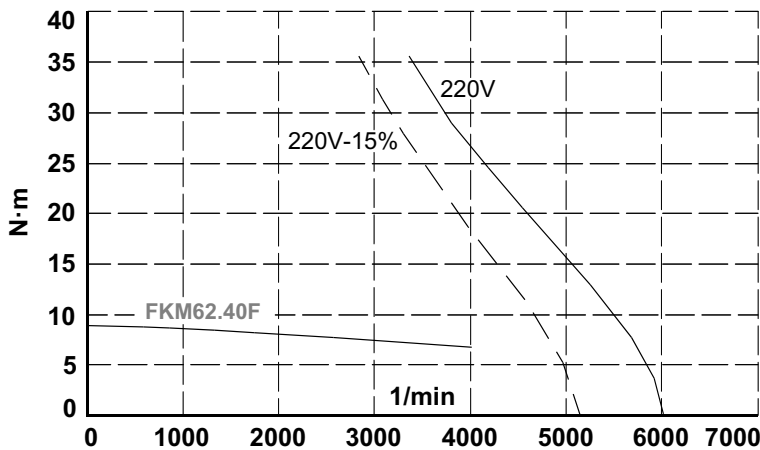
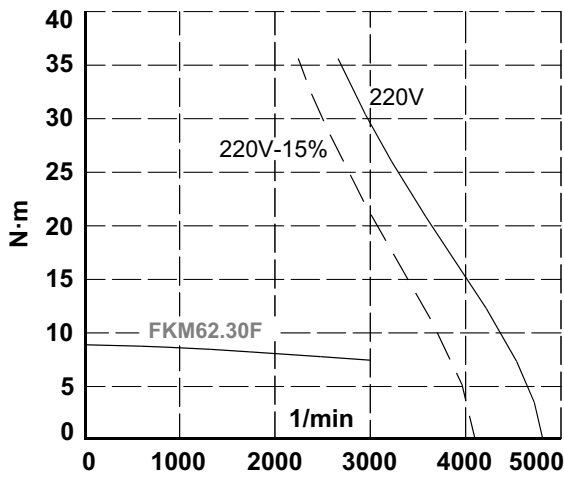
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FKM62 models

T- 3/64 Technical data of the FKM62.●●F.□□.□□□.□□ motors.

Model	FKM62.●●F.□□.□□□.□□				
Terminology	Notation	Units		30	40
Stall torque	Mo	N·m		8.9	8.9
Rated torque	Mn	N·m		7.5	6.8
Stall peak torque	Mp	N·m		35	35
Rated speed	nN	1/min		3000	4000
Stall current	Io	A		13.1	16.4
Peak current	I _{max}	A		52	66
Calculation power	P _{cal}	kW		2.8	3.7
Rated power	P _n	kW		2.4	2.8
Torque constant	K _t	N·m/A		0.68	0.54
Acceleration time	t _{ac}	ms		14.3	19.1
Inductance per fase (3-phase)	L	mH		2.1	1.3
Resistance per phase	R	Ω		0.225	0.18
Inertia (without brake)	J	kg·cm ²		16	16
Inertia (with standard brake)	J*	kg·cm ²		17.15	17.15
Inertia (with extra-torque brake)	J**	kg·cm ²		-	-
Mass (without brake)	P	kg		11.9	11.9
Mass (with standard brake)	P*	kg		12.8	12.8
Mass (with extra-torque brake)	P**	kg		-	-

Note. These motors with "F" winding (220 V AC) can only be controlled by ACSD-□L or MCS-□L series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.



F- 3/61

Torque-speed graphs. FKM62.●●F.□□.□□□.□□ models.

3.

3-PHASE SERVOMOTORS. FKM

Technical data. Torque-Speed curves



FAGOR AUTOMATION

FXM/FKM

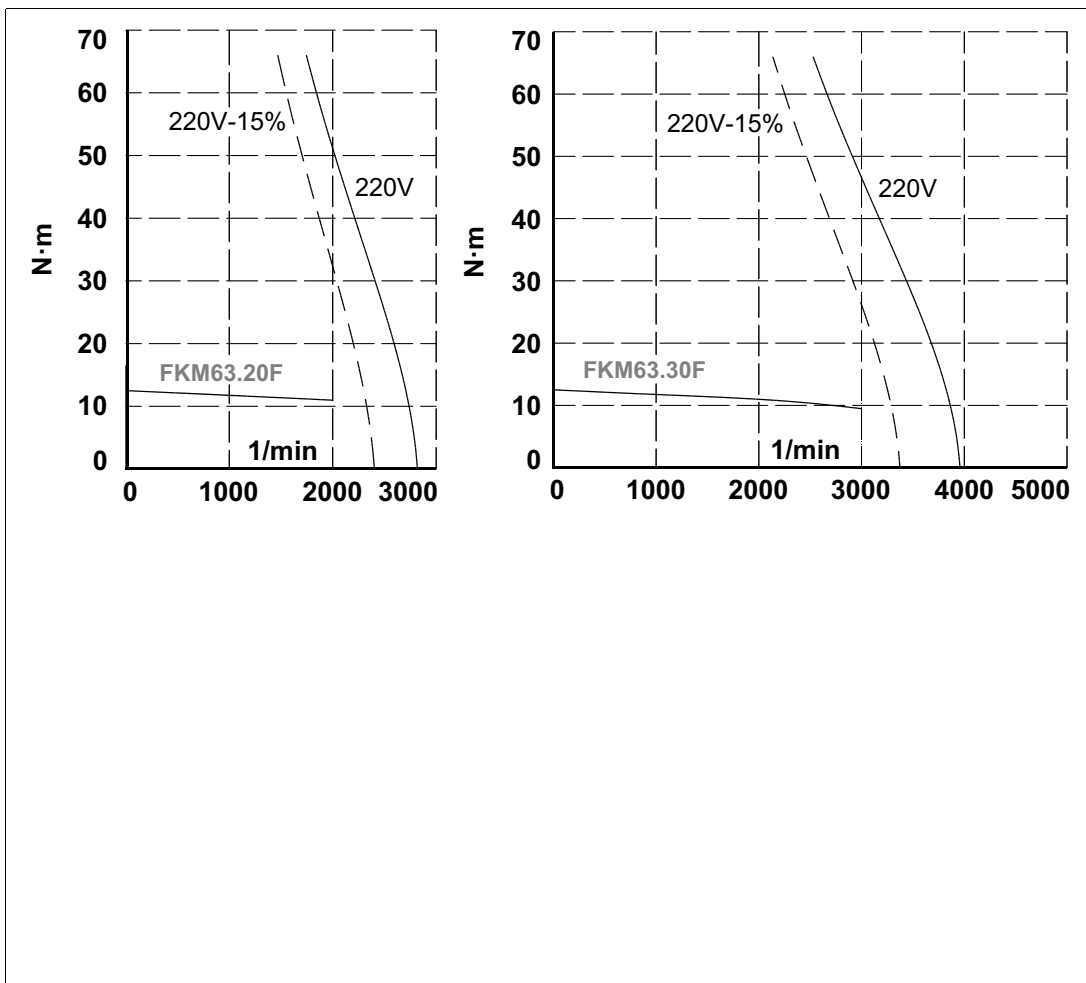
Ref.1703

FKM63 models

T- 3/65 Technical data of the FKM63.●●F.□□.□□0.□□ motors.

Model	FKM63.●●F.□□.□□0.□□				
Terminology	Notation	Units	20	30	
Stall torque	Mo	N·m	12.5	12.5	
Rated torque	Mn	N·m	11.0	9.5	
Stall peak torque	Mp	N·m	51	51	
Rated speed	nN	1/min	2000	3000	
Stall current	Io	A	11.7	16.6	
Peak current	Imax	A	46.6	66.4	
Calculation power	Pcal	kW	2.6	3.9	
Rated power	Pn	kW	2.3	2.98	
Torque constant	Kt	N·m/A	1.06	0.75	
Acceleration time	tac	ms	12.1	18.1	
Inductance per fase (3-phase)	L	mH	2.7	1.3	
Resistance per phase	R	Ω	0.205	0.100	
Inertia (without brake)	J	kg·cm ²	29.50	29.50	
Inertia (with standard brake)	J*	kg·cm ²	31.16	31.16	
Inertia (with extra-torque brake)	J**	kg·cm ²	-	-	
Mass (without brake)	P	kg	17.10	17.10	
Mass (with standard brake)	P*	kg	17.97	17.97	
Mass (with extra-torque brake)	P**	kg	-	-	

Note. These motors with “F” winding (220 V AC) can only be controlled by ACSD-□L or MCS-□L series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.



F- 3/62

Torque-speed graphs. FKM63.●●F.□□.□□0.□□ models.

3.

3-PHASE SERVOMOTORS. FKM
Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

FKM64 models

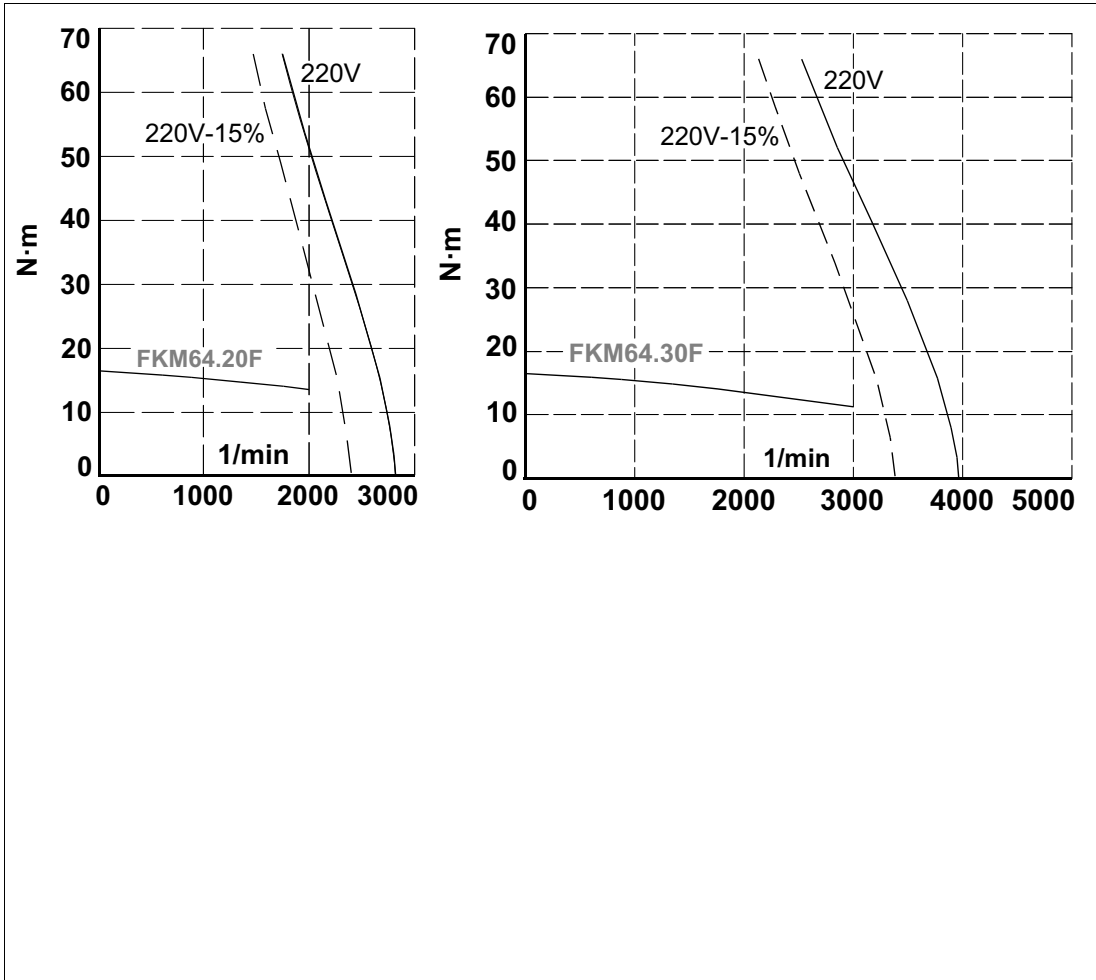
T- 3/66 Technical data of the FKM64.●●F.□□.□□0.□□ motors.

3.

3-PHASE SERVOMOTORS. FKM
Technical data. Torque-Speed curves

Model	FKM64.●●F.□□.□□0.□□				
Terminology	Notation	Units	20	30	
Stall torque	Mo	N·m	16.5	16.5	
Rated torque	Mn	N·m	13.6	11.2	
Stall peak torque	Mp	N·m	66	66	
Rated speed	nN	1/min	2000	3000	
Stall current	Io	A	14.3	20.0	
Peak current	I _{max}	A	57	80	
Calculation power	P _{cal}	kW	3.4	5.1	
Rated power	P _n	kW	2.8	3.5	
Torque constant	K _t	N·m/A	1.15	0.82	
Acceleration time	t _{ac}	ms	9.3	14.0	
Inductance per fase (3-phase)	L	mH	2.7	1.3	
Resistance per phase	R	Ω	0.205	0.145	
Inertia (without brake)	J	kg·cm ²	29.5	29.5	
Inertia (with standard brake)	J*	kg·cm ²	30.65	30.65	
Inertia (with extra-torque brake)	J**	kg·cm ²	-	-	
Mass (without brake)	P	kg	17.1	17.1	
Mass (with standard brake)	P*	kg	18.0	18.0	
Mass (with extra-torque brake)	P**	kg	-	-	

Note. These motors with "F" winding (220 V AC) can only be controlled by ACSD-□L or MCS-□L series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.



F- 3/63

Torque-speed graphs. FKM64.●●F.□□.□□0.□□ models.



FXM/FKM

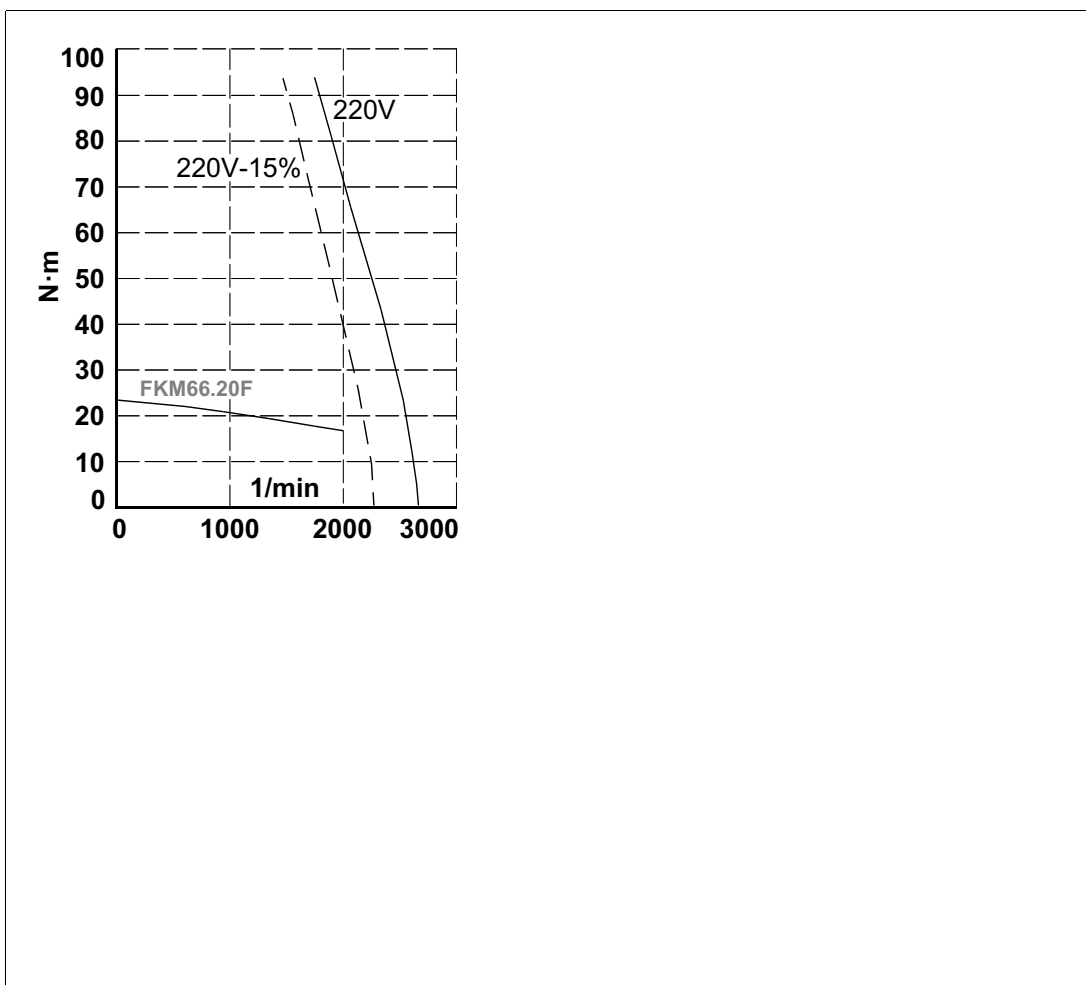
Ref.1703

FKM66 models

T- 3/67 Technical data of the FKM66. ●●F.□□.□□0.□□ motors.

Model	FKM66.●●F.□□.□□0.□□				
Terminology	Notation	Units	20		
Stall torque	Mo	N·m	23.5		
Rated torque	Mn	N·m	16.7		
Stall peak torque	Mp	N·m	94		
Rated speed	nN	1/min	2000		
Stall current	Io	A	19.2		
Peak current	Imax	A	76.8		
Calculation power	Pcal	kW	4.9		
Rated power	Pn	kW	3.5		
Torque constant	Kt	N·m/A	1.22		
Acceleration time	tac	ms	9.57		
Inductance per fase (3-phase)	L	mH	0.8		
Resistance per phase	R	Ω	0.135		
Inertia (without brake)	J	kg·cm ²	43.0		
Inertia (with standard brake)	J*	kg·cm ²	44.15		
Inertia (with extra-torque brake)	J**	kg·cm ²	-		
Mass (without brake)	P	kg	22.3		
Mass (with standard brake)	P*	kg	23.2		
Mass (with extra-torque brake)	P**	kg	-		

Note. These motors with “F” winding (220 V AC) can only be controlled by ACSD-□L or MCS-□L series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.



F- 3/64

Torque-speed graphs. FKM66.●●F.□□.□□0.□□ models.

3.

3-PHASE SERVOMOTORS. FKM
Technical data. Torque-Speed curves



FXM/FKM

Ref.1703

3.11 Axial and radial loads on the shaft extension

The following table shows the maximum axial and radial forces that the shaft extension can withstand:

T- 3/68 Maximum values for axial and radial loads.

Series	Axial force ·Fax·		Radial force ·Fr·		Distance ·d·	
	N	lbf	N	lbf	mm	in
FKM1	45	10.11	234	52.60	8.75	0.34
FKM2	125	28.10	668	150.17	20	0.78
FKM4	140	31.47	737	165.68	25	0.98
FKM6	240	53.95	1342	301.69	29	1.14
FKM8	440	98.91	1616	363.29	40	1.57
FKM9	339	76.21	1775	399.03	E/2*	E/50.8*

*E, length in mm of the shaft end on FKM9 servomotors. See dimension according to model in the dimensions drawing.

Note. When applying a combined axis and radial load, decrease the maximum radial force allowed “Fr” to 70% of the value indicated in the table.

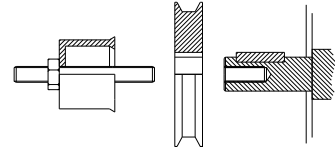
Also bear in mind that:



WARNING.

Avoid hitting the motor and especially its shaft when installing transmission pulleys or gear boxes. These motors have extremely fragile optical and electronic components.

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

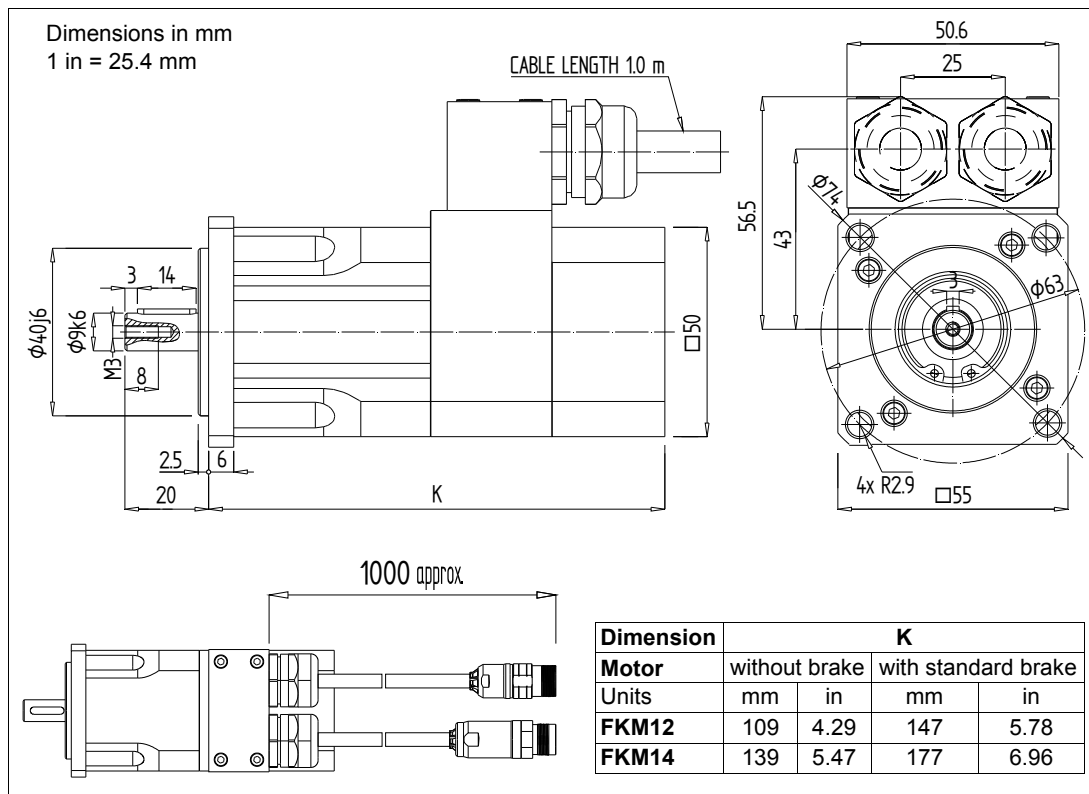


3.

3-PHASE SERVOMOTORS. FKM
Axial and radial loads on the shaft extension

3.12 Dimensions

FKM1 series



F- 3/65

Synchronous servomotors. FKM1 series. Dimensions.

3.

3-PHASE SERVOMOTORS. FKM
Dimensions

FAGOR 
FAGOR AUTOMATION

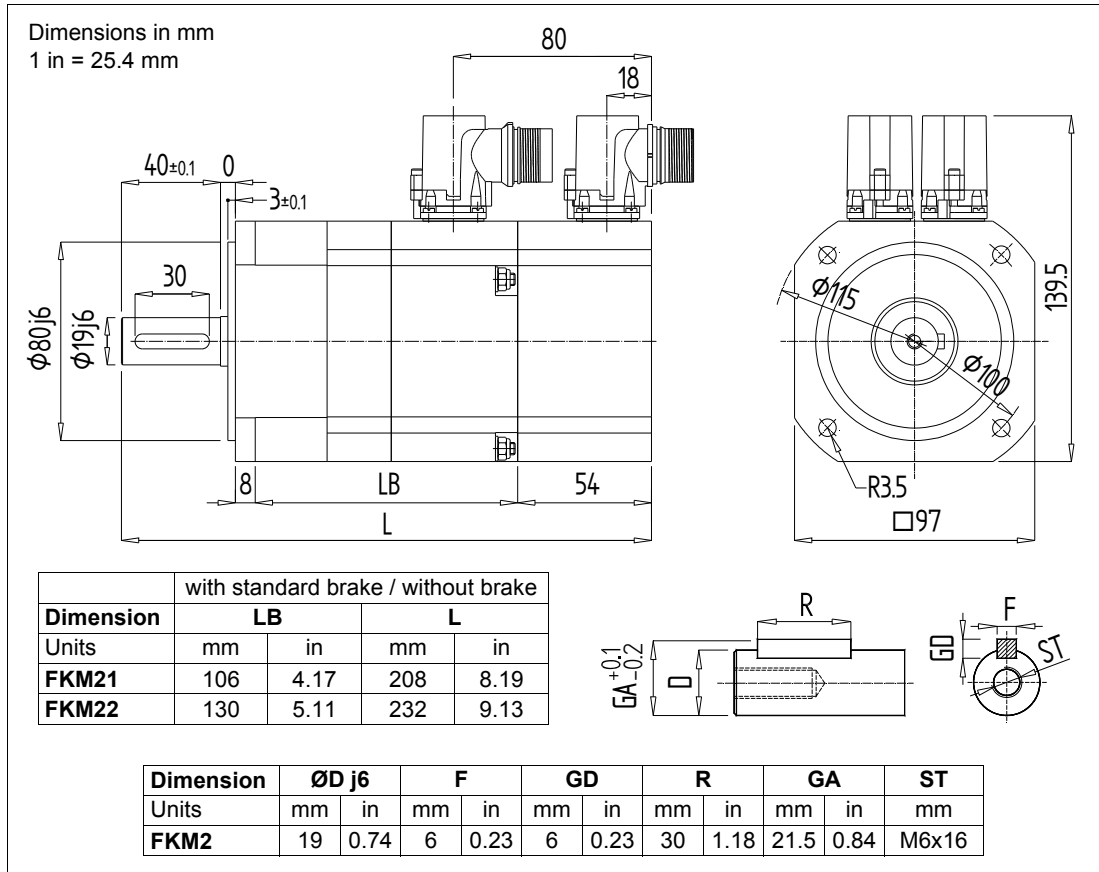
FXM/FKM

Ref.1703

FKM2 series

3.

3-PHASE SERVOMOTORS. FKM
Dimensions



F- 3/66

Synchronous servomotors. FKM2 series. Dimensions.



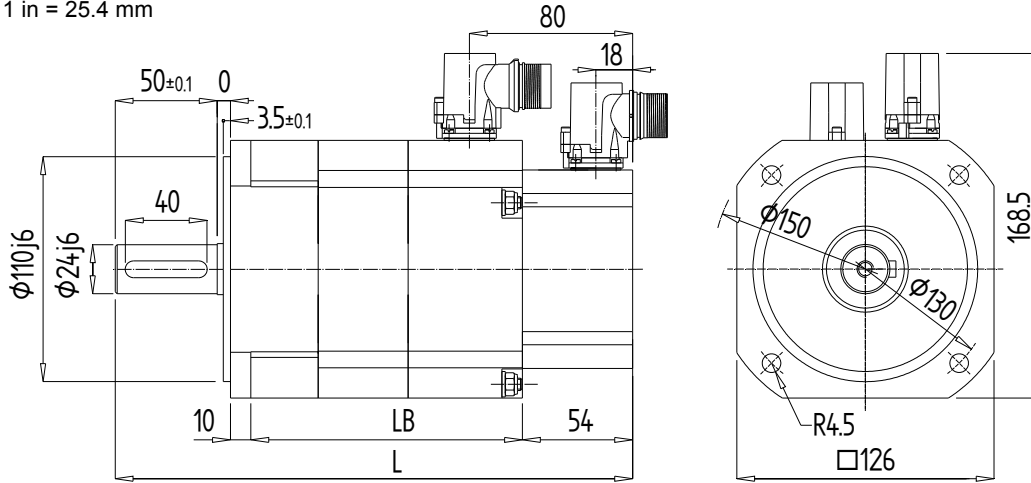
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FXM/FKM

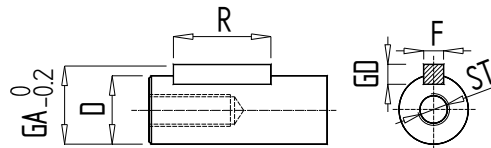
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FKM4 series

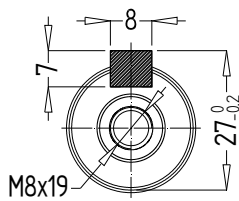
Dimensions in mm
1 in = 25.4 mm



Dimension	with standard brake / without brake			
	LB		L	
Units	mm	in	mm	in
FKM42	133	5.23	247	9.72
FKM43	175	6.88	289	11.38
FKM44	175	6.88	289	11.38

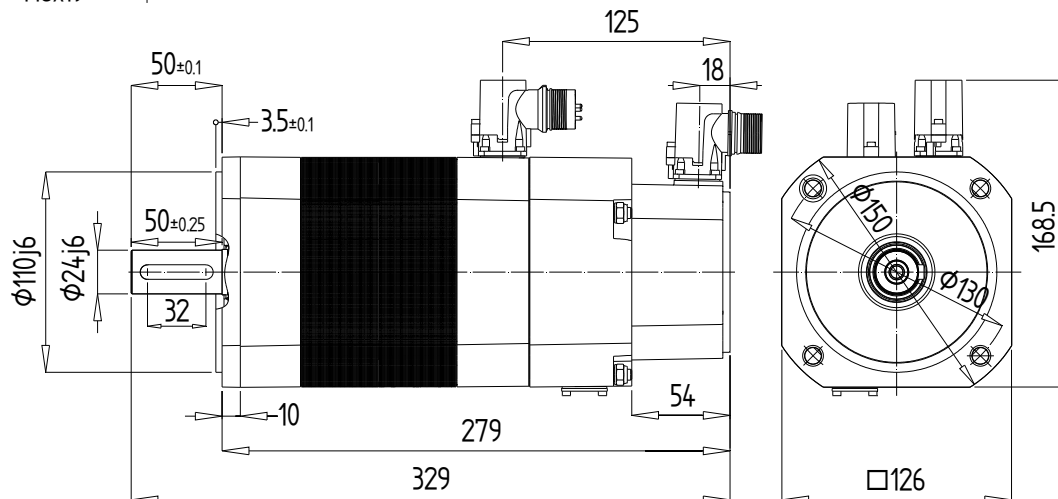


Dimension	$\phi D j6$		F		GD		R		GA		ST
Units	mm	in	mm	in	mm	in	mm	in	mm	in	mm
FKM4	24	0.94	8	0.31	7	0.27	40	1.57	27.0	1.06	M8x19



Models with extra-torque brake
FKM44.20A.□□.□20.□□
FKM44.30A.□□.□20.2□
FKM44.40A.□□.□20.□□

Dimensions in mm
1 in = 25.4 mm



F- 3/67

Synchronous servomotors. FKM4 series. Dimensions.

3.

3-PHASE SERVOMOTORS. FKM
Dimensions

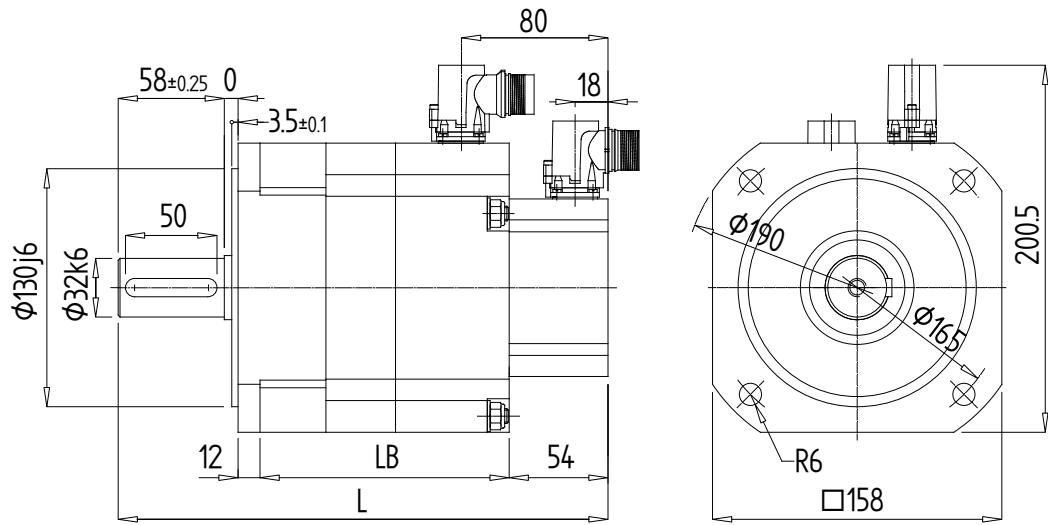
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FAGOR AUTOMATION

FXM/FKM

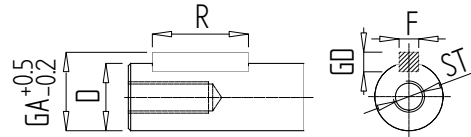
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FKM6 series

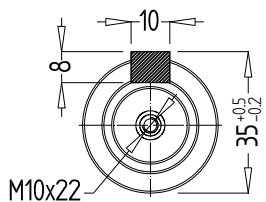
Dimensions in mm
1 in = 25.4 mm



Dimension	with standard brake / without brake			
	LB		L	
Units	mm	in	mm	in
FKM62	136	5.35	260	10.24
FKM63	172	6.77	296	11.65
FKM64	172	6.77	296	11.65
FKM66	208	8.18	332	13.07



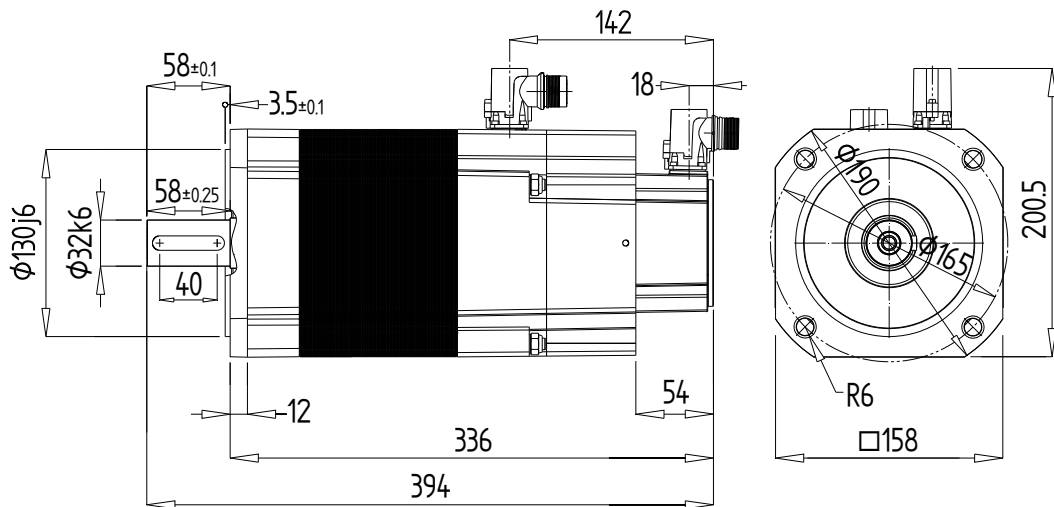
Dimension	ØD k6		F		GD		R		GA		ST
Units	mm	in	mm	in	mm	in	mm	in	mm	in	mm
FKM6	32	0.39	10	0.39	8	0.31	50	1.96	35.0	1.37	M10x22



Models with extra-torque brake

- FKM66.20A.□□.□20.□□
- FKM66.30A.□□.□20.□□

Dimensions in mm
1 in = 25.4 mm



F- 3/68

Synchronous servomotors. FKM6 series. Dimensions.

3.

3-PHASE SERVOMOTORS. FKM
Dimensions

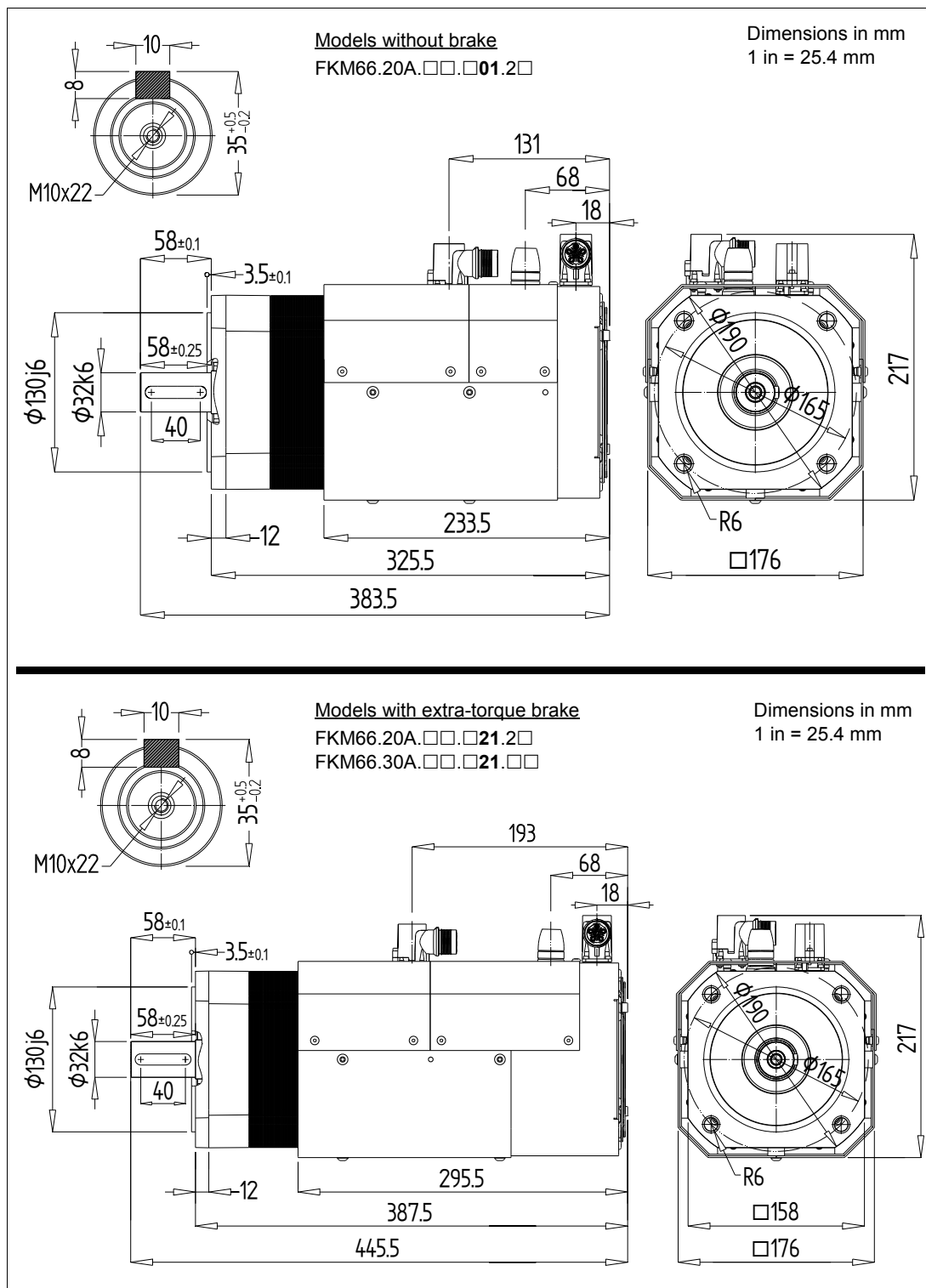


FAGOR AUTOMATION

FXM/FKM

Ref.1703

FKM6/V series



F- 3/69

Synchronous servomotors. FKM6/V series. Dimensions.

3.

3-PHASE SERVOMOTORS. FKM
Dimensions

FAGOR 

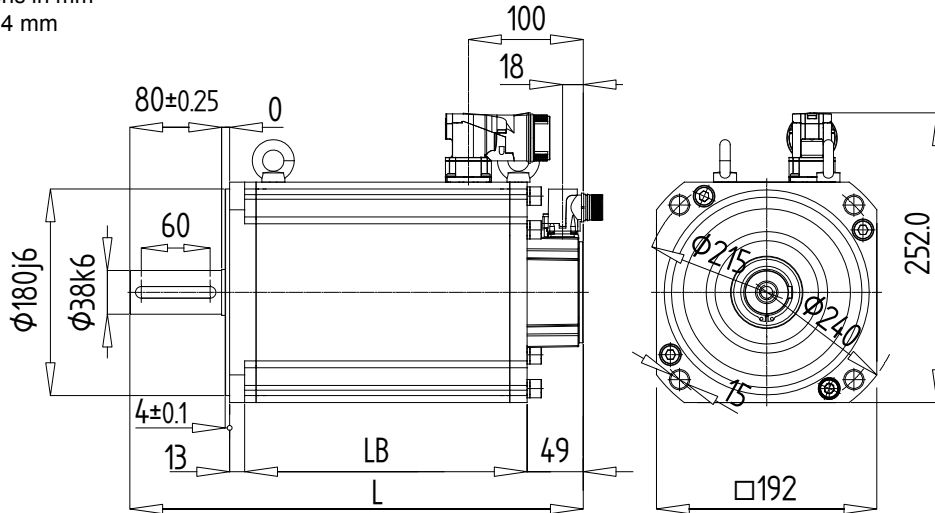
FAGOR AUTOMATION

FXM/FKM

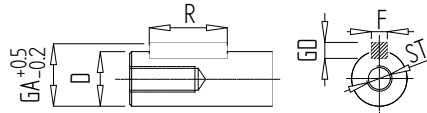
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FKM8 series

Dimensions in mm
1 in = 25.4 mm



Dimension	without brake				with standard brake			
	LB		L		LB		L	
Units	mm	in	mm	in	mm	in	mm	in
FKM82	246	9.68	388	15.27	296	11.65	438	17.24
FKM83	296	11.65	438	17.24	346	13.62	488	19.21
FKM84	346	13.62	488	19.21	396	15.59	538	21.18
FKM85	396	15.59	538	21.18	446	17.55	588	23.14



Dimension	ØD k6		F		GD		R		GA		ST
Units	mm	in	mm	in	mm	in	mm	in	mm	in	mm
FKM8	38	1.49	10	0.39	8	0.31	70	2.75	41.0	1.61	M12x30

F- 3/70

Synchronous servomotors. FKM8 series. Dimensions.

3.

3-PHASE SERVOMOTORS. FKM
Dimensions



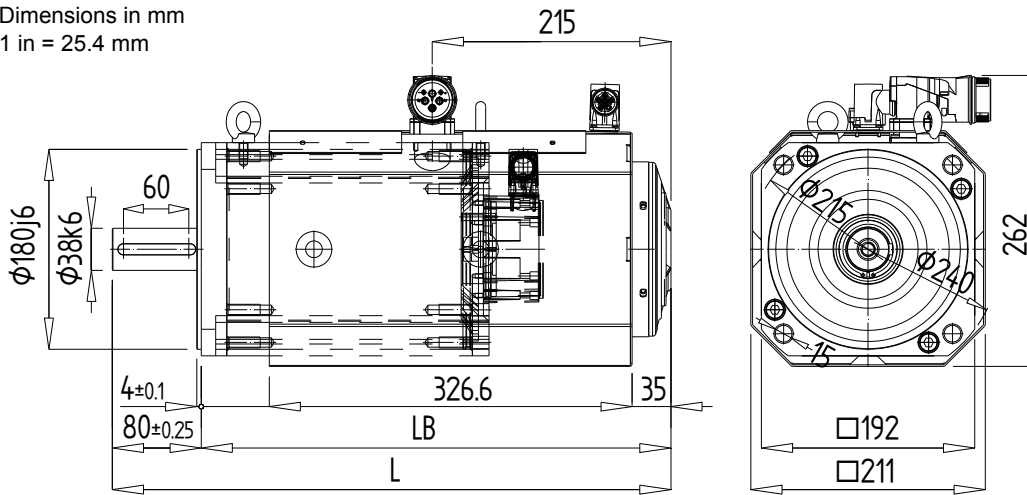
FAGOR AUTOMATION

FXM/FKM

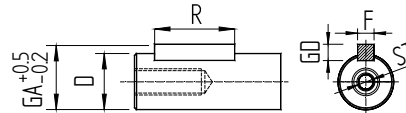
Ref.1703

FKM8/V series

Dimensions in mm
1 in = 25.4 mm

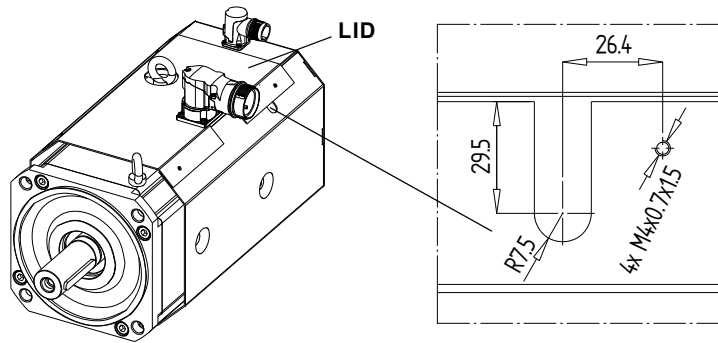


Dimension	without brake		with standard brake		without brake		with standard brake	
	LB	L	LB	L	LB	L	LB	L
Units	mm	in	mm	in	mm	in	mm	in
FKM82/V	423	16.65	503	19.80	473	18.62	553	21.77
FKM83/V	473	18.62	553	21.77	523	20.59	603	23.74
FKM84/V	523	20.59	603	23.74	573	22.55	653	25.70
FKM85/V	573	22.55	653	25.70	623	24.52	703	27.67



Dimension	ØD k6		F		GD		R		GA		ST
Units	mm	in	mm	in	mm	in	mm	in	mm	in	mm
FKM8/V	38	1.49	10	0.39	8	0.31	70	2.75	41.0	1.61	M12x30

· Feedback cable output dimensions when removing the lid ·



F- 3/71

Synchronous servomotors. FKM8/V series. Dimensions.

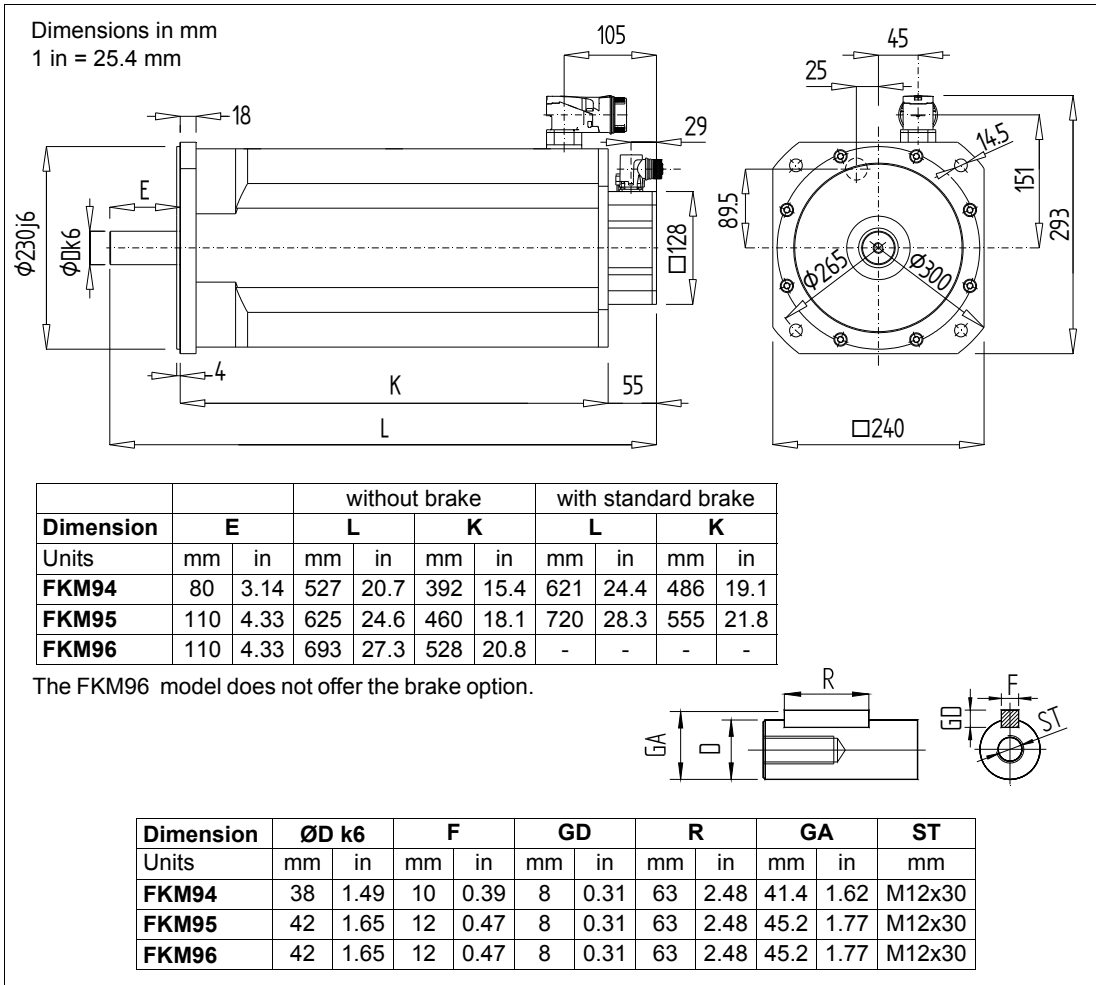
3.

3-PHASE SERVOMOTORS. FKM
Dimensions

FKM9 series

3.

3-PHASE SERVOMOTORS. FKM
Dimensions



F- 3/72

Synchronous servomotors. FKM9 series. Dimensions.



FAGOR AUTOMATION

FXM/FKM

Ref.1703



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