MOTOR

FXM/FKM

Installation manual

Ref.1301

FAGOR

FAGOR AUTOMATION

Title	**FXM/FKM MOTOR**.
Type of documentation	Description and installation of FXM and FKM synchronous axis motors. Associated with FAGOR drives.
Electronic document	man_fxm_fkm_motors.pdf
Language	English
Manual reference	Ref.1301
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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 . Model FKM22.60A.□□.□□0. FKM2 series . Model FKM42.60A.□□.□□0. FKM6 series. Models FKM66.20A.□□.□□0, FKM66.20F.□□.□□0, FKM64.30F.□□.□□0, FKM62.40F.□□.□□0.
1006	FKM9 series. Models FKM94.20A.□□.□□0, FKM95.20A.□□.□□0 and 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.** New model FKM44.20A.□□.□□0. The FKM44.30A.□□.□□□.2 motor replaces the FKM44.30A.□□.□□0, optimized for ACSD-16H drives. **FKM6 series.** New model FKM64.20A.□□.□□0. The FKM44.30A.□□.□□□.2 motor replaces the FKM44.30A.□□.□□0, optimized for ACSD-16H drives. **FKM8 series.** Models: FKM82.20A.□□.□□□, FKM82.30A.□□.□□□, FKM82.40A.□□.□□□ FKM83.20A.□□.□□□, FKM83.30A.□□.□□□ FKM84.20A.□□.□□□, FKM84.30A.□□.□□□ FKM85.20A.□□.□□□

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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.

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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.

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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

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January 2013 / Ref.1301

Original instructions

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ABOUT THE MANUAL

Title

Manual for AC servomotors FXM and FKM.

Type of documentation

Description and installation of FXM and 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) Code 04754051

Manual reference

Ref.1301.

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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DECLARATION OF CONFORMITY

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

Declares under our exclusive responsibility the conformity of the product:

FAGOR DDS SERVO DRIVE SYSTEM

consisting of the following modules and accessories:

PS-25B4, PS-65A, APS-24
XPS-25, XPS-65
RPS-80, RPS-75, RPS-45, RPS-20
AXD/SPD/MMC 1.08, 1.15, 1.25, 1.35
AXD/SPD/MMC 2.50, 2.75, 2.85
AXD/SPD/MMC 3.100, 3.150, 3.200, 3.250
ACD/SCD/CMC 1.08, 1.15, 1.25
ACD/SCD/CMC 2.35, 2.50, 2.75
ER+TH, ER+TH-18/X+FAN, CM 1.60, CHOKE
MAINS FILTER 42A, MAINS FILTER 130A, MAINS FILTER 180A
FXM, FKM, FM7, FM9

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

mentioned on this declaration, meet the requirements on:

Safety

EN 60204 -1:2006 Machinery safety. Electrical equipment of the machines. Part 1: General requirements.

Electromagnetic Compatibility

EN 61800-3:2004 EMC Directive on servo drive systems.

In compliance with EC Directives 2006/95/EC on Low Voltage and 2004/108/EC on Electrical Compatibility.

Fagor Automation, S. Coop.
Director Gerente
Pedro Ruiz de Aguirre

In Mondragón September 1st 2012

WARRANTY TERMS

INITIAL WARRANTY

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

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

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

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

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

FAGOR is committed to repairing or replacing its products from the time when the first such product was launched up to 8 years after such product has disappeared from the product catalog.

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

EXCLUDING CLAUSES

The repair will take place at our facilities. Therefore, all shipping expenses as well as travelling expenses incurred by technical personnel are NOT under warranty even when the unit is under warranty.

The warranty will be applied so long as the equipment has been installed according to the instructions, it has not been mistreated or damaged by accident or negligence and has been handled by personnel authorized by FAGOR.

If once the service call or repair has been completed, the cause of the failure is not to be blamed on the FAGOR product, the customer must cover all generated expenses according to current fees.

No other implicit or explicit warranty is covered and FAGOR AUTOMATION shall not be held responsible, under any circumstances, of the damage which could be originated.

SERVICE CONTRACTS

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

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 and FKM servomotors as well as their associated axis AC servo drives.

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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1. Notes on 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.

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.

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.

5. 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.

6. Cabling

MANDATORY.

The installation must comply with directive EMC 2004/108/EC.

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.

7. 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 “dds-hardware” manual and chapter “Error codes and messages” in the “dds-software” 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.

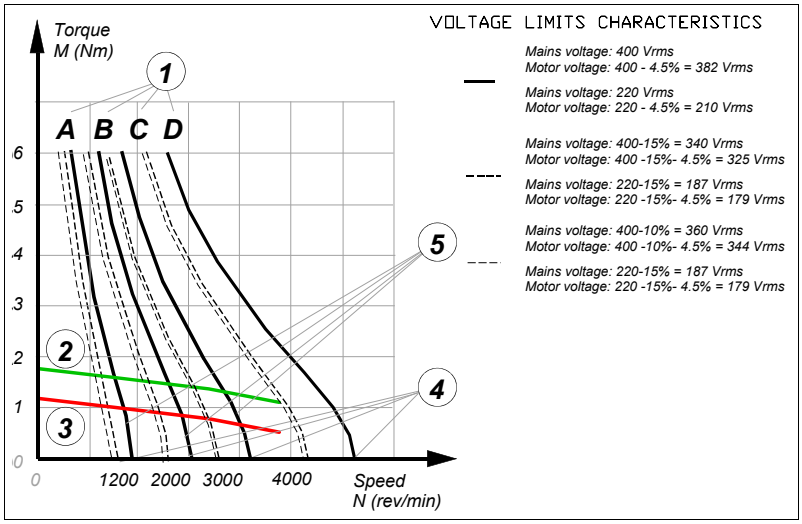
The AC axis motor only needs a simple daily inspection. Adjust the inspection periods depending on the operating conditions and work environment.

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.

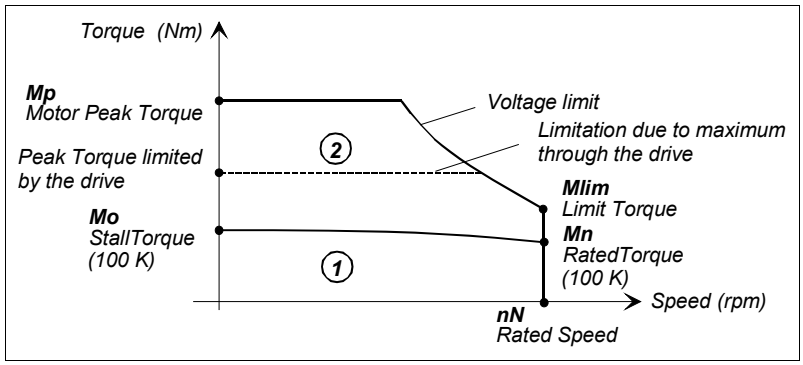
Elements shown:

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) Nmax.
5. Voltage saturation curves.

INFORMATION. Note that this data is valid for ambient temperature or an average cooling temperature of 40 °C (104 °F).

Electrical limitations for the motor-drive combination

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



F- 1/2

Electrical 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 electrical terminology for servomotors used in the previous section.

Stall torque (Mo)

Maximum torque that the motor can supply when the rotor is locked and is thermally limited by the temperature increase at the stator winding (ΔT=100 K). This torque is available for a zero motor turning speed for an unlimited time period. The stall torque M0 is always greater than the rated torque Mn.

Stall current (Io)

Current circulating through each phase of the stator winding required to generated 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 (ΔT=100 K).

Rated current (In)

Current circulating through each phase of the stator winding required to generated the rated torque Mn.

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)

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 (Mo/Io).

$$K_t = M_0 / I_0$$

where:

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

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 rpm

Stator winding resistance (R)

Value of the resistance of a phase at an ambient temperature of 20 °C (68 °F). The stator winding has a star configuration.

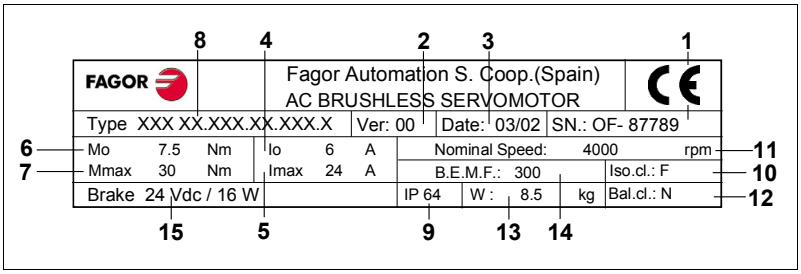
Inductance of the stator winding (L)

Value of the inductance corresponding to a phase when using three-phase power supply. The stator winding has a star (Y) configuration.

Characteristics plate

The specifications label stuck on synchronous servomotors supplied by FAGOR offers the necessary data to identify the motor for the user.

On motor all series of the FXM motor family and on series 2, 4, 6 and 8 of the FKM motor family, they correspond with:



F- 1/3

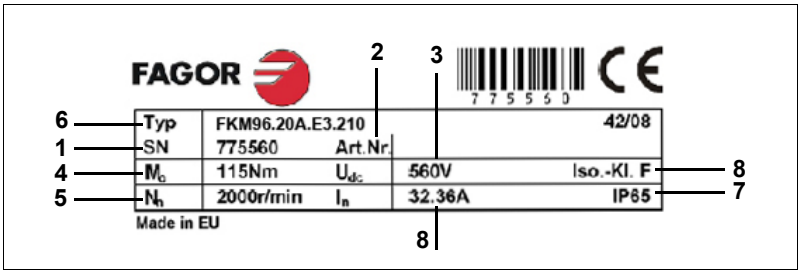
Identification label.

This characteristics plate of the motor is located on the right side of the motor viewed from its shaft. The items shown on this plate are:

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

1	Serial Nr.
2	Version
3	Manufacturing date
4	Current without load
5	Maximum current
6	Stall torque
7	Maximum torque
8	Motor model reference
9	Degree of protection of the motor
10	Insulation class
11	Rated speed
12	Level of vibration
13	Mass
14	B.E.M.F. (**B**ack **E**lectro **M**otor **F**orce)
15	Brake. Unlocking voltage / power absorbed

On FKM motor families (9 series) the characteristics label corresponds with:



F- 1/4

Identification label.

and the meaning of the elements that define the plate are:

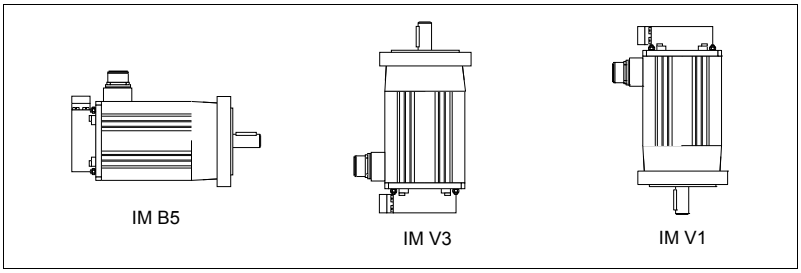
T- 1/2 Meaning of the fields of the identification plate.

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

1.2 Mechanical concepts

Construction types

FXM / FKM motors, according to the nomenclature of the IEC 34-3-72 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- 1/5.**



F- 1/5

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, FKM4, FKM6, FKM8	FKM9
Configuration	**Protection degree**	
Standard	IP 64	IP 65
With a seal (option)	IP 65	Irrelevant
With fan (option) *	IP 54	Irrelevant

(*) Only on FXM motors.

Ventilation

The “fan” option is only available for FXM family motors in the FXM5 and FXM7 series.

FKM motors do not offer the “fan” option in any of their series.

Bearings

The bearings are closed on both sides and lubricated permanently. The bearings should be replaced after working for about 20000 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 and FKM motors (except the 9 series) can have the “seal” option both for keyless shafts and for shafts with key.

They are BA type 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-34-5 standard) may be obtained with full protection against dust and water jets.

NOTE. FAGOR does NOT supply the seal.

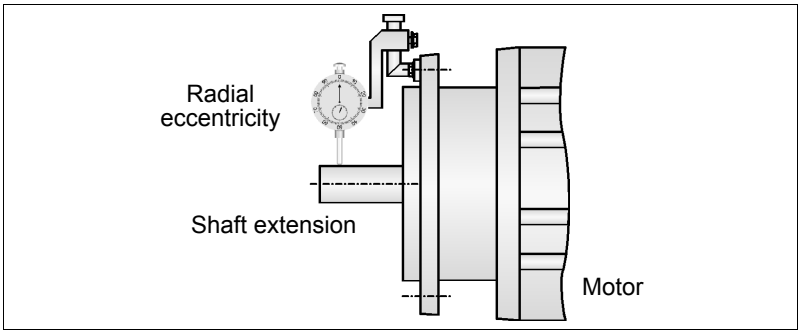
INFORMATION. FAGOR shall not held responsible for any damage caused to the motor if the user has replaced the seal.

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)
FXM1, FKM2	35 µm	18 µm
FXM3, FXM5, FKM4	40 µm	21 µm
FXM7, FKM6, FKM8, FKM9	50 µm	25 µm



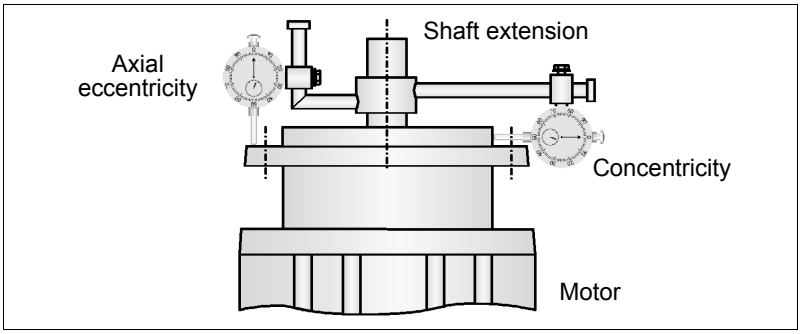
F- 1/6

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, FKM2	80 µm	40 µm
FXM3	80 µm	40 µm
FKM4	100 µm	50 µm
FXM5, FKM6	100 µm	50 µm
FXM7, FKM8, FKM9	100 µm	50 µm



F- 1/7

Measuring axial concentricity and eccentricity

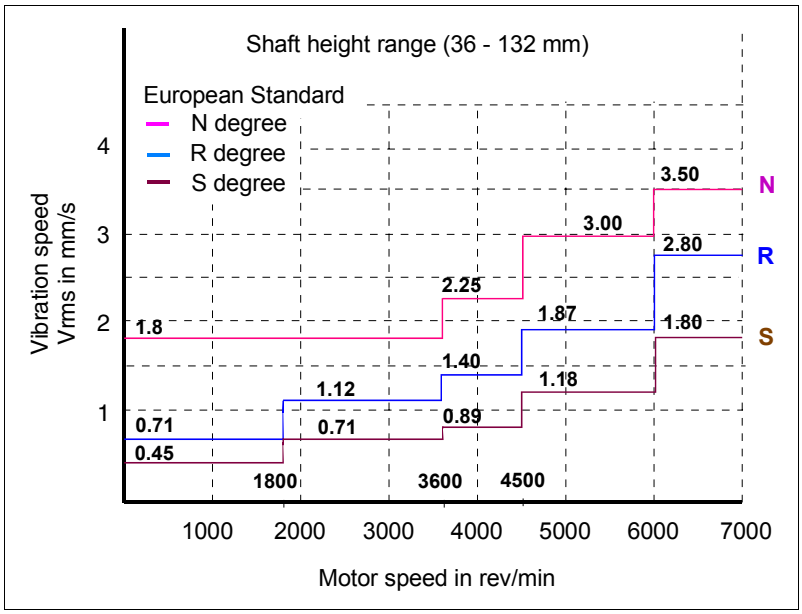
Noise

Meets the DIN 45653 standard.

Level of vibration

According to the IEC 34-14 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 rpm and 3000 rpm and their associated limit values. For speeds of 4500 rpm and 6000 rpm, the associated limit values will be set by the manufacturer of the motor.



F- 1/8

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

T- 1/7 Levels of vibration.

Motor family	Level of vibration
FKM	N degree (R optional)
FXM	N degree (R optional)

Balancing

Meets the ISO 8821 standard.

T- 1/8 Balancing.

Motor family	Output shaft	Balancing
FKM (standard)	Cylindrical without	Keyless shaft
FKM (optional)	Cylindrical with keyway	Half-key
FXM (standard)	Cylindrical with keyway	Full key
FXM (optional)	Cylindrical without	Keyless shaft

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.

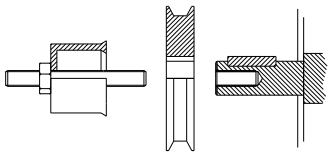
See these values in the following chapters for each motor model.

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 and FXM7 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 startup

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.

Cabling

Power cable

Fagor Automation supplies the cable to supply the electric power to FXM and 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).

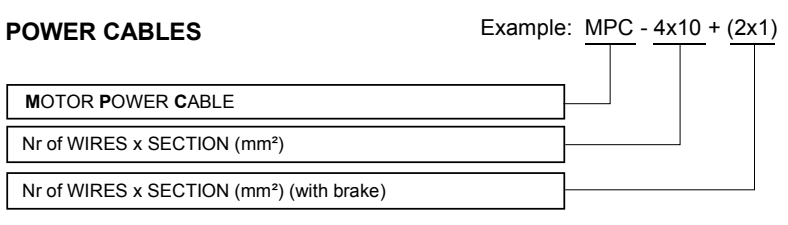
T- 1/9 Cable section / Imax current.

Section (mm²)	Imax. (Arms)	Section (mm²)	Imax. (Arms)
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 Automation.



F- 1/9

Sales reference of the power cable.

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

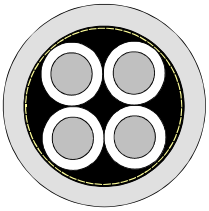
T- 1/10 Range of power cables (without brake at the motor).

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

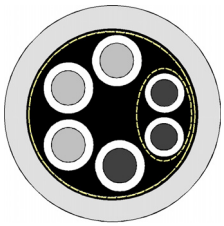
T- 1/11 Range of power cables (with brake at the motor).

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.



MPC- 4x□



MPC- 4x□+(2x□)

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.

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 IEC	Uo/U: 600 / 1000 V

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

	MC 23 / AMC 23		**MC 46 / AMC 46**		**MC 80**	
Reference	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.

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: EEC-SP - 20

EEC-SP *	**E**NCODER **E**XTENSION **C**ABLE - **S**HIELDED **P**AIR
IECD **	**I**NCREMENTAL **E**XTENSION **C**ABLE **D**IGITAL

LENGTH (m) *** 5, 10, 15, 20, 25, 30, 35, 40, 45, 50**
**** 5, 7, 10, 15, 20, 25, 30**

F- 1/10

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-5	EEC-SP-15	EEC-SP-25	EEC-SP-35	EEC-SP-45
EEC-SP-10	EEC-SP-20	EEC-SP-30	EEC-SP-40	EEC-SP-50

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

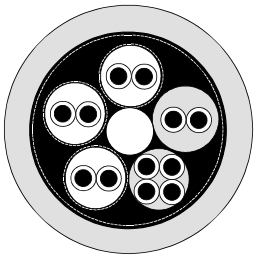
IECD-5	IECD-10	IECD-20	IECD-30	
IECD-7	IECD-15	IECD-25		

Technical data

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

Sinusoidal encoder cable EEC-SP-☐

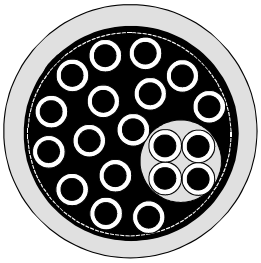
T- 1/16 Mechanical characteristics of the feedback cable EEC-SP-☐ (with overall shield and shielded twisted pairs).



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 under static conditions. (= 35 mm).
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 48 V CA	Upp: 350 V Urms: 48 V CA

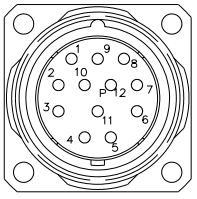
Feedback devices

Sinusoidal encoder (ref. A1, E1, A3 & E3)

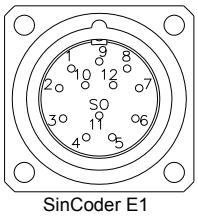
Optical encoder used as position detector coupled to the rotor shaft with sinusoidal signal of 1.024 pulses per turn (A1 and E1 on FXM motors, A3 and E3 on FKM motors). It is connected to the drive through a 12-pin male Conney connector that meets the sealing standard IP 65. All sinusoidal encoder models available (A1, E1, A3 and E3) use this type of connector. The connection cable is identified with the reference EEC-SP-☐ (cable with overall shield and shielded twisted pairs). All FXM and FKM motors with A (400 V AC) winding can have a sinusoidal encoder.

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

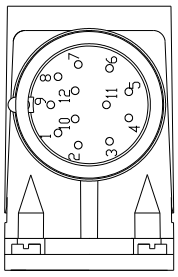
T- 1/18 Base of connector EOC 12 on FXM and FKM motors.



SinCos A1
(on FXM motors)



SinCoder E1
(on FXM motors)



SinCos A3, SinCos E3
(on FKM motors)

Pin	Signal	Meaning
1	REFCOS	Reference level for the cosine signal 2.5 V DC
2	+ 485	RS-485 serial line transmission signal
3	temp	PTC thermistor (on FXM motors)
4	temp	
3	kty84 -	PTC KTY84-130 thermistor (on FKM motors)
4	kty84 +	
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
9	Shield + Chassis	Shield wire
10	GND	Ground
11	N. C.	Not connected
12	+ 8 V DC	Supply voltage

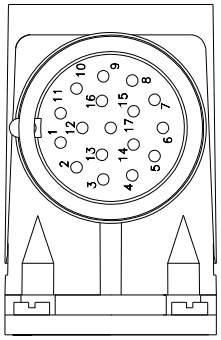
NOTE. Observe that the only difference in the pinout of the base of connector EOC 12 depending on whether it is an FXM or an FKM motor is in pins 3 and 4 for the motor temperature sensor.

Incremental TTL encoder (ref. I0)

Optical disk used as position detector coupled to the rotor shaft with a square TTL signal of 2500 pulses per turn. It is connected to the drive through a 17-pin male Conninvers™ 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 and FKM motors with F (220 V AC) winding can have a incremental TTL encoder.

NOTE. The connection base for resolver (ref. RO) shown in the following figures are viewed from the motor end.

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



Incremental I0
(FXM and FKM motors
with F winding)

Pin	Signal	Meaning
1	A	A signal output
2	$\overline{A}$	Complemented A signal output
3	+5 V DC	Supply voltage
4	GND	Ground
5	B	B signal output
6	$\overline{B}$	Complemented B signal output
7	Z	Z signal output
8	$\overline{Z}$	Complemented Z signal output
9	temp	PTC thermistor (on FXM motors)
10	temp	
9	kty84 -	PTC kty84-130 thermistor (on FKM motors)
10	kty84 +	
11	Ucm	U signal output
12	$\overline{Ucm}$	Complemented U signal output
13	Vcm	V signal output
14	$\overline{Vcm}$	Complemented V signal output
15	Wcm	W signal output
16	$\overline{Wcm}$	Complemented W signal output
17	Shield + chassis	Shield wire

NOTE. Observe that the only difference in the pinout of the base of connector IOC -17 depending on whether it is an FXM or an FKM motor is in pins 3 and 4 for the motor temperature sensor.

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 (FeedbackRhoCorrectionParamenter) 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.

If the feedback device has memory

- Record (save) the value **in the encoder memory** (ref. E1 and A1 on FXM motors, E3 and A3 on FKM motors) by executing the RC1 command.

  The value of the offset generated when replacing the feedback device is now registered in parameter RP5 (FeedbackRho CorrectionParameter) and in the RV3 (FeedbackRho Correction) 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:

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

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.

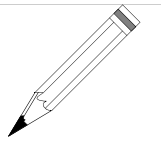
  Verify that the value of RP5 is practically zero. If instead of zero, it registers a value double the rotated angle, it means that it has been rotated in the opposite direction.

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

NOTE. Drive variable RV10 is also available, to Fagor Automation 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.



THREE-PHASE SERVOMOTORS. FXM FAMILY

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 electromechanical 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 series
- FXM3 series
- FXM5 series
- FXM7 series

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 series
- FXM7/V series

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 rpm to 4000 rpm
- 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 (optional with no keyway)
Mounting	Face flange
Mounting methods	IM B5, IM V1, IM V3 meets IEC 34-3-72
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)
Noise	DIN 45653
Vibration resistance	Withstands 1g in the direction of the shaft and 3g sideways (g=9.81 m/s²)
Electrical insulation	Class F (150°C / 302°F)
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 and FXM7 series. See fan characteristics.
Brake	Optional in all models. See brake characteristics.
Feedback (*)	Sinusoidal encoder. Incremental TTL encoder.

(*) Sinusoidal encoder on FXM series with A winding (400 V AC) and incremental TTL encoder on FXM series with F winding (220 V AC).

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

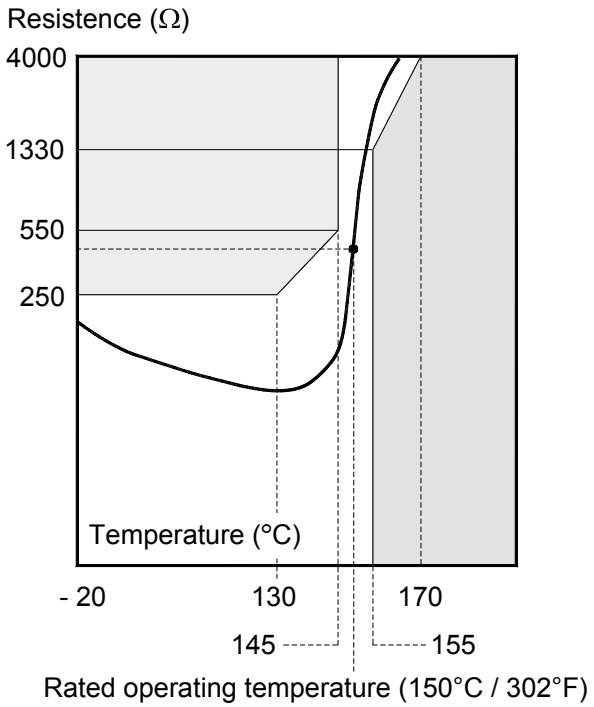
2.3 Temperature sensor

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	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):



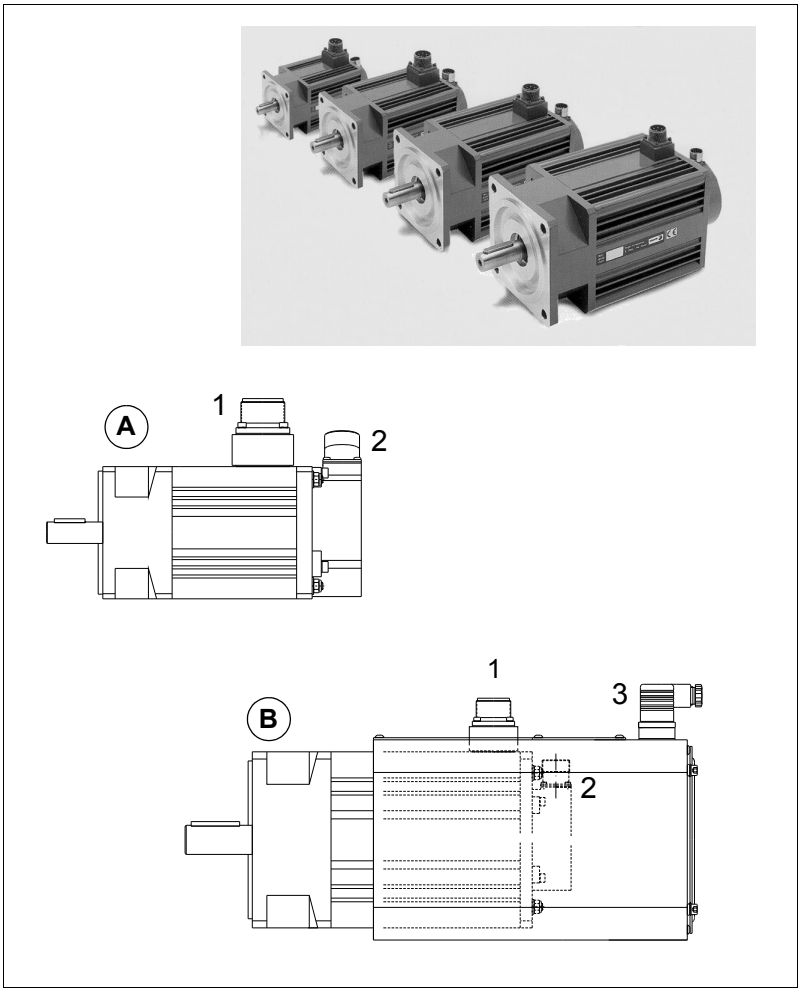
F- 2/1

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

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

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, brake and fan (when having all these options).



F- 2/2

Servomotor FXM. **A.** Without fan. **B.** With fan.
1. Voltage supply for the motor and the 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 ΔT = 100 K with a room temperature of 40 °C (104 °F). The power cable shown in the table corresponds to motors without brake.

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

nN	Mo	Mn	Motor model	Io	Pcal	Power terminal strip	Power cable *
1/min	Nm	Nm	FXM	Arms	kW	Type	Nr of wires x mm²
1200	11.9	11.1	53.12A.□□.□00.1	2.8	1.5	MC 23	MPC-4x1.5
1200	14.8	13.7	54.12A.□□.□00.1	3.5	1.9	MC 23	MPC-4x1.5
1200	17.3	15.7	55.12A.□□.□00.1	2.8	1.5	MC 23	MPC-4x1.5
1200	20.8	19.2	73.12A.□□.□00.1	4.9	2.6	MC 23	MPC-4x1.5
1200	27.3	24.9	74.12A.□□.□00.1	6.6	3.4	MC 23	MPC-4x1.5
1200	33.6	30.2	75.12A.□□.□00.1	8.0	4.2	MC 23	MPC-4x1.5
1200	39.7	35.3	76.12A.□□.□00.1	9.4	5.0	MC 23	MPC-4x1.5
1200	45.6	40.0	77.12A.□□.□00.1	11.0	5.7	MC 23	MPC-4x1.5
1200	51.1	44.3	78.12A.□□.□00.1	12.6	6.4	MC 23	MPC-4x2.5
2000	1.2	1.18	11.20A.□□.□00.1	0.45	0.3	MC 23	MPC-4x1.5
2000	2.3	2.25	12.20A.□□.□00.1	0.86	0.5	MC 23	MPC-4x1.5
2000	3.3	3.22	13.20A.□□.□00.1	1.23	0.7	MC 23	MPC-4x1.5
2000	4.1	3.98	14.20A.□□.□00.1	1.53	0.9	MC 23	MPC-4x1.5
2000	2.6	2.56	31.20A.□□.□00.1	0.97	0.5	MC 23	MPC-4x1.5
2000	5.1	5.0	32.20A.□□.□00.1	1.89	1.1	MC 23	MPC-4x1.5
2000	7.3	7.12	33.20A.□□.□00.1	2.7	1.5	MC 23	MPC-4x1.5
2000	9.3	9.02	34.20A.□□.□00.1	3.4	1.9	MC 23	MPC-4x1.5
2000	11.9	10.5	53.20A.□□.□00.1	4.7	2.5	MC 23	MPC-4x1.5
2000	14.8	12.8	54.20A.□□.□00.1	5.9	3.1	MC 23	MPC-4x1.5
2000	17.3	14.7	55.20A.□□.□00.1	6.7	3.6	MC 23	MPC-4x1.5
2000	20.8	17.7	73.20A.□□.□00.1	8.2	4.4	MC 23	MPC-4x1.5
2000	27.3	22.8	74.20A.□□.□00.1	11.1	5.7	MC 23	MPC-4x1.5
2000	33.6	27.5	75.20A.□□.□00.1	13.3	7.0	MC 23	MPC-4x2.5
2000	39.7	31.9	76.20A.□□.□00.1	15.7	8.3	MC 23	MPC-4x2.5
2000	45.6	36.0	77.20A.□□.□00.1	17.8	9.6	MC 23	MPC-4x4
2000	51.1	39.6	78.20A.□□.□00.1	20.7	10.7	MC 23	MPC-4x4
3000	1.2	1.15	11.30A.□□.□00.1	0.67	0.4	MC 23	MPC-4x1.5
3000	2.3	2.18	12.30A.□□.□00.1	1.29	0.7	MC 23	MPC-4x1.5
3000	3.3	3.1	13.30A.□□.□00.1	1.85	1.0	MC 23	MPC-4x1.5
3000	4.1	3.81	14.30A.□□.□00.1	2.3	1.3	MC 23	MPC-4x1.5
3000	2.6	2.50	31.30A.□□.□00.1	1.45	0.8	MC 23	MPC-4x1.5
3000	5.1	4.79	32.30A.□□.□00.1	2.8	1.6	MC 23	MPC-4x1.5
3000	7.3	6.72	33.30A.□□.□00.1	4.1	2.3	MC 23	MPC-4x1.5
3000	9.3	8.37	34.30A.□□.□00.1	5.1	2.9	MC23	MPC-4x1.5
3000	11.9	9.6	53.30A.□□.□00.1	7.1	3.7	MC 23	MPC-4x1.5
3000	14.8	11.6	54.30A.□□.□00.1	8.7	4.7	MC 23	MPC-4x1.5
3000	17.3	13.1	55.30A.□□.□00.1	10.3	5.4	MC 23	MPC-4x1.5
3000	20.8	15.2	73.30A.□□.□00.1	12.3	6.5	MC 23	MPC-4x2.5
3000	27.3	19.4	74.30A.□□.□00.1	16.2	8.6	MC 23	MPC-4x2.5
3000	33.6	23.2	75.30A.□□.□00.1	19.9	10.6	MC 23 (1	MPC-4x4
3000	39.7	26.6	76.30A.□□.□00.1	23.6	12.5	MC 23 (1	MPC-4x6
3000	45.6	29.6	77.30A.□□.□00.1	29.0	14.3	MC 46	MPC-4x6
3000	51.1	32.2	78.30A.□□.□00.1	28.4	16.1	MC 46	MPC-4x6

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

nN	Mo	Mn	Motor model	Io	Pcal	Power terminal strip	Power cable *
1/min	Nm	Nm	FXM	Arms	kW	Type	Nr of wires x mm²
4000	1.2	1.11	11.40A.□□.□00.1	0.9	0.5	MC 23	MPC-4x1.5
4000	2.3	2.09	12.40A.□□.□00.1	1.72	1.0	MC 23	MPC-4x1.5
4000	3.3	2.95	13.40A.□□.□00.1	2.5	1.4	MC 23	MPC-4x1.5
4000	4.1	3.61	14.40A.□□.□00.1	3.1	1.7	MC 23	MPC-4x1.5
4000	2.6	2.38	31.40A.□□.□00.1	1.92	1.1	MC 23	MPC-4x1.5
4000	5.1	4.49	32.40A.□□.□00.1	3.8	2.1	MC 23	MPC-4x1.5
4000	7.3	6.17	33.40A.□□.□00.1	5.5	3.1	MC 23	MPC-4x1.5
4000	9.3	7.53	34.40A.□□.□00.1	6.9	3.9	MC 23	MPC-4x1.5
4000	11.9	8.7	53.40A.□□.□00.1	9.3	5.0	MC 23	MPC-4x1.5
4000	14.8	10.2	54.40A.□□.□00.1	11.8	6.2	MC 23	MPC-4x1.5
4000	17.3	11.2	55.40A.□□.□00.1	14.1	7.3	MC 23	MPC-4x2.5
4000	20.8	11.9	73.40A.□□.□00.1	16.5	8.7	MC 23	MPC-4x2.5
4000	27.3	15.0	74.40A.□□.□00.1	22.1	11.4	MC 23	MPC-4x4
4000	33.6	17.6	75.40A.□□.□00.1	26.6	14.1	MC 46	MPC-4x6
4000	39.7	19.8	76.40A.□□.□00.1	32.1	16.6	MC 46	MPC-4x10
4000	45.6	21.7	77.40A.□□.□00.1	36.6	19.1	MC 46	MPC-4x10
4000	51.1	23.0	78.40A.□□.□00.1	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 sales reference the factor + (2x...).
E.g. for the model FXM55.12F.□□.□**1**0.1 (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 index[1].

NOTE. All motor models of the previous tables show an additional digit "**.1**" at the end of their sales reference (e.g. FXM□□.□□A.□□.□□□.**1**) meaning that these motors have been manufactured after October 2000. Motors manufactured before this date will show the auxiliary digit "**.0**" and since they have been discontinued, this manual does not show their technical data tables. Get a manual prior to this date for information on them. **Remember that** this auxiliary digit is not part of the sales reference of the motor and, therefore, does not appear in the motor id of its characteristics plate.

Ventilated FXM with “A” winding (400 V AC)

All the data supplied here are for winding over-temperature of ΔT = 100 K with a room temperature of 40 °C (104 °F). The power cable shown in the table corresponds to motors without 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	Power cable *
1/min	Nm	Nm	FXM	Arms	kW	Type	Nr of wires x mm²
1200	17.8	17.0	53.12A.□□.□01.1	4.2	2.2	MC 23	MPC-4x1.5
1200	22.2	21.0	54.12A.□□.□01.1	5.3	2.8	MC 23	MPC-4x1.5
1200	25.9	24.5	55.12A.□□.□01.1	6.1	3.3	MC 23	MPC-4x1.5
1200	31.2	29.5	73.12A.□□.□01.1	7.4	3.9	MC 23	MPC-4x1.5
1200	40.9	38.5	74.12A.□□.□01.1	9.8	5.1	MC 23	MPC-4x1.5
1200	50.4	47.0	75.12A.□□.□01.1	12.0	6.3	MC 23	MPC-4x1.5
1200	59.5	55.0	76.12A.□□.□01.1	14.1	7.5	MC 23	MPC-4x2.5
1200	68.4	62.8	77.12A.□□.□01.1	16.6	8.6	MC 23	MPC-4x2.5
1200	76.6	69.8	78.12A.□□.□01.1	19.0	9.6	MC 23[1]	MPC-4x4
2000	17.8	16.4	53.20A.□□.□01.1	7.0	3.7	MC 23	MPC-4x1.5
2000	22.2	20.2	54.20A.□□.□01.1	8.9	4.7	MC 23	MPC-4x1.5
2000	25.9	23.2	55.20A.□□.□01.1	10.1	5.4	MC 23	MPC-4x1.5
2000	31.2	28.1	73.20A.□□.□01.1	12.3	6.5	MC 23	MPC-4x2.5
2000	40.9	36.4	74.20A.□□.□01.1	16.5	8.6	MC 23	MPC-4x2.5
2000	50.4	44.3	75.20A.□□.□01.1	20.0	10.6	MC 23[1]	MPC-4x4
2000	59.5	51.8	76.20A.□□.□01.1	23.5	12.5	MC 46	MPC-4x6
2000	68.4	58.8	77.20A.□□.□01.1	26.8	14.3	MC 46	MPC-4x6
2000	76.6	65.1	78.20A.□□.□01.1	31.0	16.0	MC 46	MPC-4x10
3000	17.8	15.5	53.30A.□□.□01.1	10.6	5.6	MC 23	MPC-4x1.5
3000	22.2	19.0	54.30A.□□.□01.1	13.1	7.0	MC 23	MPC-4x2.5
3000	25.9	21.8	55.30A.□□.□01.1	15.4	8.1	MC 23	MPC-4x2.5
3000	31.2	25.6	73.30A.□□.□01.1	18.5	9.8	MC 23[1]	MPC-4x4
3000	40.9	33.0	74.30A.□□.□01.1	24.3	12.8	MC 46	MPC-4x6
3000	50.4	40.0	75.30A.□□.□01.1	29.9	15.8	MC 46	MPC-4x10
3000	59.5	46.4	76.30A.□□.□01.1	35.3	18.7	MC 46	MPC-4x10
3000	68.4	52.4	77.30A.□□.□01.1	43.5	21.5	MC 46	MPC-4x16
3000	76.6	57.7	78.30A.□□.□01.1	42.6	24.1	MC 46	MPC-4x16
4000	17.8	14.6	53.40A.□□.□01.1	14.0	7.5	MC 23	MPC-4x2.5
4000	22.2	17.6	54.40A.□□.□01.1	17.7	9.3	MC 23	MPC-4x4
4000	25.9	19.9	55.40A.□□.□01.1	21.1	10.8	MC 23[1]	MPC-4x4
4000	31.2	22.4	73.40A.□□.□01.1	24.7	13.1	MC 46	MPC-4x6
4000	40.9	28.6	74.40A.□□.□01.1	33.1	17.1	MC 46	MPC-4x10
4000	50.4	34.4	75.40A.□□.□01.1	39.9	21.1	MC 46	MPC-4x10
4000	59.5	39.7	76.40A.□□.□01.1	48.2	24.9	MC 80	MPC-4x16
4000	68.4	44.5	77.40A.□□.□01.1	55.0	28.6	MC 80	MPC-4x25
4000	76.6	48.5	78.40A.□□.□01.1	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 sales reference the factor + (2x...).
E.g. for the model FXM55.12F.□□.□**1**0.1 (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 index[1].

NOTE. All motor models of the previous tables show an auxiliary digit "**.1**" at the end of their sales reference (e.g. FXM□□.□□A.□□.□01**.1**) meaning that these motors have been manufactured after October 2000. Motors manufactured before this date will show the auxiliary digit "**.0**" and since they have been discontinued, this manual does not show their technical data tables. Get a manual prior to this date for information on them. **Remember that** this auxiliary digit is not part of the sales reference of the motor and, therefore, does not appear in the motor id of its characteristics plate.

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

All the data supplied here are for winding over-temperature of ΔT = 100 K with a room temperature of 40 °C (104 °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	Power cable *
1/min	Nm	Nm	FXM	Arms	kW	Type	Nr of wires x mm²
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-4x2.5
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 sales reference the factor + (2x...).
E.g. for the model FXM55.12F.□□.□**1**0 (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 index[1].

2.6 Options / expansions

Brake

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

WARNING. NEVER use this 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 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·cm²	kg (lbf)
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 rpm except for the FXM7 series that is 8000 rpm.

WARNING.

(A) The brake must not be used to stop the axis while it is moving.

(B) The brake must never exceed its maximum turning speed. See its value in the table **T- 2/6**

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

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

Fan

FXM5 and FXM7 series will offer the option for a fan whose main characteristics are:

T- 2/7 Technical data of the fan.

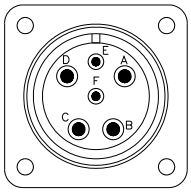
Motor series	Frequency	Voltage	Power	Flow	Noise	Speed:
	Hz	V AC	W	m³/h	dB(A)	rpm
FXM5/V	50	230	45	325	48	2800
	60	230	39	380	52	3250
FXM7/V	50	230	45	325	48	2800
	60	230	39	380	52	3250

2.7 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.

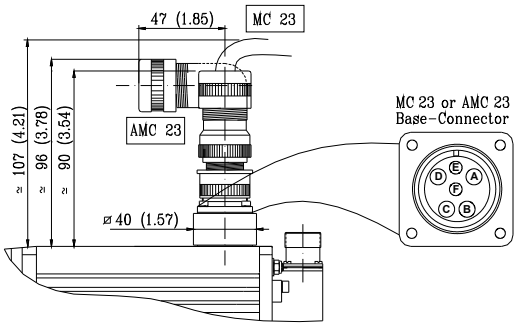
Terminal strips MC 23 and AMC 23



Important. *The range of outside diameters of the cable admitted by the aerial connector for the base connector is Dmin. / Dmax. = 6/16.5 mm.*

MC 23
AMC 23
Sealing: IP67

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



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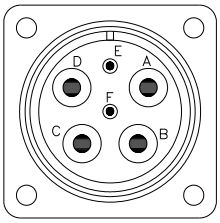
Terminal strips MC 23 (straight) and AMC 23 (angled) for rated current In < 23 A.

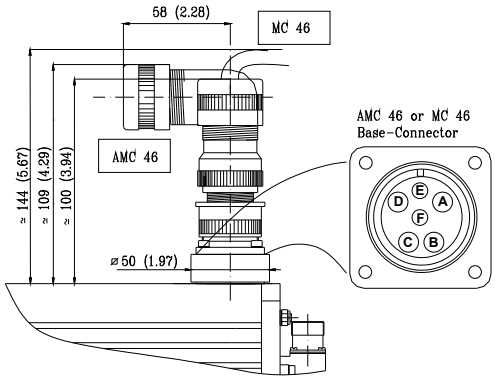
Terminal strips MC 46 and AMC 46



Important. *The range of outside diameters of the cable admitted by the aerial connector for the base connector is Dmin. / Dmax. = 19/24 mm.*

MC 46
AMC 46
Sealing: IP67

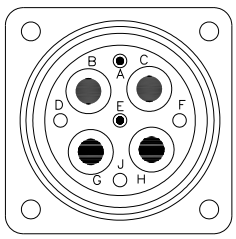
PIN	SIGNAL
A	Phase U
B	Phase V
C	Phase W
D	Ground
E	Brake (+)
F	Brake (−)



F- 2/4

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

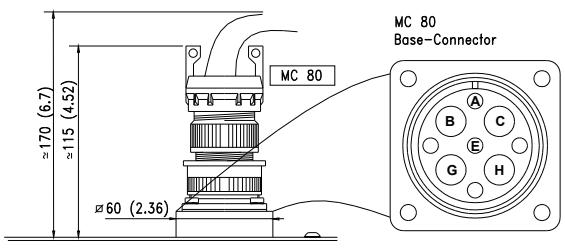
Terminal strip MC 80



Important. *The range of outside diameters of the cable admitted by the aerial connector for the base connector is Dmin. / Dmax. = 19/24 mm.*

MC 80
Sealing: IP 65

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

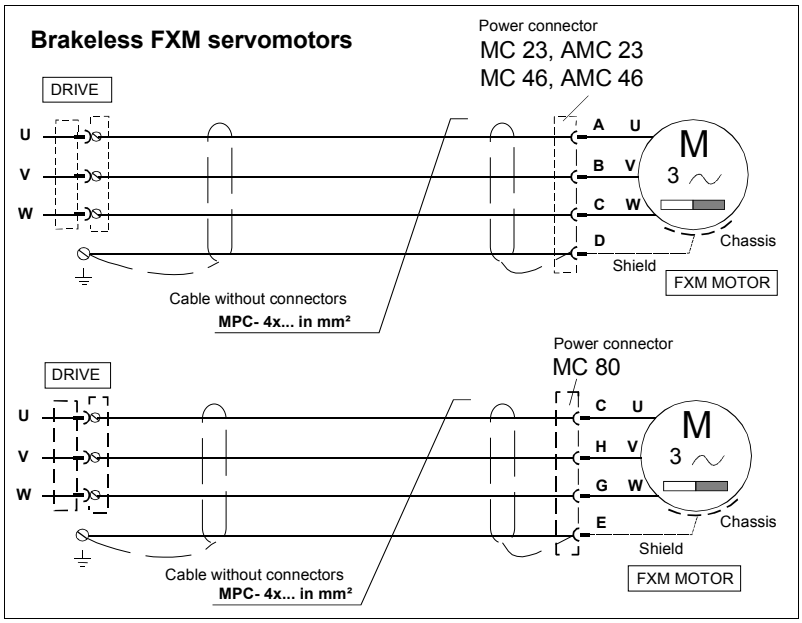


F- 2/5

Terminal strip MC 80 (straight) for rated current In > 46 A.

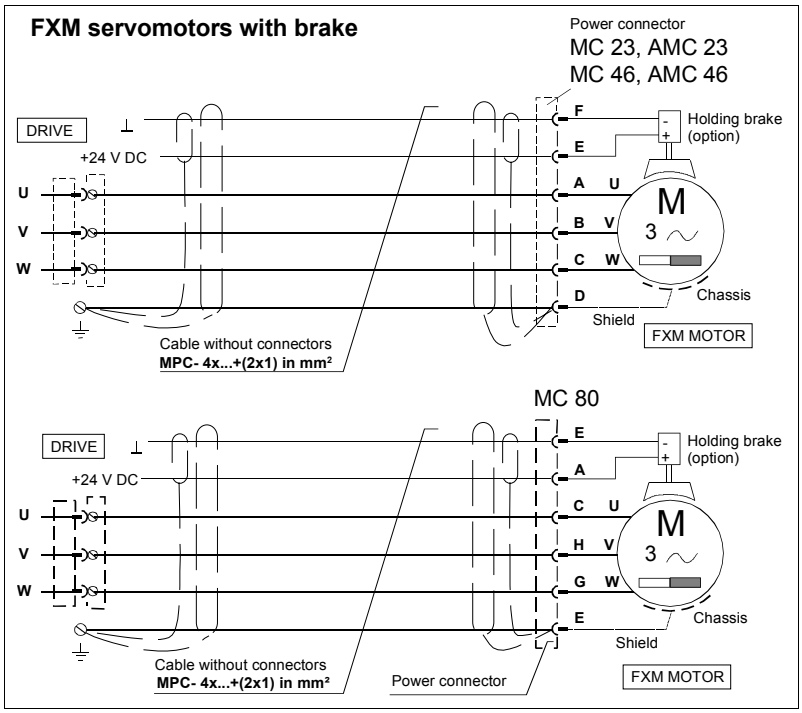
MOTOR-DRIVE connection

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.

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.

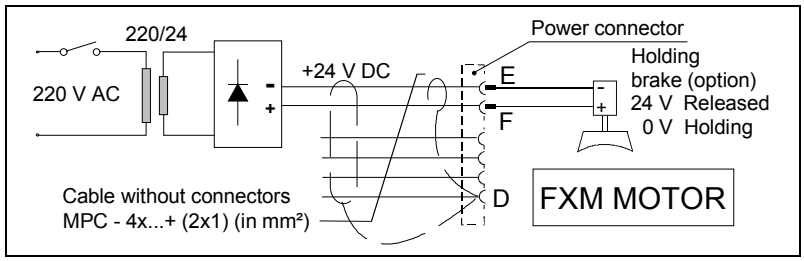
In order for the system to comply with the European Directive 2004/108/EC on Electromagnetic Compatibility, the cable grouping the wires that make up the power cable must be shielded. **The shield must be connected to ground at the drive end and at the motor end** as shown in figure **F- 2/7**. This condition is a must.

Brake connection

To govern the optional mechanical 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

Brake connection diagram.

WARNING.

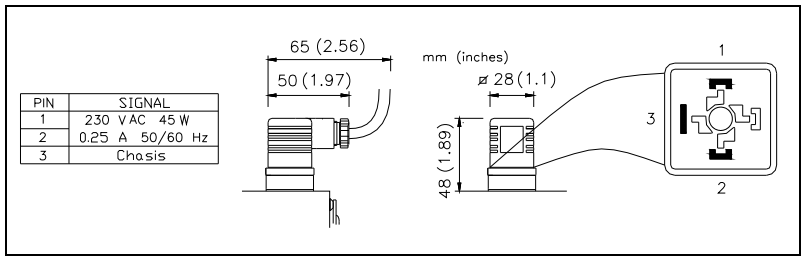
Voltage between 22 and 26 release the shaft. Make sure that no voltage over 26 V is applied that prevents the shaft from turning.

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-XX 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.

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- 2/9

Power connector of the fan.

Feedback connection

Feedback may be obtained through a sinusoidal incremental TTL encoder. To take the motor feedback to the drive module, use the corresonding cable with connectors provided by FAGOR.

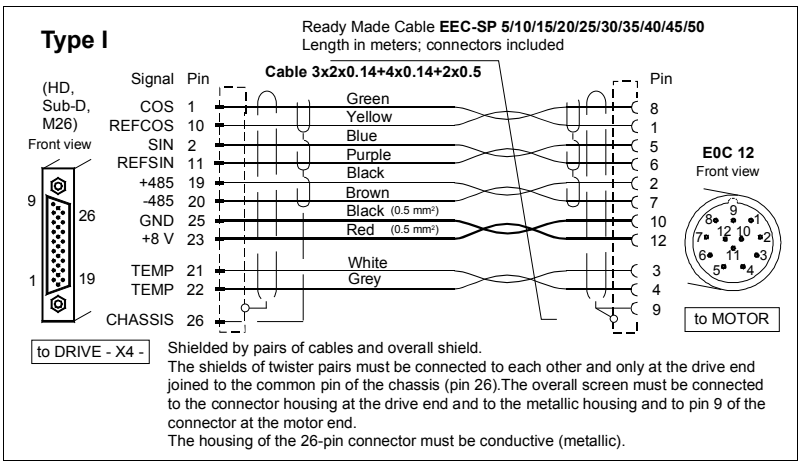
Sinusoidal encoder. EEC-SP cable

INFORMATION. Using the EEC-SP cable as motor feedback cable ensures compliance with Directive 2004/108/EC on Electromagnetic Compatibility.

FAGOR supplies the EEC-SP feedback cable upon request.

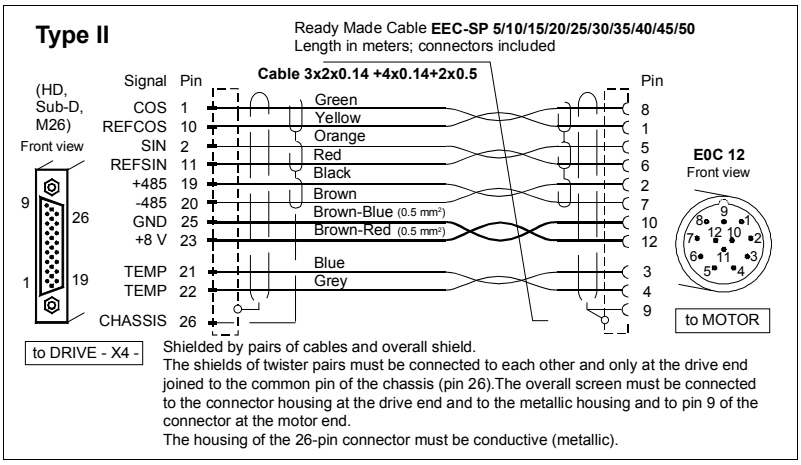
If you use to manufacture you own cable, read the following instructions carefully to understand the diagrams correctly. Observe that there are two cables indicated as type I and type II. Any of the cables shown is valid as feedback cable for a sinusoidal encoder. Only the wire colors are different, 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- 2/10

Encoder connection EEC-SP. Cable type I.
With overall shield and shielded twisted pairs.



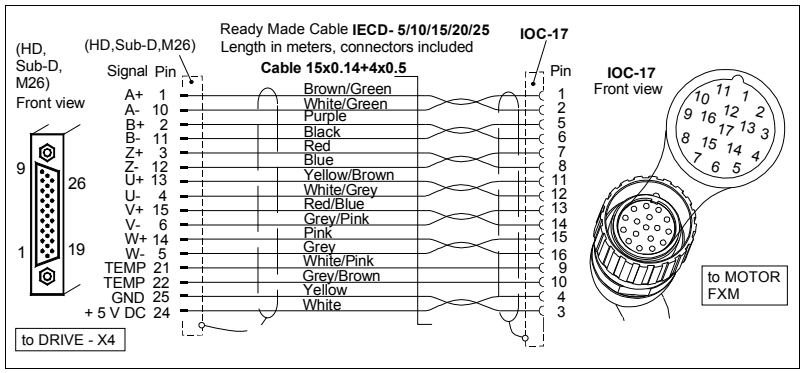
F- 2/11

Encoder connection EEC-SP. Type II cable.
Overall shield and shielded twisted pairs.

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

Incremental TTL encoder. IECD cable

FAGOR supplies the IECD feedback cable upon request.



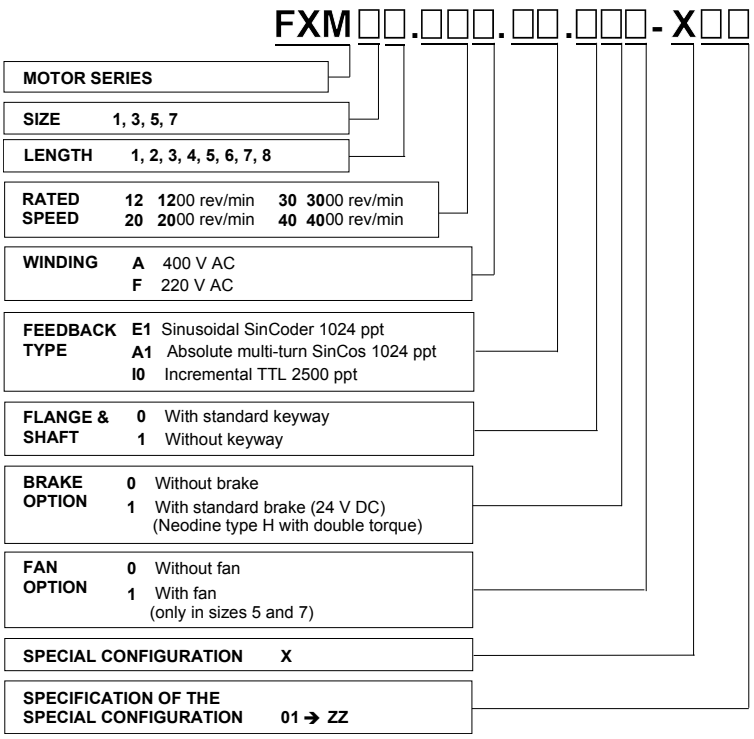
F- 2/12

TTL incremental encoder connection.
Overall shield and unshielded twisted pairs.

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

2.8 Sales reference

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



Note. *Any motor with F type winding (220 VAC) can have an incremental TTL encoder (Ref.I0) The rest of encoders (Ref. E3 and A3) will only available on motors with A winding (400 VAC).*

F- 2/13

Sales reference of FXM servomotors.

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 (Mp) 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 Mp/Mo 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 Mp/Mo 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 Mp/Mo ratio has required getting the peak torque value of the drive (Mp). This value results from multiplying the peak current (Imax) of the selected drive by the torque constant (Kt) 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 "dds-hardware" 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, MCS and MCP 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 these drives, consult the selection table for these drives shown on the first pages of the corresponding manual. Observe that each drive family mentioned here has its own manual.

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

FXM11 series

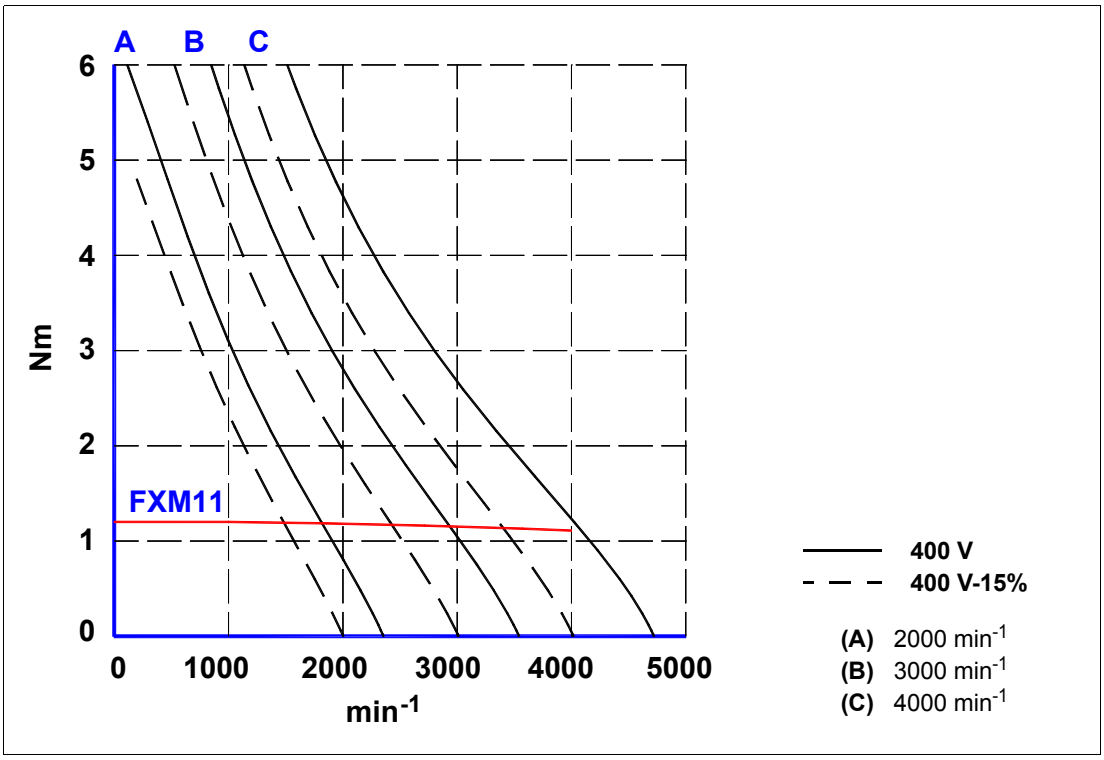
T- 2/8 Technical data of the series: FXM11.●●A.□□.□□0.1.

Model				**FXM11.●●A.□□.□□0.1**		
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	6	6
Rated speed	nN	1/min		2000	3000	4000
Stall current	Io	Arms		0.45	0.67	0.90
Peak current	Imax	Arms		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/Arms		2.7	1.8	1.3
Acceleration time	tac	ms		4.2	6.3	8.4
Inductance per phase (3-phase)	L	mH		248	110	62
Resistance per phase	R	Ω		93.5	43.0	23.5
Inertia (without brake)	J	kg·cm²		1.2	1.2	1.2
Inertia (with brake)	J*	kg·cm²		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.□□.□□0.1 motors.

Drive peak torque in Nm	**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-xxH, MCS-xxH or MCP-xxH drive with any motor of this series, refer to the manual of the corresponding drive.



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Torque-speed graphs. FXM11.●●A.□□.□□0.1 models.

FXM12 series

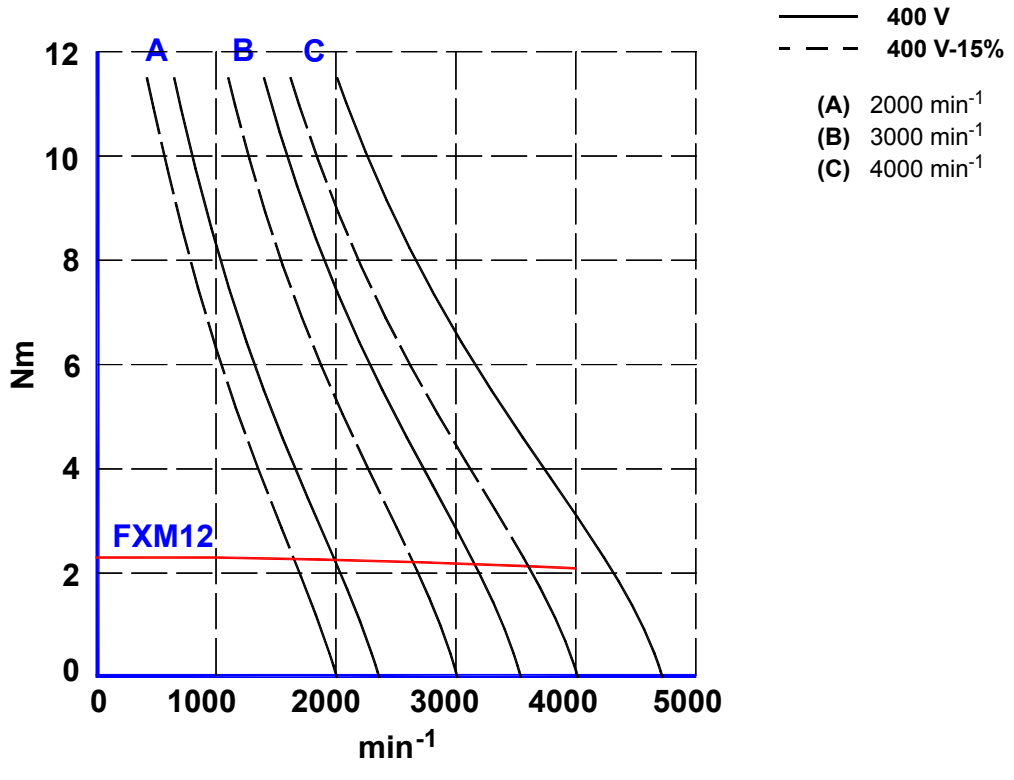
T- 2/10 Technical data of FXM12.●●A.□□.□□0.1 motors.

Model				**FXM12.●●A.□□.□□0.1**		
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	Arms		0.86	1.29	1.72
Peak current	Imax	Arms		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/Arms		2.7	1.8	1.3
Acceleration time	tac	ms		3.6	5.4	7.2
Inductance per phase (3-phase)	L	mH		111	49	28
Resistance per phase	R	Ω		32	13	7.8
Inertia (without brake)	J	kg·cm²		1.9	1.9	1.9
Inertia (with brake)	J*	kg·cm²		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.□□.□□0.1 motors.

Drive peak torque in Nm	**1.08**		**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-xxH, MCS-xxH or MCP-xxH drive with any motor of this series, refer to the manual of the corresponding drive.



F- 2/15

Torque-speed graphs. FXM12.●● A.□□.□□0.1 models.

FXM13 series

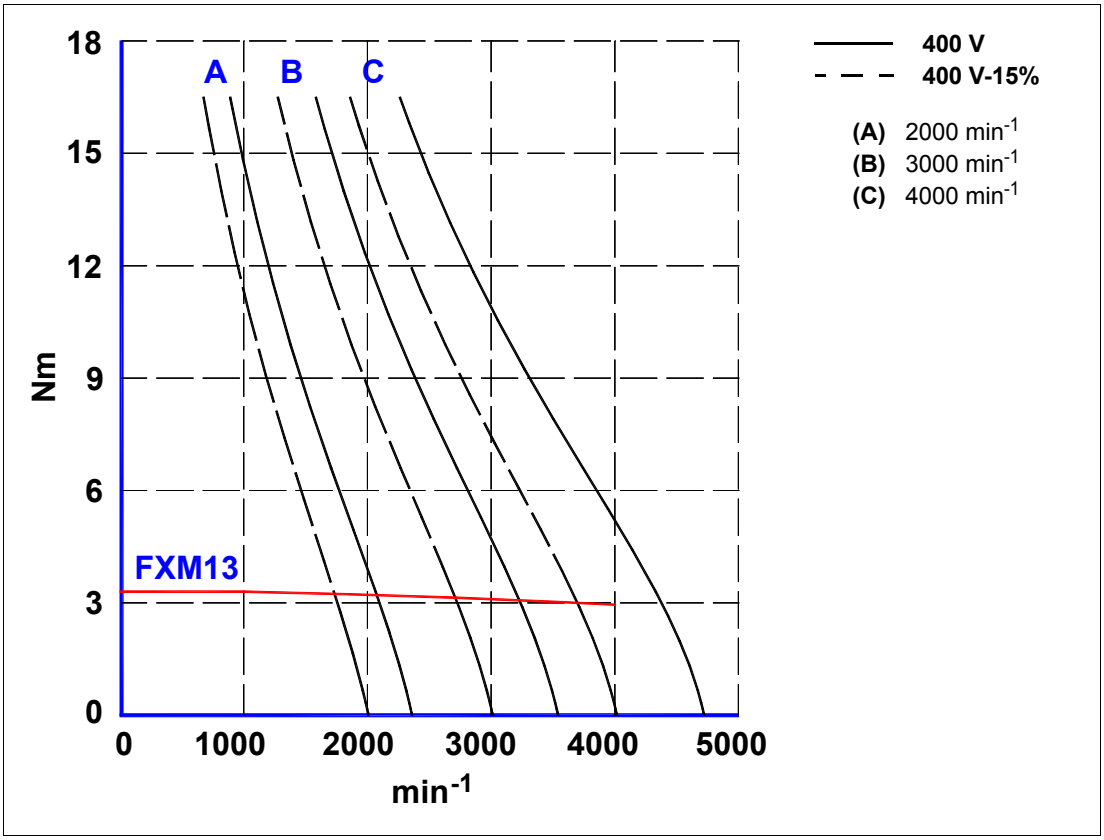
T- 2/12 Technical data of FXM13.●● A.□□.□□0.1 motors.

Model				**FXM13.●●A.□□.□□0.1**		
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	Arms		1.23	1.85	2.50
Peak current	Imax	Arms		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/Arms		2.7	1.8	1.3
Acceleration time	tac	ms		3.4	5.1	6.8
Inductance per phase (3-phase)	L	mH		71	32	18
Resistance per phase	R	Ω		16.00	7.25	4.05
Inertia (without brake)	J	kg·cm²		2.6	2.6	2.6
Inertia (with brake)	J*	kg·cm²		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.□□.□□0.1 motors.

Drive peak torque in Nm	**1.08**		**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-xxH, MCS-xxH or MCP-xxH drive with any motor of this series, refer to the manual of the corresponding drive.



F- 2/16

Torque-speed graphs. FXM13.●● A.□□.□□0.1 models.

FXM14 series

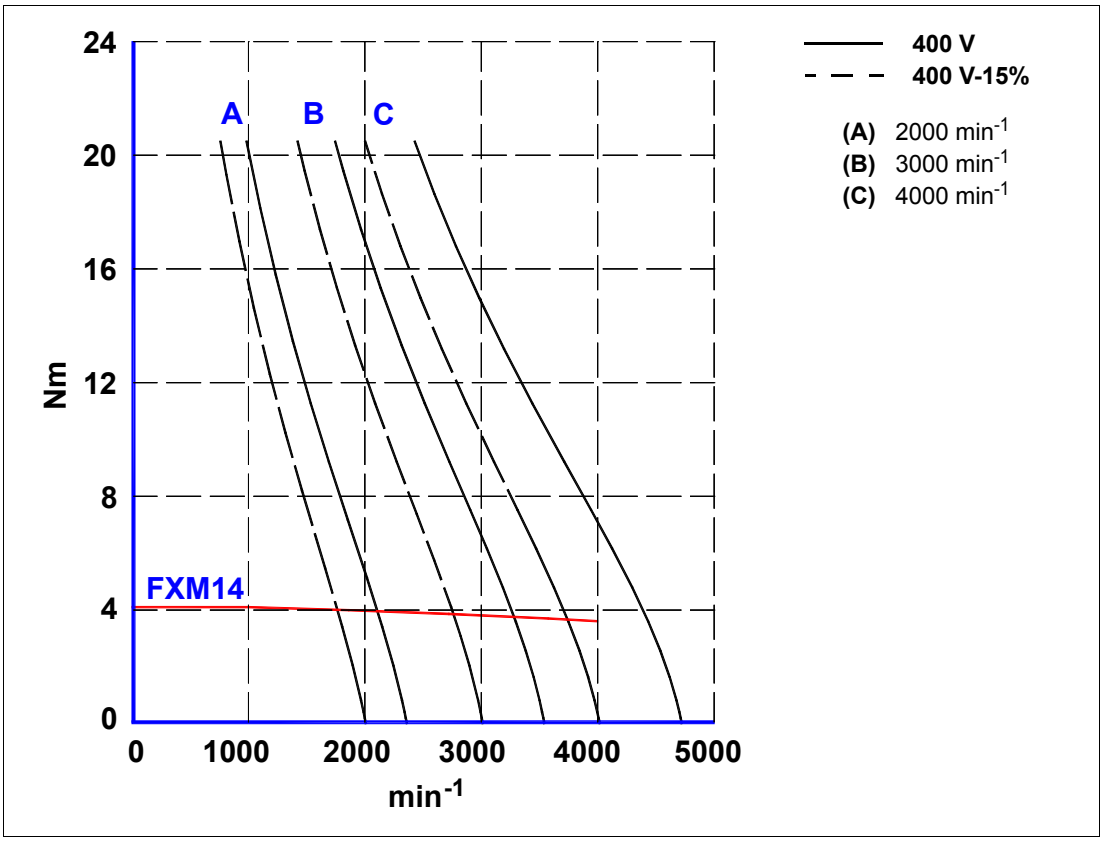
T- 2/14 Technical data of FXM14.●●A.□□.□□0.1 motors.

Model				**FXM14.●●A.□□.□□0.1**		
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	Arms		1.5	2.3	2.1
Peak current	Imax	Arms		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/Arms		2.7	1.8	1.3
Acceleration time	tac	ms		3.5	5.2	6.9
Inductance per phase (3-phase)	L	mH		52	23	13
Resistance per phase	R	Ω		12.00	4.85	2.95
Inertia (without brake)	J	kg·cm²		3.3	3.3	3.3
Inertia (with brake)	J*	kg·cm²		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.□□.□□0.1 motors.

Drive peak torque in Nm	**1.08**		**1.15**		**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-xxH, MCS-xxH or MCP-xxH drive with any motor of this series, refer to the manual of the corresponding drive.



F- 2/17

Torque-speed graphs. FXM14.●● A.□□.□□0.1 models.

FXM31 series

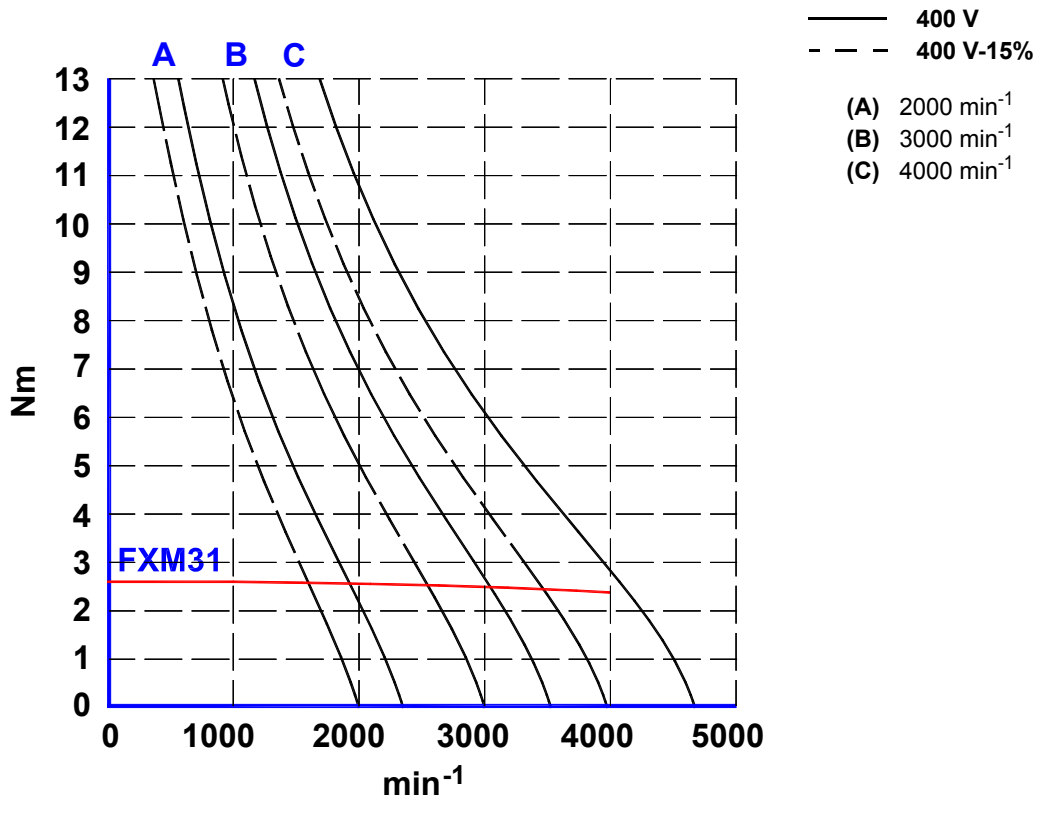
T- 2/16 Technical data of FXM31.●● A.□□.□□0.1 motors.

Model				**FXM31.●●A.□□.□□0.1**		
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	Arms		0.97	1.45	1.92
Peak current	Imax	Arms		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/Arms		2.7	1.8	1.4
Acceleration time	tac	ms		5.6	8.5	11.3
Inductance per phase (3-phase)	L	mH		126	56	32
Resistance per phase	R	Ω		29.0	12.5	7.25
Inertia (without brake)	J	kg·cm²		3.5	3.5	3.5
Inertia (with brake)	J*	kg·cm²		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.□□.□□0.1 motors.

Drive peak torque in Nm	**1.08**		**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-xxH, MCS-xxH or MCP-xxH drive with any motor of this series, refer to the manual of the corresponding drive.



F- 2/18

Torque-speed graphs. FXM31.●● A.□□.□□0.1 models.

FXM32 series

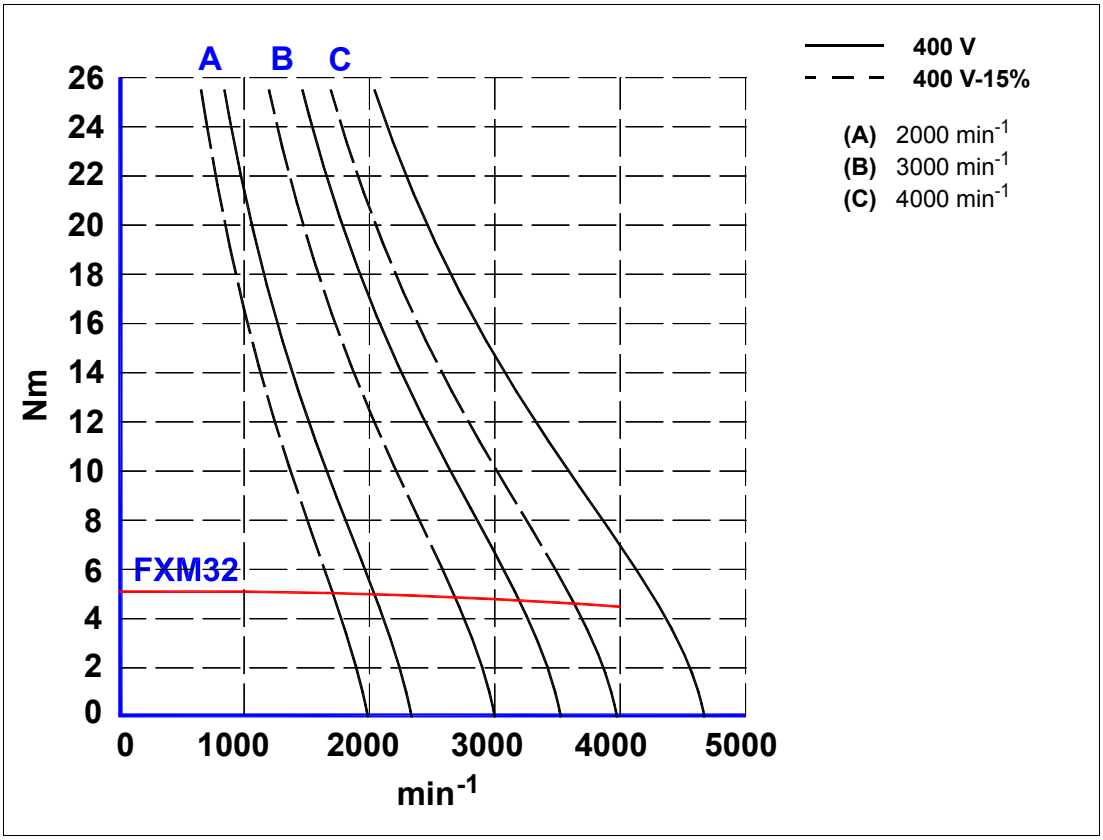
T- 2/18 Technical data of FXM32.●● A.□□.□□0.1 motors.

Model				**FXM32.●●A.□□.□□0.1**		
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	Arms		1.89	2.80	3.80
Peak current	Imax	Arms		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/Arms		2.7	1.8	1.4
Acceleration time	tac	ms		5.0	7.5	10.1
Inductance per phase (3-phase)	L	mH		56	25	14
Resistance per phase	R	Ω		9.55	4.05	2.30
Inertia (without brake)	J	kg·cm²		6.0	6.0	6.0
Inertia (with brake)	J*	kg·cm²		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

T- 2/19 Selection of FAGOR drives for FXM32.●● A.□□.□□0.1 motors.

Drive peak torque in Nm	**1.08**		**1.15**		**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-xxH, MCS-xxH or MCP-xxH drive with any motor of this series, refer to the manual of the corresponding drive.



F- 2/19

Torque-speed graphs. FXM32.●● A.□□.□□0.1 models.

FXM33 series

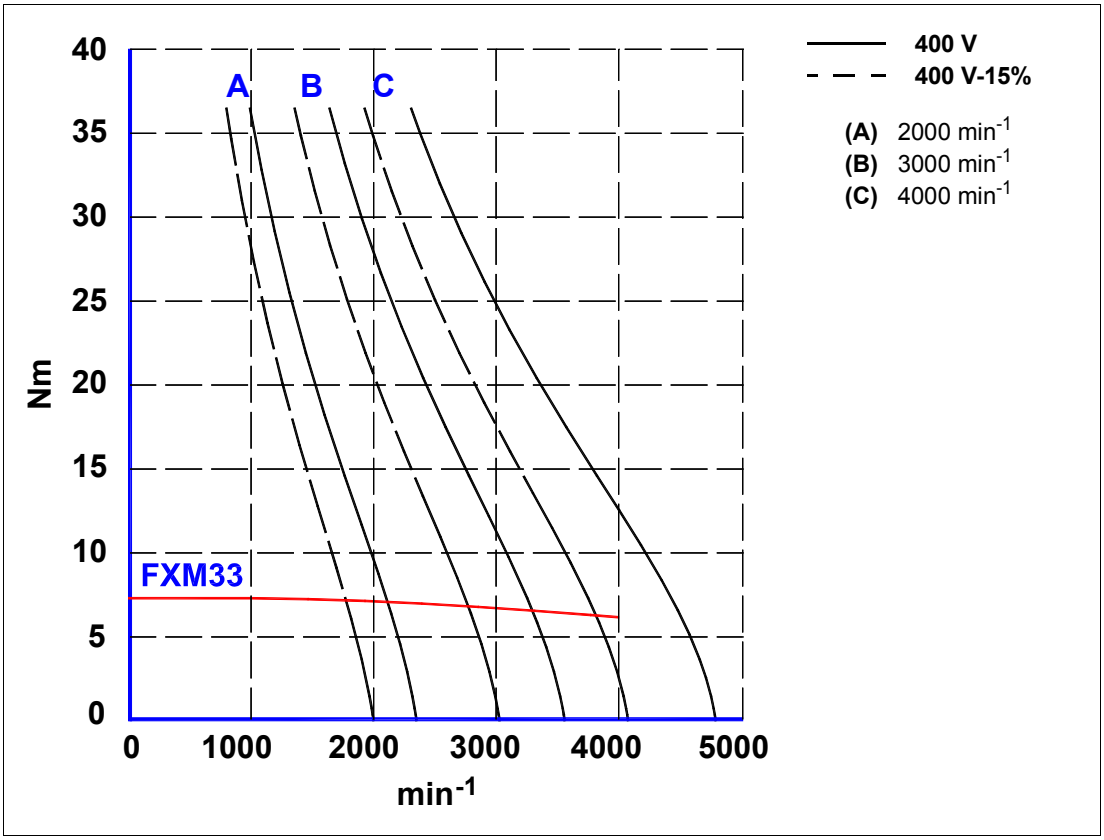
T- 2/20 Technical data of FXM33.●● A.□□.□□0.1 motors.

Model				**FXM33.●●A.□□.□□0.1**		
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	Arms		2.7	4.1	5.5
Peak current	Imax	Arms		13.4	20.0	27.0
Calculation power	Pcal	kW		1.5	2.3	3.1
Rated power	Pn	kW		1.4	2.1	2.5
Torque constant	Kt	N·m/Arms		2.7	1.8	1.3
Acceleration time	tac	ms		4.9	7.4	9.9
Inductance per phase (3-phase)	L	mH		36.0	16.0	8.6
Resistance per phase	R	Ω		5.05	2.20	1.15
Inertia (without brake)	J	kg·cm²		8.5	8.5	8.5
Inertia (with brake)	J*	kg·cm²		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.□□.□□0.1 motors.

Drive peak torque in Nm	**1.08**		**1.15**		**1.25**		**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-xxH, MCS-xxH or MCP-xxH drive with any motor of this series, refer to the manual of the corresponding drive.



F- 2/20

Torque-speed graphs. FXM33.●● A.□□.□□0.1 models.

FXM34 series

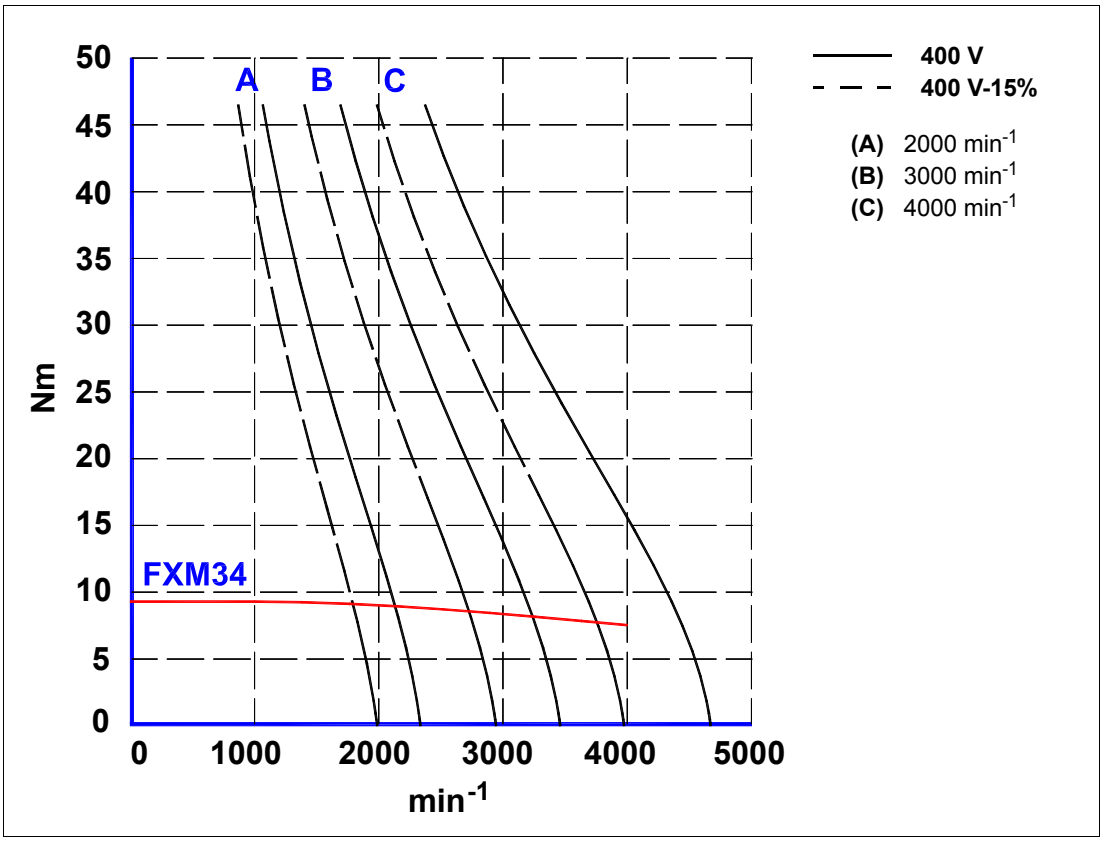
T- 2/22 Technical data of FXM34.●● A.□□.□□0.1 motors.

Model				**FXM34.●●A.□□.□□0.1**		
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	Arms		3.4	5.1	6.9
Peak current	Imax	Arms		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/Arms		2.7	1.8	1.4
Acceleration time	tac	ms		5.0	7.5	10.0
Inductance per phase (3-phase)	L	mH		26.0	12.0	6.6
Resistance per phase	R	Ω		3.45	1.60	0.85
Inertia (without brake)	J	kg·cm²		11.0	11.0	11.0
Inertia (with brake)	J*	kg·cm²		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.□□.□□0.1 motors.

Drive peak torque in Nm	**1.08**		**1.15**		**1.25**		**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-xxH, MCS-xxH or MCP-xxH drive with any motor of this series, refer to the manual of the corresponding drive.



F- 2/21

Torque-speed graphs. FXM34.●● A.□□.□□0.1 models.

FXM53 series

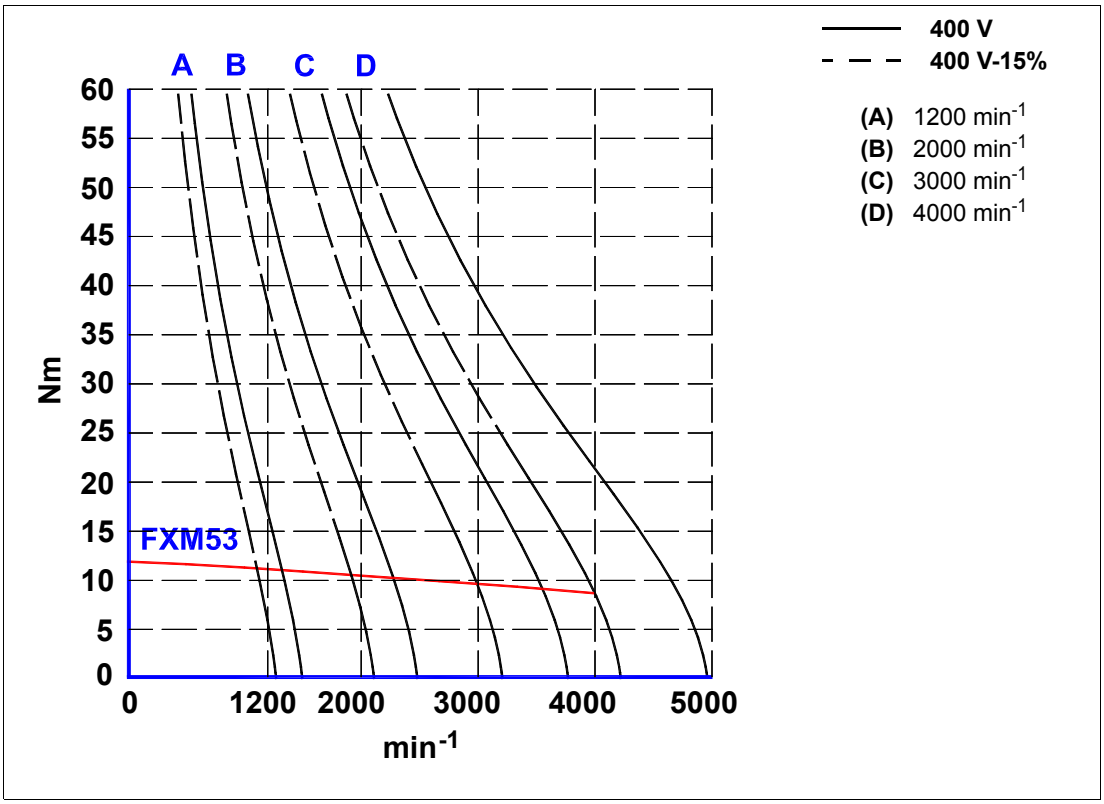
T- 2/24 Technical data of FXM53.●●A.□□.□□0.1 motors.

Model			**FXM53.●●A.□□.□□0.1**			
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	Arms	2.8	4.7	7.1	9.3
Peak current	Imax	Arms	14	23	35	46
Calculation power	Pcal	kW	1.5	2.5	3.7	5.0
Rated power	Pn	kW	1.4	2.2	3.0	3.6
Torque constant	Kt	N·m/Arms	4.2	2.5	1.7	1.3
Acceleration time	tac	ms	4.7	7.8	11.7	15.6
Inductance per phase (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·cm²	22.0	22.0	22.0	22.0
Inertia (with brake)	J*	kg·cm²	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.□□.□□0.1 motors.

Drive peak torque in Nm	**1.08**		**1.15**		**1.25**		**1.35**		**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-xxH, MCS-xxH or MCP-xxH drive with any motor of this series, refer to the manual of the corresponding drive.



F- 2/22

Torque-speed graphs. FXM53.●● A.□□.□□0.1 models.

FXM54 series

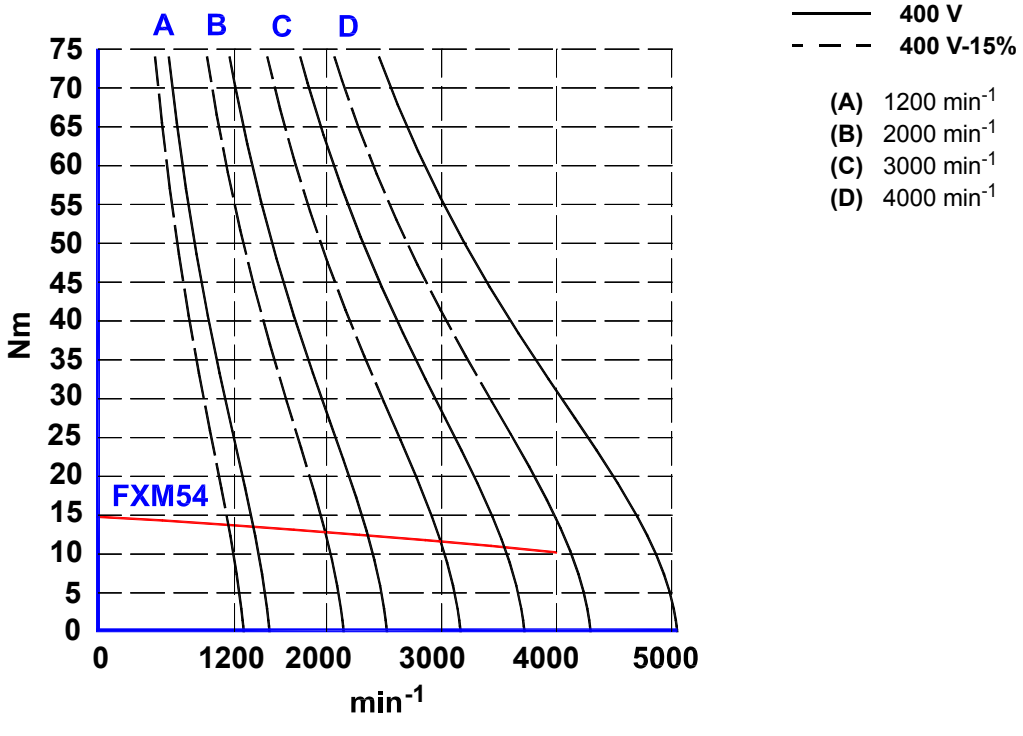
T- 2/26 Technical data of FXM54.●● A.□□.□□0.1 motors.

Model			**FXM54.●●A.□□.□□0.1**			
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	Arms	3.5	5.9	8.7	11.8
Peak current	Imax	Arms	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/Arms	4.2	2.5	1.7	1.3
Acceleration time	tac	ms	4.9	8.2	12.3	16.4
Inductance per phase (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·cm²	29.0	29.0	29.0	29.0
Inertia (with brake)	J*	kg·cm²	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.□□.□□0.1 motors.

Drive peak torque in Nm	**1.08**		**1.15**		**1.25**		**1.35**		**2.50**		**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	61.1	4.1	**74.0**	**5.0**

NOTE. To select a ACSD-xxH, MCS-xxH or MCP-xxH drive with any motor of this series, refer to the manual of the corresponding drive.



F- 2/23

Torque-speed graphs. FXM54.●● A.□□.□□0.1 models.

FXM55 series

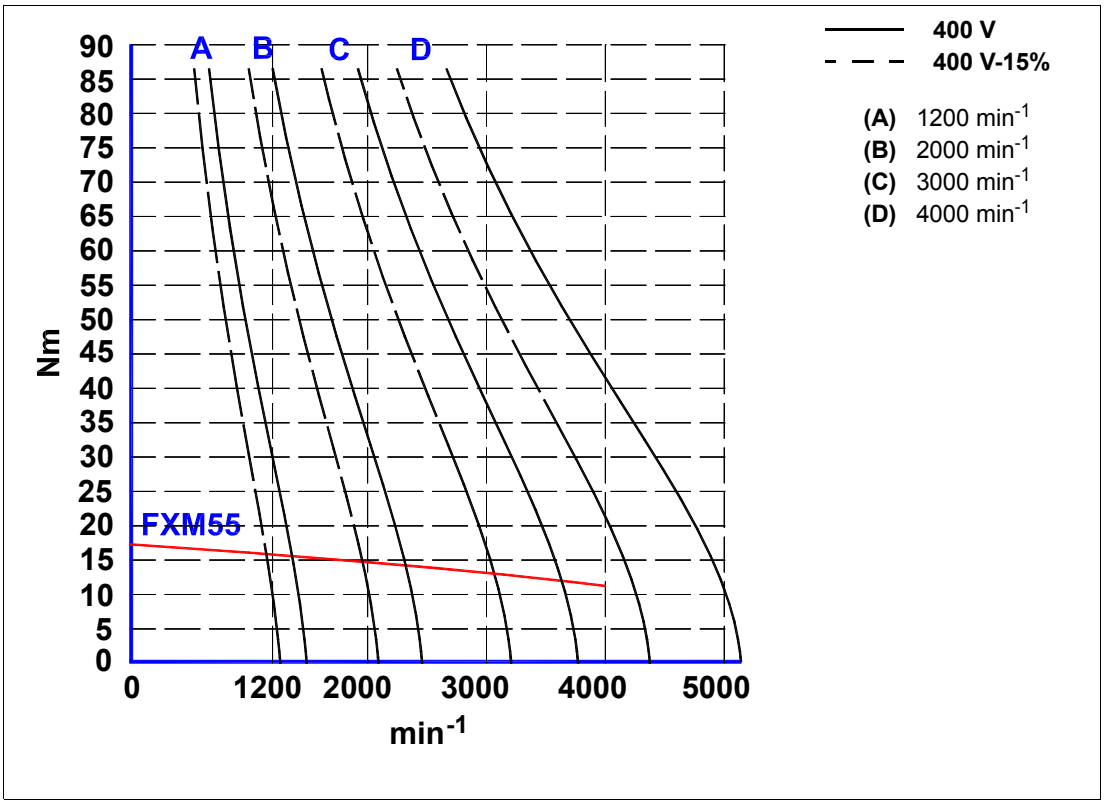
T- 2/28 Technical data of FXM55.●●A.□□.□□0.1 motors.

Model			**FXM55.●●A.□□.□□0.1**			
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	Arms	4.1	6.7	10.3	14.1
Peak current	Imax	Arms	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/Arms	4.2	2.6	1.7	1.2
Acceleration time	tac	ms	5.3	8.8	13.2	17.5
Inductance per phase (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·cm²	36.0	36.0	36.0	36.0
Inertia (with brake)	J*	kg·cm²	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.□□.□□0.1 motors.

Drive peak torque in Nm	**1.15**		**1.25**		**1.35**		**2.50**		**2.75**		**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	79.9	4.6	**86.0**	**4.9**	-	-
FXM55.40A	-	-	-	-	42.0	2.4	56.4	3.2	75.6	4.3	**86.0**	**4.9**

NOTE. To select a ACSD-xxH, MCS-xxH or MCP-xxH drive with any motor of this series, refer to the manual of the corresponding drive.



F- 2/24

Torque-speed graphs. FXM55.●●A.□□.□□0.1 models.

FXM73 series

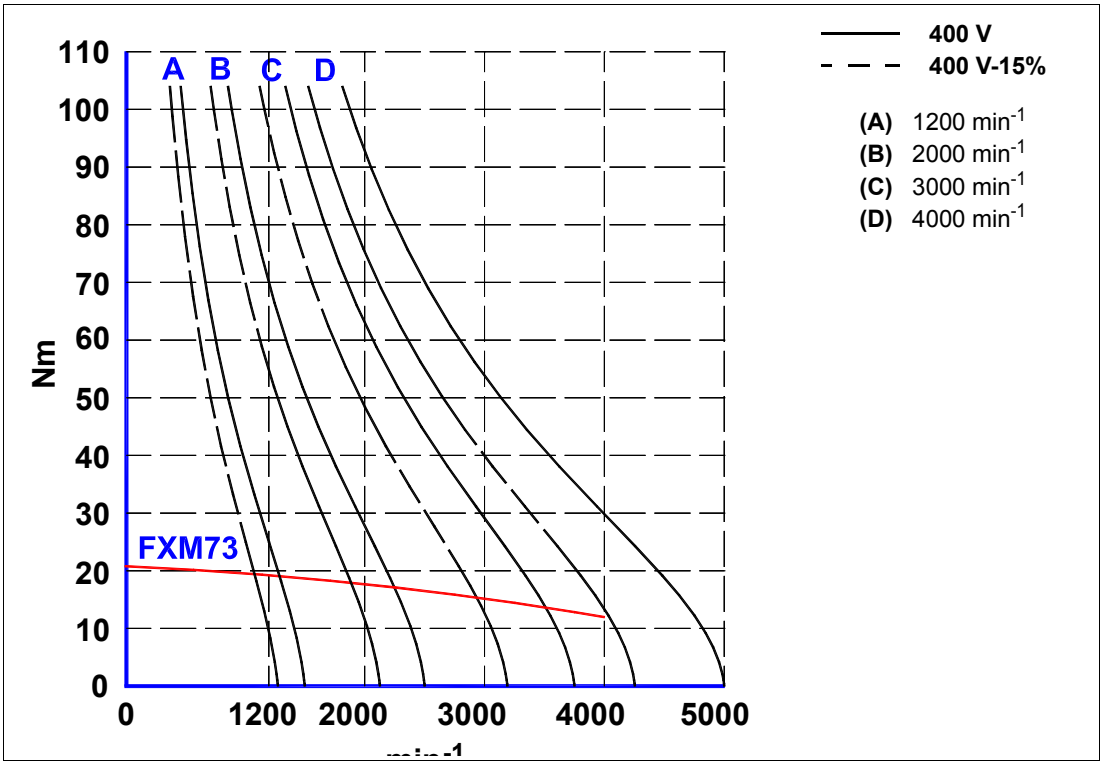
T- 2/30 Technical data of FXM73.●●A.□□.□□0.1 motors.

Model			**FXM73.●●A.□□.□□0.1**			
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	Arms	4.9	8.2	12.3	16.5
Peak current	Imax	Arms	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/Arms	4.2	2.5	1.7	1.3
Acceleration time	tac	ms	7.4	12.3	18.4	25.0
Inductance per phase (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·cm²	61.0	61.0	61.0	61.0
Inertia (with brake)	J*	kg·cm²	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.□□.□□0.1 motors.

Drive peak torque in Nm	**1.15**		**1.25**		**1.35**		**2.50**		**2.75**		**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	79.9	3.8	**104.0**	**5.0**	-	-
FXM73.40A	-	-	-	-	45.5	2.1	61.1	2.9	81.9	3.9	**104.0**	**5.0**

NOTE. To select a ACSD-xxH, MCS-xxH or MCP-xxH drive with any motor of this series, refer to the manual of the corresponding drive.



F- 2/25

Torque-speed graphs. FXM73.●●A.□□.□□0.1 models.

FXM74 series

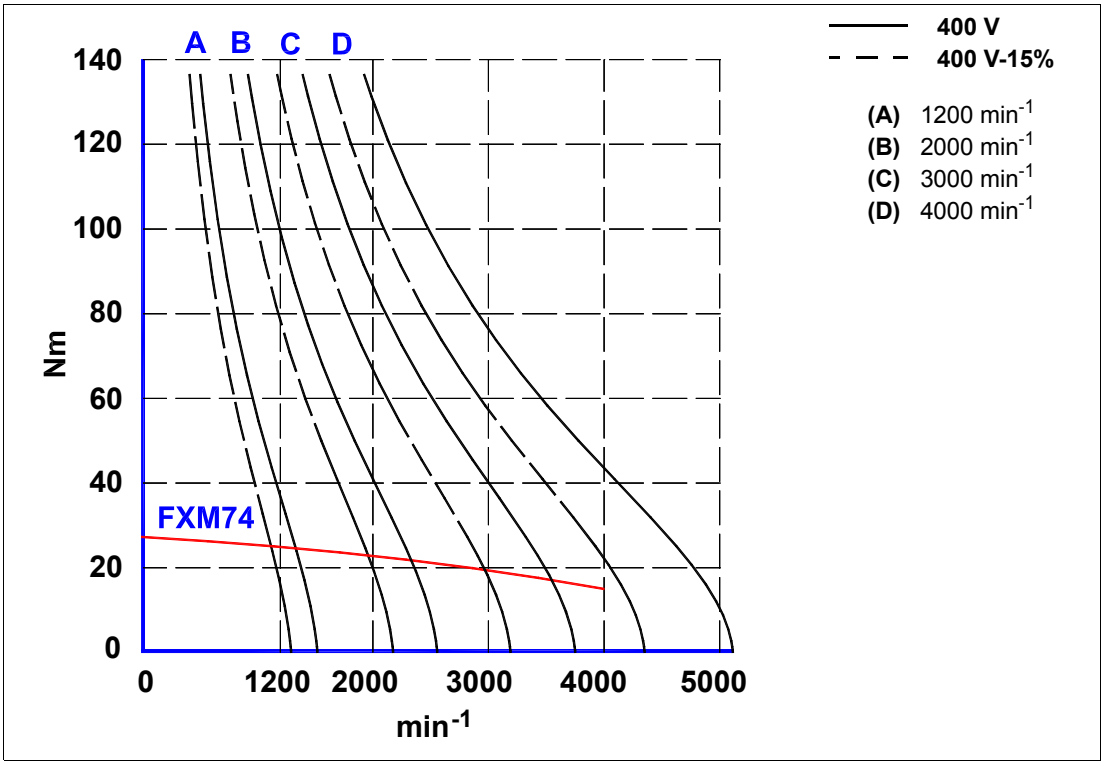
T- 2/32 Technical data of FXM74.●●A.□□.□□0.1 motors.

Model			**FXM74.●●A.□□.□□0.1**			
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	Arms	6.6	11.1	16.2	22.1
Peak current	Imax	Arms	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/Arms	4.2	2.5	1.7	1.2
Acceleration time	tac	ms	7.4	12.3	18.4	25.0
Inductance per phase (3-phase)	L	mH	33	12	5.4	2.9
Resistance per phase	R	Ω	1.9	0.68	0.31	0.17
Inertia (without brake)	J	kg·cm²	79	79	79	79
Inertia (with brake)	J*	kg·cm²	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.□□.□□0.1 motors.

Drive peak torque in Nm	**1.25**		**1.35**		**2.50**		**2.75**		**3.100**		**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	**135.0**	**4.9**	-	-	-	-	-	-
FXM74.30A	-	-	59.5	2.1	79.9	2.9	107.1	3.9	**135.0**	**4.9**	-	-
FXM74.40A	-	-	-	-	56.4	2.0	75.6	2.7	120.0	4.4	**135.0**	**4.9**

NOTE. To select a ACSD-xxH, MCS-xxH or MCP-xxH drive with any motor of this series, refer to the manual of the corresponding drive.



F- 2/26

Torque-speed graphs. FXM74.●●A.□□.□□0.1 models.

FXM75 series

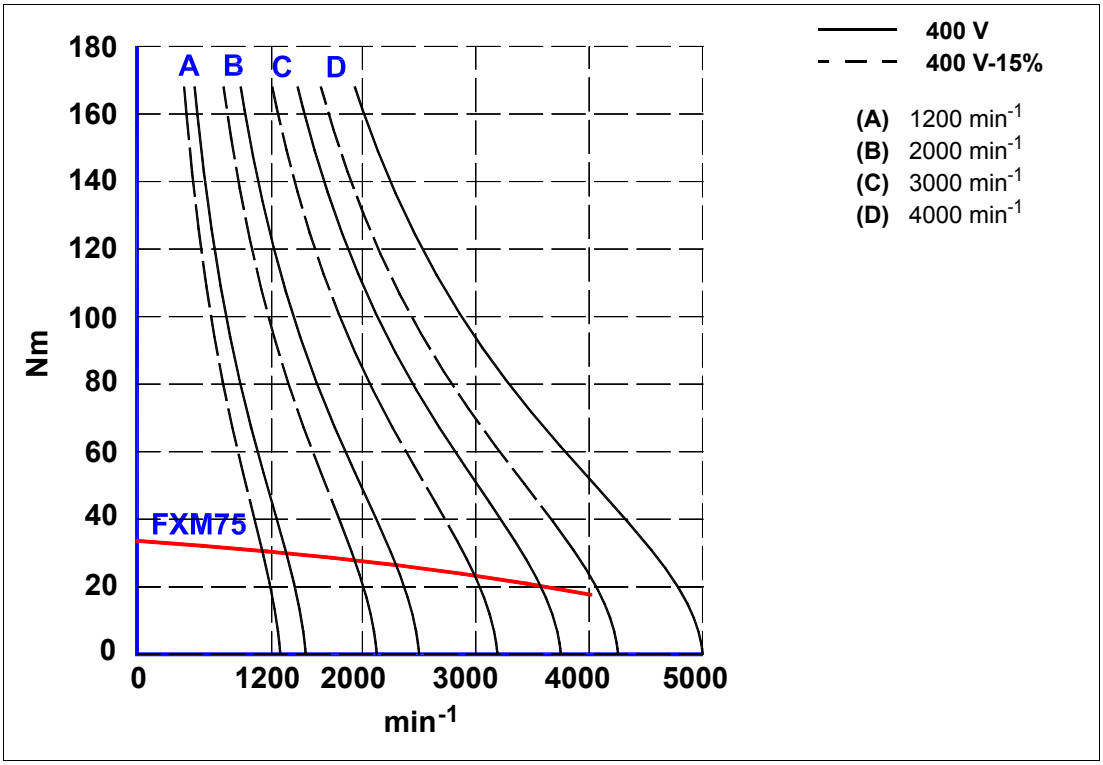
T- 2/34 Technical data of FXM75.●●A.□□.□□0.1 motors.

Model			**FXM75.●●A.□□.□□0.1**			
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	Arms	8.0	13.3	19.9	26.6
Peak current	Imax	Arms	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/Arms	4.2	2.5	1.7	1.3
Acceleration time	tac	ms	7.4	12.3	18.5	25.0
Inductance per phase (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·cm²	97.0	97.0	97.0	97.0
Inertia (with brake)	J*	kg·cm²	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.□□.□□0.1 motors.

Drive peak torque in Nm	**1.35**		**2.50**		**2.75**		**3.100**		**3.150**			
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo		
FXM75.12A	147.0	4.3	**165.0**	**4.9**	-	-	-	-	-	-		
FXM75.20A	87.5	2.6	117.5	3.5	157.5	4.6	**165.0**	**4.9**	-	-		
FXM75.30A	-	-	79.9	2.3	107.1	3.1	**165.0**	**4.9**	-	-		
FXM75.40A	-	-	-	-	81.9	2.4	130.0	3.8	161.2	4.8		

NOTE. To select a ACSD-xxH, MCS-xxH or MCP-xxH drive with any motor of this series, refer to the manual of the corresponding drive.



F- 2/27

Torque-speed graphs. FXM75.●●A.□□.□□0.1 models.

FXM76 series

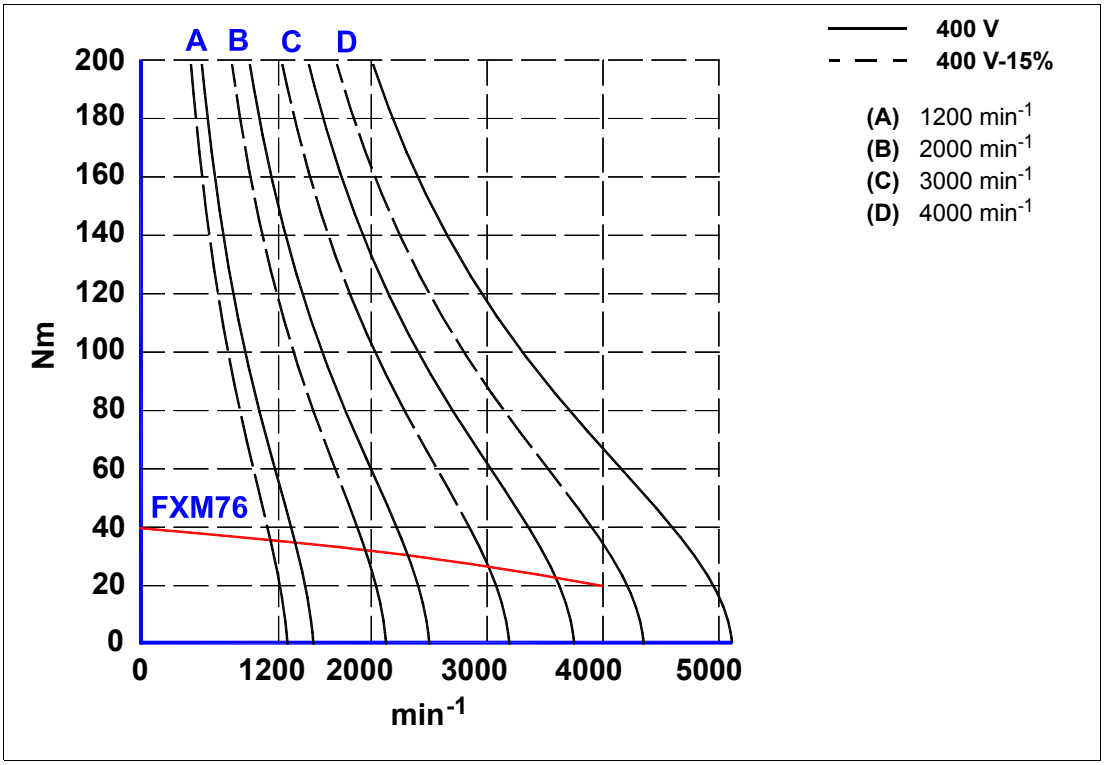
T- 2/36 Technical data of FXM76.●●A.□□.□□0.1 motors.

Model			**FXM76.●●A.□□.□□0.1**			
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	Arms	9.4	15.7	23.6	32.1
Peak current	Imax	Arms	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/Arms	4.2	2.5	1.7	1.2
Acceleration time	tac	ms	7.4	12.4	18.5	25.0
Inductance per phase (3-phase)	L	mH	22.0	8.0	3.6	1.9
Resistance per phase	R	Ω	1.1	0.4	0.18	0.095
Inertia (without brake)	J	kg·cm²	115	115	115	115
Inertia (with brake)	J*	kg·cm²	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.□□.□□0.1 motors.

Drive peak torque in Nm	**1.35**		**2.50**		**2.75**		**3.100**		**3.150**			
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo		
FXM76.12A	147.0	3.7	**195.0**	**4.9**	-	-	-	-	-	-		
FXM76.20A	87.5	2.2	117.5	2.9	157.5	3.9	**195.0**	**4.9**	-	-		
FXM76.30A	-	-	-	-	107.1	2.7	170.0	4.2	**195.0**	**4.9**		
FXM76.40A	-	-	-	-	-	-	120.0	3.0	148.8	3.7		

NOTE. To select a ACSD-xxH, MCS-xxH or MCP-xxH drive with any motor of this series, refer to the manual of the corresponding drive.



F- 2/28

Torque-speed graphs. FXM76.●●A.□□.□□0.1 models.

FXM77 series

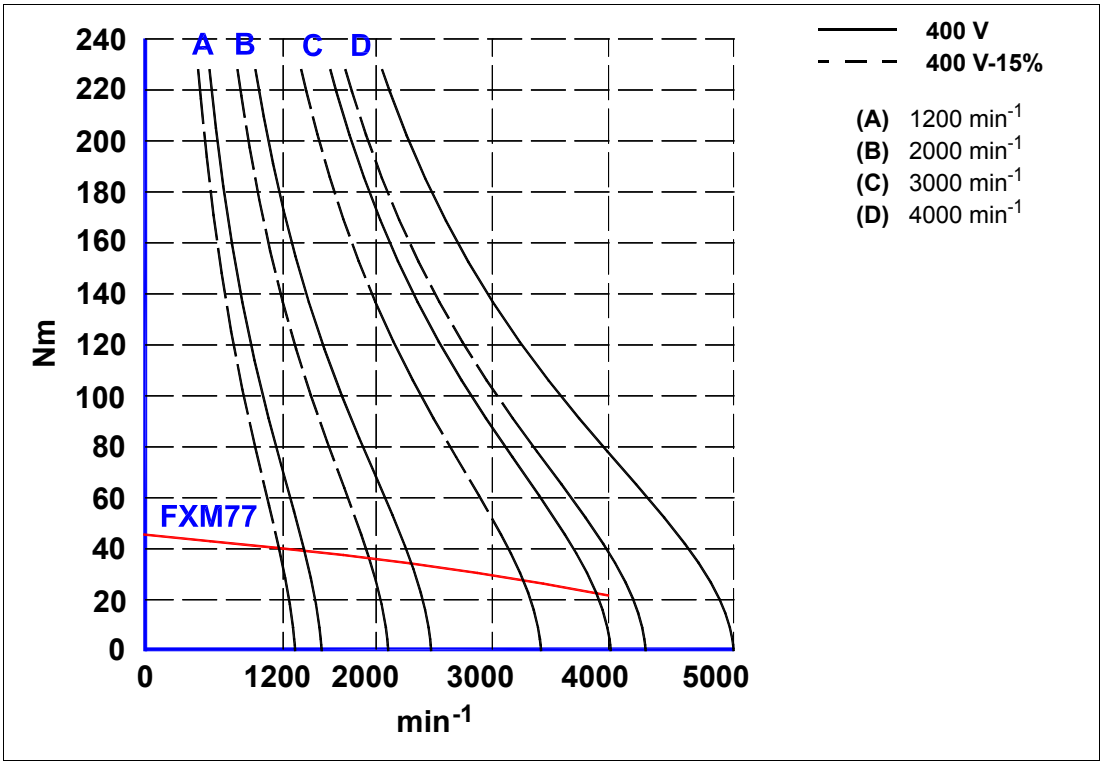
T- 2/38 Technical data of FXM77.●●A.□□.□□0.1 motors.

Model			**FXM77.●●A.□□.□□0.1**			
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	Arms	11.0	17.8	29.0	36.6
Peak current	Imax	Arms	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/Arms	4.1	2.6	1.6	1.2
Acceleration time	tac	ms	7.4	12.4	18.6	25.0
Inductance per phase (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·cm²	133.0	133.0	133.0	133.0
Inertia (with brake)	J*	kg·cm²	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.□□.□□0.1 motors.

Drive peak torque in Nm	**1.35**		**2.50**		**2.75**		**3.100**		**3.150**			
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo		
FXM77.12A	143.5	3.1	192.7	4.2	**225.0**	**4.9**	-	-	-	-		
FXM77.20A	-	-	122.2	2.6	163.8	3.6	**225.0**	**4.9**	-	-		
FXM77.30A	-	-	-	-	100.8	2.2	160.0	3.5	**225.0**	**4.9**		
FXM77.40A	-	-	-	-	-	-	120.0	2.6	148.8	3.2		

NOTE. To select a ACSD-xxH, MCS-xxH or MCP-xxH drive with any motor of this series, refer to the manual of the corresponding drive.



F- 2/29

Torque-speed graphs. FXM77.●●A.□□.□□0.1 models.

FXM78 series

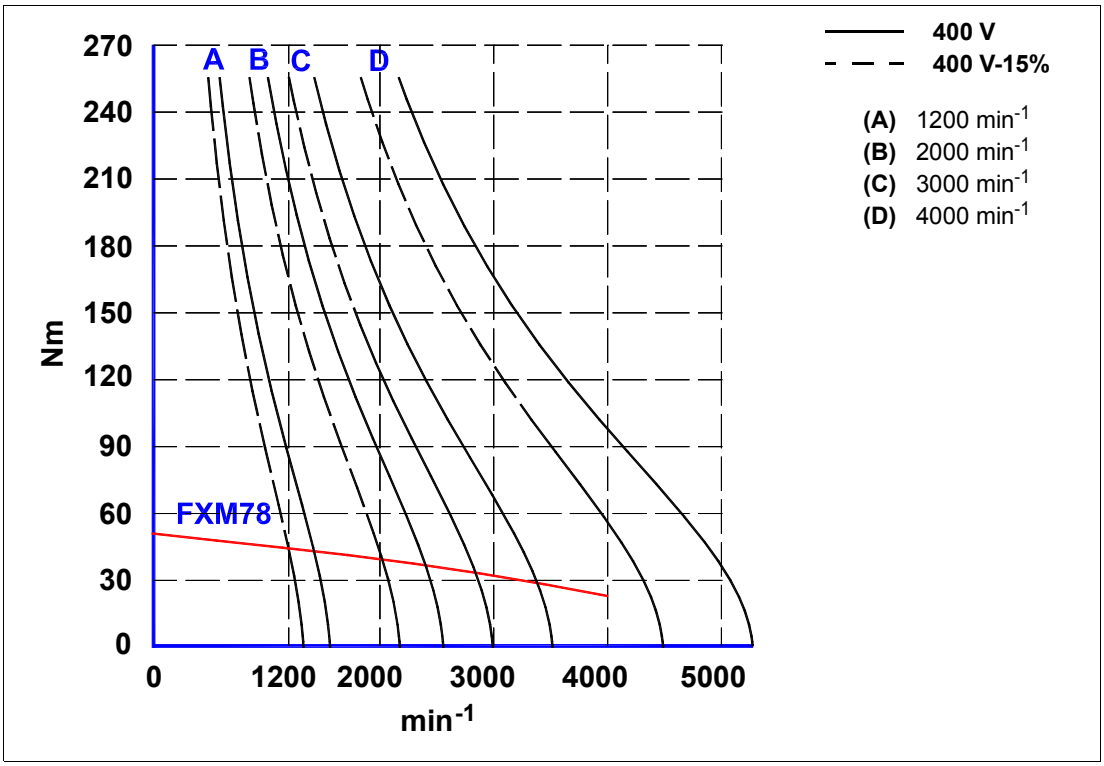
T- 2/40 Technical data of FXM78.●●A.□□.□□0.1 motors.

Model			**FXM78.●●A.□□.□□0.1**			
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	Arms	12.6	20.7	28.4	42.7
Peak current	Imax	Arms	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/Arms	4.0	2.5	1.8	1.2
Acceleration time	tac	ms	7.4	12.4	18.6	25.0
Inductance per phase (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·cm²	151.0	151.0	151.0	151.0
Inertia (with brake)	J*	kg·cm²	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.□□.□□0.1 motors.

Drive peak torque in Nm	**1.35**		**2.50**		**2.75**		**3.100**		**3.150**	
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo
FXM78.12A	140.0	2.7	188.0	3.6	252.0	4.9	**255.0**	**5.0**	-	-
FXM78.20A	-	-	117.5	2.3	157.5	3.0	250.0	4.9	**255.0**	**5.0**
FXM78.30A	-	-	-	-	113.4	2.2	180.0	3.5	223.2	4.3
FXM78.40A	-	-	-	-	-	-	120.0	2.3	148.8	2.9

NOTE. To select a ACSD-xxH, MCS-xxH or MCP-xxH drive with any motor of this series, refer to the manual of the corresponding drive.



F- 2/30

Torque-speed graphs. FXM78.●●A.□□.□□0.1 models.

Ventilated FXM with “A” winding (400 V AC)

FXM53 series

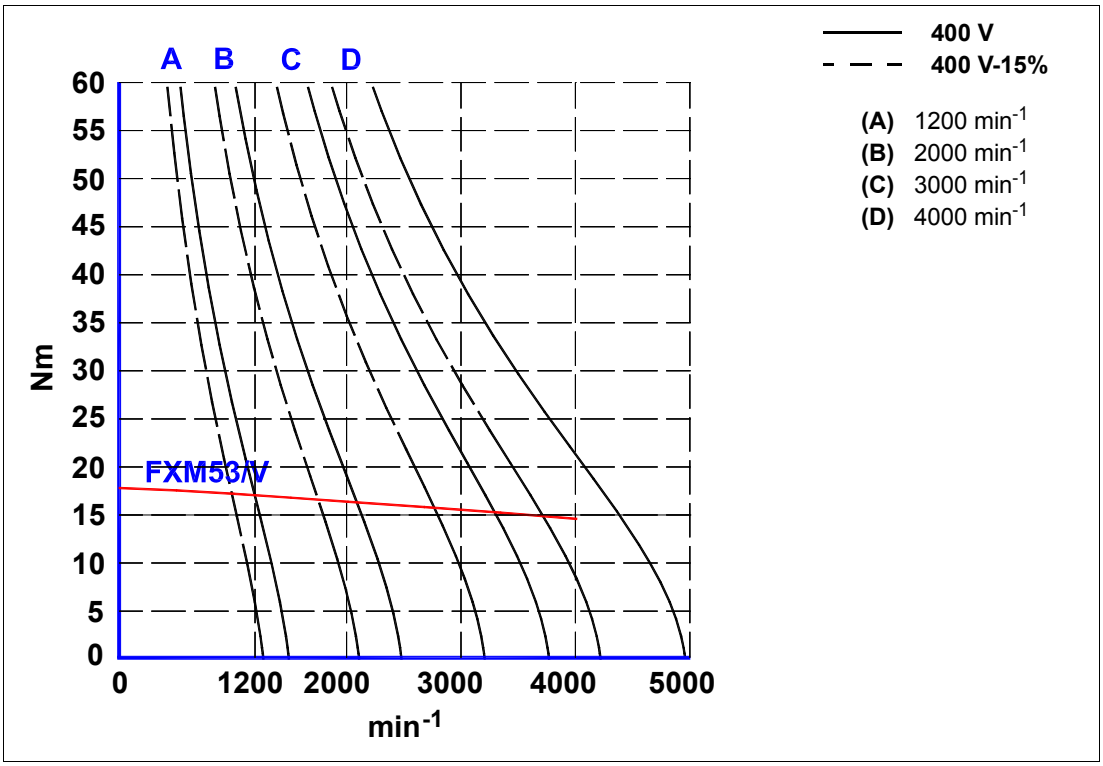
T- 2/42 Technical data of FXM53.●●A.□□.□□1.1 motors.

Model			**FXM53.●●A.□□.□□1.1**			
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	Arms	4.2	7.0	10.6	14.0
Peak current	Imax	Arms	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/Arms	4.2	2.5	1.7	1.3
Acceleration time	tac	ms	4.7	7.8	11.7	15.6
Inductance per phase (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·cm²	22.0	22.0	22.0	22.0
Inertia (with brake)	J*	kg·cm²	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

T- 2/43 Selection of FAGOR drives for FXM53.●●A.□□.□□1.1 motors.

Drive peak torque in Nm	**1.15**		**1.25**		**1.35**		**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-xxH, MCS-xxH or MCP-xxH drives has not been considered.



F- 2/31

Torque-speed graphs. FXM53.●●A.□□.□□1.1 models.

FXM54 series

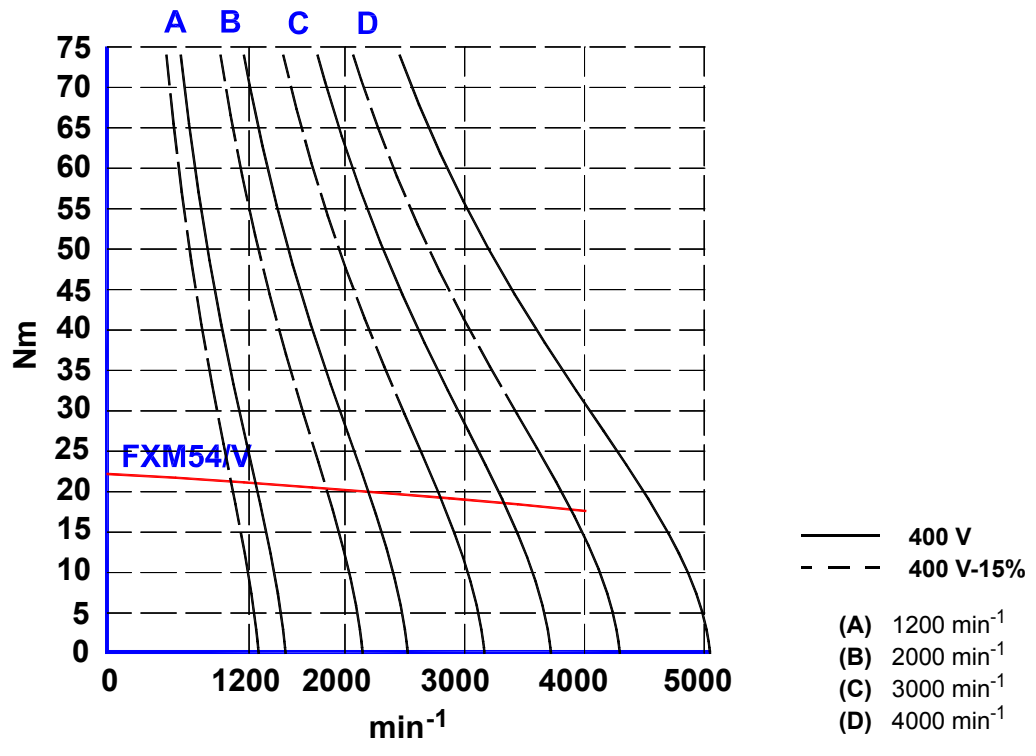
T- 2/44 Technical data of FXM54.●●A.□□.□□1.1 motors.

Model			**FXM54.●●A.□□.□□1.1**			
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	Arms	5.3	8.9	13.1	17.7
Peak current	Imax	Arms	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/Arms	4.2	2.5	1.7	1.3
Acceleration time	tac	ms	4.9	8.2	12.3	16.4
Inductance per phase (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·cm²	29.0	29.0	29.0	29.0
Inertia (with brake)	J*	kg·cm²	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.□□.□□1.1 motors.

Drive peak torque in Nm	**1.15**		**1.25**		**1.35**		**2.50**		**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	-	-	-	-	-	-	61.1	2.7	**74.0**	**3.3**		

NOTE. Controlling ventilated motors with ACSD-xxH, MCS-xxH or MCP-xxH drives has not been considered.



F- 2/32

Torque-speed graphs. FXM54.●●A.□□.□□1.1 models.

FXM55 series

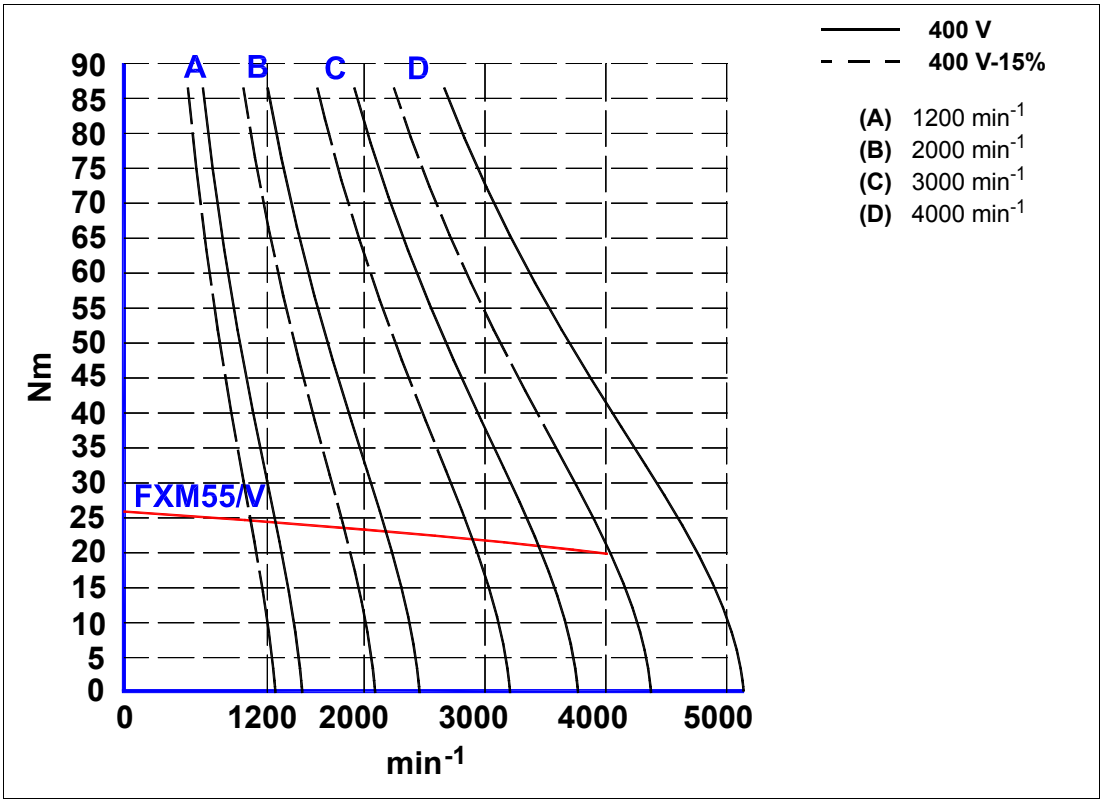
T- 2/46 Technical data of FXM55.●●A.□□.□□1.1 motors.

Model			**FXM55.●●A.□□.□□1.1**			
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	Arms	6.1	10.1	15.4	21.1
Peak current	Imax	Arms	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/Arms	4.2	2.6	1.7	1.2
Acceleration time	tac	ms	5.3	8.8	13.2	17.5
Inductance per phase (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·cm²	36.0	36.0	36.0	36.0
Inertia (with brake)	J*	kg·cm²	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.□□.□□1.1 motors.

Drive peak torque in Nm	**1.15**		**1.25**		**1.35**		**2.50**		**2.75**		**3.100**	
	Mp	Mp/Mo	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	79.9	3.1	**86.0**	**3.3**	-	-
FXM55.40A	-	-	-	-	-	-	56.4	2.1	75.6	2.9	**86.0**	**3.3**

NOTE. Controlling ventilated motors with ACSD-xxH, MCS-xxH or MCP-xxH drives has not been considered.



F- 2/33

Torque-speed graphs. FXM55.●●A.□□.□□1.1 models.

FXM73 series

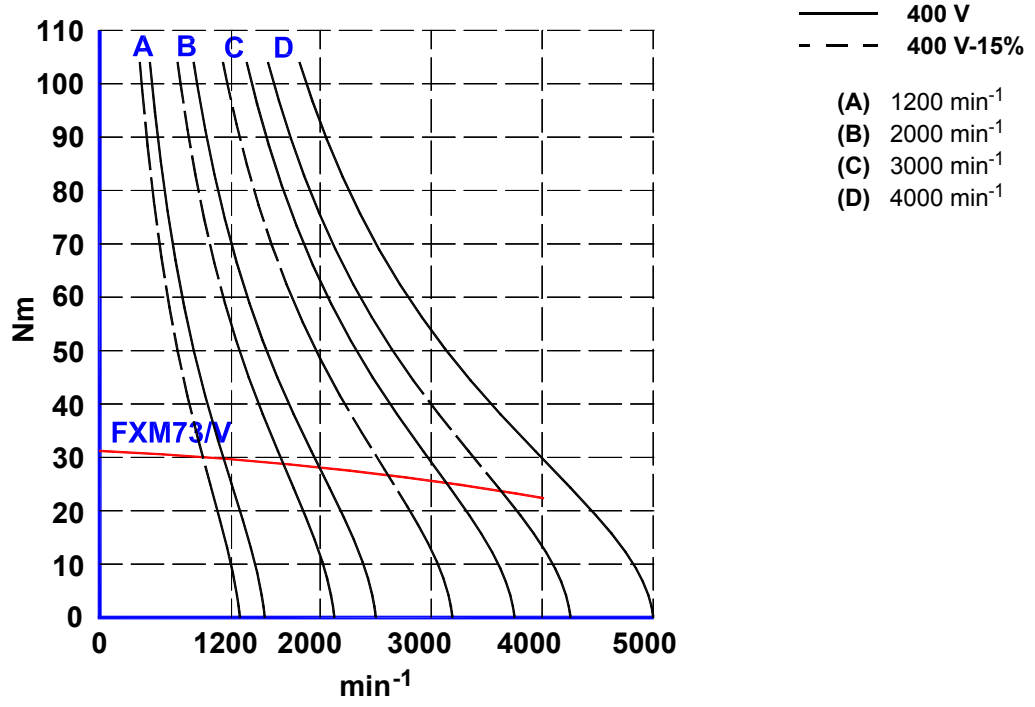
T- 2/48 Technical data of FXM73.●●A.□□.□□1.1 motors.

Model			**FXM73.●●A.□□.□□1.1**			
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	Arms	7.4	12.3	18.5	24.7
Peak current	Imax	Arms	25	41	62	82
Calculation power	Pcal	kW	3.9	6.5	9.8	13.1
Rated power	Pn	kW	3.7	5.9	8.0	9.4
Torque constant	Kt	N·m/Arms	4.2	2.5	1.7	1.3
Acceleration time	tac	ms	7.4	12.3	18.4	25.0
Inductance per phase (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·cm²	61.0	61.0	61.0	61.0
Inertia (with brake)	J*	kg·cm²	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.□□.□□1.1 motors.

Drive peak torque in Nm	**1.15**		**1.25**		**1.35**		**2.50**		**2.75**		**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	-	-	-	-	-	-	73.1	2.3	**104.0**	**3.3**	-	-
FXM73.40A	-	-	-	-	-	-	-	-	81.9	2.6	**104.0**	**3.3**

NOTE. Controlling ventilated motors with ACSD-xxH, MCS-xxH or MCP-xxH drives has not been considered.



F- 2/34

Torque-speed graphs. FXM73.●●A.□□.□□1.1 models.

FXM74 series

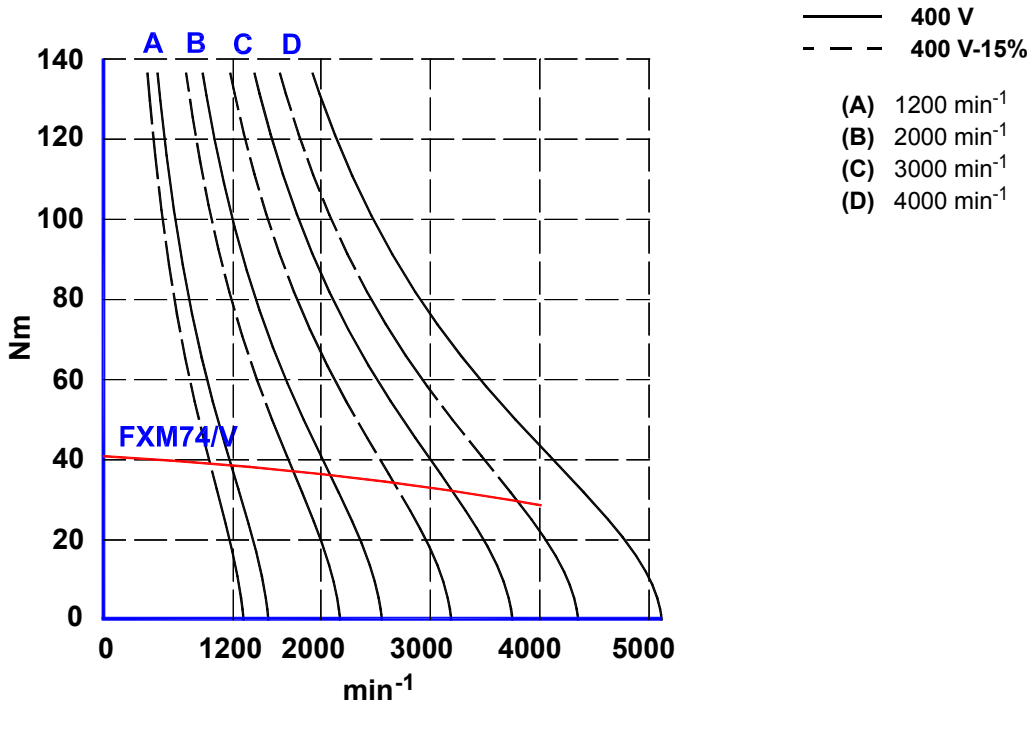
T- 2/50 Technical data of FXM74.●●A.□□.□□1.1 motors.

Model			**FXM74.●●A.□□.□□1.1**			
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	Arms	9.8	16.5	24.3	33.1
Peak current	Imax	Arms	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/Arms	4.2	2.5	1.7	1.2
Acceleration time	tac	ms	7.4	12.3	18.4	25.0
Inductance per phase (3-phase)	L	mH	33	12	5.4	2.9
Resistance per phase	R	Ω	1.9	0.68	0.31	0.17
Inertia (without brake)	J	kg·cm²	79.0	79.0	79.0	79.0
Inertia (with brake)	J*	kg·cm²	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

T- 2/51 Selection of FAGOR drives for FXM74.●●A.□□.□□1.1 motors.

Drive peak torque in Nm	**1.25**		**1.35**		**2.50**		**2.75**		**3.100**		**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	117.5	2.8	**135.0**	**3.3**	-	-	-	-
FXM74.30A	-	-	-	-	79.9	1.9	107.1	2.6	**135.0**	**3.3**	-	-
FXM74.40A	-	-	-	-	-	-	-	-	120.0	2.9	**135.0**	**3.3**

NOTE. Controlling ventilated motors with ACSD-xxH, MCS-xxH or MCP-xxH drives has not been considered.



F- 2/35

Torque-speed graphs. FXM74.●●A.□□.□□1.1 models.

FXM75 series

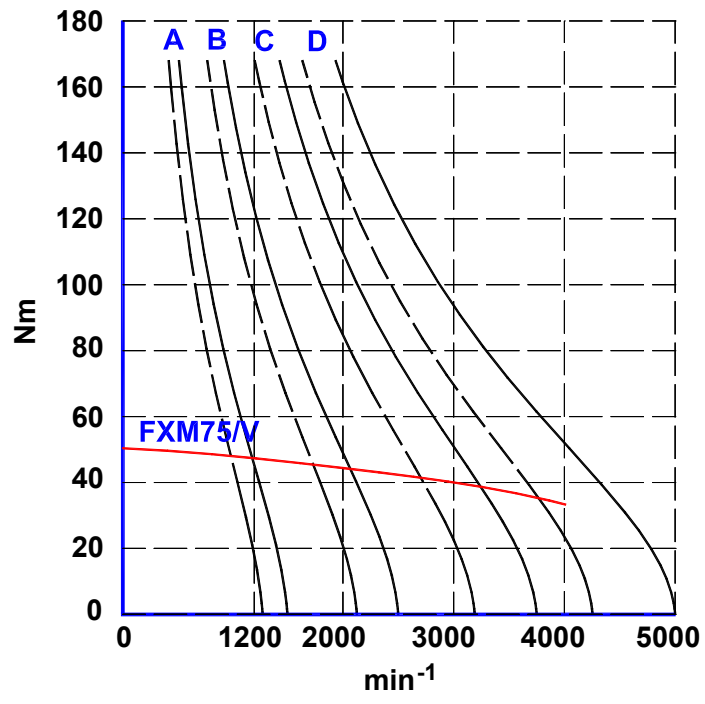
T- 2/52 Technical data of FXM75.●●A.□□.□□1.1 motors.

Model			**FXM75.●●A.□□.□□1.1**			
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	Arms	12.0	20.0	29.9	39.9
Peak current	Imax	Arms	39	65	98	131
Calculation power	Pcal	kW	6.3	10.6	15.8	21.1
Rated power	Pn	kW	5.9	9.3	12.6	14.4
Torque constant	Kt	N·m/Arms	4.2	2.5	1.7	1.3
Acceleration time	tac	ms	7.4	12.3	18.5	25.0
Inductance per phase (3-phase)	L	mH	27.0	9.7	4.3	2.4
Resistance per phase	R	Ω	1.45	0.515	0.23	0.125
Inertia (without brake)	J	kg·cm²	97.0	97.0	97.0	97.0
Inertia (with brake)	J*	kg·cm²	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.□□.□□1.1 motors.

Drive peak torque in Nm	**1.25**		**1.35**		**2.50**		**2.75**		**3.100**		**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	-	-	-	-	117.5	2.3	157.5	3.1	**165.0**	**3.2**	-	-
FXM75.30A	-	-	-	-	-	-	107.1	2.1	**165.0**	**3.2**	-	-
FXM75.40A	-	-	-	-	-	-	-	-	130.0	2.5	161.2	3.1

NOTE. Controlling ventilated motors with ACSD-xxH, MCS-xxH or MCP-xxH drives has not been considered.



F- 2/36

Torque-speed graphs. FXM75.●●A.□□.□□1.1 models.

FXM76 series

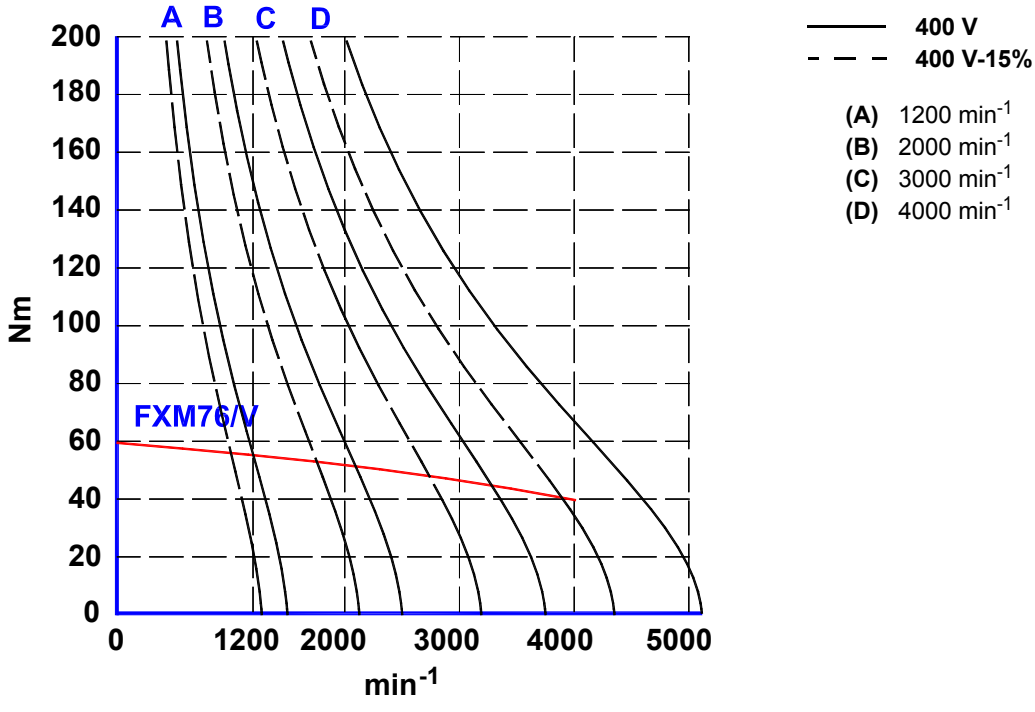
T- 2/54 Technical data of FXM76.●●A.□□.□□1.1 motors.

Model			**FXM76.●●A.□□.□□1.1**			
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	Arms	14.1	23.5	35.3	48.2
Peak current	Imax	Arms	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/Arms	4.2	2.5	1.7	1.2
Acceleration time	tac	ms	7.4	12.4	18.5	25.0
Inductance per phase (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·cm²	115	115	115	115
Inertia (with brake)	J*	kg·cm²	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.□□.□□1.1 motors.

Drive peak torque in Nm	**1.35**		**2.50**		**2.75**		**3.100**		**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	-	-	117.5	2.0	157.5	2.6	**195.0**	**3.2**	-	-		
FXM76.30A	-	-	-	-	-	-	170.0	2.8	**195.0**	**3.2**		
FXM76.40A	-	-	-	-	-	-	120.0	2.0	148.8	2.5		

NOTE. Controlling ventilated motors with ACSD-xxH, MCS-xxH or MCP-xxH drives has not been considered.



F- 2/37

Torque-speed graphs. FXM76.●●A.□□.□□1.1 models.

FXM77 series

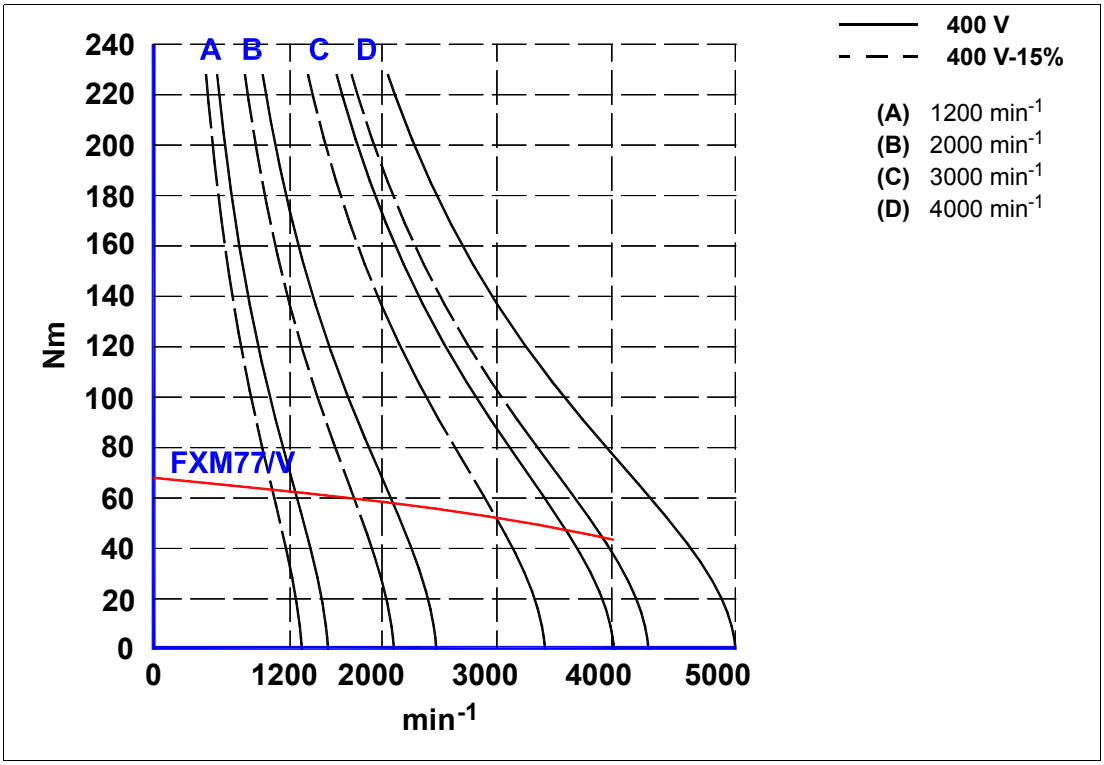
T- 2/56 Technical data of FXM77.●●A.□□.□□1.1 motors.

Model			**FXM77.●●A.□□.□□1.1**			
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	Arms	16.6	26.8	43.5	55.0
Peak current	Imax	Arms	55	88	143	181
Calculation power	Pcal	kW	8.6	14.3	21.5	28.6
Rated power	Pn	kW	7.9	12.3	16.5	18.6
Torque constant	Kt	N·m/Arms	4.1	2.6	1.6	1.2
Acceleration time	tac	ms	7.4	12.4	18.6	25.0
Inductance per phase (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·cm²	133	133	133	133
Inertia (with brake)	J*	kg·cm²	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.□□.□□1.1 motors.

Drive peak torque in Nm	**1.35**		**2.50**		**2.75**		**3.100**		**3.150**			
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo		
FXM77.12A	143.5	2.1	192.7	2.8	**225.0**	**3.2**	-	-	-	-		
FXM77.20A	-	-	-	-	163.8	2.4	**225.0**	**3.2**	-	-		
FXM77.30A	-	-	-	-	-	-	160	2.3	198.4	2.9		
FXM77.40A	-	-	-	-	-	-	-	-	148.8	2.1		

NOTE. Controlling ventilated motors with ACSD-xxH, MCS-xxH or MCP-xxH drives has not been considered.



F- 2/38

Torque-speed graphs. FXM77.●●A.□□.□□1.1 models.

FXM78 series

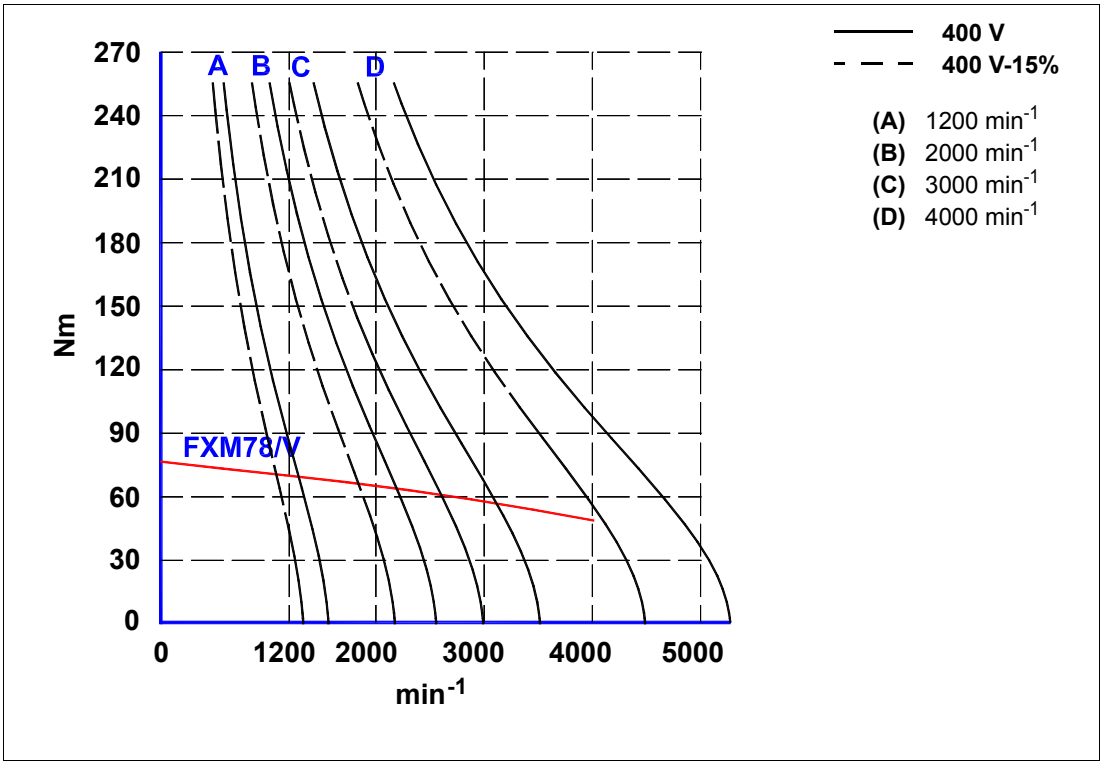
T- 2/58 Technical data of FXM78.●●A.□□.□□1.1 motors.

Model			**FXM78.●●A.□□.□□1.1**			
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	Arms	19	31	42.6	63.9
Peak current	Imax	Arms	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/Arms	4.0	2.5	1.8	1.2
Acceleration time	tac	ms	7.4	12.4	18.6	25.0
Inductance per phase (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·cm²	151	151	151	151
Inertia (with brake)	J*	kg·cm²	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

T- 2/59 Selection of FAGOR drives for FXM78.●●A.□□.□□1.1 motors.

Drive peak torque in Nm	**2.50**		**2.75**		**3.100**		**3.150**					
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo				
FXM78.12A	188.0	2.4	252.0	3.2	**255.0**	**3.3**	-	-				
FXM78.20A	-	-	157.5	2.0	250.0	3.2	**255.0**	**3.3**				
FXM78.30A	-	-	-	-	180.0	2.3	223.2	2.9				
FXM78.40A	-	-	-	-	-	-	148.8	2.0				

NOTE. Controlling ventilated motors with ACSD-xxH, MCS-xxH or MCP-xxH drives has not been considered.



F- 2/39

Torque-speed graphs. FXM78.●● A.□□.□□1.1 models.

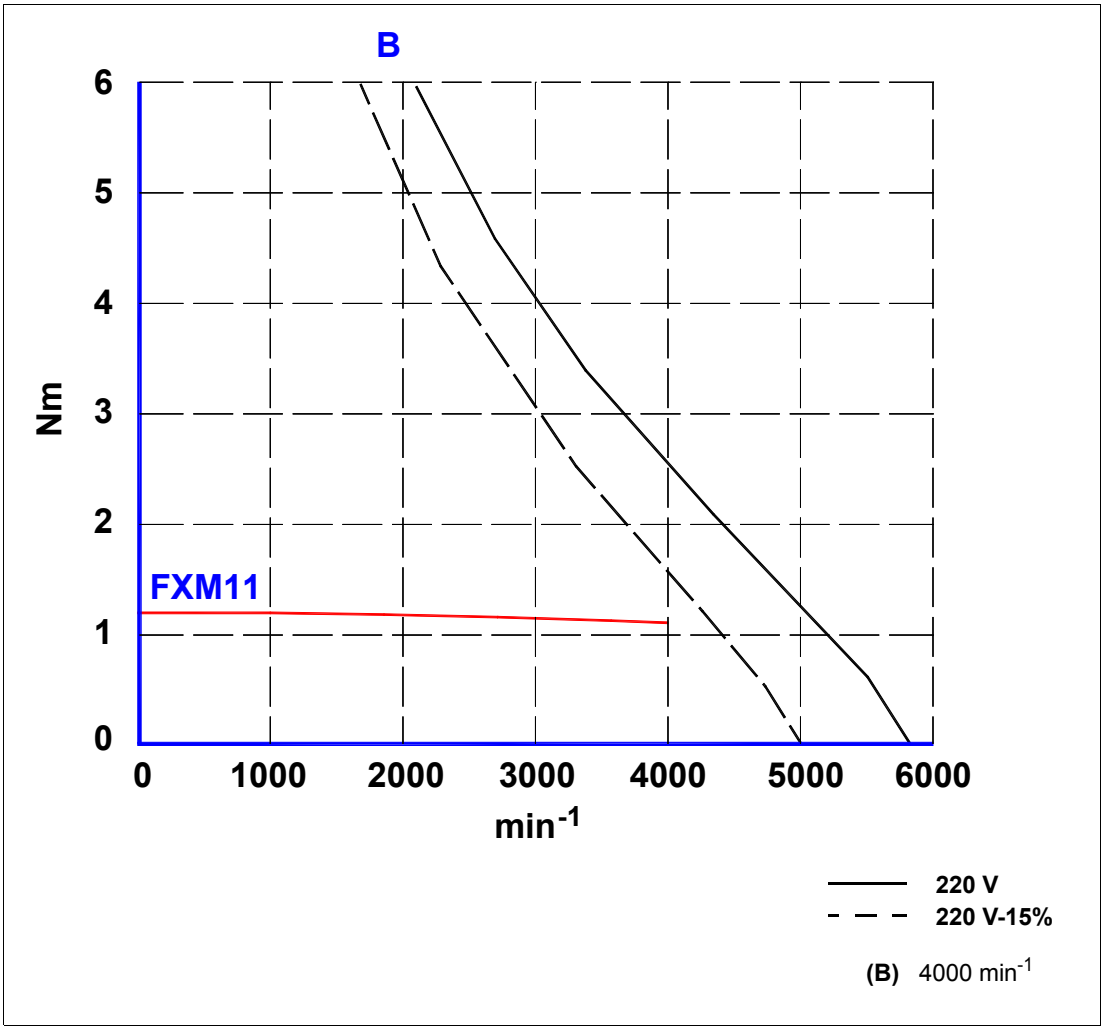
Non-ventilated FXM with “F” winding (220 V AC)

FXM11 series

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

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	Arms				2.0
Peak current	Imax	Arms				10.1
Calculation power	Pcal	kW				0.5
Rated power	Pn	kW				0.5
Torque constant	Kt	N·m/Arms				0.6
Acceleration time	tac	ms				8.4
Inductance per phase (3-phase)	L	mH				12
Resistance per phase	R	Ω				4.6
Inertia (without brake)	J	kg·cm²				1.2
Inertia (with brake)	J*	kg·cm²				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-xxL, MCS-xxL or MCP-xxL series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.



F- 2/40

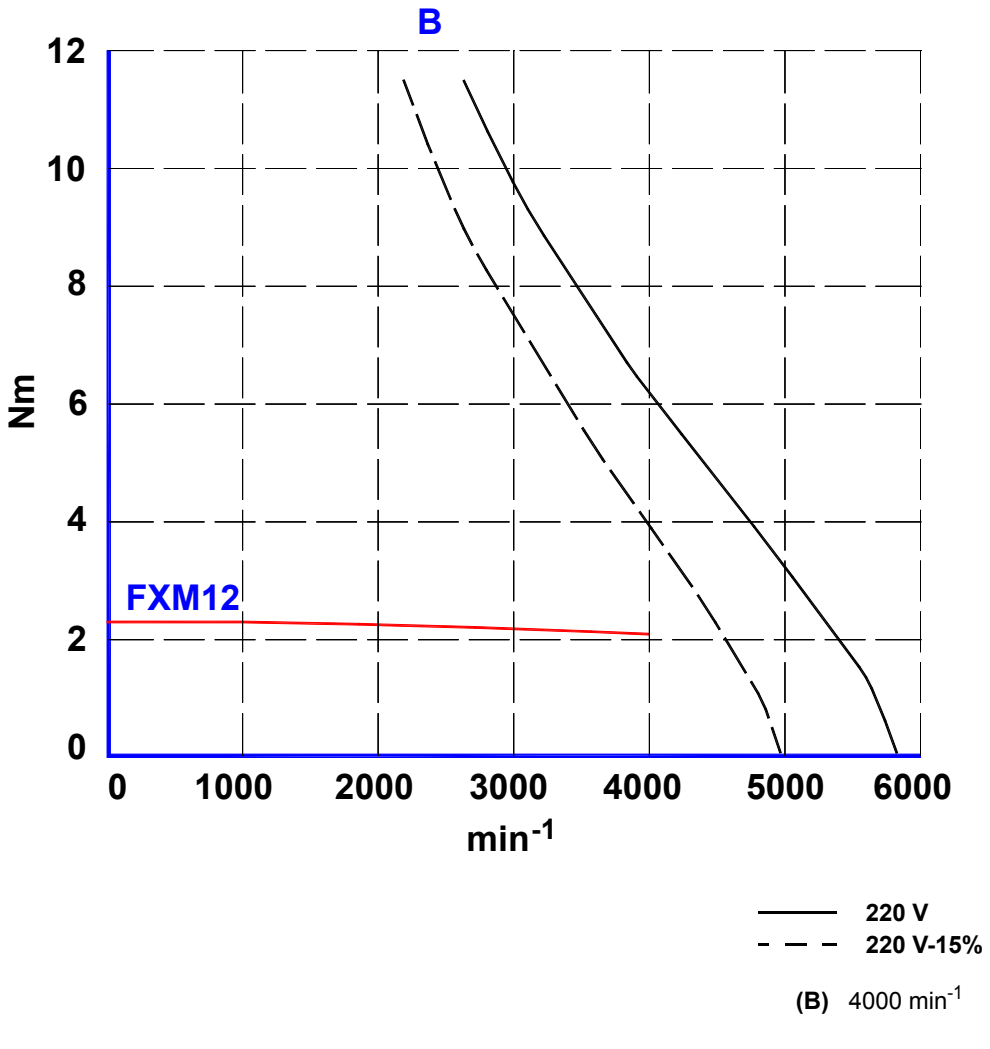
Torque-speed graphs. FXM11.●●F.□□.□□0 models.

FXM12 series

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	Arms				3.9
Peak current	Imax	Arms				19.3
Calculation power	Pcal	kW				1.0
Rated power	Pn	kW				0.8
Torque constant	Kt	N·m/Arms				0.6
Acceleration time	tac	ms				7.2
Inductance per phase (3-phase)	L	mH				5.5
Resistance per phase	R	Ω				1.45
Inertia (without brake)	J	kg·cm²				1.9
Inertia (with brake)	J*	kg·cm²				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-xxL, MCS-xxL or MCP-xxL series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.



F- 2/41

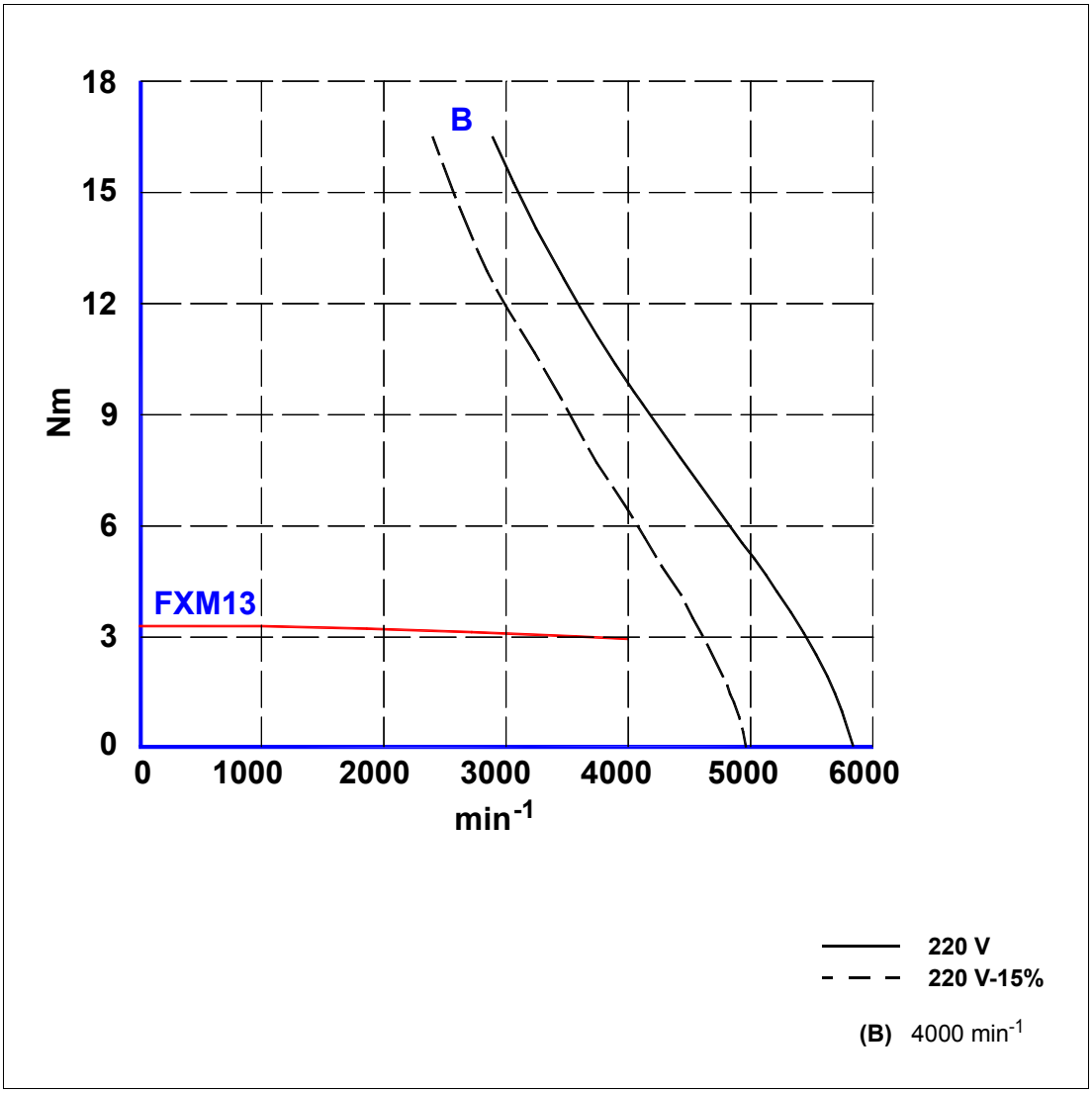
Torque-speed graphs. FXM12.●● F.□□.□□0 models.

FXM13 series

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

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	Arms				5.6
Peak current	Imax	Arms				28
Calculation power	Pcal	kW				1.4
Rated power	Pn	kW				1.2
Torque constant	Kt	N·m/Arms				0.6
Acceleration time	tac	ms				6.8
Inductance per phase (3-phase)	L	mH				3.5
Resistance per phase	R	Ω				0.8
Inertia (without brake)	J	kg·cm²				2.6
Inertia (with brake)	J*	kg·cm²				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-xxL, MCS-xxL or MCP-xxL series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.



F- 2/42

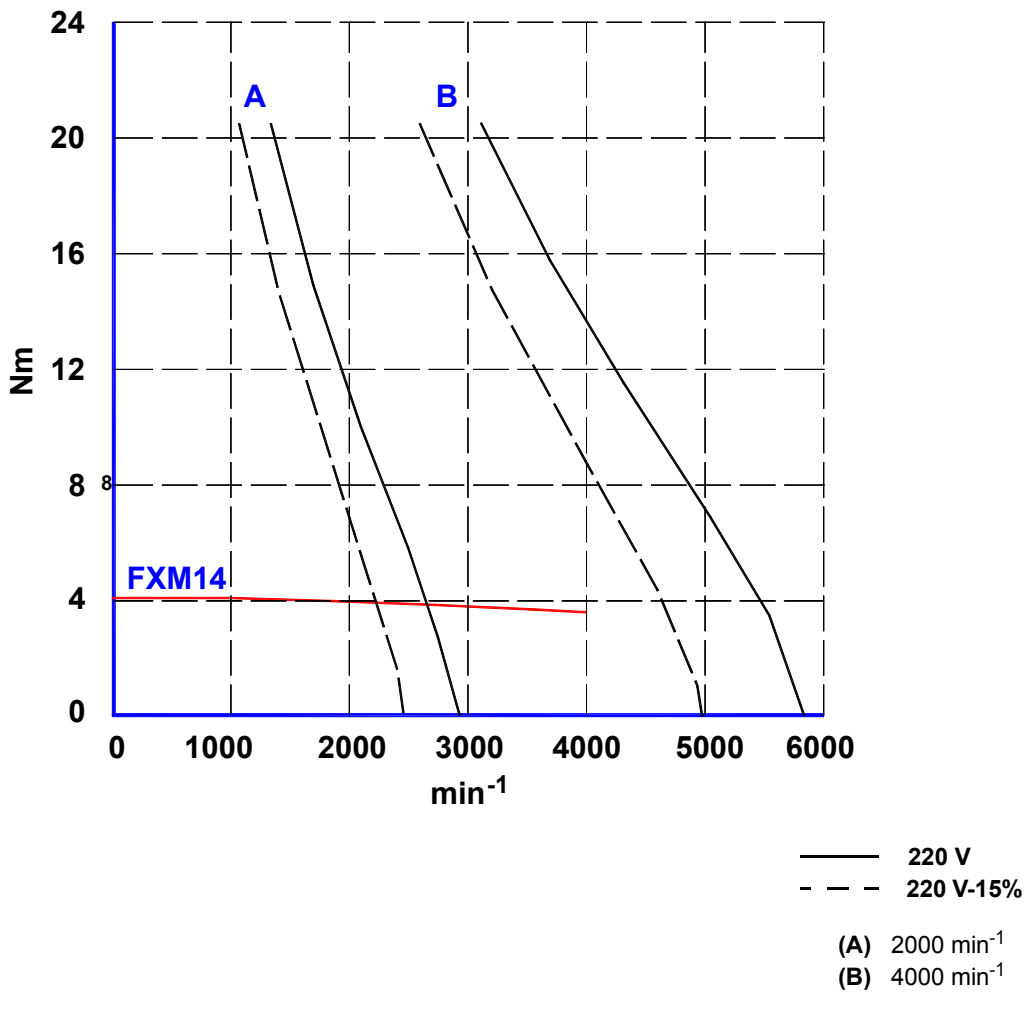
Torque-speed graphs. FXM13.●● F.□□.□□0 models.

FXM14 series

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	Arms		3.5		6.9
Peak current	Imax	Arms		17.2		34
Calculation power	Pcal	kW		0.9		1.7
Rated power	Pn	kW		0.8		1.5
Torque constant	Kt	N·m/Arms		1.2		0.6
Acceleration time	tac	ms		3.5		6.9
Inductance per phase (3-phase)	L	mH		10.0		2.6
Resistance per phase	R	Ω		2.30		0.55
Inertia (without brake)	J	kg·cm²		3.3		3.3
Inertia (with brake)	J*	kg·cm²		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-xxL, MCS-xxL or MCP-xxL series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.



F- 2/43

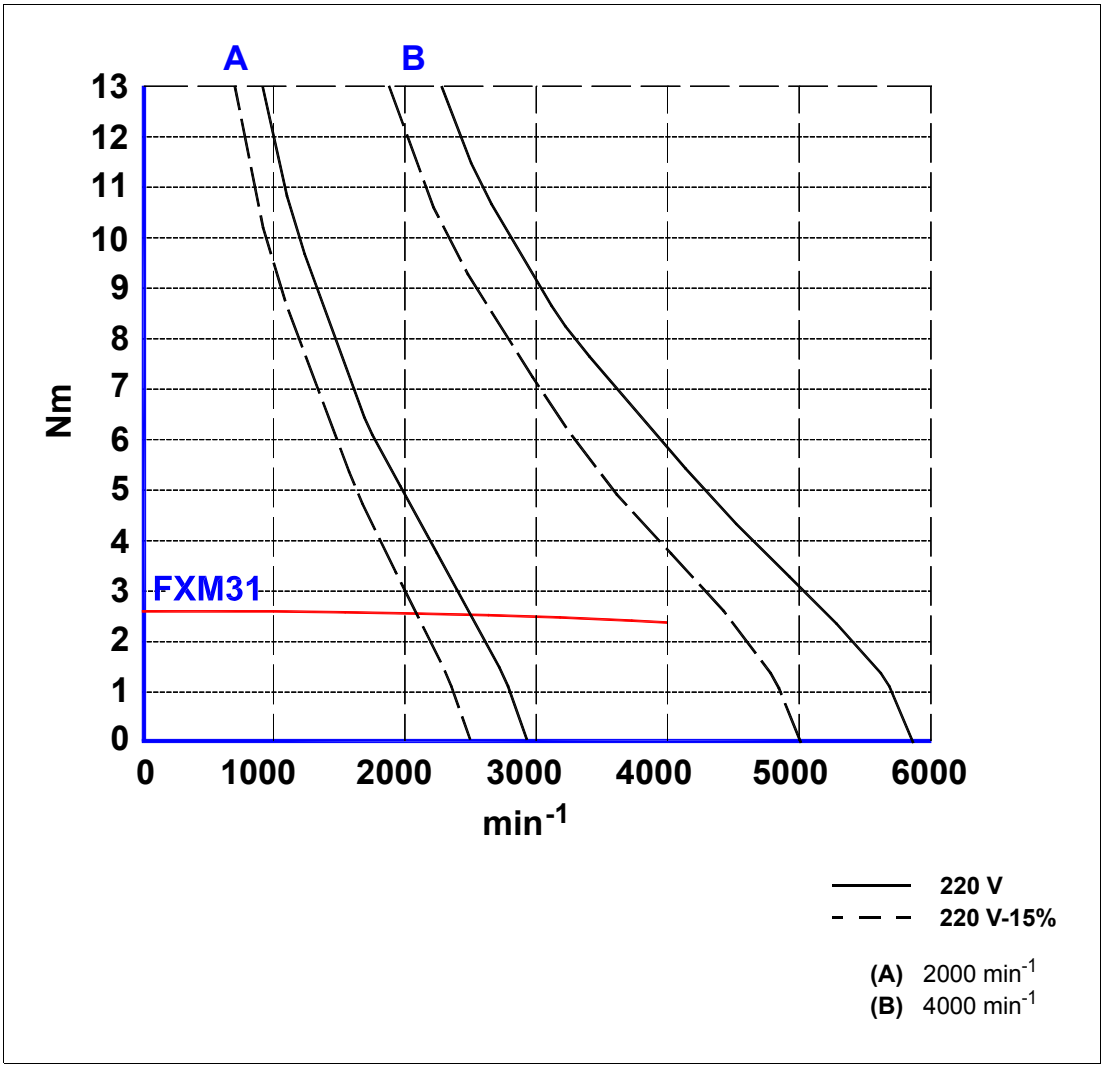
Torque-speed graphs. FXM14.●● F.□□.□□0 models.

FXM31 series

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

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	Arms		2.2		4.4
Peak current	Imax	Arms		11		22
Calculation power	Pcal	kW		0.5		1.1
Rated power	Pn	kW		0.5		1.0
Torque constant	Kt	N·m/Arms		1.2		0.6
Acceleration time	tac	ms		5.6		11.3
Inductance per phase (3-phase)	L	mH		24		6.1
Resistance per phase	R	Ω		5.05		1.25
Inertia (without brake)	J	kg·cm²		3.5		3.5
Inertia (with brake)	J*	kg·cm²		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-xxL, MCS-xxL or MCP-xxL series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.



F- 2/44

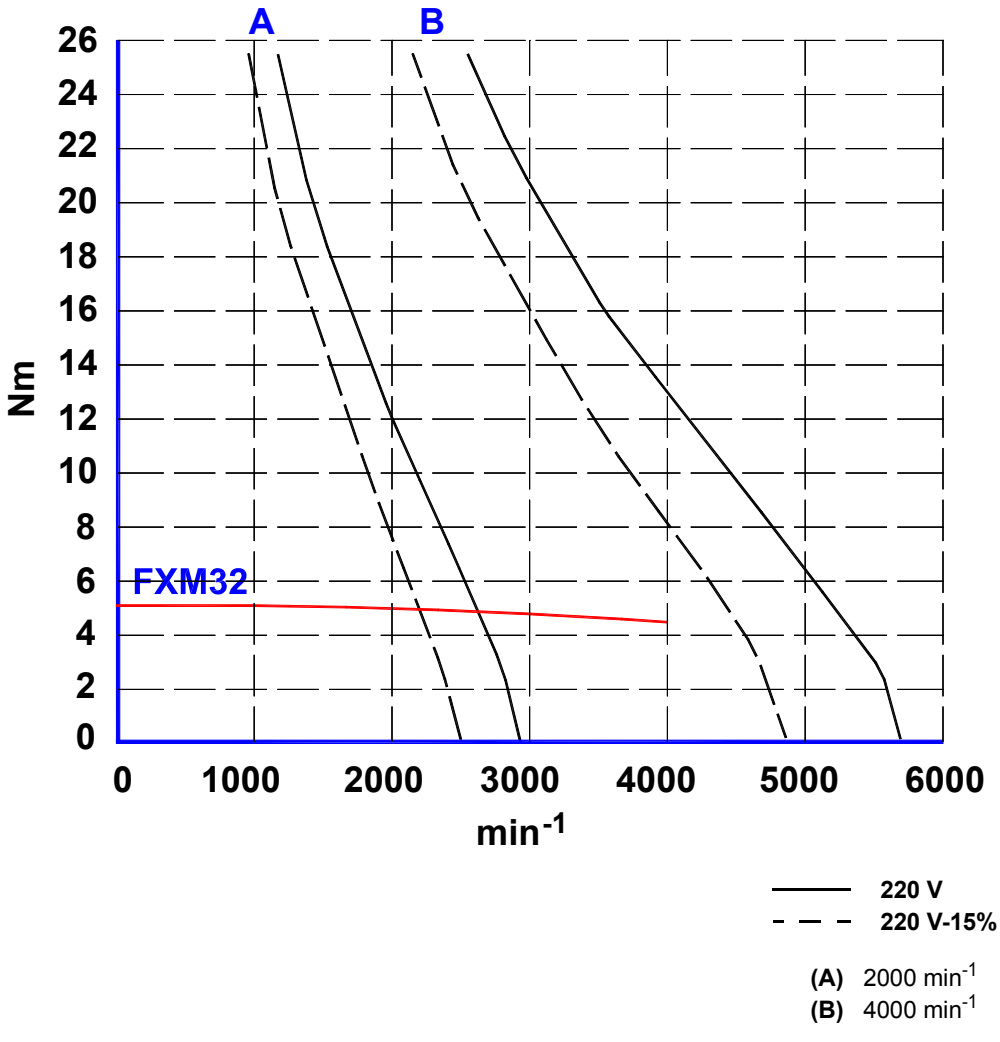
Torque-speed graphs. FXM31.●● F.□□.□□0 models.

FXM32 series

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	Arms		4.3		8.4
Peak current	Imax	Arms		22		42
Calculation power	Pcal	kW		1.1		2.1
Rated power	Pn	kW		1.0		1.8
Torque constant	Kt	N·m/Arms		1.2		0.6
Acceleration time	tac	ms		5.0		10.1
Inductance per phase (3-phase)	L	mH		11		2.9
Resistance per phase	R	Ω		1.65		0.44
Inertia (without brake)	J	kg·cm²		6		6
Inertia (with brake)	J*	kg·cm²		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-xxL, MCS-xxL or MCP-xxL series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.



F- 2/45

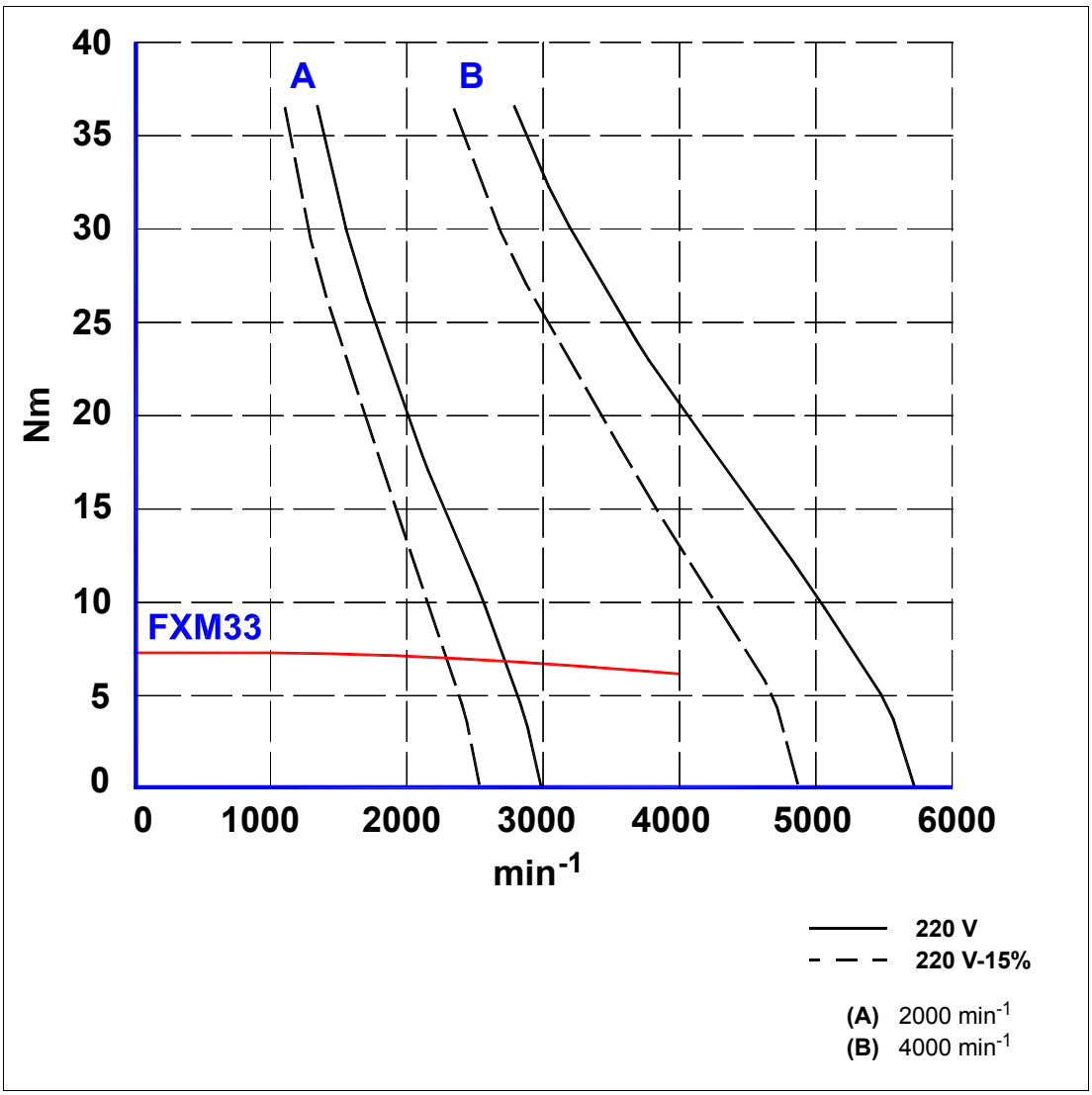
Torque-speed graphs. FXM32.●● F.□□.□□0 models.

FXM33 series

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	Arms		6.3		12
Peak current	Imax	Arms		31		60
Calculation power	Pcal	kW		1.5		3.1
Rated power	Pn	kW		1.4		2.5
Torque constant	Kt	N·m/Arms		1.2		0.6
Acceleration time	tac	ms		4.9		9.9
Inductance per phase (3-phase)	L	mH		6.7		1.8
Resistance per phase	R	Ω		0.9		0.245
Inertia (without brake)	J	kg·cm²		8.5		8.5
Inertia (with brake)	J*	kg·cm²		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-xxL, MCS-xxL or MCP-xxL series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.



F- 2/46

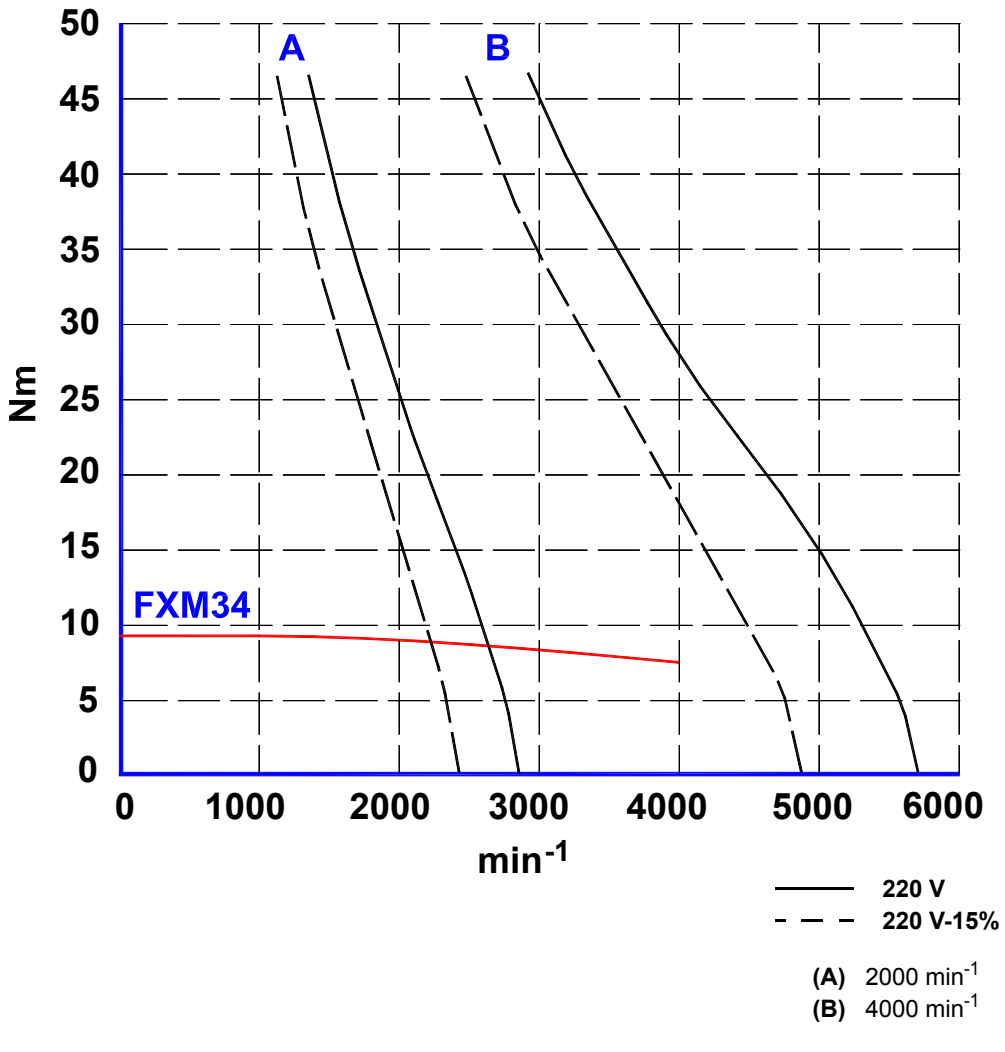
Torque-speed graphs. FXM33.●● F.□□.□□0 models.

FXM34 series

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	Arms		7.6		15.3
Peak current	Imax	Arms		38		76
Calculation power	Pcal	kW		1.9		3.9
Rated power	Pn	kW		1.9		3.2
Torque constant	Kt	N·m/Arms		1.2		0.6
Acceleration time	tac	ms		5		10
Inductance per phase (3-phase)	L	mH		5.3		1.3
Resistance per phase	R	Ω		0.65		0.17
Inertia (without brake)	J	kg·cm²		11		11
Inertia (with brake)	J*	kg·cm²		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-xxL, MCS-xxL or MCP-xxL series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.



F- 2/47

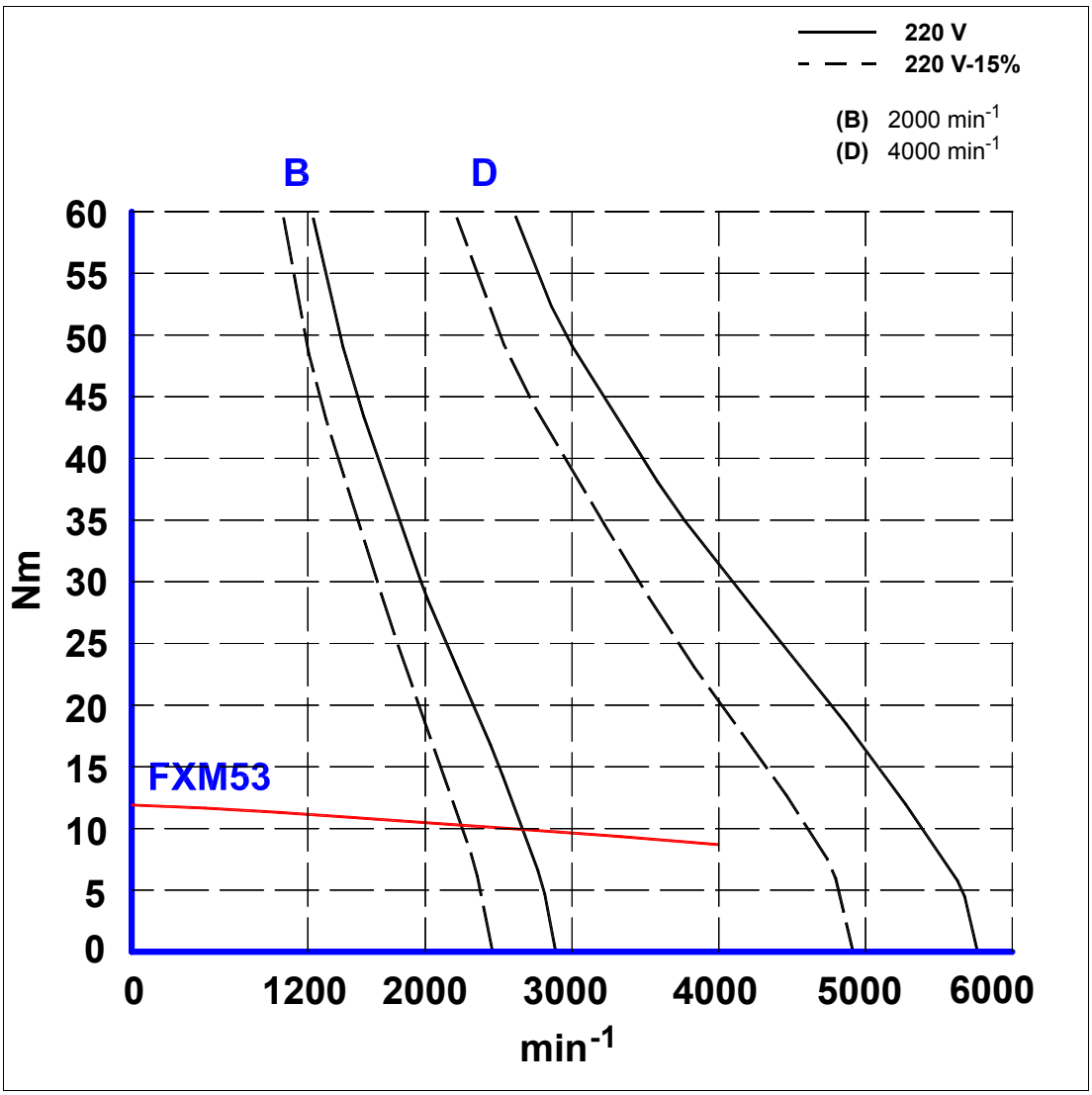
Torque-speed graphs. FXM34.●● F.□□.□□0 models.

FXM53 series

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

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	Arms		9.9	14.8	19.7
Peak current	Imax	Arms		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/Arms		1.2	0.8	0.6
Acceleration time	tac	ms		7.8	11.7	15.6
Inductance per phase (3-phase)	L	mH		5.0	2.2	1.3
Resistance per phase	R	Ω		0.445	0.20	0.11
Inertia (without brake)	J	kg·cm²		22	22	22
Inertia (with brake)	J*	kg·cm²		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-xxL, MCS-xxL or MCP-xxL series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.



F- 2/48

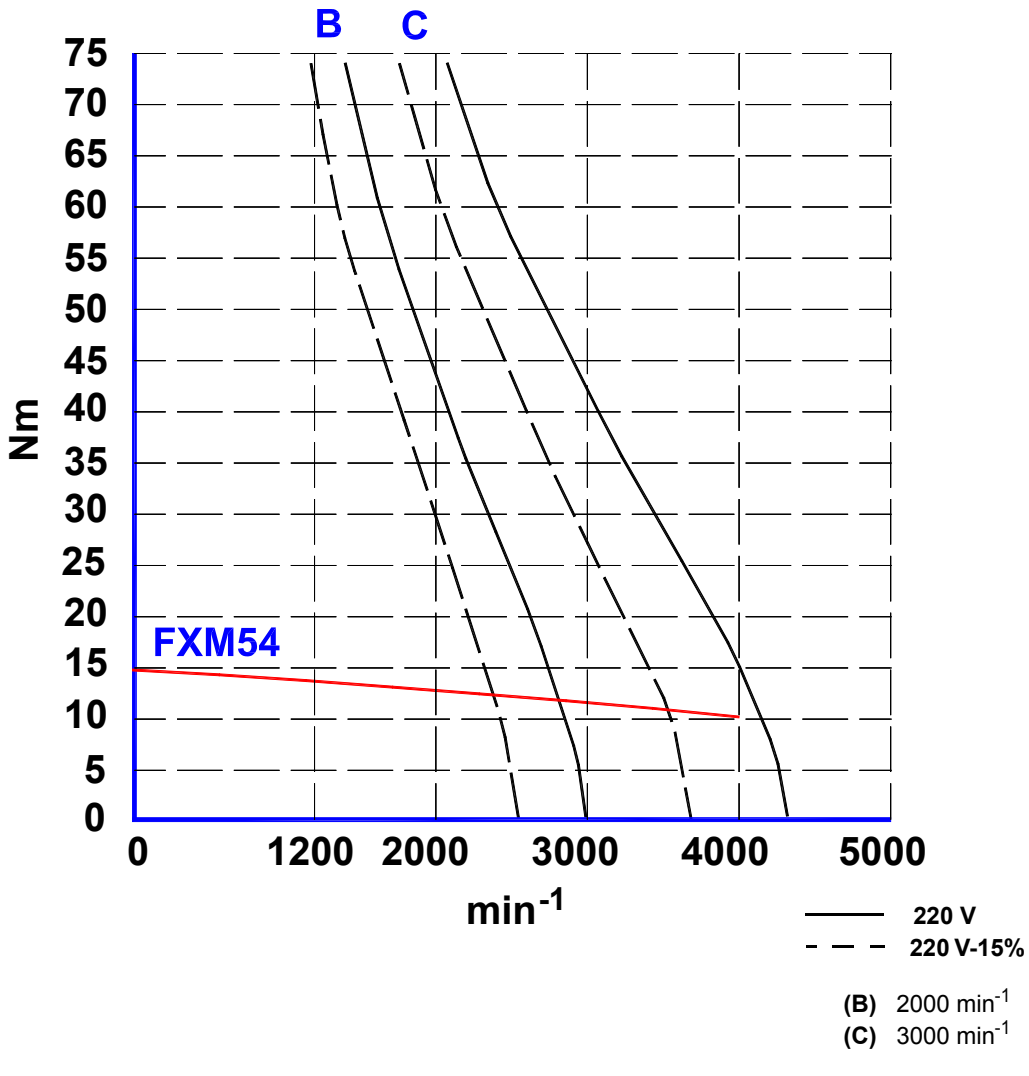
Torque-speed graphs. FXM53.●● F.□□.□□0 models.

FXM54 series

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	Arms		12.7	18.4	
Peak current	Imax	Arms		64	92	
Calculation power	Pcal	kW		3.1	4.7	
Rated power	Pn	kW		2.7	3.6	
Torque constant	Kt	N·m/Arms		1.2	0.8	
Acceleration time	tac	ms		8.2	12.3	
Inductance per phase (3-phase)	L	mH		3.4	1.6	
Resistance per phase	R	Ω		0.275	0.135	
Inertia (without brake)	J	kg·cm²		29	29	
Inertia (with brake)	J*	kg·cm²		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-xxL, MCS-xxL or MCP-xxL series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.



F- 2/49

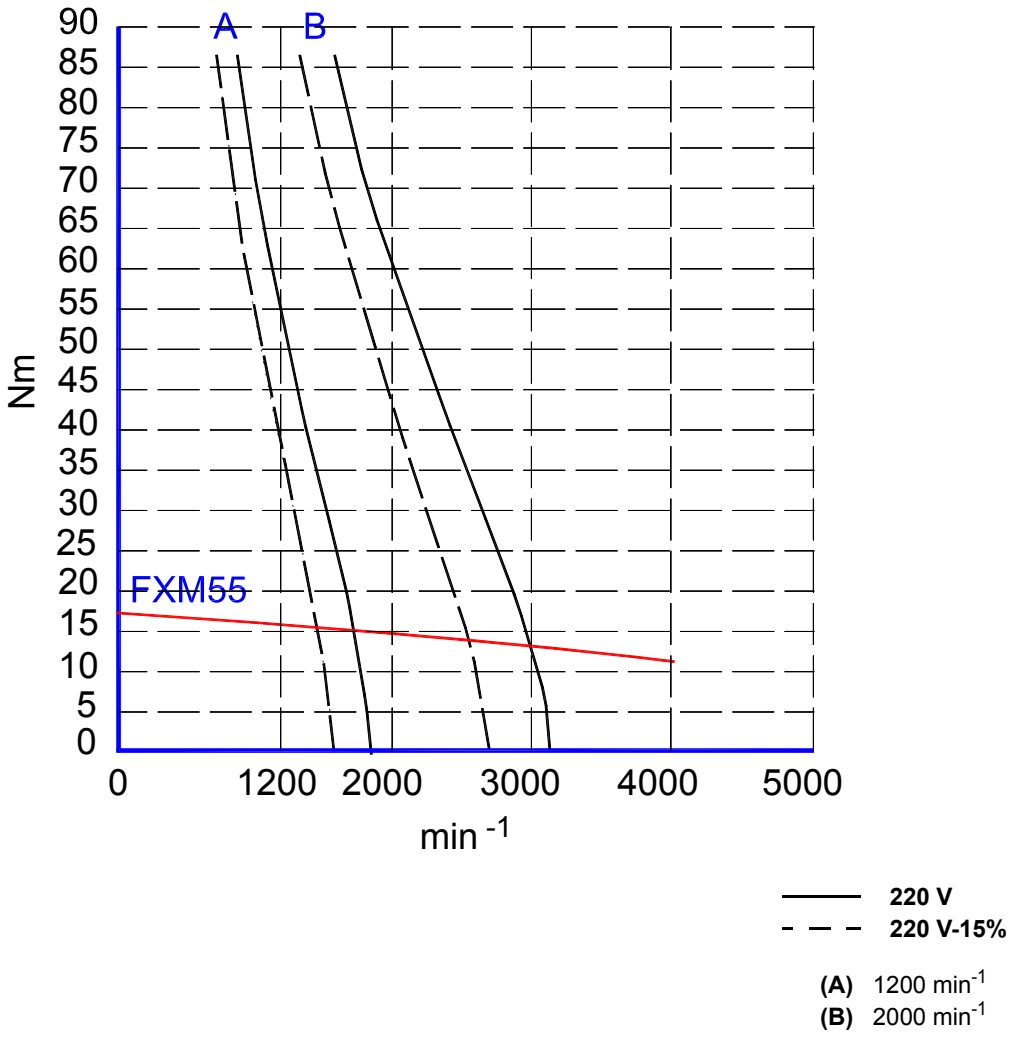
Torque-speed graphs. FXM54.●● F.□□.□□0 models.

FXM55 series

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

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	Arms	9.1	15.5		
Peak current	Imax	Arms	45	77		
Calculation power	Pcal	kW	2.2	3.6		
Rated power	Pn	kW	2.0	3.1		
Torque constant	Kt	N·m/Arms	1.9	1.1		
Acceleration time	tac	ms	5.3	8.8		
Inductance per phase (3-phase)	L	mH	7.2	2.5		
Resistance per phase	R	Ω	0.55	0.19		
Inertia (without brake)	J	kg·cm²	36.0	36.0		
Inertia (with brake)	J*	kg·cm²	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-xxL, MCS-xxL or MCP-xxL series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.



F- 2/50

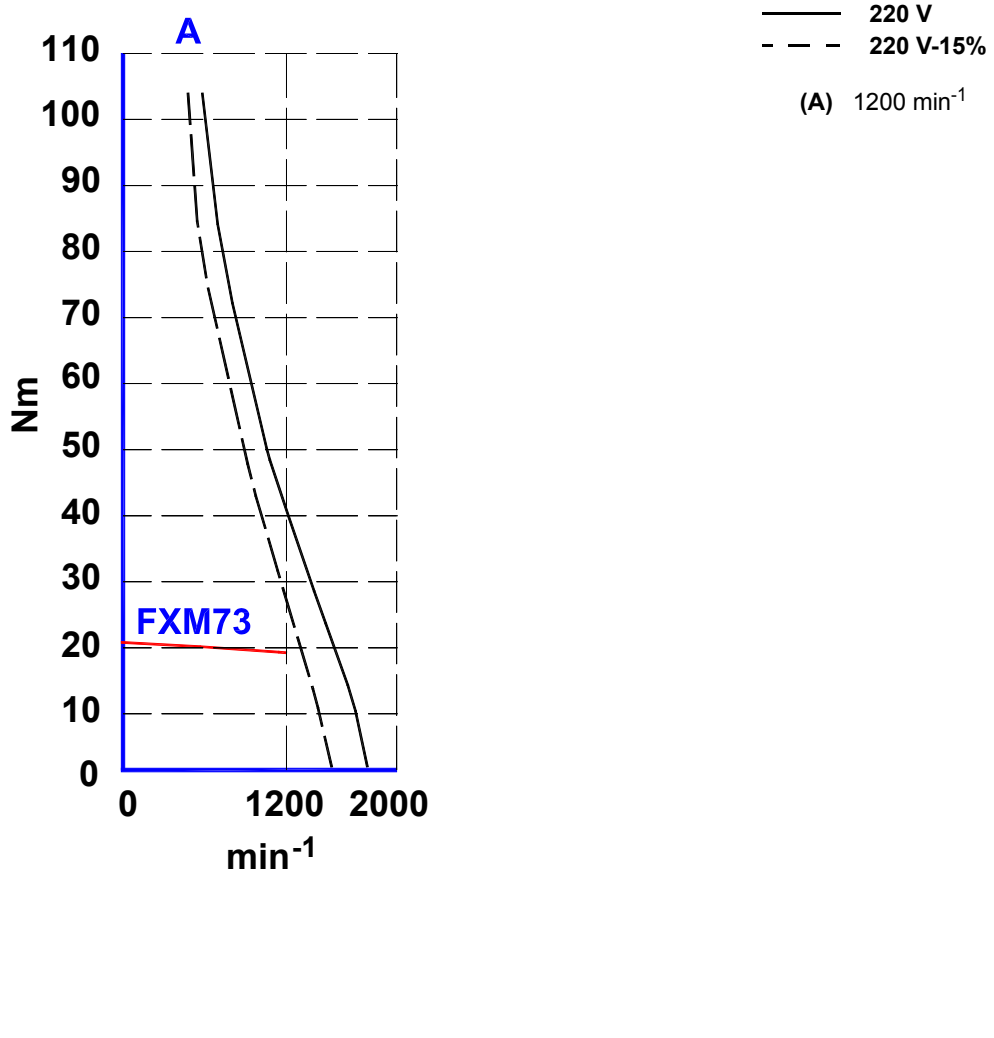
Torque-speed graphs. FXM55.●● F.□□.□□0 models.

FXM73 series

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	Arms	10.7			
Peak current	Imax	Arms	54			
Calculation power	Pcal	kW	2.6			
Rated power	Pn	kW	2.4			
Torque constant	Kt	N·m/Arms	1.9			
Acceleration time	tac	ms	7.4			
Inductance per phase (3-phase)	L	mH	9.8			
Resistance per phase	R	Ω	0.6			
Inertia (without brake)	J	kg·cm²	61.0			
Inertia (with brake)	J*	kg·cm²	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-xxL, MCS-xxL or MCP-xxL series drives. See the tables shown in the manual of the corresponding drive to select the motor-drive combination.



F- 2/51

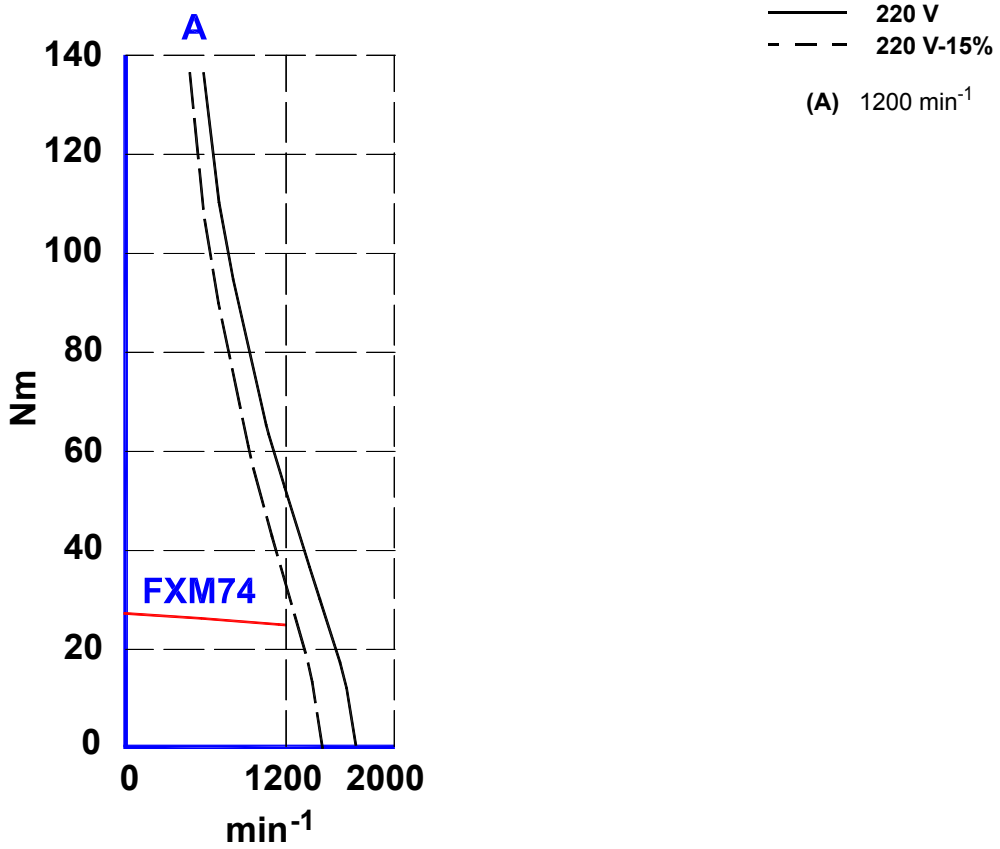
Torque-speed graphs. FXM73.●● F.□□.□□0 models.

FXM74 series

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

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	Arms	13.5			
Peak current	Imax	Arms	67			
Calculation power	Pcal	kW	3.4			
Rated power	Pn	kW	3.1			
Torque constant	Kt	N·m/Arms	2.0			
Acceleration time	tac	ms	7.4			
Inductance per phase (3-phase)	L	mH	7.8			
Resistance per phase	R	Ω	0.445			
Inertia (without brake)	J	kg·cm²	79			
Inertia (with brake)	J*	kg·cm²	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-xxL, MCS-xxL or MCP-xxL 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. FXM74.●● F.□□.□□0 models.

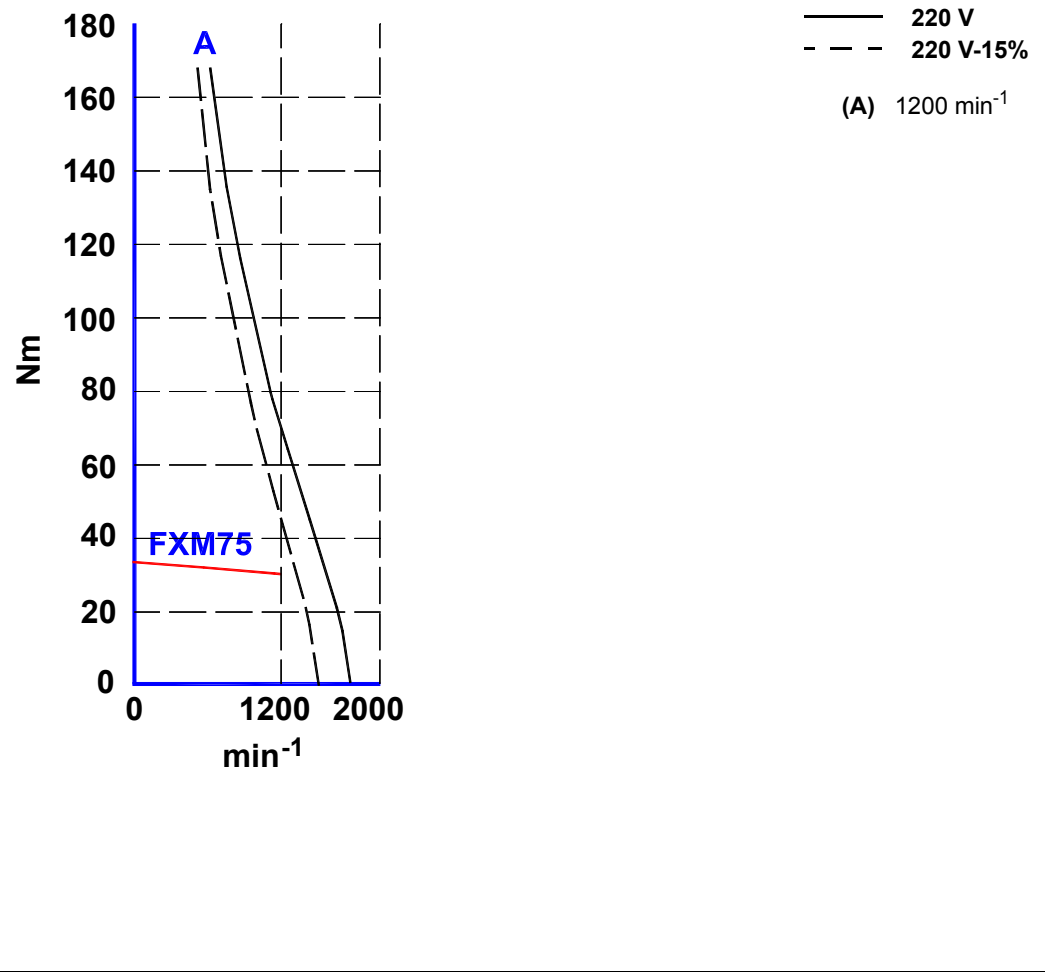
FXM75 series

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	Arms	17,1			
Peak current	Imax	Arms	85			
Calculation power	Pcal	kW	4.2			
Rated power	Pn	kW	3.7			
Torque constant	Kt	N·m/Arms	2.0			
Acceleration time	tac	ms	7.4			
Inductance per phase (3-phase)	L	mH	5.9			
Resistance per phase	R	Ω	0.31			
Inertia (without brake)	J	kg·cm²	97.0			
Inertia (with brake)	J*	kg·cm²	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 Nm, the largest FAGOR drive that can govern it can only get 29.5 Nm out of it.

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

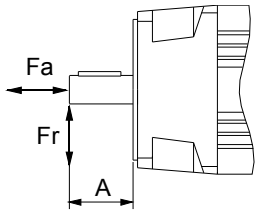


F- 2/53

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

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:



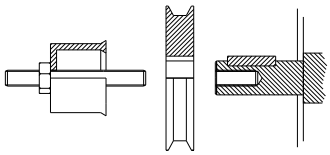
T- 2/74 Maximum values for axial and radial loads.

Series	**Axial force (Fa)**		**Radial force (Fr)**		**(A) distance**	
Units.	N	lb	N	lb	mm	inches
FXM1	105	23.6	500	112.4	15	0.59
FXM3	138	31.0	660	148.3	20	0.78
FXM5	157	35.3	745	167.4	25	0.98
FXM7	336	75.5	1590	357.4	29	1.14

Also bear in mind that:

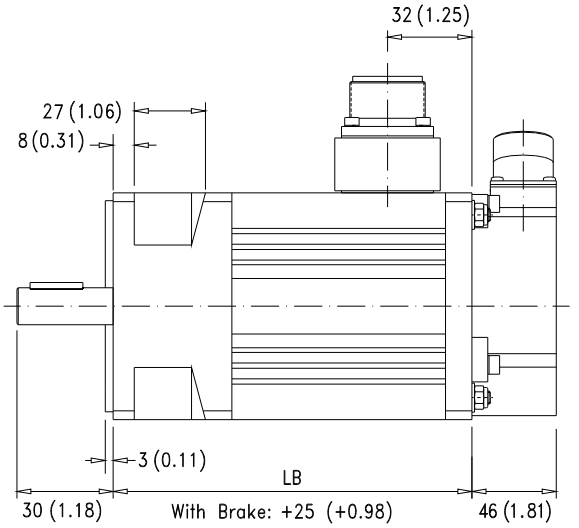
WARNING. Avoid hitting the motor and especially its shaft when installing transmission pulleys or gear boxes. These motors have extremely fragile optical and electronic components.

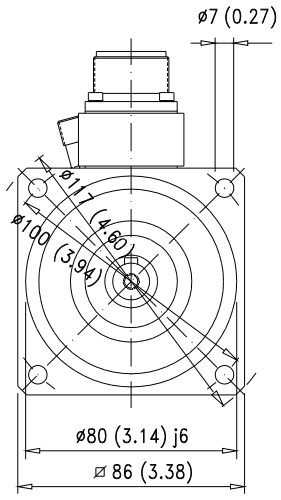
Use some tool that is supported in the threaded hole on the shaft to insert the pulley or the gear !



2.11 Dimensions

FXM1 series





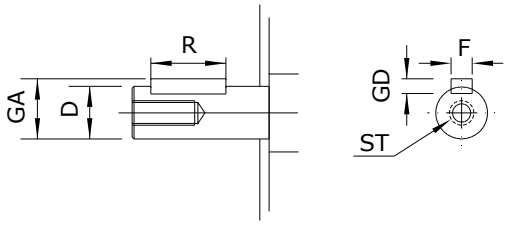
Dimension	LB	
Units	mm	inches
FXM11	136	5.35
FXM12	171	6.70
FXM13	206	8.11
FXM14	241	9.48

Dimensions in mm (inches)

F- 2/54

Dimensions of FXM servomotors. FXM1 series.

Dimension	ØD j6	
Units	mm	inches
FXM1	14	0.55

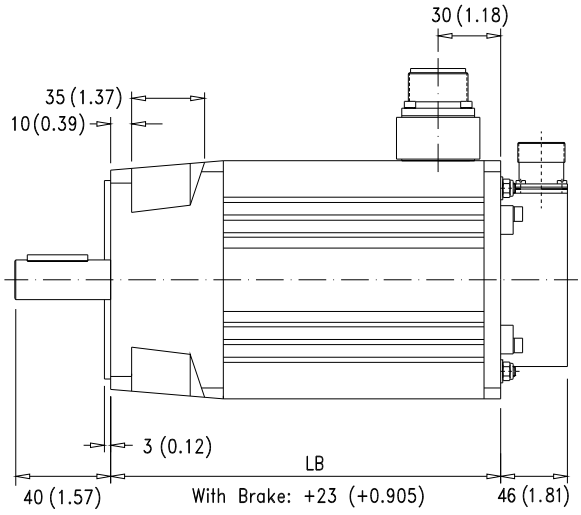


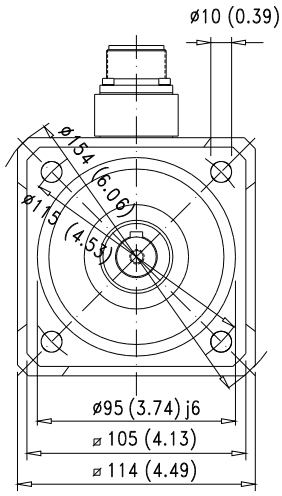
Dimension	F		GD		R		GA		ST
Units	mm	inches	mm	inches	mm	inches	mm	inches	mm
FXM1	5	0.19	5	0.19	20	0.78	16	0.62	M5x12.5

F- 2/55

Dimensions of the shaft extension on FXM servomotors. FXM1 series.

FXM3 series





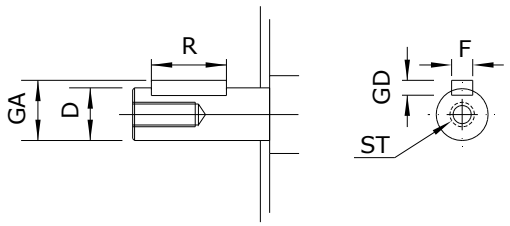
Dimension	LB	
Units	mm	inches
FXM31	152	5.98
FXM32	187	7.36
FXM33	222	8.74
FXM34	257	10.12

Dimensions in mm (inches)

F- 2/56

Dimensions of FXM servomotors. FXM3 series.

Dimension	ØD j6	
Units	mm	inches
FXM3	19	0.75



Dimension	F		GD		R		GA		ST
Units	mm	inches	mm	inches	mm	inches	mm	inches	mm
FXM3	6	0.24	6	0.24	30	1.18	21.5	0.85	M6x16

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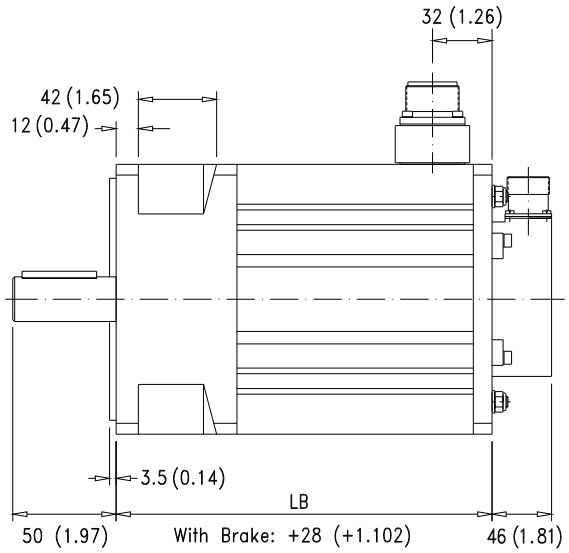
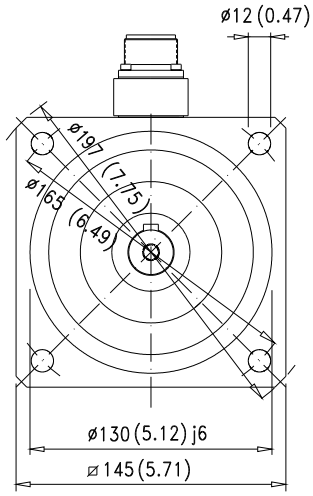
Dimensions of the shaft extension on FXM servomotors. FXM3 series.

FXM5 series





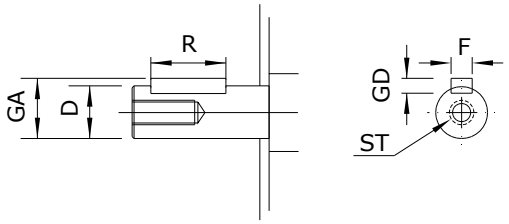
Dimension	LB	
Units	mm	inches
FXM53	237	9.33
FXM54	272	10.71
FXM55	307	12.09

Dimensions in mm (inches)

F- 2/58

Dimensions of FXM servomotors. FXM5 series.

Dimension	ØD j6	
Units	mm	inches
FXM5	24	0.94

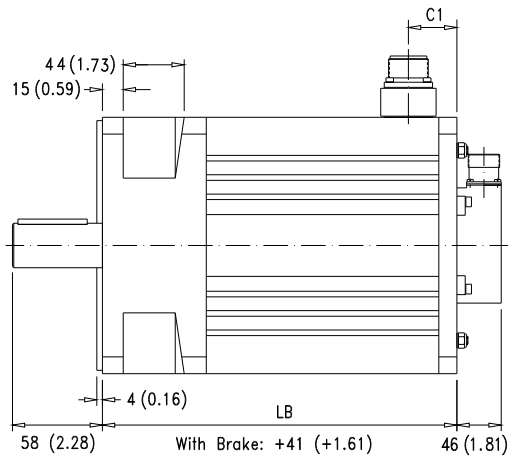


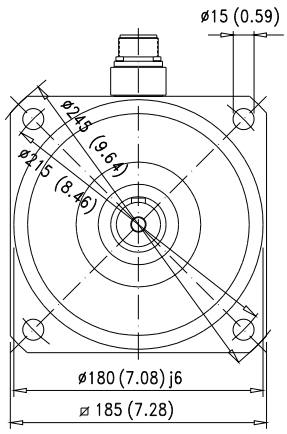
Dimension	F		GD		R		GA		ST
Units	mm	inches	mm	inches	mm	inches	mm	inches	mm
FXM5	8	0.31	7	0.27	40	1.58	27	1.07	M8x19

F- 2/59

Dimensions of the shaft extension on FXM servomotors. FXM5 series.

FXM7 series





Dimension	LB	
Units	mm	inches
FXM73	256	10.08
FXM74	291	11.46
FXM75	326	12.83
FXM76	361	14.21
FXM77	396	15.59
FXM78	431	16.97

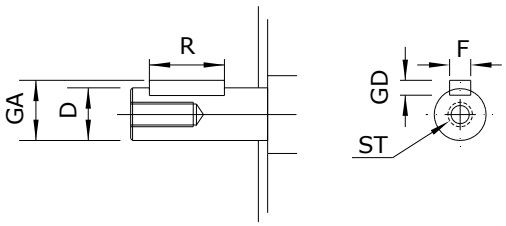
Dimension	C1	
Units	mm	inches
With base terminal strip MC 23	35	1.38
With base terminal strip MC 46	40	1.57

Dimensions in mm (inches)

F- 2/60

Dimensions of FXM servomotors. FXM7 series.

Dimension	ØD k6	
Units	mm	inches
FXM7	32	1.26

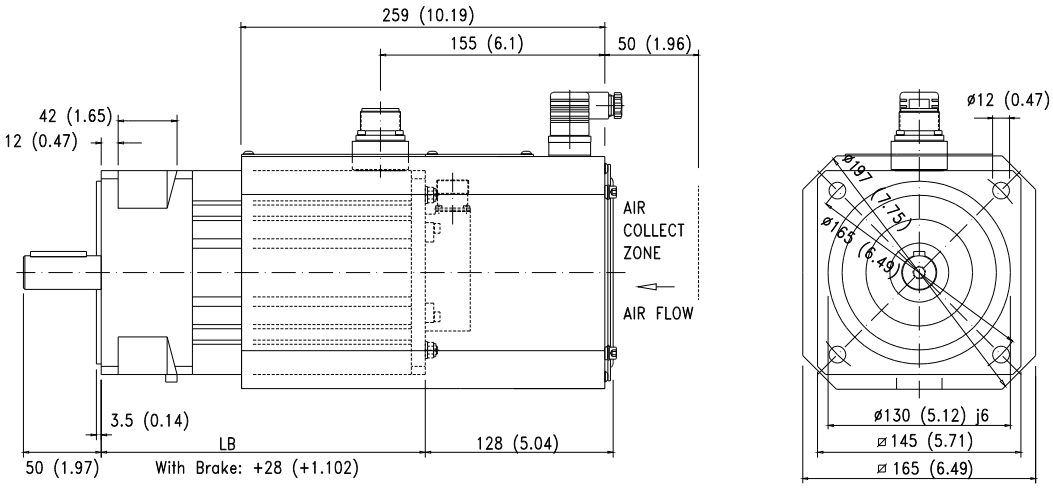


Dimension	F		GD		R		GA		ST
Units	mm	inches	mm	inches	mm	inches	mm	inches	mm
FXM7	10	0.39	8	0.31	50	1.97	35	1.38	M10x22

F- 2/61

Dimensions of the shaft extension on FXM servomotors. FXM7 series.

FXM5/V series



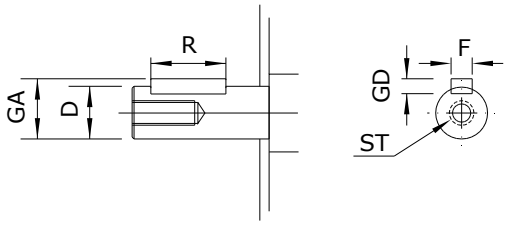
Dimension	LB	
Units	mm	inches
FXM53/V	237	9.33
FXM54/V	272	10.71
FXM55/V	307	12.09

Dimensions in mm (inches)

F- 2/62

Dimensions of FXM servomotors. FXM5/V series.

Dimension	ØD j6	
Units	mm	inches
FXM5/V	24	0.94

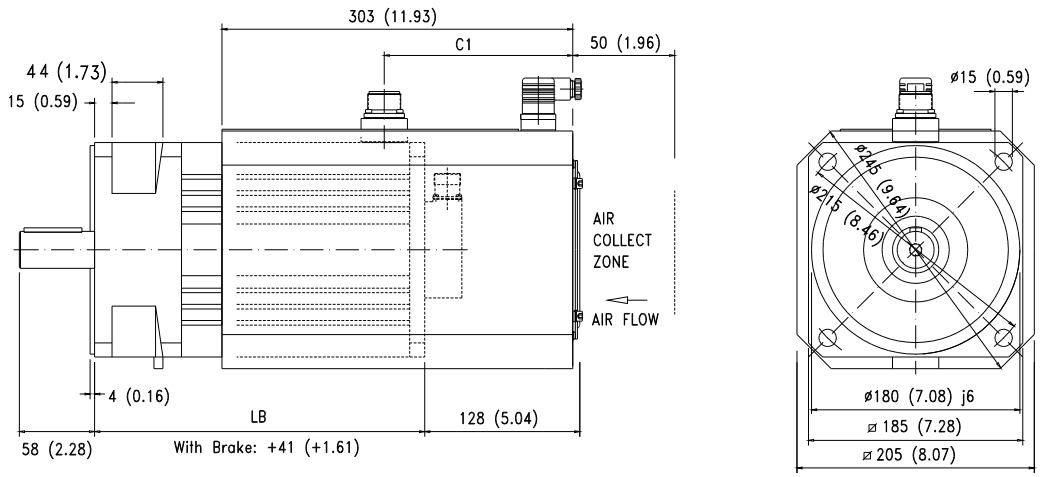


Dimension	F		GD		R		GA		ST
Units	mm	inches	mm	inches	mm	inches	mm	inches	mm
FXM5/V	8	0.31	7	0.27	40	1.58	27	1.07	M8x19

F- 2/63

Dimensions of the shaft extension on FXM servomotors. FXM5/V series.

FXM7/V series



Dimension	LB	
Units	mm	inches
FXM73/V	256	10.08
FXM74/V	291	11.46
FXM75/V	326	12.83
FXM76/V	361	14.21
FXM77/V	396	15.59
FXM78/V	431	16.97

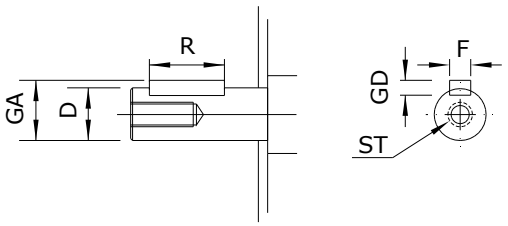
Dimension	C1	
Units	mm	inches
With base terminal strip MC 23	157	6.18
With base terminal strip MC 46	162	6.38
With base terminal strip MC 80	167	6.57

Dimensions in mm (inches)

F- 2/64

Dimensions of FXM servomotors. FXM7/V series.

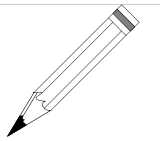
Dimension	ØD k6	
Units	mm	inches
FXM7/V	32	1.26



Dimension	F		GD		R		GA		ST
Units	mm	inches	mm	inches	mm	inches	mm	inches	mm
FXM7/V	10	0.39	8	0.31	50	1.97	35	1.38	M10x22

F- 2/65

Dimensions of the shaft extension on FXM servomotors. FXM7/V series.



THREE-PHASE SERVOMOTORS. FKM FAMILY

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. Only the winding and the metal plates of the stator get heated 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 have a KTY84-130 sensor to monitor the internal temperature. For further detail, see section **"3.3 Temperature sensor"** in this chapter.

They carry an encoder for position feedback and, optionally, an electromechanical brake.

This motor family consists of the FKM2, FKM4 and FKM6 series available for 220 V (F winding) or 400 V AC (A winding) and the FKM8 and FKM9 series available only for 400 V AC (A winding).

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

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 0.5 kW to 17.8 kW and rated speed from 2000 rpm to 6000 rpm.
- Uniform output torque.
- High torque/volume ratio.
- High reliability.
- Low maintenance.
- Rotary connectors for feedback and power.

3.2 General characteristics

T- 3/1 Standard characteristics of FKM2, FKM4, FKM6 and FKM8 servomotors.

Excitation	Permanent rare earth magnets (Nd-Fe-B)
Temperature sensor	Thermistor PTC KTY84-130
Shaft extension	Cylindrical without keyway. Option: with keyway
Mounting	Face flange
Mounting methods	IM B5, IM V1, IM V3 meets IEC 34-3-72
Mechanical tolerances	Normal class N, meets IEC 72/1971
Balancing	Class N (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)
Noise	DIN 45653
Vibration resistance	Withstands 1g in the direction of the shaft and 3g side-ways (g = 9.81 m/s²)
Electrical insulation	Class F (150 °C / 302 °F)
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
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	Not available
Brake	Optional in all models
Feedback (*)	Sinusoidal encoder Incremental TTL encoder

* Sinusoidal encoder (FKM with A winding) and incremental TTL encoder (FKM with F winding).
** The FKM8 series only has the “A” winding.

T- 3/2 Standard characteristics of FKM9 servomotors.

Excitation	Permanent Neodymium magnets
Temperature sensor	Thermistor PTC KTY84-130
Shaft extension	Cylindrical without keyway. Option: with keyway
Mounting	Face flange
Mounting methods	IM B5, IM V1, IM V3 meets IEC 34-3-72
Mechanical tolerances	Normal class N, meets IEC 72/1971
Balancing	Class N (class R optional) meets DIN 45665
Type of winding	A winding (400 V AC)
Noise	DIN 45653
Electrical insulation	Class F (150 °C / 302 °F)
Protection degree	Standard configuration IP 65
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
Brake *	Optional only on FKM94 and FKM95 models.
Feedback	Sinusoidal encoder

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

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

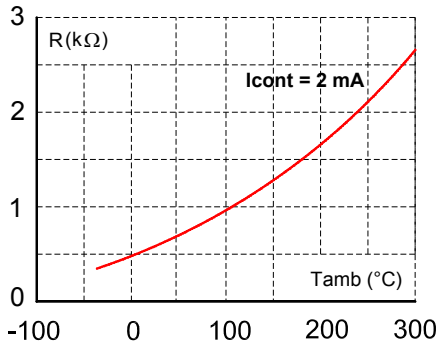
3.3 Temperature sensor

All FKM motors have a 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).

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

Sensor type	KTY84-130
Resistance at 20 °C (68 °F)	581 Ω
Resistance at 100 °C (212 °F)	1000 Ω
Sensor connection	Feedback cable
Motor series	FKM2, FKM4, FKM6, FKM8 and FKM9

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.

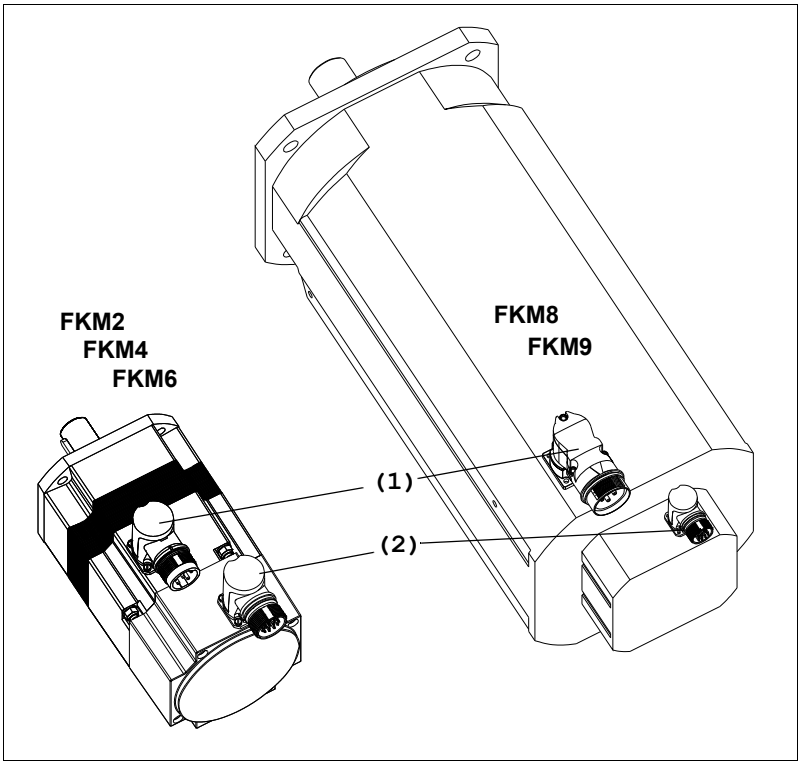
NOTE. The wires of the temperature sensor are included in the feedback cable.

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 connectted to terminals “KTY84+” and “KTY84-”. If these instructions are not complied with, there is a risk of electric shock.

3.4 Outside appearance

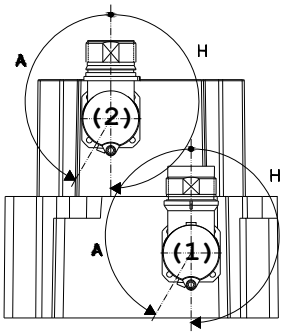
The figure shows the outside shape of these servomotors and the location of the connectors for power supply, motor feedback and brake (when having this option).



F- 3/2

FKM servomotors.
1. Power base connector for the motor + brake (if applicable). **2.** Motor feedback base connector.

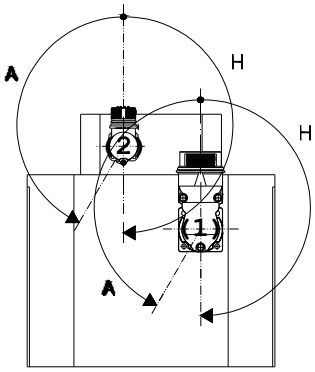
Both the power connector and the feedback connector are rotary making it easier to connect the cable when the installation so requires. The possible rotating angles are:



Connector	Motor	Amax	Hmax
Power (1)	FKM	150°	180°
Signal (2)	FKM2	150°	180°
	FKM4	115°	110°
	FKM6	110°	105°

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

Approx. maximum rotating torque. 8 Nm
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. maximum rotating torque. 8 Nm
Only 5 rotations are allowed in order to keep the degree of protection.

F- 3/3

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.

NOTE. Note that 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 exceeconnectorded; 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.

3.5 Technical data

FKM with “A” winding (400 V AC)

All the data supplied here are for winding over-temperature of ΔT = 100 K with a room temperature of 40 °C (104 °F). The power cable shown in the table corresponds to motors without brake.

T- 3/4 Technical data of FKM servomotors with A winding and without brake.

nN	Mo	Mn	Motor model	Io	Pcal	Power cable *
1/min	Nm	Nm	FKM	Arms	kW	Nr of wires x mm²
2000	11.6	9.2	44.20A.□□.□0□	4.6	2.4	MPC-4x1.5
2000	16.5	13.6	64.20A.□□.□0□	6.5	3.4	MPC-4x1.5
2000	23.5	16.7	66.20A.□□.□0□	10.5	4.9	MPC-4x1.5
2000	23.5	16.7	66.20A.□□.□0□.2	9.4	4.9	MPC-4x1.5
2000	32.0	25.0	82.20A.□□.□0□	13.2	6.7	MPC-4x1.5
2000	41.0	32.0	83.20A.□□.□0□	17.0	8.6	MPC-4x2.5
2000	52.0	38.0	84.20A.□□.□0□	21.5	10.9	MPC-4x4
2000	74.0	46.0	85.20A.□□.□0□	29.3	15.5	MPC-4x6
2000	68	56.0	94.20A.□□.□00	25.4	14.2	MPC-4x6
2000	93	70.0	95.20A.□□.□00	33.1	19.5	MPC-4x10
2000	115	85.0	96.20A.□□.□00	42.1	24.0	MPC-4x16
3000	3.2	2.6	22.30A.□□.□0□	2.4	1.0	MPC-4x1.5
3000	6.3	4.6	42.30A.□□.□0□	4.6	1.9	MPC-4x1.5
3000	11.6	7.4	44.30A.□□.□0□	8.2	3.6	MPC-4x1.5
3000	11.6	7.4	44.30A.□□.□0□.2	7.0	3.6	MPC-4x1.5
3000	8.9	7.3	62.30A.□□.□0□	7.1	2.8	MPC-4x1.5
3000	16.5	11.4	64.30A.□□.□0□	12.1	5.2	MPC-4x1.5
3000	23.5	12.1	66.30A.□□.□0□	16.4	7.3	MPC-4x2.5
3000	32.0	20.0	82.30A.□□.□0□	19.8	10.1	MPC-4x4
3000	41.0	21.0	83.30A.□□.□0□	27.1	12.9	MPC-4x6
3000	52.0	17.0	84.30A.□□.□0□	32.2	16.3	MPC-4x10
4000	11.6	4.8	44.40A.□□.□0□	10.7	4.9	MPC-4x1.5
4000	8.9	6.9	62.40A.□□.□0□	9.3	3.7	MPC-4x1.5
4000	16.5	6.6	64.40A.□□.□0□	16.2	6.9	MPC-4x2.5
4000	32.0	12.0	82.40A.□□.□0□	26.4	13.4	MPC-4x6
4500	6.3	3.5	42.45A.□□.□0□	6.9	2.9	MPC-4x1.5
5000	3.2	2.0	22.50A.□□.□0□	4.0	1.7	MPC-4x1.5
6000	1.7	0.8	21.60A.□□.□0□	2.8	1.1	MPC-4x1.5
6000	3.2	1.5	22.60A.□□.□0□	4.5	2.0	MPC-4x1.5
6000	6.3	1.9	42.60A.□□.□0□	8.5	3.9	MPC-4x1.5
6000	8.9	3.4	62.60A.□□.□0□	13.1	5.6	MPC-4x1.5

***** When having the “brake” option, add to the cable sales reference the factor+(2x1). E.g. for the FKM22.30A.□□.□**1**□ model (with brake option), the power cable is MPC-4x1.5**+(2x1)**.

FKM with “F” winding (220 V AC)

All the data supplied here are for winding over-temperature of ΔT = 100 K with a room temperature of 40 °C (104 °F). The power cable shown in the table corresponds to motors without brake.

T- 3/5 Technical data of FKM servomotors with F winding and without brake.

nN	Mo	Mn	Motor model	Io	Pcal	Power cable*
1/min	Nm	Nm	FKM	Arms	kW	Nr of wires x mm²
2000	16.5	13.7	64.20F.□□.□0□	14.3	3.4	MPC-4x2.5
2000	23.5	16.7	66.20F.□□.□0□	19.2	4.9	MPC-4x4
3000	3.2	2.6	22.30F.□□.□0□	4.5	1.0	MPC-4x1.5
3000	6.3	4.6	42.30F.□□.□0□	8.5	1.9	MPC-4x1.5
3000	11.6	7.4	44.30F.□□.□0□	15.6	3.6	MPC-4x2.5
3000	8.9	7.5	62.30F.□□.□0□	13.1	2.8	MPC-4x1.5
3000	16.5	11.2	64.30F.□□.□0□	20.4	5.1	MPC-4x2.5
4000	8.9	6.7	62.40F.□□.□0□	16.4	3.7	MPC-4x2.5
4500	6.3	3.2	42.45F.□□.□0□	12.4	2.9	MPC-4x1.5
5000	3.2	1.9	22.50F.□□.□0□	7.2	1.7	MPC-4x1.5
6000	1.7	0.8	21.60F.□□.□0□	4.7	1.1	MPC-4x1.5

* When having the “brake” option, add to the cable sales reference the factor+(2x1). E.g. for the FKM22.30F.□□.□**1**□ model (with brake option), the power cable is MPC-4x1.5+(2x1).

3.6 Options / Expansions

Brake

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

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

WARNING.
NEVER use this 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- 3/6 Technical data of the brake.

Motor series	Holding torque	Rated power absorbed	On/Off time	Unlocking rated voltage	Inertia	Approx. mass
Units	N·m (lbf·ft)	W (hp)	ms	V DC	kg·cm²	kg (lbf)
FKM2	4.5 (3.32)	12 (0.016)	7/35	22-26	0.12	0.28 (0.61)
FKM4	9.0 (6.64)	18 (0.024)	7/40	22-26	0.54	0.46 (1.01)
FKM6	18.0 (13.28)	24 (0.032)	10/50	22-26	1.15	0.90 (1.98)
FKM8	80.0 (59.00)	35 (0.046)	53/97	22-26	31.8	4.1 (9.03)
FKM9	145.0 (106.94)	50 (0.067)	65/190	21.6-25.4	0.53	5.35 (11.79)

NOTE. The maximum turning speed of the brake for the FKM2, FKM4 and FKM6 series is 10000 rev/min and 8000 rev/min for the FKM8 and FKM9 series.

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 VDC 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

None of the models of the FKM motors offers the “fan” option.

3.7 Connections

FKM2, FKM4 and FKM6 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 the FKM2, FKM4 and FKM6 series have the same power base connector.

NOTE. FAGOR supplies, upon request, the MC-20/6 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□+(2x□) (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.

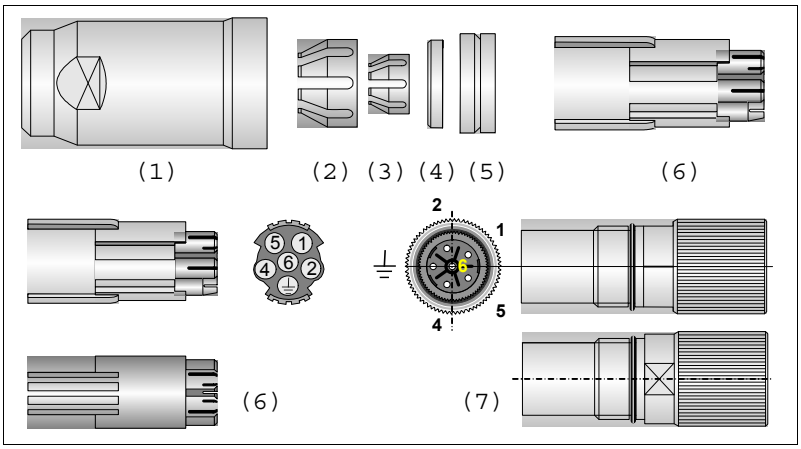
MC-20/6 connector assembling instructions

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.

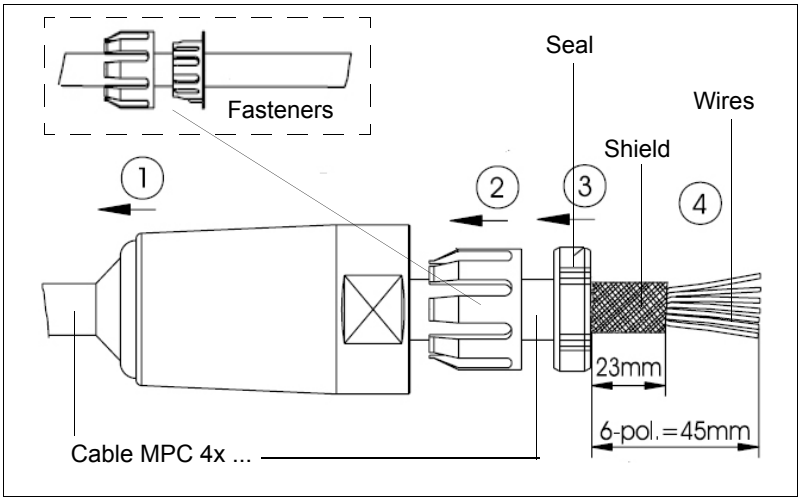
  - Set 2 made up of pieces 6 and 7.



F- 3/4

Exploded view of MC-20/6 connector.

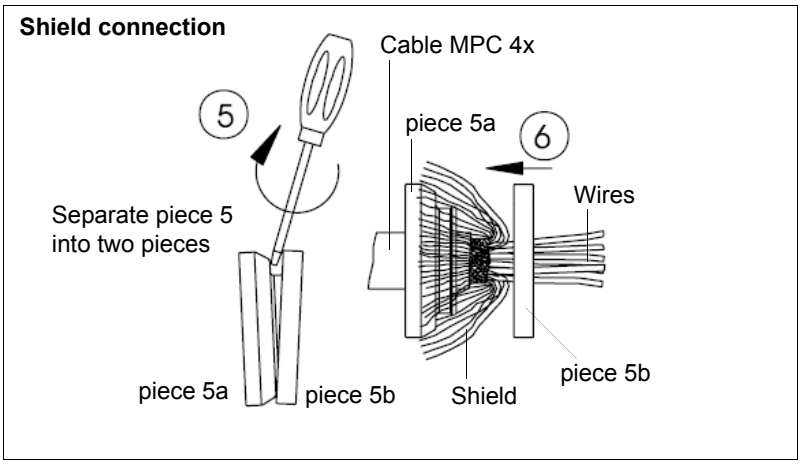
- Insert the power cable whose reference is MPC- 4x□ (for brakeless motor) or MPC- 4x□+(2x□) (for motor with brake) into the holes of the pieces shown in the figure in the order shown.



F- 3/5

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

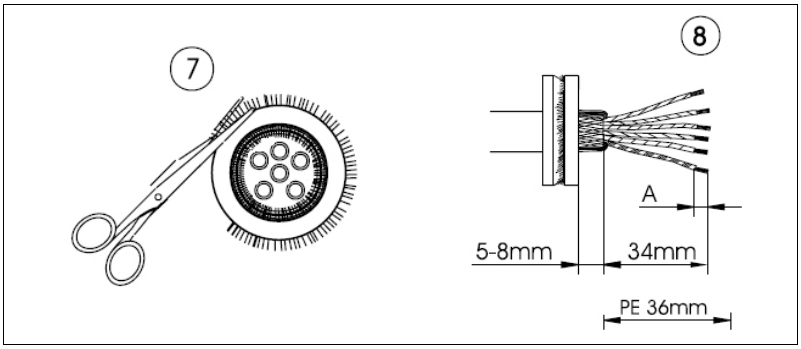
- Now strip the cable with the values indicated in the previous figure for the shield and for the wires.
- Use a screwdriver to separate piece 5 into two pieces 5a and 5b. Insert the wires and the whole length of the stripped shield through the holes of the two pieces leaving the shield between them as shown in figure **F- 3/6**.
- 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- 3/6**.



F- 3/6

Shield connection.

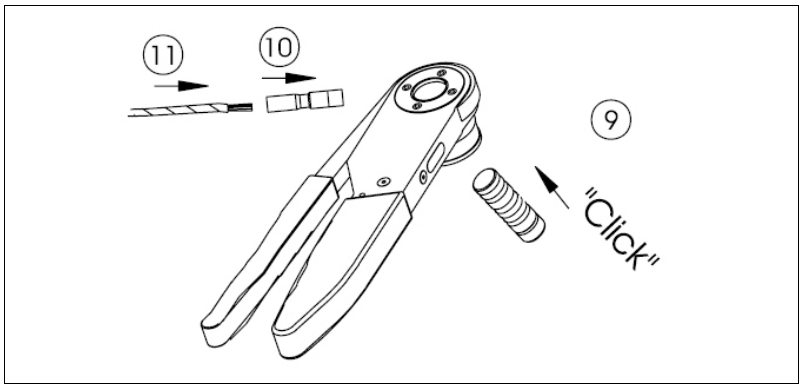
- Now cut off the excess shield with scissors along the joint of both pieces 5a and 5b.



F- 3/7

Removal of excess shield.

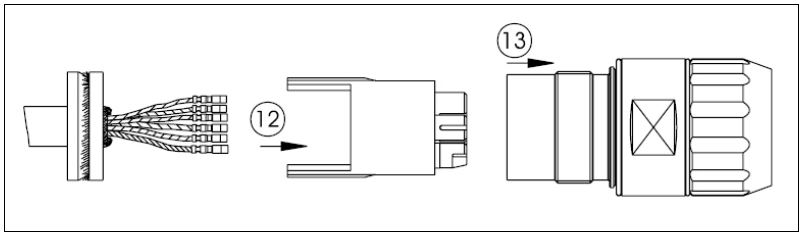
- Crimp each pin (supplied in the bag of accessories) at each stripped end of the 4 or 6 wires (accordingly).



F- 3/8

Pin crimping.

- 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- 3/9** with Nr. 12) all the way in. Observe that each hole is numbered according to figure **F- 3/4**.



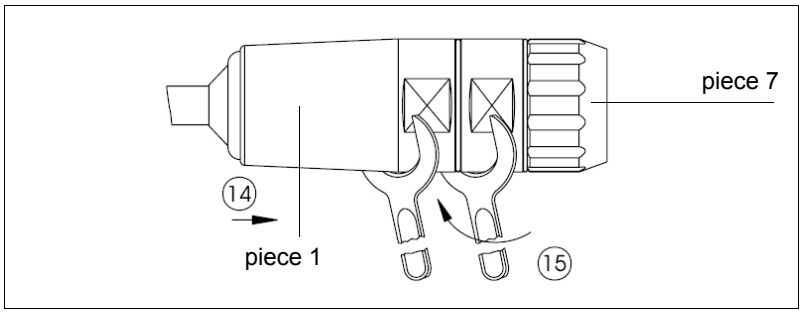
F- 3/9

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- 3/11**.

- 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.

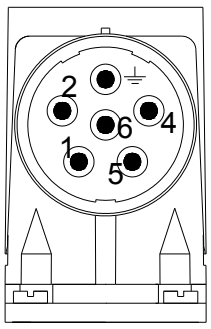
NOTE. Observe that the crimped pins do not stick out once the cable has been assembled to the connector.



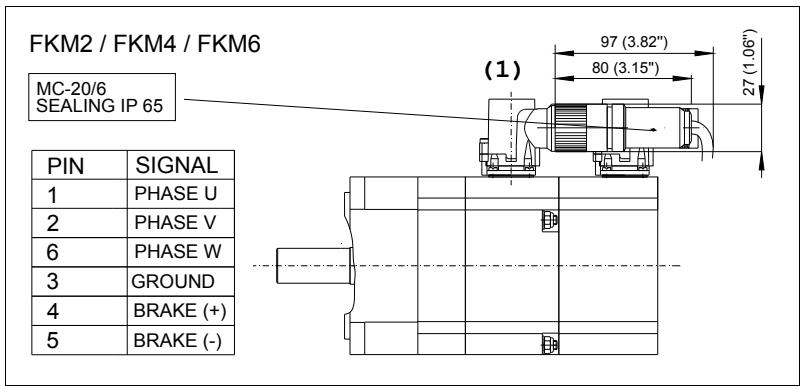
F- 3/10

Final power cable assembling step.

Power base connector pinout



(1)



PIN	SIGNAL
1	PHASE U
2	PHASE V
6	PHASE W
3	GROUND
4	BRAKE (+)
5	BRAKE (-)

F- 3/11

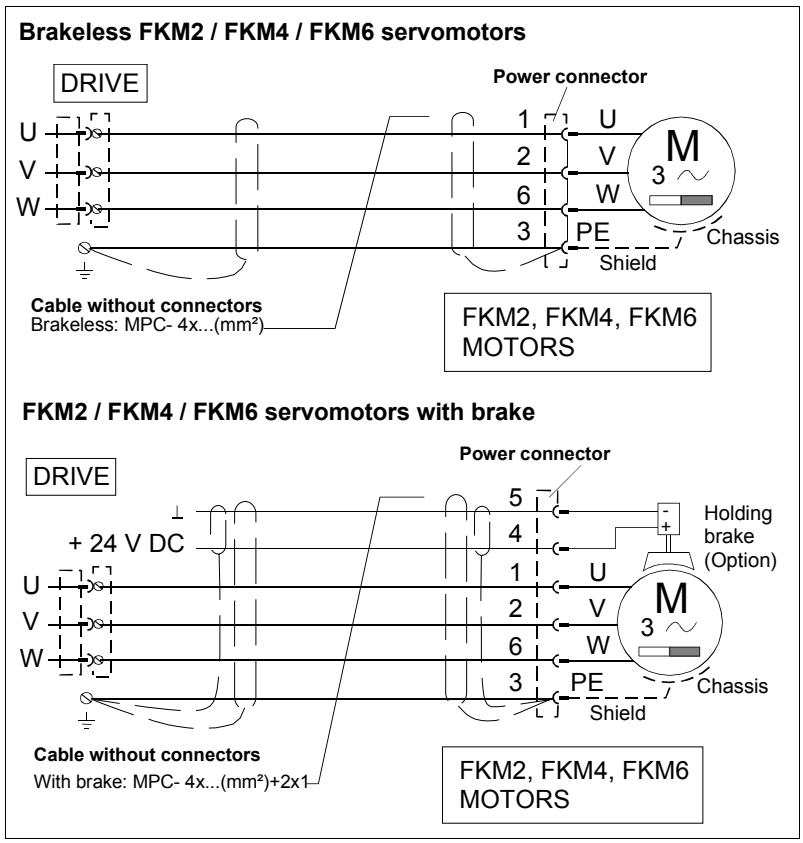
Power base connector pinout.

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

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

MOTOR-DRIVE connection

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



F- 3/12

Power connection diagram between an FKM2, FKM4 or FKM6 motor 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 its corresponding motor, connect the U terminal of the module with 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). When using a brake, pin 4 will be supplied with 24 V DC and pin 5 with 0 V DC.

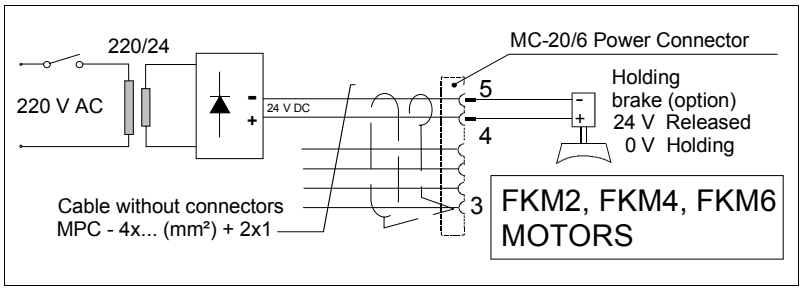
In order for the system to comply with the European Directive 2004/108/CE on electromagnetic compatibility, the cable grouping the wires that make up the power cable must be shielded. **The shield must be connected to ground at the drive end and at the motor end** as shown in figure **F- 3/12**. This condition is a must.

Brake connection

To govern the optional mechanical brake of FKM2, FKM4 and FKM6 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- 3/6** table.

A transformer-rectifier circuit will be enough to power the brake of the servomotor. See figure **F- 3/13**.

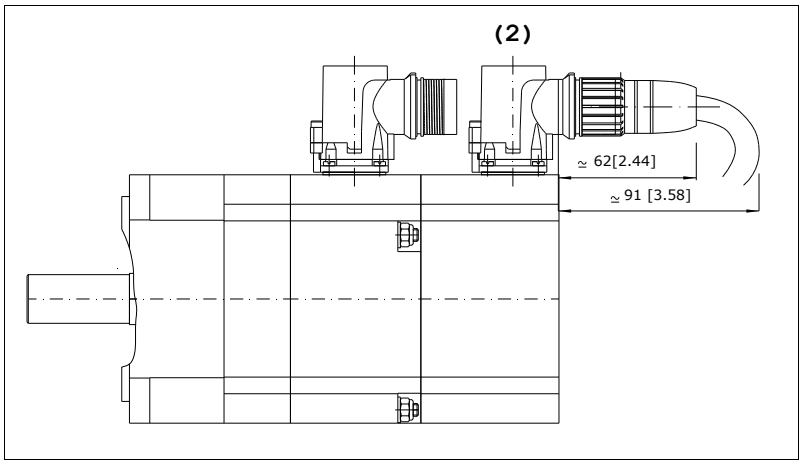


F- 3/13

Brake connection diagram.

Feedback connection

Feedback may be obtained through a sinusoidal encoder (motors with A winding) or incremental TTL (motors with F winding). It is connected through connector (2). See figure **F- 3/14**.



F- 3/14

Feedback connector.

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

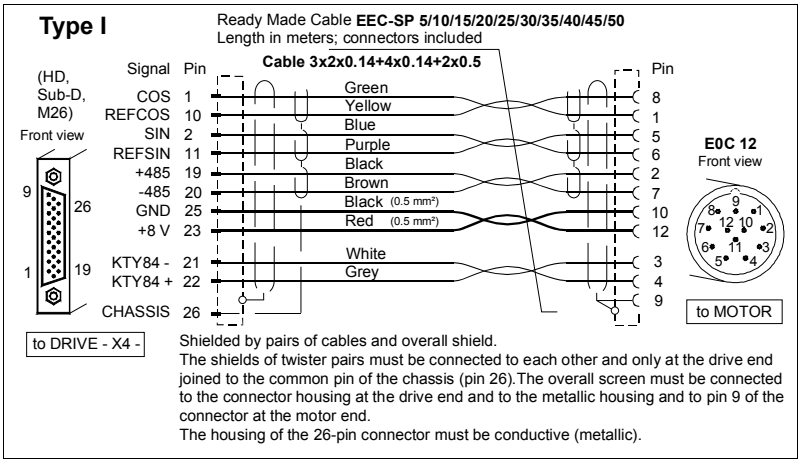
Sinusoidal encoder. EEC-SP cable

INFORMATION. Using the EEC-SP cable as feedback cable ensures compliance with the European Directive 2004/108/EC on Electromagnetic Compatibility.

FAGOR supplies the EEC-SP feedback cable upon request.

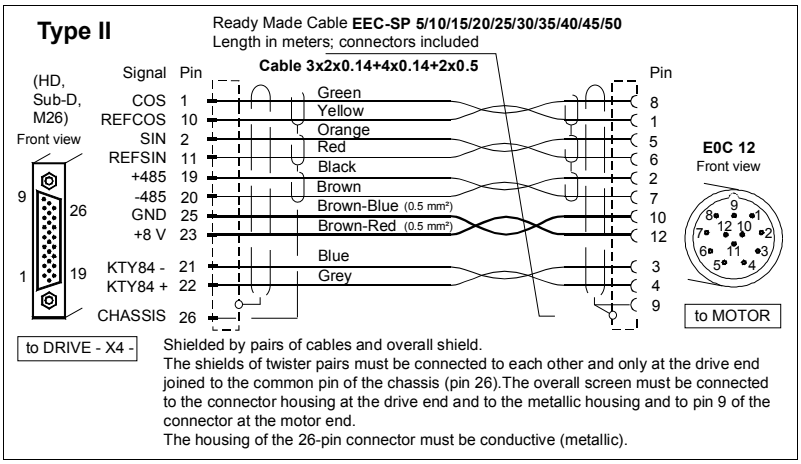
If you use to manufacture you own cable, read the following instructions carefully to understand the diagrams correctly. Observe that there are two cables indicated as type I and type II. Any of the cables shown is valid as feedback cable for a sinusoidal encoder. Only the wire colors are different, 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- 3/15

Encoder connection EEC-SP. Cable type I.
With overall shield and shielded twisted pairs.



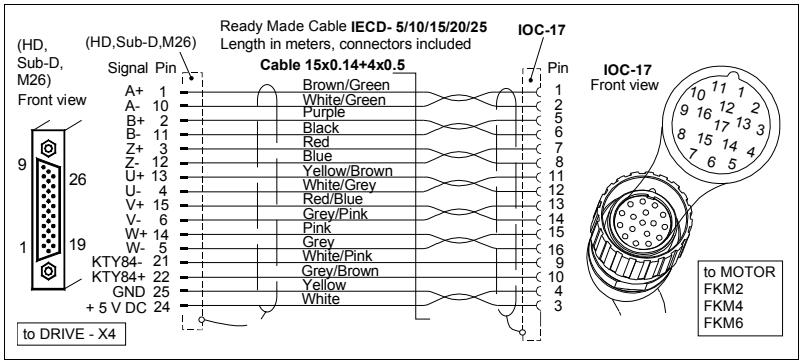
F- 3/16

Encoder connection EEC-SP. Type II cable.
Overall shield and shielded twisted pairs.

NOTE. This cable may be connected to AXD, ACD, MMC and CMC drives as well as to ACSD-xxH, MCS-xxH and MCP-xxH drives. For further detail on the latter, refer to their corresponding manual.

Incremental TTL encoder. IECD cable

FAGOR supplies the IECD feedback cable upon request.



F- 3/17

TTL incremental encoder connection.
Overall shield and unshielded twisted pairs.

The incremental TTL encoder only comes on FKM2, FKM4 or FKM6 servomotors with F winding (220 V AC) that will be governed by drives whose sales references are ACSD-xxL, MCS-xxL or MCP-xxL. For further detail on these drives, refer to their corresponding manual.

FKM8 and FKM9 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.

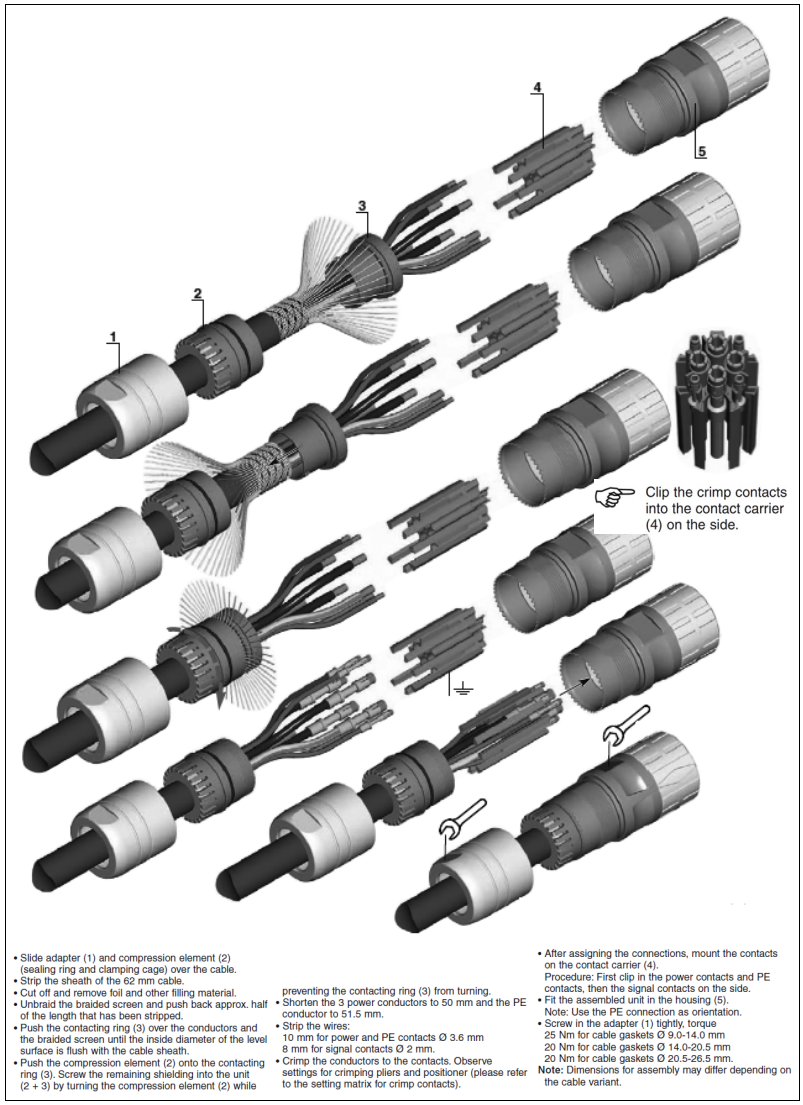
All models of the FKM8 and FKM9 series motors have the same power base connector.

NOTE. 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☐+(2x☐) (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.

MC-61/6 connector assembling instructions

Use the figure to help you and proceed as follows:

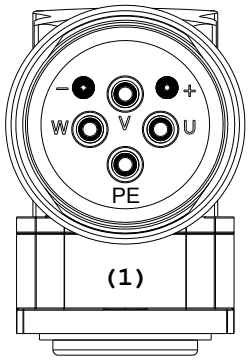


F- 3/18

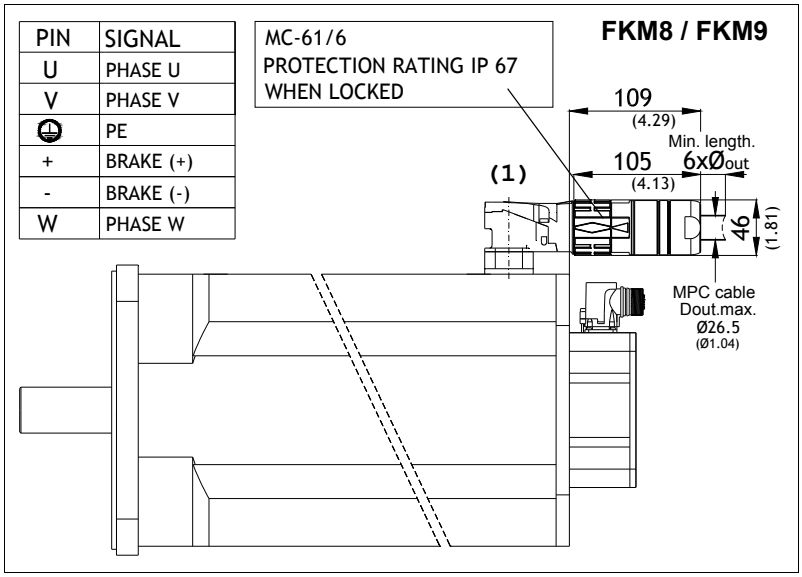
Assembling the MC-61/6 power connector to the cable MPC- 4x...

Power base connector pinout

2+3+PE



Outside view of the motor power connector



F- 3/19

Power base connector pinout.

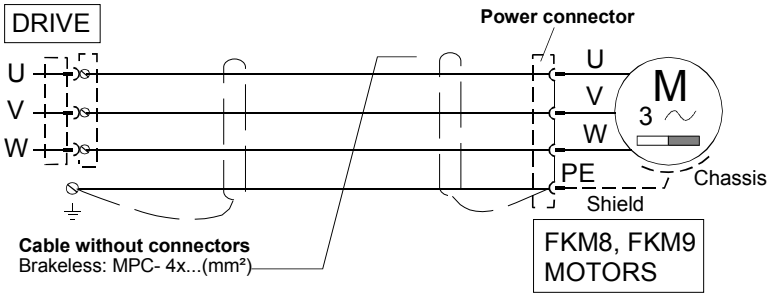
MANDATORY. Remember that before connecting the power cable, it must be assembled. Fagor Automation supplies, upon request and in meters, the MPC-4x□+(2x□) cable and the MC-61/6 connector, also upon request, that must be assembled to it. Proceed as described earlier. See figure **F- 3/18.**

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

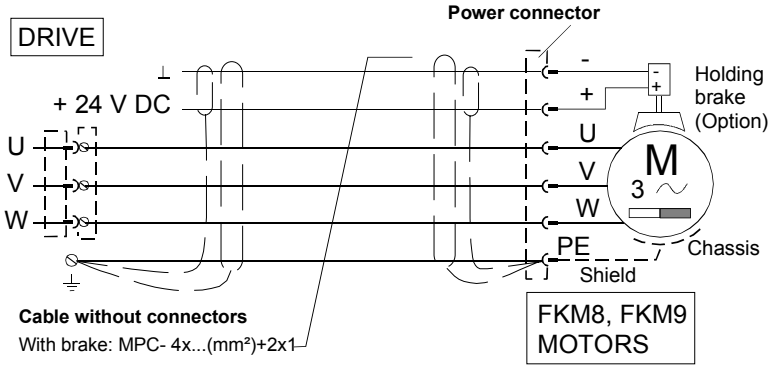
MOTOR-DRIVE connection

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

Brakeless FKM8 / FKM9 servo motors



FKM8 / FKM9 servo motors with brake



F- 3/20

Power connection diagram between an FKM8/FKM9 motor 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 its corresponding motor, connect the U terminal of the module with the terminal corresponding to the U phase of the motor. Proceed the same way with the terminals V-V, W-W and PE-PE. When using a brake, pin (+) will be supplied with 24 V DC and pin (-) with 0 V DC.

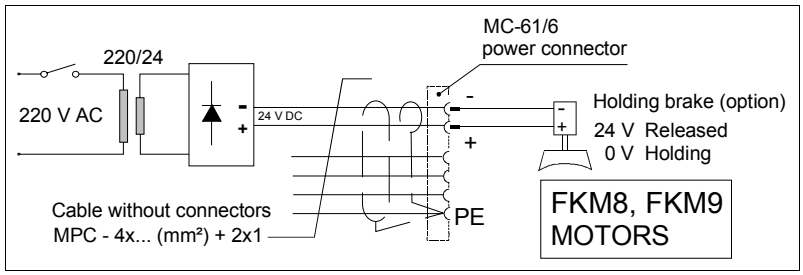
In order for the system to comply with the European Directive 2004/108/EC on Electromagnetic Compatibility, the cable grouping the wires that make up the power cable must be shielded. **The shield must be connected to ground at the drive end and at the motor end** as shown in figure **F- 3/20**. This condition is a must.

Brake connection

Governing the mechanical brake optionally carried by axis servomotor models FKM8 (all models) 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- 3/6** table.

A transformer-rectifier circuit will be enough to power the brake of the FKM9 servomotor. See figure **F- 3/21**.

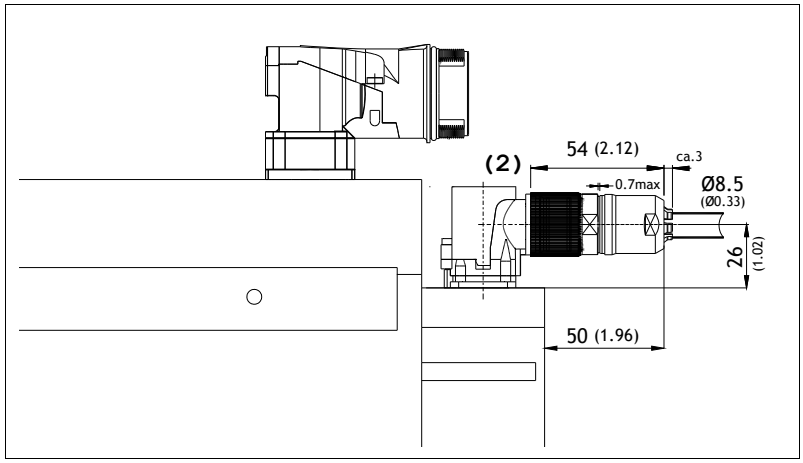


F- 3/21

Brake connection diagram.

Feedback connection

The feedback device of the motor will be a 1024 line sinusoidal 1 Vpp encoder (ref. A3 or E3). It will be connected to the motor feedback through base connector (2). See figure **F- 3/22**.



F- 3/22

Feedback connector.

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

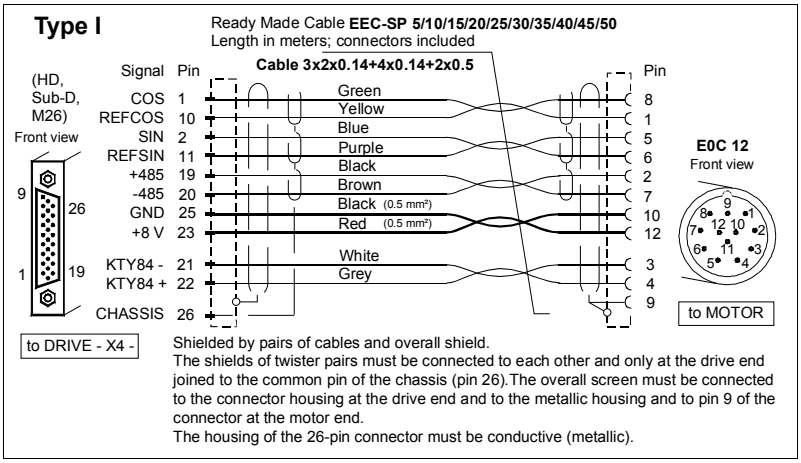
Sinusoidal encoder. EEC-SP cable

INFORMATION. Using the EEC-SP cable as feedback cable ensures compliance with the European Directive 2004/108/EC on Electromagnetic Compatibility. It improves system immunity to disturbances and offers greater flexibility than the EEC cable

FAGOR supplies the EEC-SP feedback cable upon request.

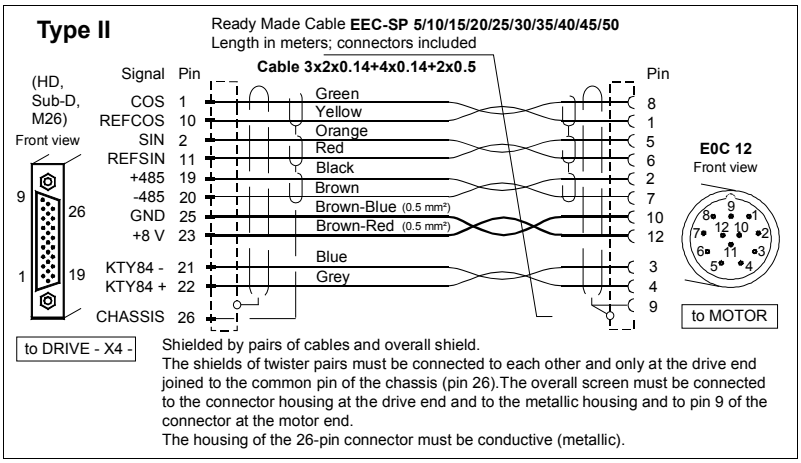
If you use to manufacture you own cable, read the following instructions carefully to understand the diagrams correctly. Observe that there are two cables indicated as type I and type II. Any of the cables shown is valid as feedback cable for a sinusoidal encoder. Only the wire colors are different, 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- 3.23

Encoder connection EEC-SP. Cable type I.
With overall shield and shielded twisted pairs.



F- 3/24

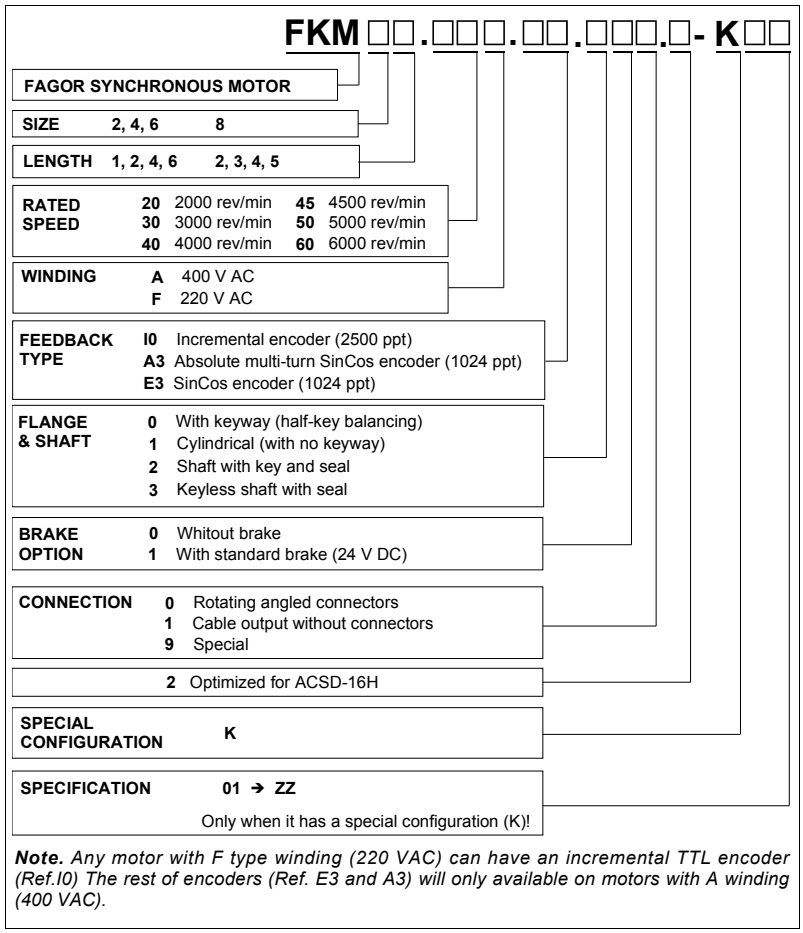
Encoder connection EEC-SP. Type II cable.
Overall shield and shielded twisted pairs.

NOTE. This cable may be connected to AXD, ACD, MMC and CMC drives as well as to ACSD-xxH, MCS-xxH and MCP-xxH drives. For further detail on the latter, refer to their corresponding manual.

3.8 Sales references

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

FKM2, FKM4, FKM6 and FKM8 series

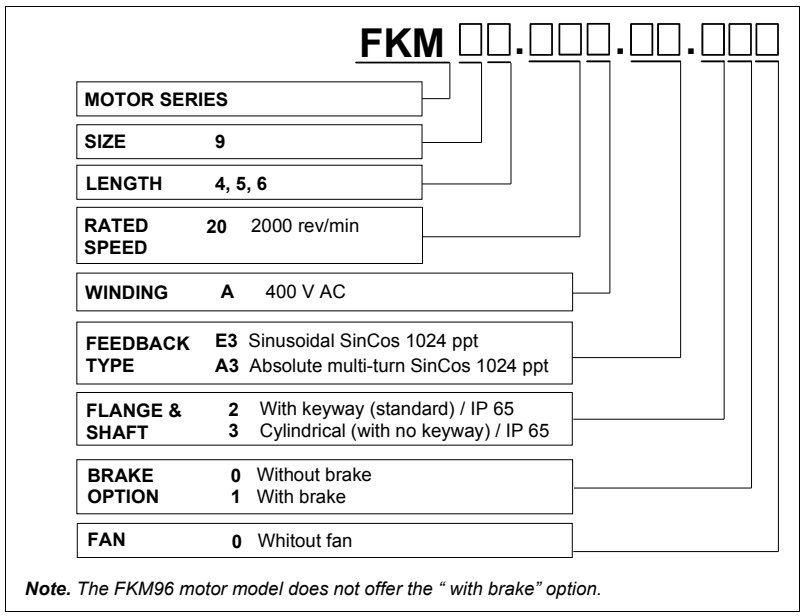


Note. *Any motor with F type winding (220 VAC) can have an incremental TTL encoder (Ref.I0) The rest of encoders (Ref. E3 and A3) will only available on motors with A winding (400 VAC).*

F- 3/25

Sales reference of FKM2, FKM4, FKM6 and FKM8 series servomotors.

FKM9 series



Note. *The FKM96 motor model does not offer the " with brake" option.*

F- 3/26

Sales reference of the FKM9 series.

3.9 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 (Mp) 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 Mp/Mo 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 Mp/Mo 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 Mp/Mn ratio has required getting the peak torque value of the drive (Mp). This value results from multiplying the peak current (Imax) of the selected drive by the torque constant (Kt) 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 “dds-hardware” 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, MCS and MCP 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.

FKM with “A” winding (400 V AC)

FKM21 models

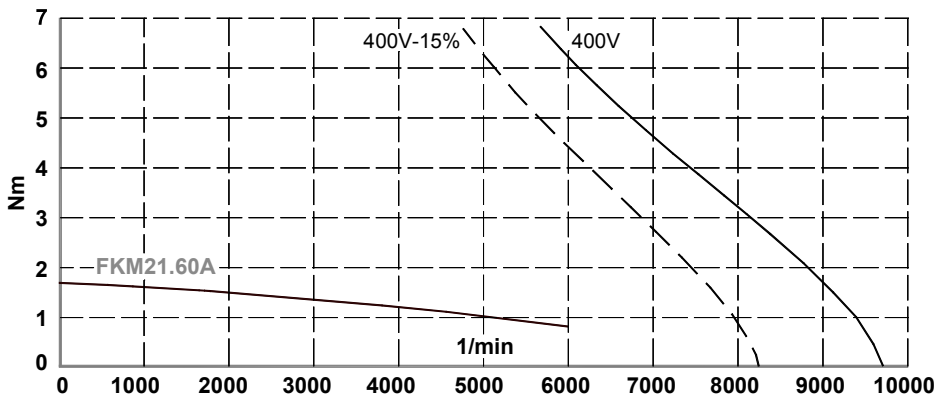
T- 3/7 Technical data of the FKM21.●●A.□□.□□□ motors.

Model						**FKM21.●●A.□□.□□□**
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	Arms				2.8
Peak current	Imax	Arms				11
Calculation power	Pcal	kW				1.1
Rated power	Pn	kW				0.5
Torque constant	Kt	N·m/Arms				0.6
Acceleration time	tac	ms				14.3
Inductance per phase (3-phase)	L	mH				7.7
Resistance per phase	R	Ω				2.55
Inertia (without brake)	J	kg·cm²				1.60
Inertia (with brake)	J*	kg·cm²				1.72
Mass (without brake)	P	kg				4.20
Mass (with brake)	P*	kg				4.48

T- 3/8 Selection of FAGOR drives for FKM21.●●A.□□.□□□ motors.

Drive peak torque in Nm	**1.08**		**1.15**									
	Mp	Mp/Mo	Mp	Mp/Mo								
FKM21.60A	4.8	2.8	**7.0**	**4.1**								

NOTE. To select a ACSD-xxH, MCS-xxH or MCP-xxH drive with any motor of this series, refer to the manual of the corresponding drive.



F- 3/27

Torque-speed graphs. FKM21.●●A.□□.□□□ models.

FKM22 models

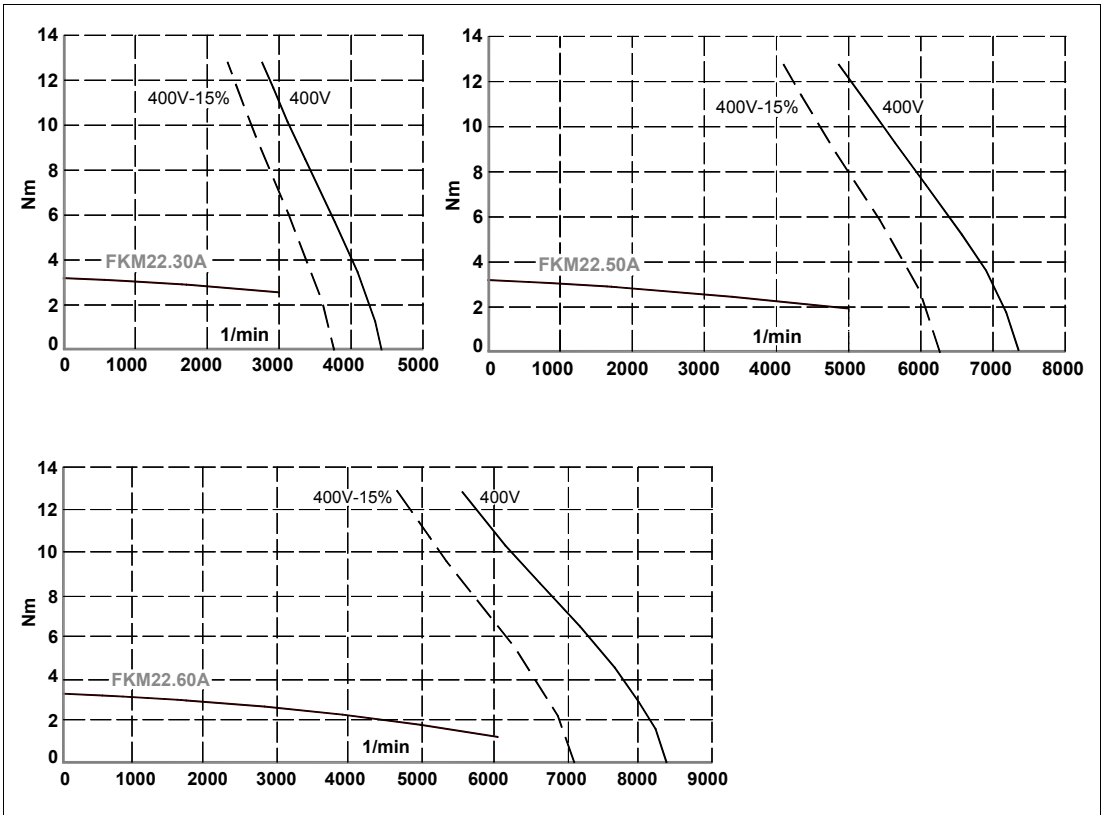
T- 3/9 Technical data of the FKM22.●●A.□□.□□□ motors.

Model			**FKM22.●●A.□□.□□□**			
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	Arms	2.4		4.0	4.5
Peak current	Imax	Arms	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/Arms	1.33		0.8	0.7
Acceleration time	tac	ms	7.0		11.7	14.0
Inductance per phase (3-phase)	L	mH	16		5.8	4.6
Resistance per phase	R	Ω	3.85		1.4	1.1
Inertia (without brake)	J	kg·cm²	2.9		2.90	2.90
Inertia (with brake)	J*	kg·cm²	3.02		3.02	3.02
Mass (without brake)	P	kg	5.3		5.30	5.30
Mass (with brake)	P*	kg	5.58		5.58	5.58

T- 3/10 Selection of FAGOR drives for FKM22.●● A.□□.□□□ motors.

Drive peak torque in Nm	**1.08**		**1.15**		**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-xxH, MCS-xxH or MCP-xxH drive with any motor of this series, refer to the manual of the corresponding drive.



F- 3/28

Torque-speed graphs. FKM22.●● A.□□.□□□ models.

FKM42 models

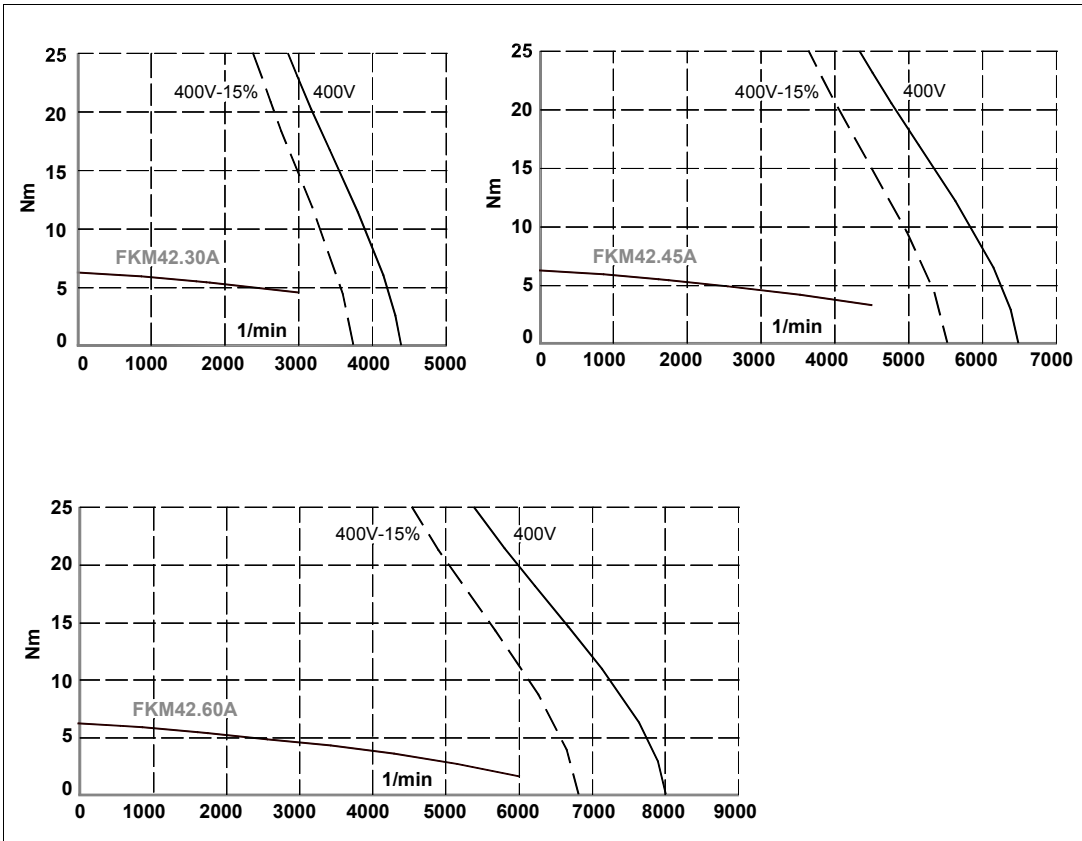
T- 3/11 Technical data of the FKM42.●●A.□□.□□□ motors.

Model			**FKM42.●●A.□□.□□□**			
Terminology	**Notation**	**Units**	**30**	**45**		**60**
Stall torque	Mo	N·m	6.3	6.3		6.3
Rated torque	Mn	N·m	4.6	3.34		1.89
Stall peak torque	Mp	N·m	25	25		25
Rated speed	nN	1/min	3000	4500		6000
Stall current	Io	Arms	4.6	6.9		8.5
Peak current	Imax	Arms	19	28		34
Calculation power	Pcal	kW	2.0	3.0		3.9
Rated power	Pn	kW	1.4	1.57		1.67
Torque constant	Kt	N·m/Arms	1.34	0.9		0.7
Acceleration time	tac	ms	10.7	16.0		21.3
Inductance per phase (3-phase)	L	mH	8.6	3.9		2.6
Resistance per phase	R	Ω	1.45	0.675		0.45
Inertia (without brake)	J	kg·cm²	8.5	8.5		8.5
Inertia (with brake)	J*	kg·cm²	9.04	9.04		9.04
Mass (without brake)	P	kg	7.80	7.80		7.80
Mass (with brake)	P*	kg	8.26	8.26		8.26

T- 3/12 Selection of FAGOR drives for FKM42.●●A.□□.□□□ motors.

Drive peak torque in Nm	**1.15**		**1.25**		**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-xxH, MCS-xxH or MCP-xxH drive with any motor of this series, refer to the manual of the corresponding drive.



F- 3/29

Torque-speed graphs. FKM42.●● A.□□.□□□ models.

FKM44 models

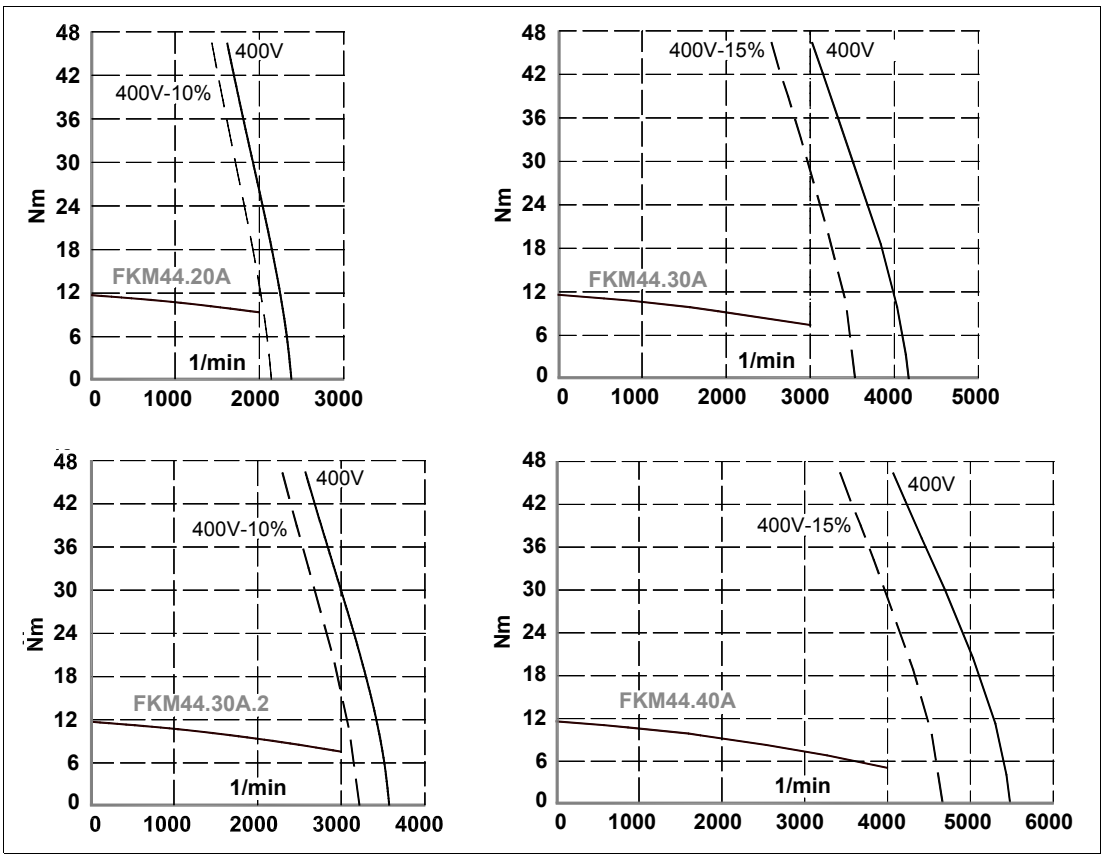
T- 3/13 Technical data of the FKM44.●●A.□□.□□□ motors.

Model			**FKM44.●●A.□□.□□□**			
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	Arms	4.6	8.2	7.0	10.7
Peak current	Imax	Arms	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/Arms	2.5	1.4	1.65	1.1
Acceleration time	tac	ms	7.4	11.2	11.2	14.9
Inductance per phase (3-phase)	L	mH	14.51	4.2	6.16	2.4
Resistance per phase	R	Ω	1.72	0.54	0.755	0.315
Inertia (without brake)	J	kg·cm²	16.7	16.7	16.7	16.7
Inertia (with brake)	J*	kg·cm²	17.24	17.24	17.24	17.24
Mass (without brake)	P	kg	11.70	11.70	11.70	11.70
Mass (with brake)	P*	kg	12.16	12.16	12.16	12.16

T- 3/14 Selection of FAGOR drives for FKM44.●● A.□□.□□□ motors.

Drive peak torque in Nm	**1.15**		**1.25**		**1.35**		**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-xxH, MCS-xxH or MCP-xxH drive with any motor of this series, refer to the manual of the corresponding drive.



F- 3/30

Torque-speed graphs. FKM44.●●A.□□.□□□ models.

FKM62 models

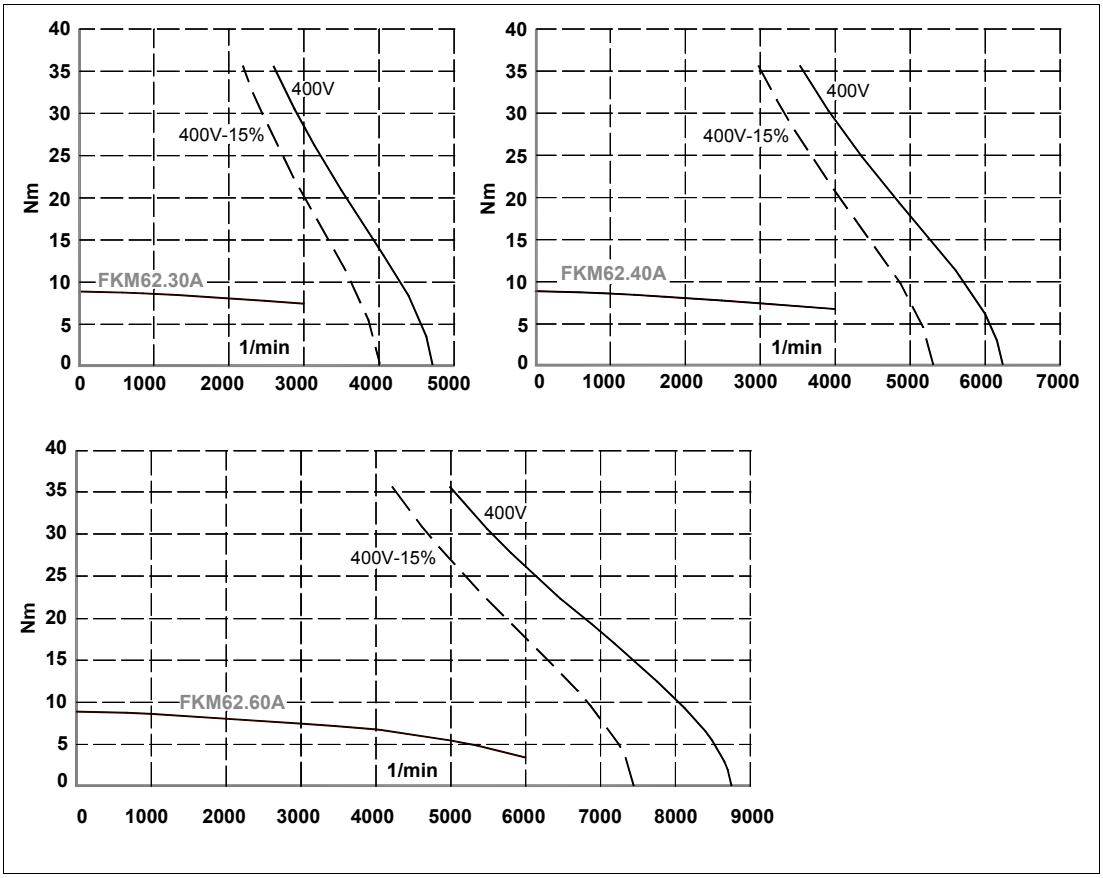
T- 3/15 Technical data of the FKM62.●●A.□□.□□□ motors.

Model			**FKM62.●●A.□□.□□□**			
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	Arms	7.1	9.3		13.1
Peak current	Imax	Arms	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/Arms	1.2	0.9		0.68
Acceleration time	tac	ms	14.3	19.1		28.7
Inductance per phase (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·cm²	16	16		16
Inertia (with brake)	J*	kg·cm²	17.15	17.15		17.15
Mass (without brake)	P	kg	11.9	11.9		11.9
Mass (with brake)	P*	kg	12.8	12.8		12.8

T- 3/16 Selection of FAGOR drives for FKM62.●●A.□□.□□□ motors.

Drive peak torque in Nm	**1.15**		**1.25**		**1.35**		**2.50**		**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	31.9	3.5	**35.0**	**3.9**		

NOTE. To select a ACSD-xxH, MCS-xxH or MCP-xxH drive with any motor of this series, refer to the manual of the corresponding drive.



F- 3/31

Torque-speed graphs. FKM62.●● A.□□.□□□ models.

FKM64 models

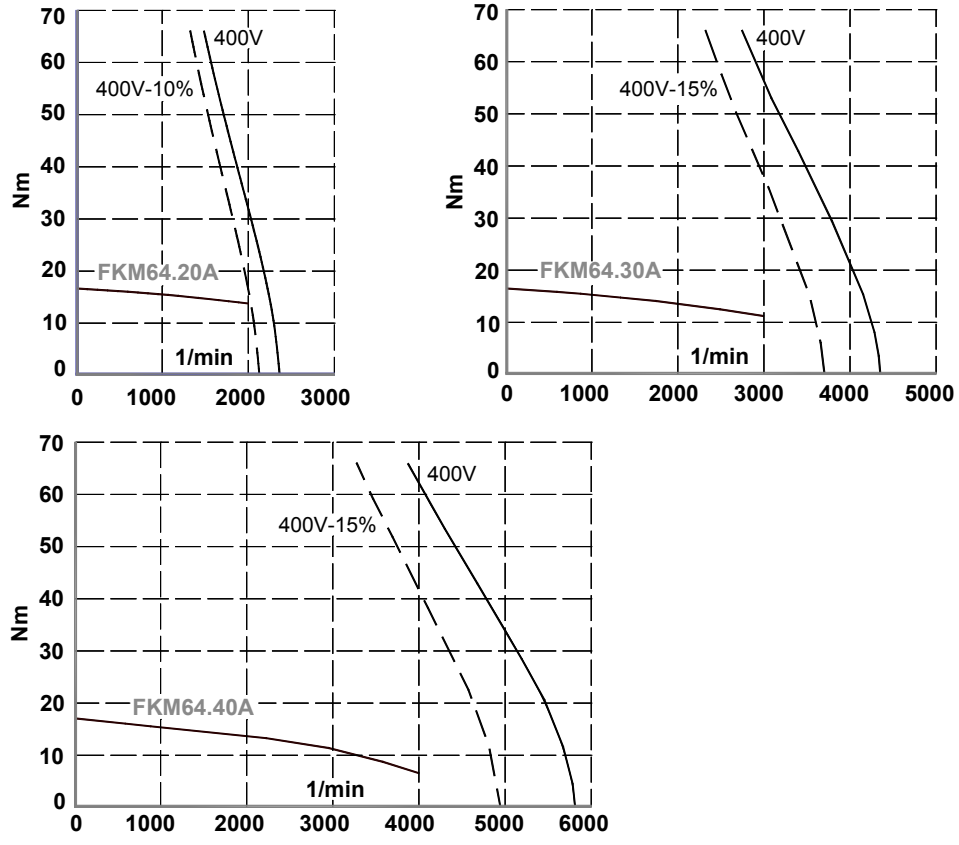
T- 3/17 Technical data of the FKM64.●● A.□□.□□□ motors.

Model			**FKM64.●●A.□□.□□□**			
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	Arms	6.5	12.1	16.2	
Peak current	Imax	Arms	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/Arms	2.53	1.36	1.0	
Acceleration time	tac	ms	9.3	14.0	18.7	
Inductance per phase (3-phase)	L	mH	13.16	3.8	2.1	
Resistance per phase	R	Ω	0.935	0.28	0.16	
Inertia (without brake)	J	kg·cm²	29.50	29.50	29.50	
Inertia (with brake)	J*	kg·cm²	30.65	30.65	30.65	
Mass (without brake)	P	kg	17.1	17.1	17.1	
Mass (with brake)	P*	kg	18.0	18.0	18.0	

T- 3/18 Selection of FAGOR drives for FKM64.●● A.□□.□□□ motors.

Drive peak torque in Nm	**1.25**		**1.35**		**2.50**		**2.75**		**3.100**			
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo				
FKM64.20A	63.2	3.8	**66.0**	**4.0**	-	-	-	-	-	-		
FKM64.30A	34.0	2.0	47.6	2.8	63.9	3.8	**66.0**	**4.0**	-	-		
FKM64.40A	-	-	35.0	2.1	47.0	2.8	63.0	3.8	**66.0**	**4.0**		

NOTE. To select a ACSD-xxH, MCS-xxH or MCP-xxH drive with any motor of this series, refer to the manual of the corresponding drive.



F- 3/32

Torque-speed graphs FKM64.●● A.□□.□□□ models.

FKM66 models

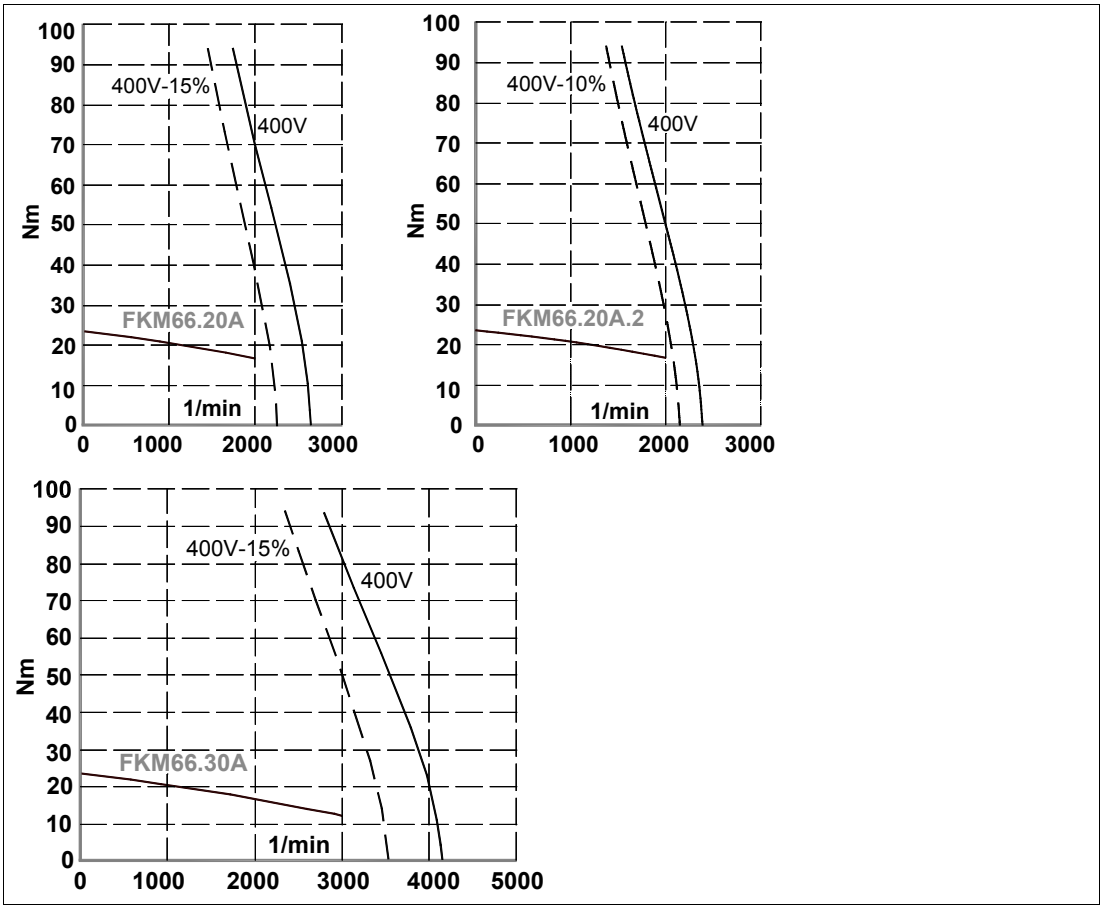
T- 3/19 Technical data of the FKM66.●●A.□□.□□□ motors.

Model			**FKM66.●●A.□□.□□□**			
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	Arms	10.5	9.4	16.4	
Peak current	Imax	Arms	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/Arms	2.2	2.5	1.4	
Acceleration time	tac	ms	9.5	9.57	14.3	
Inductance per phase (3-phase)	L	mH	4.6	8.82	2.6	
Resistance per phase	R	Ω	0.41	0.52	0.17	
Inertia (without brake)	J	kg·cm²	43	43	43	
Inertia (with brake)	J*	kg·cm²	44.15	44.15	44.15	
Mass (without brake)	P	kg	22.3	22.3	22.3	
Mass (with brake)	P*	kg	23.2	23.2	23.2	

T- 3/20 Selection of FAGOR drives for FKM66.●●A.□□.□□□ motors.

Drive peak torque in Nm	**1.25**		**1.35**		**2.50**		**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	67.2	2.8	**94.0**	**4.0**				

NOTE. To select a ACSD-xxH, MCS-xxH or MCP-xxH drive with any motor of this series, refer to the manual of the corresponding drive.



F- 3/33

Torque-speed graphs. FKM66.●●A.□□.□□□ models.

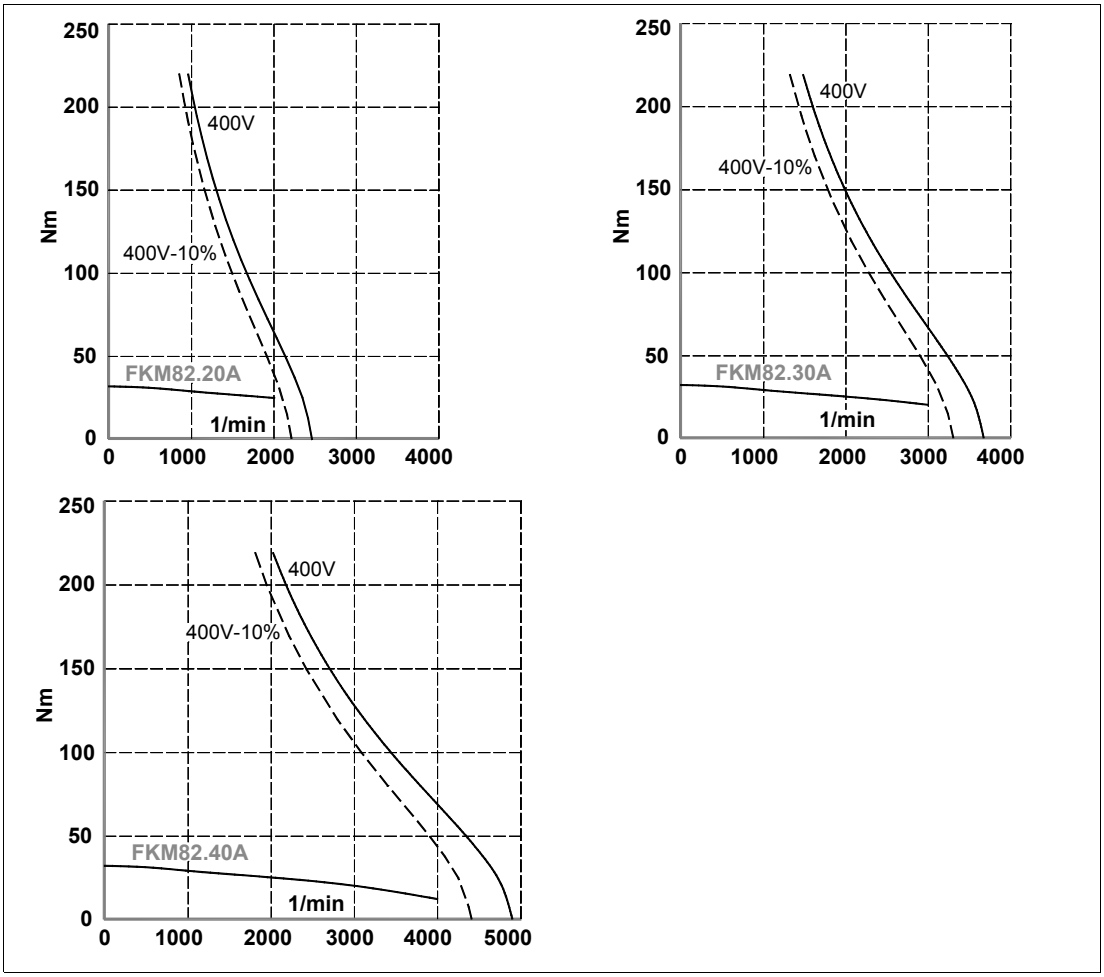
FKM82 models

T- 3/21 Technical data of the FKM82.●●A.□□.□□□ motors.

Model			**FKM82.●●A.□□.□□□**			
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	Arms	13.2	19.8	26.4	
Peak current	Imax	Arms	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/Arms	2.42	1.61	1.21	
Acceleration time	tac	ms	22.4	33.6	44.9	
Inductance per phase (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·cm²	103.0	103.0	103.0	
Inertia (with brake)	J*	kg·cm²	134.8	134.8	134.8	
Mass (without brake)	P	kg	31	31	31	
Mass (with brake)	P*	kg	36	36	36	

T- 3/22 Selection of FAGOR drives for FKM82.●●A.□□.□□□ motors.

Drive peak torque in Nm	**1.25**		**1.35**		**2.50**		**2.75**		**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	-	-	-	-	75.6	2.3	**96.0**	**3.0**	-	-		
FKM82.40A	-	-	-	-	-	-	90.9	2.8	**96.0**	**3.0**		



F- 3/34

Torque-speed graphs. FKM82.●●A.□□.□□□ models.

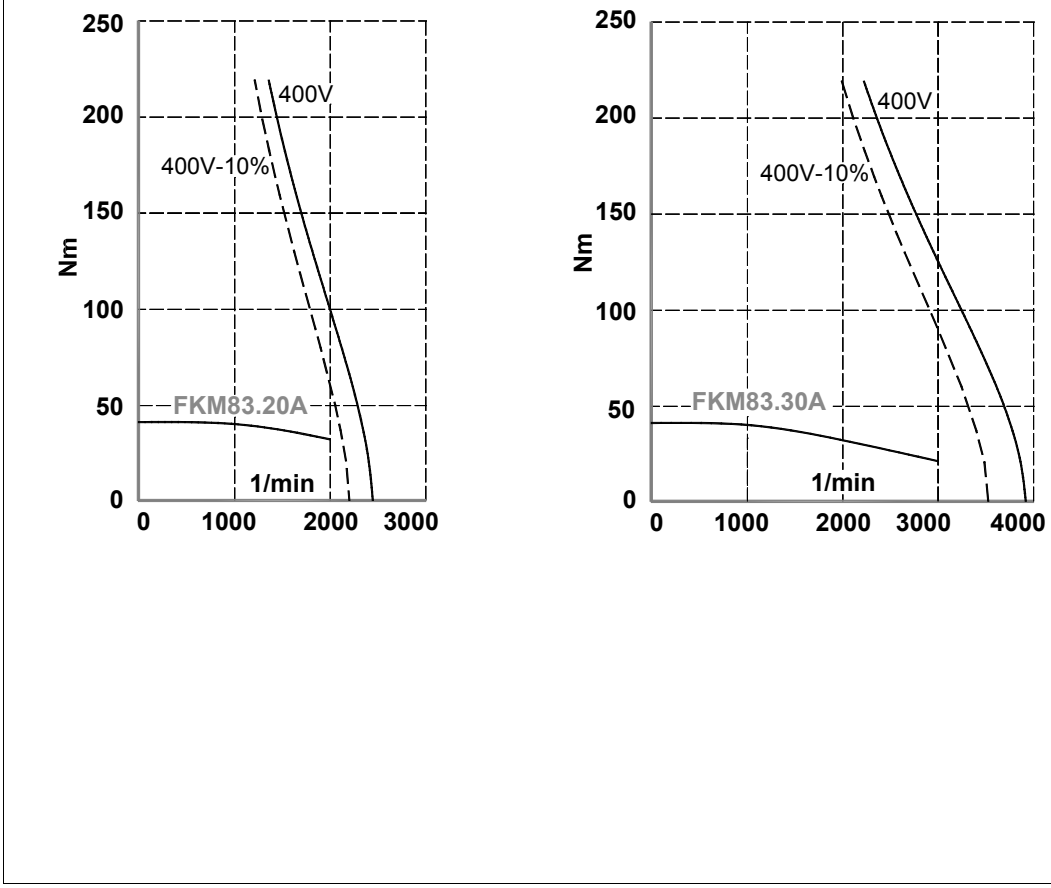
FKM83 models

T- 3/23 Technical data of the FKM83.●●A.□□.□□□ motors.

Model			**FKM83.●●A.□□.□□□**			
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	Arms	17.0	27.1		
Peak current	Imax	Arms	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/Arms	2.41	1.51		
Acceleration time	tac	ms	25.5	38.3		
Inductance per phase (3-phase)	L	mH	4.6	1.8		
Resistance per phase	R	Ω	0.265	0.100		
Inertia (without brake)	J	kg·cm²	150.0	150.0		
Inertia (with brake)	J*	kg·cm²	181.8	181.8		
Mass (without brake)	P	kg	41	41		
Mass (with brake)	P*	kg	46	46		

T- 3/24 Selection of FAGOR drives for FKM83.●●A.□□.□□□ motors.

Drive peak torque in Nm	**1.25**		**1.35**		**2.50**		**2.75**		**3.100**	
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo
FKM83.20A	-	-	84.3	2.0	113.3	2.7	**123.0**	**3.0**	-	-
FKM83.30A	-	-	-	-	-	-	113.4	2.7	**123.0**	**3.0**



F- 3/35

Torque-speed graphs. FKM83.●●A.□□.□□□ models.

FAGOR

FXM/FKM

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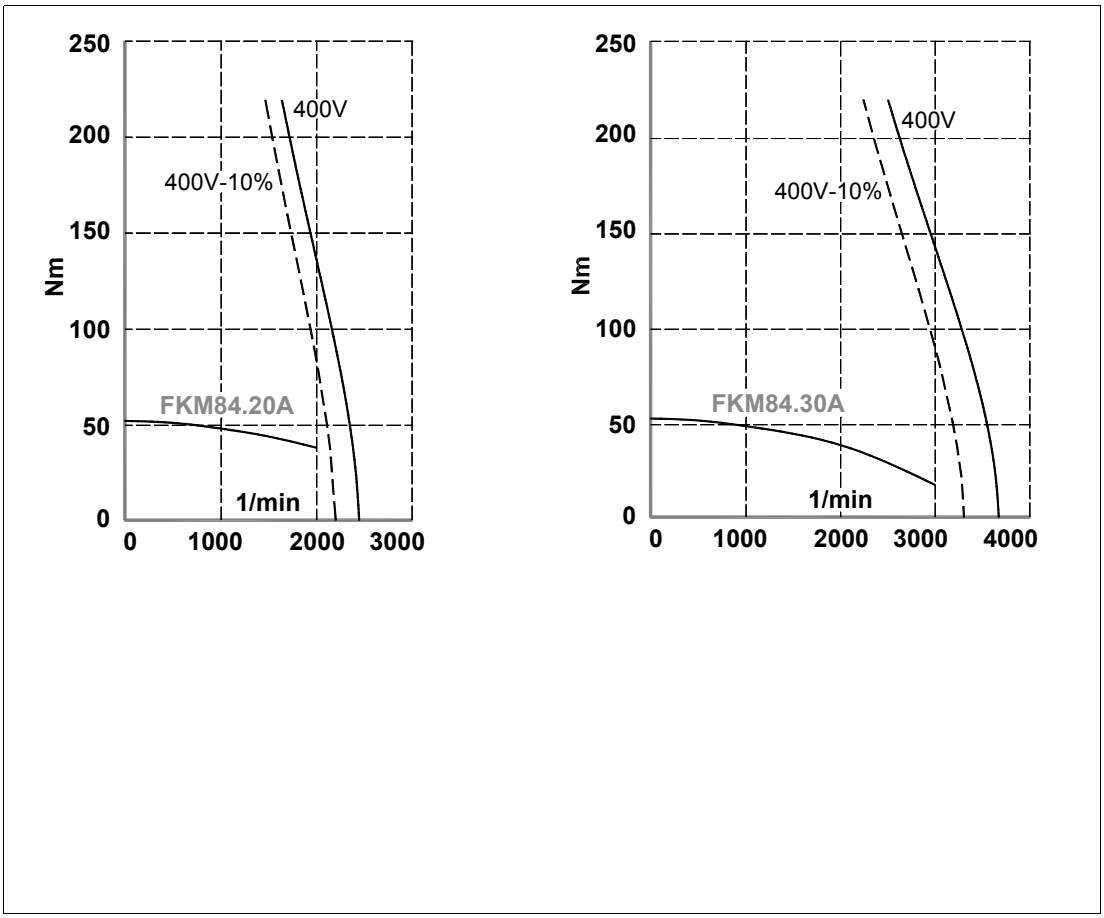
FKM84 models

T- 3/25 Technical data of the FKM84.●●A.□□.□□□ motors.

Model			**FKM84.●●A.□□.□□□**			
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	Arms	21.5	32.2		
Peak current	Imax	Arms	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/Arms	2.41	1.61		
Acceleration time	tac	ms	26.4	39.6		
Inductance per phase (3-phase)	L	mH	3.4	1.5		
Resistance per phase	R	Ω	0.18	0.08		
Inertia (without brake)	J	kg·cm²	197.0	197.0		
Inertia (with brake)	J*	kg·cm²	228.8	228.8		
Mass (without brake)	P	kg	50	50		
Mass (with brake)	P*	kg	55	55		

T- 3/26 Selection of FAGOR drives for FKM84.●●A.□□.□□□ motors.

Drive peak torque in Nm	**1.25**		**1.35**		**2.50**		**2.75**		**3.100**	
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo
FKM84.20A	-	-	-	-	113.6	2.1	**156.0**	**3.0**	-	-
FKM84.30A	-	-	-	-	-	-	121.1	2.3	**123.0**	**3.0**



F- 3/36

Torque-speed graphs. FKM84.●●A.□□.□□□ models.

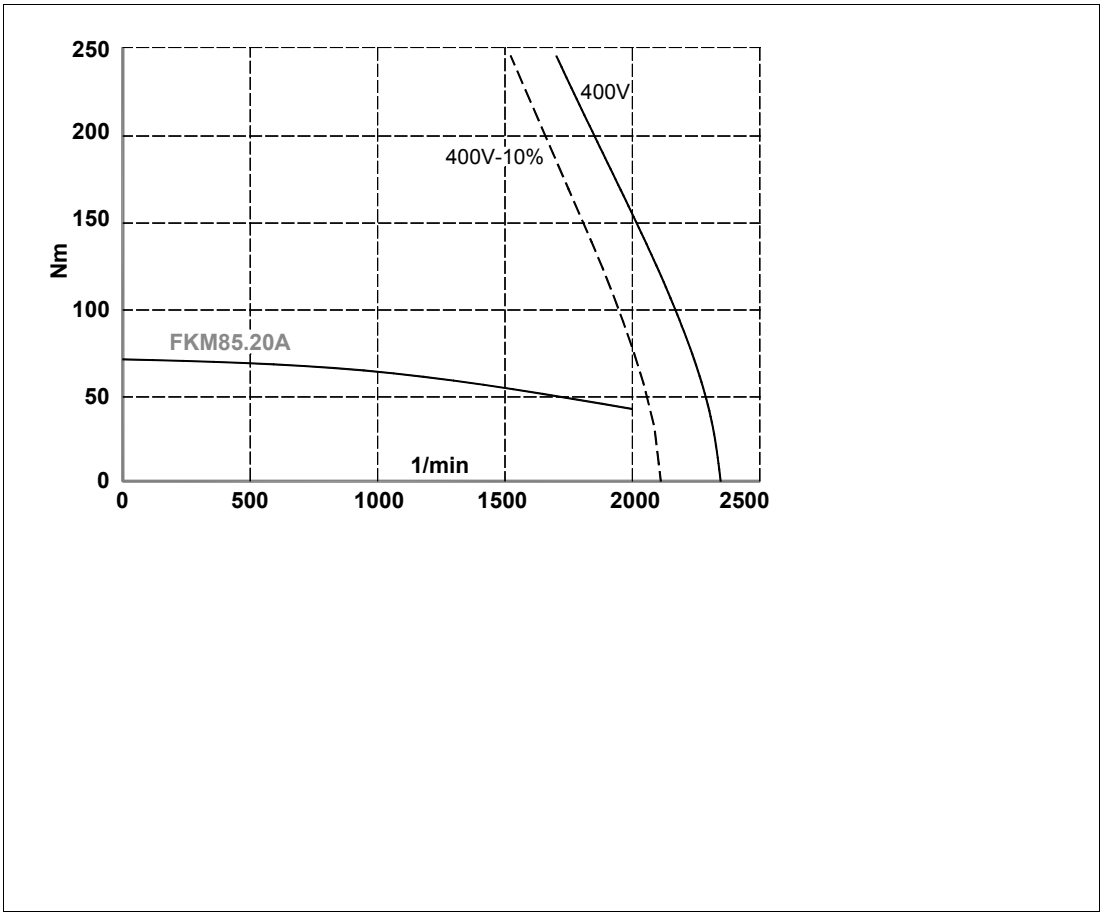
FKM85 models

T- 3/27 Technical data of the FKM85.●●A.□□.□□□ motors.

Model			**FKM85.●●A.□□.□□□**			
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	Arms	29.3			
Peak current	Imax	Arms	87.0			
Calculation power	Pcal	kW	15.5			
Rated power	Pn	kW	15.5			
Torque constant	Kt	N·m/Arms	2.52			
Acceleration time	tac	ms	22.91			
Inductance per phase (3-phase)	L	mH	2.9			
Resistance per phase	R	Ω	0.14			
Inertia (without brake)	J	kg·cm²	243.0			
Inertia (with brake)	J*	kg·cm²	274.8			
Mass (without brake)	P	kg	60			
Mass (with brake)	P*	kg	65			

T- 3/28 Selection of FAGOR drives for FKM85.●●A.□□.□□□ motors.

Drive peak torque in Nm	**1.25**		**1.35**		**2.50**		**2.75**		**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- 3/37

Torque-speed graphs. FKM85.●●A.□□.□□□ models.

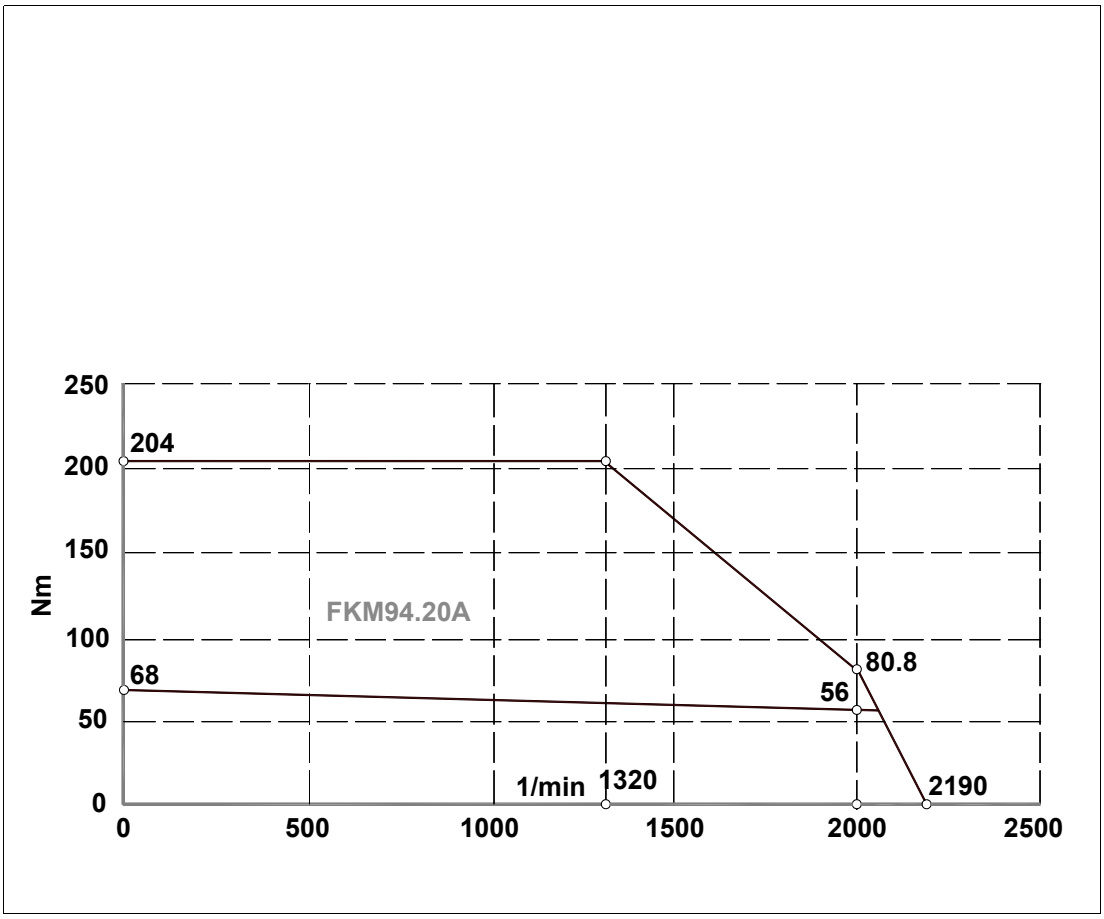
FKM94 models

T- 3/29 Technical data of the FKM94.●●A.□□.□□0 motors.

Model			**FKM94.●●A.□□.□□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	Arms	25.4			
Peak current	Imax	Arms	99			
Calculation power	Pcal	kW	14.2			
Rated power	Pn	kW	11.7			
Torque constant	Kt	N·m/Arms	2.7			
Acceleration time	tac	ms	11.69			
Inductance per phase (3-phase)	L	mH	3.15			
Resistance per phase	R	Ω	0.12			
Inertia (without brake)	J	kg·cm²	430			
Inertia (with brake)	J*	kg·cm²	483			
Mass (without brake)	P	kg	56.0			
Mass (with brake)	P*	kg	65.5			

T- 3/30 Selection of FAGOR drives for FKM94.●●A.□□.□□0 motors.

Drive peak torque in Nm	**1.35**		**2.50**		**2.75**		**3.100**					
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo				
FKM94.20A	-	-	-	-	170.1	2.5	**204**	**3.0**				



F- 3/38

Torque-speed graphs. FKM94.●●A.□□.□□0 models.

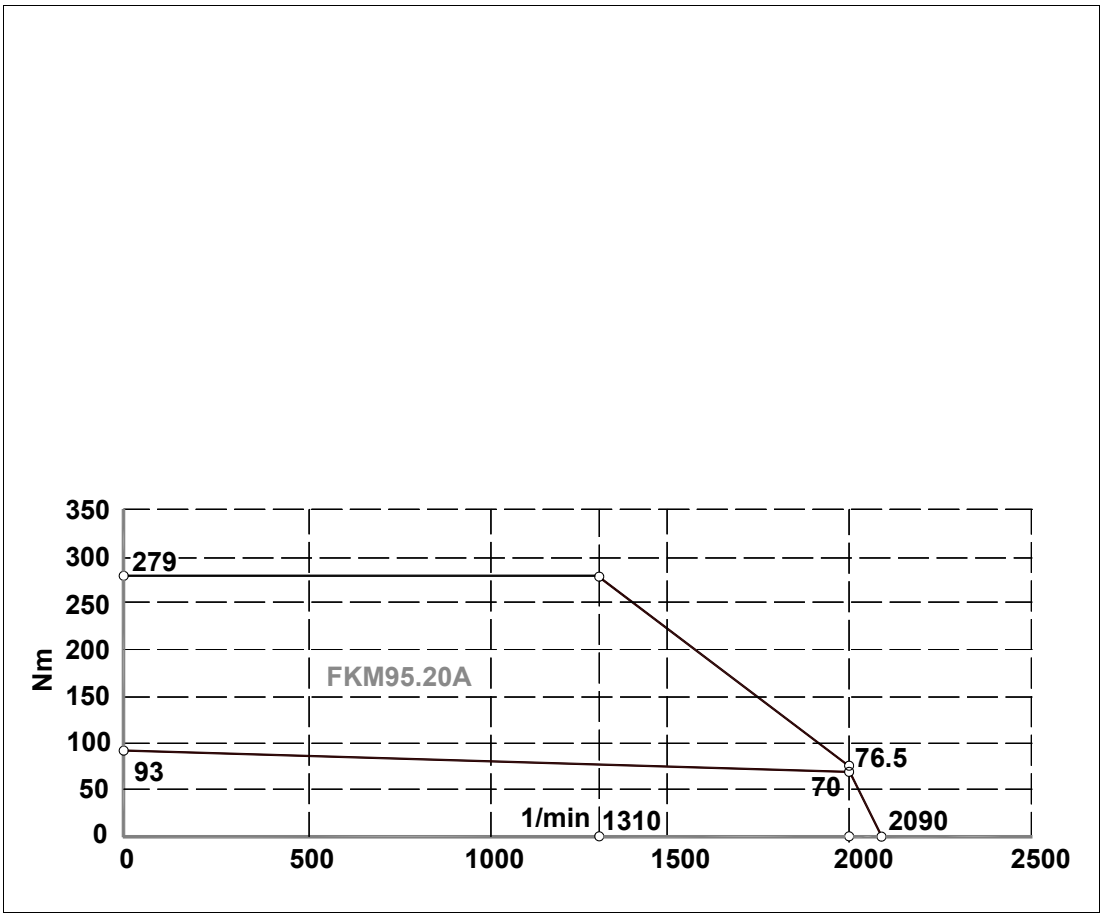
FKM95 models

T- 3/31 Technical data of the FKM95.●●A.□□.□□0 motors.

Model			**FKM95.●●A.□□.□□0**			
Terminology	**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	Arms	33.1			
Peak current	Imax	Arms	129			
Calculation power	Pcal	kW	19.5			
Rated power	Pn	kW	14.7			
Torque constant	Kt	N·m/Arms	2.8			
Acceleration time	tac	ms	11.48			
Inductance per phase (3-phase)	L	mH	2.4			
Resistance per phase	R	Ω	0.075			
Inertia (without brake)	J	kg·cm²	550			
Inertia (with brake)	J*	kg·cm²	603			
Mass (without brake)	P	kg	73.0			
Mass (with brake)	P*	kg	92.5			

T- 3/32 Selection of FAGOR drives for FKM95.●●A.□□.□□0 motors.

Drive peak torque in Nm	**1.35**		**2.50**		**2.75**		**3.100**					
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo				
FKM95.20A	-	-	-	-	176.4	1.9	**279.0**	**3.0**				



F- 3/39

Torque-speed graphs. FKM95.●●A.□□.□□0 models.

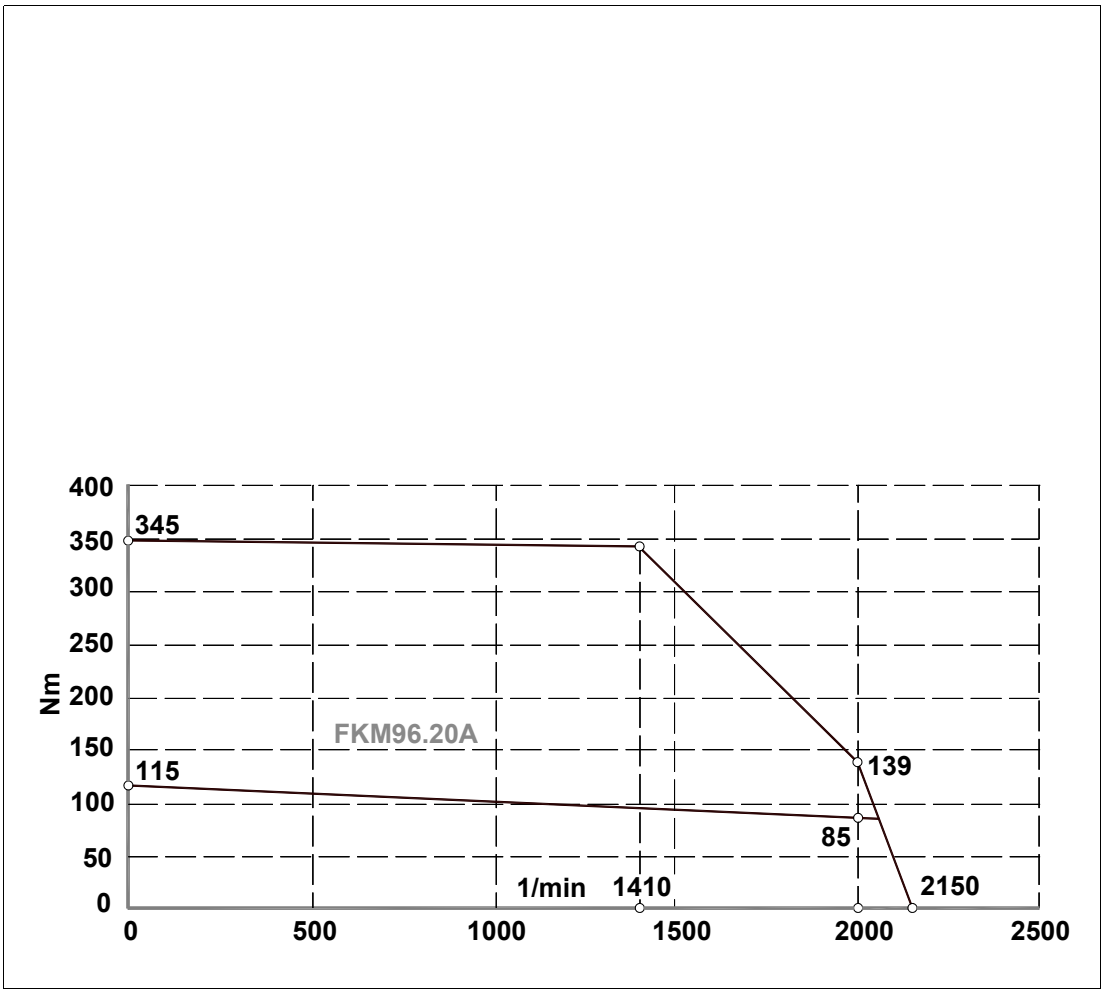
FKM96 models

T- 3/33 Technical data of the FKM96.●●A.□□.□□0 motors.

Model			**FKM96.●●A.□□.□□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	Arms	42.1			
Peak current	Imax	Arms	164			
Calculation power	Pcal	kW	24			
Rated power	Pn	kW	17.8			
Torque constant	Kt	N·m/Arms	2.7			
Acceleration time	tac	ms	11.52			
Inductance per phase (3-phase)	L	mH	1.7			
Resistance per phase	R	Ω	0.055			
Inertia (without brake)	J	kg·cm²	660			
Inertia (with brake)	J*	kg·cm²	-			
Mass (without brake)	P	kg	89			
Mass (with brake)	P*	kg	-			

T- 3/34 Selection of FAGOR drives for FKM96.●●A.□□.□□0 motors.

Drive peak torque in Nm	**1.35**		**2.50**		**2.75**		**3.100**		**3.150**			
	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo	Mp	Mp/Mo		
FKM96.20A	-	-	-	-	-	-	270.0	2.35	334.8	2.91		



F- 3/40

Torque-speed graphs. FKM96.●●A.□□.□□0 models.

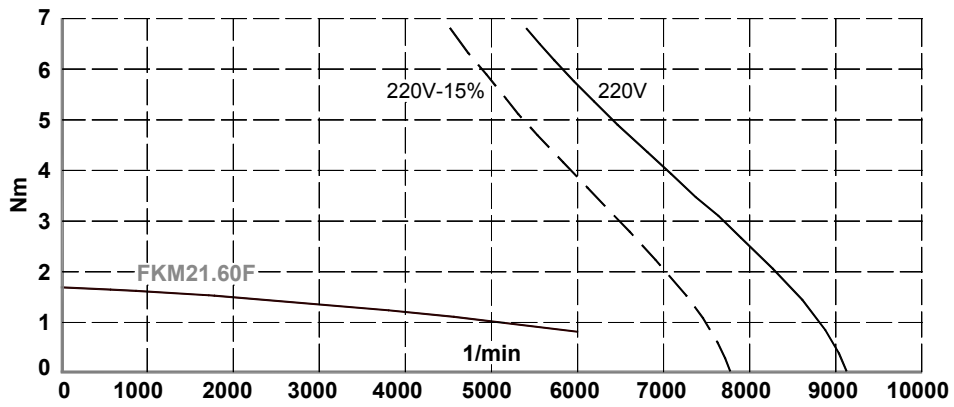
FKM with “F” winding (220 V AC)

FKM21 models

T- 3/35 Technical data of the FKM21.●●F.□□.□□□ motors.

Model						**FKM21.●●F.□□.□□□**
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	Arms				4.7
Peak current	Imax	Arms				19
Calculation power	Pcal	kW				1.0
Rated power	Pn	kW				0.5
Torque constant	Kt	N·m/Arms				0.36
Acceleration time	tac	ms				14.3
Inductance per phase (3-phase)	L	mH				2.6
Resistance per phase	R	Ω				0.885
Inertia (without brake)	J	kg·cm²				1.6
Inertia (with brake)	J*	kg·cm²				1.72
Mass (without brake)	P	kg				4.20
Mass (with brake)	P*	kg				4.48

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



F- 3/41

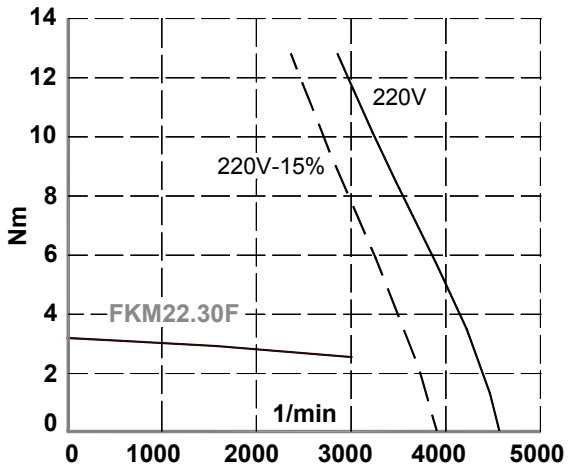
Torque-speed graphs. FKM21.●● F.□□.□□□ models.

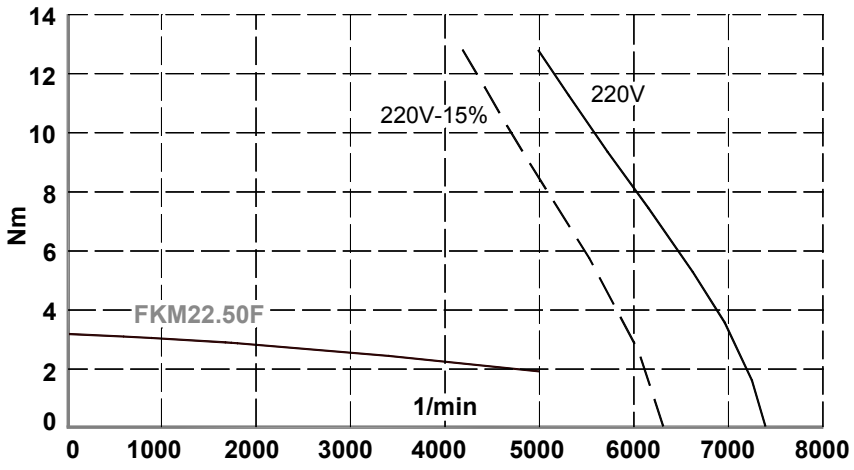
FKM22 models

T- 3/36 Technical data of the FKM22.●● F.□□.□□□ motors.

Model			**FKM22.●●F.□□.□□□**			
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	Arms	4.5		7.2	
Peak current	Imax	Arms	18		29	
Calculation power	Pcal	kW	1.0		1.7	
Rated power	Pn	kW	0.8		1.0	
Torque constant	Kt	N·m/Arms	0.71		0.44	
Acceleration time	tac	ms	7.0		11.7	
Inductance per phase (3-phase)	L	mH	4.6		1.7	
Resistance per phase	R	Ω	1.1		0.425	
Inertia (without brake)	J	kg·cm²	2.9		2.9	
Inertia (with brake)	J*	kg·cm²	3.02		3.02	
Mass (without brake)	P	kg	5.3		5.3	
Mass (with brake)	P*	kg	5.58		5.58	

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





F- 3/42

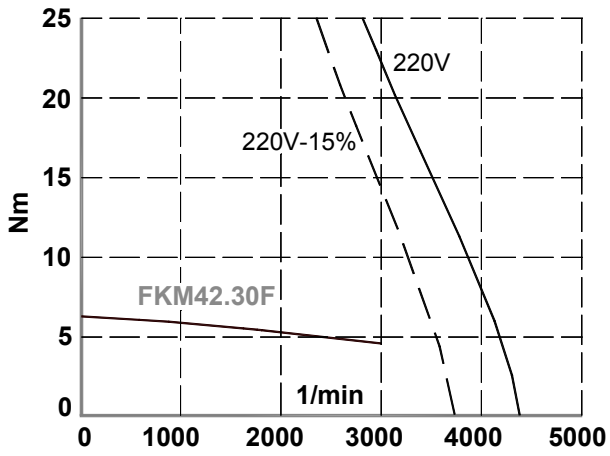
Torque-speed graphs. FKM22.●● F.□□.□□□ models.

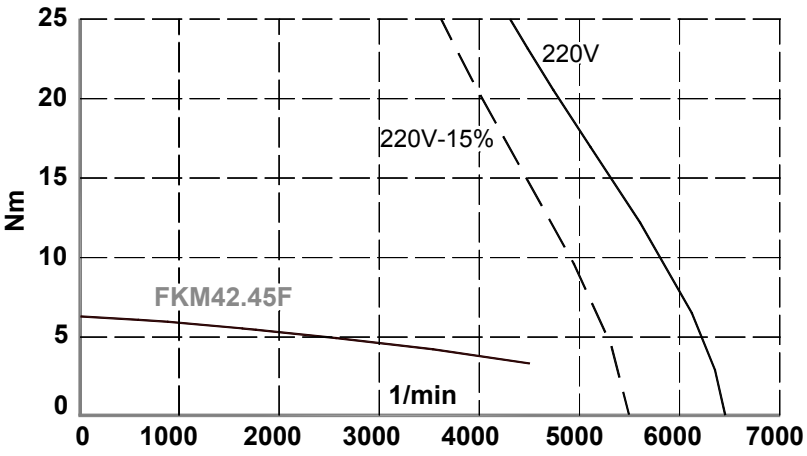
FKM42 models

T- 3/37 Technical data of the FKM42.●●F.□□.□□□ motors.

Model			**FKM42.●●F.□□.□□□**			
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	Arms	8.5	12.4		
Peak current	Imax	Arms	34	50		
Calculation power	Pcal	kW	2.0	3.0		
Rated power	Pn	kW	1.4	1.5		
Torque constant	Kt	N·m/Arms	0.74	0.51		
Acceleration time	tac	ms	10.7	16.0		
Inductance per phase (3-phase)	L	mH	2.6	1.2		
Resistance per phase	R	Ω	0.45	0.21		
Inertia (without brake)	J	kg·cm²	8.5	8.5		
Inertia (with brake)	J*	kg·cm²	9.04	9.04		
Mass (without brake)	P	kg	7.80	7.80		
Mass (with brake)	P*	kg	8.26	8.26		

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





F- 3/43

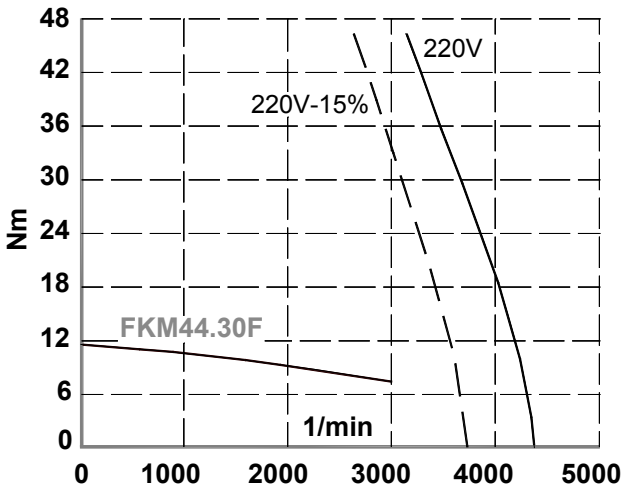
Torque-speed graphs. FKM42.●● F.□□.□□□ models.

FKM44 models

T- 3/38 Technical data of the FKM44.●●F.□□.□□□ motors.

Model			**FKM44.●●F.□□.□□□**			
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	Arms	15.6			
Peak current	Imax	Arms	62			
Calculation power	Pcal	kW	3.6			
Rated power	Pn	kW	2.3			
Torque constant	Kt	N·m/Arms	0.74			
Acceleration time	tac	ms	11.2			
Inductance per phase (3-phase)	L	mH	1.2			
Resistance per phase	R	Ω	0.15			
Inertia (without brake)	J	kg·cm²	16.7			
Inertia (with brake)	J*	kg·cm²	17.24			
Mass (without brake)	P	kg	11.70			
Mass (with brake)	P*	kg	12.16			

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



F- 3/44

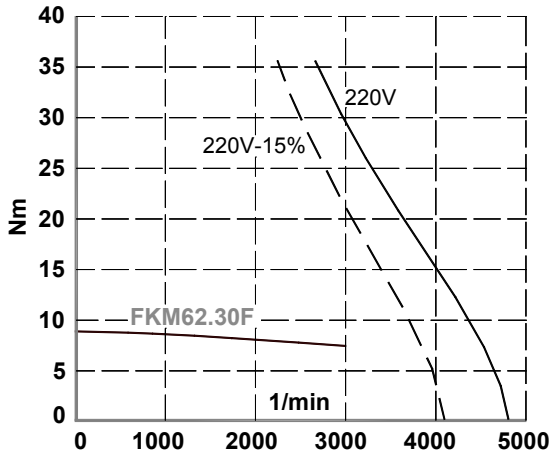
Torque-speed graphs. FKM44.●● F.□□.□□□ models.

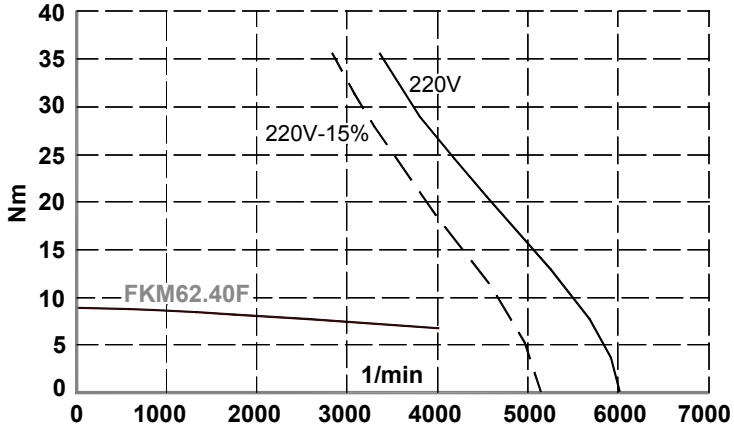
FKM62 models

T- 3/39 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	Arms		13.1	16.4	
Peak current	Imax	Arms		52	66	
Calculation power	Pcal	kW		2.8	3.7	
Rated power	Pn	kW		2.4	2.8	
Torque constant	Kt	N·m/Arms		0.68	0.54	
Acceleration time	tac	ms		14.3	19.1	
Inductance per phase (3-phase)	L	mH		2.1	1.3	
Resistance per phase	R	Ω		0.225	0.18	
Inertia (without brake)	J	kg·cm²		16	16	
Inertia (with brake)	J*	kg·cm²		17.15	17.15	
Mass (without brake)	P	kg		11.9	11.9	
Mass (with brake)	P*	kg		12.8	12.8	

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





F- 3/45

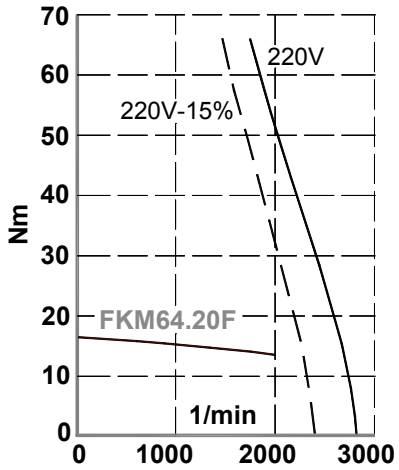
Torque-speed graphs. FKM62.●● F.□□.□□□ models.

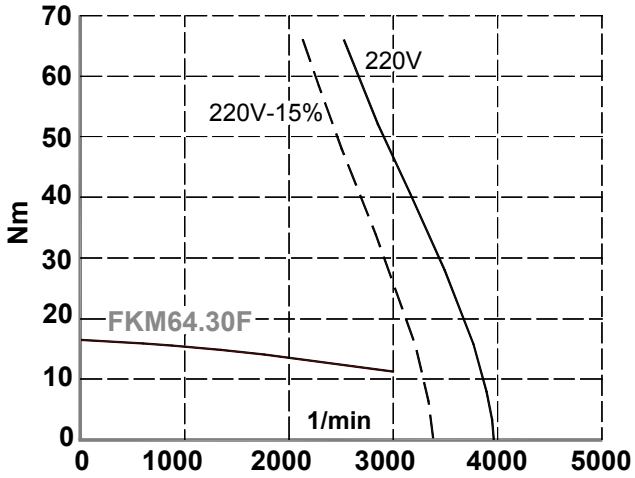
FKM64 models

T- 3/40 Technical data of the FKM64.●●F.□□.□□□ motors.

Model			**FKM64.●●F.□□.□□□**			
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	Arms	14.3	20.0		
Peak current	Imax	Arms	57	80		
Calculation power	Pcal	kW	3.4	5.1		
Rated power	Pn	kW	2.8	3.5		
Torque constant	Kt	N·m/Arms	1.15	0.82		
Acceleration time	tac	ms	9.3	14.0		
Inductance per phase (3-phase)	L	mH	2.7	1.3		
Resistance per phase	R	Ω	0.205	0.145		
Inertia (without brake)	J	kg·cm²	29.5	29.5		
Inertia (with brake)	J*	kg·cm²	30.65	30.65		
Mass (without brake)	P	kg	17.1	17.1		
Mass (with brake)	P*	kg	18.0	18.0		

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





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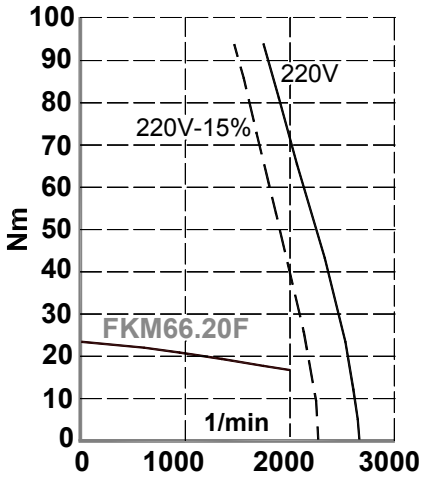
Torque-speed graphs. FKM64.●● F.□□.□□□ models.

FKM66 models

T- 3/41 Technical data of the FKM66.●●F.□□.□□□ motors.

Model			**FKM66.●●F.□□.□□□**			
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	Arms	19.2			
Peak current	Imax	Arms	76.8			
Calculation power	Pcal	kW	4.9			
Rated power	Pn	kW	3.5			
Torque constant	Kt	N·m/Arms	1.22			
Acceleration time	tac	ms	9.57			
Inductance per phase (3-phase)	L	mH	0.8			
Resistance per phase	R	Ω	0.135			
Inertia (without brake)	J	kg·cm²	43.0			
Inertia (with brake)	J*	kg·cm²	44.15			
Mass (without brake)	P	kg	22.3			
Mass (with brake)	P*	kg	23.2			

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



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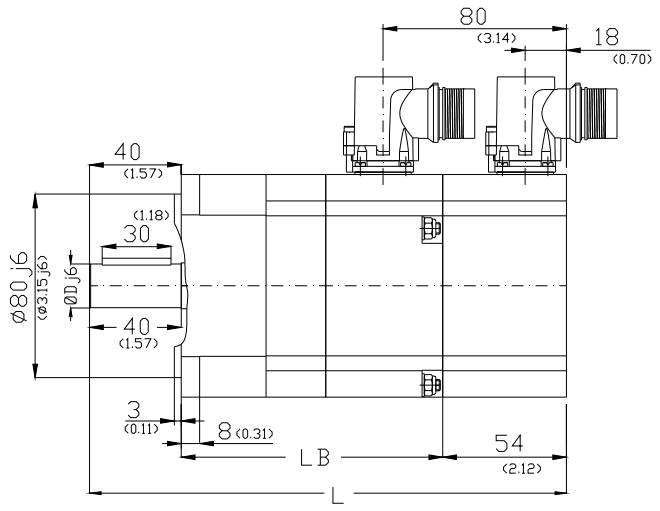
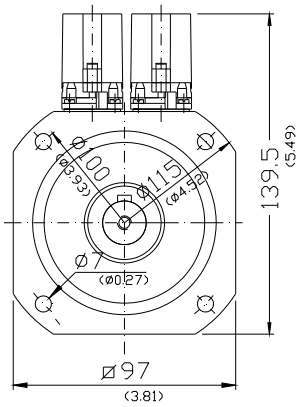
Torque-speed graphs. FKM66.●● F.□□.□□□ models.

3.10 Dimensions

FKM2 series





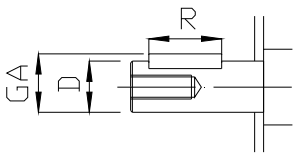
Dimension	LB		L	
Units	mm	inches	mm	inches
FKM21	114	4.48	208	8.19
FKM22	138	5.43	232	9.13

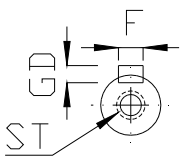
Dimensions in mm (inches)

F- 3/48

Dimensions of FKM servomotors. FKM2 series.

Dimension	ØD j6	
Units	mm	inches
FKM2	19	0.74





Dimension	F		GD		R		GA		ST
Units	mm	inches	mm	inches	mm	inches	mm	inches	mm
FKM2	6	0.23	6	0.23	30	1.18	21.5	0.84	M6x16

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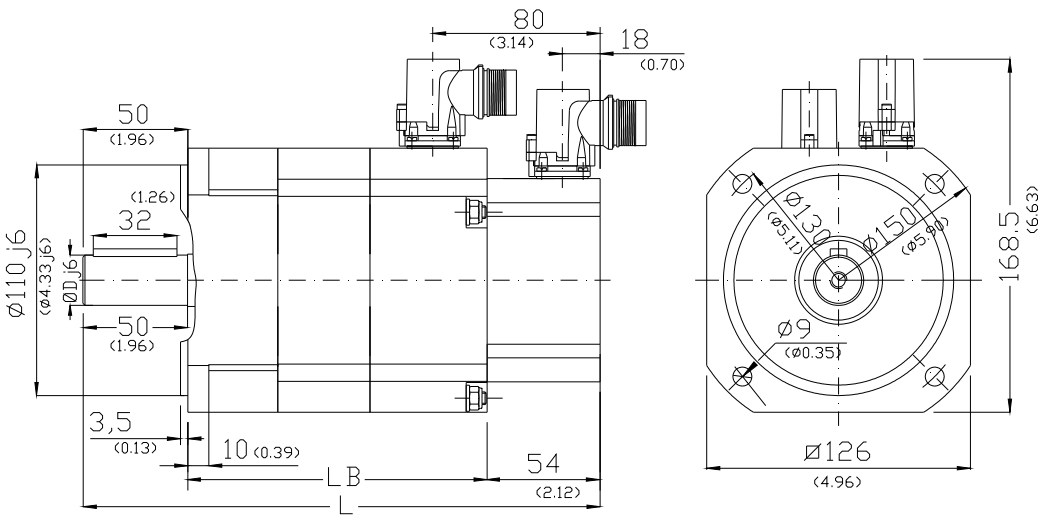
Dimensions of the shaft extension on FKM servomotors. FKM2 series.

FKM4 series



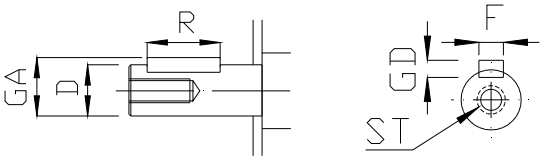
Dimension	LB		L	
Units	mm	inches	mm	inches
FKM42	143	5.63	247	9.72
FKM44	185	7.28	289	11.38

Dimensions in mm (inches)

F- 3/50

Dimensions of FKM servomotors. FKM4 series.

Dimension	ØD j6	
Units	mm	inches
FKM4	24	0.94



Dimension	F		GD		R		GA		ST
Units	mm	inches	mm	inches	mm	inches	mm	inches	mm
FKM4	8	0.31	7	0.27	40	1.57	27	1.06	M8x19

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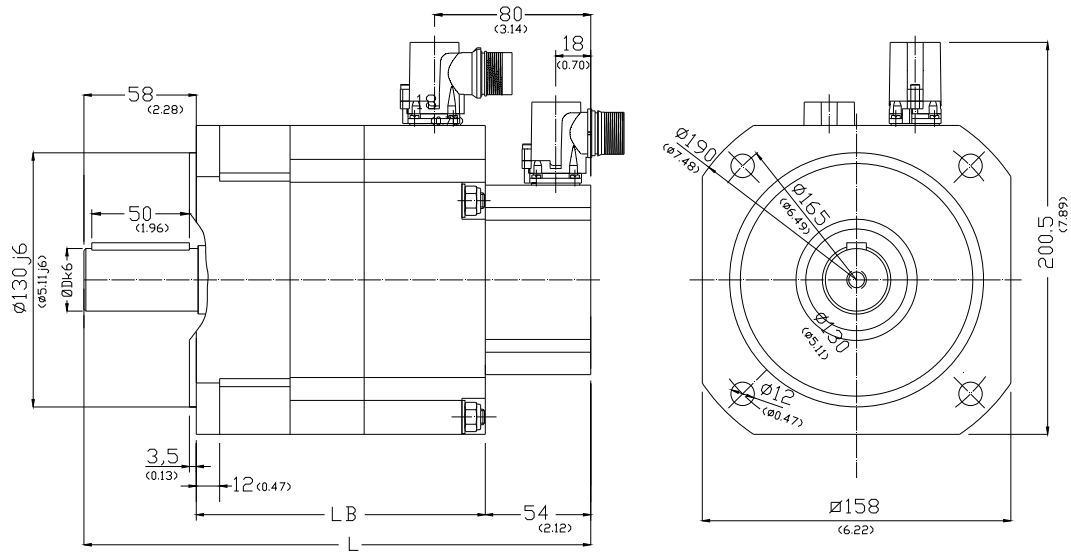
Dimensions of the shaft extension on FKM servomotors. FKM4 series.

FKM6 series



Dimension	LB		L	
Units	mm	inches	mm	inches
FKM62	148	5.82	260	10.24
FKM64	184	7.24	296	11.65
FKM66	220	8.66	332	13.07

Dimensions in mm (inches)

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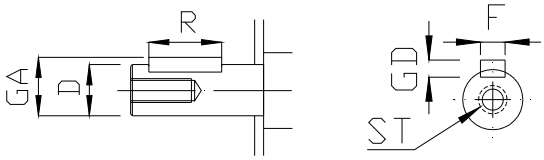
Dimensions of FKM servomotors. FKM6 series.

Dimension	ØD k6	
Units	mm	inches
FKM6	32	1.26



Dimension	F		GD		R		GA		ST
Units	mm	inches	mm	inches	mm	inches	mm	inches	mm
FKM6	10	0.39	8	0.31	50	1.96	35	1.37	M10x22

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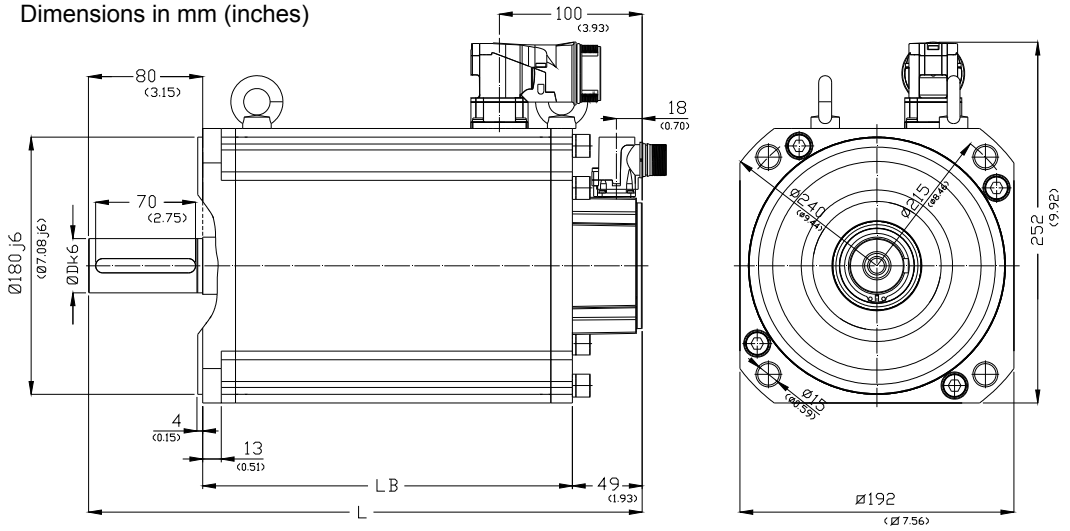
Dimensions of the shaft extension on FKM servomotors. FKM6 series.

FKM8 series

Dimensions in mm (inches)



	without brake				with brake			
Dimension	**LB**		**L**		**LB**		**L**	
Units	mm	inches	mm	inches	mm	inches	mm	inches
FKM82	259	10.19	388	15.27	309	12.16	438	17.24
FKM83	309	12.16	438	17.24	359	14.13	488	19.21
FKM84	359	14.13	488	19.21	409	16.10	538	21.18
FKM85	409	16.10	538	21.18	459	18.07	588	23.14

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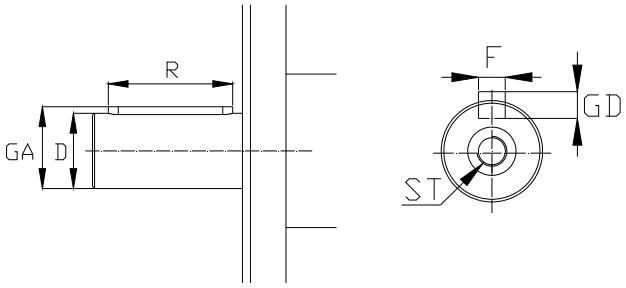
Dimensions of FKM servomotors. FKM8 series.

Dimension	**ØD k6**	
Units	mm	inches
FKM8	38	1.49



Dimension	**F**		**GD**		**R**		**GA**		**ST**
Units	mm	inches	mm	inches	mm	inches	mm	inches	mm
FKM8	10	0.39	8	0.31	70	2.75	41	1.61	M12x30

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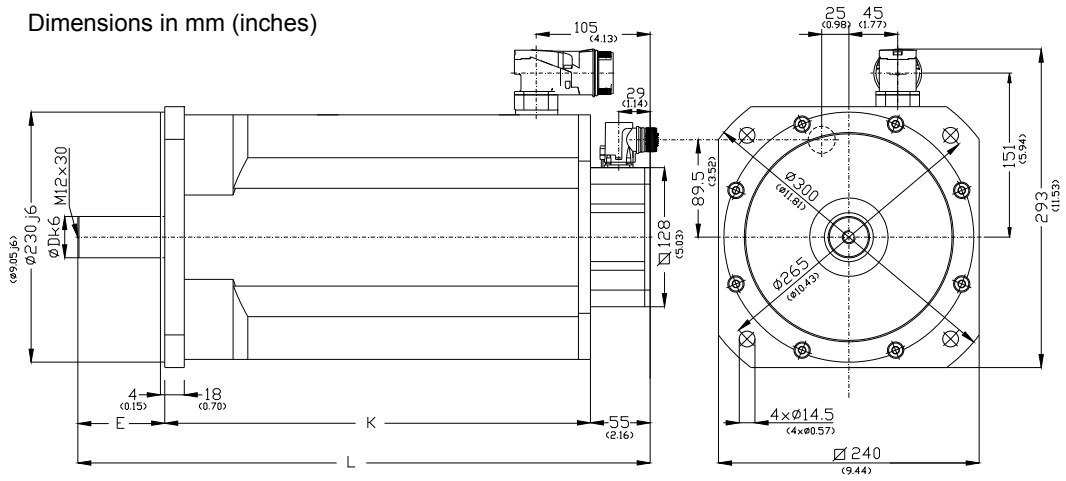
Dimensions of the shaft extension on FKM servomotors. FKM8 series.

FKM9 series

Dimensions in mm (inches)



Dimension	L without brake		L with brake		E without brake		E with brake		K without brake		K with brake	
Unit	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches	mm	inches
FKM94	582	22.9	676	26.6	80	3.1	80	3.1	447	17.5	541	21.3
FKM95	680	26.7	775	30.5	110	4.3	110	4.3	515	20.2	610	24.0
FKM96	748	29.4	-	-	110	4.3	-	-	583	22.9	-	-

The FKM96 model does not offer the brake option.

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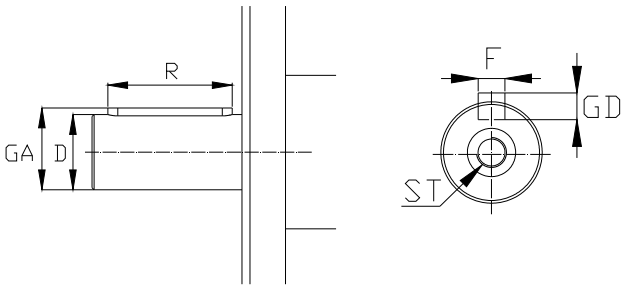
Dimensions of FKM servomotors. FKM9 series.



Dimension	ØD k6	
Units	mm	inches
FKM94	38	1.49
FKM95	42	1.65
FKM96	42	1.65

Dimension	F		GD		R		GA		ST
Units	mm	inches	mm	inches	mm	inches	mm	inches	mm
FKM94	10	0.39	8	0.31	63	2.48	41.4	1.62	M12x30
FKM95	12	0.47	8	0.31	63	2.48	45.2	1.77	M12x30
FKM96	12	0.47	8	0.31	63	2.48	45.2	1.77	M12x30

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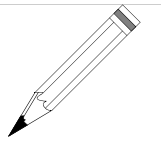
Dimensions of the shaft extension on FKM servomotors. FKM9 series.



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