FAGOR AUTOMATION

COMPACT QUICK REFERENCE

Ref.1601

· Original instructions ·

FAGOR

WARRANTY TERMS

INITIAL WARRANTY

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

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

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

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

FAGOR offers a 12-month period for the OEM or distributor for selling and installing the product. This means that the warranty starting date may be up to one year after the product has left our warehouse so long as the warranty control sheet has been sent back to us. This translates into the extension of warranty period to two years since the product left our warehouse.

If this sheet has not been sent to us, the warranty period ends 15 months from when the product left our warehouse.

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

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

EXCLUDING CLAUSES

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

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

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

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

SERVICE CONTRACTS

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

DUAL-USE products
Products manufactured by Fagor Automation S. Coop. included on the list of dual-use products according to regulation (UE) Nr 1382/2014. Their product identification includes the text -MDU and require an export license depending on destination.

SAFETY CONDITIONS

Read the following safety instructions in order to prevent harming people and damage to this product or to the products connected to it. FAGOR AUTOMATION shall not be held responsible of any physical or material damage originated from not complying with these basic safety rules.

MANDATORY. Always use the latest ·**man_dds_hard.pdf**· manual reference, available on FAGOR's corporate website. http://www.fagorautomation.com.

To obtain detailed information regarding the safety system of the DDS system, read the section on ·**SAFETY CONDITIONS**· of the ·**man_dds_hard.pdf**· manual.

Refer to **CHAPTER 9** of the ·**man_dds_hard.pdf**· manual for any information on ·**SAFETY FUNCTIONS**· of the DDS system.

WARNING. Do not access the inside of this unit.

Only personnel authorized by Fagor Automation may access the interior of this unit.

Do not handle the connectors while the unit is connected to mains

Before handling the connectors (mains, moving power, feedback, etc.) make sure that the unit is not connected to mains.

Use the right mains cables

In order to avoid risks, use only the mains cables recommended for this unit.

Avoid electrical shocks

To avoid electric shocks and the risk of fire, do not apply electrical voltage beyond the range indicated in this manual.

Ground connection

In order to avoid electrical shocks, connect the ground terminal of this unit to the main ground point. Also, before connecting the inputs and outputs, make sure that the ground connection has been done.

Before turning the unit on, make sure that it is connected to ground

In order to avoid electrical shocks, make sure that it has been connected to ground.

Ambient conditions

Respect the limits of temperature and relative humidity indicated in the technical characteristics of this manual.

Do not operate this unit in explosive environments

In order to avoid risks, harm or damages, do not work in explosive environments.

Working environment

These electrical units are ready to be used in industrial environments and comply with the current Directives and regulations of the European Community.

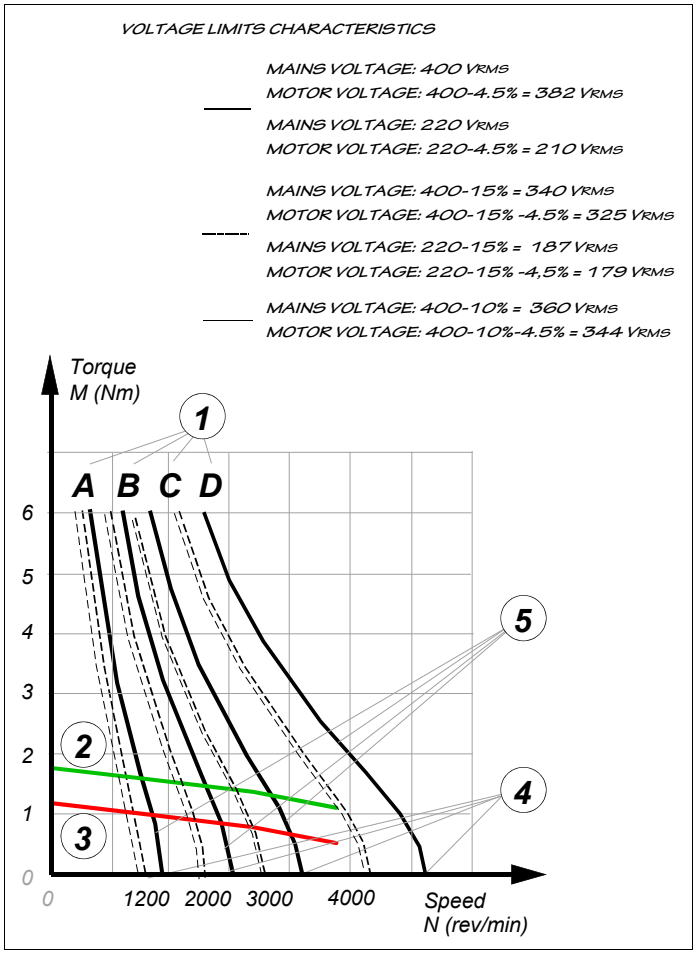
Electrical cabinet. Diagrams

DANGER. The diagrams of this manual do not meet the European Machinery Directive 2006/42/EC. Complying with the European Machinery Directive usually requires PL d or SIL 2 (milling machines and lathes). The AXD/SPD reaches PL d or SIL 2 (see models in the Declaration of Conformity). An external safety controller PL d or SIL 2 is necessary as well as bearing in mind the concepts in ·**CHAPTER 9. SAFETY FUNCTIONS**· of the ·**man_dds_hard.pdf**·.

SYNCHRONOUS MOTORS

ELECTRICAL CHARACTERISTICS

Electrical limitations for a synchronous motor



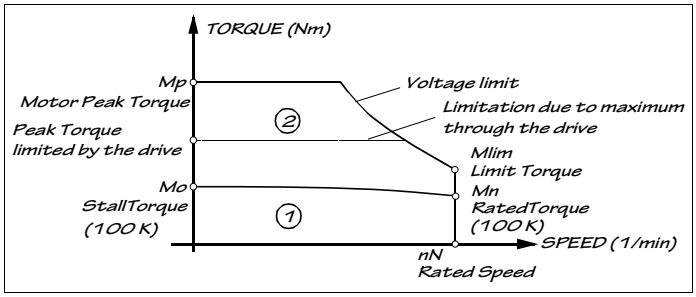
1. Curves for torque limitation by voltage depending on type of stator winding.
2. Curve for thermal torque limitation in continuous duty S1 (100 K) with fan where ΔT=100 K at the winding.
3. Curve for thermal torque limitation in continuous duty S1 (100 K) without fan where ΔT=100 K at the winding.
4. Maximum turning speed limitation (in voltage) Nmax.
5. Voltage saturation curves.

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

Electrical limitations for a motor-drive combination

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

ZONE 2. Is the intermittent duty zone.



DEFINITIONS

Mo. Stall torque. 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 rotor turning speed for an unlimited time period. The stall torque Mo is always greater than the rated torque Mnom.

Io. Stall current. Current circulating through each phase of the stator winding required to generated the stall torque Mo. This current can circulate for an unlimited time.

Mn. Rated torque.Torque that the motor can supply continuously at its rated speed and is thermally limited by the temperature increase at the stator winding (ΔT=100 K).

In. Rated current. Current circulating through each phase of the stator winding required to generated the rated torque Mrated.

Pn. Rated power. Power available at rated speed and rated torque. Its value is given in watts by expression: Mn·nN/9550 where Pn (in kW), Mn (in Nm) and nN (in rev/min).

Nmax. Maximum speed. Rotor turning speed limitation due to electrical restrictions (voltage limits). Note that the maximum value for this speed is shown in the torque-speed curves given in this manual.

Mp. Peak torque. Maximum torque (limited by current) generated by the maximum Ip current allowed at zero speed. It is available for dynamic operations such as accelerations, ... The value of this current is always limited by the control parameter (CP20) in face of the risk of exceeding the destruction temperature of the insulation of the stator winding.

tac. Acceleration time. Time it takes the motor to accelerate from zero speed to its rated speed with maximum torque.

kt. Torque constant. 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).

nN. Rated turning speed.

Pcal. Power value given by the expression: Mo·nN/9550 where Pcal (in kW), Mo (in Nm) and nN (in rev/min).

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

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

J. Rotor moment of inertia.

P. Mass.

FXM 1/3/5/7 MOTORS

GENERAL CHARACTERISTICS

These motors have been manufactured in accordance with the European regulations EN 60204-1 and EN 60034 as instructed by the European Directive 2006/95/EC on Low Voltage (LVD).

Excitation	Permanent rare earth magnets (SmCo)
Temperature sensor	Thermistor PTC
Shaft end	Cylindrical with keyway Optionally: without keyway
Mounting	Face flange
Mounting methods	IM B5 - IM V1 - IM V3 (as recommended by IEC-34-3-72)
Mechanical tolerances	Normal class N (meets IEC-72/1971)
Balancing	Class N, (class R optional) (DIN 45665) (balanced with the wole key)
Roller bearing's life	20000 hours
Type of winding	F winding (220 V AC) A winding (400 V AC)
Pairs of poles	P=3
Noise emission	DIN 45653
Vibration resistance	Withstands 1g along the shaft and 3g sideways (take g=9.81 m/s²)
Stator winding insulation	Heating class F (150°C/302°F)
Insulation resistance	500 V DC, 10 MΩ or greater
Dielectric rigidity	1500 V AC, 1 min.
Degree of protection	Overall: IP 64 standard, IP 54 with fan Axis: IP 64 standard, IP 65 with oil seal
Storage temperature	-20°C/80°C (-4°F/176°F)
Permitted ambient temp.	0°C/40°C (32°F/104°F)
Working ambient humidity	From 20 % to 80 % (non condensing)
Brake	Optional on all models
Feedback	Sinewave encoder Incremental TTL encoder

Sinusoidal encoder. FXM models with A and ·F· winding.
Incremental TTL encoder. FXM models with ·F· winding.

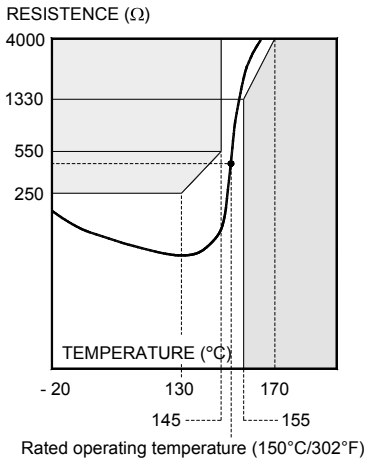
WARNING. The "F class" insulation on the motor keeps its dielectric properties as long as the temperature does not exceed 150 °C (302 °F) for a cooling temperature of 40°C (104°F).

TEMPERATURE SENSOR

FXM motors have a thermistor PTC (positive temperature coefficient) sensitive in a temperature range between 130 °C (266 °F) and 160 °C (320 °F).

Sensor type	PTC thermistor (triple)
Resistance at 145°C (293°F)	550 Ω
Resistance at 155°C (311°F)	1330 Ω
Sensor connection	Feedback cable

RESISTANCE/TEMPERATURE. CHARACTERISTICS OF «PTC» THERMISTOR

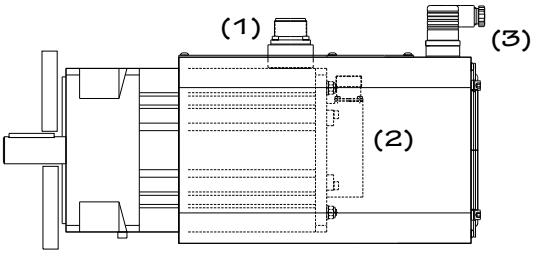


The following figure shows the resistance of the sensor as a function of the ambient temperature (average values).

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

OUTSIDE APPEARANCE

The following figure shows the location of the connectors for power and motor feedback conection:



1. *Power supply connector for the motor and the brake (optional)*
2. *Feedback connector. Sinusoidal encoder and incremental TTL*
3. *Power supply connector for the fan (optional)*

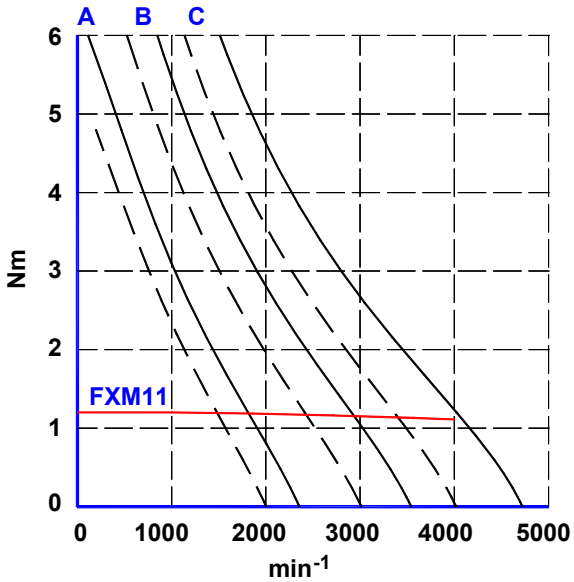
CHARACTERISTICS CURVES. NON-VENTILATED FXM SERIES AT 400 V AC

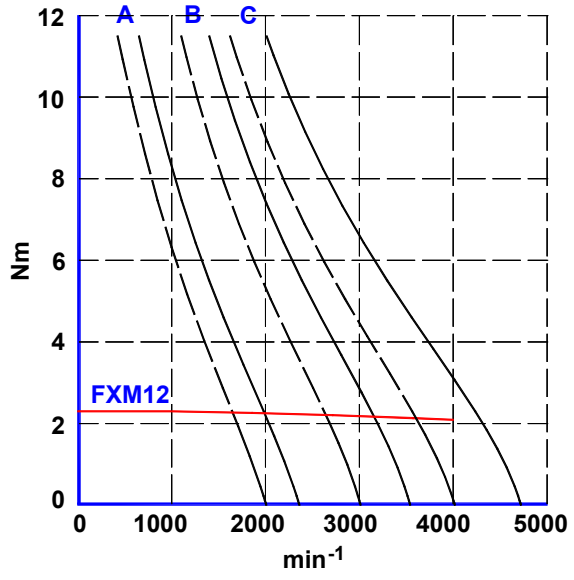
FXM1 series and FXM3 series

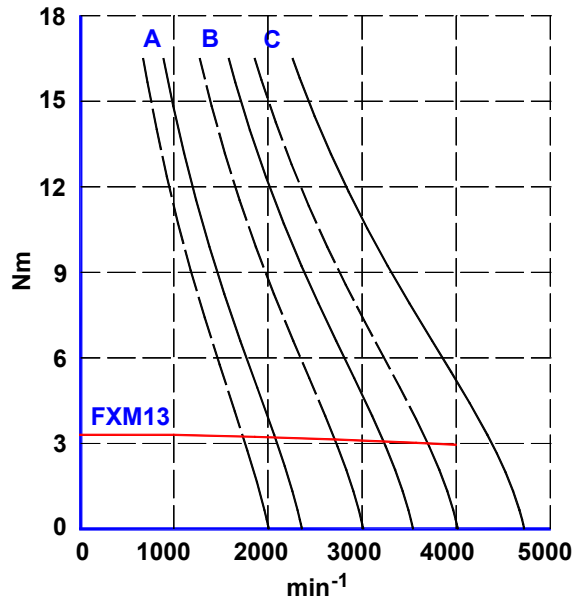
——————— 400 V

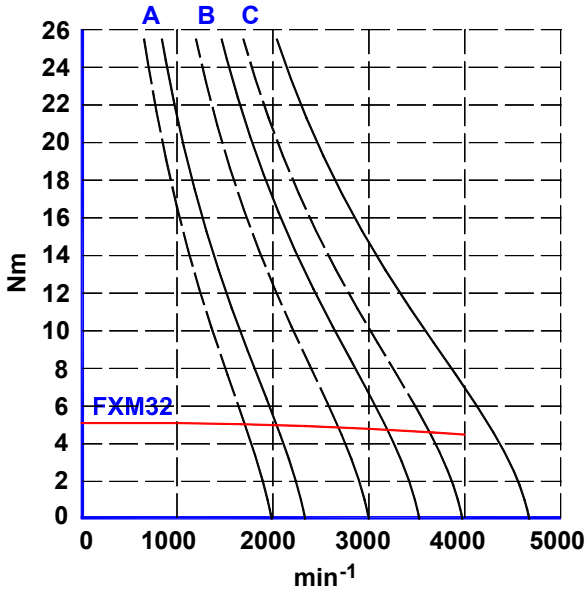
---------- 400 V-15%

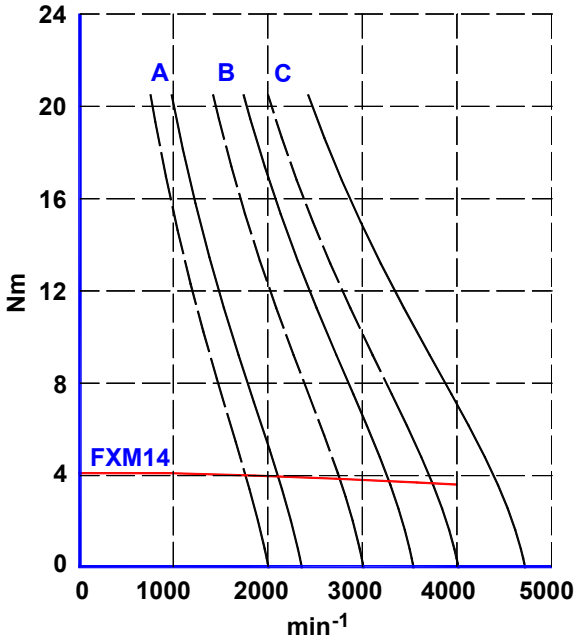
(A) 2000 min^{-1}, **(B)** 3000 min^{-1}, **(C)** 4000 min^{-1}

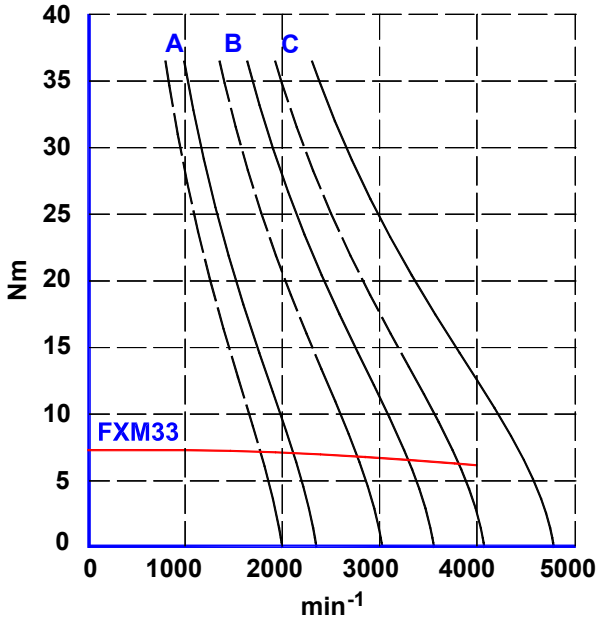


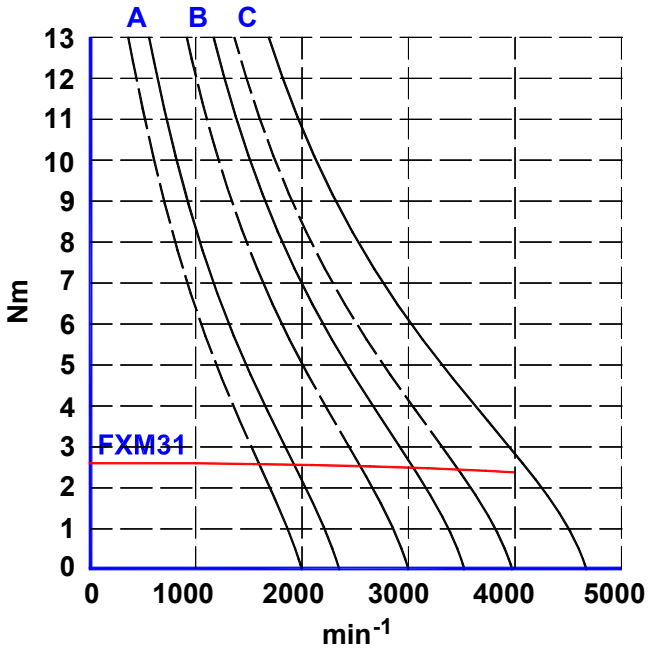


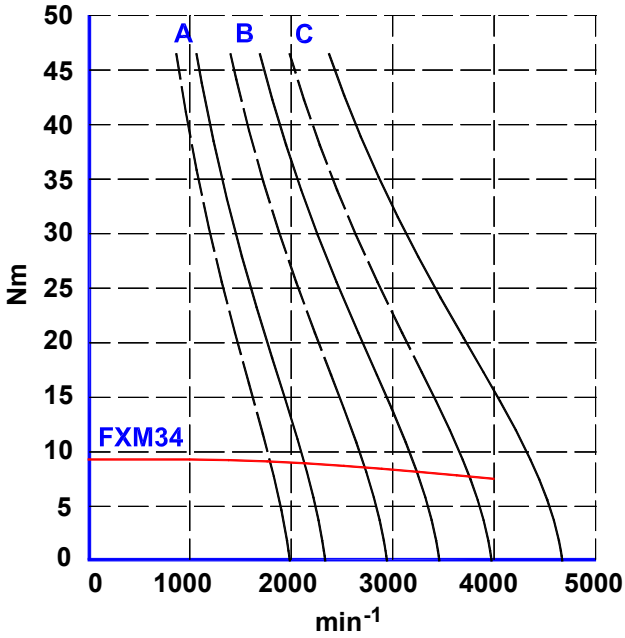

A
B
C
FXM13
Nm
min-1
0
3
6
9
12
15
18
0
1000
2000
3000
4000
5000


A
B
C
FXM32
Nm
min-1
0
2
4
6
8
10
12
14
16
18
20
22
24
26
0
1000
2000
3000
4000
5000


A
B
C
FXM14
Nm
min-1
0
4
8
12
16
20
24
0
1000
2000
3000
4000
5000

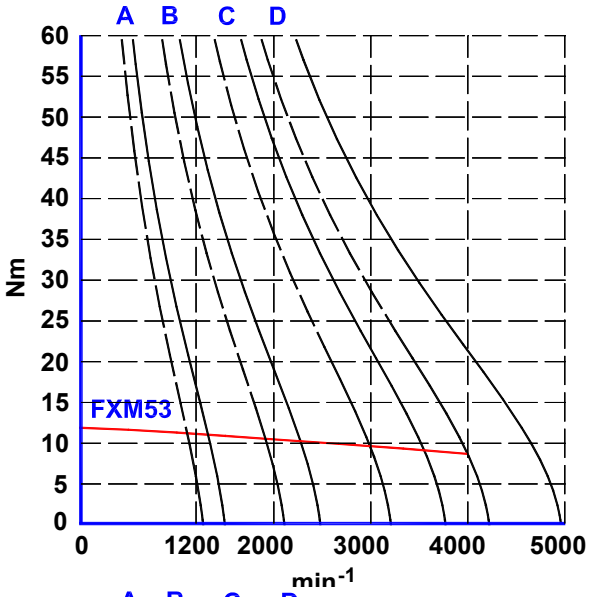

A
B
C
FXM33
Nm
min-1
0
5
10
15
20
25
30
35
40
0
1000
2000
3000
4000
5000

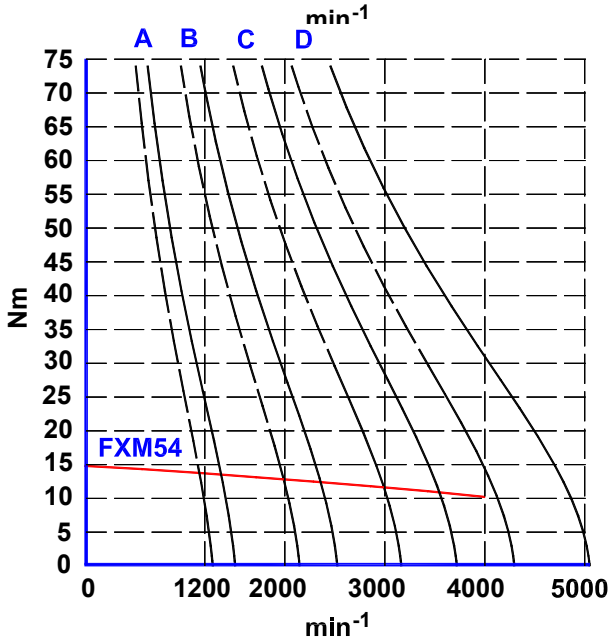

A
B
C
FXM31
Nm
min-1
0
1
2
3
4
5
6
7
8
9
10
11
12
13
0
1000
2000
3000
4000
5000

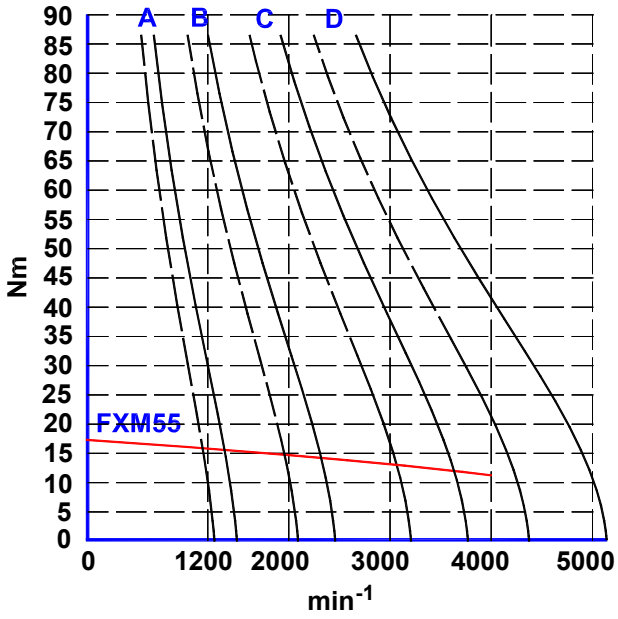

A
B
C
FXM34
Nm
min-1
0
5
10
15
20
25
30
35
40
45
50
0
1000
2000
3000
4000
5000

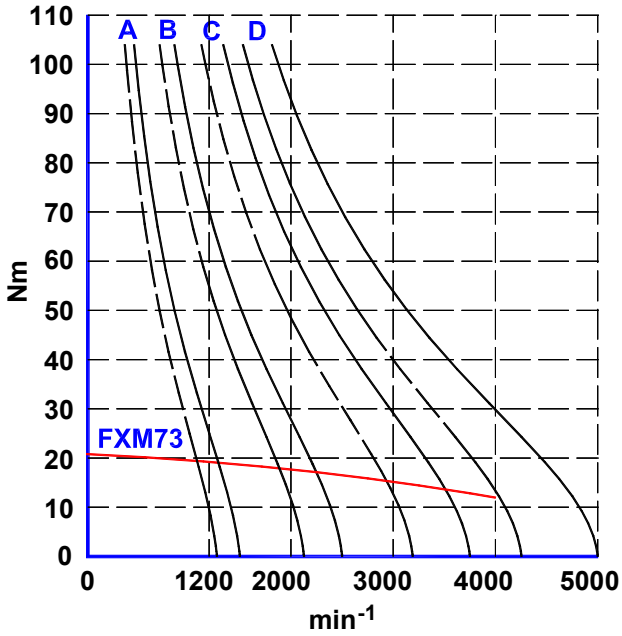
FXM5 series and FXM7 series

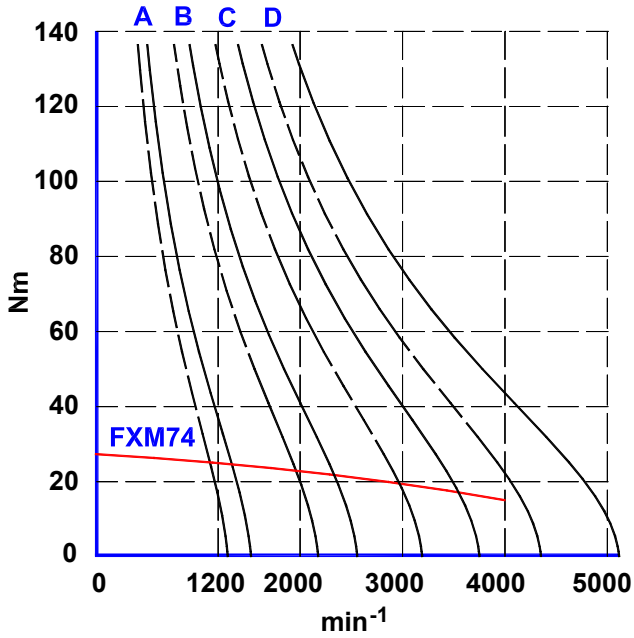
———————— 400 V
---------- 400 V-15%
(A) 1200 min^{-1},**(B)** 2000 min^{-1}, **(C)** 3000 min^{-1}, **(D)** 4000 min^{-1}

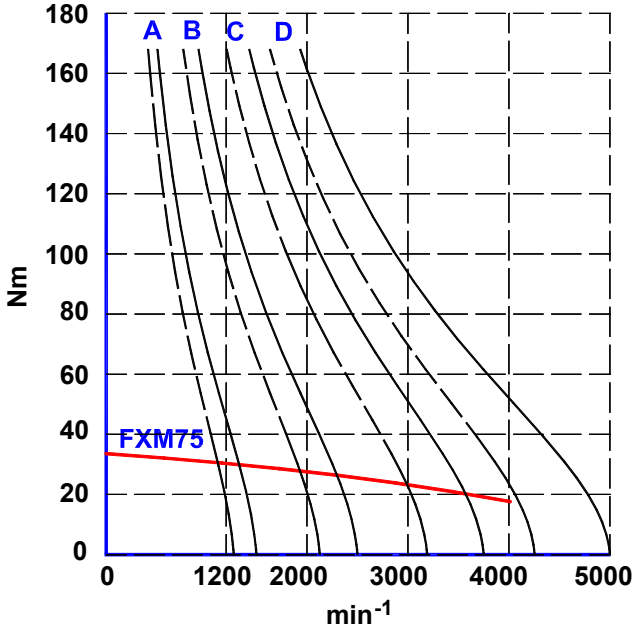








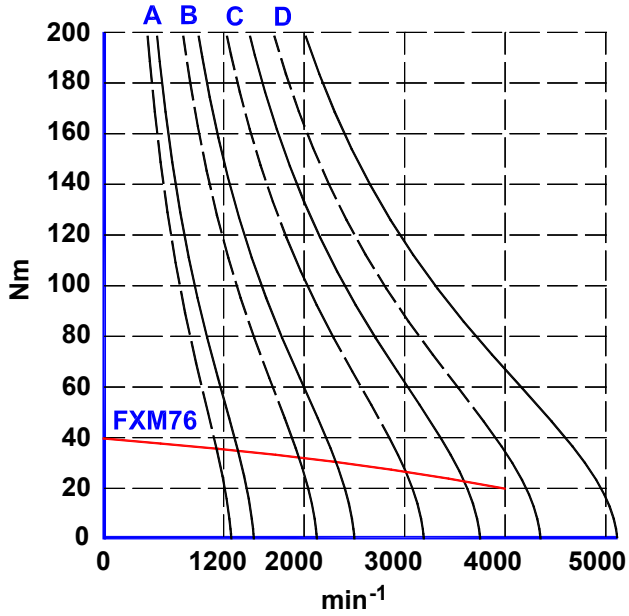


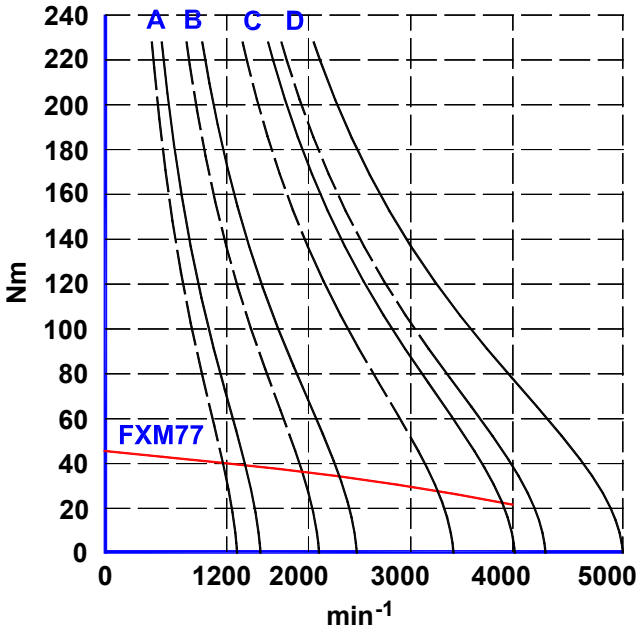


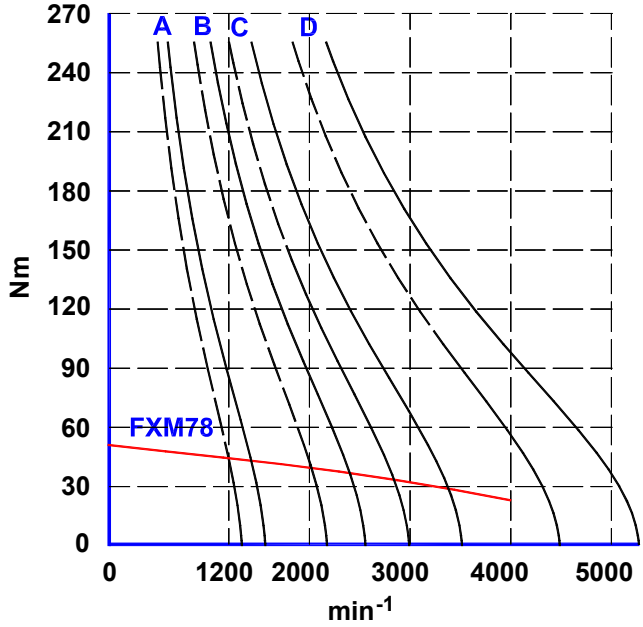
CHARACTERISTICS CURVES.
VENTILATED FXM SERIES AT 400 V AC

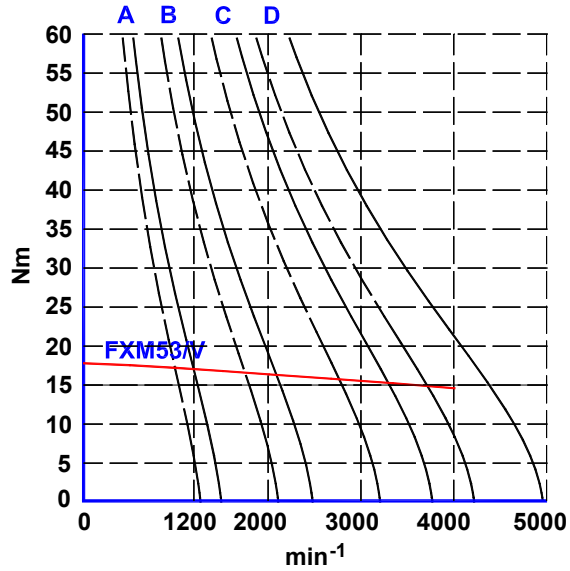
FXM5/V series and FXM7/V series

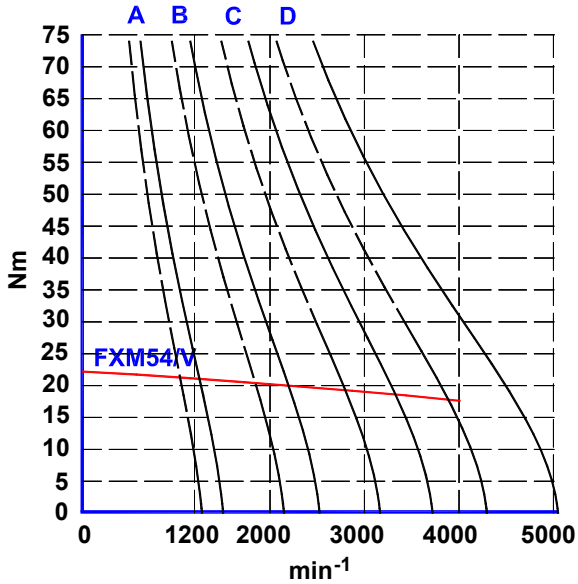
———————— 400 V
---------- 400 V-15%
(A) 1200 min^{-1},**(B)** 2000 min^{-1}, **(C)** 3000 min^{-1}, **(D)** 4000 min^{-1}

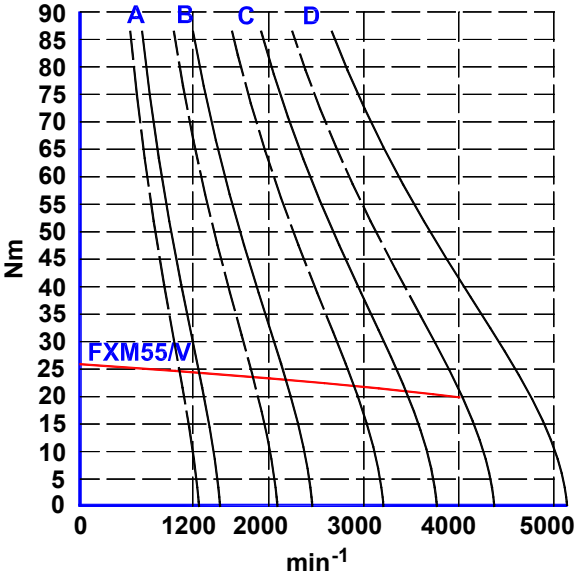


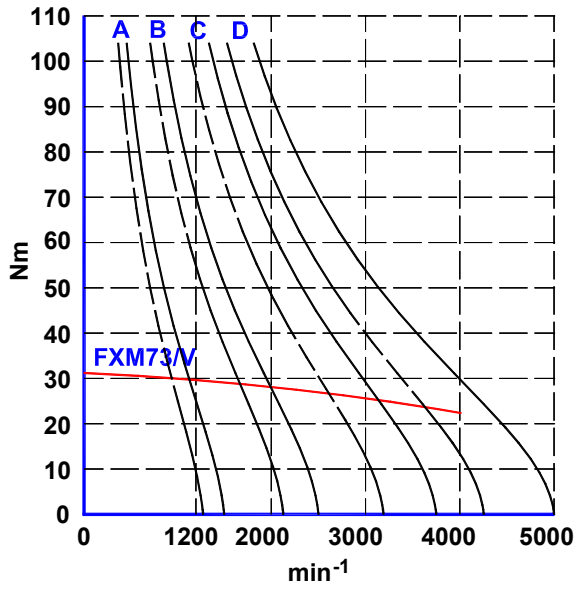


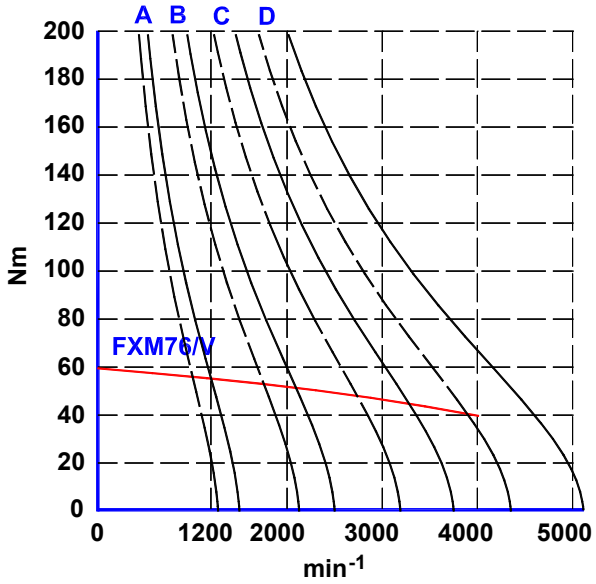


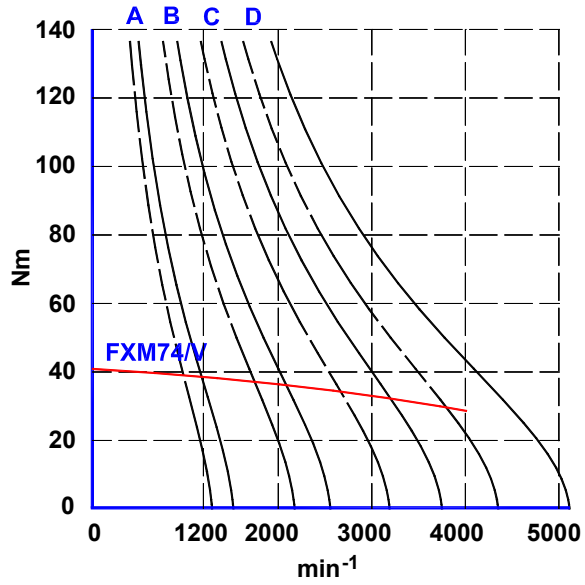


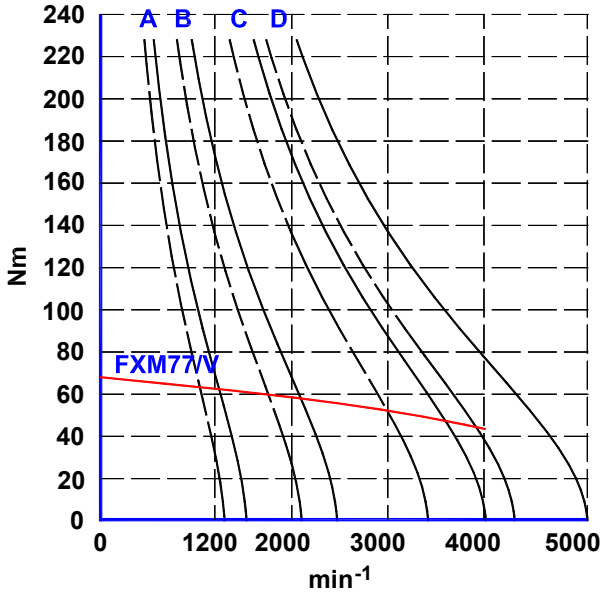


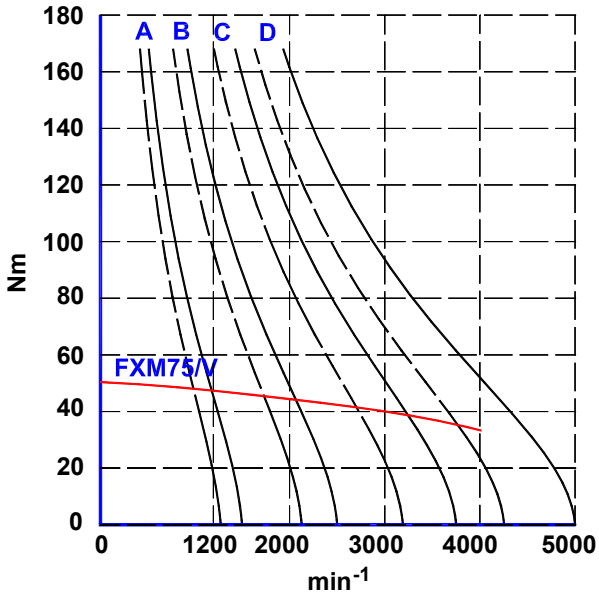


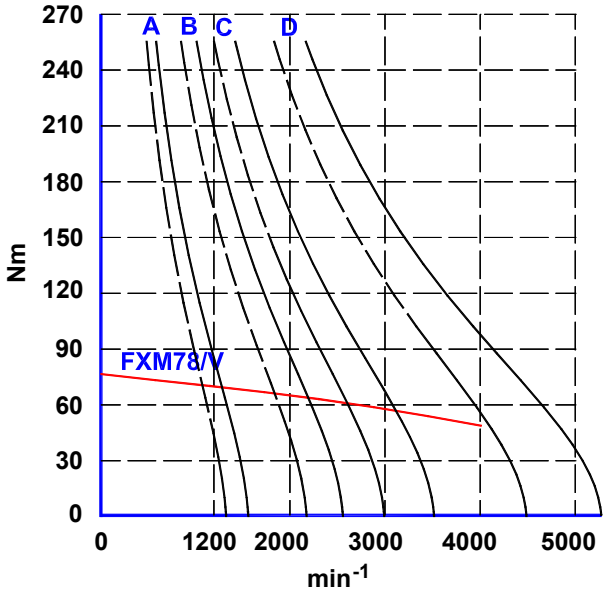

A B C D
FXM73/V
Nm
min-1
0 10 20 30 40 50 60 70 80 90 100 110
0 1200 2000 3000 4000 5000


A B C D
FXM76/V
Nm
min-1
0 20 40 60 80 100 120 140 160 180 200
0 1200 2000 3000 4000 5000


A B C D
FXM74/V
Nm
min-1
0 20 40 60 80 100 120 140
0 1200 2000 3000 4000 5000


A B C D
FXM77/V
Nm
min-1
0 20 40 60 80 100 120 140 160 180 200 220 240
0 1200 2000 3000 4000 5000


A B C D
FXM75/V
Nm
min-1
0 20 40 60 80 100 120 140 160 180
0 1200 2000 3000 4000 5000


A B C D
FXM78/V
Nm
min-1
0 30 60 90 120 150 180 210 240 270
0 1200 2000 3000 4000 5000

TECHNICAL DATA. NON VENTILATED FXM MOTORS

NON-VENTILATED MOTORS	Stall torque	Peak torque	Rated speed	Stall current	Peak current	Power	torque constant	acceleration time	inductance per phase	resistance per phase	Inertia ●	mass	Peak torque (Nm) for 0.5 s							
	Mo	Mp	n_N	Io	Imax	Pcal	Kt	tac	L	R	J	P	1.08	1.15	1.25	1.35	2.50	2.75	3.100	3.150
	N·m	N·m	rpm	Arms	Arms	kW	Nm/Arms	ms	mH	Ω	kg·cm²	kg	N·m	N·m	N·m	N·m	N·m	N·m	N·m	N·m
FXM11.20A.□□.□□0	1.2	6	2000	0.45	2.2	0.3	2.7	4.2	248	93.5	1.2	3.3	**6.0**	-	-	-	-	-	-	-
FXM11.30A.□□.□□0	1.2	6	3000	0.67	3.4	0.4	1.8	6.3	110	43	1.2	3.3	**6.0**	-	-	-	-	-	-	-
FXM11.40A.□□.□□0	1.2	6	4000	0.90	4.5	0.5	1.3	8.4	62	23.5	1.2	3.3	**6.0**	-	-	-	-	-	-	-
FXM12.20A.□□.□□0	2.3	11	2000	0.86	4.1	0.5	2.7	3.6	111	32	1.9	4.3	**11.0**	-	-	-	-	-	-	-
FXM12.30A.□□.□□0	2.3	11	3000	1.29	6.2	0.7	1.8	5.4	49	13	1.9	4.3	**11.0**	-	-	-	-	-	-	-
FXM12.40A.□□.□□0	2.3	11	4000	1.72	8.2	1.0	1.3	7.2	28	7.8	1.9	4.3	10.4	**11.0**	-	-	-	-	-	-
FXM13.20A.□□.□□0	3.3	16	2000	1.23	5.7	0.7	2.7	3.4	71	16	2.6	6.4	**16.0**	-	-	-	-	-	-	-
FXM13.30A.□□.□□0	3.3	16	3000	1.85	9.0	1.0	1.8	5.1	32	7.25	2.6	6.4	14.4	**16.0**	-	-	-	-	-	-
FXM13.40A.□□.□□0	3.3	16	4000	2.50	12.1	1.4	1.3	6.8	18	4.05	2.6	6.4	10.4	**16.0**	-	-	-	-	-	-
FXM14.20A.□□.□□0	4.1	20	2000	1.53	7.5	0.9	2.7	3.4	52	12	3.3	7.6	**20.0**	-	-	-	-	-	-	-
FXM14.30A.□□.□□0	4.1	20	3000	2.30	11.1	1.3	1.8	5.2	23	4.85	3.3	7.6	14.4	**20.0**	-	-	-	-	-	-
FXM14.40A.□□.□□0	4.1	20	4000	3.10	15.1	1.7	1.3	6.9	13	2.95	3.3	7.6	10.4	19.5	**20.0**	-	-	-	-	-
FXM31.20A.□□.□□0	2.6	13	2000	0.97	4.8	0.5	2.7	5.6	126	29	3.5	5.5	**13.0**	-	-	-	-	-	-	-
FXM31.30A.□□.□□0	2.6	13	3000	1.45	7.2	0.8	1.8	8.4	56	12.5	3.5	5.5	**13.0**	-	-	-	-	-	-	-
FXM31.40A.□□.□□0	2.6	13	4000	1.92	9.6	1.1	1.3	11.3	32	7.25	3.5	5.5	11.2	**13.0**	-	-	-	-	-	-
FXM32.20A.□□.□□0	5.1	25	2000	1.89	9.3	1.1	2.7	5.0	56	9.55	6	7.5	21.6	**25.0**	-	-	-	-	-	-
FXM32.30A.□□.□□0	5.1	25	3000	2.80	13.7	1.6	1.8	7.5	25	4.05	6	7.5	14.4	**25.0**	-	-	-	-	-	-
FXM32.40A.□□.□□0	5.1	25	4000	3.80	18.6	2.1	1.3	10.0	14	2.30	6	7.5	11.2	21.0	**25.0**	-	-	-	-	-
FXM33.20A.□□.□□0	7.3	36	2000	2.70	13.3	1.5	2.7	4.9	36	5.05	8.5	9.6	21.6	**36.0**	-	-	-	-	-	-
FXM33.30A.□□.□□0	7.3	36	3000	4.10	20.2	2.3	1.8	7.4	16	2.20	8.5	9.6		27.0	**36.0**	-	-	-	-	-
FXM33.40A.□□.□□0	7.3	36	4000	5.50	27.1	3.1	1.3	9.9	8.6	1.15	8.5	9.6		19.5	32.5	**36.0**	-	-	-	-
FXM34.20A.□□.□□0	9.3	46	2000	3.40	16.8	1.9	2.7	5.0	26	3.45	11	11.5	21.6	40.5	**46.0**	-	-	-	-	-
FXM34.30A.□□.□□0	9.3	46	3000	5.10	25.2	2.9	1.8	7.5	12	1.60	11	11.5		27.0	45.0	**46.0**	-	-	-	-
FXM34.40A.□□.□□0	9.3	46	4000	6.90	34.1	3.9	1.3	10.0	6.6	0.85	11	11.5		21.0	35.0	**46.0**	-	-	-	-
FXM53.12A.□□.□□0	11.9	59	1200	2.80	13.9	1.5	4.2	4.7	61	5.85	22	15.8	33.6	**59.0**	-	-	-	-	-	-
FXM53.20A.□□.□□0	11.9	59	2000	4.70	23.3	2.5	2.5	7.8	22	2.15	22	15.8		37.5	**59.0**	-	-	-	-	-
FXM53.30A.□□.□□0	11.9	59	3000	7.10	35.2	3.7	1.7	11.7	9.6	0.91	22	15.8		25.5	42.5	**59.0**	-	-	-	-
FXM53.40A.□□.□□0	11.9	59	4000	9.30	46.1	5.0	1.3	15.6	5.6	0.55	22	15.8			32.5	45.5	**59.0**	-	-	-
FXM54.12A.□□.□□0	14.8	74	1200	3.50	17.5	1.9	4.2	4.9	44	3.7	29	17.8	33.6	63.0	**74.0**	-	-	-	-	-
FXM54.20A.□□.□□0	14.8	74	2000	5.90	29.5	3.1	2.5	8.2	16	1.35	29	17.8		37.5	62.5	**74.0**	-	-	-	-
FXM54.30A.□□.□□0	14.8	74	3000	8.70	43.5	4.6	1.7	12.3	7.3	0.64	29	17.8			42.5	59.5	**74.0**	-	-	-
FXM54.40A.□□.□□0	14.8	74	4000	11.80	59.0	6.2	1.2	16.4	3.9	0.35	29	17.8			32.5	45.5	65.0	**74.0**	-	-
FXM55.12A.□□.□□0	17.3	86	1200	4.10	20.4	2.2	4.2	5.3	36	2.95	36	20		63.0	**86.0**	-	-	-	-	-
FXM55.20A.□□.□□0	17.3	86	2000	6.70	33.3	3.6	2.6	8.8	13	1.05	36	20		39.0	65.0	**86.0**	-	-	-	-
FXM55.30A.□□.□□0	17.3	86	3000	10.30	51.2	5.4	1.7	13.1	5.6	0.45	36	20			42.5	59.5	85.0	**86.0**	-	-
FXM55.40A.□□.□□0	17.3	86	4000	14.10	70.1	7.2	1.2	17.5	3	0.25	36	20				42.0	60.0	**86.0**	-	-
FXM73.12A.□□.□□0	20.8	104	1200	4.9	24.5	2.6	4.2	7.4	46	3.05	61	29		63.0	**104.0**	-	-	-	-	-
FXM73.20A.□□.□□0	20.8	104	2000	8.2	41.0	4.4	2.5	12.3	17	1.10	61	29			62.5	87.5	**104.0**	-	-	-
FXM73.30A.□□.□□0	20.8	104	3000	12.3	61.5	6.5	1.7	18.4	7.4	0.49	61	29			42.5	59.5	85.0	**104.0**	-	-
FXM73.40A.□□.□□0	20.8	104	4000	16.5	82.5	8.7	1.3	24.6	4.2	0.27	61	29				45.5	65.0	97.5	**104.0**	-
FXM74.12A.□□.□□0	27.3	135	1200	6.6	32.6	3.4	4.1	7.3	33	1.9	79	31.6			105.0	**135.0**	-	-	-	-
FXM74.20A.□□.□□0	27.3	135	2000	11.1	54.9	5.7	2.5	12.2	12	0.68	79	31.6			62.5	87.5	125.0	**135.0**	-	-
FXM74.30A.□□.□□0	27.3	135	3000	16.2	80.1	8.6	1.7	18.4	5.4	0.31	79	31.6				59.5	85.0	127.5	**135.0**	-
FXM74.40A.□□.□□0	27.3	135	4000	22.1	109.3	11.4	1.3	24.5	2.9	0.17	79	31.6					60.0	90.0	120.0	**135.0**
FXM75.12A.□□.□□0	33.6	165	1200	8.0	39.3	4.2	4.20	7.4	27	1.45	97	36			105.0	147.0	**165.0**	-	-	-
FXM75.20A.□□.□□0	33.6	165	2000	13.3	65.3	7.0	2.53	12.3	9.7	0.52	97	36				87.5	125.0	**165.0**	-	-
FXM75.30A.□□.□□0	33.6	165	3000	19.9	97.7	10.5	1.69	18.5	4.3	0.23	97	36					85.0	127.5	**165.0**	-
FXM75.40A.□□.□□0 ●	33.6	165	4000	26.6	130.6	14.1	1.26	24.6	2.4	0.13	97	36						97.5	130.0	**165.0**
FXM76.12A.□□.□□0	39.7	195	1200	9.4	46.2	5.0	4.2	7.4	22	1.1	115	40			105.0	147.0	**195.0**	-	-	-
FXM76.20A.□□.□□0	39.7	195	2000	15.7	77.1	8.3	2.5	12.3	8	0.4	115	40				87.5	125.0	187.5	**195.0**	-
FXM76.30A.□□.□□0	39.7	195	3000	23.6	115.9	12.5	1.7	18.5	3.6	0.18	115	40					85.0	127.5	170.0	**195.0**
FXM76.40A.□□.□□0 ●	39.7	195	4000	32.1	157.7	16.6	1.2	24.7	1.9	0.1	115	40						90.0	120.0	180.0
FXM77.12A.□□.□□0	45.6	225	1200	11.0	54.3	5.7	4.2	7.4	18	0.87	133	43			102.5	143.5	205.0	**225.0**	-	-
FXM77.20A.□□.□□0	45.6	225	2000	17.8	87.8	9.5	2.6	12.4	7	0.33	133	43					130.0	195.0	**225.0**	-
FXM77.30A.□□.□□0 ●	45.6	225	3000	29.0	143.1	14.3	1.6	18.6	2.6	0.13	133	43						100.8	160.0	**225.0**
FXM77.40A.□□.□□0 ●	45.6	225	4000	36.6	180.6	19.1	1.2	24.7	1.7	0.08	133	43						90.0	120.0	148.8
FXM78.12A.□□.□□0	51.1	255	1200	12.6	62.9	6.4	4.1	7.4	15	0.71	151	47				140.0	200.0	**255.0**	-	-
FXM78.20A.□□.□□0	51.1	255	2000	20.7	103.3	10.7	2.5	12.4	5.7	0.27	151	47					125.0	187.5	250.0	**255.0**
FXM78.30A.□□.□□0 ●	51.1	255	3000	28.4	141.7	16.0	1.8	18.6	3	0.14	151	47						135.0	180.0	**255.0**
FXM78.40A.□□.□□0 ●	51.1	255	4000	42.7	213.1	21.4	1.2	24.8	1.3	0.07	151	47							120.0	180.0

● *Motors with a power "base" which need to be connected via MC 46 type socket. All the others with MC 23.*
In bold, the drive recommended for each motor.

●● *When adding a mechanical brake (optional) to the motor, the moment of inertia values of the brake will also have to be taken into account.*

TECHNICAL DATA. VENTILATED FXM MOTORS

VENTILATED MOTORS	Stall torque	Peak torque	Rated speed	Stall current	Peak current	Power	torque constant	acceleration time	inductance per phase	resistance per phase	Inertia ●●●	mass	Peak torque (Nm) for 0.5 s							
	Mo	Mp	n_N	Io	Imax	Pcal	Kt	tac	L	R	J	P	1.08	1.15	1.25	1.35	2.50	2.75	3.100	3.150
	N·m	N·m	rpm	Arms	Arms	kW	Nm/Arms	ms	mH	Ω	kgcm²	kg	N·m	N·m	N·m	N·m	N·m	N·m	N·m	N·m
FXM53.12A.□□.□□1	17.8	59	1200	4.2	13.9	2.2	4.2	4.7	61	5.85	22	20		**59.0**	-	-	-	-	-	-
FXM53.20A.□□.□□1	17.8	59	2000	7.0	23.2	3.7	2.5	7.8	22	2.15	22	20		37.5	**59.0**	-	-	-	-	-
FXM53.30A.□□.□□1	17.8	59	3000	10.6	35.1	5.6	1.7	11.7	9.6	0.91	22	20			42.5	**59.0**	-	-	-	-
FXM53.40A.□□.□□1	17.8	59	4000	14.0	46.4	7.5	1.3	15.6	5.6	0.55	22	20				45.5	**59.0**	-	-	-
FXM54.12A.□□.□□1	22.2	74	1200	5.3	17.7	2.8	4.2	4.9	44	3.7	29	22		63.0	**74.0**	-	-	-	-	-
FXM54.20A.□□.□□1	22.2	74	2000	8.9	29.7	4.6	2.5	8.2	16	1.35	29	22			62.5	**74.0**	-	-	-	-
FXM54.30A.□□.□□1	22.2	74	3000	13.1	43.7	7.0	1.7	12.3	7.3	0.64	29	22				59.5	**74.0**	-	-	-
FXM54.40A.□□.□□1	22.2	74	4000	17.7	59.0	9.3	1.2	16.4	3.9	0.35	29	22					65.0	**74.0**	-	-
FXM55.12A.□□.□□1	25.9	86	1200	6.1	20.2	3.2	4.2	5.3	36	2.95	36	24.2		63.0	**86.0**	-	-	-	-	-
FXM55.20A.□□.□□1	25.9	86	2000	10.1	33.5	5.4	2.6	8.8	13	1.05	36	24.2			65.0	**86.0**	-	-	-	-
FXM55.30A.□□.□□1	25.9	86	3000	15.4	51.1	8.1	1.7	13.1	5.6	0.45	36	24.2				59.5	85.0	**86.0**	-	-
FXM55.40A.□□.□□1	25.9	86	4000	21.1	70.1	10.8	1.2	17.5	3	0.25	36	24.2					60.0	**86.0**	-	-
FXM73.12A.□□.□□1	31.2	104	1200	7.4	24.7	3.9	4.2	7.4	46	3.05	61	33.2		63.0	**104.0**	-	-	-	-	-
FXM73.20A.□□.□□1	31.2	104	2000	12.3	41.0	6.5	2.5	12.3	17	1.10	61	33.2			62.5	87.5	**104.0**	-	-	-
FXM73.30A.□□.□□1	31.2	104	3000	18.5	61.7	9.8	1.7	18.4	7.4	0.49	61	33.2					85.0	**104.0**	-	-
FXM73.40A.□□.□□1 ●	31.2	104	4000	24.7	82.3	13.1	1.3	24.6	4.2	0.27	61	33.2					65.0	97.5	**104.0**	-
FXM74.12A.□□.□□1	40.9	135	1200	9.8	32.3	5.1	4.2	7.3	33	1.9	79	35.8			105.0	**135.0**	-	-	-	-
FXM74.20A.□□.□□1	40.9	135	2000	16.5	54.5	8.6	2.5	12.2	12	0.68	79	35.8				87.5	125.0	**135.0**	-	-
FXM74.30A.□□.□□1 ●	40.9	135	3000	24.3	80.2	12.8	1.7	18.4	5.4	0.31	79	35.8					85.0	127.5	**135.0**	-
FXM74.40A.□□.□□1 ●	40.9	135	4000	33.1	109.2	17.1	1.2	24.5	2.9	0.17	79	35.8						90.0	120.0	**135.0**
FXM75.12A.□□.□□1	50.4	165	1200	12.0	39.3	6.3	4.2	7.4	27	1.45	97	40.2			105.0	147.0	**165.0**	-	-	-
FXM75.20A.□□.□□1	50.4	165	2000	20.0	65.5	10.5	2.5	12.3	9.7	0.52	97	40.2					125.0	**165.0**	-	-
FXM75.30A.□□.□□1 ●	50.4	165	3000	29.9	97.9	15.8	1.7	18.5	4.3	0.23	97	40.2						127.5	**165.0**	-
FXM75.40A.□□.□□1 ●	50.4	165	4000	39.9	130.6	21.1	1.3	24.6	2.4	0.13	97	40.2							130.0	**165.0**
FXM76.12A.□□.□□1	59.5	195	1200	14.1	46.2	7.5	4.2	7.4	22	1.1	115	44.2				147.0	**195.0**	-	-	-
FXM76.20A.□□.□□1 ●	59.5	195	2000	23.5	77.0	12.5	2.5	12.3	8	0.4	115	44.2					125.0	187.5	**195.0**	-
FXM76.30A.□□.□□1 ●	59.5	195	3000	35.3	115.7	18.7	1.7	18.5	3.6	0.18	115	44.2						127.5	170.0	**195.0**
FXM76.40A.□□.□□1 ●●	59.5	195	4000	48.2	158.0	24.9	1.2	24.7	1.9	0.1	115	44.2							120.0	180.0
FXM77.12A.□□.□□1	68.4	225	1200	16.6	54.6	8.6	4.1	7.4	18	0.87	133	47.2				143.5	205.0	**225.0**	-	-
FXM77.20A.□□.□□1 ●	68.4	225	2000	26.8	88.2	14.3	2.5	12.4	7	0.33	133	47.2						195.0	**225.0**	-
FXM77.30A.□□.□□1 ●	68.4	225	3000	43.5	143.1	21.5	1.6	18.6	2.6	0.13	133	47.2							160.0	**225.0**
FXM77.40A.□□.□□1 ●●	68.4	225	4000	55.0	180.9	28.6	1.2	24.7	1.7	0.08	133	47.2								180.0
FXM78.12A.□□.□□1	76.6	255	1200	19.0	62.2	9.6	4.0	7.4	15	0.71	151	51.2					200.0	**255.0**	-	-
FXM78.20A.□□.□□1 ●	76.6	255	2000	31.0	103.2	16.0	2.5	12.4	5.7	0.27	151	51.2						187.5	250.0	**255.0**
FXM78.30A.□□.□□1 ●	76.6	255	3000	42.6	141.8	24.1	1.8	18.6	3	0.14	151	51.2							180.0	**255.0**
FXM78.40A.□□.□□1 ●●	76.6	255	4000	63.9	212.7	32.1	1.2	24.8	1.3	0.07	151	51.2								180.0

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

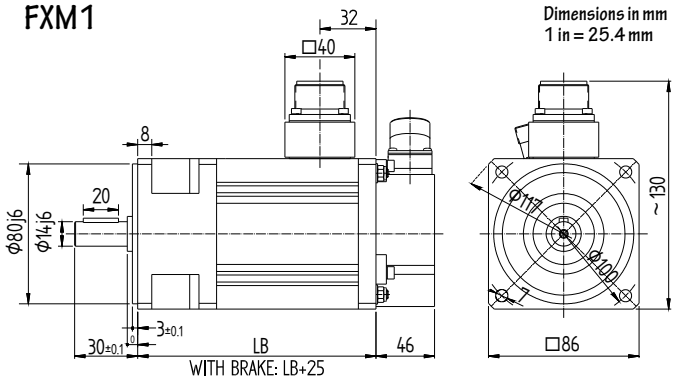
●● *Motors with a power "base" which need to be connected via MC 80 type socket. All the others with MC 23.*
In bold, the drive recommended for each motor.

●●● *When adding a mechanical brake (optional) to the motor, the moment of inertia values of the brake will also have to be taken into account.*

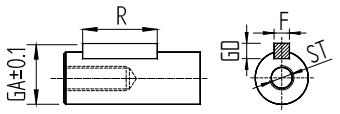
DIMENSIONS

FXM1

Dimensions in mm
1 in = 25.4 mm



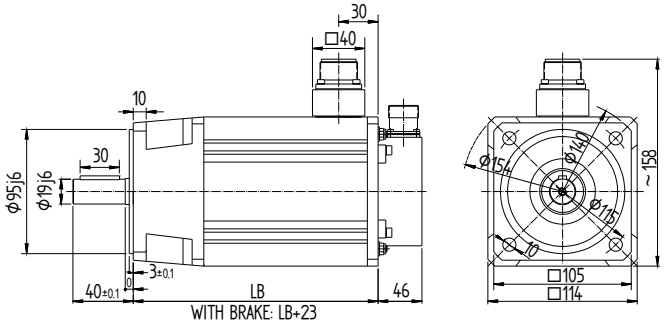
DIMENSION	LB	
UNITS	mm	in
FXM11	136	5.35
FXM12	171	6.70
FXM13	206	8.11
FXM14	241	9.48



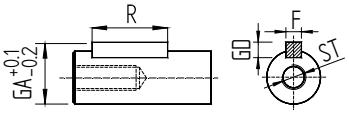
DIMENSION	F		GD		R		GA		ST
UNITS	mm	in	mm	in	mm	in	mm	in	mm
FXM1	5	0.19	5	0.19	20	0.78	16	0.62	M5x12.5

FXM3

Dimensions in mm
1 in = 25.4 mm



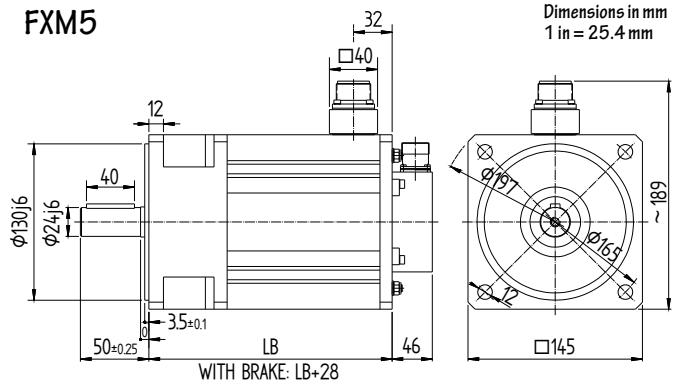
DIMENSION	LB	
UNITS	mm	in
FXM31	152	5.98
FXM32	187	7.36
FXM33	222	8.74
FXM34	257	10.12



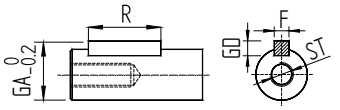
DIMENSION	F		GD		R		GA		ST
UNITS	mm	in	mm	in	mm	in	mm	in	mm
FXM3	6	0.24	6	0.24	30	1.18	21.5	0.85	M6x16

FXM5

Dimensions in mm
1 in = 25.4 mm



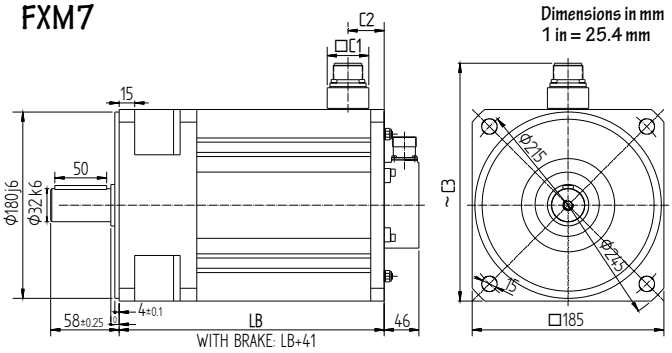
DIMENSION	LB	
UNITS	mm	in
FXM53	237	9.33
FXM54	272	10.71
FXM55	307	12.09



DIMENSION	F		GD		R		GA		ST
UNITS	mm	in	mm	in	mm	in	mm	in	mm
FXM5	8	0.31	7	0.27	40	1.58	27	1.07	M8x19

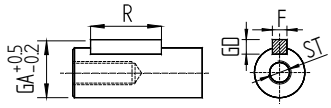
FXM7

Dimensions in mm
1 in = 25.4 mm



DIMENSION	LB	
UNITS	mm	in
FXM73	256	10.08
FXM74	291	11.46
FXM75	326	12.83
FXM76	361	14.21
FXM77	396	15.59
FXM78	431	16.97

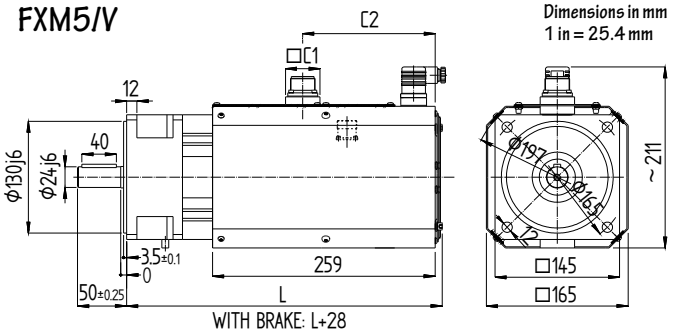
DIMENSION	C1		C2		C3	
UNITS	mm	in	mm	in	mm	in
Io ≤ 23 A (MC 23)	40	1.57	35	1.37	229	9.01
23 A < Io ≤ 46 A (MC 46)	50	1.96	40	1.57	236	9.29



DIMENSION	F		GD		R		GA		ST
UNITS	mm	in	mm	in	mm	in	mm	in	mm
FXM7	10	0.39	8	0.31	50	1.97	35	1.38	M10x22

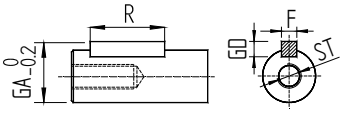
FXM5/V

Dimensions in mm
1 in = 25.4 mm



DIMENSION	L	
UNITS	mm	in
FXM53/V	365	14.37
FXM54/V	400	15.74
FXM55/V	435	17.12

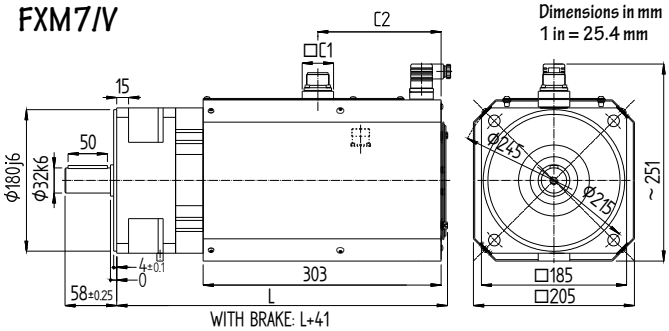
DIMENSION	C1		C2	
UNITS	mm	in	mm	in
Io ≤ 23 A (MC 23)	40	1.57	154	6.06
23 A < Io ≤ 46 A (MC 46)	50	1.96	159	6.25



DIMENSION	F		GD		R		GA		ST
UNITS	mm	in	mm	in	mm	in	mm	in	mm
FXM5/V	8	0.31	7	0.27	40	1.58	27	1.07	M8x19

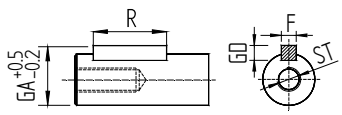
FXM7/V

Dimensions in mm
1 in = 25.4 mm



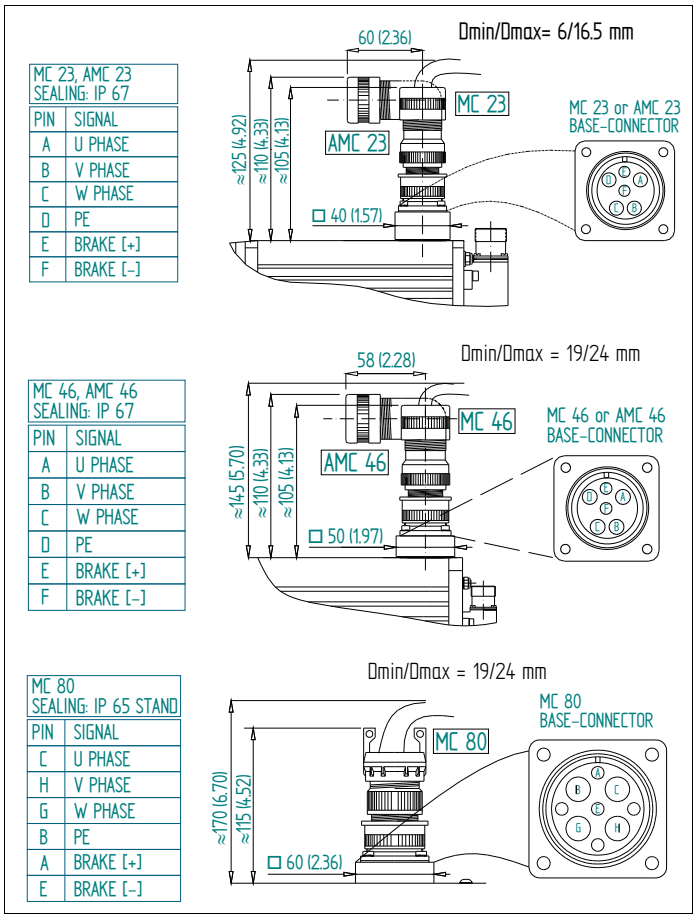
DIMENSION	L	
UNITS	mm	in
FXM73/V	384	15.11
FXM74/V	419	16.49
FXM75/V	454	17.87
FXM76/V	489	19.25
FXM77/V	524	20.62
FXM78/V	559	22.00

DIMENSION	C1		C2	
UNITS	mm	in	mm	in
Io ≤ 23 A (MC 23)	40	1.57	157	6.18
23 A < Io ≤ 46 A (MC 46)	50	1.96	162	6.25
46 A < Io ≤ 80 A (MC 80)	50	1.96	162	6.37

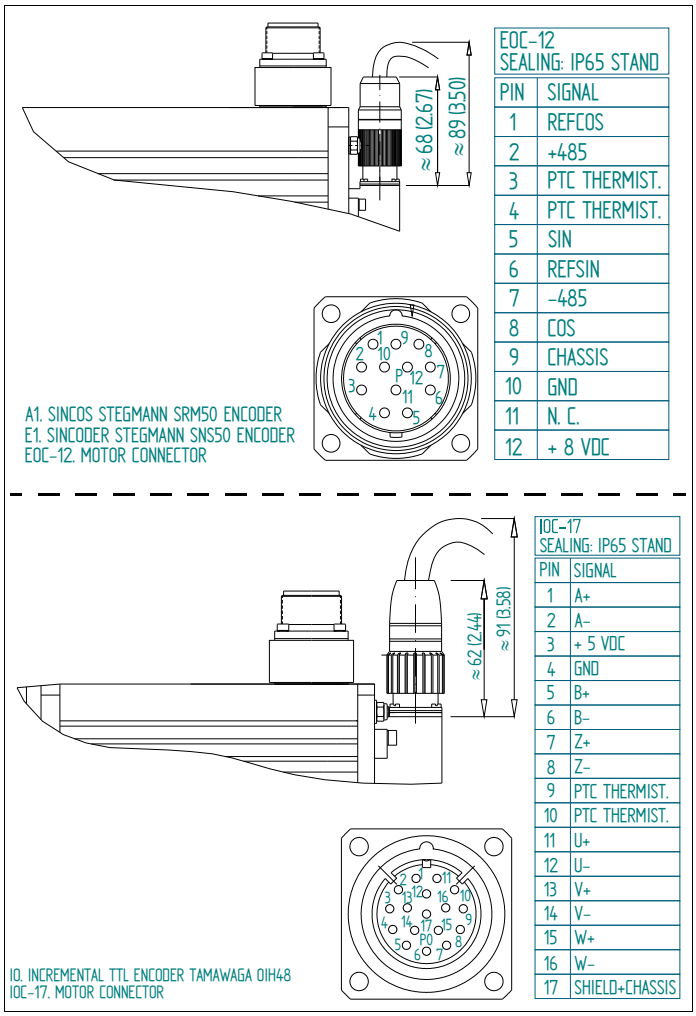


DIMENSION	F		GD		R		GA		ST
UNITS	mm	in	mm	in	mm	in	mm	in	mm
FXM7/V	10	0.39	8	0.31	50	1.97	35	1.38	M10x22

POWER CONNECTORS



FEEDBACK CONNECTORS



BRAKE CHARACTERISTICS

The brake (motor shaft) must never exceed its maximum speed. Voltage over 22-26 V DC will lock the axis.

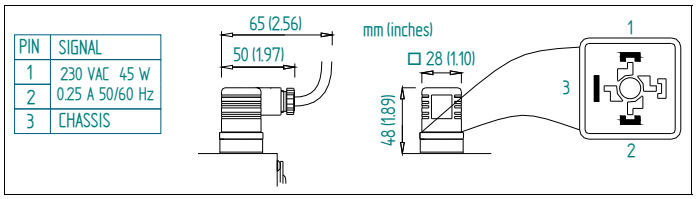
Motor	Holding torque	Power consumption	Time on/off	Inertia	Mass
Units	N·m (lbf·ft)	W (HP)	ms	kg·cm²	kg (lbf)
FXM1	Motor Mo	12 (0.016)	19/29	0.38	0.3 (0.66)
FXM3	Motor Mo	16 (0.021)	20/29	1.06	0.6 (1.32)
FXM5	Motor Mo	18 (0.024)	25/50	3.60	1.1 (2.42)
FXM7	Motor Mo	35 (0.047)	53/97	31.80	4.1 (9.03)

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

FAN CHARACTERISTICS

FXM5 and FXM7 motors have an optional fan whose characteristics are:

Motor	Frequency	Supply voltage	Power	Flow	Noise	Speed
Units	Hz	V	W	m³/h	dBA	1/min
FXM5/V	50	230	45	325	48	2800
FXM7/V	50	230	45	325	48	2800
FXM5/V	60	230	39	380	52	3250
FXM7/V	60	230	39	380	52	3250



GENERAL MOUNTING CONDITIONS

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

CAUTION!

When installing pulleys or gears for transmission, avoid hitting the shaft. Use some tool that is supported in the threaded hole on the shaft to insert the pulley or the gear.

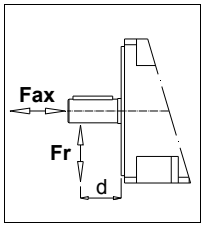
AXIAL AND RADIAL LOADS

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.

Follow these considerations in order to avoid these problems:

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

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

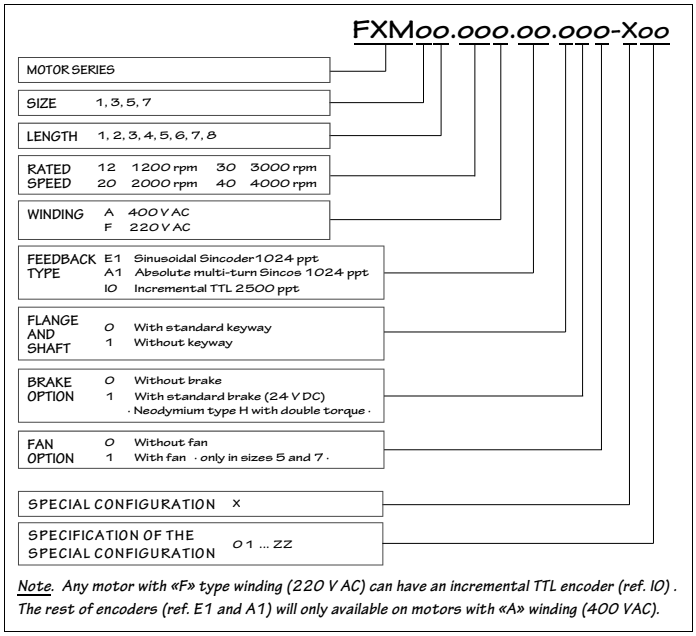


Series	Axial force ·Fax·		Radial force ·Fr·		Distance ·d·	
Units	N	lb	N	lb	mm	in
FXM1	105	23.60	500	112.40	15	0.59
FXM3	138	31.02	660	148.37	20	0.78
FXM5	157	35.29	745	167.48	25	0.98
FXM7	336	75.53	1590	357.44	29	1.14

SALES MODEL

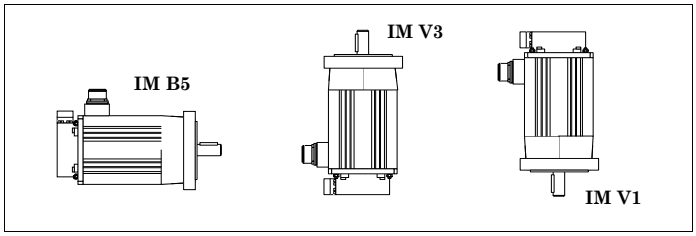
The sales model is stored in the motor encoder. The drive software can automatically adjust the motor parameters by reading that “sales model” from the encoder memory.

MOTOR MODEL NOMENCLATURE



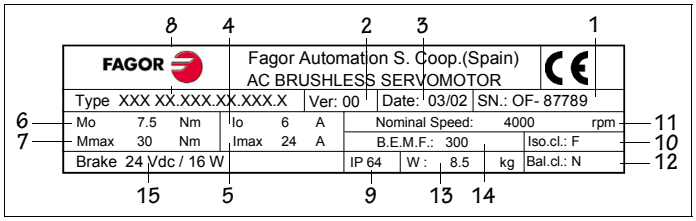
Note. Any motor with «F» type winding (220 V AC) can have an incremental TTL encoder (ref. I0) . The rest of encoders (ref. E1 and A1) will only available on motors with «A» winding (400 VAC).

MOUNTING METHODS KEY



RATING PLATE DATA

The specifications label stuck on FXM servo motors supplied by Fagor Automation S. Coop offers the necessary data to identify the motor for the user.



1	Serial Nr
2	Version
3	Manufacturing date
4	Stall current
5	Maximum current
6	Stall torque
7	Maximum torque
8	Motor model reference
9	Degree of protection of motor
10	Insulation class
11	Rated speed
12	Level of vibration
13	Weight (mass)
14	BEMF (**B**ack **E**lectro **M**otor **F**orce)
15	Holding brake (unlocking voltage / power absorbed)

FKM 2/4/6/8 MOTORS

GENERAL CHARACTERISTICS

These motors have been manufactured in accordance with the European regulations EN 60204-1 and EN 60034 as instructed by the European Directive 2006/95/EC on Low Voltage (LVD).

Excitation	Permanent rare earth magnets (Nd-Fe-B)
Temperature sensor	PTC thermistor, KTY-84-130
Shaft extension	Cylindrical without keyway Option: with keyway
Mounting	Face flange with through holes
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 option) meets DIN 45665 Half-key balancing
Usefull life of bearings	20000 hours
Type of winding **	F winding (220 V AC) A winding (400 V AC)**
Pairs of poles	FKM2, FKM4, FKM6: P=3 FKM8: P=4
Noise emission	DIN 45653
Vibration resistance	Withstands 1g along the shaft and 3g sideways (take g=9.81 m/s²)
Stator winding insulation class	Heating 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	-20°C/80°C (-4°F/176°F)
Ambient temp. allowed	0°C/40°C (32°F/104°F)
Working ambient humidity	From 20 % to 80 % (non condensing)
Ventilation ***	Optional only in the FKM8 series. See fan characteristics
Holding brake	Optional on 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.*

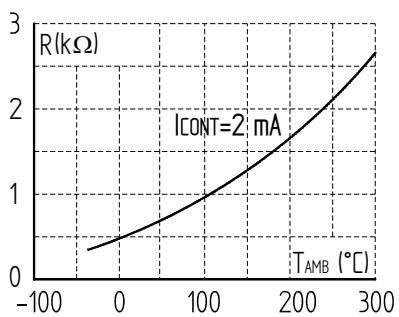
*** *Only the FKM8 series offers the "with fan" option.*

WARNING. The ·F class· insulation on the motor keeps its dielectric properties as long as the temperature does not exceed 150°C (302°F) for a cooling temperature of 40°C (104°F).

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).

Sensor type	KTY-84-130
Resistance at 20°C (68°F)	581 Ω
Resistance at 100°C (212°F)	1000 Ω
Sensor connection	Feedback cable
Response temperature	Break at 145°C ±10°C



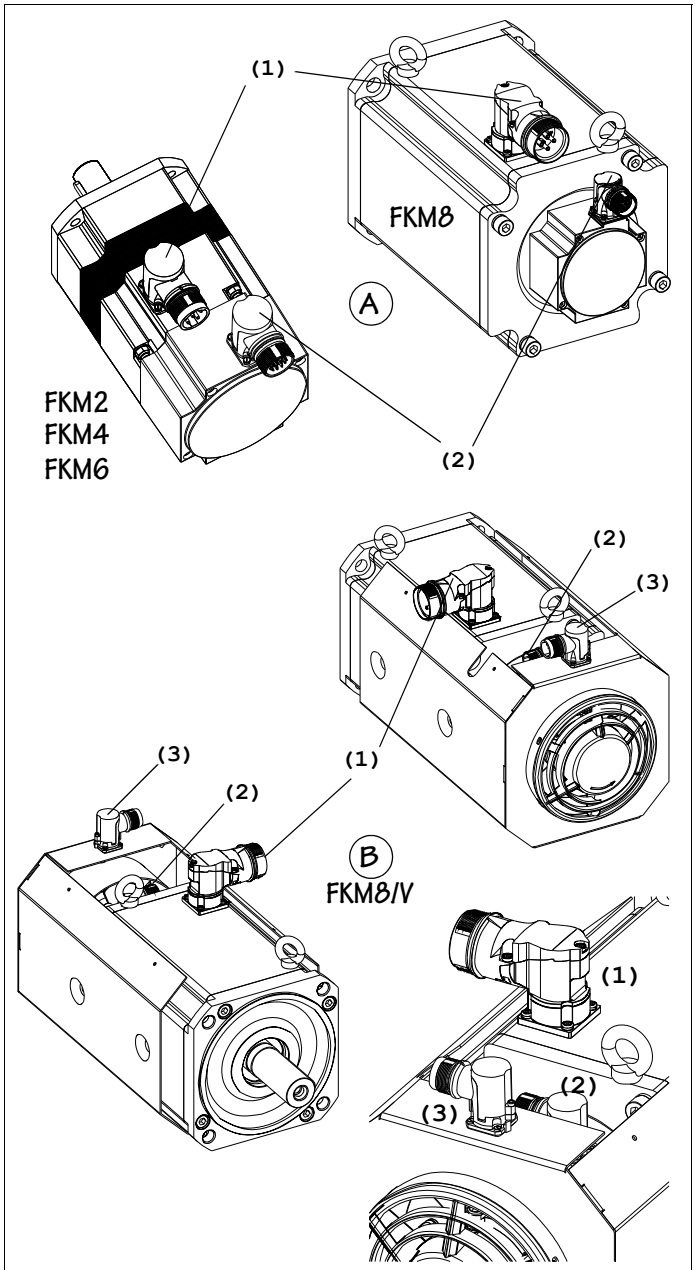
The following figure shows the resistance of the sensor as a function of the ambient temperature (average values).

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

The temperature sensor KTY-84-130 has polarity. Therefore, watch its polarity when connecting it !

OUTSIDE APPEARANCE

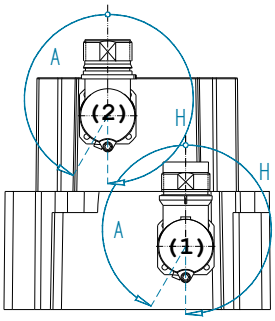
The following figure shows the location of the connectors for power and motor feedback conection:



*FKM servomotors. **A.** Without FAN. **B.** With FAN.*
***1.** Power base connector for the motor+brake (if applicable).*
***2.** Motor feedback base connector.*
***3.** Power base connector for the fan (if applicable).*

Rotary connectors

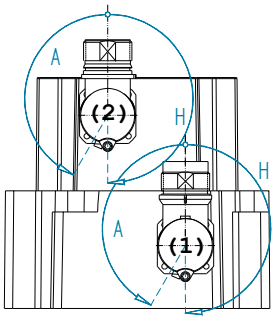
Note that both the power connector and the feedback connector are rotary making it easier to connect the cable when the installation so requires. The possible rotating angles are:



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.*

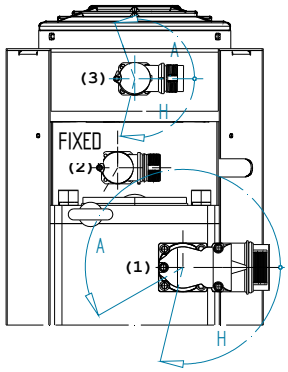
Approx. maximum rotating torque, 8 Nm. Only 5 rotations are allowed in order to keep the degree of protection.



CONNECTOR	MOTOR	Amax	Hmax
POWER (1)	FKM8	200°	110°
SIGNAL (2)	FKM8	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/V	200°	110°
SIGNAL (2)	FKM8/V	Keep it fixed in the position shown in the image	
FAN (3)	FKM8/V	110°	105°

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

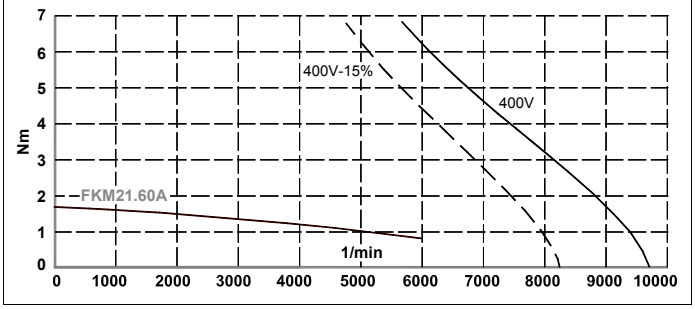
Approx. maximum rotating torque, 8 Nm. Only 5 rotations are allowed in order to keep the degree of protection.

MANDATORY. The indicated rotating angle values must be exceeded. We recommend to rotate both connectors only when necessary and not too often. The more times they are rotated, the torque necessary to rotate them will decrease.They must not be forced permanently.

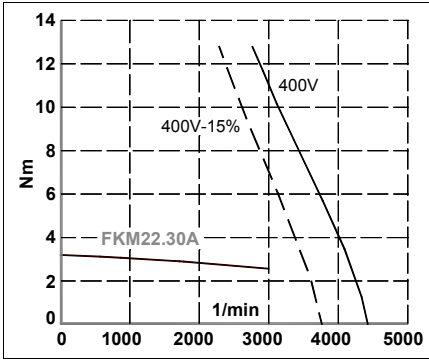
WARNING. Note that the corresponding cable must be installed on each connector. Remember that each cable has a specific flexibility and, therefore, when handling the connector with the cable installed, its maximum bending radius must not be exceeded.

CHARACTERISTICS CURVES. FKM SERIES AT 400 V AC

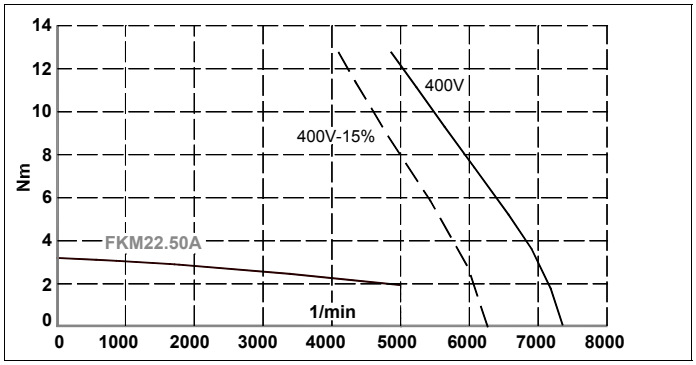
FKM21.60A



FKM22.30A



FKM22.50A



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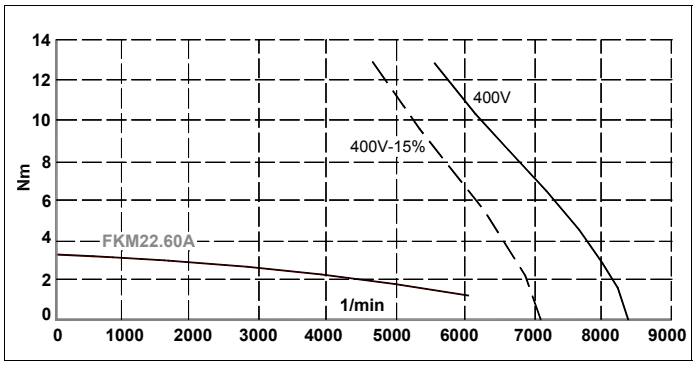
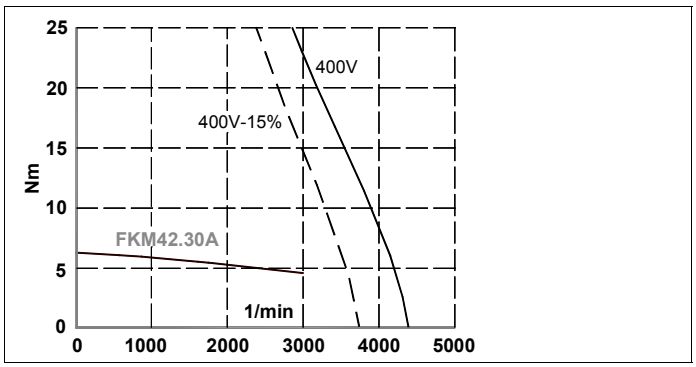
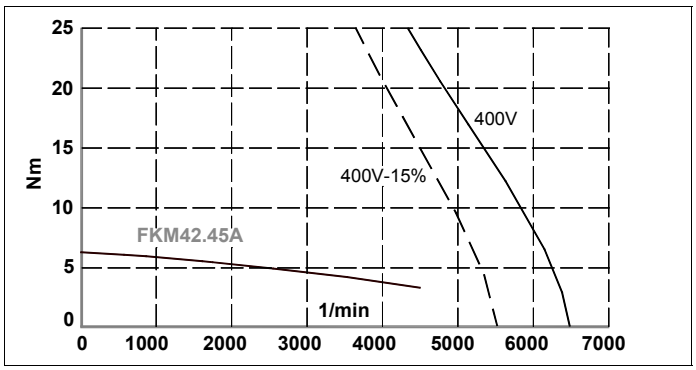


FKM42.30A



FKM42.45A



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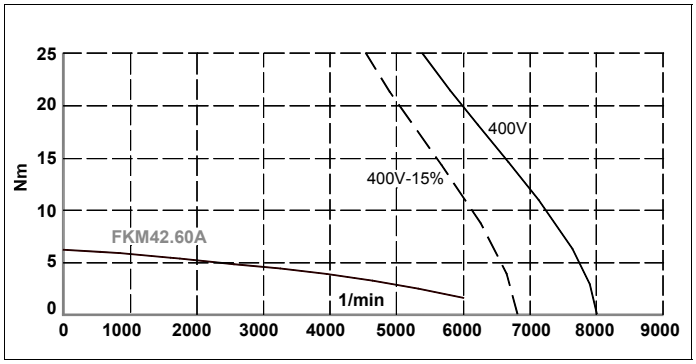
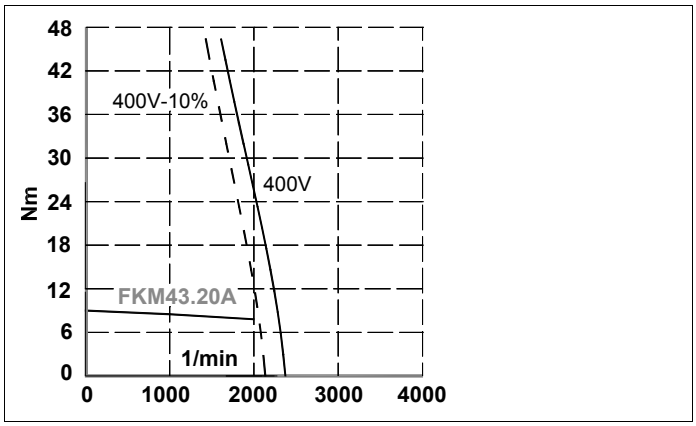


FKM43.20A



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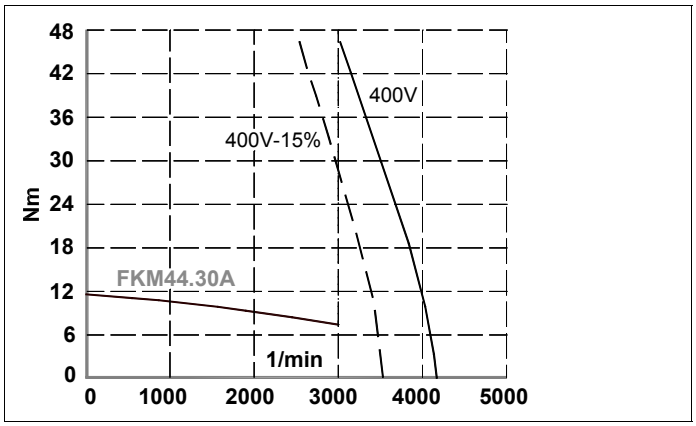

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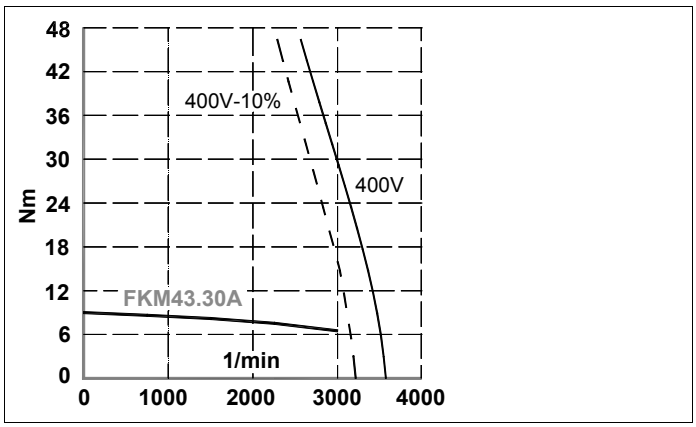

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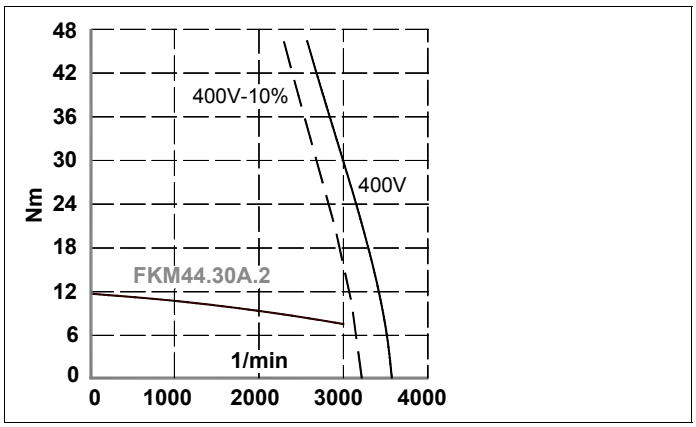

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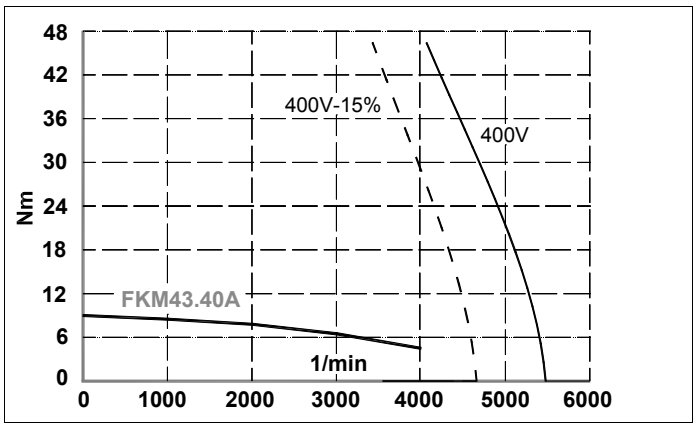
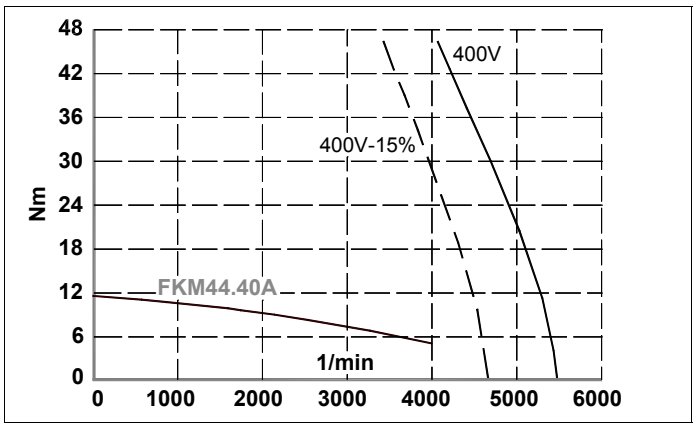


FKM44.40A



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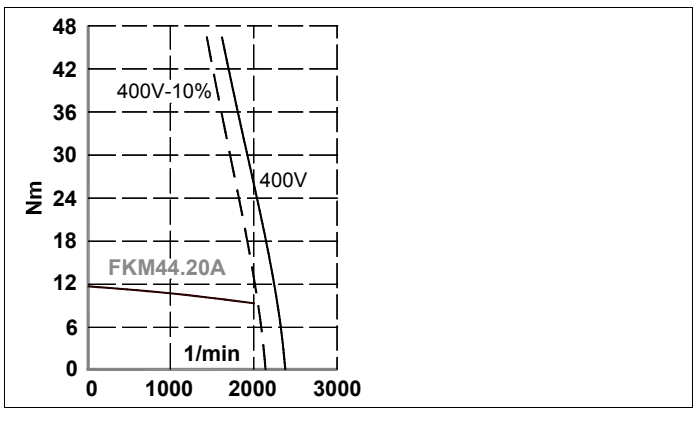

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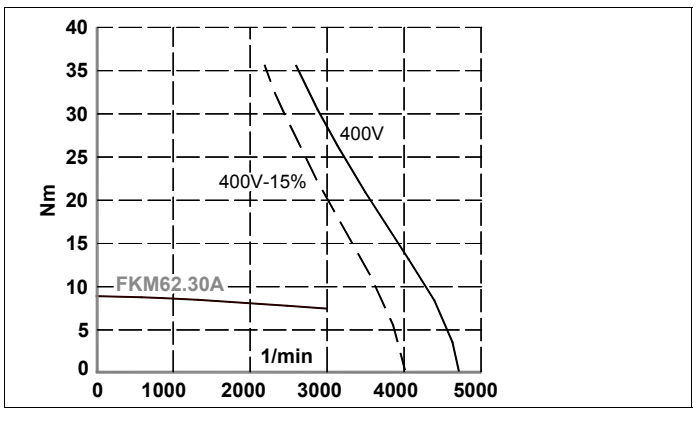

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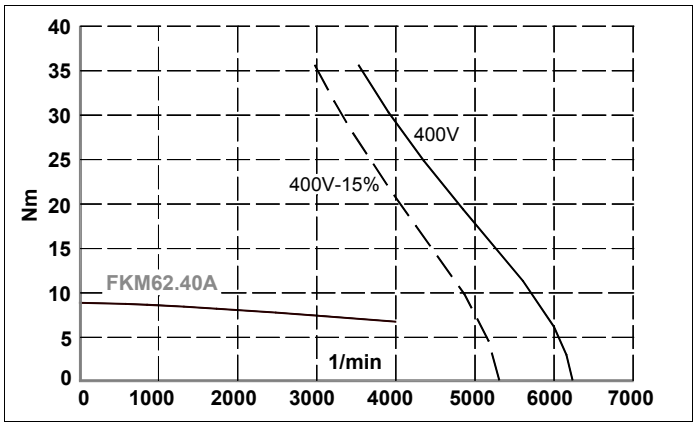

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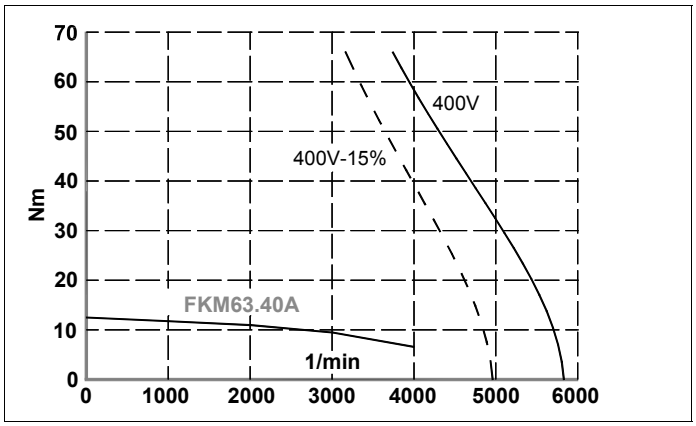

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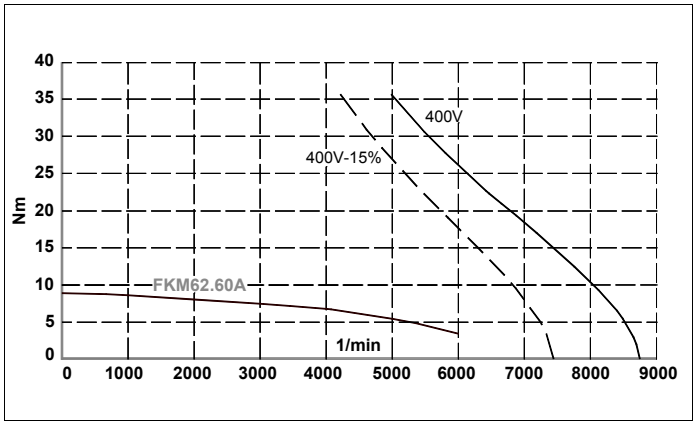

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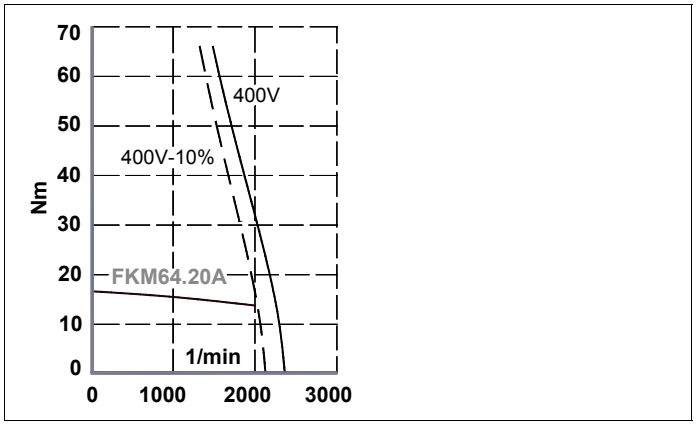

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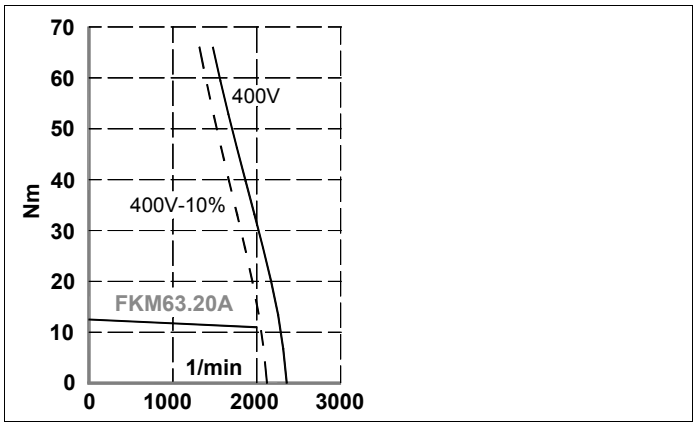

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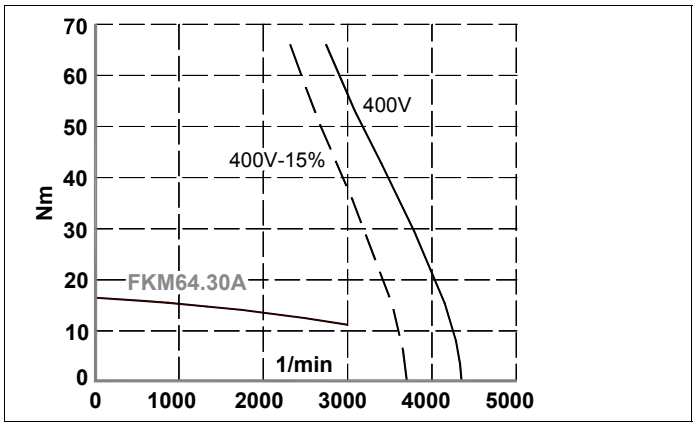

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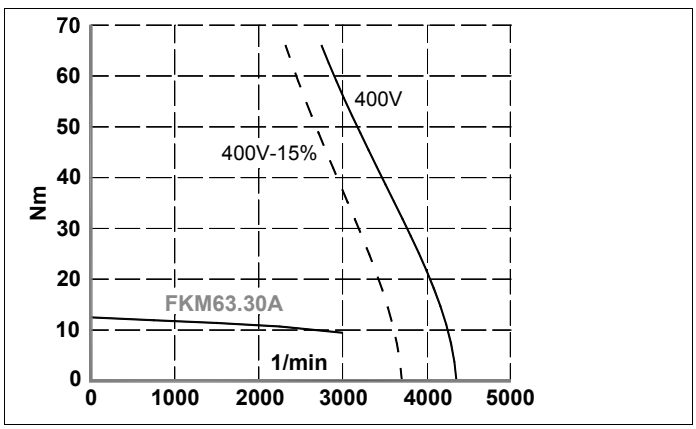

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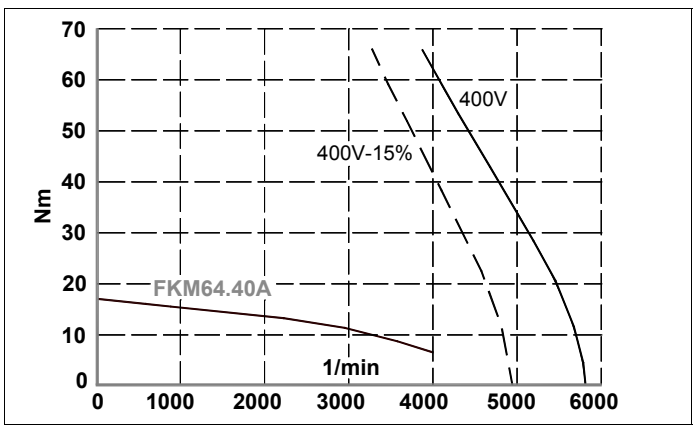

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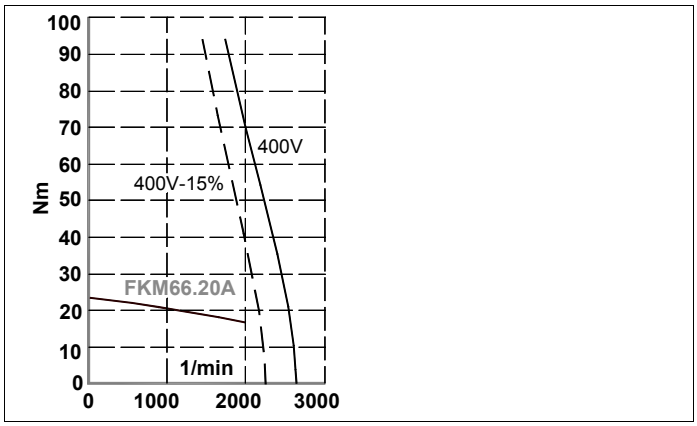

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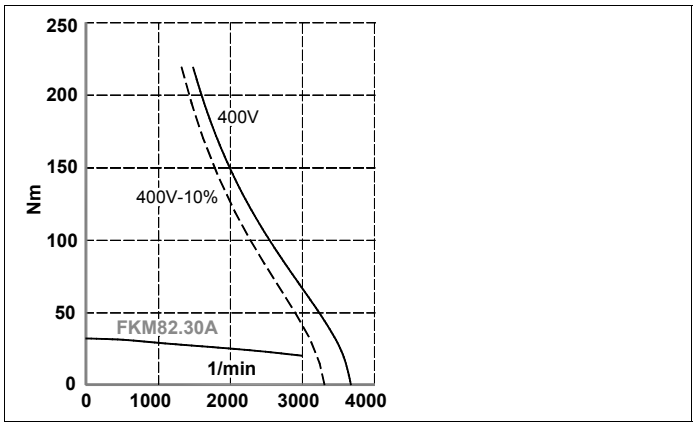

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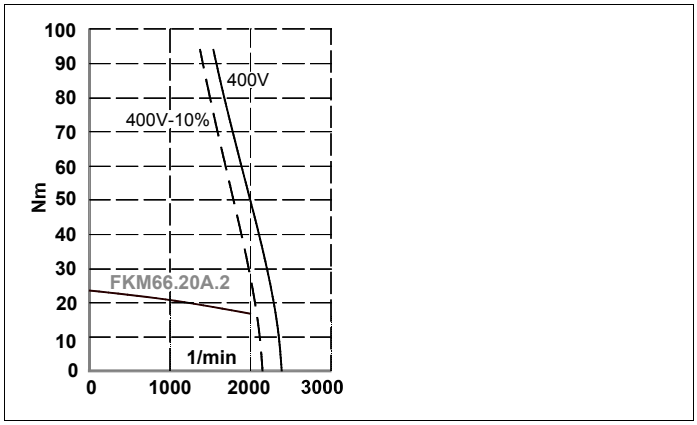

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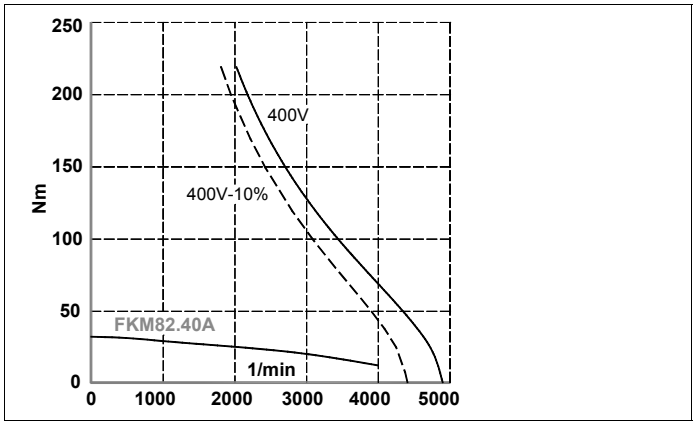

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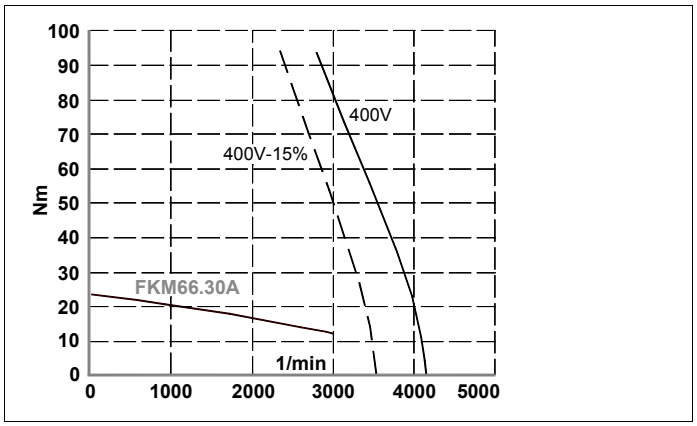

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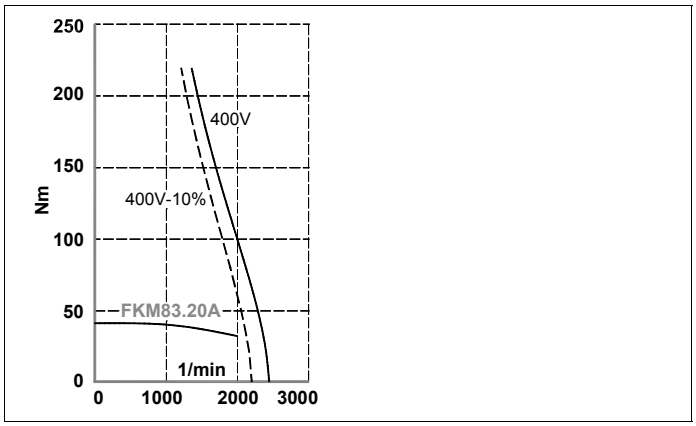

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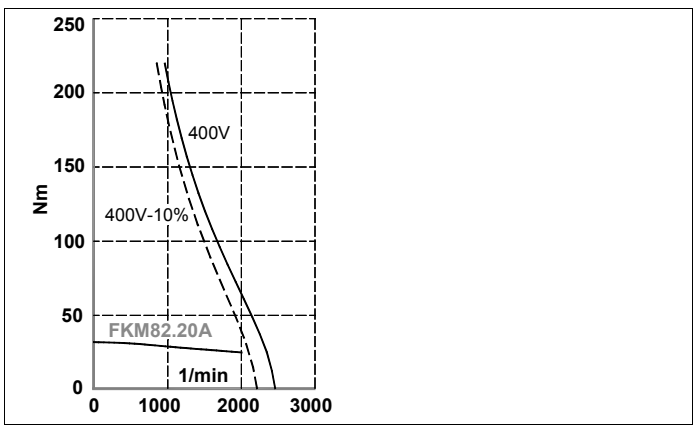

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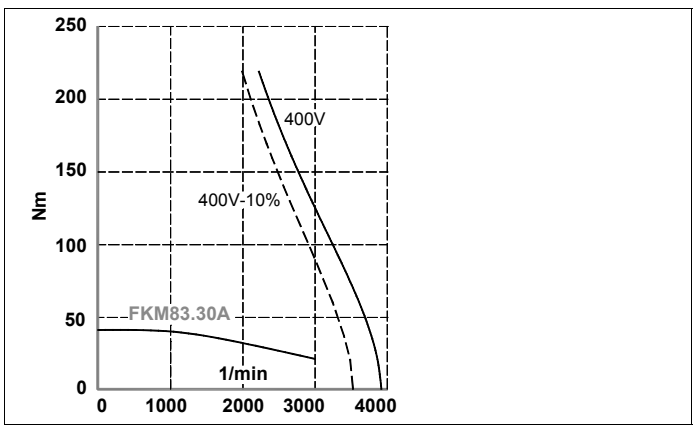

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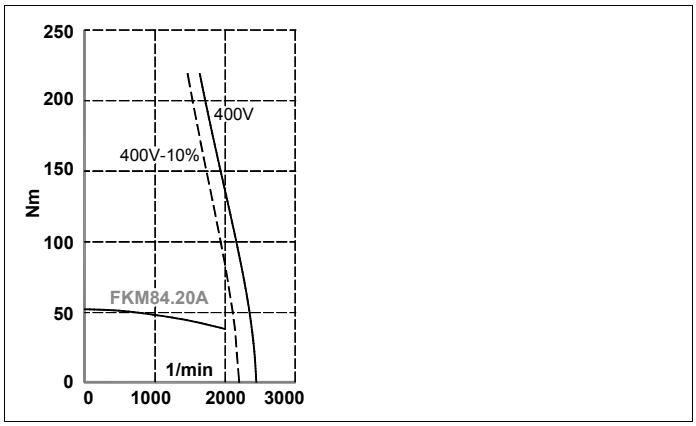
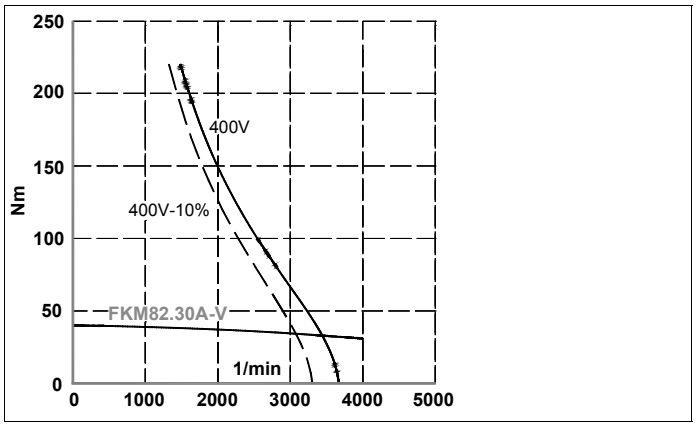


FKM82.30A-V



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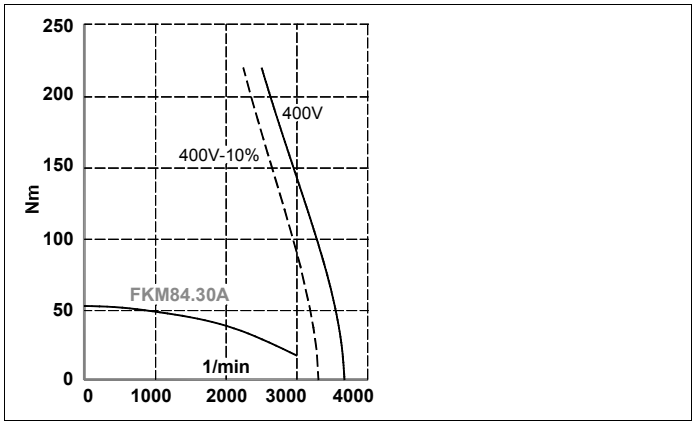

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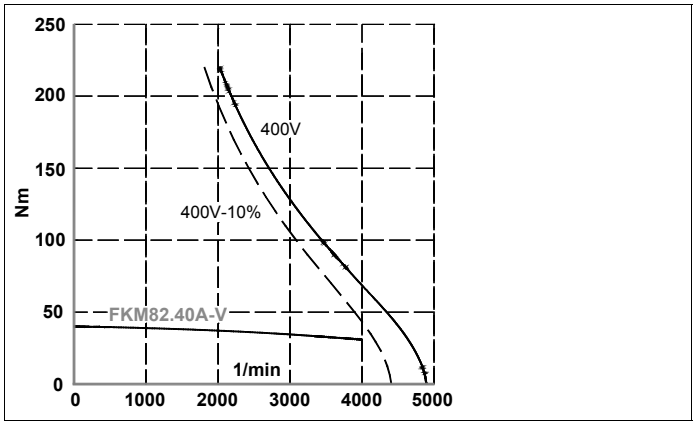

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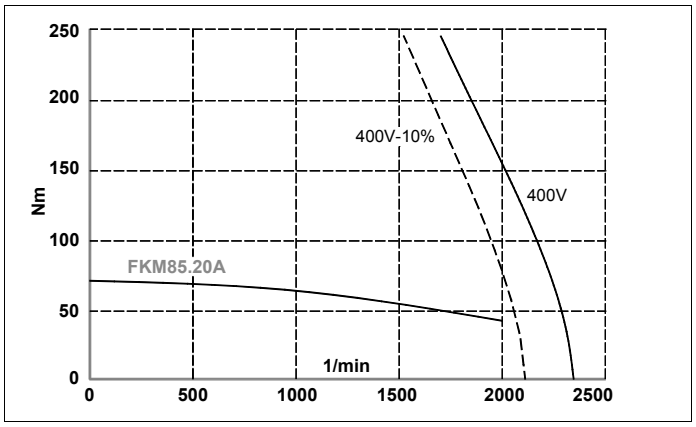

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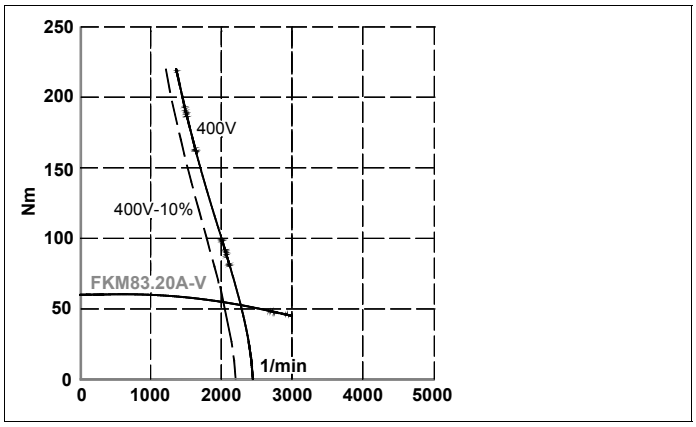
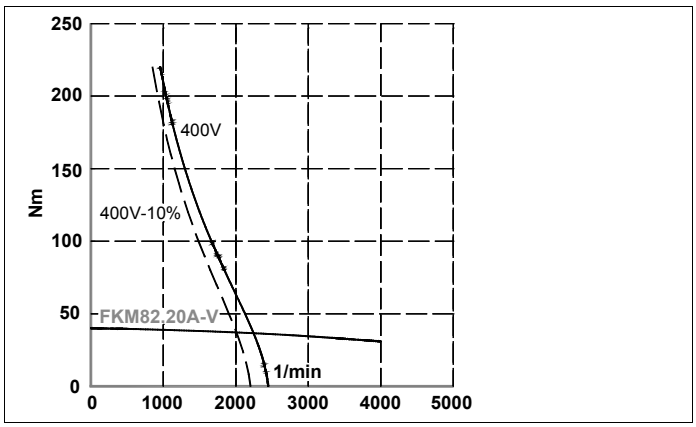
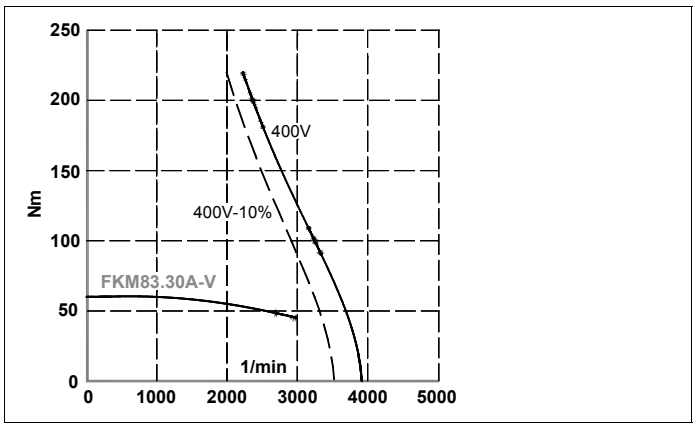


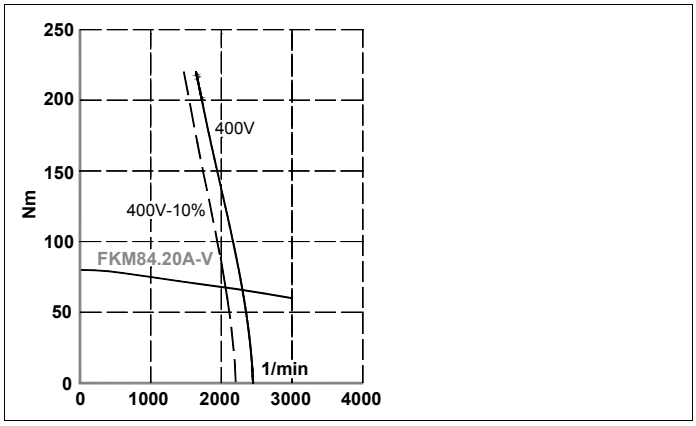
FKM82.20A-V



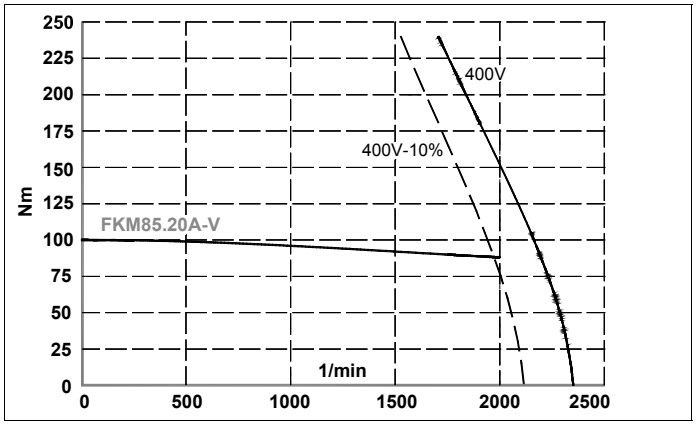
FKM83.30A-V



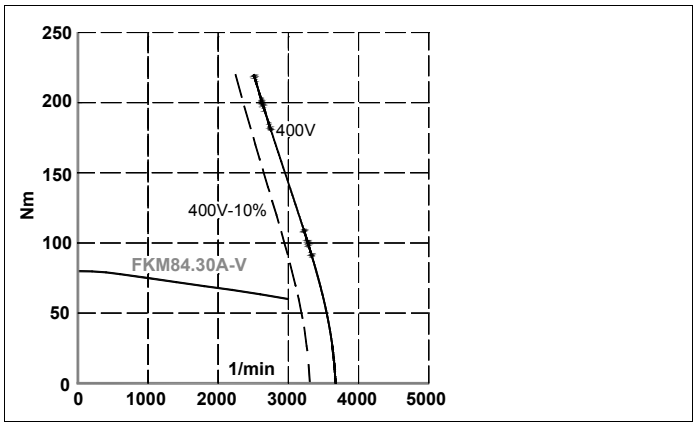
FKM84.20A-V



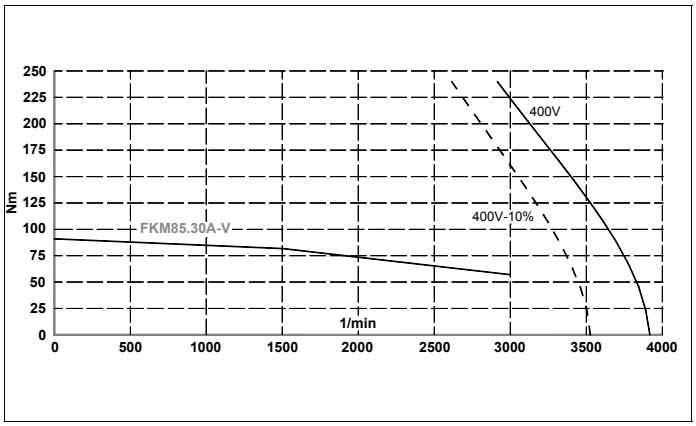
FKM85.20A-V



FKM84.30A-V



FKM85.30A-V



Technical data

MOTORS	Stall torque	Peak torque	Rated speed	Stall current	Peak current	Calculation power	Torque constant	Acceleration time	Inductance per phase	Resistance per phase	Inertia*	Mass*	ACD Peak torque (N·m) for 0.5 seconds				
	Mo	**Mp**	**n_N**	**Io**	**Imax**	**Pcal**	**kt**	**tac**	**L**	**R**	**J**	**P**	**1.08**	**1.15**	**1.25**	**2.35**	**2.50**
	N·m	N·m	rpm	Arms	Arms	kW	Nm/A	ms	mH	Ω	kg·cm²	kg	N·m	N·m	N·m	N·m	N·m
FKM21.60A.□□.□□0	1.7	7	6000	2.8	11	1.1	0.6	14.4	7.7	2.6	1.6	4.2	4.8	**7.0**	-	-	-
FKM22.30A.□□.□□0	3.2	13	3000	2.4	10	1.0	1.3	7.0	16	3.95	2.9	5.3	10.6	**13.0**	-	-	-
FKM22.50A.□□.□□0	3.2	13	5000	4.0	16	1.7	0.8	11.7	5.8	1.4	2.9	5.3	6.4	12.0	**13.0**	-	-
FKM22.60A.□□.□□0	3.2	13	6000	4.5	18	2.0	0.7	14.0	4.6	1.1	2.9	5.3		10.5	**13.0**	-	-
FKM42.30A.□□.□□0	6.3	25	3000	4.6	19	2.0	1.3	10.7	8.6	1.45	8.5	7.8		20.1	**25.0**	-	-
FKM42.45A.□□.□□0	6.3	25	4500	6.9	28	3.0	0.9	16.0	3.9	0.675	8.5	7.8		13.5	22.5	**25.0**	-
FKM42.60A.□□.□□0	6.3	25	6000	8.5	34	3.9	0.7	21.3	2.6	0.45	8.5	7.8			17.5	**25.0**	-
FKM43.20A.□□.□□0	9.0	36	2000	3.9	15.7	1.88	2.30	9.7	14.5	1.720	16.7	11.7	18.4	34.5	**36.0**	-	-
FKM43.30A.□□.□□0	9.0	36	3000	6.2	25	2.82	1.45	14.5	6.2	0.755	16.7	11.7		21.7	**36.0**	-	-
FKM43.40A.□□.□□0	9.0	36	4000	9.4	38	3.77	0.95	19.4	2.4	0.315	16.7	11.7			23.7	33.2	**36.0**
FKM44.20A.□□.□□0	11.6	47	2000	4.6	19	2.4	2.5	7.4	14.51	1.72	16.7	11.7		37.5	**47.0**	-	-
FKM44.30A.□□.□□0	11.6	47	3000	8.2	33	3.6	1.4	11.2	4.2	0.54	16.7	11.7			35.0	**47.0**	-
FKM44.30A.□□.□□0.2	11.6	47	3000	7.0	28	3.6	1.65	11.1	6.16	0.755	16.7	11.7		24.7	41.2	**47.0**	-
FKM44.40A.□□.□□0	11.6	47	4000	10.7	43	4.9	1.1	14.9	2.4	0.315	16.7	11.7			27.5	38.5	**47.0**
FKM62.30A.□□.□□0	8.9	35	3000	7.1	28	2.8	1.2	14.3	7.2	0.77	16.0	11.9		18.0	30.0	**35.0**	-
FKM62.40A.□□.□□0	8.9	35	4000	9.3	37	3.7	0.9	19.1	4.1	0.44	16.0	11.9			22.5	31.5	**35.0**
FKM62.60A.□□.□□0	8.9	35	6000	13.1	52	5.6	0.6	28.7	2.1	0.225	16.0	11.9				23.8	34.0
FKM63.20A.□□.□□0	12.5	51	2000	5.3	21.3	2.6	2.35	12.1	13.2	0.935	29.5	17.1		35.2	**51.0**	-	-
FKM63.30A.□□.□□0	12.5	51	3000	10.3	40.6	3.9	1.21	18.1	3.8	0.280	29.5	17.1			30.2	42.3	**51.0**
FKM63.40A.□□.□□0	12.5	51	4000	16.2	64.0	5.2	0.77	24.2	2.1	0.160	29.5	17.1				26.9	38.5
FKM64.20A.□□.□□0	16.5	66	2000	6.5	26	3.4	2.53	9.3	13.16	0.935	29.5	17.1		38.0	63.2	**66.0**	-
FKM64.30A.□□.□□0	16.5	66	3000	12.1	48	5.2	1.4	14.0	3.8	0.285	29.5	17.1			34.0	47.6	**66.0**
FKM64.40A.□□.□□0	16.5	66	4000	16,2	64	6.9	1.0	18.7	2.1	0.16	29.5	17.1				35.0	50.0
FKM66.20A.□□.□□0	23.5	94	2000	10,5	42	4.9	2.23	9.5	4.6	0.31	43.0	22.3			55.9	78.0	**94.0**
FKM66.20A.□□.□□0.2	23.5	94	2000	9.4	37	4.9	2.5	9.57	8.82	0.41	43.0	22.3			62.5	87.5	**94.0**
FKM66.30A.□□.□□0	23.5	94	3000	16.4	66	7.4	1.4	14.3	2.6	0.17	43.0	22.3				50.1	70.0
FKM82.20A.□□.□□0	32.0	96	2000	13.2	39	6.7	2.42	22.4	7.0	0.48	103.0	31.0				84.7	**96.0**
FKM82.30A.□□.□□0	32.0	96	3000	19.8	59	10.1	1.61	33.6	3.1	0.21	103.0	31.0					80.5
FKM83.20A.□□.□□0	41.0	123	2000	17.0	51	8.6	2.41	25.5	4.6	0.265	150.0	41.0				84.3	120.5
FKM84.20A.□□.□□0	52.0	156	2000	21.5	64	10.9	2.41	26.4	3.4	0.18	197.0	50.0					120.5

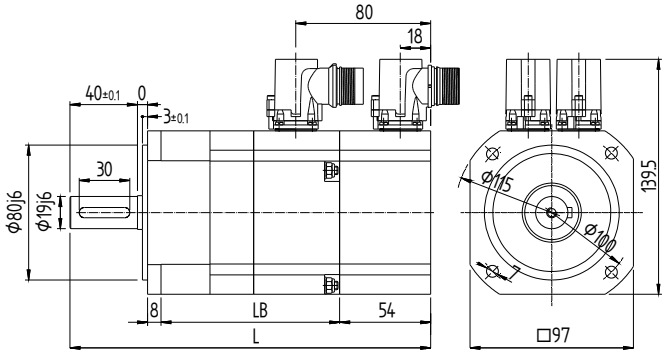
In bold, the drive recommended for each motor.

** When adding a mechanical brake (optional) to the motor, the inertia and mass values of the brake will also have to be taken into account.*

DIMENSIONS

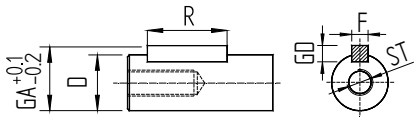
FKM2

Dimensions in mm
1 in = 25.4 mm



DIMENSION	LB		L	
UNITS	mm	in	mm	in
FKM21	106	4.17	208	8.19
FKM22	130	5.11	232	9.13

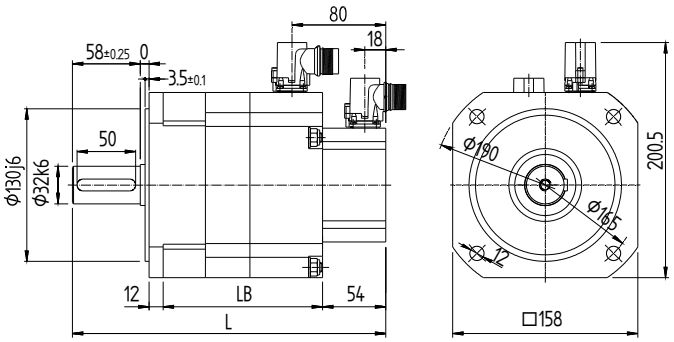
DIMENSION	ØD j6	
UNITS	mm	in
FKM2	19	0.74



DIMENSION	F		GD		R		GA		ST
UNITS	mm	in	mm	in	mm	in	mm	in	mm
FKM2	6	0.23	6	0.23	30	1.18	21.5	0.84	M6x16

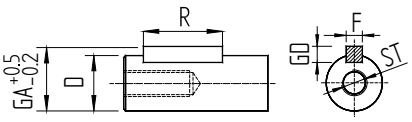
FKM6

Dimensions in mm
1 in = 25.4 mm



DIMENSION	LB		L	
UNITS	mm	in	mm	in
FKM62	136	5.35	260	10.24
FKM63	172	6.77	296	11.65
FKM64	172	6.77	296	11.65
FKM66	208	8.18	332	13.07

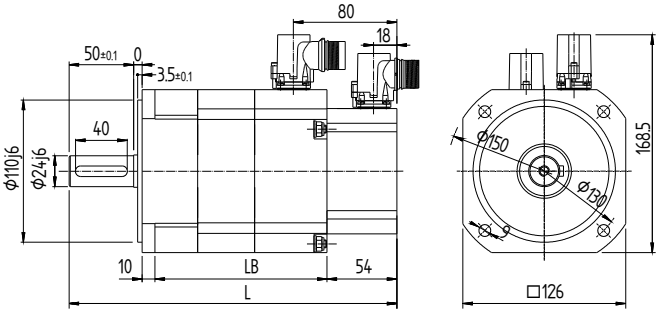
DIMENSION	ØD j6	
UNITS	mm	in
FKM6	32	1.26



DIMENSION	F		GD		R		GA		ST
UNITS	mm	in	mm	in	mm	in	mm	in	mm
FKM6	10	0.39	8	0.31	50	1.96	35	1.37	M10x22

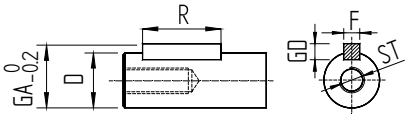
FKM4

Dimensions in mm
1 in = 25.4 mm



DIMENSION	LB		L	
UNITS	mm	in	mm	in
FKM42	133	5.23	247	9.72
FKM43	175	6.88	289	11.38
FKM44	175	6.88	289	11.38

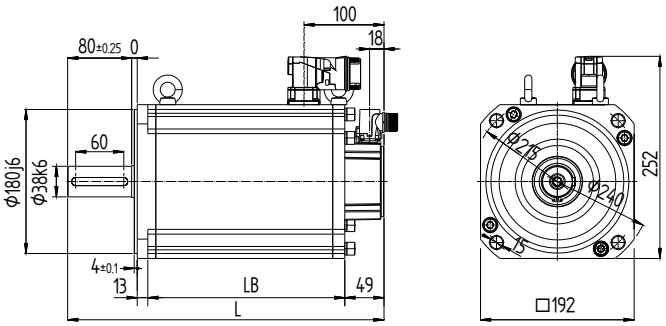
DIMENSION	ØD j6	
UNITS	mm	in
FKM4	24	0.94



DIMENSION	F		GD		R		GA		ST
UNITS	mm	in	mm	in	mm	in	mm	in	mm
FKM4	8	0.31	7	0.27	40	1.57	27	1.06	M8x19

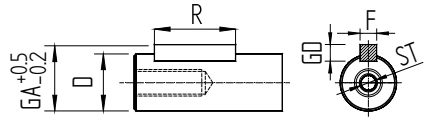
FKM8

Dimensions in mm
1 in = 25.4 mm



	WITHOUT BRAKE				WITH BRAKE			
DIMENSION	LB		L		LB		L	
UNITS	mm	in	mm	in	mm	in	mm	in
FKM82	246	9.68	388	15.27	296	11.65	438	17.24
FKM83	296	11.65	438	17.24	346	13.62	488	19.21
FKM84	346	13.62	488	19.21	396	15.59	538	21.18
FKM85	396	15.59	538	21.18	446	17.55	588	23.14

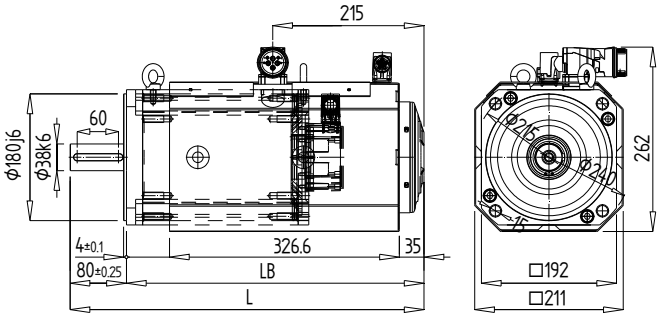
DIMENSION	ØD k6	
UNITS	mm	in
FKM8	38	1.49



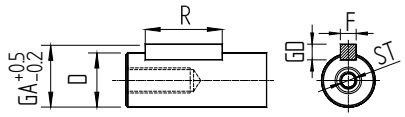
DIMENSION	F		GD		R		GA		ST
UNITS	mm	in	mm	in	mm	in	mm	in	mm
FKM8	10	0.39	8	0.31	70	2.75	41	1.61	M12x30

FKM8/V

Dimensions in mm
1 in = 25.4 mm



	WITHOUT BRAKE				WITH BRAKE			
DIMENSION	LB		L		LB		L	
UNITS	mm	in	mm	in	mm	in	mm	in
FKM82/V	423	16.65	503	19.80	473	18.62	553	21.77
FKM83/V	473	18.62	553	21.77	523	20.59	603	23.74
FKM84/V	523	20.59	603	23.74	573	22.55	653	25.70
FKM85/V	573	22.55	653	25.70	623	24.52	703	27.67



DIMENSION	ØD k6	
UNITS	mm	in
FKM8/V	38	1.49

DIMENSION	F		GD		R		GA		ST
UNITS	mm	in	mm	in	mm	in	mm	in	mm
FKM8/V	10	0.39	8	0.31	70	2.75	41	1.61	M12x30

HOLDING BRAKE CHARACTERISTICS

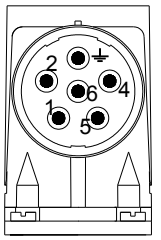
The holding brake (motor shaft) must never exceed its maximum speed. Voltage over 22-26 V DC will lock the axis.

Motor	Holding torque	Power consump.	Time on/off	Inertia	Mass
Units	N·m (lbf·ft)	W (hp)	ms	kgcm²	kg (lbf)
FKM2	4.5 (3.31)	12 (0.016)	7/35	0.18	0.30 (0.66)
FKM4	9.0 (6.63)	18 (0.024)	7/40	0.54	0.48 (1.06)
FKM6	18.0 (13.27)	24 (0.032)	10/50	1.66	0.87 (1.92)
FKM8 FKM8/V	80.0 (59.00)	35 (0.046)	53/97	31.8	4.10 (9.03)

Note. *The max. turning speed of the brake for the FKM2, FKM4 and FKM6 series is 10000 rpm and 8000 rpm for the FKM8 and FKM8/V series.*

POWER AND FEEDBACK CONNECTORS

OUTSIDE VIEW OF THE MOTOR POWER CONNECTOR

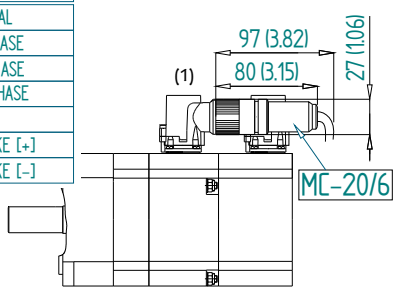


(1)

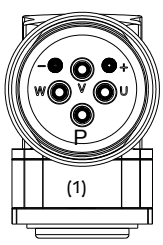
MC-20/6
SEALING: IP 65

PIN	SIGNAL
1	U PHASE
2	V PHASE
6	W PHASE
3	PE
4	BRAKE [+]
5	BRAKE [-]

FKM2/4/6



OUTSIDE VIEW OF THE MOTOR POWER CONNECTOR

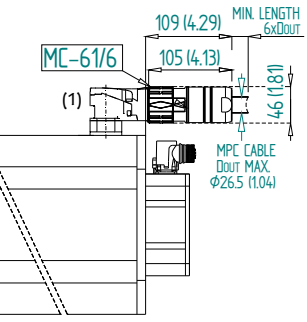


(1)

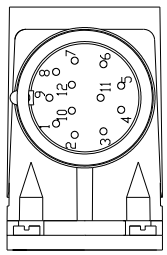
MC-61/6
SEALING: IP 67
WHEN LOCKED

PIN	SIGNAL
U	U PHASE
V	V PHASE
⏚	PE
+	BRAKE [+]
-	BRAKE [-]
W	W PHASE

FKM8



OUTSIDE VIEW OF THE MOTOR POWER CONNECTOR

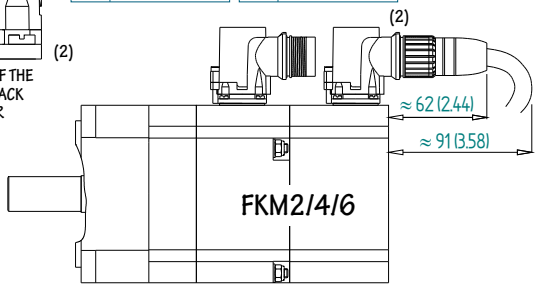


(2)

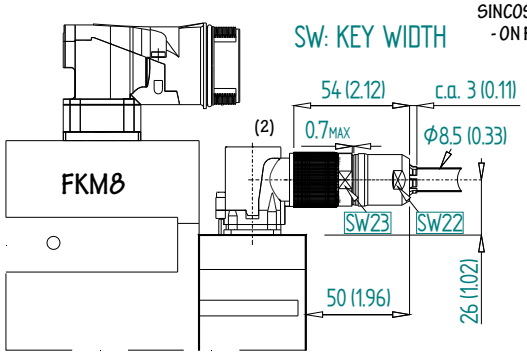
OUTSIDE VIEW OF THE MOTOR FEEDBACK CONNECTOR

PIN	SIGNAL	PIN	SIGNAL
1	REFCOS	7	-485
2	+ 485	8	COS
3	KTY84-	9	CHASSIS
4	KTY84+	10	GND
5	SIN	11	N.C.
6	REFSIN	12	+ 8 VDC

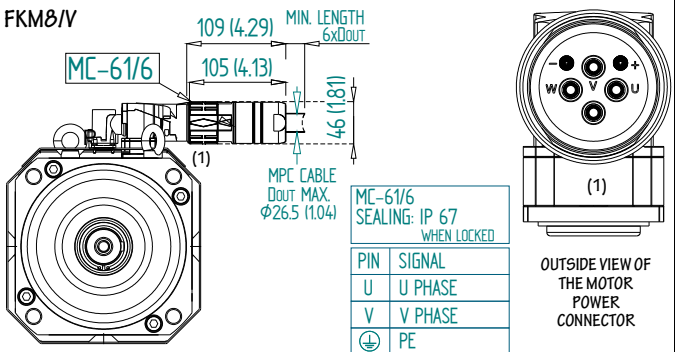
FKM2/4/6/8



SINCOS A3, SINCOS E3
- ON FKM MOTORS -



FKM8/V

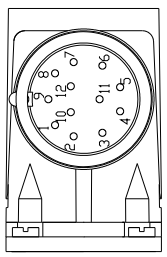


MC-61/6
SEALING: IP 67
WHEN LOCKED

PIN	SIGNAL
U	U PHASE
V	V PHASE
⏚	PE
+	BRAKE [+]
-	BRAKE [-]
W	W PHASE

OUTSIDE VIEW OF THE MOTOR POWER CONNECTOR

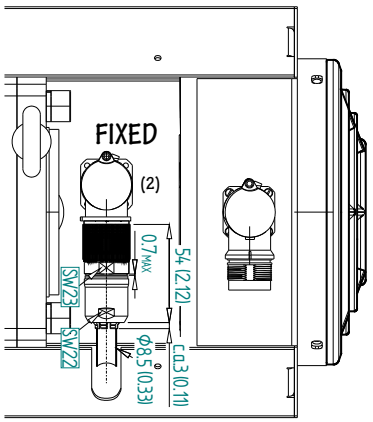
FKM8/V



(2)

OUTSIDE VIEW OF THE MOTOR FEEDBACK CONNECTOR

PIN	SIGNAL	PIN	SIGNAL
1	REFCOS	7	-485
2	+ 485	8	COS
3	KTY84-	9	CHASSIS
4	KTY84+	10	GND
5	SIN	11	N.C.
6	REFSIN	12	+ 8 VDC



FAN CHARACTERISTICS

The "with fan" option is only availabe on the FKM8 motor series.

GENERAL MOUNTING CONDITIONS

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

CAUTION!

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

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

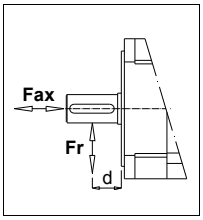
AXIAL AND RADIAL LOADS

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.

Follow these considerations in order to avoid these problems:

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

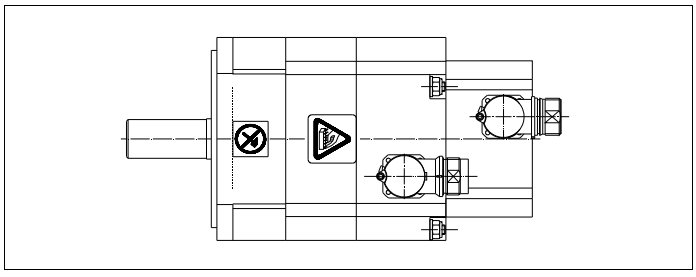
MANDATORY. When applying a combined axis and radial load, decrease the maximum radial force allowed ·**Fr**· to 70% of the value indicated in the table.



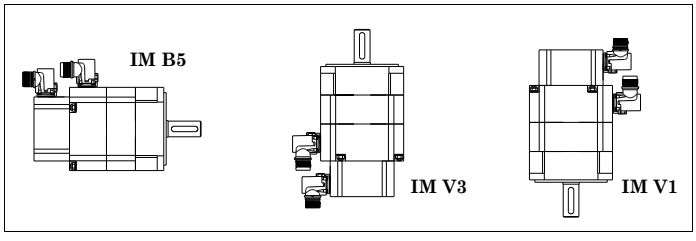
Series	Axial force ·**Fax**·		Radial force ·**Fr**·		Distance ·**d**·	
Units	N	lb	N	lb	mm	in
FKM2	125	28.10	668	150.17	20	0.78
FKM4	140	31.47	737	165.68	25	0.98
FKM6	240	53.95	1342	301.69	29	1.14
FKM8	440	98.91	1616	363.29	40	1.57

CAUTION!

Note that the surface of the motor can reach very high temperatures when it is running or it just stopped running. This label warns about this danger.



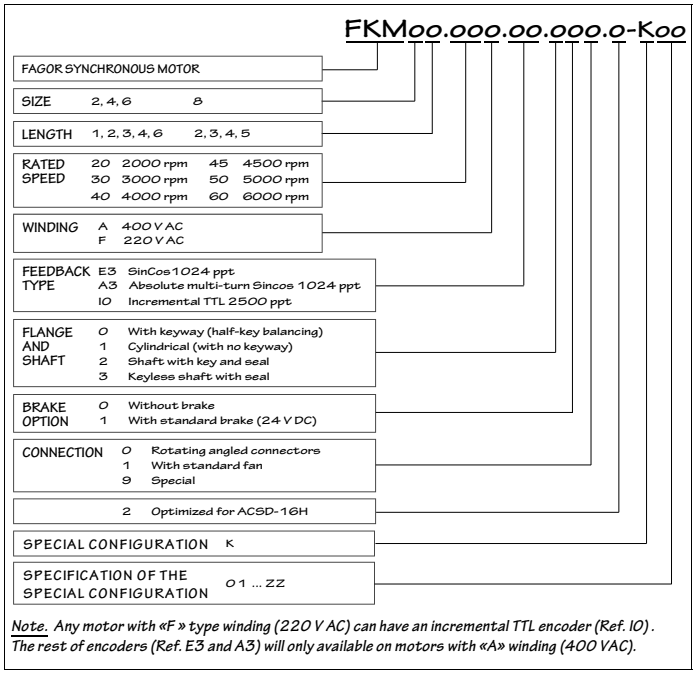
MOUNTING METHODS KEY



SALES MODEL

The sales reference is stored in the motor encoder. The drive software can automatically adjust the motor parameters by reading that “sales-model” from the encoder memory.

MOTOR MODEL NOMENCLATURE

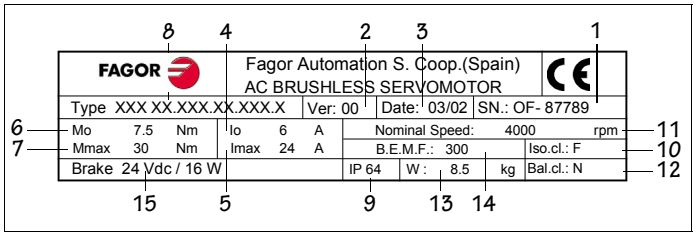


Note. Any motor with «F» type winding (220 V AC) can have an incremental TTL encoder (Ref. IO). The rest of encoders (Ref. E3 and A3) will only available on motors with «A» winding (400 VAC).

RATING PLATE DATA

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

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



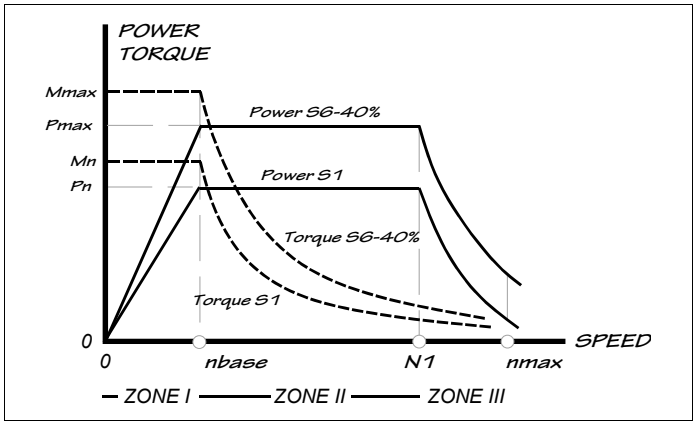
This characteristics plate of the motor is located on the right side of the motor viewed from its shaft. The items shown on this plate are:

1	Serial Nr
2	Version
3	Manufacturing date
4	Stall current
5	Maximum current
6	Stall torque
7	Maximum torque
8	Motor model reference
9	Degree of protection of motor
10	Insulation class
11	Rated speed
12	Level of vibration
13	Weight (mass)
14	BEMF (**B**ack **E**lectro **M**otor **F**orce)
15	Holding brake (unlocking voltage / power absorbed)

ASYNCHRONOUS MOTORS

OPERATING MODES

Next, the motor operating modes are described showing the different zones in the diagram below (power-torque/speed). The motor behavior characteristics are different in each of them. For spindle motors it is crucial to have an ample constant power zone. Three operating zones are established in order to analyze this characteristic. The following graph shows each zone and the motor operating mode in each of them.



OPERATING ZONES

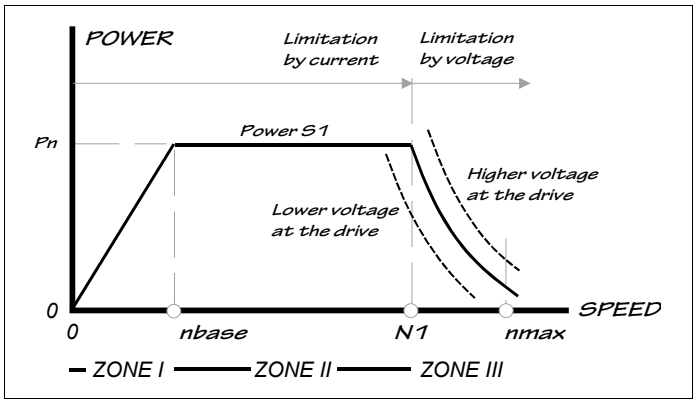
ZONE I. This zone is established from the rest state - null speed (0 rev/min) - to the nominal operation (rated or base speed). The torque developed by the motor coincides with the rated torque (Mrated) and is constant in the whole zone. Its value is obtained as the product of the power generated by the motor (directly proportional to the current circulating through its rotor up to the rated operation point) times its corresponding turning speed. The power developed by the motor is directly proportional to the speed up to the rated operation point where it reaches the rated power (Prated).

ZONE II. This zone is defined as the constant power zone and covers from the nominal operating point to where the motor reaches its maximum available voltage. The torque decreases porportional as the speed increases. The power remains constant.

ZONE III. This zone begins when the voltage at the motor terminals has reached the maximum voltage that the drive can provide. The torque decreases with the square of the speed. The power decreases as the speed increases.

INFLUENCE OF THE SUPPLY VOLTAGE

The supply voltage of the bus sets the electrical limitation on how the motor will run.

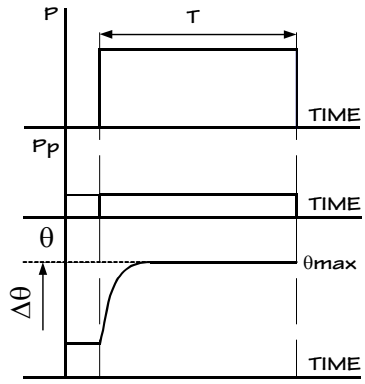


DEFINITIONS

nmax. Maximum turning speed allowed. The maximum speed nmax depends on the mechanical design (roller bearings life, short-circuit ring of the squirrel cage) and electrical design (voltage limiting characteristics).

n1. Maximum permanent speed. It is the maximum speed allowed permanently (regardless of the speed duty cycle).

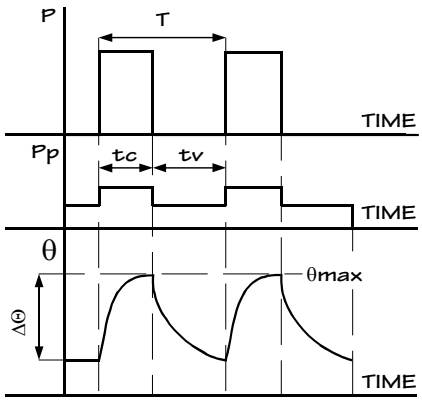
S1. S1 duty cycle (continuous). Operation with constant load enough to stabilize the temperature of the motor.



T: Duration of the cycle
P: Power of the load
Pp: Lost electrical power
ΔΘ: Temperature increase over ambient temperature
Θmax: Maximum temperature that the motor may reach without damaging its insulation

S6. S6 duty cycle (intermittent operation). Uninterrupted periodic service with intermittent load, also called ''continuous cycle with intermittent load''. It consists of a series of identical cycles that have a constant load time and another one without load. There is no resting (stopped) intervals. If no other value is indicated, the duty cycle with load will be referred to a time period of 10 minutes. Thus, S6-40% indicates:

tc = 4 minutes with load
tv = 6 minutes without load



T: Duration of the cycle
Tc: Time with load
Tv: Time without load
P: Power of the load
Pp: Lost electrical power
ΔΘ: Temperature increase over ambient temperature
Θmax: Maximum temperature that the motor may reach without damaging its insulation

Motor limits. For induction motors, the speed and power values are limited for thermal and mechanical reasons. The maximim current is only limited by thermal characteristics of the motor windings.

- ***Thermal limit.*** Heat loss is stored in the motor and dissipated by cooling systems. The motor temperature depends, among other things, on the duty cycle with load. This critical motor temperature must never be exceeded. The characteristics for continuous cycle S1 and intermittent cycle S6-40% define de outputs allowed for an ambient temperature of up to 40°C. For this case, the winding temperature increase is about 100 °C.
- ***Mechanical limit.*** The mechanical speed limit must never be exceeded. Exceeding this value may damage the roller bearings, the short-circuit ring of the rotor, ...

FM7 MOTORS

GENERAL CHARACTERISTICS

These motors have been manufactured in accordance with the European regulations EN 60204-1 and EN 60034 as instructed by the European Directive 2006/95/EC on Low Voltage (LVD).

Motor type	Induction. Squirrel cage
Thermal protection	NTC thermistor
Balancing	**On E01 and E02 series** Standard degree of vibration: V5/V10 Optional degree of vibration: V3/V5 **On E03 and HS3 series** Standard degree of vibration: V3
Mounting	**On E01 and E02 series** Horizontal: IM B3 - IM B5 - IM B35 Vertical: IM V1 - IM V5 - IM V15 **On E03 and HS3 series** Horizontal: IM B5 Vertical: IM V1
Electric winding insulation	Class F (155°C/311°F)
Degree of protection	IP 44
Storage temperature	0°C/60°C (32°F/140°F)
Permitted ambient temperature	0°C/40°C (32°F/104°F)
Working ambient humidity	95% max. (non condensing)
Recommended maximum altitude	1000 m (3281 ft) max. over sea level
Fan	400 V AC three-phase (50/60 Hz). Independent supply voltage
Resistance of the isolation voltage	1800 V AC in 1 min.
Isolation resistance	500 V DC, 10 MΩ min.
Feedback	Standard: Magnetic encoder Optional: "C" axis encoder
Meets EC regulation	IEC 34-1

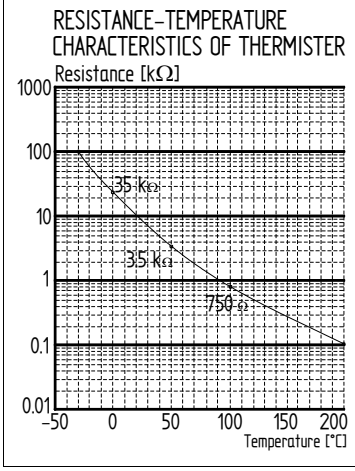
The "F" classification of the winding insulation is based on its capability to run at maximum temperature.

This temperature 155°C (311°F) represents the maximum running temperature for the winding. In other words, if the motor ran 40 hrs a week in a clean and dry environment, its life expectancy would be 10 to 20 years before the insulation deteriorates due to the point that it can no longer withstand the applied voltage.

TEMPERATURE SENSOR

The temperature sensor have a negative temperature coefficient (NTC) and they should be used in control and measurement systems within a range between -50°C (-58°F) and 200°C (392°F).

Sensor type	NTC thermistor
Resistance at 20°C (68°F)	10 kΩ
Resistance at 100°C (212°F)	750 Ω
Sensor connection	Feedback cable

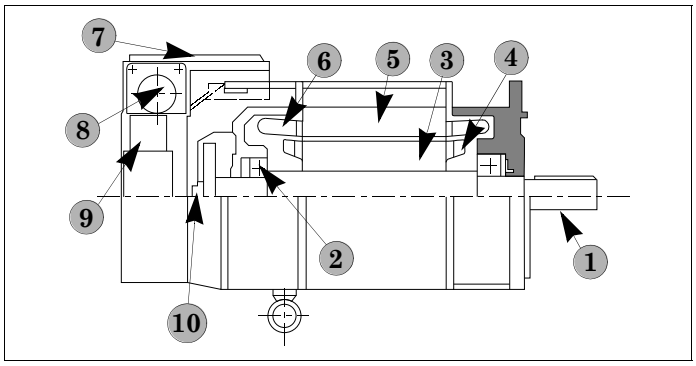


The following figure shows the resistance of the sensor as a function of the ambient temperature (average values).

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

STRUCTURE

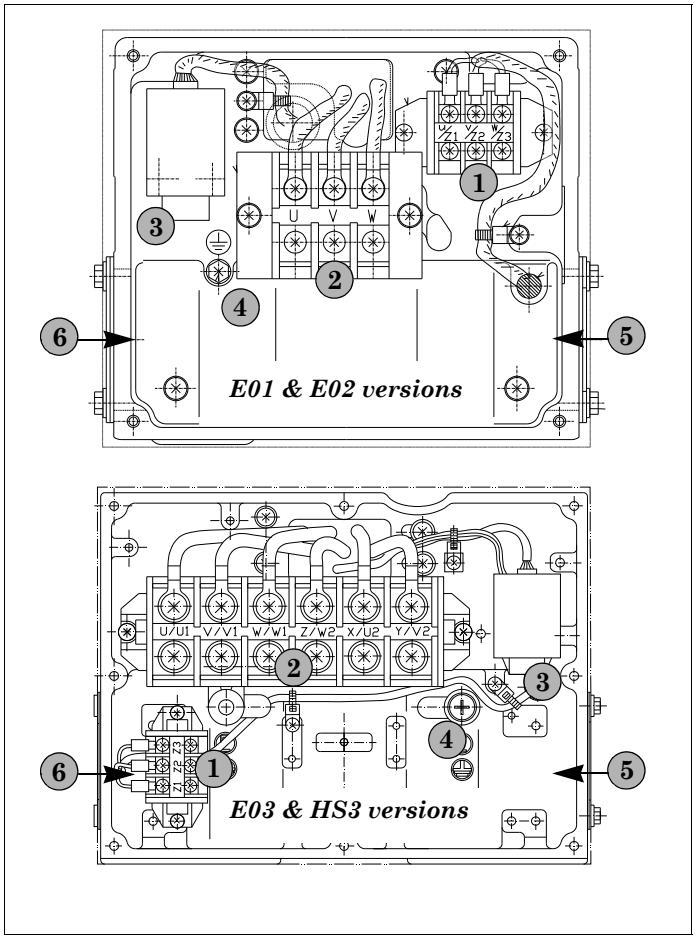
The structure of the motor is shown below.



1	Shaft	**6**	Stator winding
2	Ball bearing	**7**	Terminal box
3	Rotor	**8**	Power connector
4	Short-circuit ring of the rotor	**9**	Cooling fan
5	Stator	**10**	Encoder

TERMINAL BOX. LAYOUT OF THE CONNECTION TERMINAL

The layout of the terminals in the box on top of the motor depends on the type of motor. The top image shows the terminal box on the motor series FM7-□□□□-□□□□-E01 and FM7-□□□□-□□□□-E02. The bottom image shows the terminal box on the motor series FM7-D□□□-S1D0-E03 and FM7-D□□□-S1D0-HS3.



1	FAN connection	**4**	Ground bolt
2	MOTOR connection	**5**	Cable input-1
3	ENCODER connection	**6**	Cable input-2

TECHNICAL DATA AND CHARACTERISTICS CURVES

E01/E02 series

The following figures show the torque and power characteristics for motor versions E01 and E02. Version E02 differs from E01 in the maximum number of rpm that the motor can reach. Thus, the graph are whose shaded area is lighter represents the behavior for version E01 and the darker area expands its rpm range.

Note that not all motor models have both versions; some of them only come in version E01 (FM7-A110, FM7-A300, FM7-A370, FM7-B220, FM7-B280 and FM7-E600). The rest come in both versions.

Note that the value of weight B/P (flange/foot) indicated in the data table indicates the weight depending on whether it is a flange or foot mounted model.

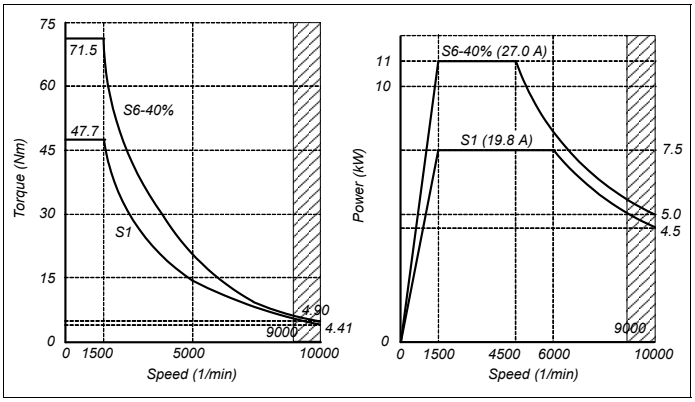
Motors whose **maximum speed** ≥ **8000 rev/min** are recommended to have a keyless shaft and be balanced under these conditions.

Their power and torque graphs are shown here for duty cycles S1 and S6-40% (duty cycle of 10 minutes). The tables accompanying the graphs show the technical data for each model.

The AC motors of the FM7 series for main-spindle drives must be fanned all the time while running regardless of their duty cycles.

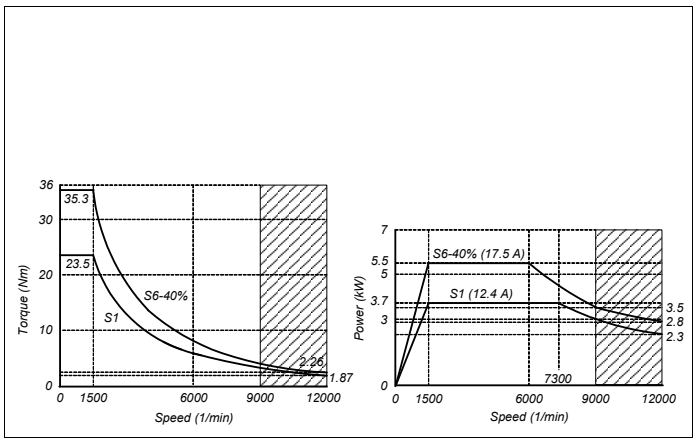
FM7-A075-□□□□-E0□

Rated power	Rated speed	Rated torque	Rated current	Max. speed		Inertia	Weight B/P
				E01	E02		
P_N (kW)	n_N (1/min)	M_N (N·m)	I_N (Arms)	n_{max} (1/min)		J (kg·cm²)	P (kg)
7.5	1500	47.7	19.8	9000	10000	260	59/64



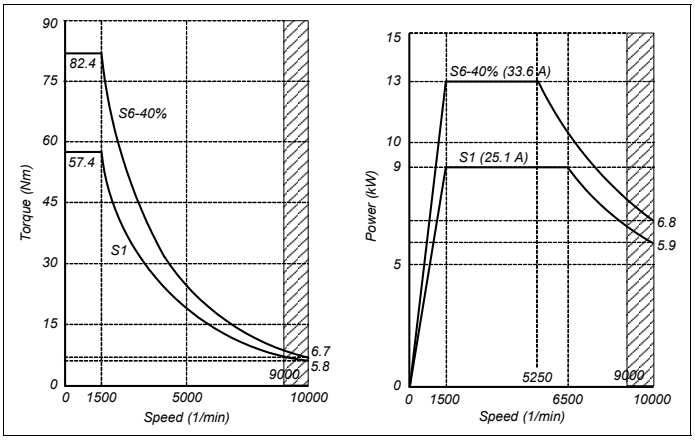
FM7-A037-□□□□-E0□

Rated power	Rated speed	Rated torque	Rated current	Max. speed		Inertia	Weight B/P
				E01	E02		
P_N (kW)	n_N (1/min)	M_N (N·m)	I_N (Arms)	n_{max} (1/min)		J (kg·cm²)	P (kg)
3.7	1500	23.5	12.4	9000	12000	140	47/49



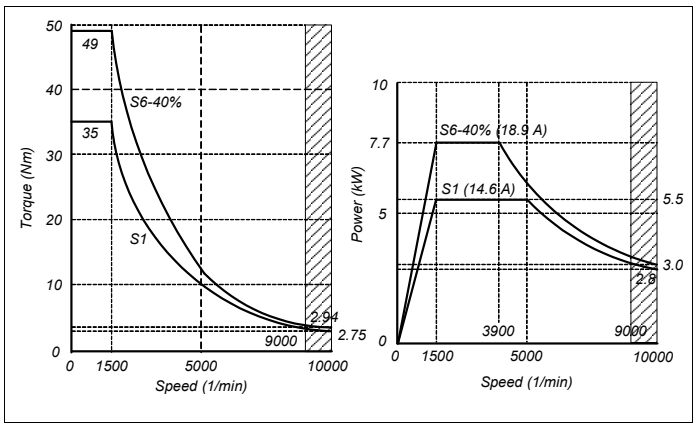
FM7-A090-□□□□-E0□

Rated power	Rated speed	Rated torque	Rated current	Max. speed		Inertia	Weight B/P
				E01	E02		
P_N (kW)	n_N (1/min)	M_N (N·m)	I_N (Arms)	n_{max} (1/min)		J (kg·cm²)	P (kg)
9.0	1500	57.4	25.1	9000	10000	330	68/73



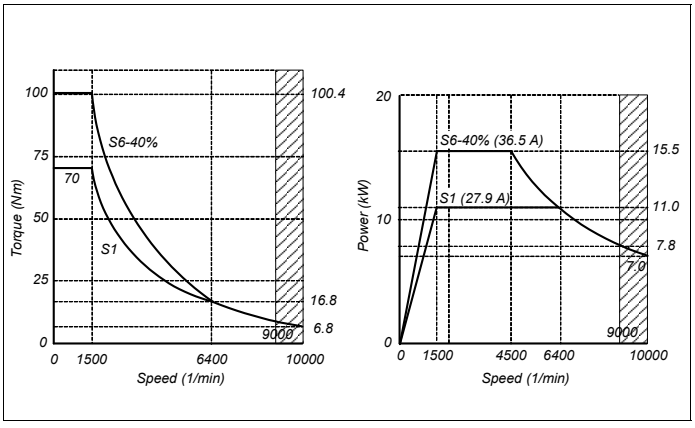
FM7-A055-□□□□-E0□

Rated power	Rated speed	Rated torque	Rated current	Max. speed		Inertia	Weight B/P
				E01	E02		
P_N (kW)	n_N (1/min)	M_N (N·m)	I_N (Arms)	n_{max} (1/min)		J (kg·cm²)	P (kg)
5.5	1500	35.0	14.6	9000	10000	210	52/56



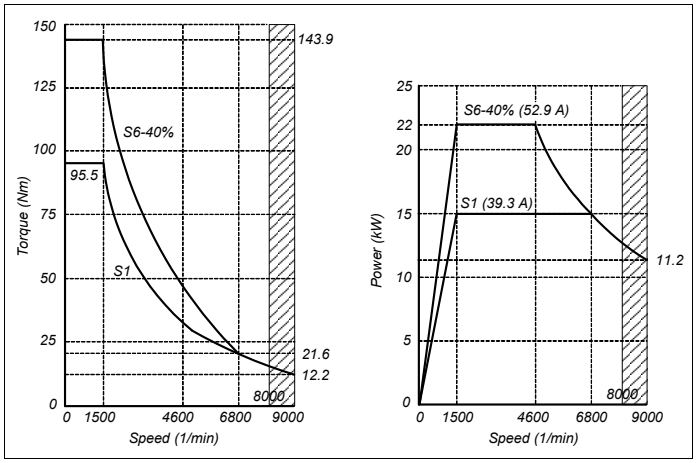
FM7-A110-□□□□-E0□

Rated power	Rated speed	Rated torque	Rated current	Max. speed		Inertia	Weight B/P
				E01	E02		
P_N (kW)	n_N (1/min)	M_N (N·m)	I_N (Arms)	n_{max} (1/min)		J (kg·cm²)	P (kg)
11.0	1500	70.0	28.0	9000	10000	690	94/110



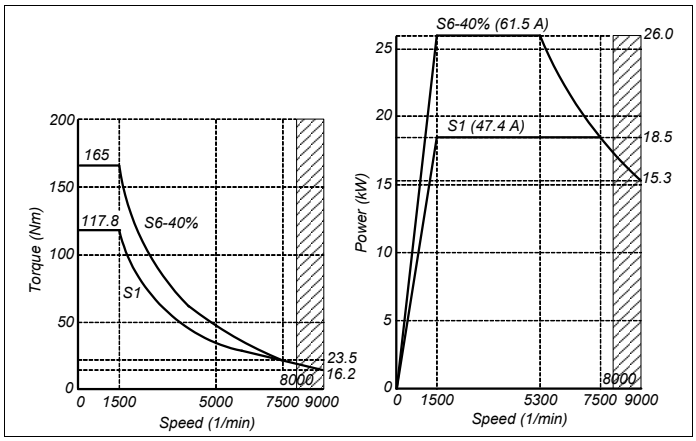
FM7-A150-□□□□-E0□

Rated power	Rated speed	Rated torque	Rated current	Max. speed		Inertia	Weight B/P
				E01	E02		
P_N (kW)	n_N (1/min)	M_N (N·m)	I_N (Arms)	n_{max} (1/min)		J (kg·cm²)	P (kg)
15.0	1500	95.5	39.3	8000	9000	690	94/110



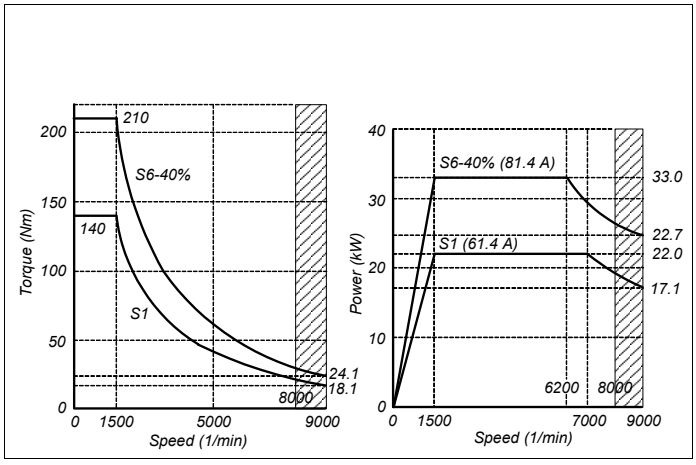
FM7-A185-□□□□-E0□

Rated power	Rated speed	Rated torque	Rated current	Max. speed		Inertia	Weight B/P
				E01	E02		
P_N (kW)	n_N (1/min)	M_N (N·m)	I_N (Arms)	n_{max} (1/min)		J (kg·cm²)	P (kg)
18.5	1500	117.8	47.4	8000	9000	890	120/130



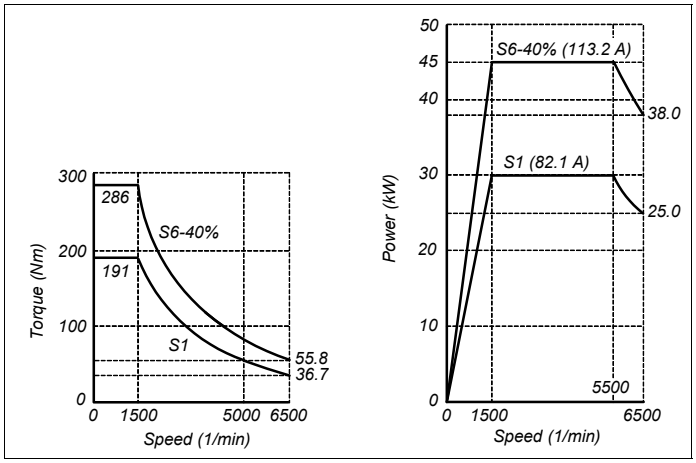
FM7-A220-□□□□-E0□

Rated power	Rated speed	Rated torque	Rated current	Max. speed		Inertia	Weight B/P
				E01	E02		
P_N (kW)	n_N (1/min)	M_N (N·m)	I_N (Arms)	n_{max} (1/min)		J (kg·cm²)	P (kg)
22.0	1500	140.0	61.4	8000	9000	1080	135/145



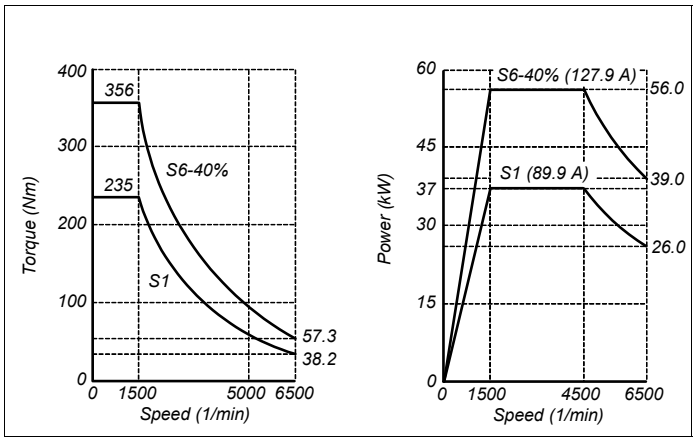
FM7-A300-□□□□-E01

Rated power	Rated speed	Rated torque	Rated current	Max. speed		Inertia	Weight B/P
				E01	E02		
P_N (kW)	n_N (1/min)	M_N (N·m)	I_N (Arms)	n_{max} (1/min)		J (kg·cm²)	P (kg)
30.0	1500	191.0	82.1	6500	-	2310	220/230



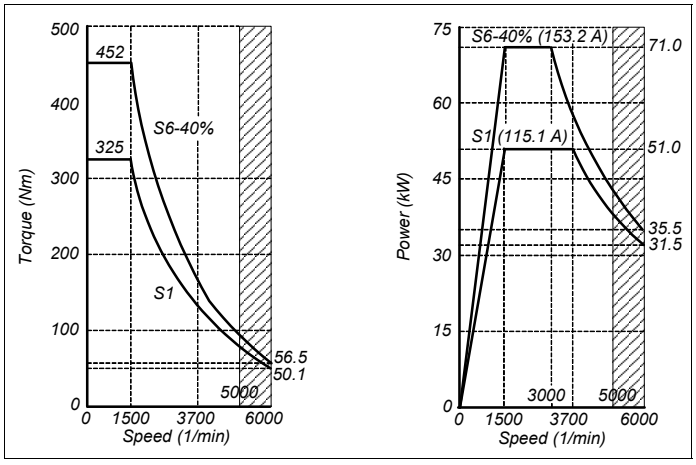
FM7-A370-□□□□-E01

Rated power	Rated speed	Rated torque	Rated current	Max. speed		Inertia	Weight B/P
				E01	E02		
P_N (kW)	n_N (1/min)	M_N (N·m)	I_N (Arms)	n_{max} (1/min)		J (kg·cm²)	P (kg)
37.0	1500	235.0	90.0	6500	-	2660	250/260



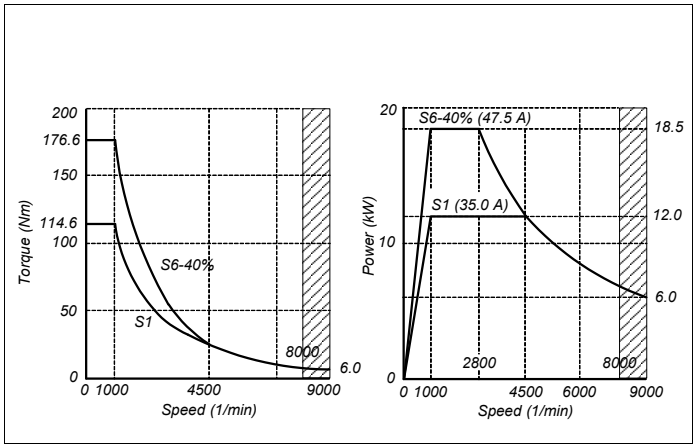
FM7-A510-□□□□-E0□

Rated power	Rated speed	Rated torque	Rated current	Max. speed		Inertia	Weight B/P
				E01	E02		
P_N (kW)	n_N (1/min)	M_N (N·m)	I_N (Arms)	n_{max} (1/min)		J (kg·cm²)	P (kg)
51.0	1500	325.0	115.1	5000	6000	4730	340/350



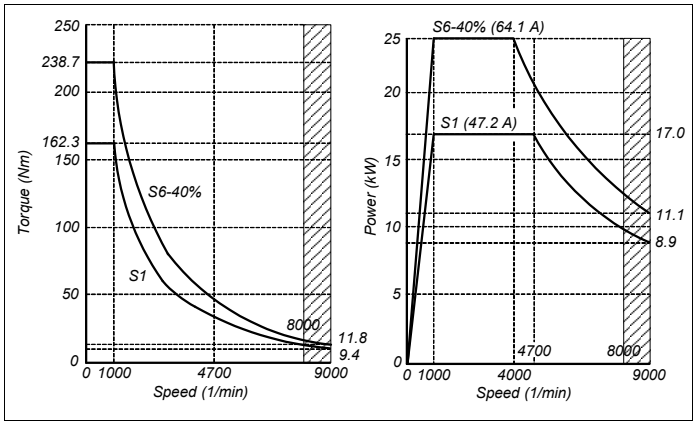
FM7-B120-□□□□-E0□

Rated power	Rated speed	Rated torque	Rated current	Max. speed		Inertia	Weight B/P
				E01	E02		
P_N (kW)	n_N (1/min)	M_N (N·m)	I_N (Arms)	n_{max} (1/min)		J (kg·cm²)	P (kg)
12.0	1000	114.6	35.0	8000	9000	890	120/130



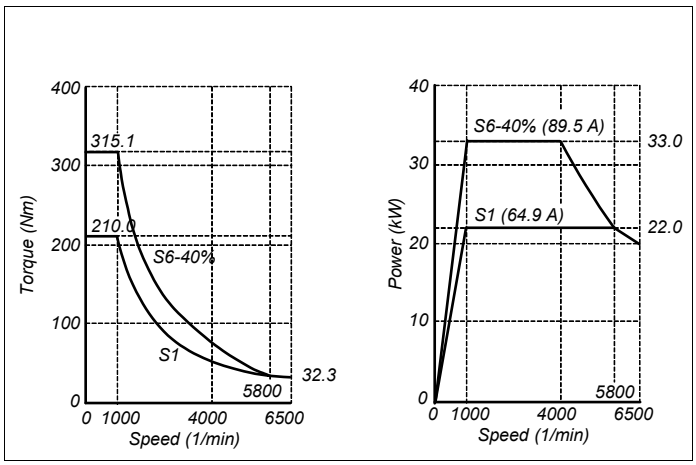
FM7-B170-□□□□-E0□

Rated power	Rated speed	Rated torque	Rated current	Max. speed		Inertia	Weight B/P
				E01	E02		
P_N (kW)	n_N (1/min)	M_N (N·m)	I_N (Arms)	n_{max} (1/min)		J (kg·cm²)	P (kg)
17.0	1000	162.0	47.2	8000	9000	1080	135/145



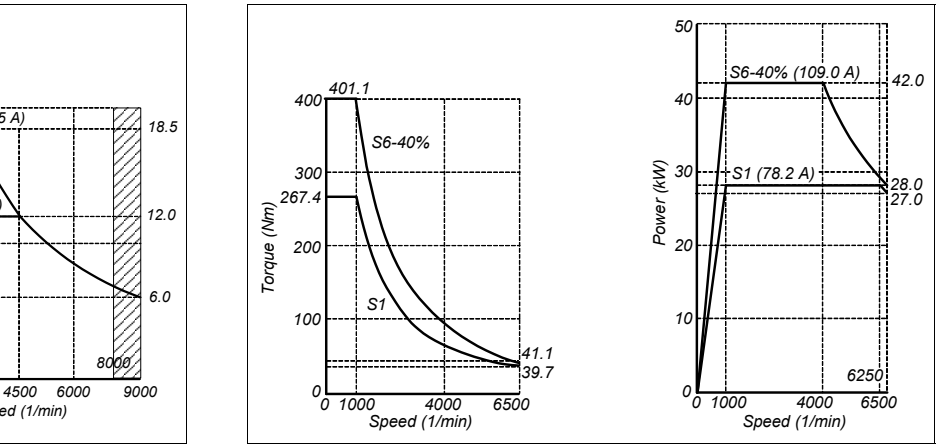
FM7-B220-□□□□-E01

Rated power	Rated speed	Rated torque	Rated current	Max. speed		Inertia	Weight B/P
				E01	E02		
P_N (kW)	n_N (1/min)	M_N (N·m)	I_N (Arms)	n_{max} (1/min)		J (kg·cm²)	P (kg)
22.0	1000	210.0	64.9	6500	-	2310	220/230



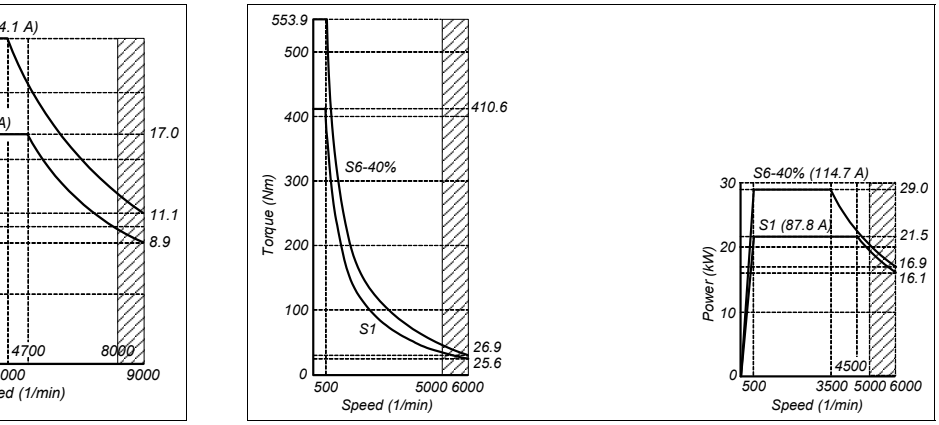
FM7-B280-□□□□-E01

Rated power	Rated speed	Rated torque	Rated current	Max. speed		Inertia	Weight B/P
				E01	E02		
P_N (kW)	n_N (1/min)	M_N (N·m)	I_N (Arms)	n_{max} (1/min)		J (kg·cm²)	P (kg)
28.0	1000	267.4	78.2	6500	-	2660	250/260



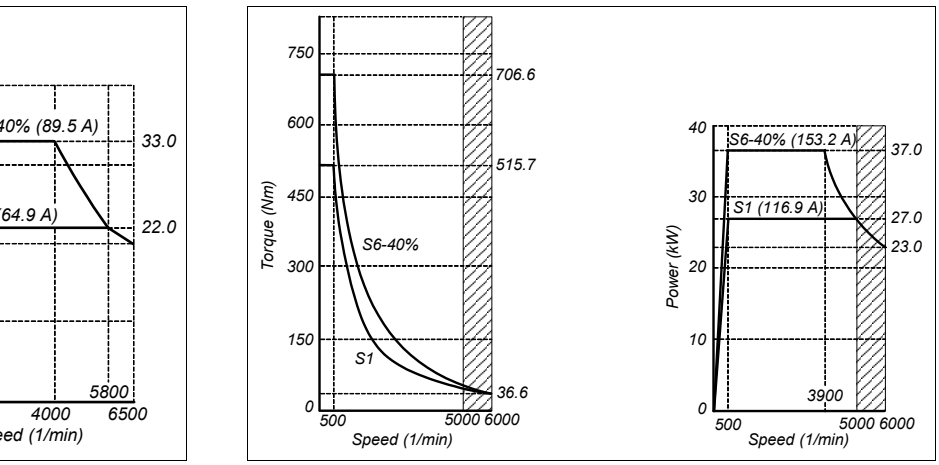
FM7-C215-□□□□-E0□

Rated power	Rated speed	Rated torque	Rated current	Max. speed		Inertia	Weight B/P
				E01	E02		
P_N (kW)	n_N (1/min)	M_N (N·m)	I_N (Arms)	n_{max} (1/min)		J (kg·cm²)	P (kg)
21.5	500	410.6	87.8	5000	6000	4730	340/350



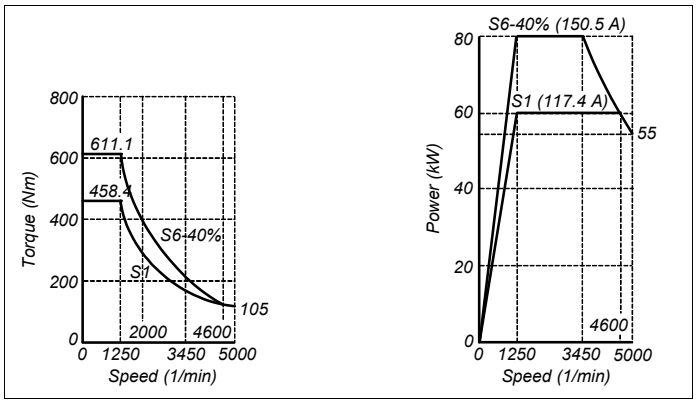
FM7-C270-□□□□-E0□

Rated power	Rated speed	Rated torque	Rated current	Max. speed		Inertia	Weight B/P
				E01	E02		
P_N (kW)	n_N (1/min)	M_N (N·m)	I_N (Arms)	n_{max} (1/min)		J (kg·cm²)	P (kg)
27.0	500	515.7	116.9	5000	6000	5480	380/390



FM7-E600-C□B□-E01

Rated power	Rated speed	Rated torque	Rated current	Max. speed		Inertia	Weight B/P
				E01	E02		
P_N (kW)	n_N (1/min)	M_N (N·m)	I_N (Arms)	n_{max} (1/min)		J (kg·cm²)	B/P/B+P (kg)
60.0	1250	458.4	117.4	5000	-	8720	525/540/ 545

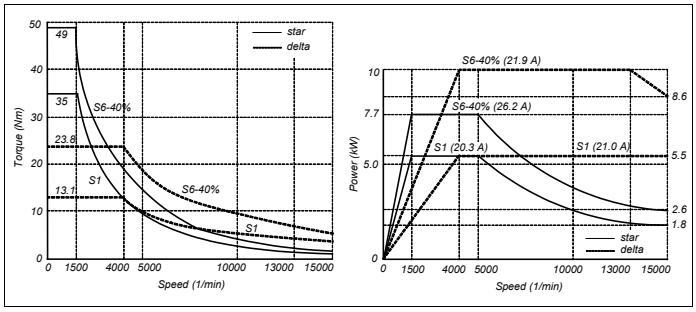


E03/HS3 series

The following figures show the torque and power characteristics for motor versions E03 and HS3. The HS3 has a hollow shaft for cooling the spindle tool. Higher speeds may be reached with these FM7 motor versions those mentioned earlier. Their windings may be connected in start or triangle to obtain constant power either at low or high rpm respectively.

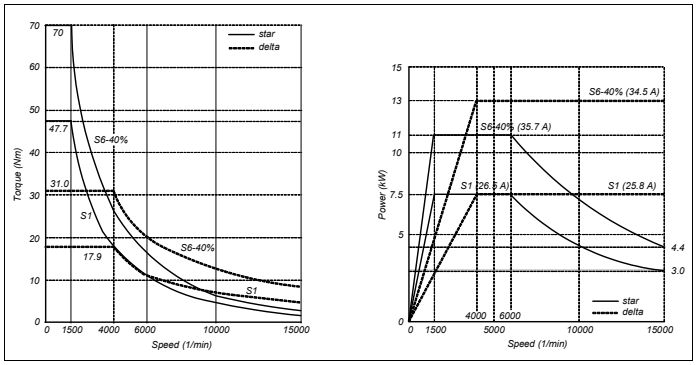
FM7-D055-S1D0-E03

Connection type	Rated power	Rated speed	Rated torque	Rated current	Max. speed	Inertia	Weight (B)
					E03		
	P_N (kW)	n_N (1/min)	M_N (N·m)	I_N (Arms)	n_{max} (1/min)	J (kg·cm²)	P (kg)
⅄	5.5	1500	35.0	20.3	15000	210	67
Δ	5.5	4000	13.1	20.7	15000	210	67



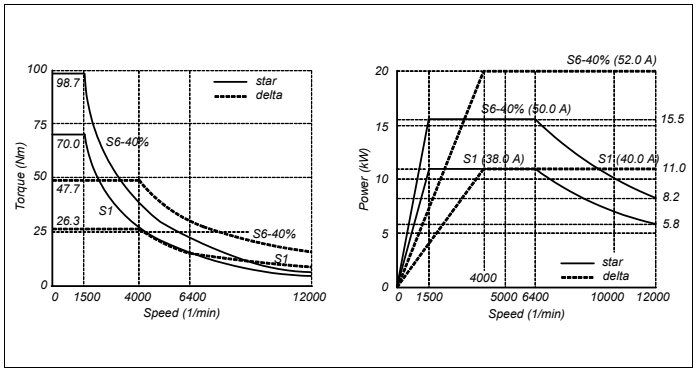
FM7-D075-S1D0-E03

Connection type	Rated power	Rated speed	Rated torque	Rated current	Max. speed	Inertia	Weight (B)
					E03		
	P_N (kW)	n_N (1/min)	M_N (N·m)	I_N (Arms)	n_{max} (1/min)	J (kg·cm²)	P (kg)
⅄	7.5	1500	47.7	26.5	15000	260	74
Δ	7.5	4000	17.9	25.8	15000	260	74



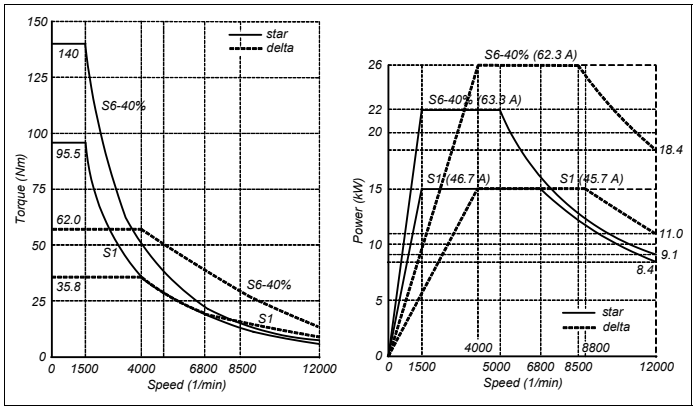
FM7-D110-S1D0-E03

Connection type	Rated power	Rated speed	Rated torque	Rated current	Max. speed	Inertia	Weight (B)
					E03		
	P_N (kW)	n_N (1/min)	M_N (N·m)	I_N (Arms)	n_{max} (1/min)	J (kg·cm²)	P (kg)
⅄	11.0	1500	70.0	38.0	12000	690	110
Δ	11.0	4000	26.3	40.0	12000	690	110



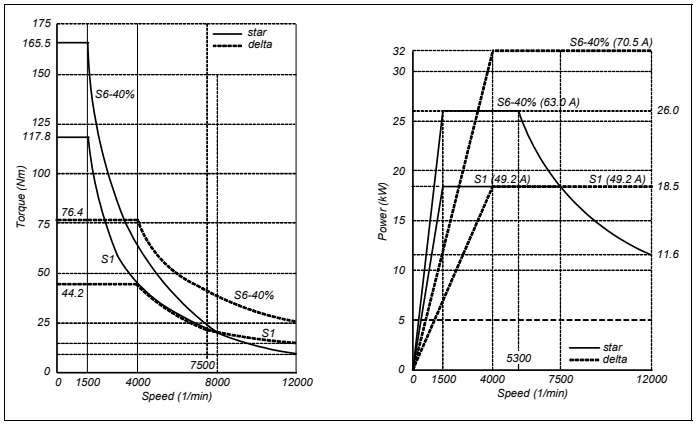
FM7-D150-S1D0-E03

Connection type	Rated power	Rated speed	Rated torque	Rated current	Max. speed	Inertia	Weight (B)
					E03		
	P_N (kW)	n_N (1/min)	M_N (N·m)	I_N (Arms)	n_{max} (1/min)	J (kg·cm²)	P (kg)
⅄	15.0	1500	95.5	46.4	12000	690	110
Δ	15.0	4000	35.8	45.7	12000	690	110



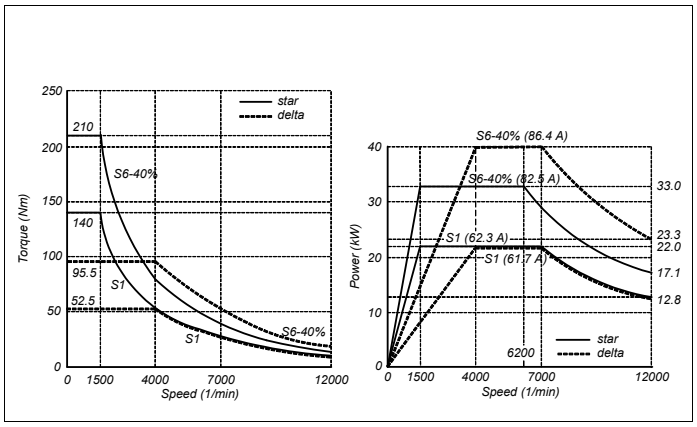
FM7-D185-S1D0-E03

Connection type	Rated power	Rated speed	Rated torque	Rated current	Max. speed	Inertia	Weight (B)
					E03		
	P_N (kW)	n_N (1/min)	M_N (N·m)	I_N (Arms)	n_{max} (1/min)	J (kg·cm²)	P (kg)
⅄	18.5	1500	117.8	49.2	12000	890	135
Δ	18.5	4000	44.2	49.2	12000	890	135



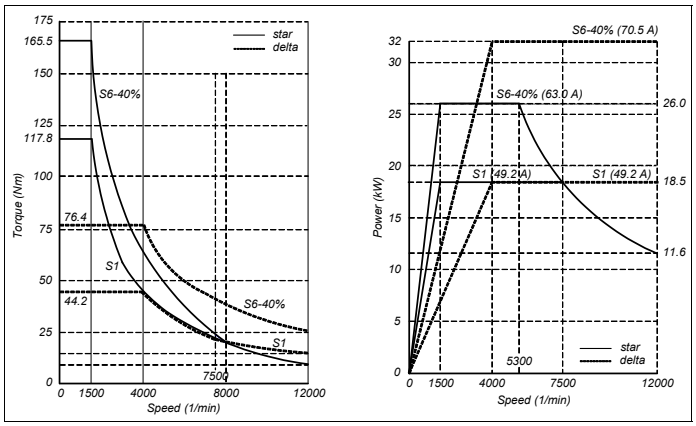
FM7-D220-S1D0-E03

Connection type	Rated power	Rated speed	Rated torque	Rated current	Max. speed	Inertia	Weight (B)
					E03		
	P_N (kW)	n_N (1/min)	M_N (N·m)	I_N (Arms)	n_{max} (1/min)	J (kg·cm²)	P (kg)
⅄	22.0	1500	140.1	62.3	12000	1080	150
Δ	22.0	4000	52.2	61.7	12000	1080	150



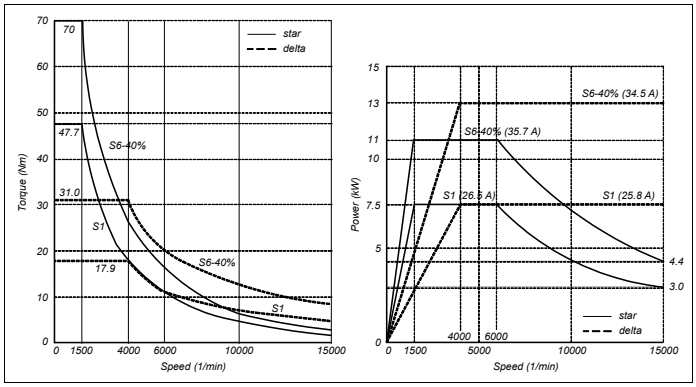
FM7-D185-S1D0-HS3

Connection type	Rated power	Rated speed	Rated torque	Rated current	Max. speed	Inertia	Weight (B)
					HS3		
	P_N (kW)	n_N (1/min)	M_N (N·m)	I_N (Arms)	n_{max} (1/min)	J (kg·cm²)	P (kg)
⅄	18.5	1500	117.8	49.2	12000	890	140
Δ	18.5	4000	44.2	49.2	12000	890	140



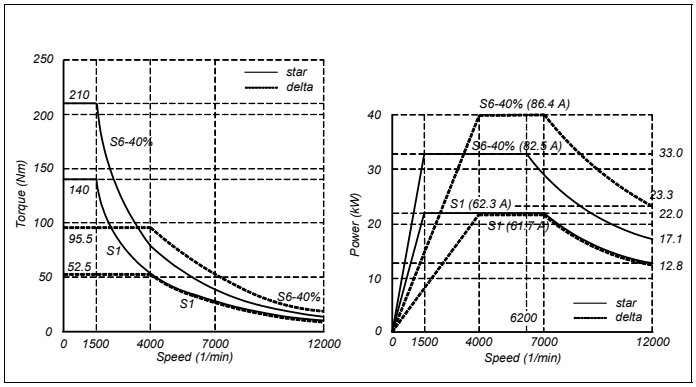
FM7-D075-S1D0-HS3

Connection type	Rated power	Rated speed	Rated torque	Rated current	Max. speed	Inertia	Weight (B)
					HS3		
	P_N (kW)	n_N (1/min)	M_N (N·m)	I_N (Arms)	n_{max} (1/min)	J (kg·cm²)	P (kg)
⅄	7.5	1500	47.7	26.5	15000	260	77
Δ	7.5	4000	17.9	25.8	15000	260	77



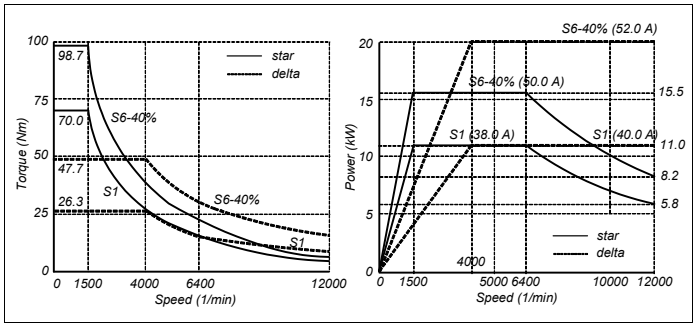
FM7-D220-S1D0-HS3

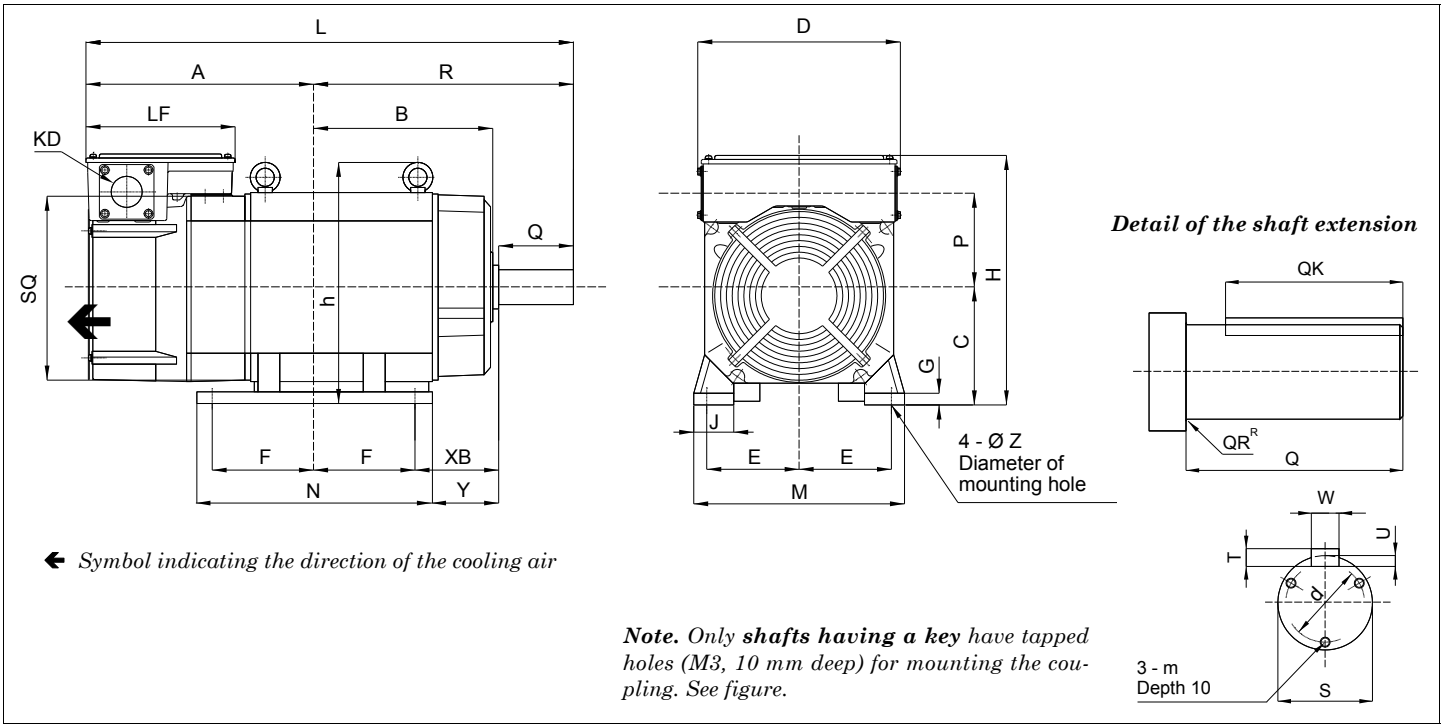
Connection type	Rated power	Rated speed	Rated torque	Rated current	Max. speed	Inertia	Weight (B)
					HS3		
	P_N (kW)	n_N (1/min)	M_N (N·m)	I_N (Arms)	n_{max} (1/min)	J (kg·cm²)	P (kg)
⅄	22.0	1500	140.1	62.3	12000	1080	155
Δ	22.0	4000	52.2	61.7	12000	1080	155



FM7-D110-S1D0-HS3

Connection type	Rated power	Rated speed	Rated torque	Rated current	Max. speed	Inertia	Weight (B)
					HS3		
	P_N (kW)	n_N (1/min)	M_N (N·m)	I_N (Arms)	n_{max} (1/min)	J (kg·cm²)	P (kg)
⅄	11.0	1500	70.0	38.0	12000	690	115
Δ	11.0	4000	26.3	40.0	12000	690	115





← *Symbol indicating the direction of the cooling air*

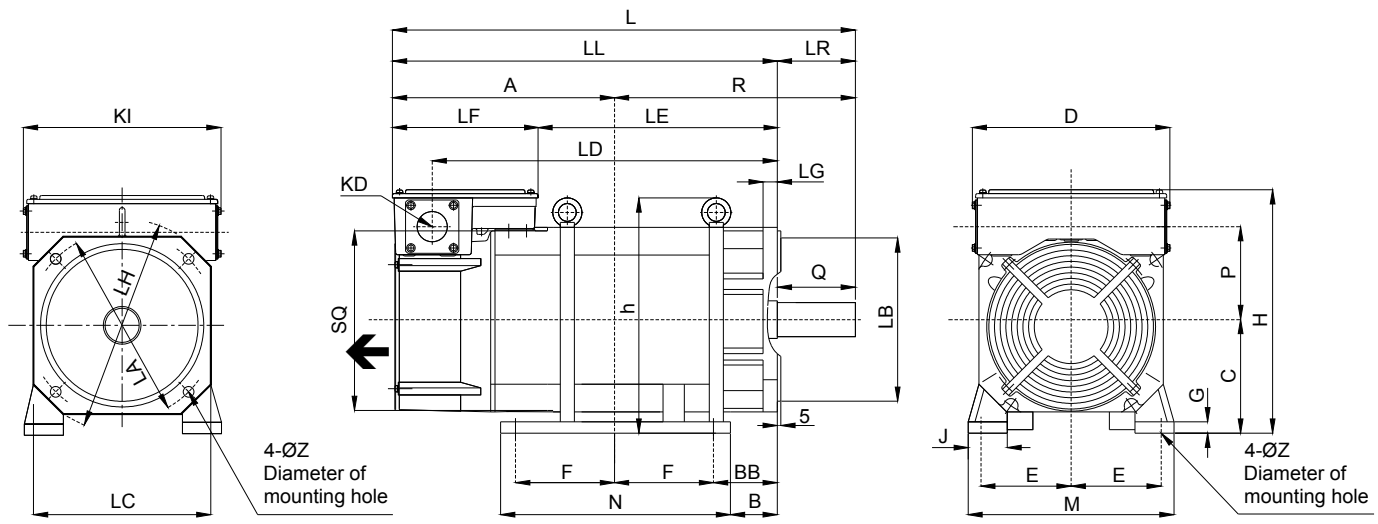
Note. *Only* ***shafts having a key*** *have tapped holes (M3, 10 mm deep) for mounting the coupling. See figure.*

Units in mm	A	B	C	D	E	F	G	H	h	J	KD	L	M	N	P	R	XB	Y	Z	SQ
FM7-A037-□3□□-E0□	324.0	113.0	100	174	80.0	70.0	9	250	-	34	34.0	499.0	188	168	110.5	175.0	45	31	12	174
FM7-A055-□3□□-E0□	286.0	117.0	112	204	95.0	50.0	10	269	247.0	75	42.5	486.0	220	129	114.0	200.0	70	55	12	204
FM7-A075-□3□□-E0□	296.0	137.0	112	204	95.0	70.0	10	269	247.0	75	42.5	546.0	220	177	114.0	250.0	70	55	12	204
FM7-A090-□3□□-E0□	317.0	156.0	112	204	95.0	89.0	10	269	247.0	75	42.5	586.0	220	215	114.0	269.0	70	55	12	204
FM7-A110-□3□□-E0□	264.0	196.0	160	279	127.0	89.0	16	343	331.5	55	42.5	571.0	290	223	131.0	307.0	108	84	15	260
FM7-A150-□3□□-E0□	264.0	196.0	160	279	127.0	89.0	16	343	331.5	55	42.5	571.0	290	223	131.0	307.0	108	84	15	260
FM7-A185-□3□□-E0□	310.0	212.0	160	279	127.0	105.0	16	343	331.5	55	42.5	633.0	290	255	131.0	323.0	108	84	15	260
FM7-A220-□3□□-E0□	313.5	246.5	160	279	127.0	139.5	16	343	331.5	55	42.5	671.0	290	324	131.0	357.5	108	84	15	260
FM7-A300-□3□□-E0□	381.0	246.0	180	320	139.5	127.0	16	407	401.0	55	61.0	769.0	320	298	163.5	388.0	121	99	19	320
FM7-A370-□3□□-E0□	421.0	246.0	180	320	139.5	127.0	16	407	401.0	55	61.0	809.0	320	298	163.5	388.0	121	99	19	320
FM7-A510-□3□□-E0□	398.0	302.0	225	388	178.0	155.5	21	540	480.0	75	61.0	842.5	420	425	235.5	444.5	149	73	24	380
FM7-B120-□3□□-E0□	310.0	212.0	160	279	127.0	105.0	16	343	331.5	55	42.5	633.0	290	255	131.0	323.0	108	84	15	260
FM7-B170-□3□□-E0□	313.5	246.5	160	279	127.0	139.5	16	343	331.5	55	42.5	671.0	290	324	131.0	357.5	108	84	15	260
FM7-B220-□3□□-E0□	381.0	246.0	180	320	139.5	127.0	16	407	401.0	55	61.0	769.0	320	298	163.5	388.0	121	99	19	320
FM7-B280-□3□□-E0□	421.0	246.0	180	320	139.5	127.0	16	407	401.0	55	61.0	809.0	320	298	163.5	388.0	121	99	19	320
FM7-C215-□3□□-E0□	398.0	302.0	225	388	178.0	155.5	21	540	480.0	75	61.0	842.5	420	425	235.5	444.5	149	73	24	380
FM7-C270-□3□□-E0□	429.0	321.0	225	388	178.0	174.5	21	540	480.0	75	61.0	892.5	420	465	235.5	463.5	149	73	24	380
FM7-E600-C3B□-E01	589.0	331.5	225	388	178.0	228.5	21	540	480.0	90	61.0	1065.5	420	590	235.5	476.5	108	65	24	380

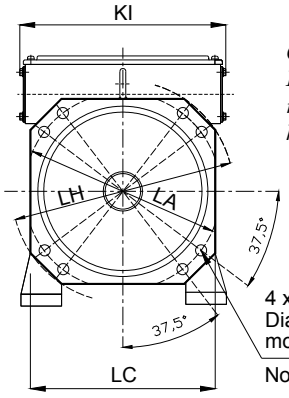
Units in inches	A	B	C	D	E	F	G	H	h	J	KD	L	M	N	P	R	XB	Y	Z	SQ
FM7-A037-□3□□-E0□	12.76	4.45	3.94	6.85	3.15	2.76	0.35	9.84	-	1.34	1.34	19.65	7.40	6.61	4.35	6.89	1.77	1.22	0.47	6.85
FM7-A055-□3□□-E0□	11.26	4.61	4.41	8.03	3.74	1.97	0.39	10.59	9.72	2.95	1.67	19.13	8.66	5.08	4.49	7.87	2.76	2.16	0.47	8.03
FM7-A075-□3□□-E0□	11.65	5.39	4.41	8.03	3.74	2.76	0.39	10.59	9.72	2.95	1.67	21.50	8.66	6.97	4.49	9.84	2.76	2.16	0.47	8.03
FM7-A090-□3□□-E0□	12.48	6.14	4.41	8.03	3.74	3.50	0.39	10.59	9.72	2.95	1.67	21.50	8.66	8.46	4.49	10.59	2.76	2.16	0.47	8.03
FM7-A110-□3□□-E0□	10.39	7.72	6.30	11.00	5.00	3.50	0.63	13.50	13.05	2.16	1.67	22.48	11.42	8.78	5.16	12.09	4.25	3.31	0.59	10.24
FM7-A150-□3□□-E0□	10.39	7.72	6.30	11.00	5.00	3.50	0.63	13.50	13.05	2.16	1.67	22.48	11.42	8.78	5.16	12.09	4.25	3.31	0.59	10.24
FM7-A185-□3□□-E0□	12.20	8.35	6.30	11.00	5.00	4.13	0.63	13.50	13.05	2.16	1.67	24.92	11.42	10.04	5.16	12.72	4.25	3.31	0.59	10.24
FM7-A220-□3□□-E0□	12.34	9.70	6.30	11.00	5.00	5.49	0.63	13.50	13.05	2.16	1.67	26.42	11.42	12.76	5.16	14.07	4.25	3.31	0.59	10.24
FM7-A300-□3□□-E0□	15.00	9.69	7.09	12.60	5.49	5.00	0.63	16.02	15.79	2.16	2.40	30.28	12.60	11.73	6.44	15.28	4.76	3.90	0.75	12.60
FM7-A370-□3□□-E0□	16.57	9.69	7.09	12.60	5.49	5.00	0.63	16.02	15.79	2.16	2.40	31.85	12.60	11.73	6.44	15.28	4.76	3.90	0.75	12.60
FM7-A510-□3□□-E0□	15.67	11.90	8.86	15.30	7.01	6.12	0.83	21.26	18.90	2.95	2.40	33.17	16.54	16.73	9.27	17.50	5.87	2.87	0.94	14.96
FM7-B120-□3□□-E0□	12.20	8.35	6.30	11.00	5.00	4.13	0.63	13.50	13.05	2.16	42.5	24.92	11.42	10.04	5.16	12.72	4.25	3.31	0.59	10.24
FM7-B170-□3□□-E0□	12.34	9.70	6.30	11.00	5.00	5.49	0.63	13.50	13.05	2.16	42.5	26.42	11.42	12.76	5.16	14.07	4.25	3.31	0.59	10.24
FM7-B220-□3□□-E0□	15.00	9.69	7.09	12.60	5.49	5.00	0.63	16.02	15.79	2.16	2.40	30.28	12.60	11.73	6.44	15.28	4.76	3.90	0.75	12.60
FM7-B280-□3□□-E0□	16.57	9.69	7.09	12.60	5.49	5.00	0.63	16.02	15.79	2.16	2.40	31.85	12.60	11.73	6.44	15.28	4.76	3.90	0.75	12.60
FM7-C215-□3□□-E0□	15.67	11.90	8.86	15.30	7.01	6.12	0.83	21.26	18.90	2.95	2.40	33.17	16.54	16.73	9.27	17.50	5.87	2.87	0.94	14.96
FM7-C270-□3□□-E0□	16.89	12.60	8.86	15.30	7.01	6.87	0.83	21.26	18.90	2.95	2.40	35.14	16.54	18.31	9.27	18.25	5.87	2.87	0.94	14.96
FM7-E600-C3B□-E01	23.18	13.05	8.86	15.30	7.01	8.99	0.83	21.26	18.90	3.54	2.40	41.94	16.54	23.22	9.27	18.75	4.25	2.55	0.94	14.96

	Units in mm									Units in inches								
	Q	**QK**	**QR**	**S**	**T**	**U**	**W**	**d**	**m**	**Q**	**QK**	**QR**	**S**	**T**	**U**	**W**	**d**	**m**
FM7-A037-□3□□-E0□	60	45	1.0	28h6	7h11	4.0	8h9	22	M4	2.36	1.77	0.039	1.10h6	0.28h11	0.16	0.31h9	0.87	M4
FM7-A055-□3□□-E0□	80	70	2.0	32h6	8h11	5.0	10h9	22	M5	3.15	2.76	0.078	1.26h6	0.31h11	0.20	0.39h9	0.87	M5
FM7-A075-□3□□-E0□	110	90	0.5	48h6	9h11	5.5	14h9	40	M5	4.33	3.54	0.019	1.89h6	0.35h11	0.21	0.55h9	1.57	M5
FM7-A090-□3□□-E0□	110	90	0.5	48h6	9h11	5.5	14h9	40	M5	4.33	3.54	0.019	1.89h6	0.35h11	0.21	0.55h9	1.57	M5
FM7-A110-□3□□-E0□	110	90	1.0	48h6	9h11	5.5	14h9	40	M5	4.33	3.54	0.039	1.89h6	0.35h11	0.21	0.55h9	1.57	M5
FM7-A150-□3□□-E0□	110	90	1.0	48h6	9h11	5.5	14h9	40	M5	4.33	3.54	0.039	1.89h6	0.35h11	0.21	0.55h9	1.57	M5
FM7-A185-□3□□-E0□	110	90	1.0	48h6	9h11	5.5	14h9	40	M5	4.33	3.54	0.039	1.89h6	0.35h11	0.21	0.55h9	1.57	M5
FM7-A220-□3□□-E0□	110	90	1.0	48h6	9h11	5.5	14h9	40	M5	4.33	3.54	0.039	1.89h6	0.35h11	0.21	0.55h9	1.57	M5
FM7-A300-□3□□-E0□	140	110	2.0	60m6	11h11	7.0	18h9	50	M6	5.51	4.33	0.078	2.36m6	0.43h11	0.27	0.70h9	1.96	M6
FM7-A370-□3□□-E0□	140	110	2.0	60m6	11h11	7.0	18h9	50	M6	5.51	4.33	0.078	2.36m6	0.43h11	0.27	0.70h9	1.96	M6
FM7-A510-□3□□-E01	140	110	1.0	70m6	12h11	7.5	20h9	60	M6	5.51	4.33	0.039	2.75m6	0.47h11	0.29	0.78h9	2.36	M6
FM7-A510-□3□□-E02	140	110	2.0	60m6	11h11	7.0	18h9	50	M6	5.51	4.33	0.078	2.36m6	0.43h11	0.27	0.70h9	1.96	M6
FM7-B120-□3□□-E0□	110	90	1.0	48h6	9h11	5.5	14h9	40	M5	4.33	3.54	0.039	1.89h6	0.35h11	0.21	0.55h9	1.57	M5
FM7-B170-□3□□-E0□	110	90	1.0	48h6	9h11	5.5	14h9	40	M5	4.33	3.54	0.039	1.89h6	0.35h11	0.21	0.55h9	1.57	M5
FM7-B220-□3□□-E0□	140	110	2.0	60m6	11h11	7.0	18h9	50	M6	5.51	4.33	0.078	2.36m6	0.43h11	0.27	0.70h9	1.96	M6
FM7-B280-□3□□-E0□	140	110	2.0	60m6	11h11	7.0	18h9	50	M6	5.51	4.33	0.078	2.36m6	0.43h11	0.27	0.70h9	1.96	M6
FM7-C215-□3□□-E01	140	110	1.0	70m6	12h11	7.5	20h9	60	M6	5.51	4.33	0.039	2.75m6	0.47h11	0.29	0.78h9	2.36	M6
FM7-C215-□3□□-E02	140	110	2.0	60m6	11h11	7.0	18h9	50	M6	5.51	4.33	0.078	2.36m6	0.43h11	0.27	0.70h9	1.96	M6
FM7-C270-□3□□-E01	140	110	1.0	70m6	12h11	7.5	20h9	60	M6	5.51	4.33	0.039	2.75m6	0.47h11	0.29	0.78h9	2.36	M6
FM7-C270-□3□□-E02	140	110	2.0	60m6	11h11	7.0	18h9	50	M6	5.51	4.33	0.078	2.36m6	0.43h11	0.27	0.70h9	1.96	M6
FM7-E600-C3B□-E01	140	110	1.0	65m6	11h11	7.0	18h9	55	M6	5.51	4.33	0.039	2.56m6	0.43h11	0.27	0.70h9	2.16	M6

FM7. E01/E02 series. Foot and flange mounting



← *Symbol indicating the direction of the cooling air*

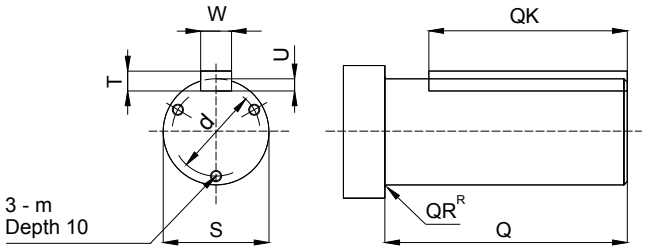


Observe that FM7- E600-C5BX-E01 models have 8 mounting holes instead of 4.

4 x 2 - Ø Z
Diameter of
mounting holes

Note. Only in FM7-E600-C5BX-E01 models

Detail of the shaft extension



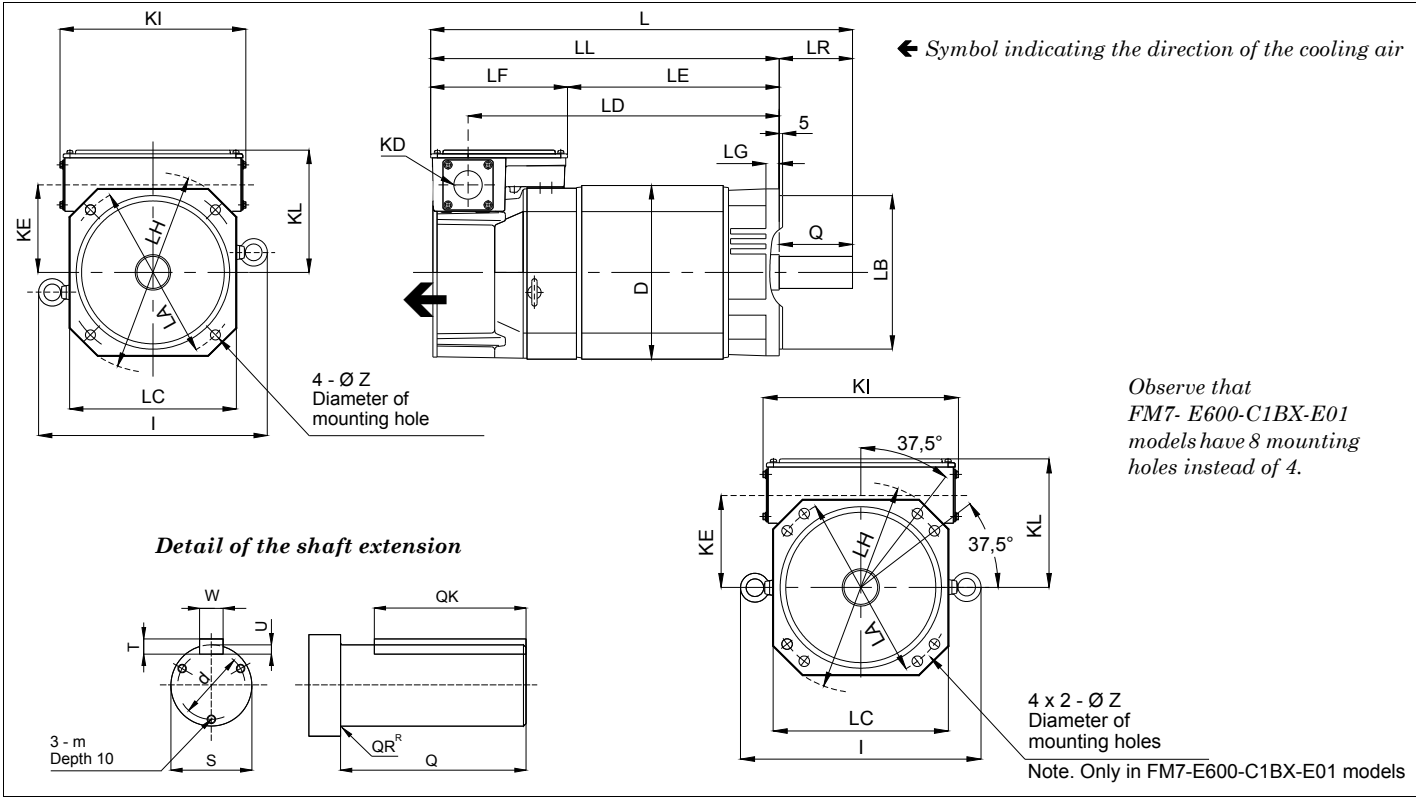
Units in mm	L	LL	LR	LD	LG	LB	KI	LA	LH	LC	LE	LF	R	Z	A	D	E	F	G
FM7-A110-□5□□-E0□	571.0	461.0	110	404.5	20	230h7	279	265	300	250	256.0	205	307.0	15	264.0	279	127.0	89.0	16
FM7-A150-□5□□-E0□	571.0	461.0	110	404.5	20	230h7	279	265	300	250	256.0	205	307.0	15	264.0	279	127.0	89.0	16
FM7-A185-□5□□-E0□	633.0	523.0	110	466.5	20	230h7	279	265	300	250	318.0	205	323.0	15	310.0	279	127.0	105.0	16
FM7-A220-□5□□-E0□	671.0	561.0	110	504.5	20	230h7	279	265	300	250	355.0	205	357.5	15	313.5	279	127.0	139.5	16
FM7-A300-□5□□-E0□	769.0	629.0	140	557.5	20	300h7	320	350	385	320	362.0	261	388.0	19	381.0	320	139.5	127.0	16
FM7-A370-□5□□-E0□	809.0	669.0	140	597.5	20	300h7	320	350	385	320	402.0	261	388.0	19	421.0	320	139.5	127.0	16
FM7-A510-□5□□-E0□	847.0	707.0	140	632.5	22	350h7	388	400	450	370	430.0	277	449.0	24	398.0	388	178.0	155.5	21
FM7-B120-□5□□-E0□	633.0	523.0	110	466.5	20	230h7	250	265	300	250	318.0	205	323.0	15	310.0	279	127.0	105.0	16
FM7-B170-□5□□-E0□	671.0	561.0	110	504.5	20	230h7	279	265	300	250	355.0	205	357.5	15	313.5	279	127.0	139.5	16
FM7-B220-□5□□-E0□	769.0	629.0	140	557.5	20	300h7	320	350	385	320	362.0	261	388.0	19	381.0	320	139.5	127.0	16
FM7-B280-□5□□-E0□	809.0	669.0	140	597.5	20	300h7	320	350	385	320	402.0	261	388.0	19	421.0	320	139.5	127.0	16
FM7-C215-□5□□-E0□	847.0	707.0	140	632.5	22	350h7	388	400	450	370	430.0	277	444.5	24	398.0	388	178.0	155.5	21
FM7-C270-□5□□-E0□	897.0	757.0	140	632.5	22	350h7	388	400	450	370	480.0	277	463.5	24	429.0	388	178.0	174.5	21
FM7-E600-C5B□-E01	1065.5	925.5	140	851.0	22	350h7	388	400	450	356	648.5	277	476.5	24	589.0	388	178.0	228.5	21

Units in mm	Q	QK	C	QR	H	h	J	KD	M	N	B	BB	P	SQ	S	T	U	W	d	m
FM7-A110-□5□□-E0□	110	90	160	1	343	331.5	55	42.5	290	223	84.0	108.0	131.0	260	48h6	9h11	5.5	14h9	40	M5
FM7-A150-□5□□-E0□	110	90	160	1	343	331.5	55	42.5	290	223	84.0	108.0	131.0	260	48h6	9h11	5.5	14h9	40	M5
FM7-A185-□5□□-E0□	110	90	160	1	343	331.5	55	42.5	290	255	84.0	108.0	131.0	260	48h6	9h11	5.5	14h9	40	M5
FM7-A220-□5□□-E0□	110	90	160	1	343	331.5	55	42.5	290	324	84.0	108.0	131.0	260	48h6	9h11	5.5	14h9	40	M5
FM7-A300-□5□□-E0□	140	110	180	2	407	401.0	55	61.0	320	298	99.0	121.0	163.5	320	60m6	11h11	7.0	18h9	50	M6
FM7-A370-□5□□-E0□	140	110	180	2	407	401.0	55	61.0	320	298	99.0	121.0	163.5	320	60m6	11h11	7.0	18h9	50	M6
FM7-A510-□5□□-E01	140	110	225	1	540	480.0	75	61.0	420	425	77.5	153.5	235.5	380	70m6	12h11	7.5	20h9	60	M6
FM7-A510-□5□□-E02	140	110	225	2	540	480.0	75	61.0	420	425	77.5	153.5	235.5	380	60m6	11h11	7.0	18h9	50	M6
FM7-B120-□5□□-E0□	110	90	160	1	343	331.5	55	42.5	290	255	84.0	108.0	131.0	260	48h6	9h11	5.5	14h9	40	M5
FM7-B170-□5□□-E0□	110	90	160	1	343	331.5	55	42.5	290	324	84.0	108.0	131.0	260	48h6	9h11	5.5	14h9	40	M5
FM7-B220-□5□□-E0□	140	110	180	2	407	401.0	55	61.0	320	298	99.0	121.0	163.5	320	60m6	11h11	7.0	18h9	50	M6
FM7-B280-□5□□-E0□	140	110	180	2	407	401.0	55	61.0	320	298	99.0	121.0	163.5	320	60m6	11h11	7.0	18h9	50	M6
FM7-C215-□5□□-E01	140	110	225	1	540	480.0	75	61.0	420	425	77.5	153.5	235.5	380	70m6	12h11	7.5	20h9	60	M6
FM7-C215-□5□□-E02	140	110	225	2	540	480.0	75	61.0	420	425	77.5	153.5	235.5	380	60m6	11h11	7.0	18h9	50	M6
FM7-C270-□5□□-E01	140	110	225	1	540	480.0	75	61.0	420	425	73.0	153.5	235.5	380	70m6	12h11	7.5	20h9	60	M6
FM7-C270-□5□□-E02	140	110	225	2	540	480.0	75	61.0	420	425	73.0	153.5	235.5	380	60m6	11h11	7.0	18h9	50	M6
FM7-E600-C5B□-E01	140	110	225	1	540	480.0	90	61.0	420	590	65.0	108.0	235.5	380	65m6	11h11	7.0	18h9	55	M6

Units in inches	L	LL	LR	LD	LG	LB	KI	LA	LH	LC	LE	LF	R	Z	A	D	E	F	G
FM7-A110-□5□□-E0□	22.48	18.15	4.33	15.93	0.7	9.05h7	10.98	10.43	11.81	9.84	10.08	8.07	12.09	0.59	10.39	11.00	5.00	3.50	0.63
FM7-A150-□5□□-E0□	22.48	18.15	4.33	15.93	0.7	9.05h7	10.98	10.43	11.81	9.84	10.08	8.07	12.09	0.59	10.39	11.00	5.00	3.50	0.63
FM7-A185-□5□□-E0□	24.92	20.59	4.33	18.37	0.7	9.05h7	10.98	10.43	11.81	9.84	12.52	8.07	12.72	0.59	12.20	11.00	5.00	4.13	0.63
FM7-A220-□5□□-E0□	26.42	22.09	4.33	19.86	0.7	9.05h7	10.98	10.43	11.81	9.84	13.98	8.07	14.07	0.59	12.34	11.00	5.00	5.49	0.63
FM7-A300-□5□□-E0□	30.28	24.76	5.51	21.95	0.7	11.81h7	12.60	13.78	15.16	12.60	14.25	10.27	15.28	0.75	15.00	12.60	5.49	5.00	0.63
FM7-A370-□5□□-E0□	31.85	26.34	5.51	23.52	0.7	11.81h7	12.60	13.78	15.16	12.60	15.83	10.27	15.28	0.75	16.57	12.60	5.49	5.00	0.63
FM7-A510-□5□□-E0□	33.34	27.83	5.51	24.90	0.8	13.78h7	15.28	15.75	17.72	14.57	16.92	6.96	17.67	0.94	15.67	15.30	7.01	6.12	0.83
FM7-B120-□5□□-E0□	24.92	20.59	4.33	18.37	0.7	9.05h7	9.84	10.43	11.81	9.84	12.52	8.07	12.72	0.59	12.20	11.00	5.00	4.13	0.63
FM7-B170-□5□□-E0□	26.42	22.09	4.33	19.86	0.7	9.05h7	10.98	10.43	11.81	9.84	13.98	8.07	14.07	0.59	12.34	11.00	5.00	5.49	0.63
FM7-B220-□5□□-E0□	30.28	24.76	5.51	21.95	0.7	11.81h7	12.60	13.78	15.16	12.60	14.25	10.27	15.28	0.75	15.00	12.60	5.49	5.00	0.63
FM7-B280-□5□□-E0□	31.85	26.34	5.51	23.52	0.7	11.81h7	12.60	13.78	15.16	12.60	15.83	10.27	15.28	0.75	16.57	12.60	5.49	5.00	0.63
FM7-C215-□5□□-E0□	33.35	27.83	5.51	24.90	0.8	13.78h7	15.28	15.75	17.72	14.57	16.93	10.90	17.50	0.94	15.67	15.30	7.01	6.12	0.83
FM7-C270-□5□□-E0□	35.31	29.80	5.51	26.87	0.8	13.78h7	15.28	15.75	17.72	14.57	18.90	10.90	18.25	0.94	16.89	15.30	7.01	6.87	0.83
FM7-E600-C5B□-E01	41.94	36.43	5.51	33.50	0.8	13.78h7	15.28	15.75	17.72	14.01	25.53	10.90	18.75	0.94	23.18	15.27	7.01	8.99	0.83

Units in inches	Q	QK	C	QR	H	h	J	KD	M	N	B	BB	P	SQ	S	T	U	W	d	m
FM7-A110-□5□□-E0□	4.33	3.54	6.30	0.039	13.50	13.05	2.16	1.67	11.42	8.78	3.30	4.25	5.16	10.24	1.89 h6	0.35h11	0.21	0.55h9	1.57	M5
FM7-A150-□5□□-E0□	4.33	3.54	6.30	0.039	13.50	13.05	2.16	1.67	11.42	8.78	3.30	4.25	5.16	10.24	1.89 h6	0.35h11	0.21	0.55h9	1.57	M5
FM7-A185-□5□□-E0□	4.33	3.54	6.30	0.039	13.50	13.05	2.16	1.67	11.42	10.04	3.30	4.25	5.16	10.24	1.89 h6	0.35h11	0.21	0.55h9	1.57	M5
FM7-A220-□5□□-E0□	4.33	3.54	6.30	0.039	13.50	13.05	2.16	1.67	11.42	12.76	3.30	4.25	5.16	10.24	1.89 h6	0.35h11	0.21	0.55h9	1.57	M5
FM7-A300-□5□□-E0□	5.51	4.33	7.09	0.078	16.02	15.79	2.16	2.40	12.60	11.73	3.89	4.76	6.44	12.60	2.36 m6	0.43h11	0.27	0.70h9	1.96	M6
FM7-A370-□5□□-E0□	5.51	4.33	7.09	0.039	16.02	15.79	2.16	2.40	12.60	11.73	3.89	4.76	6.44	12.60	2.36 m6	0.43h11	0.27	0.70h9	1.96	M6
FM7-A510-□5□□-E01	5.51	4.33	8.86	0.039	21.26	18.90	2.95	2.40	16.54	16.73	3.05	6.04	9.27	14.96	2.75 m6	0.47h11	0.29	0.78h9	2.36	M6
FM7-A510-□5□□-E02	5.51	4.33	8.86	0.078	21.26	18.90	2.95	2.40	16.54	16.73	3.05	6.04	9.27	14.96	2.36 m6	0.43h11	0.27	0.70h9	1.96	M6
FM7-B120-□5□□-E0□	4.33	3.54	6.30	0.039	13.50	13.05	2.16	1.67	11.42	10.04	3.30	4.25	5.16	10.24	1.89 h6	0.35h11	0.21	0.55h9	1.57	M5
FM7-B170-□5□□-E0□	4.33	3.54	6.30	0.039	13.50	13.05	2.16	1.67	11.42	12.76	3.30	4.25	5.16	10.24	1.89 h6	0.35h11	0.21	0.55h9	1.57	M5
FM7-B220-□5□□-E0□	5.51	4.33	7.09	0.078	16.02	15.79	2.16	2.40	12.60	11.73	3.89	4.76	6.44	12.60	2.36 m6	0.43h11	0.27	0.70h9	1.96	M6
FM7-B280-□5□□-E0□	5.51	4.33	7.09	0.078	16.02	15.79	2.16	2.40	12.60	11.73	3.89	4.76	6.44	12.60	2.36 m6	0.43h11	0.27	0.70h9	1.96	M6
FM7-C215-□5□□-E01	5.51	4.33	8.86	0.039	21.26	18.90	2.95	2.40	16.54	16.73	3.05	6.04	9.27	14.96	2.75 m6	0.47h11	0.29	0.78h9	2.36	M6
FM7-C215-□5□□-E02	5.51	4.33	8.86	0.078	21.26	18.90	2.95	2.40	16.54	16.73	3.05	6.04	9.27	14.96	2.36 m6	0.43h11	0.27	0.70h9	1.96	M6
FM7-C270-□5□□-E01	5.51	4.33	8.86	0.039	21.26	18.90	2.95	2.40	16.54	18.31	2.87	6.04	9.27	14.96	2.75 m6	0.47h11	0.29	0.78h9	2.36	M6
FM7-C270-□5□□-E02	5.51	4.33	8.86	0.078	21.26	18.90	2.95	2.40	16.54	18.31	2.87	6.04	9.27	14.96	2.36 m6	0.43h11	0.27	0.70h9	1.96	M6
FM7-E600-C5B□-E01	5.51	4.33	8.86	0.039	21.26	18.90	3.54	2.40	16.54	23.23	2.55	4.25	9.27	14.96	2.56 m6	0.43h11	0.27	0.70h9	2.16	M6

FM7. E01/E02 series. Flange mounting



Observe that FM7- E600-C1BX-E01 models have 8 mounting holes instead of 4.

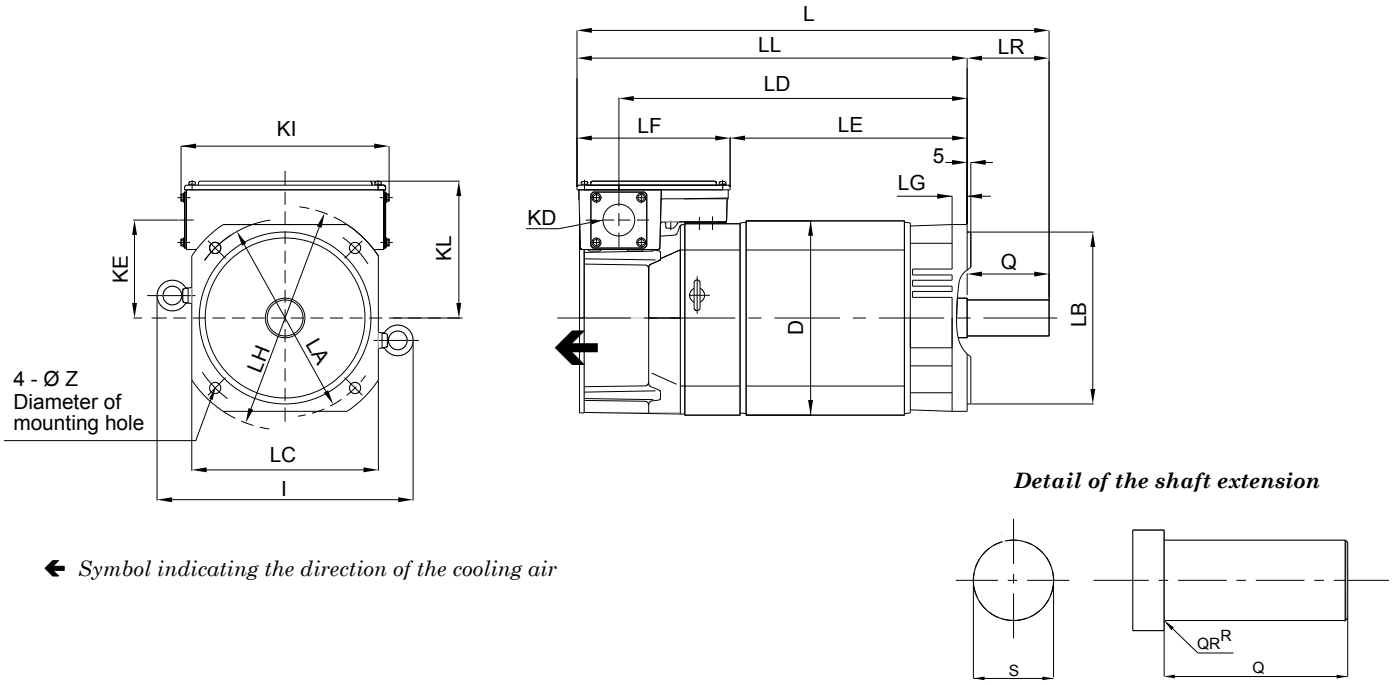
Detail of the shaft extension

Units in mm	L	LA	LB	LC	LG	LH	LL	LR	LD	LE	LF	Z	D	l	KD	KL	KI	KE
FM7-A037-□1□□-E0□	499.0	185	150h7	174	12	220	407.0	60	399.0	214.0	225	11	174	-	34.0	150	174	110.5
FM7-A055-□1□□-E0□	486.0	215	180h7	204	16	250	406.0	80	354.0	227.0	170	15	204	270	42.5	158	204	114.0
FM7-A075-□1□□-E0□	546.0	215	180h7	204	16	250	436.0	110	384.0	257.0	171	15	204	270	42.5	158	204	114.0
FM7-A090-□1□□-E0□	586.0	215	180h7	204	16	250	476.0	110	424.0	297.0	171	15	204	270	42.5	158	204	114.0
FM7-A110-□1□□-E0□	571.0	265	230h7	250	20	300	461.0	110	404.5	256.0	205	15	260	343	42.5	183	279	131.0
FM7-A150-□1□□-E0□	571.0	265	230h7	250	20	300	461.0	110	404.5	256.0	205	15	260	343	42.5	183	279	131.0
FM7-A185-□1□□-E0□	633.0	265	230h7	250	20	300	523.0	110	466.5	318.0	205	15	260	343	42.5	183	279	131.0
FM7-A220-□1□□-E0□	671.0	265	230h7	250	20	300	561.0	110	504.5	355.0	205	15	260	343	42.5	183	279	131.0
FM7-A300-□1□□-E0□	769.0	350	300h7	320	20	385	629.0	140	557.5	362.0	261	19	320	440	61.0	227	320	163.5
FM7-A370-□1□□-E0□	809.0	350	300h7	320	20	385	669.0	140	597.5	402.0	261	19	320	440	61.0	227	320	163.5
FM7-A510-□1□□-E0□	847.0	400	350h7	370	22	450	707.0	140	632.5	430.0	277	24	380	504	61.0	315	388	235.5
FM7-B120-□1□□-E0□	633.0	265	230h7	250	20	300	523.0	110	466.5	318.0	205	15	260	343	42.5	183	279	131.0
FM7-B170-□1□□-E0□	671.0	265	230h7	250	20	300	561.0	110	504.5	355.0	205	15	260	343	42.5	181	250	131.0
FM7-B220-□1□□-E0□	769.0	350	300h7	320	20	385	629.0	140	557.5	362.0	261	19	320	440	61.0	227	320	163.5
FM7-B280-□1□□-E0□	809.0	350	300h7	320	20	385	669.0	140	597.5	402.0	261	19	320	440	61.0	227	320	163.5
FM7-C215-□1□□-E0□	847.0	400	350h7	370	22	450	707.0	140	632.5	430.0	277	24	380	504	61.0	315	388	235.5
FM7-C270-□1□□-E0□	897.0	400	350h7	370	22	450	757.0	140	682.5	480.0	277	24	380	504	61.0	315	388	235.5
FM7-E600-C1B□-E01	1065.5	400	350h7	370	22	450	925.5	140	851.0	648.5	277	24	380	526	61.0	315	388	235.5

Units in inches	L	LA	LB	LC	LG	LH	LL	LR	LD	LE	LF	Z	D	l	KD	KL	KI	KE
FM7-A037-□1□□-E0□	18.39	7.28	5.90h7	6.85	0.47	8.66	16.02	2.36	15.71	8.42	8.86	0.43	6.85	-	1.34	5.90	6.85	4.35
FM7-A055-□1□□-E0□	19.13	8.46	7.09h7	8.03	0.63	9.84	15.98	3.15	13.94	8.94	6.69	0.59	8.03	10.63	1.67	6.22	8.03	4.49
FM7-A075-□1□□-E0□	21.50	8.46	7.09h7	8.03	0.63	9.84	17.17	4.33	15.12	10.12	6.73	0.59	8.03	10.63	1.67	6.22	8.03	4.49
FM7-A090-□1□□-E0□	23.07	8.46	7.09h7	8.03	0.63	9.84	18.74	4.33	16.69	11.69	6.73	0.59	8.03	10.63	1.67	6.22	8.03	4.49
FM7-A110-□1□□-E0□	22.48	10.43	9.05h7	9.84	0.79	11.81	18.15	4.33	15.93	10.08	8.07	0.59	10.24	13.50	1.67	7.20	10.98	5.16
FM7-A150-□1□□-E0□	22.48	10.43	9.05h7	9.84	0.79	11.81	18.15	4.33	15.93	10.08	8.07	0.59	10.24	13.50	1.67	7.20	10.98	5.16
FM7-A185-□1□□-E0□	24.92	10.43	9.05h7	9.84	0.79	11.81	20.59	4.33	18.37	12.52	8.07	0.59	10.24	13.50	1.67	7.20	10.98	5.16
FM7-A220-□1□□-E0□	26.42	10.43	9.05h7	9.84	0.79	11.81	22.09	4.33	19.86	13.98	8.07	0.59	10.24	13.50	1.67	7.20	10.98	5.16
FM7-A300-□1□□-E0□	30.28	13.78	11.81h7	12.60	0.79	15.16	24.76	5.51	21.95	14.25	10.28	0.75	12.60	17.32	2.40	8.94	12.60	6.44
FM7-A370-□1□□-E0□	31.85	13.78	11.81h7	12.60	0.79	15.16	26.34	5.51	23.52	15.83	10.28	0.75	12.60	17.32	2.40	8.94	12.60	6.44
FM7-A510-□1□□-E0□	33.35	15.75	13.78h7	14.57	0.87	17.72	27.83	5.51	24.90	16.93	10.91	0.94	14.96	19.84	2.40	12.40	15.28	9.27
FM7-B120-□1□□-E0□	24.80	10.43	9.05h7	9.84	0.79	11.81	20.47	4.33	17.72	12.48	6.89	0.59	10.24	13.50	1.67	7.13	9.84	5.16
FM7-B170-□1□□-E0□	26.42	10.43	9.05h7	9.84	0.79	11.81	22.09	4.33	19.86	13.98	8.07	0.59	10.24	13.50	1.67	7.20	10.98	5.16
FM7-B220-□1□□-E0□	30.28	13.78	11.81h7	12.60	0.79	15.16	24.76	5.51	21.95	14.25	10.28	0.75	12.60	17.32	2.40	8.94	12.60	6.44
FM7-B280-□1□□-E0□	31.85	13.78	11.81h7	12.60	0.79	15.16	26.34	5.51	23.52	15.83	10.28	0.75	12.60	17.32	2.40	8.94	12.60	6.44
FM7-C215-□1□□-E0□	33.35	15.75	13.78h7	14.57	0.87	17.72	27.83	5.51	24.90	16.93	10.91	0.94	14.96	19.84	2.40	12.40	15.28	9.27
FM7-C270-□1□□-E0□	35.31	15.75	13.78h7	14.57	0.87	17.72	29.80	5.51	26.87	18.90	10.91	0.94	14.96	19.84	2.40	12.40	15.28	9.27
FM7-E600-C1B□-E01	41.94	15.75	13.78h7	14.57	0.87	17.72	36.43	5.51	33.50	25.53	10.91	0.94	14.96	20.70	2.40	12.40	15.28	9.27

	Units in mm									Units in inches								
	Q	**QK**	**QR**	**S**	**T**	**U**	**W**	**d**	**m**	**Q**	**QK**	**QR**	**S**	**T**	**U**	**W**	**d**	**m**
FM7-A037-□1□□-E0□	60	45	1.0	28h6	7h11	4.0	8h9	22	M4	2.36	1.77	0.039	1.10h6	0.28h11	0.16	0.31h9	0.87	M4
FM7-A055-□1□□-E0□	80	70	2.0	32h6	8h11	5.0	10h9	22	M5	3.15	2.76	0.078	1.26h6	0.31h11	0.20	0.39h9	0.87	M5
FM7-A075-□1□□-E0□	110	90	0.5	48h6	9h11	5.5	14h9	40	M5	4.33	3.54	0.019	1.89h6	0.35h11	0.21	0.55h9	1.57	M5
FM7-A090-□1□□-E0□	110	90	0.5	48h6	9h11	5.5	14h9	40	M5	4.33	3.54	0.019	1.89h6	0.35h11	0.21	0.55h9	1.57	M5
FM7-A110-□1□□-E0□	110	90	1.0	48h6	9h11	5.5	14h9	40	M5	4.33	3.54	0.039	1.89h6	0.35h11	0.21	0.55h9	1.57	M5
FM7-A150-□1□□-E0□	110	90	1.0	48h6	9h11	5.5	14h9	40	M5	4.33	3.54	0.039	1.89h6	0.35h11	0.21	0.55h9	1.57	M5
FM7-A185-□1□□-E0□	110	90	1.0	48h6	9h11	5.5	14h9	40	M5	4.33	3.54	0.039	1.89h6	0.35h11	0.21	0.55h9	1.57	M5
FM7-A220-□1□□-E0□	110	90	1.0	48h6	9h11	5.5	14h9	40	M5	4.33	3.54	0.039	1.89h6	0.35h11	0.21	0.55h9	1.57	M5
FM7-A300-□1□□-E0□	140	110	2.0	60m6	11h11	7.0	18h9	50	M6	5.51	4.33	0.078	2.36m6	0.43h11	0.27	0.70h9	1.96	M6
FM7-A370-□1□□-E0□	140	110	2.0	60m6	11h11	7.0	18h9	50	M6	5.51	4.33	0.078	2.36m6	0.43h11	0.27	0.70h9	1.96	M6
FM7-A510-□1□□-E01	140	110	1.0	70m6	12h11	7.5	20h9	60	M6	5.51	4.33	0.039	2.75m6	0.47h11	0.29	0.78h9	2.36	M6
FM7-A510-□1□□-E02	140	110	2.0	60m6	11h11	7.0	18h9	50	M6	5.51	4.33	0.078	2.36m6	0.43h11	0.27	0.70h9	1.96	M6
FM7-B120-□1□□-E0□	110	90	1.0	48h6	9h11	5.5	14h9	40	M5	4.33	3.54	0.039	1.89h6	0.35h11	0.21	0.55h9	1.57	M5
FM7-B170-□1□□-E0□	110	90	1.0	48h6	9h11	5.5	14h9	40	M5	4.33	3.54	0.039	1.89h6	0.35h11	0.21	0.55h9	1.57	M5
FM7-B220-□1□□-E0□	140	110	2.0	60m6	11h11	7.0	18h9	50	M6	5.51	4.33	0.078	2.36m6	0.43h11	0.27	0.70h9	1.96	M6
FM7-B280-□1□□-E0□	140	110	2.0	60m6	11h11	7.0	18h9	50	M6	5.51	4.33	0.078	2.36m6	0.43h11	0.27	0.70h9	1.96	M6
FM7-C215-□1□□-E01	140	110	1.0	70m6	12h11	7.5	20h9	60	M6	5.51	4.33	0.039	2.75m6	0.47h11	0.29	0.78h9	2.36	M6
FM7-C215-□1□□-E02	140	110	2.0	60m6	11h11	7.0	18h9	50	M6	5.51	4.33	0.078	2.36m6	0.43h11	0.27	0.70h9	1.96	M6
FM7-C270-□1□□-E01	140	110	1.0	70m6	12h11	7.5	20h9	60	M6	5.51	4.33	0.039	2.75m6	0.47h11	0.29	0.78h9	2.36	M6
FM7-C270-□1□□-E02	140	110	2.0	60m6	11h11	7.0	18h9	50	M6	5.51	4.33	0.078	2.36m6	0.43h11	0.27	0.70h9	1.96	M6
FM7-E600-C1B□-E01	140	110	1.0	65m6	11h11	7.0	18h9	55	M6	5.51	4.33	0.039	2.55m6	0.43h11	0.27	0.70h9	2.16	M6

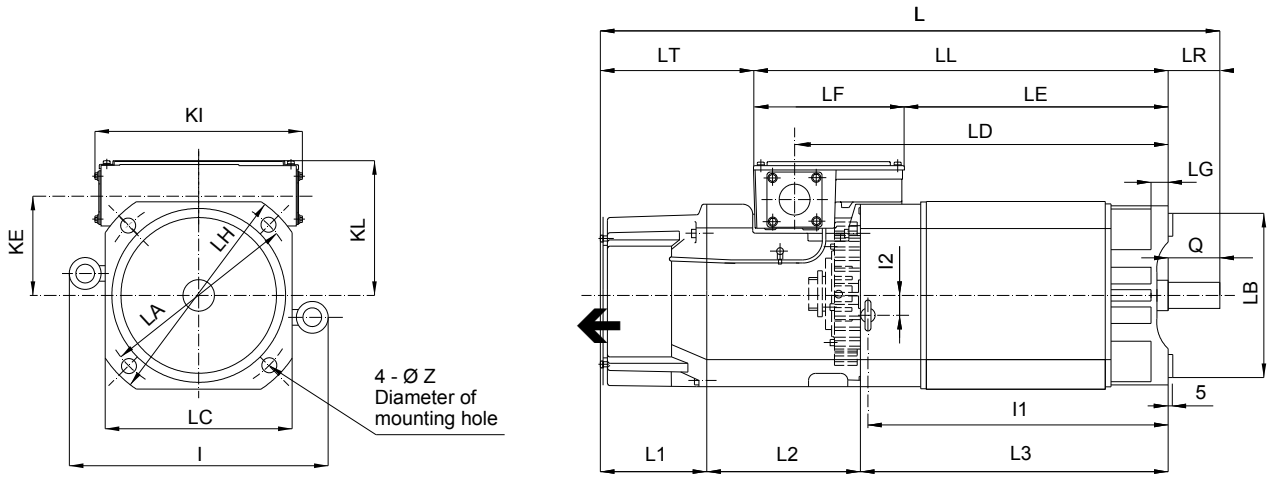
FM7. E03 series. Flange mounting



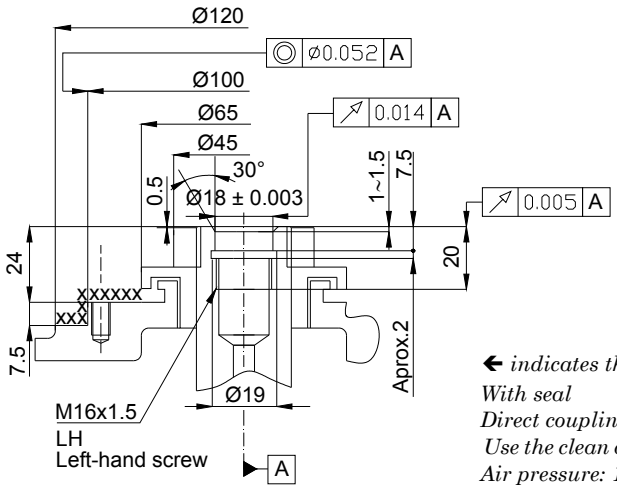
Units in mm	L	LA	LB	LC	LG	LH	LL	LR	LD	LE	LF	Z	D	I	KD	KL	KI	KE	Q	QR	S
FM7-D055-S1D0-E03	475	215	180h7	204	20	250	415	60	353	226	171	15	204	270	42.5	158	204	114	60	0.5	28h6
FM7-D075-S1D0-E03	506	215	180h7	204	20	250	446	60	401	256	190	15	204	270	42.5	164	250	114	60	0.5	28h6
FM7-D110-S1D0-E03	556	265	230h7	250	25	300	476	80	420	271	205	15	260	343	42.5	183	279	131	80	0.5	38h6
FM7-D150-S1D0-E03	556	265	230h7	250	25	300	476	80	420	271	205	15	260	343	42.5	183	279	131	80	0.5	38h6
FM7-D185-S1D0-E03	618	265	230h7	250	25	300	538	80	482	333	205	15	260	343	42.5	183	279	131	80	0.5	38h6
FM7-D220-S1D0-E03	656	265	230h7	250	25	300	576	80	520	371	205	15	260	343	42.5	183	279	131	80	0.5	38h6

Units in inches	L	LA	LB	LC	LG	LH	LL	LR	LD	LE	LF	Z	D	I	KD	KL	KI	KE	Q	QR	S
FM7-D055-S1D0-E03	18.7	8.4	7.1h7	8.0	0.7	9.8	16.3	2.3	13.8	8.8	6.7	0.5	8.0	10.6	1.6	6.2	8.0	4.4	2.36	0.02	1.1h6
FM7-D075-S1D0-E03	19.9	8.4	7.1h7	8.0	0.7	9.8	17.5	2.3	15.7	10.0	7.4	0.5	8.0	10.6	1.6	6.4	9.8	4.4	2.36	0.02	1.1h6
FM7-D110-S1D0-E03	21.9	10.4	9.1h7	9.8	0.9	11.8	18.7	3.1	16.5	10.6	8.0	0.5	10.2	13.5	1.6	7.2	10.9	5.1	3.15	0.02	1.5h6
FM7-D150-S1D0-E03	21.9	10.4	9.1h7	9.8	0.9	11.8	18.7	3.1	16.5	10.6	8.0	0.5	10.2	13.5	1.6	7.2	10.9	5.1	3.15	0.02	1.5h6
FM7-D185-S1D0-E03	24.3	10.4	9.1h7	9.8	0.9	11.8	21.1	3.1	18.9	13.1	8.0	0.5	10.2	13.5	1.6	7.2	10.9	5.1	3.15	0.02	1.5h6
FM7-D220-S1D0-E03	25.8	10.4	9.1h7	9.8	0.9	11.8	22.6	3.1	20.4	14.6	8.0	0.5	10.2	13.5	1.6	7.2	10.9	5.1	3.15	0.02	1.5h6

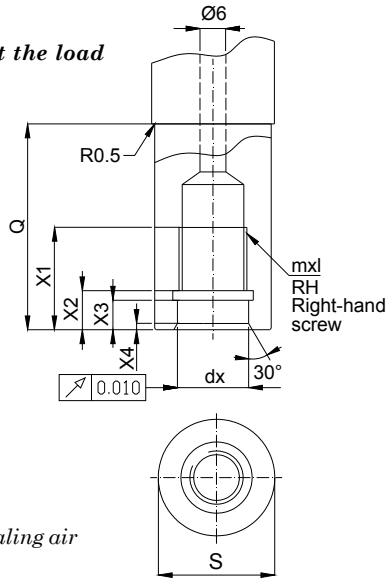
FM7. HS3 series. Flange mounting



Detail of the shaft at the end opposite to the load



Detail of the shaft at the load



← *indicates the direction of the cooling air*
With seal
Direct coupling only
Use the clean air through the air drier and filter for sealing air
Air pressure: 1 kg/cm²

Units in mm	L	LA	LB	LC	LG	LH	LL	LR	LD	LE	LF	Z	D	I	KD	KL	KI	KE
FM7-D075-S1D0-HS3	715	215	180h7	204	20	250	446	60	401	256	190	15	204	271	42.5	158	250	114
FM7-D110-S1D0-HS3	751	265	230h7	250	25	300	476	70	420	271	205	15	260	343	42.5	183	279	131
FM7-D185-S1D0-HS3	813	265	230h7	250	25	300	538	70	482	333	205	15	260	343	42.5	183	279	131
FM7-D220-S1D0-HS3	851	265	230h7	250	25	300	576	70	520	371	205	15	260	343	42.5	183	279	131

Units in inches	L	LA	LB	LC	LG	LH	LL	LR	LD	LE	LF	Z	D	I	KD	KL	KI	KE
FM7-D075-S1D0-HS3	28.1	8.4	7.1h7	8.0	0.7	9.8	17.5	2.3	15.7	10.0	7.4	0.5	8.0	10.6	1.6	6.2	9.8	4.4
FM7-D110-S1D0-HS3	29.5	10.4	9.1h7	9.8	0.9	11.8	18.7	2.7	16.5	10.6	8.0	0.5	10.2	13.5	1.6	7.2	10.9	5.1
FM7-D185-S1D0-HS3	32.0	10.4	9.1h7	9.8	0.9	11.8	21.1	2.7	18.9	13.1	8.0	0.5	10.2	13.5	1.6	7.2	10.9	5.1
FM7-D220-S1D0-HS3	33.5	10.4	9.1h7	9.8	0.9	11.8	22.6	2.7	20.4	14.6	8.0	0.5	10.2	13.5	1.6	7.2	10.9	5.1

Units in mm	L1	L2	L3	I1	I2	Q	mxl	S	X1	X2	X3	X4	dx
FM7-D075-S1D0-HS3	137	210	308	288	33	60	M12 x1.25	28h6	31	14.5	13	1.0	16
FM7-D110-S1D0-HS3	142	208	331	320	30	70	M16 x1.50	38h6	38	17.0	15	1.0-1.5	20
FM7-D185-S1D0-HS3	142	208	393	382	30	70	M16 x1.50	38h6	38	17.0	15	1.0-1.5	20
FM7-D220-S1D0-HS3	142	208	431	420	30	70	M16 x1.50	38h6	38	17.0	15	1.0-1.5	20

Units in inches	L1	L2	L3	I1	I2	Q	mxl	S	X1	X2	X3	X4	dx
FM7-D075-S1D0-HS3	5.39	8.26	12.12	11.33	1.30	2.36	M12 x0.04	1.10h6	1.22	0.57	0.51	0.03	0.63
FM7-D110-S1D0-HS3	5.59	8.18	13.03	12.59	1.18	2.75	M16 x0.05	1.49h6	1.49	0.66	0.59	0.03-0.05	0.78
FM7-D185-S1D0-HS3	5.59	8.18	15.47	15.03	1.18	2.75	M16 x0.05	1.49h6	1.49	0.66	0.59	0.03-0.05	0.78
FM7-D220-S1D0-HS3	5.59	8.18	16.96	16.53	1.18	2.75	M16 x0.05	1.49h6	1.49	0.66	0.59	0.03-0.05	0.78

ASSEMBLING PRECISION

Associate the accuracies of the elements with the code assigned according to the table in order to interpret later data.

Code	Measurement
A	Parallelism of shaft extensión
B	Rotational excentricity of shaft extension (runout)
C	Shaft runout at the end
D	Concentricity between flange and shaft diameters
E	Concentricity of the support side of the flange with respect to the machine axis
F	Perpendicularity of the support side of the flange with respect to the foot

FM7. E01/E02 series. Foot mounting

Units in mm	A	B			
FM7-A037-□3□□-E0□	0.03	0.02			
FM7-A055-□3□□-E0□	0.03	0.02			
FM7-A075-□3□□-E0□	0.033	0.022			
FM7-A090-□3□□-E0□	0.033	0.022			
FM7-A110-□3□□-E01	0.033	0.022			
FM7-A150-□3□□-E0□	0.033	0.022			
FM7-A185-□3□□-E0□	0.033	0.022			
FM7-A220-□3□□-E0□	0.033	0.022			
FM7-A300-□3□□-E01	0.042	0.028			
FM7-A370-□3□□-E01	0.042	0.028			
FM7-A510-□3□□-E0□	0.042	0.028			
FM7-B120-□3□□-E0□	0.033	0.022			
FM7-B170-□3□□-E0□	0.033	0.022			
FM7-B220-□3□□-E01	0.042	0.028			
FM7-B280-□3□□-E01	0.042	0.028			
FM7-C215-□3□□-E0□	0.042	0.028			
FM7-C270-□3□□-E0□	0.042	0.028			
FM7-E600-C3B□-E01	0.042	0.028			

FM7. E01/E02 series. Flange mounting

Units in mm	C	D	E		
FM7-A037-□1□□-E0□	0.02	0.04	0.04		
FM7-A055-□1□□-E0□	0.02	0.04	0.04		
FM7-A075-□1□□-E0□	0.022	0.04	0.04		
FM7-A090-□1□□-E0□	0.022	0.04	0.04		
FM7-A110-□1□□-E0□	0.022	0.046	0.04		
FM7-A150-□1□□-E0□	0.022	0.046	0.04		
FM7-A185-□1□□-E0□	0.022	0.046	0.04		
FM7-A220-□1□□-E0□	0.022	0.046	0.04		
FM7-A300-□1□□-E01	0.028	0.048	0.06		
FM7-A370-□1□□-E01	0.028	0.048	0.06		
FM7-A510-□1□□-E0□	0.028	0.07	0.072		
FM7-B120-□1□□-E0□	0.022	0.046	0.04		
FM7-B170-□1□□-E0□	0.022	0.046	0.04		
FM7-B220-□1□□-E01	0.028	0.048	0.06		
FM7-B280-□1□□-E01	0.028	0.048	0.06		
FM7-C215-□1□□-E0□	0.028	0.07	0.072		
FM7-C270-□1□□-E0□	0.028	0.07	0.072		
FM7-E600-C1B□-E01	0.028	0.07	0.072		

FM7. E01/E02 series. Flange and foot mounting

Units in mm	A	C	D	E	F
FM7-A110-□5□□-E01	0.033	0.022	0.046	0.04	0.130
FM7-A150-□5□□-E0□	0.033	0.022	0.046	0.04	0.130
FM7-A185-□5□□-E0□	0.033	0.022	0.046	0.04	0.130
FM7-A220-□5□□-E0□	0.033	0.022	0.046	0.04	0.130
FM7-A300-□5□□-E01	0.042	0.028	0.048	0.06	0.176
FM7-A370-□5□□-E01	0.042	0.028	0.048	0.06	0.176
FM7-A510-□5□□-E0□	0.042	0.028	0.048	0.06	0.176
FM7-B120-□5□□-E0□	0.033	0.022	0.046	0.04	0.130
FM7-B170-□5□□-E0□	0.033	0.022	0.046	0.04	0.130
FM7-B220-□5□□-E01	0.042	0.028	0.048	0.06	0.176
FM7-B280-□5□□-E01	0.042	0.028	0.048	0.06	0.176
FM7-C215-□5□□-E0□	0.042	0.028	0.048	0.06	0.176
FM7-C270-□5□□-E0□	0.042	0.028	0.048	0.06	0.176
FM7-E600-C5B□-E01	0.042	0.028	0.070	0.072	0.207

FM7. E03 series. Flange mounting

Units in mm	C	D	E		
FM7-D055-S1D0-E03	0.02	0.04	0.04		
FM7-D075-S1D0-E03	0.022	0.04	0.04		
FM7-D110-S1D0-E03	0.022	0.046	0.04		
FM7-D150-S1D0-E03	0.022	0.046	0.04		
FM7-D185-S1D0-E03	0.022	0.046	0.04		
FM7-D220-S1D0-E03	0.022	0.046	0.04		

FM7. HS3 series. Flange mounting

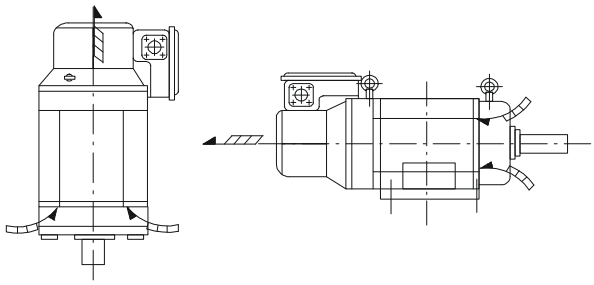
Units in mm	C	D	E		
FM7-D075-S1D0-HS3	0.022	0.04	0.04		
FM7-D110-S1D0-HS3	0.022	0.046	0.04		
FM7-D150-S1D0-HS3	0.022	0.046	0.04		
FM7-D220-S1D0-HS3	0.022	0.046	0.04		

BRAKE CHARACTERISTICS

FM7 motors do not offer the brake in any of their models.

FAN CHARACTERISTICS

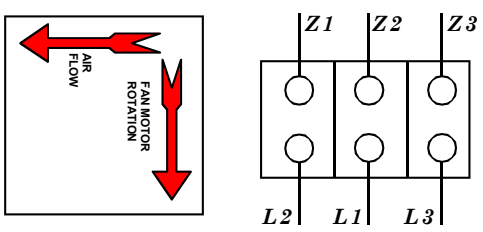
All FM7 series spindle AC motors have an electrical cooling fan that generates a constant air flow regardless of the motor turning direction. This assures proper motor cooling in all duty cycles. This fan starts turning when connected to the three-phase line.



(a) Flange mounting *(b) Foot mounting*

The fan will blow the hot air towards the rear of the motor in both types of connections. However, it will be necessary to verify that the turning direction is the one shown on the label.

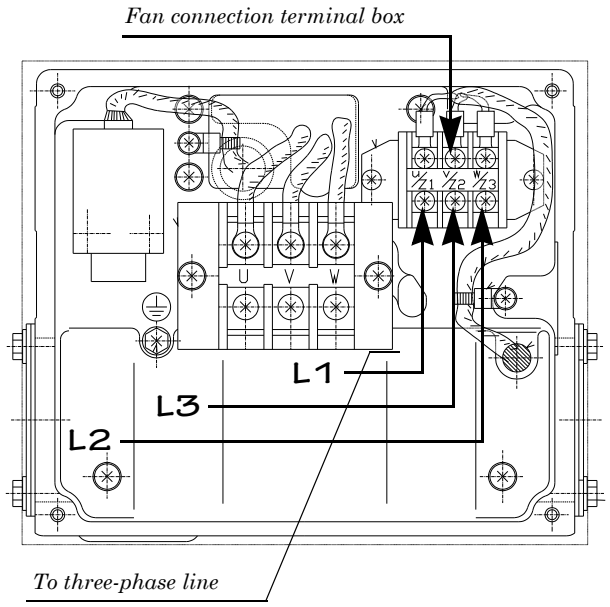
MANDATORY. Make sure that the fan is turning in the direction indicated on the label that is located on the outside of the body and that the air flowing as shown in the drawing below.



Connection for the direction shown on fan label

If connected Z1-L1, Z2-L2 and Z3-L3 the fan will turn in the opposite direction to the one indicated on the label. Observe that the phases are not swapped.

The fan connection to the three/phase line is done through 4/wire cable with a minimum section of 1.5 mm² per wire.



Note that phases L1 and L2 are swapped for proper air flow and motor turning directions indicated on the outside label.

Electrical characteristics

Motor	Voltage	Frequency	Power	Current
Units	V AC	Hz	W	Arms
FM7-A037-□□□□-E0□	400 460	50/60 60	37/51 60	0.11/0.14 0.16
FM7-A055-□□□□-E0□ FM7-D055-S1D0-E03	400 460	50/60 60	64/85 96	0.11/0.16 0.17
FM7-A075-□□□□-E0□ FM7-D075-S1D0-E03 FM7-D075-S1D0-HS3	400 460	50/60 60	41/62 63	0.07/0.10 0.09
FM7-A090-□□□□-E0□	400 460	50/60 60	45/58 63	0.11/0.10 0.10
FM7-A110-□□□□-E0□ FM7-D110-S1D0-E03 FM7-D110-S1D0-HS3	400 460	50/60 60	59/83 88	0.11/0.14 0.13
FM7-A150-□□□□-E0□ FM7-D150-S1D0-E03	400 460	50/60 60	59/83 88	0.11/0.14 0.13
FM7-A185-□□□□-E0□ FM7-D185-S1D0-E03 FM7-D185-S1D0-HS3	400 460	50/60 60	59/83 88	0.11/0.14 0.13
FM7-A220-□□□□-E0□ FM7-D220-S1D0-E03 FM7-D220-S1D0-HS3	400 460	50/60 60	57/82 87	0.11/0.13 0.13
FM7-A300-□□□□-E0□	400 460	50/60 60	152/205 226	0.38/0.38 0.40
FM7-A370-□□□□-E0□	400 460	50/60 60	152/205 226	0.38/0.38 0.40
FM7-A510-□□□□-E0□	400 460	50/60 60	86/117 128	0.22/0.23 0.24
FM7-B120-□□□□-E0□	400 460	50/60 60	58/82 88	0.11/0.14 0.13
FM7-B170-□□□□-E0□	400 460	50/60 60	57/82 87	0.11/0.13 0.13
FM7-B220-□□□□-E0□	400 460	50/60 60	163/218 238	0.39/0.39 0.41
FM7-B280-□□□□-E0□	400 460	50/60 60	152/205 226	0.38/0.38 0.40
FM7-C215-□□□□-E0□	400 460	50/60 60	86/117 128	0.22/0.23 0.24
FM7-C270-□□□□-E0□	400 460	50/60 60	103/140 159	0.18/0.23 0.22
FM7-E600-C□B□-E01	400 460	50/60 60	94/132 143	0.22/0.25 0.25

PRECAUTIONS WHEN INSTALLING THE MOTOR

This section describes the environmental precautions to bear in mind when installing the motor.

MANDATORY. The flange and the shaft of the motor have an anticorrosive layer of paint or grease. The flange, the shaft and the key must be cleaned before installing the motor.

The motor must be installed under the following conditions:

- Leave enough clearance for the cooling fan to blow the air out. The minimum clearance between the machine and the exit of the motor fan is 100 mm (3.94 in).
- Install the motor in a clean place, away from oil and water. If there is a chance that the motor may be exposed to oil or water, cover it for protection. If dirty oil or water gets into the motor, it would decrease the isolation resistance and cause a grounding failure.
- Make sure that the motor is firmly secured to the floor or with the flange because the weight of the motor the dynamic load when it is running may generate vibrations.
- Install the motor in an environment free of dust and metal particles. The motor has an integrated fan with an internal structure that provides cooling air to the motor. Blocking the air flow with dust other strange elements may decrease the efficiency of the cooling system.

CONSIDERATIONS FOR MOTOR INSTALLATION

Bear in mind the following considerations when installing the motor:

- If it is a flange-mounted motor, it may be installed with its shaft at the load end and at an angle between the horizontal and vertical with the shaft facing down.

NOTE. The motor must not be mounted with its shaft facing up.

- If it is a **foot-mounted motor**, it must be mounted with its feet secured to the floor. If the motor is installed vertically, its shaft must be facing down.

NOTE. The motor must not be mounted with its shaft facing up.

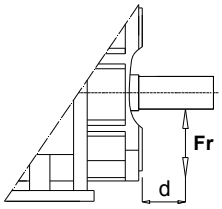
CAUTION!

Note that when installing transmission pulleys or gearboxes, any blow to the shaft reduces its useful life, of bearings, and may damage the encoder.

Therefore, do not hit it for any reason.

RADIAL LOADS

A misalignment between the motor shaft and the machine axis increases vibration of the shaft and shortens the life of the ball bearings and couplings. Likewise, exceeding certain maximum radial load values may cause a similar effect of the ball bearings.



In order to avoid these problems, the maximum values given in the table for radial load must not be exceeded.

They are assumed to be applied at the end of the shaft and for the maximum motor speed.

FM7. E01/E02 series

Motor	Radial force ·Fr·		Distance ·d·	
Units	N	lb	mm	in
FM7-A037-□□□□-E01	1370	308.0	60	2.36
FM7-A037-□□□□-E02	1140	256.3	60	2.36
FM7-A055-□□□□-E01	1570	353.0	80	3.15
FM7-A055-□□□□-E02	1510	339.5	80	3.15
FM7-A075-□□□□-E01	1570	353.0	110	4.33
FM7-A075-□□□□-E02	1510	339.5	110	4.33

FM7. E01/E02 series

Motor	Radial force ·Fr·		Distance ·d·		
Units	N	lb	mm	in	
FM7-A090-□□□□-E01	1570	353.0	110	4.33	
FM7-A090-□□□□-E02	1470	330.5	110	4.33	
FM7-A110-□□□□-E01	1715	385.5	110	4.33	
FM7-A110-□□□□-E02	1590	357.4	110	4.33	
FM7-A150-□□□□-E01	2640	593.5	110	4.33	
FM7-A150-□□□□-E02	1715	385.5	110	4.33	
FM7-A185-□□□□-E01	2640	593.5	110	4.33	
FM7-A185-□□□□-E02	1715	385.5	110	4.33	
FM7-A220-□□□□-E01	2640	593.5	110	4.33	
FM7-A220-□□□□-E02	1715	385.5	110	4.33	
FM7-A300-□□□□-E01	3920	881.3	140	5.51	
FM7-A370-□□□□-E01	3920	881.3	140	5.51	
FM7-A510-□□□□-E01	4900	1102.0	140	5.51	
FM7-A510-□□□□-E02	4500	1012.0	140	5.51	
FM7-B120-□□□□-E01	2640	593.5	110	4.33	
FM7-B120-□□□□-E02	1715	385.5	110	4.33	
FM7-B170-□□□□-E01	2640	593.5	110	4.33	
FM7-B170-□□□□-E02	1715	385.5	110	4.33	
FM7-B220-□□□□-E01	3920	881.3	140	5.51	
FM7-B280-□□□□-E01	3920	881.3	140	5.51	
FM7-C215-□□□□-E01	4900	1102.0	140	5.51	
FM7-C215-□□□□-E02	4500	1012.0	140	5.51	
FM7-C270-□□□□-E01	4900	1102.0	140	5.51	
FM7-C270-□□□□-E02	4500	1012.0	140	5.51	
FM7-E600-C□B□-E01	8820	1982.8	140	5.51	

FM7. E03 series

Motor	Radial force ·Fr·		Distance ·d·		
Units	N	lb	mm	in	
FM7-D055-S1D0-E03	196	44.1	60	2.36	
FM7-D075-S1D0-E03	196	44.1	60	2.36	
FM7-D110-S1D0-E03	290	65.2	80	3.15	
FM7-D150-S1D0-E03	290	65.2	80	3.15	
FM7-D185-S1D0-E03	290	65.2	80	3.15	
FM7-D220-S1D0-E03	290	65.2	80	3.15	

FM7. HS3 series

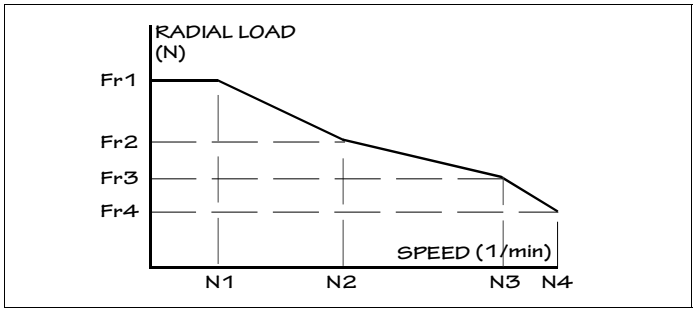
Motor	Radial force ·Fr·		Distance ·d·		
Units	N	lb	mm	in	
FM7-D075-S1D0-E03	196	44.1	60	2.36	
FM7-D110-S1D0-E03	290	65.2	70	2.75	
FM7-D185-S1D0-E03	290	65.2	70	2.75	
FM7-D220-S1D0-E03	290	65.2	70	2.75	

RADIAL LOAD GRAPHS-RPM

When using mechanical transmission elements, the end of the motor shaft may be subjet to radial loads.

- Make sure that the maximum radial load values at the end of the shaft do not exceed the permitted values shown on the graphs depending on the rev/min of the shaft.
- Exceeding these radial load values increases the vibration of the shaft and shortens the life of the ball bearings and couplings.

The particular graph may be used to determine the permitted radial loads that may be applied on to the end of the motor shaft depending o its rev/min.



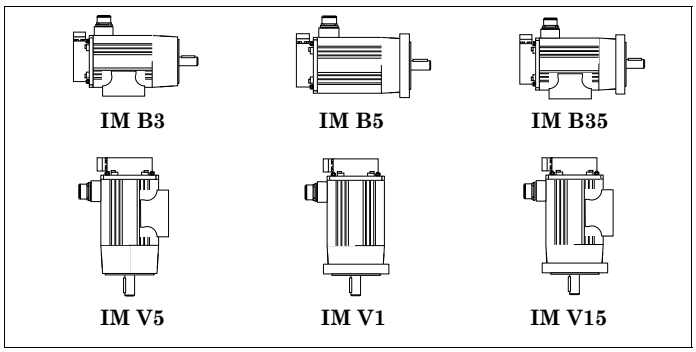
Motor	Radial force ·Fri·				Speed ·Ni·			
Units	N				rev/min			
	Fr1	**Fr2**	**Fr3**	**Fr4**	**N1**	**N2**	**N3**	**N4***
FM7-A037-□□□□-E0□	1610	1467	1370	1140	5630	7190	9000	12000
FM7-A055-□□□□-E0□	1910	1890	1570	1510	4880	5000	9000	10000
FM7-D055-S1D0-□□3	1910	1890	1570	196	4880	5000	9000	15000
FM7-A075-□□□□-E0□	1990	1890	1570	1510	4310	5965	9000	10000
FM7-D075-S1D0-□□3	1990	1890	1570	196	4310	5965	9000	15000
FM7-A090-□□□□-E0□	1990	1890	1570	1470	4610	5625	9000	10000
FM7-A110-□□□□-E0□	2810	2150	1715	590	1500	4560	9000	10000
FM7-D110-S1D0-□□3	2810	2150	1715	290	1500	4560	9000	12000
FM7-A150-□□□□-E0□	3230	3195	2640	1715	4360	4560	8000	9000
FM7-D150-S1D0-□□3	3230	3195	2640	290	4360	4560	8000	12000
FM7-A185-□□□□-E0□	3880	3000	2640	1715	2340	5265	8000	9000
FM7-D185-S1D0-□□3	3880	3000	2640	290	2340	5265	8000	12000
FM7-A220-□□□□-E0□	3930	2935	2640	1715	1500	6140	8000	9000
FM7-D220-S1D0-□□3	3930	2935	2640	290	1500	6140	8000	12000
FM7-A300-□□□□-E01	5570	4175	3920	-	1500	5440	6500	-
FM7-A370-□□□□-E01	5720	4435	3920	-	1640	4385	6500	-
FM7-A510-□□□□-E0□	5720	5390	4900	4500	2960	3510	5000	6000
FM7-B120-□□□□-E0□	3530	3130	2640	1715	2990	5000	8000	9000
FM7-B170-□□□□-E0□	3530	3130	2640	1715	2990	5000	8000	9000
FM7-B220-□□□□-E01	5720	4610	3920	-	2080	3947	6500	-
FM7-B280-□□□□-E01	5720	4520	3920	-	2220	4210	6500	-
FM7-C215-□□□□-E0□	5720	5565	4900	4500	3340	3510	5000	6000
FM7-C270-□□□□-E0□	5720	5305	4900	4500	3600	3860	5000	6000
FM7-E600-C□B□-E01	8820	8820	8820	-	1250	3450	5000	-

***** *The values of Fr4 and N4 do not apply to FM7-A□□□-□□□□-E01.*

BALL BEARINGS. USEFUL LIFE

NOTE. The useful life of the bearings is aproximately 12000 hours of continuous operation at max. speed both for version E01 and E02.

MOUNTING METHODS KEY

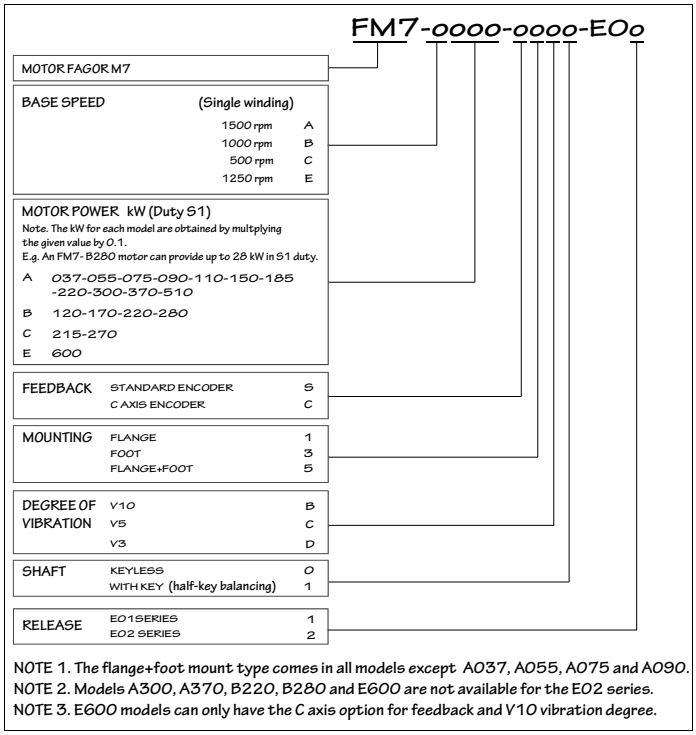


SALES MODEL

The sales model is stored in the motor encoder. The drive software can automatically adjust the motor parameters by reading that ·sales model· from the encoder memory.

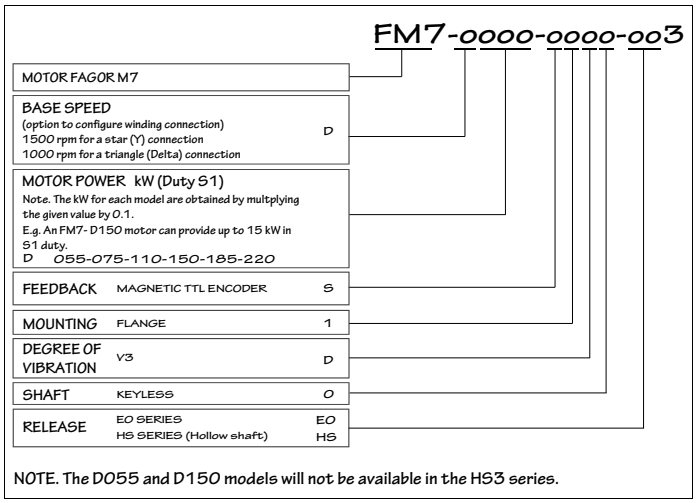
MOTOR MODEL NOMENCLATURE

FM7. E01/E02 series



NOTE 1. The flange+foot mount type comes in all models except A037, A055, A075 and A090.
NOTE 2. Models A300, A370, B220, B280 and E600 are not available for the E02 series.
NOTE 3. E600 models can only have the C axis option for feedback and V10 vibration degree.

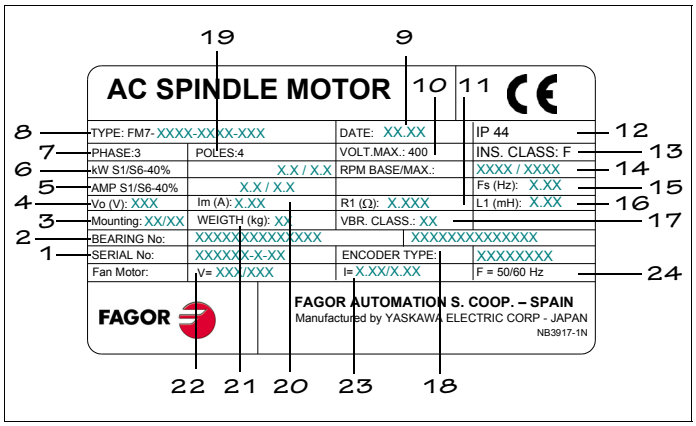
FM7. E03/HS3 series



NOTE. The D055 and D150 models will not be available in the HS3 series.

RATING PLATE DATA

The specifications label stuck on FM7 servo motors supplied by Fagor Automation S. Coop offers the necessary data to identify the motor for the user.



1	Serial number
2	Bearing number: LOAD side / FAN side
3	Mounting type
4	Voltage without load
5	Rated current in S1/S6-40%
6	Rated power in S1/S6-40%
7	Nr of phases
8	Motor model reference
9	Manufacturing year/month
10	Maximum voltage
11	Stator winding resistance per phase
12	Protection degree
13	Insulation class
14	Base speed / maximum speed
15	Slip frequency
16	Stator dispersion inductance per phase
17	Level of vibration
18	Encoder type
19	Nr of poles
20	Magnetizing current
21	Mass
22	Fan supply voltage at 50/60 Hz
23	Fan supply current at 50/60 Hz
24	Frequency of the fan supply voltage

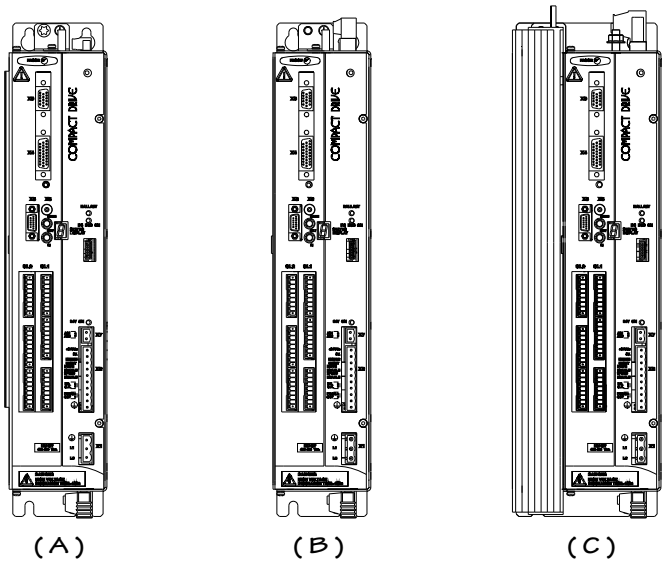
ELECTRONIC MODULES

COMPACT AXIS DRIVE MODULE. ACD

Digital module that can govern a synchronous motor in speed and position.

COMPACT SPINDLE DRIVE MODULE. SCD

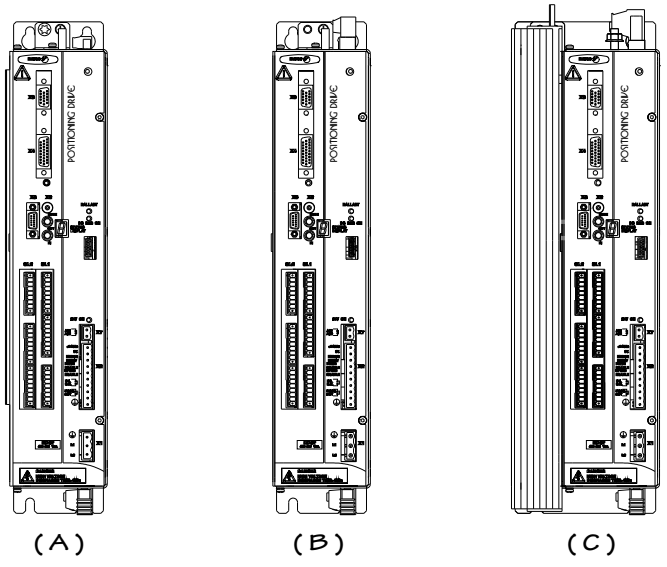
Digital module that can govern a asynchronous motor in speed and position.



A. ACD/SCD 1.08/1.15 **B.** ACD/SCD 1.25 **C.** ACD/SCD 2.35/2.50, SCD 2.75

COMPACT MOTION CONTROL. CMC

Digital module that can govern a synchronous motor in speed and position and also generate a tool path.



A. CMC 1.08/1.15 **B.** CMC 1.25 **C.** CMC 2.35/2.50

RESISTOR MODULES ER+TH-x/x & ER+TH-18/x+FAN

The resistor modules are designed for dissipating the energy excess at power bus when requiring a Ballast resistor with greater power than can be dissipated inside the power supply module.

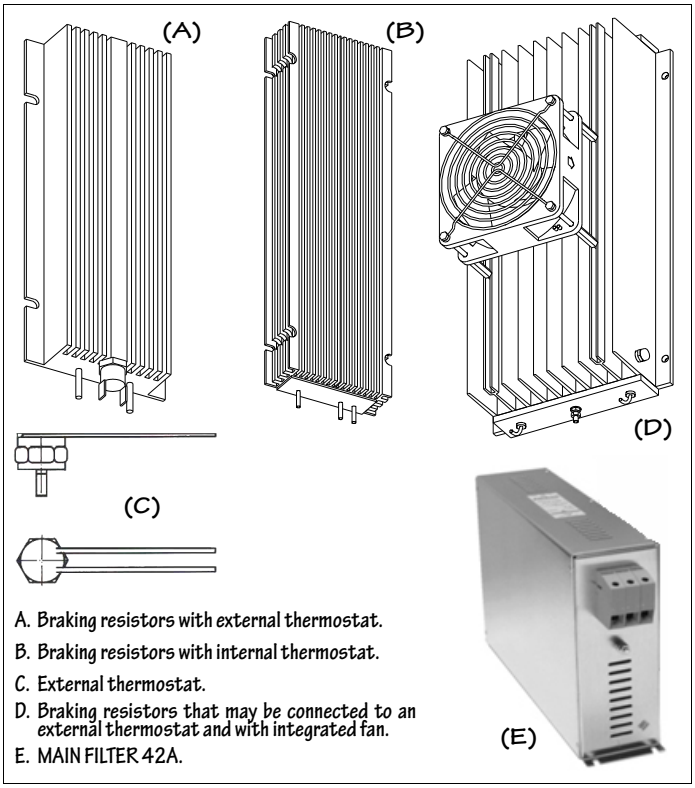
The independent resistors ER+TH-x/x are electrical resistors that can also be used with power supplies and compact drives that have a thermostat (some internal and others external). The independent resistors ER+TH-18/x+FAN are electrical resistors that can also be used with power supplies and compact drives that may be connected to an internal thermostat or carry a single-phase 220 V AC cooling fan.

ACD/SCD/CMC compact units without NR reference have a particular resistor associated with them; Fagor supplies it in an accessory bag inside the unit package and the user must install it.

This is not the case for units with NR reference for which the user must select the appropriate resistor model depending on the energy to be dissipated in the application. Therefore, the latter do not come with the resistor in the accessory bag of the unit and it must be requested separately.

MAIN FILTER 42A

Absolutely necessary for complying with the European Directive on Electromagnetic Compatibility 2004/108/EC or the International Standard IEC 1800-3. The filter ·MAIN FILTER 42A· is designed for ACD/SCD/CMC □.□□.



A. Braking resistors with external thermostat.
B. Braking resistors with internal thermostat.
C. External thermostat.
D. Braking resistors that may be connected to an external thermostat and with integrated fan.
E. MAIN FILTER 42A.

AXIS DRIVE MODULES. ACD/CMC

With internal fan	Axis drive (for synchronous motor)				
Currents (Arms) at **fc= 4 kHz**	**ACD/CMC 1.08**	**ACD/CMC 1.15**	**ACD/CMC 1.25**	**ACD/CMC 2.35**	**ACD/CMC 2.50**
Rated current (Arms)	4.0	7.5	12.5	17.5	25.0
Max. peak current for 500 ms in 10 s cycle Arms	8	15	25	35	50
Dissipat. power (W)	40	87	110	160	222

With internal fan	Axis drive (for synchronous motor)				
Currents (Arms) at **fc= 8 kHz**	**ACD/CMC 1.08**	**ACD/CMC 1.15**	**ACD/CMC 1.25**	**ACD/CMC 2.35**	**ACD/CMC 2.50**
Rated current (Arms)	4.0	7.5	9.5	17.5	20.0
Max. peak current for 500 ms in 10 s cycle Arms	8	15	19	35	40
Dissipat. power (W)	50	118	139	206	226

SPINDLE DRIVE MODULES. SCD

With internal fan	Spindle drive (for synchronous & asynchronous motors)				
Currents (Arms) at **fc= 4 kHz**	**SCD 1.15**	**SCD 1.25**	**SCD 2.35**	**SCD 2.50**	**SCD 2.75**
(*) Maximum current in any duty cycle (Arms)	10.6	17.5	28.0	38.0	52.0
Dissipat. power (W)	123	150	215	275	395

* *This current must be equal to or greater than that of the corresponding spindle motor in S6.*

With internal fan	Spindle drive (synchronous & asynchronous motors)				
Currents (Arms) at **fc= 8 kHz**	**SCD 1.15**	**SCD 1.25**	**SCD 2.35**	**SCD 2.50**	**SCD 2.75**
(*) Max. current in any duty cycle. Arms	10.6	12.5	19.5	27.0	39.0
Dissipat. power (W)	123	150	220	315	410

***** *This current must be equal to or greater than that of the corresponding spindle motor in S6.*

Note. The indicated dissipated power values for the spindles correspond to the operation at rated current in S1 mode.

Technical data

	ACD/CMC				SCD				
	1.08/15	1.25	2.35	2.50	1.15	1.25	2.35	2.50	2.75
Power supply	Three-phase 50/60 Hz mains with a voltage range between 400 -10 % and 460 +10 % V AC								
Internal power bus voltage	565/650 V DC				565/650 V DC				
Filter capacity (µF) 900 V DC	330	560	680		330	560	680		1500
Energy stored in the capacitors	0.5 C·V²								
Int.Ballast resistor (Ω) Power (W)	75 (150)	-	-	-	75 (150)	-	-	-	-
Energy pulse that can be dissipated (kWs) Pulse duration (s)	3.5 (0.40)	-	-	-	3.5 (0.40)	-	-	-	-
Ballast ON/OFF	768 / 760 V DC								
Minimum Ballast resistor (Ω)	75	24	18	18	75	24	18	18	18
Speed feedback	Encoder				Encoder				
Controlling method	PWM, AC sinewave, vector control								
Communication	Serial line to connect to a PC								
Interface	Standard analog or digital via SERCOS or CAN bus (in all models). Serial line RS-232/422 (only on CMC models).								
Status display	7 - segments display								
Speed range of analog input	1 : 8192								
Current bandwidth	800 Hz								
Speed bandwidth	100 Hz (depends on the motor/drive combination)								
Protections	Overvoltage, overcurrent, overspeed, heat-sink temperature, ambient temperature, motor temperature, Ballast temperature, hardware error, overload.								
Frequency [1]	Lower than 600 Hz								
Approx. mass in kg lb	6.0 13.2	5.8 13.7	6.1 13.4	6.1 13.4	6.0 13.2	5.8 13.7	6.1 13.4	6.1 13.4	6.1 13.4

1 Equal to or higher than 600 Hz only for commercial models **SCD ... - MDU** (dual-use).

POWER FOR INTERNAL CIRCUITS (24 V DC)	
Input voltage	Between 400-10 % and 460+10 % V AC (50/60 Hz)
Mains consumption	124.5 mA (400 V AC), 108 mA (460 V AC)
Output voltage, max.current	24 V DC (5 %), 100 mA. Connector X2, pins 1 & 2.

AMBIENT CONDITIONS AND OTHER CONDITIONS	
Ambient temperature	0°C/45°C (32°F/113°F) From 45°C (113°F) on see current derating
Storage temperature	-25°C/60°C (-13°F/140°F)
Sealing	IP 2x
Maximum humidity	< 90 % (non condensing at 45°C/113°F)
Max. installation altitude	2000 m (6561 ft) above sea level
Operating/shippingvibration	1 g / 1.5 g

EXTERNAL BALLAST RESISTOR

With external thermostat. Technical data

ER+TH-OO/OOO	43/350
Resistance	43 Ω
RMS power	300 W
Energy absorbed in 5'' overload	20 kJ
Operating ambient temperature	5°C/45°C (41°F/113°F)
Storage temperature	-20°C/60°C (-4°F/140°F)
Relative humidity	< 90 % non condensing at 45°C/113°F
Running/shipping vibration	0.5 g / 2 g
Sealing	IP 55
Mass	400 gr (1.01 lb)

WARNING. Be careful with the surface of the resistors. Remember that its temperature may reach 390°C (734°F).

ER+TH-OO/OOO	24/750	24/1100	18/1100
Resistor	24 Ω	24 Ω	18 Ω
Tolerance	± 5 %	± 5 %	± 5 %
RMS power	650 W	950 W	950 W
Energy absorbed in 5" overloaded	37 kJ	55 kJ	55 kJ
Operating room temperature	5°C/45°C (41°F/113°F)		
Storage temperature	- 20°C/60°C (- 4°F/140°F)		
Relative humidity	< 90 % non condensing at 45°C/113°F		
Operating vibration	0.5 g		
Shipping vibration	2 g		
Sealing	IP 55		
Approx. mass gr (lb)	920 (2.02)	1250 (2.75)	1250 (2.75)

WARNING. Careful with the surface of these resistors. Remember that its temperature may reach 400°C (752°F).

With internal thermostat. Technical data

ER+TH-OO/OOO	ER+TH-18/1800	ER+TH-18/2200
Resistor	18 Ω	18 Ω
Tolerance	± 5 %	± 5 %
RMS power	1300 W	2000 W
Energy absorbed in 5"	55 kJ	83 kJ
Operating room temperature	5°C/45°C (41°F/113°F)	
Storage temperature	-20°C/60°C (-4°F/140°F)	
Relative humidity	< 90 % non condensing at 45°C/113°F	
Operating vibration	0.5 g	
Shipping vibration	2 g	
Sealing	IP 54	IP 54
Approx. mass kg (lb)	3.0 (6.61)	7.0 (15.43)

WARNING. Careful with the surface of these resistors. Remember that its temperature may reach 410°C (770°F).

With internal thermostat and fan. Technical data

ER+TH-OO/OOOO+FAN	18/1000	18/1500	18/2000
Resistor	18 Ω	18 Ω	18 Ω
RMS power	2.0 kW	3.0 kW	4.0 kW
Operating room temperature	-10°C/40°C (14°F/104°F)		
Storage temperature	-20°C/60°C (-4°F/140°F)		
Relative humidity	< 90% non condensing at 45°C/113°F		
Operating vibration	0.5 g		
Shipping vibration	2 g		
Sealing	IP 20 / IP 65*		
Approx. mass kg (lb)	6.0 (13.2)	7.0 (15.4)	8.0 (17.6)

***** *To maintain a sealing protection of IP 65, the surface temperature of the resistor must not exceed 200°C/392°F.*

WARNING. Careful with the surface of these resistors. Remember that its temperature may exceed 300°C (572°F).

Thermostats associated with external ballast resistors

All external Ballast resistors currently available come with a thermostat. They are classified as:

With internal thermostat	ER+TH-18/1800, ER+TH-18/2200 ER+TH-18/1000+FAN, ER+TH-18/1500+FAN, ER+TH-18/2000+FAN
With external thermostat	ER+TH-24/750, ER+TH-24/1100, ER+TH-18/1100

Internal thermostat	
Contact person	**N**ormally **C**losed
Contact opening temperature	160°C (320°F) ±10 %
Rated voltage	250 V AC
Rated current	2 A
Wire section	0.25 mm²

External thermostat	
Protection degree	IP 20
Contact person	**N**ormally **C**losed
Contact opening temperature	200°C (392ºF) ±10 %
Rated voltage	250 V AC
Rated current	2.5 A
Wire section	0.25 mm²

OMHAGE

WARNING. When connecting an external Ballast resistor other than the one shown in the following table, make sure that its ohm value is the same as that of the internal Ballast resistor of the unit. See the technical characteristics table of the unit in **man_dds _hard.pdf** manual that indicates the associated internal resistor.

The following table indicates how combine resistors to obtain the Ohm value for each power supply.

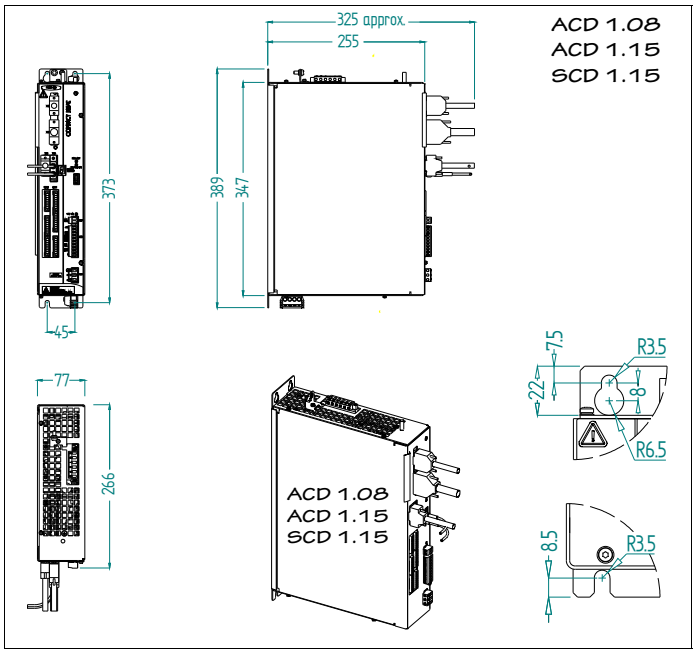
ACD 1.15	43 Ω	300 W	Internal R.
CMC 1.15	43 Ω	300 W	Internal R.
SCD 1.15	43 Ω	300 W	Internal R. or external ER+TH-43/350 (with external thermostat)
ACD 1.25	24 Ω	250 W	24Ω 550 W *
CMC 1.25	24 Ω	250 W	24Ω 550 W *
SCD 1.25	24 Ω	650 W	24Ω 750 W * with external thermostat
SCD 1.25...-NR	24 Ω	950 W	ER+TH-24/1100
ACD 2.35	18 Ω	450 W	18Ω 900W *
CMC 2.35	18 Ω	450 W	18Ω 900W *
SCD 2.35	18 Ω	1.3 kW	18Ω 1800W * with internal thermostat
SCD 2.35...-NR	18 Ω	2.0 kW	ER+TH-18/2200
		2.0 kW	ER+TH-18/1000+FAN
		3.0 kW	ER+TH-18/1500+FAN
		4.0 kW	ER+TH-18/2000+FAN
ACD 2.50	18 Ω	450 W	18Ω 900W *
CMC 2.50	18 Ω	450 W	18Ω 900W *
SCD 2.50	18 Ω	1.3 kW	18Ω 1800W * with internal thermostat
SCD 2.50...-NR	18 Ω	2.0 kW	ER+TH-18/2200
		2.0 kW	ER+TH-18/1000+FAN
		3.0 kW	ER+TH-18/1500+FAN
		4.0 kW	ER+TH-18/2000+FAN
SCD 2.75	18 Ω	3.0 kW	ER+TH-18/1500+FAN *
SCD 2.75...-NR	18 Ω	4.0 kW	ER+TH-18/2000+FAN

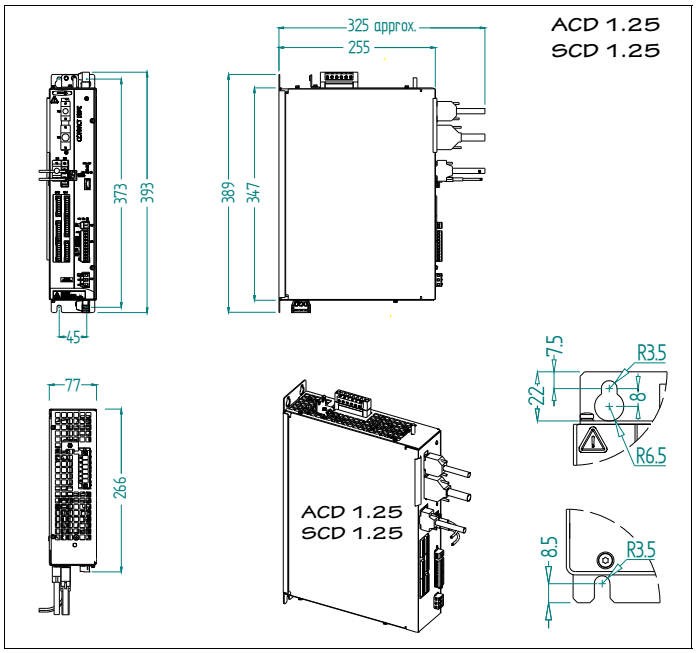
* ***FAGOR*** *supplies the resistors indicated with an asterisk (see shaded rows) as accessories with the unit. The rest of them are supplied only upon request.*

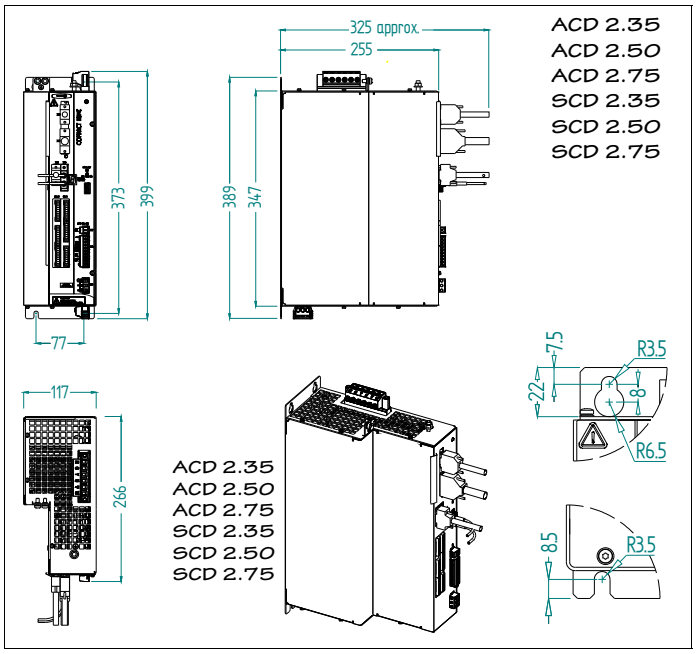
DIMENSIONS

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

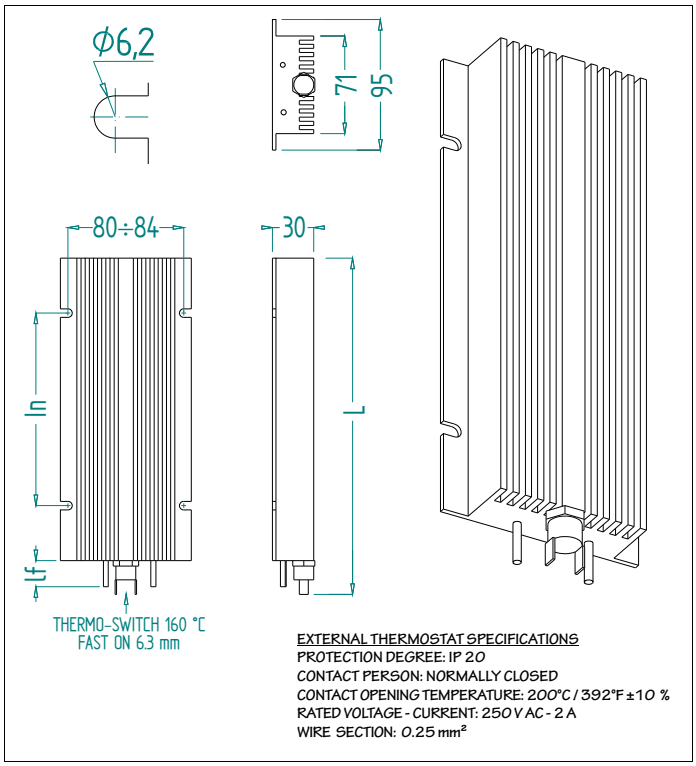
Compact drives modules







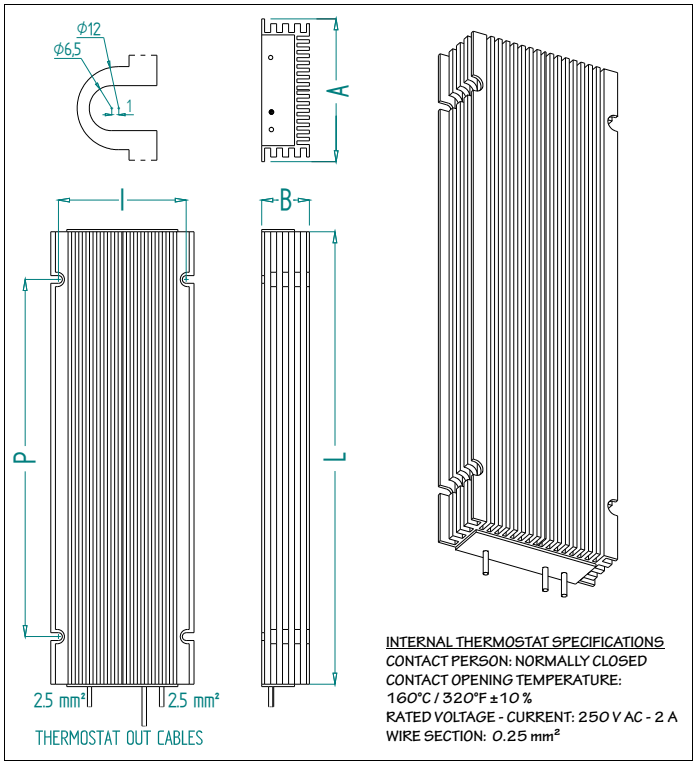
External resistors with external thermostat



EXTERNAL THERMOSTAT SPECIFICATIONS
PROTECTION DEGREE: IP 20
CONTACT PERSON: NORMALLY CLOSED
CONTACT OPENING TEMPERATURE: 200°C / 392°F ±10 %
RATED VOLTAGE - CURRENT: 250 V AC - 2 A
WIRE SECTION: 0.25 mm²

	ER+TH-43/350		ER+TH-24/750		ER+TH-24/1000 ER+TH-18/1000	
Units	mm	in	mm	in	mm	in
L	110	4.33	220	8.66	320	12.59
In	60	2.36	140	5.51	240	9.44
If	300	11.81	300	11.81	300	11.81

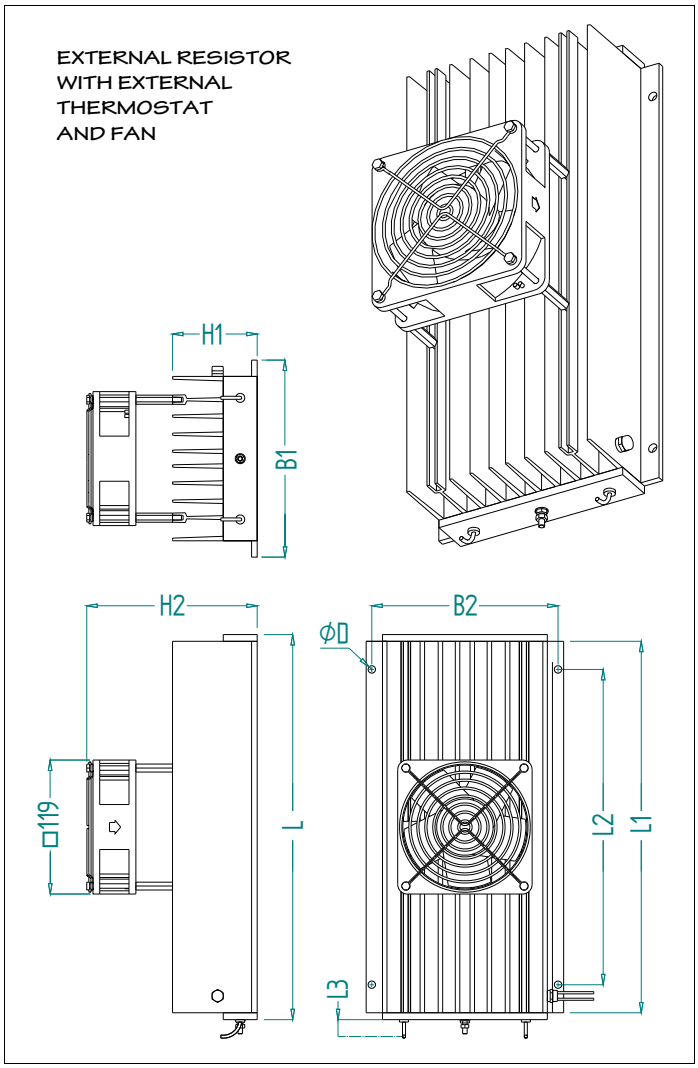
External resistor with internal thermostat



INTERNAL THERMOSTAT SPECIFICATIONS
CONTACT PERSON: NORMALLY CLOSED
CONTACT OPENING TEMPERATURE:
160°C / 320°F ±10 %
RATED VOLTAGE - CURRENT: 250 V AC - 2 A
WIRE SECTION: 0.25 mm²

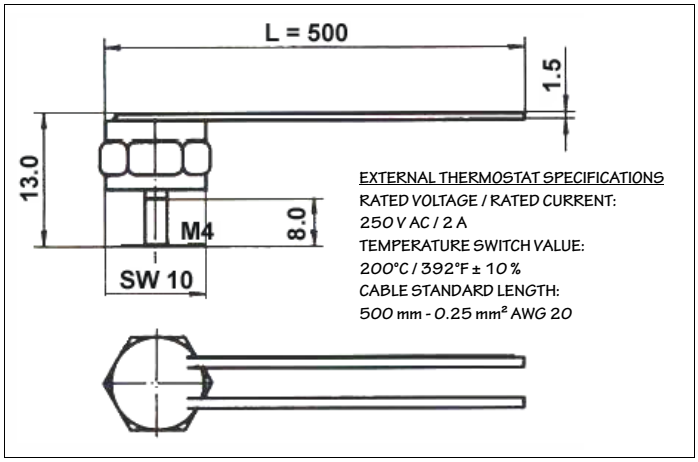
	ER+TH-18/1800		ER+TH-18/2200			
Units	mm	in	mm	in		
A	120	4.72	190	7.48		
B	40	1.57	67	2.63		
L	380	14.96	380	14.96		
I	107÷112	4.21÷4.40	177÷182	6.96÷7.16		
P	300	11.81	300	11.81		

External resistor with external thermostat and fan



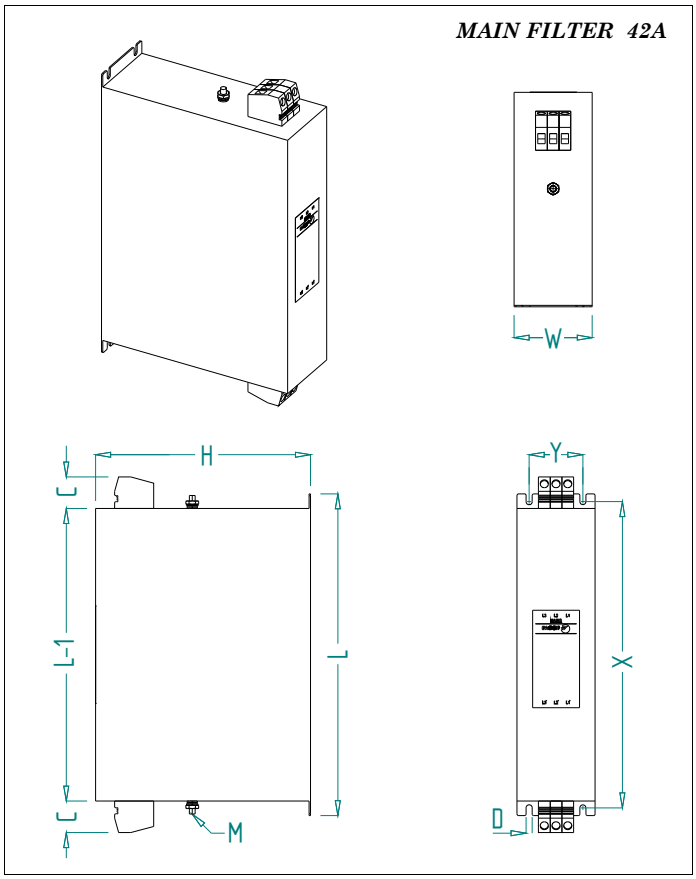
	ER+TH-18/1000+FAN		ER+TH-18/1500+FAN		ER+TH-18/2000+FAN	
Units	mm	in	mm	in	mm	in
B1	175	6.88	175	6.88	175	6.88
B2	165	6.49	165	6.49	165	6.49
H1	76	2.99	76	2.99	76	2.99
H2	154	6.06	154	6.06	154	6.06
L1	170	6.69	329	12.95	530	20.86
L2	121	4.76	280	11.02	500	19.68
L3	250	9.84	250	9.84	250	9.84
L	188	7.40	347	13.66	548	21.57
ØD	6.5	2.55	6.5	2.55	6.5	2.55

External thermostat



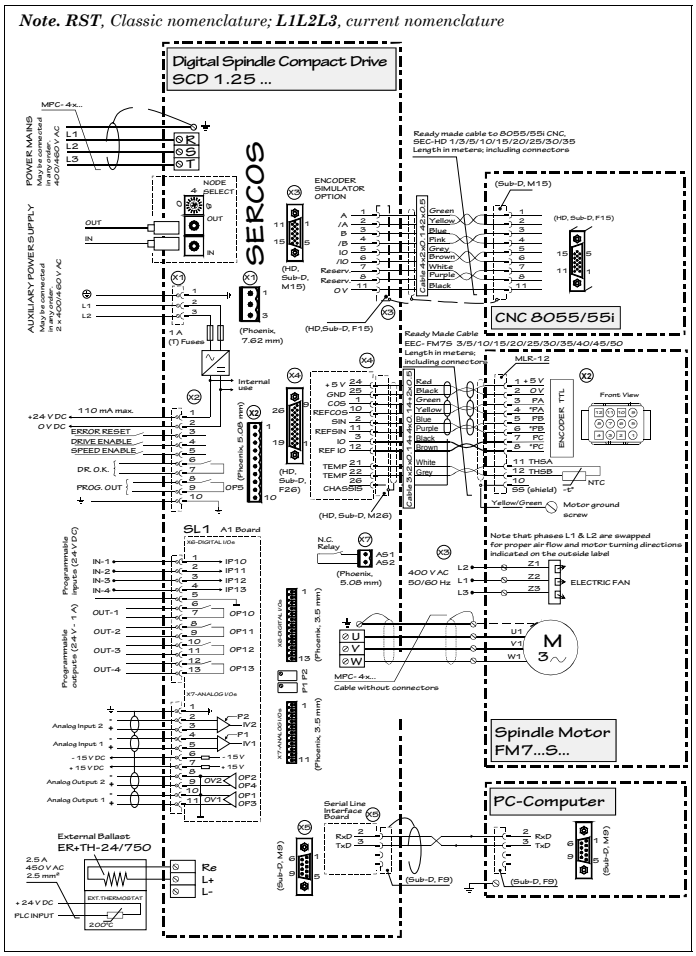
EXTERNAL THERMOSTAT SPECIFICATIONS
RATED VOLTAGE / RATED CURRENT:
250 V AC / 2 A
TEMPERATURE SWITCH VALUE:
200°C / 392°F ± 10 %
CABLE STANDARD LENGTH:
500 mm - 0.25 mm² AWG 20

Mains filter

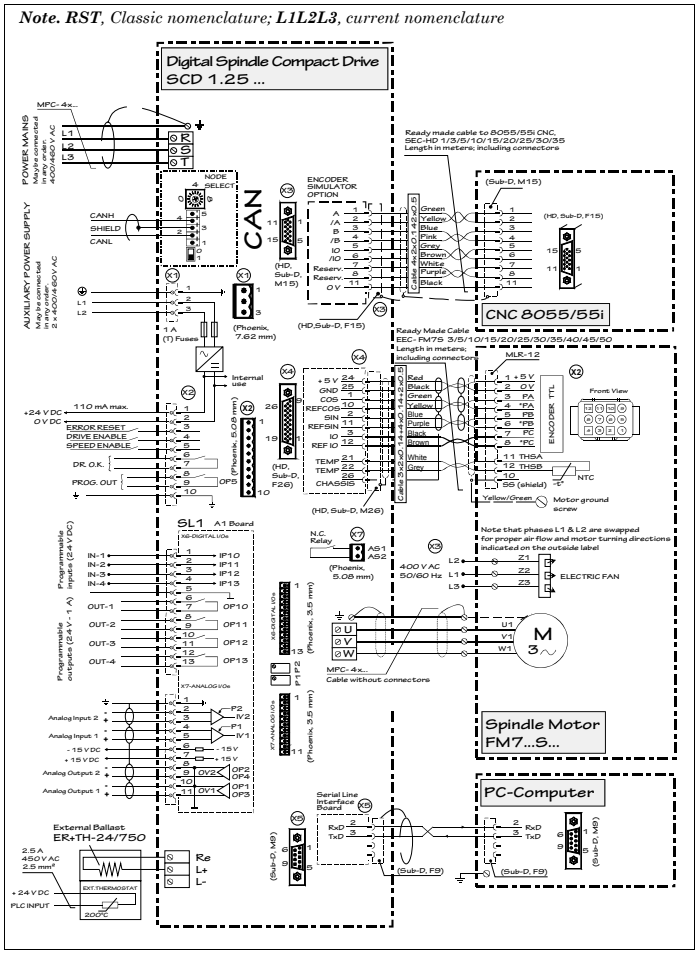


MAIN FILTER	42A					
Units	mm	in				
L	330	12.99				
L-1	300	11.81				
C	15	0.59				
W	70	2.75				
H	185	7.28				
X	314	12.36				
Y	45	1.77				
M	M6					
D	M5					

SCD 1.25 with FM7 connection. SERCOS interface



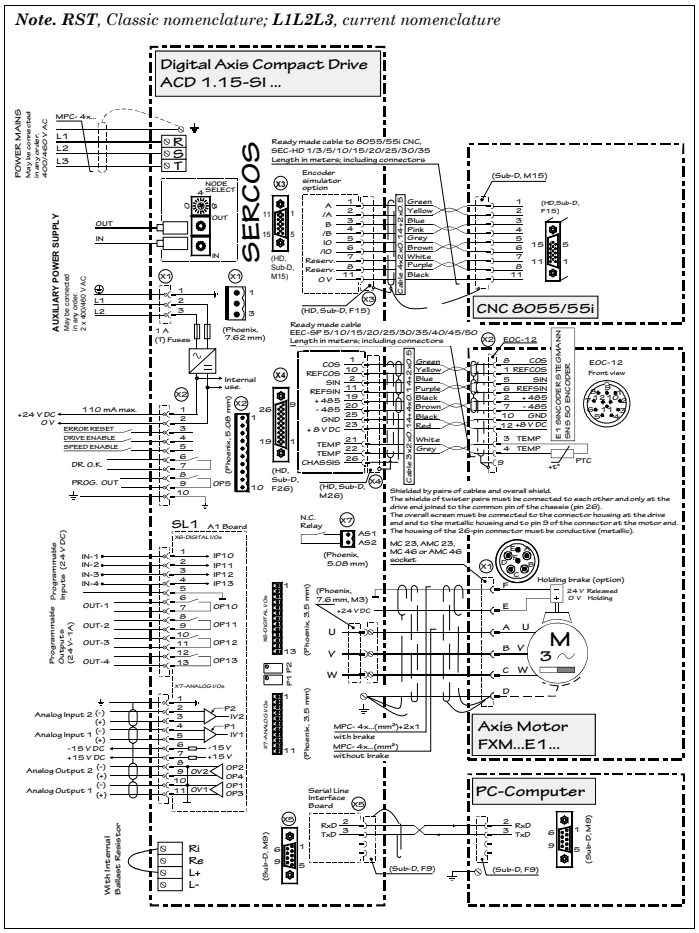
SCD 1.25 with FM7 connection. CAN interface



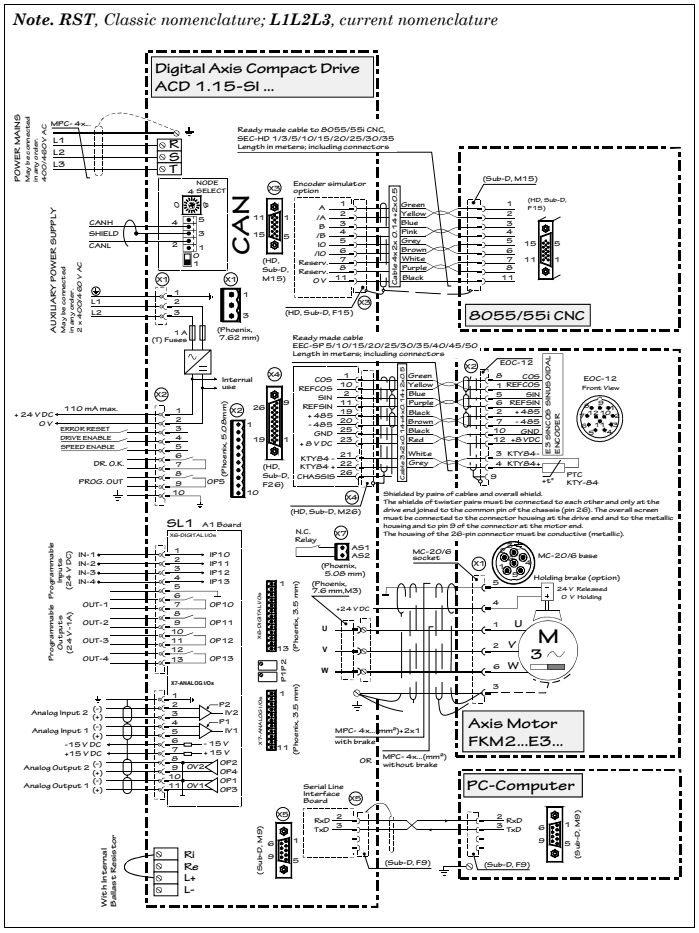
COMPACT DRIVE CONNECTORS

This is a sample diagram with all connecting options.

ACD 1.15 with FXM connection. SERCOS interface



ACD 1.15 with FKM connection. CAN interface



CONNECTORS AT SLOTS SL1 AND SL2

Card A1

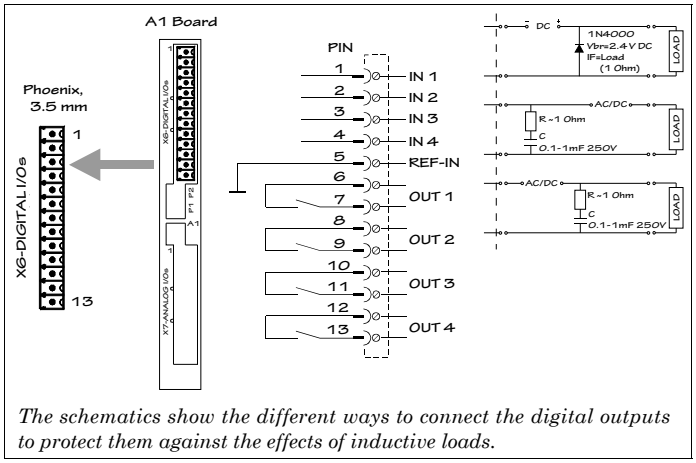
The A1 Card must always be in slot SL1.

X6-DIGITAL I/Os, digital inputs and outputs

If offers 4 digital inputs and 4 digital outputs, all of them fully programmable.

The digital inputs are optocoupled and referred to a common point (pin 5). The digital outputs are contact type and also optocoupled.

Each input and output is associated with a parameter. The user may assign to these parameters, internal Boolean type variables that may be used to show the system status via electrical contacts.



The schematics show the different ways to connect the digital outputs to protect them against the effects of inductive loads.

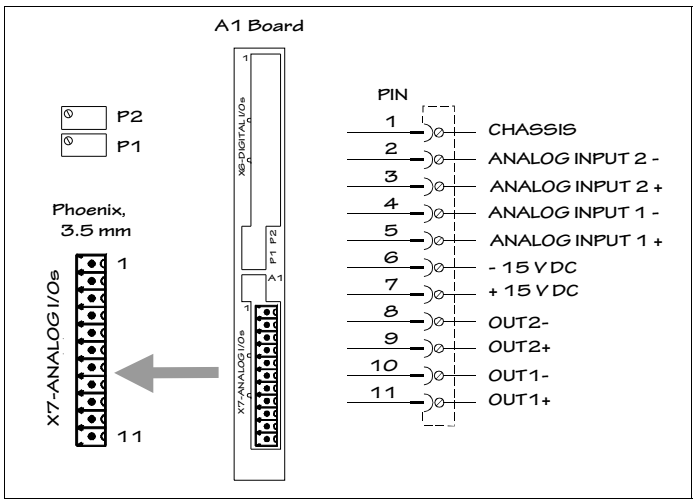
Digital inputs characteristics	
Nominal voltage (maximum)	24 V DC (36 V DC)
Turn ON/OFF input voltage	18 V DC (5 V DC)
Typical consumption (maximum)	5 mA (7 mA)

Digital outputs characteristics	
Maximum voltage	250 V
Maximum load current (peak)	150 mA (500 mA)
Maximum internal resistance	24 Ω
Galvanic isolation voltage	3750 V (1 min)

X7-ANALOG I/Os, analog inputs and outputs

It offers 2 inputs and 2 outputs, all of them fully programmable.

Each input and output is associated with a parameter.



Analog inputs characteristics		
Resolution		1.22 mV
Input voltage range		± 10 V DC
Input overvoltage	Continuous mode	80 V DC
	Transients	250 V DC
Input impedance	With respect to GND	40 kΩ
	Between both inputs	80 kΩ
Voltage in common mode		20 V DC

Analog outputs characteristics	
Resolution	4.88 mV
Voltage range	± 10 V DC
Maximum current	± 15 mA
Impedance (respect to GND)	112 Ω

Cards 8DI-16DO and 16DI-8DO

These cards may be located in slot SL1 and/or SL2.

8DI-16DO offers to the user 8 digital inputs and 16 outputs.

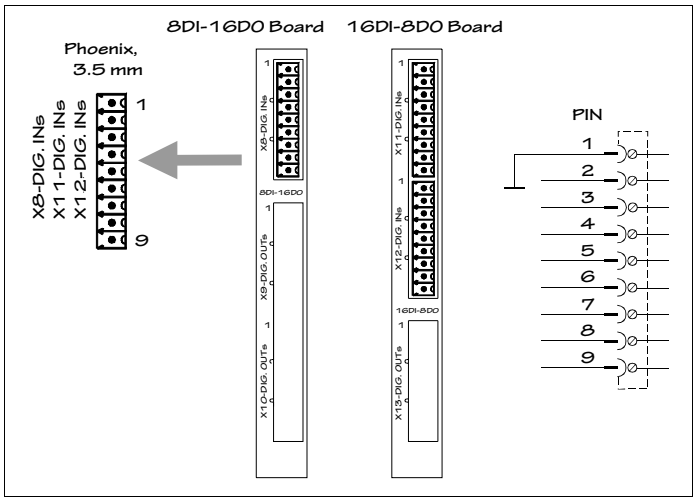
16DI-8DO offers to the user 16 digital inputs and 8 outputs.

X8-DIG.INs, X11-DIG.INs, X12-DIG.INs, digital inputs

They offer 8 fully programmable digital inputs.

The digital inputs are optocoupled and referred to a common point (pin 1) and they admit digital signals at 24 V DC.

Each input is associated with a PLC resource.



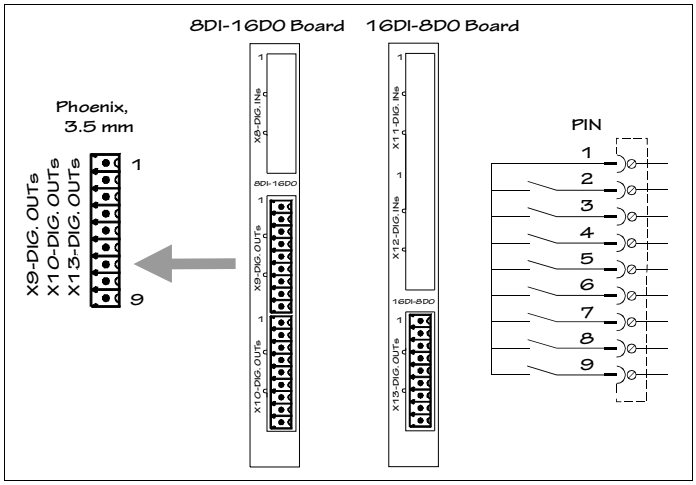
Digital inputs characteristics configured at 24 V DC	
Nominal voltage (maximum)	24 V DC (40 V DC)
ON/OFF voltage	12 V DC (6 V DC)
Typical consumption (maximum)	5 mA (7 mA)

X9-DIG.OUTs, X10-DIG.OUTs, X12-DIG.OUTs. digital outputs

They offer 8 fully programmable digital outputs.

These outputs are optocoupled and of the contact type referred to a common point (pin 1).

Each output is associated with a PLC resource.



Digital outputs characteristics	
Maximum voltage	250 V
Maximum load current	150 mA
Current auto-supply	200 mA
Maximum internal resistance	20 Ω
Galvanic isolation voltage	3750 V (1 min)

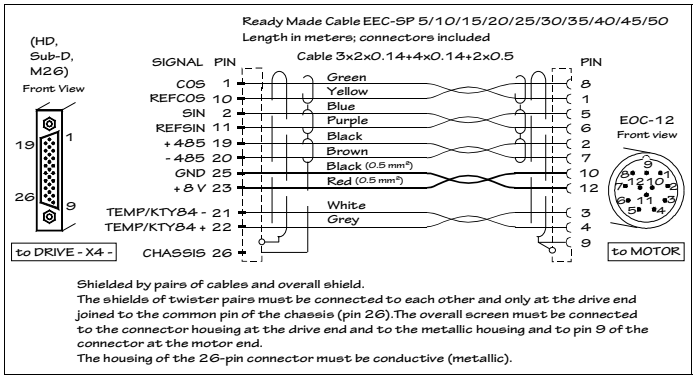
CONNECTING THE MOTOR FEEDBACK TO THE DRIVE

Use the cable with connectors supplied by FAGOR to lead the motor feedback to connector X4 of the drive module. The motor feedback is an encoder.

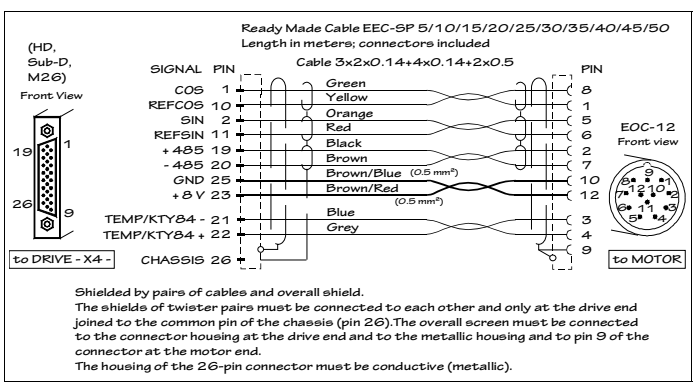
INFORMATION. Note that both type I and II mentioned next are the same. Their only difference is the color of the wires because they are from different manufacturers. When referring to the cable hose, it means the cable without connector shown on the connection diagrams. The user must verify which one matches his cable by looking at these diagrams.

ENCODER CABLES WITH FXM/FKM SYNCHRONOUS SERVO MOTORS

EEC-SP, encoder connection. I type

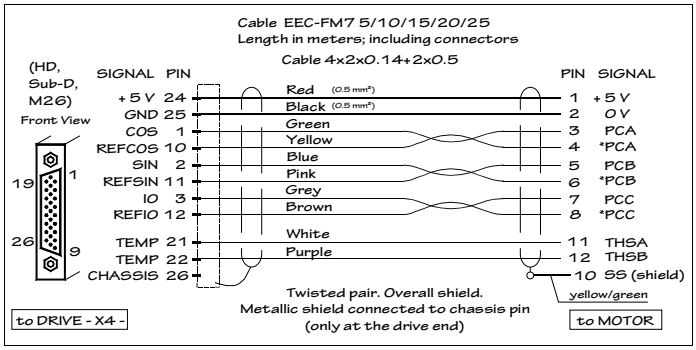


EEC-SP, encoder connection. II type

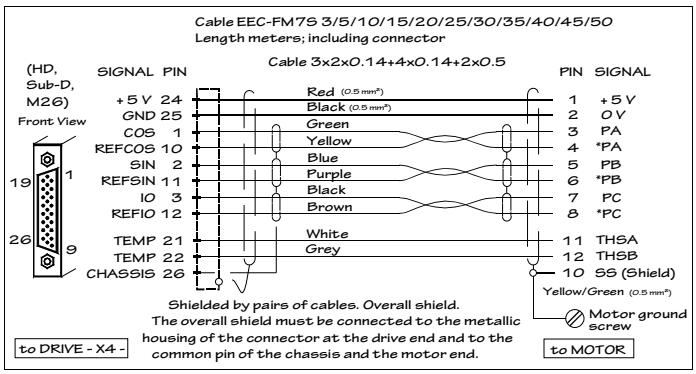


ENCODER CABLES WITH FM7 ASYNCHRONOUS MOTORS

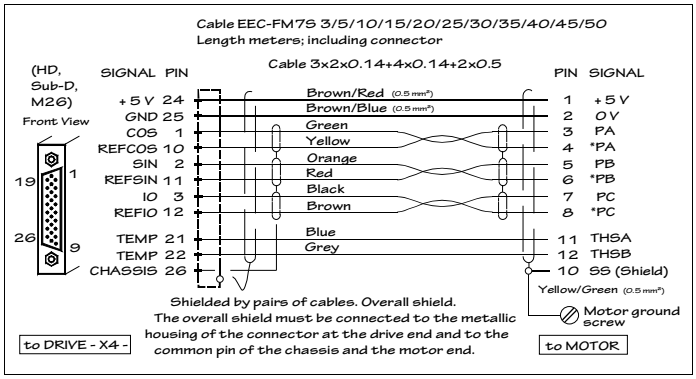
EEC-FM7, standard TTL encoder connection



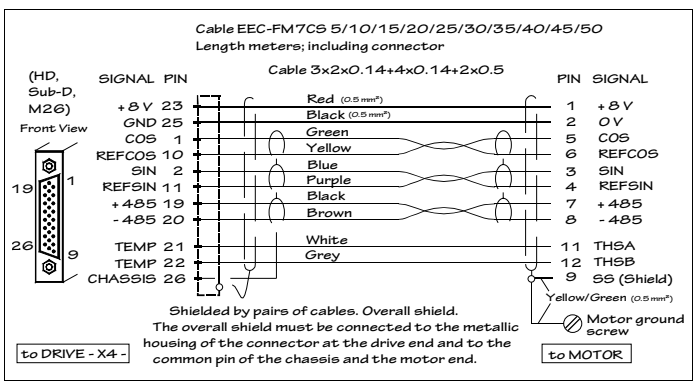
EEC-FM7S, standard TTL encoder connection. I type



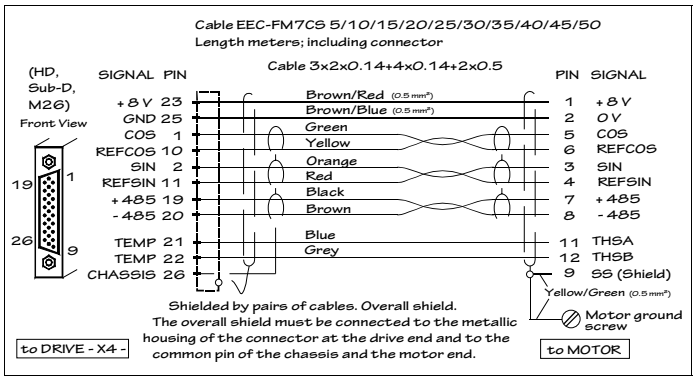
EEC-FM7S, standard TTL encoder connection. II type



EEC-FM7CS, Sincos encoder of the C axis connection. I type



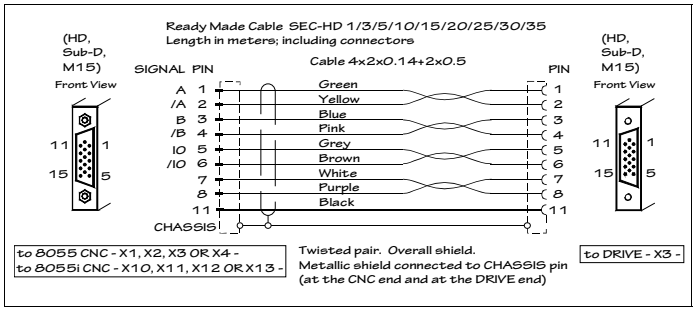
EEC-FM7CS, Sincos encoder of the C axis connection. II type



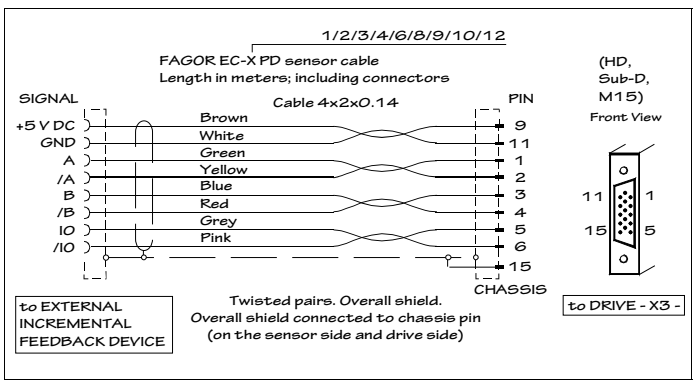
CONTROL AND COMMUNICATION SIGNALS

Connect the encoder simulator signal to the CNC.

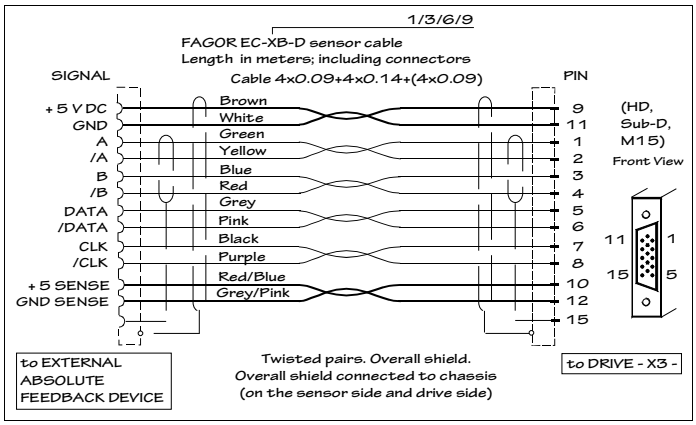
SEC-HD, encoder simulator connection



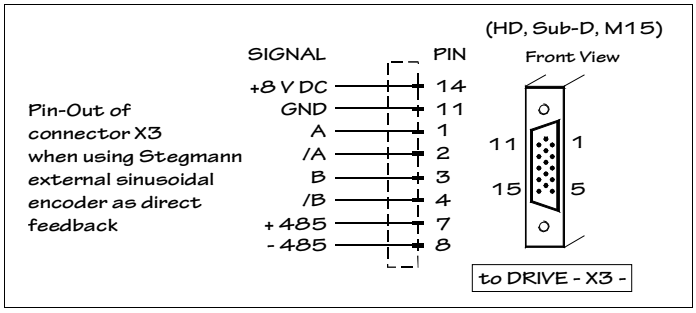
EC-□ PD, direct feedback with external incremental linear or rotary encoder (1 Vpp or diferential TTL)



EC-□B-D, direct feedback with external absolute linear encoder (1 Vpp or diferential TTL)



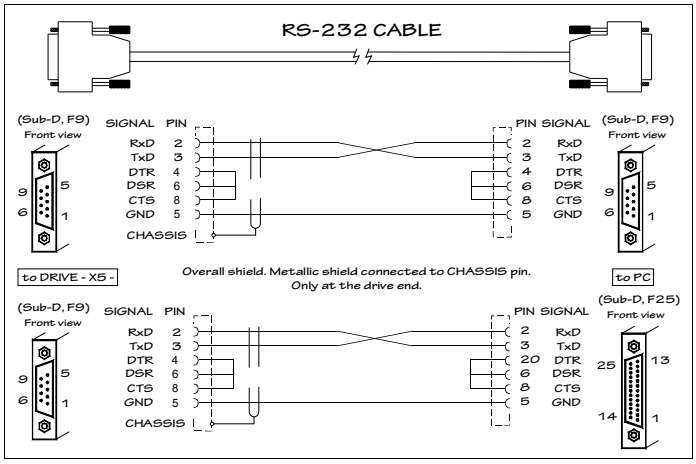
Direct feedback Stegmann sinusoidal encoder



RS-232 SERIAL LINE. X5 CONNECTOR

RS-232 serial line cable to a PC

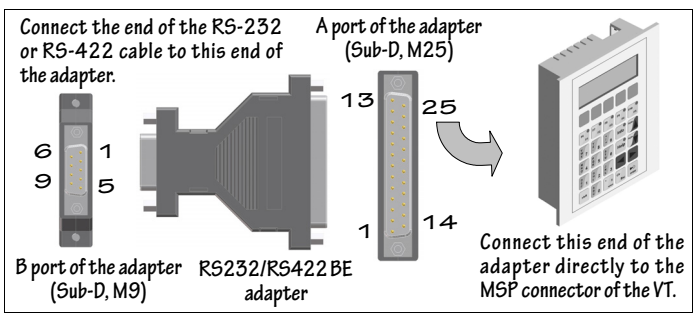
To transfer the parameter table and setup the system, the drive must be connected to a PC-compatible computer through a serial line RS-232.



RS232/RS422 BE adapter

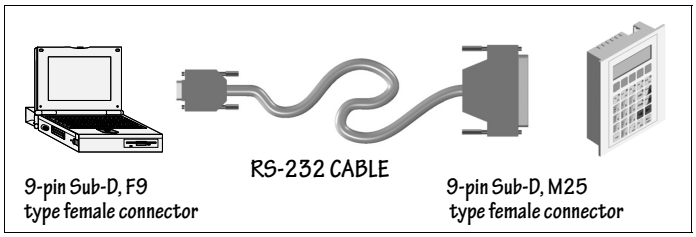
Some connections will mention the adapter “RS232/RS422 BE”, thus being necessary to describe it and its pinout at both ends.

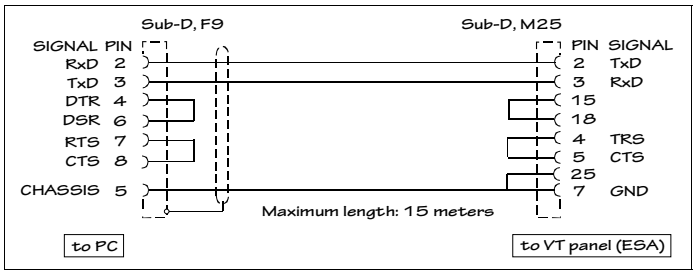
Note. Remember that the user is free to use it or not. However, using it would make the connection a lot easier.



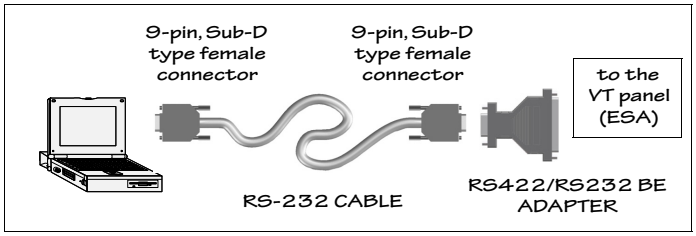
RS-232 serial line between PC and VT (without adapter)

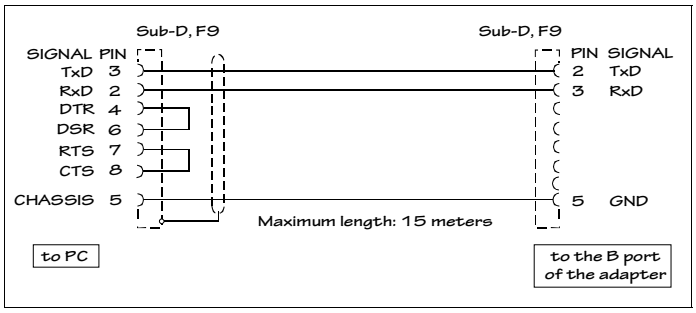
The VT-PC connection is essential for transferring the communication driver and the proyect.





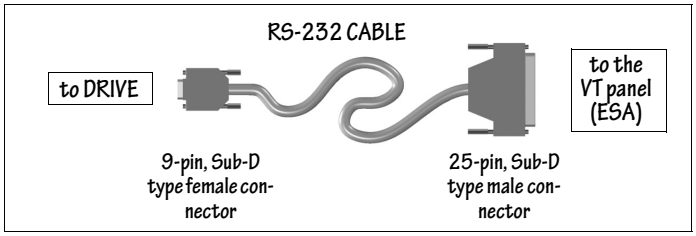
RS-232 serial line between PC and VT (with adapter)



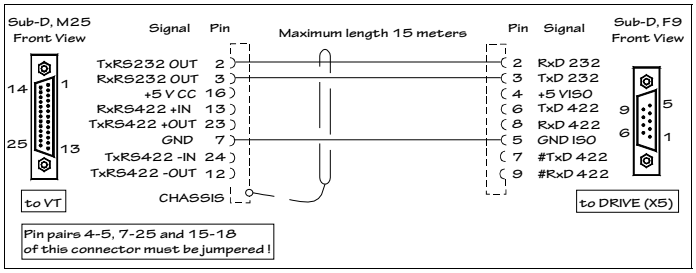


RS-232 serial line between VT and Drive

It will then be possible to manage and control the various process applications from the VT.



Note. The “RS232/RS422 BE” adapter is not required in any case.

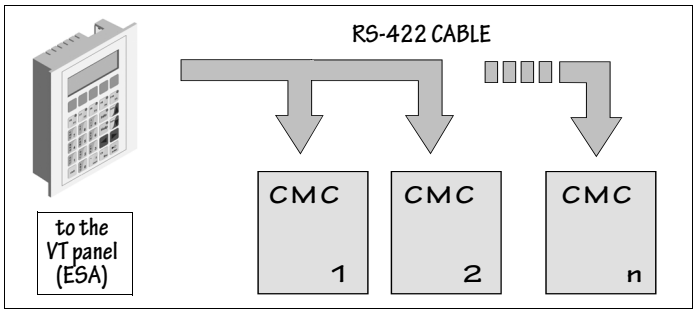


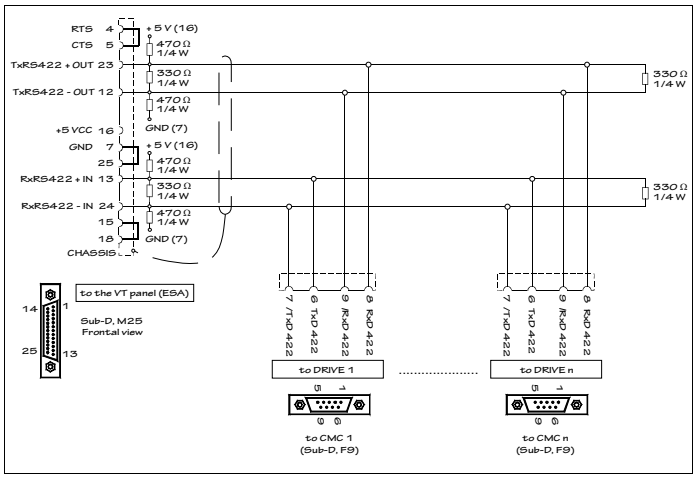
RS-422 SERIAL LINE. X6 CONNECTOR

Note. In this section, when mentioning drives, it means **only** the CMC models of the FAGOR catalog. This connection must be used when using ModBus communications protocol between an ESA VT panel and several CMC modules.

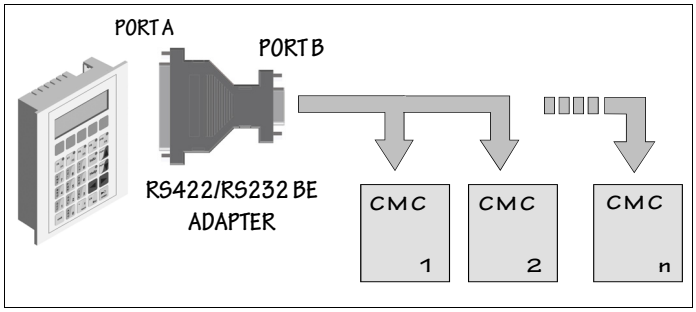
Once the project has been transferred from the PC to the VT, the VT may now be connected with several drives. This connection may be made either by connecting directly as described next or through the "RS232/RS422 BE" adapter that will make the connection a lot easier for the user. In either case, communication must be established through the MSP serial port of the VT (port A when using the adapter) and the RS-232/422 serial port (B port when using the adapter) of each drive.

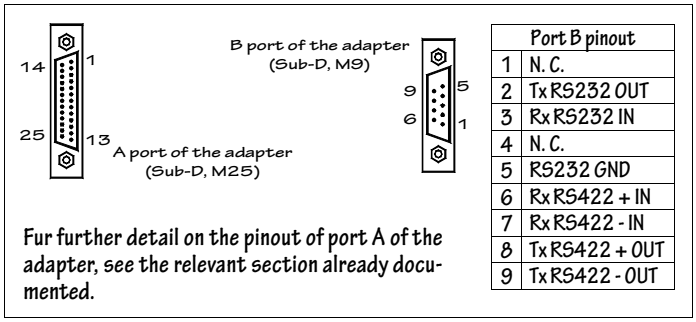
VT and CMC connection through RS-422 cable (without adapter)



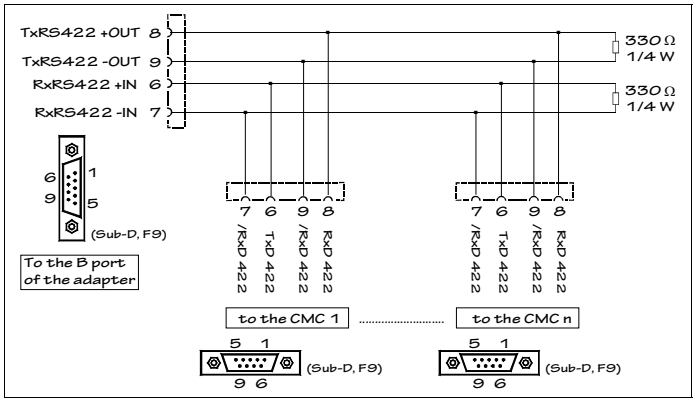


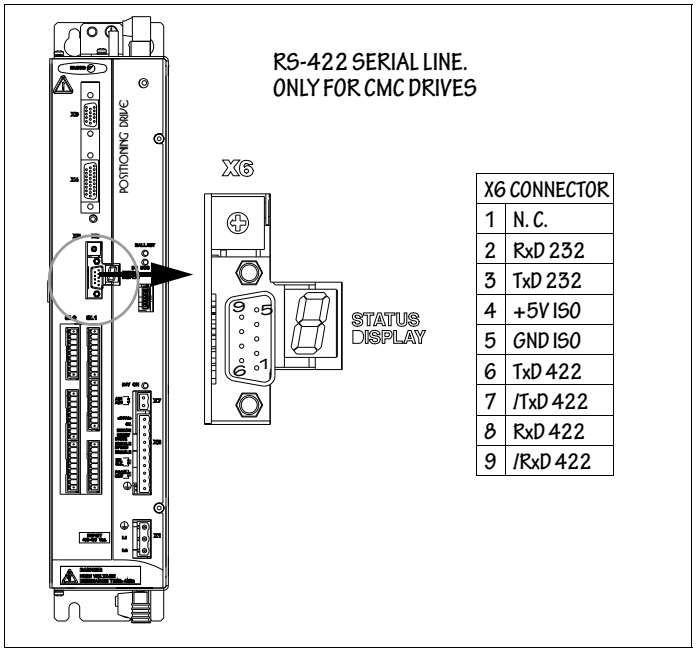
VT and CMC connection through RS-422 cable (with adapter)





Port B pinout	
1	N. C.
2	Tx RS232 OUT
3	Rx RS232 IN
4	N. C.
5	RS232 GND
6	Rx RS422 + IN
7	Rx RS422 - IN
8	Tx RS422 + OUT
9	Tx RS422 - OUT





X6 CONNECTOR	
1	N. C.
2	RxD 232
3	TxD 232
4	+5V ISO
5	GND ISO
6	TxD 422
7	/TxD 422
8	RxD 422
9	/RxD 422

INFORMATION. Any CMC drive may be configured with an RS-232 serial line and SERCOS or CAN interface or with an RS-422 serial line.

RS-232 MODE. To establish serial communication via RS-232 between a VT or a PC and the drive, the arrow of the rotary switch of the drive module musy be pointing at the 0 identifier.

RS-422 MODE. To establish serial communication via RS-422 between a VT or a PC and the CMC drive, the arrow of the rotary switch of the drive module musy be pointing at an identifier other than 0. When having several drives, assign the identifying node using the rotary switch. A reset is required to validate any node number change at the rotary switch.

SERCOS RING CONNECTION

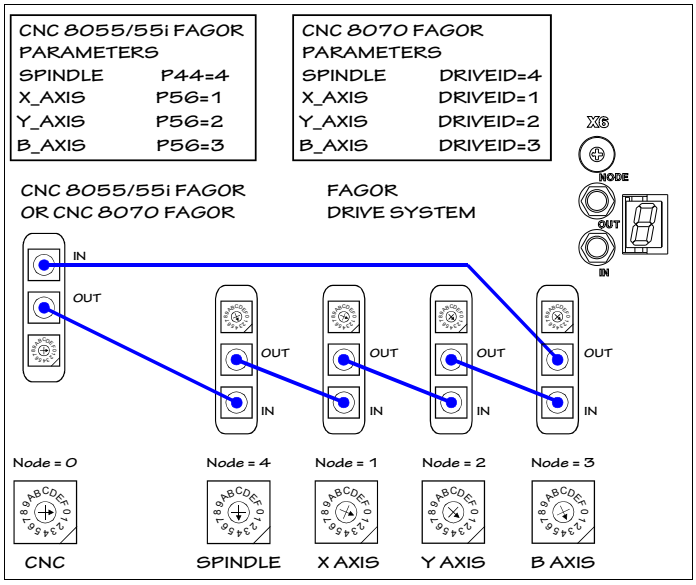
Interconnection

Connect in the SERCOS ring all the drives that will be governed by the CNC.

- With each fiber optic line, connect the OUT terminal of the first drive with the IN terminal of the next adjacent drive.
- Repeat this procedure with the second drive and so on up to the last drive.
- Connect the OUT terminal of the last drive with the IN terminal of the CNC.
- Connect the IN terminal of the first drive with the OUT terminal of the CNC.

When all these connections have been made, the ring will be closed.

Note. Remember that each drive has a fiber optic line to connect it to the adjacent module. FAGOR supplies the rest of the optical fiber upon request.

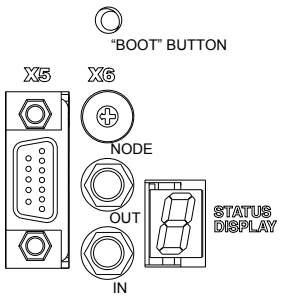


WARNING. The bending radius of the fiber optic cable must be more than 30 mm (SFO-x & SFO-FLEX-x) or 60 mm (SFO-V-FLEX-x).

Transmission speed selection

From version 06.05 on, the drive will have a SERCOS board capable of transmitting data at 2, 4, 8 or 16 MBd.

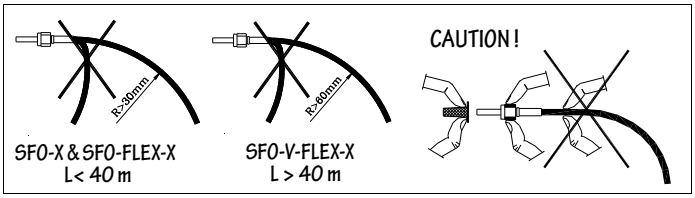
The communication speed between the drives that will be governed by the CNC in the SERCOS ring is selected by hardware using the "BOOT" button located over the connector of the SERCOS board.



Note. This board will not be compatible with software versions older than 06.05.

FAGOR supplies the fiber optic cable with its terminals protected with a hood. Remove the terminal protecting hood before connecting the cable.

Either to remove the terminal protecting hood or to connect and disconnect the cable, the cable must always be held by the terminal, never pull at the cable because it could get damaged.



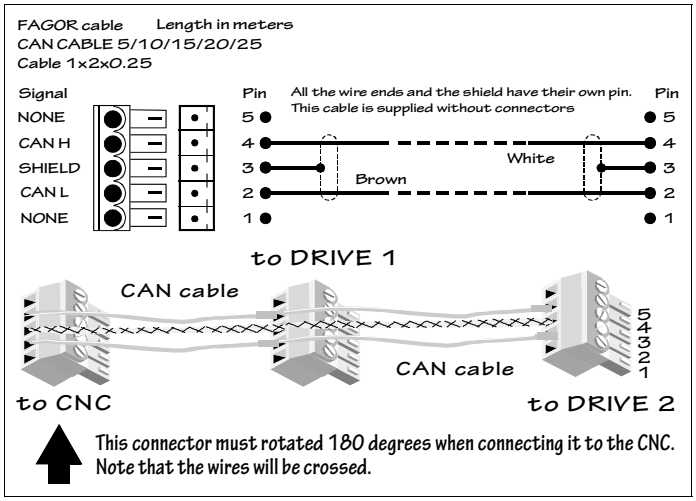
CAN BUS CONNECTION

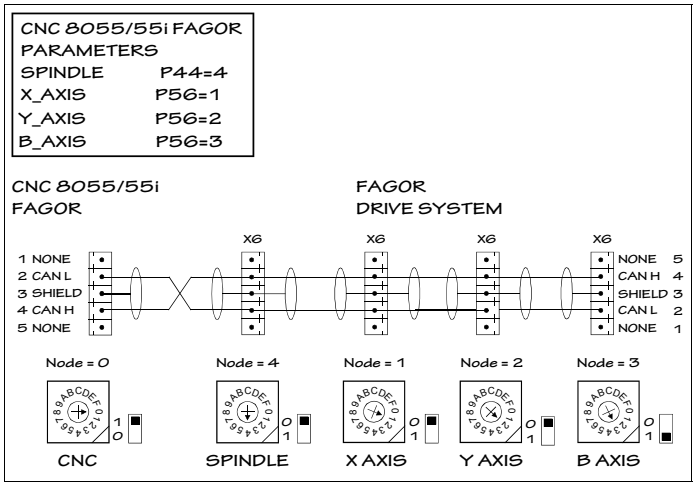
Interconnection

Connect in the CAN field bus all the drives that will be governed by the CNC.

- Use the CAN cable to connect the first drive to the adjacent one (it will be the second drive) through their X6 connectors.
- Repeat this procedure with the second drive and its adjacent drive and so on up to the last drive.
- Use a CAN cable to connect the X6 connector of the first drive to the CAN connector of the CNC model being used.

Note. Note that the CAN cable is supplied without connectors! Before connecting it, put the cable and connectors together as indicated in figure.





Note. No more than six drive modules (axes+spindles) can be connected in the CAN bus.

WARNING. The bending radius of the CAN cable must always be more than 50 mm.

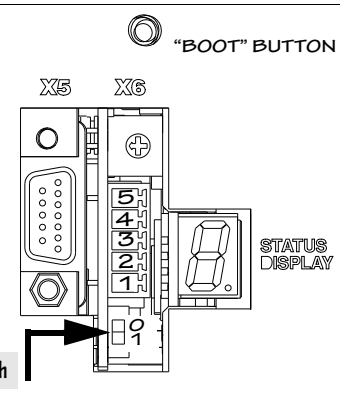
Terminating resistor

After connecting the modules, make sure that the elements at each end connected to the bus have the terminating resistor activated; i.e. the terminal resistor switch (under the CAN connector) of the last drive (usually the one farthest away from the CNC) is set to 1 (switch down) and the rest of the drives with the terminal resistor set to 0 (switch up).The CNC (or the ESA panel), located at the end of the bus always has this resistor activated.

Transmission speed selection

From version 07.02 on, the drive may have a CAN board capable of transmitting data at 1 MBd, 800 kBd or 500 kBd.

The communication speed between all the drives being governed by the CNC in the CAN bus is selected by hardware using the "BOOT" button on top of the CAN board connector.



ELECTRICAL INSTALLATION

MOUNTING CONDITIONS

- The servodrive system must be mounted vertically in the electrical cabinet with the power connectors on top.
- The equipment should be installed so as to leave at least 80 mm (3.15 in) above and below it.
- The temperature around the equipment should always be under 55°C/131°F. Vibration should be avoided.
- When applying external cooling to the system, make sure that water condensation does not fall on the equipment.
- Never install the servodrive system in places where there are corrosive gases.
- The ER+TH-x/x and ER+TH-18/x+FAN modules should be mounted away from the rest of the heat sensitive modules and materials. We recommend the upright position with the cables down (ideal case), but the horizontal position is also acceptable (although with lower dissipation). Never position it in the upright with the cables up.

ELECTRICAL INTERCONNECTION OF THE SERVODRIVE SYSTEM

See electrical drawings.

- Connect the ground connection

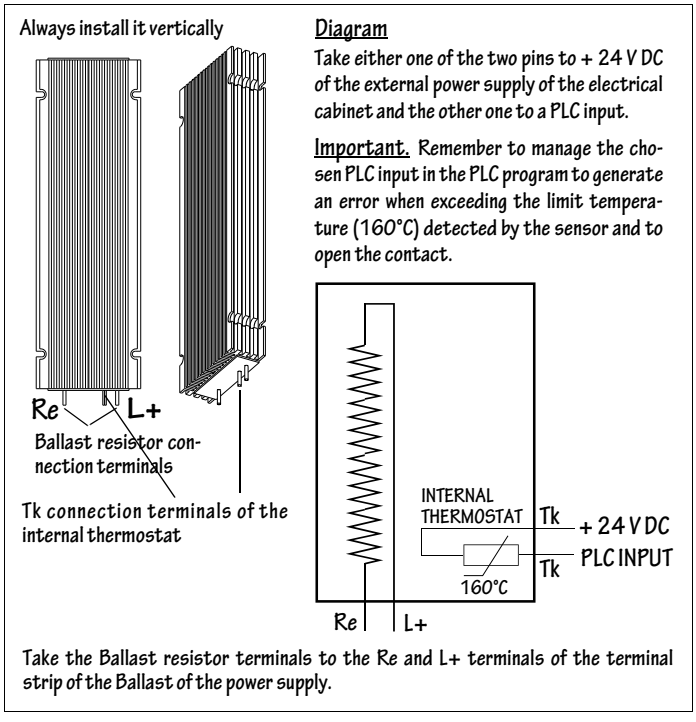
  Tightening torque 2.3 ÷ 2.8 Nm
- Connect the internal Bus X1
- For connecting an external Ballast resistor, RM-15 (discontinued), ER+TH-x/x or ER+TH-18/x+FAN

  Remove the wire joining Ri and L+ and connect the module between Re and L+ terminals. Never connect an external resistor in parallel with the internal Ballast resistor.

EXTERNAL BALLAST RESISTOR

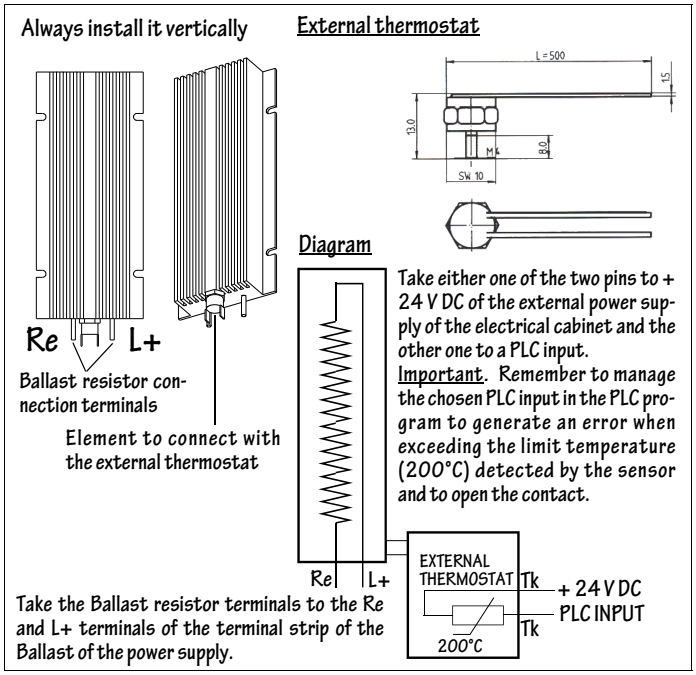
How to install an external Ballast resistor with internal thermostat and with no fan

WARNING. On top of the ER+TH modules, the air temperature can reach values over 120°C (248°F). Therefore, the resistor should be mounted away from the rest of the modules or even outside the electrical cabinet, always vertically and away from cables and other temperature sensitive material.



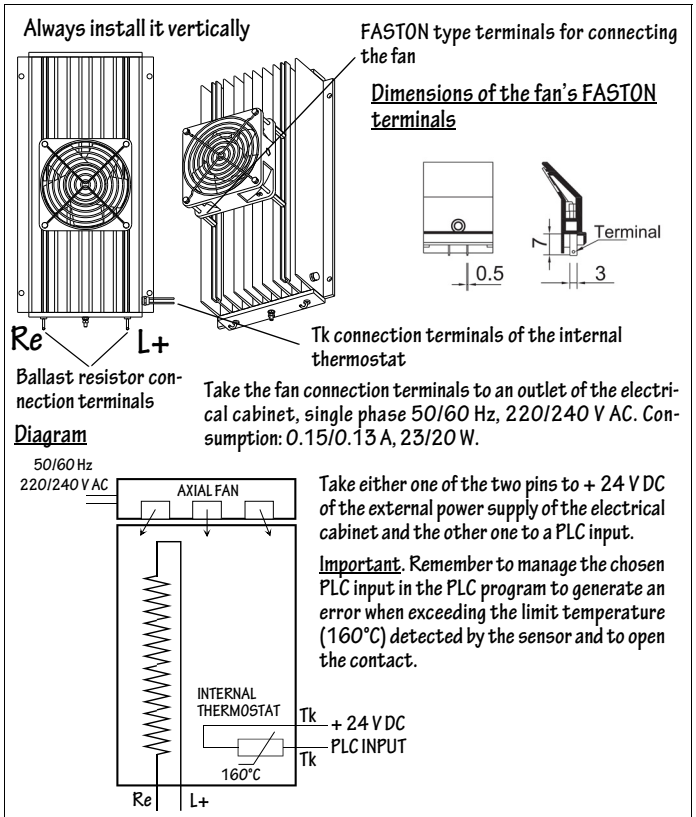
How to install an external Ballast resistor with an external thermostat and with no fan

WARNING. On top of the ER+TH modules, the air temperature can reach values over 120°C (248°F). Therefore, the resistor should be mounted away from the rest of the modules or even outside the electrical cabinet, always vertically and away from cables and other temperature sensitive material.



How to install an external Ballast resistor with internal thermostat and fan

WARNING. Therefore, the resistor should be mounted away from the rest of the modules or even outside the electrical cabinet, always vertically and away from cables and other temperature sensitive material.



MOTOR DRIVE CONNECTIONS

Power connections

Connect the power cable MPC. Connect terminal U of the drive with the terminal corresponding ti the U phase of the motor. Same as terminals V-V, W-W, and PE-PE terminal of the drive and NOT to that of the motor.

Feedback connections

Motor feedback connection

Connect the encoder cable (EEC-SP, EEC-FM7, EEC-FM7S, EEC-FM7CS), accordingly to take the feedback from the motor to the drive.

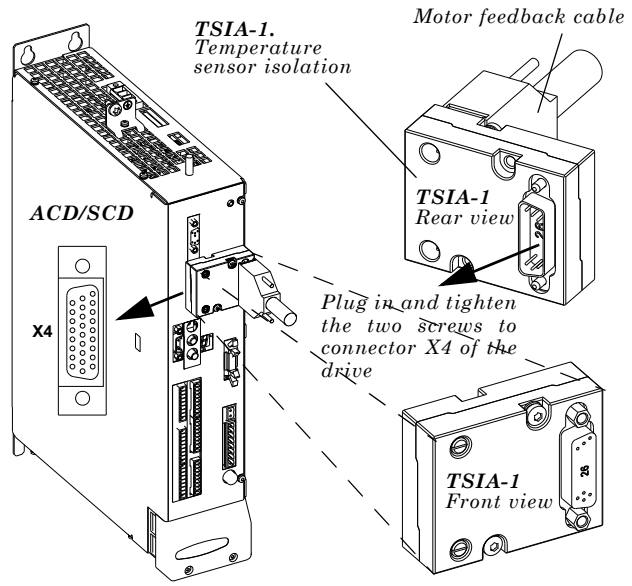
It is connected directly through the feedback cable between the feedback connector of the motor and connector X4 of the drive module as long as the isolation level required by FAGOR is guaranteed between the motor temperature sensor and the power circuit of the drive.

WARNING. FAGOR uses isolation systems between the temperature sensors and the winding of their motors ensuring long life to the motor-drive system regardless of wiring lengths. When installing non-FAGOR motors, since it cannot be guaranteed that the existing isolation will comply with FAGOR standards, we recommend installing the isolation adapter TSIA-1.

Note that installing the temperature sensor isolation adapter TSIA-1 means getting galvanic isolation between the temperature sensor of the motor and the drive itself.

INFORMATION. Note that the isolation adapter TSIA-1 does not check the encoder signals or the temperature sensor of the motor. It only provides galvanic isolation of the temperature sensor.

TEMPERATURE SENSOR ISOLATION ADAPTER: **TSIA-1**



*Note. The pinout of the temperature sensor isolation adapter **TSIA-1** is the same as that of connector X4 of the drive's motor feedback.*

Direct feedback connection or encoder simulator connection

Connect the SEC-HD cable to take the encoder simulation from the drive to the CNC, or connect the EC-☐ PD or EC-☐B-D cable to take the feedback from the sensor to the drive.

CABLING OF THE SYSTEM TO MAINS

Mains connection

The FAGOR DDS compact drive system is designed to be connected to TN type three-phase mains with values within the voltage range between 400 V AC -10 % and 460 V AC +10 % and a mains frequency of 50/60 Hz.

Connecting it to a different voltage range requires the use of transformers or auto-transformers.

The connection may vary depending on the type of mains and electromagnetic compatibility required by the machine.

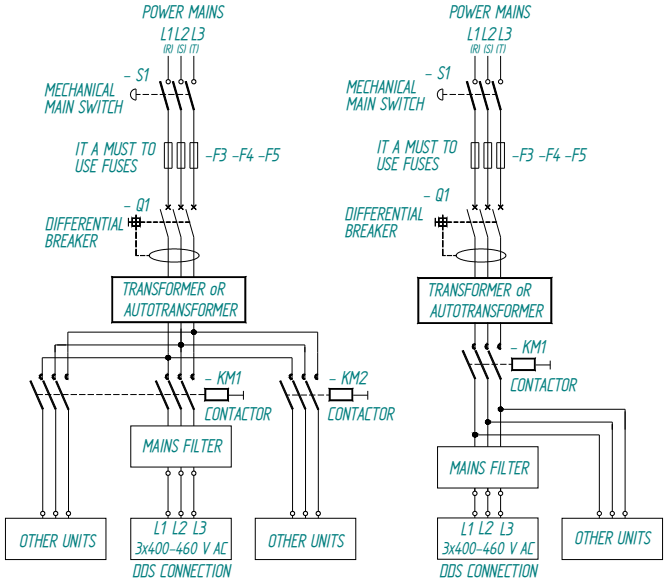
MANDATORY. Never connect other components (motors, inductive components, etc.) in parallel with the drive system. They may cause the system to perform poorly when stopping the machine. The equipment to be connected together with the DDS system must be powered through a second contactor or through auxiliary contacts of the drive's contactor.

INFORMATION. The mains filter may be installed either before or after the power switch - **KM1**.

Certain mandatory protection devices must be added to the mains lines. Others are optional.

*Note. **RST**, Classic nomenclature; **L1L2L3**, current nomenclature*

MAINS CONNECTION (TN TYPE)



*Note. The mains filter may be installed indistinctly before or after the power switch **-KM1**.*

Protection fuses

The DDS system does not include the fuses.

WARNING. The protect the DDS system fuses must be includes on the lines coming from mains.

WARNING. Using other types of protection instead of fuses (e.g.:magneto-thermal switches) does not ensure the proper protection of the unit.

	ACD/SCD/CMC				SCD
MANUFAC.	1.08	1.15	1.25	2.35/2.50	2.75
BUSSMANN	FC-6A	FC-12A	FC-20A	FWC-32A10F	-
	XL50-10A	XL50-15A	RF-000-25	FWP-32A10F	-
	6CT	12CT	-	-	-
	FWH-6.30A6F	-	-	-	-
GOULD	ST-6 10x38	ST-12 10x38	ST-20 10x38	-	-
	000-10	000-16	A60x20	-	-
	000/80-10	000/80-16	-	-	-
FERRAZ	6.600CP URC 14.51/6 D08L 040	12.600CP URC 14.51/6 D08L 040	A60Q20-2	A60Q30-2	-
	6.621CP URC 14.51/6 D08L 040	12.621CP URC 14.51/6 D08L 040	-	-	-
	6.6URE10/6 D08L 040	12.6URE10/6 D08L 040	-	-	-
	A60Q6-2	A60Q12-2	-	-	-
	A60X6-1	A60X12-1	-	-	-
SIEMENS	-	-	3NE8015	3NE8003	-
SIBA	-	-	-	-	50-140-34.63 without striker
	-	-	-	-	50 142 34.63 with striker

Differential breaker

On a DDS system, fault DC current, practically flat, may come up besides the AC currents and pulsating DC currents. This requires the use of a differential breaker. This switch must be a B type universal breaker of selective disconnection.

INFORMATION. It is not recommended to use differential breakers sensitive to pulsating currents and, overall, general purpose differential breakers. In this cases, undesired stops might occur due to the high sensitivity of those devices to pulsating currents.

MANDATORY. Never use AC type differential breakers.

As an alternative, «**A type**» differential signals may be used with selective shut-off. They are more economical than the «**B type**» and usually valid for DDS systems with a FAGOR filter. The shut-off current must be equal or greater than 500 mA and with selective switch-off.

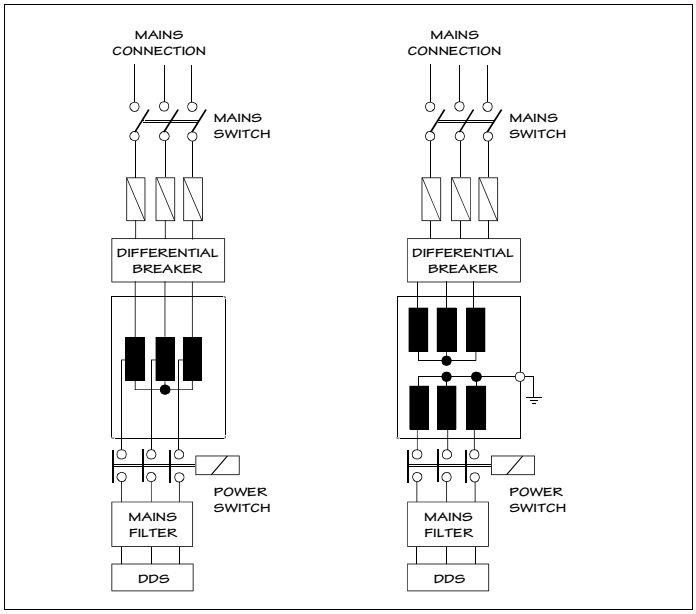
Isolating transformer or auto-transformer

When the mains voltage must be isolated or adapted to the levels required by the DDS system, it may be connected through an isolating transformer or an auto-transformer. This element will also help reduce the amount of harmonics on the line although it will not guarantee the compliance with the EC regulation.

INFORMATION. When having a mains perfectly referred to ground, auto-transformers may be used to adapt the mains voltage. However, if mains is not referred to ground, an isolating transformer must be used in order to avoid possible dangerous voltage surges on any phase with respect to ground that could damage the equipment. In this situation, the secondary must have a star configuration with access to the middle point. This middle point of the secondary must be connected to ground or the neuter of mains.

MANDATORY. When using transformers or auto-transformers, the main contactor must be connected between them and the DDS system, never on the input line of the transformer or autotransformer.

This means oversizing the transformer or auto-transformer considerably in relation to the power of the machine. Thus, individual transformers should not be used for each machine; instead, several machines should be connected to a single transformer. Thus it is possible to apply simultaneity factors and decrease the power required by the transformer or auto-transformer.



Note. Not complying with the given indications could cause the DDS system to perform poorly.

Note. The mains filter may be installed either before or after the power switch **- KM1**.

DISTRIBUTION DIAGRAMS

The distribution diagram being used must be taken into consideration in order to determine the characteristics of the protection means against electrical shocks, in case of failure (indirect contacts) and against overcurrent, as well as the specifications of the devices in charge of such functions. The distribution diagrams are established according to the ground connections of the distribution network or of mains, on one hand, and the of the grounds of the receiving installation on the other.

Depending on the electric energy distribution network, there are three types of diagrams: TN, TT and IT.

Note that the diagrams provided here do not show the main contactor **- KM1** that must be connected between the transformer or auto-transformer and the DDS system.

TN diagram

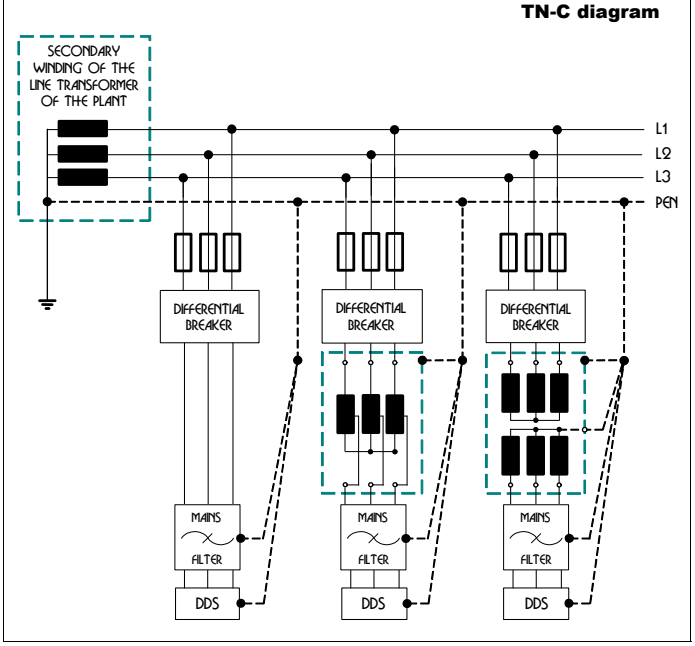
Distribution diagram that has a point directly connected to ground and the conductive parts of the installation are connected to this point through ground protection conductors. This type of mains admits loads between one or several phases and the neuter.

There are three kinds of TN diagrams depending on the relative position of the neuter wire (N) and the protection wire (PE):

- **TN-S diagram** where the neuter wire (N) and the protection wire (PE) are different in the entire diagram.
- **TN-C-S diagram** where the neuter and protection functions are combined in a single wire (PEN) in part of the diagram.
- **TN-C diagram** where the neuter and protection functions are combined in a single wire (PEN) in the entire diagram.

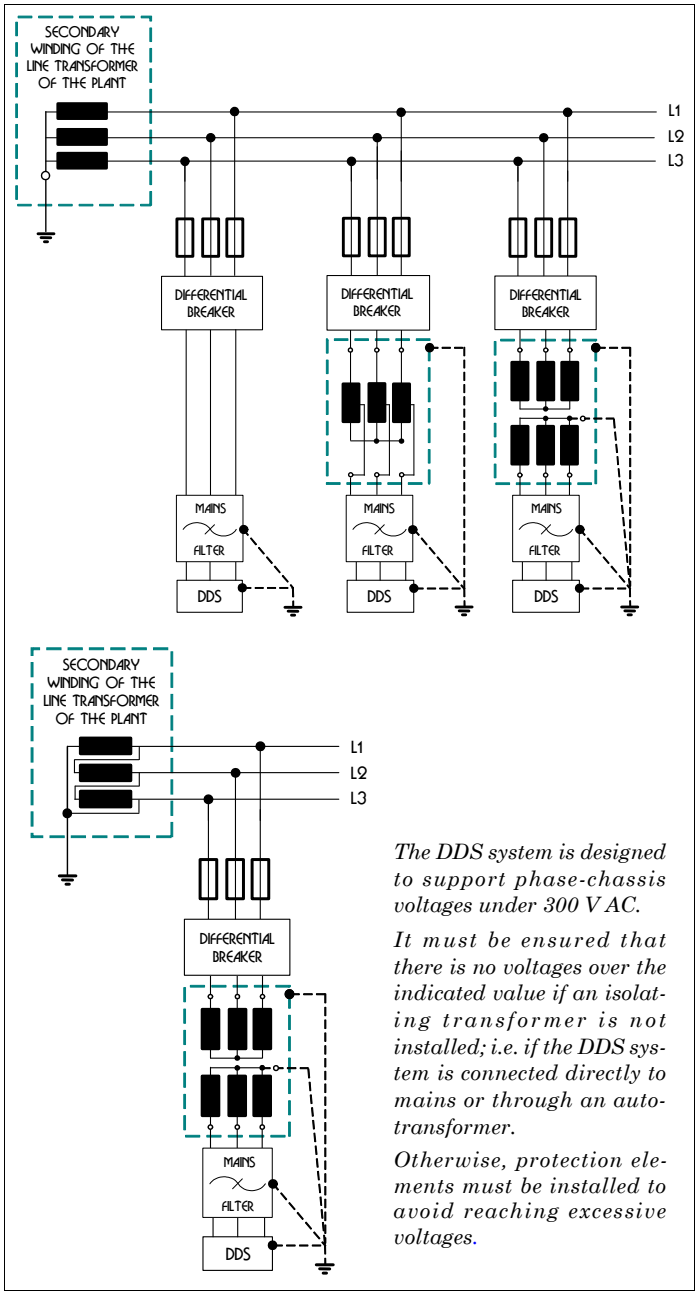
INFORMATION. The DDS system may be connected directly, through a transformer or auto-transformer in mains with a TN type distribution diagram.

TN-C diagram



TT diagram

Distribution diagram that has a point directly connected to ground and the conductive parts of the installation are connected to a ground point independently from the ground electrode of the power supply system.



The DDS system is designed to support phase-chassis voltages under 300 V AC.

It must be ensured that there is no voltages over the indicated value if an isolating transformer is not installed; i.e. if the DDS system is connected directly to mains or through an autotransformer.

Otherwise, protection elements must be installed to avoid reaching excessive voltages.

MANDATORY. "**CORNER GROUNDED**" type TT mains require installing an isolating transformer.

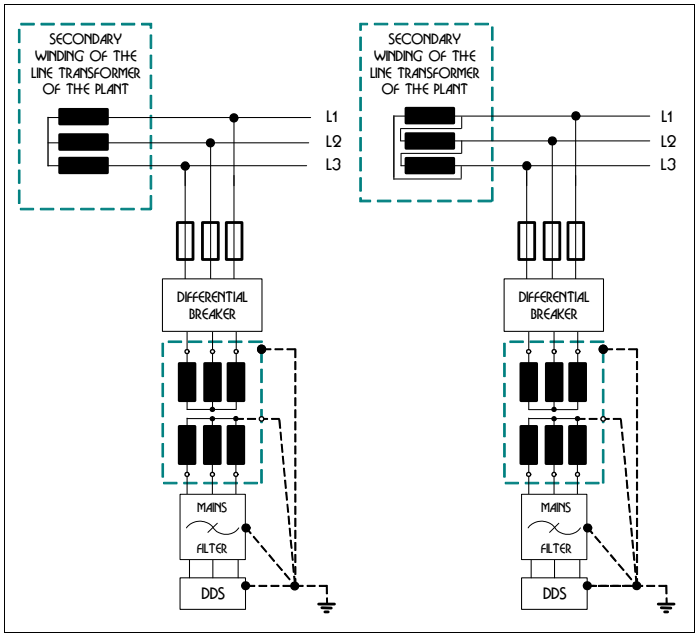
IT diagram

Distribution diagram that has no direct connection to ground and the conductive parts of the installation are connected to ground.

MANDATORY. With an IT distribution diagram, always install the DDS system to mains through an isolating transformer.

With IT type distribution diagrams, the differential breaker is used assuming that the capacitance of mains with respect to ground is large enough to ensure that a minimum fault current flows with the same magnitude as that of the operating differential current assigned. Otherwise, its use is not necessary.

INFORMATION. Note that with an IT type distribution diagram, mains can also be controlled through an isolation watching device. Both protection measurements are compatible with each other.



CABLE SECTIONS

SECTION	MAX. CURRENT	SECTION	MAX. CURRENT
mm²	Arms	mm²	Arms
0.75	8.5	6	30
1	10.1	10	40
1.5	13.1	16	54
2.5	17.4	25	70
4	23.0	35	86

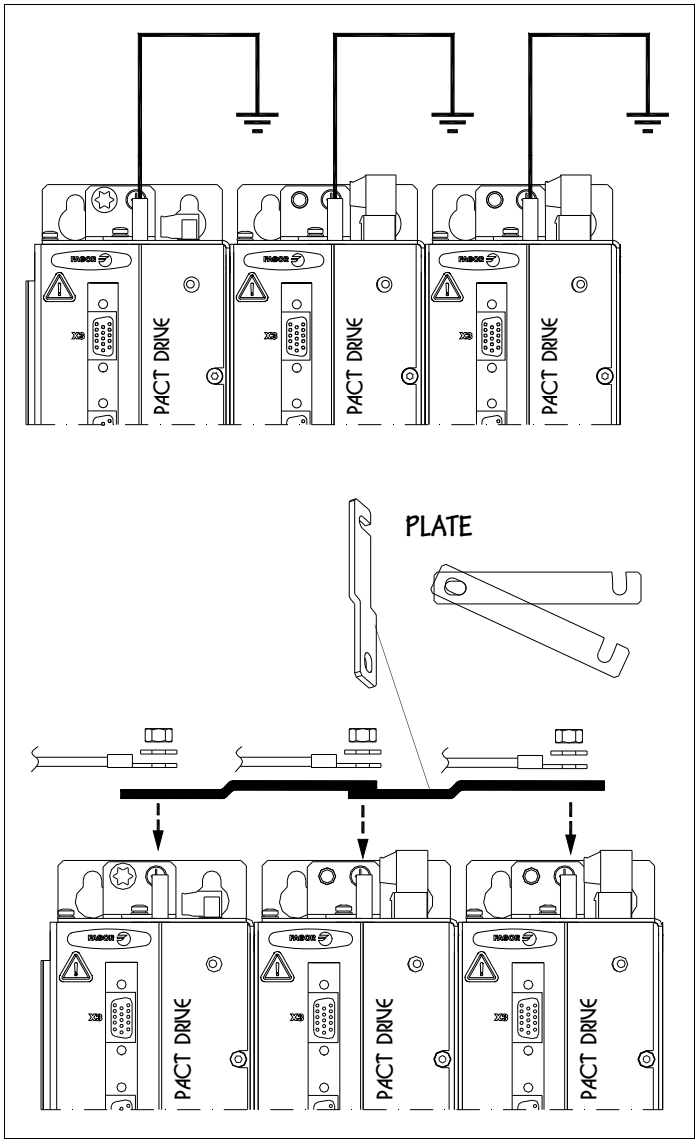
The table gathers the regulation applicable to typical installations of drive systems. In any case, the cables must have a greater section or the same as the ones connected to any motor.

Determines the maximum current in continuous duty cycle, admitted by three-phase conductors in PVC hoses and installed on the machines through conduits and channels. The ambient temperature considered is 40°C/104°F.

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

GROUND CONNECTION. JOINING THE CHASSIS BETWEEN MODULES

The chassis of each module must be connected to the machine ground point. Use the washers and nuts supplied with each module to make the ground connection. The tightening torque must be between 2.3 and 2.8 N·m. Connecting these terminals by means of metal plates offers mechanical ridigity; but it does ot guarantee proper ground connection of each module.



MANDATORY. Take a ground cable (as short as possible) from each module to each main machine ground point. The cable section must be the same as that of the cables connected to the largest servomotor (at least 6 mm²).

ELECTRICAL DRAWING

The schematics of the following pages are only an orientation to design the machine and may be expanded or reduced at wil.

Power-up procedure

- Supply the compact drives by X1 (pin 2, pin 3) (400/460 V AC) from mains. This will supply 24 V DC to the internal control circuits, and outputs this 24 V DC by X2 (pin 1, pin 2). Each module runs an internal test. If the test is successful, the DR. OK contacts close.
- Push ON button. This supplies power from mains to the compact drive modules and activates the DRIVE ENABLE, X2 (pin 4) of each drive.
- Activate the control input SPEED ENABLE, X2 (pin 5) of each drive from the CNC. The motor can now follow the velocity command.

Emergency line

The **- KA1** relay confirms that the system is mechanically and electrically in working condition.

Error reset

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

Control from CNC

The CNC enables each axis and confirms the SPEED_ENABLE signal to each drive by means of KA4 and KA6.

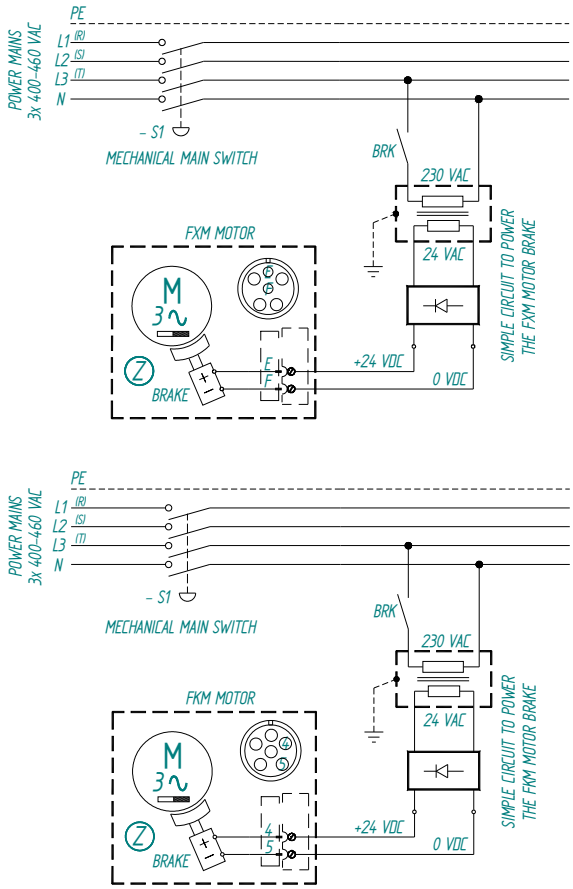
Stop

When the emergency line breaks or the OFF or **- S1** keys are opened, the control circuit of the drives must keep on working to brake the motors, and the DRIVE ENABLE signal must be kept active (24 V DC). The 24 V DC compact drive output voltage keep the power to the control circuits, and the DRIVE ENABLE signals are kept active while braking, by delaying the deactivation of **- KA3**.

BRAKE SUPPLY CIRCUIT

The brake of the FXM and FKM motors is unlocked by applying 24 V DC through a connector.

Note. ***RST****, Classic nomenclature;* ***L1L2L3****, current nomenclature*

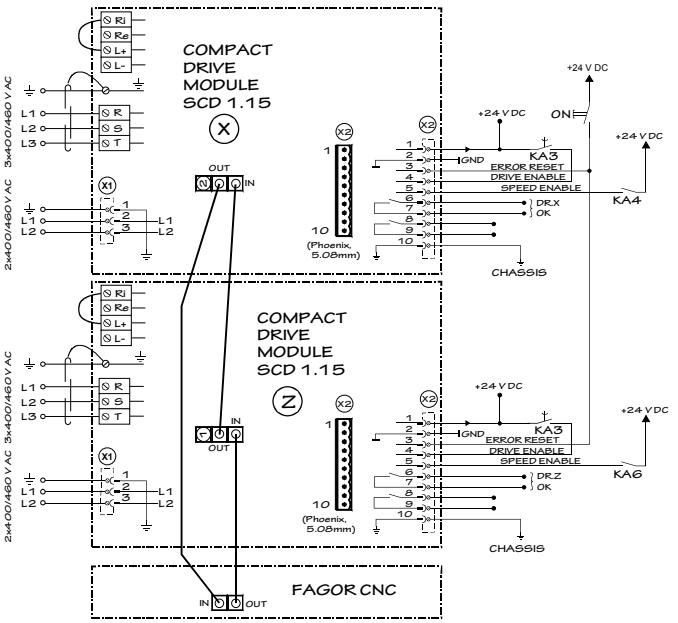


WARNING. When installing the motor, verify that the brake releases the shaft completely before turning it for the first time.

If you decide not install the mains filter and electrical choke (on each of the three power lines) or a transformer or an auto-transformer may be installed instead. However, it does not ensure compliance with the EC Directive.

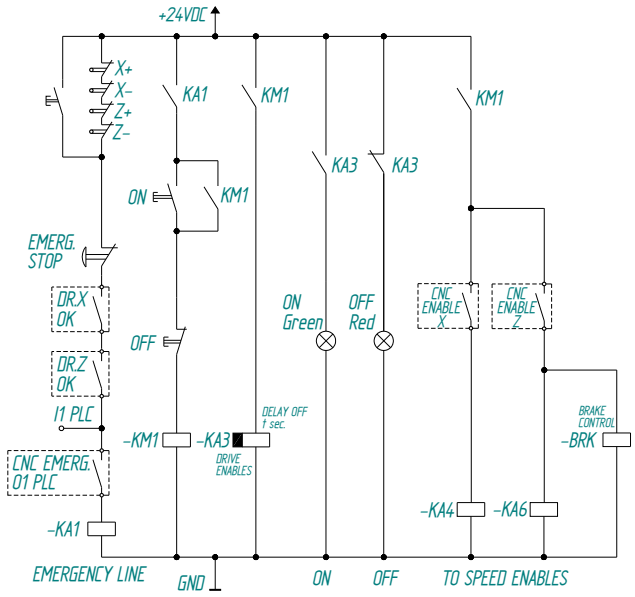
COMPACT SYSTEM WITH SERCOS CONNECTION

*Note. **RST**, Classic nomenclature; **L1L2L3**, current nomenclature*

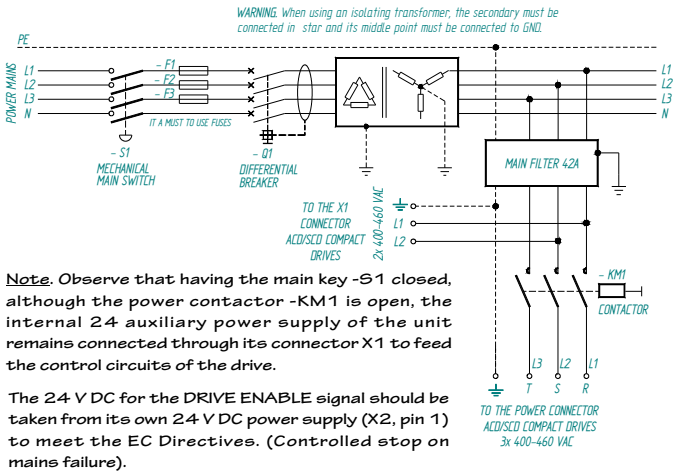


Note. Compact modules do not have a "System Speed Enable" signal. In this schematics, even when having SERCOS interface, electrical signals are used to activate the enables.

Note. The relay -KA3 uses delayed deactivation (t sec.) maintaining the DRIVE ENABLE control signal active for a few seconds to maintain motor torque while the vertical axis holding brake is enabled.



CNC EMERG. will always be assigned to I1/O1 of the PLC with an 8055/55i CNC. With an 8070 CNC, it may be assigned to any I/O of the PLC.

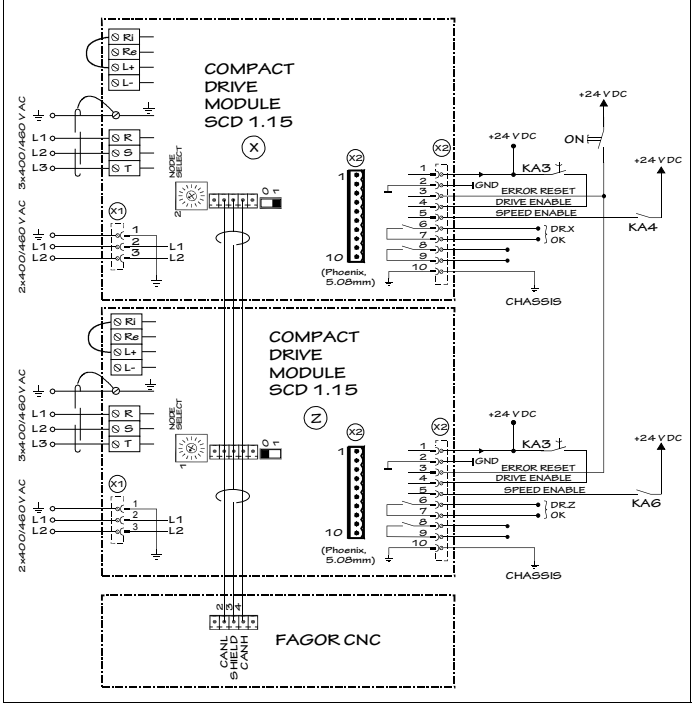


Note. Observe that having the main key -S1 closed, although the power contactor -KM1 is open, the internal 24 auxiliary power supply of the unit remains connected through its connector X1 to feed the control circuits of the drive.

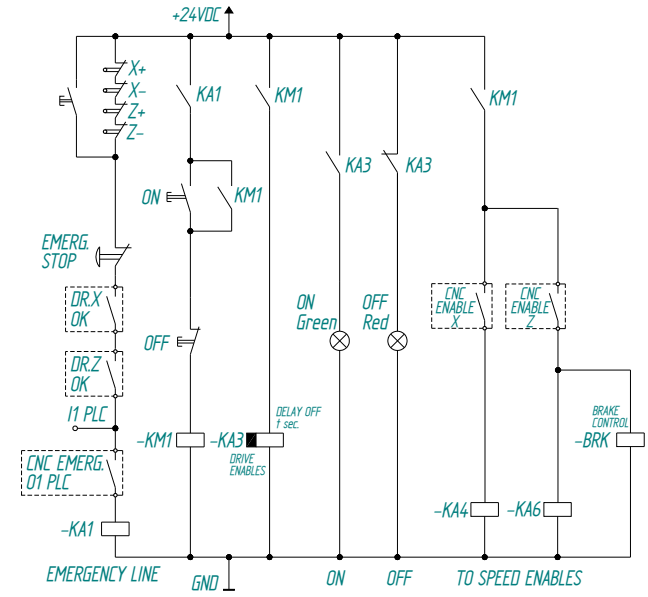
The 24 V DC for the DRIVE ENABLE signal should be taken from its own 24 V DC power supply (X2, pin 1) to meet the EC Directives. (Controlled stop on mains failure).

COMPACT SYSTEM WITH CAN CONNECTION

*Note. **RST**, Classic nomenclature; **L1L2L3**, current nomenclature*



Note. The relay -KA3 uses delayed deactivation (t sec.) maintaining the DRIVE ENABLE control signal active for a few seconds to maintain motor torque while the vertical axis holding brake is enabled.



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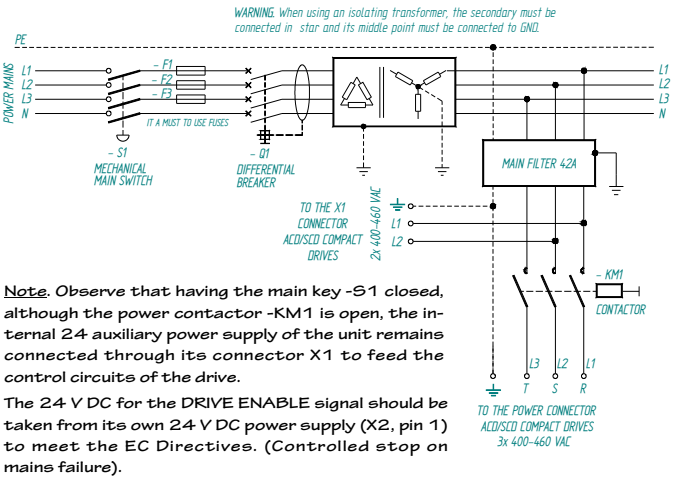
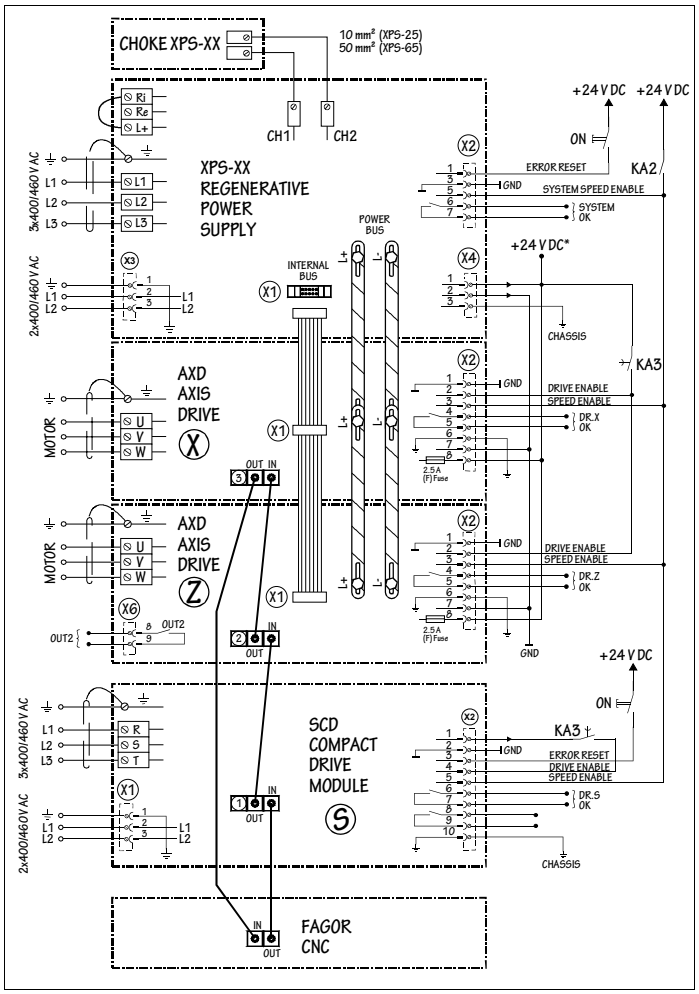


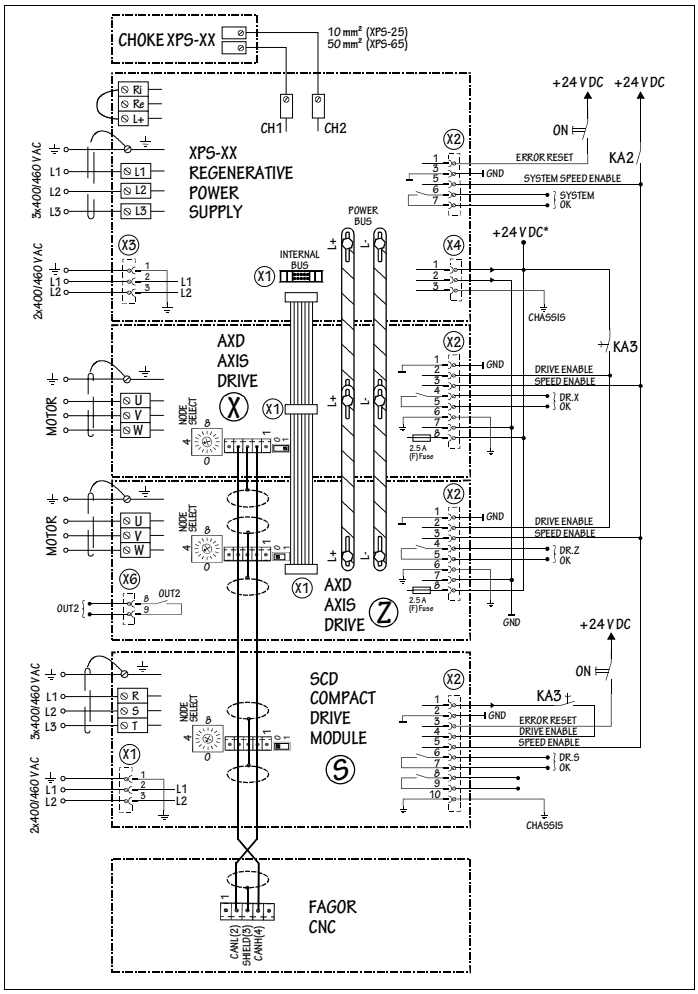
Note. Observe that having the main key -S1 closed, although the power contactor -KM1 is open, the internal 24 auxiliary power supply of the unit remains connected through its connector X1 to feed the control circuits of the drive.

The 24 V DC for the DRIVE ENABLE signal should be taken from its own 24 V DC power supply (X2, pin 1) to meet the EC Directives. (Controlled stop on mains failure).

MIXED SYSTEM WITH SERCOS



MIXED SYSTEM WITH CAN



COMPATIBILITY

VECON-2 BOARD

This board replaces the **VECON** board expanding the capacity of the flash memory and increasing the operating speed of the flash memory and of the RAM memory.

VERSION OF THE VECON-2 BOARD	SOFTWARE VERSION
VEC 01A AND LATER	05.08 AND LATER 06.01 AND LATER

VECON-3 BOARD

This board replaces the **VECON-2**.

VERSION OF THE VECON-3 BOARD	SOFTWARE VERSION
VEC 01A AND LATER	06.18 AND LATER

VECON-4 BOARD

This board replaces the **VECON-3**.

VERSION OF THE VECON-4 BOARD	SOFTWARE VERSION
VEC 01A AND LATER	06.26 AND LATER 08.05 AND LATER

SERCOS BOARD (AT 16 MB)

This card will not be compatible with software versions older than 06.05 or with 07.0x or with 08.01 versions. With software versions later than 06.04 (not included), it may be used to exchange data between the CNC and the drives that make up the **SERCOS** ring at 2, 4, 8 and 16 MBd.

Note. Therefore, in order to select a baudrate higher than 4 MBd, the drive must have this **SERCOS** board and any software version already mentioned.

MANDATORY. The **SERCOS** ring can have drives that have this board or the previous ones. However, all the drives must be set to the same transmission rate.

INFORMATION. Drives having this board or older ones may be added to the **SERCOS** ring. However, all the drives must set with the same transmission speed.

CAN BOARD

Although this board was already recognized on FAGOR drives since software version 07.0x, now when using a FAGOR drive that has a CAN communication board, always install software version 08.0x.

MANDATORY. All the modules (CNC included) must set with the same transmission speed.

Note. A **SERCOS** board and a **CAN** board cannot be installed in the same drive module at the same time; i.e. the communications interface must be either **SERCOS** or **CAN**, but not both at the same time.

Note. Drive modules with software versions 07.0x and 08.0x may be installed indistinctively in the same **CAN** field bus.

CAPMOTOR-X BOARDS

SOFTWARE	INTERFACE	MOTOR FEEDBACK BOARD
Up to 06.17	SERCOS	CAPMOTOR-1
06.18 and later	SERCOS	CAPMOTOR-1, CAPMOTOR-2
07.0x	CAN	CAPMOTOR-1, CAPMOTOR-2
08.01 to 08.04	CAN	CAPMOTOR-1, CAPMOTOR-2
08.05 and later	SERCOS/CAN	CAPMOTOR-2

INFORMATION. Remember that the **CAPMOTOR-1** board has been discontinued.

Note that a **CAPMOTOR-2**, as opposed to **CAPMOTOR-1**, can process the signals coming from a serial motor feedback with **SSI** protocol or **ENDAT** (with incremental A and B signals, necessarily). However, it cannot process signals coming from resolver feedback, which can be processed by **CAPMOTOR-1**.

MANDATORY. Never install a **CAPMOTOR-2** motor feedback board when using a resolver as motor feedback. This combination is incompatible.

CAPMOTOR-X BOARD & THE TYPE OF FEEDBACK

FEEDBACK DEVICE TYPE	MOTOR FEEDBACK BOARD
RESOLVER	CAPMOTOR-1
STEGMANN ENCODER	CAPMOTOR-1, CAPMOTOR-2
ENCODER WITH SQUARE SIGNALS U, V & W	CAPMOTOR-1, CAPMOTOR-2
ENCODER WITH C & D SIGNALS	CAPMOTOR-1, CAPMOTOR-2
ENDAT WITH INCREMENTAL A & B SIGNALS	CAPMOTOR-2
SSI	CAPMOTOR-2

VECON-X BOARDS

SOFTWARE	INTERFACE	VECON BOARD
Up to 06.01	SERCOS	VECON
06.01 up to 06.17	SERCOS	VECON-2, VECON-3
06.18 up to 06.25	SERCOS	VECON-2, VECON-3
06.26 and later	SERCOS	VECON-2, VECON-3, VECON-4
07.0x	CAN	VECON-2, VECON-3
08.01 to 08.04	CAN	VECON-2, VECON-3
08.05 to 08.09	SERCOS/CAN	VECON-2, VECON-3, VECON-4 (vers.00A)
08.10 and later	SERCOS/CAN	VECON-2, VECON-3, VECON-4 (vers.00A and later)

TRANSFER OF · *.MOT · FILES · MOTOR TABLE

Transferring any (*.mot) motor file (AKA motor table) whose version is higher than 02.01 requires having a software version 08.09 or higher installed at the drive.

Note. Drive software versions older than 08.09 are NOT compatible with motor table version 02.02 or higher.

SOFTWARE VERSION	MOTOR TABLE VERSION
Up to 08.08 included	02.01
08.09	02.02
08.10	02.03
08.11	02.04

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