ABB Servomotors

ABB AC Brushless Servodrives

AC Brushless Servomotors Series 8
Installation and use Manual

Motors Manual

AC Brushless Servomotors Series 8

Motors Manual

MANUM02.0310 E

EFFECTIVE: 14.11.2003
SUPERSEDES: MANUM02.0307 E

Safety Instructions

Introduction

This chapter states the safety instructions that must be followed when installing an Ac brushless servomotor of the 8C series manufactured by ABB Servomotors. The material in this chapter must be studied before attempting any work on, or with, the servomotor.

This chapter refers in particular to 8C servomotors coupled to BIVECTOR or DGV700 series converters, even though, in general, it can be applied to any converter.

Warnings and Notes

This manual distinguishes two sorts of safety instructions. Warnings are used to inform of conditions that can, if proper steps are not taken, lead to a serious fault condition, physical injury and death. Notes are used when the reader is required to pay special attention or when there is additional information available on the subject. Notes are less crucial than Warnings, but should not be disregarded.

Warnings

Readers are informed of situations that can result in serious physical injury and/or serious damage to equipment with the following symbols:

WARNING! Dangerous Voltage: warns of situations in which a high voltage can cause physical injury and/or damage equipment. The text next to this symbol describes ways to avoid the danger.

WARNING! General Warning: warns of situations that can cause physical injury and/or damage equipment by means other than electrical. The text next to this symbol describes ways to avoid the danger.

Notes

Readers are notified of the need for special attention or additional information available on the subject with the following symbol:

CAUTION! **Caution** aims to draw special attention to a particular issue.

Note **Note** gives additional information or points out more information available on the subject.

General Safety Instructions

WARNING! The contents of this guide refer to 8C Series Servomotors correctly installed as described in this *Motors Manual*.

Only properly qualified electricians who are familiar with operation on motors are allowed to perform the commissioning and operation activities of the Servomotors described in this Guide.

WARNING! For no reason should any person access the terminals of the servomotor, before at least eight minutes from the power outage.

However this time strongly depends on the converter type connected to the motor.

Potentially lethal voltages are present on a DC intermediate circuit and on the associated circuits.

WARNING! The machine manufacturer who commissions the servomotor, must install proper additional protection functions to avoid damages to health or equipment when the machine is operating.

Neglecting these instructions can cause physical injury and death.

More Warnings and Notes are printed at appropriate instances along the text.

Summary

Chapter 1 – Introduction to this Manual

Introduction

This document *Motors Manual* may be part of the BIVECTOR or DGV700 Converters manual suite, provided by ABB Servomotors S.r.l. In this case the material contained in these manuals must be studied before attempting any work on, or with, the motors.

In any case, since motors can be used also with converters different than Bivector or DGV700, it can be used without consulting the other manuals of the suite.

Before You Start

The reader is expected to have an appropriate knowledge of electrical fundamentals, electrical wiring practices and, in general, of the drive

What This Manual Contains

The aim of this manual is to provide the reader with all the necessary information for a proper installation of the motors, both mechanical and electrical.

Safety Instructions are featured in the first few pages of this Manual. Safety Instructions describe the formats for various warnings and notations used within this Manual. Other instructions are given in the *Installation Manual*.

Chapter 1 – Introduction to this Manual, contains a short description of this Manual.

Chapter 2 – 8C Servomotors, describes the main charateristics of the servomotors, their main components and available accessories.

Chapter 3 – Mechanical Installation, shows how to deal with mechanical installation of the servomotors.

Chapter 4 – Electrical Installation, shows how to deal with electrical installation of the motors.

Chapter 5 – Motors Parameter and data, shows the main parameters and electromechanical data of the servomotors.

Appendix A – Motor Coding, describes the coding method used to identify the servomotors.

Appendix B – Motor Label, shows a typical servomotor label.

Appendix C – Servomotor Curves, shows the torque behaviour with respect to speed for all the motors.

Appendix D – Standards and Safety, lists the norms that the motors complies to, that have been used in design and must be followed in installation.

Related Publications

In addition to this *Motor Manual*, please consult the BIVECTOR, BIVECTOR MKII, BIVECTOR MKIII, BIVECTOR MKIV, DGV700 complete user documentation.

Conventions used in this Manual

Listed below are the terms and conventions which have special meaning throughout this Manual.

ServoDrive A Servodrive is a system made of a converter coupled with a servomotor.

Chapter 2 – 8C Servomotors

Introduction

This chapter gives general information on the AC Brushless Servomotors manufactured by ABB servomotors S.r.l. The main characteristics, components and accessories of these servomotors are described.

Main characteristics

8C Series Servomotors are brushelss, rare earth permanent magnet (Neodimium, Iron, Boron), 6 or 8 poles, high performance servomotors. Each of these 8C Servomotors, provided as part of the BIVECTOR or DGV700 servodrive series, is equipped with:

- a brushless/frameless resolver (integrated into the servomotor)
- a temperature sensor (integrated into the servomotor)

The following optionals are also available:

- a mechanical parking brake
- an oil seal on the drive end side

As an alternative to resolvers various kinds of encoders can be mounted, customer specific, or other position detection devices.

For more information on the available encoders, please contact ABB Servomotors Customer Service.

Cooling

8C series servomotors are natuaral air cooled using natural circulation.

Accroding to IEC 60034-6 they are therefore identified by the code IC0041 that means closed motor, surface cooled without fan.

Temperature Sensor

Internally to the motor a temperature sensor of the PTC type is mounted with the function to provide information to the control circuits of the converter on a motor over-temperature event.

The standard version of 8C Series servomotors foresees only the presence of a PTC thermal sensor.

The connection of the PTC to the converter is done through the resolver cable, and the omitted connection of the PTC wires inhibits the drive operation.

Alternatively, a special version of the motor can be provided equipped with an incorporated thermal switch, instead than the thermal sensor. For this application please contact our Customer Service.

Protection

8C series servomotors are protected according to the indications given in IEC 60034-5.

Definition of IP protection grade

The protection grade according to the specified norm is indicated by the IP letters followed by two numerals.

The first numeral indicates the degree of protection given by the enclosure to both people and motor itself; in particular the objects, tools, wires, that, handled by a person can enter into the motor or, in case they enter the motor they do not cause damages to the motor itself, are indicated.

First numeral	Description	Examples of things from which the motor is protected
0	Non protected motor	No particular protection.
1	Motor protected by solid objects having dimensions greater than 50 mm	For example parts of the body like hands or objects with dimensions greater than 50 mm cannot contact or enter into the motor or close to live parts, either accidentally or inadvertently.
2	Motor protected by solid objects having dimensions greater than 12 mm	For example parts of the body like fingers or objects like screwdrivers with length greater than 80 mm or objects with dimensions greater than 12 mm cannot contact or enter into the motor or close to live parts.
3	Motor protected by solid objects having dimensions greater than 2.5 mm	For example objects like small tools, wires or objects with dimensions greater than 2.5 mm cannot enter into the motor or close to live parts.
4	Motor protected by solid objects having dimensions greater than 1 mm	For example objects like wires, strips of 1 mm thickness, or objects with dimensions greater than 1 mm cannot enter into the motor.
5	Motor protected by the dust	Some dust can enter into the motor but its amount does not compromise the correct operation of the motor.
6	Motor totally protected by the dust	No dust can enter into the motor at all.

The second numearl indocates the degree of protection offered by the enclosure to prevent the dangerous effects of the penetration of water into the motor.

Second numeral	Description	Examples of things from which the motor is protected
0	Non protected motor	No particular protection.
1	Motor protected from water drops	The vertical drops of water.

2	Motor protected by water drops until tilted at 15°	Vetical drops until the motor is tilted up to 15° in any direction different than its normal position.
3	Motor protected from sprayed water	Water sprayed against the motor up to 60° from the vertical direction.
4	Motor protected from spalshed water	Water spalshed onto the motor from any direction.
5	Motorprotected from water jets	Water jets created by a nozzle in any direction.
6	Motor protected by powerful jets	Water created by poweful jets or by sea waves.
7	Motor protected by the immersion	Water cannot enter whren the motor is submersed according to predefined conditions
8	Motorprotected by the effects of a prolongued immersion	A prolongued immersion in water under specified conditions, ofr example becuase the motor is totally sealed or because if the water enters it does not create damages.

Standard Degree of protection

This standard degree of protection is valid for servomotors that are not mounted according to the IMV3 or IMV19 configuration.

For 8C Series servomotors with power and signal connectors the standard IP protection is:

- Motor frame: IP65

For the servomotors with signal connector and connection box (only for 8C4 and 8C5) the standard IP protection is:

- Motor frame: IP54

The motor body, by using special arrangements, can reach also IP67 protection degree.

For the shaft end (Drive end side) the degree of protection is:

  - IP64 with oil seal installed
  - IP54 without oil seal

This protection is intended for the interface shaft- motor body. If the flange mounting of the motor is such that it prevents the leakage of fluids towards the shaft drive end, e.g. by means of O-rings, than the protection level of the whole motor can be that of the motor body.

IP protezione in IMV3 or IMV19 configuration

In these configurations the protection degree on the shaft drive end can be dramatically lowered, both in case of motor without oil seal and in case of standard oil seal.

Despite 8C motors are provided with sealed bearings it is practically impossible to prevent dangerous fluids entering into the motor on the shaft drive end, unless particular special oil seal are used.

In fact, even the normal oil seals used by ABB Servomotors to increase the protection degree from fluids, may show significant criticality when the motor is mounted according to IMV3 or IMV19. To guarantee a protection level IP x4-x7 it is therefore necessary to use special oil seals, not mounted in the standard configurations.

In these cases please contact ABB Servomotors Customer Service.

Radial oil seal (option)

All 8C series servomotors are mechanically arranged to allow for a radial oil seal on the rotating shaft (the so called “corteco”); in the standard version, this oil seal is not included and can be provided on request.

The radial oil seal is optionally mounted on the drive end side to improve the capacity of withstanding leakage of fluids into the motor, in particular oil. Its function is therefore to protect insulation and permanent magnets from potentially dangerous fluids.

It is an additional device that complements the function of the sealed bearings that are mounted by default on 8C Series servomotors.

The usage of the oil seal improves the IP protection degree of the motor on the shaft drive-end.

Normally, the servomotor arranged with the oil seal has a protection degree of IP64.

The oil seal used by ABB Servomotors in the 8C series is usually done with Viton material.

This oil sealer shall be installed (by the user or by ABB Servomotors on request) **only** if the motor shaft and the oil sealer itself are actually wet by oil. If lubricating fluids other than common mineral and synthetic oils are used and in case of over-pressure of these fluids, ABB Servomotors should be contacted.

We suggest to avoid mounting the oil seal if a dry operation on drive end side is foreseen: the material of the device will be quickly damaged and worn out, creating dust and possibly damaging the bearing itself.

Resolver

8C brushless servomotors are usually equipped with resolvers.

ABB Servomotors has qualified, for its converters of the BIVECTOR or DGV700 series, some types of resolvers:

- LTNRE15-1-A14
- TS2620N21E11
- V23401-D1001-B101

ABB Servomotors indifferently may mount one of these resolvers on its motors.

The main characteristics of these resolvers are here listed:

- Operating temperature: -55 ºC...+155 ºC
- Admissible speed: 10,000 RPM max.
- Accuracy: ±10'
- Input voltage: 7 Vrms
- Pole pairs: 1
- Vibrations: 196 m/ s^2, 10Hz - 500Hz
- Shock: 980 m/s^2, 11ms

More detailed informations can be found either by contacting our Customer Service or directly looking in the manufacturers datasheet.

Brake (option)

For particular applications, the motor can be arranged with a electrically driven brake, that mechanically acts on the servomotor shaft; when mounted, the brake is fully integrated into the motor structure.

Do not confuse this mechanical-action brake with the electronic unit for the control of the converter intermediate DC voltage circuit, allowing for the dissipation of electric power generated by the servomotor during electric braking on the resistor; this part of the electronic circuit is often simply called “braking”.

The servomotor’s brake can be considered as a “parking and emergency brake” because its main functions are to lock the motor shaft when there is no electric power supply to the converter and to brake in emergency cases. In case of axial loads on the motor shaft, please contact the Customer Service.

When brakes are present they can be of two types:

- permanent magnet (by default)
- spring (on request)

In any case brake are always working with reverse logic, i.e. they brake when no power is applied, while they are free when supplied with the proper DC voltage.

The insertion of ant kind of brake does not result in a different length of the servomotor.

The characteristics of spring applied brakes are similar to those of permanent magnet brakes.

Since brakes are typically disc brakes they are very sensitive to axial movements of the shaft.

Therefore, for motors equipped with brakes, if axial loads are foreseen, please contact our Customer Service.

TIPO	**Technical data of the brakes** **Power supply voltage: 24 VDC; Tolerance: ±10%**			
	Holding Torque (20°C)		Moment of inertia	Exitation current
	$\mathbf{M}_{br\ permanent\ magnet}$ [Nm]	$\mathbf{M}_{br\ spring}$ [Nm]	$\mathbf{J}_{br}$ [kgcm^2]	$\mathbf{I}_{br}$ [A]
8C1.(1-4).(30, 60)	2	2	0,4	0,5
8C4.(0-4).(15, 30)	10	12	4	0,75
8C5.(0-6).(15, 30)	18	32	11	1,2

Note

Both for permanent magnet and for spring brakes, upon request, other holding torques are available.

When the brake option is available, the connection must be performed observing the following

The brake management is fully under the care and responsibility of the electrical control cabinet manufacturer. The installed brake is a safety brake and so it is **operating (i.e. it brakes) when it is not powered**. It is therefore absolutely necessary for the motor to be free (without brake) before being powered, so the logic of the electrical control cabinet must provide for a timely and adequate power supply to the brake, also checking that during the servomotor operation the brake is always powered.

Note. The brake is powered by **DC current**, coming from a power supply (not included in the drive system supply) having adequate power and the specified voltage tolerance.

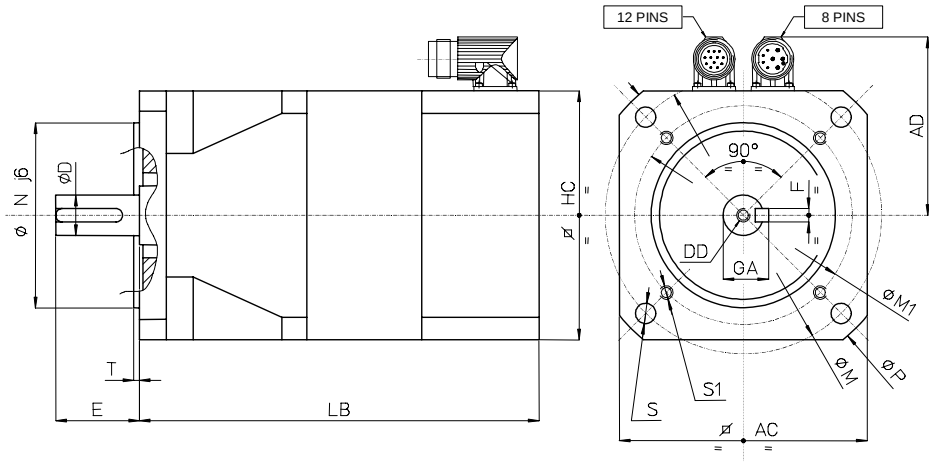
Note. The power supplied to the brake must come from a mains separated circuit.

Note. **The power supply polarity must absolutely be respected** (as explained in the converter manual): exchanging the poles means failure of supply and therefore a braking action on the motor

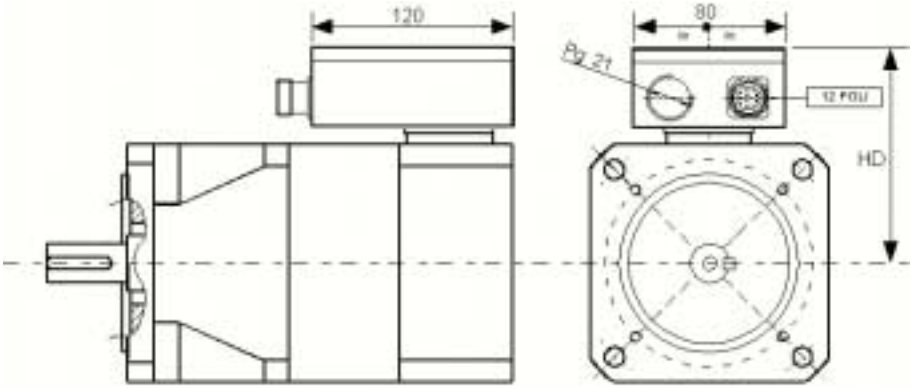
Overall dimensions

The overall dimensions drawings of 8C Series servomotors are shown in the next figure, both for the version with the power connector as well as the signal connector and for the version with the signal connector and connection box for power connections (available only for 8C4 and 8C5); the mm dimensions related to the a.m. drawings are shown in the next Table.

Version with connectors



Version with terminal box



Note. The motor code (or better, the motor assembly code) is made of a combination of letters and/or digits. In the "TYPE" column, the first two positions (**8C**) indicate the series, the third position indicates the axis height (**1, 4,** etc.), the forth indicates the motor size (**1, 2**, etc.) related to axial length, the sixteenth indicates the converter supply voltage (letter **E:** 230 Vac, letter **M:** 400 Vac; other voltages are available on request); the other letters/digits indicate further specifications of the servomotor (see Appendix A for motor code description).

TYPE		LB	AC	N	T	M	S	M1	S1	P	D	E	DD	F	GA	AD	HC	HD
8C1.1		185																
8C1.2	xx0xxxxxSE3M	212	80	60	2.5	75	M5x10	/	/	100	16 j6	40	M5x12.5	5	18	83	80	-
8C1.3		239																
8C1.4		266																
8C1.1		185																
8C1.2	xx1xxxxxSG3M	212	100	95	3	115	Ø10	/	/	140	19 k6	40	M6x16	6	21.5	83	80	-
8C1.3		239																
8C1.4		266																
8C1.1		185																
8C1.2	xx2xxxxxSC3M	212	90	80	3	100	Ø7	/	/	120	14 k6	30	M5x12.5	5	16	83	80	-
8C1.3		239																
8C1.4		266																
8C4.0		220																
8C4.1		251																
8C4.2	xx0xxxxxSG3M	276	118	110	3.5	130	Ø10	/	/	150	19 j6	40	M6x16	6	21.5	91	118	116
8C4.3		299																
8C4.4		332																
8C4.0		220																
8C4.1		251																
8C4.2	xx1xxAxxSG3M	276	118	95	3	115	Ø10	/	/	150	19 k6	40	M6x16	6	21.5	91	118	116
8C4.3		299																
8C4.4		332																
8C4.0		220																
8C4.1		251																
8C4.2	xx9xxxxxSL3M	276	140	130	3.5	165	Ø12	/	/	190	24 j6	50	M8x19	8	27	91	118	116
8C4.3		299																
8C4.4		332																
8C5.0		266																
8C5.1	xx0xxAxxSL3M	296									24 j6	50	M8x19	8	27			
8C5.2		326																
8C5.3		356	148	130	3.5	165	Ø12	/	/	190						106	148	133
8C5.4	xx0xxxxxSN3M	387									32 k6	58	M12x28	10	35			
8C5.5		418																
8C5.6		447																
8C5.0		266																
8C5.1	xx4xxxxxSL3M	296									24 j6	50	M8x19	8	27			
8C5.2		326																
8C5.3		356	148	110	4	165	Ø12	130	M 8x12	190						106	148	133
8C5.4	xx4xxxxxSN3M	387									32 k6	58	M12x28	10	35			
8C5.5		418																
8C5.6		447																

Types of construction and mounting arrangements

The servomotors of this series can only provide for flange installation. The different possibilities for the different sizes as listed in the following Table

TYPE	*Construction type and Mounting arrangement*					
	IMB5	IMV1	IMV3	IMB14	IMV18	IMV19
8C1.x.xx.0.x.x.x.x.x.S.x.3.M	No	No	No	Sì	Sì	Sì
8C1.x.xx.1.x.x.x.x.x.S.x.3.M	Sì	Sì	Sì	No	No	No
8C1.x.xx.2.x.x.x.x.x.S.x.3.M	Sì	Sì	Sì	No	No	No
8C4.x.xx.0.x.x.x.x.x.S.x.3.M	Sì	Sì	Sì	No	No	No
8C4.x.xx.1.x.x.x.x.x.S.x.3.M	Sì	Sì	Sì	No	No	No
8C4.x.xx.9.x.x.x.x.x.S.x.3.M	Sì	Sì	Sì	No	No	No
8C5.x.xx.0.x.x.x.x.x.S.x.3.M	Sì	Sì	Sì	No	No	No
8C5.x.xx.4.x.x.x.x.x.S.x.3.M	Sì	Sì	Sì	Sì	Sì	Sì

The strict definitions of the IM code numbers are laid down in IEC 60034-7 (1993), number 2179 E; the practical meaning is provided below.

IMB5 Flange mounted with passing holes on the flange, horizontal.

IMV1 Flange mounted with passing holes on the flange, vertical, shaft down.

IMV3 Flange mounted with passing holes on the flange, vertical, shaft up.

IMB14 Flange mounted with tapped blind holes on the flange, horizontal.

IMV18 Flange mounted with tapped blind holes on the flange, vertical, shaft down.

IMV19 Flange mounted with tapped blind holes on the flange, vertical axis, shaft up.

Note. Upon request, 8C1.x.xx.0..x.x.x.x.x.S.x.3.M servomotors are also available with IMB5, IMV1 and IMV3 design.

Chapter 3 –Mechanical Installation

Introduction

This chapter provides information on mechanical installation of the AC Brushless Servomotors manufactured by ABB Servomotors S.r.l.

Usage notes

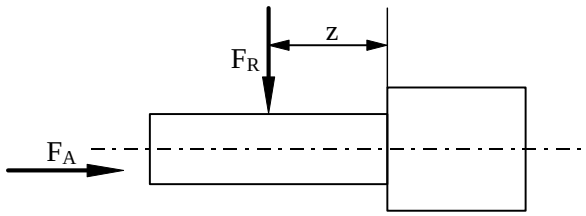
A particular care from the mechanical point of view must be devoted when using any kind of servomotor.

Since the most delicate part of a servomotor are bearings and shaft, information on mounting constraints and on the usage of the coupling of the motor to its load though the drive end shaft will be in particular given.

On the other hand, for what concerns mounting of the motor to the mechanical body of the machine there are not particular instructions or recommendations, but the normal professional competence of the installer.

For the best use of 8C Series servomotors, table below indicates axial and radial loads for each servomotor, which must not be exceeded in order to guarantee a regular lifetime of 20,000 hours in continuous duty of the bearings with permanent lubrication. In general, the locked bearing is mounted on the motor front-side. The configuration related to the load application is shown in figure.

Loads on drive end motor shaft



Bearings specs

Servo motor	speed [rev/min]		Bearing type Sealed		Radial load F_R [N]		Axial load F_A [N]		Dist. [mm]
	n_1	n_N	Drive end side	Back side	a n_1	a n_N	a n_1	a n_N	z
8C1	3000	6000	6004-C3	6002-C3	475	375	290	240	20
8C4	1500	3000	6205-C3	6204-C3	950	750	575	475	20
8C5	1500	3000	6207-C3	6205-C3	1750	1400	1000	850	27.5

Note. Values for simultaneous axial stresses are available on request.

Note. Values for versions with integrated brake (special versions) are available on request.

Note. The permissible axial load values refer to the F_A force direction towards the motor; for reverse direction a reduction is necessary (values are available on request).

Taking into consideration the foreseen duration, F_R radial loads must not exceed the values indicated, even for a transient period (accelerations, decelerations).

In particular, shocks caused, for example, by the assembling of mechanical parts (couplings, keys, nuts, etc.) on the shaft end are not allowed.

Pulleys and couplings

Couplings, sheaves and pinions must be assembled using adequate tools, **absolutely avoiding the use of a hammer**, which could cause serious damage to the motor.

Once the assembly has been completed, the shaft should be greased in order to avoid oxidation.

Mounting according to IMVx configuration

In vertical mounting due to the different kind of mechanical loads, due to the vertical forces acting on the motor, it is necessary to consider the effect of these loads on the bearings life.

In these cases ABB Servomotors recommends to contact the Customer Service.

Chapter 4 –Electrical Installation

Introduction

This chapter gives information on how to make electrical installation of AC Brushless servomotors of the 8C Series done by ABB Servomotors S.r.l.

Connection to the motor assembly

All power and signal connections to the motor assembly are indicated in this paragraph.

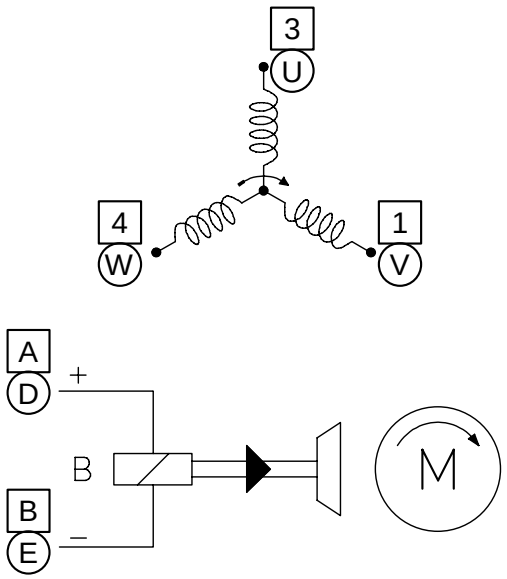
As already mentioned, the 8C series servomotors use as connections, alternatively the following two options:

a. power and signal connectors, right-angled fixed on the frame of the motor; as shown in the overall dimensions drawing in previous chapter. The pin numbers are shown in the following figures;

b. connection box for connections to the servomotor and the possible brake and one connector for connections to the resolver; the overall dimensions drawing in shown in the previous Chapter 3; the pin numbers are shown in the following figures; this version is available only for 8C4 and 8C5.

Electric diagram of motor assembly components

Drive end side view



☐ - Pin Connector

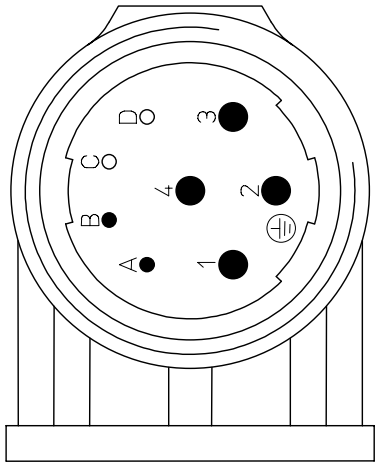
○ - Terminal in Connection box

This figure shows the electric diagram of motor assembly components, with terminal identification either in the case a) (digit in the square) or in the case b) (letter in the circle).

Connection of power cables to the servomotor

The specific connections are shown here below.

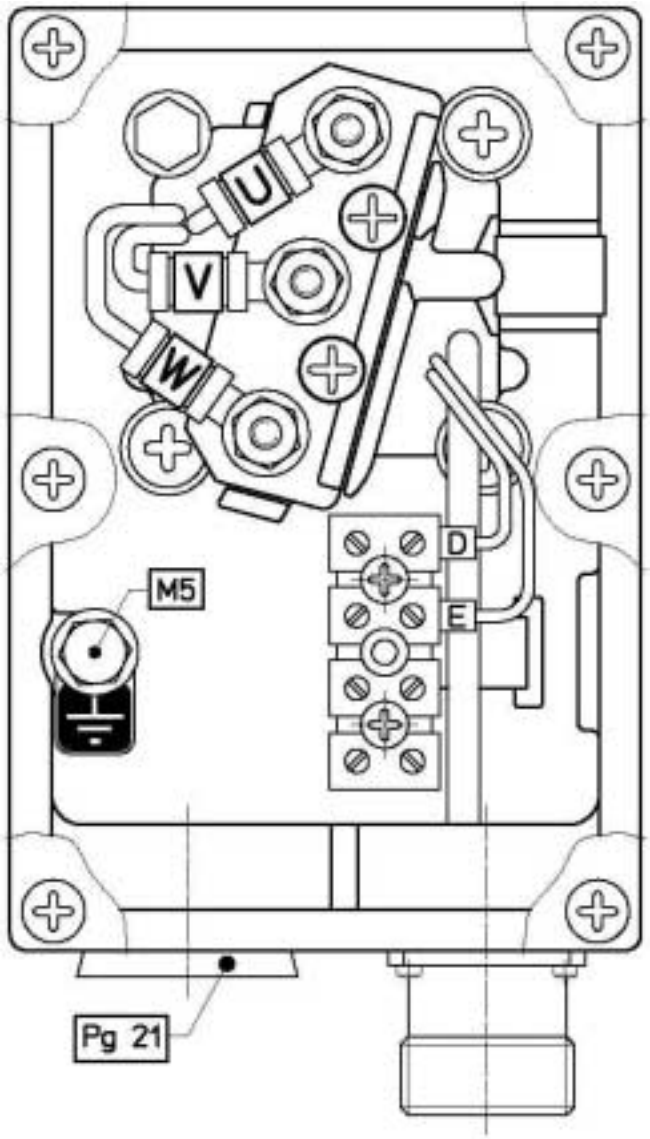
Front view of the power connector when right-angled fixed on the motor frame



Phase		Connections on motor side
U	Connect to	Pin 3
V		Pin 1
W		Pin 4
Ground ⏚		Pin 2

The connection cables must be connected, motor assembly side, to a suitable female plug connector (the ordering code is available on request), that has to be inserted on the power connector when right-angled fixed on the motor frame.

Top view of Connection box (only for 8C4 e 8C5)



Phase		Connections on motor side
U	Connect to	Pin U
V		Pin V
W		Pin W
Ground ⏚		**Ground** ⏚ on motor

Note. For cable connections, the connection box contains a kit of loose nuts and washers.

Note. The cable must be introduced into the box through the PG21 hole using an adequate cable gland.

Note. For converters manufactured by ABB Servomotors pre-assembled cables are available. For information please contact our Customer Support.

Note. At least for the route between the electrical control cabinet and the motor, it is suggested to use a shielded four-pole cable (three-phases + yellow-green), with appropriate cross section for the converter output rated current. For these connections it is also possible to use metal sheath cables. **In any case, the external shield must be connected to the motor earth.**

Note. It is important to keep in mind that it is necessary to strictly observe what described in the Installation Manual in the Chapter “Application guide to electromagnetic compatibility”

WARNING! In general, for any kind of converter, t**he correct correspondence of the connections between motor and converter must be strictly observed**.

The exchange of phases prevents the drive system from operating.

Connection of the brake to the servomotor

With reference to the previous figures, the connections to be done for what concerns the mechanical parking brake are here reported in detail.

Motor with connectors

Pin		Connections on motor side
Brake +	Connect to	Pin A
Brake -		Pin B

Motor with terminal box

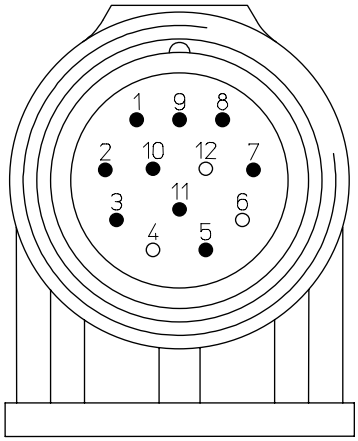
Pin		Connections on motor side
Brake +	Connect to	Pin D
Brake -		Pin E

Note. **The power supply polarity must absolutely be respected** (as explained in the converter manual): exchanging the poles means failure of supply and therefore a braking action on the motor

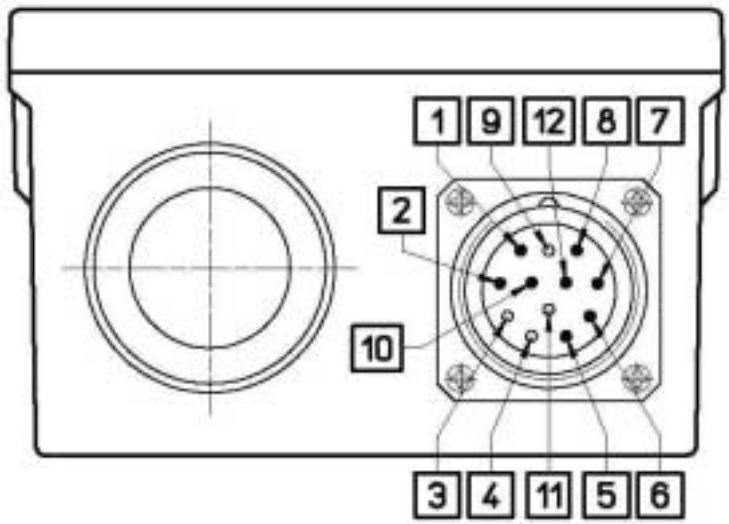
Connection of signal cables to the servomotor

The connections to be done are reported in detail in the following pages.

Front view of the signal connector when right-angled fixed on the motor frame



Front view of the signal connector fixed on the terminal box (only for 8C4 and 8C5)



Connection of signal pins on motor side

PIN	1	2	3	4	5	6	7	8	9	10	11	12
Resolver	S2	S1	⏚	N.C.	R1	N.C.	R2			S4	S3	N.C

Note. N.C. = not connected.

Note. For the resolver connection between motor assembly and converter, **standardized cables** for fixed installation are available complete with connector both on the motor assembly side and on the converter side.

Note. These cables can be purchased together with the drive system

Note. The resolver cable is also provided with two conductors (pin 8 and pin 9, on motor side), that allow for the connection of the PTC thermal sensor to the converter.

See the following paragraph *Connection to thermal sensor*.

Note. The connection diagram of the resolver is reported in the figure above. Please note that the number of the pins is identical for any kind of connector, both the right angle one and the straight fixed connector on the terminal box.

WARNING! Resolver connections are extremely important! A malfunctioning of this part of the circuit may seriously compromise the operation of the whole drive system.

If users prefer to prepare the complete cable by themselves, cabling the flying connectors, the following rules should be observed:

- the assembly must be performed by skilled personnel;
- only ABB Servomotors S.r.l. approved cable type can be used, code 16080125; connections must be those described in previous figures;
- only flying connectors can be used, that are supplied on request;
- the prescriptions contained in the *Installation Manual* (only for BIVECTOR and DGV700) under section “Guidelines on the application of electromagnetic compatibility” must be complied with;
- **for no reason should the cable be interrupted between the motor assembly connector and the converter connector**: no intermediate terminal blocks and/or connectors are allowed;
- the maximum cable length must not exceed 30 m;
- if, for special reasons, a non-approved type of cable needs to be used, the Customer Service should be contacted.

Connection to the thermal sensor

Inside the motor a PTC thermal sensor is provided; this device informs the converter control circuit about a possible overtemperature of the motor.

The connection of the PTC sensor to the converter is made through the resolver cable; the pins to be used are shown in the following table.

With ABB Servomotors converters the incorrect connection of the thermal sensor prevents the drive system from operating.

PTC pin connection on motor side

PIN	1	2	3	4	5	6	7	8	9	10	11	12
Thermal sensor				N.C.		N.C.		PTC	PTC			N.C.

Note. In the standard version of Series 8C servomotors only the PTC sensor is provided; it is possible to supply a special version of the servomotor, in which a thermal switch – instead the PTC thermal sensor - is included. This special version is identified by the fifteenth digit in the motor code.

For the special version, the shielded bipolar cable, connecting the thermal switch to the converter, must be connected to terminal block **TH MOT** and absolutely it cannot be connected to the signal connector.

For this special application please contact Customer Service.

Chapter 5 – Motor Parameters and data

Introduzione

This Chapter provides with information on the main motor parameters and electromechanical data of the 8C servomotors.

8C Series Servomotors Data

The following tables report the most important data on the performances of the servomotors of the 8C series as well as data mainly related to their electrical characteristics.

It is worth noting that all these data are reported for completeness of information, but that only a part of them is currently used by the customers.

High voltage motors

The following data refer to the so called High Voltage motors, i.e. motors to be supplied up to 400 Vac. these motors are characterized by the value M in the 16th position of the code.

TYPE	Continuous torque at zero speed M_0 [Nm] (3)	Current at continuous torque I_0 [A] (1) (2) (3)	Rated torque M_N [Nm] (3)	Rated current I_N [A] (1) (2) (3)	Rated speed n_N [revi/min]	Mechanical rated power P_N [kW] (3)	Peak torque M_{max} [Nm]	Current at peak torque I_{max} [A] (1)	Motor current limit I_{limit} [A]
(4)									
8C1.1.30	1.3	1.4	1.2	1.3	3000	0.38	4.6	5.5	9.3
8C1.1.60	1.3	2.1	1.05	1.8	6000	0.66	4.6	8.1	13.8
8C1.2.30	2.5	2.5	2.2	2.3	3000	0.69	8.8	9.7	16.4
8C1.2.60	2.5	3.1	1.8	2.4	6000	1.13	8.8	12.2	20.7
8C1.3.30	3.6	2.4	3.1	2.2	3000	0.97	12.6	9.3	15.8
8C1.3.60	3.6	4.3	2.3	2.9	6000	1.45	12.6	16.7	28.3
8C1.4.30	4.5	2.8	3.8	2.5	3000	1.19	15.8	10.8	18.4
8C1.4.60	4.5	4.9	2.5	3	6000	1.57	15.8	19.2	32.5
8C4.0.15	3.9	1.5	3.8	1.5	1500	0.61	14	5.8	9.9
8C4.0.30	3.9	2.8	3.4	2.4	3000	1.13	14	10.8	18.3
8C4.1.15	7.3	2.5	6.9	2.5	1500	1.13	26.3	10.3	17.5
8C4.1.30	7.3	4.6	5.8	3.8	3000	2.04	26.3	18.3	31.1
8C4.2.15	9.6	3.3	8.8	3.2	1500	1.48	35	13.4	22.7
8C4.2.30	9.6	5.8	7.2	4.6	3000	2.64	35	23.8	40.4
8C4.3.15	11.6	3.9	10.6	3.7	1500	1.81	42.7	15.9	26.9
8C4.3.30	11.6	7.2	8.2	5.4	3000	3.14	42.7	29.5	50
8C4.4.15	14.1	4.6	12.7	4.3	1500	2.2	52.9	19.2	32.5
8C4.4.30	14.1	7.9	9.4	5.6	3000	3.83	52.9	33	56.1
8C5.0.15	12.2	4.2	11.6	4.1	1500	1.82	42.7	16.3	27.7
8C5.0.30	12.2	8	10	6.8	3000	3.14	42.7	31	52.6
8C5.1.15	16.9	5.3	16	5.1	1500	2.51	59.2	20.5	34.7
8C5.1.30	16.9	11	13	8.8	3000	4.08	59.2	43	72.9
8C5.2.15	21.5	7.5	20	7.1	1500	3.14	75.3	29.3	49.7
8C5.2.30	21.5	14.1	16	10.9	3000	5.03	75.3	54.6	92.7
8C5.3.15	25.8	8.4	23.5	7.8	1500	3.69	90.3	32.8	55.6
8C5.3.30	25.8	15.6	18.5	11.6	3000	5.81	90.3	60.5	102.7
8C5.4.15	30	9.8	27	9	1500	4.24	105	38.1	64.7
8C5.4.30	30	17.8	21	13	3000	6.6	105	69.3	117.6
8C5.5.15	34.1	11.9	30.5	10.9	1500	4.79	119	46.4	78.8
8C5.5.30	34.1	21.2	22.7	14.8	3000	7.13	119	82.5	140.1
8C5.6.15	38.2	12.5	33	11	1500	5.18	134	48.5	82.4
8C5.6.30	38.2	23.4	24	15.5	3000	7.54	134	91	154.5
8C7.1.20	45	21.7	23.4	11.9	2000	4.90	158	84.6	144.3
8C7.2.15	76	27.5	49.5	18.8	1500	7.78	266	106.8	182.9
8C7.2.20	76	36.6	38.1	19.3	2000	7.98	266	142.4	243.4
8C7.3.10	105	28.1	82	23.1	1000	8.59	368	109.4	186.8
8C7.3.15	105	38.9	65	25.4	1500	10.2	368	151.5	258.7
8C7.3.20	105	50.6	50	25.4	2000	10.4	368	197	336.5

Note (1) Currents are in RMS values.

Note (2) Tolerance ± 5%.

Note (3) Duty type S1, ambient temperature mounted on 40°C, steel flange (dim. 300x300x20 mm; for 8C7: dim. 600x400x25 mm), altitude ≤ 1000 m above sea level.

Note (4) See Appendix A for information about the servomotor code.

TYPE	Torque constant K_{t0} [Nm/A] (1) (2) (3)	B.e.m.f. between phases at rated speed V [V] (1) (2) (3)	Resistance at terminals R_{UV} [W] (1) (3)	Inductance at terminals L_{UV} [mH] (4)	Moment of inertia of rotor J_m [kgcm2] (3) (6)	Weight m [kg]	Curves (5)
8C1.1.30	1.05	190	20.8	47	0.9	3.1	501000
8C1.1.60	0.71	257	9.07	21	0.9	3.1	501001
8C1.2.30	1.14	208	6.85	23	1.65	4.1	501002
8C1.2.60	0.9	328	4.26	14	1.65	4.1	501003
8C1.3.30	1.71	310	8.33	31	2.35	4.9	501004
8C1.3.60	0.95	346	2.6	9.6	2.35	4.9	501005
8C1.4.30	1.84	333	6.27	25	3	5.8	501006
8C1.4.60	1.04	376	2.02	8	3	5.8	501007
8C4.0.15	3.04	276	29.3	96	5	6.9	501008
8C4.0.30	1.63	296	8.51	28	5	6.9	501009
8C4.1.15	3.22	292	10.7	41	9.4	9.2	501010
8C4.1.30	1.81	328	3.22	13	9.4	9.2	501011
8C4.2.15	3.3	299	6.76	29	12.8	10.8	501012
8C4.2.30	1.85	336	2.12	9.3	12.8	10.8	501013
8C4.3.15	3.4	308	5.13	23	16	12.4	501014
8C4.3.30	1.83	332	1.46	6.8	16	12.4	501015
8C4.4.15	3.48	316	3.76	24	20.5	14.8	501016
8C4.4.30	2.02	366	1.3	8	20.5	14.8	501017
8C5.0.15	3.3	300	5.71	44	21	15	501018
8C5.0.30	1.74	315	1.58	12	21	15	501019
8C5.1.15	3.65	331	3.65	32	30.2	18.3	501020
8C5.1.30	1.74	315	0.82	7.3	30.2	18.3	501021
8C5.2.15	3.25	294	1.91	19	40	21.9	501022
8C5.2.30	1.74	315	0.55	5.3	40	21.9	501023
8C5.3.15	3.48	315	1.59	17	49.2	25.3	501024
8C5.3.30	1.88	342	0.46	4.9	49.2	25.3	501025
8C5.4.15	3.48	315	1.23	13	59	28.6	501026
8C5.4.30	1.91	347	0.38	4.1	59	28.6	501027
8C5.5.15	3.25	294	0.89	9.8	68.4	32	501028
8C5.5.30	1.83	331	0.28	3.1	68.4	32	501029
8C5.6.15	3.48	315	0.86	9.7	78	35.4	501030
8C5.6.30	1.85	336	0.24	2.8	78	35.4	501031
8C7.1.20	2.36	285	0.46	5.4	97.5	34.1	501032
8C7.2.15	3.14	285	0.29	4.4	188	49.6	501033
8C7.2.20	2.36	285	0.16	2.5	188	49.6	-
8C7.3.10	4.25	257	0.30	5.2	278	65	501034
8C7.3.15	3.07	278	0.16	2.7	278	65	-
8C7.3.20	2.36	285	0.09	1.6	278	65	-

Note (1) Values referred to 20°C

Note (2) Current and voltages are in RMS values.

Note (3) Tolerance ± 5%.

Note (4) Tolerance ± 10%.

Note (5) The operational curves are obtained with Bivector converters

Note (6) Rotor inertia can be increased on request.

Low voltage motors

The following data refer to the so called Low Voltage motors, i.e. motors to be supplied up to 230 Vac. these motors are characterized by the value ME in the 16th position of the code.

TYPE	Continuous torque at zero speed M_0 [Nm]	Current at continuous torque I_0 [A]	Rated torque M_N [Nm]	Rated current I_N [A]	Rated speed n_N [revi/min]	Mechanical rated power P_N [kW]	Peak torque M_{max} [Nm]	Current at peak torque I_{max} [A]	Motor current limit I_{limit} [A]
(4)	(3)	(1) (2) (3)	(3)	(1) (2) (3)		(3)		(1)	
8C1.1.30	1.3	2.1	1.2	2	3000	0.38	4.6	8.1	13.8
8C1.1.60	1.3	3.2	1.05	2.7	6000	0.66	4.6	12.5	21.3
8C1.2.30	2.5	3.1	2.2	2.8	3000	0.69	8.8	11.9	20.1
8C1.2.60	2.5	5	1.8	3.8	6000	1.13	8.8	19.3	32.8
8C1.3.30	3.6	4	3.1	3.6	3000	0.97	12.6	15.4	26.1
8C1.3.60	3.6	7.9	2.3	5.4	6000	1.45	12.6	30.8	52.3
8C1.4.30	4.5	4.9	3.8	4.4	3000	1.19	15.8	19.2	32.5
8C1.4.60	4.5	9.2	2.5	6	6000	1.57	15.8	35.6	60.4
8C4.0.15	3.9	2.9	3.8	2.9	1500	0.61	14	11.7	19.9
8C4.0.30	3.9	4.8	3.4	4.3	3000	1.13	14	19	32.2
8C4.1.15	7.3	4.4	6.9	4.3	1500	1.13	26.3	17.3	29.4
8C4.1.30	7.3	7.5	5.8	6.2	3000	2.04	26.3	29.9	50.8
8C4.2.15	9.6	4.8	8.8	4.6	1500	1.48	35	19.5	33.1
8C4.2.30	9.6	9.3	7.2	7.3	3000	2.64	35	37.8	64.2
8C4.3.15	11.6	6.8	10.6	6.5	1500	1.81	42.7	28.1	47.8
8C4.3.30	11.6	12.6	8.2	9.4	3000	3.14	42.7	51.6	88
8C4.4.15	14.1	7.5	12.7	7	1500	2.2	52.9	31.3	53.1
8C4.4.30	14.1	14.3	9.4	10	3000	3.83	52.9	59.5	100.9
8C5.0.15	12.2	8	11.6	7.7	1500	1.82	42.7	31	52.6
8C5.0.30	12.2	13	10	11.3	3000	3.14	42.7	52	87.7
8C5.1.15	16.9	10	16	9.7	1500	2.51	59.2	39	66.3
8C5.1.30	16.9	17	13	13.6	3000	4.08	59.2	66	112.1
8C5.2.15	21.5	13.2	20	12.5	1500	3.14	75.3	51.2	86.9
8C5.2.30	21.5	21.1	16	16.3	3000	5.03	75.3	82	139.1
8C5.3.15	25.8	16.9	23.5	16	1500	3.69	90.3	65.6	111.3
8C5.3.30	25.8	25.3	18.5	18.9	3000	5.81	90.3	98.4	167
8C5.4.15	30	16.3	27	15	1500	4.24	105	63.5	107.8
8C5.4.30	30	32.7	21	24	3000	6.6	105	127.1	216
8C5.5.15	34.1	17.4	30.5	16	1500	4.79	119	67.5	114.6
8C5.5.30	34.1	31.8	22.7	22.2	3000	7.13	119	123.8	210
8C5.6.15	38.2	18.7	33	16.6	1500	5.18	134	73	123.6
8C5.6.30	38.2	37.4	24	24.7	3000	7.54	134	146	155

Note (1) Currents are in RMS values.

Note (2) Tolerance ± 5%.

Note (3) Duty type S1, ambient temperature mounted on 40°C, steel flange (dim. 300x300x20 mm), altitude ≤ 1000 m above sea level.

Note (4) See Appendix A for information about the servomotor code.

TYPE	Torque constant K_{t0} [Nm/A] (1) (2) (3)	B.e.m.f. between phases at rated speed V [V] (1) (2) (3)	Resistance at terminals R_{UV} [W] (1) (3)	Inductance at terminals L_{UV} [mH] (4)	Moment of inertia of rotor J_m [kgcm2] (3) (6)	Weight m [kg]	Curves (5)
8C1.1.30	0.71	128	9.5	21	0.9	3.1	501038
8C1.1.60	0.46	166	3.8	9	0.9	3.1	501039
8C1.2.30	0.93	169	4.5	15	1.65	4.1	501040
8C1.2.60	0.57	208	1.7	6	1.65	4.1	501041
8C1.3.30	1.03	187	3	11	2.35	4.9	501042
8C1.3.60	0.52	187	0.76	2.8	2.35	4.9	501043
8C1.4.30	1.04	188	2.1	8	3	5.8	501044
8C1.4.60	0.56	203	0.61	2	3	5.8	501045
8C4.0.15	1.51	137	7.3	24	5	6.9	501046
8C4.0.30	0.93	169	2.7	9	5	6.9	501047
8C4.1.15	1.91	173	3.7	15	9.4	9.2	501048
8C4.1.30	1.11	201	1.25	4.9	9.4	9.2	501049
8C4.2.15	2.3	206	3.2	14	12.8	10.8	501050
8C4.2.30	1.17	212	0.84	3.7	12.8	10.8	501051
8C4.3.15	1.9	174	1.6	7.4	16	12.4	501052
8C4.3.30	1.05	190	0.48	2.2	16	12.4	501053
8C4.4.15	2.13	193	1.45	9	20.5	14.8	501054
8C4.4.30	1.1	204	0.4	2.5	20.5	14.8	501055
8C5.0.15	1.7	158	1.6	12	21	15	501056
8C5.0.30	1.04	189	0.56	4	21	15	501057
8C5.1.15	1.91	173	1	9	30.2	18.3	501058
8C5.1.30	1.13	205	0.35	3.1	30.2	18.3	501059
8C5.2.15	1.85	168	0.62	6	40	21.9	501060
8C5.2.30	1.16	210	0.25	2.4	40	21.9	501061
8C5.3.15	1.74	158	0.4	4	49.2	25.3	501062
8C5.3.30	1.16	210	0.18	1.8	49.2	25.3	501063
8C5.4.15	2.09	189	0.44	5	59	28.6	-
8C5.4.30	1.04	189	0.11	1.2	59	28.6	-
8C5.5.15	2.23	202	0.42	4.6	68.4	32	-
8C5.5.30	1.22	221	0.13	1.4	68.4	32	-
8C5.6.15	2.32	210	0.38	4.3	78	35.4	-
8C5.6.30	1.16	210	0.09	1.1	78	35.4	-

Note (1) Values referred to 20°C

Note (2) Current and voltages are in RMS values.

Note (3) Tolerance ± 5%.

Note (4) Tolerance ± 10%.

Note (5) The operational curves are obtained with Bivector converters

Note (6) Rotor inertia can be increased on request.

Other characteristics

Operating ambient temperature	0 ÷ 40 °C
Max ambient temperature	50 °C
Derating in the 40 ÷ 50 °C range	1% / °C
Storage temperature	-30 °C ÷ +85 °C
Cooling	IC0041 (completely enclosed machine, surface cooled - no fan)
Thermal Class	F
Protection degree	IP65 (for the motor frame, for the connector version) or IP54 (for the connection box version)
Back electromotive force b.e.m.f.	sinewave
Max operating altitude	1000 m.a.s.l.

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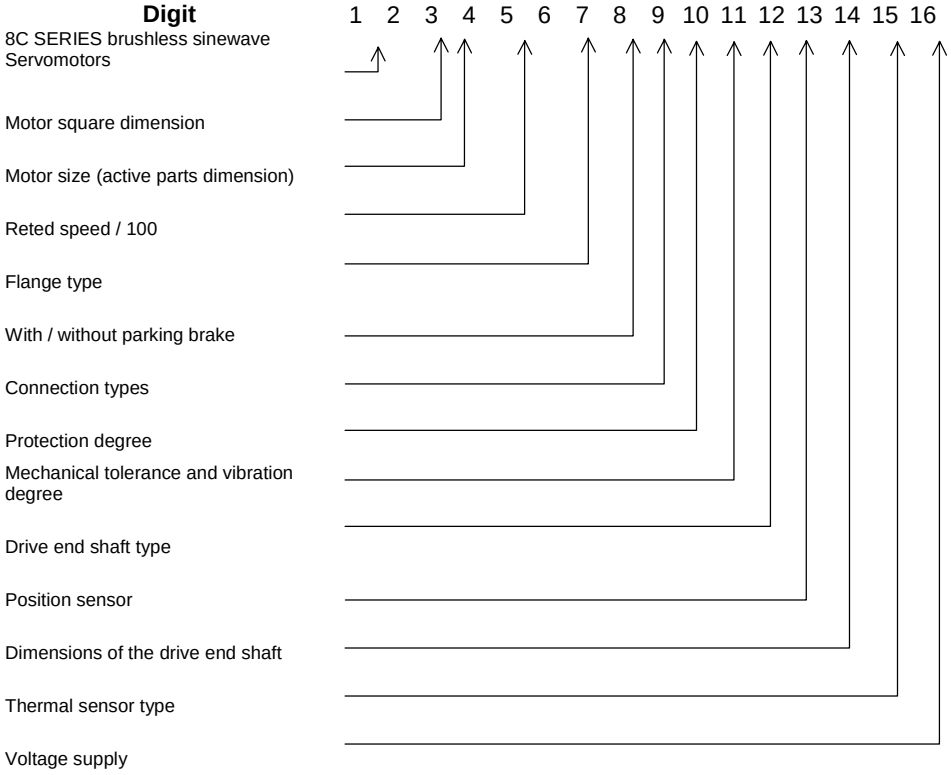
Appendix A – Motor coding

The following table shows the coding method used for 8C series servomotors manufactured by ABB Servomotors.

For a complete list of theorderable options please contact our Customer Support.



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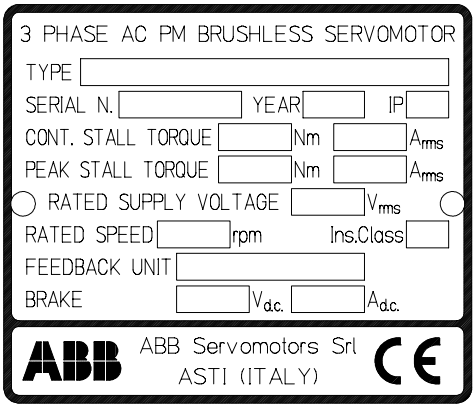
Appendix B –Servomotor Plate

The following figure shows a typical plate put on lateral side of the 8C Series servomotors manufactured by ABB Servomotors.

Servomotor plate



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Appendix C – Motor curves

Introduction

The following curves show the behaviour of the torque with respect to speed of the 8C Servomotors

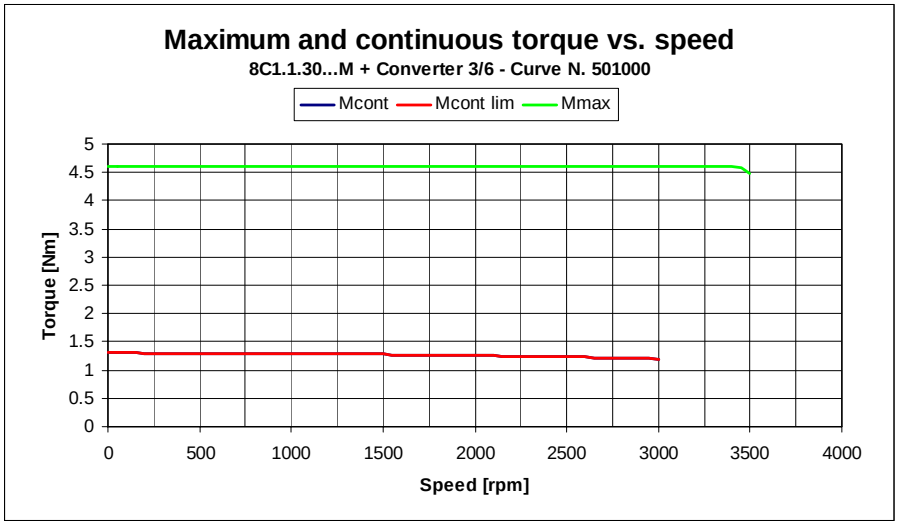
The curves represent the torque both in continuous duty and in intermittent duty at the various speeds.

These curves have been obtained by coupling the motors with Bivector converters. Similar behaviours are obtained with the DGV700 converters.

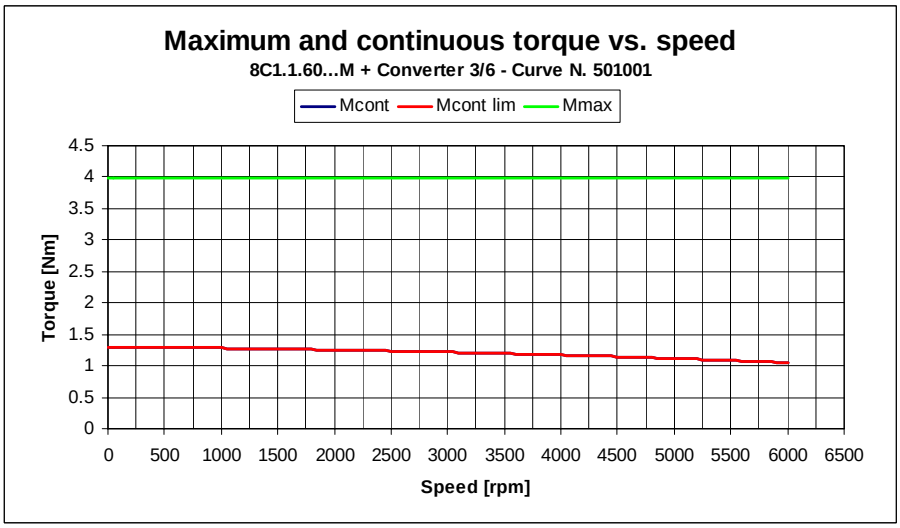
High voltage motors

The following curves refer to the so called High Voltage motors, i.e. motors to be supplied up to 400 Vac. these motors are characterized by the value M in the 16th position of the code.

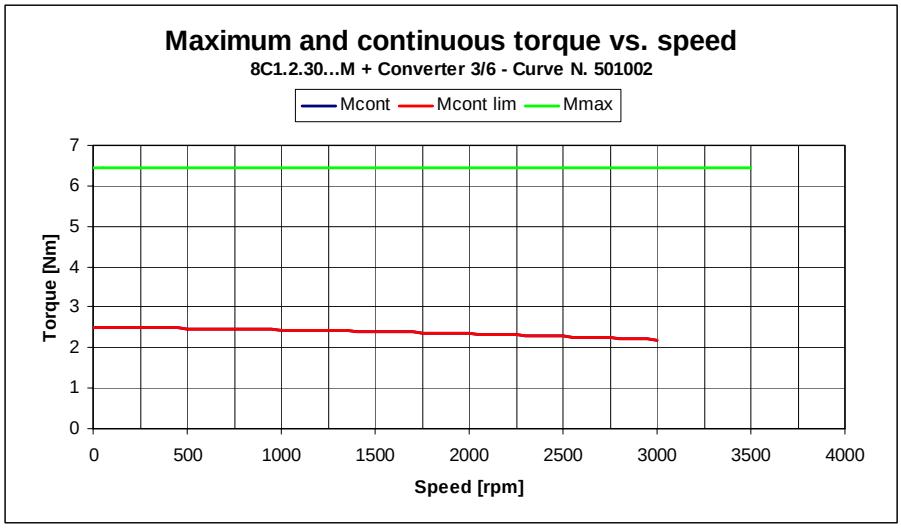
N 501000 - 8C1130



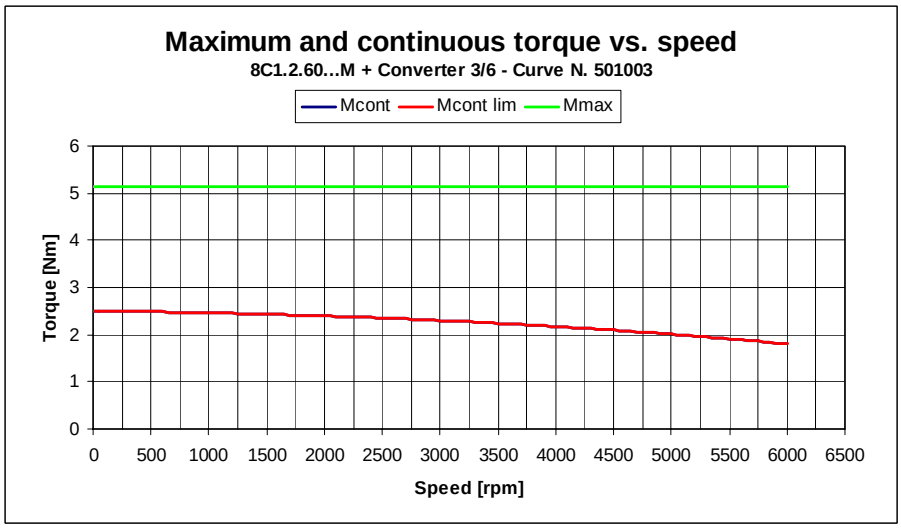
N 501001 - 8C1160



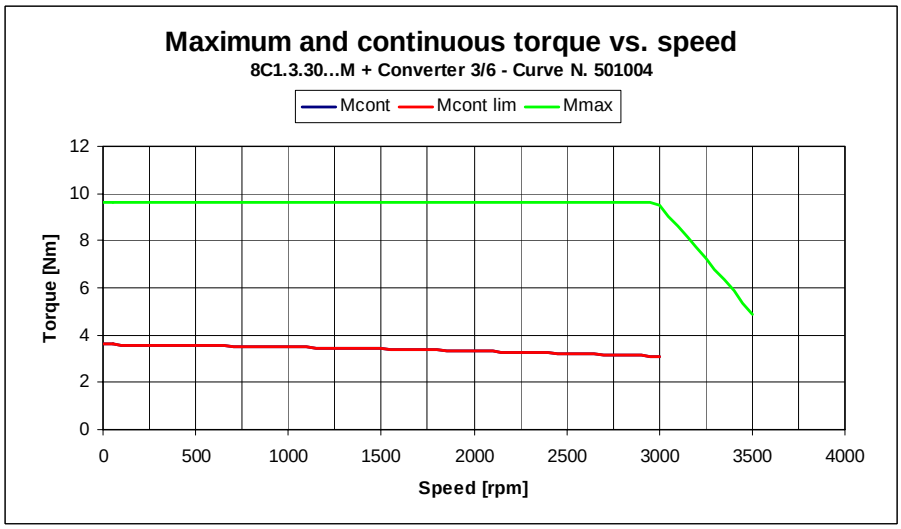
N 501002 - 8C1230



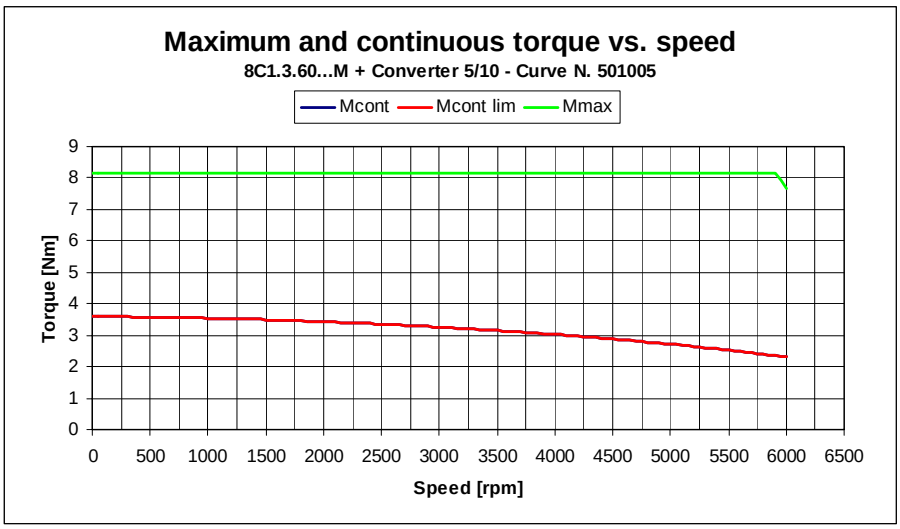
N 501003 - 8C1260



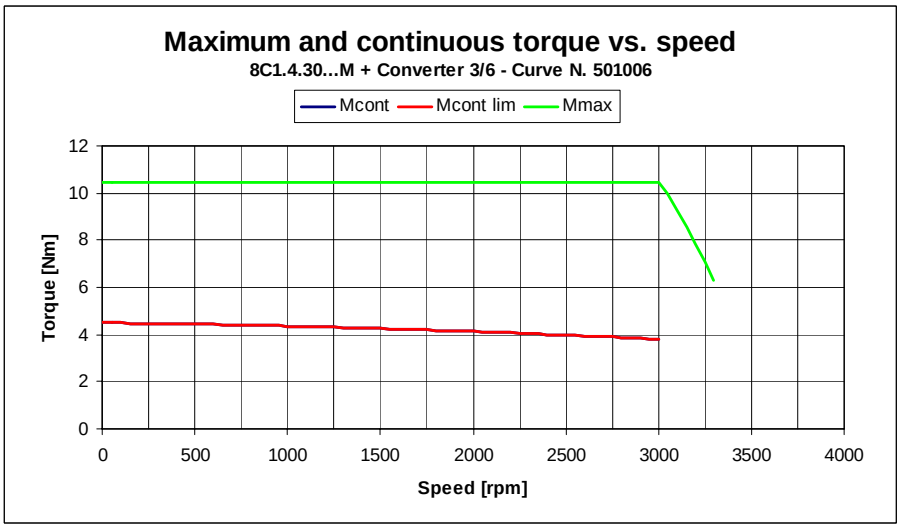
N 501004 - 8C1330



N 501005 - 8C1360



N 501006 - 8C1430



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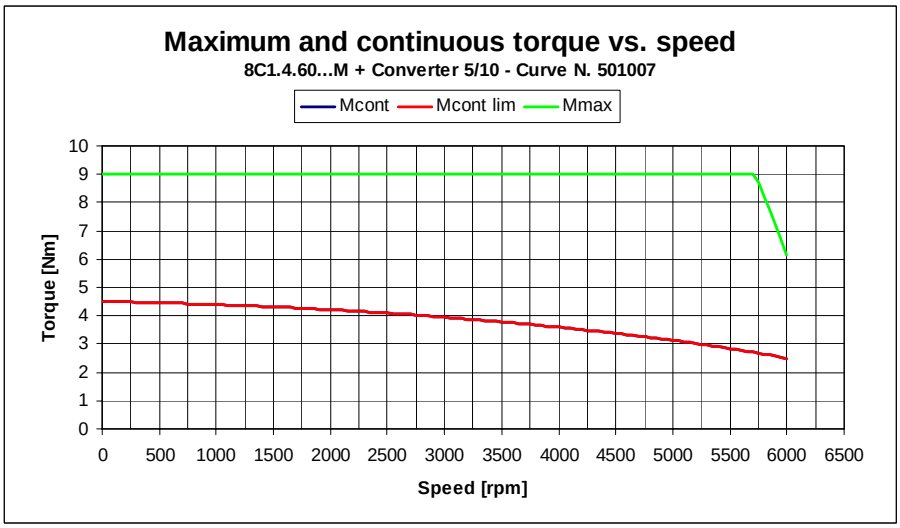
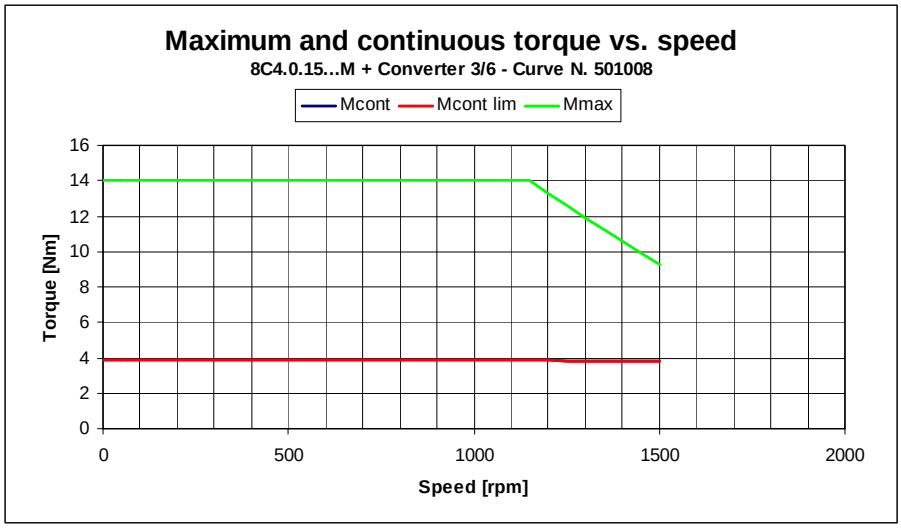
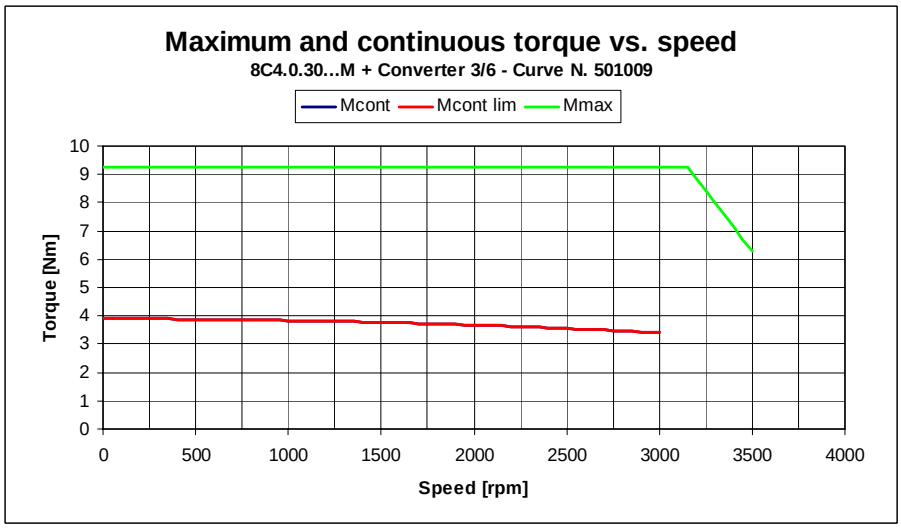


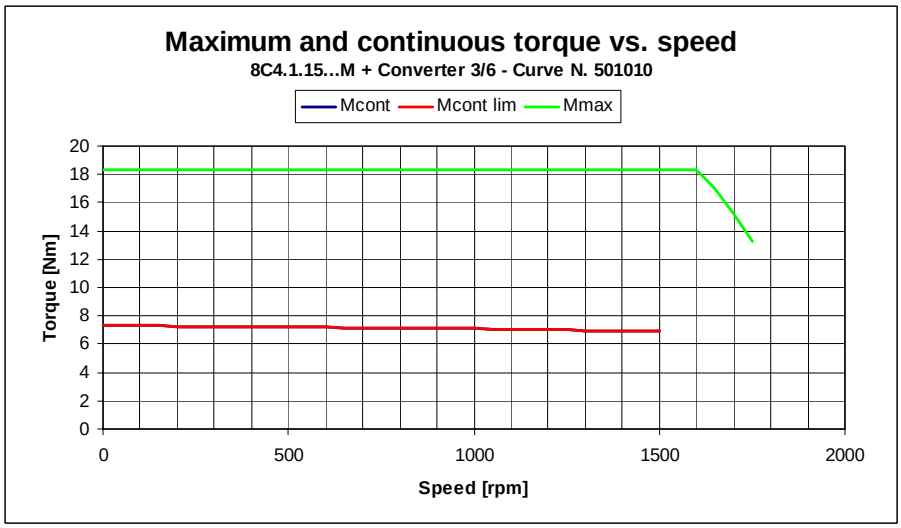
N 501008 - 8C4015



N 501009 - 8C4030



N 501010 - 8C4115



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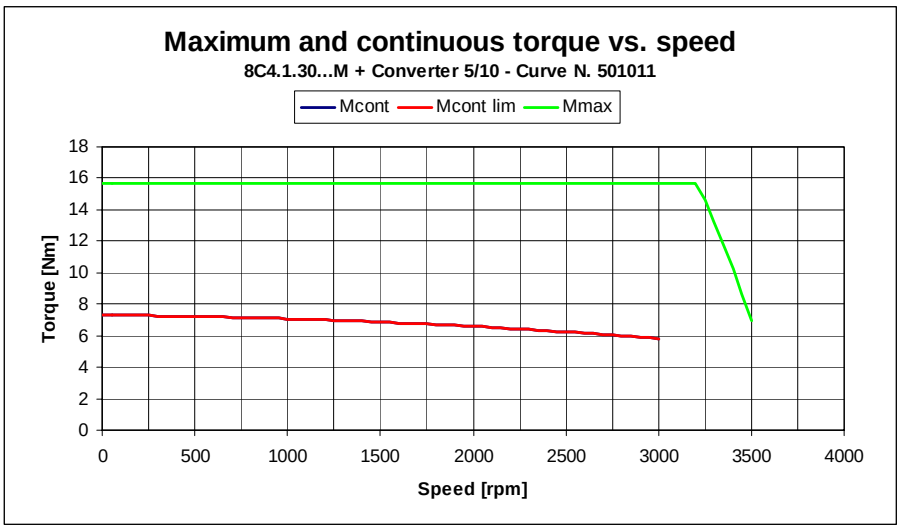
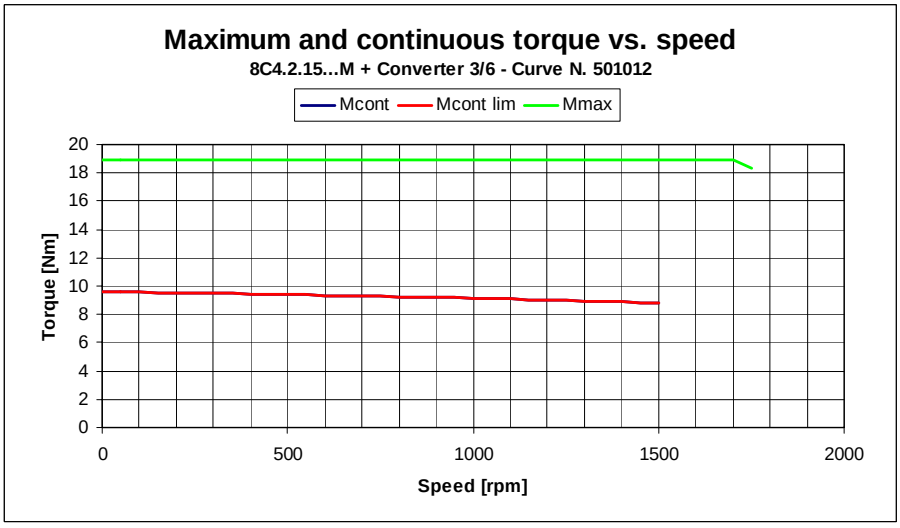


N 501012 - 8C4215



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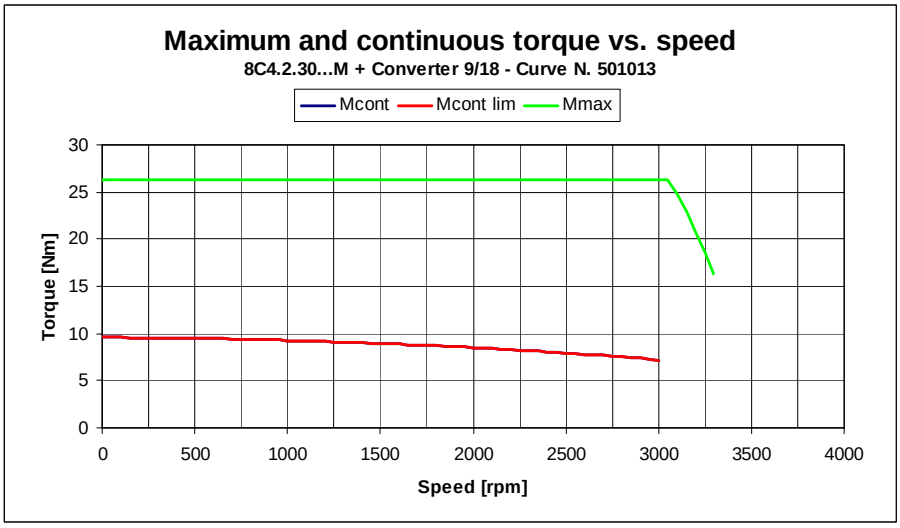

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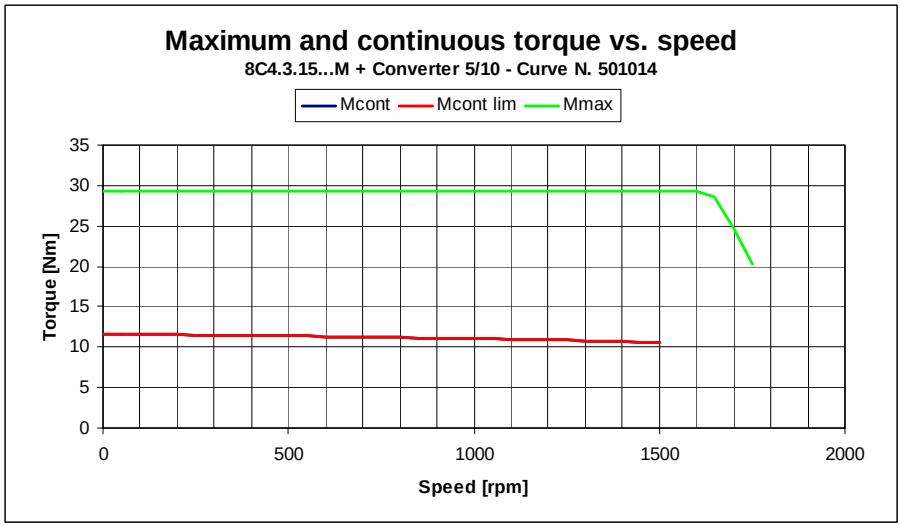

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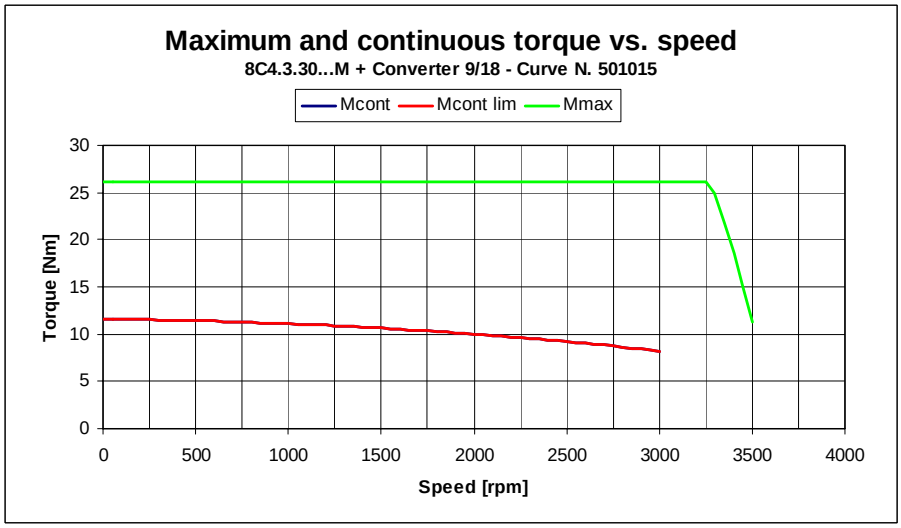

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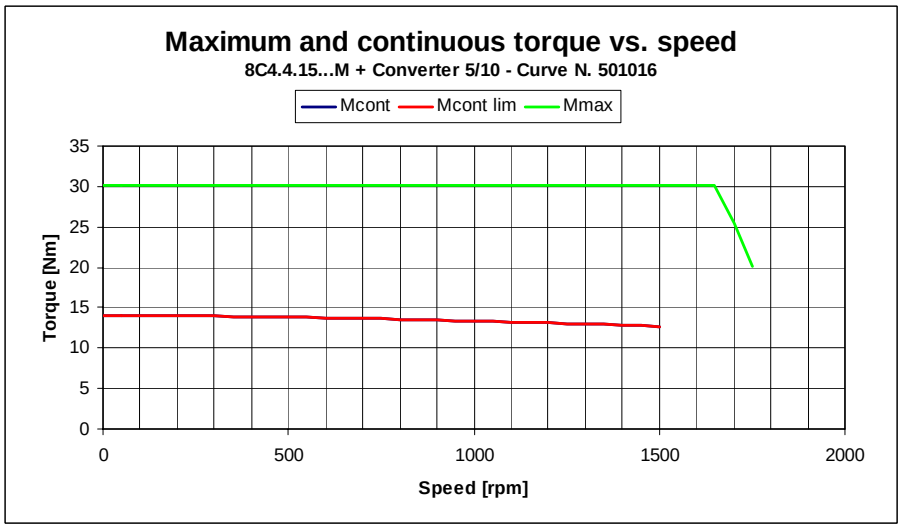

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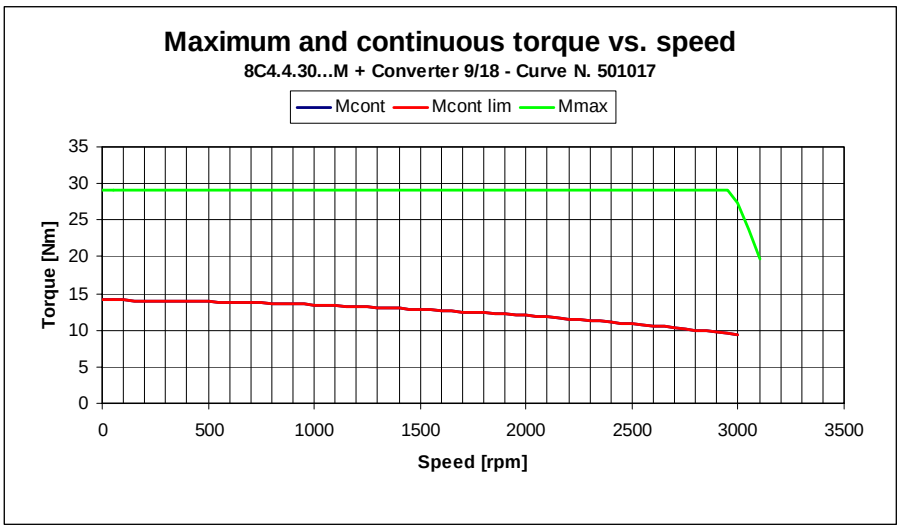

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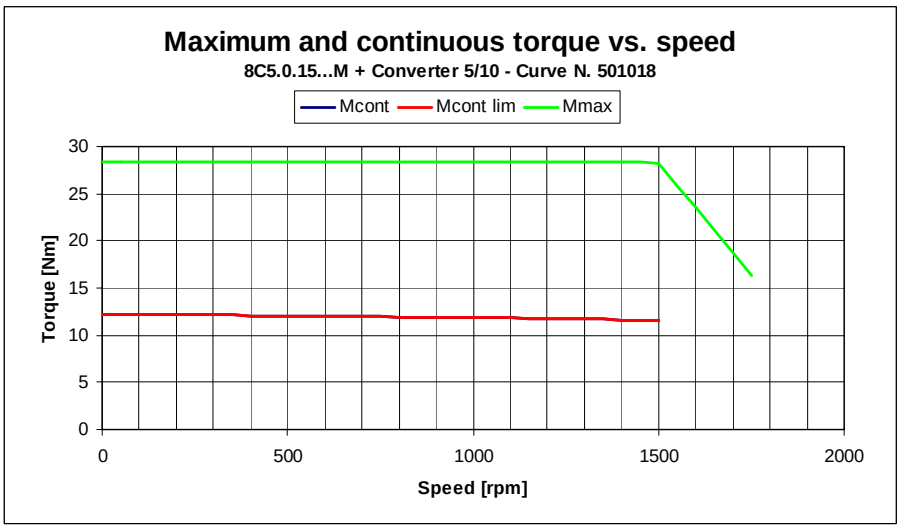

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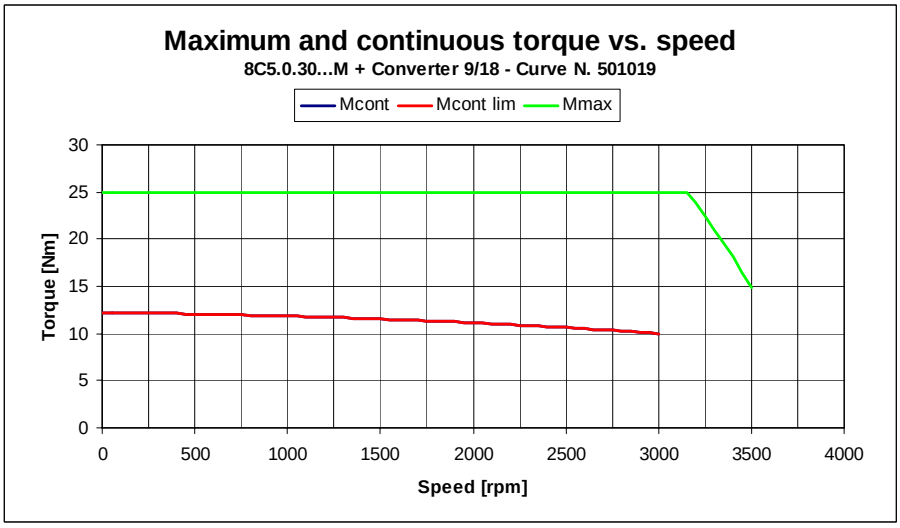
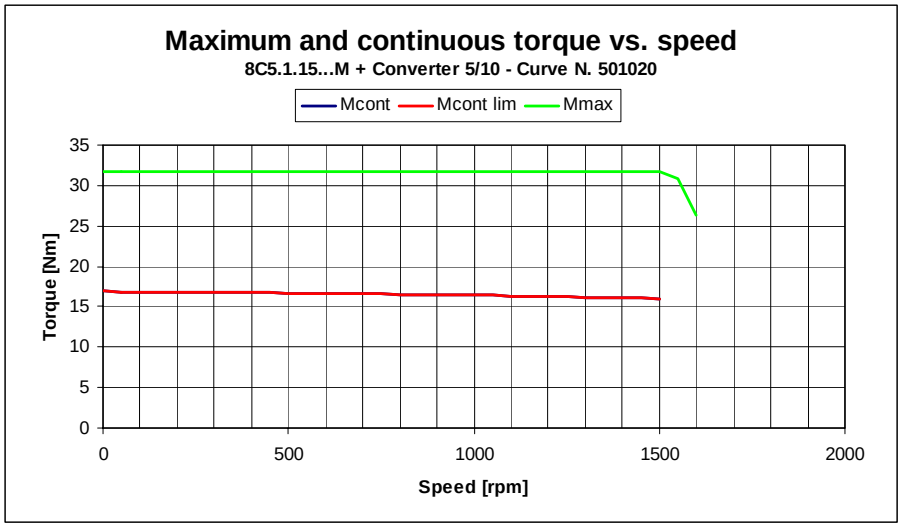
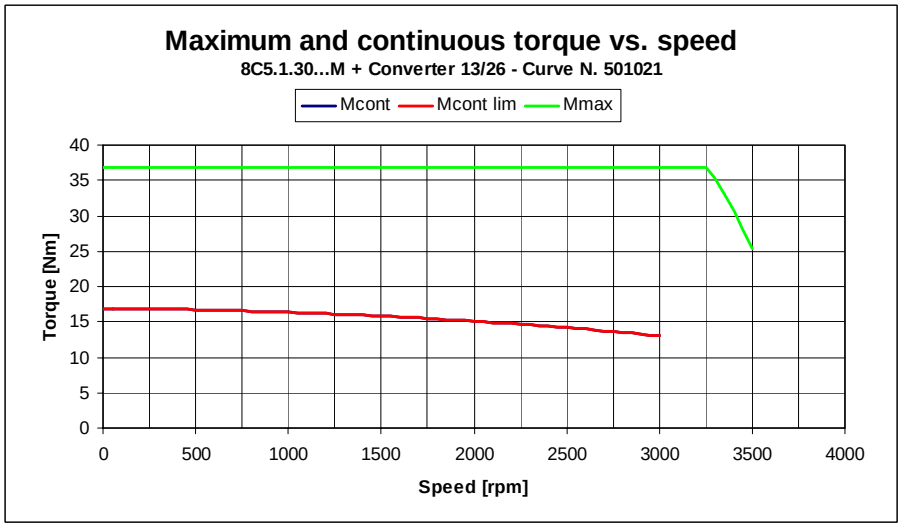


N 501020 - 8C5115



N 501021 - 8C5130



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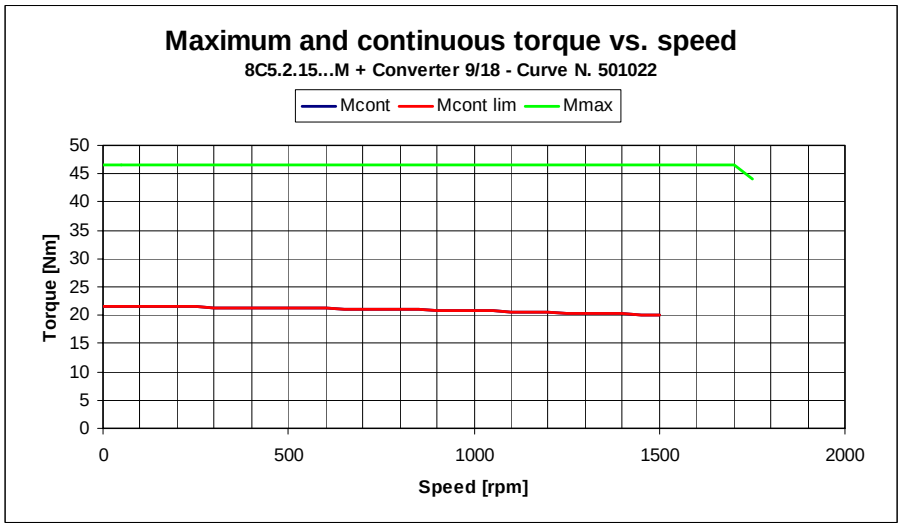

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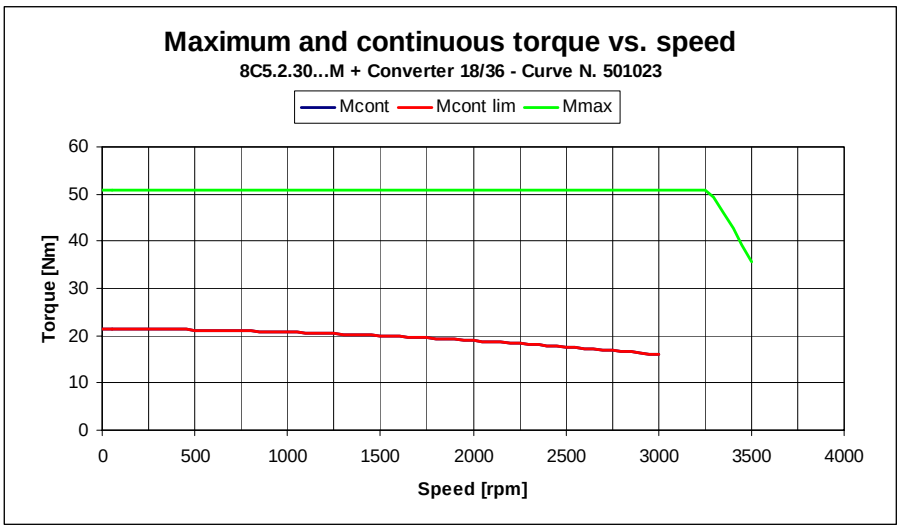

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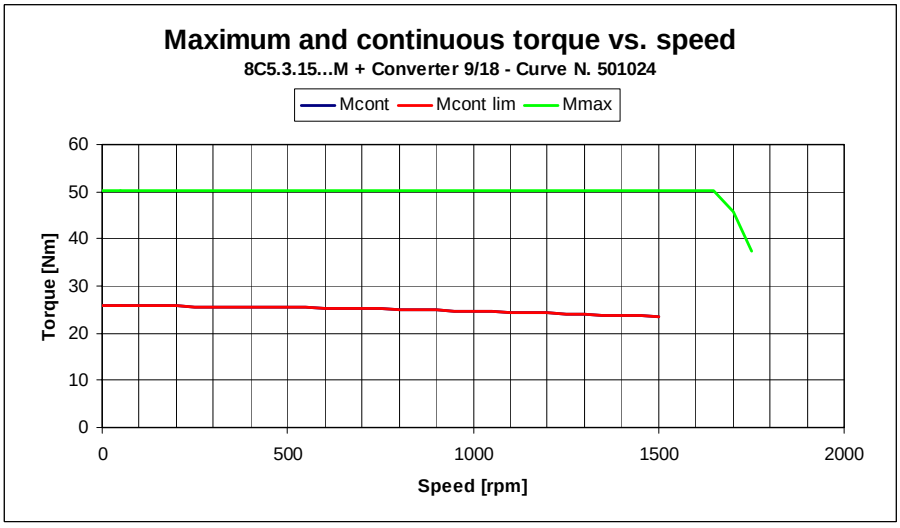

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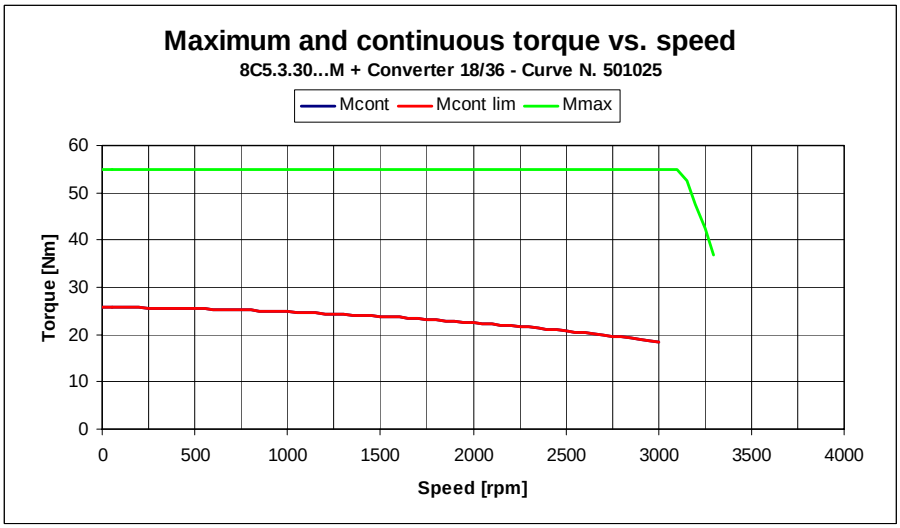
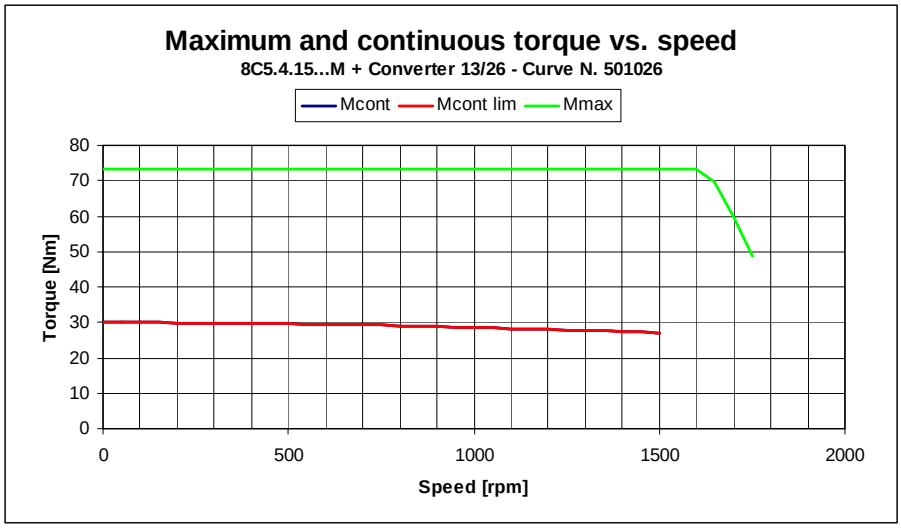


N 501026 - 8C5415



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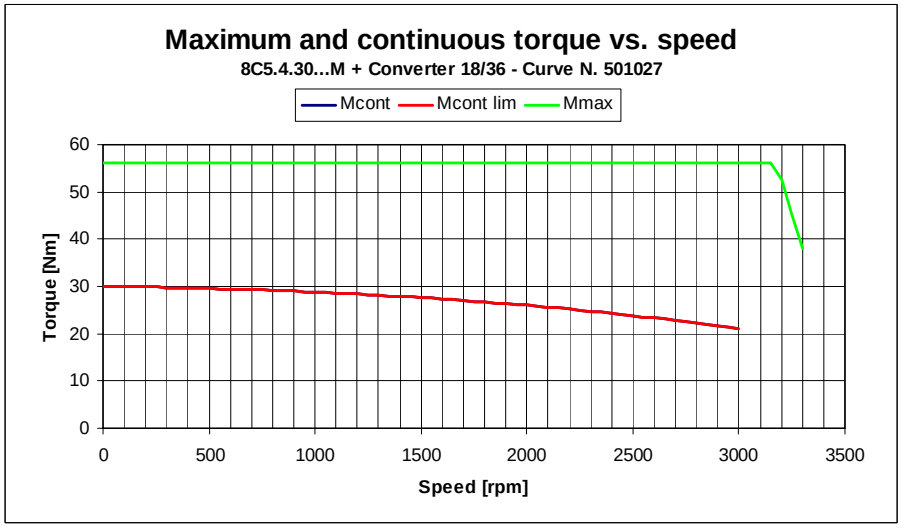

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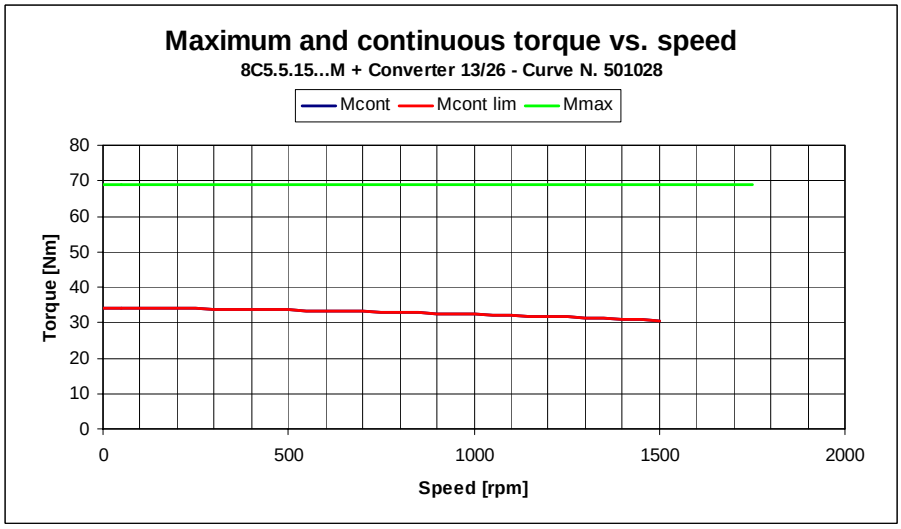
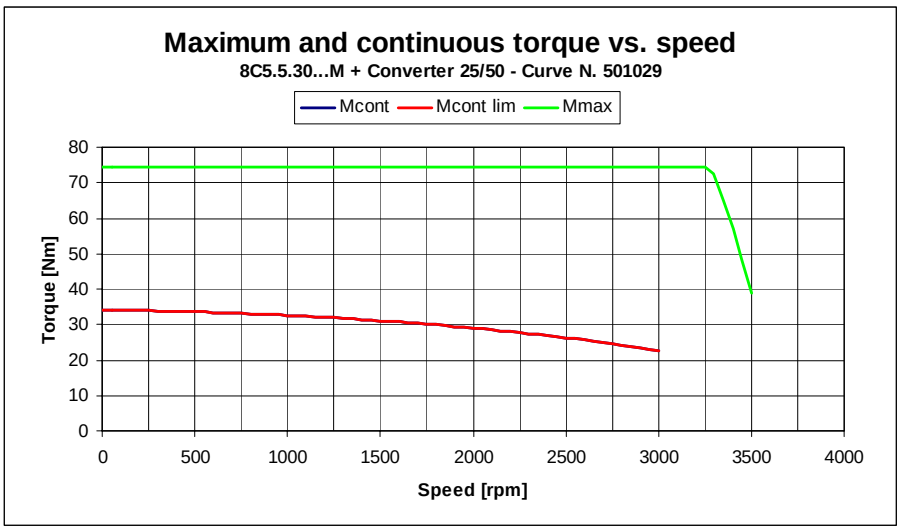


N 501029 - 8C5530



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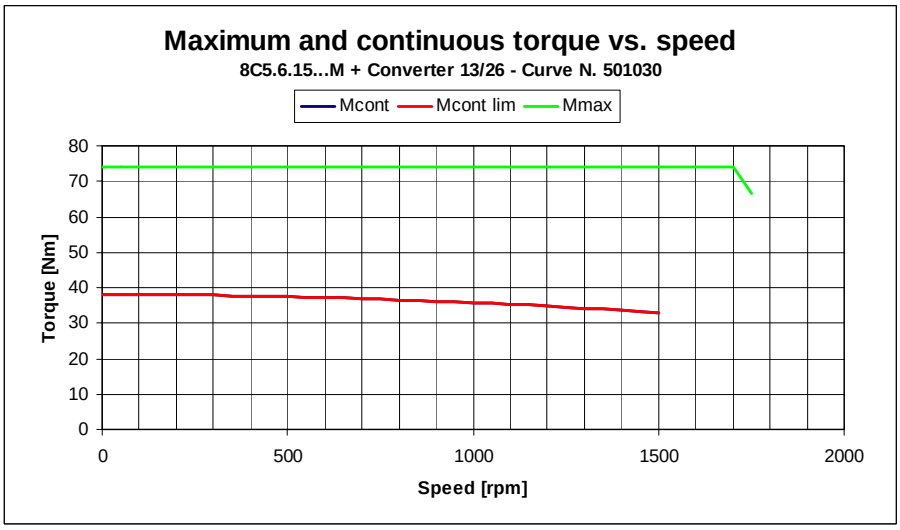
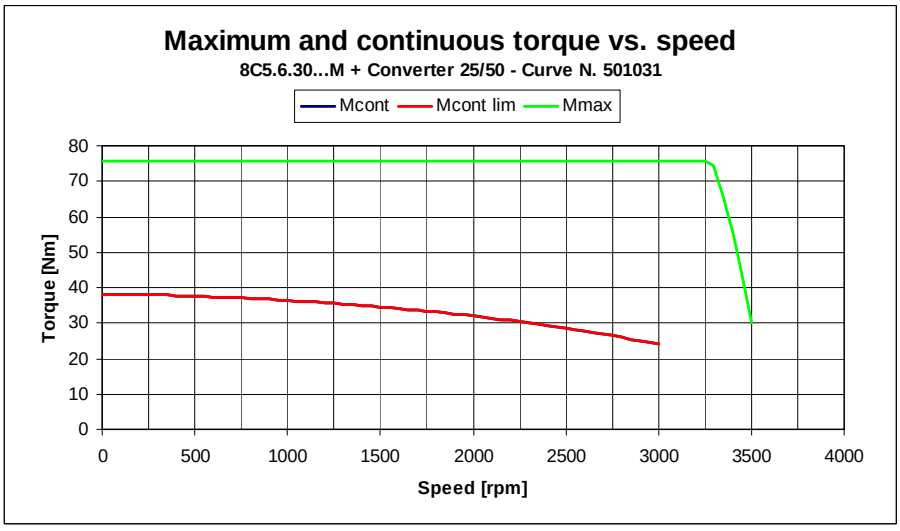
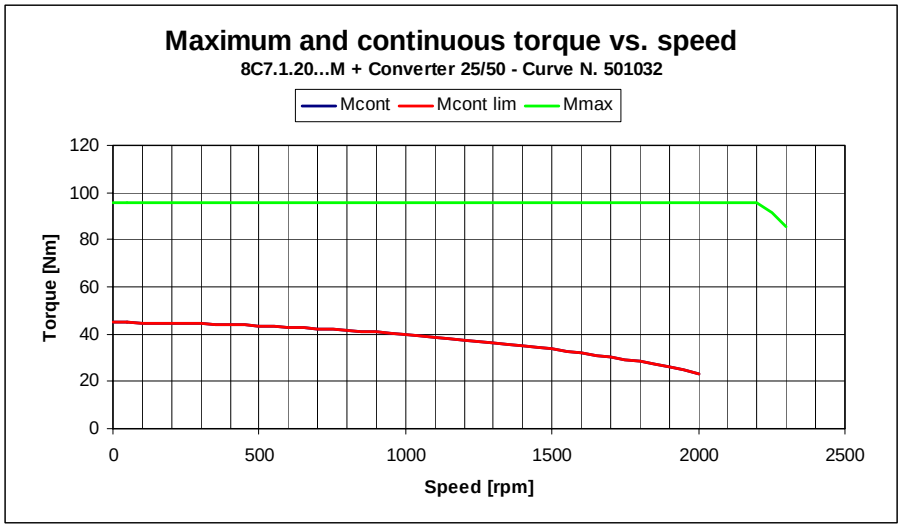


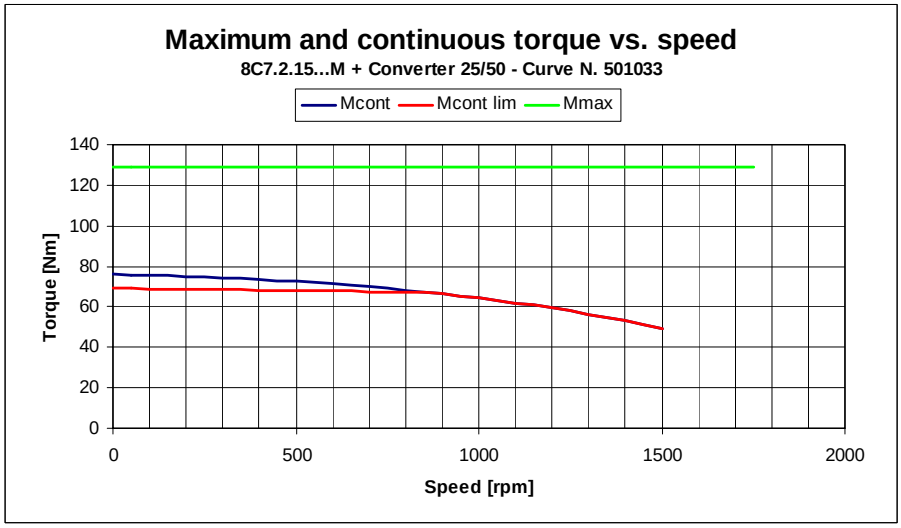
N 501031 - 8C5630



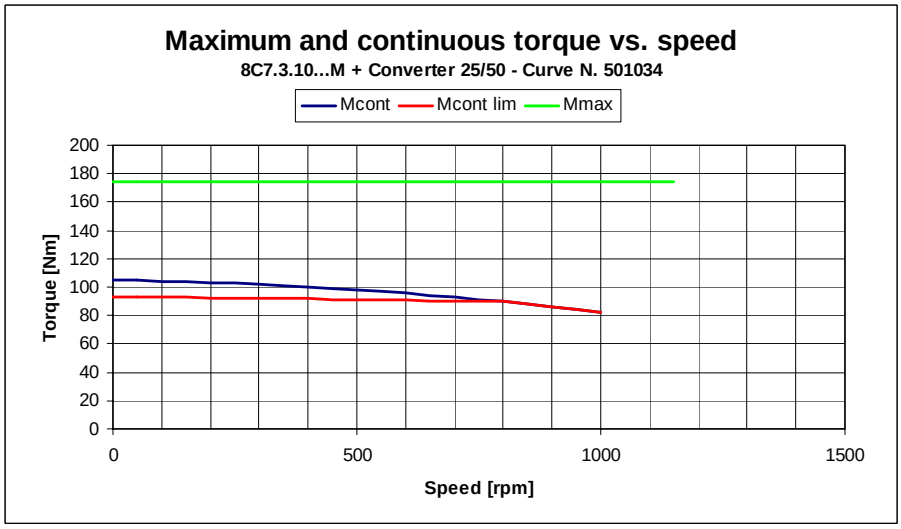
N 501032 - 8C7120



N 501033 - 8C7215



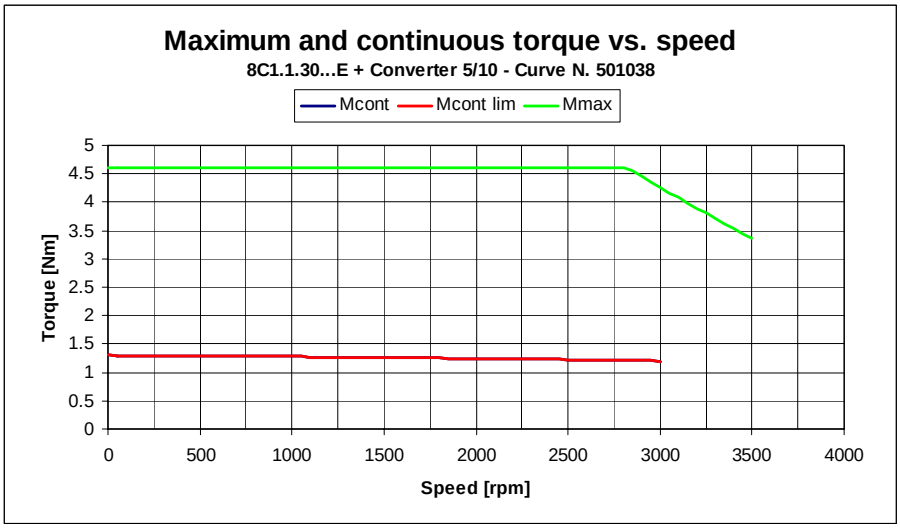
N 501034 - 8C7310



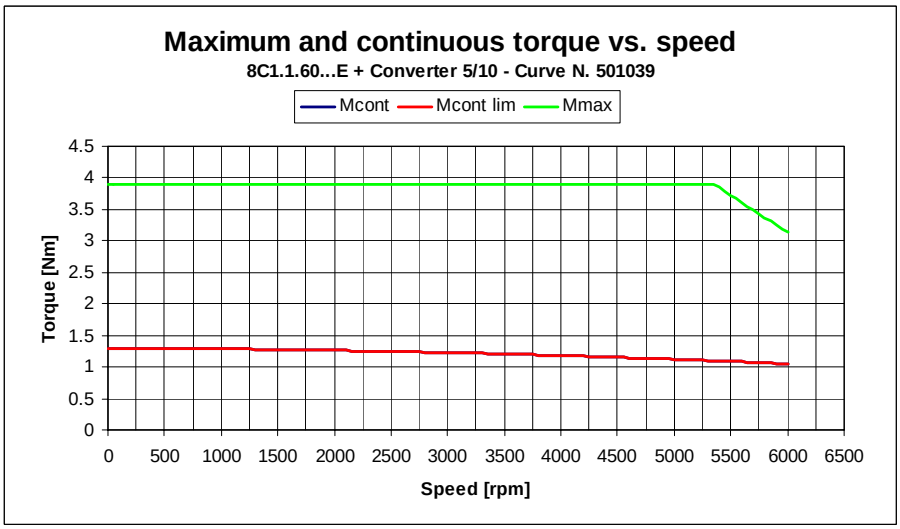
Low voltage motors

The following curves refer to the so called Low Voltage motors, i.e. motors to be supplied up to 230 Vac. these motors are characterized by the value ME in the 16th position of the code.

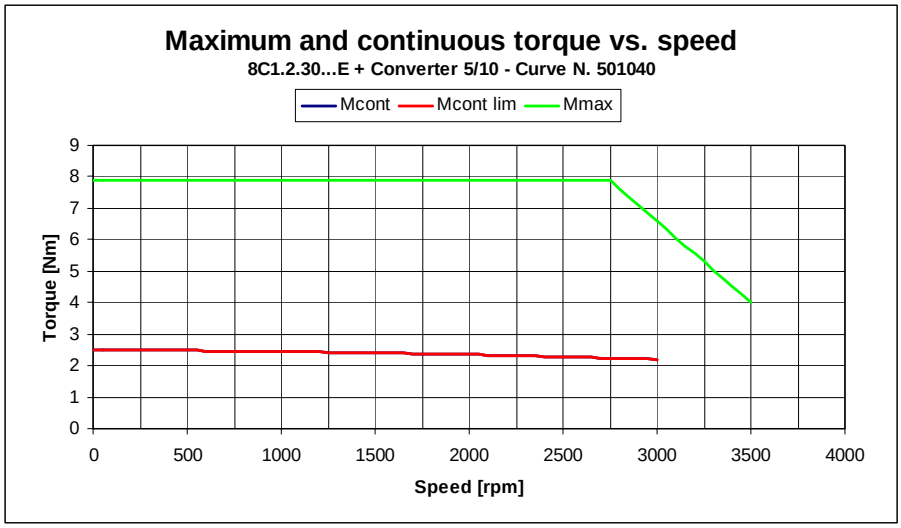
N 501038 - 8C1130



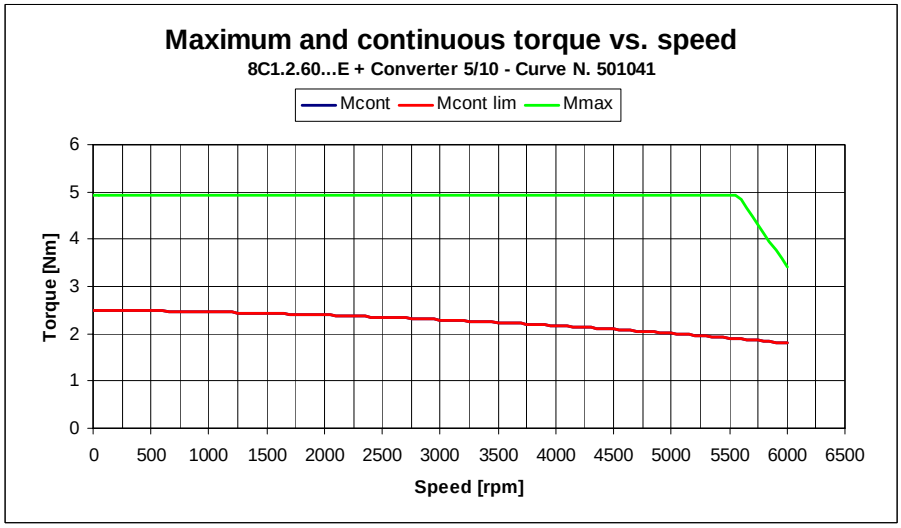
N 501039 - 8C1160



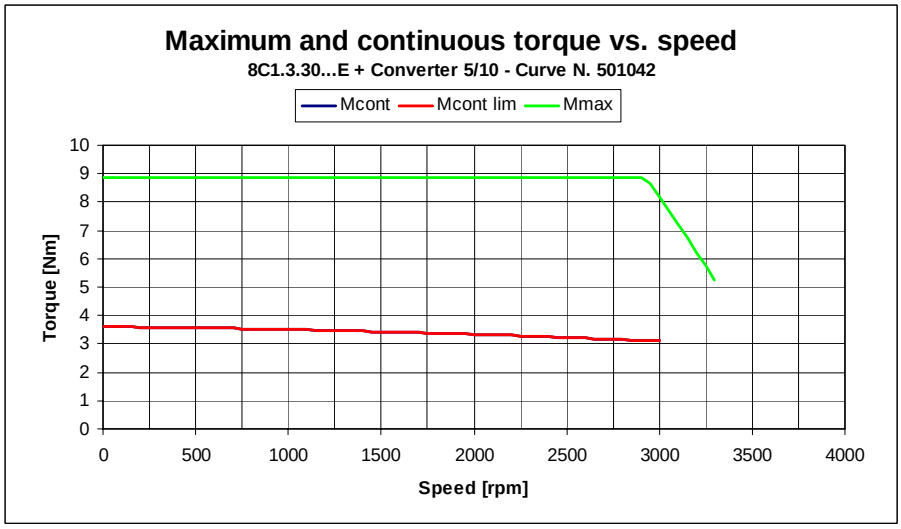
N 501040 - 8C1230



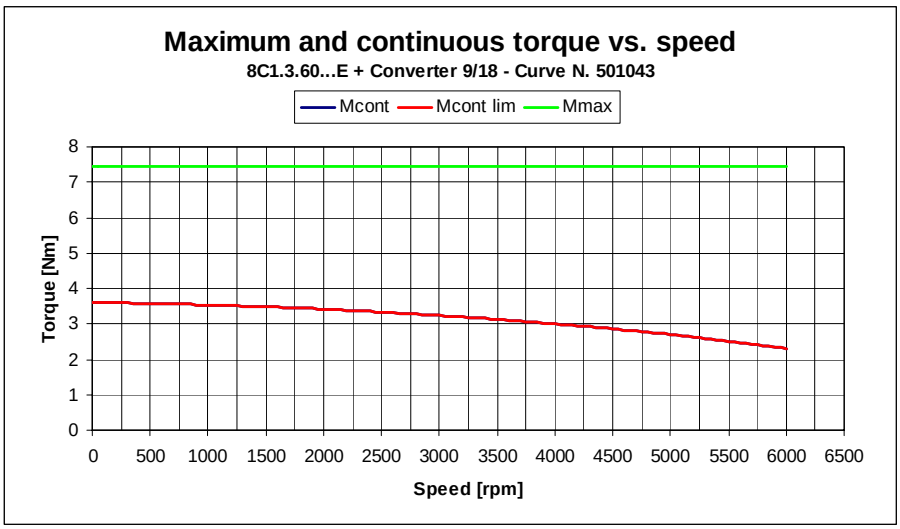
N 501041 - 8C1260



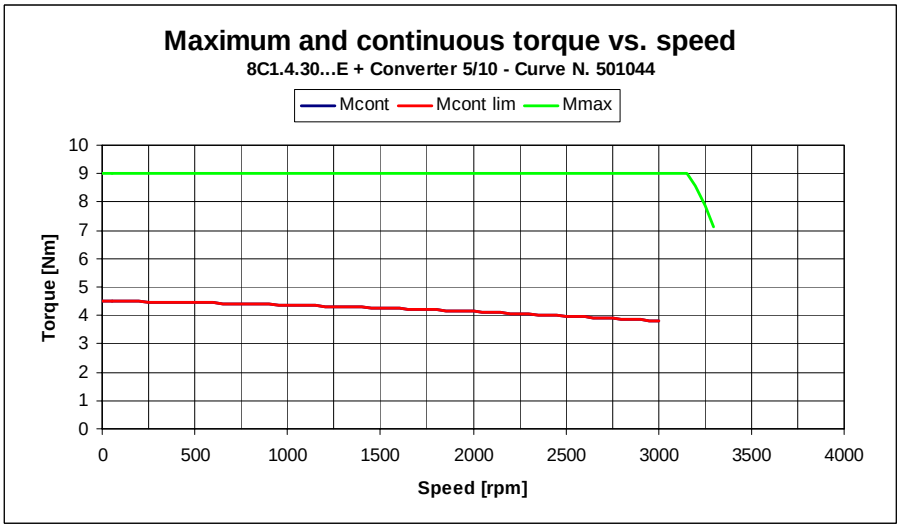
N 501042 - 8C1330



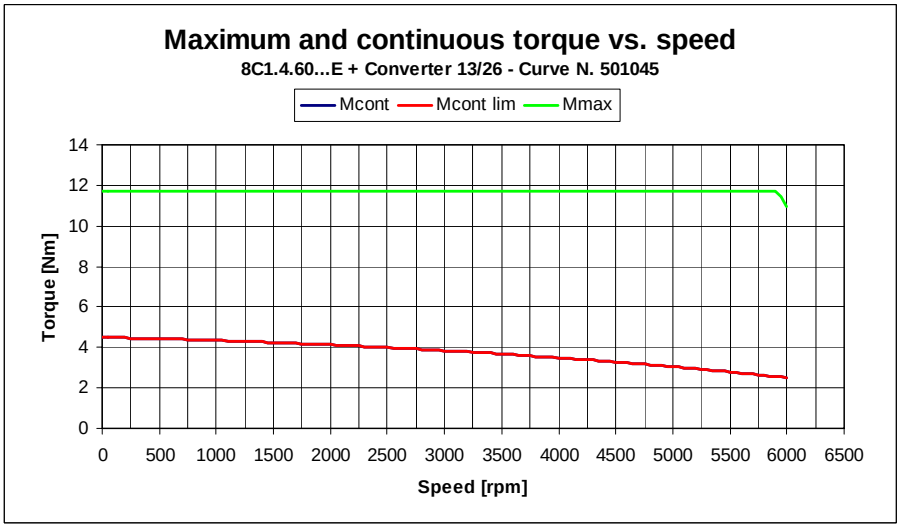
N 501043 - 8C1360



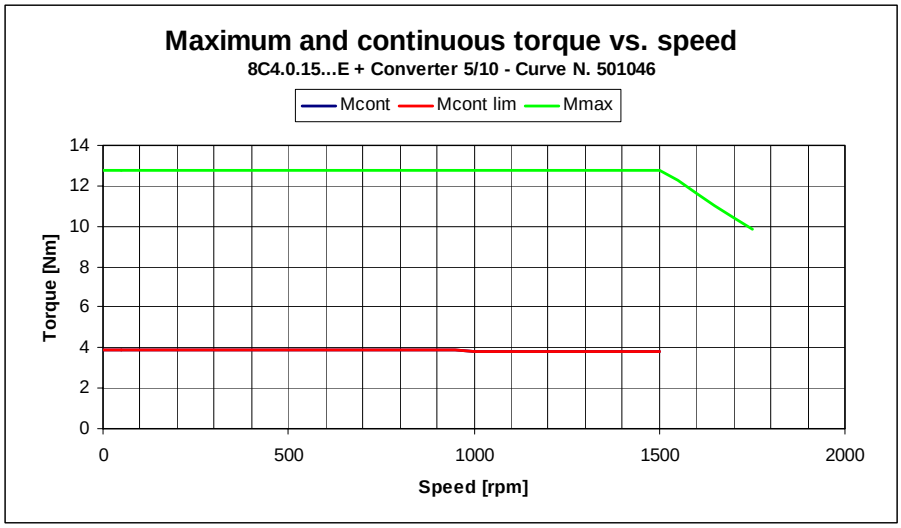
N 501044 - 8C1430



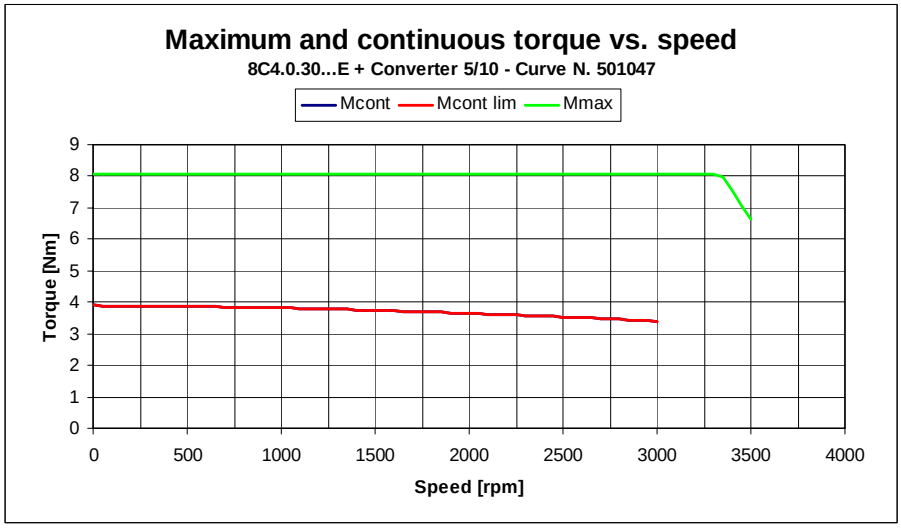
N 501045 - 8C1460



N 501046 - 8C4015



N 501047 - 8C4030



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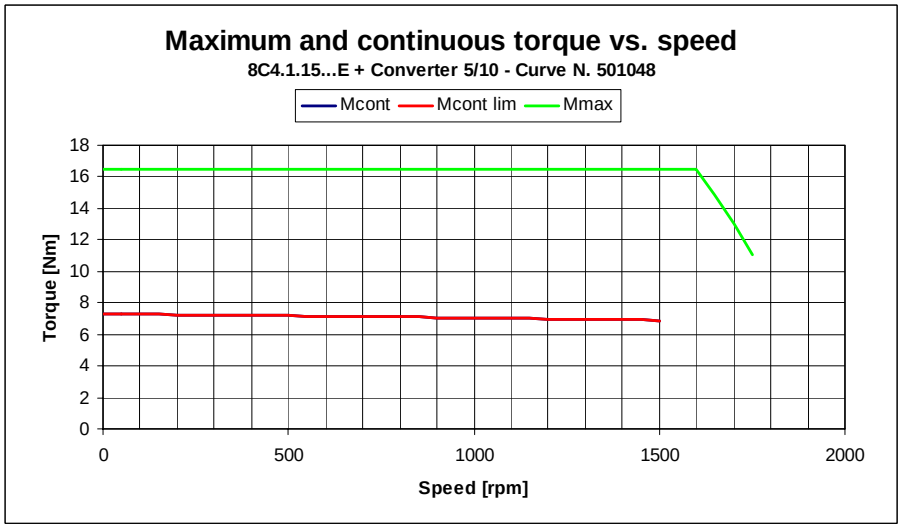
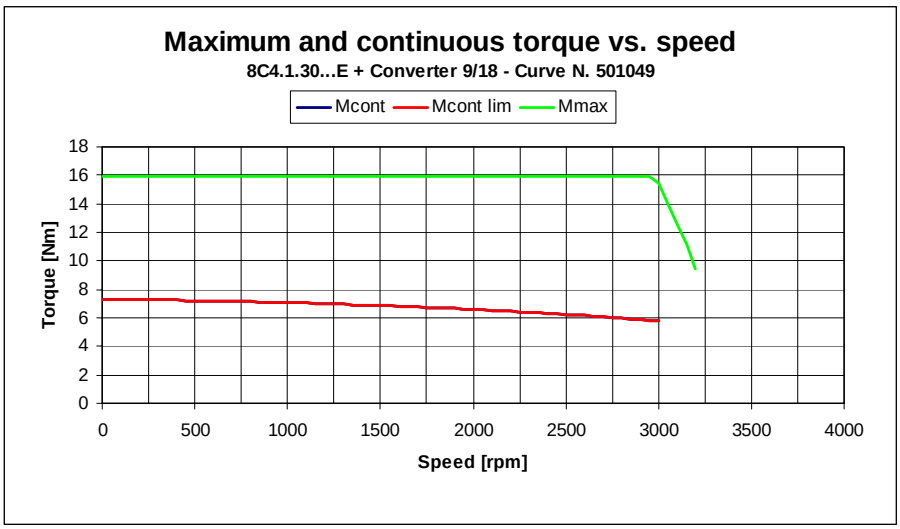
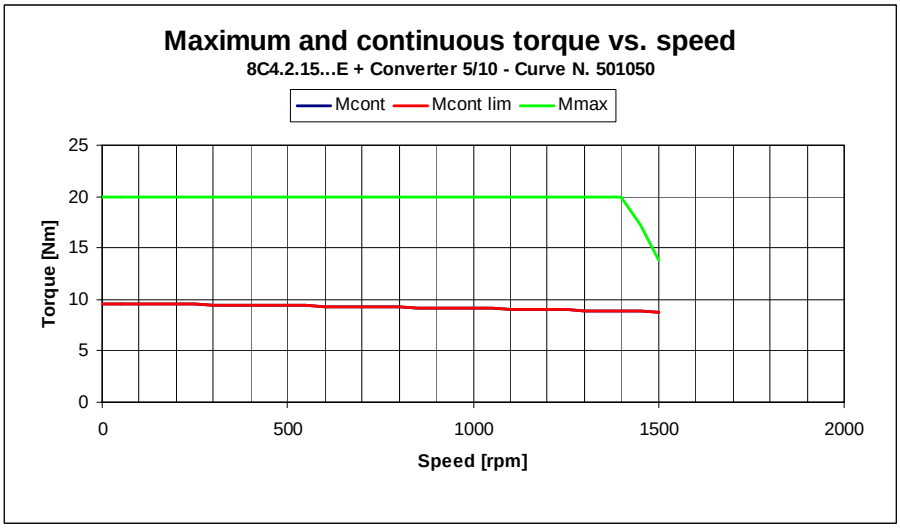


N 501049 - 8C4130



N 501050 - 8C4215



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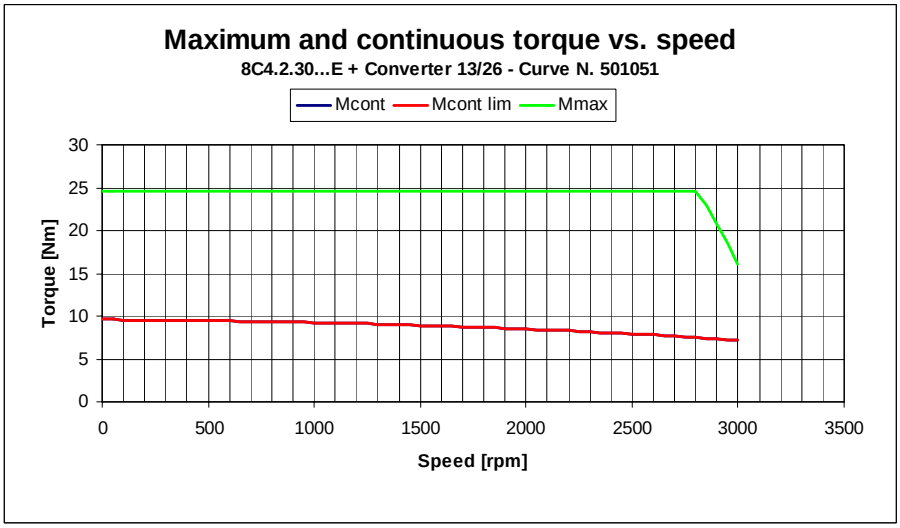
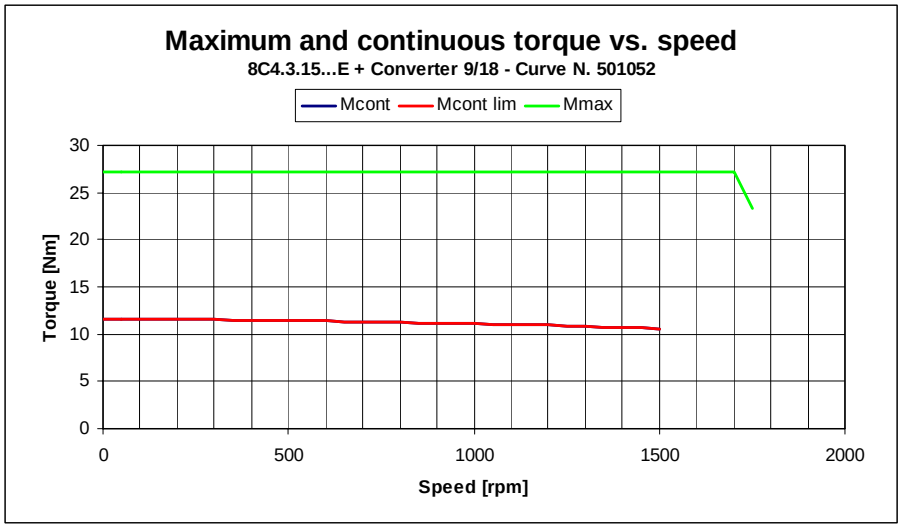


N 501052 - 8C4315



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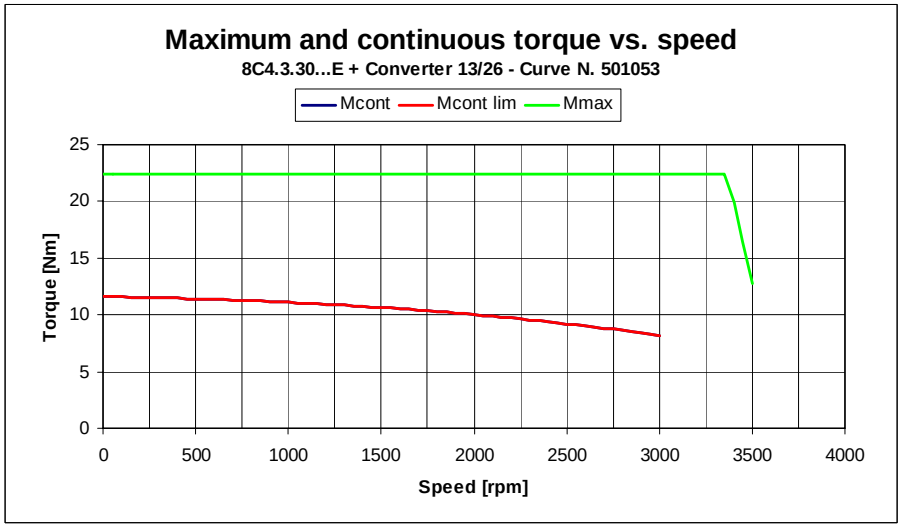

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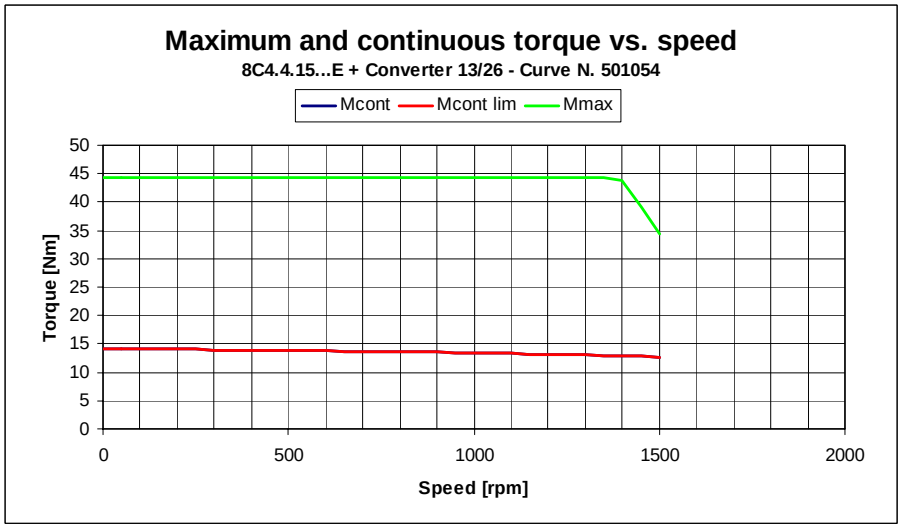
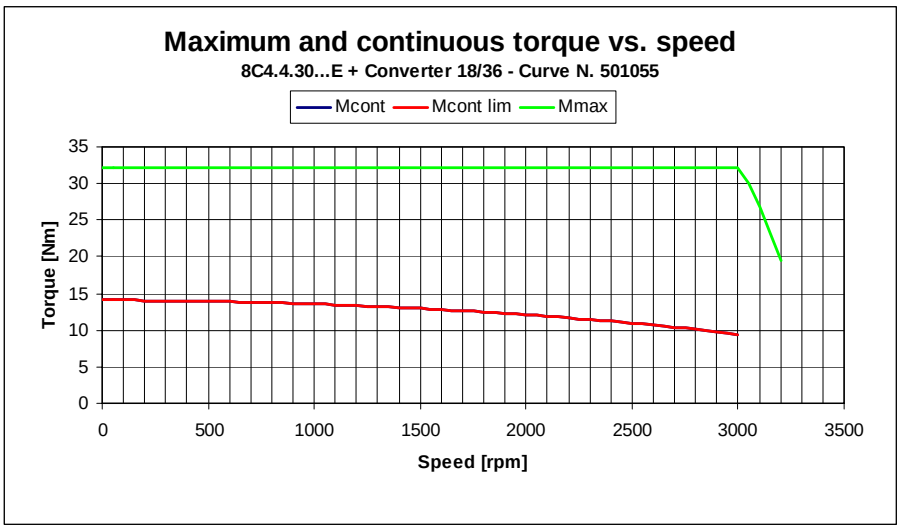
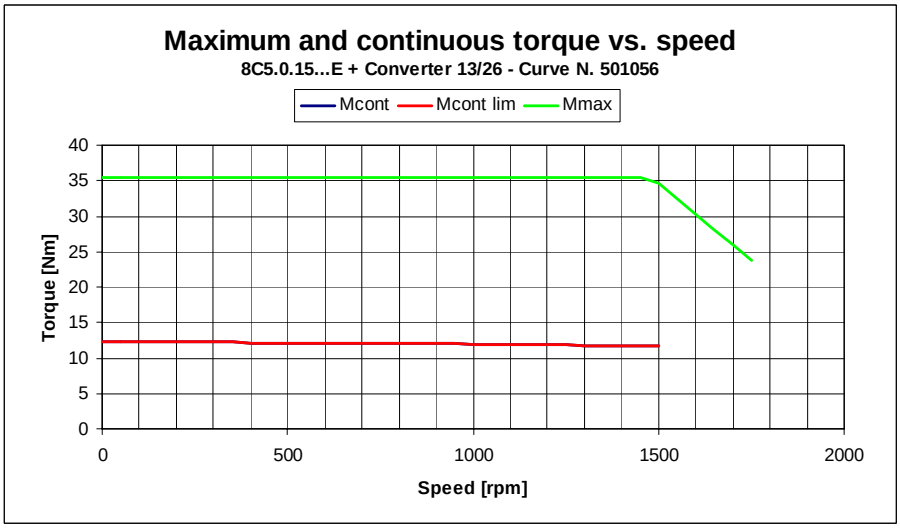


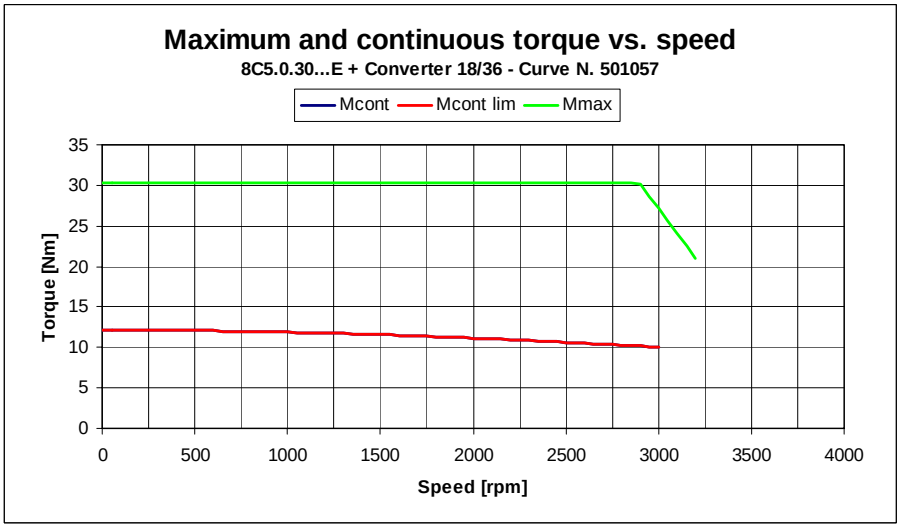
N 501055 - 8C4430



N 501056 - 8C5015



N 501057 - 8C5030



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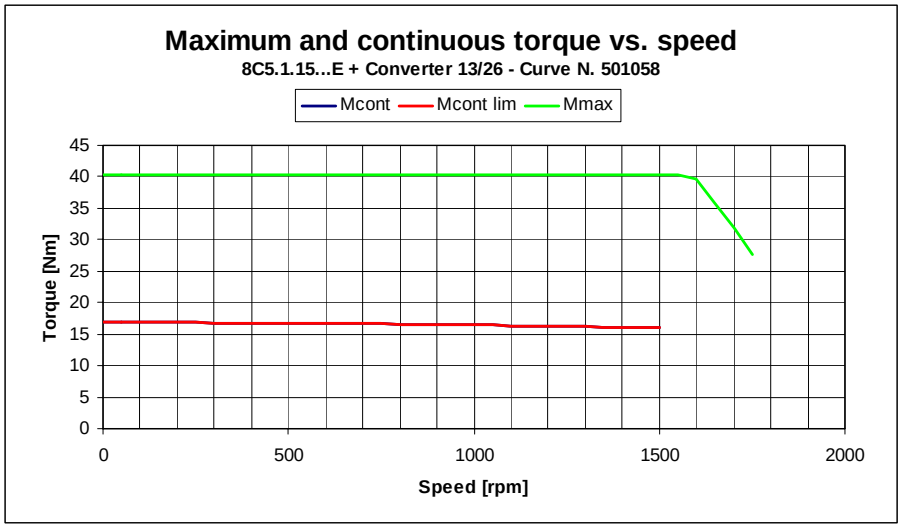

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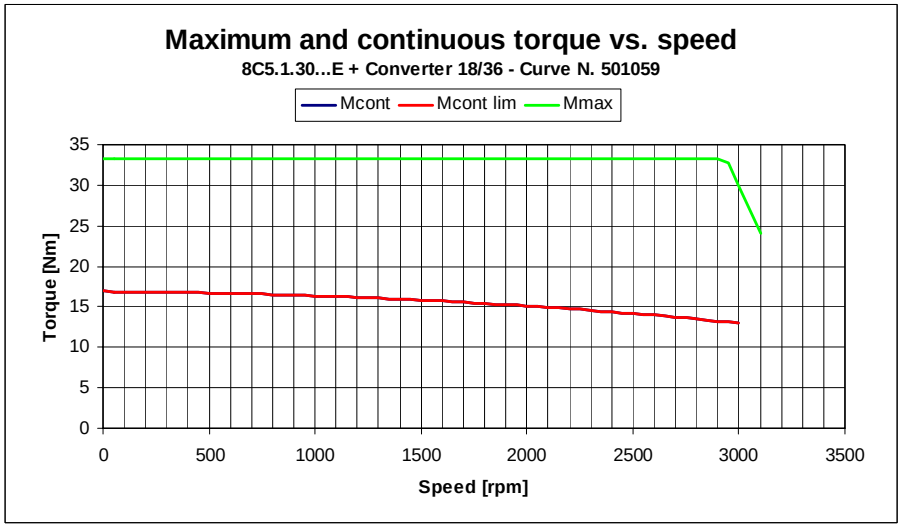
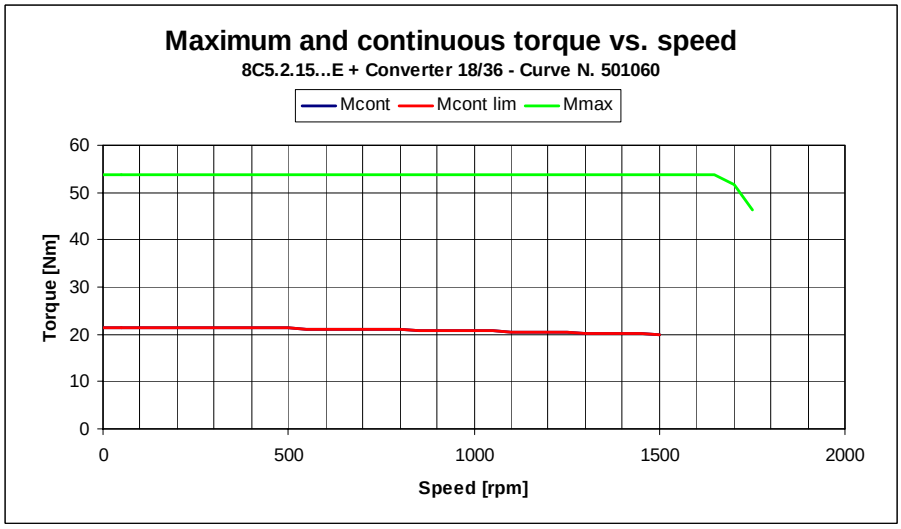
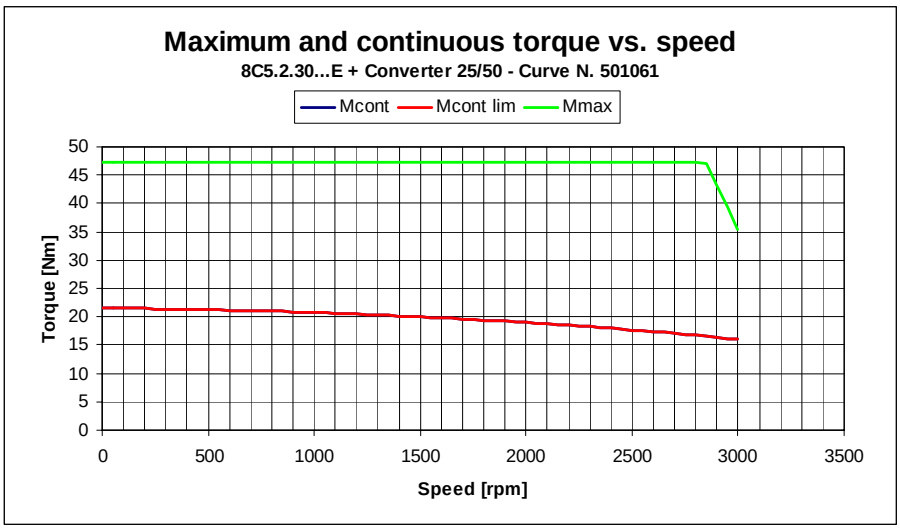


N 501060 - 8C5215



N 501061 - 8C5230



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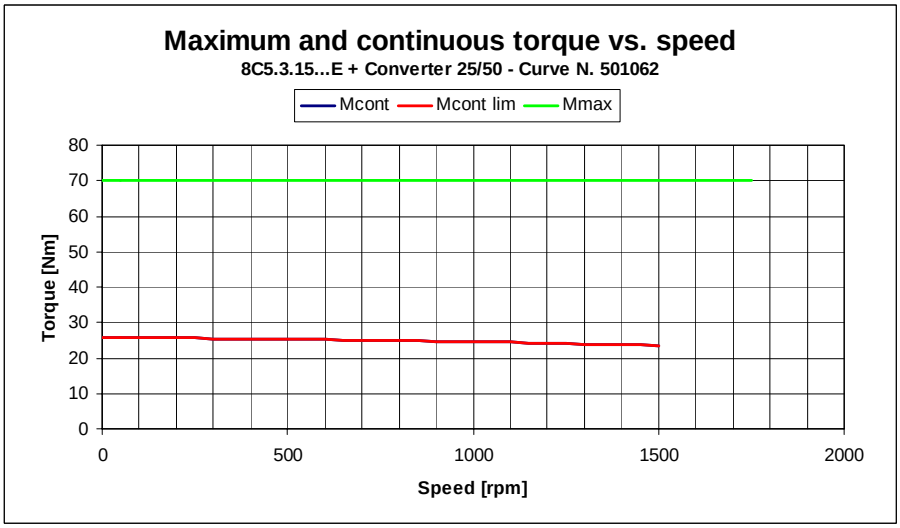

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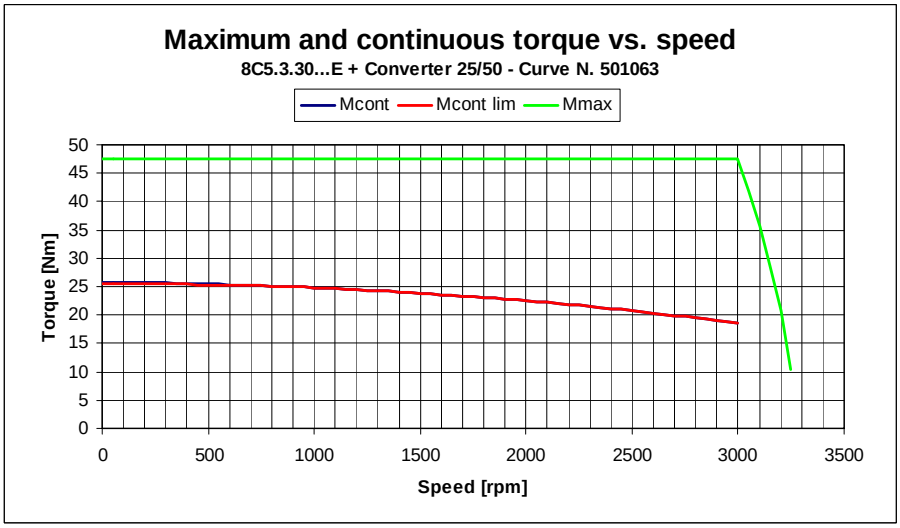

Other motors

For any other motor not listed or for any coupling motor-converter here not shown (related to ABB servomotors converters), please contact our Customer Service.

Appendix D – Standards and Safety

Introduction

8C series servomotors have been designed in compliance with IEC 60034 norm. Moreover, for completeness, other norms have been followed. The main norms are here reported.

Standards

[1] IEC 60034-1 "Rotating electrical Machines – Part 1: Rating and performance".

[2] IEC 60034-5 " Rotating electrical Machines – Part 5: Degrees of protection provided by the integral design of rotating electrical machines (IP code) – Classification".

[3] IEC 60034-6 "Rotating electrical Machines – Part 6: Methods of cooling (IC code)"

[4] IEC 60034-7 " Rotating electrical Machines – Part 7: Classification of types of construction, mounting arrangements and terminal box position (IM code)".

[5] IEC 60034-8 "Rotating electrical Machines – Part 8: Terminal markings and direction of rotation".

[6] IEC 60034-9 " Rotating electrical Machines – Part 9: Noise limits".

[7] IEC 60034-11: Rotating electrical Machines – Part 11: Built-in thermal protection. Chapter 1: Rules for protection of electrical machines"

[8] IEC 60034-14-1: Rotating electrical Machines – Part 14-1: Mechanical vibration of certain machines with shaft heights 56 mm and higher – Measurements, evaluation and limits of vibration

[9] IEC 60034-18-1 " Rotating electrical Machines – Part 18: Functional evaluation of insulation systems for rotating electrical machines. PArt 1: General guidelines".

[10] IEC 60072-1: "Dimensions and output series for rotating electrical machines – Part 1: Frame numbers 56 to 400 and flange numbers 55 to 1080"

[11] IEC 60085 "Thermal evaluation and classification of electrical insulation"IEC 60204-1, "Safety of machinery – electrical equipment of machines. Part 1: General requirements".

Direttiva Compatibilità Elettromagnetica (EMC)

[12] Directive 89/336/EEC, “On the approximation of the laws of the Member States relating to electromagnetic compatibility” and the subsequent amendments 92/31/EEC and 93/68/EEC.

[13] Italian Legislative Decree, 4 December 1992, No. 476 “Attuazione della direttiva 89/336/CEE del Consiglio del 3 maggio 1989, in materia di ravvicinamento delle legislazioni degli Stati membri relative alla compatibilità elettromagnetica, modificata dalla direttiva 92/31/CEE del Consiglio del 28 aprile 1992” (Directive 89/336/EEC, “On the approximation of the laws of the Member States relating to electromagnetic compatibility” and the subsequent amendments 92/31/EEC and 93/68/EEC).

[14] Italian Legislative Decree, 12 November 1996, No. 615 “ Attuazione della direttiva 89/336/CEE del Consiglio del 3 maggio 1989, in materia di ravvicinamento delle legislazioni degli Stati membri relative alla compatibilità elettromagnetica, modificata ed integrata dalla direttiva 92/31/CEE del Consiglio del 22 luglio 1993 e dalla direttiva 93/97/CEE del Consiglio del 29 ottobre 1993” (Implementation of the directive 89/336/EEC, 3 May 1989, “On the approximation of the laws of the Member States relating to electromagnetic compatibility” changed and integrated by the Directive of the Council 92/31/EEC, 22 July 1993 and by the Directive of the Council 93/97/EEC, 29 October 1993).

IMPORTANT NOTE: This Legislative Decree repeals the Legislative Decree [2], excepting article 14, sub-section 2.

Direttiva Bassa Tensione

[15] Directive 73/23/EEC, 19 February 1973, “Harmonization of the laws of Member States relating to electrical equipment designed for use within certain voltage limits”, integrated by the Directive 93/68/EEC, 29 June 1993.

[16] Italian Law 18 October 1977, No. 791 “Attuazione della direttiva del Consiglio delle Comunità europee (n. 73/23/CEE) relativa alle garanzie di sicurezza che deve possedere il materiale elettrico destinato ad essere utilizzato entro taluni limiti di tensione” (Directive 73/23/EEC, 19 February 1973, “Harmonisation of the laws of Member States relating to electrical equipment designed for use within certain voltage limits”, integrated by the Directive 93/68/EEC, 29 June 1993).

[17] Italian Legislative Decree, 25 November 1996, No. 626 “Attuazione della direttiva 93/68/CEE in materia di marcatura CE del materiale elettrico destinato ad essere utilizzato entro taluni limiti di tensione” (Implementation of the Directive 93/68/EEC concerning the CE marking of electric material designed for use within certain voltage limits).

Compliance with EEC Directives and CE Marking

Conditions for compliance with EMC Directives of the ABB drive systems composed by **8C SERIES Servomotors**.

The compliance of the drive systems made with 8C servomotors, defined in the title of this section, with the directives and/or legislative provisions, related to the Electromagnetic Compatibility, are only valid under the following conditions.

Restricted Distribution

8C Servomotors are only delivered as component of the **"Restricted distribution"** Class, and only sold to professional assemblers to be included as part of a system or of an installation. The actual EMC behavior is under the responsibility of the equipment manufacturer of the system or of the installation, to which the specific standards apply.

Therefore the CE marking, placed on the 8C SERIES servomotor, only certifies the compliance of the said components with the directives and the laws specified in section *Low Voltage Directive*.

Mounting and Installing Instructions

8C Servomotors presented in this Manual must be installed according to the instructions prescribed in this Manual; provisions indicated in this Chapter at section *Application Guide to Electromagnetic Compatibility* must also be strictly followed.

Compliance of the Drive Systems with the Directives

Declaration of Conformity

ABB Servomotors declares that, under the conditions specified in this document, in particular in section *Compliance with EEC Directives and CE Marking*, the drive systems composed of the **SERIES 8C Servomotors** comply with EMC European Directives [12], including the most recent changes, with the related endorsement Italian legislation [13] and [14], and with the Low Voltage European Directives [15], [16] and [17]; the applicable regulatory references are indicated in section Normative Documents.

Note for the Application of Other EEC Directives

Servomotors are not subject to other EEC directives, apart from those specified in section *Standards*. As far as the **89/392 EEC Machine Directive and subsequent changes 91/368/EEC, 93/44 EEC, 93/68 EEC, Italian legislation for implementation of the Presidential Decree No. 459, 24 July 1996**, the Certificate of Incorporation (also known as "Manufacturer's declaration") is sometimes required.

Certificate of Incorporation

ABB Servomotors, according to what required in the Machine Directive (MD) 89/392 EEC and subsequent changes, declares that **SERIES 8C Servomotors**, must be installed in accordance with our installation instructions and must not be put into service until the machinery into which it is to be incorporated has been declared in conformity with the Machinery Directive.

Safety Instructions

Meaning of the Symbols

WARNING! Dangerous Voltage

WARNING! General Warning

Installation Operation

This Manual is intended for qualified personnel who have a relevant experience with installation, troubleshooting and maintenance of drive systems.

WARNING! Only properly qualified personnel who are familiar with operation on servomotors are allowed to perform the commissioning and operation activities on the drive.

WARNING! The cabinet, the power supply and the auxiliary supply must be disconnected during mechanical and electrical installation of the servomotor.

For no reason should an unskilled operator work on the servomotor terminal box.

Dangerous Temperature

WARNING! During operation the servomotor can reach temperatures up to 155 °C (with ambient temperature of 40 °C) **with consequent risk of scalding**

Guida di Applicazione alla Compatibilità Elettromagnetica

This section applies to prescriptions specified in *Note for the Application of Other EEC Directives* concerning the standard about electromagnetic compatibility for drive systems [8].

The need to follow precise rules as far as EMC is concerned, is due to the increasing use of electronic power units, which, for the used techniques, represent a noise source in a wide frequency range (**emission**). These devices are at the same time sensitive to noise produced by other devices; for this reason they must be provided with an adequate **immunity** level.

Noise is conventionally classified as **low frequency** (0 = < f < 9 kHz) and **high frequency** (f > 9 kHz) noise.

In the range of the low frequency noise, the **harmonic frequency** phenomena of the power supply line frequency are particularly important.

There are also **large spectrum** events, such as electrostatic discharges in the air or by contact.

Noise can be transmitted both through conductors (**<conducted noise>**; conducted emission: 0,15 MHz ÷ 30 MHz) and through irradiation (**<irradiated noise>**; irradiated emission: 30 MHz ÷ 1000 MHz). **Industrial experience showed that the main causes of compatibility lack are caused by conducted noise.**

The servomotor installation must be carried out by closely following the instructions in this Manual and, in particular, in Chapter 3 and 4 of this Guide

For electromagnetic compatibility, the installation must be carried out following some appropriate instructions.

The motor assembly, including the **8C SERIES** servomotor and the angle position transducer, as well as the motor thermal switch and - where necessary - the brake, is usually mounted on the machine at a certain distance from the electrical control cabinet.

There are actually two different types of installations: the one referring to the electrical control cabinet manufacture and the actual on-site installation, which is carried out by the installer at the premises of the final user. In this guide we will deal with instructions related to the connections of the motor only.

Impianto Elettrico

As stated above, we refer to the on-site installation, in the final installation of the machine. For some types of machines (such as small machine tools), the electrical control cabinet is physically connected to the machine and therefore the on-site electrical equipment is reduced to the connection of the machine to the power mains. Nevertheless, the electrical control cabinet is usually placed at a certain distance from the machine, on which the motor assembly is mounted; sometimes there is also a remote control desk, to which conductors could be connected.

In this case, since the emission problem is strictly linked to installation factors, the following recommendations come from good technique standards and from experience in field and must be basically considered as guidelines and not as sure solutions.

- **Keep in mind that the servomotor is intended for the use in a "Second Environment", i.e. industrial environments where the low voltage network does not feed residential buildings.**
- **Carefully study the installation cable routes, minimizing their length.**
- **All the metal channels and sheaths and, in general, all the shields, if not otherwise specified, must be earthed both on the electrical control cabinet side and on the motor side; the earthing connections must have a largely dimensioned section and their route must be as short as possible.**

  This is an EMC specific need, which can seem in contrast with what is often prescribed, that is to say the need to earth shields at only one side; this prescription requires very efficient earths.

Customer Service

For any additional question and support, please contact our Customer Service.

ABB Servomotors S.r.l.
Customer Service
Frazione Stazione Portacomaro, 97/C
I - 14100 ASTI (ITALY)
Telephone +39 0141 276. 230
Telefax +39 0141 276. 294

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8C SERIES SERVOMOTORS
MANUM02.0310 E
EFFECTIVE: 14.11.2003

ABB Servomotors S.r.l.
Headquarters and Offices
Frazione Stazione Portacomaro, 97/C
I - 14100 Asti
ITALY
Telephone: +39 0141 276 111
Fax: +39 0141 276 294
E-mail: servomotors.vendite@it.abb.com
Internet: www.abb.com Servomotors

ABB Servomotors
Export
Via Luciano Lama, 33
I - 20090 Sesto San Giovanni (MI)
ITALY
Telephone: +39 02 2414 3562
Fax: +39 02 2414 3972
E-mail: servomotors.vendite@it.abb.com