

Synchronous Servomotors MSM

Data Sheet
R911329338

Edition 05



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Purpose of Documentation	This documentation ... • explains the features of the product, possibilities for use, operating conditions and operational limits von MSM motors. • contains technical data. • provides information regarding product selection, handling and operation.
Record of revisions	Edition 05, 2019-02 See tab. 1-1 "Record of revisions" on page 3
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1 About this documentation

Editions of this documentation

Edition	State	Note
01	09/2007	First edition
02	02/2015	Revision; Plug connector revision
03	06/2015	Encoder lifetime, storage and transport temperature from technical data tables removed.
03.1	12/2015	System accuracy encoder in definition
04	09/2017	System accuracy encoder M5, switching cycles holding brakes
05	02/2019	Update technical data holding brakes. Declaration of conformity, RohS China.

Tab. 1-1: Record of revisions

1.1 Presentation of information

Safety instructions The safety instructions in this documentation include signal words (danger, warning, caution, note) and a signal symbol (acc. to ANSI Z535.6-2006). The signal word is intended to draw your attention to the safety instructions and describes the seriousness of the danger. The warning triangle with exclamation mark indicates the danger for persons.

DANGER

Non-compliance with this safety instructions **will** result in death or severe personal injury.

WARNING

Non-compliance with this safety instructions **can** result in death or severe personal injury.

CAUTION

Non-compliance with this safety instructions **can** result in moderate or minor personal injury.

NOTICE

Non-compliance with this safety instructions **can** result in material damage.

Safety sign In the documentation, the following internationally standardized safety signs and graphic symbols are used. The table contains the significance of the signs.

About this documentation

Safety sign	Meaning
	Warning against dangerous electric voltage
	Warning against hot surfaces
	Warning against rotating machine parts
	Warning against overhead load
	Electrostatic sensitive devices
	Prohibition for persons with cardiac pacemakers or implanted defibrillators.
	Do not carry along metal parts or clocks.
	Hammer scales are forbidden

Tab. 1-2: *Meaning of safety signs*

Markup The following markups are used for a user-friendly text information representation:

 Reference to supplementary documentation



This note gives important information, which must be observed.

- Listings on the first level contain a bullet point
 - Listings on the second level contain a dash
- 1. Handling instructions are specified in numbered lists. Please comply with the order of the handling instructions.

2 Introduction

Introduction to the product of MSM servomotors

The maintenance-free MSM motors are available in five different frame sizes up to a mechanical continuous power of 750 watt. High power density at a short frame length and a minimized flange dimension make use in most different applications possible. The motors with protection class IP54 are fitted with an absolute encoder and are available with or without holding brake. MSM motors with winding code "0xxx" are provided for operation on IndraDrive Cs controllers with nominal voltage 3x AC 230 V. MSM motors with winding code "Rxxx" are provided for operation on NYCe4000 controllers with nominal voltage 3x AC 100 V. Any operation on supply network with a higher nominal voltage is forbidden.

MSM motors are featured by

- Dynamic
- Compact construction
- Protection class IP54
- Precision due to optical Single- and Multiturn absolute value encoders
- Holding brake
- Plug connector for encoder and power connection

Motor MSM 	Continuous power P_N [W]	Continuous torque at standstill M_O [Nm]	Maximum torque M_{max} [Nm]	Maximum speed n_{max} [min ⁻¹]	Degree of protection
019A	50	0.16	0.48	5000	IP54 (Shaft IP40)
019B	100	0.32	0.95		
031B	200	0.64	1.91		
031C	400	1.3	3.8		
041B	750	2.4	7.1	4500	

Tab. 2-1: MSM motors: Features

This documentation serves to

- Select motors
- Describe variants

Feedback

If you detect any failures or have any amendments, please do not hesitate to contact us.

Please send your comments to dokusupport@boschrexroth.de.

3 Operating conditions

3.1 Ambient and application conditions

MSM Servomotors are designed for use in machines and facilities.

Ambient and application conditions

Designation	Symbol	Unit	Value
Protection class (IEC529)			IP54
Use in scope of application of CSA / UL			Only allowed for use in NFPA-79 applications.
Storage temperature			see chapter "chapter 8.1 "Transport of motors" on page 43"
Transport temperature			see chapter "chapter 8.2 "Storage of motors" on page 43"
Allowed installation positions. Definition of installation positions: refer to key-word "Installation positions"			IM B5 IM V1 IM V3
Ambient temperature range	T_{a_work}	°C	0 ... 40
Installation altitude	h_{nenn}	m	1000
Derating vs. ambient temperature: Within ambient temperature range $T_{a_work_red}$ the power data ³⁾ have to be reduced by the reduction factor f_{Ta} . Use outside of T_{a_work} or $T_{a_work_red}$ is not allowed!			
	$T_{a_work_red}$	°C	40 ... 55
	f_{Ta}	%/K	2.0 also refer to technical data of the separate components
Derating vs. installation altitude: From installation altitude $h > h_{nenn}$ for factor f reduced performance data ^{2) 3)} are available For installation altitude in range $h_{max_without}$ up to h_{max} install an overvoltage limitation in the installation against transient overvoltage. Use above h_{max} is not allowed!			
	$h_{max_without}$	m	2000
	h_{max}	m	4000
Simultaneous derating for ambient temperature and installation altitude	allowed; reduce with factors f and f_{Ta}		

Operating conditions

Designation	Symbol	Unit	Value
Relative air humidity		%	5 ... 95
Absolute air humidity		g/m ³	1 ... 29
Climatic class (IEC721)			3K3
Allowed degree of contamination (EN50178)			2
Allowability of dusts, vapors			EN50178 Tab. A.2
Vibration Sinus: Acceleration at 10 ... 2000 Hz ¹⁾ , axially		g	1
Vibration Sinus: Acceleration at 10 ... 2000 Hz ¹⁾ , radially		g	3
Overvoltage category			III (nach IEC60664-1)

- 1) acc. to EN 60068-2-6
 2) reduced power data for drive controllers: allowed intermediate circuit continuous power, brake resistor - continuous power, continuous current
 3) reduced power data for motors: Power, torque S1 and S3

Tab. 3-1: Ambient and conditions on use - use

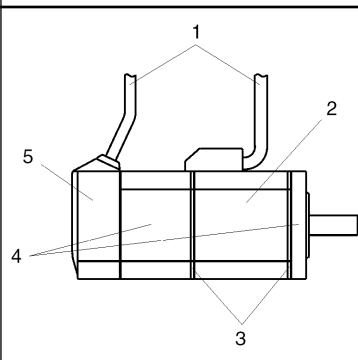
3.2 Compatibility with foreign matters

All Rexroth controls and drives are developed and tested according to the state-of-the-art technology.

As it is impossible to follow the continuing development of all materials (e.g. lubricants in machine tools) which may interact with the controls and drives, it cannot be completely ruled out that any reactions with the materials we use might occur.

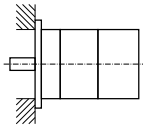
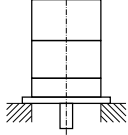
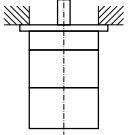
For this reason, before using the respective material a compatibility test has to be carried out for new lubricants, cleaning agents etc. and our housings/ materials.

3.3 Materials

	No.	Material
 motor_materialien.fh11	1	Polyvinyl chlorid resin (Oil resistance: according to standard" JIS C 3005"; test conditions: Oil temperature: 70 °C; Test duration (cable within oil): 4 hours; oil: Machine oil 46 (from GENERAL))
	2	Aluminum; eloxed
	3	Rubber
	4	Die-cast aluminum; blanc
	5	Polyamid 46 (Nylon 46)

Tab. 3-2: Materials

3.4 Frame shape and installation positions

Motor design B05		
IM B5	IM V1	IM V3
		
Flange attachment on the drive side of the flange	Flange attachment on the drive side of the flange, drive side facing down	Flange attachment on the drive side of the flange, drive side facing up

Tab. 3-3: Allowed installation types acc. to EN 60034-7:1993

NOTICE

Motor damage due to penetration of liquids!

If motors are attached according to IM V3, fluid present at the output shaft over a prolonged time may penetrate and cause damage to the motors.
Ensure that fluid cannot be present at the output shaft.

3.5 Installation space

Self-cooling of the motor should not be prevented due to the installation situation.

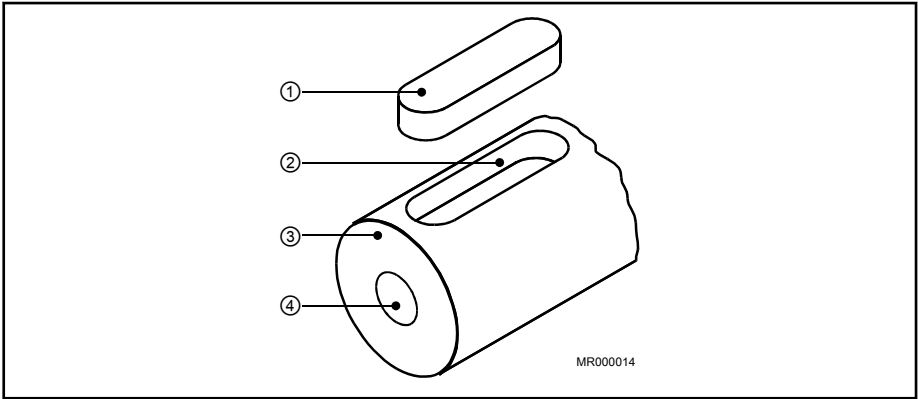
3.6 Output shaft

Smooth shaft MSM motors offer a non-positive shaft-hub connection without play with excellent running smoothness. Use clamping sets, clamping sleeves or tensioning elements to couple the machine elements to be driven.

Labeling within motor type: MSM.....-.....H

Shaft with keyway MSM motors with keyway allow form-locking transmission of torques with constant direction and low requirements on the shaft-hub connection. The keyway is not in the scope of delivery.

Labeling within motor type: MSM.....-.....L



- ① Key
- ② Keyway
- ① Motor shaft
- ① Centering hole

Fig. 3-1: MSM Output shaft with keyway

Operating conditions

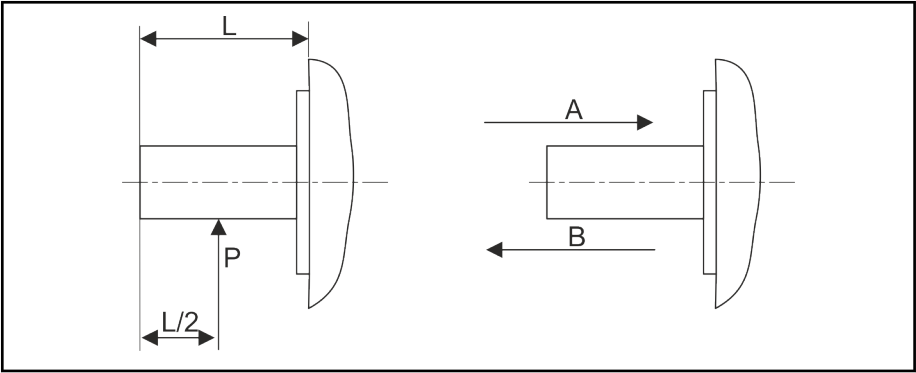
In addition, the machine elements to be driven must be secured axially via the frontal centering hole.

NOTICE Damage to property due to reversing mode!

Shaft damage! In case of intense reversing operation, the seat of the fitting spring may deflect. Increasing deformations can lead to a break of shaft.
Preferably, use plain output shafts.

3.7 Bearing and shaft load

During operation, radial and axial forces act on the motor shaft and the motor bearings. The design of the machine and the shaft-side mounting of drive elements must be coordinated to ensure that the specified load limits are not exceeded.



L Shaft length
P Point of application of radial force
A, B Direction of axial force
Fig. 3-2: Parameter for shaft load

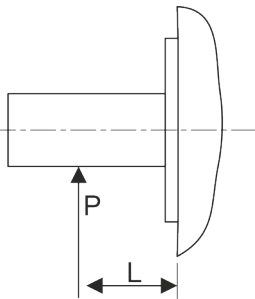
The following table shows the allowed shaft load of single motors.

Motor	At assembly			During operation	
	Radial force (N)	Axial force (N)		Radial force (N)	Axial force (N)
		Direction A	Direction B		
MSM019	147	88	117.6	68.6	58.8
MSM031	392	147	196	245	98
MSM041	686	294	392	392	147

Tab. 3-4: Allowed radial / axial force

In the case of adjusted point of application of radial force, calculate the allowed radial force according to the following formula.

Operating conditions

	Motor	Radial force dependend from the point of applica- tion of force
	MSM019A	$P = \frac{3533}{L + 39}$
	MSM019B	$P = \frac{4905}{L + 59}$
	MSM031B	$P = \frac{14945}{L + 46}$
	MSM031C	$P = \frac{19723}{L + 65,5}$
	MSM041B	$P = \frac{37044}{L + 77}$

Tab. 3-5: Radial force dependend from the point of application of force

Lifetime of motor bearing



When operating MSM motors within the limits specified for radial and axial load, the nominal bearing lifetime is **L_{10h} 20,000 operating hours**.

When exceeding the allowed radial force, the bearing lifetime is reduced to:

$$L_{10h} = \left(\frac{F_{\text{radial}}}{F_{\text{radial_ist}}} \right)^3 \times 20000$$

L_{10h}

F_{radial}

F_{radial_act}

Fig. 3-3:

Bearing service life (according to ISO 281, Version 12/1990)

Determined allowed radial force in N (Newton)

Actually acting radial force in N (Newton)

Calculating the bearing lifetime L_{10h} if the allowed radial force F_{radial} is exceeded.



The actually acting radial force F_{radial_act} may never be higher than the maximum allowed radial force F_{radial_max}.

3.8 Holding brakes

The following general details are binding for all MSM motors The frame size depending data of the holding brakes are specified in chapter"Technical data"

- The values specified in the technical data are typical values excluding holding torque, trip voltage and rated voltage.
- If the motor was moved, the brake clearance is ±1° or less.
- The power supply of the holding brake is done externally.
- The maximum number of acceleration and braking with the highest allowed angular acceleration: 10 million

Operating conditions

3.9 Attachment of drive elements

Please observe the following notes during assembly of drive element onto the output shaft.

Gearbox mounting on motors

If transmissions are attached to motors, the thermal coupling of the motors to the machine or system design changes.

Depending on the type of transmission, the amount of heat generated at the transmission varies. In any case, the heat dissipation of the motor via the flange is reduced when the transmission is attached. This must be taken into account when planning the system.

In order not to thermally overload motors when using transmissions, it is necessary to reduce the specified performance data.

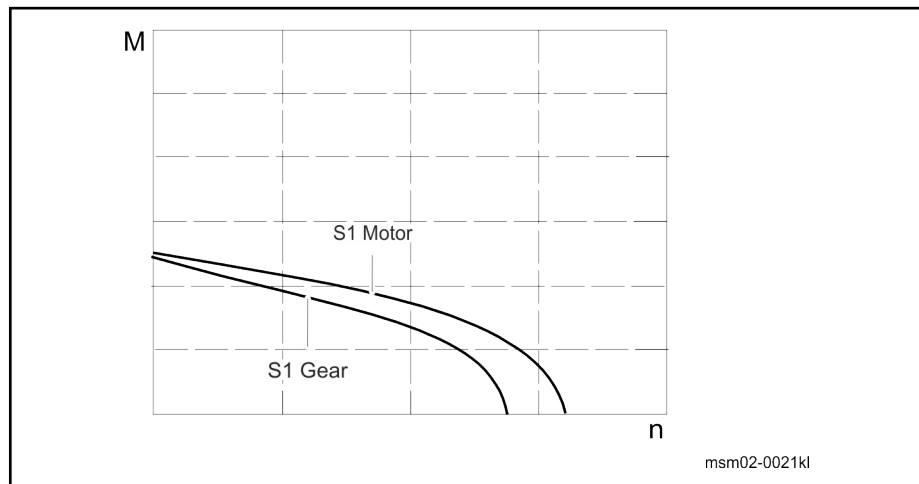


Fig. 3-4: S1 characteristic curve gearboxes



The torques specified in the motor characteristics must be reduced by approx. **10-20%** when attaching transmissions.

Observe all other notes and requirements in the documentation for the transmissions used.

Over-determined bearing

When assemble drive elements, avoid an over-determined bearing, because the indispensable existing tolerances lead to additional forces on the bearing of the motor shaft and, if necessary, to a significantly reduced bearing life.



If an over-determined arrangement cannot be avoided, please contact Bosch Rexroth.

Couplings

The machine construction and the drive elements used must be carefully adapted to the motor type so as to make sure that the load limits of the shaft and the bearing are not exceeded.



When mounting extremely rigid couplings, an unacceptably high load on the shaft and bearing can occur due to a radial force which constantly changes the angular position.

Bevel pinion or helical drive pinions

Due to thermal effects, the flange end of the output shaft can shift by up to 0.6 mm in relation to the motor housing. When using helical drive pinions or bevel gear pinions mounted directly on the output shaft, this change in length leads to

Operating conditions

- A shift in the position of the axis, if the driving pinions are not axially fixed on the machine side,
- A thermally dependent component of the axial force, if the driving pinions are axially fixed on the machine side. There is a risk that the maximum permissible axial force will be exceeded or that the backlash within the gearing will increase excessively.
- Damage to the B-side motor fixed bearing due to exceeding the maximum permissible axial force.



Preferably use self-bearing drive elements which are connected to the motor shaft via axially compensating couplings!

Operating conditions

3.10 Certifications

Declaration of conformity Declaration of conformity (see [chapter 12 "Appendix" on page 55](#)) confirm that the components comply with the valid EN standards and EC Directives.

MSM motors

DX00011v01_mn.FH11

CE-Conformity regarding

EN 60034-1: Rotating electrical machines - Part 1: Rating and performance: Rating and performance behavior (Edition 2010 + Cor.:2010 (2010, modified))

EN 60034-5: Rotating electrical machines - Part 5: Degrees of protection provided by integral design of rotating electrical machines (IP-Code) - Classification (Edition 2001 + A1:2007 (2000 + Corrigendum 2001 + A1:2006))

C-UR-US-Listing The motors are listed by **UL** ("Underwriters Laboratories Inc.®"). A proof of certification can be found in the Internet via <http://www.ul.com> under "Certifications" by entering the file number or the "Company Name: Rexroth".

MSM motors

CUR_Zeichen.fh11

Company Name:

BOSCH REXROTH ELECTRIC DRIVES & CONTROLS GMBH

Category Name:

Servo and Stepper Motors Components

For file numbers, standards refer to table "Technical data"

**Wiring material UL (ready-made cables of Rexroth)**

Only use copper lines of class 6 (or equivalent) with minimal allowed wire temperature of 75 °C in the scope of application of CSA / UL for wiring the components.

**Allowed degree of contamination**

Please observe the allowed pollution degree of the components (see "Ambient and application conditions").

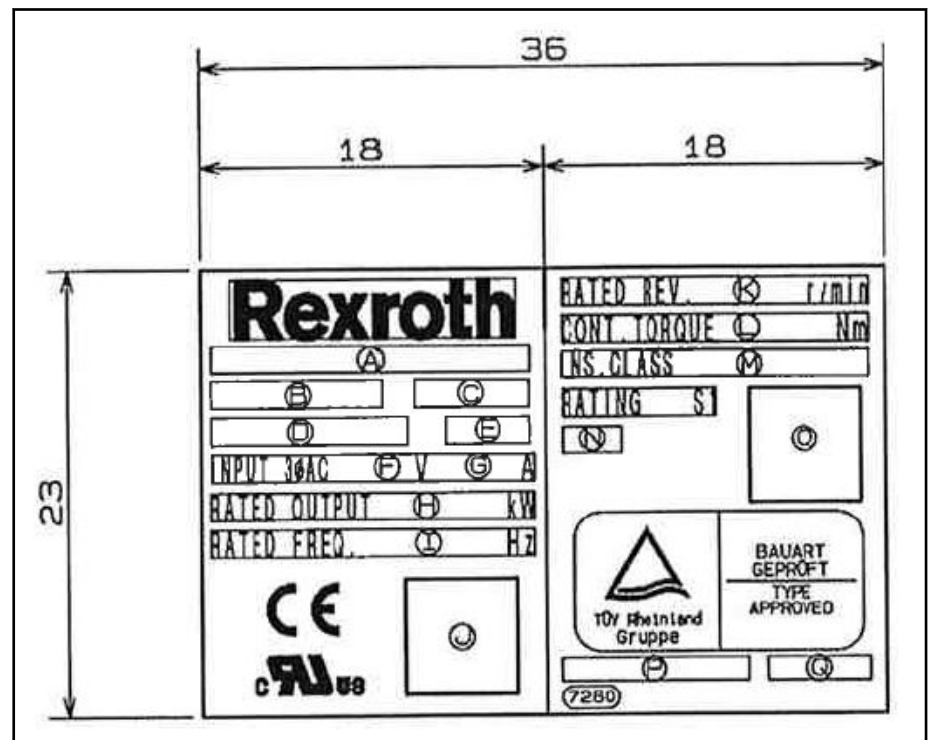
4 Identification and type code

4.1 Identification

MSM motors have an individual type plate showing the device designation and providing technical information. The two-part type plate is attached at the side of the encoder housing.

The type plate is provided for

- Identification of the motor
- Procurement of spare parts in case of a fault
- Service information.



(A)	Type
(B)	Material number
(C)	Date of manufacture
(D)	Serial number
(E)	Hardware index
(F)	Rated voltage
(G)	Rated current
(H)	Rated power
(I)	Frequency
(J)	Serial number (Rexroth)
(K)	Speed
(L)	Torque
(M)	Insulation class
(N)	Degree of protection
(O)	Barcode
(P)	Country of manufacture
(Q)	UL file number

Fig. 4-1: Type plate MSM

Identification and type code

4.2 MSM019 Type code



The figure illustrates the basic structure of the type code. Our sales representative will help you with the current status of available versions.

Type Designation	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
Example:	M	S	M	0	1	9	B	-	0	3	0	0	-	N	N	-	M	0	-	C	H	1																		

Product
MSM = MSM

Frame Size
019 = 019

Frame Lengths
Frame length = A, B

Winding ¹⁾
MSM019A = 0300
MSM019B = 0300, R300

Cooling Mode
Natural convection = NN

Encoder ^{1) 2)}
Optical encoder, Multiturn absolute (17 Bit) = M0
Optical encoder, Multiturn absolute (20 Bit) = M5

Electrical Connection ²⁾
Cable connection = C
Cable connection, circular connector M17 = M

Shaft ^{1) 2)}
Smooth shaft, without shaft sealing ring = H
Shaft with keyway, without shaft sealing ring = L

Holding Brake
Without = 0
Electrically released, 1.27 Nm = 1

Note:
1) Winding „R300“ for reduced voltage (100 V) only available with shaft „H“
2) Encoder „M0“ only available with electrical connection „C“ and shaft „H“
Encoder „M5“ only available with electrical connection „M“

msm02-0001ty

Fig. 4-2: MSM019

4.3 MSM031 Type code



The figure illustrates the basic structure of the type code. Our sales representative will help you with the current status of available versions.

Type Designation	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
Example:	M	S	M	0	3	1	B	-	0	3	0	0	-	N	N	-	M	0	-	C	H	1																		

Product
MSM = MSM

Frame Size
031 = 031

Frame Lengths
Frame lengths = B, C

Winding ¹⁾
MSM031B = 0300, R300
MSM031C = 0300, R300

Cooling Mode
Natural convection = NN

Encoder ^{1) 2)}
Optical encoder, Multiturn absolute (17 Bit) = M0
Optical encoder, Multiturn absolute (20 Bit) = M5

Electrical Connection ²⁾
Cable connection = C
Cable connection, circular connector M17 = M

Shaft ^{1) 2)}
Smooth shaft, without shaft sealing ring = H
Shaft with keyway, without shaft sealing ring = L

Holding Brake
Without = 0
Electrically released, 1.27 Nm = 1

Note:
1) Winding „R300“ for reduced voltage (100 V) only available with shaft „H“
2) Encoder „M0“ only available with electrical connection „C“ and shaft „H“
Encoder „M5“ only available with electrical connection „M“

msm02-0002ty

Fig. 4-3: MSM031

Identification and type code

4.4 MSM041 Type code



The figure illustrates the basic structure of the type code. Our sales representative will help you with the current status of available versions.

Type Designation	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0	1	2	3	4	5	6	7	8	9	0
Example:	M	S	M	0	4	1	B	-	0	3	0	0	-	N	N	-	M	0	-	C	H	1																		

Product
MSM = MSM

Frame Size
041 = 041

Frame Length
Frame length = B

Winding ¹⁾
MSM031B = 0300

Cooling Mode
Natural convection = NN

Encoder ^{1) 2)}
Optical encoder, Multiturn absolute (17 Bit) = M0
Optical encoder, Multiturn absolute (20 Bit) = M5

Electrical Connection ²⁾
Cable connection = C
Cable connection, circular connector M17 = M

Shaft ^{1) 2)}
Smooth shaft, without shaft sealing ring = H
Shaft with keyway, without shaft sealing ring = L

Holding Brake
Without = 0
Electrically released, 2.45 Nm = 1

Note:
1) Encoder „M0“ only available with electrical connection „C“ and shaft „H“
Encoder „M5“ only available with electrical connection „M“

msm02-0003ty

Fig. 4-4: MSM041

5 Technical data

5.1 Basics

Operation modes

The motors are documented according to the test criteria and measuring methods of EN 60034-1. The specified characteristic curves correspond to operating modes S1.

Duty cycle

Operating mode S6 is only available with duty cycle DC ≤100%. The duty cycle is calculated:

$$ED = \frac{\Delta t_P}{T_C} \times 100\% = \left(\frac{M_d}{M_{KB}} \right)^2 \times 100\%$$

ED

Duty cycle

T_C

Cycle duration

ΔT_P

Operating time with constant load

M_d

Continuous torque

M_{KB}

Short-time service torque

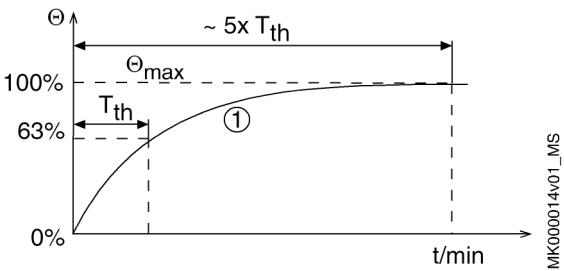
Fig. 5-1:

Relative duty cycle

Definition of parameters

Designation	Symbol	Unit	Definition
Cooling mode acc. to EN 60034-6			Short name acc. to EN
Listed acc. to UL standard (UL)			UL Standard
Listed acc. to CSA standard (UL)			CSA Standard
UL-Files (UL)			UL File Number
Electrical parameters			
Continuous torque at standstill 60 K	M _{0_60}	Nm	Continuous torque that can be applied to the motor output shaft at a speed of n ≥ 0.1 Hz.
Continuous current at standstill 60 K	I _{0_60(eff)}	A	Phase current (crest value) of the motor M _{0_60} required for the continuous torque at standstill at a speed of n ≥ 0.1 Hz.
Maximum current	I _{max(eff)}	A	Maximum, temporarily permissible phase current of the motor winding without adverse effect on the permanent magnet circuit of the motor.
Maximum torque	M _{max}	Nm	For maximum current I _{max} , for approx. 400 ms exchangeable maximum torque. The achievable maximum torque depends on the drive control unit.
Torque constant at 20 °C ¹⁾	K _{M_N}	Nm/A	Ratio of generated torque to motor phase current at motor temperature 20 °C. Valid up to approx. i = 2x I _{0_60} .
Voltage constant at 20 °C ²⁾	K _{EMK_1000}	V/min ⁻¹	Root-mean-square value of the induced motor voltage at a motor temperature of 20 °C and 1,000 revolutions per minute.
Winding resistance at 20 °C	R ₁₂	Ohm	Winding resistance measured between two phases.
Winding inductance	L ₁₂	mH	Measured inductance between two strands.
Discharge capacity of the component	C _{dis}	nF	Discharge capacity
Number of pole pairs	p	-	Number of pole pairs
Mechanical parameters			
Moment of inertia of rotor	J _{rot}	kg*m ²	Moment of inertia of the rotor without optional holding brake.
Power wire cross-section	A ₆₀		Minimum cross-section of the power wire to be connected on the motor

Technical data

Designation	Symbol	Unit	Definition
Thermal time constant	T_{th}		Duration of the temperature rise to 63% of the final temperature of the motor housing at motor load with permissible S1 continuous torque. The thermal time constant is determined by the cooling type used.  ① : Chronological course of the motor housing temperature Θ_{max} : Highest temperature (motor housing) T_{th} : Thermal time constant
Maximum speed	n_{max}	min^{-1}	Maximum permissible speed of the motor. Centrifugal forces or bearing stress can result in mechanical and DC bus voltage can result in electrical limiting factors.
Mass ³⁾	m	kg	Motor mass
Ambient temperature during operation	T_{amb}		Admissible ambient temperature during operation
Installation altitude			Maximale installation altitude
Insulation class according to DIN EN 60034-1	---	-	Insulation class
Protection class acc. to IEC60529	---	-	IP type of protection
Sound pressure level	L_p		Value of sound emission

1) 2)
3)

Manufacturing tolerance $\pm 5\%$
(...) Values for motors with holding brake

Tab. 5-1: Definition of parameters

5.2 MSM019

5.2.1 MSM019 Technical data

Designation	Symbol	Unit	MSM019A-0300-NN	MSM019B-0300-NN	MSM019B-R300-NN
Cooling mode acc. to EN 60034-6		-	IC00		
Listed acc. to UL standard		-	UL 1004; ANSI UL 840		
Listed acc. to CSA standard		-	CSA-C22,2 No, 100		
UL-Files			E335445		
Electrical parameters					
Rated power	P _N	kW	0.05	0.10	
Continuous torque at standstill 60 K	M _{0_60}	Nm	0.16	0.32	
Continuous current at standstill 60 K	I _{0_60(eff)}	A	1.10		1.70
Maximum current	I _{max(eff)}	A	3.30		7.20
Maximum torque	M _{max}	Nm	0.48	0.95	
Torque constant at 20 °C	K _{M,N}	Nm/A	0.14	0.30	0.19
Voltage constant at 20 °C ¹⁾	K _{EMK_1000}	V/min ⁻¹	8.6	17.4	11.4
Winding resistance at 20 °C	R ₁₂	Ohm	9.30	13.20	5.50
Winding inductance	L ₁₂	mH	5.650	9.250	3.800
Discharge capacity of the component	C _{dis}	nF	0.3	0.7	
Number of pole pairs	p	-	4		
Mechanical parameters					
Moment of inertia of rotor ²⁾	J _{rot}	kg*m ²	0.0000025	0.0000051	
Wire cross section	A ₆₀	mm ²	0.75		
Maximum speed (electrical)	n _{max el}	min ⁻¹	5000		
Mass ³⁾	m	kg	0.32 (0.53)	0.47 (0.68)	
Storage temperature	T _L	°C	-20 ... +60		
Ambient temperature during operation	T _{amb}	°C	0 ... 40		
Installation altitude		m	0 ... 1000		
Thermal class (EN 60034-1)	T.CL.	-	130 (B)		
Protection class acc. to IEC 60529	IP	-	IP54		
Sound pressure level	L _p	dB[A]	< 70		
Latest amendment: 2019-02-14					

- 1) Manufacturing tolerance ±5%
2) Tolerance ± 10%
3) (...) Motors with holding brake 1, 2, ...
Tab. 5-2: MSM - Technical data

Technical data

Designation	Symbol	Unit	Holding brake 1 (MSM019)
Holding torque	M_4	Nm	0.29
Rated voltage ¹⁾	U_N	V	24 ±1.2
Rated current	I_N	A	0.30
Maximum connection time	t_1	ms	20
Maximum disconnection time	t_2	ms	35
Moment of inertia of the holding brake	J_{br}	kg*m ²	0.0000002
Switching cycles within standstill			2 Mio

Latest amendment: 2019-02-14

Tab. 5-3: MSM019 Holding brakes - Technical data (optional)

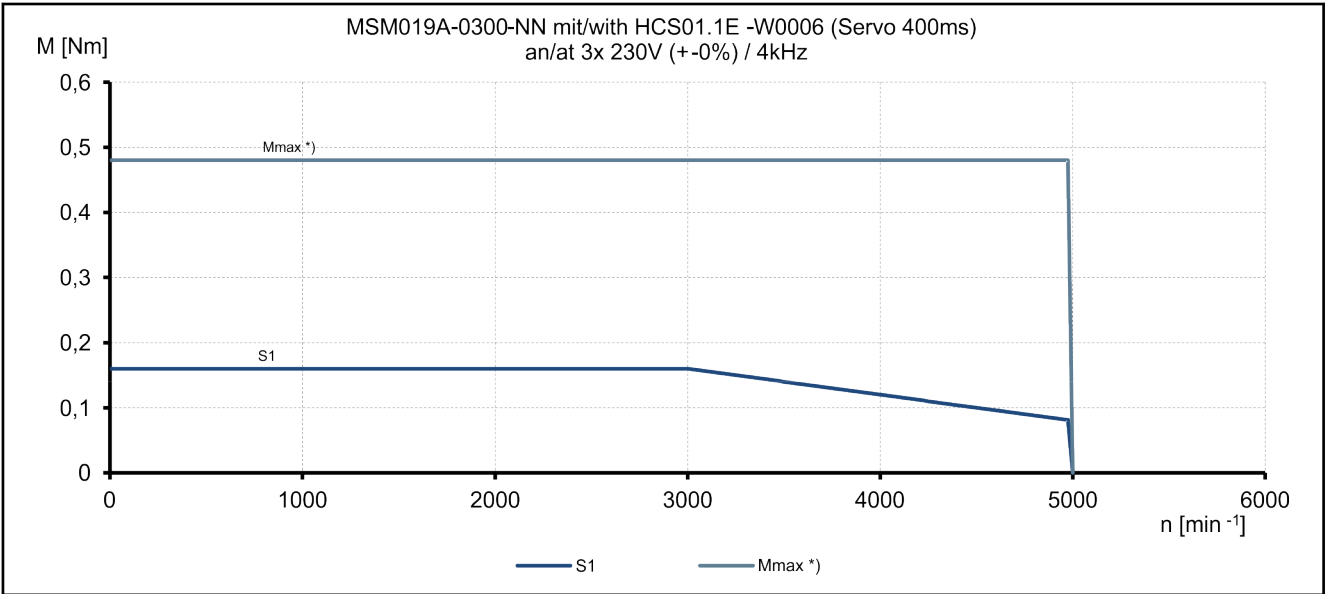


Fig. 5-2: Speed-torque characteristic curves

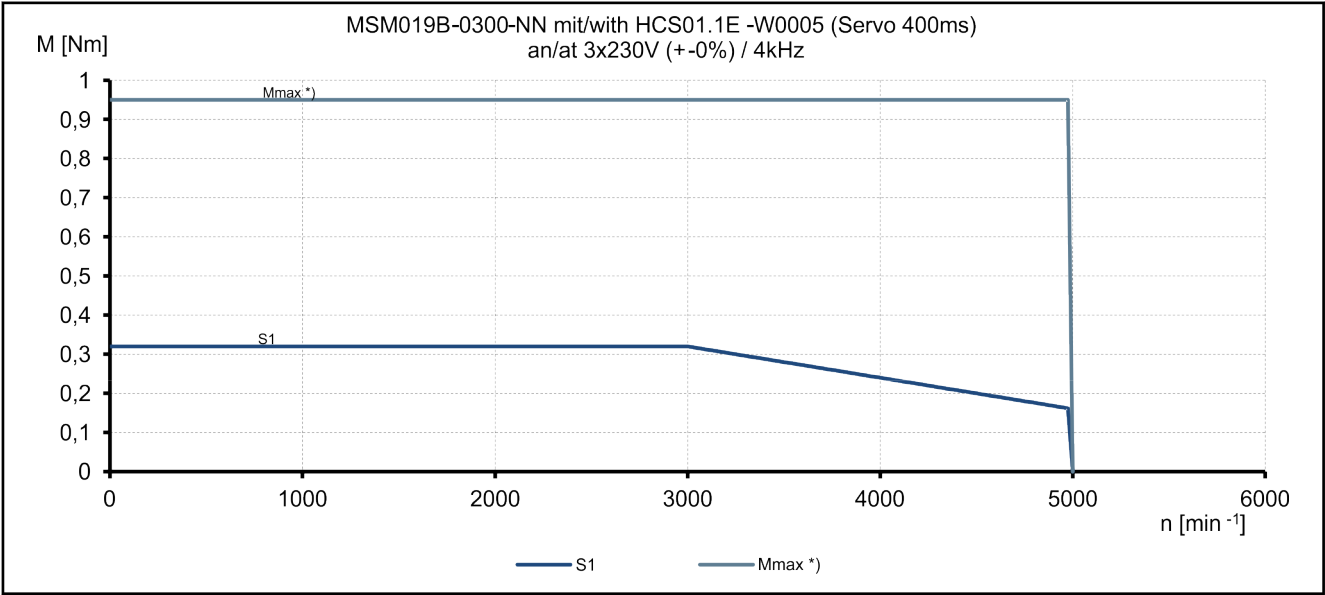
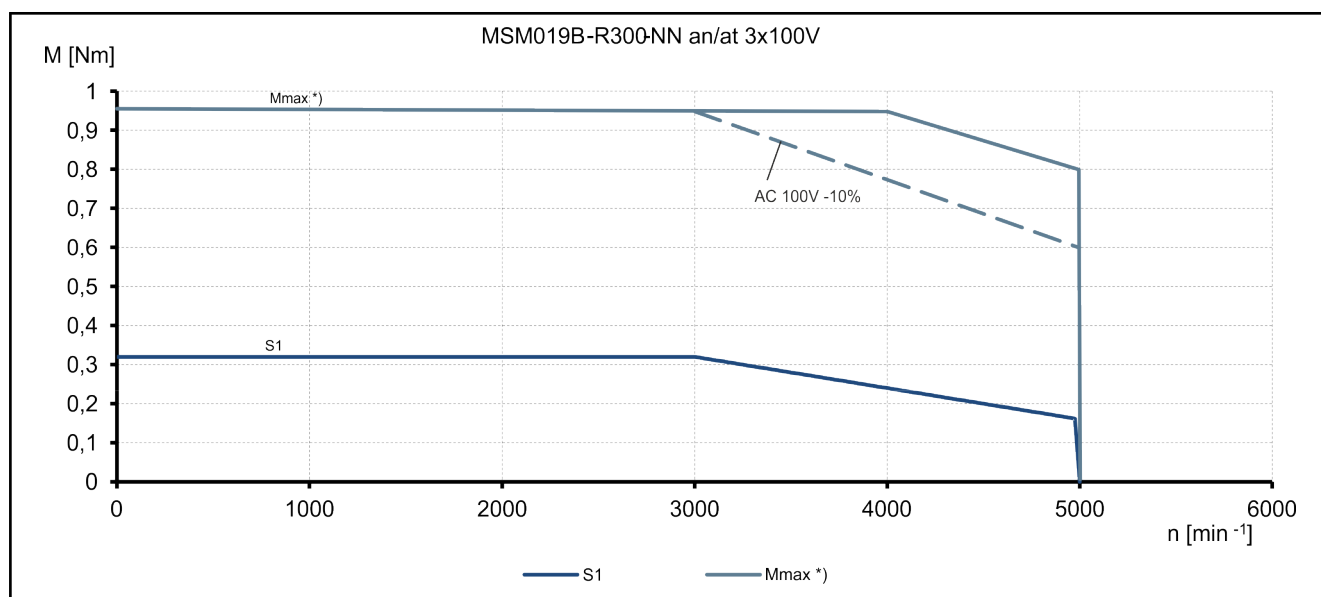


Fig. 5-3: Speed-torque characteristic curves

Technical data



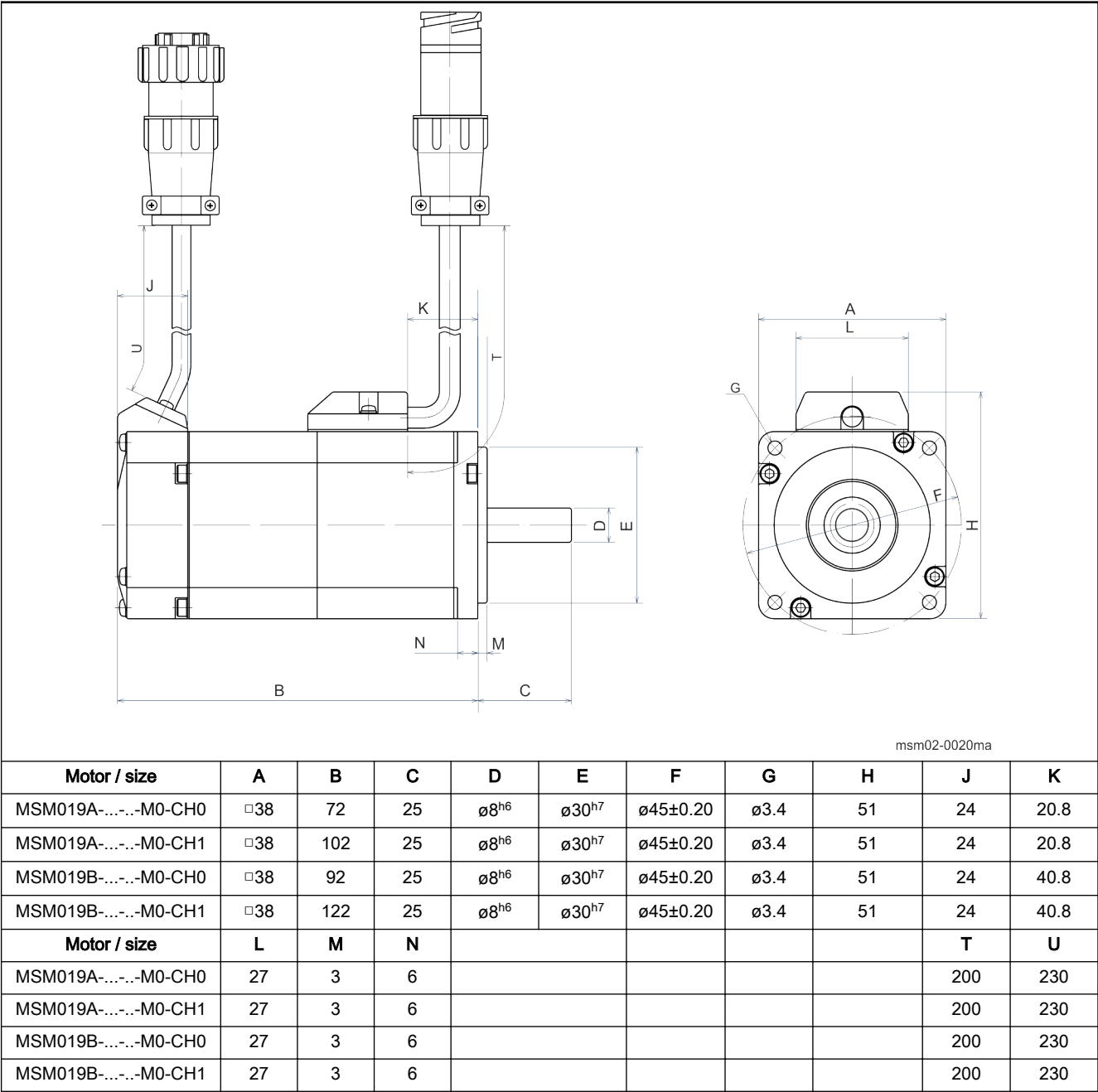
*) maximum permitted nominal line voltage 3x 230V
Fig. 5-4: Speed-torque characteristic curves

Technical data

5.2.2

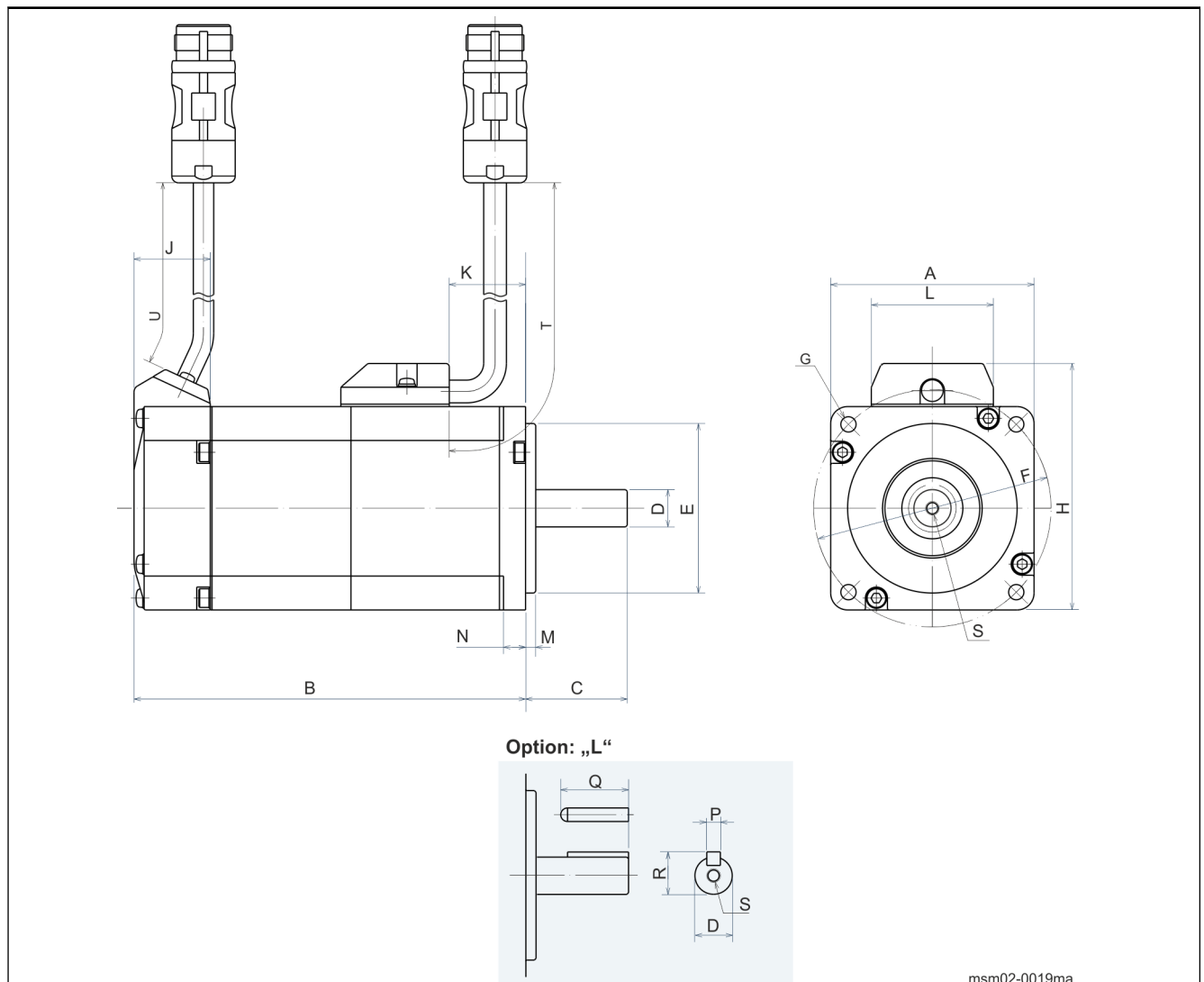
MSM019 Specifications

MSM019...M0-C...



Tab. 5-4: Dimensions MSM019

MSM019...M5-M...



Motor / size	A	B	C	D	E	F	G	H	J	K
MSM019A-...-M5-M.0	□38	72	25	ø8 ^{h6}	ø30 ^{h7}	ø45±0.20	ø3.4	51	24	17.3
MSM019A-...-M5-M.1	□38	102	25	ø8 ^{h6}	ø30 ^{h7}	ø45±0.20	ø3.4	51	24	17.3
MSM019B-...-M5-M.0	□38	92	25	ø8 ^{h6}	ø30 ^{h7}	ø45±0.20	ø3.4	51	24	37.4
MSM019B-...-M5-M.1	□38	122	25	ø8 ^{h6}	ø30 ^{h7}	ø45±0.20	ø3.4	51	24	37.4
Motor / size	L	M	N	P		Q	R	S	T	U
MSM019A-...-M5-M.0	27	3	6	3h9 (groove p9)		14	9.2	M3 (6 deep)	200	230
MSM019A-...-M5-M.1	27	3	6	3h9 (groove p9)		14	9.2	M3 (6 deep)	200	230
MSM019B-...-M5-M.0	27	3	6	3h9 (groove p9)		14	9.2	M3 (6 deep)	200	230
MSM019B-...-M5-M.1	27	3	6	3h9 (groove p9)		14	9.2	M3 (6 deep)	200	230

Tab. 5-5: Dimensions MSM019

Technical data

5.3 MSM031

5.3.1 MSM031 Technical data

Designation	Symbol	Unit	MSM031B-0300-NN	MSM031B-R300-NN	MSM031C-0300-NN	MSM031C-R300-NN
Cooling mode acc. to EN 60034-6		-	IC00			
Listed acc. to UL standard		-	UL 1004; ANSI UL 840			
Listed acc. to CSA standard		-	CSA-C22,2 No, 100			
UL-Files			E335445			
Electrical parameters						
Rated power	P _N	kW	0.20		0.40	
Continuous torque at standstill 60 K	M _{0_60}	Nm	0.64		1.30	
Continuous current at standstill 60 K	I _{0_60(eff)}	A	1.60	2.50	2.60	4.60
Maximum current	I _{max(eff)}	A	4.90	10.60	7.70	19.50
Maximum torque	M _{max}	Nm	1.91		3.80	
Torque constant at 20 °C	K _{M,N}	Nm/A	0.41	0.26	0.51	0.28
Voltage constant at 20 °C ¹⁾	K _{EMK_1000}	V/min ⁻¹	24.5	15.4	30.6	17.0
Winding resistance at 20 °C	R ₁₂	Ohm	6.10	2.50	3.60	1.10
Winding inductance	L ₁₂	mH	14.700	5.700	10.600	3.200
Discharge capacity of the component	C _{dis}	nF	0.7		1.4	1.2
Number of pole pairs	p	-	4			
Mechanical parameters						
Moment of inertia of rotor ²⁾	J _{rot}	kg*m ²	0.0000140		0.0000260	
Wire cross section	A ₆₀	mm ²	0.75			
Maximum speed (electrical)	n _{max el}	min ⁻¹	5000	3000	5000	3000
Mass ³⁾	m	kg	0.82 (1.3)		1.2 (1.7)	
Storage temperature	T _L	°C	-20 ... +60			
Ambient temperature during operation	T _{amb}	°C	0 ... 40			
Installation altitude		m	0 ... 1000			
Thermal class (EN 60034-1)	T.CL.	-	130 (B)			
Protection class acc to IEC 60529	IP	-	IP54			
Sound pressure level	L _p	dB[A]	< 70			

Latest amendment: 2019-02-14

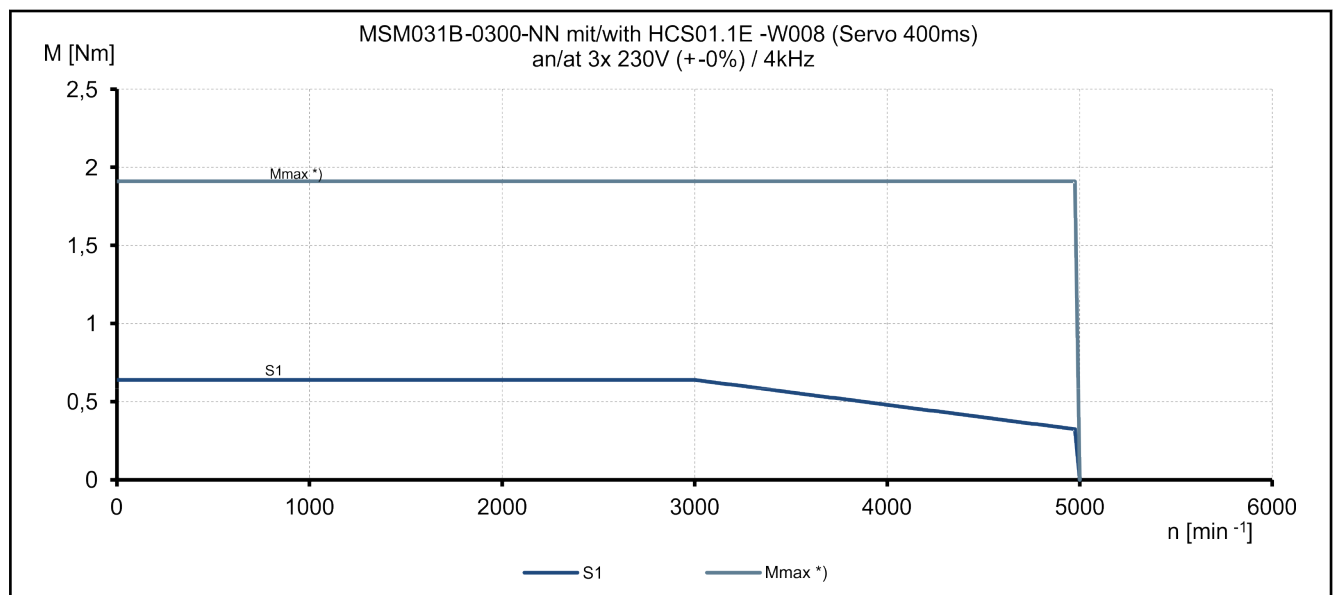
- 1) Manufacturing tolerance ±5%
 2) Tolerance ± 10%
 3) (...) Motors with holding brake 1, 2, ...

Tab. 5-6: MSM - Technical data

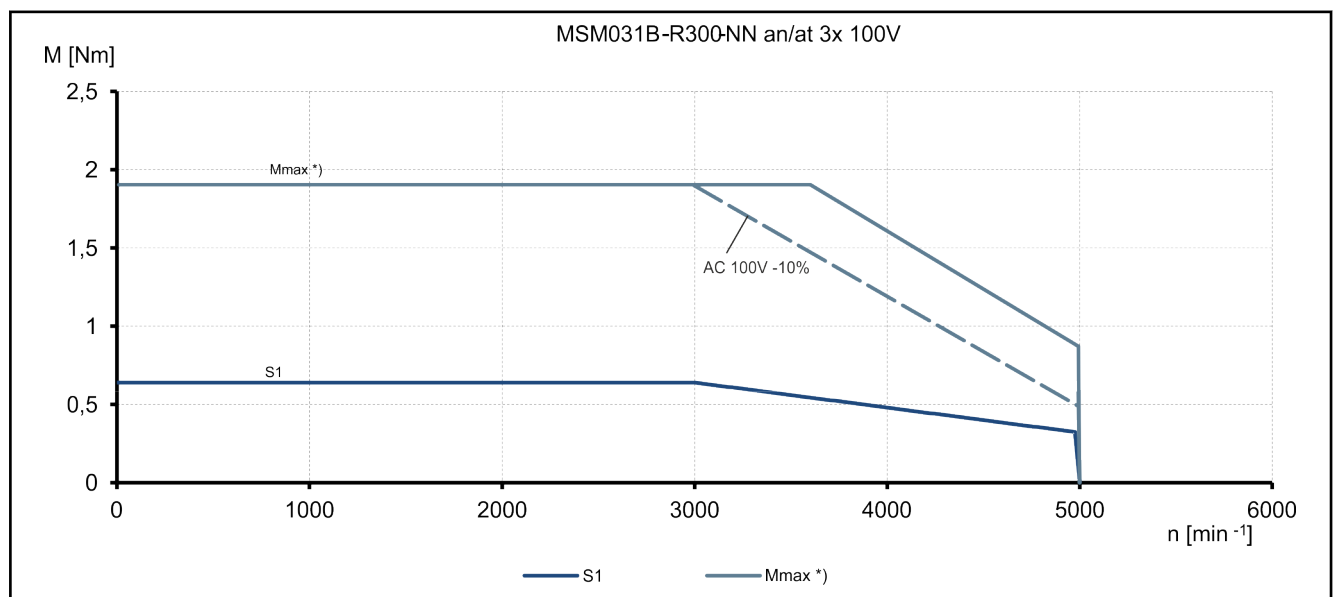
Technical data

Designation	Symbol	Unit	Holding brake 1 (MSM031)
Holding torque	M_4	Nm	1.27
Rated voltage ¹⁾	U_N	V	24 ± 1.2
Rated current	I_N	A	0.36
Maximum connection time	t_1	ms	15
Maximum disconnection time	t_2	ms	50
Moment of inertia of the holding brake	J_{br}	kg*m ²	0.0000018
Switching cycles within standstill			2 Mio
Latest amendment: 2019-02-14			

Tab. 5-7: MSM031 Holding brakes - Technical data (optional)

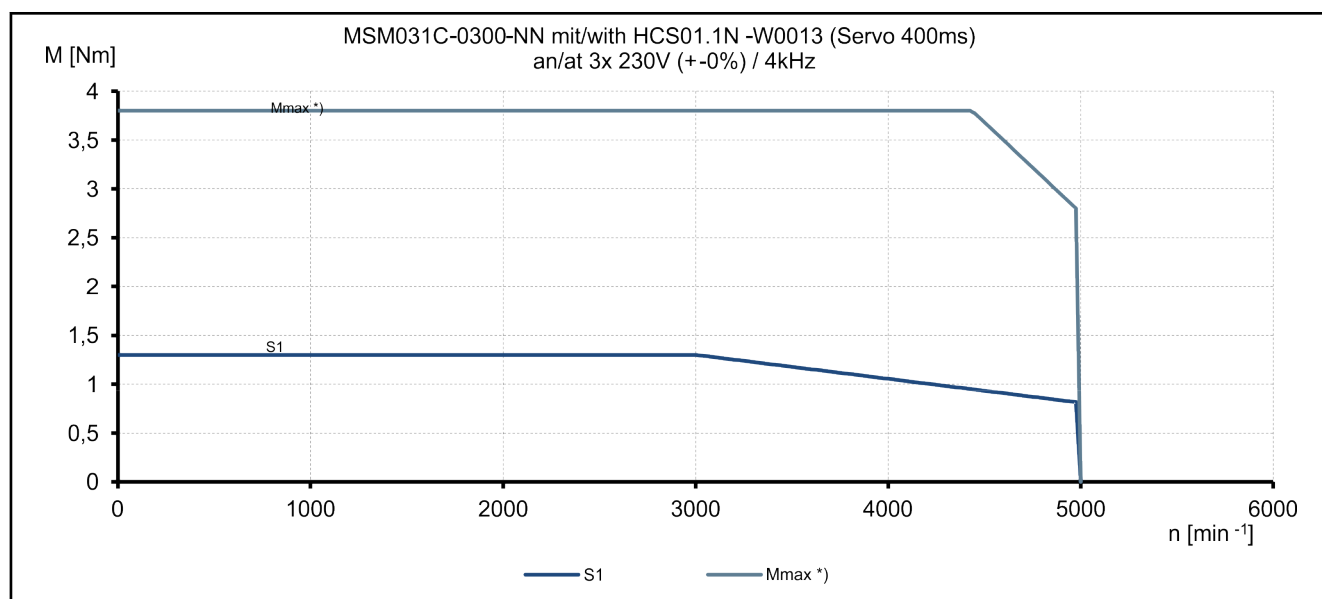


*) maximum permitted nominal line voltage 3x 230 V
Fig. 5-5: Speed-torque characteristic curves

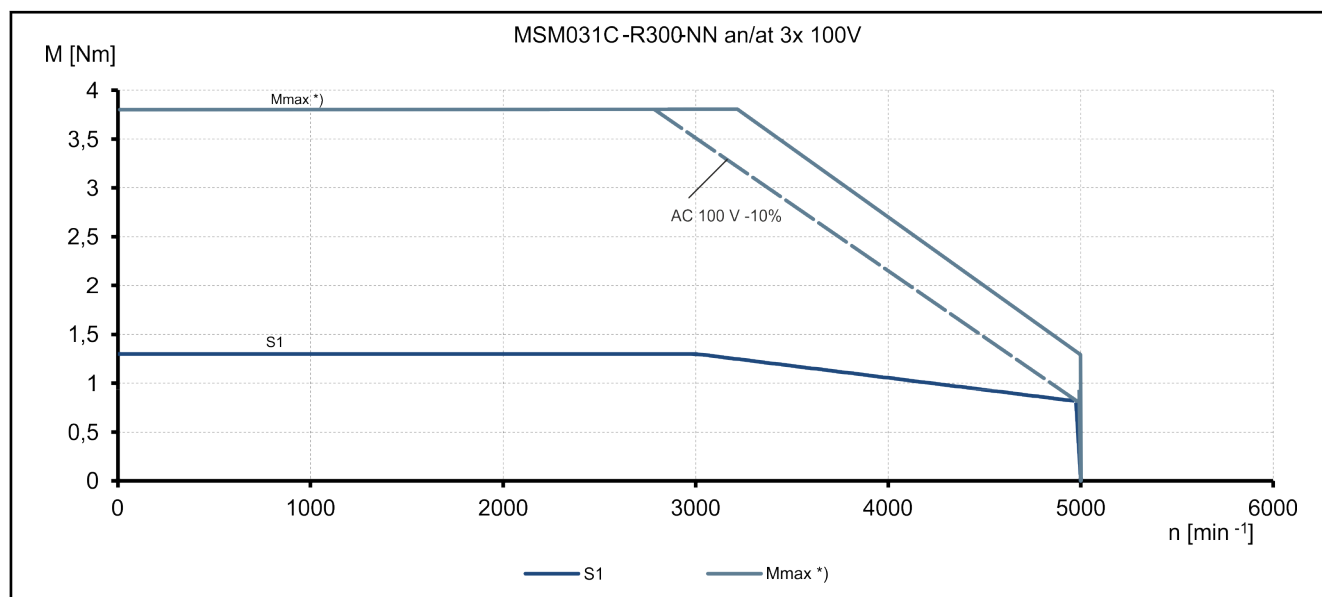


*) maximum permitted nominal line voltage 3x 100V
Fig. 5-6: Speed-torque characteristic curves

Technical data



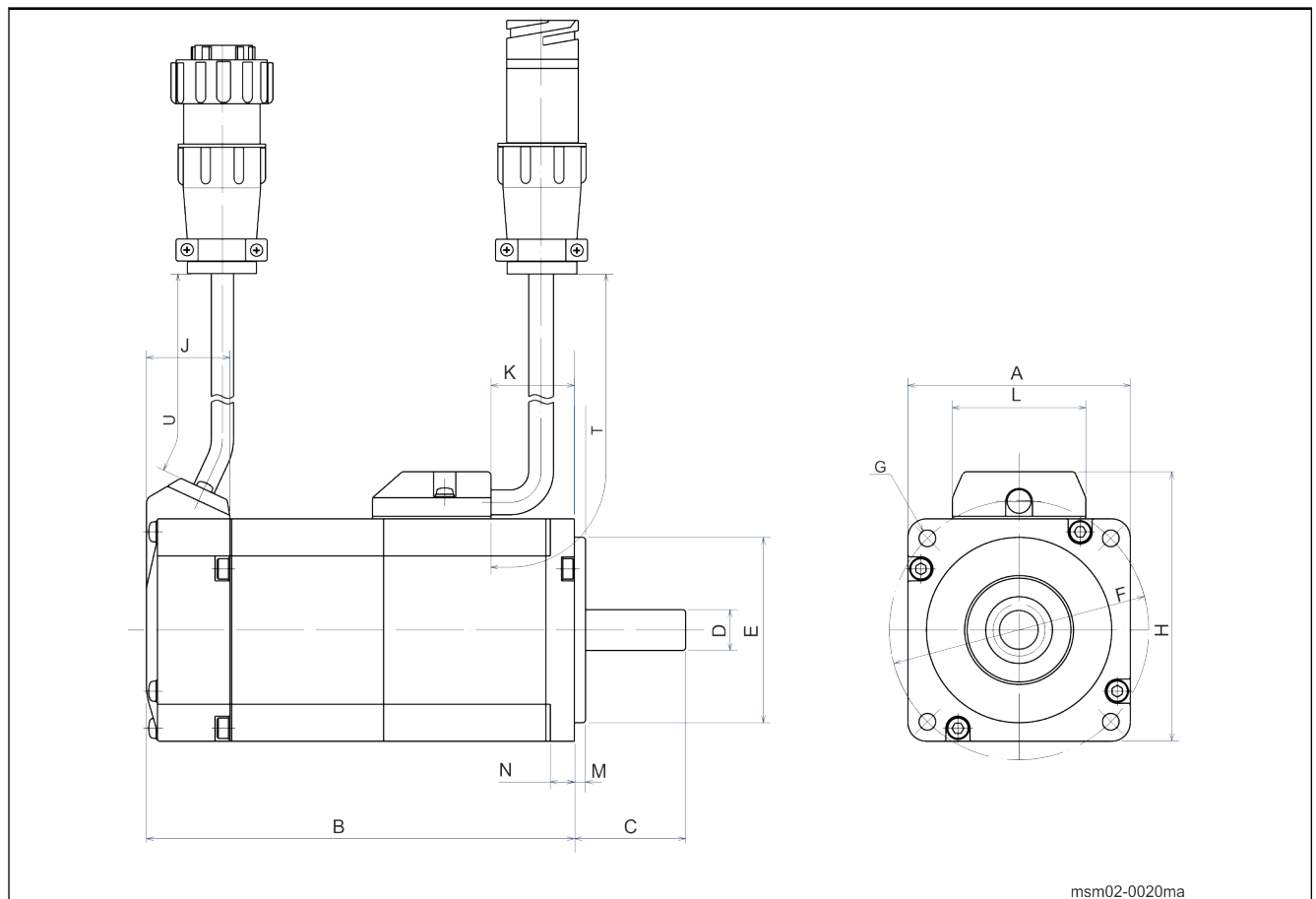
*) maximum permitted nominal line voltage 3x 230 V
Fig. 5-7: Speed-torque characteristic curves



*) maximum permitted nominal line voltage 3x 100V
Fig. 5-8: Speed-torque characteristic curves

5.3.2 MSM031 Specifications

MSM031...M0-C...



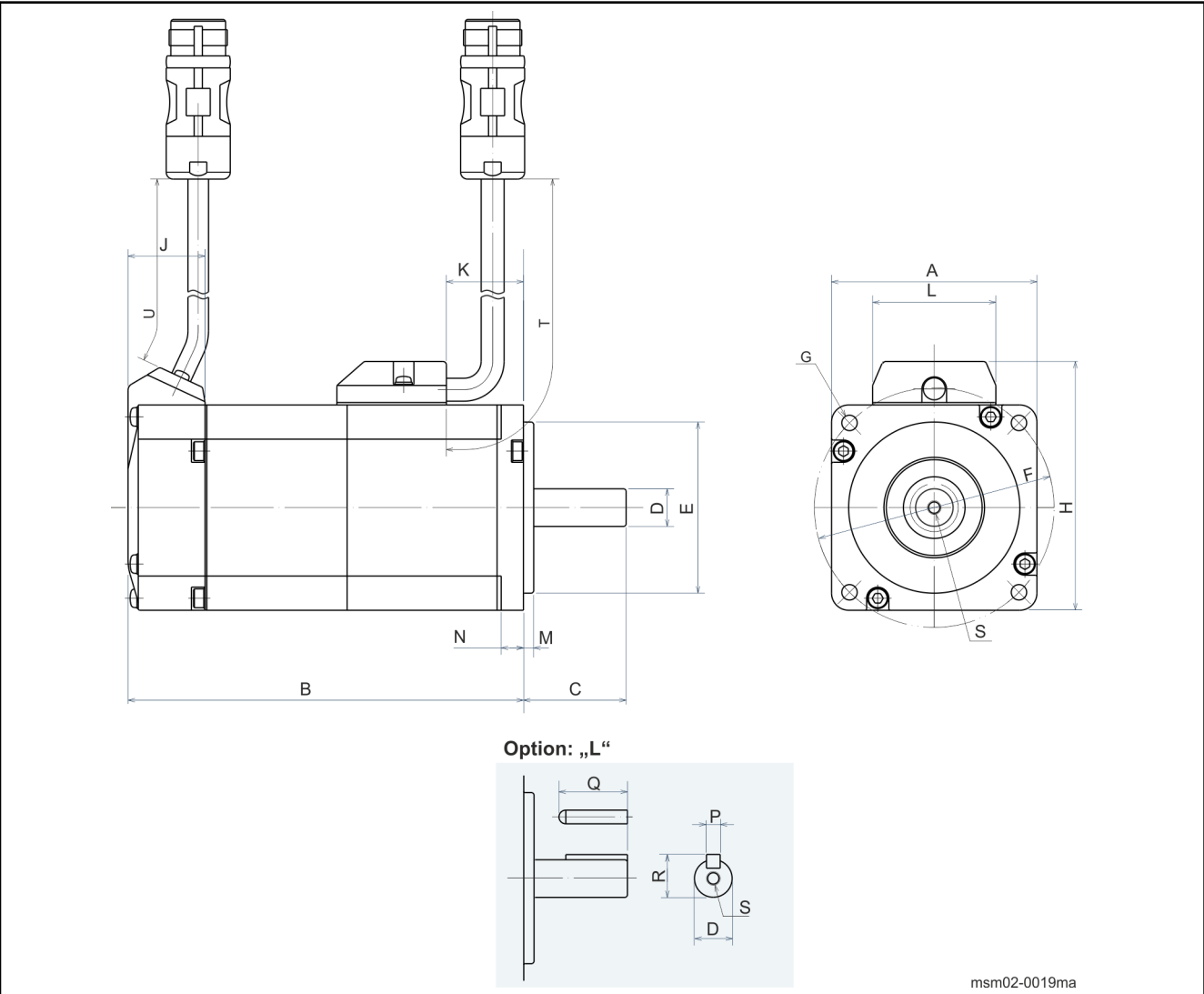
msh02-0020ma

Motor / size	A	B	C	D	E	F	G	H	J	K
MSM031B-...-M0-CH0	□60	79	30	∅11 ^{h6}	∅50 ^{h7}	∅70±0.20	∅4.5	73	22.5	22.5
MSM031B-...-M0-CH1	□60	115.5	30	∅11 ^{h6}	∅50 ^{h7}	∅70±0.20	∅4.5	73	22.5	22.5
MSM031C-...-M0-CH0	□60	98.5	30	∅14 ^{h6}	∅50 ^{h7}	∅70±0.20	∅4.5	73	22.5	42
MSM031C-...-M0-CH1	□60	135	30	∅14 ^{h6}	∅50 ^{h7}	∅70±0.20	∅4.5	73	22.5	42
Motor / size	L	M	N						T	U
MSM031B-...-M0-CH0	36	3	6.5						200	220
MSM031B-...-M0-CH1	36	3	6.5						200	220
MSM031C-...-M0-CH0	36	3	6.5						200	220
MSM031C-...-M0-CH1	36	3	6.5						200	220

Tab. 5-8: Dimensions MSM031

Technical data

MSM031...M5-M...



Motor / size	A	B	C	D	E	F	G	H	J	K
MSM031B-...-M5-M.0	60	79	30	11 ^{h6}	50 ^{h7}	70±0.20	4.5	73	22.5	22.5
MSM031B-...-M5-M.1	60	115.5	30	11 ^{h6}	50 ^{h7}	70±0.20	4.5	73	22.5	22.5
MSM031C-...-M5-M.0	60	98.5	30	14 ^{h6}	50 ^{h7}	70±0.20	4.5	73	22.5	42
MSM031C-...-M5-M.1	60	135	30	14 ^{h6}	50 ^{h7}	70±0.20	4.5	73	22.5	42
Motor / size	L	M	N	P		Q	R	S	T	U
MSM031B-...-M5-M.0	36	3	6.5	4h9 (groove p9)		20	12.5	M4 (8 deep)	200	220
MSM031B-...-M5-M.1	36	3	6.5	4h9 (groove p9)		20	12.5	M4 (8 deep)	200	220
MSM031C-...-M5-M.0	36	3	6.5	5h9 (groove p9)		25	16	M5 (10 deep)	200	220
MSM031C-...-M5-M.1	36	3	6.5	5h9 (groove p9)		25	16	M5 (10 deep)	200	220

Tab. 5-9: Dimensions MSM031

5.4 MSM041

5.4.1 MSM041 Technical data

Designation	Symbol	Unit	MSM041B-0300-NN
Cooling mode acc. to EN 60034-6		-	IC00
Listed acc. to UL standard		-	UL 1004; ANSI UL 840
Listed acc. to CSA standard		-	CSA-C22,2 No, 100
UL-Files			E335445
Electrical parameters			
Rated power	P_N	kW	0.75
Continuous torque at standstill 60 K	$M_{0,60}$	Nm	2.40
Continuous current at standstill 60 K	$I_{0,60(\text{eff})}$	A	4.00
Maximum current	$I_{\text{max}(\text{eff})}$	A	12.00
Maximum torque	M_{max}	Nm	7.10
Torque constant at 20 °C	$K_{M,N}$	Nm/A	0.64
Voltage constant at 20 °C ¹⁾	K_{EMK_1000}	V/min ⁻¹	37.6
Winding resistance at 20 °C	R_{12}	Ohm	1.50
Winding inductance	L_{12}	mH	6.700
Discharge capacity of the component	C_{dis}	nF	1.3
Number of pole pairs	p	-	4
Mechanical parameters			
Moment of inertia of rotor ²⁾	J_{rot}	kg*m ²	0.0000870
Wire cross section	A_{60}	mm ²	0.75
Maximum speed (electrical)	$n_{\text{max el}}$	min ⁻¹	4500
Mass ³⁾	m	kg	2.3 (3.1)
Storage temperature	T_L	°C	-20 ... +60
Ambient temperature during operation	T_{amb}	°C	0 ... 40
Installation altitude		m	0 ... 1000
Thermal class (EN 60034-1)	T.CL.	-	130 (B)
Protection class acc. to IEC 60529	IP	-	IP54
Sound pressure level	L_p	dB[A]	< 70

Latest amendment: 2019-02-14

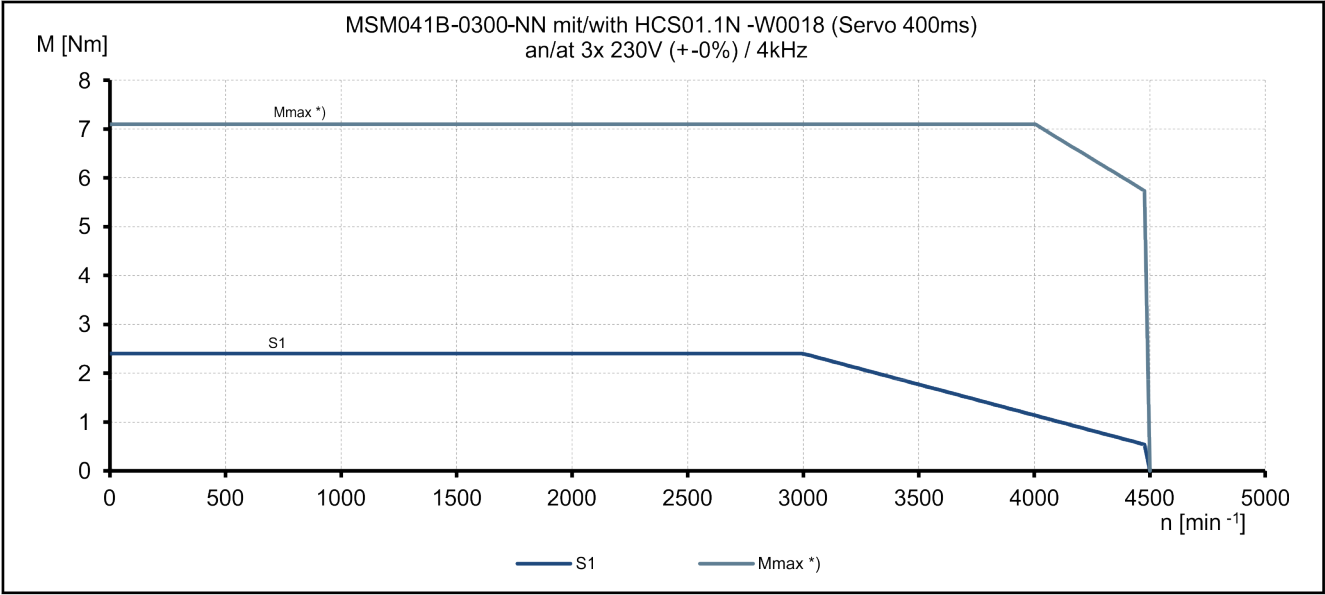
- 1) Manufacturing tolerance ±5%
2) Tolerance ± 10%
3) (...) Motors with holding brake 1, 2, ...
Tab. 5-10: MSM - Technical data

Technical data

Designation	Symbol	Unit	Holding brake 1 (MSM041)
Holding torque	M_4	Nm	2.45
Rated voltage ¹⁾	U_N	V	24 ±1.2
Rated current	I_N	A	0.42
Maximum connection time	t_1	ms	20
Maximum disconnection time	t_2	ms	70
Moment of inertia of the holding brake	J_{br}	kg*m ²	0.0000075
Switching cycles within standstill			2 Mio

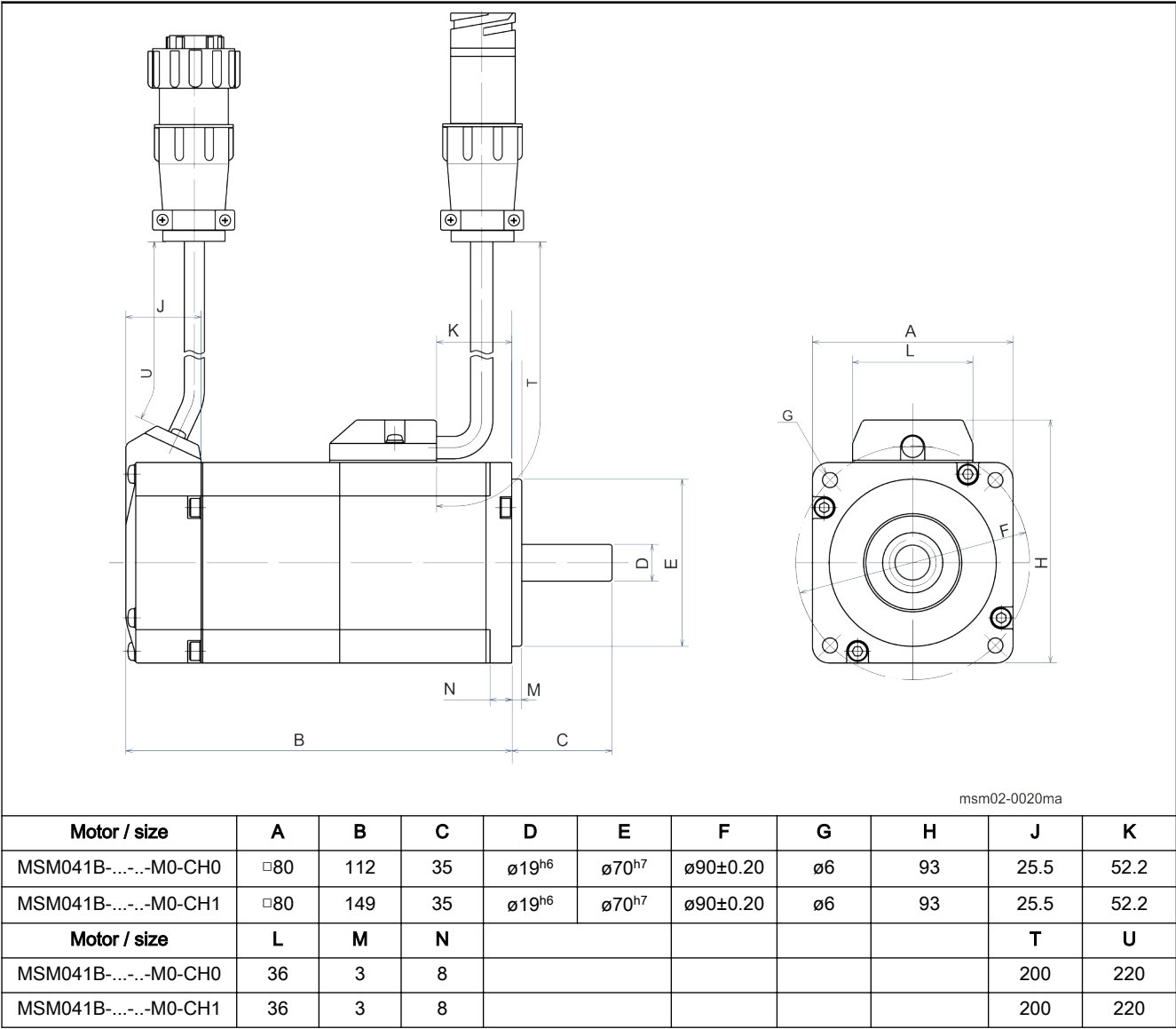
Latest amendment: 2019-02-14

Tab. 5-11: MSM041 Holding brakes - Technical data (optional)



*) maximum permitted nominal line voltage 3x 230V
Fig. 5-9: Speed-torque characteristic curves

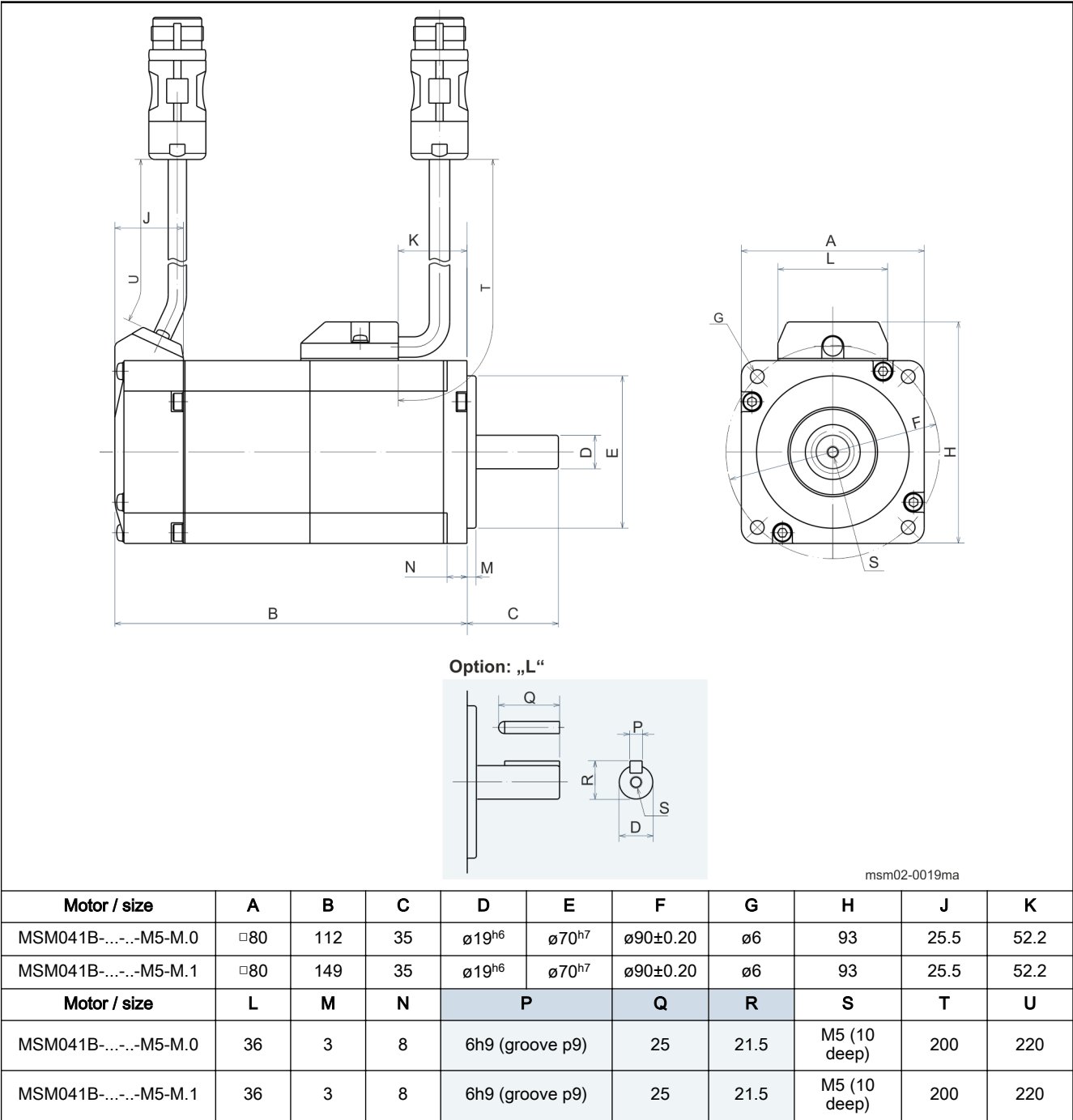
5.4.2 MSM041 Specifications
MSM041...M0-C...



Tab. 5-12: Dimensions MSM041

Technical data

MSM041...M5-M...



Tab. 5-13: Dimensions MSM041

6 Motor encoder MSM

6.1 Motor encoder M0

Data sheet - Encoder

Designation	Symbol	Unit	Encoder M0 (MSM)	
Battery extern			-	Yes
Encoder design	-	-	Singleturn absolute	Multiturn absolute
Distinguishable revolutions	-	-	1	65536
Incremental signals	-	-	without	
Resolution of encoder	-	-	17 bit	17+16 bit
System accuracy	-	“	tbd	
Maximum encoder speed		min ⁻¹	6000	
Supply voltage	VCC _{Encoder}	V	4.75 ... 5.25	
Max. current consumption	I _{Encoder}	mA	70	
Latest amendment: 2009-07-07				

" Angular seconds

Tab. 6-1: Encoder data

Singleturn absolute value encoder

The singleturn absolute value encoder serves for absolute indirect position detection within 1 motor revolution. For this encoder variant, the absolute axis position gets lost after switching-off the voltage.

Multiturn absolute value encoder

The multiturn absolute value encoder serves for absolute indirect position detection within 65536 motor revolutions. It replaces a separate absolute value encoder at the motor. The absolute axis position at this encoder variant is retained by the battery buffering even after switching-off the voltage. If the motor is disconnected from the batterybus, the information about absolute axis position gets lost after about 1 minute.

Details for multiturn signals

For using the multiturn option, the buffering memory via a necessary battery is necessary. Therefore, the following accessory is available:

Batterybox

Designation	Order number
SUP-E01-MSM-BATTERYBOX	R911324240

Spare battery

Designation	Order number
SUP-E03-DKC*CS-BATTERY	R911295648

Motor encoder MSM

6.2 Motor encoder M5

Data sheet - Encoder

Designation	Symbol	Unit	Encoder M5 (MSM)	
Battery extern			-	Yes
Encoder design	-	-	Singleturn absolute	Multiturn absolute
Distinguishable revolutions	-	-	1	65536
Incremental signals	-	-	without	
Resolution of encoder	-	-	20 bit	20 + 16 bit
System accuracy typical/ maximum	-	“	-170 / -240	
Maximum encoder speed		min ⁻¹	6000	
Supply voltage	VCC _{Encoder}	V	4.5 ... 5.5	
Max. current consumption	I _{Encoder}	mA	70	
Latest amendment: 2017-09-21				

“ Angular seconds

Tab. 6-2: Encoder data

Singleturn absolute value encoder

The singleturn absolute value encoder serves for absolute indirect position detection within 1 motor revolution. For this encoder variant, the absolute axis position gets lost after switching-off the voltage.

Multiturn absolute value encoder

The multiturn absolute value encoder serves for absolute indirect position detection within 65536 motor revolutions. The absolute axis position at this encoder variant is retained by the battery buffering even after switching-off the voltage. If the motor is disconnected from the batterybox, the information about absolute axis position gets lost after about 1 minute. It replaces a separate absolute value encoder at the motor.

Details for multiturn signals

For using the multiturn option, the buffering memory via a necessary battery is necessary. Therefore, the following accessory must be used:

Batterybox

Designation	Order number	Length
SUP-E02-MSM-BATTERYBOX-L010	R911346063	1000 mm
SUP-E02-MSM-BATTERYBOX-L030	R911346065	3000 mm
SUP-E02-MSM-BATTERYBOX-NNNN	R911346084	250 mm

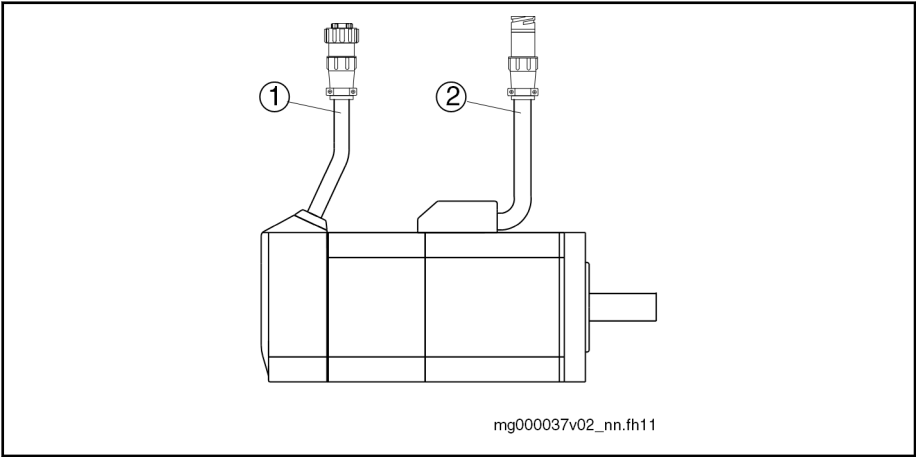
Spare battery

Designation	Order number
SUP-E02-MSM-BATTERY	R911369925

7 Connection technique

7.1 Electrical connection "C" cable connection

Bayonet locking IP54 The connections for power and encoder MSM motors are done via flexible connection lines with plug connectors (IP54) and bayonet fastening.
When connecting the connection cables, the bayonet fastening must engage.



1 Encoder connection
2 Power connection

Fig. 7-1: MSM motor connection

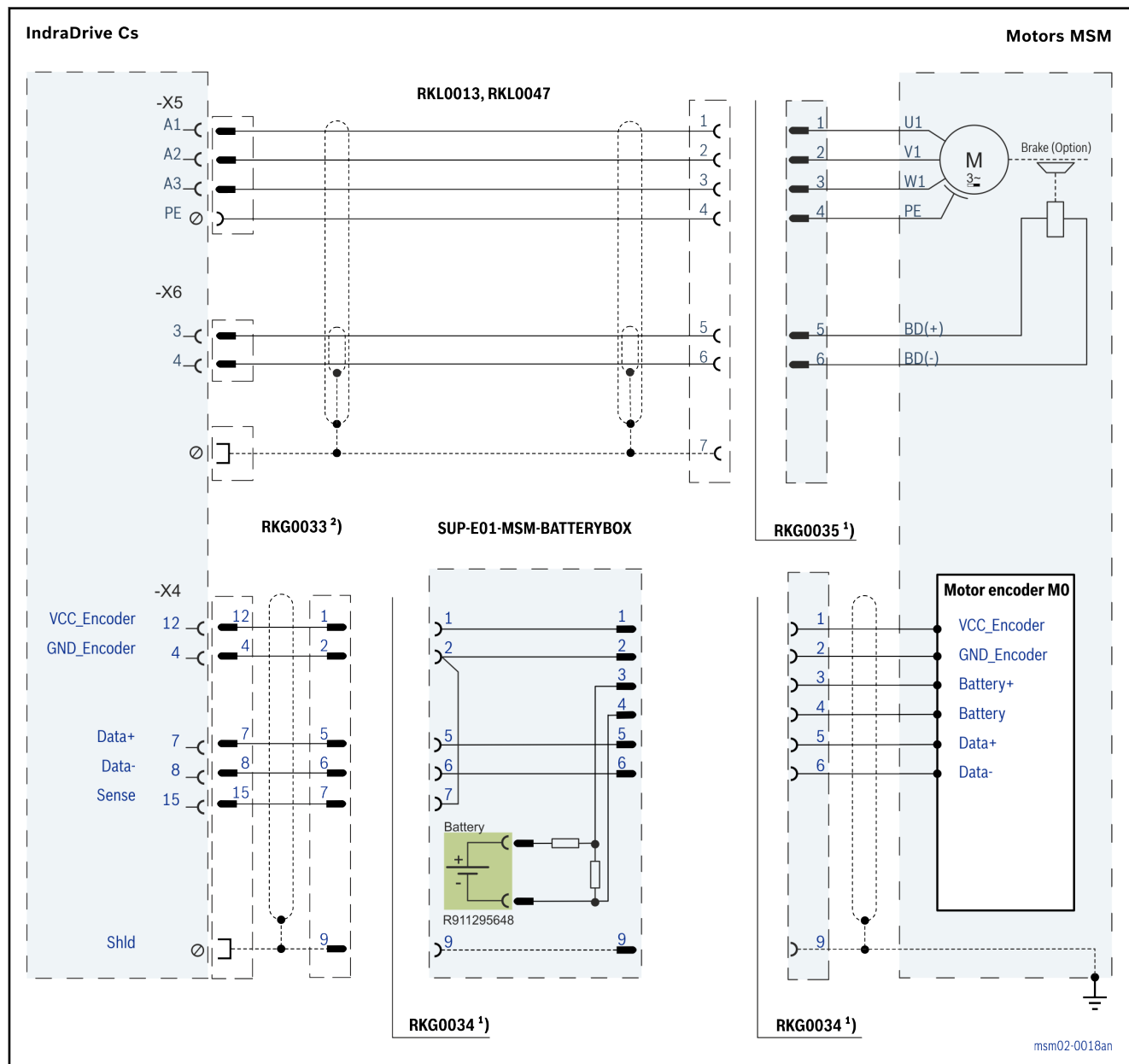
For the length of the flexible connection line, refer to the following table.

Motor	Length connection line and plug connector	
	Encoder	Power
MSM019	230 mm (+63 mm plug connector INS0758)	200 mm (+70 mm plug connector INS0757)
MSM031	220 mm (+63 mm plug connector INS0758)	
MSM041		

Tab. 7-1: MSM motors: Length of connection line

Connection technique

Connection overview



1)

Optional extension cable

2)

In the case of Singleturn application, connect RKG033 directly with the cable connector INS0758 of the MSM motor.

□

Shield connection via housing

Fig. 7-2:

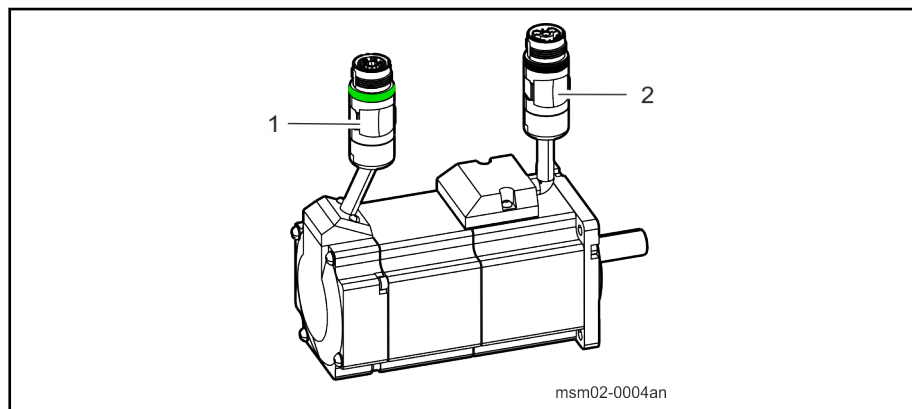
MSM connection plan with encoder M0 and battery box.

Mount the battery box near the motor. The maximum cable length between battery box and MSM motor (RKG0034) is 2.0 m.

7.2 Electrical connection "M" cable connection circular connector M17

SpeedCon quick lock IP67

The connections for power and encoder MSM motors are done via flexible connection lines with circular connector M17 (IP67) and Speedcon fastener.



1 Encoder connection (green code ring)

2 Power connection (black code ring)

Fig. 7-3: MSM SpeedCon motor connection

For the length of the flexible connection line, please refer to the following table.

Motor	Length connection line ("M" cable connection circular connector M17)	
	Encoder	Power
MSM019	230 mm (+47 mm plug connector RGS1782)	200 mm (+47 mm plug connector RLS1722)
MSM031	220 mm (+47 mm plug connector RGS1782)	
MSM041	220 mm (+47 mm plug connector RGS1782)	

Tab. 7-2: MSM motors: Length of connection line ("M" cable connection circular connector M17)

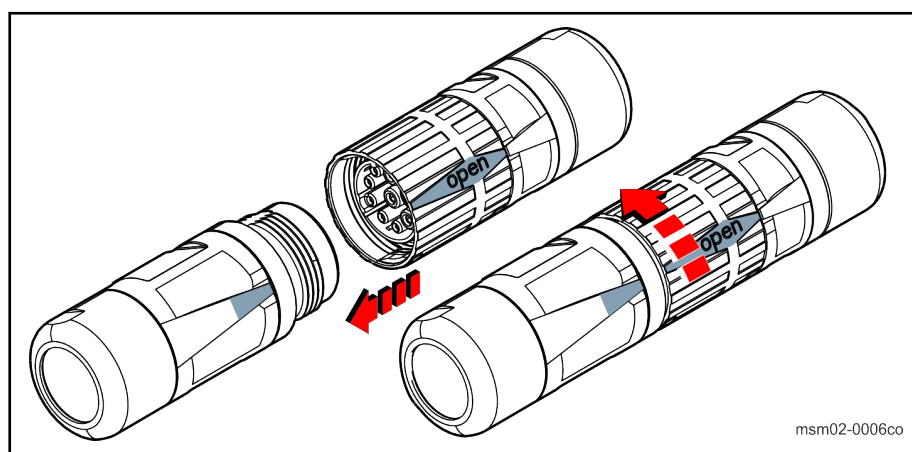
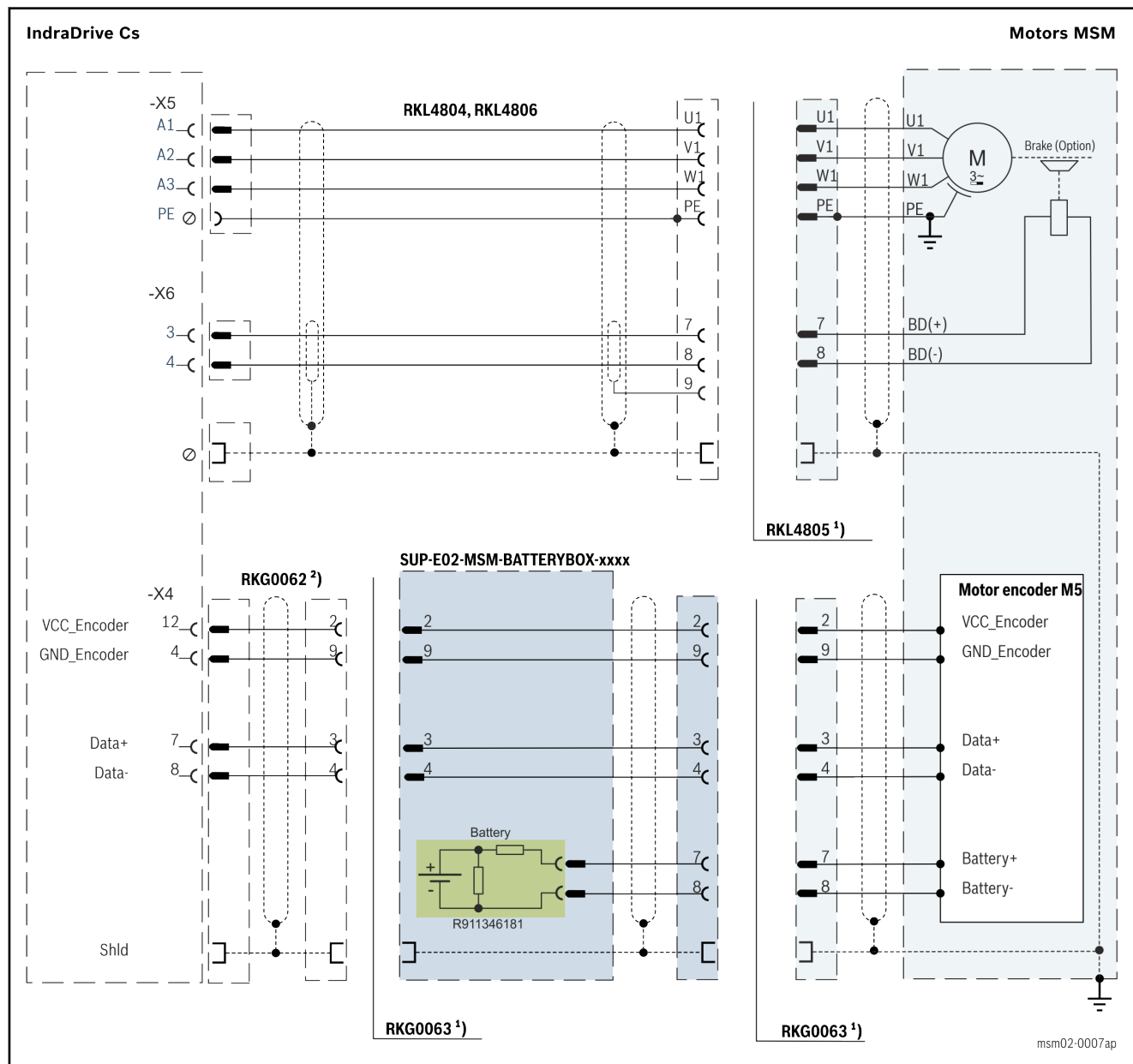


Fig. 7-4: SpeedCon quick lock

Rack the cable connector in "open" position and "manually" tighten the power connector with a rotation by approx. 90°.

Connection technique

Connection overview



7.3 Ready-made connection cables

7.3.1 Power cables

Motor	Controller		
	HCS01.1E-W0003 HCS01.1E-W0005 HCS01.1E-W0006 HCS01.1E-W0008 HCS01.1E-W0009 HCS01.1E-W0013	HCS01.1E-W0018 HCS01.1E-W0028	NYCe4000
MSM019A-_300-NN-__-C__	RKL0013 (RKL0035)	RKL0047 (RKL0035)	-
MSM019B-_300-NN-__-C__			
MSM031B-_300-NN-__-C__			
MSM031C-_300-NN-__-C__			
MSM041B-_300-NN-__-C__			
MSM019A-_300-NN-__-M__	RKL4804 (RKL4805)	RKL4806 (RKL4805)	-
MSM019B-_300-NN-__-M__			
MSM031B-_300-NN-__-M__			
MSM031C-_300-NN-__-M__			
MSM041B-_300-NN-__-M__			
MSM019B-R300-NN-__-C__	-	-	RKL0044 (RKL0035)
MSM031B-R300-NN-__-C__			
MSM031C-R300-NN-__-C__			
MSM041B-R300-NN-__-C__			
MSM019B-R300-NN-__-M__	-	-	RKL4807 (RKL4805)
MSM031B-R300-NN-__-M__			
MSM031C-R300-NN-__-M__			
MSM041B-R300-NN-__-M__			

(...)

Tab. 7-3:

Extension (optional)

MSM Power cable

Connection technique

7.3.2 Encoder cable

Motor	Controller			
	HCS01.1E-W0003 HCS01.1E-W0005 HCS01.1E-W0006 HCS01.1E-W0008 HCS01.1E-W0009 HCS01.1E-W0013 HCS01.1E-W0018 HCS01.1E-W0028			NYCe4000
	Singelturn	Multiturn + Battery box	Multiturn + battery on controller	
MSM019A-_300-NN-__-C__	RKG0033 (RKG0034)	RKG0033	RKG0041 (RKG0034)	-
MSM019B-_300-NN-__-C__		+		
MSM031B-_300-NN-__-C__		SUP-E01-MSM-BAT-		
MSM031C-_300-NN-__-C__		TERYBOX		
MSM041B-_300-NN-__-C__		+		
		RKG0034		
MSM019A-_300-NN-__-M__	RKG0062 (RKG0063)	RKG0062	RKG0065 (RKG0063)	-
MSM019B-_300-NN-__-M__		+		
MSM031B-_300-NN-__-M__		SUP-E02_MSM-BAT-		
MSM031C-_300-NN-__-M__		TERYBOX-xxxx		
MSM041B-_300-NN-__-M__		+		
		RKG0063		
MSM019B-R300-NN-__-C__	-	-	-	RKG0040 (RKG0034)
MSM031B-R300-NN-__-C__				
MSM031C-R300-NN-__-C__				
MSM041B-R300-NN-__-C__				
MSM019B-R300-NN-__-M__	-	-	-	RKG0064 (RKG0063)
MSM031B-R300-NN-__-M__				
MSM031C-R300-NN-__-M__				
MSM041B-R300-NN-__-M__				

(...)

Tab. 7-4:

Extension (optional)
MSM power cable

8 Transport and storage

8.1 Transport of motors

Environmental and operating conditions - Transport

Designation	Symbol	Unit	Value
Temperature range	T_{a_tran}	°C	-20 ... +80
Relative air humidity		%	5 ... 95
Absolute air humidity		g/m ³	1 ... 60
Climatic class (IEC721)			2K3
Condensation			not allowed
Icing			not allowed

Tab. 8-1: Environmental and operating conditions - Transport

8.2 Storage of motors

Environmental and operating conditions - Storage

Designation	Symbol	Unit	Value
Temperature range	T_{a_store}	°C	-20 ... +60
Relative air humidity		%	5 ... 95
Absolute air humidity		g/m ³	1 ... 29
Climatic class (IEC721)			1K3
Condensation			not allowed
Icing			not allowed

Tab. 8-2: Environmental and operating conditions - Storage

9 Assembly accessory

9.1 Flange fastening

The screw connection must be adjusted to the installation situation (screw-length, property class, screw-in depth, material, ...). The dimensioning of the screw connection is in the responsibility of the customer.

To attach the motors properly and safely to the machine, Bosch Rexroth recommends the following screws and washers for attachment.

Mounting screws: MSM Motors

Hole ø [mm]	Screw 8.8 DIN EN ISO 4762 DIN EN ISO 4014	Tightening torque M_A [Nm] at $\mu_K = 0.12$	Washer DIN EN ISO 28738
3.4	M3 × 16	1.3	-
4.5	M4 × 20	3.1	-
6	M5 × 20	6.1	-

Tab. 9-1: Tightening torque of mounting screws



The screwed connections must be able to take up both the force due to the weight of the motor and the forces acting during operation.

If the screws and washers used do not comply with this recommendation, the property class of the screws and the hardness class must be equivalent in order to transmit the required tightening torques.

MSM motors are produced for flange mounting (B05). Details on the mounting holes are given in the corresponding dimension sheet.

Assembly accessory

9.2 Battery box SUP-E01-MSM-BATTERYBOX

Use The battery box "SUP-E01-MSM-BATTERYBOX" is an set of accessories for operation of MSM motors with absolute encoder (M0) and is used for buffering of the encoder data in case of power shut off.

Scope of delivery

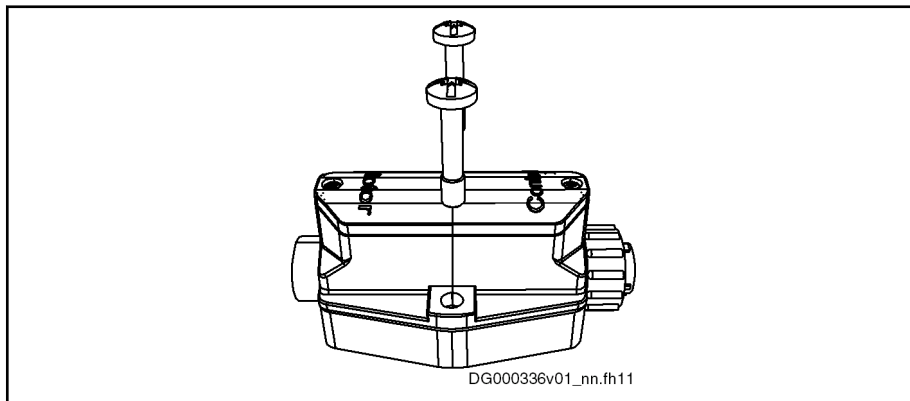


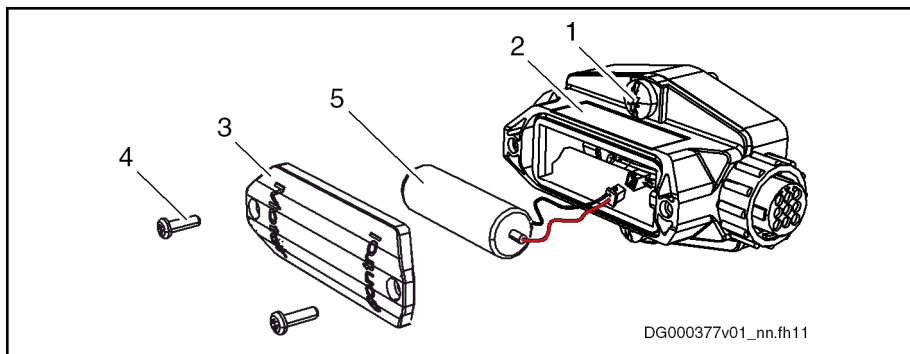
Fig. 9-1: Battery box

Battery box complete with

- **Battery:** Type: ER6C, 3.6 V; 1800 mA, lithium; lifetime: up to 10 years, depending on use and ambient temperature
- **Assembly screws:** M6×30; screw head: Torx and slot

The battery box "SUP-E01-MSM-BATTERYBOX" is delivered in ready-for-use state with battery.

Components:



- | | |
|---|--|
| 1 | Assembly screw |
| 2 | Housing |
| 3 | Housing lid |
| 4 | Housing lid screw (self-shaping screw 30×10; tightening torque 0.8 Nm) |
| 5 | Battery |

Fig. 9-2: Components of battery box

Assembly accessory

Dimensions

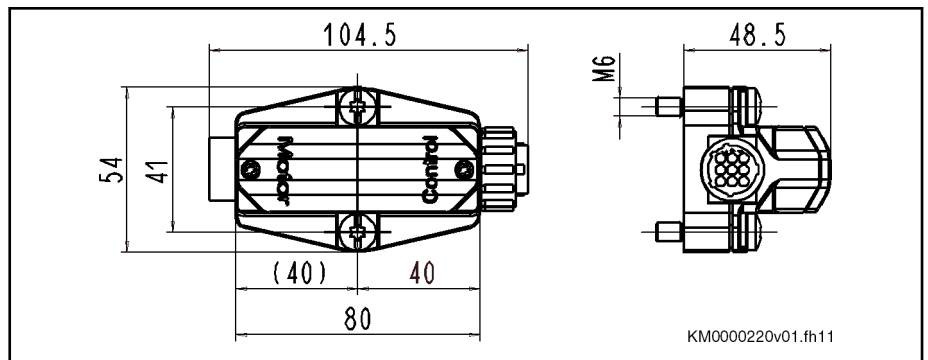


Fig. 9-3: Dimensions

Weight 120 g

Mounting



Install the battery box in the immediate vicinity of the motor.

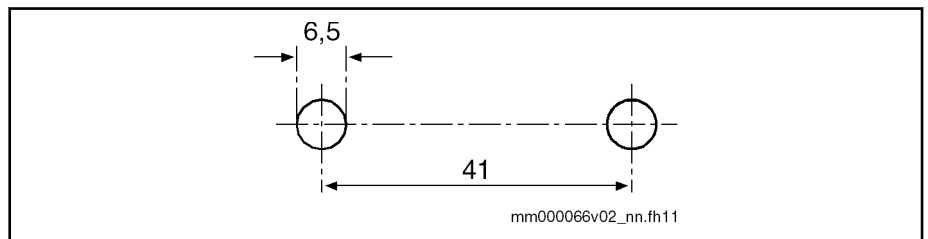
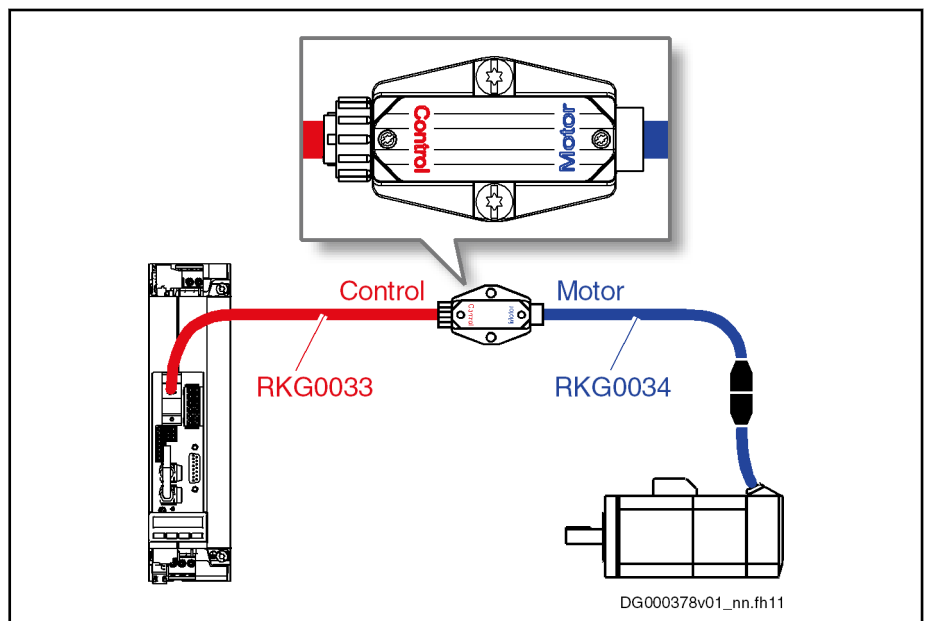


Fig. 9-4: Drilling diagram for battery box

- Assembly screws: M6×30
- Tightening torque M_A : 3 Nm

Cabling



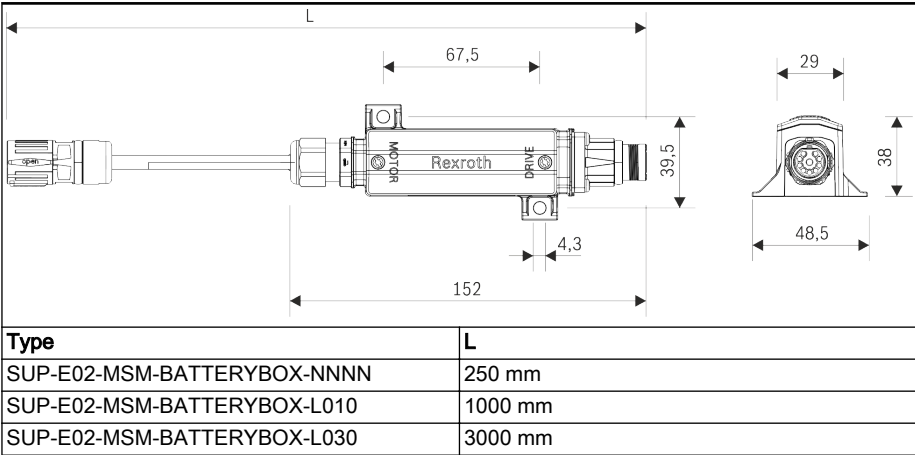
RKG0033 Encoder cable
RKG0034 Extension cable (optional)

Fig. 9-5: Cabling of battery box

9.3 Battery box SUP-E02-MSM-BATTERYBOX-xxxx

Use When operating MSM motors with absolute value encoder (M5), the battery box serves for buffering the encoder data when disconnecting the voltage.

Scope of delivery



Tab. 9-2: Battery box measures

Battery box complete with

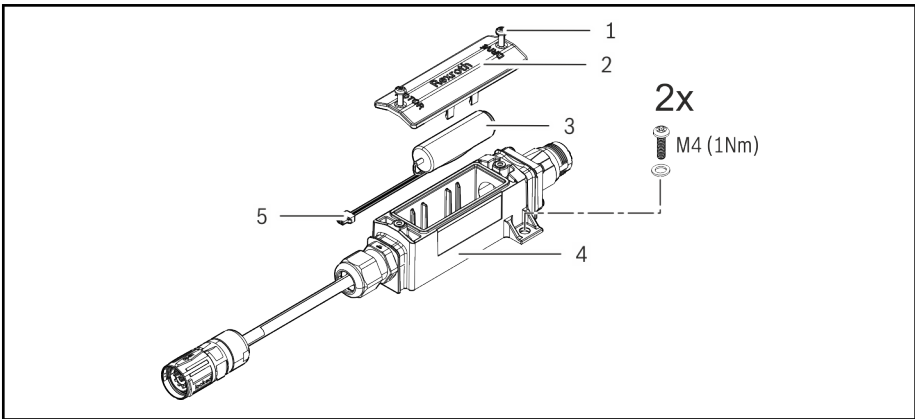
- Battery:** Type PRM1-03V6-2600C-D2-LITH-ZNR-50, 3.6 V; 2600 mAh, Lithium; Lifetime: up to 10 years, dependet from stress and environmental temperature

When the "SUP-E02-MSM-BATTERYBOX-xxxx" battery box is delivered, it is ready to use.

Recommendation Battery change after 5 years

Order number spare battery **R911369925** SUP-E02-MSM-BATTERY

Components:



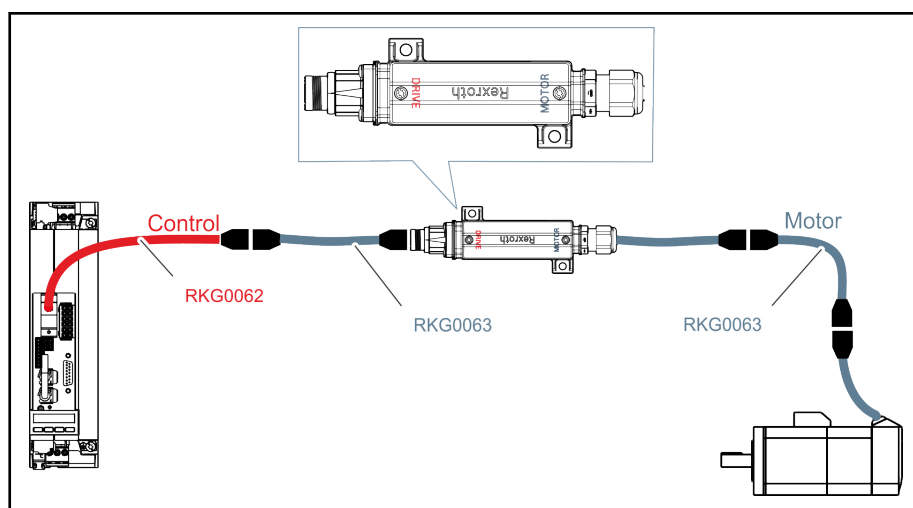
- 1 Housing screw (M_A 0.7 Nm)
- 2 Housing lid
- 3 Battery
- 4 Housing
- 5 Battery connector

Fig. 9-6: Components of a battery box

For fastening the battery box, use 2xM4 mounting screws mit washer and screw locking. The fastening screws are not included in the scope of delivery and must be customized onto the required mounting situation. Tightening torque of fastening screws 1 Nm.

Assembly accessory

Cabling



RKG0062 Encoder cable
RKG0063 Extension cable (optional)
Fig. 9-7: Battery box cabling

Assembly accessory

9.4 Shaft sealing ring

Shaft sealing rings are available as accessory. The shaft sealing rings increase the IP protection within the output shaft.

Retrofitting must be done on the customer side. The proper function requires proper mounting.

Motor	Order no.	Designation
MSM019	R911311237	SUP-M01-MSM020-OILSEAL
MSM031	R911311238	SUP-M01-MSM030-OILSEAL
MSM041	R911311239	SUP-M01-MSM040-OILSEAL

Tab. 9-3: Accessories MSM Shaft sealing ring

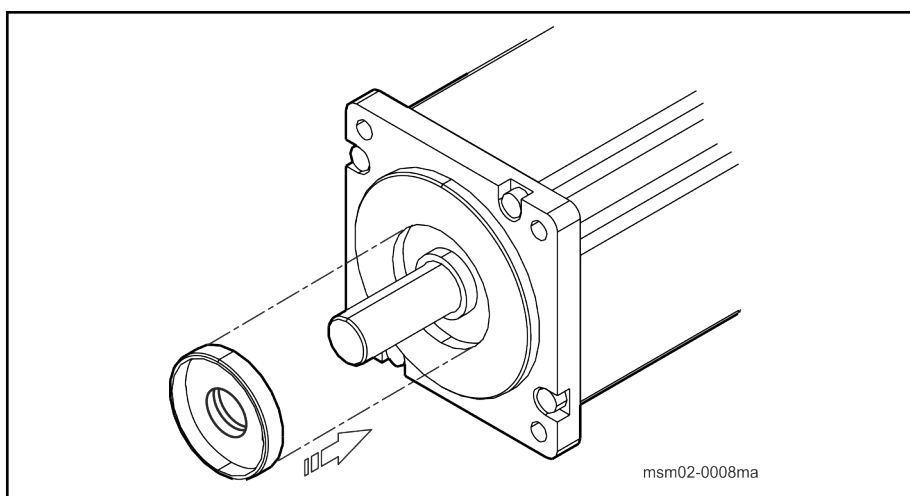


Fig. 9-8: Mounting accessories radial shaft sealing ring MSM

Mounting notes:

- Clean the place of the radial shaft sealing ring.
- Slide the radial shaft sealing ring over the shaft and observe that the key does not damage the sealing lip.
- Slowly slight the radial shaft sealing ring by means of mounting tools on-to the motor.
- Grease the radial shaft sealing ring.

10 Environmental protection and disposal

10.1 Environmental protection

Production processes	The products are manufactured in energy- and resource-optimized production processes which allow re-using and recycling the resulting waste. We regularly try to replace pollutant-loaded raw materials and supplies by more environment-friendly alternatives.	
No release of hazardous substances	Our products do not contain any hazardous substances which may be released in case of appropriate use. Normally, our products will not have any negative influences on the environment.	
Significant components	Significant components of our products are:	
	Electronic devices	Motors
	• Steel • Aluminum • Copper • Plastics • Electronic components	• Steel / Stainless steel • Aluminum • Copper • Brass • Magnetic materials • Elektronic components

10.2 Disposal

Return of products	Our products can be returned to us for disposal free of charge. However, this requires that the products be free from oil, grease or other dirt. Furthermore, the products returned for disposal may not contain any undue foreign material or foreign components. Deliver the products "free domicile" to the following address: Bosch Rexroth AG Electric Drives and Controls Buergermeister-Dr.-Nebel-Straße 2 97816 Lohr am Main, Germany	
Packaging	Packaging materials consist of cardboard, wood and polystyrene. They can be recycled anywhere without any problem. For ecological reasons, please refrain from returning the empty packages to us.	
Batteries and accumulators	Batteries and accumulators can be labeled with this symbol.  The symbol indicating "separate collection" for all batteries and accumulators is the crossed-out wheeled bin. End users in the EU are legally bound to return used batteries and accumulators. Outside the validity of the EU Directive 2006/66/EC, the particularly applicable regulations must be followed. Batteries and accumulators can contain hazardous substances which can harm the environment or people's health when improperly stored or disposed of. After use, the batteries or accumulators contained in Rexroth products must be properly disposed of according to the country-specific collection systems.	

Environmental protection and disposal

Recycling Most of the products can be recycled due to their high content of metal. In order to recycle the metal in the best possible way, the products must be disassembled into individual assemblies.

Metals contained in electric and electronic assemblies can also be recycled by means of special separation processes.

Plastic parts of the products may contain flame retardants. These plastic parts are labeled according to EN ISO 1043. They have to be recycled separately or disposed of according to the applicable legal provisions.

11 Service and support

Our worldwide service network provides an optimized and efficient support. Our experts offer you advice and assistance should you have any queries. You can contact us **24/7**.

Service Germany Our technology-oriented Competence Center in Lohr, Germany, is responsible for all your service-related queries for electric drive and controls.

Contact the **Service Hotline** and **Service Helpdesk** under:

Phone: **+49 9352 40 5060**
Fax: **+49 9352 18 4941**
E-mail: service.svc@boschrexroth.de
Internet: <http://www.boschrexroth.com>

Additional information on service, repair (e.g. delivery addresses) and training can be found on our internet sites.

Service worldwide Outside Germany, please contact your local service office first. For hotline numbers, refer to the sales office addresses on the internet.

Preparing information To be able to help you more quickly and efficiently, please have the following information ready:

- Detailed description of malfunction and circumstances
- Type plate specifications of the affected products, in particular type codes and serial numbers
- Your contact data (phone and fax number as well as your e-mail address)

12 Appendix

12.1 EU-Declaration of conformity

Acc. to **Low Voltage Directive 2006/95/EC** (valid from April 19, 2016)

Acc. to **Low Voltage Directive 2014/35/EU** (valid from April 20, 2016)

Bosch Rexroth AG

Buurgermeister-Dr.-Nebel-Straße 2

97816 Lohr a. Main / Germany

The sole responsibility for drawing up this declaration of conformity lies with the manufacturer.

We declare that the following products

3-PHASE SYNCHRONOUS PM -MOTOR

MSM019...	MSM020...	MSM030...
MSM031...	MSM040...	MSM0419...

from the date of manufacture 2015-03-26 were developed, designed and manufactured in compliance with the above-mentioned EU directives.

Applied harmonized standards:

Standard	Title	Edition
EN 60034-1 (IEC 60034-1)	Rotating electrical machines - Part 1: Rating and performance	2010 + Cor.:2010 (2010, modified)
EN 60034-5 (IEC 60034-5)	Rotating electrical machines - Part 5: Degrees of protection provided by in- tegral design of rotating electrical ma- chines (IP-Code) - Classification	2001 + A1:2007 (2000 + Corrigen- dum 2001 + A1:2006

Further explanations: None

Appendix

**EU-Konformitätserklärung - Original**

Dok.-Nr.: DCTC-30321-001

Datum: 2017-06-01

- ☐ nach Maschinenrichtlinie 2006/42/EG
☒ nach Niederspannungsrichtlinie 2006/95/EG (gültig bis 19. April 2016)
☒ nach Niederspannungsrichtlinie 2014/35/EU (gültig ab 20. April 2016)
☐ nach EMV-Richtlinie 2014/30/EU
☐ nach ATEX-Richtlinie 2014/34/EU

Hersteller:
 Bosch Rexroth AG
 Bürgermeister-Dr.-Nebel-Straße 2
 97816 Lohr am Main / Germany,

Die alleinige Verantwortung für die Ausstellung dieser Konformitätserklärung trägt der Hersteller.

Wir erklären, dass die nachstehenden Produkte

Bezeichnung: 3-PHASE SYNCHRONOUS PM-MOTOR

Baureihen: MSM019... MSM020... MSM030...
 MSM031... MSM040... MSM041...

ab Herstelldatum: 2015-03-26

in Übereinstimmung mit den oben genannten EU-Richtlinien entwickelt, konstruiert und gefertigt wurden.

Angewandte harmonisierte Normen:

Norm	Titel	Ausgabe
EN 60034-1 (IEC 60034-1)	Drehende elektrische Maschinen – Teil 1: Bemessung und Betriebsverhalten	2010 + Cor.:2010 (2010, modifiziert)
EN 60034-5 (IEC 60034-5)	Drehende elektrische Maschinen – Teil 5: Schutzarten aufgrund der Gesamtstruktur von drehenden elektrischen Maschinen (IP-Code) –Einteilung	2001 + A1:2007 (2000 + Corrigendum 2001 + A1:2006)

Lohr am Main , den

2017-06-01

i.V.

Daniel Voegeli
 Leitung Vertriebsliches
 Produktmanagement

i.V.

Thomas Laux
 Entwicklungsbereichsleiter Antriebe

Änderungen im Inhalt der EU-Konformitätserklärung sind vorbehalten. Derzeit gültige Ausgabe auf Anfrage.



Seite 1 / 1

Fig. 12-1: EU-Declaration of conformity - origin, German



EU declaration of conformity - original

Doc. No.: DCTC-30321-001

Date: 2017-06-01

- ☐ in accordance with Machinery Directive 2006/42/EC
- ☒ in accordance with Low Voltage Directive 2006/95/EC (valid until 19th April, 2016)
- ☒ in accordance with Low Voltage Directive 2014/35/EU (valid from 20th April, 2016)
- ☐ in accordance with EMC Directive 2014/30/EU
- ☐ in accordance with ATEX Directive 2014/34/EU

Manufacturer:
Bosch Rexroth AG
Bürgermeister-Dr.-Nebel-Straße 2
97816 Lohr am Main / Germany

This declaration of conformity is issued under the sole responsibility of the manufacturer.

We hereby declare that the products below

Name: 3-PHASE SYNCHRONOUS PM-MOTOR

Series: MSM019... MSM020... MSM030...
MSM031... MSM040... MSM041...

from the date of manufacture: 2015-03-26

were developed, designed and manufactured in compliance with the above-mentioned EU directives.

Harmonized Standards applied:

Standard	Title	Edition
EN 60034-1 (IEC 60034-1)	Rotating electrical machines – Part 1: Rating and performance	2010 + Cor.:2010 (2010, modified)
EN 60034-5 (IEC 60034-5)	Rotating electrical machines – Part 5: Degrees of protection provided by integral design of rotating electrical machines (IP code) - Classification	2001 + A1:2007 (2000 + Corrigendum 2001 + A1:2006)

Lohr am Main , dated 2017-06-01
Place Date

i.V.
Daniel Voegeli
Manager Sales Product Management

i.V.
Thomas Laux
Head of Development Drives Solutions

We reserve the right to make changes to the content of the EU Declaration of Conformity. Current issue on request.



Appendix

12.2 China RoHS 2

www.boschrexroth.com.cn/zh/cn/home_2/china_rohs2

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Notes

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R911329338