

IndraDyn S

MSM Synchronous Motors

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Purpose of Documentation This documentation ...

- explains the features of the product, possibilities for use, operating conditions and operational limits of MSM motors.
- contains technical data.
- provides information regarding product selection, handling and operation.

Record of Revision

Edition	Release Date	Notes
DOK-MOTOR*-MSM*****-DA01-EN-P	Edition 2009-07	First edition
DOK-MOTOR*-MSM*****-DA02-EN-P	Edition 2015-02	Revision; change of plug connector
DOK-MOTOR*-MSM*****-DA03-EN-P	Edition 2015-06	Note on encoder bearing lifetime removed + table cell for bearing and transport temperature removed from technical data tables.
DOK-MOTOR*-MSM*****-DA03-EN-P	Edition 2015-12	Encoder system accuracy in definition

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1 Introduction

IndraDyn S - servo motors MSM introduction to the product

The maintenance-free MSM motors are available in five sizes up to a mechanical continuous output of 750 Watt. The high power density in connection with short frame length and minimized flange size allow for use in the most varied fields of application. The motors with degree of protection IP54 are equipped with an absolute encoder and can be optionally provided with or without holding brake. They are predestined for use in IndraDrive Cs controller with 3 AC 230 V power connection.

MSM motors are characterized by

- Dynamics
- Compact construction
- Degree of protection IP54
- Precision by optic single-turn and multi-turn absolute encoders
- Holding brake
- Plug connector for encoder and power connection

Motor MSM 	Continuous output P_N [W]	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. 1-1: Performance features MSM motors

This documentation is intended for

- Selection of motors
- Description of variants

Feedback

Please do not hesitate to inform us of any mistakes you detect in this documentation or of any modifications you might desire.

Please send your remarks to dokusupport@boschrexroth.de.

2 Operating conditions

2.1 Environmental and operating conditions

Servo motors MSM are designed for use in machines and systems.

Environmental and operating conditions

Designation	Symbol	Unit	Value
Degree of protection (IEC529)			IP54
Use within scope of application of CSA / UL			Only authorized for use in NFPA-79 applications.
Storage temperature			see chapter "chapter 7.1 "Transport of motors" on page 41"
Transport temperature			see chapter "chapter 7.2 "Storage of motors" on page 41"
Admissible installation position Definition of installation positions: see keyword "Installation positions"			IM B5 IM V1 IM V3
Ambient temperature range	T_{a_work}	°C	0 ... 40
Installation altitude	h_{nenn}	m	1000
De-rating vs. ambient temperature: In the ambient temperature range $T_{a_work_red}$ the performance data ³⁾ should be reduced by the reduction factor f_{Ta} . The use out of T_{a_work} or $T_{a_work_red}$ is not allowed!			
	$T_{a_work_red}$	°C	40 ... 55
	f_{Ta}	%/K	2.0 see also the technical data of the individual components
De-rating vs. installation altitude: Starting at an installation altitude $h > h_{nenn}$, performance data ^{2) 3)} reduced by the factor f will be available. At the installation altitude in the range h_{max_ohne} to h_{max} , an overvoltage limiter against transient overvoltage should be installed for the system. The use above h_{max} is not allowed!			
	h_{max_ohne}	m	2000
	h_{max}	m	4000

Operating conditions

Designation	Symbol	Unit	Value
Simultaneous de-rating for ambient temperature and installation altitude			allowed; reduced by factors f and f_{Ta}
Relative air humidity		%	5 ... 95
Absolute air humidity		g/m ³	1 ... 29
Climatic class (IEC721)			3K3
Admissible level of contamination (EN50178)			2
Admissible dusts, vapors			EN50178 table A.2
Vibration sinus: Acceleration at 10 ... 2000 Hz ¹⁾ , axial		g	1
Vibration sinus: Acceleration at 10 ... 2000 Hz ¹⁾ , radial		g	3
Overvoltage category			III (acc. to IEC60664-1)

- 1) acc. to DIN EN 60068-2-6
 2) reduced performance data with drive controllers: admissible continuous output of intermediate circuit, continuous output of brake resistance, continuous current
 3) reduced performance data with motors: output, torque S1 and S3

Tab. 2-1: *Environmental and operating conditions - Operation*

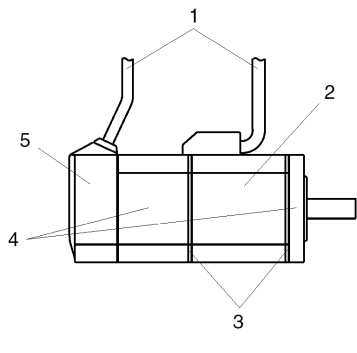
2.2 Compatibility with foreign matters

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.

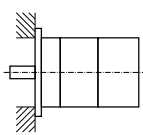
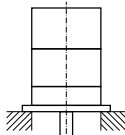
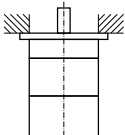
For this reason, before using the respective material a compatibility test has to be carried out for new lubricants, cleaning agents etc. and our housings/ materials.

2.3 Materials

	No.:	Material
	1	Polyvinyl chloride resin (oil resistance: corresponding to standard" JIS C 3005"; test conditions: oil temperature: 70 °C; test duration (cable in oil): 4 hours; oil: machine oil 46 (by GENERAL))
	2	Aluminum; anodized
	3	Rubber
	4	Aluminum pressure casting; blank
	5	Polyamide 46 (nylon 46)

Tab. 2-2: Materials

2.4 Design 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. 2-3: Permissible conditions of installation according 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.

2.5 Installation space

The own cooling of the motor must not be prevented by the installation situation.

2.6 Output shaft

Plain shaft

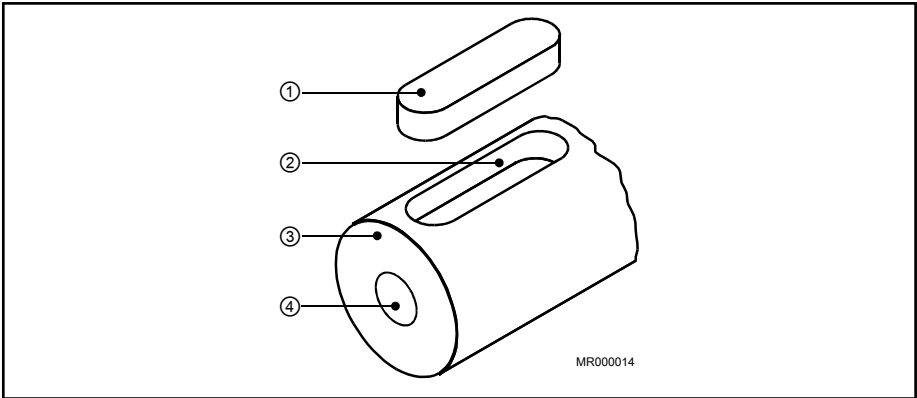
MSM motors offer a non-positive shaft-hub connection without play and excellent running smoothness. Use clamping sets, pressure sleeves or clamping elements for coupling the machine elements to be driven.

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

Operating conditions

Shaft with keyway MSM motors with key allow form-locking transmission of torques with constant direction and lower requirements for the shaft-hub connection. The key is enclosed in the package upon delivery.

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



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

Fig. 2-1: MSM Output shaft with key

In addition, the machine elements to be driven must be secured in axial direction via the centering hole on the end face.

NOTICE

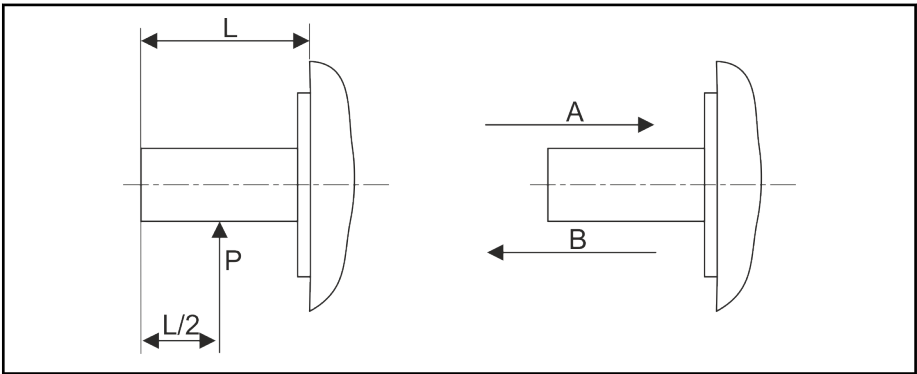
Damage to property due to reversing mode!

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.

2.7 Bearings and shaft load

During operation, both radial and axial forces act upon the motor shaft and the motor bearings. The construction of the machine and the attachment of driving elements on the shaft side must be adjusted to one another to ensure that the load limits specified are not exceeded.



- L Length of shaft
- P Application point of radial force
- A, B Directions of axial force

Fig. 2-2: Shaft load parameters

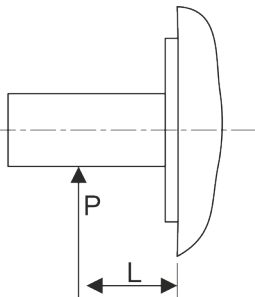
The following table shows the admissible shaft loads of the individual motors.

Operating conditions

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

Tab. 2-4: Admissible radial/axial force

When shifting the application point of the radial force, the admissible radial force should be calculated as follows.

	Motor	Radial force depending on force application point
	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. 2-5: Radial force depending on force application point

Lifetime of motor bearings



If the MSM motors are operated within the limits specified for radial and axial loads, the nominal service life of the bearings will be **L_{10h} 20000 operating hours**.

When exceeding the admissible radial force, the bearing service life will be reduced to:

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

L_{10h} Bearing service life (according to ISO 281, Version 12/1990)
F_{radial} Determined allowed radial force in N (Newton)
F_{radial_act} Actually acting radial force in N (Newton)
Fig. 2-3: Calculating the bearing service life 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}.

Operating conditions

2.8 Holding brakes

The following general data are decisive for all MSM motors. The holding brake data depending on frame size are stated in the "Technical data" section.

- The values stated in the technical data, except for holding torque, trigger voltage and rated voltage, represent typical values
- After moving the motor, the brake play will be $\pm 1^\circ$ or less.
- The voltage supply of the holding brake is fed externally.
- Maximum number of acceleration and brake processes with the highest admissible angular acceleration: 10 million.

2.9 Attachment of drive elements

Please observe the following notes when attaching drive elements to the output shaft.

Gearbox mounting on motors

If gearboxes are mounted on motors, the thermal coupling of the motors on machines or constructions will change.

Depending on the gearbox type, the heat development on the gearbox is different. The heat dissipation of the motor via the flange is reduced in every case when a gearbox is mounted. This must be heeded at the project planning.

A reduction of the given performance data is necessary, to do not overload motors when using gearboxes.

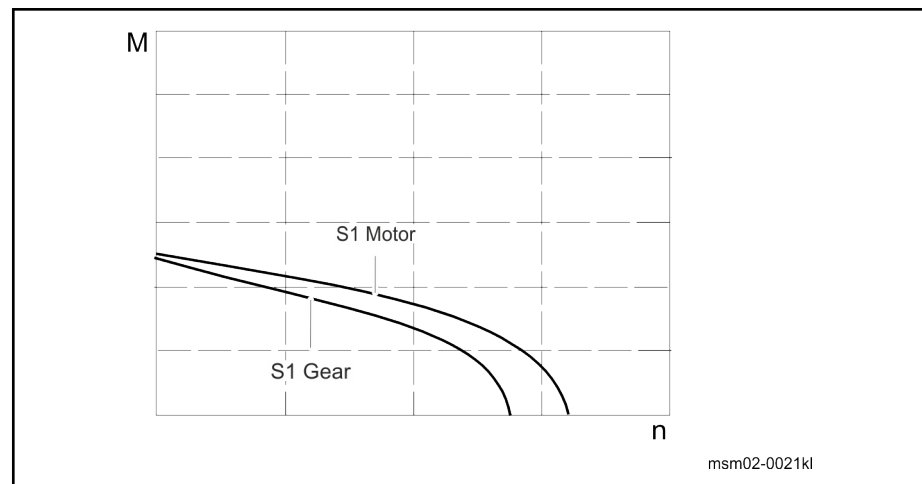


Fig. 2-4: S1 characteristic curve of gearboxes



The indicated torques in the characteristic curves of the motor have to be reduced by **10-20%** when mounting gearboxes.

Please, heed all further notes and specifications within this documentation for the used gearboxes.

Overdetermined bearing

When attaching drive elements, overdetermined bearing should be avoided because the tolerances inevitably present in such cases will lead to additional forces acting on the bearing of the motor shaft and, as the case may be, to a distinctly reduced service life of the bearing.



If an overdetermined attachment cannot be avoided, it is absolutely necessary to consult with Rexroth.

Operating conditions

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 extremely stiff couplings are attached, the radial force which constantly changes the angular position may cause an impermissibly high load on the shaft and bearing.

Bevel gear pinion or helical gear drive

Owing to thermal effects, the flange-sided end of the output shaft may shift by 0.6 mm in relation to the motor housing. If helical drive pinions or bevel gear pinions directly attached to the output shaft are used, this change in position will lead to

- a shift in the position of the axis, if the driving pinions are not defined axially on the machine side,
- a thermally dependent component of the axial force, if the driving pinions are defined axially on the machine side. This causes the risk of exceeding the maximum permissible axial force or of the play within the gears increasing to an impermissible degree.
- Damage of the motor bearing on the B-side due to exceeding of the maximum permissible axial force.



In such cases, drive elements should preferably be used with their own bearings which are connected to the motor drive shaft via axially compensating couplings.

Operating conditions

2.10 Certifications

Declaration of conformity

Declarations of conformity (see [chapter 11 "Appendix" on page 53](#)) confirm that the components comply with the applicable EN standards and EC directives.

MSM motors



DX00011v01_m.FH11

CE conformity regarding

EN 60034-1: Rotating electrical machines - Part 1: Rating and performance (IEC 60034-1:2004); German version EN 60034-1:2004

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

C-UR-US listing

The motors are listed by **UL** ("Underwriters Laboratories Inc.®"). The proof of certification is available in the Internet at <http://www.ul.com> at "Certifications" by entering the File Number or the "Company Name: Rexroth".

MSM motors



CUR_Zeichen.fh11

Company Name:

BOSCH REXROTH AG

Category Name:

Servo and Stepper Motors - Component

For file numbers and standards, see table "Technical data"



Wiring material UL (ready-made cables by Rexroth)

Within scope of application of CSA / UL, only use class 6 copper lines (or equivalent) with minimal admissible conductor temperature of 75 °C for wiring of the components.



Admissible level of contamination

Observe the allowed storage temperature of the components (see "Environmental and operating conditions").

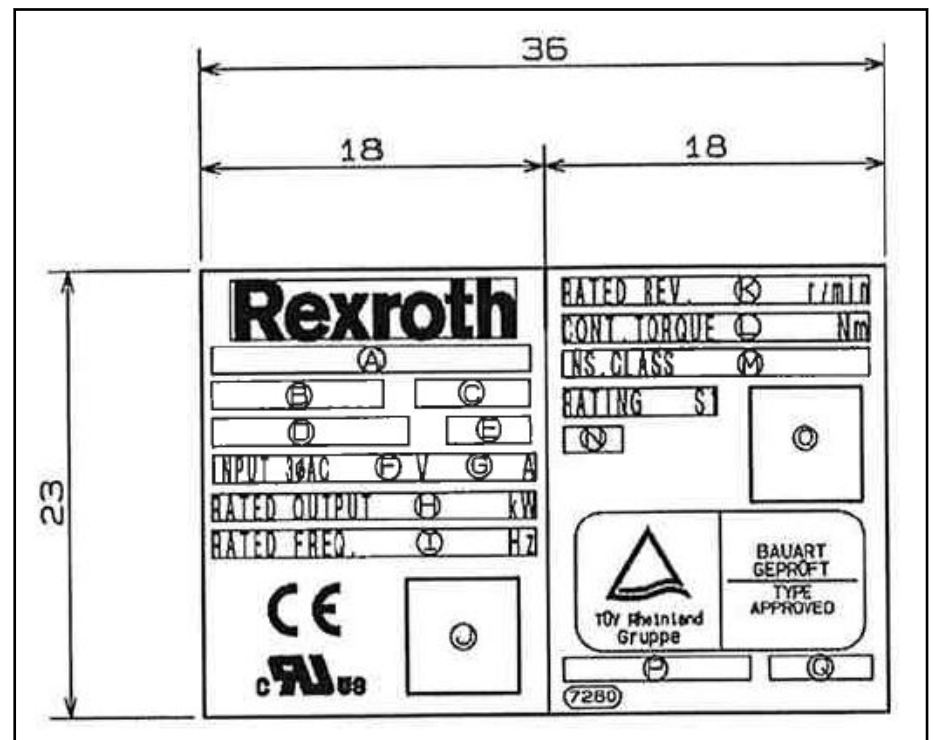
3 Identification and type code

3.1 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. 3-1: Type plate MSM

Identification and type code

3.2 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. 3-2: MSM019

3.3 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. 3-3: MSM031

Identification and type code

3.4 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. 3-4: MSM041

4 Technical data

4.1 Basic information

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

Duty cycle The operating mode S6 is only possible with a duty cycle $ED \leq 100\%$. The duty cycle is calculated as follows:

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

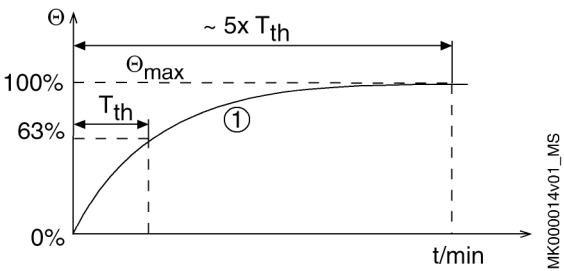
ED Duty cycle
T_C Cycle duration
ΔT_P Operating time with constant load
M_d Continuous torque
M_{KB} Short-time service torque

Fig. 4-1: Relative duty cycle

Definition of parameters

Designation	Symbol	Unit	Definition
Cooling type acc. to EN 60034-6			Short name acc. to EN
Listing acc. to UL standard (UL)			UL standard
Listing acc. to CSA standard (UL)			CSA standard
UL Files (UL)			UL File number
Electric parameters			
Continuous torque at standstill, 60K	M _{0_60}	Nm	Continuous torque that can be applied to the motor output shaft at a speed of $n \geq 0.1$ Hz.
Continuous current at standstill, 60K	I _{0_60(rms)}	A	Phase current (crest value) of the motor M _{0_60} required for the continuous torque at standstill at a speed of $n \geq 0.1$ Hz.
Maximum current	I _{max(eff)}	A	Maximum, briefly permissible phase current of the motor winding without adverse affect on the permanent magnet circuit of the motor.
Maximum torque	M _{max}	Nm	Maximum torque that can be applied for about 400 ms at maximum current I _{max} . The maximum torque that can be attained depends on the drive control device used.
Torque constant at 20 °C ¹⁾	K _{M_N}	Nm/A	Relation of created torque to motor phase current at motor temperature 20°C. Valid up to approx. $i = 2 \times I_{0_60}$.
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 inductivity	L ₁₂	mH	Measured inductivity 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 the rotor	J _{rot}	kg*m ²	Moment of inertia of the rotor without the optional holding brake.
Power wire cross-section	A ₆₀		Minimum cross-section of power wire of the power cable to be connected to the motor

Technical data

Designation	Symbol	Unit	Definition
Thermal time constant	T_{th}		Time of the temperature increase to 63% of the final temperature of the motor housing with the motor loaded with the permissible S1 continuous torque. The thermal time constant is defined 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. Limiting factors can have mechanical (centrifugal forces, bearing stress) or electrical (DC link voltage) causes.
Mass ³⁾	m	kg	Motor mass
Ambient temperature during operation	T_{amb}		Admissible ambient temperature during operation
Installation altitude			Maximum installation altitude
Insulation class according to DIN EN 60034-1	---	-	Insulation class
Degree of protection according to IEC 60529	---	-	IP type of protection
Sound pressure level	L_p		Value of sound emission

1) 2) Manufacturing tolerance $\pm 5\%$
3) (...) values for motors with holding brake
Tab. 4-1: Definition of parameters

4.2 MSM019

4.2.1 MSM019 Technical data

Designation	Symbol	Unit	MSM019A-0300-NN	MSM019B-0300-NN	MSM019B-R300-NN
Cooling type acc. to EN 60034-6		-	IC00		
Listing acc. to UL standard		-	UL 1004; ANSI UL 840		
Listing acc. to CSA standard		-	CSA-C22.2 No. 100		
UL Files			E335445		
Electric parameters					
Rated power	P _N	kW	0.05	0.10	
Continuous torque at standstill, 60K	M _{0_60}	Nm	0.16	0.32	
Continuous current at standstill, 60K	I _{0_60(rms)}	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 inductivity	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 the rotor	J _{rot}	kg*m ²	0.0000025	0.0000051	
Wire cross section	A ₆₀	mm ²	0.75		
Maximum speed	n _{max}	min ⁻¹	5000		
Weight ²⁾	m	kg	0.32 (0.53)	0.47 (0.68)	
Ambient temperature during operation	T _{amb}	°C	0 40		
Installation altitude		m	0 1000		
Thermal class (EN 60034-1)	T.CL.	-	130 (B)		
Degree of protection according to IEC 60529	IP	-	IP54		
Sound pressure level	L _P	dB[A]	less than 70		
Latest amendment: 2008-11-20					

1) Manufacturing tolerance ±5%
2) (...) Motors with holding brake
Tab. 4-2: MSM019 - Technical data

Technical data

Designation	Symbol	Unit	Holding brake 1 (MSM019)
Holding torque	M_4	Nm	0.29
Rated voltage	U_N	V	24 ± 1.2
Rated current	I_N	A	0.3
Connection time	t_1	ms	35
Disconnection time	T_2	ms	20
Moment of inertia of the holding brake	J_{rot}	kg*m ²	0.0000002
Latest amendment: 2008-10-16			

Tab. 4-3: MSM019 Holding brakes - Technical data (optional)

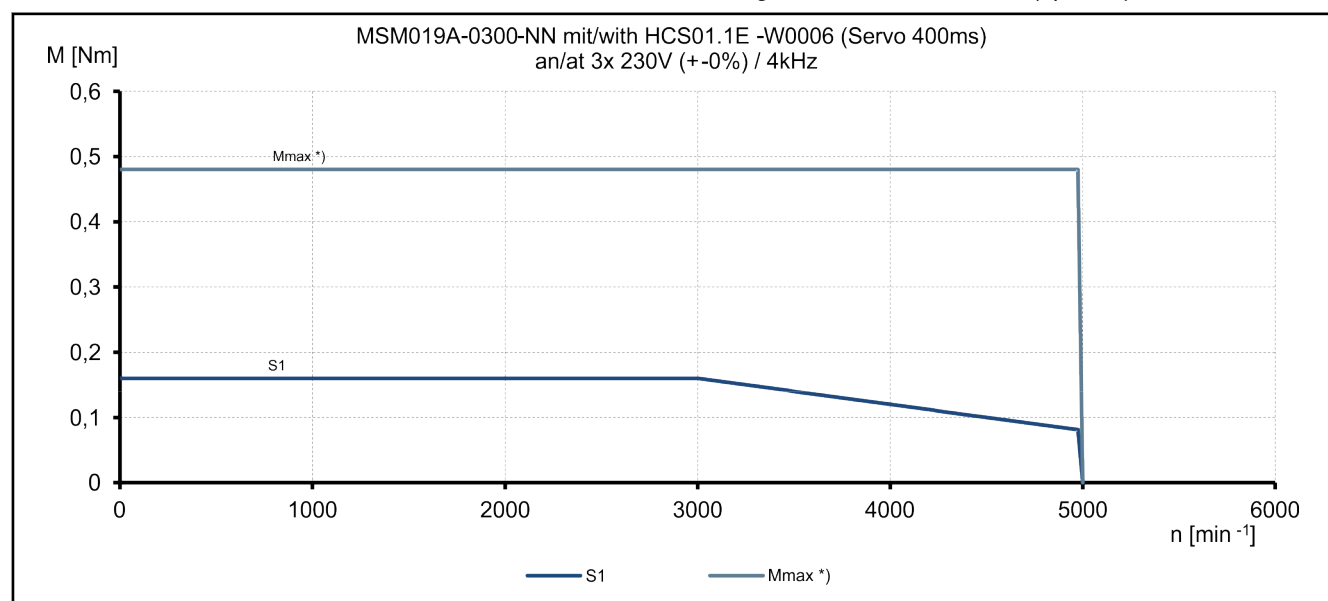


Fig. 4-2: Speed-torque characteristic curve

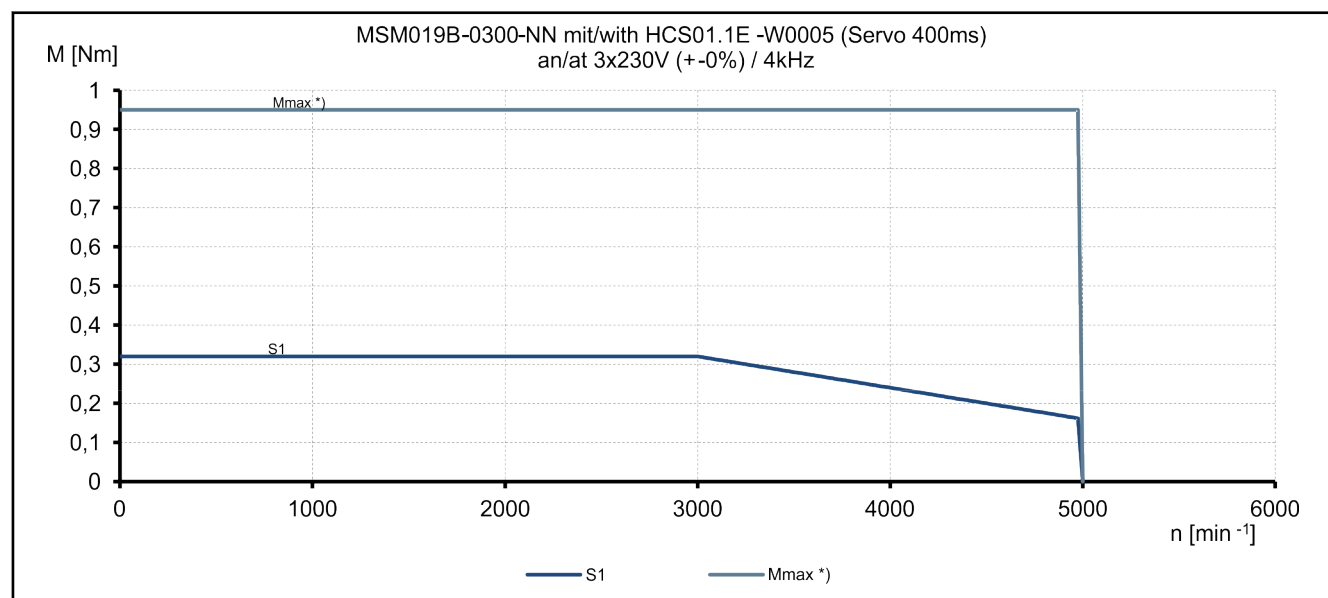


Fig. 4-3: Speed-torque characteristic curve

Technical data

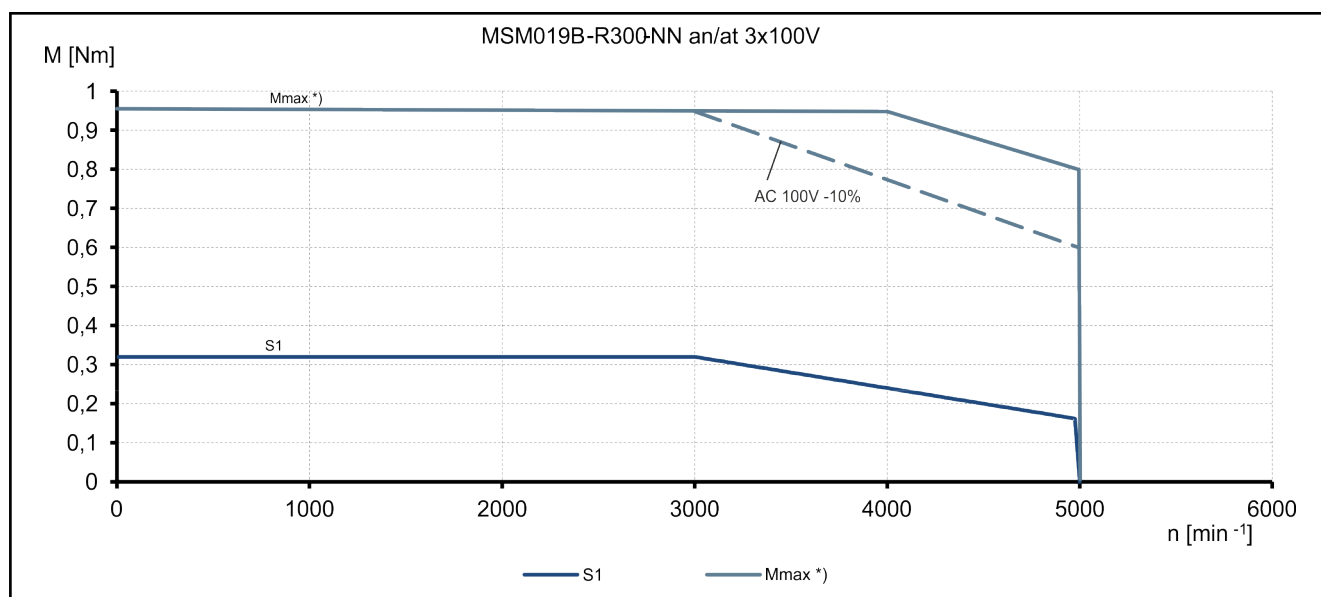
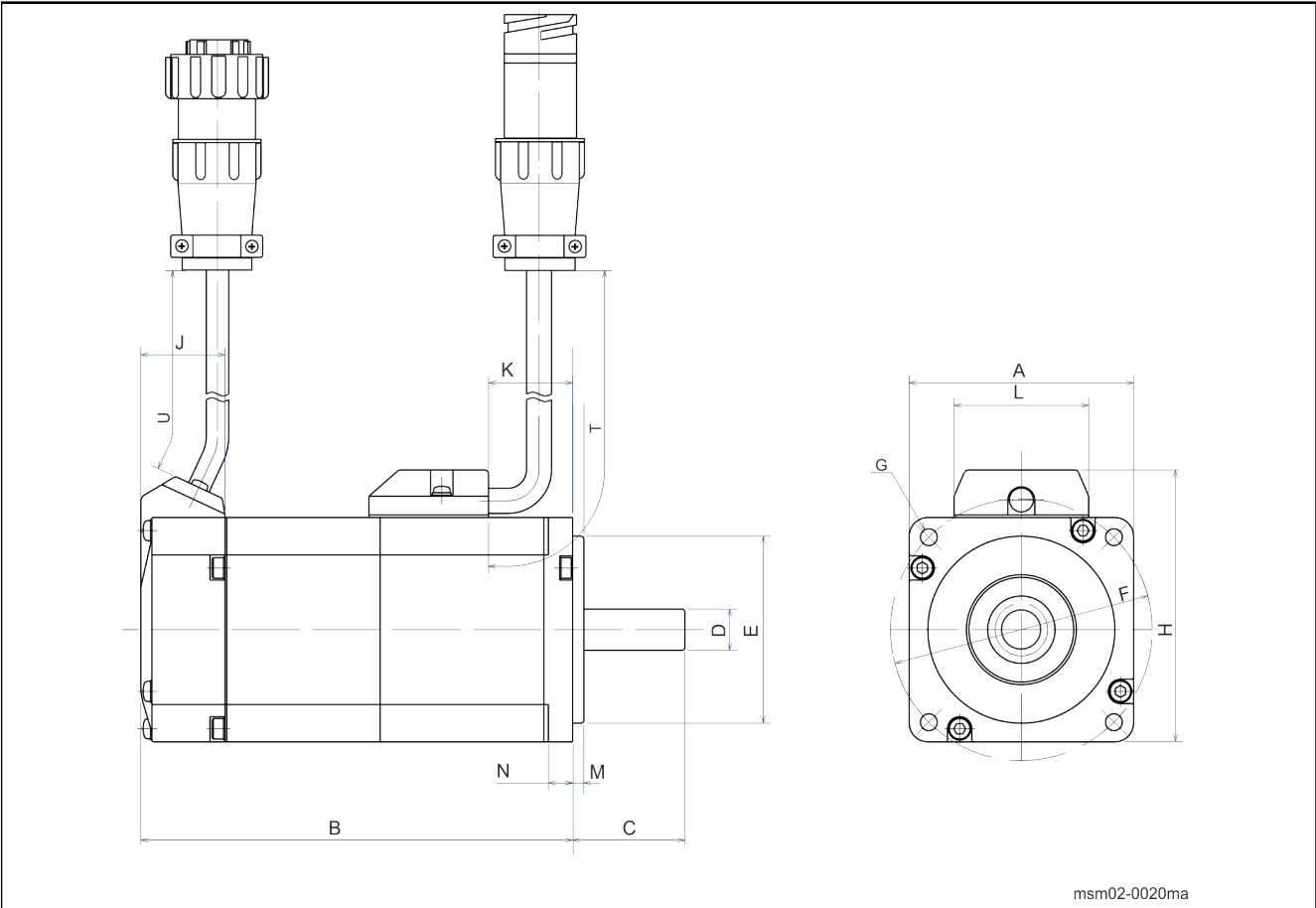


Fig. 4-4: Speed-torque characteristic curve

Technical data

4.2.2 **MSM019 Specifications**
MSM019...M0-C...

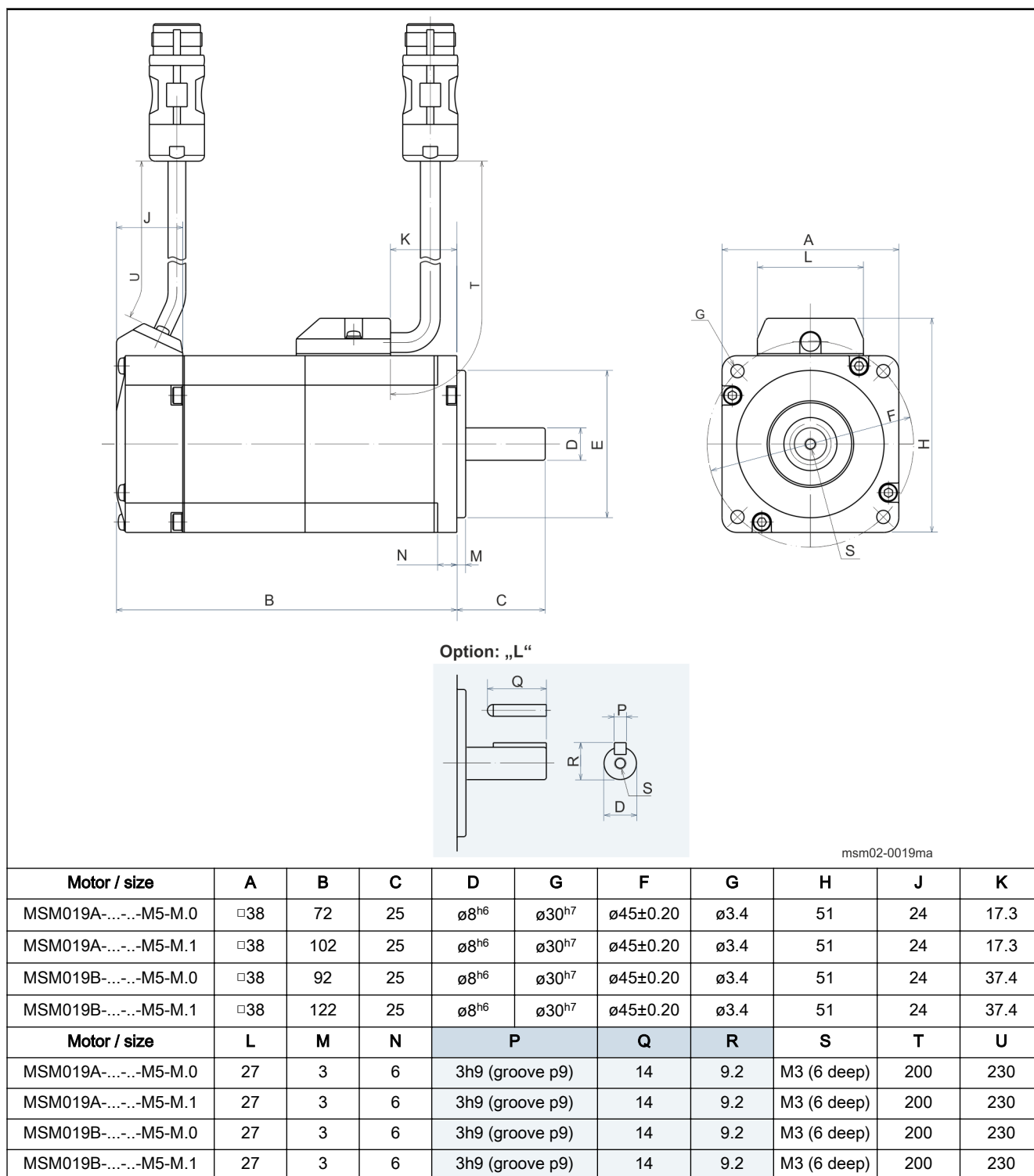


msm02-0020ma

Motor / size	A	B	C	D	G	F	G	H	J	K
MSM019A-...-M0-CH0	□38	72	25	ø8 ^{h6}	ø30 ^{h7}	ø45±0.20	ø3.4	51	24	20.8
MSM019A-...-M0-CH1	□38	102	25	ø8 ^{h6}	ø30 ^{h7}	ø45±0.20	ø3.4	51	24	20.8
MSM019B-...-M0-CH0	□38	92	25	ø8 ^{h6}	ø30 ^{h7}	ø45±0.20	ø3.4	51	24	40.8
MSM019B-...-M0-CH1	□38	122	25	ø8 ^{h6}	ø30 ^{h7}	ø45±0.20	ø3.4	51	24	40.8
Motor / size	L	M	N						T	U
MSM019A-...-M0-CH0	27	3	6						200	230
MSM019A-...-M0-CH1	27	3	6						200	230
MSM019B-...-M0-CH0	27	3	6						200	230
MSM019B-...-M0-CH1	27	3	6						200	230

Tab. 4-4: Dimensions MSM019

MSM019...M5-M...



Tab. 4-5: Dimensions MSM019

Technical data

4.3 MSM031

4.3.1 MSM031 Technical data

Data sheet - Motor

Designation	Symbol	Unit	MSM031B-0300-NN	MSM031B-R300-NN	MSM031C-0300-NN	MSM031C-R300-NN
Cooling type acc. to EN 60034-6		-	IC00			
Listing acc. to UL standard		-	UL 1004; ANSI UL 840			
Listing acc. to CSA standard		-	CSA-C22.2 No. 100			
UL Files			E335445			
Electric parameters						
Rated power	P _N					
Continuous torque at standstill, 60K	M _{0_60}	Nm	0.64		1.30	
Continuous current at standstill, 60K	I _{0_60(rms)}	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 inductivity	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 the rotor	J _{rot}	kg*m ²	0.0000140		0.0000260	
Wire cross section	A ₆₀	mm ²	0.75			
Maximum speed	n _{max}	min ⁻¹	5000	3000	5000	3000
Weight ²⁾	m	kg	0.82 (1.3)		1.2 (1.7)	
Ambient temperature during operation	T _{amb}	°C	0 40			
Installation altitude		m	0 1000			
Thermal class (EN 60034-1)	T.CL.	-	130 (B)			
Degree of protection according to IEC 60529	IP	-	IP54			
Sound pressure level	L _P	dB[A]	less than 70			
Latest amendment: 2009-07-07						

1)

2)

Tab. 4-6:

Manufacturing tolerance ±5%

(...) Motors with holding brake

MSM - Technical data

Technical data

Designation	Symbol	Unit	Holding brake 1 (MSM031)
Holding torque	M_4	Nm	1.27
Rated voltage	U_N	V	24 ± 1.2
Rated current	I_N	A	0.36
Connection time	t_1	ms	50
Disconnection time	T_2	ms	15
Moment of inertia of the holding brake	J_{rot}	kg*m ²	0.0000018
Latest amendment: 2008-10-16			

Tab. 4-7: MSM031 Holding brakes - Technical data (optional)

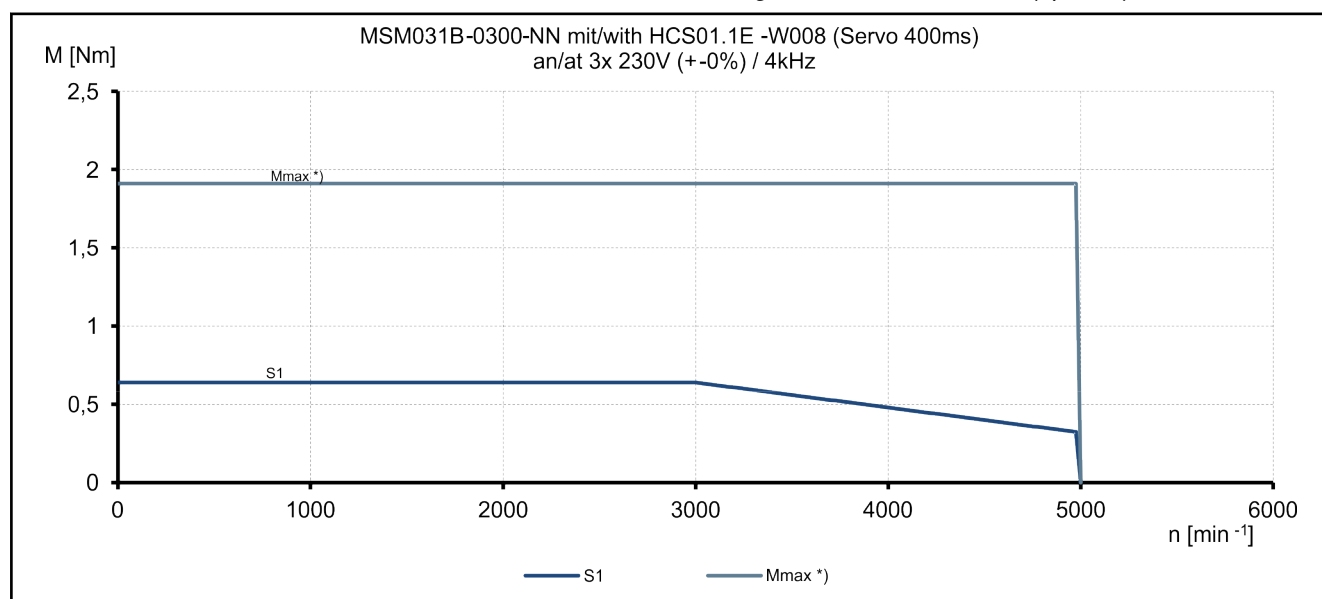


Fig. 4-5: Speed-torque characteristic curve

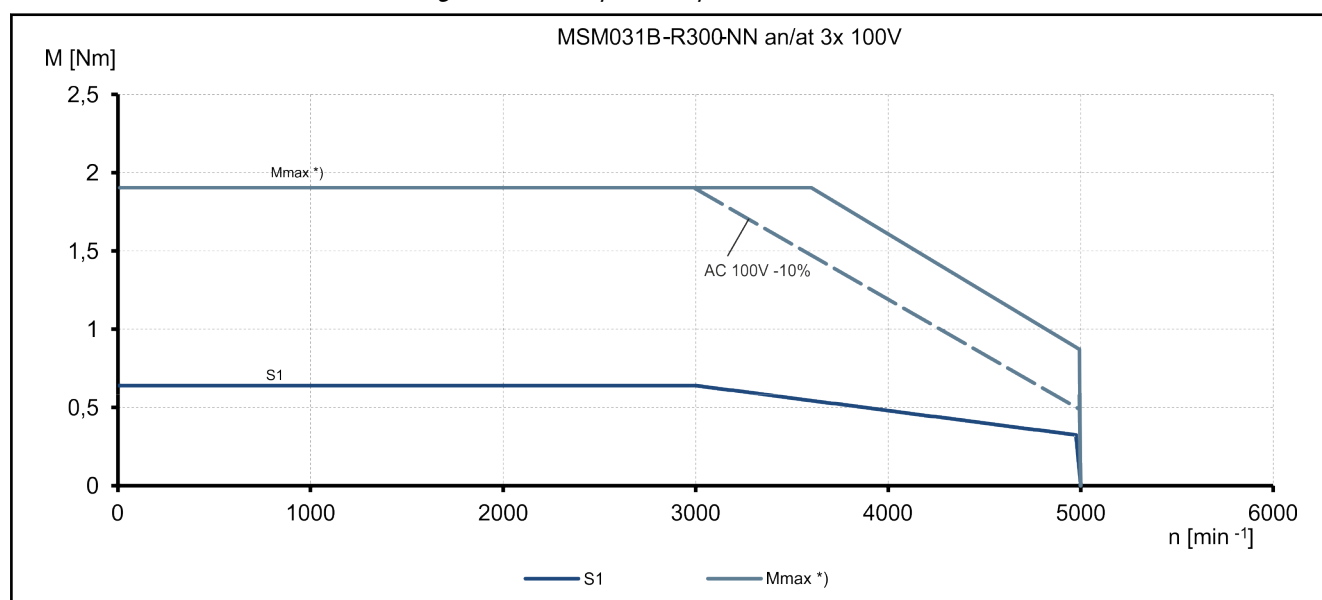


Fig. 4-6: Speed-torque characteristic curve

Technical data

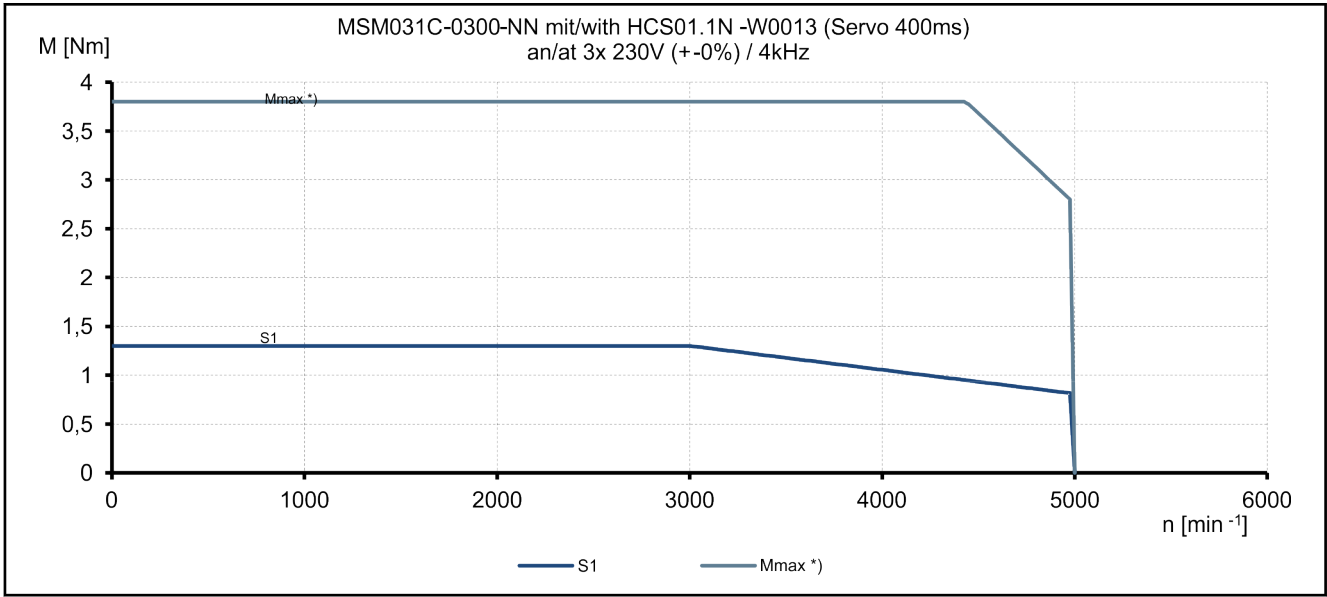


Fig. 4-7: Speed-torque characteristic curve

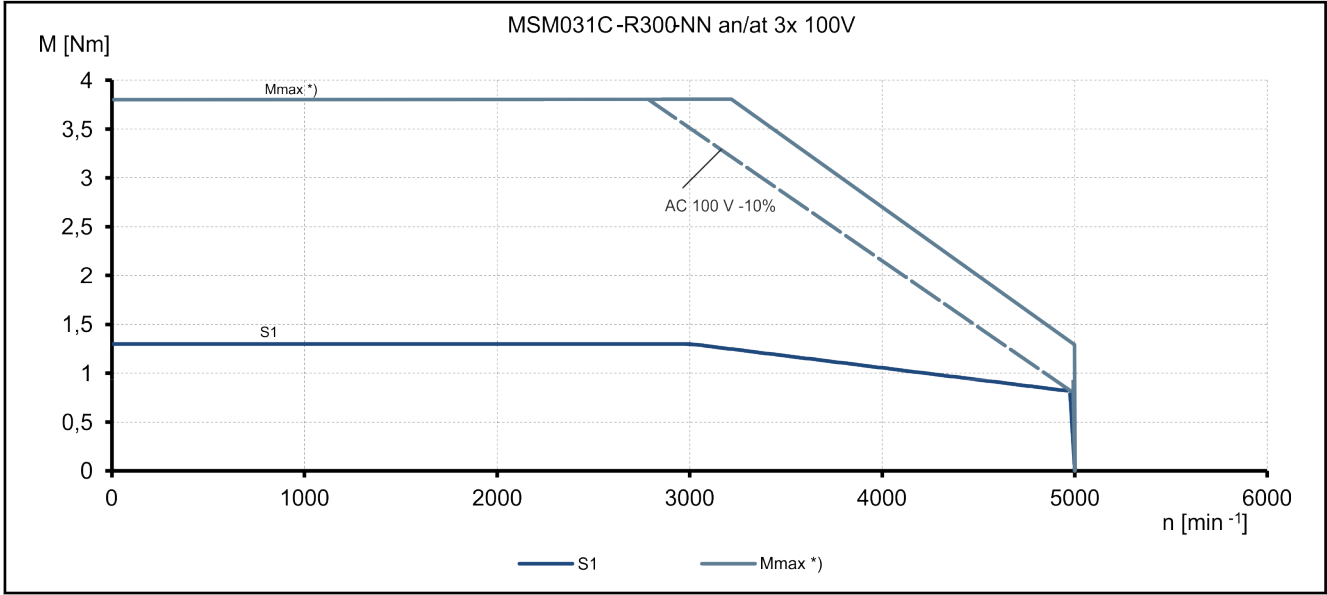
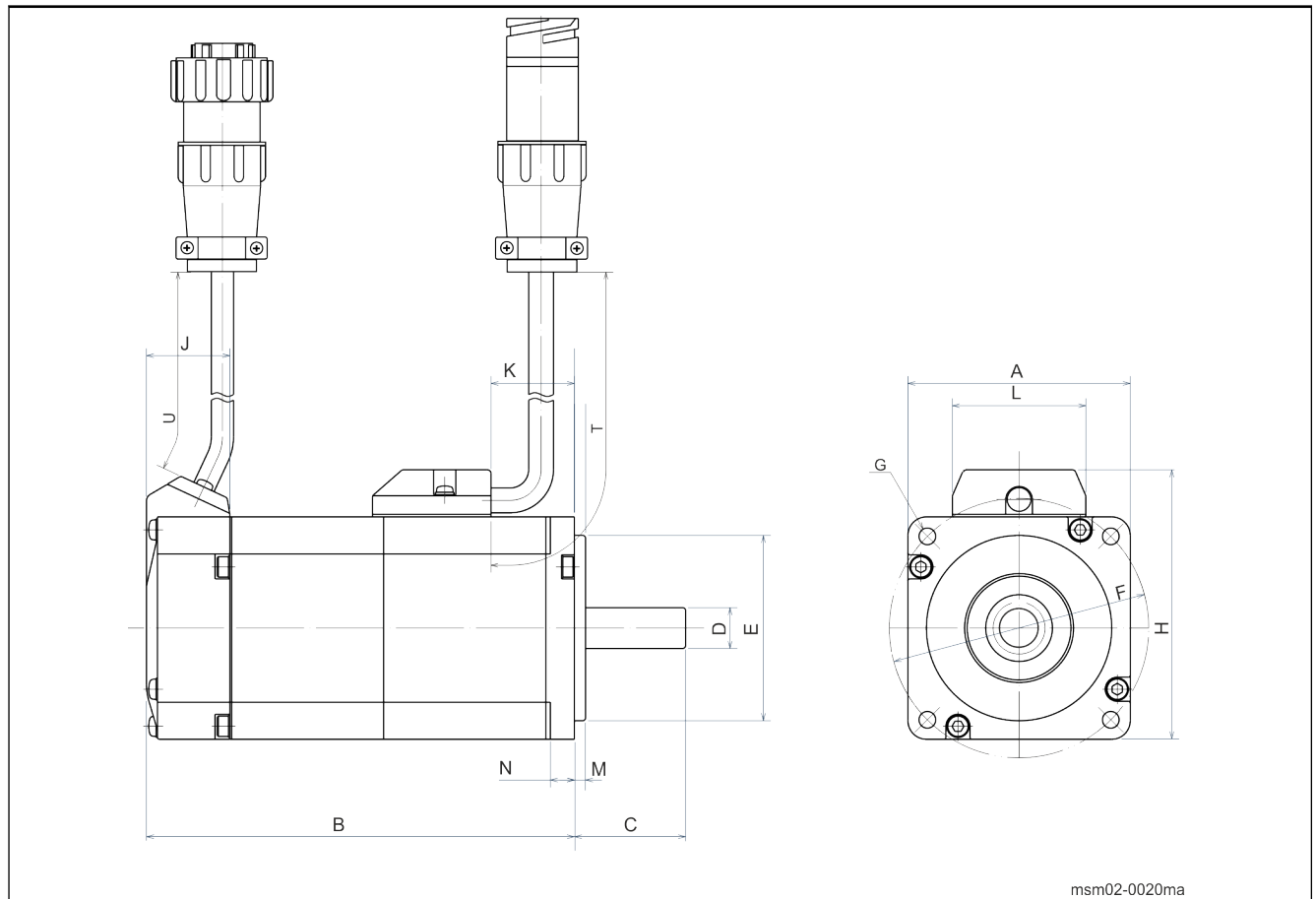


Fig. 4-8: Speed-torque characteristic curve

4.3.2 MSM031 Specifications

MSM031...M0-C...

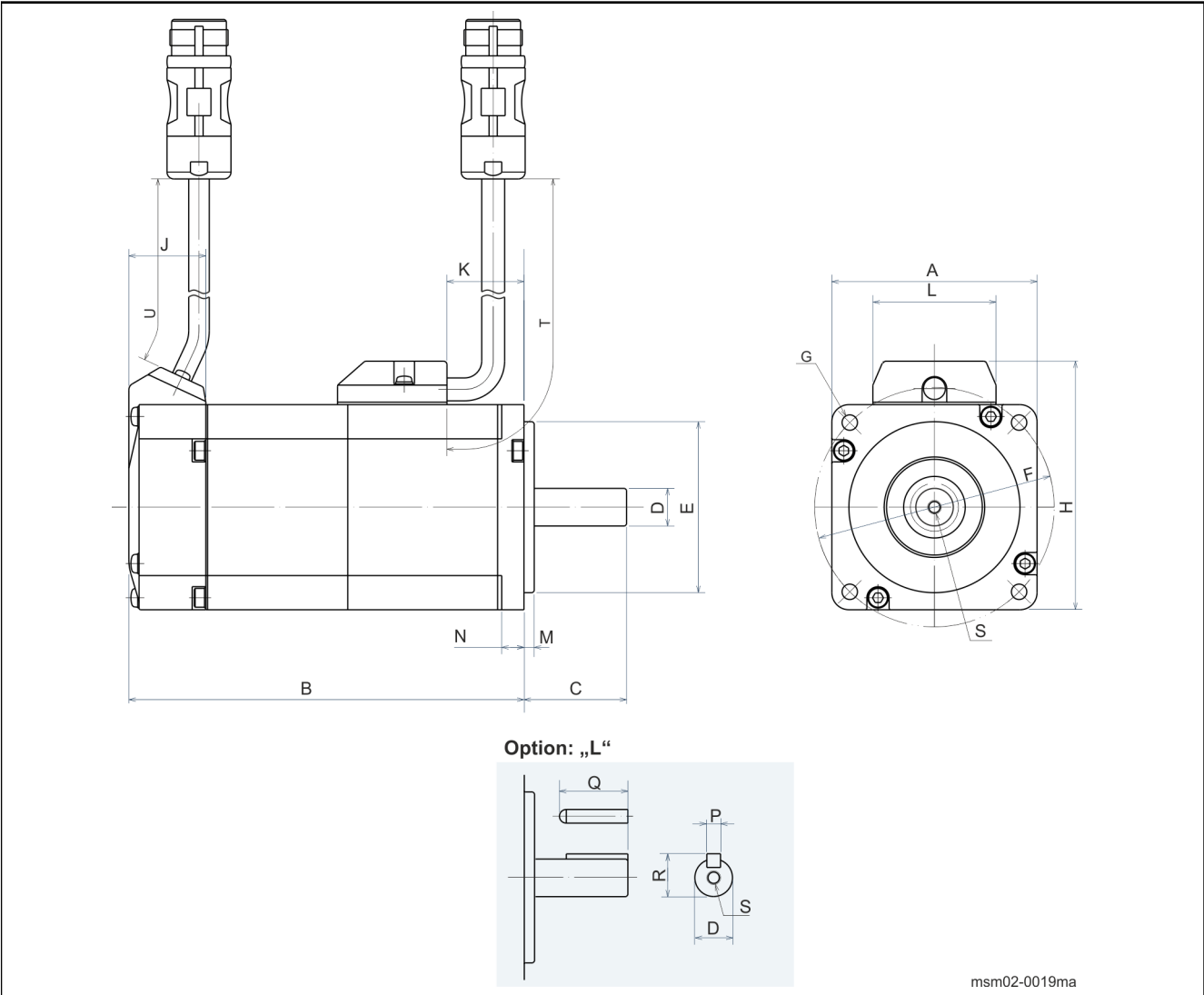


Motor / size	A	B	C	D	G	F	G	H	J	K
MSM031B-...-M0-CH0	□60	79	30	∅11 ^{h6}	∅50 ^{h7}	∅70±0.20	∅4.5	73	22.5	22.5
MSM031B-...-M0-CH1	□60	115.5	30	∅11 ^{h6}	∅50 ^{h7}	∅70±0.20	∅4.5	73	22.5	22.5
MSM031C-...-M0-CH0	□60	98.5	30	∅14 ^{h6}	∅50 ^{h7}	∅70±0.20	∅4.5	73	22.5	42
MSM031C-...-M0-CH1	□60	135	30	∅14 ^{h6}	∅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. 4-8: Dimensions MSM031

Technical data

MSM031...M5-M...



Motor / size	A	B	C	D	G	F	G	H	J	K
MSM031B-...-M5-M.0	□60	79	30	ø11 ^{h6}	ø50 ^{h7}	ø70±0.20	ø4.5	73	22.5	22.5
MSM031B-...-M5-M.1	□60	115.5	30	ø11 ^{h6}	ø50 ^{h7}	ø70±0.20	ø4.5	73	22.5	22.5
MSM031C-...-M5-M.0	□60	98.5	30	ø14 ^{h6}	ø50 ^{h7}	ø70±0.20	ø4.5	73	22.5	42
MSM031C-...-M5-M.1	□60	135	30	ø14 ^{h6}	ø50 ^{h7}	ø70±0.20	ø4.5	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. 4-9: Dimensions MSM031

4.4 MSM041

4.4.1 MSM041 Technical data

Data sheet - Motor

Designation	Symbol	Unit	MSM041B-0300-NN
Cooling type acc. to EN 60034-6		-	IC00
Listing acc. to UL standard		-	UL 1004; ANSI UL 840
Listing acc. to CSA standard		-	CSA-C22,2 No. 100
UL Files			E335445
Electric parameters			
Rated power	P_N		
Continuous torque at standstill, 60K	$M_{0,60}$	Nm	2.40
Continuous current at standstill, 60K	$I_{0,60(rms)}$	A	4.00
Maximum current	$I_{max(eff)}$	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 inductivity	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 the rotor	J_{rot}	kg*m ²	0.0000870
Wire cross section	A_{60}	mm ²	0.75
Maximum speed	n_{max}	min ⁻¹	4500
Weight ²⁾	m	kg	2.3 (3.1)
Ambient temperature during operation	T_{amb}	°C	0 40
Installation altitude		m	0 1000
Thermal class (EN 60034-1)	T.CL.	-	130 (B)
Degree of protection according to IEC 60529	IP	-	IP54
Sound pressure level	L_P	dB[A]	less than 70
Latest amendment: 2008-11-05			

1) Manufacturing tolerance ±5%
2) (...) Motors with holding brake
Tab. 4-10: MSM - Technical data

Technical data

Designation	Symbol	Unit	Holding brake 1 (MSM041)
Holding torque	M_4	Nm	2.45
Rated voltage	U_N	V	24 ± 1.2
Rated current	I_N	A	0.42
Connection time	t_1	ms	70
Disconnection time	T_2	ms	20
Moment of inertia of the holding brake	J_{rot}	kg*m ²	0.0000075
Latest amendment: 2008-10-16			

Tab. 4-11: MSM041 Holding brakes - Technical data (optional)

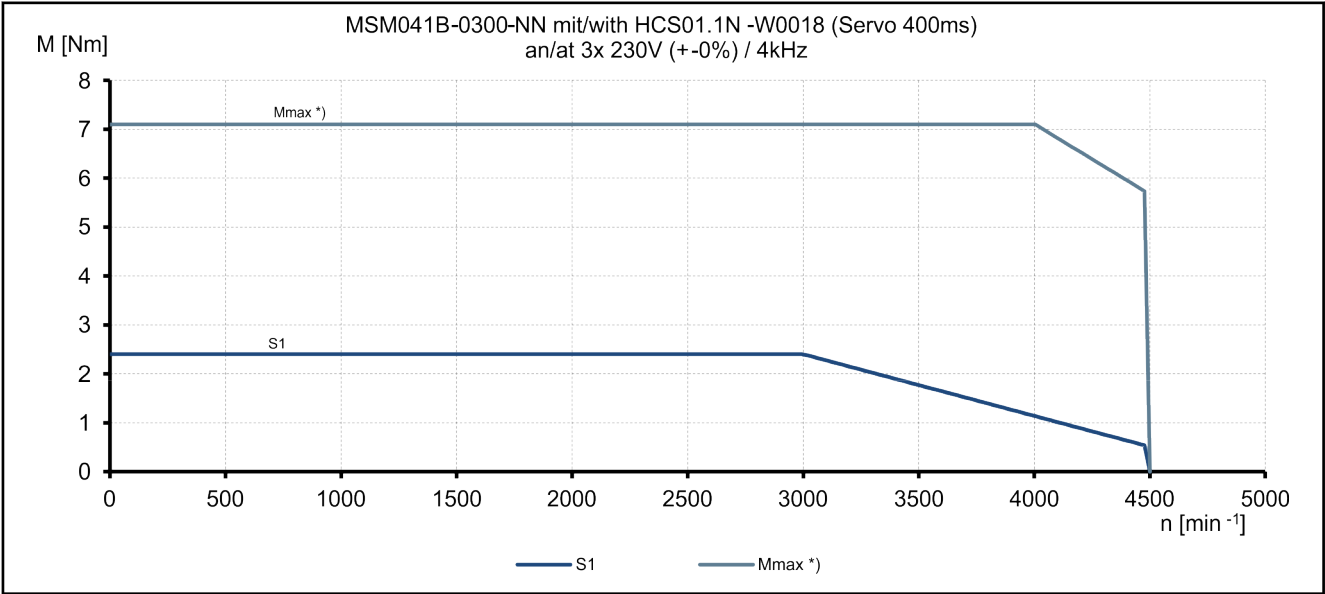
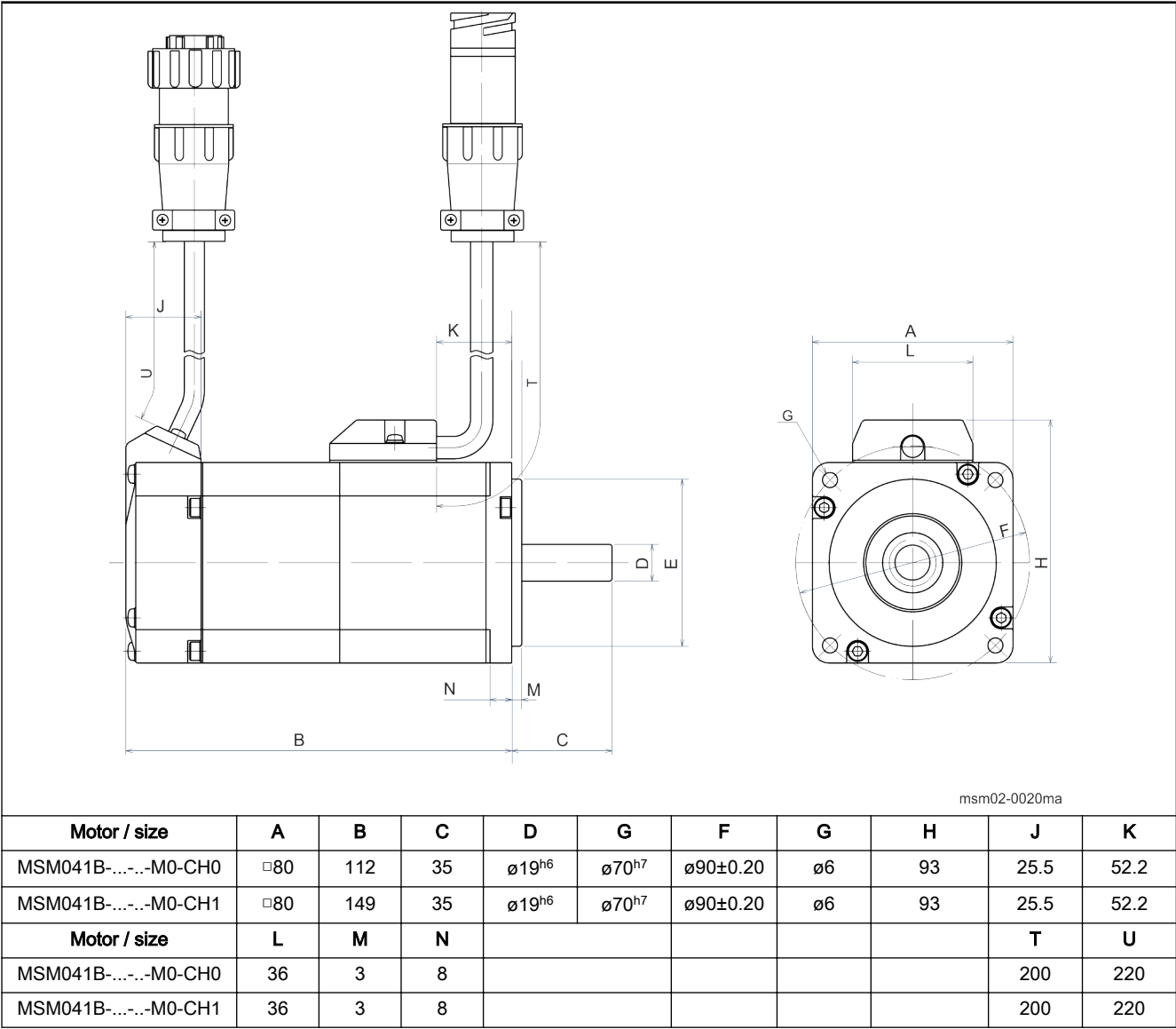


Fig. 4-9: Speed-torque characteristic curve

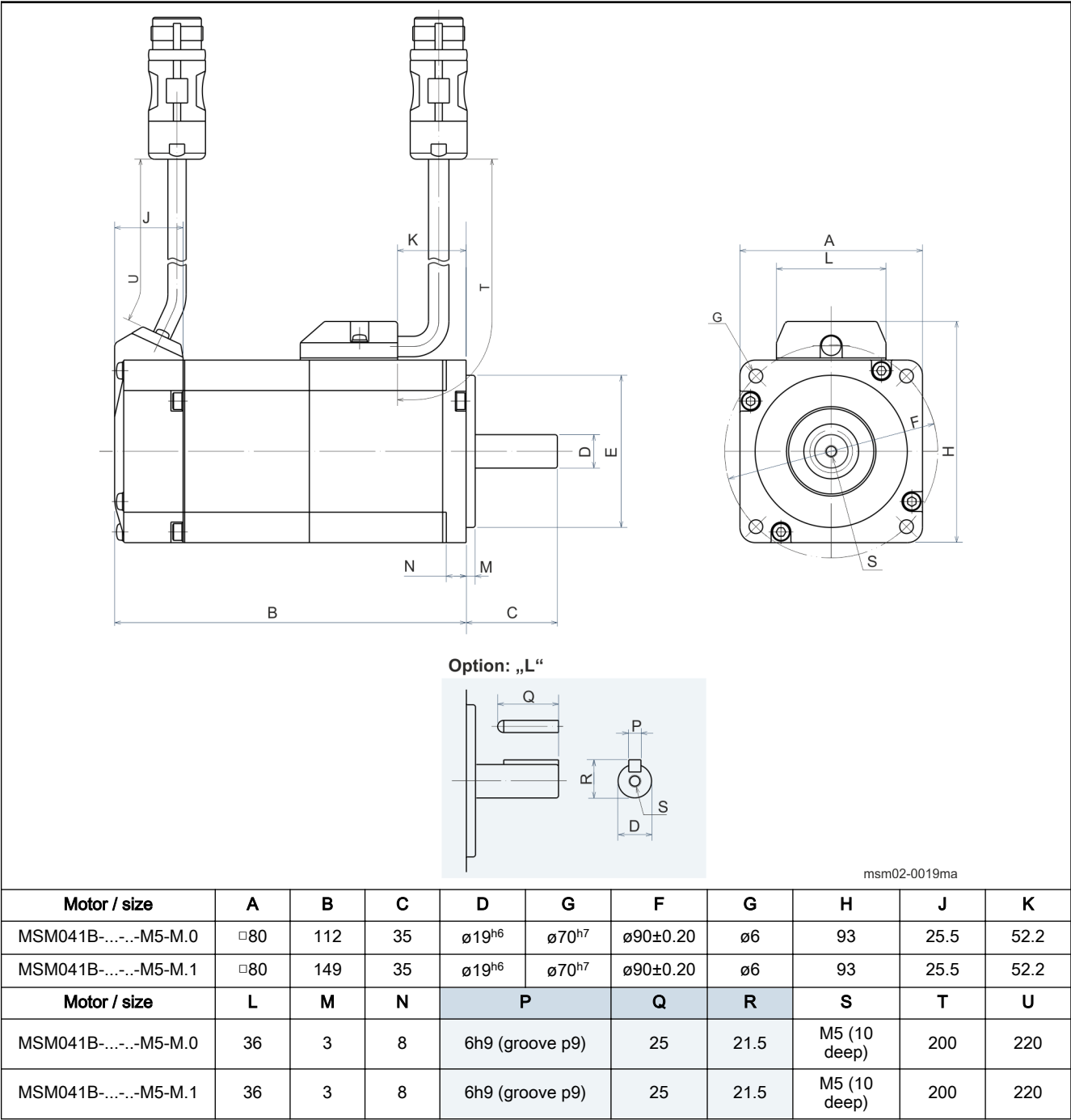
4.4.2 MSM041 Specifications
MSM041...M0-C...



Tab. 4-12: Dimensions MSM041

Technical data

MSM041...M5-M...



Tab. 4-13: Dimensions MSM041

5 Motor encoder MSM

5.1 Motor encoder M0

Data sheet - Encoder

Designation	Symbol	Unit	ENCODER-M0 (MSM)	
External battery			-	Yes
Encoder design	-	-	Single-turn absolute	Multi-turn absolute
Distinguishable revolutions	-	-	1	65536
Incremental signals	-	-	none	
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. 5-1: Encoder data

The absolute encoder (M0) can be used as single-turn encoder without further accessories; when using the battery box accessory, it can be used as multi-turn encoder.

Single-turn absolute encoder

The single-turn absolute encoder is used for absolute indirect position detection within 1 motor revolution. With this encoder version, the absolute axis position will get lost after power shut down.

Multi-turn absolute encoder

The multi-turn absolute encoder is used for absolute indirect position detection within 65536 motor revolutions. It replaces a separate absolute value encoders at the motor. The absolute axis position at this encoder variety is still exist because of the battery back-up also after power shut down. If the motor is disconnected from the battery box, the information on the absolute axis position will get lost after approx. 1 minute.

Information for multi-turn signals

The use of the multi-turn option requires buffer storage via an external battery. For this, the following accessories should be used:

Information for multi-turn signals

The use of the multi-turn option requires buffer storage via an external battery. For this, the following accessories are available:

Battery box

Designation	Order number
SUP-E01-MSM-BATTERYBOX	R911324240

Spare battery

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

Motor encoder MSM

5.2 Motor encoder M5

Data sheet - Encoder

Designation	Symbol	Unit	ENCODER-M5 (MSM)	
External battery			-	Yes
Encoder design	-	-	Single-turn absolute	Multi-turn absolute
Distinguishable revolutions	-	-	1	65536
Incremental signals	-	-	none	
Resolution of encoder	-	-	20 bit	20 + 16 bit
System accuracy	-	"	tbd	
Maximum encoder speed		min ⁻¹	6000	
Supply voltage	VCC _{Encoder}	V	4.5 ... 5.5	
Max. current consumption	I _{Encoder}	mA	70	
Latest amendment: 2014-07-09				

" Angular seconds

Tab. 5-2: Encoder data

The absolute encoder (M0) can be used as single-turn encoder without further accessories; when using the battery box accessory, it can be used as multi-turn encoder.

Single-turn absolute encoder

The single-turn absolute encoder is used for absolute indirect position detection within 1 motor revolution. With this encoder version, the absolute axis position will get lost after power shut down.

Multi-turn absolute encoder

The multi-turn absolute encoder is used for absolute indirect position detection within 65536 motor revolutions. The absolute axis position at this encoder variety is still exist because of the battery back-up also after power shut down. If the motor is disconnected from the battery box, the information on the absolute axis position will get lost after approx. 1 minute. It replaces a separate absolute value encoders at the motor.

Information for multi-turn signals

The use of the multi-turn option requires buffer storage via an external battery. For this, the following accessories should be used:

Battery box

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

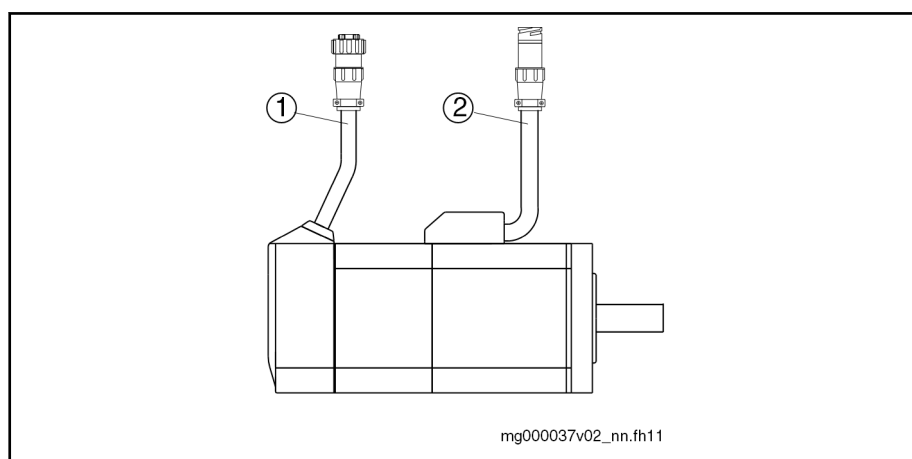
6 Connection technique

6.1 Electrical connection "C" cable connection

Bayonet lock IP54

The connections for output and encoder of MSM motors are provided by flexible connection cables with plug connector (IP 54) and bayonet lock.

When connecting the connection cables, the bayonet lock should lock in place.



- 1 Encoder connection
 2 Power connection

Fig. 6-1: Motor connection MSM

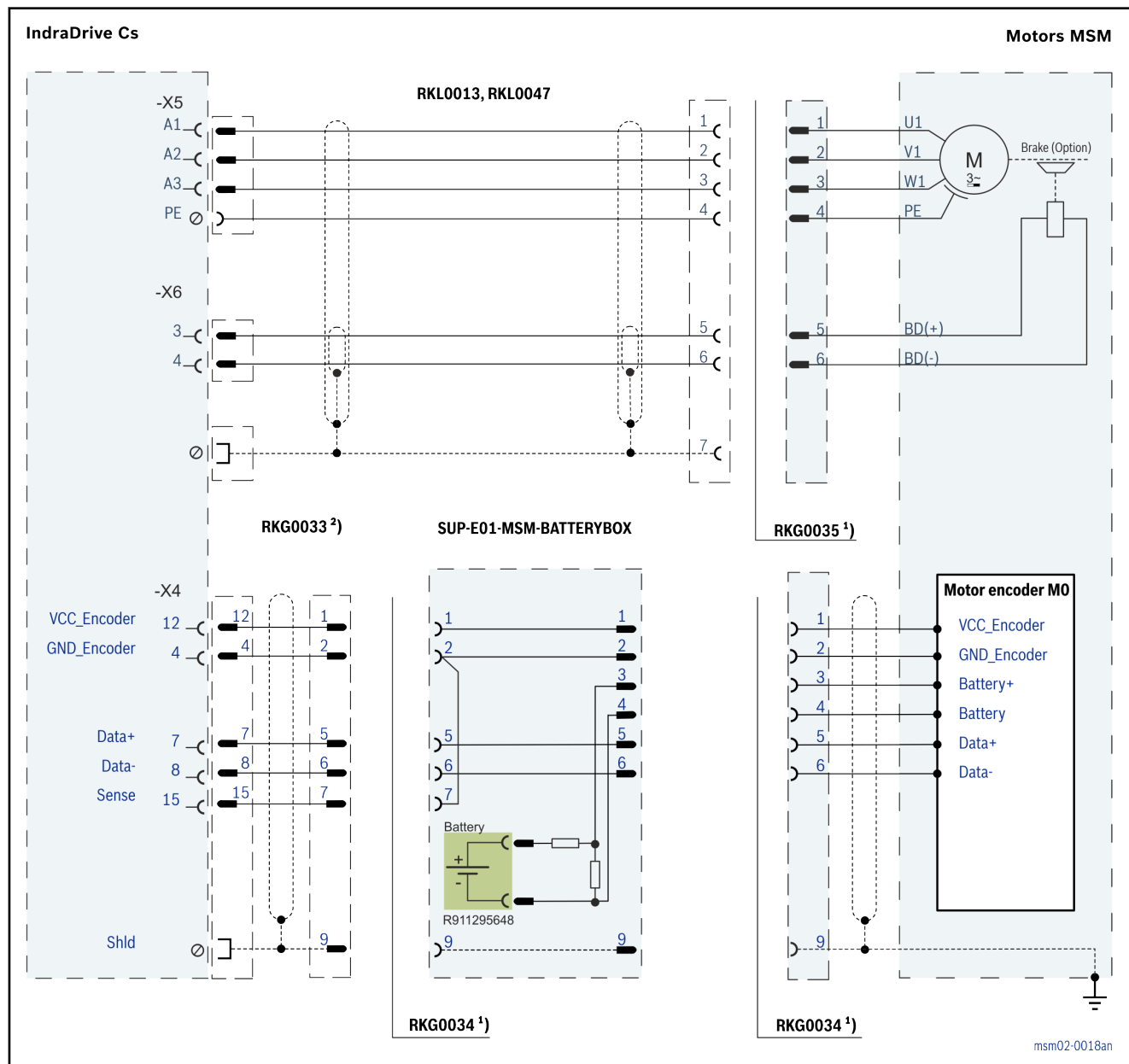
The length of the flexible connection cable is included in the following table.

Motor	Length of connection cable and plug connector	
	Encoder	Output
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. 6-1: MSM motors: Length of connection cable

Connection technique

Connection overview



1)

Optional extension cable

2)

In case of single-turn applications, RKG033 should be connected directly to the MSM motor by using the INS0758 cable plug. Shielding connection over housing

②

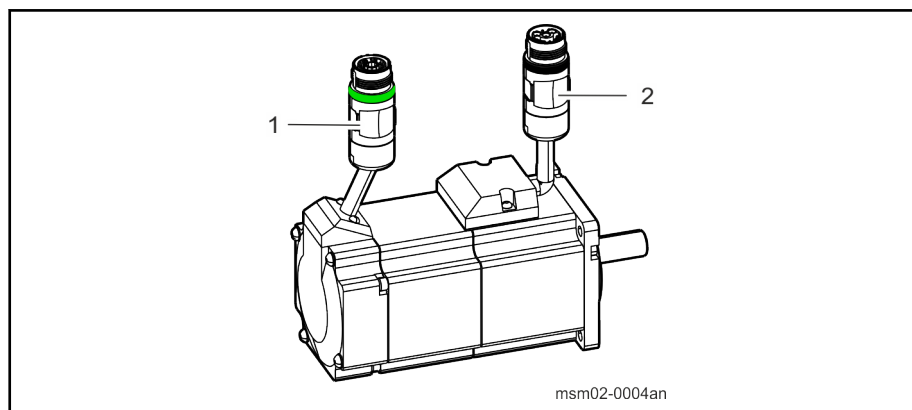
Fig. 6-2: Interconnection diagram MSK with encoder M0 and battery box

The battery box is to be installed close to the motor; the maximum cable length between battery box and MSM motor (RKG0034) is 2.0 m.

6.2 Electrical connection "M" cable connection round plug M17

SpeedCon quick lock IP67

The connections for output and encoder of MSM motors are provided by flexible connection cables with round plug connector M17 (IP 67) and Speedcon lock.



1 Encoder connection (green color coder ring)

2 Power connection (black color code ring)

Fig. 6-3: Motor connection Speedcon MSM

The length of the flexible connection cable is included in the following table.

Motor	Length of connection cable ("M" cable connection round plug M17)	
	Encoder	Output
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. 6-2: MSM motors: Length of connection cable ("M" cable connection round plug M17)

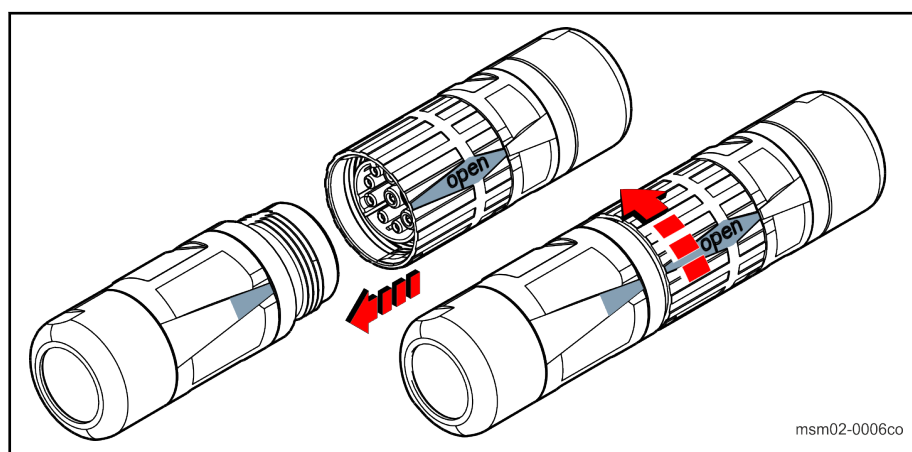
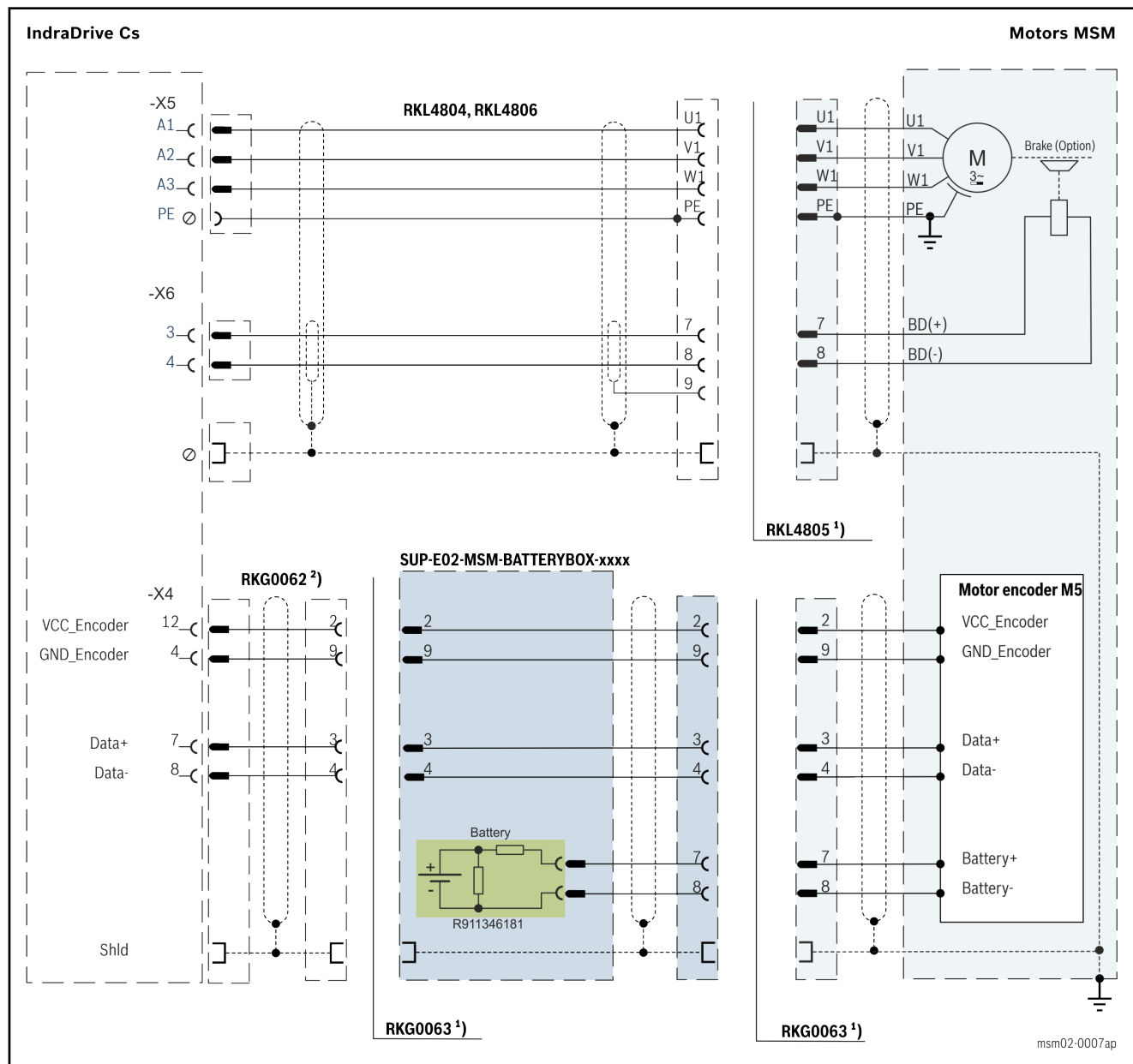


Fig. 6-4: Speedcon quick lock

Plugging of cable plugs in "open" position and "hand-tighten" the cable plug with a rotation of approx. 90°.

Connection technique

Connection overview



1

2

②

Fig. 6-5:

Optional extension cable

In case of single-turn applications, the cable should be connected directly to the motor

Shielding connection over housing

Interconnection diagram MSM

6.3 Ready-made connection cables

6.3.1 Power cables

Motor	Controllers		
	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__			

(...) Extension (optional)
Tab. 6-3: MSM power cable

Connection technique

6.3.2 Encoder cable

Motor	Controllers			
		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
	Single-turn	Multi-turn + battery box	Multi-turn + battery at 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__				

(...) Extension (optional)
 Tab. 6-4: MSM power cable

7 Transport and storage

7.1 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. 7-1: Environmental and operating conditions - Transport

7.2 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. 7-2: Environmental and operating conditions - Storage

8 Assembly accessory

8.1 Flange assembly

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.

Fastening 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. 8-1: 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 designed for flange assembly (B05). Details on the mounting holes are given in the corresponding dimension sheet.

Assembly accessory

8.2 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

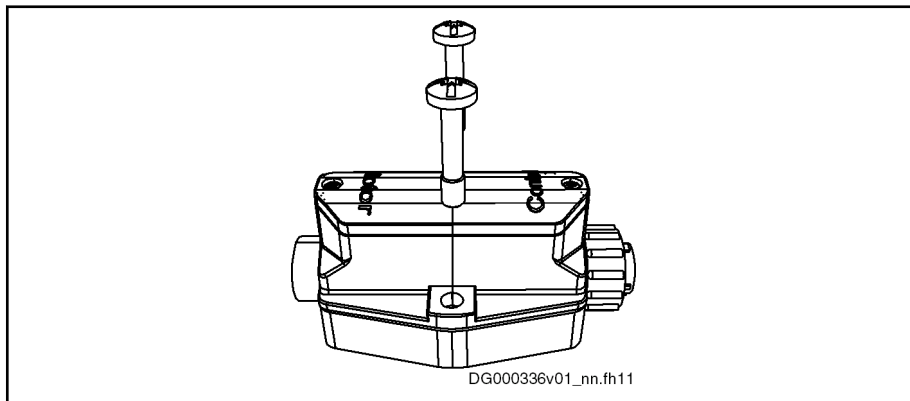


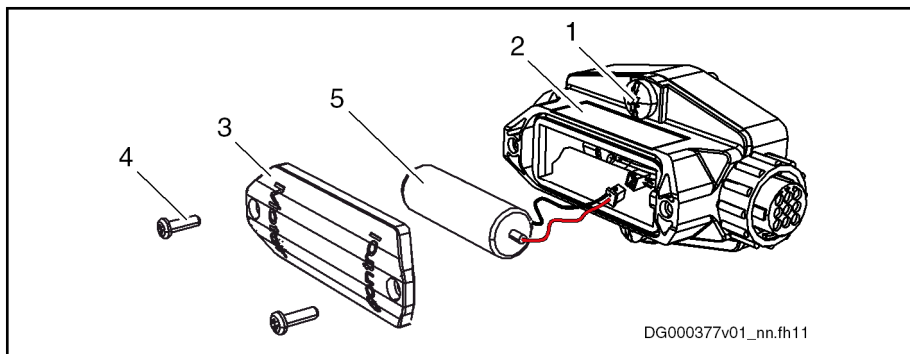
Fig. 8-1: Battery box

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. 8-2: Components of battery box

Assembly accessory

Dimensions

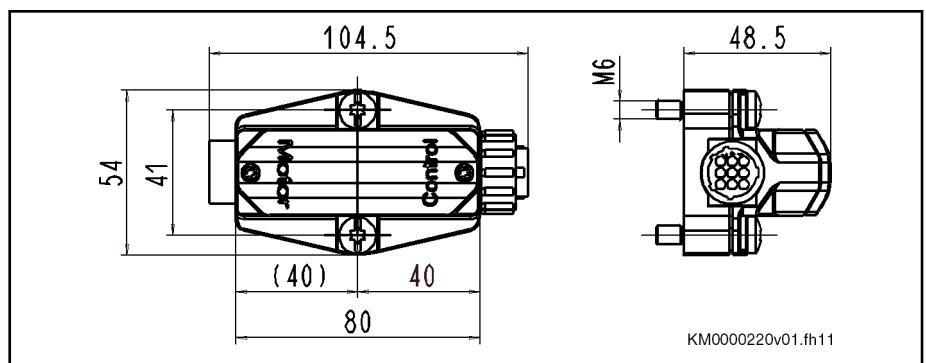


Fig. 8-3: Dimensions

Weight 120 g

Mounting



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

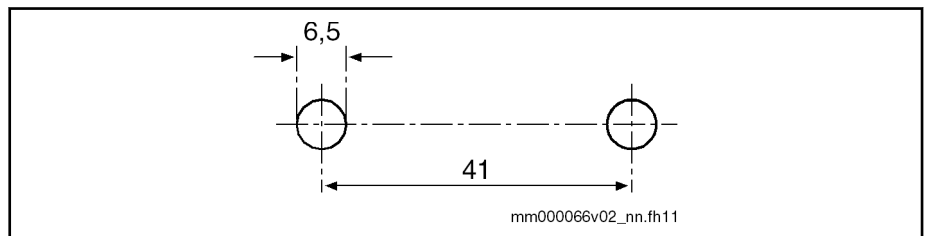
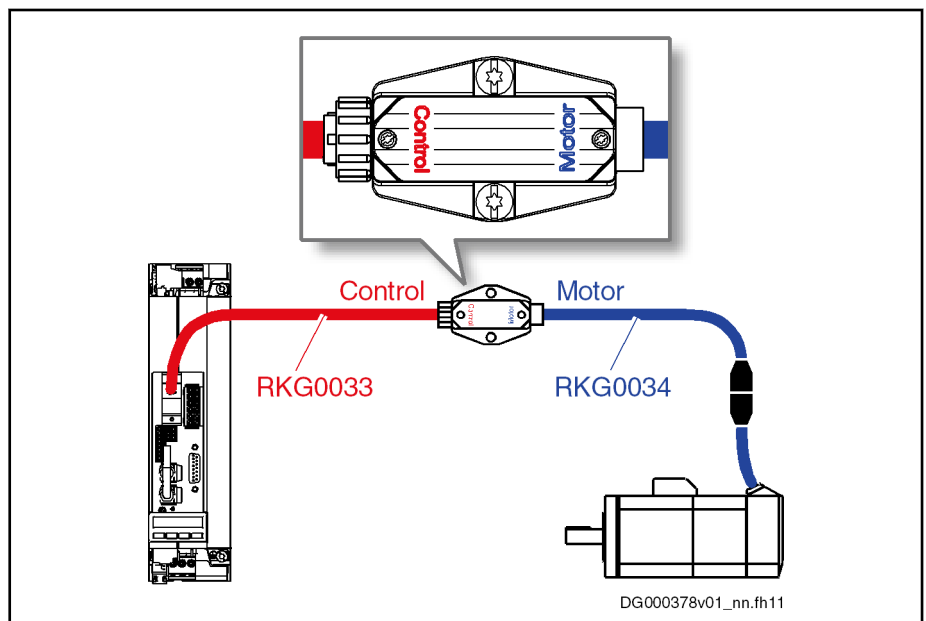


Fig. 8-4: Drilling diagram for battery box

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

Cabling



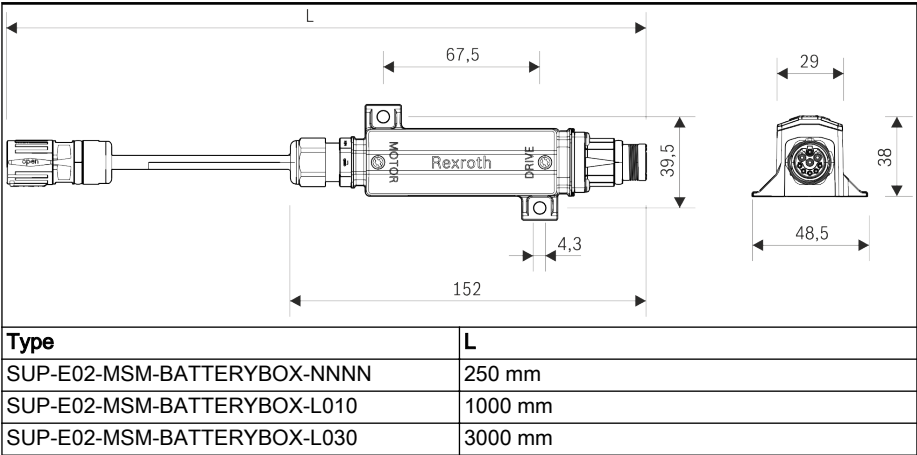
RKG0033 Encoder cable
RKG0034 Extension cable (optional)

Fig. 8-5: Cabling of battery box

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

Use The battery box is used for buffering of the encoder data in case of power shut off when operating MSM motors with absolute encoder (M5).

Scope of delivery



Tab. 8-2: Battery box dimensions

Battery box complete with

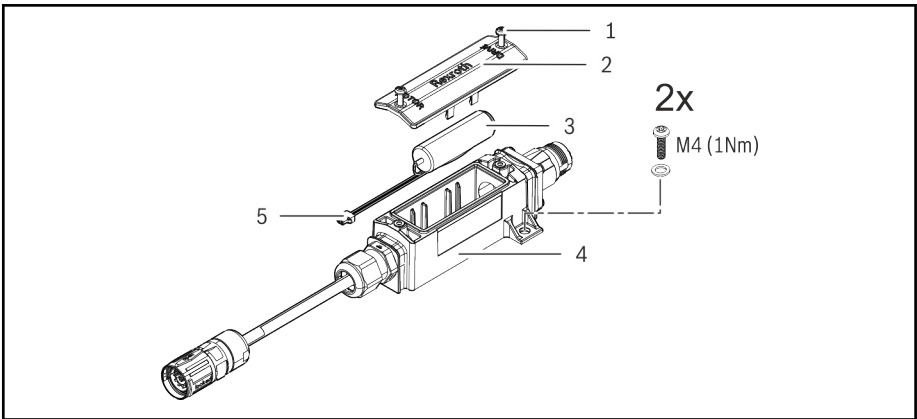
- Battery:** Type: PRM1-03V6-2600C-D2-LITH-ZNR-50, 3.6 V; 2600 mA, lithium; lifetime: up to 10 years, depending on use and ambient temperature

The battery box "SUP-E02-MSM-BATTERYBOX-xxxx" is delivered in ready-for-use state with battery.

Recommendation: Battery change limit is 5 years

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

Components:



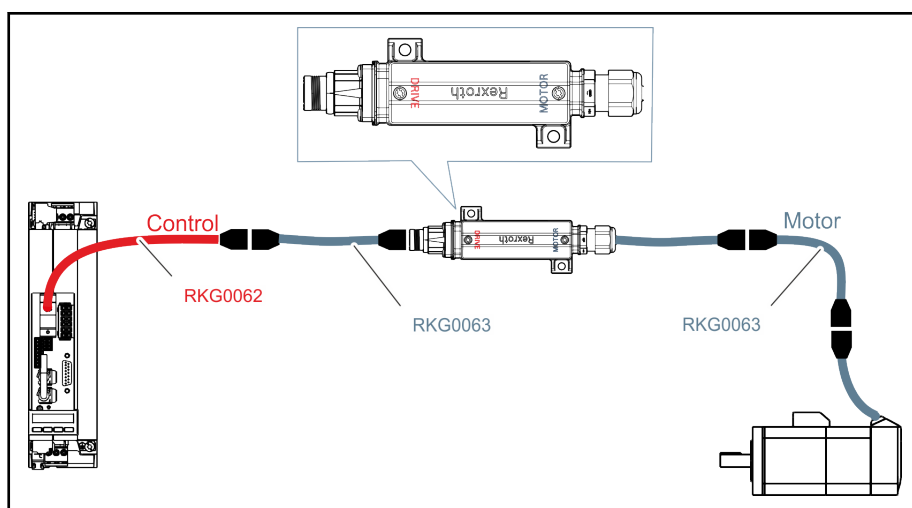
- 1 Housing screw (M_A 0.7 Nm)
- 2 Housing lid
- 3 Battery
- 4 Housing
- 5 Battery connector

Fig. 8-6: Components of battery box

Use assembly screws 2x M4 with washer and screw locking for fastening the battery box. Fastening screws are not in the scope of delivery and should be based to the assembly situation. Tightening torque of the mounting screws: 1 Nm.

Assembly accessory

Cabling



RKG0062 Encoder cable
 RKG0063 Extension cable (optional)

Fig. 8-7: Cabling of battery box

Assembly accessory

8.4 Shaft sealing ring

Shaft sealing rings are available as accessories; the shaft sealing rights increase the IP protection in the region of the output shaft.

Retrofitting is to be performed by the customer. Proper functioning requires proper installation.

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

Tab. 8-3: Accessories MSM shaft sealing ring

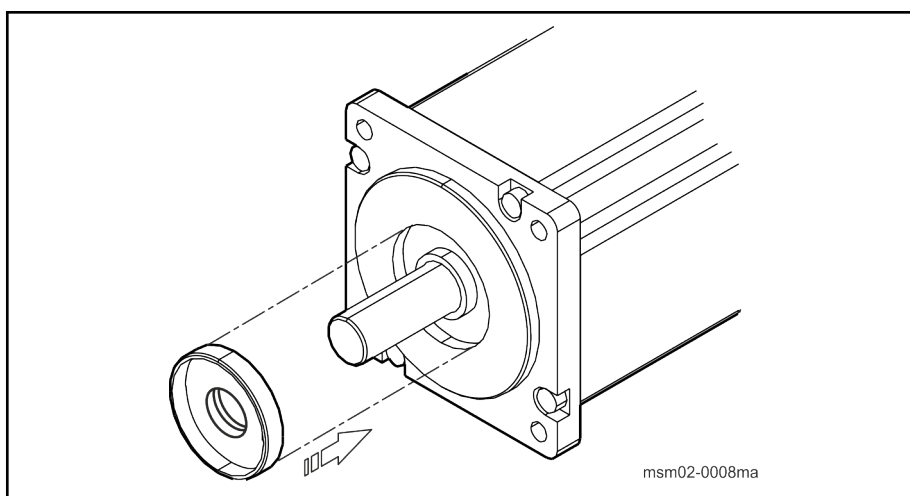


Fig. 8-8: Assembly accessories radial shaft sealing ring MSM

Assembly notes:

- Clean position of radial shaft sealing ring.
- Place radial shaft sealing ring on shaft; in case of a key, make sure that the sealing lip is not damaged.
- Slowly place the radial shaft sealing ring on the motor by using the assembly tool.
- Lubricate the radial shaft sealing ring.

9 Environmental protection and disposal

9.1 Environmental protection

Production processes	The products are made with 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 the case of appropriate use. Normally, our products will not have any negativ influences on the environment.		
Significant components	Basically, our products contain the following components: <table border="0"> <tr> <td> Electronic devices • steel • aluminum • copper • synthetic materials • electronic components and modules </td><td> Motors • steel • aluminum • copper • brass • magnetic materials • electronic components and modules </td></tr> </table>	Electronic devices • steel • aluminum • copper • synthetic materials • electronic components and modules	Motors • steel • aluminum • copper • brass • magnetic materials • electronic components and modules
Electronic devices • steel • aluminum • copper • synthetic materials • electronic components and modules	Motors • steel • aluminum • copper • brass • magnetic materials • electronic components and modules		

9.2 Disposal

Return of products	Our products can be returned to our premises free of charge for disposal. It is a precondition, however, that the products are free of oil, grease or other dirt. Furthermore, the products returned for disposal must not contain any undue foreign material or foreign components. Send 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	The packaging materials consist of cardboard, wood and polystyrene. These materials 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. The end user within the EU is legally obligated to return used batteries. Outside the validity of the EU Directive 2006/66/EC keep the stipulated directives. Used batteries can contain hazardous substances, which can harm the environment or the people's health when they are improper stored or disposed of. After use, the batteries or accumulators contained in Rexroth products have to be properly disposed of according to the country-specific collection.
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 modules.

Environmental protection and disposal

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

Products made of plastics can 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 valid legal requirements.

10 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)

11 Appendix

Electric Drives and Controls Hydraulics Linear Motion and Assembly Technologies Pneumatics Service	Rexroth Bosch Group												
Konformitätserklärung im Sinne der EG-Niederspannungsrichtlinie 2006/95/EG, Anhang III B Produkt/Product/Produit: MSM													
TC 30321-1 2008-11-28													
Declaration of Conformity as per EC Low-Voltage directive 2006/95/EC, Attachment III B Déclaration du fabricant conformément à la directive "CE" relative à la basse tension 2006/95/EC, Annexe III B													
<table style="width: 100%; border: none;"> <tr> <td style="width: 33%; border: none;">Hiermit erklären wir in alleiniger Verantwortung, dass das Produkt</td> <td style="width: 33%; border: none;">Assuming sole responsibility, we herewith declare that the product</td> <td style="width: 33%; border: none;">Par la présente, nous déclarons sous notre propre et unique responsabilité que le produit</td> </tr> </table>		Hiermit erklären wir in alleiniger Verantwortung, dass das Produkt	Assuming sole responsibility, we herewith declare that the product	Par la présente, nous déclarons sous notre propre et unique responsabilité que le produit									
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<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 33%; vertical-align: top;"> 1 Produkt: AC-Motor Product: AC motor Produit: Moteur AC 2 Hersteller: Bosch Rexroth Electric Drives and Controls GmbH Manufacturer: Bürgermeister-Dr.-Nebel-Straße 2 Constructeur: 97816 Lohr a. Main Germany 3 Typ: MSM019 MSM020 Type: MSM030 MSM031 Type: MSM040 MSM041 4 ab Herstellungsdatum: 2003-01-01 from date of manufacture: à partir de la date de fabrication: 5 Angewendete Normen / Applicable standard / Normes utilisées <table style="width: 100%; border: none;"> <tr> <th style="text-align: left;"><u>Norm / Standard / Norme</u></th> <th style="text-align: left;"><u>Titel / Title / Titre</u></th> <th style="text-align: left;"><u>Ausgabe / Edition</u></th> </tr> <tr> <td>EN 60034-1</td> <td>Rotating electrical machines – Part 1: Ratings and performance</td> <td>2004</td> </tr> <tr> <td>EN 60034-5</td> <td>Rotating electrical machines – Part 5: Degrees of protection provided by integral design of rotating electrical machines (IP-Code) - Classification</td> <td>2001 + A1:2007</td> </tr> </table> </td> <td style="width: 33%;"></td> <td style="width: 33%;"></td> </tr> </table>		1 Produkt: AC-Motor Product: AC motor Produit: Moteur AC 2 Hersteller: Bosch Rexroth Electric Drives and Controls GmbH Manufacturer: Bürgermeister-Dr.-Nebel-Straße 2 Constructeur: 97816 Lohr a. Main Germany 3 Typ: MSM019 MSM020 Type: MSM030 MSM031 Type: MSM040 MSM041 4 ab Herstellungsdatum: 2003-01-01 from date of manufacture: à partir de la date de fabrication: 5 Angewendete Normen / Applicable standard / Normes utilisées <table style="width: 100%; border: none;"> <tr> <th style="text-align: left;"><u>Norm / Standard / Norme</u></th> <th style="text-align: left;"><u>Titel / Title / Titre</u></th> <th style="text-align: left;"><u>Ausgabe / Edition</u></th> </tr> <tr> <td>EN 60034-1</td> <td>Rotating electrical machines – Part 1: Ratings and performance</td> <td>2004</td> </tr> <tr> <td>EN 60034-5</td> <td>Rotating electrical machines – Part 5: Degrees of protection provided by integral design of rotating electrical machines (IP-Code) - Classification</td> <td>2001 + A1:2007</td> </tr> </table>	<u>Norm / Standard / Norme</u>	<u>Titel / Title / Titre</u>	<u>Ausgabe / Edition</u>	EN 60034-1	Rotating electrical machines – Part 1: Ratings and performance	2004	EN 60034-5	Rotating electrical machines – Part 5: Degrees of protection provided by integral design of rotating electrical machines (IP-Code) - Classification	2001 + A1:2007		
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Bosch Rexroth Electric Drives and Controls GmbH Bürgermeister-Dr.-Nebel-Straße 2 • 97816 Lohr a. Main Germany													

Fig. 11-1: Declaration of conformity 1/2

Appendix

Konformitätserklärung / Declaration of Conformity / Déclaration du fabricant conformément

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MSM**TC 30321-1 : 2008-11-28**

Im eingebauten Zustand können sich die EMV-Eigenschaften dieses Produktes ändern.

Deshalb ist für das Endprodukt (Endgerät, Maschine, Anlagen) eine Überprüfung der EMV-Eigenschaften durch den Endprodukt-hersteller zweckmäßig.

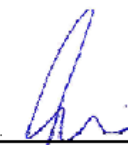
After the product has been installed, its EMC properties may change. Hence the product intended for the final user (complete apparatus, machines or installations) should be inspected with regard to its EMC properties by the manufacturer of the product intended for the final user.

En état monté, les propriétés CEM du présent produit peuvent subir des modifications. C'est pourquoi, il est recommandé au constructeur du produit final (appareils, machines, installations où est intégré le présent produit) d'effectuer un nouveau contrôle des propriétés CEM du produit final.

Lohr a. Main , den
Ort/place/lieu

2008-11-28
Datum/date

i.V.


Michael Steinbrecher
Leiter Qualitäts-Management/
Head of Quality Management/
Directeur Gestion Qualité

i.V.


Eberhard Schemm
Entwicklungsbereichsleiter Antriebe/
Head of Development Drives/
Directeur Développement

Änderungen im Inhalt der Konformitätserklärung sind vorbehalten. Derzeit gültige Ausgabe auf Anfrage.
We reserve the right to make changes in the conformity declaration. Presently applicable edition can be obtained upon request.
Le fabricant se réserve le droit de modifier le contenu de la déclaration. Edition actuellement en vigueur demande.

Fig. 11-2: Declaration of conformity 2/2

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