17.4 Dimensional drawings

In this chapter, you can find the dimensions of the motors.

Dimensions can exceed the specifications of ISO 2768-mK due to casting tolerances or accumulation of individual tolerances.

We reserve the right to make dimensional changes due to ongoing technical development.

You can download 3D models of our standard drives at https://configurator.stoeber.de/en-US/.

In this chapter, the dimensions p1 and w1 for standard motor designs are presented. In designs for connection to drive controllers of third-party manufacturers, dimensions p1 and w1 may differ. You can find more details at https://configurator.stoeber.de/en-US/.

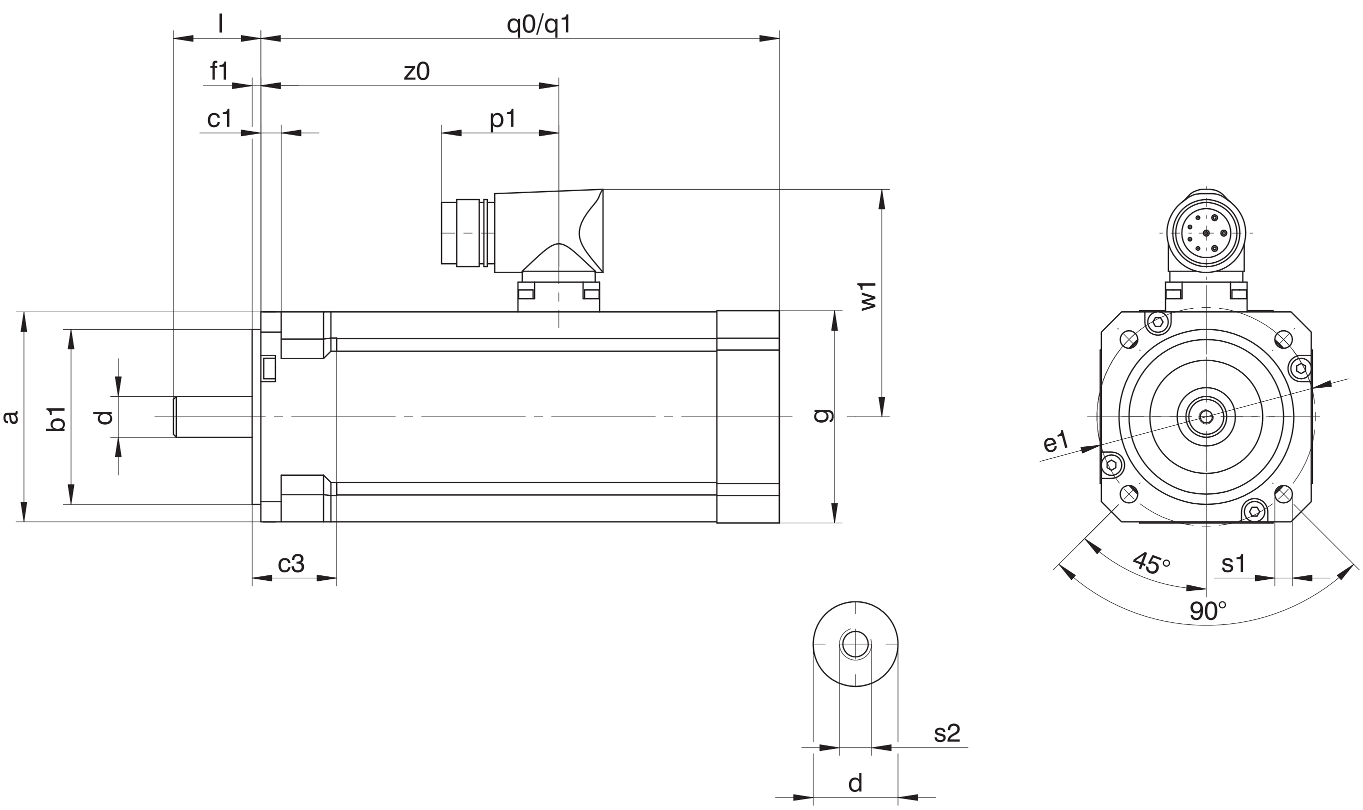
Tolerances

Solid shaft	Tolerance
Shaft ∅ fit ≤ 50 mm	DIN 748-1, ISO k6
Shaft ∅ fit > 50 mm	DIN 748-1, ISO m6

Centering holes in solid shafts in accordance with DIN 332-2, DR shape

Thread size	M4	M5	M6	M8	M10	M12	M16	M20	M24
Thread depth [mm]	10	12.5	16	19	22	28	36	42	50

17.4.1 EZ2 – EZ3 motors (One Cable Solution)

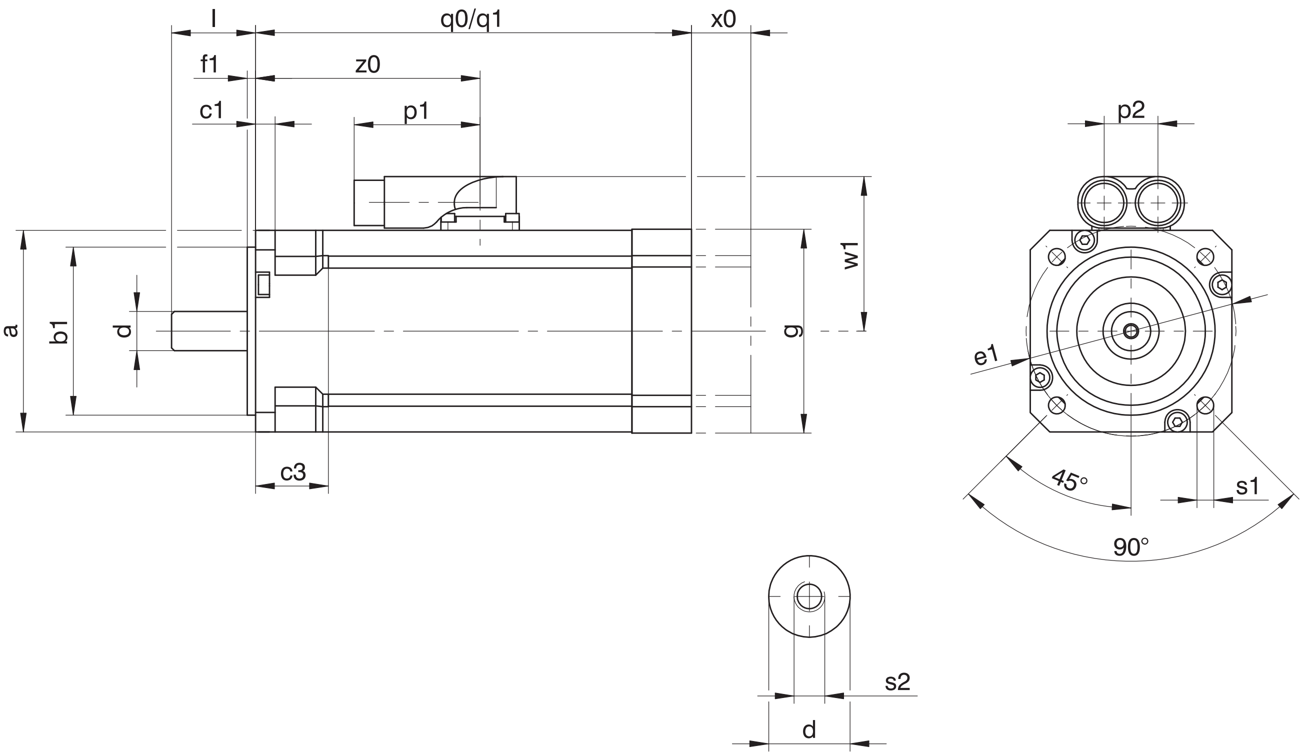


q0 Applies to motors without holding brake

q1 Applies to motors with holding brake

Type	□a	∅b1	c1	c3	∅d	∅e1	f1	□g	l	p1	q0	q1	∅s1	s2	w1	z0
EZ202U	55	40_{j6}	7	7	9_{k6}	63	3.5	55	20	40	148	157	5.8	M4	69.5	93.0
EZ203U	55	40_{j6}	7	7	9_{k6}	63	3.5	55	20	40	166	175	5.8	M4	69.5	111.0
EZ301U	72	60_{j6}	7	26	14_{k6}	75	3.0	72	30	40	116	156	6.0	M5	78.0	80.5
EZ302U	72	60_{j6}	7	26	14_{k6}	75	3.0	72	30	40	138	178	6.0	M5	78.0	102.5
EZ303U	72	60_{j6}	7	26	14_{k6}	75	3.0	72	30	40	160	200	6.0	M5	78.0	124.5

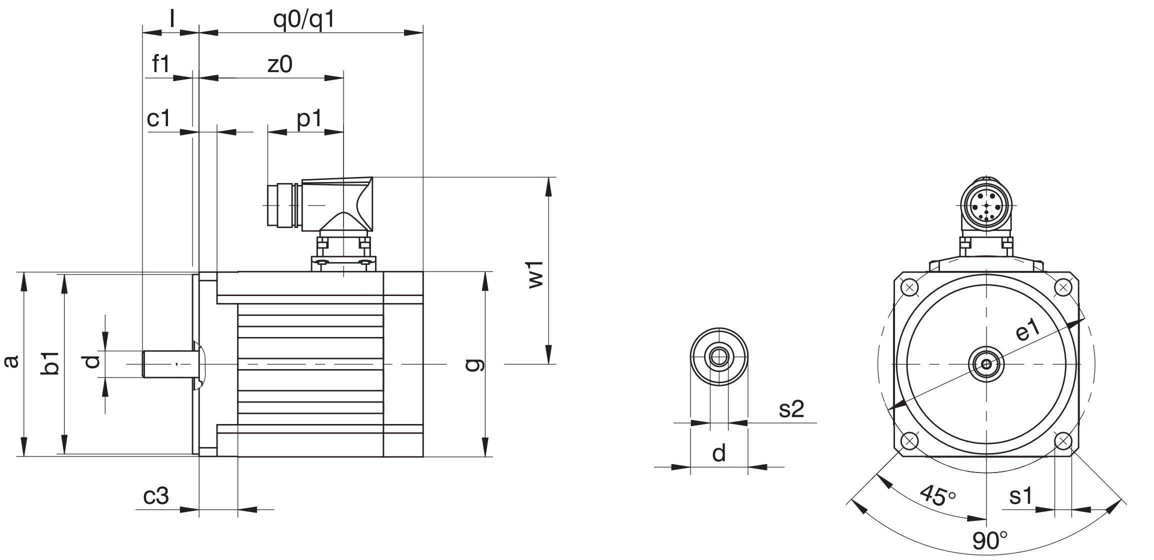
17.4.2 EZ2 – EZ3 motors



q0	Applies to motors without holding brake
q1	Applies to motors with holding brake
x0	EZ2: Applies only to motors with holding brake and encoders using an optical or inductive measuring method EZ3 − EZ8: Applies to encoders using an optical measuring method

Type	□a	∅b1	c1	c3	∅d	∅e1	f1	□g	l	p1	p2	q0	q1	∅s1	s2	w1	x0	z0
EZ202U	55	40_{j6}	7	7	9_{k6}	63	3.5	55	20	45	19	148	157	5.8	M4	47.0	25	93.0
EZ203U	55	40_{j6}	7	7	9_{k6}	63	3.5	55	20	45	19	166	175	5.8	M4	47.0	25	111.0
EZ301U	72	60_{j6}	7	26	14_{k6}	75	3.0	72	30	45	19	116	156	6.0	M5	55.5	21	80.5
EZ302U	72	60_{j6}	7	26	14_{k6}	75	3.0	72	30	45	19	138	178	6.0	M5	55.5	21	102.5
EZ303U	72	60_{j6}	7	26	14_{k6}	75	3.0	72	30	45	19	160	200	6.0	M5	55.5	21	124.5

17.4.3 EZ4 – EZ7 motors with convection cooling (One Cable Solution)

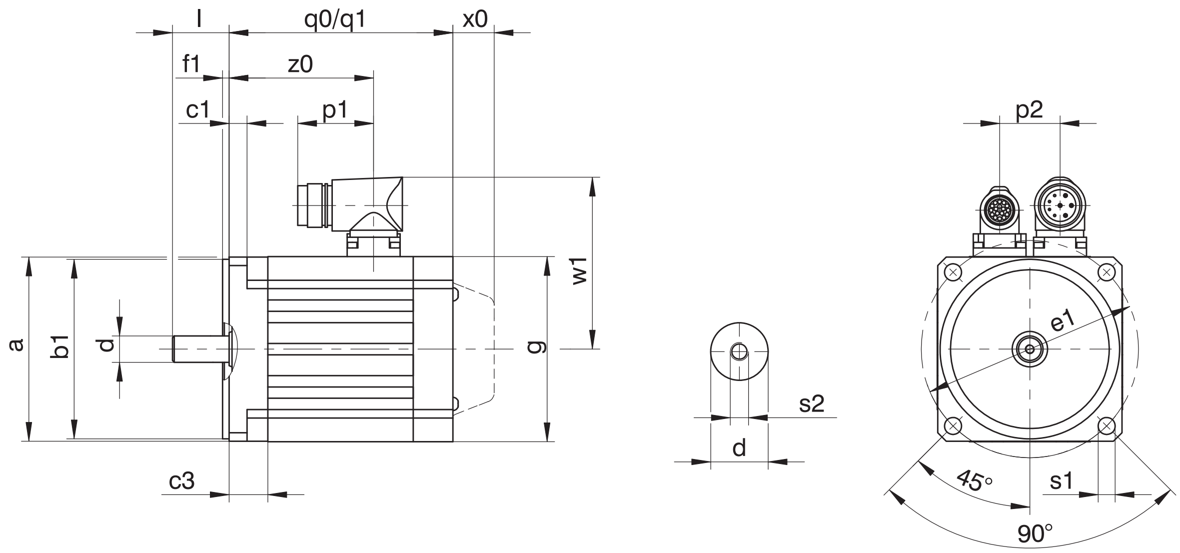


q0 Applies to motors without holding brake

q1 Applies to motors with holding brake

Type	□a	∅b1	c1	c3	∅d	∅e1	f1	□g	l	p1	q0	q1	∅s1	s2	w1	z0
EZ401U	98	95_{j6}	9.5	20.5	14_{k6}	115	3.5	98	30	40	118.5	167.0	9	M5	99	76.5
EZ402U	98	95_{j6}	9.5	20.5	19_{k6}	115	3.5	98	40	40	143.5	192.0	9	M6	99	101.5
EZ404U	98	95_{j6}	9.5	20.5	19_{k6}	115	3.5	98	40	40	193.5	242.0	9	M6	99	151.5
EZ501U	115	110_{j6}	10.0	16.0	19_{k6}	130	3.5	115	40	40	109.0	163.5	9	M6	110	74.5
EZ502U	115	110_{j6}	10.0	16.0	19_{k6}	130	3.5	115	40	40	134.0	188.5	9	M6	110	99.5
EZ503U	115	110_{j6}	10.0	16.0	24_{k6}	130	3.5	115	50	40	159.0	213.5	9	M8	110	124.5
EZ505U	115	110_{j6}	10.0	16.0	24_{k6}	130	3.5	115	50	40	209.0	263.5	9	M8	110	174.5
EZ701U	145	130_{j6}	10.0	19.0	24_{k6}	165	3.5	145	50	40	121.0	180.0	11	M8	125	83.0
EZ702U	145	130_{j6}	10.0	19.0	24_{k6}	165	3.5	145	50	40	146.0	205.0	11	M8	125	108.0
EZ703U	145	130_{j6}	10.0	19.0	24_{k6}	165	3.5	145	50	40	171.0	230.0	11	M8	125	133.0
EZ705U	145	130_{j6}	10.0	19.0	32_{k6}	165	3.5	145	58	40	226.0	285.0	11	M12	125	184.0

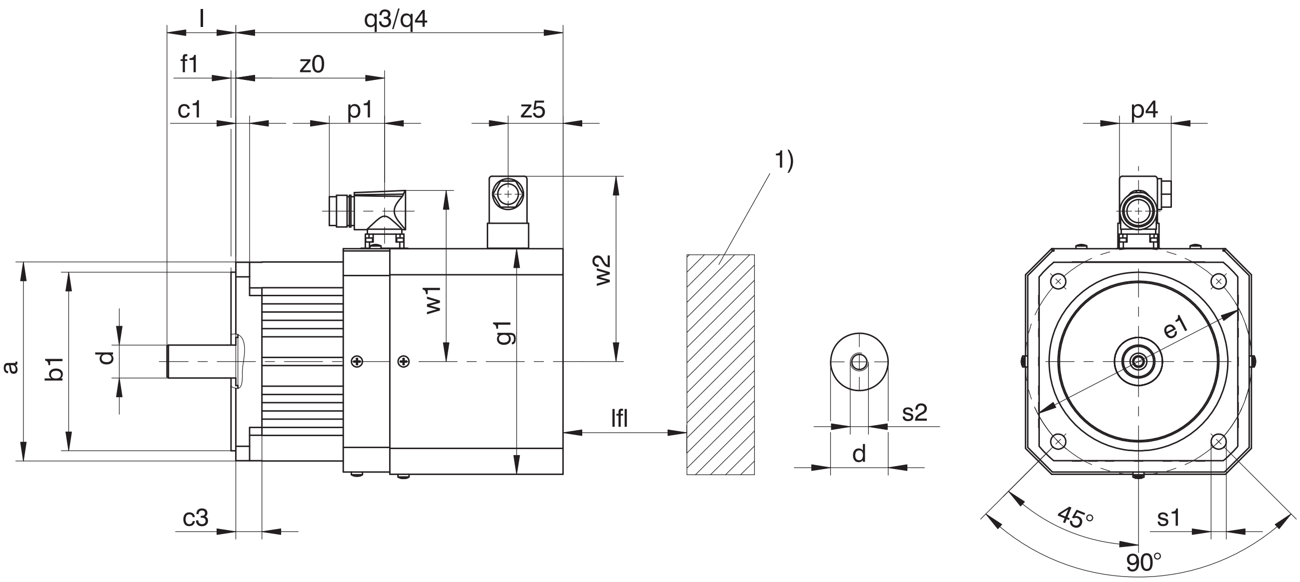
17.4.4 EZ4 – EZ8 motors with convection cooling



q0	Applies to motors without holding brake	q1	Applies to motors with holding brake
x0	Applies to encoders based on an optical measuring method		

Type	□a	∅b1	c1	c3	∅d	∅e1	f1	□g	l	p1	p2	q0	q1	∅s1	s2	w1	x0	z0
EZ401U	98	95_{j6}	9.5	20.5	14_{k6}	115	3.5	98	30	40	32	118.5	167.0	9.0	M5	91.0	22	76.5
EZ402U	98	95_{j6}	9.5	20.5	19_{k6}	115	3.5	98	40	40	32	143.5	192.0	9.0	M6	91.0	22	101.5
EZ404U	98	95_{j6}	9.5	20.5	19_{k6}	115	3.5	98	40	40	32	193.5	242.0	9.0	M6	91.0	22	151.5
EZ501U	115	110_{j6}	10.0	16.0	19_{k6}	130	3.5	115	40	40	36	109.0	163.5	9.0	M6	100.0	22	74.5
EZ502U	115	110_{j6}	10.0	16.0	19_{k6}	130	3.5	115	40	40	36	134.0	188.5	9.0	M6	100.0	22	99.5
EZ503U	115	110_{j6}	10.0	16.0	24_{k6}	130	3.5	115	50	40	36	159.0	213.5	9.0	M8	100.0	22	124.5
EZ505U	115	110_{j6}	10.0	16.0	24_{k6}	130	3.5	115	50	40	36	209.0	263.5	9.0	M8	100.0	22	174.5
EZ701U	145	130_{j6}	10.0	19.0	24_{k6}	165	3.5	145	50	40	42	121.0	180.0	11.0	M8	115.0	22	83.0
EZ702U	145	130_{j6}	10.0	19.0	24_{k6}	165	3.5	145	50	40	42	146.0	205.0	11.0	M8	115.0	22	108.0
EZ703U	145	130_{j6}	10.0	19.0	24_{k6}	165	3.5	145	50	40	42	171.0	230.0	11.0	M8	115.0	22	133.0
EZ705U	145	130_{j6}	10.0	19.0	32_{k6}	165	3.5	145	58	71	42	226.0	285.0	11.0	M12	134.0	22	184.0
EZ802U	190	180_{j6}	15.0	25.0	32_{k6}	215	3.5	190	58	71	60	222.0	299.0	13.5	M12	156.5	22	168.0
EZ803U	190	180_{j6}	15.0	25.0	38_{k6}	215	3.5	190	80	71	60	263.0	340.0	13.5	M12	156.5	22	209.0
EZ805U	190	180_{j6}	15.0	25.0	38_{k6}	215	3.5	190	80	71	60	345.0	422.0	13.5	M12	156.5	22	291.0

17.4.5 EZ4 – EZ7 motors with forced ventilation (One Cable Solution)



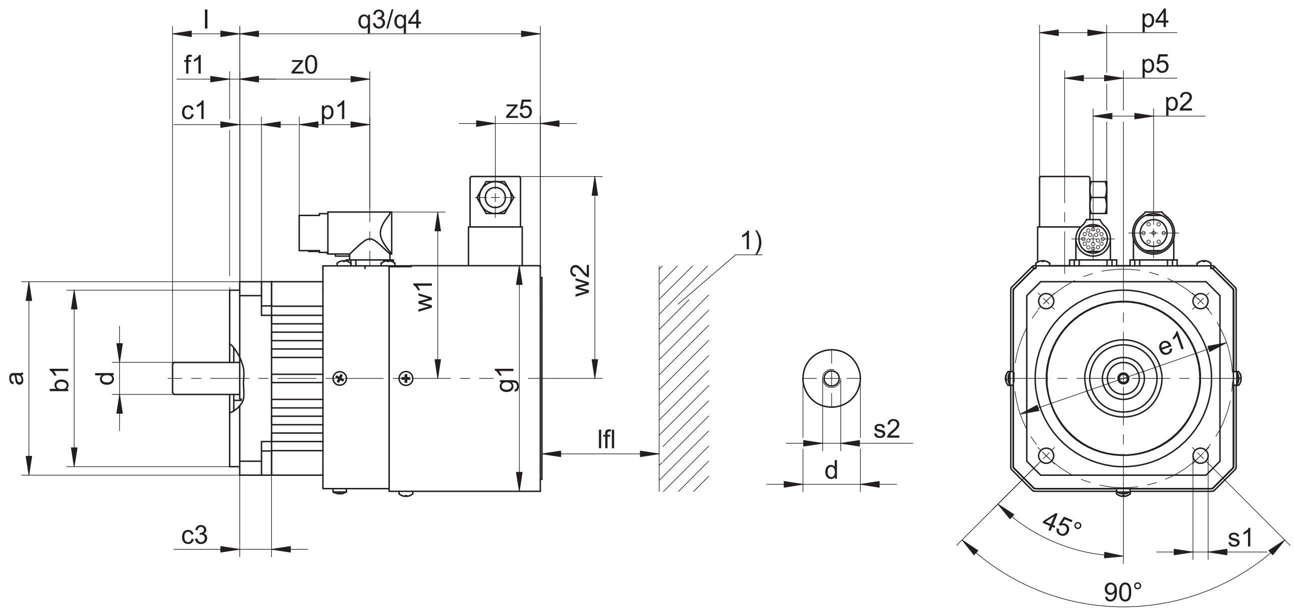
q3 Applies to motors without holding brake

q4 Applies to motors with holding brake

1) Machine wall

Type	□a	∅b1	c1	c3	∅d	∅e1	f1	□g1	l	lfl_{min}	p1	p4	q3	q4	∅s1	s2	w1	w2	z0	z5
EZ401B	98	95_{j6}	9.5	20.5	14_{k6}	115	3.5	118	30	20	40	37.5	175	224	9.0	M5	99	111	76.5	25
EZ402B	98	95_{j6}	9.5	20.5	19_{k6}	115	3.5	118	40	20	40	37.5	200	249	9.0	M6	99	111	101.5	25
EZ404B	98	95_{j6}	9.5	20.5	19_{k6}	115	3.5	118	40	20	40	37.5	250	299	9.0	M6	99	111	151.5	25
EZ501B	115	110_{j6}	10.0	16.0	19_{k6}	130	3.5	135	40	20	40	37.5	179	234	9.0	M6	110	120	74.5	25
EZ502B	115	110_{j6}	10.0	16.0	19_{k6}	130	3.5	135	40	20	40	37.5	204	259	9.0	M6	110	120	99.5	25
EZ503B	115	110_{j6}	10.0	16.0	24_{k6}	130	3.5	135	50	20	40	37.5	229	284	9.0	M8	110	120	124.5	25
EZ505B	115	110_{j6}	10.0	16.0	24_{k6}	130	3.5	135	50	20	40	37.5	279	334	9.0	M8	110	120	174.5	25
EZ701B	145	130_{j6}	10.0	19.0	24_{k6}	165	3.5	165	50	30	40	37.5	213	272	11.0	M8	125	134	83.0	40
EZ702B	145	130_{j6}	10.0	19.0	24_{k6}	165	3.5	165	50	30	40	37.5	238	297	11.0	M8	125	134	108.0	40
EZ703B	145	130_{j6}	10.0	19.0	24_{k6}	165	3.5	165	50	30	40	37.5	263	322	11.0	M8	125	134	133.0	40

17.4.6 EZ4 – EZ8 motors with forced ventilation



q3	Applies to motors without holding brake	q4	Applies to motors with holding brake
1)	Machine wall		

Type	□a	∅b1	c1	c3	∅d	∅e1	f1	□g1	l	lfl_{min}	p1	p2	p4	p5	q3	q4	∅s1	s2	w1	w2	z0	z5
EZ401B	98	95_{j6}	9.5	20.5	14_{k6}	115	3.5	118	30	20	40	32	37.5	0	175	224	9.0	M5	91.0	111	76.5	25
EZ402B	98	95_{j6}	9.5	20.5	19_{k6}	115	3.5	118	40	20	40	32	37.5	0	200	249	9.0	M6	91.0	111	101.5	25
EZ404B	98	95_{j6}	9.5	20.5	19_{k6}	115	3.5	118	40	20	40	32	37.5	0	250	299	9.0	M6	91.0	111	151.5	25
EZ501B	115	110_{j6}	10.0	16.0	19_{k6}	130	3.5	135	40	20	40	36	37.5	0	179	234	9.0	M6	100.0	120	74.5	25
EZ502B	115	110_{j6}	10.0	16.0	19_{k6}	130	3.5	135	40	20	40	36	37.5	0	204	259	9.0	M6	100.0	120	99.5	25
EZ503B	115	110_{j6}	10.0	16.0	24_{k6}	130	3.5	135	50	20	40	36	37.5	0	229	284	9.0	M8	100.0	120	124.5	25
EZ505B	115	110_{j6}	10.0	16.0	24_{k6}	130	3.5	135	50	20	40	36	37.5	0	279	334	9.0	M8	100.0	120	174.5	25
EZ701B	145	130_{j6}	10.0	19.0	24_{k6}	165	3.5	165	50	30	40	42	37.5	0	213	272	11.0	M8	115.0	134	83.0	40
EZ702B	145	130_{j6}	10.0	19.0	24_{k6}	165	3.5	165	50	30	40	42	37.5	0	238	297	11.0	M8	115.0	134	108.0	40
EZ703B	145	130_{j6}	10.0	19.0	24_{k6}	165	3.5	165	50	30	40	42	37.5	0	263	322	11.0	M8	115.0	134	133.0	40
EZ705B	145	130_{j6}	10.0	19.0	32_{k6}	165	3.5	165	58	30	71	42	37.5	0	318	377	11.0	M12	134.0	134	184.0	40
EZ802B	190	180_{j6}	15.0	25.0	32_{k6}	215	3.5	215	58	30	71	60	37.5	62	322	399	13.5	M12	156.5	160	168.0	40
EZ803B	190	180_{j6}	15.0	25.0	38_{k6}	215	3.5	215	80	30	71	60	37.5	62	363	440	13.5	M12	156.5	160	209.0	40
EZ805B	190	180_{j6}	15.0	25.0	38_{k6}	215	3.5	215	80	30	71	60	37.5	62	445	522	13.5	M12	156.5	160	291.0	40

17.5 Type designation

Example code

EZ	4	0	1	U	D	BB	Q7	O	096

Explanation

Code	Designation	Design
EZ	Type	Synchronous servo motor
4	Size	4 (example)
0	Generation	0
1	Length	1 (example)
U	Cooling[1]	Convection cooling
B		Forced ventilation
D	Design	Dynamic
BB	Drive controller	SI6 (example)
Q7	Encoder	EnDat 3 EQI 1131 (example)
O	Brake	Without holding brake
P		Permanent magnet holding brake
096	Voltage constant K_{EM}	96 V/1000 rpm (example)

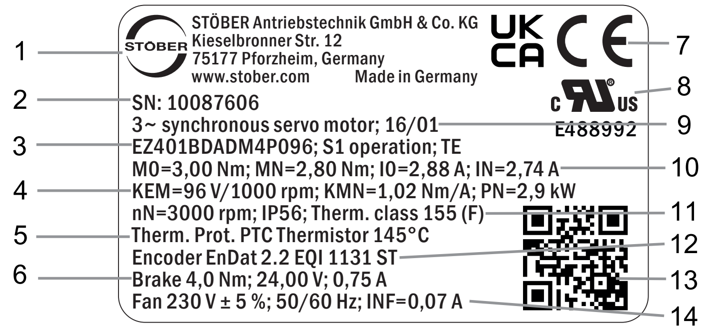
Notes

- In Chapter [▸ 17.6.4], you can find information about available encoders.
- In Chapter [▸ 17.6.4.6], you can find information about connecting synchronous servo motors to other drive controllers from STOBER.
- In Chapter [▸ 18], you can find information about options for connecting STOBER synchronous servo motors to drive controllers from other manufacturers.

[1] EZ3 motors only available with convection cooling

17.5.1 Nameplate

An example nameplate of an EZ401 synchronous servo motor is explained in the figure below.



Line	Value	Description
1	STÖBER Antriebstechnik GmbH + Co. KG	Logo and address of the manufacturer
2	Ser. No. 10087606	Serial number of the motor
3	EZ401BDADM4P096 S1 operation TE	Type designation Operating mode Protection class in accordance with UL1004
4	KEM=96 V/1000 rpm KMN=1.02 Nm/A PN=2.9 kW	Voltage constant Torque constant Nominal power
5	Therm. prot. of PTC thermistor 145 °C	Type of temperature sensor
6	Brake 4.0 Nm 24.00 V 0.75 A	Holding brake (optional) Static braking torque at 100 °C Nominal voltage (DC) of the holding brake Nominal current of the holding brake at 20 °C
7	CE UKCA	CE mark UKCA mark
8	cURus E488992	cURus test symbol, registered under UL number E488992
9	3~ synchronous servo motor 16/01	Motor type: Three-phase synchronous servo motor Date of manufacture (year/calendar week)
10	M0=3.00 Nm MN=2.80 Nm I0=2.88 A IN=2.74 A	Stall torque Nominal torque Stall current Nominal current
11	nN=3000 rpm IP56 Therm. class 155 (F)	Nominal speed Protection class Thermal class
12	EnDat 2.2 EQI 1131 ST encoder	Encoder model
13	QR code	Link to product information
14	Fan 230 V ± 5%; 50/60 Hz INF = 0.07 A	Forced ventilation unit (optional) Nominal voltage of the forced ventilation unit Nominal current of the forced ventilation unit

17.6 Product description

17.6.1 General features

Feature	Description
Design	IM B5, IM V1, IM V3 in accordance with EN 60034-7
Protection class	IP56 / IP66 (option)
Thermal class	155 (F) in accordance with EN 60034-1 (155 °C, heating Δϑ = 100 K)
Surface	Matte black as per RAL 9005
Cooling	IC 410 convection cooling (IC 416 convection cooling with forced ventilation units, optional)
Bearing	Rolling bearing with lifetime lubrication and non-contact sealing
Sealing	Radial shaft seal rings made of FKM (A side)
Shaft	Shaft without feather key, diameter quality k6
Radial runout	Normal tolerance class in accordance with IEC 60072-1
Concentricity	Normal tolerance class in accordance with IEC 60072-1
Axial runout	Normal tolerance class in accordance with IEC 60072-1
Vibration intensity	A in accordance with EN 60034-14
Noise level	Limit values in accordance with EN 60034-9

17.6.2 Electrical features

General electrical features of the motor are described in this chapter. Details can be found in the "Selection tables" chapter.

Feature	Description
DC link voltage	DC 540 V (max. 620 V) on STOBER drive controllers
Winding	Three-phase, single-tooth coil design
Circuit	Star, center not led through
Protection class	I (protective grounding) in accordance with EN 61140
Impulse voltage insulation class (IVIC)	C in accordance with DIN EN 60034-18-41 (inverter connection voltage 0 – 480 V ± 10%)
Number of pole pairs	2 (EZ2) 5 (EZ3) 7 (EZ4/EZ5/EZ7) 8 (EZ8)

17.6.3 Ambient conditions

Standard ambient conditions for transport, storage and operation of the motor are described in this chapter. Information about differing ambient conditions can be found in the chapter Derating.

Feature	Description
Surrounding temperature for transport/storage	−30 °C to +85 °C
Surrounding temperature for operation	−15 °C to +40 °C
Relative humidity	5% to 95%, no condensation
Installation altitude	≤ 1000 m above sea level
Shock load	≤ 50 m/s^2 (5 g), 6 ms in accordance with EN 60068-2-27

Notes

- STOBER synchronous servo motors are not suitable for potentially explosive atmospheres.
- Secure the power cables close to the motor so that vibrations of the cable do not place impermissible loads on the motor plug connector.
- Note that the braking torques of the holding brake (optional) may be reduced by shock loading.
- At operating temperatures below 0 °C, note that the discs of the holding brake (optional) may ice up.
- Also take into consideration the shock load of the motor due to output units (such as gear units and pumps) which are coupled with the motor.

17.6.4 Encoders

STOBER synchronous servo motors can be designed with different encoder models. The following chapters include information for choosing the optimal encoder for your application.

17.6.4.1 Encoder measuring method selection tool

The following table offers a selection tool for an encoder measuring method that is optimally suited for your application.

Feature	Absolute encoder		Resolver
Measuring method	Optical	Inductive	Electromag-netic
Temperature resistance	★★☆	★★★	★★★
Vibration strength and shock resistance	★★☆	★★★	★★★
System accuracy	★★★	★★☆	★☆☆
FMA version with fault exclusion for mechanical coupling (option with EnDat interface)	✓	✓	–
Elimination of referencing with multi-turn design (optional)	✓	✓	–
Simple commissioning with electronic nameplate	✓	✓	–
Key: ★☆☆ = satisfactory, ★★☆ = good, ★★★ = very good			

17.6.4.2 Selection tool for EnDat interface

The following table offers a selection tool for the EnDat interface of absolute encoders.

Feature	EnDat 2.1	EnDat 2.2	EnDat 3
Short cycle times	★★☆	★★★	★★★
Transfer of additional information along with the position value	–	✓	✓
Expanded power supply range	★★☆	★★★	★★★
One Cable Solution (OCS)	–	–	✓
Key: ★★☆ = good, ★★★ = very good			

17.6.4.3 EnDat 3 encoders

EnDat 3 is a robust, purely digital protocol that functions with minimal connection lines. EnDat 3 facilitates the One Cable Solution, which allows the connection lines between the encoder and drive controller to be routed along in the motor's power cable.

The One Cable Solution offers the following advantages:

- Significantly reduced wiring effort by eliminating the encoder cable
- For cable lengths up to 50 m, a choke between the drive controller and motor is not necessary
- Advanced safety functions possible (up to SIL2 / category 3, PLd)
- Significantly reduced space requirements by eliminating the encoder plug connector
- Transmission of measured values from the temperature sensor using the EnDat 3 protocol

A motor with the EnDat 3 encoder can be operated only on a SI6 or SC6 drive controller from STOBER.

The EnDat 3 encoder has the following features:

Encoder model	Code	Measuring method	Recordable revolutions	Resolution	Position values per revolution	MTTF [years]	PHF [h]
EnDat 3 EQI 1131	Q7	Inductive	4096	19 bit	524288	> 100	$\leq 15 \times 10^{-9}$

17.6.4.4 EnDat 2 encoders

In this chapter, you can find detailed technical data for encoder models that can be selected with EnDat interface.

Encoders with EnDat 2.2 interface

Encoder model	Code	Measuring method	Recordable revolutions	Resolution	Position values per revolution	MTTF [years]	PHF [h]
EnDat 2.2 EQI 1131	Q6	Inductive	4096	19 bit	524288	> 100	$\leq 15 \times 10^{-9}$
EnDat 2.2 EBI 1135	B0	Inductive	65536	18 bit	262144	> 100	$\leq 600 \times 10^{-9}$
EnDat 2.2 ECI 1118-G2	C5	Inductive	–	18 bit	262144	> 76	$\leq 1.5 \times 10^{-6}$
EnDat 2.2 EQN 1135 FMA	M3	Optical	4096	23 bit	8388608	> 100	$\leq 15 \times 10^{-9}$
EnDat 2.2 EQN 1135	Q5	Optical	4096	23 bit	8388608	> 100	$\leq 15 \times 10^{-9}$
EnDat 2.2 ECN 1123 FMA	M1	Optical	–	23 bit	8388608	> 100	$\leq 15 \times 10^{-9}$
EnDat 2.2 ECN 1123	C7	Optical	–	23 bit	8388608	> 100	$\leq 15 \times 10^{-9}$

Encoders with EnDat 2.1 interface

Encoder model	Code	Measuring method	Recordable revolutions	Resolution	Position values per revolution	Periods per revolution	MTTF [years]	PHF [h]
EnDat 2.1 EQN 1125 FMA	M2	Optical	4096	13 bit	8192	Sin/cos 512	> 57	$\leq 2 \times 10^{-6}$
EnDat 2.1 EQN 1125	Q4	Optical	4096	13 bit	8192	Sin/cos 512	> 57	$\leq 2 \times 10^{-6}$
EnDat 2.1 ECN 1113 FMA	M0	Optical	–	13 bit	8192	Sin/cos 512	> 57	$\leq 2 \times 10^{-6}$
EnDat 2.1 ECN 1113	C6	Optical	–	13 bit	8192	Sin/cos 512	> 57	$\leq 2 \times 10^{-6}$
EnDat 2.1 ECI 1118-G3	C2	Inductive	–	18 bit	262144	Sin/cos 512	> 100	$\leq 6 \times 10^{-7}$

Notes

- The encoder code is a part of the type designation of the motor.
- FMA = Version with fault exclusion for mechanical coupling.
- MTTF = Average time before dangerous failure. MTTF values greater than 100 years were reduced in accordance with DIN EN ISO 13849.
- PFH = Probability of a dangerous failure per hour
- The EnDat 2.2 EBI 1135 encoder requires an external buffer battery so that absolute position information is retained after the power supply is turned off (AES option for STOBER drive controllers).
- Multiple revolutions of the motor shaft can be recorded only using multi-turn encoders.

17.6.4.5 Resolver

In this chapter, you can find detailed technical data for the resolver that can be installed as an encoder in a STOBER synchronous servo motor.

Feature	Description
Number of poles	2
Input voltage U_{1eff}	7 V ± 5%
Input frequency f_1	10 kHz
Output voltage $U_{2,S1-S3}$	$K_{tr} \cdot U_{R1-R2} \cdot \cos \theta$
Output voltage $U_{2,S2-S4}$	$K_{tr} \cdot U_{R1-R2} \cdot \sin \theta$
Transformation ratio K_{tr}	0.5 ± 5%
Electrical fault	±10 arcmin
MTTF	> 100 years
PHF	$\leq 10^{-9}$

17.6.4.6 Possible combinations with drive controllers

The following table shows the options for combining STOBER drive controllers with selectable encoder models.

Drive controller		**SDS 5000**		**SD6**		**SI6**			**SC6**		
Drive controller code		AA	AC	AD	AE	AP	AQ	**BB**	AU	AV	**BA**
Connection plan ID		442305	442307	442450	442451	442771	442772	**443175**	443052	443053	**443174**
Encoder	**Encoder code**										
EnDat 3 EQI 1131	Q7	–	–	–	–	–	–	✓	–	–	✓
EnDat 2.2 EQI 1131	Q6	✓	–	✓	–	✓	–	–	✓	–	–
EnDat 2.2 EQN 1135 FMA	M3	✓	–	✓	–	–	–	–	–	–	–
EnDat 2.2 EQN 1135	Q5	✓	–	✓	–	✓	–	–	✓	–	–
EnDat 2.2 ECN 1123 FMA	M1	✓	–	✓	–	–	–	–	–	–	–
EnDat 2.2 ECN 1123	C7	✓	–	✓	–	✓	–	–	✓	–	–
EnDat 2.2 ECI 1118-G2	C5	✓	–	✓	–	✓	–	–	✓	–	–
EnDat 2.1 EQN 1125 FMA	M2	✓	✓	✓	✓	–	–	–	–	–	–
EnDat 2.1 EQN 1125	Q4	✓	✓	✓	✓	–	–	–	–	–	–
EnDat 2.1 ECN 1113 FMA	M0	✓	✓	✓	✓	–	–	–	–	–	–
EnDat 2.1 ECN 1113	C6	✓	✓	✓	✓	–	–	–	–	–	–
Resolver	R0	✓	–	–	✓	–	✓	–	–	✓	–

Notes

- The drive controller and encoder codes are a part of the type designation of the motor (see the "Type designation" chapter).
- In Chapter [▶ 18], you can find information about options for connecting STOBER synchronous servo motors to drive controllers from other manufacturers.

17.6.5 Temperature sensor

In this chapter, you can find technical data for the temperature sensors that are installed in STOBER synchronous servo motors for implementing thermal winding protection. To prevent damage to the motor, always monitor the temperature sensor with appropriate devices that will turn off the motor if the maximum permitted winding temperature is exceeded.

Some encoders feature integrated temperature monitoring, the warning and switch-off thresholds of which may overlap with the corresponding values set for the temperature sensor in the drive controller. In some cases, this may result in an instance where an encoder with internal temperature monitoring forces the motor to shut down, even before the motor has reached its nominal data.

You can find information about the electrical connection of the temperature sensor in the "Connection method" chapter.

17.6.5.1 PTC thermistor

The PTC thermistor is installed as a standard temperature sensor in STOBER synchronous servo motors.

The PTC thermistor is a triple thermistor in accordance with DIN 44082 that can be used for monitoring the temperature of each winding phase. The resistance values in the following table and curve refer to a single thermistor in accordance with DIN 44081. These values must be multiplied by 3 for a triple thermistor in accordance with DIN 44082.

Feature	Description
Nominal response temperature ϑ_{NAT}	145 °C ± 5 K
Resistance R −20 °C up to ϑ_{NAT} − 20 K	≤ 250 Ω
Resistance R with ϑ_{NAT} − 5 K	≤ 550 Ω
Resistance R with ϑ_{NAT} + 5 K	≥ 1330 Ω
Resistance R with ϑ_{NAT} + 15 K	≥ 4000 Ω
Operating voltage	≤ DC 7.5 V
Thermal response time	< 5 s
Thermal class	155 (F) in accordance with EN 60034-1 (155 °C, heating Δϑ = 100 K)

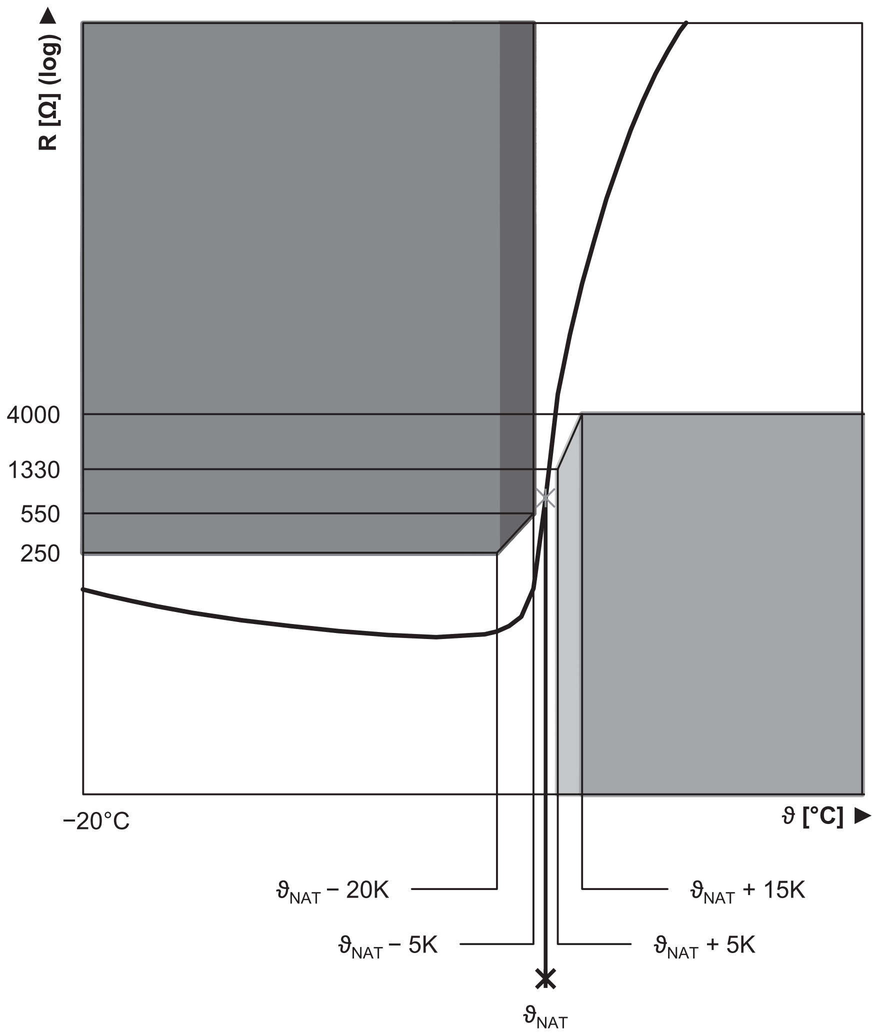


Fig. 2: PTC thermistor curve (single thermistor)

17.6.5.2 Pt1000 temperature sensor

STOBER synchronous servo motors are available in versions with a Pt1000 temperature sensor. The Pt1000 is a temperature-dependent resistor that has a resistance curve with a linear relationship with temperature. As a result, the Pt1000 allows for measurements of the winding temperature. These measurements are limited to one phase of the motor winding, however. In order to adequately protect the motor from exceeding the maximum permitted winding temperature, use a i²t model in the drive controller to monitor the winding temperature.

Pt1000 temperature sensors can also be used with the One Cable Solution.

Avoid exceeding the specified measurement current so that the measured values are not falsified due to self-heating of the temperature sensor.

Feature	Description
Measurement current (constant)	2 mA
Resistance R for ϑ = 0 °C	1000 Ω
Resistance R for ϑ = 80 °C	1300 Ω
Resistance R for ϑ = 150 °C	1570 Ω

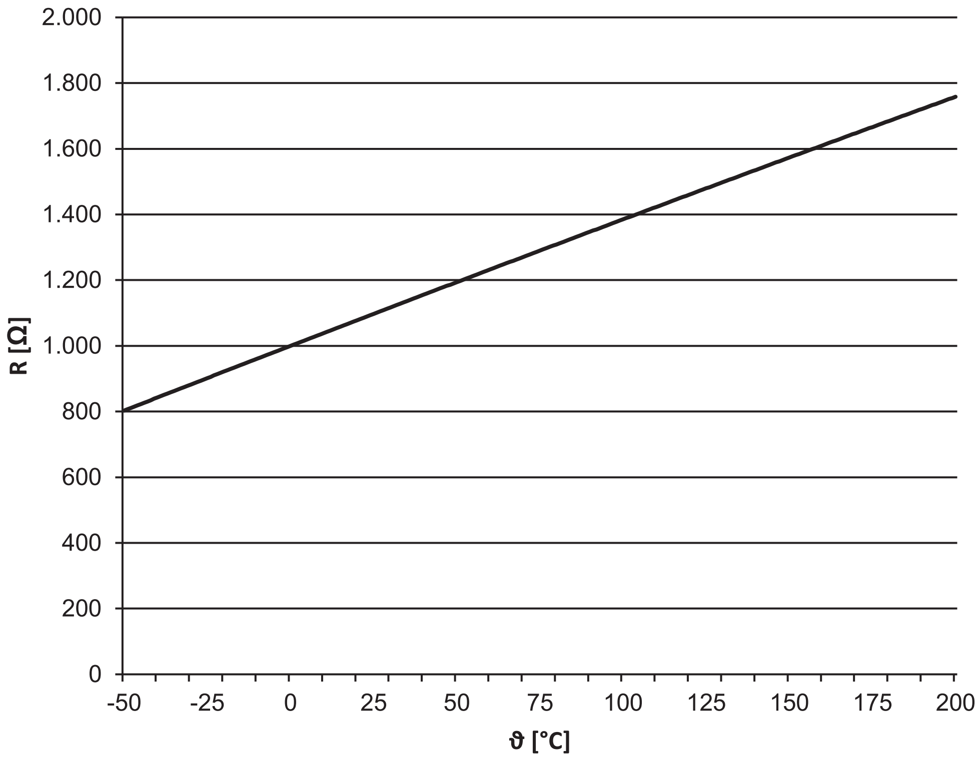


Fig. 3: Pt1000 temperature sensor characteristic curve

17.6.6 Cooling

A synchronous servo motor in the standard version is cooled by convection cooling (IC 410 in accordance with EN 60034-6). Optionally, forced ventilation can be used to cool the motor.

17.6.6.1 Forced ventilation

STOBER synchronous servo motors offer the option of being cooled with forced ventilation in order to increase performance data while maintaining the same size. Retrofitting with a forced ventilation unit is also possible in order to optimize the drive at a later date. When retrofitting, check whether the conductor cross-section of the power cable of the motor must be increased. Also take into account the dimensions of the forced ventilation unit.

The performance data for motors with forced ventilation can be found in the chapter Selection tables and the dimensions in the chapter Dimensional drawings.

Technical data

Motor	Forced ventilation unit	$U_{N,F}$ [V]	$I_{N,F}$ [A]	$P_{N,F}$ [W]	q_{vF} [m³/h]	$L_{pA,F}$ [dBA]	m_F [kg]	Protection class
EZ4_B	FL4	230 V ± 5%, 50/60 Hz	0.07	10	59	41	1.4	IP44
EZ5_B	FL5		0.10	14	160	45	1.9	IP54
EZ7_B	FL7		0.10	14	160	45	2.9	IP54
EZ8_B	FL8		0.20	26	420	54	5.0	IP55

Terminal assignment for forced ventilation unit plug connectors

Connection diagram	Pin	Connection
	1	L1 (phase)
	2	N (neutral conductor)
	3	
	⏚	Grounding conductor

17.6.7 Holding brake

STOBER synchronous servo motors can be equipped with a backlash-free holding brake using permanent magnets in order to secure the motor shaft when at a standstill. The holding brake engages automatically if the voltage drops.

The holding brake is designed for a high number of operations (B_{10} = 10 million operations, B_{10d} = 20 million operations).

Nominal voltage of permanent magnet holding brake: DC 24 V ± 5%, smoothed.

Observe the following during project configuration:

- The holding brake is designed to keep the motor shaft from moving. Activate braking processes during operation using the corresponding electrical functions of the drive controller. In exceptional circumstances, the holding brake can be used for braking from full speed (following a power failure or when setting up the machine). The maximum permitted work done by friction $W_{B,Rmax/h}$ may not be exceeded.
- Note that the braking torque M_{Bdyn} may initially be up to 50% less when braking from full speed. As a result, the braking effect has a delayed action and braking distances become longer.
- Regularly perform a brake test to ensure the functional safety of the brakes. Details can be found in the documentation of the motor and the drive controller.
- Connect a varistor of type S14 K35 (or comparable) in parallel to the brake coil to protect your machine from switching surges. (Not necessary for connecting the holding brake to STOBER drive controllers of the 5th and 6th generation with a BRS/BRM brake module).
- The holding brake of the motor does not offer adequate safety for persons in the hazardous area of gravity-loaded vertical axes. Therefore take additional measures to minimize risk, e.g. by providing a mechanical substructure for maintenance work.
- Take into consideration voltage losses in the connection cables that connect the voltage source to the holding brake connections.
- The holding torque of the brake can be reduced by shock loading. Information about shock loading can be found in the "Ambient conditions" chapter.
- At operating temperatures from −15 °C to 0 °C, a cold holding brake in the released state may cause operating noises. As the temperature of the holding brake increases, these noises decrease such that operating noises are not heard when using holding brake at operating temperature in the released state.

Calculation of work done by friction per braking process

$$W_{B,R/B} = \frac{J_{tot} \cdot n^2}{182.4} \cdot \frac{M_{Bdyn}}{M_{Bdyn} \pm M_L}, \quad M_{Bdyn} > M_L$$

The sign of M_L is positive if the movement runs vertically upwards or horizontally and it is negative if the movement runs vertically down.

Calculation of the stop time

$$t_{dec} = 2.66 \cdot t_{1B} + \frac{n \cdot J_{tot}}{9.55 \cdot M_{Bdyn}}$$

Switching behavior

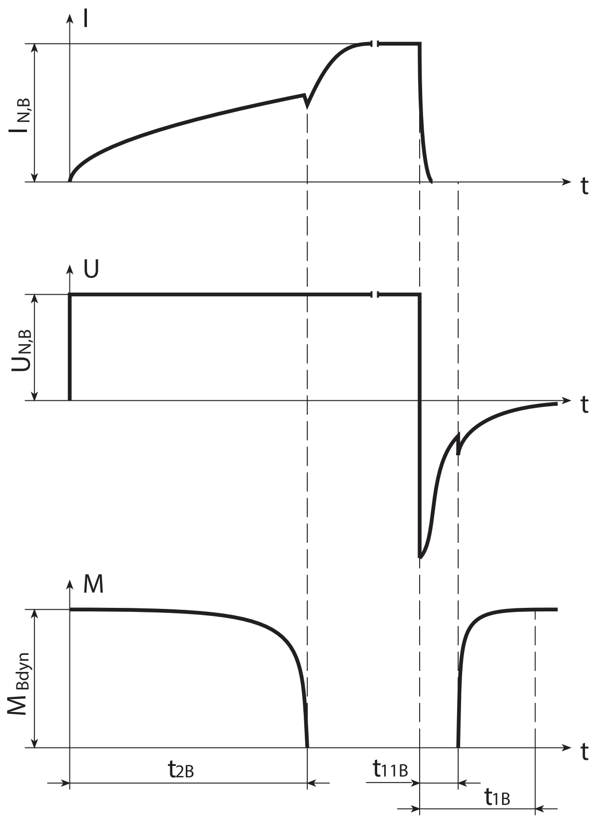


Fig. 4: Holding brake – Switching behavior

Technical data

Type	M_{Bstat} [Nm]	M_{Bdyn} [Nm]	$I_{N,B}$ [A]	$W_{B,Rmax/h}$ [kJ/h]	N_{Bstop}	J_{Bstop} [kgcm²]	$W_{B,Rlim}$ [kJ]	t_{2B} [ms]	t_{11B} [ms]	t_{1B} [ms]	$x_{B,N}$ [mm]	ΔJ_B [kgcm²]	Δm_B [kg]
EZ202	1.2	1.0	0.36	3.0	45000	0.310	70	10	2.0	5	0.15	0.03	0.25
EZ203	1.2	1.0	0.38	3.0	36000	0.390	70	10	2.0	5	0.15	0.03	0.25
EZ301	2.5	2.3	0.51	6.0	48000	0.752	180	25	3.0	20	0.20	0.19	0.55
EZ302	4.0	3.8	0.50	8.5	38000	0.952	180	44	4.0	26	0.30	0.19	0.55
EZ303	4.0	3.8	0.50	8.5	30000	1.17	180	44	4.0	26	0.30	0.19	0.55
EZ401	4.0	3.8	0.50	8.5	16000	2.24	180	44	4.0	26	0.30	0.19	0.76
EZ402	8.0	7.0	0.75	8.5	13500	4.39	300	40	2.0	20	0.30	0.57	0.97
EZ404	8.0	7.0	0.75	8.5	8500	7.09	300	40	2.0	20	0.30	0.57	0.97
EZ501	8.0	7.0	0.75	8.5	8700	6.94	300	40	2.0	20	0.30	0.57	1.19
EZ502	8.0	7.0	0.80	8.5	5200	11.5	300	40	2.0	20	0.30	0.57	1.19
EZ503	15	12	1.0	11.0	5900	18.6	550	60	5.0	30	0.30	1.72	1.62
EZ505	15	12	1.0	11.0	4000	27.8	550	60	5.0	30	0.30	1.72	1.62
EZ701	15	12	1.0	11.0	5400	20.5	550	60	5.0	30	0.30	1.74	1.94
EZ702	15	12	1.0	11.0	3600	30.9	550	60	5.0	30	0.30	1.74	1.94
EZ703	32	28	1.1	25.0	5200	54.6	1400	100	5.0	25	0.40	5.68	2.81
EZ705	32	28	1.1	25.0	3500	79.4	1400	100	5.0	25	0.40	5.68	2.81
EZ802	65	35	1.7	45.0	6000	149	2250	200	10	50	0.40	16.5	5.40
EZ803	65	35	1.7	45.0	4500	200	2250	200	10	50	0.40	16.5	5.40
EZ805	115	70	2.1	65.0	7000	376	6500	190	12	65	0.50	55.5	8.40

17.6.8 Connection method

The following chapters describe the connection technology of STOBER synchronous servo motors in the standard version on STOBER drive controllers. You can find further information relating to the drive controller type that was specified in your order in the connection plan that is delivered with every synchronous servo motor.

In Chapter [▶ 18], you can find information about options for connecting STOBER synchronous servo motors to drive controllers from other manufacturers.

17.6.8.1 Connection of the motor housing to the grounding conductor system

Connect the motor housing to the grounding conductor system of the machine in order to prevent personal injury and faulty triggering of residual current protective devices.

All attachment parts required for the connection of the grounding conductor to the motor housing are delivered with the motor. The grounding screw of the motor is identified with the symbol ⏚ in accordance with IEC 60417-DB. The cross-section of the grounding conductor has to be at least as large as the cross-section of the lines in the power connection.

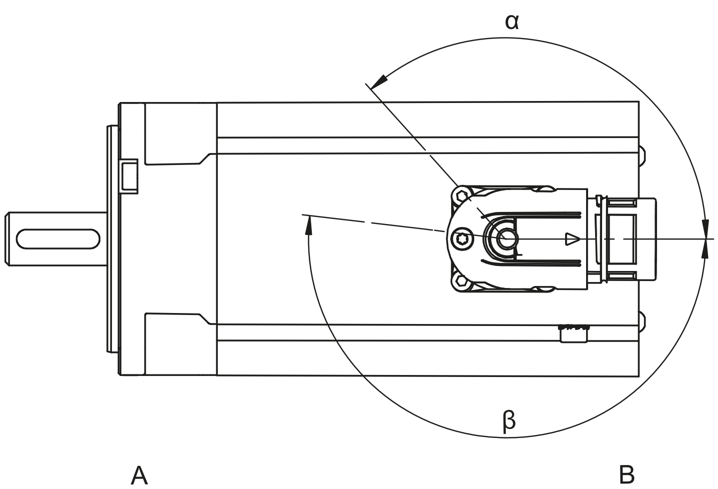
17.6.8.2 Plug connectors (One Cable Solution)

In the One Cable Solution design, the power and encoder lines are connected using a shared plug connector.

For motors with forced ventilation, avoid collisions between the motor connection cables and the plug connector of the forced ventilation unit. In the event of a collision, turn the motor plug connectors accordingly. Details regarding the position of the plug connector for the forced ventilation unit can be found in the "Dimensional drawings" chapter.

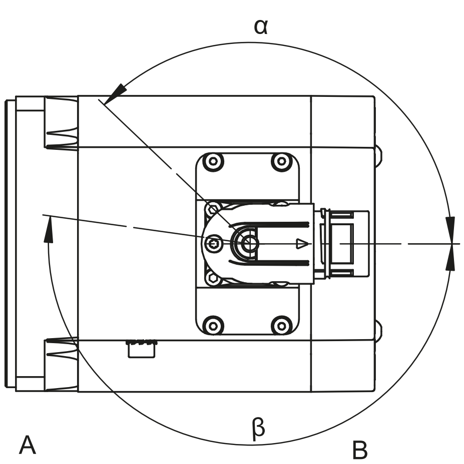
The figures represent the position of the plug connectors upon delivery.

Turning ranges of plug connectors (EZ2 – EZ3 motors)



A	Attachment or output side of the motor	B	Not output side

Turning ranges of plug connectors (EZ4 – EZ7 motors)



A	Attachment or output side of the motor	B	Not output side

Plug connector features

Motor type	Size	Connection	Turning range	
			α	β
EZ2 – EZ5, EZ701 – EZ703, EZ705U	con.23	Quick lock	130°	190°

Notes

- The number after "con." indicates the approximate external thread diameter of the plug connector in mm (for example, con.23 designates a plug connector with an external thread diameter of about 23 mm).

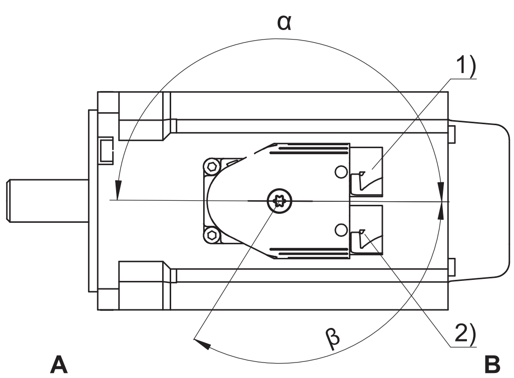
17.6.8.3 Plug connectors

STOBER synchronous servo motors are equipped with rotatable quick-lock plug connectors in the standard version. Details can be found in this chapter.

For motors with forced ventilation, avoid collisions between the motor connection cables and the plug connector of the forced ventilation unit. In the event of a collision, turn the motor plug connectors accordingly. Details regarding the position of the plug connector for the forced ventilation unit can be found in the "Dimensional drawings" chapter.

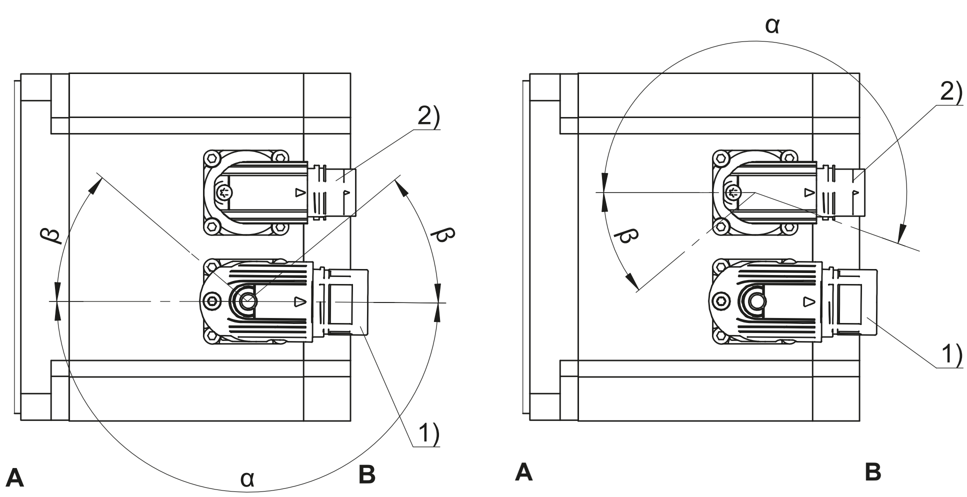
The figures represent the position of the plug connectors upon delivery.

Turning ranges of plug connectors (EZ2 – EZ3 motors)



1	Power plug connector	2	Encoder plug connector
A	Attachment or output side of the motor	B	Not output side

Turning ranges of plug connectors (EZ4 – EZ8 motors)



1	Power plug connector	2	Encoder plug connector
A	Attachment or output side of the motor	B	Not output side

Power plug connector features

Motor type	Size	Connection	Turning range	
			α	β
EZ2, EZ3	con.15	Quick lock	180°	140°
EZ4, EZ5, EZ701, EZ702, EZ703	con.23	Quick lock	180°	40°
EZ705, EZ802, EZ803, EZ805	con.40	Quick lock	180°	40°

Encoder plug connector features

Motor type	Size	Connection	Turning range	
			α	β
EZ2, EZ3	con.15	Quick lock	180°	140°
EZ4, EZ5, EZ7, EZ802, EZ803, EZ805	con.17	Quick lock	195°	35°

Notes

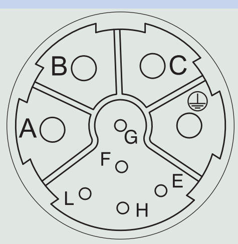
- The number after "con." indicates the approximate external thread diameter of the plug connector in mm (for example, con.23 designates a plug connector with an external thread diameter of about 23 mm).
- In turning range β, the power or encoder plug connectors can be turned only if doing so does not cause them to collide.
- For the EZ3 motor, the power and encoder plug connectors are mechanically connected and can only be turned together.

17.6.8.4 Terminal assignment for plug connectors (One Cable Solution)

In the One Cable Solution design, the power and encoder lines are connected using a shared plug connector.

The temperature sensor of the motor is connected to the encoder internally. The measured values from the temperature sensor are transmitted via the EnDat 3 protocol of the encoder.

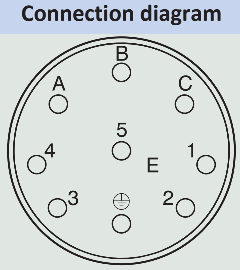
Plug connector size con.23

Connection diagram	Pin	Connection	Color
	A	U phase	BK
	B	V phase	BU
	C	W phase	RD
	E	P_SD –	YE
	F		
	G	Brake +	
	H	P_SD +	VT
	L	Brake –	
	⏚	Grounding conductor	GNYE

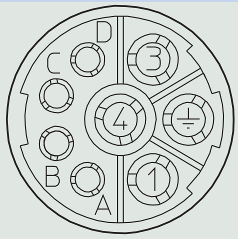
17.6.8.5 Connection assignment of the power plug connector

The size and connection plan of the power plug connector depend on the size of the motor. The colors of the connecting wires inside the motor are specified in accordance with IEC 60757.

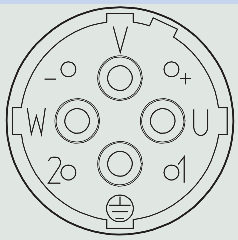
Plug connector size con.15

Connection diagram	Pin	Connection	Color
	A	U phase	BK
	B	V phase	BU
	C	W phase	RD
	1	Temperature sensor +	
	2	Temperature sensor –	
	3	Brake +	RD
	4	Brake –	BK
	⏚	Grounding conductor	GNYE

Plug connector size con.23

Connection diagram	Pin	Connection	Color
	1	U phase	BK
	3	V phase	BU
	4	W phase	RD
	A	Brake +	RD
	B	Brake –	BK
	C	Temperature sensor +	
	D	Temperature sensor –	
	⏚	Grounding conductor	GNYE

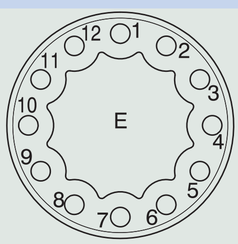
Plug connector size con.40 (1.5)

Connection diagram	Pin	Connection	Color
	U	U phase	BK
	V	V phase	BU
	W	W phase	RD
	+	Brake +	RD
	–	Brake –	BK
	1	Temperature sensor +	
	2	Temperature sensor –	
	⏚	Grounding conductor	GNYE

17.6.8.6 Connection assignment of the encoder plug connector

The size and connection assignment of the encoder plug connectors depend on the model of encoder installed and the size of the motor.

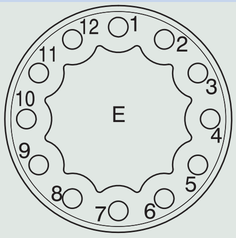
EnDat 2.1/2.2 digital encoders, plug connector size con.15

Connection diagram	Pin	Connection	Color
	1	Clock +	VT
	2	Up sense	BNGN
	3		
	4		
	5	Data –	PK
	6	Data +	GY
	7		
	8	Clock –	YE
	9		
	10	0 V GND	WHGN
	11		
	12	Up +	BNGN

EnDat 2.1/2.2 digital encoders, plug connector size con.17

Connection diagram	Pin	Connection	Color
	1	Clock +	VT
	2	Up sense	BNGN
	3		
	4		
	5	Data –	PK
	6	Data +	GY
	7		
	8	Clock –	YE
	9		
	10	0 V GND	WHGN
	11		
	12	Up +	BNGN

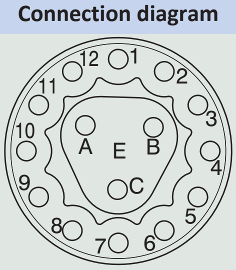
EnDat 2.2 digital encoder with battery buffering, plug connector size con.15

Connection diagram	Pin	Connection	Color
	1	Clock +	VT
	2	UBatt +	BU
	3	UBatt –	WH
	4		
	5	Data –	PK
	6	Data +	GY
	7		
	8	Clock –	YE
	9		
	10	0 V GND	WHGN
	11		
	12	Up +	BNGN
	UBatt+ = DC 3.6 V for encoder model EBI in combination with the AES option of STOBER drive controllers		

EnDat 2.2 digital encoder with battery buffering, plug connector size con.17

Connection diagram	Pin	Connection	Color
	1	Clock +	VT
	2	UBatt +	BU
	3	UBatt –	WH
	4		
	5	Data –	PK
	6	Data +	GY
	7		
	8	Clock –	YE
	9		
	10	0 V GND	WHGN
	11		
	12	Up +	BNGN
	UBatt+ = DC 3.6 V for encoder model EBI in combination with the AES option of STOBER drive controllers		

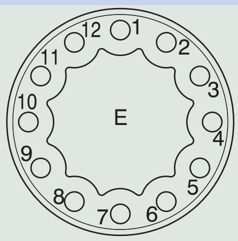
EnDat 2.1 encoder with sin/cos incremental signals, plug connector size con.15

Connection diagram	Pin	Connection	Color
	1	Up sense	BU
	2	0 V sense	WH
	3	Up +	BNGN
	4	Clock +	VT
	5	Clock –	YE
	6	0 V GND	WHGN
	7	B + (Sin +)	BUBK
	8	B – (Sin –)	RDBK
	9	Data +	GY
	10	A + (Cos +)	GNBK
	11	A – (Cos –)	YEBK
	12	Data –	PK
	A		
	B		
	C		

EnDat 2.1 encoder with sin/cos incremental signals, plug connector size con.17

Connection diagram	Pin	Connection	Color
	1	Up sense	BU
	2		
	3		
	4	0 V sense	WH
	5		
	6		
	7	Up +	BNGN
	8	Clock +	VT
	9	Clock –	YE
	10	0 V GND	WHGN
	11		
	12	B + (Sin +)	BUBK
	13	B – (Sin –)	RDBK
	14	Data +	GY
	15	A + (Cos +)	GNBK
	16	A – (Cos –)	YEBK
	17	Data –	PK

Resolver, plug connector size con.15

Connection diagram	Pin	Connection	Color
	1	S3 Cos +	BK
	2	S1 Cos –	RD
	3	S4 Sin +	BU
	4	S2 Sin –	YE
	5		
	6		
	7	R2 Ref +	YEWH/BKWH[2]
	8	R1 Ref –	RDWH
	9		
	10		
	11		
	12		

Resolver, plug connector size con.17

Connection diagram	Pin	Connection	Color
	1	S3 Cos +	BK
	2	S1 Cos –	RD
	3	S4 Sin +	BU
	4	S2 Sin –	YE
	5		
	6		
	7	R2 Ref +	YEWH/BKWH[3]
	8	R1 Ref –	RDWH
	9		
	10		
	11		
	12		

17.7 Project configuration

Project your drives using our SERVOsoft designing software. Download SERVOsoft for free at https://www.stoeber.de/en/ServoSoft.

[2] (depending on the brand of the resolver)

[3] (depending on the brand of the resolver)

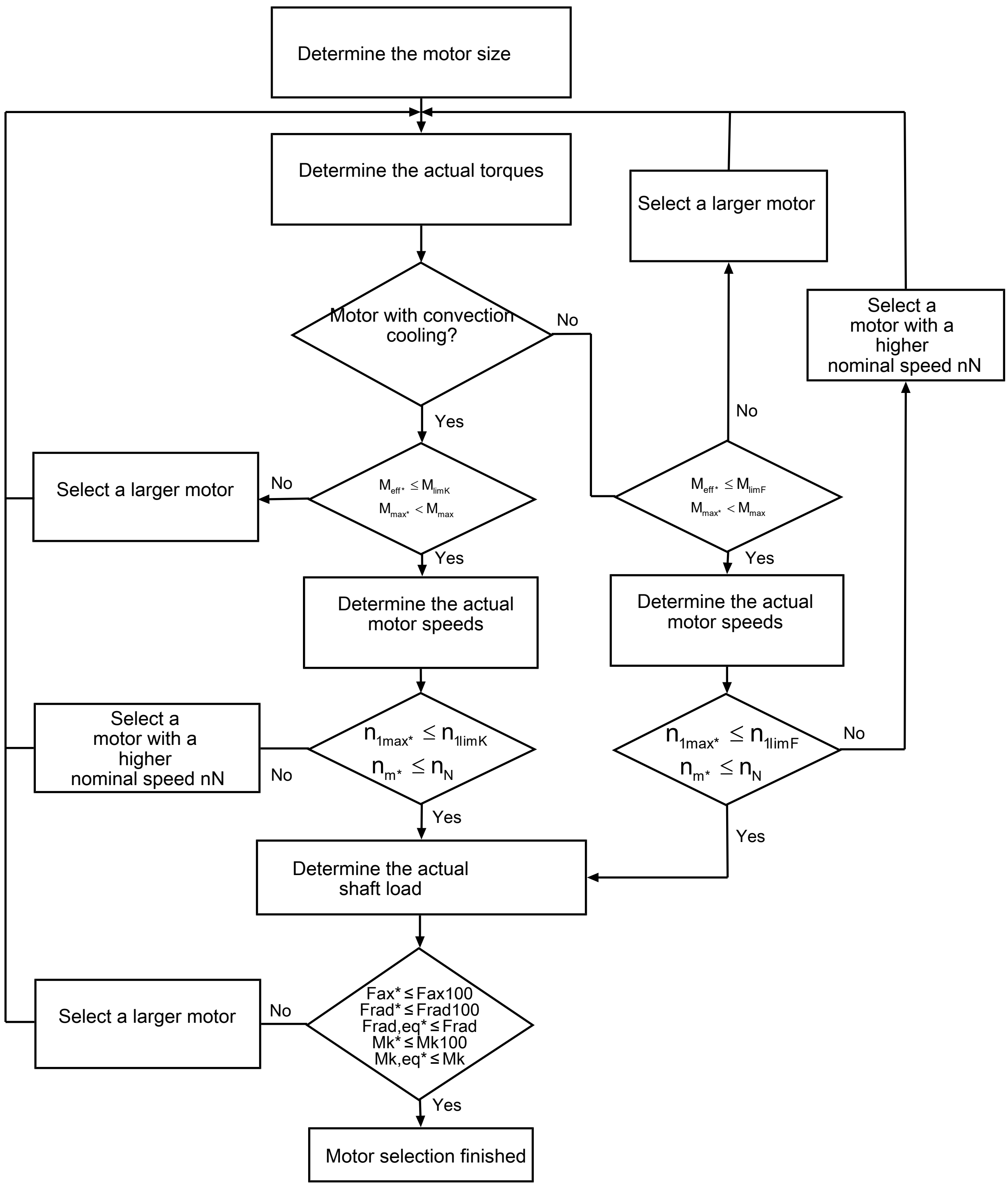
It is the most convenient and reliable method of drive selection, as the entire torque/speed curve of the application is displayed and evaluated here in the curve of the geared motor.

In this chapter, only limit values for specific operating points can be taken into consideration for manual drive selection.

An explanation of the formula symbols can be found in Chapter [▸ 20.1].

The formula symbols for values actually present in the application are marked with *.

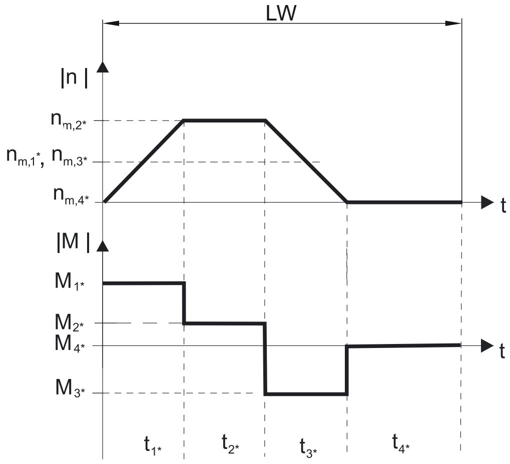
17.7.1 Drive selection



The value for M_{lim}, M_{limK}, M_{limF}, M_{max}, n_{1limK} and n_{1limF} can be found in the motor characteristic curve in the chapter [▸ 17.3]. Note the size, nominal speed n_N and cooling type of the motor.

Example of cyclic operation

The following calculations refer to a representation of the power delivered at the motor shaft in accordance with the following example:



Calculation of the actual average input speed

$$n_{m^*} = \frac{|n_{m,1^*}| \cdot t_{1^*} + \ldots + |n_{m,n^*}| \cdot t_{n^*}}{t_{1^*} + \ldots + t_{n^*}}$$

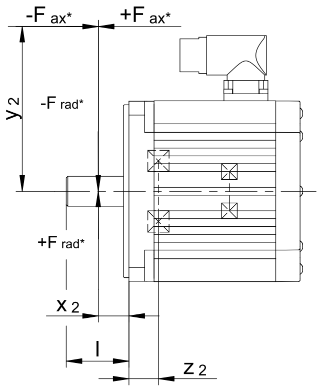
If t_{1*} + ... + $t_{3*} \geq 6$ min, determine n_{m*} without the rest phase t_{4*}.

Calculation of the actual effective torque

$$M_{eff^*} = \sqrt{\frac{t_{1^*} \cdot M_{1^*}{}^2 + \ldots + t_{n^*} \cdot M_{n^*}{}^2}{t_{1^*} + \ldots + t_{n^*}}}$$

17.7.2 Permitted shaft loads

This chapter contains information about the maximum permitted shaft loads of the output shaft of the motor.



Type	z_2 [mm]	F_{ax100} [N]	F_{rad100} [N]	M_{k100} [Nm]
EZ202	12.0	250	750	20
EZ203	12.0	250	750	20
EZ301	24.0	350	1000	39
EZ302	24.0	350	1000	39
EZ303	24.0	350	1000	39
EZ401	19.5	550	1800	62
EZ402	19.5	550	1800	71
EZ404	19.5	550	1800	71
EZ501	19.5	750	2000	79
EZ502	19.5	750	2400	95
EZ503	19.5	750	2400	107
EZ505	19.5	750	2400	107
EZ701	24.5	1300	3500	173
EZ702	24.5	1300	4200	208
EZ703	24.5	1300	4200	208
EZ705	24.5	1300	4200	225
EZ802	28.5	1750	5600	384
EZ803	28.5	1750	5600	384
EZ805	28.5	1750	5600	384

The values for permitted shaft loads specified in the table apply:

- For shaft dimensions in accordance with the catalog
- A force applied at the center of the output shaft: $x_2 = l / 2$ (shaft dimensions can be found in the chapter [▷ 17.4])
- Output speeds $n_{m*} \leq 100$ rpm ($F_{ax} = F_{ax100}$; $F_{rad} = F_{rad100}$; $M_k = M_{k100}$)

The following applies to output speeds $n_{m*} > 100$ rpm:

$$F_{ax} = \frac{F_{ax100}}{\sqrt[3]{\frac{n_{m*}}{100\ \text{rpm}}}} \qquad F_{rad} = \frac{F_{rad100}}{\sqrt[3]{\frac{n_{m*}}{100\ \text{rpm}}}} \qquad M_k = \frac{M_{k100}}{\sqrt[3]{\frac{n_{m*}}{100\ \text{rpm}}}}$$

The following applies to other force application points:

$$M_{k*} = \frac{2 \cdot F_{ax*} \cdot y_2 + F_{rad*} \cdot (x_2 + z_2)}{1000}$$

For applications with multiple axial and/or radial forces, you must add the forces as vectors.

Also note the calculation for equivalent values:

$$M_{k,eq^*} = \sqrt[3]{\frac{|n_{m,1^*}| \cdot t_{1^*} \cdot |M_{k,1^*}{}^3| + \ldots + |n_{m,n^*}| \cdot t_{n^*} \cdot |M_{k,n^*}{}^3|}{|n_{m,1^*}| \cdot t_{1^*} + \ldots + |n_{m,n^*}| \cdot t_{n^*}}}$$

$$F_{rad,eq^*} = \sqrt[3]{\frac{|n_{m,1^*}| \cdot t_{1^*} \cdot |F_{rad,1^*}{}^3| + \ldots + |n_{m,n^*}| \cdot t_{n^*} \cdot |F_{rad,n^*}{}^3|}{|n_{m,1^*}| \cdot t_{1^*} + \ldots + |n_{m,n^*}| \cdot t_{n^*}}}$$

17.7.3 Derating

If you use the motor under ambient conditions that differ from the standard ambient conditions, the nominal torque M_N of the motor is reduced. In this chapter, you can find information for calculating the reduced nominal torque.

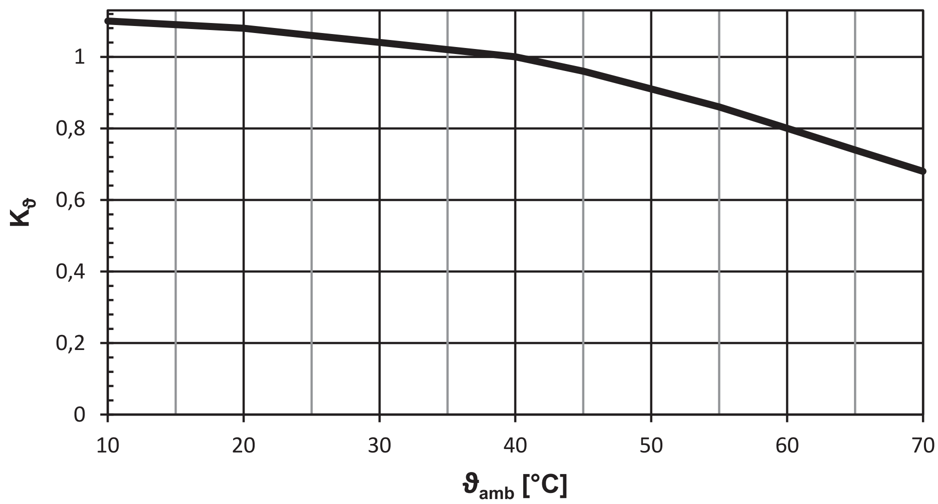


Fig. 5: Derating depending on the surrounding temperature

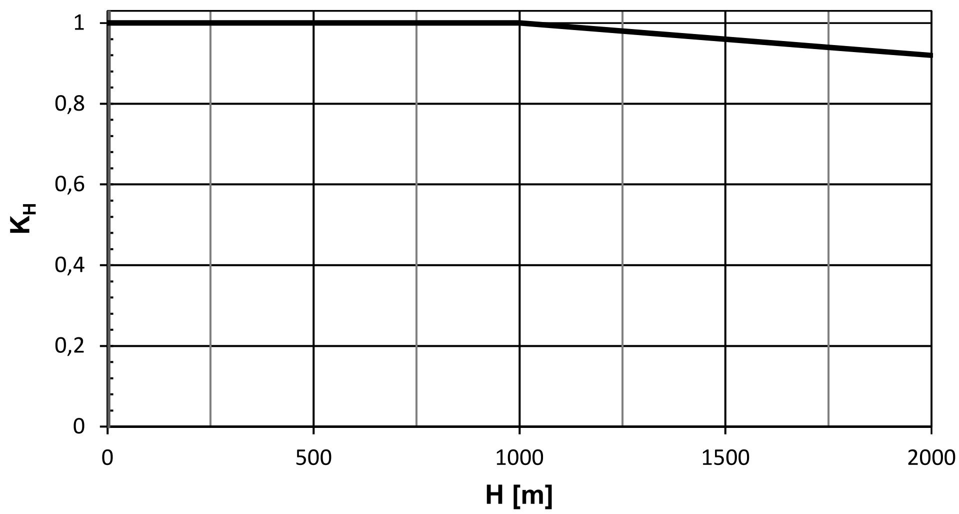


Fig. 6: Derating depending on the installation height

Calculation

If surrounding temperature ϑ_{amb} > 40 °C:

$M_{Nred} = M_N \cdot K_\vartheta$

If installation altitude H > 1000 m above sea level:

$M_{Nred} = M_N \cdot K_H$

If the surrounding temperature ϑ_{amb} > 40 °C and installation altitude H > 1000 m above sea level:

$M_{Nred} = M_N \cdot K_H \cdot K_\vartheta$

17.8 Further information

17.8.1 Directives and standards

STOBER synchronous servo motors meet the requirements of the following directives and standards:

- (Low Voltage) Directive 2014/35/EU
- EN 60034-1:2010 + Cor.:2010
- EN 60034-5:2001 + A1:2007
- EN 60034-6:1993

17.8.2 Identifiers and test symbols

STOBER synchronous servo motors have the following identifiers and test symbols:

CE mark: The product meets the requirements of EU directives.

UKCA mark: The product meets the requirements of UK directives.

cURus test symbol "Servo and Stepper Motors – Component"; registered under UL number E488992 with Underwriters Laboratories USA (optional).

17.8.3 Additional documentation

Additional documentation related to the product can be found at http://www.stoeber.de/en/downloads/

Enter the ID of the documentation in the Search term field.

Documentation	ID
Operating manual for EZ synchronous servo motors	443032_en