18.4 Dimensional drawings

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

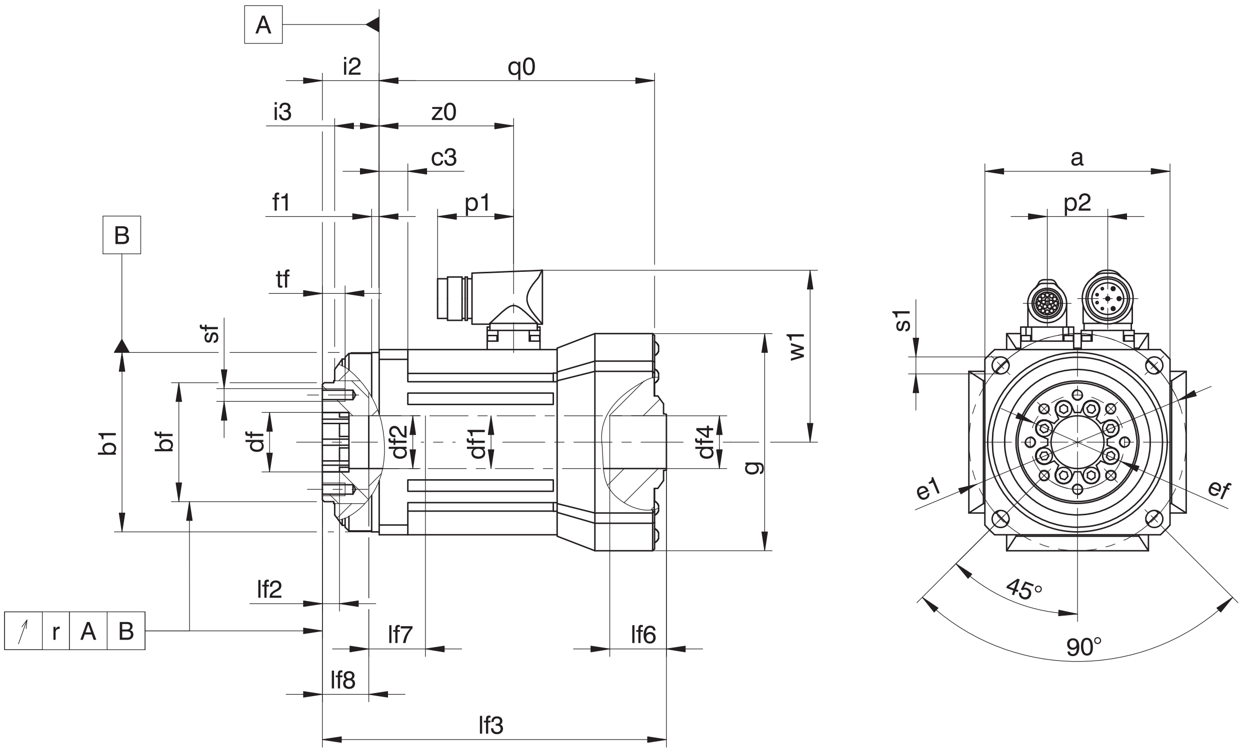
Dimensions can exceed the specifications of ISO 2768-mK due to casting tolerances or accumulation of individual tolerances.

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/.

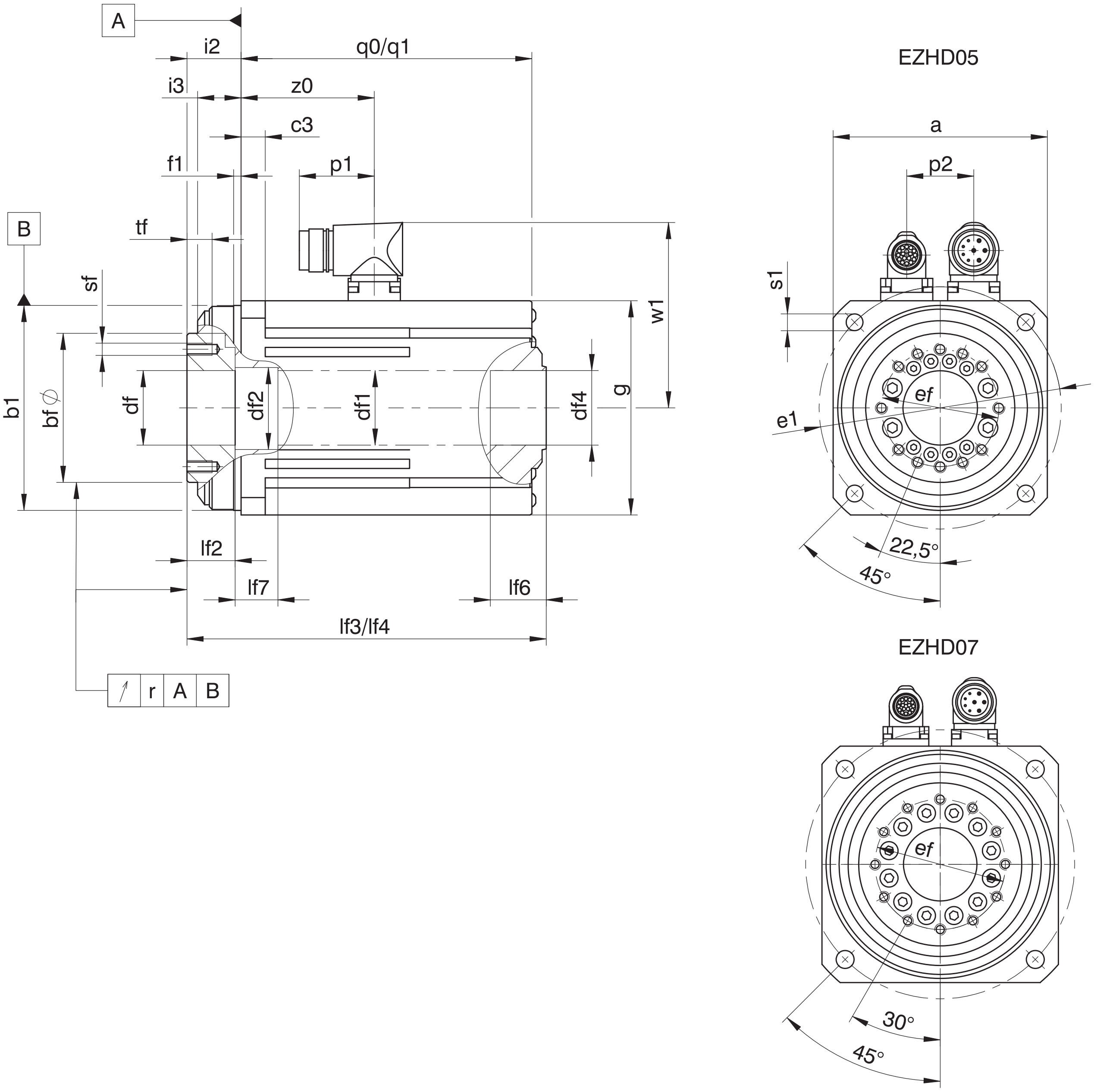
In this chapter, the dimensions p1 and w1 for standard motor designs are presented. In designs for connection to drive controllers of third-party manufacturers, dimensions p1 and w1 may differ. You can find more details at https://configurator.stoeber.de/en-US/.

18.4.1 EZHD04 motors



Type	□a	∅b1	∅bf	c3	∅df	∅df1	∅df2	∅df4	∅e1	∅ef	f1	□g	i2	i3	lf2	lf3	lf6	lf7	lf8	p1	p2	q0	r	∅s1	sf	tf	w1	z0
EZHD0411	98	95_{j6}	63_{h7}	15.1	31.5^{H7}	28.4	$28^{+0,1}$	28^{JS10}	115	50	4	115	30±0.4	23.5	9	182	30	30	24.5	40	32	145.8	0.030	9	M6	11	91	71
EZHD0412	98	95_{j6}	63_{h7}	15.1	31.5^{H7}	28.4	$28^{+0,1}$	28^{JS10}	115	50	4	115	30±0.4	23.5	9	207	30	30	24.5	40	32	170.8	0.030	9	M6	11	91	96
EZHD0414	98	95_{j6}	63_{h7}	15.1	31.5^{H7}	28.4	$28^{+0,1}$	28^{JS10}	115	50	4	115	30±0.4	23.5	9	257	30	30	24.5	40	32	220.8	0.030	9	M6	11	91	143

18.4.2 EZHD05 – EZHD07 motors



q0, lf3 Applies to motors without holding brake.

q1. lf4 Applies to motors with holding brake.

Type	□a	Øb1	Øbf	c3	Ødf	Ødf1	Ødf2	Ødf4	Øe1	Øef	f1	□g	i2	i3
EZHD0511	115	110_{j6}	80_{h7}	13.0	40.0^{H7}	40.5	$44^{+0,1}$	40^{JS10}	130	63	4	115	29±0.4	23.3
EZHD0512	115	110_{j6}	80_{h7}	13.0	40.0^{H7}	40.5	$44^{+0,1}$	40^{JS10}	130	63	4	115	29±0.4	23.3
EZHD0513	115	110_{j6}	80_{h7}	13.0	40.0^{H7}	40.5	$44^{+0,1}$	40^{JS10}	130	63	4	115	29±0.4	23.3
EZHD0515	115	110_{j6}	80_{h7}	13.0	40.0^{H7}	40.5	$44^{+0,1}$	40^{JS10}	130	63	4	115	29±0.4	23.3
EZHD0711	145	140_{j6}	100_{h7}	14.5	50.0^{H7}	45.5	$50^{+0,1}$	45^{JS10}	165	80	4	145	38±0.4	24.5
EZHD0712	145	140_{j6}	100_{h7}	14.5	50.0^{H7}	45.5	$50^{+0,1}$	45^{JS10}	165	80	4	145	38±0.4	24.5
EZHD0713	145	140_{j6}	100_{h7}	14.5	50.0^{H7}	45.5	$50^{+0,1}$	45^{JS10}	165	80	4	145	38±0.4	24.5
EZHD0715	145	140_{j6}	100_{h7}	14.5	50.0^{H7}	45.5	$50^{+0,1}$	45^{JS10}	165	80	4	145	38±0.4	24.5

Type	lf2	lf3	lf4	lf6	lf7	p1	p2	q0	q1	r	Øs1	sf	tf	w1	z0
EZHD0511	25.8	192.8	248.3	30	23.0	40	36	156.1	211.4	0.030	9	M6	11	100	71.5
EZHD0512	25.8	217.8	273.3	30	23.0	40	36	181.1	236.4	0.030	9	M6	11	100	96.3
EZHD0513	25.8	242.8	298.3	30	23.0	40	36	206.1	261.4	0.030	9	M6	11	100	121.5
EZHD0515	25.8	292.8	348.3	30	23.0	40	36	256.1	311.4	0.030	9	M6	11	100	171.5
EZHD0711	33.5	219.0	278.7	30	40.5	40	42	172.2	232.2	0.030	11	M8	15	115	78.7
EZHD0712	33.5	244.0	303.7	30	40.5	40	42	197.2	257.2	0.030	11	M8	15	115	103.7
EZHD0713	33.5	269.0	328.7	30	40.5	40	42	222.2	282.2	0.030	11	M8	15	115	128.7
EZHD0715	33.5	324.0	383.7	30	40.5	71	42	277.2	337.2	0.030	11	M8	15	134	179.7

18.5 Type designation

Example code

EZH	D	0	5	1	1	U	F	AD	B1	O	097

Explanation

Code	Designation	Design
EZH	Type	Synchronous servo motor with hollow shaft
D	Drive	Direct drive
0	Stages	Zero-stage (direct drive)
5	Motor size	5 (example)
1	Generation	1
1	Length	1 (example)
U	Cooling	Convection cooling
F	Output	Flange
AD	Drive controller	SD6 (example)
B1	Encoder	EnDat 2.2 EBI 135 EnDat 2.2 (example)
O	Brake	Without holding brake
P		Permanent magnet holding brake[1]
097	Voltage constant K_{EM}	97 V/1000 rpm (example)

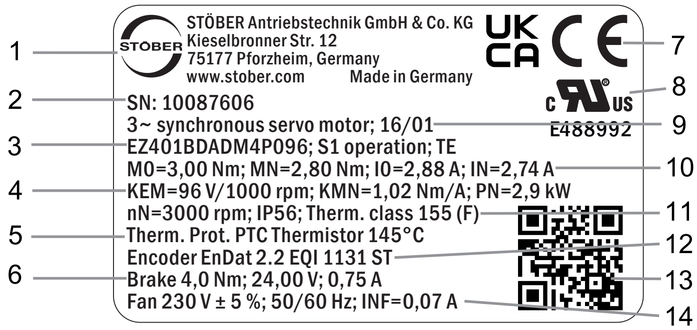
Notes

- In Chapter [▷ 18.6.4], you can find information about available encoders.
- In Chapter [▷ 18.6.4.3], you can find information about connecting synchronous servo motors to other drive controllers from STOBER.
- In Chapter [▷ 21], you can find information about options for connecting STOBER synchronous servo motors to drive controllers from other manufacturers.

[1] Not available for EZHD_4.

18.5.1 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 (optional)
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

18.6 Product description

18.6.1 General features

Feature	Description
Design	IM B5, IM V1, IM V3 in accordance with EN 60034-7
Protection class	IP56
Thermal class	155 (F) in accordance with EN 60034-1 (155 °C, heating $\Delta\vartheta$ = 100 K)
Surface	Matte black as per RAL 9005
Cooling	IC 410 convection cooling
Bearing	Rolling bearing with lifetime lubrication and non-contact sealing
Sealing	Gamma ring (on A and B side)
Vibration intensity	A in accordance with EN 60034-14
Noise level	Limit values in accordance with EN 60034-9

18.6.2 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	7

18.6.3 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 [▶ 18.7.3].

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.

18.6.4 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.

18.6.4.1 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
Short cycle times	★★☆	★★★
Transfer of additional information along with the position value	–	✓
Expanded power supply range	★★☆	★★★
Key: ★★☆ = good, ★★★ = very good		

18.6.4.2 EnDat 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 EBI 135	B1	Inductive	65536	19 bit	524288	> 57	$\leq 2 \times 10^{-6}$
EnDat 2.2 ECI 119-G2	C9	Inductive	–	19 bit	524288	> 57	$\leq 2 \times 10^{-6}$

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 ECI 119	C4	Inductive	–	19 bit	524288	Sin/cos 32	> 57	$\leq 2 \times 10^{-6}$

Notes

- The encoder code is a part of the type designation of the motor.
- Multiple revolutions of the motor shaft can be recorded only using multi-turn encoders.
- The EnDat 2.2 EBI 135 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).
- 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

18.6.4.3 Possible combinations with drive controllers

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

Drive controller		SDS 5000	MDS 5000	SDS 5000/ MDS 5000	SD6		SI6	SC6
Drive controller code		AA	AB	AC	AD	AE	**AP**	**AU**
Connection plan ID		442305	442306	442307	442450	442451	**442771**	**443052**
Encoder	**Encoder code**							
EnDat 2.2 EBI 135	B1	✓	✓	–	✓	–	✓	✓
EnDat 2.2 ECI 119-G2	C9	✓	✓	–	✓	–	✓	✓
EnDat 2.1 ECI 119	C4	–	–	✓	–	✓	–	–

Notes

- The drive controller and encoder codes are a part of the type designation of the motor (see the "Type designation" chapter).
- In Chapter [▸ 21], you can find information about options for connecting STOBER synchronous servo motors to drive controllers from other manufacturers.

18.6.5 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.

18.6.5.1 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)

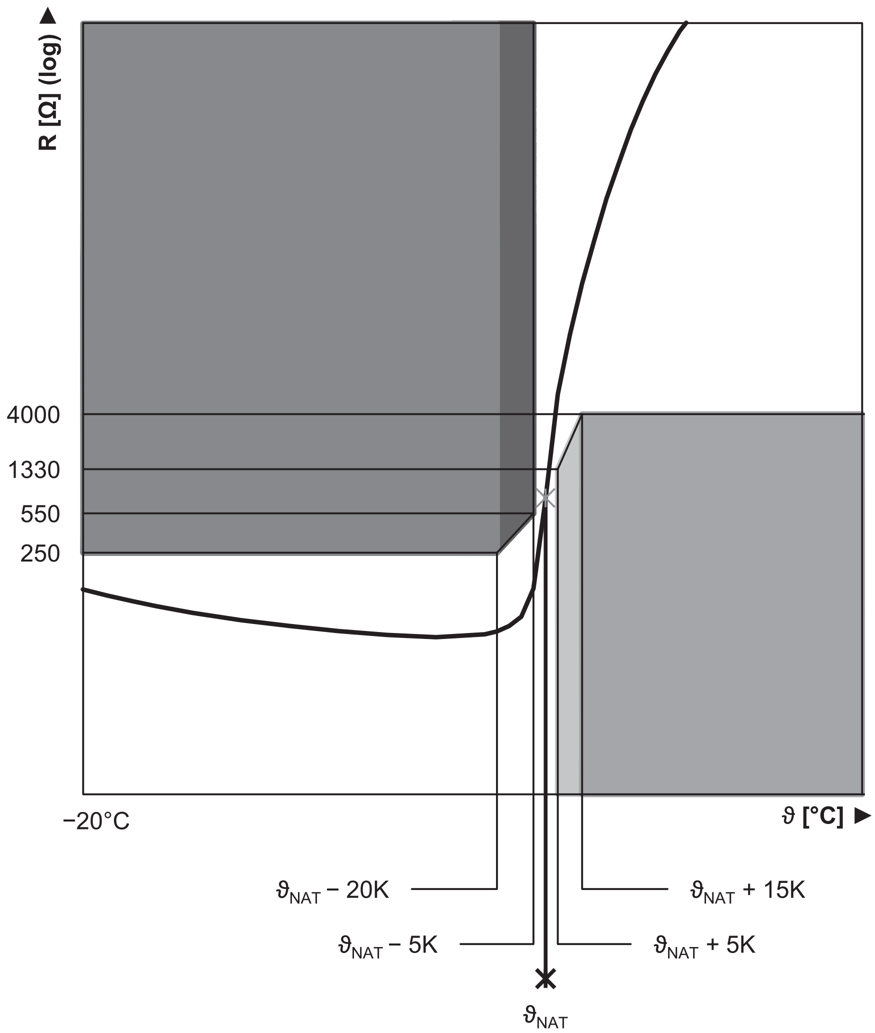


Fig. 2: PTC thermistor curve (single thermistor)

18.6.5.2 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.

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

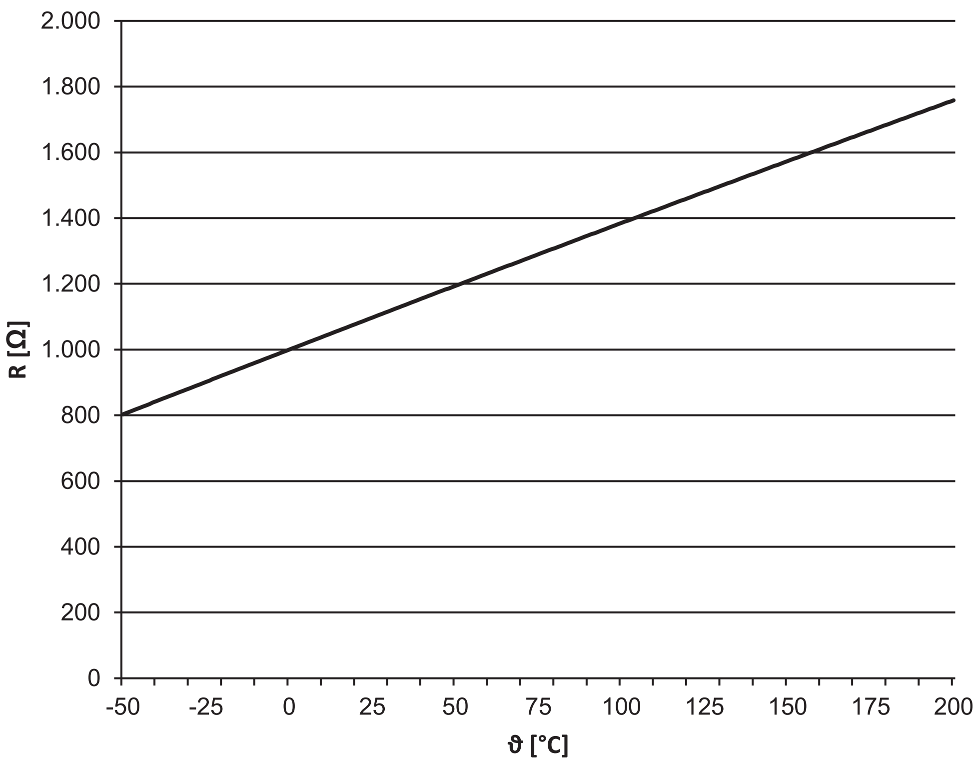


Fig. 3: Pt1000 temperature sensor characteristic curve

18.6.6 Cooling

An EZHD motor is cooled by convection cooling (IC 410 in accordance with EN 60034-6).

18.6.7 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

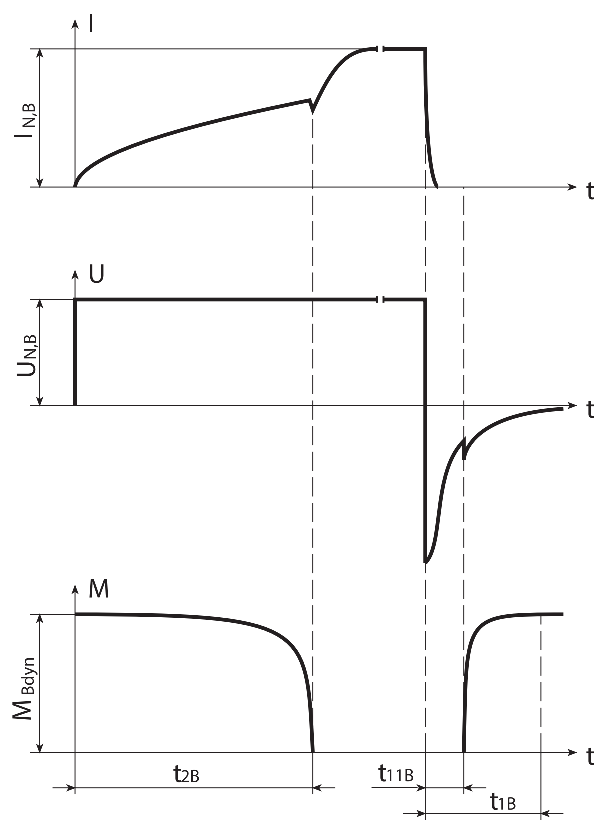


Fig. 4: Holding brake – Switching behavior

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]
EZHD0511	18	15	1.1	11.0	2050	54.3	550	55	3.0	30	0.3	4.840	2.30
EZHD0512	18	15	1.1	11.0	1850	59.8	550	55	3.0	30	0.3	4.840	2.30
EZHD0513	18	15	1.1	11.0	1700	65.5	550	55	3.0	30	0.3	4.840	2.30
EZHD0515	18	15	1.1	11.0	1450	76.9	550	55	3.0	30	0.3	4.840	2.30
EZHD0711	28	25	1.1	25.0	1850	152	1400	120	4.0	40	0.4	12.280	3.77
EZHD0712	28	25	1.1	25.0	1650	170	1400	120	4.0	40	0.4	12.280	3.77
EZHD0713	28	25	1.1	25.0	1500	187	1400	120	4.0	40	0.4	12.280	3.77
EZHD0715	28	25	1.1	25.0	1250	224	1400	120	4.0	40	0.4	12.280	3.77

18.6.8 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 [▸ 21], you can find information about options for connecting STOBER synchronous servo motors to drive controllers from other manufacturers.

18.6.8.1 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.

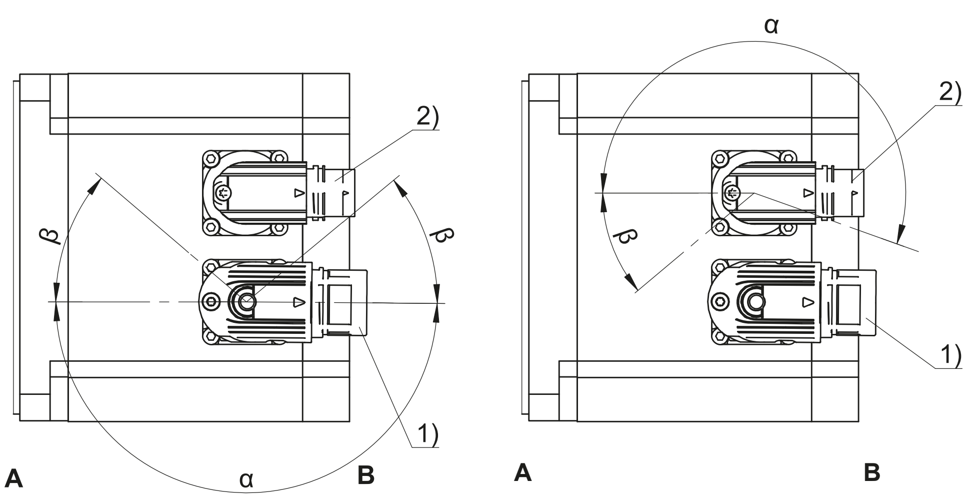
All attachment parts required for the connection of the grounding conductor to the motor housing are delivered with the motor. The grounding screw of the motor is identified with the symbol ⏚ in accordance with IEC 60417-DB. The cross-section of the grounding conductor has to be at least as large as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

18.6.8.2 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.

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

Turning ranges of plug connectors



1	Power plug connector	2	Encoder plug connector
A	Attachment or output side of the motor	B	Rear side of the motor

Power plug connector features

Motor type	Size	Connection	Turning range	
			α	β
EZHD_4, EZHD_5, EZHD_711 – EZHD_713	con.23	Quick lock	180°	40°
EZHD_715	con.40	Quick lock	180°	40°

Encoder plug connector features

Motor type	Size	Connection	Turning range	
			α	β
EZHD	con.17	Quick lock	195°	35°

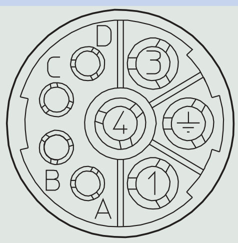
Notes

- 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.

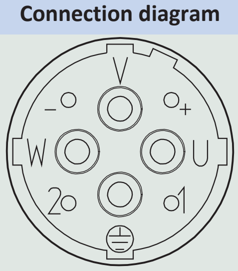
18.6.8.3 Connection assignment of the power plug connector

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.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

18.6.8.4 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. The colors of the connecting wires inside the motor are specified in accordance with IEC 60757.

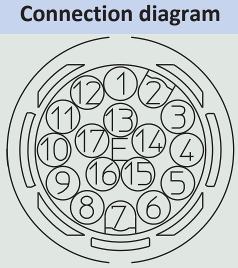
EnDat 2.1/2.2 digital encoders, plug connector size con.17

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.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.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

18.7 Project configuration

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

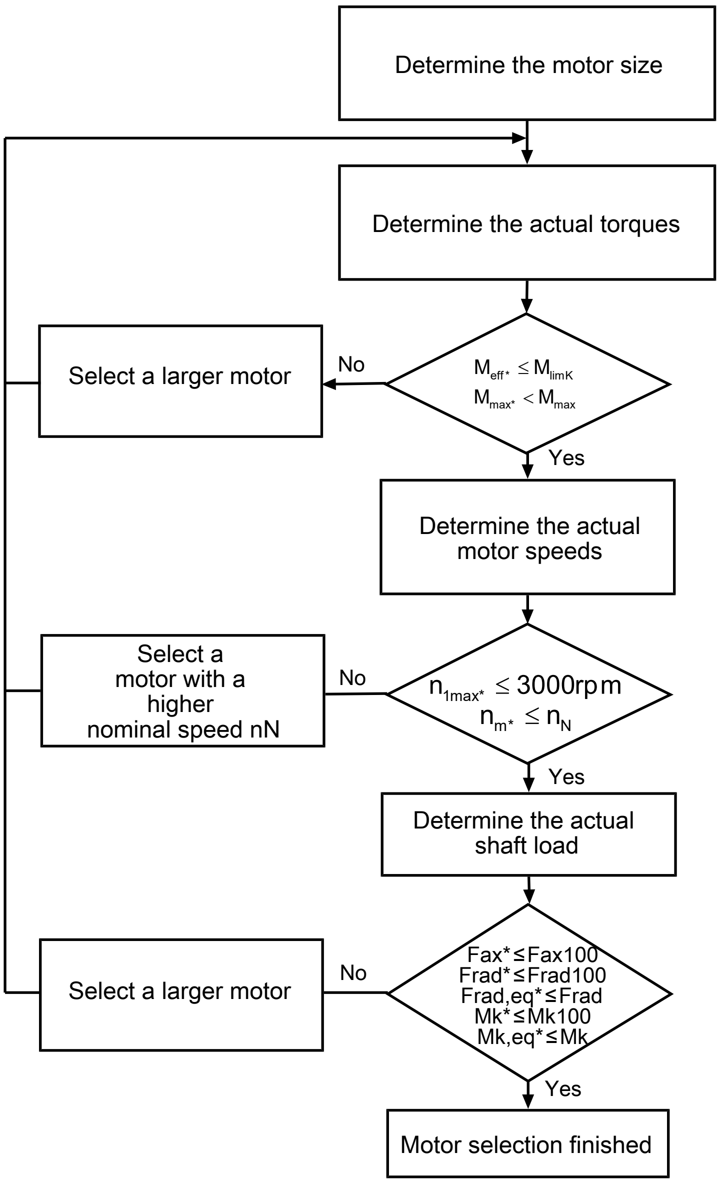
It is the most convenient and reliable method of drive selection, as the entire torque/speed curve of the application is displayed and evaluated here in the curve of the geared motor.

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 [▹ 23.1].

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

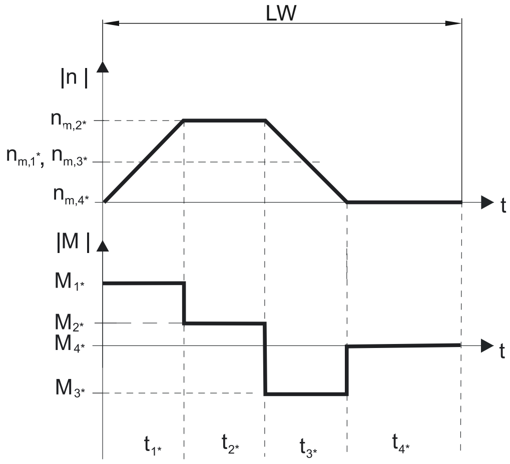
18.7.1 Drive selection



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

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

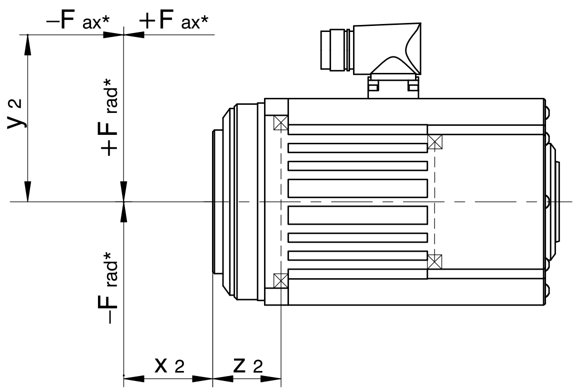
If $t_{1^*} + \ldots + t_{3^*} \geq 6$ min, determine n_{m^*} without the rest phase t_{4^*}.

Calculation of the actual effective torque

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

18.7.2 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_{ax300} [N]	F_{rad300} [N]	M_{k300} [Nm]	C_{2k} [Nm/ arcmin]
EZHD0411	29.5	1600	3400	102	60
EZHD0412	29.5	1600	3700	109	66
EZHD0414	29.5	1600	4000	118	44
EZHD0511	30.0	4500	3400	102	111
EZHD0512	30.0	4500	3600	108	126
EZHD0513	30.0	4500	3750	113	130
EZHD0515	30.0	4500	4000	120	122
EZHD0711	41.5	7000	5000	208	212
EZHD0712	41.5	7000	5300	220	256
EZHD0713	41.5	7000	5500	229	287
EZHD0715	41.5	7000	5800	241	315

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

- For shaft dimensions in accordance with the catalog
- Output speed $n_{m*} \leq 300$ rpm ($F^{ax} = F_{ax300}$; $F_{rad} = F_{rad300}$; $M_k = M_{k300}$)
- Only if pilots are used (housing, flange hollow shaft)

The following applies to output speeds $n_{m*} > 300$ rpm:

$$F_{ax} = \frac{F_{ax300}}{\sqrt[3]{\frac{n_{m*}}{300\text{ rpm}}}} \qquad F_{rad} = \frac{F_{rad300}}{\sqrt[3]{\frac{n_{m*}}{300\text{ rpm}}}} \qquad M_k = \frac{M_{k300}}{\sqrt[3]{\frac{n_{m*}}{300\text{ rpm}}}}$$

The following applies to other force application points:

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

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

Also note the calculation for equivalent values:

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

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

18.7.3 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.

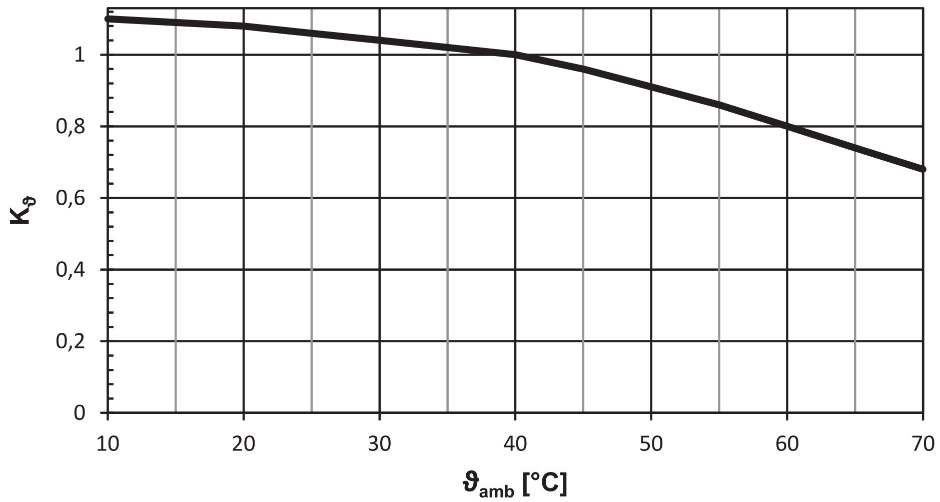


Fig. 5: Derating depending on the surrounding temperature

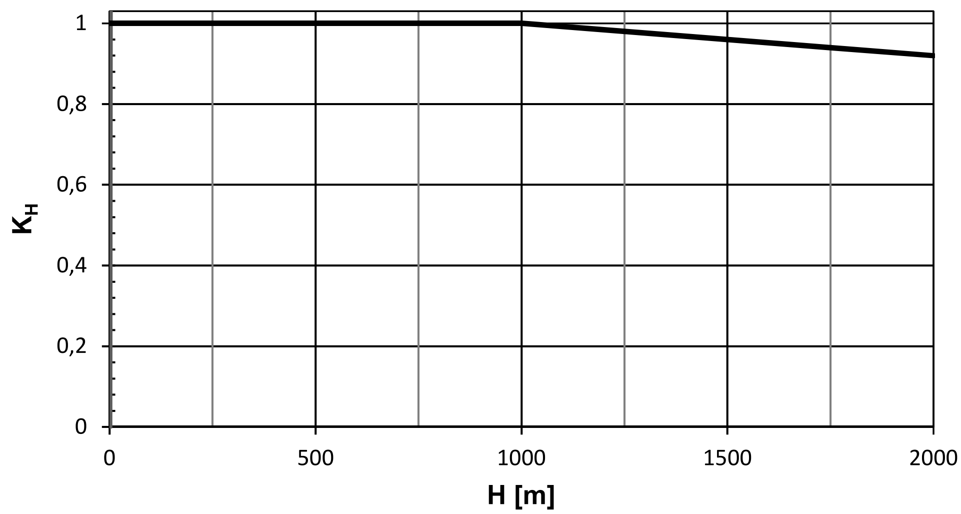


Fig. 6: Derating depending on the installation height

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:

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

18.8 Further information

18.8.1 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

18.8.2 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).

18.8.3 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 field.

Documentation	ID
Operating manual for EZ synchronous servo motors	443032_en