



# HEIDENHAIN



## HEIDENHAIN Motors

for Axis and Spindle Drives

**Information for the  
Machine Tool Builder**

March 2008



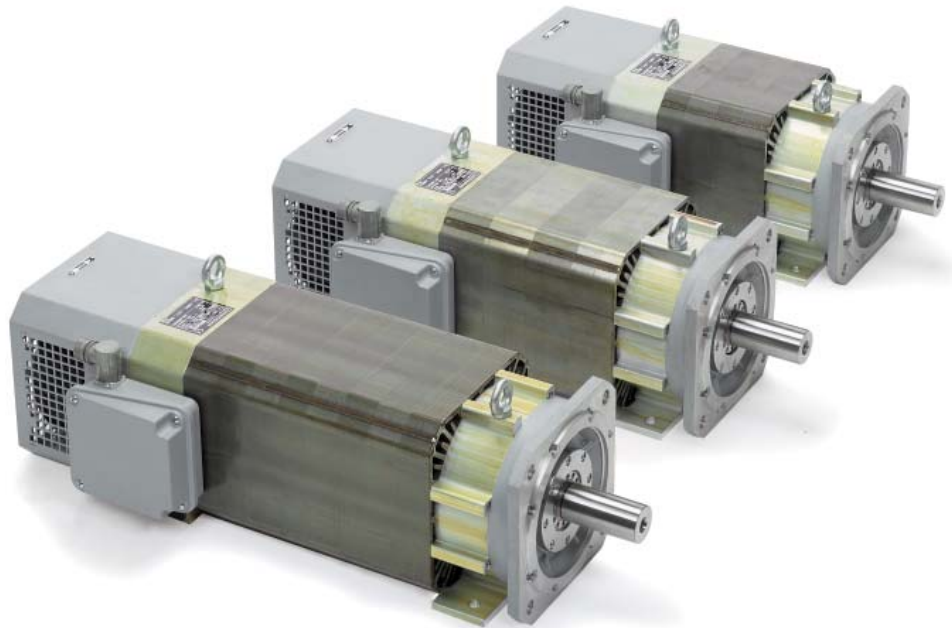
Synchronous motors for feed drives

**Motors for axis and spindle drives**

HEIDENHAIN supplies motors for axis and spindle drives as accessories to the iTNC 530, MANUALplus 4110 and CNC PILOT 4290 controls with integrated inverter.

This brochure provides an overview of all the available motors and contains technical data and dimensions.

For commissioning, please request the *Inverter Systems and Motors* Technical Manual.



Asynchronous motors for spindles

*This catalog supersedes all previous editions, which thereby become invalid. The basis for ordering from HEIDENHAIN is always the catalog edition valid when the contract is made.*

*Standards (ISO, EN, etc.) apply only where explicitly stated in the catalog.*

**Parts subject to wear**

Motors from HEIDENHAIN include in particular the following consumable parts:

- Bearing
- Fans

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# Synchronous Motors

## QSY Overview

### General technical information

Synchronous motors from HEIDENHAIN fulfill all requirements of a numerically controlled machine tool. Some special characteristics include

- an excellent running smoothness,
- an appropriate mass moment of inertia,
- a very good ratio of the rated torque to the stall torque,
- and a low torque ripple.

### Specifications

The specifications and the characteristic curves apply to motors mounted without thermal insulation. The temperature of the winding may differ from the maximum permissible ambient temperature of 40 °C by a maximum of 100 K. If the motor is mounted so that it is thermally insulated, it is necessary to reduce the motor torque in order to avoid thermal overloading of the motor.

For motors with ECN 1313 or EQN 1325 absolute rotary encoders, the rated torque is reduced by 10%.

### Speed measurement

Synchronous motors from HEIDENHAIN operate with sinusoidal commutation. An integrated rotary encoder from HEIDENHAIN measures the rotor position and shaft speed. The following versions are available (see *Specifications*):

- ERN 1387 incremental rotary encoder  
or
- ECN 1313 absolute singleturn rotary encoder (only one motor revolution can be evaluated)  
or
- EQN 1325 absolute multiturn rotary encoder

### Mechanical life

The service life of the bearings depends on the shaft load and the mean rotational speed (see the *Inverter Systems and Motors* Technical Manual).

### EcoDyn motors

Motors of the EcoDyn series are characterized by reduced current consumption together with higher rated torque and a max. permissible rated speed of 3000 min<sup>-1</sup>. The following controls are required to drive the motors in EcoDyn mode:

- iTNC 530 as of software version 340420-06
- MANUALplus 4110 as of software version 354809-11
- CNC PILOT 4290 as of software versions 340460-14 and 362796-10

For all other controls, the rated speed is 2000 min<sup>-1</sup>.

### Electronic ID label

The synchronous motors with ECN 1313 or EQN 1325 feature an electronic ID label to make commissioning and diagnosis easier. The information, such as motor designation, ID number or serial number, stored in this ID label can be read and displayed with the TNCdiag diagnostic software as well as with the internal diagnostic functions of the iTNC 530 (as of software 340422-07 and 340480-07).

The control automatically identifies the motor type and, if required, updates the machine parameters every time it is switched on.

### Mechanical data

**Dimensions** IM B5 (for securing by flange) as per EN 60034-7

**Flange:** Dimensions as per DIN 42948 and IEC 72

**Protection** as per EN 60529

*Motor:* IP 65

*Shaft exit:* IP 64

#### Shaft end

- Cylindrical as per DIN 748 and IEC 72
- Without feather key (with feather key upon request)
- With centering hole as per ISO 866 BS 5 and thread

**Bearing** free of maintenance

**Holding brake** as option

Low backlash ≤ 1°

### Thermal variables

#### Natural cooling

**Temperature monitoring** with KTY 84-130 thermistor in the stator winding

**Thermal class** F

Synchronous motors	Stall torque	Stall current	Rated speed	Recommended inverters <sup>2)</sup>				Page
				1-axis module	2-axis module	Compact inverter/axis		
						UR 2xxD UE 2xxB	UE 1xx	
<b>QSY 96A</b>	1.5 Nm	1.5 A	4500 min <sup>-1</sup>	UM 111 D	UM 121 D	1 to 4	1 to 4	<b>6</b>
<b>QSY 96G</b>	5.2 Nm	5.2 A	4500 min <sup>-1</sup>	UM 111 D	UM 121 D	1 to 4	1 to 4	
<b>QSY 116C</b>	5.2 Nm	3.3 A	3000 min <sup>-1</sup>	UM 111 D	UM 121 D	1 to 4	1 to 4	<b>8</b>
<b>QSY 116E</b>	7.2 Nm	4.8 A	3000 min <sup>-1</sup>	UM 111 D	UM 121 D	1 to 4	4	
<b>QSY 116J</b>	10.0 Nm	6.8 A	3000 min <sup>-1</sup>	UM 111 D	UM 121 D	1 to 4	4	
<b>QSY 116J EcoDyn</b>	10.0 Nm	5.0 A	3000 min <sup>-1</sup>	UM 111 D	UM 121 D	1 to 4	4	
<b>QSY 130C EcoDyn</b>	6.0 Nm	3.0 A	3000 min <sup>-1</sup>	UM 111 D	UM 121 D	1 to 4	1 to 4	<b>10</b>
<b>QSY 130E EcoDyn</b>	9.0 Nm	4.5 A	3000 min <sup>-1</sup>	UM 111 D	UM 121 D	1 to 4	1 to 4	
<b>QSY 155B</b>	13.0 Nm	9.1 A	3000 min <sup>-1</sup>	UM 111 BD	UM 121 BD	4	–	<b>12</b>
<b>QSY 155C</b>	17.7 Nm	11.8 A	3000 min <sup>-1</sup>	UM 111 BD	UM 121 BD	4	–	
<b>QSY 155D</b>	21.6 Nm	14.6 A	3000 min <sup>-1</sup>	UM 111 BD	UM 121 BD	4	–	
<b>QSY 155F</b>	26.1 Nm	18.0 A	3000 min <sup>-1</sup>	UM 112 D	UM 122 D	4 <sup>1)</sup>	–	
<b>QSY 155B EcoDyn</b>	13.0 Nm	6.5 A	3000 min <sup>-1</sup>	UM 111 D	UM 121 D	1 to 4	–	<b>14</b>
<b>QSY 155C EcoDyn</b>	17.7 Nm	8.5 A	3000 min <sup>-1</sup>	UM 111 BD	UM 121 BD	4	–	
<b>QSY 155D EcoDyn</b>	21.6 Nm	10.6 A	3000 min <sup>-1</sup>	UM 111 BD	UM 121 BD	4	–	
<b>QSY 155F EcoDyn</b>	26.1 Nm	12.8 A	3000 min <sup>-1</sup>	UM 111 BD	UM 121 BD	4	–	
<b>QSY 190C EcoDyn</b>	28.0 Nm	14.0 A	3000 min <sup>-1</sup>	UM 111 BD	UM 121 BD	4	–	<b>16</b>
<b>QSY 190D EcoDyn</b>	38.0 Nm	18.1 A	3000 min <sup>-1</sup>	UM 112 D	UM 122 D	4 <sup>1)</sup>	–	
<b>QSY 190F EcoDyn</b>	47.6 Nm	22.7 A	3000 min <sup>-1</sup>	UM 112 D	UM 122 D	4 <sup>1)</sup>	–	
<b>QSY 190K EcoDyn</b>	62.5 Nm	29.8 A	3000 min <sup>-1</sup>	UM 113 D	–	–	–	

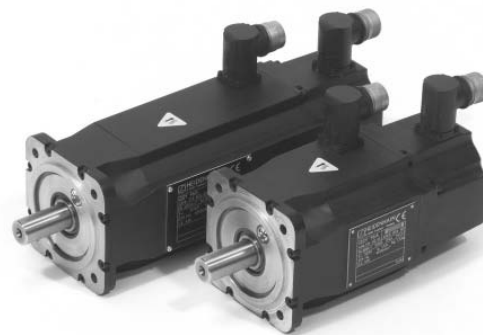
<sup>1)</sup> Only UE 242B, UR 242D

<sup>2)</sup> The maximum acceleration of the motor might not be achievable with the recommended inverters. If necessary, a more powerful power module must be selected.

# Synchronous Motors

## QSY 96 Series

Feed motors with 3 pole pairs  
 Stall torque 1.5 Nm and 5.2 Nm  
 Choice of incremental or absolute rotary encoder

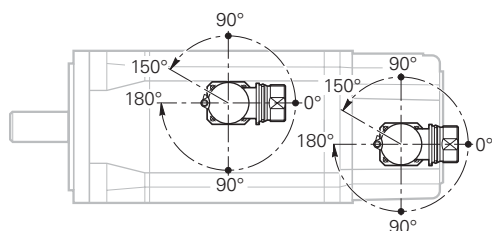


Motor	QSY 96A		QSY 96G	
Rated voltage $U_N$	307 V/303 V		288 V/287 V	
Power rating $P_N$	0.5 kW/0.45 kW		1.4 kW/1.3 kW	
Rated shaft speed $n_N$	4500 min <sup>-1</sup>			
Rated torque $M_N$ <sup>1)</sup>	1.05 Nm/0.95 Nm		3.0 Nm/2.7 Nm at 4500 min <sup>-1</sup>	
Rated current $I_N$ <sup>1)</sup>	1.1 A/1.0 A		3.3 A/3.0 A	
Stall torque $M_0$ <sup>1)</sup>	1.5 Nm		5.2 Nm	
Stall current $I_0$ <sup>1)</sup>	1.5 A		5.2 A	
Max. shaft speed $n_{max}$	6000 min <sup>-1</sup>			
Max. torque $M_{max}$ <sup>2)</sup>	5.5 Nm		22 Nm	
Max. current $I_{max}$ <sup>2)</sup>	6.3 A		25.4 A	
Weight m	3.6 kg	4.5 kg	7.2 kg	8.1 kg
Rotor inertia J	1.8 kgcm <sup>2</sup>	2.1 kgcm <sup>2</sup>	6.3 kgcm <sup>2</sup>	6.6 kgcm <sup>2</sup>
<b>Brake</b> Rated voltage $U_{Br}$ Rated current $I_{Br}$ Holding torque $M_{Br}$	<b>Without</b> – – –	<b>With</b> 24 Vdc 0.5 A 5.0 Nm	<b>Without</b> – – –	<b>With</b> 24 Vdc 0.5 A 5.0 Nm
<b>ID number</b> For motor with ERN 1387 For motor with ECN 1313 For motor with EQN 1325	344512-03 344512-83 344512-53	344512-04 344512-84 344512-54	339875-03 339875-83 339875-53	339875-04 339875-84 339875-54

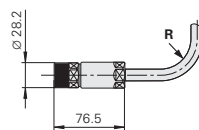
<sup>1)</sup> At 100 K      <sup>2)</sup> Max. 200 ms

*In italics:* Data for motors with ECN 1313 or EQN 1325 (rated torque reduced by 10%)

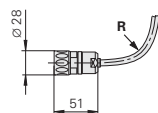
### Rotatable connections



### Power connector



### Encoder connector



For R, see page 33

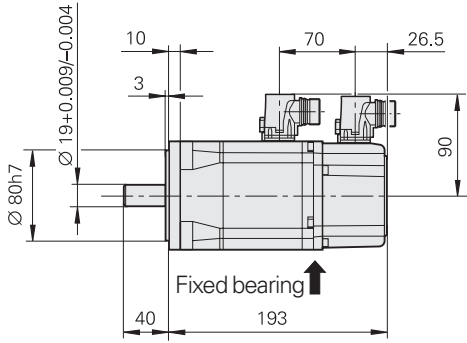
# Dimensions

## Dimensions in mm

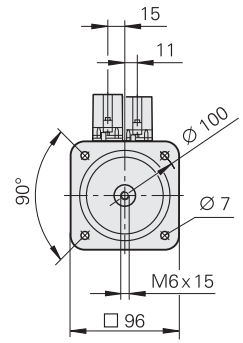
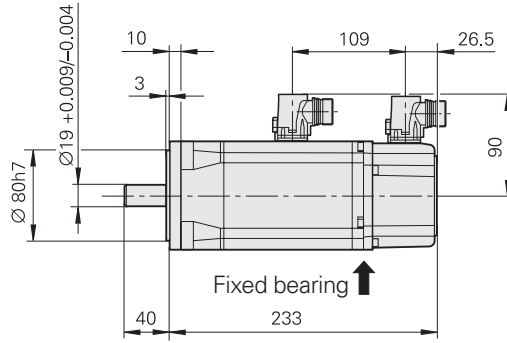


Tolerancing ISO 8015  
 ISO 2768 - m H  
 < 6 mm: ±0.2 mm

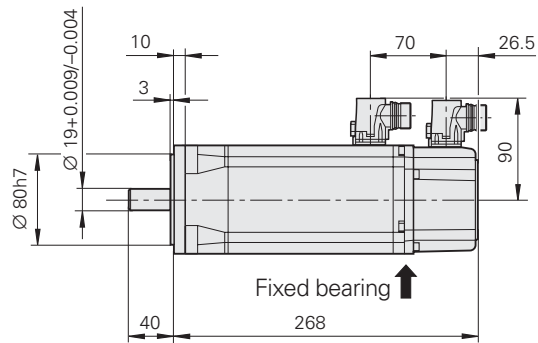
**QSY 96A** Without brake



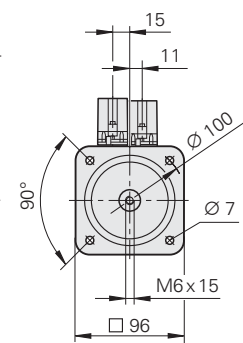
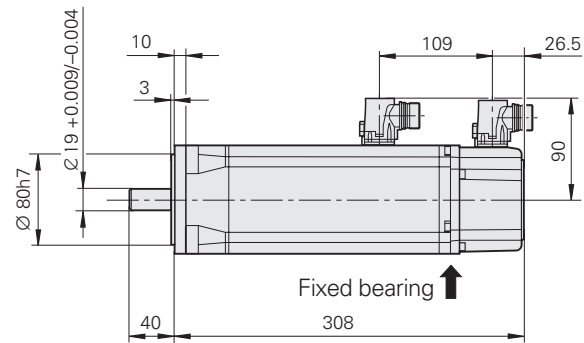
With brake



**QSY 96G** Without brake



With brake



# Synchronous Motors

## QSY 116 Series

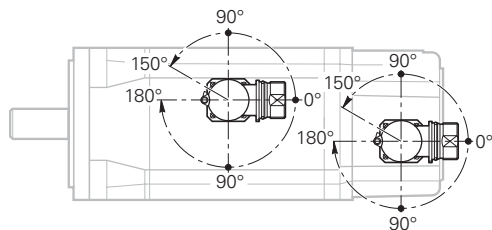
Feed motors with 3 pole pairs  
 Stall torque 5.2 Nm to 10 Nm  
 Choice of incremental or absolute rotary encoder



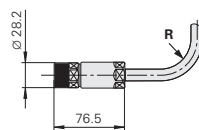
Motor	QSY 116C		QSY 116E		QSY 116J		QSY 116J EcoDyn	
Rated voltage $U_N$	307 V/303 V		296 V/294 V		287 V/286 V		401 V/399 V	
Power rating $P_N$	1.45 kW/1.30 kW		1.85 kW/1.67 kW		2.42 kW/2.18 kW		2.64 kW/2.38 kW	
Rated shaft speed $n_N$	3000 min <sup>-1</sup>						3000 min <sup>-1</sup> <sup>3)</sup>	
Rated torque $M_N$ <sup>1)</sup>	4.6 Nm/4.1 Nm		5.9 Nm/5.3 Nm		7.7 Nm/6.9 Nm		8.4 Nm/7.6 Nm	
Rated current $I_N$ <sup>1)</sup>	3.3 A/3.0 A		4.1 A/3.7 A		5.35 A/4.8 A		4.3 A/3.9 A	
Stall torque $M_0$ <sup>1)</sup>	5.2 Nm		7.2 Nm		10.0 Nm		10.0 Nm	
Stall current $I_0$ <sup>1)</sup>	3.3 A		4.8 A		6.8 A		5.0 A	
Max. shaft speed $n_{max}$	5400 min <sup>-1</sup>						4200 min <sup>-1</sup> <sup>3)</sup>	
Max. torque $M_{max}$ <sup>2)</sup>	16 Nm		25 Nm		41 Nm		41 Nm	
Max. current $I_{max}$ <sup>2)</sup>	12.7 A		19.0 A		32.6 A		23.0 A	
Weight m	6.9 kg	7.8 kg	8.6 kg	9.5 kg	12.0 kg	13.3 kg	12.0 kg	13.3 kg
Rotor inertia J	7.5 kgcm <sup>2</sup>	7.9 kgcm <sup>2</sup>	9.9 kgcm <sup>2</sup>	10.3 kgcm <sup>2</sup>	15.0 kgcm <sup>2</sup>	15.4 kgcm <sup>2</sup>	15.0 kgcm <sup>2</sup>	15.4 kgcm <sup>2</sup>
<b>Brake</b>	<b>Without</b>	<b>With</b>	<b>Without</b>	<b>With</b>	<b>Without</b>	<b>With</b>	<b>Without</b>	<b>With</b>
Rated voltage $U_{Br}$	–	24 Vdc	–	24 Vdc	–	24 Vdc	–	24 Vdc
Rated current $I_{Br}$	–	0.6 A	–	0.6 A	–	0.85 A	–	0.85 A
Holding torque $M_{Br}$	–	13.5 Nm	–	13.5 Nm	–	13.5 Nm	–	13.5 Nm
<b>ID number</b>								
For motor with ERN 1387	339876-03	339876-04	339877-03	339877-04	339878-03	339878-04	339878-13	339878-14
For motor with ECN 1313	339876-83	339876-84	339877-83	339877-84	–	–	339878-83	339878-84
For motor with EQN 1325	339876-53	339876-54	339877-53	339877-54	339878-53	339878-54	339878-63	339878-64

<sup>1)</sup> At 100 K      <sup>2)</sup> Max. 200 ms      <sup>3)</sup> In EcoDyn mode  
*In italics: Data for motors with ECN 1313 or EQN 1325 (rated torque reduced by 10%)*

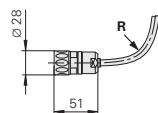
### Rotatable connections



### Power connector



### Encoder connector



For R, see page 33



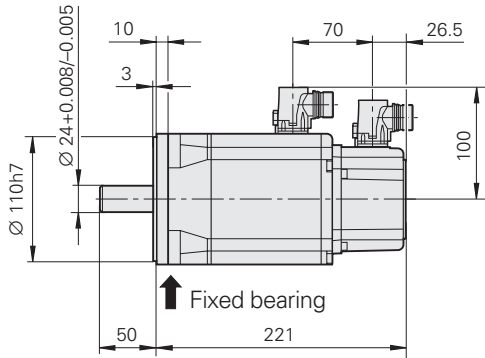
# Dimensions

## Dimensions in mm

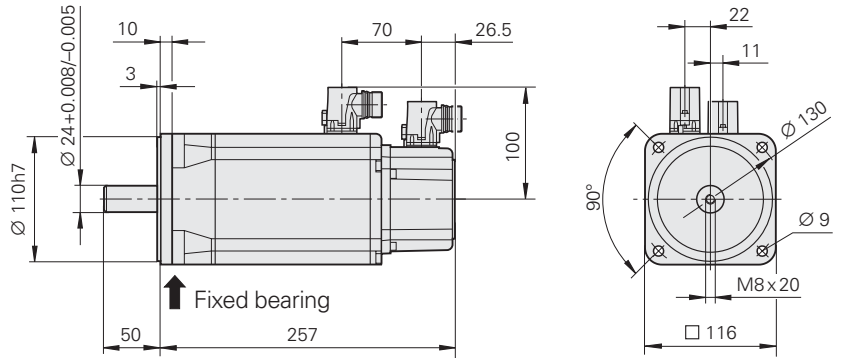


Tolerancing ISO 8015  
 ISO 2768 - m H  
 < 6 mm: ±0.2 mm

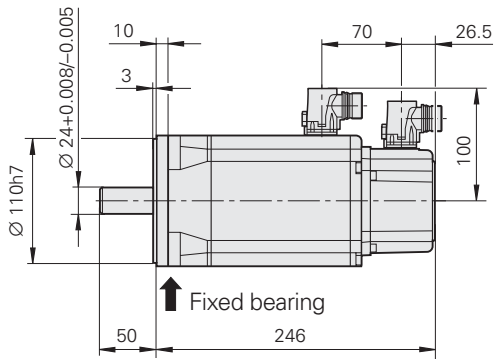
**QSY 116C** Without brake



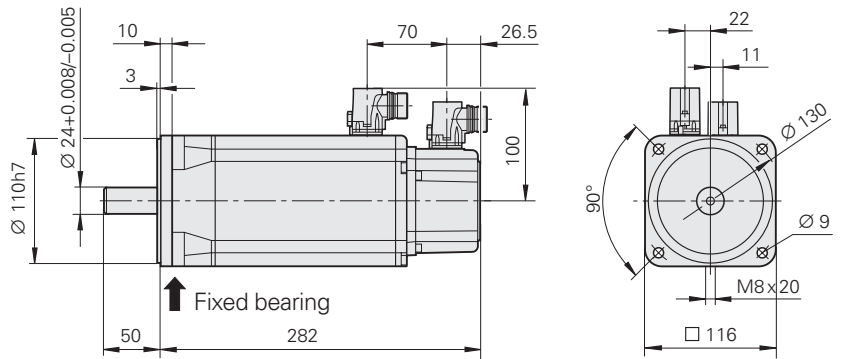
With brake



**QSY 116E** Without brake

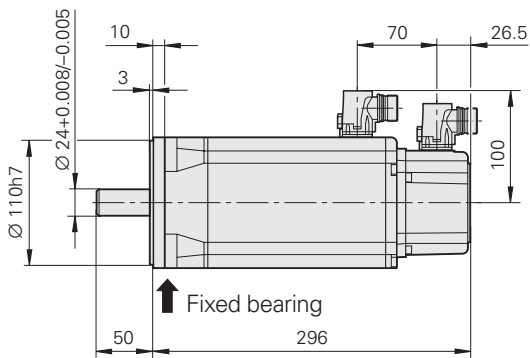


With brake

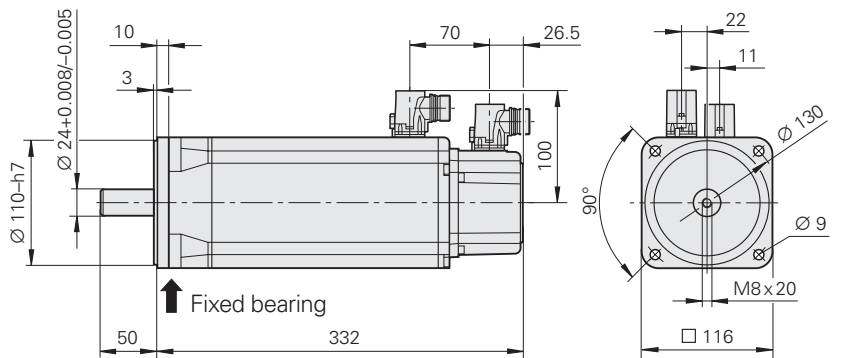


**QSY 116J**

**QSY 116J EcoDyn** Without brake



With brake



# Synchronous Motors

## QSY 130 EcoDyn Series

Feed motors with 4 pole pairs  
 Stall torque 6 Nm and 9 Nm  
 Choice of incremental or absolute rotary encoder

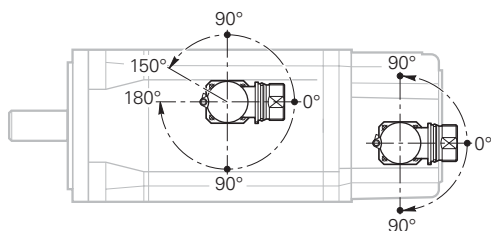


Motor	QSY 130C EcoDyn		QSY 130E EcoDyn	
Rated voltage $U_N$	408 V/404 V		401 V/399 V	
Power rating $P_N$	1.6 kW/1.5 kW		2.3 kW/2.1 kW	
Rated shaft speed $n_N$	3000 min <sup>-1</sup> (in EcoDyn mode)			
Rated torque $M_N^{1)}$	5.2 Nm/4.7 Nm		7.4 Nm/6.7 Nm	
Rated current $I_N^{1)}$	2.7 A/2.4 A		3.8 A/3.4 A	
Stall torque $M_0^{1)}$	6.0 Nm		9.0 Nm	
Stall current $I_0^{1)}$	3.0 A		4.5 A	
Max. shaft speed $n_{max}$	4200 min <sup>-1</sup> (in EcoDyn mode)			
Max. torque $M_{max}^{2)}$	16 Nm		23 Nm	
Max. current $I_{max}^{2)}$	8.6 A		12.7 A	
Weight m	7.9 kg	8.8 kg	9.7 kg	10.6 kg
Rotor inertia J	16.0 kgcm <sup>2</sup>	16.4 kgcm <sup>2</sup>	21.0 kgcm <sup>2</sup>	21.4 kgcm <sup>2</sup>
<b>Brake</b> Rated voltage $U_{Br}$ Rated current $I_{Br}$ Holding torque $M_{Br}$	<b>Without</b> – – –	<b>With</b> 24 Vdc 0.6 A 13.5 Nm	<b>Without</b> – – –	<b>With</b> 24 Vdc 0.6 A 13.5 Nm
<b>ID number</b> For motor with ERN 1387 For motor with ECN 1313 For motor with EQN 1325	389053-13 389053-83 389053-63	389053-14 389053-84 389053-64	388422-13 388422-83 388422-63	388422-14 388422-84 388422-64

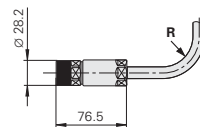
<sup>1)</sup> At 100 K      <sup>2)</sup> Max. 200 ms

*In italics: Data for motors with ECN 1313 or EQN 1325 (rated torque reduced by 10%)*

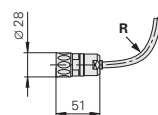
### Rotatable connections



### Power connector



### Encoder connector



For R, see page 33

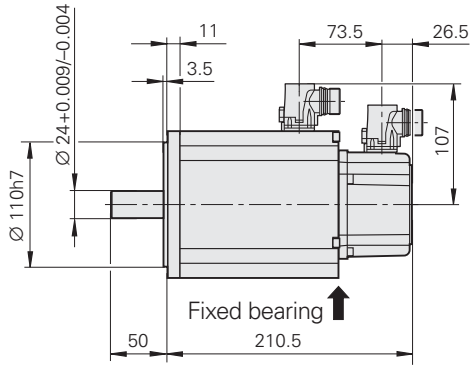
# Dimensions

## Dimensions in mm

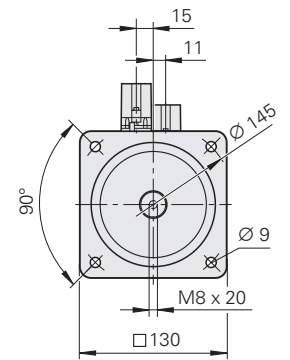
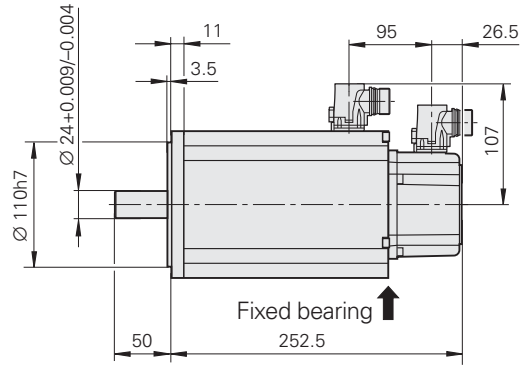


Tolerancing ISO 8015  
 ISO 2768 - m H  
 < 6 mm: ±0.2 mm

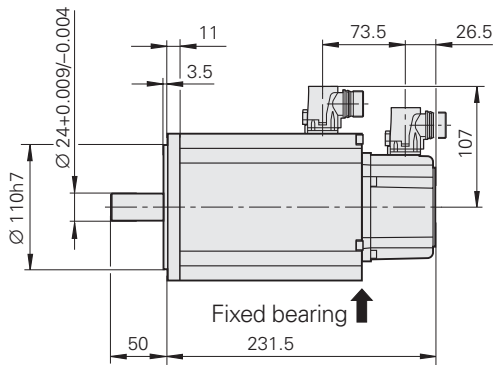
**QSY 130C** Without brake



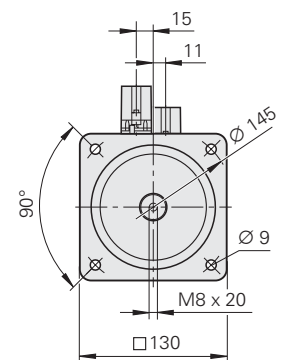
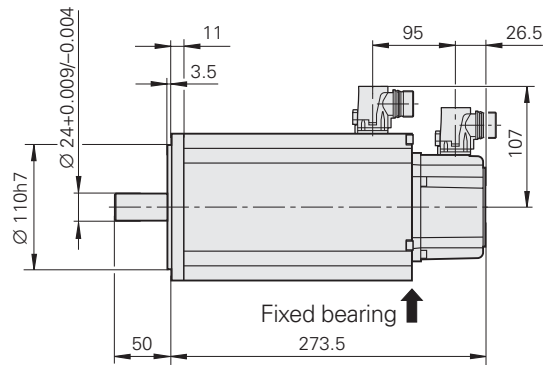
With brake



**QSY 130E** Without brake



With brake



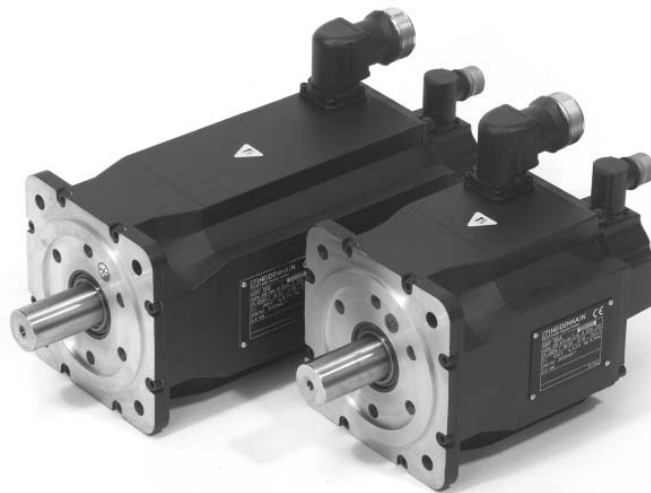
# Synchronous Motors

## QSY 155 Series

Feed motors with 4 pole pairs

Stall torque 13 Nm to 26.1 Nm

Choice of incremental or absolute rotary encoder

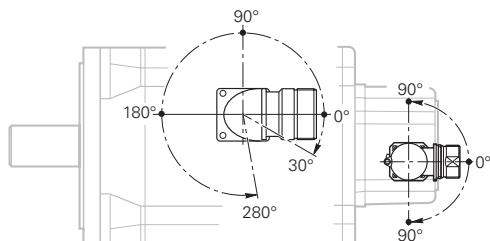


Motor	QSY 155B		QSY 155C		QSY 155D		QSY 155F	
Rated voltage $U_N$	295 V/292 V		291 V/289 V		291 V/288 V		287 V/285 V	
Power rating $P_N$	2.9 kW/2.6 kW		3.9 kW/3.5 kW		4.6 kW/4.1 kW		5.2 kW/4.7 kW	
Rated shaft speed $n_N$	3000 min <sup>-1</sup>							
Rated torque $M_N$ <sup>1)</sup>	9.2 Nm/8.3 Nm		12.5 Nm/11.3 Nm		14.8 Nm/13.3 Nm		16.7 Nm/15.0 Nm	
Rated current $I_N$ <sup>1)</sup>	6.9 A/6.2 A		8.7 A/7.8 A		10.6 A/9.5 A		12.0 A/10.8 A	
Stall torque $M_0$ <sup>1)</sup>	13.0 Nm		17.7 Nm		21.6 Nm		26.1 Nm	
Stall current $I_0$ <sup>1)</sup>	9.1 A		11.8 A		14.6 A		18.0 A	
Max. shaft speed $n_{max}$	5000 min <sup>-1</sup>							
Max. torque $M_{max}$ <sup>2)</sup>	39 Nm		52 Nm		64 Nm		90 Nm	
Max. current $I_{max}$ <sup>2)</sup>	29.7 A		38.9 A		49.5 A		68.6 A	
Weight m	15.0 kg	17.4 kg	17.5 kg	19.9 kg	20.0 kg	22.4 kg	25.0 kg	27.4 kg
Rotor inertia J	33 kgcm <sup>2</sup>	35 kgcm <sup>2</sup>	43 kgcm <sup>2</sup>	45 kgcm <sup>2</sup>	54 kgcm <sup>2</sup>	56 kgcm <sup>2</sup>	75 kgcm <sup>2</sup>	77 kgcm <sup>2</sup>
<b>Brake</b>	<b>Without</b>	<b>With</b>	<b>Without</b>	<b>With</b>	<b>Without</b>	<b>With</b>	<b>Without</b>	<b>With</b>
Rated voltage $U_{Br}$	–	24 Vdc	–	24 Vdc	–	24 Vdc	–	24 Vdc
Rated current $I_{Br}$	–	1.1 A	–	1.1 A	–	1.1 A	–	1.1 A
Holding torque $M_{Br}$	–	40 Nm	–	40 Nm	–	40 Nm	–	40 Nm
<b>ID number</b>								
For motor with ERN 1387	339880-03	339880-04	365308-03	365308-04	339881-03	339881-04	339882-03	339882-04
For motor with EQN 1325	339880-53	339880-54	365308-53	365308-54	339881-53	339881-54	339882-53	339882-54

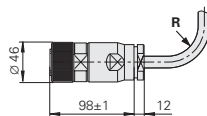
<sup>1)</sup> At 100 K      <sup>2)</sup> Max. 200 ms

*In italics:* Data for motors with EQN 1325 (rated torque reduced by 10%)

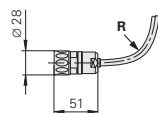
### Rotatable connections



### Power connector



### Encoder connector



For R, see page 33

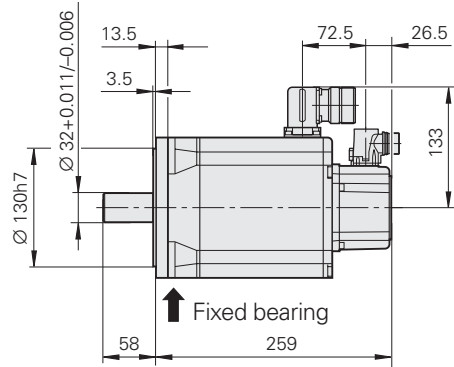
# Dimensions

## Dimensions in mm

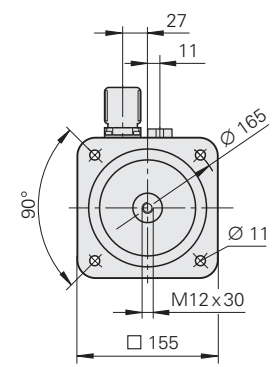
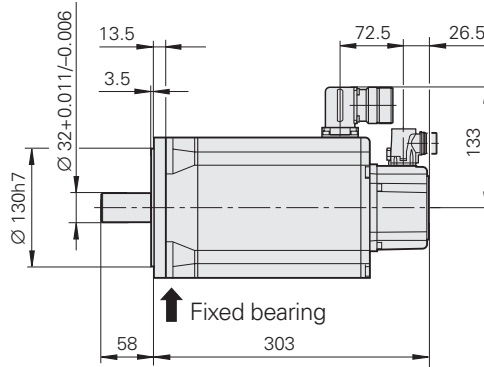


Tolerancing ISO 8015  
 ISO 2768 - m H  
 < 6 mm: ±0.2 mm

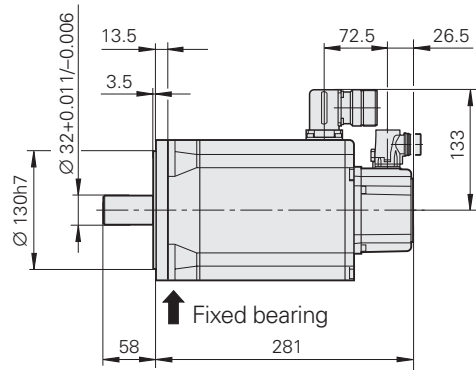
**QSY 155B** Without brake



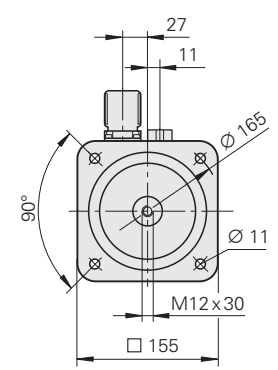
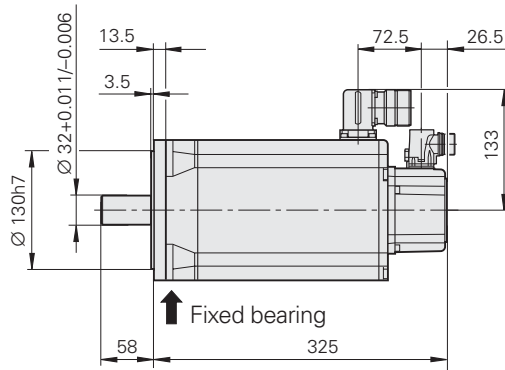
With brake



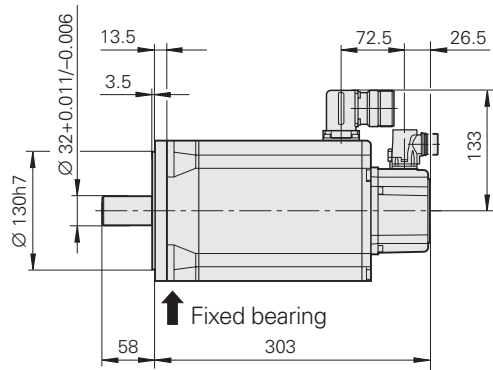
**QSY 155C** Without brake



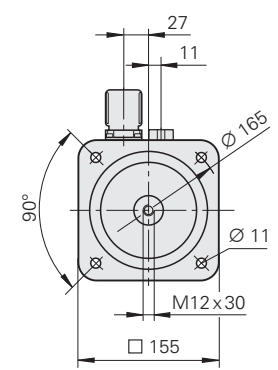
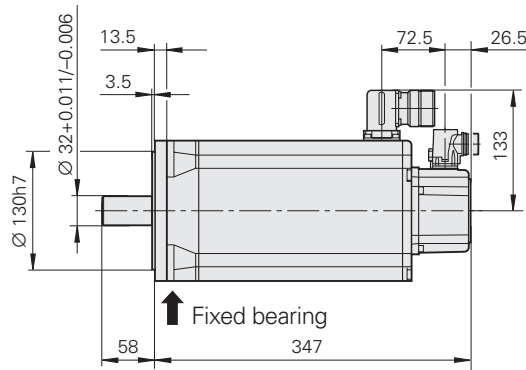
With brake



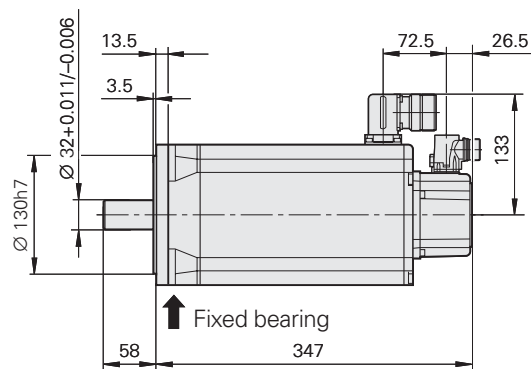
**QSY 155D** Without brake



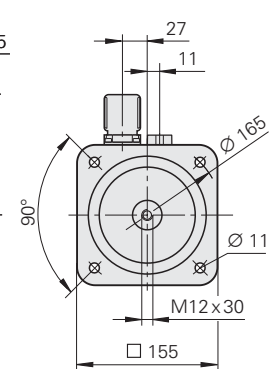
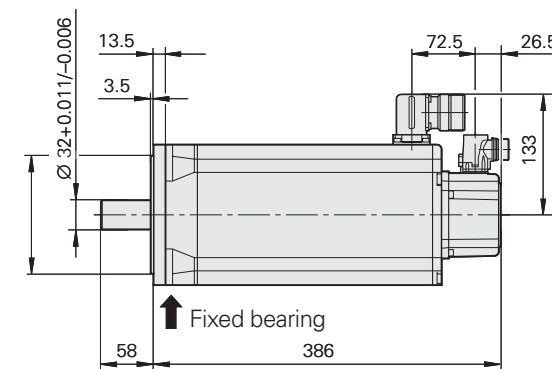
With brake



**QSY 155F** Without brake



With brake



# Synchronous Motors

## QSY 155 EcoDyn Series

Feed motors with 4 pole pairs  
 Stall torque 13 Nm to 26.1 Nm  
 Choice of incremental or absolute rotary encoder

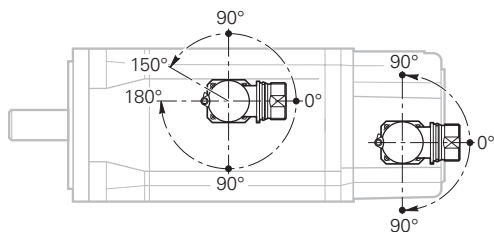


Motor	QSY 155B EcoDyn		QSY 155C EcoDyn		QSY 155D EcoDyn		QSY 155F EcoDyn	
Rated voltage $U_N$	412 V/408 V		416 V/411 V		408 V/404 V		396 V/394 V	
Power rating $P_N$	3.5 kW/3.1 kW		5.0 kW/4.5 kW		5.7 kW/5.1 kW		6.0 kW/5.4 kW	
Rated shaft speed $n_N$	3000 min <sup>-1</sup> (in EcoDyn mode)							
Rated torque $M_N$ <sup>1)</sup>	11.0 Nm/9.9 Nm		16.0 Nm/14.4 Nm		18.1 Nm/16.3 Nm		19.2 Nm/17.3 Nm	
Rated current $I_N$ <sup>1)</sup>	5.6 A/5.0 A		8.2 A/7.4 A		9.1 A/8.2 A		9.8 A/8.8 A	
Stall torque $M_0$ <sup>1)</sup>	13.0 Nm		17.7 Nm		21.6 Nm		26.1 Nm	
Stall current $I_0$ <sup>1)</sup>	6.5 A		8.5 A		10.6 A		12.8 A	
Max. shaft speed $n_{max}$	4200 min <sup>-1</sup> (in EcoDyn mode)							
Max. torque $M_{max}$ <sup>2)</sup>	39 Nm		52 Nm		64 Nm		90 Nm	
Max. current $I_{max}$ <sup>2)</sup>	21.2 A		27.6 A		35.0 A		49.5 A	
Weight m	15.0 kg	17.4 kg	17.5 kg	19.9 kg	20.0 kg	22.4 kg	25.0 kg	27.4 kg
Rotor inertia J	33 kgcm <sup>2</sup>	35 kgcm <sup>2</sup>	43 kgcm <sup>2</sup>	45 kgcm <sup>2</sup>	54 kgcm <sup>2</sup>	56 kgcm <sup>2</sup>	75 kgcm <sup>2</sup>	77 kgcm <sup>2</sup>
<b>Brake</b>	<b>Without</b>	<b>With</b>	<b>Without</b>	<b>With</b>	<b>Without</b>	<b>With</b>	<b>Without</b>	<b>With</b>
Rated voltage $U_{Br}$	–	24 Vdc	–	24 Vdc	–	24 Vdc	–	24 Vdc
Rated current $I_{Br}$	–	1.1 A	–	1.1 A	–	1.1 A	–	1.1 A
Holding torque $M_{Br}$	–	40 Nm	–	40 Nm	–	40 Nm	–	40 Nm
<b>ID number</b>								
For motor with ERN 1387	339880-13	339880-14	365308-13	365308-14	339881-13	339881-14	339882-13	339882-14
For motor with ECN 1313	339880-83	339880-84	365308-83	365308-84	339881-83	339881-84	339882-83	339882-84
For motor with EQN 1325	339880-63	339880-64	365308-63	365308-64	339881-63	339881-64	339882-63	339882-64

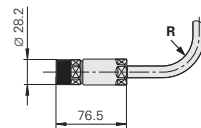
<sup>1)</sup> At 100 K      <sup>2)</sup> Max. 200 ms

*In italics:* Data for motors with ECN 1313 or EQN 1325 (rated torque reduced by 10%)

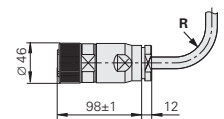
### Rotatable connections



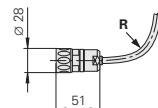
### Power connector for QSY 155B/C/D EcoDyn



### Power connector for QSY 155F EcoDyn



### Encoder connector



For R, see page 33

## Dimensions

### Dimensions in mm

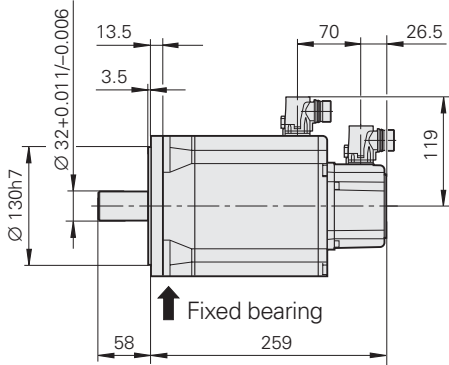


Tolerancing ISO 8015

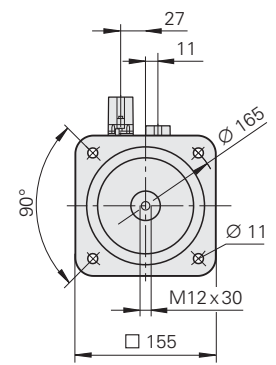
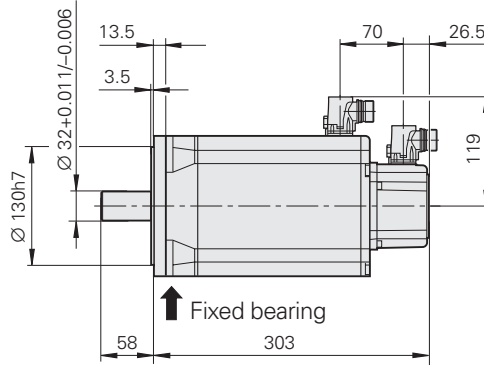
ISO 2768 - m H

< 6 mm: ±0.2 mm

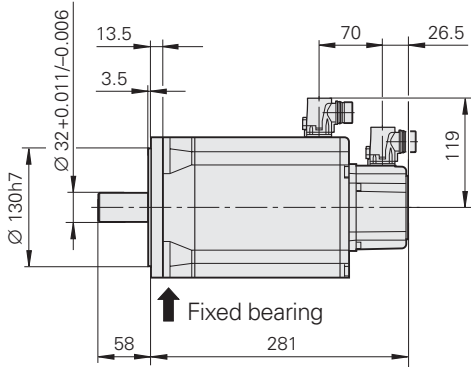
**QSY 155B EcoDyn** Without brake



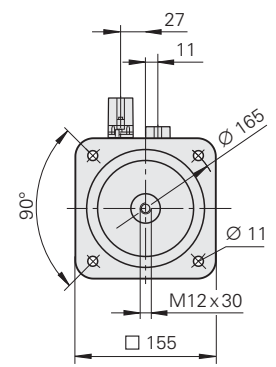
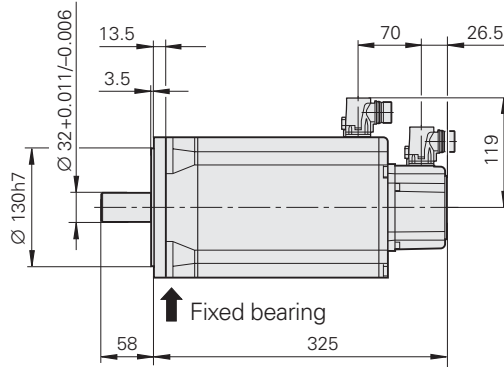
With brake



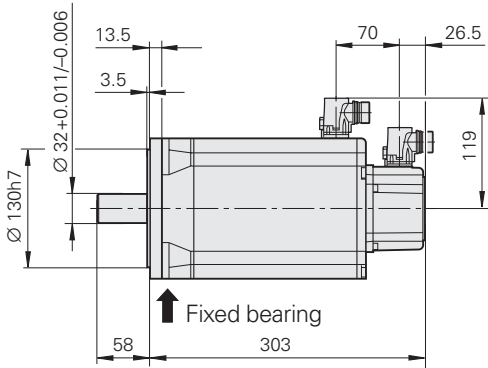
**QSY 155C EcoDyn** Without brake



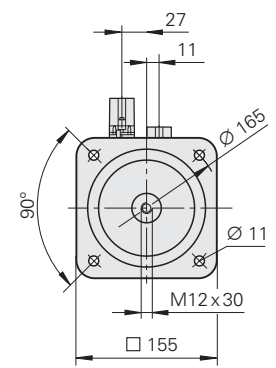
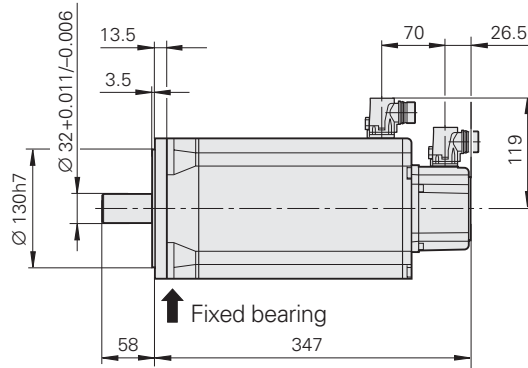
With brake



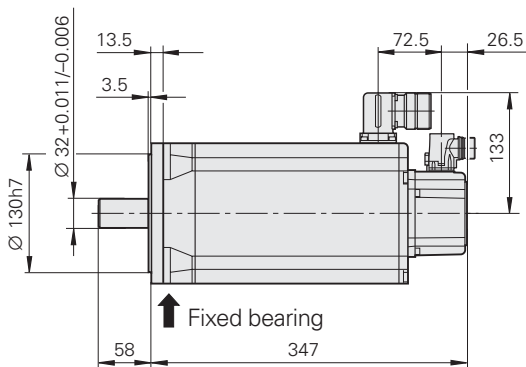
**QSY 155D EcoDyn** Without brake



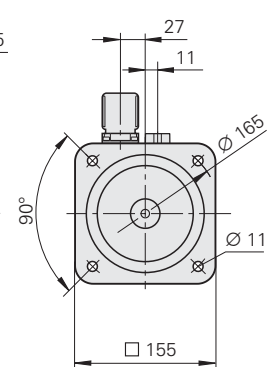
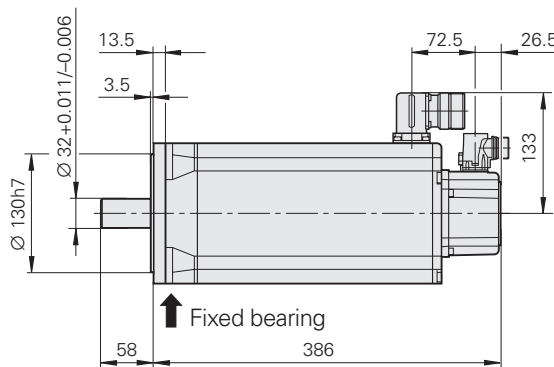
With brake



**QSY 155F EcoDyn** Without brake



With brake



# Synchronous Motors

## QSY 190 EcoDyn Series

Feed motors with 4 pole pairs  
 Stall torque 28 Nm to 62.5 Nm  
 Choice of incremental or absolute rotary encoder

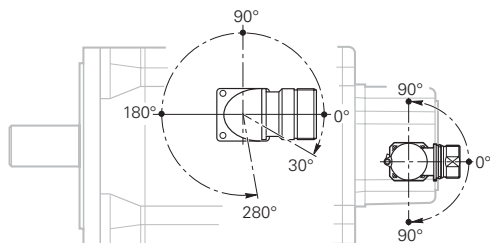


Motor	QSY 190C EcoDyn		QSY 190D EcoDyn		QSY 190F EcoDyn		QSY 190K EcoDyn	
Rated voltage $U_N$	423 V/416 V		418 V/412 V		405 V/401 V		397 V/395 V	
Power rating $P_N$	7.2 kW/6.5 kW		9.6 kW/8.6 kW		9.9 kW/8.9 kW		12.2 kW/11.0 kW	
Rated shaft speed $n_N$	3000 min <sup>-1</sup> (in EcoDyn mode)							
Rated torque $M_N$ <sup>1)</sup>	23.0 Nm/20.7 Nm		30.6 Nm/27.5 Nm		31.5 Nm/28.4 Nm		39.0 Nm/35.1 Nm	
Rated current $I_N$ <sup>1)</sup>	11.8 A/10.6 A		14.6 A/13.1 A		15.0 A/13.5 A		20.2 A/18.2 A	
Stall torque $M_0$ <sup>1)</sup>	28.0 Nm		38.0 Nm		47.6 Nm		62.5 Nm	
Stall current $I_0$ <sup>1)</sup>	14.0 A		18.1 A		22.7 A		29.8 A	
Max. shaft speed $n_{max}$	3900 min <sup>-1</sup> (in EcoDyn mode)							
Max. torque $M_{max}$ <sup>2)</sup>	78 Nm		104 Nm		135 Nm		210 Nm	
Max. current $I_{max}$ <sup>2)</sup>	40.0 A		54.4 A		75.0 A		113.0 A	
Weight m	29.3 kg	37.6 kg	33.5 kg	41.8 kg	42.5 kg	50.8 kg	61 kg	69.3 kg
Rotor inertia J	106 kgcm <sup>2</sup>	115 kgcm <sup>2</sup>	133 kgcm <sup>2</sup>	142 kgcm <sup>2</sup>	190 kgcm <sup>2</sup>	199 kgcm <sup>2</sup>	290 kgcm <sup>2</sup>	299 kgcm <sup>2</sup>
<b>Brake</b>	<b>Without</b>	<b>With</b>	<b>Without</b>	<b>With</b>	<b>Without</b>	<b>With</b>	<b>Without</b>	<b>With</b>
Rated voltage $U_{Br}$	–	24 Vdc	–	24 Vdc	–	24 Vdc	–	24 Vdc
Rated current $I_{Br}$	–	1.7 A	–	1.7 A	–	1.7 A	–	1.7 A
Holding torque $M_{Br}$	–	70 Nm	–	70 Nm	–	70 Nm	–	70 Nm
<b>ID number</b>								
For motor with ERN 1387	392 023-13	392 023-14	392 024-13	392 024-14	388 244-13	388 244-14	392 025-13	392 025-14
For motor with ECN 1313	392 023-83	392 023-84	392 024-83	392 024-84	388 244-83	388 244-84	392 025-83	392 025-84
For motor with EQN 1325	392 023-63	392 023-64	392 024-63	392 024-64	388 244-63	388 244-64	392 025-63	392 025-64

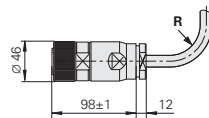
<sup>1)</sup> At 100 K      <sup>2)</sup> Max. 200 ms

*In italics: Data for motors with ECN 1313 or EQN 1325 (rated torque reduced by 10%)*

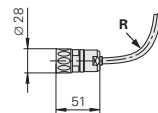
### Rotatable connections



### Power connector



### Encoder connector



For R, see page 33



## Dimensions

### Dimensions in mm

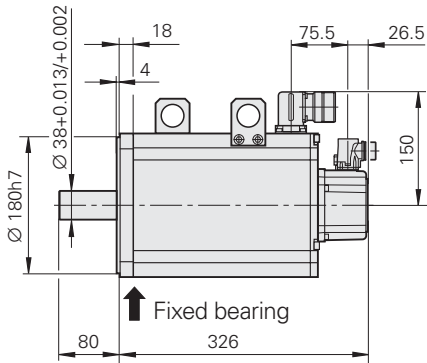


Tolerancing ISO 8015

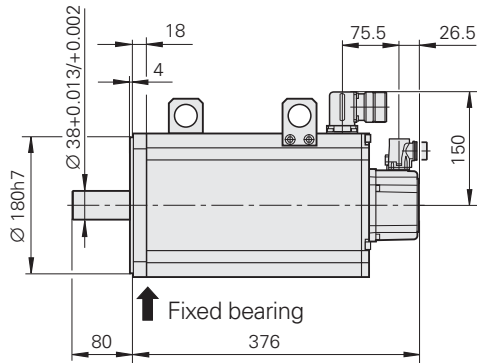
ISO 2768 - m H

< 6 mm:  $\pm 0.2$  mm

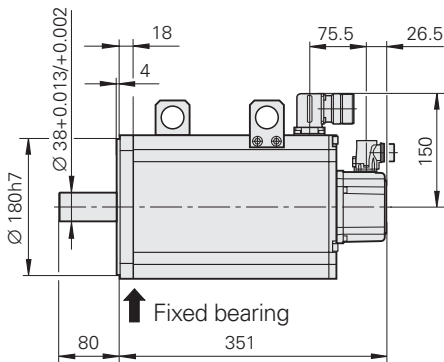
**QSY 190C EcoDyn** Without brake



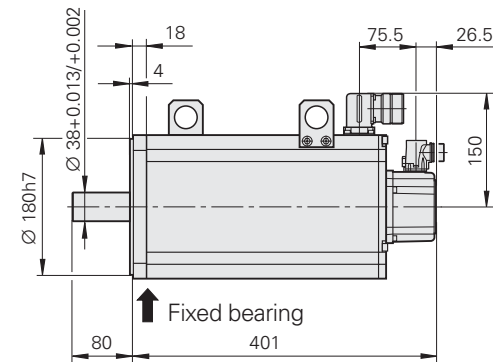
With brake



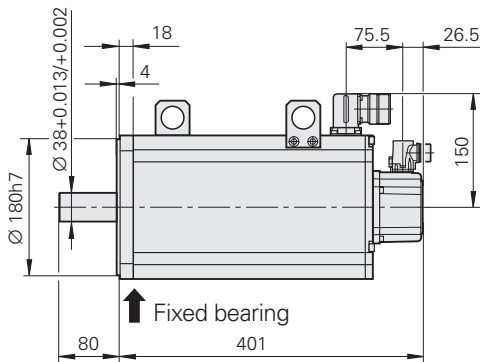
**QSY 190D EcoDyn** Without brake



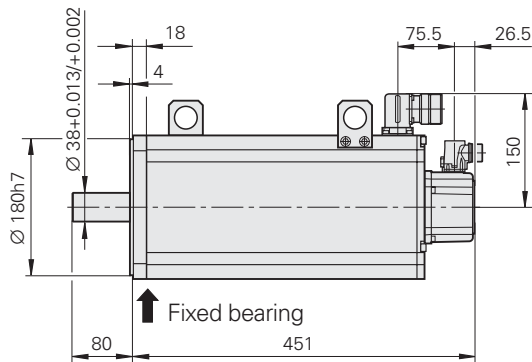
With brake



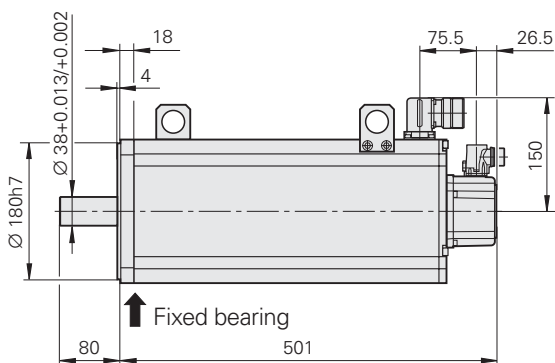
**QSY 190F EcoDyn** Without brake



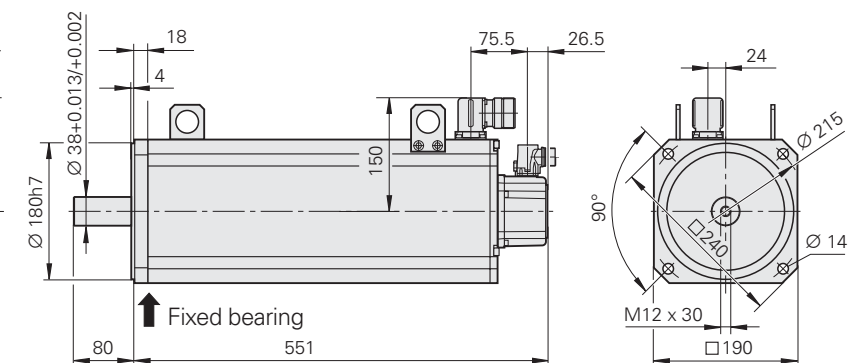
With brake



**QSY 190K EcoDyn** Without brake



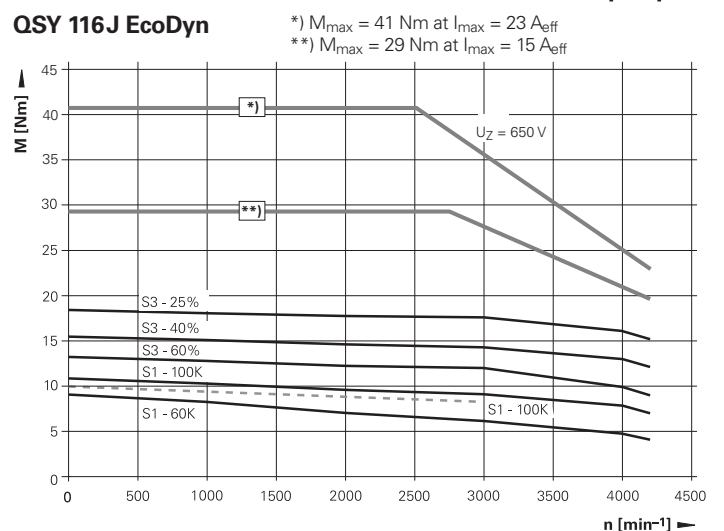
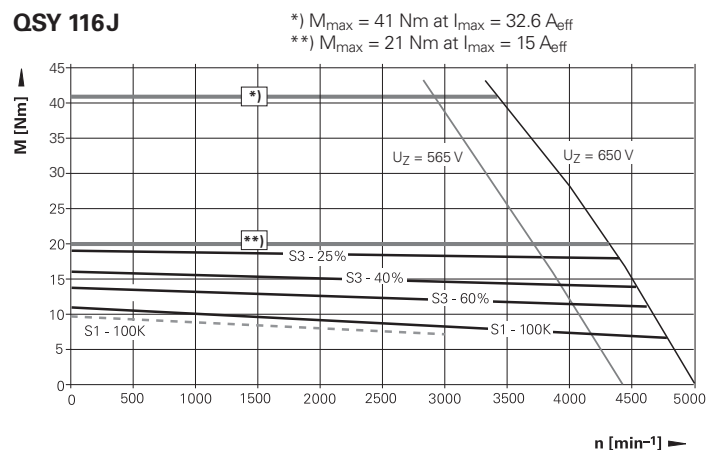
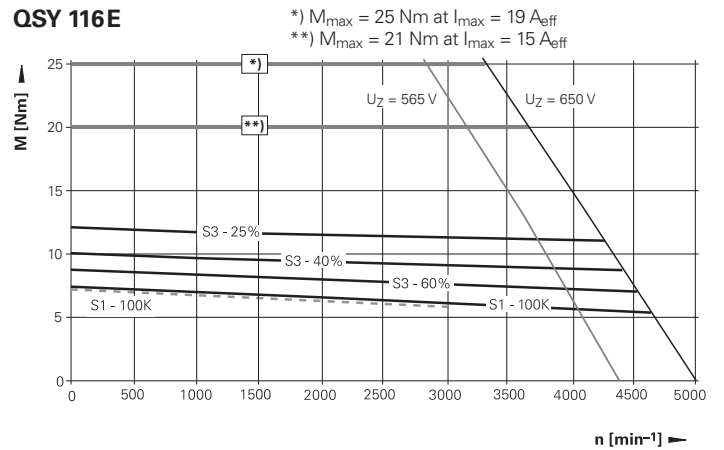
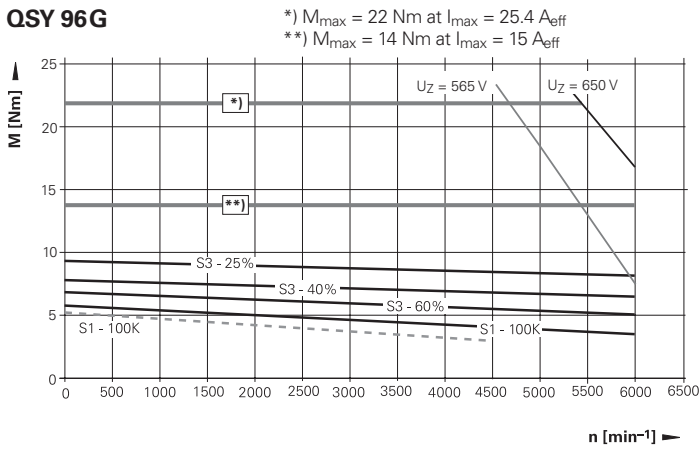
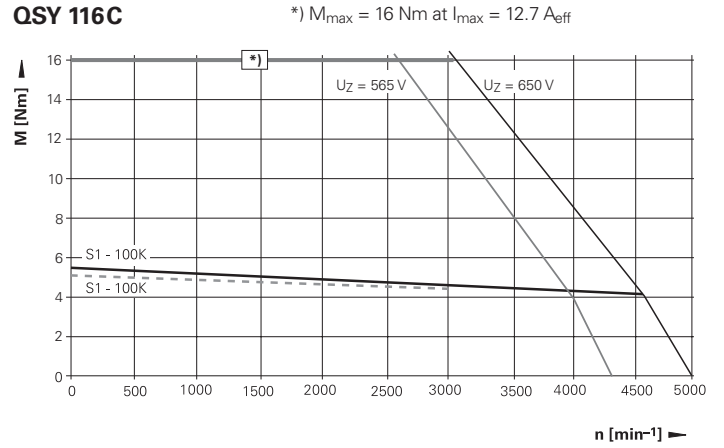
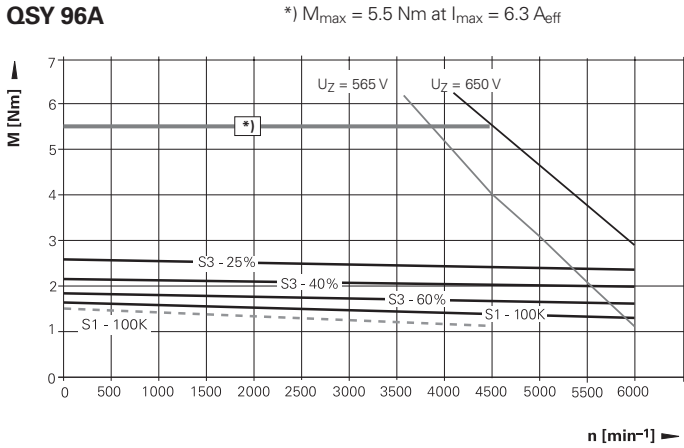
With brake



# Synchronous Motors

## Torque Characteristics

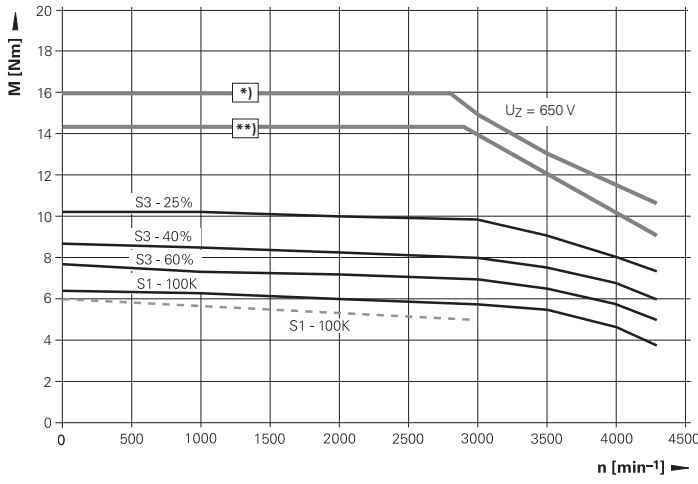
----- Characteristic curve according to the specifications  
 ————— Measured characteristic curve of one motor



The characteristic curves apply to motors with ERN 1387.

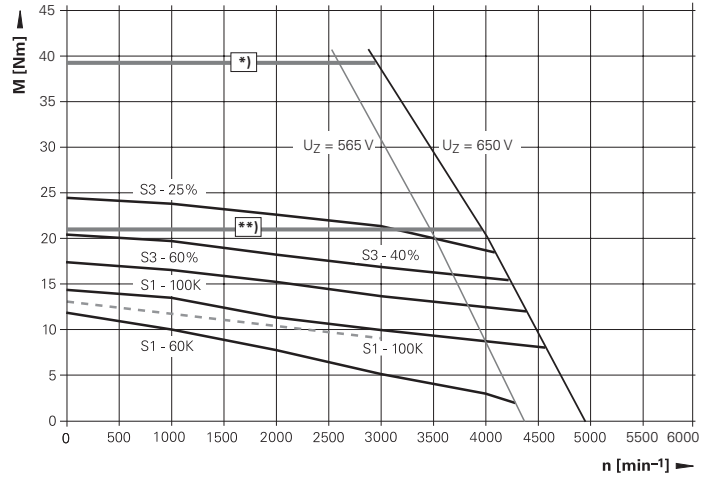
**QSY 130C EcoDyn**

\*)  $M_{max} = 16 \text{ Nm}$  at  $I_{max} = 8.6 \text{ A}_{eff}$   
 \*\*)  $M_{max} = 14.5 \text{ Nm}$  at  $I_{max} = 7.5 \text{ A}_{eff}$



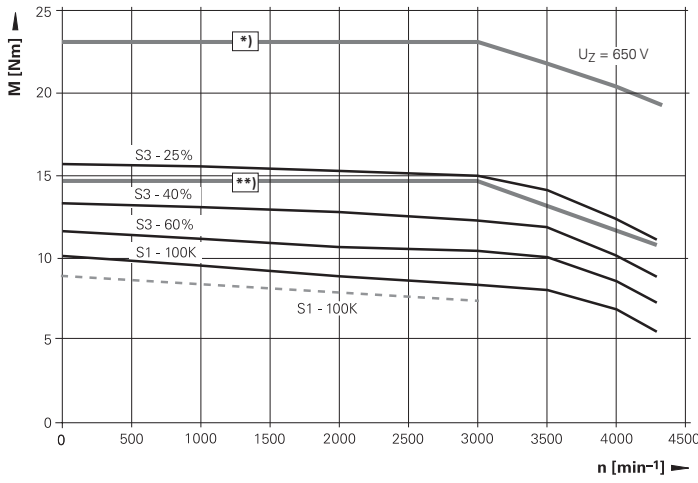
**QSY 155B**

\*)  $M_{max} = 39 \text{ Nm}$  at  $I_{max} = 29.7 \text{ A}_{eff}$   
 \*\*)  $M_{max} = 21 \text{ Nm}$  at  $I_{max} = 15 \text{ A}_{eff}$



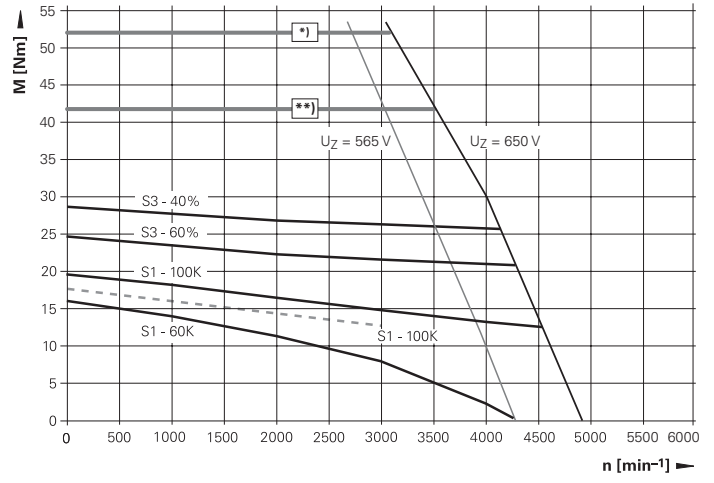
**QSY 130E EcoDyn**

\*)  $M_{max} = 23 \text{ Nm}$  at  $I_{max} = 12.7 \text{ A}_{eff}$   
 \*\*)  $M_{max} = 14.5 \text{ Nm}$  at  $I_{max} = 7.5 \text{ A}_{eff}$



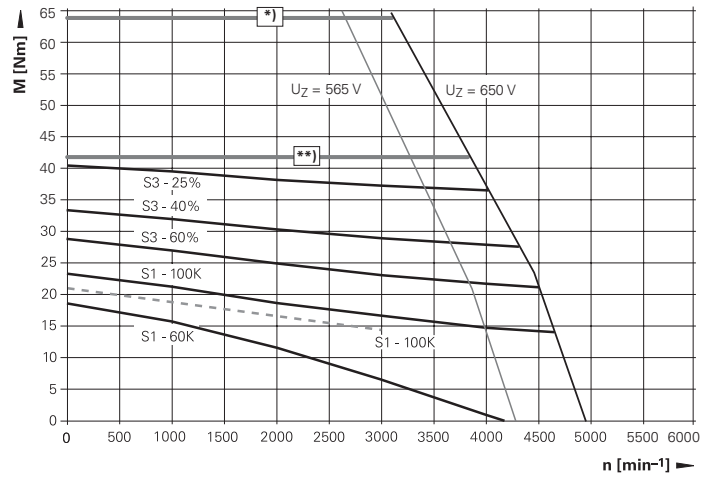
**QSY 155C**

\*)  $M_{max} = 52 \text{ Nm}$  at  $I_{max} = 38.9 \text{ A}_{eff}$   
 \*\*)  $M_{max} = 42 \text{ Nm}$  at  $I_{max} = 30 \text{ A}_{eff}$



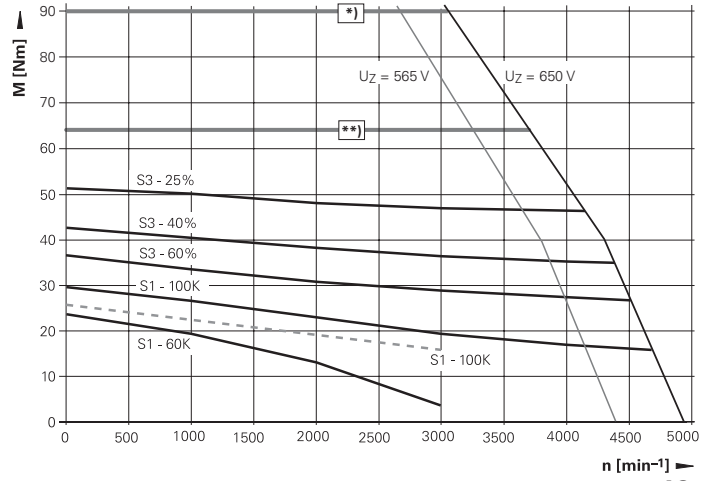
**QSY 155D**

\*)  $M_{max} = 64 \text{ Nm}$  at  $I_{max} = 49.5 \text{ A}_{eff}$   
 \*\*)  $M_{max} = 42 \text{ Nm}$  at  $I_{max} = 30 \text{ A}_{eff}$



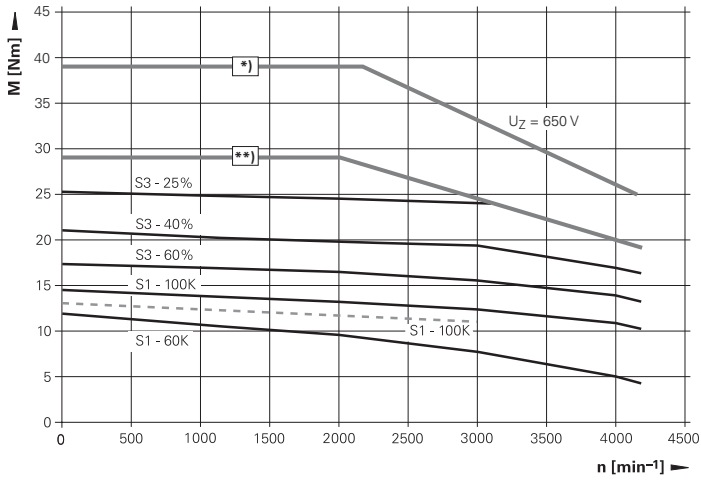
**QSY 155F**

\*)  $M_{max} = 90 \text{ Nm}$  at  $I_{max} = 68.6 \text{ A}_{eff}$   
 \*\*)  $M_{max} = 64 \text{ Nm}$  at  $I_{max} = 46 \text{ A}_{eff}$



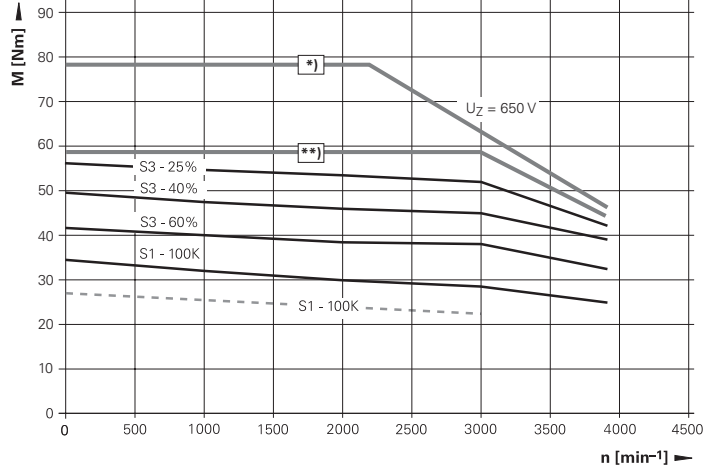
**QSY 155B EcoDyn**

\*)  $M_{max} = 39 \text{ Nm}$  at  $I_{max} = 21.2 \text{ A}_{eff}$   
 \*\*)  $M_{max} = 29 \text{ Nm}$  at  $I_{max} = 15 \text{ A}_{eff}$



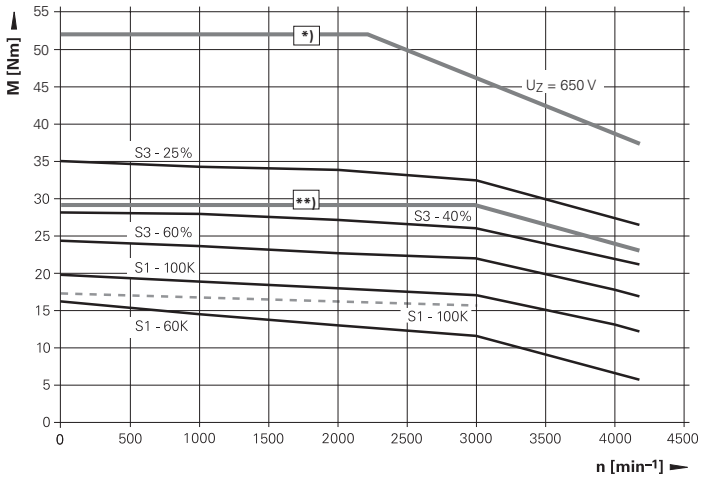
**QSY 190C EcoDyn**

\*)  $M_{max} = 78 \text{ Nm}$  at  $I_{max} = 40 \text{ A}_{eff}$   
 \*\*)  $M_{max} = 59 \text{ Nm}$  at  $I_{max} = 30 \text{ A}_{eff}$



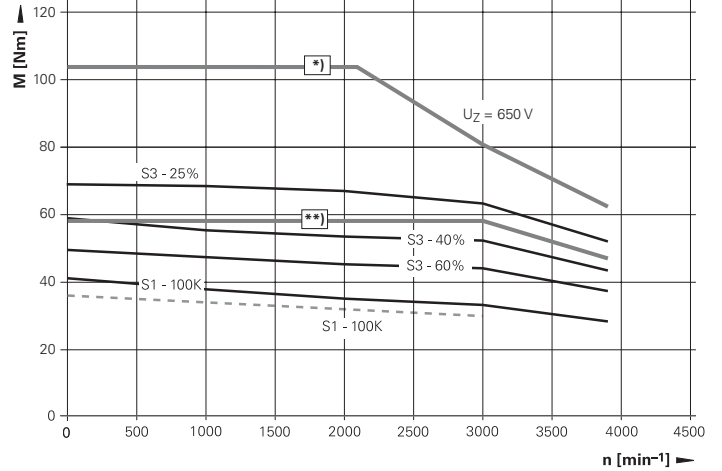
**QSY 155C EcoDyn**

\*)  $M_{max} = 52 \text{ Nm}$  at  $I_{max} = 27.6 \text{ A}_{eff}$   
 \*\*)  $M_{max} = 29 \text{ Nm}$  at  $I_{max} = 15 \text{ A}_{eff}$



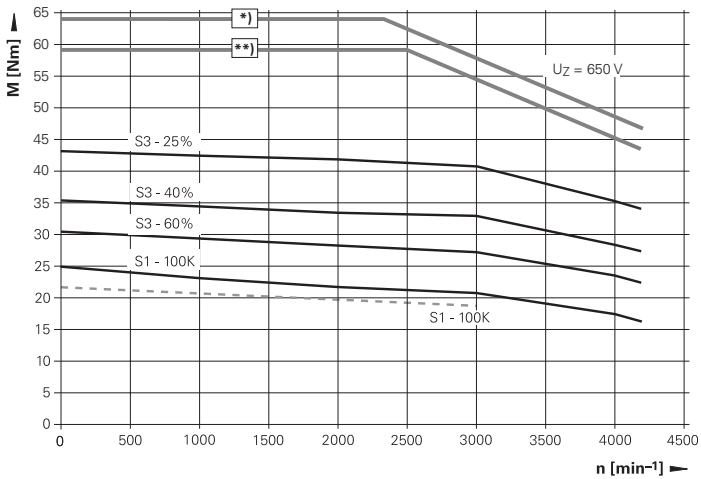
**QSY 190D EcoDyn**

\*)  $M_{max} = 104 \text{ Nm}$  at  $I_{max} = 54.4 \text{ A}_{eff}$   
 \*\*)  $M_{max} = 59 \text{ Nm}$  at  $I_{max} = 30 \text{ A}_{eff}$



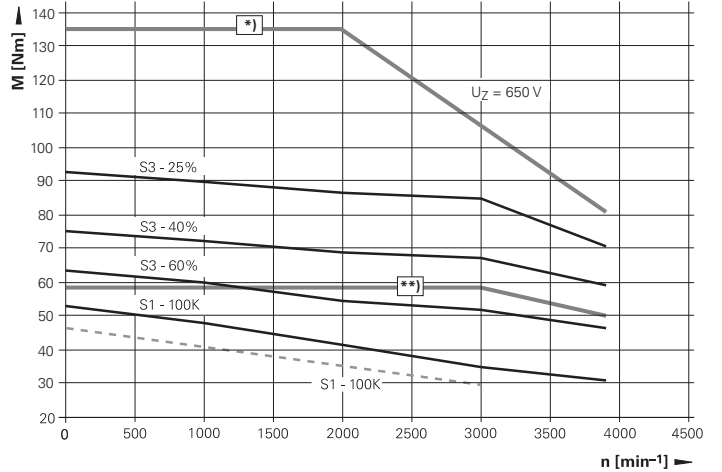
**QSY 155D EcoDyn**

\*)  $M_{max} = 64 \text{ Nm}$  at  $I_{max} = 35 \text{ A}_{eff}$   
 \*\*)  $M_{max} = 59 \text{ Nm}$  at  $I_{max} = 30 \text{ A}_{eff}$



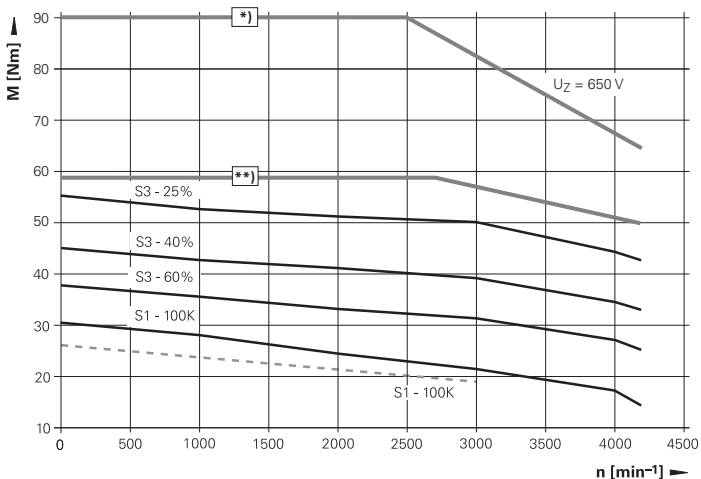
**QSY 190F EcoDyn**

\*)  $M_{max} = 135 \text{ Nm}$  at  $I_{max} = 75 \text{ A}_{eff}$   
 \*\*)  $M_{max} = 59 \text{ Nm}$  at  $I_{max} = 30 \text{ A}_{eff}$



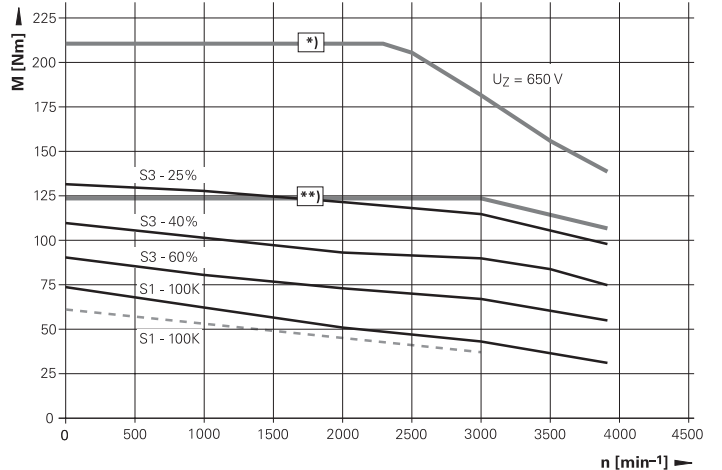
**QSY 155F EcoDyn**

\*)  $M_{max} = 90 \text{ Nm}$  at  $I_{max} = 49.5 \text{ A}_{eff}$   
 \*\*)  $M_{max} = 59 \text{ Nm}$  at  $I_{max} = 30 \text{ A}_{eff}$



**QSY 190K EcoDyn**

\*)  $M_{max} = 210 \text{ Nm}$  at  $I_{max} = 113 \text{ A}_{eff}$   
 \*\*)  $M_{max} = 123 \text{ Nm}$  at  $I_{max} = 64 \text{ A}_{eff}$



# Synchronous Motors

## 1FK7 Series Overview

### General technical information

The 1FK7 synchronous motors fulfill all requirements of a numerically controlled machine tool.

### Specifications

The specifications and the characteristic curves apply to motors mounted without thermal insulation. The temperature of the winding may differ from the maximum permissible ambient temperature of 40 °C by a maximum of 100 K. If the motor is mounted so that it is thermally insulated, it is necessary to reduce the motor torque in order to avoid thermal overloading of the motor.

### Speed measurement

The 1FK7 synchronous motors operate with sinusoidal commutation. An integrated ERN 1387 incremental rotary encoder from HEIDENHAIN measures the rotor position and shaft speed.

### Mechanical life

The service life of the bearings depends on the shaft load and the mean rotational speed (see the *Inverter Systems and Motors* Technical Manual).

### Mechanical data

**Dimensions** IM B5 (for securing by flange) as per EN 60034-7

**Flange:** Dimensions as per DIN 42948 and IEC 72

**Protection** as per EN 60529

*Motor:* IP 65

*Shaft exit:* IP 64

### Shaft end

- Cylindrical as per DIN 748 and IEC 72
- Without feather key (with feather key upon request)
- With centering hole as per ISO 866 BS 5 and thread

**Bearing** free of maintenance

**Holding brake** as option

### Thermal variables

### Natural cooling

**Temperature monitoring** with KTY 84-130 thermistor in the stator winding

**Thermal class** F

Synchronous motors	Stall torque	Stall current	Rated speed	Recommended inverters <sup>2)</sup>				Page
				1-axis module	2-axis module	Compact inverter/axis		
						UR 2xxD UE 2xxB	UE 1xx	
<b>1FK7 042-5AF71</b>	3.0 Nm	2.2 A	3000 min <sup>-1</sup>	UM 111 D	UM 121 D	Axes 1 to 4	Axes 1 to 4	<b>22</b>
<b>1FK7 060-5AF71</b>	6.0 Nm	4.5 A	3000 min <sup>-1</sup>	UM 111 D	UM 121 D	Axes 1 to 4	Axes 1 to 4	<b>24</b>
<b>1FK7 063-5AF71</b>	11.0 Nm	8.0 A	3000 min <sup>-1</sup>	UM 111 BD	UM 121 BD	Axis 4	–	
<b>1FK7 080-5AF71</b>	8.0 Nm	4.8 A	3000 min <sup>-1</sup>	UM 111 D	UM 121 D	Axes 1 to 4	Axes 1 to 4	<b>26</b>
<b>1FK7 083-5AF71</b>	16.0 Nm	10.4 A	3000 min <sup>-1</sup>	UM 111 BD	UM 121 BD	Axis 4	–	
<b>1FK7 100-5AF71</b>	18.0 Nm	11.2 A	3000 min <sup>-1</sup>	UM 111 BD	UM 121 BD	Axis 4	–	<b>28</b>
<b>1FK7 101-5AF71</b>	27.0 Nm	19.0 A	3000 min <sup>-1</sup>	UM 112 D	UM 122 D	Axis 4 <sup>1)</sup>	–	
<b>1FK7 103-5AF71</b>	36.0 Nm	27.5 A	3000 min <sup>-1</sup>	UM 113 D	–	–	–	

<sup>1)</sup> Only UE 242B, UR 242D

<sup>2)</sup> The maximum acceleration of the motor might not be achievable with the recommended inverters. If necessary, a more powerful power module must be selected.

# Synchronous Motor

## 1FK7 042-5AF71

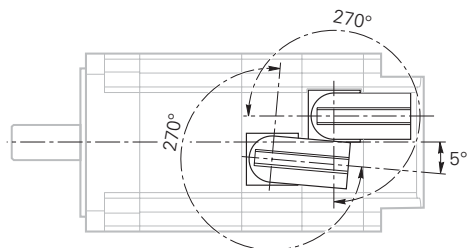
Feed motor with 4 pole pairs  
 Stall torque 3.0 Nm  
 With incremental rotary encoder



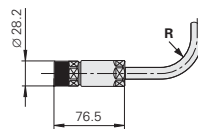
Motor	1FK7 042-5AF71	
Rated voltage $U_N$	297 V	
Power rating $P_N$	0.82 kW	
Rated shaft speed $n_N$	3000 min <sup>-1</sup>	
Rated torque $M_N$ <sup>1)</sup>	2.6 Nm	
Rated current $I_N$ <sup>1)</sup>	2 A	
Stall torque $M_0$ <sup>1)</sup>	3.0 Nm	
Stall current $I_0$ <sup>1)</sup>	2.2 A	
Max. torque $M_{max}$ <sup>2)</sup>	10.5 Nm	
Max. current $I_{max}$ <sup>2)</sup>	7.35 A	
Weight m	4.8 kg	5.4 kg
Rotor inertia J	3.01 kgcm <sup>2</sup>	3.73 kgcm <sup>2</sup>
<b>Brake</b>	<b>Without</b>	<b>With</b>
Rated voltage $U_{Br}$	–	24 Vdc
Rated current $I_{Br}$	–	0.6 A
Holding torque $M_{Br}$	–	3.8 Nm
<b>ID number</b>	539964-03	539964-04

<sup>1)</sup> At 100 K      <sup>2)</sup> Max. 200 ms

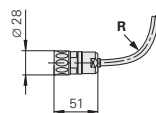
### Rotatable connections



### Power connector



### Encoder connector



For R, see page 33

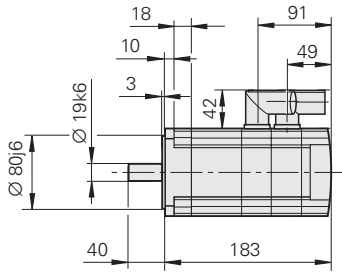
## Dimensions

### Dimensions in mm

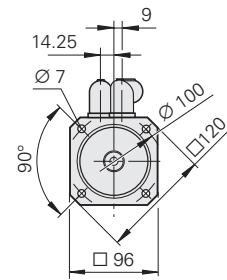
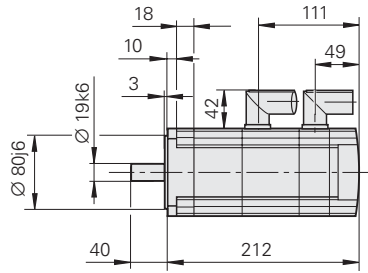


Tolerancing ISO 8015  
ISO 2768 - m H  
< 6 mm:  $\pm 0.2$  mm

**1FK7 042-5AF71** Without brake



With brake



# Synchronous Motors

## 1FK7 06x-5AF71 Series

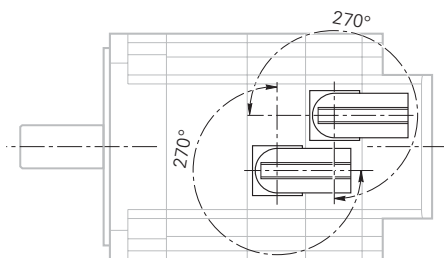
Feed motors with 4 pole pairs  
 Stall torque 6 Nm and 11 Nm  
 With incremental rotary encoder



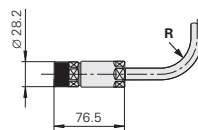
Motor	1FK7 060-5AF71		1FK7 063-5AF71	
Rated voltage $U_N$	274 V		275 V	
Power rating $P_N$	1.48 kW		2.3 kW	
Rated shaft speed $n_N$	3000 min <sup>-1</sup>			
Rated torque $M_N^{1)}$	4.7 Nm		7.3 Nm	
Rated current $I_N^{1)}$	3.7 A		5.6 A	
Stall torque $M_0^{1)}$	6.0 Nm		11.0 Nm	
Stall current $I_0^{1)}$	4.5 A		8.0 A	
Max. torque $M_{max}^{2)}$	18.0 Nm		35.0 Nm	
Max. current $I_{max}^{2)}$	15.0 A		28.0 A	
Weight m	8.0 kg	8.5 kg	12.0 kg	12.5 kg
Rotor inertia J	7.95 kgcm <sup>2</sup>	10.2 kgcm <sup>2</sup>	15.1 kgcm <sup>2</sup>	17.3 kgcm <sup>2</sup>
Brake Rated voltage $U_{Br}$ Rated current $I_{Br}$ Holding torque $M_{Br}$	<b>Without</b> – – –	<b>With</b> 24 Vdc 0.8 A 13.0 Nm	<b>Without</b> – – –	<b>With</b> 24 Vdc 0.8 A 13.0 Nm
ID number	539965-03	539965-04	539966-03	539966-04

<sup>1)</sup> At 100 K      <sup>2)</sup> Max. 200 ms

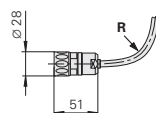
### Rotatable connections



### Power connector



### Encoder connector



For R, see page 33



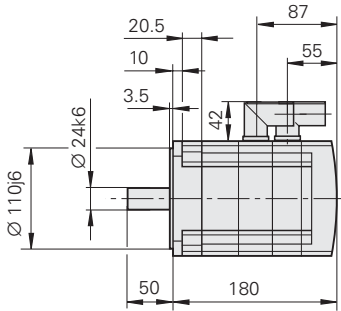
# Dimensions

## Dimensions in mm

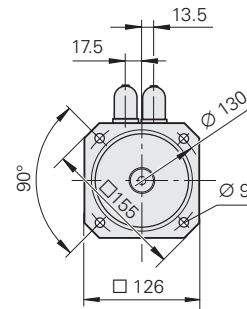
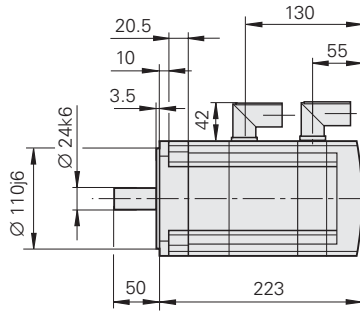


Tolerancing ISO 8015  
 ISO 2768 - m H  
 < 6 mm: ±0.2 mm

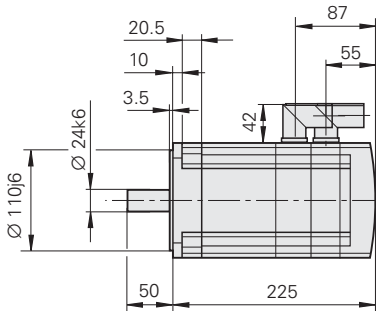
**1FK7 060-5AF71** Without brake



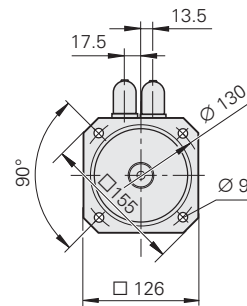
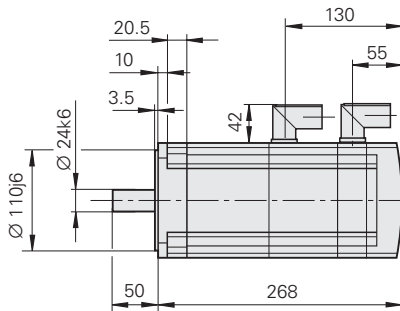
With brake



**1FK7 063-5AF71** Without brake



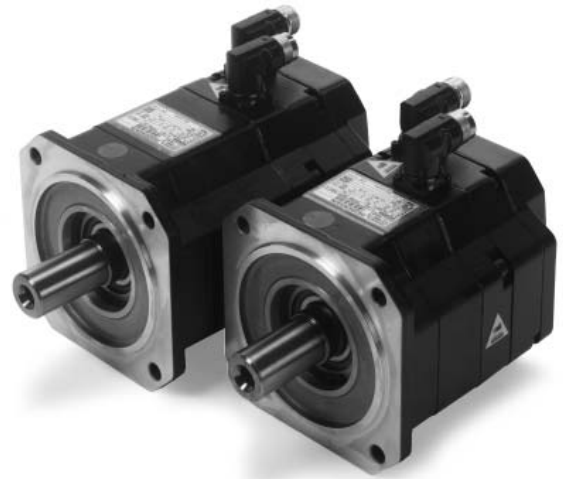
With brake



# Synchronous Motors

## 1FK7 08x-5AF71 Series

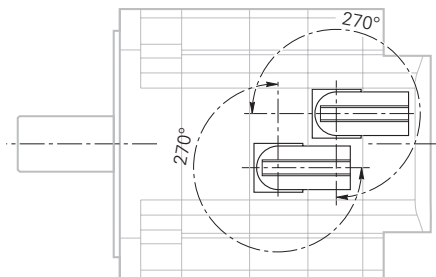
Feed motors with 4 pole pairs  
 Stall torque 8 Nm and 16 Nm  
 With incremental rotary encoder



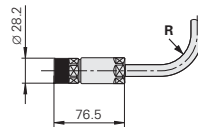
Motor	1FK7 080-5AF71		1FK7 083-5AF71	
Rated voltage $U_N$	327 V		303 V	
Power rating $P_N$	2.14 kW		3.0 kW	
Rated shaft speed $n_N$	3000 min <sup>-1</sup>			
Rated torque $M_N^{1)}$	6.8 Nm		10.5 Nm	
Rated current $I_N^{1)}$	4.4 A		7.4 A	
Stall torque $M_0^{1)}$	8.0 Nm		16.0 Nm	
Stall current $I_0^{1)}$	4.8 A		10.4 A	
Max. torque $M_{max}^{2)}$	25.0 Nm		50.0 Nm	
Max. current $I_{max}^{2)}$	18.0 A		37.0 A	
Weight m	11.3 kg	12.5 kg	16.0 kg	16.5 kg
Rotor inertia J	15.0 kgcm <sup>2</sup>	18.1 kgcm <sup>2</sup>	27.3 kgcm <sup>2</sup>	35.9 kgcm <sup>2</sup>
<b>Brake</b> Rated voltage $U_{Br}$ Rated current $I_{Br}$ Holding torque $M_{Br}$	<b>Without</b> – – –	<b>With</b> 24 Vdc 0.7 A 10.0 Nm	<b>Without</b> – – –	<b>With</b> 24 Vdc 0.9 A 22.0 Nm
<b>ID number</b>	539967-03	539967-04	539968-03	539968-04

<sup>1)</sup> At 100 K      <sup>2)</sup> Max. 200 ms

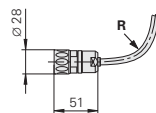
### Rotatable connections



### Power connector



### Encoder connector



For R, see page 33

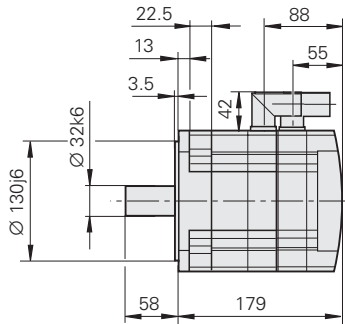
## Dimensions

### Dimensions in mm

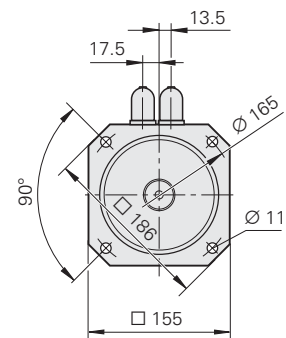
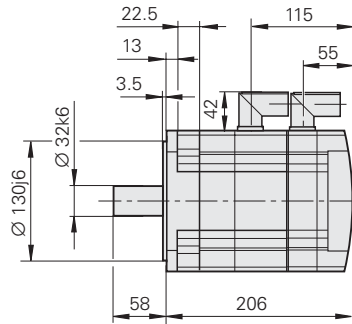


Tolerancing ISO 8015  
 ISO 2768 - m H  
 < 6 mm:  $\pm 0.2$  mm

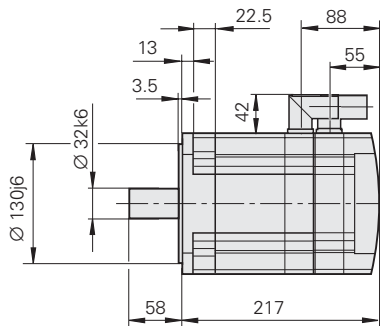
**1FK7 080-5AF71** Without brake



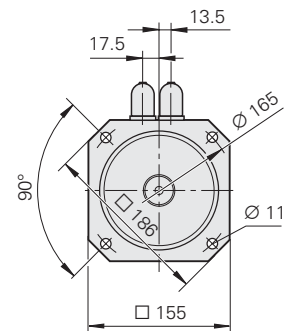
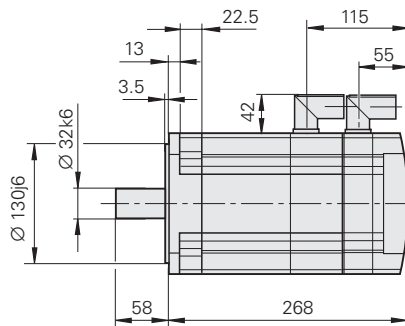
With brake



**1FK7 083-5AF71** Without brake



With brake



# Synchronous Motors

## 1FK7 10x-5AF71 Series

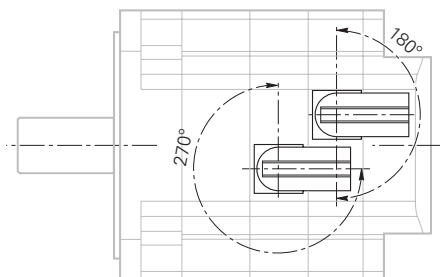
Feed motors with 4 pole pairs  
 Stall torque 18 Nm to 36 Nm  
 With incremental rotary encoder



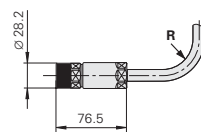
Motor	1FK7 100-5AF71		1FK7 101-5AF71		1FK7 103-5AF71	
Rated voltage $U_N$	318 V		277 V		262 V	
Power rating $P_N$	3.77 kW		4.87 kW		4.4 kW	
Rated shaft speed $n_N$	3000 min <sup>-1</sup>					
Rated torque $M_N$ <sup>1)</sup>	12.0 Nm		15.5 Nm		14.0 Nm	
Rated current $I_N$ <sup>1)</sup>	8.0 A		11.8 A		12.0 A	
Stall torque $M_0$ <sup>1)</sup>	18.0 Nm		27.0 Nm		36.0 Nm	
Stall current $I_0$ <sup>1)</sup>	11.2 A		19.0 A		27.5 A	
Max. torque $M_{max}$ <sup>2)</sup>	55.0 Nm		80.0 Nm		108.0 Nm	
Max. current $I_{max}$ <sup>2)</sup>	37.0 A		63.0 A		84.0 A	
Weight m	18.9 kg	21.5 kg	21.0 kg	24.0 kg	29.0 kg	32.0 kg
Rotor inertia J	55.3 kgcm <sup>2</sup>	63.9 kgcm <sup>2</sup>	79.9 kgcm <sup>2</sup>	92.3 kgcm <sup>2</sup>	105.0 kgcm <sup>2</sup>	118.0 kgcm <sup>2</sup>
Brake Rated voltage $U_{Br}$ Rated current $I_{Br}$ Holding torque $M_{Br}$	<b>Without</b> – – –	<b>With</b> 24 Vdc 0.9 A 22.0 Nm	<b>Without</b> – – –	<b>With</b> 24 Vdc 1.0 A 41.0 Nm	<b>Without</b> – – –	<b>With</b> 24 Vdc 1.0 A 41.0 Nm
ID number	539969-03	539969-04	539970-03	539970-04	539971-03	539971-04

<sup>1)</sup> At 100 K      <sup>2)</sup> Max. 200 ms

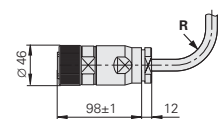
### Rotatable connections



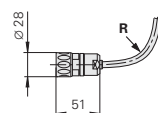
### Power connector for 1FK7 100-5AF71



### Power connector for 1FK7 101-5AF71/ 1FK7 103-5AF71



### Encoder connector



For R, see page 33

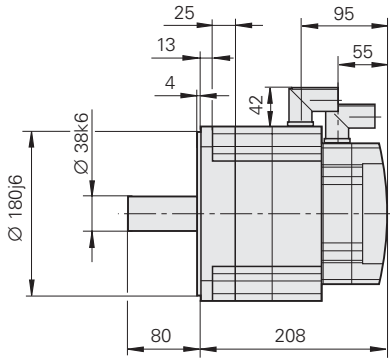
# Dimensions

## Dimensions in mm

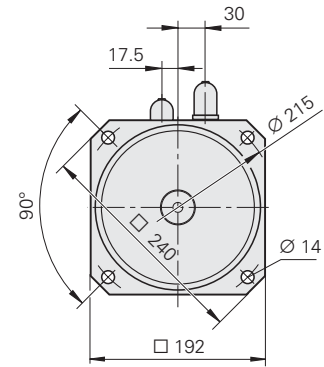
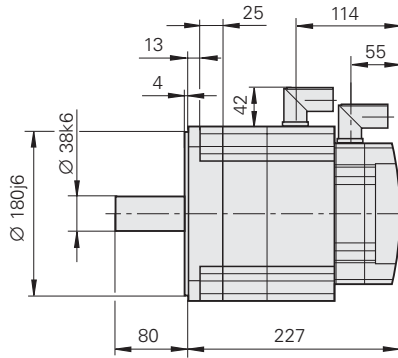


Tolerancing ISO 8015  
 ISO 2768 - m H  
 < 6 mm: ±0.2 mm

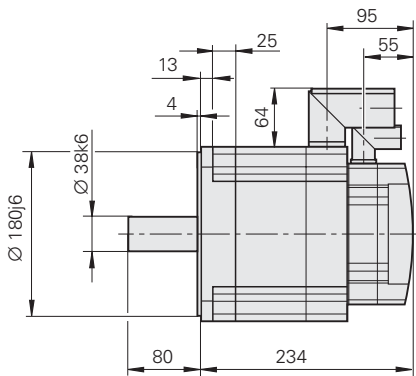
**1FK7 100-5AF71** Without brake



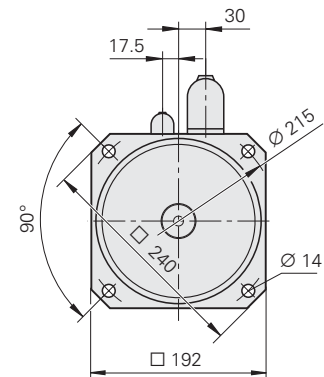
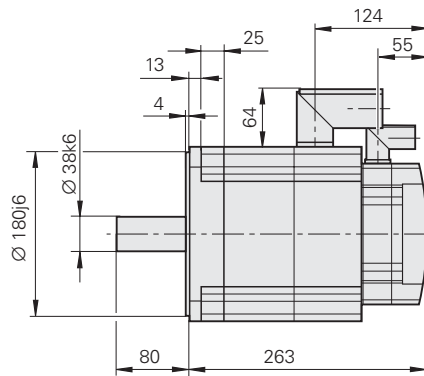
With brake



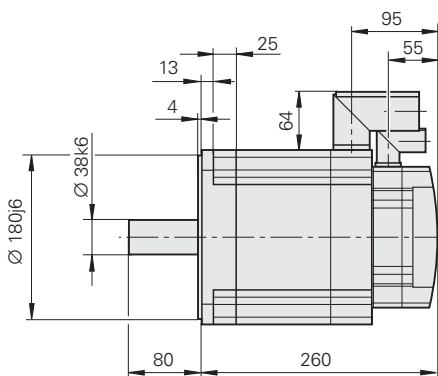
**1FK7 101-5AF71** Without brake



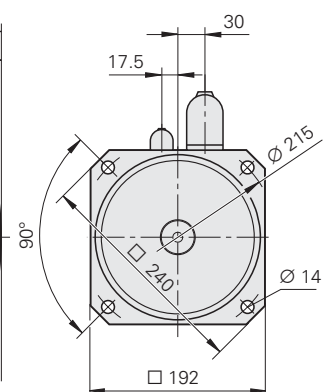
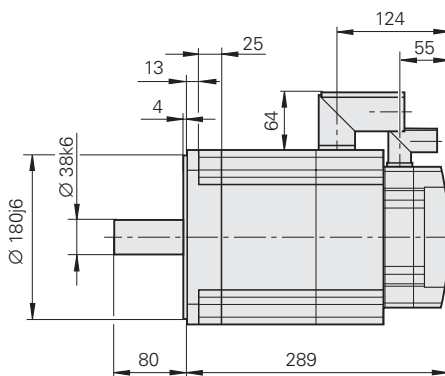
With brake



**1FK7 103-5AF71** Without brake



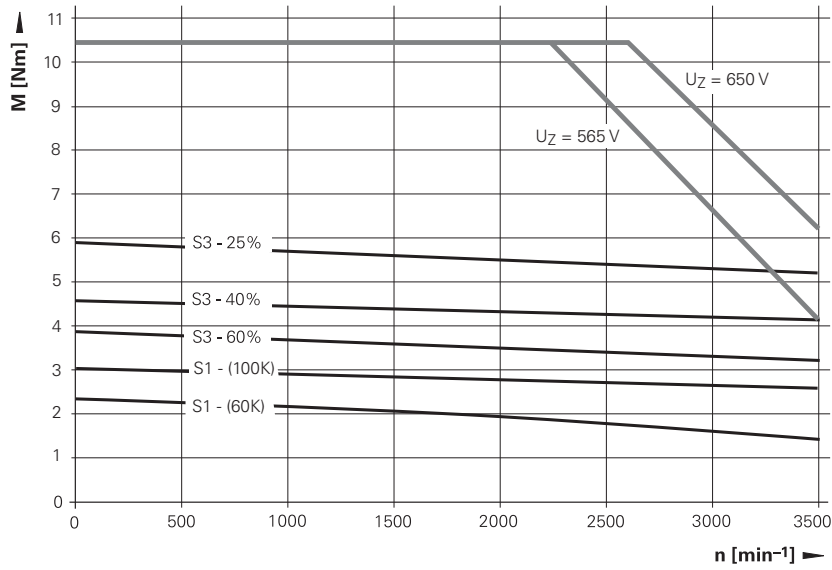
With brake



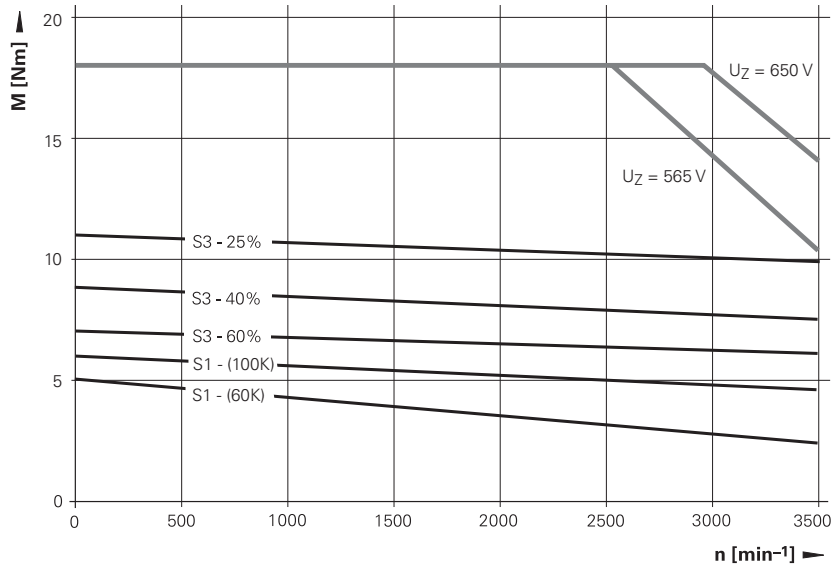
# Synchronous Motors

## Torque Characteristics

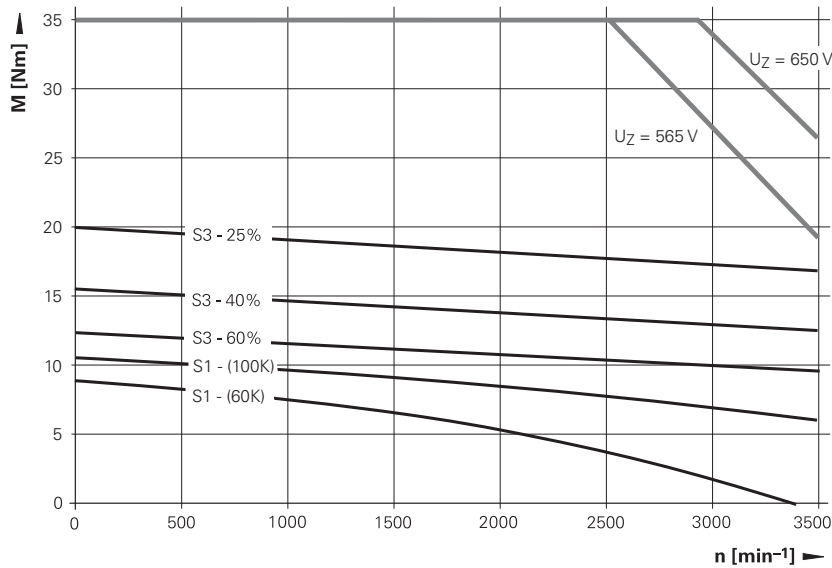
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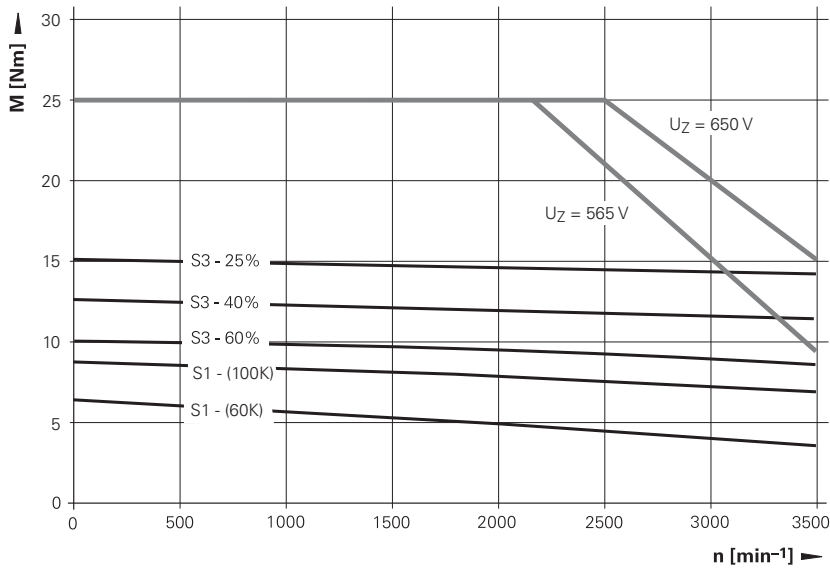
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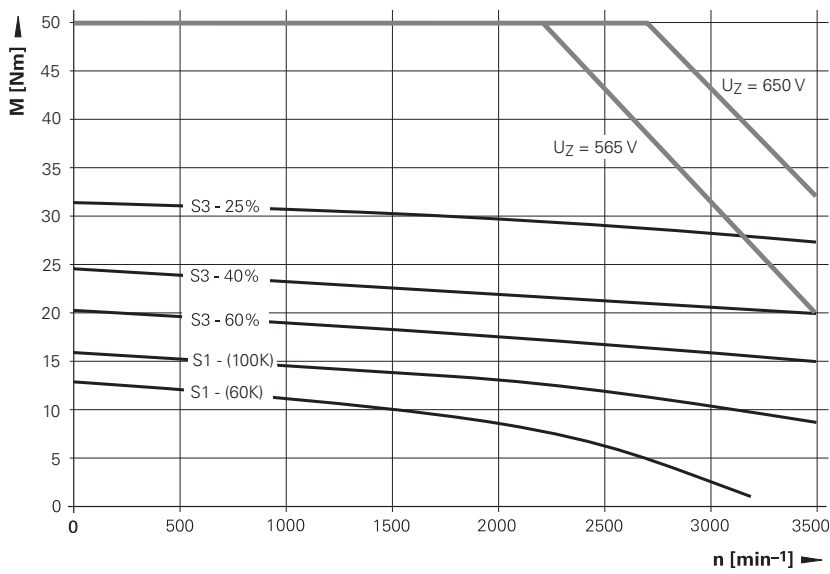
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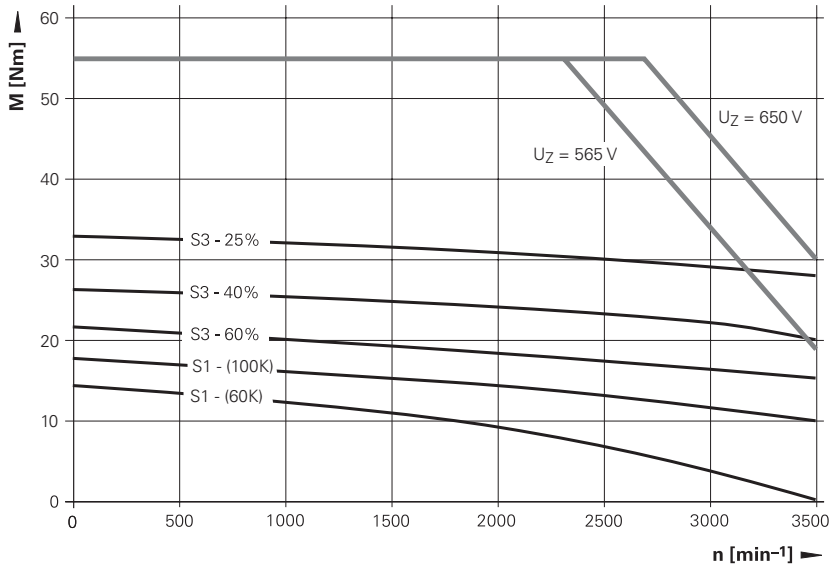
**1FK7 080-5AF71**



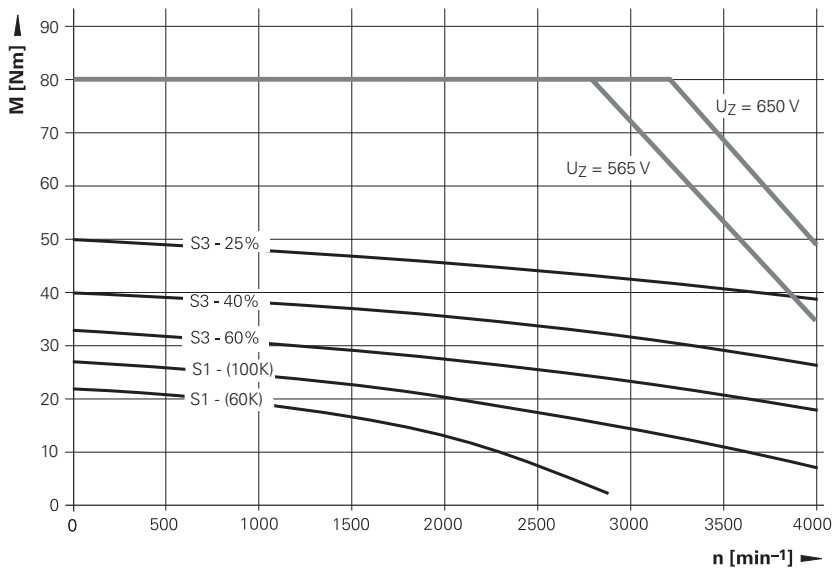
**1FK7 083-5AF71**



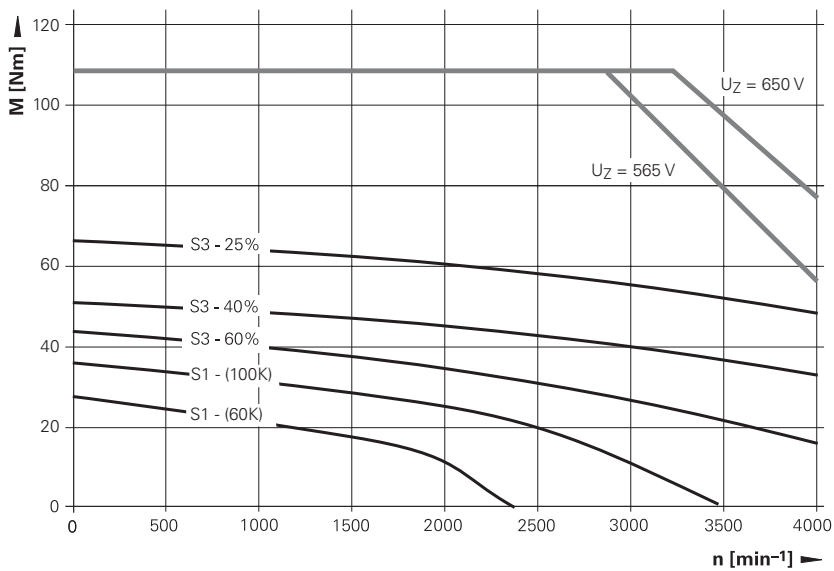
**1FK7 100-5AF71**



**1FK7 101-5AF71**



**1FK7 103-5AF71**





# Synchronous Motors

## Cables and Connectors

### Power cables

Current load at ambient temperature up to 40 °C

	Cable with one connector ID number	Connector ID number	Cable without connectors ID number	Bend radius R for frequent flexing	Cable type	Diameter
<b>Current load up to 13.8 A</b>						
<b>QSY 96</b> <b>QSY 116</b> <b>QSY 116J EcoDyn</b> <b>QSY 130C EcoDyn</b> <b>QSY 130E EcoDyn</b> <b>QSY 155B EcoDyn</b> <b>QSY 155C EcoDyn</b> <b>QSY 155D EcoDyn</b>	352960-xx	325165-02	348948-01	≥ 65 mm	PUR [4 x 1.5 mm <sup>2</sup> + (2 x 1.0 mm <sup>2</sup> )]	12.5 mm
<b>1FK7 042-5AF71</b> <b>1FK7 060-5AF71</b> <b>1FK7 063-5AF71</b> <b>1FK7 080-5AF71</b> <b>1FK7 083-5AF71</b> <b>1FK7 100-5AF71</b>						
<b>QSY 155B</b> <b>QSY 155C</b>	352962-xx	333090-02				
<b>Current load up to 26.0 A</b>						
<b>QSY 155D</b> <b>QSY 155F</b> <b>QSY 155F EcoDyn</b> <b>QSY 190C EcoDyn</b> <b>QSY 190D EcoDyn</b> <b>QSY 190F EcoDyn</b>	352963-xx	333090-02	348948-03	≥ 75 mm	PUR [4 x 4 mm <sup>2</sup> + (2 x 1.0 mm <sup>2</sup> )]	14.8 mm
<b>1FK7 101-5AF71</b>						
<b>Current load up to 32.8 A</b>						
<b>QSY 190K EcoDyn</b> <b>1FK7 103-5AF71</b>	393570-xx	333090-03	348948-04	≥ 85 mm	PUR [4 x 6 mm <sup>2</sup> + (2 x 1.0 mm <sup>2</sup> )]	16.4 mm

### Encoder cables

	Cable length	Cable complete with connectors ID number	Line-drop compensator ID number	Extension cable ID number	Bend radius R for frequent flexing
<b>QSY with ECN 1313 or EQN 1325</b>	< 15 m	336376-xx	–	340302-xx (as required)	≥ 100 mm
	> 15 m	336376-xx	370224-01	340302-xx	
<b>QSY or 1FK7 synchronous motor with ERN 1387</b>	< 30 m	289440-xx	–	336847-xx (as required)	≥ 100 mm
	> 30 m	289440-xx	370226-01	336847-xx	

# Asynchronous Motors

## QAN Overview

### General technical information

#### Speed measurement

An integrated rotary encoder from HEIDENHAIN measures the shaft speed.

- ERN 1381 with 1 024 lines for motors with solid shaft.
- ERM 280 with 600 lines for motors with hollow shaft.

#### Specifications

The specifications and the characteristic curves apply to motors mounted without thermal insulation. The temperature may differ from the maximum permissible ambient temperature of 40 °C by a maximum of 105 K. If the motor is mounted so that it is thermally insulated, it is necessary to reduce the motor torque in order to avoid thermal overloading of the motor.

#### Shaft bearing

HEIDENHAIN asynchronous motors are equipped with maintenance-free bearings. The shaft bearing on **motors with solid shaft** is optionally available as either standard bearing or as spindle bearing. The version with spindle bearing can withstand greater lateral forces and allows higher spindle speeds:

- Standard bearing: max. 8000/9000 min<sup>-1</sup>
  - Spindle bearing: max 10000/12000 min<sup>-1</sup>
- Motors with spindle bearing have a slightly larger overall length.

The **hollow-shaft motors** always have spindle bearings.

#### Mechanical life

The service life of the bearings depends on the shaft load and the mean rotational speed (see the *Inverter Systems and Motors* Technical Manual).

#### Shaft end

QAN asynchronous motors from HEIDENHAIN have a cylindrical shaft end as per DIN 748. The solid-shaft motors have a centering hole as per DIN 332-DR.

Asynchronous motors with **standard bearing** are supplied with keyway and feather key as per DIN 6885 Sheet 1 and are full-key balanced. They are also available with smooth shaft upon request.

Feather key:

QAN 200: AS 10 x 8 x 70

QAN 260: AS 12 x 8 x 90

QAN 320: A 16 x 8 x 90

The standard version of the asynchronous motors **with spindle bearing** has a smooth shaft (without keyway and feather key). Upon request motors with solid shaft are also available with keyway and feather key as per DIN 6885 Sheet 1.

#### Precision balancing

QAN asynchronous motors from HEIDENHAIN can be balanced at any time.

#### Hollow-shaft motors

The QAN 200 UH and QAN 260 UH hollow-shaft motors are suited for mounting directly on mechanical spindles. The hollow shaft permits you to convey coolant to tools with inner cooling.

The coolant is introduced at the rear of the motor through a rotating manifold (e.g. from Deublin Co., order no.: 1109-020-188). The shaft end is prepared for this.

#### Mechanical data

**Dimensions** IM B35 (for securing by flange/base) as per EN 60034-7

**Flange:** Dimensions as per DIN 42948 and IEC 72

**Protection** as per EN 60529: IP 54

#### Vibration severity

Grade SR (external precision balancing possible)

#### Thermal variables

**Separate cooling** through integral fan  
**Temperature monitoring** with KTY 84-130 thermistor in the stator winding

**Thermal class** F

Asynchronous motors with solid shaft	Rated power output	Rated speed	Max. speed		Rated torque	Rated current	Recommended inverters			Page
			Standard bearing	Spindle bearing			1-axis module	2-axis module	Compact inverters	
<b>QAN 200M</b>	5.5 kW	1500 min <sup>-1</sup>	9000 min <sup>-1</sup>	12000 min <sup>-1</sup>	35.0 Nm	18.0 A	UM 112D	UM 122D	Spindle output	<b>36</b>
<b>QAN 200L</b>	7.5 kW	1500 min <sup>-1</sup>	9000 min <sup>-1</sup>	12000 min <sup>-1</sup>	47.8 Nm	20.1 A	UM 112D	UM 122D	Spindle output	
<b>QAN 200U</b>	10.0 kW	1500 min <sup>-1</sup>	9000 min <sup>-1</sup>	12000 min <sup>-1</sup>	63.7 Nm	25.0 A	UM 112D	UM 122D	Spindle output <sup>1)</sup>	
<b>QAN 260M</b>	15.0 kW	1500 min <sup>-1</sup>	8000 min <sup>-1</sup>	10000 min <sup>-1</sup>	95.5 Nm	35.0 A	UM 113D	–	Spindle output <sup>2)</sup>	<b>38</b>
<b>QAN 260L</b>	20.0 kW	1500 min <sup>-1</sup>	8000 min <sup>-1</sup>	10000 min <sup>-1</sup>	127.3 Nm	46.0 A	UM 113D	–	–	
<b>QAN 260U</b>	24.0 kW	1500 min <sup>-1</sup>	8000 min <sup>-1</sup>	10000 min <sup>-1</sup>	152.8 Nm	58.0 A	UM 114D	–	–	
<b>QAN 260W</b>	12.0 kW	750 min <sup>-1</sup>	8000 min <sup>-1</sup>	10000 min <sup>-1</sup>	152.8 Nm	29.0 A	UM 112D	–	Spindle output <sup>2)</sup>	
<b>QAN 320M</b>	32.0 kW	1500 min <sup>-1</sup>	8000 min <sup>-1</sup>	10000 min <sup>-1</sup>	203.7 Nm	77.5 A	UM 114D	–	–	<b>40</b>
<b>QAN 320L</b>	40.0 kW	1500 min <sup>-1</sup>	8000 min <sup>-1</sup>	10000 min <sup>-1</sup>	254.6 Nm	99.0 A	UM 115D	–	–	
<b>QAN 320W</b>	18.0 kW	750 min <sup>-1</sup>	8000 min <sup>-1</sup>	10000 min <sup>-1</sup>	229.2 Nm	43.0 A	UM 114D	–	–	

Asynchronous motors with hollow shaft	Rated power output	Rated speed	Max. speed		Rated torque	Rated current	Recommended inverters			Page
			Standard bearing	Spindle bearing			1-axis module	2-axis module	Compact inverters	
<b>QAN 200UH</b>	10.0 kW	1500 min <sup>-1</sup>	–	12000 min <sup>-1</sup>	63.7 Nm	25.0 A	UM 112D	UM 122D	Spindle output <sup>1)</sup>	<b>42</b>
<b>QAN 260UH</b>	22.0 kW	1500 min <sup>-1</sup>	–	10000 min <sup>-1</sup>	140.0 Nm	54.0 A	UM 113D <sup>1)</sup> UM 114D <sup>3)</sup>	–	–	<b>44</b>

<sup>1)</sup> Only UE 24xB, UR 24x

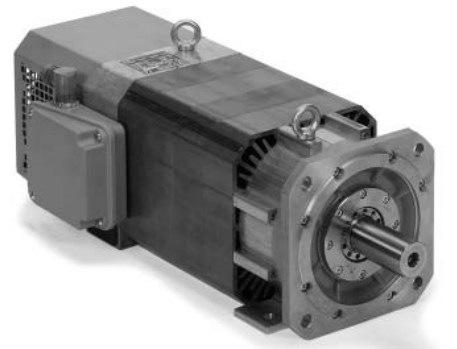
<sup>2)</sup> Only UR 24x

<sup>3)</sup> Depending on the required acceleration of the spindle ( $I_{max}$ )

# Asynchronous Motors with Solid Shaft

## QAN 200 Series

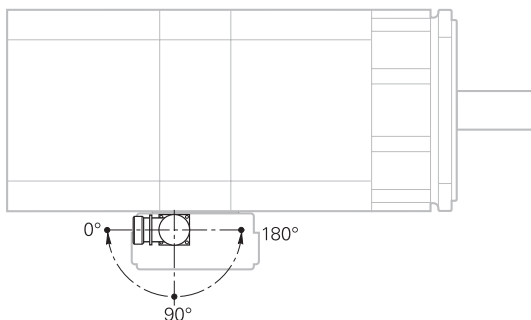
Spindle motors with 2 pole pairs  
 Rated power output 5.5 kW to 10 kW  
 Choice of standard or spindle bearing



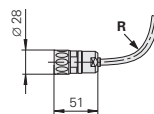
Motor	QAN 200M	QAN 200L	QAN 200U
<b>Rated voltage <math>U_N</math></b>	250 V	305 V	330 V
<b>Power rating <math>P_N</math></b>	5.5 kW	7.5 kW	10.0 kW
<b>Rated shaft speed <math>n_N</math></b>	1500 min <sup>-1</sup>		
<b>Rated torque <math>M_N</math></b> (105 K)	35.0 Nm	47.8 Nm	63.7 Nm
<b>Rated current <math>I_N</math></b> (105 K)	18.0 A	20.1 A	25.0 A
<b>Efficiency</b>	0.85		
<b>Max. shaft speed <math>n_{max}</math></b> <sup>1)</sup> Standard bearing Spindle bearing	9000 min <sup>-1</sup> 12000 min <sup>-1</sup>		
<b>Max. current <math>I_{max}</math></b>	33 A	36 A	44 A
<b>Weight m</b>	51 kg	68 kg	83 kg
<b>Rotor inertia J</b>	245 kgcm <sup>2</sup>	353 kgcm <sup>2</sup>	405 kgcm <sup>2</sup>
<b>Protection</b>	IP 54		
<b>Fan</b> Rated voltage $U_L$ Rated current $I_L$ Frequency $f_L$	3 × 400 V 0.2 A 50 Hz/60 Hz		
<b>ID number</b> Motor with standard bearing Motor with spindle bearing	374328-01 374328-13	374329-01 374329-13	374330-01 374330-13

<sup>1)</sup> The max. speed depends on the motor's application conditions, such as the shaft load (see the Inverter Systems and Motors *Technical Manual*)

### Rotatable connections



### Encoder connector



For R, see page 59

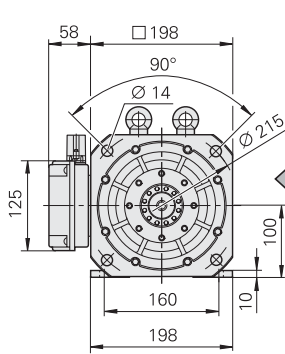
# Dimensions

## Dimensions in mm

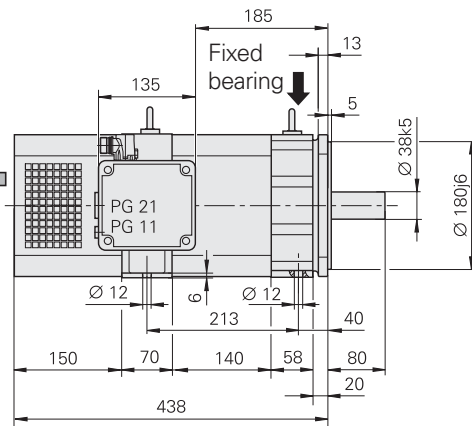


Tolerancing ISO 8015  
 ISO 2768 - m H  
 < 6 mm: ±0.2 mm

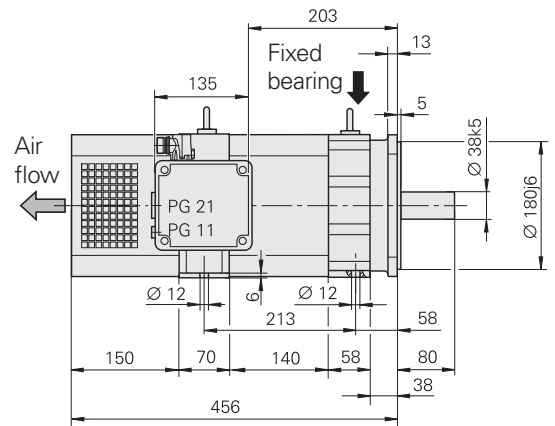
### QAN 200M



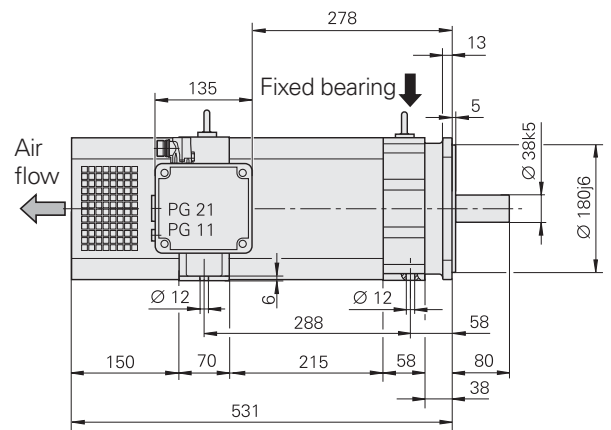
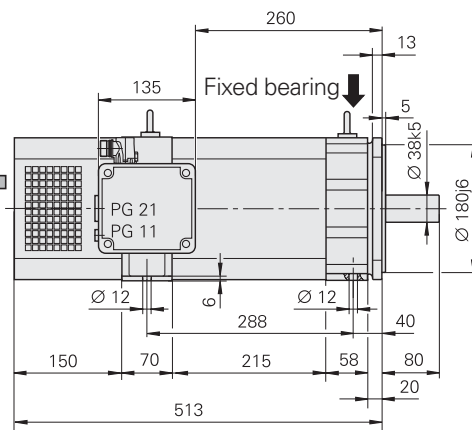
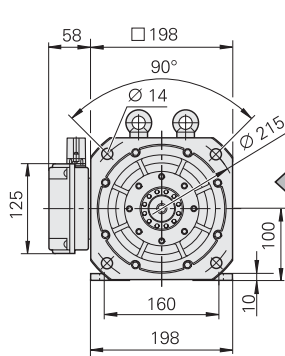
#### With standard bearing



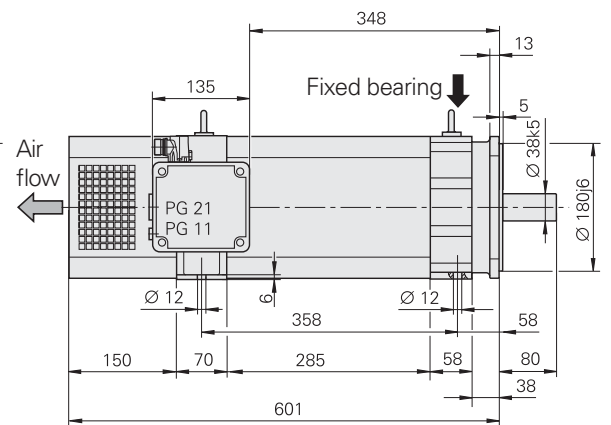
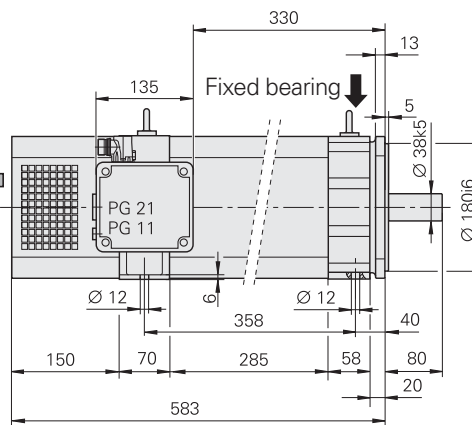
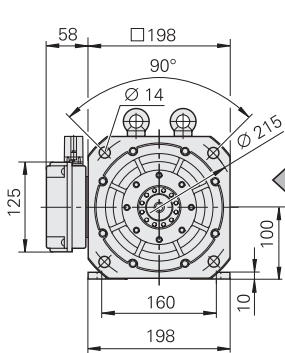
#### With spindle bearing



### QAN 200L



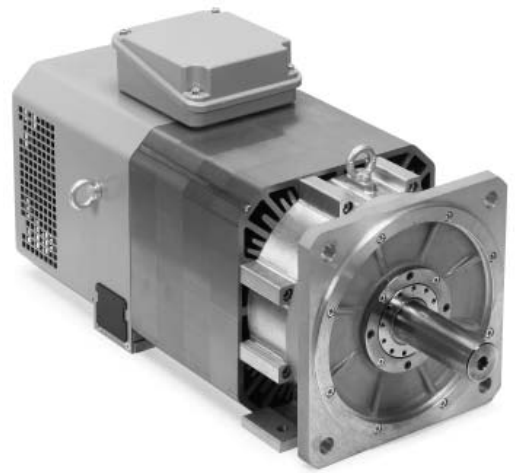
### QAN 200U



# Asynchronous Motors with Solid Shaft

## QAN 260 Series

Spindle motors with 2 pole pairs  
 Rated power output 12 kW to 24 kW  
 Choice of standard or spindle bearing

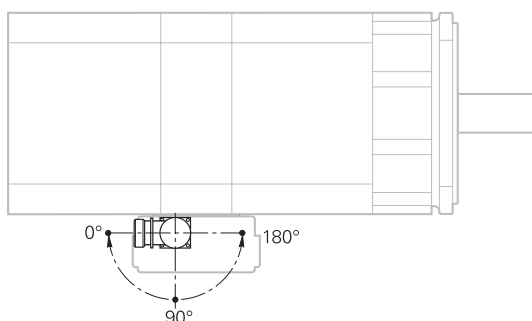


Motor	QAN 260M	QAN 260L	QAN 260U	QAN 260W
<b>Rated voltage <math>U_N</math></b>	348 V	331 V	318 V	335 V
<b>Power rating <math>P_N</math></b>	15 kW	20 kW	24 kW	12 kW
<b>Rated shaft speed <math>n_N</math></b>	1500 min <sup>-1</sup>			750 min <sup>-1</sup>
<b>Rated torque <math>M_N</math></b> (105 K)	95.5 Nm	127.3 Nm	152.8 Nm	152.8 Nm
<b>Rated current <math>I_N</math></b> (105 K)	35.0 A	46.0 A	58.0 A	29.0 A
<b>Efficiency</b>	0.85			
<b>Max. shaft speed <math>n_{max}</math></b> <sup>1)</sup> Standard bearing Spindle bearing*	8000 min <sup>-1</sup> 10000 min <sup>-1</sup> or 12000 min <sup>-1</sup>		8000 min <sup>-1</sup> 10000 min <sup>-1</sup>	
<b>Max. current <math>I_{max}</math></b>	70 A	96 A	116 A	62 A
<b>Weight m</b>	112 kg	135 kg	158 kg	158 kg
<b>Rotor inertia J</b>	700 kgcm <sup>2</sup>	920 kgcm <sup>2</sup>	1100 kgcm <sup>2</sup>	1100 kgcm <sup>2</sup>
<b>Protection</b>	IP 54			
<b>Fan</b> Rated voltage $U_L$ Rated current $I_L$ Frequency $f_L$	3 × 400 V 0.35 A 50 Hz/60 Hz			
<b>ID number</b> Motor with standard bearing Motor with spindle bearing 10000 min <sup>-1</sup> 12000 min <sup>-1</sup>	510019-01 510019-13 510019-33	510020-01 510020-13 510020-33	510021-01 510021-13 –	510022-01 510022-13 –

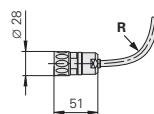
<sup>1)</sup>The max. speed depends on the motor's application conditions, such as the shaft load  
 (see the Inverter Systems and Motors *Technical Manual*)

\* Please indicate when ordering

### Rotatable connections



### Encoder connector



For R, see page 59

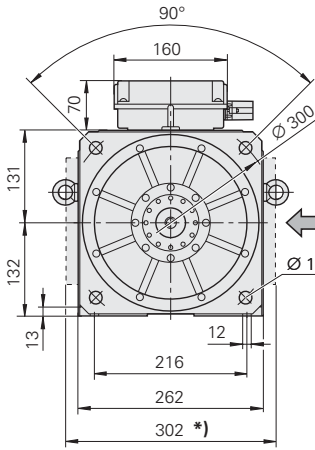
# Dimensions

## Dimensions in mm

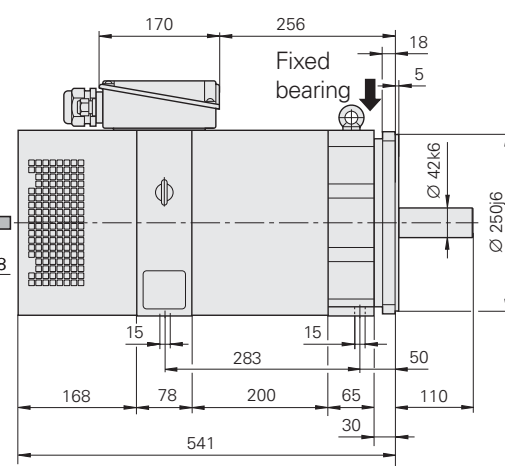


Tolerancing ISO 8015  
 ISO 2768 - m H  
 < 6 mm: ±0.2 mm

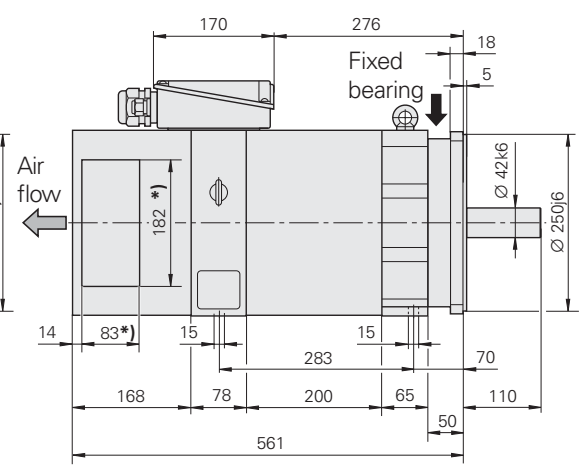
### QAN 260M



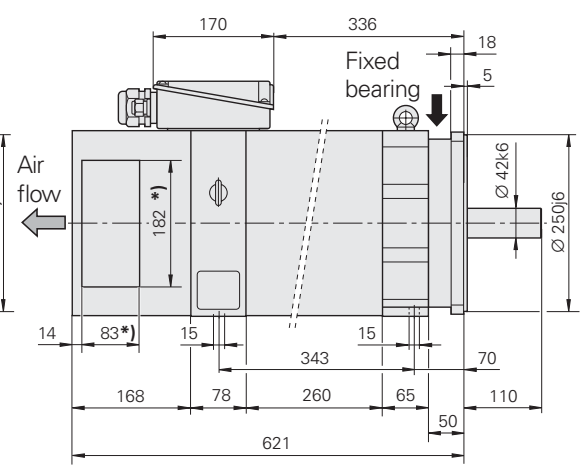
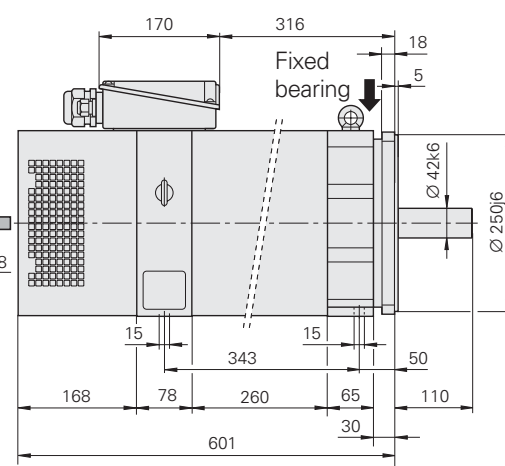
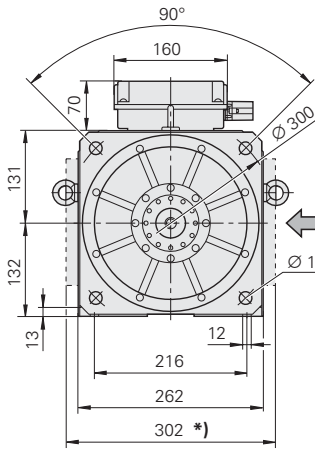
#### With standard bearing



#### With spindle bearing

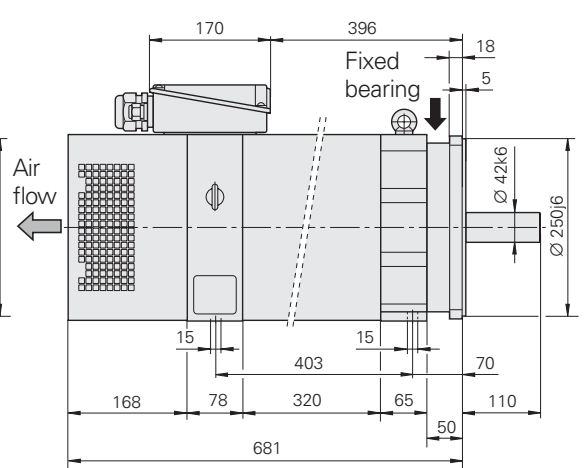
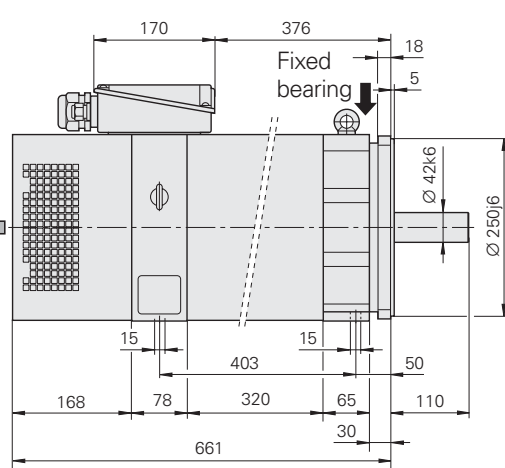
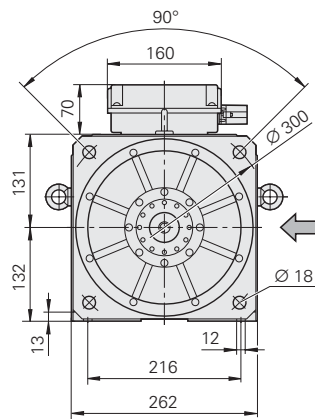


### QAN 260L



\*) Only for QAN 260M/L with 12000 min<sup>-1</sup>

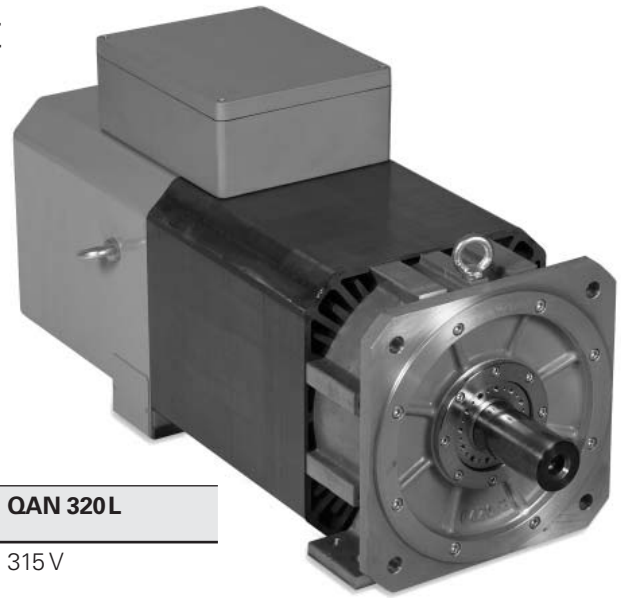
### QAN 260U QAN 260W



# Asynchronous Motors with Solid Shaft

## QAN 320 Series

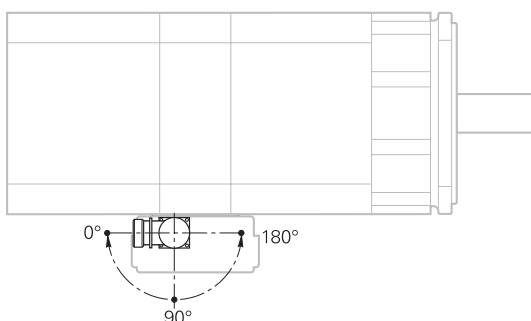
Spindle motors with 2 pole pairs  
 Rated power output 18 kW to 40 kW



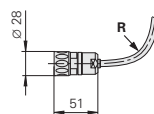
Motor	QAN 320M	QAN 320W	QAN 320L
<b>Rated voltage <math>U_N</math></b>	317 V	320 V	315 V
<b>Power rating <math>P_N</math></b>	32 kW	18 kW	40 kW
<b>Rated shaft speed <math>n_N</math></b>	1 500 min <sup>-1</sup>	750 min <sup>-1</sup>	1 500 min <sup>-1</sup>
<b>Rated torque <math>M_N</math></b> (105 K)	203.7 Nm	229.2 Nm	254.6 Nm
<b>Rated current <math>I_N</math></b> (105 K)	77.5 A	43.0 A	99.0 A
<b>Efficiency</b>	0.85		0.91
<b>Max. shaft speed <math>n_{max}</math></b> <sup>1)</sup> Standard bearing Spindle bearing	8 000 min <sup>-1</sup> 10 000 min <sup>-1</sup>		
<b>Max. current <math>I_{max}</math></b>	155 A	86 A	186 A
<b>Weight m</b>	240 kg		280 kg
<b>Rotor inertia J</b>	1 870 kgcm <sup>2</sup>		2 300 kgcm <sup>2</sup>
<b>Fan</b> Rated voltage $U_L$ Rated current $I_L$ Frequency $f_L$	3 × 400 V 0.6 A 50 Hz/60 Hz		
<b>ID number</b> Motor with standard bearing Motor with spindle bearing	513302-01 513302-13	517952-01 517952-13	577484-01 577484-13

<sup>1)</sup>The max. speed depends on the motor's application conditions, such as the shaft load  
 (see the *Inverter Systems and Motors* Technical Manual)

### Rotatable connections



### Encoder connector



For R, see page 59



## Dimensions

### Dimensions in mm

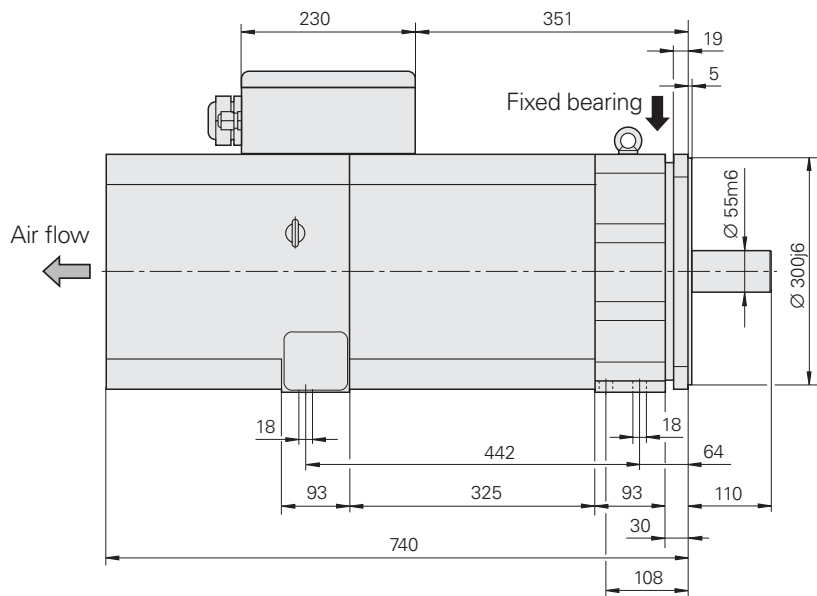
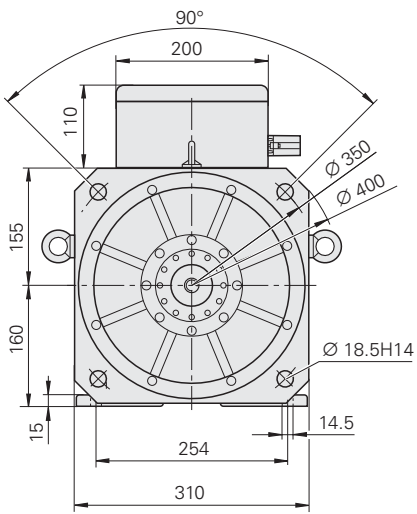


Tolerancing ISO 8015

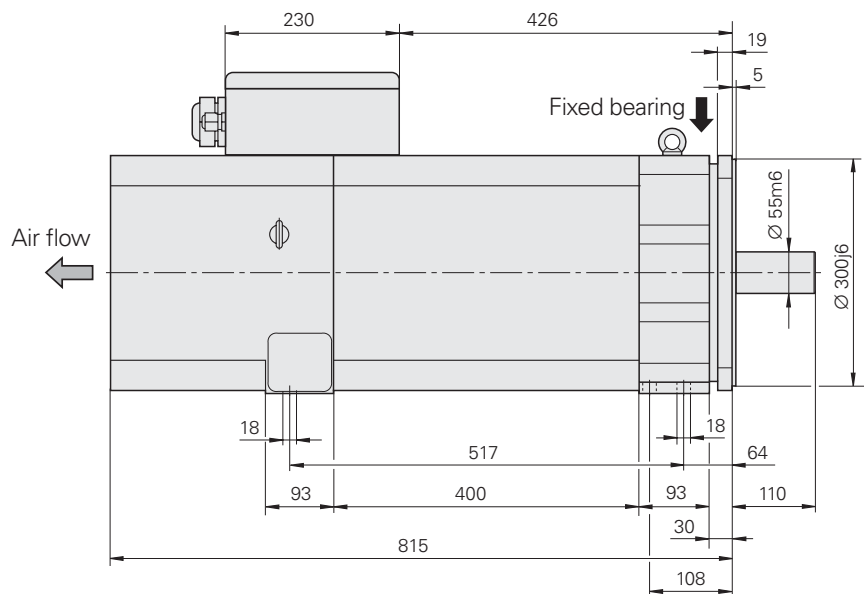
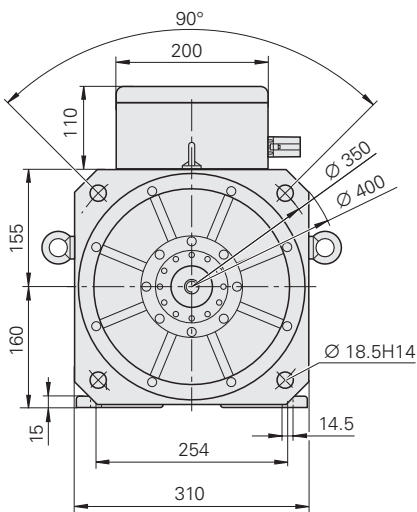
ISO 2768 - m H

< 6 mm: ±0.2 mm

### QAN 320M QAN 320W



### QAN 320L



# Asynchronous Motors with Hollow Shaft

## QAN 200 UH

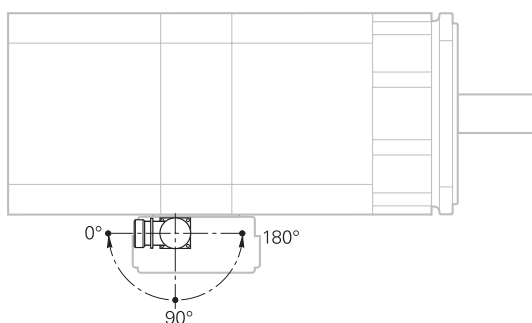
Hollow-shaft spindle motor with 2 pole pairs  
 Rated power output to 10 kW  
 With spindle bearing



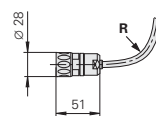
Motor	QAN 200 UH	
Rated voltage $U_N$	330 V	
Power rating $P_N$	10.0 kW	
Rated shaft speed $n_N$	1500 min <sup>-1</sup>	
Rated torque $M_N$ (105 K)	63.7 Nm	
Rated current $I_N$ (105 K)	25.0 A	
Efficiency	0.85	
Max. shaft speed $n_{max}$ <sup>1)</sup> Spindle bearing	12000 min <sup>-1</sup>	15000 min <sup>-1</sup>
Max. current $I_{max}$	44 A	
Bore hole in shaft	Ø 9 mm	
Weight m	91 kg	
Rotor inertia J	405 kgcm <sup>2</sup>	
Protection	IP 54	
<b>Fan</b> Rated voltage $U_L$ Rated current $I_L$ Frequency $f_L$	3 × 400 V 0.2 A 50 Hz/60 Hz	
<b>ID number</b> Motor with spindle bearing	536257-18	536257-43

<sup>1)</sup> The max speed depends on the motor's application conditions, such as the shaft load (see the *Inverter Systems and Motors* Technical Manual)

### Rotatable connections



### Encoder connector



For R, see page 59

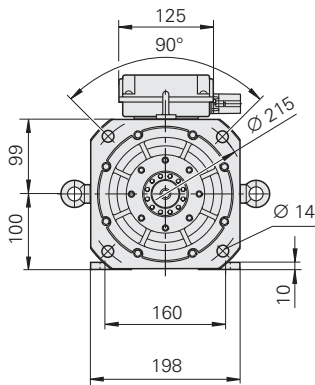
# Dimensions

## Dimensions in mm

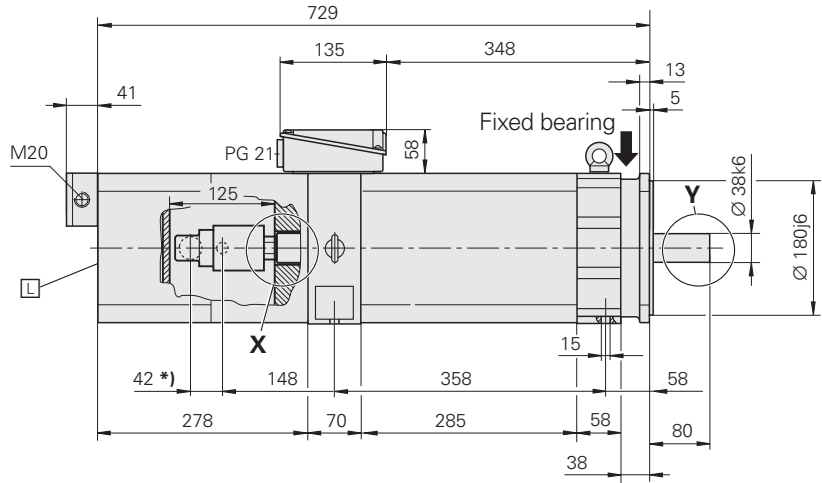


Tolerancing ISO 8015  
 ISO 2768 - m H  
 < 6 mm: ±0.2 mm

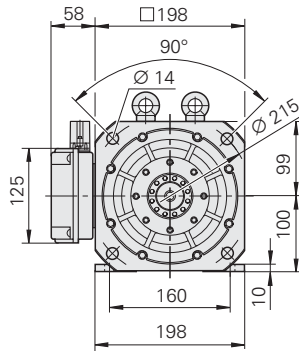
**QAN 200UH 12000 min<sup>-1</sup>**



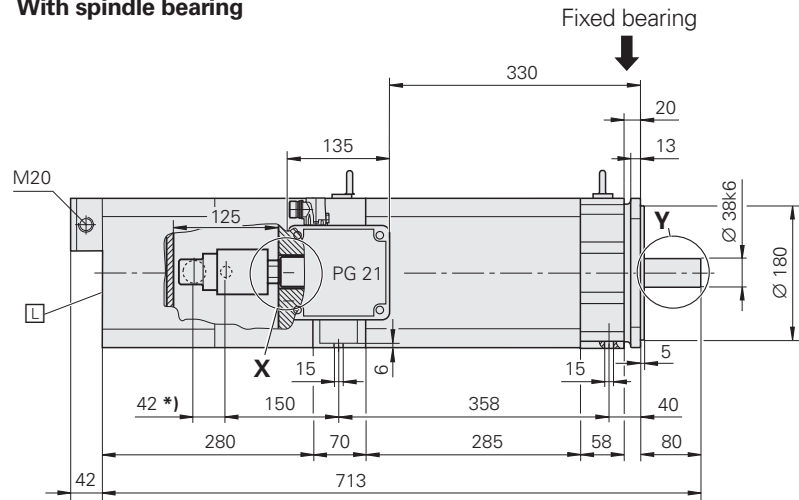
**With spindle bearing**



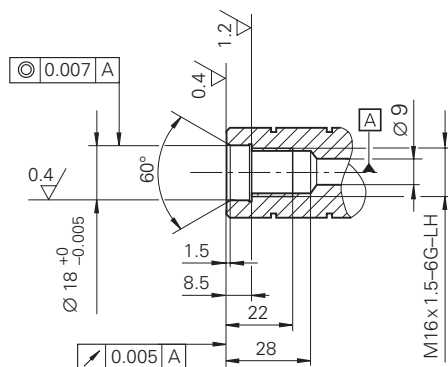
**QAN 200UH 15000 min<sup>-1</sup>**



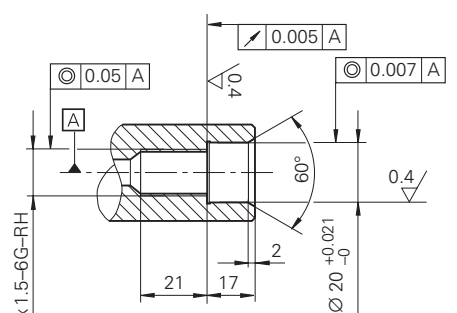
**With spindle bearing**



**X**



**Y**



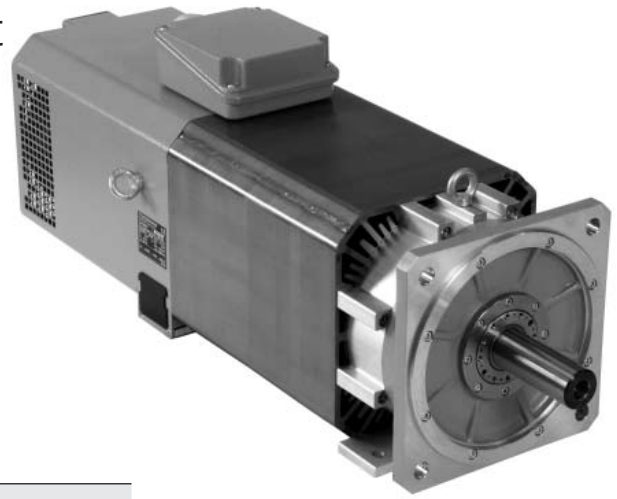
□ = Air outlet at the rear

\*) = Coolant connection on the right side  
 e.g. from Deublin 1109-020-188

# Asynchronous Motors with Hollow Shaft

## QAN 260 UH

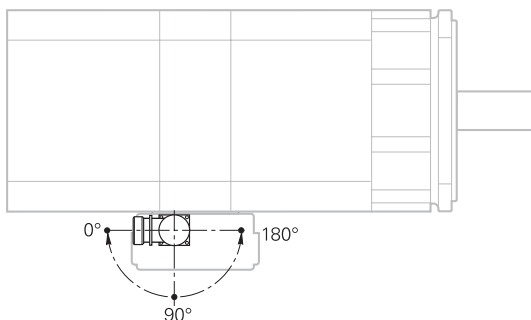
Hollow-shaft spindle motor with 2 pole pairs  
 Rated power output to 24 kW  
 With spindle bearing



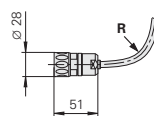
Motor	QAN 260 UH
Rated voltage $U_N$	318 V
Power rating $P_N$	22.0 kW
Rated shaft speed $n_N$	1 500 min <sup>-1</sup>
Rated torque $M_N$ (105 K)	140.0 Nm
Rated current $I_N$ (105 K)	54.0 A
Efficiency	0.85
Max. shaft speed $n_{max}$ <sup>1)</sup> Spindle bearing	10 000 min <sup>-1</sup>
Max. current $I_{max}$	116 A
Bore hole in shaft	Ø 9 mm
Weight m	158 kg
Rotor inertia J	1 100 kgcm <sup>2</sup>
Protection	IP 54
<b>Fan</b> Rated voltage $U_L$ Rated current $I_L$ Frequency $f_L$	3 × 400 V 0.35 A 50 Hz/60 Hz
<b>ID number</b> Motor with spindle bearing	536259-13

<sup>1)</sup> The max speed depends on the motor's application conditions, such as the shaft load (see the *Inverter Systems and Motors* Technical Manual)

### Rotatable connections



### Encoder connector



For R, see page 59

# Dimensions

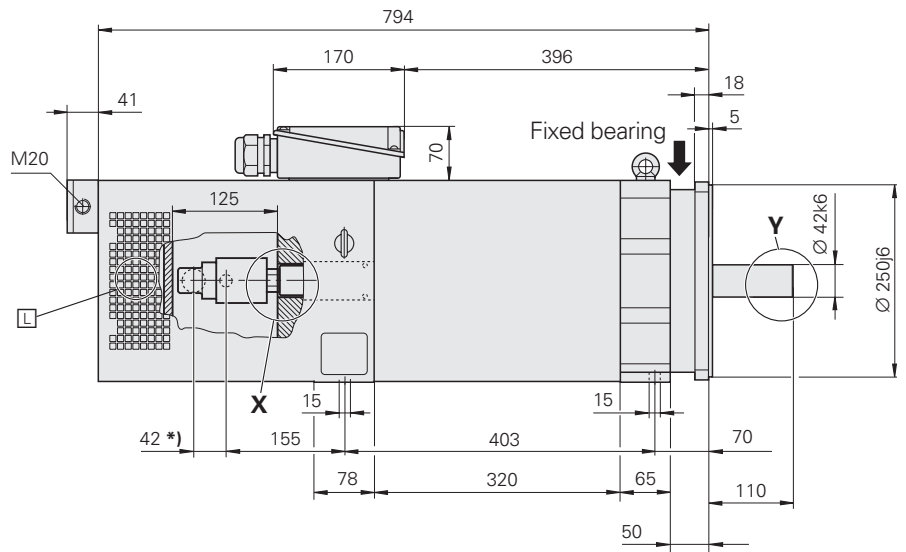
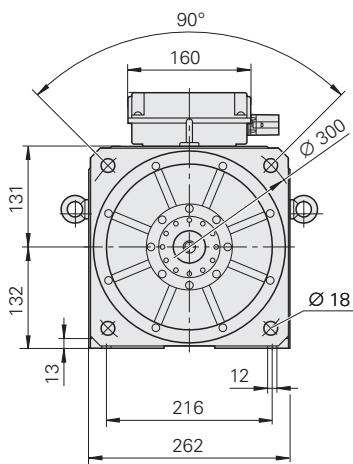
## Dimensions in mm



Tolerancing ISO 8015  
 ISO 2768 - m H  
 < 6 mm: ±0.2 mm

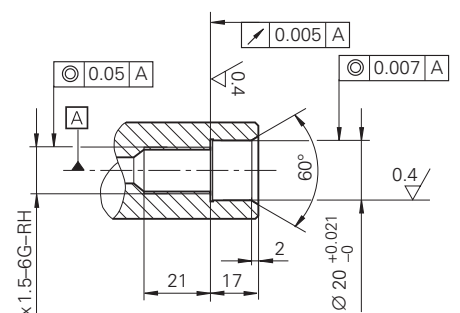
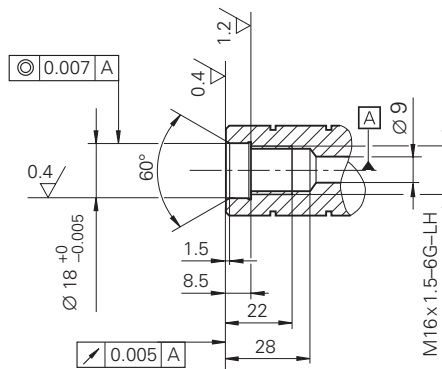
### QAN 260UH

### With spindle bearing



**X**

**Y**



□ = Air outlet on both sides

\*) = Coolant connection on the right side  
 e.g. from Deublin 1109-020-188

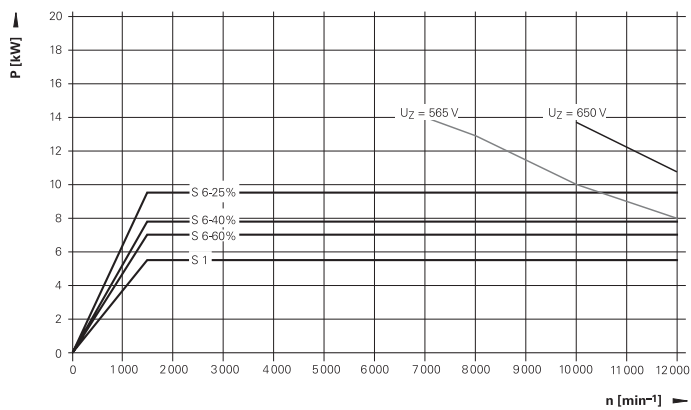
# Asynchronous Motors with Solid Shaft

## Characteristics of Power and Torque

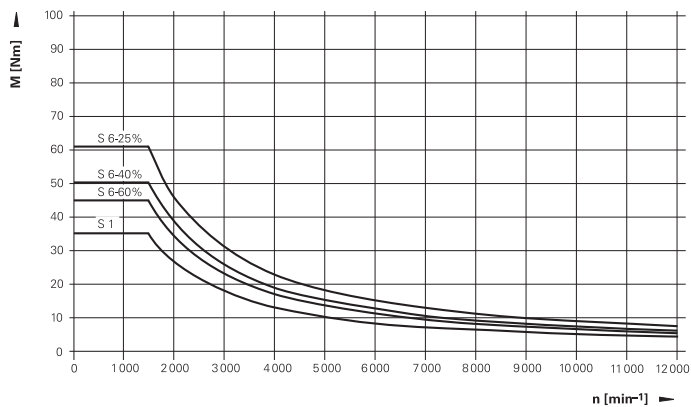
### QAN 200M

Duty cycle	Speed n	Power P	Torque M	Current I
<b>S1</b>	1 500 min <sup>-1</sup>	5.5 kW	35.0 Nm	18.0 A
	6 000 min <sup>-1</sup>	5.5 kW	8.8 Nm	–
	12 000 min <sup>-1</sup>	5.5 kW	4.4 Nm	–
<b>S6-60%</b>	1 500 min <sup>-1</sup>	7.0 kW	44.7 Nm	22.0 A
	6 000 min <sup>-1</sup>	7.0 kW	11.2 Nm	–
	12 000 min <sup>-1</sup>	7.0 kW	5.6 Nm	–
<b>S6-40%</b>	1 500 min <sup>-1</sup>	7.9 kW	50.4 Nm	24.0 A
	6 000 min <sup>-1</sup>	7.9 kW	12.6 Nm	–
	12 000 min <sup>-1</sup>	7.9 kW	6.3 Nm	–
<b>S6-25%</b>	1 500 min <sup>-1</sup>	9.5 kW	60.7 Nm	28.0 A
	6 000 min <sup>-1</sup>	9.5 kW	15.2 Nm	–
	12 000 min <sup>-1</sup>	9.5 kW	7.6 Nm	–

Power characteristic curve



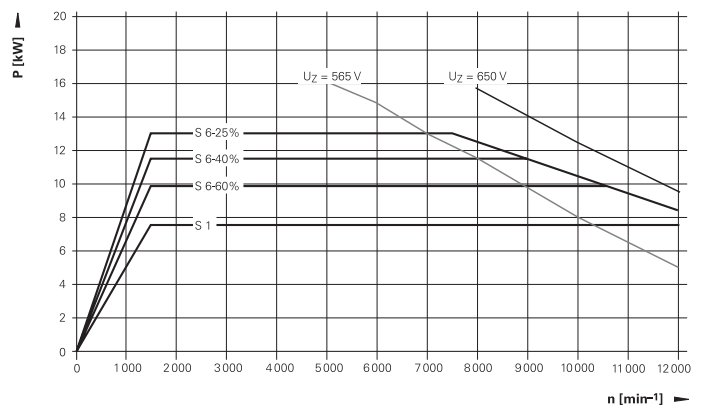
Torque characteristic curve



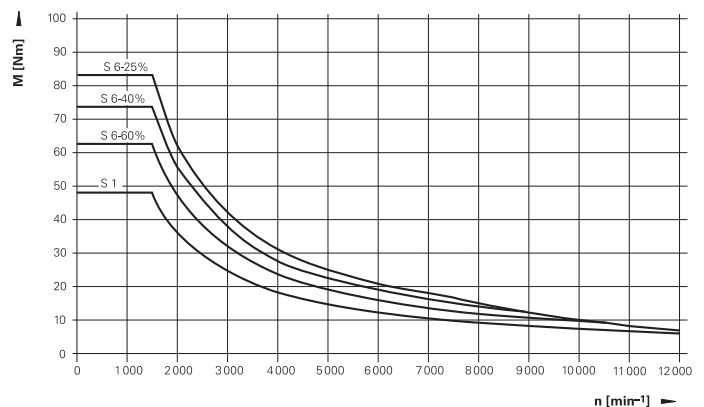
### QAN 200L

Duty cycle	Speed n	Power P	Torque M	Current I
<b>S1</b>	1 500 min <sup>-1</sup>	7.5 kW	47.8 Nm	20.1 A
	6 000 min <sup>-1</sup>	7.5 kW	12.0 Nm	–
	12 000 min <sup>-1</sup>	7.5 kW	6.0 Nm	–
<b>S6-60%</b>	1 500 min <sup>-1</sup>	9.8 kW	62.6 Nm	24.0 A
	10 700 min <sup>-1</sup>	9.8 kW	9.5 Nm	–
	12 000 min <sup>-1</sup>	8.5 kW	6.8 Nm	–
<b>S6-40%</b>	1 500 min <sup>-1</sup>	11.5 kW	73.4 Nm	27.0 A
	9 000 min <sup>-1</sup>	11.5 kW	11.0 Nm	–
	12 000 min <sup>-1</sup>	8.5 kW	6.8 Nm	–
<b>S6-25%</b>	1 500 min <sup>-1</sup>	13.0 kW	83.0 Nm	31.0 A
	7 500 min <sup>-1</sup>	13.0 kW	16.6 Nm	–
	12 000 min <sup>-1</sup>	8.5 kW	6.8 Nm	–

Power characteristic curve



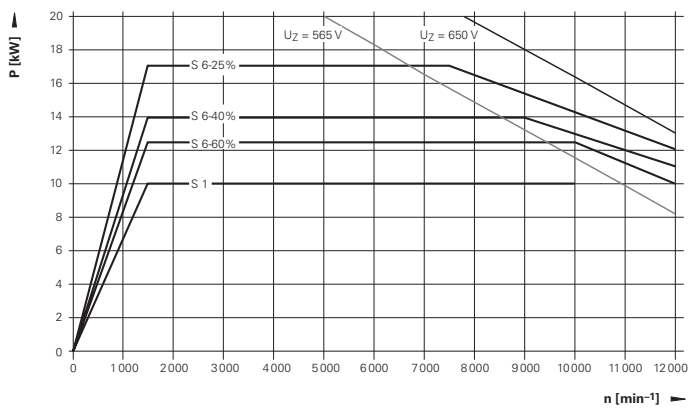
Torque characteristic curve



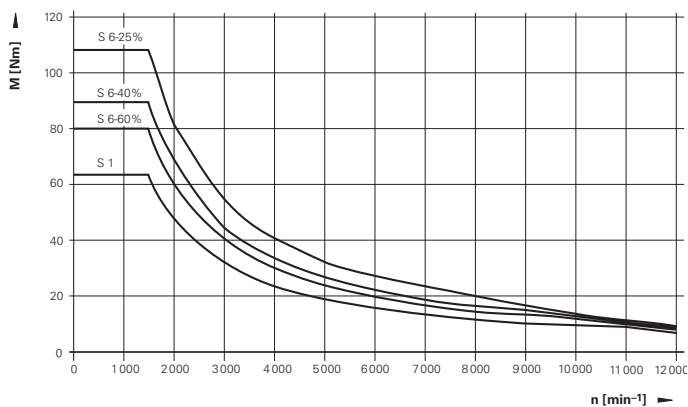
# QAN 200U

Duty cycle	Speed n	Power P	Torque M	Current I
<b>S1</b>	1 500 min <sup>-1</sup>	10.0 kW	63.7 Nm	25.0 A
	11 000 min <sup>-1</sup>	10.0 kW	8.7 Nm	–
	12 000 min <sup>-1</sup>	8.0 kW	6.4 Nm	–
<b>S6-60%</b>	1 500 min <sup>-1</sup>	12.5 kW	79.8 Nm	29.0 A
	10 000 min <sup>-1</sup>	12.5 kW	11.9 Nm	–
	12 000 min <sup>-1</sup>	10.0 kW	8.0 Nm	–
<b>S6-40%</b>	1 500 min <sup>-1</sup>	14.0 kW	89.4 Nm	32.0 A
	9 000 min <sup>-1</sup>	14.0 kW	19.1 Nm	–
	12 000 min <sup>-1</sup>	11.0 kW	8.8 Nm	–
<b>S6-25%</b>	1 500 min <sup>-1</sup>	17.0 kW	108.6 Nm	37.0 A
	7 500 min <sup>-1</sup>	17.0 kW	21.7 Nm	–
	12 000 min <sup>-1</sup>	12.0 kW	9.5 Nm	–

## Power characteristic curve



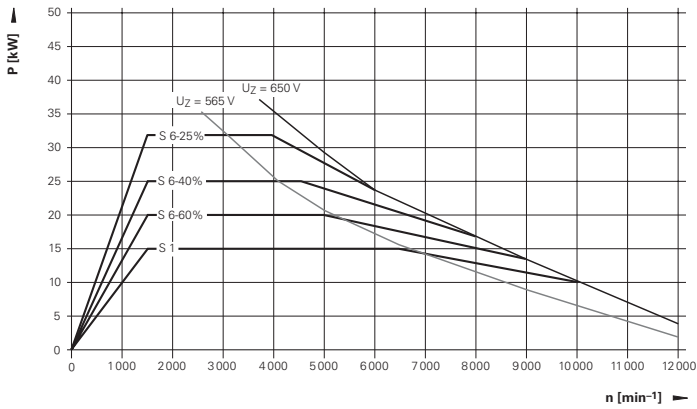
## Torque characteristic curve



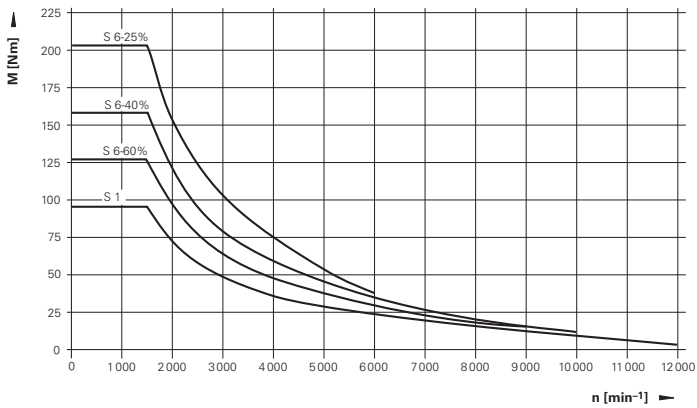
# QAN 260M

Duty cycle	Speed n	Power P	Torque M	Current I
<b>S1</b>	1 500 min <sup>-1</sup>	15.0 kW	95.5 Nm	35.0 A
	6 500 min <sup>-1</sup>	15.0 kW	22.0 Nm	–
	10 000 min <sup>-1</sup>	10.0 kW	9.5 Nm	–
	12 000 min <sup>-1</sup>	4.0 kW	3.2 Nm	–
<b>S6-60%</b>	1 500 min <sup>-1</sup>	20.0 kW	127.3 Nm	43.3 A
	5 000 min <sup>-1</sup>	20.0 kW	38.2 Nm	–
	9 000 min <sup>-1</sup>	13.5 kW	14.3 Nm	–
<b>S6-40%</b>	1 500 min <sup>-1</sup>	25.0 kW	159.2 Nm	52.3 A
	4 500 min <sup>-1</sup>	25.0 kW	53.1 Nm	–
	8 000 min <sup>-1</sup>	16.8 kW	20.1 Nm	–
<b>S6-25%</b>	1 500 min <sup>-1</sup>	32.0 kW	203.7 Nm	65.0 A
	4 000 min <sup>-1</sup>	32.0 kW	76.4 Nm	–
	6 000 min <sup>-1</sup>	23.7 kW	37.7 Nm	–

Power characteristic curve



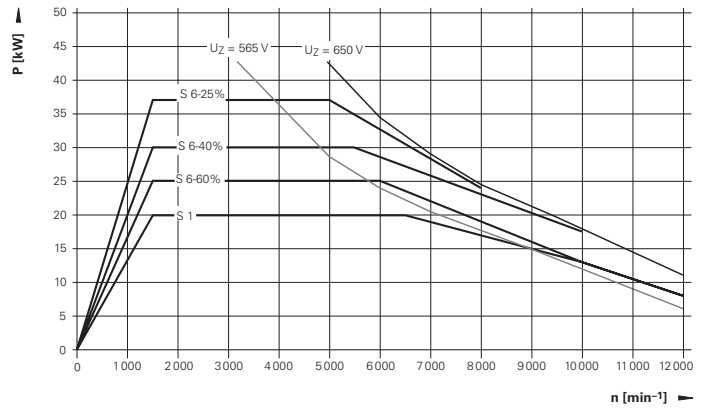
Torque characteristic curve



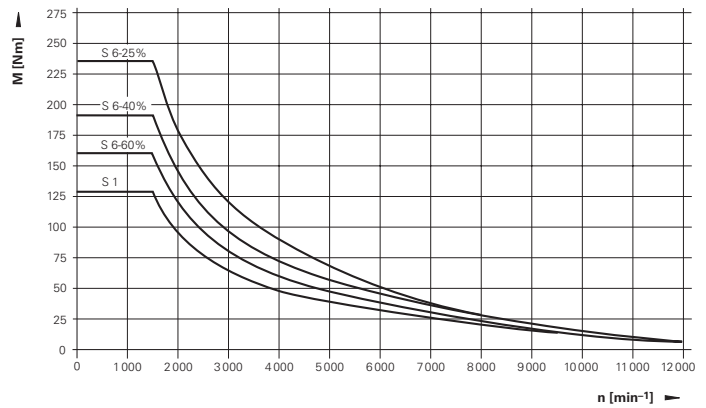
# QAN 260L

Duty cycle	Speed n	Power P	Torque M	Current I
<b>S1</b>	1 500 min <sup>-1</sup>	20.0 kW	127.3 Nm	46.0 A
	6 500 min <sup>-1</sup>	20.0 kW	29.4 Nm	–
	10 000 min <sup>-1</sup>	13.0 kW	12.4 Nm	–
	12 000 min <sup>-1</sup>	8.0 kW	6.4 Nm	–
<b>S6-60%</b>	1 500 min <sup>-1</sup>	25.0 kW	159.2 Nm	56.0 A
	6 000 min <sup>-1</sup>	25.0 kW	39.4 Nm	–
	10 000 min <sup>-1</sup>	16.0 kW	15.3 Nm	–
	12 000 min <sup>-1</sup>	8.0 kW	6.4 Nm	–
<b>S6-40%</b>	1 500 min <sup>-1</sup>	30.0 kW	191.0 Nm	65.0 A
	5 500 min <sup>-1</sup>	30.0 kW	52.1 Nm	–
	10 000 min <sup>-1</sup>	17.5 kW	16.7 Nm	–
<b>S6-25%</b>	1 500 min <sup>-1</sup>	37.0 kW	235.5 Nm	79.0 A
	5 000 min <sup>-1</sup>	37.0 kW	70.7 Nm	–
	8 000 min <sup>-1</sup>	24.0 kW	28.6 Nm	–

Power characteristic curve



Torque characteristic curve

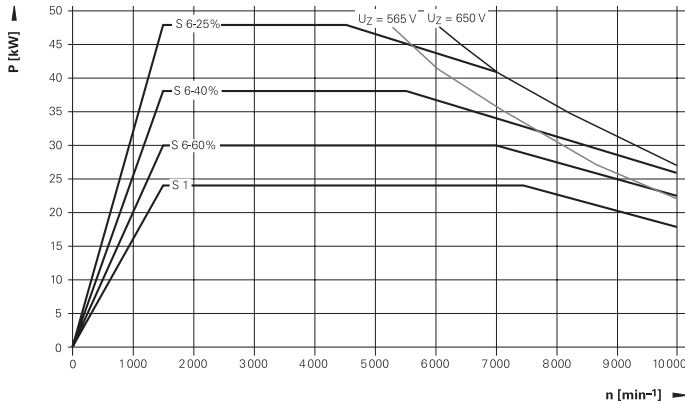




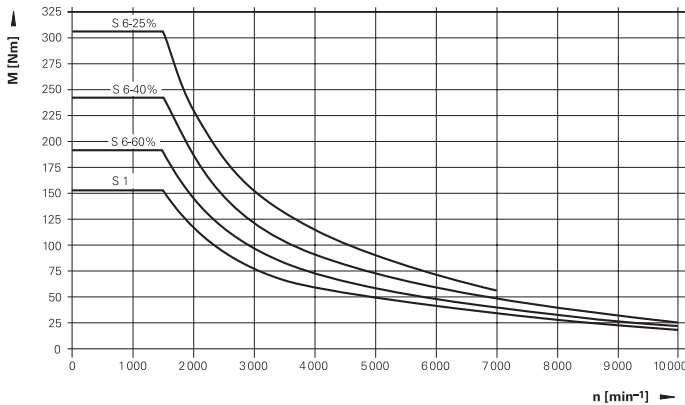
## QAN 260U

Duty cycle	Speed n	Power P	Torque M	Current I
<b>S1</b>	1 500 min <sup>-1</sup>	24.0 kW	152.8 Nm	58.0 A
	7 400 min <sup>-1</sup>	24.0 kW	31.0 Nm	–
	10 000 min <sup>-1</sup>	18.0 kW	17.2 Nm	–
<b>S6-60%</b>	1 500 min <sup>-1</sup>	30.0 kW	191.0 Nm	67.2 A
	7 000 min <sup>-1</sup>	30.0 kW	40.9 Nm	–
	10 000 min <sup>-1</sup>	22.5 kW	21.5 Nm	–
<b>S6-40%</b>	1 500 min <sup>-1</sup>	38.0 kW	241.9 Nm	81.8 A
	5 500 min <sup>-1</sup>	38.0 kW	66.0 Nm	–
	10 000 min <sup>-1</sup>	26.0 kW	24.8 Nm	–
<b>S6-25%</b>	1 500 min <sup>-1</sup>	48.0 kW	305.6 Nm	100.6 A
	4 500 min <sup>-1</sup>	48.0 kW	101.9 Nm	–
	7 000 min <sup>-1</sup>	41.0 kW	55.9 Nm	–

Power characteristic curve



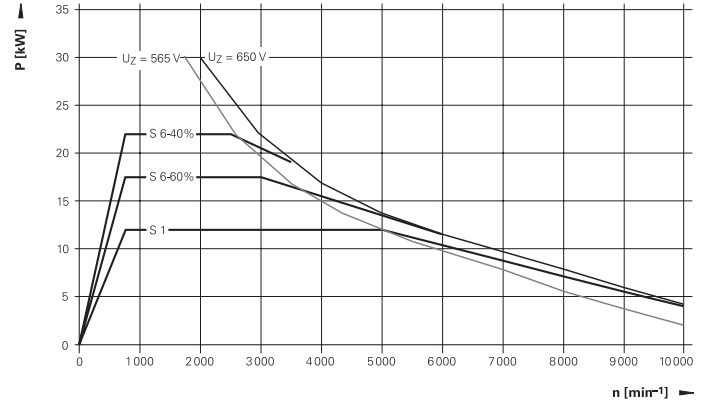
Torque characteristic curve



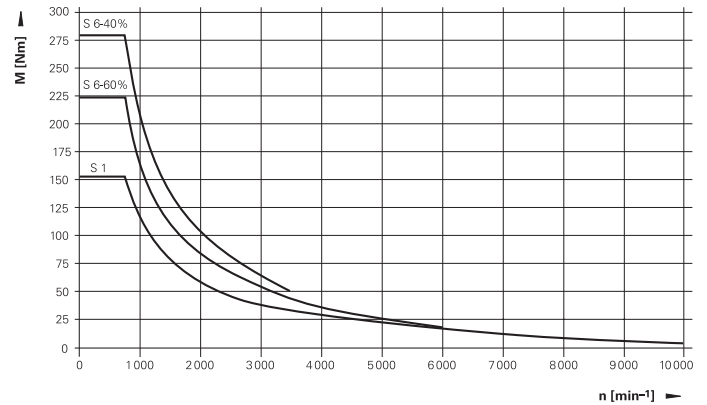
## QAN 260W

Duty cycle	Speed n	Power P	Torque M	Current I
<b>S1</b>	750 min <sup>-1</sup>	12.0 kW	152.8 Nm	29.0 A
	5 000 min <sup>-1</sup>	12.0 kW	22.9 Nm	–
	10 000 min <sup>-1</sup>	4.0 kW	3.8 Nm	–
<b>S6-60%</b>	750 min <sup>-1</sup>	17.5 kW	222.8 Nm	38.1 A
	3 000 min <sup>-1</sup>	17.5 kW	55.7 Nm	–
	6 000 min <sup>-1</sup>	11.3 kW	18.0 Nm	–
<b>S6-40%</b>	750 min <sup>-1</sup>	22.0 kW	280.1 Nm	46.4 A
	2 500 min <sup>-1</sup>	22.0 kW	84.0 Nm	–
	3 500 min <sup>-1</sup>	19.0 kW	51.8 Nm	–

Power characteristic curve



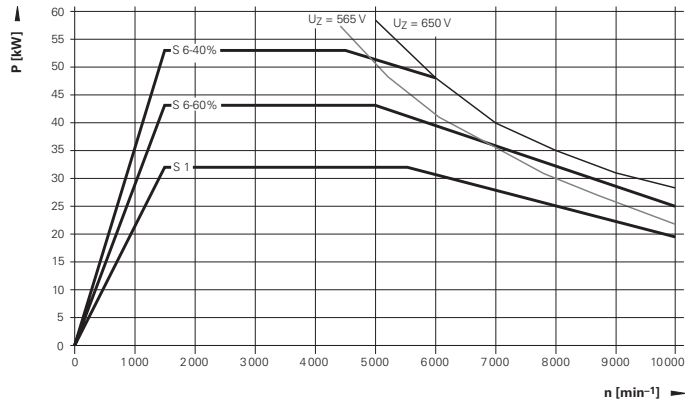
Torque characteristic curve



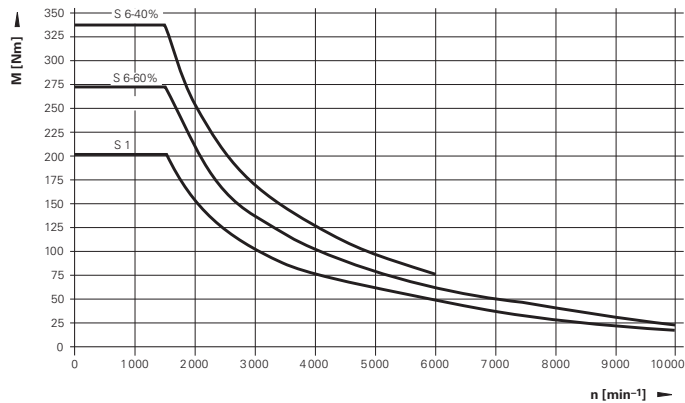
# QAN 320M

Duty cycle	Speed n	Power P	Torque M	Current I
<b>S1</b>	1 500 min <sup>-1</sup>	32.0 kW	203.7 Nm	77.5 A
	5 500 min <sup>-1</sup>	32.0 kW	55.0 Nm	–
	10 000 min <sup>-1</sup>	19.5 kW	18.6 Nm	–
<b>S6-60%</b>	1 500 min <sup>-1</sup>	43.0 kW	273.7 Nm	98.0 A
	5 500 min <sup>-1</sup>	43.0 kW	71.5 Nm	–
	10 000 min <sup>-1</sup>	25.0 kW	23.9 Nm	–
<b>S6-40%</b>	1 500 min <sup>-1</sup>	53.0 kW	337.4 Nm	118.0 A
	5 500 min <sup>-1</sup>	53.0 kW	86.2 Nm	–
	6 000 min <sup>-1</sup>	48.0 kW	76.4 Nm	–

Power characteristic curve



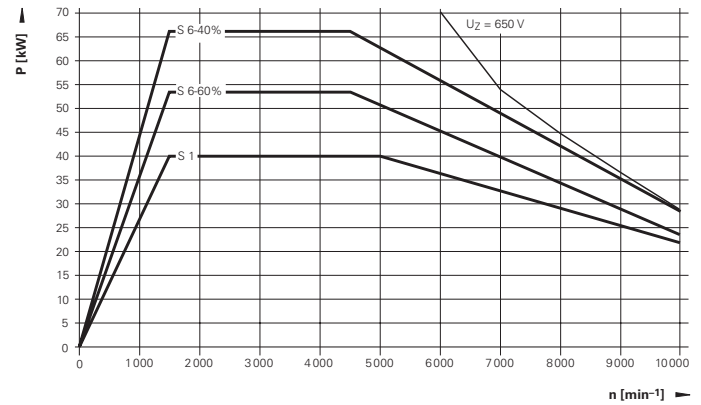
Torque characteristic curve



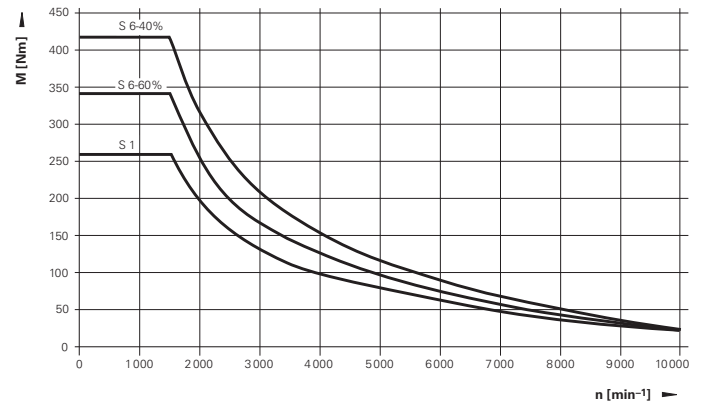
# QAN 320L

Duty cycle	Speed n	Power P	Torque M	Current I
<b>S1</b>	1 500 min <sup>-1</sup>	40.0 kW	254.6 Nm	99.0 A
	5 000 min <sup>-1</sup>	40.0 kW	77.9 Nm	–
	10 000 min <sup>-1</sup>	21.0 kW	21.0 Nm	–
<b>S6-60%</b>	1 500 min <sup>-1</sup>	53.0 kW	337.4 Nm	123.0 A
	4 500 min <sup>-1</sup>	53.0 kW	112.5 Nm	–
	10 000 min <sup>-1</sup>	24.0 kW	22.9 Nm	–
<b>S6-40%</b>	1 500 min <sup>-1</sup>	66.0 kW	420.2 Nm	148.0 A
	4 500 min <sup>-1</sup>	66.0 kW	140.1 Nm	–
	10 000 min <sup>-1</sup>	28.0 kW	26.7 Nm	–

Power characteristic curve



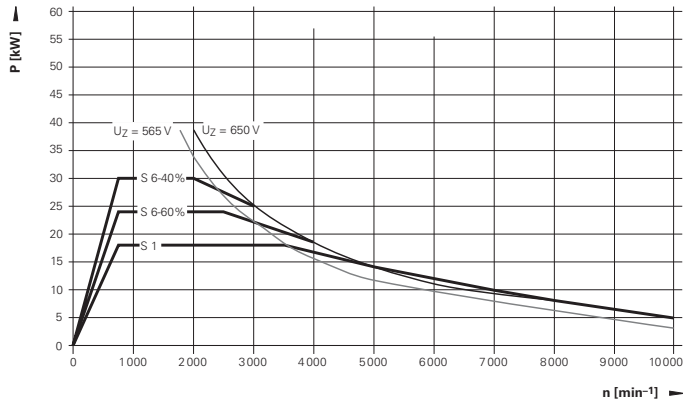
Torque characteristic curve



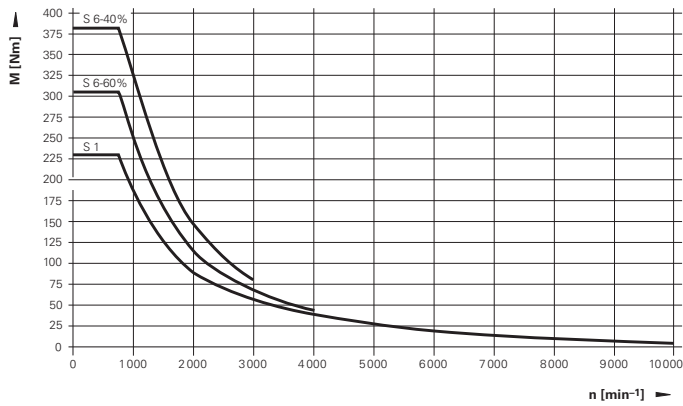
# QAN 320W

Duty cycle	Speed n	Power P	Torque M	Current I
<b>S1</b>	750 min <sup>-1</sup>	18.0 kW	229.2 Nm	43.0 A
	3500 min <sup>-1</sup>	18.0 kW	49.1 Nm	–
	10000 min <sup>-1</sup>	5.0 kW	4.8 Nm	–
<b>S6-60%</b>	750 min <sup>-1</sup>	24.0 kW	305.6 Nm	54.0 A
	2000 min <sup>-1</sup>	24.0 kW	114.6 Nm	–
	4000 min <sup>-1</sup>	18.5 kW	44.2 Nm	–
<b>S6-40%</b>	750 min <sup>-1</sup>	30.0 kW	382.0 Nm	71.0 A
	2000 min <sup>-1</sup>	30.0 kW	143.2 Nm	–
	3000 min <sup>-1</sup>	25.0 kW	79.6 Nm	–

Power characteristic curve



Torque characteristic curve



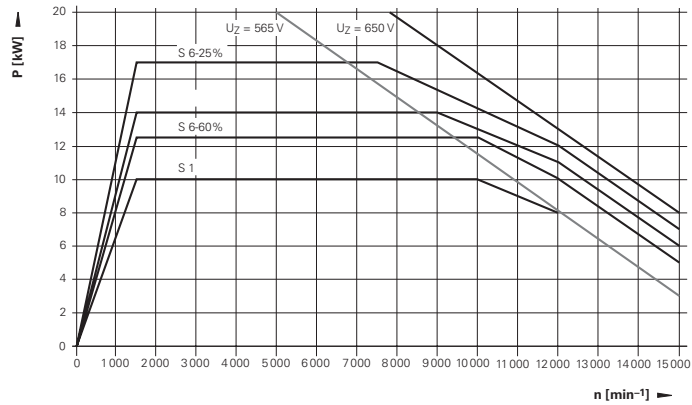
# Asynchronous Motors with Hollow Shaft

## Characteristics of Power and Torque

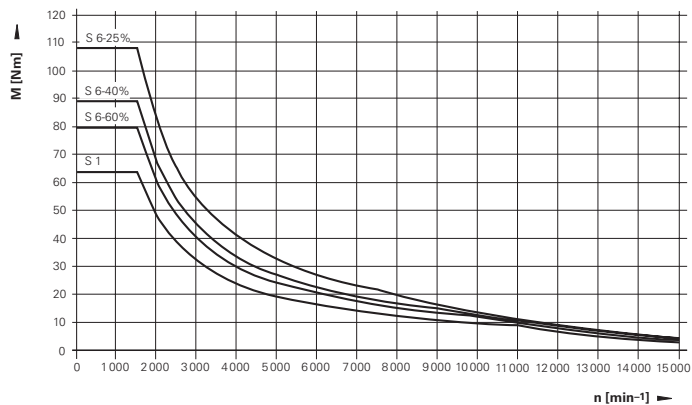
### QAN 200UH

Duty cycle	Speed n	Power P	Torque M	Current I
<b>S1</b>	1 500 min <sup>-1</sup>	10.0 kW	63.7 Nm	25.0 A
	11 000 min <sup>-1</sup>	10.0 kW	8.7 Nm	–
	12 000 min <sup>-1</sup>	8.0 kW	6.4 Nm	–
	15 000 min <sup>-1</sup>	4.0 kW	2.5 Nm	–
<b>S6-60%</b>	1 500 min <sup>-1</sup>	12.5 kW	79.8 Nm	29.0 A
	10 000 min <sup>-1</sup>	12.5 kW	11.9 Nm	–
	12 000 min <sup>-1</sup>	10.0 kW	8.0 Nm	–
	15 000 min <sup>-1</sup>	5.0 kW	3.2 Nm	–
<b>S6-40%</b>	1 500 min <sup>-1</sup>	14.0 kW	89.4 Nm	32.0 A
	9 000 min <sup>-1</sup>	14.0 kW	19.1 Nm	–
	12 000 min <sup>-1</sup>	11.0 kW	8.8 Nm	–
	15 000 min <sup>-1</sup>	6.0 kW	3.8 Nm	–
<b>S6-25%</b>	1 500 min <sup>-1</sup>	17.0 kW	108.6 Nm	37.0 A
	7 500 min <sup>-1</sup>	17.0 kW	21.7 Nm	–
	12 000 min <sup>-1</sup>	12.0 kW	9.5 Nm	–
	15 000 min <sup>-1</sup>	7.0 kW	4.5 Nm	–

Power characteristic curve



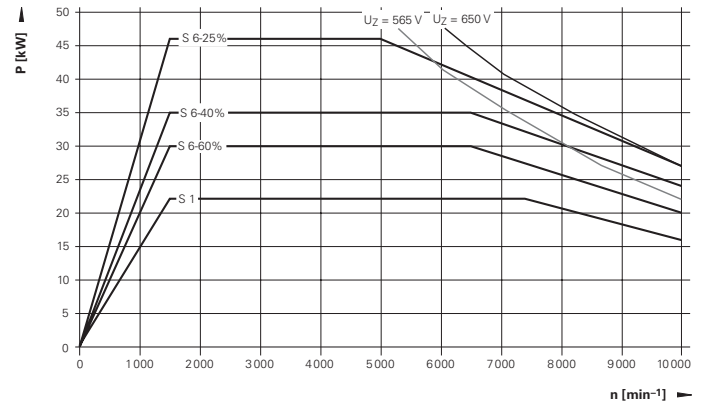
Torque characteristic curve



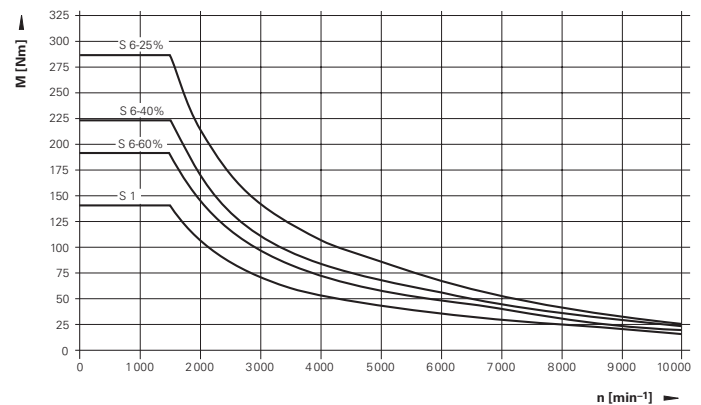
### QAN 260UH

Duty cycle	Speed n	Power P	Torque M	Current I
<b>S1</b>	1 500 min <sup>-1</sup>	22.0 kW	140.1 Nm	54.0 A
	7 400 min <sup>-1</sup>	22.0 kW	28.4 Nm	–
	10 000 min <sup>-1</sup>	16.0 kW	15.3 Nm	–
<b>S6-60%</b>	1 500 min <sup>-1</sup>	30.0 kW	191.0 Nm	67.0 A
	6 500 min <sup>-1</sup>	30.0 kW	44.1 Nm	–
	10 000 min <sup>-1</sup>	20.0 kW	19.5 Nm	–
<b>S6-40%</b>	1 500 min <sup>-1</sup>	35.0 kW	222.8 Nm	77.0 A
	6 500 min <sup>-1</sup>	35.0 kW	66.8 Nm	–
	10 000 min <sup>-1</sup>	24.0 kW	22.9 Nm	–
<b>S6-25%</b>	1 500 min <sup>-1</sup>	46.0 kW	286.5 Nm	97.0 A
	5 000 min <sup>-1</sup>	46.0 kW	85.9 Nm	–
	10 000 min <sup>-1</sup>	27.0 kW	25.8 Nm	–

Power characteristic curve



Torque characteristic curve



# Asynchronous Motors with Hollow Shaft

## 1PM6 Series Overview

### General technical information

#### Hollow-shaft motors

The 1PM6 105 and 1PM6 133 hollow-shaft motors are suited for mounting directly on mechanical spindles. The hollow shaft permits you to convey coolant to tools with inner cooling.

The coolant is introduced at the rear of the motor through a rotating manifold (e.g. from Deublin Co., order no.: 1109-020-188). The shaft end is prepared for this.

#### Speed measurement

An integrated rotary encoder from HEIDENHAIN measures the shaft speed. An ERM 280 with 600 lines is used.

#### Specifications

The specifications and the characteristic curves apply to motors mounted without thermal insulation. The temperature may differ from the maximum permissible ambient temperature of 40 °C by a maximum of 105 K. If the motor is mounted so that it is thermally insulated, it is necessary to reduce the motor torque in order to avoid thermal overloading of the motor.

#### Shaft bearing

The 1PM6 motors are equipped with maintenance-free bearings.

#### Mechanical life

The service life of the bearings depends on the shaft load and the mean rotational speed (see the *Inverter Systems and Motors* Technical Manual).

#### Shaft end

The 1PM6 asynchronous motors have a cylindrical shaft end as per DIN 748.

They have a smooth shaft (without keyway and feather key).

#### Precision balancing

1PM6 asynchronous motors can be balanced at any time.

#### Mechanical data

**Dimensions** IM B5 (for securing by flange/base) as per EN 60034-7

**Flange:** Dimensions as per DIN 42948 and IEC 72

**Protection** as per EN 60529: IP 55 (fan IP 54)

#### Vibration severity

Grade SR (external precision balancing possible)

#### Thermal variables

**Separate cooling** through integral fan  
**Temperature monitoring** with KTY 84-130 thermistor in the stator winding

**Thermal class** F

Asynchronous motors	Rated power output	Rated speed	Max. speed	Rated torque	Rated current	Recommended inverters			Page
						1-axis module	2-axis module	Compact inverters	
<b>1PM6 105</b>	7.5 kW	1500 min <sup>-1</sup>	18000 min <sup>-1</sup>	48.0 Nm	23.0 A	UM 112D	UM 122D	Spindle output	<b>54</b>
<b>1PM6 133</b>	11.0 kW	1500 min <sup>-1</sup>	15000 min <sup>-1</sup>	70.0 Nm	41.0 A	UM 113D UM 114D <sup>1)</sup>	–	–	<b>56</b>

<sup>1)</sup> Depending on the required acceleration of the spindle ( $I_{max}$ )

# Asynchronous Motors with Hollow Shaft

## 1PM6 105

Hollow-shaft spindle motor with 2 pole pairs  
 Rated power output to 7.5 kW



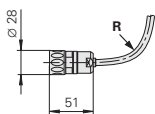
<b>Motor</b>	<b>1PM6105-2DF81-1AR1-Z</b>
<b>Rated voltage <math>U_N</math></b>	300 V
<b>Power rating <math>P_N</math></b>	7.5 kW
<b>Rated shaft speed <math>n_N</math></b>	1500 min <sup>-1</sup>
<b>Rated torque <math>M_N</math></b> (105 K)	48.0 Nm
<b>Rated current <math>I_N</math></b> (105 K)	23.0 A
<b>Efficiency</b>	0.82
<b>Max. shaft speed <math>n_{max}</math></b> <sup>1)</sup>	18000 min <sup>-1</sup>
<b>Max. current <math>I_{max}</math></b>	52 A
<b>Bore hole in shaft</b>	Ø 11.5 mm
<b>Weight m</b>	70 kg
<b>Rotor inertia J</b>	240 kgcm <sup>2</sup>
<b>Protection</b>	IP 55 (fan: IP 54)
<b>Fan</b> Rated voltage $U_L$ Rated current $I_L$ Frequency $f_L$	3 × 400 V 0.15 A 50 Hz/60 Hz
<b>ID number</b>	557622-13

<sup>1)</sup>The max. speed depends on the motor's application conditions, such as the shaft load (see the *Inverter Systems and Motors* Technical Manual).

The following load cycle applies:

30%  $n_{max}$ , 60%  $2/3 n_{max}$ , 10% standstill, duty cycle time 10 min.

### Encoder connector



For R, see page 59

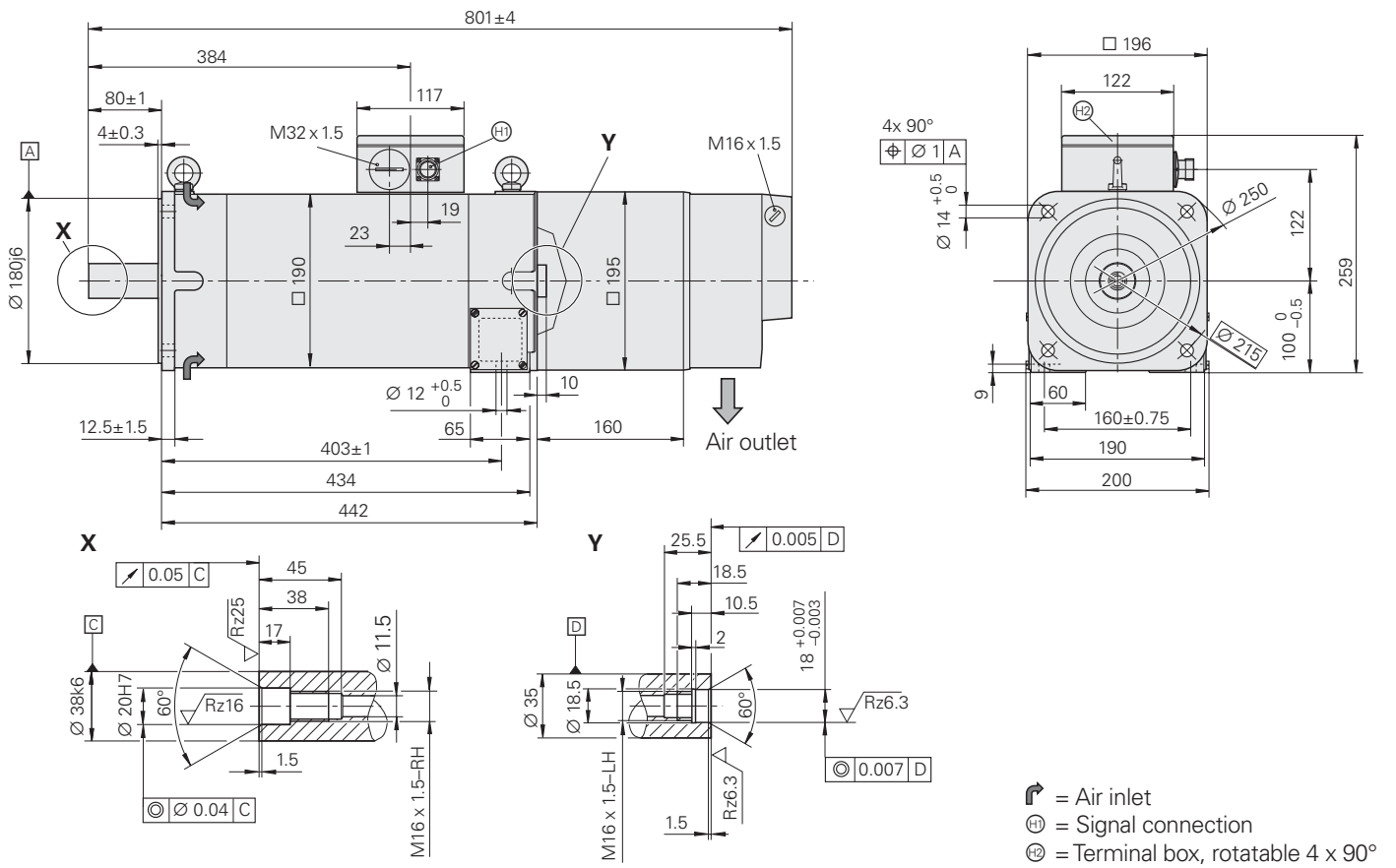
# Dimensions

## Dimensions in mm



Tolerancing ISO 8015  
 ISO 2768 - m H  
 < 6 mm: ±0.2 mm

### 1PM6 105



# Asynchronous Motors with Hollow Shaft

## 1PM6 133

Hollow-shaft spindle motor with 2 pole pairs  
 Rated power output to 11 kW



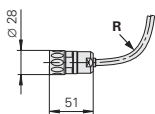
<b>Motor</b>	<b>1PM6133-2DF81-1AR1-Z</b>
<b>Rated voltage <math>U_N</math></b>	222 V
<b>Power rating <math>P_N</math></b>	11.5 kW
<b>Rated shaft speed <math>n_N</math></b>	1500 min <sup>-1</sup>
<b>Rated torque <math>M_N</math></b> (105 K)	70.0 Nm
<b>Rated current <math>I_N</math></b> (105 K)	41.0 A
<b>Efficiency</b>	0.82
<b>Max. shaft speed <math>n_{max}</math></b> <sup>1)</sup>	15000 min <sup>-1</sup>
<b>Max. current <math>I_{max}</math></b>	101 A
<b>Bore hole in shaft</b>	Ø 11.5 mm
<b>Weight m</b>	94 kg
<b>Rotor inertia J</b>	460 kgcm <sup>2</sup>
<b>Protection</b>	IP 55 (fan: IP 54)
<b>Fan</b> Rated voltage $U_L$ Rated current $I_L$ Frequency $f_L$	3 × 400 V 0.25 A 50 Hz/60 Hz
<b>ID number</b>	557623-13

<sup>1)</sup>The max. speed depends on the motor's application conditions, such as the shaft load (see the *Inverter Systems and Motors* Technical Manual).

The following load cycle applies:

30%  $n_{max}$ , 60%  $2/3 n_{max}$ , 10% standstill, duty cycle time 10 min.

### Encoder connector



For R, see page 59



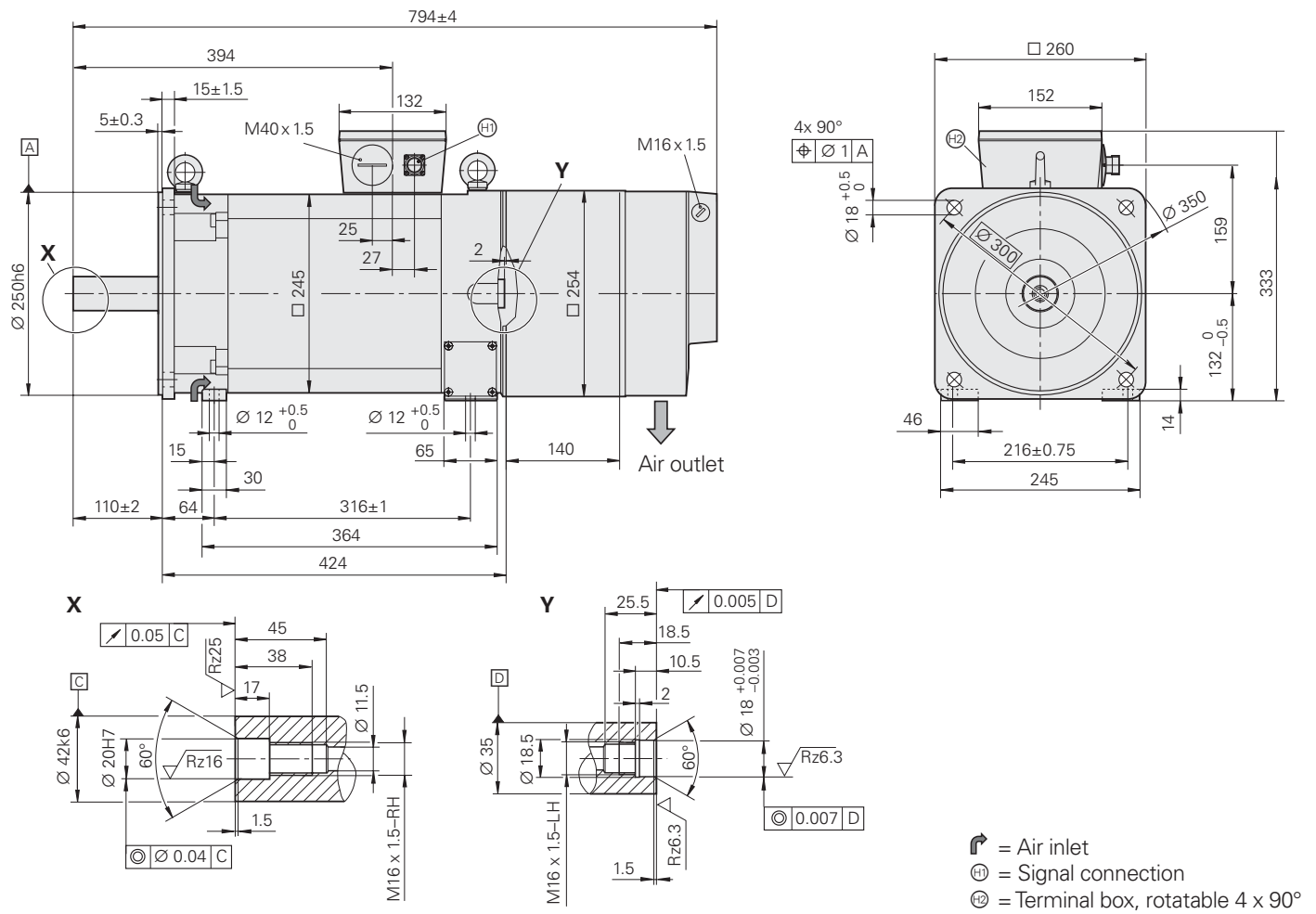
# Dimensions

## Dimensions in mm



Tolerancing ISO 8015  
 ISO 2768 - m H  
 < 6 mm: ±0.2 mm

### 1PM6 133



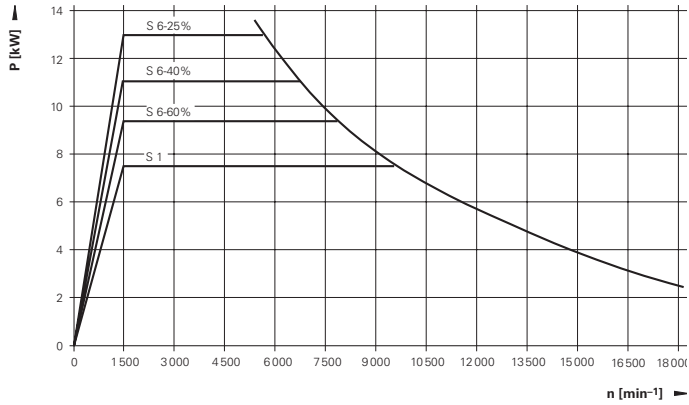
# Asynchronous Motors

## Characteristics of Power and Torque

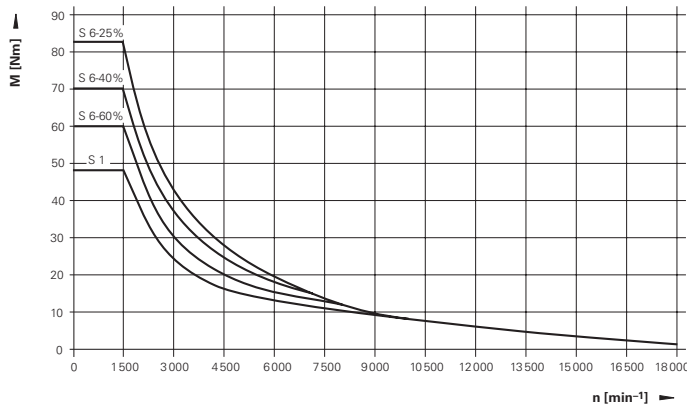
### 1PM6 105

Duty cycle	Speed n	Power P	Torque M	Current I
<b>S1</b>	1 500 min <sup>-1</sup>	7.5 kW	47.7 Nm	23.0 A
	9 500 min <sup>-1</sup>	7.5 kW	7.5 Nm	–
	18 000 min <sup>-1</sup>	2.2 kW	1.2 Nm	–
<b>S6-60%</b>	1 500 min <sup>-1</sup>	9.5 kW	60.5 Nm	27.5 A
	7 800 min <sup>-1</sup>	9.5 kW	11.6 Nm	–
	18 000 min <sup>-1</sup>	2.2 kW	1.2 Nm	–
<b>S6-40%</b>	1 500 min <sup>-1</sup>	11.0 kW	70.0 Nm	31.0 A
	6 700 min <sup>-1</sup>	11.0 kW	15.7 Nm	–
	18 000 min <sup>-1</sup>	2.2 kW	1.2 Nm	–
<b>S6-25%</b>	1 500 min <sup>-1</sup>	13.0 kW	82.8 Nm	36.0 A
	5 500 min <sup>-1</sup>	13.0 kW	22.6 Nm	–
	18 000 min <sup>-1</sup>	2.2 kW	1.2 Nm	–

Power characteristic curve



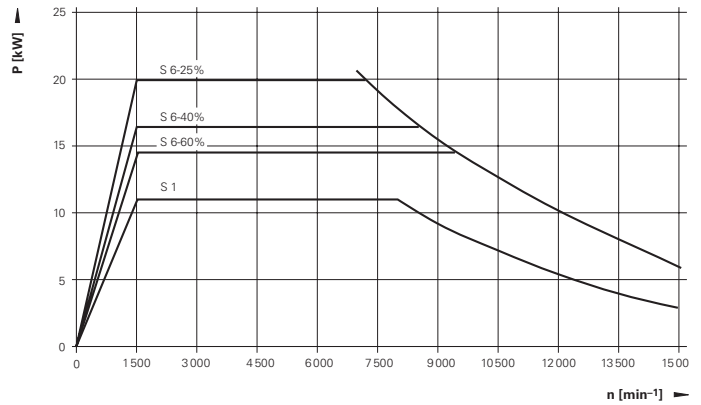
Torque characteristic curve



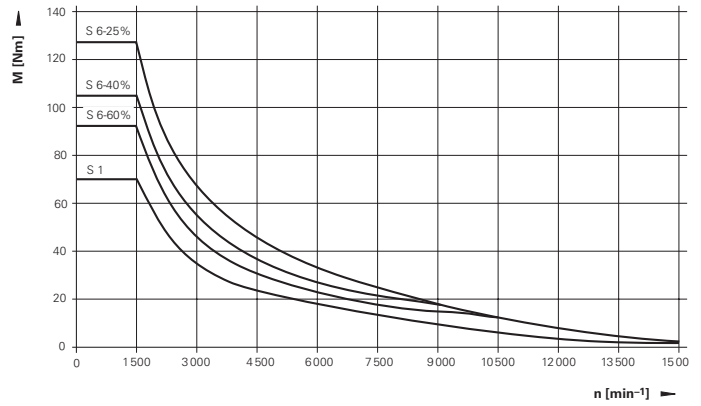
### 1PM6 133

Duty cycle	Speed n	Power P	Torque M	Current I
<b>S1</b>	1 500 min <sup>-1</sup>	11.0 kW	70.0 Nm	41.0 A
	8 000 min <sup>-1</sup>	11.0 kW	13.1 Nm	–
	15 000 min <sup>-1</sup>	3.0 kW	1.9 Nm	–
<b>S6-60%</b>	1 500 min <sup>-1</sup>	14.5 kW	92.3 Nm	52.0 A
	9 500 min <sup>-1</sup>	14.5 kW	14.6 Nm	–
	15 000 min <sup>-1</sup>	6.0 kW	3.8 Nm	–
<b>S6-40%</b>	1 500 min <sup>-1</sup>	16.5 kW	105.0 Nm	58.5 A
	8 500 min <sup>-1</sup>	16.5 kW	15.5 Nm	–
	15 000 min <sup>-1</sup>	6.0 kW	3.8 Nm	–
<b>S6-25%</b>	1 500 min <sup>-1</sup>	20.0 kW	127.3 Nm	70.0 A
	7 100 min <sup>-1</sup>	20.0 kW	26.9 Nm	–
	15 000 min <sup>-1</sup>	6.0 kW	3.8 Nm	–

Power characteristic curve



Torque characteristic curve



# Asynchronous Motors

## Cables

### Power cables

Current load at ambient temperature up to 40 °C

	Cable without connectors ID number	Bend radius R for frequent flexing	Cable type	Diameter
<b>Current load up to 26 A (installation type B2)</b>				
QAN 200M QAN 200L QAN 200U QAN 200UH 1PM6 105	348949-04	≥ 70 mm	PUR [4 x 4 mm <sup>2</sup> ]	14.1 mm
<b>Current load up to 32.8 A (installation type B2)</b>				
QAN 260W	348949-05	≥ 75 mm	PUR [4 x 6 mm <sup>2</sup> ]	15.6 mm
<b>Current load up to 45.2 A (installation type B2)</b>				
QAN 260M QAN 320W 1PM6 133	348949-06		PUR [4 x 10 mm <sup>2</sup> ]	20,3 mm
<b>Current load up to 59.9 A (installation type B2)</b>				
QAN 260L QAN 260U QAN 260UH	348949-07	≥ 135 mm	PUR [4 x 16 mm <sup>2</sup> ]	27.3 mm
<b>Current load up to 93.8 A (installation type B2)</b>				
QAN 320M	348949-09	≥ 175 mm	PUR [4 x 35 mm <sup>2</sup> ]	35.5 mm
<b>Current load up to 117.5 A (installation types C and E)</b>				
QAN 320L	348949-09	≥ 175 mm	PUR [4 x 35 mm <sup>2</sup> ]	35.5 mm

### Encoder cables

	Cable length	Cable complete with connectors ID number	Line-drop compensator ID number	Extension cable ID number	Bend radius R for frequent flexing
All QAN, all 1PM6	< 30 m	289440-xx	–	336847-xx (as required)	≥ 100 mm
	> 30 m	289440-xx	370226-01	336847-xx	

### Cables for fans

	Cable without connectors ID number	Bend radius R for frequent flexing	Cable type	Diameter
All QAN, all 1PM6	348949-01	≥ 50 mm	PUR [4 x 0.75 mm <sup>2</sup> ]	10 mm

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