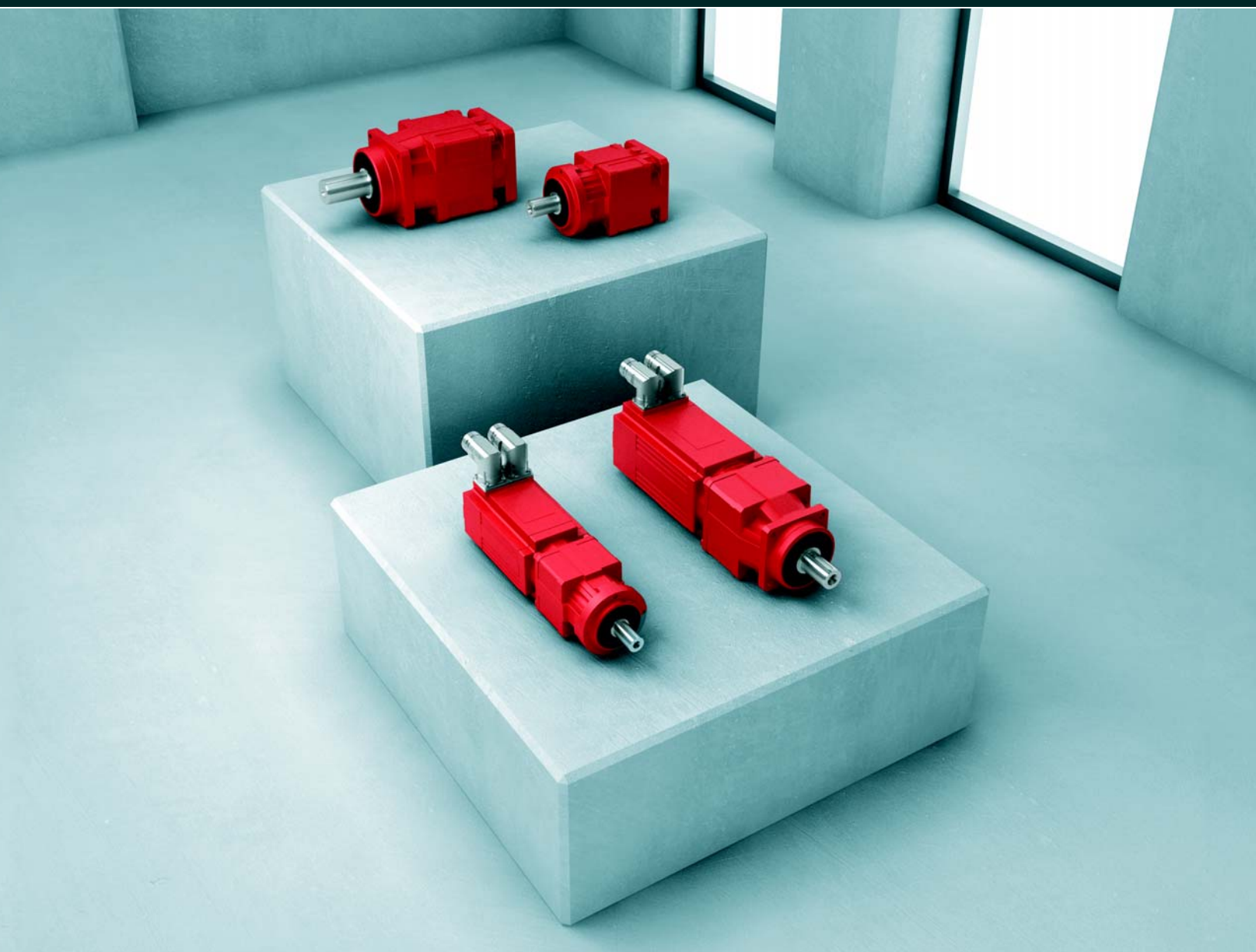


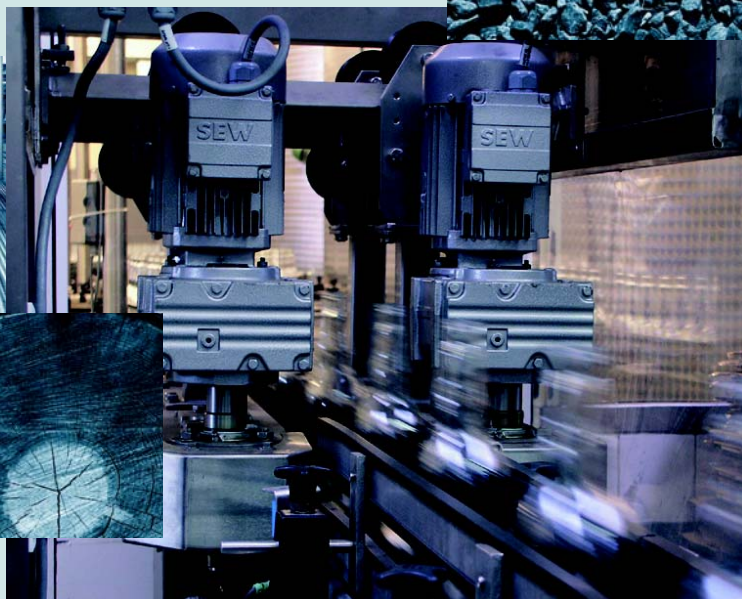


Servo Gearmotors DS, CM, CMP Motors With PS.C Gear Units

Edition 02/2009

11602538 / US

Catalog





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1 Introduction

1.1 The SEW-EURODRIVE Group of Companies

Global presence

Driving the world with innovative drive solutions for all branches and for every application. Products and systems from SEW-EURODRIVE are used in a multitude of applications – worldwide. SEW-EURODRIVE products are found in a variety of industries, such as automotive, building materials, food and beverage as well as metal-processing. The decision to use drive technology made by SEW-EURODRIVE stands for reliability for both functionality and investment.

Not only are we represented in all important branches of industry today – we are found all over the world: with eleven manufacturing plants, 58 assembly plants in 44 countries and our comprehensive range of services, which we consider an integrative service that continues our commitment to outstanding quality.

Always the right drive for the task at hand

The SEW-EURODRIVE modular concept offers millions of combinations. This wide selection enables you to choose the correct drive for all applications, each based on the required speed and torque range, space available and the ambient conditions. Gear units and gearmotors offering a unique and finely tuned performance range and the best economic prerequisites to face your drive challenges.

The gearmotors are electronically empowered by MOVITRAC[®] frequency inverters, MOVIDRIVE[®] inverters and MOVIAXIS[®] multi-axis servo drives, a combination that blends perfectly with the existing SEW-EURODRIVE systems program. As is the case with the mechanical systems, development, production and assembly is carried out completely by SEW-EURODRIVE. In combination with our drive electronics, these drives will provide the utmost in flexibility.

Products of the servo drive system, such as servo gear units, compact servomotors or MOVIAXIS[®] multi-axis servo drives provide precision and dynamics. From single-axis or multi-axis applications all the way to synchronized process sequences, servo drive systems by SEW-EURODRIVE offer flexible and customized implementation of your applications.

For economical, decentralized installations, SEW-EURODRIVE offers components from its decentralized drive system, such as MOVIMOT[®], the gearmotor with integrated frequency inverter or MOVI-SWITCH[®], the gearmotor with integrated switching and protection function. SEW-EURODRIVE has developed hybrid cables to provide cost-effective functional solutions, independent of the philosophy behind or the size of the system. The latest developments from SEW-EURODRIVE: MOVITRANS[®] – system components for contactless energy transfer, MOVIPRO[®] – the decentralized drive control and MOVIFIT[®] – the new decentralized intelligence.

Power, quality and sturdy design combined in one standard product: with SEW-EURODRIVE, high-torque industrial gear units achieve large movements. The modular concept once again provides optimum adaptation of industrial gear units to meet a wide range of the most varying applications.

Your ideal partner

Its global presence, extensive product range and broad spectrum of services make SEW-EURODRIVE the ideal partner for the machinery and plant construction industry when it comes to providing drive systems for demanding applications in all applications and branches of industry.



1.2 Products and systems from SEW-EURODRIVE

The products and systems from SEW-EURODRIVE are divided into four product groups. These four product groups are:

1. Gearmotors and frequency inverters
2. Servo drive systems
3. Decentralized drive systems
4. Industrial gear units

Products and systems used in several group applications are listed in a separate group "Products and systems covering several product groups." Consult the following tables to locate the products and systems included in the respective product group:

1. Gearmotors and frequency inverters		
Gear units / gearmotors	Motors	Frequency inverters
- Helical gear units / Helical gearmotors - Parallel shaft helical gear units / parallel shaft helical gearmotors - Helical-bevel gear units / Helical-bevel gearmotors - Helical-worm gear units/ helical-worm gearmotors - Spiroplan® right-angle gearmotors - Drives for overhead trolley systems - Multi-speed gearmotors - Variable speed gear units / variable speed gearmotors	- Asynchronous AC motors / AC brakemotors - Multi-speed AC motors / AC brakemotors - Energy efficient motors	- MOVITRAC® frequency inverters - MOVIDRIVE® drive inverters - Control, technology and communication options for inverters

2. Servo drive systems		
Servo gear units / geared servomotors	Servomotors	Servo drive inverters / servo inverters
- Low backlash servo planetary gear units / planetary gearmotors - Low backlash helical-bevel gear units / helical-bevel gearmotors	Synchronous servomotors / servo brakemotors	- MOVIDRIVE® servo drive inverters - MOVIAxis® multi-axis servo inverters - Control, technology and communication options for servo drive inverters and servo inverters

3. Decentralized drive systems		
Decentralized drives	Communication and installation	Contactless energy transfer
- MOVIMOT® gearmotors with integrated frequency inverter - MOVIMOT® motors/brakemotors with integrated frequency inverter - MOVI-SWITCH® gearmotor with integrated switching and protection function - MOVI-SWITCH® motors/brakemotors with integrated switching and protection function	- Fieldbus interfaces - Field distributors for decentralized installation - MOVIFIT® product range - MOVIFIT® MC for controlling MOVIMOT® - MOVIFIT® SC with integrated electronic motor switch - MOVIFIT® FC with integrated frequency inverter	- MOVITRANS® system - Stationary components for energy supply - Mobile components for energy absorption - Line cables and installation material

**4. Industrial gear units**

- Helical gear units
- Bevel-helical gear units
- Planetary gear units

Products and systems covering several product groups

- Operator terminals
- MOVI-PLC® drive-based control system

In addition to its products and systems, SEW-EURODRIVE offers a comprehensive range of services. These include:

- Technical consulting
- Application software
- Seminars and training
- Extensive technical documentation
- International customer service

Visit our home page:

→ **www.seweurodrive.com**

The website offers a great deal of information and services.



1.3 Additional documentation

1

Contents of this publication

This catalog describes PS.C.. servo gear units in combination with the synchronous servomotors DFS, CFM and CMP.

The descriptions include:

- Product descriptions
- Type overviews
- Project planning notes
- Visual representation of mounting positions
- Combination overviews and technical data
- Dimension sheets

Additional documentation

For detailed information on synchronous servomotors, refer to the following catalogs and price catalogs:

- Low Backlash Geared Servomotors (BSF.., PSF..)
- Synchronous servomotors CMP40/50/63
- Synchronous Servo Gearmotors

Please note that the complete range of technical documentation is available on our home page:

→ www.seweurodrive.com



2 Product Description for Servo Gear Units and Overview of Types

This chapter describes PS.C.. servo gear units and combinations of this gear unit with the synchronous servomotors CFM, DFS and CMP, both directly mounted and mounted with an adapter.

2.1 General information

Power and torque

The power and torque values listed in the catalogs apply to normal environmental conditions.

Please note that the motor torques shown in the selection tables for gearmotors is subject to selection. However, the output torque and the desired output speed are essential for the application and need to be checked.

Noise levels

The noise levels of all SEW geared servomotors and servomotors are well within the maximum permitted noise levels outlined in the VDI guideline 2159 for gear units and EN 60034 for motors.

Coating

The servo gear units, synchronous servomotors and geared servomotors from SEW-EURODRIVE will be coated as follows:

Type	Coating
Servo gear units with ECH.. adapter / EPH..	RAL 9005 black
Synchronous servomotor DFS../CFM.., CMP..	
PS.C.. servo gear unit	

Special coatings are available on request.

Weights

Please note that all weights shown in the catalogs exclude the oil fill for the gearmotors. The weights vary according to gear unit design and gear unit size.

Heat dissipation and accessibility

Servo gearmotors and brakes can reach surface temperatures > 100 °C (212 °F) during operation. Make sure to maintain adequate distance from heat-sensitive components when installing gear (brake) motors to the driven machine.



Brakemotors

On request, motors and gearmotors can be supplied with an integrated mechanical brake. The SEW-EURODRIVE brake is an electromagnetic disk brake with a DC coil that releases electrically and brakes using spring force. Due to its operating principle, the brake is applied if the power fails. It meets the basic safety requirements. The brake is controlled by a control element that is either installed in the motor wiring space or the control cabinet.

A feature of the brake is the very compact design. The brake bearing end shield is a part of both the motor and the brake. The integrated construction of the SEW-EURODRIVE brake motor permits particularly compact and sturdy solutions.

2

International markets

Upon request, SEW-EURODRIVE can deliver motors with connection requirements according to CSA and NEMA guidelines (UR listed).

For the Japanese market, SEW-EURODRIVE offers motors conforming to JIS (Japan Industrial Standard). Contact your sales representative to assist you in such cases.



2.2 Description servo gear units

General information

PS.C gear units are available as a compact construction in single- and two-stage design and in four different sizes.

Any mounting position is possible. For the output, the customer can choose between a B5 and B14 flange as well as between solid shaft with or without key (standard).

Oil lubrication is standard. Grease lubrication is also possible if requested by the customer.

Direct motor mounting

The tried and tested modular concept enables a direct combination of servo gear units and synchronous servomotors.

The new PS.C servo gear units can be combined directly and without adapter with the synchronous servomotors of the DFS, CFM or CMP series from SEW-EURODRIVE. These integrated servo gearmotors offer shaft-hub connections that are all positive and free from backlash.

Motor mounting with adapter

Servomotors can also be mounted to PS.C gear units using ECH or EPH motor adapters, if requested by the customer.

The cost optimized ECH adapter ensures straightforward motor mounting due to the simple design of the clamp connection.

The EPH adapter from the PS.F series can be used as alternative for certain motors or motor dimensions.



2.3 Servo gear unit characteristics

Low backlash and positioning accuracy

2

The gearing geometry paired with precisely manufactured components and careful assembly make for low circumferential backlash.

Circumferential backlash will remain constantly low for the entire gear unit life due to the wear-free operating performance and high-endurance design of the running gears.

Extensive ratio range with fine graduation

All ratios from 3:1 to 100:1 are integers and finely graduated. This means that the gear units are suitable for use with controllers that require integer resolution ratios.

Reliability, longevity and low maintenance

The high reliability of servo gear units from SEW-EURODRIVE in the system is ensured by the use of high-strength materials, high-quality anti-friction bearings, extended life oil seals and synthetic lubricants.

High overload capacity

Exactly matched components as well as backlash-free and positively connected drive elements ensure that high torques can be transferred and that large axial and radial forces can be absorbed.

Compact and lightweight structure

The high power density allows for integrating the gear stages in a compact and extremely solid cast housing of small dimensions.

Torsionally rigid

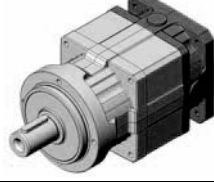
The special design of SEW-EURODRIVE servo gear units in conjunction with large shaft diameters ensures high torsional rigidity.



2.4 Design variants and options for PS.C.. servo gear units

Design variants

The following design variants of PS.C.. servo gear units can be supplied:

PS.C.. servo gear unit		
Type		Meaning
	PSC..	Servo gear unit with B5 flange and solid shaft
	PSKC..	Servo gear unit with B5 flange and solid shaft with key
	PSCZ..	Servo gear unit with B14 flange and solid shaft
	PSKCZ..	Servo gear unit with B14 flange and solid shaft with key



2.5 Unit designation of servo gearmotors

Example: Order code for PS.C.. servo gearmotors

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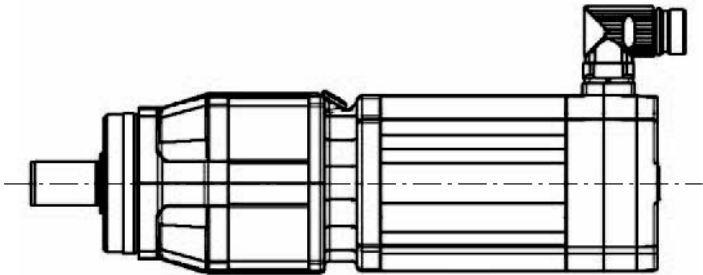
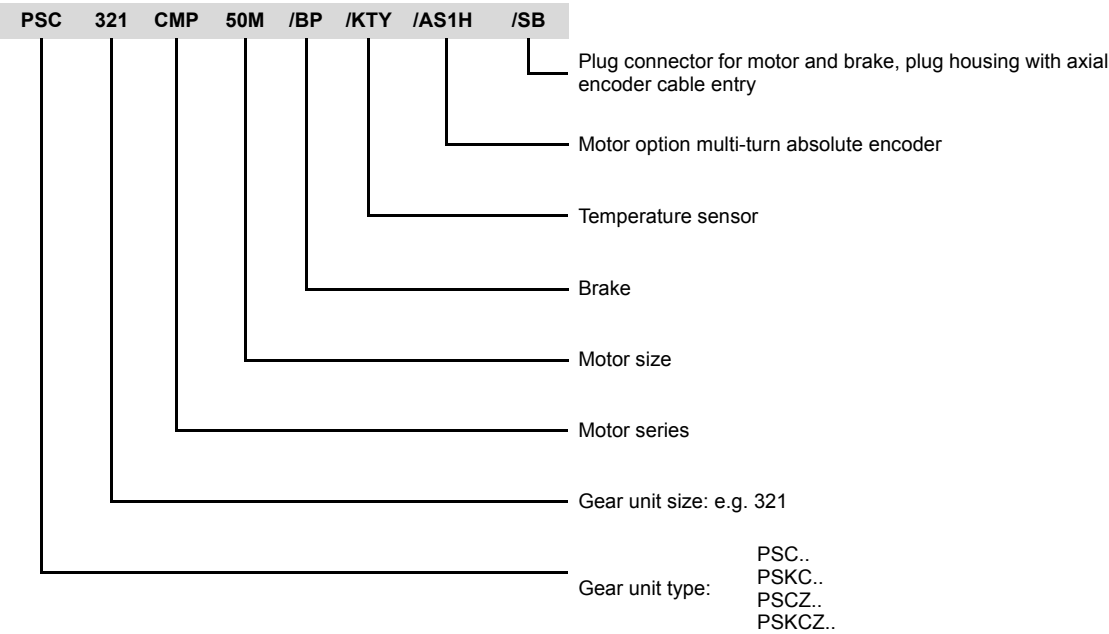


Figure 1: Example for a PS.C.. servo gearmotor

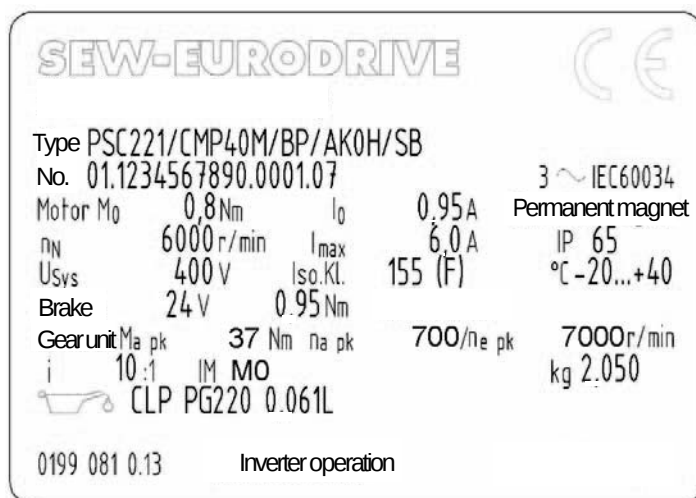
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A servo gearmotor with brake, manual brake, positive temperature coefficient thermistor and plug connector with a connection cross section of 1.5 mm² has, for example, the following unit designation:





Example: Nameplate for PS.C.. servo gearmotors



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Figure 2: Servo gearmotor nameplate

Key

i	Gear unit reduction ratio	n _N	[rpm]	Rated speed
IM	Mounting position	M ₀	[Nm]	Rated torque
IP	Degree of protection	I ₀	[A]	Rated current
n _{epk}	[rpm] Maximum permitted input speed	I _{max}	[A]	Maximum permitted current
n _{apk}	[rpm] Maximum permitted output speed	f _N	[Hz]	Rated frequency
M _{apk}	[Nm] Maximum permitted output torque	U _{max}	[V]	Maximum permitted voltage

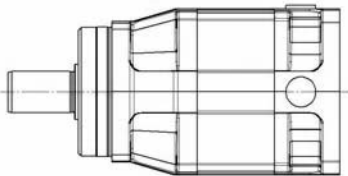


NOTE

The nameplate of the PS.C.. servo gearmotor is attached to the servomotor!



Example: Order code for PS.C.. servo gear units with ECH.. adapter

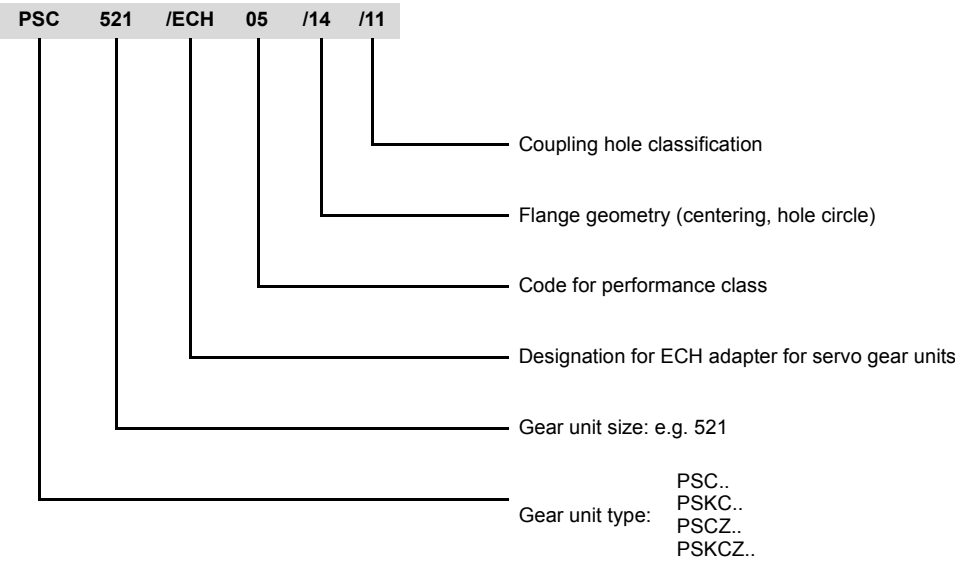


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Figure 3: Example for a PS.C.. servo gear unit with ECH.. adapter

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The unit designation of the PS.C.. servo gear unit with adapter begins with the series of the gear unit.





Example: Nameplate on the PS.C.. servo gear unit with ECH.. adapter

SEW-Eurodrive						i	10
						kg	5,9
PSC321 ECH03/13/11						IP	65
201.3123755201.0001.04				IM		M0	
n _{apk}	1/min	650	n _{epk}	1/min	6500		
M _{apk}	Nm	81					
CLP PG220				0,091 L		01178997	

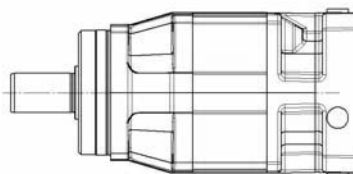
Figure 4: Nameplate adapter mounting

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Key

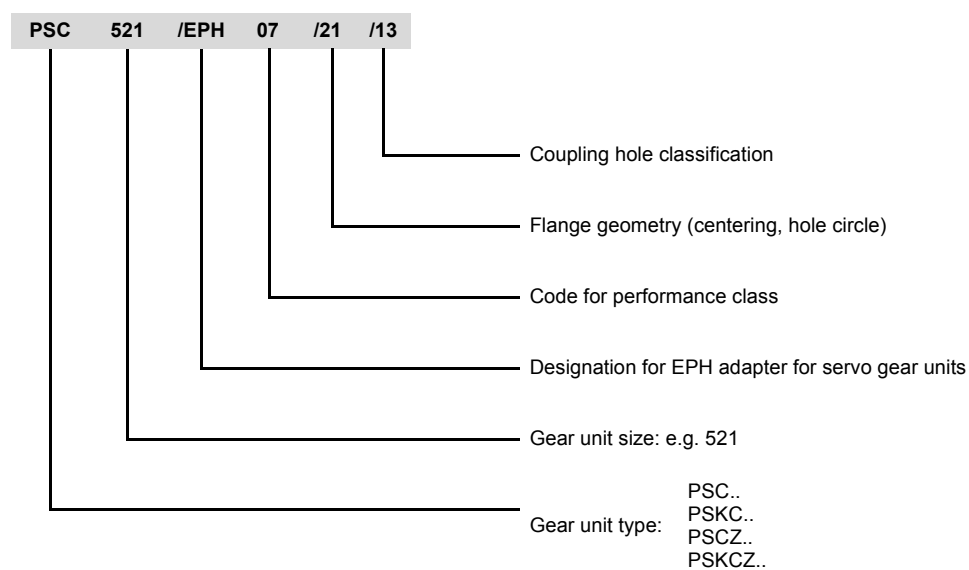
i		Gear unit reduction ratio
IM		Mounting position
IP		Degree of protection
n _{epk}	[rpm]	Maximum permitted input speed
n _{apk}	[rpm]	Maximum permitted output speed
M _{apk}	[Nm]	Maximum permitted output torque

2



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2





3 Project Planning for Servo Gearmotors

3.1 Additional documentation

In addition to the information in this catalog, SEW-EURODRIVE offers extensive documentation covering the entire topic of electrical drive engineering. These are mainly the publications in the "Drive Engineering – Practical Implementation" series as well as the manuals and catalogs for electronically controlled drives. You will find additional links to a wide selection of our documentation in many languages for download on the SEW-EURODRIVE homepage (<http://www.seweurodrive.com>). The list below includes other documents that are of interest in terms of project planning. You can order these publications from SEW-EURODRIVE.

Drive Engineering - Practical Implementation

- Drive Planning
- Controlled AC Drives
- Servo Technology.
- EMC in Drive Engineering.
- SEW Disc Brakes.

Electronics documentation

- MOVIDRIVE® MDX60/61B system manual.
- MOVIAXIS® MX project planning manual.



3.2 Data for drive and gear unit selection

Certain data is essential to specify the components for your drive precisely. These are:

Designation	Meaning	Unit
φ	Circumferential backlash	[°]
h	Gear unit efficiency (for M_{apk})	
a, b, c, f	Gear unit constants as regards the overhung load conversion	
a_0, a_1, a_2	Gear unit constants as regards the rise in temperature in the gear unit	
F_A	Axial load (tension and compression) on the output shaft	[N]
f_k	Speed ratio	
F_R	Overhung load on the output shaft	[N]
F_{Rapk}	Maximum permitted overhung load at the output shaft for short-time duty (load application point is the middle of the shaft end)	[N]
F_{Ramax}	Maximum permitted overhung load at the output shaft for continuous duty (load application point is the middle of the shaft end)	[N]
F_{Repk}	Maximum permitted overhung load at the input shaft for short-time duty (load application point is the middle of the shaft end)	[N]
F_{Remax}	Maximum permitted overhung load at the input shaft for continuous duty (load application point is the middle of the shaft end)	[N]
H	Installation altitude	[m above sea level]
I_0	Current consumption of the motor at M_0	[A]
I_{max}	Maximum permitted motor current (root-mean-square value)	[A]
Ins.Cl.	Thermal classification of the motor	
i	Gear unit reduction ratio	
IM	Int. mounting position of gear unit $M_1 \dots M_6$	
IP..	Degree of protection according to IEC60034-5	
J_A	Mass moment of inertia for the adapter	[kgm ²]
J_G	Mass moment of inertia of the gear unit	[kgm ²]
J_{ext}	Mass moment of inertia (external) reduced on motor shaft	[kgm ²]
J_{Mot}	Mass moment of inertia of the motor	[kgm ²]
J_L	Mass moment of inertia of the load	[kgm ²]
k	Inertia ratio J_{ext}/J_{Mot}	
l	Length of output shaft	
$M_1 \dots M_n$	Output torque in time period t_1 to t_n	[Nm]
M_0	Thermally permitted output torque of the motor in continuous duty at low speed (not to be confused with standstill torque)	[Nm]
M_a^{DYN}	Dynamic output torque assumed for the drive in project planning	[Nm]
M_{aeff}	Effective torque for component testing calculated in project planning	[Nm]
M_{akub}	Effective torque for bearing testing calculated in project planning	[Nm]
M_{omax}	Maximum permitted output torque for continuous duty	[Nm]
M_{apk}	Maximum permitted torque for short-time duty	[Nm]
$M_{aNOTAUS}$	Maximum permitted emergency stop torque, max. 1000 emergency stops	[Nm]
M_{ath}	Effective torque for thermal testing calculated in project planning	[Nm]
M_B	Rated brake torque	[Nm]
M_{pk}	Dynamic limit torque of the servomotor	[Nm]

Table continued on next page.



Designation	Meaning	Unit
M_{eff}	Effective torque requirement (in relation to the motor)	[Nm]
M_{max}	Maximum output torque assumed for the drive in project planning	[Nm]
ML	Mounting location (UL)	
n_{apk}	Maximum permitted output speed for short-time duty	[rpm]
n_{epk}	Maximum permitted input speed for short-time duty	
n_{em}	Mean input speed	[rpm]
n_{am}	Mean output speed	[rpm]
n_{ak}	Breakpoint speed	[rpm]
n_{N}	Rated speed	[rpm]
$n_1 \dots n_n$	Output speed in time period t_1 to t_n	[rpm]
$n_{\text{etn_pk}}$	Maximum input speed in section	[rpm]
P_{Br}	Braking power	[W]
$P_{\text{Br_pk}}$	Peak braking power	[W]
$P_{\text{Br_tn}}$	Braking power in section t_n	[W]
$S_{\dots} \dots \% \text{ cdf}$	Duty type and cyclic duration factor (cdf) or exact load cycle can be entered.	-
$t_1 \dots t_n$	Time period 1 to n	[min]
t_z	Cycle time	[s]
T_{Amb}	Ambient temperature	[°C]
U_{sys}	System voltage, voltage of the supplying inverter	[V]
V_{B}	Operating voltage of the brake	[V]
x	Distance between overhung load application point and shaft shoulder	[mm]
F_{Rmax}	Calculated auxiliary variable	
F_{Rkub}	Calculated auxiliary variable	

Determining the application data

It is first necessary to have data on the machine to be driven (mass, speed, setting range, etc.) to design the drive correctly.

These data help determine the required power, torque and speed. Refer to the SEW publication "Drive Engineering - Practical Implementation, Drive Planning" or the SEW project planning tool SEW Workbench for assistance.

Selecting the correct drive

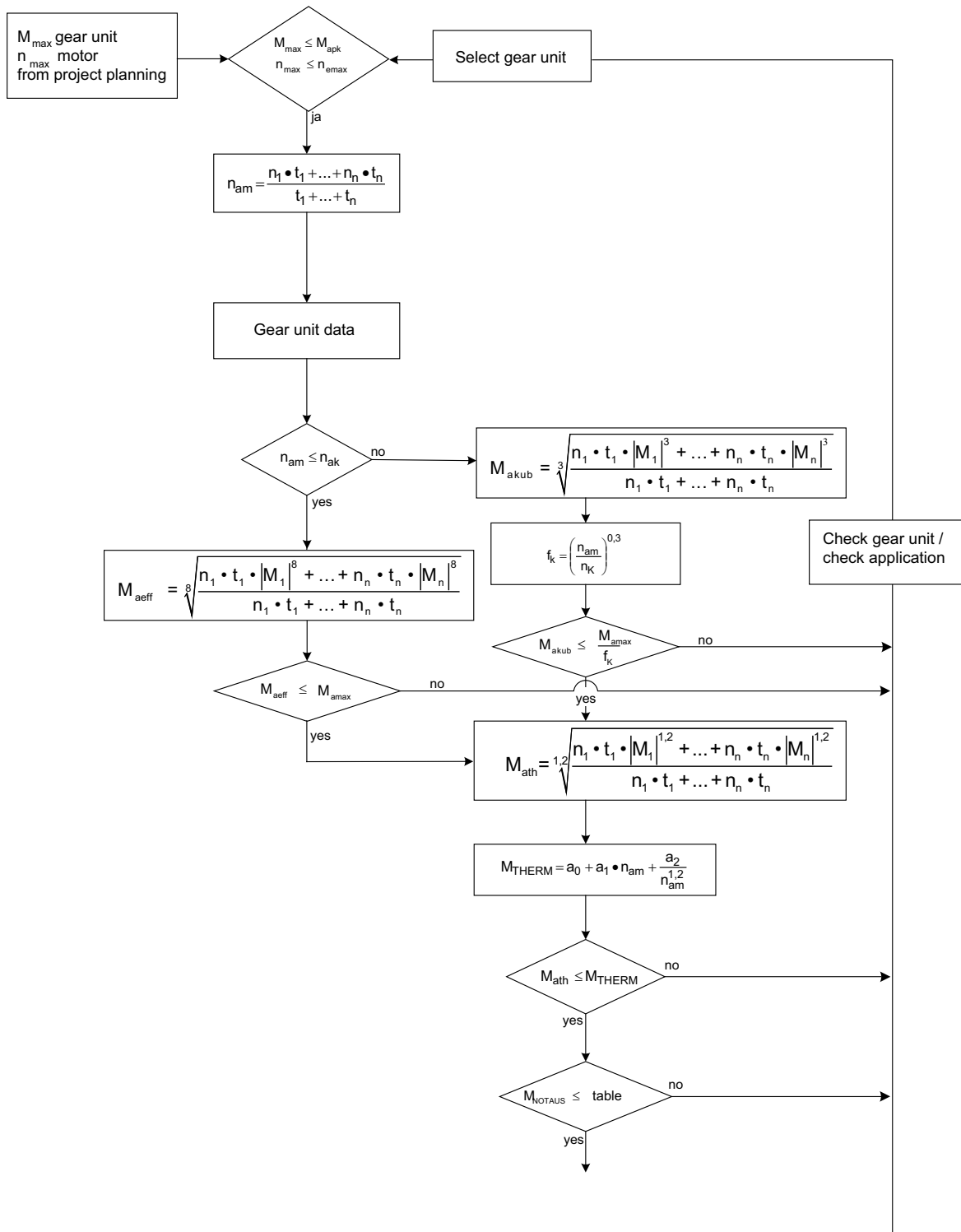
The appropriate drive can be selected once the power and speed of the drive have been calculated and with regard to mechanical requirements.

3.3 Project planning procedure

The following flowcharts show a schematic view of the project planning procedure of a servo gear unit for a positioning drive in S3 operation.



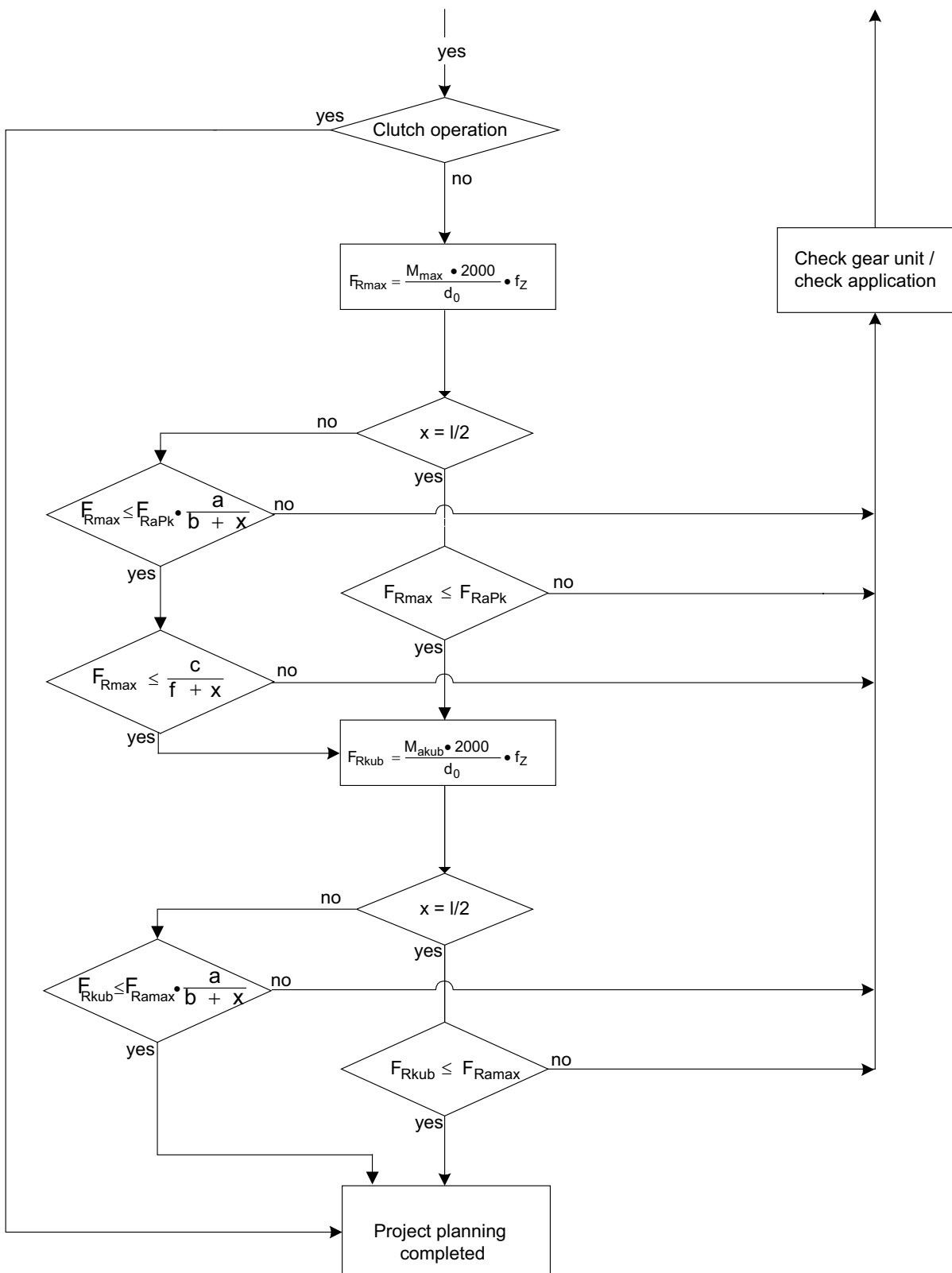
Project planning procedure part 1, servo gear units



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Project planning procedure part 2, servo gear units

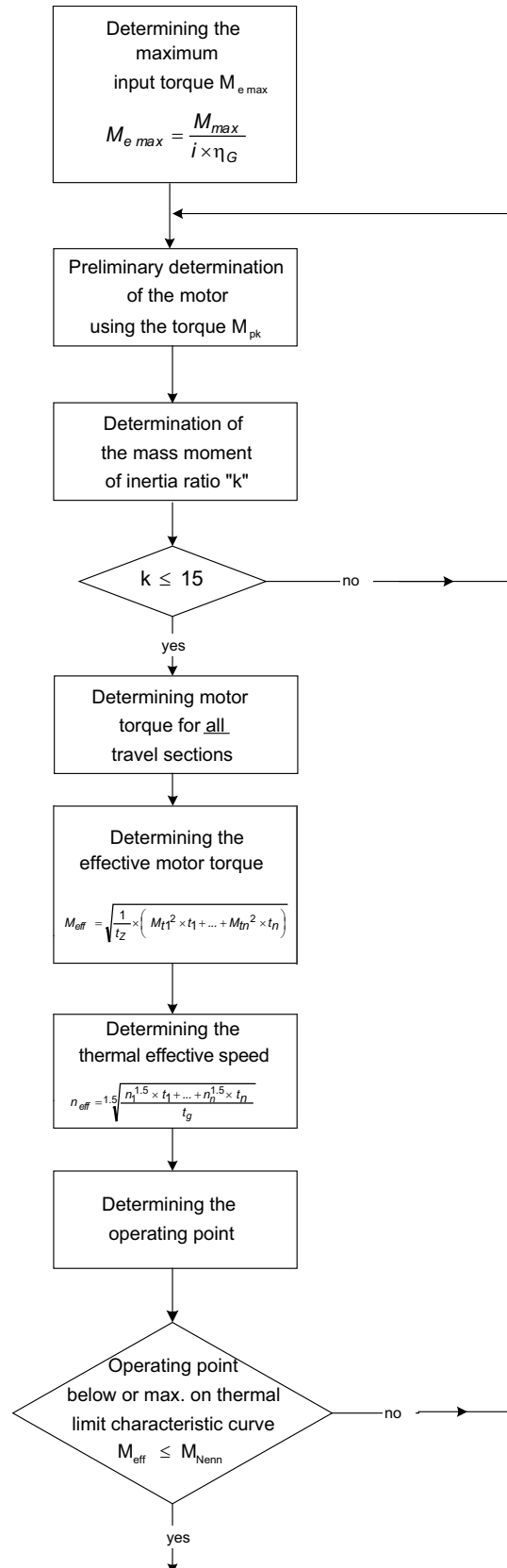


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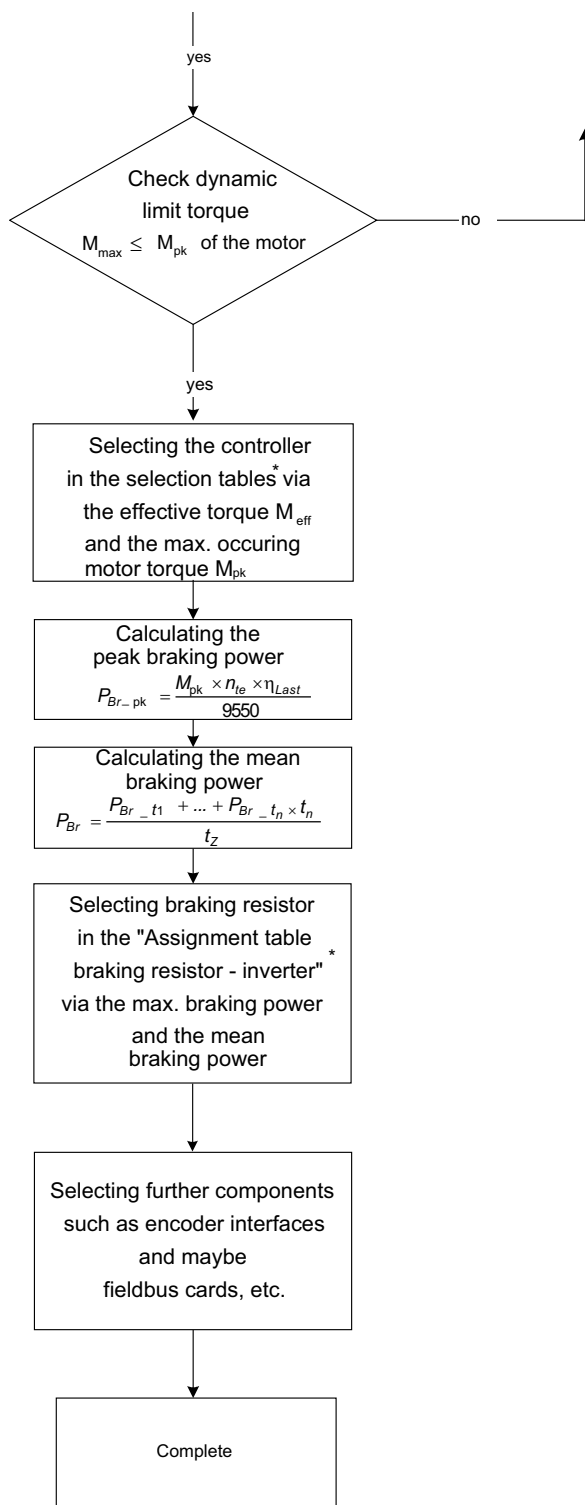
Project planning procedure part 3, servomotors

3





Project planning procedure part 4, servomotors



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* MOVIDRIVE® system manual, MOVIAxis® project planning manual



3.4 Project planning for gear units / gearmotors

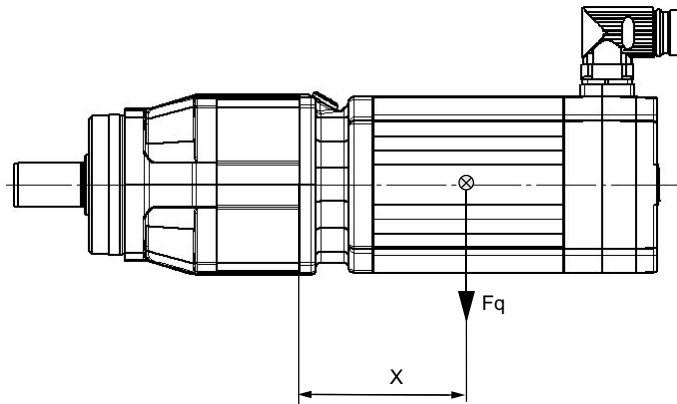
	NOTE When input and output elements are mounted on servo gear units, the shaft shoulder can be used as a stop for transmission elements (belt pulley, pinion gear, etc.).
--	--

3

	NOTE - Servo gear units can be operated at ambient temperatures of between - 20 °C and + 40 °C (- 4 °F and + 104 °F). It is essential that you contact SEW-EURO-DRIVE if ambient temperatures exceed this temperature range. - Servo gear units can be operated up to altitudes of 1000 m above sea level. For operation at altitudes above 1000 m above sea level, contact SEW-EURODRIVE.
--	--

Design and operating notes

Permitted
maximum
overhung load on
motors



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- ⊗ .. Motor's center of gravity
- X .. Distance from adapter flange to motor's center of gravity
- F_q .. Overhung load



Project Planning for Servo Gearmotors

Project planning for gear units / gearmotors

ECH adapter

Gear unit type	Adapter type ECH..	X [mm]	F _q [N] ¹⁾
PS.C..221 PS.C..222	ECH02/01	90	40
	ECH02/08	130	94
PS.C..321 PS.C..322	ECH03/08	130	94
	ECH03/13	155	170
PS.C..521 PS.C..522	ECH05/13	155	170
	ECH05/14	200	306
PS.C..621 PS.C..622	ECH06/14	200	306
	ECH06/20	235	530

- 1) Maximum load values for connection screws of strength class 8.8. The maximum permitted weight of the attached motor F_{qmax} must be reduced proportionally as the distance between the adapter flange and the middle of the motor (x) increases. When this distance is reduced, F_{qmax} cannot be increased.

EPH adapter

Gear unit type	Adapter type EPH..	X [mm]	F _q [N] ¹⁾
PS.C221 PS.C222	EPH01/01-03	100	120
	EPH02/04-08	120	150
	EPH03/03-14	182	157
	EPH04/03-15	182	157
PS.C321 PS.C322	EPH04/03-15	182	157
	EPH05/14-20	290	273
PS.C521 PS.C522	EPH04/03-15	182	157
	EPH05/14-20	290	273
	EPH06/19	290	312
	EPH07/20-22	290	312
PS.C621 PS.C622	EPH05/14-20	220	273
	EPH06/19	290	312
	EPH07/20-22	290	312
	EPH08/22	351	600

- 1) Maximum load values for connection screws of strength class 8.8. The maximum permitted weight of the attached motor F_{qmax} must be reduced proportionally as the distance between the adapter flange and the middle of the motor (x) increases. When this distance is reduced, F_{qmax} cannot be increased.



3.5 Overhung and axial loads

Determining the overhung load

An important factor for determining the resulting overhung load is the type of transmission element mounted to the shaft end. The following transmission element factors f_z also have to be considered for various transmission elements according to the following formula:

$$f_z = f_{z1} \times f_{z2}$$

Transmission element	Transmission element factor f_{z1}	Comments
Gears	1.15	< 17 teeth
Chain sprockets	1.40	< 13 teeth
Chain sprockets	1.25	< 20 teeth
Narrow V-belt pulleys	1.75	Depending on the pre-tensioning force
Flat belt pulleys	2.50	Depending on the pre-tensioning force
Toothed belt pulleys	2.00 - 2.50	Depending on the pre-tensioning force

	NOTE
	Factor f_{z2} only applies to helical output elements.

Gear unit	Helical output elements	
	Helix angle β ^{1) 2)}	f_{z2}
PS.C221 - PS.C622	$\leq 11^\circ$	1.00
	20°	1.20

1) For $11^\circ < \beta < 20^\circ$, f_z must be interpolated linearly

2) For helix angles $> 20^\circ$, please contact SEW-EURODRIVE.

Permitted overhung load

The basis for determining the permitted overhung loads is the computation of the rated bearing service life L_{H10} of the anti-friction bearings (according to ISO 281).

For special operating conditions, the permitted overhung loads can be determined with regard to the modified bearing service life L_{na} on request.

	NOTE
	The data refers to gearmotors with the force acting midway on the output shaft. The values for the force application angle α and direction of rotation are based on the most unfavorable conditions.



Higher permitted overhung loads

Taking into consideration the direction of rotation, it may be possible to achieve a higher overhung load. Contact SEW-EURODRIVE in such a case.

Definition of force application point

Force application is defined according to the following diagram:

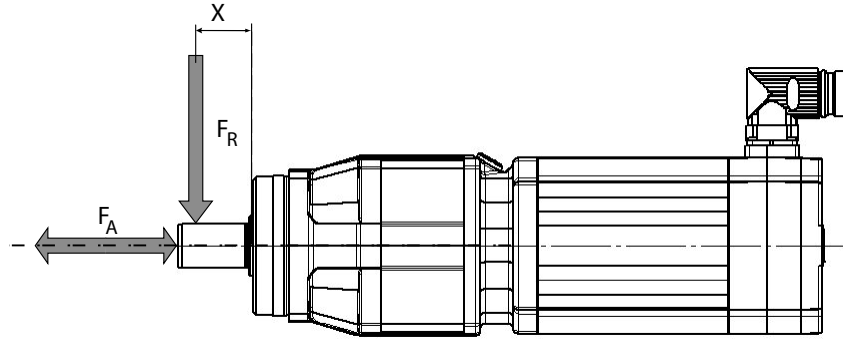


Figure 6: Definition of force application point

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F_R = Overhung load at point x [N]
 F_A = Axial load [N]

Permitted axial loads

If there is no overhung load, then an axial force F_A (tension or compression) of up to 50% of the overhung load given in the selection tables is permitted.

Overhung load calculation

The overhung load is determined as described in the project planning procedure on page 24.

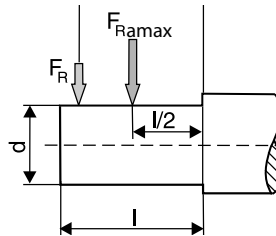


Figure 7: Overhung load F_R for off-center force application on a solid shaft

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Gear unit constants for overhung load conversion

Design:	Gear unit constants for overhung load conversion:			
	a [mm]	b [mm]	f [mm]	c [mm]
PS.C221/222	57	43	0	3.41×10^4
PS.C321/322	63.5	45.5	0	7.55×10^4
PS.C521/522	95.5	66.5	0	2.13×10^4
PS.C621/622	107.5	66.5	0	3.68×10^4



3.6 Project planning for servomotors

Features of synchronous servomotors

Synchronous servomotors

Synchronous servomotors are permanent-magnet synchronous motors. Characteristics of SEW-EURODRIVE synchronous servomotors are:

- Standstill torque of 1 Nm up to 68 Nm, with forced cooling fan up to 95 Nm
- High dynamics (ratio between rated torque and mass moment of inertia of the motor).
- High level of enclosure (IP65)
- Robust encoder system (resolver)
- The optimal encoder system with sine/cosine encoder allows for a very wide setting range up to 5000:1.
- High speeds up to 6000 rpm can be set without operation in the field weakening range.
- High continuous torque at low speeds and at standstill, without forced cooling fan
- High overload capability
- NeFeB magnets, permanent magnets with high magnetic field density

3

Degrees of protection according to IEC 34-5 (EN 60034-5)

- Synchronous servomotors are supplied with IP65 enclosure as standard.

IP	1. digit		2. digit
	Touch guard	Protection against foreign objects	Protection against water
0	No protection	No protection	No protection
1	Protected against access to hazardous parts with the back of your hand	Protected against solid foreign objects Ø50 mm and larger	Protection against dripping water
2	Protected against access to hazardous parts with a finger	Protected against solid foreign objects Ø12 mm and larger	Protection against dripping water when tilted up to 15°
3	Protected against access to hazardous parts with a tool	Protected against solid foreign objects Ø2.5 mm and larger	Protected against spraying water
4	Protected against access to hazardous parts with a wire	Protected against solid foreign objects Ø1 mm and larger	Protection against splashing water
5		Protection against dust	Protection against water jets
6		Dust-proof	Protection against powerful water jets
7	-	-	Protected against temporary immersion in water
8	-	-	Protected against permanent immersion in water



Applications

Acceleration greater than 5 m/s²

The rotor of the synchronous servomotor is designed to be extremely low-inertia. This motor is the perfect choice for very dynamic applications. For accelerations greater than 5 m/s², the **synchronous servomotor** is usually the technically and economically best solution.

Cogging

The motors produce small torque ripple due to the servo drive design. The torque ripple is compensated by the inverter to prevent fluctuations even at low speeds.

Assignment of gear unit to motor

Permitted combinations of motor and gear unit are indicated by gray fields in the combination overviews.

Notes on selecting servomotors

Project planning for a servomotor involves the following tasks for determining the thermal and dynamic load on the motor:

- Calculating the **effective operating point** for checking the thermal load on the motor.
- Calculating the **maximum operating point** for determining the motor/inverter combination.
- Determining the **inertia ratio** $J_{\text{ext}} / J_{\text{Mot}}$ for checking the stability of the speed control.
 - J_{ext} = Mass moment of inertia, reduced on motor shaft
 - J_{Mot} = Mass moment of inertia of the motor

Rated speeds

All synchronous servomotors DFS / CFM and CMP are available in several rated speeds

As all servomotors operate as controlled drives it is necessary to consider the inertia ratio between the load and the motor. This ratio has a decisive effect on the control quality. The inertia ratio should not exceed the values listed in the table below. Reduction of the inertia ratio using the motor speed (the selected gear unit reduction ratio) offers hardly any advantage with respect to closed-loop control starting at the value $J_{\text{ext}} / J_{\text{Mot}} < 8$. Backlash and elasticity negatively influence the possible dynamic response of the driveline and must be kept to a minimum.

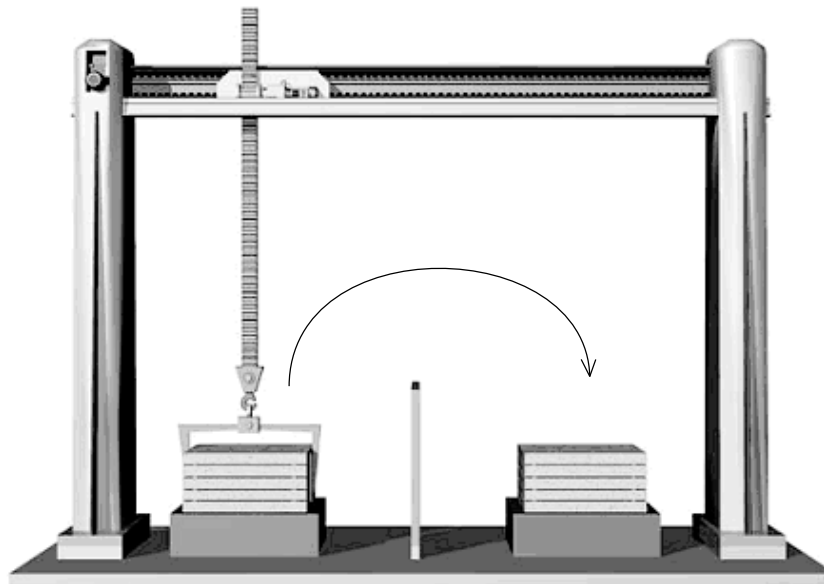
As a result, the maximum speed should be selected such that the following criteria are met:

Driveline	Control characteristics	Inertia ratio $J_{\text{ext}} / J_{\text{Mot}}$
Forged gear rack, reduced backlash gear unit	Low backlash and low elasticity drive	$J_{\text{ext}} / J_{\text{Mot}} < 15$
Toothed belt, reduced backlash gear unit	Common servo applications	$J_{\text{ext}} / J_{\text{Mot}} < 15$
Toothed belt, standard gear unit	Standard applications, couplings with torque buffer (→ elasticity)	$J_{\text{ext}} / J_{\text{Mot}} < 10$



3.7 Project planning example: Gantry with servo drives

X-axis configuration (travel axis)



3

Figure 8: Project planning example: Gantry with servo drives travel axis

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Reference data:

- Total moved mass: $m_L = 50 \text{ kg}$
- Diameter of the belt pulley: $d_0 = 75 \text{ mm}$
- Friction coefficient of the axis: $\mu = 0.01$
- Traveling velocity: $v_{\max} = 2 \text{ m/s}$
- Maximum occurring acceleration/deceleration: $a_{\max} = 10 \text{ m/s}^2$
- Cycle time: $t_z = 3 \text{ s}$
- Rest period: $t_p = 1.8 \text{ s}$
- Load efficiency: $\eta_L = 0.9$
- Mounting position of the gear unit: IM = M1

For the drive, a PS.C servo gear unit is designed to be mounted directly to a CMP servomotor.

The overhung load is to act on the shaft center.

Power is transmitted via a belt pulley.



Travel sections

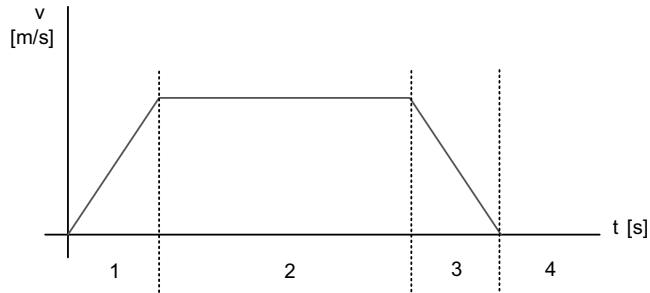


Figure 9: Travel sections 1 - 4

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Acceleration time in travel section 1, deceleration time in travel section 3

$$t_1 = t_3 = \frac{v_{max}}{a_{max}} = \frac{2 \text{ m/s}}{10 \text{ m/s}^2} = 0.2 \text{ s}$$

Travel time for constant travel in travel section 2

$$t_2 = t_z - t_p - t_1 - t_3$$

$$t_2 = 3 \text{ s} - 1.8 \text{ s} - 0.2 \text{ s} - 0$$

$$t_2 = 0.8 \text{ s}$$

M_{stat} for all travel sections

$$M_{stat} = \frac{(m \cdot g \cdot \mu) \cdot \frac{d_0}{2}}{\eta_L}$$

$$M_{stat} = \frac{50 \text{ kg} \cdot 9.81 \frac{\text{m}}{\text{s}^2} \cdot 0.01 \cdot \frac{0.075 \text{ m}}{2}}{0.9}$$

$$M_{stat} = 0.2043 \text{ Nm}$$

M_{dyn} during acceleration in travel section 1

$$M_{dyn} = \frac{(m \cdot a) \cdot \frac{d_0}{2}}{\eta_L}$$

$$M_{dyn} = \frac{50 \text{ kg} \cdot 10 \frac{\text{m}}{\text{s}^2} \cdot \frac{0.075 \text{ m}}{2}}{0.9}$$

$$M_{dyn} = 20.83 \text{ Nm}$$



M_{dyn} during deceleration in travel section 3

$$M_{dyn} = m \cdot a \cdot \frac{d_0}{2} \cdot \eta_L$$

$$M_{dyn} = 50kg \cdot \left(-10 \frac{m}{s^2}\right) \cdot \frac{0.075m}{2} \cdot 0.9$$

$$M_{dyn} = -16.875Nm$$

3

M_{max} during acceleration in travel section 1

$$M_{max} = M_{stat} + M_{dyn1}$$

$$M_{max} = 0.2043Nm + 20.8333Nm$$

$$M_{max} = 21.04Nm$$

M_{max} during deceleration in travel section 3

$$M_{max} = M_{stat} + M_{dyn3}$$

$$M_{max} = 0.2043Nm + (-16.87Nm)$$

$$M_{max} = -16.6657Nm$$

Output speed

$$n_{amax} = \frac{v_{max}}{d_0 \cdot \pi} \cdot 60$$

$$n_{amax} = \frac{2 \frac{m}{s}}{0.075m \cdot \pi} \cdot 60$$

$$n_{amax} = 506.295 \frac{1}{min}$$

Gear ratio including 10% motor speed reserve

$n_N = 4500$ rpm is just an assumption

$$i = \frac{n_N \cdot 0.9}{n_{amax}}$$

$$i = \frac{4500 \frac{1}{min} \cdot 0.9}{509.295 \frac{1}{min}}$$

$$i = 7.95$$

Selected gear ratio: $i = 7$



Maximum input speed

$$n_{\max} = n_{a\max} \cdot i$$

$$n_{\max} = 509.295 \frac{1}{\min} \cdot 7$$

$$n_{\max} = 3565.065 \frac{1}{\min}$$

Servo gear unit project planning

Project planning follows the project planning procedure on page 23 and subsequent pages.

The gear unit is selected on the basis of the table below:

	i	M _{omax} [Nm]	M _{apk} [Nm]	M _{aNotaus} [Nm]	n _{ak} [rpm]	J _G 10 ⁻⁴ kgm ²	c _T PSC [Nm/°]	F _{Ra} PSC [N]	F _{Rapk} PSC [N]
	3	29	40	60	1500	0.172	3.46	1170	2000
	5	34	42	63	720	0.0578	3.44	1390	2000
	7	32	39	59	800	0.03	3.28	1550	2000
	10	30	37	56	700	0.0144	2.92	1750	2000

	i	n _{epk} [rpm]	η [%]	M1;M3;M5-6			M2			M4			φ
				a ₀	a ₁	a ₂	a ₀	a ₁	a ₂	a ₀	a ₁	a ₂	[°]
	3	7000	99	101.00	-0.093	0	106.00	-0.104	0	109.00	-0.110	0	10
	5	7000	99	160.00	-0.181	0	163.00	-0.190	0	167.00	-0.200	0	10
	7	7000	99	186.00	-0.257	0	187.00	-0.264	0	186.00	-0.267	0	10
	10	7000	99	158.00	-0.178	0	161.00	-0.184	0	164.00	-0.194	0	10

Selection condition:

$$M_{\max} \leq M_{apk}$$

$$21.04 Nm \leq 39 Nm$$

$$n_{\max} \leq n_{epk}$$

$$3565 \frac{1}{\min} \leq 7000 \frac{1}{\min}$$

Conditions are fulfilled.



Mean output speed

$$n_{am} = \frac{n_1 \cdot t_1 + \dots + n_n \cdot t_n}{t_1 + \dots + t_n}$$

$$n_{am} = \frac{\frac{509.295 \frac{1}{\text{min}}}{2} \cdot 0.2s + 509.295 \frac{1}{\text{min}} \cdot 0.8s + \frac{509.295 \frac{1}{\text{min}}}{2} \cdot 0.2s}{0.2s + 0.8s + 0.2s + 1.8s}$$

$$n_{am} = 169.765 \frac{1}{\text{min}}$$

3

Selection condition:

$$n_{am} \leq n_{ak}$$

$$169.765 \frac{1}{\text{min}} \leq 809 \frac{1}{\text{min}}$$

Condition is fulfilled.

Effective torque of servo gear unit

$$M_{aeff} = \sqrt[8]{\frac{n_1 \cdot t_1 \cdot |M_1|^8 + \dots + n_n \cdot t_n \cdot |M_n|^8}{n_1 \cdot t_1 + \dots + n_n \cdot t_n}}$$

$$M_{aeff} = \sqrt[8]{\frac{\frac{509.295 \frac{1}{\text{min}}}{2} \cdot 0.2s \cdot |21.04Nm|^8 + 509.295 \frac{1}{\text{min}} \cdot 0.8s \cdot |0.2043Nm|^8 + \frac{506.295 \frac{1}{\text{min}}}{2} \cdot 0.2s \cdot |16.67Nm|^8}{0.2s \cdot 254.64 \frac{1}{\text{min}} + 0.8s \cdot 509.295 \frac{1}{\text{min}} + 0.2s \cdot 254.64 \frac{1}{\text{min}}}}$$

$$M_{aeff} = 16.065Nm$$

Selection condition:

$$M_{aeff} \leq M_{amax}$$

$$16.065Nm \leq 32Nm$$

Condition is fulfilled.



Thermal torque of servo gear unit

$$M_{ath} = \sqrt[1.2]{\frac{n_1 \cdot t_1 \cdot |M_1|^{1.2} + \dots + n_n \cdot t_n \cdot |M_n|^{1.2}}{n_1 \cdot t_1 + \dots + n_n \cdot t_n}}$$

$$M_{ath} = \sqrt[1.2]{\frac{\frac{509.295 \frac{1}{\min}}{2} \cdot 0.2s \cdot |21.04Nm|^{1.2} + 509.295 \frac{1}{\min} \cdot 0.8s \cdot |0.2043Nm|^{1.2} + \frac{506.295 \frac{1}{\min}}{2} \cdot 0.2s \cdot |-16.67Nm|^{1.2}}{0.2s \cdot 254.64 \frac{1}{\min} + 0.8s \cdot 509.295 \frac{1}{\min} + 0.2s \cdot 254.64 \frac{1}{\min}}}$$

$$M_{ath} = 5.009Nm$$

Thermal factors for mounting position M1

$$a_0 = 186$$

$$a_1 = -0.257$$

$$a_3 = 0$$

$$M_{Therm} = a_0 + a_1 \cdot n_{am} + \frac{a_2}{n_{am}^{1.2}}$$

$$M_{Therm} = 186 + (-0.257 \cdot 169.765 \frac{1}{\min}) + \frac{0}{169.765^{1.2}}$$

$$M_{Therm} = 142.37Nm$$

Selection condition:

$$M_{ath} \leq M_{Therm}$$

$$5.035Nm \leq 142.37Nm$$

Condition is fulfilled.

Overhung load calculation

For transmission element factors f_z for overhung loads of different transmission elements at the output shaft, refer to page 29.

$$F_{Rmax} = \frac{M_{max}}{\frac{d_0}{2}} \cdot f_z$$

$$F_{Rmax} = \frac{21.04Nm}{\frac{0.075m}{2}} \cdot 2.5$$

$$F_{Rmax} = 1402N$$

The force application point is the center of the output shaft.

Selection condition:

$$F_{Rmax} \leq F_{RaPk}$$

$$1402N \leq 2000N$$

Condition is fulfilled.



Calculating the bearing force

$$M_{akub} = \sqrt[3]{\frac{n_1 \cdot t_1 \cdot |M_1|^3 + \dots + n_n \cdot t_n \cdot |M_n|^3}{n_1 \cdot t_1 + \dots + n_n \cdot t_n}}$$

$$M_{akub} = \sqrt[3]{\frac{\frac{509.295 \frac{1}{\min}}{2} \cdot 0.2s \cdot |21.04Nm|^3 + \frac{509.295 \frac{1}{\min}}{2} \cdot 0.8s \cdot |0.2043Nm|^3 + \frac{506.295 \frac{1}{\min}}{2} \cdot 0.2s \cdot |-16.67Nm|^3}{0.2s \cdot 254.64 \frac{1}{\min} + 0.8s \cdot 509.295 \frac{1}{\min} + 0.2s \cdot 254.64 \frac{1}{\min}}}$$

$$M_{akub} = 11.172 Nm$$

3

$$F_{Rkub} = \frac{M_{akub}}{\frac{d_0}{2}} \cdot f_z$$

$$F_{Rkub} = \frac{11.12Nm}{\frac{0.075m}{2}} \cdot 2.5$$

$$F_{Rkub} = 744.8N$$

Selection condition:

$$F_{Rkub} \leq F_{Rmax}$$

$$744.8N \leq 1402N$$

Condition is fulfilled.

Load torques in travel sections 1 to 3

Travel section 1

$$M_{e\max 1} = \frac{M_{dyn1}}{i \cdot \eta_G}$$

$$M_{e\max 1} = \frac{21.04Nm}{7 \cdot 0.99}$$

$$M_{e\max 1} = 3.036Nm$$

Travel section 2

$$M_{e\max 2} = \frac{M_{stat}}{i \cdot \eta_G}$$

$$M_{e\max 2} = \frac{0.2043Nm}{7 \cdot 0.99}$$

$$M_{e\max 2} = 0.0294Nm$$

Travel section 3

$$M_{e\max 3} = \frac{M_{dyn3} \cdot \eta_G}{i}$$

$$M_{e\max 3} = \frac{-16.67Nm \cdot 0.99}{7}$$

$$M_{e\max 3} = -2.357Nm$$



Project Planning for Servo Gearmotors

Project planning example: Gantry with servo drives

Motor selection Preliminary determination of motor using torque M_{pk} .

n_N [rpm]	Motor	M_0 [Nm]	I_0 [A]	M_{pk} [Nm]	I_{max} [A]	M_{0VR} [Nm]	I_{0VR} [A]	J_{mot} [kgcm ²]	J_{bmot}	M_{B1} [Nm]	M_{B2}	L_1 [mH]	R_1 Ω	$U_{p0 \text{ cold}}$ [V]
4500	CMP40S	0.5	1.2	1.9	6.1	-	-	0.1	0.13	0.85	--	23	11.94	27.5
	CMP40M	0.8	0.95	3.8	6.0	-	-	0.15	0.18	0.95	--	45.5	19.92	56
	CMP50S	1.3	1.32	5.2	7.0	1.7	1.7	0.42	0.48	3.1	4.3	37	11.6	62
	CMP50M	2.4	2.3	10.3	13.1	3.5	3.35	0.67	0.73	4.3	3.1	20.5	5.29	66
	CMP50L	3.3	3.15	15.4	19.5	4.8	4.6	0.92	0.99	4.3	3.1	14.6	3.56	68
	CMP63S	2.9	3.05	11.1	18.3	4	4.2	1.15	1.49	7	9.3	18.3	3.34	64
	CMP63M	5.3	5.4	21.4	32.4	7.5	7.6	1.92	2.26	9.3	7	9.8	1.49	67
	CMP63L	7.1	6.9	30.4	41.4	10.3	10	2.69	3.03	9.3	7	7.2	1.07	71

Selected motor:

CMP63M

$M_{pk} = 21.4 \text{ Nm}$

$J_{mot} = 1.92 \times 10^{-4} \text{ kgm}^2$

Determining the inertia ratio "k"

$$J_{ext} = 91.2 \cdot m \cdot \left(\frac{v_{max}}{n_{max}} \right)^2 + J_G$$

$$J_{ext} = 91.2 \cdot 50 \text{ kg} \cdot \frac{\left(2 \frac{\text{m}}{\text{s}} \right)^2}{3565.065 \frac{1}{\text{min}}} + 0.03 \cdot 10^{-4} \text{ kgm}^2$$

$$J_{ext} = 14.38125 \cdot 10^{-4} \text{ kgm}^2$$

J_{ext} is thus in relation to the motor shaft.

$$k = \frac{J_{ext}}{J_{Motor}}$$

$$k = \frac{14.38125 \cdot 10^{-4} \text{ kgm}^2}{1.92 \cdot 10^{-4} \text{ kgm}^2}$$

$$k = 7.49$$

Selection condition:

$$k \leq 15$$

$$7.49 \leq 15$$

Condition is fulfilled.



Intrinsic acceleration or deceleration of motor in sections 1 and 3

$$M_{Eigen} = (J_G + J_{Mot}) \cdot \frac{n_{max}}{9.55 \cdot t}$$

$$M_{Eigen} = (0.03 \cdot 10^{-4} \text{ kgm}^2 + 1.92 \cdot 10^{-4} \text{ kgm}^2) \cdot \frac{3565.065 \frac{1}{\text{min}}}{9.55 \cdot 0.2 \text{ s}}$$

$$M_{Eigen} = 0.3639 \text{ Nm}$$

3

Maximum motor torques in sections 1 and 3

Travel section 1

$$M_{t1} = M_{e \max 1} + M_{Eigen}$$

$$M_{t1} = 3.036 \text{ Nm} + 0.3639 \text{ Nm}$$

$$M_{t1} = 3.3999 \text{ Nm}$$

Travel section 2

$$M_{t3} = M_{e \max 3} + M_{Eigen}$$

$$M_{t3} = -2.357 \text{ Nm} + 0.3639 \text{ Nm}$$

$$M_{t3} = -1.9931 \text{ Nm}$$

Effective motor torque

$$M_{eff} = \sqrt{\frac{1}{t_z} (M_{t1}^2 \cdot t_1 + \dots + M_{tn}^2 \cdot t_n)}$$

$$M_{eff} = \sqrt{\frac{(3.399 \text{ Nm})^2 \cdot 0.2 \text{ s} + (0.0294 \text{ Nm})^2 \cdot 0.8 \text{ s} + (-1.9931 \text{ Nm})^2 \cdot 0.2 \text{ s}}{3 \text{ s}}}$$

$$M_{eff} = 1.0174 \text{ Nm}$$

Thermal effective motor speed

$$n_{eff} = \sqrt[1.5]{\frac{n_1^{1.5} \cdot t_1 + \dots + n_n^{1.5} \cdot t_n}{t_g}}$$

$$n_{eff} = \sqrt[1.5]{\frac{\left(\frac{3565.065 \frac{1}{\text{min}}}{2}\right)^{1.5} \cdot 0.2 \text{ s} + \left(3565.065 \frac{1}{\text{min}}\right)^{1.5} \cdot 0.8 \text{ s} + \left(\frac{3565.065 \frac{1}{\text{min}}}{2}\right)^{1.5} \cdot 0.2 \text{ s}}{3 \text{ s}}}$$

$$n_{eff} = 1646.3 \frac{1}{\text{min}}$$



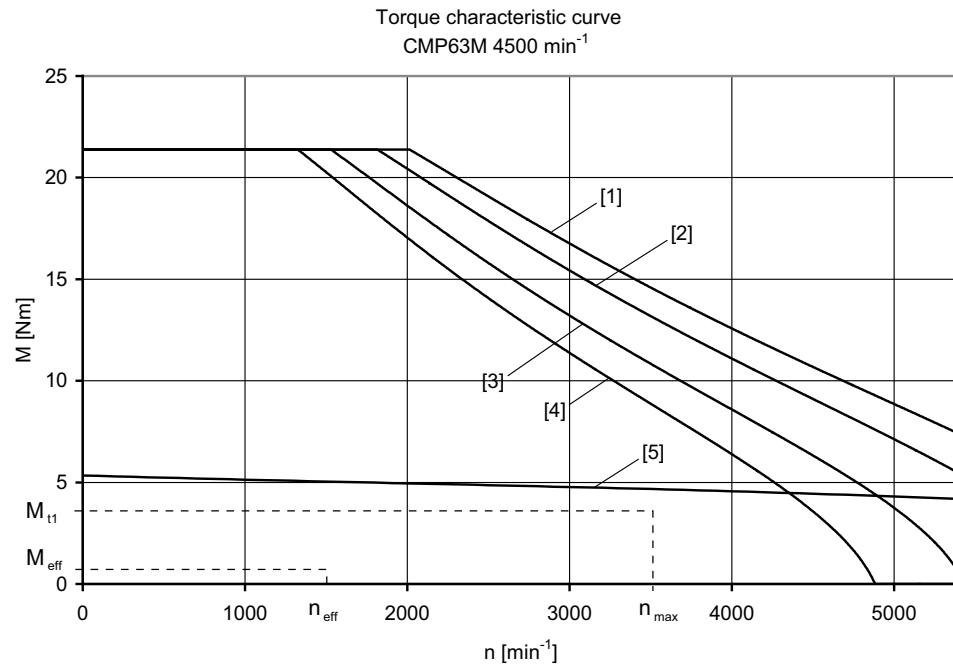
Determining the dynamic and thermal motor operating points

- The thermal operating point must be below or exactly on the thermal limit characteristic curve:

$$M_{eff} \leq M_{Nenn}$$

- The dynamic limit torque must be checked:

$$M_{max\ Mot} \leq M_{pk}$$



- [1] $M_{dynamic}(n)$ 500 V
- [2] $M_{dynamic}(n)$ 460 V
- [3] $M_{dynamic}(n)$ 400 V
- [4] $M_{dynamic}(n)$ 360 V
- [5] $M_{S1_{thermal}}$ (derating)



Inverter assignment

The inverter assignment of CMP servomotors to MOVIAXIS® and MOVIDRIVE® can be found in the "CMP40/50/63 Synchronous Servomotors" catalog.

3

Calculating the braking resistor

Peak braking
power in travel
section 3

$$P_{Br_pk} = \frac{M_m \cdot n_m \cdot \eta_{Last}}{9550}$$

$$P_{Br_pk} = \frac{1.9931Nm \cdot 3565 \frac{1}{min} \cdot 0.9}{9550}$$

$$P_{Br_pk} = 0.6696kW$$

Mean braking
power in travel
section 3

$$P_{Br} = \frac{M_m \cdot n_m \cdot \eta_{Last}}{9550}$$

$$P_{Br} = \frac{1.9931Nm \cdot \frac{3565 \frac{1}{min}}{2} \cdot 0.9}{9550}$$

$$P_{Br} = 0.3348kW$$

Effective braking
power

$$P_{Br_eff} = \frac{P_{Br} \cdot t_3}{t_g}$$

$$P_{Br_eff} = \frac{0.3348kW \cdot 0.2s}{3s}$$

$$P_{Br_eff} = 0.223kW$$

The selection of the braking resistor depends, among other factors, on which braking resistor may be connected to the respective inverter. If you use a MOVIDRIVE® inverter, refer to the system manual for relevant notes.

If you use a MOVIAXIS® servo inverter, a suitable braking resistor must be determined using "SEW Workbench".

4 Important Order Information for Servo Gearmotors

For all gearmotors

The following order information is required for an accurate configuration of the drive:

- Position of power plug connector and motor terminal box
- Position of cable entry for power plug connector / cable entry for terminal box

Sample orders

Type (Examples)	Position of plug connector	Position of cable entry
PS.C521 EPH05/15/10	-	-
PS.CZ222 DS56L	-	X

Direction of rotation of the gear units

Servo gear units	Direction of rotation on the input side	Direction of rotation on the output side
PSC, PSKC, PSCZ, PSKCZ	CW	CW
	CCW	CCW

4.1 DFS / CFM servomotors

Plug connectors for CFM motors

Position of power plug connector and cable entry for CFM motors

Possible positions of the power plug connector are 0°, 90°, 180° or 270° as viewed onto the non-drive end of the motor (onto the fan end).

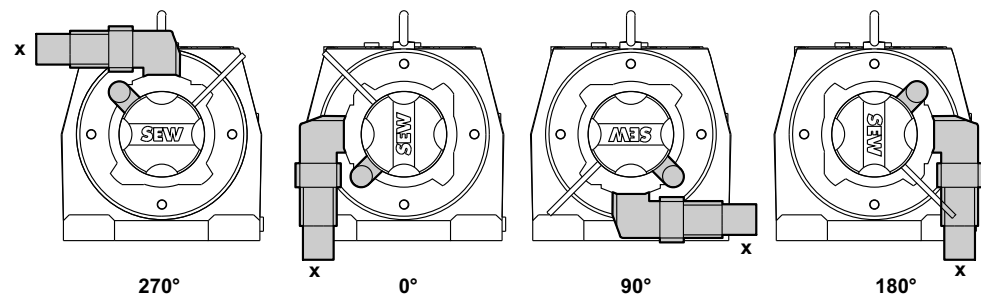
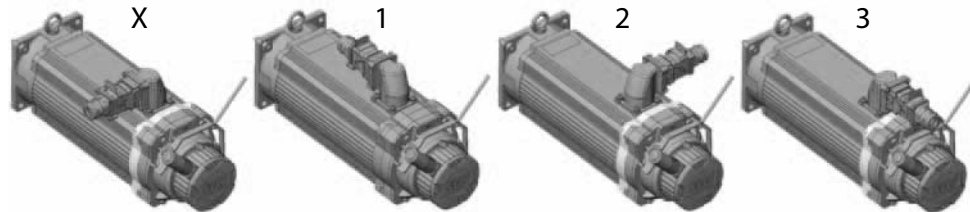


Figure 10: Position "X" of the power plug connector of CFM motors

62884axx

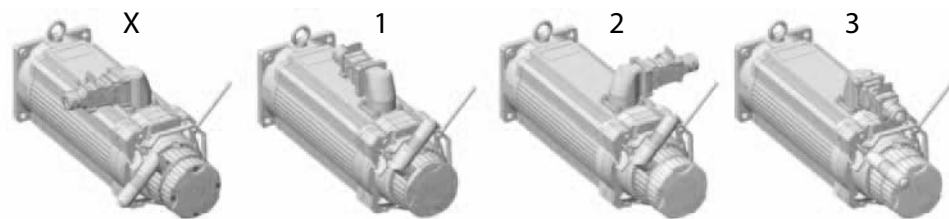
*Position of the
cable entry of CFM
motors*

Positions "X", "1", "2" or "3" are possible with CFM motors ("X" = standard).



54684AXX

Figure 11: Cable entry position for CM..S.5



54685AXX

Figure 12: Cable entry position for CM..S.6

Unless indicated otherwise, you will receive the power plug connector type 270° position with cable entry "3" and radial encoder plug (CM..S.5).



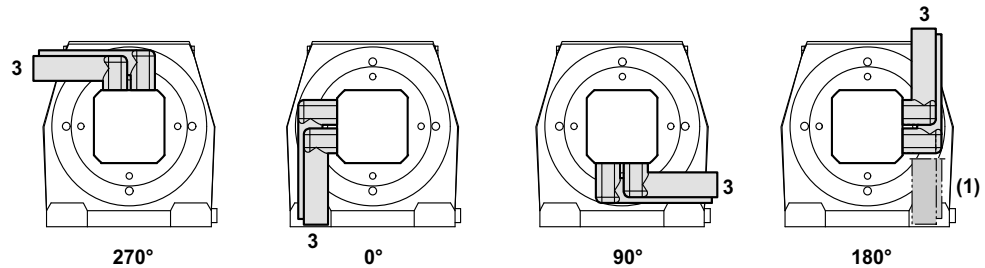
NOTE

Important: It is not possible to mount a forced cooling fan to motors with axial encoder plug SM6./SB6.

Plug connectors for DFS motors

Position of power plug connector and cable entry for DFS motors

Possible positions of the power plug connector are 0°, 90°, 180° or 270° as viewed onto the non-drive end of the motor (onto the fan end).

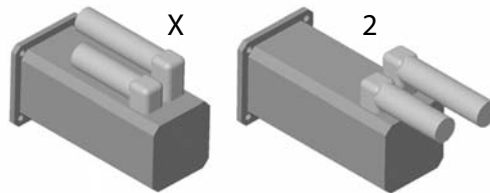


62883axx

Figure 13: Position "3" of the power plug connector of DFS motors

Position of the cable entry of DFS motors

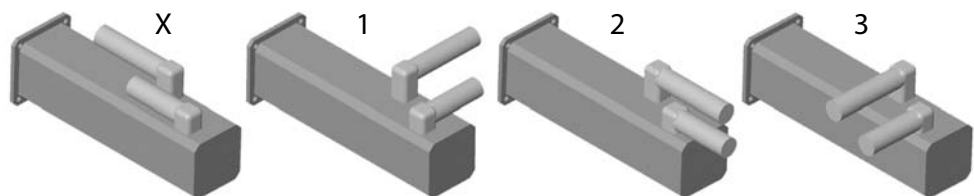
Positions "2" and "X" are possible for DFS56M and DFS56L motors ("X" = standard).



54678AXX

Figure 14: Cable entry position for DS56M/L

Positions "1", "2", "3" and "X" are possible for DFS56H and DFS brake motors.



54679AXX

Figure 15: Cable entry position for DS56H

Unless indicated otherwise, you will receive the power plug connector type 270° position with cable entry "2".

Terminal box

Position terminal box and cable entry

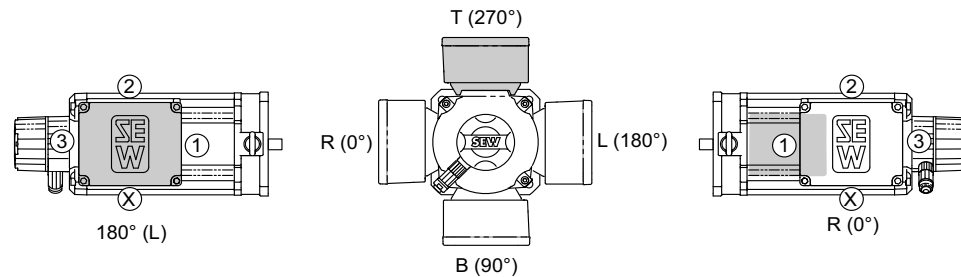
The product standard EN 60034 specifies that the following designations have to be used for terminal box positions:

- As viewed onto the output shaft = A-end
- Designation as R (right), B (bottom), L (left) and T (top)

This new designation applies to motors without a gear unit in mounting position B3 (= M1). The previous designation is retained for gearmotors.

The position of the motor terminal box has so far been specified indicated with 0°, 90°, 180° or 270° as viewed onto the fan guard = B-end.

Figure 16 shows both designations. Where the mounting position of the motor changes, "R", "B", "L" and "T" are rotated accordingly. In motor mounting position B8 (= M3), "T" is at the bottom.



62881AXX

Figure 16: Position of terminal box and cable entry

Unless indicated otherwise, you will receive the terminal box type 0° with "X" cable entry, see page 45. We recommend selecting cable entry "2" with mounting position M3.



NOTE

- Terminal box positions R, B, L (0°, 90°, 180°) can only be achieved by rotating the entire motor.
- The terminal box has a cable entry with positions "2", "3" and "X".
- The CM112H synchronous servomotor can only be ordered with terminal box.

Terminal box position	R (0°)	B (90°)	L (180°)	T (270°)
Possible cable entries	"X", "3"	"X", "1", "3"	"1", "2"	"X", "1", "3"

4.2 CMP Servomotors

Servomotors of the CMP series are equipped with adjustable or radial connectors. A design with a terminal box does not exist.

Position of the cable entry of CMP motors

Position "adjustable" has been defined for right-angle, rotatable connectors. This is the standard connector position. It corresponds to connector position "3".

Position "radial" has been defined for the straight connector housing (radial output). Radial connectors are optional.

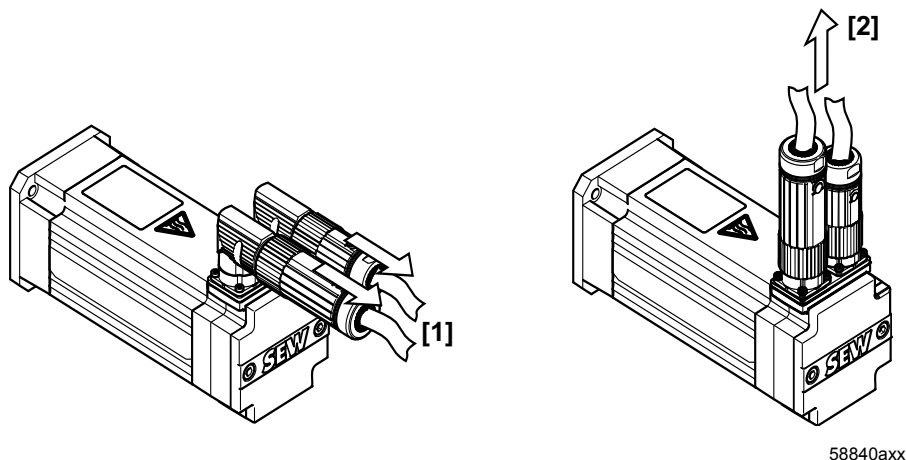


Figure 17: Connector positions

[1] Connector position "adjustable"

[2] Connector position "radial"

The CMP motors are supplied with right-angle connectors in position "adjustable" as standard.

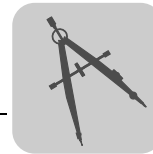
The right-angle connectors can be rotated to achieve all position.

	NOTE The connector should only be rotated to install and connect the motor. Do not turn the connector regularly once it has been installed.
--	--



Figure 18: Positions of the adjustable connectors (examples)

[1] Delivery status = standard connector position "adjustable"



5 Design and Operating Notes for Servo Gear Units

5.1 Lubricants

PS.C gear units are delivered with oil fill as standard. They are available with grease fill or with lubricant for the food industry on request.



6 Important Notes on Selection Tables and Dimension Drawings

6.1 Notes on combination overviews

M_{aDyn} [Nm]		CMP							DS		
	i	40M	50S	50M	50L	63S	63M	63L	56M	56L	56H
PSC221  1	3	11	15	31	>40	33	>40	>40	11	23	>40
	5	19	26	>42	>42	>42	>42	>42	19	38	>42
	7	26	36	>39	>39	>39	>39		26	>39	>39
	10	>37	>37						>37	>37	

Dynamic output torque M_{aDyn} of the drive

Gear unit reduction ratio

Gear unit size with gear unit stages

	The dark-gray fields contain preferred combinations
	Please contact SEW-EURODRIVE for more information about the light-gray fields.
	White fields mean: Combination not possible

	NOTE
	In fields marked with ">...", M_{aDyn} must not exceed the maximum permitted torque M_{apk} in short-term duty because the motor may overload the gear unit.

m [kg]		CMP							DS		
	s	40M	50S	50M	50L	63S	63M	63L	56M	56L	56H
PSC221	 1	3.2	4.0	5.0	5.9	6.3	7.8	9.3	4.2	5.2	5.9
PSC222	 2	3.8	4.7	5.6	6.5	7.0	8.5	10.0	4.8	5.8	6.5

m	Mass of the drive
s	Number of gear unit stages

		M1;M3;M5-6					M2			M4			φ
	i	n_{epk} [rpm]	η [%]	a_0	a_1	a_2	a_0	a_1	a_2	a_0	a_1	a_2	[°]
PSC221  1	3	7000	99	101.00	-0.093	0	106.00	-0.104	0	109.00	-0.110	0	10
	5	7000	99	160.00	-0.181	0	163.00	-0.190	0	167.00	-0.200	0	10
	7	7000	99	186.00	-0.257	0	187.00	-0.264	0	186.00	-0.267	0	10
	10	7000	99	158.00	-0.178	0	161.00	-0.184	0	164.00	-0.194	0	10

i	Gear unit reduction ratio
n_{epk}	Maximum permitted input speed for short-time duty
η	Gear unit efficiency (for M_{apk})
φ	Circumferential backlash
a_0, a_1, a_2	Gear unit constants as regards the rise in temperature in the gear unit



CMP / DS									
	i	M _{omax} [Nm]	M _{apk} [Nm]	M _{aNotaus} [Nm]	n _{ak} [rpm]	J _G 10 ⁻⁴ kgm ²	c _T PSC [Nm/°]	F _{Ramax} PSC [N]	F _{Rapk} PSC [N]
PSC221 	3	29	40	60	1500	0.17	3.46	1170	2000
	5	34	42	63	720	0.058	3.44	1390	2000
	7	32	39	59	800	0.030	3.28	1550	2000
	10	30	37	56	700	0.014	2.92	1750	2000

i	Gear unit reduction ratio
M _{omax}	Maximum permitted output torque for continuous duty
M _{apk}	Maximum permitted output torque for short-time duty
M _{aNotaus}	Maximum permitted output emergency stop torque, max. 1000 emergency stops
n _{ak}	Breakpoint speed (output)
J _G	Mass moment of inertia of the gear unit with reference to the input shaft
c _T	Torsional rigidity of the gear unit / gear unit with adapter
F _{Ramax}	Maximum permitted overhung load at the output shaft for continuous duty, load application point is the center of the shaft end
F _{Rapk}	Maximum permitted overhung load at the output shaft for short-time duty, load application point is the center of the shaft end

6.2 Notes on dimension sheets

Tolerances

Shaft ends of solid shafts

Diameter tolerance:

∅ ≤ 50 mm → ISO k6

Center bores according to DIN 332, shape DR:

∅ = 7...10 mm → M3
 ∅ > 10...13 mm → M4
 ∅ > 13...16 mm → M5
 ∅ > 16...21 mm → M6
 ∅ > 21...24 mm → M8
 ∅ > 24...30 mm → M10
 ∅ > 30...38 mm → M12
 ∅ > 38...50 mm → M16

Keys: according to DIN 6885 form A, sheet 1 (domed type).

Hollow shafts

Diameter tolerance:

∅ → ISO H7 measured with plug gauge



6.3 Gearmotor dimensions

Motor options

The motor dimensions may change when installing motor options. Refer to the dimension drawings of the motor options.

Special designs

The terminal box dimensions in special designs might vary from the standard.

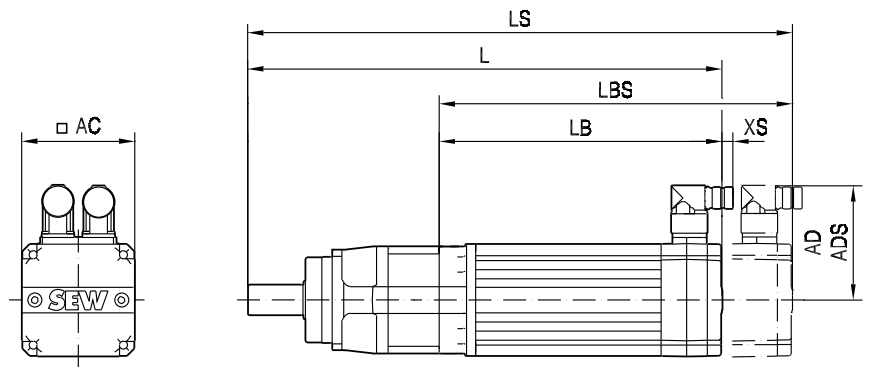
EN 50347

European standard EN 50347 became effective in August 2001. This standard adopts the dimension designations for three-phase AC motors for sizes 56 to 315M and flange sizes 65 to 740 from the IEC 72-1 standard.

The new dimension designations given in EN 50347 / IEC 72-1 are used for the dimensions in question in the dimension tables of the dimensions sheets.

Dimension designations of motors

The dimension designations are explained below:



63003axx

Figure 19: Dimension designations of motors with mounted resolver

L	Total length of gearmotor
LS	Total length of gearmotor including brake
LB	Length of motor
LBS	Length of brakemotor
AC	Diameter of motor
AD	Center of motor shaft to top part of terminal box
ADS	Center of brakemotor shaft to top part of terminal box
XS	Projecting length of the plug connector beyond the motor housing



NOTE

For motors with other feedback systems than resolvers, possible additional lengths must be considered.



6.4 Dimensions for gear units with adapter

Dimension designations of gear units with adapter

The dimension designations are explained below:

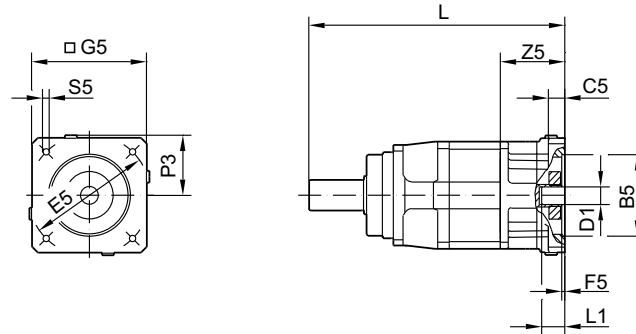


Figure 20: Dimension designations of gear units with adapter

63097axx

- L Total length of gear unit including adapter
- Z5 Length of the adapter
- G5 Square dimension of flange on the input side
- C5 Thickness of flange on the input side
- P3 Height of the closing plug
- L1 Maximum insertion depth of the motor shaft
- D1 Diameter of the motor shaft
- B5 Diameter of the centering seat
- F5 Width of the centering seat
- E5 Hole circle diameter of flange on the input side
- S5 Thread diameter



7 PS.C..CMP, DS, CM

7.1 PS.C221 / 222 CMP / DS [Nm]

MaDyn [Nm]		CMP							DS		
	i	40M	50S	50M	50L	63S	63M	63L	56M	56L	56H
PSC221 	3	11	15	31	>40	33	>40	>40	11	23	>40
	5	19	26	>42	>42	>42	>42	>42	19	38	>42
	7	26	36	>39	>39	>39	>39		26	>39	>39
	10	>37	>37						>37	>37	
PSC222 	15	>40	>40	>40	>40	>40	>40	>40	>40	>40	>40
	21	>40	>40	>40	>40	>40	>40		>40	>40	>40
	25	>42	>42	>42	>42	>42	>42	>42	>42	>42	>42
	30	>40	>40						>40	>40	
	35	>42	>42	>42	>42	>42	>42		>42	>42	>42
	49	>39	>39	>39	>39	>39	>39		>39	>39	>39
	50	>42	>42						>42	>42	
	70	>39	>39						>39	>39	
	100	>37	>37						>37	>37	

m [kg]		CMP							DS		
	s	40M	50S	50M	50L	63S	63M	63L	56M	56L	56H
PSC221		3.2	4.0	5.0	5.9	6.3	7.8	9.3	4.2	5.2	5.9
PSC222		3.8	4.7	5.6	6.5	7.0	8.5	10.0	4.8	5.8	6.5

CMP / DS		n _{epk} [rpm]	η [%]	M1;M3;M5-6			M2			M4			φ [°]
	i			a ₀	a ₁	a ₂	a ₀	a ₁	a ₂	a ₀	a ₁	a ₂	
PSC221 	3	7000	99	101.00	-0.093	0	106.00	-0.104	0	109.00	-0.110	0	10
	5	7000	99	160.00	-0.181	0	163.00	-0.190	0	167.00	-0.200	0	10
	7	7000	99	186.00	-0.257	0	187.00	-0.264	0	186.00	-0.267	0	10
	10	7000	99	158.00	-0.178	0	161.00	-0.184	0	164.00	-0.194	0	10
PSC222 	15	7000	98	176.00	-0.608	0	176.00	-0.623	0	178.00	-0.633	0	15
	21	7000	98	198.00	-0.834	0	196.00	-0.840	0	197.00	-0.850	0	15
	25	7000	98	342.00	-1.906	0	345.00	-1.965	0	346.00	-1.980	0	15
	30	7000	98	177.00	-0.606	0	177.00	-0.617	0	178.00	-0.627	0	15
	35	7000	98	395.00	-2.703	0	396.00	-2.764	0	398.00	-2.780	0	15
	49	7000	98	557.00	-5.287	0	559.00	-5.413	0	560.00	-5.433	0	15
	50	7000	98	932.00	-8.059	0	914.00	-8.267	0	916.00	-8.301	0	15
	70	7000	98	484.00	-3.704	0	485.00	-3.798	0	487.00	-3.815	0	15
	100	7000	98	634.00	-6.890	0	637.00	-7.071	0	638.00	-7.089	0	15

CMP / DS		M _{amax} [Nm]	M _{apk} [Nm]	M _{aNotaus} [Nm]	n _{ak} [rpm]	J _G 10 ⁻⁴ kgm ²	c _T PSC [Nm/°]	F _{Ramax} PSC [N]	F _{Rapk} PSC [N]
	i								
PSC221 	3	29	40	60	1500	0.17	3.46	1170	2000
	5	34	42	63	720	0.058	3.44	1390	2000
	7	32	39	59	800	0.030	3.28	1550	2000
	10	30	37	56	700	0.014	2.92	1750	2000
PSC222 	15	29	40	60	467	0.057	2.93	2000	2000
	21	29	40	60	333	0.030	2.88	2000	2000
	25	34	42	63	280	0.053	3.02	2000	2000
	30	29	40	60	233	0.014	2.77	2000	2000
	35	34	42	63	200	0.027	2.98	2000	2000
	49	32	39	59	143	0.027	2.88	2000	2000
	50	34	42	63	140	0.013	2.9	2000	2000
	70	32	39	59	100	0.013	2.82	2000	2000
	100	30	37	56	70	0.013	2.57	2000	2000

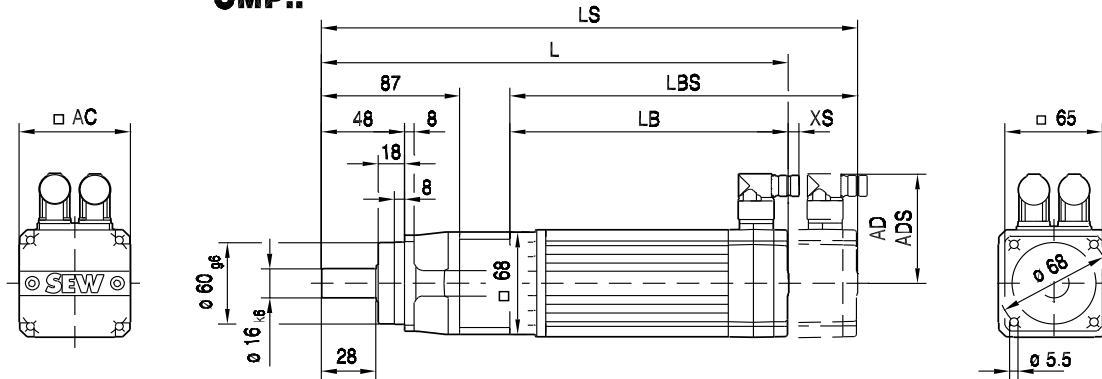


7.2 PS.C221 / 222 CMP / DS [mm]

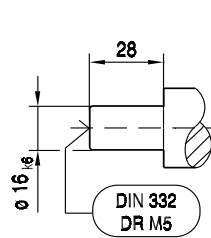
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PSC221..

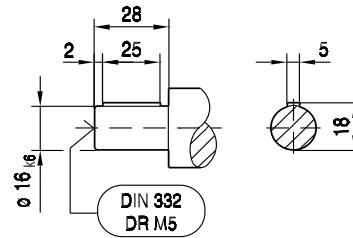
CMP..



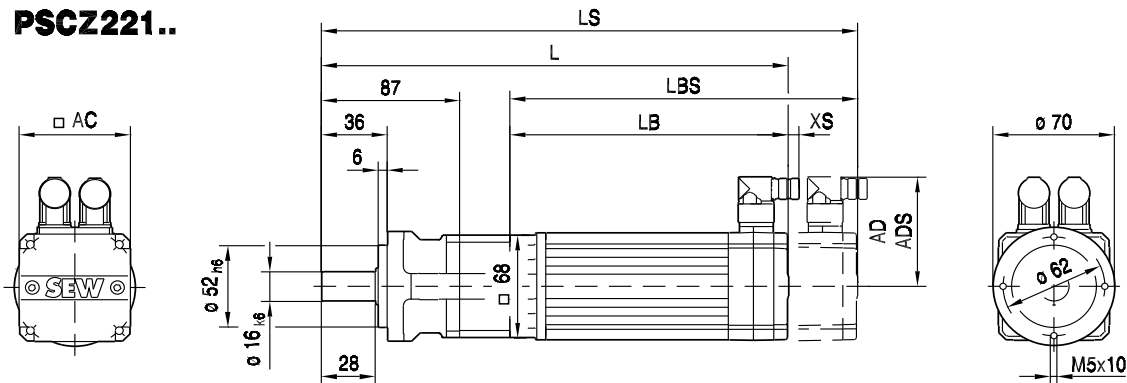
PSC / PSCZ



PSKC / PSKCZ



PSCZ221..

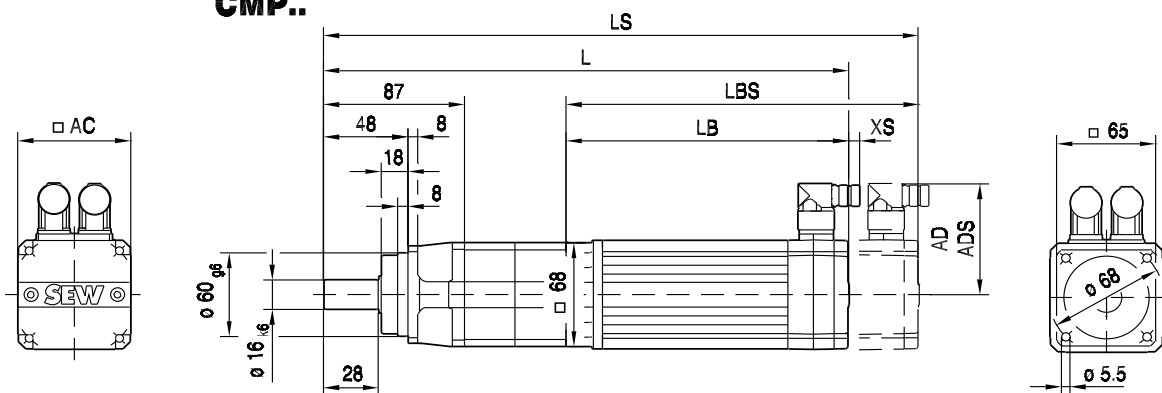


(→ 52)	CMP40M	CMP50S	CMP50M	CMP50L	CMP63S	CMP63M	CMP63L				
AC	57	73	73	73	88	88	88				
AD	75	83	83	83	92	92	92				
ADS	75	83	83	83	92	92	92				
L	270	272	311	350	307	357	407				
LS	300	301	340	379	336	386	435				
LB	149	151	190	229	186	236	286				
LBS	179	180	219	258	215	265	314				
XS	19	18	18	18	14	14	14				

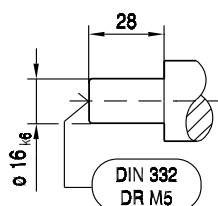
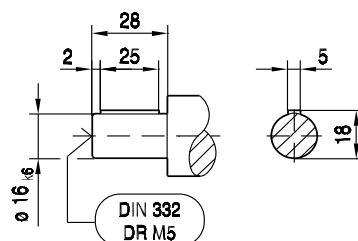
57 032 00 07

PSC222..

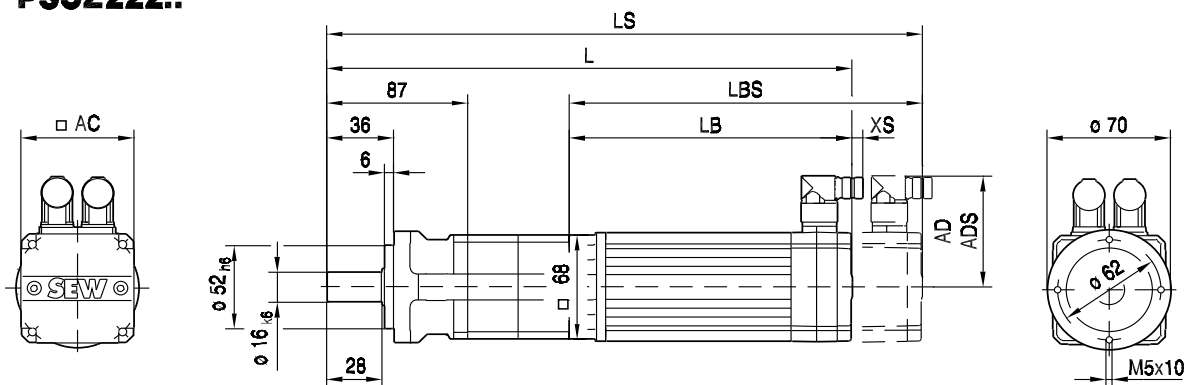
CMP..



PSC / PSCZ

**PSKC / PSCKZ**

PSCZ222..



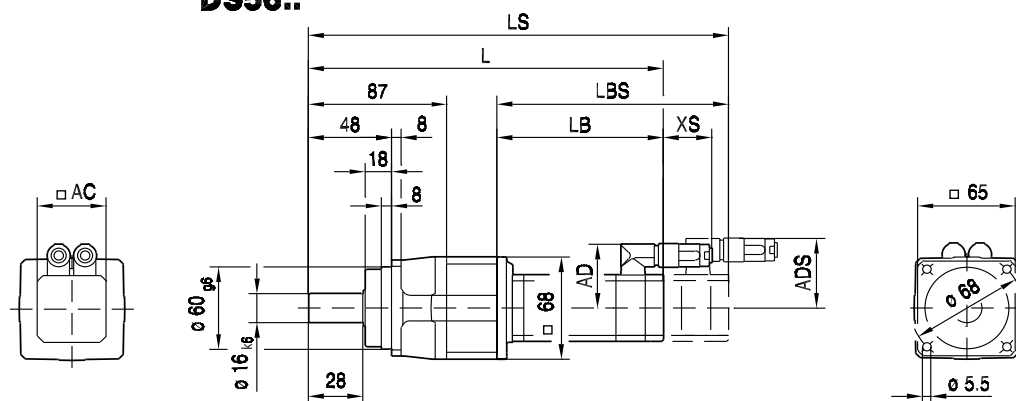
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AC	57	73	73	73	88	88	88				
AD	75	83	83	83	92	92	92				
ADS	75	83	83	83	92	92	92				
L	305	307	346	385	342	392	442				
LS	335	336	375	414	370	420	470				
LB	149	151	190	229	186	236	286				
LBS	179	180	219	258	215	265	314				
XS	19	18	18	18	14	14	14				



57 039 00 07

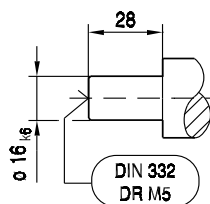
PSC221..

DS56..

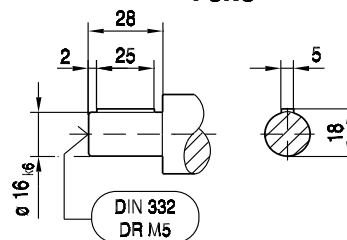


7

PSC



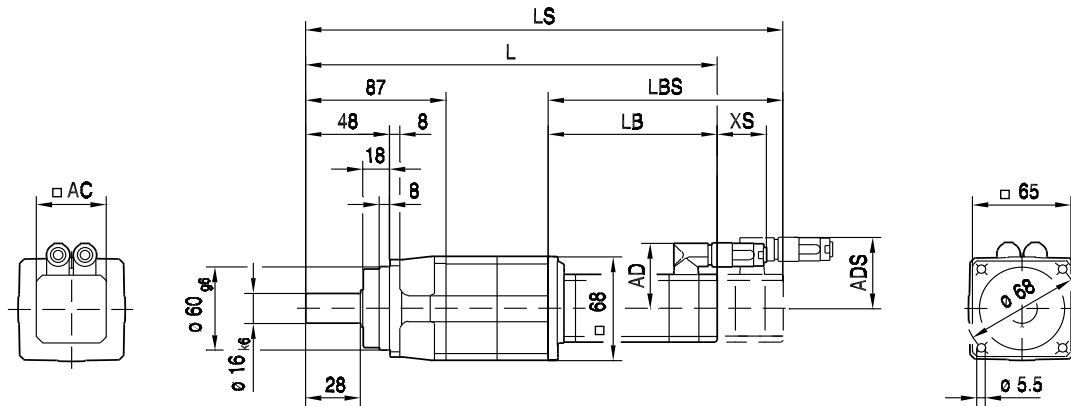
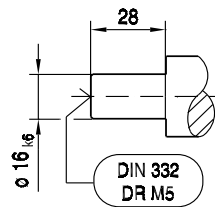
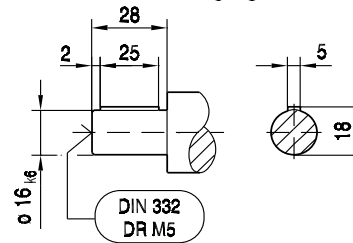
PSKC



(→ 52)	DS56M	DS56L	DS56H								
AC	73	73	73								
AD	71	71	77								
ADS	77	77	77								
L	265	297	400								
LS	295	327	400								
LB	144	176	279								
LBS	174	206	279								
XS	70	70	51								



57 040 00 07

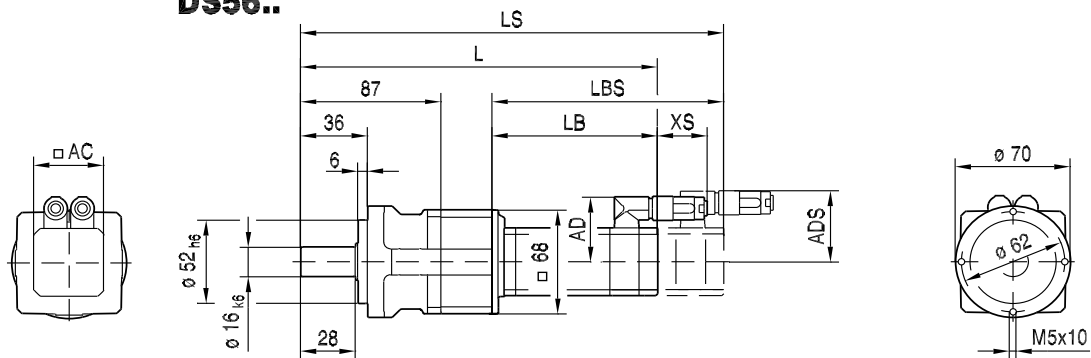
PSC222..**DS56..****PSC****PSKC**

(→ 52)	DS56M	DS56L	DS56H								
AC	73	73	73								
AD	71	71	77								
ADS	77	77	77								
L	300	332	435								
LS	330	362	435								
LB	144	176	279								
LBS	174	206	279								
XS	70	70	51								

57 047 00 07

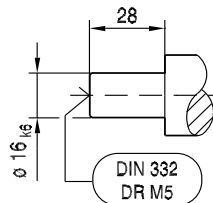
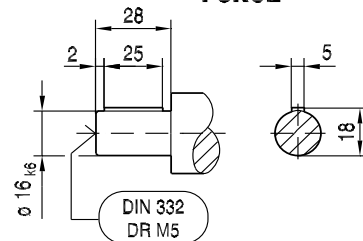
PSCZ221..

DS56..



7

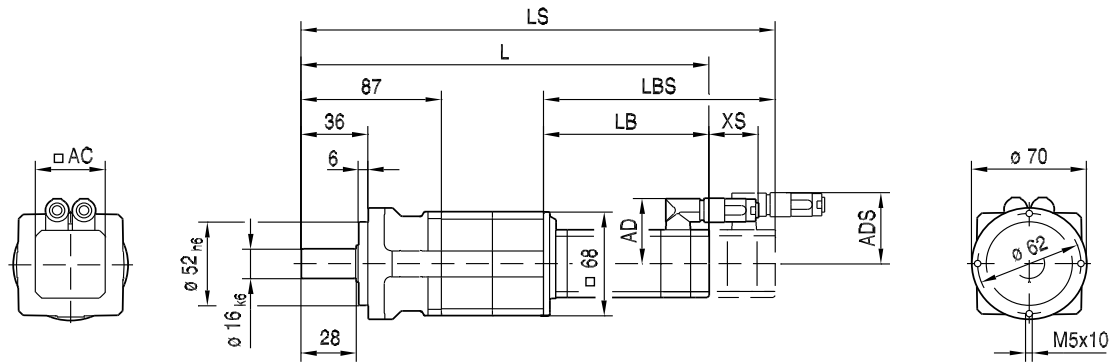
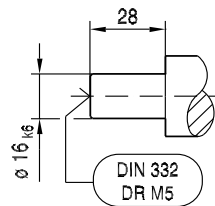
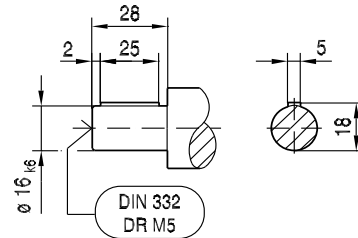
PSCZ

**PSKCZ**

(⇒  52)	DS56M	DS56L	DS56H							
AC	73	73	73							
AD	71	71	77							
ADS	77	77	77							
L	265	297	400							
LS	295	327	400							
LB	144	176	279							
LBS	174	206	279							
XS	70	70	51							



57 048 00 07

PSCZ222..**DS56..****PSCZ****PSKCZ**

(→ 52)	DS56M	DS56L	DS56H								
AC	73	73	73								
AD	71	71	77								
ADS	77	77	77								
L	300	332	435								
LS	330	362	435								
LB	144	176	279								
LBS	174	206	279								
XS	70	70	51								



7.3 PS.C321 / 322 CMP / DS / CM [Nm]

M _{aDyn} [Nm]		CMP						DS			CM		
	i	50S	50M	50L	63S	63M	63L	56M	56L	56H	71S	71M	71L
PSC321 	3	15	31	46	33	64	>86	11	23	45	49	64	>86
	5	26	51	76	55	>91	>91	19	38	75	82	>91	>91
	7	36	71	>85	77	>85	>85	26	53	>85	>85	>85	>85
	10	51	>81	>81	>81			38	75	>81	>81		
PSC322 	15	76	>86	>86	>86	>86	>86	56	>86	>86	>86	>86	>86
	21	>86	>86	>86	>86	>86	>86	78	>86	>86	>86	>86	>86
	25	>91	>91	>91	>91	>91	>91	>91	>91	>91	>91	>91	>91
	30	>86	>86	>86	>86			>86	>86	>86	>86		
	35	>91	>91	>91	>91	>91	>91	>91	>91	>91	>91	>91	>91
	49	>85	>85	>85	>85	>85	>85	>85	>85	>85	>85	>85	>85
	50	>91	>91	>91	>91			>91	>91	>91	>91		
	70	>85	>85	>85	>85			>85	>85	>85	>85		
	100	>81	>81	>81	>81			>81	>81	>81	>81		

m [kg]		CMP						DS			CM		
	s	50S	50M	50L	63S	63M	63L	56M	56L	56H	71S	71M	71L
PSC321 	1	6.4	7.3	8.2	7.8	9.2	11	5.7	6.7	7.4	13	16	18
PSC322 	2	7.8	8.7	9.6	9.2	11	12	7.1	8.1	8.8	14	17	19

CMP / DS / CM		n _{epk} [rpm]	η [%]	M1;M3;M5-6			M2			M4			φ [°]
	i			a ₀	a ₁	a ₂	a ₀	a ₁	a ₂	a ₀	a ₁	a ₂	
PSC321 	3	6500	99	183.00	-0.184	0	190.00	-0.201	0	191.00	-0.212	0	10
	5	6500	99	257.00	-0.296	0	262.00	-0.308	0	264.00	-0.324	0	10
	7	6500	99	257.00	-0.341	0	261.00	-0.350	0	259.00	-0.360	0	10
	10	6500	99	247.00	-0.395	0	251.00	-0.406	0	251.00	-0.418	0	10
PSC322 	15	6500	98	296.00	-1.011	0	296.00	-1.026	0	299.00	-1.053	0	15
	21	6500	98	310.00	-1.219	0	308.00	-1.224	0	311.00	-1.250	0	15
	25	6500	98	539.00	-2.935	0	542.00	-3.004	0	545.00	-3.041	0	15
	30	6500	98	326.00	-1.546	0	323.00	-1.547	0	326.00	-1.575	0	15
	35	6500	98	571.00	-3.602	0	572.00	-3.666	0	575.00	-3.704	0	15
	49	6500	98	737.00	-6.438	0	739.00	-6.559	0	741.00	-6.599	0	15
	50	6500	98	1901.0	-21.769	0	1904.0	-22.556	0	1908.0	-22.648	0	15
	70	6500	98	777.00	-8.291	0	767.00	-8.289	0	769.00	-8.331	0	15
	100	6500	98	961.00	-14.560	0	947.00	-14.538	0	948.00	-14.571	0	15

CMP / DS / CM		M _{amax} [Nm]	M _{apk} [Nm]	M _{aNotaus} [Nm]	n _{ak} [rpm]	J _G 10 ⁻⁴ kgm ²	c _T PSC [Nm/°]	F _{Ramax} PSC [N]	F _{Rapk} PSC [N]
	i								
PSC321 	3	62	86	129	633	0.52	10.5	1710	4000
	5	74	91	136	300	0.17	10.9	2030	4000
	7	69	85	128	329	0.092	10.3	2270	4000
	10	66	81	122	360	0.045	8.59	2560	4000
PSC322 	15	62	86	129	467	0.16	8.26	2930	4000
	21	62	86	129	333	0.085	8.1	3280	4000
	25	74	91	136	280	0.15	9.02	3470	4000
	30	62	86	129	233	0.042	7.67	3690	4000
	35	74	91	136	200	0.078	8.88	3880	4000
	49	69	85	128	143	0.076	8.62	4000	4000
	50	74	91	136	140	0.038	8.53	4000	4000
	70	69	85	128	100	0.037	8.35	4000	4000
	100	66	81	122	70	0.037	7.33	4000	4000

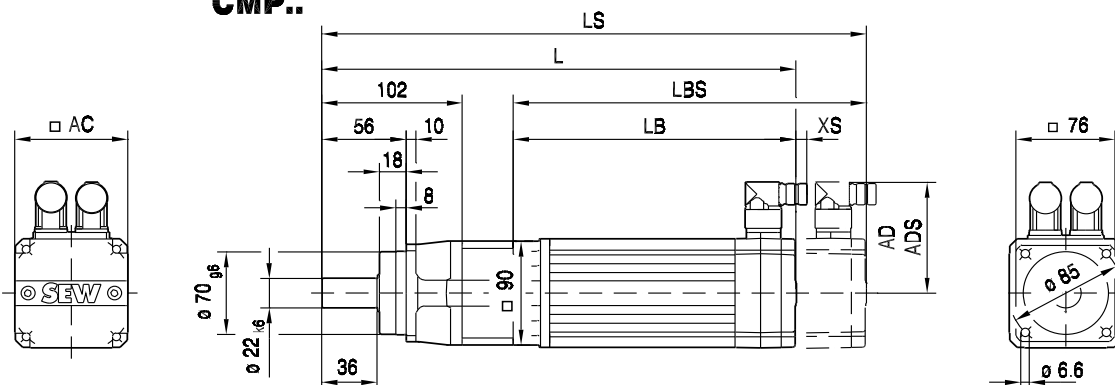


7.4 PS.C321 / 322 CMP / DS / CM [mm]

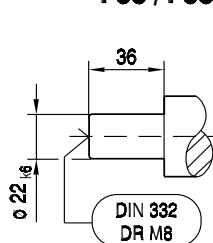
57 033 00 07

PSC321..

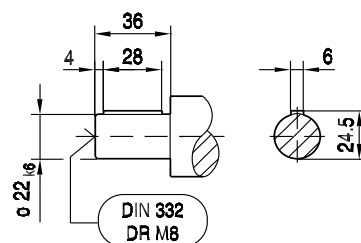
CMP..



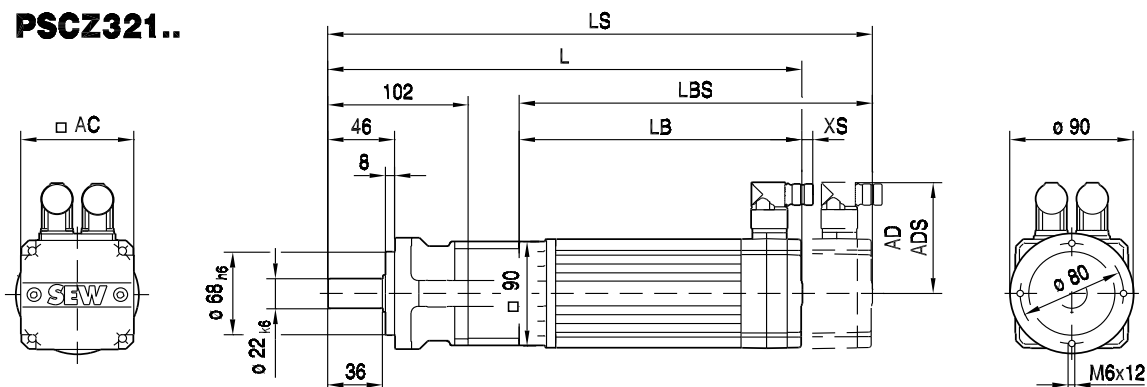
PSC / PSCZ



PSKC / PSKCZ



PSCZ321..



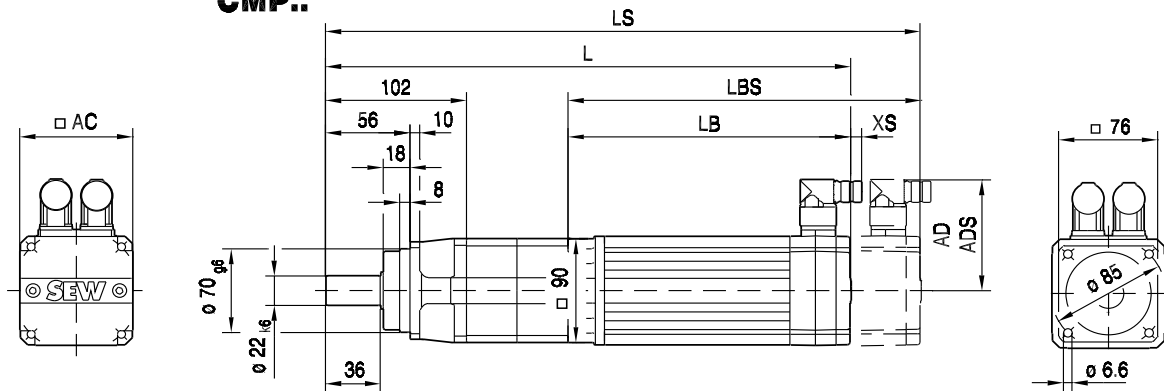
(→ 52)	CMP50S	CMP50M	CMP50L	CMP63S	CMP63M	CMP63L					
AC	73	73	73	88	88	88					
AD	83	83	83	92	92	92					
ADS	83	83	83	92	92	92					
L	290	329	368	325	375	425					
LS	319	358	397	354	404	454					
LB	146	185	224	181	231	281					
LBS	175	214	253	210	260	310					
XS	18	18	18	14	14	14					



57 034 00 07

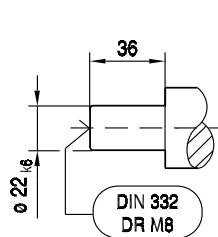
PSC322..

CMP..

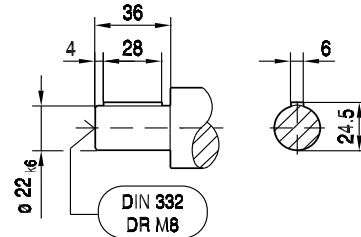


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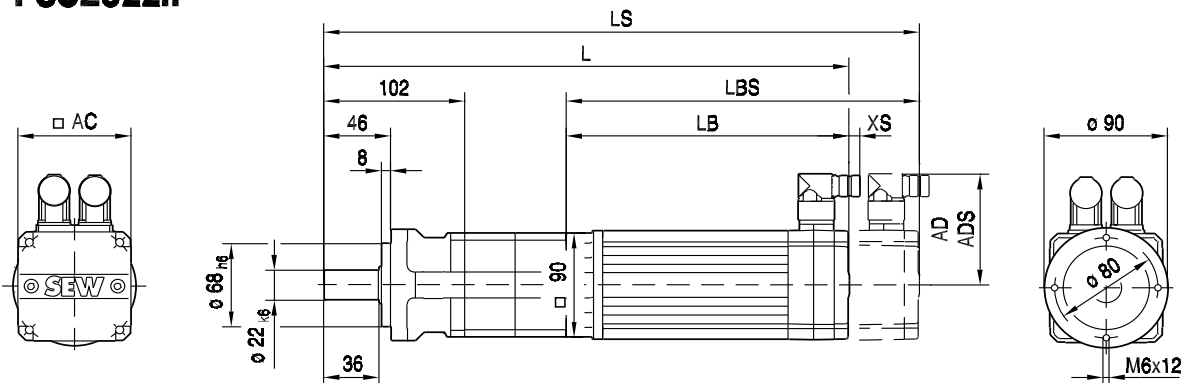
PSC / PSCZ



PSKC / PSCKZ



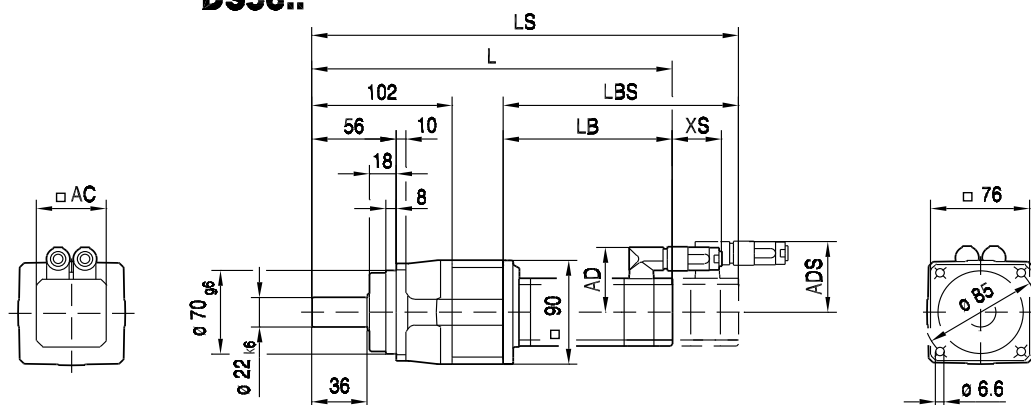
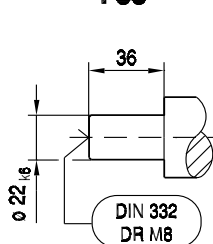
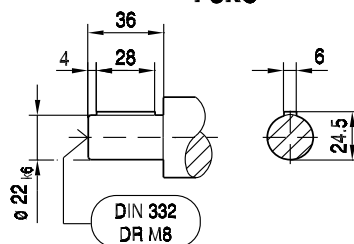
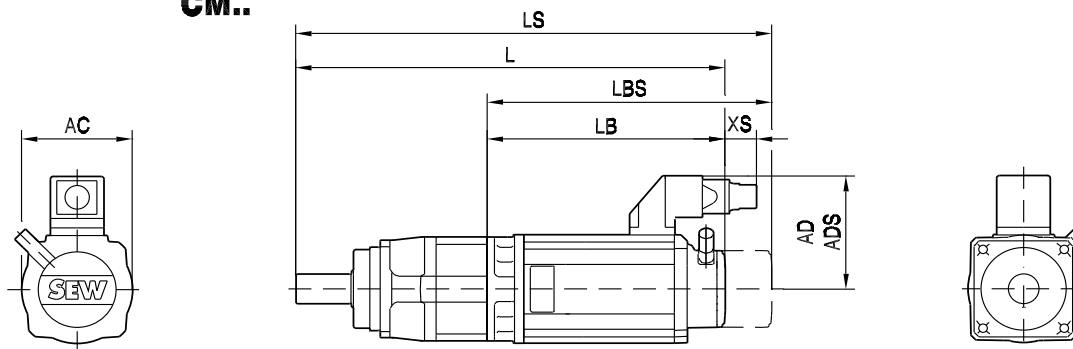
PSCZ322..



(→ 52)	CMP50S	CMP50M	CMP50L	CMP63S	CMP63M	CMP63L					
AC	73	73	73	88	88	88					
AD	83	83	83	92	92	92					
ADS	83	83	83	92	92	92					
L	332	371	410	367	417	467					
LS	361	400	439	395	445	495					
LB	146	185	224	181	231	281					
LBS	175	214	253	210	260	310					
XS	18	18	18	14	14	14					



57 041 00 07

PSC321..**DS56..****PSC****PSKC****CM..**

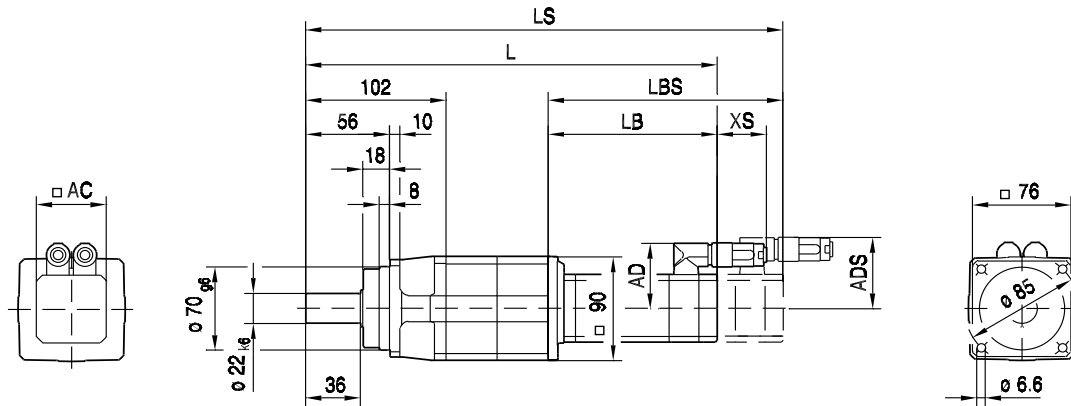
(→ 52)	DS56M	DS56L	DS56H	CM71S	CM71M	CM71L					
AC	73	73	73	117	117	117					
AD	71	71	77	122	122	122					
ADS	77	77	77	122	122	122					
L	283	315	418	383	403	443					
LS	313	345	418	466	486	526					
LB	139	171	274	240	260	300					
LBS	169	201	274	322	342	382					
XS	70	70	51	45	45	45					



57 042 00 07

PSC322..

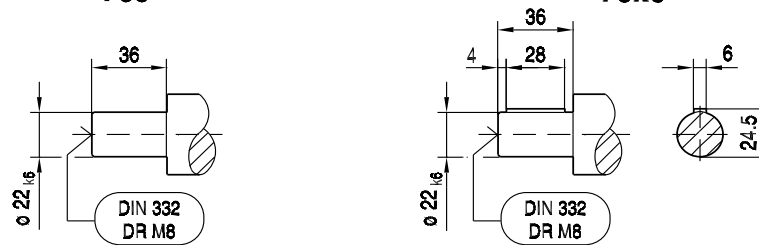
DS56..



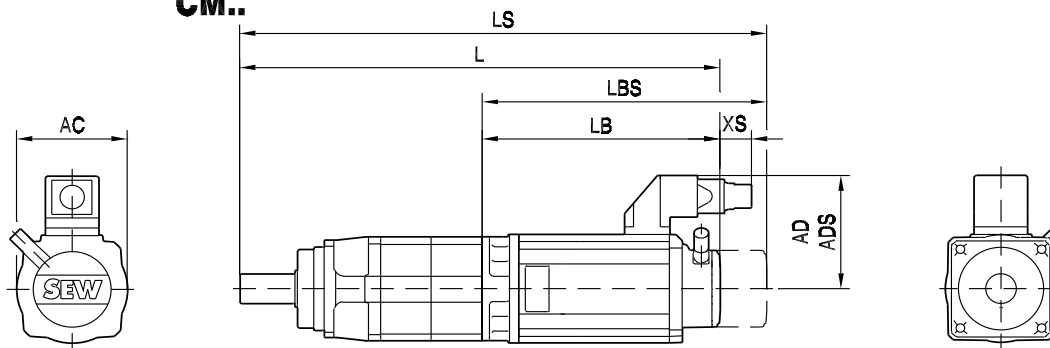
7

PSC

PSKC



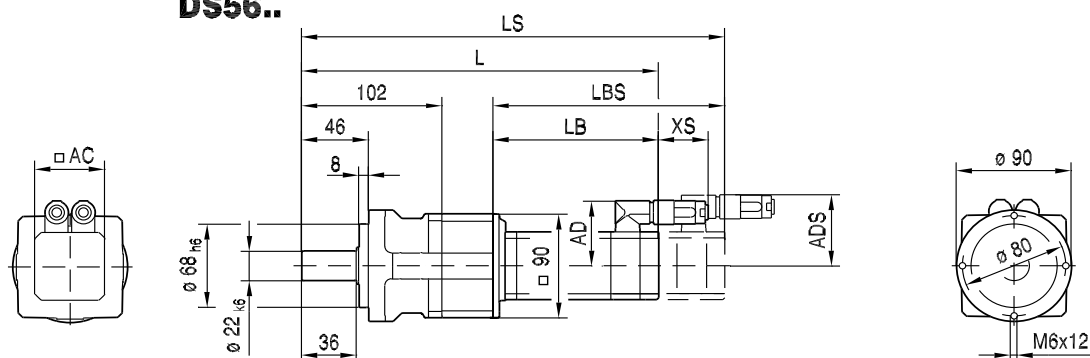
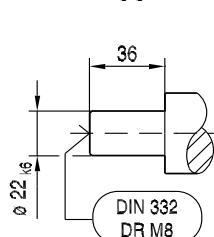
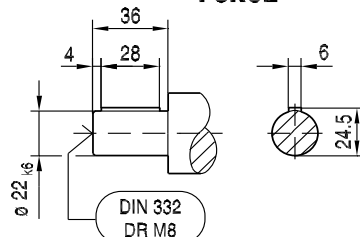
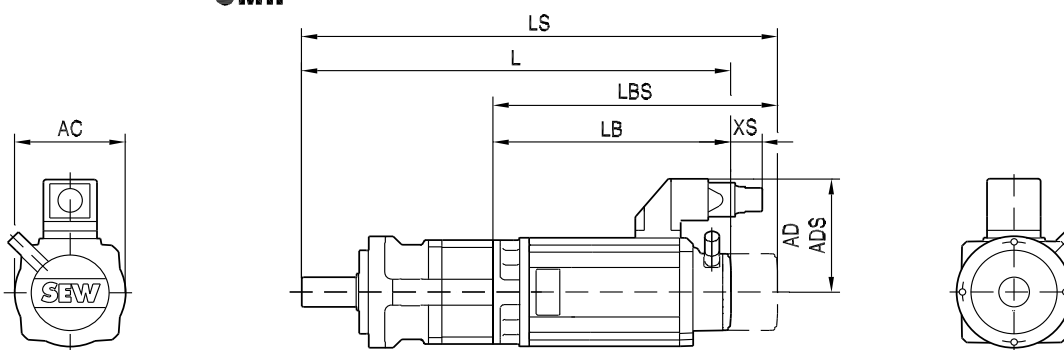
CM..



(→ 52)	DS56M	DS56L	DS56H	CM71S	CM71M	CM71L					
AC	73	73	73	117	117	117					
AD	71	71	77	122	122	122					
ADS	77	77	77	122	122	122					
L	325	357	460	425	445	485					
LS	355	387	460	507	527	567					
LB	139	171	274	240	260	300					
LBS	169	201	274	322	342	382					
XS	70	70	51	45	45	45					



57 049 00 07

PSCZ321..**DS56..****PSCZ****PSKCZ****CM..**

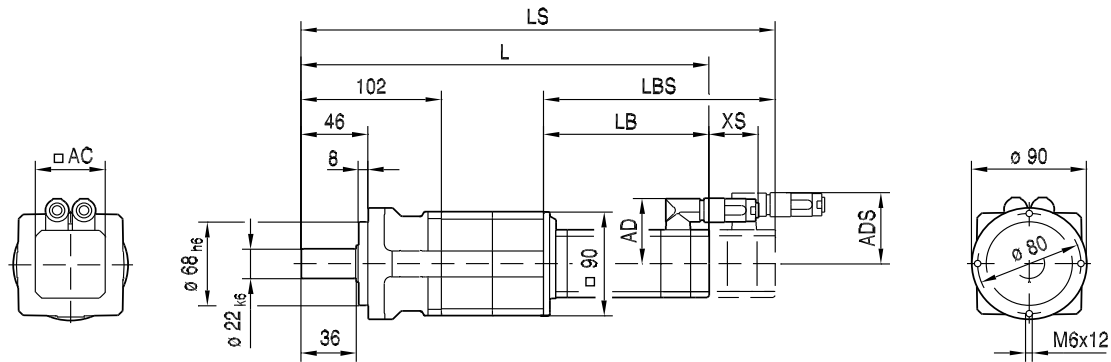
(→ 52)	DS56M	DS56L	DS56H	CM71S	CM71M	CM71L					
AC	73	73	73	117	117	117					
AD	71	71	77	122	122	122					
ADS	77	77	77	122	122	122					
L	283	315	418	383	403	443					
LS	313	345	418	466	486	526					
LB	139	171	274	240	260	300					
LBS	169	201	274	322	342	382					
XS	70	70	51	45	45	45					



57 050 00 07

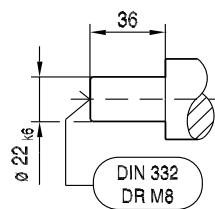
PSCZ322..

DS56..

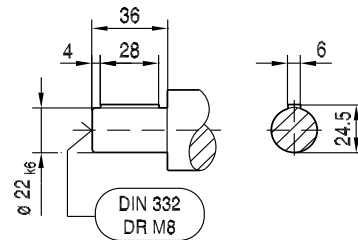


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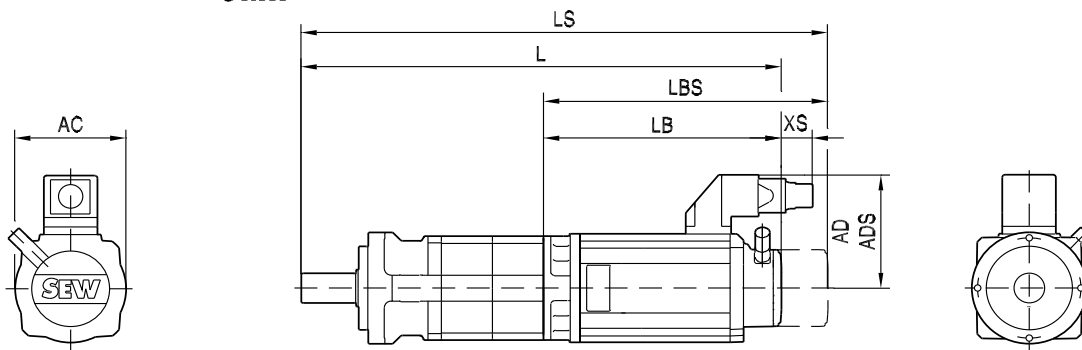
PSCZ



PSKCZ



CM..



(→ 52)	DS56M	DS56L	DS56H	CM71S	CM71M	CM71L					
AC	73	73	73	117	117	117					
AD	71	71	77	122	122	122					
ADS	77	77	77	122	122	122					
L	325	357	460	425	445	485					
LS	355	387	460	507	527	567					
LB	139	171	274	240	260	300					
LBS	169	201	274	322	342	382					
XS	70	70	51	45	45	45					



7.5 PS.C521 / 522 CMP / DS / CM [Nm]

M _{aDyn} [Nm]		CMP					DS	CM					
	i	50M	50L	63S	63M	63L	56H	71S	71M	71L	90S	90M	90L
PSC521 	3	31	46	33	64	90	45	49	64	93	118	155	>203
	5	51	76	55	106	150	75	82	106	155	196	>223	>223
	7	71	107	77	148	>209	105	114	149	>209	>209	>209	>209
	10	102	152	110	>199	>199	150	163	>199	>199	>199		
PSC522 	15	151	>203	163	>203	>203	>203	>203	>203	>203	>203	>203	>203
	21	>203	>203	>203	>203	>203	>203	>203	>203	>203	>203	>203	>203
	25	>223	>223	>223	>223	>223	>223	>223	>223	>223	>223	>223	>223
	30	>203	>203	>203	>203	>203	>203	>203	>203	>203	>203		
	35	>223	>223	>223	>223	>223	>223	>223	>223	>223	>223	>223	>223
	49	>209	>209	>209	>209	>209	>209	>209	>209	>209	>209	>209	>209
	50	>223	>223	>223	>223	>223	>223	>223	>223	>223	>223		
	70	>209	>209	>209	>209	>209	>209	>209	>209	>209	>209		
	100	>199	>199	>199	>199	>199	>199	>199	>199	>199	>199		

m [kg]		CMP					DS	CM					
	s	50M	50L	63S	63M	63L	56H	71S	71M	71L	90S	90M	90L
PSC521		10	11	11	13	14	11	16	17	21	27	29	34
PSC522		13	14	14	16	17	14	19	20	24	30	32	37

CMP / DS / CM		n _{epk} [rpm]	η [%]	M1;M3;M5-6			M2			M4			φ [°]
	i			a ₀	a ₁	a ₂	a ₀	a ₁	a ₂	a ₀	a ₁	a ₂	
PSC521 	3	6000	99	408.00	-0.482	0	421.00	-0.522	0	419.00	-0.543	0	10
	5	6000	99	607.00	-0.833	0	620.00	-0.867	0	610.00	-0.887	0	10
	7	6000	99	680.00	-1.083	0	693.00	-1.117	0	690.00	-1.158	0	10
	10	6000	99	781.00	-1.515	0	705.00	-1.383	0	718.00	-1.467	0	10
PSC522 	15	6000	98	669.00	-2.850	0	661.00	-2.849	0	667.00	-2.913	0	15
	21	6000	98	729.00	-3.600	0	722.00	-3.607	0	729.00	-3.681	0	15
	25	6000	98	1280.0	-8.694	0	1273.0	-8.782	0	1279.0	-8.877	0	15
	30	6000	98	786.00	-4.717	0	782.00	-4.755	0	788.00	-4.830	0	15
	35	6000	98	1399.0	-11.090	0	1382.0	-11.117	0	1391.0	-11.241	0	15
	49	6000	98	1940.0	-21.291	0	1917.0	-21.345	0	1923.0	-21.472	0	15
	50	6000	98	4389.0	-62.376	0	4470.0	-65.385	0	4478.0	-65.603	0	15
	70	6000	98	2117.0	-28.597	0	2107.0	-28.880	0	2112.0	-29.007	0	15
	100	6000	98	2942.0	-56.440	0	2674.0	-52.085	0	2678.0	-52.214	0	15

CMP / DS / CM							C _T PSC	F _{Ramax} PSC	F _{Rapk} PSC
	i	M _{amax} [Nm]	M _{apk} [Nm]	M _{aNotaus} [Nm]	n _{ak} [rpm]	J _G 10 ⁻⁴ kgm ²	[Nm/°]	[N]	[N]
PSC521  1	3	147	203	305	900	2.1	26.7	2900	6750
	5	181	223	334	360	0.85	28.0	3440	6750
	7	169	209	313	414	0.37	26.5	3850	6750
	10	161	199	298	440	0.18	22.2	4330	6750
PSC522  2	15	147	203	305	467	0.81	21.09	4960	6750
	21	147	203	305	333	0.35	20.66	5550	6750
	25	181	223	334	280	0.76	23.39	5880	6750
	30	147	203	305	233	0.17	19.57	6250	6750
	35	181	223	334	200	0.32	23.01	6580	6750
	49	169	209	313	143	0.31	22.47	6750	6750
	50	181	223	334	140	0.16	22.13	6750	6750
	70	169	209	313	100	0.15	21.8	6750	6750
	100	161	199	298	70	0.15	19.28	6750	6750

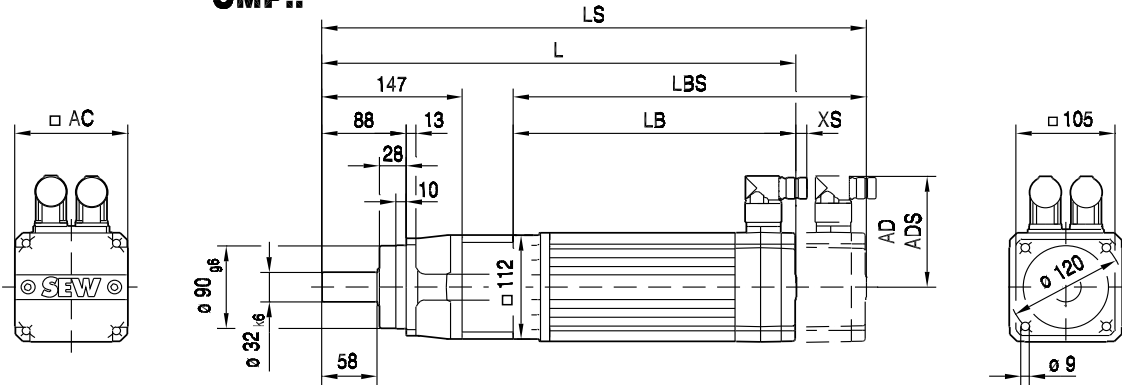


7.6 PS.C521 / 522 CMP / DS / CM [mm]

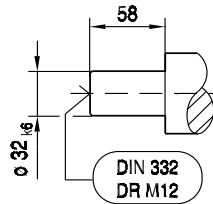
57 035 00 07

PSC521..

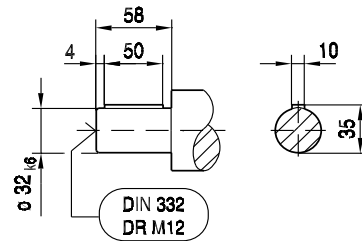
CMP..



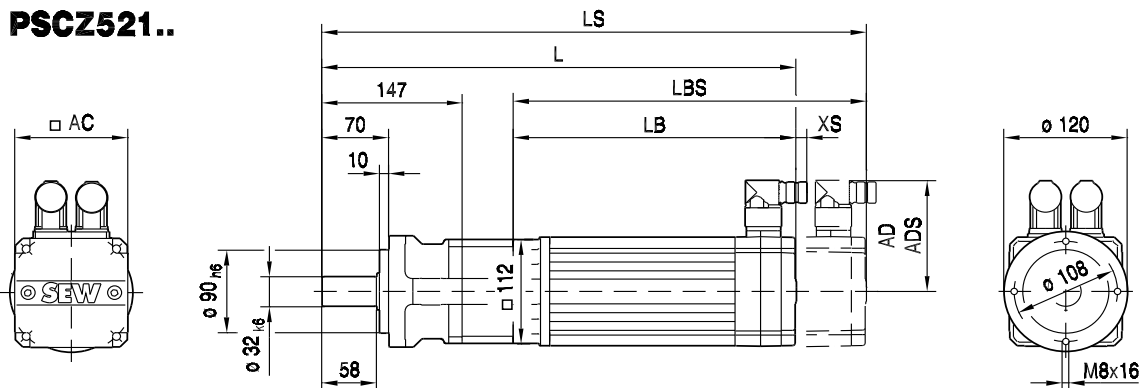
PSC / PSCZ



PSKC / PSKCZ



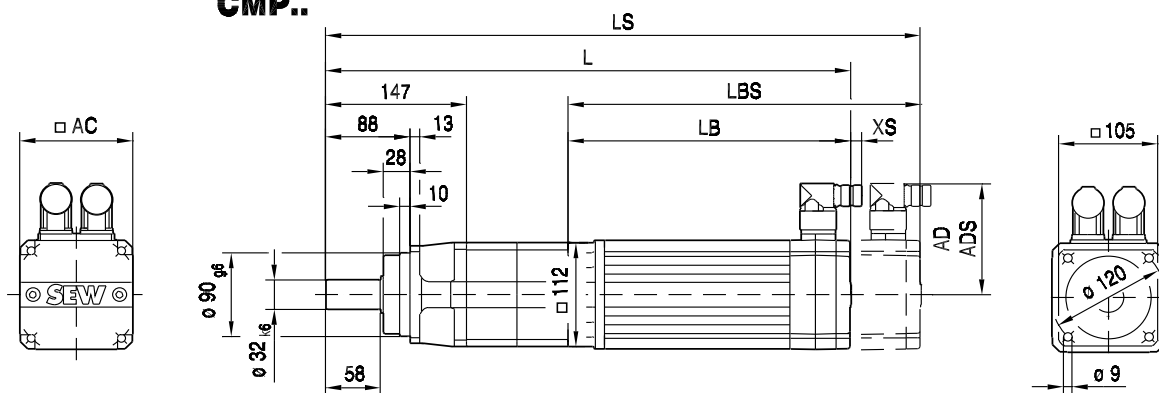
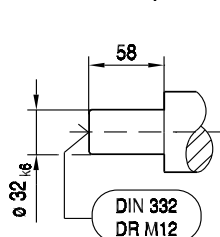
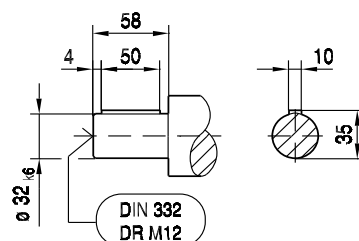
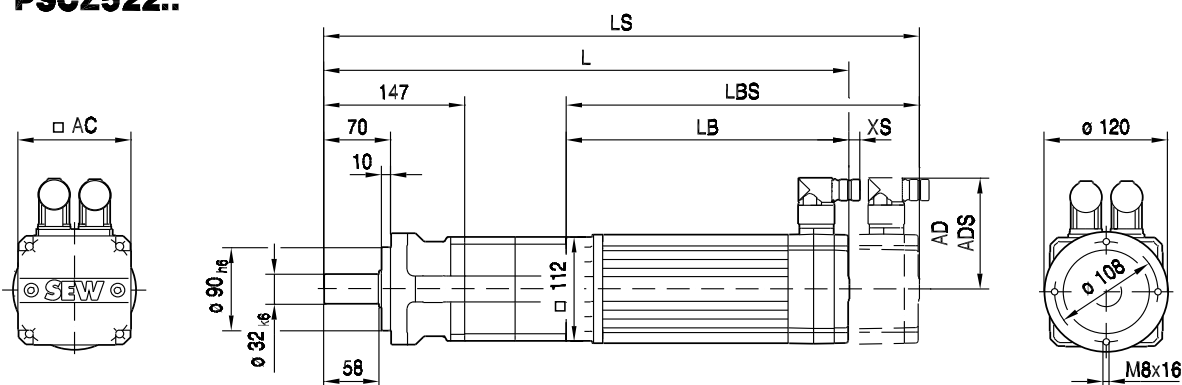
PSCZ521..



(→ 52)	CMP50M	CMP50L	CMP63S	CMP63M	CMP63L						
AC	73	73	88	88	88						
AD	83	83	92	92	92						
ADS	83	83	92	92	92						
L	381	420	377	427	477						
LS	410	449	405	455	505						
LB	180	219	176	226	276						
LBS	209	248	205	255	305						
XS	18	18	14	14	14						



57 036 00 07

PSC522..**CMP..****PSC / PSCZ****PSKC / PSCKZ****PSCZ522..**

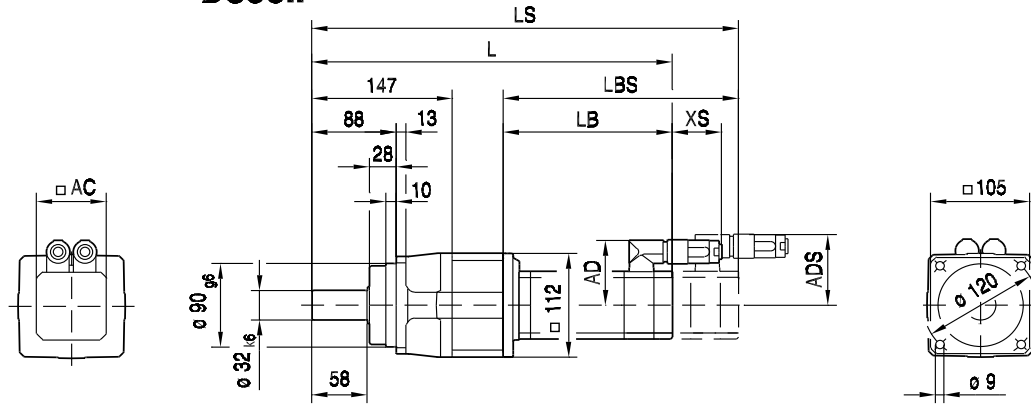
(→ 52)	CMP50M	CMP50L	CMP63S	CMP63M	CMP63L						
AC	73	73	88	88	88						
AD	83	83	92	92	92						
ADS	83	83	92	92	92						
L	434	473	430	480	530						
LS	463	502	458	508	558						
LB	180	219	176	226	276						
LBS	209	248	205	255	305						
XS	18	18	14	14	14						



57 043 00 07

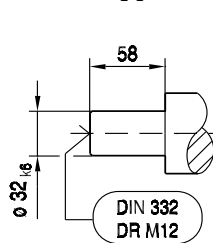
PSC521..

DS56..

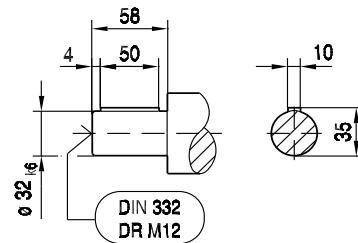


7

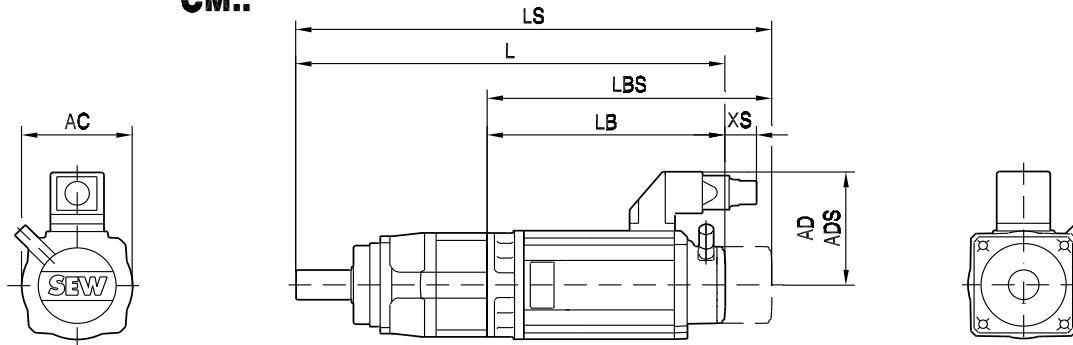
PSC



PSKC



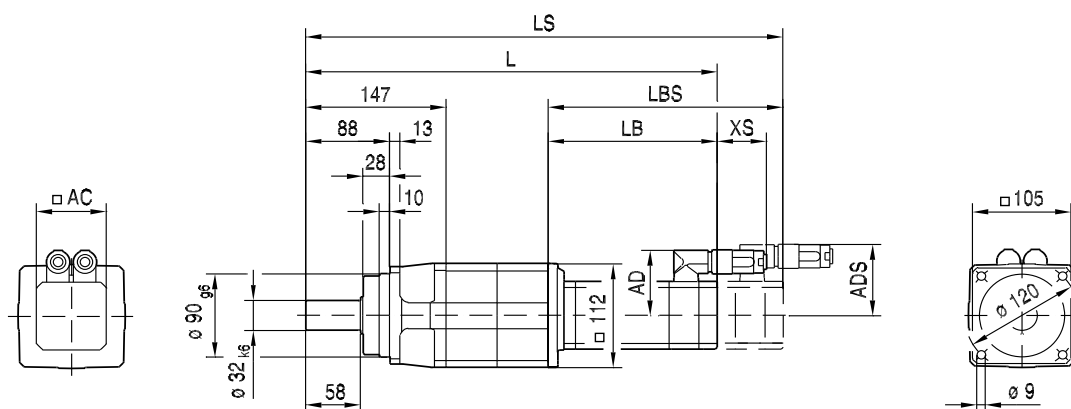
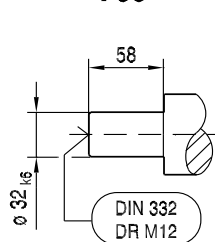
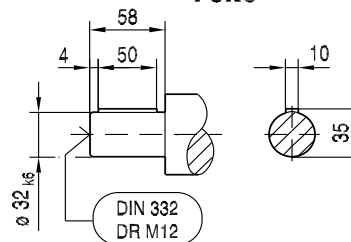
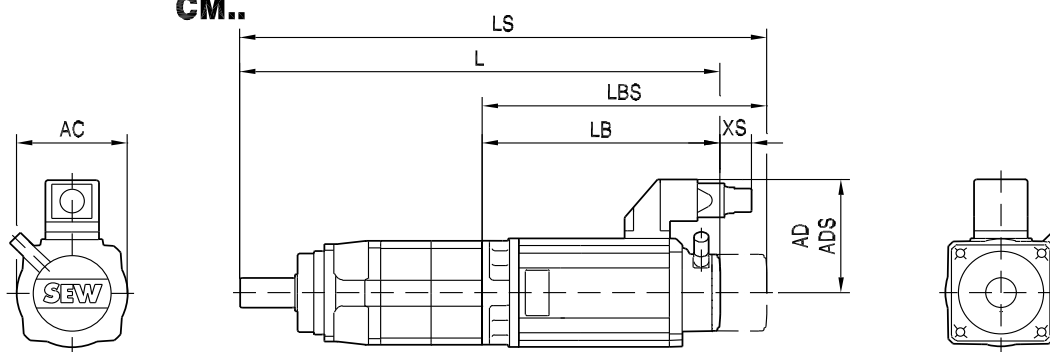
CM..



(→ 52)	DS56H	CM71S	CM71M	CM71L	CM90S	CM90M	CM90L				
AC	73	117	117	117	142	142	142				
AD	77	122	122	122	140	140	140				
ADS	77	122	122	122	140	140	140				
L	469	435	455	495	487	514	568				
LS	469	517	537	577	582	609	663				
LB	269	235	255	295	287	314	368				
LBS	269	317	337	377	382	409	463				
XS	51	45	45	45	50	50	50				



57 044 00 07

PSC522..**DS56..****PSC****PSKC****CM..**

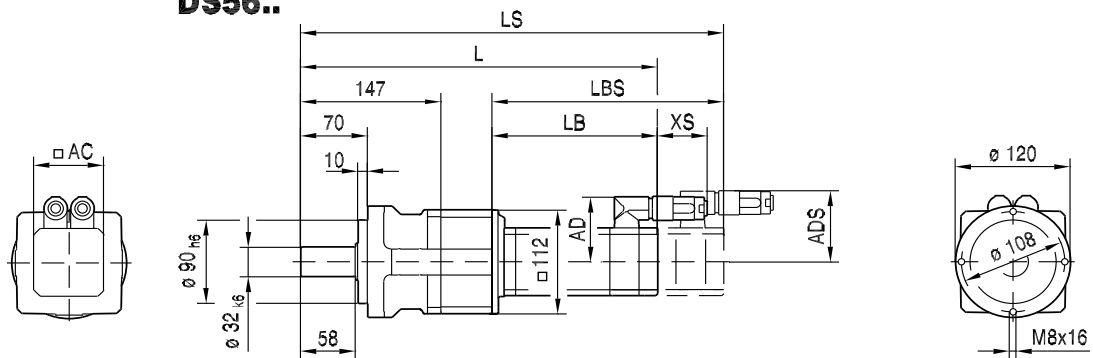
(→ 52)	DS56H	CM71S	CM71M	CM71L	CM90S	CM90M	CM90L				
AC	73	117	117	117	142	142	142				
AD	77	122	122	122	140	140	140				
ADS	77	122	122	122	140	140	140				
L	522	488	508	548	540	567	621				
LS	522	570	590	630	635	662	716				
LB	269	235	255	295	287	314	368				
LBS	269	317	337	377	382	409	463				
XS	51	45	45	45	50	50	50				



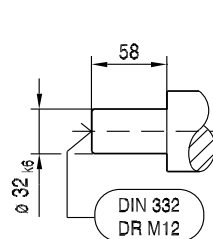
57 051 00 07

PSCZ521..

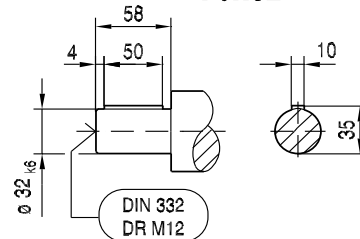
DS56..



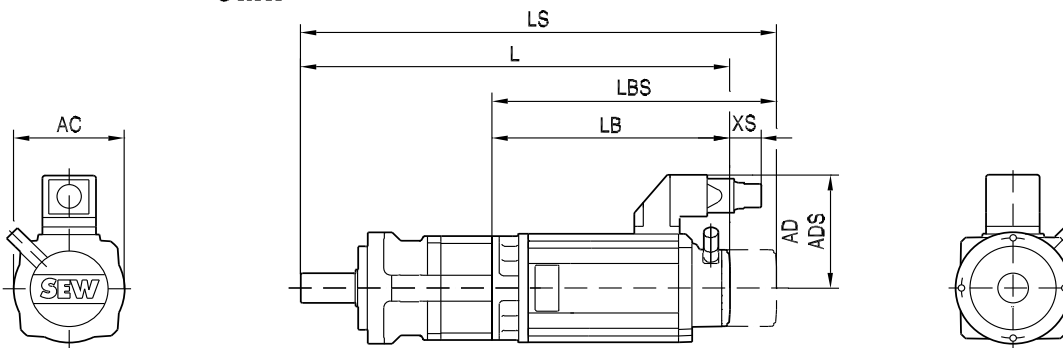
PSCZ



PSKCZ



CM..



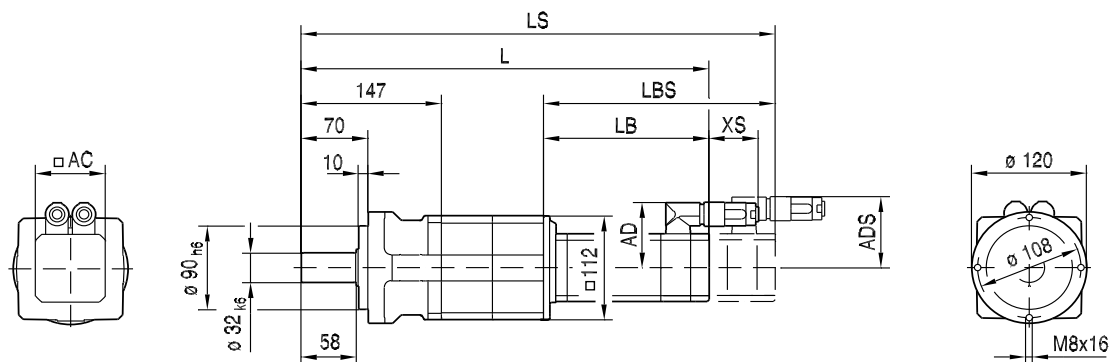
(→ 52)	DS56H	CM71S	CM71M	CM71L	CM90S	CM90M	CM90L				
AC	73	117	117	117	142	142	142				
AD	77	122	122	122	140	140	140				
ADS	77	122	122	122	140	140	140				
L	469	435	455	495	487	514	568				
LS	469	517	537	577	582	609	663				
LB	269	235	255	295	287	314	368				
LBS	269	317	337	377	382	409	463				
XS	51	45	45	45	50	50	50				



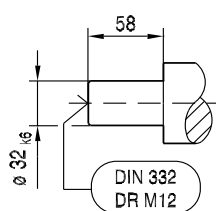
57 052 00 07

PSCZ522..

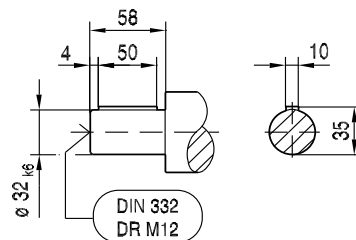
DS56..



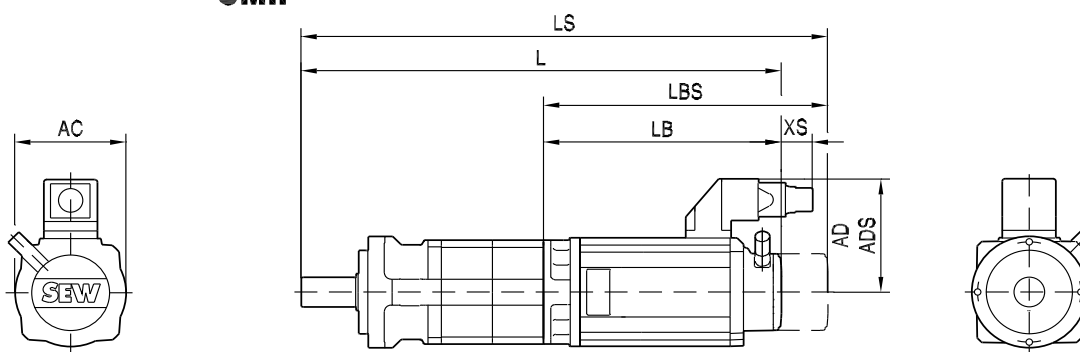
PSCZ



PSKCZ



CM..



(→ 52)	DS56H	CM71S	CM71M	CM71L	CM90S	CM90M	CM90L				
AC	73	117	117	117	142	142	142				
AD	77	122	122	122	140	140	140				
ADS	77	122	122	122	140	140	140				
L	522	488	508	548	540	567	621				
LS	522	570	590	630	635	662	716				
LB	269	235	255	295	287	314	368				
LBS	269	317	337	377	382	409	463				
XS	51	45	45	45	50	50	50				



7.7 PS.C621 / 622 CMP / CM [Nm]

M _{aDyn} [Nm]		CMP	CM							
	i	63L	71L	90S	90M	90L	112S	112M	112L	112H
PSC621 	5	150	155	196	258	374	407	>427	>427	>427
	7	211	218	274	362	>398	>398	>398		
	10	301	311	>380	>380	>380				
PSC622 	25	>427	>427	>427	>427	>427	>427	>427	>427	>427
	35	>427	>427	>427	>427	>427	>427	>427		
	49	>398	>398	>398	>398	>398	>398	>398		
	50	>427	>427	>427	>427	>427				
	70	>398	>398	>398	>398	>398				
	100	>380	>380	>380	>380	>380				

m [kg]		CMP	CM							
	s	63L	71L	90S	90M	90L	112S	112M	112L	112H
PSC621		19	26	32	34	39	42	46	62	69
PSC622		25	31	37	40	45	47	51	67	74

CMP / CM		n _{epk} [rpm]	η [%]	M1;M3;M5-6			M2			M4			φ [°]
	i			a ₀	a ₁	a ₂	a ₀	a ₁	a ₂	a ₀	a ₁	a ₂	
PSC621 	5	5000	99	1028.0	-1.462	0	1050.0	-1.528	0	1024.0	-1.567	0	10
	7	5000	99	1139.0	-1.828	0	1163.0	-1.895	0	1164.0	-2.016	0	10
	10	5000	99	1094.0	-1.884	0	1108.0	-1.918	0	1123.0	-2.071	0	10
PSC622 	25	5000	98	2054.0	-14.465	0	2207.0	-16.130	0	2213.0	-16.299	0	15
	35	5000	98	2307.0	-18.628	0	2506.0	-20.911	0	2520.0	-21.172	0	15
	49	5000	98	3179.0	-35.478	0	3438.0	-39.458	0	3453.0	-39.784	0	15
	50	5000	98	6285.0	-89.733	0	6539.0	-98.165	0	6553.0	-98.609	0	15
	70	5000	98	3140.0	-37.381	0	3408.0	-41.677	0	3421.0	-42.001	0	15
	100	5000	98	4084.0	-68.968	0	4441.0	-76.856	0	4451.0	-77.198	0	15

CMP / CM		M _{amax} [Nm]	M _{apk} [Nm]	M _{aNotaus} [Nm]	η _{ak} [rpm]	J _G 10 ⁻⁴ kgm ²	c _T PSC [Nm/°]	F _{Ramax} PSC [N]	F _{Rapk} PSC [N]
	i								
PSC621 	5	347	427	640	820	2.2	59.8	5390	11000
	7	323	398	597	929	1.2	54.8	6030	11000
	10	308	380	569	700	0.58	46.3	6790	11000
PSC622 	25	347	427	640	280	1.8	51.47	9220	11000
	35	347	427	640	200	0.96	50.73	10300	11000
	49	323	398	597	143	0.94	47.92	11000	11000
	50	347	427	640	140	0.48	48.97	11000	11000
	70	323	398	597	100	0.46	46.67	11000	11000
	100	308	380	569	70	0.46	40.87	11000	11000

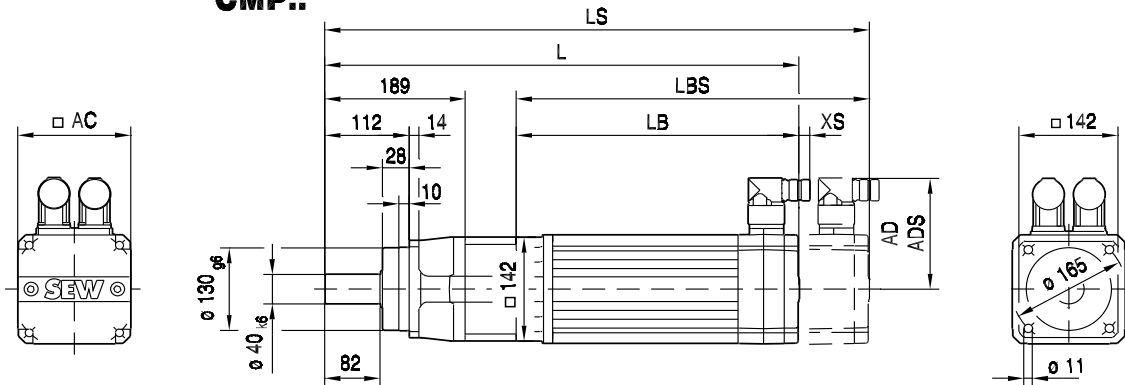


7.8 PS.C621 / 622 CMP / CM [mm]

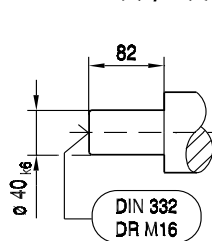
57 037 00 07

PSC621..

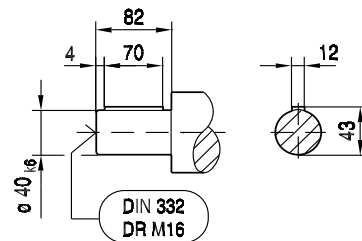
CMP..



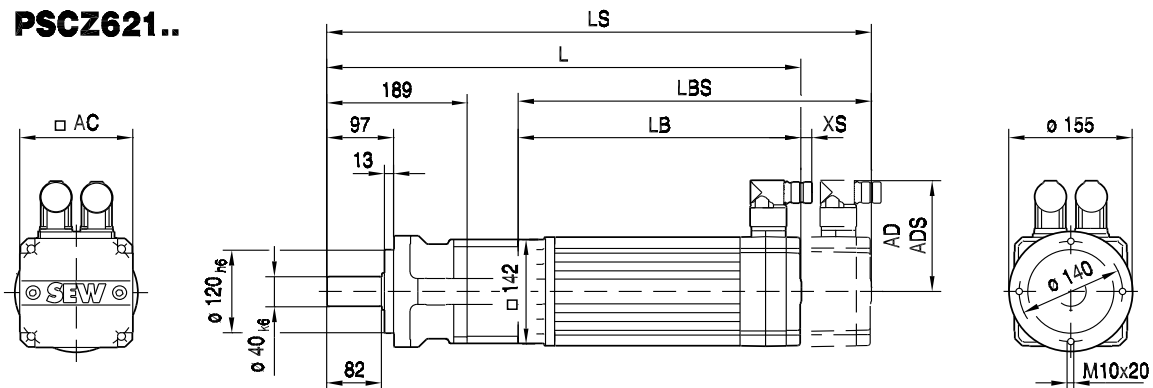
PSC / PSCZ



PSKC / PSKCZ



PSCZ621..



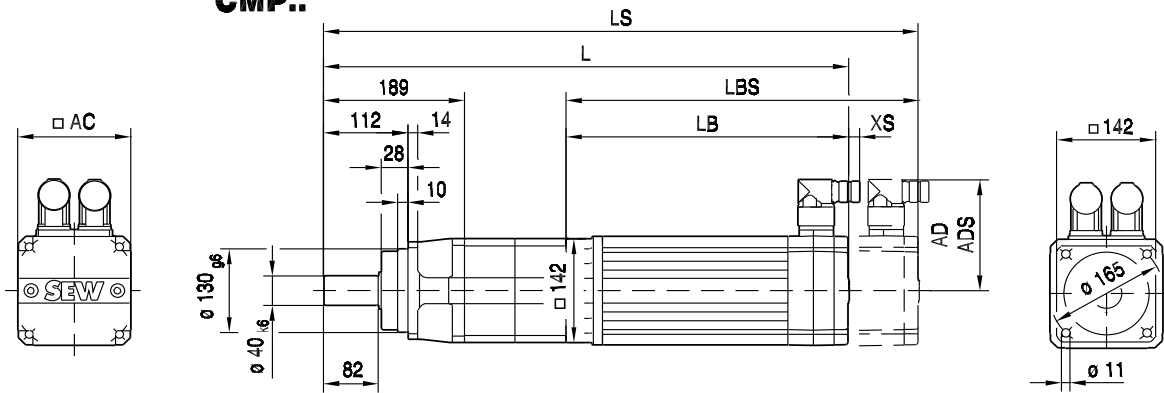
(→ 52)	CMP63L										
AC	88										
AD	92										
ADS	92										
L	516										
LS	545										
LB	268										
LBS	297										
XS	14										



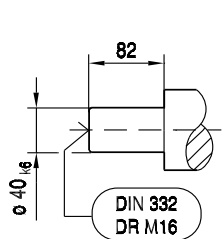
57 038 00 07

PSC622..

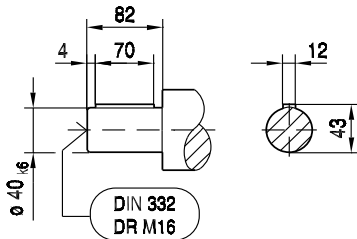
CMP..



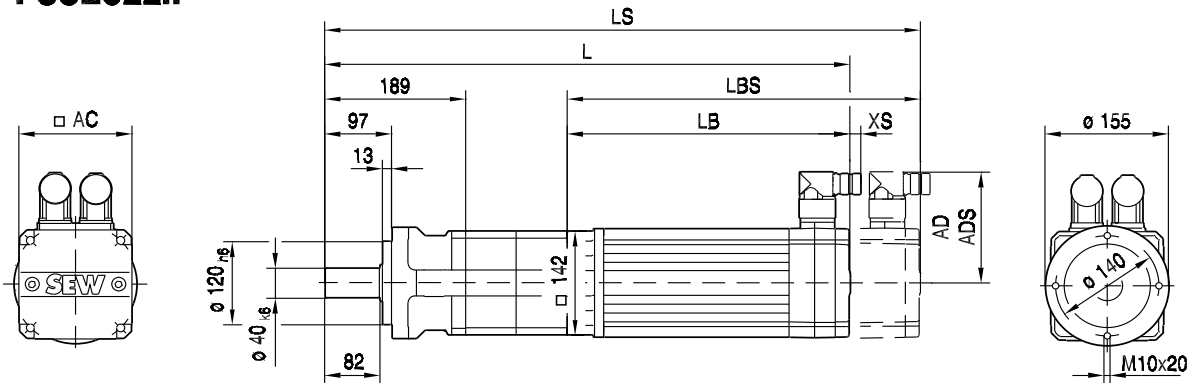
PSC / PSCZ



PSKC / PSCKZ



PSCZ622..

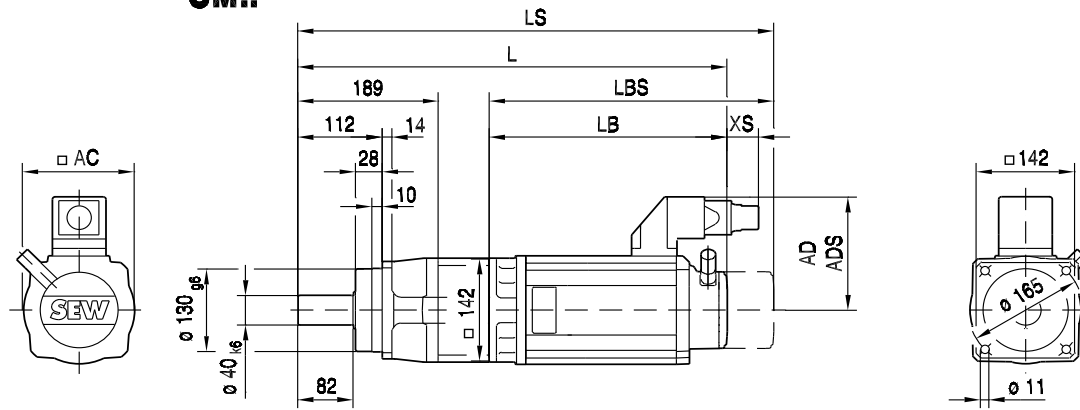


(→ 52)	CMP63L										
AC	88										
AD	92										
ADS	92										
L	575										
LS	604										
LB	268										
LBS	297										
XS	14										

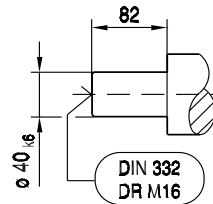


PSC621..

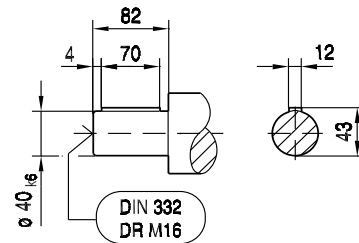
CM..



PSC



PSKC



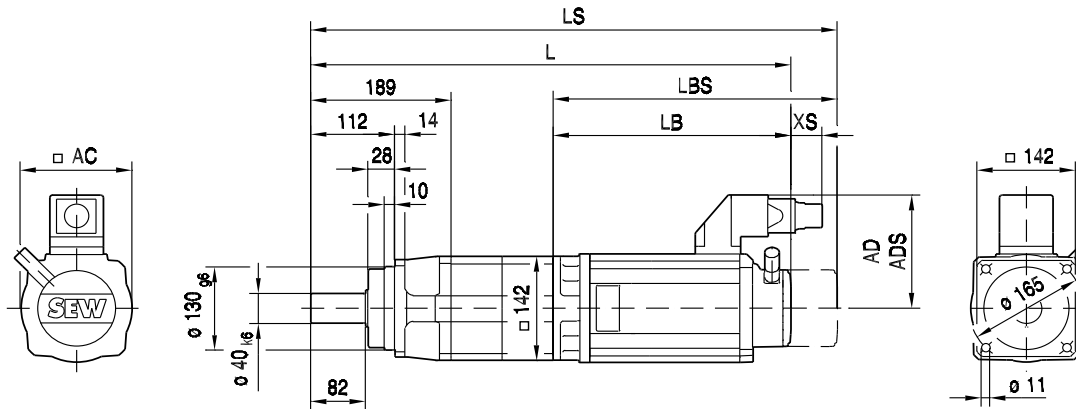
(→  52)	CM71L	CM90S	CM90M	CM90L	CM112S	CM112M	CM112L	CM112H			
AC	117	142	142	142	186	186	186	186			
AD	122	140	140	140	162	162	162	162			
ADS	122	140	140	140	162	162	162	162			
L	534	527	554	608	561	588	645	771			
LS	617	622	649	703	652	679	736	836			
LB	287	279	306	360	314	341	398	523			
LBS	369	374	401	455	404	431	488	588			
XS	45	50	50	50	36	36	36	36			



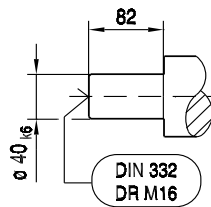
57 046 00 07

PSC622..

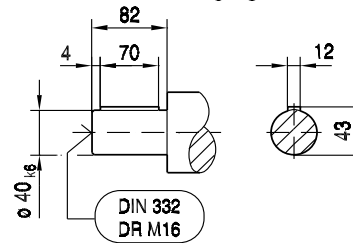
CM..



PSC



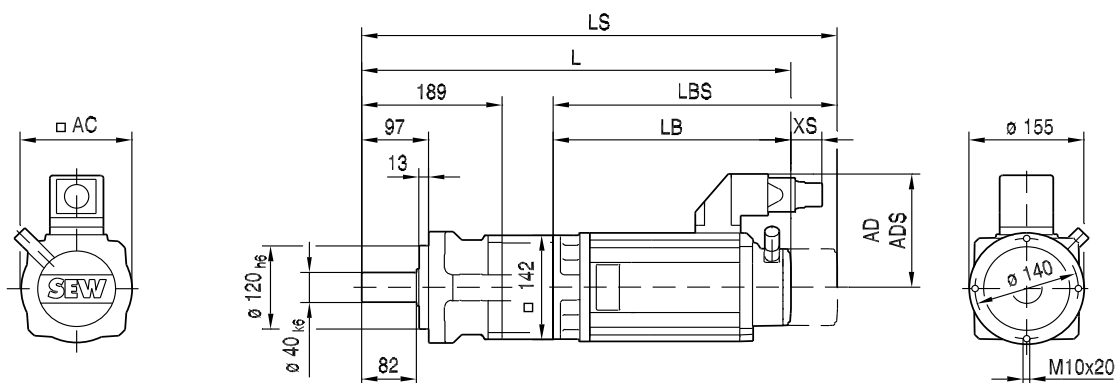
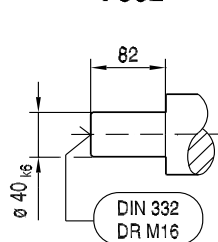
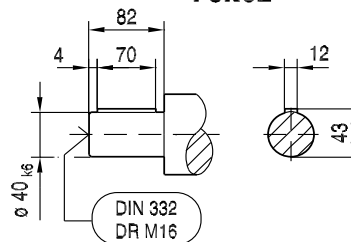
PSKC



(→ 52)	CM71L	CM90S	CM90M	CM90L	CM112S	CM112M	CM112L	CM112H			
AC	117	142	142	142	186	186	186	186			
AD	122	140	140	140	162	162	162	162			
ADS	122	140	140	140	162	162	162	162			
L	594	586	613	667	621	648	705	830			
LS	676	681	708	762	711	738	795	895			
LB	287	279	306	360	314	341	398	523			
LBS	369	374	401	455	404	431	488	588			
XS	45	50	50	50	36	36	36	36			



57 053 00 07

PSCZ621**CM..****PSCZ****PSKCZ**

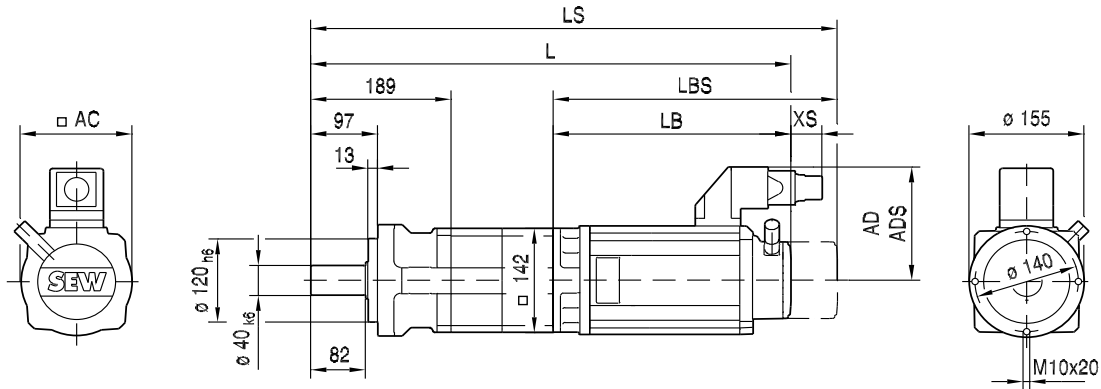
(→ 52)	CM71L	CM90S	CM90M	CM90L	CM112S	CM112M	CM112L	CM112H			
AC	117	142	142	142	186	186	186	186			
AD	122	140	140	140	162	162	162	162			
ADS	122	140	140	140	162	162	162	162			
L	534	527	554	608	561	588	645	771			
LS	617	622	649	703	652	679	736	836			
LB	287	279	306	360	314	341	398	523			
LBS	369	374	401	455	404	431	488	588			
XS	45	50	50	50	36	36	36	36			



57 054 00 07

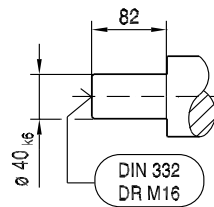
PSCZ622..

CM..

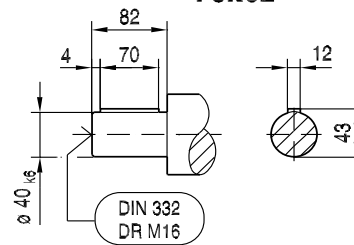


7

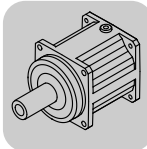
PSCZ



PSKCZ



(→ 52)	CM71L	CM90S	CM90M	CM90L	CM112S	CM112M	CM112L	CM112H			
AC	117	142	142	142	186	186	186	186			
AD	122	140	140	140	162	162	162	162			
ADS	122	140	140	140	162	162	162	162			
L	594	586	613	667	621	648	705	830			
LS	676	681	708	762	711	738	795	895			
LB	287	279	306	360	314	341	398	523			
LBS	369	374	401	455	404	431	488	588			
XS	45	50	50	50	36	36	36	36			



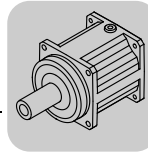
8 PS.C..ECH

8.1 PS.C221 / 222 ECH [Nm]

ECH	i	n_{epk} [rpm]	η [%]	M1;M3;M5-6			M2			M4			φ [°]
				a_0	a_1	a_2	a_0	a_1	a_2	a_0	a_1	a_2	
PSC221  1	3	7000	99	104.00	-0.073	0	111.00	-0.084	0	114.00	-0.089	0	-
	5	7000	99	153.00	-0.121	0	159.00	-0.130	0	164.00	-0.139	0	-
	7	7000	99	170.00	-0.152	0	175.00	-0.160	0	180.00	-0.170	0	-
	10	7000	99	172.00	-0.182	0	175.00	-0.188	0	179.00	-0.198	0	-
PSC222  2	15	7000	98	172.00	-0.414	0	173.00	-0.426	0	175.00	-0.435	0	-
	21	7000	98	183.00	-0.499	0	184.00	-0.509	0	186.00	-0.519	0	-
	25	7000	98	330.00	-1.266	0	335.00	-1.313	0	337.00	-1.327	0	-
	30	7000	98	192.00	-0.620	0	193.00	-0.629	0	195.00	-0.640	0	-
	35	7000	98	354.00	-1.547	0	358.00	-1.591	0	360.00	-1.606	0	-
	49	7000	98	495.00	-2.993	0	501.00	-3.084	0	503.00	-3.102	0	-
	50	7000	98	1023.0	-8.172	0	999.00	-8.236	0	1002.0	-8.271	0	-
	70	7000	98	524.00	-3.777	0	529.00	-3.865	0	530.00	-3.883	0	-
	100	7000	98	686.00	-7.022	0	693.00	-7.195	0	694.00	-7.215	0	-

ECH02	i	M_{amax} [Nm]	M_{apk} [Nm]	$M_{aNotaus}$ [Nm]	n_{ak} [rpm]	J_G $10^{-4}kgm^2$	c_T PSC [Nm/°]	F_{Ramax} PSC [N]	F_{Rapk} PSC [N]
PSC221  1	3	29	40	60	1500	0.38	3.11	1170	2000
	5	34	42	63	720	0.27	3.42	1390	2000
	7	32	39	59	800	0.24	3.41	1550	2000
	10	30	37	56	700	0.22	3.0	1750	2000
PSC222  2	15	29	40	60	467	0.27	2.9	2000	2000
	21	29	40	60	333	0.24	2.9	2000	2000
	25	34	42	63	280	0.26	3.0	2000	2000
	30	29	40	60	233	0.22	2.8	2000	2000
	35	34	42	63	200	0.24	3.0	2000	2000
	49	32	39	59	143	0.23	2.9	2000	2000
	50	34	42	63	140	0.22	2.9	2000	2000
	70	32	39	59	100	0.22	2.8	2000	2000
	100	30	37	56	70	0.22	2.6	2000	2000

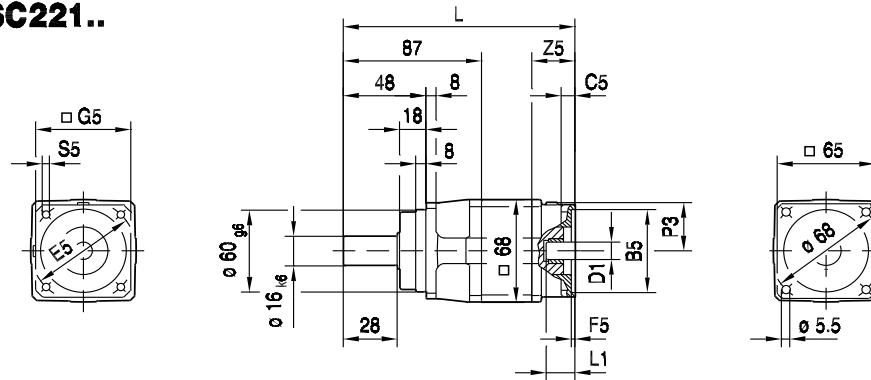
m [kg]		ECH 02				
	s					
PSC221	 1	1.8				
PSC222	 2	2.5				



8.2 PS.C221 / 222 ECH [mm]

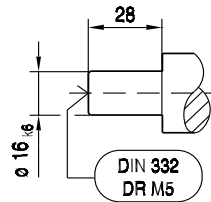
57 015 00 07

PS.C221..

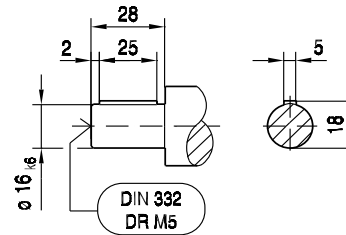


8

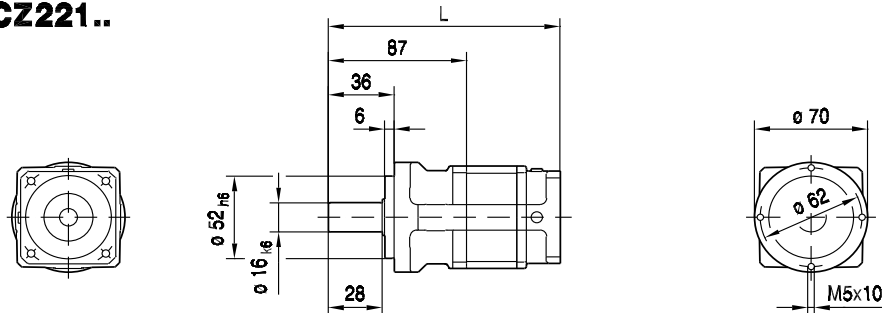
PSC / PSCZ



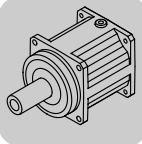
PSKC / PSKCZ



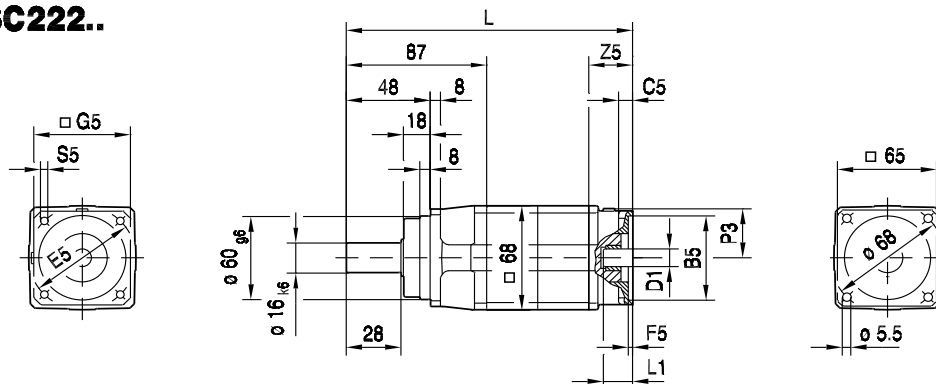
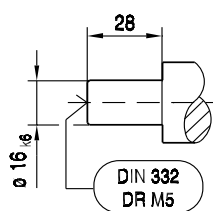
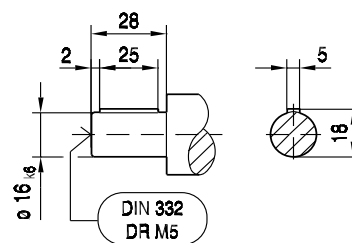
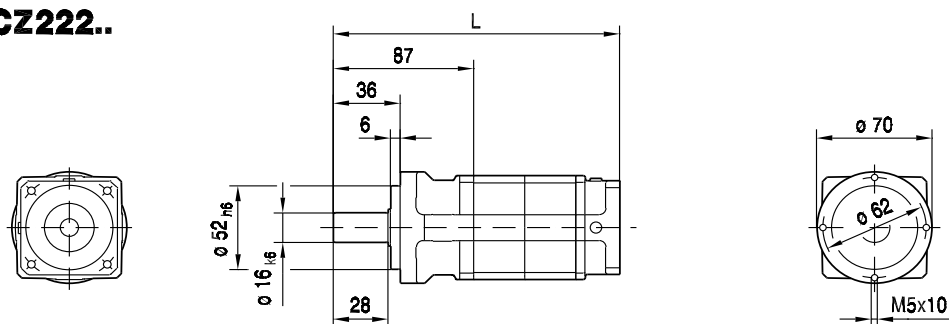
PS.CZ221..



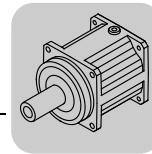
(→ 53)	L	B5	C5	E5	F5	G5	S5	Z5	L1	P	P3	D1
ECH02/01	149	40	8	63	5.0	55	M4	28	20	0	30	9,11
ECH02/08	152	60	9	75	5.0	73	M5	31	23	0	36	9,11



57 016 00 07

PSC222..**PSC / PSCZ****PSKC / PSKCZ****PSCZ222..**

(→ 53)	L	B5	C5	E5	F5	G5	S5	Z5	L1	P	P3	D1
ECH02/01	184	40	8	63	5.0	55	M4	28	20	0	30	9,11
ECH02/08	187	60	9	75	5.0	73	M5	31	23	0	36	9,11

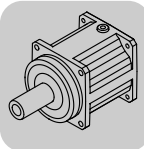


8.3 PS.C321 / 322 ECH [Nm]

ECH	i	n _{epk} [rpm]	η [%]	M1;M3;M5-6			M2			M4			φ [°]
				a ₀	a ₁	a ₂	a ₀	a ₁	a ₂	a ₀	a ₁	a ₂	
PSC321 	3	6500	99	201.00	-0.184	0	235.00	-0.189	0	218.00	-0.218	0	-
	5	6500	99	281.00	-0.296	0	289.00	-0.308	0	299.00	-0.333	0	-
	7	6500	99	281.00	-0.340	0	286.00	-0.348	0	289.00	-0.365	0	-
	10	6500	99	262.00	-0.383	0	267.00	-0.389	0	264.00	-0.395	0	-
PSC322 	15	6500	98	323.00	-1.023	0	325.00	-1.035	0	329.00	-1.062	0	-
	21	6500	98	336.00	-1.223	0	338.00	-1.231	0	341.00	-1.259	0	-
	25	6500	98	588.00	-2.956	0	595.00	-3.018	0	598.00	-3.056	0	-
	30	6500	98	346.00	-1.510	0	344.00	-1.505	0	347.00	-1.532	0	-
	35	6500	98	613.00	-3.568	0	618.00	-3.620	0	622.00	-3.659	0	-
	49	6500	98	790.00	-6.356	0	797.00	-6.459	0	800.00	-6.500	0	-
	50	6500	98	2059.0	-21.651	0	2067.0	-22.218	0	2071.0	-22.312	0	-
	70	6500	98	824.00	-8.055	0	830.00	-8.143	0	832.00	-8.186	0	-
	100	6500	98	1016.0	-14.093	0	1024.0	-14.259	0	1025.0	-14.301	0	-

ECH03									
	i	M _{amax} [Nm]	M _{apk} [Nm]	M _{aNotaus} [Nm]	n _{ak} [rpm]	J _G 10 ⁻⁴ kgm ²	c _T PSC [Nm/°]	F _{Ramax} PSC [N]	F _{Rapk} PSC [N]
PSC321 	3	62	86	129	633	1.3	8.99	1710	4000
	5	74	91	136	300	0.95	10.2	2030	4000
	7	69	85	128	329	0.87	10.0	2270	4000
	10	66	73	110	360	0.82	7.97	2560	4000
PSC322 	15	62	86	129	467	0.94	8.2	2930	4000
	21	62	86	129	333	0.86	8.1	3280	4000
	25	74	91	136	280	0.92	9.0	3470	4000
	30	62	86	129	233	0.82	7.7	3690	4000
	35	74	91	136	200	0.86	8.9	3880	4000
	49	69	85	128	143	0.85	8.6	4000	4000
	50	74	91	136	140	0.82	8.6	4000	4000
	70	69	85	128	100	0.81	8.4	4000	4000
	100	66	81	122	70	0.81	7.4	4000	4000

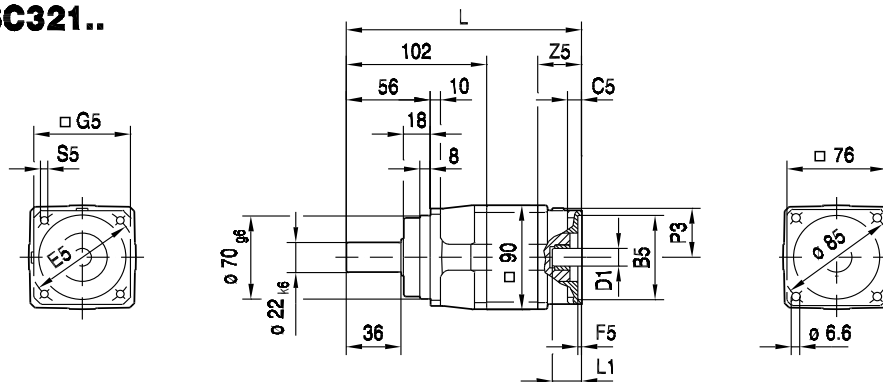
m [kg]		ECH 03	
s			
PSC321		3.6	
PSC322		5.0	



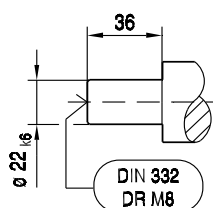
8.4 PS.C321 / 322 ECH [mm]

57 017 00 07

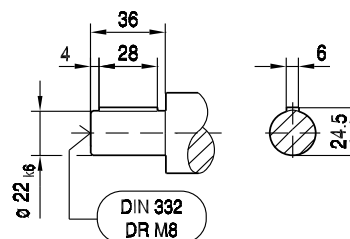
PSC321..



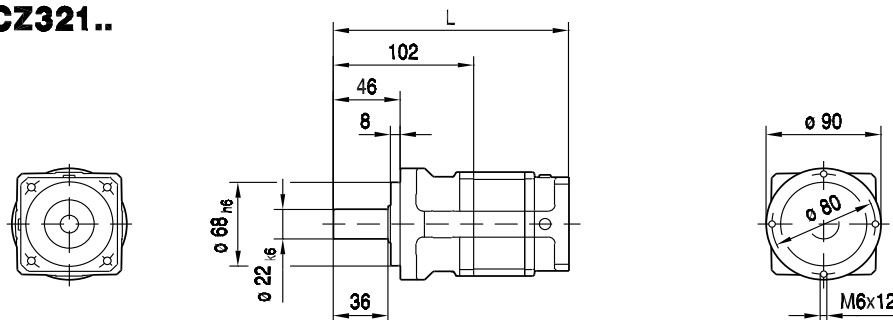
PSC / PSCZ



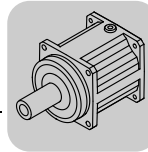
PSKC / PSKCZ



PSCZ321..

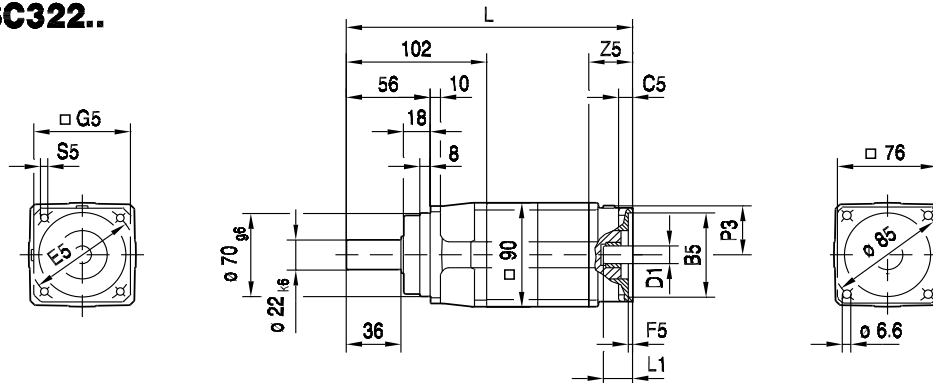


(→ 53)	L	B5	C5	E5	F5	G5	S5	Z5	L1	P	P3	D1
ECH03/08	172	60	9	75	5.0	73	M5	28	28	0	38	11,14
ECH03/13	179	80	10	100	5.0	90	M6	35	35	0	47	11,14

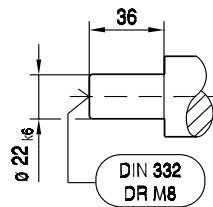


57 018 00 07

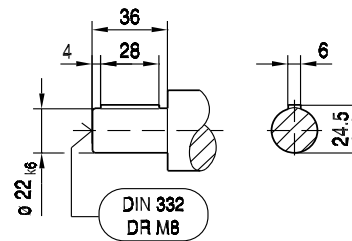
PSC322..



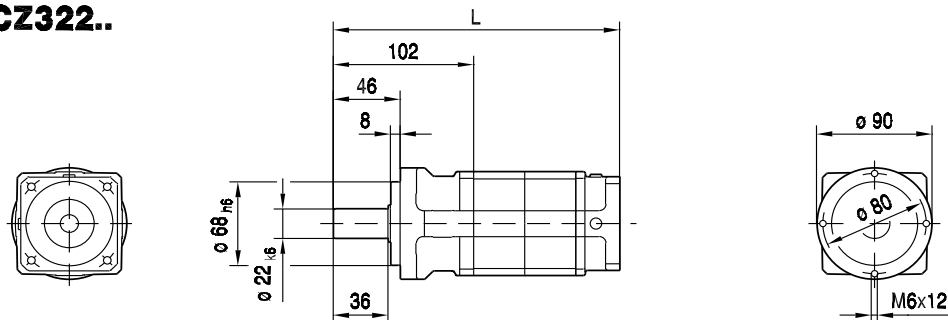
PSC / PSCZ



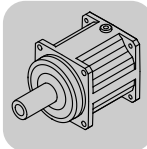
PSKC / PSKCZ



PSCZ322..



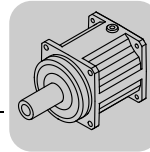
(→ 53)	L	B5	C5	E5	F5	G5	S5	Z5	L1	P	P3	D1
ECH03/08	214	60	9	75	5.0	73	M5	28	28	0	38	11,14
ECH03/13	221	80	10	100	5.0	90	M6	35	35	0	47	11,14


8.5 PS.C521 / 522 ECH [Nm]

ECH		n _{epk} [rpm]	η [%]	M1;M3;M5-6			M2			M4			φ
	i			a ₀	a ₁	a ₂	a ₀	a ₁	a ₂	a ₀	a ₁	a ₂	[°]
 PSC521 1	3	6000	99	439.00	-0.443	0	458.00	-0.485	0	463.00	-0.513	0	-
	5	6000	99	642.00	-0.722	0	659.00	-0.754	0	669.00	-0.799	0	-
	7	6000	99	693.00	-0.871	0	708.00	-0.898	0	709.00	-0.935	0	-
	10	6000	99	732.00	-1.062	0	667.00	-0.977	0	656.00	-0.992	0	-
 PSC522 2	15	6000	98	703.00	-2.454	0	706.00	-2.478	0	714.00	-2.542	0	-
	21	6000	98	739.00	-2.881	0	738.00	-2.884	0	745.00	-2.949	0	-
	25	6000	98	1333.0	-7.375	0	1344.0	-7.509	0	1354.0	-7.611	0	-
	30	6000	98	754.00	-3.406	0	749.00	-3.389	0	756.00	-3.456	0	-
	35	6000	98	1419.0	-8.819	0	1428.0	-8.934	0	1437.0	-9.045	0	-
	49	6000	98	1968.0	-16.894	0	1984.0	-17.160	0	1991.0	-17.275	0	-
	50	6000	98	4428.0	-51.528	0	4455.0	-53.090	0	4465.0	-53.308	0	-
	70	6000	98	2009.0	-20.188	0	2013.0	-20.327	0	2017.0	-20.427	0	-
	100	6000	98	2795.0	-39.812	0	2574.0	-36.874	0	2578.0	-36.994	0	-

ECH05							c _T PSC	F _{Ramax} PSC	F _{Rapk} PSC
	i	M _{amax} [Nm]	M _{apk} [Nm]	M _{aNotaus} [Nm]	n _{ak} [rpm]	J _G 10 ⁻⁴ kgm ²	[Nm/°]	[N]	[N]
 PSC521 1	3	147	203	305	900	4.4	25.4	2900	6750
	5	181	223	334	360	3.2	27.4	3440	6750
	7	169	209	313	414	2.7	25.1	3850	6750
	10	161	162	243	440	2.6	20.7	4330	6750
 PSC522 2	15	147	203	305	467	3.2	20.9	4960	6750
	21	147	203	305	333	2.7	20.3	5550	6750
	25	181	223	334	280	3.1	23.2	5880	6750
	30	147	203	305	233	2.5	19.1	6250	6750
	35	181	223	334	200	2.7	22.7	6580	6750
	49	169	209	313	143	2.7	22.3	6750	6750
	50	181	223	334	140	2.5	21.7	6750	6750
	70	169	209	313	100	2.5	21.5	6750	6750
	100	161	199	298	70	2.5	19.1	6750	6750

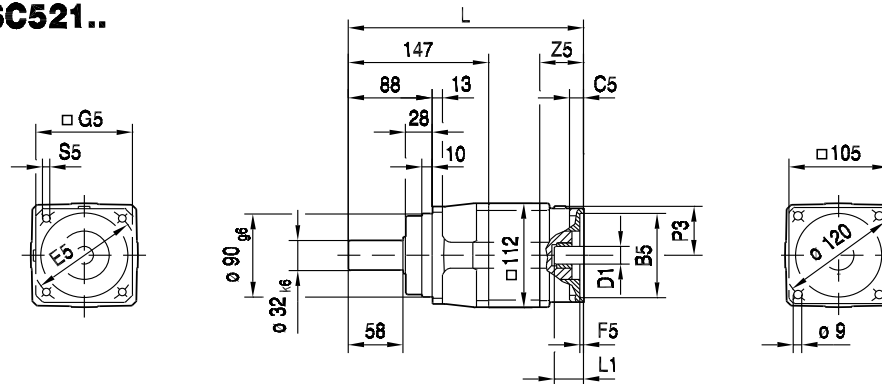
m [kg]		ECH 05				
s						
PSC521 	1	7.4				
PSC522 	2	10				



8.6 PS.C521 / 522 ECH [mm]

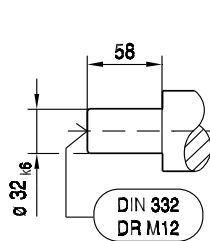
57 019 00 07

PS.C521..

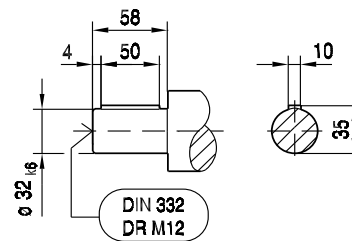


8

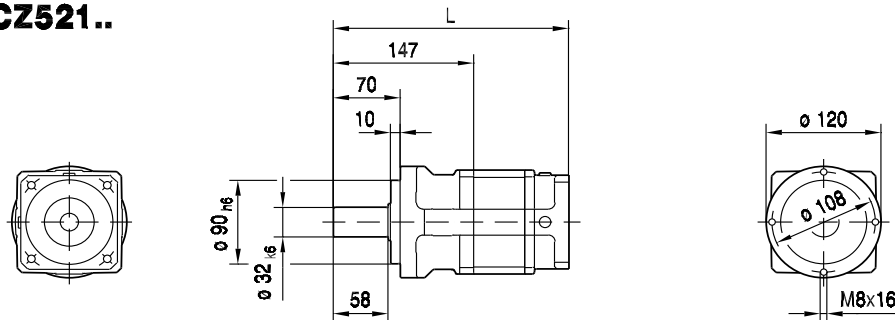
PSC / PSCZ



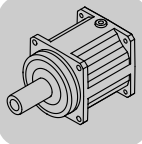
PSKC / PSKCZ



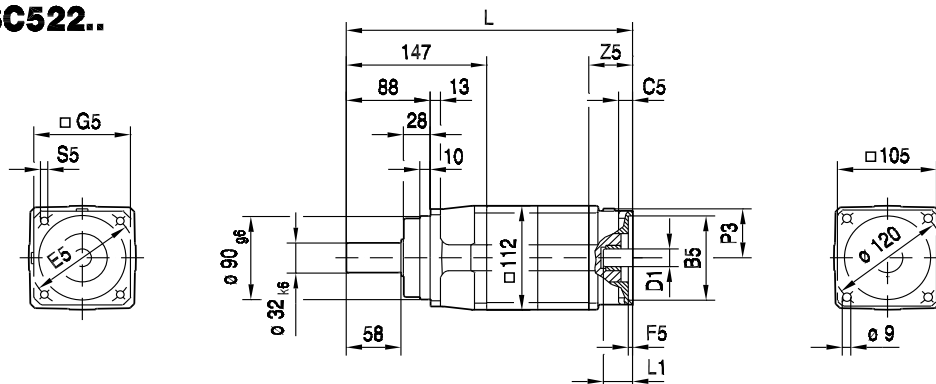
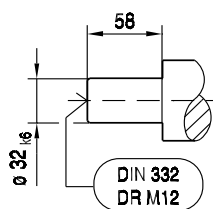
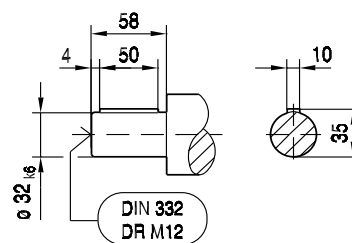
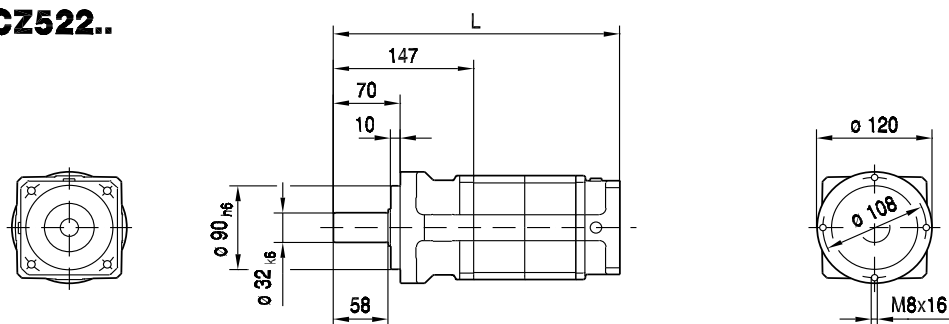
PS.CZ521..



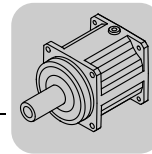
(→ 53)	L	B5	C5	E5	F5	G5	S5	Z5	L1	P	P3	D1
ECH05/13	237	80	11	100	5.0	88	M6	36	30	0	47	14,19
ECH05/14	247	95	15	115	5.0	105	M8	46	40	0	55	14,19



57 020 00 07

PSC522..**PSC / PSCZ****PSKC / PSKCZ****PSCZ522..**

(→ 53)	L	B5	C5	E5	F5	G5	S5	Z5	L1	P	P3	D1
ECH05/13	290	80	11	100	5.0	88	M6	36	30	0	47	14,19
ECH05/14	300	95	15	115	5.0	105	M8	46	40	0	55	14,19

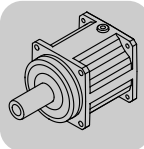


8.7 PS.C621 / 622 ECH [Nm]

ECH	i	n _{epk} [rpm]	η [%]	M1;M3;M5-6			M2			M4			φ [°]
				a ₀	a ₁	a ₂	a ₀	a ₁	a ₂	a ₀	a ₁	a ₂	
PSC621  1	5	5000	99	1100.0	-1.463	0	1130.0	-1.529	0	1110.0	-1.581	0	-
	7	5000	99	1184.0	-1.765	0	1212.0	-1.822	0	1193.0	-1.886	0	-
	10	5000	99	1211.0	-2.132	0	1232.0	-2.168	0	1248.0	-2.324	0	-
PSC622  2	25	5000	98	2230.0	-14.715	0	2467.0	-16.770	0	2473.0	-16.936	0	-
	35	5000	98	2417.0	-18.197	0	2617.0	-20.145	0	2635.0	-20.420	0	-
	49	5000	98	3344.0	-34.752	0	3623.0	-38.323	0	3629.0	-38.534	0	-
	50	5000	98	6984.0	-97.392	0	7298.0	-105.85	0	7314.0	-106.30	0	-
	70	5000	98	3525.0	-43.318	0	3854.0	-48.148	0	3869.0	-48.492	0	-
	100	5000	98	4583.0	-79.855	0	5025.0	-88.798	0	5036.0	-89.161	0	-

ECH06	i	M _{amax} [Nm]	M _{apk} [Nm]	M _{aNotaus} [Nm]	n _{ak} [rpm]	J _G 10 ⁻⁴ kgm ²	c _T PSC [Nm/°]	F _{Ramax} PSC [N]	F _{Rapk} PSC [N]
PSC621  1	5	347	427	640	820	8.3	56.1	5390	11000
	7	323	398	597	929	7.2	52.2	6030	11000
	10	308	380	569	700	6.6	44.3	6790	11000
PSC622  2	25	347	427	640	280	7.9	51.2	9220	11000
	35	347	427	640	200	7.0	50.6	10300	11000
	49	323	398	597	143	7.0	47.8	11000	11000
	50	347	427	640	140	6.5	48.9	11000	11000
	70	323	398	597	100	6.5	46.6	11000	11000
	100	308	380	569	70	6.5	40.8	11000	11000

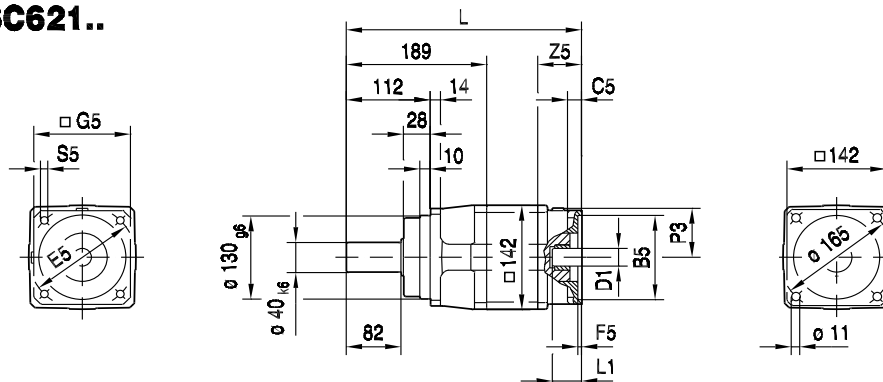
m [kg]		ECH 06				
	s					
PSC621	 1	13				
PSC622	 2	18				



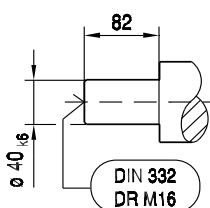
8.8 PS.C621 / 622 ECH [mm]

57 021 00 07

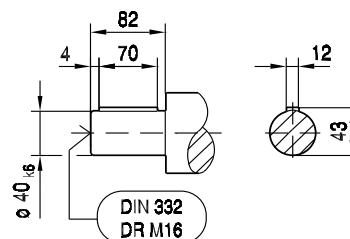
PSC621..



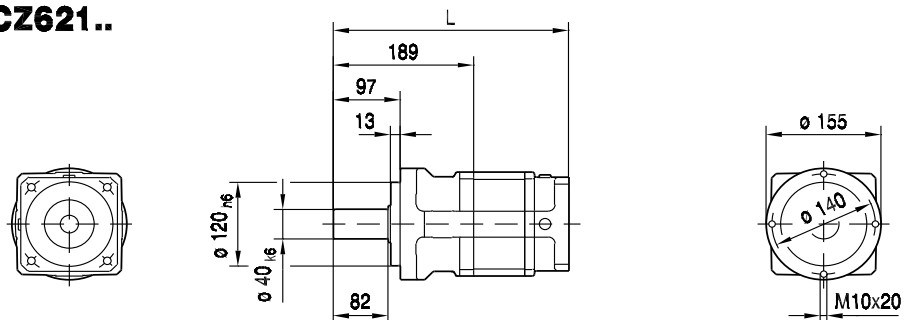
PSC / PSCZ



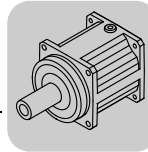
PSKC / PSKCZ



PSCZ621..

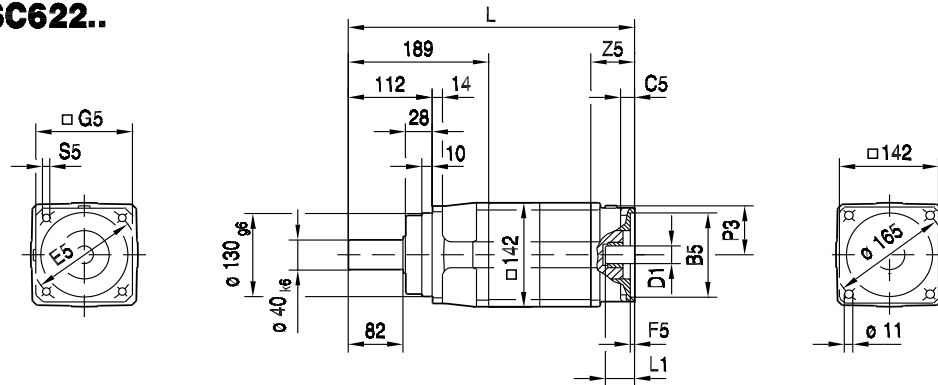


(→ 53)	L	B5	C5	E5	F5	G5	S5	Z5	L1	P	P3	D1
ECH06/14	291	95	15	115	5.0	105	M8	43	48	0	55	19,24
ECH06/20	301	130	18	165	5.0	142	M10	53	58	0	73	19,24

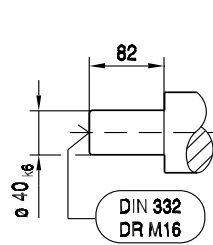


57 022 00 07

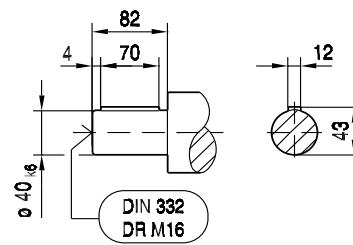
PSC622..



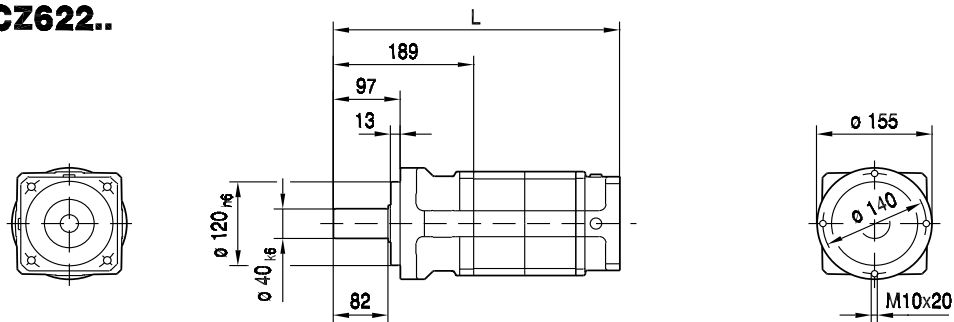
PSC / PSCZ



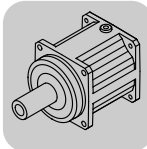
PSKC / PSKCZ



PSCZ622..



(→ 53)	L	B5	C5	E5	F5	G5	S5	Z5	L1	P	P3	D1
ECH06/14	350	95	15	115	5.0	105	M8	43	48	0	55	19,24
ECH06/20	360	130	18	165	5.0	142	M10	53	58	0	73	19,24



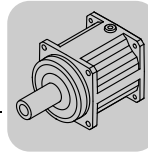
9 PS.C..EPH

9.1 PS.C221 / 222 EPH [Nm]

EPH	i	n_{epk} [rpm]	η [%]	M1;M3;M5-6			M2			M4			φ [°]
				a_0	a_1	a_2	a_0	a_1	a_2	a_0	a_1	a_2	
PSC221  1	3	7000	99	104.00	-0.073	0	111.00	-0.084	0	114.00	-0.089	0	-
	5	7000	99	153.00	-0.121	0	159.00	-0.130	0	164.00	-0.139	0	-
	7	7000	99	170.00	-0.152	0	175.00	-0.160	0	180.00	-0.170	0	-
	10	7000	99	172.00	-0.182	0	175.00	-0.188	0	179.00	-0.198	0	-
PSC222  2	15	7000	98	172.00	-0.414	0	173.00	-0.426	0	175.00	-0.435	0	-
	21	7000	98	183.00	-0.499	0	184.00	-0.509	0	186.00	-0.519	0	-
	25	7000	98	330.00	-1.266	0	335.00	-1.313	0	337.00	-1.327	0	-
	30	7000	98	192.00	-0.620	0	193.00	-0.629	0	195.00	-0.640	0	-
	35	7000	98	354.00	-1.547	0	358.00	-1.591	0	360.00	-1.606	0	-
	49	7000	98	495.00	-2.993	0	501.00	-3.084	0	503.00	-3.102	0	-
	50	7000	98	1023.0	-8.172	0	999.00	-8.236	0	1002.0	-8.271	0	-
	70	7000	98	524.00	-3.777	0	529.00	-3.865	0	530.00	-3.883	0	-
	100	7000	98	686.00	-7.022	0	693.00	-7.195	0	694.00	-7.215	0	-

EPH01	i	M_{amax} [Nm]	M_{apk} [Nm]	$M_{aNotaus}$ [Nm]	n_{ak} [rpm]	J_G 10^{-4}kgm^2	c_T PSC [Nm/°]	F_{Ramax} PSC [N]	F_{Rapk} PSC [N]
PSC221  1	3	23	23	34	2333	0.34	3.11	1170	2000
	5	34	42	63	720	0.23	3.42	1390	2000
	7	32	39	59	800	0.20	3.41	1550	2000
	10	30	37	56	700	0.19	3.0	1750	2000
PSC222  2	15	29	40	60	467	0.23	2.9	2000	2000
	21	29	40	60	333	0.20	2.9	2000	2000
	25	34	42	63	280	0.22	3.0	2000	2000
	30	29	40	60	233	0.19	2.8	2000	2000
	35	34	42	63	200	0.20	3.0	2000	2000
	49	32	39	59	143	0.20	2.9	2000	2000
	50	34	42	63	140	0.19	2.9	2000	2000
	70	32	39	59	100	0.18	2.8	2000	2000
	100	30	37	56	70	0.18	2.6	2000	2000

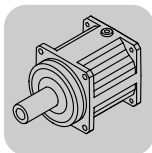
EPH02	i	M_{amax} [Nm]	M_{apk} [Nm]	$M_{aNotaus}$ [Nm]	n_{ak} [rpm]	J_G 10^{-4}kgm^2	c_T PSC [Nm/°]	F_{Ramax} PSC [N]	F_{Rapk} PSC [N]
PSC221  1	3	29	40	60	1500	0.68	3.11	1170	2000
	5	34	42	63	720	0.56	3.42	1390	2000
	7	32	39	59	800	0.53	3.41	1550	2000
	10	30	37	56	700	0.52	3.0	1750	2000
PSC222  2	15	29	40	60	467	0.56	2.9	2000	2000
	21	29	40	60	333	0.53	2.9	2000	2000
	25	34	42	63	280	0.56	3.0	2000	2000
	30	29	40	60	233	0.52	2.8	2000	2000
	35	34	42	63	200	0.53	3.0	2000	2000
	49	32	39	59	143	0.53	2.9	2000	2000
	50	34	42	63	140	0.52	2.9	2000	2000
	70	32	39	59	100	0.52	2.8	2000	2000
	100	30	37	56	70	0.52	2.6	2000	2000



EPH03									
	i	M _{amax} [Nm]	M _{apk} [Nm]	M _{aNotaus} [Nm]	n _{ak} [rpm]	J _G 10 ⁻⁴ kgm ²	c _T PSC [Nm/°]	F _{Ramax} PSC [N]	F _{Rapk} PSC [N]
PSC221  1	3	29	40	60	1500	0.75	3.11	1170	2000
	5	34	42	63	720	0.64	3.42	1390	2000
	7	32	39	59	800	0.61	3.41	1550	2000
	10	30	37	56	700	0.59	3.0	1750	2000
PSC222  2	15	29	40	60	467	0.64	2.9	2000	2000
	21	29	40	60	333	0.61	2.9	2000	2000
	25	34	42	63	280	0.63	3.0	2000	2000
	30	29	40	60	233	0.59	2.8	2000	2000
	35	34	42	63	200	0.61	3.0	2000	2000
	49	32	39	59	143	0.61	2.9	2000	2000
	50	34	42	63	140	0.59	2.9	2000	2000
	70	32	39	59	100	0.59	2.8	2000	2000
	100	30	37	56	70	0.59	2.6	2000	2000

EPH04									
	i	M _{amax} [Nm]	M _{apk} [Nm]	M _{aNotaus} [Nm]	n _{ak} [rpm]	J _G 10 ⁻⁴ kgm ²	c _T PSC [Nm/°]	F _{Ramax} PSC [N]	F _{Rapk} PSC [N]
PSC221  1	3	29	40	60	1500	0.97	3.11	1170	2000
	5	34	42	63	720	0.85	3.42	1390	2000
	7	32	39	59	800	0.83	3.41	1550	2000
	10	30	37	56	700	0.81	3.0	1750	2000
PSC222  2	15	29	40	60	467	0.85	2.9	2000	2000
	21	29	40	60	333	0.83	2.9	2000	2000
	25	34	42	63	280	0.85	3.0	2000	2000
	30	29	40	60	233	0.81	2.8	2000	2000
	35	34	42	63	200	0.82	3.0	2000	2000
	49	32	39	59	143	0.82	2.9	2000	2000
	50	34	42	63	140	0.81	2.9	2000	2000
	70	32	39	59	100	0.81	2.8	2000	2000
	100	30	37	56	70	0.81	2.6	2000	2000

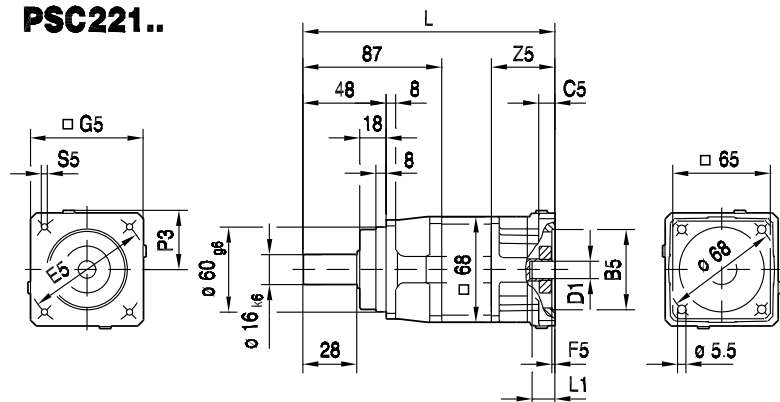
m [kg]		EPH				
	s	01	02	03	04	
PSC221	 1	2.4	2.5	2.8	2.9	
PSC222	 2	3.1	3.1	3.4	3.5	



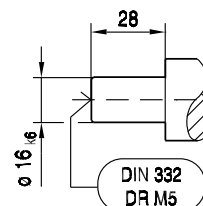
9.2 PS.C221 / 222 EPH [mm]

57 023 00 07

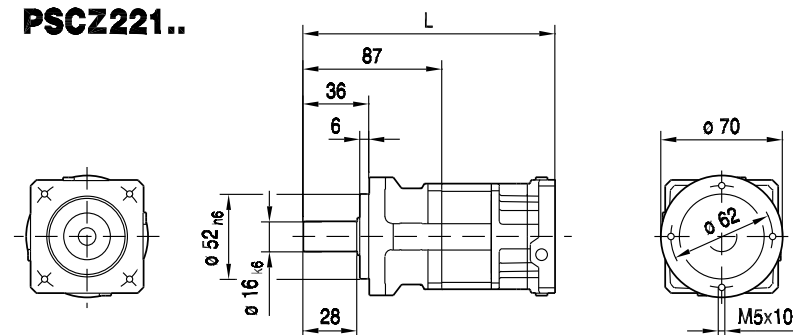
PSC221..



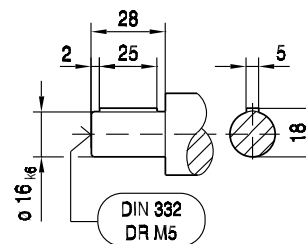
PSC / PSCZ



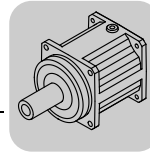
PSCZ221..



PSKC / PSKCZ

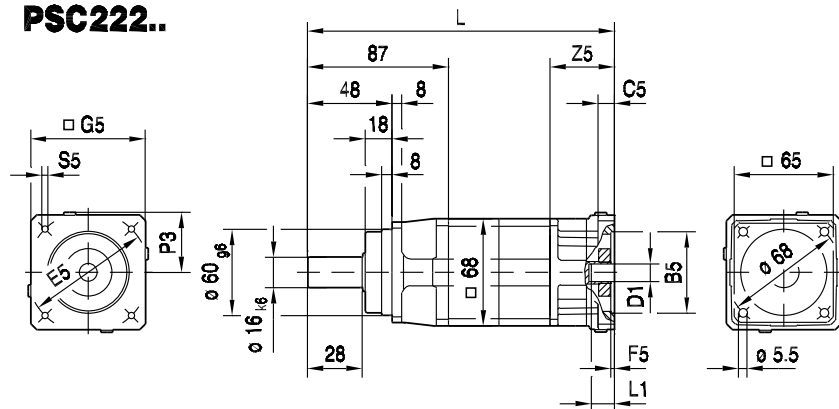


(→ 53)	L	B5	C5	E5	F5	G5	S5	Z5	L1	P	P3	D1
EPH01/01	159	40	13	63	4.0	73	M4	38	33	0	39	9,11
EPH01/03	159	50	13	60	4.0	73	M4	38	33	0	39	9,11
EPH02/04	159	50	13	70	4.0	73	M5	38	34	0	39	8,9,10,11,12,14
EPH02/05	159	50	13	80	4.0	73	M4	38	34	0	39	8,9,10,11,12,14
EPH02/08	159	60	13	75	4.0	73	M5	38	34	0	39	8,9,10,11,12,14
EPH03/03	168	50	20	60	3.5	90	M4	47	30	0	47	8,9,10,11,12,14
EPH03/04	168	50	20	70	3.5	90	M5	47	30	0	47	8,9,10,11,12,14
EPH03/05	168	50	20	80	3.5	90	M4	47	30	0	47	8,9,10,11,12,14
EPH03/06	168	50	20	95	3.5	90	M6	47	30	0	47	8,9,10,11,12,14
EPH03/07	168	50	20	100	3.5	90	M6	47	30	0	47	8,9,10,11,12,14
EPH03/08	168	60	20	75	3.5	90	M5	47	30	0	47	8,9,10,11,12,14
EPH03/09	168	60	20	90	3.5	90	M5	47	30	0	47	8,9,10,11,12,14
EPH03/10	168	70	20	85	3.5	90	M6	47	30	0	47	8,9,10,11,12,14
EPH03/11	168	70	20	90	3.5	90	M5	47	30	0	47	8,9,10,11,12,14
EPH03/12	168	70	20	90	3.5	90	M6	47	30	0	47	8,9,10,11,12,14
EPH03/13	168	80	20	100	3.5	90	M6	47	30	0	47	8,9,10,11,12,14
EPH03/14	168	95	16	115	4.0	105	M8	47	30	0	55	8,9,10,11,12,14
EPH04/03	177	50	20	60	3.5	90	M4	56	41	0	47	11,12,14,16,19
EPH04/04	177	50	20	70	3.5	90	M5	56	41	0	47	11,12,14,16,19
EPH04/05	177	50	20	80	3.5	90	M4	56	41	0	47	11,12,14,16,19
EPH04/06	177	50	20	95	3.5	90	M6	56	41	0	47	11,12,14,16,19
EPH04/07	177	50	20	100	3.5	90	M6	56	41	0	47	11,12,14,16,19
EPH04/08	177	60	20	75	3.5	90	M5	56	41	0	47	11,12,14,16,19
EPH04/09	177	60	20	90	3.5	90	M5	56	41	0	47	11,12,14,16,19
EPH04/10	177	70	20	85	3.5	90	M6	56	41	0	47	11,12,14,16,19
EPH04/11	177	70	20	90	3.5	90	M5	56	41	0	47	11,12,14,16,19
EPH04/12	177	70	20	90	3.5	90	M6	56	41	0	47	11,12,14,16,19
EPH04/13	177	80	20	100	3.5	90	M6	56	41	0	47	11,12,14,16,19
EPH04/14	177	95	16	115	4.0	105	M8	56	41	0	55	11,12,14,16,19
EPH04/15	177	95	16	130	4.0	115	M8	56	41	0	60	11,12,14,16,19

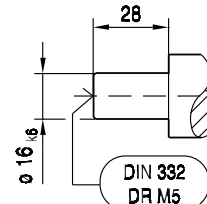


57 024 00 07

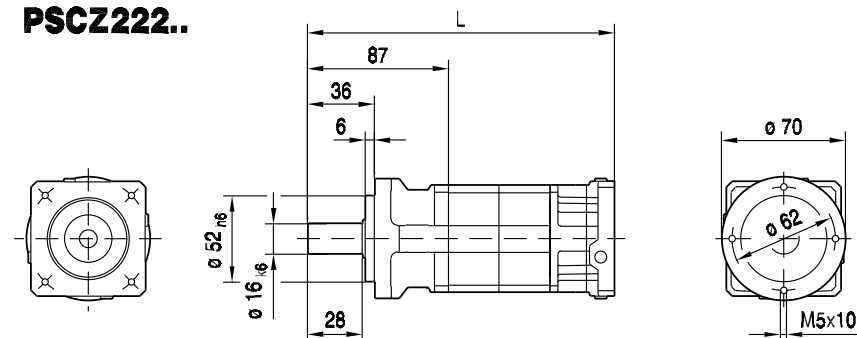
PSC222..



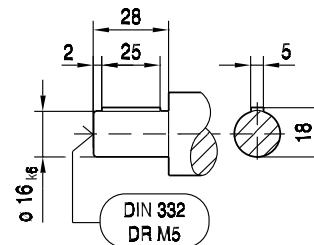
PSC / PSCZ



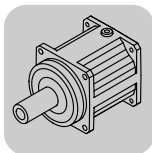
PSCZ222..



PSKC / PSKCZ



(→ 53)	L	B5	C5	E5	F5	G5	S5	Z5	L1	P	P3	D1
EPH01/01	194	40	13	63	4.0	73	M4	38	33	0	39	9,11
EPH01/03	194	50	13	60	4.0	73	M4	38	33	0	39	9,11
EPH02/04	194	50	13	70	4.0	73	M5	38	34	0	39	8,9,10,11,12,14
EPH02/05	194	50	13	80	4.0	73	M4	38	34	0	39	8,9,10,11,12,14
EPH02/08	194	60	13	75	4.0	73	M5	38	34	0	39	8,9,10,11,12,14
EPH03/03	203	50	20	60	3.5	90	M4	47	30	0	47	8,9,10,11,12,14
EPH03/04	203	50	20	70	3.5	90	M5	47	30	0	47	8,9,10,11,12,14
EPH03/05	203	50	20	80	3.5	90	M4	47	30	0	47	8,9,10,11,12,14
EPH03/06	203	50	20	95	3.5	90	M6	47	30	0	47	8,9,10,11,12,14
EPH03/07	203	50	20	100	3.5	90	M6	47	30	0	47	8,9,10,11,12,14
EPH03/08	203	60	20	75	3.5	90	M5	47	30	0	47	8,9,10,11,12,14
EPH03/09	203	60	20	90	3.5	90	M5	47	30	0	47	8,9,10,11,12,14
EPH03/10	203	70	20	85	3.5	90	M6	47	30	0	47	8,9,10,11,12,14
EPH03/11	203	70	20	90	3.5	90	M5	47	30	0	47	8,9,10,11,12,14
EPH03/12	203	70	20	90	3.5	90	M6	47	30	0	47	8,9,10,11,12,14
EPH03/13	203	80	20	100	3.5	90	M6	47	30	0	47	8,9,10,11,12,14
EPH03/14	203	95	16	115	4.0	105	M8	47	30	0	55	8,9,10,11,12,14
EPH04/03	212	50	20	60	3.5	90	M4	56	41	0	47	11,12,14,16,19
EPH04/04	212	50	20	70	3.5	90	M5	56	41	0	47	11,12,14,16,19
EPH04/05	212	50	20	80	3.5	90	M4	56	41	0	47	11,12,14,16,19
EPH04/06	212	50	20	95	3.5	90	M6	56	41	0	47	11,12,14,16,19
EPH04/07	212	50	20	100	3.5	90	M6	56	41	0	47	11,12,14,16,19
EPH04/08	212	60	20	75	3.5	90	M5	56	41	0	47	11,12,14,16,19
EPH04/09	212	60	20	90	3.5	90	M5	56	41	0	47	11,12,14,16,19
EPH04/10	212	70	20	85	3.5	90	M6	56	41	0	47	11,12,14,16,19
EPH04/11	212	70	20	90	3.5	90	M5	56	41	0	47	11,12,14,16,19
EPH04/12	212	70	20	90	3.5	90	M6	56	41	0	47	11,12,14,16,19
EPH04/13	212	80	20	100	3.5	90	M6	56	41	0	47	11,12,14,16,19
EPH04/14	212	95	16	115	4.0	105	M8	56	41	0	55	11,12,14,16,19
EPH04/15	212	95	16	130	4.0	115	M8	56	41	0	60	11,12,14,16,19

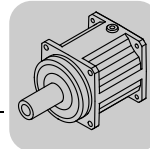

9.3 PS.C321 / 322 EPH [Nm]

EPH	i	n_{epk} [rpm]	η [%]	M1;M3;M5-6			M2			M4			φ [°]
				a_0	a_1	a_2	a_0	a_1	a_2	a_0	a_1	a_2	
PSC321 	3	6500	99	201.00	-0.184	0	235.00	-0.189	0	218.00	-0.218	0	-
	5	6500	99	281.00	-0.296	0	289.00	-0.308	0	299.00	-0.333	0	-
	7	6500	99	281.00	-0.340	0	286.00	-0.348	0	289.00	-0.365	0	-
	10	6500	99	262.00	-0.383	0	267.00	-0.389	0	264.00	-0.395	0	-
PSC322 	15	6500	98	323.00	-1.023	0	325.00	-1.035	0	329.00	-1.062	0	-
	21	6500	98	336.00	-1.223	0	338.00	-1.231	0	341.00	-1.259	0	-
	25	6500	98	588.00	-2.956	0	595.00	-3.018	0	598.00	-3.056	0	-
	30	6500	98	346.00	-1.510	0	344.00	-1.505	0	347.00	-1.532	0	-
	35	6500	98	613.00	-3.568	0	618.00	-3.620	0	622.00	-3.659	0	-
	49	6500	98	790.00	-6.356	0	797.00	-6.459	0	800.00	-6.500	0	-
	50	6500	98	2059.0	-21.651	0	2067.0	-22.218	0	2071.0	-22.312	0	-
	70	6500	98	824.00	-8.055	0	830.00	-8.143	0	832.00	-8.186	0	-
	100	6500	98	1016.0	-14.093	0	1024.0	-14.259	0	1025.0	-14.301	0	-

EPH04									
	i	M_{amax} [Nm]	M_{apk} [Nm]	$M_{aNotaus}$ [Nm]	n_{ak} [rpm]	J_G $10^{-4}kgm^2$	c_T PSC [Nm/°]	F_{Ramax} PSC [N]	F_{Rapk} PSC [N]
PSC321 	3	62	86	129	633	1.3	8.99	1710	4000
	5	74	91	136	300	0.97	10.2	2030	4000
	7	69	85	128	329	0.89	10.0	2270	4000
	10	66	81	122	360	0.84	7.97	2560	4000
PSC322 	15	62	86	129	467	0.96	8.2	2930	4000
	21	62	86	129	333	0.88	8.1	3280	4000
	25	74	91	136	280	0.94	9.0	3470	4000
	30	62	86	129	233	0.84	7.7	3690	4000
	35	74	91	136	200	0.87	8.9	3880	4000
	49	69	85	128	143	0.87	8.6	4000	4000
	50	74	91	136	140	0.83	8.6	4000	4000
	70	69	85	128	100	0.83	8.4	4000	4000
	100	66	81	122	70	0.83	7.4	4000	4000

EPH05									
	i	M_{amax} [Nm]	M_{apk} [Nm]	$M_{aNotaus}$ [Nm]	n_{ak} [rpm]	J_G $10^{-4}kgm^2$	c_T PSC [Nm/°]	F_{Ramax} PSC [N]	F_{Rapk} PSC [N]
PSC321 	3	62	86	129	633	3.1	8.99	1710	4000
	5	74	91	136	300	2.8	10.2	2030	4000
	7	69	85	128	329	2.7	10.0	2270	4000
	10	66	81	122	360	2.6	7.97	2560	4000
PSC322 	15	62	86	129	467	2.8	8.2	2930	4000
	21	62	86	129	333	2.7	8.1	3280	4000
	25	74	91	136	280	2.7	9.0	3470	4000
	30	62	86	129	233	2.6	7.7	3690	4000
	35	74	91	136	200	2.7	8.9	3880	4000
	49	69	85	128	143	2.7	8.6	4000	4000
	50	74	91	136	140	2.6	8.6	4000	4000
	70	69	85	128	100	2.6	8.4	4000	4000
	100	66	81	122	70	2.6	7.4	4000	4000

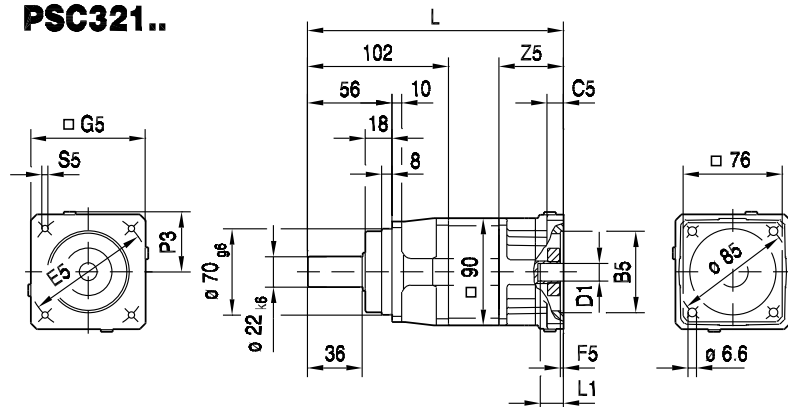
m [kg]		EPH	
	s	04	05
PSC321		4.4	5.7
PSC322		5.8	7.1



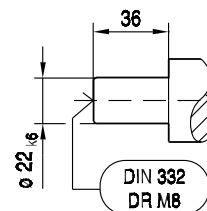
9.4 PS.C321 / 322 EPH [mm]

PSC321..

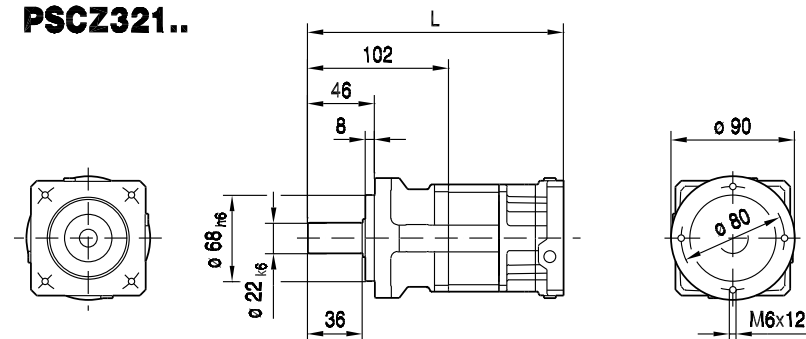
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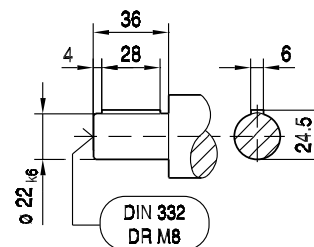
PSC / PSCZ



PSCZ321..

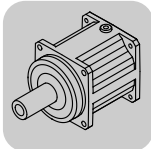


PSKC / PSKCZ

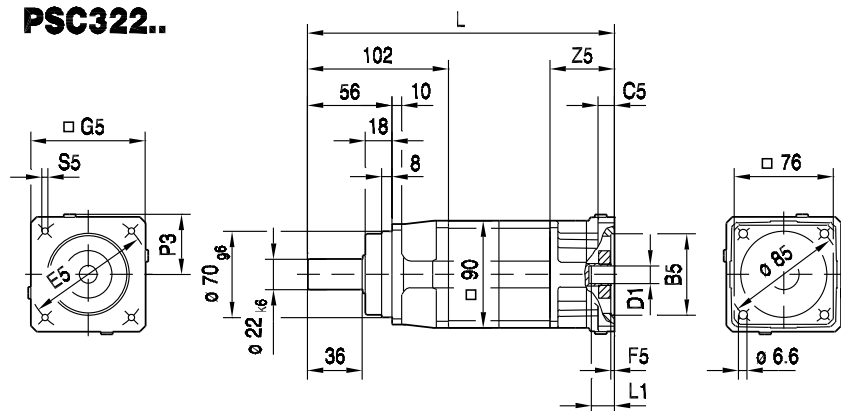
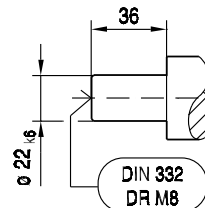
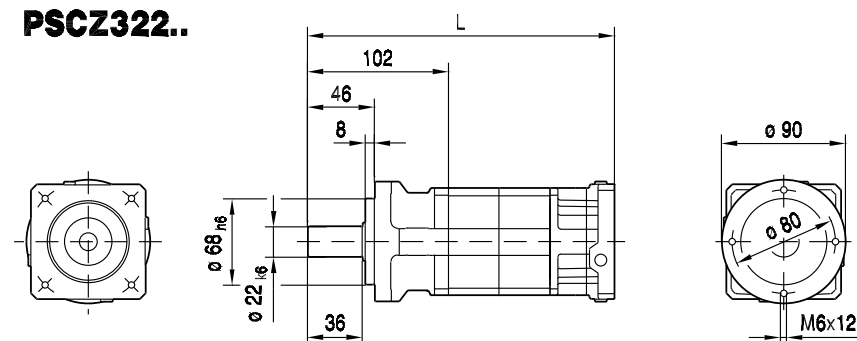
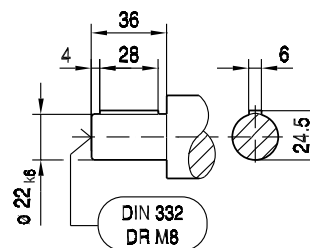


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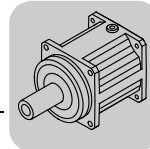
(→ 53)	L	B5	C5	E5	F5	G5	S5	Z5	L1	P	P3	D1
EPH04/03	195	50	20	60	3.5	90	M4	51	41	0	47	11,12,14,16,19
EPH04/04	195	50	20	70	3.5	90	M5	51	41	0	47	11,12,14,16,19
EPH04/05	195	50	20	80	3.5	90	M4	51	41	0	47	11,12,14,16,19
EPH04/06	195	50	20	95	3.5	90	M6	51	41	0	47	11,12,14,16,19
EPH04/07	195	50	20	100	3.5	90	M6	51	41	0	47	11,12,14,16,19
EPH04/08	195	60	20	75	3.5	90	M5	51	41	0	47	11,12,14,16,19
EPH04/09	195	60	20	90	3.5	90	M5	51	41	0	47	11,12,14,16,19
EPH04/10	195	70	20	85	3.5	90	M6	51	41	0	47	11,12,14,16,19
EPH04/11	195	70	20	90	3.5	90	M5	51	41	0	47	11,12,14,16,19
EPH04/12	195	70	20	90	3.5	90	M6	51	41	0	47	11,12,14,16,19
EPH04/13	195	80	20	100	3.5	90	M6	51	41	0	47	11,12,14,16,19
EPH04/14	195	95	16	115	4.0	105	M8	51	41	0	55	11,12,14,16,19
EPH04/15	195	95	16	130	4.0	115	M8	51	41	0	60	11,12,14,16,19
EPH05/14	211	95	16	115	5.0	120	M8	67	52	0	62	14,16,17,18,19,24
EPH05/15	211	95	16	130	5.0	120	M8	67	52	0	62	14,16,17,18,19,24
EPH05/16	211	110	16	130	5.0	120	M8	67	52	0	62	14,16,17,18,19,24
EPH05/17	211	110	16	145	5.0	120	M8	67	52	0	62	14,16,17,18,19,24
EPH05/18	211	110	20	165	5.0	140	M10	67	52	0	72	14,16,17,18,19,24
EPH05/20	211	130	20	165	5.0	140	M10	67	52	0	72	14,16,17,18,19,24



57 026 00 07

PSC322..**PSC / PSCZ****PSCZ322..****PSKC / PSKCZ**

(→ 53)	L	B5	C5	E5	F5	G5	S5	Z5	L1	P	P3	D1
EPH04/03	237	50	20	60	3.5	90	M4	51	41	0	47	11,12,14,16,19
EPH04/04	237	50	20	70	3.5	90	M5	51	41	0	47	11,12,14,16,19
EPH04/05	237	50	20	80	3.5	90	M4	51	41	0	47	11,12,14,16,19
EPH04/06	237	50	20	95	3.5	90	M6	51	41	0	47	11,12,14,16,19
EPH04/07	237	50	20	100	3.5	90	M6	51	41	0	47	11,12,14,16,19
EPH04/08	237	60	20	75	3.5	90	M5	51	41	0	47	11,12,14,16,19
EPH04/09	237	60	20	90	3.5	90	M5	51	41	0	47	11,12,14,16,19
EPH04/10	237	70	20	85	3.5	90	M6	51	41	0	47	11,12,14,16,19
EPH04/11	237	70	20	90	3.5	90	M5	51	41	0	47	11,12,14,16,19
EPH04/12	237	70	20	90	3.5	90	M6	51	41	0	47	11,12,14,16,19
EPH04/13	237	80	20	100	3.5	90	M6	51	41	0	47	11,12,14,16,19
EPH04/14	237	95	16	115	4.0	105	M8	51	41	0	55	11,12,14,16,19
EPH04/15	237	95	16	130	4.0	115	M8	51	41	0	60	11,12,14,16,19
EPH05/14	253	95	16	115	5.0	120	M8	67	52	0	62	14,16,17,18,19,24
EPH05/15	253	95	16	130	5.0	120	M8	67	52	0	62	14,16,17,18,19,24
EPH05/16	253	110	16	130	5.0	120	M8	67	52	0	62	14,16,17,18,19,24
EPH05/17	253	110	16	145	5.0	120	M8	67	52	0	62	14,16,17,18,19,24
EPH05/18	253	110	20	165	5.0	140	M10	67	52	0	72	14,16,17,18,19,24
EPH05/20	253	130	20	165	5.0	140	M10	67	52	0	72	14,16,17,18,19,24

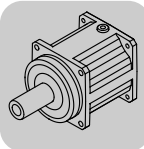


9.5 PS.C521 / 522 EPH [Nm]

EPH	i	n _{epk} [rpm]	η [%]	M1;M3;M5-6			M2			M4			φ [°]
				a ₀	a ₁	a ₂	a ₀	a ₁	a ₂	a ₀	a ₁	a ₂	
PSC521  1	3	6000	99	439.00	-0.443	0	458.00	-0.485	0	463.00	-0.513	0	-
	5	6000	99	642.00	-0.722	0	659.00	-0.754	0	669.00	-0.799	0	-
	7	6000	99	693.00	-0.871	0	708.00	-0.898	0	709.00	-0.935	0	-
	10	6000	99	732.00	-1.062	0	667.00	-0.977	0	656.00	-0.992	0	-
PSC522  2	15	6000	98	703.00	-2.454	0	706.00	-2.478	0	714.00	-2.542	0	-
	21	6000	98	739.00	-2.881	0	738.00	-2.884	0	745.00	-2.949	0	-
	25	6000	98	1333.0	-7.375	0	1344.0	-7.509	0	1354.0	-7.611	0	-
	30	6000	98	754.00	-3.406	0	749.00	-3.389	0	756.00	-3.456	0	-
	35	6000	98	1419.0	-8.819	0	1428.0	-8.934	0	1437.0	-9.045	0	-
	49	6000	98	1968.0	-16.894	0	1984.0	-17.160	0	1991.0	-17.275	0	-
	50	6000	98	4428.0	-51.528	0	4455.0	-53.090	0	4465.0	-53.308	0	-
	70	6000	98	2009.0	-20.188	0	2013.0	-20.327	0	2017.0	-20.427	0	-
	100	6000	98	2795.0	-39.812	0	2574.0	-36.874	0	2578.0	-36.994	0	-

EPH04									
	i	M _{amax} [Nm]	M _{apk} [Nm]	M _{aNotaus} [Nm]	n _{ak} [rpm]	J _G 10 ⁻⁴ kgm ²	c _T PSC [Nm/°]	F _{Ramax} PSC [N]	F _{Rapk} PSC [N]
PSC521  1	3	117	117	176	1930	2.9	25.4	2900	6750
	5	181	196	293	360	1.6	27.4	3440	6750
	7	169	209	313	414	1.2	25.1	3850	6750
	10	161	199	298	440	0.98	20.7	4330	6750
PSC522  2	15	147	203	305	467	1.6	20.9	4960	6750
	21	147	203	305	333	1.1	20.3	5550	6750
	25	181	223	334	280	1.6	23.2	5880	6750
	30	147	203	305	233	0.97	19.1	6250	6750
	35	181	223	334	200	1.1	22.7	6580	6750
	49	169	209	313	143	1.1	22.3	6750	6750
	50	181	223	334	140	0.95	21.7	6750	6750
	70	169	209	313	100	0.95	21.5	6750	6750
	100	161	199	298	70	0.95	19.1	6750	6750

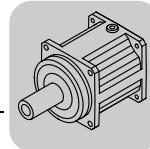
EPH05									
	i	M _{amax} [Nm]	M _{apk} [Nm]	M _{aNotaus} [Nm]	n _{ak} [rpm]	J _G 10 ⁻⁴ kgm ²	c _T PSC [Nm/°]	F _{Ramax} PSC [N]	F _{Rapk} PSC [N]
PSC521  1	3	147	203	305	900	4.7	25.4	2900	6750
	5	181	223	334	360	3.4	27.4	3440	6750
	7	169	209	313	414	3.0	25.1	3850	6750
	10	161	199	298	440	2.8	20.7	4330	6750
PSC522  2	15	147	203	305	467	3.4	20.9	4960	6750
	21	147	203	305	333	2.9	20.3	5550	6750
	25	181	223	334	280	3.4	23.2	5880	6750
	30	147	203	305	233	2.8	19.1	6250	6750
	35	181	223	334	200	2.9	22.7	6580	6750
	49	169	209	313	143	2.9	22.3	6750	6750
	50	181	223	334	140	2.7	21.7	6750	6750
	70	169	209	313	100	2.7	21.5	6750	6750
	100	161	199	298	70	2.7	19.1	6750	6750



EPH06									
	i	M _{amax} [Nm]	M _{apk} [Nm]	M _{aNotaus} [Nm]	n _{ak} [rpm]	J _G 10 ⁻⁴ kgm ²	c _T PSC [Nm/°]	F _{Ramax} PSC [N]	F _{Rapk} PSC [N]
PSC521  1	3	147	203	305	900	7.7	25.4	2900	6750
	5	181	223	334	360	6.4	27.4	3440	6750
	7	169	209	313	414	6.0	25.1	3850	6750
	10	161	199	298	440	5.8	20.7	4330	6750
PSC522  2	15	147	203	305	467	6.4	20.9	4960	6750
	21	147	203	305	333	5.9	20.3	5550	6750
	25	181	223	334	280	6.3	23.2	5880	6750
	30	147	203	305	233	5.8	19.1	6250	6750
	35	181	223	334	200	5.9	22.7	6580	6750
	49	169	209	313	143	5.9	22.3	6750	6750
	50	181	223	334	140	5.7	21.7	6750	6750
	70	169	209	313	100	5.7	21.5	6750	6750
	100	161	199	298	70	5.7	19.1	6750	6750

EPH07									
	i	M _{amax} [Nm]	M _{apk} [Nm]	M _{aNotaus} [Nm]	n _{ak} [rpm]	J _G 10 ⁻⁴ kgm ²	c _T PSC [Nm/°]	F _{Ramax} PSC [N]	F _{Rapk} PSC [N]
PSC521  1	3	147	203	305	900	7.9	25.4	2900	6750
	5	181	223	334	360	6.7	27.4	3440	6750
	7	169	209	313	414	6.2	25.1	3850	6750
	10	161	199	298	440	6.1	20.7	4330	6750
PSC522  2	15	147	203	305	467	6.7	20.9	4960	6750
	21	147	203	305	333	6.2	20.3	5550	6750
	25	181	223	334	280	6.6	23.2	5880	6750
	30	147	203	305	233	6.0	19.1	6250	6750
	35	181	223	334	200	6.2	22.7	6580	6750
	49	169	209	313	143	6.2	22.3	6750	6750
	50	181	223	334	140	6.0	21.7	6750	6750
	70	169	209	313	100	6.0	21.5	6750	6750
	100	161	199	298	70	6.0	19.1	6750	6750

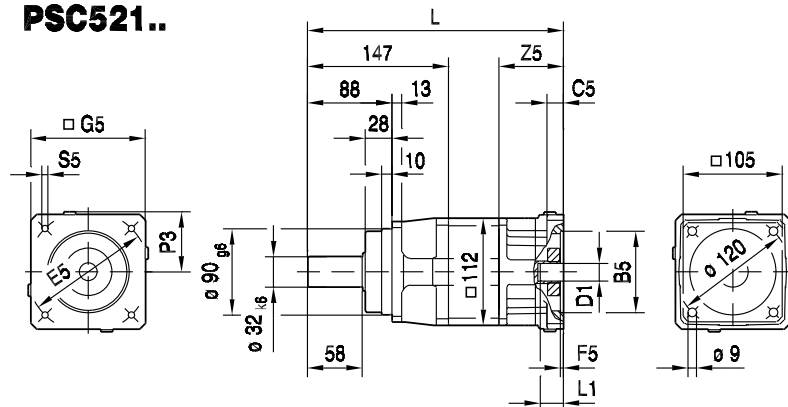
m [kg]		EPH				
	s	04	05	06	07	
PSC521	 1	7.7	9.0	11	11	
PSC522	 2	11	12	14	14	



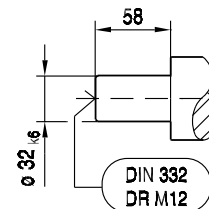
9.6 PS.C521 / 522 EPH [mm]

PSC521..

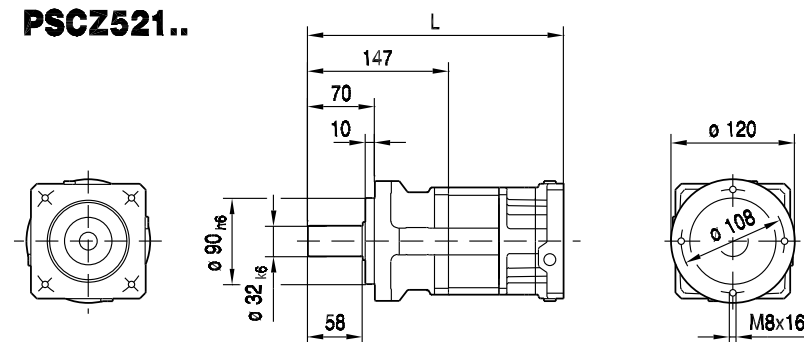
57 027 00 07



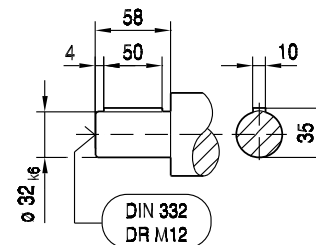
PSC / PSCZ



PSCZ521..

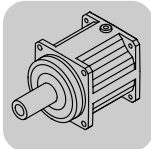


PSKC / PSKCZ

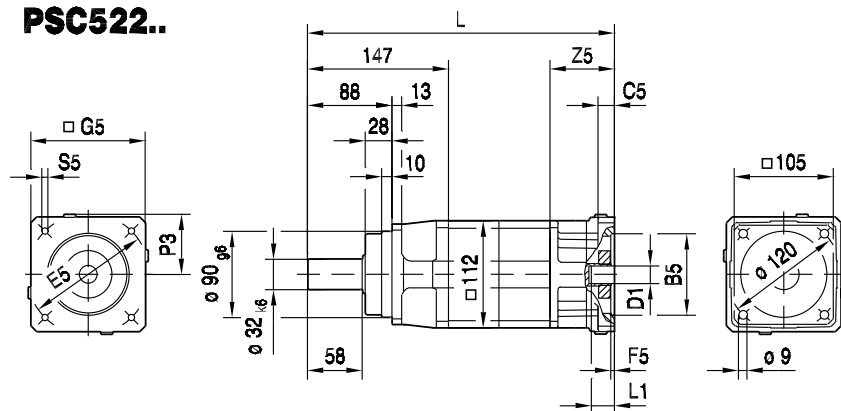
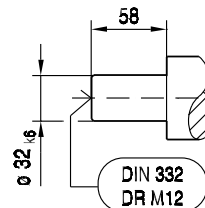
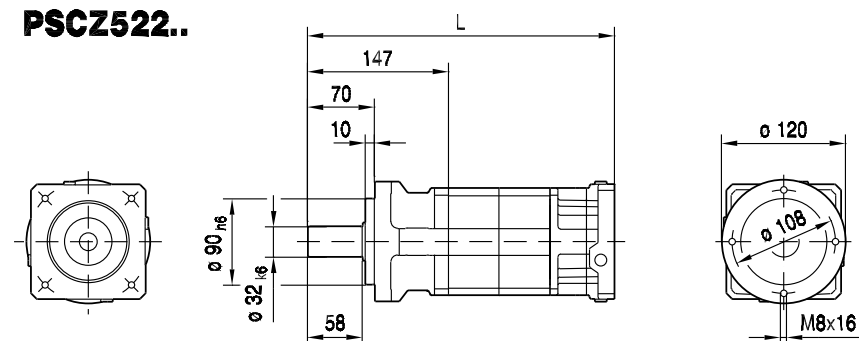
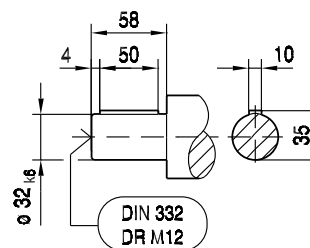


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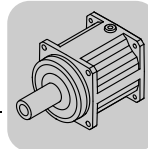
(→ 53)	L	B5	C5	E5	F5	G5	S5	Z5	L1	P	P3	D1
EPH04/03	247	50	20	60	3.5	90	M4	46	41	0	47	11,12,14,16,19
EPH04/04	247	50	20	70	3.5	90	M5	46	41	0	47	11,12,14,16,19
EPH04/05	247	50	20	80	3.5	90	M4	46	41	0	47	11,12,14,16,19
EPH04/06	247	50	20	95	3.5	90	M6	46	41	0	47	11,12,14,16,19
EPH04/07	247	50	20	100	3.5	90	M6	46	41	0	47	11,12,14,16,19
EPH04/08	247	60	20	75	3.5	90	M5	46	41	0	47	11,12,14,16,19
EPH04/09	247	60	20	90	3.5	90	M5	46	41	0	47	11,12,14,16,19
EPH04/10	247	70	20	85	3.5	90	M6	46	41	0	47	11,12,14,16,19
EPH04/11	247	70	20	90	3.5	90	M5	46	41	0	47	11,12,14,16,19
EPH04/12	247	70	20	90	3.5	90	M6	46	41	0	47	11,12,14,16,19
EPH04/13	247	80	20	100	3.5	90	M6	46	41	0	47	11,12,14,16,19
EPH04/14	247	95	16	115	4.0	105	M8	46	41	0	55	11,12,14,16,19
EPH04/15	247	95	16	130	4.0	115	M8	46	41	0	60	11,12,14,16,19
EPH05/14	263	95	16	115	5.0	120	M8	62	52	0	62	14,16,17,18,19,24
EPH05/15	263	95	16	130	5.0	120	M8	62	52	0	62	14,16,17,18,19,24
EPH05/16	263	110	16	130	5.0	120	M8	62	52	0	62	14,16,17,18,19,24
EPH05/17	263	110	16	145	5.0	120	M8	62	52	0	62	14,16,17,18,19,24
EPH05/18	263	110	20	165	5.0	140	M10	62	52	0	72	14,16,17,18,19,24
EPH05/20	263	130	20	165	5.0	140	M10	62	52	0	72	14,16,17,18,19,24
EPH06/19	298	115	24	200	5.0	174	M12	97	82	0	89	35
EPH07/20	278	130	24	165	5.0	155	M10	77	62	0	80	22,24,28,32
EPH07/21	278	130	24	215	5.0	190	M12	77	62	0	97	22,24,28,32
EPH07/22	278	180	24	215	5.0	190	M12	77	62	0	97	22,24,28,32



57 028 00 07

PSC522..**PSC / PSCZ****PSCZ522..****PSKC / PSKCZ**

(→ 53)	L	B5	C5	E5	F5	G5	S5	Z5	L1	P	P3	D1
EPH04/03	300	50	20	60	3.5	90	M4	46	41	0	47	11,12,14,16,19
EPH04/04	300	50	20	70	3.5	90	M5	46	41	0	47	11,12,14,16,19
EPH04/05	300	50	20	80	3.5	90	M4	46	41	0	47	11,12,14,16,19
EPH04/06	300	50	20	95	3.5	90	M6	46	41	0	47	11,12,14,16,19
EPH04/07	300	50	20	100	3.5	90	M6	46	41	0	47	11,12,14,16,19
EPH04/08	300	60	20	75	3.5	90	M5	46	41	0	47	11,12,14,16,19
EPH04/09	300	60	20	90	3.5	90	M5	46	41	0	47	11,12,14,16,19
EPH04/10	300	70	20	85	3.5	90	M6	46	41	0	47	11,12,14,16,19
EPH04/11	300	70	20	90	3.5	90	M5	46	41	0	47	11,12,14,16,19
EPH04/12	300	70	20	90	3.5	90	M6	46	41	0	47	11,12,14,16,19
EPH04/13	300	80	20	100	3.5	90	M6	46	41	0	47	11,12,14,16,19
EPH04/14	300	95	16	115	4.0	105	M8	46	41	0	55	11,12,14,16,19
EPH04/15	300	95	16	130	4.0	115	M8	46	41	0	60	11,12,14,16,19
EPH05/14	316	95	16	115	5.0	120	M8	62	52	0	62	14,16,17,18,19,24
EPH05/15	316	95	16	130	5.0	120	M8	62	52	0	62	14,16,17,18,19,24
EPH05/16	316	110	16	130	5.0	120	M8	62	52	0	62	14,16,17,18,19,24
EPH05/17	316	110	16	145	5.0	120	M8	62	52	0	62	14,16,17,18,19,24
EPH05/18	316	110	20	165	5.0	140	M10	62	52	0	72	14,16,17,18,19,24
EPH05/20	316	130	20	165	5.0	140	M10	62	52	0	72	14,16,17,18,19,24
EPH06/19	351	115	24	200	5.0	174	M12	97	82	0	89	35
EPH07/20	331	130	24	165	5.0	155	M10	77	62	0	80	22,24,28,32
EPH07/21	331	130	24	215	5.0	190	M12	77	62	0	97	22,24,28,32
EPH07/22	331	180	24	215	5.0	190	M12	77	62	0	97	22,24,28,32



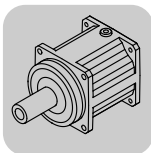
9.7 PS.C621 / 622 EPH [Nm]

EPH	i	n _{epk} [rpm]	η [%]	M1;M3;M5-6			M2			M4			φ [°]
				a ₀	a ₁	a ₂	a ₀	a ₁	a ₂	a ₀	a ₁	a ₂	
PSC621  1	5	5000	99	1100.0	-1.463	0	1130.0	-1.529	0	1110.0	-1.581	0	-
	7	5000	99	1184.0	-1.765	0	1212.0	-1.822	0	1193.0	-1.886	0	-
	10	5000	99	1211.0	-2.132	0	1232.0	-2.168	0	1248.0	-2.324	0	-
PSC622  2	25	5000	98	2230.0	-14.715	0	2467.0	-16.770	0	2473.0	-16.936	0	-
	35	5000	98	2417.0	-18.197	0	2617.0	-20.145	0	2635.0	-20.420	0	-
	49	5000	98	3344.0	-34.752	0	3623.0	-38.323	0	3629.0	-38.534	0	-
	50	5000	98	6984.0	-97.392	0	7298.0	-105.85	0	7314.0	-106.30	0	-
	70	5000	98	3525.0	-43.318	0	3854.0	-48.148	0	3869.0	-48.492	0	-
	100	5000	98	4583.0	-79.855	0	5025.0	-88.798	0	5036.0	-89.161	0	-

EPH05	i	M _{amax} [Nm]	M _{apk} [Nm]	M _{aNotaus} [Nm]	n _{ak} [rpm]	J _G 10 ⁻⁴ kgm ²	c _T PSC [Nm/°]	F _{Ramax} PSC [N]	F _{Rapk} PSC [N]
PSC621  1	5	347	427	640	820	4.8	56.1	5390	11000
	7	323	398	597	929	3.8	52.2	6030	11000
	10	308	380	569	700	3.2	44.3	6790	11000
PSC622  2	25	347	427	640	280	4.4	51.2	9220	11000
	35	347	427	640	200	3.5	50.6	10300	11000
	49	323	398	597	143	3.5	47.8	11000	11000
	50	347	427	640	140	3.1	48.9	11000	11000
	70	323	398	597	100	3.1	46.6	11000	11000
	100	308	380	569	70	3.0	40.8	11000	11000

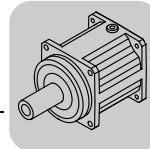
EPH06	i	M _{amax} [Nm]	M _{apk} [Nm]	M _{aNotaus} [Nm]	n _{ak} [rpm]	J _G 10 ⁻⁴ kgm ²	c _T PSC [Nm/°]	F _{Ramax} PSC [N]	F _{Rapk} PSC [N]
PSC621  1	5	347	427	640	820	7.8	56.1	5390	11000
	7	323	398	597	929	6.7	52.2	6030	11000
	10	308	380	569	700	6.2	44.3	6790	11000
PSC622  2	25	347	427	640	280	7.4	51.2	9220	11000
	35	347	427	640	200	6.5	50.6	10300	11000
	49	323	398	597	143	6.5	47.8	11000	11000
	50	347	427	640	140	6.1	48.9	11000	11000
	70	323	398	597	100	6.0	46.6	11000	11000
	100	308	380	569	70	6.0	40.8	11000	11000

EPH07	i	M _{amax} [Nm]	M _{apk} [Nm]	M _{aNotaus} [Nm]	n _{ak} [rpm]	J _G 10 ⁻⁴ kgm ²	c _T PSC [Nm/°]	F _{Ramax} PSC [N]	F _{Rapk} PSC [N]
PSC621  1	5	347	427	640	820	8.1	56.1	5390	11000
	7	323	398	597	929	7.0	52.2	6030	11000
	10	308	380	569	700	6.4	44.3	6790	11000
PSC622  2	25	347	427	640	280	7.7	51.2	9220	11000
	35	347	427	640	200	6.8	50.6	10300	11000
	49	323	398	597	143	6.8	47.8	11000	11000
	50	347	427	640	140	6.3	48.9	11000	11000
	70	323	398	597	100	6.3	46.6	11000	11000
	100	308	380	569	70	6.3	40.8	11000	11000



PS.C..EPH
PS.C621 / 622 EPH [Nm]

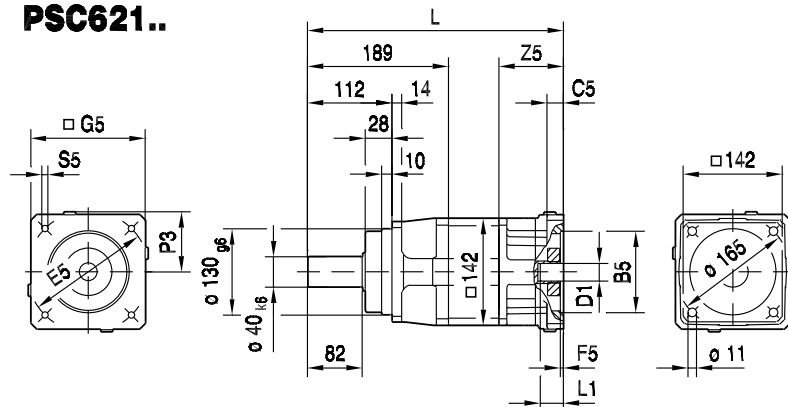
EPH08									
	i	M _{amax} [Nm]	M _{apk} [Nm]	M _{aNotaus} [Nm]	n _{ak} [rpm]	J _G 10 ⁻⁴ kgm ²	c _T PSC [Nm/°]	F _{Ramax} PSC [N]	F _{Rapk} PSC [N]
PSC621 1	5	347	427	640	820	15	56.1	5390	11000
	7	323	398	597	929	13	52.2	6030	11000
	10	308	380	569	700	13	44.3	6790	11000
PSC622 2	25	347	427	640	280	14	51.2	9220	11000
	35	347	427	640	200	13	50.6	10300	11000
	49	323	398	597	143	13	47.8	11000	11000
	50	347	427	640	140	13	48.9	11000	11000
	70	323	398	597	100	13	46.6	11000	11000
	100	308	380	569	70	13	40.8	11000	11000
m [kg]		EPH							
	s	05	06	07	08				
PSC621	1	14	15	15	20				
PSC622	2	19	21	21	25				



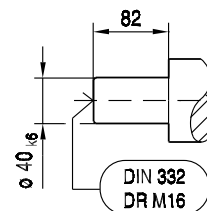
9.8 PS.C621 / 622 EPH [mm]

PSC621..

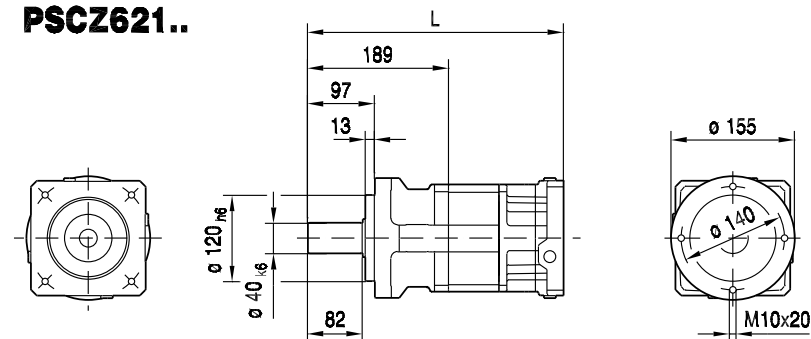
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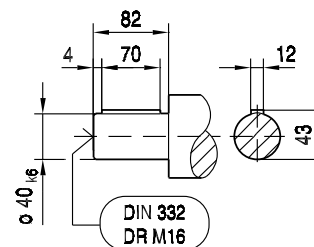
PSC / PSCZ



PSCZ621..

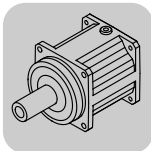


PSKC / PSKCZ



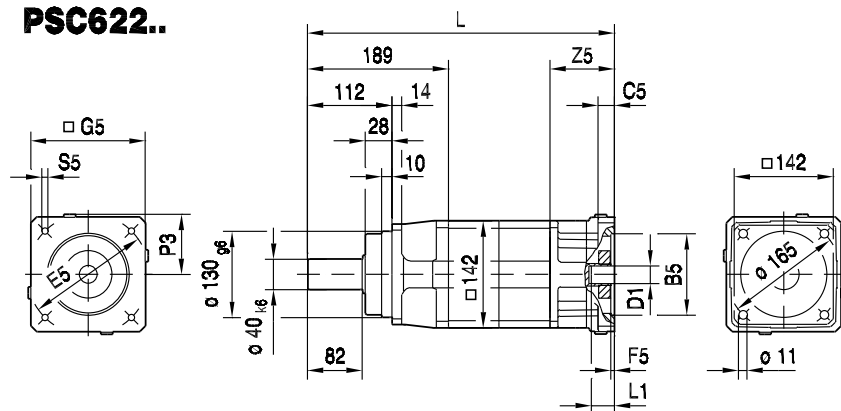
9

(→ 53)	L	B5	C5	E5	F5	G5	S5	Z5	L1	P	P3	D1
EPH05/14	302	95	16	115	5.0	120	M8	54	52	0	62	14,16,17,18,19,24
EPH05/15	302	95	16	130	5.0	120	M8	54	52	0	62	14,16,17,18,19,24
EPH05/16	302	110	16	130	5.0	120	M8	54	52	0	62	14,16,17,18,19,24
EPH05/17	302	110	16	145	5.0	120	M8	54	52	0	62	14,16,17,18,19,24
EPH05/18	302	110	20	165	5.0	140	M10	54	52	0	72	14,16,17,18,19,24
EPH05/20	302	130	20	165	5.0	140	M10	54	52	0	72	14,16,17,18,19,24
EPH06/19	337	115	24	200	5.0	174	M12	89	82	0	89	35
EPH07/20	317	130	24	165	5.0	155	M10	69	62	0	80	22,24,28,32
EPH07/21	317	130	24	215	5.0	190	M12	69	62	0	97	22,24,28,32
EPH07/22	317	180	24	215	5.0	190	M12	69	62	0	97	22,24,28,32
EPH08/22	342	180	24	215	5.0	190	M12	94	82	0	97	32,35,38

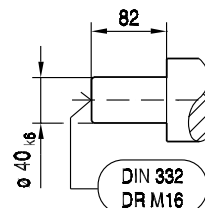


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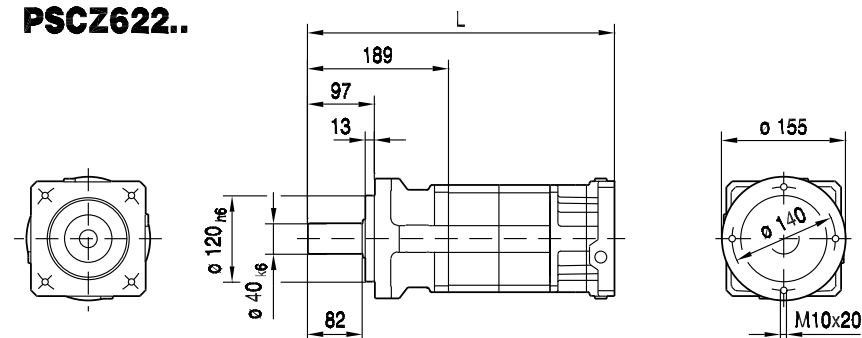
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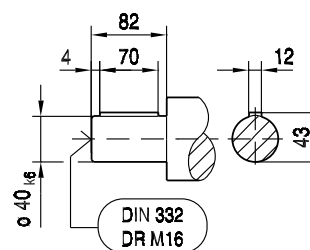
PSC / PSCZ



PSZ622..



PSKC / PSKCZ



(→ 53)	L	B5	C5	E5	F5	G5	S5	Z5	L1	P	P3	D1
EPH05/14	361	95	16	115	5.0	120	M8	54	52	0	62	14,16,17,18,19,24
EPH05/15	361	95	16	130	5.0	120	M8	54	52	0	62	14,16,17,18,19,24
EPH05/16	361	110	16	130	5.0	120	M8	54	52	0	62	14,16,17,18,19,24
EPH05/17	361	110	16	145	5.0	120	M8	54	52	0	62	14,16,17,18,19,24
EPH05/18	361	110	20	165	5.0	140	M10	54	52	0	72	14,16,17,18,19,24
EPH05/20	361	130	20	165	5.0	140	M10	54	52	0	72	14,16,17,18,19,24
EPH06/19	396	115	24	200	5.0	174	M12	89	82	0	89	35
EPH07/20	376	130	24	165	5.0	155	M10	69	62	0	80	22,24,28,32
EPH07/21	376	130	24	215	5.0	190	M12	69	62	0	97	22,24,28,32
EPH07/22	376	180	24	215	5.0	190	M12	69	62	0	97	22,24,28,32
EPH08/22	401	180	24	215	5.0	190	M12	94	82	0	97	32,35,38



10 Main Technical Data of the Servomotors

Key to the technical data

n_N	Rated speed
M_0	Standstill torque (thermal continuous torque at low speeds)
I_0	Standstill current
M_{pk}	Dynamic limit torque
I_{max}	Maximum permitted motor current
M_{0VR}	Standstill torque with forced cooling fan
I_{0VR}	Standstill current with forced cooling fan
J_{mot}	Mass moment of inertia of the motor
J_{bmot}	Mass moment of inertia of the brakemotor
M_{B1}	Standard braking torque
M_{B2}	Reduced braking torque
W_{max1}	Maximum possible braking work with standard braking torque during a maintenance interval
W_{max2}	Maximum possible braking work with reduced braking torque during a maintenance interval
L_1	Inductivity between connection phase and star point
R_1	Resistance between connection phase and star point
$U_{p0 \text{ cold}}$	Internal voltage at 1000 rpm
m_{mot}	Mass of the motor
m_{bmot}	Mass of the brake motor



10.1 Technical data of DFS/CFM motors

Synchronous servomotors with 380 - 500V input system voltage ¹⁾

n_N [rpm]	Motor	M_0 [Nm]	I_0 [A]	M_{pk} [Nm]	I_{max} [A]	M_{0VR} [Nm]	I_{0VR} [A]	J_{mot} [10 ⁻⁴ kgm ²]	J_{bmot} [10 ⁻⁴ kgm ²]	M_{B1} [Nm]	M_{B2} [Nm]	W_{max1} [kJ]	W_{max2} [kJ]
2000	CFM71S	5	2.2	16.5	8.8	7.3	3.2	4.89	6.65	10	5	18	22
	CFM71M	6.5	3	21.5	12	9.4	4.2	6.27	8.03	14	7	15	20
	CFM71L	9.5	4.2	31.4	16.8	13.8	6.1	9.02	10.8	14	10	15	18
	CFM90S	11	4.9	39.6	19.6	16	7.1	17.4	21.2	28	14	17	24
	CFM90M	14.5	6.9	52.2	28	21	10	22.3	26.1	40	20	10.5	19.5
	CFM90L	21	9.9	75.6	40	30.5	14.4	32.1	35.9	40	28	10.5	17
	CFM112S	23.5	10	82.3	40	34	14.5	68.4	84	55	28	32	48
	CFM112M	31	13.5	108.5	54	45	19.6	88.2	104	90	40	18	44
	CFM112L	45	20	157.5	80	65	29	128	143	90	55	18	32
	CFM112H	68	30.5	238.0	122	95	42.5	190	209	90	55	18	32
3000	DFS56M	1	1.65	3.8	6.6	—	—	0.48	0.83	2.5	—	—	—
	DFS56L	2	2.4	7.6	9.6	—	—	0.83	1.18	2.5	—	—	—
	DFS56H	4	2.8	15.2	11.2	—	—	1.53	1.88	5	—	—	—
	CFM71S	5	3.3	16.5	13.2	7.3	4.8	4.89	6.65	10	5	14	20
	CFM71M	6.5	4.3	21.5	17.2	9.4	6.2	6.27	8.03	14	7	11	18
	CFM71L	9.5	6.2	31.4	25	13.8	9	9.02	10.8	14	10	11	14
	CFM90S	11	7.3	39.6	29	16	10.6	17.4	21.2	28	14	10	20
	CFM90M	14.5	10.1	52.2	40	21	14.6	22.3	26.1	40	20	4.5	15
	CFM90L	21	14.4	75.6	58	30.5	21	32.1	35.9	40	28	4.5	10
	CFM112S	23.5	15	82.3	60	34	22	68.4	84	55	28	18	36
	CFM112M	31	20.5	108.5	82	45	30	88.2	104	90	40	7	32
	CFM112L	45	30	157.5	120	65	44	128	143	90	55	7	18
	CFM112H	68	43	238.0	172	95	60	190	209	90	55	7	18
	DFS56M	1	1.65	3.8	6.6	—	—	0.48	0.83	2.5	—	—	—
4500	DFS56L	2	2.4	7.6	9.6	—	—	0.83	1.18	2.5	—	—	—
	DFS56H	4	4	15.2	16	—	—	1.53	1.88	5	—	—	—
	CFM71S	5	4.9	16.5	19.6	7.3	7.2	4.89	6.65	10	5	10	16
	CFM71M	6.5	6.6	21.5	26	9.4	9.6	6.27	8.03	14	7	6	14
	CFM71L	9.5	9.6	31.4	38	13.8	14	9.02	10.8	14	10	6	10
	CFM90S	11	11.1	39.6	44	16	16.2	17.4	21.2	28	14	5	15
	CFM90M	14.5	14.7	52.2	59	21	21.5	22.3	26.1	40	20	3	9
	CFM90L	21	21.6	75.6	86	30.5	31.5	32.1	35.9	40	28	3	5
	CFM112S	23.5	22.5	82.3	90	34	32.5	68.4	84	55	25	11	22
	CFM112M	31	30	108.5	120	45	44	88.2	104	90	40	4	18
	CFM112L	45	46	157.5	184	65	67	128	143	90	55	4	11
	CFM112H	68	66	238.0	264	95	92	190	209	90	55	4	11
	DFS56M	1	1.65	3.8	6.6	—	—	0.48	0.83	2.5	—	—	—
	DFS56L	2	2.75	7.6	11	—	—	0.83	1.18	2.5	—	—	—
6000	DFS56H	4	5.3	15.2	21	—	—	1.53	1.88	5	—	—	—
	CFM71S	5	6.5	16.5	26	7.3	9.5	4.89	6.65	—	—	—	—
	CFM71M	6.5	8.6	21.5	34	9.4	12.5	6.27	8.03	—	—	—	—
	CFM71L	9.5	12.5	31.4	50	13.8	18.2	9.02	10.8	—	—	—	—
	CFM90S	11	14.5	39.6	58	16	21	17.4	21.2	—	—	—	—
	CFM90M	14.5	19.8	52.2	79	21	29	22.3	26.1	—	—	—	—
	CFM90L	21	29.5	75.6	118	30.5	43	32.1	35.9	—	—	—	—
	DFS56M	1	1.65	3.8	6.6	—	—	0.48	0.83	2.5	—	—	—
	DFS56L	2	2.75	7.6	11	—	—	0.83	1.18	2.5	—	—	—
	DFS56H	4	5.3	15.2	21	—	—	1.53	1.88	5	—	—	—

1) Recommended to be used with SEW-EURODRIVE servo controllers.



Synchronous servomotors with 380 - 500V input system voltage ¹⁾

n_N [rpm]	Motor	L_1 [mH]	R_1 [mΩ]	U_{p0} [V/1000 rpm]	m_{mot} [kg]	m_{bmot} [kg]
2000	CFM71S	52	7090	151	9.5	11.8
	CFM71M	36	4440	148	10.8	13.0
	CFM71L	24	2500	152	13.0	15.3
	CFM90S	18	1910	147	15.7	19.6
	CFM90M	12.1	1180	141	17.8	21.6
	CFM90L	8.4	692	146	21.9	26.5
	CFM112S	10	731	155	26.2	31.8
	CFM112M	7.5	453	153	30.5	36.0
	CFM112L	4.6	240	151	39.3	44.9
	CFM112H	2.6	115	147	54.2	59.8
3000	DFS56M	9.7	5700	40	2.8	2.9
	DFS56L	8.8	3700	56	3.5	3.6
	DFS56H	12.7	4500	97	4.8	5.3
	CFM71S	23	3150	101	9.5	11.8
	CFM71M	16	2000	100	10.8	13.0
	CFM71L	11	1120	102	13.0	15.3
	CFM90S	8.1	838	98	15.7	19.6
	CFM90M	5.7	533	96	17.8	21.6
	CFM90L	3.9	324	99	21.9	26.5
	CFM112S	4.6	325	103	26.2	31.8
	CFM112M	3.1	193	99	30.5	36.0
	CFM112L	2	103	101	39.3	44.9
	CFM112H	1.3	57	104	54.2	59.8
4500	DFS56M	9.7	5700	40	2.8	2.9
	DFS56L	8.8	3700	56	3.5	3.6
	DFS56H	6.2	2200	67.5	4.8	5.3
	CFM71S	10	1380	66	9.5	11.8
	CFM71M	6.9	828	64	10.8	13.0
	CFM71L	4.9	446	65	13.0	15.3
	CFM90S	3.45	358	64	15.7	19.6
	CFM90M	2.65	249	65	17.8	21.6
	CFM90L	1.73	148	66	21.9	26.5
	CFM112S	2	149	69	26.2	31.8
	CFM112M	1.5	92	68	30.5	36.0
	CFM112L	0.85	44	66	39.3	44.9
	CFM112H	0.54	24	67	54.2	59.8
6000	DFS56M	9.70	5700	40	2.8	2.9
	DFS56L	6.80	2800	49	3.5	3.6
	DFS56H	3.50	1200	50.5	4.8	5.3
	CFM71S	5.75	780	50	9.5	-
	CFM71M	3.93	493	49	10.8	-
	CFM71L	2.68	277	50	13.0	-
	CFM90S	2.03	212	49	15.7	-
	CFM90M	1.48	136	48	17.8	-
	CFM90L	0.93	77	48	21.9	-

1) Recommended to be used with SEW-EURODRIVE servo controllers.



10.2 Technical data of CMP motors

n_N [rpm]	Motor	M_0 [Nm]	I_0 [A]	M_{pk} [Nm]	I_{max} [A]	M_{0VR} [Nm]	I_{0VR} [A]	J_{mot} [kgcm ²]	J_{bmot}	M_{B1} [Nm]	M_{B2}	L_1 [mH]	R_1 Ω	$U_{p0 \text{ cold}}$ [V]
3000	CMP40S	0.5	1.2	1.9	6.1	-	-	0.1	0.13	0.95	--	23	11.94	27.5
	CMP40M	0.8	0.95	3.8	6.0	-	-	0.15	0.18	0.95	--	45.5	19.92	56
	CMP50S	1.3	0.96	5.2	5.1	1.7	1.25	0.42	0.48	3.1	4.3	71	22.49	86
	CMP50M	2.4	1.68	10.3	9.6	3.5	2.45	0.67	0.73	4.3	3.1	38.5	9.98	90
	CMP50L	3.3	2.2	15.4	13.6	4.8	3.2	0.92	0.99	4.3	3.1	30.5	7.41	98
	CMP63S	2.9	2.15	11.1	12.9	4	3	1.15	1.49	7	9.3	36.5	6.79	90
	CMP63M	5.3	3.6	21.4	21.6	7.5	5.1	1.92	2.26	9.3	7	22	3.57	100
	CMP63L	7.1	4.95	30.4	29.7	10.3	7.2	2.69	3.03	9.3	7	14.2	2.07	100
4500	CMP40S	0.5	1.2	1.9	6.1	-	-	0.1	0.13	0.85	--	23	11.94	27.5
	CMP40M	0.8	0.95	3.8	6.0	-	-	0.15	0.18	0.95	--	45.5	19.92	56
	CMP50S	1.3	1.32	5.2	7.0	1.7	1.7	0.42	0.48	3.1	4.3	37	11.6	62
	CMP50M	2.4	2.3	10.3	13.1	3.5	3.35	0.67	0.73	4.3	3.1	20.5	5.29	66
	CMP50L	3.3	3.15	15.4	19.5	4.8	4.6	0.92	0.99	4.3	3.1	14.6	3.56	68
	CMP63S	2.9	3.05	11.1	18.3	4	4.2	1.15	1.49	7	9.3	18.3	3.34	64
	CMP63M	5.3	5.4	21.4	32.4	7.5	7.6	1.92	2.26	9.3	7	9.8	1.49	67
	CMP63L	7.1	6.9	30.4	41.4	10.3	10	2.69	3.03	9.3	7	7.2	1.07	71
6000	CMP40S	0.5	1.2	1.9	6.1	-	-	0.1	0.13	0.95	--	23	11.94	27.5
	CMP40M	0.8	1.1	3.8	6.9	-	-	0.15	0.18	0.95	--	34	14.95	48.5
	CMP50S	1.3	1.7	5.2	9.0	1.7	2.2	0.42	0.48	3.1	4.3	22.5	7.11	48.5
	CMP50M	2.4	3	10.3	17.1	3.5	4.4	0.67	0.73	4.3	3.1	12	3.21	50.5
	CMP50L	3.3	4.2	15.4	26	4.8	6.1	0.92	0.99	4.3	3.1	8.2	1.91	51
	CMP63S	2.9	3.9	11.1	23.4	4	5.4	1.15	1.49	--	--	11.2	2.1	50
	CMP63M	5.3	6.9	21.4	41.4	7.5	9.8	1.92	2.26	--	--	5.9	0.92	52
	CMP63L	7.1	9.3	30.4	55.8	10.3	13.5	2.69	3.03	--	--	4	0.62	53

Motor	m_{mot} [kg]	m_{bmot} [kg]
CMP40S	1.3	1.7
CMP40M	1.6	2
CMP50S	2.3	2.9
CMP50M	3.3	3.9
CMP50L	4.1	4.7
CMP63S	4	5
CMP63M	5.7	6.7
CMP63L	7.5	8.5



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Sales Service	Dublin	Alpertor Engineering Ltd. 48 Moyle Road Dublin Industrial Estate Glasnevin, Dublin 11	Tel. +353 1 830-6277 Fax +353 1 830-6458 info@alperton.ie http://www.alperton.ie
Israel			
Sales	Tel-Aviv	Liraz Handasa Ltd. Ahofer Str 34B / 228 58858 Holon	Tel. +972 3 5599511 Fax +972 3 5599512 http://www.liraz-handasa.co.il office@liraz-handasa.co.il
Italy			
Assembly Sales Service	Milano	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via Bernini, 14 I-20020 Solaro (Milano)	Tel. +39 02 96 9801 Fax +39 02 96 799781 http://www.sew-eurodrive.it sewit@sew-eurodrive.it
Technical Offices	Bologna	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via della Grafica, 47 I-40064 Ozzano dell'Emilia (Bo)	Tel. +39 051 65-23-801 Fax +39 051 796-595
	Caserta	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Viale Carlo III Km. 23,300 I-81020 S. Nicola la Strada (Caserta)	Tel. +39 0823 219011 Fax +39 0823 421414



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Italy			
	Firenze	RIMA Via Einstein, 14 I-50013 Campi Bisenzio (Firenze)	Tel. +39 055 898 58-21 Fax +39 055 898 58-30
	Pescara	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Viale Europa,132 I-65010 Villa Raspa di Spoltore (PE)	Tel. +39 085 41-59-427 Fax +39 085 41-59-643
	Torino	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Filiale Torino c.so Unione Sovietica 612/15 - int. C I-10135 Torino	Tel. +39 011 3473780 Fax +39 011 3473783
	Verona	SEW-EURODRIVE di R. Blickle & Co.s.a.s. Via P. Sgulmero, 27/A I-37132 Verona	Tel. +39 045 89-239-11 Fax +39 045 97-6079
Ivory Coast			
Sales	Abidjan	SICA Ste industrielle et commerciale pour l'Afrique 165, Bld de Marseille B.P. 2323, Abidjan 08	Tel. +225 2579-44 Fax +225 2584-36
Japan			
Assembly Sales Service	Iwata	SEW-EURODRIVE JAPAN CO., LTD 250-1, Shimoman-no, Iwata Shizuoka 438-0818	Tel. +81 538 373811 Fax +81 538 373814 http://www.sew-eurodrive.co.jp sewjapan@sew-eurodrive.co.jp
Technical Offices	Fukuoka	SEW-EURODRIVE JAPAN CO., LTD. C-go, 5th-floor, Yakuin-Hiruzu-Bldg. 1-5-11, Yakuin, Chuo-ku Fukuoka, 810-0022	Tel. +81 92 713-6955 Fax +81 92 713-6860 sewkyushu@jasmine.ocn.ne.jp
	Osaka	SEW-EURODRIVE JAPAN CO., LTD. B-Space EIRAI Bldg., 3rd Floor 1-6-9 Kyoumachibori, Nishi-ku, Osaka, 550-0003	Tel. +81 6 6444--8330 Fax +81 6 6444--8338 sewosaka@crocus.ocn.ne.jp
	Tokyo	SEW-EURODRIVE JAPAN CO., LTD. Izumi-Bldg. 5 F 3-2-15 Misaki-cho Chiyoda-ku, Tokyo 101-0061	Tel. +81 3 3239-0469 Fax +81 3 3239-0943 sewtokyo@basil.ocn.ne.jp
Korea			
Assembly Sales Service	Ansan-City	SEW-EURODRIVE KOREA CO., LTD. B 601-4, Banweol Industrial Estate 1048-4, Shingil-Dong Ansan 425-120	Tel. +82 31 492-8051 Fax +82 31 492-8056 http://www.sew-korea.co.kr master@sew-korea.co.kr
	Busan	SEW-EURODRIVE KOREA Co., Ltd. No. 1720 - 11, Songjeong - dong Gangseo-ku Busan 618-270	Tel. +82 51 832-0204 Fax +82 51 832-0230 master@sew-korea.co.kr
Technical Offices	Daegu	SEW-EURODRIVE KOREA Co., Ltd. No.1108 Sungan officetel 87-36, Duryu 2-dong, Dalseo-ku Daegu 704-712	Tel. +82 53 650-7111 Fax +82 53 650-7112
	DaeJeon	SEW-EURODRIVE KOREA Co., Ltd. No. 1502, Hongin officetel 536-9, Bongmyung-dong, Yuseung-ku Daejeon 305-301	Tel. +82 42 828-6461 Fax +82 42 828-6463



Korea			
	Kwangju	SEW-EURODRIVE KOREA Co., Ltd. 4fl., Dae-Myeong B/D 96-16 Unam-dong, Buk-ku Kwangju 500-170	Tel. +82 62 511-9172 Fax +82 62 511-9174
	Seoul	SEW-EURODRIVE KOREA Co., Ltd. No.504 Sunkyung officetel 106-4 Kuro 6-dong, Kuro-ku Seoul 152-054	Tel. +82 2 862-8051 Fax +82 2 862-8199
Latvia			
Sales	Riga	SIA Alas-Kuul Katlakalna 11C LV-1073 Riga	Tel. +371 7139253 Fax +371 7139386 http://www.alas-kuul.com info@alas-kuul.com
Lebanon			
Sales	Beirut	Gabriel Acar & Fils sarl B. P. 80484 Bourj Hammoud, Beirut	Tel. +961 1 4947-86 +961 1 4982-72 +961 3 2745-39 Fax +961 1 4949-71 gacar@beirut.com
Lithuania			
Sales	Alytus	UAB Irseva Naujoji 19 LT-62175 Alytus	Tel. +370 315 79204 Fax +370 315 56175 info@irseva.lt http://www.sew-eurodrive.lt
Luxembourg			
Assembly Sales Service	Brüssel	CARON-VECTOR S.A. Avenue Eiffel 5 B-1300 Wavre	Tel. +32 10 231-311 Fax +32 10 231-336 http://www.sew-eurodrive.lu info@caron-vector.be
Malaysia			
Assembly Sales Service	Johore	SEW-EURODRIVE SDN BHD No. 95, Jalan Seroja 39, Taman Johor Jaya 81000 Johor Bahru, Johor West Malaysia	Tel. +60 7 3549409 Fax +60 7 3541404 sales@sew-eurodrive.com.my
Technical Offices	Kota Kinabalu	SEW-EURODRIVE Sdn Bhd (Kota Kinabalu Branch) Lot No. 2, 1st Floor, Inanam Baru Phase III, Miles 5.1 /2, Jalan Tuaran, Inanam 89350 Kota Kinabalu Sabah, Malaysia	Tel. +60 88 424792 Fax +60 88 424807
	Kuala Lumpur	SEW-EURODRIVE Sdn. Bhd. No. 2, Jalan Anggerik Mokara 31/46 Kota Kemuning Seksyen 31 40460 Shah Alam Selangor Darul Ehsan	Tel. +60 3 5229633 Fax +60 3 5229622 sewpjy@po.jaring.my
	Kuching	SEW-EURODRIVE Sdn. Bhd. Lot 268, Section 9 KTL D Lorong 9, Jalan Satok 93400 Kuching, Sarawak East Malaysia	Tel. +60 82 232380 Fax +60 82 242380



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Mexico			
Assembly Sales Service	Quéretaro	SEW-EURODRIVE MEXICO SA DE CV SEM-981118-M93 Tequisquiapan No. 102 Parque Industrial Quéretaro C.P. 76220 Quéretaro, México	Tel. +52 442 1030-300 Fax +52 442 1030-301 http://www.sew-eurodrive.com.mx scmexico@seweurodrive.com.mx
Morocco			
Sales	Casablanca	Afit 5, rue Emir Abdelkader MA 20300 Casablanca	Tel. +212 22618372 Fax +212 22618351 ali.alami@premium.net.ma
Netherlands			
Assembly Sales Service	Rotterdam	VECTOR Aandrijftechniek B.V. Industrieweg 175 NL-3044 AS Rotterdam Postbus 10085 NL-3004 AB Rotterdam	Tel. +31 10 4463-700 Fax +31 10 4155-552 http://www.vector.nu info@vector.nu
		VECTOR Aandrijftechniek B.V. Gelderhorst 10 NL-7207 BH Zutphen Industrieterrein de Revelhorst	Tel. +31 575 57 44 94 Fax +31 575 57 24 43 oost@vector.nu
		VECTOR Aandrijftechniek B.V. Mercuriusweg 8A NL-5971 LX Grubbenvorst	Tel. +31 77 36 61 873 Fax +31 77 36 62 109 zuid@vector.nu
		VECTOR Aandrijftechniek B.V. Weberstraat 74 NL-1446 VV Purmerend Industrieterrein "De Baansteer"	Tel. +31 299 66 63 38 Fax +31 299 47 60 55 noordwest@vector.nu
New Zealand			
Assembly Sales Service	Auckland	SEW-EURODRIVE NEW ZEALAND LTD. P.O. Box 58-428 82 Greenmount drive East Tamaki Auckland	Tel. +64 9 2745627 Fax +64 9 2740165 http://www.sew-eurodrive.co.nz sales@sew-eurodrive.co.nz
	Christchurch	SEW-EURODRIVE NEW ZEALAND LTD. 10 Settlers Crescent, Ferrymead Christchurch	Tel. +64 3 384-6251 Fax +64 3 384-6455 sales@sew-eurodrive.co.nz
Technical Office	Palmerston North	SEW-EURODRIVE NEW ZEALAND LTD. C/-Grant Shearman, RD 5, Aronui Road Palmerston North	Tel. +64 6 355-2165 Fax +64 6 355-2316 sales@sew-eurodrive.co.nz



Norway			
Assembly Sales Service	Moss	SEW-EURODRIVE A/S Solgaard skog 71 N-1599 Moss	Tel. +47 69 24 10 20 Fax +47 69 24 10 40 http://www.sew-eurodrive.no sew@sew-eurodrive.no
Peru			
Assembly Sales Service	Lima	SEW DEL PERU MOTORES REDUCTORES S.A.C. Los Calderos, 120-124 Urbanizacion Industrial Vulcano, ATE, Lima	Tel. +51 1 3495280 Fax +51 1 3493002 http://www.sew-eurodrive.com.pe sewperu@sew-eurodrive.com.pe
Philippines			
Technical Office	Manila	SEW-EURODRIVE Pte Ltd Manila Liaison Office Suite 110, Ground Floor Comfoods Building Senator Gil Puyat Avenue 1200 Makati City	Tel. +63 2 894275254 Fax +63 2 8942744 sewmla@i-next.net
Poland			
Assembly Sales Service	Lodz	SEW-EURODRIVE Polska Sp.z.o.o. ul. Techniczna 5 PL-92-518 Łódź	Tel. +48 42 67710-90 Fax +48 42 67710-99 http://www.sew-eurodrive.pl sew@sew-eurodrive.pl
		24 Hour Service	Tel. +48 602 739 739 (+48 602 SEW SEW) sewis@sew-eurodrive.pl
Technical Office	Tychy	SEW-EURODRIVE Polska Sp.z.o.o. ul. Nad Jeziorom 87 PL-43-100 Tychy	Tel. +48 32 2175026 + 32 2175027 Fax +48 32 2277910
	Bydgoszcz	SEW-EURODRIVE Polska Sp.z.o.o. ul. Fordońska 246 PL-85-959 Bydgoszcz	Tel. +48 52 3606590 Fax +48 52 3606591
	Poznan	SEW-EURODRIVE Polska Sp.z.o.o. ul. Romana Maya 1 PL-61-371 Poznań	Tel. +48 61 8741640 Fax +48 61 8741641
	Szczecinek	SEW-EURODRIVE Polska Sp.z.o.o. ul. Mickiewicza 2 pok. 36 PL-78-400 Szczecinek	Tel. +48 94 3728820 Fax +48 94 3728821
Portugal			
Assembly Sales Service	Coimbra	SEW-EURODRIVE, LDA. Apartado 15 P-3050-901 Mealhada	Tel. +351 231 20 9670 Fax +351 231 20 3685 http://www.sew-eurodrive.pt infosew@sew-eurodrive.pt
Technical Offices	Lisboa	SEW-EURODRIVE, LDA. Núcleo Empresarial I de São Julião do Tojal Rua de Entremuros, 54 Fracção I P-2660-533 São Julião do Tojal	Tel. +351 21 958-0198 Fax +351 21 958-0245 esc.lisboa@sew-eurodrive.pt
	Porto	SEW-EURODRIVE, LDA. Av. 25 de Abril, 68 4440-502 Valongo	Tel. +351 229 350 383 Fax +351 229 350 384 MobilTel. +351 9 32559110 esc.porto@sew-eurodrive.pt



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Romania			
Sales Service	București	Sialco Trading SRL str. Madrid nr.4 011785 Bucuresti	Tel. +40 21 230-1328 Fax +40 21 230-7170 sialco@sialco.ro
Russia			
Assembly Sales Service	St. Petersburg	ZAO SEW-EURODRIVE P.O. Box 36 195220 St. Petersburg Russia	Tel. +7 812 3332522 +7 812 5357142 Fax +7 812 3332523 http://www.sew-eurodrive.ru sew@sew-eurodrive.ru
Technical Office	Yekaterinburg	ZAO SEW-EURODRIVE Komintern Str. 16 Office 614 RUS-620078 Ekaterinburg	Tel. +7 343 310 3977 Fax +7 343 310 3978 eso@sew-eurodrive.ru
	Irkutsk	ZAO SEW-EURODRIVE 5-Armii Str., 31 RUS-664011 Irkutsk	Tel. +7 3952 25 5880 Fax +7 3952 25 5881 iso@sew-eurodrive.ru
	Moskau	ZAO SEW-EURODRIVE RUS-107023 Moskau	Tel. +7 495 9337090 Fax +7 495 9337094 mso@sew-eurodrive.ru
	Novosibirsk	ZAO SEW-EURODRIVE pr. K Marksa, d.30 RUS-630087 Novosibirsk	Tel. +7 383 3350200 Fax +7 383 3462544 nso@sew-eurodrive.ru
	Togliatti	ZAO SEW-EURODRIVE Sportivnaya Str. 4B, office 2 Samarskaya obl. RUS-445057 Togliatti	Tel. +7 8482 710529 Fax +7 8482 810590
Senegal			
Sales	Dakar	SENEMECA Mécanique Générale Km 8, Route de Rufisque B.P. 3251, Dakar	Tel. +221 338 494 770 Fax +221 338 494 771 senemeca@sento.sn
Serbia			
Sales	Beograd	DIPAR d.o.o. Ustanicka 128a PC Košum, IV floor SCG-11000 Beograd	Tel. +381 11 347 3244 / +381 11 288 0393 Fax +381 11 347 1337 office@dipar.co.yu
Singapore			
Assembly Sales Service	Singapore	SEW-EURODRIVE PTE. LTD. No 9, Tuas Drive 2 Jurong Industrial Estate Singapore 638644	Tel. +65 68621701 Fax +65 68612827 http://www.sew-eurodrive.com.sg sewsingapore@sew-eurodrive.com
Slovakia			
Sales	Bratislava	SEW-Eurodrive SK s.r.o. Rybničná 40 SK-831 06 Bratislava	Tel. +421 2 33595 202 Fax +421 2 33595 200 sew@sew-eurodrive.sk http://www.sew-eurodrive.sk
	Žilina	SEW-Eurodrive SK s.r.o. Industry Park - PChZ ulica M.R.Štefánika 71 SK-010 01 Žilina	Tel. +421 41 700 2513 Fax +421 41 700 2514 sew@sew-eurodrive.sk
	Banská Bystrica	SEW-Eurodrive SK s.r.o. Rudlovská cesta 85 SK-974 11 Banská Bystrica	Tel. +421 48 414 6564 Fax +421 48 414 6566 sew@sew-eurodrive.sk



Slovakia			
	Košice	SEW-Eurodrive SK s.r.o. Slovenská ulica 26 SK-040 01 Košice	Tel. +421 55 671 2245 Fax +421 55 671 2254 sew@sew-eurodrive.sk
Slovenia			
Sales Service	Celje	Pakman - Pogonska Tehnika d.o.o. Ul. XIV. divizije 14 SLO - 3000 Celje	Tel. +386 3 490 83-20 Fax +386 3 490 83-21 pakman@siol.net
South Africa			
Assembly Sales Service	Johannesburg	SEW-EURODRIVE (PROPRIETARY) LIMITED Eurodrive House Cnr. Adcock Ingram and Aerodrome Roads Aeroton Ext. 2 Johannesburg 2013 P.O.Box 90004 Bertsham 2013	Tel. +27 11 248-7000 Fax +27 11 494-3104 http://www.sew.co.za info@sew.co.za
	Cape Town	SEW-EURODRIVE (PROPRIETARY) LIMITED Rainbow Park Cnr. Racecourse & Omuramba Road Montague Gardens Cape Town P.O.Box 36556 Chempet 7442 Cape Town	Tel. +27 21 552-9820 Fax +27 21 552-9830 Telex 576 062 cfoster@sew.co.za
	Durban	SEW-EURODRIVE (PROPRIETARY) LIMITED 2 Monaceo Place Pinetown Durban P.O. Box 10433, Ashwood 3605	Tel. +27 31 700-3451 Fax +27 31 700-3847 hengela@sew.co.za
	Nelspruit	SEW-EURODRIVE (PTY) LTD. 7 Christie Crescent Vintonia P.O.Box 1942 Nelspruit 1200	Tel. +27 13 752-8007 Fax +27 13 752-8008 robermeyer@sew.co.za
	Port Elizabeth	SEW-EURODRIVE PTY LTD. 8 Ruan Access Park Old Cape Road Greenbushes 6000 Port Elizabeth	Tel. +27 41 3722246 Fax +27 41 3722247 dtait@sew.co.za
Technical Offices	Richards Bay	SEW-EURODRIVE PTY LTD. 103 Bulion Blvd Richards Bay P.O. Box 458 Richards Bay, 3900	Tel. +27 35 797-3805 Fax +27 35 797-3819 jswart@sew.co.za
Spain			
Assembly Sales Service	Bilbao	SEW-EURODRIVE ESPAÑA, S.L. Parque Tecnológico, Edificio, 302 E-48170 Zamudio (Vizcaya)	Tel. +34 94 43184-70 Fax +34 94 43184-71 http://www.sew-eurodrive.es sew.spain@sew-eurodrive.es
Technical Offices	Barcelona	Delegación Barcelona Avenida Francesc Macià 40-44 Oficina 4.2 E-08208 Sabadell (Barcelona)	Tel. +34 93 7162200 Fax +34 93 7233007
	Lugo	Delegación Noroeste Apartado, 1003 E-27080 Lugo	Tel. +34 639 403348 Fax +34 982 202934



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Spain			
	Madrid	Delegación Madrid Gran Vía. 48-2° A-D E-28220 Majadahonda (Madrid)	Tel. +34 91 6342250 Fax +34 91 6340899
	Seville	MEB Pólogono Calonge, C/A Nave 2 - C E-41.077 Sevilla	Tel. +34 954 356 361 Fax +34 954 356 274 mebsa.sevilla@mebsa.com
	Valencia	MEB Músico Andreu i Piqueres, 4 E-46.900 Torrente (Valencia)	Tel. +34 961 565 493 Fax +34 961 566 688 mebsa.valencia@mebsa.com
Sri Lanka			
Sales	Colombo	SM International (Pte) Ltd 254, Galle Raod Colombo 4, Sri Lanka	Tel. +94 1 2584887 Fax +94 1 2582981
Sweden			
Assembly Sales Service	Jönköping	SEW-EURODRIVE AB Gnejsvägen 6-8 S-55303 Jönköping Box 3100 S-55003 Jönköping	Tel. +46 36 3442 00 Fax +46 36 3442 80 http://www.sew-eurodrive.se info@sew-eurodrive.se
Technical Offices	Göteborg	SEW-EURODRIVE AB Gustaf Werners gata 8 S-42132 Västra Frölunda	Tel. +46 31 70968 80 Fax +46 31 70968 93
	Malmö	SEW-EURODRIVE AB Borrgatan 5 S-21124 Malmö	Tel. +46 40 68064 80 Fax +46 40 68064 93
	Stockholm	SEW-EURODRIVE AB Björkholmsvägen 10 S-14146 Huddinge	Tel. +46 8 44986 80 Fax +46 8 44986 93
	Skellefteå	SEW-EURODRIVE AB Trädgårdsgatan 8 S-93131 Skellefteå	Tel. +46 910 7153 80 Fax +46 910 7153 93
Switzerland			
Assembly Sales Service	Basel	Alfred Imhof A.G. Jurastrasse 10 CH-4142 Münchenstein bei Basel	Tel. +41 61 417 1717 Fax +41 61 417 1700 http://www.imhof-sew.ch info@imhof-sew.ch
Technical Offices	Rhaetian Switzerland	André Gerber Es Perreyres CH-1436 Chamblon	Tel. +41 24 445 3850 Fax +41 24 445 4887
	Bern / Solothurn	Rudolf Bühler Muntersweg 5 CH-2540 Grenchen	Tel. +41 32 652 2339 Fax +41 32 652 2331
	Central Switzerland and Ticino	Beat Lütolf Baumacher 11 CH-6244 Nebikon	Tel. +41 62 756 4780 Fax +41 62 756 4786
	Zürich	René Rothenbühler Nörgelbach 7 CH-8493 Saland	Tel. +41 52 386 3150 Fax +41 52 386 3213
	Bodensee and East Switzerland	Markus Künzle Eichweg 4 CH-9403 Goldach	Tel. +41 71 845 2808 Fax +41 71 845 2809

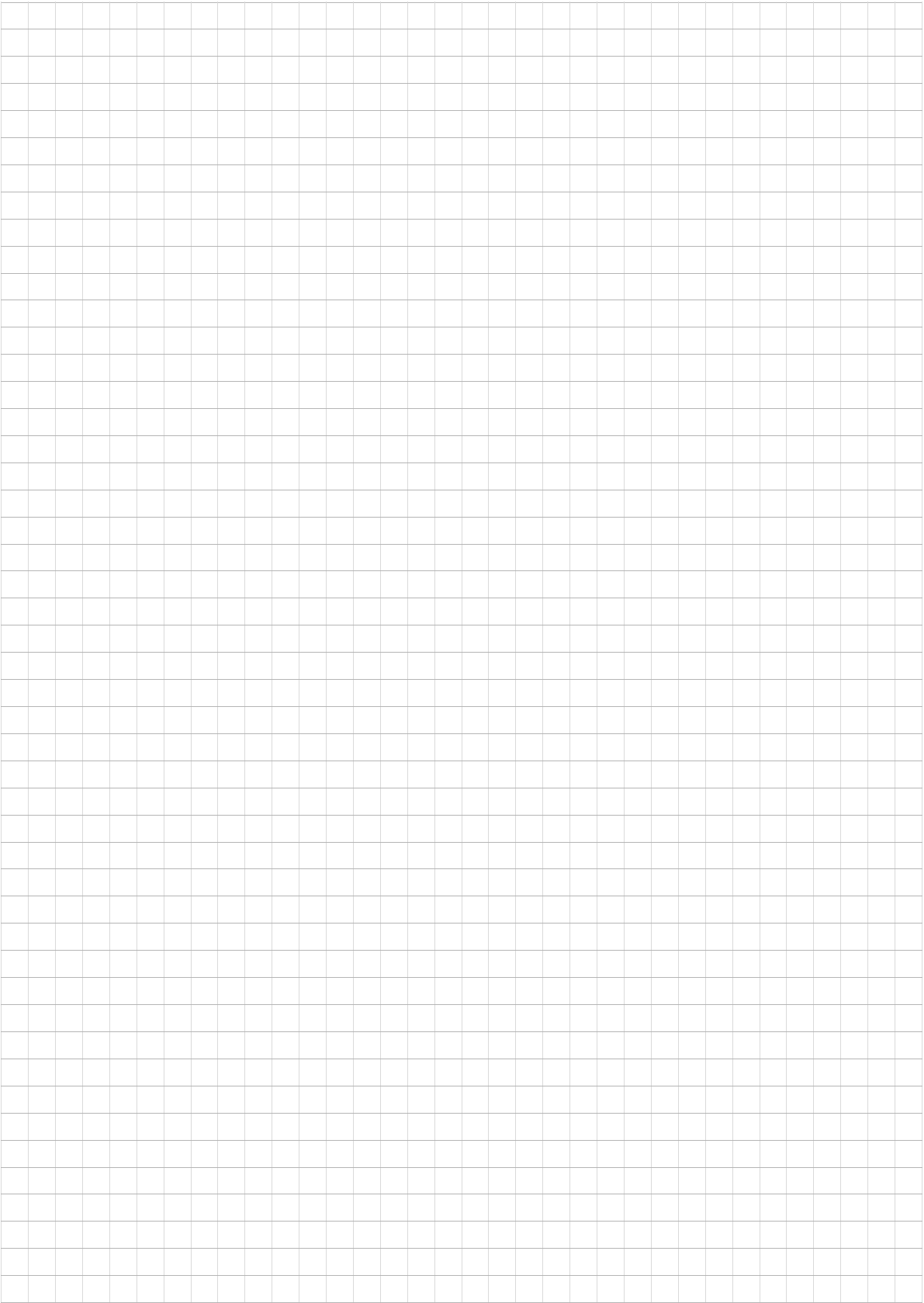


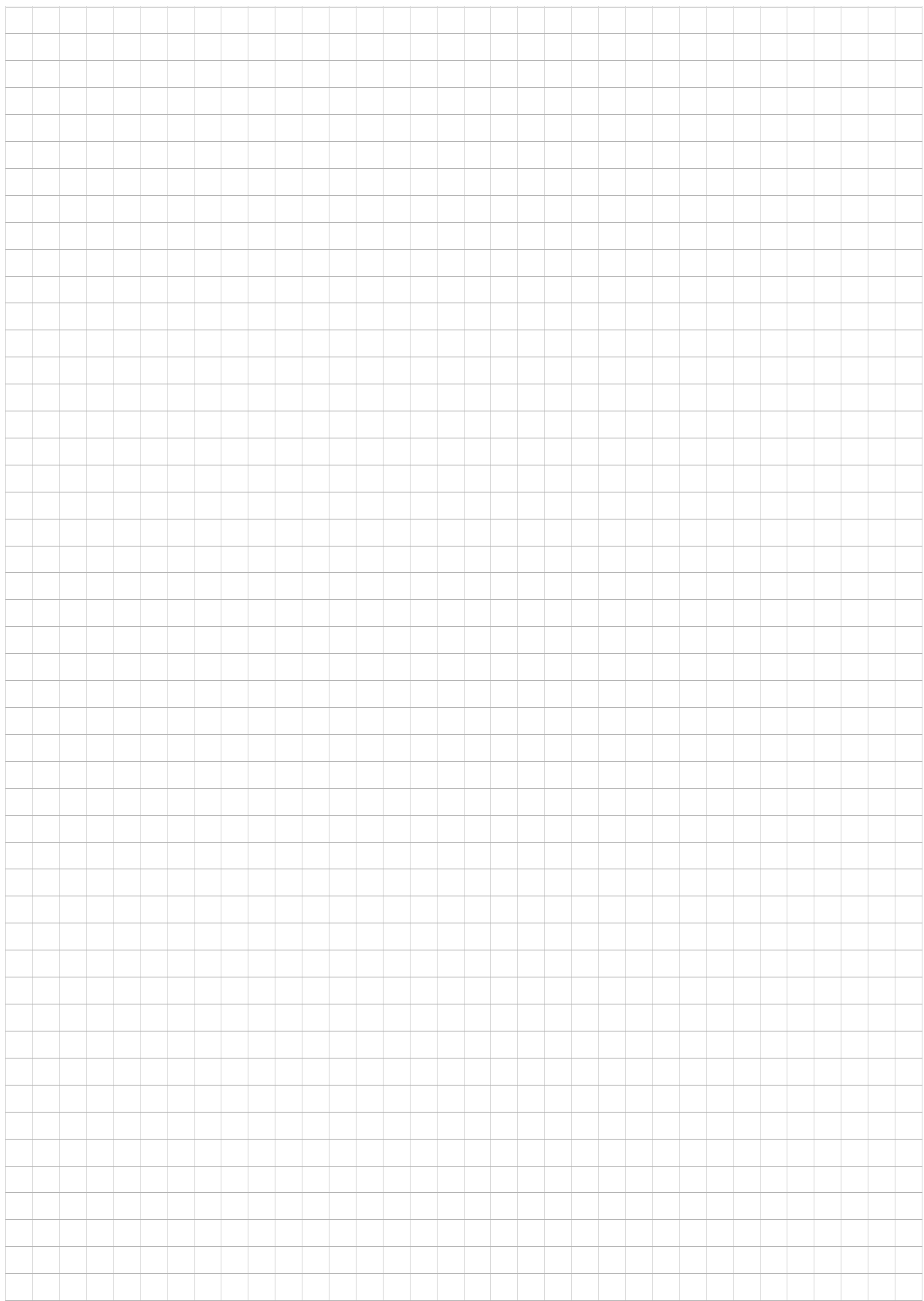
Taiwan (R.O.C.)			
Sales	Nan Tou	Ting Shou Trading Co., Ltd. No. 55 Kung Yeh N. Road Industrial District Nan Tou 540	Tel. +886 49 255353 Fax +886 49 257878
	Taipei	Ting Shou Trading Co., Ltd. 6F-3, No. 267, Sec. 2 Tung Hwa South Road, Taipei	Tel. +886 2 27383535 Fax +886 2 27368268 Telex 27 245 sewtwn@ms63.hinet.net
Thailand			
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	Khonkaen	SEW-EURODRIVE (Thailand) Ltd. 4th Floor, Kaow-U-HA MOTOR Bldg, 359/2, Mitraphab Road. Muang District Khonkaen 40000	Tel. +66 43 225745 Fax +66 43 324871 sew-thailand@sew-eurodrive.com
Tunisia			
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Assembly Sales Service	Istanbul	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. Bagdat Cad. Koruma Cikmazi No. 3 TR-34846 Maltepe ISTANBUL	Tel. +90 216 4419164, 3838014, 3738015 Fax +90 216 3055867 http://www.sew-eurodrive.com.tr sew@sew-eurodrive.com.tr
Technical Offices	Adana	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. Kizilay Caddesi 8 Sokak No 6 Daötekin Is Merkezi Kat 4 Daire 2 TR-01170 SEYHAN / ADANA	Tel. +90 322 359 94 15 Fax +90 322 359 94 16
	Ankara	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. Özcelik Is Merkezi, 14. Sok, No. 4/42 TR-06370 Ostim/Ankara	Tel. +90 312 3853390 / +90 312 3544715 / +90 312 3546109 Fax +90 312 3853258
	Bursa	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. Besevler Küçük Sanayi Parkoop Parçacilar Sitesi 48. Sokak No. 47 TR Nilüfer/Bursa	Tel. +90 224 443 4556 Fax +90 224 443 4558

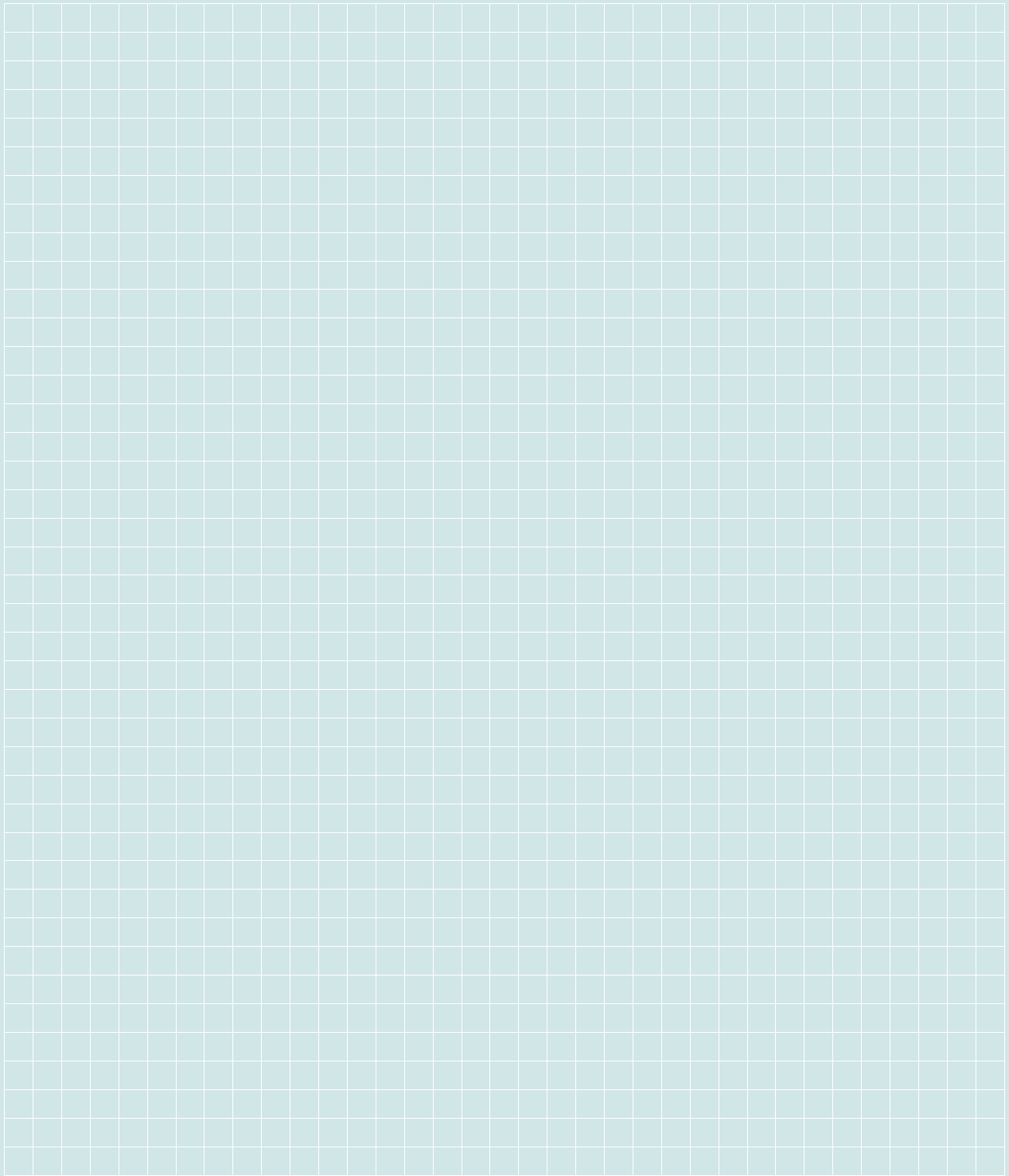


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Turkey			
	Izmir	SEW-EURODRIVE Hareket Sistemleri San. ve Tic. Ltd. Sti. 1203/11 Sok. No. 4/613 Hasan Atli Is Merkezi TR-35110 Yenisehir-Izmir	Tel. +90 232 4696264 Fax +90 232 4336105
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Sales	Kiev	SEW-EURODRIVE GmbH S. Oleynika str. 21 02068 Kiev	Tel. +380 44 503 95 77 Fax +380 44 503 95 78 kso@sew-eurodrive.ua
	Donetsk	SEW-EURODRIVE GmbH 25th anniversary of RKKA av. 1-B, of. 805 Donetsk 83000	Tel. +380 62 38 80 545 Fax +380 62 38 80 533 dso@sew-eurodrive.ua
Uruguay			
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