

Two-speed PS gearbox

Operating manual

Installation

Commissioning

Service

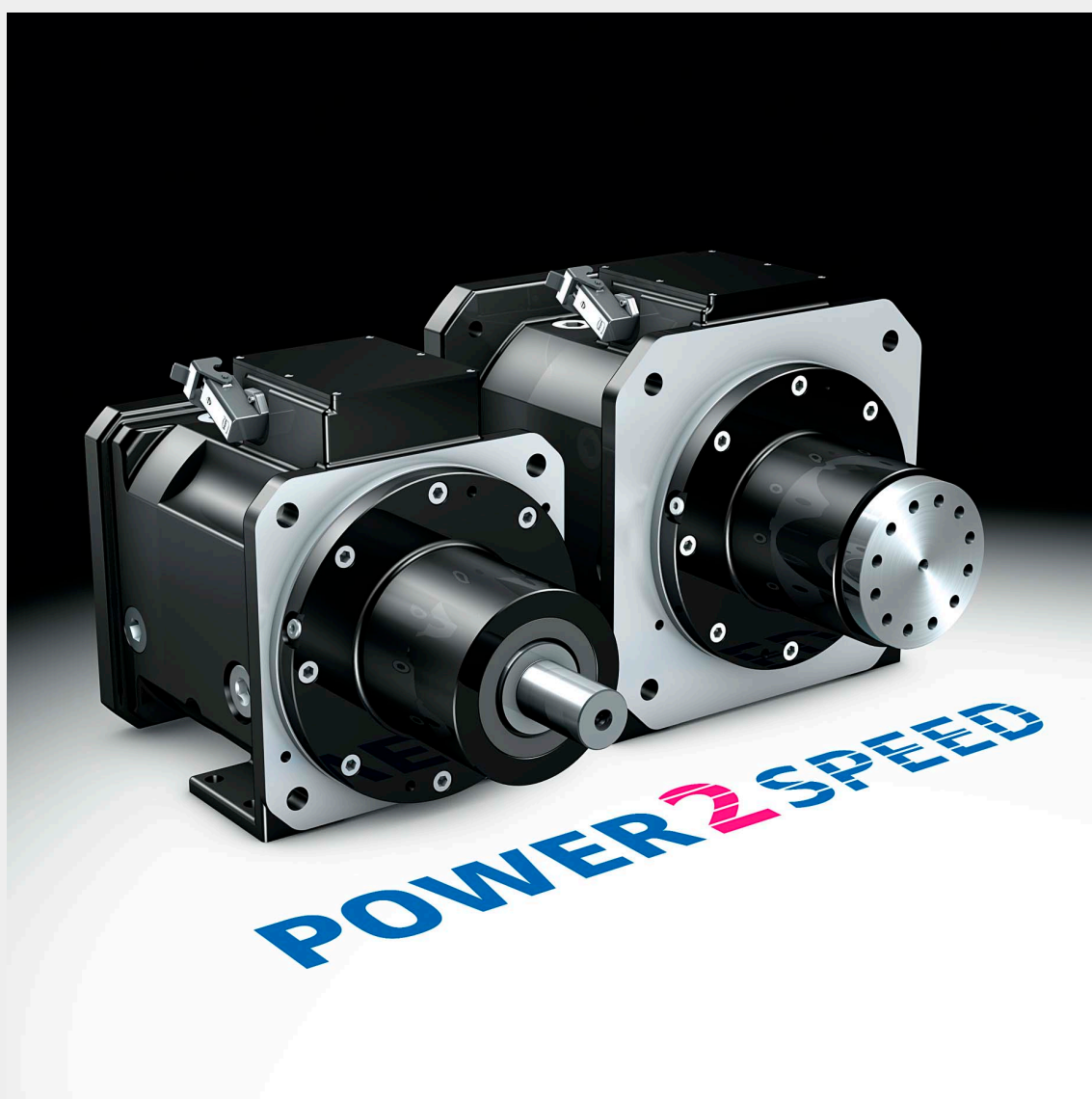


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1 Introduction

1.1 Purpose of the manual

This operating manual describes the two-speed gearbox, called gearbox in the following. It contains information on transport, storage, installation, commissioning, service and disposal of the gearbox.

Also observe the technical documentation of the attached motor.

1.2 Further support

If you have queries that are not answered in this operating manual, please contact STÖBER (the contact information can be found at the end of this operating manual).

1.3 Modifications

Index	Date	Change
00	03/2014	First edition
01	06/2014	<ul style="list-style-type: none"> - Section 5.1.3 Install motor updated - Section 5.2.1 Connect cooling flange (optional) expanded - Section 5.2.4 Install gearbox expanded - Section 5.2.1.1 Cooling circuit specification added - Other minor corrections
02	10/2014	<ul style="list-style-type: none"> - Section 5.1.1 Requirements for the installed motor updated - Section 5.3 Connect gear switcher updated - Section 5.4.1 Circulating lubrication system specification added - Other minor corrections
03	07/2015	<ul style="list-style-type: none"> - Formula symbols and dimensional units - Section 3.6 Performance data revised - Section 5.1.2 Maximum permitted breakdown torque on the gear unit output drive added - Section 5.4 Connect circulating lubrication system (optional) revised - Section 6.3 Check gear change revised - Attachment resolved

Subject to technical changes and alterations in content.

1.4 Copyright statement

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2 Notes on safety

2.1 Warranty and liability

There are risks associated with the gearbox. For this reason, comply with the safety information and technical regulations listed in the following sections. STÖBER is not liable for damage arising from non-compliance of the operating manual or the relevant regulations. Subject to technical changes that improve the units. This documentation is purely a production description. It does not include any guaranteed features in terms of a warranty right.

2.2 Component part of the product

The operating manual is a part of the product.

- Always keep the operating manual ready to hand near the product as it contains important information.
- Pass on the operating manual if the product is sold.

2.3 Operation in accordance with its intended use

The gearbox is primarily intended for the drive of main spindles in tool machines, test benches and other machines for which high rotational speeds and high torques are required on an axle.

Unintended use includes:

- Overloading the gearbox or exceeding the limits that are defined in the technical data;
- Converting or modifying the gearbox;
- Using the gearbox for an application that it was not designed for.

2.4 Personnel requirements

There are risks associated with the gearbox. For this reason, only qualified personnel who are aware of possible dangers may carry out work on the gearbox. In addition the valid regulations, legal requirements, basic rules and this operating manual, particularly the safety information included in it, must be carefully

- read,
- understood and
- observed.

Qualified personnel are persons who have acquired the required specialist knowledge as a result of their professional training, their vocational experience and their recent professional activity to check, assess and operate devices, systems, machines and plants according to the generally applicable standards and guidelines of safety engineering.

2.5 Presentation of notes on safety



DANGER!

Danger

means that serious danger of death exists

- ▶ if the stated precautionary measures are not taken.



WARNING!

Warning

means that there may be a serious danger of death

- ▶ if the stated precautionary measures are not taken.



CAUTION!

Caution

with warning triangle means that minor injury may occur

- ▶ if the stated precautionary measures are not taken.

NOTICE

Notice

means that property damage may occur

- ▶ if the stated precautionary measures are not taken.



Information

Indicates importation information about the product or highlights a part of the document that requires particular attention.

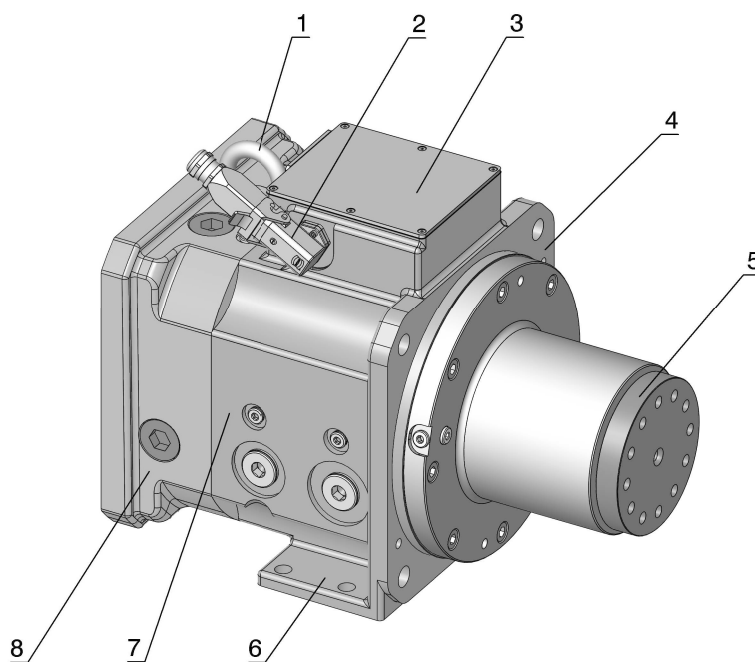
3 Technical description

3.1 Features

The two-speed PS gearbox is primarily intended for the drive of main spindles in tool machines, test benches and other machines for which high rotational speeds and high torques are required on an axle. The gearbox has the following features:

- Available with solid shaft or flange shaft
- Loss-optimized direct gear
- Electrical gear change
- Splash lubrication or circulation lubrication (optional)
- Cooling flange for high heat generation (optional)
- Horizontal and vertical installation positions possible
- Simple motor adaptation

3.2 Setup



1. Ring screw
2. Connector
3. Gear switcher
4. Installation flange
5. Flange shaft
6. Base
7. Housing
8. Motor adapter

Fig. 3-1 Overview of two-speed gearbox with flange shaft

3.3 Type designation

Sample code

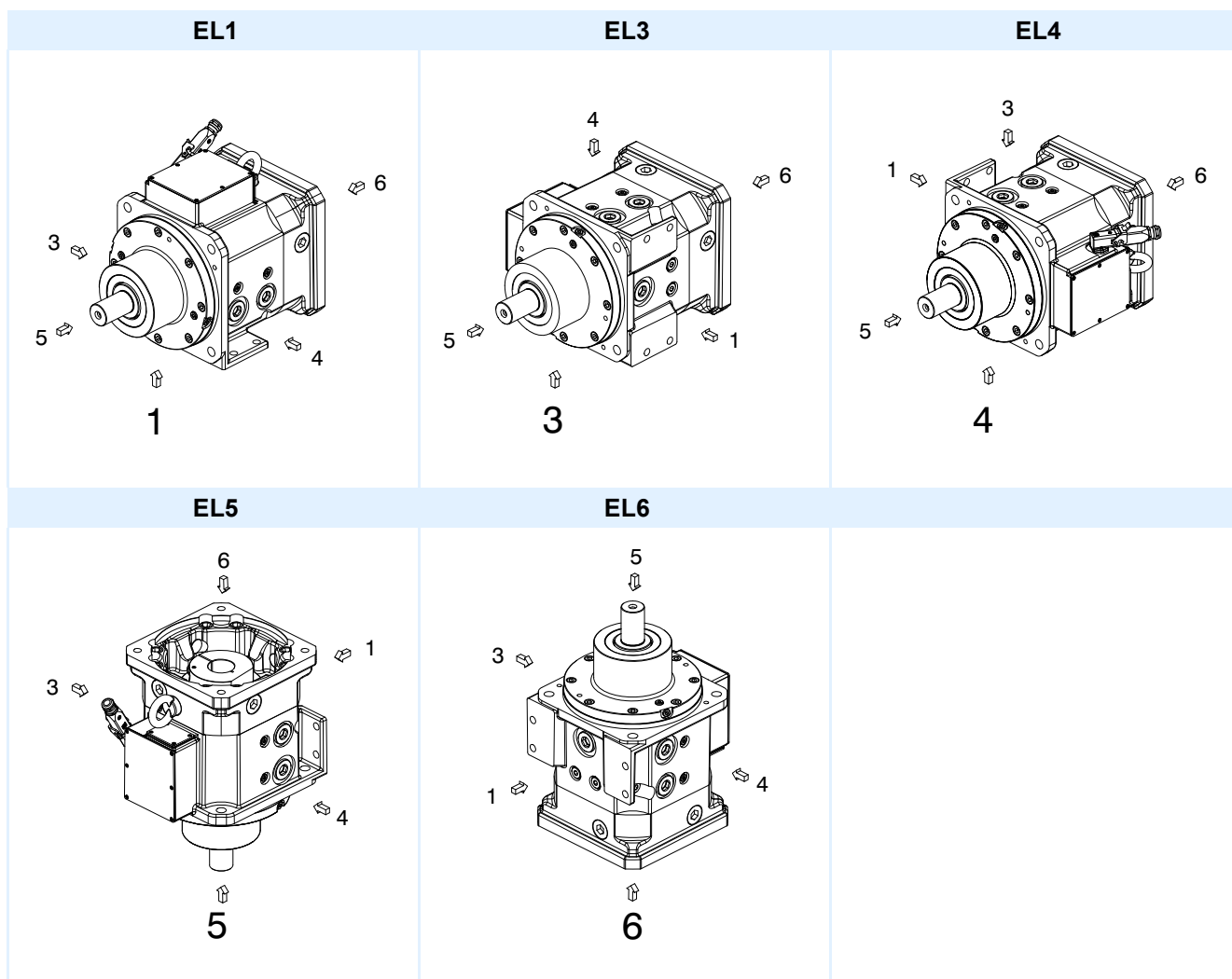
PS	25	0	1	M	F	Z	0040	ME
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Explanation

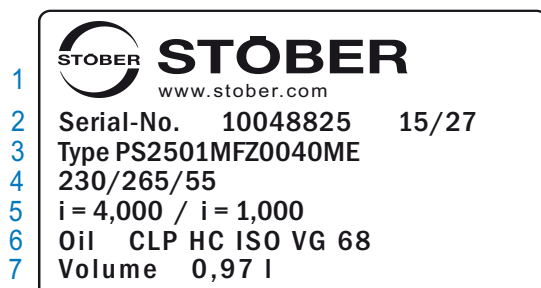
Code	Designation	Version
PS	Type	Two-speed gearbox
25	Size	25
30		30
0	Generation	0
1	Stages	1-stage
S	Housing	Short bearing distance
SC		Short bearing distance with cooling flange
M		Medium bearing distance
MC		Medium bearing distance with cooling flange
L		Long bearing distance
LC		Long bearing distance with cooling flange
F	Shaft	Flange shaft
G		Solid shaft or feather key
P		Solid shaft with two feather keys
R	Bearing	Deep-groove ball bearing
S		Angular ball bearing
Z		Cylindrical roller bearing
0040	Transmission ratio (i x 10)	i = 4 (example)
ME	Attachment groups	Motor adapter with EASY-Adapt coupling

3.4 Installation positions

The installation position is derived from the gear unit side, which points down (installation position EL2 is not permitted).



3.5 Nameplate



Line	Value in the example	Meaning
1	STÖBER	Manufacturer's name
2	Serial-No. 10048825 15/27	Serial number of the gearbox Date of manufacture (year/week)
3	PS2501MFZ0040ME	Gear type (see type designation)
4	230/265/55	Dimensions of motor connection
4	i = 4,000 / i = 1,000	Transmission in 1st and 2nd gear
5	Oil CLP HC ISO VG 68	Gear oil specification ¹⁾
6	Volume 0,97 l	Oil filling quantity ¹⁾

1) only for splash lubrication

3.6 Performance data

Note

The technical data below applies to the ambient conditions that are described in Chapter 3.7.

Formula symbol	Unit	Explanation
EL	–	Installation position
f _{B_T}	–	Operational factor – temperature
i	–	Gear ratio
J ₁	10 ⁻⁴ kgm ²	Mass moment of inertia relative to the input drive
m	kg	Weight
m _C	kg	Additive weight of the cooling flange
M _{1max}	Nm	Maximum torque on the gear unit input drive
M _{1N}	Nm	Nominal torque on the gear unit input drive

$M_{2,1^*} - M_{2,6^*}$	Nm	Existing torque in the relevant time segment (1 to 6)
M_{2,n^*}	Nm	Existing torque in the n-th time segment
M_{2max}	Nm	Maximum torque on the gear unit output drive
M_{2N}	Nm	Nominal torque on the gear unit output (relative to n_{1N})
n_{1m^*}	rpm	Existing average input drive speed
n_{1max^*}	rpm	Existing maximum input speed
n_{1maxH}	rpm	Maximum permitted input drive speed in horizontal installation positions
n_{1maxV}	rpm	Maximum permitted input drive speed in vertical installation positions
n_{1N}	rpm	Nominal speed on the gear unit input
n_{2m^*}	rpm	Existing average output speed
$n_{2m,1^*} - n_{2m,6^*}$	rpm	Existing average output speed in the relevant time segment (1 to 6)
n_{2m,n^*}	rpm	Existing average output speed in the n-th time segment
$P_{N,GB}$	kW	Nominal output of the gearbox
S1		Continuous operation with constant load (duty cycle 100 %)
S6		Uninterrupted periodic operation (duty cycle 60 % relative to 10 minutes)
$t_{1^*} - t_{6^*}$	s	Duration of the relevant time segment (1 to 6)
t_{n^*}	s	Duration of the n-th time segment
ϑ_{amb}	°C	Surrounding temperature
v_{sw}	mm/s	Vibration speed (RMS value)
$\Delta\phi_2$	arcmin	Backlash on the output shaft with the input blocked



3.6.1 Maximum speeds

Instructions for S1 operation

The maximum permitted input drive speeds $n_{1\max H}$ and $n_{1\max V}$ in S1 operation depend on the surrounding temperature ϑ_{amb} (see table below). The maximum permitted input drive speeds for your application can be calculated as follows:

For EL1, EL3, EL4:

$$n_{1\max*} = \frac{n_{1\max H}}{fB_T}$$

For EL5, EL6:

$$n_{1\max*} = \frac{n_{1\max V}}{fB_T}$$

Surrounding temperature ϑ_{amb}	Operational factor fB_T
$\leq 20\text{ °C}$	1.0
$\leq 30\text{ °C}$	1.1
$\leq 40\text{ °C}$	1.2

Tab. 3-1: Operational factor – temperature

Instructions for S6 operation

In S6 operation of the gearbox, the following condition $n_{1m*} < n_{1\max H}$ or $n_{1m*} < n_{1\max V}$ must be observed. The instructions for calculating the existing average input drive speed n_{1m*} are as follow

$$n_{1m*} = n_{2m*} \cdot i$$

$$n_{2m*} = \frac{|n_{2m,1*}| \cdot t_{1*} + \dots + |n_{2m,n*}| \cdot t_{n*}}{t_{1*} + \dots + t_{n*}}$$

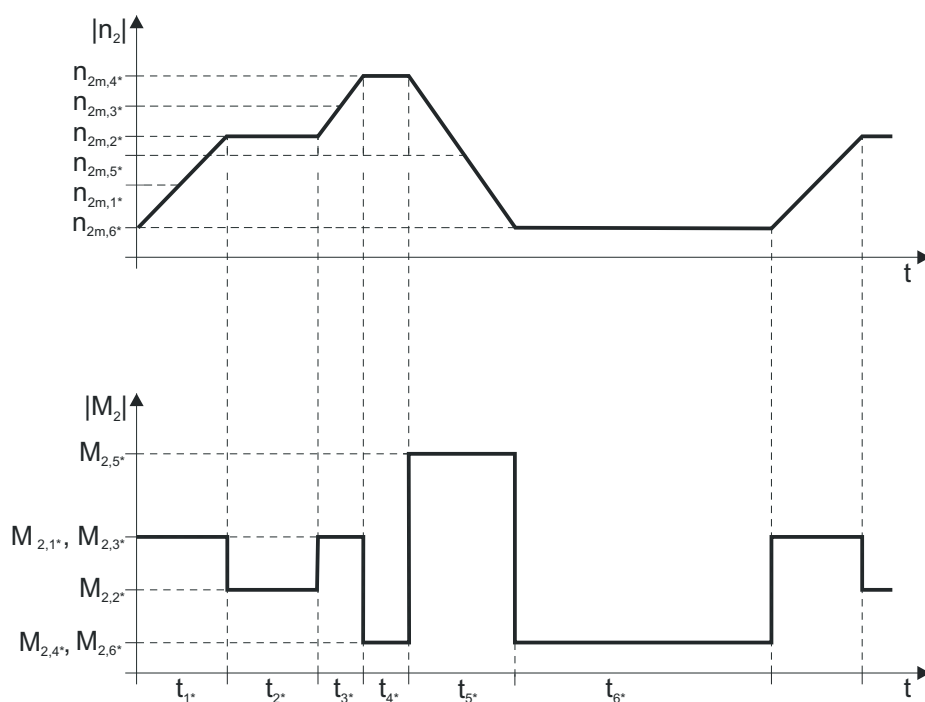


Fig. 3-2 Sample diagram for S6 operation

Maximum speeds with splash lubrication

Typ	i	$n_{1\max H}$	$n_{1\max V}$	$n_{1\max H}$	$n_{1\max V}$
		EL1, EL3, EL4	EL5	EL1, EL3, EL4	EL5
		S1	S1	S6	S6
		[min ⁻¹]	[min ⁻¹]	[min ⁻¹]	[min ⁻¹]
PS2501_0040 ME	4,0	3000	2500	4500	3500
–	1,0	5000	4500	6000	5500
PS2501_0055 ME	5,5	3000	2500	4500	3500
–	1,0	5000	4500	6000	5500
PS3001_0040 ME	4,0	3000	2500	4500	3500
–	1,0	5000	4500	6000	5500
PS3001_0055 ME	5,5	3000	2500	4500	3500
–	1,0	5000	4500	6000	5500

Maximum speeds with splash lubrication and cooling flange

Typ	i	$n_{1\max H}$	$n_{1\max V}$	$n_{1\max H}$	$n_{1\max V}$
		EL1, EL3, EL4	EL5	EL1, EL3, EL4	EL5
		S1	S1	S6	S6
		[min ⁻¹]	[min ⁻¹]	[min ⁻¹]	[min ⁻¹]
PS2501_0040 ME	4,0	4000	3500	5000	4500
–	1,0	5500	5000	6500	6000
PS2501_0055 ME	5,5	4000	3500	5000	4500
–	1,0	5500	5000	6500	6000
PS3001_0040 ME	4,0	4000	3500	5000	4500
–	1,0	5500	5000	6500	6000
PS3001_0055 ME	5,5	4000	3500	5000	4500
–	1,0	5500	5000	6500	6000

The maximum speeds for the version with cooling flange are in reference to water as the coolant (specification in section 5.2.1.1). If another coolant is used, you will have to determine the maximum speeds again. For detailed instructions please consult the manufacturer of your cooling system.

Maximum speeds with circulation lubrication system

Typ	i	$n_{1\max H}$	$n_{1\max V}$	$n_{1\max H}$	$n_{1\max V}$
		EL1, EL3, EL4	EL5, EL6	EL1, EL3, EL4	EL5, EL6
		S1	S1	S6	S6
		[min ⁻¹]	[min ⁻¹]	[min ⁻¹]	[min ⁻¹]
PS2501_0040	4,0	6500	6500	7000	7000
–	1,0	8000	8000	10000	10000
PS2501_0055	5,5	6500	6500	7000	7000
–	1,0	8000	8000	10000	10000
PS3001_0040	4,0	6500	6500	7000	7000
–	1,0	8000	8000	10000	10000
PS3001_0055	5,5	6500	6500	7000	7000
–	1,0	8000	8000	10000	10000

The specification of the circulation lubrication system can be found in section 5.4.1.

3.6.2 Torques

Typ	i	P _{N,GB} [kW]	M _{1N} [Nm]	M _{2N} [Nm]	M _{1max} [Nm]	M _{2max} [Nm]
PS2501_0040 ME	4,0	47	300	1200	400	1600
–	1,0	47	300	300	400	400
PS2501_0055 ME	5,5	47	250	1375	400	2200
–	1,0	47	250	250	400	400
PS3001_0040 ME	4,0	47	300	1200	400	1600
–	1,0	47	300	300	400	400
PS3001_0055 ME	5,5	47	250	1375	400	2200
–	1,0	47	250	250	400	400

The nominal torque for the output drive M_{2N} is relative to the input drive speed $n_{1N} = 1500$ rpm.

3.6.3 Further technical data

Shaft version G (solid shaft without feather key)

Typ	J ₁ 10 ⁻⁴ [kgm ²]	m [kg]	m _C [kg]	Δφ ₂ [arcmin]	v _{sw} [mm/s]
PS25	82	86	15	30/20	1
PS30	82	95	24	30/20	1

Shaft version P (solid shaft with two feather keys)

Typ	J ₁ 10 ⁻⁴ [kgm ²]	m [kg]	m _C [kg]	Δφ ₂ [arcmin]	v _{sw} [mm/s]
PS25	85	86	15	30/20	1
PS30	85	95	24	30/20	1

Shaft version F (flange shaft)

Typ	J ₁ 10 ⁻⁴ [kgm ²]	m [kg]	m _C [kg]	Δφ ₂ [arcmin]	v _{sw} [mm/s]
PS25	120	86	15	30/20	1
PS30	120	95	24	30/20	1



Instructions

- The mass moment of inertia J_1 applies to both the transmitted and the direct gear for the relevant shaft version.
- The vibration speed v_{sw} was determined in accordance with DIN ISO 10816 under the following test conditions: $n_{1m^*} = 5000$ rpm, load-free, soft installation, bearing version with angular ball bearing.

3.6.4 Permissible loads for flange shaft

Formula symbol	Unit	Explanation
F_{2ax^*}	N	Existing axial force on the gear unit output
F_{2ax300}	N	Permitted axial force on the gear unit output drive for $n_{2m^*} \leq 300 \text{ min}^{-1}$
F_{2axN}	N	Permitted nominal axial force on the gear unit output
F_{2rad^*}	N	Existing radial force on the gear unit output
$F_{2rad300}$	N	Permitted radial force on the gear unit output drive for $n_{2m^*} \leq 300 \text{ min}^{-1}$
F_{2radN}	N	Permitted nominal axial force on the gear unit output
M_{2k^*}	Nm	Existing breakdown torque on the gear unit output
M_{2k300}	Nm	Permitted breakdown torque on the gear unit output drive for $n_{2m^*} \leq 300 \text{ min}^{-1}$
M_{2kN}	Nm	Permitted nominal breakdown torque on the gear unit output
n_{2m^*}	rpm	Existing average output speed

The values specified in the following tables apply to permitted shaft loads

- For shaft dimensions see the catalog
- to output drive speeds $n_{2m^*} \leq 300$ rpm
($F_{2axN} = F_{2ax300}$; $F_{2radN} = F_{2rad300}$; $M_{2kN} = M_{2k300}$)
- Only if the lateral forces acting on the gearbox are supported by the pilot of the gearbox housing

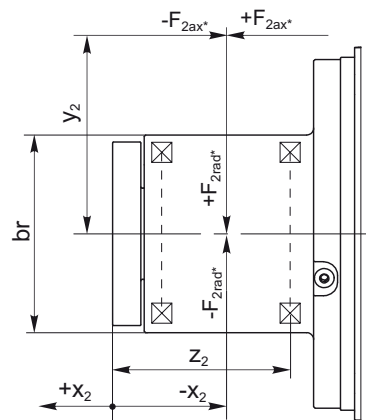


Fig. 3-3 Application of force points for the flange shaft

Permissible shaft loads for version MS (medium bearing distance, angular ball bearing)

Typ	z_2 [mm]	x_{2min} [mm]	x_{2max} [mm]	F_{2ax300} [N]	$F_{2rad300}$ [N]	M_{2k300} [Nm]
PS25	154,0	-83,0	83,0	2300	11000	770
PS30	154,0	-83,0	83,0	2300	11000	770

Permissible shaft loads for version MZ (medium bearing distance, cylindrical roller bearing)

Typ	br [mm]	z_2 [mm]	x_{2min} [mm]	x_{2max} [mm]	F_{2ax300} [N]	$F_{2rad300}$ [N]	M_{2k300} [Nm]
PS25	116,0	122,0	-80,0	80,0	1750	23000	943
PS25	140,0	121,0	-81,0	81,0	1750	30000	1185
PS30	116,0	122,0	-80,0	80,0	1750	23000	943
PS30	140,0	121,0	-81,0	81,0	1750	30000	1185

Permissible shaft loads for version LZ (long bearing distance, cylindrical roller bearing)

Typ	z_2 [mm]	x_{2min} [mm]	x_{2max} [mm]	F_{2ax300} [N]	$F_{2rad300}$ [N]	M_{2k300} [Nm]
PS25	186,0	-111,0	111,0	1750	30000	2235
PS30	186,0	-111,0	111,0	1750	30000	2235



For output drive speeds $> 300 \text{ min}^{-1}$ permitted shaft loads can be determined according to the following formulas:

$$F_{2axN} = \frac{F_{2ax300}}{\sqrt[3]{\frac{n_{2m*}}{300 \text{ min}^{-1}}}} \quad F_{2radN} = \frac{F_{2rad300}}{\sqrt[3]{\frac{n_{2m*}}{300 \text{ min}^{-1}}}} \quad M_{2kN} = \frac{M_{2k300}}{\sqrt[3]{\frac{n_{2m*}}{300 \text{ min}^{-1}}}}$$

The specified values for radial forces refer to x_{2min} in the tables above. For a different application of force, the permitted radial forces can be determined from the permitted breakdown torque M_{2k*} according to the following formula (limit values for x_2 are indicated in the previous tables):

$$M_{2k*} = \frac{F_{2ax*} \cdot y_2 + F_{2rad*} \cdot (x_2 + z_2)}{1000} \leq M_{2k300}$$

3.7 Ambient conditions

Feature	Value
Transport/storage ambient temperature	-10 °C to +50 °C
Operating ambient temperature	0 °C to +40 °C (without water cooling) +10 °C to +40 °C (with water cooling)
Relative humidity	< 60 %
Installation altitude	≤ 1000 m above sea level
Shock load	≤ 5 g

4 Transportation and storage

4.1 Transportation

4.1.1 General safety instructions



WARNING!

Suspended loads!

Falling gearboxes or motors can cause serious injuries or even death!

- ▶ Cordon off the danger zone and make sure that no personnel are under suspended loads.
- ▶ Use lifting gear with adequate lifting capacity.
- ▶ Only sling the gearbox or the motor at the ring screws intended for this.
- ▶ In addition sling the motor mounted on the gearbox and make sure that there is no diagonal pull.

NOTICE

Material damage!

The use of force causes damage to the gearbox.

- ▶ Transport the gearbox in the transport packaging and only remove it before installation.
- ▶ Do not apply any pressure, impact or high acceleration to the gearbox.

4.1.2 Scope of delivery

Check the completeness of your delivery using the delivery note and report any missing parts or transport damage immediately to the carrier and the supplier.

4.1.3 Packaging

The gearbox is wrapped in film and delivered in a stable carton on a pallet. Store the gearbox in the transport packaging and only remove the packaging just before installation.

Dispose of the packaging materials at disposal centers intended for this and observe the applicable legal rules on-site.



4.2 Storage

4.2.1 General safety instructions

NOTICE

Material damage!

Improper storage can cause damage to or corrosion on the gearbox.

- ▶ Store the gearbox in closed, dust-free and dry rooms.
- ▶ Make sure that no condensation, e.g. due to extreme temperature fluctuations at high levels of humidity, forms during storage.
- ▶ Protect the gearbox from UV radiation, mechanical, chemical and thermal damage such as scratches, acids, sparks or heat.

4.2.2 Long-term storage

If you want to store the gearbox for longer than six months, take the following measures to prevent corrosion damage:

- Observe the general information on storage in the previous section
- Protect the not painted gearbox parts from corrosion.
- Completely fill the gearbox with gear oil (the oil specification is specified on the rating plate).

NOTICE

Material damage!

An incorrect gear oil filling quantity can cause damage to the gearbox or affect its function.

- ▶ Before installing the gearbox after long-term storage, reduce the gear oil filling quantity to the correct amount (see section 7.2.3).

5 Installation



WARNING!

Suspended loads!

Falling gearboxes or motors can cause serious injuries or even death!

- ▶ Cordon off the danger zone and make sure that no personnel are under suspended loads.
- ▶ Use lifting gear with adequate lifting capacity.
- ▶ Only sling the gearbox or the motor at the ring screws intended for this.
- ▶ In addition sling the motor mounted on the gearbox and make sure that there is no diagonal pull.

NOTICE

Material damage!

Knocks or any other use of force can cause damage to the gearbox or motor.

- ▶ Do not strike the shafts or housing of the gearbox or motor with a hammer or other tools.
- ▶ Do not apply any pressure, impact or high acceleration to the gearbox or motor.

NOTICE

Material damage!

Solvent damages the sealing lips of the shaft seal rings.

- ▶ Make sure that solvent can not come into contact with the sealing lips of the shaft seal rings.

5.1 Install motor on gearbox

5.1.1 Requirements for the installed motor

We recommend to use a motor with a plain shaft. You can find information about when a motor with foot fastening (design IMB35) is required in sections 5.1.2 and 5.2.4. The motor to be installed must have the following tolerances to ensure problem-free operation (see also Fig. 5-1):

Feature	Tolerance
Concentricity of the shaft end ¹⁾	25 µm
Coaxiality of the flange centering for the shaft ¹⁾	63 µm
Axial runout of the attachment area of the flange for the shaft ¹⁾	63 µm
Diameter of the motor shaft < 55 mm	k6 ²⁾
Diameter of the motor shaft ≥ 55 mm	m6 ²⁾

1) According to IEC 60072-1 (Precision class)

2) According to DIN EN ISO 286-1

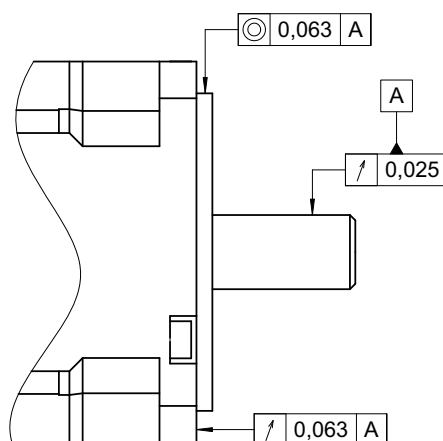
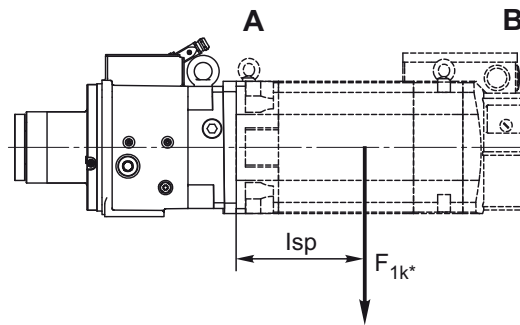


Fig. 5-1 Motor tolerances

5.1.2 Maximum permitted breakdown torque on the gear unit output drive

Formula symbol	Unit	Explanation
F_{1k^*}	N	Static and dynamic loads from motor weight, mass acceleration and vibrations on the gear unit input drive.

l_{sp}	m	Distance between the center of gravity of the motor and the gear unit input drive
$M_{1k,max}$	Nm	Maximum permitted breakdown torque on the gear unit output drive



A = Mounting or output side of the motor

B = Rear side of the motor

Calculate the maximum permitted breakdown torque of the attached motor as follows: $M_{1k,max} = F_{1k*} \cdot l_{sp} \leq 1000 \text{ Nm}$.

Fix the motor in place on its foot fastening (design IMB35) as well or support it tension-free on the B side if the maximum allowable breakdown torque is exceeded. Note also the instructions in section 5.2.4.

5.1.3 Install motor

NOTICE

Material damage!

Prevent damage to the gearbox and faults during operation that may occur if the motor is incorrectly attached.

- Note the maximum permitted breakdown torque on the input drive of the gearbox (see section 5.1.2).
- Please note the motor specifications in section 5.1.1.

NOTICE

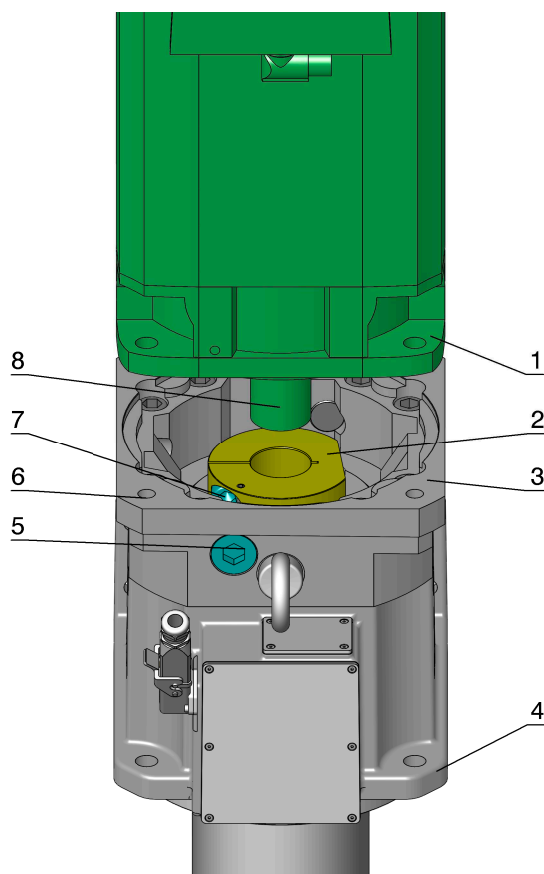
Material damage!

The output shaft of the gearbox must not be loaded with the weight of the gearbox or motor when installing the motor.

- Use suitable assembly equipment for vertical motor installation so that the load of the gearbox and the motor is taken by the gearbox flange and not the output shaft.

**Information**

The motor is installed on the gearbox using a motor adapter with clamp coupling. The motor shaft has a friction connection with the clamp coupling using a clamping hub. The clamp coupling operates without any backlash and is maintenance-free.



1. Motor flange
2. Clamping hub
3. Motor adapter housing
4. Installation flange
5. Screw plug
6. Mounting hole
7. Clamping screw
8. Motor shaft

Fig. 5-2 Install motor on gearbox

The following is required for motor installation:

- Suitable lifting gear (crane)
- Mounting device
- Torque wrench with extension and hex socket insert SW 14

Install the motor on the gearbox as follows (also see the figure above):

1. Provide a mounting device (e.g. a suitable pipe section) on which the gearbox can be deposited with the installation flange (4). The output shaft must not be loaded when doing so.
2. Bring the gearbox with the lifting gear in the vertical position and deposit it with the installation flange (4) on the mounting device.

The easy to assemble motor adapter has four access holes for the clamping screw that can be used depending on the installation position.

3. Degrease the motor shaft (8) as well as the hole of the clamping hub (2) and make sure that solvent does not come into contact with the shaft seal rings.
 4. Position the clamping hub (2) so that the clamping screw (7) can be tightened through one of the four access holes.
 5. Remove the screw plug (5) opposite the clamping screw.
 6. Sling the motor with the lifting gear at two suitable sling points so that the motor shaft points downwards.
 7. Guide the motor shaft in the clamping hub and make sure that it does not tilt. If the clamping hub is too narrow, turn the clamping screw about 1/4 revolution counter clockwise to widen the clamping hub.
 8. Turn the motor relative to the gearbox so that it is positioned in the desired installation position and the attachment holes line up exactly at the motor adapter and motor flange.
 9. Mount the motor on the gearbox with four suitable fastening screws of strength class 8.8.
 10. Tighten the clamping screw (7) with the torque wrench with 210 Nm.
 11. Close the access hole again with the screw plug.
 12. Pick up the motor and the gearbox at suitable sling points and remove them from the mounting device.
- ⇒ Installation of the motor is now complete

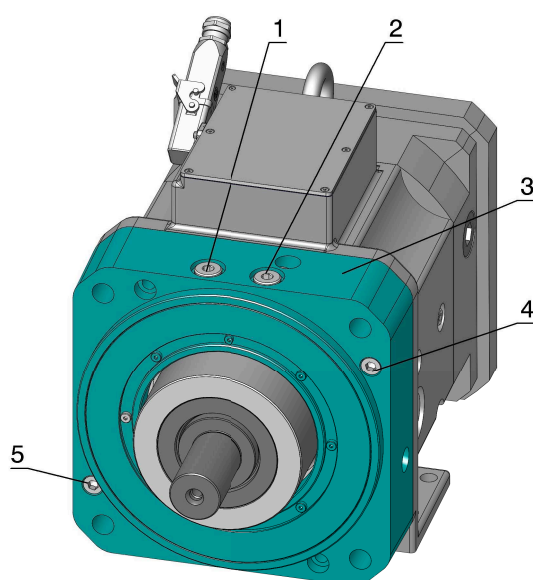
5.2 Install gearbox

5.2.1 Connect cooling flange (optional)

5.2.1.1 Cooling circuit specification

Feature	Value
Coolant	Water
Temperature at inlet	10 – 40 °C (max. 5 °C below the surrounding temperature)
Cooling circuit	Closed, with recooling unit; no non-ferrous metals
Cleanliness	Clear, with no suspended matter or dirt (use particle filter ≤ 100 µm if necessary)
pH value	6.5 – 7.5
Hardness	1.43 – 2.5 mmol/l
Salinity	NaCL < 100 ppm, demineralized
Anticorrosive	Max. percentage 25%, neutral relative to S235JK, EN-GJL-HB 215
Flow rate	3 l/min (recommended)
Operating pressure	Max. 3.5 bar (provide a pressure relief valve in the supply line)
Connection thread	G3/8

5.2.1.2 Turn cooling flange



1. Screw plug
2. Screw plug
3. Cooling flange
4. Cylinder head screw
5. Cylinder head screw

Fig. 5-3 Cooling flange

To optimally connect the cooling flange to the cooling system, you can change the position of the cooling connection by turning the cooling flange in 90° steps.

Turn the cooling flange as follows (also see the figure above):

1. Unscrew the cylinder head screws (4) and (5).
2. Turn the cooling flange (3) in 90° steps to the desired position.
3. Reattach the cooling flange with both cylinder head screws.

5.2.1.3 Connect cooling flange

NOTICE

Material damage!

Unsuitable coolants may cause corrosion damage to the gearbox and/or reduce maximum permitted speeds.

- ▶ Please note the coolant specifications in section 5.2.1.1.
- ▶ Coolant with fresh water from the public supply grid with coolants, lubricants or cutting agents from the machining process is not permitted.

NOTICE**Material damage!**

Water from condensation can cause damage to your machine.

- ▶ If the temperature of the coolant is lower than the surrounding temperature, interrupt the supply of coolant when the motor is stopped for extended times to prevent condensation water from forming.

The cooling flange is connected to the cooling system as follows:

1. Install the gearbox in the machine (section 5.2.4).
2. Remove both screw plugs (1) and (2).
3. Connect the lines of the cooling system to the cooling flange.
4. Check whether the connection points are leak-proof.

5.2.2 Install belt pulley (optional)**NOTICE****Material damage!**

Exceeding the permitted radial forces of the flange shaft can cause bearing damage at the gearbox.

- ▶ When tightening the belt, observe the permitted radial forces of the flange shaft 5.2.1.1.

Note the following before installing the belt pulley:

- The belt pulley should be balanced for quality 6.3 according to VDI Directive 2060 for the respective operating speed to ensure vibration-free running;
- The outer diameter of the flange shaft has a tolerance of k6.
- Inner diameter of the belt pulley ≥ 142 mm

Install the belt pulley on the flange shaft as follows:

1. If there is difficulty sliding the belt pulley on the output flange or it can not be slid on at all, then warm it.
2. Center the belt pulley on the flange shaft.
3. Attach the belt pulley on the flange shaft with suitable screws of strength class 10.9 and tighten with the appropriate tightening torque.



5.2.3 Install transfer elements on the solid shaft (optional)

Note the following when attaching the transfer elements to the solid shaft:

- The solid shaft is provided with a centering thread acc. to DIN 332-2. This can be used to mount and also axially attach transfer elements such as a gear, chain wheel, belt pulley or coupling hub using a central screw.
- The feather keys (option) comply with DIN 6885-1.

5.2.4 Install gearbox

NOTICE

Material damage!

If you are only mounting the gearbox on the foot fastening, radial forces on the output shaft may damage the gearbox.

- In this type of application, fix the attached motor in place on the foot fastening of the motor.

Check the following before installing the gearbox:

- Is the substructure at the installation site even and torsion-resistant?
- Can the cooling air of the motor flow in and out unimpeded?
- Can the motor be attached to the gearbox beforehand to prevent the motor shaft jamming? (section 5.1, page 23)
- Can the transfer element (gear, chain wheel, belt pulley or coupling hub) be attached to the output shaft beforehand? (section 5.2.3, page 29).

Install the gearbox as follows:

1. Sling the gearbox (and the attached motor) at the suitable sling points with the lifting gear and transport it to the installation site. Also observe the installation position of the gearbox.
2. When attaching –
 - 2.1 On the drive flange: Fit the gearbox housing on the pilot (h6);
 - 2.2 to the foot fastening: If necessary, fix the motor in place on the foot fastening of the motor.
3. Attach the gearbox with suitable screws of strength class 10.9 and tighten it with the appropriate tightening torque.

5.3 Connect gear switcher

NOTICE

Material damage!

The gear switcher can be damaged if incorrectly connected.

- The electrical connection may only be carried out by a qualified electrician.
- Carry out all work on connection cables of the gear switcher that are completely disconnected from the power supply.

NOTICE

Material damage!

Electromagnetic fields that arise from electric motors, for example, can falsify signals of the limit switch of the gear switcher.

- Do not lay the control lines for the gear switcher parallel to the lines for the voltage supply or shield them.

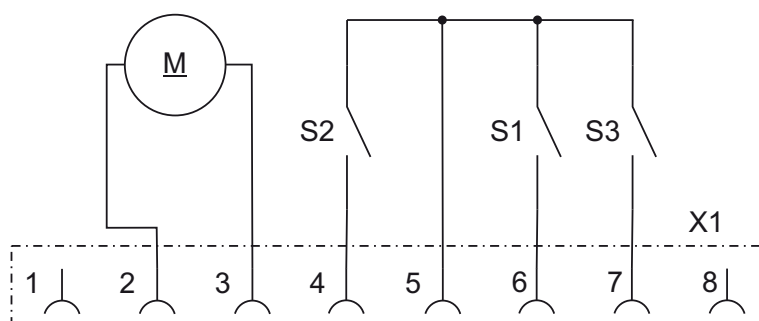
5.3.1 Gear switcher specification

Merkmal	Wert
Switching motor rated voltage ¹	24 V DC \pm 10%
Switching motor rated current	0,6 A
Switching motor starting current	2,76 A
Limit switch rated voltage ¹	24 V DC
Limit switch rated current ²	1 A

1) Note voltage losses in lines, contact resistors and increased resistances that arise over time due to corrosion.

2) The limit switch may only be applied with the control current and not the current of the switching motor.

5.3.2 Connect gear switcher



Details about the gear change can be found in 6.3.

Fig. 5-4 Gear switcher circuit diagram

S1 – Limit switch for direct gear (1:1)

S2 – Limit switch for transmitted gear (4:1 or 5.5:1)

S3 – Limit switch for neutral position (option)

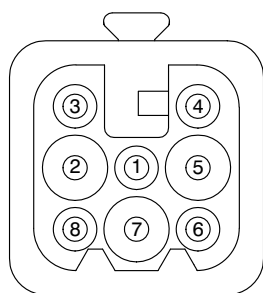


Fig. 5-5 Pin assignment of connector X1

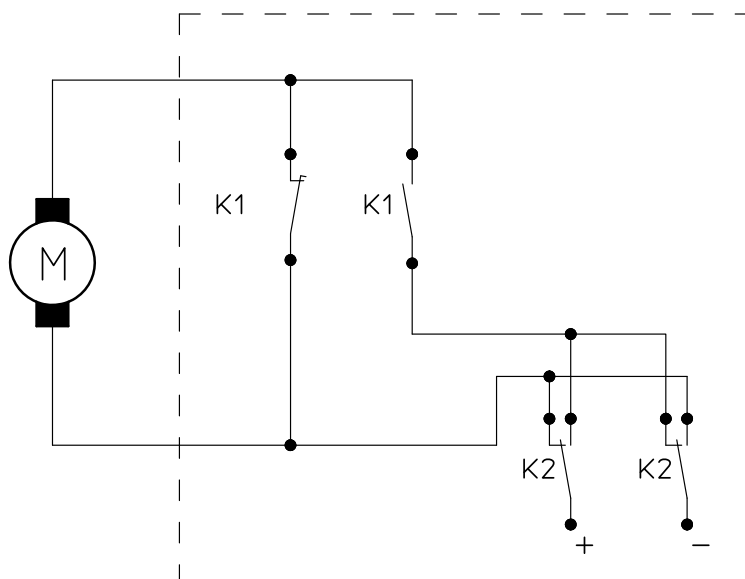


Fig. 5-6 Circuit diagram for the controller of the switching motor

K1 (relay) switches the switching motor on or off;

K2 (relay) changes the polarity of the voltage supply.

5.3.3 Turn connector (optional)

The mating plug for the gear switcher is available as an option.

For motor adapters with the dimensions $a_6 \leq 260$ mm (see Fig. 5-7) you can turn the housing of the connector in the horizontal position if this is appropriate for the cable guide.

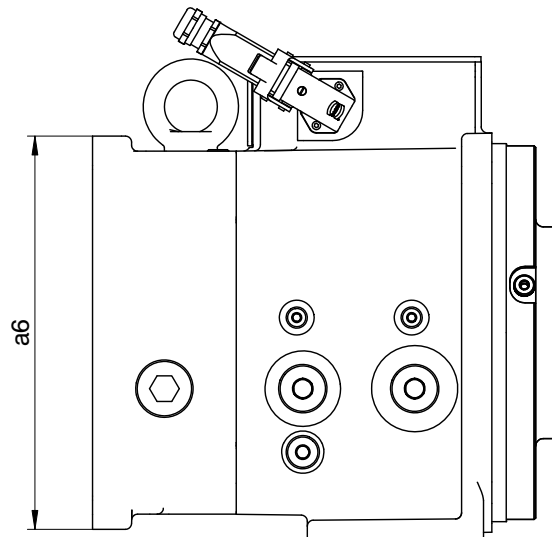
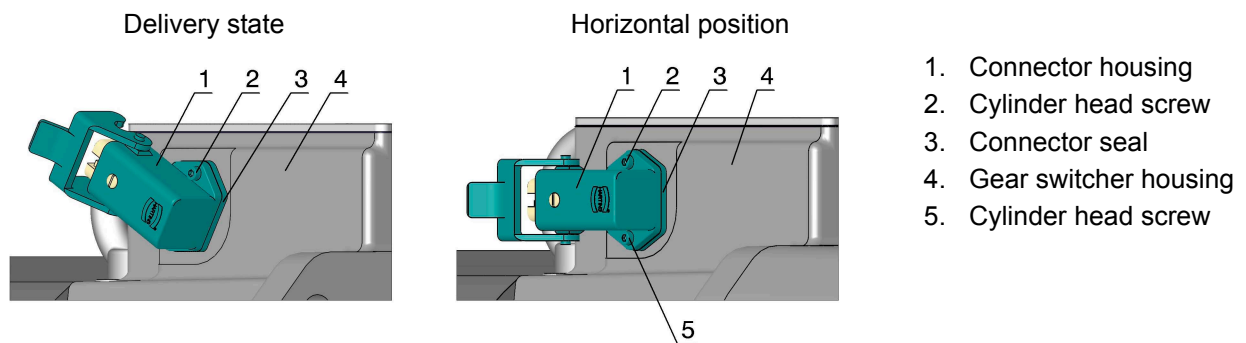


Fig. 5-7 Dimension a_6 of the motor adapter



Turn the connector in the horizontal position as follows (also see the previous figure):

1. Unscrew both cylinder head screws (3) and (5) on the connector housing (1).
2. Arrange the connector housing and connector seal (3) in the horizontal position.
3. Remount the connector housing with both cylinder head screws at the housing of the gear switcher (4) and make sure that no lines are pinched between the housings of the connector and gear switcher.



5.3.4 Connect connector

Observe the above requirements and warnings.

Connect the gear switcher as follows:

1. Disconnect the connection lines for the gear switcher from the power supply.
2.
 - 2.1 **With supplied mating plug:** Connect the supplied mating plug (option) to the controller of the machine according to the above circuit diagram.
 - 2.2 **With mating plug provided by the customer:** Check whether your mating plug mechanically and electrically fits the connector of the gear switcher.
3. Connect the mating plug to the connector of the gear switcher and lock it.

⇒ The connection of the gear switcher is now complete.

5.4 Connect circulating lubrication system (optional)

NOTICE

Material damage!

Too little oil or dry running can cause damage to the gearbox!

- ▶ Install a non-return valve at the oil inlet connection of the gearbox so that the oil level does not drop if there is a fault.
- ▶ Install an oil level sensor at the oil tank to switch off the main spindle drive if there is a fault.

The circulation lubrication system allows for efficient lubrication and cooling of the gearbox. As a result, the power of the gearbox increases and the heat input of the gearbox in the machine decreases.

NOTICE

Material damage!

If the oil level is too high, the performance of the gearbox decreases!

- ▶ Lay the oil return flow line so that it always runs below the oil return flow connection of the gearbox.
- ▶ If your circulation lubrication system has no suction pump for the return, lay the oil return line vertically from the gearbox down to the circulation lubrication system.

5.4.1 Circulating lubrication system specification

Formula symbol	Unit	Explanation
$\Delta\vartheta$	K	Temperature difference
$q_{v,lub}$	l/min	Volume flow of circulation lubrication
ϑ_1	°C	Temperature at the inlet connection
ϑ_2	°C	Temperature at the return flow connection
ϑ_{amb}	°C	Surrounding temperature

Feature	Value
Specific cooling capacity	$\geq 0.07 \text{ kW/K}$
Absolute cooling capacity	$\geq 1.4 \text{ kW}$ with $\Delta\vartheta = \vartheta_1 - \vartheta_2 = 60 \text{ °C} - 40 \text{ °C} = 20 \text{ °C}$ and $\vartheta_{amb} = 30 \text{ °C}$
Volume flow $q_{v,lub}$	See following table
Filter ¹⁾	Filter fineness 60 μm
Internal diameter of connecting element on the return flow ²⁾	$\geq 21 \text{ mm}$ (G1" thread) $\geq 19 \text{ mm}$ (G3/4" thread)
Gear oil specification ³⁾	CLP HC ISO VG 46

1) At the inlet connection of the gearbox

2) Pipeline cross sections specified by thread connections should not be limited by screw connection elements

3) Other specifications on request

5.4.2 Connections

Depending on the installation position and rotary direction, the gearbox must be connected to different connections on the cooling system. For details see this section.

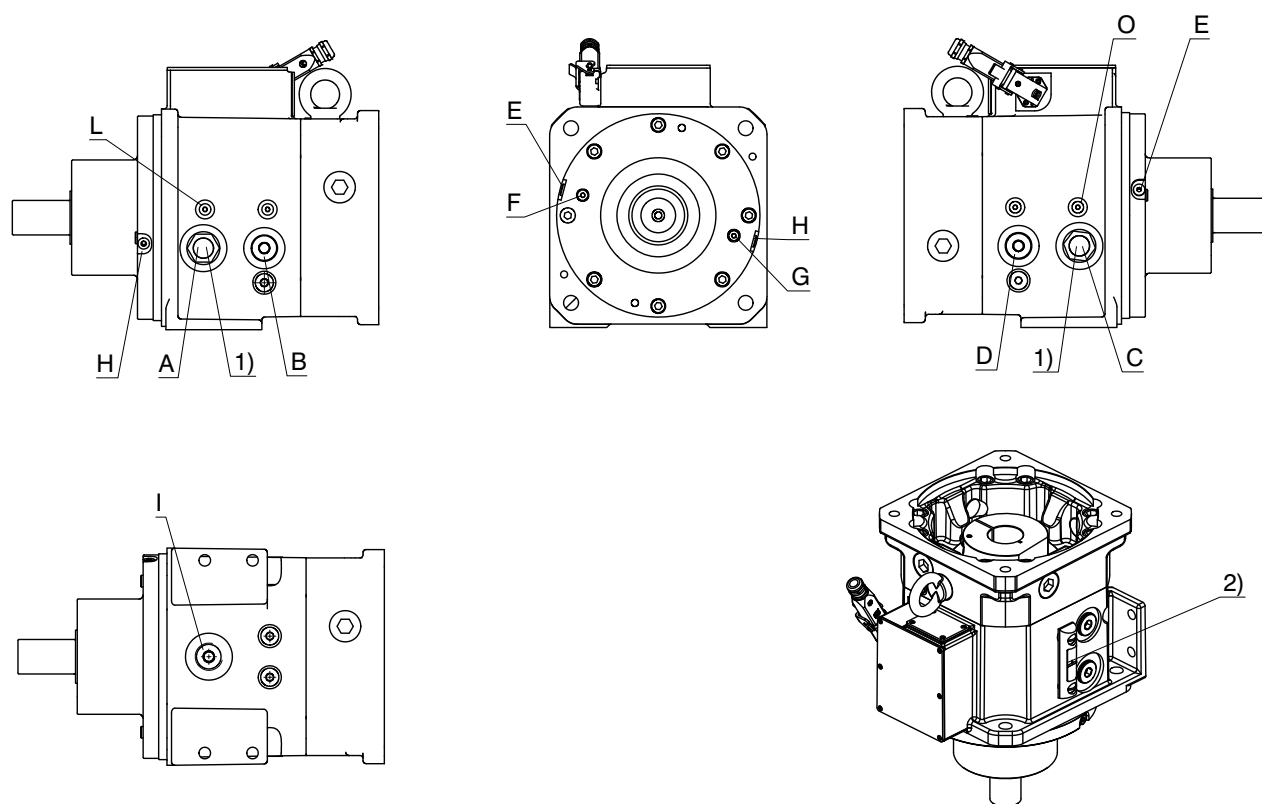


Fig. 5-8 Position of the connections

- 1) Oil inspection glass for splash lubrication and EL1
 2) Oil level indicator for splash lubrication and EL 5 (option)

Installation position / main direction of rotation	Supply lineconnection 1		Supply lineconnection 2		Return flow connection	
	Designation ¹⁾	$q_{v,lub}$ [l/min]	Designation ¹⁾	$q_{v,lub}$ [l/min]	Designation ¹⁾	$q_{v,lub}$ ²⁾ [l/min]
EL1 / cw ³⁾	B	≥ 2	E/F/G/H	≥ 1	C	> 3
EL1 / ccw ⁴⁾	D	≥ 2	E/F/G/H	≥ 1	A	> 3
EL3 / cw and ccw	D	≥ 2	E/F/G/H	≥ 1	I	> 3
EL4 / cw and ccw	B	≥ 2	E/F/G/H	≥ 1	I	> 3
EL5 / cw and ccw	E/F/G/H	≥ 3	—		B/D	> 3
EL6 / cw and ccw	E/F/G/H	≥ 3	—		A/C/I	> 3

Tab. 5-1: Assignment of the connections for the installation position and rotary direction

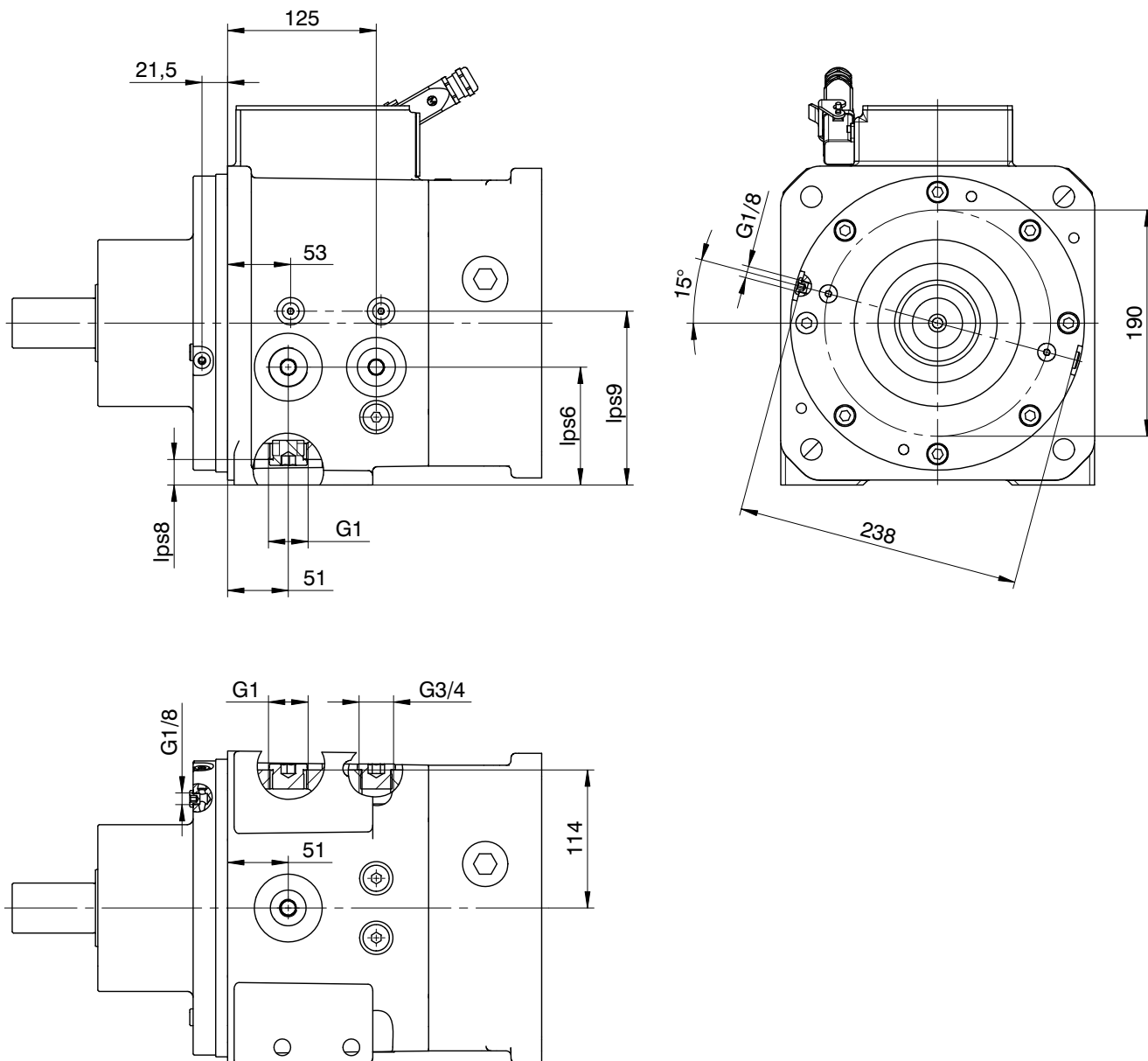
1) The "/" sign means "or" (E or F or G or H). Connections F and G are not accessible with the cooling flange option

2) As a general rule: $q_{v,lub}$ return $>$ $q_{v,lub}$ supply

3) cw = clockwise when looking at the output shaft

4) ccw = counter-clockwise when looking at the output shaft

Dimensions of the connections for circulation lubrication



	lps6	lps8	lps9
PS25	99	21,5	146
PS30	127	49,5	174

5.4.3 Connect circulating lubrication system

Note the above specification and warnings before connecting the gearbox to the circulating lubrication system.

Connect the gearbox to the circulating lubrication system as follows:

1. Make sure that the required inlet and outlet connections of the gearbox can be accessed (see section 5.4.2). If your gearbox includes the optional cooling flange, you must guide the supply line through the access holes of the cooling flange to connection E or H
2. Remove the corresponding screw plugs.
3. Connect the inlet and outlet lines to the gearbox in the appropriate sequence.



Information

In principle operation of the gearbox with splash lubrication (with the corresponding maximum speeds) is possible if the circulating lubrication system fails (except in installation position EL6). For this you must ensure that the gearbox remains filled with the required oil quantity. The oil quantity depends on the installation position. The oil filling quantities of the gearbox with splash lubrication can be found on the Internet at www.stoeber.de

6 Commissioning



WARNING!

Risk of injury due to moving parts!

Make certain before commissioning that

- ▶ no persons are in danger due to start-up;
- ▶ all protection and safety equipment is properly installed;
- ▶ the drive is not blocked;
- ▶ components attached to the drive (e.g. feather keys or transfer elements) are adequately protected from centrifugal forces;
- ▶ the direction of rotation of the drive is correct.



WARNING!

Burns!

The surface temperature of the gearbox can significantly exceed 65° C in operation!

- ▶ Allow the gearbox to cool down sufficiently before touching it or wear protective gloves.

6.1 Check installation

NOTICE

Material damage!

Only commission the gearbox when the following preconditions are satisfied:

- ▶ Instructions for commissioning the attached motor are observed;
- ▶ Transfer elements are checked for tight fitting and correct setting;
- ▶ For circulation lubrication: The circulation lubrication system is connected to the gearbox and put into operation;
- ▶ All other checks specific to and required for commissioning your system are carried out.

Note during commissioning:

- For multi-axis systems, each drive must be put into operation individually.
- For circulation lubrication: The attached main spindle motor may only be switched on when the gearbox is provided with the required oil supply.

6.2 Check lubrication

6.2.1 Splash lubrication



Information

The gearbox with splash lubrication is filled with suitable gear oil when delivered. The oil quantity depends on the installation position.

Check whether the oil level is correct before commissioning the gearbox (see 7.2.2).

6.2.2 Circulation lubrication (optional)

Check whether the gearbox is supplied with the required supply of oil before starting the main spindle motor.



Information

Non-hazardous:

- A drop in the oil level when the circulation lubrication system starts up
- The formation of an oil-air emulsion in the return flow line and in the tank.

6.3 Check gear change

6.3.1 Switching logic

For the gear change, a switching logic must be programmed in the machine controller that is described in the diagram below and explained in the following sections.

The electrical connection of the gear switcher is described in Chapter 5.3.2.

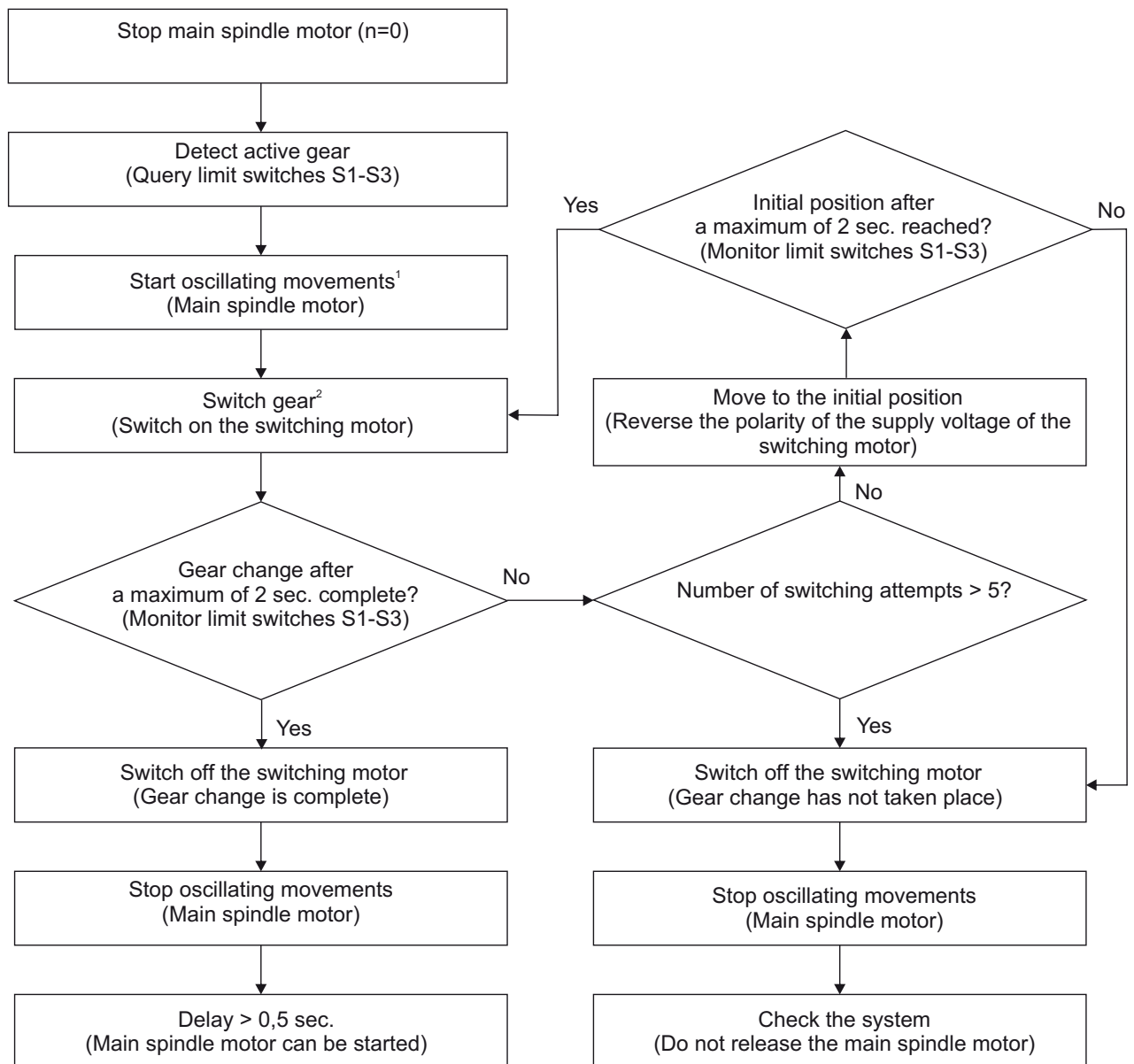


Fig. 6-1 Switching logic for the gear change

1) For details see section 6.3.2.

2) For details see section 6.3.3.

6.3.2 Oscillating movements

Formula symbol	Unit	Explanation
α	$^{\circ}/s^2$	Angular acceleration
n	rpm	Speed
ω	$^{\circ}/s$	Angular velocity
f_{dw}	Hz	Frequency of the change in the direction of rotation
φ	$^{\circ}$	Angle of rotation
t	s	Time
t_{dw}	s	Duration of the rotary movement in one direction

For the gear change to run properly, the main spindle motor must perform oscillating movements with an angle of rotation of 10° . The frequency of the change in the direction of rotation (f_{dw}) depends on the mass of the main spindle components and may vary in the range from 5 to 20 Hz. Determine the optimum value of f_{dw} by switching trials.

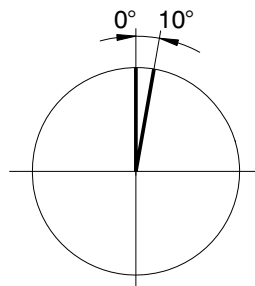


Fig. 6-2 Angle of rotation

The following diagrams illustrate the course of oscillating movements over time.

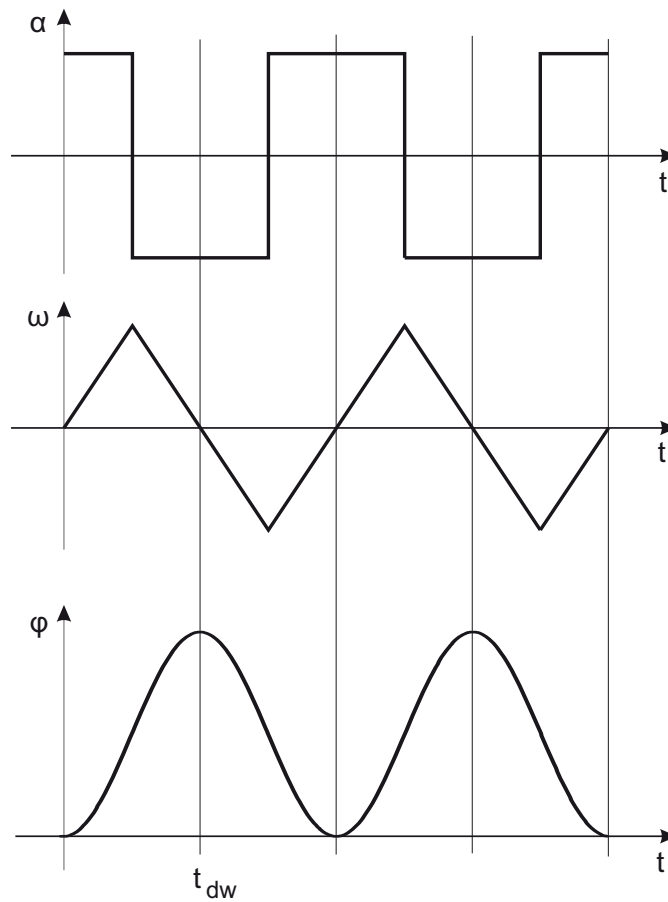


Fig. 6-3 Temporal sequence of oscillating movements

The angular speed (ω), angular acceleration (α), speed (n) and frequency of the change in direction of rotation (f_{dw}) can be calculated as follows:

$$\omega = \frac{\varphi}{t_{dw}/2} \quad \varphi = \frac{\omega}{t_{dw}/2} \quad n = \frac{30^\circ \cdot \omega}{360^\circ} \quad f_{dw} = \frac{1}{t_{dw}}$$

Example values for programming such oscillating movements are listed in the table below.

φ [°]	f_{dw} [Hz]	t_{dw} [s]	α [°/s ²]	ω [°/s]	n rpm
10	5	0.2	1000	100	16.7
10	10	0.1	4000	200	33.3
10	15	0.067	9000	300	50.0
10	20	0.05	16000	400	66.7

Tab. 6-1: Sample values for programming

6.3.3 Change gears

The gear change occurs while the gearbox is stopped by turning on the power supply of the switching motor for a short period. The polarity of the voltage supply specifies the gear changed to. A closed limit switch signals the active gear. For details see the table below.

The circuit diagram and the pin assignment of the gear switcher can be found in 5.3.2, page 31.



Information

Designation of the gear in the gearbox:

- 1st Gear = direct gear (1:1), delivery state
- 2nd Gear = transmitted gear (4:1 or 5.5:1)
- 3rd Gear = neutral position (option)

Gear change	Polarity of the voltage supply of the switching motor		Limit switch monitoring
	Pin 2	Pin3	
2 → 1	24 V	GND	S1 closed?
3 → 1	24 V	GND	S1 closed?
1 → 2	GND	24 V	S2 closed?
3 → 2	GND	24 V	S2 closed?
2 → 3 ¹⁾	GND	24 V	S3 closed?
1 → 3	Not permitted directly; shift into 2nd gear previously (see above)		

Tab. 6-2: Change gears

1) To ensure problem-free switching to neutral position (optional), the cycle time of the controller for gear switching must not be more than 60 ms.

7 Service

7.1 General safety instructions



WARNING!

Serious injuries!

Unintentional startup of the gearbox or machine drives during maintenance can cause serious injuries.

- ▶ Before starting maintenance work, disconnect the machine drives from the mains and secure them against unintentional startup.



WARNING!

Burns!

The surface temperature of the gearbox and the gear oil can significantly exceed 65° C in operation!

- ▶ Allow the gearbox and the gear oil to adequately cool down before starting maintenance work.

NOTICE

Material damage!

Unauthorized opening of the gearbox and improper interventions will result in loss of the warranty.

- ▶ The gearbox may only be repaired by STÖBER Service or qualified personnel.

NOTICE

Environmental damage!

Lubricants and cleaning agents must not reach the earth, groundwater or sewage system.

- ▶ Collect old oil in a sufficiently sized container.
- ▶ Observe the regulations of the manufacturer of the lubricant and cleaning agent used.
- ▶ Dispose of lubricants and cleaning agents according to the valid local environmental regulations.

7.2 Maintenance

7.2.1 Cleaning

NOTICE

Material damage!

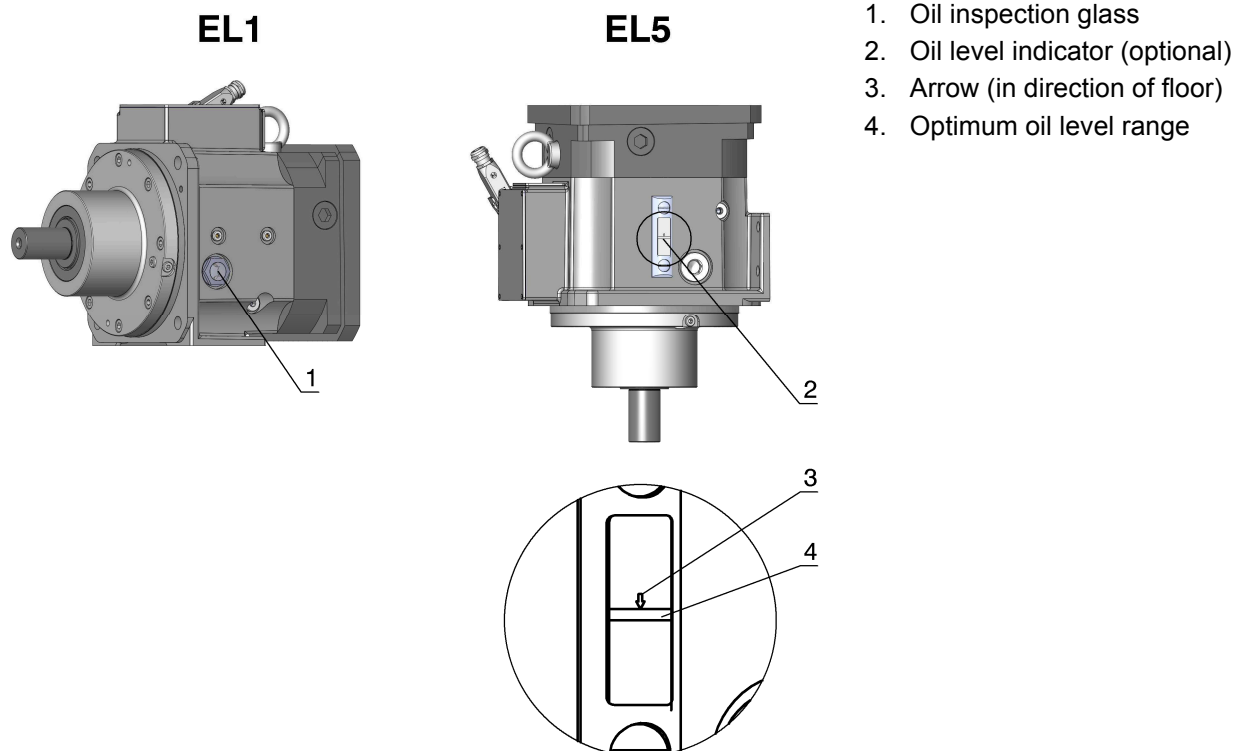
Dust particles or water that penetrate the gearbox can cause damage to the gearbox.

- ▶ Do not use a high pressure cleaner or compressed air when cleaning the gearbox housing.

Clean dirt and deposits from the gearbox housing at regular intervals depending on the local contamination level. When doing so, observe the safety information above and the following:

- Do not use any solvent;
- Observe the protection class of the gearbox.

7.2.2 Check oil level for splash lubrication



To check the oil level in the gearbox (also see the figure above):

1. Allow the gearbox to cool to room temperature.
2. In installation position EL1:
 - 2.1 Read the oil level at the oil inspection glass (1).
 - 2.2 If the oil level clearly deviates from the middle of the oil inspection glass, then correct it accordingly (7.2.3).
3. In installation position EL5 (with oil level indicator option):
 - 3.1 Read the oil level at the oil inspection glass (2).
 - 3.2 If the oil level clearly deviates from the optimum oil level range (4), (arrow points in the direction of the floor), correct the oil level accordingly (7.2.3).
4. The oil level can not be visually checked in installation positions EL3 and EL4. To check the oil level, either bring the gearbox to installation position EL1 or drain the gear oil, measure the oil quantity and refill (7.2.3).

7.2.3 Oil change for splash lubrication

CAUTION!

Skin irritations!

Physical contact with gear oil can cause eye disorders and skin irritation!

- ▶ Carefully unscrew the screw plugs for draining the oil;
- ▶ Wear goggles with side protection and rubber gloves when changing the oil.

NOTICE

Material damage!

Unsuitable gear oil or mixing different types of gear oil can cause damage to the gearbox!

- ▶ Only use gear oils according to the specification stated below and do not mix different types of gear oil.

NOTICE

Material damage!

As the oil filling quantity of the gearbox depends on the installation position, installation positions that differ from the details specified in your order may result in damage to the gearbox.

- ▶ Coordinate the correct oil filling quantity together with STÖBER for different installation positions or sloping positions of the gearbox that can arise in connection with belt tensioners.



Information

The gearbox with the splash lubrication version is filled with gear oil when delivered. The oil quantity depends on the installation position. The oil filling quantity can be found on the nameplate of your gearbox and on the Internet at www.stoeber.de.

Details for oil change with splash lubrication

Oil change interval	every 10,000 operating hours
Gear oil specification	CLP HC ISO VG 68

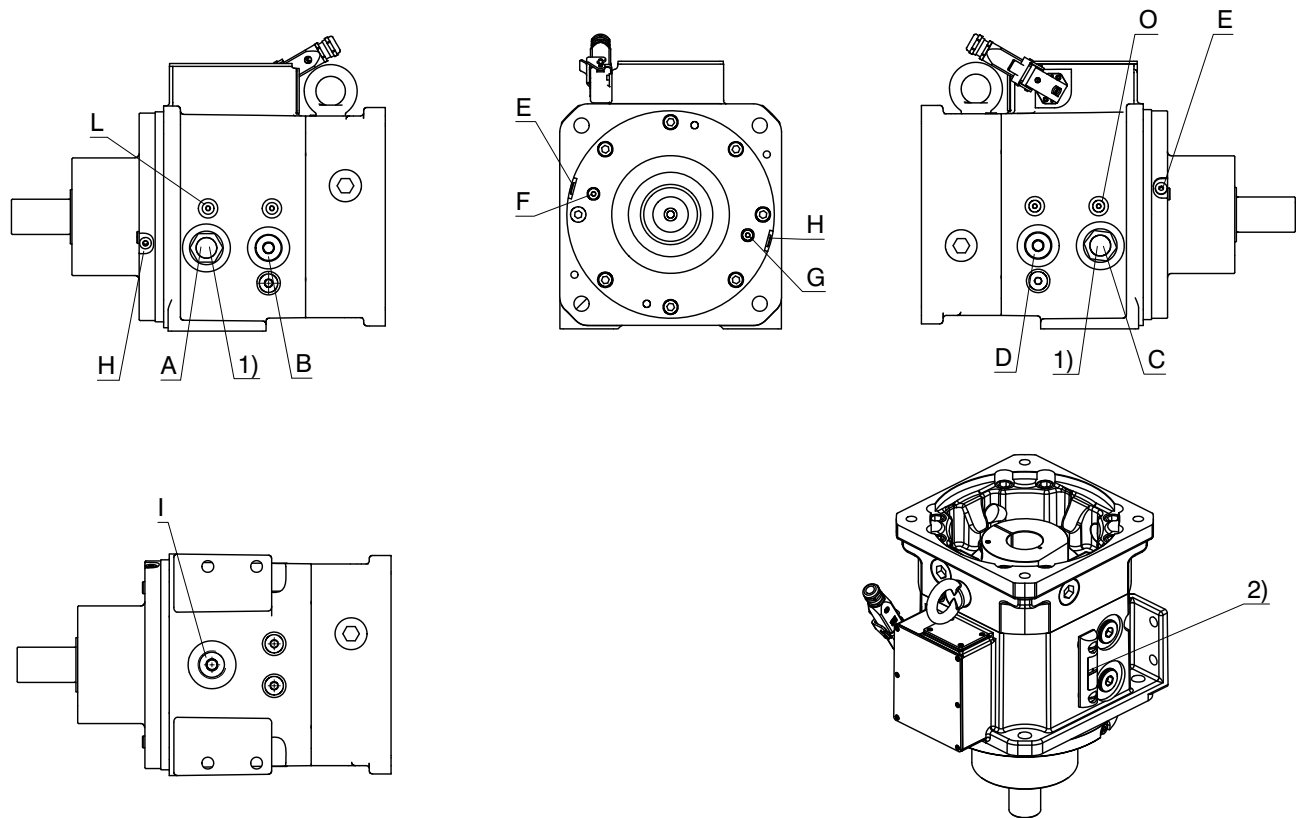


Fig. 7-1 Position of the connections

1) Oil inspection glass for splash lubrication and EL1

2) Oil level indicator for splash lubrication and EL 5 (option)

Installation position	Fill	Drain
EL1	L / O ¹⁾	I
EL3	A / B	C / D
EL4	C / D	A / B
EL5	B / D	E / F / G / H ²⁾

Tab. 7-1: Assignment of the connections for the installation position

1) The "/" character means "or" (L or O);

2) The transmission oil must be suctioned out. Connections F and G are not accessible with the cooling flange option

Change oil as follows:

1. Allow the gearbox to run for about 1 minute before the oil change so that there will be no deposited dirt particles in the gearbox.
2. Carry out the safety instructions in 7.1.



3. Make sure that each filling and draining connection of the gearbox can be accessed (see above table).
 4. Place a sufficiently sized container under the corresponding draining connection.
 5. Remove the appropriate screw plug and connect an oil suction device if necessary.
 6. Remove the screw plug at the filling connection too and wait until the old oil has completely drained out of the gearbox.
 7. Close the draining connection and remove the collection container or the oil suction device.
 8. Fill the gearbox using the filling connection with the oil quantity and oil specification stated on the name plate.
 9. Close the filling connection.
- ⇒ The oil change is now complete.

7.2.4 Oil change for circulation lubrication

CAUTION!

Skin irritations!

Physical contact with gear oil can cause eye disorders and skin irritation!

- ▶ Carefully unscrew the screw plugs for draining the oil;
- ▶ Wear goggles with side protection and rubber gloves when changing the oil.

NOTICE

Material damage!

Unsuitable gear oil or mixing different types of gear oil can cause damage to the gearbox!

- ▶ Only use gear oils according to the specification stated below and do not mix different types of gear oil.

Details for oil change with circulation lubrication

Oil change interval	See technical documentation of the manufacturer of the circulation lubrication system
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Gear oil specification	CLP HC ISO VG 46 ¹⁾
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1) Other specifications on request

Instructions for the oil change for circulation lubrication can be found in the technical documentation of the manufacturer of the circulation lubrication system.

7.3 In the event of disruptions

Persons who work on the machine or gearbox (machine user, machine operator, service employees, etc.) must be made aware of changes compared with normal operation. Show them that the function of the gearbox is affected. This includes:

- Increased operating temperatures or vibrations
- Unusual noises or odors
- Leaks on the gearbox housing

If any of these occur, shut down the machine and notify the responsible qualified specialist without delay.

7.3.1 Detecting the cause of a fault

The following table lists faults that can arise during operation of the gearbox. Go through the table from top to bottom when looking for the cause of fault.

Fault	Possible cause	Measure	See section
Increased operating temperature or maximum permitted temperature of the gearbox exceeded	Speed or torque too high	Check design of the gearbox	3.6.1
	Main spindle motor heats the gearbox (too much)	Adequately cool the main spindle motor	Documentation of the manufacturer
		Check configuration of the main spindle motor	
		Replace main spindle motor	
	Ambient temperature too high	Make sure the gearbox is adequately cooled	
	Bearing damage	Contact STOBER Service	last page
	Oil level in the gearbox too high or too low	Check oil level	7.2.2
	Gear oil is too old	Check oil change interval and change oil if necessary	7.2.2
Increased or unusual noises or vibrations during operation	Fault in circulation lubrication system (if provided)	Check circulation lubrication system	Documentation of the manufacturer
	Motor installed off-center	Check motor installation	5.1
	Gearbox off-center or not correctly attached	Check installation of the gearbox	5.2
	Oil level in the gearbox too low	Check oil level	7.2.2
	Bearing damage	Contact STOBER Service	last page
	Tooth damage	Contact STOBER Service	last page

Fault	Possible cause	Measure	See section
Gearbox loses oil	Oil level in the gearbox too high	Check oil level	7.2.2
	Radial shaft seal ring not tight	Contact STOBER Service	last page
	Output shaft at the sealing point damaged	Contact STOBER Service	last page
	Gearbox leaky	Contact STOBER Service	last page
Output shaft does not rotate although the motor is running	Gear switcher is in the neutral position (if provided)	Change to the desired gear	6.3.3
	Fault in the switching unit	Check gear change	continued below
	Clamp coupling incorrectly tightened or faulty	Check clamp coupling	5.1
Gear is not changed	Switching motor is not correctly controlled (during commissioning)	Check control program	6.3.3
	No voltage for switching motor or voltage is too low	Check control voltage	5.3.4
	Limit switch misplaced or faulty	Contact STOBER Service	last page
	Loose wiring in the connector of the switching unit	Check plug connection and clean if necessary	
	Switch mechanism jammed	Contact STOBER Service	last page
	Switching motor faulty	Contact STOBER Service	last page

7.3.2 Material defects



Information

Information on material defects can be found in our current sales and delivery conditions at www.stoeber.de

7.3.3 Complaint form

Our aim is to continually improve the quality of our product. For this reason, we ask you to complete and return this form if you have a complaint or repair request (you can find our contact information on the last page of this operating manual). Our service team will then contact you promptly.

Company	Customer number	Post code / Town
Name of contact partner	Telephone no. for queries	E-mail
Product description	Type designation	Serial number
<input type="checkbox"/> Complaint	<input type="checkbox"/> Repair query	
Fault description		
Probable cause		
Other		
Location	Date	Signature

7.4 Disassemble gearbox



WARNING!

Suspended loads!

Falling gearboxes or motors can cause serious injuries or even death!

- ▶ Cordon off the danger zone and make sure that no personnel are under suspended loads.
- ▶ Use lifting gear with adequate lifting capacity.
- ▶ Only sling the gearbox or the motor at the ring screws intended for this.
- ▶ In addition sling the motor mounted on the gearbox and make sure that there is no diagonal pull.

NOTICE

Material damage!

Knocks or any other use of force can cause damage to the gearbox or motor.

- ▶ Do not strike the shafts or housing of the gearbox or motor with a hammer or other tools.
- ▶ Do not apply any pressure, impact or high acceleration to the gearbox or motor.

Disassemble the gearbox as follows:

1. Observe the safety instructions in 7.1.
2. Remove the connector of the switching unit.
3. (For circulation lubrication) Place a suitable collection container for gear oil under the gearbox and disconnect the gearbox from the circulation lubrication system.
4. (For gearboxes with cooling flange) Place a suitable collection container for the coolant under the gearbox and disconnect the gearbox from the cooling system.
5. If there are transfer elements on the output shaft that prevent disassembly, disassemble them.
6. Sling the gearbox and the attached motor at suitable sling points with the lifting gear.
7. Unscrew the fastening screws on the output flange and, if necessary, at the base of the gearbox.
8. If the gearbox is adjusted at the pilot, remove it from the fit.
9. Remove the gearbox with the attached motor out of the machine using the lifting gear.

10. Separate the gearbox from the motor (adapt the procedure in 5.1 for disassembly).

⇒ Disassembly of the gearbox is now complete.

7.5 Disposal

Dispose of the gearbox at disposal points intended for this. When doing so, please observe:

- The separated collection and disposal of lubricants (old oil);
- The applicable legal regulations on-site.



STÖBER



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Technische Änderungen vorbehalten
Errors and changes excepted
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