

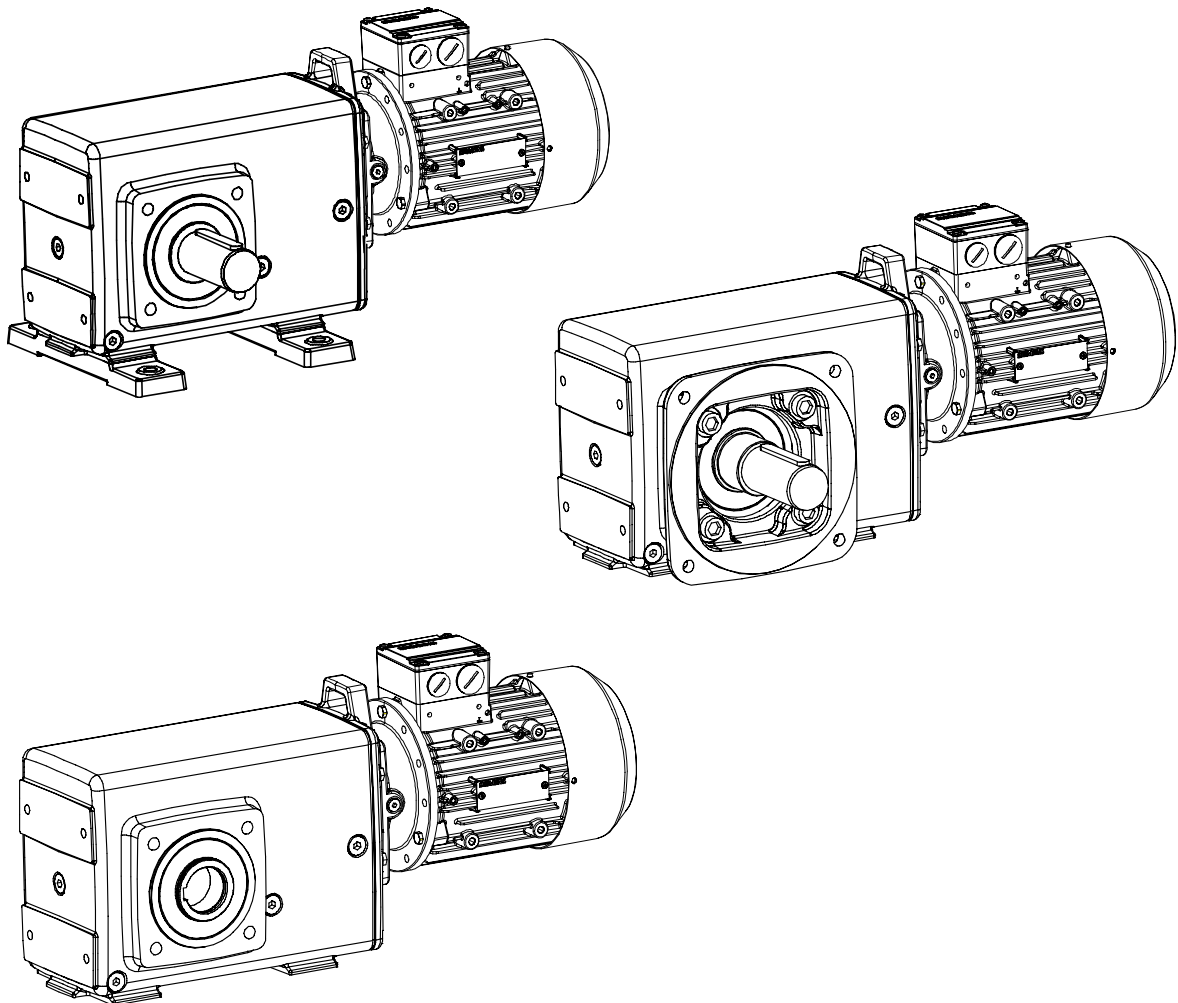
# SIEMENS

## Geared motors

Operating instructions

Edition 04.03

## Angular gearboxes 2KG13 Sizes W1 ... W0



Order N° 2KG1901-3AA00-0EA0  
IdN° 214 663 44

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### Further operating instructions and documents

Depending on the present type, additionally the following operating instructions and documents have to be pointed out:

Description	Type	Order-N°
<b>Information and commissioning instructions</b>		
Helical geared motors	2KG11	2KG1900-1AA00-0AA0
Offset shaft geared motors	2KG12	2KG1900-2AA00-0AA0
Angular geared motors	2KG13	2KG1900-3AA00-0AA0
Helical worm geared motors	2KG14	2KG1900-4AA00-0AA0
<b>Operating instructions</b>		
Three phase motors	2KG1	2KG1901-0AA00-0EA0
Helical gearboxes	2KG11	2KG1901-1AA00-0EA0
Offset shaft gearboxes	2KG12	2KG1901-2AA00-0EA0
Helical worm gearboxes	2KG14	2KG1901-4AA00-0EA0
Rotary pulse encoder	1XP8001-1 1XP8001-2	517.30777.30 517.30777.30
Spring loaded brake	2LM8002 – 1NL10 2LM8005 – 2NL10 2LM8010 – 3NL10 2LM8020 – 4NL10 2LM8040 – 5NL10 2LM8060 – 6NL10 2LM8100 – 7NL10	610.43431.21 610.43431.21 610.43431.21 610.43431.21 610.43431.21 610.43431.21 610.43431.21
Energy plug ECOFAST	--	610.40038.21
MICROSTARTER	--	610.43400.02
Inverter	6SE96	6SE9996-0XA36
Inverter	MM411	6SE6400-5CA00-0BP0
<b>Catalogue geared motors</b>	<b>M15</b>	<b>E86060-K1715-A101-A2</b>
<b>Catalogue helical worm geared motors</b>	<b>M15.1</b>	<b>E86060-K1715-A111-A1</b>
<b>SGM-Designer CD-Rom</b>		<b>E86060-D5202-A100-A1</b>
<b>Repair parts lists</b>		
Three phase motors	2KG1	2KG1902-0AA00-0EA0
Helical gearboxes	2KG11	2KG1902-1AA00-0EA0
Offset shaft gearboxes	2KG12	2KG1902-2AA00-0EA0
Angular gearboxes	2KG13	2KG1902-3AA00-0EA0
Helical worm gearboxes	2KG14	2KG1902-4AA00-0EA0

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**Notice**

- ◆ These operating instructions do not contain all detail information for reasons of the transparentness and cannot take into account every conceivable application case either.
  - ◆ If you should want to receive additional information or if special problems should appear, which are not treated in detail in these operating instructions, you can request the required information through the local Siemens branch office.
  - ◆ In addition, we point out that the contents of these operating instructions are not part of any earlier made or existing agreement, part of an assent or a legal relationship and will not amend any of these. All obligations of Siemens arise only from the respective sales contract that contains the completely and lonely valid guaranty settlement. These contractual guaranty regulations are neither enlarged nor confined by the explanations of these operating instructions.
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## Definitions, warnings

### Qualified staff

Following these operating instructions resp. the warning advices on the product itself, qualified staff are persons who are familiar with the erection, assembling, commissioning and operating of the product and who are qualified resp. in:

- ◆ Education and training resp. who have the allowance to switch off / on, earthen or mark electrical circuits and units following the standards of security rules.
- ◆ Education and training in maintenance and use of matching security equipment following to the standards of security rules.
- ◆ Training in First Aid.

### Danger

Following these operating instructions and the warning advices on the product itself, danger means, that death, heavy bodily injury or serious damage **will be caused**, if the relevant precautionary measures are not fulfilled.

### Warning

Following these operating instructions and the warning advices on the product itself, warning means that death, heavy bodily injury or serious damage **may be caused**, if the relevant precautionary measures are not fulfilled.

### Attention

Following these operating instructions and the warning advices on the product itself, attention means that bodily injuries or damages **may happen**, if the relevant precautionary measures are not fulfilled.

### Notice

Following these Operating instructions, notice means that important information about the product or the relevant part of the Operating instructions is made which shall be noticed very carefully.



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### Warning

During operation of electrical units, several parts of the units are in general under dangerous, electrical power.

In case of non-observance of the warning advices, heavy bodily injury or serious damage may be caused.

Only qualified staff shall work at this unit or nearby.

This staff has to be fully familiar with all warnings and maintenance actions according to these operating instructions.

The proper and safe Operating of this unit affords the appropriate transport, professional storage and erection as well as the careful handling and maintenance.

National security rules have to be followed.

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# General

## Intended usage

The gearboxes are approved for all travelling, lifting or turning motions in industrial applications. While using these drives, it is necessary to regard the field conditions (e.g. protection class, ambient temperature, site altitudes).

## Incorrect Operatings, possible misuse

Under certain conditions, the operating of geared motors is inadmissible, because it can result in malfunctions, faults in equipment or threat to life or physical condition will come up e.g.:

- ◆ Acidic and corrosive air for cooling.
- ◆ Operating outside of the permitted temperature range.
- ◆ Operating beyond normal air pressure. Otherwise, the adjustment of power may be necessary.
- ◆ Operating under conditions of high humidity or the danger of splash water.
- ◆ Manipulation of electrical components.

Safety devices must not be rendered inoperable or modified or used in any way other than they have been designed for.

## Warning

The relevant national accident prevention regulations and the general safety conditions have to be observed during the operating of our products in order to avoid accidents and damages to the machines. If the safety instructions given in these operating instructions are not observed in any way, personal injury or even death can result.

## Danger

Warning: Dangerous voltage!

The geared motors are connected to the mains voltage supply. Any contact to live parts can cause heavy bodily injuries or even death.

## Commissioning of the angular geared motors

Carry out the commissioning only

- ◆ if you have read these operating instructions and if the operator has given you a complete instruction.
- ◆ if these operating instructions are available for reference at the place of operating.
- ◆ if you are qualified staff / skilled labour.
- ◆ if you are not under influence of drugs, alcohol or medicine which may affect your capacity of reaction.
- ◆ if you comply with the general accident prevention regulations, the operating instructions and the commissioning rules.

**Additional security advises**

You shall only do maintenance and installation,

- ◆ if you are skilled worker.
- ◆ if the motors are switched off from power.
- ◆ if no hazards exist (e.g. hazard of crushing, slipping, etc).
- ◆ if the motors are secured against switching on.
- ◆ if all cables or terminal connections or other parts are free of power (check with a voltmeter).
- ◆ if you are working with insulated tools.
- ◆ if you are using genuine spare parts.



# 1 Description

The model range is covered by 10 gearbox sizes. The sizes W1 and W4 have a housing of high quality pressure gravity die-cast aluminium alloy. This guarantees high stability for high performance and low deadweight.

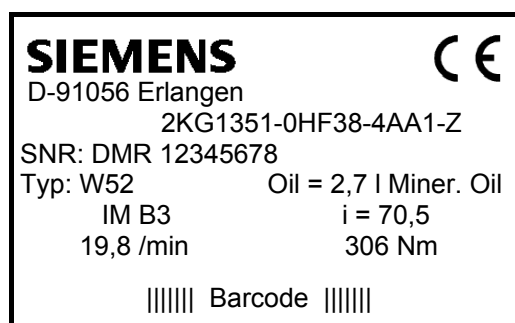
The sizes W5 to W0 feature a grey cast iron housing.

The angular gearboxes of the size W1 to W5 are basically 2-stage; the sizes W6 to W0 are basically 3-stage. With an intermediate stage the transmission range of the gearboxes of size W2 to W0 may be noticeably increased.

## 1.1 Connection motor - gearbox

The motor is driving the gearbox as “direct drive input”. That means the motor is flange-mounted directly into the gear.

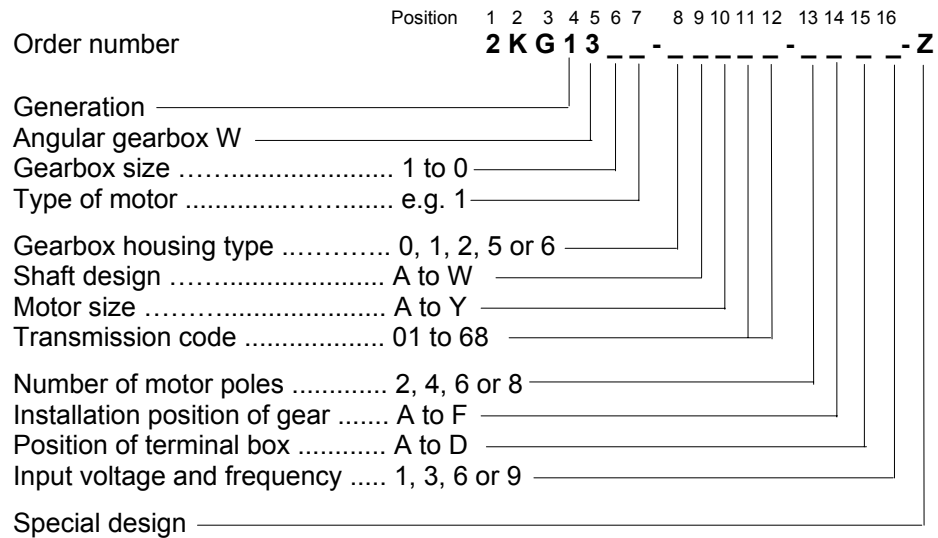
## 1.2 Rating plate



Picture 1-1 Example for rating plate of angular geared motor

Order-N° geared motor	2KG1351-0HF38-4AA1-Z
Serial- N°	DMR 12345678
Gearbox type	W52
Quantity of oil / type	2,7 l / mineral oil
Type of construction	IM B3
Transmission ratio	i = 70,5
Output speed	19,8 / min
Output torque	306 Nm

### 1.3 Structure of order number



## 2 Operation

### 2.1 Transport

For transport, the provided transporting eyelets are to be used.

Explanation of the symbols on the packaging:



This way up



Fragile



Keep dry



Protect against heat



Top-heavy



No use of



Attach sling here  
hand hooks



Centre of gravity

#### Attention

While transporting the gearbox, you have to be very careful to avoid damages through violent impact e.g. through careless loading and unloading.

### 2.2 Storage

The storage of gearboxes demands for conditions as followed:

- ◆ dry rooms with low temperature fluctuation.
- ◆ in the same position as for provided operating.
- ◆ prevented against dust and moisture.
- ◆ on wooden base frames.
- ◆ free from vibrations (no impacts).

The stacking of gears is forbidden.

#### Indication

If not contractual stipulated, a standard conservation is used which includes a guarantee time of six month.

The period of guarantee starts with the day of delivery.

**Attention! In case of storage terms longer than six month, the gearbox may take damage!**

## 2.3 Erection of the angular geared motor

Before erection, it has to be checked whether no damages through transport or storage occurred as e.g. corrosion, leakages, deformations or ruptures.

### **Attention! Do not clean drives with air pressure!**

The standard drives are intended for provided operating under normal industrial conditions. If there are deviations concerning to ambient temperature, atmospheric pressure or air humidity, the angular geared motor has to be prepared with optional equipment or features (see rating plate).

Normal conditions are:

Ambient temperature:	from –10 °C to +40 °C
Site altitudes:	up to 1000 m above sea level

The angular geared motor has to be installed regarding:

- ◆ Air may circulate to allow heat to be exchanged and heated air is not directly sucked in again.
- ◆ No residue from operating processes can accumulate on the geared motor, fall between the drive elements or damage the sealing ring.
- ◆ The oil inlet and outlet and rating plate are accessible.

Before erecting the angular geared motor, it has to be checked whether it will be operated following the mounting position described on the rating plate. The oil quantity is adjusted to the mounting position.

### **Gearbox sizes W1 – W4:**

These gearbox sizes do not need a breathing valve.

If as special request, a breather valve is ordered, it must be fitted at the highest point of the gearbox replacing the oil inlet screw. It will be packed separately for delivery with the information on safety and commissioning.

The position of breather valve, oil input and output – see chart 2-2.

Tightening torques see chart 3-1.

### **Gearbox sizes W5 – W0:**

A breather valve is supplied as standard and is packed separately for delivery with the information on safety and commissioning. This must be fitted at the highest point of the gearbox replacing the oil inlet screw.

The breather valve will be fixed with a band to the gearbox for delivering.

The position of breather valve, oil input and output – see chart 2-2.

Tightening torques see chart 3-1.

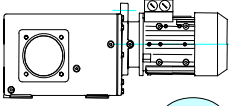
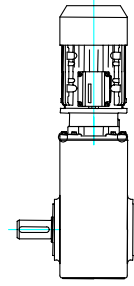
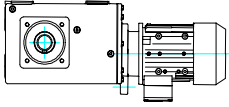
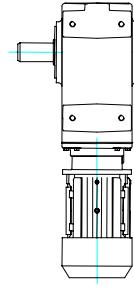
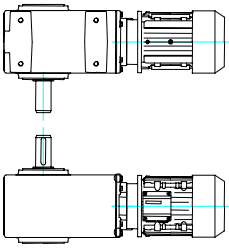
## **Special advices for the erection of the angular geared motor**

For types of construction with air inlet from the top, a canopy is recommended. With the air inlet from the bottom, a cover **must be provided by the customer** to prevent any foreign bodies from falling into the fan.

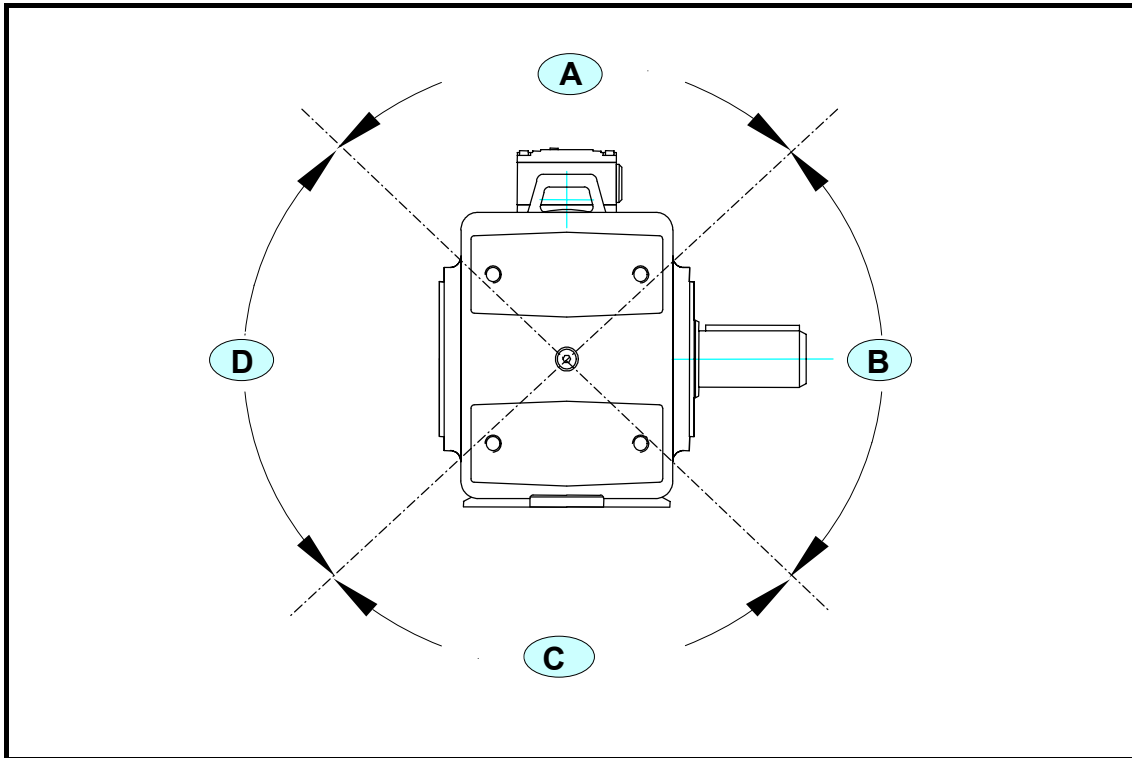
At motors with outlets for condensed water, which may be closed with bolting screws, the outlets have to be in the deepest position of the mounted motor; otherwise it may happen that water enters the motor. In case of change of the mounting position of the angular geared motor, the outlets, which are not used any more, have to be plugged and sealed everlasting.

## 2.3.1 Lubricant quantities

Chart 2-1 Lubricant quantities in litres in dependence on size of gearbox and mounting position

Mounting position	Size of gearbox																		
	W1	W2		W3		W4		W5		W6		W7		W8		W9		W0	
		W22	W23	W32	W33	W42	W43	W52	W53	W63	W64	W73	W74	W83	W84	W93	W94	W03	W04
	Transmission i resp. from ... to ...																		
	5,34 100	5,45 90,1	97,1 369	3,73 90,1	107 369	3,87 90,8	99,6 371	4,94 94,3	99,9 386	12,6 95,1	113 388	13,7 102	113 399	15,3 113	126 441	15,9 111	126 434	16,5 113	121 485
 <b>A</b>	0,4	1,1	1,7	1,4	2,0	1,8	3,6	2,7	4,9	6	7,5	10	13	12	14	20	24	38	43
 <b>B</b>	1,4	2,4	2,8	3,7	3,9	5,7	7,1	8,8	11,3	10,5	13	15	21	20	24,5	31	38	63	67
 <b>C</b>	0,9	1,4	1,7	2,3	2,4	3,6	4,0	6,0	6,8	7	8,5	11	12	14	16	23	25	44	47
 <b>D</b>	1,0	1,8	2,3	2,5	3,2	4,0	5,3	6,1	8,3	8	9	11	14	12	15	20	23	38	44
 <b>E + F</b>	0,8	1,4	1,7	2,1	2,3	3,1	4,0	5,0	6,2	10	11	15	17	18	25	34	38	35	36

In angled mounting positions the quantity of lubricants depend on the positions as described in picture 2-1.

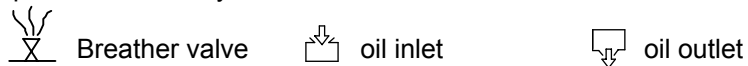


Picture 2-1 Quantity of lubricants in angled mounting position

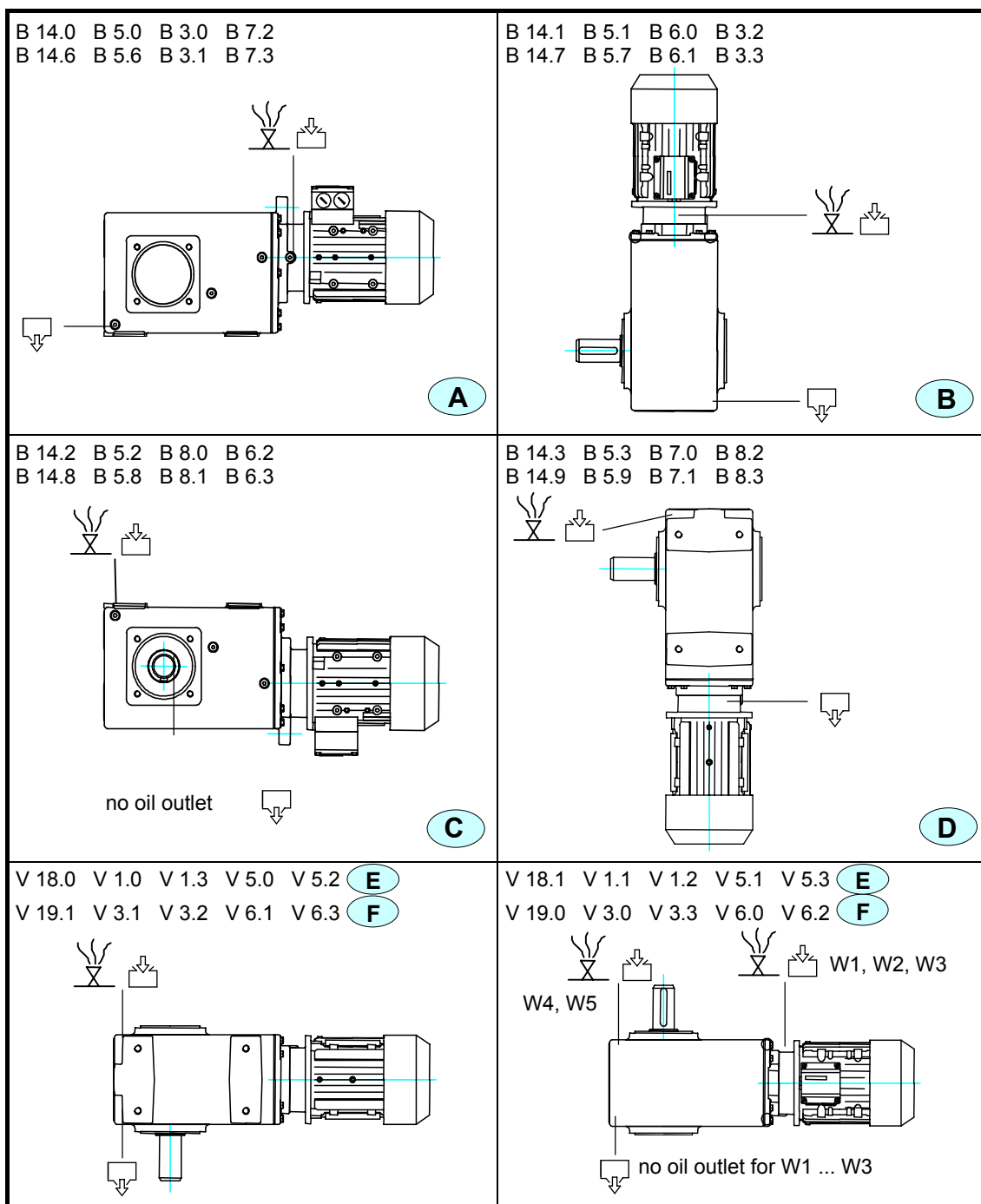
### Overview type of construction / mounting position W1 – W0

The gearboxes have to be operated with the type of construction and in the mounting position, which is shown on the rating plate to guarantee optimal lubricant quantity.

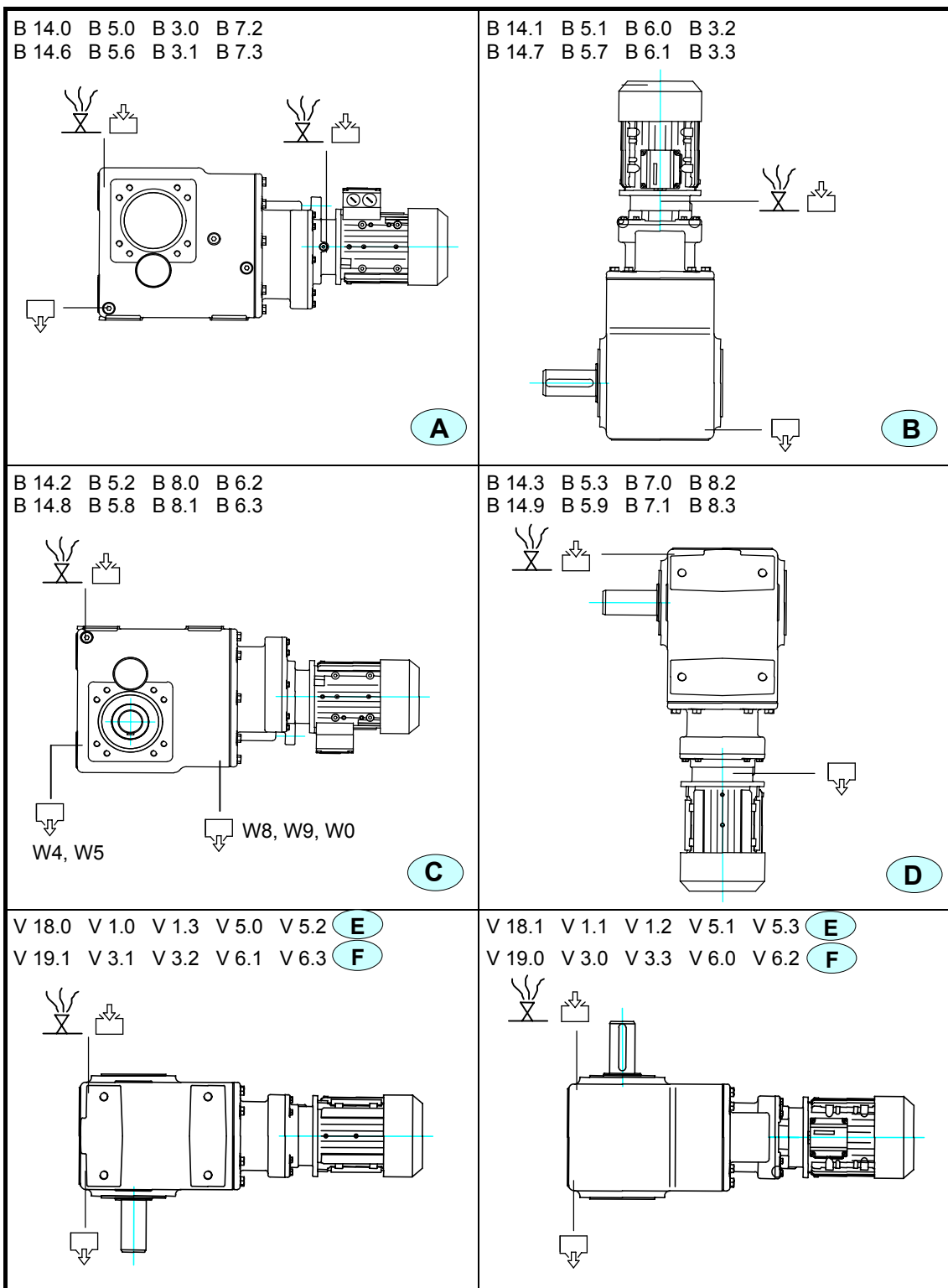
Explanation of the symbols:



Picture 2-2 Type of construction and mounting position gearbox sizes W1 – W5



Picture 2-3 Type of construction and mounting position gearbox sizes W6 – W0





### 2.3.2 Mounting of the angular gearbox with solid shaft

The mounting position resp. the flanging face have to be in such a condition that no compulsory forces through mounting distortions will be transmitted into the gearbox housing. For the correct mounting of the angular gearbox to the construction the following conditions concerning to the screwed joints have to be fulfilled:

Chart 2-2 Tightening torques for **foot-mounted type** to the construction

Gearbox size	Bolt <sup>1)</sup> DIN EN ISO 4762 DIN EN ISO 4014	Washer DIN125	Tightening torque [Nm]	Bolt <sup>1)</sup> Locking bolt	Tightening torque [Nm]
W1	(4x) M8, Strength 8.8	A 8,4	25	(4x) M8	35
W2	(4x) M10, Strength 8.8	A 10,5	51	(4x) M10	75
W3	(4x) M10, Strength 8.8	A 10,5	51	(4x) M10	75
W4	(4x) M12, Strength 8.8	A 13	87	(4x) M12	115
W5	(4x) M12, Strength 8.8	A 13	87	(4x) M12	115
W6	(4x) M16, Strength 8.8	A 17	215	(4x) M16	300
W7	(4x) M16, Strength 8.8	A 17	215	(4x) M16	300
W8	(4x) M20, Strength 8.8	A 21	430	(4x) M20	720
W9	(4x) M24, Strength 8.8	A 25	670	-	-
W0	(4x) M30, Strength 8.8	A 31	1500	-	-

<sup>1)</sup> optional

Chart 2-3 Tightening torques for **flange-mounted type** to the construction

Gearbox size	Bolt <sup>1)</sup> DIN EN ISO 4762 DIN EN ISO 4014	Washer DIN125	Tightening torque [Nm]	Bolt <sup>1)</sup> Locking bolt	Tightening torque [Nm]
W1	(4x) M8, Strength 8.8	A 8,4	23	(4x) M8	35
W2	(4x) M8, Strength 8.8	A 8,4	23	(4x) M8	35
W3	(4x) M10, Strength 8.8	A 10,5	46	(4x) M10	75
W4	(4x) M12, Strength 8.8	A 13	79	(4x) M12	115
W5	(4x) M12, Strength 8.8	A 13	79	(4x) M12	115
W6	(4x) M12, Strength 8.8	A 13	79	(4x) M12	115
W7	(4x) M16, Strength 8.8	A 17	195	(4x) M16	300
W8	(8x) M16, Strength 8.8	A 17	195	(8x) M16	300
W9	(8x) M16, Strength 8.8	A 17	195	(8x) M16	300
W0	(8x) M16, Strength 8.8	A 17	195	(8x) M16	300

<sup>1)</sup> optional

Flanges:

Tolerance of centering edge acc. to DIN 42948:

- ISO j6. if  $b_1 \leq 230$  mm
- ISO h6 if  $b_1 \geq 230$  mm

Before fitting of the drift elements like clutches, chain sprockets, gear wheels or belt pulleys, the drift shaft must be cleaned carefully from the corrosion protection.

**Regard the compatibility of the detergent with the shaft seal!**

The drift elements may only be fitted or removed with suitable devices, if necessary under use of the centering drilling following DIN 332 in the shaft extension. It is advisable to warm up the hub on approximately 100 °C.

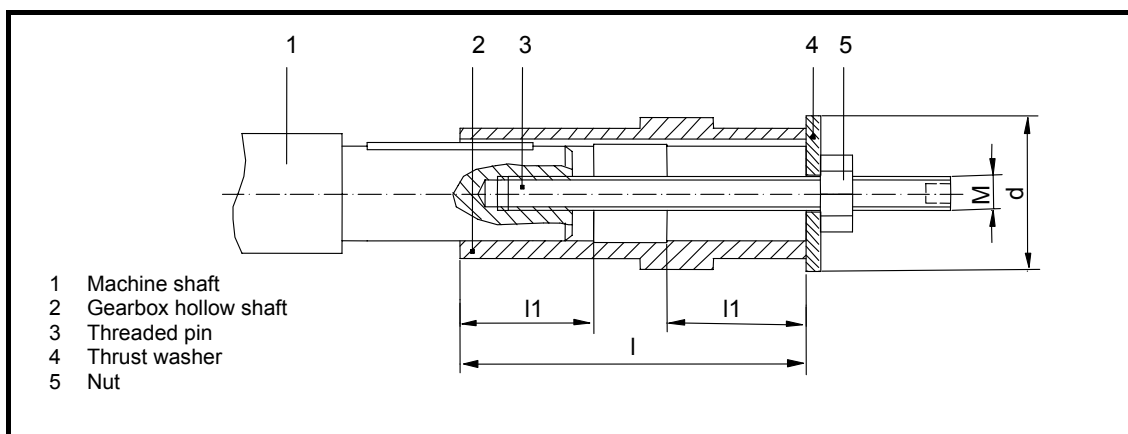
The drift element must be fixed on shaft in the position specified for the drive arrangement. The manufacturer's recommendations relating to pretension settings and maintenance must be complied with in the case of chains and wheels.

### 2.3.3 Mounting of the angular gearbox with hollow shaft, key way or splined profile shaft

Prior to the beginning of the installation it has to be checked, whether the machine shaft and the hollow shaft of the driving gear are free of damage, show no burrs and are not polluted through foreign bodies. The machine shaft must be furnished with a centre drilling with a thread acc. to DIN 332 and has to be greased slightly with common grease.

Fitting of the angular gearbox:

- ◆ The Fitting of the gearbox must be carried out with a threaded pin and a relevant thrust washer
- ◆ The dimensions are shown in the chart 2-4 „Overview: Dimensions for Fitting“ on the next page.
- ◆ The machine shaft must be led on both seats in the hollow shaft



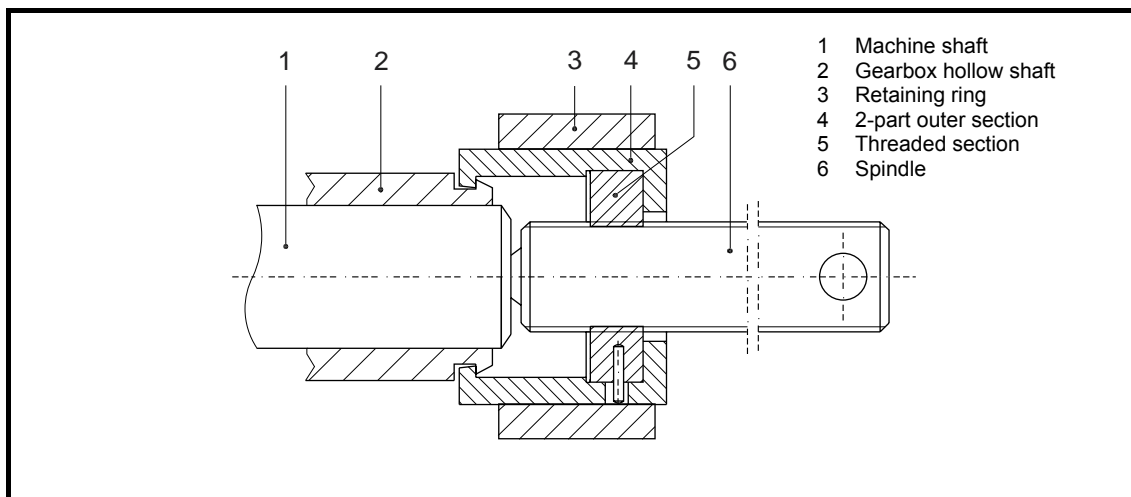
Picture 2-1 Principle sketch: Mounting with a thread bolt – Dimensions see next page  
(The scope of delivery does not include the threaded pin and thrust washer)

Chart 2-4 Overview: Dimensions for fitting (referring to picture 2-2 on the opposite page)

Gearbox size	d [mm]	M	l [mm]	l1 [mm]
W1	45	M10	135	30
W2	45	M10	155	30
W3	50	M10	175	30
W4	55	M16	204	35
W5	70	M16	229	35
W6	75	M16	254	35
W7	90	M20	295	45
W8	100	M20	299	50
W9	120	M24	336	50
W0	140	M24	418	75

### Disassembling of the angular gear

For the correct disassembling of the angular gearbox, a special extractor can be used. The extractor engages the groove, which holds the protective cap.

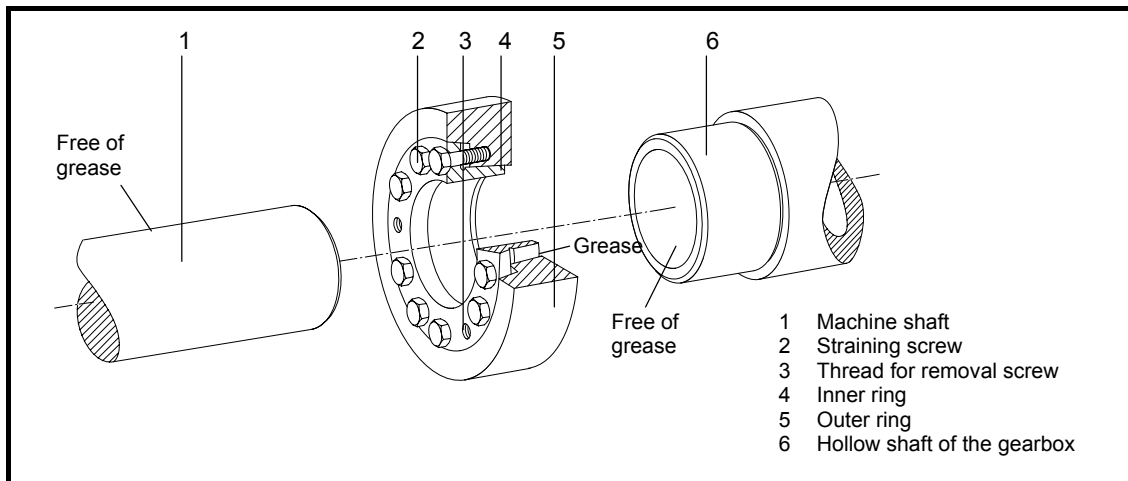


Picture 2-3 Principle sketch disassembling kit

It can be expected, that a mounted spindle profile shaft can be more easily disassembled than a key way connection.

### 2.3.4 Fitting of the angular gearbox with hollow shaft and shrink disc

For fitting of the gearbox onto the machine shaft, the same procedure is valid as for the hollow shaft with fitting-key and the spindle profile shaft.



Picture 2-2 Fitting and disassembling of the shrink disc mechanism

#### General

Normally the shrink disc is placed on the hollow shaft of the gearbox. For the transport it is only slightly braced.

#### Fitting

1. Prior to the Fitting of the gearbox on the machine shaft the gearbox hollow shaft has to be degreased inside and outside using a solvent.
2. The transport wiring of the shrink disc is detached through few turns anticlockwise at all clamp bolts, and the gearbox has to be edged and positioned with the shrink disc on the machine shaft. The inside ring of that shrink disc has to be edged until the limit stop of the hollow shaft is reached.
3. Tightening all clamping bolts.  
Several circulations at the whole circle of the instep screw arrangement are necessary until the front lateral surface area and the outside and seating rim are aligned. The correct wiring conditions of the shrink disc HSD can be easily checked at any time, because at the end of the assembly process the forehead plain of the outer ring must lie in plane with the seating rim.

#### Disassembling

1. Loosen the clamping bolts through anticlockwise turns at all screws. If necessary, loosen the outer ring of the inside circle with the help of imprinting screws about the tapped holes that are intended therefore. You can use the clamp bolts as imprinting screws.
2. Rust crust, which has been arising on the machine shaft in the section nearby to the hollow shaft, has to be removed.
3. Disassembling of the gearbox from the machine shaft.

## Cleaning and lubrication

Dismantled shrink discs do not need to be taken apart and greased newly before wiring again.

Only if the shrink disc is dirty, it must be cleaned and greased newly.

For the cone areas, one of the following lubricants must be used:

Chart 2-5 Lubricants with high content of MoS<sub>2</sub>

Description	Offered product type
Molikote 321 R (sliding varnish)	spray
Molikote Spray (powder-spray)	spray
Molikote G Rapid	spray or paste

### 2.3.5 Connection of torque support type 1 and type 2

The torque support is carried out as an arm with an eye. It is screwed to the gearbox in three possible positions in the 90°-axis cross around the spur. It can be mounted on both sides - at the right as well as at the left side of the gearbox.

#### Mounting of the torque support type 1

During the use of the torque support type 1, additional power arises on the shaft. At drives that were loaded dynamically, e.g. traction drives, the strength of the primary shafts has to be checked, which are inserted into hollow shafts.

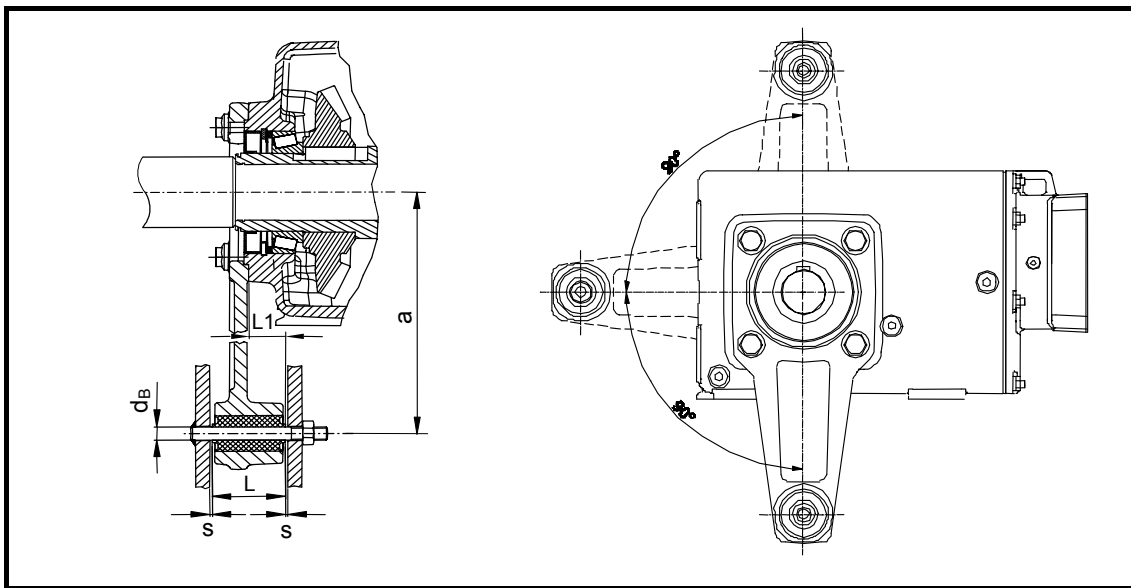
The order N<sup>o</sup>s in chart 2-6 include the complete mounting set.

Chart 2-6 Connection data for the torque support type 1

Gearbox size	Order N <sup>o</sup> torque support	Tightening torque [Nm]	Measures in mm				
			a ± 0,5	d <sub>B</sub>	L	L1	s
W1	1XP8051	35	130	12	40	13	1
W2	1XP8052	75	160	12	40	13	1
W3	1XP8053	75	160	12	40	13	1
W4	1XP8054	75	200	12	59	30	2
W5	1XP8055	115	250	12	59	30	2
W6	1XP8056	115	250	20	70	40	2
W7	1XP8057	300	300	20	70	36	2
W8	1XP8058	300	350	38	88	51	2
W9	1XP8060	720	400	38	88	47	2
W0	1XP8061	720	500	45	100	51	2

Procedure:

- ◆ Screwing on the torque support at the centering of the transmission drive of the gearbox with the anticipated tightening torque following chart 2-6.
- ◆ Hoist the gearbox on the machine shaft and the torque support mounting.
- ◆ Set up the torque support mounting observing the data a and s (see pic. 2-5).
- ◆ Avoid the bracing of the gearbox.
- ◆ In the direction of the power, the torque support mounting has to be free from backlash.



Picture 2-3 Torque support type 1

**Mounting of the torque support type 2**

During the use of the torque support type 2, additional power arises on the shaft. At drives that were loaded dynamically, e.g. traction drives, the stability of the primary shafts has to be checked, which are inserted into hollow shafts.

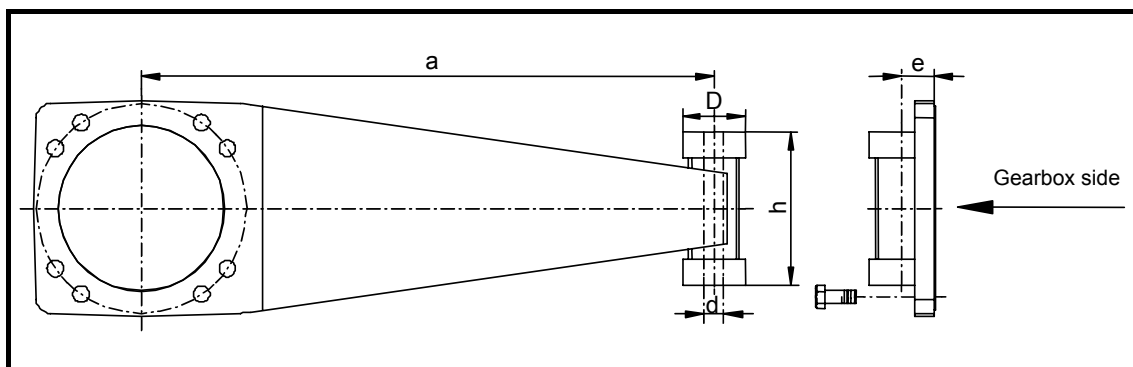
Chart 2-7 Connection data for torque support type 2

Gearbox size	Order N° torque support <sup>1)</sup>	Tightening torque [Nm]	Measures in mm				
			a ± 0,5	D	d	h	e
W5	1XP8065	300	250	35	13	95	24
W6	1XP8066	115	450	50	21	100	26
W7	1XP8067	300	450				19
W8	1XP8068	300	450	60	26	123	8,5
W9	1XP8062	720	450				

<sup>1)</sup> Set includes the torque support type 2, damping element and bolts

## Procedure:

- ◆ Screwing on the torque support at the centering of the transmission drive of the gearbox with the anticipated tightening torque following chart 2-7.
- ◆ Hoist the gearbox on the machine shaft and fix the torque support mounting.
- ◆ Set up the torque support mounting observing the data a (see picture 2-6).
- ◆ Avoid the bracing of the gearbox.
- ◆ In the direction of the power, the torque support mounting has to be free from backlash.



Picture 2-4 Torque support type 2

## 2.4 Commissioning

### 2.4.1 Pre-Conditions

**When operating geared motors, the operating instructions of the motor have to be regarded additionally!**

Before the commissioning can be started, it has to be ensured and checked at the geared motor, that

- ◆ the warm air can dissipate (free ventilation slots).
- ◆ no hazard is coming up from the drives e.g. through rotating parts or voltage contact.
- ◆ the gearbox and drives are fastened in the correct way.
- ◆ no other possible hazard may occur.

### 2.4.2 Tests during commissioning

Make sure that

- ◆ the geared motor is running correctly e.g. no oscillation of speed or development of noises are to be noticed.
- ◆ no leakage of oil is visible.
- ◆ no strong vibrations are appearing.



## 3 Maintenance and service

### 3.1 Checks before start up to work and during work

**In case that damages appear, the geared motor must not be started or has to be stopped!** Only if the problems are cleared, the geared motor may be taken under service again.

#### Check of the geared motor

Type of check:	Step:
◆ External damage	→ Inform the responsible person
◆ Leakage of oil	→ Inform the responsible person
◆ Unusual noises whilst running	→ Inform the responsible person
◆ Dirt accumulation	→ Remove dirt

### 3.2 Gearbox / Lubrication

The gearbox is delivered filled with lubricants. The oil quantity is depending on the construction form and the installing location of the gearbox. The oil quantity is noted on the rating plate of the gearbox. If no additional statements are made, the standard lubrication is used.

#### Quality of the oil

Chart 3-1 Lubricants, which can be used:

Gearbox size	Specification of the mineral oil	Standard oil
W1 – W5	SAE 85 W – 90 API – Class GL-5	BP Energear Hypo 85 W - 90
W6 – W0	CLP 220	BP ENERGOL GR-XP 220 ESSO Spartan EP 220

**Do not mix different lubrications.**

#### Control of oil filling level

An optical control of the oil filling level is only possible if the gearbox was ordered with an oil filling level glass.

#### Intervals for changing the oil

A lubricant change should be accomplished at normal use after 10.000 operating hours or at least after 4 years. At extreme operating conditions, e.g. with high ambient temperatures or extreme variation of temperatures, the oil change has to be done earlier.

### Check of the oil condition

The oil should only be checked, if the gearbox is still operation-warm immediately after switching off the power in order to reach an optimal distribution of the oil.

- ◆ Take an oil sample at the oil drain plug (screw after DIN 908).
- ◆ Check the oil (Colour, viscosity, metal abrasion).
- ◆ The oil has to be changed, if it is not clean.
- ◆ The taken oil has to be disposed due to the environmental rules.

**Attention: Danger of burning through hot gearbox oil!**

### Steps of changing the oil

An oil change shall only be carried out in case of the gearbox still being operation-warm to guarantee a total depletion (better flowing property of the warm oil).

- ◆ Place a vessel under the oil outlet screw.
- ◆ Remove the oil outlet screw and one of the oil inlet screws.
- ◆ Drain the oil from the gearbox totally.  
If the oil is very dirty, the gearbox shall be flushed (see flushing)!
- ◆ Screw in the oil outlet screw with a tightening torque acc. to chart 3-2.
- ◆ Fill in new oil through one of the oil inlets (the quantity of oil is shown on the name disc).
- ◆ Screw in the oil inlet screw or the breathing valve acc. to chart 3-2.

**Attention: Danger of burning through hot gearbox oil!**

Chart 3-2 Tightening torque – Oil inlet screw, oil outlet screw, breathing valve

Bolt	Tightening torque [Nm]
M10 x 1,0	5
M16 x 1,5	15

### Flushing

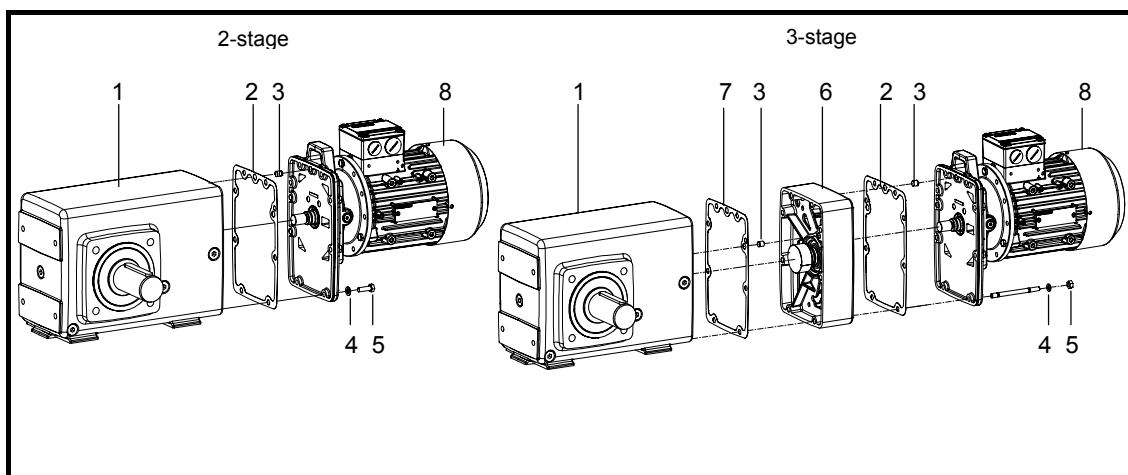
If a strong pollution of the oil is noticed during the oil change, it is recommended to flush the gearbox prior to the refilling of the new oil.

The flushing oil should have a viscosity of 46-68 mm<sup>2</sup>/s at 40 °C. For flushing use double amount of the oil quantity shown on the rating plate. After some minutes with idle run of the geared motor, the flushing oil can be drained. Several flushing terms with changing the rotation of the idle running gearbox ensures that rest of the old lubricant will be as well drained.

**The used oil has to be disposed due to the environmental rules!**

### 3.3 Assembling and disassembling of the direct drive input

#### 3.3.1 Gearbox size W1 –W5



Picture 3-1 Gearbox size W1 – W5

#### Disassembling

1. Drain the oil (see chapter 3.2),
2. detach the fixing bolts / nuts (5) at the motor,
3. deduct the motor (8), leave the locating pin in the part where it sticks in (3)
4. take off the seal (2) and clean the contact faces,
5. at the 3-stage gearbox take off the intermediate stage (6), remove the seal and clean the sealing surface at the gearbox.

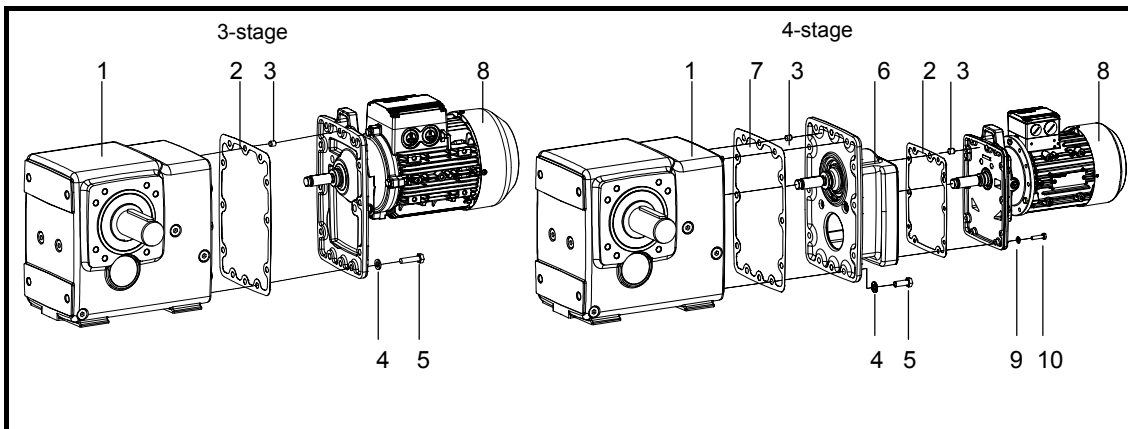
#### Assembling

6. 2-stage gearbox: Place seal (2) on the contact face of the gearbox.
7. 3-stage gearbox: Place seal (7) on the contact face of the gearbox and assemble the intermediate stage. Then place the seal (2) on the contact face of the intermediate stage.
8. Fit the motor (8) on to the gearbox (1) / intermediate stage (6). Tighten the fixing bolts / nuts (5) including the washers (4).

*Tightening torques see chart 3-3*

9. Fill in oil (see Chart 2-1 and chapter 3.2),
11. start the geared motor and check whether any leakage is visible.

### 3.3.2 Gearbox size W6 – W0



Picture 3-2 Gearbox size W6 – W0

#### Disassembling

1. Drain the oil (see chapter 3.2),
2. Detach the fixing bolts (3-stage: 5 / 4-stage: 10) at the motor and take them off including the washers (6),
3. deduct the motor (8), leave the locating pin in the part where it sticks in (3),
4. take off the seal (2) and clean the contact faces.

At 4-stage gearbox:

5. Detach the fixing screws/nuts (5) at the intermediate stage,
6. take off the intermediate stage (6) and the seal, (7) clean the contact faces.

#### Assembling

7. 3-stage gearbox: Place seal (2) onto the contact face of the gearbox; fit the motor (8) onto the gearbox (1). Tighten the fixing screws (5) including the washers (4).
8. 4-stage gearbox: Place seal (7) onto the contact face of the gearbox, fit the intermediate stage (6), tighten the fixing screws (5) including the washers (4) at the intermediate stage. Place the seal (2) onto the contact face of the intermediate stage and fit the motor to the intermediate stage (6). Tighten the fixing bolts (10) including the washers (9) between motor and intermediate stage.

*Tightening torques see chart 3-3*

9. Fill in the oil (see chart 2-1 and chapter 3.2),
10. start the geared motor and check whether any leakage is visible.

Chart 3-3 Tightening torque with direct drive input

Gearbox size	Connection Motor – Gearbox housing	
	Motor size	Tightening torque for the screws [Nm]
W1	63 ... 80	10,5
W2	W22 63 ... 90	10,5
	W23 63 ... 80	10,5
W3	W32 71 ... 100	10,5
	W33 71 ... 80	10,5
W4	W42 80 ... 112	10,5
	W43 80	10,5
W5	W52 80 ... 132	25
	W53 80	25
W6	W63 100 ... 132	51
		160
	W64 80 ... 112	10,5
W7	W73 112 ... 132	51
		160 ... 180
	W74 80 ... 132	25
W8	W83 112 ... 132	51
		160 ... 180
	W84 80 ... 132	25
W9	W93 132 ... 225	115
	W94 100 ... 132	51
		160
W0	W03 160 ... 225	300
	W04 112 ... 132	51
		160 ... 180

## 4 Technical data

### Gearbox

Chart 4-1 Technical conditions for normal design

Conditions	
Transport temperature	-20 ... +40 °C
Storage temperature	0 ... +40 °C
Storage conditions	Dry rooms
Ambient temperature during operating	-10 ... +50 °C
Environment	Low dust burden, free of acid
Cooling agent	Fresh air
Cooling agent temperature	max. +40 °C
At site altitudes	max. 1000 m above sea level
Air flow	Freely overflowing
Construction	Low of oscillation
Operating conditions	Assure the cooling
Max. input speed	3600 min <sup>-1</sup> (an increase of noise may occur)
Lubricant	See rating plate