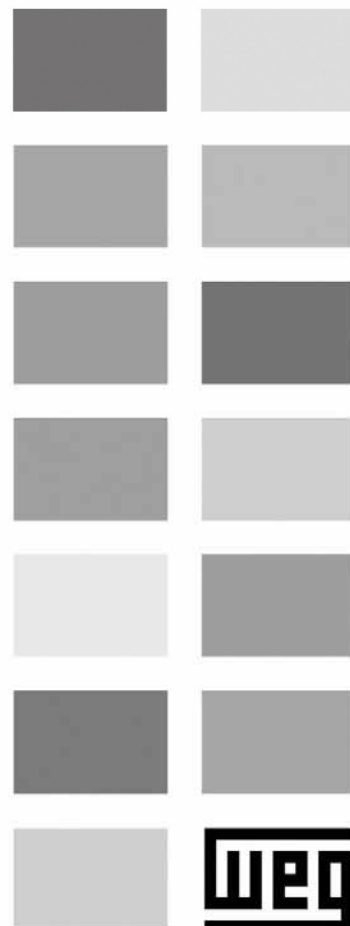
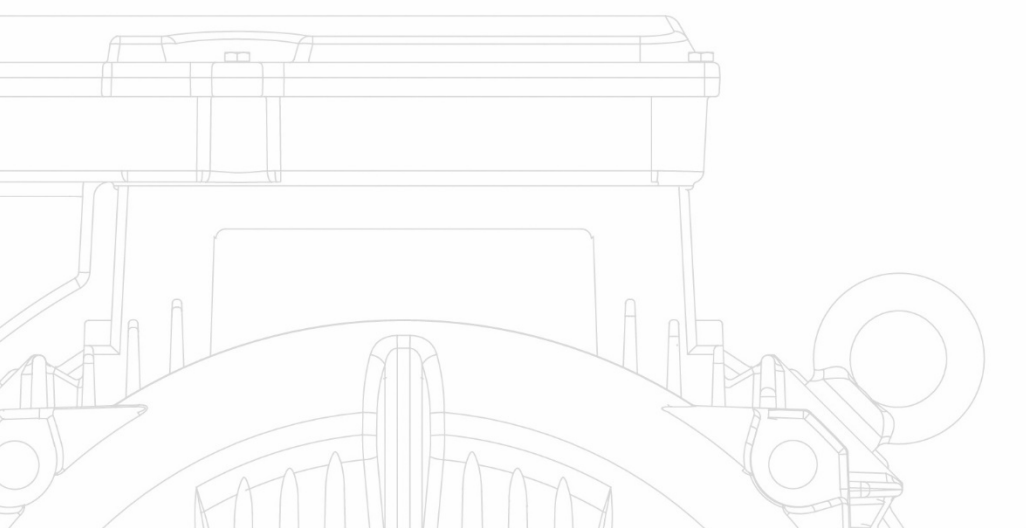


WG20 Geared Motors - Mounting Instruction



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1 General

1.1 Safety and information markings

All safety and warning instructions must be followed without exception!

WARNING !

Warning of electrical or mechanical danger.

ATTENTION !

Important instructions for safe and trouble-free operation.

1.2 General information

This Mounting Instruction (MI) is part of the gear unit as supplied and must be read carefully before working with the gear unit. The instructions in the MI must be followed. Keep the MI close to the gear unit.

We assume no liability for damages or disruptions of operations resulting from the failure to observe this MI.

In order to develop the product further, the producer reserves the right to make modifications to the individual components or assemblies that are believed to be useful to improve the product, while maintaining its essential characteristics.

Protection class:

The gears are in accordance with Protection Class IP 65.

Motors are designed within Protection Class IP 55 at minimum (see nameplate).

Intended use:

The gears / geared motors are exclusively assigned for the generation of a defined rotary motion within machinery and plants. The gears comply with the basic requirements of the machinery directive 2006/42/EC as far as possible.

Any other use or utilisation above this is deemed a not intended use. The user / operator of the machine / plant is solely liable for damages resulting therefrom.

The details in this mounting instruction, on the nameplate as well as in other technical documentation, are to be considered and observed.

Intended use for motors:

The motors comply with the basic requirements of the Low Voltage Directive 2014/35/EU. They are designed for power operating as well as operating in combination with frequency inverters.

They are designed both for mains operation as well as in combination with frequency converters.

Standard motors are designed for use at:

- Ambient temperatures of -20°C (-4°F) to +40°C (104°F)
- Altitudes of ≤ 1,000 m above sea level.

1.3 Exclusion of liability

You must comply with the information contained in this MI to ensure safe operation of the gear unit, geared motor and to achieve the specified product characteristics and performance requirements.

The producer assumes no liability for injury to people or damage to equipment or property resulting from non-observance of this MI. In such cases, any liability for defects is excluded.

1.4 Indication of copyright and protective right

All technical documents are protected in the sense of the copyright law. The processing, reproduction and dissemination of it, even in extracts, as well as other utilisation is not allowed, unless it has been expressly conceded in written form.

2 General safety

The customer is responsible for setting up the drive in accordance with good engineering practices.

The instructions in this Mounting Instruction must be followed to achieve the confirmed characteristics of the drive units and to ensure approval in case of warranty claims.

Make certain that you never put damaged products into operation!

Read this Mounting Instruction carefully before you begin any setup, installation or maintenance work.

Installation, start-up, maintenance and repair work on the gear unit / gear motor as well as on electrical accessory equipment may only be performed by qualified **technical personnel**, taking the following items into account:

- Operating Instructions
- Information labels/tags on the gear unit / geared motor
- All other project documents, setup manuals, operating manuals
- Drive-specific specifications and requirements belonging to the drive unit
- The applicable regional and national regulations on safety and accident prevention.

WARNING !

Work is only permitted:

- on the stationary drive,
- while disconnected and
- prevented from being switched on again.

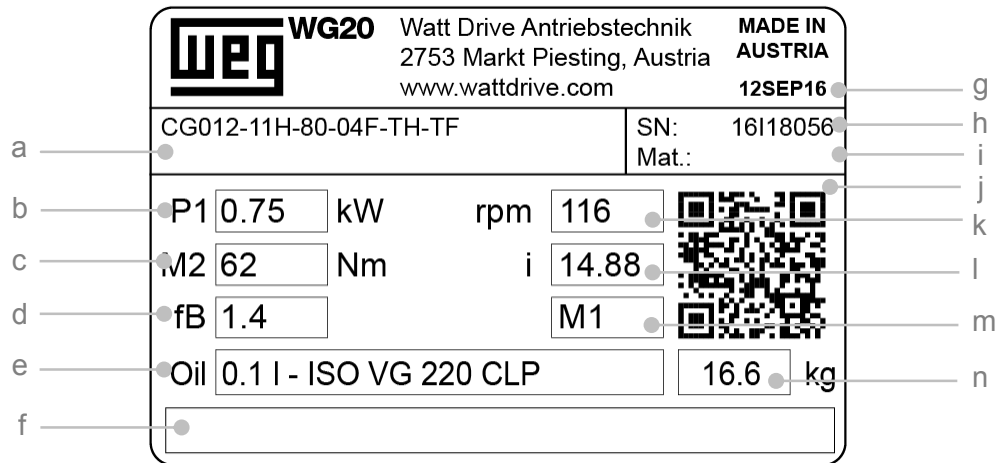
Operation of the drive unit by means of a frequency inverter may only occur if the specifications shown on the motor nameplate have been carried out.

3 Gear unit / Geared motor description

3.1 Nameplate

All data on the nameplate of the gear defines the limits of its intended usage. It is imperative to adhere to this data.

Please take further technical data and drawings from the latest geared motor catalogue.



WG20 nameplate (example)

a	Type code	h	Serial number
b	Motor power	i	Material number
c	Output torque	j	QR code with link to additional data
d	Service factor	k	Output speed
e	Oil quantity and type	l	Total gear ratio
f	Space for additional information	m	Mounting position
g	Production date	n	Weight

3.2 Type designation

Type designation (example)	CG012-11N-63-04F-TH-TF-BR2	FH032-11P-80-04F-TH-TF-BR10	KH022-11N-63-04F-TH-TF
Type	C (Helical gear unit)	F (Parallel shaft gear unit)	K (Helical bevel gear unit)
Possible gear unit execution	CA ... Foot and flange type with output shaft CC ... B14-flange housing with output shaft CF ... Flange type with output shaft CG ... Foot type with output shaft CW ... Foot and B14-flange type with output shaft	FD ... Hollow shaft and shrink disc FF ... B5-flange type with output shaft FH ... Hollow shaft FO ... B5-flange type with hollow shaft FP ... B5-flange type with hollow shaft and shrink disc FS ... Output shaft FT ... Hollow shaft with rubber buffer FU ... Hollow shaft with shrink disc and rubber buffer	KD ... Hollow shaft and shrink disc KF ... B5-flange type with output shaft KH ... Hollow shaft KO ... B5-flange type with hollow shaft KP ... B5-flange type with hollow shaft and shrink disc KS ... Output shaft KT ... Hollow shaft with torque arm KU ... Hollow shaft with shrink disc and torque arm
Possible gear unit sizes	00, 01, 03, 05, 06	02, 03, 04, 05	02, 03, 04, 05
Possible gear stages	00, 01: 2 stages 03-06: 2 or 3 stages	02, 03: 2 stages 04, 05: 2 or 3 stages	02: 2 stages 03-05: 3 stages

Gear unit input types	
63.. – 225...	Motor frame size

Optional additional motor devices	
Type designation (example)	11P 100L-04F SH K1 KB MIP BRH40 FL SD
11P 100L-04F	Motor type
TH, TF, KTY	Temperature control
FL	Forced cooling
IG, SG	Encoder
BR..	Brake
BBR..	Double brake
BRH..	Brake with manual release
BRHA..	Brake with manual release and locking device
KKM, RSM	Back stop
U, UW	Unventilated
KB	Drain
SH	Anti condensation heating
K1, K2	Climatic protection
MIP, MIG	Terminal box design
SD	Protection cap
HR	Hand wheel
ZM	Metal fan
ZL	Fly wheel fan
ZWM, ZWV	Second shaft end

4 Transport

After delivery, the unit must be inspected for any damage that may have occurred during transport. In case of damage do not put the motor into operation.

ATTENTION!

To lift the geared motors, you have to use the following load handling equipment:

Helical geared motors C

	Gear size	Motor size	Load handling	
	C00 C01	all	No equipment for load handling provided	-
	C03 C05 C06	63 - 71	No equipment for load handling provided	-
		80 - 90	Lifting eye on the gearbox	1
		100 - 132	Lifting eye on the gearbox + eye bolt on motor (max. angle of 60° between the ropes)	2

Parallel shaft geared motors F

	Gear size	Motor size	Load handling	
	F02	all	No equipment for load handling provided	-
	F03 F04 F05	63 - 71	No equipment for load handling provided	-
		80 - 90	Support hole	1
		100 - 132	Support hole + eye bolt on motor (max. angle of 60° between the ropes)	2

Helical bevel geared motors K

	Gear size	Motor size	Load handling	
	K02	all	No equipment for load handling provided	-
	K03 K04 K05	63 - 71	No equipment for load handling provided	-
		80 - 90	Lifting eye on the gearbox	1
		100 - 132	Lifting eye on the gearbox + eye bolt on motor (max. angle of 60° between the ropes)	2

General:

The following items must be taken into account when storing the gear units:

- In general, the drive units must be stored in closed rooms.
- Ambient temperature max. 25°C (77°F)
- Relative humidity max. 80%
- The drive units are to be protected from exposure to the sun or UV light.
- No aggressive or corrosive materials are to be stored in the vicinity of the unit.
- The gear units are to be stored in the same position that is intended for a later use.
- The gear units are to be rotated 1-2 revolutions on the output side every 6 months to ensure that the interior parts are wetted with lubricant.
- The units are to be protected from mechanical loads and exposure to outside forces.

Long-term storage:

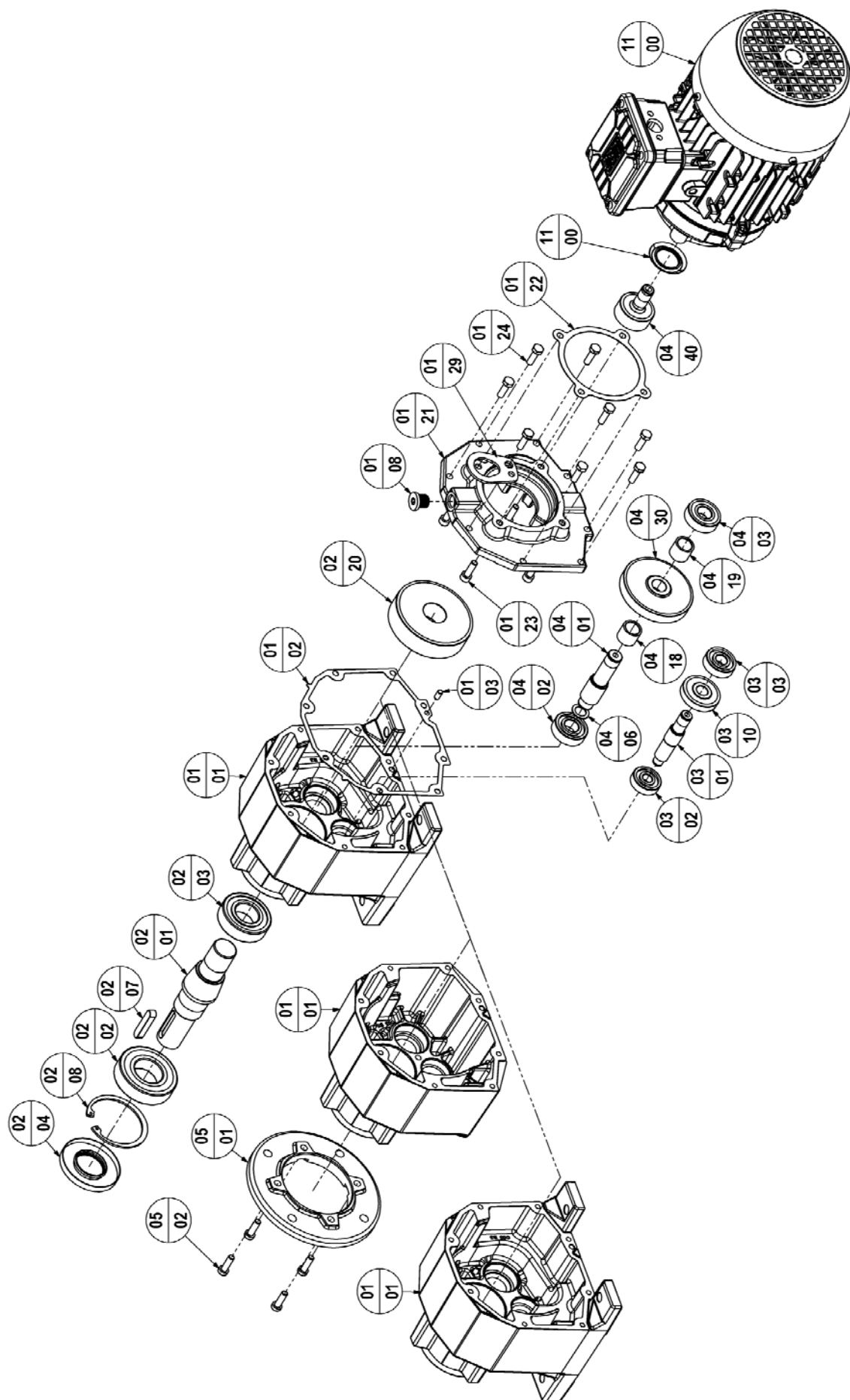
- When the gear units are to be stored for longer than 12 months, they must be completely filled with lubricant as stated on the nameplate or lubricant plate.
- Unfinished, bare-metal parts on the outside of the unit are to be protected with a corrosion protection product (inspection every 6 months is recommended). The corrosion protection must be replaced after one year.
- Before starting the gear unit, drain the lubricant from it. If more than one lubricant chamber is present, make certain that all of the lubricant chambers have been drained out.
- Gaskets settle, especially after a longer period without loading. Before starting, the screws must be retightened.
- Then fill the gear unit with the lubricant type specified on the nameplate using the specified quantity.
- If the gear units are stored for longer than 24 months before being put into service, they must be checked for leaks. If there are any visible cracks on the surfaces of sealing elements, such parts must be replaced.

6 Gear unit construction

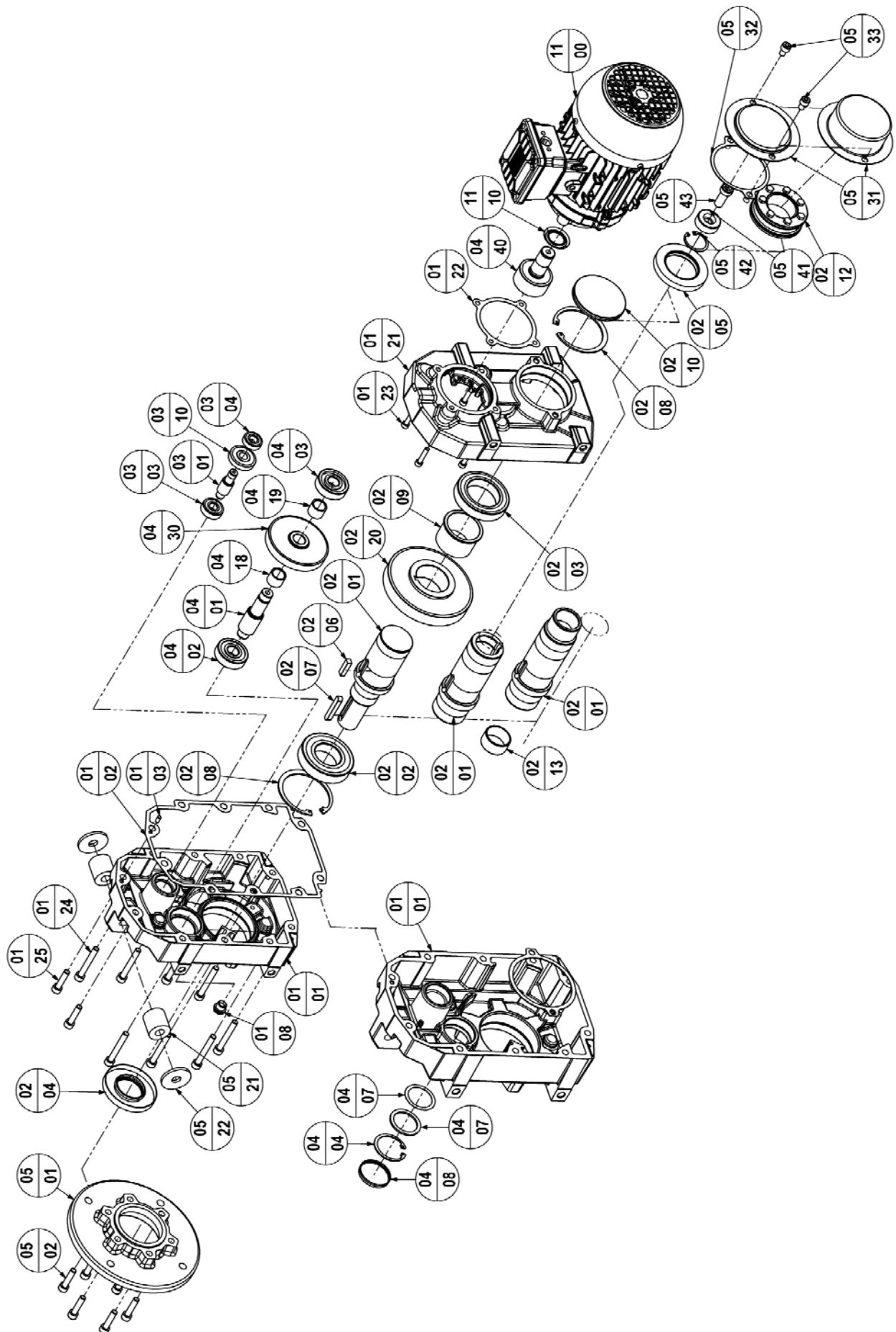
The following drawings basically show the construction of the various dry series in theory. Deviations from other gear unit sizes and design versions are possible per gear unit series.

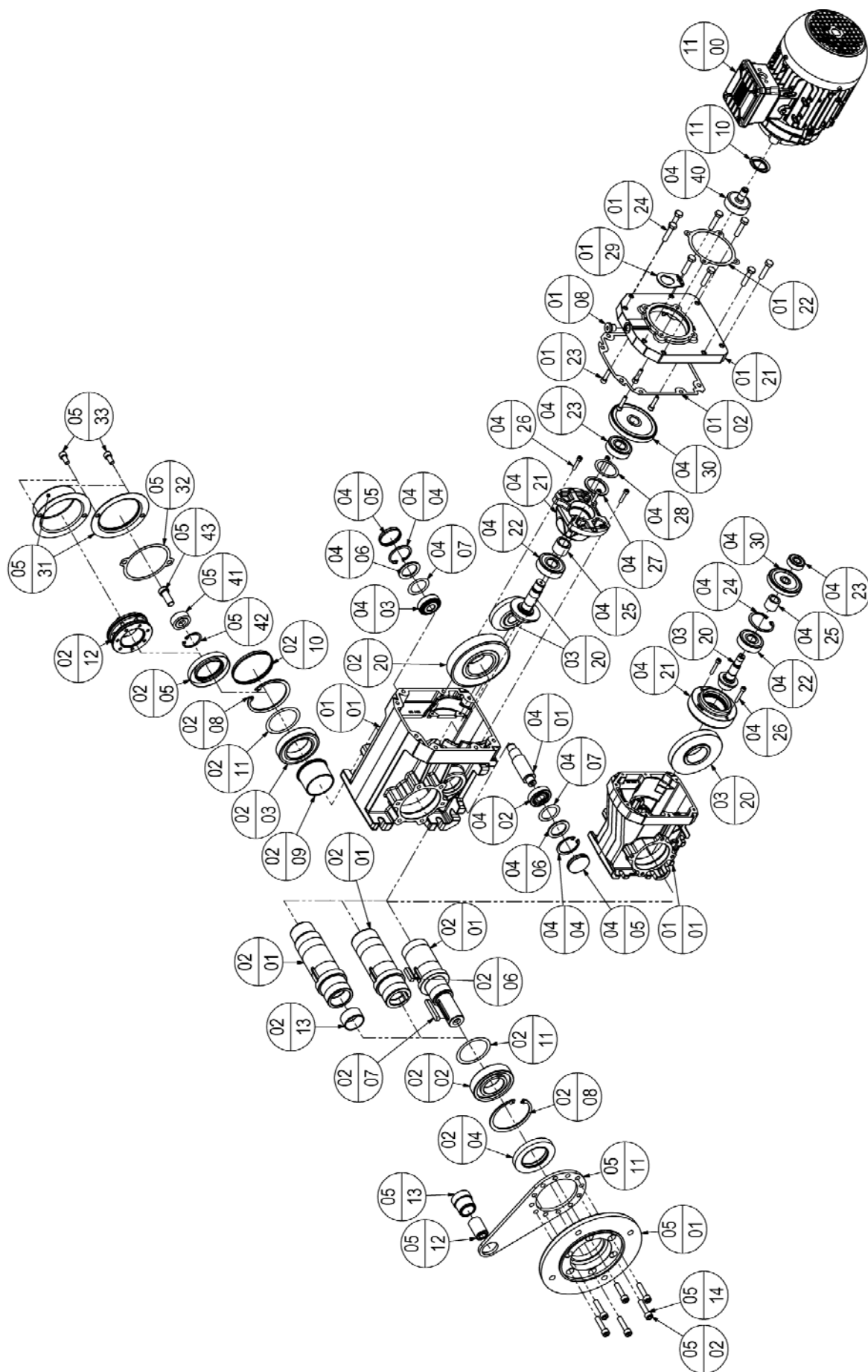
Legend for the construction drawings:

Position	Description	Position	Description
01 00	Kit Housing	05 00	Kit Output Flange
01 01	Housing	05 01	Output Flange
01 02	Gasket	05 02	Screw
01 03	Pin	05 10	Kit Torque Arm
01 08	Plug	05 11	Torque Arm
01 09	Ventil Plug	05 12	Silent Block
01 20	Kit Case Cover	05 13	Bushing
01 21	Case Cover	05 14	Screw
01 22	Motor Gasket	05 20	Kit Rubber Buffer Set
01 23	Screw	05 21	Rubber Buffer
01 24	Screw	05 22	Shim
01 25	Screw	05 30	Kit Shaft Cover
01 29	Lifting Eye	05 31	Shaft Cover
02 00	Kit Output Shaft	05 32	Gasket
02 01	Output Shaft	05 33	Screw
02 02	Bearing 1 (C) / 1/2 (F, K)	05 40	Kit Fixing Kit
02 03	Bearing 2	05 41	Circlip
02 04	Shaft Sealing 1 (C) / 1/2 (F, K)	05 42	Disc
02 05	Shaft Sealing 2	05 43	Screw
02 06	Key	11 00	Motor
02 07	Key	11 10	Slinger
02 08	Circlip		
02 09	Distance Sleeve		
02 10	Cover		
02 11	Adjusting Washer		
02 12	Shrink Disc		
02 13	Glycodur Bush		
02 20	Output Gear		
03 00	Kit Intermediate Pinion Shaft		
03 01	Intermediate Pinion Shaft		
03 02	Bearing 5		
03 03	Bearing 6		
03 10	1st Stage Gear		
03 20	Bevel Pair		
04 00	Kit Output Pinion Shaft		
04 01	Output Pinion Shaft		
04 02	Bearing 3 (F), 3/4 (C, K)		
04 03	Bearing 4		
04 04	Circlip		
04 05	Cover		
04 06	Supporting ring		
04 07	Adjusting Washer		
04 18	Distance Sleeve 3		
04 19	Distance Sleeve 4		
04 20	Kit Bearing Carrier		
04 21	Bearing Carrier		
04 22	Bearing 5/6		
04 23	Bearing 6		
04 24	Circlip		
04 25	Distance Sleeve		
04 26	Screws		
04 27	Supporting ring		
04 28	Adjusting Washer		
04 30	Intermediate Gear (C, F) / 1st Stage Gear (K)		
04 40	Pinion		



6.2 Basic design principles parallel shaft gear unit F





7 Mechanical installation

7.1 Preparatory work gear unit

7.1.1 Inspecting the gear unit

The gear unit must not be put into operation unless:

- No damage caused, for example, by storage or transport, is apparent.
- In particular, the shaft seals, cover caps, and guard hoods are not damaged.
- No leaks or loss of oil are visible.
- No corrosion or other indication of improper storage or storage under damp conditions is present.
- All of the packaging materials were removed.
- Oil drain plugs and vent plugs must be fully accessible!

As a general rule, drive shafts and flange surfaces must have all corrosion protection products and dirt cleaned from them, standard commercial solvents can be used.

ATTENTION !

The sealing lips on the shaft seals must not be allowed to come in contact with the solvent. → **Material can be damaged!**

7.1.2 Mounting position

The gear unit may only be operated in the specified mounting position, which may be found on the nameplate. The mounting position must not be changed during operation.

7.1.3 Torque support by means of rubber buffer

Every Urelast spring must be mounted with a pre-stressing of 3 mm.

7.1.4 Painting the gear unit

If the gear unit will be painted or partially repainted, make certain that the vent plug and the shaft seals are carefully masked. Remove the masking tape after the painting work is completed.

7.1.5 Housing surface temperature

In order to prevent excessive heating of the gear unit, the following must be observed:

- Sufficient clearance must be provided around the gear unit.
- The cooling air for gear unit motors must be able to flow unhindered around the gear unit.
- The gear unit must not be completely boxed in with a housing.
- The gear units must not be exposed to hot exhaust air from other units.

No heat must be transferred into the gear unit.

7.2 Preparatory work motor

7.2.1 Terminal box

It must be ensured that there are no foreign bodies, dirt or moisture in the terminal box. Open entries are to be sealed with an O ring or a suitable flat gasket so that dust and water cannot enter, whereas the terminal box itself is to be sealed against dust and water with the original seal.

It must be ensured that the terminal box, terminal board and cable connections etc. inside the terminal box are not damaged.

WARNING !

The terminal box must be sealed so that dust and water cannot enter.

7.2.2 Checking the insulation resistance

The insulation resistance needs to be checked prior to start-up and again after any extended periods of storage or periods during which the equipment is not in operation.

Before you begin measuring the insulation resistance, please read the manual for the insulation resistance meter you are going to use. Any cables of the main circuit, which are already connected, should be disconnected from the terminals in order to carry out the insulation measurements.

WARNING !

During the measurement, and immediately afterwards, some of the terminals are at hazardous voltage levels and must not be touched. Carry out a check with the power cables connected that no voltage can be applied.

Where possible, measure the minimum insulation resistance of the winding to the motor enclosure when the winding temperature is between +20 °C and +30 °C. For other temperatures, different values apply to the insulation resistance. When taking the measurement, you must wait until the final resistance value is reached (approximately 1 minute).

ATTENTION !

If the critical insulation resistance is less than or equal to this value, the windings must be dried or, if the fan is removed, cleaned thoroughly and dried. Note that the insulation resistance of dried, clean windings is lower than that of warm windings. The insulation resistance can only be properly assessed after conversion to the reference temperature of +25 °C. If the measured value is close to the critical value, you must subsequently check the insulation resistance at appropriately frequent intervals.

The following Table 1 indicates the measuring circuit voltage together with the minimum insulation resistance and the critical insulation resistance. Values apply at a winding temperature of +25 °C.

Table 1: Insulation resistance

	Rated voltage $U_{\text{rated}} < 2 \text{ kV}$
Measuring circuit voltage	500 V
Minimum insulation resistance with new, cleaned or repaired windings	10 MΩ
Critical specific insulation resistance after a long operating time	0.5 MΩ/kV

Also note the following points:

- When measuring at winding temperatures other than +25 °C, the measured value must be converted to the reference temperature of +25 °C. The insulation resistance is reduced by a factor of a half for every 10 K increase in temperature, and it is increased by a factor of two for every 10 K decrease in temperature.
- New, dry windings have an insulation resistance of between 100 and 2,000 MΩ, or even higher values in some cases. If the insulation resistance is close to or below the minimum value, the cause could be humidity and/or dirt accumulation. The windings must then be dried.
- During operation, the insulation resistance of the windings can fall to the critical insulation resistance due to ambient and operational influences. Depending on the rated voltage, the critical insulation resistance for a +25 °C winding temperature can be calculated by multiplying the rated voltage (kV) by the specific critical resistance value (0.5 MΩ/kV); e.g. critical resistance for a rated voltage (UN) 690 V: $1000 \text{ V} \times 0.5 \text{ MΩ/kV} = 0.345 \text{ MΩ}$

7.2.3 Connecting the ground conductor

The grounding has to be connected in the terminal box at the place intended for this purpose and marked accordingly.

The cross-section of the ground conductor of the machine must comply with the regulations for electrical installations, e.g. DIN EN IEC 60204-1.

Please note the following when connecting-up:

- The contact surface must be clean and bright, and protected with a suitable anti-corrosion agent, e. g. acid-free Vaseline.

Table 2: Minimum surface area

Minimum surface area „S“ of phase conductor (L1, L2, L3)	Minimum surface area of corresponding ground connection
mm ²	mm ²
$S \leq 16$	S
$16 < S \leq 35$	16
$S > 35$	$0,5 \times S$

7.3 Setting up the gear unit, geared motor

- When installing please ensure that the unit is not exposed to any shocks or vibrations in order to avoid noise during operation.
- The mounting surface should be even and torsionally rigid.
- Distortion of the gear case should also be avoided.
- Reduce reaction torque with a torque arm or a rubber buffer kit (no rigid joints).
- Input and output elements have to be equipped with a contact protection.
- When installing the motor, ensure that the intake is not obstructed and air can circulate freely. Do not remove the fan blade or cowl, or enclose the motor with a casing because in both cases, there would not be enough air for cooling and the motor could overheat.

7.3.1 Gear unit ventilation

Gear unit with vent plug:

Oil drain plugs and vent plugs must be fully accessible!

The vent plug with transport locking device is installed at the proper position for the mounting position.

ATTENTION !

Activating the vent valve:

The vent valve is to be activated before the unit is put into operation by completely demounting the transport protection (rubber clip) as described below.

Figure 1: Information label (red) on the gear unit



Remove the rubber clip completely before start-up!

Gear drives lacking a vent plug:

Sealed-design gear drives are supplied without a vent plug.

This applies to the following gear unit types:

- C00, C01, C03, C05, C06
- F02, F03, F04, F05
- K02, K03, K04, K05

7.3.2 Geared motor with backstop

The backstop allows the operating in only one rotating direction. The free rotating direction is marked with a rotating direction arrow at the output of the gear or on the ventilation cover of the motor.

ATTENTION !

A start-up of the motor with full power consumption against the locking direction of the gear will lead to destruction or damage of the backstop.

The free rotating direction has to be checked before the start-up.

Geared motor with a backstop at the motor:

Using gears with backstop, the rotating direction of the e-motor and the mains are to be detected with a meter. Mind the rotating direction arrow on the housing! On motors, which are winded 400/690 Volt, the rotating direction can be detected through a short-time start-up in star connection.

7.3.3 Gear unit with solid shaft

The output shafts are manufactured with a diameter of 50 mm in ISO k6 tolerance class and beginning at a diameter 55 mm in ISO m6 tolerance class.

All output shafts are equipped with DIN 332 tapped centre holes that are used to tighten the transfer elements.

All output shafts are provided with a corrosion protection product upon delivery. This product must be removed with a conventional solvent.

ATTENTION !

- The solvent must not be allowed to come into contact with the shaft seals!
- Make certain to prevent all impacts and mechanical shocks on the end of the shaft since the output bearing system can be damaged.
- Mechanical drive elements that apply radial forces to the output shaft must be installed as close as possible to the output shaft bearings!
- Add-on power transfer elements should balance and must not cause any unacceptable radial or axial forces (see Catalogue for acceptable values).

7.3.4 Installation and demounting of hollow-shaft gear units

ATTENTION !

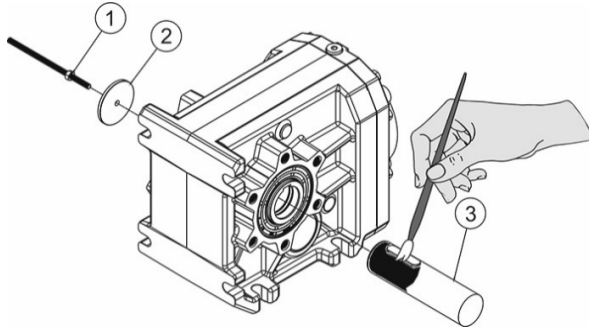
Concerning the design of the customer's shaft please mind the construction references in the latest geared motor catalogue.

Assembling: (see Figure 2 and 3)

The hollow-shaft gear units must always be installed in such a way that no axial forces are applied to the output shaft bearing system.

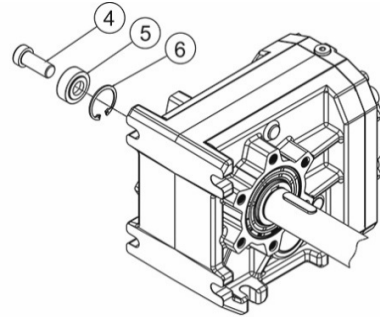
1. Check the machine shaft (3) on possible damages like e.g. notches or upsettings.
2. Clean the customer's machine shaft (3) thoroughly before the mounting.
3. Before tightening the hollow-shaft gear unit onto the machine shaft, paint the surface of the machine shaft with lubricating paste (3) such as Klüber Paste 46MR401.
4. Mount the drive onto the machine shaft (4, 5). An additional distance tube is required for a customer's shaft without contact shoulder.
5. Implement the optionally obtainable fixing set into the hollow shaft and secure the customer's shaft axial with the locking bolt (4). Screw tightening torque see page E-32.

Figure 2: Tightening the customer shaft



- (1) Threaded rod + hex nut
- (2) Thrust washer
- (3) Customer-side machine shaft

Figure 3: Mounting the customer shaft using a mounting set

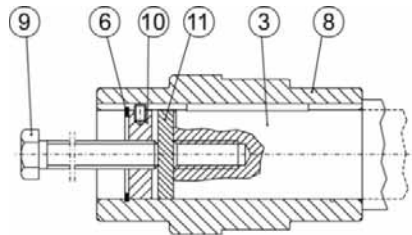


Parts (4), (5) and (6) are included in the optional fixing kit GMBSBSD...

Demounting:

1. Loosen the fixing bolt (4). Remove the complete fixing set and, if existing, the distance tube.
2. Put the pressure disc (11), jack nut (10) and circlip (6) into the hollow shaft.
3. Screw in the fixing bolt (9). Through tightening of the screw you are pressing the gear off the machine shaft (3).

Figure 4: Demounting the customer shaft with or without contact shoulder



- (3) Customer's shaft with tapped centre hole as per DIN332, sh.1
- (6) Circlip DIN 472
- (8) Hollow shaft
- (9) Retaining screw DIN 933 (to customer specification, length according to machine shaft length)
- (10) Jack nut
- (11) Thrust washer

7.3.5 Installation and demounting of shrink disks

ATTENTION !

The shrink discs are supplied ready to install. They must not be taken apart prior to the first installation.
The tightening of the locking bolts without an implemented customer's shaft can lead to a deformation of the hollow shaft.

Assembling (see Figure 5):

1. Remove the possibly existing cover cap.
2. Loosen the locking bolts (3) with just a few threads. Do not screw them out completely!
3. Thoroughly degrease the entire hollow shaft boring (2, grey area). It must be ABSOLUTELY free of grease!
4. Thoroughly degrease the machine shaft (1, grey area) in the clamping area of the shrink disc. It must be ABSOLUTELY free of grease!
5. Push the shrink disc onto the hollow shaft (2) until the outer ring of the shrink disc is flush with the hollow shaft (2). The outer part of the hollow shaft (2) can be greased in the area where the shrink disc is fitted.

6. Insert the degreased machine shaft (1) into the hollow shaft (2) so that the area of the shrink connection is fully used.
7. Slightly tighten the locking bolts (3) in sequence clockwise with several turns, so that both outer rings (5) are clamped parallel towards each other. The number of locking bolts depends on the size of the shrink disc.

ATTENTION !

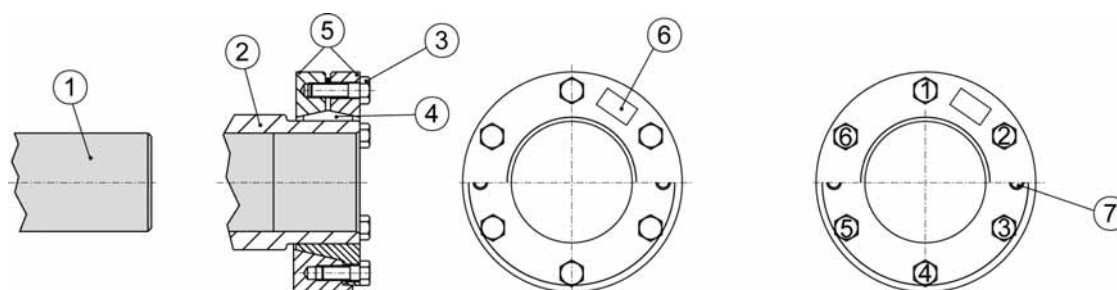
Do not tighten the locking bolts (3) „CROSSED“.

8. Tighten the locking bolts (3) with a torque key up to the indicated screwing torque (6) on the shrink disc. After the tightening of the locking bolts (3) there has to be an even gap between the outer rings (5). If it is not the case the shrink disc has to be mounted anew.

ATTENTION !

After installation you can sign the hollow shaft respectively the machine shaft with a marking (use a pencil) to detect a slipping during the initial operation (under load).

Figure 5: Hollow shaft with shrink disc



- (1) Customer-side machine shaft
- (2) Hollow shaft
- (3) Locking screw
- (4) Inner ring
- (5) Outer ring
- (6) Tightening torque of the locking screws
- (7) Jack nut

Demounting:

1. Undo the locking screws (3) uniformly and in sequence. Only undo each locking bolt about a quarter turn initially. Do not remove the locking bolts completely.
2. Press the inner ring (4) off using the jack nut (7). Remove any rust beforehand that may have formed on the machine shaft in front of the hollow shaft.
3. Remove the shrink disc from the hollow shaft (2)

Step 2 only required for two-part shrink disk execution!

7.3.6 Installation and demounting of protection cap

Before being installed, the protection caps must be inspected for any damage that might have occurred during transport. Damaged protection caps must not be installed, since they can possibly cause abrasion.

All of the fixing bolts are to be used and secured by wetting them with a thread-locking adhesive (medium strength).

See on page E-32 for the bolt tightening torque.

Figure 6: Protection cap for hollow shaft

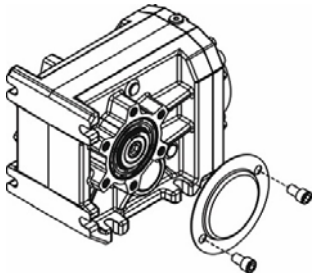
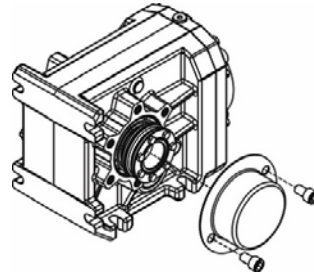


Figure 7: Protection cap for shrink disc hollow shaft



7.3.7 Installation of torque arms

ATTENTION !

Pay attention to the direction of rotation of the hollow shaft!

The Urelast springs in the rubber buffer set are to be loaded under compression in the main working direction of rotation!

Recommended pre loading 3 mm per Urelast spring.

Figure 8: Parallel shaft gear unit

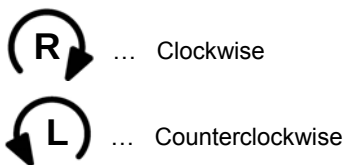
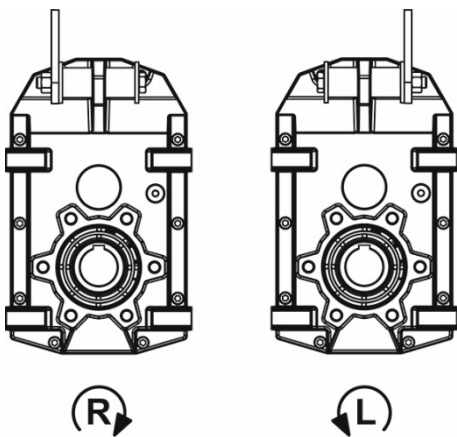
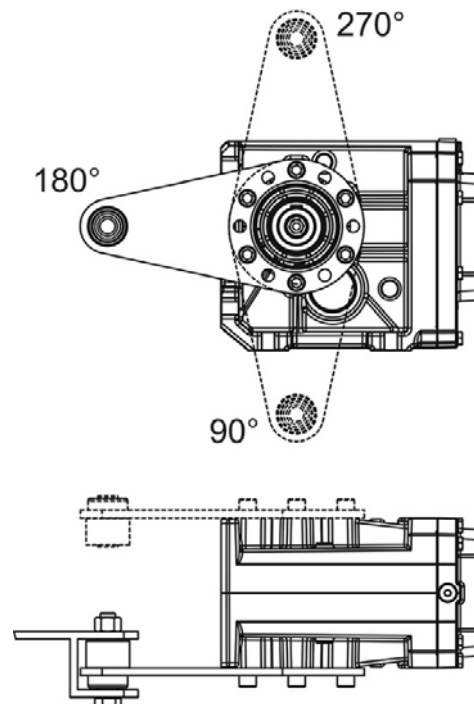


Figure 9: Helical bevel gear unit



8 Check list – Gear unit

Check the following before starting up the gear unit:

	Information see chapter	checked
Inspect the shipment immediately after reception for any transport damages. In some cases, it may not be advisable to start up the unit.		
Does the mounting position on the nameplate correspond to the actual mounting position?	3.1, 15	
Is the vent plug located at the correct location (in compliance with the installation position) and freely accessible?	15	
Is the vent plug activated (rubber flap removed)?	7.3.1	
In the case of a shrink disc version: has the expansion been checked?	7.3.5	
Has the free rotating direction been checked when using a backstop?	7.3.2	
Is protection provided around rotating parts to prevent personnel from coming into contact with them?		

9 Check list – Motor

Check the following before starting up the motor:

	Information see chapter	checked
Check that the mains voltage and frequency correspond to the data on the motor rating plate?		
All connections have been made properly (motor connection, ground conductor, etc.)?	7.2.3	
Is the direction of rotation of the motor/geared motor correct?	10.2	
Has the free rotating direction been checked when using a backstop?	7.3.2	
Is the terminal box dust and watertight?	7.2.1	
Is a motor circuit breaker installed?	10.1	
Is all motor protection equipment active and set for the rated motor current?		
Has the insulation resistance been checked?	7.2.2	
Optional anti-condensation heating is switched off?	18.1	
Optional forced cooling is connected to an external power supply?	18.3	

10 Startup

10.1 Electrical connection of the motor

The mains voltage and the mains frequency must match the data on the nameplate. Voltage deviations of $\pm 5\%$ and/or frequency deviations of $\pm 2\%$ are allowable.

ATTENTION !

Connect the motor only as shown in the wiring diagram included in the terminal box of the motor.

The wiring diagram for the motor series 11N, 11H, 11P is available in this manual on page E-27. Connections must be made in such a way as to ensure that a permanently safe electrical connection is maintained (no protruding wire ends); use the corresponding cable end pieces.

ATTENTION !

A motor circuit breaker or contactor with an overcurrent relay should be installed to prevent the motor winding from burning out. Fuses do not stop the motor overloading, but merely protect the power cables or switchgear from damage in the event of a short circuit. Before energizing the motor, always make sure that the optional anti-condensation heating is switched off.

10.2 Direction of rotation

The standard motors are suitable for clockwise and counter-clockwise rotation. Connection of the power cables in the phase sequence L1, L2, L3 to U1, V1, W1 results in clockwise rotation (looking at the shaft end on the drive side).

If two connections are interchanged, this results in counterclockwise rotation (e.g. L1, L2, L3 to V1, U1, W1).

10.3 Oil level in the gear unit as delivered

ATTENTION !

The proper oil level for the mounting position is designed by the plant. See gear unit nameplate for the precise amount of oil to add.

Gear units that are ordered without oil filling are supplied with internal rust proofing consisting of anti-corrosion oil. The anti-corrosion oil can however be mixed with the recommended lubricant indicated on the nameplate. This means that the unit does not have to be flushed before filling with oil.

ATTENTION !

A change in the mounting position must not be made before consulting the producer.

If the gear unit is opened, for example: to make repairs, it must be filled with the correct lubricant in the correct amount as stated on the nameplate before being put back into service. For lubricants, see page E-23.

11 Operation

During the operation, the gear unit must be tested under maximum load for:

- unusual noises,
- vibrations and unusual oscillations,
- smoke formation,
- leaks.
- With shrink disc types: After demounting the cover cap, check whether any relative movement has occurred between the hollow shaft and the machine shaft. Then reinstall the cover guard.
- Maximum gear housing temperature 90°C.

Gear housing temperature:

During the operation, the surface temperature must be measured in the maximum operating condition. The max. surface temperature is reached in about 3 hours, and it must not exceed **90°C**.

The surface temperature shall be measured with standard commercially available temperature-measuring instruments.

ATTENTION !

The drive must be shut down if any abnormalities relative to the items listed above have been noted upon inspection. Contact the producer.

12 Malfunction

Please provide the following information if help is needed:

- Data from the nameplate
- Type of problem
- Time the problem occurred and circumstances accompanying the problem
- Possible cause

⚠ ATTENTION !

Incorrect work on the gear or motor can lead to damages. Should errors emerge at the gear or gearbox, the drive has to be stopped immediately!

Possible malfunctions on the gear unit:

Malfunction	Possible Cause	Settling
Unusual, even operating noise.	Bearing damage, gearing damage.	Consult the producer.
Unusual, uneven operating noise.	Foreign object in the oil.	Perform an oil change.
Movement of the gear unit during switch-on.	Gear unit fixation has loosened.	Tighten the fixing bolts and nuts with prescribed screwing torque. Change damaged fixing bolts and nuts.
	Rubber buffer set at the torque support is not pre-stressed or damaged.	Pre-stress the rubber buffer set correctly or change the damaged rubber buffer set.
Gear unit gets too warm (Gear surface temp. > 90°C).	Too much oil.	Correct the oil filling capacity.
	Gear unit damage (gearing, bearing).	Consult the producer.
	Vent plug is defective.	Change the vent plug.
Oil leakage at the gear unit or motor.	Gasket is damaged.	Check gaskets, change them if necessary.
	Gear unit is not ventilated.	Remove the transport lock at the vent plug.
Oil leakage at the vent plug.	Too much oil.	Correct the oil filling capacity.
	Gear unit is operated with the wrong type.	Mount the vent plug at the correct position. Adjust the oil filling capacity according to the type.
	Vent plug is defect.	Change the vent plug.
The gear unit output shaft does not turn though the motor runs or the drive shaft is being turned.	Breakage in the gear unit or shaft hub connection disrupted.	Consult the producer.
	Shrink disc connection slips through.	Check the shrink disc connection.

13 Inspection and maintenance

Gear units of the model range C, F and K are **maintenance-free**, an oil change is not necessary. The gear units are executed **without vent plug**, there are no oil drain or oil level screws.

For special applications under difficult/aggressive ambient conditions, an oil change has to be done frequently!

13.1 Inspection and maintenance intervals

Time interval	Inspection and maintenance work
monthly	- gear units must be checked for noise changes (running noise of the gearing and rolling bearings) - Check the housing temperature (max. 90°C, 194°F) - Visible inspection of seals for leakage (Oil leakage) - Remove dust deposits
every 3 months	Clean the exterior of the vent plug
every half year	- Check the rubber buffer set - Check the fixing bolts to make certain they are tight
every 5.000 service hours, no later than every 4 years	Visual check of the shaft seals; if applicable replace the shaft seals
every 10 years	General recovery
Regularly on demand (depending on outside influences)	- Check the air gap - Clean the fan wheel of the motor

13.2 Inspection and maintenance work on gear unit

⚠ WARNING !

No explosive atmosphere may be prevented in any maintenance or repair work. Maintenance and repair work must only be performed by qualified specialists in the field.

Maintenance and repair work are only to be carried out on a drive, which is in standstill with zero potential and secured against accidental switch on.

⚠ WARNING !

Before beginning the work let the gear cool down → Danger of burning!

Visible inspection of seals for leakage:

Make certain that no gear oil is leaking and that no oil traces can be found. In particular, the shaft seals and locking caps, as well as the sealing surface must be checked.

Check the rubber buffer set:

The rubber buffer set must be checked for visible damage, such as cracks on the surface, and they must be replaced in some cases.

Change the shaft seals:

Remove any layers of dust that have accumulated on the gear unit. If the gear unit design included a protection cap, remove it and clean it too. Then reinstall the protection cap (see page E-19).

Remove dust deposits:

When changing the shaft seal, make certain that, depending on the design, a sufficient deposit of grease is present between the dust lip and the sealing lip.

When using double seals, fill one-third of the space between them with grease.

General overhaul:

The general overhaul is to be performed by the producer or by an authorised service partner.

Adjustment of air gap: See Figure 13.

14 Lubricants

If a special agreement regarding the lubricant is not reached, the gear units shall be delivered factory-filled (see table below marked grey.)

The specified gear fill amount and type is stated on the gear unit nameplate. The fill amount and oil type can be different at special applications.

The following lubricant table shows the lubricants that are approved for WG20 gear units.

For helical, parallel shaft and helical bevel gear units at ambient temperatures: -10°C up to +60°C (14°F up to 140°F)

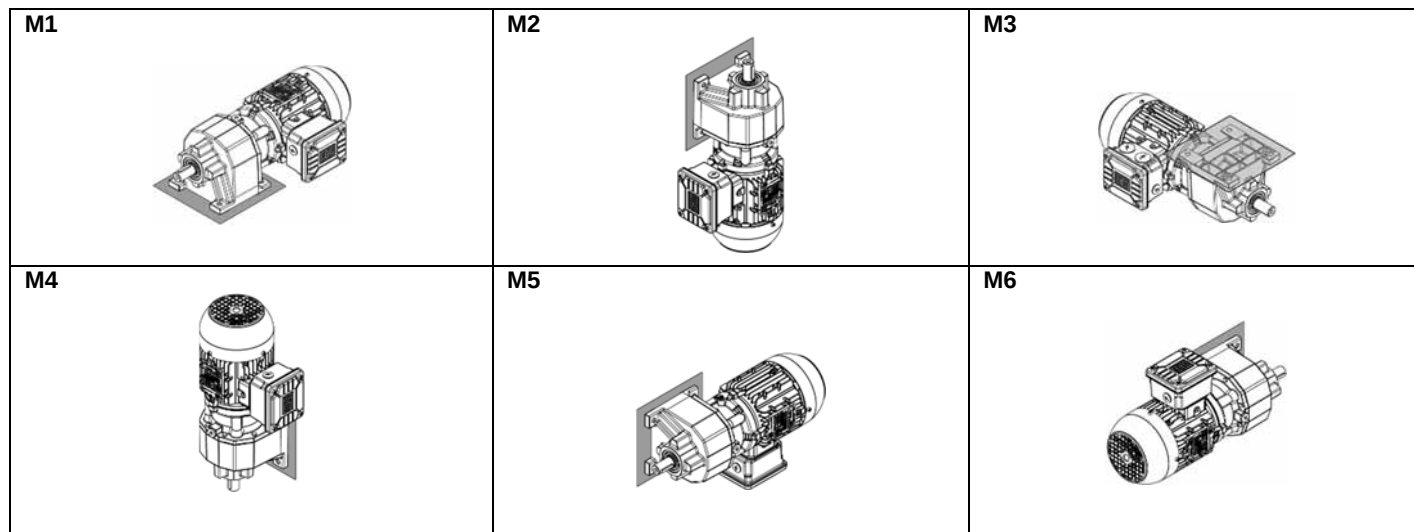
	ALPHA SP 220		Klüberoil GEM 1-220 N
	DEGOL BG 220		Mobilgear 600 XP 220
	Energol GR-XP 220		Omala S2 GX220
	Addinol CLP220		

Do not mix different types of lubricant.

Lubricants for other ambient conditions on request. Food proofed and biodegradable lubricants on request.

15 Mounting positions and lubricant capacity

15.1 Helical gear units C



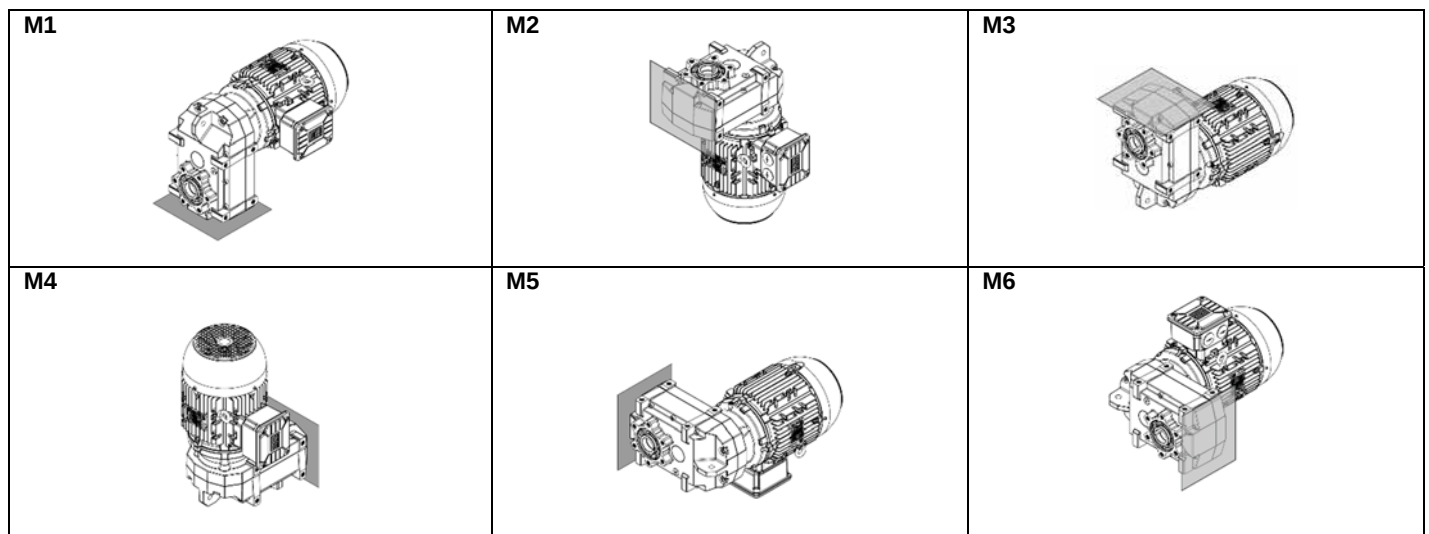
Gear unit sizes C00, C01, C03, C05, C06: no vent plugs are used in any mounting position as standard.

LUBRICANT CAPACITY

Stages	Type with housing in foot execution	Mounting positions					
		M1	M2	M3	M4	M5	M6
2	C00	0,1 l	0,3 l	0,3 l	0,3 l	0,2 l	0,2 l
	C01	0,1 l	0,4 l	0,4 l	0,3 l	0,3 l	0,3 l
	C03	0,3 l	0,7 l	0,6 l	0,6 l	0,5 l	0,4 l
	C05	0,4 l	1,2 l	1,1 l	1,2 l	0,8 l	0,7 l
	C06	0,5 l	1,6 l	1,6 l	1,5 l	1,1 l	1,0 l
3	C03	0,2 l	0,7 l	0,7 l	0,6 l	0,4 l	0,4 l
	C05	0,3 l	1,1 l	1,1 l	1,1 l	0,7 l	0,7 l
	C06	0,3 l	1,5 l	1,6 l	1,4 l	1,0 l	0,9 l

Stages	Type with housing in flange execution	Mounting positions					
		M1	M2	M3	M4	M5	M6
2	C00	0,1 l	0,3 l	0,4 l	0,3 l	0,2 l	0,3 l
	C01	0,2 l	0,4 l	0,5 l	0,5 l	0,3 l	0,4 l
	C03	0,4 l	0,8 l	0,7 l	0,8 l	0,5 l	0,5 l
	C05	0,6 l	1,3 l	1,2 l	1,5 l	0,9 l	1,0 l
	C06	0,9 l	1,8 l	1,9 l	2,2 l	1,9 l	1,4 l
3	C03	0,3 l	0,7 l	0,7 l	0,7 l	0,5 l	0,5 l
	C05	0,5 l	1,2 l	1,3 l	1,5 l	0,9 l	1,0 l
	C06	0,8 l	1,7 l	1,8 l	2,1 l	1,2 l	1,3 l

15.2 Parallel shaft gear units F

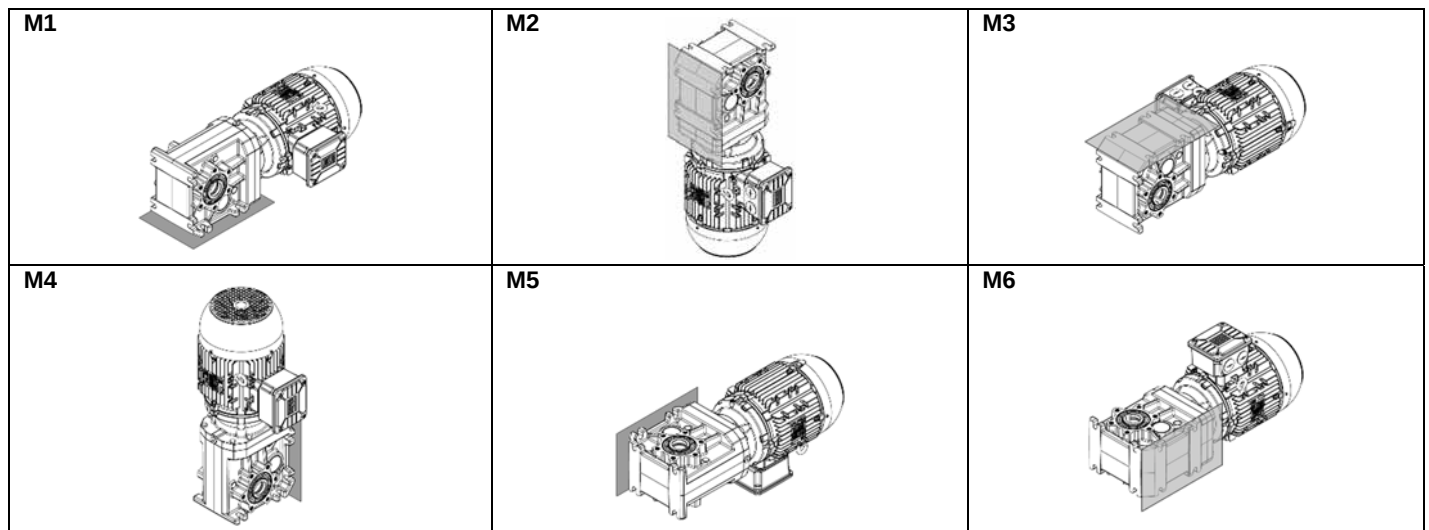


Gear unit sizes F02, F03, F04, F05: no vent plugs are used in any mounting position as standard.

LUBRICANT CAPACITY

Stages	Type	Mounting positions					
		M1	M2	M3	M4	M5	M6
2	F02	0,5 l	0,7 l	0,6 l	0,8 l	0,5 l	0,5 l
	F03	0,8 l	1,1 l	0,7 l	1,1 l	0,8 l	0,8 l
	F04	1,1 l	1,8 l	1,1 l	1,9 l	1,1 l	1,1 l
	F05	2,0 l	2,3 l	1,5 l	2,8 l	1,7 l	1,8 l
3	F04	1,5 l	1,7 l	1,1 l	1,8 l	1,0 l	1,1 l
	F05	2,3 l	2,2 l	1,4 l	2,5 l	1,6 l	1,5 l

15.3 Helical bevel gear units K



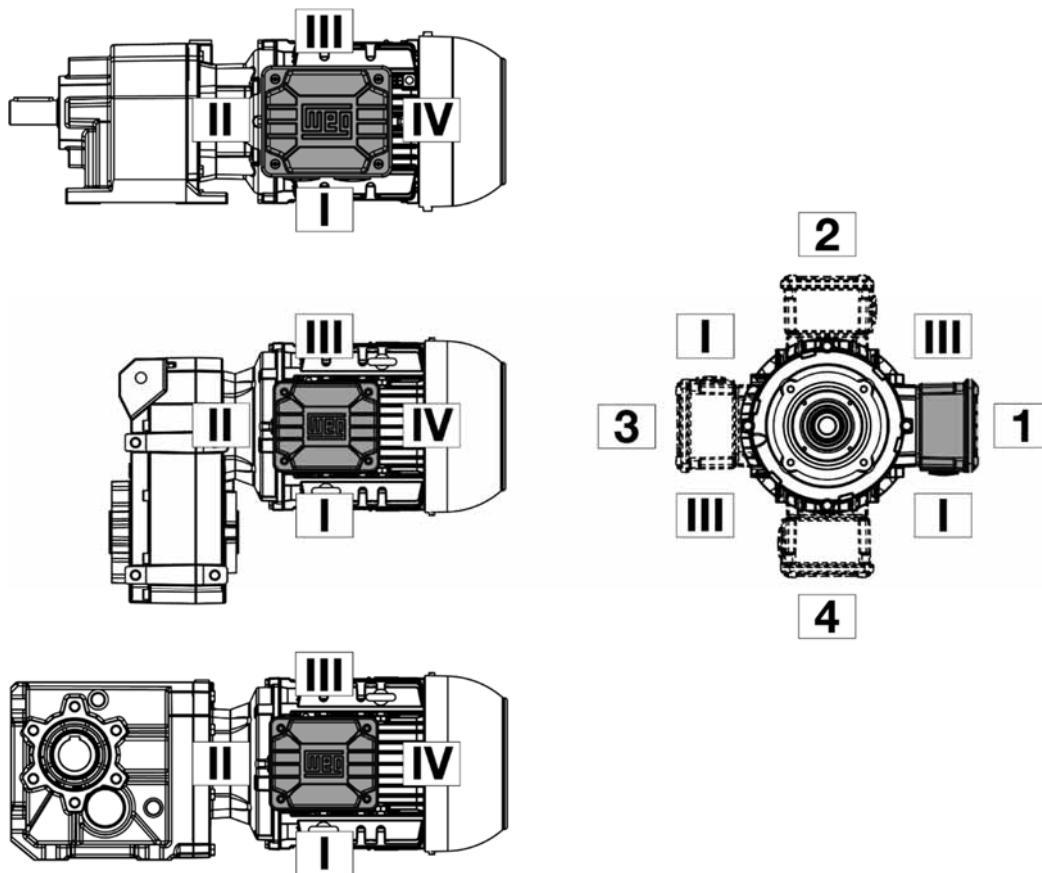
Gear unit sizes K02, K03, K04, K05: no vent plugs are used in any mounting position as standard.

LUBRICANT CAPACITY

Stages	Type	Mounting positions					
		M1	M2	M3	M4	M5	M6
2	K02	0,4 l	0,9 l	0,7 l	0,9 l	0,5 l	0,6 l
3	K03	0,4 l	1,0 l	1,2 l	1,3 l	1,0 l	1,0 l
	K04	0,6 l	1,6 l	1,9 l	2,1 l	1,7 l	1,7 l
	K05	0,8 l	2,1 l	2,6 l	3,1 l	2,1 l	2,2 l

16 Position of terminal box and cable entry

Figure 10: Possible terminal box positions 1 to 4 (standard position on side 1) and cable entries I to IV (standard position on side I)



17 Terminal board connection

Rated voltage series 11N, 11H, 11P (IEC frame sizes 63 to 100)

Possible connection		Rated power P_N	Increased r. power $1,2 \times P_N$	VSD operation	
	Delta	220 – 230 – 240 V at 50 Hz 220 – 265 – 277 V at 60 Hz	254 – 265 – 277 V at 60 Hz		400 V, 87 Hz
	Delta - Delta	110 – 115 – 120 V at 50 Hz 110 – 132 – 138 V at 60 Hz	127 – 132 – 138 V at 60 Hz		230 V, 100 Hz
	Star (Basic connection)	380 – 400 – 420 V at 50 Hz 380 – 460 – 480 V at 60 Hz	440 – 460 – 480 V at 60 Hz		400 V, 100 Hz
	Star - Star	190 – 200 – 210 V at 50 Hz 190 – 230 – 240 V at 60 Hz	220 – 230 – 240 V at 60 Hz		460 V, 120 Hz

Rated voltage series 11H, 11P (IEC frame sizes 112 to 132)

Possible connection		Rated power P_N	Increased r. power $1,2 \times P_N$	VSD operation	
	Delta (Basic connection)	380 – 400 – 420 V at 50 Hz 380 – 460 – 480 V at 60 Hz	440 – 460 – 480 V at 60 Hz		400 V, 100 Hz
	Delta - Delta	190 – 200 – 210 V at 50 Hz 190 – 230 – 240 V at 60 Hz	220 – 230 – 240 V at 60 Hz		
	Star	660 – 690 – (730) V at 50 Hz 660 – (796) – (830) V at 60 Hz	(760) – (796) V at 60 Hz		460 V, 120 Hz
	Star - Star	330 – 346 – 365 V at 50 Hz 330 – 400 – 415 V at 60 Hz	380 – 400 – 415 V at 60 Hz		

The following connection diagram is valid for modular system motors of the series 11N, 11H and 11P in frame sizes 63 up to 132.

Figure 11: Terminal board connection – Motor series 11N, 11H and 11P

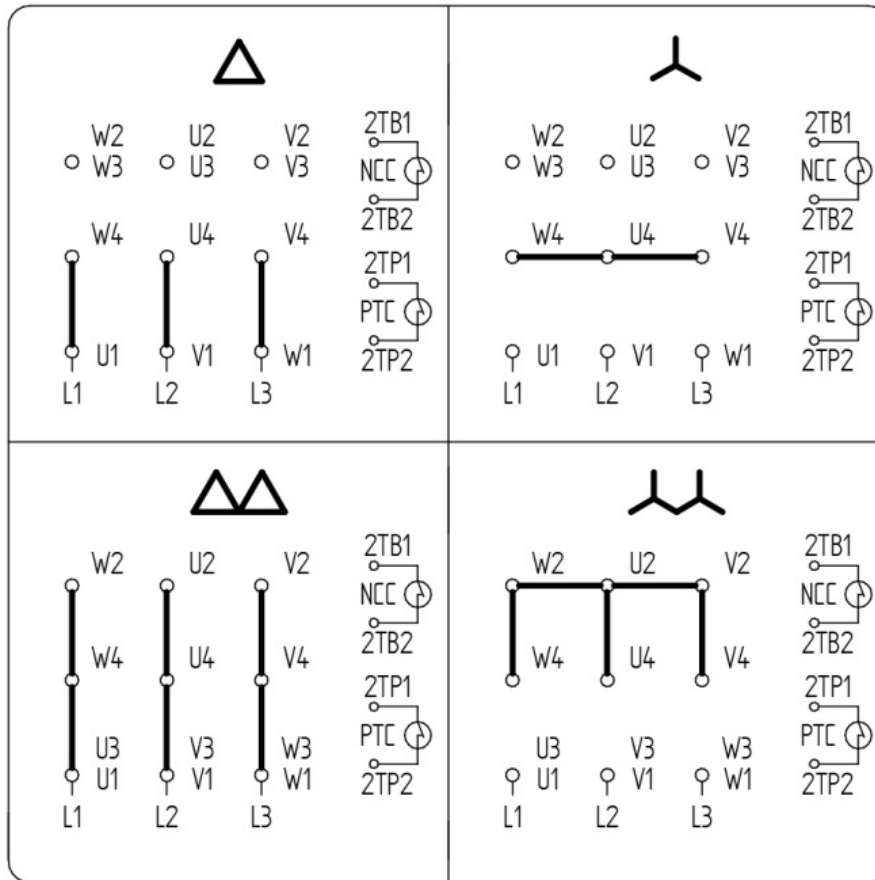


Table 3: Tightening torque

Thread	Tightening torque M_a [Nm]
M4	0,7 - 1,0
M5	1,6 - 2,2
M6	2,2 - 3,5
M8	6 - 8
M10	10 - 14

18 Optional motor devices

Brake, encoder, temperature controller, anti-condensation heating, forced ventilation, etc. are present only on special order.

Additional devices are to be connected according to the valid wiring diagrams.

18.1 Anti-condensation heating

Under certain climatic conditions, an anti-condensation heater may be required e. g. when there are great fluctuations in temperature or the motor is at rest in a humid atmosphere. For heater connection, see the motor terminal box.

WARNING !

Before energizing the motor, always make sure that the (optional) anti-condensation heating is switched off.

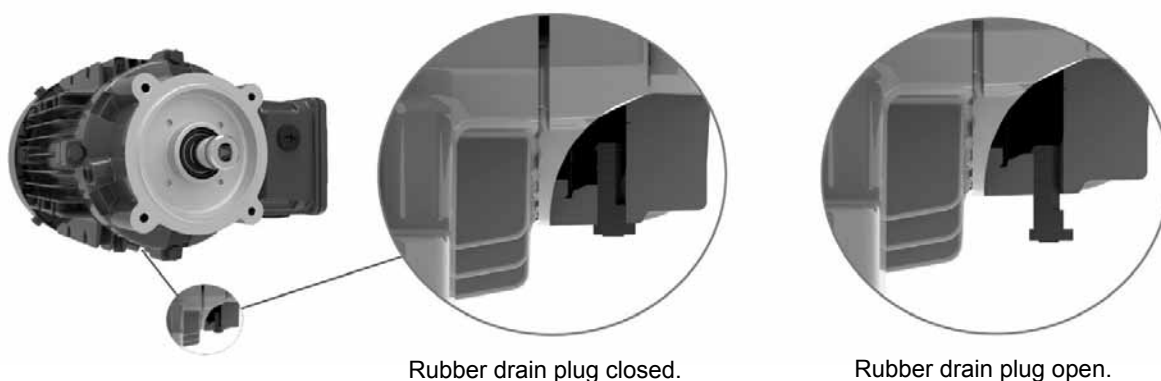
18.2 Drain

If motors are subject to great fluctuations in temperature or extreme climatic conditions, humid air can condense inside the machine. We recommend using a drain.

ATTENTION !

- Open the drain depending on the environment and operating conditions. Afterwards, close the drain plug.
- Before installing motors with drain, check that the mounting position is correct.

Figure 12: Detail of the drain plug position on drive endshield



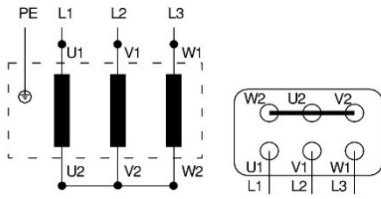
18.3 Forced cooling

ATTENTION !

- The forced cooling must be connected according to the wiring diagram below (see also in forced cooling terminal box).
- If the motor is operated with a frequency inverter, it's not allowed to connect the forced cooling to the frequency inverter. Connect the forced cooling to an EXTERNAL power supply.

IEC frame size	Phases / Connection	Voltage range [V]	
		50 Hz	60 Hz
63 – 132	3~ / Star	346 – 525	380 – 575
	3~ / Delta	200 – 303	220 – 332
	1~ / Delta Steinmetz	230 – 277	230 – 277

Star Connection

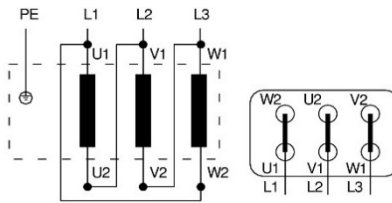


U1 = black
U2 = green

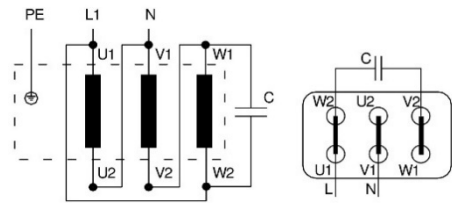
V1 = light-blue
V2 = white

W1 = brown
W2 = yellow

Delta Connection



Delta Steinmetz Connection



18.4 Temperature controller Bimetal switch “NC contact” (TH)

Thermostats have small bimetallic strips that make or break a contact when the critical temperature is reached. The break contact opens the field circuit and disconnects the power supply to the motor.

Block terminal designation in the terminal box: 2TB1 / 2TB2

18.5 PTC Thermistor protection (TF)

PTC thermistors are semi-conductors whose electrical resistance increases dramatically when the critical temperature is reached. In addition to the PTC thermistor, a control unit is also required. The relay in the tripping unit has a changeover contact, which can either be used to open the excitation circuit in the motor contactor or trigger a warning signal.

Block terminal designation in the terminal box: 2TP1 / 2TP2

18.6 Brake

The single-disc brake is released electrically. The brake is applied mechanically when the voltage is switched off.

At delivery the brakes are adjusted to the brake torque.

Connecting the brake:

Connect the brake control system according to the circuit diagram supplied with the brake.

Maintenance:

The spring-loaded brakes hardly need any maintenance. The air gap "a" must be checked periodically to ensure safe brake release. Adjust air gap "a" to the figures given in Table 4 below if necessary.

Table 4: Brake air gap

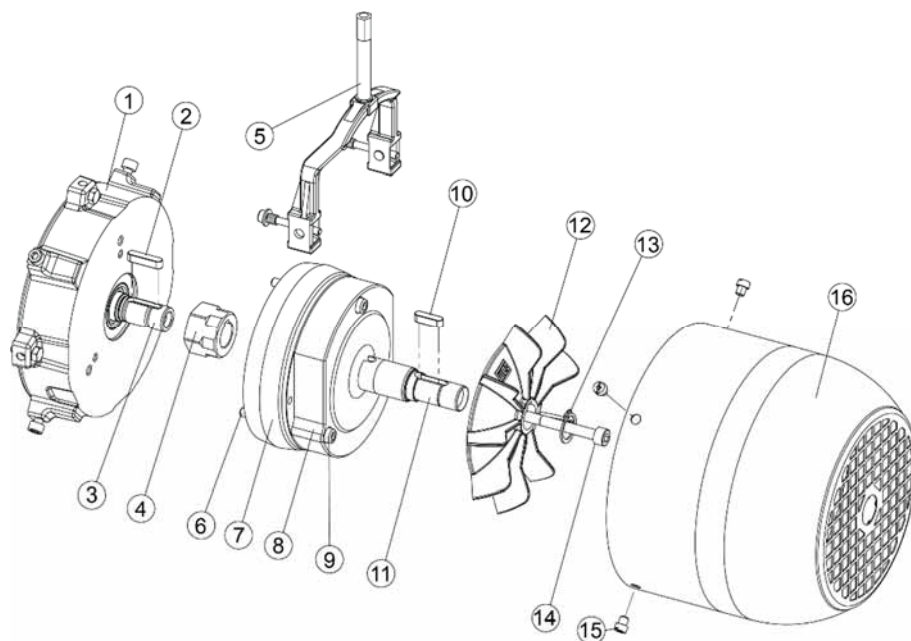
Brake torque	[Nm]	2	5	10	20	40	60	100
a (normal)	[mm]	0,2	0,2	0,2	0,3	0,3	0,3	0,4
a (maximum)	[mm]	0,6	0,6	0,7	0,8	0,9	1	1,1

Adjustment of the air gap (see Figure 13):

1. Loosen the three fixing bolts (9) in a half turn.
2. Turn the hollow screws (6) counter-clockwise into the magnetic case (8).
3. Turn the three fixing bolts (9) clockwise until the nominal air gap (see Table 4) between the magnetic case (8) and armature disc (7) is reached.

Turn the three hollow screws (6) again clockwise out of the magnetic case (8) and retighten the fixing bolts (9). Control the air gap "a" with a feeler gauge on evenness and make a correction if necessary.

Figure 13: Exploded view brake



- | | |
|-------------------------------------|--------------------------------|
| (1) Brake-endshield | (9) Socket head cap screw |
| (2) Key | (10) Key |
| (3) Shaft | (11) Brake shaft adapter |
| (4) Gear hub | (12) Fan |
| (5) Hand release bracket (optional) | (13) Retaining ring |
| (6) Hollow screws | (14) Socket head cap screw |
| (7) Armature disc | (15) Fan cover screw |
| (8) Magnetic case | (16) Fan cover brake execution |

18.6.1 Manual brake release

It is used to lift the brake in case of a loss of power supply. By pressing the lever, the anchor plate is pulled to the magnet and the brake is lifted.

ATTENTION !

For safety reasons the adjustment of the manual release must not be changed.

18.6.2 Locking device for the hand release bracket

In case of service, the manual brake release can be fixed with a locking device.

ATTENTION !

The motor may only be taken into operation after having deactivated the locking device.

18.6.3 Rectifier

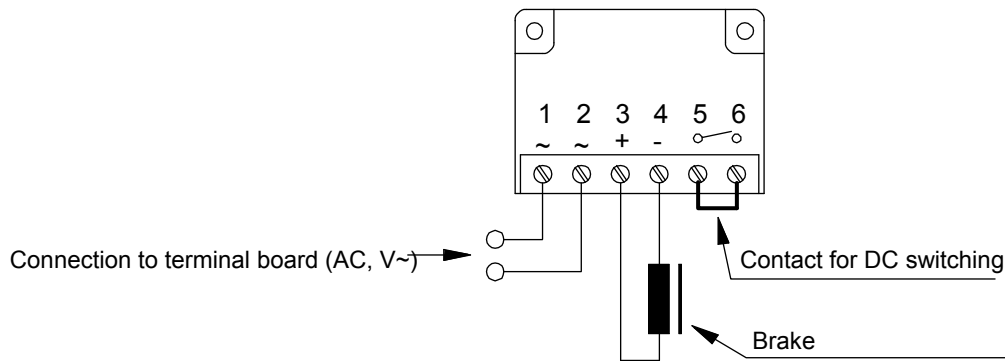
Brake motors will be delivered as standard with connected rectifier for AC-side switching.

For DC-side switching the bridge between terminals 5 and 6 must be removed and a switching contact must be connected.

ATTENTION !

Start-up of motor only with connected brake. (Check!)

Figure 14: Rectifier



Power supply:

The DC brake coil is normally supplied with power from a rectifier installed in the motor terminal box. The rectifiers are equipped with varistors to protect them against overvoltage. Max. ambient temperature for rectifiers is +80°C.

For starting frequency above 1/s, contact us for rectifier loading capacity!

The braking system is connected with a rectifier installed in the terminal box in accordance with the enclosed circuit diagram.

Half-wave rectifier (standard version) - Connection:

- AC voltage 100% e.g. 400 V AC
- DC voltage 45% e.g. 180 V DC

Bridge rectifier - Connection:

- AC voltage 100% e.g. 230 V AC
- DC voltage 90% e.g. 207 V DC

ATTENTION !

If a brake motor is operated with a frequency converter, connect the brake coil to an external power supply.

18.7 Encoder

This encoder is a precision measuring instrument. Always observe the information and instructions of the datasheet to ensure trouble-free function and to maintain warranty claims.

Please observe absolutely the following points:

- It is not permissible to dismantle the encoder entirely or in part or to modify it.
- Do not alter the shaft (by grinding, sawing, drilling, etc.), otherwise the accuracy of the encoder and the reliability of bearing and seal will suffer.
- Never align the instrument with a hammer.
- It is imperative to avoid impact loads.
- Observe maximal radial and axial loads to the encoder shaft under any circumstances.
- Do not connect encoder and drive rigidly to one another at shafts and flanges.
- Never use the assembled encoder to lift the drive-unit.
- Never step onto the encoder.

Technical Data Standard Encoder:

Type	Voltage	Pulses	Output signal
Kübler 5020	10 – 30 V	1024	HTL
Kübler A02H (Heavy Duty)	10 – 30 V	1024	HTL

Pin definition standard encoder:



SIGNAL		GRD	B _{INV}	+UB Sens	0	0 _{INV}	A	A _{INV}	-	B	-	0 V	0 V Sens	+UB	U _{AS}
KÜBLER	M23 X 1 Can		1	2	3	4	5	6	7	8	9	10	11	12	-
	PVC cable	PH	PK	BU/RD	BU	RD	GN	YE	-	GY	-	WH	GY/PK	BN	-
	PUR cable HT cable	PH	PK	BN*	BU	RD	GN	YE	-	GY	-	WH°	WH*	BN°	-

Code	Colour	Code	Colour	Code	Colour	Code	Colour	Code	Colour
BK	Black	GN	Green	RD	Red	YE	Yellow	PH	Shield is attached to connector housing
BN	Brown	GY	Grey	VT	Violet	*	Thin cable		
BU	Blue	PK	Pink	WH	White	°	Thick cable		

19 Table of Tightening Torques

Screw connections are laid out for screw property class 8.8:

Table 5: Tightening Torques

Tightening torque M _a [Nm] - tolerance +10%			
Thread	Screw property class 8.8	Screw property class 10.9	Screw property class 12.9
M5	5,5	8,0	10
M6	10	14	18
M8	25	33	43
M10	45	65	80
M12	75	105	135
M16	190	270	340
M20	380	530	670
M24	650	900	1150
M30	1300	1800	2300

20 Disposal

Mind the current national regulations for the disposal.

Oils and greases or oil and grease containing wastes make up a high hazardous potential for the environment. Thus, ensure a professional disposal!

Geared motors units	Material
Gear housing, housing parts (input cover, adapters, flanges etc.)	Aluminium
Gear inner parts (tooth wheels, keys, shafts)	Steel
Shaft sealing rings	Elastomer with steel
Flat seals	Asbestos-free
Gear oil	Additivated mineral oil

Declaration of Incorporation

in terms of the EC Machinery Directive 2006/42/EC, Annex II B

Product:

- Helical geared motors WG20
- Parallel shaft geared motors WG20
- Helical bevel geared motors WG20

Classification:

C.
F.
K.

Producer: WATT DRIVE Antriebstechnik GmbH - Wöllersdorfer Straße 68 - 2753 Markt Piesting - Austria

Authorized person for the compilation of the technical documents:

Norbert Reisner - Wöllersdorfer Straße 68 - A-2753 Markt Piesting - Austria

The producer herewith declares referring to the above named incomplete machines that:

- They meet the basic requirements of the Direction 2006/42/EC as far as possible,
- The technical documents have been compiled according to Annex VII Chapter B.
- The special technical documents for partly completed machinery have been created and can be made available to the national authorities in response to a reasonable request.
- Their commissioning is prohibited until they have been implemented according to the mounting instruction and an EC Declaration of Conformity for the whole machine according to Direction 2006/42/EC is submitted.

Relevant applicable provisions:

- | | |
|--------------------------------|---|
| ▪ EC Machinery Directive | 2006/42/EC |
| ▪ Security for Machinery | EN 12100 -1, -2 |
| ▪ Electric Equipment | EN 60204 -1 |
| ▪ Separating Safety Equipment | EN 953 |
| ▪ Safety Distances | EN 13857 |
| ▪ Rotating Electrical Machines | EN 60034 -1, -2, -5, -6, -7, -8, -9, -11, -12, -14, -30 |

The original version of the mounting instruction belonging to the incomplete machine is in German.

Markt Piesting, 10.01.2017

Place and date of issue


Klaus Sirenberg – Managing Director

EU - Declaration of Conformity

In terms of the Low Voltage Directive 2014/35/EU

Product:

- Asynchronous Three Phase motors with cage rotor
- Single Phase Induction motors with cage rotor

IEC Motor Size: 56 - 355

Series:

WA_	7WA_	70 WA_	7B WA_	2A WA_	2B WA_	3A WA_	3B WA_	3C WA_
WP_	7WP_	70 WP_	7B WP_	2A WP_	2B WP_	3A WP_	3B WP_	3C WP_
11N	11H	11P	M31_	M32_	M33_			

Producer: WATT DRIVE Antriebstechnik GmbH - Wöllersdorfer Straße 68 - 2753 Markt Piesting - Austria

This declaration of conformity is issued under the sole responsibility of the manufacturer.

The object of the declaration described above is in conformity with the relevant Union harmonisation legislation:

- | | |
|--------------------------------|---|
| ▪ Low Voltage Directive | 2014/35/EU |
| ▪ Regulation | 2009/125/EC |
| ▪ Directive | 2009/640/EC |
| ▪ Electrical Equipment | EN 60204 -1 |
| ▪ Rotating Electrical Machines | EN 60034 -1, -2, -5, -6, -7, -8, -9, -11, -12, -14, -30 |

Markt Piesting, 10.01.2017

Place and date of issue



Klaus Sirrenberg – Managing Director



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