

# Explosionproof gearboxes

## Operating Instructions Types SR, FG, S, SS, SM, SMN, SSM



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## 1 Important Notes

Always follow the safety and warning instructions contained in this publication!



### **Electrical hazard**

Possible consequences: Severe or fatal injuries.



### **Hazard**

Possible consequences: Severe or fatal injuries.



### **Hazardous situation**

Possible consequences: Slight or minor injuries.



### **Harmful situation**

Possible consequences: Damage to the drive and the environment



### **Important information about explosion protection**



### **Tips and useful information**

A requirement of fault-free operation and fulfilment of any rights to claim under guarantee is that you adhere to the information in the operating instructions. Consequently, read the operating instructions before you start operating the drive!

Keep the operating instructions in the vicinity of the unit since they contain important information about servicing the unit.

### **Waste disposal**

(please dispose of the parts in accordance with the applicable regulations)

parts of housing, gears, shafts and rolling bearings of the gearboxes are to be disposed of as iron. Cast parts as well when there is no special collection.

Worm wheels are partly made from non-ferrous materials and are to be disposed of in accordance to applicable regulations. Collect used oil and dispose of in accordance to applicable regulations.

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# Operating instructions – explosionproof drives

## 2 Safety Notes

### 2.1 Safety notes for standard use (non hazardous area)

#### Preliminary remarks

The following safety notes refer mainly to the use of gearboxes. When using geared motors please refer to the safety notes for motors in the corresponding operation instruction.

Also take account of the additional safety notes in the individual sections of these operating instructions.

#### General

During and after operating geared motors, gearboxes and motors have live and rotating parts as well as possibly hot surfaces. All works to transport, stocking, connection, start up, repair and maintenance may only be performed by qualified personnel under strict consideration of

- these instructions
- warning and instruction labels on gearboxes/geared motors
- system-specific regulations and requirements
- national/regional regulations for safety

#### Severe damages on persons and equipment may result from

- inexpert application
- false installation or use
- not allowed removal of necessary protection covers or housing

#### Designated use

These gearboxes / geared motors are intended for industrial systems, they correspond to applicable standards and regulations and meet the requirements of directive 2014/34/EU (ATEX).

Technical data and information to applicable regulations are listed on the nameplate and in the documentation. All instructions must be strictly observed!

#### Transport

Please check all shipments immediately upon receipt for possible damaged in transport. Announce these without delay to the forwarding agent. Start up has to be postponed if necessary. Fix screwed transport rings. They are only designed for the weight of the gearbox / geared motor, no additional load must be added. Build in ring screws correspond to DIN 580. Loads and instructions contained therein have to be observed strictly. When two transport rings or ring screws are fixed, transport has to be executed on both transport rings. Direction of draw angle may not exceed 45° according to DIN 580. If necessary use sufficient means of transport. If there are transport securities please remove before start-up.

#### Gearboxes with extended storage

Gearboxes with extended storage contain a typical, ready for use oil filling with synthetic oil. Please check oil level before start up.

# Operating instructions – explosionproof drives

For extended storage please observe stocking conditions as stated below:

package	Place where stored	Storage time
open	Under a roof and closed at constant temperature and humidity (5° -60%, <50% rel. humidity) No sudden changes of temperature and controlled ventilation with filter (free of dirt and dust). No aggressive damp and vibrations. Protect from insects.	2 years and more with regular inspections. Check if clean and mechanical damages. Check if corrosion protection is complete.

Packaging has to be done by experienced personnel with for the usage qualified packing material.

## Installation

Please note information in chapters „installation“ and „Assembly/Dismantle“.

## Start up

Check correct direction when not coupled (listen for unusual grinding noises when turning). For test running without driving elements protect feather .Do not turn off control and protection functions even for tests. When there are changes to regular use as there are rise of temperature, noise, vibrations) geared motor has to be stopped. search reason , if necessary contact REHFUSS.

## Inspection / Maintenance

Note information in chapter „inspection / maintenance“!

## 2.2 Safety notes for the use in hazardous areas



Explosive gas mixtures or dust concentration with hot, energised of moving parts of gearboxes / geared motors can cause serious injury or death. Installation, connection , start-up, maintenance and repair works on gearboxes / geared motors may only be performed by qualified personnel while taking into account these instructions, warning and instruction labels on gearbox / geared motor, all other project planning documentation, start-up instruction and wiring diagrams, system-specific regulations and requirements, currently effective national / regional regulations (explosionproof, safety, accident avoiding) Maintenance or repair work on the gearbox / gear motor may only be carried out by repair shops which are certified according to DIN EN 60079-19

### Designated use

The gearbox / geared motors are intended for industrial use and may only be used in accordance with the technical documentation provided by Rehfuss and the information listed on the nameplate. They correspond to applicable standards and regulations and meet the requirements of directive 2014/34/EU (ATEX).

A drive motor connected may only be operated on requirements described in chapter „Start-up of gearbox / geared motor in hazardous areas“.

A drive motor connected to gearbox may only be operated when instructions on nameplate of gearbox are considered!

If a gearbox is used in connection with a variable speed drive, operating instructions of variable speed drive have to be considered additionally.

# Operating instructions – explosionproof drives

## 2.3 Checklists

### Before start-up

In this checklist all items are listed which have to be checked before starting a gearbox in hazardous areas according to 2014/34/EU (ATEX).

Please check before starting in hazardous area	Checked	Information in chapter
Check shipment immediately after receipt on possible damages in transport. Inform the forwarding agent immediately. If necessary do not start. Remove transport safety systems before starting.		2.1
Do Group, Ex-Zone, temperature class, max. surface temperature correspond to allowed Ex-range in site		3.6 and 4.7
Is it made sure that no explosive atmospheres, oils, acids, gases or damps are around when installing the gearbox?		4.2
Is ambient temperature of $-20^{\circ}$ - $+40^{\circ}$ kept		9
Is it made sure that gearboxes are ventilated sufficiently and no extreme heat builds up (for example by couplings). Cooling air may not have more than $40^{\circ}\text{C}$ .		4.4 and 4.7
Does version on nameplate of gearbox correspond to version of gearbox? Please note that a amendment of version may only be made after agreement with Refhuss. Without prior agreement ATEX-Certification is void.		4.4
Does oil level of this version correspond to the lubricant capacity stated on nameplate of gearbox? If changed Please contact Refhuss and request new nameplate.		4.4
Are all oil control and drain screws and all ventilation screws and valves easily accessible?		4.4
Are all driving elements ATEX-certified?		4.5
Is it made sure that dates stated on nameplate of gearbox are not exceeded for solo gearboxes with IEC-Adapter or free input shaft.		5.7
When installing gears with hollow shaft and shrink disc – is cowl fixed regularly?		4.10
When fixing IEC-adapter no shims may be used.		4.11 4.12 4.13
When installing a motor with belt adjusting unit: Does belt between input shaft end and motor shaft has sufficient bleeder resistor $< 10^9 \Omega$ ? Before fixing a protective hood it has to be confirmed by a risk analysis by the hood's manufacturer that there is no ignition source (for example impact sparks when grinding		4.14
When motors are mains-operated check if dates stated on nameplate of gear and motor do correspond to ambient conditions.		5.6
When inverter is used check if geared motor is certified for converter use. Parameter of inverter must prevent overload of gearbox (-> nameplate of gearbox).		5.6

### During Installation

In this checklist all items are listed which have to be considered during installation of a gearbox according to 2014/34/EU (ATEX) in hazardous area.

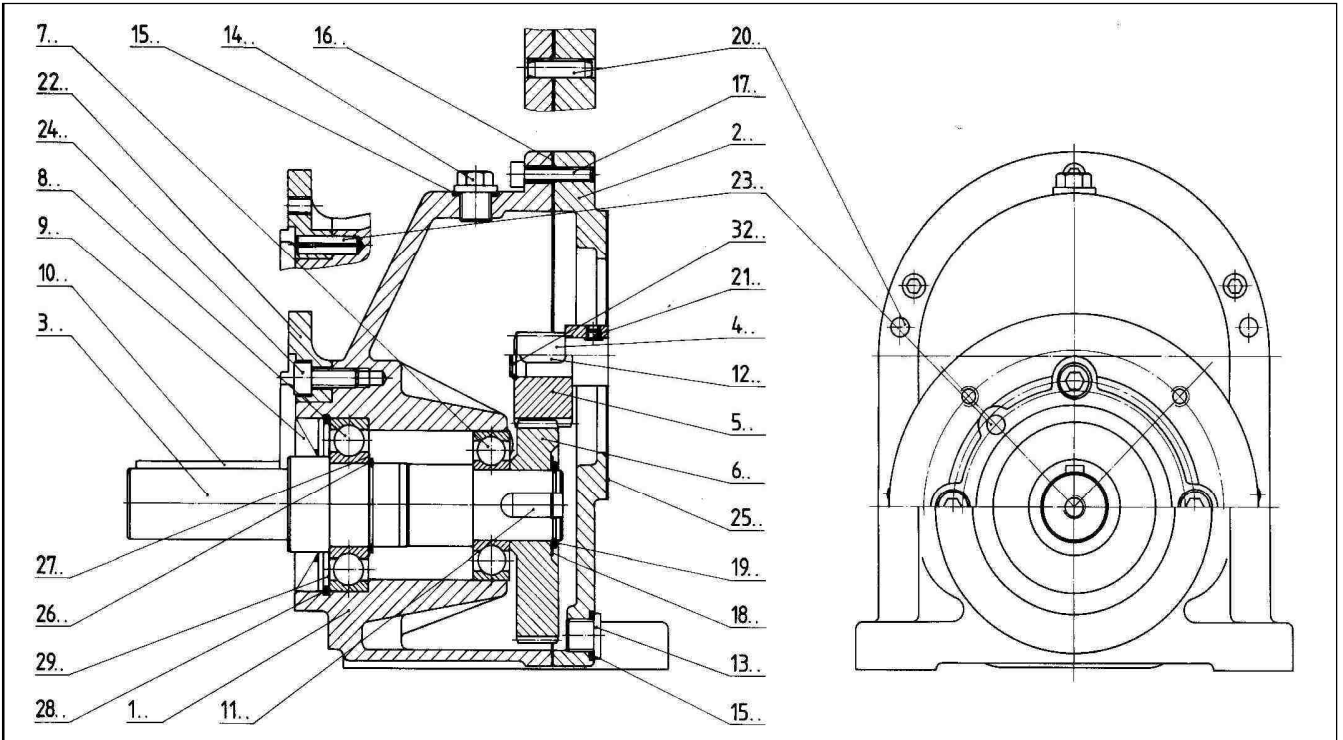
Check during installation in hazardous area	checked	Information in chapter
Measure surface temperature after approx. 3 hours. A difference of 70 K against ambient temperature may not be exceeded. If there is a value $> 70 \text{ K}$ stop drive immediately and contact Refhuss.		5.3
Measure temperature of lubricant. Add 10 K to the value measured. Determine interval to change lubricant by this value.		5.3



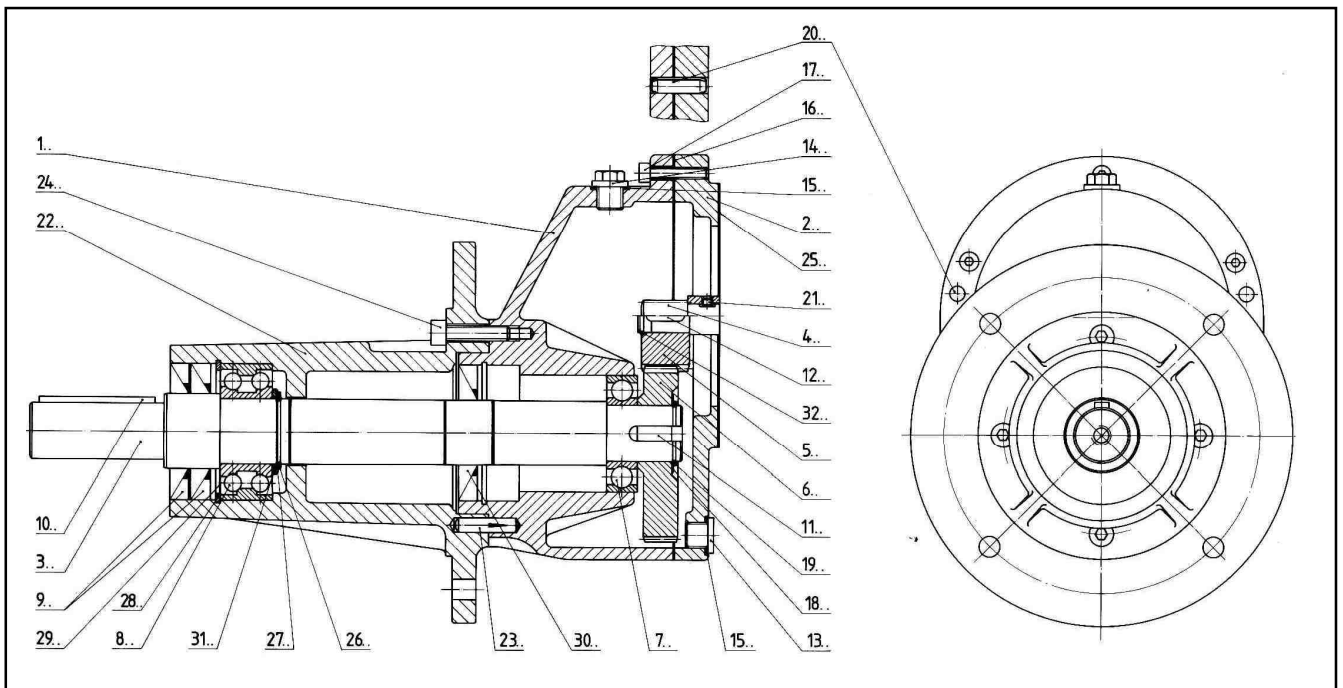
### 3 Construction of gearbox

#### 3.1 basic construction helical gear 1-step SR120 – SR160

version L,C,B,F,Z



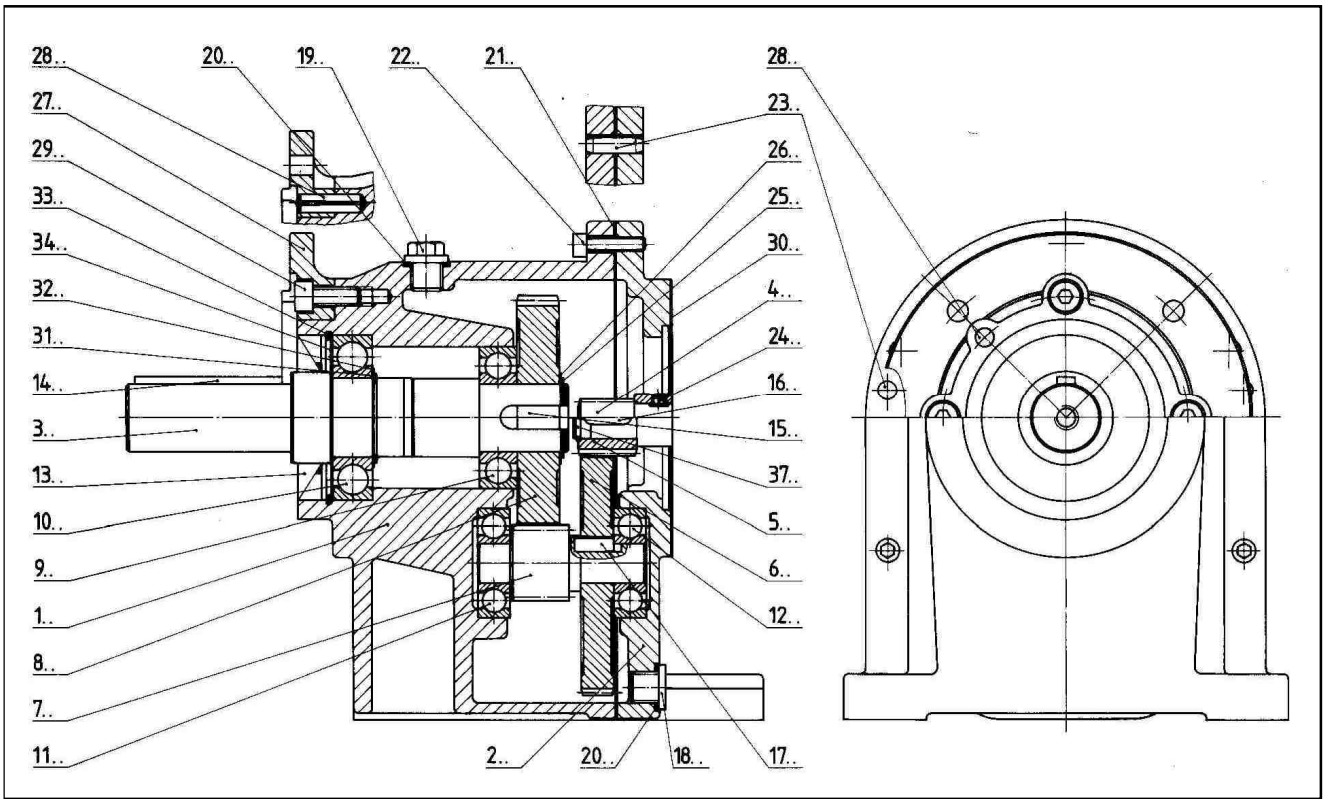
version R



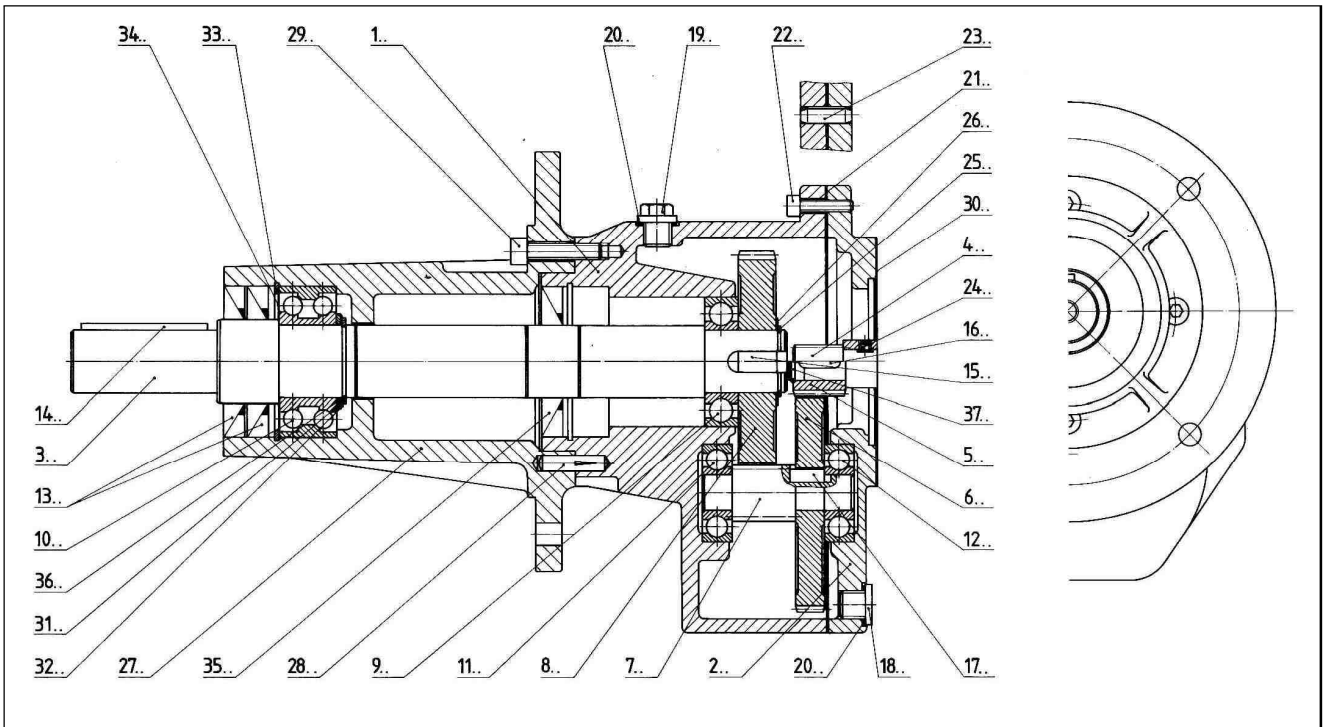
# Operating instructions – explosionproof drives

## 3.2 Basic construction helical gear 2 step SR210 – SR260

version L,C,B,F,Z

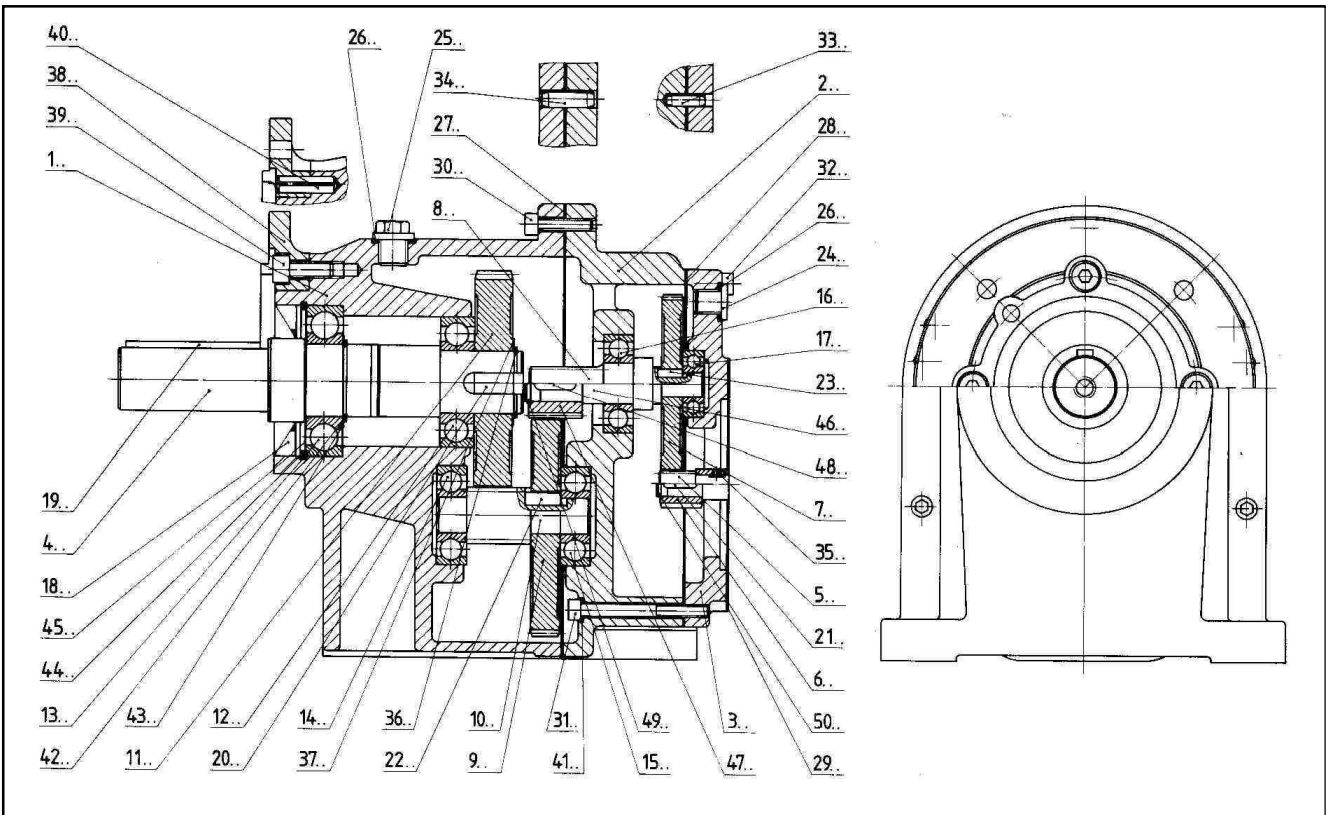


version R

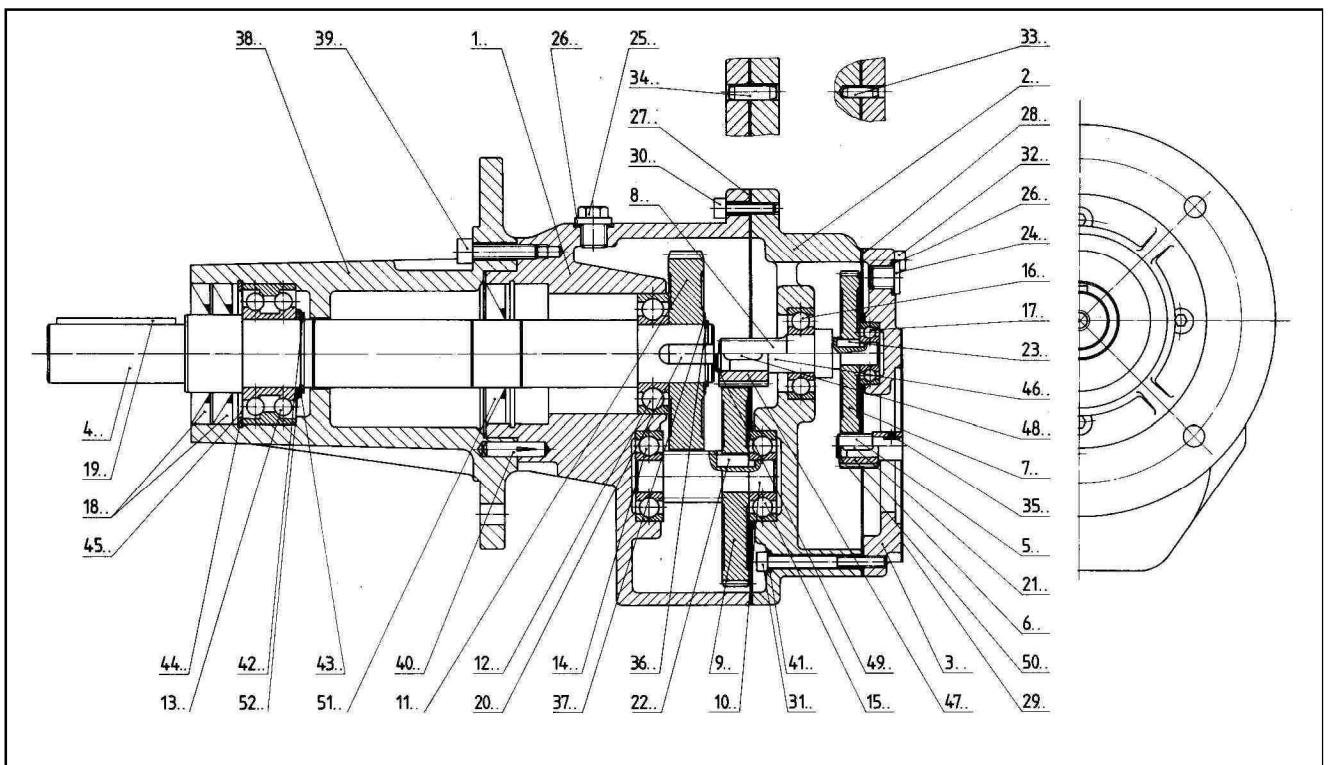


### 3.3 Basic construction helical gear 3-step SR320 – SR360

version L,C,B,F,Z



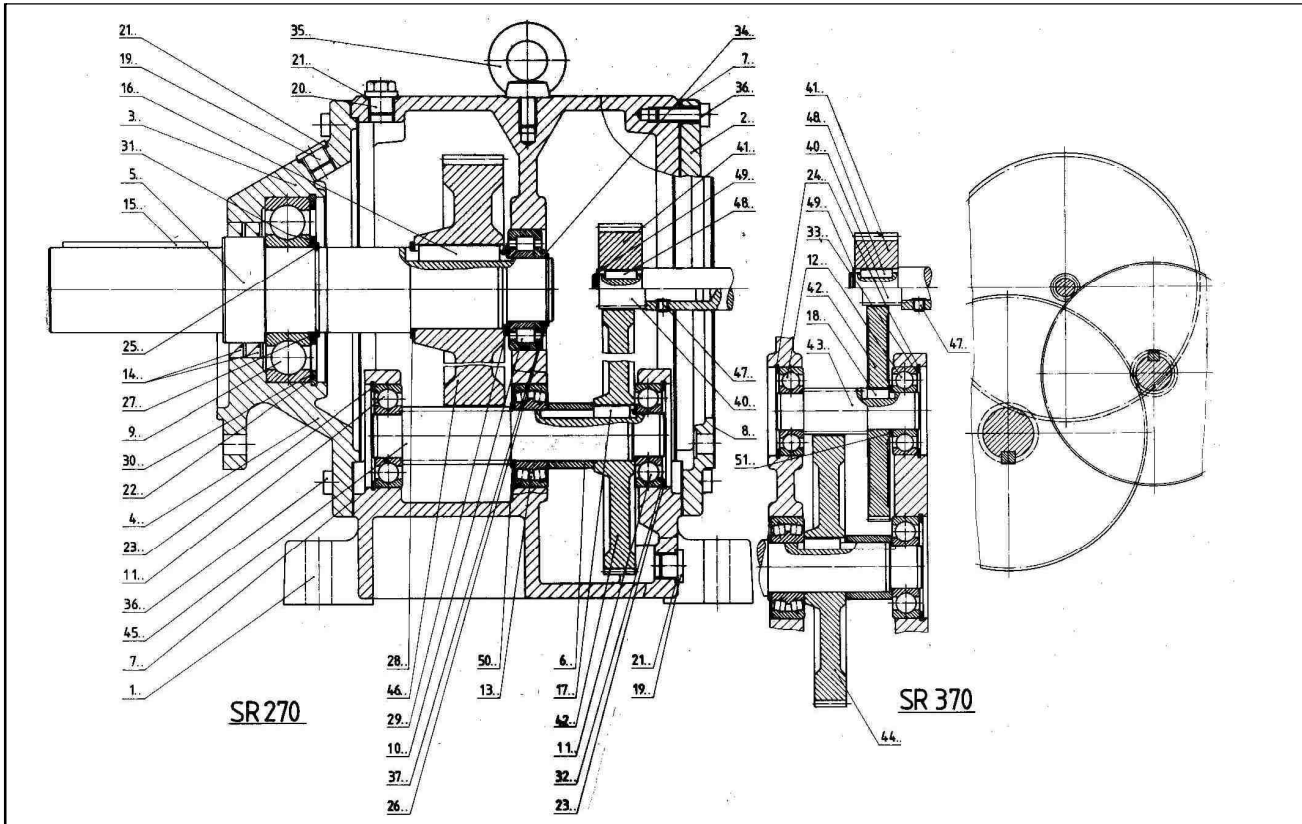
version R



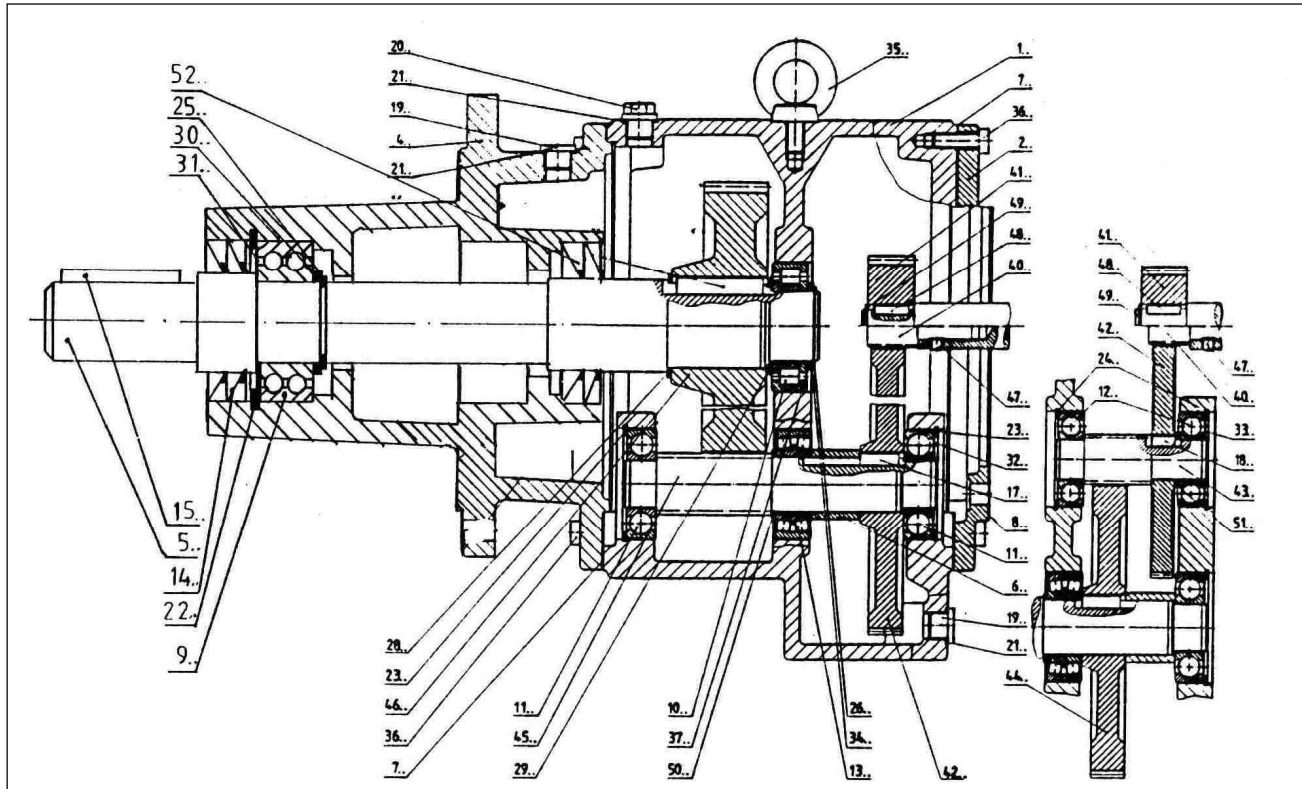
# Operating instructions – explosionproof drives

## 3.4 Basic construction helical gear SR270 – SR370

version L,B,F

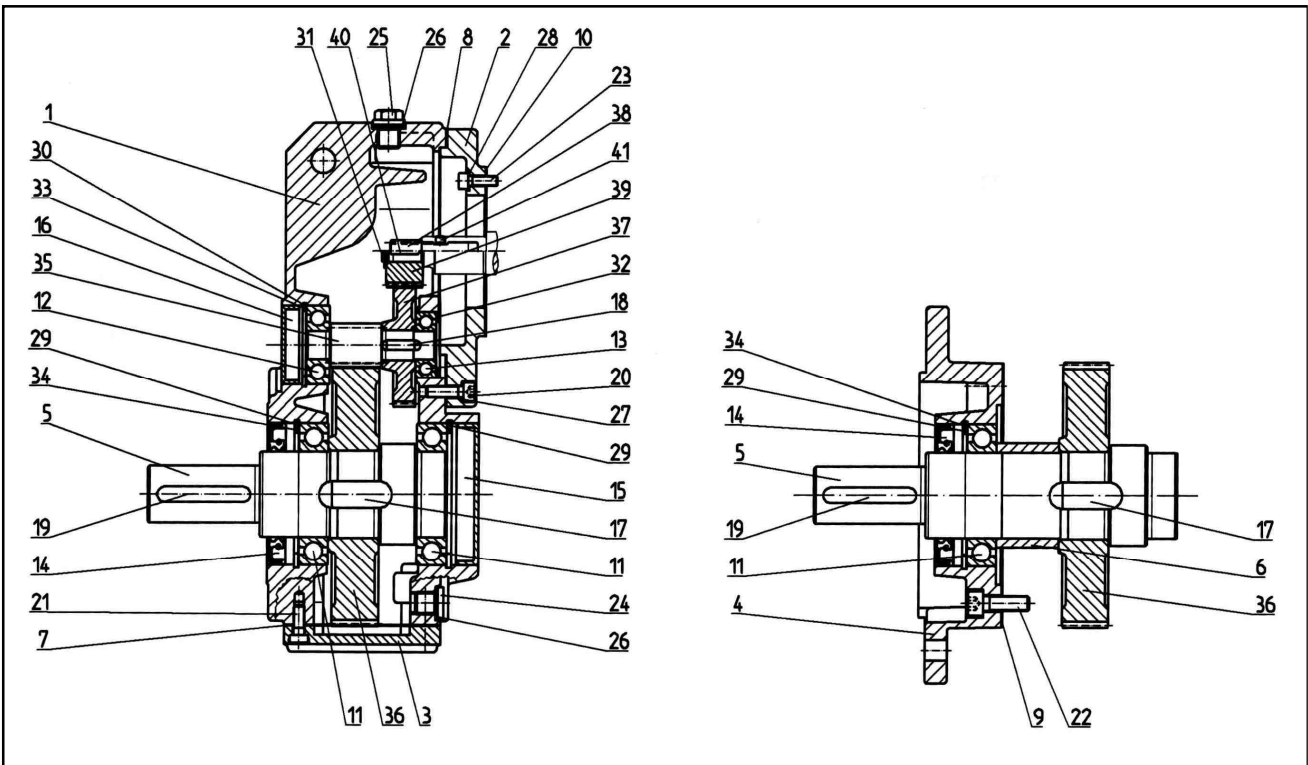


version R

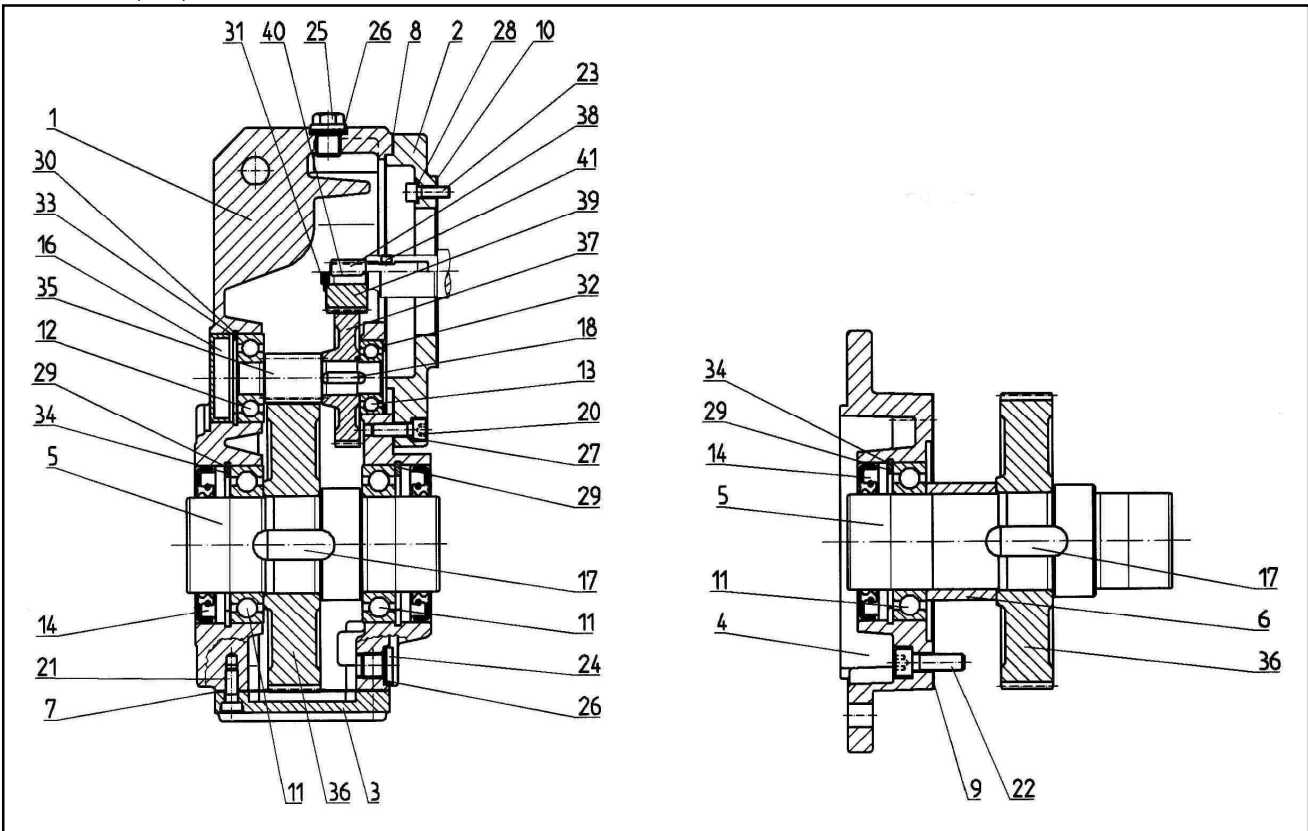


### 3.5 Basic construction shaft mounted gearboxes Type FG

version WG,WF,WU



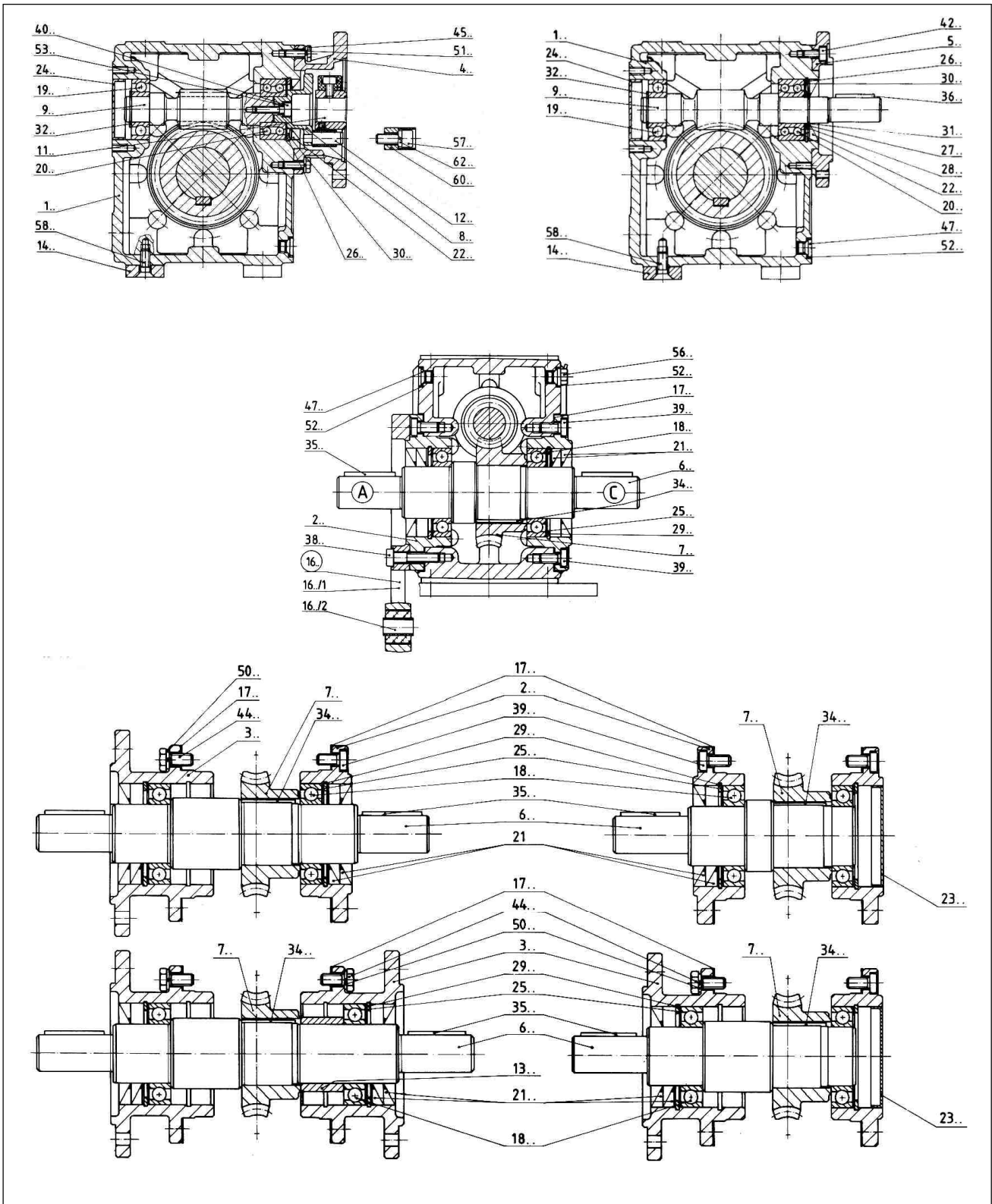
version HG, HF, HU



# Operating instructions – explosionproof drives

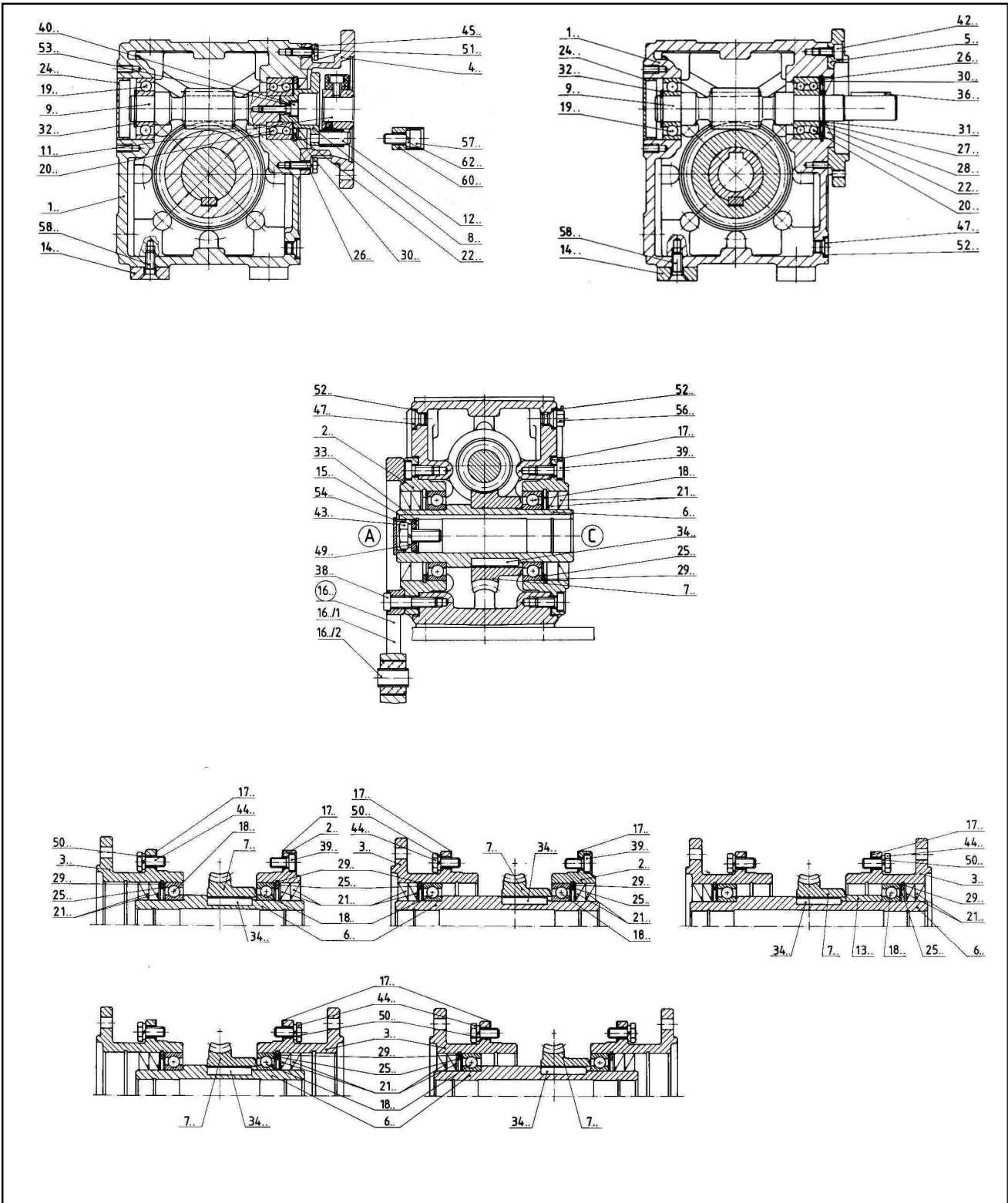
## 3.6 Basic construction worm gear box S030 – S050 IEC, K, KF

version WG,WF,WL,WD



### 3.7 Basic construction worm gear box S030 – S050 IEC, K, KF

version HG, HF, HL, HD

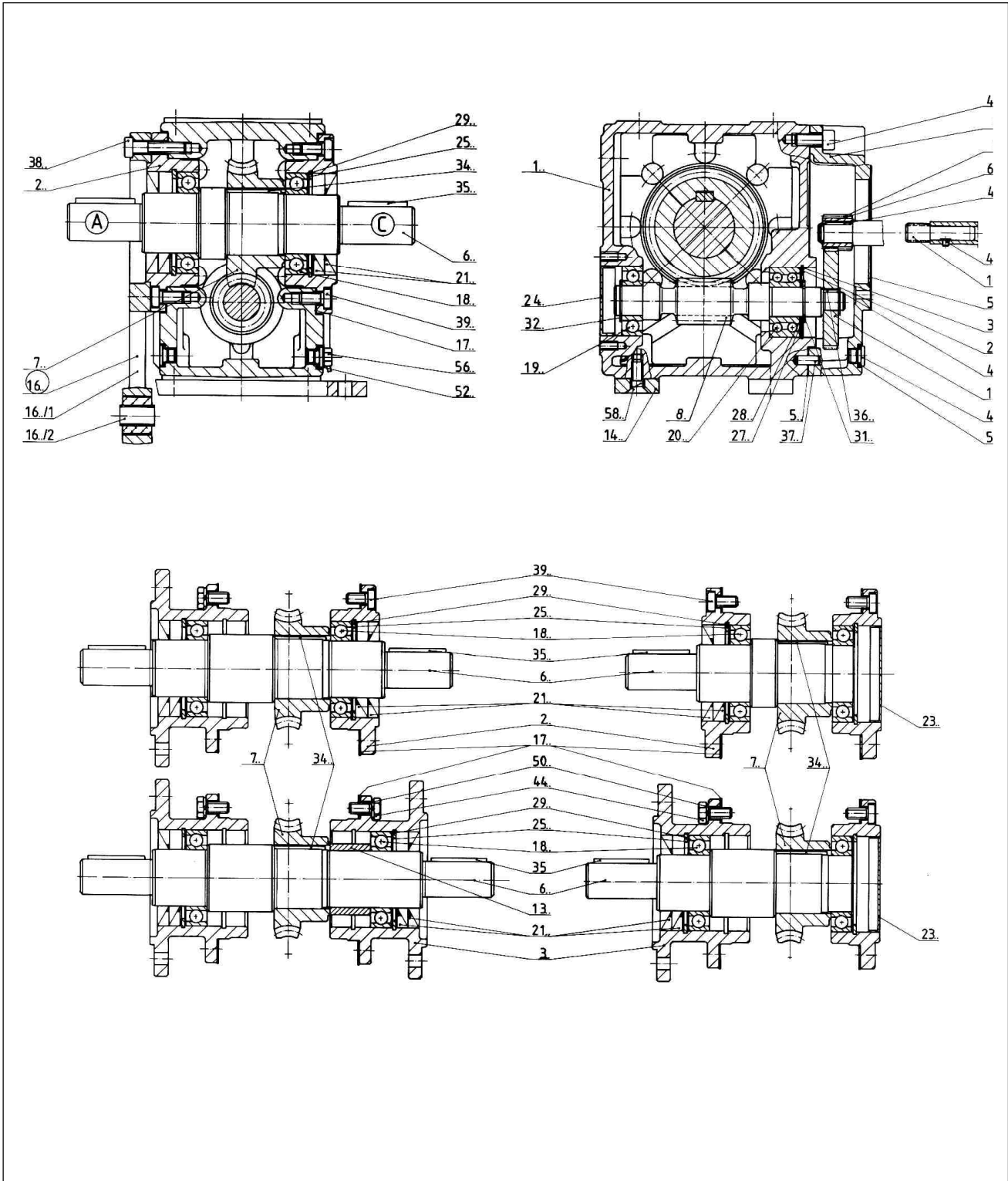




# Operating instructions – explosionproof drives

## 3.8 Basic construction helical worm gearbox SS130 – SS150

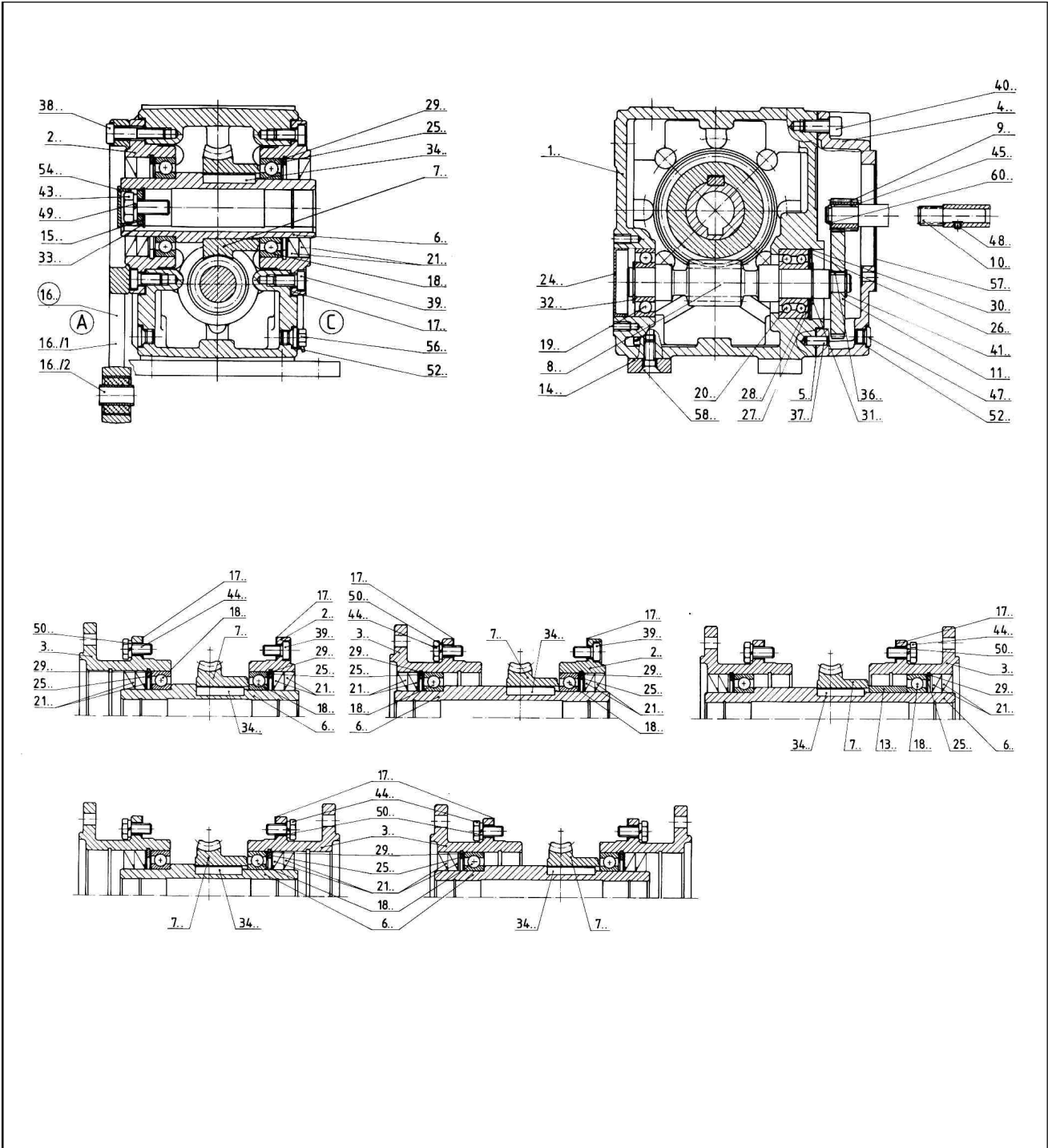
version WG,WF,WL,WD





### 3.9 Basic construction helical worm gearbox SS130 – SS150

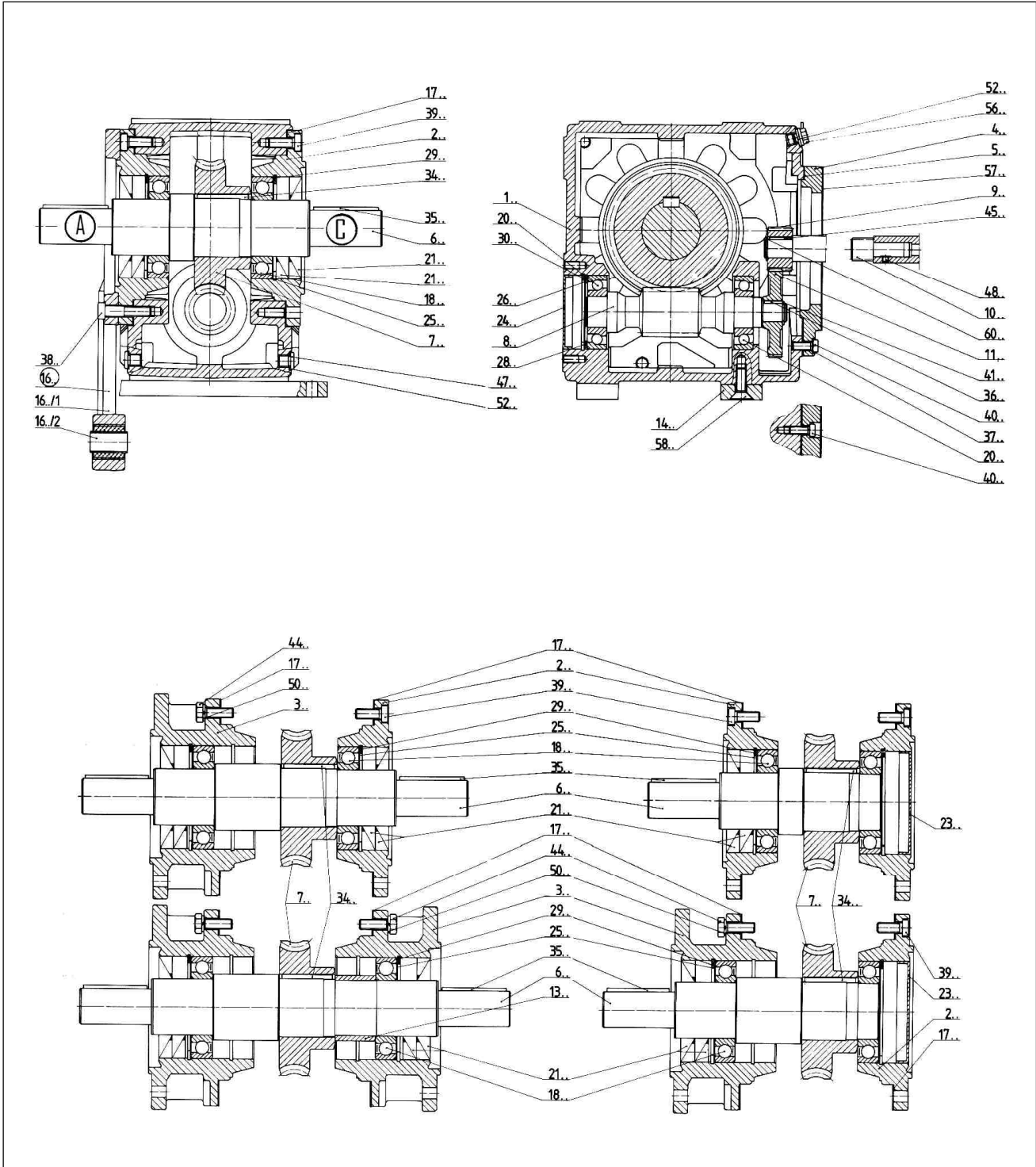
version HG, HF, HL, HD



# Operating instructions – explosionproof drives

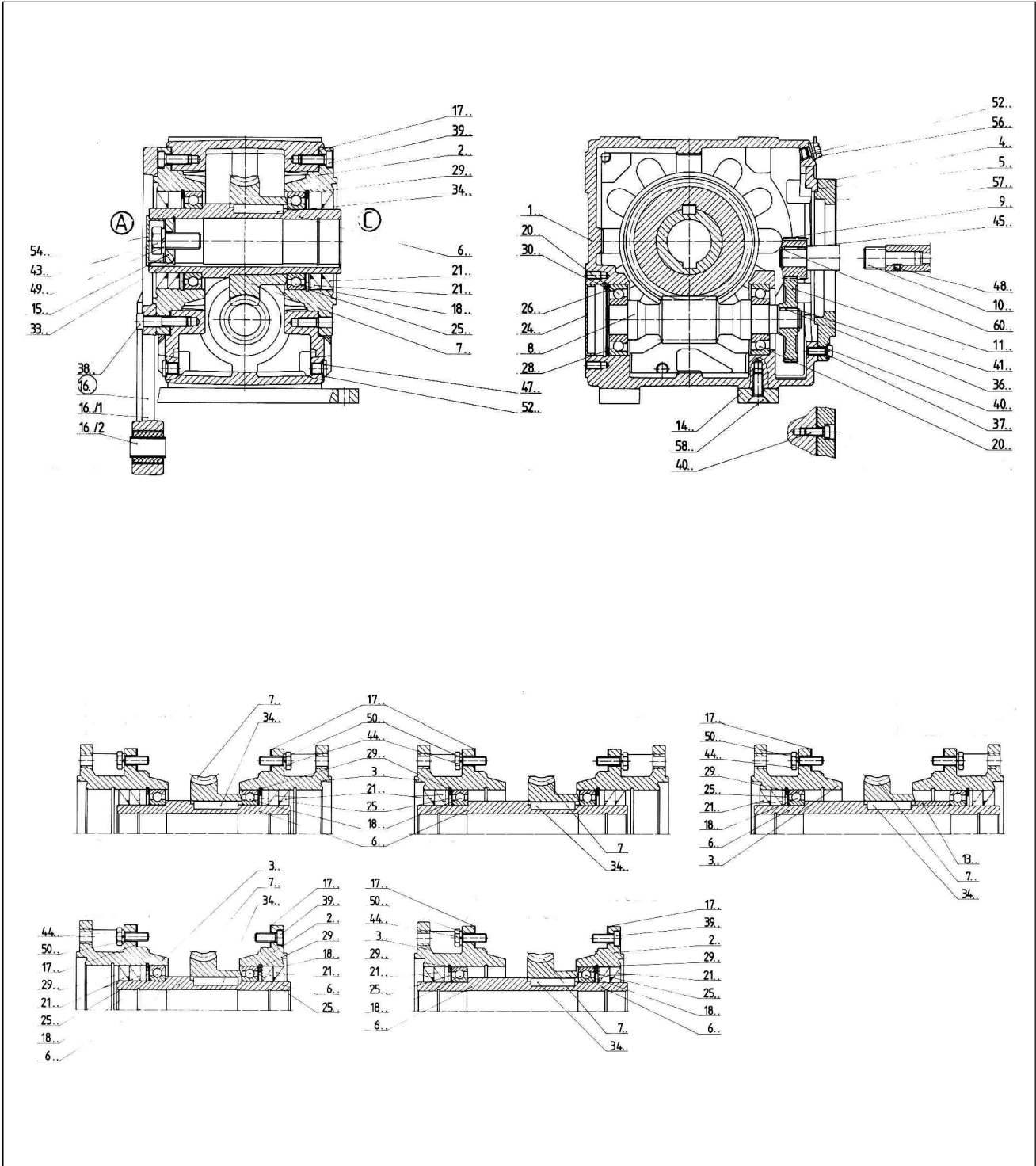
## 3.10 Basic construction helical worm gearbox SS160 - SS170

version WG,WF,WL,WD



3.11 Basic construction helical worm gearbox SS160 - SS170

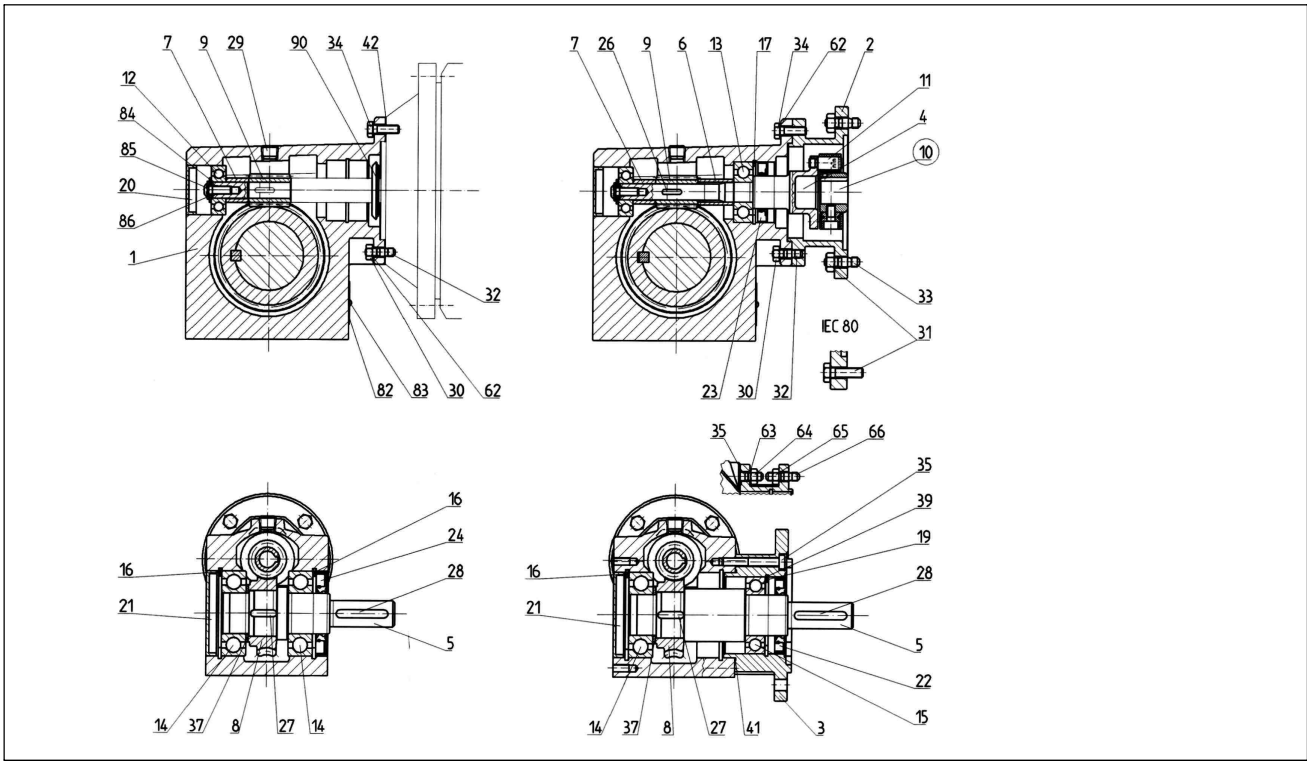
version HG, HF, HL, HD



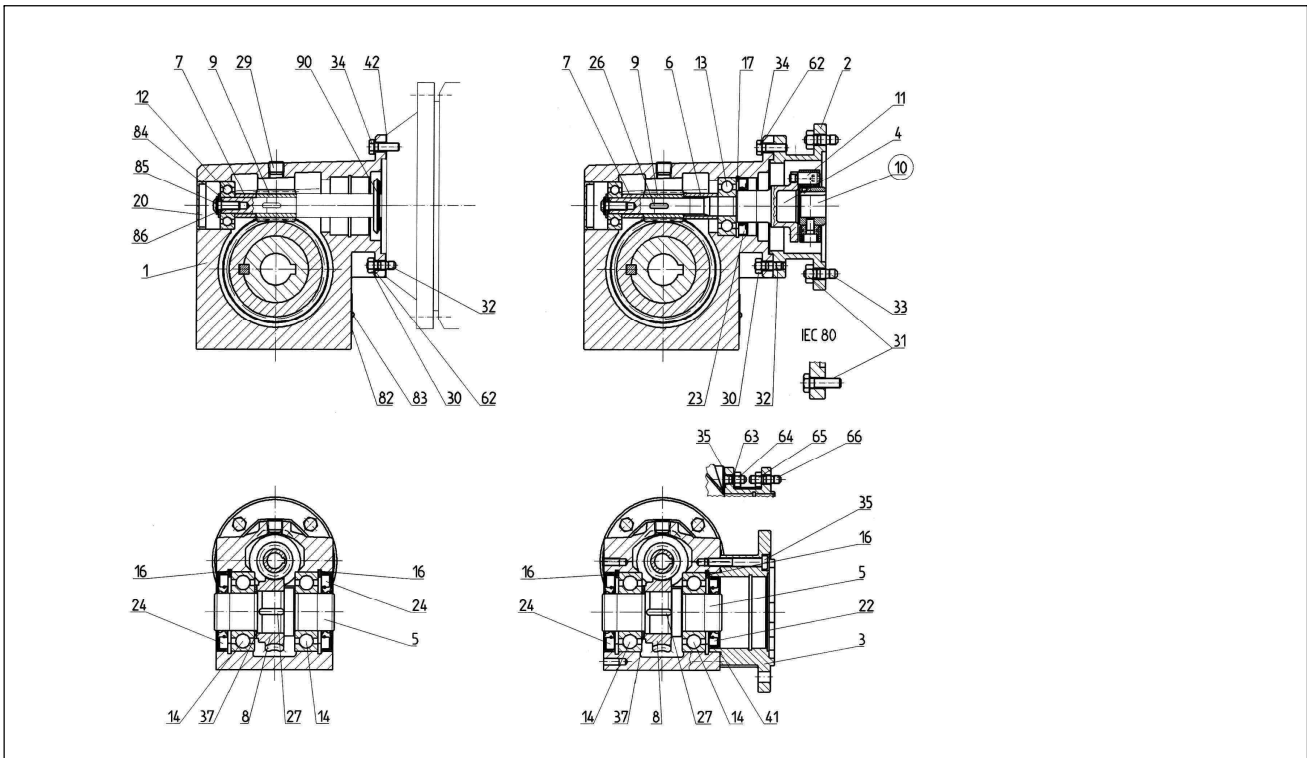
# Operating instructions – explosionproof drives

## 3.12 Basic construction worm gearbox SM011 - SM031, SMN021 - SMN031

version WG,WGU,WF,WFU

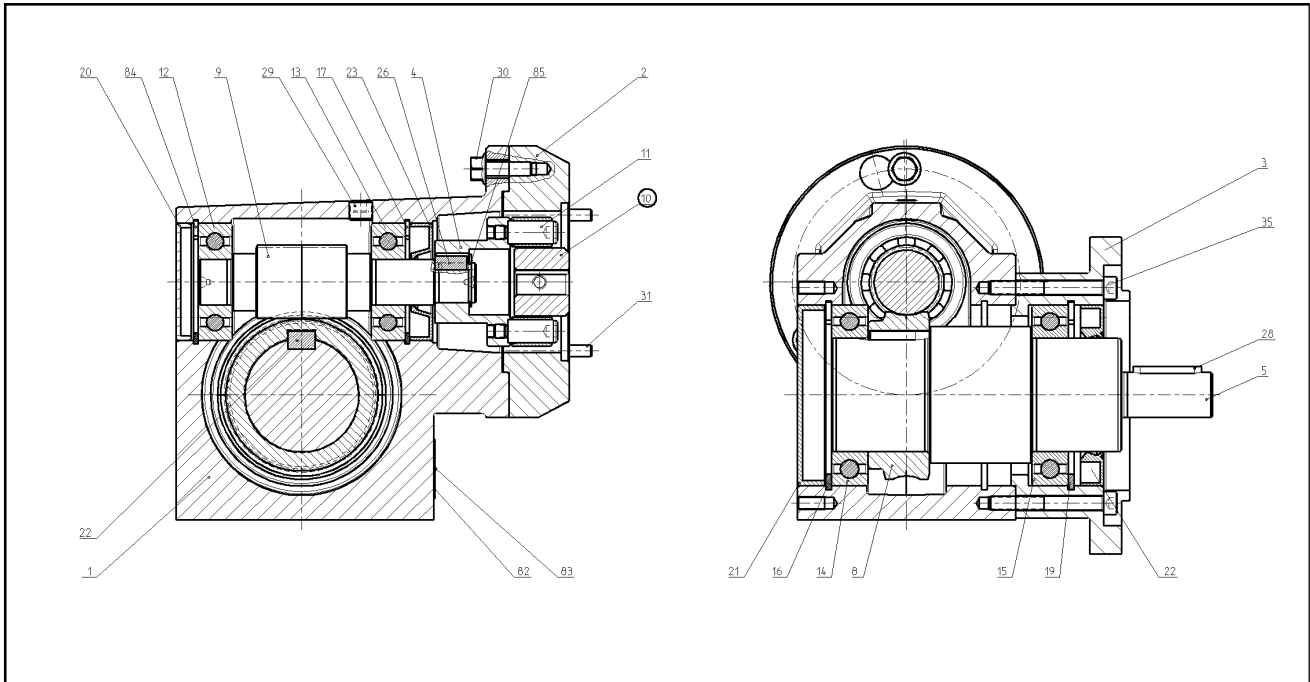


version HG,HGU,HF,HFU

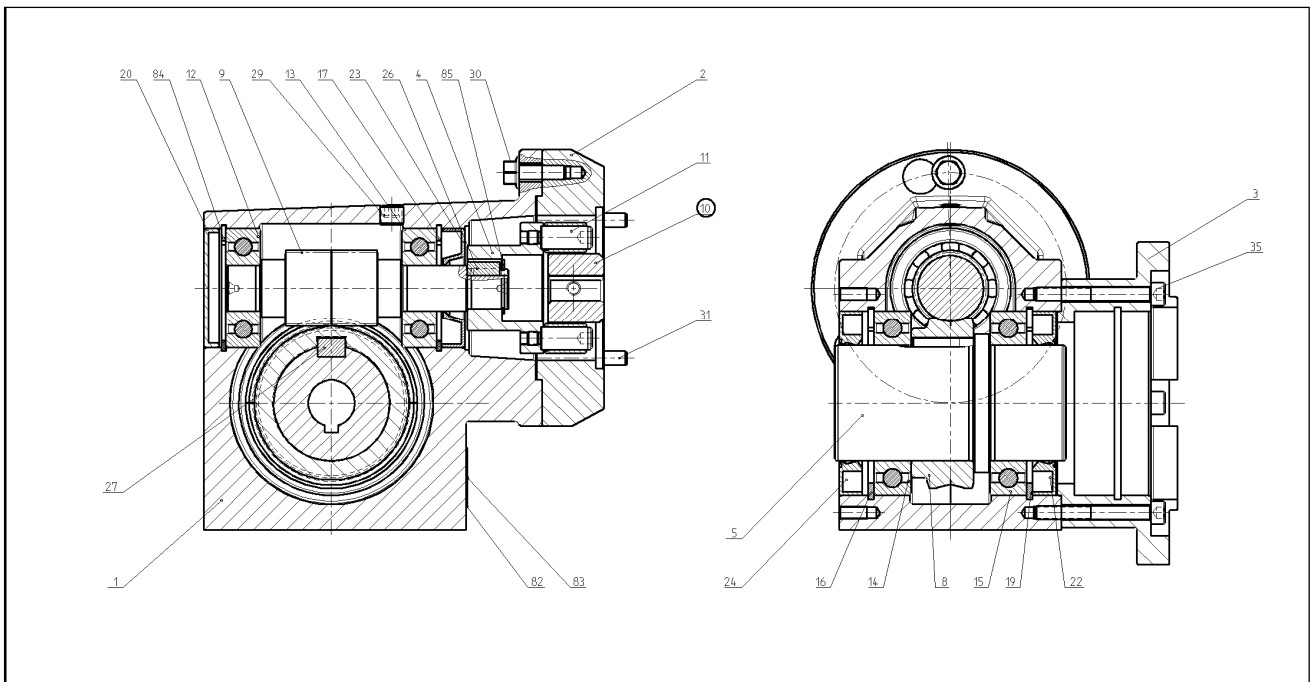


### 3.13 Basic construction worm gearbox SM041

version WG,WGU,WF,WFU



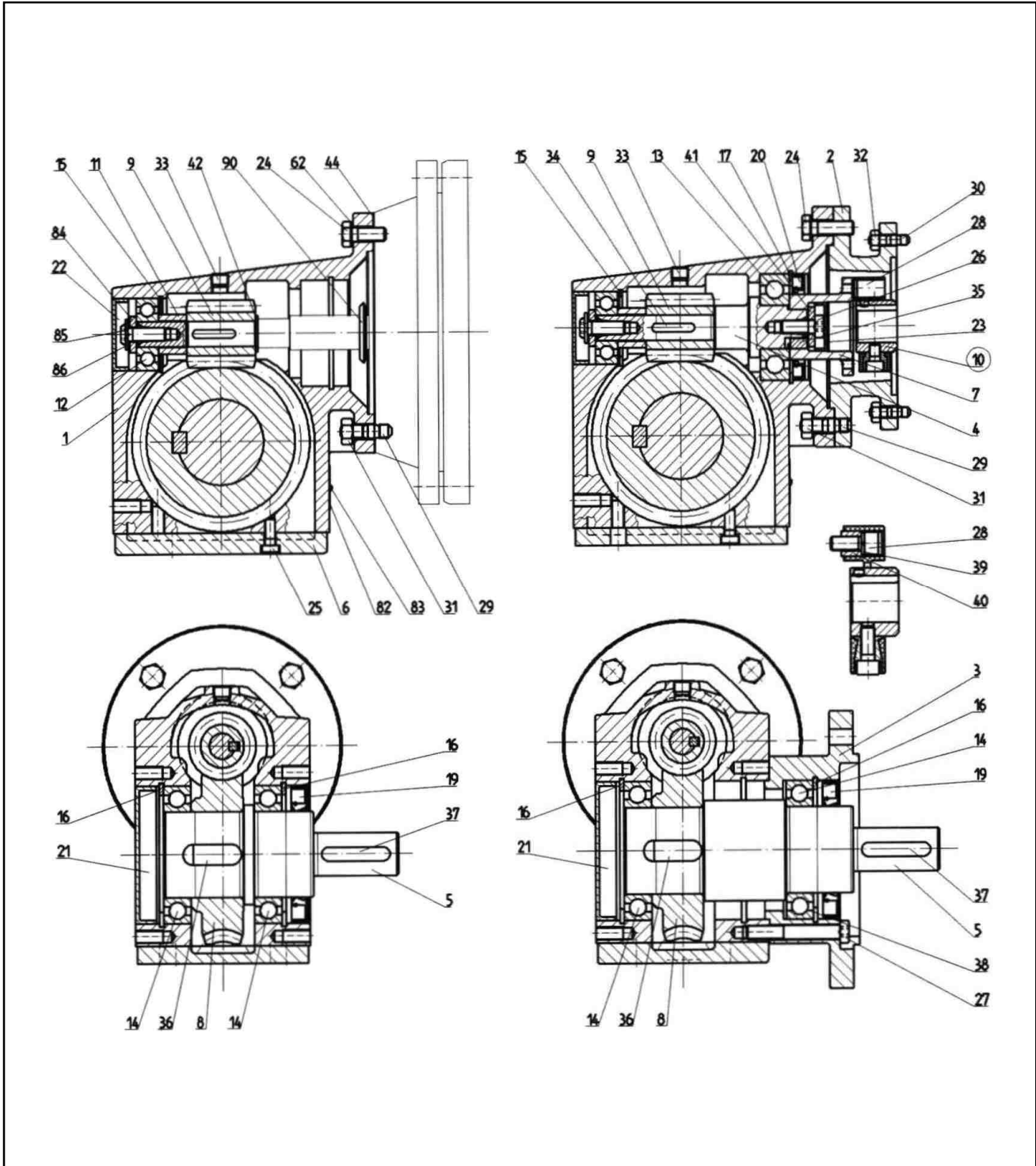
version HG,HGU,HF,HFU



# Operating instructions – explosionproof drives

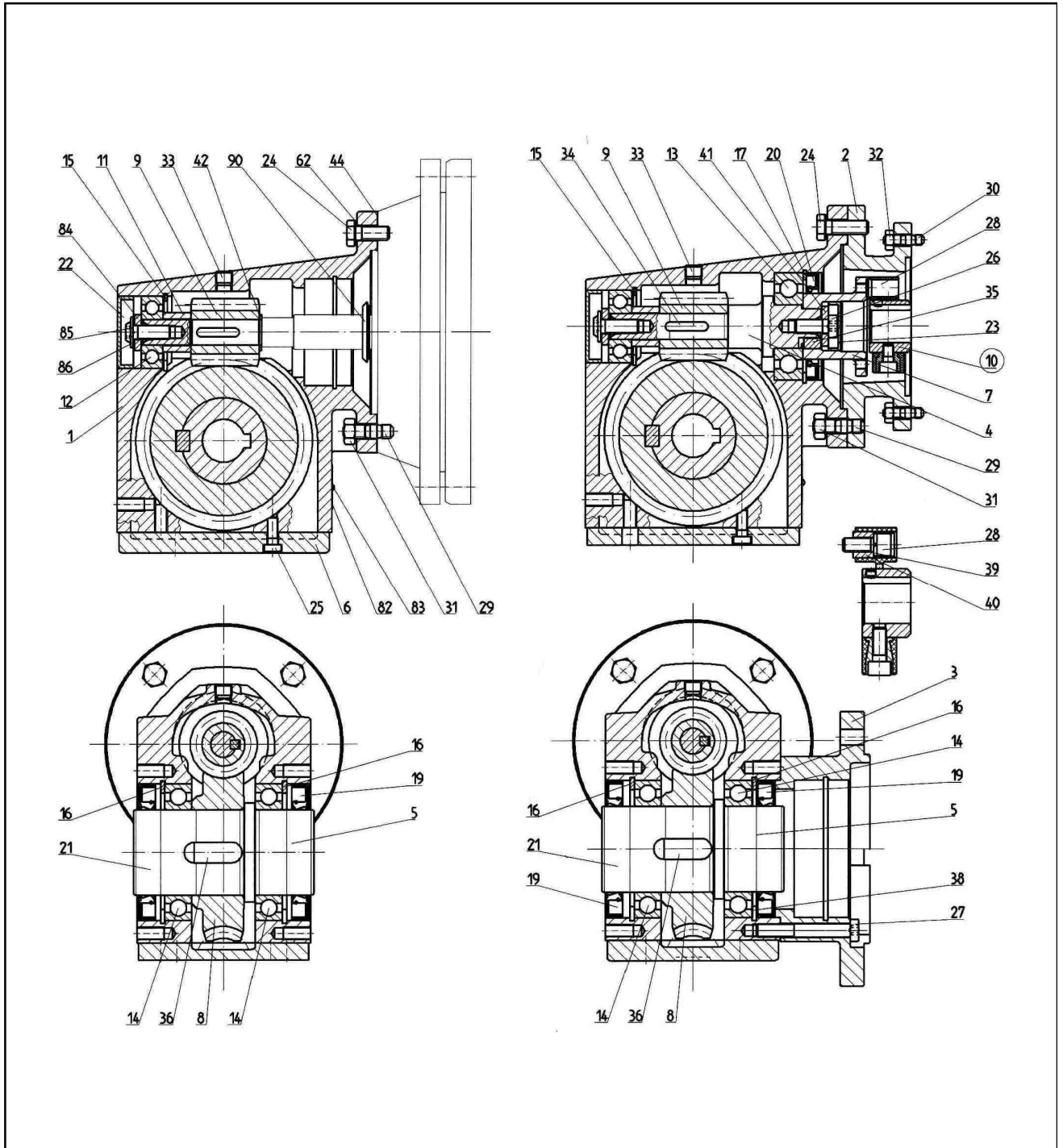
## 3.14 Basic construction worm gearbox SM051, SMN051, SM061

version WG,WGU,WF,WFU



3.15 Basic construction worm gearbox SM051, SMN051, SM061

version HG,HGU,HF,HFU

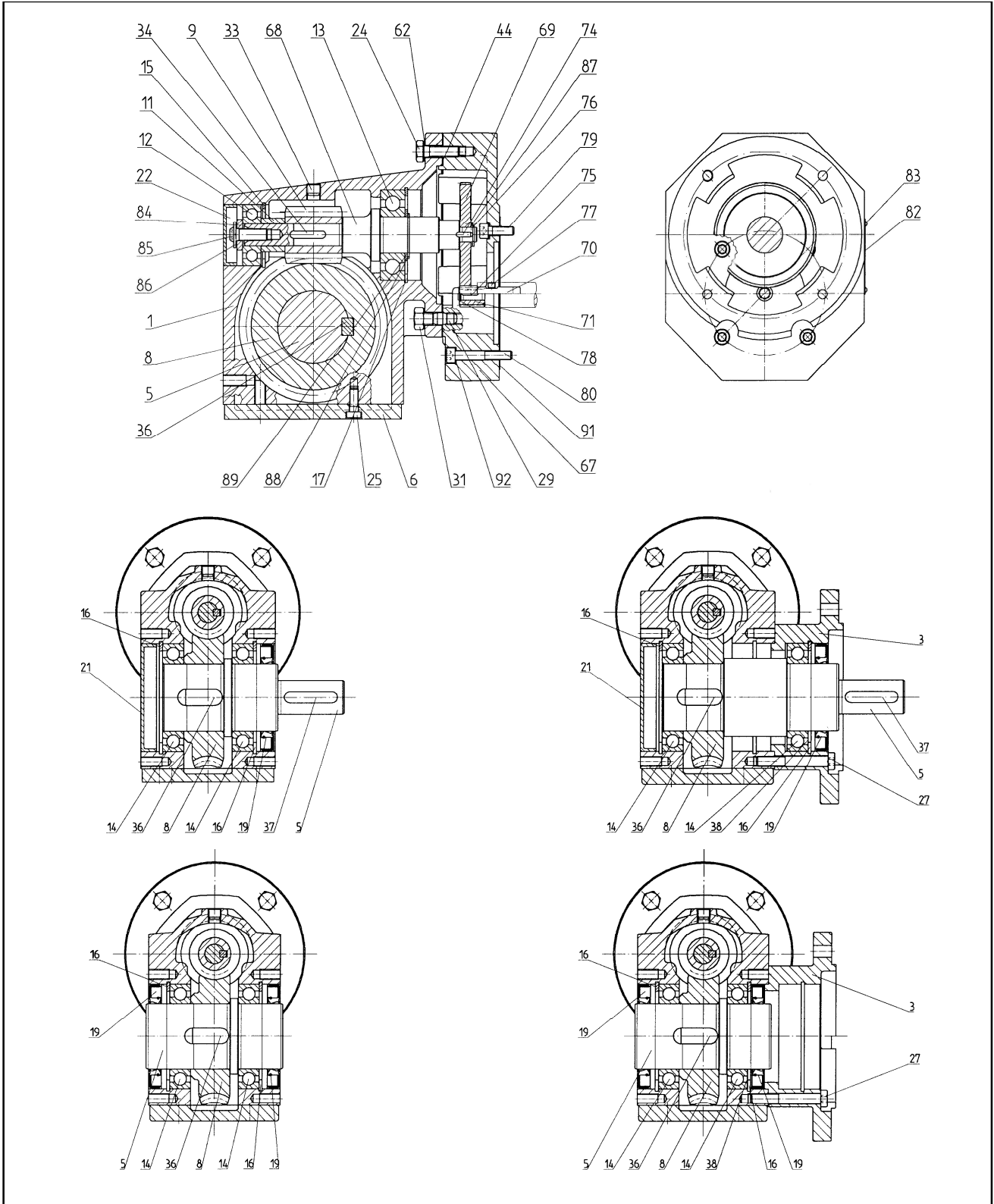






3.17 Basic construction worm gearbox SSM151 – SSM161

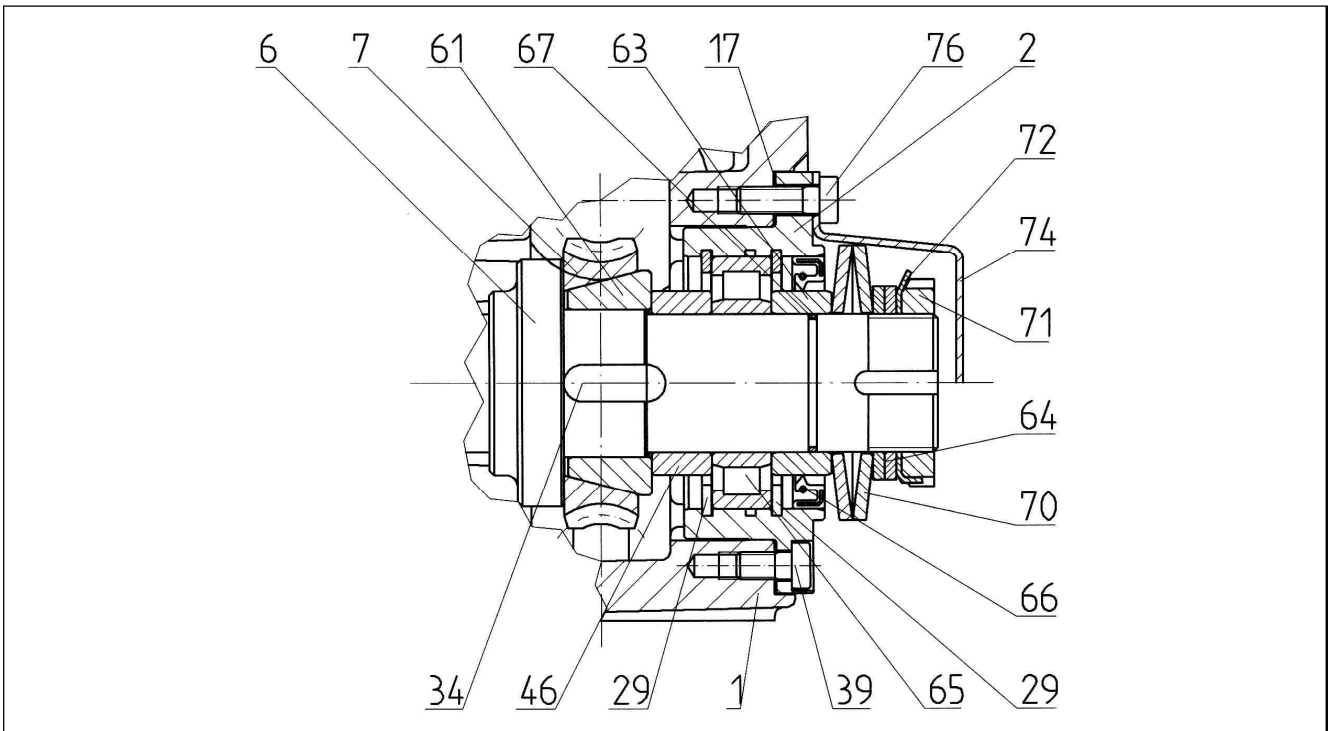
version WG,WGU,WF,WFU - HG,HGU,HF,HFU



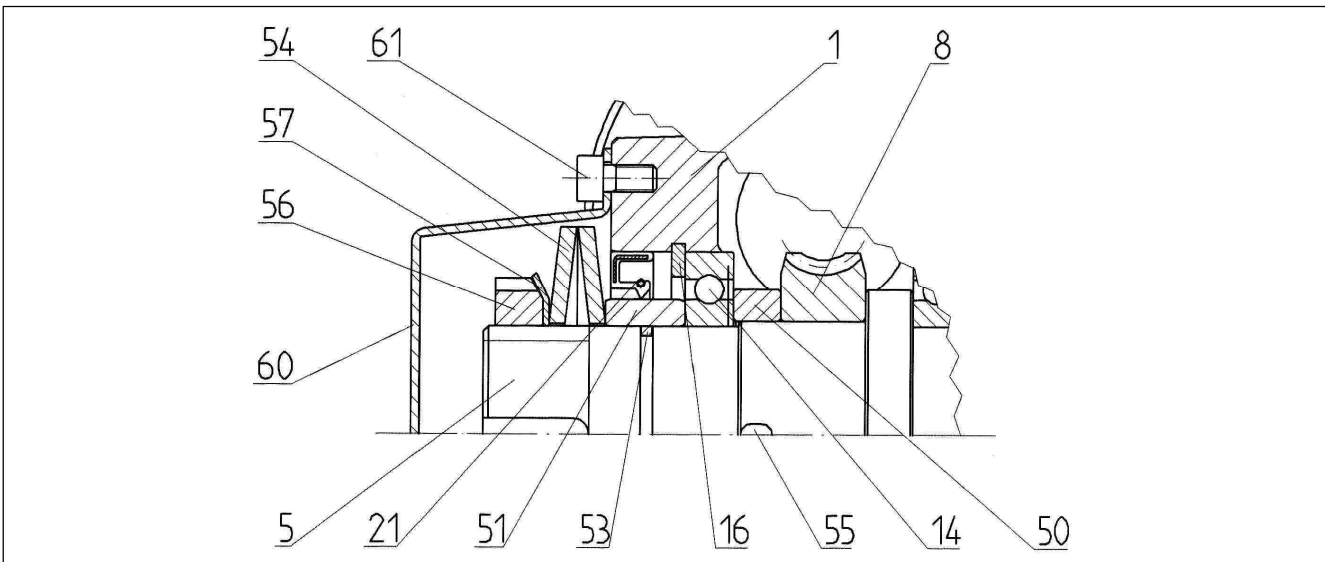
# Operating instructions – explosionproof drives

## 3.18 basic construction slip clutch

worm gearbox S, SS



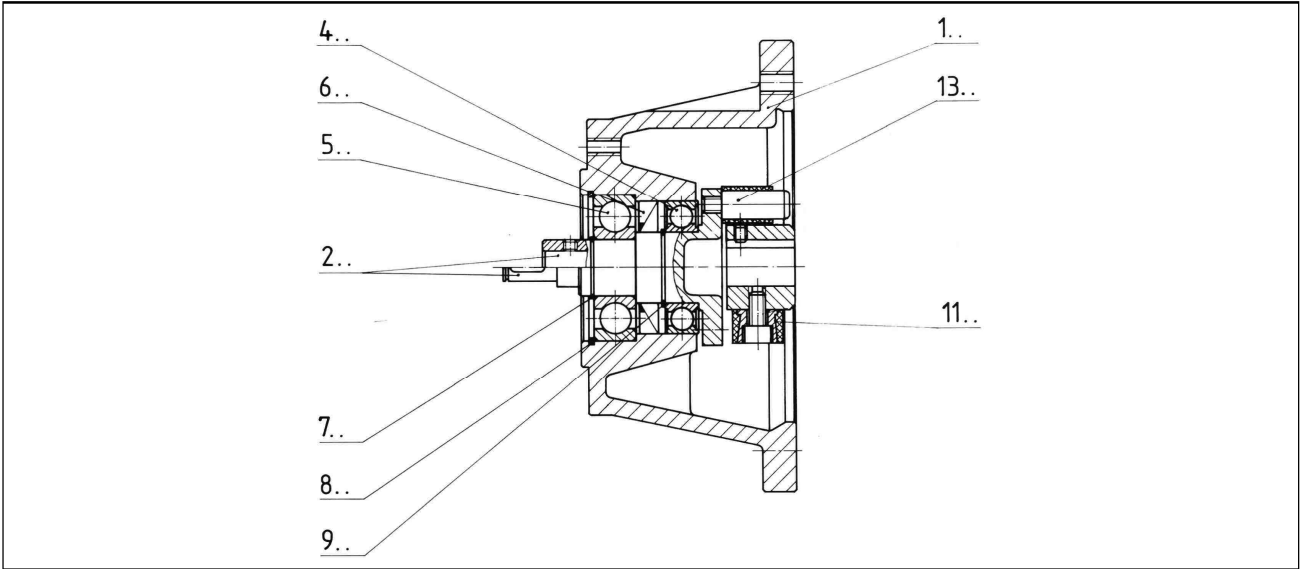
Worm gearbox SM, SSM



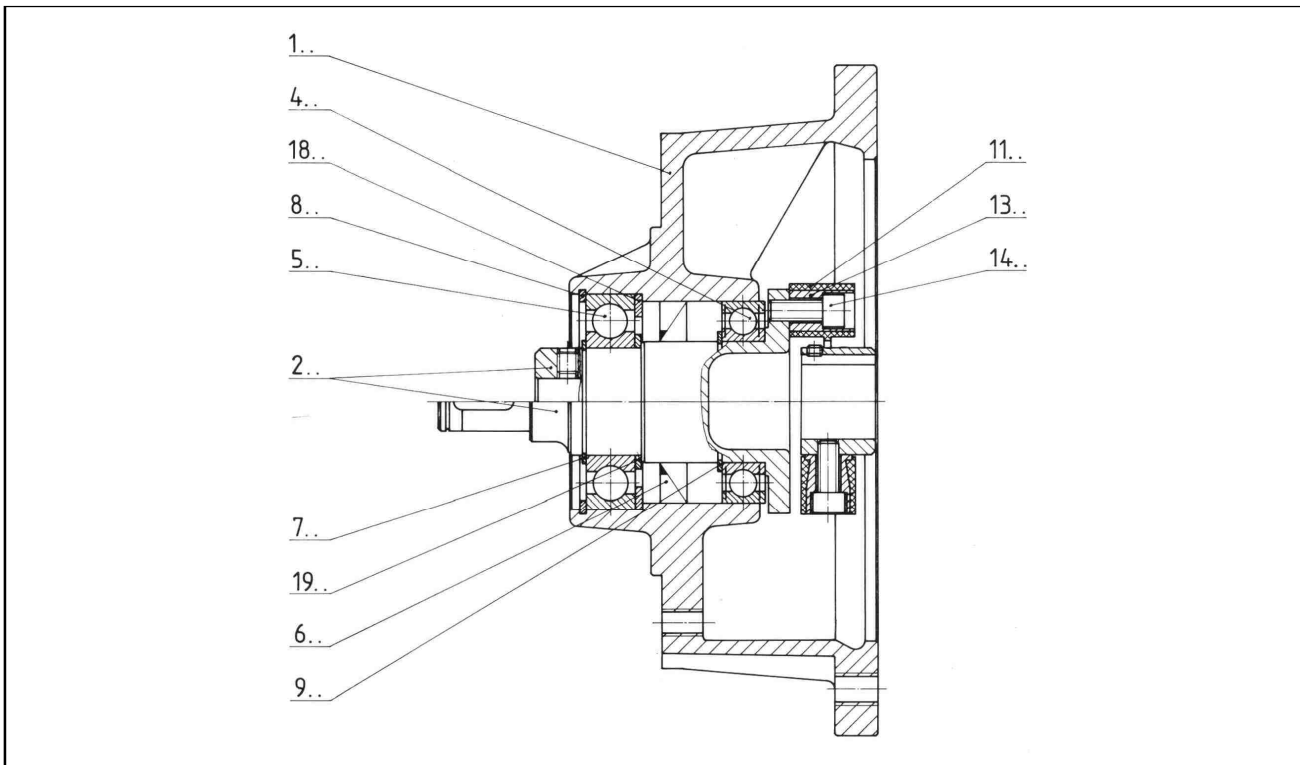
The torque limiter is adjusted by REHFUSS and the nut (71/72 respectively 56/57) is saved accordingly and sealed. The adjusted torque moment must only be changed by authorised and instructed staff. When torque moment has been readjusted new sealing is required and newly adjusted torque moment has to be documented.

3.19 Basic construction IEC – Adapter

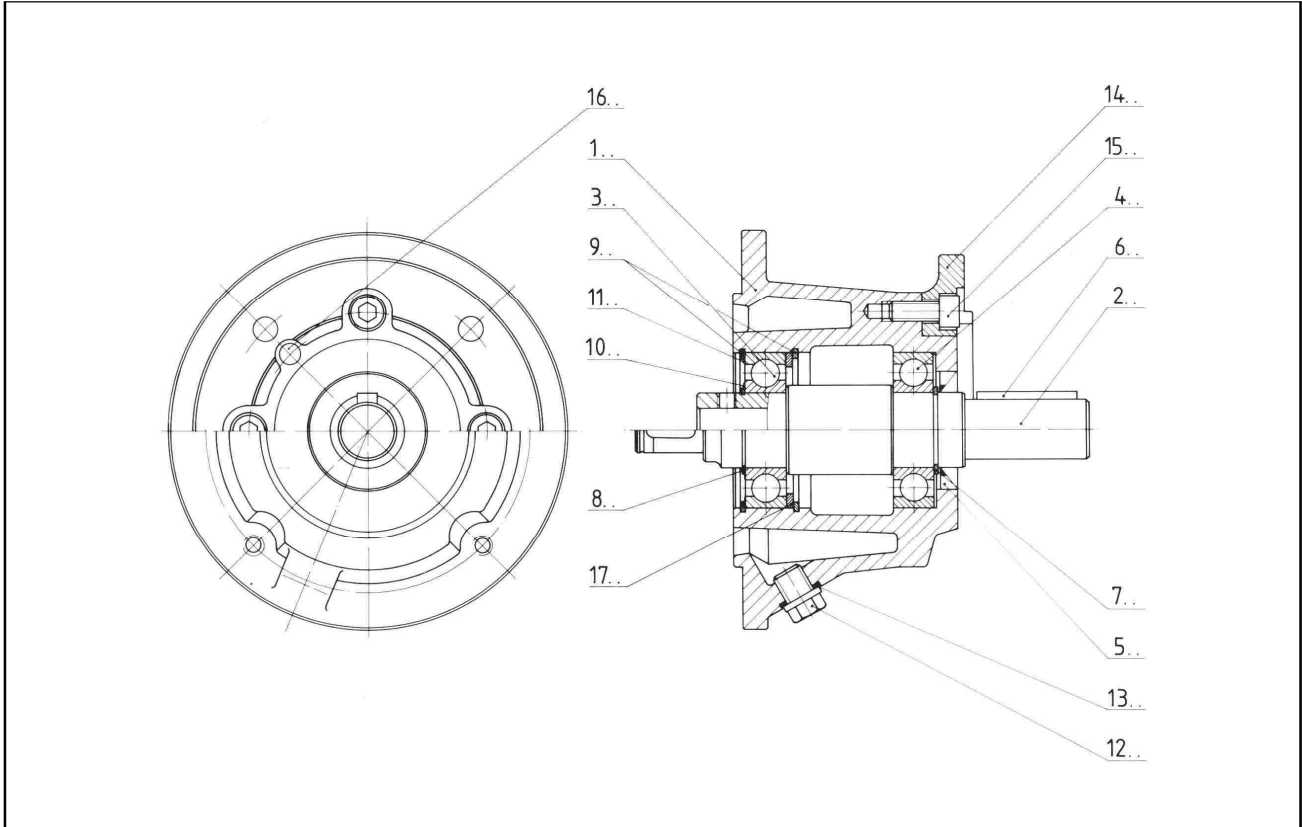
size 56 – 71



size 80 – 180



3.20 Basic construction free input shaft






## 3.21 Nameplate, Description

Nameplate (sample)

For gearboxes with

- Motor
- IEC – Adapter
- K – free input shaft

<b>1</b>	Rehfuß Drive Solutions GmbH Vor dem Weißen Stein 21, D-72461 Albstadt <a href="http://www.rehfuess.com">www.rehfuess.com</a>		
<b>2</b>	SM021HZ-IEC 63C		
<b>3</b>	Gnr. XXXXXX	Bj. xxxx	Bauf. xx
<b>4</b>	 CLP PG VG320 / 0,07L		IP 65
<b>5</b>	na= 20 /min	Ma= 15 Nm	fb= 1,0
<b>6</b>	i= 75	ne= 1500/min	Pe= 0,07kW
<b>7</b>	 II2G Ex h IIC T4 Gb		
<b>8</b>	 II2D Ex h IIC T120 °C Db		

line 1: Name, address, URL, name of manufacturer, CE-marking

line 2: Type – construction year

line 3: serial number – year of manufacture – Mounting position

line 4: kind of lubricant – quantity of lubricant – protection class

line 5: output speed – output torque – service factor

line 6: gearbox ratio – maximal input speed – max. Input power

line 7: Ex – description – gas

line 8: Ex – description – dust

### 3.22 Materials Used

Housing	cast iron, for SM / SSM: Aluminium, for SMN: Stainless steel
flanges	cast iron, Aluminium, steel, stainless steel
shafts	steel, stainless steel
tooth wheels	steel
gears	steel
worm wheels	special bronze
shaft seals	NBR, Viton
gaskets	sealing paper, liquid sealing
gasket rings	copper
cowls	ABS
screw caps	NBR
coupling	Polyamid

## 4 Mechanical Installation

### 4.1 required tools

- Wrench set
- torque wrench (for shrink discs)
- mounting press
- equalisation elements if needed (discs, distance rings)
- fixing material for input- output elements
- lubricant
- screw protection (for cover on input side with centring ring). z. B. Loctite  
all screws which had to be disengaged have to be secured again with screw protection (liquid or mechanical)

#### Tolerances at installation

Shaft end	flange
Tolerance on diameter according to DIN 748 ISO k6 at solid shaft < 50 mm ISO m6 at solid shaft > 50 mm ISO H7 at hollow shaft Centre bore according to DIN 332, Form D	Tolerance on centring according to DIN 42948 ISO j6 at $b_1 \leq 230$ mm

### 4.2 Before you start



The drive may only be installed if:

Information on nameplate of drive corresponds to the approved on site explosion application range (equipment group, category, zone, temperature class or maximum surface temperature)

The drive is not damaged ( no damage resulting from shipping or storage)

The following requirements have been properly met:

There are no potentially explosive atmospheres, oils, acids, gases, vapours, radiation etc. during installation.

For standard drives: ambient temperature  $-20^{\circ}\text{C} - +40^{\circ}\text{C}$

For worm gearboxes: there is no extern mass moment of inertia which might drive back gearbox on load  
 [at  $\eta'$  (back driving) =  $2 - 1/\eta < 0.5$  retained by friction].

### 4.3 Preparation

Output shafts and flanges must be completely free of anti-corrosion agents, contamination or other impurities ( use a commercially available solvent) Do not let solvent get in contact with the sealing lips of the oil seals – danger of damage of the material.

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## Operating instructions – explosionproof drives

### 4.4 Installation of gearbox

The gearbox or geared motor may be mounted or installed in the specified position (SM, SMN, SSM-gearboxes are position independent) only on a level, vibration free or torsionally rigid support structure. Do not tighten housing legs and mounting flanges against each other.

For mounting of geared motors use screws in quality 8.8 only!



**Oil control and drain screws must be easily accessible!**  
**When mounting customer's parts protection class has to be maintained!**



**Before starting check specified lubricate quantity! (Chapter "Lubricant" – information on nameplate)**

We deliver gears with necessary lubricant quantity. Slight deviation is possible and allowed within tolerance. Check oillevel before starting (-> chapter "Inspection / Maintenance").



**Alter design only after prior agreement with Rehfuß. Without prior agreement ATEX-Confirmation is void! Attach new nameplate!**

Use plastic inserts when there is danger of electrochemical corrosion between gear and machine (connection of mixed materials as cast/steel). Use plastic inserts 2-3 mm thick. Use plastic washers for screws! Plastic used must have bleeder resistor of  $< 10^9 \Omega$ . Ground gear housings on principle. For geared motors use additionally grounding screws on motor. Ensure adequate supply of cooling air and that heated air from other units is not drawn in. The cooling air may not exceed a temperature of 40°C. No metal parts must be mounted isolated.

#### **Installation in damp areas or in the open**

Drives might be supplied in corrosion-resistant versions for use in damp areas or in the open. Any damages to the paintwork (e.g. on the breather valve) must be repaired.

#### **Ventilation of gearboxes**

No ventilation necessary for below gearboxes:

SM, SMN, SSM –gearboxes

All remaining gears are supplied by Rehfuß with adequate and activated breather valves.

Exception:

Gearboxes for extended storage and when mounted on sloping level are supplied with protection cap on breather bore.

Before starting user has to change supplied breather valve against sealing plug in the highest position.

For geared motors for extended storage and for mounting in sloping level supplied breather valve finds in Terminal Box of motor.

Gearboxes in closed design are supplied without breather valve.

Breather valves are activated ex works normally.

#### **Painting the gear unit**

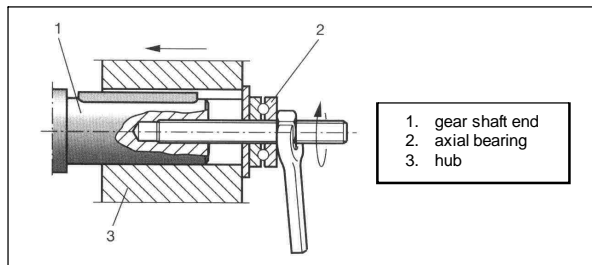
If the drive will be over painted or partially repainted, ensure that the breather valve and oil seals are carefully covered with tape. The total thickness of the coating must not exceed 0.2mm. Remove tape strips after the paint work is finished. Seals must be compatible!



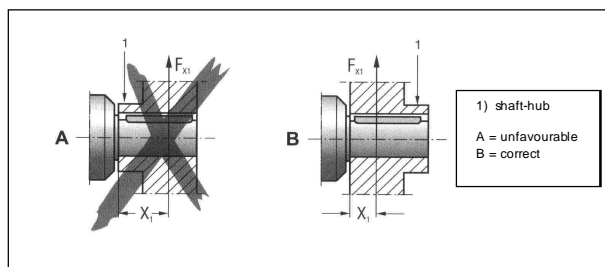
## 4.5 Gears with solid shaft

### Mounting of Input and output components

The figure below shows an example of a mounting device for mounting clutches or hubs onto shaft ends of gear units or motors. Where required, the thrust bearing on the mounting device can be removed.



The following figure shows the correct mounting arrangement B of a gear or sprocket to avoid excessive overhangs loaded.



Only use a mounting device for installing input and output-elements. Use the centre bore and the thread on the shaft end for positioning purposes.



Never mount belt pulleys, clutches, pinions etc. onto the shaft end by hitting them with a hammer ( damage to bearings, housing and the shaft!).

Observe correct tension of the belt for belt pulleys (in accordance with manufacturer's specifications).

Power transmission elements should be balanced after installation and must not rise to excessive radial or axial forces (see the "Gearmotors" catalogue for approved values).



Assembly is easier if you first apply lubricant to the output element or heat it up briefly (to 80-100°C).

### Mounting of couplings

The following items have to be balanced according to the coupling manufacturer's specifications when mounting couplings:

- Maximum and minimum clearance
- Axial offset
- angular offset



Input and output elements such as belt pulleys, clutches etc. must be equipped with a touch guard!

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## Operating instructions – explosionproof drives

### 4.6 Installation of gearboxes in hazardous areas



Please strictly observe the safety notes in chapter 2 when installing gearboxes in hazardous areas!

### 4.7 Gears and geared motors in category II2G and II2D



The explosion proof gears and geared motors in variations SR, FG, S, SS, SM, SMN and SSM correspond to the requirements of equipment group II, category 2G (Ex-atmosphere Gas) and 2D (Ex-atmosphere dust). These units are intended for use in zone 1 and 21.

#### Temperature class

The mains-operated gears / geared motors of category II2G (Ex-atmosphere Gas) are depending on speed, ratio and design certified for temperature classes T3 to T6. See temperature class on nameplate. Solo gears and geared motors run with frequency inverters (only 4-pole and 6-pole) are designed according to application after consulting REHFUSS.

#### Ambient temperature

Gearboxes in categories II2G and II2D may only be used at an ambient temperature of  $-20\text{ °C}$  to  $+40\text{ °C}$ . For other ambient temperatures you must consult REHFUSS !

#### Surface temperature

The surface temperature of gearboxes in category II2D must not exceed maximal  $120\text{ °C}$  according to speed, ratio and design. Higher surface temperatures are allowed after consulting REHFUSS and have to be noted on the nameplate. The system operator has to make sure that there is no dust accumulation of more than 5 mm according to EN50281 -1-2.

#### Protection class

All variations of gearboxes correspond to IP6- according to EN 60529.

#### Ambient conditions

Ensure adequate supply of cooling air and that heated air from other units is not drawn in (e.g. from clutches)

#### Output power and output torque

It is essential that the nominal values of output power and output torque are maintained..

#### Special designs

Special designs (e.g. modified output shaft) may only be used in hazardous areas when released by REHFUSS .

### 4.8 Mounting torque arm

do not stain when mounting!  
Supportack on both sides.

### 4.9 Mounting/Dismantling on Shaft gearboxes with hollow shaft



Please refer for design of user's shaft Construction information in catalogue!

Mounting is easier when using a mounting device..

For axial safety of shaft Option „Fixing elements“ may be used.

To avoid corrosion we recommend to turn free user's shaft between the 2 bearing surfaces!

Dismantling only with appropriate device.



Only mount / dismantle drives with appropriate device. Hitting on drives or shafts might damage bearings, housings or shafts).

### 4.10 Mounting/Dismantling of Shaft gears with shrink discs and cowl



Do not tighten clamping screw when shaft is not fixed! Hollow shaft might deform.  
Clamping area of shrink disc must be free from any grease!

#### Assembly

1. loosen clamping screws slightly (do not remove entirely!).
2. carefully lubricate hollow shaft boring and Input shaft.
3. join degreased hollow shaft/Input shaft.

Assemble input shaft, note parallel position of outer rings of shrink discs. For housing with shaft collar fix shrink disc with bearing of 1 to 2 mm to housing of gearbox. Tighten clamping screws in a row (not crossing) with torque wrench till crews do not move any more. Pick-up of crews are noted on shrink discs.



After assembly t  
here must be a remaining clearance  $s > 1$  mm.  
Outer flanges of hollow shaft in reach of shrink disc should be greased for corrosion protection.

#### Dismantling of shrink disc

1. Loosen clamping screws steadily and in a line. Each screw must only be loosened approximately. A quarter of a turn in the beginning to avoid unleveling of outer race. Do not totally remove screws!
2. Remove shaft respectively remove hub from shaft (remove corrosion that might be on shaft in front of hub first)
3. Remove shrink disc from hub..



**Danger** When shrink disc is dismantled inappropriately you might be injured!

## Operating instructions – explosionproof drives

### Cleaning and lubrication of shrink disc

Dismantled shrink discs do not have to be disassembled and lubricated when used again. If shrink disc is dirty it has to be cleaned and lubricated again.

Use one of the below lubricants (Spray or Paste).

Lubricant (Mo S2) e.g.: Molykote 321 (), Molykote Spray (Powder-Spray), Molykote G Rapid, Aemasol MO 19P, AemasolDI0-sétral 57 N.

Lubricate clamping screws with general purpose lubricant Molykote BR 2 or similar.

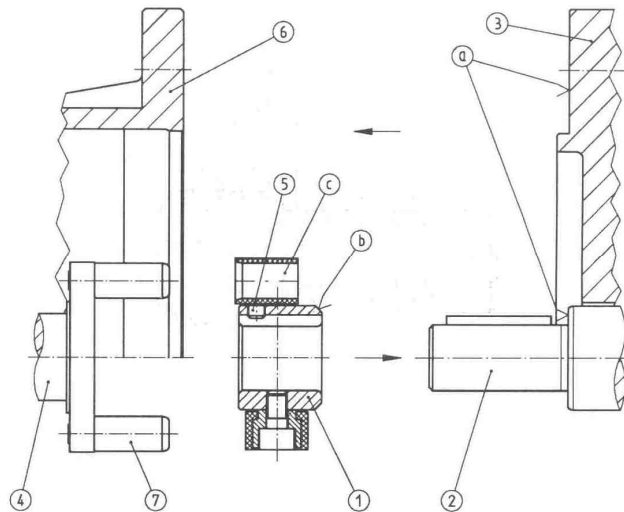
### Mounting the cowl



Ensure before mounting correct glued joint of bearing and cowl and that bores of bearing and cowl do correspond. Fix cowl to gearbox housing with attached screws. Do only wipe plastic surfaces damply.

## 4.11 Mounting of IEC-Adapter

1. Slide the coupling (1) up the motor shaft (2) until the hub rests against the shaft collar (a) and flange facing (a) lie on a single plane and that the highly chamfered side (b) faces the motor flange (3). This guarantees the correct distance between the coupling and the coupling shaft (4).
2. Tighten the radial locking screw (5) in the hub.
3. Implace the motor on IEC-Adapter (6). In doing so, insure that the socket pins (7) have been correctly inserted into the bore holes (c) of the coupling ring.
4. Screw the motor an the IEC-Adapter together.



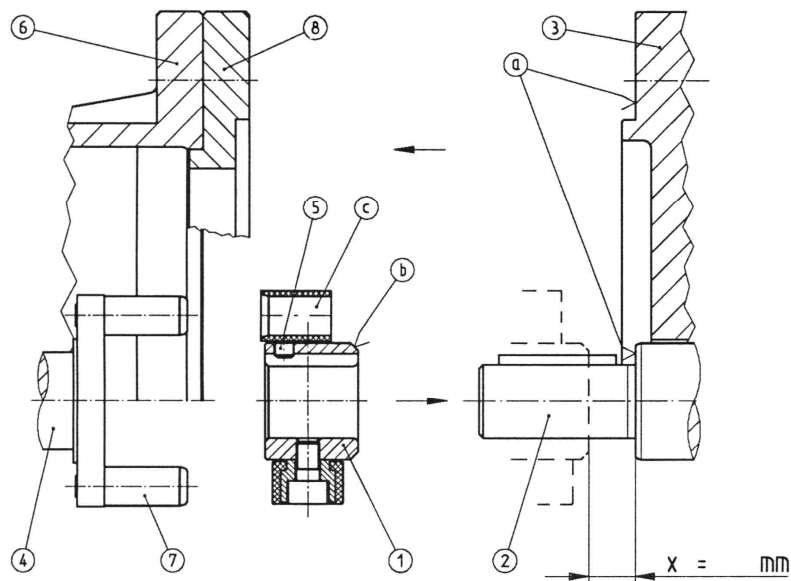
Do not use distance shims as mounting aid!



Note: We recommend to use anti-corrosion agents on motor shaft before mounting coupling hub.

## 4.13 Mounting of IEC-Adapter with adapter flange

1. Slide the coupling (1) up the motor shaft (2) up to distance **X** between hub and shaft collar. It is essential that shaft collar (a) and flange (a) lie in line and the highly chamfered side (b) faces to motor flange (3). This guarantees the correct distance between the coupling and the coupling shaft (4).
2. Tighten the radial locking screw (5) in the hub.
3. Implace the motor with adapter flange (8) on IEC-Adapter (6).. Ensure that socket pins (7) have been correctly inserted into the bore holes (c) of the coupling ring.
4. Screw the motor on IEC-Adapter.

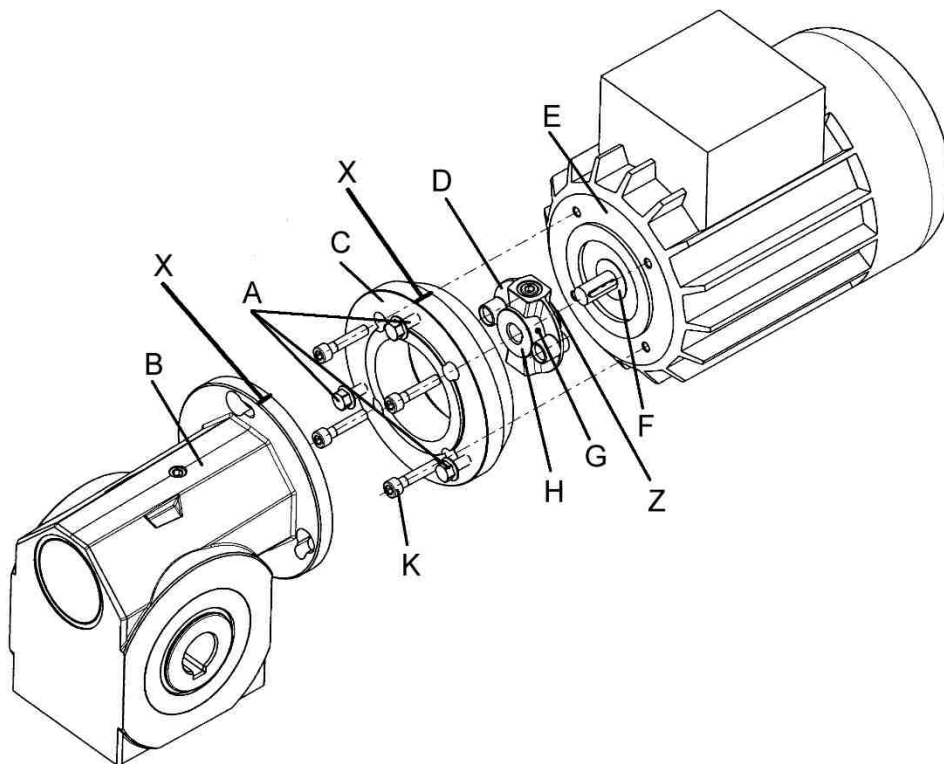


Measurement X see in attached mounting instruction.  
Do not use distance shims as mounting aid !



Note: We recommend to use anti-corrosion agents on motor shaft before mounting coupling hub.

### 4.13 Mounting of IEC-Adapter by SM041



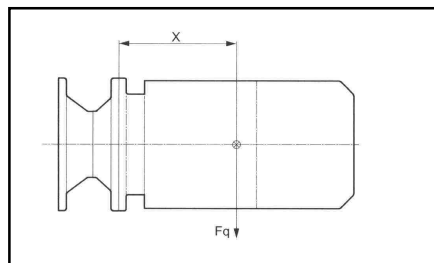
Gearbox (B) is supplied complete with Motor adaptor (C) and fixing screws (K) for Motor (E).

1. Loosen 3 locking screws (A) on gearbox side (do not take out!) Note marking "X". Remove Motor adaptor (C) from gearbox by turning (Bayonet). Then take off coupling (D) from drive pins.
2. Slide on coupling with face (Z) of the Coupling hub (H) onto the motor shaft towards motor flange side (E) until coupling hub (H) mounts to shaft collar (F). It is essential that shaft collar and flange face of motor are in line. Tighten radial locking screw (G) of coupling hub.
3. Put on motor adaptor (C) on motor flange and align according to required terminal box position. Orientate according to marking "X" on adaptor. Screw adaptor on motor flange.
4. Put motor with adaptor on gearbox and position by turning (bayonet). Markings on adaptor and gearbox have to be in line. Then tighten the 3 locking screws (A).

## Allowed loads



Below load dates must not be exceeded by fixing a motor.



IEC Adapter size	X (mm)	Fq (N)
56	72	350
63/71	75	530
80/90	112	420
100/112	142	2000
132	184	4700
160/180	250	4600



Maximum allowed weight of attached motor  $F_{qmax}$  has to be reduced linearly when distance of centre of gravity  $x$  is increased. When distance of centre of gravity  $x$  is reduced no increase of maximum allowed weight  $F_{qmax}$  is allowed.

## 4.14 Mounting on free input shaft

For mounting of input drive element see chapter „Mounting of Input and output shafts.“



Only use belts with sufficient bleeder resistor  $< 10^9 \Omega$ . Before mounting a cowl it has to be proved by a analysis of risks that no ignition source (e.g. sparks by grinding) can develop. The manufacturer of the cowl has to provide the analysis of risks. Protection class of gearbox has to be maintained when parts are added!

### Variation with centring ring

Mounting of applications an input cover with centring ring.

1. To fix application provide screws in adequate lengths.
2. Clean joining faces and centring ring.
3. Put application on centring ring and tighten clamping screws with protection element and pick-up TA.

# Operating instructions – explosionproof drives

## 5 Installation



Check appropriate oil level before starting. Oil control and drain screws as well as breather screws and -valves must be easily accessible. Plastic surfaces must only be wiped damply (electrostatic charging). Avoid dust accumulation of more than 5 mm (clean regularly).

### 5.1 Control lubricant with Oillevel screw

The 4-step gearboxes of series SR need a higher oil level which is necessary for sufficient lubrication,. Therefore added oillevel screws nut no be used. In this case necessarily contact REHFUSS!



1. Switch geared motor dead, make sure it cannot be started accidentally!
2. remove Oillevel screw..
3. If required correct filling level, fix oillevel screw again (insert sealing ring and seal with sealing liquid).

### 5.2 Control lubricant on gearboxes without oillevel screw



Below series of gearboxes have no oil level screw:  
SM/SMN/SSM  
Oillevel is controlled with oil filling screw on these gearboxes.



1. Switch geared motor dead, make sure it cannot be started accidentally!
2. Put up gearboxes in mounting positions B6 or B7 i.e. Oil filling screw is used as oillevel screw.
3. Loosen oil filling screw..
4. Oil level has to be up to thread..
5. Seal oillevel screw of gearbox after controlling lubricant with liquid sealant..

### 5.3 Measure Surface temperature and Oil temperature



Information about surface temperature on nameplate result on measurements under regular ambient and installation conditions. Even slight alterations of these conditions (e.g. narrow installation room) might influence development of temperature essentially.

#### Measure Surface temperature

It is essential to measure surface temperature in maximum load during installation of gearbox. Measurement can be made by normal temperature measuring instruments. Take measurement at junction of gearbox-motor, where terminal box prevents ventilation through motor ventilation. Maximum temperature is reached after approximately 3 hours and must not exceed a difference value of 70 K against ambient temperature. If difference is higher stop drive immediately! In this case contact REHFUSS necessarily. On gearboxes with IEC adapter or free input shaft surface temperature is measured on joint between input side flange and IEC-Adapter.

#### Measure Oil temperature

Oil temperature has to be measured to define intervals for changing of lubricant as described in chapter „Inspection and Maintenance“. For this measure temperature on lower side of gearbox. On gearboxes with drain screw temperature has to be measured on drain screw. Add 10 K to the measured value. With this value intervals for change of lubricant can be defined.



### 5.4 Starting of worm gearbox

#### **warmup time**

Worm gearboxes need a warmup time of at least 24 hours, to reach maximum performance. If gearbox operated in both turning directions, a warmup time for each of the directions is necessary. Average reduction of performance during warmup time is approximately 5%.

### 5.5 Starting of helical and shaft mounted gearboxes.

There are no special instructions for installation of helical or shaft mounted gearboxes if gearboxes are mounted according to chapter "mechanical Installation".

### 5.6 Starting gearboxes / geared motors in hazardous areas

#### **Solo gearboxes**

Ensure that Values stated on nameplate of gearboxes with IEC-Adapter or free input shaft are not exceeded. Prevent overload of gearbox.

#### **Mainsloaded motors**

Make sure that information stated on nameplates of gearbox and motor correspond to ambient conditions in site.

#### **Geared motors used with frequency inverters**

Make sure geared motor is certified for inverter use. Parameter of inverter have to prevent overload of gearbox. For allowed power rate of gearbox see nameplate..

# Operating instructions – explosionproof drives

## 6 Inspection and Maintenance



Plastic surfaces must only be wiped damply (electrostatic charging).  
 Make sure that there is no dust accumulation of more than 5 mm (clean regularly).  
**Repairs may only be carried out in accordance with EN60079-19.**

### 6.1 Inspection and maintenance intervals

Interval	What is to do?
every 3000 operating hours, at least every 6 months	Control oil and lubricant level View seals on leaking, replace if required Check rubber buffer on gearboxes with torque arm
According to operation conditions (see below figure), at least every 5 year according to oil temperature	Replace synthetic oil Replace grease of rolling bearing if required Replace shaft seals
variable (depending on external influences)	Repair or replace paint / corrosion protection

Gearboxes SM / SMN / SSM have lifetime lubricant are so need no maintenance

### 6.2 Intervals for changing lubricants

Intervals for replacement on Ex-gearboxes under regular conditions

Permanent Lubricant temperature- in °C	Replace lubricant after operating hours
Up to 70	20000
71 - 80	15000
81 - 90	10000
91 - 100	5000
over 101	2500

On special design under heavy / aggressive ambient conditions change lubricant more often!

Rehfluss recommends when replacing lubricant on rolling bearings with grease filling replace grease as well.  
 Below quantities are needed:



For fast running bearings (Motor and gearbox –input side) fill hollow spaces between rolling elements up to 1/3

For slowly running bearings (in gearbox and gearbox output side): Fill 2/3 of hollow spaces with grease

### 6.3 Intervals for changing rolling bearings

Rolling bearings are oiled or greased. Replace bearings before they fail. Indicators are running noise and temperature..  
 According to performance below average values have to be considered

performance fb	Replace after operating hours
1	2500
1,2	4500
1,4	7000
1,6	10500
1,8	15000
2,0	20000

## 6.4 Inspection / Maintenance gearbox

As standard we use synthetic lubricant. Position of Oillevel and drain screws and breather valve see drawings of the variations. All loosened screws have to be tightened again with screw protection! .

### Check Lubricant level



1. Switch gearbox dead, Protect against unintended start! Wait till gearbox has cooled down – danger of burning!
2. When design has be amended please contact REHFUSS!
3. Check lubricant according to chapter start up „Check oil level on gearboxes with/without oil level screw“

### Replace lubricant



Replace lubricant only on gearboxes that are worm from operation.

1. Switch gearbox dead, Protect against unintended start! Wait till gearbox has cooled down – danger of burning!  
Note: Gearbox has to be warm however as total draining is more difficult when oil is too cold.
2. For gearboxes with drain screw/Oillevel screw:
3. Put vessel under drain screw.
4. remove oillevel screw, breather screw /-valve and drain screw
5. drain oil totally
6. insert oillevel screw again.
7. Replace lubrication of same kind into breather bore (otherwise contact service) quantity according to variation (see chapter „lubricant capacity“) or to instruction on nameplate. Check on oillevel screw.
8. insert oillevel screw.
9. insert breather screw/valve.

### Replace shaft seals



1. Switch gearbox dead, Protect against unintended start! Wait till gearbox has cooled down – danger of burning!
2. Ensure there is sufficient grease between dirt lip and sealing lip according to variation
3. When using double shaft seals fill space between 1/3 with grease.

## 6.5 Inspection / maintenance IEC-adapter

interval	What to do?
every 3000 operating hours, at least every 6 months	Check clearance View coupling View adapter for leaking
after 25000 - 30000 operating hours	Replace rolling bearing grease if required Replace coupling

## 6.6 Inspection / Maintenance free input shaft

interval	What to do?
every 3000 operating hours, at least every 6 months	Check running noise View for leaking
after 25000 - 30000 operating hours	Replace rolling bearing grease if required Replace shaft seals

# Operating instructions – explosionproof drives

## 7 Malfunctions

### Service

Please provide the following information if you require assistance from our customer service:

Nameplate information (complete), Nature and extent of the problem, time and circumstances of problem, presumed cause

### 7.1 Malfunction on gear unit

Problem	Possible cause	Solution
unusual, continuous running noise	Noise reeling/grinding: damage on bearing	Check lubricant and quantity – (see „inspection and maintenance“), contact REHFUSS replace bearing.
	noise knocking: irregular toothing	Contact REHFUSS
Unusual, differential running noise	Alien element in lubricant	Check lubricant and quantity – (see „inspection and maintenance“), stop engine. Contact REHFUSS
Oil leaking On motor shaft seals On gear flange On output shaft seal	Bearing defective	Contact REHFUSS
Oil leaking on breather valve	Too much oil Drive used in incorrect mounting position Frequent cold started (oil frothing) and / or high oil level Breather valve dirty	contact REHFUSS
Output shaft not turning although motor is running or input shaft is turned	Connection shaft-hub in gear interrupted	Return to REHFUSS for repair.

Leaking oil/grease on shaft seal (low quantities) during warm up time (24 operating hours) are considered normal (see DIN 3761).

### 7.2 Malfunction on IEC-Adapter

Problem	Possible cause	Solution
Unusual, continuous running noise	Noise reeling/grinding	contact REHFUSS
Oil leaking	Sealing defective	contact REHFUSS
Output shaft not turning, although motor running or input shaft is turned	Connection shaft-hub in gear is interrupted	Return to REHFUSS for repair.
Changing noise and/or vibrations occurring	Coupling worn, short term transmission of torque by contact with metal Screw for fastening hub axial loose.	Replace coupling Tighten screw and protect
Premature wearing of coupling	Contact with aggressive oils, influence of Ozone, ambient temperature to high etc. which cause a physical change of coupling or too high temperatures, overload	contact REHFUSS

### 7.3 Malfunction on free input shaft

Problem	Possible cause	Solution
Unusual, continuous running noise	Noise reeling/grinding damaged on bearing	Contact REHFUSS
Oil leaking	Sealing defective	contact REHFUSS
Output shaft not turning, although input shaft is turned	Connection shaft-hub in gear is interrupted	Return to REHFUSS for repair

### 8 Mounting positions

#### 8.1 General information about mounting positions

##### Description of mounting positions

The following figures show position of gearbox on the various mounting positions

8.2 Mounting position SR / position of terminal box

Einbaulagen / Bauform	Mounting position	Position de montage
Fussgehäuse Foot housing -L -C Cater à pattes	Fuss-Flanschgehäuse Foot-Flange housing -B Cater à pattes et à bride	Flanschgehäuse Flange housing -F -Z -R Cater à bride
1-stufig 1-stage 1-étage		mehrstufig multi-stage plus-étages
○ Entlüftung / Breather plug / Désaérag ● Ölstand / Oil level / Niveau d'huile ● Ablass / Drain plug / Vidange		
Lage des Klemmenkastens	Position of terminal box	Position de la boîte de bornes
<p>Im Normalfall und wenn bei der Bestellung nichts anders angegeben, befindet sich der Klemmenkasten bei A, die Kabeleinführung bei 1. Wird eine davon abweichende Anordnung des Klemmenkastens bzw. der Kabeleinführung gewünscht, so ist dies bei der Bestellung anzugeben.</p>	<p>Normally and unless otherwise specified, the terminal box is in pos. A, and the cable entry is in pos. 1. If other terminal box or cable entry positions are required, they are to be specified when ordering.</p>	<p>Normalement, et si rien d'autre n'a été indiqué lors de la commande, la boîte de bornes se trouve en position A, l'entrée de câbles en position 1. Si le client désire une autre disposition de la boîte de bornes ou de l'entrée de câbles, prière de l'indiquer lors de la commande.</p>
<p>Bei Bremsmotoren ist die Kabeleinführung nur bei 1 oder 2 möglich.</p>	<p>With brake motors only cable entry positions 1 or 2 are possible.</p>	<p>Pour les moteurs-freins, l'entrée de câbles ne peut être qu'en position 1 ou 2.</p>

# Operating instructions – explosionproof drives

## 8.3 Mounting position FG / position of terminal box

	○ Entlüftung    Breather plug    Désaéragé ● Ölstand       Oil level       Niveau d'huile ● Ablass       Drain plug     Vidange													
	<table border="1" style="width: 100%; border-collapse: collapse;"> <tr> <td style="width: 25%; text-align: center; vertical-align: middle;">B3</td> <td style="width: 50%; text-align: center;"></td> <td style="width: 25%; text-align: center; vertical-align: middle;">B8</td> <td style="width: 50%; text-align: center;"></td> </tr> <tr> <td style="text-align: center; vertical-align: middle;">B6</td> <td style="text-align: center;"></td> <td style="text-align: center; vertical-align: middle;">V1</td> <td style="text-align: center;"></td> </tr> <tr> <td style="text-align: center; vertical-align: middle;">B7</td> <td style="text-align: center;"></td> <td style="text-align: center; vertical-align: middle;">V3</td> <td style="text-align: center;"></td> </tr> </table>		B3		B8		B6		V1		B7		V3	
B3		B8												
B6		V1												
B7		V3												
<b>Lage des Klemmenkastens</b>	<b>Position of terminal box</b>	<b>Position de la boîte de bornes</b>												
<p>Im Normalfall und wenn bei der Bestellung nichts anders angegeben, befindet sich der Klemmenkasten bei A, die Kabeleinführung bei 1. Wird eine davon abweichende Anordnung des Klemmenkastens bzw. der Kabeleinführung gewünscht, so ist dies bei der Bestellung anzugeben.</p> <p>Bei Bremsmotoren ist die Kabeleinführung nur bei 1 oder 2 möglich.</p>	<p>Normally and unless otherwise specified, the terminal box is in pos. A, and the cable entry is in pos. 1. If other terminal box or cable entry positions are required, they are to be specified when ordering.</p> <p>With brake motors only cable entry positions 1 or 2 are possible.</p>	<p>Normalement, et si rien d'autre n'a été indiqué lors de la commande, la boîte de bornes se trouve en position A, l'entrée de câbles en position 1. Si le client désire une autre disposition de la boîte de bornes ou de l'entrée de câbles, prière de l'indiquer lors de la commande.</p> <p>Pour les moteurs-freins, l'entrée de câbles ne peut être qu'en position 1 ou</p>												



## 8.4 Mounting position S / position of terminal box

Schneckengetriebe

Worm gearbox

Réducteur  
à vis sans fin

Schneckengetriebemotoren

Worm geared motors

Motoréducteurs  
à vis sans fin

Einbaulagen

Mounting configurations

Positions de montage

○ Entlüftung

○ Breather plug

○ Désaérage

◐ Ölstand

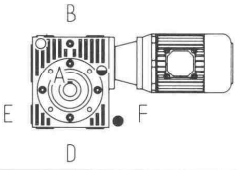
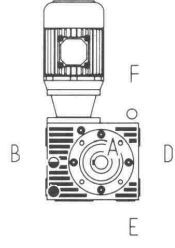
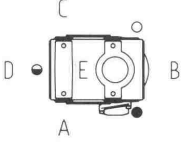
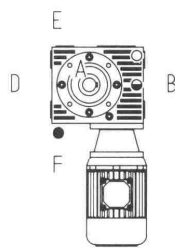
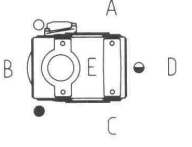
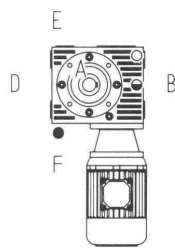
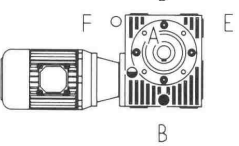
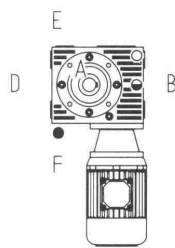
◐ Oil level

◐ Niveau d'huile

● Ablaß

● Drain plug

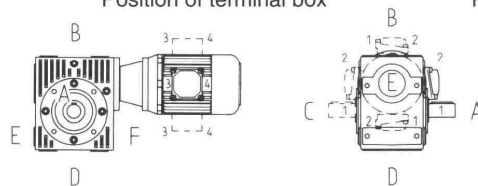
● Vidange

Bauform Mounting position Position de montage		Bauform Mounting position Position de montage	
B3		V5	
B6			
B7		V6	
B8			

Lage des Klemmenkastens

Position of terminal box

Position de la boîte de bornes



Im Normalfall und wenn bei der Bestellung nichts anders angegeben, sitzt der Klemmenkasten bei A, die Kabeleinführung bei 1. Wird eine davon abweichende Anordnung des Klemmenkastens bzw. der Kabeleinführung gewünscht, so ist dies bei der Bestellung anzugeben.

Normally and unless otherwise specified, the terminal box is in pos. A, and the cable entry is in pos. 1. If other terminal box or cable entry positions are required, they are to be specified when ordering.

Normalement, et si rien d'autre n'a été indiqué lors de la commande, la boîte de bornes se trouve en position A, l'entrée de câbles en position 1. Si le client désire une autre disposition de la boîte de bornes ou de l'entrée de câbles, prière de l'indiquer lors de la commande.

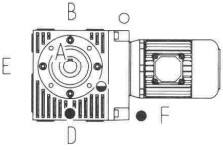
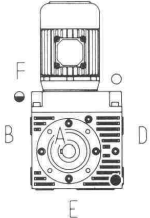
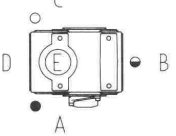
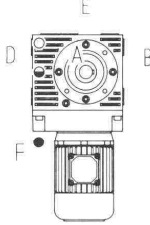
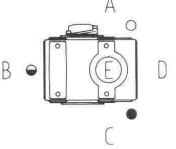
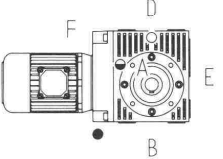
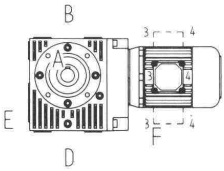
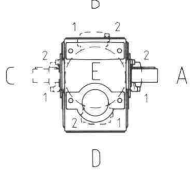
Bei Bremsmotoren ist die Kabeleinführung nur bei 1 oder 2 möglich

With brake motors only cable entry positions 1 or 2 are possible.

Pour les moteurs-freins, l'entrée de câbles ne peut être qu'en position 1 ou 2.

# Operating instructions – explosionproof drives

## 8.6 Mounting position SS / position of terminal box

Stirnrad-Schneckengetriebe Stirnrad-Schneckengetriebemotoren	Helical worm gearbox Helical worm geared motors	Réducteurs à engrenages et vis sans fin Motoréducteurs à engrenages et vis sans fin	
Einbaulagen	Mounting configurations	Positions de montage	
<ul style="list-style-type: none"> <li>○ Entlüftung</li> <li>◐ Ölstand</li> <li>● Ablaß</li> </ul>	<ul style="list-style-type: none"> <li>○ Breather plug</li> <li>◐ Oil level</li> <li>● Drain plug</li> </ul>	<ul style="list-style-type: none"> <li>○ Désaérage</li> <li>◐ Niveau d'huile</li> <li>● Vidange</li> </ul>	
Bauform Mounting position Position de montage	Bauform Mounting position Position de montage	Bauform Mounting position Position de montage	
B3		V5	
B6		V6	
B7			
B8			
Lage des Klemmenkastens	Position of terminal box	Position de la boîte de bornes	
			
<p>Im Normalfall und wenn bei der Bestellung nichts anders angegeben, sitzt der Klemmenkasten bei A, die Kabeleinführung bei 1. Wird eine davon abweichende Anordnung des Klemmenkastens bzw. der Kabeleinführung gewünscht, so ist dies bei der Bestellung anzugeben.</p> <p>Bei Bremsmotoren ist die Kabeleinführung nur bei 1 oder 2 möglich</p>	<p>Normally and unless otherwise specified, the terminal box is in pos. A, and the cable entry is in pos. 1. If other terminal box or cable entry positions are required, they are to be specified when ordering.</p> <p>With brake motors only cable entry positions 1 or 2 are possible.</p>	<p>Normalement et si rien d'autre n'a été indiqué lors de la commande, la boîte de bornes se trouve en position A, l'entrée de câbles en position 1. Si le client désire une autre disposition de la boîte de bornes ou de l'entrée de câbles, prière de l'indiquer lors de la commande.</p> <p>Pour les moteurs-freins, l'entrée de câbles ne peut être qu'en position 1 ou 2.</p>	



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# Operating instructions – explosionproof drives

## 9 Lubricants

### General

If not agreed specially REHFUSS supplies explosion proof drives with lubricant according to specification of gear and mounting position. For this it is essential to advise mounting position when ordering the drive.



When design is amended later please contact REHFUSS necessarily. Without prior agreement ATEX-Certification is void!

### Quantity

Please see name plate on gearbox for requested lubricant quantities of explosion proof gearboxes. It is essential to watch oillevel screw for indicator of exact quantity.

### Lubricant

Rehfuss gearboxes are filled with synthetic lubricant. Kind of lubricant: CLP PG VG 320, for explosion proofed gearboxes witch where used in food industry, the kind of lubricant is: CLP H1 VG320

### Grease for rolling bearings


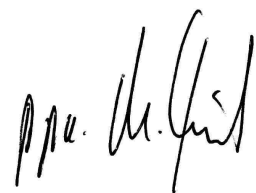
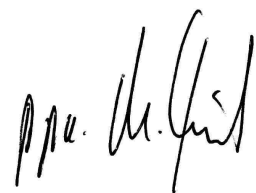
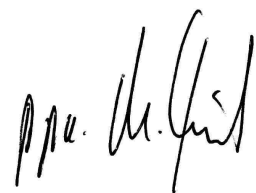
Rolling bearings of explosion proof gears and motors are supplied filled with below stated greases. Rehfuss recommends to replace grease as well when replacing lubricant.



Below quantities are needed:

For fast running bearings (Motor and gearbox –input side) fill hollow spaces between rolling elements up to 1/3

For slowly running bearings (in gearbox and gearbox output side): Fill 2/3 of hollow spaces with grease

	<p align="center"><b>EU-Konformitätserklärung</b> <b>EU Declaration of conformity</b></p>	<p align="center">2G/D 3G/D</p>				
<p><b>EU-Konformitätserklärung</b> <b>EU Declaration of conformity</b></p> <p><b>Rehfuss Drive Solutions GmbH</b> Vor dem Weißen Stein 21, 72461 Albstadt</p> <p>erklärt in alleiniger Verantwortung,      dass die SR, FG, S, SM, SMN, SS, SSM-Getriebe für Gerätegruppe II der Kategorien 2G,2D und 3G,3D, auf die sich diese Erklärung bezieht, mit der</p> <p>Declares under its sole responsibility,      that the SR,FG, S, SM, SMN, SS, SSM-gearboxes for equipment group II of categories 2G, 2D and 3G, 3D to which this declaration refers, comply with:</p> <p align="center"><b>ATEX – Richtlinie 2014/34/EU</b></p> <p align="center"><b>ATEX – Directive 2014/34/EU</b></p> <p align="center">übereinstimmen.</p> <p>Folgende harmonisierende Normen sind angewandt: The following harmonising standards are applied:</p> <p align="center">DIN EN 1127-1:2017 EN ISO 80079-36:2016 EN ISO 80079-37:2016 EN 60529:1991/A1:2000/A2:2013</p> <p>Die technische Dokumentation für Getriebe der Kategorie 2 ist hinterlegt bei notifizierter Stelle: The technical documentation for category 2 gearboxes is stored at the notified location:</p> <p><b>TÜV-Austria-Services GmbH, EU-Code 0408</b></p>						
<table border="0"> <tr> <td data-bbox="156 1579 606 1702"> <p>Ort und Datum der Ausstellung place and Date of issuing</p> </td> <td data-bbox="606 1579 1477 1702"> <p align="center">Bevollmächtigter zur Ausstellung dieser Erklärung im Namen des Herstellers authorized representative for issuing this declaration on behalf of the manufacturer</p> </td> </tr> <tr> <td data-bbox="156 1702 606 2045"> <p>Albstadt 14.07.2020</p> </td> <td data-bbox="606 1702 1477 2045"> <p align="center">Bevollmächtigter zur Zusammenstellung der technischen Unterlagen authorized representative for compiling the technical documents</p> <div align="center" data-bbox="845 1713 1101 1904">  </div> <p align="center">Dipl. Ing. (FH) M. Fink</p> <p align="center">Funktion: Bereichsleiter Technik Function: Technical Director</p> </td> </tr> </table>			<p>Ort und Datum der Ausstellung place and Date of issuing</p>	<p align="center">Bevollmächtigter zur Ausstellung dieser Erklärung im Namen des Herstellers authorized representative for issuing this declaration on behalf of the manufacturer</p>	<p>Albstadt 14.07.2020</p>	<p align="center">Bevollmächtigter zur Zusammenstellung der technischen Unterlagen authorized representative for compiling the technical documents</p> <div align="center" data-bbox="845 1713 1101 1904">  </div> <p align="center">Dipl. Ing. (FH) M. Fink</p> <p align="center">Funktion: Bereichsleiter Technik Function: Technical Director</p>
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