

# WORKING INSTRUCTIONS AND MAINTENANCE

ATEX MANUAL 



## Experience at the service of innovation

EN

The Varvel Group has been designing and producing power transmission systems for numerous areas of industry since 1955. "Know-how to do it": Varvel has the know-how needed to satisfy customers' requests in the best way possible. Thanks to over sixty years of accumulated experience, Varvel can offer customers a vast range of standard solutions and customise products for specific needs. The entire product range is designed and made in Italy and sold worldwide through two subsidiaries (in the USA and India) and a global network of over 100 commercial partners.

UNI EN ISO 9001:2015  
UNI EN ISO 14001:2015  
BS OHSAS 18001:2007



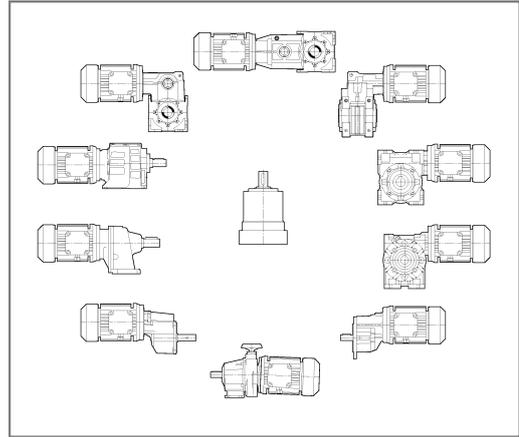
EC DIRECTIVE 2014/34/EC (ATEX)



# IUM

- WORKING INSTRUCTIONS  
AND MAINTENANCE

- ATEX MANUAL 



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# Working Instructions & Maintenance

## General Information - Safety Warnings - Product Layout

### GENERAL INFORMATION

Varvel speed reducers and variators are not in the field of application of the Machinery Directive 2006/42/CE as considered "**machinery components**".

Guide of Machinery Directive - § 35 - decrees:

"The Machinery Directive does not apply directly to machinery components, such as, for example, valves, hydraulic cylinders or **gearboxes**, that do not have a specific application as such but are intended to be incorporated into machinery, although the design and construction of such components must enable the complete machinery to comply with the relevant essential health and safety requirements."

Regular operation and the right to guarantee servicing request the observance of information contained in this manual that must be read before the gearbox is put into service.

### SAFETY WARNINGS

#### Product Operation

During operation, outer surfaces of gearboxes and variators may warm up because of in motion parts and also by external environmental conditions.

Everything referred to transport, stocking, assembling, setting up, starting and maintenance must be performed by trained personnel and that follows this manual within specific national / regional regulations about safety and prevention of accidents.

#### Prevalent Use

Gearboxes and variators referred to in this manual are destined to operate industrial applications and they correspond to standards and regulations where applicable.

Performances and technical data are available in the unit's nameplate and from the related documentation.

#### Transport

Carefully check the state of the goods at their receipt and immediately notify the possible damages to the carrier.

#### Long-Term Storage

Stocked units must be kept in dry warehouse and dust free.

For storage longer than 3 months, apply anti-oxidants on the shafts and machined surfaces paying special attention to oil seal lips.

Storages longer than one year reduce bearing grease lifetime .

#### Environmental Management

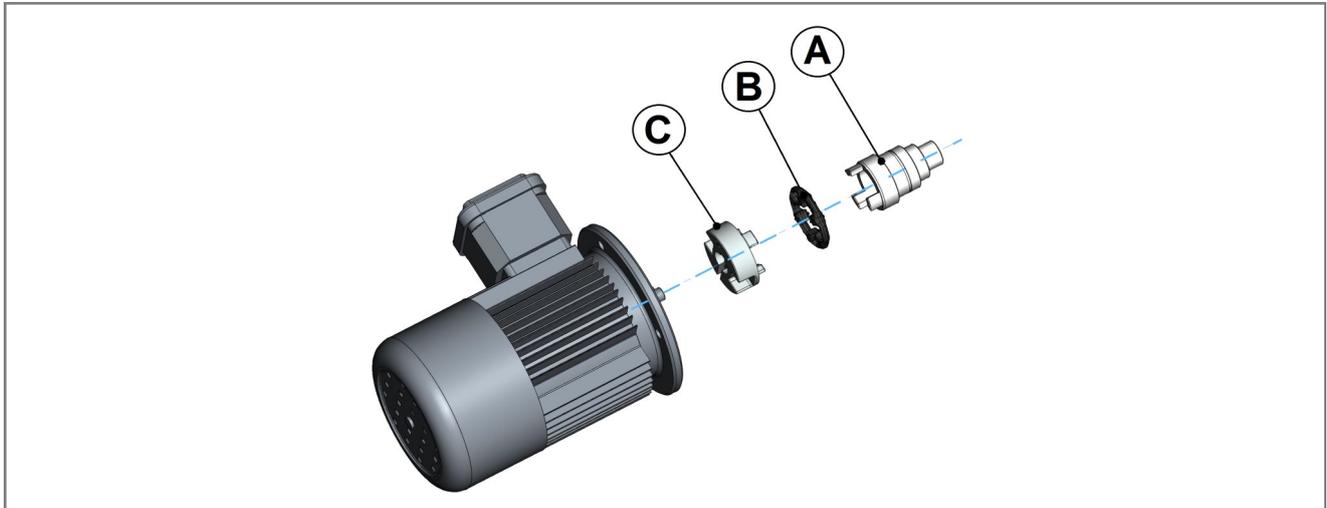
In conformity with Environmental Certification ISO14001, we recommend the following to dispose of

- scrapped gearbox components: to deliver to authorised centres for metal object collection;
- drained oils and lubricants: to deliver to Exhausted Oil Centres;
- product accompanying packages (pallets, carton boxes, paper, plastic, etc.): to deliver into regeneration / recycling circuits as far as possible, by delivering separate waste classes to authorised companies.

### PRODUCT LAYOUT

The following layouts supply a generic help in finding out the most significant parts of the products.

Various design executions, assembling versions, number of stages actually origin a variety of solutions and therefore, we recommend to refer to the appropriate catalogue and/or Engineering Department.



The flexible coupling “G” is supplied as standard fitting on the Series RD, RN, RO, RV, RP, RS, RT.

**A) Reducer half-coupling**

- Material: steel alloy
- One piece built-in input shaft
- Two bearing mounting
- Unchanged casing dimensions

**B) Spider**

- Material: Thermoplastic Elastomer IXEF® - Polyarylamide
- Hardness : 90 Shore D
- Temperature -30/+135° C (-22/+275°F)
- External tooth connection

**C) Motor half-coupling**

- Materials: Aluminium die cast (G3, G5, G6)  
Alloy steel (GS3, GS5, GS6, GS8)
- Dynamic balancing
- Fitting: Clamp (G3, G5, G6)  
Key (GS3, GS5, GS6, GS8)
- Bores according to motor shafts IEC 72 / DIN42948  
NEMA C and TC

**Advantages**

- One gearbox only for each reduction ratio
- Greater flexibility
- Increased stock rotation
- Fretting corrosion elimination between key and keyway
- Zero backlash in gearbox/motor connection
- Allowed angular misalignment 1° max
- Torsional rigidity
- High vibration damping

**Input flanges**

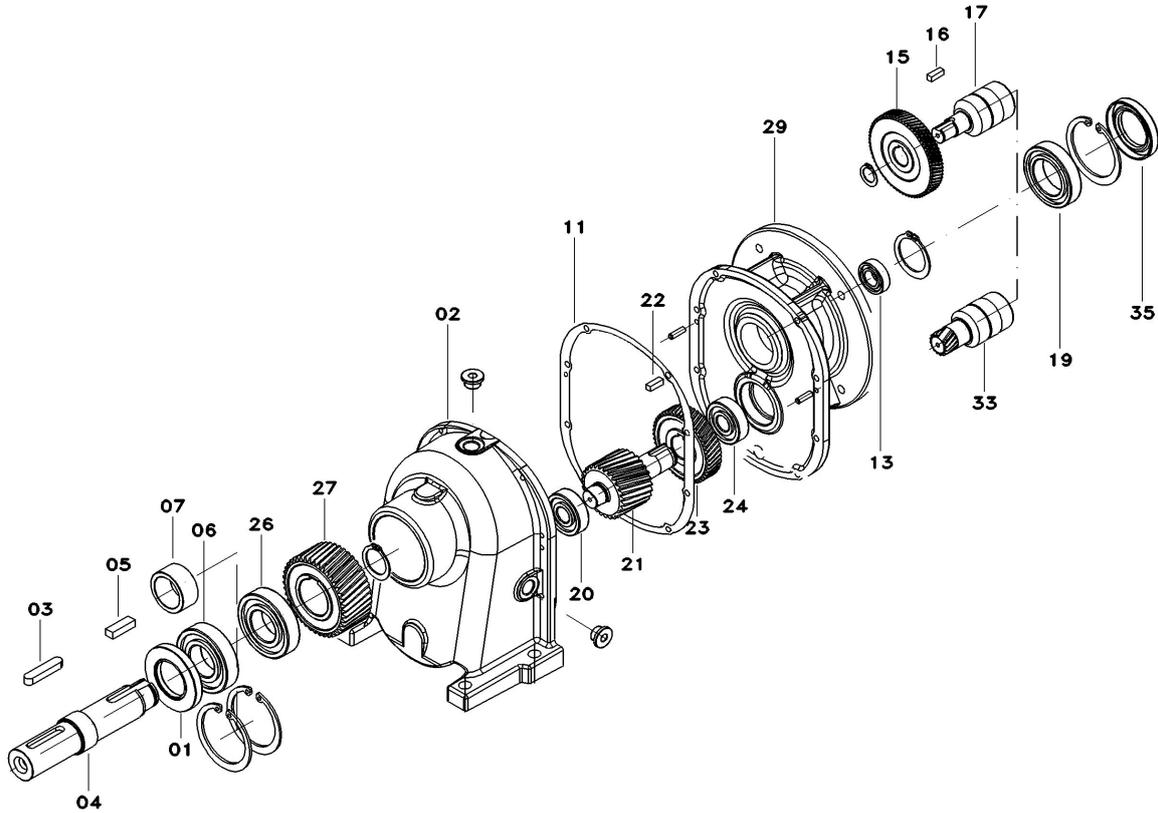
- Material: Aluminium up to IEC112 and NEMA TC180  
Cast iron from IEC132 and NEMA TC200

# Working Instructions & Maintenance

**RC-2**

## Series RC - 2 stages

The layout shows the general structure of a two-stage foot-mounted helical gearbox type FRC (sizes 05 to 30). Ask for part list of other sizes 40 to 60, flanged output, input solid shaft and four stage executions.



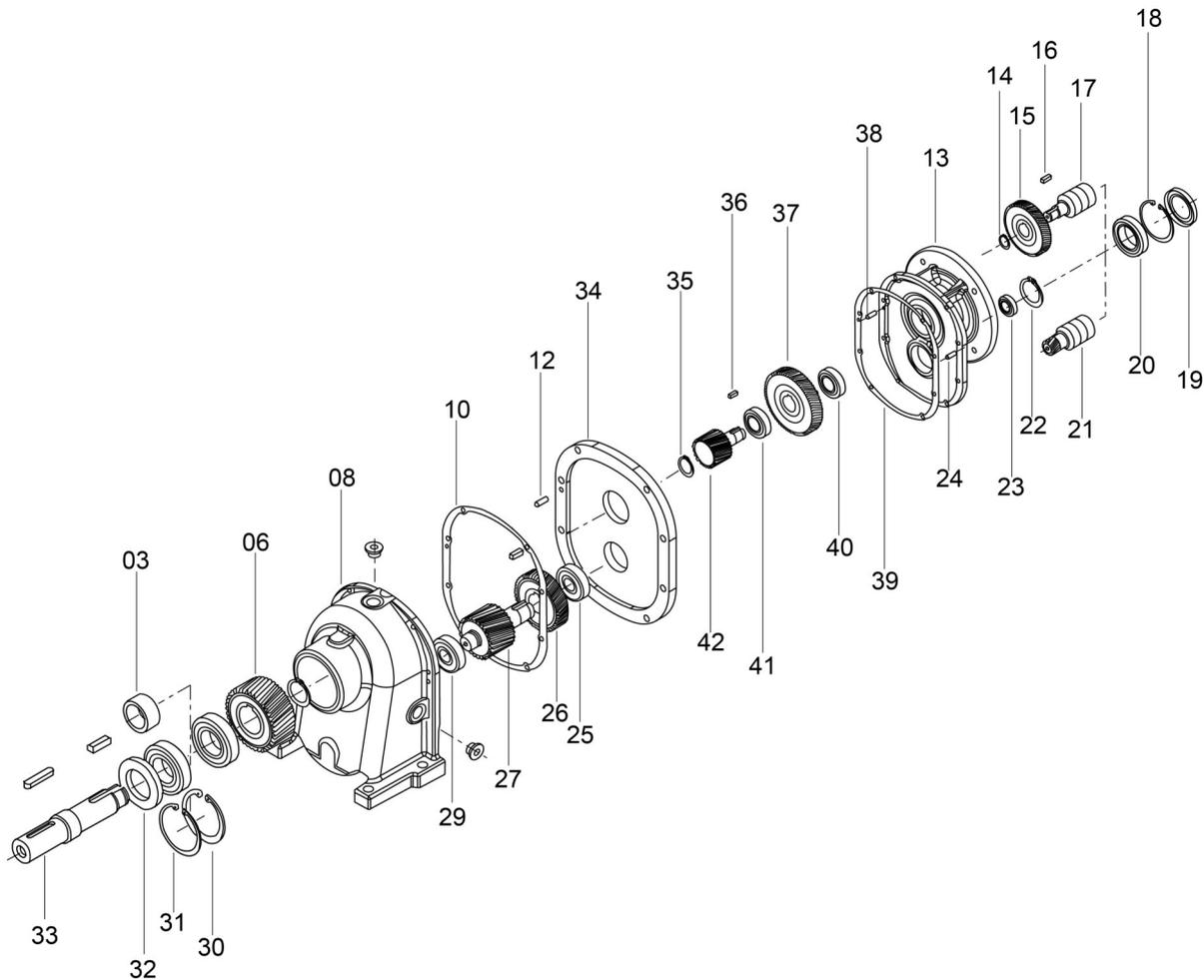
01	Oil seal	19	Bearing
02	Housing	20	Bearing
03	Key	21	Pinion
04	Output shaft	22	Key
05	Key	23	Gear
06	Bearing	24	Bearing
07	Spacer	26	Bearing
11	Gasket	27	Gear
13	Bearing	29	IEC input cover
15	Pinion	33	Hollow input
16	Key	35	Oil seal
17	Hollow input		

## RC-3

## Working Instructions & Maintenance

Series RC - 3 stages

The layout shows the general structure of a two-stage foot-mounted helical gearbox type FRC (sizes 05 to 30). Ask for part list of other sizes 40 to 60, flanged output, input solid shaft and four stage executions.



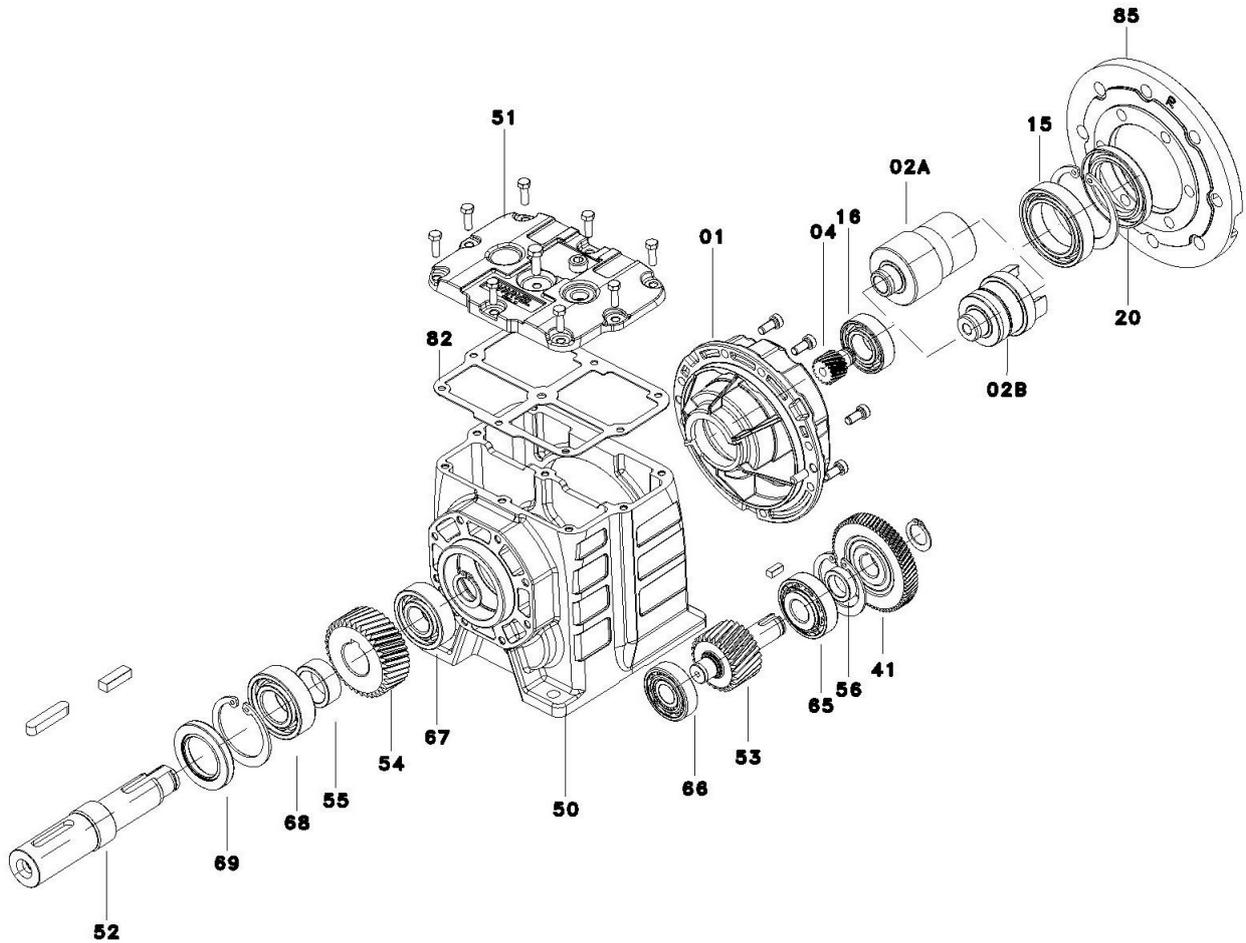
03	Spacer (RC40, 50, 60)	20	Bearing	33	Output shaft
06	Gear	21	Input hollow shaft, toothed	34	Intermediate housing
08	Housing	22	Circlip	35	Circlip
10	Gasket	23	Bearing	36	Key
12	Parallel pin	24	Parallel pin	37	Pinion
13	Input cover	25	Bearing	38	Parallel pin
14	Circlip	26	Gear	39	Gasket
15	Pinion	27	Pinion	40	Bearing
16	Key	29	Bearing	41	Bearing
17	Input hollow shaft, stud	30	Circlip (RC05, 10, 20, 30)	42	Pinion
18	Circlip	31	Circlip (RC05, 10, 20, 30)		
19	Oil seal	32	Oil seal		

# Working Instructions & Maintenance

**RD-2**

## Series RD - 2 stages

The layout shows the general structure of a two-stage foot-mounted helical gearbox type FRD. Ask for part list of flanged output and input solid shaft.



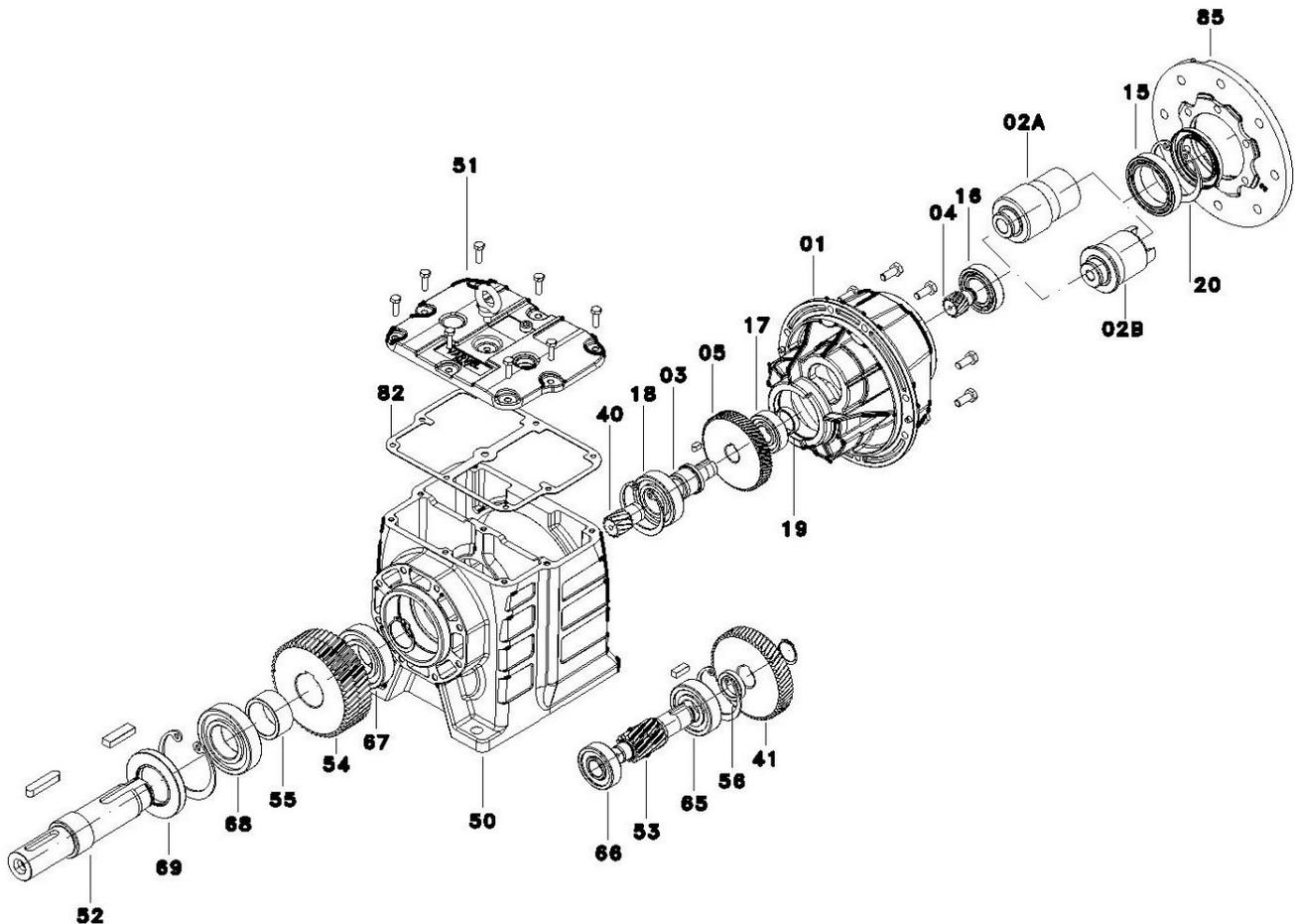
01	Input cover	54	Gear		
02A	Hollow input IEC	55	Spacer		
02B	Hollow input "G"	56	Circlip		
03	3rd stage shaft	65	Bearing		
04	Pinion	66	Bearing		
05	Gear	67	Bearing		
15	Bearing	68	Bearing		
16	Bearing	69	Oil seal		
17	Bearing	82	Gasket		
18	Bearing	85	Motor Flange		
19	Spacer				
20	Oil seal				

## RD-3

## Working Instructions & Maintenance

Series RD - 3 stages

The layout shows the general structure of a three-stage foot-mounted helical gearbox type FRD. Ask for part list of flanged output and input solid shaft.



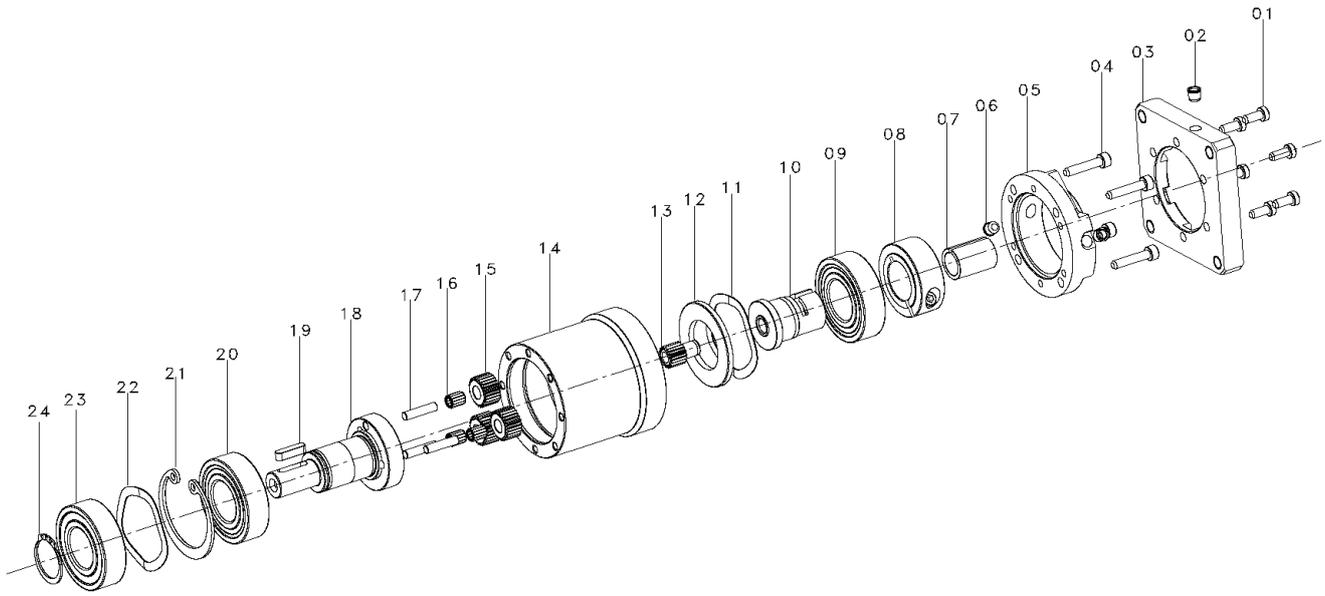
01	Input cover	40	Pinion	68	Bearing
02A	Hollow input IEC	41	Gear	69	Oil seal
02B	Hollow input "G"	50	Housing	82	Gasket
03	3rd stage shaft	51	Upper cover	85	Motor flange
04	Pinion	52	Output shaft		
05	Gear	53	Pinion		
15	Bearing	54	Gear		
16	Bearing	55	Spacer		
17	Bearing	56	Spacer		
18	Bearing	65	Bearing		
19	Spacer	66	Bearing		
20	Oil seal	67	Bearing		

# Working Instructions & Maintenance

**RG-1**

## Series RG - 1 stage

The layout shows the general structure of a one-stage planetary gearbox type FRG.



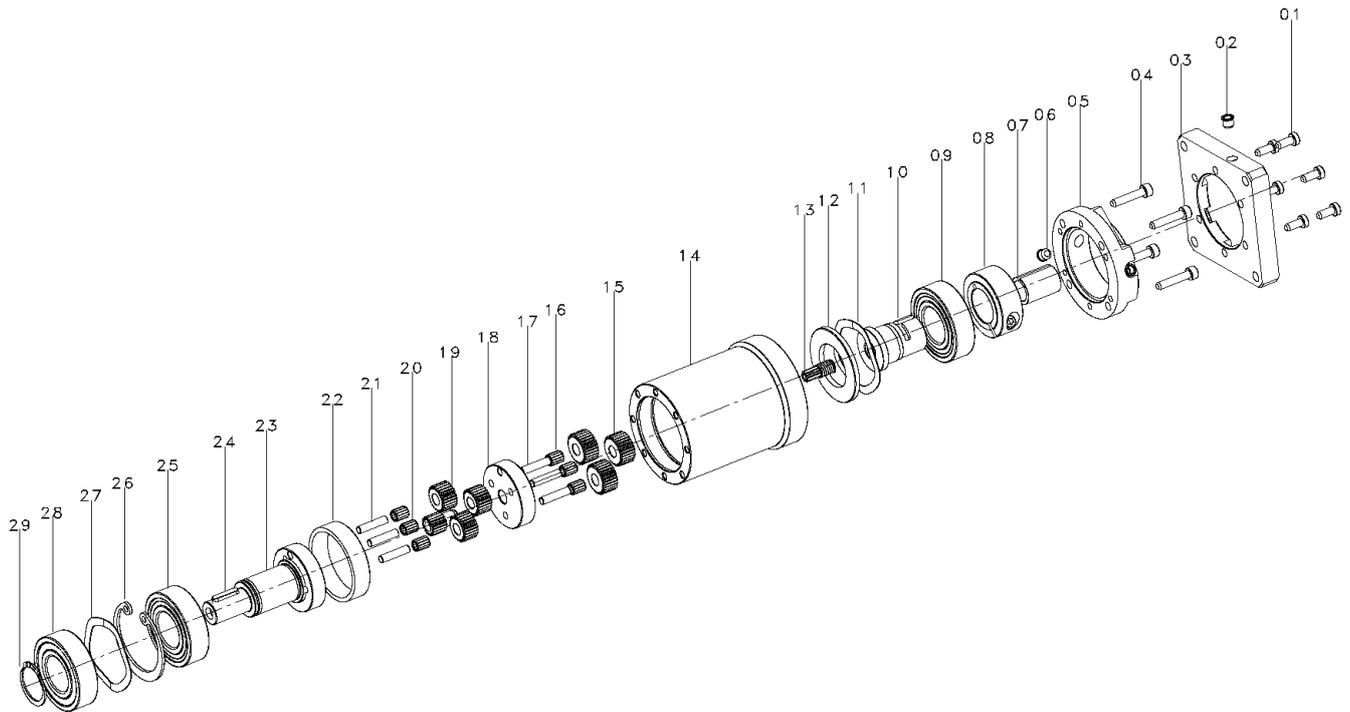
01	Screw	13	Sun gear
02	Plug	14	Ring gear body
03	Motor flange	15	Planet gear
04	Screw	16	Needle bearing
05	Input flange	17	Planet shaft
06	Plug	18	Planet carrier
07	Adapter	19	Key
08	Clamp coupling	20	Bearing
09	Bearing	21	Snap ring
10	Input shaft	22	Shim
11	Shim	23	Bearing
12	Spacer	24	Snap ring

## RG-2

## Working Instructions & Maintenance

Series RG - 2 stages

The layout shows the general structure of a two-stage planetary gearbox type FRG.



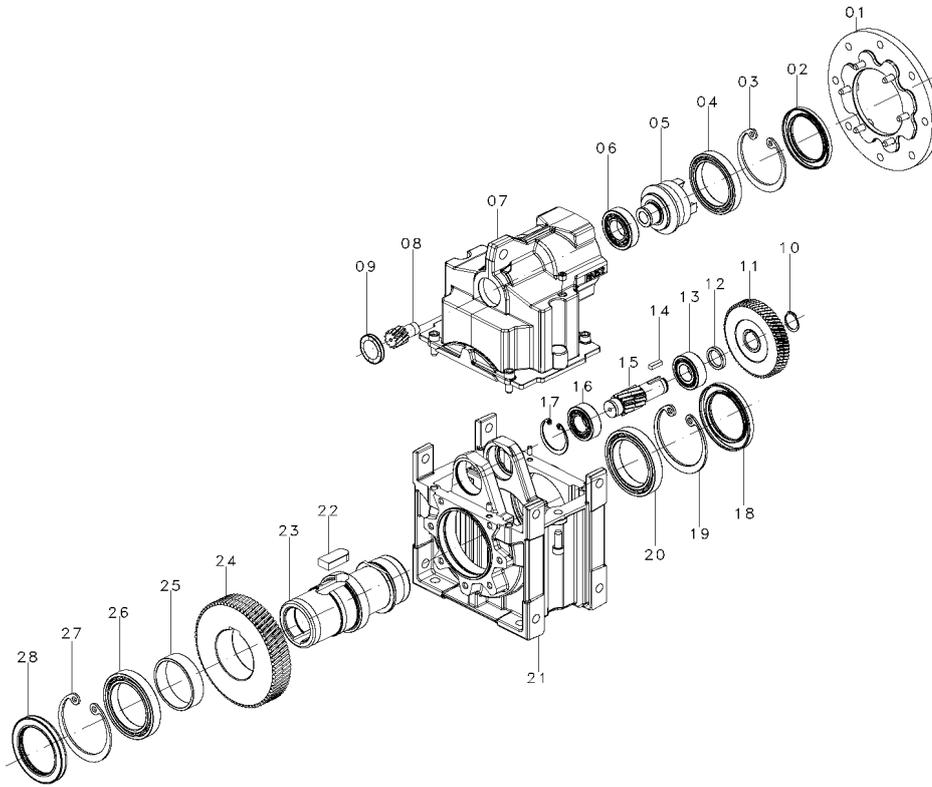
01	Screw	13	Sun gear	25	Bearing
02	Plug	14	Ring gear body	26	Snap ring
03	Motor flange	15	Planet gear	27	Shim
04	Screw	16	Needle bearing	28	Bearing
05	Input flange	17	Planet shaft	29	Snap ring
06	Plug	18	Planet carrier		
07	Adapter	19	Planet gear		
08	Clamp coupling	20	Needle bearing		
09	Bearing	21	Planet shaft		
10	Input shaft	22	Spacer		
11	Shim	23	Planet carrier		
12	Spacer	24	Key		

# Working Instructions & Maintenance

**RN-2**

## Series RN - 2 stages

The layout shows the general structure of a two-stage parallel shaft gearbox type FRN with through hollow output shaft. Ask for part list of flanged output and input solid shaft.



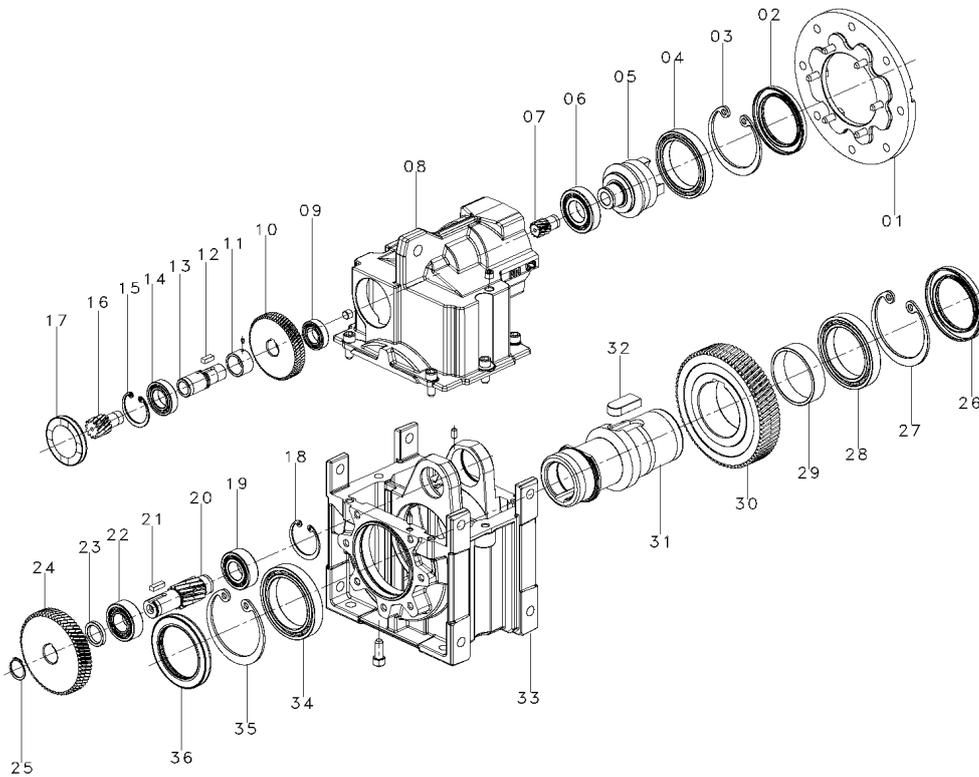
01	Input flange	13	Bearing	25	Spacer
02	Oil seal	14	Key	26	Bearing
03	Snap ring	15	Pinion	27	Snap ring
04	Bearing	16	Bearing	28	Oil seal
05	Input shaft	17	Snap ring		
06	Bearing	18	Oil seal		
07	Cover	19	Snap ring		
08	Pinion	20	Bearing		
09	Oil seal RCA	21	Body		
10	Snap ring	22	Key		
11	Gear	23	Output shaft		
12	Spacer	24	Gear		

## RN-3

## Working Instructions & Maintenance

Series RN - 3 stages

The layout shows the general structure of a two-stage parallel shaft gearbox type FRN with through hollow output shaft. Ask for part list of flanged output and input solid shaft.



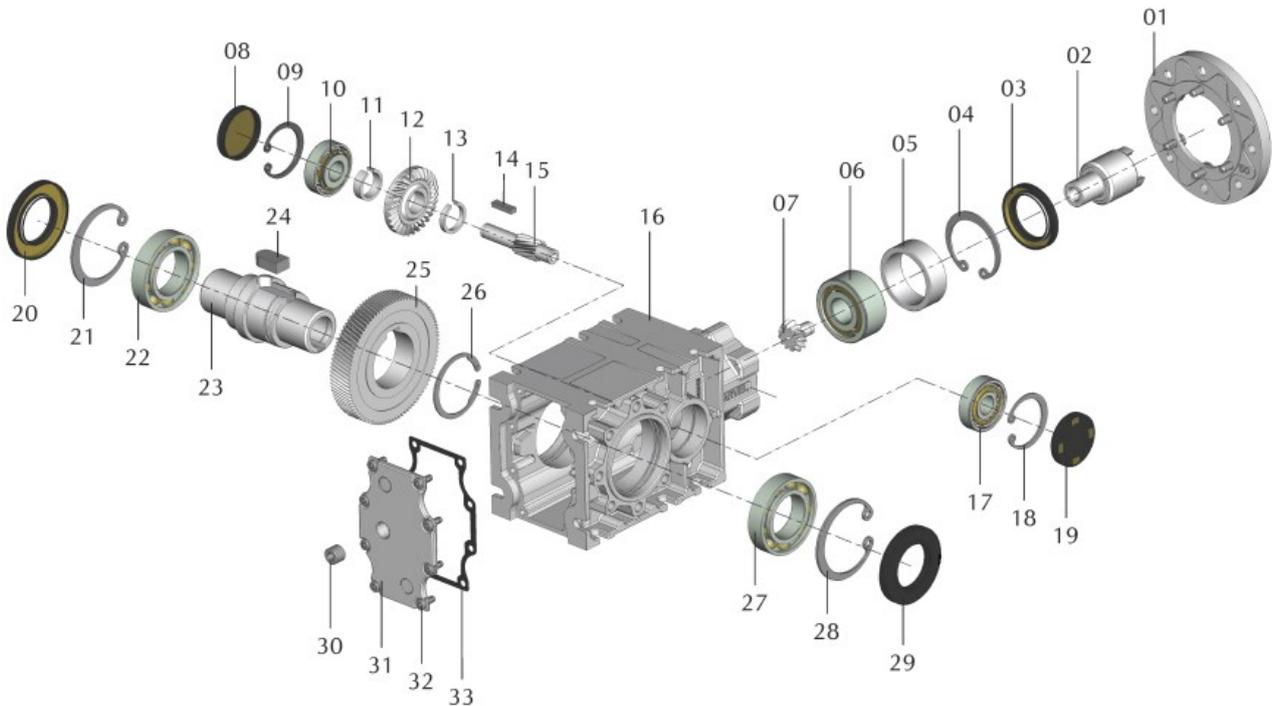
01	Motor flange	13	Shaft	25	Snap ring
02	Oil seal	14	Bearing	26	Oil seal
03	Snap ring	15	Snap ring	27	Snap ring
04	Bearing	16	Pinion	28	Bearing
05	Input shaft	17	Oil seal RCA	29	Spacer
06	Bearing	18	Snap ring	30	Gear
07	Pinion	19	Bearing	31	Output shaft
08	Cover	20	Pinion	32	Key
09	Bearing	21	Key	33	Body
10	Gear	22	Bearing	34	Bearing
11	Spacer	23	Spacer	35	Snap ring
12	Key	24	Gear	36	Oil seal

# Working Instructions & Maintenance

## RO-2

### Series RO - 2 stages

The layout shows the general structure of a two-stage bevel/helical gearbox type FRO with through hollow output shaft. Ask for part list of flanged output and input solid shaft.



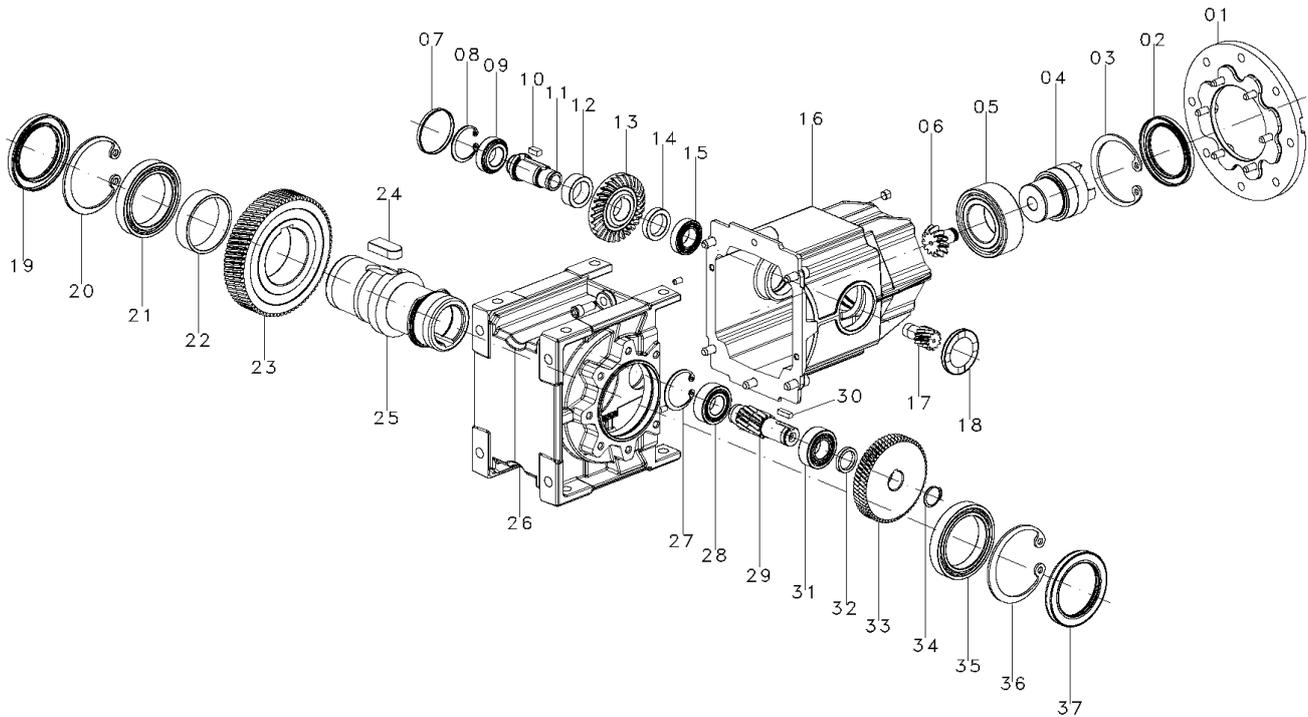
01	Motor flange	13	Spacer	25	Gear
02	Input shaft	14	Key	26	Circlip
03	Oil seal	15	Pinion	27	Bearing
04	Circlip	16	Housing	28	Circlip
05	Spacer	17	Bearing	29	Oil seal
06	Bearing	18	Circlip	30	Plug
07	Gleason pinion	19	Oil seal	31	Cover
08	Oil seal	20	Oil seal	32	Screw
09	Circlip	21	Circlip	33	Gasket
10	Bearing	22	Bearing		
11	Spacer	23	Output shaft		
12	Gleason gear	24	Key		

## RO-3

## Working Instructions & Maintenance

Series RO - 3 stages

The layout shows the general structure of a three-stage bevel/helical gearbox type FRO with through hollow output shaft. Ask for part list of flanged output and input solid shaft.



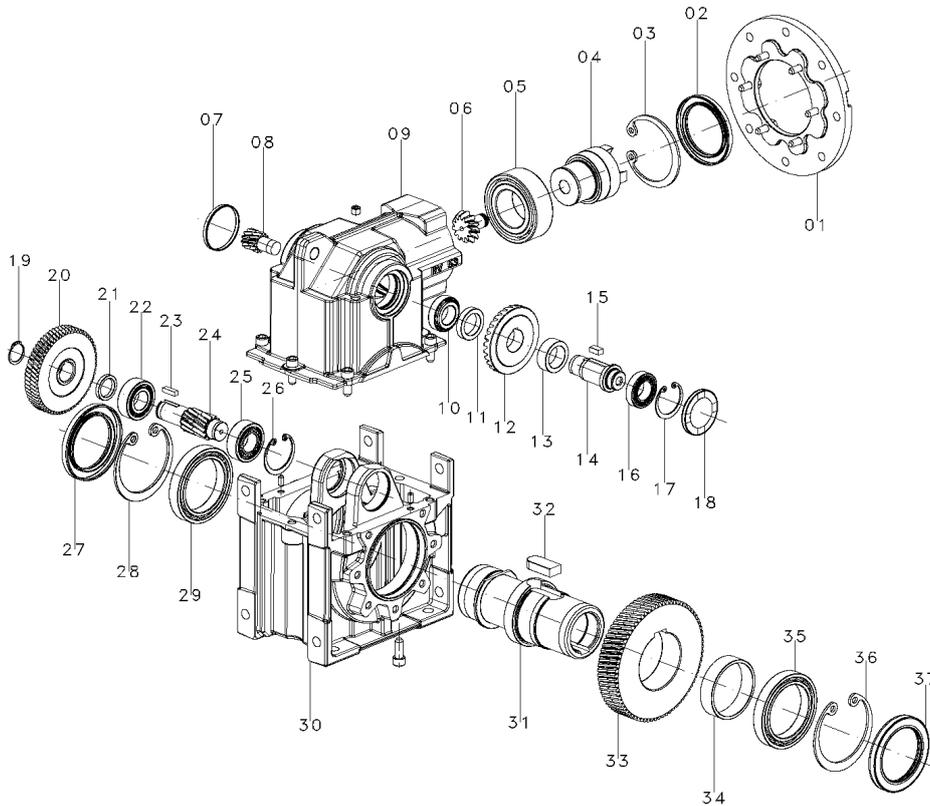
01	Motor flange	13	Gear	25	Output shaft
02	Oil seal	14	Spacer	26	Body
03	Snap ring	15	Bearing	27	Snap ring
04	Input shaft	16	Cover	28	Bearing
05	Bearing	17	Pinion	29	Pinion
06	Pinion	18	Oil seal RCA	31	Bearing
07	Oil seal RCA	19	Oil seal	32	Spacer
08	Snap ring	20	Snap ring	33	Gear
09	Bearing	21	Bearing	34	Snap ring
10	Key	22	Spacer	35	Bearing
11	Shaft	23	Gear	36	Snap ring
12	Spacer	24	Key	37	Oil seal

# Working Instructions & Maintenance

**RV-3**

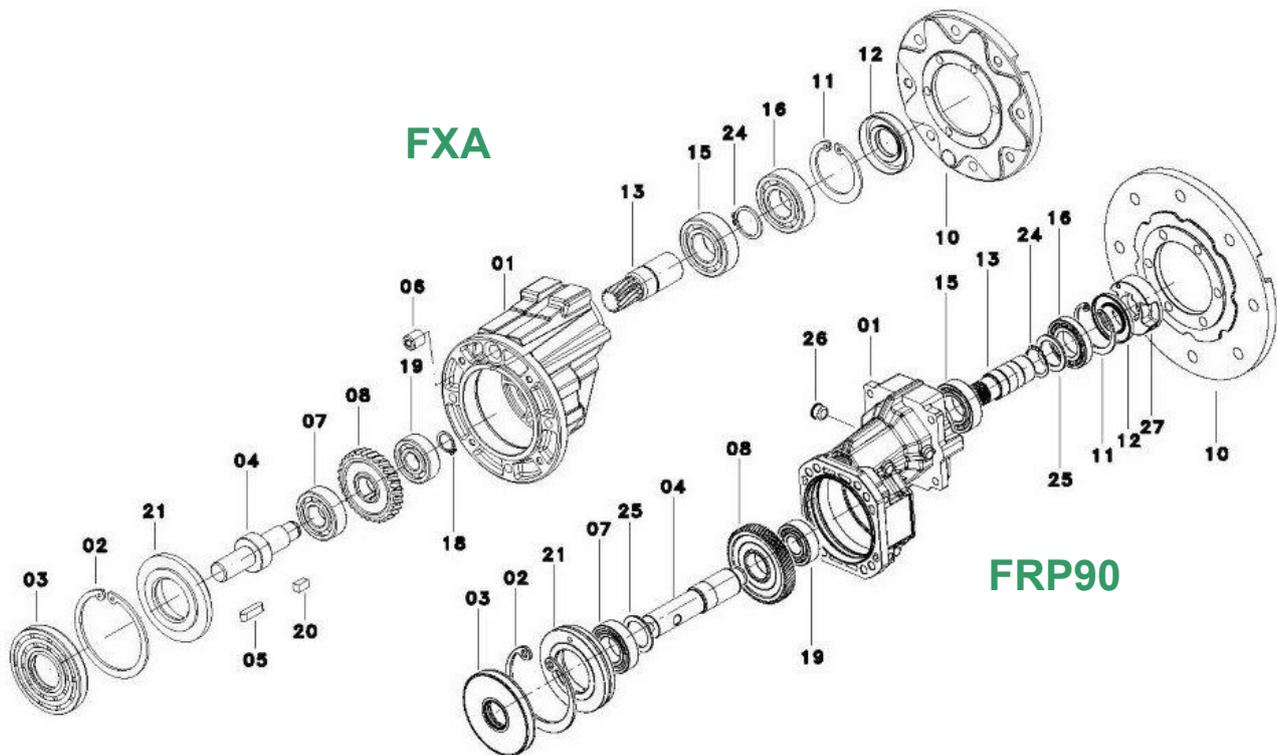
**Series RV - 3 stages**

The layout shows the general structure of a three-stage bevel/helical gearbox type FRV with through hollow output shaft. Ask for part list of flanged output and input solid shaft.



01	Motor flange	13	Bearing	25	Bearing
02	Oil seal	14	Shaft	26	Snap ring
03	Snap ring	15	Key	27	Oil seal
04	Input shaft	16	Bearing	28	Snap ring
05	Bearing	17	Snap ring	29	Bearing
06	Pinion	18	Oil seal RCA	30	Body
07	Oil seal RCA	19	Snap ring	31	Output shaft
08	Pinion	20	Gear	33	Gear
09	Cover	21	Spacer	34	Spacer
10	Bearing	22	Bearing	35	Bearing
11	Spacer	23	Key	36	Snap ring
12	Gear	24	Pinion	37	Oil seal

The layout shows the general structure of a one-stage flange mounting helical gearbox type FRP and FXA .



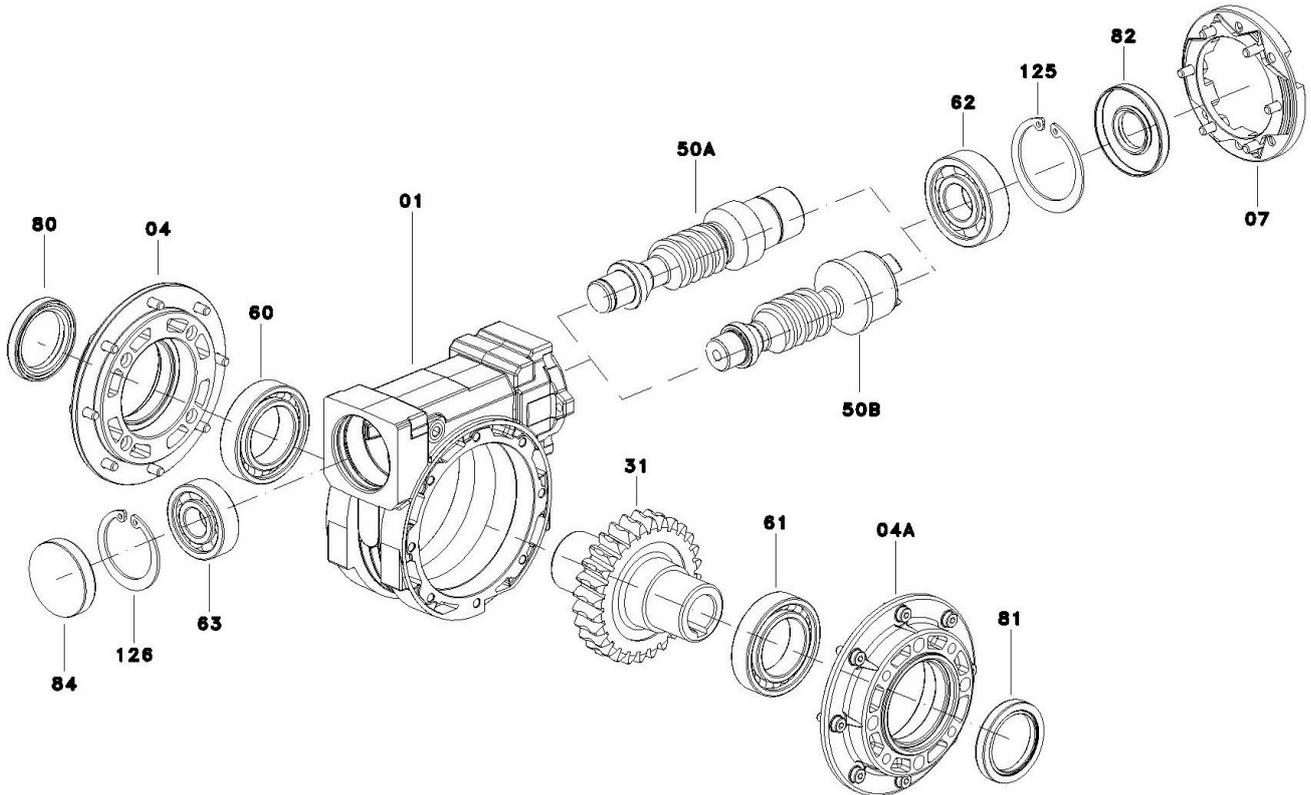
01	Body	15	Bearing		
02	Snap ring	16	Bearing		
03	Oil seal	18	Snap ring		
04	Output shaft	19	Bearing		
05	Key	20	Key		
06	Screw	21	Adapter		
07	Bearing	24	Snap ring		
08	Gear	25	Spacer		
10	Motor flange	26	Plug		
11	Snap ring	27	Flexible coupling		
12	Oil seal				
13	Pinion				

# Working Instructions & Maintenance

**RS**

## Series RS

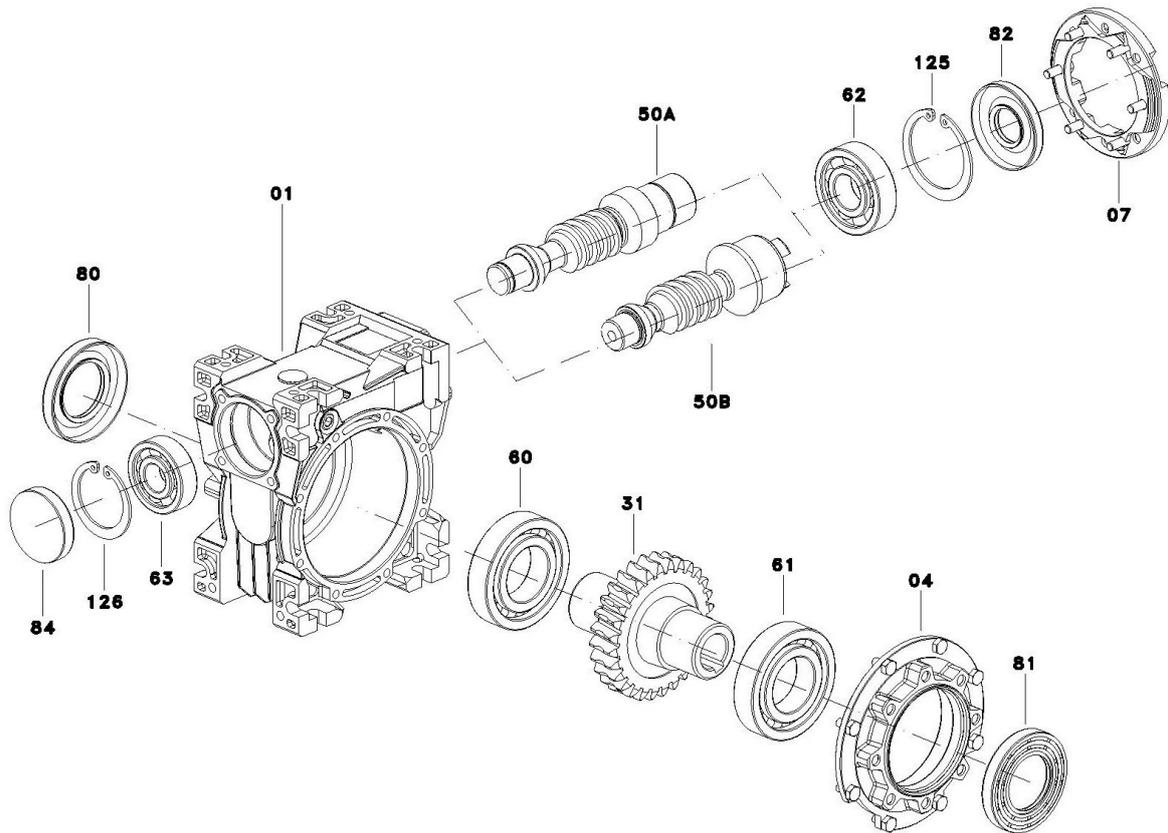
The layout shows the general structure of a worm gearbox type FRS with through hollow output shaft and shaft mounting. The Series TA (helical / worm) are made of a helical one-stage gearbox XA mounted as input stage onto a standard worm box RS and the Series RS/RS (two stage worm) of two standard worm boxes RS and an appropriate combination kit.



01	Body	82	Oil seal
04	Side cover	84	Oil seal RCA
07	Motor flange	125	Snap ring
31	Worm wheel	126	Snap ring
50A	IEC wormshaft		
50B	"G coupling" wormshaft		
60	Bearing		
61	Bearing		
62	Bearing		
63	Bearing		
80	Oil seal		
81	Oil seal		

The layout shows the general structure of a foot-mounted worm gearbox type FRT.

The Series TA (helical / worm) are made of a helical one-stage gearbox XA mounted as input stage onto a standard worm box RT and the Series RT/RT (two stage worm) of two standard worm boxes RT and an appropriate combination kit.



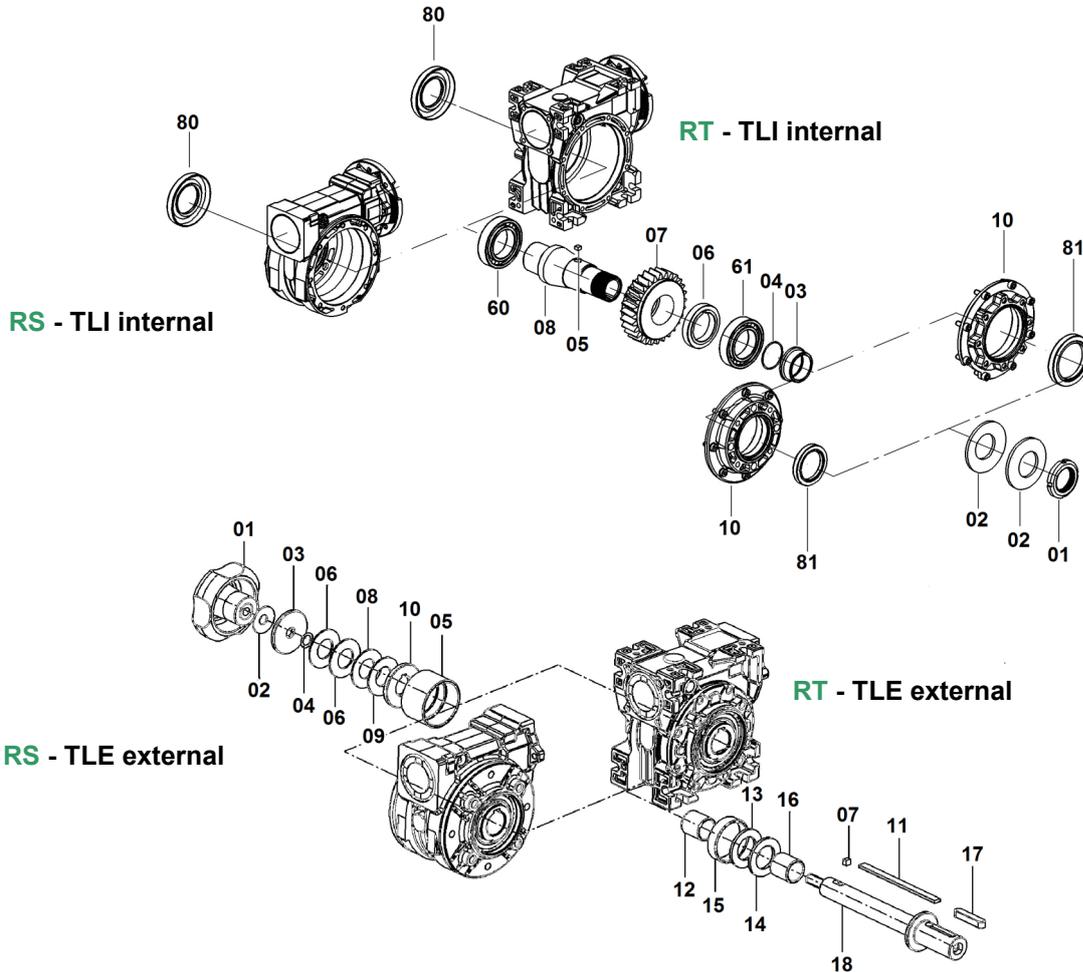
01	Housing	82	Oil seal		
04	Side cover	84	Oil seal RCA		
07	Motor flange	125	Seeger ring		
31	Worm wheel	126	Seeger ring		
50A	IEC wormshaft				
50B	"G coupling" wormshaft				
60	Bearing				
61	Bearing				
62	Bearing				
63	Bearing				
80	Oil seal				
81	Oil seal				

# Working Instructions & Maintenance

**TLI**

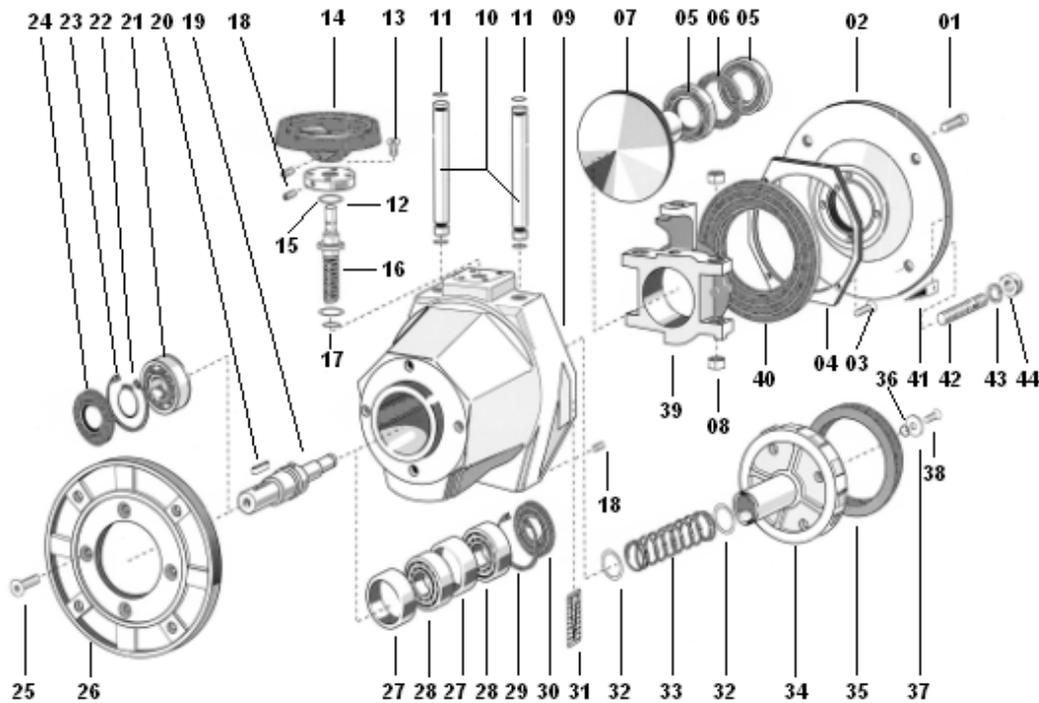
## TLI - TLE Torque Limiter Options

The layout shows the general structure of a built-in torque limiter type TLI incorporated inside a worm gearbox Series RS or RT and type TLE to fit inside a worm gearbox Series RS or RT. The TLI type is incorporated during the gearbox assembly, while the type TLE can be directly fitted into the hollow shaft of an already assembled standard gearboxes without any special tooling.



TLI - Internal		80	Oil seal	09	Rear friction	
01	Lock nut	81	Oil seal	10	Rear washer	
02	Bellville washer	<b>TLE - External</b>			11	Key
03	Bush				01	Setting torque hand wheel
04	Oil seal	02	Belville washer	13	Front washer	
05	Key	03	Spacer	14	Front friction	
06	Spacer	04	Spacer	15	Front protection	
07	Worm wheel	05	Rear protection	16	Front bush	
08	Hollow output shaft	06	Belville washer	17	Key	
10	Cover	07	Key	18	Low speed shaft	
60	Bearing	08	Thrust washer			
61	Bearing					

The layout shows the general structure of a flange-mounted variator without gearbox type.



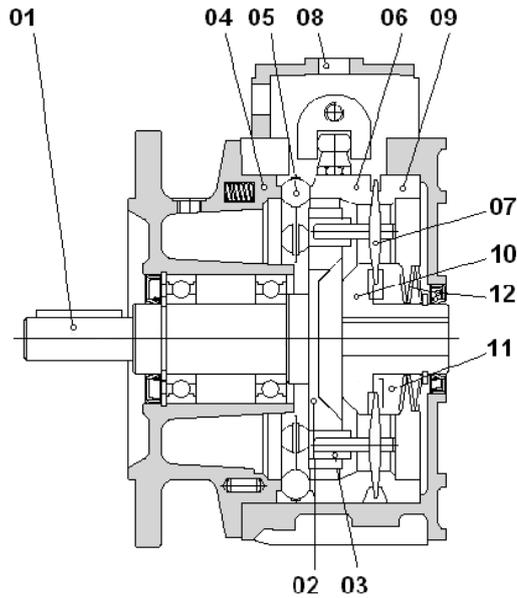
01	Screw	14	Control hand wheel	27	Spacer
02	IEC motor flange	15	Control shaft lock	28	Bearing
03	Screw	16	Control shaft	29	Snap ring
04	Seal plate	17	Oil seal OR	30	Oil seal
05	Bearing	18	Screw	31	Index scale
06	Spacer	19	Output shaft	32	Snap ring
07	Cone	20	Key	33	Spring
09	Body	21	Bearing	34	Friction ring carrier
10	Cylindrical slide	22	Snap ring	35	Friction ring
11	Oil seal OR	23	Snap ring	39	Cone holder
12	Oil seal OR	24	Oil seal	40	Bellows seal
13	Screw	26	Output flange	41	Index

## Working Instructions & Maintenance

**VS**

### Series VS

The layout shows the general structure of a flange-mounted variator without gearbox type.



01	Output shaft
02	Planet carrier
03	Sliding bush
04	Adjusting track
05	Ball carrier
06	External mobile track
07	Planet
08	Adjusting box
09	External fixed track
10	Internal fixed track
11	Internal mobile track
12	Belville washer

## Working Instructions & Maintenance

### Installation

#### INSTALLATION

##### Tolerances

Tolerances are recommended according to DIN 748 as follows

- Shafts: solid input or output ISO h6  
hollow input ISO E8  
hollow output ISO EH7  
centre hole DIN 332, DR
- Flanges: spigot ISO h7

##### Precautions

Check that the unit to be put into service is rightly sized to perform the required function and that its mounting position complies with the order. Such data are shown in the nameplate fitted on the unit.

Check mounting stability so that the unit operates without vibrations or overloads, or insert damping couplings or torque limiters.

Care must be taken to ensure exact positioning and steadiness when handling the units to not origin damages to normal operation of the unit.

When hoisting, use relevant locations of the housing or eyebolts if provided, or foot or flange holes.

Never hoist on any moving part (input or output shafts).

##### Groundwork

Clean carefully all the surfaces of shafts and flanges paying attention that the used product for cleaning does not come in contact with sealing lips of oil seals to avoid any damage and lubricant leakages.

##### Set up

The unit may be connected for clockwise or counter-clockwise rotation.

Stop immediately the unit when unexpected running or noise occurs: if the part originating the anomaly is not identified, other parts may be damaged with consequent difficulty in going back to the cause.

##### Pulleys, Pinions, Couplings

Bore tolerance F7 is recommended when fitting pulleys, pinions, couplings, etc. on the output shaft.

It is also recommended to not fit or extract with mallets or hammer hits to not damaging internal parts, but to use the shaft-head threaded bore as reaction to fitting or extraction.

- Belt drives: the force imposed on the shaft due to belt tension to not exceed the maximum permissible radial force of the unit.
- Chain drives: properly lubricate the chain drive and check that no pitch differences hinder its smooth running.

##### Torque arm

The torque arm Type BR (Series RS) or Type BT (Series RT) can rotate by 45° within the arc 45° to 315°.

The types BRV (Series RS) and Type BTV (Series RT) incorporate a Vulkollan® bush to allow vibration dumping.

##### Painting

Carefully protect oil seals, coupling faces and shafts when re-painting the units.

# Working Instructions & Maintenance

## Starting - Inspections and Maintenance

### STARTING

#### Series RS, RT

The worm gearbox originates the following rotations of input and output shafts, with worm shaft upwards :

- inverse rotation  
one-stage gearboxes (RS, RT);
- original rotation  
helical/worm gearboxes (RA, TA);
- inverse rotation  
two-stage gearboxes (RS/RS, RT/RT).

Worm shaft downwards: opposite rotations.

#### Series RC, RD, RN, RO/RV, RP, XA, VR, VS

The helical or bevel/helical gearbox and the variator originate the following rotations of input and output shafts :

- inverse rotation  
odd-stage gearboxes (one, three, etc.)  
and variators with odd-stages;
- original rotation  
even-stage gearboxes (two, four, etc.)  
and variators without stages or even-stages .

### INSPECTIONS AND MAINTENANCE

#### Intervals

Although the units are no-load run tested in the factory before despatch, it is advisable not to run them at maximum load for the first 20-30 hours to allow proper running in.

For variators, run throughout the full speed range at reduced load before the full load is applied.

The units are delivered already filled with synthetic long-life oil: no servicing or refilling within the average lifetime of 15,000 hours for operation according to SF1.0.

Refer to the Catalogues as appropriate to the right definition of Service Factor.

Variators Series VR run dry and bearings are lifetime grease packed; therefore, there is no part needing periodical maintenance, the friction ring replacement excepted on normal wearing conditions. .

#### Maintenance Servicing

Units supplied without any oil plugs:

Series RC	(sizes 05, 10, 20, 30)
Series RD	(sizes 0, 1, 2, 3, 4, 5, 6)
Series RG	(sizes 05, 07, 09, 12)
Series RN	(sizes 1, 2, 3, 4, 5, 6)
Series RO	(sizes 1, 2, 3, 4, 5, 6)
Series RV	(sizes 1, 2, 3, 4, 5, 6)
Series RP	(size 71)
Series RS	(sizes 28, 40, 50, 60, 70, 85)
Series RT	(sizes 28, 40, 50, 60, 70, 85, 110)
Series XA	(sizes 63, 71, 80, 100)
Series VR	(sizes 63, 71, 80, 90)

## Working Instructions & Maintenance

### Inspections and Maintenance

#### INSPECTIONS AND MAINTENANCE (contd)

##### Maintenance Servicing

Units supplied with oil plugs:

Series RC (sizes 40, 50, 60)

Series RS (sizes 110, 130, 150)

Series VS (sizes 63, 71, 80, 90, 100, 112)

Periodically check the seal condition and possible evidence of lubricant leakages.

If lubricant replacement or topping is required, do not mix synthetic lubricants with mineral based lubricants.

##### **According to working conditions:**

Eliminate by means of a vacuum cleaner any dust accumulation thicker than 5 mm.

##### **GEARBOXES**

- **Every 500 working hours or every month:**  
Oil seal visual check to monitoring any lubricant leakage.
- **Every 3000 working hours or every 6 months:**  
Oil seal check and replacement if considerably used.
- **Every 5 years:**  
Replace synthetic oil.

##### **VARIATORS**

###### **Series VR**

Variation section, dry running and with lifetime grease-packed bearings, does not require any periodic servicing, excepted the friction ring replacement on normal wearing conditions.

- **According to working conditions:**  
Replace friction ring, if considerably used.
- **Every 3000 working hours or every 6 months:**  
Check output shaft angular play and oil seal and corrugated hood integrity.
- **Every 6000 working hours or every year:**  
Replace friction ring.

###### **Series VS**

Variation section, mineral oil lubricated, requires periodic servicing as follows:

- **Every 500 working hours or every month:**  
Oil seal visual check to monitoring any lubricant leakage.
- **Every 3000 working hours or every 6 months:**  
Oil seal check and replacement if considerably used.
- **Every 5 years:**  
Replace mineral oil .

# Working Instructions & Maintenance

## Malfunctioning

### MALFUNCTIONING

#### Major Events

- **Running noise, continuous**
  - Grinding sound: damaged bearing  
Replace bearing & check the oil
  - Knocking sound: irregular gearing  
Contact Customer Service
- **Running noise, intermittent**
  - Foreign particles in the oil  
Contact Customer Service
  - Series VR - Damaged friction ring  
Rectify the cause and replace friction ring at an authorized centre.
- **Oil leakages**
  - Damaged oil seal  
Replace the oil seal
  - Loosen screws  
Tighten the screws
  - Inner overpressure  
Contact Customer Service
  - Oil seal fitting  
Defective fitting or fitting-lubricant melting
- **No rotation of output shaft**
  - Internal connection cut off  
Contact Customer Service
  - Series VR - Friction ring end of life  
Replace the friction ring at an authorized centre.
  - Series VR - Contaminated friction ring  
Clean carefully cone and ring working areas with solvent of similar product.

#### Customer Service

We recommend to always provide the Customer Service with the following information:

- Full data of name plate and/or Serial No.
- Type of application
- Duty cycle
- Circumstances of malfunctioning
- Supposed causes.

## Working Instructions & Maintenance

Lubricants

### LUBRICANTS

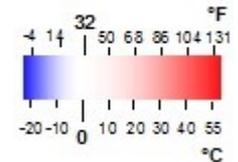
Recommended Types

All the units are delivered already filled with synthetic long-life oil.

The safe operation of the units with ISO VG 320 grade lubricant is recommended in the ambient temperature range

-20 to +55 °C (-4 to 131 °F)

Other temperatures require specific recommendations for low or high temperatures to ask the Customer Service.



ISO	ARAL	bp	Castrol	EXXON	KLÜBER LUBRICATION	Mobil	TEXACO	TOTAL	Shell
VG320*	Degol GS 320	Energyn SG-XP320	Alphasyn PG 320	Glycolube 320	Klübersynth GH-6-320	Glygoyle HE 320	Synlube CLP 320	Carter SY 320	Omala S4 WE 320
VG320**	Eural Gear 320	---	Vitalube GS 320	Gear Oil FM 320	Klübersynth UH1-6-320	Mobil DTE FM 320	---	Nevastane EP 320	---

\* - Synthetic oil

\*\* - Food Industry Approved Synthetic Oil

Oil quantity [l] = litres

RC	2c			3c			4c				
	[l] <sub>1</sub>	[l] <sub>2</sub>	[l] <sub>3</sub>	[l] <sub>1</sub>	[l] <sub>2</sub>	[l] <sub>3</sub>	[l] <sub>1</sub>	[l] <sub>2</sub>	[l] <sub>3</sub>		
RC205	0.13	0.15	0.15	RC305	0.17	0.30	0.30	RC305	0.21	0.40	0.40
RC210	0.17	0.25	0.17	RC310	0.25	0.50	0.35	RC310	0.35	0.70	0.50
RC220	0.50	0.60	0.50	RC320	0.60	0.80	0.60	RC320	0.85	1.10	0.85
RC230	0.70	1.15	0.80	RC330	1.15	1.50	1.15	RC330	1.25	1.60	1.25
RC240	1.15	2.25	2.00	RC340	1.50	3.00	2.25	RC340	2.75	5.00	3.50
RC250	2.25	4.40	4.00	RC350	3.75	6.00	5.00	RC350	6.50	10.0	8.00
RC260	6.00	8.80	8.00	RC360	8.00	10.0	8.80	RC360	12.0	15.0	13.5

[l]<sub>1</sub> = B3, B6, B7, B8, B5      [l]<sub>2</sub> = V1, V5

[l]<sub>3</sub> = V3, V6

RD	2c		3c		
	[l] H	[l] V	[l] H	[l] V	
RD02	0.20	0.28	RD03	0.30	0.38
RD12	0.50	0.70	RD13	0.50	0.70
RD22	0.80	1.00	RD23	0.80	1.00
RD32	1.30	1.80	RD33	1.60	2.10
RD42	2.20	3.00	RD43	2.20	3.40
RD52	4.50	5.50	RD53	4.50	6.50
RD62	7.00	9.00	RD63	7.00	11.00

H = H1, H2, H3, H4

V = V5, V6

# Working Instructions & Maintenance

## Lubricants

Oil quantity [l] = litres (cont.)

RP	FRP	71 H	71 V	90	680
	Oil	0.05	0.10	* 50 g	0.04

\* Shell Grease Gadus S5 V142W 00 (grams)

RS	RS	I	RA	l <sub>1</sub> / l <sub>2</sub>	RS / RS	l <sub>3</sub> / l <sub>4</sub>
	28	0.03	63 / 40	0.04 / 0.08	28 / 28	0.03 / 0.03
	40	0.08	63 / 50	0.04 / 0.13	28 / 40	0.03 / 0.10
	50	0.13	63 / 60	0.04 / 0.20	28 / 50	0.03 / 0.15
	60	0.20	71 / 50	0.06 / 0.13	28 / 60	0.03 / 0.25
	70	0.35	71 / 60	0.06 / 0.20	40 / 70	0.10 / 0.35
	85	0.60	71 / 70	0.06 / 0.35	40 / 85	0.10 / 0.63
	110	1.50	71 / 85	0.06 / 0.60	50 / 110	0.15 / 1.50
	130	2.75	80 / 60	0.10 / 0.20	60 / 130	0.25 / 2.75
	150	4.40	80 / 70	0.10 / 0.35	70 / 150	0.35 / 4.40
			80 / 85	0.10 / 0.60		
			80 / 110	0.10 / 1.50		
			100 / 110	0.20 / 1.50		
			100 / 130	0.20 / 2.75		
			100 / 150	0.20 / 4.40		

[I] - Litres FRS

[l<sub>1</sub> / l<sub>2</sub>] - Litres FXA / FRS

[l<sub>3</sub> / l<sub>4</sub>] - Litres FRS / FRS

RT	RT	I	TA	l <sub>1</sub> / l <sub>2</sub>	RT / RT	l <sub>3</sub> / l <sub>4</sub>
	28	0.03	63 / 40	0.04 / 0.08	28 / 28	0.03 / 0.03
	40	0.08	63 / 50	0.04 / 0.13	28 / 40	0.03 / 0.08
	50	0.13	63 / 60	0.04 / 0.20	28 / 50	0.03 / 0.13
	60	0.20	71 / 50	0.06 / 0.13	28 / 60	0.03 / 0.20
	70	0.35	71 / 60	0.06 / 0.20	40 / 70	0.08 / 0.35
	85	0.60	71 / 70	0.06 / 0.35	40 / 85	0.08 / 0.60
	110	1.50	71 / 85	0.06 / 0.60	50 / 110	0.13 / 1.50
			80 / 60	0.10 / 0.20		
			80 / 70	0.10 / 0.35		
			80 / 85	0.10 / 0.60		
			80 / 110	0.10 / 1.50		
			100 / 110	0.20 / 1.50		

[I] - Litres FRT

[l<sub>1</sub> / l<sub>2</sub>] - Litres FTA / FRT

[l<sub>3</sub> / l<sub>4</sub>] - Litres FRT / FRT

XA	FXA	[I]
	63	0.04
	71	0.05
	80	0.10
	100	0.20

[I] - Litres

## Working Instructions & Maintenance

Lubrificant

Oil quantity [l] = litres (cont.)

RN	RN-2							RN-3						
	H1	H2	H3	H4	V1	V2	H1	H2	H3	H4	V1	V2		
12	0.5	0.6	0.4	0.6	0.6	0.6	13	0.5	0.4	0.3	0.4	0.6	0.4	
22	0.6	0.7	0.5	0.7	0.7	0.7	23	0.6	0.5	0.4	0.5	0.7	0.5	
32	1.1	1.3	0.8	1.3	1.2	1.2	33	1.2	1.0	0.6	1.0	1.2	1.0	
42	2.8	1.8	1.2	1.8	2.7	2.7	43	2.5	1.5	0.9	1.5	2.2	1.9	
52	5.1	3.2	2.1	3.2	4.9	4.9	53	5.0	2.8	1.6	2.8	4.0	3.4	
62	9.2	5.8	3.8	5.8	8.8	8.8	63	9.0	5.0	2.9	5.0	7.2	6.1	

RO RV	RO-3							RV-3						
	H1	H2	H3	H4	V1	V2	H1	H2	H3	H4	V1	V2		
13	0.6	0.6	0.6	0.6	0.7	0.7	13	0.6	0.5	0.4	0.5	0.6	0.6	
23	0.9	0.7	0.9	0.7	1.0	1.0	23	0.9	0.6	0.5	0.6	0.7	0.7	
33	1.5	1.2	1.4	1.2	1.7	1.7	33	1.5	1.0	0.8	1.0	1.2	1.2	
43	2.8	2.0	1.6	2.0	2.5	2.5	43	2.9	1.9	1.2	1.8	2.6	2.6	
53	5.1	3.6	2.9	3.6	5.0	5.0	53	5.2	3.4	2.1	3.2	4.7	4.7	
63	9.2	6.5	5.2	6.5	9.0	9.0	63	9.4	6.1	3.8	5.8	8.5	8.5	

RO-2	H1	H2	H3	H4	V1	V2
02	0.2	0.2	0.15	0.2	0.2	0.2
12	0.4	0.35	0.3	0.35	0.35	0.35
22	0.7	0.6	0.7	0.6	0.8	0.8
32	1.3	1.0	1.2	1.0	1.5	1.5

RG	051	052	071	072	091	092	121	122
[g]	1	2	2	4	4	8	5	10

Grease quantity in grams [g].

The RG reduced backlash planetary gearboxes are packed with Klübersynth GE 46 long-life grease.

# Working Instructions & Maintenance

Directive 2014/34/UE (ATEX)

## DIRECTIVE 2014/34/EU - ATEX

<b>General Information</b> .....	<b>28</b>
<b>Prevalent Use</b> .....	<b>28</b>
<b>References</b> .....	<b>28</b>
<b>Temperature</b> .....	<b>28</b>
<b>Safety Instructions</b> .....	<b>29</b>
<b>ATEX Marking</b> .....	<b>29</b>
<b>Maintenance Servicing</b> .....	<b>30</b>
<b>Materials - Dangerous Zones - Categories</b> .....	<b>30</b>
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<b>DECLARATION OF CONFORMITY</b> .....	<b>32</b>

### General Information

Directive relates not only to electrical equipment, but also to all kind of machines and control components, separately or jointly, for use in potentially explosive atmospheres.

The following recommendations, issued to operations in potentially explosive environment, are meant as specific completion to the preceding «Working Instructions».

VARVEL-ATEX gearboxes are manufactured with housings and covers of metallic material, incorporating the transmission elements fitted on ball and roller bearings, with Viton oil seals on input and output shafts et with the adequate oil quantity to assure the design operation.

### Prevalent Use

VARVEL-ATEX gearboxes are identified as « components », fundamental but without any autonomous function to operate units and protection systems for production, transport, storage, measurement, control and conversion of energy, or the processing of materials which are capable of causing an explosion through their own potential source of ignition.

### References

VARVEL-ATEX gearboxes are designed and produced according to Directive 2014/34/EU and the following standards

- EN 1127-1: 2011 - Explosion prevention and explosion protection, Fundamental notions and methodology.
- EN 13463-1: 2009 - Not electrical devices for potentially explosive atmospheres, Basic methods and required conditions.
- EN 13463-5: 2011 - Not electrical devices for potentially explosive atmospheres, Section 5: protection by construction safety « c ».
- EN 13463-8: 2003 - Not electrical devices for potentially explosive atmospheres, Section 8: protection by construction safety « k ».

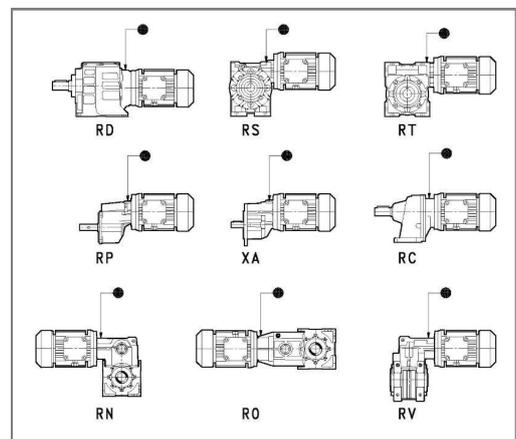
### Temperature

The units must be properly ventilated:  
check that ventilation temperature does not exceed 55 °C.

Measure housing temperature:  
after 2 hours from start up.

Check that the difference between measured temperature (see sketch) and ambient temperature does not exceed the max. value of 80 °C.

In such a case, immediately stop the unit and call for Customer Service.



## Working Instructions & Maintenance

Direttiva 2014/34/UE (ATEX)

### Safety Instructions

Electric motors and other elements to fit at the input or at the output of VARVEL-ATEX products, must be ATEX approved according the Directive 2014/34/EU.

Expected temperature limits of the products must comply with temperature classes and max. temperature.

VARVEL gearboxes must be installed and serviced according to installation and servicing standards for classified environments against explosion hazard because of gas or dust presence (e.g. EN 60079-14, EN 60079-17, EN 50281-1-2 and any other acknowledged national standard).

In case of combustible dusts, it is mandatory the regular cleaning to avoid any accumulation of dust layers on product surfaces.

It is imperative to earth the gearbox in case it is not coupled to an electric motor or installed on a metal surface.

If the motor is earthed, electrical continuity is ensured by the adapter between the motor and gearbox that is always of metallic material (steel, aluminium, cast iron).

It is the final responsibility of the installer to verify the electrical continuity between the engine and gearbox.

### ATEX Marking

VARVEL Series RD, XA, RP, RS, RT, RN, RO-RV conform to design requirements required by Group II, Category 2 and to operate in areas with explosion danger of gas (Zone 1 and Zone 2) and combustible dust (Zone 21 and Zone 22).

- Dust accumulation: max. thickness on surface 5 mm maximum (EN50281-1-2)

- Casing: IP66 (Ingress Protection)

VARVEL-ATEX products are identified by the corresponding technical files, deposited at the Notified Body of Technical File Deposit, INERIS - France:

- "ATEX 13 RD" Series RD - "ATEX 13 XA" Series XA - "ATEX 13 RP" Series RP - "ATEX 13 RT" Series RT

- "ATEX 13 RS" Series RS - "ATEX 13 RN" Series RN - "ATEX 13 RO-RV" Series RO-RV

and marked

 II 2 GD ck IP66 CE T<sub>max</sub>=T135°C

where:

- II** - Group II (surface industry)
- 2** - Category 2
- G** - Explosive atmosphere with presence of gas, vapour, cloud  
Zone 1 (2G) and Zone 2 (2G or 3G)
- D** - Explosive atmosphere with presence of dust  
Zone 21 (2D) and Zone 22 (2D or 3D)
- c** - Construction safety « c »
- k** - Liquid dipping « k »
- IP66** - Protection grade (Ingress Protection)
- T 135°C** - Max. surface temperature

**ATEX 13 XX** - Technical File Ref. No.

# Working Instructions & Maintenance

Directive 2014/34/UE (ATEX)

## Maintenance Servicing

Strict observance of maintenance intervals is recommended to ensure appropriate working conditions and explosion-proof protection.

- **According to working conditions:**  
Elimination of any dust accumulation thicker than 5 mm by means of a vacuum cleaner.
- **Every 500 working hours or every month:**  
Visual inspection of oil seals to monitor any lubricant leakage.
- **Every 3000 working hours or every 6 months:**  
Inspection of oil seals and replacement if worn-out.
- **Every 5 years:**  
Replacement of synthetic oil.

## Materials - Dangerous Zones - Categories

CORRESPONDENCE AMONG MATERIAL, DANGEROUS ZONE AND CATEGORIES  
(according to the Directive 2014/34/UE)

Material	Dangerous Zone	Categories		
		1G	2G	3G
Gas, Vapour Cloud	Zona 0	1G		
	Zona 1	1G	2G	
	Zona 2	1G	2G	3G
Dust	Zona 20	1D		
	Zona 21	1D	2D	
	Zona 22	1D	2D	3D

VARVEL Products not ATEX-certified

## Working Instructions & Maintenance

Directive 2014/34/UE (ATEX)

### Gas Temperature Class

#### GAS TEMPERATURE CLASS

Group	T1	T2	T3	T4	T5	T6
I	*Natural gas (Firedamp)					
II A	Ethyl acetate Methyl acetate Acetone Ammonia Benzene Benzol Chlorine methylene Chlorine ethylene Ethane Methane Methanol Carbon monoxide Naphthalene Propane Toluene Xylene	Butyl acetate Propyl acetate Amyl alcohol Ethyl alcohol Isobutyl alcohol Methyl alcohol n-butyl alcohol Acetic anhydride Cyclohexanone Liquefied petroleum gas Natural gas Isopropanol Mono amyl acetate n-Butane	Cyclohexane Cyclohexane Decano Heptane Hexane Gasoil Kerosene Naphtha Pentane Oil **	Acetaldehyde Ethylic ether		
II B	Coke gas Water gas	1.3-butadiene Ethyl benzene Ethylene Ethylene oxide	Hydrogen sulphide Isoprene Oil **	Ethylic ether		
II C	Hydrogen	Acetylene				Ethyl nitrate Carbon sulphide

\* - VARVEL Products not ATEX certified

\*\* - According to chemical composition

# Working Instructions & Maintenance

## UE Declaration of Conformity (specimen)

### VARVEL SpA

Via 2 Agosto 1980, 9  
I-40053 - Crespellano-  
Valsamoggia BO  
Italy

dichiara sotto la propria responsabilità che il prodotto

*declares on his own responsibility that the product*

**Riduttori  
Gearboxes**

**Serie/s RS  
Serie/s RT  
Serie/s RD  
Serie/s RC  
Serie/s RP  
Serie/s XA  
Serie/s RN  
Serie/s RO-RV**

al quale questa dichiarazione si riferisce, è conforme alla Direttiva

*to which this declaration relates to, complies with the Directive*

**2014/34/EU (ATEX).**

La conformità è stata verificata sulla base dei requisiti delle norme o dei documenti normativi

*The conformity is under observance of the standard documents*

**EN 1127-1: 2011  
EN 13463-1: 2009  
EN 13463-5: 2011  
EN 13463-8: 2003**

Modo di protezione:  
*Type of protection:*

**CE Ex II 2 G D ck  
T4 T135°C IP66  
Tamb. -20 / +55°C**

I File Tecnici (in accordo all'allegato VIII Direttiva 94/9/CE)

*The Technical Files (according with Annex VIII of Directive 94/9EC)*

**ATEX 13RS, ATEX 13RT, ATEX 13RD,  
ATEX 13RP, ATEX 13XA, ATEX 13RN,  
ATEX 13RO-RV**

sono stati depositati presso l'Organismo Notificato di deposito del fascicolo tecnico

*were deposited at the Notified Body of Technical File Deposit*

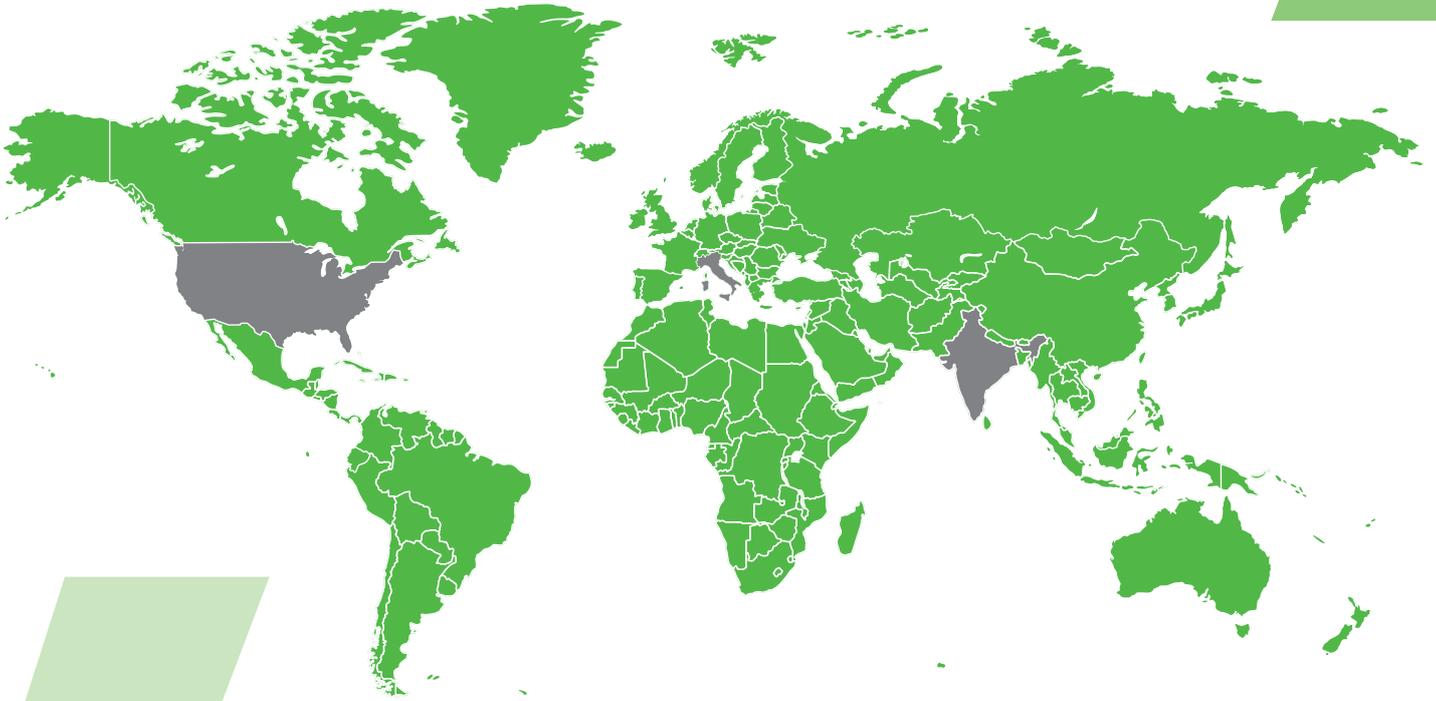
**0080 INERIS,  
F-60550 Verneuil-en-Halatte, France**

Firma autorizzata - *Authorized Signature* .....

(Funzione - *Function*) .....

Luogo e data dell'emissione  
*Place and Date of Issue*

**Crespellano-Valsamoggia, ..../..**



**2** Foreign subsidiaries, one in India, one in the USA



**60** Over 60 years of history and international success



**100** A global network with over 100 commercial partners

India subsidiary:

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