VARVEL

RC

RD

RP

RS

RT

VR

XA

# WORKING INSTRUCTIONS AND MAINTENANCE

VARVEL®

RIDUTTORI · VARIATORI

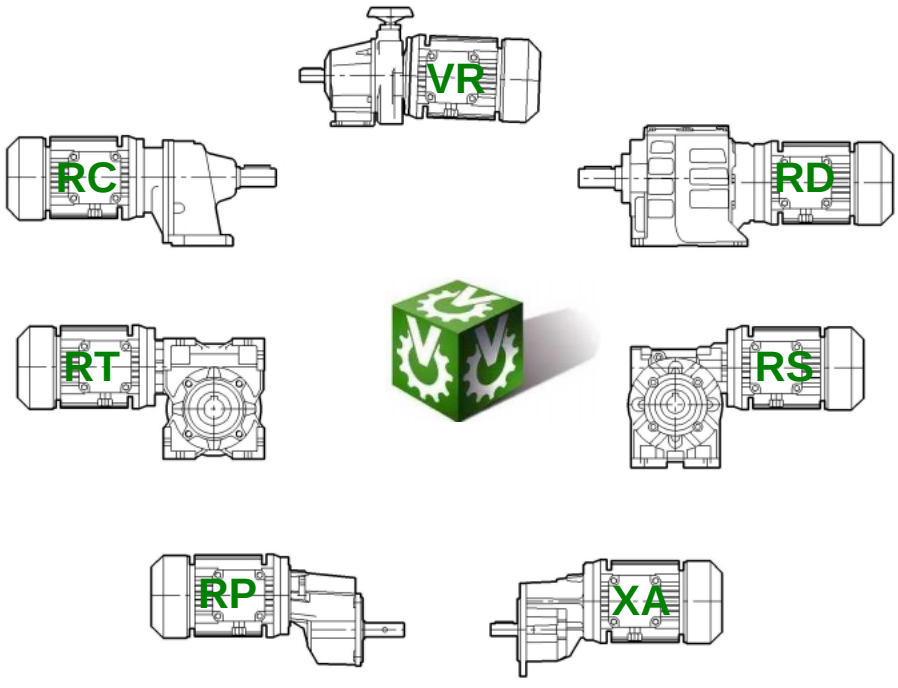
# WORKING INSTRUCTIONS AND MAINTENANCE

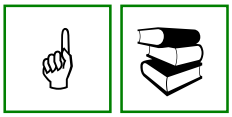
## SPEED REDUCERS

**RC** - Helical Gearboxes
**RD** - Helical Gearboxes
**RP** - Helical Gearboxes
**RS** - Worm Gearboxes
**RT** - Worm Gearboxes
**XA** - Helical Gearboxes

## VARIATORS

**VR -** Mechanical, dry friction





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## 1 GENERAL INFORMATION

Varvel speed reducers and variators are not in the field of application of the Machinery Directive, Article 1(2), and they must be not put into service until the machinery into which they are to be incorporated, has been declared in conformity with the provisions of Article 4(2), Annex II (B) of Machinery Directive 98/37/CE and, for Italy only, of DL 459/96.

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.

## 2 SAFETY WARNINGS

### 2.1 Products 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.

### 2.2 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.

### 2.3 Transport

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

### 2.4 Long-Term Storage

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

For storage longer than 3 months, apply antioxidants on the shafts and machined surfaces paying special attention to oilseal lips.

Storages longer than one year reduce bearing grease lifetime.

### 2.5 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.

## 3 PRODUCTS LAYOUT

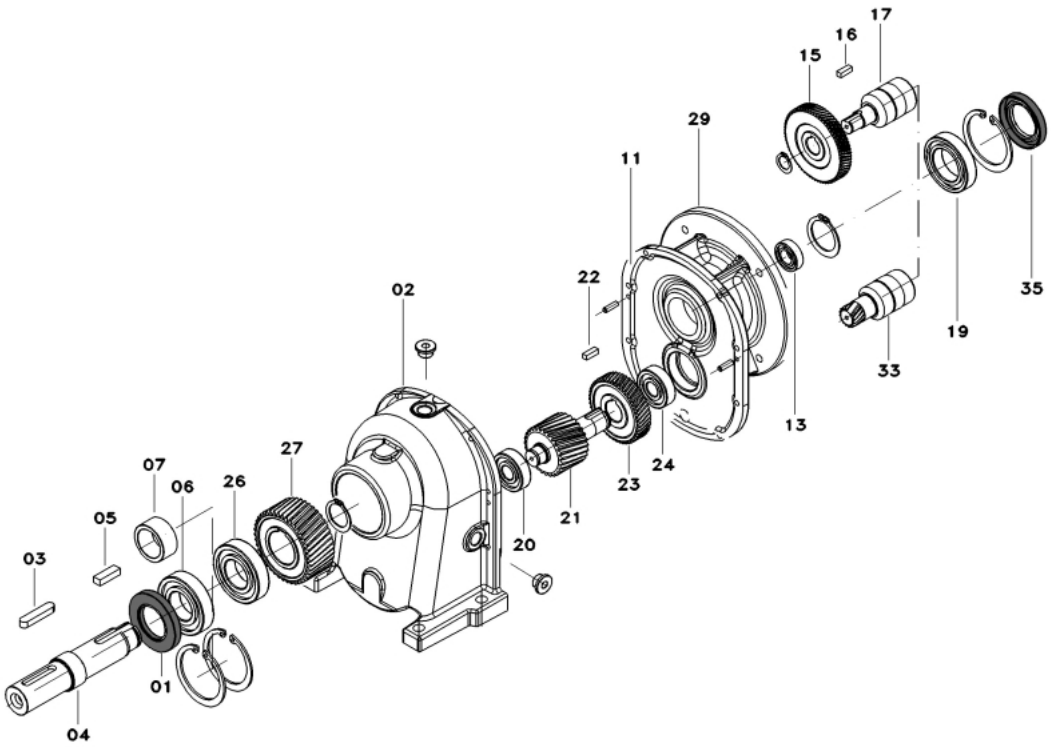
The following layouts supply a generic help in finding out the most significant parts of the products.

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

PRODUCTS LAYOUT

### 3.1 Series RC

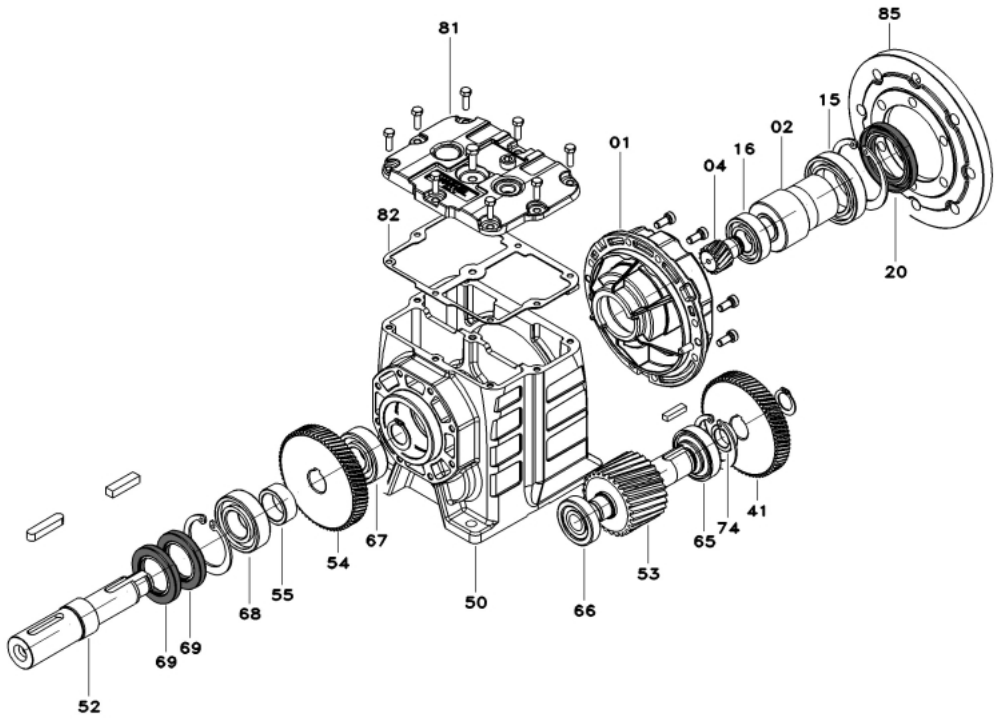
The layout shows the general structure of a two-stage foot-mounted helical gearbox type FRC.
The exact identification of spare parts is sent to the appropriate Catalogue MRC.




| | | | |
|---|---|---|---|
| 01 | Oilseal | 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 | Oilseal |
| 17 | Hollow input | | |

### 3.2 Series RD

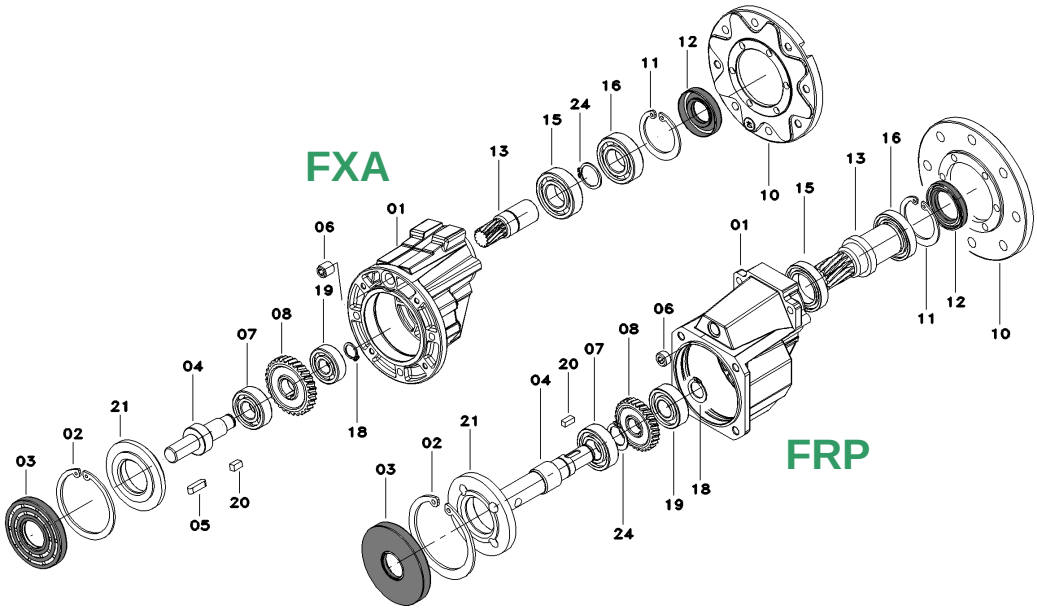
The layout shows the general structure of a two-stage foot-mounted helical gearbox type FRD.
The exact identification of spare parts is sent to the appropriate Catalogue MRD.




| | | | |
|---|---|---|---|
| 01 | Input cover | 55 | Spacer |
| 02 | Hollow input | 65 | Bearing |
| 04 | Pinion | 66 | Bearing |
| 15 | Bearing | 67 | Bearing |
| 16 | Bearing | 68 | Bearing |
| 20 | Oilseal | 69 | Oilseal |
| 41 | Gear | 74 | Circlip |
| 50 | Housing | 81 | Cover |
| 52 | Output shaft | 82 | Gasket |
| 53 | Pinion | 85 | Flange IEC |
| 54 | Gear | | |

### 3.3 Series RP and XA

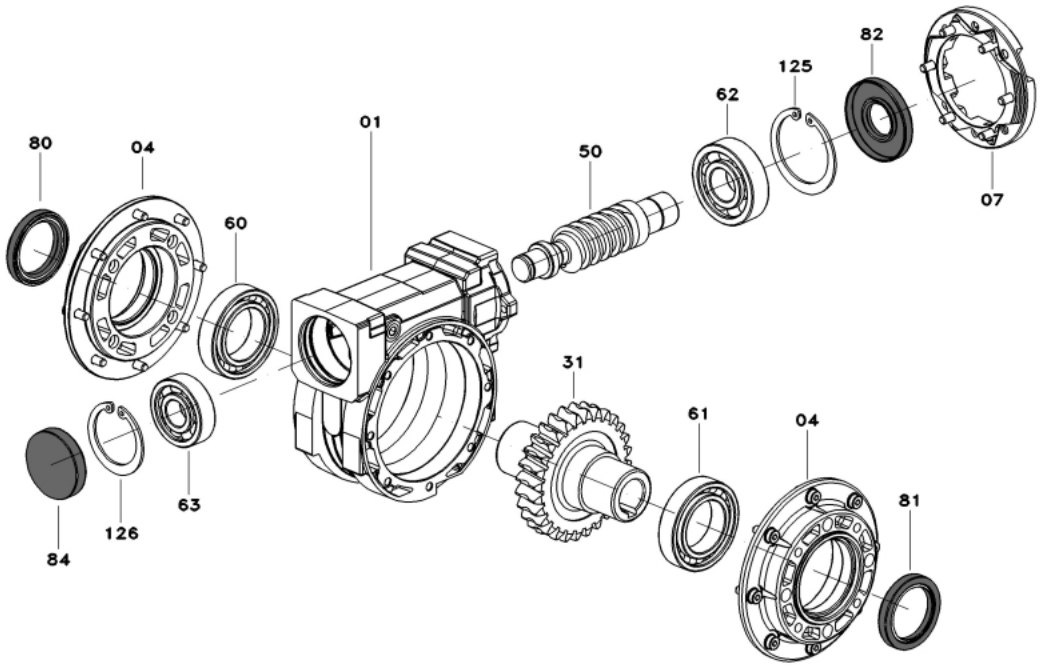
The layout shows the general structure of a one-stage flange-mounted helical gearbox type FRP and FXA.
The exact identification of spare parts is sent to the appropriate Catalogue MRP or MXA.




| | | | |
|---|---|---|---|
| 01 | Housing | 12 | Oilseal |
| 02 | Circlip | 13 | Pinion |
| 03 | Oilseal | 15 | Bearing |
| 04 | Output shaft | 16 | Bearing |
| 06 | Screw | 18 | Circlip |
| 07 | Bearing | 19 | Bearing |
| 08 | Gear | 20 | Key |
| 10 | Flange IEC | 21 | Adapter |
| 11 | Circlip | 24 | Circlip |

### 3.4 Series RS

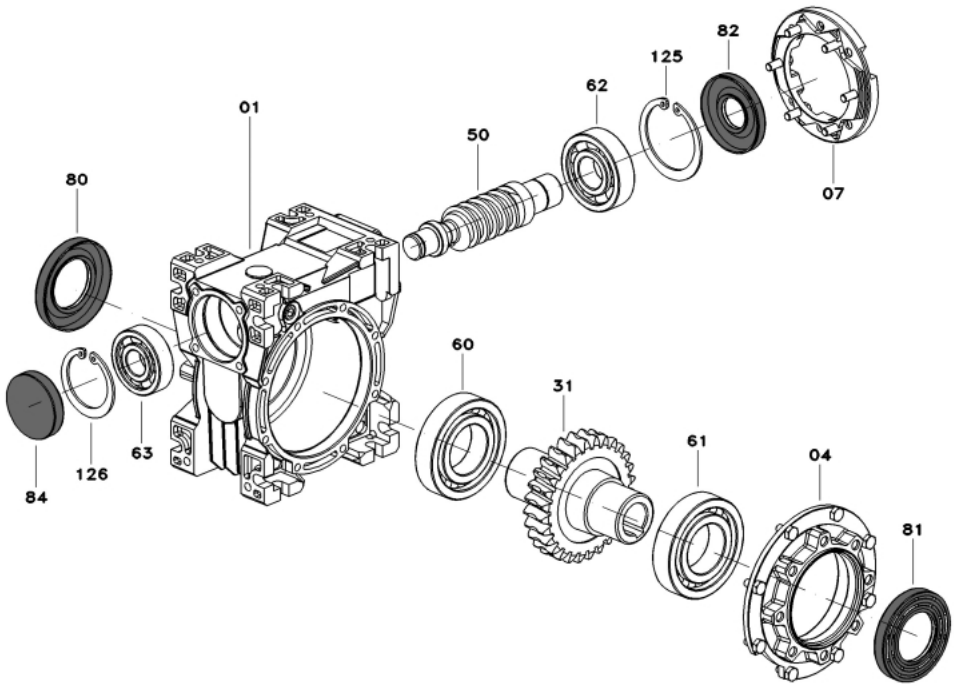
The layout shows the general structure of a foot-mounted worm gearbox type FRS.
The exact identification of spare parts is sent to the appropriate Catalogue MRS.




| | | | |
|---|---|---|---|
| 01 | Housing | 63 | Housing |
| 04 | Side cover | 80 | Side cover |
| 07 | Flange IEC | 81 | Flange IEC |
| 31 | Worm wheel | 82 | Worm wheel |
| 50 | Worm shaft | 84 | Worm shaft |
| 60 | Bearing | 125 | Bearing |
| 61 | Bearing | 126 | Bearing |
| 62 | Bearing | | |

### 3.5 Series RT

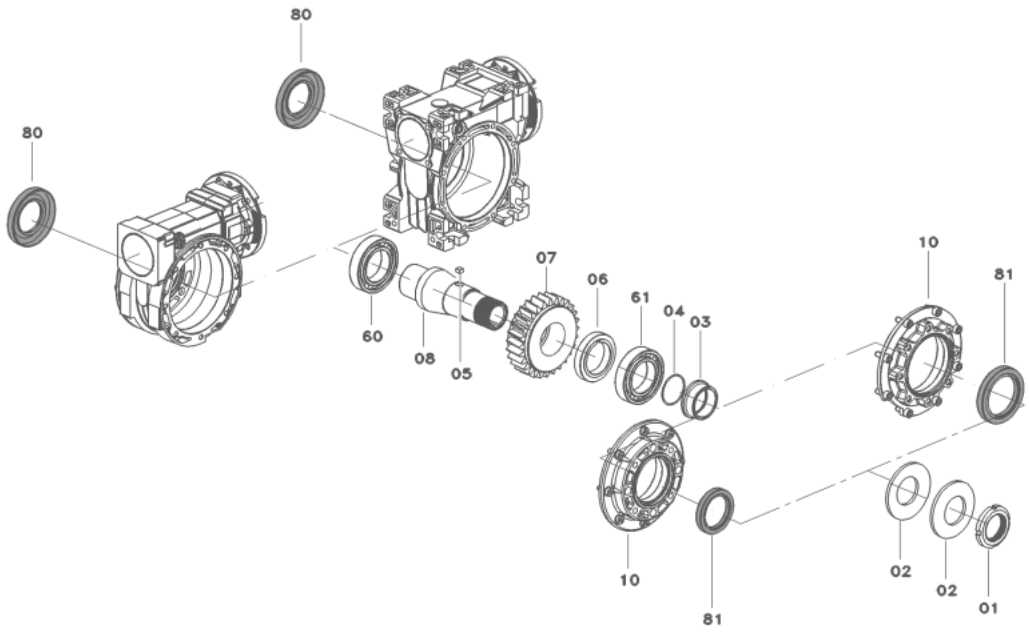
The layout shows the general structure of a foot-mounted worm gearbox type FRT.
The exact identification of spare parts is sent to the appropriate Catalogue MRT.




| | | | |
|---|---|---|---|
| 01 | Housing | 63 | Bearing |
| 04 | Side cover | 80 | Oilseal |
| 07 | Flange IEC | 81 | Oilseal |
| 31 | Worm wheel | 82 | Oilseal |
| 50 | Worm shaft | 84 | Oilseal RCA |
| 60 | Bearing | 125 | Circlip |
| 61 | Bearing | 126 | Circlip |
| 62 | Bearing | | |

### 3.6 Torque Limiter Option TLI

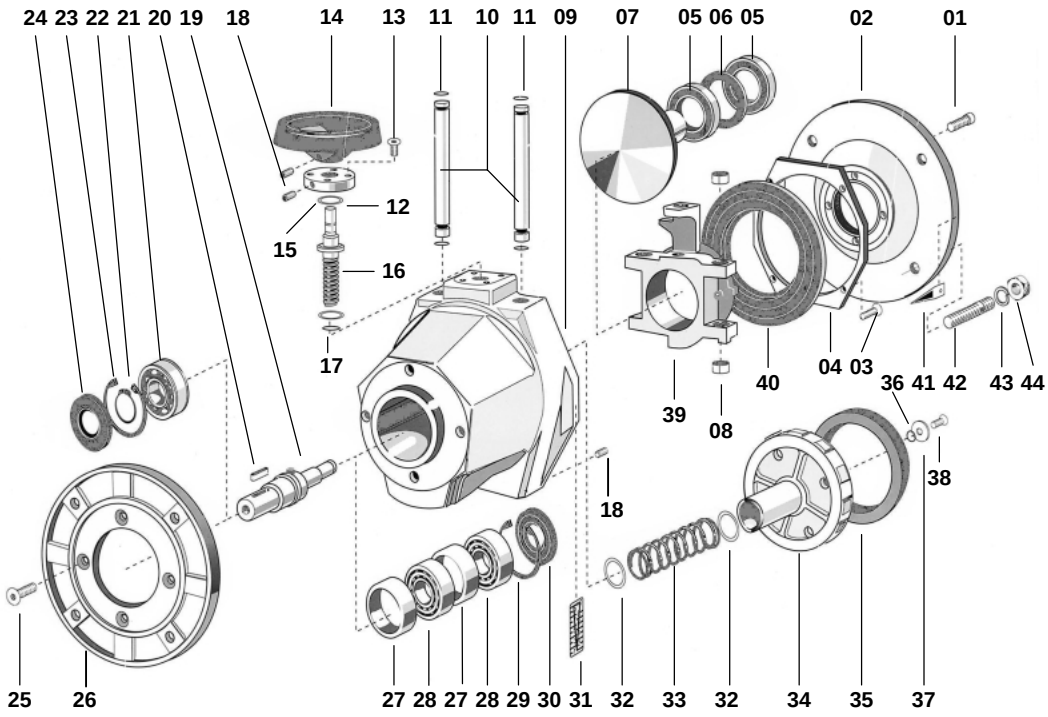
The layout shows the general structure of a built-in torque limiter type TLI fitted inside a worm gearbox MRS or MRT.
The exact identification of spare parts is sent to the appropriate Catalogue TL.




| | | | |
|---|---|---|---|
| 01 | Lock nut | 08 | Hollow output shaft |
| 02 | Bellville washer | 10 | Cover |
| 03 | Bush | 60 | Bearing |
| 04 | Oilseal | 61 | Bearing |
| 05 | Key | 80 | Oilseal |
| 06 | Spacer | 81 | Oilseal |
| 07 | Worm wheel | | |

### 3.7 Series VR

The layout shows the general structure of a flange-mounted variator without gearbox type FVR.
The exact identification of spare parts is sent to the appropriate Catalogue MVR.




| | | | |
|---|---|---|---|
| 02 | Flange IEC | 24 | Oilseal |
| 04 | Seal plate | 26 | Output flange |
| 05 | Bearing | 27 | Spacer |
| 06 | Spacer | 28 | Bearing |
| 07 | Cone | 30 | Oilseal |
| 09 | Housing | 31 | Index scale |
| 10 | Cylindrical slide | 33 | Spring |
| 14 | Control hand wheel | 34 | Driving flange |
| 15 | Control-shaft lock | 35 | Friction ring |
| 16 | Control shaft | 39 | Cone support |
| 19 | Output shaft | 40 | Bellows seal |
| 21 | Bearing | | |

# 4 INSTALLATION

## 4.1 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

## 4.2 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).

## 4.3 Groundwork

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

## 4.4 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.

## 4.5 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.

## 4.6 Torque arm

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

## 4.7 Painting

Carefully protect oilseals, coupling faces and shafts when units are re-painted.

# 5 STARTING

## 5.1 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 situations.

## 5.2 Series RC, RD, RP, XA, VR

The 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.

# 6 INSPECTIONS AND MAINTENANCE

## 6.1 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; thereore, there is no part needing periodical maintenance, the friction ring replacement excepted on normal wearing conditions.

## 6.2 Maintenance Servicing

Units supplied without any oil plugs:

- Series RC (sizes 05, 10, 20, 30)
- Series RD (sizes 0, 1, 2, 3, 4)
- 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)
- Series VR (sizes 63, 71, 80, 90)

Units supplied with oil plugs:

- Series RC (sizes 40, 50, 60)
- Series RS (sizes 110, 130, 150)

Periodically check the state of seals and possible evidence of lubricant leakages.

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

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.

## 6 INSPECTIONS AND MAINTENANCE

### 6.2 Maintenance Servicing

Observance of maintenance intervals is recommended to ensure the appropriate working conditions.

- **GEARBOXES**

  ➔ **According to working conditions:**
  Eliminate by means of a vacuum cleaner any dust accumulation thicker than 5 mm

  ➔ **Every 500 working hours or every month:**
  Oilseal visual check to monitoring any lubricant leakage.

  ➔ **Every 3000 working hours or every 6 months:**
  Oilseal check and replacement if considerably used.

  ➔ **Every 5 years:**
  Replace synthetic oil.

- **VARIATORS**

  For variators VR only, please also consider the following prescriptions in addition to the above ones

  ➔ **According to working conditions**:
  Replace friction ring, if considerably used.

  ➔ **Every 3000 working hours or every 6 months:**
  Check output shaft angular play and oilseal and corrugated hood integrity.

  ➔ **Every 6000 working hours or every year:**
  Replace friction ring.

## 7 MALFUNCTIONING

### 7.1 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 bodies in the oil
  Contact Customer Service

  ➔Series VR - Damaged friction ring
  Rectify the cause and replace friction ring.
  See the following Section « Friction Ring Replacement »

- **Oil leakages**
  (see also the following note)

  ➔ Damaged oilseal
  Replace oilseal

  ➔ Loosen screws
  Tighten the screws

  ➔ Inner overpressure
  Contact Customer Service

- **No rotation of output shaft**

  ➔ Internal connection cut off
  Contact Customer Service

  ➔Series VR - Friction ring end of life
  Replace the friction ring
  See the following Section « Friction Ring Replacement »

  ➔Series VR - Contaminated friction ring
  Clean carefully cone and ring working areas with solvent of similar product.
  See the following Section « Friction Ring Replacement »

Note: Oil evidence nearby the oilseal lip is a normal situation due to possible melting of lubricant used when fitting the oilseal.

### 7.2 Customer Service

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

- Full data of name plate
- Type of application
- Duty cycle
- Circumstances of malfunctioning
-

## 8 LUBRICANTS

### 8.1 Recommended Types

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 e +55 °C.

Temperatures beyond this range require specific recommendations for low or high temperatures to ask for the Customer Service.

| Type | ISO VG | ARAL | bp | Castrol | EXXON | Mobil | TEXACO | TOTAL | Shell |
|---|---|---|---|---|---|---|---|---|---|
| Synthetic Oil | 320 | Degol GS 320 | Energol SG-XP 320 | Alphasyn PG 320 | Glycolube 320 | Glygoyle HE 320 | Synlube CLP 320 | --- | Tivela SC 320 |
| Food-grade Synthetic Oil | 320<br>460 | Eural Gear 460 | --- | Vitalube GS 460 | Gear Oil FM 460 | Mobil DTE FM 460 | --- | --- | Cassida Fluid GL 460 |

### 8.2 Quantity [litres]

**RC**

| 1c | $l_1$ | $l_2$ | $l_3$ | 2c | $l_1$ | $l_2$ | $l_3$ | 3c | $l_1$ | $l_2$ | $l_3$ |
|---|---|---|---|---|---|---|---|---|---|---|---|
| RC105 | 0,05 | 0,65 | 0,05 | RC205 | 0,13 | 0,15 | 0,15 | RC305 | 0,17 | 0,30 | 0,30 |
| RC110 | 0,10 | 0,13 | 0,10 | RC210 | 0,17 | 0,25 | 0,17 | RC310 | 0,25 | 0,50 | 0,35 |
| RC120 | 0,17 | 0,25 | 0,17 | RC220 | 0,50 | 0,60 | 0,50 | RC320 | 0,60 | 0,80 | 0,60 |
| RC130 | 0,30 | 0,50 | 0,30 | RC230 | 0,70 | 1,15 | 0,80 | RC330 | 1,15 | 1,50 | 1,15 |
| RC140 | 0,60 | 1,15 | 0,60 | RC240 | 1,15 | 2,25 | 2,00 | RC340 | 1,50 | 3,00 | 2,25 |
| RC150 | 1,50 | 2,25 | 1,50 | RC250 | 2,25 | 4,40 | 4,00 | RC350 | 3,75 | 6,00 | 5,00 |
| RC160 | 3,00 | 4,40 | 3,00 | RC260 | 6,00 | 8,80 | 8,00 | RC360 | 8,00 | 10,00 | 8,80 |

1c - One stage
2c - Two stages
3c - Three stages

$l_1$ - B3, B6, B7, B8, B5
$l_2$ - V1, V5
$l_3$ - V3, V6

Refer to Catalogue MRC for detailed mounting positions

**RD**

| 2c | H | V | 3c | H | V |
|---|---|---|---|---|---|
| RD02 | 0,40 | 0,50 | RD03 | 0,40 | 0,50 |
| 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 | RS43 | 2,20 | 3,40 |

2c - Two gear sets
3c - Three gear sets

H - H1, H2, H3, H4
V - V5, V6

Refer to Catalogue MRD for detailed mounting positions

## 8.2 Quantity [litres]

**RP**

| FRP | l |
|---|---|
| 71 | 0,50 |

**RS**

| RS | l | RA | $l_1$ / $l_2$ | RS / RS | $l_3$ / $l_4$ |
|---|---|---|---|---|---|
| 28 | 0,03 | 63 / 40 | 0,04 / 0,10 | 28 / 28 | 0,03 / 0,03 |
| 40 | 0,10 | 63 / 50 | 0,04 / 0,15 | 28 / 40 | 0,03 / 0,10 |
| 50 | 0,15 | 63 / 60 | 0,04 / 0,25 | 28 / 50 | 0,03 / 0,15 |
| 60 | 0,25 | 71 / 50 | 0,06 / 0,15 | 28 / 60 | 0,03 / 0,25 |
| 70 | 0,35 | 71 / 60 | 0,06 / 0,25 | 40 / 70 | 0,10 / 0,35 |
| 85 | 0,63 | 71 / 70 | 0,06 / 0,35 | 40 / 85 | 0,10 / 0,63 |
| 110 | 1,50 | 71 / 85 | 0,06 / 0,63 | 50 / 110 | 0,15 / 1,50 |
| 130 | 2,75 | 80 / 60 | 0,10 / 0,25 | 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 / 0,63 | | |
| | | 80 / 110 | 0,10 / 1,50 | | |
| | | 130 | 0,20 / 2,75 | | |
| | | 150 | 0,20 / 4,40 | | |

l - Litres FRS
$l_1$ / $l_2$ - Litres FXA / FRS
$l_3$ / $l_4$ - Litres FRS / FRS

**RT**

| RT | l | TA | $l_1$ / $l_2$ | RT / RT | $l_3$ / $l_4$ |
|---|---|---|---|---|---|
| 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 | | |

l - Litres FRT
$l_1$ / $l_2$ - Litres FTA / FRT
$l_3$ / $l_4$ - Litres FRT / FRT

**XA**

| FXA | l |
|---|---|
| 63 | 0,30 |
| 71 | 0,40 |
| 80 | 0,65 |

# 9 DIRECTIVE 94/9/CE



## 9.1 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 general-purpose «Working instructions».

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

## 9.2 Prevalent Use

VARVEL-ATEX gearboxes and variators are identified like « 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.

## 9.3 References

VARVEL-ATEX gearboxes and variators are designed and produced according to Directive 94/9/CE, and the following standards

- EN 1127-1 - Explosion prevention and explosion protection
  Fundamental notions and methodology.
- EN 13463-1 - Not electrical devices for potentially explosive atmospheres
  Basic methods and required conditions.
- PrEN 13463-5 - Not electrical devices for potentially explosive atmospheres
  Section 5: protection by construction safety « c ».
- PrEN 13463-6 - Not electrical devices for potentially explosive atmospheres
  Section 6: protection by trigger source control « b ».
- PrEN 13463-8 - Not electrical devices for potentially explosive atmospheres
  Section 8: protection by construction safety « k ».

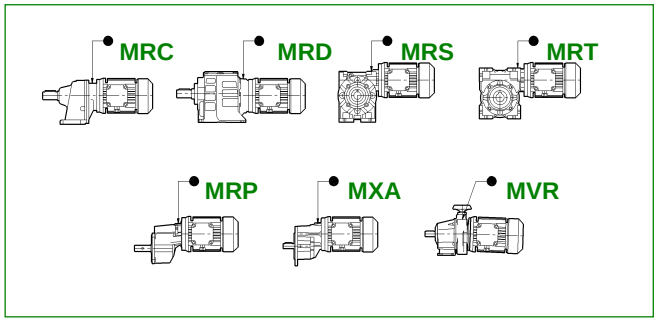
# DIRECTIVE 94/9/CE - (ATEX)

## 9.4 Temperature

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

Measure housing temperature after 2 hours from start up and check that the difference between measured temperature (see the following 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.




## 9.5 Safety Instructions

The electric motors and all the other elements, also enclosed the combinations of other power transmission elements to fit at the input or at the output of the products VARVEL-ATEX, must be ATEX approved according the Directive 94/9/CE.

Temperature classes and max. temperature must be compatible with expected temperature limits of different product types.

VARVEL gearboxes and variators 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.

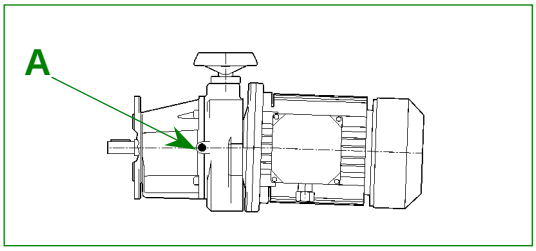
The variators series VR (to run in category 2GD, or 3GD with overload possibilities) must be put into operation only when fitted with a control device of output shaft rotation, made of impulse generator and speed control device (antiskid device), that should be properly installed and calibrated by trained and qualified personnel.

Carefully check the speed control operation before starting the variator up.

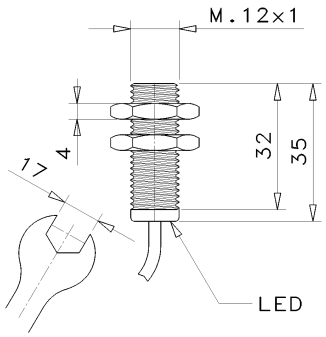
Unique identification of the variators Series VR VARVEL-ATEX is threaded hole (A) on the housing to install a pulse generator (see drawing).

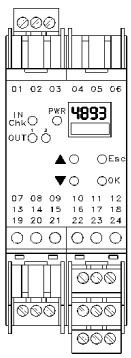
Speed control device and pulse generator are not included in the standard configuaration of Variators VARVEL-ATEX.

Nevertheless, ask when ordering for the built in pulse generator and output shaft speed control with the following specifications.




| | Pulse Generator | Speed Control Device |
|---|---|---|
| - Make: | Pepperl+Fuchs,GmbH | Pepperl+Fuchs, GmbH |
| - Type: | NCB2-12GM35-N0<br>according to DIN 60947-5-6 (NAMUR)<br>with cable 2 m long | KFD2-DWB-Ex1.D<br>according to DIN 60947-5-6 (NAMUR)<br>…… |
| - Housing threaded hole: | M12x1 | …… |
| - ATEX Certification: | PTB 00 ATEX 2048 X (II 1 G Eex ia IIC T6)<br>ZELM 03 ATEX 0128 X (II 1 D Ex iaD 20 T..) | TUV 99 ATEX 1408 (II 1 G Eex ia IIC) |

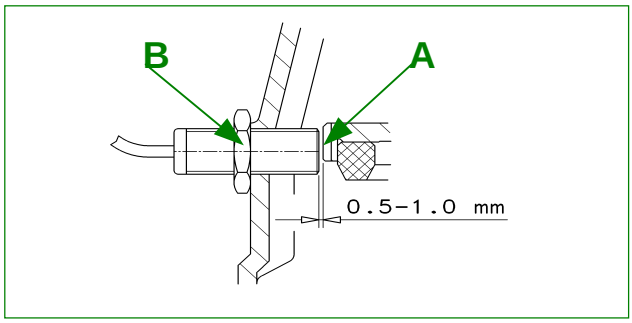


### 9.5 Safety Instructions

Pulse generator wiring must be made before variator installation:

- rotate the variator output shaft until a pole piece (A) of the friction ring holder is shown through the side threaded hole of the housing;
- apply adeguate quantity of liquid locking threadsealing on housing threaded hole M12x1, warning do not introduce liquid sealing inside the housing;
- carefully screw the pulse generator to get in touch with the pole piece;
- unscrew the pulse generator of 360°;
- apply adeguate quantity of liquid locking threadsealing between enclosed lock-nut (B) and housing;
- secure pulse generator by screwing the equipped lock-nut (B).




We recommned the utmost attention during the pulse generator adjustment because a mistake in screwing depth would cause wrong impact with friction ring holder and the consequent damaging of both the parts and a mistake in pulse generator sealing would cause the not ermetic sealing of variator and the IP66 protection level.

**Speed control device adjustment**

The above set up distance gives six pulses for each friction ring revolution.

Speed control device must be fitted and put into operation according to manufacturer's documentation and installed outside the potential esplosive atmosphere.

When installing:

- note working speed of variator on operation conditions;
- set stop speed of speed control device (according to working instructions of the used device) to 90% of the above working speed;
- modify the stop speed according to working speed modifications.

Maximum operating time of speed control device must be shorther than 3 seconds: detect and remove the variator slipping cause prior to switch the variator on again.

In case vibrations or anomalous noise occur during the variator starting, stop the variator and replace the friction ring damaged by slipping (friction ring replacement at page 22).

The right wiring of the pulse generator to speed control device and to main control board is left to the sole responsibility of the appointed technician.

# DIRECTIVE 94/9/CE - (ATEX)

## 9.6 ATEX Marking

The Varvel Series RC, RD, RP, RS, RT, XA, VR are according to design requirements asked by Group II, Category 2 and to operate in areas with explosion danger of gas (Zone 1 and Zone 2) and of combustive dusts (Zone 21 and Zone 22).

- Temperature class and Surface temperature: see below
- Dust accumulation: max. thickness on surface 5 mm maximum (EN50281-1-2)
- Carter: IP66 (Ingress Protection)

The VARVEL-ATEX products are identified by the following technical files:

| | | | | | |
|---|---|---|---|---|---|
| - Series RC | **"ATEX 03RC"** | - Series XA | **"ATEX 03XA"** | and marked | **II 2 GD ck IP66** |
| - Series RD | **"ATEX 03RD"** | - Series RS | **"ATEX 03RS"** | | $T_{max}$=120°C or |
| - Series RP | **"ATEX 03RP"** | - Series RT | **"ATEX 03RT"** | | $T_{max}$=135°C $T_{amb}$ -20/+55 °C |
| - Series VR | **"ATEX 03VR"** | | | and marked | **II 2 GD cb IP66** |
| | | | | | $T_{max}$=185°C or |
| | | | | | $T_{max}$=200°C $T_{amb}$ -20/+55 °C |

where **:**

**II** - Group II (surface industries)
**2** - Category 2
**G** - Explosive atmosphere with presence of gas, vapours or clouds
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)
**b** - Trigger Source Control « b »
**c** - Construction Safety « c »
**k** - Dipping in liquid « k »

**$T_{max}$** - Max. Surface Temperature
**$T_{amb}$** - Ambient Temperature
**ATEX 03XX** - Deposited Technical File Ref. No.
**IP66** - Protection

## 9.7 Maintenance Servicing

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

- GEARBOXES

➔**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 oilseals to monitor any lubricant leakage.

➔**Every 3000 working hours or every 6 months:**
Inspection of oilseals and replacement if considerably used.

➔**Every 5 years:**
Replacement of synthetic oil.

- VARIATORS

For variators VR, consider also the following prescriptions

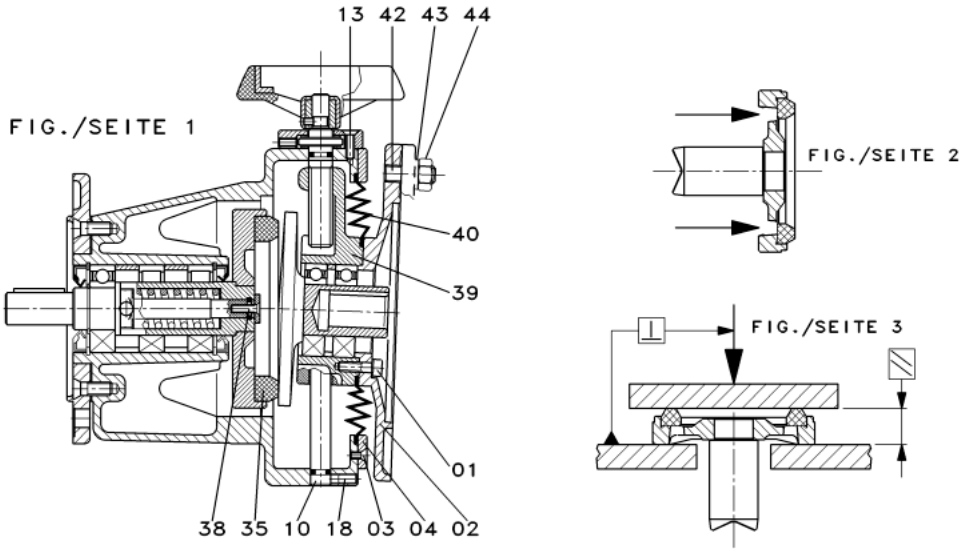
➔**According to working conditions:**
Replacement of friction ring if worn out.

➔**Every 3000 working hours or every 6 months:**
Inspection of the angular play of output shaft,
the integrity of oilseals and corrugated hood,
the right operation of monitoring device of output shaft rotation (antiskid device),
the over-temperature of variator housing (≤ 80 K in comparison with $T_{amb}$).

➔**Every 6000 working hours or every year:**
Replacement of friction ring.

# MAINTENANCE SCHEMES

**VARIATORS SERIES VR**
Friction ring replacement




Friction ring replacement of variators VR VARVEL-ATEX must be carried out by appointed Service Centres.

- Unscrew the nuts (44) and remove the motor
- Unscrew the screws (01) and remove motor flange (02)
- Unscrew the screws (03) and remove the seal plate (04) and the bellows seal (40)
- Unscrew the screws (13) and turn the hand wheel together with the shaft until the full disengagement is achieved
- Unscrew the screws (18) and pull off the slides (10) to disengage the cone (07) with its support (39) and bearings (05)
- Pull off the driving flange (34)
- Push outwards the used friction ring (35) from its seat, same as shown in Fig. 2
- Certainly, the hits will damage the friction ring to remove and therefore clean carefully the seat before fitting the new friction ring
- Fit the new friction ring according to Fig. 3: the fit assembling needs accurate centred pressure and parallel adjustment
- Re-assembling of the variator classified ATEX provides for Loctite 281 sealing of screws (01), (03), (13) and sealing checking with air pressure test (40 mbar for 40 seconds)

**Correspondence among Materials, Dangerous Zones and Categories (according to Directive 94/9/CE)**

Products VARVEL ATEX to be used

| MATERIALS | DANGEROUS ZONES | CATEGORIES | | |
|---|---|---|---|---|
| Gases, Vapours or Clouds | Zone 0 | 1G | | |
| | Zone 1 | 1G | 2G | |
| | Zone 2 | 1G | 2G | 3G |
| Dusts | Zone 20 | 1D | | |
| | Zone 21 | 1D | 2D | |
| | Zone 22 | 1D | 2D | 3D |

# ATTESTATO DI CONFORMITÀ (Esempio)
# *ATTESTATION OF CONFORMITY (Specimen)*

**VARVEL SpA**
Via 2 Agosto 1980, 9
I-40056 Crespellano BO

dichiara sotto la propria responsabilità che il prodotto

*declares under sole responsibility that the product*

**Riduttori/*Gearboxes*** **Serie/s RS**
**Serie/s RT**
**Serie/s RC**
**Serie/s RD**
**Serie/s RP**
**Serie/s XA**

**Variatori/*Variators*** **Serie/s VR**

al quale questa dichiarazione si riferisce, è conforme alla seguente Direttiva

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

**94/9/EC (ATEX).**

---

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

*The conformity is under observance of the following standard documents*

**EN 1127-1**
**EN 13463-1**
**prEN 13463-5**
**prEN 13463-6 ⇔ solo Variatori**
***Variators only***
**prEN 13463-8 ⇔ solo Riduttori**
***Gearboxes only***

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Modo di protezione:

*Type of protection:*

Serie/s RS, RT, RC, RD, RP, XA

**II 2 GD ck IP66**
Tmax = 120°C oppure/*or*
Tmax = 135°C Tamb. -20/+55°C

Serie/s VR

**II 2 GD cb IP66**
Tmax = 185°C oppure/*or*
Tmax = 200°C Tamb. -20/+55°C

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I File Tecnici

*The Technical Files*

**ATEX 03RS, ATEX 03RT, ATEX 03RC, ATEX 03RD, ATEX 03RP, ATEX 03XA, ATEX 03VR**

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**

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Firma autorizzata
(Funzione: Presidente)
*Authorized Signature*
*(Function: President)*

**VARVEL SpA**

(Francesco Berselli)

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

**Crespellano, 25.07.2003**

VARVEL

SIC +39 051 327700

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RIDUTTORI · VARIATORI

**Varvel** S.p.A. - Via 2 Agosto 1980, 9 - 40056 Crespellano (BO) Italy
Tel. +39 051 6721811 - Fax +39 051 6721825
e-mail:varvel@varvel.com • http://www.varvel.com

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UNI EN ISO 14001:1996