

## ***Operating and Maintenance Instructions***



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## GENERAL INFORMATION

TEC/Wuma 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 **gear boxes**, 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

### 2.1 Product Operation

During operation, outer surfaces of gearboxes and variators may warm up because of moving 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 on the unit's nameplate and from the related documentation.

### 2.3 Transport

Carefully check the condition of the goods upon receipt and immediately notify any possible damages to the carrier.

### 2.4 Long-Term Storage

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

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

Storage longer than one year will reduce bearing grease life time.

### 2.5 Environmental Management

In conformity with Environmental Certification ISO14001, we recommend the following procedure for disposal:

Scrapped gearbox components: to deliver to authorised centres for metal object collection:

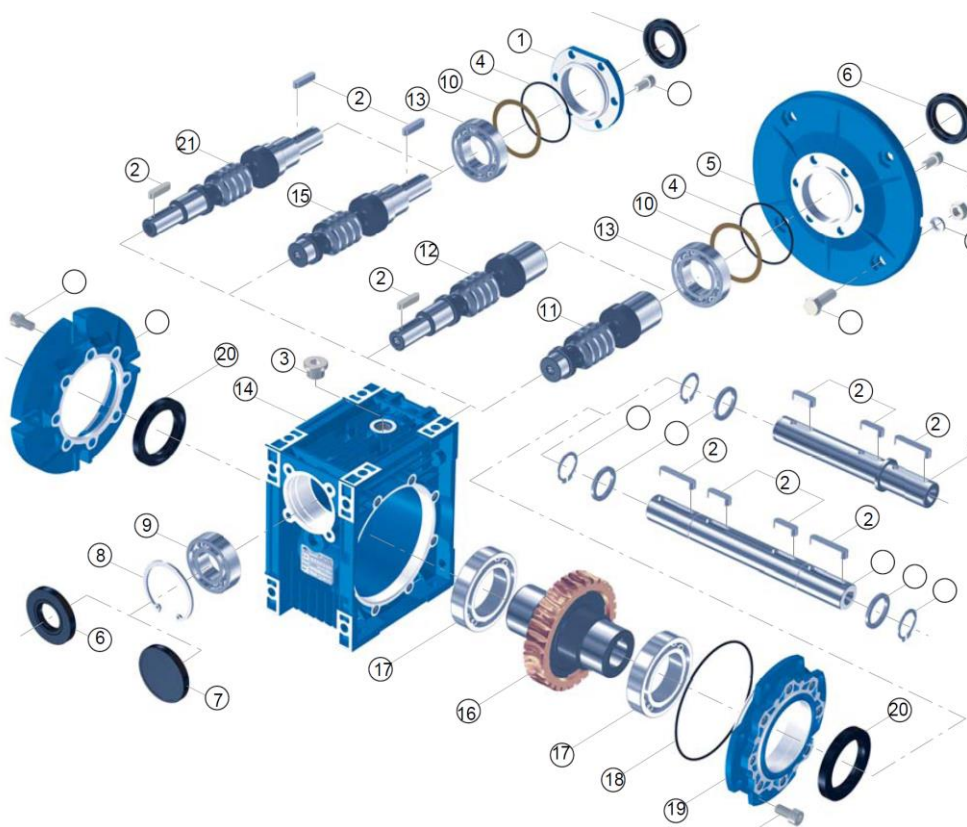
Drained oils and lubricants: to deliver to Exhausted Oil Centres;

Product packaging (pallets, carton boxes, paper, plastic, etc.): to deliver into regeneration / recycling sites as far as possible, by delivering separate waste classes to authorised companies.

## GEAR UNIT STRUCTURE

The following figures are block diagrams. Their purpose is only to make it easier to assign components to the spare parts lists. Discrepancies may occur depending on the gear unit size and version!

### 3.1 Basic Structure of worm geared units



|                        |                |                      |                    |
|------------------------|----------------|----------------------|--------------------|
| 1 Input cover          | 6 Oil seal     | 11 Worm hollow input | 16 Worm wheel      |
| 2 Key                  | 7 Oil seal RCA | 12 Worm extended     | 17 Bearing         |
| 3 Filler plug-breather | 8 Circlip      | 13 Bearing           | 18 O-ring (output) |
| 4 O-ring (input)       | 9 Bearing      | 14 Housing           | 19 Bearing cover   |
| 5 Input flange         | 10 Shim        | 15 Worm solid input  | 20 Oil seal        |
|                        |                |                      |                    |



## 4. Mechanical 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 correctly sized to perform the required function and that its mounting position complies with the order. Such data are shown on 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 prevent damage 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 product used for cleaning does not come in contact with sealing lips of oil seals, 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 prevent damaging internal parts, but to use the shaft-head threaded bore to facilitate fitting or extraction.

Belt drives: the force imposed on the shaft due to belt tension must 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 Painting

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



## 5 STARTING

### 5.1 Series FCNDK

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

- Inverse rotation  
One-stage gearboxes (FCNDK);
- Original rotation  
Helical/worm gearboxes (FCNDK/SXA);
- Inverse rotation  
Two-stage gearboxes (FCNDK/FCNDK).

Worm shaft under worm wheel: Opposite to above

## 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.

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.

### 6.2 Maintenance Servicing

Units supplied with oil plugs:

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

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 worn-out.

Every 5 years:

Replace synthetic oil .



## 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 particles in the oil  
Contact Customer Service

#### Oil leakages

- ➔ Damaged oil seal  
(see also next note) Replace the oil seal
- ➔ Loose 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

### 7.2 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









## 8 LUBRICATION

### 8.1 Recommended Types

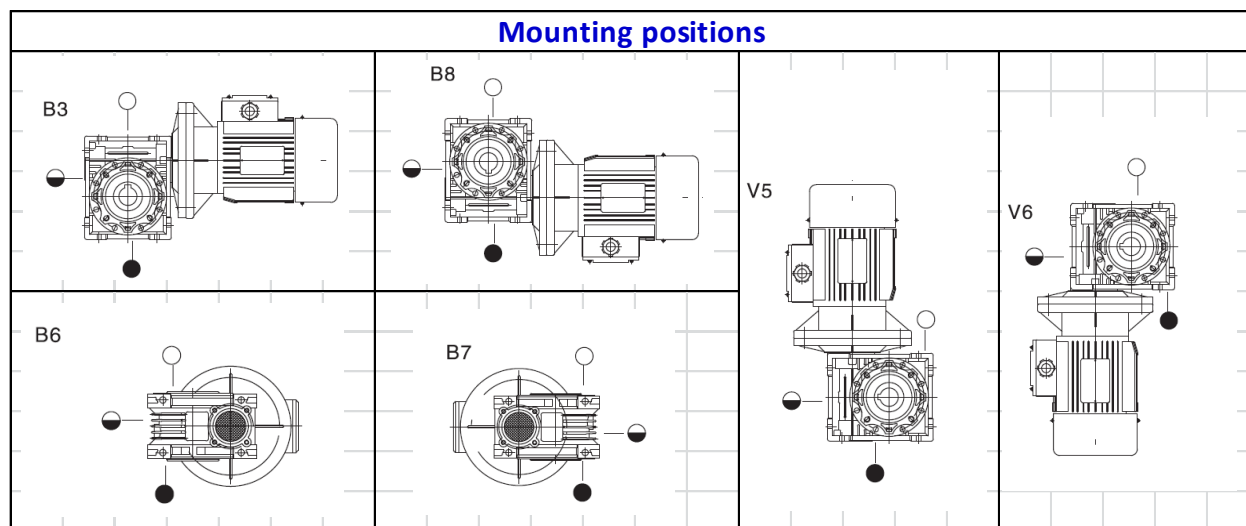
All the units are delivered already filled with synthetic long-life oil.

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.

| Type          | ISO |  |  |  |  |  |  |  |  |
|---------------|-----|---|---|---|---|--|---|---|---|
| Synthetic oil | 320 | Degol GS 320  | Energyn SG-XP320  | Alphasyn PG 320   | Glycolube 320   | Glygoyle HE 320  | Synlube CLP 320   | ---   | Tivela SC 320   |

### 8.2 Mounting positions



### 8.3 Lubrication quantity

| Oil fill quantity in litres |      |      |      |      |     |      |     |     |     |     |
|-----------------------------|------|------|------|------|-----|------|-----|-----|-----|-----|
| Mtg                         | 25   | 30   | 40   | 50   | 63  | 75   | 90  | 110 | 130 | 150 |
| B3                          | 0.02 | 0.04 | 0.08 | 0.15 | 0.3 | 0.55 | 1.0 | 2.0 | 3.0 | 5.5 |
| B6-7                        |      |      |      |      |     |      |     | 1.7 | 2.8 | 5.0 |
| B8                          |      |      |      |      |     |      |     | 1.7 | 2.8 | 4.5 |
| V5                          |      |      |      |      |     |      |     | 2.0 | 3.0 | 5.5 |
| V6                          |      |      |      |      |     |      |     | 2.0 | 3.0 | 5.5 |





# Working Instructions & Maintenance - ATEX

## 9 DIRECTIVE 94/9/CE – ATEX

### 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 the preceding «Working Instructions».

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 and with the adequate oil quantity to assure the design operation.

### 9.2 Prevalent Use

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.

### 9.3 References

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

- EN 1127-1 - Explosion prevention and explosion .
- EN 13463-1 - Non electrical devices for potentially explosive atmospheres, basic methods and conditions.
- EN 13463-5 - Non electrical devices for potentially explosive atmospheres.
- Section 5: protection by construction safety « c ».
- EN 13463-6 - Non electrical devices for potentially explosive atmospheres, Section 6: protection by trigger source control « b ».
- EN 13463-8 - Non electrical devices for potentially explosive atmospheres, Section 8: protection by construction safety « k ».





#### 9.4 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 and check that the difference between measured temperature 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

Electric motors and other elements to fit at the input or at the output of TEC ATEX products, must be ATEX approved according the Directive 94/9/CE.

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

TEC 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 that regular cleaning is followed to avoid any accumulation of dust layers on the product surfaces.

#### 9.6 ATEX Marking

TEC Series FCNDK, FCNDK/SXA conform to design requirements required by Group II, Category 3 and to operate in areas with explosion danger of gas (Zone 2) and combustible dust ( Zone 22).

- Dust accumulation: maximum thickness on surface 5 mm. (EN50281-1-2)
- Casing: IP66 (Ingress Protection)

**II 3 GD ck IP66**  $T_{max}=135^{\circ}\text{C}$   $T_{amb} -20/+55^{\circ}\text{C}$ -

Where:

|                        |   |
|------------------------|---|
| <b>II</b>              | - Group II (Surface Industries)   |
| <b>3</b>               | - Category 3  |
| <b>G</b>               | - Explosive atmosphere with presence of gas, vapours or clouds<br>Zone 2 (3G) |
| <b>D</b>               | - Explosive atmosphere with presence of dust<br>Zone 22 (3D)                  |
| <b>c</b>               | - Construction Safety « c »   |
| <b>k</b>               | - Liquid Dipping « k »  |
| <b>IP66</b>            | - Protection Grade (Ingress Protection)                                       |
| <b>T<sub>max</sub></b> | - Max. Surface Temperature  |
| <b>T<sub>amb</sub></b> | - Ambient Temperature   |



### **9.7 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.



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