# Contents

# 1 Safety

## 1.1 Safety Warnings

**Symbols**
The following symbols are used in this manual.

**⚠WARNING**

**Indicates a potentially hazardous situation which, if not avoided, could result in death or serious injury.**

**⚠CAUTION**

**Indicates a potentially hazardous situation which, if not avoided, may result in minor or moderate injury. It may also be used to alert against unsafe practices.**

**CAUTION**

**Indicates a situation that may result in equipment or property damage-only accidents.**

**NOTE!**

**Indicates highlighted information that should be observed in order to avoid mistakes or operate equipment at less than optimal performance.**

**Approvals**

CE

**Table 1.1**

## 1.2 Safety Information for the Operation of Geared Motors

### 1.2.1 General

This safety information applies in addition to the relevant product-specific instruction manual and for safety reasons must be taken into particular consideration in every case. This safety information is intended to protect persons and objects from injury and hazards which can arise from improper use, incorrect operation, inadequate maintenance or other incorrect handling of electric drive units in industrial installations. Low-voltage machines have rotating parts and may have parts that are live, even when the machine is at rest, and surfaces that may become hot in operation. Warning signs and information signs on the machine are to be observed without exception. Details may be found in our detailed instruction manual. It is included in the machine delivery and can be requested separately if necessary by indicating the motor model.

### 1.2.2 Personnel

All necessary work on electric drive units, in particular also planning work, transport, assembly, installation, commissioning, maintenance, repair, may only be performed by adequately qualified personnel (e.g., electrical engineers as specified in draft EN 50 110-1/DIN VDE 0105), who have access to the instruction manual and other product documentation during any corresponding work and who are obliged to abide by the instructions contained therein. This work must be monitored by a specialist supervisor. Qualified personnel are persons who are authorized through training, experience and instruction as well as their knowledge of relevant standards, rules, accident prevention regulations and operating conditions. The person responsible for the safety of the installation must perform the activities required in each case and be able to recognize and avoid potential hazards.
Knowledge of First Aid and of the necessary lifesaving equipment available is also required.
Non-qualified personnel are forbidden to work on the geared motors.

### 1.2.3 Intended Use Taking into Account the Relevant Technical Regulations

These machines are intended for commercial installations, unless otherwise expressly agreed. They comply with the standards of the series EN 60034/DIN VDE 0530. Use in a potentially explosive atmosphere is forbidden, if not expressly intended for this purpose (refer to additional information). If in a special case - use in non-commercial installations - increased safety precautions are required (e.g., protection against access by children's fingers), these conditions must be ensured when setting up the installation. The machines are designed for ambient temperatures between -4° F [-20˚C] to 104° F [+40˚C] as well as for installation heights up to 3,300 ft [1,000 m] above sea level. Any deviations found on the rating plate must be taken into consideration. Ensure that the conditions at the work place correspond to all the rating plate data.

# CAUTION

**Low-voltage machines are components for installation in machines in the sense of the Machinery Directive 2006/42/EC. It is forbidden to use the machine until the conformity of the final product with this directive has been established (refer to EN 60204-01).**

### 1.2.4 Transportation, Storage

When the electric drive units are being transported, the eye bolts - where provided in the design - must be firmly tightened down to their bearing surface. They may be used only for transporting the drive unit and not for lifting both the drive unit and the machine being driven. Report any damage discovered after delivery to the transport company immediately. Commissioning may have to be suspended.
If drive units are to be stored, ensure a dry, dust free and low vibration (veff < 0.2 mm/s) environment (damage sustained during storage). The life of the lubricants and seals is reduced with longer storage times.
There is a risk of fracture at very low temperatures (under approximately -4° F [-20˚C]). If the transport eye bolts are replaced, use drop forged eye bolts as specified in DIN 580.

### 1.2.5 Mounting Arrangement, Assembly

Fasten the drive unit by its flange. Attach the gear units with hollow shafts on to the driven shaft using the means provided.

## ⚠CAUTION

**Caution! Depending on the reduction ratio, geared motors develop substantially higher torques and forces than high-speed motors of similar power.**

Mounts, substructure and torque restraint must be rated for the high forces anticipated during operation and secured sufficiently against loosening. Cover the output shaft(s) and any second motor shaft extension present, as well as the transmission elements mounted on it (couplings, chain wheels etc.), so that they cannot be touched.

### 1.2.6 Connection

All work can only be carried out by qualified technical personnel on a stationary machine, which has been protected against re-starting. This applies also to auxiliary circuits. Remove any transportation blocks before start-up.

**Check to ensure safe isolation from the supply!**
The terminal box may only be opened once it has been ensured that the power is switched off. The information on voltage and frequency on the rating plate must correspond with the AC line voltage under observance of the terminal circuit. Exceeding the tolerances defined in EN 60034 / DIN VDE 0530, i.e., voltages ±5%, frequency ±2%, cam form, symmetry, increases heating and reduces service life.
Observe any accompanying connection diagrams, particularly for special equipment (e.g., thermistor protection, etc.). The type and cross-section of the main conductors, as well the protective conductors and any potential equalization which may become necessary, must correspond to the general and local installation regulations. With switching duty, take the starting current into account. Protect the drive unit against overload and in dangerous situations against automatic restart due to inadvertent starting.
Lock the terminal box again to protect against contact with live components.

### 1.2.7 Commissioning

Before commissioning, remove the protective films. Disconnect the mechanical connection to the machine being driven as far as possible and examine the direction of rotation in the no-load state. Remove feather keys or secure them in such a way that they cannot be ejected. Ensure that the current draw in the loaded condition does not exceed the rated current indicated on the rating plate for any length of time. Observe the drive unit after first commissioning for at least one hour for any unusual heat or noise.

### 1.2.8 Operation

**⚠CAUTION**

**Danger of burns**
**The surface of the VLT OneGearDrive can reach temperatures of over 140° F [60˚C] during operation.**

- **Do not touch the VLT OneGearDrive until it has cooled down.**

With certain layouts (e.g., unventilated machines), relatively high temperatures can occur on the motor frame, which are, however, within the limits specified in the standard. If these drive units are located in a place where they are subject to intensive contact, measures must be taken by the installer or operator to provide protective shielding.

### 1.2.9 Spring-loaded Brakes

Spring-loaded brakes are safety brakes, which continue to work in the event of power failure or usual wear. If a manual release bracket is provided, remove it during operation. Since other components could also fail, take suitable safety precautions to avoid any injury to persons or damage to objects cause by un-braked operation.

### 1.2.10 Maintenance

In order to prevent breakdown, danger and damage, examine the drive units at regular intervals depending on the operating conditions. Observe the lubrication intervals for bearings and gear units specified in the respective instruction manual. Replace worn or damaged parts using original spare parts or standard parts.

### 1.2.11 Instruction Manual

For reasons of clarity, the instruction manual and safety information do not contain all information relating to all geared motors types and cannot take into account every conceivable case of installation, operation or maintenance. The information is essentially limited to that which is required for qualified personnel in normal working situations. Any unclear points can be clarified by contacting Danfoss.

### 1.2.12 Faults

Changes in relation to normal operation, such as higher temperatures, vibrations, noises, etc. tend to indicate that function is impaired. To avoid faults which could lead directly or indirectly to injury to persons or damage to property, inform the maintenance staff responsible. If in any doubt, switch the geared motors off immediately.

### 1.2.13 Electromagnetic Compatibility

The operation of the low-voltage machine in its intended application must meet the protection requirements of the EMC (electromagnetic compatibility) Directive 2004/108/EC. Correct installation (e.g., shielded cables) is the responsibility of the system's installers. Precise information can be found in the instruction manual. For systems with frequency inverters and rectifiers, the manufacturer's electromagnetic compatibility information must also be taken into consideration. The electromagnetic compatibility directive in accordance with EN 61000-6-2 and EN 61000-6-4 is complied with given proper use and installation of the geared motors. This is also true in combination with Danfoss frequency inverters and rectifiers. The additional information provided in the instruction manual must be taken into consideration when using the motors in residential, commercial and trade sectors, as well as in small businesses in accordance with EN 61000-6-1 and EN 61000-6-3.

### 1.2.14 Warranty and Liability

The warranty obligations of Danfoss arise out of the relevant supply contract, which is neither expanded nor restricted by this safety information or other instructions.

## NOTE!

**This safety information must be kept in a safe place, where it is available to all persons working with the VLT OneGearDrive.**

# 2 Geared Motors with Permanent Magnet Motors

## 2.1 Geared Motors Degree of Protection

The VLT OneGearDrive range complies with EN 60529 and IEC 34-5/529. The drives are totally enclosed and dust-tight as well as hose-proof.

The VLT OneGearDrive-Basic is supplied as standard in IP67.

The VLT OneGearDrive-Standard and VLT OneGearDrive-Hygienic are for use in aggressive areas and are supplied in IP67 (optionally IP69K).

## 2.2 Surface Damage

**CAUTION**

**Damage to the protective coating**

**Damage to the paint coating reduces its protective function.**

- **Handle the VLT OneGearDrive with care and do not place it on any rough surfaces.**

Check the condition of the paint regularly and repair when necessary, depending on ambient influences. Ensure that the paint finish is compatible with the other components.

Contact Danfoss Service for information on paint repair and approved lacquer.

## 2.3 Rating Plate

Danfoss geared motors are supplied with a corrosion-proof rating plate as standard. The standard rating plate is made of special plastic tried and tested in many years of practical use and approved for hazardous areas by the Physikalisch-Technische-Bundesanstalt (PTB).

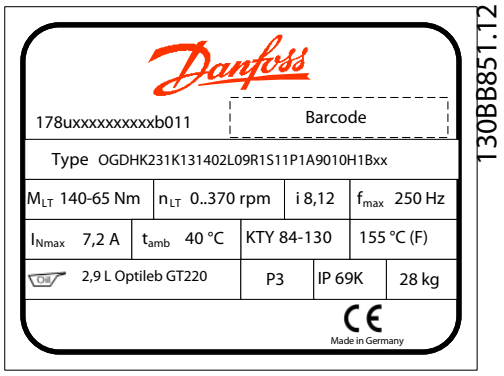


**Figure 2.1 Example Rating Plate**

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## 2.4 Mounting Arrangement

Cover any drinking water, food, textiles, etc. located beneath the geared motor.

Install the drive unit as free from vibration as possible.

Observe the special instructions for installation locations with abnormal operating conditions (e.g., prolonged exposure to dripping water, high ambient temperatures above 104° F [40°C], explosion hazards). The fresh air intake must not be restricted by unsuitable installation or by fouling.

Flexible couplings with zero play, if possible, are recommended for direct power transmission from the gear unit to the driven machine and commercially available slip clutches are recommended if there is a risk of blocking.

Take care when fitting transmission elements onto the hollow shaft of the gear unit, which is finished to ISO h 7. Use the tapped end hole intended for this purpose according to DIN 332 if possible. Warming the machine part to be fitted onto the shaft to approximately 212° F [100°C] has proved to be advantageous. The bore must be dimensioned in accordance with following table and therefore exhibit the following tolerances:

| Nominal size of bore (in [mm]) | h 7 output shaft Bore H7 with tolerances (in microns [1/1000 mm]) |
|---|---|
| over 0.71 to 1.18 [18 to 30] | 0 to 0.008 [0 to +21] |
| over 1.22 to 1.97 [31 to 50] | 0 to 0.010 [0 to +25] |

**Table 2.1**

## 2.5 Proposal Assembly Kit

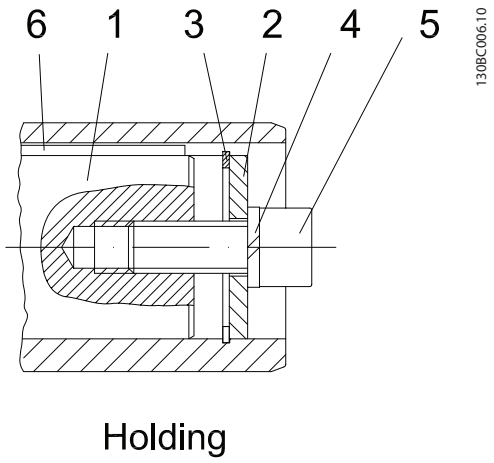


**Figure 2.2**

| | |
|---|---|
| 1 | Shaft |
| 2 | Disc |
| 3 | Retaining ring |
| 4 | Lock washer |
| 5 | Fixing screw (filister head) |
| 6 | Key |

**Table 2.2**

| Type | Dimensions (in [mm]) | | | |
|---|---|---|---|---|
| | Retaining ring (3) ANSI B17.1 | Lock washer (4) ANSI B17.1 | Fixing screw (5) ANSI B17.1 | Key (6) ANSI B17.1 Width x Height x Length |
| OGD-L1 | 1.250 x 0.050 | 0.375 | 0.500-13 x 1.1875 [M12 x 30] | 0.250 x 0.250 x 5.122 |
| OGD-L2 | 1.4375 x 0.050 | 0.500 | 0.500-13 x 1.375 [M12 x 35] | 0.375 x 0.375 x 5.122 |
| OGD-L3 | 1.500 x 0.050 | 0.625 | 0.625-11 x 1.625 [M16 x 35] | 0.375 x 0.375 x 5.122 |

**Table 2.3**

The dimensions shown could differ from the customer conditions and must potentially be changed by the customer.

### Mounting Instructions

Rotate the disc (2) and fit it against the retaining ring (3).
The fixing screw (5) and lock washer (4) are not included in the delivery. The parts are dependant on the length and size of the shaft. For further information, refer to the mounting arrangement, see *2.4 Mounting Arrangement*.

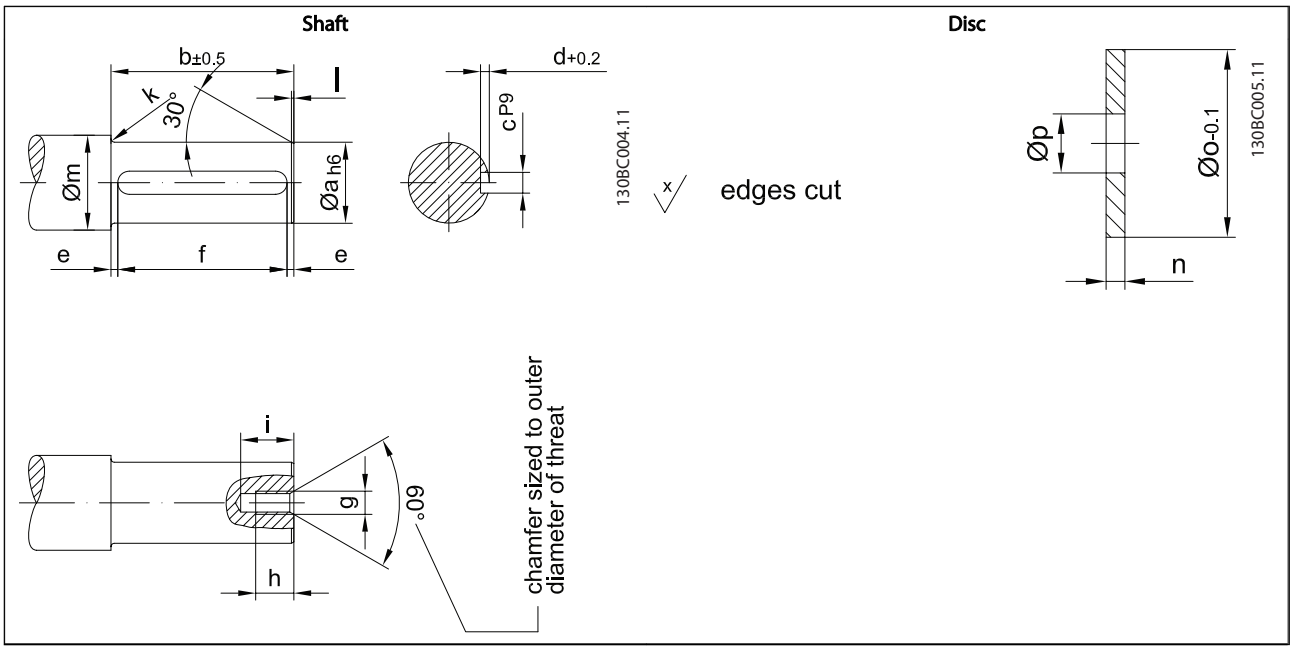


**Table 2.4**

| Type | Dimensions (in) | | | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Shaft | | | | | | | | | | | | Disc | | |
| | a | b | c | d | e | f | g | h | i | k | l | m | n | o | p |
| OGD-L1 | 1.250 | 5.512 | 0.2500 | 0.138 | 0.195 | $5.122^{+0.02}$ | 0.500-13 (M12) | 0.866 | 1.181 | 0.118 | 0.059 | 1.496 | 0.1575 | 1.236 | 0.512 |
| OGD-L2 | 1.4375 | 5.512 | 0.3750 | 0.214 | 0.195 | $5.122^{+0.02}$ | 0.500-13 (M12) | 1.102 | 1.457 | 0.118 | 0.059 | 1.693 | 0.1575 | 1.425 | 0.512 |
| OGD-L3 | 1.500 | 5.512 | 0.3750 | 0.211 | 0.195 | $5.122^{+0.02}$ | 0.625-11 (M16) | 1.417 | 1.772 | 0.118 | 0.079 | 1.890 | 0.1575 | 1.488 | 0.669 |

**Table 2.5**

The dimensions shown could differ from the customer conditions and must potentially be changed by the customer.

2

## 2.6 Torque Restraint

Shaft-mounted geared motors require a suitable torque restraint to resist the reaction torque. Shaft-mounted gears have cast torque arms as standard. Bevel gears are available with bolt-on torque arms on request. The torque arm is screwed onto the front “V” on the side of the gear unit. It is always important to ensure that the torque arm does not create excessive constraining forces due to the driven shaft running untrue, for example. Excessive play can result in excessive shock torques in switching or reversing operations. Consequently, Danfoss recommends the use of pre-tensioned rubber damping elements.

## 2.7 Electrical Connection

When connecting the motor, take note of the rating plate information and the connection diagram as well as the relevant safety regulations and rules for the prevention of accidents.
Unless a special design is concerned, the rating data refer to ± 5% voltage tolerance, to -4° to 104° F [-20 to 40°C] ambient temperature and altitudes up to 3,300 ft [1,000 m] above sea level.
The permissible switching frequency depends on the design of the motors, the load torque and the mass moment of inertia.

When closing the terminal box, particular attention must be given to obtaining a perfect seal.

To guarantee electromagnetic compatibility (EMC) as defined in EMC Directive 2004/108/EC, all signal lines must use shielded cables. The cable sheath is to be grounded at both ends. The frequency inverter operating instructions will indicate whether a shielded cable is necessary for the motor supply line. A shielded motor cable is not required when connecting to the low-voltage network or to a frequency inverter with an output filter. Signal cables and power cables should not be laid parallel over long distances.

## 2.8 Terminal Box

The cables of motors with and without brakes can be introduced into the motor terminal box.

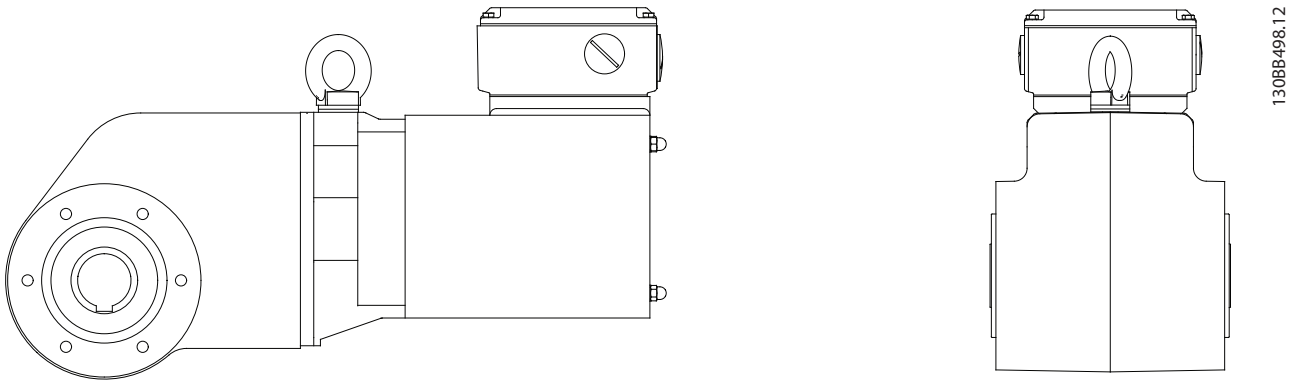


**Figure 2.3**

The standard position for the motor terminal box is shown in the dimensional drawings for the geared motor (see *4.1.1 VLT OneGearDrive Standard*).

Screw-on terminal boxes are supplied with a metric screw thread as standard.

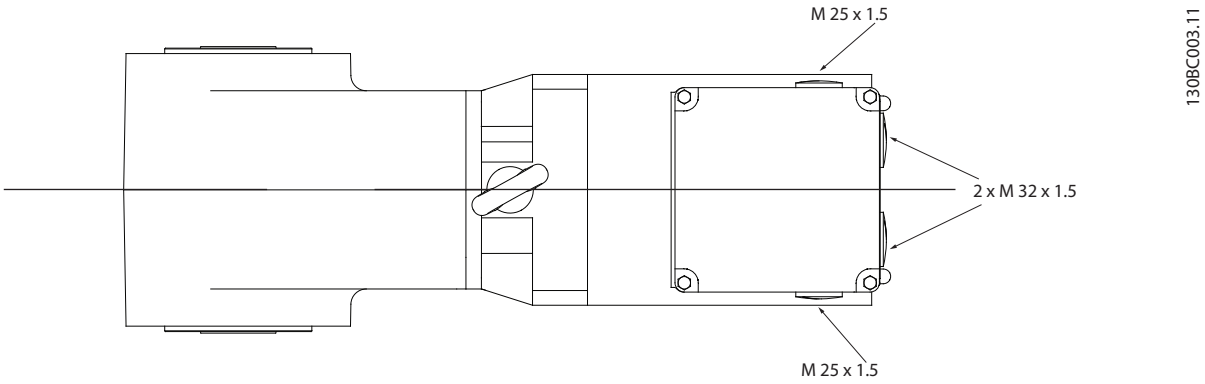


**Figure 2.4**

2

## 2.9 Connection Diagram Cage Clamp

# CAUTION

**Refer to the Instruction Manual for VLT AutomationDrive FC 302 and FCD 302 to connect the terminals.**
**Do not connect the VLT OneGearDrive directly to the power supply.**

## NOTE!

**The connection from the resolver to the inverter is based on a VLT AutomationDrive FC302 or FCD302 with an MCB103 option. For other connection or for non-Danfoss adjustable frequency drives, contact Danfoss Service.**

The following graphic shows the VLT OneGearDrive DA09LA10 with terminal box in Y-connection with a thermal protection connection resolver.

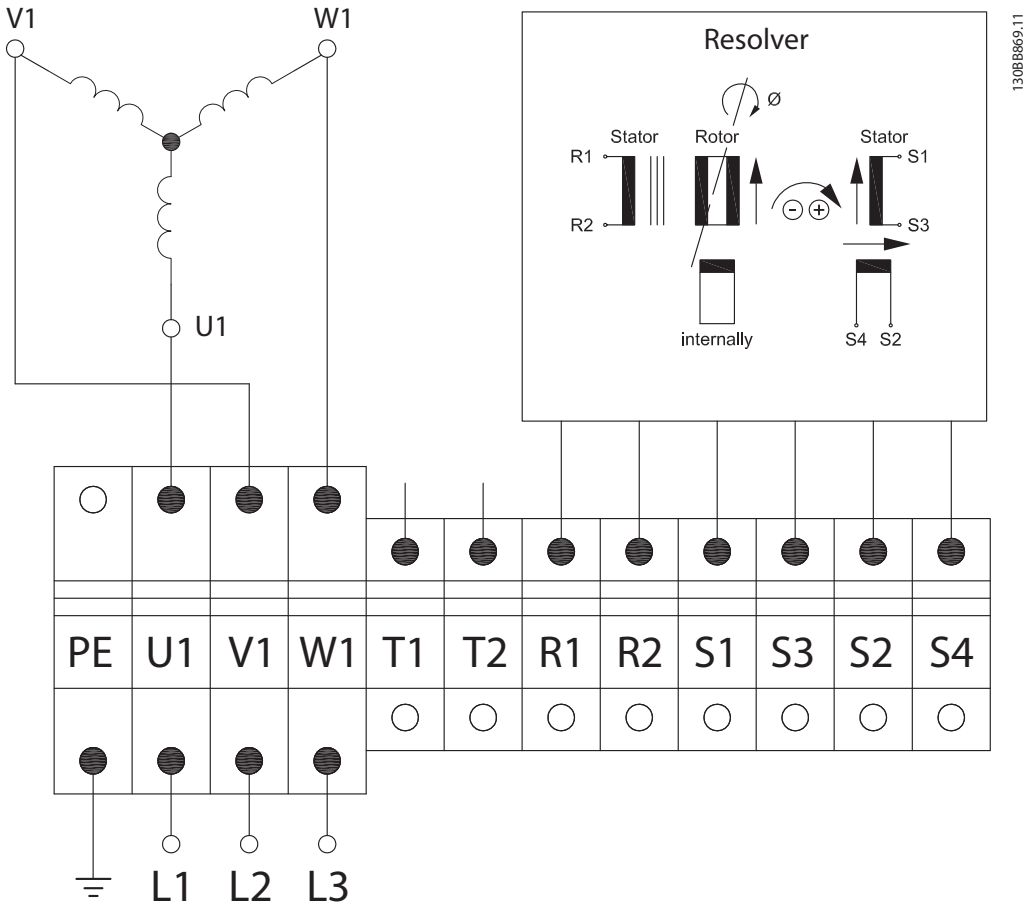


**Figure 2.5**

| | | | |
|---|---|---|---|
| **Input:** | $E_{R1-R2}$ | = | $E_0$ x sin (ωt) |
| **Output:** | $E_{S1-S3}$ | = | Tr x $E_{R1-R2}$ x cos Ø |
| | $E_{S2-S4}$ | = | Tr x $E_{R1-R2}$ x sin Ø |
| | Tr | = | Transformation ratio |

**Table 2.6**

| | | |
|---|---|---|
| T1<br>T2 | KTY 84-130 | ZK010.1090-17 |

**Table 2.7**

| | | Color |
|---|---|---|
| Motor winding | U1 | black |
| | V1 | blue |
| | W1 | brown |
| Resolver* optional | R1 → REF+ | red/white |
| | R2 → REF- | black/white |
| | S1 → COS+ | yellow |
| | S3 → COS- | blue |
| | S2 → SIN+ | red |
| | S4 → SIN- | black |

**Table 2.8**

## 2.10 Connection Diagram Three-phase Gear Motors

# CAUTION

**Refer to the Instruction Manual for VLT AutomationDrive FC 302 and FCD 302 to connect the terminals.**
**Do not connect the VLT OneGearDrive directly to the power supply.**

The following graphic shows the connection power plug for VLT OneGearDrive Hygienic DA09LA10 in Y-connection with thermistors.

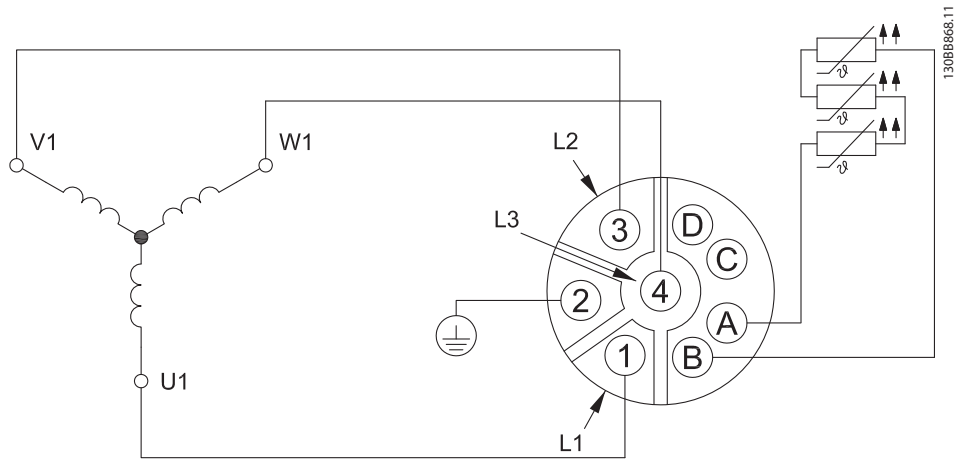


**Figure 2.6**

| | | Pin | Cable allocation for plug with connection cable |
|---|---|---|---|
| Motor winding | U1 | 1 | No. 1 AWG 12 |
| | V1 | 3 | No. 2 AWG 12 |
| | W1 | 4 | No. 3 AWG 12 |
| | PE | 2 | – |

**Table 2.9**

2

## 2.11 Connection Diagram Signal Plug

**NOTE!**

**The connection from the resolver to the inverter is based on a VLT AutomationDrive FC 302 or FCD 302 with an MCB 103 option. For other connections or for non-Danfoss adjustable frequency drives, contact Danfoss Service.**

The following graphic shows the connection signal plug for VLT OneGearDrive Hygienic DA09LA10 resolver connection.

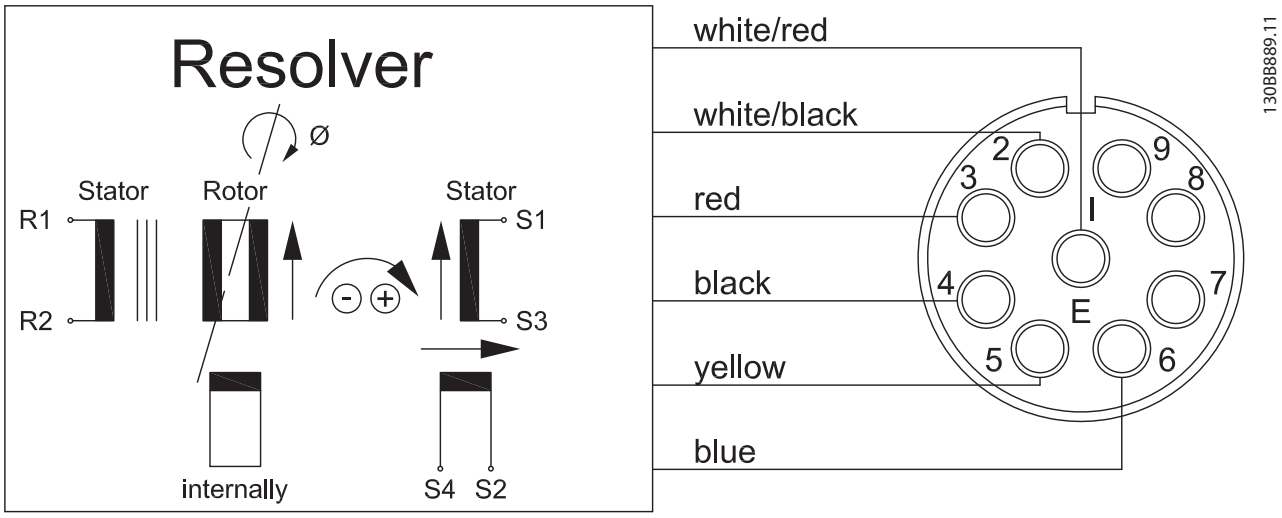


**Figure 2.7**

| | | | |
|---|---|---|---|
| **Input:** | $E_{R1-R2}$ | = | $E_0$ x sin (ωt) |
| **Output:** | $E_{S1-S3}$ | = | Tr x $E_{R1-R2}$ x cos Ø |
| | $E_{S2-S4}$ | = | Tr x $E_{R1-R2}$ x sin Ø |
| | Tr | = | Transformation ratio |

**Table 2.10**

| **Resolver** | **Pin** | **Cable allocation for plug with connection cable** |
|---|---|---|
| R1 → REF+ | 1 | brown |
| R2 → REF- | 2 | white |
| S1 → COS+ | 3 | yellow |
| S3 → COS- | 4 | blue |
| S2 → SIN+ | 5 | red |
| S4 → SIN- | 6 | black |

**Table 2.11**

For information about resolver-connections when using a Danfoss VLT AutomationDrive FC 302 or a Danfoss FCD 302 with an MCB 103 option, please refer to the instruction manual for those products.

## 2.12 Overload Protection

Take note of the relevant circuit diagram for motors with thermally activated winding protection (e.g., thermostats or thermistors).

Automatic restart after the winding has cooled must be avoided in most applications.
The output of the motors is normally adequately rated. The rated current does not represent a measure of gear unit utilization in these cases and cannot be used as overload protection for the gear unit. In some cases, the way in which the machine being driven is loaded can exclude any overloading as a matter of course. In other cases, it is prudent to protect the gear unit by mechanical means (e.g., slip clutch, sliding hub, etc.). This depends on the maximum permissible limit torque $M_2$ in continuous running duty specified on the rating plate.

## 2.13 Lubricant Changes

The gear units are supplied with lubricant ready for operation.

The following table shows the oil change intervals based on normal operating conditions and a lubricant temperature of approximately 176° F [80°C]. The lubrication interval must be reduced at higher temperatures (halve it for each 10 K increase in the lubricant temperature).

| Lubricant type | Lubricant change interval |
|---|---|
| PGLP220 | 25000 operating hours |
| Optileb GT220 H1 (food grade) | 35000 operating hours |

**Table 2.12**

The gear units have filling plugs and drain plugs. In the standard designs, these make it possible to change the lubricant without disassembly.

It is also necessary to flush the gear unit enclosure if the lubricant grade or lubricant type is changed.

If the motor is only used briefly it is sufficient to drain off the original oil and use the original lubricant type to refill the maximum possible amount for the gear unit as defined on the rating plate. Then operate the drive unit briefly under no load, drain this oil off again and refill with the new lubricant as defined on the rating plate.

If necessary, drain off the original lubricant and flush out the gear unit with petroleum until all traces have been washed out. Then perform the procedure described above for short-term operation twice before filling with the specified volume of new lubricant in accordance with the rating plate.

It is advisable to inspect, and if necessary replace, the wear parts (bearings and seals) when changing the lubricant.

## 2.14 Lubricant Grade

Oils PGLP 220 and PGLP 68 comply with DIN 51502 and DIN 51517 and are suitable for lubricating the gear unit. Food grade oils which comply with NSF H1 can be used.

The lubricant must permit low-friction, virtually wear-free continuous operation. The damage load level on the FZG test as specified in DIN 51354 shall be in excess of load level 12, and the specific wear below 0.27 mg/kWh. The lubricant should not foam, should protect against corrosion and should not attack the interior paint, the rolling contact bearings, gearwheels and seals.

Lubricants of different types may not be mixed, as otherwise the lubrication characteristics may be impaired. A long service life is only ensured by the use of a lubricant listed in the following table or equivalent.

If the VLT OneGearDrive is stored for a longer period of time before installation, refer to chapter “Storage and Startup of geared motors with permanent magnet rotors”.

The wear-protecting EP gear lubricant oils as listed in the following table are recommended.

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| Lubricant-manufacturer | Standard oil<br>Synthetic oil<br>PGLP 220 | Low temperature<br>Synthetic oil<br>PGLP 68 | Foodstuffs industry oil<br>NSF<br>USDA H1 oil |
|---|---|---|---|
| ARAL | Degol GS 220 | – | Eural Gear 220 |
| BP | Enersyn SP-XP 220 | – | – |
| CASTROL | Alphasyn PG 220<br>OPTIFLEX A 220 | – | OPTILEB GT 220 |
| FUCHS | Renolin PG 220 | Renolin PG 68 | – |
| KLÜBER | Klübersynth GH 6-220 | Klübersynth GH 6-80 | Klüberoil 4UH1-220N |
| MOBIL | Glygoyle HE 220<br>Glygoyle 30 | – | – |
| OEST | – | – | Cassida Fluid GL 220 |
| SHELL | Tivela S220 | – | – |
| TEXACO | – | – | NEVASTANE SL220 |

**Table 2.13**

## NOTE!

**Synthetic gear oils with a polyglycol base (e.g., PGLP, etc) must be kept separate from mineral oils and disposed of as special waste.**

As long as the ambient temperature does not fall below 14° F [-10°C], ISO viscosity grade VG 220 (SAE 90) is recommended. This is as specified in the international definition of viscosity grades at 104° F [40°C] in accordance with ISO 3448 and DIN 51519 and for North America, AGMA 5 EP.

For lower ambient temperatures oils of a lower nominal viscosity with correspondingly better starting characteristics should be used, such as PGLP with a nominal viscosity of VG 68 (SAE 80) or AGMA 2 EP. These grades may also be required at temperatures around the freezing point in the following circumstances:

- if the drive unit's breakaway torque has been reduced with a view to achieving soft starting
- if the motor has a relatively low power output

## 2.15 Lubricant Volume

The recommended lubricant volume for the particular mounting position is indicated on the motor rating plate. When filling, ensure that the upper gear unit components are also well lubricated.

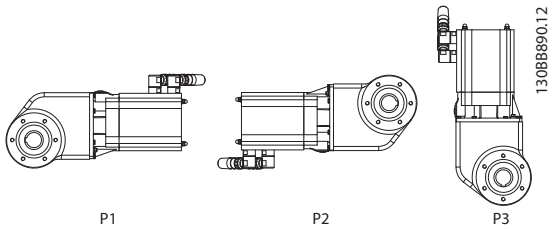


**Figure 2.8 Mounting Positions**

| | Mounting Position | | |
|---|---|---|---|
| | P1 | P2 | P3 |
| Lubricant Volume for VLT OneGearDrive | 37.2 fl oz (1.1 l) | 74.4 fl oz (2.2 l) | 98 fl oz (2.9 l) |

**Table 2.14 Lubricant Volume in fluid ounces (litres)**

Other mounting positions on request!

## 2.16 Changing the oil

**⚠CAUTION**

**Danger of burns**
**The surface of the VLT OneGearDrive can reach high temperatures during operation.**

- **Do not touch the VLT OneGearDrive until it has cooled down.**

**⚠CAUTION**

**Danger of burns**
**The oil in the VLT OneGearDrive reaches high temperatures during operation.**

- **Do not carry out the oil change until it has cooled down sufficiently.**

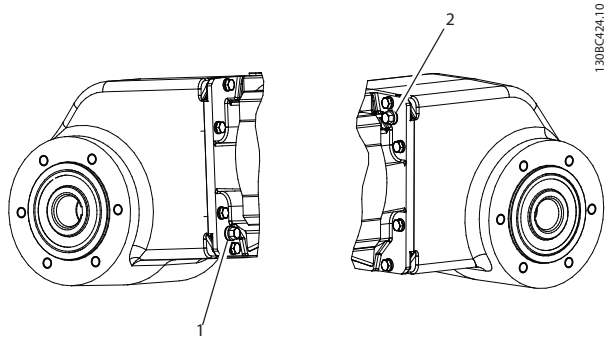


**Figure 2.9 VLT OneGearDrive Oil Screws 1 and 2**

**Draining the Oil**

1. Once the VLT OneGearDrive has cooled down, remove it from your system
2. Bring the VLT OneGearDrive into a vertical position and remove oil screws 1 and 2
3. Turn the VLT OneGearDrive into a horizontal position and drain the oil through screw hole 1 into a suitable container
4. Turn the VLT OneGearDrive back into a vertical position

**Filling the Oil**

**NOTE!**

**The required oil quantities can be found on the rating plate and in chapter *2.15.1 Lubricant Volume*.**

1. Fill the VLT OneGearDrive with the appropriate amount of oil through screw hole 1
2. Remove all traces of oil from the surface of the VLT OneGearDrive using a soft cloth
3. Reinsert and tighten oil screws 1 and 2

## 2.17 Bearing Lubrication for Geared Motors

With smaller and middle sized gear units, the input components and motor components are designed with enclosed ball bearings.

The lubricant should be changed when the bearings are replaced during maintenance work on the rotary shaft seals. Cleaning and lubrication of the bearings is not recommended due to the risk of contamination.

## 2.18 Disposal

The metallic parts of the gear unit and the geared motor can be disposed of as scrap, segregated into steel, iron, aluminum and copper.
The lubricants should be disposed of as waste oil, and the synthetic oils should be disposed of as special waste.

# 3 Storage and Commissioning of Geared Motors with Permanent Magnet Motors



## 3.1 Storage of Geared Motors with Permanent Magnet Motors

If the VLT OneGearDrive is being stored for an extended time before start-up, increased protection against damage by corrosion or humidity can be achieved by observing the following information. The actual load depends very strongly on local conditions, therefore the time period stated is only a guide value. Note that this period does not include any extension of the warranty. If disassembly is necessary before start-up, contact Danfoss Service. The instructions contained in this document must be observed.

## 3.2 Geared Motor Condition and Storage Space

Check the factory-fitted plugs in all entry holes on the terminal box for damage caused during transportation and for correct positioning. Replace if necessary.

Remove any present vent valves and replaced them with a suitable cover screw.

Repair any damage to the exterior paint layer or to the rust protection of the bright metal shafts, including hollow shafts.

The storage space should be dry, well-ventilated and vibration-free. If the temperature in the space exceeds the normal range of -4° F to 104° F [-20°C to +40°C] for an extended period of time or varies strongly frequently, employ the measures before start-up specified in chapter *3.4 Measures before Commissioning*, even after short storage times.

## 3.3 Measures During the Storage Period

It is recommended that the drive units be turned 180° every 12 months so that the lubricant in the gear unit covers the bearings and gearwheels which have previously been positioned on top. Also, the output shaft should be turned manually in order to churn the rolling-contact bearing grease and distribute it evenly.

Turning the drive unit does not have to be carried out if the gear unit enclosure is completely filled with lubricant as the result of a special agreement. In this case, the lubricant level before start-up is to be reduced to the desired value as defined in the instruction manual and the rating plate.

## 3.4 Measures before Commissioning

### 3.4.1.1 Motor Component

- Insulation measurement
  Measure the insulation resistance of the winding with commercially available measuring apparatus (e.g., with a megger) between all winding parts and between the winding and the enclosure.

| Measured value | Action/State |
|---|---|
| > 50 megohm | no drying necessary, new condition |
| < 5 megohm | drying advised |
| approx 50 megohm | lowest permissible threshold |

**Table 3.1**

### 3.4.1.2 Gear Unit Component

- Lubricant
  The lubricant in the gear unit must be changed if the storage period exceeds three years or the temperatures were very harsh throughout a shorter storage period. For detailed instructions and lubricant recommendations, see chapter*2.15.1 Lubricant Volume*.
- Shaft seals
  When changing the lubricant, the function of the shaft seals between the motor and gear unit as well as on the output shaft must also be checked. If a change in shape, color, hardness or sealing effect is determined, the shaft seals must be replaced.
- Gaskets
  If lubricant is draining out at the connecting points on the gear unit enclosure, the sealing compound must be replaced.

# 4 Dimensions

## 4.1 VLT OneGearDrive Standard



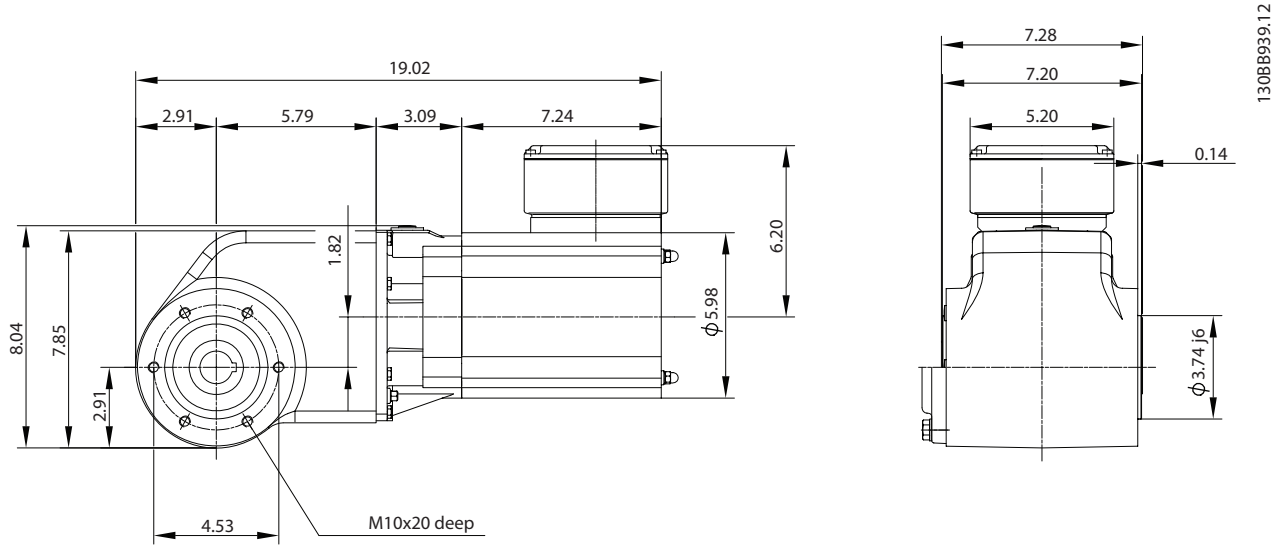


**Figure 4.1 VLT OneGearDrive Standard**

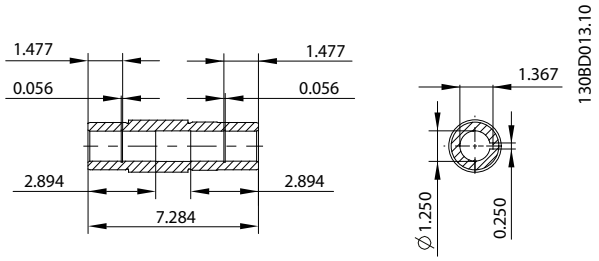


**Figure 4.2 1 1/4 inch shaft**

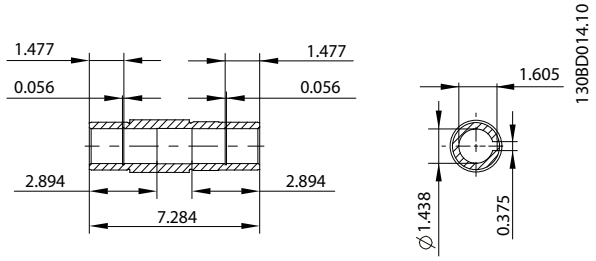


**Figure 4.3 1 7/16 inch shaft**

4

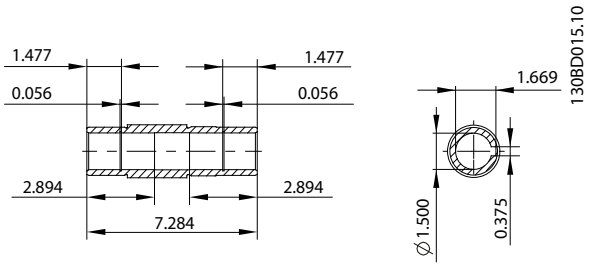


Figure 4.4 1 1/2 inch shaft

## 4.2 VLT OneGearDrive Standard with Torque Arm in Front Position (optional)

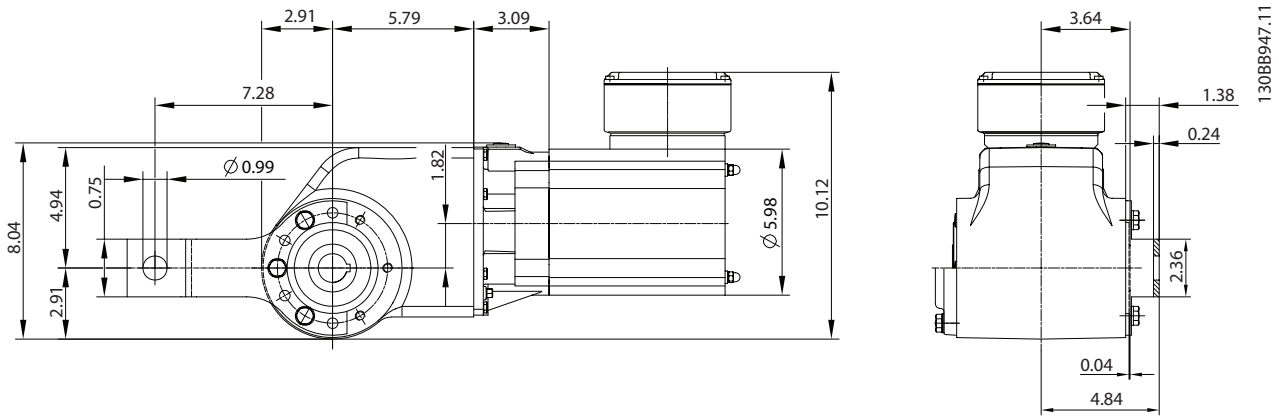


Figure 4.5 Torque Arm in Front Position

## 4.3 VLT OneGearDrive Hygienic

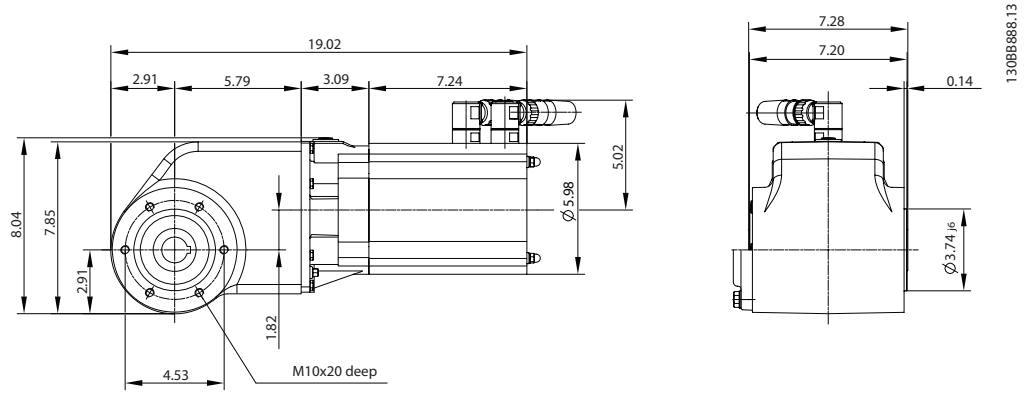


Figure 4.6 VLT OneGearDrive Hygienic

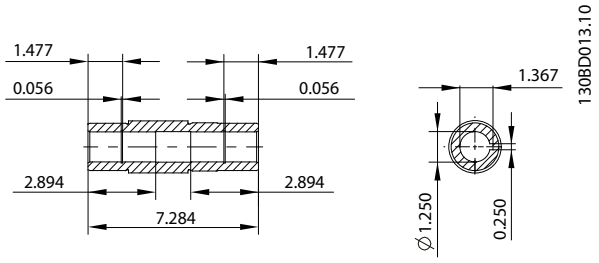


Figure 4.7 Stainless Steel 1 1/4 inch shaft

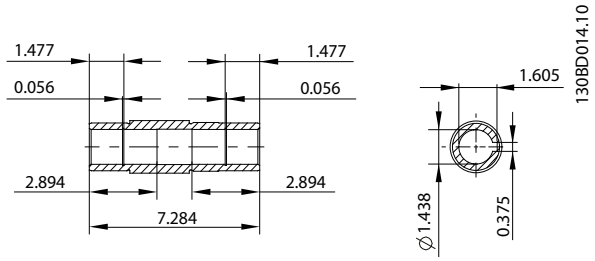


Figure 4.8 Stainless Steel 1 7/16 inch shaft

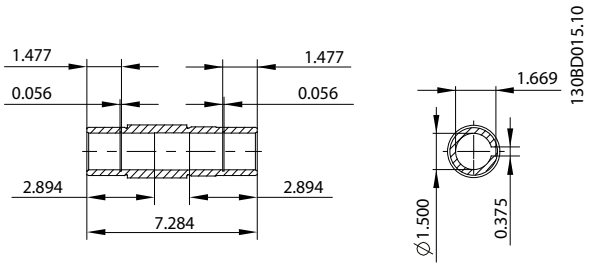


Figure 4.9 Stainless Steel 1 1/2 inch shaft

4

## 4.4 VLT OneGearDrive Hygienic with Torque Arm in Front Position (optional)

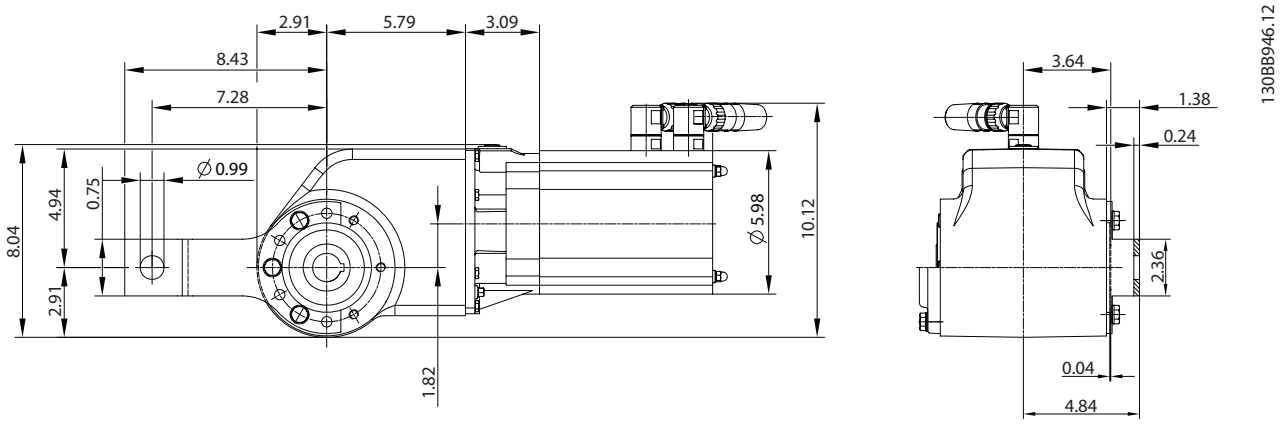


Figure 4.10 Torque Arm in Front Position

# 5 Motor Datasheet

## 5.1 Permanent Magnet Three-phase Synchronous Motor

| | |
|---|---|
| Rated torque | 12.6 Nm |
| Rated current | 7.2 A |
| Rated speed | 3000 rpm |
| Rated frequency | 250 Hz |
| Motor circuit | Y |
| Winding resistance (Rtt) | 1Ω |
| Winding inductivity (Ltt) | 9 mH |
| Inductivity - D axis (Ld) | 5 mH |
| Inductivity - Q axis (Lq) | 5 mH |
| Motor poles (2p) | 10 |
| Moment of inertia | 0.102 lbft$^2$ (0.0043 Kgm$^2$) |
| Back EMF constant (ke) | 120V/1000 rpm |
| Torque constant (kt) | 1.75 Nm/A |

**Table 5.1**

## 5.2 Resolver Data

| | |
|---|---|
| Poles | 2 |
| Input voltage | 7 V |
| Input current | 30 mA |
| Input frequency | 10 kHz |
| Transmission ratio | 0.5 ± 10% |

**Table 5.2**

5

# 6 Options

## 6.1 Torque Arm Set

Part number: 178G5006

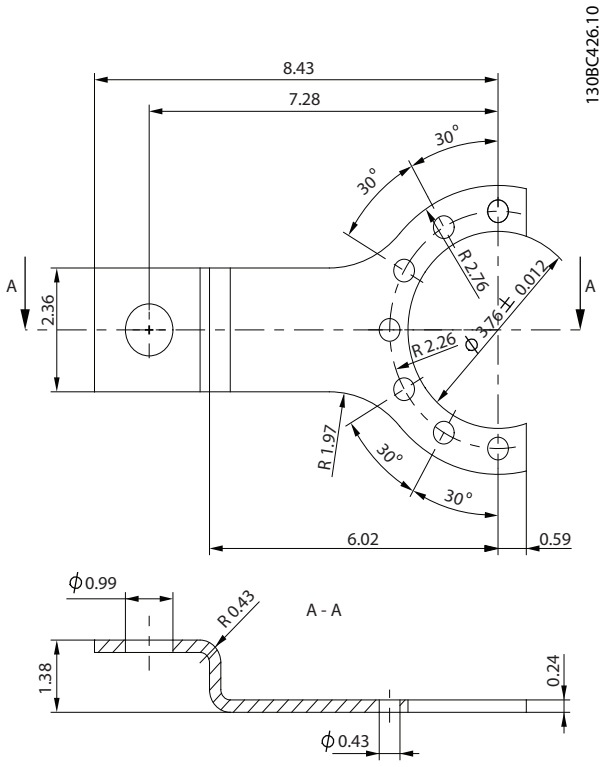


**Figure 6.1 Torque Arm**

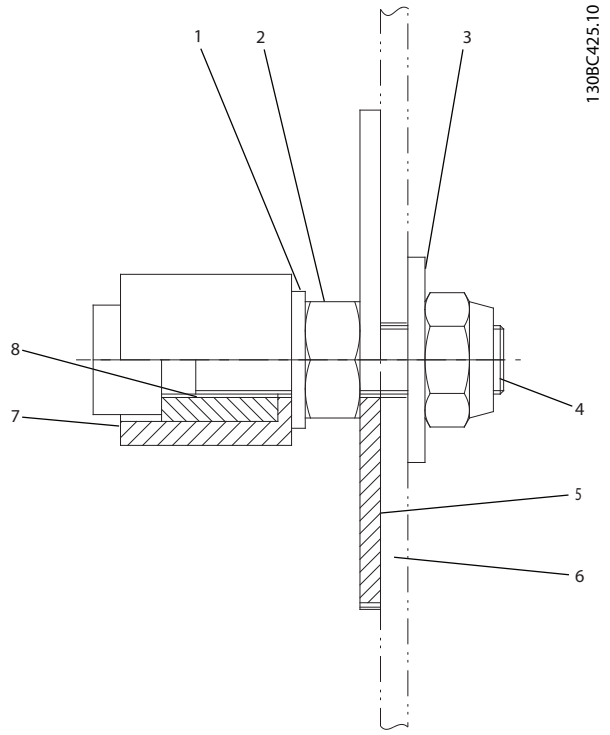


Figure 6.2 Mounting Set

| Position | Description | Specification |
|---|---|---|
| 1 | Disc | DIN 125-A10 5 |
| 2 | Nut | DIN 934 M10 |
| 3 | Disc | DIN 9021 10, 0.197 x 1.181 x 0.984 in (5 x 30 x 25 mm) |
| 4 | Nut | DIN 985, 7/16 in (approx. M10) |
| 5 | Disc | Ø2.874 x 0.118 in (73 x 3 mm) Stainless steel |
| 6 | Customer Frame | – |
| 7 | Barrel | POM-C white |
| 8 | Bushing | Stainless Steel |
| 9 | Torque Arm | Stainless Steel |

Table 6.1

## NOTE!

**The set also contains 3 x DIN 933, 7/16 x 0.984 in (M10 x 25 mm), 0.346 in (8.8 mm), stainless steel screws.**

# CAUTION

**Only use the original Danfoss or comparable mounting set to mount the VLT OneGearDrive to the conveyor. The mounting equipment used must ensure the same degree of flexibility as the original Danfoss mounting set. The torque arm cannot be screwed directly on to the conveyor frame.**

## 6.2 Mechanical Brake

### 6.2.1 Overview

The VLT OneGearDrive Standard is available with a DC 180 V brake option. This mechanical brake option is intended for emergency stop and park brake duty. Normal braking of a load would still be controlled by the inverter dynamic brake.

**⚠WARNING**

**Danger of fatal injury if the hoist falls.**
**Severe or fatal injuries.**

- **The brake must not be used in vertical lifting and hoisting applications.**

### 6.2.2 Technical Data

| | | |
|---|---|---|
| Voltage | $V_{DC}$ | 180 ±10% |
| $P_{el}$ | HP [W] | 0.019 [14.4] |
| Resistance | Ω | 2250 ±5% |
| Current | A | 0.08 |
| Maximum brake torque | Nm | 10 |

**Table 6.2**

### 6.2.3 Dimensions

The following graphics show the dimensions of the VLT OneGearDrive with the mechanical brake option

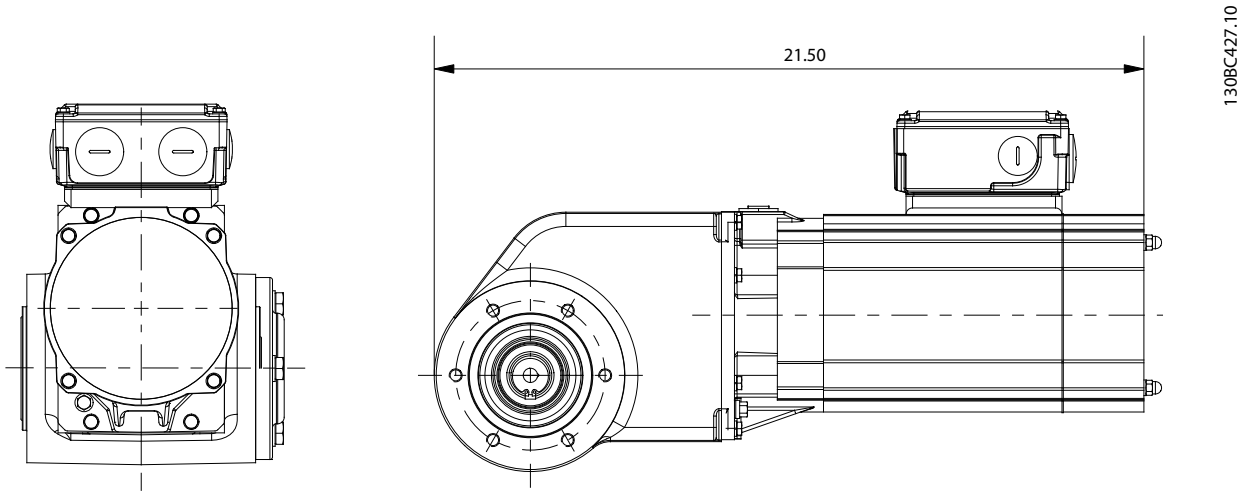


**Figure 6.3**

## 6.2.4 Connection

The following graphic shows the cage clamp and the connection to VLT® AutomationDrive FC 302.

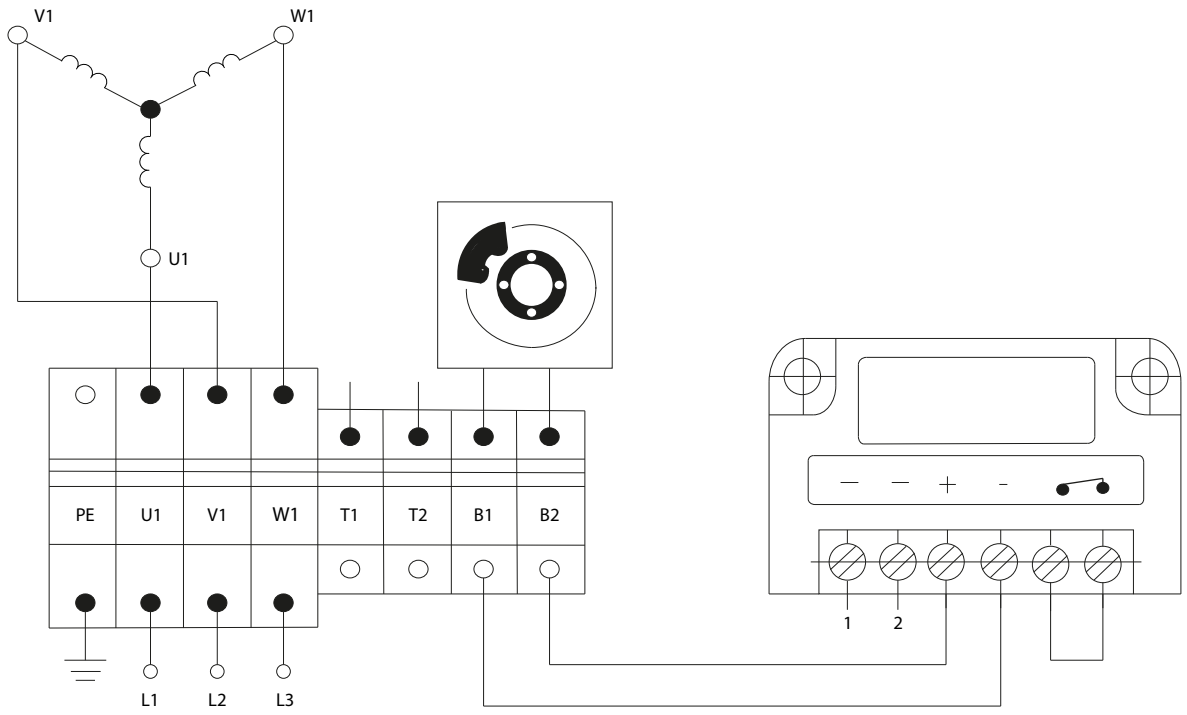


Figure 6.4

| Pin | FC 302 |
|---|---|
| 1 | AC 400 V power supply |
| 2 | Terminal 04 |

Table 6.3

## NOTE!

**Connect terminal 05 on the VLT® AutomationDrive FC 302 to the AC 400 V power supply.**

## NOTE!

**Using a VLT® AutomationDrive FC 302 disconnect the bridge rectifier and connect the brake directly as follows:**

| | | FCD 302 |
|---|---|---|
| Brake | B1 | Terminal 122 (MBR+) |
| | B2 | Terminal 123 (MBR–) |

Table 6.4

The connection and use of the mechanical brake has been tested and released with VLT® AutomationDrive FC 302 and FCD 302. Any other inverter may require a different connection. Contact Danfoss Service for further information.

For information about parameter setting and programming when using a VLT AutomationDrive FC 302 or FCD 302, refer to the corresponding instruction manual.

## 6.2.5 Maintenance

### 6.2.5.1 Figure

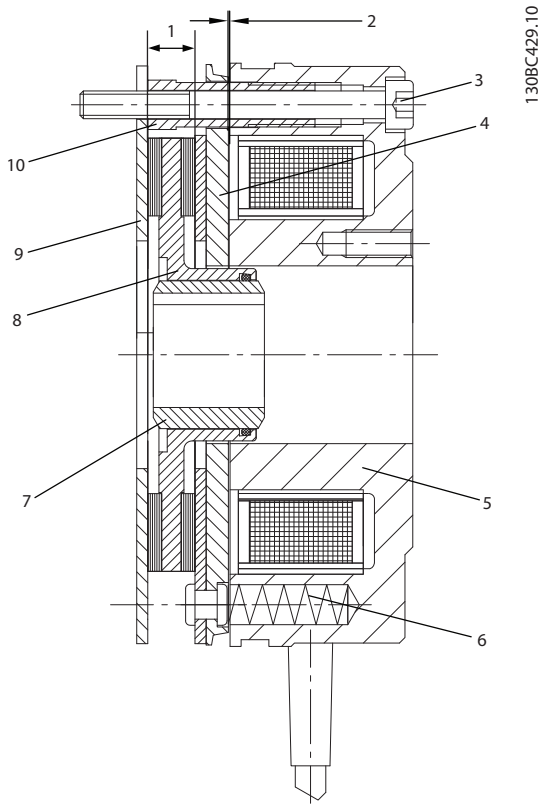


**Figure 6.5**

| | |
|---|---|
| 1 | Rotor width, minimum 0.217 in [5.5 mm] |
| 2 | Air gap, maximum 0.018 in [0.45 mm] |
| 3 | Fastening screws |
| 4 | Armature plate |
| 5 | Magnet |
| 6 | Springs |
| 7 | Hub for rotor |
| 8 | Rotor |
| 9 | Friction Plate |
| 10 | Hollow screws |

**Table 6.5**

### 6.2.5.2 Readjusting the Air Gap

The spring-applied brake is virtually maintenance-free. However, when the maximum air gap a(max) is reached, a re-adjustment will be required.

- Loosen the fastening screws (3) by turning them half a rotation counter-clockwise
- Turn the hollow screws (10) into the magnet body by turning them counter-clockwise
- Turn the fastening screws (3) clockwise into the motor flange until the nominal air gap is reached at 3 positions on the circumference
- Reset the hollow screws (10) by turning them out of the magnet body (clockwise) until locked against the counter-friction surface
- Tighten the fastening screws (3)
- Check that the air gap is correct

### 6.2.5.3 Replacing the Rotor

When the minimum rotor size s(min) is reached, a re-adjustment of the air gap a is no longer possible and the rotor has to be replaced.

- Loosen the fastening screws (3) by turning them half a rotation counter-clockwise
- Remove the retainer ring and replace the rotor (9) with a new one
- Fix the retainer ring again into the radial groove of the shaft and assemble the brake (see also chapter “readjusting the air gap”)
- Install the brake (also see chapter )
- Tighten the fastening screws

# CAUTION

**Even after the exchange of the rotor, the complete braking torque will only be effective after the brake linings at the rotor have been run in.**

### 6.2.5.4 Adjusting the Nominal Braking Torque and Replacing the Springs

The nominal braking torque can be adjusted and broken springs can be replaced. Follow the instruction in chapter to open the brake as reference for the nominal brake torque:

| Nominal braking torque in Nm | Number of springs |
|---|---|
| 10 | 7 |
| 7 | 5 |
| 6 | 4 |
| 4 | 3 |

Table 6.6

# Index

## R



## S



## T



## W