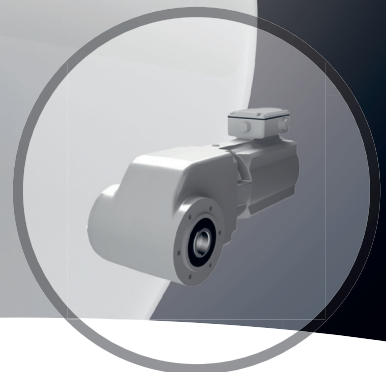




Operating Guide VLT[®] OneGearDrive



Contents

1 Introduction	4
1.1 Purpose of the Manual	4
1.2 Document Version	4
1.3 Disclaimer	4
1.4 Product Overview	4
1.4.1 Intended Use	4
1.5 Approvals	5
1.6 Disposal	5
1.7 Service and Support	5
2 Safety	6
2.1 Safety Symbols	6
2.2 Qualified Personnel	6
2.3 Due Diligence	6
2.4 Safety Precautions	6
3 Mechanical Installation	7
3.1 Unpacking	7
3.1.1 Items Supplied	7
3.2 Transportation	7
3.2.1 Inspection on Receipt	7
3.2.2 Transport	7
3.3 Protection Rating	7
3.4 Protective Coating	7
3.5 Mounting Arrangement	7
3.5.1 Mounting Procedure	8
3.6 Assembly Kit	9
3.7 Torque Restraint	11
3.8 Final Assembly	11
4 Electrical Installation	12
4.1 EMC-compliant Installation	12
4.2 Electrical Connection	12
4.3 Terminal Box	12
4.3.1 Connection	13
4.4 Cage Clamp Connection Diagram	14
4.5 CleanConnect® Connection Diagram	15
4.6 Overload Protection	15
5 Commissioning	16

5.1 Measures before Commissioning	16
5.1.1 Overview	16
5.1.2 Motor Component	16
5.1.3 Gear Unit Component	16
5.2 Commissioning Procedure	16
6 Maintenance, Diagnostics, and Troubleshooting	17
6.1 Maintenance	17
6.1.1 Replacing the Brake and Rotor	17
6.2 Inspection during Operation	18
6.3 Repair	18
6.4 Oil	19
6.4.1 Oil Changes	19
6.4.2 Oil Grade	19
6.4.3 Oil Volume	19
6.4.4 Changing the Oil	19
6.5 Spare Parts	20
7 Decommissioning	21
7.1 Dismounting	21
7.2 Product Returns	21
8 Specifications	22
8.1 Nameplate	22
8.2 Storage	22
8.2.1 Measures during Storage	22
8.2.2 Measures after Storage	22
8.3 Permanent Magnet 3-phase Synchronous Motor	22
8.4 Speed/Torque Characteristics	22
8.4.1 Ratio $i=31.13$	23
8.4.2 Ratio $i=14.13$	23
8.4.3 Ratio $i=5.92$	23
8.5 General Specifications and Environmental Conditions	24
8.6 Dimensions	25
8.6.1 VLT® OneGearDrive Standard	25
8.6.2 VLT® OneGearDrive Standard with Torque Arm in Front Position (Optional)	26
8.6.3 VLT® OneGearDrive Hygienic	26
8.6.4 VLT® OneGearDrive Hygienic with Torque Arm in Front Position (Optional)	28
8.7 Options	28
8.7.1 Torque Arm Set	28
8.7.2 Mechanical Brake	29

8.7.2.1 Overview	29
8.7.2.2 Technical Data	29
8.7.2.3 Dimensions	30
8.7.2.4 Connections	30
8.8 Accessories	31
8.8.1 Accessories for VLT® OneGearDrive Standard	31
8.8.2 Accessories for VLT® OneGearDrive Hygienic	31
9 Appendix	32
9.1 Glossary	32
9.2 Abbreviations and Conventions	32
9.2.1 Abbreviations	32
9.2.2 Conventions	33
Index	34

1 Introduction

1.1 Purpose of the Manual

The purpose of this operating guide is to describe the VLT® OneGearDrive. The operating guide contains information about:

- Safety.
- Installation.
- Commissioning.
- Maintenance and repair.
- Specifications.
- Options and accessories.

The VLT® OneGearDrive is available with 2 different motor types:

- LA10 (type code L09), service period since August 2015.
- V210 (type code L06), since August 2015.

Check the motor type on the nameplate.

NOTICE

If exchanging a OneGearDrive with LA10 motor type with a V210 motor type, always ensure to update the motor model in the VLT® AutomationDrive FC 302, see *chapter 8.3 Permanent Magnet 3-phase Synchronous Motor*. Contact Danfoss Service for further instructions.

NOTICE

For reasons of clarity, the instructions and safety information do not contain all information relating to all OneGearDrive types and cannot take into account every conceivable case of installation, operation, or maintenance. The information is limited to that which is required for qualified personnel in normal working situations. Contact Danfoss for further assistance.

This operating guide is intended for use by qualified personnel. Read this operating guide in full in order to use the OneGearDrive safely and professionally. Pay particular attention to the safety instructions and general warnings.

This operating guide is a part of the OneGearDrive and also contains important service information. Always keep this operating guide available with the OneGearDrive.

Compliance with the information in this operating guide is a prerequisite for:

- Trouble-free operation.
- Recognition of product liability claims.

Therefore, read this operating guide before working on or with the OneGearDrive.

VLT® is a registered trademark.

1.2 Document Version

This document is regularly reviewed and updated. All suggestions for improvement are welcome. *Table 1.1* shows the document version.

Edition	Remarks
MG75C6xx	Editorial update

Table 1.1 Document Version

1.3 Disclaimer

No liability is assumed for any damage or breakdown resulting from:

- Failure to observe the information in the instruction manuals.
- Unauthorized modifications to the VLT® OneGearDrive.
- Operator error.
- Improper work on or with the OneGearDrive.

1.4 Product Overview

1.4.1 Intended Use

The VLT® OneGearDrive is intended for commercial installations, unless otherwise expressly agreed. It complies 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. Increased safety precautions (for example protection against access by children's fingers) are required in special cases, such as use in non-commercial installations. Ensure these safety conditions when setting up the installation. The OneGearDrive is designed for ambient temperatures between -20 °C (68 °F) to 40 °C (104 °F) and for installation heights up to 1000 m (3280 ft) above sea level. Any deviations found on the nameplate must be considered. Ensure that the conditions at the place of work correspond to all the nameplate data.

CAUTION

Low-voltage machines are components for installation in machines in the sense of the machinery directive 2006/42/EC.

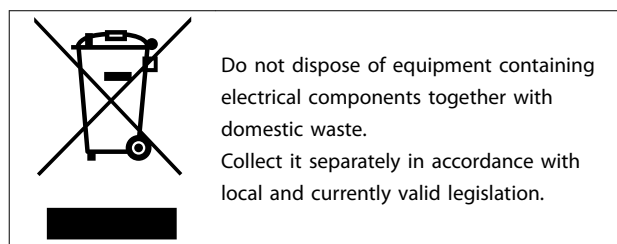
- Do not use the machine until conformity of the final product with this directive is established (refer to EN 60204-01).

Any use not expressly approved by Danfoss constitutes misuse. This also applies to failure to comply with the specified operating conditions and applications. Danfoss assumes no liability of any sort for damage attributable to improper use.

1.5 Approvals



1.6 Disposal



Dispose of oils as special waste.

1.7 Service and Support

Contact the local service representative for service and support:

vlt-drives.danfoss.com/Support/Service/

2 Safety

2.1 Safety Symbols

The following symbols are used in this guide:



Indicates a potentially hazardous situation that could result in death or serious injury.



Indicates a potentially hazardous situation that could result in minor or moderate injury. It can also be used to alert against unsafe practices.



Indicates important information, including situations that can result in damage to equipment or property.

2.2 Qualified Personnel

All necessary work on electric drive units must only be performed by adequately qualified personnel (for example electrical engineers as specified in draft EN 50110-1/DIN VDE 0105). The operating guide and other product documentation must be available during any corresponding work, and qualified personnel are obliged to abide by the instructions contained therein. Qualified personnel are persons who are authorized due to 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 measures and of the available life-saving equipment is also required.

Unqualified personnel are forbidden to work on the VLT® OneGearDrive.

2.3 Due Diligence

The operator and/or fabricator must ensure that:

- The OneGearDrive is only used as intended.
- The OneGearDrive is only operated in a perfect operational condition.
- The operating guide is always available near the OneGearDrive in complete and readable form.
- The OneGearDrive is only fitted, installed, commissioned, and maintained by adequately qualified and authorized personnel.
- Qualified personnel are regularly instructed on all relevant matters of occupational safety and environmental protection, as well as the contents of the operating guide and in particular the instructions it contains.
- The product markings and identification markings applied to the OneGearDrive, as well as safety and warning instructions, are not removed and are always kept in a legible condition.
- The national and international regulations regarding the control of machinery and equipment, which are applicable at the place of use, are complied with.
- The users always have all current information relevant to their interests about the OneGearDrive and its use and operation.

2.4 Safety Precautions



HIGH VOLTAGE

High voltage, which can lead to death or serious injury, is present on the connectors.

- Before working on the power connectors (disconnecting or connecting the cable to the VLT® OneGearDrive), disconnect the power supply to the frequency converter and wait for the discharge time to elapse (see the frequency converter *operating guide*).
- Installation, start-up, maintenance, and decommissioning must only be performed by qualified personnel.



DANGER OF BURNS

The surface of the OneGearDrive and the oil in the OneGearDrive can reach high temperatures during operation.

- Do not touch the OneGearDrive until it has cooled down.
- Do not carry out an oil change until the oil has cooled down sufficiently.

3 Mechanical Installation

3.1 Unpacking

3.1.1 Items Supplied

The items supplied with the VLT® OneGearDrive are:

- The OneGearDrive.
- The installation instructions.
- Eyebolt.
- Plastic cap for eyebolt opening.
- Hollow shaft cover with 3 washers and fixing screws.
- Disc and retaining ring.

3.2 Transportation

3.2.1 Inspection on Receipt

After receiving the delivery, immediately check whether the item supplied matches the shipping documents. Danfoss does not honor claims for faults registered later.

Register a complaint immediately:

- With the carrier, if there is visible transport damage.
- With the responsible Danfoss representative, if there are visible defects or the delivery is incomplete.

Commissioning may have to be suspended if the VLT® OneGearDrive is damaged.

3.2.2 Transport

Before transporting the VLT® OneGearDrive, ensure the eyebolt provided is firmly tightened down to its bearing surface. Only use the eyebolt to transport the OneGearDrive and not for lifting attached machines.

3.3 Protection Rating

The VLT® OneGearDrive range complies with EN 60529 and IEC 34-5/529.

The OneGearDrive Standard is suitable for use in aggressive areas and is supplied in protection rating IP67 as standard. The OneGearDrive Hygienic is rated for both IP67 and IP69K.

3.4 Protective Coating

NOTICE

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.

3.5 Mounting Arrangement

CAUTION

HIGH TORQUE AND FORCE

Depending on the reduction ratio, the VLT® OneGearDrive develops substantially higher torques and forces than high-speed motors of similar power. The installer is responsible for the mechanical protection depending on the back driving torques.

- Rate the mounts, substructure, and torque restraint for the high forces anticipated during operation. Secure them sufficiently against loosening.

Avoid as much vibration as possible when installing the OneGearDrive.

Observe the special instructions for installation locations with abnormal operating conditions (for example high ambient temperatures >40 °C (104 °F)). Ensure that the fresh air intake is not restricted by unsuitable installation or build-up of dirt.

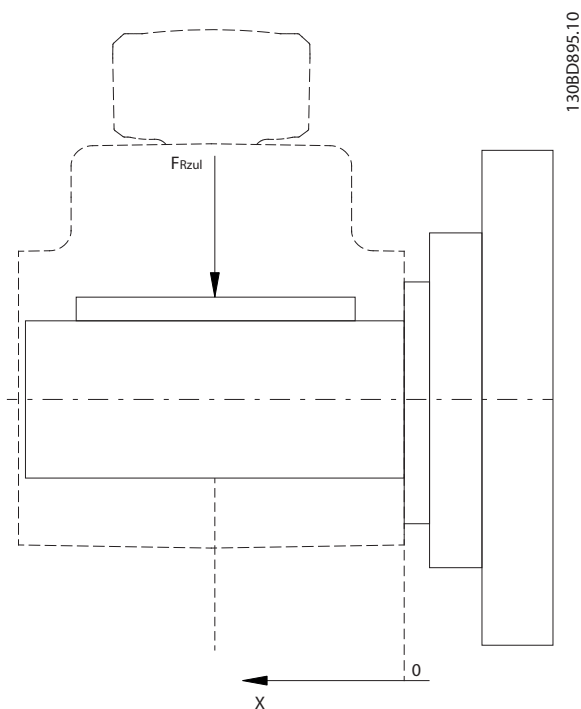
The surface temperature of the OneGearDrive is usually below 70 °C (158 °F) during operation. If unexpected overheating occurs, refer to *chapter 6.2 Inspection during Operation*.

With certain layouts (for example unventilated machines), temperatures on the surface may exceed the limits of DIN EN 563, but still be within the specified limits for the OneGearDrive. If the OneGearDrive is installed in a place where it is subject to intensive contact, the installer or operator must provide protective shielding.

Take care when fitting the shaft with keyway onto the hollow shaft of the OneGearDrive, which is finished to ISO H7. Use the tapped end hole intended for this purpose according to DIN 332.

3

The maximum force based on bearing life is detailed in Table 3.1.



3.5.1 Mounting Procedure

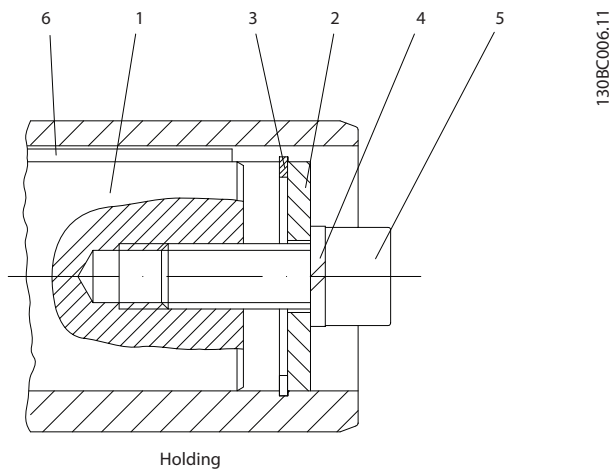
1. Fasten the VLT® OneGearDrive by its flange using the torque arm (see chapter 8.7.1 Torque Arm Set).
2. Attach the OneGearDrive on to the driven shaft using the means provided.

Up to n2 [RPM]	FRZUL [N] up to X [mm] ¹⁾				
	25	50	75	100	125
50	4319	3763	3335	2994	2716
100	3023	2634	2334	2096	1901
200	1727	1505	1334	1198	1086
360	1404	1223	1084	973	883

1) X is the distance from the surface of the hollow shaft to the force location.

Illustration 3.1 Maximum Force

3.6 Assembly Kit



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

Illustration 3.2 Assembly Kit

Type	Dimensions [mm]			
	Stainless steel retaining ring (3) DIN 472	Lock washer (4) DIN 7980	Fixing screw (5) DIN 912-8.8	Key (6) DIN 6885 Width x Height x Length
OGD-30	30x1.2	10	M10x30	A 8x7x100 ¹⁾
OGD-35	35x1.5	12	M12x35	A 10x8x100 ¹⁾
OGD-40	40x1.75	16	M16x35	A 12x8x100 ¹⁾

Table 3.1 Dimensions of Assembly Kit Items

1) Key length required for b_{min} is shown in Table 3.2. Adapt the key length according to the shaft length used (b) in Table 3.2.

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). Both items are included in every delivery.

The fixing screw (5) and lock washer (4) are not included in the delivery. The screws and washers required depend on the length and size of the shaft. For further information, refer to the mounting arrangement (see *chapter 3.5 Mounting Arrangement*).

3

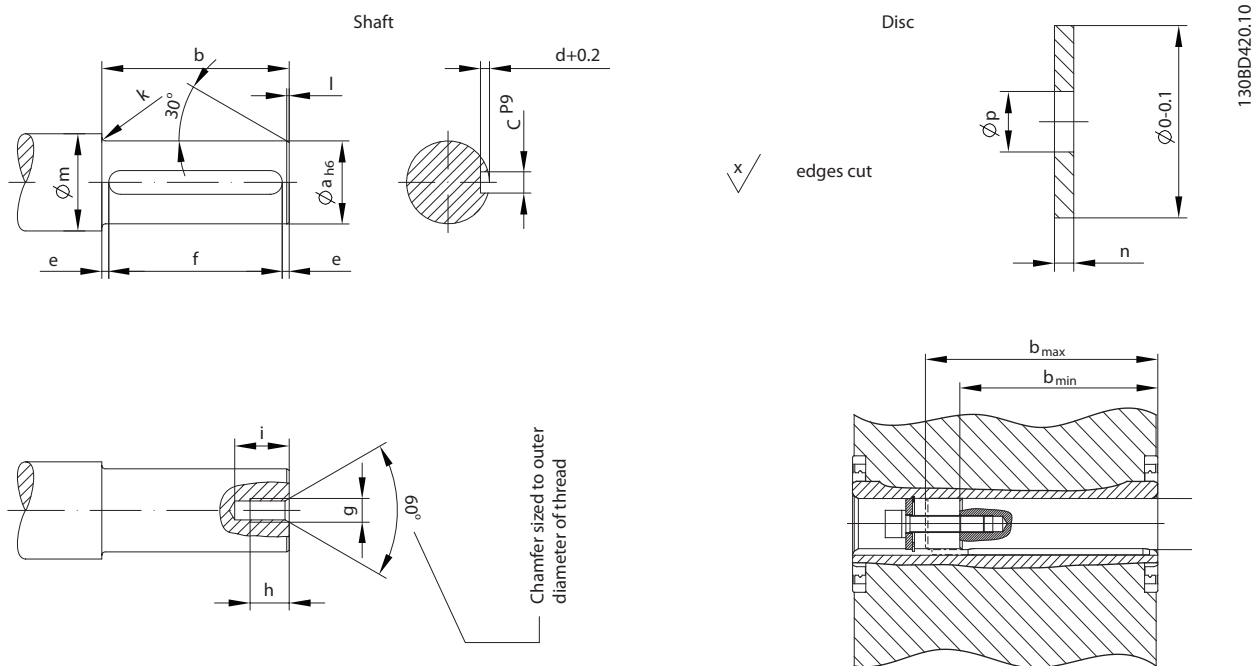


Illustration 3.3 Axial Fastening

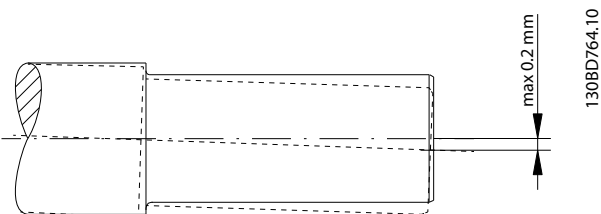


Illustration 3.4 Maximum Allowed Eccentricity of the Conveyor Shaft

Type	Dimensions [mm]															
	Shaft													Disc		
	a	b _{min}	b _{max}	c	d	e	f ¹⁾	g	h	i	k	l	m	n	o	p
OGD-30	30	120	140	8	4	5	100	M10	22	30	3	1.5	38	4	29.8	11
OGD-35	35	120	140	10	5	5	100	M12	28	37	3	1.5	43	4	34.8	13
OGD-40	40	120	140	12	5	5	100	M16	36	45	3	2	48	4	39.8	17

Table 3.2 Dimensions of the Shaft and Disc

1) Key length required for b_{min}. Adapt the key length according to the shaft length used (b).

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

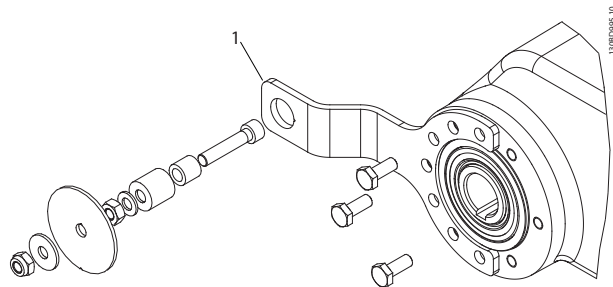
NOTICE

Use grease to mount the VLT® OneGearDrive onto the shaft. For example, CASTROL Obeen Paste NH1, ARAL Noco Fluid or similar. Always use a stainless steel key with the OneGearDrive and the stainless steel hollow shafts option.

3.7 Torque Restraint

The VLT® OneGearDrive requires a suitable torque restraint to resist the reaction torque. The torque arm with mounting set is available as an option (see *chapter 8.7.1 Torque Arm Set*). Ensure that the torque arm does not create excessive constraining forces, for example due to the driven shaft running untrue. Excessive backlash can result in excessive shock torques in switching or reversing operations.

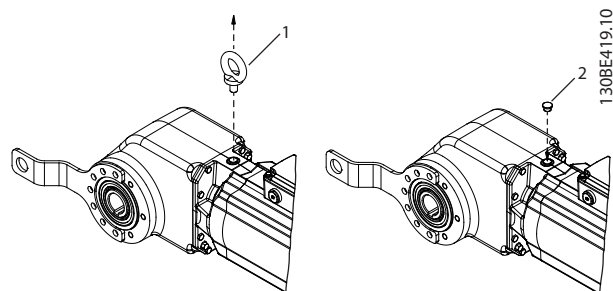
3.8 Final Assembly



1	Torque arm (optional)
---	-----------------------

Illustration 3.5 Final Assembly

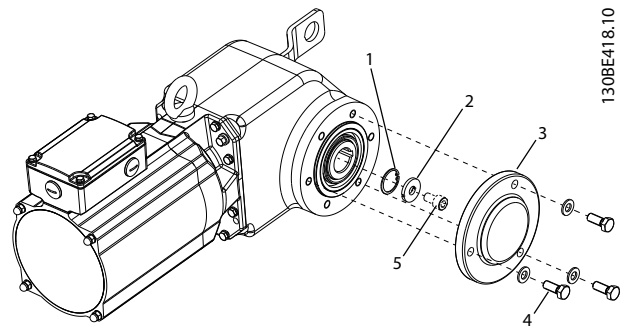
1. Remove the red plastic screw if installed.
2. Remove the eyebolt (1) and cover the hole with the plastic cap (2) as shown in *Illustration 3.6*. This ensures the hygienic features of a smooth surface.



1	Eyebolt
2	Plastic cap

Illustration 3.6 Exchanging the Eyebolt with the Plastic Cap after Installation

3. Assemble the VLT® OneGearDrive to the shaft with the assembly kit as shown in *Illustration 3.7*.



1	Retaining ring
2	Disk
3	Shaft cover
4	Shaft cover screws
5	Screw (not included)

Illustration 3.7 Assembly of the Mounting Arrangement and the Hollow Shaft Cover

4. Assemble the hollow shaft cover (3) onto the OneGearDrive using the 3 shaft cover screws (4).
 - 4a Fasten the screws by hand.
 - 4b Using a flat spanner, turn the screws 180° clockwise. The tightening torque is 4.5 Nm (39.8 in-lb).

4 Electrical Installation

4.1 EMC-compliant Installation

To guarantee electromagnetic compatibility (EMC) as defined in EMC Directive 2014/30/EU, all signal lines must use shielded cables. The frequency converter *operating guide* indicates whether a shielded cable is necessary for the motor supply line.

Adhere to the following instructions:

- Ground the cable sheath at both ends.
- Ensure that hybrid cables are double-shielded.
- Always use shielded cables when laying signal cables and power cables parallel to each other.
- Ensure that the cable shields are connected to the terminal box.

NOTICE

It is not necessary to shield brake cables if they are laid alongside the power cable.

NOTICE

When using a brake option, use a frequency converter with a mains filter.

4.3 Terminal Box

Feed the motor cables (motor with or without brakes) into the motor terminal box and connect them.

Ensure a perfect seal when closing the terminal box.

The operation of the low voltage machine in its intended application must meet the protection requirements of the EMC (electromagnetic compatibility) Directive 2014/30/EU. Correct installation (for example, shielded cables) is the responsibility of the system's installers. For systems with frequency converters and rectifiers, the manufacturer's electromagnetic compatibility information must also be considered. The electromagnetic compatibility directive in accordance with IEC/EN 61800-3 is complied with given proper use and installation of the VLT® OneGearDrive. This is also true in combination with Danfoss frequency converters and rectifiers.

4.2 Electrical Connection

When connecting the motor, take note of the nameplate data, the connection diagram, and the relevant safety regulations and rules for the prevention of accidents. Unless a special design is concerned, the data on the nameplate refers to:

- A voltage tolerance of $\pm 5\%$.
- An ambient temperature of -20 to $+40$ °C (-4 to $+104$ °F).
- Altitudes up to 1000 m (3280 ft) above sea level.

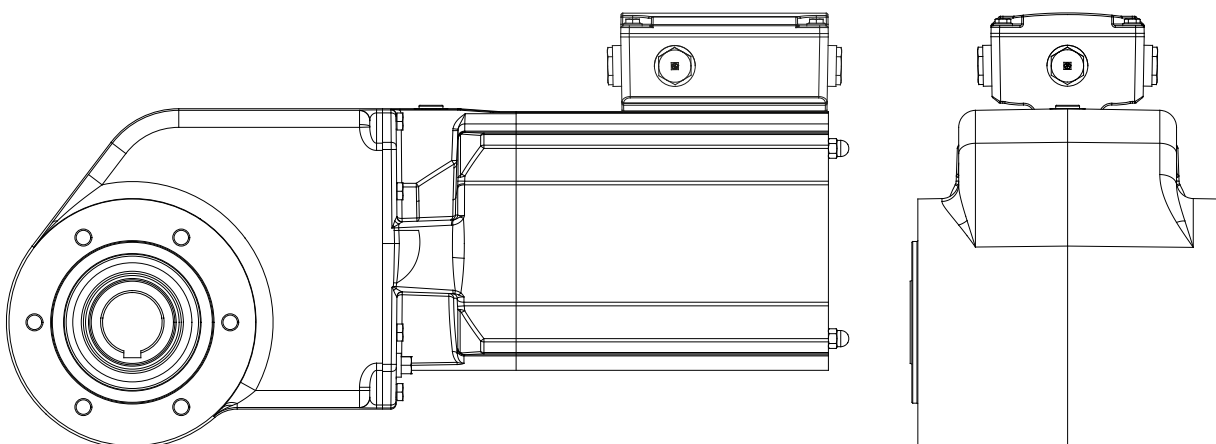
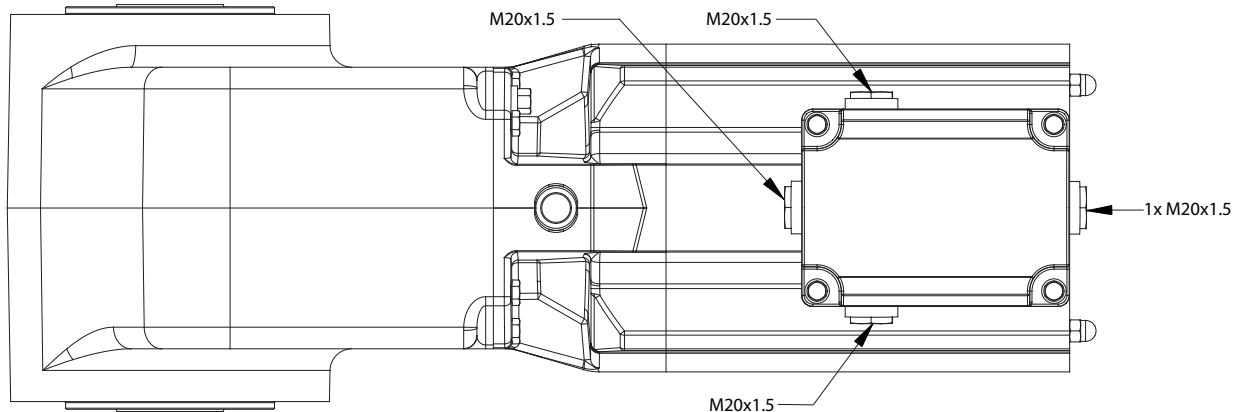


Illustration 4.1 Terminal Box

NOTICE

Never alter the position of the terminal box or open any screws unless instructed to in this operating guide. Doing so can damage the VLT® OneGearDrive and invalidate the warranty.

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



130BC003.12

4

Illustration 4.2 Terminal Box Screws

4.3.1 Connection

Ensure that the power is switched off before opening the terminal box. The information on voltage and frequency on the nameplate must correspond with the mains voltage under observance of the terminal circuit. Exceeding the tolerances as in EN 60034/DIN VDE 0530, that is, voltages $\pm 5\%$, frequency $\pm 2\%$, cam form, symmetry, increases heating and reduces service life.

Observe any accompanying connection diagrams, particularly for special equipment (for example, thermistor protection). The type and cross-section of the main conductors, as well as 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 VLT® OneGearDrive against overload and, in dangerous situations, against unintended starts. Lock the terminal box again to protect against contact with live components.

CAUTION**RISK OF SHORT CIRCUITS**

Short circuits can occur if water penetrates through the cables into the terminal box. The installed end caps on the terminal box support the IP protection rating of the OneGearDrive (see also *chapter 3.3 Protection Rating*).

- Always use the adequate sealed components when removing the end caps and plugging the wire connection.
- Always ensure that the terminal box is closed properly.

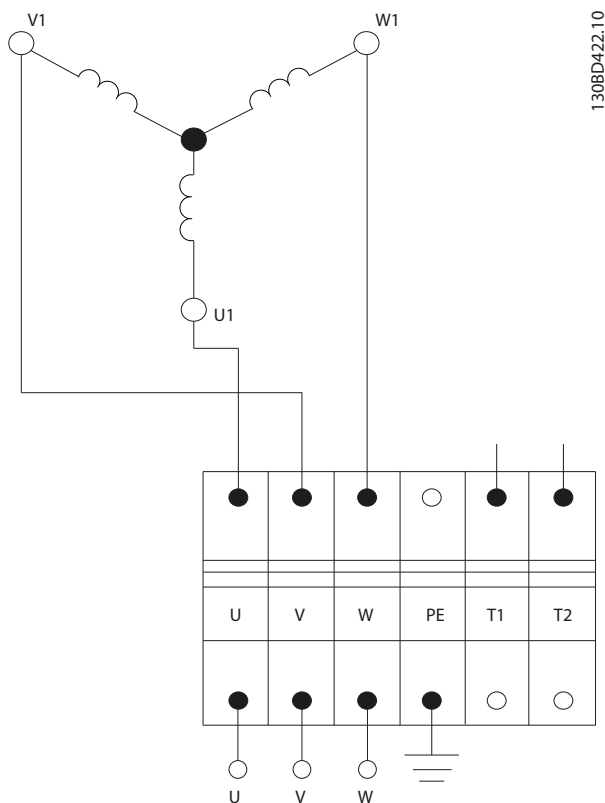
NOTICE

Refer to the operating guides for VLT® AutomationDrive FC 302 and VLT® Decentral Drive FCD 302 to connect the terminals.

Do not connect the OneGearDrive directly to the supply.

4.4 Cage Clamp Connection Diagram

Illustration 4.3 shows the VLT® OneGearDrive V210 with terminal box in Y-connection and the connection to the thermal protection.



130BD422.10

4

Illustration 4.3 Cage Clamp Connection Diagram

Description	Inverter output	Color	Typical cross-section	Maximum cross-section ²⁾
Motor winding	U	Black	1.5 mm ² /AWG 16	4 mm ² /AWG 12
	V	Blue		
	W	Brown		
Protective earth	PE	Yellow/green	1.5 mm ² /AWG 16	4 mm ² /AWG 12
Temperature protection ¹⁾ KTY 84-130	T1	White	0.75 mm ² /AWG 20	1.5 mm ² /AWG 16
	T2	Brown		

Table 4.1 Cage Clamp Connections

1) When connected to VLT® AutomationDrive FC 302 and VLT® Decentral Drive FCD 302, use analog input terminal 54, KTY sensor 1. For information about parameter setting and programming, refer to the corresponding operating guides.

2) Do not use the maximum allowed cross-section with a cable lug.

T1		VLT® AutomationDrive FC 302 ¹⁾	VLT® Decentral Drive FCD 302 ¹⁾
T2	KTY 84-130	KTY sensor 1 Analog input 54	

Table 4.2 Connections T1 and T2

1) Only if connected.

NOTICE

After connection, tighten all 4 screws on the terminal box cover. The tightening torque is 3 Nm (26.6 in-lb).

4.5 CleanConnect® Connection Diagram

Illustration 4.4 shows the connection power plug for VLT® OneGearDrive Hygienic V210 in Y-connection with thermistors.

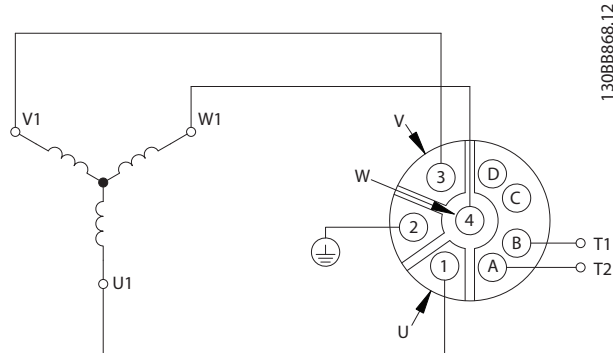


Illustration 4.4 CleanConnect® OneGearDrive Connection Diagram

Description	Inverter output	Pin	Typical cross-section	Maximum cross-section
Motor winding	U	1	1.5 mm ² /AWG 16	2.5 mm ² /AWG 14
	V	3		
	W	4		
Protective earth	PE	2	1.5 mm ² /AWG 16	2.5 mm ² /AWG 14
Temperature protection ¹⁾ KTY 84-130	T1	A	0.75 mm ² /AWG 20	1.5 mm ² /AWG 16
	T2	B		

Table 4.3 CleanConnect® OneGearDrive Connection

1) When connected to VLT® AutomationDrive FC 302 and VLT® Decentral Drive FCD 302, use analog input terminal 54, KTY sensor 1. For information about parameter setting and programming, refer to the corresponding operating guides.

T1		VLT® AutomationDrive FC 302 ¹⁾	VLT® Decentral Drive FCD 302 ¹⁾
T2	KTY 84-130	KTY sensor 1 Analog input 54	

Table 4.4 Connections T1 and T2

1) Only if connected.

4.6 Overload Protection

Take note of the relevant circuit diagram for motors with thermally activated winding protection (see chapter 4.4 Cage Clamp Connection Diagram).

For thermal protection, the built-in KTY sensor can be connected. Alternatively, the ETR function of the VLT® AutomationDrive FC 302 or VLT® Decentral Drive FCD 302 can be used.

5 Commissioning

5.1 Measures before Commissioning

5.1.1 Overview

If the VLT® OneGearDrive has been stored, take the measures detailed in *chapter 5.1.2 Motor Component* and *chapter 5.1.3 Gear Unit Component*.

5.1.2 Motor Component

Insulation measurement

Measure the insulation resistance of the winding with a commercially available measuring tool (for example, megger) between all winding parts and between the winding and the enclosure.

Measured value	Action/state
>50 MΩ	No drying necessary, new condition
<5 MΩ	Drying advised
approximately 50 MΩ	Lowest allowed threshold

Table 5.1 Insulation Measurement Values

5.1.3 Gear Unit Component

- **Oil**
Change the oil in the VLT® OneGearDrive if the storage period exceeds 5 years or the temperatures were harsh throughout a shorter storage period. For detailed instructions and oil recommendations, see *chapter 6.4.3 Oil Volume*.
- **Shaft seals**
Lubricate the hollow shaft seal with grease if the storage period exceeds 2 years. When changing the oil, check the function of the shaft seals between the motor and gear unit and on the output shaft. Replace the shaft seals if any change in shape, color, hardness, or sealing defect is detected.

5.2 Commissioning Procedure

1. Remove the protective films.
2. Disconnect the mechanical connection to the driven machine as far as possible and examine the direction of rotation in the no-load state.
3. Remove the feather keys or secure them in such a way that they cannot be ejected.
4. Ensure that the current draw in the loaded condition does not exceed the rated current indicated on the nameplate for any length of time, refer to *chapter 8.4 Speed/Torque Characteristics* and *chapter 9.1 Glossary*.
5. After first commissioning, observe the OneGearDrive for at least 1 hour to detect any unusual heat or noise.

6 Maintenance, Diagnostics, and Troubleshooting

⚠ WARNING

HIGH VOLTAGE

High voltage, which can lead to death or serious injury, is present on the connectors.

- Before working on the power connectors (disconnecting or connecting the cable), disconnect the power supply module from the mains and wait for the discharge time to elapse.
- Installation, start-up, maintenance, and decommissioning must be performed by qualified personnel only.

⚠ CAUTION

DANGER OF BURNS

Depending on the operating point, the surface of the VLT® OneGearDrive and the oil in the drive can reach high temperatures.

- Do not touch the OneGearDrive until it has cooled down.
- Do not carry out an oil change until the oil has cooled down sufficiently.

6.1 Maintenance

To prevent breakdown, danger, and damage, examine the VLT® OneGearDrive at regular intervals depending on the operating conditions. Replace worn or damaged parts using original spare parts or standard parts.

Contact the local service representative for service and support:

vlt-drives.danfoss.com/Support/Service/

The OneGearDrive has a low rate of maintenance. The maintenance tasks listed in *Table 6.1* may be performed by the customer. No other tasks are required.

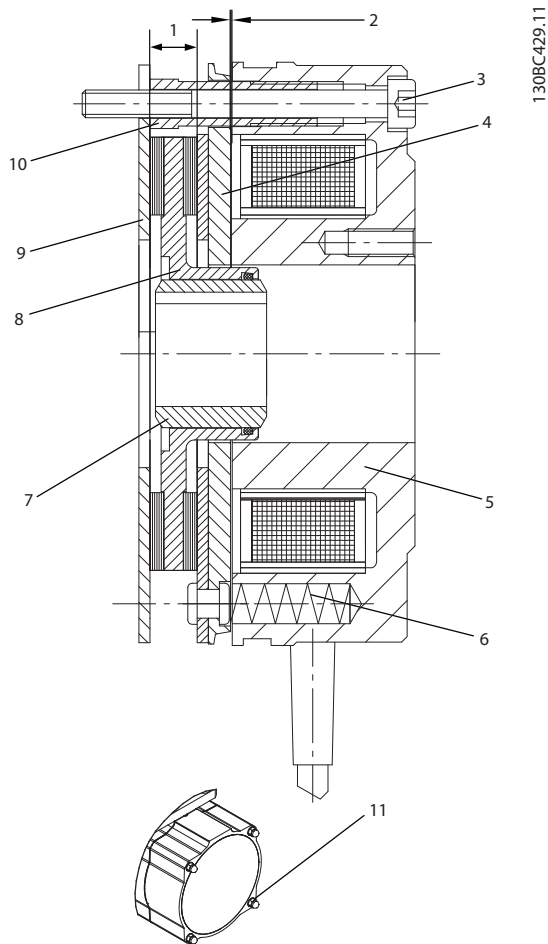
Component	Maintenance task	Maintenance interval	Instruction
OneGearDrive	Check for abnormal noise and vibration.	Every 6 months.	Contact Danfoss Service.
Protective coating	Check for damage.	Every 6 months.	Repair damage using the Danfoss paint repair set.
Hollow shaft seal (stainless steel shaft)	Check the condition and check for leakage.	Every 6 months.	If damaged, replace with a Viton seal.
Hollow shaft seal (mild steel shaft)	Check the condition and check for leakage.	Every 6 months.	If damaged, replace with an NBR seal.
Oil	Change the oil.	Standard oil: After 25000 hours run. Food grade oil: After 35000 hours run.	See <i>chapter 6.4.4 Changing the Oil.</i>
	Check for oil leakage on gear and motor housing.	Every 12 months.	Replace the OneGearDrive.

Table 6.1 Overview of Maintenance Tasks

6.1.1 Replacing the Brake and Rotor

All work must only be carried out by qualified technical personnel on a stationary machine that has been protected against restarting. This also applies to auxiliary circuits.

6.1.1.1 Illustration



1	Rotor width, minimum 5.5 mm (0.2 in)
2	Air gap, maximum 0.45 mm (0.02 in)
3	Fastening screws
4	Armature plate
5	Magnet
6	Springs
7	Hub for rotor
8	Rotor
9	Friction plate
10	Hollow screws
11	Brake cover and nuts

Illustration 6.1 Brake and Rotor

1. Disconnect the brake from the rectifier (see chapter 8.7.2.4 Connections).
2. Open the brake completely by turning the brake cover nuts (11) counterclockwise.
3. Loosen the fastening screws (3) completely by turning them counterclockwise.
4. Remove the installed brake and rotor from the hub of the rotor (7).

5. Assemble the new brake and rotor on the hub of the rotor (7).
6. Tighten the fastening screws (3).
7. Close the brake cover and tighten the covering nuts (11).
8. Connect the brake to the rectifier (see chapter 8.7.2.4 Connections).

NOTICE

After the rotor has been exchanged, the complete brake power is only effective after the brake linings at the rotor have been run in. Check the brake cover seal before closing it and exchange the seal if any damage is detected.

6.2 Inspection during Operation

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

Carry out regular inspections during operation. Check the VLT® OneGearDrive at regular intervals for anything unusual.

Pay particular attention to:

- Unusual noises.
- Overheated surfaces (temperatures up to 70 °C (158 °F) may occur in normal operation), see chapter 8.4 Speed/Torque Characteristics.
- Uneven running.
- Strong vibrations.
- Loose fastenings.
- Condition of electrical wiring and cables.
- Poor heat dispersion.

Overheated surfaces can be caused by wrong gearbox selection or wrong parameter set-up in the frequency converter. If irregularities or problems occur, contact Danfoss Service.

6.3 Repair

NOTICE

Always return defective VLT® OneGearDrives to the local Danfoss sales company.

6.4 Oil

6.4.1 Oil Changes

The VLT® OneGearDrive is supplied with oil ready for operation.

The oil change period in part load is up to 35000 hours run (for motor characteristics at different loads, see *chapter 8.4 Speed/Torque Characteristics*). The oil change interval is based on normal operating conditions and an oil temperature of approximately 70 °C (158 °F). The oil change interval must be reduced at higher temperatures (halve the interval for for each 10 K increase in the oil temperature).

The OneGearDrive has drain and filling plugs that make it possible to change the oil without disassembly.

When changing the oil, inspect and, if necessary, replace the seals.

Flush the OneGearDrive if the oil grade or oil type is changed.

Flushing the OneGearDrive

See *chapter 6.4.4 Changing the Oil*.

6.4.2 Oil Grade

The filled oil type is specified on the nameplate. Danfoss uses food grade oils that comply with NSF H1.

Do not mix different oil types as this may impair the characteristics of the oil.

Contact Danfoss for further information on oil types.

6.4.3 Oil Volume

The recommended oil quantity for the particular mounting position is indicated on the motor nameplate. When filling, ensure that the upper gear unit components are also lubricated.

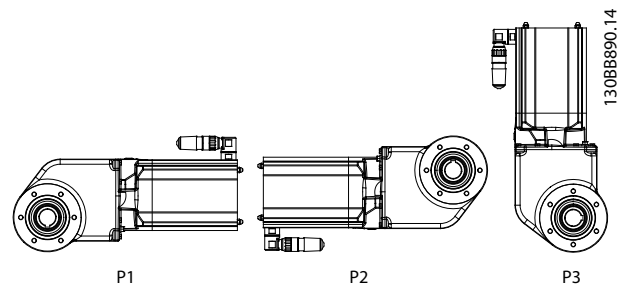


Illustration 6.2 Mounting Positions

	Mounting position		
	P1 ¹⁾	P2	P3
Oil volume for OneGearDrive [l (fl oz)]	2.2 (74.4)		3.1 (105)

Table 6.2 Oil Volume in Litres

1) P1 is no longer available in the Danfoss DRIVECAT configurator. Use P2 also for P1 installations.

6.4.4 Changing the Oil

CAUTION

DANGER OF BURNS

The surface of the VLT® OneGearDrive and the oil in the OneGearDrive can reach high temperatures during operation.

- Do not touch the OneGearDrive until it has cooled down.
- Do not carry out an oil change until the oil has cooled down sufficiently.

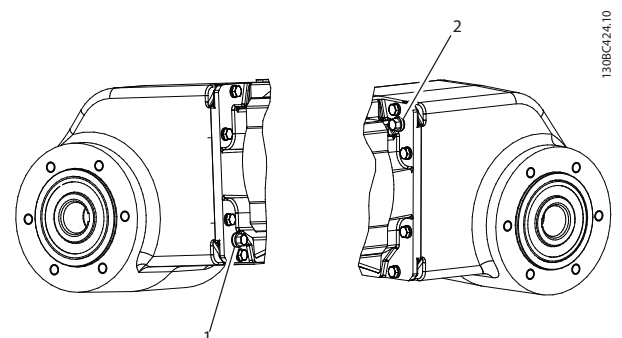


Illustration 6.3 OneGearDrive Oil Screws 1 and 2

Draining the oil

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

Filling the oil

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

NOTICE

The required oil quantities can be found on the nameplate and in *chapter 6.4.3 Oil Volume*.

6.5 Spare Parts

Spare parts can be ordered via the Danfoss VLT Shop:
vltshop.danfoss.com

7 Decommissioning

⚠ WARNING

HIGH VOLTAGE

Potentially lethal voltage is present on the connectors, which can lead to death or serious injury.

- Before working on the power connectors (disconnecting or connecting the cable to the VLT® OneGearDrive), disconnect the supply to the frequency converter and wait for the discharge time to elapse (see the frequency converter *operating guide*).
- Installation, start-up, maintenance, and decommissioning must only be performed by qualified personnel.

⚠ CAUTION

DANGER OF BURNS

Depending on the operating point, the surface of the OneGearDrive and the oil in the OneGearDrive can reach high temperatures.

- Do not touch the OneGearDrive until it has cooled down.
- Do not carry out an oil change until the oil has cooled sufficiently.

7.1 Dismounting

1. Disconnect the supply to the frequency converter and wait for the discharge time to elapse (see the frequency converter *operating guide*).
2. Remove the electrical cable from the frequency converter to the VLT® OneGearDrive.
3. Dismount the OneGearDrive.

7.2 Product Returns

Danfoss products can be returned for disposal at no charge. A prerequisite for this is that they are free of deposits, such as oil, grease, or other types of contamination that hampers disposal.

Furthermore, foreign materials or third-party components cannot be included with the returned product.

Ship the products free on board to the local Danfoss sales company.

8 Specifications

8.1 Nameplate

The nameplate on the VLT® OneGearDrive is corrosion-proof. It is made of a special plastic, approved for hazardous areas by the Physikalisch-Technische-Bundesanstalt (PTB).

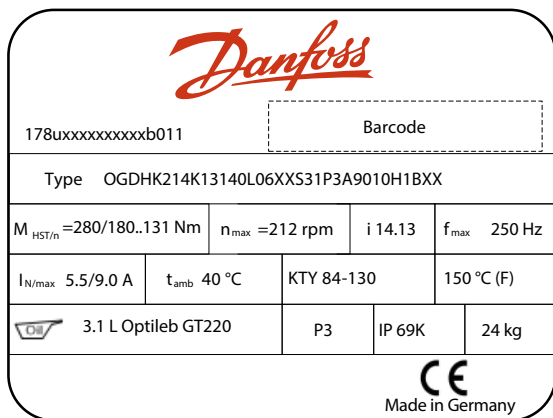


Illustration 8.1 Example Nameplate

8.2 Storage

If the VLT® OneGearDrive is to be stored, ensure a dry, dust free, and well-ventilated environment. If the temperature in the storage space exceeds the normal range of -20 °C (-4 °F) to 40 °C (+104 °F) for an extended period or varies frequently, employ the measures before start-up specified in *chapter 5.1 Measures before Commissioning*, even after short storage times.

Damage sustained during storage:

- The life of the oils and seals is reduced with longer storage times.
- There is a risk of fracture at low temperatures (under approximately -20 °C (-4 °F)).

If the 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 strongly on local conditions, therefore the time period stated is only a guiding value. 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 operating guide must be observed.

8.2.1 Measures during Storage

Turn the VLT® OneGearDrive 180° every 12 months so that the oil in the gear unit covers the bearings and gearwheels that were previously positioned on top. Also, turn the output shaft manually to churn the rolling-contact bearing grease and distribute it evenly.

8.2.2 Measures after Storage

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

Check that the VLT® OneGearDrive contains the correct amount of oil and confirm the right mounting position, see the instructions in *chapter 6.4.4 Changing the Oil*.

8.3 Permanent Magnet 3-phase Synchronous Motor

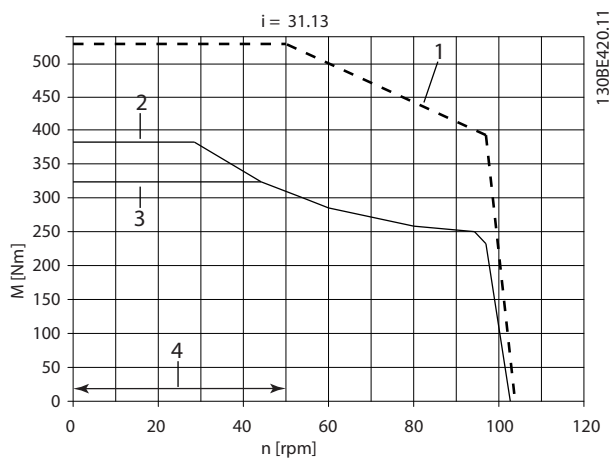
	V210	LA10
Rated torque	13 Nm (115 in-lb)	12.6 Nm (111.5 in-lb)
Rated current	5.5 A	7.2 A
Rated speed	3000 RPM	3000 RPM
Rated frequency	250 Hz	250 Hz
Motor circuit	Y	Y
Stator resistance (Rs)	1.0 Ω	0.5 Ω
Inductivity – D axis (Ld)	13.5 mH	5 mH
Motor poles (2p)	10	10
Inertia moment	0.0043 Kgm ²	0.0043 Kgm ²
Back EMF constant (ke)	155 V/1000 RPM	120 V/1000 RPM
Torque constant (kt)	2.35 Nm/A (20.8 in-lb/A)	1.75 Nm/A (15.5 in-lb/A)

Table 8.1 Specifications

8.4 Speed/Torque Characteristics

For more details, see the *VLT® OneGearDrive Fact Sheet*.

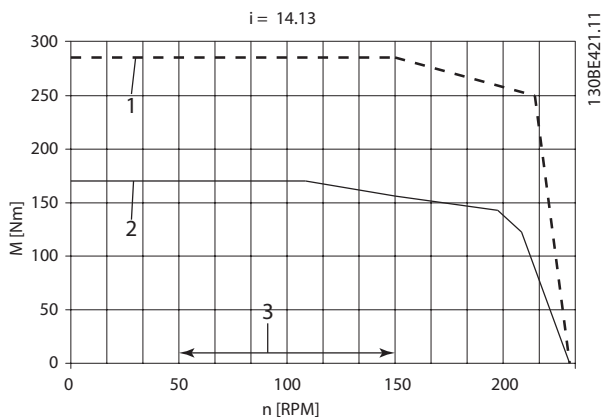
8.4.1 Ratio $i=31.13$



1	Maximum high starting torque, M_{HST} (maximum 3 s, 10 cycles/h)
2	Maximum torque in part load operation
3	Maximum nominal torque, M_n
4	Typical operating range

Illustration 8.2 Ratio $i=31.13$

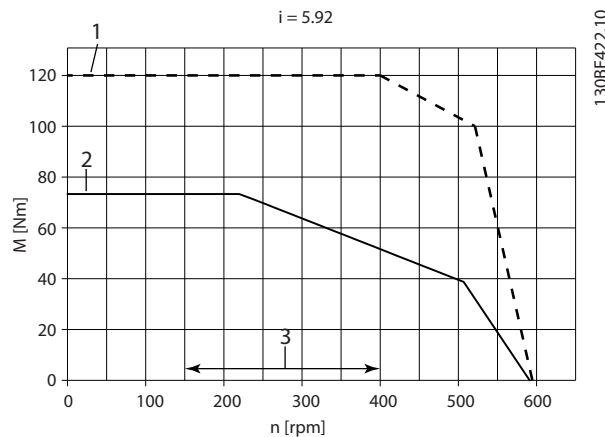
8.4.2 Ratio $i=14.13$



1	Maximum high starting torque, M_{HST}
2	Maximum nominal torque, M_n
3	Typical operating range

Illustration 8.3 Ratio $i=14.13$

8.4.3 Ratio $i=5.92$



1	Maximum high starting torque, M_{HST}
2	Maximum nominal torque, M_n
3	Typical operating range

Illustration 8.4 Ratio $i=5.92$

i	n_{max}	I_{max}	I_N	M_{HST}		M_n		M_{max}	
5.92	507 RPM	9.0 A	5.5 A	120 Nm (at n 0..400 RPM)	100 Nm at n_{max}	75 Nm (at n 0..255 RPM)	40 Nm at n_{max}	75 Nm (at n 0..255 RPM)	40 Nm at n_{max}
14.13	212 RPM	9.0 A	5.5 A	280 Nm (at n 0..150 RPM)	250 Nm at n_{max}	180 Nm (at n 0..120 RPM)	131 Nm at n_{max}	180 Nm (at n 0..120 RPM)	131 Nm at n_{max}
31.13	96 RPM	7.2 A	5.5 A	520 Nm (at n 0..50 RPM)	400 Nm at n_{max}	320 Nm (at n 0..45 RPM)	255 Nm at n_{max}	380 Nm (at n 0..45 RPM)	255 Nm at n_{max}

Table 8.2 Speed Torque Values

8.5 General Specifications and Environmental Conditions

Installation elevation	Refer to the design guide for the installed frequency converter.
Maximum backlash of gearbox unit	$\pm 0.07^\circ$

Table 8.3 General Specifications and Environmental Conditions

8.6 Dimensions

8.6.1 VLT® OneGearDrive Standard

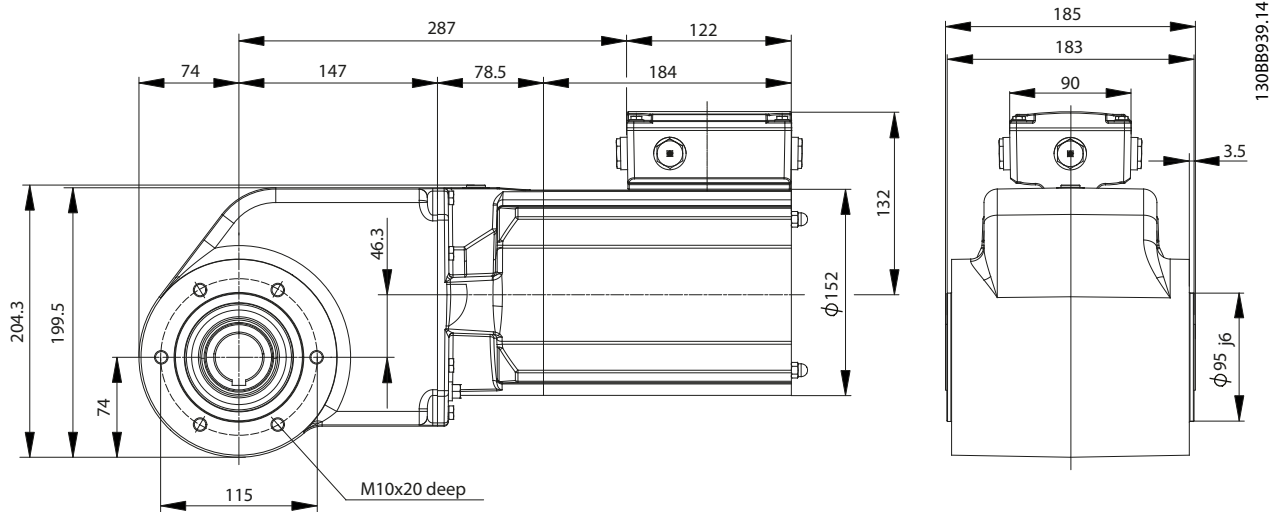


Illustration 8.5 OneGearDrive Standard

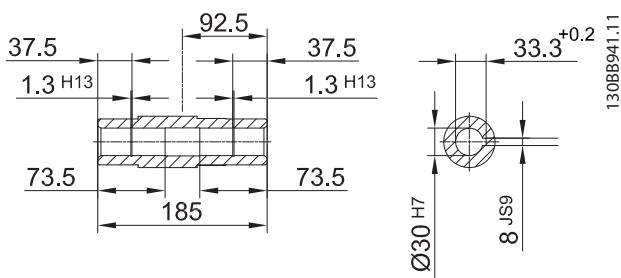


Illustration 8.6 Steel/Stainless Steel 30

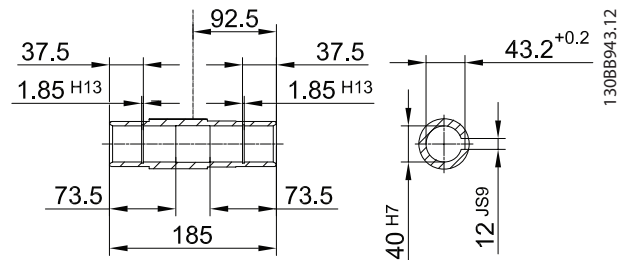


Illustration 8.8 Steel/Stainless Steel 40

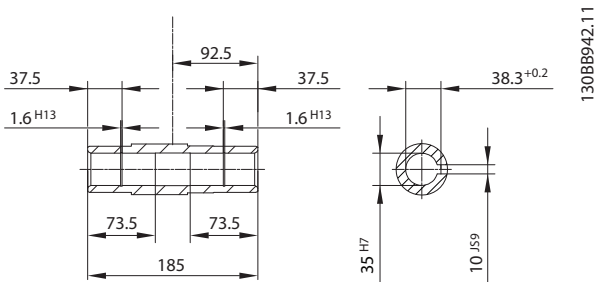
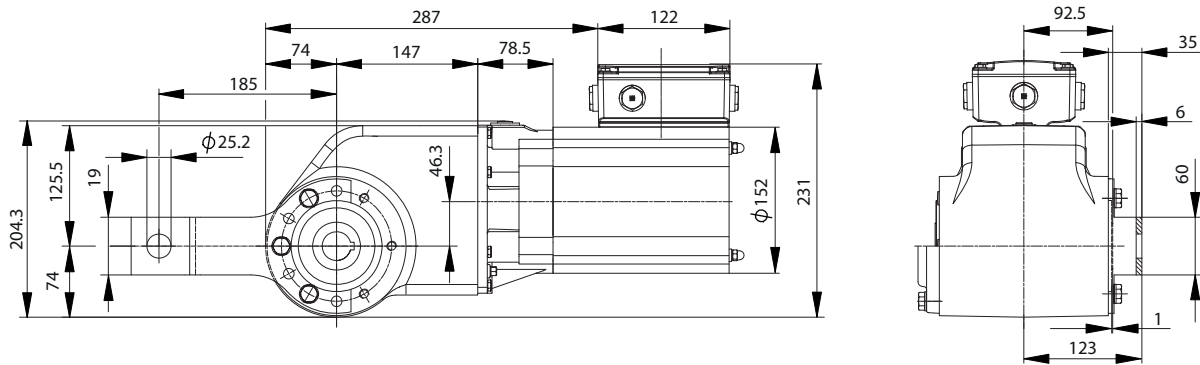


Illustration 8.7 Steel/Stainless Steel 35

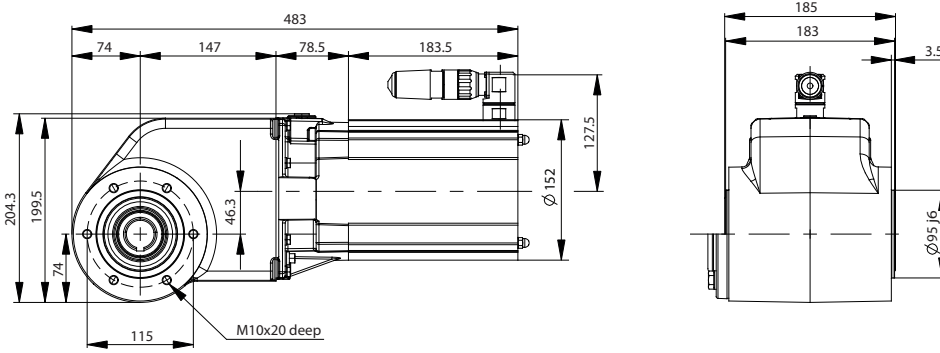
8.6.2 VLT® OneGearDrive Standard with Torque Arm in Front Position (Optional)



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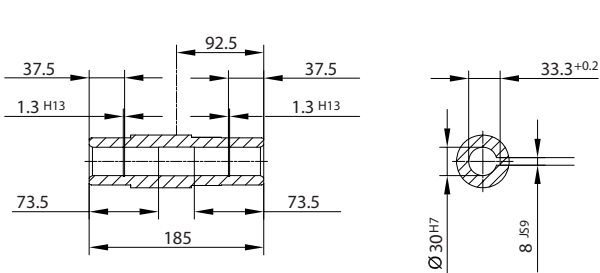
Illustration 8.9 Torque Arm in Front Position

8.6.3 VLT® OneGearDrive Hygienic



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Illustration 8.10 OneGearDrive Hygienic



1308B935.12

Illustration 8.11 Stainless Steel 30

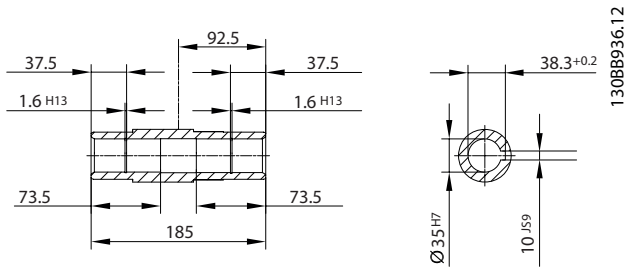


Illustration 8.12 Stainless Steel 35

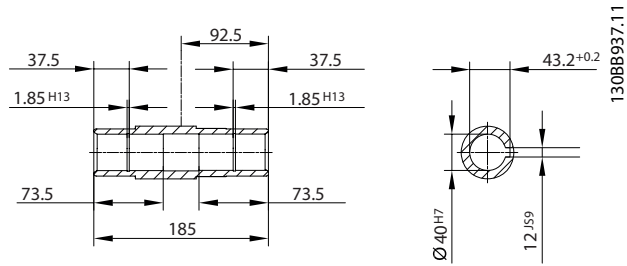


Illustration 8.13 Stainless Steel 40

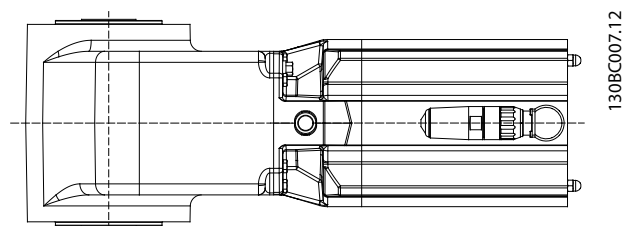


Illustration 8.14 Connector Position

NOTICE

Never turn the CleanConnect® plug from the delivered position and do not use it to lift the OneGearDrive. If the plug is rotated, the cables could be damaged, causing a short circuit. Contact Danfoss Service if the plug is not fastened tightly.

8.6.4 VLT® OneGearDrive Hygienic with Torque Arm in Front Position (Optional)

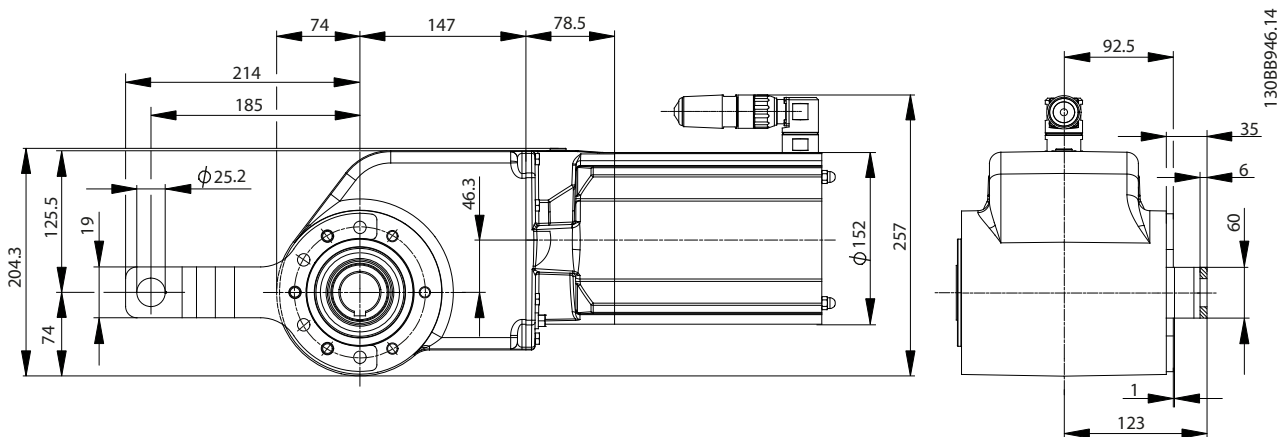


Illustration 8.15 Torque Arm in Front Position

8

8.7 Options

8.7.1 Torque Arm Set

Part number: 178H5006

The torque arm set consists of the torque arm (see *Illustration 8.16*) and the mounting set (see *Illustration 8.17*).

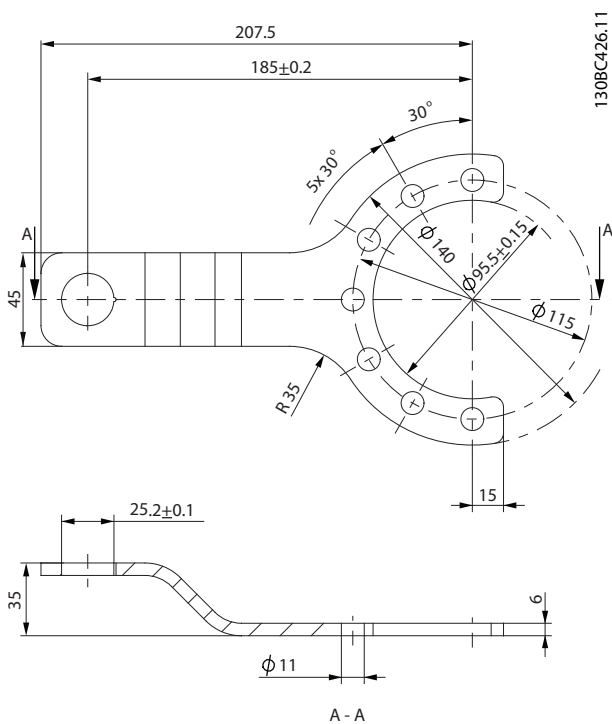
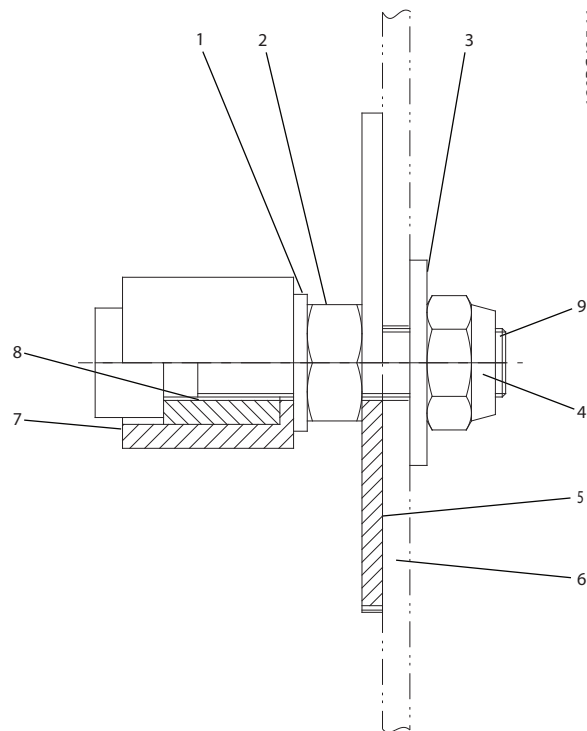


Illustration 8.16 Torque Arm



Position	Description	Specification
1	Disc	DIN 125-A10 5
2	Nut	DIN 934 M10
3	Disc	DIN 9021 10, 5x30x25
4	Nut	DIN 985 M10
5	Disc	Ø73x3 stainless steel
6	Customer frame	-
7	Barrel	POM-C white
8	Bushing	Stainless steel
9	Screw	Stainless steel

Illustration 8.17 Mounting Set

NOTICE

The set also contains 3xDIN 933, M10x25, 8.8, stainless steel screws. The tightening torque is 49 Nm (433.7 in-lb).

NOTICE

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 onto the conveyor frame.

8.7.2 Mechanical Brake

8.7.2.1 Overview

The VLT® OneGearDrive Standard is available with a 180 V DC/400 V AC brake option. This mechanical brake option is intended for emergency stop and park brake duty. Normal braking of a load is still controlled by the frequency converter dynamic brake.

Spring-loaded brakes are safety brakes that continue to work in the event of power failure or usual wear. Since other components could also fail, take suitable safety precautions to avoid any injury to persons or damage to objects caused by operation without a brake.

⚠ WARNING

SEVERE OR FATAL INJURIES

The OneGearDrive is designed exclusively for horizontal conveyor applications with or without any angle. Using the OneGearDrive in vertical lifting and hoisting applications can cause danger of fatal injury if the hoist falls.

- Do not use the brake in safety relevant vertical lifting and hoisting applications.

8.7.2.2 Technical Data

Voltage	V _{DC}	180
P _{el}	W	14.4
Resistance	Ω	2250 ±5%
Current	A	0.08
Maximum brake torque	Nm (in-lb)	10 (88.5)

Table 8.4 Technical Data: Mechanical Brake Option

8.7.2.3 Dimensions

Illustration 8.18 shows the dimensions of the VLT® OneGearDrive with the mechanical brake option.

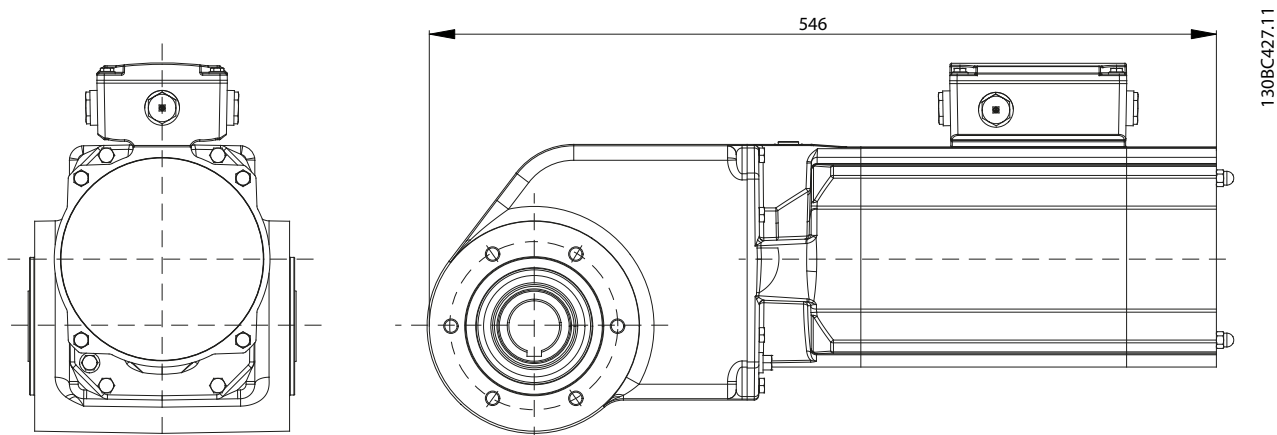


Illustration 8.18 Dimensions: OneGearDrive with Mechanical Brake Option

8

8.7.2.4 Connections

Illustration 8.19 shows the cage clamp and the connection to VLT® AutomationDrive FC 302.

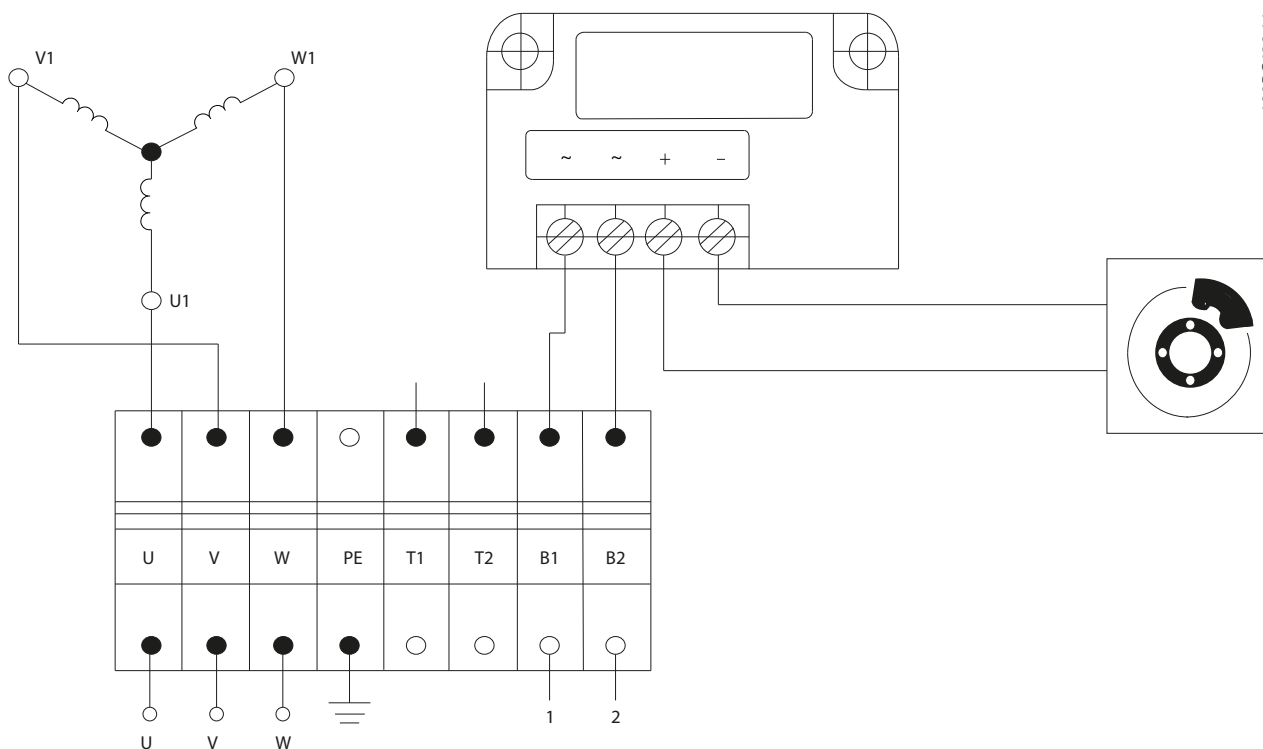


Illustration 8.19 Cage Clamp and Connection to VLT® AutomationDrive FC 302.

Description	Coding	Pin	Color	Typical cross-section [mm ² (AWG)]	Maximum cross-section [mm ² (AWG)]	VLT® AutomationDrive FC 302	VLT® Decentral Drive FCD 302	External DC supply
Brake supply	B1	1	Brown	0.75 (20)	2.5 (14)	See <i>Illustration 8.20</i> .	Terminal 122 (MBR+)	+
	B2	2	Black			See <i>Illustration 8.20</i> .	Terminal 123 (MBR-)	-

Table 8.5 Mechanical Brake Option Connections

An example of how to connect the VLT® OneGearDrive mechanical brake to the frequency converter is shown in *Illustration 8.20*.

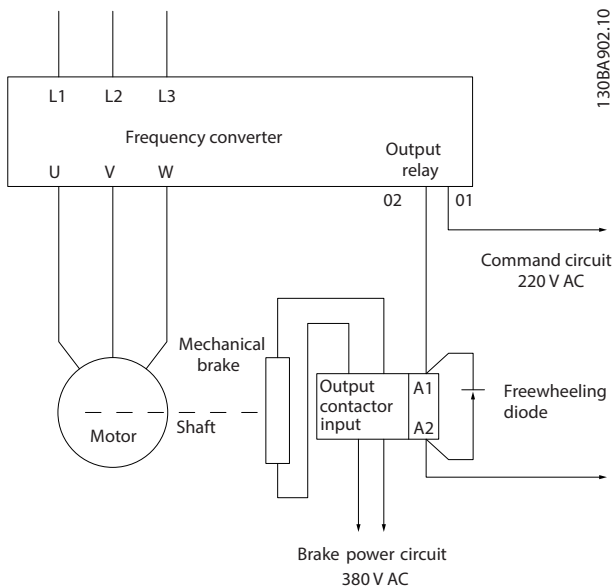


Illustration 8.20 Example of Connecting the Mechanical Brake to the Frequency Converter

The connection and use of the mechanical brake have been tested and released with VLT® AutomationDrive FC 302 and VLT® Decentral Drive FCD 302. Any other frequency converter may require a different connection. Contact Danfoss Service for further information. For information about parameter setting and programming when using VLT® AutomationDrive FC 302 or VLT® Decentral Drive FCD 302, refer to the corresponding *operating guide*.

8.8 Accessories

8.8.1 Accessories for VLT® OneGearDrive Standard

OneGearDrive Standard	Ordering number
Torque arm, stainless steel	178H5006

Table 8.6 Accessories for OneGearDrive Standard

8.8.2 Accessories for VLT® OneGearDrive Hygienic

OneGearDrive Hygienic	Ordering number
Motor connector without cable	178H1613
Motor connector with 5 m (0.19 ft) cable	178H1630
Motor connector with 10 m (0.39 ft) cable	178H1631
Torque arm, stainless steel	178H5006

Table 8.7 Accessories for OneGearDrive Hygienic

9 Appendix

9.1 Glossary

Ambient temperature

The temperature in the immediate vicinity of the system or component.

Axial force

The force in newton-meters acting on the rotor axis in the axial direction.

CE

European test and certification mark.

Cage clamp

Wire retention method without using special tools in the terminal box.

CleanConnect

EHEDG certified connection from Danfoss with a stainless steel connector.

CSA

Canadian test and certification mark.

EHEDG

European Hygienic Engineering and Design Group.

ExtensionBox

Optional part for VLT® OneGearDrive that increases the output torque.

f_{max}

Maximum frequency specified.

Gear ratio

The speed ratio of the input pinion and the output shaft of the VLT® OneGearDrive.

Hygienic

Variant of the VLT® OneGearDrive for hygienic critical areas.

Installation elevation

Installation elevation above normal sea level, typically associated with a derating factor.

I_N

Nominal current specified for the VLT® OneGearDrive.

I_{MAX}

Maximum allowed current for the VLT® OneGearDrive.

IP

International protection codes.

M20x1.5

Thread specification in the terminal box.

Mechanical brake

Option for the VLT® OneGearDrive.

M_{HST}

Maximum allowed high starting torque within 3 s and 10 cycles/h for the VLT® OneGearDrive.

M_{MAX}

Maximum allowed torque in part-load operation for the VLT® OneGearDrive.

M_n

Specified nominal torque for the VLT® OneGearDrive.

Motor shaft

Rotating shaft on the A side of the motor, typically without a key groove.

Mounting set

Extra components to fix the torque arm to the conveyor frame and included in the torque arm set.

n_{MAX}

Maximum allowed speed at final shaft.

Radial force

The force in newton-meters acting at 90° to the longitudinal direction of the rotor axis.

t_{amb}

Maximum ambient temperature specified.

Terminal box

Connection cage for the VLT® OneGearDrive Standard.

Torque arm set

Accessory for the VLT® OneGearDrive that includes a torque arm and a mounting-set

UL

Underwriters Laboratories.

9.2 Abbreviations and Conventions

9.2.1 Abbreviations

°C	Degrees Celsius
°F	Degrees Fahrenheit
AC	Alternating current
AWG	American wire gauge
DC	Direct current
EMC	Electromagnetic compatibility
ETR	Electronic thermal relay
FC	Frequency converter
IP	Ingress protection
N.A.	Not applicable
PE	Protective earth
PELV	Protective extra low voltage
PM motor	Permanent magnet motor
RPM	Revolutions per minute

Table 9.1 Abbreviations

9.2.2 Conventions

- Numbered lists indicate procedures.
- Bulleted lists indicate other information and description of illustrations.
- Italicized text indicates:
 - Cross-reference.
 - Link.
 - Footnote.
 - Parameter name, parameter group name, or parameter option.
- All dimension drawings are in [mm (in)].

Index

A

Abbreviations..... 32
 Accessories..... 31
 Approvals..... 5
 Assembly kit..... 9
 Axial fastening..... 9

B

Backlash..... 24
 Brake
 Dimensions..... 30
 Maintenance..... 17
 Overview..... 29
 Replacement..... 18

C

Cage clamp connection..... 14
 CleanConnect®..... 15
 Commissioning..... 16
 Connection
 Cage clamp..... 14
 CleanConnect®..... 15
 Electrical..... 12
 Mechanical brake option..... 30
 Safety..... 13
 T1 and T2..... 15
 Conventions..... 33
 Current (rated)..... 22

D

Damage to surface..... 7
 Decommissioning..... 21
 Diagnostics..... 17
 Dimensions
 Mechanical brake option..... 30
 OneGearDrive Hygienic..... 26
 OneGearDrive Hygienic with torque arm in front position
 28
 OneGearDrive Standard..... 25
 OneGearDrive Standard with torque arm in front position
 26
 Disclaimer..... 4
 Dismounting..... 21
 Disposal instruction..... 5
 Due diligence..... 6

F

Faults..... 18
 Frequency (rated)..... 22

G

Glossary..... 32

I

Inductivity..... 22
 Inertia..... 22
 Inspection during operation..... 18
 Installation elevation..... 24
 Intended use..... 4
 Introduction..... 4
 IP rating..... 7
 Items supplied..... 7

L

Lubricant
 Change intervals..... 19
 Grades..... 19
 How to change..... 19
 Types..... 19
 Volume..... 19

M

Maintenance..... 17
 Mechanical brake option
 Connection..... 30
 Dimensions..... 30
 Maintenance..... 17
 Overview..... 29
 Technical data..... 29
 Misuse of the product..... 5
 Motor circuit..... 22
 Motor torque..... 22
 Mounting..... 8
 Mounting arrangement..... 7
 Mounting set for torque arm..... 28

N

Nameplate..... 22

O

Oil
 Change intervals..... 19
 Grades..... 19
 How to change..... 19
 Types..... 19
 Volume..... 19
 Options..... 28
 Overload protection..... 15

P

Product returns.....	21
Protection against overload.....	15
Protection rating.....	7
Protective coating.....	7

R

Rating plate.....	22
Recycling.....	5
Repair.....	18

S

Safety	
Connection.....	13
Electrical connection.....	12
High voltage.....	6
Intended use.....	4
Mounting.....	8
Qualified personnel.....	6
Symbols.....	6
Service.....	5
Shaft seals.....	16
Spare parts.....	20
Speed (rated).....	22
Start-up	
Measures before commissioning.....	16
Stator.....	22
Storage	
Conditions.....	22
Measures after storage.....	22
Measures during storage.....	22
Support.....	5
Surface damage.....	7

T

Technical data.....	22
Terminal box.....	12
Torque arm set.....	28
Torque mounting set.....	28
Torque restraint.....	11
Transportation.....	7
Troubleshooting.....	17

W

Warning	
Danger of burns.....	6
High voltage.....	6



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