

1 Safety

1.1 Safety Information for the Operation of Geared Motors

1.1.1 General

This safety information applies in addition to the relevant product-specific operating instructions 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 operating instructions. They are provided with the machine when it is supplied and can be requested separately as required by stating the motor model.

1.1.2 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 the operating instructions provided and other product documentation available during any corresponding work and who are obliged to abide by the instructions contained therein. This work is to be monitored by a specialist supervisor. Qualified personnel are persons who are authorised due to training, experience and instruction as well as their knowledge of relevant standards, rules, accident prevention regulations and operating conditions by the person responsible for the safety of the installation to perform the activities required in each case and who are able to recognise and avoid possible hazard. Knowledge of first-aid measures and of the available lifesaving equipment is also required. Non-qualified personnel shall be forbidden to work on the geared motors.

1.1.3 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 are to be ensured when setting up the installation. The machines are designed for ambient temperatures between -20°C to +40°C as well as for installation heights up to 1000m above sea level. Any deviations found on the rating plate must be taken into consideration. The conditions at the place of work must correspond to all 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 conformity of the final product with this directive is established (consult EN 60204-01).

1.1.4 Transportation, Storage

When the electric drive units are being transported, the eye bolts - where provided in the design - must be firmly tightened down their bearing surface. They may be used only for transporting the drive unit and not for lifting both the drive unit and the driven machine. Damage sustained after delivery must be reported to the haulage company immediately. Commissioning may have to be suspended. If drive units are to be stored, ensure a dry, dust free and low vibration ($v_{eff} < 0,2 \text{ mm/s}$) 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 -20°C). If the transport eye bolts are replaced, drop forged eye bolts as specified in DIN 580 are to be used.

1.1.5 Mounting Arrangement, Assembly

The drive unit is to be fastened by its flange. Gear units with hollow shafts are to be attached on 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 are to be rated for the high forces to be anticipated during operation and secured sufficiently against loosening. The output shaft(s) and any second motor shaft extension present as well as the transmission elements mounted on it (couplings, chain wheels etc.) are to be covered so that they cannot be touched.

1.1.6 Connection

All work shall 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 mains voltage under observance of the terminal circuit. Exceeding the tolerances as in EN 60034 / DIN VDE 0530, i.e. voltages $\pm 5\%$, frequency $\pm 2\%$, cam form, symmetry, increases heating and reduces service life.

Accompanying connection diagrams, particularly for special equipment (e.g. thermistor protection etc.), are to be observed. 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, the starting current is to be taken into account.

The drive unit is to be protected against overloading and in dangerous situations against automatic restarting due to inadvertent starting.

The terminal box is to be locked again to protect against contact with live components.

1.1.7 Commissioning

Before commissioning, protective films are to be removed, the mechanical connection to the driven machine disconnected as far as possible and the direction of rotation examined in the no-load state. Feather keys are to be removed or secured in such a way that they cannot be ejected as this is done. 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.

1.1.8 Operation

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.

1.1.9 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, it is to be removed when operating. Since other components could also fail, suitable safety precautions are to be taken to avoid any injury to persons or damage to objects cause by un-braked operation.

1.1.10 Maintenance

In order to prevent breakdowns, danger and damage, the drive units must be examined at regular intervals depending on the operating conditions. The lubrication intervals for bearings and gear units specified in the respective operating instructions are to be observed. Worn or damaged parts are to be replaced using original spare parts or standard parts. In the event of heavy dust accumulation, clean airways regularly. For all inspection and maintenance work, observe Section 5 and the information provided in the detailed operating instructions.

1.1.11 Operating Instructions

For reasons of clarity, the operating instructions 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.

1.1.12 Faults

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

1.1.13 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. screened cables) is the responsibility of the system's installers. Precise information can be taken from the operation instructions. For systems with frequency inverters and rectifiers, the manufacturer's electromagnetic compatibility information is also to 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 operation instructions is to be taken into consideration when using the motors in the residential, commercial and trade sectors, as well as in small businesses in accordance with EN 61000-6-1 and EN 61000-6-3.

1.1.14 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 is to be kept in a safe place.

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2.1 Geared Motors with Permanent Magnet Motors

2.1.1 Geared Motor Degree of Protection

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

The OneGearDrive-Basic is supplied as standard in IP67.

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

The condition of the paint must be checked and repaired at regular intervals, depending on ambient influences. The paint finish must be compatible with the other components. Paints with a synthetic resin base have proved well suited to this purpose.

2.1.2 Mounting Arrangement

It is recommended that drinking water, food, textiles etc. beneath the geared motor be covered.

The drive unit should be installed as free from vibration as possible.

Special instructions are to be observed in installation locations with abnormal operating conditions (e.g. prolonged exposure to dripping water, high ambient temperatures above 40°C, explosion hazards). The fresh air intake must not be restricted by unsuitable installation or by fouling.

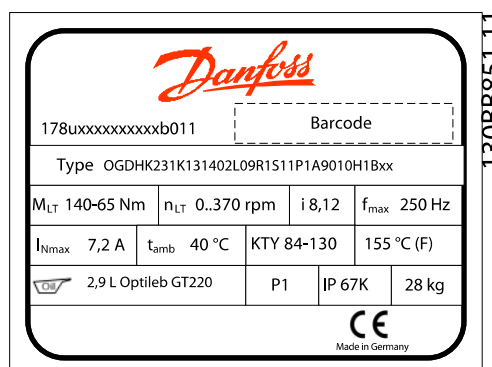
Flexible couplings with zero play, if possible, are recommended for direct power transmission from the gear unit to the driven machine and commercially available slip clutches are recommended if there is a risk of blocking.

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

Nominal size of bore (in mm)	h 7 output shaft Bore H7 with tolerances (in 1/1000mm)
over 18 to 30	0 to + 21
over 30 to 50	0 to + 25

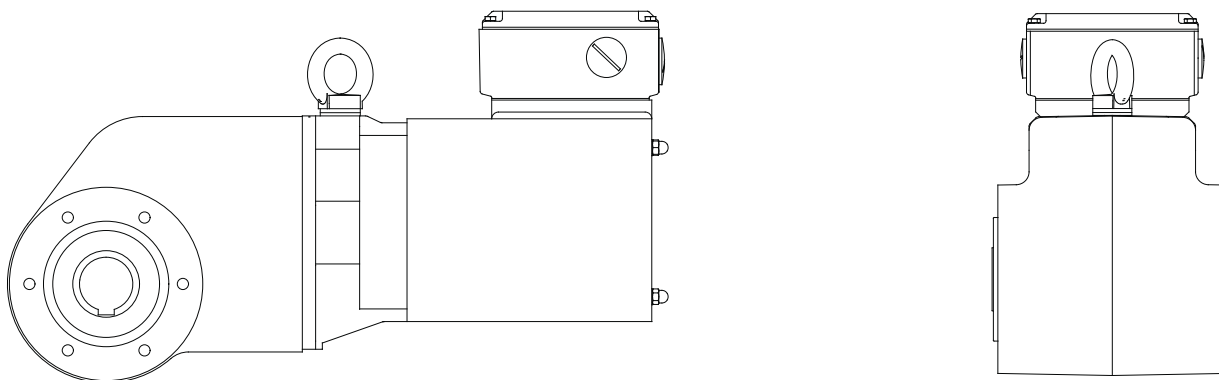
2.1.3 Rating Plate

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).



2.1.4 Terminal Box

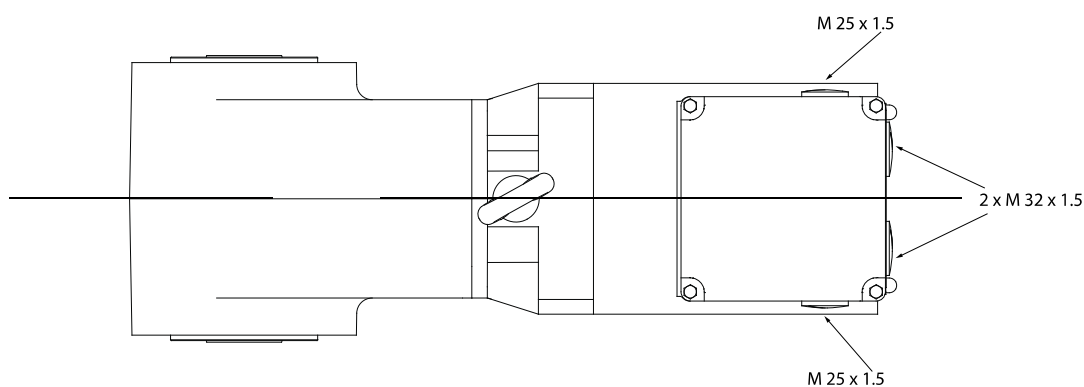
The cables of motors with and without brakes can be introduced into the motor terminal box.



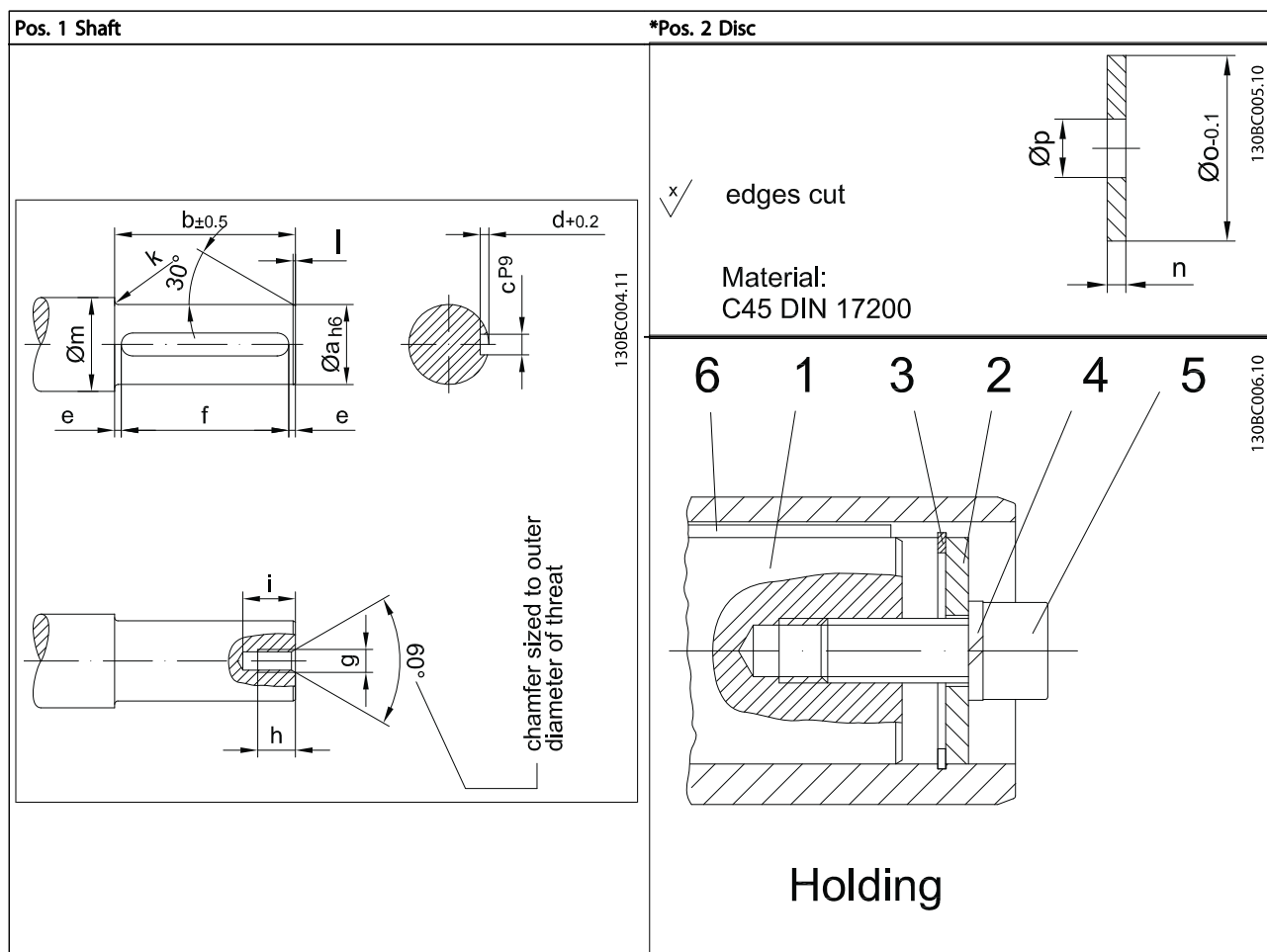
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The standard position for the motor terminal box is shown in the dimensional drawings for the geared motor (see 3.1.5 OGD-5).

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



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Type	Dimensions (mm)														
	Pos. 1 Shaft												Pos. 2 Disc		
	a	b	c	d	e	f	g	h	i	k	l	m	n	o	p
OGD-K30	30	140	8	4	5	130 ^{+0.5}	M10	20	26	3	1.5	38	5	29.8	11
OGD-K35	35	140	10	5	5	130 ^{+0.5}	M10	20	26	3	1.5	43	6	34.8	11
OGD-K40	40	140	12	5	5	130 ^{+0.5}	M12	22	29	3	2	48	6	39.8	13.5

Type	Retainer ring DIN 472	Lock washer DIN 7980	Filister head screw DIN 912-8.8	Key DIN 6885 width x Height x length
	Pos. 3	Pos. 4	Pos. 5	Pos. 6
OGD-K30	30x1.2	10	M10x30	A 8x7x130
OGD-K35	35x1.5	10	M10x35	A 10x8x130
OGD-K40	40x1.75	12	M12x35	A 12x8x130

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

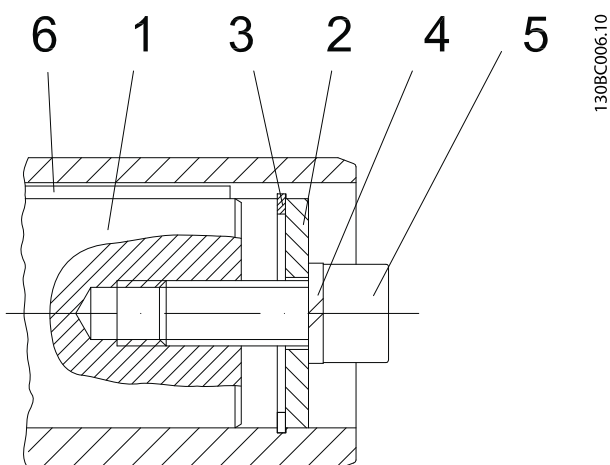
2.1.5 Torque Restraint

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, we recommend the use of pre-tensioned rubber damping elements.

2.1.6 Notes for Axial Fastening

Axial fastening

Pressure piece (2) is rotated and fitted against retaining ring (3) using fixing screw (5), see *Illustration 2.1*.



Holding

Illustration 2.1

2.1.7 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 $\pm 5\%$ voltage tolerance, to -20 to 40°C ambient temperature and altitudes up to 1000 m above sea level. The permissible switching frequency depends on the design of the motors, the load torque and the mass moment of inertia.

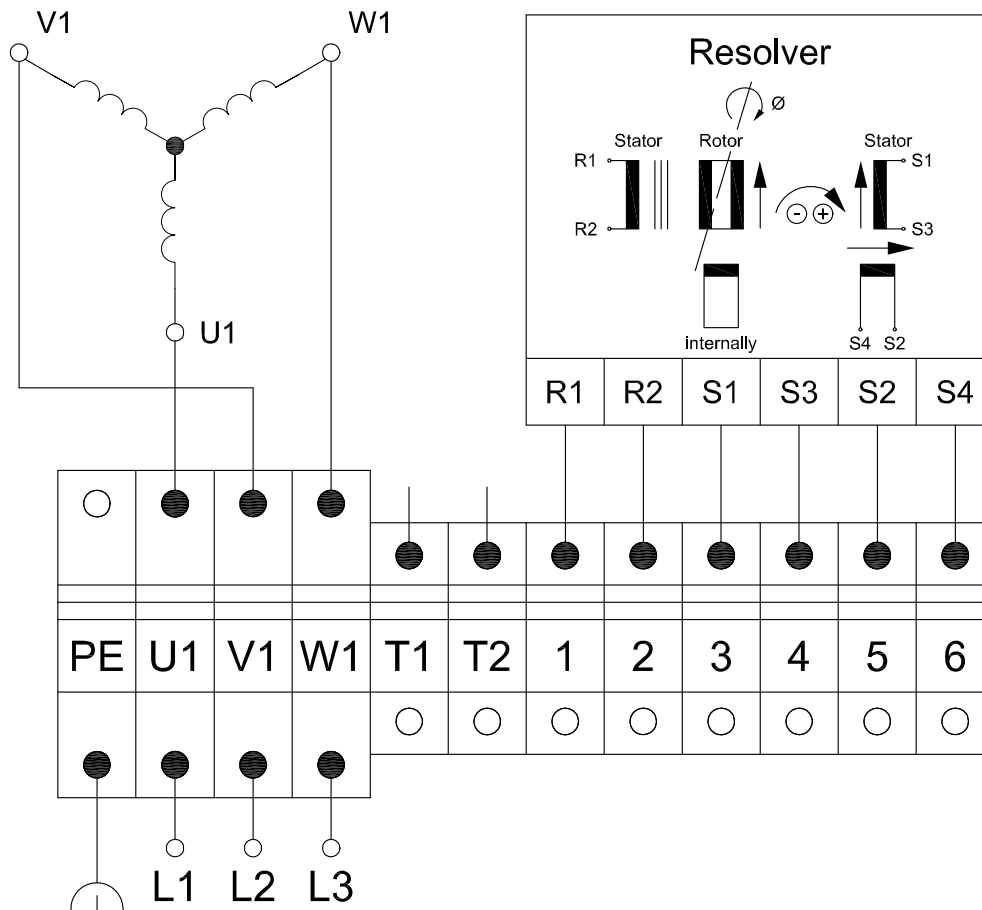
When closing the terminal box, particular attention must be given to obtaining a perfect seal.

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 earthed 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.

2.1.8 Connection Diagram Cage Clamp

2

PM-motor SO09 with terminal box, Y-connection, thermal protection connection resolver*.



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Input:	E_{R1-R2}	=	$E_0 \times \sin(\omega t)$
Output:	E_{S1-S3}	=	$Tr \times E_{R1-R2} \times \cos \emptyset$
	E_{S2-S4}	=	$Tr \times E_{R1-R2} \times \sin \emptyset$
	Tr	=	Transformation ratio

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

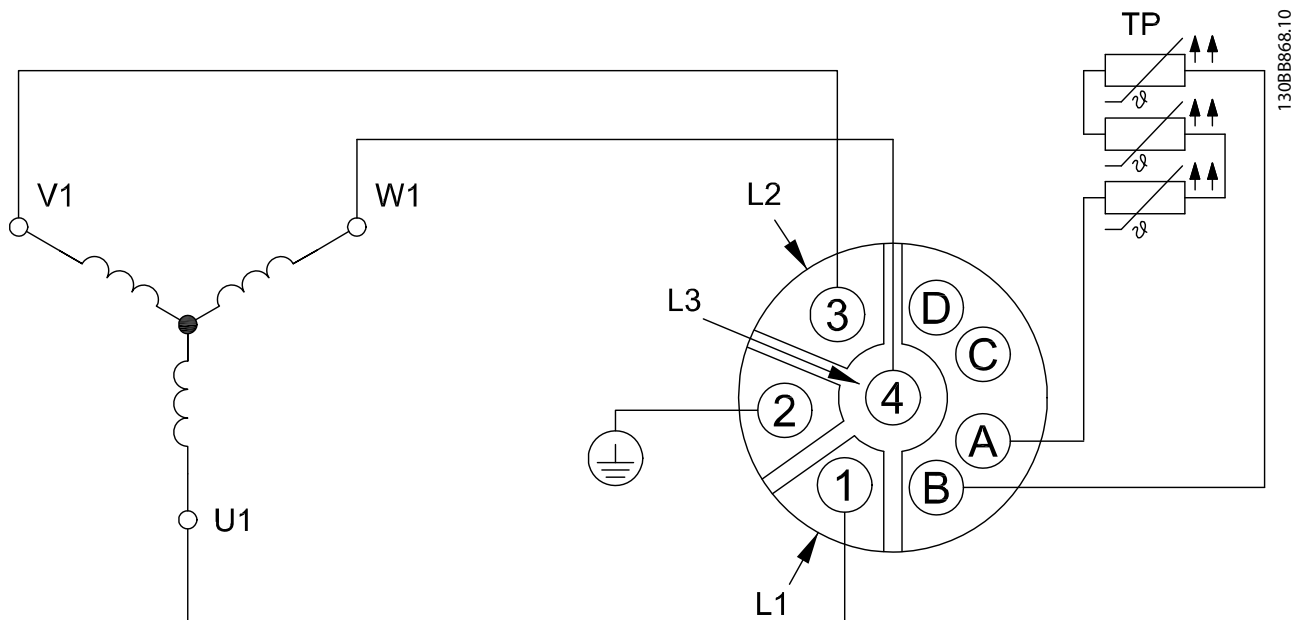
T1	KTY 84-130	ZK010.1090-17
T2		

Table 2.1 Connection According

2.1.9 Connection Diagram Three-phase Gear Motors

Connection power plug for OneGearDrive Hygienic DSA09LA10in Y-connection, with thermistors

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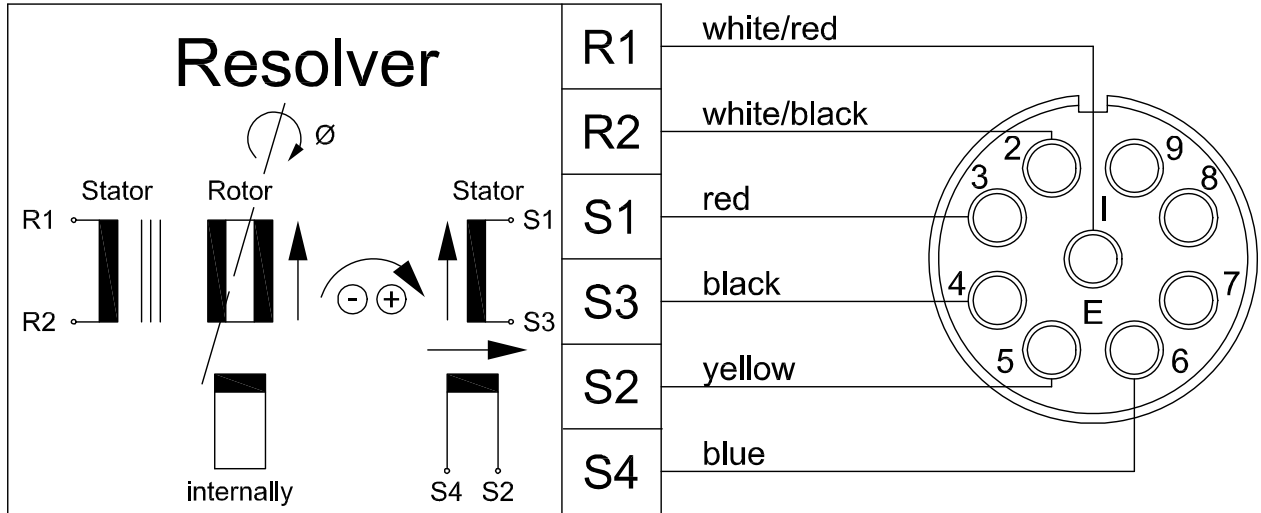


		Pin	Cable allocation for plug with connection cable
Motor winding	U1	1	No. 1 (2.5 mm ²)
	V1	3	No. 2 (2.5 mm ²)
	W1	4	No. 3 (2.5 mm ²)
	PE	2	

2.1.10 Connection Diagram Signal Plug

2

Connection signal plug for OGD Hygienic DSA09LA10 Resolver-connection.



130BB889.10

Input:	E_{R1-R2}	=	$E_0 \times \sin(\omega t)$
Output:	E_{S1-S3}	=	$Tr \times E_{R1-R2} \times \cos \emptyset$
	E_{S2-S4}	=	$Tr \times E_{R1-R2} \times \sin \emptyset$
	Tr	=	Transformation ratio

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

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

2.1.11 Overload Protection

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

Automatic restarting 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 driven machine 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.). The maximum permissible limit torque M_2 in continuous running duty specified on the rating plate is decisive here.

2.1.12 Lubricant Changes

The gear units are supplied with lubricant ready for operation.

In normal operating conditions and with a lubricant temperature of approximately 80°C, the oil should be replaced after approximately 25000 operating hours when using PGLP 220.

When using food grade oil Optileb GT220 H1, the oil should be replaced after approximately 35.000 operating hours. This means operating during partly load like conveyor systems.

The lubrication interval must be reduced at higher temperatures (halve it for each 10 K increase in the lubricant temperature).

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 in the lubricant volume table. 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.

2.1.13 Lubricant Grade

Oils PGLP 220 and PGLP 68 complying with DIN 51502 dn DIN 51517 and are suitable for lubricating the gear unit. Foodgrade oils complying 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 below or which is demonstrably equivalent. The original lubricant can also be supplied in small amounts (5 and 10 kg) from the factory.

Should geared motors need to be stored for a longer period of time before installation, please observed the chapter "Information on the storage of geared motors with cage rotors".

Wear-protecting EP gear lubricant oils as listed in the lubricant table below have proved particularly suitable.

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

WARNING

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 -10°C , ISO viscosity grade VG 220 (SAE 90) is recommended in accordance with the international definition of viscosity grades at 40°C in accordance with ISO 3448 and DIN 51519, and AGMA 5 EP in North America.

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

2.1.14 Lubricant Volume

The recommended lubricant quantity for the particular style is indicated on the rating plate of the motor. When filling, make certain that the upper gear unit components, depending upon the installation position, are also well lubricated.

2.1.15 Disposal

The metallic parts of the gear unit and the geared motor can be disposed of as scrap, segregated into steel, iron, aluminium and copper.

The lubricants used are to be disposed of as waste oil, and the synthetic oils are to be disposed of as special waste. Information on this can be found on the lubrication chart or the rating plate.

2.1.16 Bearing Lubrication for Geared Motors

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

The lubricant change is to be carried out here when the bearings are replaced in the context of maintenance/monitoring of the rotary shaft seals. Cleaning and lubrication of the bearings is not recommended due to the risk of contamination.

2.1.17 Lubrication Quantity for OGD

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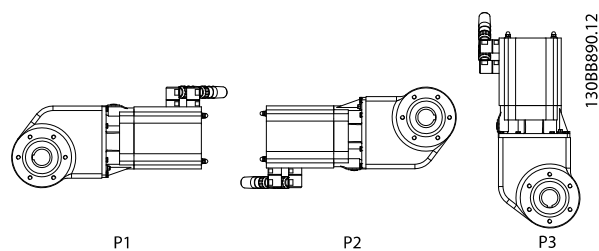


Illustration 2.2 Lubrication Quantity in l

Gear type	P1	P2	P3
OGD	1.1	2.2	2.9

Other mounting positions on request!

3 Information on the Storage of Geared Motors with PM Motors

If geared motors are to be stored for an extended time before start-up, increased protection against damage by corrosion or humidity can be achieved by observing the following information. Since the actual loading depends very strongly on local conditions, the time data can be regarded only as a guide value. It should also be noted that this data does not include any extension of the warranty term. If disassembly is necessary before start-up according to this information, it is recommended that the nearest Danfoss franchised workshop or representatives be called in. The instructions contained in the after-sales manual are to be observed in all cases.

3.1.1 Geared Motor Condition and Storage Space

The plugs supplied by the works in all entry holes on the terminal box are to be checked for damage caused during transportation and for correct positioning and replaced if necessary.

Any vent valves which are present are to be removed and replaced with a suitable cover screw.

Any damage caused during transit to the exterior paint layer or to the rust protection of the bright metal shafts, including hollow shafts, must be repaired.

The storage space should be dry, well-ventilated and vibration-free. If the temperature in the space exceeds the normal range of approximately -20°C to $+40^{\circ}\text{C}$ for an extended period of time or varies strongly frequently, it could even become necessary to employ the measures before start-up specified in section 3 after shorter storage times.

3.1.2 Measures during the Storage Period

Space permitting, it is recommended that the drive units be turned 180° after approximately one year and annually thereafter 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 operating instructions and the lubrication information plate.

3.1.3 Measures before Start-up

3.1.3.1 Motor Component

- **Insulation measurement**
Measure the insulation resistance of the winding with commercially available measuring apparatus (e.g. with a megohm) between all winding parts and between the winding and the enclosure.
- **Measured value above 50 megohm: no drying necessary, new condition**
Measured value under 5 megohm: drying advised
Measured value approximately 1 megohm: lowest permissible threshold
- **Drying the winding by standstill stator heating without disassembly**
Connection to stepless or tapped variable alternating current voltage up to approximately 20% maximum of the rated voltage. Heating current max. 65% of the rated current according to the rating plate. Observe heating up for first 2 to 5 hours; reduce heating voltage if necessary. Heating duration approximately 12 to 24 hours until insulation resistance rises to desired value.

3.1.3.2 Gear Unit Component

- **Lubricant**
If the storage period exceeds approximately 2 to 3 years, or the temperatures were very unfavourable throughout a shorter storage period the lubricant in the gear unit must be changed. For detailed instructions and lubricant recommendations please see chapter lubrication quantity.
- **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, colour, hardness or sealing effect is determined, the shaft seals must be replaced appropriately.
- **Gaskets**
If lubricant is draining out at the connecting points on the gear unit enclosure, the sealing compound must be replaced.

3.1.4 OGD-H

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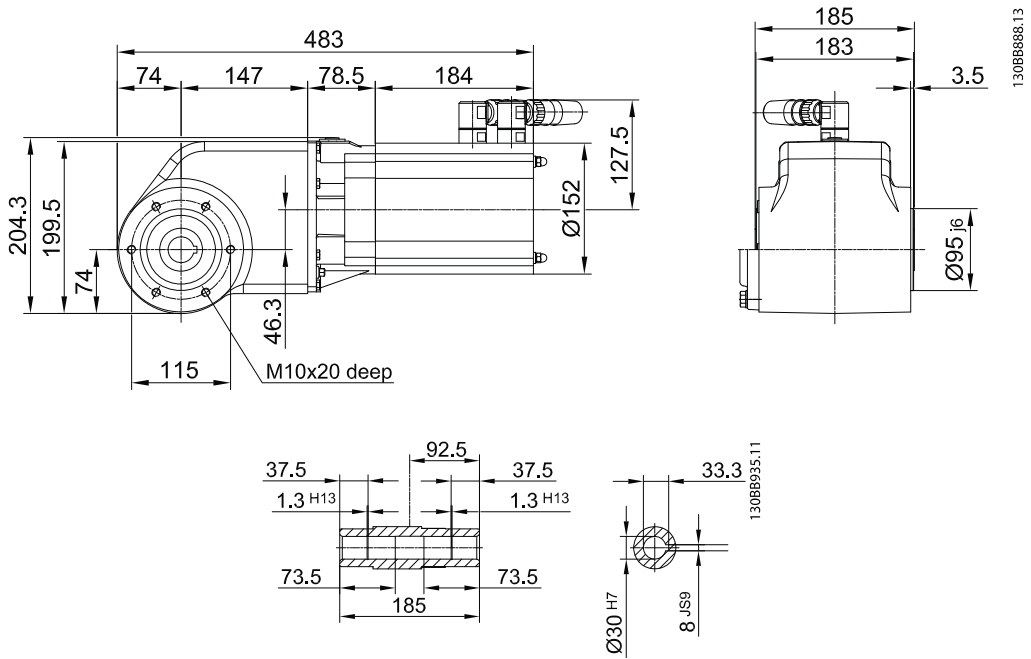


Illustration 3.1 Stainless Steel 30

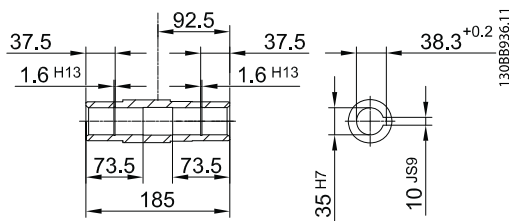


Illustration 3.2 Stainless Steel 35

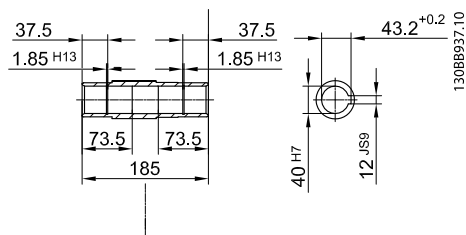


Illustration 3.3 Stainless Steel 40

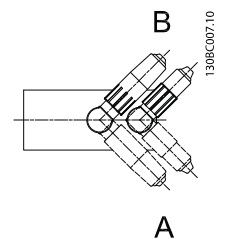
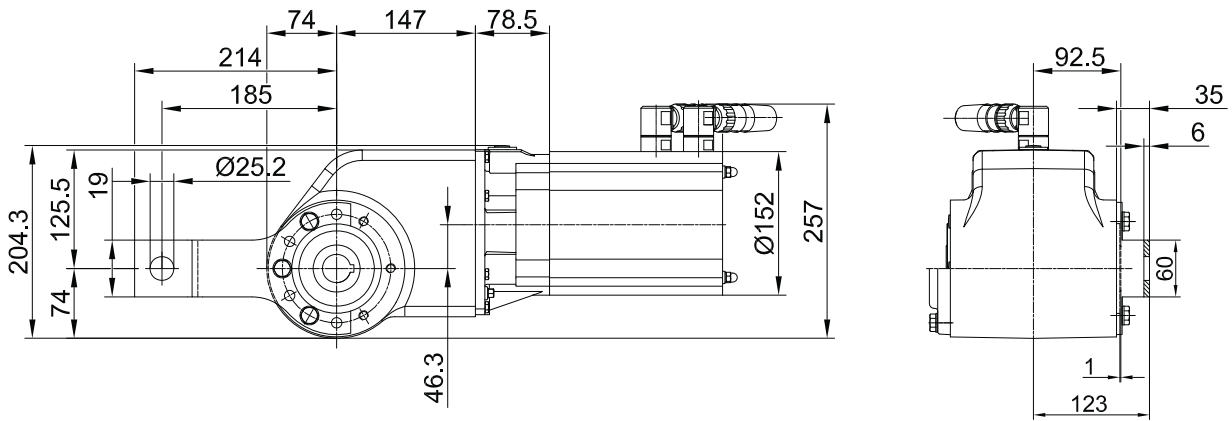


Illustration 3.4 Connector Position, Standard



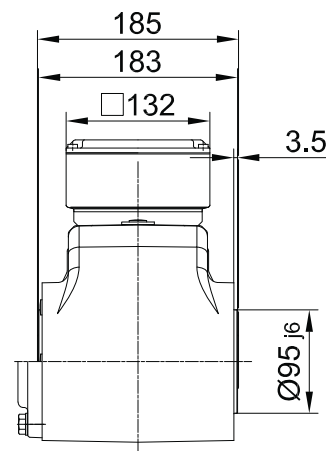
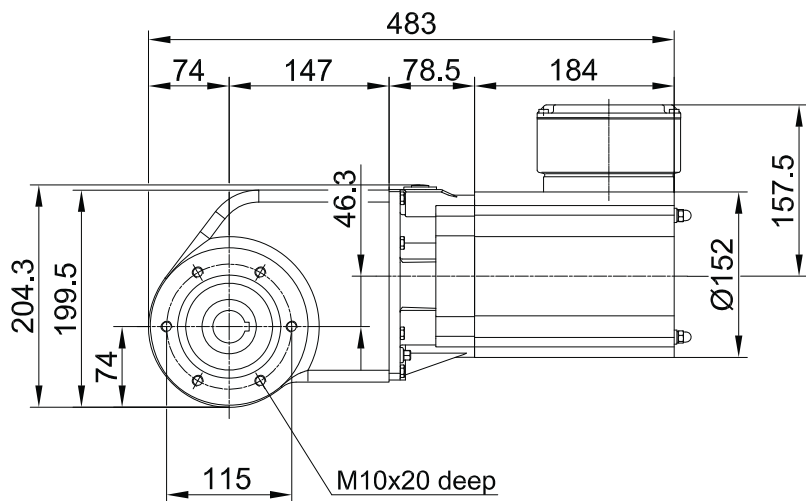
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Illustration 3.5 Torque Arm at Front

3.1.5 OGD-S

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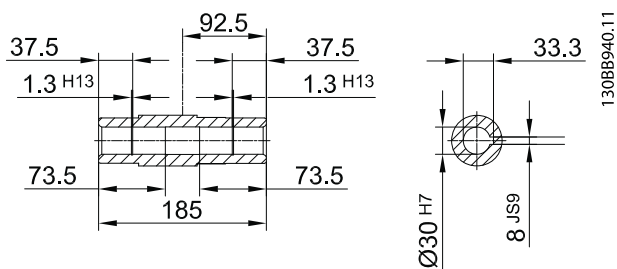


Illustration 3.6 Steel 30

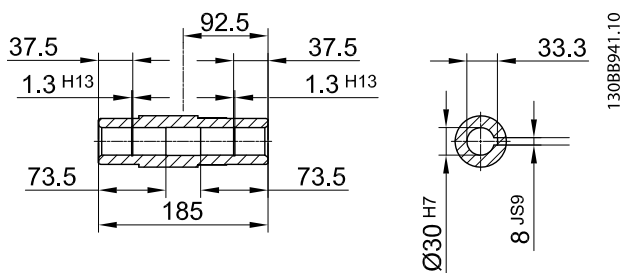


Illustration 3.7 Optional: Steel/Stainless Steel 30

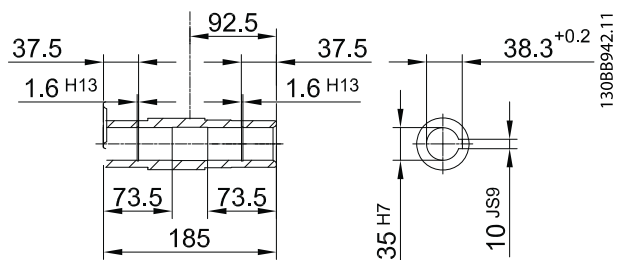


Illustration 3.8 Optional: Steel/Stainless Steel 35

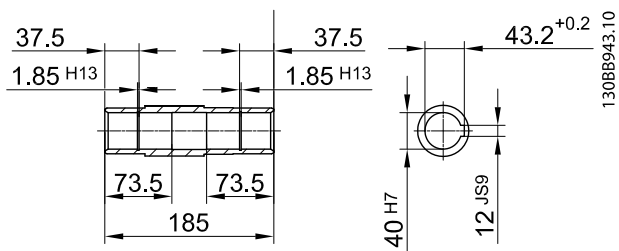


Illustration 3.9 Optional: Steel/Stainless Steel 40

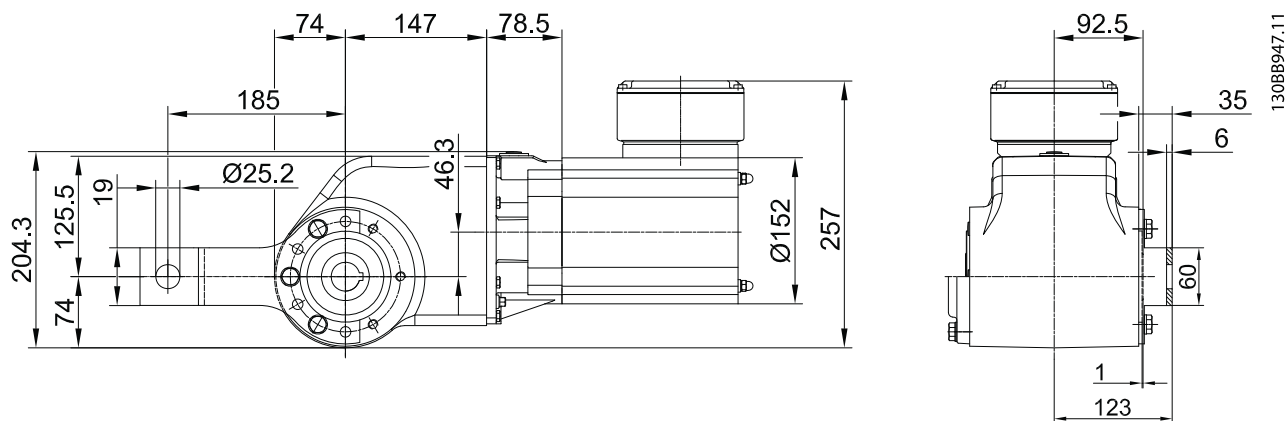


Illustration 3.10 Torque Arm at Front

4 Motor Datasheet

4.1 Motor Type: Permanent-magnet Three-phase Synchronous Motor

4

Rated torque	12,6Nm
Rated current	7,2A
Rated speed	3000 rpm
Rated frequency	250Hz
Motor circuit	Y
Winding resistance (Rtt)	1Ω
Winding inductivity (Ltt)	9mH
Inductivity - D axis (Ld)	5mH
Inductivity - Q axis (Lq)	5mH
Motor poles (2p)	10
Moment of inertia	0,0043 Kgm ²
Back EMF constant (ke)	120V/1000 rpm
Torque constant (kt)	1,75Nm/A

4.2 Resolver Data

Poles	2
Input voltage	7V
Input current	30mA
Input frequency	10kHz
Transmission ratio	0,5 +/- 10%