



Owner's manual

for the brushless DC motor HPD10

HighPowerDirect 10





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Dear customer,

Congratulations on your purchase of HPD10.

This drive is a german high-end product of a completely new type (Polyphase Permanently magnet excited Synchronic Machine PPSM), which will keep its capability for a long time if treated the right way.

The drive was developed and very elaborately tested by Dr. Ing. Werner Eck.

The development objective was to build an extremely light, slow running drive providing very much of specific performance at highest efficiency and above all for relatively low rotation speeds.

The HPD10 allows a gearless drive without the usually essential step-up gear unit which cause power losses, additional weight, complexity and maintenances. The little weight per power at very high torque should be unique on the market.

Because of the little internal resistance of the motor, very good performances are achieved in a wide range and at an excellent efficiency.

Though many intensive tests had already been made and though the parts were produced by modern CNC machines, the drive is still not a real series product.

Many manufacturing processes are still made by hand, what makes every drive of the first series unique.

So, our first 10 customers will be part of a field test and we are already excited which experiences they make with the new motor.

1. Intended usage of the DC motor HPD 10 and the corresponding components

- The drive right now is in the testing phase in the field. The customer assumes responsibility to share experiences made with the drive with the manufacturer, so that the manufacturer can gather know-how and identify possible weaknesses.
- The drive must only be used with the safety-controller SDC of the company Geiger Engineering, anyways warranty can not be extended. This also presupposes the use of the frequency converter complementary to the motor.
- There are no or no qualified experiences of other frequency converters. The use of those frequency converters causes a forfeit of warranty claims.
- The drive is built according to the state of the art and to approved safety-related rules. However, risks for life and limb of the user or other parties as well as damages to the device or other material assets can arise.
- Only use the system in technically soundness, safety-conscious, according to the intended usage and be aware of dangers! Especially faults which can affect the safety should be cleared immediately!
- Only use the drive if properly mounted on the four M6 boreholes destined for that at the stator. The HPD10 is an external rotor without shaft which must not at all, not even for trying, be connected to the frequency converter or the power source if not fixed in the way described above.



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- The power transmission to the load is accomplished by a flange joint with an extension shaft at the rotor, which has to be provided by the customer himself. The shaft should also be braced with another bearing. The thin section bearings of the rotor are not qualified for forces higher than 500N and a bending moment above 50Nm. In case of doubts, the case of operation shall be discussed with the manufacturer.
- A static redundant dimensioning caused by the thrust bearing is to be avoided in any case. A certain resilience in the mount of the drive or the thrust bearing is satisfactory. Required is a clean rotation of the extension shaft. The shaft must be able to be rotated smooth and easy by hand after mounting.
- Fresh air has to be served to the drive symmetrically and sufficiently. This has to be ensured by intake ports or other air conduction measures.

Be aware of the following safety instructions before starting.

It is essential to permanently check the loads driven by the motor for damages, cracks etc. The use of damaged loads can lead to heaviest injuries.

The Frequency Converter as well as the SDC need to be mounted jacked up, so that a vibration-free use is unconditionally guaranteed. If this is not the case, vibrations can cause contact faults and further the breakdown of devices. This may lead to damages to the electronic system or to components in its environment.

Maintenance

The drive does not need any maintenance.

Opening or disassembling of the motor causes a forfeit of warranty claims!

Though, it has to be considered that no foreign objects at all can enter the interior of the drive. Further, it is necessary to protect the motor from humidity, dirt, paint, glues etc. If this is ignored, a proper functionality of the motor can not be guaranteed and irreparable damages are possible. In case of damage, ship the drive back to the manufacturer for repairs. Unintended handling leads to secondary damages.

Keep magnetic memory cards or electronic devices out of the rotor's close-up range, because the alternating magnetic field can cause a delete of data. Be also careful with medical devices (e.g. pacemakers) which are sensitive to alternating magnetic fields.

The small gap between the stator and the magnets of the rotor function-bound has a thickness of only a few tenth millimetres. Here, the danger of foreign objects accumulating in this gap exists but can be heard by scratching-sounds. In this case the motor should be blown-out with compressed-air or cleaned with a thin, non-magnetic foil strip. Do not at all simply keep on using the drive. Be especially aware of cuttings which can almost irremovably stick to the magnets. In this case, the only thing that helps is a disassembly of the drive by the manufacturer.

Direction of rotation of the drive

The drive can be driven in anti- as well as in clockwise rotation. The pole reversal can be achieved by a change of two of the three motor phase cables or by modifying the software settings by the manufacturer.



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Motor cooling

It is important to care for a sufficient cooling of the motor at any time. A high load of the motor while insufficient cooling is only approvable for a short time of usage.

In every case, the electronic measuring and protective equipment SDC, provided by the manufacturer, should be used to protect the motor from overload. During these operations, the drive should not exceed a temperature of 100°C. After each use, the motor should get some time to cool down a bit again.

6. Motor connection

It is only permitted to use control electronics approved by Geiger Engineering. Warranty claims forfeit if other electronics are used and the drive or the electronic gets damaged.

Before starting, the right direction of rotation has to be checked and if necessary be changed.

The drive should be if possible directly connected to the frequency controller, without any inserted connectors. If this is not possible, only use high current capable, low-impedance, gold-plated connectors. Shoddy connectors lead to voltage peaks and can destroy the frequency converter. Oftentimes unplugging the connector can cause contact problems which may also lead to a destruction of the converter.

Only use 6mm high current connector systems of the Plettenberg company with gold plugs / jacks with internal discs as connectors between the converter and the battery. The connectors have to be checked before every use. If the coating is used up, the internal discs in the jacks get play or have lost their resilience, they have to be replaced.

Shoddy or used up connectors are the most common reason for destructions of the drive, the controller and possible components around it.

The connectors at the accumulator cables have to be soldered professional and reverse-polarity proof and have to be isolated by a shrink hose. Mixing up the polarity of the battery or a short circuit leads to a destruction of the drive and means an acute fire hazard and danger of life!

The maximal cable lengths described in the Motor Management System owner's manual must not be exceeded. Anyways the drive, the controller and other components can be destroyed. Possible battery connectors have to be added to the cable length. Further details about the maximal cable length can be found in chapter 9: "The frequency converter" of the Motor Management System owner's manual.



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7. Technical specifications:

1. Brushless DC motor, type **HPD 10** mit with the following specifications:

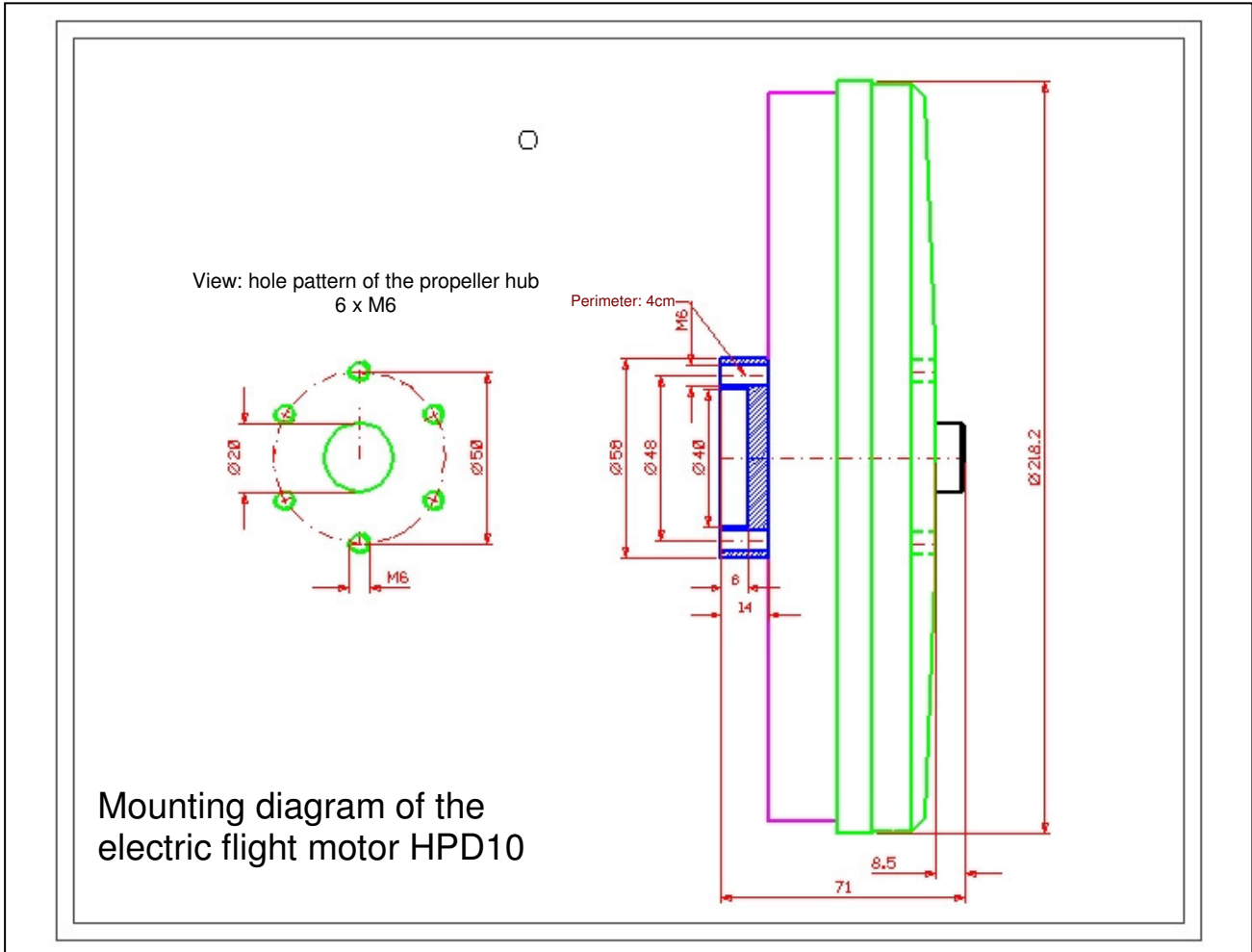
Voltage range:	40-55	V
Specific idle speed:	49	1/min/V
Specific nominal load rotation speed:	42	1/min/V
Max. rotation speed:	2500	1/min
Nominal current:	190	A
Max. motor current:	up to 220	A (according to the cooling)
Max. temp. of the stator	100	°C
Nominal power intake:	10 000	VA
Nominal efficiency ca *:	>90	% incl.converter
Weight ca.	3.750	kg
External diameter of the rotor	218	mm
Drive length	71	mm
Internal resistance	<8	milliohm

* = indirect determined data.

The operating and the idle speed should not be higher than 2300rpm. Please check this with a rev counter. Avoid full throttle idle running at higher voltages.



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8. SERVICE

In case of a fault or damage(s), post the devices and a formulation of the problem(s) to the manufacturer:

Geiger Engineering
Kronacher Str. 41
96052 Bamberg
Phone: (0049) - 951/9649-220

We now wish you lots of fun and success with your **High Performance Direct 10**.