



HDD 09S Data sheet

Electrical data

Value	unit	Pa winding
Number of poles		20
Number of pole pairs		10
Inductance/Phase	mH	2.45
Resistance/Phase	Ohm	1.0
Resistance/Phase-phase	Ohm	1.9
Back EMF/Phase-Phase RMS	Vs/rad	0.76
Back EMF @ 1000 rpm	V	80
Torque constant (RMS)	Nm/A	1.46
Max rail voltage	V	750
Recommended peak current	A	26
Torque at recommended peak current	Nm	33

For higher torques, see next page. The torque constant is defined as the back EMF; friction losses are ignored. Data are based on a small sample and not definitive.

Mechanical data (resolver feedback)

Value	unit	HDD09S	no brake	brake
J	kgcm ²	12.0	12.4	
Mass	kg	5.7	6.3	

Holding brake

Torque	Nm	9
J	kgcm ²	0.4
Voltage	VDC	24
Power	W	18

Insulation class

The insulation system complies with the requirements of EEC LV Directive 73/23/EEC and 93/68/EEC. Test report E9911111E01.

Protection class

HDD motors comply with the requirements for IP-65. IP-67 is available on request.

Thermistor

Overheat protection consists of triple PTC thermistors (one on each phase).

R @ 25 C	100 to 350 Ohm
R @ 145 C	< 1650 Ohm
R @ 155 C	> 4 kOhm

Motor name structure

Type	Flange size	Stator length	Winding	Feedback	Power connector	Brake	Shaft key	Options
HDD	09	S	- Pa	- A	- A	- A	- A	- AAA

Type HDD = shaft motor, ICM = internal coupling motor.

Flange size Approximate in cm. 09 = 92 mm.

Stator length E (shortest), J, N, Q, S (longest).

Winding Pa suitable for 3000 rpm at rail voltage 560V
Ma suitable for 3000 rpm at rail voltage 320V

Feedback See the feedback list on www.hdd.se

Power connector Many different pinouts available; see www.hdd.se

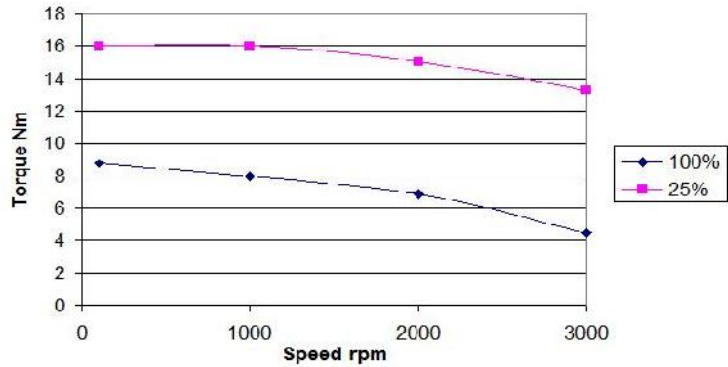
Brake A = no brake, D = holding brake. Data see above.

Shaft key A = shaft with keyway (standard), B = shaft without keyway.

Options AAA = standard. For other options please contact HDD.

Torque at 90°C temp rise, in Nm

Speed	Duty cycle	
	100%	25%
100rpm	8.8	16.0
1000rpm	8.0	16.0
2000rpm	6.9	15.1
3000rpm	4.5	13.3



Current at 90°C temp rise, in Ampere rms

Winding	Duty cycle	
	100%	25%
100rpm	6.5 Pa	12.0 Pa
1000rpm	5.9 Pa	12.0 Pa
2000rpm	5.3 Pa	11.7 Pa
3000rpm	4.5 Pa	11.3 Pa

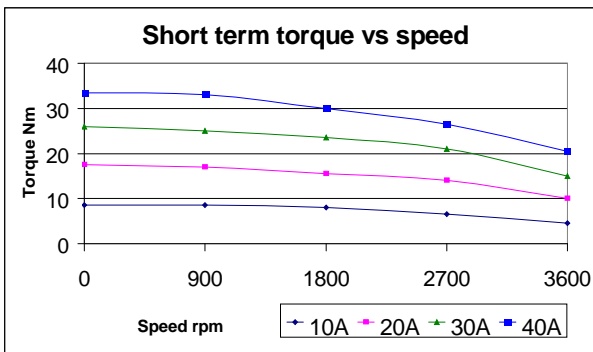
Data were measured on an HDD 09S-Pa series motor mounted on a vertical 260 x 200 x 12 mm aluminum plate in free air, with a winding temperature rise of 90°C and driven by a commercially available inverter.

Important note on peak torque and currents

The HDD motors are capable of high peak torques. At very high peak torques the permitted pulse time is very limited as a high current in a very small motor causes rapid temperature rise in the copper winding. The protection thermistor will not react fast enough to protect the winding during high pulse loads. A 20A rms current to a HDD09S-Pa will give some 23.3 Nm, but the copper winding temperature will increase with some 42°C **per second**. This is not a problem for short pulses of < 0.5 seconds as long as the rms value of the current is kept below some 3.3 A. The short term torque graph below represents acceleration ramps at various commanded currents; the actual currents are lower as the driver has not been able to compensate for the high acceleration.

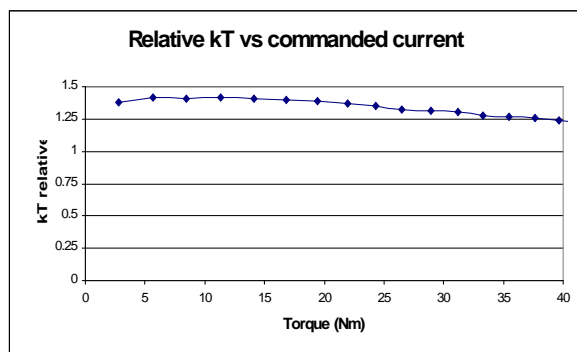
Torque at various commanded currents

HDD 09S-Pa at 560V rail voltage



kT derating factor

Low speed, HDD09S-Pa



Maximum load on shaft at life expectancy 20,000 h (shaft motors only)

Maximal axial load (push): 350 N at 500 rpm, 100 N at 3000 rpm. Maximal axial load (pull): 50 N at all speeds. Maximal radial load at zero axial load is given by the curves below. For special cases please contact HDD for calculations.

