HDD/ICM 09N Data sheet

Electric data

Value	unit	Winding		
		Pa	**Ma**	**Fa**
Number of poles		20	20	20
Number of pole pairs		10	10	10
Inductance/Phase	mH	4.9	1.23	0.034
Resistance/Phase	Ohm	1.9	0.47	0.013
Resistance/Phase-Phase	Ohm	3.9	0.94	0.026
Back EMF/Phase-Phase RMS	Vs/rad	0.84	0.42	0.070
Back EMF @ 1000 rpm	V	88	44	7.3
Torque constant (RMS)	Nm/A	1.46	0.73	0.12
Max rail voltage	V	750	750	750
Recommended peak current	A	13	26	156
Torque at recommended peak current	Nm	16.4	16.4	16.4

Mechanical data (resolver feedback)

Value	unit	HDD09N		ICM09N	
		no brake	**brake**	**no brake**	**brake**
J	kgcm2	6.1	6.5	5.5	5.9
Mass	kg	3.6	4.2	3.0	3.6

Holding brake

Torque	Nm	9
J	$kgcm^2$	0.4
Voltage	V DC	24
Power	W	12

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

Other options are available, see www.hdd.se.

Motor name structure

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

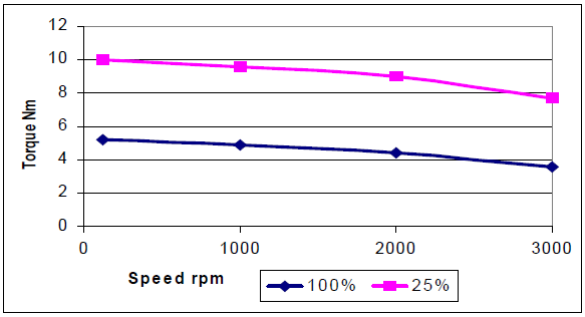
Type HDD = shaft motor, ICM = internal coupling motor.
Flange size Approximate in cm. 09 = 92 mm.
Stator length E(shortest), J, N, Q, S (longest).
Winding Suitable rail voltage at 3000 rpm.

Pa	560V
Ma	320V
Fa	48V

Feedback See the feedback list on www.hdd.se/Available feedback
Power connector Many different pinouts available; see www.hdd.se/Connector pin-outs
Brake A = no brake, D = holding brake. Data see above.
Shaft key A = shaft with key, B = shaft without key.
Options AAA = standard. For other options please contact HDD.

Torque in Nm at 90ºC temp rise (median temp rise, i.e. average between min and max temp for 25% cycle).

Speed	Duty cycle	
	100%	**25%**
100rpm	5.2	10.0
1000rpm	4.9	9.6
2000rpm	4.4	9.0
3000rpm	3.6	7.7



Current at 90ºC temp rise, in Ampere rms

Duty cycle	100 %			25 %		
Winding	**Pa**	**Ma**	**Fa**	**Pa**	**Ma**	**Fa**
locked rotor	3.4	6.3				
100rpm	3.9	7.4	47	7.8	14.8	94
1000rpm	3.8	7.2	46	7.6	14.4	91
3000rpm	3.3	6.3	40	6.9	7.3	83

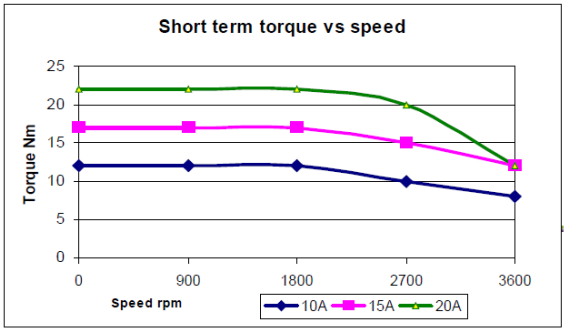
Data were measured on an HDD 09N-Pa series motor mounted on a vertical 260 x 200 x 12 mm aluminum plate in free air, with a winding temperature rise of 90ºC and driven by a commercially available inverter. Data for Ma and Fa windings were calculated.

Important note on peak torque and currents

The HDD/ICM motors are capable of high peak torques. The coupling inside the ICM is however limited to 15 Nm peak. 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 HDD09N-Pa will give some 23.3 Nm, but the copper winding temperature will increase with some 42ºC 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.

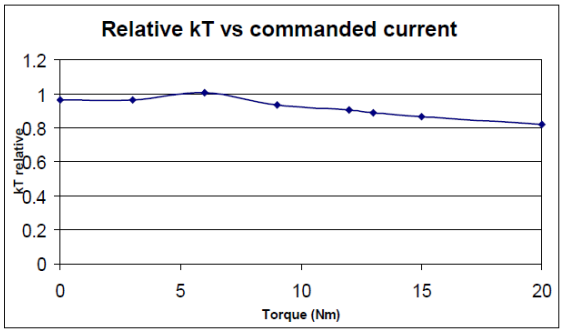
Torque at various commanded currents

HDD 09N-Pa at 560V rail voltage



kT derating factor

Low speed, HDD09N-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.