

## HSM 09Q Data sheet

### Electrical data

Value	unit	Pa winding
Number of poles		20
Number of pole pairs		10
Inductance/Phase	mH	2.7
Resistance/Phase	Ohm	1.0
Resistance/Phase-phase	Ohm	2.0
Back EMF/Phase-Phase RMS	Vs/rad	0.69
Back EMF @ 1000 rpm	V	72
Torque constant (RMS)	Nm/A	1.19
Max rail voltage	V	750
Recommended max current	A	18
Torque at recommended max current	Nm	18

**For higher torques, see next page**

### Mechanical data

Value	unit	Singleturn	Multiturn
J	kgcm <sup>2</sup>	10.0	10.5
Mass	kg	4.6	4.9
Length "L"	mm	150.3	150.3

### Thermistor

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

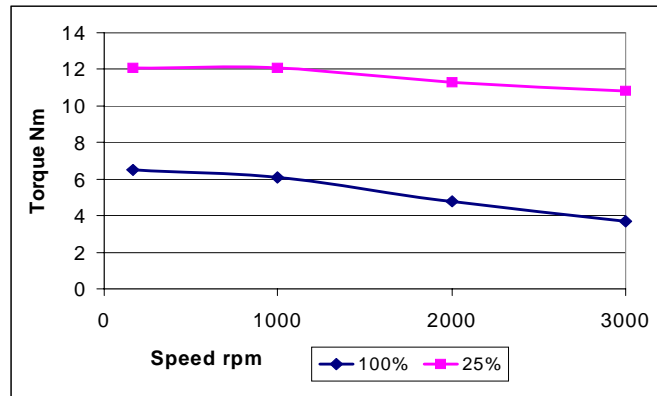
R @ 25 C	100 to 350 Ohm
R @ 145 C	< 1650 Ohm
R @ 155 C	> 4 kOhm

### Motor name structure

Type	Flange size	Stator length	Winding	Feedback	Power connector	Brake	Shaft key	Options
HSM	09	- Q	- Pa	- ST	- A	- A	- A	- AAA
<b>Type</b>	HSM = Hollow Shaft Motor							
<b>Flange size</b>	Approximate in cm. 09 = 92 mm.							
<b>Stator length</b>	J (shortest), N, Q (longest).							
<b>Winding</b>	Pa suitable for 3000 rpm at rail voltage 560V Ma suitable for 3000 rpm at rail voltage 320V							
<b>Feedback</b>	ST/SN = SinCos single/multiturn.							
<b>Power connector</b>	Many different pinouts available; see <a href="http://www.hdd.se/Connector">www.hdd.se/Connector</a> pin-outs							
<b>Brake</b>	A = no brake (no other option available for HSM motors)							
<b>Shaft key</b>	A (no options available for HSM motors)							
<b>Options</b>	AAA = standard. For other options please contact HDD.							

## Torque at 90°C temp rise, in Nm

Speed	Duty cycle	
	100%	25%
165rpm	6.5	12.1
1000rpm	6.1	12.1
2000rpm	4.8	11.3
3000rpm	3.7	10.8



## Current at 90°C temp rise, in Ampere rms

Winding	Duty cycle	
	100%	25%
165rpm	5.3	10.7
1000rpm	4.8	10.4
3000rpm	3.0	9.6

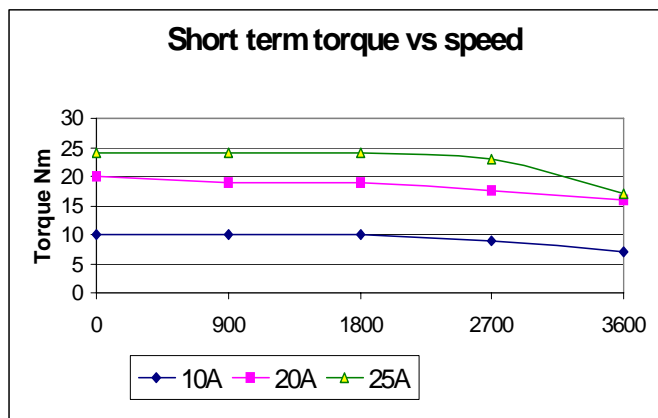
Data were measured on an HSM 09Q-Pa series motor mounted on a vertical 260 x 200 x 12 mm aluminum plate in free air, with a winding temperature rise of 90°C and driven by a commercially available inverter.

## Important note on peak torque and currents

The HSM 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 25A rms current to a HSM09Q-Pa will give some 24Nm, but the copper winding temperature will increase with some 28°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 5 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.

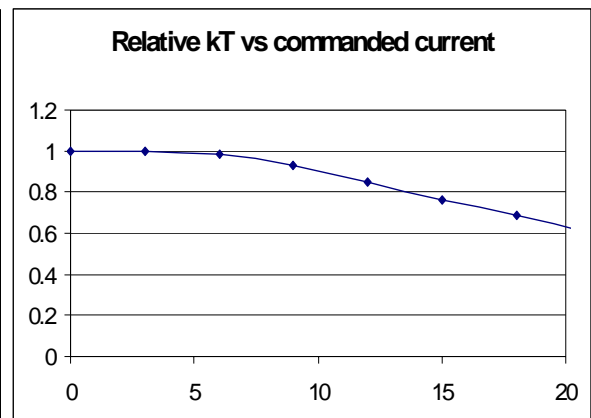
## Torque at various commanded currents

HSM 09Q-Pa at 560V rail voltage



## kT derating factor

Low speed, HSM 09Q-Pa



## Maximum load on shaft at life expectancy 20,000 h

Maximal axial load (push): 1600 N at 500 rpm, 650 N at 3000 rpm.

Maximal axial load (pull): 50 N at all speeds.

Maximal radial load is given by the curves below.

