Allied Motion
An Allient Company

Brushless DC Outer-Rotor Motors
KINETIMAX HPD - 072

72 mmdiameter, 0.34 to 0.94 Nm continuous torque, up to 260 Watts

The KinetiMax HPD (High Power Density) Series motors are frameless, outer-rotor brushless DC motors designed as stator-rotor part sets. With an exceptional torque-to-weight ratio, these motors are ideal for weight-sensitive applications.

The large stator inner diameter (ID) accommodates larger ball bearings, while the clear aperture allows cabling to pass through the motor. Additionally, low cogging torque and high peak torque characteristics enhance performance in demanding servo applications. The HPD series provides flexible configuration options to deliver optimal performance tailored to your application's needs.

KEY FEATURES & BENEFITS

Efficiency:
Exceptional efficiency ranging from 81% to 91% across a broad speed-torque range, ensuring optimal performance near the nominal working point.

High Torque-to-Weight Ratio:
Delivers powerful torque while keeping weight to a minimum, critical in battery-operated and portable systems.

Torque Range:
Rated torque from 0.34 Nm to 0.94 Nm for diverse.

Multiple Voltage Options:
Winding selections available to match specific voltage requirements.

Battery Optimization:
High efficiency is ideal for battery-powered applications, maximizing operational timeper charge.

OPTIONS & ACCESSORIES

Frame Sizes & Stack Heights:
Available in six frame sizes with three different stack heights to suit various space and performance constraints.

Commutation Sensors:
Integrated Hall effect sensor board for precise commutation.

Thermal Monitoring:
Stator-mounted temperature sensor for thermal management and protection.

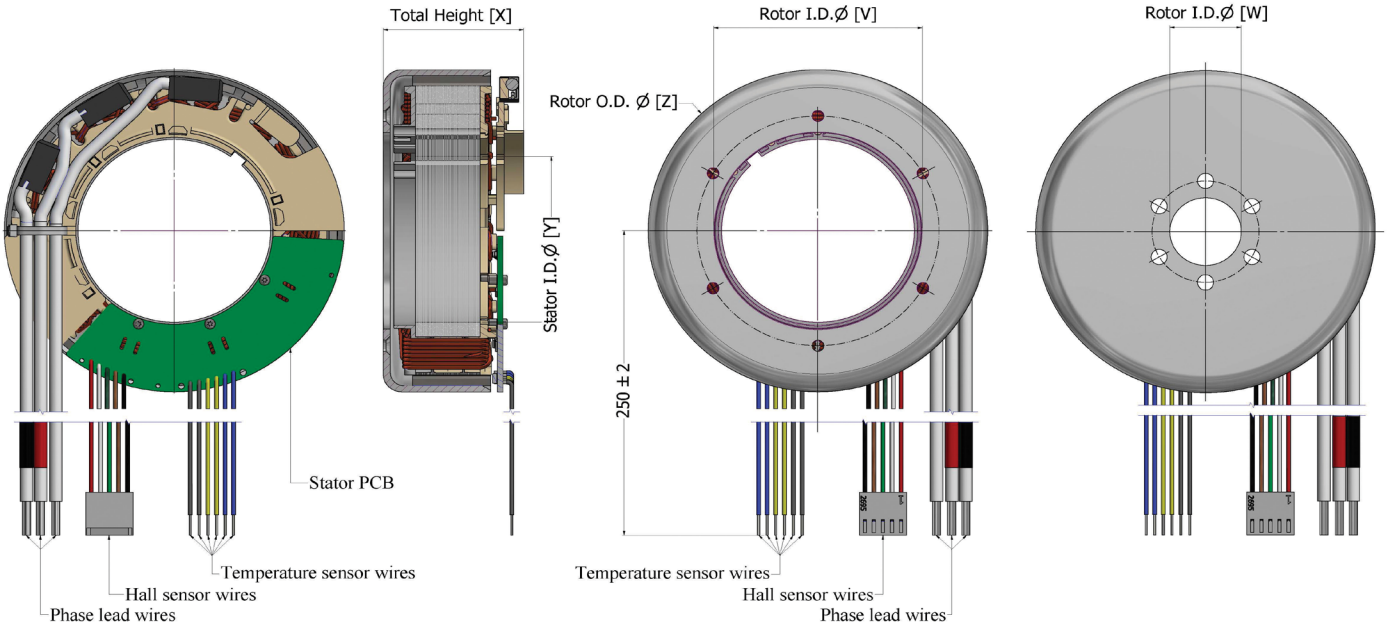
APPLICATIONS

The KinetiMax HPD Series motors are well-suited for a variety of high-performance applications:

Including

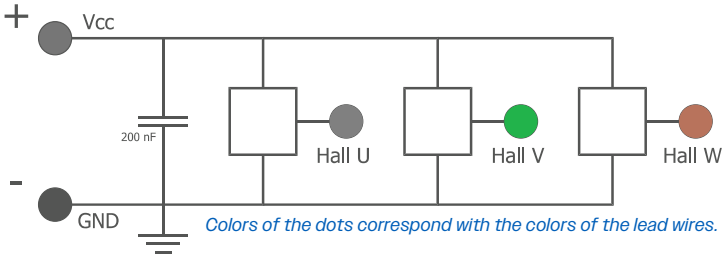
- Automated Guided Vehicles (AGVs)
- Robotics (arms, joints, end-effectors)
- Handheld hydraulic power tools
- Material handling systems
- Medical devices and equipment
- Rotary actuators and gimbals

DIMENSIONS



HALL SENSORS

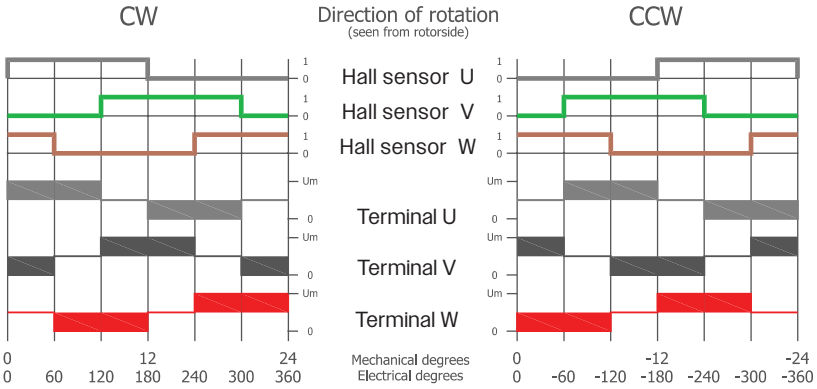
Connections/Specifications:



Colors of the dots correspond with the colors of the lead wires.

Specification Item	Value [typ.]
Supply Voltage [VCC]	3.0-32V
Supply Current	4.8 mA
Temperature Range	-40 °C+170 °C
Output Type	Open drain
Max Output Voltage	32 V
Max Output Current	25 mA

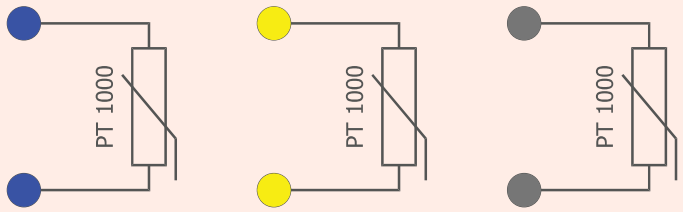
Switching Sequence:



The colors of the 3 Hall sensor signals correspond with the 3 colors of the Hall lead wires.
The colors of the 3 signals of the terminals U, V, W, correspond with the 3 colors of the motor lead wires.

TEMPERATURE SENSORS

Connections/Specifications:



Specification Item	Value [typ.]
Resistance at 0°C	1000 Ohm
Temperature Coefficient	+ 3850 ppm/K
Temperature Range	-40 °C/+175 °C
ΔT (1)	T.B.D.

Colors of the dots correspond with the colors of the lead wires, each wire color is used for a different motor phase.

(1) Due to the thermal coupling between the winding and sensor, the temperature measured by the sensor will be lower than the actual temperature of the winding.
Optional sensor types are possible after consulting the factory (PTC, NTC).

SPECIFICATIONS

		KMF 072 01							
Winding Identification[3]		**C**	**D**	**E**	**F**	**G**	**H**	**J**	**K**
Nominal Supply Voltage DC Link	Volt	15	18	24	30	42	60	72	72
Rated Output Power[1]	Watt	158	151	145	145	147	157	145	107
Rated Speed	RPM	4490	4306	4142	4142	4179	4480	4139	3041
Rated Torque[1]	Nm	0.34							
Rated Line Current[1][4]	Arms	9.0	7.2	5.2	4.1	3.0	2.2	1.7	1.3
Max Efficiency	%	86							
No Load Speed (@ nominal voltage)	RPM	4695	4507	4337	4337	4382	4695	4337	3253
BEMF Constant Ke	V/kRPM	3.2	4.0	5.5	6.9	9.6	12.8	16.6	22.1
Motor Speed Constant Kv (=1/Ke)	RPM/V	313.0	250.4	180.7	144.6	104.3	78.2	60.2	45.2
Continuous Stall Torque[1]	Nm	0.44							
Continuous Stall Line Current (rms)[1]	Arms	11.8	9.4	6.8	5.4	3.9	2.9	2.3	1.7
Peak Torque	Nm	1.31							
Max. Demagnetization Line Current	A	82	66	48	38	27	21	16	12
Torque/Rms Line Current Kt[4]	Nm/Arms	0.037	0.047	0.065	0.081	0.112	0.149	0.194	0.259
Resistance (terminal-to-terminal)	mOhm	60	91	170	265	530	999	1555	2962
Inductance (terminal-to-terminal)	µH	26	41	79	123	237	421	710	1263
Back EMF (@1000 RPM terminal-to-terminal)	Vrms	2.3	2.8	3.9	4.9	6.8	9.0	11.7	15.7
Thermal Resistance (stator/rotor to ambient)[1]	°C/W	3.18							
Thermal Resistance Winding-Housing	°C/W	2.79							
Max. Winding Temperature	°C	160							
Number of Pole Pairs		15							
Weight	kg	0.21							
Rotor Inertia - Large I.D.	kgm²*E-6	85							
Rotor Inertia - Small I.D.	kgm²*E-6	90							
Mechanical Time Constant	ms	3.6							
Electrical Time Constant	ms	0.4							
Motor Constant Km	Nm/ sqrt(W)	0.126							

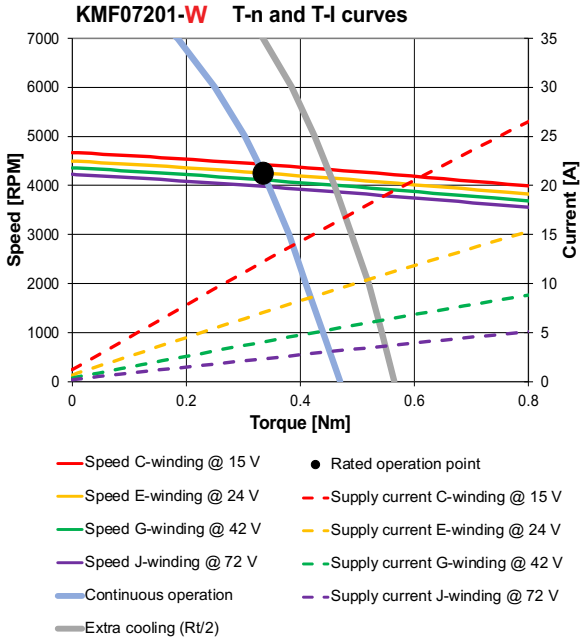
(1) Assuming the stator-rotor set is mounted on a bracket with an aluminium flange diameter 1.5 times rotor diameter.
(2) See the dimensions in the drawing (page 6).
(3) Windings C, D, G and H are delta connected, windings E, F, J and K are wye connected.
(4) Line currents are the AC currents running into the three terminals of the stator.

SPECIFICATIONS

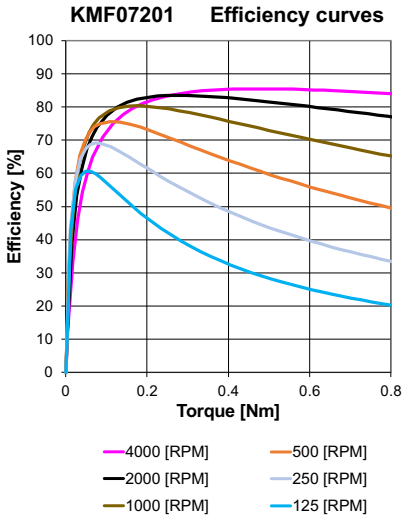
		KMF 072 01							
Winding Identification[3]		**C**	**D**	**E**	**F**	**G**	**H**	**J**	**K**
Cogging Torque (typical, peak to peak)	Nm	0.008							
Drag Torque	Nm	0.012							
Viscous Damping	Nm/RPM	5.1E-06							
Thermal Time Constant of Winding Only	s	21							
Adiabatic Heating of Winding at Peak Torque	K/s	9							
Rotor Inner Diameter [V] [2]	mm	44							
Rotor Inner Diameter [W] [2]	mm	16							
Rotor Outer Diameter [Z] [2]	mm	72.3							
Stator Inner Diameter [Y] [2]	mm	39.0							
Total Height [X] [2]	mm	23.5							
Motor Lead Wire AWG Size		14	14	14	14	20	20	20	20

(1) Assuming the stator-rotor set is mounted on a bracket with an aluminium flange diameter 1.5 times rotor diameter.
(2) See the dimensions in the drawing (page 6).
(3) Windings C, D, G and H are delta connected, windings E, F, J and K are wye connected.
(4) Line currents are the AC currents running into the three terminals of the stator.

PERFORMANCE



Supply current is the DC current taken from the DC power supply by the drive. The torque-speed curves and torque-current curves are made assuming a FOC drive is used.



SPECIFICATIONS

		KMF 072 02							
Winding Identification[3]		**C**	**D**	**E**	**F**	**G**	**H**	**J**	**K**
Nominal Supply Voltage DC Link	Volt	18	24	36	42	60	72	72	72
Rated Output Power[1]	Watt	199	213	231	215	222	198	150	109
Rated Speed	RPM	2788	2987	3250	3023	3116	2777	2111	1531
Rated Torque[1]	Nm	0.68							
Rated Line Current[1 4]	Arms	9.5	7.6	5.5	4.4	3.2	2.4	1.8	1.4
Max Efficiency	%	87							
No Load Speed (@ nominal voltage)	RPM	2952	3149	3409	3182	3280	2952	2273	1704
BEMF Constant Ke	V/kRPM	6.1	7.6	10.6	13.2	18.3	24.4	31.7	42.2
Motor Speed Constant Kv (=1/Ke)	RPM/V	164.0	131.2	94.7	75.8	54.7	41.0	31.6	23.7
Continuous Stall Torque[1]	Nm	0.83							
Continuous Stall Line Current (rms)[1]	Arms	11.6	9.3	6.7	5.4	3.9	2.9	2.2	1.7
Peak Torque	Nm	2.61							
Max. Demagnetization Line Current	A	86	69	50	40	29	22	17	12
Torque/Rms Line Current Kt[4]	Nm/Arms	0.071	0.089	0.124	0.154	0.214	0.285	0.371	0.494
Resistance (terminal-to-terminal)	mOhm	86	133	248	389	773	1464	2284	4357
Inductance (terminal-to-terminal)	µH	48	75	143	224	430	765	1291	2296
Back EMF (@1000 RPM terminal-to-terminal)	Vrms	4.3	5.4	7.5	9.3	12.9	17.2	22.4	29.9
Thermal Resistance (stator/rotor to ambient)[1]	°C/W	2.82							
Thermal Resistance Winding-Housing	°C/W	1.39							
Max. Winding Temperature	°C	160							
Number of Pole Pairs		15							
Weight	kg	0.32							
Rotor Inertia - Large I.D.	kgm²*E-6	122							
Rotor Inertia - Small I.D.	kgm²*E-6	127							
Mechanical Time Constant	ms	2.1							
Electrical Time Constant	ms	0.6							
Motor Constant Km	Nm/ sqrt(W)	0.198							

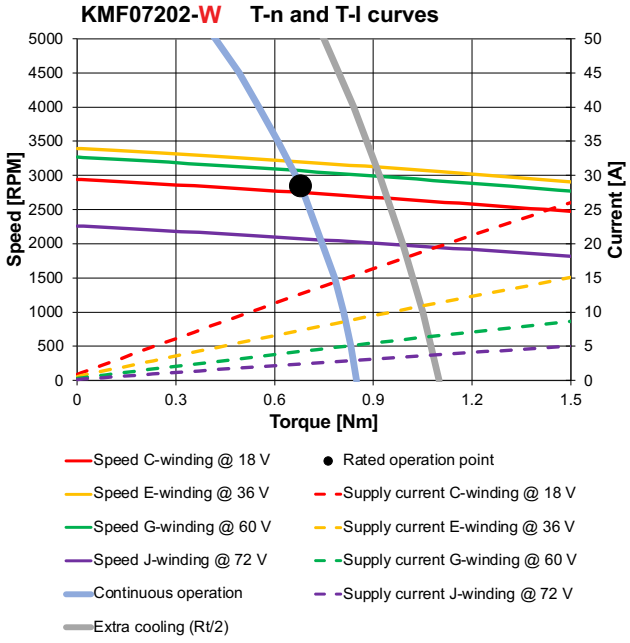
(1) Assuming the stator-rotor set is mounted on a bracket with an aluminium flange diameter 1.5 times rotor diameter.
(2) See the dimensions in the drawing (page 6).
(3) Windings C, D, G and H are delta connected, windings E, F, J and K are wye connected.
(4) Line currents are the AC currents running into the three terminals of the stator.

SPECIFICATIONS

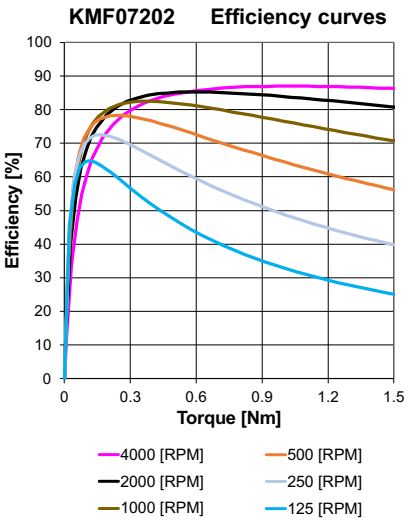
		KMF 072 02							
Winding Identification[3]		**C**	**D**	**E**	**F**	**G**	**H**	**J**	**K**
Cogging Torque (typical, peak to peak)	Nm	0.017							
Drag Torque	Nm	0.022							
Viscous Damping	Nm/RPM	9.7E-06							
Thermal Time Constant of Winding Only	s	15							
Adiabatic Heating of Winding at Peak Torque	K/s	10							
Rotor Inner Diameter [V] [2]	mm	44							
Rotor Inner Diameter [W] [2]	mm	16							
Rotor Outer Diameter [Z] [2]	mm	72.3							
Stator Inner Diameter [Y] [2]	mm	39.0							
Total Height [X] [2]	mm	30.5							
Motor Lead Wire AWG Size		14	14	14	14	20	20	20	20

(1) Assuming the stator-rotor set is mounted on a bracket with an aluminium flange diameter 1.5 times rotor diameter.
(2) See the dimensions in the drawing (page 6).
(3) Windings C, D, G and H are delta connected, windings E, F, J and K are wye connected.
(4) Line currents are the AC currents running into the three terminals of the stator.

PERFORMANCE



Supply current is the DC current taken from the DC power supply by the drive. The torque-speed curves and torque-current curves are made assuming a FOC drive is used.



SPECIFICATIONS

		KMF 072 03							
Winding Identification[3]		**C**	**D**	**E**	**F**	**G**	**H**	**J**	**K**
Nominal Supply Voltage DC Link	Volt	24	30	42	54	72	72	72	72
Rated Output Power[1]	Watt	257	257	260	268	257	188	142	102
Rated Speed	RPM	2612	2612	2644	2723	2610	1911	1447	1038
Rated Torque[1]	Nm	0.94							
Rated Line Current[1][4]	Arms	9.2	7.4	5.3	4.3	3.1	2.3	1.8	1.3
Max Efficiency	%	87							
No Load Speed (@ nominal voltage)	RPM	2757	2757	2785	2865	2757	2068	1592	1194
BEMF Constant Ke	V/kRPM	8.7	10.9	15.1	18.8	26.1	34.8	45.2	60.3
Motor Speed Constant Kv (=1/Ke)	RPM/V	114.9	91.9	66.3	53.1	38.3	28.7	22.1	16.6
Continuous Stall Torque[1]	Nm	1.18							
Continuous Stall Line Current (rms)[1]	Arms	11.6	9.3	6.7	5.4	3.9	2.9	2.2	1.7
Peak Torque	Nm	3.92							
Max. Demagnetization Line Current	A	91	73	52	42	30	23	17	13
Torque/Rms Line Current Kt[4]	Nm/Arms	0.102	0.127	0.176	0.220	0.305	0.407	0.529	0.705
Resistance (terminal-to-terminal)	mOhm	112	174	327	513	1016	1929	3012	5752
Inductance (terminal-to-terminal)	µH	71	110	212	331	635	1128	1904	3384
Back EMF (@1000 RPM terminal-to-terminal)	Vrms	6.2	7.7	10.7	13.3	18.5	24.6	32.0	42.6
Thermal Resistance (stator/rotor to ambient)[1]	°C/W	2.54							
Thermal Resistance Winding-Housing	°C/W	0.93							
Max. Winding Temperature	°C	160							
Number of Pole Pairs		15							
Weight	kg	0.43							
Rotor Inertia - Large I.D.	kgm^2*E-6	159							
Rotor Inertia - Small I.D.	kgm^2*E-6	163							
Mechanical Time Constant	ms	1.7							
Electrical Time Constant	ms	0.6							
Motor Constant Km	Nm/ sqrt(W)	0.247							

(1) Assuming the stator-rotor set is mounted on a bracket with an aluminium flange diameter 1.5 times rotor diameter.
(2) See the dimensions in the drawing (page 6).
(3) Windings C, D, G and H are delta connected, windings E, F, J and K are wye connected.
(4) Line currents are the AC currents running into the three terminals of the stator.

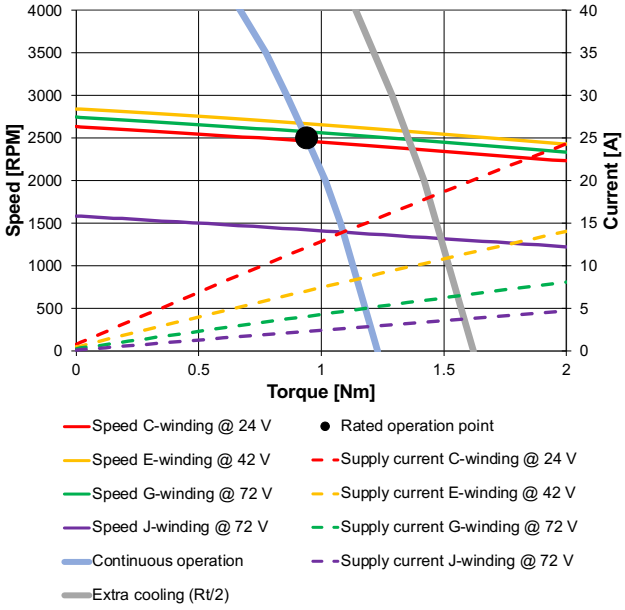
SPECIFICATIONS

		KMF 072 03							
Winding Identification[3]		**C**	**D**	**E**	**F**	**G**	**H**	**J**	**K**
Cogging Torque (typical, peak to peak)	Nm	0.024							
Drag Torque	Nm	0.027							
Viscous Damping	Nm/RPM	1.4E-05							
Thermal Time Constant of Winding Only	s	14							
Adiabatic Heating of Winding at Peak Torque	K/s	11							
Rotor Inner Diameter [V] [2]	mm	44							
Rotor Inner Diameter [W] [2]	mm	16							
Rotor Outer Diameter [Z] [2]	mm	72.3							
Stator Inner Diameter [Y] [2]	mm	39.0							
Total Height [X] [2]	mm	37.5							
Motor Lead Wire AWG Size		14	14	14	14	20	20	20	20

(1) Assuming the stator-rotor set is mounted on a bracket with an aluminium flange diameter 1.5 times rotor diameter.
(2) See the dimensions in the drawing (page 6).
(3) Windings C, D, G and H are delta connected, windings E, F, J and K are wye connected.
(4) Line currents are the AC currents running into the three terminals of the stator.

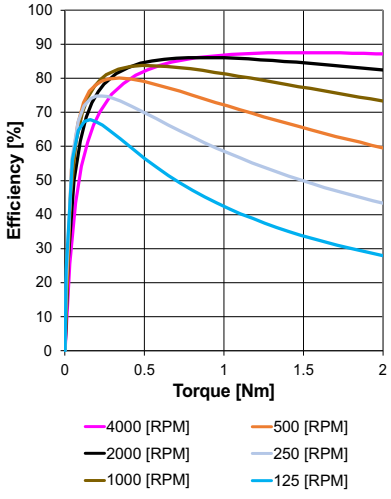
PERFORMANCE

KMF07203-W T-n and T-I curves



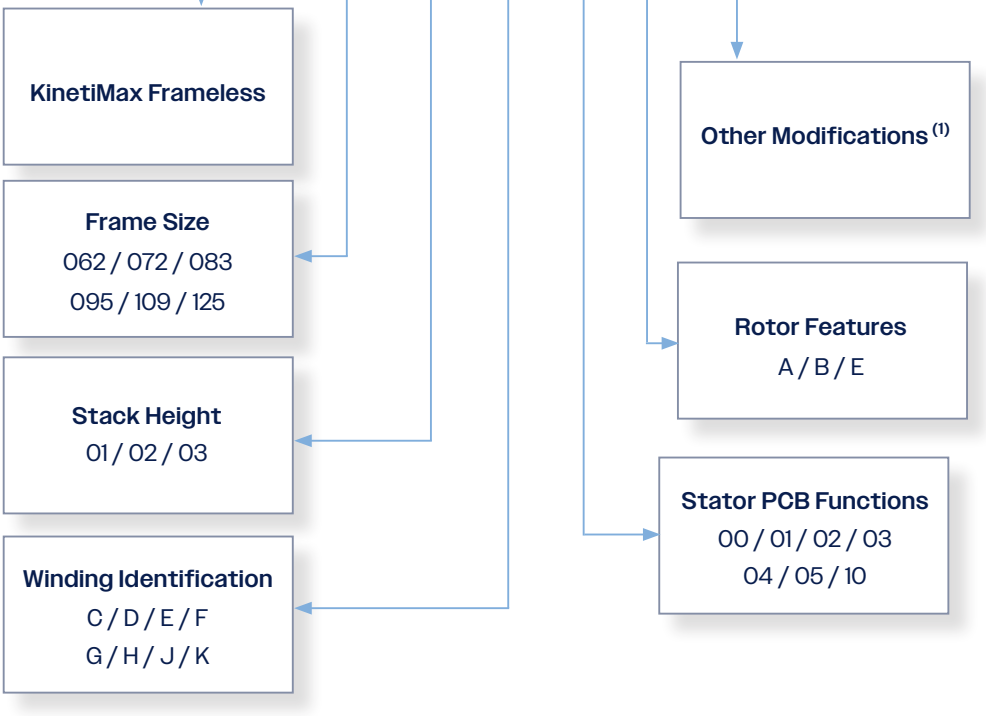
Supply current is the DC current taken from the DC power supply by the drive. The torque-speed curves and torque-current curves are made assuming a FOC drive is used.

KMF07203 Efficiency curves



COMMERCIAL PART NUMBERING KMF HPD STATOR-ROTOR SETS

KMF xxx yy-W zz R-vv



ZZ	Stator PCB functions
00	No PCB
01	PCB with 3 Hall sensors
02	PCB with 1 temperature sensor only
03	PCB with 3 Hall sensors and 1 temperature sensor
04	PCB with 3 temperature sensors only
05	PCB with 3 Hall sensors and 3 temperature senors
10	Starting with 1 are custom PCB's

R	Rotor features
A	Large bore hole, G40 balancing class
B	Small bore hole, G40 balancing class
E	Custom rotor or balancing

(1) ***Other modifications*** are meant custom added parts to stator or rotor like a stator bracket, other leadwires with connector or a rotor nave/shaft etc.