

Pi-EV 2022 Motor Selection

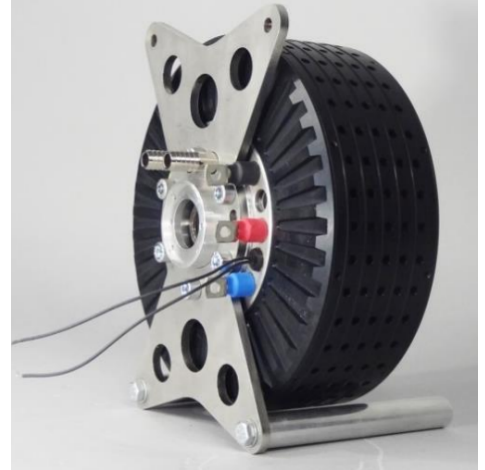
A BLDC motor is chosen due to its higher efficiency and to avoid the usage of DC-AC converter.

Motor calculations are present in this [Google sheet](#).

The motor vendor website link is <https://emrax.com/e-motors/emrax-188/>

Motor Specifications:

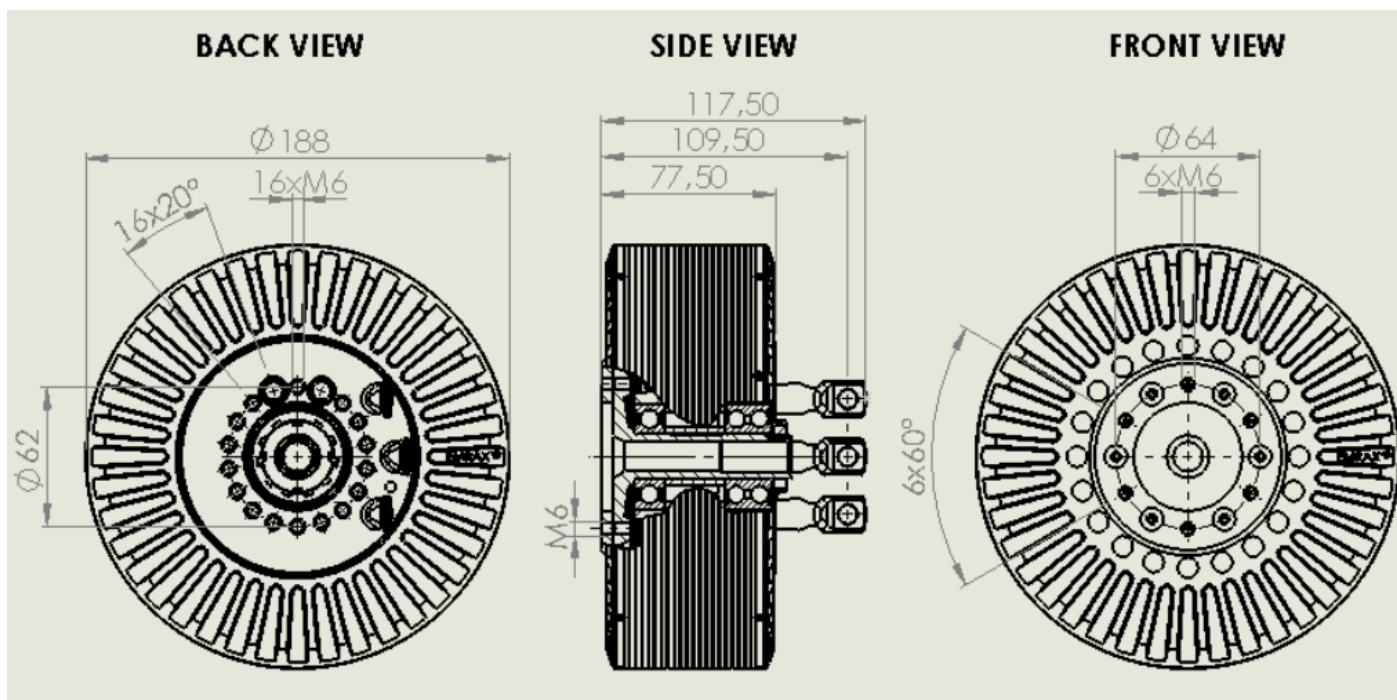
Motor type	: BLDC Axial flux motor
Model	: EMRAX 188
Cooling technology	: Air cooling
Weight	: 7kg
Diameter	: 188mm
Width	: 77mm
Peak power at max load RPM	: 52kW
Max load RPM / Maximal Rotation speed	: 6500rpm
Continuous motor power at max load RPM	: 23 kW
Maximal peak motor torque	: 90Nm
Continuous motor torque	: 40Nm
Controller / motor signal	: Sine wave
Wire connection	: Star
Maximal temperature of the copper	
Windings in the stator and max. temperature of the magnets	: 120°C
Motor efficiency	: 92 - 98%
Specific Energy density	: 7.428 kW/Kg



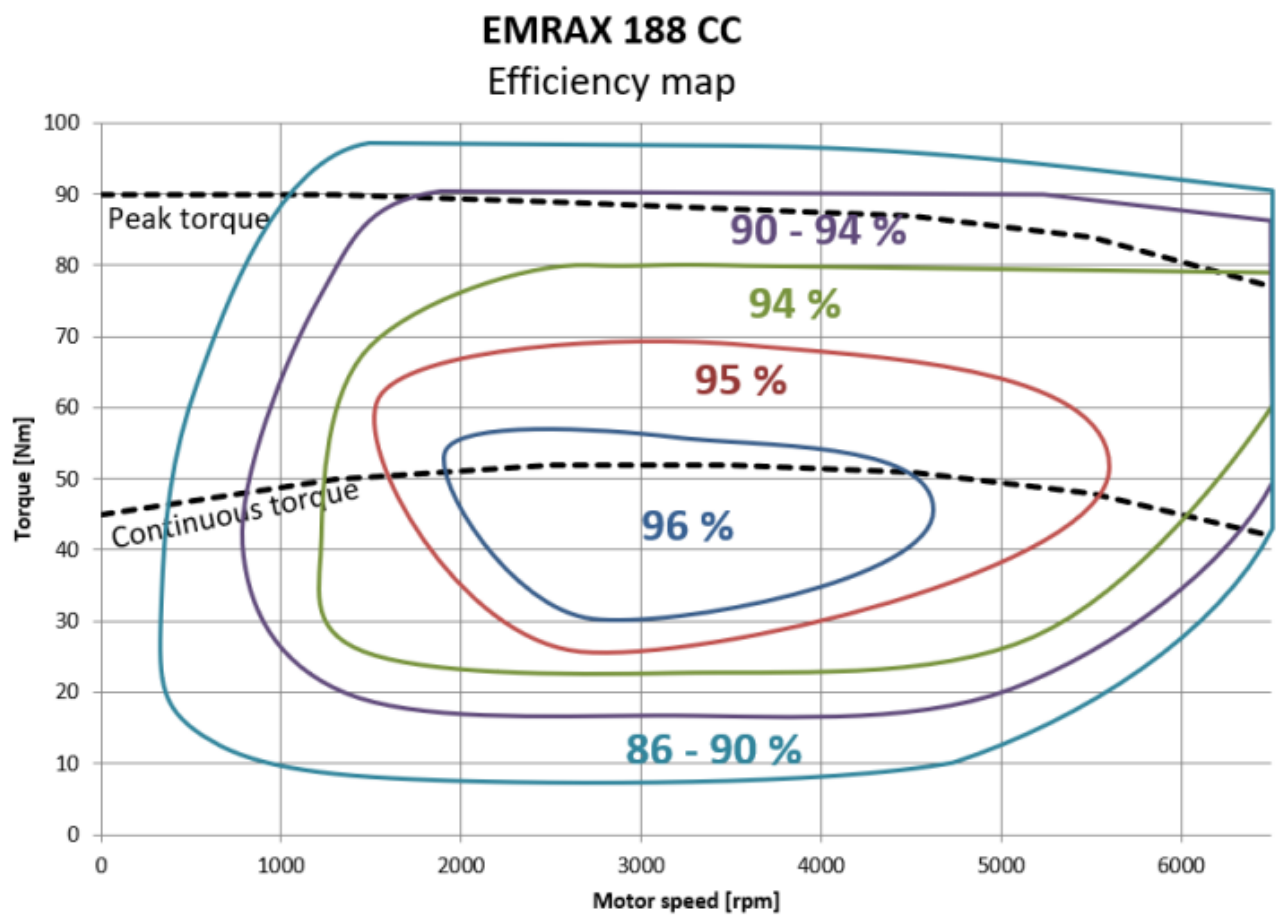
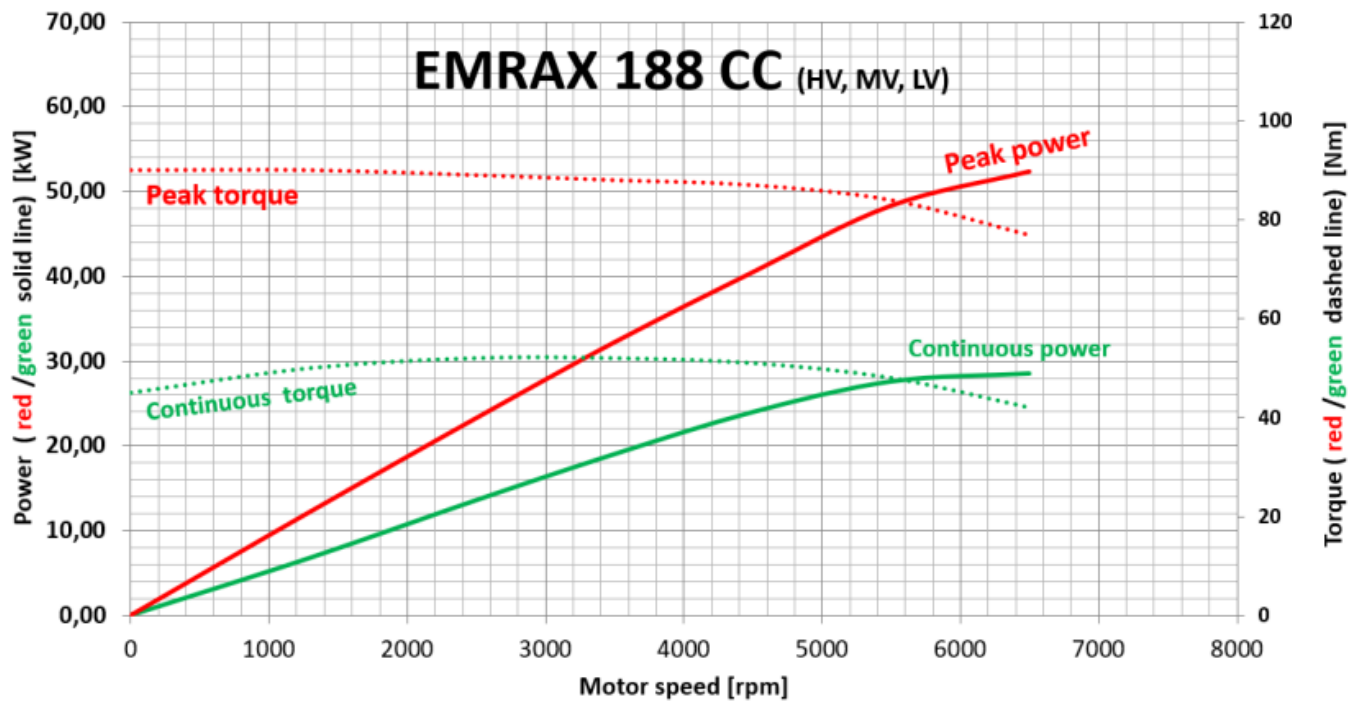
Some more specifications based on Battery Voltage:

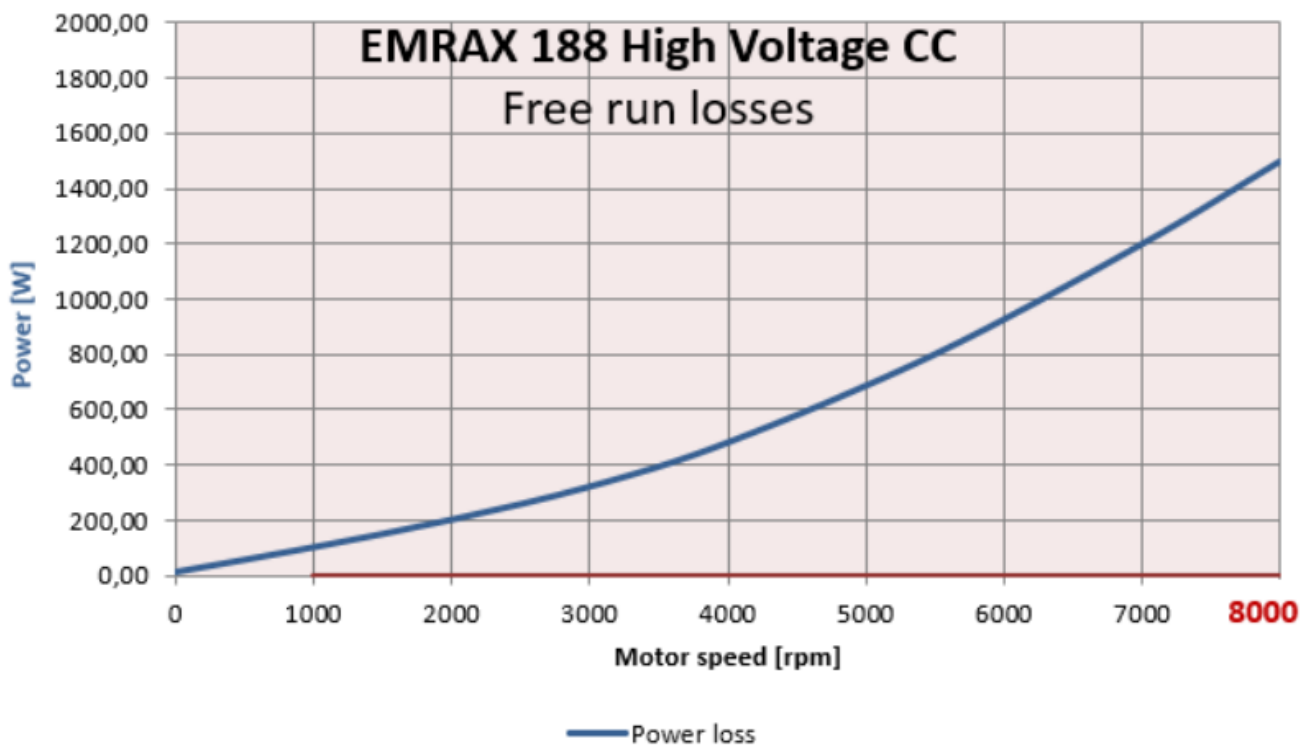
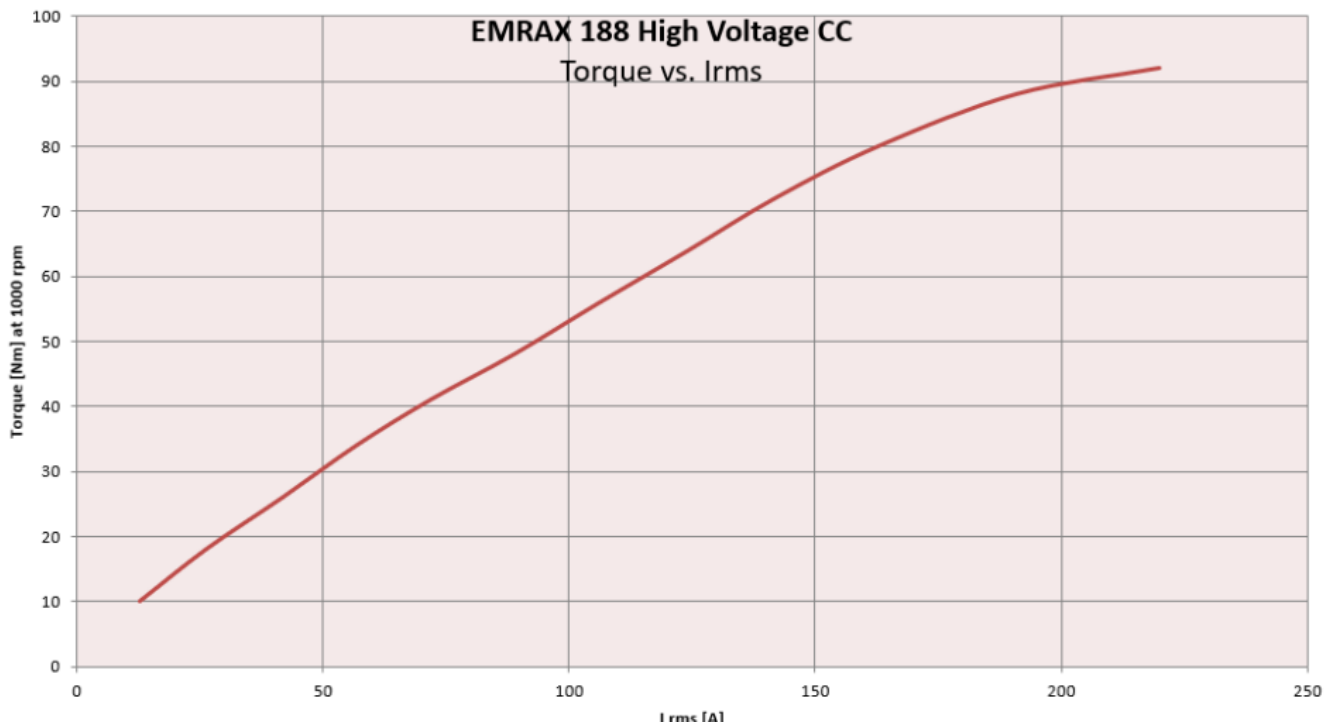
Parameter	High Voltage	Medium Voltage	Low Voltage
Maximal battery voltage	430Vdc	300Vdc	110Vdc
Maximal motor current	200Arms	300Arms	800Arms
Continuous motor current	100Arms	150Arms	400Arms
Torque / motor current [Nm/1Aph rms]	0.60	0.39	0.15
Specific idle speed (no load) [RPM/1Vdc]	19	28	75
Specific load speed (max load) [RPM/1Vdc]	15	22	60

Dimensions:



Characteristics of EMRAX 188:





NOTE:

Graphs of EMRAX air cooled motor type: The continuous power and continuous torque for air cooled motor is 20% lower.

Graphs of the EMRAX 188 medium and low voltage motor type: Graphs of EMRAX 188 low voltage and EMRAX 188 medium voltage are similar to graphs of EMRAX 188 high voltage. The only differences are the DC voltage and motor current. These two parameters can be read from the Technical data table for the EMRAX 188 low and medium voltage motor.

Low voltage motor needs 4 x higher motor current and 4 x lower DC voltage for the same power/torque and RPM, compared to EMRAX 188 high voltage motor.

Medium voltage motor needs 1.52 x higher motor current and 1/3 lower DC voltage for the same power/torque and RPM, compared to EMRAX 188 high voltage motor.