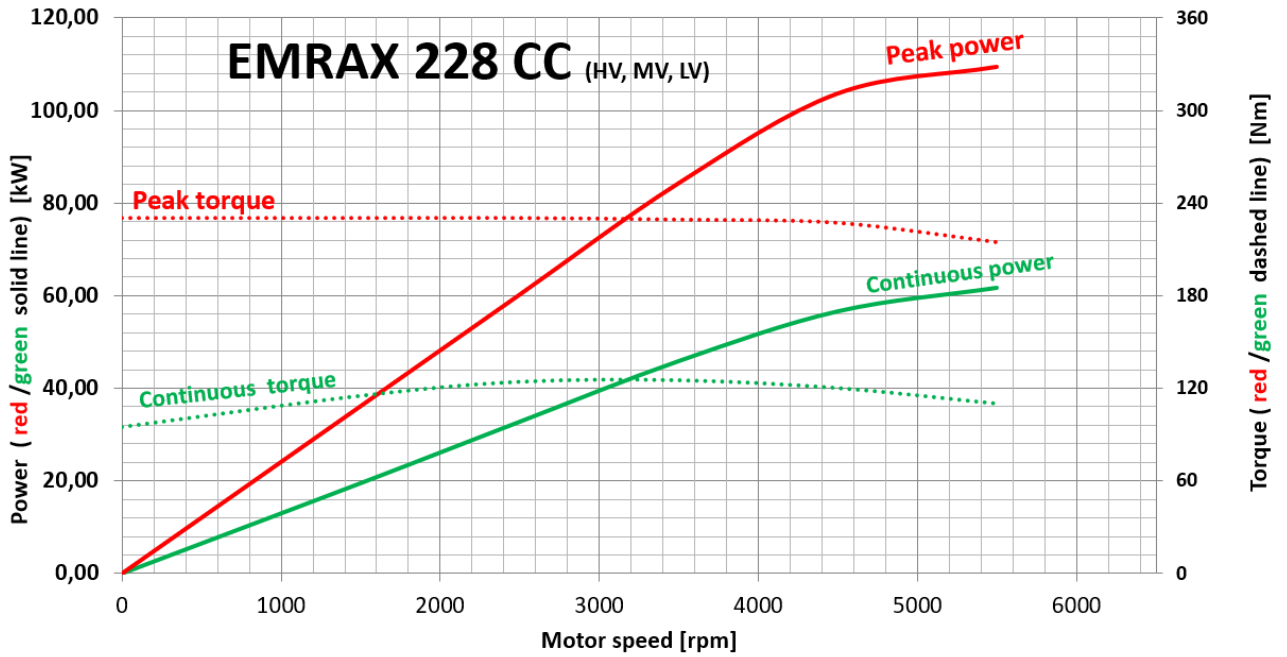


**EMRAX 228 Technical Data Table (dynamometer test data)**

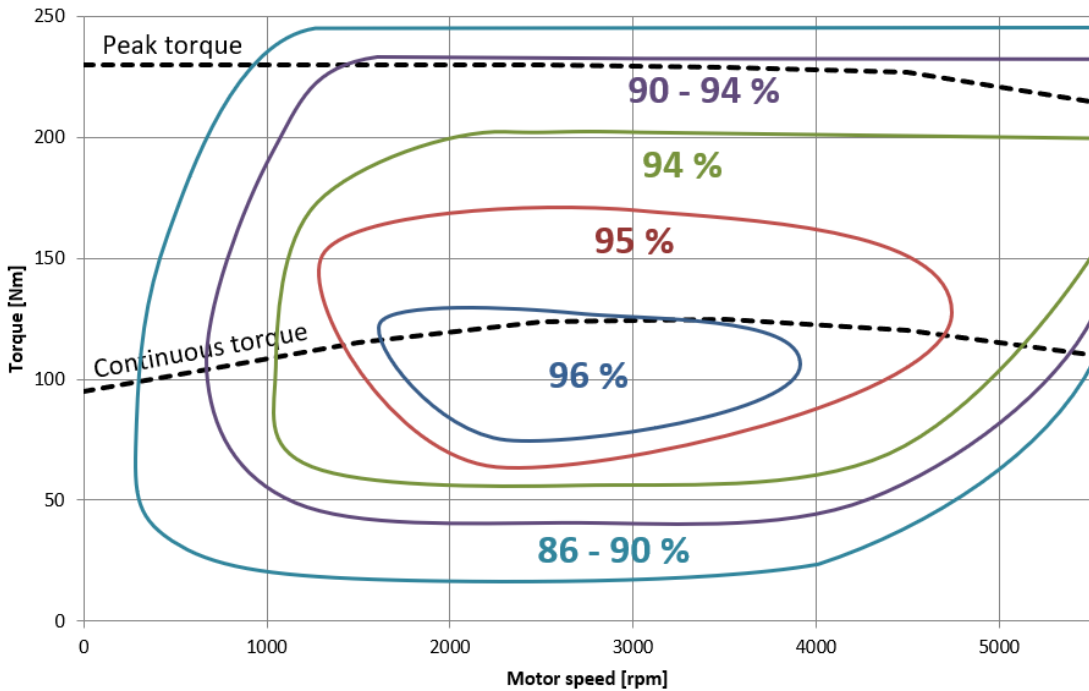
Type Technical data	EMRAX 228 High Voltage			EMRAX 228 Medium Voltage			EMRAX 228 Low Voltage		
	AC	LC	CC	AC	LC	CC	AC	LC	CC
Air cooled = AC Liquid cooled = LC Combined cooled = Air + Liquid cooled = CC									
Ingress protection	IP21	IP65	IP21	IP21	IP65	IP21	IP21	IP65	IP21
Cooling medium specification (Air Flow = AF; Inlet Water/glycol Flow = WF; Ambient Air = AA) If inlet WF temperature and/or AA temperature are lower, then continuous power is higher.	AF=20m/s AA=25°C	WF=8l/min at 50°C; AA=25°C	WF=8l/min at 50°C; AA=25°C	AF=20m/s AA=25°C	WF=8l/min at 50°C; AA=25°C	WF=8l/min at 50°C; AA=25°C	AF=20m/s AA=25°C	WF=8l/min at 50°C; AA=25°C	WF=8l/min at 50°C; AA=25°C
Weight [kg]	12,0	12,4	12,3	12,0	12,4	12,3	12,0	12,4	12,3
Diameter $\phi$ / width [mm]	228 / 86								
Maximal battery voltage [Vdc] and max load RPM	680 Vdc (5500 RPM)			500 Vdc (5500 RPM)			160 Vdc (5500 RPM)		
Peak motor power at max load RPM (few min at cold start / few seconds at hot start) [kW]	109								
Continuous motor power (at 5500 RPM)	50	53	62	50	53	62	50	53	62
Maximal rotation speed [RPM]	5500 (6500 for a few seconds with magnetic field weakening)								
Maximal motor current (for 2 min if cooled as described in Manual) [Arms]	240			340			900		
Continuous motor current [Arms]	115			160			450		
Maximal motor torque (for a few seconds) [Nm]	230								
Continuous motor torque [Nm]	96	102	120	96	102	120	96	102	120
Torque / motor current [Nm/1Aph rms]	1,1			0,75			0,27		
Maximal temperature of the copper windings in the stator and max. temperature of the magnets [°C]	120								
Motor efficiency [%]	92-98%								
Internal phase resistance at 25 °C [m $\Omega$ ]	16,7			7,0			1,1		
Input phase wire cross-section [mm <sup>2</sup> ]	11,4			17,0			42,5		
Wire connection	star								
Induction in Ld/Lq [ $\mu$ H] of 1 phase	177/183			76/79			10,3/10,6		
Controller / motor signal	sine wave								
AC voltage between two phases [Vrms/1RPM]	0,0730			0,0478			0,0176		
Specific idle speed (no load) [RPM/1Vdc]	9,8			14			40		
Specific load speed (max load) [RPM/1Vdc]	8			11			34		
Magnetic field weakening (for higher RPM at the same power and lower torque) [%]	up to 100								
Magnetic flux – axial [Vs]	0,0542			0,0355			0,0131		
Temperature sensor on the stator windings	kty 81/210								
Number of pole pairs	10								
Rotor inertia LC motor [kg*m <sup>2</sup> ]	0,0383								
Bearings (front:back) - FAG	6206:3206 (for axial-radial forces; for pull-push mode, $\alpha=25^\circ$ )								

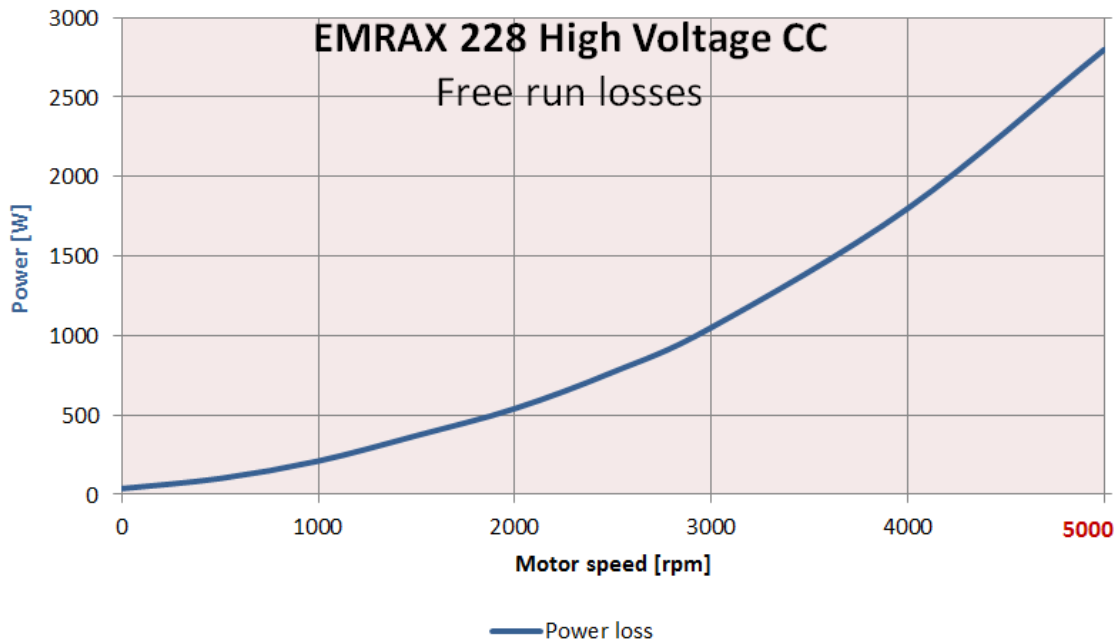
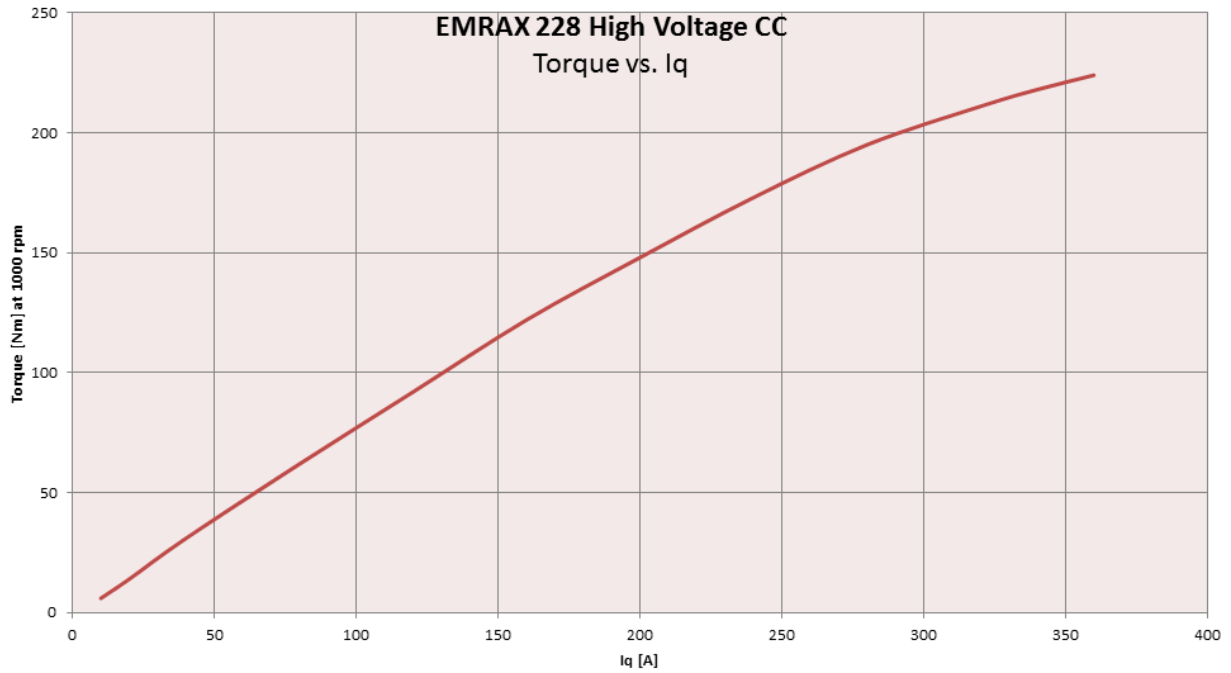
Graphs valid for EMRAX 228:



Note 1: for determining peak or continuous power (kW) you should choose motor speed and then read power from chosen power curve (in the left graph side)  
 Note 2: for determining peak or continuous torque (Nm) you should choose motor speed and then read torque from chosen torque curve (in the right graph side)

**EMRAX 228 CC**  
Efficiency map





**Graphs of EMRAX air cooled and liquid cooled type:**

The continuous power and continuous torque for air cooled motor is 20% lower and for liquid cooled motor is 15% lower.

**Graphs of the EMRAX 228 medium and low voltage motor type:**

Graphs of EMRAX 228 low voltage and EMRAX 228 medium voltage are similar to graphs of EMRAX 228 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 228 low and medium voltage motor.

Low voltage motor needs 4 x higher current and 4 x lower DC voltage for the same power/torque and RPM, compared to EMRAX 228 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 228 high voltage motor.