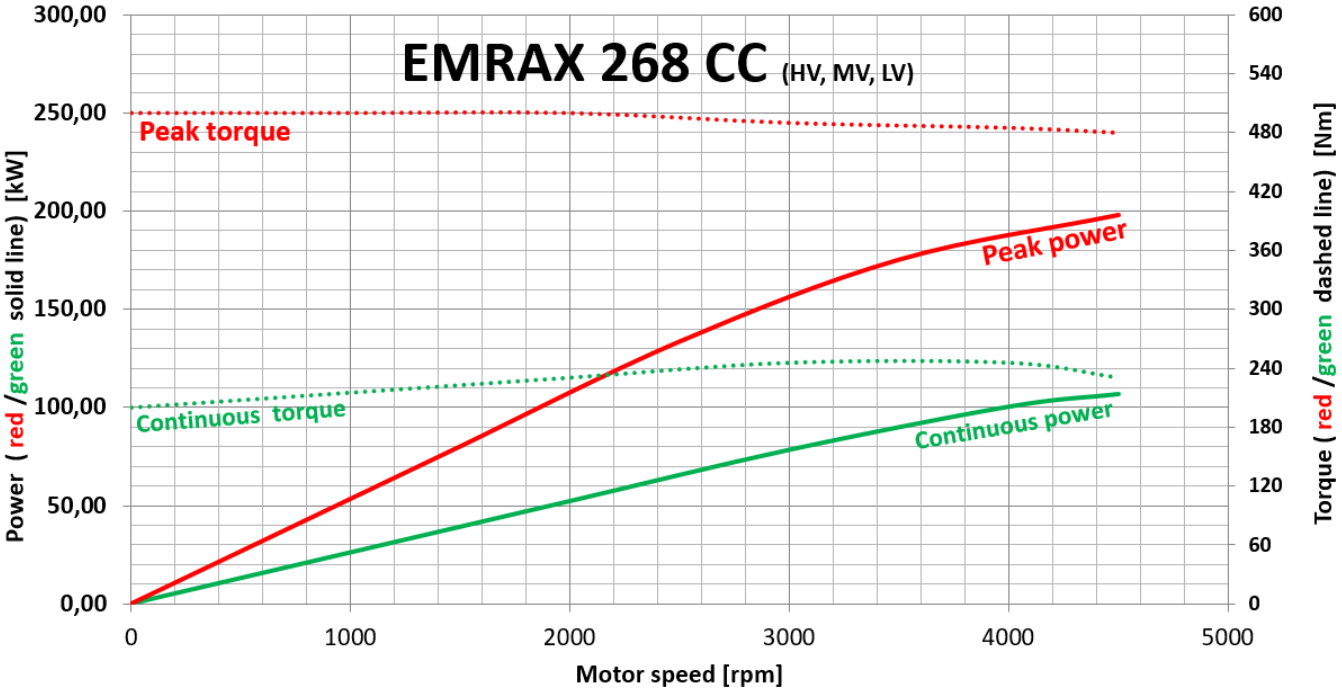
EMRAX 268 Technical Data Table

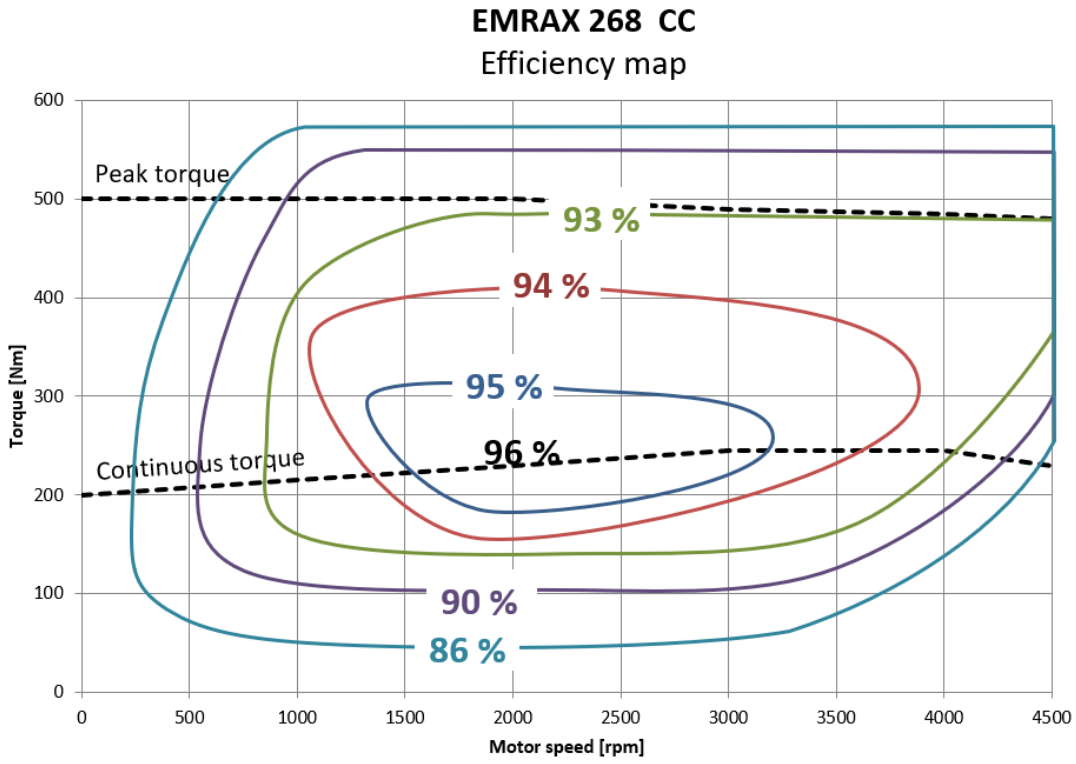
Type / Technical data	EMRAX 268 High Voltage			EMRAX 268 Medium Voltage			EMRAX 268 Low Voltage*		
Air cooled = AC Liquid cooled = LC Combined cooled = Air + Liquid cooled = CC	AC	LC	CC	AC	LC	CC	AC	LC	CC
Ingress protection	IP21	IP65	IP21	IP21	IP65	IP21	IP21	IP65	IP21
Cooling medium specification (Air 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]	20,0	20,5	20,3	20,0	20,5	20,3	20,0	20,5	20,3
Diameter ø / width [mm]	268 / 91								
Maximal battery voltage [Vdc] and max load RPM	800 Vdc (3600 RPM)			650 Vdc (4500 RPM)			250 Vdc (4500 RPM)		
Peak motor power at max load RPM (few min at cold start / few seconds at hot start) [kW]	160			200			200		
Continuous motor power (at 2000-4000 RPM) depends on the motor RPM [kW]	67	73	86	86	91	107	86	91	107
Maximal rotation speed [RPM]	4500 (5500 for a few seconds with magnetic field weakening)								
Maximal motor current (for 2 min if it is cooled as described in Manual) [Arms]	250			400			1000		
Continuous motor current [Arms]	125			190			500		
Maximal motor torque (for a few seconds) [Nm]	500								
Continuous motor torque [Nm]	200	213	250	200	213	250	200	213	250
Torque / motor current [Nm/1Aph rms]	1,90			1,30			0,46		
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 [mΩ]	22,9			10,5			1,8		
Input phase wire cross-section [mm²]	11,4			17			42,5		
Wire connection	star								
Induction in Ld/Lq [µH] of 1 phase	292/273			126/118			17/15,9		
Controller / motor signal	sine wave								
AC voltage between two phases [Vrms/1RPM]	0,126			0,0825			0,0304		
Specific idle speed (no load) [RPM/1Vdc]	5,4			8,2			22,0		
Specific load speed (max load) [RPM/1Vdc]	4,5			7			18		
Magnetic field weakening (for higher RPM at the same power and lower torque) [%]	up to 100								
Magnetic flux – axial [Vs]	0,1014			0,0664			0,0245		
Temperature sensor on the stator windings	kty 81/210								
Number of pole pairs	10								
Rotor inertia LC motor [kg*m²]	0,0922								
Bearings (front:back) – FAG	7206:3207 (for axial-radial forces; for pull-push mode, α=25°)								

*EMRAX 268 low voltage version always has 2 sequences of phase connectors (2xUVW).

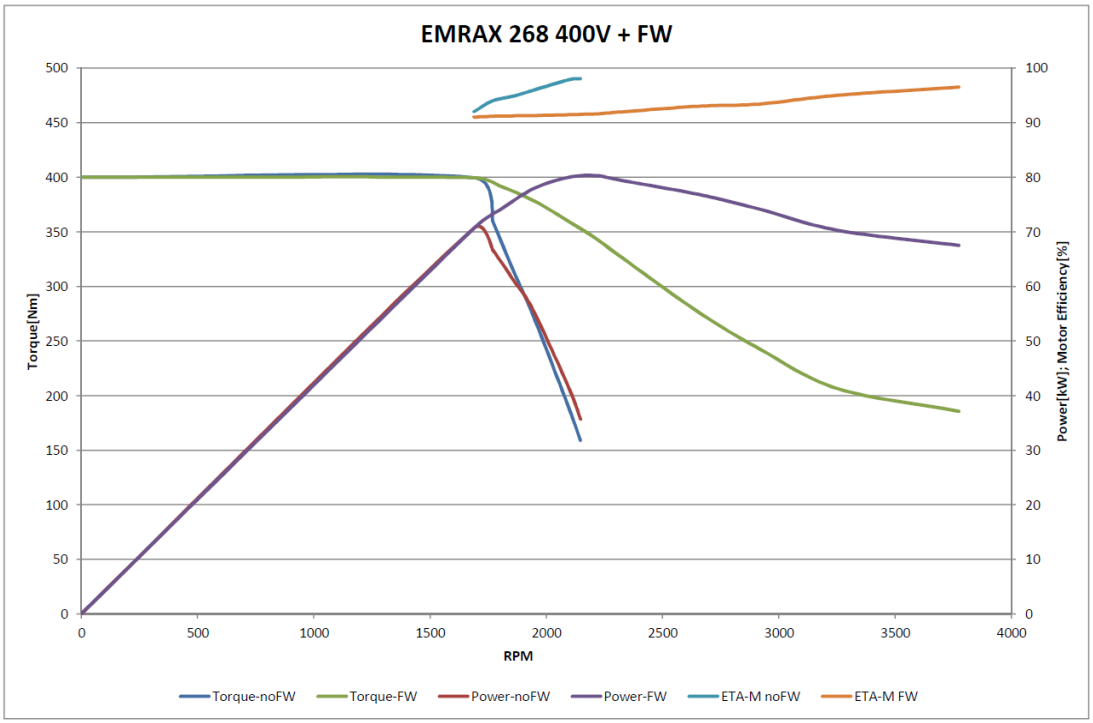
Graphs valid for EMRAX 268:

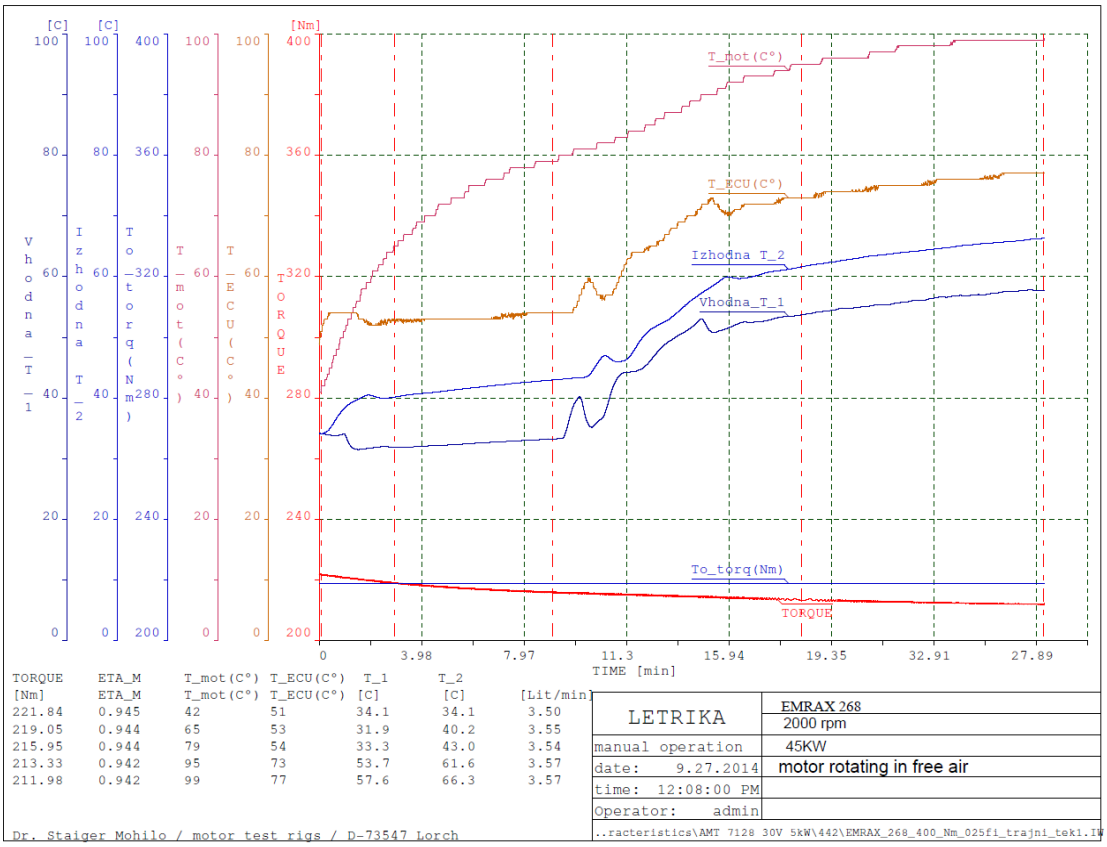


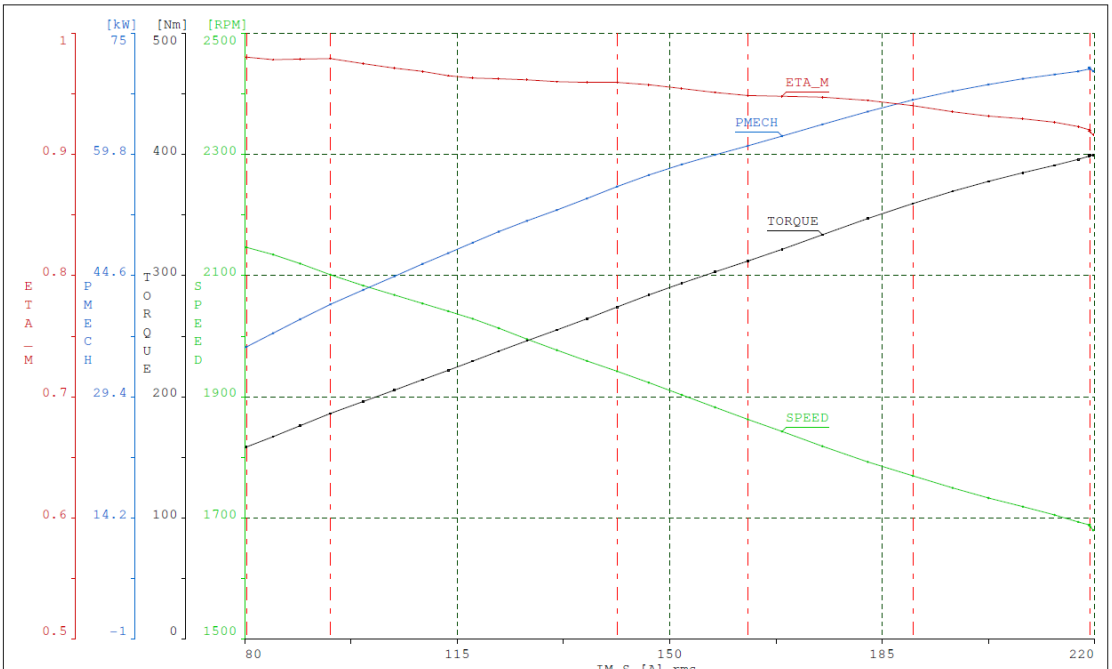
Note 1: for determening peak or continuous power (kW) you should choose motor speed and than read power from chosen power curve (in the left graph side)
Note 2: for determening peak or continuous torque (Nm) you should choose motor speed and than read torque from chosen torque curve (in the right graph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



***Graphs from testing in Letrika (2014):**


EMRAX 268 400V + FW
Torque[Nm]
Power[kW]; Motor Efficiency[%]
RPM
Torque-noFW
Torque-FW
Power-noFW
Power-FW
ETA-M noFW
ETA-M FW

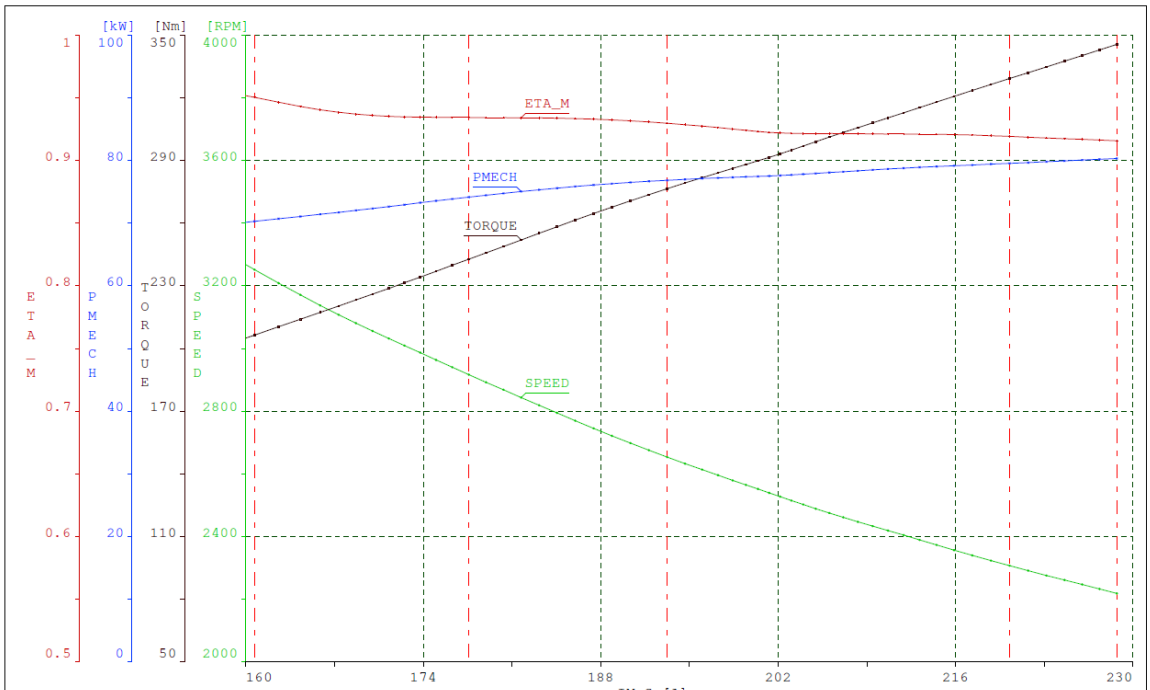

T_mot(C°)
T_ECU(C°)
Izhodna_T_2
Vhodna_T_1
To_torq(Nm)
TORQUE
TIME [min]
TORQUE [Nm] | ETA_M | T_mot(C°) | T_ECU(C°) | T_1 [C] | T_2 [C] | [Lit/min]
221.84 | 0.945 | 42 | 51 | 34.1 | 34.1 | 3.50
219.05 | 0.944 | 65 | 53 | 31.9 | 40.2 | 3.55
215.95 | 0.944 | 79 | 54 | 33.3 | 43.0 | 3.54
213.33 | 0.942 | 95 | 73 | 53.7 | 61.6 | 3.57
211.98 | 0.942 | 99 | 77 | 57.6 | 66.3 | 3.57
Dr. Staiger Mohilo / motor test rigs / D-73547 Lorch
LETRIKA
EMRAX 268
2000 rpm
manual operation
45KW
date: 9.27.2014
motor rotating in free air
time: 12:08:00 PM
Operator: admin
..racteristics\AMT 7128 30V 5kW\442\EMRAX_268_400_Nm_025fi_trajni_tek1.IW



SPEED [RPM]	TORQUE [Nm]	PMECH [kW]	IM_S [A]	ETA_M ETA_M	ETA_ECU ETA_ECU	ETA ETA
2147	158.70	35.676	80.28	0.980	0.980	0.961
2101	186.34	41.005	94.11	0.979	0.979	0.958
1942	274.15	55.762	141.30	0.959	0.973	0.933
1863	312.01	60.868	162.84	0.949	0.970	0.920
1770	359.47	66.626	190.02	0.940	0.965	0.908
1689	399.56	70.672	219.17	0.920	0.960	0.883

Dr. Staiger Mohilo / motor test rigs / D-73547 Lorch

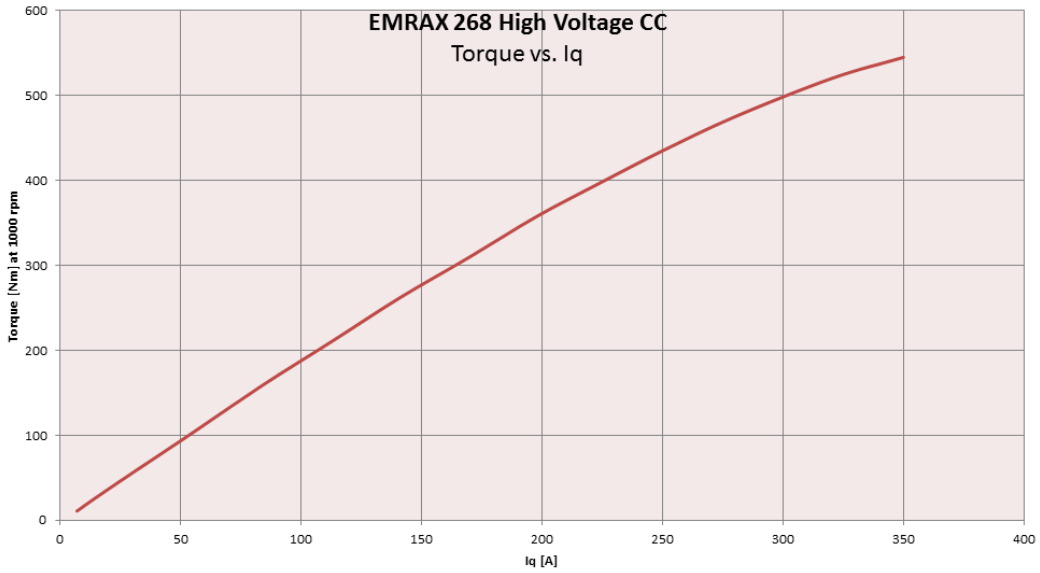
LETRIKA	EMRAX 268 400Nm 400Vdc
manual operation	
date: 9.19.2014	
time: 10:14:26 AM	
Operator: admin	
	Tmotor = 27ºC

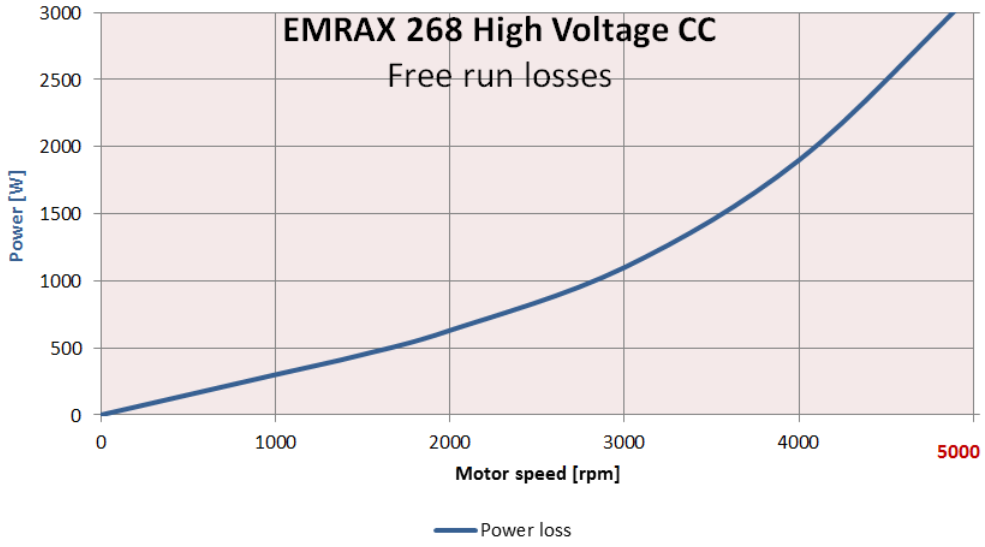


SPEED [RPM]	TORQUE [Nm]	PMECH [kW]	IM_S [A]	ETA_M ETA_M	ETA_ECU ETA_ECU	ETA ETA
3474	185.56	67.501	151.64	0.965	0.973	0.938
3252	206.39	70.276	160.69	0.950	0.972	0.924
2917	242.77	74.149	177.61	0.934	0.970	0.906
2654	276.50	76.844	193.25	0.930	0.967	0.899
2307	329.17	79.535	220.26	0.919	0.962	0.885
2219	345.54	80.295	228.73	0.916	0.961	0.880

Dr. Staiger Mohilo / motor test rigs / D-73547 Lorch

LETRIKA	EMRAX 268 350Nm 400Vdc
	FIELD WEAKENING
manual operation	
date: 9.19.2014	
time: 14:01:04 PM	
Operator: admin	
	Tmotor = 27ºC





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 268 medium and low voltage motor type:
Graphs of EMRAX 268 low voltage and EMRAX 268 medium voltage are similar to graphs of EMRAX 268 high voltage. The only differences are in the DC voltage and motor current. These two parameters can be read from the Technical Data Table for the EMRAX 268 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 the EMRAX 268 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 the EMRAX 268 high voltage motor.