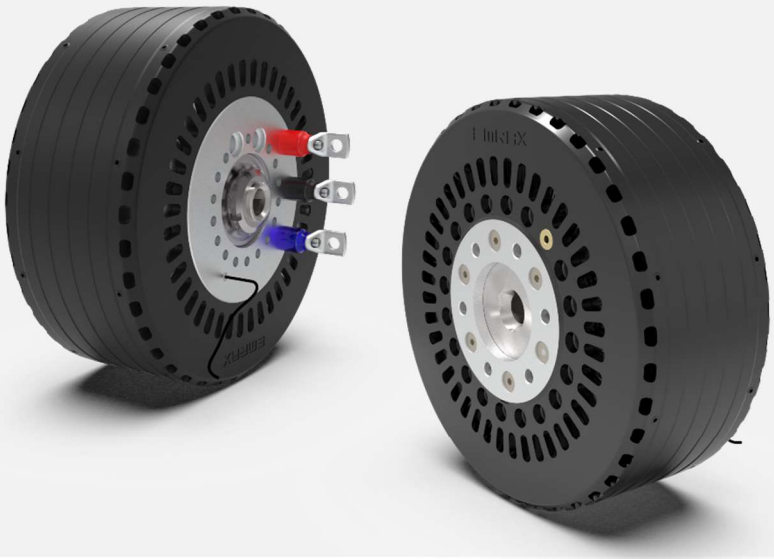
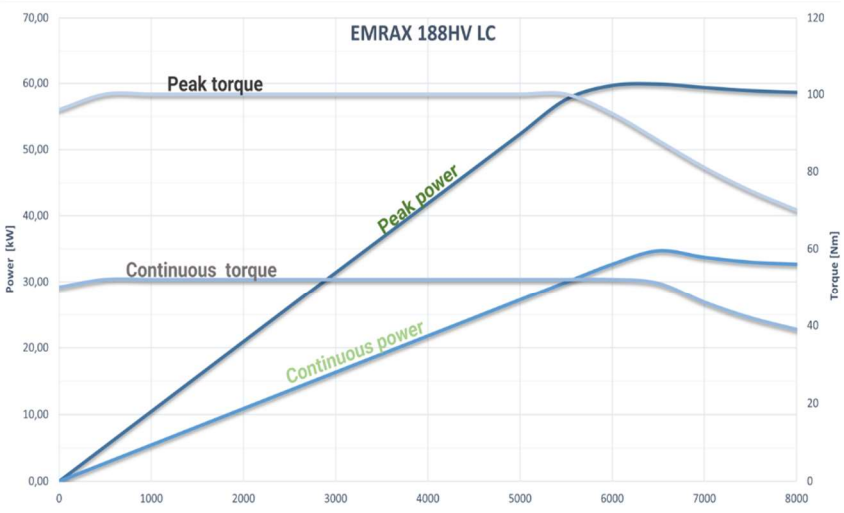
EMRAX 188 is a compact axial flux permanent magnet synchronous electric motor with high power/torque density.

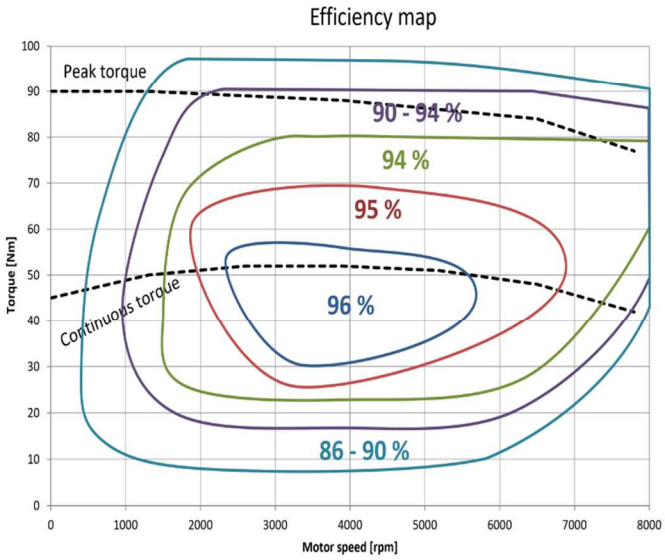
Because of its low weight, it is ideal for VTOL, ultralight aviation, motorcycles, automotive and marine outboard applications. It has gained a favorable status among FSAE competitors.

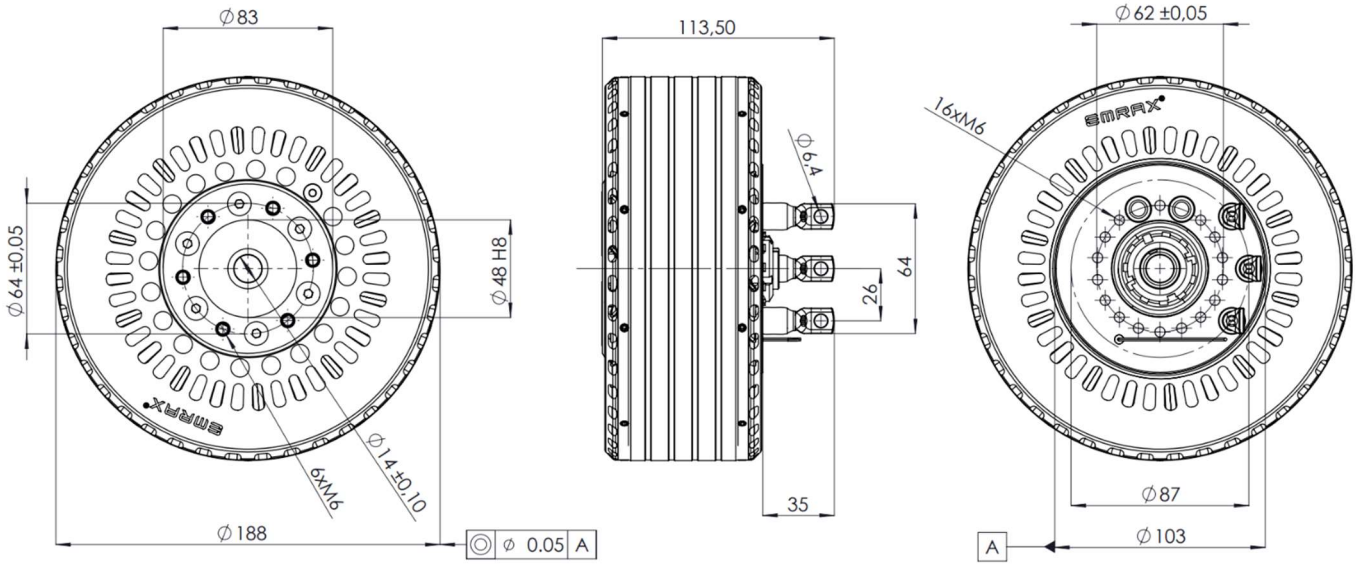
EMRAX 188	
DIAMETER | LENGTH	188 mm | 79 mm
WEIGHT	7,1-7,9 kg
COOLING	air / water / combined
PEAK | CONTINUOUS POWER	60 kW | 37 kW*
PEAK | CONTINUOUS TORQUE	100 Nm | 56 Nm*
MAXIMUM SPEED	8000 RPM
OPERATING VOLTAGE	50 - 660 V
EFFICIENY	up to 96%*
POSITION SENSOR	resolver / encoder



*Subject to motor configuration, drive cycle, thermal conditions, and controller capability.







	EMRAX 188 High Voltage			EMRAX 188 Medium Voltage			EMRAX 188 Low Voltage		
AC = Air cooled LC = Liquid cooled CC = Combined cooled (Air + liquid)	AC	LC	CC	AC	LC	CC	AC	LC	CC
Ingress protection	IP21	IP66	IP21	IP21	IP66	IP21	IP21	IP66	IP21
Cooling specifications	ambient air 20ºC 20 m/s	min. 6 l/min, max. 50°C	AC+LC*	ambient air 20ºC 20 m/s	min. 6 l/min, max. 50°C	AC+LC*	ambient air 20ºC 20 m/s	min. 6 l/min, max. 50°C	AC+LC*
Maximum motor temperature [°C]	integrated temperature sensor / rotor surface / integrated parts absolute limit 100/100/120								
Motor connection type	UVW or 2x UVW			UVW or 2x UVW			UVW or 2x UVW		
Voltage required for peak power [V_{DC}]**	660 Vdc			390 Vdc			160 Vdc		
Motor peak efficiency [%]	96%								
Peak power S2 2min [kW]	60 kW at 6500 RPM								
Continuous power S1 (kW)	27	34	37	27	34	37	27	34	37
Peak torque [Nm]	100								
Continuous torque [Nm]	40	52	56	40	52	56	40	52	56
Limiting speed [RPM]	8000								
K_V constant at no load [rpm/V_{DC}]	17,73			29,58			72,82		
K_V constant at nominal load [rpm/V_{DC}]	13,61			22,83			56,21		
K_V constant at peak load [rpm/V_{DC}]	9,81			16,61			40,87		
K_T constant [Nm/A_{RMS}]	0,54			0,32			0,13		
Peak motor current [A_{RMS}]	190			310			900		
Continuous motor current [A_{RMS}]	100			160			400		
Internal phase resistance at 25 °C [mΩ]***	14,37			5,04			1,02		
L_D inductance of 1 phase [µH]	188,5			40,2			12,5		
Induced voltage [V_{RMS}/RPM]	0,04201			0,02521			0,01025		
Magnetic flux – axial [V_S]	0,03275			0,01965			0,00798		
Temperature sensor on the stator windings	KTY 81/210								
Number of pole pairs	10								
Winding configuration	star								
Rotor Inertia [kg*m²]	0,00989								
Bearing configuration	6205 | 3204								
Weight [kg]	7,1	7,9	7,6	7,1	7,9	7,6	7,1	7,9	7,6

*Combined cooled motor (CC) requires cooling specifications from air and liquid cooled motors, to reach its specifications. It cannot only be cooled as an air-cooled motor. Every EMRAX motor requires sufficient air circulation. The motors should not be completely enclosed in any condition. Please check EMRAX motor manual to learn more. Performance in your application will depend on your installation details and boundary conditions. Please contact us to learn more.
**All motors are tested for 833V maximum voltage.
***Measured Phase to Phase, then divided by 2.

Values given are for a standard 3 phase UVW version, please consult EMRAX on 2x UVW values. $2*R_{1UVW}=R_{2UVW}$

	EMRAX 188 LV + 28%			EMRAX 188 LV + 43%			EMRAX 188 LV + 100%		
AC = Air cooled LC = Liquid cooled CC = Combined cooled (Air + liquid)	AC	LC	CC	AC	LC	CC	AC	LC	CC
Ingress protection	IP21	IP66	IP21	IP21	IP66	IP21	IP21	IP66	IP21
Cooling specifications	ambient air 20ºC 20 m/s	min. 6 l/min, max. 50°C T_{amb}≤ 30°C	AC+LC*	ambient air 20ºC 20 m/s	min. 6 l/min, max. 50°C T_{amb}≤ 30°C	AC+LC*	ambient air 20ºC 20 m/s	min. 6 l/min, max. 50°C T_{amb}≤ 30°C	AC+LC*
Maximum motor temperature [°C]	integrated temperature sensor / rotor surface / integrated parts absolute limit 100/100/120								
Motor connection type	UVW or 2x UVW			UVW or 2x UVW			UVW or 2x UVW		
Voltage required for peak power [V_{DC}]**	200			230			320		
Motor peak efficiency [%]	96%								
Peak power S2 2min [kW]	60 kW at 6500 RPM								
Continuous power S1 (kW)	27	34	37	27	34	37	27	34	37
Peak torque [Nm]	100								
Continuous torque [Nm]	40	52	56	40	52	56	40	52	56
Limiting speed [RPM]	8000								
K_V constant at no load [rpm/V_{DC}]	56,89			50,93			36,43		
K_V constant at nominal load [rpm/V_{DC}]	43,91			39,31			28,11		
K_V constant at peak load [rpm/V_{DC}]	31,93			28,58			20,43		
K_T constant [Nm/A_{RMS}]	0,17			0,19			0,26		
Peak current [A_{RMS}]	590			530			390		
Continuous current [A_{RMS}]	310			280			200		
Internal phase resistance at 25 °C [mΩ]***	1,68			2,08			4,08		
L_D inductance of 1 phase [µH]	20,5			25,5			50,0		
Induced voltage [V_{RMS}/RPM]	0,0131			0,0151			0,0205		
Magnetic flux – axial [V_S]	0,01045			0,01177			0,01598		
Temperature sensor on the stator windings	KTY 81/210								
Number of pole pairs	10								
Winding configuration	star								
Rotor Inertia [kg*m²]	0,00989								
Bearing configuration	6205 | 3204								
Weight [kg]	7,1	7,9	7,6	7,1	7,9	7,6	7,1	7,9	7,6

Combined cooled motor (CC) requires cooling specifications from air and liquid cooled motors, to reach its specifications. It cannot only be cooled as an air-cooled motor. Every EMRAX motor requires sufficient air circulation. The motors should not be completely enclosed in any condition. Please check EMRAX motor manual to learn more. Performance in your application will depend on your installation details and boundary conditions. Please contact us to learn more.
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