

EMRAX[®]

INNOVATIVE E-MOTORS

EMRAXモータ

特徴

- ・軸流永久磁石モータ
- ・アウトランナー(外周部が回転します。)
- ・入力形式：正弦波三相
- ・軽量 - クラス最高の出力密度 (最大 10kW/kg) - 高効率 (最大98%)
- ・高い信頼性 (航空宇宙産業向けに開発・生産されています。)
- ・コンパクトで高品質な製品です。
- ・EMC準拠 - Eマーク (89/336/EECの必須保護要件に準拠しています。)
- ・3つの冷却オプション 空冷 (IP21)、複合型 (IP21)、液冷 (IP65)が選択可能です。
- ・スタッキング (同じ軸に同じサイズのモータを2台接続) が可能です。



EMRAX 188



EMRAX 228

製品仕様

・表は一例であり、その他製品もご用意があります。

		EMRAX 188			EMRAX 228		
バッテリー電圧	V dc	430	300	110	680	500	160
ピーク出力	kW	52			109		
連続電流	A(AC)	100	150	400	115	160	450
連続トルク	Nm	40~50	40~50	40~50	96~120	96~120	96~120
トルク定数	Nm/A	0.60	0.39	0.15	1.1	0.75	0.27
ピーク回転数	rpm	6500			5500		
6500rpm時連続出力	kW	23~29	23~29	23~29	50~62	50~62	50~62
最大電流	A	200	300	800	240	340	900
最大負荷トルク	Nm	90			230		

お問い合わせ

株式会社オキナヤ 機電事業部 EVシステム部
 〒360-0014 埼玉県熊谷市江南中央2-17-1
 TEL:048-539-3366 FAX:048-539-1166
 MAIL: EV-group@okinaya.co.jp



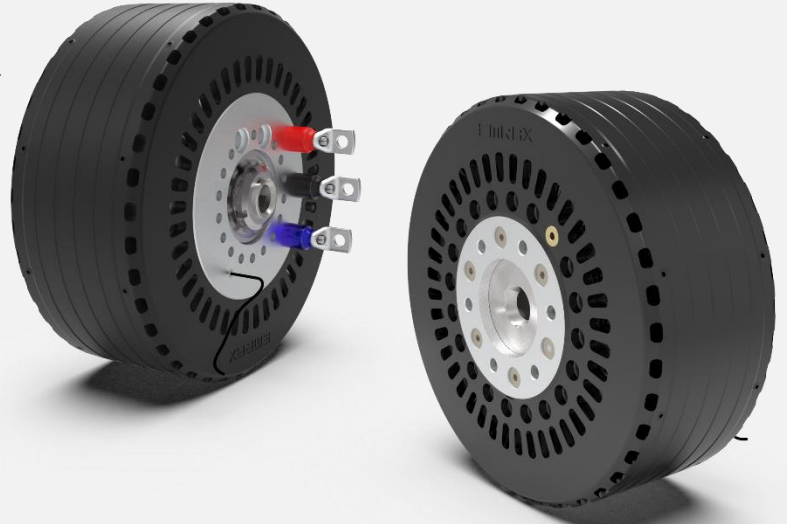
株式会社 **オキナヤ**

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

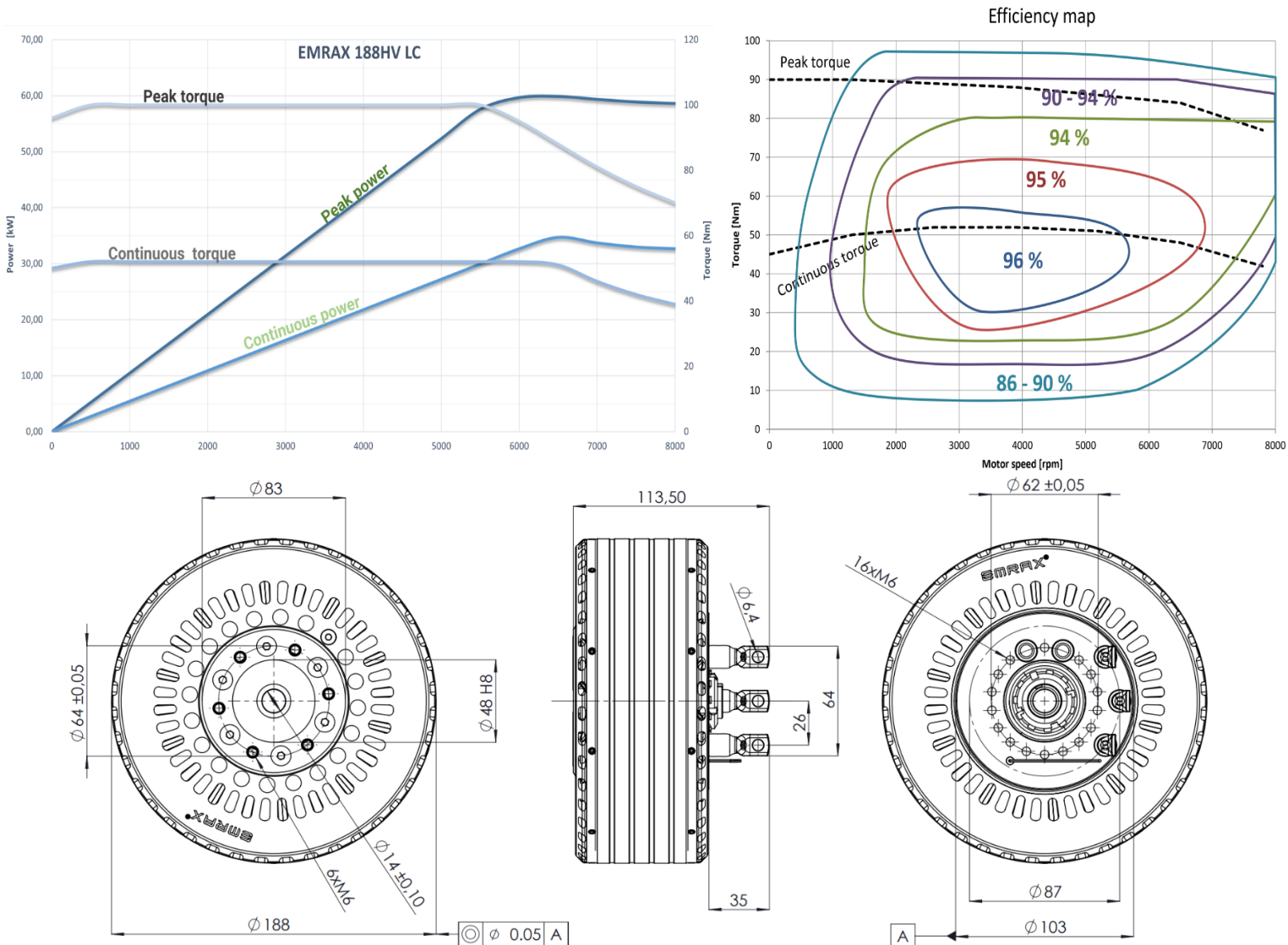
Because of its low weight, it is ideal for VTOL, ultralight aviation, motorcycles, automotive and marine outboard applications. It has gained a favorable status among FSAE competitors.

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 - 490 V
EFFICIENCY	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	IP65	IP21	IP21	IP65	IP21	IP21	IP65	IP21
Cooling specifications	ambient air 20°C 20 m/s	min. 6 l/min, max. 50°C	AC+LC*	ambient air 20°C 20 m/s	min. 6 l/min, max. 50°C	AC+LC*	ambient air 20°C 20 m/s	min. 6 l/min, max. 50°C	AC+LC*
Maximum motor temperature [°C]	120								
Motor connection type	UVW or 2x UVW			UVW or 2x UVW			UVW or 2x UVW		
Design voltage - nominal [V_{DC}]	490 Vdc			330 Vdc			120 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								
Motor constant K_v	17,72			29,52			72,68		
Motor constant K_T	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		
Induction between two phases [μH]	188,5			40,2			12,5		
Induced voltage [V_{RMS}/RPM]	0,04201			0,02521			0,01024		
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.

Values given are for a standard 3 phase UVW version, please consult EMRAX on 2x UVW values.

EMRAX 208 is a compact axial flux permanent magnet synchronous electric motor with high power/torque density.

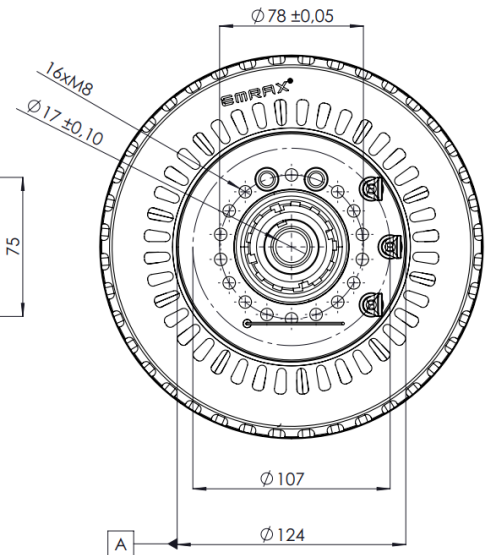
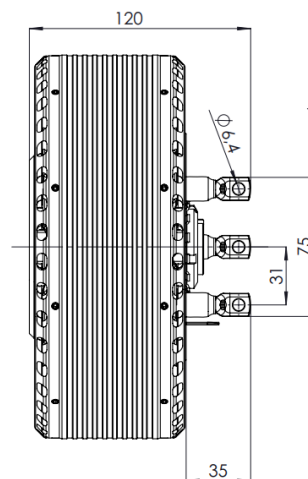
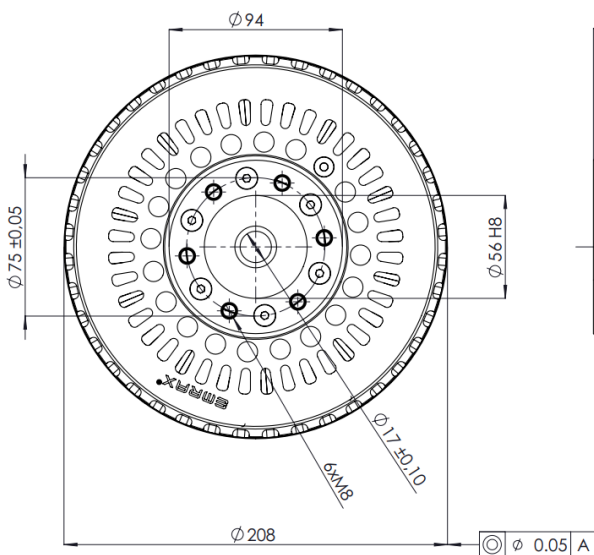
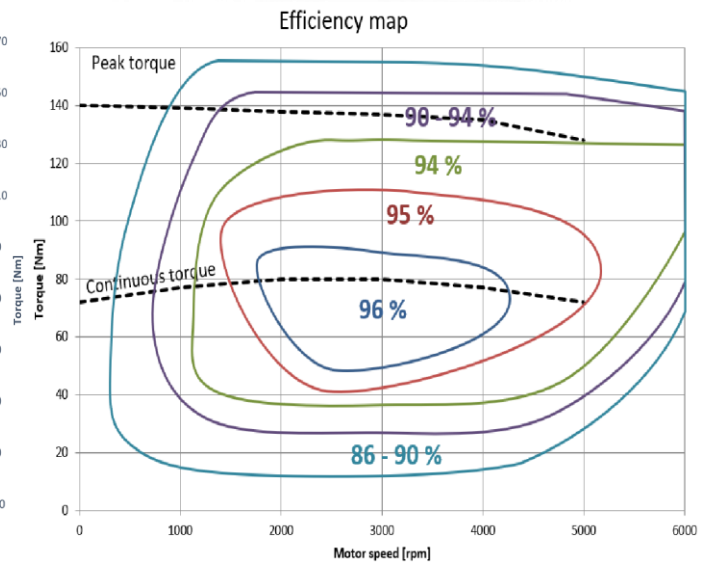
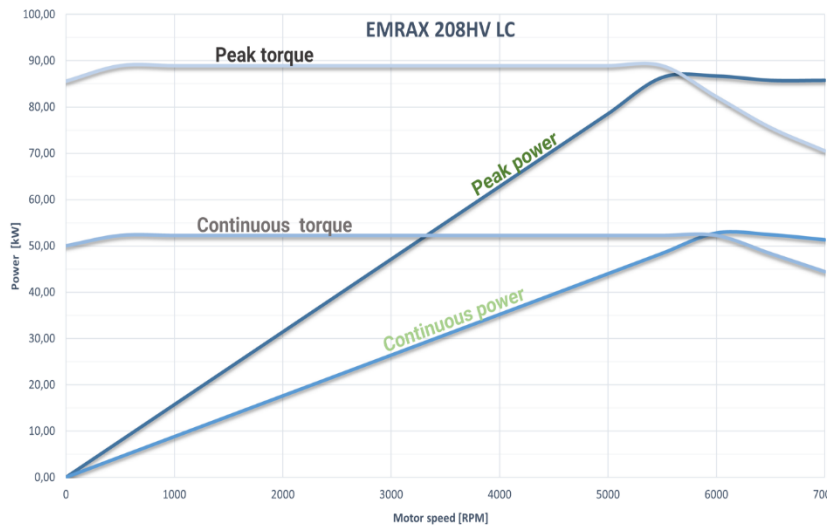
The 208 was the first motor developed by EMRAX. Its development began back in 2005 and was originally used in company's founder glider aircraft.

Nowadays the development on the motor continuous and it has found many different uses outside of aviation. Contact us for more!

EMRAX 208

DIAMETER LENGTH	208 mm 85 mm
WEIGHT	9,4-10,3 kg
COOLING	air / water / combined
PEAK CONTINUOUS POWER	86 kW 56 kW*
PEAK CONTINUOUS TORQUE	150 Nm 90 Nm*
MAXIMUM SPEED	7000 RPM
OPERATING VOLTAGE	50 - 580 V
EFFICIENCY	up to 96%*
POSITION SENSOR	resolver / encoder

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



**EMRAX 208
High Voltage**
**EMRAX 208
Medium Voltage**
**EMRAX 208
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	IP65	IP21	IP21	IP65	IP21	IP21	IP65	IP21
Cooling specifications	ambient air 20°C 20 m/s	min. 6 l/min, max. 50°C	AC+LC*	ambient air 20°C 20 m/s	min. 6 l/min, max. 50°C	AC+LC*	ambient air 20°C 20 m/s	min. 6 l/min, max. 50°C	AC+LC*
Maximum motor temperature [°C]	120								
Motor connection type	UVW or 2x UVW			UVW or 2x UVW			UVW or 2x UVW		
Design voltage - nominal [V_{DC}]	580			390			140		
Motor peak efficiency [%]	96%								
Peak power S2 2min [kW]	86 kW at 6000 RPM								
Continuous power S1 (kW)	33	52	56	33	52	56	33	52	56
Peak torque [Nm]	150								
Continuous torque [Nm]	54	84	90	54	84	90	54	84	90
Limiting speed [RPM]	7000								
Motor constant K_v	15,44			24,81			63,62		
Motor constant K_T	0,62			0,38			0,15		
Peak motor current [A_{RMS}]	240			400			1000		
Continuous motor current [A_{RMS}]	140			220			560		
Internal phase resistance at 25 °C [mΩ]	12,27			5,51			0,90		
Induction between two phases [μH]	175,5			73,5			7,5		
Induced voltage [V_{RMS}/RPM]	0,0482			0,0300			0,0117		
Magnetic flux – axial [V_s]	0,03758			0,02338			0,00912		
Temperature sensor on the stator windings	KTY 81/210								
Number of pole pairs	10								
Winding configuration	star								
Rotor Inertia [kg*m²]	0,01569								
Bearing configuration	6206 3206								
Weight [kg]	9,4	10,3	10,0	9,4	10,3	10,0	9,4	10,3	10,0

*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.

Values given are for a standard 3 phase UVW version, please consult EMRAX on 2x UVW values.

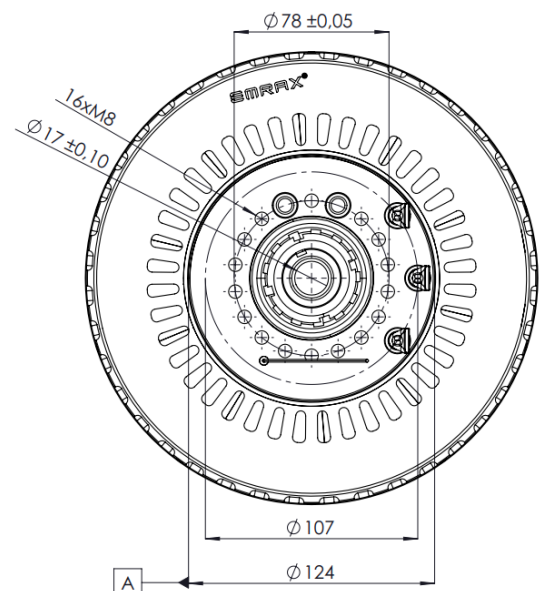
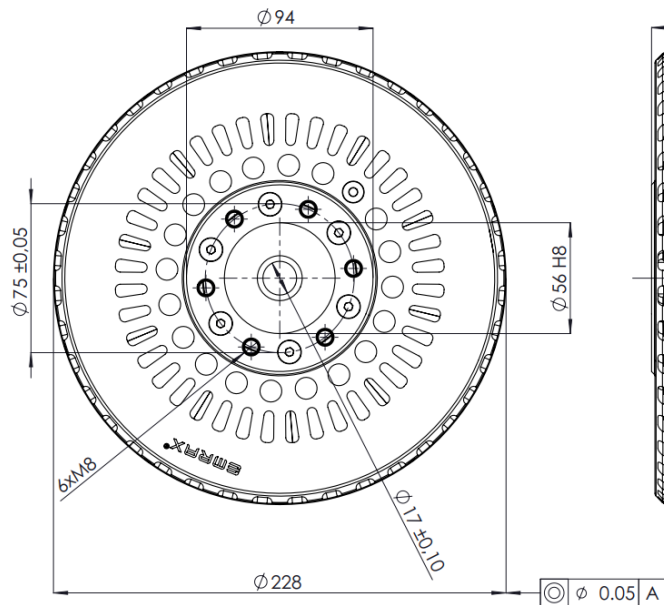
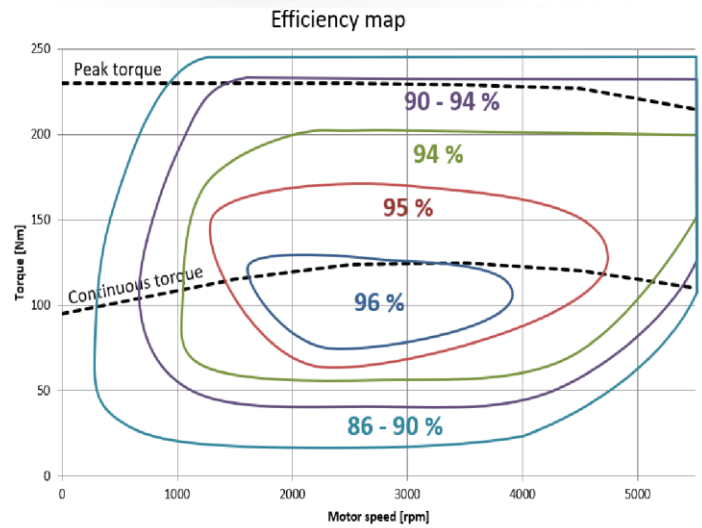
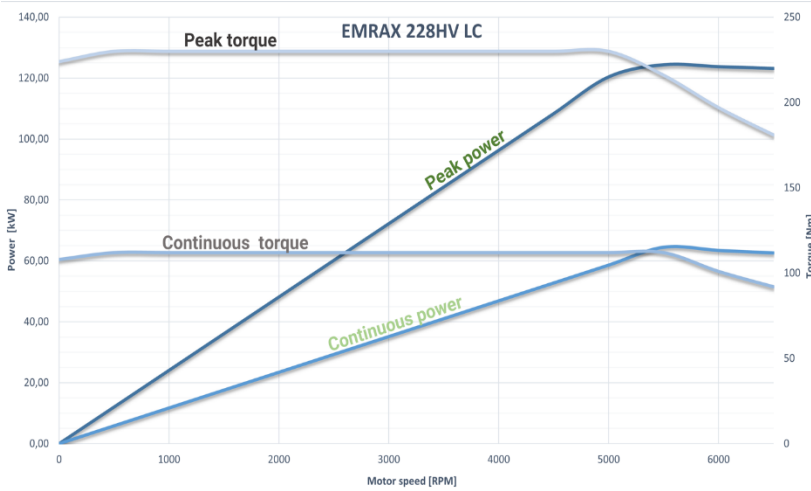
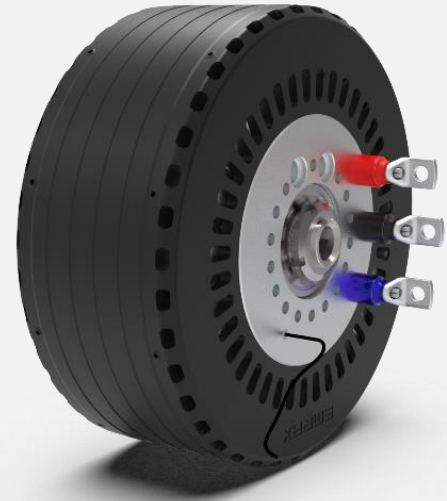
EMRAX 228 is a compact axial flux permanent magnet synchronous electric motor with high power/torque density.

It offers the middle of the range performance and is a great fit for where high power output in a small package is needed. Contact us to find out about its typical applications!

EMRAX 208

DIAMETER LENGTH	228 mm 86 mm
WEIGHT	12,9-13,5 kg
COOLING	air / water / combined
PEAK CONTINUOUS POWER	124 kW 75 kW*
PEAK CONTINUOUS TORQUE	230 Nm 130 Nm*
MAXIMUM SPEED	6500 RPM
OPERATING VOLTAGE	50 - 710 V
EFFICIENCY	up to 96%*
POSITION SENSOR	resolver / encoder

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



**EMRAX 228
High Voltage**
**EMRAX 228
Medium Voltage**
**EMRAX 228
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	IP65	IP21	IP21	IP65	IP21	IP21	IP65	IP21
Cooling specifications	ambient air 20°C 20 m/s	min. 6 l/min, max. 50°C	AC+LC*	ambient air 20°C 20 m/s	min. 6 l/min, max. 50°C	AC+LC*	ambient air 20°C 20 m/s	min. 6 l/min, max. 50°C	AC+LC*
Maximum motor temperature [°C]	120								
Motor connection type	UVW or 2x UVW			UVW or 2x UVW			UVW or 2x UVW		
Design voltage - nominal [V_{DC}]	710			520			180		
Motor peak efficiency [%]	96%								
Peak power S2 2min [kW]	124 kW at 5500 RPM								
Continuous power S1 (kW)	55	64	75	55	64	75	55	64	75
Peak torque [Nm]	230								
Continuous torque [Nm]	96	112	130	96	112	130	96	112	130
Limiting speed [RPM]	6500								
Motor constant K_v	10,12			15,53			40,45		
Motor constant K_T	0,94			0,61			0,24		
Peak motor current [A_{RMS}]	250			380			1000		
Continuous motor current [A_{RMS}]	120			180			470		
Internal phase resistance at 25 °C [mΩ]	15,48			7,06			1,35		
Induction between two phases [μH]	225,5			96,5			15,0		
Induced voltage [V_{RMS}/RPM]	0,07348			0,04793			0,01840		
Magnetic flux – axial [V_s]	0,05728			0,03737			0,01434		
Temperature sensor on the stator windings	KTY 81/210								
Number of pole pairs	10								
Winding configuration	star								
Rotor Inertia [kg*m²]	0,02521								
Bearing configuration	6206 3206								
Weight [kg]	12,9	13,5	13,2	12,9	13,5	13,2	12,9	13,5	13,2

*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.

Values given are for a standard 3 phase UVW version, please consult EMRAX on 2x UVW values.

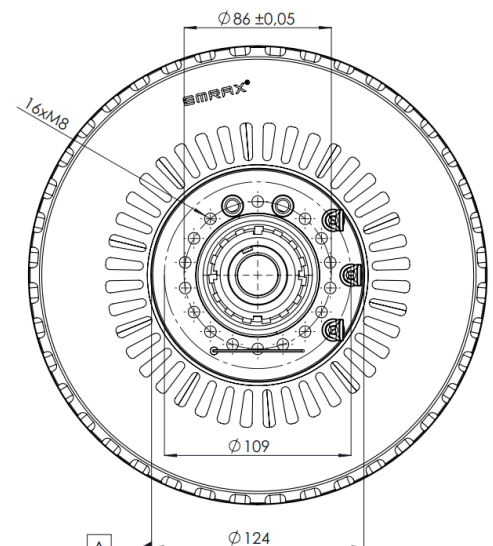
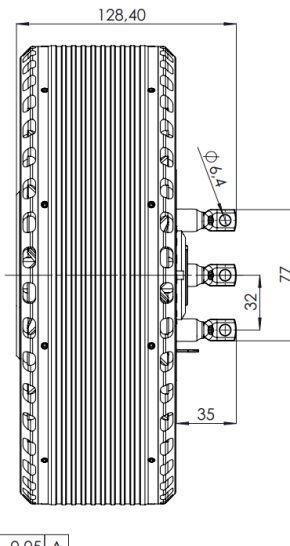
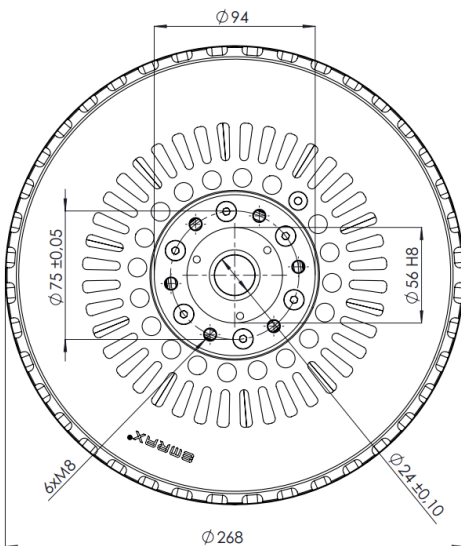
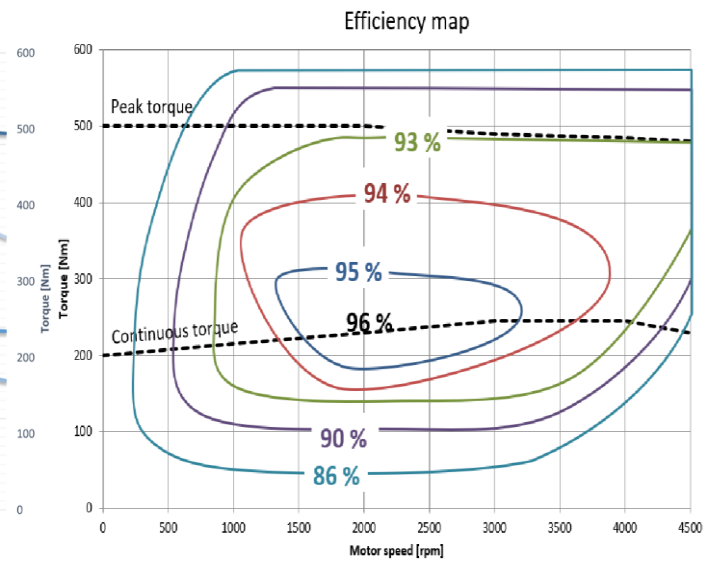
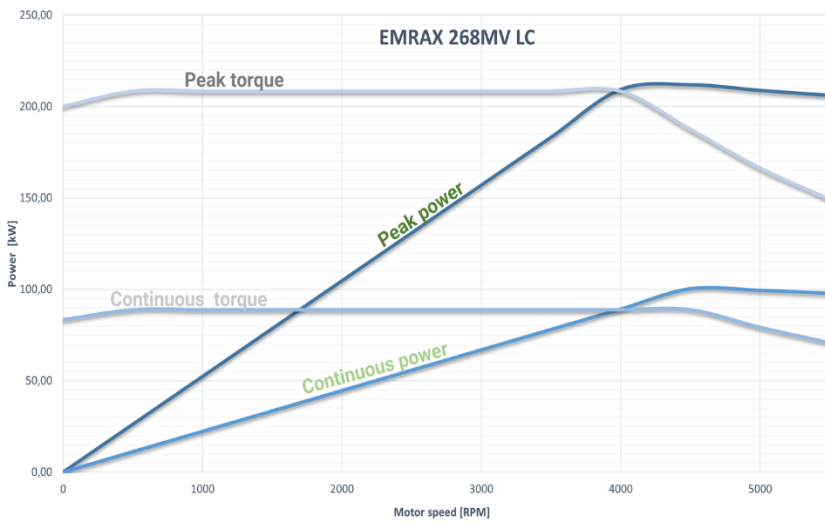
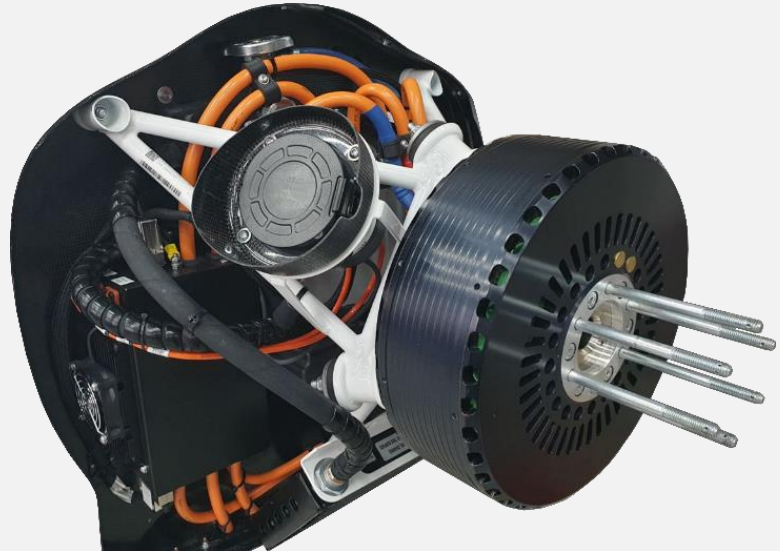
EMRAX 268 is a compact axial flux permanent magnet synchronous electric motor with high power/torque density.

The 268 is a favorite motor choice amongst light aviation, marine and traction applications. It can also be utilized as a hydraulic replacement unit or as a lightweight high power output generator. 268 is the first electric engine certified for use in General Aviation by EASA. Contact us to learn more!

EMRAX 268

DIAMETER LENGTH	268 mm 94 mm
WEIGHT	21,4-22,3 kg
COOLING	air / water / combined
PEAK CONTINUOUS POWER	210 kW 117 kW*
PEAK CONTINUOUS TORQUE	500 Nm 250 Nm*
MAXIMUM SPEED	5500 RPM
OPERATING VOLTAGE	100 - 800 V
EFFICIENCY	up to 96%*
POSITION SENSOR	resolver / encoder

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



**EMRAX 268
High Voltage**
**EMRAX 268
Medium Voltage**
**EMRAX 268
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	IP65	IP21	IP21	IP65	IP21	IP21	IP65	IP21
Cooling specifications	ambient air 20°C 20 m/s	min. 6 l/min, max. 50°C	AC+LC*	ambient air 20°C 20 m/s	min. 6 l/min, max. 50°C	AC+LC*	ambient air 20°C 20 m/s	min. 6 l/min, max. 50°C	AC+LC*
Maximum motor temperature [°C]	120								
Motor connection type	UVW or 2x UVW			UVW or 2x UVW			UVW or 2x UVW		
Design voltage - nominal [V_{DC}]	800 Vdc			680 Vdc			280 Vdc		
Motor peak efficiency [%]	96%								
Peak power S2 2min [kW]	160 kW at 3600 RPM			210 kW at 4500 RPM			210 kW at 4500 RPM		
Continuous power S1 (kW)	75	80	94	94	100	117	94	100	117
Peak torque [Nm]	500								
Continuous torque [Nm]	200	213	250	200	213	250	200	213	250
Limiting speed [RPM]	5500								
Motor constant K_v	5,93			9,51			24,44		
Motor constant K_T	1,61			1,00			0,39		
Peak motor current [A_{RMS}]	320			500			1300		
Continuous motor current [A_{RMS}]	130			220			550		
Internal phase resistance at 25 °C [mΩ]	21,87			9,85			1,65		
Induction between two phases [μH]	330,5			140,0			22,5		
Induced voltage [V_{RMS}/RPM]	0,12531			0,07823			0,03045		
Magnetic flux – axial [V_s]	0,09769			0,06099			0,02374		
Temperature sensor on the stator windings	KTY 81/210								
Number of pole pairs	10								
Winding configuration	star								
Rotor Inertia [kg*m²]	0,05769								
Bearing configuration	6208 3207								
Weight [kg]	21,4	22,3	21,9	21,4	22,3	21,9	21,4	22,3	21,9

*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.

Values given are for a standard 3 phase UVW version, please consult EMRAX on 2x UVW values.

High voltage option is operating at speeds lower than its limiting, due to voltage limitations.

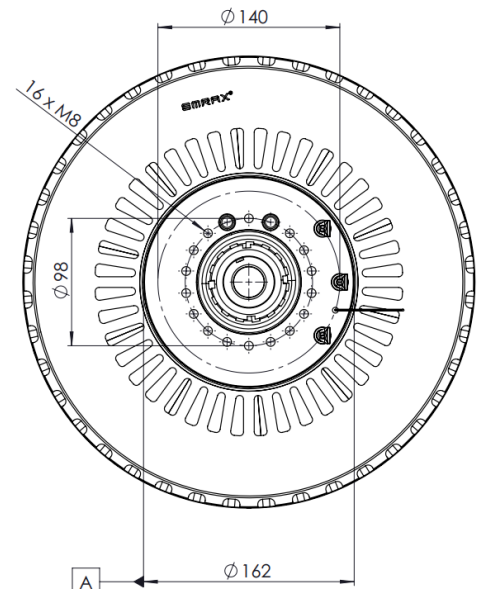
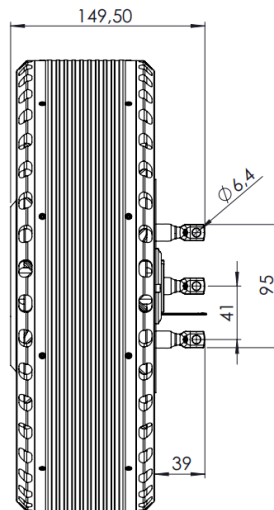
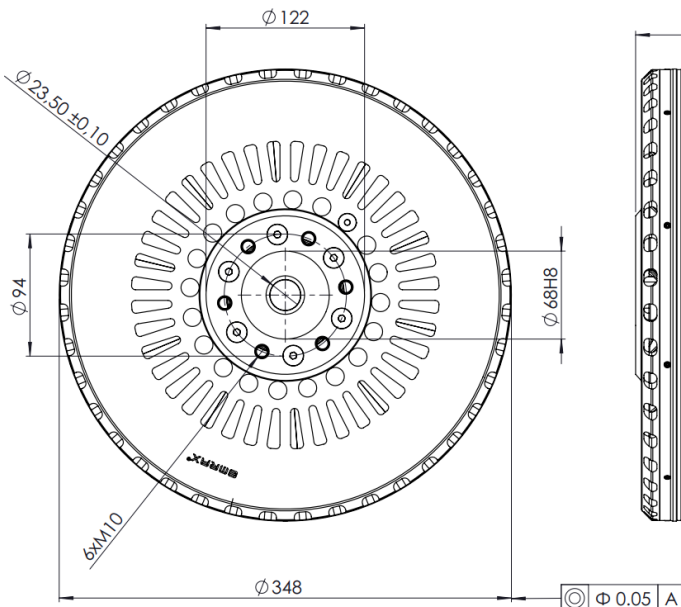
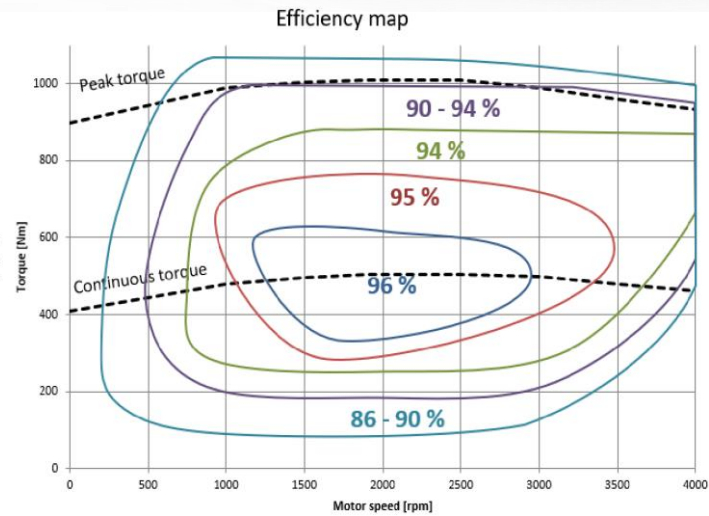
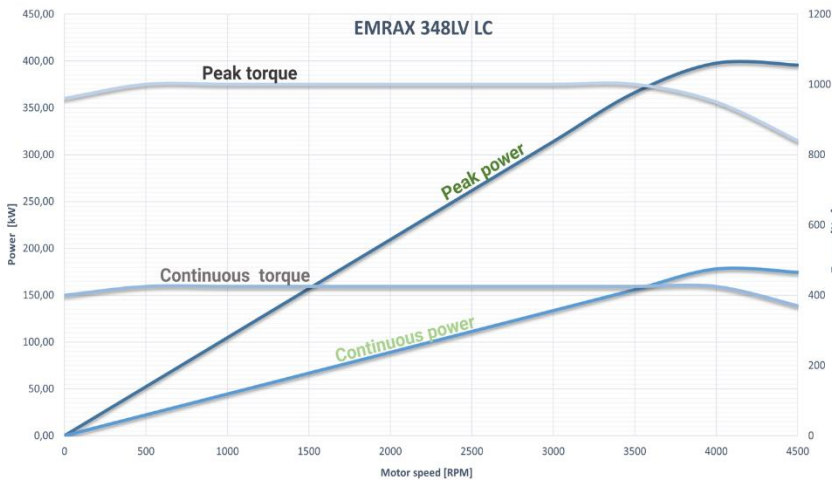
EMRAX 348 is a compact axial flux permanent magnet synchronous electric motor with high power/torque density.

The 348 is the biggest motor in our offering. It can output impressive torque figures directly on the driveshaft. It has found its uses in aviation sector, marine, heavy machinery as well as a traction motor for some impressive vehicles. Contact us to find out more!

EMRAX 208

DIAMETER LENGTH	348 mm 112 mm
WEIGHT	43,1-43,9 kg
COOLING	air / water / combined
PEAK CONTINUOUS POWER	400 kW 210 kW*
PEAK CONTINUOUS TORQUE	1000 Nm 500 Nm*
MAXIMUM SPEED	4500 RPM
OPERATING VOLTAGE	100 - 800 V
EFFICIENCY	up to 96%*
POSITION SENSOR	resolver / encoder

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



**EMRAX 348
High Voltage**
**EMRAX 348
Medium Voltage**
**EMRAX 348
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 20°C 20 m/s	min. 6 l/min, max. 50°C	AC+LC*	ambient air 20°C 20 m/s	min. 6 l/min, max. 50°C	AC+LC*	ambient air 20°C 20 m/s	min. 6 l/min, max. 50°C	AC+LC*
Maximum motor temperature [°C]	120								
Motor connection type	UVW or 2x UVW			UVW or 2x UVW			UVW or 2x UVW		
Design voltage - nominal [V_{DC}]	800 Vdc			800 Vdc			480 Vdc		
Motor peak efficiency [%]	96%								
Peak power S2 2min [kW]	165 kW at 1600 RPM			250 kW at 2400 RPM			400 kW at 4000 RPM		
Continuous power S1 (kW)	67	72	84	100	106	125	168	178	210
Peak torque [Nm]	1000								
Continuous torque [Nm]	400	425	500	400	425	500	400	425	500
Limiting speed [RPM]	4500								
Motor constant K_v [RPM/VDC]	3,23			4,95			13,29		
Motor constant K_T [Nm/Arms]	2,94			1,92			0,72		
Peak motor current [A_{RMS}]	340			520			1400		
Continuous motor current [A_{RMS}]	150			230			600		
Internal phase resistance at 25 °C [mΩ]	29,41			13,15			4,2		
Induction between two phases [μH]	425,2			185,3			28,5		
Induced voltage [V_{RMS}/RPM]	0,22982			0,15024			0,05605		
Magnetic flux – axial [V_s]	0,17918			0,11714			0,04366		
Temperature sensor on the stator windings	KTY 81/210								
Number of pole pairs	10								
Winding configuration	star								
Rotor Inertia [kg*m²]	0,22042								
Bearing configuration	6210 3208								
Weight [kg]	43,1	43,9	43,5	43,1	43,9	43,5	43,1	43,9	43,5

*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.

Values given are for a standard 3 phase UVW version, please consult EMRAX on 2x UVW values.

High and medium voltage options are operating at speeds lower than its limiting, due to voltage limitations.