

AFT140i-48V



Combines patented, cutting edge **axial flux** technology with an integrated controller offering a class leading **2-in-1** solution.

Provides **high torque & power density** enabling impressive performance in a **lightweight & compact package** with simple vehicle integration.

Also available with our paired transmission providing **3-in-1** eDrive & solid axle solutions.



Motor & Controller Overview (AFT140i)	
Model	AFT140i-48V
Motor type	Yokeless dual-rotor axial-flux PMAC
Dry mass	22 kg
Nominal voltage	48 V _{DC}
Maximum operating voltage	60 V _{DC}
Rated speed	2500 rpm
Maximum operating speed	5000 rpm

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Motor & Controller Performance	Boost (S2 - 10 s)	Peak (S2 - 2 min)	Continuous (S1 - 30+ min)
Phase current (A _{rms})	600	450	280
Torque (Nm)	135	105	65
Torque knee point (rpm)	1300	1500	1600
Power (kW)	21	19	12



Motor, Controller & Transmission Overview (eDrive)	
Model	AFT140i-48V eDrive
Transmission Type	Single Speed Offset
Dry mass	42 kg
Transmission differential	Included
Transmission stock gear ratios	5.27:1, 6.36:1, 8.98:1 and 11.39:1
Transmission custom gear ratio range	3.69:1 to 11.39:1
Transmission configuration options	eDrive or Solid axle

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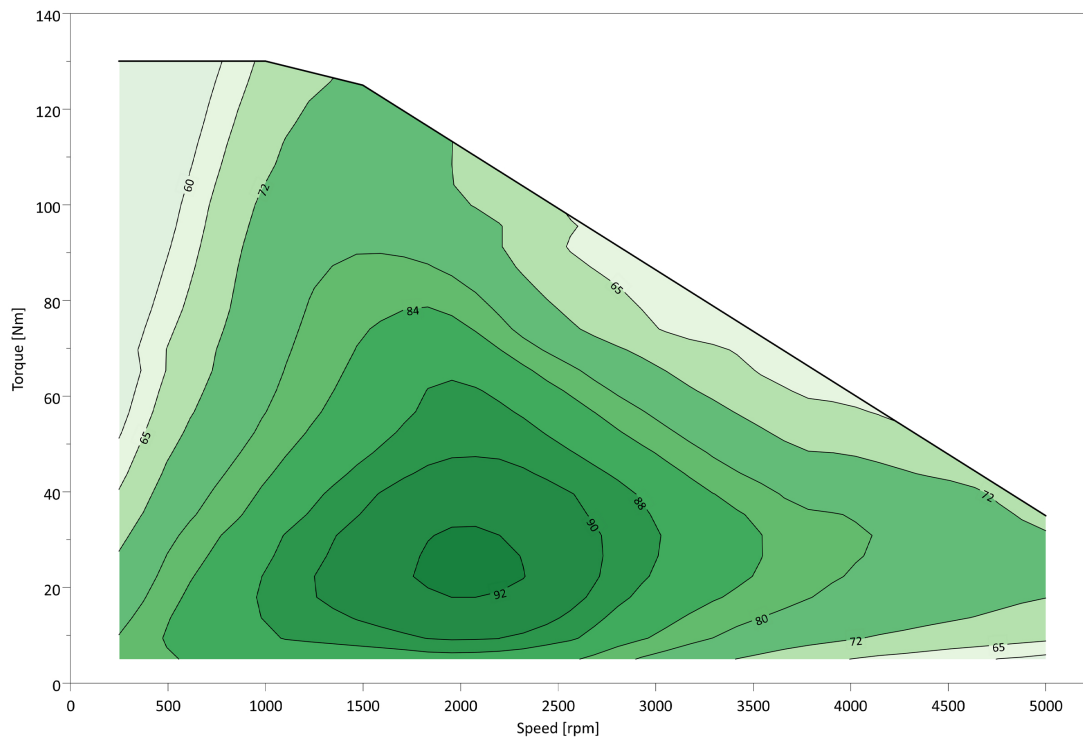
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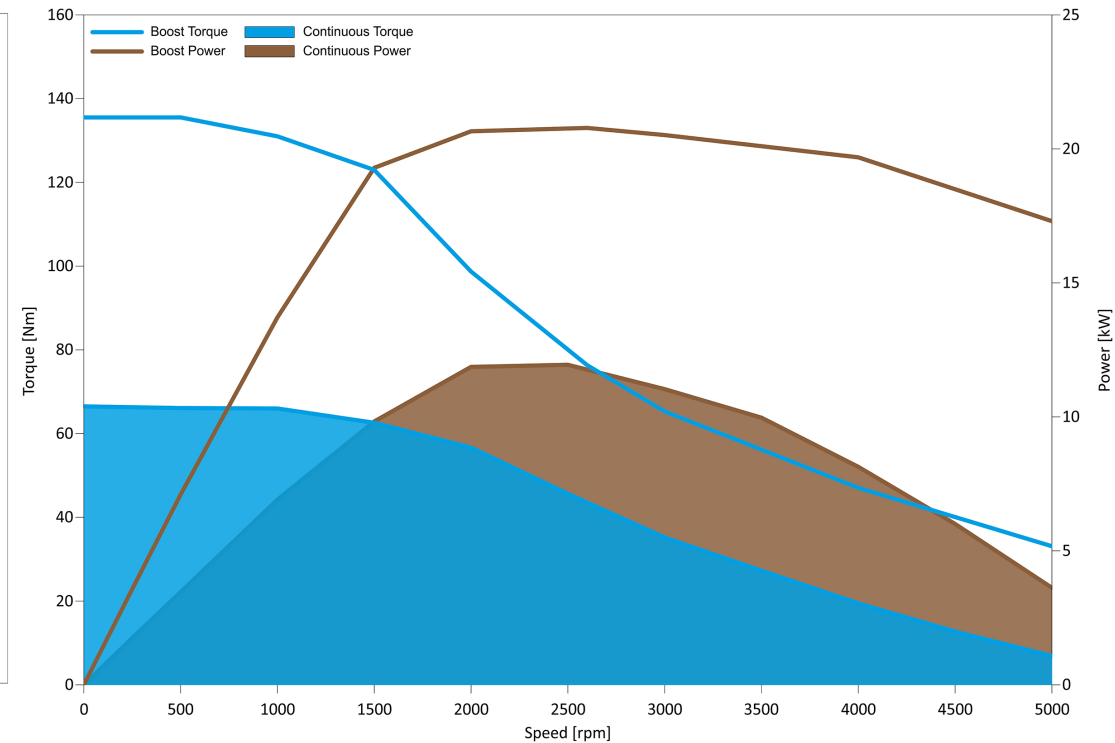
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Combined Motor & Controller Efficiency

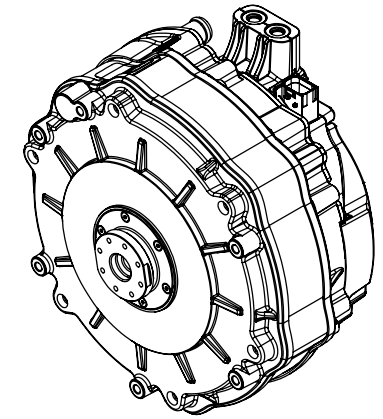
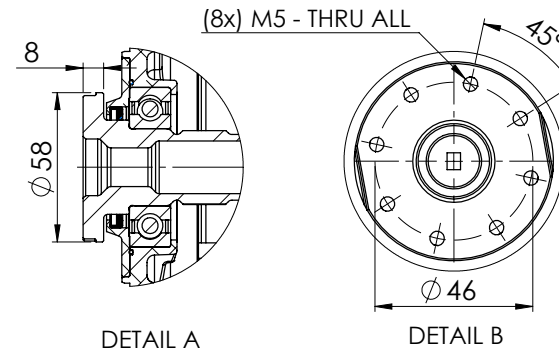
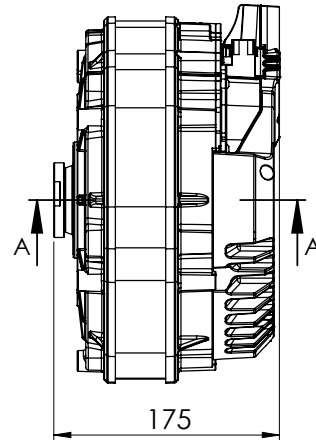
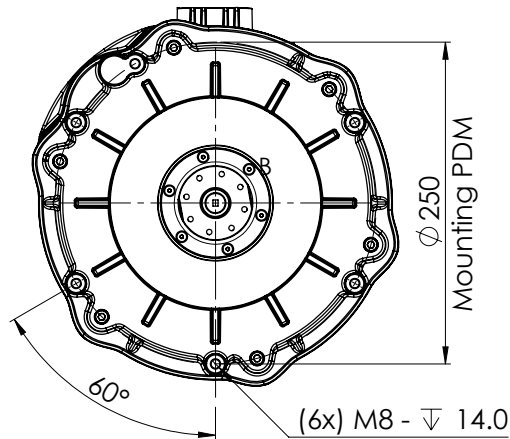


Combined Motor & Controller Performance

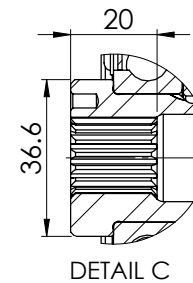
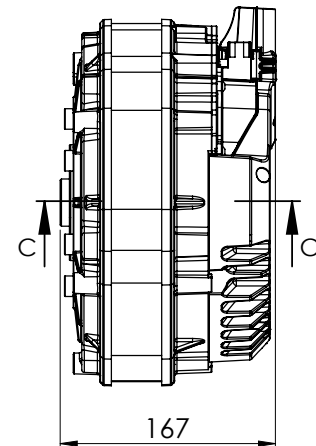
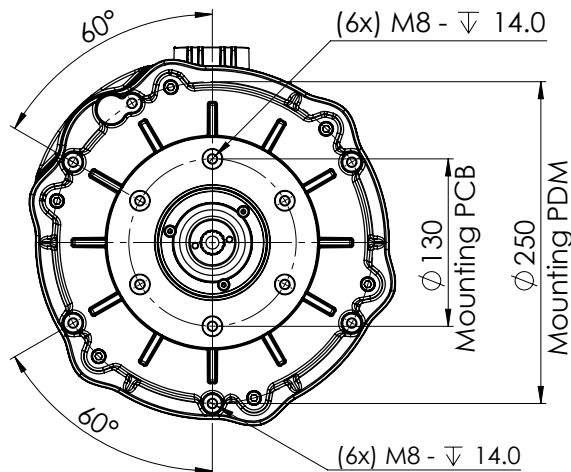


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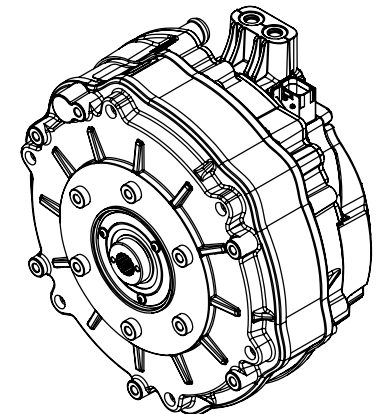
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Flanged Shaft



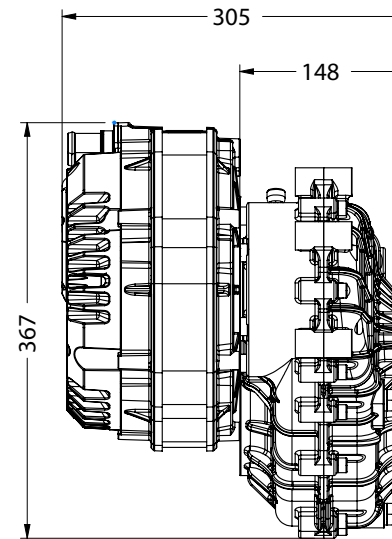
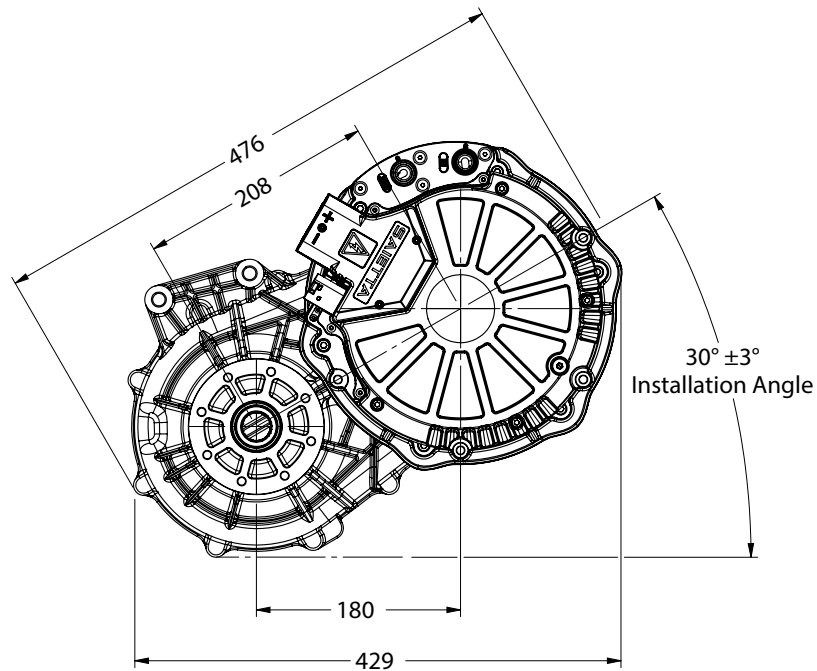
Internal Spline ANSI B92.1b		
Designation	30 deg. fillet root side fit 5H 1996	
Number of teeth	z	17
Module	m	1.058
Pressure Angle	α	30
Pitch Diameter	D	17.992
Base Diameter	D_b	15.581



Splined Shaft



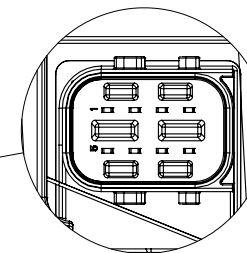
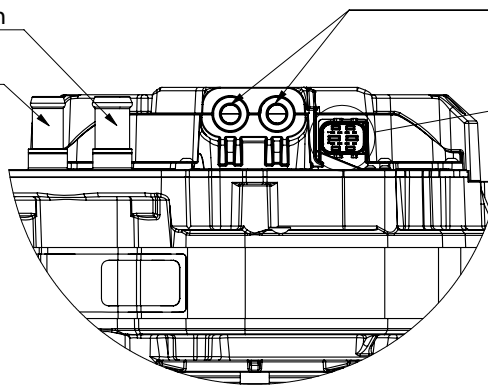
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Internal Involute Side Gear Spline ISO 4156-INT	
Number of Teeth	25
Module	1
Helix angle (°)	0.1667
Addendum Mod	0.1
Pressure Angle	45°
Pitch Circle Diameter	25
Minor Diameter	24.4 +0.1
Major Diameter	26.4 +0.1
Min. Actual Space Width	1.7905
Max. Actual Space Width	1.9305
Pin Diameter	2
Measurement Between Pins	21.939 / 22.037

Coolant Outlet = Ø19 mm
Coolant Inlet = Ø17 mm

Compatible DC cable sizes: Ø 35 mm²
Ø 50 mm²



Low Voltage Connector

Pin Number	Pin Description	Comment
1	KL 30	LV battery positive, 7-16 V, current consumption typ. 0.9 A @ 12 V Switched LV battery input
2	KL 15	
3	CAN H	
4	CAN L	
5	KL 31	LV battery negative
6	DIN 1	DI / AI or, optionally, HVIL +
7	DIN 2	DI / AI, low-side output or, optionally, HVIL-; switchable internal pull-up
8	DIN 3	DI / AI, low-side output; switchable internal pull-up



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Cooling	
Coolant	Water glycol mix
Nominal inlet temperature	60 °C
Nominal flow rate	9 L/min

Environmental Conditions	
Ambient operating temperature	-40°C to 80 °C (agrees to ISO 16750-4 temperature range F)
Temperature protections	Winding temperature (thermal model)
	MOSFET temperature (thermal model)
	Capacitor temperature
	Cooling plate temperature
IP rating	Redundant busbar temperature
	IP67

Motor Details	
Winding	3-phase, distributed, star-connected
Pole pairs	8
Synchronous inductance (1 kHz)	19 µH/ph (no saliency)
Phase Resistance (DC)	5.5 mΩ/ph
Line-line back-EMF constant (20 °C)	0.017 V _{rms} /(elec rad/s)
Torque constant (20 °C)	0.24 Nm/A _{rms}
Cogging torque	< 1.2 Nm p-p
Short-circuit current	520 A _{rms} /ph
Short-circuit torque	60 Nm
Insulation class	H (180 °C)
Surge test voltage	1.2 kV
Hi-Pot DC test voltage	2 kV
Rotational inertia	0.014 kg.m ²

Controller Hardware Capability	
Maximum HV supply	60 V _{DC}
Minimum HV supply	32 V _{DC}
LV supply	7-16 V
Active short circuit protection	Included

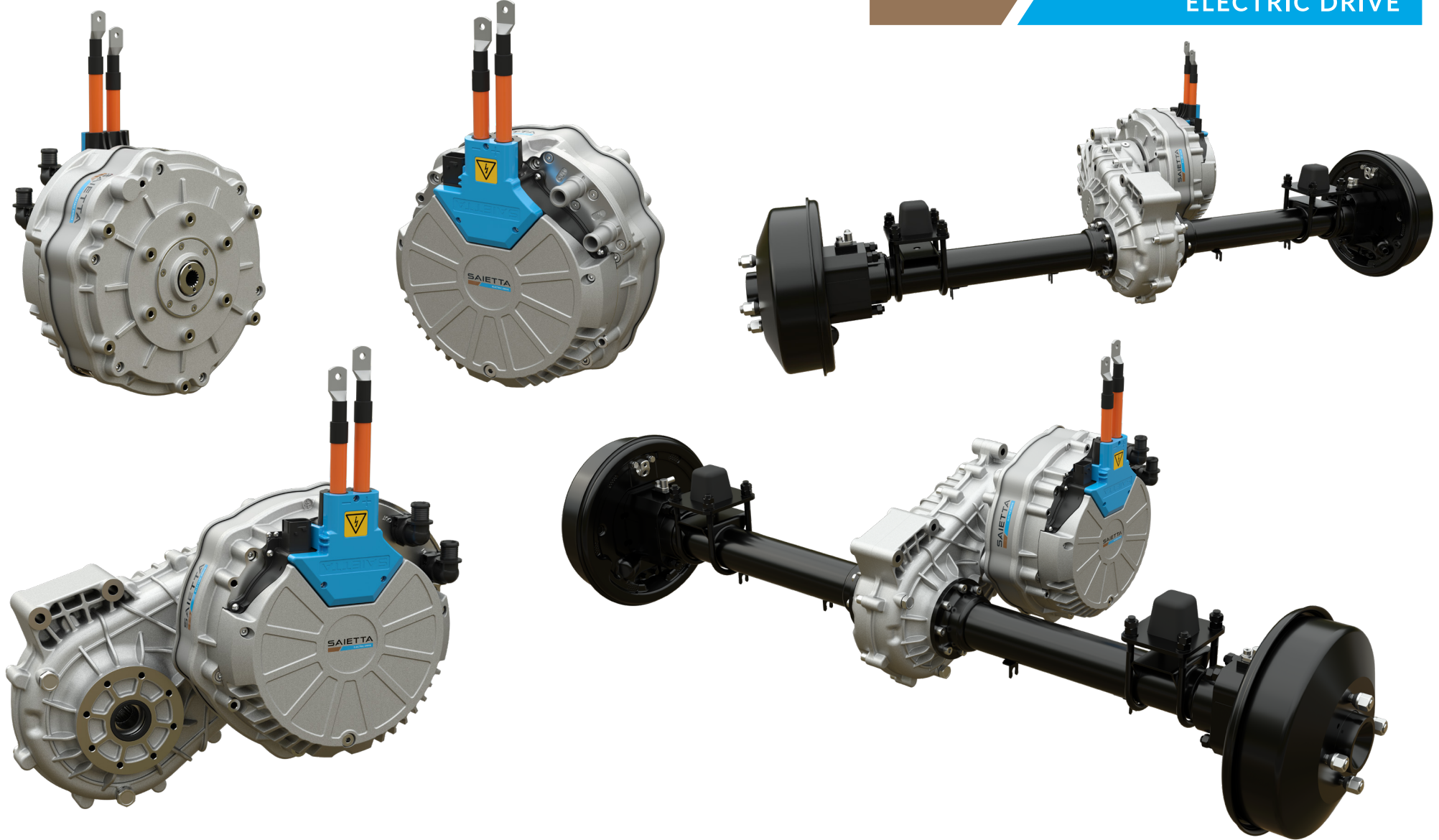
Controller Software Capability	
Motor control via CAN	Torque mode
Motor control algorithms	Speed mode (non-traction applications)
	Field oriented control (FOC)
	Automatic field weakening
Limiting functions	Maximum phase current (continuous and peak)
	Maximum torque (positive and negative)
	Maximum rpm (positive and negative)
	Maximum DC current (positive and negative)
Protection	HV under- and over-voltage
	LV under- and over-voltage
	Loss of communication
Firmware updates	SW update over CAN
Communication protocol	CANopen on CAN 2.0A
	Default or customer specific CAN DBC
Diagnostics	Critical fault detection & communication with shutdown response

Applicable Standards	
Environmental testing	ISO 16750-3:
	- Vibration + temperature cycling:
	Passenger car, gearbox
	- Mechanical shock (500m/s ²)
Functional safety	- ISO 16750-4
	- ISO 16750-5
Bearing fatigue life	ISO 26262 ASIL B ready
HV safety	ISO 281:2007
Electromagnetic compatibility (EMC)	ECE R100
	DS/EN 60349-4
ESD protection	UN ECE R10 Rev6
Performance characterization	All pins on system connector are ESD protected
	Requirement 61000-4-2 with 8kV HBM model
Overspeed	UN ECE R85
	DS/EN 60349-4



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