

CASCADIA  MOTION
2022 - 2023

Predecessors of Cascadia Motion

Rinehart Motion Systems (RMS) and AM Racing (AMR) were separate companies yet coincidentally both were based in the vicinity of Portland, Oregon (USA). Their paths crossed many times while working with customers in the emerging EV space, frequently placing RMS inverters and AMR motor assemblies on the same vehicle. RMS brought expertise in propulsion inverters and controls for electric and hybrid electric vehicles in professional motorsports, motorcycles, specialty road cars, buses, and heavy-duty sectors. AMR designed and manufactured single- and dual-core electric motors and gearsets used in all these same market segments. In many ways and on many occasions, the RMS and AMR hardware made for very natural and effective pairing.

Formation of Cascadia Motion

Recognizing that the demand for electric and hybrid propulsion systems is growing rapidly and goes beyond mainstream passenger and commercial vehicles, BorgWarner acquired these two Oregon-based businesses in early 2019. BorgWarner formed Cascadia Motion LLC to buy assets and merge the operations of the companies. Cascadia Motion retains an entrepreneurial culture and explores the wide variety of electric and hybrid propulsion solutions for niche and emerging applications. “Rinehart Motion Systems and AM Racing were two highly respected companies in the specialty electric and hybrid propulsion segment,” said Brock Fraser, General Manager of Cascadia Motion. “Bringing them together as Cascadia Motion allowed us to offer design, development, and production of full-electric and hybrid propulsion systems for niche and low-volume manufacturing applications.”



Cascadia Motion LLC had five founders: Chris Brune, Larry Rinehart, Adrian Hawkins, Marty Schmitz, and Brock Fraser.

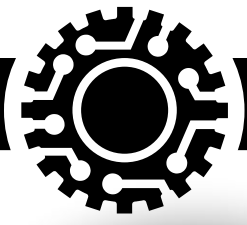
Graduation Path

Cascadia Motion leverages its experience to offer a portfolio of off-the-shelf electric vehicle products to help customers expedite their electrification programs. As an independent operating subsidiary of BorgWarner Inc., Cascadia Motion is uniquely positioned to serve customers as they ramp from smaller to larger volumes. Low to moderate volumes are handled by Cascadia Motion directly with the ability to graduate a program to one or more of BorgWarner's plants once volumes grow.

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EXAMPLE CONFIGURATIONS



MOTORCYCLE / UTV

Motor	HVH250-115DOM
Inverter	CM200DX
Voltage	400 V
Peak Power	180 KW

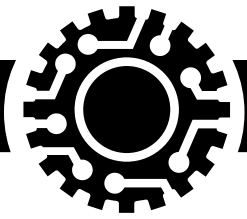
SUPER/HYPER CAR

Front Motor	SS-250-115-DOM
Rear Motor	DS-250-115-DOM
Front Inverter	CM350DZ
Rear Inverter	Dual CM350DZ
Voltage	800 V
Peak Power	1000 KW



PASSENGER CAR

Motor	iM-225 or SS-250
Inverter	CM200DX
Gearbox	eGeardrive or eDM
Voltage	400 V
Peak Power	190 KW



EXAMPLES AND EVBOT™

MEDIUM DUTY

Motor	iM-225 or SS-250
Inverter	CM200DX
Voltage	400 V
Peak Power	200 KW
Peak Torque	400+ Nm



HEAVY DUTY

Motor	iM-425 or SS-410
Inverter	Dual CM350DZ
Voltage	800 V
Peak Power	550 KW
Peak Torque	2000 Nm



EVBOT™

EVBot™ is an online application that will guide you through Cascadia Motion product selection and provide simplified calculations to predict the performance of your EV project.

CascadiaMotion.com/evbot



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iM-225 (INTEGRATED MODULE)

-DX and -DZ
Versions Available



Made with BorgWarner HVH250-115 motor core

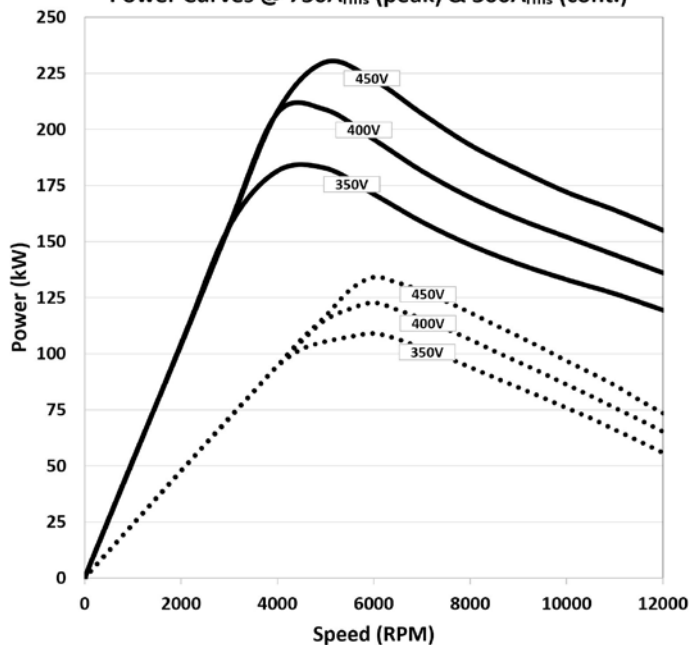
Built using the CM200 inverter and HVH250 motor core, this integrated module packs a 500Nm punch within a compact package. It's loaded with integrated features like an oil pump, oil cooler, oil sump and water pump.

FEATURES

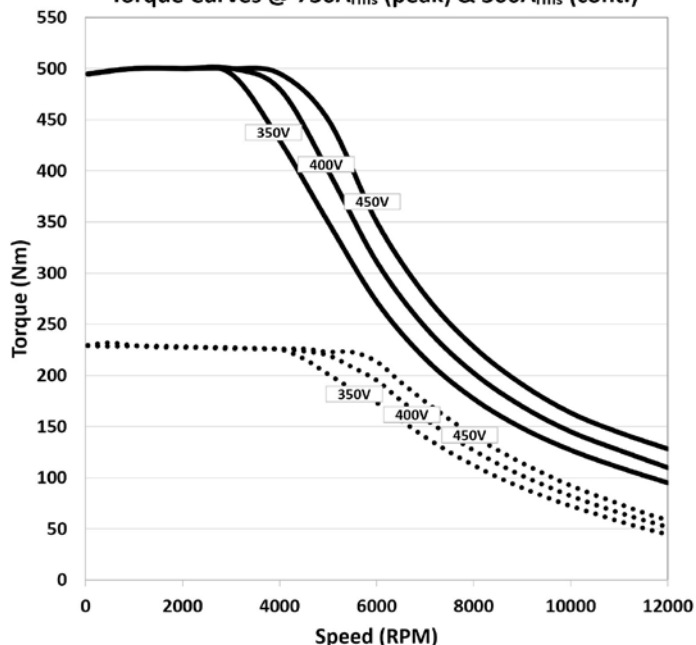
- 480Vdc maximum voltage (with CM200DX inverter)
- 840V maximum voltage (with CM200DZ inverter)
- Integrated oil pump
- Integrated water pump
- Integrated oil cooler
- Shallow sump depth, 170mm from shaft centerline to bottom
- Only 300mm in axial length and 405mm in total height
- Auxiliary ports provided for optional external oil connections
- Provided transmission connection bolt patterns:
 - 6-bolt 'Cascadia pattern'
 - 16-bolt 'Remy pattern' (e.g. 31-03 connection)
 - 4-bolt Porsche G50 pattern

Peak Torque	500Nm
Peak Power	225kW
Continuous Torque	230Nm
Continuous Power	110-135 kW
Maximum Speed	12000rpm
Weight	64 kg
Motor Cooling Medium	Dexron VI
Inverter Cooling Medium	50% E.G. / 50% Water
Maximum Water Temperature	80°C (Peak performance below 60°C, Mild Derate 60-80°C, No Torque at 100°C)
Combined Efficiency	95% peak (@200Nm, 5500rpm)

Power Curves @ 730A_{rms} (peak) & 300A_{rms} (cont.)



Torque Curves @ 730A_{rms} (peak) & 300A_{rms} (cont.)



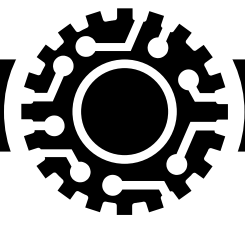
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iM-225W (INTEGRATED MODULE)

-DX and -DZ
Versions Available



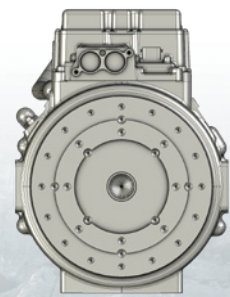
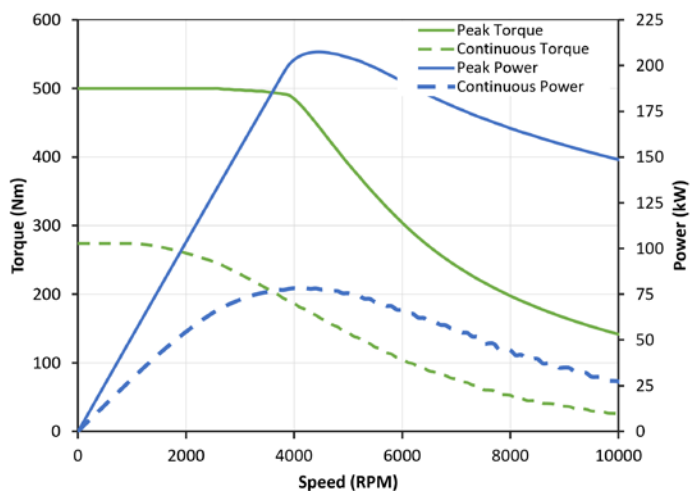
Made with BorgWarner HVH250-115 motor core

Like the iM-225, this integrated module is built using the CM200 inverter and HVH250 motor core. Standard SAE interfaces combined with a water-cooled motor design that allows mounting in either horizontal or vertical orientations make this the ideal drive for hydraulic pump and marine outboard applications.

Peak Torque	500Nm
Peak Power	210kW
Continuous Torque	275 Nm
Continuous Power	75-80 kW
Maximum Speed	12000rpm
Weight	60 kg
Motor Cooling Medium	50% E.G. / 50% Water
Inverter Cooling Medium	50% E.G. / 50% Water
Maximum Water Temperature	80°C (Peak performance below 45°C, Mild Derate 45-80°C, No Torque at 100°C)
Combined Efficiency	95% peak (@200Nm, 5500rpm)

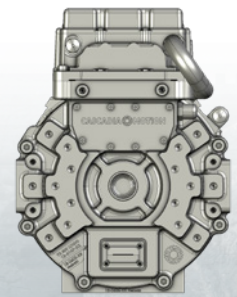
- ### FEATURES
- Enables direct mounting of standard SAE B&C pumps front and rear, see graphic below
 - Bolt Patterns
 - SAE B, 2 & 4-bolt
 - SAE C, 2 & 4-bolt
 - BorgWarner/Remy 16-bolt
 - Output Shaft
 - SAE C 14-tooth
 - Insert available for use with SAE B 13-tooth
 - Supports both horizontal and vertical mounting
 - Speed and torque control modes standard
 - 320mm axial length & under 385mm total height
 - Axially stackable to double power and torque

Power and Torque Curves @ 700Vdc



Front Flange

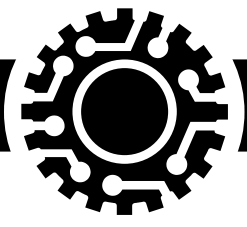
- BorgWarner/Remy 16-bolt
- SAE C, 2-bolt
- SAE C, 4-bolt
- SAE B, 2-bolt
- SAE B, 4-bolt



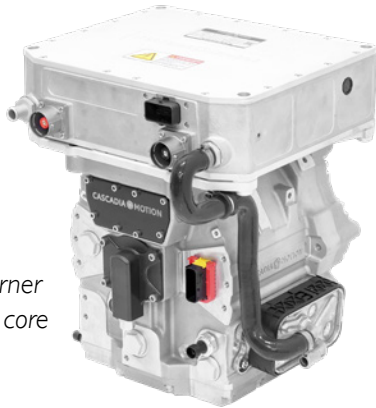
Rear Flange

- SAE C, 2-bolt
- SAE B, 2-bolt





iM-375 (INTEGRATED MODULE)



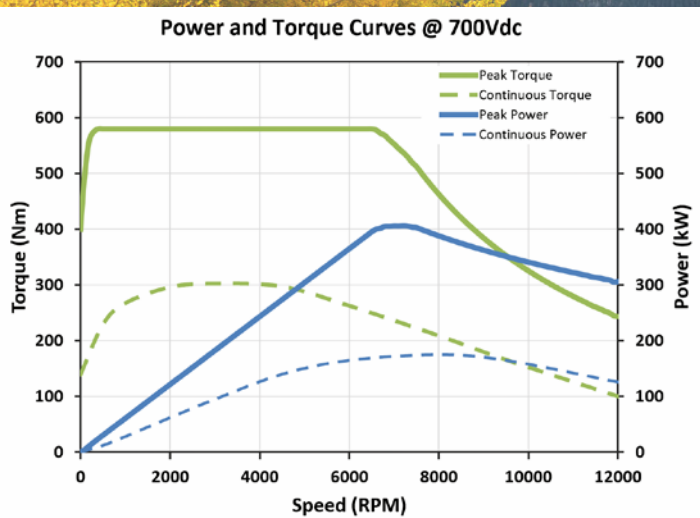
Made with BorgWarner HVH250-115 motor core

Being the higher-powered version of the iM-225, the iM-375 is built using the CM350 inverter and HVH250 motor core. This integrated module packs a 580Nm punch within a compact package and has a peak power of 400kW (537hp) at 700Vdc. It's loaded with integrated features like an oil pump, oil cooler, oil sump and water pump.

FEATURES

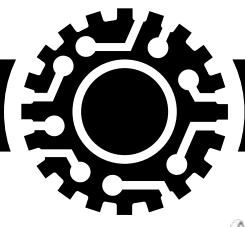
- 850Vdc maximum voltage (with CM350DZ inverter)
- Integrated oil pump
- Integrated water pump
- Integrated oil cooler
- Shallow sump depth, 170mm from shaft centerline to bottom
- Only 300mm in axial length and 424mm in total height
- Auxiliary ports provided for optional external oil connections enabling increased low-speed continuous torque
- Provided transmission connection bolt patterns:
 - 6-bolt 'Cascadia pattern'
 - 16-bolt 'Remy pattern' (e.g. SR309 gearbox)
 - 4-bolt Porsche G50 pattern

Peak Torque	580 Nm
Peak Power	400 kW
Continuous Torque	300 Nm
Continuous Power	175 kW
Maximum Speed	12000 rpm
Weight	73 kg
Motor Cooling Medium	Dexron VI
Inverter Cooling Medium	50% E.G. / 50% Water
Maximum Water Temperature	80°C (Peak performance below 45°C, Mild Derate 60-80°C, No Torque at 100°C)
Combined Efficiency	95% peak (@200Nm, 5500rpm)

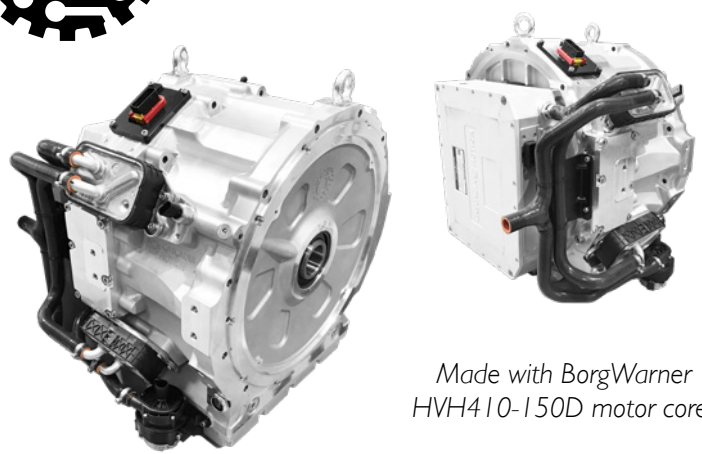


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iM-425 (INTEGRATED MODULE)

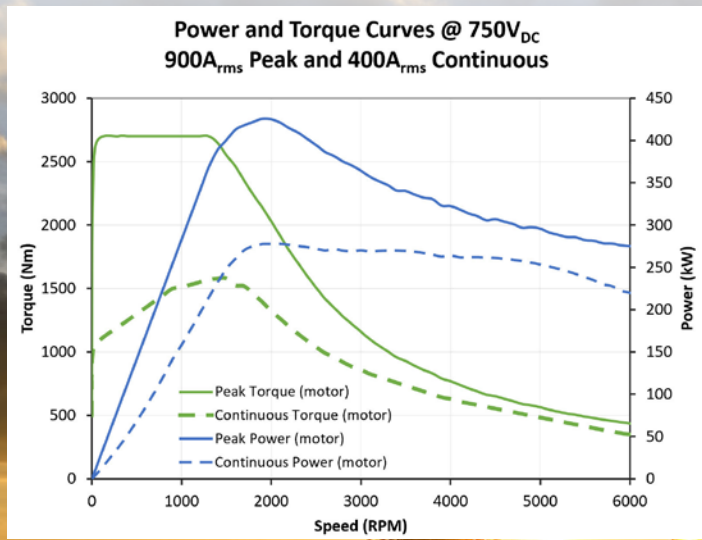


Made with BorgWarner HVH410-150D motor core

The iM-425 is built using our CM350 inverter and BorgWarner HVH410 motor core and is perfect for class 6 through 8 commercial vehicles. This integrated module packs a 2700 Nm punch within an easy-to-integrate package and has a peak power of 425kW (570hp) at 750Vdc. It's loaded with integrated features like an oil pump, oil cooler, oil sump and water pump.

Peak Torque	2700 Nm
Peak Power	425kW
Continuous Torque	1580 Nm
Continuous Power	280 kW
Maximum Speed	6000 rpm
Weight	190 kg
Motor Cooling Medium	Dexron VI
Inverter Cooling Medium	50% E.G. / 50% Water
Maximum Water Temperature	80°C (Peak performance below 45°C, Mild Derate 60-80°C, No Torque at 100°C)
Combined Efficiency	95% peak (@200Nm, 5500rpm)

- ### FEATURES
- 850Vdc maximum voltage
 - Integrated oil pump
 - Integrated water pump
 - Integrated oil cooler
 - Shallow sump depth, 296mm from shaft centerline to bottom
 - Only 420mm in axial length and 546mm in total height
 - Auxiliary ports provided for optional external oil connections
 - SAE2 flange - face and shaft interchangeable with BW HVH410-150



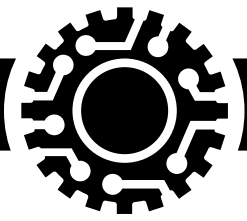
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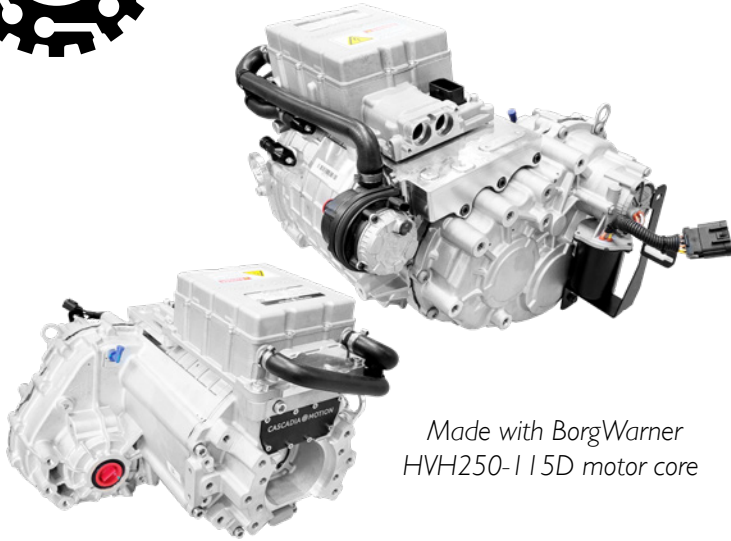


The iM-425 can operate up to 6000 rpm. However, motor operation above 4000 rpm results in back-EMF voltage above the inverter's non-operational limit. Opening battery contactors during a fault while above 4000 rpm can lead to inverter damage not covered by warranty.





iDM-190 (INTEGRATED MODULE)



Made with BorgWarner HVH250-115D motor core

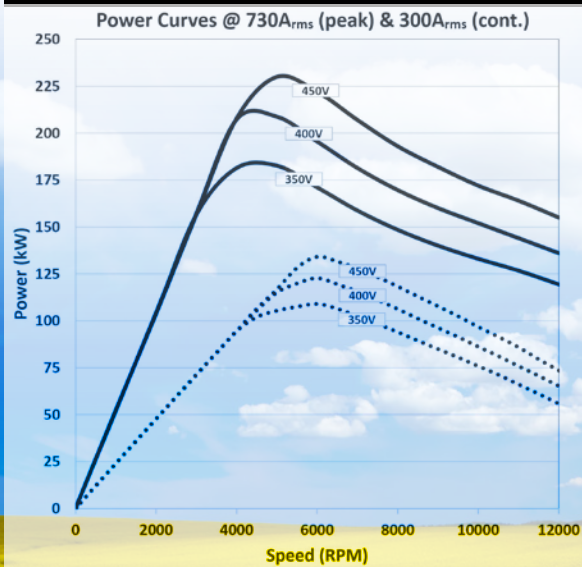
Built using the CM200 inverter and the BorgWarner eDM motor/transmission, this three-in-one integrated module is capable of 4140 Nm of axle torque. The assembly is bolt-in ready for transverse mounted drivelines and is equipped with parking lock and water pump as standard.

FEATURES

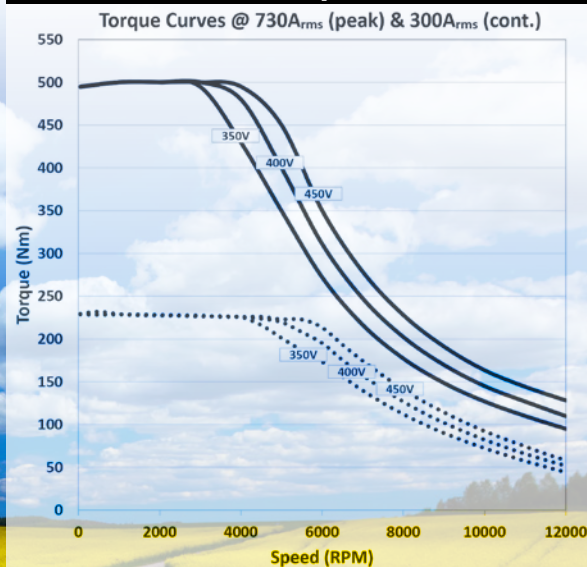
- OEM-level integration (inverter + motor + gearbox)
- 480 Vdc maximum voltage (with CM200DX inverter)
- Wavetrac® limited slip differential
- Integrated parking lock
- 8.28:1 gearbox ratio
- Assembly has multiple mounting bosses to enable flexibility in chassis mount locations
- Water-cooled motor minimizes weight & size
- Pluggable HVIL DC connection
- Flanged stub shafts available
- Boundary Box
 - Height: 435mm
 - Width: 540mm
 - Length: 515mm

Peak Torque	500Nm (4140 Nm at axles)
Peak Power	225kW
Continuous Torque	180Nm (1490Nm at axles)
Continuous Power	80kW
Maximum Speed	12000rpm
Weight	92 kg
Motor Cooling Medium	50% E.G. / 50% Water
Inverter Cooling Medium	50% E.G. / 50% Water
Maximum Water Temperature	80°C (derate from 80 to 100°C)
Combined Efficiency	95% peak (@200Nm, 5500rpm)

iDM-190 Power Curves



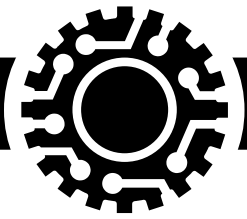
iDM-190 Torque Curves



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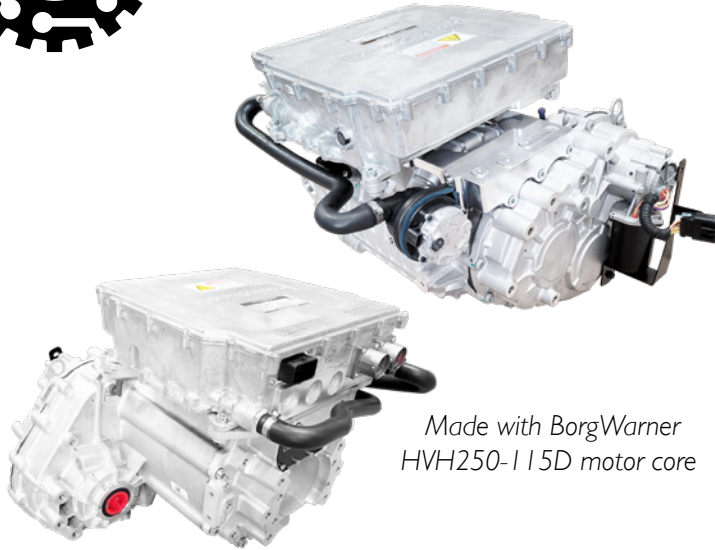


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iDM-375 (INTEGRATED DRIVE MODULE)

Built using the CM350 SiC inverter and the BorgWarner eDM motor/transmission. We modified the gearing to 6.54:1 and added a limited-slip differential. This three-in-one integrated module is capable of 4055 Nm of axle torque and 400kW (or more) of peak power when used in an 800V application. The assembly is ideal for transverse-mounted drivelines and is equipped with a parking lock actuator and water pump as standard.



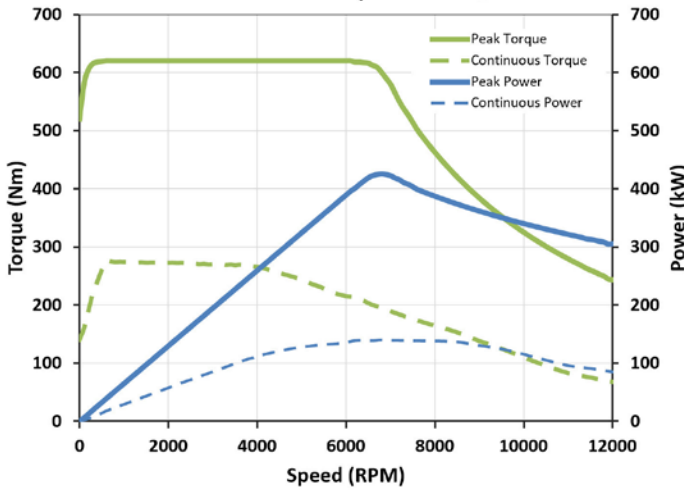
Made with BorgWarner HVH250-115D motor core

Peak Torque	620Nm (4055Nm at axles)
Peak Power	425kW
Continuous Torque	275Nm (1800Nm at axles)
Continuous Power	140kW
Maximum Speed	12000rpm
Weight	100 kg
Motor Cooling Medium	50% E.G. / 50% Water
Inverter Cooling Medium	50% E.G. / 50% Water
Maximum Water Temperature	80°C (derate from 80 to 100°C)
Combined Efficiency	95% peak (@200Nm, 5500rpm)

FEATURES

- OEM-level integration (inverter + motor + gearbox)
- 860Vdc maximum voltage (with CM200DX inverter)
- Wavetrac® limited slip differential
- Integrated parking lock
- 6.54:1 gearbox ratio
- Assembly has multiple mounting bosses to enable flexibility in chassis mount locations
- Water-cooled motor minimizes weight & size
- Pluggable HVIL DC connection
- Flanged stub shafts available
- Boundary Box
 - Height: 435mm
 - Width: 540mm
 - Length: 515mm

iDM-375 Power and Torque Curves @ 700Vdc

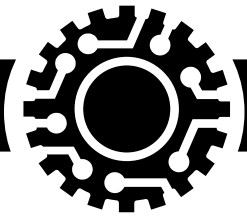


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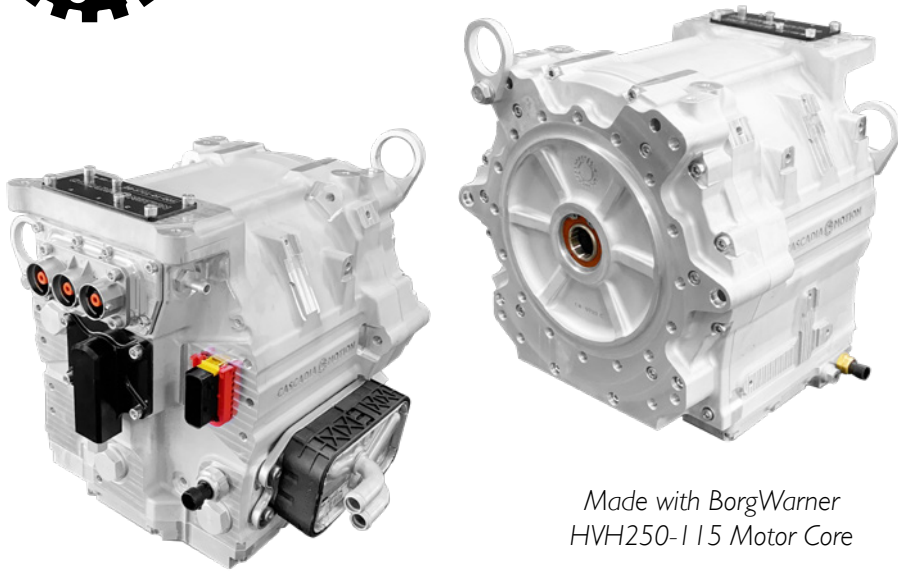


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SS-250 GEN2 SINGLE STACK MOTOR



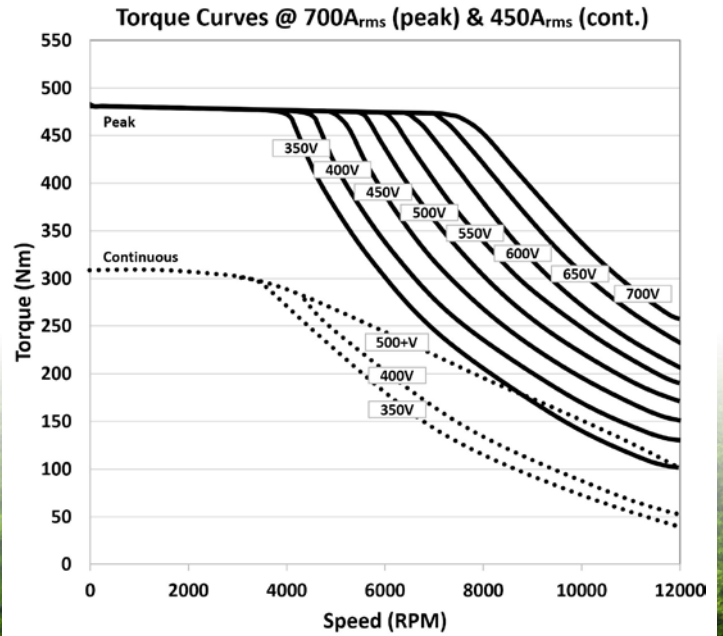
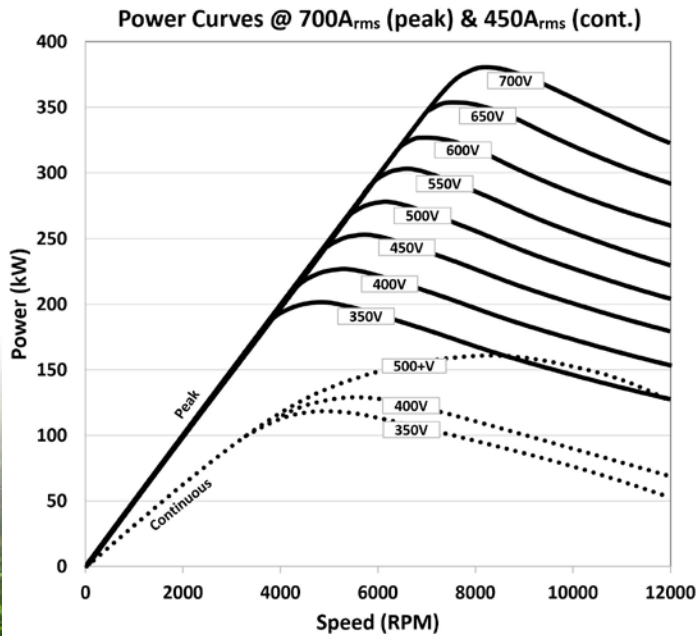
Made with BorgWarner HVH250-115 Motor Core

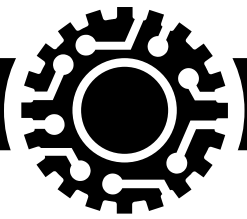
The SS-250-115 is a powerful, durable and rugged electric motor / generator with integral sump, mechanical oil pump and heat exchanger for use in on- and off-road highway vehicles, power generation and other special high power applications.

The SS-250 is currently available with a 115mm stack length. This mighty yet small workhorse develops up to 500 Nm and 375 kW [500hp].

FEATURES

- Peak torque 500Nm
- Peak speed 12kRPM
- Peak power 375kW @ 700Vdc
- Mass 57kg
- Peak efficiencies > 95%
- DC bus voltage up to 850V
- Includes oil pump, sump & integral oil to water heat exchanger
- Oil aux (external) connection points provided but not required
- Typical oil temperature of up to 90°C
- Typical oil flow rate 8 to 15 LPM
- Rated peak operating time 30 sec
- Motor rotational inertia 0.085 kg-m²





DS-250-115 DUAL STACK MOTOR

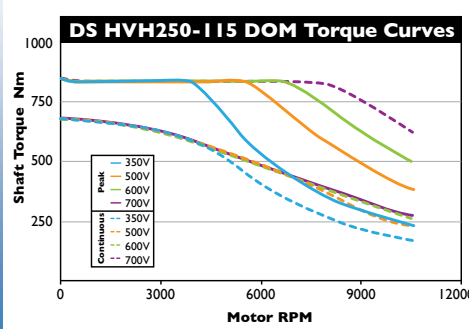
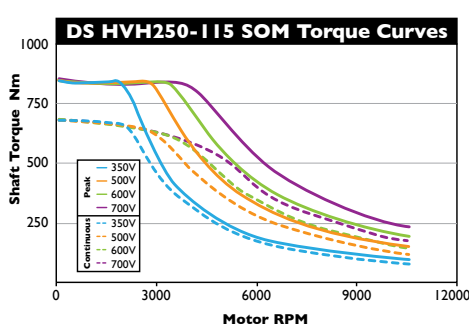
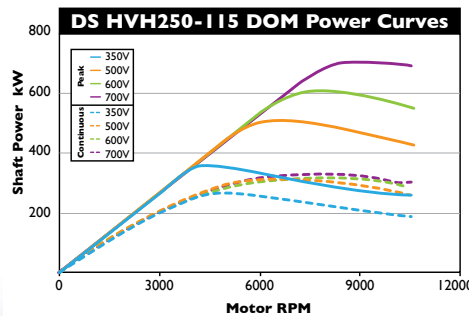
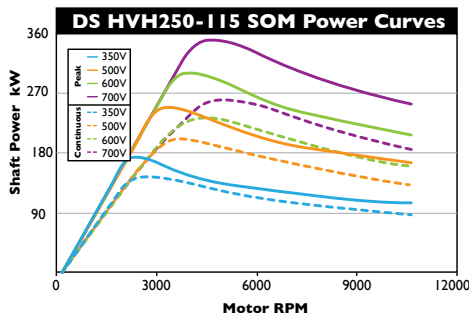


The DS-250-115 Dual Stack motor is a durable and powerful electric motor/generator with integral sump and mechanical oil pump for use in on- and off-road highway vehicles, power generation and other special high power demand applications.

DS-250-115 - Peak Torque of 960Nm at 350/700Arms (SOM/ DOM) per motor*

*(SOM = Series Wound Cores, DOM = Parallel Wound Cores)

Made with BorgWarner HVH250 Motor Cores



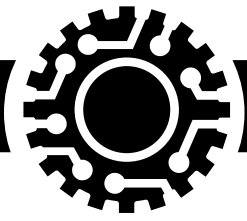
FEATURES

- Peak torque 960Nm at 350/700Arms (SOM/DOM)*
- Peak speed 11kRPM
- Peak power above 780kW (DOM)*
- Mass 106kg
- Includes Oil Pump, Sump
- Requires external heat exchanger
- Requires use of two 3-phase inverters and contains two resolvers
- Peak efficiencies > 95%
- World class power density
- Typical Oil Inlet Temperature up to 90°C
- Oil Flow Rate up to 45 LPM
- DC Bus Voltage to 850V
- Performance curves shown at 300Arms (per motor - SOM) and 600Arms (per motor - DOM)*
- Rated Peak Operating Time 60 sec
- Motor Rotational Inertia 0.140 kg-m²

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DS-410-075 DUAL STACK MOTOR



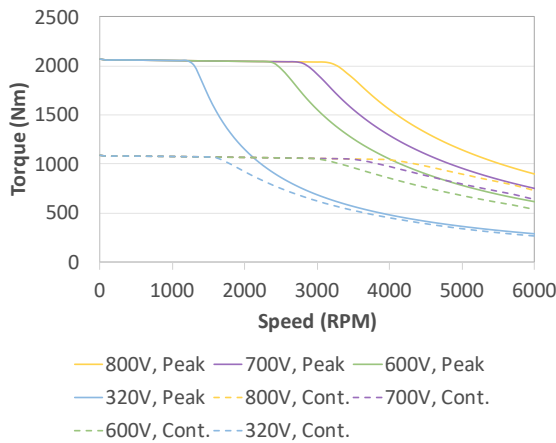
Made with BorgWarner HVH410 Motor Cores
 Note: Curves shown at 600 Arms

The DS-410-75 Dual Stack motor is a powerful, durable and rugged electric motor/generator with integral sump, pump and heat exchangers. Applications include on- and off-road highway vehicles, power generation and other special high power demand applications.

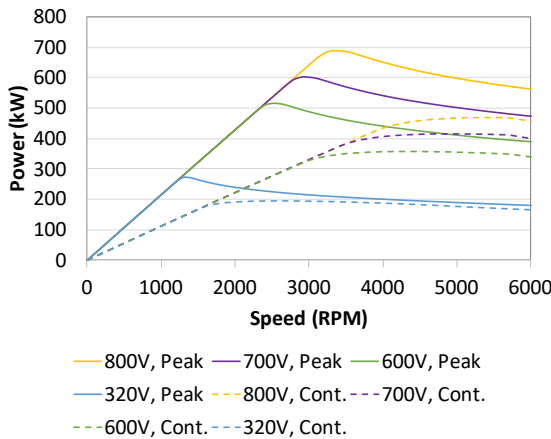
DS-410-75: Peak Torque of > 2000Nm at 300 /600 Arms (SOM/DOM) and peak power of 500kW (DOM) or more!*

*(SOM = Series Wound Cores, DOM = Parallel Wound Cores)

DS-410-075-DOM Torque Curves



DS-410-075-DOM Power Curves



FEATURES

- Peak torque 2000Nm at 600Arms per motor (DOM)*
- Peak speed 6kRPM
- Peak power above 500kW (DOM)* at VDC > 600
- Mass 220kg
- Includes Oil Pump, Sump
- Includes integral water/oil heat exchanger
- Requires use of two 3-phase inverters and contains two resolvers
- Peak efficiencies > 95%
- World class power density
- Typical Coolant Inlet Temperature up to 90°C
- Typical Coolant Flow Rate 32 LPM
- DC Bus Voltage to 850V
- Performance curves shown at 600Arms*
- Rated Peak Operating Time = 60 sec
- Motor Rotational Inertia 1.24 kg-m²

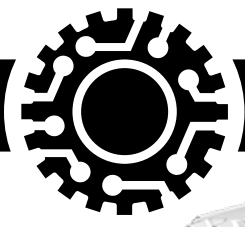
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SR-309 (SPEED REDUCER GEARBOX, 3.09:1 RATIO)



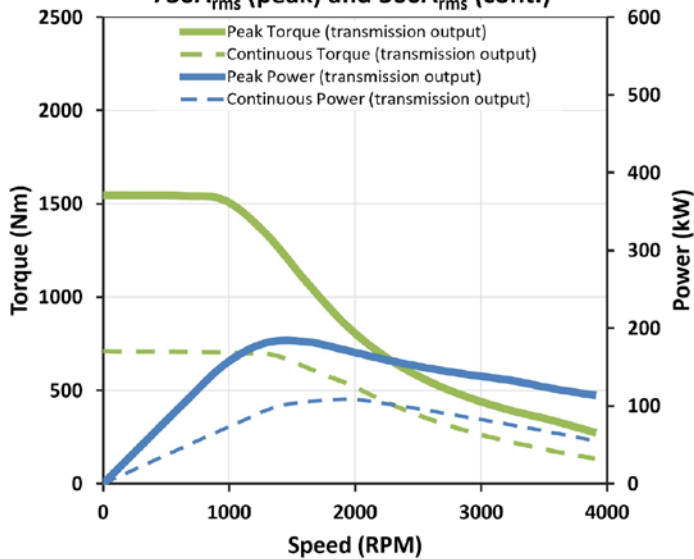
The SR-309 provides a 3.09:1 speed reduction (and torque multiplication) ratio. It's built using a pair of gears from the time-proven BorgWarner 31-03 gearbox. Added to that is a parking lock pawl and actuator. Integrated mounting features allow it to bolt right up to our iM-225, iM-375 and SS-250 products in two orientations: left offset or right offset.

FEATURES

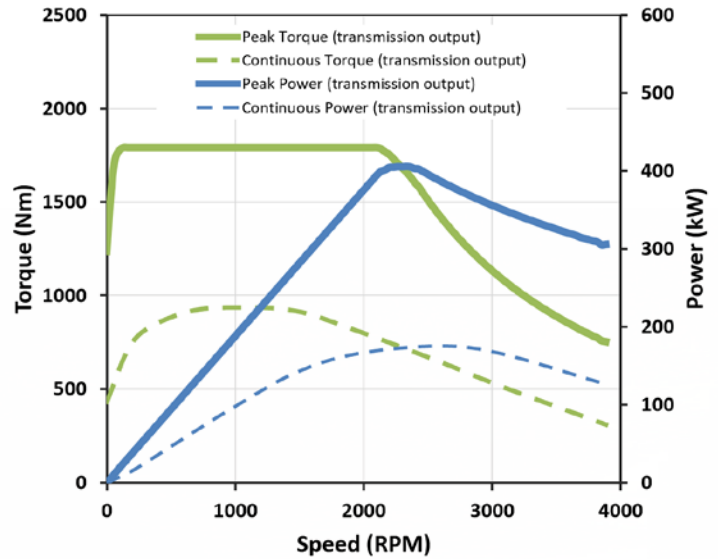
- 3.09:1 gear ratio
- High-quality helical ground gears
- Perfect for use with iM-225, iM-375 or SS-250
- Can be installed in two orientations: right offset or left offset
- Fed by cooled oil from the motor mounting face, returning through that face
- Parking lock pawl and actuator included
- DC actuator motor is commanded via H-bridge control and provides analog position feedback
- Output flange mimics the I6-bolt motor face

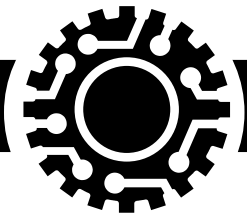
Peak Input Torque	800Nm
Maximum Input Speed	12000rpm
Weight	26 kg
Cooling/Lube Fluid	Dexron VI or similar

When paired with iM-225DX-D:
Power and Torque Curves @ 350Vdc
730A_{rms} (peak) and 300A_{rms} (cont.)



When paired with iM-375DZ-D:
Power and Torque Curves @ 700Vdc





BORGWARNER MOTORS AND GEARDRIVES



HVH250 Series Motors



HVH410 Series Motors

BorgWarner Motors

BorgWarner Motors feature hairpin-wound oil cooled internals. They require external pumps, reservoirs and coolers.

Motor	Peak Power	Peak Torque
Cast-Housing HVH250-115 SOM / DOM	180/360 kW	400 Nm
Cast-Housing HVH410-150 SOM / DOM	150/300 kW	2000 Nm

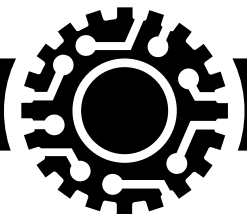


eDM (HVH250 with integrated gearbox)

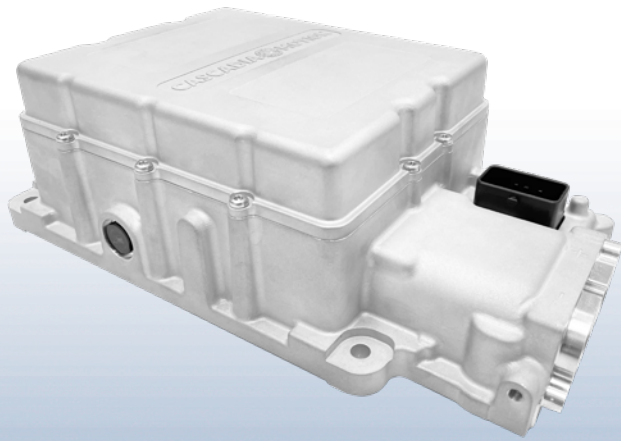
BorgWarner eDM

Motor	Peak Power	Peak Torque
eDM (HVH250-115-DOM motor and gearbox) with 8.28:1 gear ratio, open differential and parking pawl	360 kW	320-400 Nm*

** Consult Factory*



CM200 INVERTER



Our newest inverter is the CM200, packing the punch of a PM150 but being smaller volume and lighter weight than a PM100. Also features HVIL, pluggable connectors and an EMI filter!

FEATURES

- 4 (0-5V) Analog Inputs
- 2 RTD inputs PT100/1000
- 4 Digital Inputs 4-STG
- 2 High Side Driver Outputs
- 2 Low Side Driver Outputs
- 1 Resolver Interface
- 1 Sin-Cos Encoder Interface (-SP Option)
- 2 CAN 2.0A/B Ports 125kb-1Mb adjustable rate and offset
- RS232 Programming and Diagnostic Connection
- Rosenberger Power Connectors
- Integrated DC-Link EMI Filter
- Designed to ISO 16750 heavy vehicle climatic, mechanical, and environmental requirements
- ISO20653 high pressure wash rated IP6K9K / IP67
- Easy to use CAN-based network node
- Custom .dbc messaging
- J1939 compatible CAN messages available
- Extensive feedback broadcast messaging for datalogging
- PC-based setup and programming tools available free
- Robust, fault-tolerant IGBT power stage
- HVIL Interlock on connectors
- Command Safety Watchdog
- Variable PWM Rate

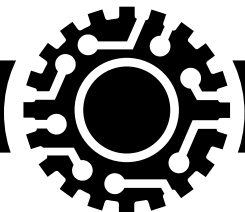
CM200	DX	DZ	Units
DC Voltage – operating	50-480	200-840	VDC
DC Overvoltage Trip	500	860	VDC
Maximum DC Voltage – non-operating	500	900	VDC
Motor Current Continuous	300	200	A
Motor Current Peak *	740	400	Arms
Output Power Peak (elect) *	225	225	kW
DC Bus Capacitance	650	255	µF
Size and Volume	330 x 188 x 97 / 3.9		mm / L
Weight	6.75		kg
Active Discharge via motor winding to <50V	< 1		sec
Passive Discharge (internal resistor) to <50V	< 120		sec
Vehicle System Power	9 .. 32 (12V & 24V systems)		VDC
Inverter PWM Frequency	12 (6 .. 16 variable)		kHz
Operating Temperature Range – coolant water	- 40 .. +80, (derate to zero 80 .. 100)		°C
Coolant Flow Rate	12 (3 GPM min)		LPM
Coolant Pressure Drop (60°C coolant / 12 LPM)	0.3 (30kPa / 4.3psi)		bar
Maximum Coolant Pressure (absolute)	3 (300kPa / 45psia)		bar
Operating Shock (ISO 16750-3, Test 4.2.2.2)	500 (50g), pending		m/s ²
Operating Vibration (ISO 16750-3, 4.1.2.7 Test VII)	57.9 (6grms), pending		m/s ²
EMC compatibility	IEC61000 / CISPR-25 pending		
Compatible Conductor Sizes	16, 25, 35, 50		mm ²

Ratings subject to change without notice—consult factory
 * Peak current is defined as a maximum of 30 seconds.

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CM350 INVERTER



The CM350 is within Cascadia Motion's newest product line of inverters. Being the big brother to the CM200, the CM350 delivers very high current and works with the highest of today's common voltage levels. It features HVIL, pluggable connectors and an EMI filter.

FEATURES

- 4 (0-5V) Analog Inputs
- 2 RTD inputs PT100/1000
- 4 Digital Inputs 4-STG
- 2 High Side Driver Outputs
- 2 Low Side Driver Outputs
- 1 Resolver Interface
- 1 Sin-Cos Encoder Interface (-SP Option)
- 2 CAN 2.0A/B Ports 125kb-1Mb adjustable rate and offset
- RS232 Programming and Diagnostic Connection
- Amphenol Powerlok 500 Gen2 Connectors
- Integrated DC-Link EMI Filter
- Designed to ISO 16750 heavy vehicle climatic, mechanical, and environmental requirements
- ISO20653 high pressure wash rated IP6K9K / IP67
- Easy to use CAN-based network node
- Custom .dbc messaging
- J1939 compatible CAN messages available
- Extensive feedback broadcast messaging for datalogging
- PC-based setup and programming tools available free
- Robust, fault-tolerant IGBT power stage
- HVIL Interlock on connectors
- Command Safety Watchdog
- Variable PWM Rate

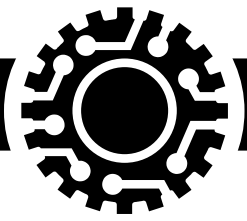
CM350	DX	DZ	COMING SOON SiC	Units
DC Voltage – operating	100-480	200-850	200-850	VDC
DC Overvoltage Trip	500	860	860	VDC
Maximum DC Voltage – non-operating	500	900	900	VDC
Motor Current Continuous **	500	500	500	Arms
Motor Current Peak *	1350	800	900	Arms
Output Power Peak (elect) *	400+	440+	500+	kW
DC Bus Capacitance	1300	510	700	µF
Weight	17.4	17.4	14.6	kg
Size and Volume	358 x 299 x 99 / 10.6			mm / L
Active Discharge via motor winding to <50V	< 2			sec
Passive Discharge (internal resistor) to <50V	< 120			sec
Vehicle System Power	9 - 32 (12V & 24V systems)			VDC
Inverter PWM Frequency	4 - 24			kHz
Operating Temperature Range – coolant water	-40 - +80, (derate to zero 80 - 100)			°C
Coolant Flow Rate	24			LPM
Coolant Pressure Drop (60°C coolant / 24 LPM)	0.3 (30kPa / 4.3psi)			bar
Maximum Coolant Pressure (absolute)	3 (300kPa / 45psia)			bar
Operating Shock (ISO 16750-3, Test 4.2.2.2)	500 (50g), pending			m/s ²
Operating Vibration (ISO 16750-3, 4.1.2.7 Test VII)	57.9 (6grms), pending			m/s ²
EMC compatibility	IEC61000 / CISPR-25 pending			
Compatible Conductor Sizes	70, 95, 120			mm ²

Ratings subject to change without notice—consult factory
 * Peak current is defined as a maximum of 30 seconds.
 ** Higher continuous limits may be possible with the motor-integrated version whereby the phase lead connectors are eliminated.

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PM100 INVERTER



The PM100 is the smallest inverter in the PM line and perfect for small cars, hybrids and motorcycles.

PM100DXR RACING VERSION AVAILABLE BY SPECIAL ORDER

- Provides 450Arms peak current in the smallest package for 400V-class applications
- This version trades operating life for increased peak power handling in transients. Suitable for motorcycles, FSAE and other compact vehicles. Requires coolant temperature to be less than 60°C to take advantage of -R current increase.

FEATURES

- 6 (0-5V) Analog Inputs
- 2 RTD Inputs PT100/1000
- 8 Digital Inputs STB/STG
- 4 High Side Driver Outputs
- 2 Low Side Driver Outputs
- I Resolver Interface
- I Sin-Cos Encoder Interface (-SP Option)
- 2 CAN 2.0A/B Ports 0.25-1MB adjustable rate and offset
- RS232 Programming Port
- M25 Cable Gland Connections
- Designed to ISO16750 heavy vehicle climatic, mechanical, and environmental requirements
- ISO20653 high pressure wash rated IP6K9K / IP67
- Easy to use CAN-based control and feedback
- CAN Database (DBC) Available
- J1939 compatible CAN messages available
- Comprehensive fault logging and diagnostics
- PC-based setup and programming tools available for free
- AN6 coolant ports—can be adapted to any hose fitting, any angle
- Robust, fault-tolerant IGBT power stage
- No internal DC-link EMI Filter
- 100% automotive-qualified components
- IPC Class 3 fab and assembly
- Command Safety Watchdog
- ISO6469 High Voltage Safety

PM100	DX	DZ	Units
DC Voltage – operating	50-400	100-820	VDC
DC Overvoltage Trip	420	840	VDC
Maximum DC Voltage – non-operating	500	900	VDC
Motor Current Continuous	300	150	Arms
Motor Current Peak *	350	200	Arms
Output Power Peak (elect) *	120	130	kW
DC Bus Capacitance	440	280	µF
Size and Volume	200 x 87 x 314 / 5.5		mm / L
Weight	7.5		kg
Active Discharge via motor winding to <50V	< 1		sec
Vehicle System Power	9 .. 16		VDC
Inverter PWM Frequency **	12 (6..16 variable with upgrade)		kHz
Operating Temperature Range – coolant water	- 40 .. +80, (derate to zero 80 .. 100)		°C
Coolant Flow Rate	8 .. 10 (2 GPM min)		LPM
Coolant Pressure Drop (60°C coolant / 10 LPM)	0.4 (42kPa / 6psi)		bar
Maximum Coolant Pressure (absolute)	4.5 (450kPa / 65psia)		bar
Operating Shock (ISO 16750-3, Test 4.2.2.2)	500 (50g), pending		m/s ²
Operating Vibration (ISO 16750-3, 4.1.2.4 Test IV)	27.8 (3grms), pending		m/s ²
Cable Gland Size	M25-1.5		
Conductor Size min .. max recommended	#4/35 .. #1/50		AWG/ mm ²
Cable OD min .. max recommended ***	9 .. 16.5		mm

Ratings subject to change without notice—consult factory

* Peak current is defined as a maximum of 30 seconds.

** Gen5 control upgrade is available on some applications which adds a variable PWM rate function. This allows lowering of the PWM rate for up to 33% more peak current and raising of the PWM rate at very high motor speeds for such applications needing it.

*** Depending on the cable type, an additional sleeve may be needed to seal the cable.

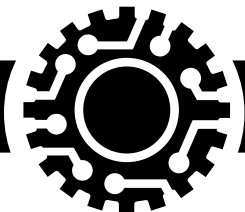
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PM150 INVERTER



PM150DZR RACING VERSION AVAILABLE BY SPECIAL ORDER

- Provides 400Arms peak current in the smallest package for 800V-class applications
- This version trades useful operating life for increased peak power handling in transients. Suitable for light aircraft and motorsports. Requires coolant temperature to be less than 60°C to take advantage of -R current increase.

FEATURES

- 6 (0-5V) Analog Inputs
- 2 RTD Inputs PT100/1000
- 8 Digital Inputs STB/STG
- 4 High Side Driver Outputs
- 2 Low Side Driver Outputs
- 1 Resolver Interface
- 1 Sin-Cos Encoder Interface (-SP Option)
- 2 CAN 2.0A/B Ports 0.25-1MB adjustable rate and offset
- RS232 Programming Port
- M32/M24 Cable Gland Connections
- Designed to ISO16750 heavy vehicle climatic, mechanical, and environmental requirements
- ISO20653 high pressure wash rated IP6K9K / IP67
- Easy to use CAN-based control and feedback
- CAN Database (DBC) Available
- J1939 compatible CAN messages available
- Comprehensive fault logging and diagnostics
- PC-based setup and programming tools available for free
- AN6 coolant ports—can be adapted to any hose fitting, any angle
- Robust, fault-tolerant IGBT power stage
- No internal DC-link EMI Filter
- Command Safety Watchdog
- ISO6469 High Voltage Safety

The PM150 is a great mid-sized inverter for 130-200 kW applications plus multi-motor setups.

PM150	DX	DZ	Units
DC Voltage – operating	50-400	100-820	VDC
DC Overvoltage Trip	420	840	VDC
Maximum DC Voltage – non-operating	500	900	VDC
Motor Current Continuous	400	225	Arms
Motor Current Peak *	450	300	Arms
Output Power Peak (elect) *	150	170	kW
DC Bus Capacitance	880	600	µF
Size and Volume	200 x 87 x 436 / 7.6		mm / L
Weight	10		kg
Active Discharge via motor winding to <50V	< 1		sec
Vehicle System Power	9 .. 16		VDC
Inverter PWM Frequency **	12 (6..16 variable with upgrade)		kHz
Operating Temperature Range—coolant water	- 40 .. +80, (derate to zero 80..100)		°C
Coolant Flow Rate	8 .. 10 (2 GPM min)		LPM
Coolant Pressure Drop (60°C coolant / 10 LPM)	0.4 (42kPa / 6psi)		bar
Maximum Coolant Pressure (absolute)	4.5 (450kPa / 65psi)		bar
Operating Shock (ISO 16750-3, Test 4.2.2.2)	500 (50g), pending		m/s ²
Operating Vibration (ISO 16750-3, 4.1.2.4—IV)	27.8 (3grms), pending		m/s ²
Cable Gland Size	M32-1.5	M32-1.5	
Conductor Size min .. max recommended	#2/35..#000/75	#4/30..#1/50	AWG/ mm ²
Cable OD min .. max recommended ***	11 .. 21	9 .. 16.5	mm

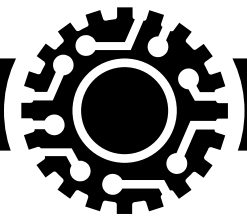
Ratings subject to change without notice—consult factory
 * Peak current is defined as a maximum of 30 seconds.
 ** Gen5 control upgrade is available on some applications which adds a variable PWM rate function. This allows lowering of the PWM rate for up to 33% more peak current and raising of the PWM rate at very high motor speeds for such applications needing it.
 *** Depending on the cable type, an additional sleeve may be needed to seal the cable.

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PM250 INVERTER



PM250DZR RACING VERSION AVAILABLE BY SPECIAL ORDER

- Provides 700Arms peak current in the smallest package for 800V-class applications
- This version trades useful operating life for increased peak power handling in transients. Suitable for motorsports and supercars/hypercars. Requires coolant temperature to be less than 60°C to take advantage of -R current increase.

FEATURES

- 6 (0-5V) Analog Inputs
- 2 selectable PT100/ PT1000 RTD Inputs
- 8 Digital Inputs STB/STG
- 4 High Side Driver Outputs
- 1 Resolver Interface
- 1 Sin-Cos Encoder Interface (-SP Option)
- 2 CAN 2.0A/B Ports 0.25-1MB adjustable rate and offset
- RS232 Programming Port
- Designed to ISO16750 heavy vehicle climatic, mechanical, and environmental requirements
- ISO20653 high pressure wash rated IP6K9K / IP67
- Easy to use CAN-based control and feedback
- CAN Database (DBC) Available
- J1939 compatible CAN messages available
- Comprehensive fault logging and diagnostics
- PC-based setup and programming tools available for free
- -10 ORB coolant ports—can be adapted to any hose fitting, any angle
- Robust, fault-tolerant IGBT power stage
- No internal DC-link EMI Filter
- Command Safety Watchdog
- ISO6469 High Voltage Safety

The PM250 is a high-powered workhorse that delivers up to 700 Arms peak current in the smallest package for 800V-class applications. This inverter sets the standard for supercar and motorsports electric propulsion.

PM250	DX	DZ	Units
DC Voltage – operating	50-400	100-820	VDC
DC Overvoltage Trip	420	840	VDC
Maximum DC Voltage – non-operating	500	900	VDC
Motor Current Continuous	450	450	Arms
Motor Current Peak *	750	600	Arms
Output Power Peak (elect) *	280	300	kW
DC Bus Capacitance	1500	645	µF
Size and Volume	523 x 391 x 75 / 15.4		mm / L
Weight	18		kg
Active Discharge via motor winding to <50V	< 1		sec
Vehicle System Power	9 .. 16		VDC
Inverter PWM Frequency **	12 (6..16 variable with upgrade)		kHz
Operating Temperature Range—coolant water	- 40 .. +80, (derate to zero 80..100)		°C
Coolant Flow Rate	24 .. 30 (6 GPM min)		LPM
Coolant Pressure Drop (60°C coolant / 24 LPM)	1.3 (132kPa / 18psi)		bar
Maximum Coolant Pressure (absolute)	2.75 (275kPa / 40psi)		bar
Operating Shock (ISO 16750-3, Test 4.2.2.2)	500 (50g), pending		m/s ²
Operating Vibration (ISO 16750-3, 4.1.2.4—IV)	27.8 (3grms), pending		m/s ²
Cable Gland Size	M32	M32	
Conductor Size min .. Max recommended	#2/35..#000/75		AWG/ mm ²
Cable OD min .. max recommended ***	11 .. 21		mm

Ratings subject to change without notice—consult factory

* Peak current is defined as a maximum of 30 seconds.

** Gen5 control upgrade is available on some applications which adds a variable PWM rate function. This allows lowering of the PWM rate for up to 33% more peak current and raising of the PWM rate at very high motor speeds for such applications needing it.

*** Depending on the cable type, an additional sleeve may be needed to seal the cable.

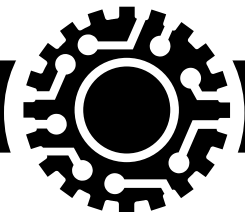
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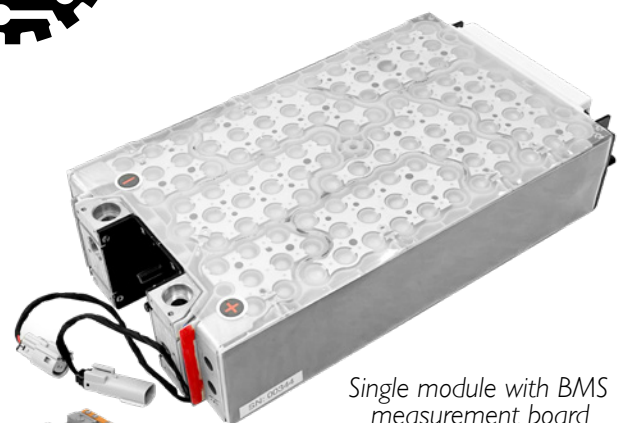
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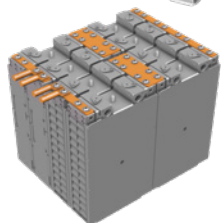


BATTERY MINI-MODULE



Single module with BMS measurement board

Cascadia Motion's small-format prototyping battery modules are favored by compact or complex in-vehicle packaging situations. It's been designed with modularity in mind, allowing our customers to configure and build their own packs in a flexible way. While supporting an awesome punch of >25kW per module (15C rate), the product also gives respectable energy density for EV range. The integrated BMS is fully user-configurable by way of an included Android tablet app. The module is built with INR/NMC "power cells" that are 21700 cylindrical form-factor.



4s2p application example

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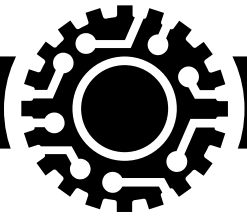


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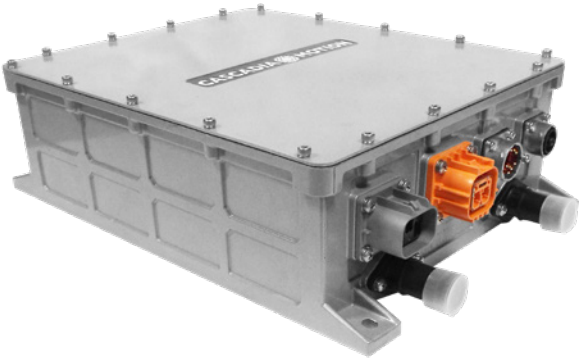
Power Cell Module	SV	HV
Capacity (Total)	1.7 kWh	
Capacity (Total)	34Ah	17Ah
Voltage Range	35 V to 59V	70 V to 118V
Peak Discharge Current (10 sec)	600 A	300 A
Cont. Discharge Current (1 min)	360 A	180 A
Peak Discharge Power (10 sec)	>25kW @ high SOC	
Operation Temperature	-40 to 60 °C (discharge) 0 to 60 °C (charge)	
Dimensions (Overall)	215 mm x 381 mm x 83 mm	
Volume	6.7 L	
Weight	10.9 kg	

- ### FEATURES
- Designed with high-power, max-performance applications in mind
 - Plug-and-play intelligent battery management systems with proprietary algorithms and powerful configuration tool (GUI)
 - Active heating/cooling (with flexible water port arrangement)
 - Modular design means faster prototyping for customers designing their own packs
 - Convenient and flexible connection scheme for water plumbing and busbars
 - Plumbing, busbars, accessories and master BMS sold separately
 - Lightweight 'bricks' for easy handling and pack construction
 - Market-leading power density

Module Type	Module Qty	# in Series	# in Parallel	Energy (kWh)	Example Max Power (kW)	Max Voltage (V)	Nom Voltage (V)	Min Voltage (V)	Mass of Modules (kg)	Application Example
SV	1	1	1	1.7	25	59	51	35	10.6	48V hybrid or micromobility
HV	2	2	1	3.4	50	235	204	140	21.2	Tiny pack/HVH146
HV	3	3	1	5.1	75	352	306	210	31.8	Superlight ATV/Motorcycle
HV	4	4	1	6.8	100	470	408	280	42.4	Superlight ATV/Motorcycle
HV	7	7	1	11.9	175	823	715	490	74.2	ATV/Motorcycle/City car
SV	7	7	1	11.9	175	411	357	245	74.2	ATV/Motorcycle/City car
SV	8	8	1	13.6	200	470	408	280	84.8	ATV/Motorcycle/City car
HV	12	4	3	20.4	300	470	408	280	127.2	Short-range sports car
SV	14	7	2	23.8	350	411	357	245	148.4	Short-range sports car
HV	14	7	2	23.8	350	823	715	490	148.4	Short-range sports car
SV	14	14	1	23.8	350	823	715	490	148.4	Short-range sports car
SV	16	8	2	27.2	400	470	408	280	169.6	Short-range sports car
SV	21	7	3	35.7	525	411	357	245	222.6	Mid-range sports car
HV	21	7	3	35.7	525	823	715	490	222.6	Mid-range sports car
SV	24	8	3	40.8	600	470	408	280	254.4	Mid-range sports car
SV	28	7	4	47.6	700	411	357	245	296.8	Lightweight supercar
SV	28	14	2	47.6	700	823	715	490	296.8	Lightweight supercar
SV	32	8	4	54.4	800	470	408	280	339.2	Lightweight supercar
HV	35	7	5	59.5	875	823	715	490	371	Lightweight supercar
SV	42	7	6	71.4	1050	411	357	245	445.2	Hypercar
SV	42	14	3	71.4	1050	823	715	490	445.2	Hypercar
HV	49	7	7	83.3	1225	823	715	490	519.4	Long-range car/truck
SV	56	14	4	95.2	1400	823	715	490	593.6	Long-range car/truck



CHARGERS AND CONVERTERS



Combo Unit: This unit combines the functionality of an on-board charger (OBC) with that of a DC/DC converter. This allows the vehicle battery to be charged from an AC building/grid power source at a 6.6kW rate and the DC/DC portion provides a 14V output converted at up to a 1.2kW nominal (1.4kW max) rate from the high voltage battery. This keeps the vehicle's low-voltage battery charged. The Combo Unit is water cooled by the vehicle's coolant loop.



EVSE cable: This is a J1772 Type-1 Level-2 stationary charger that plugs into home or workplace 208-240VAC single-phase receptacles. If your situation limits you to Level-1 charging, it can also accommodate 100-120VAC if used with a low current setting. This unit is equipped with a NEMA 14-50 plug and draws up to 32A. The charging current is adjustable in six increments (8, 10, 13, 16, 25 and 32A) by pressing the AMPS button. There's also a delay feature that can be programmed in 1 hour increments from 0 to 9 hours by pressing the TIME button. The EVSE cable assembly has a IP65 water resistance rating and features a CE mark. The cable length is a very generous 10m (~33ft) to allow for flexible vehicle parking. This unit provides up to 7.5kW of charging power which is plenty to keep up with the draw of our Combo Unit. Both a stationary charger (EVSE) and an on-board charger (such as our Combo Unit) is required to charge a DC battery from an AC grid source.

Combo Units: OBC & DC/DC

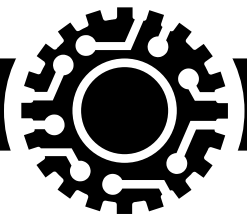
MID VOLTAGE 200-420 VDC

Battery Voltage	420VDC (470VDC Max)
OBC	6.6 kW
DC/DC	1.2 kW (1.4 kW Max)
Input Voltage	85-265 VAC

HIGH VOLTAGE 500-800 VDC

Battery Voltage	850VDC (860VDC Max)
OBC	6.6 kW
DC/DC	1.2 kW (1.4 kW Max)
Input Voltage	85-265 VAC





VCU'S, VDM AND PDU FROM AEM EV

Vehicle Control Unit VCU200/300

AEM's VCU provides supervisory control of all critical vehicle systems including inverter, pre-charge resistors, high voltage contactors, DC/DC converter, on-board charger, and battery management system.



	VCU200	VCU300
General		
AEM Part Number	30-8000	30-8100
User Interface	AEMcal	AEMcal
Pin Count	80	196
Clock Speed	64 MHz	200/260 MHz
Motor Control	1*	4
Inverter Control	1*	4
CAN Buses	4	3
Inputs**		
Analog Inputs	13	31
Digital Inputs	15	8
Frequency Inputs	4	5
Outputs**		
Low Side Outputs	12	39
High Side Drivers	6	2
H-Bridges	N/A	3
1/2 Bridges**	4 LS PWM or 4 HS Drivers	N/A
Main Power Relay Driver	N/A	1
Environmental		
Enclosure Rating	IP6K7 (Waterproof)	IP6K9K (Waterproof)
Enclosure Material	Aluminum	Aluminum
Operating Voltage	9-16V DC	9-16V DC
Overvoltage Protection	16V DC	16V DC
Dimensions	210 x 137.5 x 37.2mm	181 x 231 x 50mm
Weight	1.2 lbs (.06kg)	2.2 lbs (1.1kg)
Operating Temp Range	-40c to +105c	-40c to +105c

Vehicle Dynamics Module (VDM)



Features

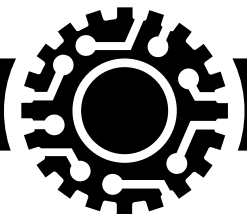
- 3-Axis Accelerometer
- 3-Axis Gyrometer
- 10Hz GPS w/ IP67-Rated Antenna
- AEMnet CAN bus Connector

Power Distribution Unit (PDU)



Features

- 8 Channel CAN driven slave to VCU
 - 4x: 20 amp
 - 4x: 10 amp
- AEMnet CAN bus Connector



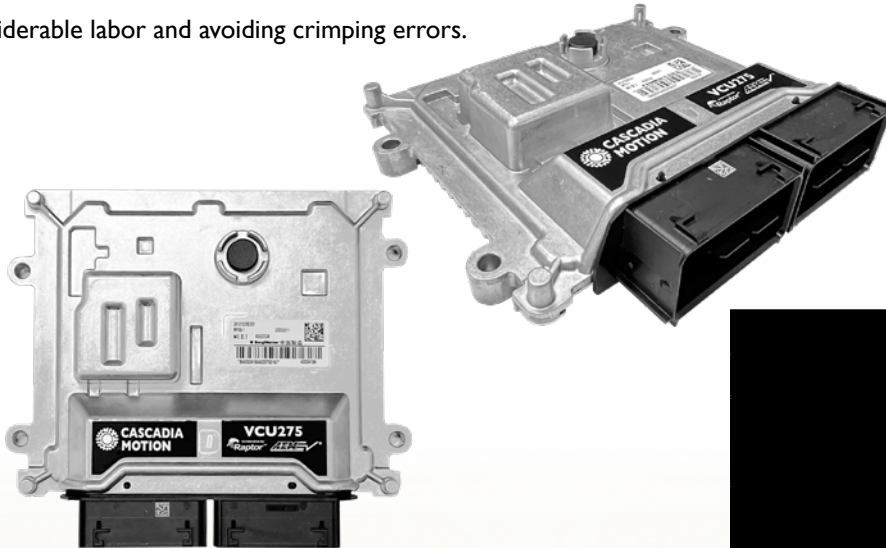
VCU275 (VEHICLE CONTROL UNIT)

COMING SOON

The VCU275 is a 198-pin (with up to 111 pins being used) state-of-the-art VCU using the AURIX TC367 microcontroller with dual TriCore processors running at 300MHz. As is the case with the VCU 200/300, the controller communicates with the BMS and manages key supervisory functions.

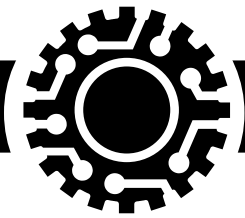
It features 3 CAN busses, 1 LIN channel, 2 H-bridge drivers and a broad collection of additional inputs (33) and outputs (24). The controller hardware was developed by and is produced by our parent company, BorgWarner. The VCU275 uses the same outstanding AEMCal interface tool (which is free/included) as the VCU200/300.

We also offer two mating connector kits: basic and deluxe. The basic kit includes connectors, terminals, hole plugs and strain reliefs. The deluxe kit adds 124 wires (10' long flying leads, TXL grade) that already have the terminals crimped on one end, saving the installer considerable labor and avoiding crimping errors.



Connector Kits

Pin Count	198 total (111 Usable)
User Interface	AEMCal
Clock Speed	300MHz (Dual Core)
Motor Control	Single (2/3/4 Coming Soon)
Inverter Control	Single (2/3/4 Coming Soon)
CAN Busses	3
LIN Busses	1
Analog Inputs	20
Digital Inputs	8
SENT Inputs	1
Frequency Inputs	4
Low Side Outputs	23
High Side Drivers	1
H-Bridge Drivers	2
Enclosure Rating	IP67 (Waterproof)
Enclosure Material	Aluminum
Operating Voltage	9-16 V DC
Overvoltage Protection	24V DC
Dimensions	217x189x38 mm
Weight	0.68kg (1.5 lbs)
Operating Temp Range	-40 to 105 °C



Digital Dash Displays



CD 7 Flat Dash (Flush Mount)



CD 7 Dash with Shade (Includes Buttons)

Features

- Full Color 7 inch screen
- Four Available:
 - Non-Logging / Non-GPS Display
 - Logging Display / Non-GPS Display
 - Non-Logging Display with Internal GPS
 - Logging Display with Internal GPS



Example of logged data from AEM Dash.

CAN Keypad (8-Button)



Features

- Replaceable Key Insert Graphics
- Compact CAN-based interface between humans and VCU

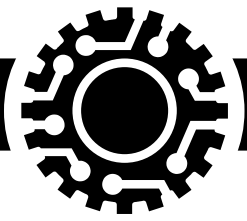
AEM Accessories



AEM Button Kit

AEM Accessories

- VCU Wiring Harness
- Button Kit
- Relay Kit



ACCESSORIES



CONTACTORS



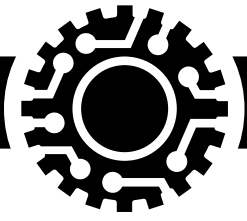
WATER PUMPS



CABLE

Connectors and Kits:

53-0006	RES 600 OHM 50W WW, Pre-charge resistor for most DX and DXR inverters
53-0008	RES 1K OHM 100W WW, Pre-charge resistor for most DZ and DZR inverters
77-0034	RLY SPST 50A 1200V 12V Coil, Pre-charge Relay for all inverters
77-0035	RLY SPST 500A 900VDC 12V COIL, Main contactor, Gigavac GXI4BA
81-0078	Champlain EXTRAD Orange 35mm ² Shielded cable 1000V
81-0081	Champlain EXTRAD Orange 50mm ² Shielded cable 1000V
81-0077	Champlain EXTRAD Orange 70mm ² Shielded cable 1000V
86-0341	PLUG-10MM, POWERLOK 300, 3-WAY, 50MM ² , 90 DEG (For SS-250)
86-0351	PLUG-10MM, POWERLOK 300, 3-WAY, 50MM ² , STRGT (For SS-250)
n/a	Recommended Soft Start Parts for DX are 53-0006, 77-0034, GI-0003-01, 77-0035
n/a	Recommended Soft Start Parts for DZ are 53-0008, 77-0034, GI-0015-01, 77-0035
GI-0001-01	PMI00/PMI50 Connector Kit, 23 Pin and 35 Pin Ampseal connectors and 60 contacts
GI-0003-01	FUSE KIT 5A 500VCD x/ FUSEHLDR, Pre-charge fuse for DX and DXR
GI-0004-01	Cable Gland for PMI00 (kit of 5 pieces)
GI-0005-01	Cable Gland for PMI50/PM250 (kit of 5 pieces)
GI-0010-01	Connector Kit, 18 Pin HDSCS/MCP Connector used on Remy Motors
GI-0015-01	FUSE KIT 5A 1000VCD x/ FUSEHLDR, Pre-charge fuse for DZ and DZR
GI-0016-01	Connector Kit PM250 (2 low voltage connectors and contacts)
GI-0017-01	Connector Kit, 19 pin Souriau connector used on Parker Motors
GI-0019-01	Replacement Access Plug, for PMI00 or PMI50 (kit of 1 plug plus o-ring)
GI-0020-01	Replacement Access Plug, for PM250 (kit of 1 plug plus o-ring)
GI-0021-01	Connector Kit, RMI00 (35 pin Ampseal with 35 contacts)
GI-0023-01	RMI00 Cooling Port Kit ARaymond Straight
GI-0024-01	RMI00 Cooling Port Kit ARaymond 45deg
GI-0025-01	RMI00 Cooling Port Kit ARaymond 90deg
GI-0026-01	RMI00 Cooling Port Kit Hose Barb 16mm
GI-0035-01	KIT CONNECTOR MOLEX 48 WAY CMC (For CM200/CM350)
GI-0040-01	KIT Bosch PCE-XL Coolant Pump Connector Kit
G4-0032-01	Bosch PCE-XL Coolant Pump
Other cables	Inquire with Sales department

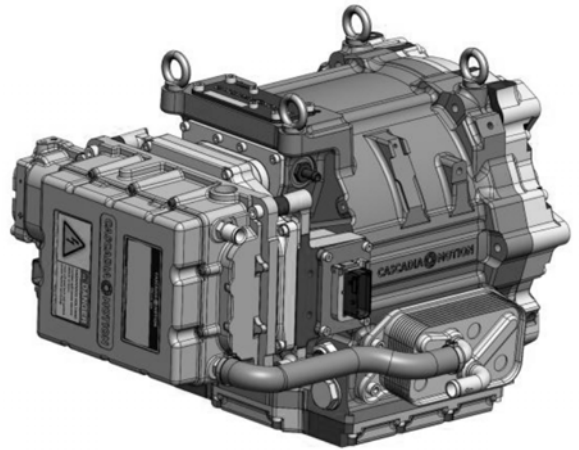
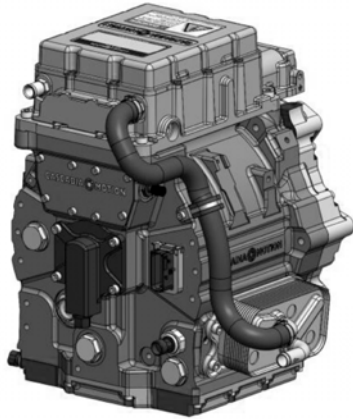


APPENDIX - INVERTER MOUNTING OPTIONS

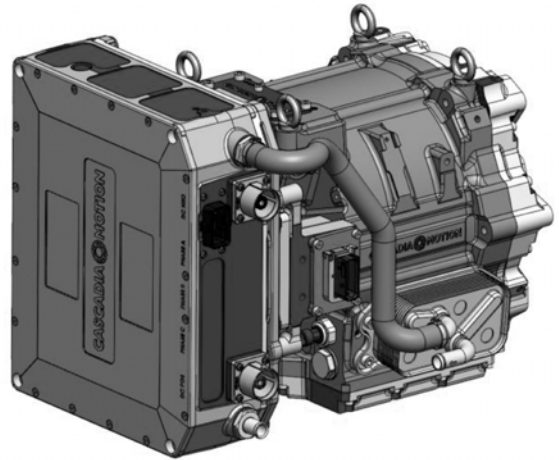
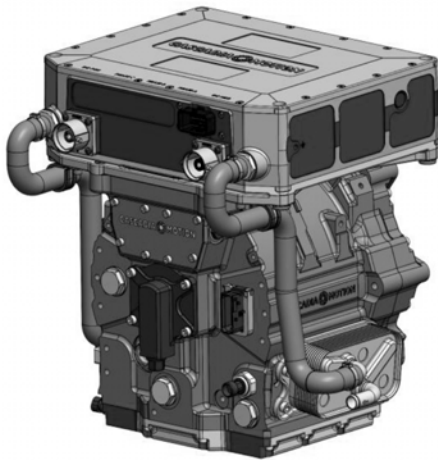
STANDARD TOP

REAR MOUNTED (RMI)

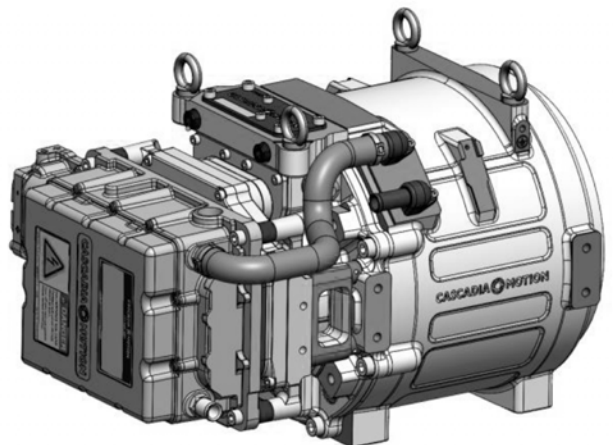
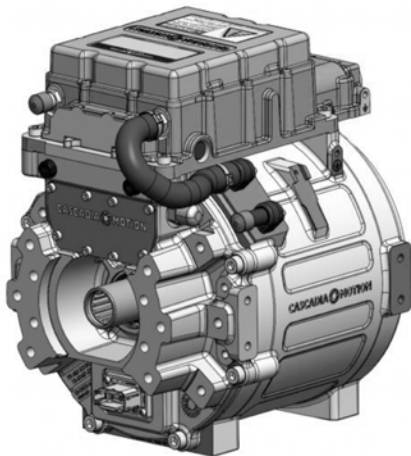
iM-225

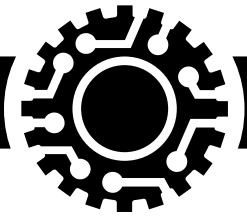


iM-375



iM-225W



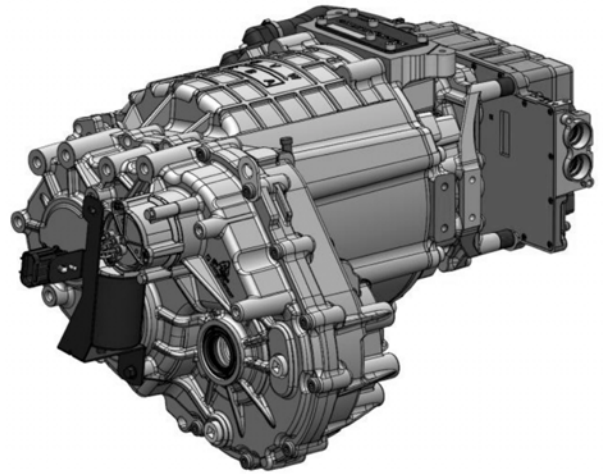
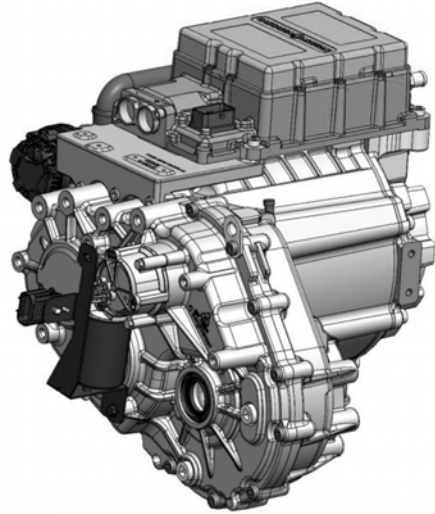


APPENDIX - INVERTER MOUNTING OPTIONS

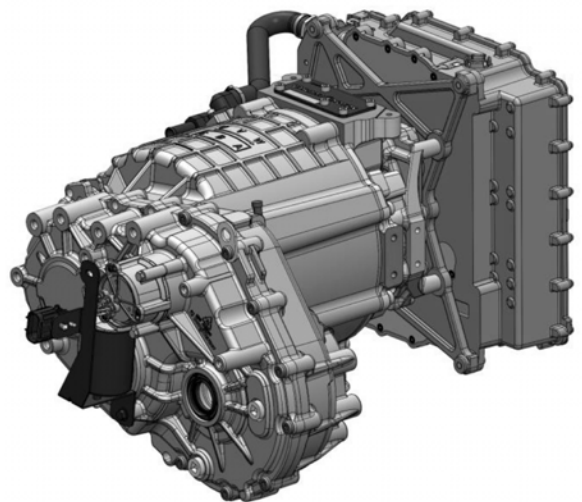
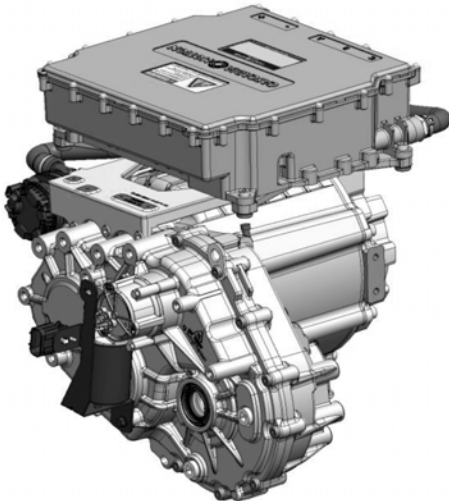
STANDARD TOP

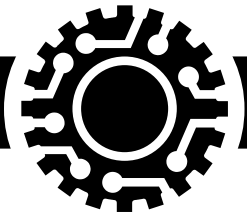
REAR MOUNTED (RMI)

iDM-190



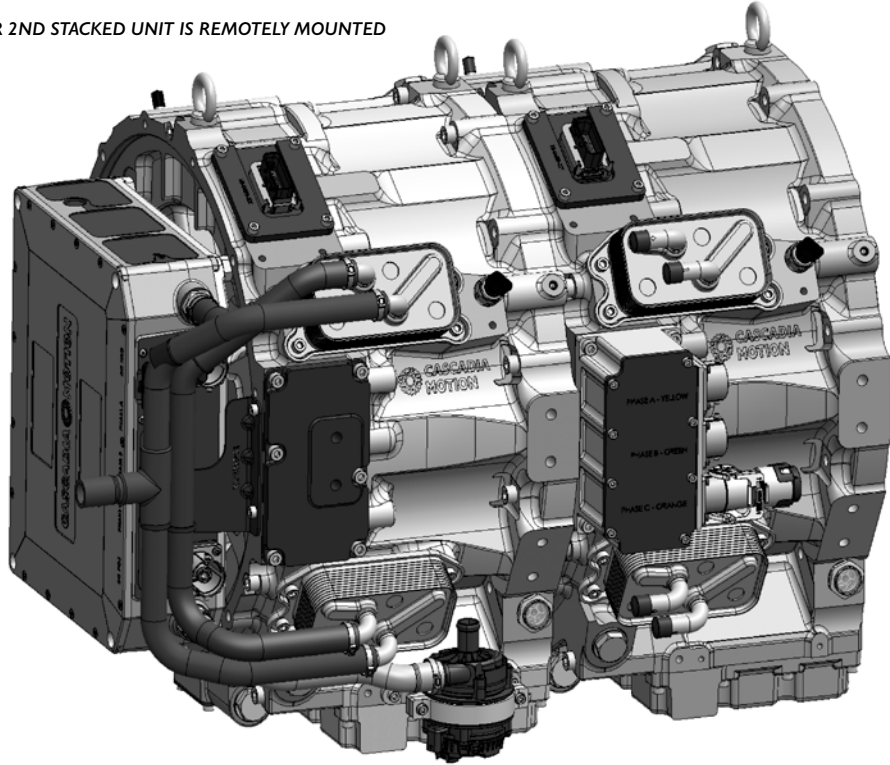
iDM-375



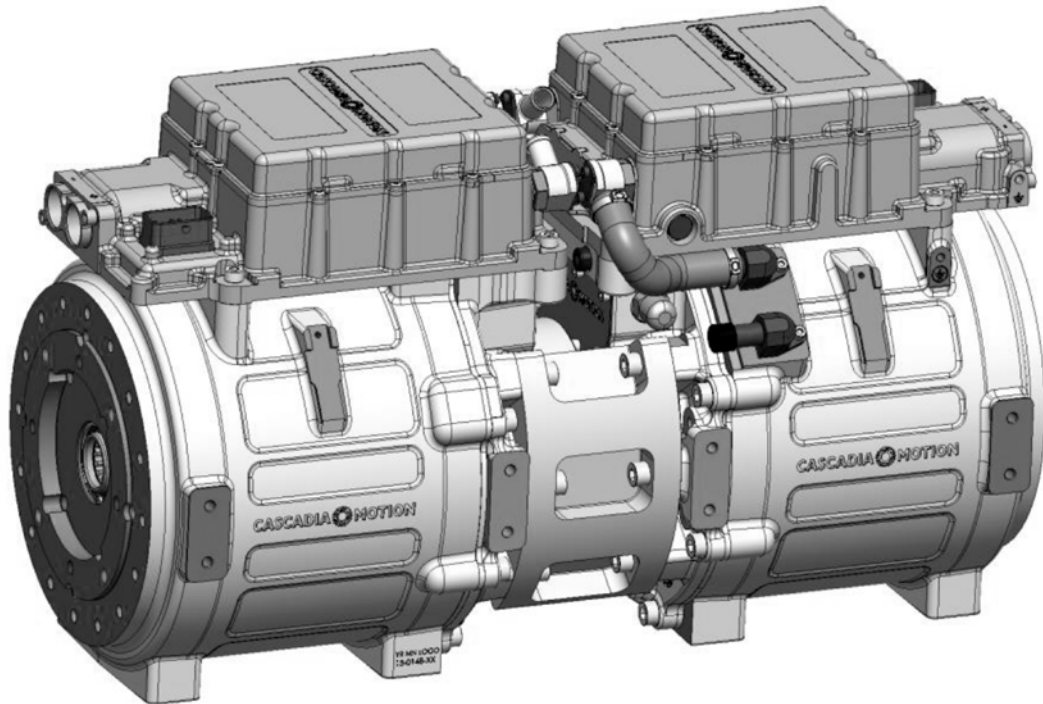


STACKED VERSION

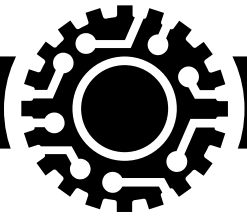
*INVERTER FOR 2ND STACKED UNIT IS REMOTELY MOUNTED



iM-425

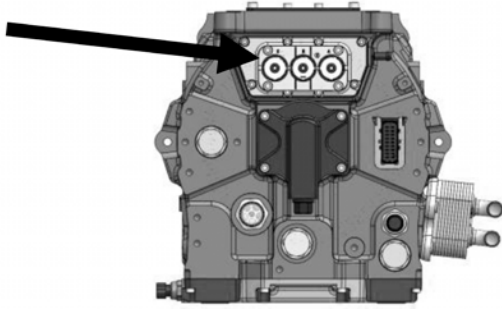


iM-225W



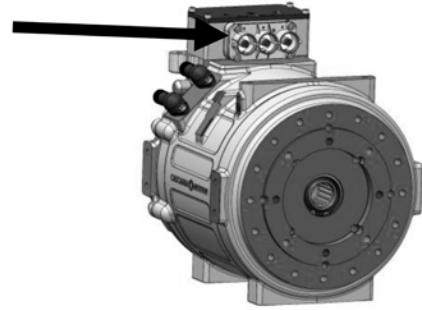
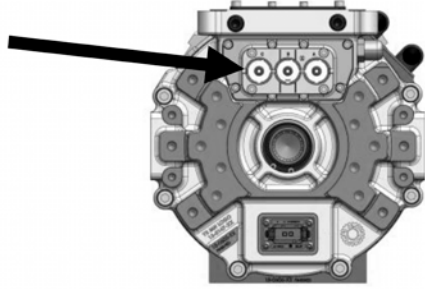
SS-250-115 SS-250-115
XWM XOM

STANDARD (AFT)



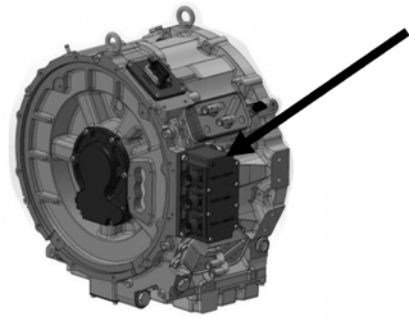
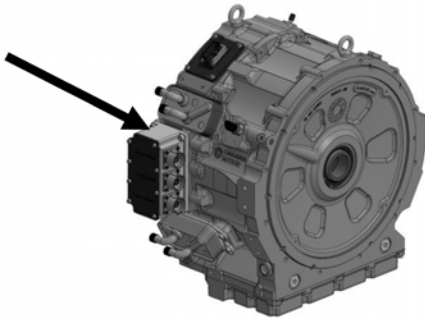
TOP

NOT CURRENTLY AVAILABLE



STANDARD, HV RADIAL

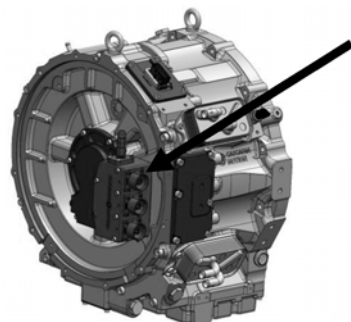
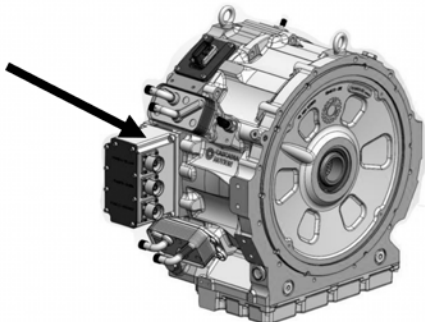
HV RADIAL, REVERSED

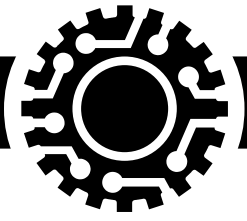


SS-410-150 DOM

HV RADIAL, TALL

HV AXIAL

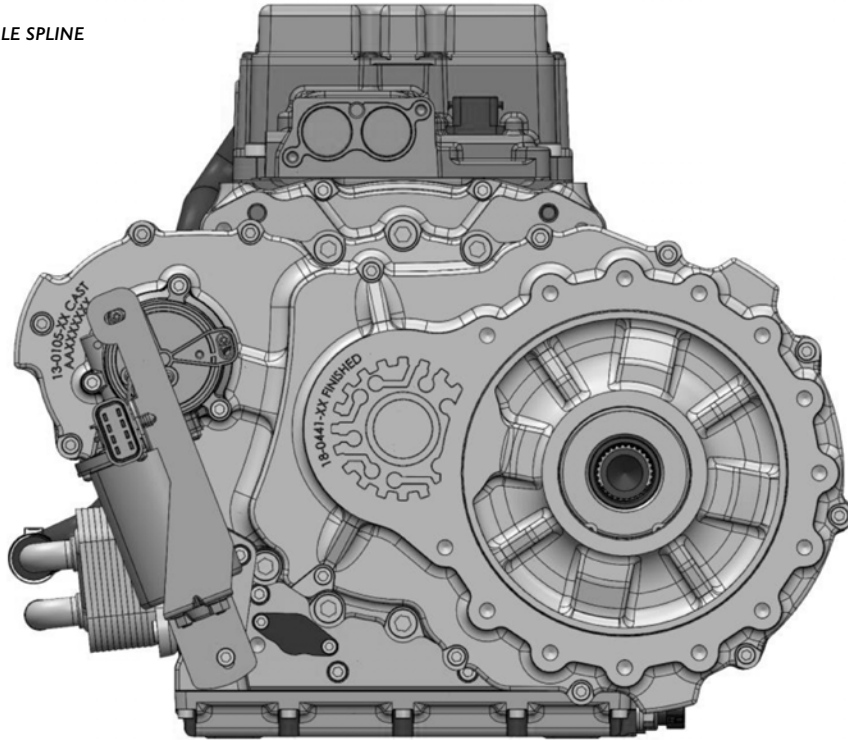




SR309 MOUNTING OPTIONS

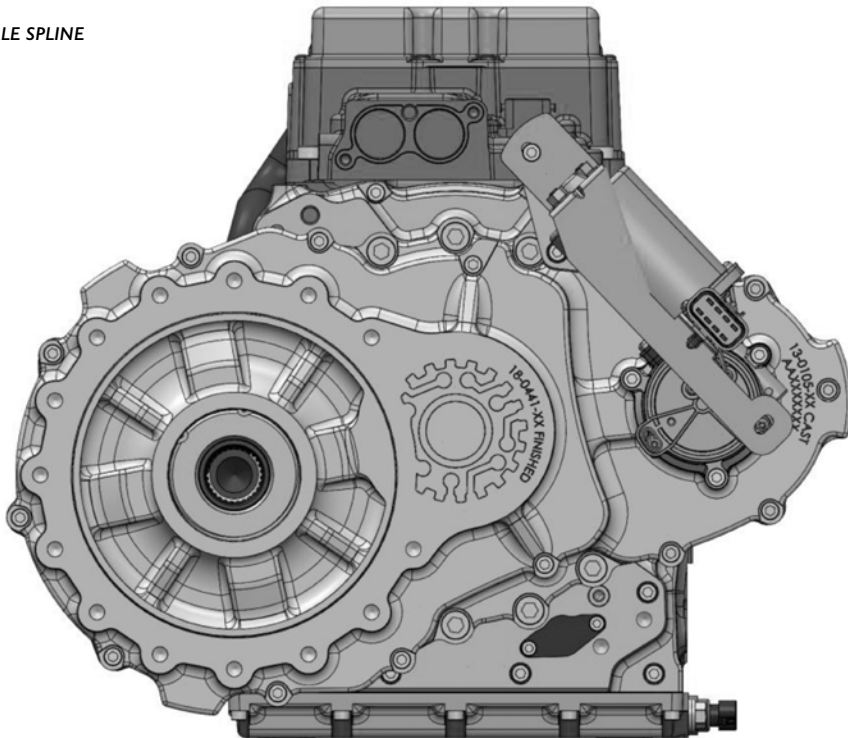
POSITION 1

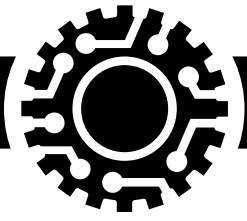
AVAILABLE WITH MALE SPLINE



POSITION 2

AVAILABLE WITH MALE SPLINE





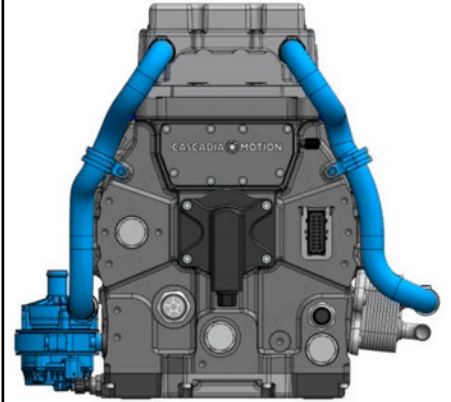
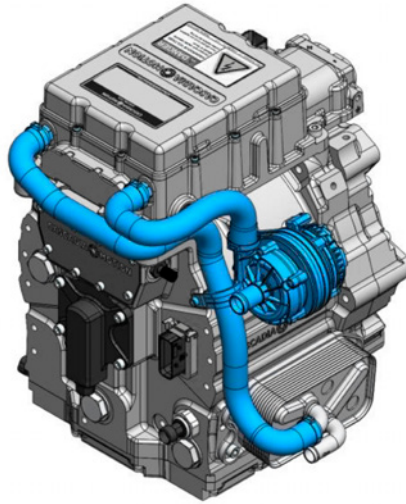
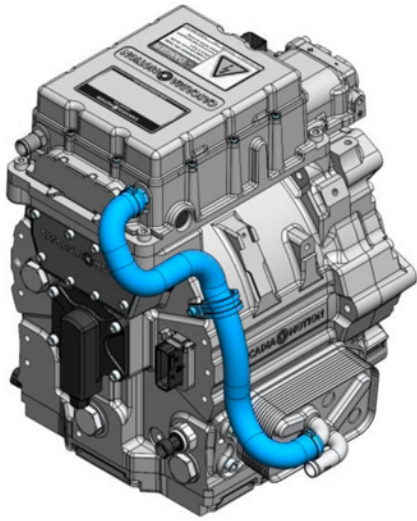
APPENDIX - COOLING KIT OPTIONS

ONE-HOSE, NO PUMP

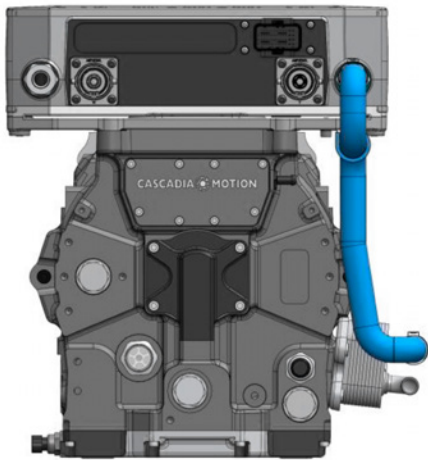
TWO-HOSE, PUMP

TWO-HOSE, PUMP OPP HX

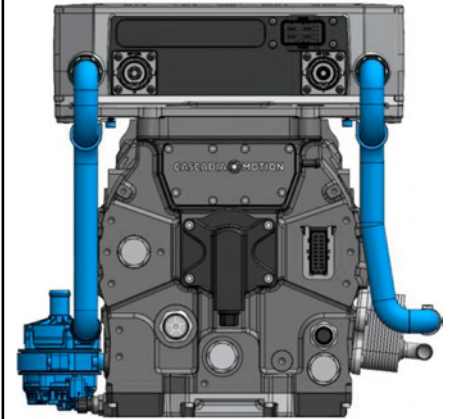
iM-225



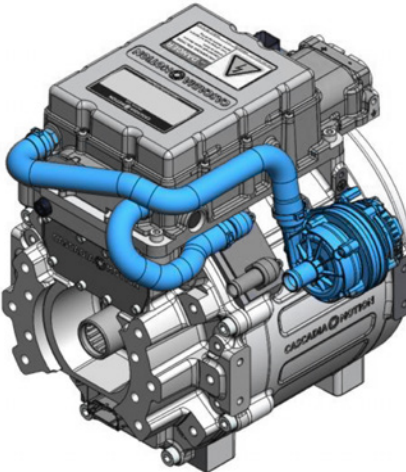
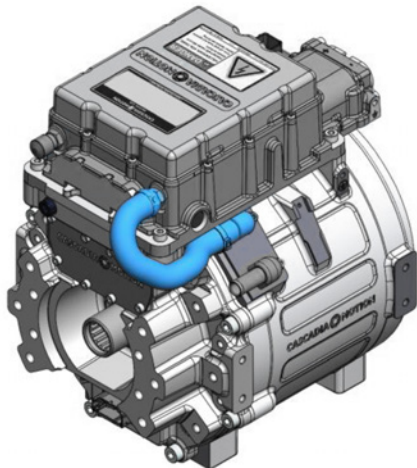
iM-375



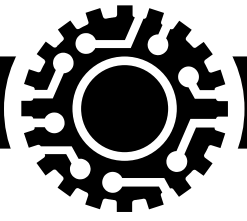
NOT CURRENTLY AVAILABLE



iM-225W



NOT AVAILABLE

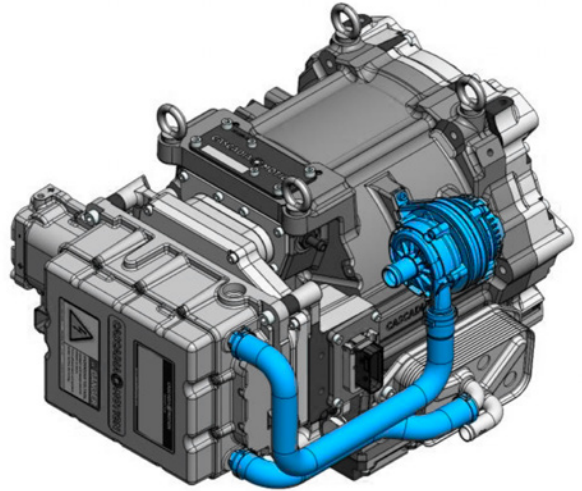
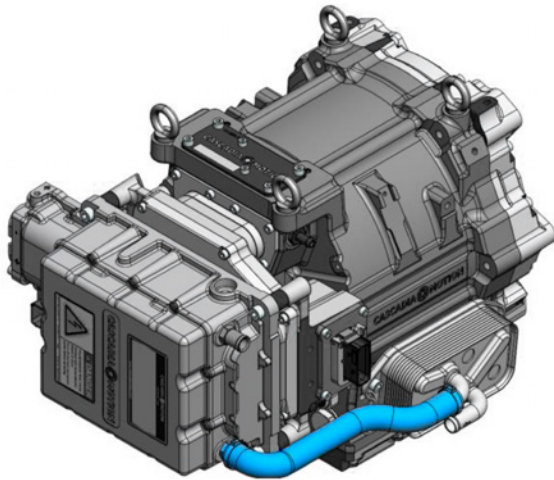


APPENDIX - COOLING KIT OPTIONS

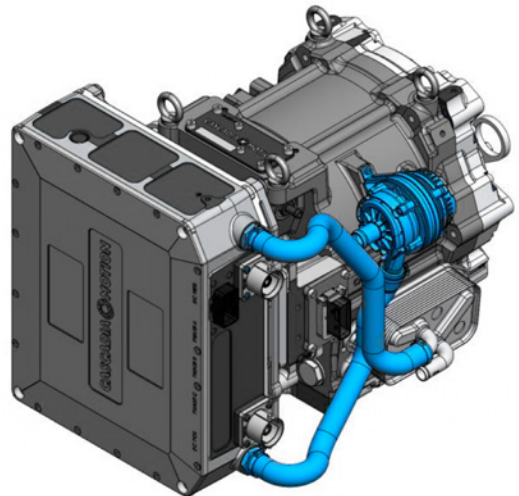
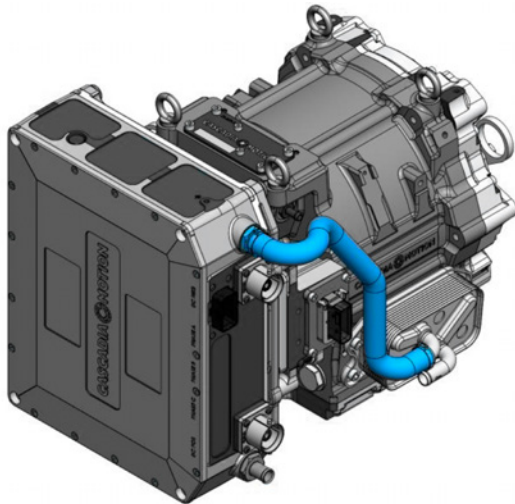
ONE-HOSE, NO PUMP

TWO-HOSE, PUMP

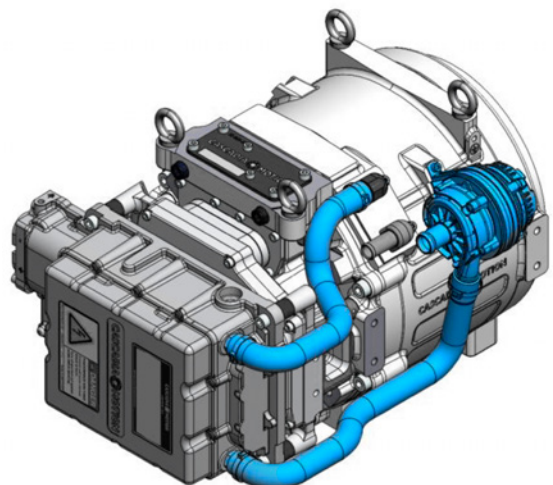
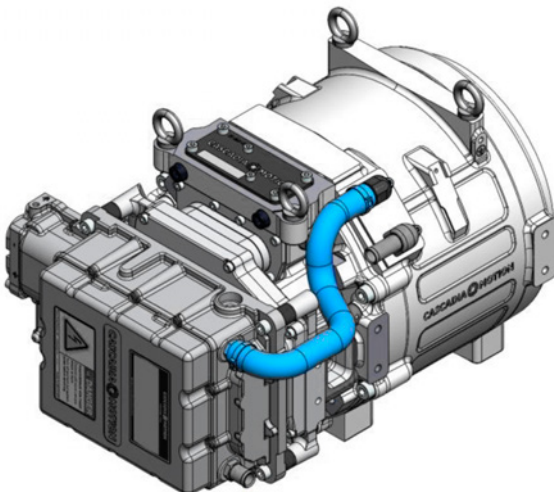
iM-225 RMI

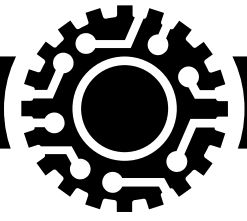


iM-375 RMI



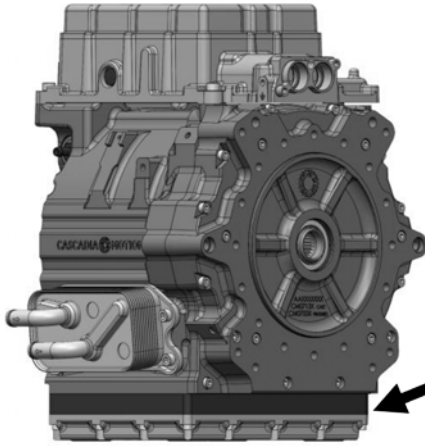
iM-225W RMI





HIGH TILT SUMP

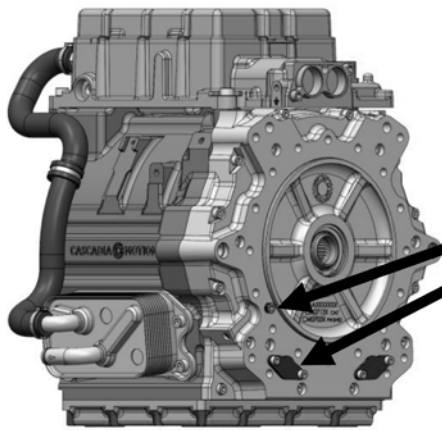
iM-225 / iM-375
Not -W (WEG) Version



Allows for continuous operation at higher tilt angles

OIL FEED AND SCAVENGE

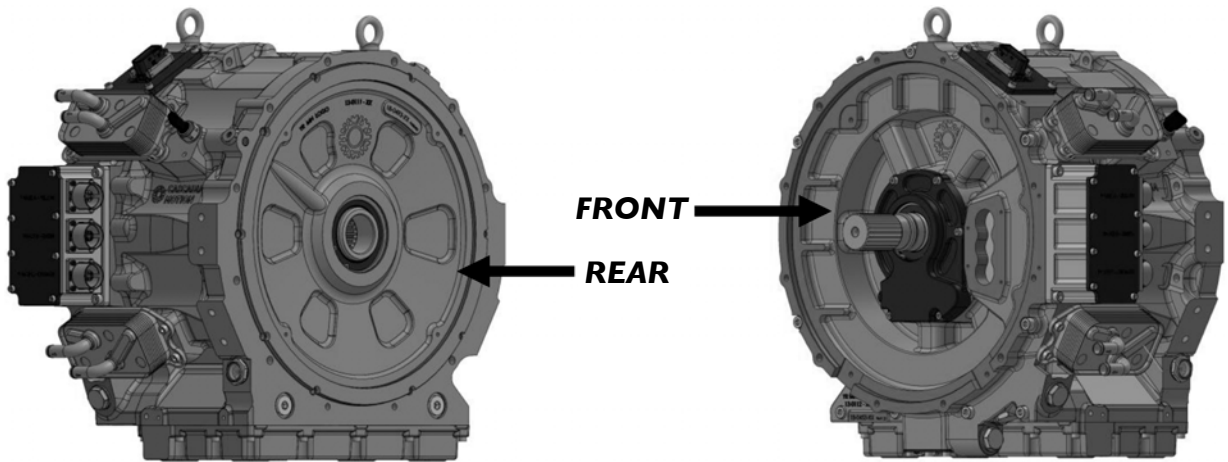
iM-225 / iM-375
Not -W (WEG) Version

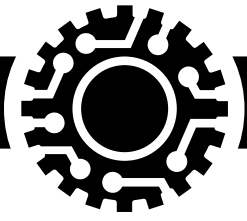


Allows for oil sharing with external gearbox or transmission

DUAL SIDED SHAFT

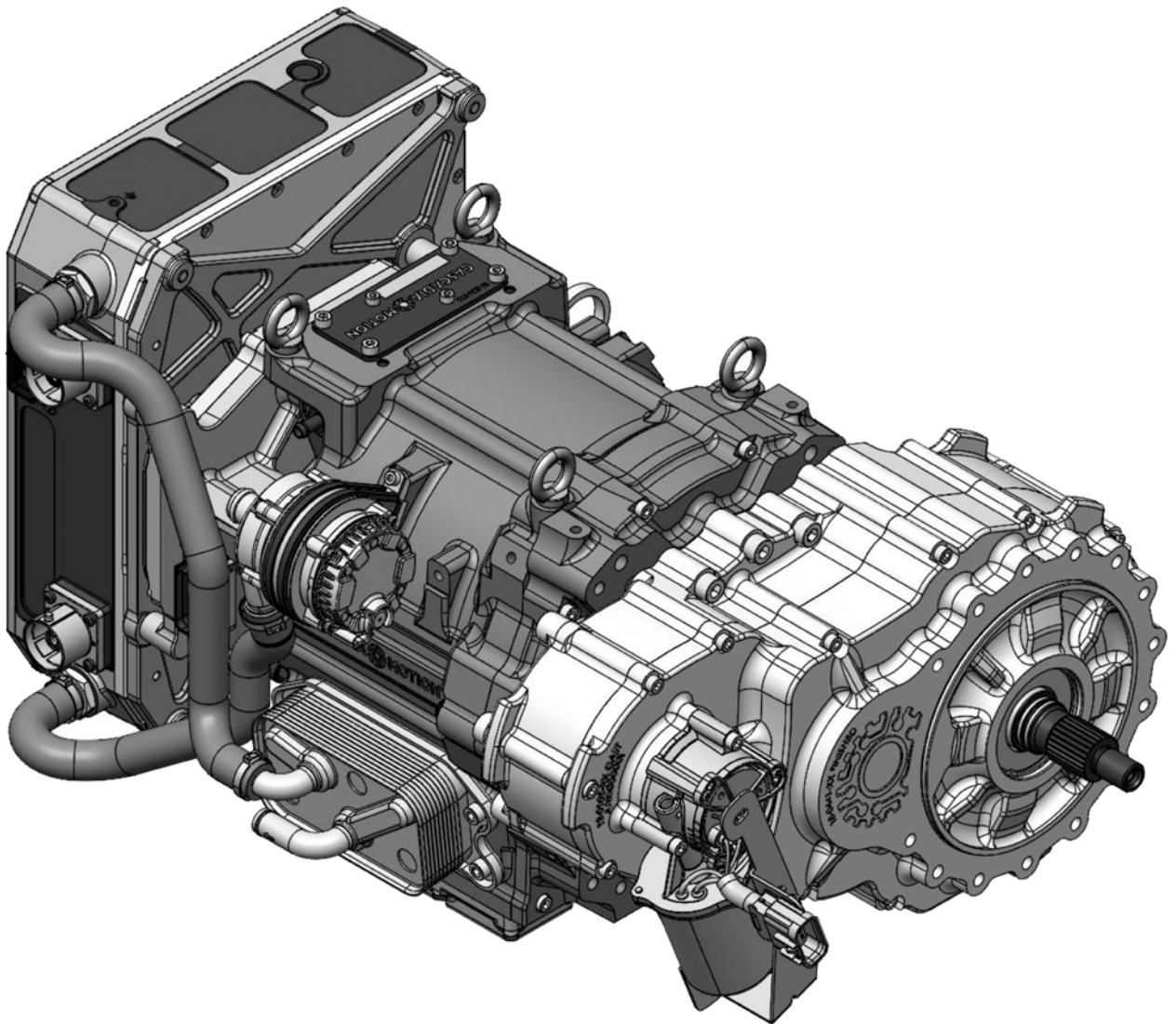
SS-410-150
iM-425

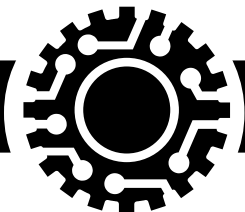




APPENDIX - EXAMPLE OPTIONS COMBINATION

iM-375, RMI, TWO HOSE, PUMP, SR309 EXTERNAL SPLINE, POSITION I





CONTACT INFO

CASCADIA MOTION

7929 SW Burns Way
Suite F
Wilsonville, OR 97070-7678
USA

Please contact us at +1-503-344-5085,
or email sales@cascadiamotion.com

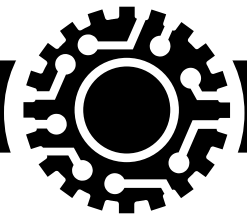
CascadiaMotion.com

Point Camera Here



To Visit Our Website

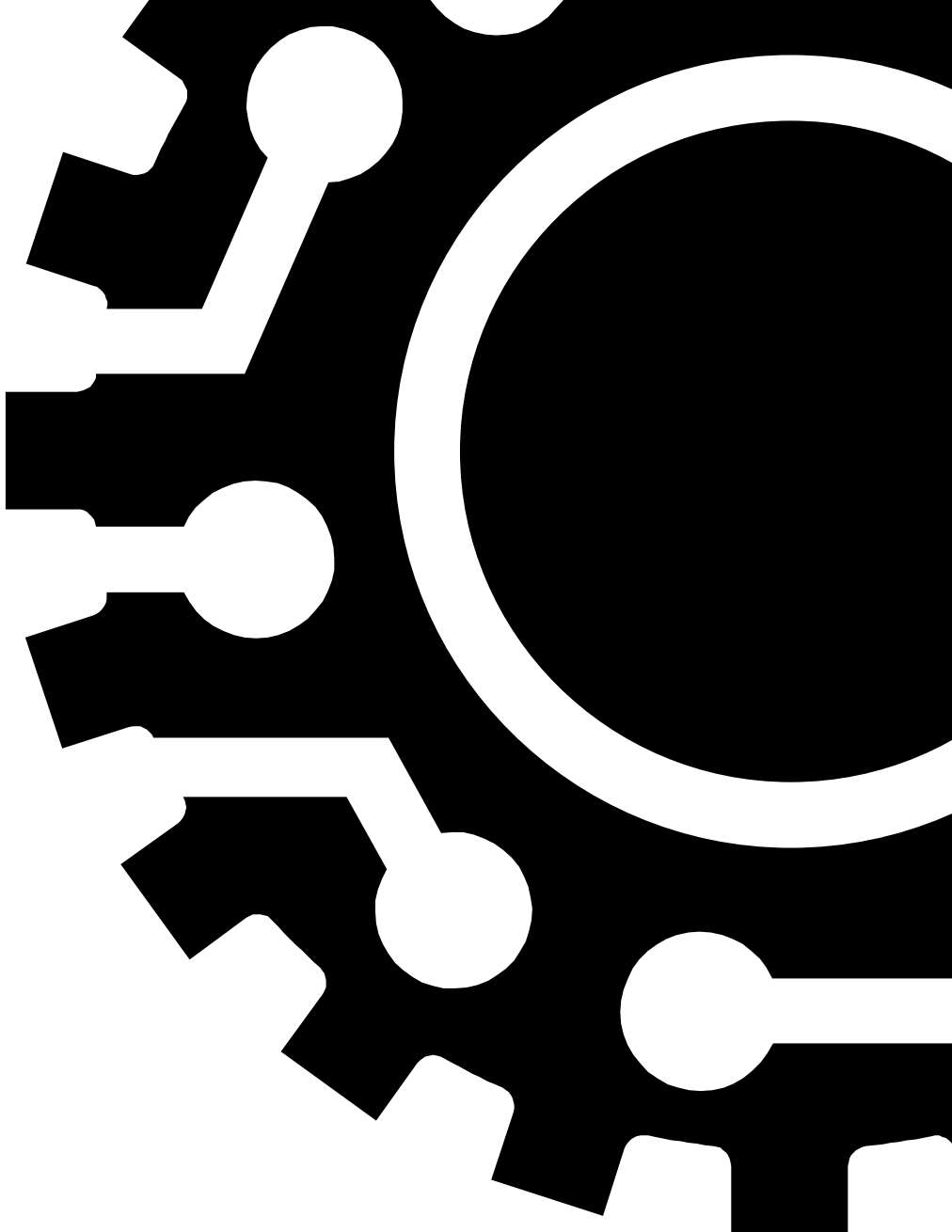




NOTES

A series of horizontal dotted lines for taking notes, spanning most of the page width.





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sales@cascdiamotion.com

CascadiaMotion.com

CASCADIA  MOTION