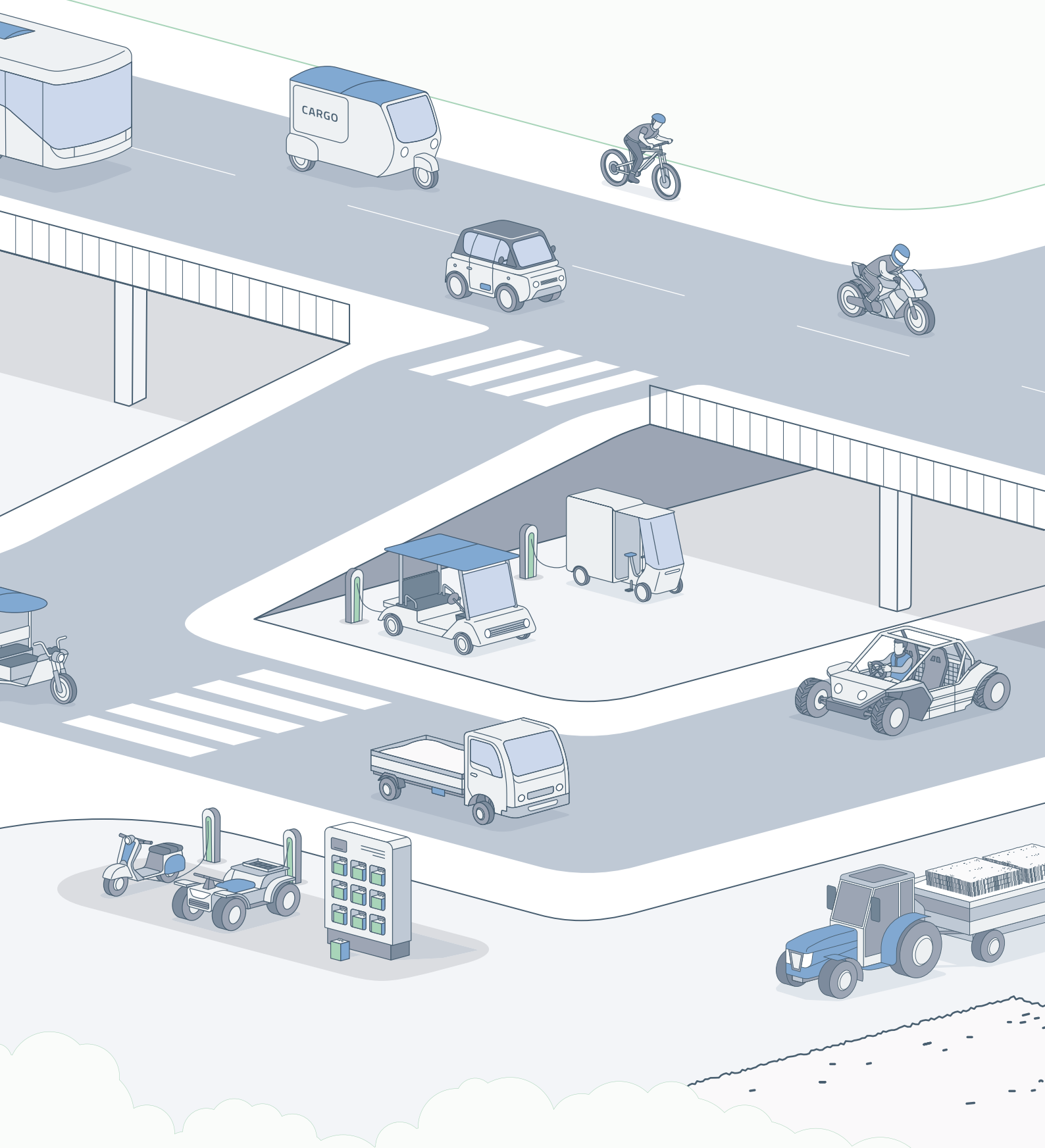
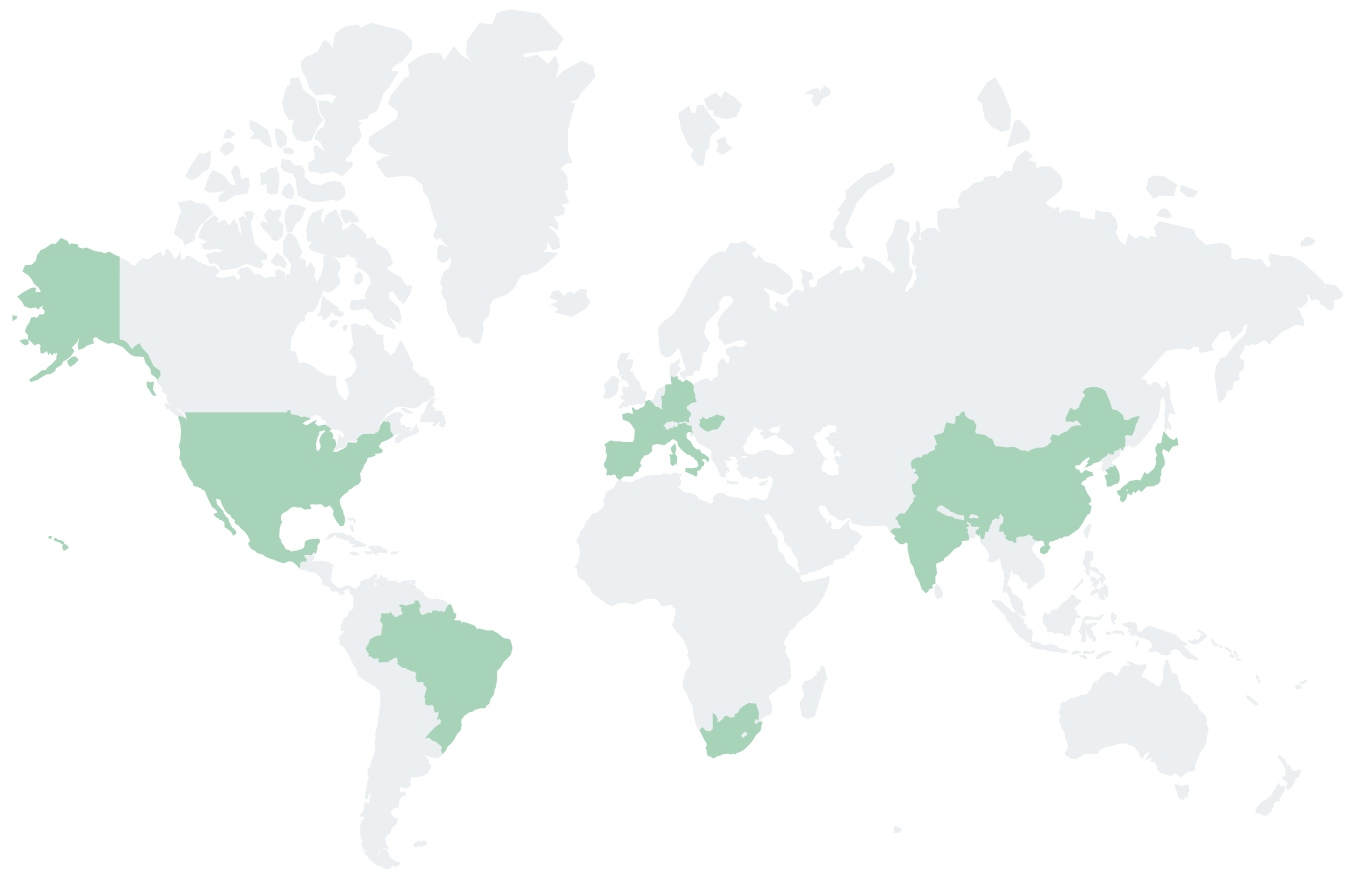




We are the motor – for the mobility of today and tomorrow.

Your partner of choice for
Light Electric Mobility solutions. —————



Reliable global partner to the automotive industry since 1913. —————

Emerging from the well-established BOSCH Starter Motors and Alternators division in 2018, we stand for more than a century of development and manufacturing competences for a broad range of rotating machines for passenger cars and commercial vehicles.

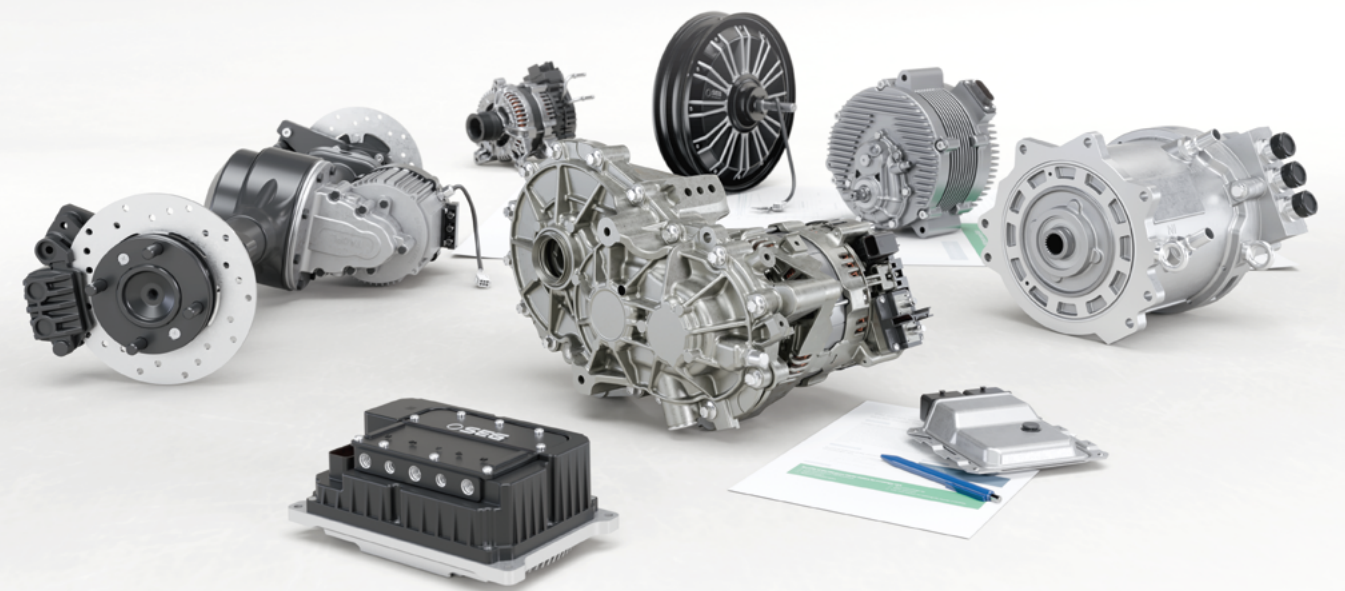
Almost all car manufacturers worldwide rely on our engineering expertise and global production network for high-performance products. Our quality mindset and manufacturing standards from the Original Equipment (OE) business also drive our growth in e-mobility solutions and make us a strong partner for your success.

Today, our portfolio covers system solutions for combustion, hybrid and electric powertrains. Light Electric Mobility has become an established part of our global business, building on the same engineering expertise, quality standards and industrial capabilities that have earned us the trust of leading vehicle manufacturers for decades.

Light electric mobility comes in many forms. So do the challenges behind it. —————

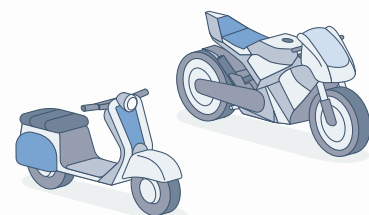
Developing a successful light electric vehicle means bringing many requirements together: the right performance for the application, reliable operation under local conditions, competitive costs and the seamless integration of all relevant components. For many manufacturers, coordinating different technologies and suppliers adds further complexity before the first vehicle even reaches the road.

SEG Automotive makes that journey easier. We help customers turn their vehicle concepts into reliable, competitive solutions for their specific applications and markets.

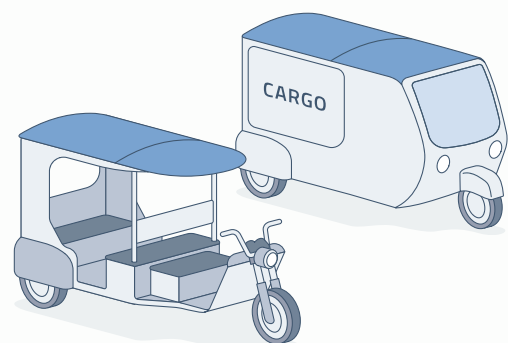


Your vision. _____

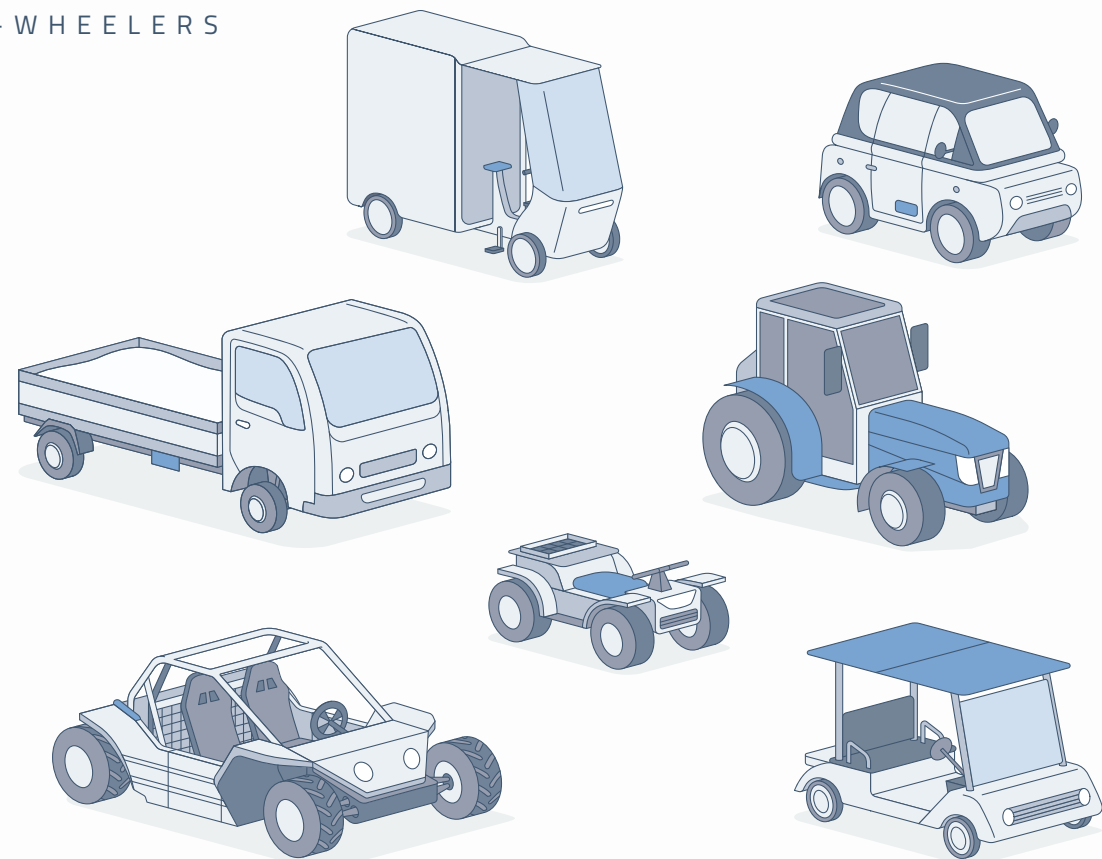
2 - WHEELERS



3 - WHEELERS

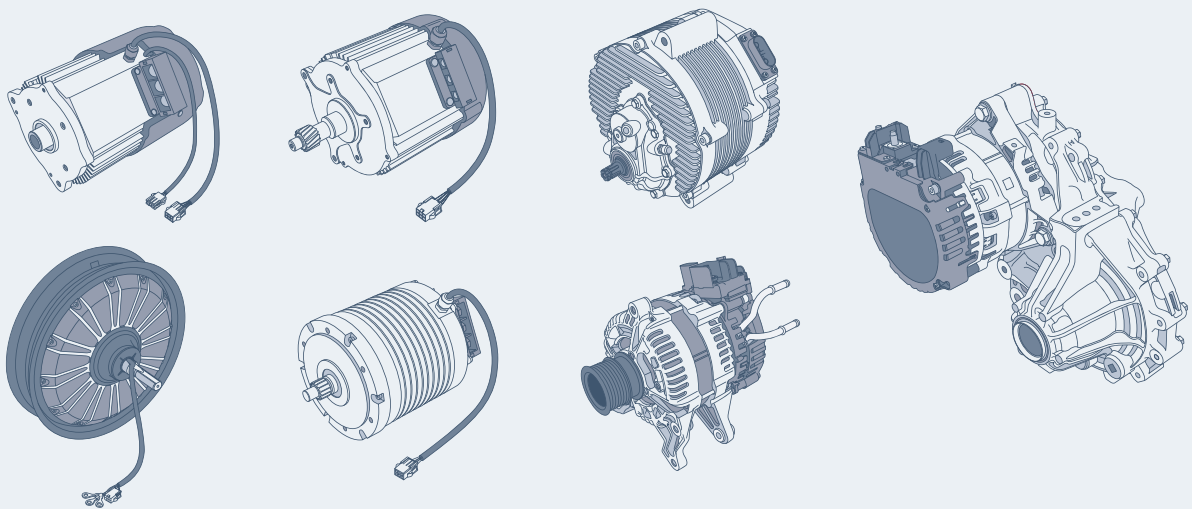


4 - WHEELERS

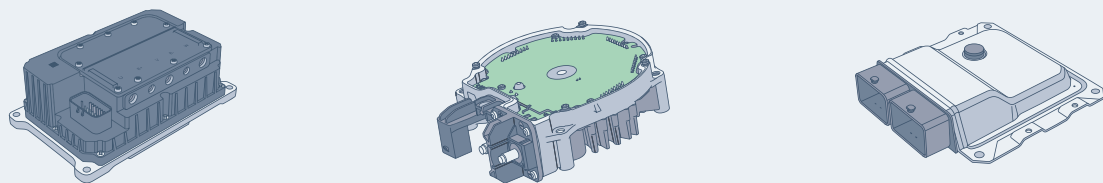


Our expertise. _____

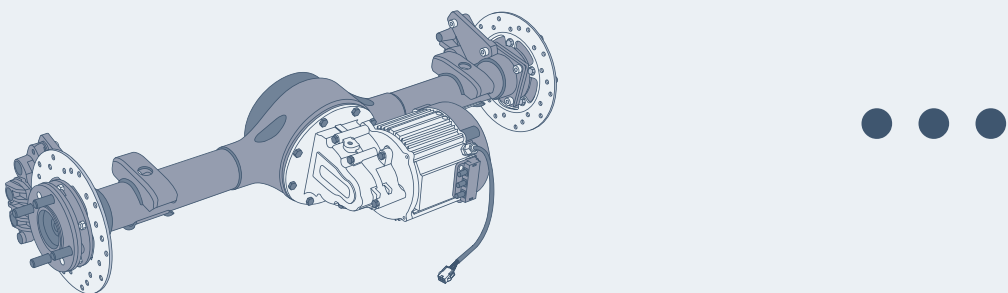
MOTORS



CONTROLLERS



AXLES & GEARBOXES

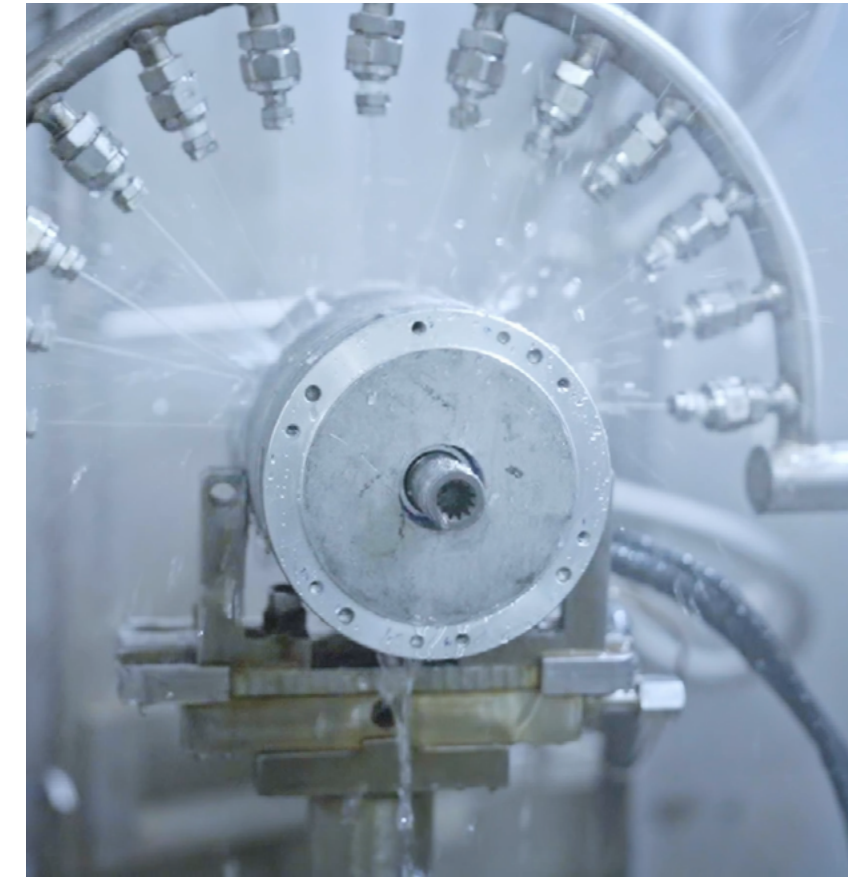
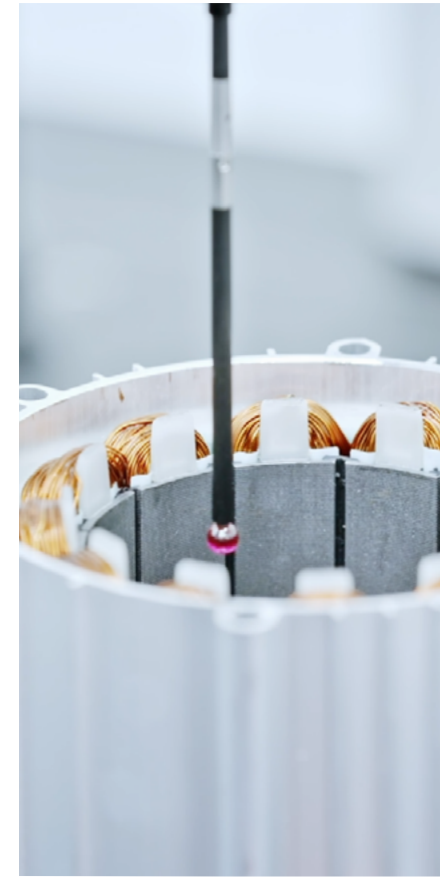


From individual components to an integrated system. ———

Every LEM project starts from a different point. Some customers need a proven motor or controller that can be integrated quickly. Others need an adapted drive solution or a partner who can bring the individual components together into a complete system.

SEG Automotive supports you according to the needs of your vehicle and business. Our existing portfolio provides a reliable and cost-efficient starting point, while its modular design allows us to adapt products and configurations to different applications. Where a more individual solution is required, we work with you from the early development stages through integration and industrialization to series production.

This gives you the freedom to choose the right level of support and accelerate your innovation journey.



Proven where it matters. ———

LEM drives must perform reliably under demanding real-world conditions. Frequent stop-and-go operation, heavy loads, challenging roads and intensive daily use place high demands on the complete system.

Our solutions are engineered for robust performance, efficiency and durability. E-machines, electronics and software are developed together from the outset to work as one system. The complete solution is then validated according to automotive standards and the requirements of the specific application to ensure reliable performance over the vehicle's service life.



48V BRM eDrive System.



BRM



BRM eDrive

Compact packaging, high performance, low weight.

Originally developed for passenger cars, the BRM has been adapted for Light Electric Mobility while retaining automotive development and quality standards. Together with SEG Automotive's Vehicle Control Unit, it forms a compact system solution for two-, three- and four-wheelers.

Its compact design, high performance and low weight enable flexible powertrain integration. The VCU supports different drive configurations and application-specific drive modes.

FEATURES

Added value of the 48V BRM Stand alone & eDrive

- Integrated inverter
- High power density
- Compact, innovative design for easy integration
- Outstanding efficiency
- Safe shut-off functions
- UDS and re-flashing capability
- CAN/CAN-FD torque control
- Air-cooled system

Data Overview BRM.

TECHNICAL DATA

Applications	2, 3 & 4 Wheelers	
Specification	BRM 2.8 With Magnets	BRM 2.8 Without Magnets
Motor Type	EESM, 5ph	
Peak Motor Power 52V, 23 °C, 4000 rpm (kW)	13	9
Peak Generator Power 52V, 23 °C, 4000 rpm (kW)	14	10
Rated Motor Power 52V, 23 °C, 6000 rpm (kW)	9	8
Peak Motor Torque 52V, 23 °C (Nm)	65	45
Continuous Torque (Nm)	12	
Max Motor Speed (Rpm)	20000	
Peak Current (Amp DC)	360 (Boost)	
Continuous Current (Amp DC)	~140	
Cooling (Natural/Air/Liquid)	Air / Liquid	
Communication	CAN (FD)	
Weight (Kg M+I)	9	
Dimensions (Ø*L mm M+I)	148 * 161	
Maximum Efficiency (% M+I)	Up to 88	Up to 86
Peak Temperature (°C)	140 (Max. ambient)	
Ingress Protection (IP class)	IP29K (motor) IP69 (inverter)	
Lifetime (Kms)	300000	
ASIL	B	

Applications	3 & 4 Wheelers	
Specification	BRM eDrive With Magnets	BRM eDrive Without Magnets
Motor Type	EESM, 5ph	
Peak eDrive Power 52V, 23 °C, 260 rpm (kW)	13	9
Peak Generator Power 52V, 23 °C, 260 rpm (kW)	14	10
Rated eDrive Power 52V, 23 °C, 400 rpm (kW)	9	8
Peak eDrive Torque 52V, 23 °C (Nm)	990	660
Continuous Torque (Nm)	172	
Max Motor Speed (Rpm)	13000	
Peak Current (Amp DC)	360 (Boost)	
Continuous Current (Amp DC)	~140	
Cooling (Natural/Air/Liquid)	Air / Liquid	
Communication	CAN (FD)	
Weight (Kg M+R)	<22.5	
Dimensions (mm M+I+R)	260 * 263 * 410 Envelope	
Maximum Efficiency (% M+I+R)	Up to 84	Up to 82
Peak Temperature (°C)	120 (Max. ambient)	
Ingress Protection (IP class)	IP29K (motor) IP69 (inverter)	
Lifetime (Kms)	80000	
ASIL	B	
Gear Ratio Off The Shelf	15.125	

Vehicle Control Unit (VCU).



VCU

The right level of control

for your application.

SEG Automotive’s VCU expands the possibilities of Light Electric Mobility while reducing integration effort. Designed for applications ranging from L1e two-wheelers to L7e four-wheelers, as well as industrial and utility vehicles, the VCU coordinates powertrain control, energy management and connected vehicle functions through a common, scalable architecture.

Both our VCU variants are designed for ASIL B functional safety and compliance with UNECE R155 cybersecurity requirements, with the necessary hardware and software provisions included.

FEATURES

Added value of the VCU

- Dimensions (Approx.): 160x160x40mm
- Weight (Approx.): 300gr
- Housing (Upper + Lower covers): Aluminum sheet (AlMg3)
- Pressure Compensation Element (PCE)
- Mechanical fixation to vehicle chassis: Via 4x through-holes

Specification Overview VCU.

OPEN PLATFORM APPROACH: BUILD ON OUR FOUNDATION

Specification	What You Get	Ideal For
Turnkey Solution	Fully integrated VCU with complete application software, calibrated and validated for your vehicle	Customers seeking a ready-to-integrate, minimal-effort solution
Open Platform (HW + Basic SW + Toolchain)	Validated VCU hardware, ASIL B & R155 compliant basic software stack (drivers, diagnostics, communication, safety monitors), and a development toolchain	Customers with in-house software competence who want full control over application logic
Key advantage	The basic software package includes all safety-critical and cybersecurity relevant layers — so customers can focus entirely on application innovation without re-developing or re-certifying the safety and security foundation.	

FUNCTIONAL CAPABILITIES: EVERYTHING IN VCU LITE & PRO

Specification	VCU Lite	VCU Pro
Application	Scooters, mopeds, motorcycles, entry-level 3W/4W	Three-wheelers, micro-cars, quadricycles (L6e/L7e), industrial vehicles
System Coordination	Coordinates key vehicle systems, including battery, OBC, DC/DC converter, and HMI	Coordinated power management, including recharge/discharge sequencing, power distribution, and supervision of connected vehicle systems
Powertrain Control	Manages torque request and e-Drive distribution, with regenerative braking, cruise control, and selectable drive modes: Normal, Eco, Boost, and Reverse	Torque vectoring across multiple e-Drive units for vehicles with dual-motor configurations, along with standard & custom drive modes for a better riding experience
Integrated Body Control	x8 Configurable switches and diagnostic smart HS/LS outputs for basic loads such as blinkers, headlights, and fans	Controls body loads such as windows, wipers, washer, locks, lighting, and EPB, eliminating the need for a separate BCM
Sensor Inputs	Sensor inputs for throttle, brake, clutch, wheel-speed PWM, and NTC temperature measurement, plus 14 configurable 12V/GND digital inputs	Expanded vehicle I/O for centralized architectures, including 24 configurable 12V/GND digital inputs plus 12V/5V analog and PWM inputs
Vehicle Networking	x3 CAN / CAN-FD up to 5Mbps	x5 CAN / CAN-FD up to 5Mbps, I2C, LIN, UART
Diagnostics, Flashing & Connectivity	OBD II/UDS diagnostics per ISO 14229 and SAE J1979-2, with key-based secure access	OBD II/UDS diagnostics per ISO 14229 and SAE J1979-2, with key-based secure access, IoT and NFC via CAN, UART or I2C
Onboard Intelligence	IMU + RTC (ride tracking & timestamps)	Extended IMU (stability, rollover) + cruise, hill-start
Safety & Security	ASIL B + R155	ASIL B + R155
Pin-Out	48 pin connector	Lockable 2-pocket connector (120 pins: 65 + 55)

Data overview HEM. _____

HEM 1 / 60

Compact hub drives for
urban two-wheelers.

The HEM series combines the e-machine and wheel hub in a compact drive solution for low-speed and city-speed electric two-wheelers. Different power classes and wheel-rim sizes allow the drive to be matched to a broad range of urban mobility and last-mile delivery applications.

High efficiency supports increased vehicle range, while the robust design is engineered for reliable operation under demanding everyday conditions.

HEM 5 / 160

FEATURES

Added value of the Hub Mount Electric Machine

- Designed for low-speed and city-speed electric two-wheelers
- Scalable performance from 1 to 4.5 kW peak power
- Available for 10-inch and 12-inch wheel rims with integrated brake housing
- Smooth and controllable variable-speed operation
- High operating efficiency to support increased vehicle range
- CAN interface, robust sealing and enhanced warranty features
- Available for 48 - 72 V systems

DCU

Specification	HEM 1/60	HEM 2/90		HEM 3/120	HEM 1/60	HEM 2/90	HEM 3/120	HEM 3/115	HEM 4/140	HEM 5/160
Motor Type	BLDC Hub									
Rim Size (Inch)	10				12					
Rated Voltage (V)	48/60									
Peak Power (kW)	0.8	1.5	1.8	2.5	0.8	2.0	2.5		3.8	4.5/6.0
Rated Power (kW)	0.25	1.0	1.2	1.5	0.25	1.2	1.5	1.8	2.0	3.0
Peak Torque (Nm)	60	90		120	60	90	120	115	140	160
Rated Torque (Nm)	10	20	18	20	10	20		24	28	35
Peak Speed (Rpm)	390	500	790		390	680	750		850	990
Rated Speed (Rpm)	250	500	690	710	250	580	710	750	700	810
Motor Peak Efficiency (%)	>90									
Max Current For 48V System (Amp DC)	30	40	46	65	25	55	65		95	110/170
Weight – Motor (Kg)	10	11 - 12			9.5	12	13 - 14			15
Cooling (Natural/Air/ Liquid)	Natural / Air									
Sensor Type	Hall									
Ingress Protection (IP class)	IP67									



Application-specific performance.

- Suitable for two-wheelers, three-wheelers and other light electric vehicles
- Scalable performance from 2 to 18 kW peak power
- Highly efficient PMSM technology
- Flexible speed-torque characteristics for application-specific solutions
- High operating efficiency to support increased vehicle range
- Optimized electromagnetic design for better NVH performance
- Robust and reliable design for demanding operating conditions
- Drive control system with diagnostics, protection functions and CAN interface
- Available for 48 - 96 V systems



Applications	2 Wheelers					
Specification	LEM 2/40	LEM 4/40	LEM 5/50	LEM 6/40	LEM 8/60	LEM 9/60
Rated Voltage (V)	48 / 60 / 72					
Peak Power (kW)	3.0	3.8	5.0	6.0	8.0	8.5
Rated Power (kW)	2.0	3.3	4.0	4.5	5.0	5.5
Peak Torque (Nm)	35		45	41	55	57
Rated Torque (Nm)	5.4	7.5	12		14	15
Peak Speed (Rpm)	4300	4500	5500	6500	5000	3600
Rated Speed (Rpm)	3500	4400	3200	3500	3450	3540
Motor DC Current 48V System (Amp)	70	95	120	150	200	210
Weight – Motor (Kg)	7.5	9.0	9.5	12.5	9	11
Dimensions – Motor (Ø*L mm)	145 * 185			185*230	145 * 185	145 * 205
Cooling (Natural/Air/Liquid)	Natural - Air					
Sensor Type	Encoder					
Ingress Protection (IP class)	IP67					

Applications	3 Wheelers						
Specification	LEM 2/30	LEM 6/40	LEM 9/60	LEM 9/50	LEM 16/80	LEM 18/100	
Rated Voltage (V)	48 / 60 / 72						
Peak Power (kW)	2.0	2.5	6.0	8.5	9.0	16	18
Rated Power (kW)	1.2	2.0	4.5	5.5	5.5	7.0	8.6
Peak Torque (Nm)	28	25	41	57	49	74	95
Rated Torque (Nm)	4	6.4	12	15	9.3	20	27.3
Peak Speed (Rpm)	3500	3900	6500	3600	6700	7200	8500
Rated Speed (Rpm)	3000		3500	3540	5700	3400	3000
Motor Peak Efficiency (%)	>90						
Motor DC Current 48V System (Amp)							
Weight – Motor (Kg)	5.8	7	12.5	11	16	17.5	22
Dimensions – Motor (Ø*L mm)	157 * 153	146 * 165	185*230	145 * 205	185 * 230	185 * 240	215*250
Cooling (Natural/Air/Liquid)	Natural - Air						
Sensor Type	Hall Sensor		Encoder				
Ingress Protection (IP class)	IP67						

E-Axle Solutions.



L 3 A x l e

Robust e-Axle for L3

Vehicle application.

Robust performance for demanding cargo applications. The Heavy Duty Cargo E-Axle combines a rigid axle with SEG Automotive’s LEM 2/30 e-machine in a compact drive solution for electric cargo and utility vehicles.

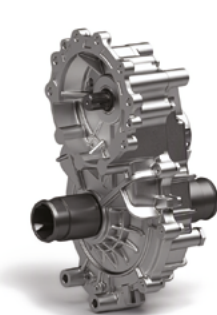
Designed for demanding loads and frequent daily operation, the system offers high durability with reduced complexity, weight and maintenance requirements. Different gear ratios, brake configurations and wheel connections allow adaptation to the vehicle concept

Data overview E-Axles.

TECHNICAL DATA

Applications	3 Wheelers
Specification	L3 Axle
Gears (Speed)	2
Brakes (mm)	180 / 200 / 220 (Disk brakes)
Track Width (mm)	870
Peak Torque (Nm)	28
Ratio	1:8:3; 1:20:8
Axel Weight (Kg)	22,5
Static Load (Kg)	800
Gear Shifter	Customizable
Wheel Connection (mm)	100 (4 whole system)

Gearbox Solutions.



L 5 G e a r b o x

Optimized Gearbox Solution for L5

vehicle application.

The L5 drive system combines SEG Automotive’s high-efficiency electric motor with a compact gearbox, creating a seamlessly integrated powertrain solution for L5 electric vehicles.

Engineered for performance and versatility, the system offers flexible gear ratios and optimized motor-gearbox integration to balance efficiency, acceleration, gradeability, speed and driving range. Its compact architecture and adaptable interfaces enable easy integration across diverse vehicle concepts and application requirements.

Data overview Gearbox.

Applications	3 Wheelers	
Specification	Single Speed Gearbox	
Gear Ratio	10.2:1	11.855:1
Max Input Torque (Nm)	60	
Max Output Torque (Nm)	612	711
Max Input Speed (Rpm)	6500	
Max Output Speed (Rpm)	637	548
Centre Distance (Mm)	160	
Lubrication (Oil Type)	SAE80W90	
Oil Quality (Liters)	0.550	
Weight Without Oil (Kg)	12	
Ingress Protection (IP class)	IP67	

48V Electric Drive System (EDS).



4 8 V E D S

Compact and reliable.

The EDS combines e-machine, power electronics and transmission in a compact package and covers different performance classes for all kinds of light electric vehicles.

High efficiency, compact dimensions and application-specific drive modes support responsive vehicle performance. The integrated design, including optimized cabling and interfaces, simplifies installation in space-constrained vehicle architectures.

FEATURES

Added value of Light Electric Machines

- Suitable for two-wheelers, three-wheelers, other light electric vehicles and auxiliary applications
- Highly efficient six-phase permanent-magnet synchronous machines
- Flat-wire concentrated winding
- Naturally air-cooled motor and controller
- Drive control system with diagnostics, protection functions and CAN interface
- Functional safety developed according to ISO 26262, ASILB
- Cybersecurity-ready architecture
- Robust and scalable AUTOSAR-based software functions
- IP67 ingress protection

Data overview 48V EDS.

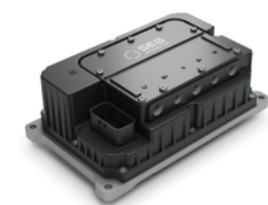
TECHNICAL DATA

Applications	2, 3 & 4 Wheelers			
Specification	EDS 6/25 48V	EDS 9/30 48V	EDS 14/50 48V	EDS 20/45 48V
Peak Power (kW)	6.7	9.0	14.0	20
Rated Power (kW)	4.5	5.7	7	9.5
Peak Torque Motor (Nm)	25	30	50	45
Max Speed Motor (Rpm)	8000	8500	7900	11000
Peak Torque* (Nm)	79	96	160	140
Max Speed* (Rpm)	2500	2650	2470	3430
Rated speed* (Rpm)	1050	880	1375	1250
Peak Current (Amp DC)	160	230	330	430
Weight – Motor (Kg)	~12.5	~13.5	~14.5	~15.5
Dim. – Motor (L*B* mm)	190* 175	190* 190	190*212	216*195
Max Efficiency (% M)	90	92		
Gear Ratio	3.2			

Synchronous Reluctance Motor (SynRM) and Controller.



S y n R M



D C U

Rare-earth-free mobility for a more resilient future.

Synchronous reluctance motor technology generates torque through the magnetic reluctance of a specially designed rotor, eliminating the need for rare-earth permanent magnets.

This reduces exposure to supply-chain constraints, geopolitical risks and material price volatility. SEG Automotive combines the rare-earth-free motor with a dedicated controller and adapted software to deliver performance comparable to conventional permanent-magnet solutions.

FEATURES

Added value of the SynRM

- Rare-earth-free motor technology
- More secure and stable supply chain
- Reduced exposure to material cost volatility
- Sustainable and future-ready concept
- Performance comparable to conventional PMSM solutions
- Compatible with existing inverter and controller platforms following software adaptation

Data Overview SynRM.

TECHNICAL DATA

Applications	SynRM Rare Earth Free
Nominal Voltage (V)	48
Peak Power (kW)	9.0
Rated Power (kW)	5.5
Peak Torque (Nm)	50
Rated Torque (Nm)	9.2
Peak Speed (Rpm)	7200
Rated speed (Rpm)	5700
Motor Efficiency (%)	>94
Max Phase Current (Amp)	350
Max DC Current (Amp)	220
Controller: SW/HW (kW)	1.9 - 9.9
Dim. – Motor (L*B* mm, kg)	185*250, 20

Scalable e-Drive Solutions for LSVs.



E - m o t o r



D C U



A x l e f o r L S V s

From drive system to digital experience.

SEG Automotive combines efficient electric propulsion, intelligent control and connected digital features into one integrated system solution. Featuring a high-efficiency PMSM motor, e-axle, intelligent drive control unit, BLE connectivity and the SEG Automotive Edge mobile app, the system is designed to enhance efficiency, vehicle control, integration and the overall user experience.

Its scalable architecture provides a flexible foundation for golf carts, passenger and utility vehicles, resort and campus transportation, and other low-speed electric mobility applications.

FEATURES

Added value as a system for LSVs

- Simplified integration
- Scalable System Solution
- Optimized Vehicle Performance
- One system approach
- Smart Connectivity
- Reliable System Operation

Data Overview for LSVs.

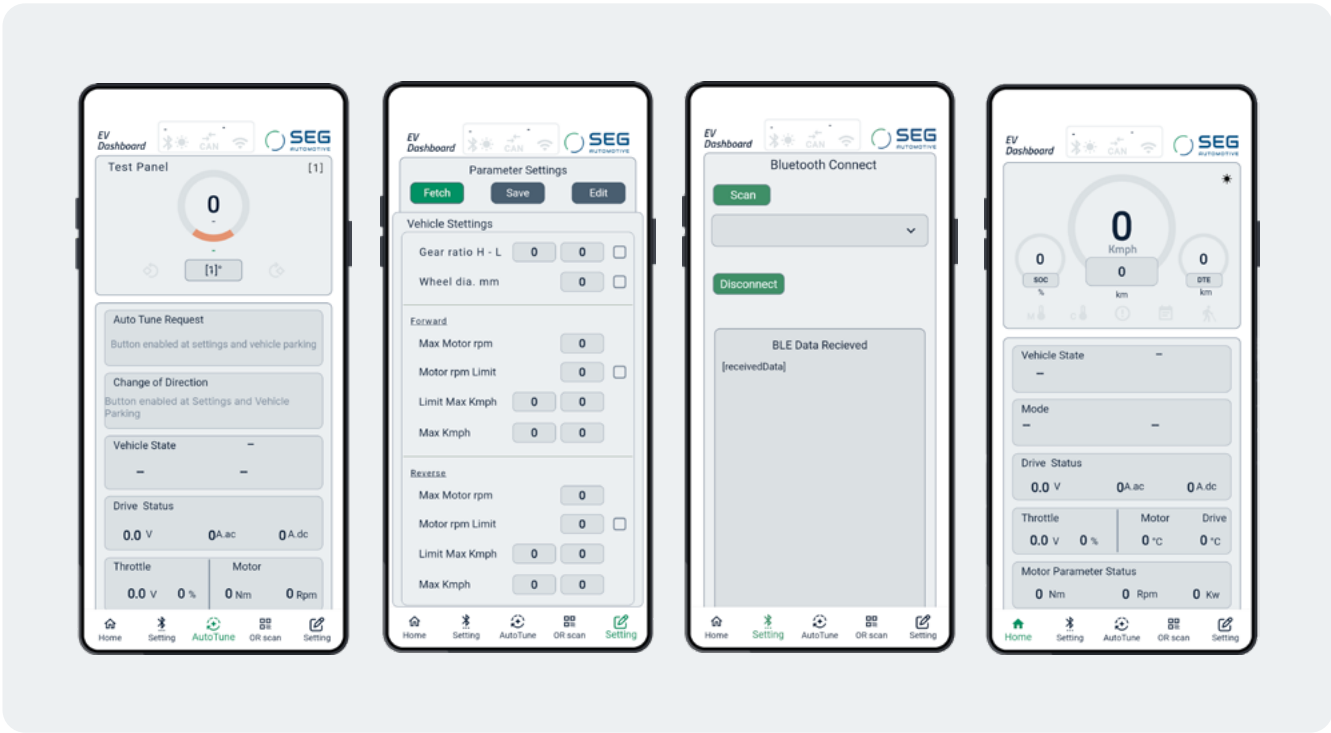
TECHNICAL DATA

Specification	LEM 6/40	LEM 9/50	LEM 16/80
Rated Voltage (V)	48/60/72		
Peak Power (kW)	6.0	9.0	16
Rated Power (kW)	4.5	5.5	7.0
Peak Torque (Nm)	41	49	75
Peak Speed (Rpm)	6500	6700	7200
Motor Peak Efficiency (%)	>90		
Max Current (DC) For 48V System	150	220	380
Weight – Motor (Kg)	12.5	16	17.5
Dimensions – Motor (Ø*L mm)	185*230		185*240
Cooling Type	Natural Air		
Sensor Type	Encoder		
Ingress Protection (IP class)	IP67		

Connected Mobility and App Control.

Digital access to vehicle information, settings and diagnostics.

Designed to enhance the digital experience, the SEG Automotive Edge App provides convenient access to vehicle information through a secure wireless connection. Users can monitor vehicle parameters, configure selected functions and access diagnostic information, creating a connected interface between the user and the vehicle.



Connected functions at a glance.



From concept to series production.

Whether you already know which product you need or only have an initial idea of your vehicle's performance, our teams help you define the right way forward.

We translate your requirements into a suitable technical solution and support its development, validation and industrialization.



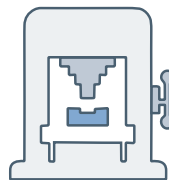
Define

Vehicle concept and requirements



Select

Suitable products and architecture



Develop

Application-specific adaptation and engineering



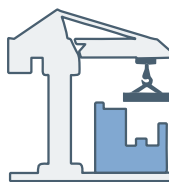
Integrate

Hardware, electronics and software as one system



Validate

System and vehicle testing



Industrialize

Transition to series production

Ready to move your project forward?

Talk to our LEM experts about your vehicle concept, technical requirements and the right starting point for your project.

Europe, Middle East & Africa (EMEA) – lem.emea@seg-automotive.com

India, Southeast Asia & Australia (Asia-Pacific) – lem.apac@seg-automotive.com

China – lem.cn@seg-automotive.com

North America – lem.na@seg-automotive.com

Latin America – lem.latam@seg-automotive.com





SEG Automotive GmbH

Lotterbergstraße 30
70499 Stuttgart
Germany
www.seg-automotive.com

Contact:
lem@seg-automotive.com

English Brochure — V261021