

SEG AUTOMOTIVE eBike systems

BLM User Manual (Light Motor eBike System)

English Master Version | Release Candidate v1.0

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Media

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Document Approval

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1. About This Manual

Purpose of this Manual

This manual provides technical and operational information regarding the BLM (Bike Light Motor) eBike system developed by SEG Automotive eBike Systems.
The document is intended to support the understanding, operation, maintenance, diagnosis, and integration of the BLM system and its associated components.
It serves as the primary technical reference for OEM manufacturers, authorized dealers, service technicians, and internal review teams.

Scope

The information contained in this manual covers the following system components:

- BLM Drive Unit.
- Main Battery (BATT BLM).
- Range Extender (BATT BOTT TB XPRO 180Wh BH/SH).
- Battery power distribution harness (XPRO BLM CONTROLLADOR TRANSCEIVER)
- SEG_D_FI Display.
- Display connection cable.
- Remote i_Buttons, (left/right).
- Connection cable i-buttons.
- SEG Automotive APP SEG Automotive eBikes systems.
- SEG GUI dealer (SW).
- SEG GUI manufacturer (SW).
- Charging System.
    - Port (CHARGER PORT BLM CARB)
    - Charger (CHARGER TB BLM CARB)
    - Extender port (XPRO BATT BLM DISCHARGE PORT)
- Speed Sensor.
- Associated accessories and service components.

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This manual is intended for:

OEM Manufacturers

Responsible for bicycle integration and system validation.

Authorized Dealers

Responsible for delivery, diagnosis, maintenance, and customer support.

Service Technicians

Responsible for inspection, troubleshooting, and repair activities.

Internal Review Teams

Engineering, Quality, Product Management, Marketing and Service organizations.

Document Structure

This manual is organized into the following sections:

SECTION	CONTENT
Chapters 1-3	**General information and system overview**
Chapters 4-7	**Core system hardware**
Chapters 8-14	**Interfaces, software and firmware**
Chapters 15-18	**Integration and diagnostics**
Chapters 19-21	**Support and after-sales**
Appendices	**Technical reference information**

Conventions Used in This Manual

The following conventions are used throughout the document.

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WARNING

Indicates a potentially hazardous situation that could result in severe injury, death or major equipment damage.

CAUTION

Indicates a potentially hazardous situation that may result in equipment damage or reduced system performance.

NOTICE

Provides important information regarding installation, operation, or maintenance.

Product Naming

For consistency across the full documentation set, the primary propulsion component shall be referred to as:
BLM Drive Unit
Reference:
E5M1200002

Software Naming

The official service software shall always be referred to as:
SEG GUI
Applicable versions:

- SEG GUI dealer (SW)
- SEG GUI manufacturer (SW)

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2. Safety Instructions



Figure 2-1. BLM Drive Unit

General Safety Information

The BLM system has been designed for application in electrically power-assisted bicycles and has been developed to provide reliable operation under normal riding conditions.

Failure to follow the recommendations and instructions contained in this manual may result in equipment damage, reduced system performance, or unsafe operating conditions.

Before operating the bicycle:

- Read this manual completely.
- Read the bicycle manufacturer's user guide.
- Verify that all system components are correctly installed.
- Ensure the battery is securely installed.
- Check that all connectors are properly mated.
- Verify that no faults or warnings are displayed on the SEG_D_FI display.

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WARNING

The BLM system contains high-energy lithium-ion batteries and high-current electrical circuits.

Improper use may result in:

- Severe injury.
- Fire.
- Permanent equipment damages.
- Loss of warranty coverage.

Rider Responsibilities

The rider is responsible for:

- Maintaining the bicycle in safe operating conditions.
- Following all applicable traffic regulations.
- Ensuring that the system is used only for its intended purpose.
- Regularly inspecting the bicycle and electrical system.

Before every ride:

- Check tire pressure.
- Verify brake operation.
- Verify the battery charge level.
- Check display operation.
- Confirm correct assistance behavior.

Electrical Safety

The BLM electrical system contains battery-powered electrical equipment operating at voltages and currents capable of causing damage if improperly handled.

WARNING

Never:

- Open the BLM Drive Unit.

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- Open the battery enclosure.
- Modify electrical wiring.
- Short-circuit battery terminals.
- Bypass protective devices.
- Install unauthorized electronic components.
- Never access the Drive Unit using unauthorized tools or software to modify the system firmware.

Unauthorized modifications may result in:

- Electrical shock.
- Fire.
- Thermal runaway.
- Permanent system damage.
- Void the SEG Automotive warranty and release SEG Automotive from any liability resulting from such modifications.

Battery Safety

The main battery and Range Extender contain lithium-ion cells and associated Battery Management System (BMS) electronics.

WARNING

Do not:

- Puncture the battery.
- Crush the battery.
- Strike the battery with tools.
- Incinerate the battery.
- Expose the battery to excessive heat.
- Use batteries showing signs of damage.

Signs of battery damage may include:

- Swelling.
- Cracks.
- Fluid leakage.

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- Unusual odor.
- Excessive temperature increases.

If any of these conditions are observed:

1. Stop using the battery immediately.
2. Disconnect charging equipment.
3. Contact an authorized dealer.

Temperature Limits

OPERATING CONDITION	TEMPERATURE RANGE
Operation	**-10 °C to +40 °C**
Storage (recommended)	**Dry indoor environment**

Operation outside the recommended temperature range may reduce performance and battery lifetime.

Charging Safety

The battery shall only be charged using approved charging equipment.

Approved charging equipment:

CHARGER TB BLM CARB (387492200)

Based on:

Battery 387492100

Output specifications:

- 42 V DC
- 4 A

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Table 2-1. Charger Technical Specifications

PARAMETER	VALUE
Commercial Reference	**CHARGER TB BLM CARB**
Manufacturer	**SEG/BH**
Model	**16480109A**
Input Voltage	**100–240 V AC**
Input Frequency	**50–60 Hz**
Maximum Input Current	**2.5 A**
Output Voltage	**42 V DC**
Output Current	**4 A**
Battery Compatibility	**BATT BLM 450018990**
Typical Charging Time	**Approximately 4 hours**
Charging Method	**Constant Current / Constant Voltage (CC/CV)**
Intended Use	**Main Battery Charging**
Protection	**Internal charger protections according to manufacturer specifications**

NOTICE

Charging times may vary depending on battery state of charge, battery temperature, and ambient conditions.

For optimum battery lifetime, SEG eBike Systems recommends charging and storing the battery according to the guidelines provided in Chapter 9 – Main Battery.

WARNING

Using unauthorized chargers may result in:

- Battery damage.
- Reduced service life.
- Overheating.
- Fire hazard.
- Warranty invalidation.

Only use charging equipment approved for the BLM battery system.

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Charger LED Status



Figure 2-2. Approved charger for the BLM battery system

The charger status indicator provides the following information:

Table 2-2. Charger LED status indication.

LED State	Status
Green	**Standby**
Red	**Charging**
Flashing Red	**Charging abnormality**
Green (after charge)	**Fully charged**

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Water Exposure

The BLM system has been designed for normal bicycle operation in outdoor environments, including rain and splash conditions.

The battery and Range Extender are designed to provide IP65 protection when correctly installed.

CAUTION

The system is not designed for direct cleaning using:

- Pressure washers.
- Steam cleaners.
- Industrial washing equipment.

High-pressure water may force moisture through seals and compromise long-term reliability.

Recommended Cleaning Procedure

1. Power off the bicycle.
2. Remove loose dirt using a soft brush.
3. Clean surfaces using damp cloth.
4. Dry the bicycle after cleaning.

Avoid directing water toward:

- Connectors.
- Battery interfaces.
- Display interfaces.
- Drive Unit seals.

Transportation

Lithium-ion batteries are regulated products and may be subject to transportation restrictions.

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NOTICE

Before transporting a bicycle equipped with the BLM system by air:

- Contact the airline.
- Verify applicable regulations.
- Confirm battery transportation requirements.

Component Compatibility

The BLM system shall only be operated using approved SEG eBike Systems components.

Examples include:

- BLM Drive Unit.
- Main Battery (BATT BLM).
- Range Extender (BATT BOTT TB XPRO 180Wh BH/SH).
- SEG_D_FI Display.
- Approved charging equipment. (CHARGER TB BLM CARB)
- Approved accessories.

Lighting System Safety

The Drive Unit supports the connection of compatible lighting accessories.

WARNING

Compatible lighting systems shall meet the following requirements:

- 36 V operating voltage.
- Maximum power consumption of 20 W.

For dual-light configurations:

- Combined power consumption shall not exceed 20 W.

Exceeding these values may result in:

- Electrical damage.

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- Connector overheating.
- Drive Unit malfunction.

Service Safety

Diagnosis, calibration and firmware updates shall be performed only by trained personnel using:

- SEG GUI dealer (SW)
- SEG GUI manufacturer (SW)
- SEG GUI interface (E5D10A0000)

WARNING

Do not perform:

- Sensor calibration.
- Firmware programming.
- Parameter modification.

unless properly trained and authorized.

Incorrect configuration may affect the safety and performance of the bicycle.

Emergency Situations

Immediately discontinue use of the bicycle if any of the following conditions occur:

- Smoke emission.
- Burning smell.
- Visible battery damage.
- Uncontrolled system behavior.
- Significant water ingress.
- Repeated fault occurrence.

Contact an authorized dealer before returning the bicycle to service.

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3. Intended Use



Figure 3-1. eBike equipped with BLM system

Product Purpose

The BLM system has been developed as a lightweight electric pedal assistance solution for bicycles. The system provides electrical assistance only when the rider is pedaling and is intended to enhance the riding experience while maintaining natural bicycle handling characteristics.

The BLM system is designed to support a wide range of bicycle categories while preserving compliance with applicable regulations and standards.

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System Description

The BLM system consists of the following primary components:

- BLM Drive Unit.
- Main Battery
- Range Extender
- SEG_D_FI Display.
- i_Buttons.
- SEG Automotive APP SEG Automotive eBikes systems
- SEG GUI
- Approved accessories and wiring components

All system components have been designed to operate together as an integrated solution.

Approved Applications

The BLM system is intended for integration into:

- Urban eBikes
- Commuter eBikes
- Trekking eBikes
- Gravel eBikes
- Road eBikes
- Mountain eBikes

Integration shall only be performed by qualified bicycle manufacturers.

Regulatory Framework

The BLM system is intended exclusively for integration into electrically power-assisted bicycles (EPACs) that comply with applicable local regulations and standards.

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The system is designed solely to provide pedal-assisted propulsion and shall only be used with approved SEG Automotive components and approved bicycle manufacturer integrations.

Non-Intended Use

The following applications are considered outside the intended use of the BLM system:

- Use in vehicles other than bicycles.
- Use in motorcycles, mopeds or other motor vehicles.
- Competitive racing applications.
- Commercial cargo applications exceeding the vehicle manufacturer's specifications.
- Use with non-approved batteries, chargers or electronic components.
- Modification of hardware, software or system parameters using unauthorized tools.
- Use after mechanical damage, water ingress or apparent component failure.

Liability Limitation

SEG Automotive shall not be responsible for any damage, malfunction, injury or regulatory non-compliance resulting from:

- Use outside the intended purpose described in this manual.
- Unauthorized modifications.
- Installation of non-approved components.
- Failure to follow installation, operation or maintenance instructions.
- Integration practices not approved by SEG Automotive.

Unauthorized Modifications

WARNING

Modification of system hardware, software or safety-related parameters may:

- Compromise rider safety.

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- Reduce system reliability.
- Affect regulatory compliance.
- Void warranty coverage.

Examples include:

- Modification of electrical connectors.
- Installation of non-approved batteries.
- Modification of Drive Unit hardware.
- Reprogramming using unauthorized tools.
- Installation of incompatible electronic accessories.

Dealer and OEM Responsibilities

Authorized dealers and OEM manufacturers are responsible for:

- Correct system installation.
- System calibration.
- Firmware maintenance.
- Diagnostic support.
- Use of approved spare parts.

Service operations requiring access to system configuration shall be performed using:

- SEG GUI dealer (SW)
- SEG GUI manufacturer (SW)
- SEG GUI interface

User Responsibilities

Users shall:

- Operate the system as intended.
- Follow charging recommendations.
- Maintain battery health.
- Report faults to authorized dealers.

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- Avoid unauthorized modifications.

Environmental Conditions

The system is intended for outdoor bicycle operation.

Permitted environments include:

- Dry roads.
- Wet roads.
- Light and heavy rain.
- Off-road bicycle trails.

CAUTION

The system is not intended for:

- Submersion in water.
- High-pressure washing.
- Use with damaged electrical components.
- Operation using non-approved batteries.

Service and After Sales

Replacement parts, accessories and diagnostic equipment are available through the official after-sales portal:

https://www.ecoelectric21.com/

Technical support requests may be submitted through:

ebike-support@seg-automotive.com

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4. BLM System Concept



Figure 4-1. System integration concept

Introduction

The BLM (Bike Light Motor) platform was developed to provide a lightweight, highly integrated and natural riding experience while maintaining the regulatory requirements applicable to electrically power-assisted bicycles.
The development of the BLM system focused on combining low mass, compact integration and intelligent control in a single platform suitable for a broad range of bicycle categories.

The result is a complete ecosystem consisting of:

- BLM Drive Unit
- Main Battery
- Range Extender
- SEG_D_FI Display
- SEG Automotive APP SEG Automotive eBikes systems
- SEG GUI
- Service and diagnostic infrastructure

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Design Philosophy

The BLM concept is based on five core development principles.

Lightweight Design

A primary objective of the BLM project was minimizing overall system mass.
The compact Drive Unit architecture and lightweight battery system allow manufacturers to develop bicycles that retain handling characteristics similar to those of conventional bicycles.
Benefits include:

- Reduced total vehicle mass.
- Improved acceleration.
- Better climbing response.
- More natural handling.
- Greater riding agility.

Natural Assistance

Unlike systems designed primarily around peak performance, the BLM platform prioritizes riding quality.

The assistance strategy continuously evaluates:

- Rider torque.
- Rider cadence.
- Vehicle speed.
- Selected assistance mode.
- System operating conditions.

The result is assistance that feels intuitive and proportional to rider input.

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OEM Integration



Figure 4-2. Example of BLM system integration

The BLM system was designed from the beginning with OEM integration in mind.

Key design objectives include:

- Minimal visual impact.
- Reduced packaging volume.
- Internal battery integration.
- Integrated display concept.
- Simplified wiring architecture.

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The result is a clean bicycle appearance without compromising serviceability.

Energy Efficiency

System efficiency plays a critical role in overall range and rider experience.

Energy efficiency has been optimized through:

- Advanced motor control algorithms.
- Efficient power electronics.
- Intelligent battery management.
- Optimized assistance profiles.

These measures help maximize the utilization of available battery capacity.

Advanced Serviceability

The BLM system incorporates professional diagnostic and service capabilities.

Service personnel can use:

- SEG GUI dealer (SW).
- SEG GUI manufacturer (SW).

Together with:

- SEG GUI interface (E5D10A0000).

Functions include:

- Diagnostics.
- Online monitoring.
- Sensor calibration.
- Firmware updates.
- Incident reporting.

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BLM Ecosystem

The BLM platform should not be considered as a standalone Drive Unit.

Instead, it is a fully integrated ecosystem composed of multiple interconnected elements.



Figure 4-3. Connected BLM ecosystem including SEG_D_FI display and SEG Automotive APP SEG Automotive eBikes systems

Table 4-1. Ecosystems components:

COMPONENT	FUNCTION
Drive Unit	**Pedal assistance**
Main Battery	**Primary energy storage**
Range Extender	**Additional energy capacity**
SEG_D_FI Display	**Rider interface**
i_Buttons	**Control interface**
SEG Automotive App	**User monitoring and customization**
SEG GUI	**Diagnostics and service**
SEG GUI interface	**Service communication interface**

Assistance Philosophy

The BLM system has been designed to work with the rider rather than replacing rider effort.

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Assistance is determined through the combination of:

- Rider torque input.
- Cadence measurement.
- Vehicle speed.
- Assistance profile settings.

This control philosophy provides predictable power delivery and helps preserve a natural riding feel.

Assistance Modes

The specific assistance modes available may vary depending on the bicycle manufacturer.

Typical configurations may include:

- ECO
- TOUR
- SPORT
- BOOST

The behavior of these modes can be adjusted within predefined limits using:

- SEG Automotive APP SEG Automotive eBikes systems
- SEG GUI dealer (SW)
- SEG GUI manufacturer (SW)

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User Customization

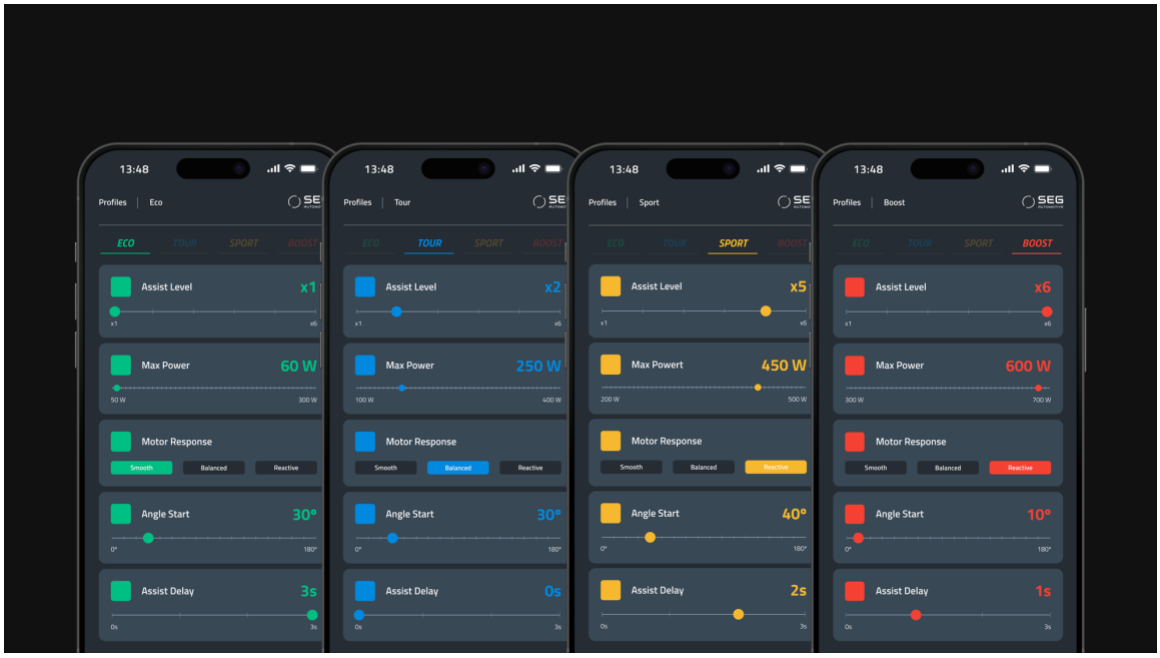


Figure 4-4. Assistance profile customization within the SEG Automotive App

The BLM ecosystem allows users to personalize the riding experience.

Depending on the OEM configuration, users may adjust parameters such as:

- Assistance intensity.
- Motor response.
- Maximum power level.
- Assistance delay.

NOTICE

User modifications are always limited by the configuration ranges defined by the bicycle manufacturer.

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Connectivity

The BLM platform provides wireless connectivity between the bicycle and the rider's smartphone.



Figure 4-5. Bluetooth connectivity between SEG_D_FI display and SEG Automotive App SEG Automotive eBikes systems

Bluetooth connectivity enables:

- Activity synchronization.
- System monitoring.
- Assistance customization.
- Status visualization.

BLM User Experience

The objective of the BLM platform is to combine:

- Lightweight construction.
- Smooth power delivery.
- Efficient energy management.
- Advanced diagnostics.
- Clean integration.

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The overall riding experience should remain intuitive while providing the benefits of electric pedal assistance.

Key System Characteristics

Table 4-2. Key Characteristics of the BLM Platform

CHARACTERISTIC	DESCRIPTION
Nominal Power	**250 W (continuous operation) according to EN15194**
Peak Power	**700 W**
Maximum Torque	**80 Nm**
Drive Unit Weight	**Approx. 2.1 kg**
Main Battery Capacity	**630 Wh**
Range Extender Capacity	**180 Wh**
Total Energy Capacity	**810 Wh**
Communication	**CAN Bus**
Service Software	**SEG GUI**
Mobile Application	**SEG Automotive APP SEG Automotive eBikes systems**

Summary

The BLM system combines lightweight construction, high integration, intelligent assistance control and professional service capabilities into a single eBike platform.
These characteristics allow OEM manufacturers to develop highly integrated bicycles while providing riders with a natural and enjoyable riding experience.

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5. System Specifications

Introduction

The following specifications summarize the key characteristics of the BLM eBike platform.
These values provide a quick technical reference for OEM manufacturers, dealers, service technicians and end users.

Table 5-1. BLM System Specifications

PARAMETER	VALUE
Drive Unit Reference	**E5M1200002**
Nominal Power	**250 W (EN15194)**
Peak Power	**700 W**
Maximum Torque	**80 Nm**
Drive Unit Weight	**Approx. 2.1 kg**
Motor Type	**Brushless DC Motor (BLDC)**
Communication	**CAN Bus**
Main Battery Capacity	**630 Wh**
Range Extender Capacity	**180 Wh**
Total System Capacity	**810 Wh**
Main Battery Weight	**Approx. 2.5 kg**
Range Extender Weight	**Approx. 1.0 kg**
Main Battery Protection	**IP65**
Range Extender Protection	**IP65**
Charger Output Voltage	**42 V DC**
Charger Output Current	**4 A**
Display	**SEG_D_FI (E5H1000001)**
Smartphone Connectivity	**Bluetooth**
Service Software	**SEG GUI**
Operating Temperature	**-10 °C to +40 °C**
Aplicable norms	**machinery directive 2006/42/EC** **EN15194:2017+A1:2023** **EN ISO 13849-1:2015 and 2023**

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Power Rating Notice

NOTICE

The nominal continuous power rating of the BLM Drive Unit is:

250 W according to EN15194

Peak power values of up to:

700 W

represent short-duration operating conditions.

Battery Configurations

Table 5-2. Available Energy Configurations

CONFIGURATION	CAPACITY
Main Battery	**630 Wh**
Main Battery + Range Extender	**810 Wh**

Main Components

Table 5-3. Core System Components

COMPONENT	REFERENCE
BLM Drive Unit	**E5M1200002**
Main Battery	**450018990**
Range Extender	**450011376**
SEG_D_FI Display	**E5H1000001**
Left i_Button	**E5H1000004**
Right i_Button	**E5H1000005**
SEG GUI Interface	**E5D10A0000**

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6. System Overview



Figure 6-1. Detail BLM eBike system

Introduction

The BLM system is a fully integrated eBike platform developed by SEG eBike Systems.
The platform combines electrical propulsion, energy storage, rider interface, connectivity and professional diagnostic tools into a single ecosystem designed for OEM integration and long-term service support.
The system has been developed around the principles of:

- Lightweight construction
- Natural assistance
- High integration
- Efficient energy management
- Advanced diagnostics

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System Architecture

The BLM platform consists of several interconnected components working together through a CAN-based communication architecture.

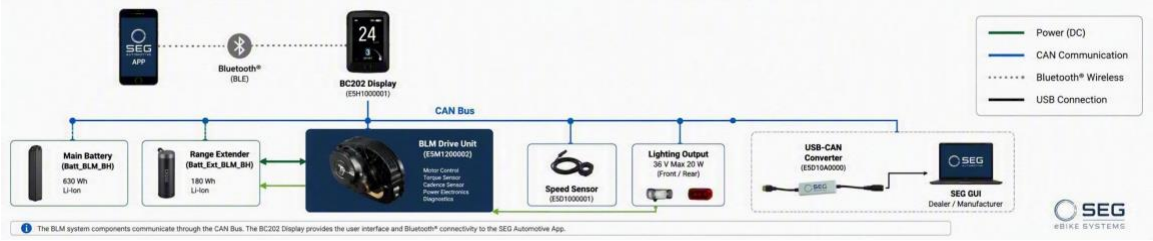


Figure 6-2. Interconnected BLM ecosystem

The system architecture is composed of:

SYSTEM ELEMENT	PRIMARY FUNCTION
Drive Unit	**Pedal assistance generation**
Main Battery	**Primary energy source**
Range Extender	**Additional energy capacity**
SEG_D_FI Display	**Rider information interface**
i_Buttons	**User control interface**
SEG Automotive APP SEG Automotive eBikes systems	**Monitoring and customization**
SEG GUI	**Diagnostics and service**
SEG GUI interface	**Service communication interface**

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7. BLM Drive Unit



Figure 7-1. BLM Drive Unit

Introduction

The BLM Drive Unit is the core propulsion component of the BLM eBike platform.

It converts electrical energy stored within the battery system into controlled rider assistance based on user input and operating conditions.

The Drive Unit combines:

- Electric motor
- Power electronics
- Torque sensing
- Cadence sensing
- Communication interfaces
- Embedded control software

within a compact and lightweight assembly optimized for OEM integration.

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Commercial Reference:

E5M1200002

Product Overview

The BLM Drive Unit has been developed to provide a natural and intuitive riding experience while maintaining compliance with regulatory requirements applicable to electrically power-assisted bicycles.

The system continuously evaluates rider intent by monitoring:

- Pedal torque
- Cadence
- Vehicle speed
- Selected assistance mode

These inputs are processed by the Drive Unit MCU to determine the appropriate level of electrical assistance.

Key Characteristics

Table 7-1. BLM Drive Unit Technical Specifications

PARAMETER	VALUE
Commercial Reference	**E5M1200002**
Product Name	**BLM Drive Unit**
Nominal Power	**250 W (continuous operation) according to EN15194**
Peak Power	**700 W**
Maximum Torque	**80 Nm**
Communication	**CAN Bus**
Motor Type	**Brushless DC Motor (BLDC)**
Approximate Weight	**2.1 kg**
Ingress Protection	**IP65**
Crank Interface	**ISIS**
Mounting Interface	**2 × M8 Fasteners**

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Power Rating

NOTICE

The nominal continuous power rating of the BLM Drive Unit is 250 W in accordance with EN15194.

Peak power values represent short-duration operating conditions.

Assistance Characteristics

The Drive Unit has been calibrated to provide smooth assistance throughout the complete operating range.

The control strategy is designed to:

- Deliver proportional assistance.
- Minimize abrupt power transitions.
- Preserve natural bicycle handling.
- Improve rider comfort.
- Maximize energy efficiency.

The resulting riding feel closely follows rider input.

Motor Technology

The Drive Unit uses a high-efficiency Brushless DC Motor (BLDC).

Advantages include:

- High efficiency.
- Reduced maintenance.
- Compact dimensions.
- Precise torque control.
- Low acoustic emissions.

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The motor is electronically commutated and controlled by the integrated MCU.

Integrated Sensors

The BLM Drive Unit incorporates multiple sensing systems used to determine rider intent and operating conditions.

Torque Sensor

The torque sensor measures rider pedal force.
This information is used to determine:

- Assistance demand.
- Power delivery.
- Assistance proportionality.

The torque signal is continuously monitored and validated by the MCU.

Cadence Sensor

The cadence sensor measures pedaling speed.
Cadence information is used in combination with torque input to optimize:

- Assistance smoothness.
- Power response.
- Riding comfort.

E-Machine sensors

E-Machine sensors provide rotor position information required for motor commutation.
These sensors allow:

- Precise motor control.
- Efficient power delivery.
- Diagnostic monitoring.

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Control Electronics (embedded in Drive Unit)

The integrated MCU supervises:

- Motor operation.
- Battery communication.
- Speed sensor input.
- Display communication.
- Lighting outputs.
- Diagnostic functions.

The MCU continuously evaluates system conditions and applies protective measures when necessary.

Electrical Interfaces

Table 7-2. Primary Drive Unit Interfaces

INTERFACE	FUNCTION
Battery +/-	**Main power supply**
COM Batt	**Battery communication**
Display	**SEG_D_FI communication**
Speed Sensor	**Vehicle speed input**
Lights	**Lighting output**
Programming	**Service communication**

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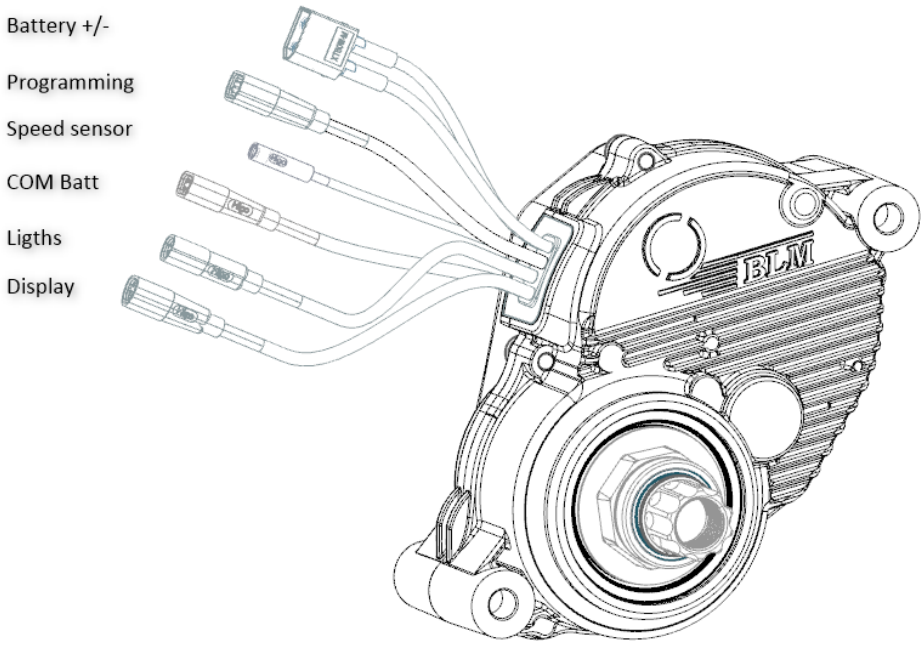


Figure 7-2. Drive Unit wiring and communication interfaces

These interfaces provide connectivity between the Drive Unit and the remainder of the BLM ecosystem.

Assistance Profiles

The Drive Unit supports multiple assistance profiles.

Typical profiles include:

- ECO
- TOUR
- SPORT
- BOOST

The final configuration depends on OEM implementation.

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Figure 7-3. Assistance profile customization parameters SEG App SEG Automotive eBikes systems

The behavior of each profile may be adjusted through:

- SEG Automotive APP SEG Automotive eBikes systems
- SEG GUI dealer (SW)
- SEG GUI manufacturer (SW)

subject to limitations defined by the bicycle manufacturer.

Communication Architecture

The Drive Unit communicates with system components through a CAN-based communication architecture.

Communicating devices include:

- Main Battery

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- Range Extender
- SEG_D_FI Display
- Service Tools

Benefits include:

- Robust communication.
- Fault detection.
- Efficient diagnostics.
- Expandability.

Thermal Protection

The Drive Unit continuously monitors internal temperatures.

Protection strategies are implemented to prevent damage caused by excessive temperatures.

WARNING

Excessive thermal loads may result in:

- Power reduction.
- Assistance limitation.
- Temporary fault conditions.

These protections are normal operating features designed to protect system components.

Current Protection

The MCU monitors motor current in real time.

Multiple protection thresholds are implemented to prevent:

- Motor damage.
- MCU damage.
- Connector overheating.

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Current-related events may generate warnings or error conditions depending on severity.

Diagnostic Monitoring

The Drive Unit continuously records operational information.

Recorded information may include:

- Current.
- Voltage.
- Temperature.
- Torque.
- Cadence.
- Speed.
- Error events.

This information is available through SEG GUI for diagnostic purposes.

Service Access



Figure 7-4. SEG GUI interface used for service communication

Service operations are performed using:

- SEG GUI dealer (SW)
- SEG GUI manufacturer (SW)
- SEG GUI interface (E5D10A0000)

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Functions include:

- Diagnostics
- Calibration
- Firmware updates
- Reporting
- Configuration

Mechanical Integration

The Drive Unit is mounted to the frame through two primary mounting points, tightened in frame thread M8.

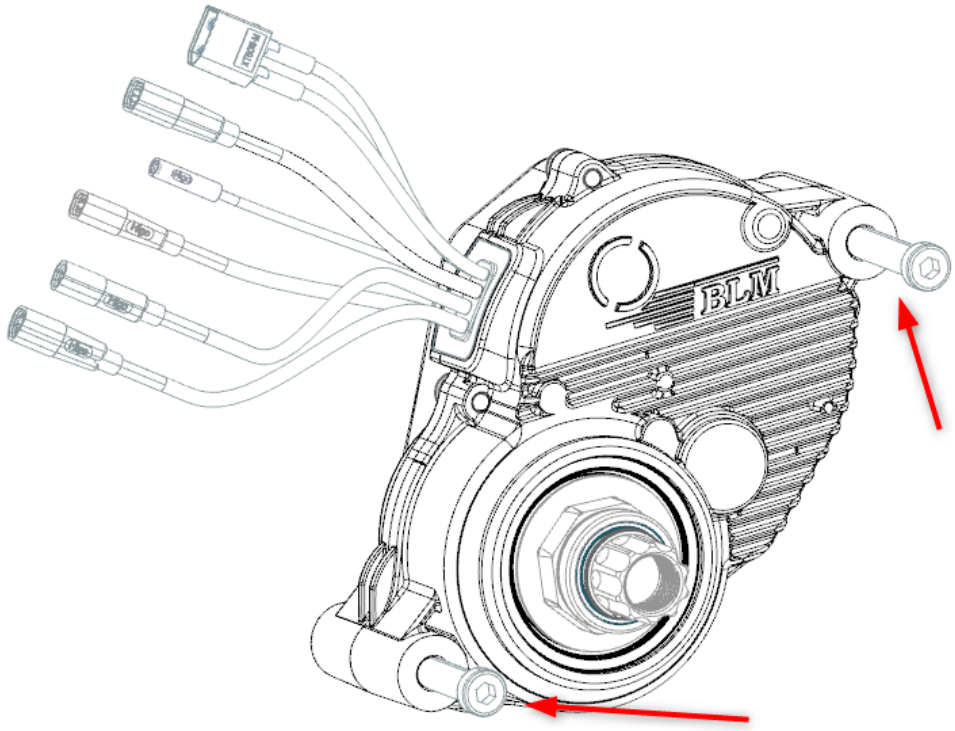


Figure 7-5. Drive Unit frame mounting interface

Table 7-3. Mounting Specifications

PARAMETER	VALUE

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Fastener Quantity	**2**
Fastener Type	**M8**
Tightening Torque	**10-12 Nm**

Refer to Chapter 19 for complete mechanical integration information.

Crank Interface

The Drive Unit uses an ISIS crank interface.

Table 7-4. ISIS Interface Specifications

PARAMETER	VALUE
Interface Type	**ISIS**
Crank Tightening Torque	**38-42 Nm**

Chainring Fixation



Figure 7-6. Chainring locknut

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Table 7-5. Chainring Locknut Specifications

Parameter	Value
Reference	**E5M10Z1126**
Thread Direction	**Right-Hand Thread**
Tightening Torque	**40-42 Nm**

Summary

The BLM Drive Unit serves as the central propulsion element of the BLM ecosystem.

By combining:

- Efficient motor technology
- Integrated sensing
- Advanced electronics
- Professional diagnostics
- Lightweight construction

the Drive Unit provides a highly integrated solution suitable for a wide range of eBike applications.

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8. Electrical Architecture

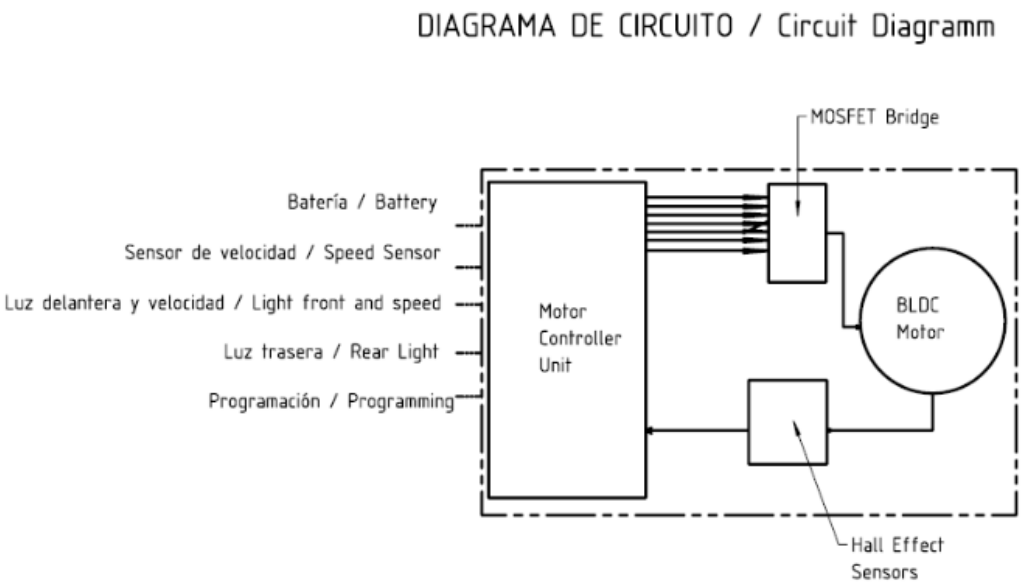


Figure 8-1. Drive Unit system diagram

Introduction

The BLM electrical architecture has been designed to provide reliable communication and power distribution between all major system components.

The architecture combines:

- Power distribution
- CAN communication
- Sensor inputs
- Rider interface connectivity
- Service connectivity
- Accessory support

into a single integrated platform centered around the Drive Unit.

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Architecture Overview

The Drive Unit acts as the central control node of the BLM system.

All major components communicate either directly or indirectly through the Drive Unit MCU.

System Components

The electrical architecture integrates:

- Drive Unit
- Main Battery
- Range Extender
- SEG_D_FI Display
- i_Buttons
- Speed Sensor
- Lighting System
- SEG GUI
- SEG GUI interface

Table 8-1. Main System Components

COMPONENT	FUNCTION
Drive Unit	**Central control and propulsion system**
Main Battery	**Primary energy source**
Range Extender	**Additional energy storage**
SEG_D_FI Display	**Rider information interface**
i_Buttons	**Command interface**
Speed Sensor	**Vehicle speed measurement**
SEG GUI	**Service and diagnostics**
SEG GUI interface	**Service communication interface**

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Drive Unit Control Architecture

The Drive Unit contains:

- Motor Controller Unit (MCU)
- Power MOSFET Bridge
- Torque Sensor Electronics
- Cadence Sensor Electronics
- CAN Communication Controller
- Motor Driver Electronics

These sub systems continuously exchange data to determine assistance demand and system operating status.

The Drive Unit MCU is responsible for:

- Motor control
- Sensor monitoring
- Protection functions
- Communication management
- Diagnostic event logging

Motor Control System

The BLM Drive Unit utilizes a Brushless DC Motor (BLDC).

Motor control requires:

- E-Machine sensor signals
- Phase current monitoring
- Battery voltage monitoring
- MCU temperature monitoring

The MCU continuously adjusts phase currents to provide the requested assistance level.

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Sensor Inputs

The Drive Unit continuously receives information from multiple sources.

Torque Sensor

Measures rider input force.

Used for:

- Assistance calculation
- Rider effort estimation

Cadence Sensor

Measures pedal rotational speed.

Used for:

- Assistance activation
- Assistance modulation

E-Machine sensors

Provide e-Machine position information.

Used for:

- Motor commutation
- Position control
- Fault detection

Speed Sensor

Measures rear wheel rotational speed.

Used for:

- Assistance control
- Distance calculation
- Regulatory compliance

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Figure 8-2. Speed Sensor

Communication Architecture

The BLM system uses CAN communication between major electronic components.

Advantages include:

- Robust data transfer
- Error detection
- Noise immunity
- Diagnostics support

The communication system exchanges:

- Battery information
- System status
- Sensor information
- Diagnostic information
- Rider interface data

Battery Communication

The battery communicates with the Drive Unit through a dedicated communication channel.

Information exchanged includes:

- Battery voltage
- Battery current

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- State of Charge (SOC)
- Fault information
- Temperature information

The MCU continuously validates this information before permitting operation.

Display Communication



Figure 8-3. SEG_D_FI integrated display

The SEG_D_FI communicates with the Drive Unit to exchange:

- Riding information
- Assistance mode information
- Battery status
- Warning events
- Error conditions

The display acts as the primary rider interface.

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Bluetooth Connectivity



Figure 8-4. Bluetooth connectivity between SEG_D_FI and SEG Automotive App SEG Automotive eBikes systems

Wireless communication allows the rider to access selected information through the SEG Automotive APP SEG Automotive eBikes systems.

Supported functions include:

- Activity recording
- Activity analysis
- Assistance customization
- System monitoring

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Display and Remote Control Wiring



Figure 8-5. Display and i_Buttons Y-cable assembly

The SEG_D_FI display and remote i_Buttons are interconnected using the dedicated Y-cable assembly.

The cable provides:

- Power supply
- Data communication
- Command transmission

NOTICE

The left and right i_Button connectors are physically different to prevent incorrect installation.

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Drive Unit Connector Overview

Table 8-2. Drive Unit Connectors

CONNECTOR	FUNCTION
Battery +/-	**Main power supply**
COM Batt	**Battery communication**
Display	**SEG_D_FI communication**
Programming	**Service interface**
Speed Sensor	**Wheel speed input**
Lights	**Lighting power output**

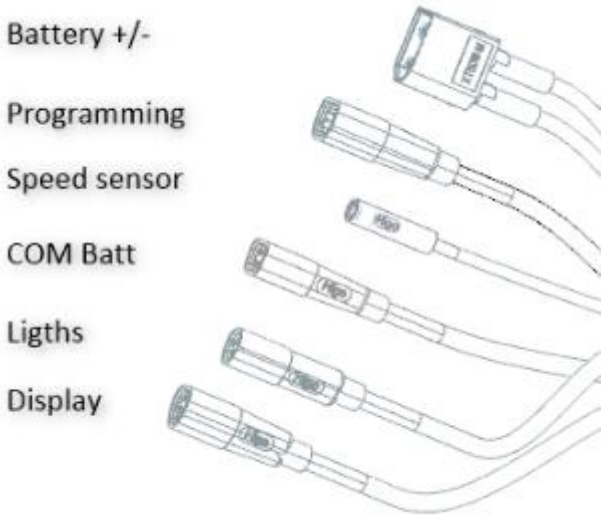


Figure 8-6. BLM Drive Unit connectors

Lighting Output

The Drive Unit includes dedicated lighting outputs.

Supported configurations:

- Front light
- Rear light
- Combined front and rear lighting

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Lighting Output, optional accessories



Figure 8-7. Single light cable accessory

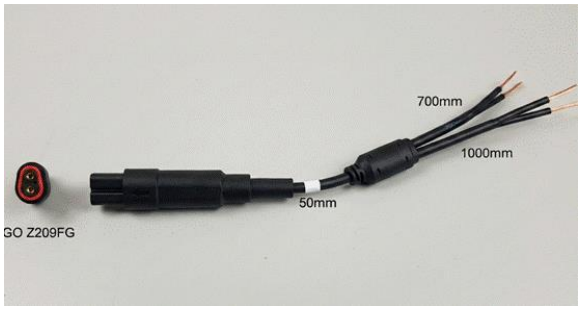


Figure 8-8. Dual light cable accessory



Figure 8-9. Lighting accessories

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WARNING

Lighting systems connected to the Drive Unit shall comply with:

- 36 V operating voltage
- Maximum power consumption of 20 W

For dual-light installations:

- Combined power consumption shall not exceed 20 W

Exceeding these limits may result in Drive Unit damage.

Service Communication Interface

The BLM platform includes a dedicated service communication path.

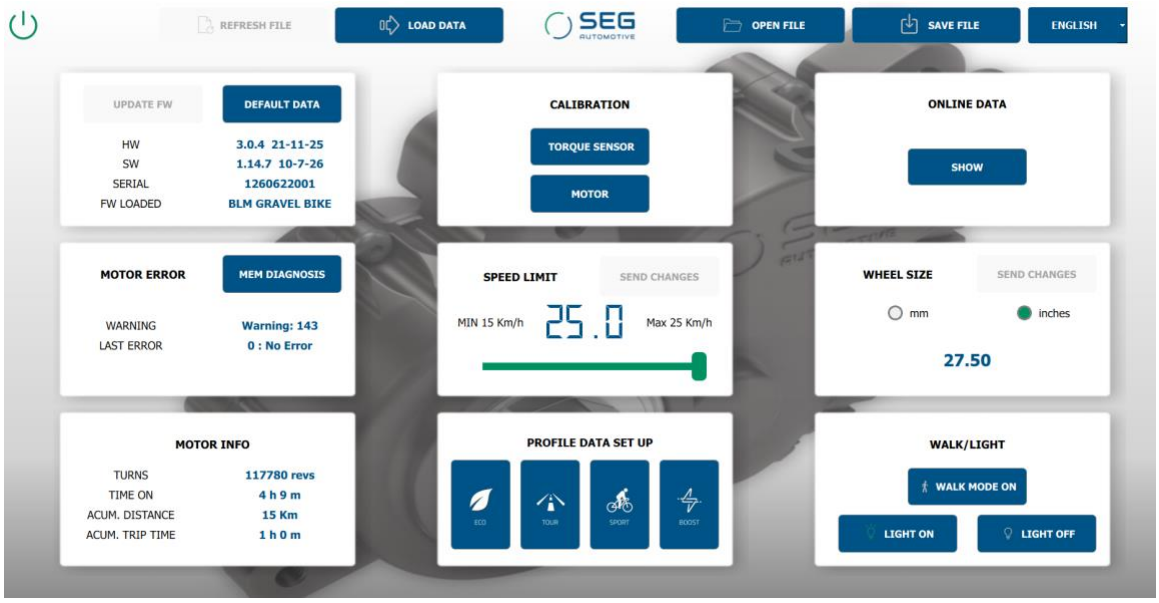


Figure 8-10. SEG GUI interface

The SEG GUI interface enables communication between:

- Service computer
- SEG GUI
- Drive Unit

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Through this interface authorized personnel can perform:

- Diagnostics
- Sensor calibration
- Firmware updates
- Incident reporting
- Configuration management

Online Monitoring

Through SEG GUI the following signals may be monitored in real time:

- Motor current
- Battery voltage
- System temperature
- Rider torque
- Cadence
- Vehicle speed
- Assistance mode
- Error status

This functionality allows advanced diagnostics and service analysis.

System Protection Functions

The Drive Unit continuously supervises:

- Current levels
- Temperature levels
- Sensor signals
- Battery status
- Communication integrity

When abnormal conditions are detected the MCU may:

- Log a warning event

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- Trigger an error condition
- Disable assistance
- Protect hardware components

These functions are described in detail in Chapter 19 – Diagnostics.

Electrical Safety Summary

The BLM electrical architecture has been designed to provide:

- Safe power distribution
- Reliable communication
- Efficient diagnostics
- Robust protection functions

Correct installation and use of approved components are essential for maintaining system integrity.

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9. Main Battery



Figure 9-1. Main Battery

Introduction

The Main Battery is the primary energy storage component of the BLM eBike system.

It supplies electrical power to:

- The BLM Drive Unit
- SEG_D_FI Display
- Lighting outputs
- Communication systems
- Connected accessories

The battery has been specifically developed to support the performance requirements of the BLM platform while maintaining a lightweight and highly integrated installation concept.

Commercial Reference:

Batt BLM 450018990

Product Overview

The Main Battery is an integrated lithium-ion battery pack designed for installation inside the bicycle frame.

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The battery incorporates:

- Lithium-ion cells
- Battery Management System (BMS)
- Protection electronics
- Communication electronics
- Mechanical enclosure

The Battery Management System continuously supervises battery operation and communicates with the Drive Unit.

Battery Specifications

Table 9-1. Main Battery Technical Specifications

PARAMETER	VALUE
Commercial Reference	**450018990**
Battery Type	**Lithium-Ion**
Energy Capacity	**630 Wh**
Weight	**Approx. 2.5 kg**
Length	**465 mm**
Width	**48 mm**
Height	**66 mm**
Protection Rating	**IP65**
Integration Type	**Internal Frame Integration**
Communication	**CAN Communication**

Notice

*The BLM battery pack delivers a theoretical energy capacity of 630 Wh based on the total capacity of the assembled cells. For regulatory and certification purposes, the battery label displays the rated discharge capacity of 599 Wh, as required by EN/IEC 62133:2017. This value reflects the standardized nominal energy available under defined operating conditions and ensures compliance with international battery safety standards.

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Battery Management System (BMS)

The battery incorporates an integrated Battery Management System (BMS).

The BMS continuously monitors:

- Cell voltages
- Charge status
- Discharge status
- Battery current
- Battery temperature
- System protection conditions

The BMS communicates with the Drive Unit to ensure safe and efficient operation.

Energy Management

The battery provides energy to the complete BLM ecosystem.

Depending on operating conditions, energy consumption may vary according to:

- Rider power demand
- Assistance mode
- Terrain
- Ambient temperature
- Bicycle configuration
- Vehicle speed

The BLM MCU continuously optimizes energy usage to maximize efficiency.

Operating Life

Battery capacity naturally decreases over time as a function of use and charging cycles.

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Typical Service Life

Condition	Typical Performance
Approx. 1000 charge cycles	**~80% remaining capacity**
Approx. 2000 charge cycles	**Functional operation typically maintained**

Actual lifetime depends on:

- Charging behavior
- Storage conditions
- Operating temperatures
- Riding profile

Battery Installation

The Main Battery must be installed according to the bicycle manufacturer's instructions.

NOTICE

Proper installation is required to ensure:

- Electrical integrity
- Water protection
- Mechanical retention
- Communication reliability

The battery shall be fully seated in its mounting location before operation.

Battery Removal

When removing the battery:

1. Power off the bicycle.
2. Follow bicycle manufacturer instructions.
3. Support the battery during removal.
4. Protect connector interfaces from contamination.

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CAUTION

Do not pull electrical cables during battery removal.

Damage to connectors or wiring may result.

Battery Storage

For extended storage periods, SEG eBike Systems recommends:

- Maintaining approximately 80% state of charge.
- Storing the battery in a dry location.
- Protecting the battery from direct sunlight.
- Avoiding excessive temperatures.
- Recharge every two months if not in use.

NOTICE

Long-term storage at full charge or fully discharged conditions may reduce battery lifetime.

Charging Procedure

1. Place the bicycle in a dry, well-ventilated area.
2. Verify the charger and cables are undamaged.
3. Connect the charger to the battery.
4. Connect the charger to the AC power source.
5. Monitor charger LED indications.

Typical charging time:

Approximately 4 hours.

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State of Charge

Battery state of charge is displayed through:

- SEG_D_FI Display
- SEG Automotive APP SEG Automotive eBikes systems
- SEG GUI

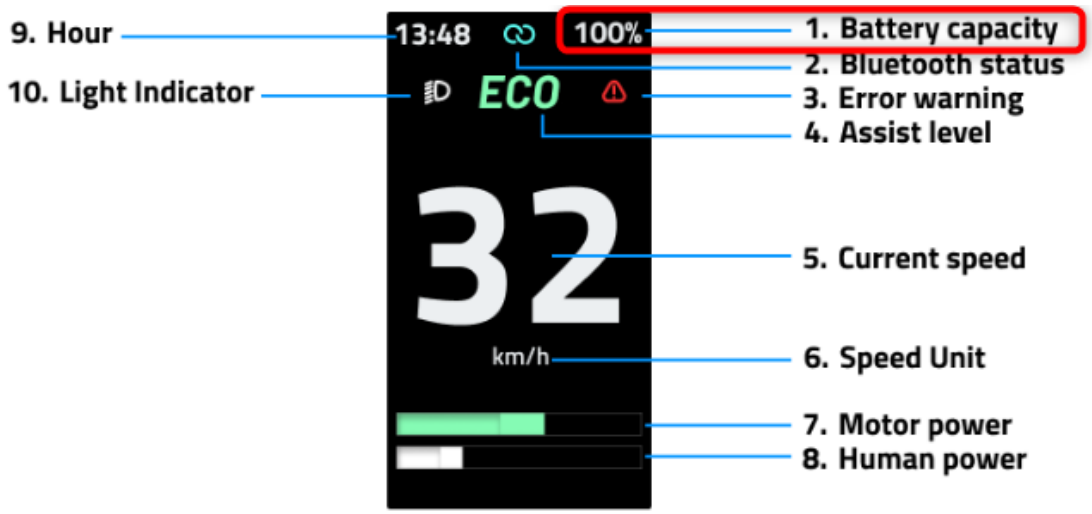


Figure 9-2. Battery status indication on the SEG_D_FI display

Battery information available to the rider may include:

- Remaining charge level
- Battery icon
- Estimated operating status

Additional battery information is available through SEG GUI.

Charging

The Main Battery shall only be charged using approved charging equipment.

Approved charger:

CHARGER TB BLM CARB 16480109A

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Charging Recommendations

For maximum service life:

- Charge in dry environments.
- Use approved charging equipment only.
- Avoid extreme temperatures during charging.
- Disconnect the charger when charging is complete.

NOTICE

Charging times may vary depending on battery temperature, state of charge and environmental conditions.

Typical charging time:
Approximately 4 hours.

Storage Recommendations

When the bicycle will not be used for extended periods:

Recommended Storage Conditions

- Store indoors.
- Protect from moisture.
- Protect from direct sunlight.
- Maintain approximately 80% charge level.
- Recharge every two months.

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NOTICE

Long-term storage at 100% charge or completely discharged conditions may reduce battery lifetime.

Battery Sleep Mode

To protect the battery and minimize self-discharge during extended periods of inactivity, the battery automatically enters Sleep Mode when the system remains powered off for a certain period of time. The sleep activation period depends on the battery state of charge and may range from approximately 2 to 7 days.
When the battery is in Sleep Mode, the system may not power on normally. In this case, the battery can be reactivated by connecting the approved charger for approximately 5 seconds.
Once awakened, the battery returns to normal operation and the system can be powered on as usual.

NOTICE

The battery Sleep Mode is a normal protective function designed to preserve battery health and reduce energy consumption during storage or extended periods of non-use.

Temperature Considerations

Table 9-2. Recommended Temperature Conditions

CONDITION	RECOMMENDATION
Operation	**-10 °C to +40 °C**
Storage	**Dry indoor environment**
Charging	**Moderate ambient temperature**

Operation outside recommended limits may reduce:

- Available capacity
- Charging efficiency
- Overall battery lifetime

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Water Protection

The battery is designed for normal bicycle operation in outdoor environments.

Protection rating:

IP65

This allows operation in:

- Rain
- Splash conditions
- Typical outdoor environments

WARNING

The battery is not designed for:

- Submersion
- Pressure washer cleaning
- Steam cleaning

High-pressure water may compromise sealing performance and reduce service life.

Transportation

Lithium-ion batteries are regulated products.

NOTICE

Before transporting the bicycle:

- Verify applicable regulations.
- Follow bicycle manufacturer recommendations.
- Follow local transportation requirements.

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Special restrictions may apply to:

- Air transport
- Commercial shipping
- International transportation

Battery Fault Conditions

The BMS continuously monitors battery operation.

Potential abnormal conditions include:

- Overvoltage
- Undervoltage
- Overtemperature
- Excessive current
- Communication faults

When abnormal conditions are detected, the system may:

- Generate warnings
- Generate error conditions
- Limit assistance
- Disable operation

These actions are intended to protect the battery and the overall BLM system.

Dealer Service Information

Battery diagnostics may be performed using:

- SEG GUI dealer (SW)
- SEG GUI manufacturer (SW)

Functions include:

- Battery status analysis
- Error review

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- Communication verification
- System reporting

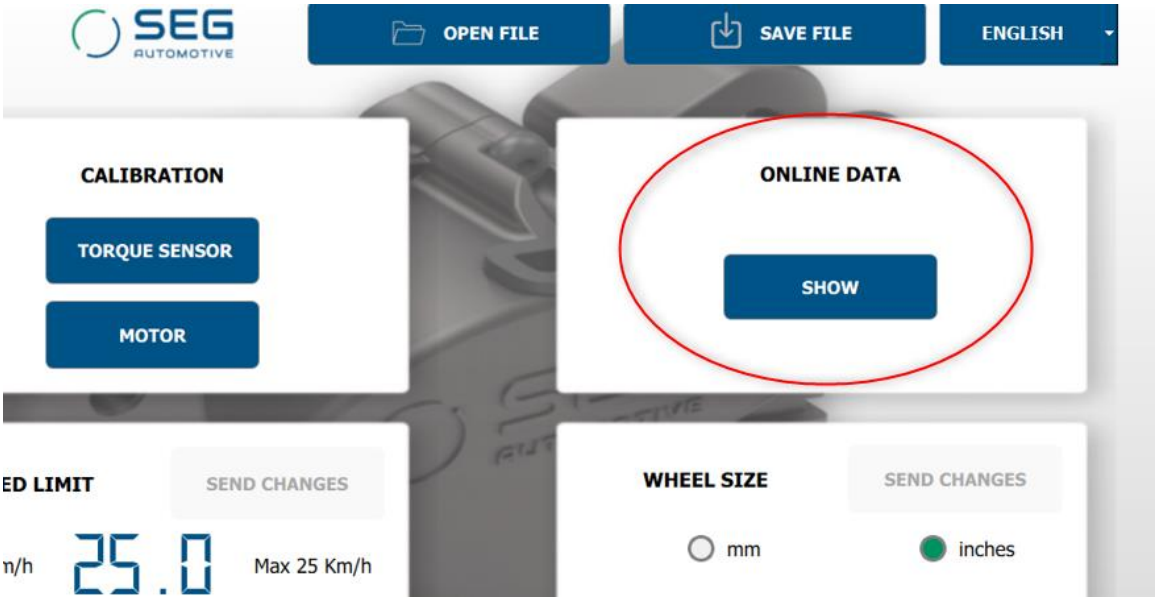


Figure 9-3. Battery information available through SEG GUI

Battery Safety Summary

The Main Battery is a critical component of the BLM ecosystem.

Safe operation requires:

- Approved charging equipment
- Correct installation
- Proper storage
- Protection from damage
- Compliance with transportation requirements

Following these recommendations helps maximize battery lifetime and system reliability.

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10. Range Extender



Figure 10-1. Range Extender

Introduction

The Range Extender is an optional auxiliary battery designed to increase the total available energy capacity of the BLM system.
When installed, the Range Extender operates together with the Main Battery to provide extended riding range without affecting normal system operation.
The Range Extender has been developed to integrate seamlessly with the BLM ecosystem through dedicated mechanical and electrical interfaces.

Commercial Reference:

BATT BOTT TB XPRO 180Wh BH/SH 450011376

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Product Overview

The Range Extender incorporates:

- Lithium-ion battery cells
- Integrated battery electronics
- Battery Management System (BMS)
- Mechanical mounting interface
- Electrical connection interface

The unit is designed to be mounted using a dedicated bicycle frame receptacle developed by the bicycle manufacturer.

Technical Specifications

Table 10-1. Range Extender Technical Specifications

PARAMETER	VALUE
Commercial Reference	**450011376**
Battery Type	**Lithium-Ion**
Energy Capacity	**180 Wh**
Weight	**Approx. 1.0 kg**
Length	**195 mm**
Diameter	**73.5 mm**
Protection Rating	**IP65**
Installation Concept	**External frame mounting**
Communication	**Integrated with BLM battery management architecture**

Total System Energy Capacity

The Range Extender supplements the capacity of the Main Battery.

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Table 10-2. Energy Capacity Configurations

CONFIGURATION	CAPACITY
Main Battery Only	**630 Wh**
Main Battery + Range Extender	**810 Wh**

The total available energy depends on system configuration and bicycle integration.

Operating Principle

When connected to the system, the Range Extender operates together with the Main Battery.

Energy management is performed automatically by the battery management system.

The rider is not required to perform any manual switching or configuration.

Functions controlled automatically include:

- Energy distribution
- Current balancing
- Voltage management
- State-of-charge monitoring
- Protection management

Integrated Battery Management

The BLM battery architecture continuously supervises both energy sources.

The battery management strategy:

- Monitors both batteries simultaneously.
- Controls current flow.
- Ensures system protection.
- Maintains stable Drive Unit operation.

The complete process is transparent to the rider.

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Range Extender Connection Interface



Figure 10-2. Range Extender electrical connection interface

The Range Extender connects through an integrated electrical and mechanical interface located within the dedicated mounting receptacle.

The interface provides:

- Power transfer
- Communication
- Automatic electrical connection
- Secure positioning

No external electrical cables are required.

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Installation Concept



Figure 10-3. Example of BLM system integration with Range Extender installed

The Range Extender is intended to be installed using the dedicated mounting interface supplied by the bicycle manufacturer.

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WARNING

The Range Extender shall only be installed in approved mounting systems developed for the BLM platform.

Use of non-approved mounting solutions may result in:

- Mechanical instability
- Electrical interface damage
- Water ingress
- Reduced system reliability

Installation Procedure

1. Verify the mounting interface is clean.
2. Verify connector interfaces are free from contamination.
3. Align the Range Extender with the mounting receptacle.
4. Insert the battery until the locking mechanism engages.
5. Verify secure retention before use.

Removal Procedure

1. Power off the bicycle.
2. Release the mechanical retention mechanism.
3. Carefully remove the Range Extender.
4. Protect connector surfaces from contamination.

CAUTION

Do not pull-on electrical contacts or attempt to rotate the battery during removal unless specified by the bicycle manufacturer.

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Environmental Protection

The Range Extender has been designed for outdoor bicycle operation.

Protection characteristics include resistance to:

- Rain
- Splash water
- Typical road contaminants

Protection rating:

IP65

WARNING

The Range Extender is not designed for:

- Water immersion
- Pressure washer cleaning
- Steam cleaning
- Direct exposure to high-pressure water jets

Failure to follow these recommendations may compromise system sealing and reliability.

Charging

The Range Extender is managed automatically as part of the BLM battery ecosystem.

Charging behavior depends on bicycle implementation and battery management strategy.

NOTICE

Only approved charging equipment shall be used.

Approved charger:

CHARGER TB BLM CARB 16480109A

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Storage Recommendations

For extended storage periods:

- Store in a dry environment.
- Maintain approximately 80% state of charge.
- Protect from direct sunlight.
- Recharge periodically when not in use.

These recommendations help maximize battery lifetime.

Service Life

Battery capacity naturally decreases over time and usage.

Actual service life depends on:

- Number of charging cycles
- Storage conditions
- Operating temperature
- Riding profile
- Charging practices

The Range Extender has been designed to provide reliable long-term operation when maintained according to the recommendations contained within this manual.

Diagnostics

Battery status information may be reviewed through:

- SEG_D_FI Display
- SEG Automotive APP SEG Automotive eBikes systems
- SEG GUI dealer (SW)
- SEG GUI manufacturer (SW)

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Figure 10-4. Battery monitoring and diagnostic functions available through SEG GUI

Diagnostic information may include:

- State of charge
- Communication status
- Operating conditions
- Warning events
- Error conditions

Transportation

As with all lithium-ion battery systems, transportation may be subject to local regulations.

NOTICE

Before air transport or commercial shipment:

- Verify applicable regulations.
- Follow local transportation requirements.
- Consult the transportation provider when necessary.

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After Sales Availability

Replacement Range Extenders and related accessories may be obtained through the official BLM after-sales platform:

https://seg.ecoelectric21.com

Email: partsecoseg@gmail.com

Only approved replacement components shall be used.

Summary

The Range Extender provides a convenient method of increasing total available energy capacity within the BLM ecosystem.

Key benefits include:

- Increased riding range
- Integrated battery management
- Fully automatic operation
- Compact installation concept
- Seamless system integration

When combined with the Main Battery, the complete system provides a total energy capacity of **810 Wh**.

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11. Charging System



Figure 11-1. Approved charger for the BLM battery system



Figure 11-2. Charging port

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Introduction

The charging system is responsible for restoring energy to the Main Battery and the Range Extender, ensuring safe and reliable operation of the BLM platform.

The charging system has been designed to work exclusively with approved battery systems and charging equipment compatible with the BLM ecosystem.

Only approved charging equipment shall be used.

Approved Charger

The BLM system has been validated using the following charger:

Commercial Reference

CHARGER TB BLM CARB

Charger Model

16480109A



Figure 11-3. Charger identification label and electrical characteristics

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Technical Specifications

Table 11-1. Technical specifications of the approved charger for the BLM battery system

PARAMETER	VALUE
Commercial Reference	**CHARGER TB BLM CARB**
Manufacturer	**SEG_BH**
Model	**16480109A**
Input Voltage	**100–240 V AC**
Input Frequency	**50–60 Hz**
Maximum Input Current	**2.5 A**
Output Voltage	**42 V DC**
Output Current	**4 A**
Battery Compatibility	**Batt BLM 450018990**
Typical Charging Time	**Approximately 4 hours**
Charging Method	**Constant Current / Constant Voltage (CC/CV)**
Intended Use	**Main Battery Charging**
Protection	**Internal charger protections according to manufacturer specifications**

Charging Principle

The charger uses a Constant Current / Constant Voltage (CC/CV) charging strategy commonly used for lithium-ion battery systems.

The charging process is automatically controlled and monitored by:

- Charger electronics
- Battery Management System (BMS)
- Drive Unit communication functions

No user intervention is required during charging.

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Charging Procedure

Standard Charging Procedure

1. Park the bicycle in a dry and well-ventilated area.
2. Verify that the charger and connectors are free from damage.
3. Connect the charger to the battery charging interface.
4. Connect the charger to the AC power supply.
5. Verify charger LED status.
6. Allow the charging process to complete.
7. Disconnect the charger from the AC supply.
8. Disconnect the charger from the bicycle.

WARNING

Only use approved charging equipment.

The use of unauthorized chargers may result in:

- Battery damage
- Fire hazard
- Reduced battery lifetime
- Charging failure
- Loss of warranty coverage

LED Indications

The charger uses a visual LED status indicator.

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Table 11-2. Charger LED Status Indications

LED STATUS	OPERATING STATE
Green	**Standby**
Red	**Charging**
Flashing Red	**Charging abnormality**
Green (after charging)	**Fully charged**

Charger Status Interpretation

Green LED

Indicates:

- Charger connected to AC power
- No charging in progress
- Charging completed

Red LED

Indicates:

- Normal charging operation
- Energy transfer to battery is active

No user action is required.

Flashing Red LED

Indicates:

- Abnormal charging condition
- Battery fault

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- Charging interruption
- Connection issue

CAUTION

If the LED remains flashing red:

1. Disconnect the charger.
2. Verify all connectors.
3. Inspect the battery.
4. Contact an authorized dealer if the condition persists.

Charging Time

Charging duration depends on:

- Battery state of charge
- Battery temperature
- Ambient temperature
- Battery age

Typical charging duration for a depleted Main Battery:

Table 11-3. Typical Charging Information

CONDITION	TYPICAL TIME
Main Battery Charging	**Approximately 4 hours**

Charging times may vary.

Charging Environment

For optimum charging performance:

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- Charge indoors whenever possible.
- Avoid direct sunlight.
- Maintain moderate temperatures.
- Ensure adequate ventilation.

NOTICE

Extreme temperatures may increase charging time and reduce charging efficiency.

Battery Temperature Considerations

The Battery Management System continuously supervises battery temperature during charging.

Protective functions may:

- Reduce charging current.
- Interrupt charging.
- Prevent charging outside acceptable conditions.

These protections are normal system functions designed to ensure battery safety.

Storage Charging Recommendations

When a bicycle will not be used for an extended period:

Recommended Practice

- Charge battery to approximately 80%.
- Store in a dry location.
- Recharge approximately every two months.

NOTICE

Long-term storage at full charge or completely discharged conditions may reduce battery lifetime.

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Charging Safety

WARNING

Never:

- Cover the charger during operation.
- Use damaged charging cables.
- Modify charging connectors.
- Expose the charger to rain while charging.
- Operate the charger with visible damage.

Doing so may result in:

- Fire
- Electric shock
- Charger failure
- Battery damage

Charger Inspection

Before use, verify:

- Housing condition
- Connector condition
- Cable condition
- Label readability

The charger shall not be used if mechanical damage is observed.

After Sales Availability

Replacement chargers may be obtained through the official BLM after-sales platform:

https://seg.ecoelectric21.com

Email: partsecoseg@gmail.com

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Only approved replacement chargers shall be used.

Summary

The charging system has been designed to provide safe and reliable battery charging for the BLM ecosystem.

Key characteristics include:

- Approved lithium-ion charging strategy
- Automatic battery management
- Integrated protection functions
- Global AC input compatibility
- Simple user operation

Correct charging practices contribute significantly to battery lifetime, safety and overall system reliability.

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12. SEG_D_FI Display



Figure 12-1. SEG_D_FI integrated display

Introduction

The SEG_D_FI Display is the primary rider information interface of the BLM ecosystem.
Designed for seamless OEM integration, the display combines essential riding information, battery status, assistance mode selection and system notifications within a compact housing integrated into the bicycle frame.
The SEG_D_FI has been developed to provide:

- Clear readability
- Minimal visual impact
- Intuitive user interaction
- Bluetooth connectivity
- Real-time riding information

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Table 12-1. Display relevant data

PARAMETER	VALUE
Commercial Name	**SEG_D_FI**
Meaning	**SEG Automotive Display Frame Integrated**
Supplier Platform	**BC202**
Reference	**E5H1000001**

Product Overview

The SEG_D_FI display provides a direct communication channel between the rider and the BLM system.

The display exchanges information with the Drive Unit and presents operating data in real time.

Functions include:

- Speed indication
- Battery status
- Assistance mode indication
- Riding metrics
- Warning notifications
- Error notifications
- Bluetooth status

The display operates in conjunction with the remote i_Buttons.

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Figure 12-2. SEG_D_FI Visualization screens

Display Integration Concept



Figure 12-3. SEG_D_FI display integrated into the bicycle top tube.

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The SEG_D_FI has been specifically designed for frame integration.

Benefits include:

- Improved aesthetics
- Reduced exposure to impacts
- Improved weather protection
- Enhanced product differentiation

The integration concept assists OEM manufacturers in achieving a clean and modern bicycle design.

During operation the display may provide:

- Vehicle speed
- Assistance level
- Battery charge status
- Bluetooth connectivity status
- Riding information

Displayed information may vary depending on software configuration and OEM implementation.

Display Functions

Table 12-2. SEG_D_FI Main Functions

FUNCTION	DESCRIPTION
Speed Display	**Current bicycle speed**
Battery Display	**State of charge indication**
Assistance Mode	**Active support level**
Bluetooth Status	**Smartphone connection status**
Warning Display	**Warning event indication**
Error Display	**Active error indication**
System Status	**Operating information**

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User Information

The SEG_D_FI continuously receives information from the Drive Unit.

Typical information available to the rider includes:

Riding Information

- Current speed
- Assistance mode
- Battery status

System Information

- Active connections
- System status
- Warning notifications
- Error notifications

Battery Status Indication

The SEG_D_FI provides visual indication of battery status.

Battery information may be represented by:

- Segmented battery icon
- Percentage indication (OEM-dependent)
- Battery warning messages

Battery status is continuously updated during operation.

Assistance Mode Display

The currently selected assistance mode is displayed at all times.

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Typical assistance profiles may include:

- ECO
- TOUR
- SPORT
- BOOST

The exact profile naming and configuration may vary depending on OEM implementation.

Bluetooth Connectivity

The SEG_D_FI acts as the communication gateway between the bicycle and the SEG Automotive APP SEG Automotive eBikes systems.

Bluetooth connectivity allows:

- Activity synchronization
- Monitoring
- Assistance profile customization
- System information exchange

Pairing is performed through the SEG Automotive APP SEG Automotive eBikes systems.

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Smartphone Connectivity



Figure 12-4. SEG_D_FI and smartphone connectivity ecosystem

Once paired, the rider may access:

- Vehicle information
- Activity history
- Assistance settings
- Data analysis

through the SEG Automotive APP SEG Automotive eBikes systems.

Warning and Error Display

The SEG_D_FI provides notification when diagnostic events occur.

Displayed events may include:

- Warning Events
- Error Conditions
- Fault indications

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NOTICE

The presence of an error code does not necessarily indicate a permanent Drive Unit fault.
Diagnostic codes must be interpreted together with the operating conditions recorded when the event occurred.
Detailed diagnostic information is available through SEG GUI.

Error Display Philosophy

The SEG_D_FI provides information intended for the rider.
Detailed diagnosis shall be performed using:

- SEG GUI dealer (SW)
- SEG GUI manufacturer (SW)

The display should therefore be considered an indication interface rather than a complete diagnostic tool.

Power-On Sequence

When the system is powered on:

1. The Drive Unit performs internal checks.
2. Communication with connected devices is verified.
3. Battery status is validated.
4. System status is displayed.

If no issues are detected, the system enters normal operating mode.

Power-Off Sequence

The rider may turn off the system using the designated control button.

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Before shutdown:

- Active communication is terminated.
- Display information is saved.
- System power consumption is minimized.

Environmental Protection

The SEG_D_FI has been designed for bicycle operating environments.

The display is suitable for:

- Outdoor use
- Rain exposure
- Splash exposure

when installed according to OEM recommendations.

Cleaning

CAUTION

Do not clean the display using:

- Pressure washers
- Steam cleaners
- High-pressure water systems

To clean the display:

1. Use a soft cloth.
2. Remove loose dirt.
3. Use a damp cloth if necessary.
4. Dry after cleaning.

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Service Information

The SEG_D_FI may be diagnosed through the BLM service architecture using:

- SEG GUI dealer (SW)
- SEG GUI manufacturer (SW)
- SEG GUI interface (E5D10A0000)

Information available includes:

- Firmware version
- Communication status
- Error history
- System configuration

Replacement

Replacement SEG_D_FI displays are available through the official after-sales platform:

https://seg.ecoelectric21.com

Email: partsecoseg@gmail.com

Only approved replacement displays shall be used.

Summary

The SEG_D_FI serves as the primary rider information interface of the BLM ecosystem.

Key benefits include:

- Seamless frame integration
- Real-time riding information
- Bluetooth connectivity
- Warning and error indication
- Compatibility with the SEG Automotive APP SEG Automotive eBikes systems

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The SEG_D_FI combines aesthetics, functionality and connectivity in a compact integrated display solution.

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13. i_Buttons



Figure 13-1. Left and right i_Buttons

Introduction

The i_Buttons serve as the primary rider control interface of the BLM ecosystem.

The buttons provide access to the most frequently used functions of the bicycle without requiring direct interaction with the SEG_D_FI display.

The i_Buttons have been designed to:

- Minimize rider distraction.
- Improve accessibility.
- Enable intuitive control.
- Support integration into multiple handlebar concepts.
- Maintain a clean cockpit appearance.

Commercial References:

E5H1000004 – Left i_Button

E5H1000005 – Right i_Button

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Product Overview

The i_Button system consists of:

- Left control unit.
- Right control unit.
- Dedicated communication wiring.
- Connection interface to the SEG_D_FI Display.

The control units are designed to operate in conjunction with the SEG_D_FI display and cannot function independently.

Main Functions

Table 13-1. i_Button Functions

FUNCTION	DESCRIPTION
Assistance Level Selection	**Change assistance modes**
Menu Navigation	**Navigate display menus**
Light Control	**Activate lighting system**
Walk Assist	**Activate walk assistance function**
Display Interaction	**Access SEG_D_FI functions**

The exact functionality may depend on OEM configuration.

Integration Concept

One of the key design objectives of the i_Button system was minimizing visual impact.
The compact housing allows OEM manufacturers to integrate the controls discreetly within the handlebar area.
Benefits include:

- Improved cockpit appearance.
- Reduced component visibility.

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- Comfortable rider access.
- Enhanced ergonomics.

Frame Integration (FI)



Figure 13-2. Typical SEG_D_FI and remote control integration concept

The i_Buttons are intended to be positioned within easy reach of the rider's hands.

Recommended positioning should allow operation without releasing the handlebar grip.

Assistance Mode Selection

The i_Buttons allow the rider to switch between available assistance modes.

Typical configurations may include:

- ECO
- TOUR
- SPORT
- BOOST

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Depending on bicycle manufacturer settings.

When a new assistance mode is selected:

- The Drive Unit updates assistance behavior.
- The SEG_D_FI display updates the corresponding indication.
- The modification is immediately applied.

Walk Assist Function

When enabled by the OEM, the i_Buttons may activate Walk Assist mode.

Walk Assist provides low-speed propulsion assistance while walking beside the bicycle.

Typical applications include:

- Ramps.
- Steep paths.
- Pedestrian areas.
- Technical terrain.

CAUTION

Walk Assist shall only be used while walking beside the bicycle.

The rider should maintain full control of the bicycle during operation.

Lighting Control

The i_Buttons provide access to the integrated lighting system.

Functions may include:

- Front/rear light activation.
- Lighting status indication.

NOTICE

Lighting functionality depends on bicycle configuration and accessory installation.

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User Interaction

The i_Buttons are designed to provide tactile feedback and intuitive operation.

The control strategy prioritizes:

- Simplicity.
- Safety.
- Minimal rider distraction.

All essential ride functions can be accessed without removing attention from the riding environment.

Electrical Connection

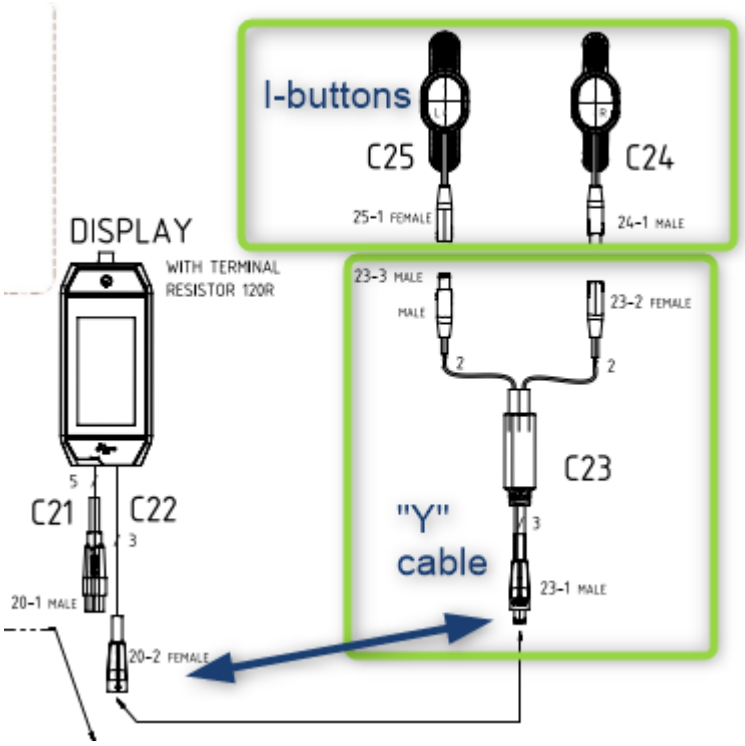


Figure 13-3. Display and i_Button Y-cable assembly

The left and right i_Buttons communicate with the SEG_D_FI display through the dedicated Y-cable assembly.

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The cable provides:

- Power supply
- Communication signals
- Command transmission

Connector Design

NOTICE

The connectors used for the left and right i_Buttons are physically different.
This design prevents incorrect installation and ensures proper connection during assembly and service operations.
The connector geometry eliminates the possibility of swapping the left and right controls.

Technical Specifications

Table 13-2. i_Button Components

COMPONENT	REFERENCE
Left i_Button	**E5H1000004**
Right i_Button	**E5H1000005**
Y-Cable	**E5H1000003**

Environmental Protection

The i_Buttons have been developed for outdoor bicycle operation.
They are intended for use in:

- Rain.
- Splash conditions.
- Dusty environments.
- Typical off-road conditions.

when installed according to OEM recommendations.

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Cleaning

CAUTION

Do not clean the i_Buttons using:

- Pressure washers.
- Steam cleaners.
- High-pressure water systems.

Recommended cleaning method:

1. Remove loose dirt.
2. Use a damp cloth.
3. Dry after cleaning.

Diagnostics

The i_Buttons are monitored by the BLM system.

Communication issues may be detected and logged by the Drive Unit.

Diagnostic functions are available through:

- SEG GUI dealer (SW)
- SEG GUI manufacturer (SW)

Information available may include:

- Communication status.
- Input status.
- Display communication health.

Replacement

Replacement i_Buttons can be obtained through the official after-sales portal:

https://seg.ecoelectric21.com

Email: partsecoseg@gmail.com

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Only approved replacement parts shall be used.

Summary

The i_Buttons provide the primary rider control interface of the BLM system.

Key advantages include:

- Compact integration.
- Intuitive operation.
- Assistance mode control.
- Walk Assist activation.
- Lighting control.
- Compatibility with the SEG_D_FI display.

The combination of SEG_D_FI and i_Buttons creates a simple and effective rider interface suitable for a wide range of bicycle applications.

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14. Speed Sensor



Figure 14-1. Speed Sensor

Introduction

The Speed Sensor provides wheel speed information to the BLM Drive Unit and represents a critical input for assistance control, riding statistics and regulatory compliance.

The Drive Unit continuously monitors speed information to determine:

- Rider assistance availability
- Assistance modulation
- Distance calculation
- Ride statistics
- Vehicle operating status

Commercial Reference:

E5D1000001

Product Overview

The Speed Sensor consists of:

- Sensor assembly
- Integrated connection cable
- Magnetic trigger target
- Drive Unit communication interface

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The sensor is installed on the bicycle frame and detects wheel rotation through the passage of the corresponding magnetic target.

Main Functions

Table 14-1. Speed Sensor Functions

FUNCTION	DESCRIPTION
Speed Measurement	**Vehicle speed calculation**
Distance Measurement	**Accumulated ride distance**
Ride Statistics	**Activity recording support**
Assistance Control	**Assistance management**
Compliance Support	**Regulatory speed supervision**

Operating Principle

The Speed Sensor detects wheel movement by monitoring the passage of a magnetic target positioned on the rotating wheel.

Each detection event generates a signal that is transmitted to the Drive Unit.

The Drive Unit uses this information to calculate:

- Vehicle speed
- Travel distance
- Ride statistics

The calculated values are subsequently used throughout the BLM ecosystem.

System Integration

The sensor connects directly to the dedicated Speed Sensor interface on the Drive Unit.

No external signal conditioning equipment is required.

The Drive Unit continuously validates signal quality and sensor status.

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Speed Information Usage

The measured speed information is distributed throughout the BLM ecosystem.

SEG_D_FI Display

Speed data is displayed to the rider in real time.

SEG Automotive APP SEG Automotive eBikes systems

Speed information is recorded as part of activity data.

SEG GUI

Speed information is available through online monitoring functions.

Displayed Information



Figure 14-2. Parameters in display related to speed sensor measurement

Vehicle speed is one of the primary parameters presented to the rider.

The displayed value is continuously updated during riding.

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Activity Recording



Figure 18-4. Speed record in APP SEG Automotive eBikes systems activity

Speed data forms part of the activity information stored by the SEG Automotive APP SEG Automotive eBikes systems.

Typical activity analysis may include:

- Current speed
- Average speed
- Maximum speed
- Speed versus time

This information supports ride evaluation and performance analysis.

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Sensor Installation

The exact mounting position depends on bicycle design and OEM implementation. The Speed Sensor is supplied with an integrated cable and connector for direct connection to the BLM Drive Unit.
Typical requirements include:

- Secure attachment.
- Stable alignment.
- Appropriate clearance to the magnetic target.
- Protection from accidental impacts.

NOTICE

The position of the magnetic target relative to the sensor shall comply with OEM specifications. Incorrect positioning may result in unreliable speed detection.

Electrical Connection

The sensor is supplied with an integrated cable assembly designed for direct connection to the Drive Unit.
Benefits include:

- Simplified installation
- Improved reliability
- Reduced connector count
- Enhanced environmental protection

Environmental Protection

The Speed Sensor has been developed for outdoor bicycle environments.
Suitable operating conditions include:

- Dry roads
- Wet roads

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- Rain
- Dust exposure
- Typical off-road usage

when installed according to OEM requirements.

Cleaning

CAUTION

Do not clean the Speed Sensor using:

- Pressure washers
- Steam cleaners
- High-pressure water systems

Cleaning should be carried out using:

- Soft brushes
- Damp cloths
- Low-pressure water methods

Diagnostic Monitoring

The Drive Unit continuously monitors Speed Sensor activity.

Diagnostic functions may detect:

- Missing speed signal
- Intermittent signal
- Wiring issues
- Sensor positioning issues

These events may generate:

- Warning Events
- Error Conditions

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- Fault records

depending on operating circumstances.

Troubleshooting

Vehicle Speed Not Displayed

Potential causes include:

- Sensor misalignment
- Missing magnetic target
- Wiring damage
- Connector issue
- Sensor failure

Intermittent Speed Reading

Potential causes include:

- Excessive sensor gap
- Loose magnetic target
- Cable routing issues
- Connector contamination

Assistance Not Operating Correctly

Because speed information is used by the Drive Unit, incorrect speed signals may influence:

- Assistance behavior
- Distance calculations
- Activity recording

The Speed Sensor should therefore be inspected whenever abnormal speed-related behavior occurs.

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Verification Through SEG GUI

SEG GUI allows service personnel to:

- Verify speed signal activity
- Monitor speed values in real time
- Confirm sensor functionality
- Support troubleshooting activities

This significantly simplifies diagnostics.

Replacement

Replacement Speed Sensors are available through the official after-sales portal:

https://seg.ecoelectric21.com

Email: partsecoseg@gmail.com

Only approved replacement components shall be used.

Service Recommendations

Periodic inspection of the Speed Sensor should include:

- Sensor condition
- Cable condition
- Mounting security
- Alignment verification
- Connector inspection

These checks help maintain reliable operation throughout vehicle life.

Summary

The Speed Sensor is a key input device within the BLM ecosystem.

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Its information is used for:

- Vehicle speed display
- Ride statistics
- Activity recording
- Assistance management
- Diagnostics

Proper installation and maintenance are essential to ensure reliable Drive Unit operation and accurate rider information.

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15. APP SEG Automotive eBikes systems

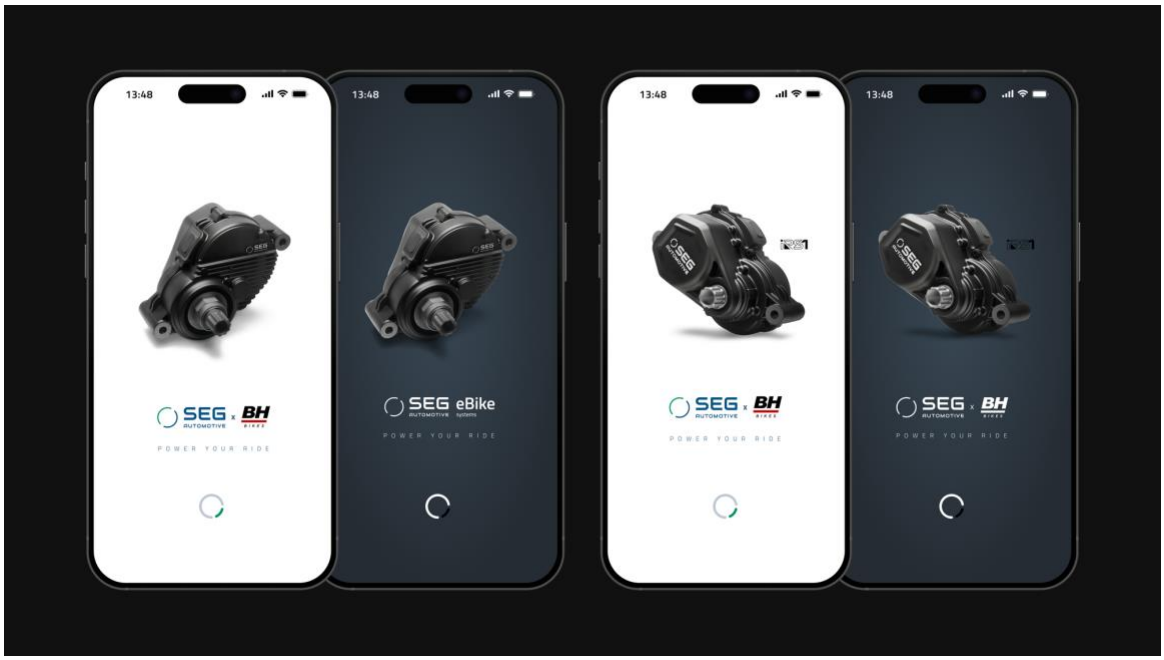


Figure 15-1. SEG Automotive APP SEG Automotive eBikes systems

Introduction

The SEG Automotive APP SEG Automotive eBikes systems provides wireless access to selected BLM system functions through a Bluetooth connection established between the smartphone and the SEG_D_FI display.

User can download APP SEG AUTOMOTIVE EBIKES SYSTEMS from:

Android:

- https://play.google.com/store/apps/details?id=com.SEGautomotive.ebikeSystemsy

IOS:

- https://apps.apple.com/es/app/seg-automotive-ebike-systems/id6762013268

The application has been designed to enhance the rider experience by providing:

- System monitoring
- Activity recording
- Activity analysis

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- Assistance profile customization
- Historical data management

The application complements the SEG_D_FI display and extends the information available to the rider.

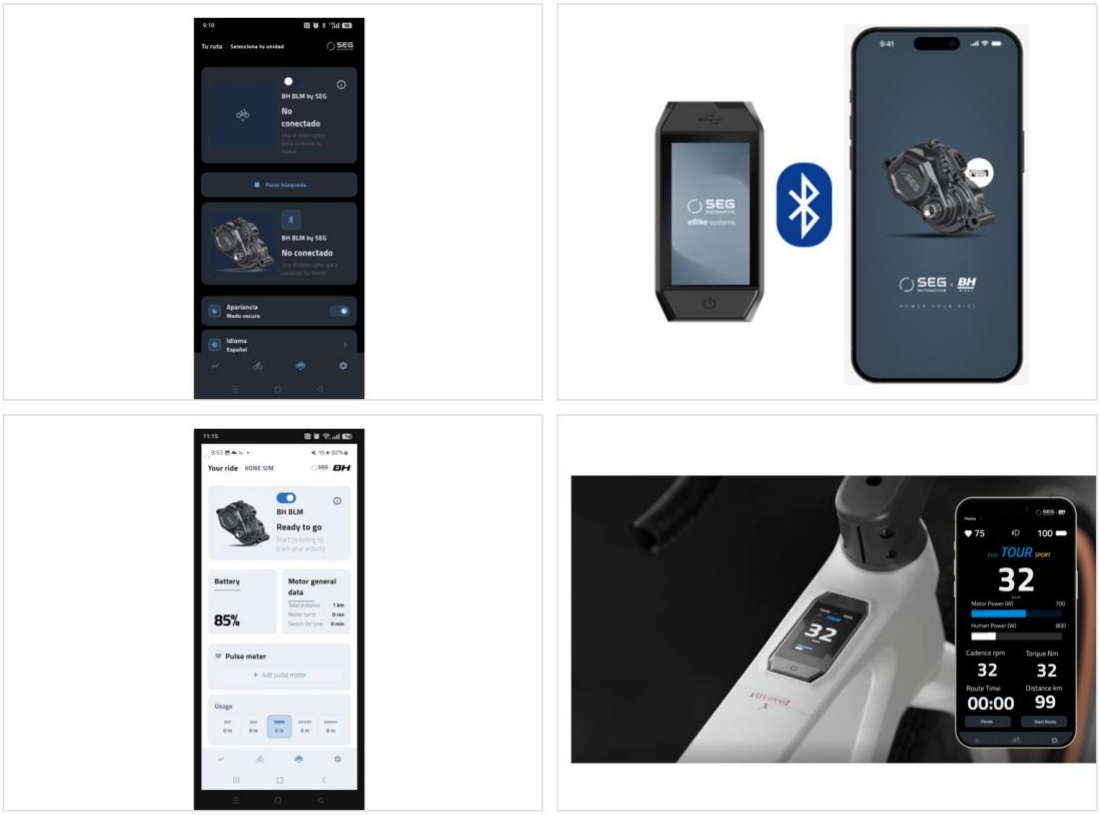


Figure 15-2. APP SEG Automotive eBikes systems ecosystem; system startup, Bluetooth connectivity and link to display

Application Overview

The SEG Automotive APP SEG Automotive eBikes systems serves as the companion application for the BLM ecosystem.

The application communicates with the bicycle through the SEG_D_FI display and provides both real-time and historical information.

Primary functions include:

- Dashboard visualization
- Activity management

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- Assistance tuning
- System information
- Data analysis

Connection

Search bike Bluetooth, Name starts as ***BH BLM by SEG***

Home Screen

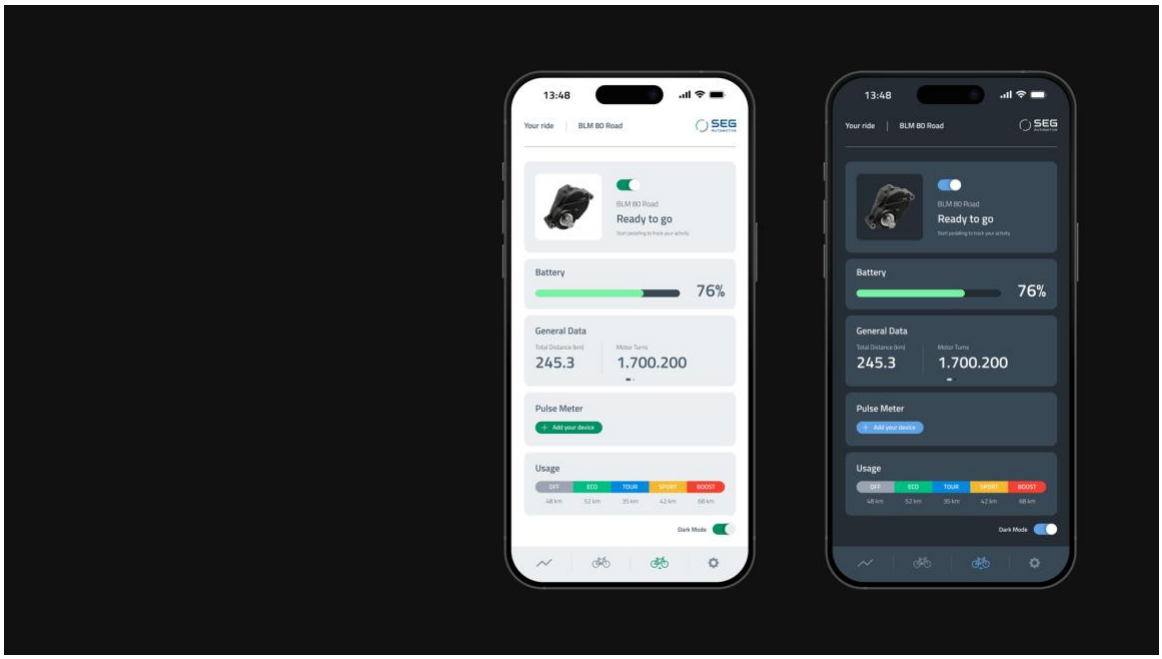


Figure 15-3. SEG Automotive APP SEG Automotive eBikes systems home screen

The home screen provides access to the main functions of the application.

Typical functions include:

- Activity History
- Start Activity
- Assistance Settings
- System Status
- Bluetooth Connection Status

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The home screen acts as the central navigation point for all APP SEG Automotive eBikes systems functions.

Bluetooth Pairing

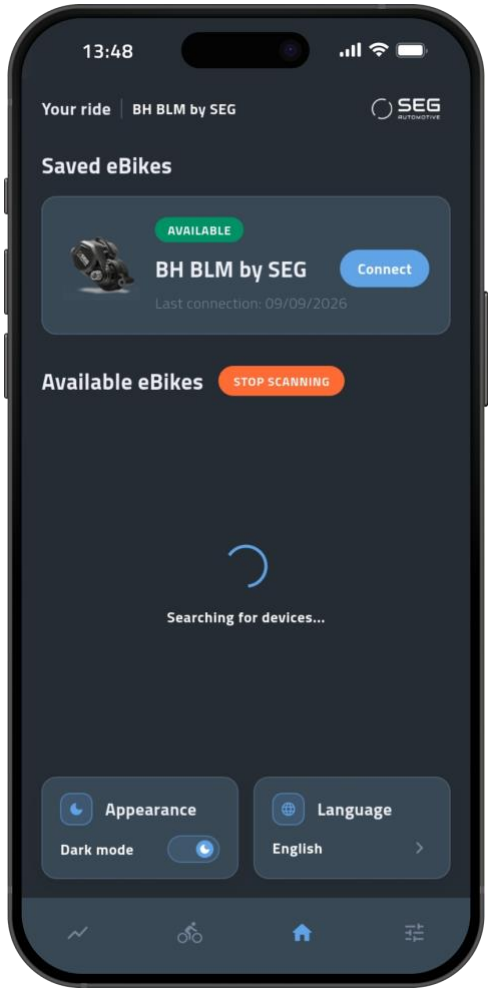


Figure 15-4. Bluetooth connectivity panel

Before data can be exchanged, the smartphone must be paired with the bicycle.

Pairing Procedure

1. Activate Bluetooth on the smartphone.
2. Power on the bicycle.

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3. Open the SEG Automotive APP SEG Automotive eBikes systems.
4. Select the bicycle from the list of available devices.
5. Confirm the connection.
6. Verify successful pairing.

Once connected, the APP SEG Automotive eBikes systems automatically synchronizes available system information.

Dashboard

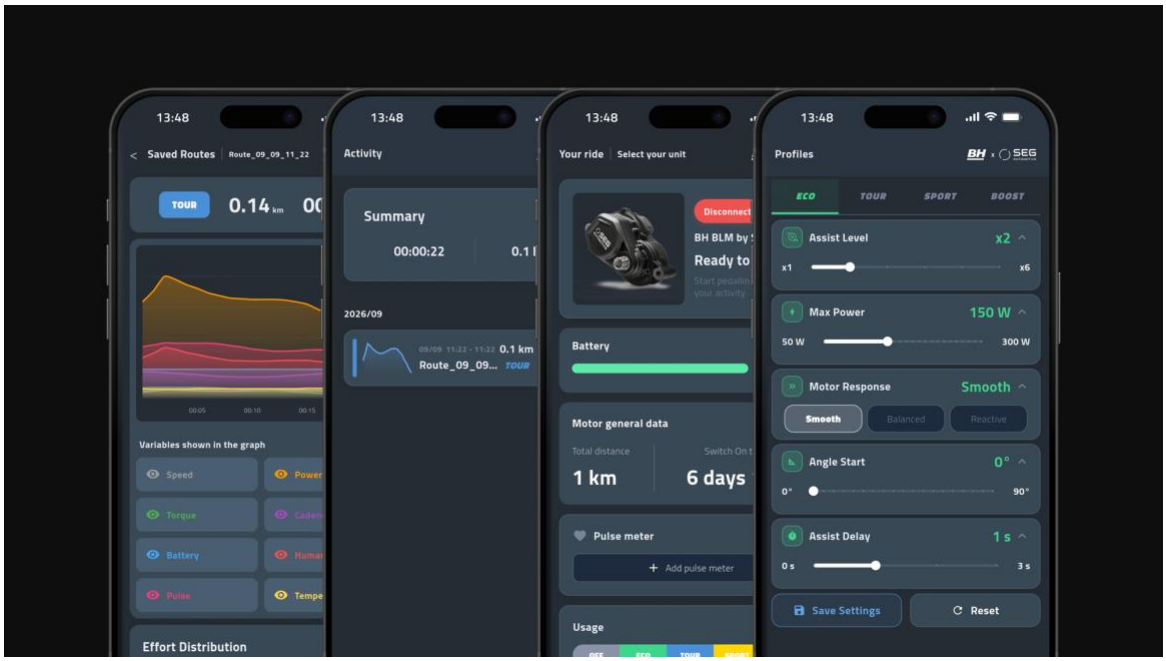


Figure 15-5. Dashboard and monitor screens, riding information, connectivity status, and performance visualization

The Dashboard provides a real-time view of important operating parameters.

Displayed information may include:

- Current speed
- Assistance level
- Battery status
- Riding statistics
- Connectivity status

Depending on software configuration and smartphone type.

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Light and Dark Modes

The application supports multiple display themes.

Benefits include:

- Improved visibility in different environments.
- Reduced eye strain.
- Consistent user experience.

Both modes provide identical functionality.

Activity Recording

Introduction

The SEG Automotive APP SEG Automotive eBikes systems allows riders to record riding activities.

NOTICE

Activities recorded by the SEG Automotive APP SEG Automotive eBikes systems are **not GPS routes**.

The application records operational parameters and riding data over time.

The purpose of activity logging is system analysis and ride evaluation rather than navigation.

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Starting an Activity

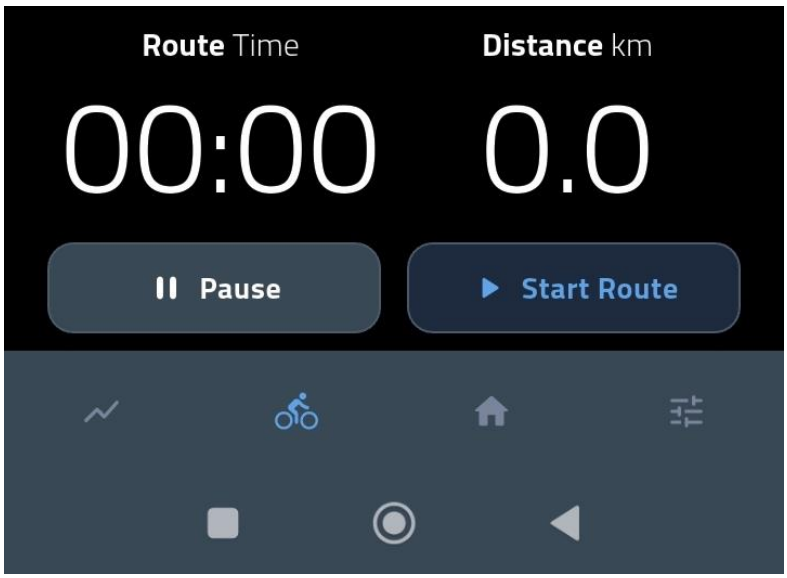


Figure 15-6. Start Activity controls within the SEG Automotive APP SEG Automotive eBikes systems

To start recording:

1. Connect the application to the bicycle.
2. Open the Activity page.
3. Press Start Activity.
4. Begin riding.

The application immediately begins collecting system data.

Recorded Parameters

During an activity, the APP SEG Automotive eBikes systems may record:

- Vehicle speed
- Distance travelled
- Riding duration
- Rider cadence
- Rider torque
- Rider power

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- Drive Unit power
- Battery status
- Assistance level
- System temperatures

The exact parameter set may depend on software version and configuration.

Pausing an Activity

Activities may be paused when required.

Typical situations include:

- Rest stops
- Transportation periods
- Interrupted rides

The rider may resume the activity without creating a separate record.

Saving an Activity

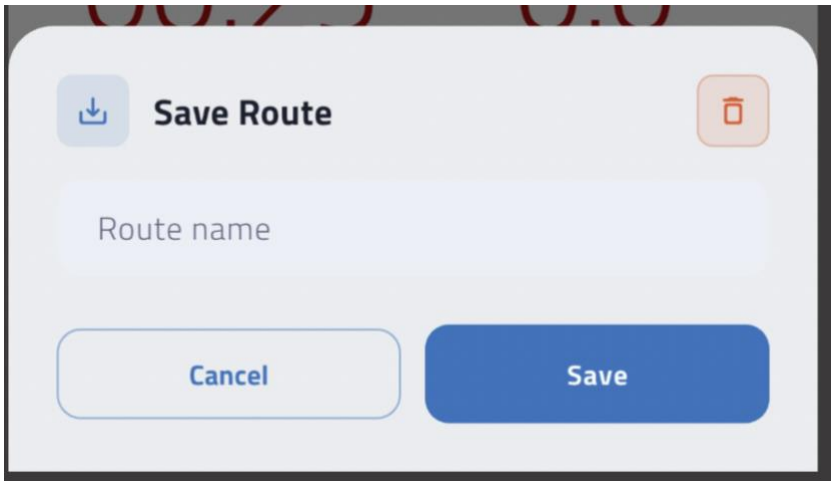


Figure 15-7. Activity save screen

At the end of the ride:

1. Stop the activity.

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2. Enter a name if desired.
3. Select **Save**.
4. Confirm storage.

The activity becomes available in the Activity History section.

Activity Analysis

Historical Activity Review

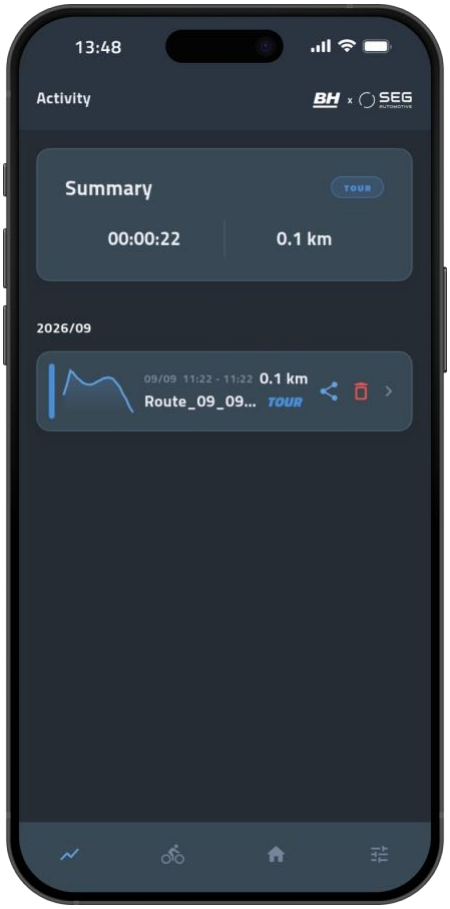


Figure 15-8. Activities saved

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Figure 15-9. Activity analysis and parameter visualization

The application provides access to previously recorded activities.

For each activity the rider may review recorded system behavior.

Information may include:

- Duration
- Distance
- Average speed
- Maximum speed
- Battery usage
- Riding statistics

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Parameter Analysis

The application presents data in the form of parameter-versus-time graphs.

Examples include:

- Speed vs Time
- Cadence vs Time
- Torque vs Time
- Drive Unit Power vs Time
- Rider Power vs Time
- Temperature vs Time

This allows detailed review of system behavior throughout an activity.

NOTICE

The displayed data represents operational parameters recorded during the activity.

The application is not intended to provide GPS tracking or navigation functionality.

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Assistance Profile Customization



Figure 15-10. Assistance profile customization screen

The application provides access to assistance profile tuning functions.

Depending on OEM settings, the rider may adjust:

- Assistance Level
- Maximum Power
- Motor Response
- Start Angle
- Assistance Delay

These parameters allow the riding experience to be tailored to individual preferences.

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OEM Control Limits

NOTICE

User adjustments remain subject to limits defined by the bicycle manufacturer.

The application cannot exceed the minimum and maximum configuration values established by the OEM.

This protects:

- System reliability
- Regulatory compliance
- Product safety

Activity History

The Activity History function allows storage and review of previous rides.

Typical information includes:

- Date
- Duration
- Distance
- Average speed
- Maximum speed

Saved activities remain accessible for later analysis.

Data Sharing and Export

Depending on APP SEG Automotive eBikes systems version and configuration, recorded activities may be exported.

Typical uses include:

- Personal ride analysis
- Dealer support

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- Service diagnostics
- Technical investigations

Exported data may provide valuable information when investigating system behavior.

APP SEG Automotive eBikes systems Supported Functions

Table 15-1. Main APP SEG Automotive eBikes systems Functions

FUNCTION	AVAILABILITY
Dashboard Monitoring	**Yes**
Activity Recording	**Yes**
Activity Analysis	**Yes**
Assistance Profile Customization	**Yes**
Bluetooth Connectivity	**Yes**
Activity History	**Yes**
Data Export	**Depending on software version**
GPS Navigation	**No**

2.Relationship with SEG_D_FI

The SEG_D_FI remains the primary rider information interface during riding.

The SEG Automotive APP SEG Automotive eBikes systems provides:

- Extended visualization
- Historical analysis
- User customization
- Smartphone connectivity

Together they form the complete user-facing portion of the BLM ecosystem.

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3.Service Considerations

The application is intended for end-user functionality.

Professional service functions remain exclusive to:

- SEG GUI dealer (SW)
- SEG GUI manufacturer (SW)

Examples include:

- Diagnostics
- Calibration
- Firmware updates
- Error analysis
- System configuration

These functions are not available within the SEG Automotive APP SEG Automotive eBikes systems.

4.Summary

The SEG Automotive APP SEG Automotive eBikes systems extends the rider experience beyond the functionality available directly through the SEG_D_FI display.

Key capabilities include:

- Bluetooth connectivity
- Activity recording
- Activity analysis
- Assistance profile customization
- Historical ride review

The application forms an integral part of the BLM ecosystem while maintaining a clear separation between rider functions and professional service functionality.

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Chapter 16 will describe:

- SEG GUI architecture
- Dealer version
- Manufacturer version
- SEG GUI interface
- Diagnostics
- Live monitoring
- Calibration
- Firmware updates
- Incident reporting
- Assistance parameter configuration

This will be one of the most important chapters for dealers and OEMs.

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16. SEG GUI

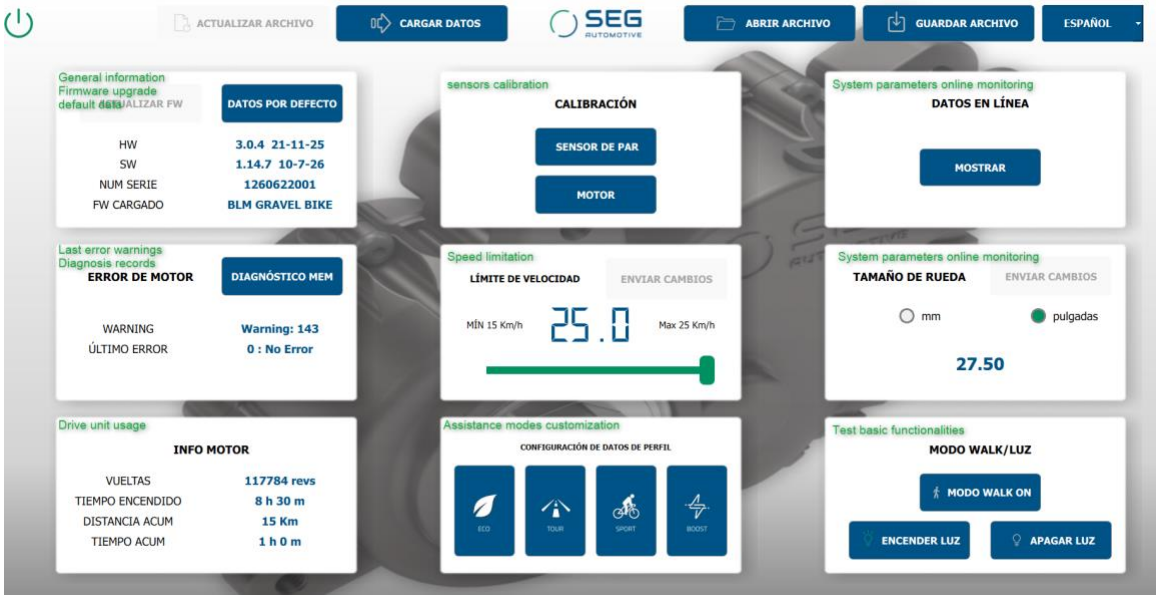


Figure 16-1. SEG GUI dealer (SW)

Introduction

SEG GUI is the official service, diagnostic and configuration software platform for the BLM ecosystem. The software has been developed to support:

- Authorized dealers
- Bicycle manufacturers (OEMs)
- Service engineers
- Technical support personnel

SEG GUI provides direct communication with the BLM system and enables access to advanced functionality not available through the SEG_D_FI display or the SEG Automotive APP SEG Automotive eBikes systems.

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SEG GUI Ecosystem

The complete service architecture consists of:

Software

- SEG GUI dealer (SW)
- SEG GUI manufacturer (SW)

Hardware

- SEG GUI interface (E5D10A0000)



Figure 16-2. SEG GUI interface (E5D10A0000) and SW

The SEG GUI interface provides the communication interface between the service computer and the Drive Unit.

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System Architecture

Table 16-1. SEG GUI Service Architecture

COMPONENT	FUNCTION
Service Computer	**User interface**
SEG GUI	**Diagnostic and configuration software**
SEG GUI interface	**Communication hardware**
BLM Drive Unit	**Target system**

Service Communication Flow

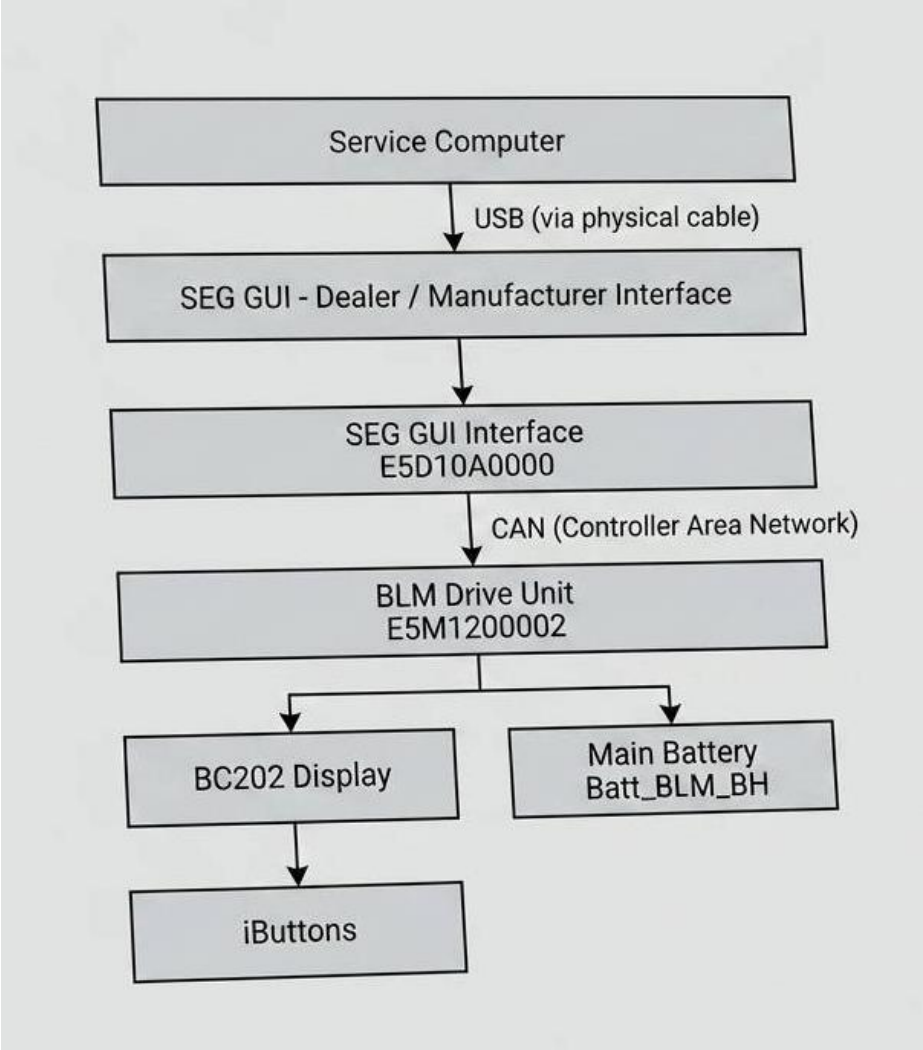


Figure 16-3. Service communication architecture using the SEG GUI Interface (E5D10A0000)

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SEG GUI dealer (SW)

Intended Users

SEG GUI dealer is intended for:

- Authorized dealers
- Certified service centers
- Support technicians

The software provides all functionality required for normal service and maintenance operations.

Dealer Functions

Diagnostics

The dealer version provides access to:

- Active warnings
- Active errors
- Historical events
- Battery information
- Communication status

Online Monitoring

The software can display operational data in real time.

Examples include:

- Battery voltage
- Battery current
- State of charge
- Drive Unit temperature

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- Torque sensor values
- Cadence values
- Vehicle speed
- Assistance level

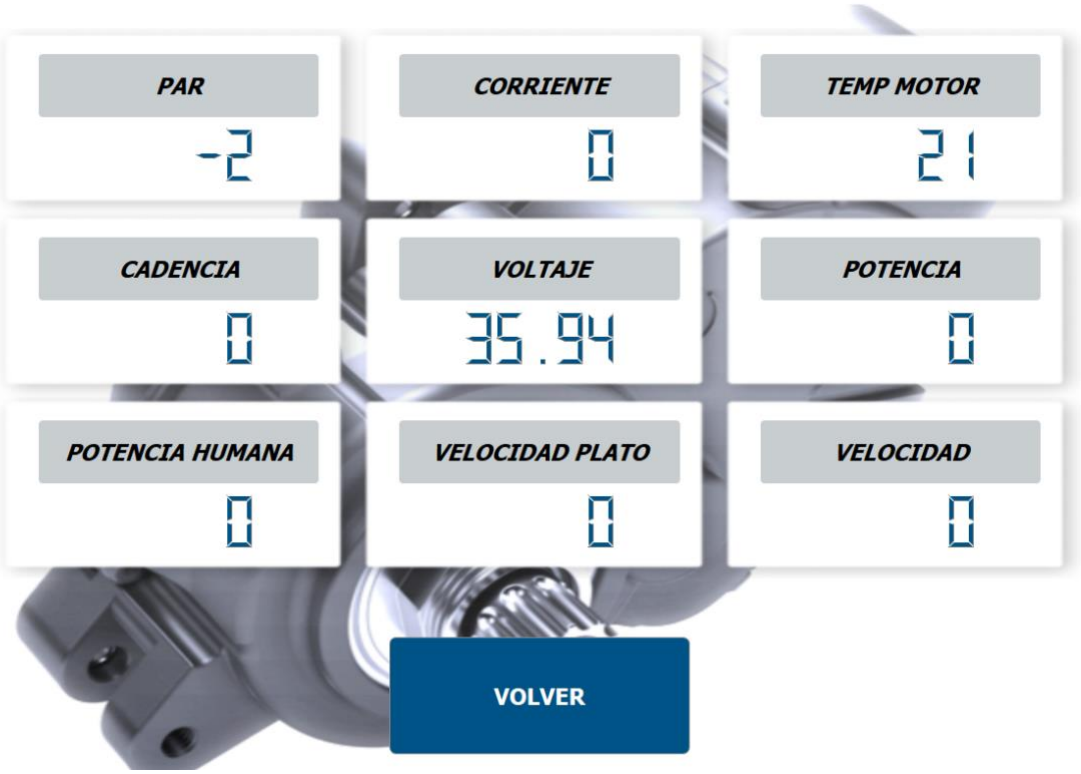


Figure 16-4. Online data monitoring

Table 16-2. Typical Online Parameters

PARAMETER	DESCRIPTION
Battery Voltage	**Battery operating voltage**
Battery Current	**Current consumption**
Drive Unit Temperature	**Internal thermal status**
Rider Torque	**Measured rider input**
Cadence	**Pedaling speed**
Vehicle Speed	**Wheel-based speed measurement**
Assist Level	**Active assistance mode**
Motor Power	**Delivered electrical assistance**

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Service Information

The dealer can access:

- Firmware versions
- Component information



Figure 16-5. SW/FW information

- Usage statistics



Figure 16-6. Drive unit use information

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- Service history



Figure 16-7. Access to diagnosis

This information supports maintenance and troubleshooting activities.

Assistance Profile Configuration

Authorized dealers may adjust assistance profiles according to rider preferences and OEM limitations.

Adjustable parameters may include:

- Assistance level
- Maximum power
- Motor response
- Assistance delay
- Start behavior

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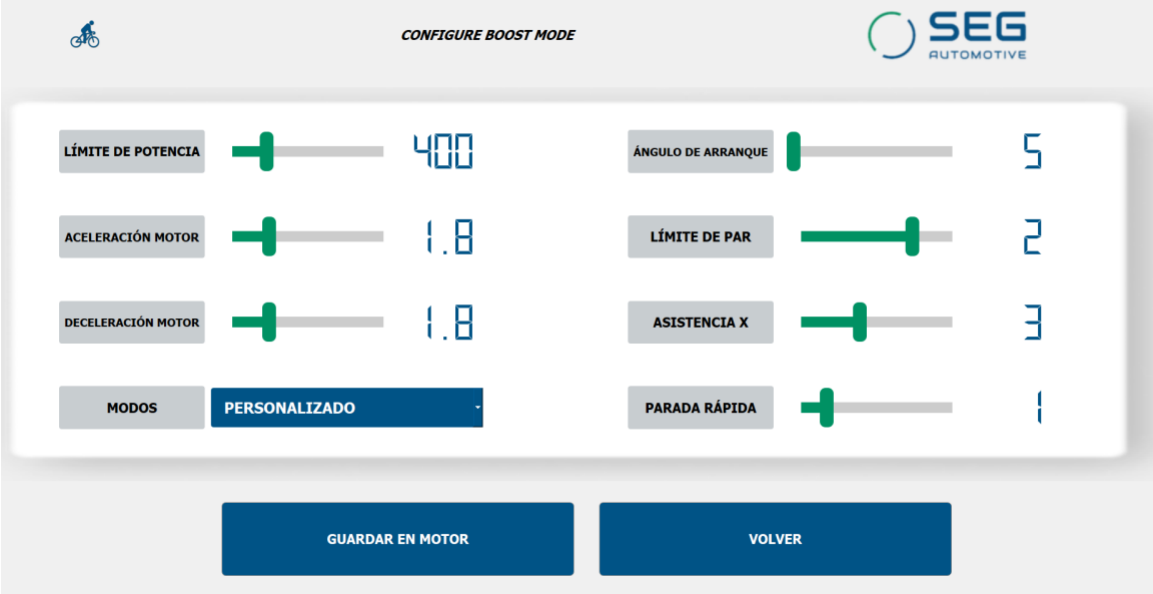


Figure 16-8. Profiles configuration panel

NOTICE

Dealer modifications remain constrained within the limits defined by the bicycle manufacturer.

Diagnostic Functions

SEG GUI continuously interprets information received from the Drive Unit.

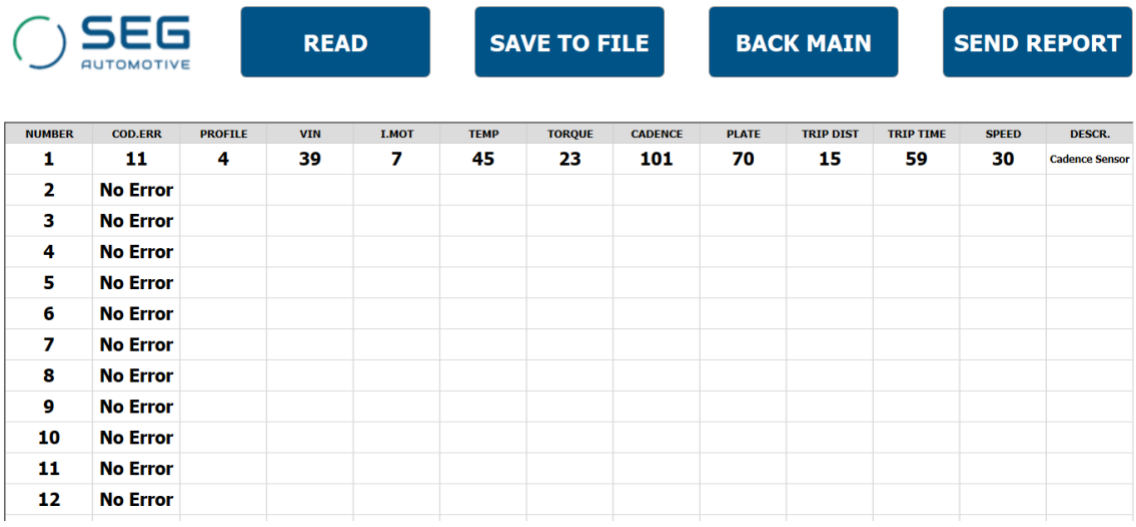
Diagnostic data includes:

- Warning Events
- Error Conditions
- Faults
- Communication status
- Battery status

The recorded information assists service personnel in identifying abnormal system behavior.

To access diagnosis while pressing “diagnostic mem” (see Figure 14-7), a new panel pop-up.

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NUMBER	COD.ERR	PROFILE	VIN	I.MOT	TEMP	TORQUE	CADENCE	PLATE	TRIP DIST	TRIP TIME	SPEED	DESCR.
1	11	4	39	7	45	23	101	70	15	59	30	Cadence Sensor
2	No Error											
3	No Error											
4	No Error											
5	No Error											
6	No Error											
7	No Error											
8	No Error											
9	No Error											
10	No Error											
11	No Error											
12	No Error											

Figure 16-9. Diagnostic event history displayed in SEG GUI

In this panel manufacturer and dealer can:

- Read error/warning records (read)
- Save report locally (save to file)
- Raise an incident report (send report)

By sending report, an automatic prompt is collecting the information of the incident, including the report in PDF format. It's sent to SEG Automotive automatically for feedback, analysis and instruction about how to proceed.

Event Logging

The Drive Unit stores diagnostic information that may be reviewed through SEG GUI. See Figure 14-9. Stored information may include:

- Event timestamp
- Event type
- System operating conditions
- Associated parameters

This information is particularly useful when investigating intermittent issues.

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SEG GUI manufacturer (SW)

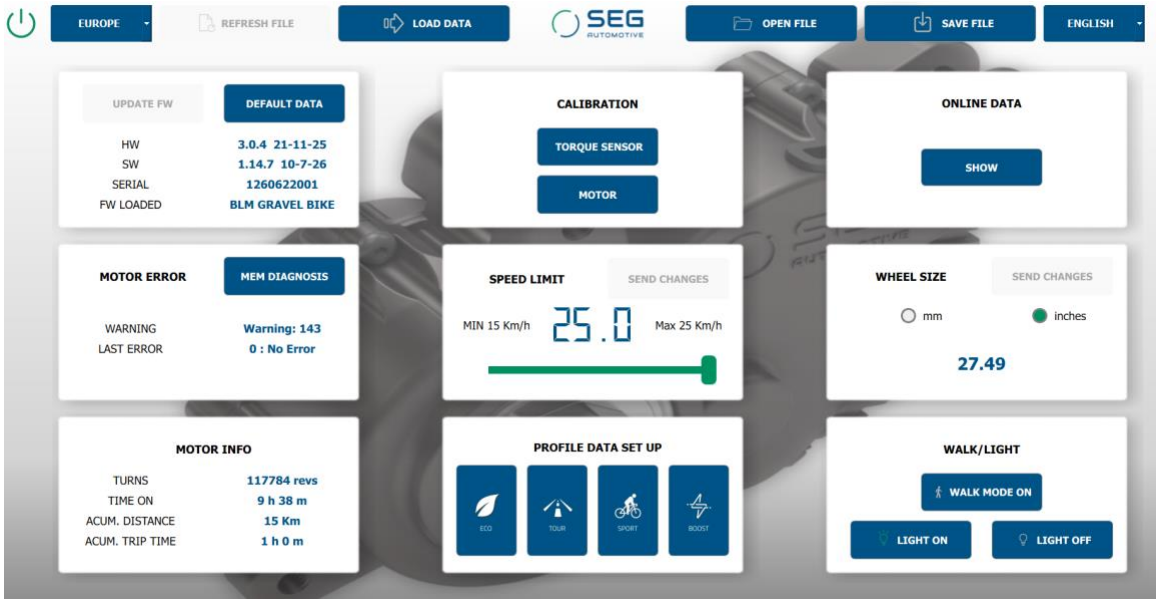


Figure 16-10. Manufacturer start panel

Intended Users

SEG GUI manufacturer (SW) is intended for:

- Bicycle manufacturers
- Integration engineers
- Production environments
- Validation teams

Manufacturer Functions

The Manufacturer version includes all Dealer functions plus additional OEM functionality.

Additional capabilities may include:

- Production setup
- Vehicle commissioning
- Regional configurations
- OEM parameter management

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- Integration validation

Configuration Functions

The manufacturer version supports:

- Assistance strategy tuning
- Vehicle-specific calibration
- Production quality checks
- System configuration verification
- Regional configurations.

Calibration Functions

Certain system functions require calibration during production or service activities.

Available calibration functions include:

- Torque Sensor Calibration
- Cadence Sensor Calibration
- Drive Unit Calibration

WARNING

Calibration procedures shall be performed only by trained personnel.

Incorrect calibration may result in:

- Incorrect assistance behavior
- Reduced performance
- Abnormal rider experience

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Torque Sensor Calibration

The torque sensor calibration procedure establishes the baseline reference used to measure rider input.

The Drive Unit relies on this reference for accurate assistance calculation.

Incorrect calibration may affect:

- Assistance smoothness
- Assistance proportionality
- Riding experience

Cadence Sensor Calibration

Cadence calibration verifies the accuracy of pedaling speed measurement.

Proper cadence measurement is necessary to ensure:

- Correct assistance activation
- Assistance responsiveness
- System stability

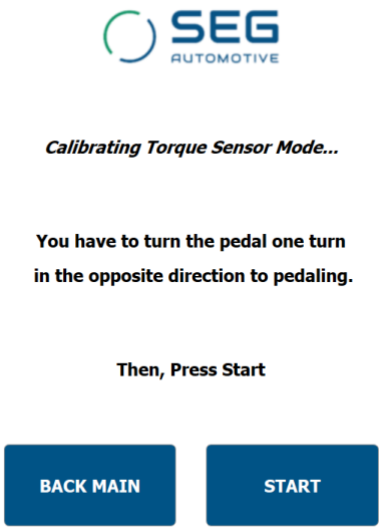


Figure 16-11. Torque and cadence calibration procedure

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Drive Unit Calibration

Drive Unit calibration aligns multiple sensing systems and operating parameters.

Calibration may be required after:

- Major service operations
- Drive Unit replacement
- Specific diagnostic procedures

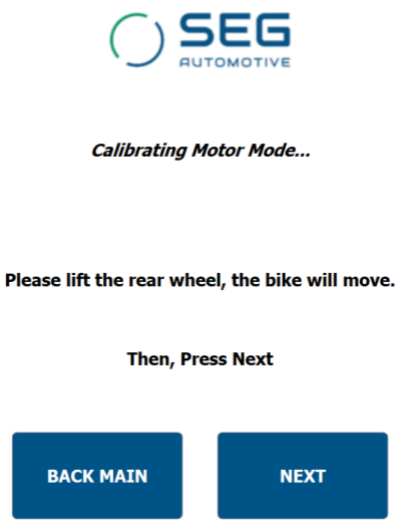


Figure 16-12. Drive unit calibration instructions

Firmware Updates

SEG GUI is used to install approved firmware releases.

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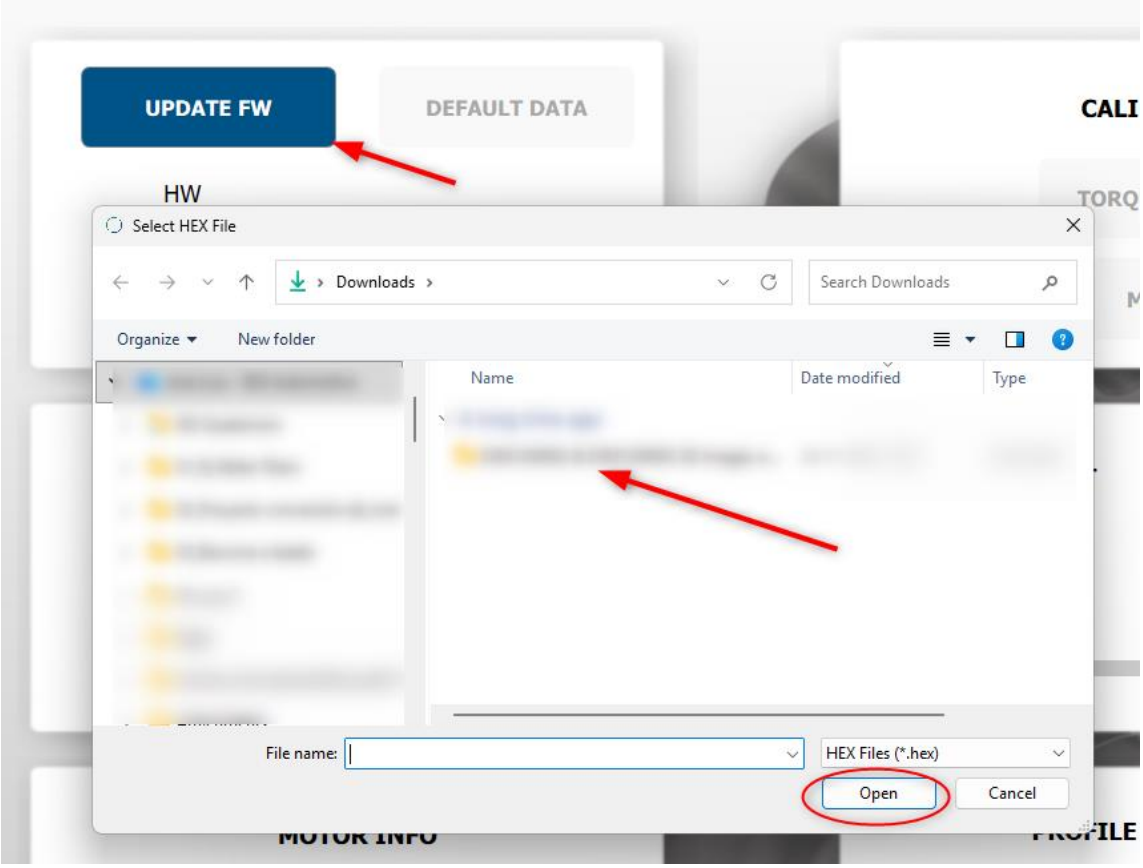


Figure 16-13. Firmware update interface within SEG GUI

The firmware update process generally consists of:

1. Download firmware package.
2. Connect SEG GUI.
3. Establish communication.
4. Select firmware file.
5. Perform update.
6. Verify installation.

SW/FW updates are available in SEG Automotive E-bike system website/downloads

- [High-Performance eBike Drive Systems - SEG Automotive eBike motor]

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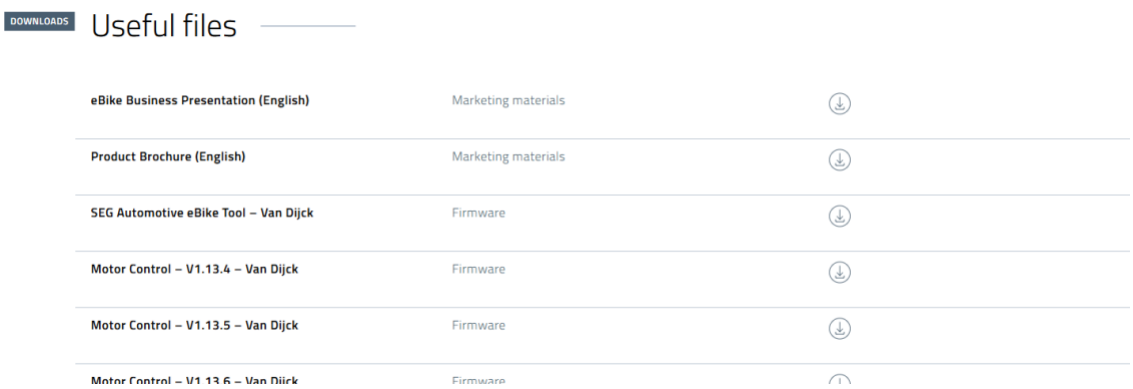


Figure 16-14. FW upgrades publishing

CAUTION

Do not disconnect power or communication interfaces during firmware updates.

Interruption of the update process may result in incomplete installation.

5.Incident Reports

SEG GUI supports the creation of technical incident reports.

Reports may include:

- System configuration
- Error history
- Battery information
- Firmware versions
- Recorded operating parameters

These reports assist the SEG Automotive technical support team in case analysis.

Technical Support Integration

Generated reports may be submitted as part of the official support workflow.

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Support contact:

ebike-support@seg-automotive.com

Service Applications

Typical SEG GUI service activities include:

- New bicycle commissioning
- Drive Unit replacement
- Battery replacement
- Sensor calibration
- Firmware update
- Diagnostic support

Advantages of SEG GUI

Table 16-3. Benefits of SEG GUI

BENEFIT	DESCRIPTION
Diagnostics	**Complete system evaluation**
Monitoring	**Real-time parameter visualization**
Calibration	**Professional calibration procedures**
Firmware Updates	**Authorized software management**
Reporting	**Incident documentation**
Configuration	**Assistance profile management**

Summary

SEG GUI provides the professional service interface for the BLM ecosystem.

Together with the SEG GUI interface, the software enables:

- Diagnostics

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- Online monitoring
- Calibration
- Configuration
- Firmware updates
- Incident reporting

SEG GUI is an essential tool for both dealers and OEM manufacturers and forms a key part of the BLM support infrastructure.

NOTE

See additional information in Appendix chapter and Media.

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17. Calibration Procedures

Introduction

(See procedures in chapter 16. SEG GUI/Calibrations)

The BLM ecosystem incorporates several sensing systems that require precise calibration to ensure correct Drive Unit performance.
Calibration procedures allow the system to establish reference values used by the control algorithms during normal operation.
Correct calibration is essential to guarantee:

- Accurate rider torque measurement
- Correct cadence detection
- Smooth assistance delivery
- Optimum riding experience
- Reliable diagnostics

Service Requirements

Table 17-1. Calibration Requirements

ITEM	REQUIREMENT
Software	**SEG GUI dealer or SEG GUI manufacturer**
Hardware	**SEG GUI interface (E5D10A0000)**
Power Source	**Fully operational BLM system**
Operator	**Authorized dealer or OEM technician**

Calibration Access

See Chapter 16. SEG GUI.

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Typical Procedure

1. Connect the SEG GUI interface.
2. Launch SEG GUI.
3. Establish communication with the bicycle.
4. Select the desired calibration function. See Chapter 16. SEG GUI
5. Follow on-screen instructions.
6. Validate results.

Torque Sensor Calibration

See chapter 16. SEG GUI/Calibrations

When Calibration May Be Required

Torque sensor calibration may be required after:

- Drive Unit replacement
- Production commissioning
- Troubleshooting
- Support request

Calibration Procedure

The exact procedure is guided by SEG GUI. See 16. SEG GUI

WARNING

Do not apply force to the pedals during torque sensor calibration unless specifically instructed by SEG GUI.

Incorrect calibration may affect assistance performance.

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Validation

After calibration:

- Verify rider assistance behavior.
- Verify torque values through online monitoring.
- Check for warning or error conditions.

Cadence Sensor Calibration

See Figure 16-11. Torque and cadence sensor calibration instructions.

Purpose

The cadence sensor measures pedaling speed.

Accurate cadence information is required to determine:

- Assistance activation
- Assistance modulation
- Power delivery timing

Calibration Process

The procedure is performed through SEG GUI.

- Cadence Sensor Calibration is performed through the calibration functions available in SEG GUI.
- Refer to Chapter 16. SEG GUI.

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Validation

Calibration results should be verified through online monitoring.

Parameters typically reviewed include:

- Cadence signal stability
- Response consistency
- Diagnostic status

Drive Unit Calibration

See Figure 14-12. Drive unit calibration instructions.

- Drive Unit Calibration is performed through SEG GUI.
- Refer to Chapter 16. SEG GUI.

Configuration Validation

Following calibration, SEG GUI can be used to verify:

- System communication
- Sensor functionality
- Operating status
- Firmware compatibility

Validation helps ensure the bicycle is ready for normal operation.

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Calibration Verification Through Online Monitoring

Online Monitoring Overview

See Figure 16-4. Online monitoring view in SEG GUI.

- After calibration, verify system operation using the online monitoring functions available in SEG GUI.
- Refer to Chapter 16. SEG GUI.

Common Calibration Scenarios

Drive Unit Replacement

Recommended:

- Torque Sensor Calibration
- Cadence Calibration
- Drive Unit Validation

Production Commissioning

Recommended:

- Complete system verification
- Configuration validation
- Functional inspection

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Customer Complaint Investigation

Recommended:

- Online monitoring
- Diagnostic analysis
- Sensor verification
- Calibration status review

Technical Support Assistance

When additional support is required, calibration data and online monitoring information may be included in support reports generated through SEG GUI.

Support contact:

ebike-support@seg-automotive.com

Calibration Safety

WARNING

Calibration procedures shall only be performed by trained personnel using approved tools.

Improper calibration may result in:

- Incorrect assistance behavior
- Reduced performance
- Diagnostic issues
- Unintended rider experience

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Summary

Calibration procedures ensure that the BLM ecosystem maintains optimum performance throughout its service life.

Using SEG GUI and the SEG GUI interface, authorized personnel can:

- Calibrate sensors
- Validate operation
- Configure assistance characteristics
- Verify system integrity

These procedures form an essential part of commissioning, maintenance and troubleshooting activities.

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18. Firmware Updates

Introduction

See Figure 16-14. FW publication.

Firmware is the software embedded within the electronic components of the BLM ecosystem.

Firmware controls the behavior of:

- Drive Unit
- Battery communication
- SEG_D_FI Display
- Sensor interfaces
- Diagnostic functions
- System protection functions

Firmware updates allow SEG eBike Systems to improve functionality, reliability and serviceability throughout the product lifecycle.

Firmware Philosophy

The BLM platform has been designed to support firmware maintenance through approved service tools.

Key objectives include:

- Continuous product improvement
- Functional enhancements
- Issue resolution
- Diagnostic improvements
- System optimization

Firmware management shall always be performed using approved procedures.

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Firmware Components

Table 18-1. Firmware-Enabled Components

COMPONENT	FIRMWARE MANAGED
Drive Unit	**Yes**
SEG_D_FI Display	**Depending on release**
Battery Management System	**OEM dependent**
Diagnostic Functions	**Yes**

Firmware releases may vary depending on system version and OEM implementation.

Firmware Resources

Approved firmware packages are distributed through the SEG eBike Systems support platform.

[High-Performance eBike Drive Systems - SEG Automotive eBike motor]

The Useful Files section may contain:

- Firmware packages
- Technical documentation
- User manuals
- Product brochures
- Integration support material

Only approved firmware files shall be used.

Table 18-2. Firmware Update Requirements

ITEM	REQUIREMENT
SEG GUI	**Required**
SEG GUI interface	**Required**
Battery Capacity	**Sufficient charge recommended**
Stable Connection	**Required**
Authorized Personnel	**Recommended**

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Update Verification

After a firmware update has been completed, the following checks should be performed:

Functional Checks

- Power on system.
- Verify SEG_D_FI operation.
- Verify assistance modes.
- Verify battery communication.
- Verify speed sensor operation.

Diagnostic Checks

- Connect SEG GUI.
- Verify firmware version.
- Check communication status.
- Verify absence of active faults.

Firmware Version Information

Firmware version information may be reviewed through SEG GUI.

Information typically includes:

- Installed version
- Release identification
- Compatibility information
- Component identification

Firmware version information should be included when creating technical incident reports.

Benefits of Firmware Updates

Firmware releases may provide:

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- Performance improvements
- Feature enhancements
- Diagnostic improvements
- Reliability updates
- System optimizations

Not every firmware release introduces visible changes for the rider.

Some updates may focus exclusively on internal improvements.

Configuration Preservation

Certain firmware updates may preserve existing configuration data.

However, some updates may require:

- Configuration review
- Calibration verification
- Parameter validation

NOTICE

Following major firmware updates, SEG recommends performing a complete system verification.

Calibration After Firmware Updates

Depending on firmware release content, calibration may be recommended after installation.

Potential activities include:

- Torque Sensor Calibration
- Cadence Calibration
- Drive Unit Validation

Refer to Chapter 15 for detailed calibration procedures.

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Troubleshooting Firmware Updates

If unexpected behavior occurs during the update process:

1. Do not disconnect components immediately.
2. Record all displayed messages.
3. Verify communication status.
4. Restart SEG GUI if necessary.
5. Contact technical support when required.

Technical Support

Firmware-related support requests should include:

- Firmware version
- Component information
- Incident description
- Diagnostic data
- Generated support report

Support contact:

ebike-support@seg-automotive.com

Best Practices

To ensure successful updates:

- Use approved firmware packages only.
- Maintain sufficient battery charge.
- Use the latest SEG GUI release.
- Verify communication stability before updating.
- Perform validation after installation.

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Firmware Lifecycle

The BLM ecosystem has been designed to support continuous software evolution throughout product life.

Firmware updates provide a mechanism for:

- Performance improvement
- Issue correction
- Enhanced diagnostics
- Long-term product support

This approach helps maintain reliability and serviceability across the installed product base.

Summary

Firmware management forms an important part of the BLM service strategy.

Using:

- SEG GUI dealer (SW)
- SEG GUI manufacturer (SW)
- SEG GUI interface

Authorized service personnel can safely update system firmware while maintaining system integrity and traceability.

Firmware updates should always follow the approved procedures described in this chapter.

19. Mechanical Integration

Introduction

The mechanical integration of the BLM system is a critical aspect of overall vehicle performance, reliability and serviceability.

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The Drive Unit has been designed to support efficient OEM integration while maintaining:

- Structural rigidity
- Service accessibility
- Compact packaging
- Weight optimization
- Component durability

This chapter provides the dimensional and installation requirements necessary for proper integration of the BLM Drive Unit into bicycle frames.

Drive Unit Overview

The Drive Unit serves as the structural and functional center of the BLM ecosystem.

Commercial Reference:

E5M1200002

The component integrates:

- Electric motor
- Reduction gearbox
- Control electronics
- Torque sensing
- Cadence sensing
- Communication interfaces

within a compact enclosure.

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Physical Dimensions

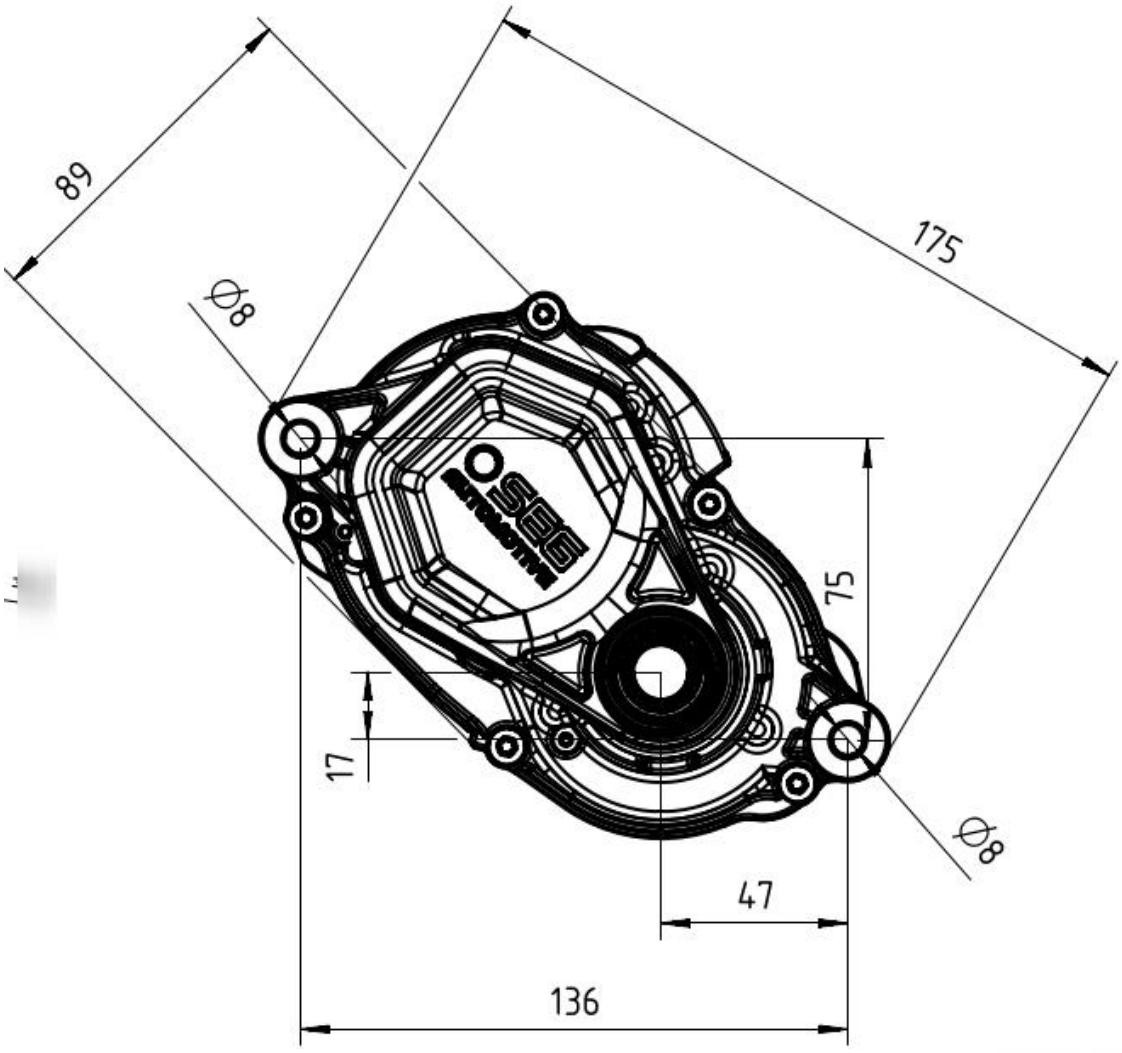


Figure 19-1. Front view dimensions of the BLM Drive Unit

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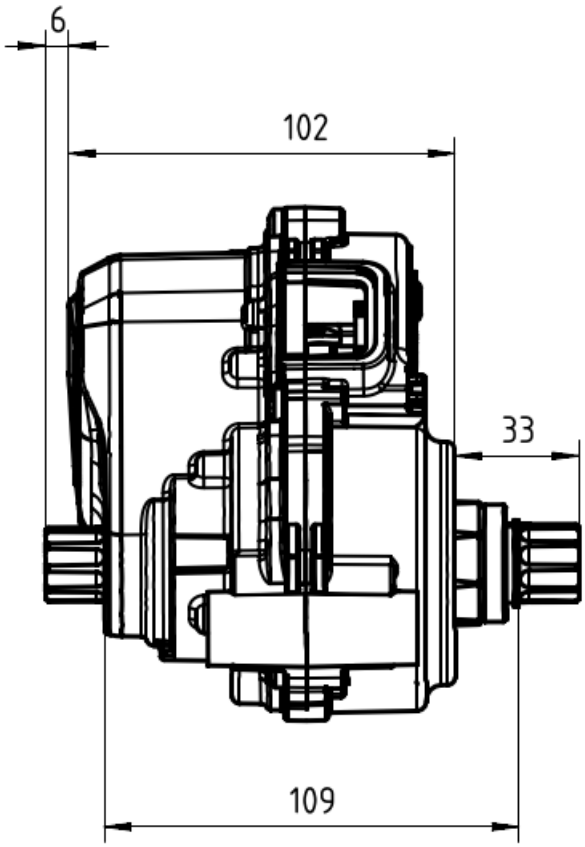


Figure 19-2. Top view dimensions of the BLM Drive Unit

Table 19-1. Main Drive Unit Dimensions

DIMENSION	VALUE
Overall Length	**175 mm**
Maximum Width	**136 mm**
Main Housing Height	**75 mm**
Secondary Housing Length	**109 mm**
Secondary Housing Depth	**102 mm**
Spindle Protrusion	**33 mm**
Mounting Hole Diameter	**Ø 8 mm**

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Mounting Concept

The Drive Unit is secured to the bicycle frame using a dedicated mounting structure based on two primary fixing points.

This solution provides:

- High structural rigidity
- Compact installation
- Simplified assembly
- Efficient force transmission

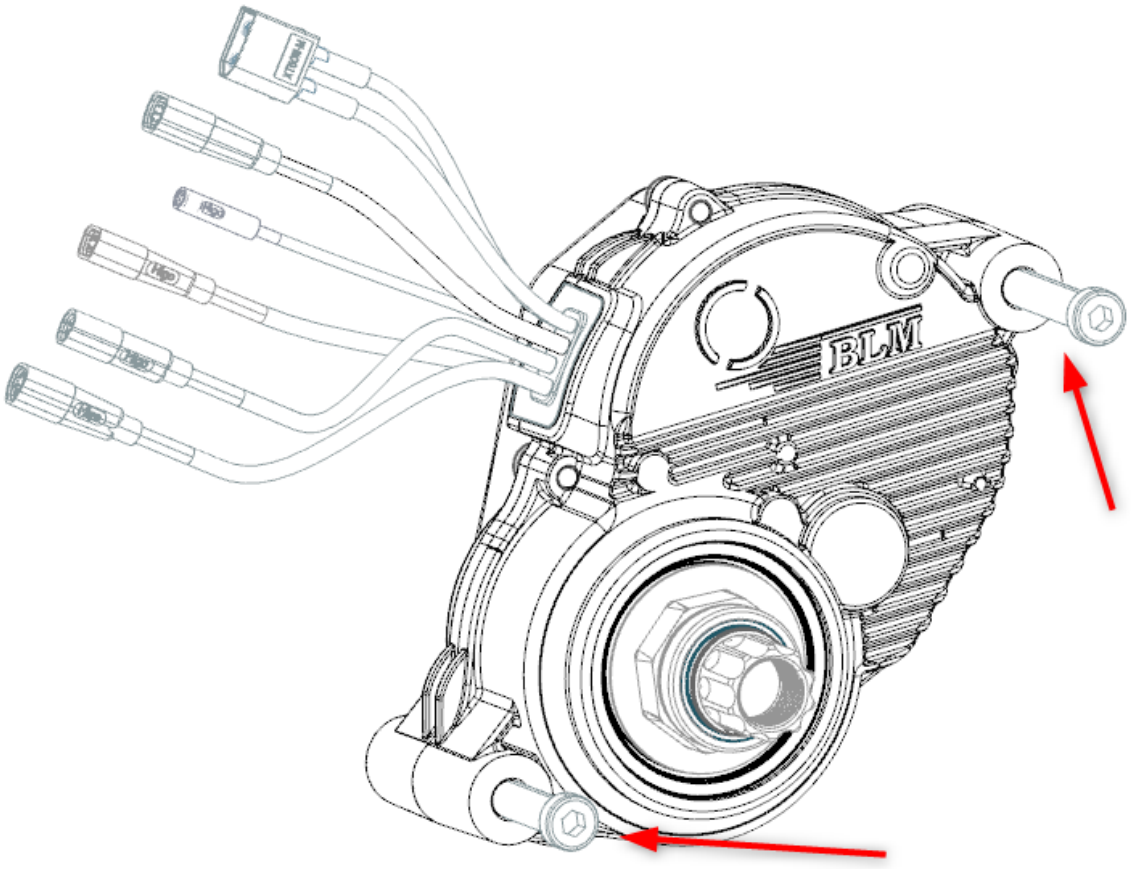


Figure 19-3. Drive Unit mounting interface using two M8 fasteners

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WARNING

Only approved fastening systems shall be used.

Failure to apply the specified tightening torque may result in:

- Reduced structural integrity
- Noise generation
- Premature wear
- Component damage

Frame Integration Recommendations

OEM manufacturers should ensure:

- Complete support of mounting surfaces
- Correct alignment of mounting interfaces
- Sufficient structural stiffness
- Clearance for all connectors

The frame design shall allow unobstructed installation and removal of the Drive Unit during service operations.

ISIS Crank Interface

The BLM Drive Unit utilizes a standard ISIS spindle interface.

This interface provides:

- Reliable torque transmission
- Industry-recognized compatibility
- Serviceability

Table 19-3. ISIS Interface Specifications

PARAMETER	VALUE
Interface Type	**ISIS**

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NOTICE

Only cranksets compatible with the ISIS interface shall be installed.

The use of incompatible crank interfaces may result in component damage or unsafe operation.

Chainring Fixation

The chainring is retained using a dedicated locknut assembly.

Commercial Reference:

E5M10Z1126

Table 19-4. Chainring Locknut Specifications

PARAMETER	VALUE
Reference	**E5M10Z1126**
Thread Direction	**Right-Hand Thread**
Tightening Torque	**40–42 Nm**

CAUTION

The specified tightening torque shall always be respected.

Insufficient tightening torque may result in chainring movement and accelerated component wear.

Mounting Fasteners

Tightening Torques

Overview

The tightening torques specified shall be respected during assembly and service operations.

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WARNING

Incorrect tightening torque may result in:

- Component damage
- Noise generation
- Reduced service life
- Unsafe operation

Table 19-2. Drive Unit Mounting Fasteners

COMPONENT	TORQUE
Drive Unit Mounting Bolts (M8)	**10-12 Nm**
ISIS Crank Interface	**38-42 Nm**
Chainring Locknut (E5M10Z1126)	**40-42 Nm**

Connector Accessibility

During frame design, manufacturers shall ensure access to all required electrical interfaces.

Accessible Interfaces

- Battery Connection
- Battery Communication
- Display Connection
- Speed Sensor Connection
- Lighting Output
- Programming Interface

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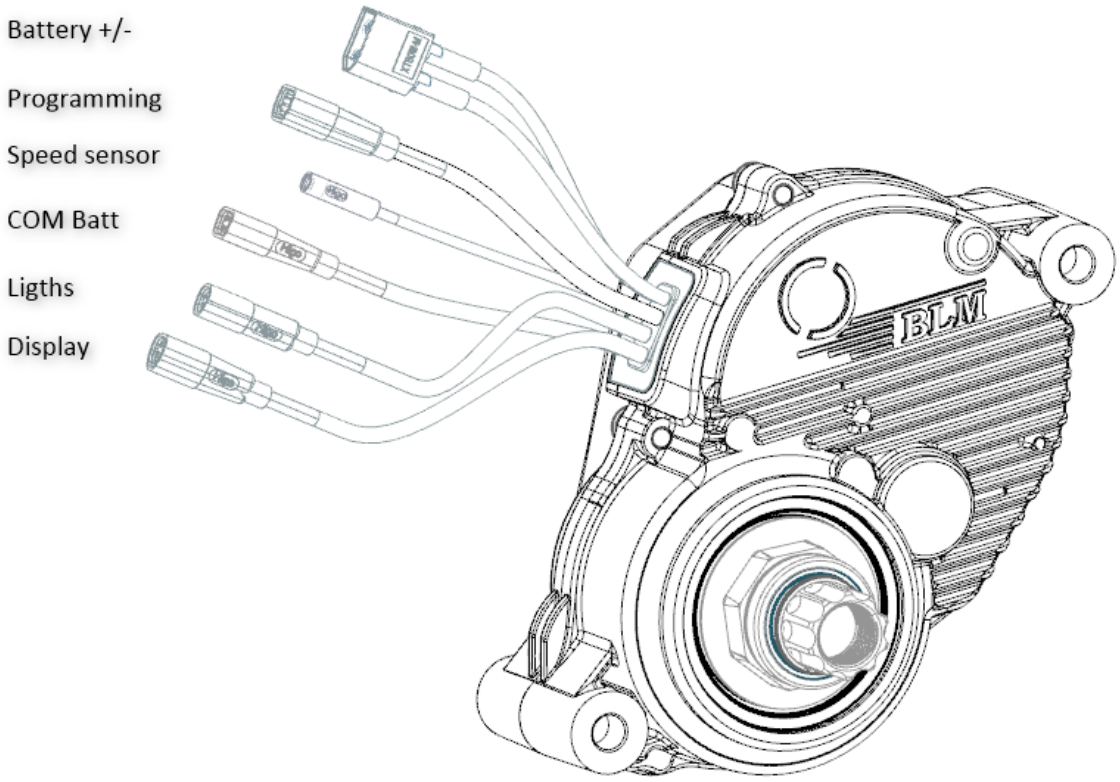


Figure 19-5. Drive Unit electrical interfaces and wiring connections

Adequate connector accessibility simplifies:

- Assembly
- Service operations
- Diagnostics
- Component replacement

Magnetic Exclusion Area

The Drive Unit incorporates precision sensing technologies that may be affected by external magnetic fields.

To ensure correct operation, a magnetic exclusion area shall be maintained around the Drive Unit spindle axis.

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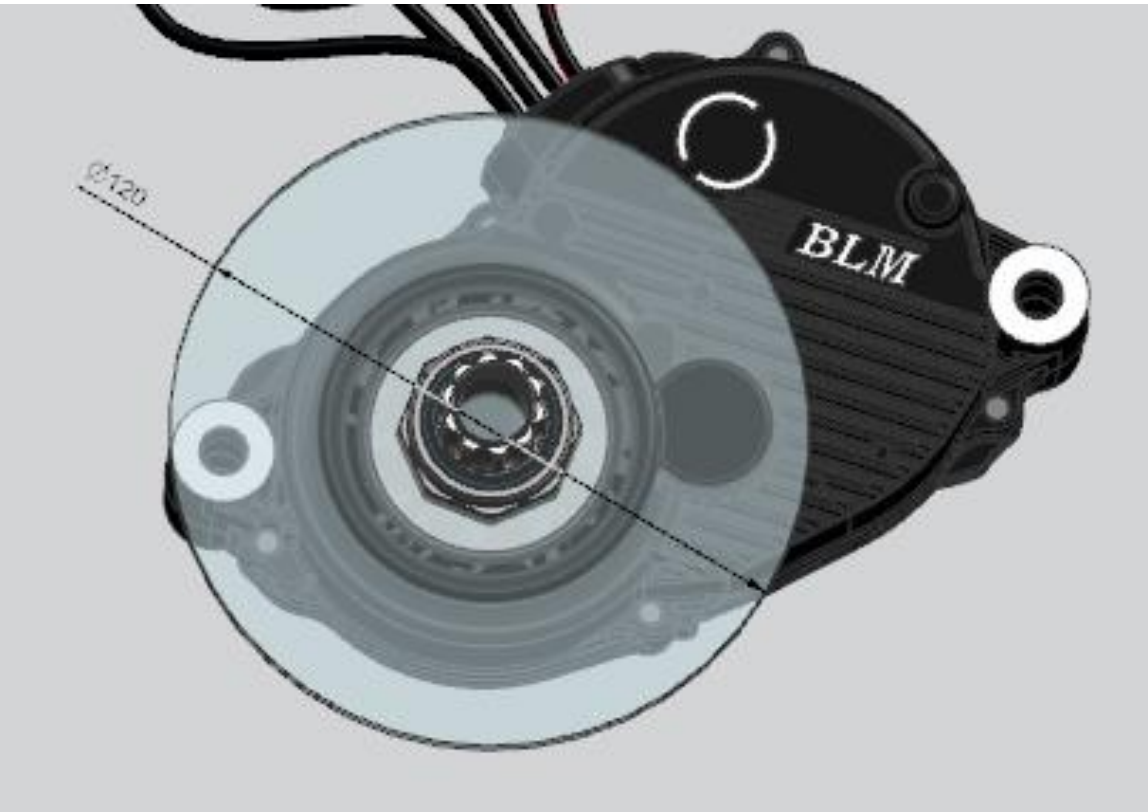


Figure 19-6. Magnetic exclusion area around the Drive Unit axis

Table 19-5. Magnetic Exclusion Area

PARAMETER	VALUE
Diameter	**Ø120 mm**
Center Reference	**Bottom Bracket Axis**
Restriction	**Magnetic Components**

WARNING

No magnetic components shall be installed within the Ø120 mm exclusion area.

Examples include:

- Permanent magnets
- Magnetic mounts
- Magnetic sensors
- Anti-theft magnetic devices

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Magnetic interference may affect:

- Torque sensing
- Cadence sensing
- Assistance behavior
- Diagnostic accuracy

Drive Unit Clearance Requirements

Frame geometry shall provide sufficient clearance for:

- Motor housing
- Crank rotation
- Wiring connections
- Service tools

Adequate clearance reduces the risk of:

- Frame contact
- Connector damage
- Assembly difficulties

Water Management

Although the Drive Unit is designed for outdoor use, OEM frame designs should minimize water accumulation near:

- Connector interfaces
- Cable outlets
- Service access points

Good drainage characteristics improve long-term durability.

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Serviceability Considerations

The BLM platform has been designed to facilitate service operations.

OEM manufacturers are encouraged to ensure:

- Accessible mounting fasteners
- Accessible connectors
- Battery removal capability
- Drive Unit replacement capability

These considerations significantly reduce service time.

Integration Validation

After installation, the following inspections are recommended:

Mechanical Inspection

- Mounting torque verification
- Crank installation verification
- Chainline verification
- Housing clearance verification

Functional Inspection

- System startup
- Assistance verification
- Sensor verification
- Communication verification

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OEM Design Checklist

Table 19-6. Mechanical Integration Checklist

VERIFICATION ITEM	STATUS
Mounting Fasteners Accessible	□
Torque Specifications Applied	□
ISIS Interface Verified	□
Connector Access Available	□
Magnetic Exclusion Zone Respected	□
Water Drainage Considered	□
Service Access Verified	□

Summary

Correct mechanical integration is essential to guarantee:

- Structural reliability
- Rider safety
- Optimal assistance performance
- Long-term durability
- Efficient serviceability

The BLM Drive Unit has been designed to simplify integration while preserving high levels of performance and reliability.

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20. Diagnostics

Introduction

The BLM ecosystem incorporates an advanced diagnostic architecture designed to support:

- Rider information
- Dealer troubleshooting
- OEM validation
- Technical support activities
- Long-term reliability monitoring

Diagnostic information is continuously collected and analyzed by the Drive Unit during operation.

This information may be accessed through:

- SEG_D_FI Display
- SEG GUI dealer (SW)
- SEG GUI manufacturer (SW)

The purpose of the diagnostic system is not only to detect failures but also to identify abnormal operating conditions before component damage occurs.

Diagnostic Philosophy

The BLM diagnostic concept is based on three levels of event classification:

1. Warning Event
2. Error Condition
3. Fault

These categories are used to communicate different levels of severity and required actions.

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Warning Events

Definition

A Warning Event indicates that the system has detected an abnormal operating situation but is still able to continue operating.

Warning Events are generally temporary in nature.

Examples may include:

- Temperature approaching operating limits
- Temporary communication interruptions
- Sensor values outside expected ranges
- Startup anomalies

Table 20-1 Typical warning message.

CHARACTERISTIC	WARNING EVENT
Drive Unit Operational	**Yes**
Rider Assistance Available	**Yes**
Component Damage Present	**Not necessarily**
Service Required	**Not always**
Event Logging	**Yes**

NOTICE

A Warning Event does not necessarily indicate a defective component.

Many Warning Events are generated as protective or informational actions.

Error list

See Appendix A. Display manual.

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Error Conditions

Definition

An Error Condition indicates that the system has detected a situation requiring protective intervention.

In certain cases the Drive Unit may:

- Limit power
- Reduce assistance
- Disable selected functions
- Prevent operation

until the condition has been removed.

Table 20-2 Error condition.

CHARACTERISTIC	ERROR CONDITION
Protection Function Active	**Yes**
Assistance May Be Limited	**Yes**
Service Investigation Recommended	**Yes**
Event Logged	**Yes**

Examples

Potential causes may include:

- Battery communication errors
- Sensor plausibility issues
- Voltage abnormalities
- Thermal protection activation

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Faults

Definition

A Fault generally represents an actual malfunction that requires service action.

A Fault may be associated with:

- Hardware failure
- Wiring problems
- Sensor defects
- Communication failure
- Internal Drive Unit abnormality

Table 20-3 Typical warning message.

CHARACTERISTIC	FAULT
Hardware Failure Possible	**Yes**
Service Required	**Yes**
Assistance May Be Disabled	**Yes**
Event Logging	**Yes**

Diagnostic Data Collection

The Drive Unit continuously records:

- Battery voltage
- Battery current
- Temperature
- Rider torque
- Cadence
- Speed
- Assistance mode
- Communication status

This information forms the basis for event interpretation.

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Event Logging

Diagnostic events are stored within Drive Unit memory and may be accessed through SEG GUI.

Recorded information may include:

- Event type
- Event timestamp
- System operating conditions
- Associated parameter values

This information assists in identifying root causes.

Diagnostic Access

Diagnostic access requires:

- SEG GUI dealer or SEG GUI manufacturer
- SEG GUI interface (E5D10A0000)
- Service computer

The service interface allows complete access to available diagnostic information.

Real-Time Monitoring

One of the most powerful diagnostic tools available in SEG GUI is online monitoring.

Online monitoring allows service personnel to observe system behavior while the bicycle is operating.

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Table 20-4. Typical Online Parameters

PARAMETER	DESCRIPTION
Battery Voltage	**Battery operating voltage**
Battery Current	**Battery current consumption**
Drive Unit Temperature	**Internal thermal status**
Rider Torque	**Torque sensor measurement**
Cadence	**Pedaling frequency**
Vehicle Speed	**Speed sensor information**
Motor Power	**Delivered assistance**
Assistance Mode	**Active riding profile**

Importance of Context

One of the most important principles of the BLM diagnostic strategy is:

A diagnostic code alone is not sufficient to determine the root cause.

The same code may have different meanings depending on:

- Operating conditions
- Rider behavior
- Battery status
- Temperature
- System state

For this reason, SEG strongly recommends reviewing online data whenever diagnostic events are investigated.

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Example: Error 4

Startup Phase Example

Consider the following scenario:

The rider powers on the bicycle.

During startup:

- Crank movement is detected.
- Torque value is unstable.
- Sensor initialization has not yet completed.

The system may temporarily generate:

Error 4

Scenario A

The event occurs once during startup.

Afterwards:

- System behaves normally.
- No repeated event occurs.
- No abnormal operating condition exists.

Interpretation:

Startup-related event.

No hardware failure necessarily exists.

Scenario B

The event repeats continuously.

Additional observations:

- Torque values unstable.
- Assistance irregular.

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- Event stored repeatedly.

Interpretation:

Possible hardware or sensor issue.

Further investigation required.

NOTICE

The interpretation of Error 4 depends on the associated operating conditions and recorded parameters.

The same diagnostic code may represent:

- A temporary operating event.
- A genuine hardware fault.

Dealer Diagnostic Workflow

Recommended Procedure

1. Read active events.
2. Read event history.
3. Verify online parameters.
4. Check wiring and connectors.
5. Perform calibration verification.
6. Conduct a ride test.
7. Generate service report if required.

Sensor Diagnostics

The diagnostic system continuously validates:

Torque Sensor

Checks include:

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- Signal plausibility
- Offset validation
- Range monitoring

Cadence Sensor

Checks include:

- Signal availability
- Consistency
- Frequency plausibility

Speed Sensor

Checks include:

- Signal presence
- Detection frequency
- Operating consistency

Battery Diagnostics

Battery-related monitoring typically includes:

- Voltage
- Current
- State of Charge
- Communication health
- Internal warnings

The Battery Management System continuously exchanges information with the Drive Unit.

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Thermal Diagnostics

The Drive Unit supervises internal temperatures and automatically applies protective strategies when required.

Protective actions may include:

- Power reduction
- Assistance limitation
- Temporary shutdown

These actions are intended to protect hardware components.

Diagnostic Reports

SEG GUI allows generation of technical reports.

Reports may include:

- Active diagnostic events
- Event history
- Firmware version
- Battery information
- Operating parameters

Incident Reporting

Generated diagnostic reports can be included in support requests sent to SEG Automotive.

Typical uses include:

- Troubleshooting support
- Warranty investigations
- Advanced technical analysis

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Support Escalation

When a dealer cannot resolve an issue locally:

1. Generate diagnostic report.
2. Submit incident information.
3. Include event history.
4. Include operating conditions.
5. Submit support request.

Technical Support:

ebike-support@seg-automotive.com

Best Practices

When investigating diagnostic events:

✅ Review event history.

✅ Review online data.

✅ Verify calibration status.

✅ Verify firmware version.

✅ Inspect wiring and connectors.

✅ Reproduce the condition whenever possible.

Avoid reaching conclusions based exclusively on the displayed code.

Summary

The BLM diagnostic system has been designed to provide comprehensive visibility into system operation.

The distinction between:

- Warning Events
- Error Conditions

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- Faults

allows service personnel to interpret system behavior accurately.

Successful diagnostics require evaluation of:

- Event information
- Online monitoring data
- Operating conditions
- System history

rather than relying on error codes alone.

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21. Technical Support

Introduction

The BLM support structure has been developed to provide efficient and traceable technical assistance for OEM manufacturers, authorized dealers and service organizations.

The support process is designed to:

- Accelerate fault resolution
- Improve diagnostic accuracy
- Minimize bicycle downtime
- Enable efficient warranty handling
- Support continuous product improvement

The process relies on cooperation between:

- Riders
- Dealers
- OEMs
- SEG Automotive Technical Support

Support Structure

Levels of Support

The support organization consists of multiple levels.

Level 1 – Rider Support

The rider should initially contact:

- Bicycle dealer
- Bicycle manufacturer
- Authorized service center

Routine issues can typically be resolved at this level.

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Level 2 – Authorized Dealer

Authorized dealers perform:

- Initial inspection
- Diagnostic evaluation
- Fault verification
- Calibration verification
- Firmware verification

The dealer is responsible for determining whether escalation is required.

Level 3 – SEG Automotive Technical Support

SEG Automotive provides advanced support for:

- Complex diagnostics
- Product investigations
- Warranty analysis
- Technical escalation
- OEM assistance

Support is provided using information collected through SEG GUI and the official reporting process.

Technical Support Contact

Technical support requests should be submitted through approved channels.

Technical Support

ebike-support@seg-automotive.com

Support requests should include sufficient technical information to allow efficient diagnosis.

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Support Workflow

The support workflow consists of the following stages:

1. Dealer Analysis

The authorized dealer performs the initial technical investigation.

Activities may include:

- Visual inspection
- Diagnostic review
- Event analysis
- Functional verification
- Ride testing

2. Web Report Submission

If the issue cannot be resolved locally, the dealer creates a support report.

The report typically includes:

- Bicycle information
- Drive Unit information
- Diagnostic data
- Event logs
- Description of the issue

3. Report Receipt

SEG Automotive receives and reviews the submitted information.

Technical personnel evaluate:

- Completeness of information
- Diagnostic content
- Event history

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- Operating conditions

Additional information may be requested if necessary.

4. Claim Accepted

After technical review, the support request may be accepted for further action.

Depending on findings, actions may include:

- Technical guidance
- Additional diagnostic requests
- Replacement authorization

5. Send Part

If replacement is required, the appropriate service component is supplied.

Examples may include:

- Drive Unit
- Battery
- Display
- Sensor
- Accessory

6. Defective Part Receipt

Returned components may be analyzed by SEG Automotive.

Objectives include:

- Root cause analysis
- Product improvement
- Warranty validation
- Reliability monitoring

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6.Support Reports

Importance of Report Quality

The quality of diagnostic information has a direct impact on response time.

The more information included, the easier it becomes to identify the root cause.

Recommended Report Content

Table 20-1. Recommended Technical Report Content

INFORMATION	RECOMMENDED
Bicycle Model	**Yes**
Bicycle Serial Number	**Yes**
Drive Unit Reference	**Yes**
Firmware Version	**Yes**
Description of Issue	**Yes**
Event Codes	**Yes**
Diagnostic Report	**Yes**
Supporting Images	**If Available**
Activity Data	**If Relevant**

Diagnostic Reports

SEG GUI supports automatic generation of technical reports.

Reports may include:

- Active events
- Historical events
- System configuration
- Firmware versions
- Battery information
- Sensor information

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These reports significantly improve support efficiency.

Activity Data in Support Cases

Activity recordings may provide valuable information during troubleshooting.

Examples of useful activity parameters include:

- Speed
- Cadence
- Rider torque
- Drive Unit power
- Battery status
- Temperature

These parameters may help reproduce and understand specific operating conditions.

Dealer Responsibilities

Authorized dealers are expected to:

- Perform initial diagnosis
- Verify system configuration
- Verify firmware level
- Verify calibration status
- Collect diagnostic information

The dealer should complete these actions before escalating a support request.

OEM Responsibilities

OEM manufacturers may be involved when an issue relates to:

- Vehicle integration

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- Mechanical design
- Wiring implementation
- Battery installation
- Display integration

OEM collaboration may be required during advanced investigations.

Warranty Support

Warranty evaluation is based on:

- Diagnostic information
- Product condition
- Operating history
- Reported symptoms

Warranty approval remains subject to SEG Automotive warranty policies and applicable agreements.

Replacement Parts

Replacement components are available through the official BLM after-sales platform:

https://seg.ecoelectric21.com

Email: partsecoseg@gmail.com

Only approved replacement parts shall be used.

Best Practices

To improve support efficiency:

✅ Verify firmware version.

✅ Review diagnostic events.

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✅ Verify calibration status.

✅ Include diagnostic reports.

✅ Include photographs when relevant.

✅ Describe operating conditions accurately.

WARNING

Replacing components without diagnosis may:

- Fail to solve the issue.
- Increase service costs.
- Delay root cause identification.

Diagnostic evaluation should always be performed before replacing components.

Continuous Improvement

Technical support information contributes directly to product improvement activities.

Returned information is used for:

- Reliability analysis
- Firmware improvement
- Product development
- Service process optimization

This feedback loop assists in maintaining long-term product quality.

Summary

The BLM support organization provides a structured process for efficient technical assistance.

Using:

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- SEG GUI
- Diagnostic reports
- Activity analysis
- Technical escalation procedures

dealers and OEMs can efficiently resolve technical issues and maintain high customer satisfaction. The combination of diagnostics, reporting and after-sales support forms an essential part of the BLM ecosystem.

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22. Spare Parts & After Sales

Introduction

The BLM after-sales program has been developed to support the complete service lifecycle of the product.

The objective of the after-sales strategy is to ensure:

- Long-term product availability
- Efficient service operations
- Rapid replacement of components
- Technical support traceability
- Dealer support

Approved spare parts, service tools and accessories are available through the official BLM after-sales channels.

After Sales Portal

The official ordering platform for dealers and service organizations is:

https://seg.ecoelectric21.com

Email: **partsecoseg@gmail.com**

The portal provides access to:

- Spare parts
- Service components
- Technical accessories
- Diagnostic equipment
- Product documentation

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Ordering Philosophy

Only approved replacement components shall be used on BLM-equipped bicycles.

Benefits include:

- Guaranteed compatibility
- Regulatory compliance
- Product reliability
- Warranty protection

WARNING

Installation of non-approved replacement parts may:

- Affect system performance.
- Affect reliability.
- Affect regulatory compliance.
- Void warranty coverage.

Drive Unit

BLM Drive Unit

Table 22-1. Drive Unit Service Information

FIELD	VALUE
Reference	**E5M1200002**
Description	**BLM Drive Unit**
Nominal Power	**250 W (continuous operation) according to EN15194**
Peak Power	**700 W**
Maximum Torque	**80 Nm**
Intended User	**Dealer / OEM**

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Battery System

Main Battery

Table 22-2. Main Battery Service Information

FIELD	VALUE
Reference	**Batt BLM**
Capacity	**630 Wh**
Weight	**Approx. 2.5 kg**
Protection Rating	**IP65**
Intended User	**Dealer / OEM**

Range Extender

Table 22-3. Range Extender Service Information

FIELD	VALUE
Reference	**BATT BOTT TB XPRO 180Wh BH/SH**
Capacity	**180 Wh**
Weight	**Approx. 1 kg**
Intended User	**Dealer / OEM**

Display and Controls

SEG_D_FI Display

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Table 22-4. SEG_D_FI Service Information

FIELD	VALUE
Reference	**BC202**
Description	**SEG_D_FI Display**
Communication	**CAN / Bluetooth**
Intended User	**Dealer / OEM**

i_Button Controls

Table 22-5. i_Button References

COMPONENT	REFERENCE
Left i_Button	**E5H1000004**
Right i_Button	**E5H1000005**
Display / i_Button Y-Cable	**E5H1000003**

Display and i_Button Harness

Sensors

Table 22-6. Speed Sensor Service Information

FIELD	VALUE
Reference	**E5D1000001**
Description	**Speed Sensor**
Connection	**Direct Drive Unit connection**
Intended User	**Dealer / OEM**

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Wiring Components

Display Extension Cable

Table 22-7. Display Extension Cable

FIELD	VALUE
Reference	**E5M10E1020**
Description	**Motor ↔ Display Extension Cable**
Intended User	**Dealer / OEM**

Powertrain Components

Chainring Locknut

Table 22-8. Locknut Information

FIELD	VALUE
Reference	**E5M10Z1126**
Description	**Chainring Locknut**
Tightening Torque	**40-42 Nm**

Charging Equipment

Approved Charger

Table 22-9. Charger Information

FIELD	VALUE

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Commercial Reference	**CHARGER TB BLM CARB (Carbon frame)**
Model CARB	**16480109A**
Commercial Reference	**CHARGER TB BLM ALU (Alu frame)**
Model ALU	**16480110A**
Output Voltage	**42 V DC**
Output Current	**4 A**
Intended User	**End User / Dealer**

Diagnostic Equipment

SEG GUI interface

Table 22-10. Diagnostic Hardware

FIELD	VALUE
Reference	**E5D10A0000**
Description	**SEG GUI interface**
Application	**SEG GUI Communication**
Intended User	**Dealer / OEM**

SEG GUI

Available Versions

SOFTWARE	TARGET USER
SEG GUI dealer (SW)	**Dealer**
SEG GUI manufacturer (SW)	**OEM**

Available Functions

- Diagnostics

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- Online Monitoring
- Calibration
- Firmware Updates
- Incident Reporting
- Assistance Configuration

Lighting Accessories

Single Light Cable & Dual Light Cable

WARNING

Lighting accessories shall only be used with:

- 36 V compatible lighting systems
- Maximum power consumption of 20 W

For dual-light installations:

- Combined power consumption shall not exceed 20 W

Failure to comply may result in Drive Unit damage.

Recommended Dealer Inventory

Table 22-11. Recommended Dealer Stock

COMPONENT	RECOMMENDATION
Speed Sensor	**Keep in stock**
Display Extension Cable	**Keep in stock**
Y-Cable Assembly	**Keep in stock**

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Charger	**Keep in stock**
SEG GUI interface	**Required**
Diagnostic Software	**Required**

Warranty Support

Warranty support requests should include:

- Product identification
- Diagnostic report
- Event information
- Photographic evidence (when available)

Support requests may be submitted through:

ebike-support@seg-automotive.com

Technical Documentation

The latest technical resources are available through:

High-Performance eBike Drive Systems - SEG Automotive eBike motor

Available resources may include:

- User Manuals
- Service Manuals
- Firmware Packages
- Technical Bulletins
- Product Information

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After Sales Summary

The after-sales program has been designed to ensure long-term supportability of the BLM platform.

Through the combination of:

- Spare part availability
- SEG GUI diagnostics
- Technical support
- Firmware maintenance
- Dealer support

The system can be efficiently maintained throughout its operational life.

Components list and comercial references

Table 22-12. Service parts list.

REFERENCE	DESCRIPTION	ADDITIONAL INFO
E5M1200002	**BLM Drive Unit**	**Mid motor SEG BLM 80Nm**
E5H1000001	**SEG_D_FI Display**	**Model BC202**
E5H1000004	**Left i_Button**	**Remote button left, hidden in handlebar**
E5H1000005	**Right i_Button**	**Remote button right, hidden in handlebar**
E5H1000003	**Y-Cable Assembly**	**Connection splitter Display/i-buttons**
E5M10E1020	**Display Extension Cable**	**Connection DU /display**
E5D1000001	**Speed Sensor**	**Bike speed sensor, cable and connector.**
E5M10Z1126	**Chainring Locknut**	**Accessory to fix chainring.**
16480109A	**CHARGER TB BLM CARB**	**Approved Charger Carbon frame**
16480110A	**CHARGER TB BLM ALU**	**Approved Charger Alu frame**
1616R432A	**CHARGER PORT BLM CARB**	**Charger connection port Carbon frame**
1616R433A	**CHARGER PORT BLM ALU**	**Charger connection port Alu frame**

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1616R434A	**XPRO BATT BLM DISCHARGE PORT**	**Extender Battery connection port**
1616R435A	**XPRO BLM CONTROLLADOR TRANSC.**	**Battery Power Distribution Harness**
450018990	**Batt BLM**	**Main Battery**
450011376	**BATT BOTT TB XPRO 180Wh BH/SH**	**Range Extender**
	Single Light Cable	**Contact ebike-support@seg-automotive.com**
	Dual Light Cable	**Contact ebike-support@seg-automotive.com**
	Lights	**Contact ebike-support@seg-automotive.com**

Ordering Portal

Official after-sales ordering platform:

https://seg.ecoelectric21.com

Email: **partsecoseg@gmail.com**

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APPENDIX

- Appendix A – Display Manual. (separate document)
- Appendix B – SEG GUI Manual (separate document)
- Appendix B2 – SEG GUI Connection. (separate document)
- Appendix B3 – SEG GUI Installation. (separate document)

Media

Video Tutorial: https://www.youtube.com/playlist?list=PLe_2OZ2RESMc

1- BH BLM - GUI Connection
2- BH BMM - GUI Connection
3- Motor Update Fw
4- GUI Presentation
5- Motor Configuration
6- Motor Calibrations
7- System Diagnosis
8- Display User Manual
9- Motor Disassembly
10- GUI Files

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