



FSG2017 Data Logger Specification

FS Rules 2017 Rule EV4.8 states that for electric cars a calibrated energy meter must be inserted in the tractive system supply lines to measure the energy used for calculation of the energy efficiency score, and to observe whether the power limitation is met.

FS Rules 2017 Rule DV1.3 states that for driverless cars a data logger must be installed on the car to understand and reproduce the perception as well as the motion planning of the vehicle by the algorithm based on the information and data collected by the sensors implemented in the vehicle.



Figure 1: CAD Rendering of the FSG Data Logger

The FSG data logger serves both purposes and consists of a single box with 5 connectors and 2 LEDs.

- The first 2 connectors are M10 nickel-plated brass bolts, sticking out of the top of the box. The HV- line must be connected to these brass bolts such that the current to the motor controller(s) is routed through the power shunt inside the data logger.
- The third connector must be connected to the HV+ line of the intermediate circuit. It is mounted on top of the data logger.
- The fourth connector, positioned on the side of the data logger, includes the data logger supply and a non-terminated 1Mbit/s CAN interface. The power supply must be directly connected to the potential switched by the GLVMS. This supplies the



energy meter, whenever the control system is switched on. A reasonably sized fuse must protect the supply wiring.

- The CAN interface will be used to send current tractive system data, as measured by the data logger, to the team’s system. It will also serve as receiving interface for the driverless data logging. Therefore, driverless teams must use/connect to this CAN interface. Further information about the data to be sent through this CAN will be provided soon.
- The fifth connector, also positioned on the side of the data logger, provides a 100Mbit/s Ethernet interface with 24V passive power over Ethernet output. The passive power over Ethernet will optionally be used to power a WLAN-AP provided by the competition officials.
- The Ethernet interface will be used by the competition officials to configure the data logger and to download logged data. Teams may also use the interface to download logged data. Therefore, this interface must be made accessible to the competition officials by the team by routing it to an easily accessible position in the car near the main roll hoop. **The exact position and connector will soon be determined.**
- The 2 LEDs will be used to show the data logger’s state.

The data logger should be properly fastened and be mounted at a place, where it is protected from water.

Detailed data and information can be found in the following tables, drawings and diagrams. CAD-data is provided in the “Rules & Important Documents”-section of the FSG website: <https://www.formulastudent.de/fsg/rules/>.

Table 1: Mechanical Parameters

Basic Housing type	Bopla Euromas II ET212
Dimensions	100 × 100 × 57mm
Weight	400g
Vibration	Tested against automotive standards

Table 2: Supply by GLVS

Supply Voltage	7 – 60VDC
Max. Power Consumption	9W total (2W logger, 7W optionally via PoE)
Internal Fusing	None

Table 3: CAN Interface

Data Rate	1Mbit/s
Internal Termination	None
IDs, Message Layout and Quantisation	Standard IDs, dbc-file will be provided



Table 4: Ethernet Interface

Ethernet Standard	100BASE-TX
Power over Ethernet	24V, passive
Required Minimum Cable Standard	ISO/IEC 11801, Cat 5

Table 5: Tractive System Data Logging

Sampling Rate	250 Hz
Logging File Format	CSV
Data Download	Browser Interface via HTTPS

Table 6: Tractive System Sensor

Sensor Type	Isabellenhütte IVT-MOD IVT-500-U3-TOI-CAN2-12
Accuracy, etc.	See sensor data sheet at http://www.isabellenhuette.de/en/precision-measurement/products/ivt-mod/

Table 7: Driverless Data Logging

Sampling Rate	Variable
Logging File Format	ASAM MDF 4.1
Data Download	Browser Interface via HTTPS

Table 8: HV Connectors

HV+, data logger side	Molex 39-01-2026 Pin 1: HV+ Pin 2: NC
HV-, data logger side	Nickel-plated brass bolts, M10, MAXIMUM TIGHTENING TORQUE: TBD

Table 9: LV Connectors

PWR/CAN, data logger side	Binder 99 3431 202 04 Pin 1: V+ Pin 2: GND Pin 3: CANH Pin 4: CANL
Ethernet / PoE, data logger side	Binder 99 3482 202 08 Pin 1: TD_N (Ethernet TX-) Pin 2: RD_P (Ethernet RX+) Pin 3: RD_N (Ethernet RX-) Pin 4: 24V (PoE)



	Pin 5: reserved (leave open) Pin 6: reserved (leave open) Pin 7: TD_P (Ethernet TX+) Pin 8: GND (PoE)
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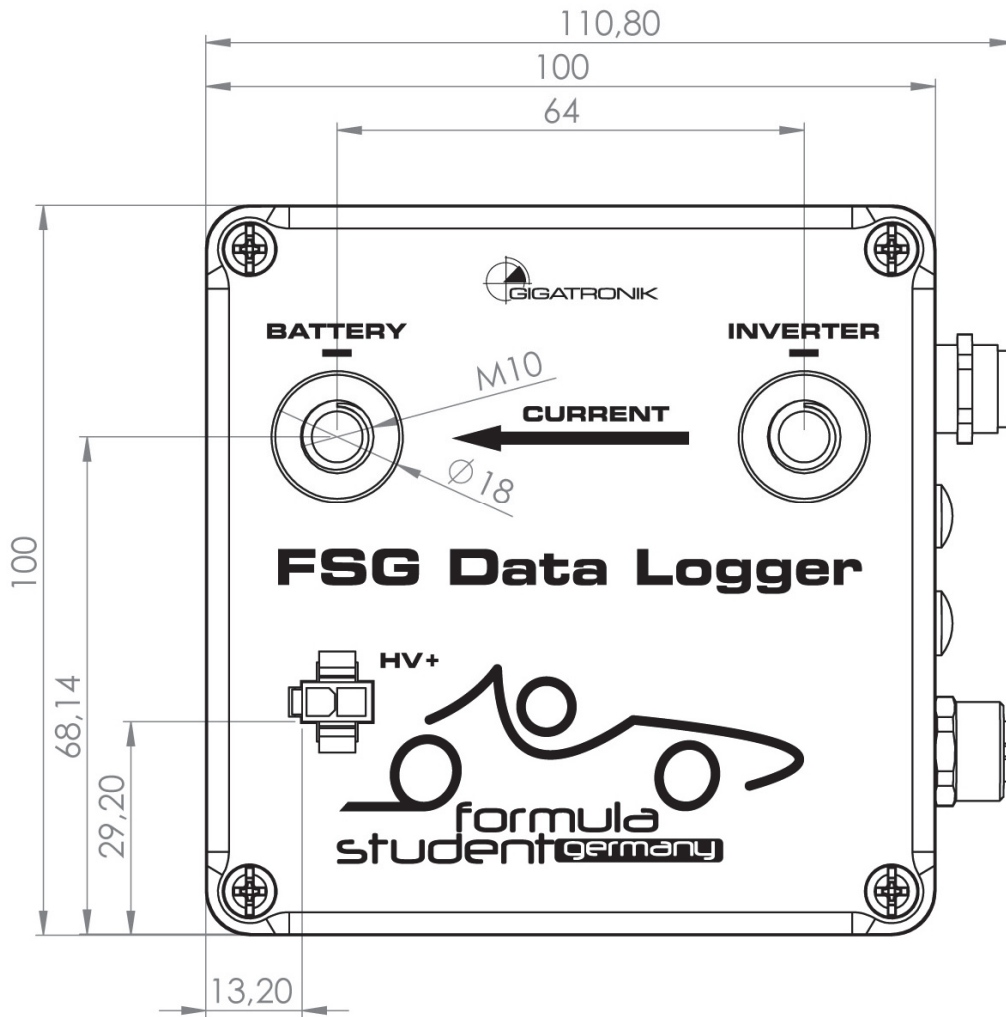


Figure 2: Top View

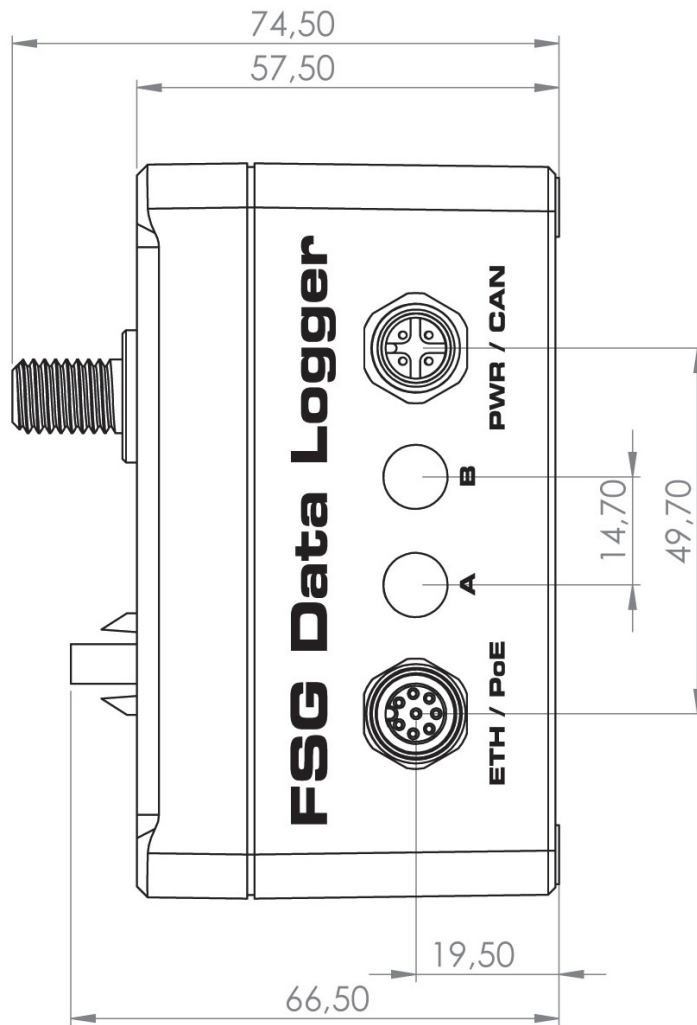


Figure 3: Side View

If there are any questions, please do not hesitate to submit a rules question through the FSG website: <https://www.formulastudent.de/fsg/rules/issue-tracker/>.

Document History

V0.85	Initial Release
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