FS WORLD

Data Logger Specification

2024-03-05

Contents

Changelog

| Section	Version	Change
	v0.1	Preliminary Datasheet
	v0.2	Fix voltage range and fix TS+ connector number
	v0.3	Update mechanical drawings and change TS+ connector due to in-availability
	v0.4	Update LED descriptions. Clarify the teams need to provide the vehicle side of the connectors.
	v0.5	Clarify the mounting of the datalogger and the usage of the pre-assembled Dual Lock
	v0.6	Mounting clarification, Status message update, LED description update
1	1.0	Change sensor to IVT-S.
6	1.0	Add information on how to view recorded data.

1 Data Logger
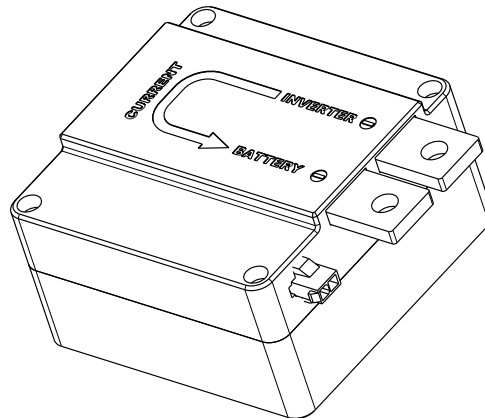
Figure 1: Data Logger (DL) overview

A DL according to this specification will be used and provided by the officials as official measuring system according to EV 4.6 and T 14.2.

Its housing has outer dimensions of 100 mm x 100 mm x 59 mm and it weighs approximately 800 g.
CAD-data of the DL can be found on the competition website[1].

The DL must be supplied by a voltage of 12 V DC to 60 V DC. It draws a maximum power of 10 W. It must be reasonably fused in the supply wiring.

The CAN bus interface operates on a data rate of $1\,\mathrm{Mbit/s}$ and is not terminated internally.

The CAN message layout can be obtained from a dbc-file provided on the competition website[1].

The Ethernet interface is according to the 100BASE-TX standard and requires a cable at least adhering to ISO/IEC 11801 Cat 5 with an RJ-45 connector. It must be easily accessible for data download. It is recommended to use a RJ45 - M12 d-code cable[2].

The sensor used by the DL is an Isabellenhütte IVT-S-500-U3-I-CAN1-12/24[3].

The pinout of the connectors has to be according to tables 2 and 3.

2 Mounting

The DL must be rigidly mounted inside a Tractive System (TS) enclosure, see EV 4.2. Only the two preapplied 3M™ Dual Lock™ strips on the bottom side of the DL must be used. The DL must not be fixed or touched in any other way, including but not limited to zip ties, HV warning stickers, any kind of glue or tape.

The DL must be protected from water. The busbars and connectors must not be mechanically loaded.

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[1] https://formulastudent.de/rules
[2] https://b2b.harting.com/ebusiness/en_us/RJ45-M12-d-code-str-AWG22-7-PUR-3-0m/09486896018030
[3] https://fsg.one/ivt-s

3 Connectors

Busbar with 8.1 mm hole(DL-side)
- TS- in current path
- Must be connected fulfilling EV 4.6.4

Molex 0039012026 (DL-side)
- TS+ voltage measurement
- Pin 1 is TS+, Pin 2 is unused
- Must be connected fulfilling EV 4.6.5
- Molex 0039012025 (vehicle-side)

Harting 21 03 321 3401 (DL-side)
- Power and CAN interface
- Must power the DL according to EV 4.6.6.
- Can be connected to a vehicle CAN bus to obtain status messages.
- Teams are advised to check the status messages, as they provide the status of the data logger.
- Missing data due to not checking the status messages will be treated as a fault of the team.
- Status messages are sent with a frequency of 1 Hz.
- Status messages contain maximum values (Voltage, Current, Power) of the respective time interval.
- Status messages are provided as a general reference only, only the data stored on the DL will be used for scoring.
- [DV ONLY] CAN Interfaces must be connected to the bus shared with the Remote Emergency System (RES).
- Harting 21 03 319 2401 (vehicle-side)

Pin	Description
1	LV+
2	LV- (GND)
3	CANH
4	CANL

Table 2: DL side Power & CAN Connector (Harting 21 03 321 3401)

Harting 21 03 381 4440 (DL-side)
- 100 $^{Mbit}/_s$ Ethernet interface used for connecting to the DL
- A cable must be provided long enough to reach a Data Logger Download Station (DLDS) that is 2 m away from the vehicle.
- A standard Ethernet RJ45 Plug must be provided for the the download station.
- Recommended cable: Harting 09 48 689 6018 030

The teams must provide the vehicle side of the connectors and all required cables.

4 LED'S

The Datalogger has two LED's, a left one and a right one. During power-up both LED's light up for a short time.
If the system is ready the left LED is always in hearbeat mode.

Pin	Description
1	TX+
2	RX+
3	TX-
4	RX-

Table 3: DL side Ethernet connector (Harting 21 03 381 4440)

Status	LED left	LED right
Idle, not logging	heartbeat	green
Logging	heartbeat	orange
Error	don't care	red or off

Table 4: DL status LEDs

5 Mechanical Drawings

The dimenson can bee seen in Figure 2.

6 Viewing recorded data
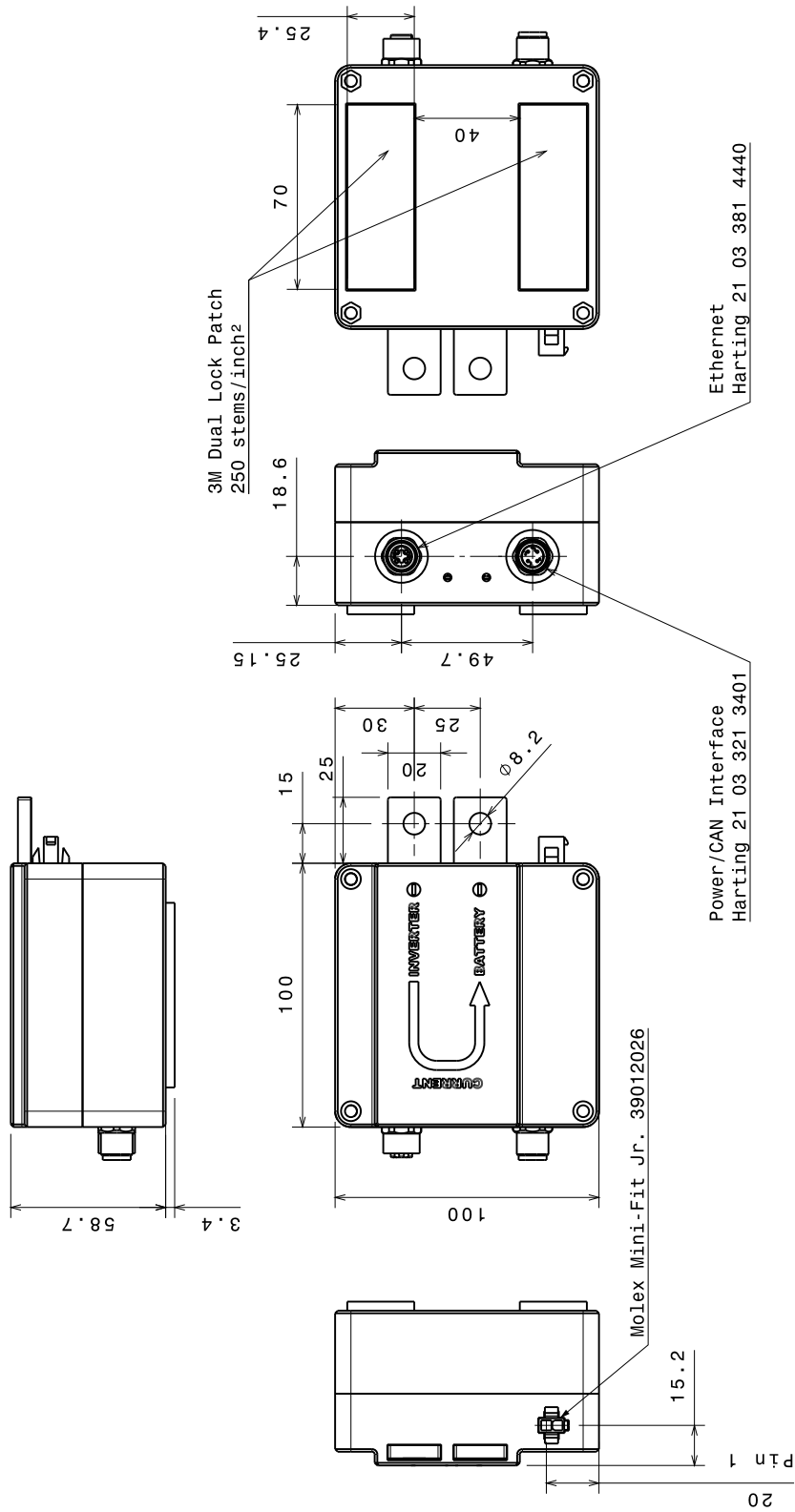
Teams can view the recorded data using an individual link provided at DL handout.

Figure 2: DL Mechanical Drawing