

# Energy Meter Specification



## Description:

FS Rule EV4.9 states that a calibrated energy meter has to 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 of 80kW is met.

The FSA 2017 Energy Meter consists of a single box with 5 connectors and 2 LEDs.

The first 2 connectors are M8 bolts, placed beside the box. The HV- line has to be connected to these bolts such that the current to the motor controllers is routed through the power shunt inside the energy meter.

The third connector has to be connected to the HV+ line. The exact type and RS part number can be found in the connectors table below.

The fourth connector, shown on the side of the Energy Meter including its mating part, has to be directly connected to the potential switched by the GLVMS. This supplies the energy meter, whenever the control system is switched on. It also supplies a CAN bus for status and error messages. The exact type and RS part number can be found in the Connectors Table 3.

The fifth connector, located beside the power connector, is for the USB Port. A shielded cable must connect the Energy Meter with a female USB-B-Port located near the measuring points on the right side of the car.

The LEDs show power and internal state.



Figure 1: FSE2017 Energy Meter CAD Rendering

The energy meter box 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 and drawings. CAD-data will be provided closer to the event.

If there are any questions, please do not hesitate to write an e-mail to [info@fsaustria.at](mailto:info@fsaustria.at)

### Parameter

LV Supply Voltage	9-60VDC
LV Power Consumption	Typ: 600mW    Max: 2W
LV Internal Fusing	None
Sample Rate Logging	250 Hz
Sample Rate CAN	100 Hz
Data Download	USB and Bluetooth
Max HV Voltage	800V
Max Voltage Error Logging	±0,6%
Max Voltage Error CAN	±2,5V
Continues HV current	±500A
Max HV current (10s)	±1000A
Shunt Resistance	36μΩ
Max Current Error Logging	±0.4%
Max Current Error CAN	±2,5A
USB Interface	USB 2.0
Bluetooth	V2.0

**Table 1: Electrical Ratings**

Housing Dimensions	87x94x39 mm
Weight	260g

**Table 2: Mechanical Ratings**

HV-, Energy Meter side	M8 screws with self-locking nuts
HV-, Vehicle side	M8 ring-lugs or similar
HV+, Energy Meter side	B02B-JWPF-RK-R (LF)(SN)
HV+, Vehicle side	O2R-JWPF-VRLE-S (RS Part Number 820-1302)
LV, Energy Meter side	Phoenix Contact M12 5-pin (RS Part Number: 652-8166)  PIN 1: LV+ PIN 2: GND PIN 3: CAN H PIN 4: CAN L PIN 5: Reserved – Do not connect  This connector is compatible to the FSE2014 Energy Meter
LV, Vehicle side	M12 5-pin (RS Part Number: 877-4803)
USB, Energy Meter side	Belden M8 / Connector 4-pin (RS Part Number: 375-2603)  PIN 1: USB VCC PIN 2: D- PIN 3: D+ PIN 4: USB GND
USB, Vehicle side	M8 4 Pin (RS Part Number: 802-5218)
USB, Measurement Port	USB-Steckverbinder Typ B 2.0 (RS Part Number: 818-0280)  PIN 1: USB VCC PIN 2: D- PIN 3: D+ PIN 4: USB GND PIN 5: Shield

**Table 3: Connectors**

CAN Standard	ISO 11898-2 (High Speed CAN) with 11-Bit-Identifier
ID 430h	Byte 1: Msg Counter + CRC Byte 2: Error Flags Byte 3: Voltage (unsigned int, 1LSB=2.5V) Byte 4: Current (signed int, 1LSB = 2,5A) Byte 5-8: Reserved
ID 431h	Reserved
ID 432h	Reserved
ID 635h	Reserved for 2018 use
ID 636h	Reserved for 2018 use

**Table 4: CAN**

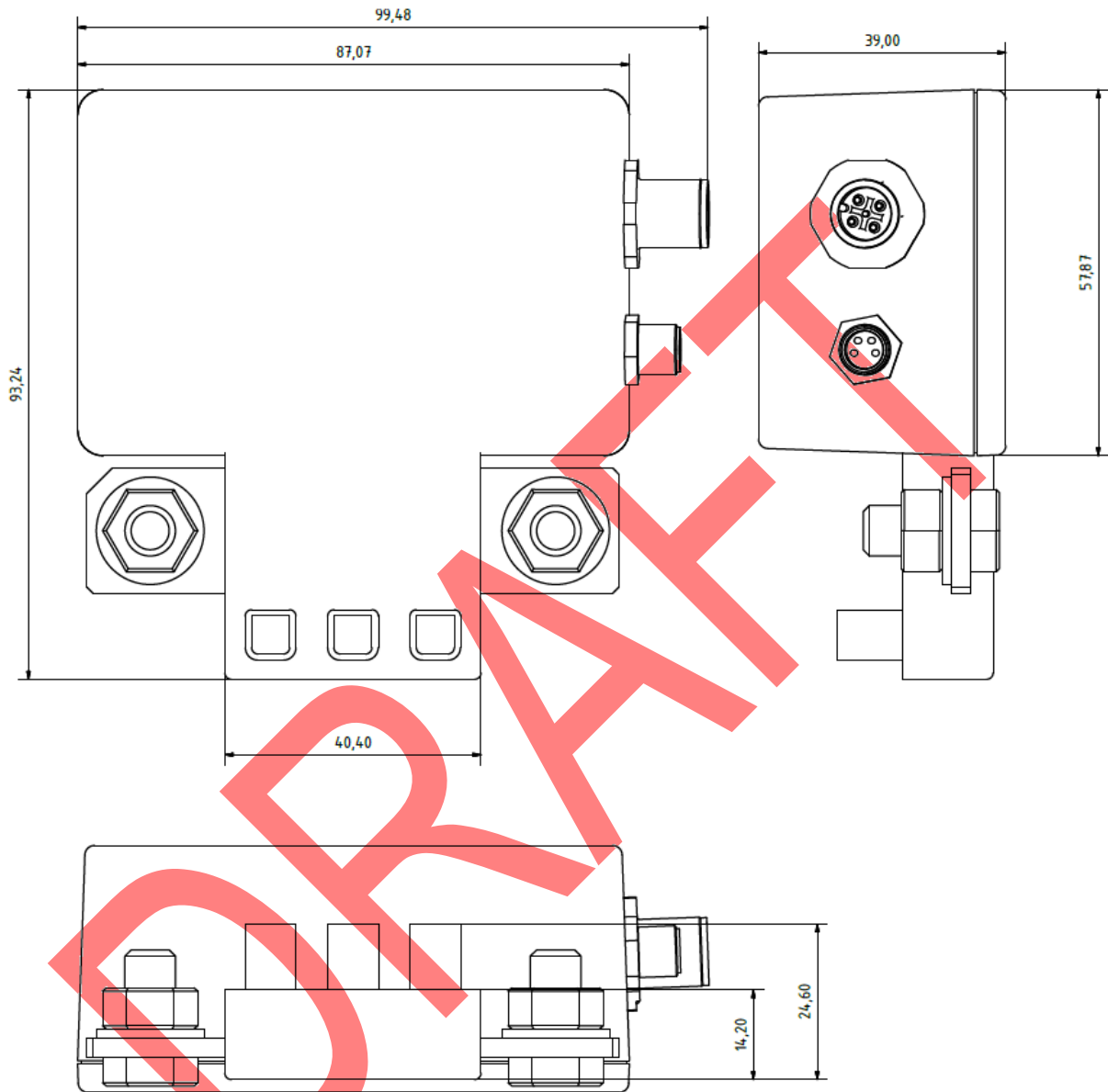


Figure 2: Energy Meter top and side view (dimensions in mm)