FAST EnergyCam Communication Interfaces

The power supply must fulfill the requirements of a limited power source due to EN 60950-1.
Recommended Output Current: 100mA per EnergyCam

External Micro-USB Power Supply
+5V max. 1A
(power only, no data)

External Power Supply
4.75-24V
100mA per EnergyCam

Graph 1: Overview EnergyCam Communication Interfaces

Micro-USB-B Socket
4-Pole Screw Terminal
4-Pole Screw Terminal
Interface Cable, open wire

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Graph 2: Overview EnergyCam 2.0 Interfaces

The power supply must fulfill the requirements of a limited power source due to EN 60950-1. Recommended Output Current: 100mA per EnergyCam.
The **M-Bus Interface** is used to connect EnergyCam as a slave to a M-Bus circuit. It contains a 4-pole screw terminal (2-pole screw terminal for EnergyCam 2.0) that allows easy integration of a line of EnergyCam devices as shown in Graph 3. It supports baud rates **up to 9600 baud**.

Graph 3: **Example for EnergyCam devices in an M-Bus circuit**

The connection to the master is polarity independent, that is, the two bus lines can be interchanged without affecting the operation of the slaves.

The EC2 M-Bus interface is powered via M-Bus by a M-Bus master device (2 standard M-Bus loads). The EC1 M-Bus communication interface **can not** get its power directly from the bus, but needs an external power supply.
RS 485 Communication Interface / EC2 RS 485 Interface

**Pinout**
The **RS 485 Interface** is used to connect EnergyCam as a slave to a RS-485 circuit. It contains a 4-pole screw terminal (3-pole screw terminal for EnergyCam 2.0) with the following pinout (Front view, from left to right):
- Pole 1: Non-inverting line (+)
- Pole 2: Inverting line (-)
- Pole 3 (+4): Common ground

Note that in Graph 1 and Graph 2 the non-inverting line (+) is labeled as 'Line A', the inverting line (-) 'Line B'. This is the common labeling of many big manufacturers, but unfortunately, some do it exactly the other way round. So when building a RS-485 circuit, care must be taken, that non-inverting line (+) and inverting line (-) are connected correctly, otherwise, the circuit won't work. Graph 4 shows a typical RS-485 circuit:

As shown in Graph 4, a RS-485 circuit should be **terminated** with resistors at both ends of the physical line. Additionally, one device should provide pull-up/pull-down resistors for **failsafe biasing**. This is usually done by the master, but in theory could be anywhere in the line.

**Graph 4: Example for EnergyCam devices in an RS-485 circuit**
Pinout for the D-SUB-9 version of the RS 485 Communication Interface

An early version of the RS 485 Communication Interface (not produced anymore) had not the 4-pole screw terminal, but a female D-SUB-9 connector. The pinout for that version is shown in the picture below.

USB Communication Interface / EC2 USB Interface

The USB Interface contains just a Micro-USB-B socket. In this interface version, it serves not just as power supply, but additionally for the communication with an EnergyCam; e.g. to a PC via a Micro-USB to USB cable. The EC2 USB Interface can not be used alone, it needs an other interface or a battery board to be plugged in.

Interface Cable, open wire / EC2 Interface Cable

The Interface Cable provides a mean to connect EnergyCam to a gateway or computer (f.e. a RaspberryPi) via a TTL connection. It uses a 4-wire cable (2m) with the following pinout:

- **RED**: 3.3-3.6V \( \leq 100 \text{ mA} \)
- **GREEN**: EnergyCam-RxD TTL
- **YELLOW**: EnergyCam-TxD TTL
- **BLACK**: GND

**IMPORTANT**: There is no polarity protection. Interchanging red and black can damage the device!

RS 232 Communication Interface (discontinued)

The RS 232 Communication Interface (not produced anymore) contains a female D-SUB-9 connector with the standard pinout for a RS-232 DCE device. Use a standard serial cable to connect it to a DTE device or a null modem cable to connect it to another DCE device.
# History

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<th>Date</th>
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<td>06th July 12</td>
<td>FBL</td>
<td>0.1</td>
<td>Initial, Serial communication scheme</td>
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<td>20th March 13</td>
<td>FBL</td>
<td>0.2</td>
<td>Changed from description of Expansion boards to description of Interface Adapter</td>
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<td>04th June 13</td>
<td>FBL</td>
<td>0.3</td>
<td>More detailed description</td>
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<td>18th July 13</td>
<td>FBL</td>
<td>0.4</td>
<td>RS 485 changed from DSUB to screw terminal</td>
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<td>0.5</td>
<td>RS 485 DSUB pinout added again</td>
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*Table 1: History*