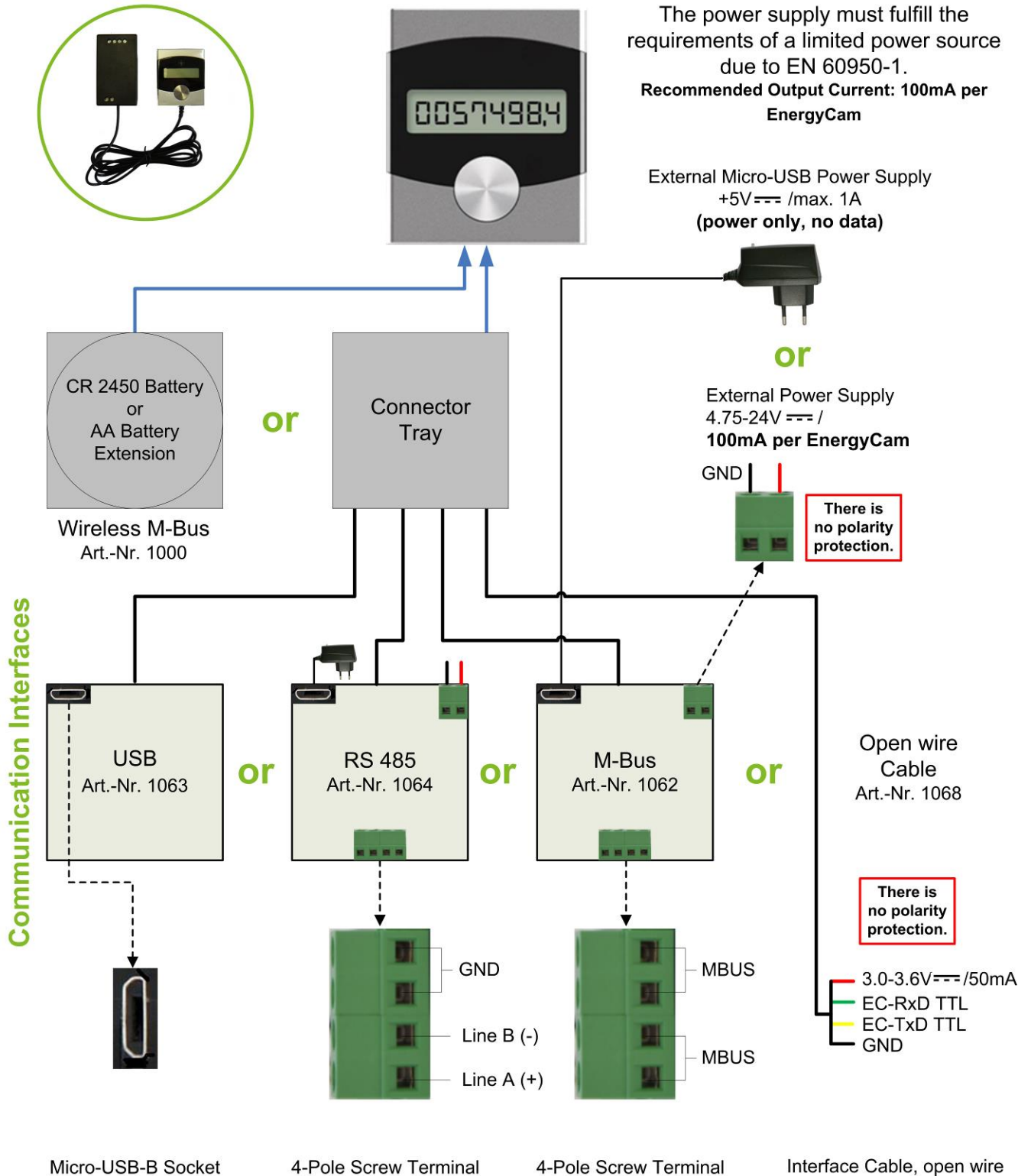
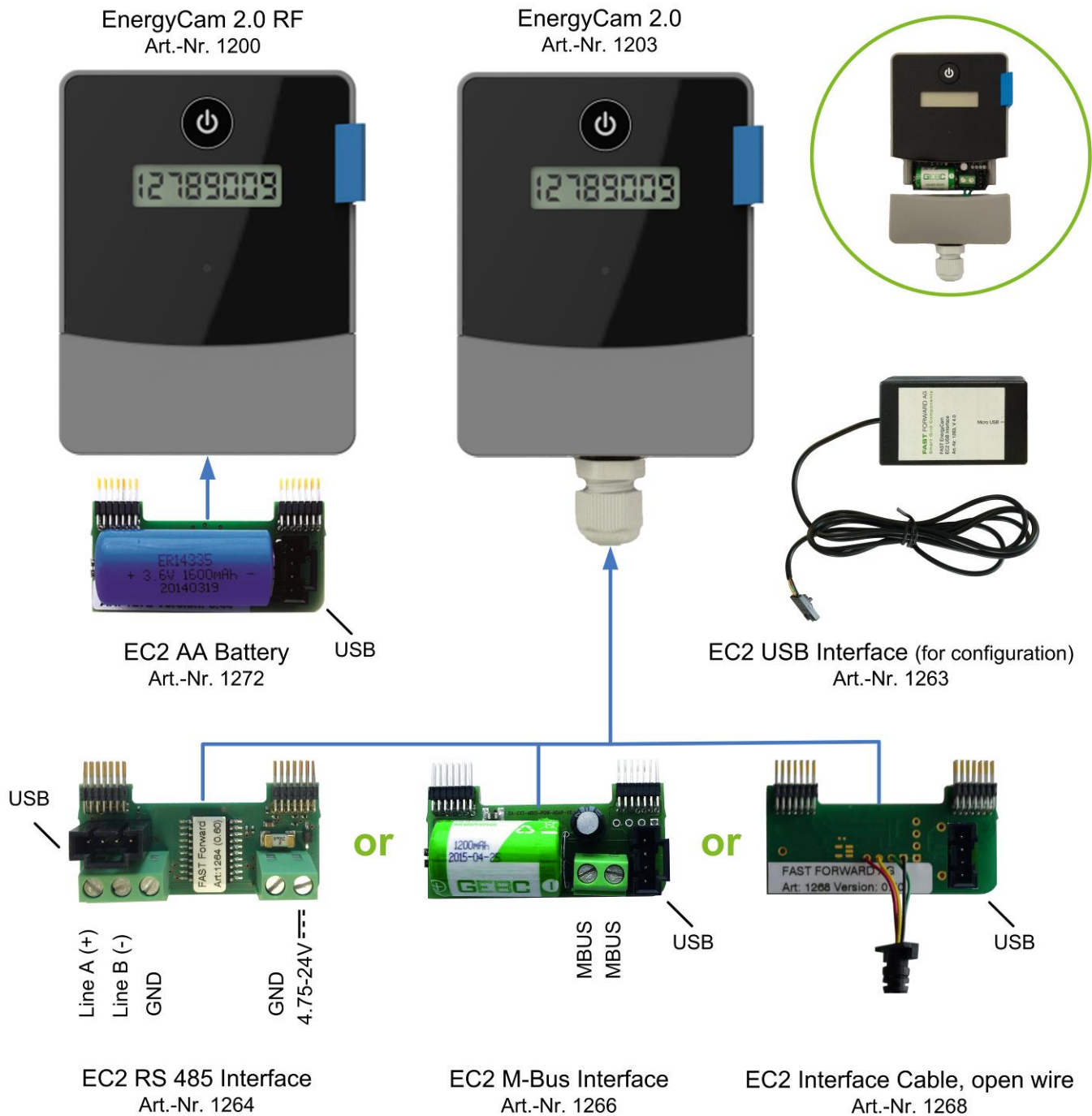


FAST EnergyCam Communication Interfaces



Graph 1: Overview EnergyCam Communication Interfaces

FAST 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

Power supply via M-Bus by a M-Bus master device.
Uses two standard M-Bus loads

3.3-3.6V \equiv /100mA
 EC2-RxD TTL
 EC2-TxD TTL
 GND

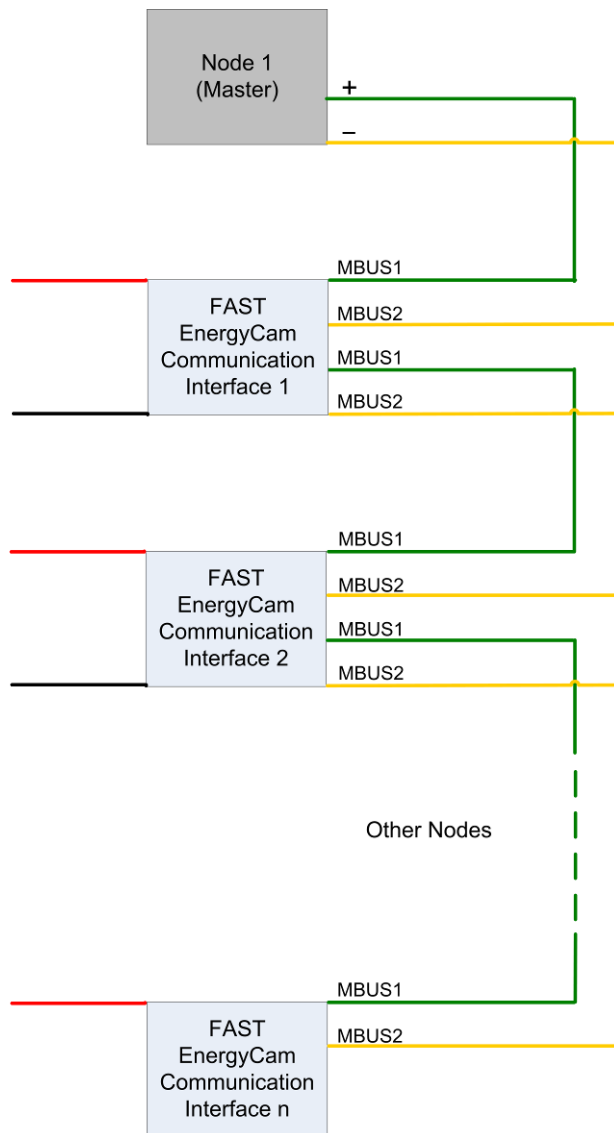
There is no polarity protection.

Graph 2: Overview EnergyCam 2.0 Interfaces

M-Bus Communication Interface / EC2 M-Bus Interface

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.

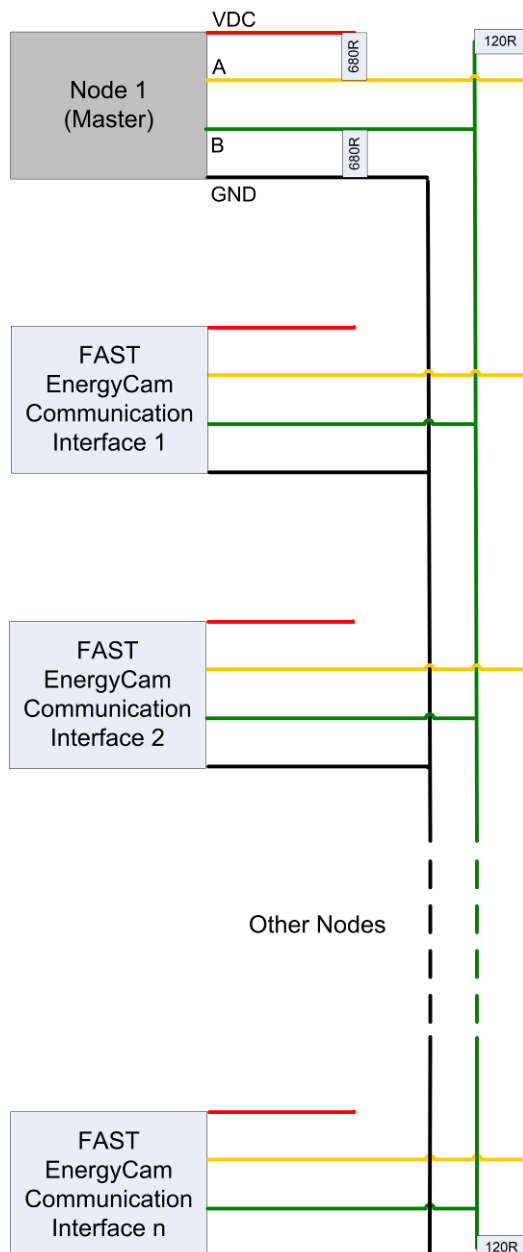
RS 485 Communication Interface / EC2 RS 485 Interface

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:

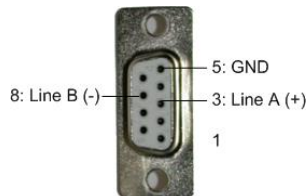


As shown in Graph 4, a RS-485 circuit should be **terminated** with resistors at both ends of the physical line. Additionally, **one** device should provide pull-up/pull-down resistors for **failsafe biasing**. This is usually done by the master, but in theory could be anywhere in the line.

Graph 4: Example for EnergyCam devices in an RS-485 circuit
 FAST_EnergyCam-Communication-Interfaces.doc 7/7/2016

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.



D-SUB-9 (female)

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

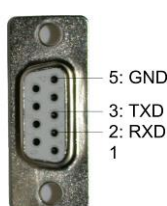
The **Interface Cable** provides a mean to connect EnergyCam to a gateway or computer (f.e. a RaspberryPi) via a TTL connection. It uses a 4-wire cable (2m) with the following pinout:

- **RED:** 3.3-3.6V $\overline{\text{V}}$ / ≥ 100 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.



D-SUB-9 (female)

History

Date	Author	Version	Changes
06 th July 12	FBL	0.1	Initial, Serial communication scheme
20 th March 13	FBL	0.2	Changed from description of Expansion boards to description of Interface Adapter
04 th June 13	FBL	0.3	More detailed description
18 th July 13	FBL	0.4	RS 485 changed from DSUB to screw terminal
03 rd Sep 13	FBL	0.5	RS 485 DSUB pinout added again
26 th Sep 13	FBL	0.6	USB Interface added
15 th Oct 13	FBL	0.7	Open wire version added
17 th Mar 14	SPR	0.8	Cosmetic
14 th Aug 14	FBL	0.9	Art.-Numbers changed
20 th Nov 14	CHZ	1.0	Add external power supply requirements
11 th Dec 14	CHZ	1.1	Changed external power supply requirements, add polarity protection warning for open wire
24 th Feb 15	FBL	1.2	Naming issues corrected, external battery added, RS 485 jumper section removed
01 th Apr 16	FBL	2.0	EC2 Interfaces added

Table 1: History