EMS bus interface board manual
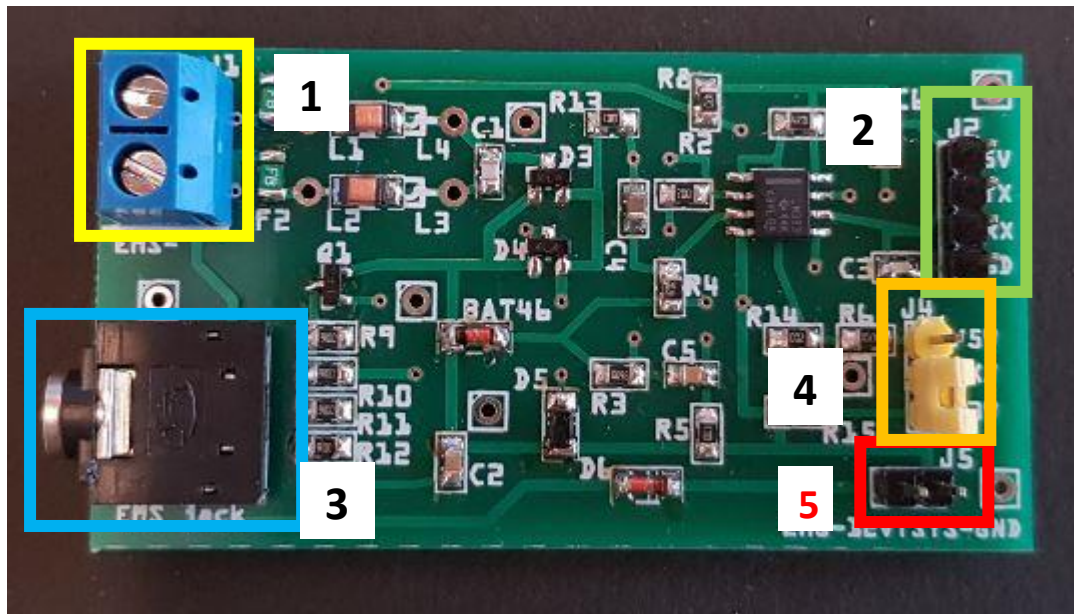
Current board version: 0.9 - April 2018 – Last update 19 October 2018.

Please see the Github page for all the details about working with the EMS bus.
https://github.com/bbqkees/Nefit-Buderus-EMS-bus-Arduino-Domoticz

This instruction is for both version V0.8 and V0.9 boards. The only difference is the silkscreen (so the text on the board).

Connectors on the board

Number	J#	Header function	Remark
1	J1	EMS screw terminal	Polarity does not matter.
2	J2	Controller header	VCC/TX/RX/GND. Input 5V or 3.3V from controller.
3	J3	EMS service jack plug	Only connect either J1 or J3.
4	J4	RX resistor selector jumper	Select either 4k7 (5V) or 100E (3.3V) resistor.
5	J5	8-12-16V pin from EMS service jack	Left pin EMS 8-16V. right pin GND. Max power draw 200mA cont.

Connecting to the controller

Although header J2 on the V0.8 boards says 5V, you can power the board with 5V or 3.3V. The controller needs to power the interface board. Connect GND as well. Do not supply the interface board with more than 5V.

You can connect this board to any 5V or 3.3V compatible UART. This might be on an Arduino, ESP8266 or f.i. a Raspberry Pi. Connect the header J2 to the controller. **Keep in mind the remarks in the red box above.**

Use the jumper of J4 to select the correct RX UART resistor setting. For most Arduino's and the Pi this is setting 1. This setting provides a standard 4k7 Ohm resistor on the output. For the ESP8266 use setting 2. Setting 2 provides a 100 Ohm resistor on the output, specifically intended for the ESP8266 and other similar chips. If one particular setting does not work, try the other setting too.

Connect RX to the RX UART serial port and TX to the TX UART serial port of your controller. If you do not need TX you can just leave the pin unconnected.

On the Arduino Mega 2560 in combination with the Github sketch connect RX to RX1 (pin 19) and TX to TX1 (pin 18).

If you use an Arduino UNO you have no choice other than RX on pin 0 and TX on pin 1. In case you use the UNO do not connect the EMS board to the Arduino while you are programming the Arduino, because the same serial pins are used for programming the Arduino.

On the Raspberry Pi connect RX to GPIO 15 (pin 10) and TX to GPIO 14 (pin 8).

Important:
The interface board also puts out the 8-16V pin of the EMS service jack via header 5. This can be used to power small electronics. The interface board has 2 polyfuses that are rated for a continuous current of 200mA and they trip at 400mA.
If you do draw power from the EMS service jack make sure the 3.5mm jack cable you use can handle the current as most of these cables are meant for audio and therefore have very thin wires inside.

The best method to power external circuits from these pins is to use a buck converter. LDO's will overheat very quickly due to the voltage difference. Furthermore you need to add a big capacitor at the input of the buck to compensate for voltage drops on the bus.

Also take care you do not short circuit the board in any way or feed this board with incorrect voltages as this may damage the board or the EMS bus. Also make sure the wires you connect the board to are in fact EMS bus wires and NOT 24V or mains power lines!!!!!!!!!

Connecting to the bus

You can use **EITHER** the EMS bus service jack **OR** the screw terminal.
Do not connect them at the same time, because you might short circuit the bus.

If you use the screw terminal, polarity does not matter because the circuit corrects both orientations.