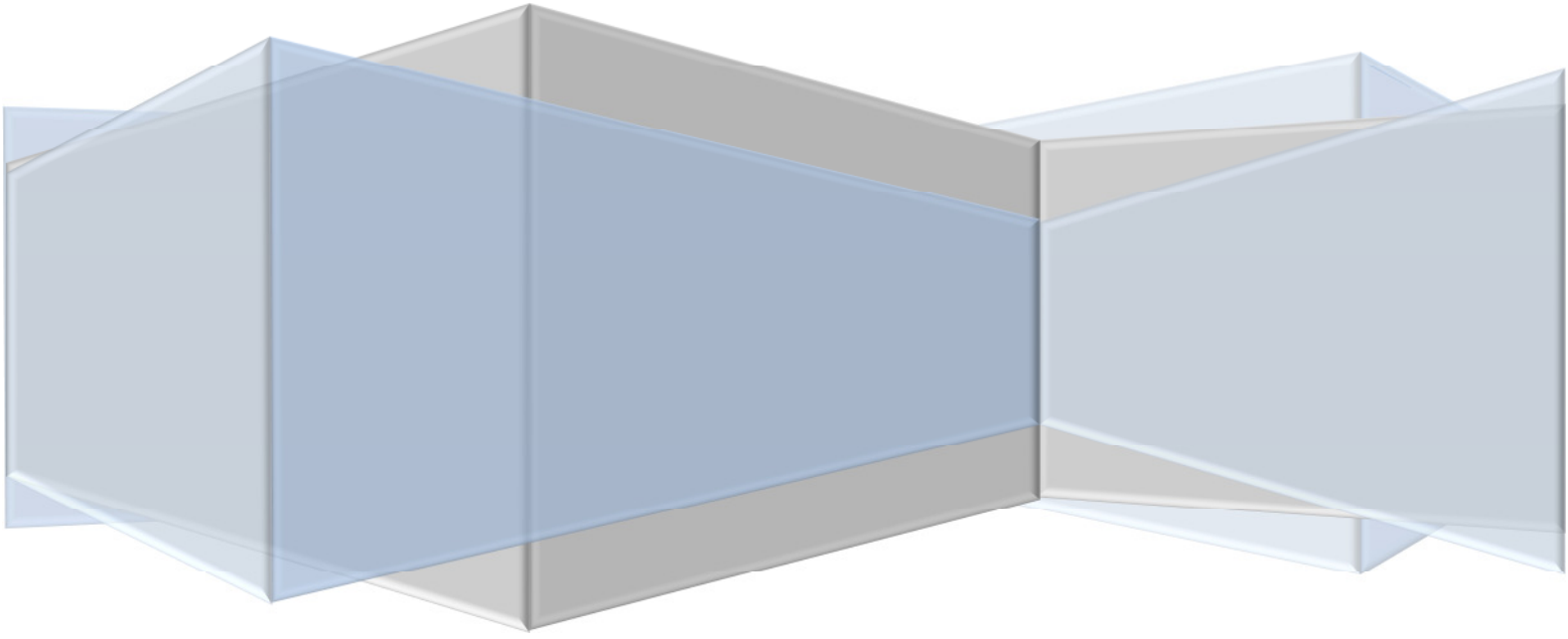
DANGER

All connections are NOT hot plug capable. Please turn off power before removing or plugging in ANY plug!!!

BCU

Documentation A.1

IB Ostendorff



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Abbreviations

BBU ..... Base Board Unit

GOLDi ..... Grid of Online Lab Devices Ilmenau

ISP ..... In System Programming

JTAG ..... Joint Test Action Group

BPU ..... Bus Protection Unit

PSPU ..... Physical System Protection Unit

BCU ..... Bus Control Unit

Explanations

Symbols mark especially important information.

DANGER

Please read these sections with extreme attention, to avoid any danger for human beings and the machine.

ATTENTION

Read these sections carefully to avoid problems while using the device.

INFORMATION

Read this section for additional information and hints.

1. Overview

This documentation describes the BCU.

BCU stands for “Bus Control Unit”. This is the central component of the *Grid of Online Lab Devices Ilmenau (GOLDi)*.

All boards are designed for academic use and research. They are not designed for any industrial use.

For feedback, as well as ideas and comments please send an email to goldi@ib-ostendorff.de.

1.1. How to read

This document is for administrators only. Administrators should be familiar with the complete document. Users may read it as well to get a better understanding of the architecture of the lab, but it is not necessary when working with the lab.

1.2. BCU

The BCU is used to connect the *GOLDi* bus to the *GOLDi* server. Therefore it interfaces all control units and electro mechanical systems to the *GOLDi* server.

It serves as a central component is and mandatory for any *GOLDi* setup. It can connect up to 6 BPUs or PSPUs[1] to *GOLDi*.

[1] Special attention has to be paid to the total maximum power required all BPUs / PSPUs at the same time. This is limited to 4 A by the BCU or less, if a weaker power supply is used.

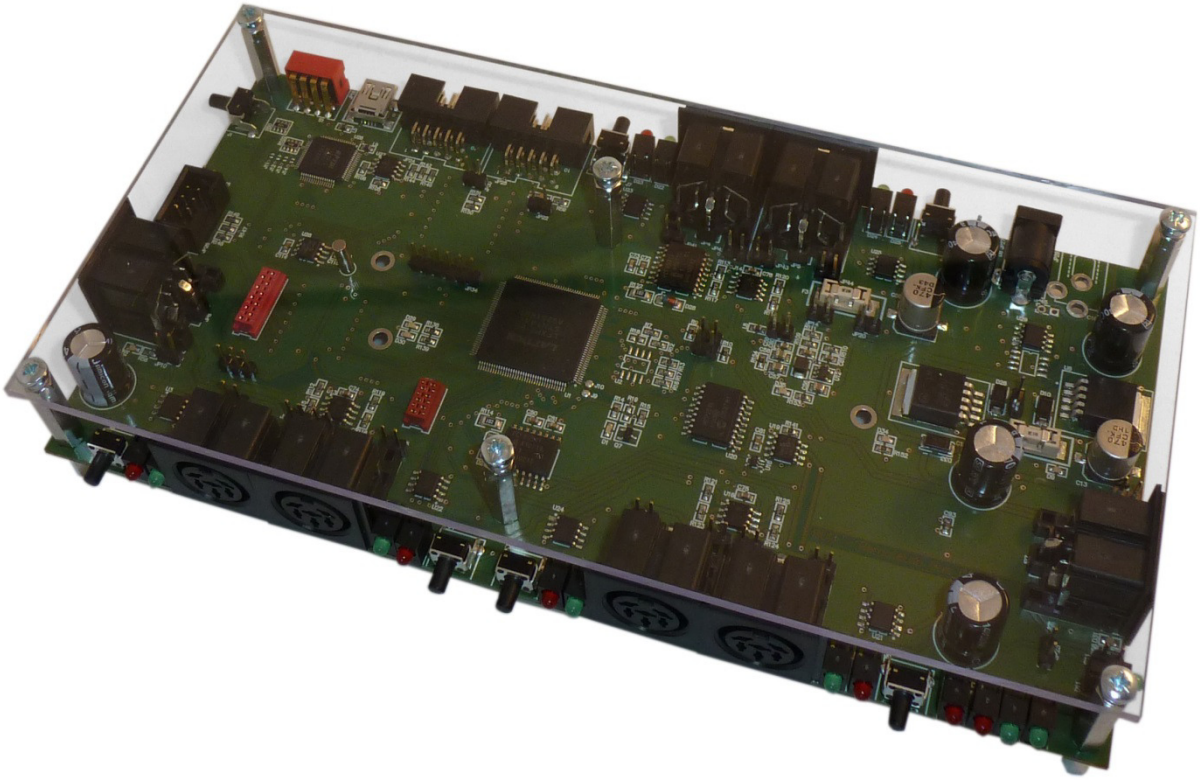

Figure 1: BCU v2_00

2. Connections

2.1. Power connector

The power connector is used for connecting a 24V power supply. It is recommended to use a supply with at least 3A. The BCU is fused at 4A to reduce the risk of damage.

Be careful not to connect too many units, if these require too much power. Especially larger electro mechanical models have to be checked for maximum power consumption.

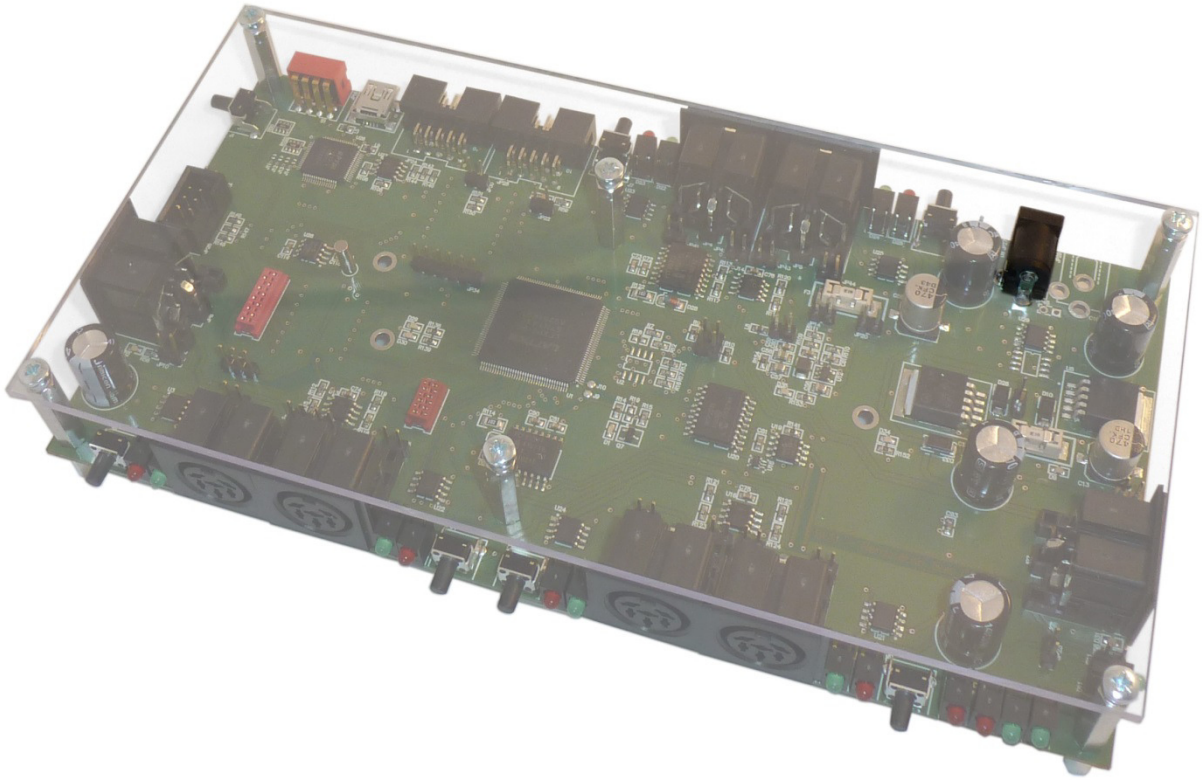

Figure 2: Power connector

Figure 3: Adapter polarity

2.2. PSPU / BPU connectors

The BCU has six *GOLDi* connectors to interface to PSPU or BPU units. These ports can be seen in Figure 4. All ports can be controlled by the BCU and switched on and off over the *GOLDi* bus.

The ports have a soft start to reduce a current rush during switch-on and also enable current monitoring.

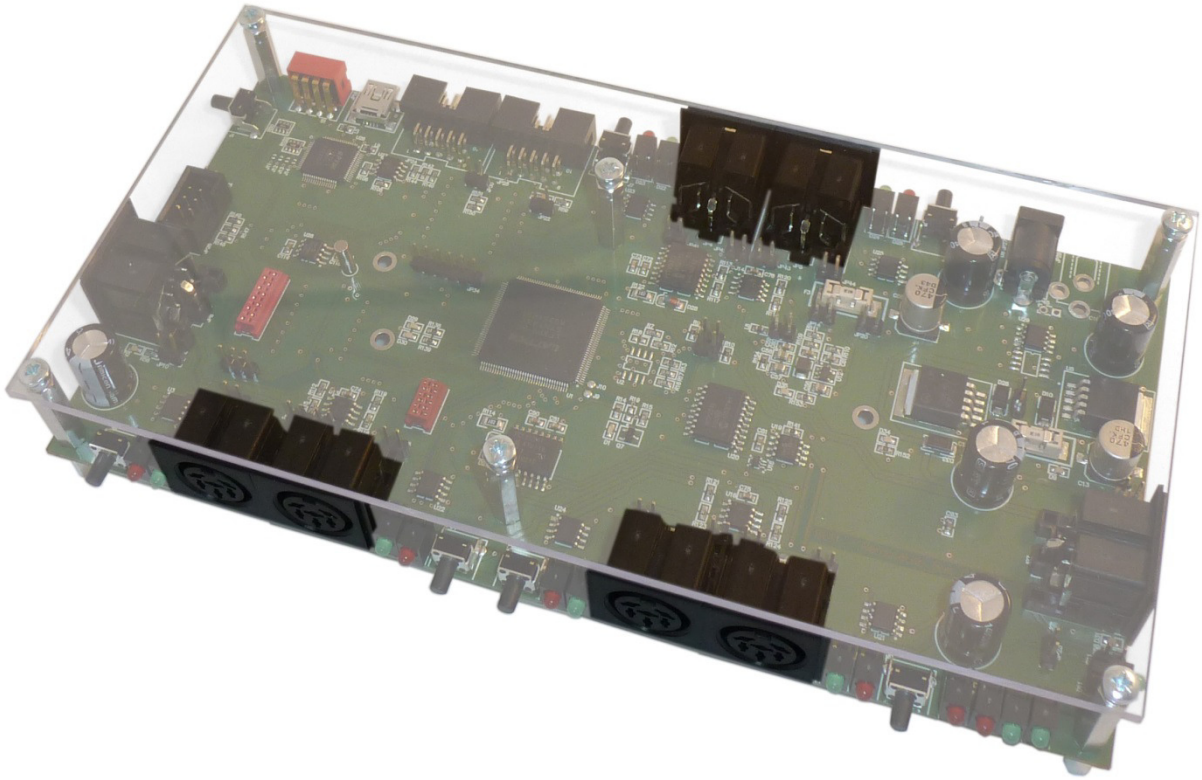

Figure 4: PSPU / BPU connectors

2.3. *GOLDi* chain

The BCU has two *GOLDi* connectors to chain up more BCUs and increase the capacity of *GOLDi* infrastructure and connect more PSPUs and BPUs.

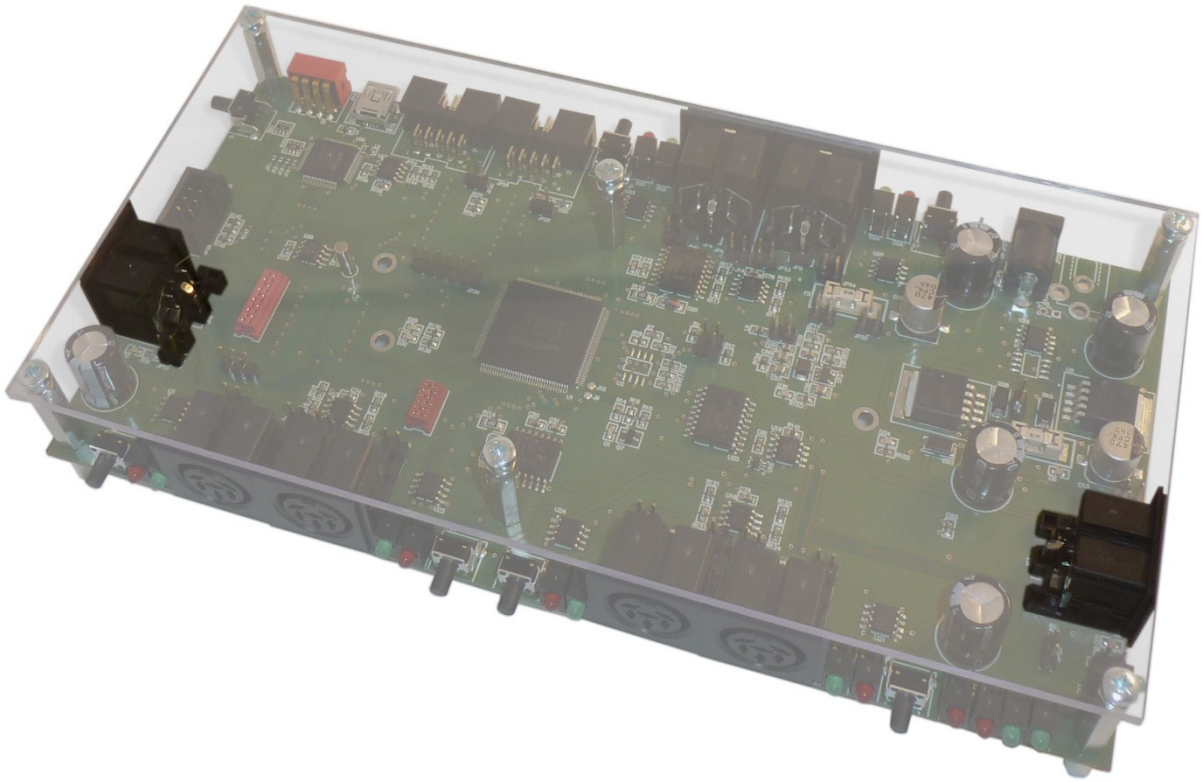

Figure 5: ***GOLDi*** **chain connectors**

Each connector also has a jumper to connect the +24V power to the *GOLDi* connectors. JP10 (left) and JP11 (right) are marked in Figure 6.

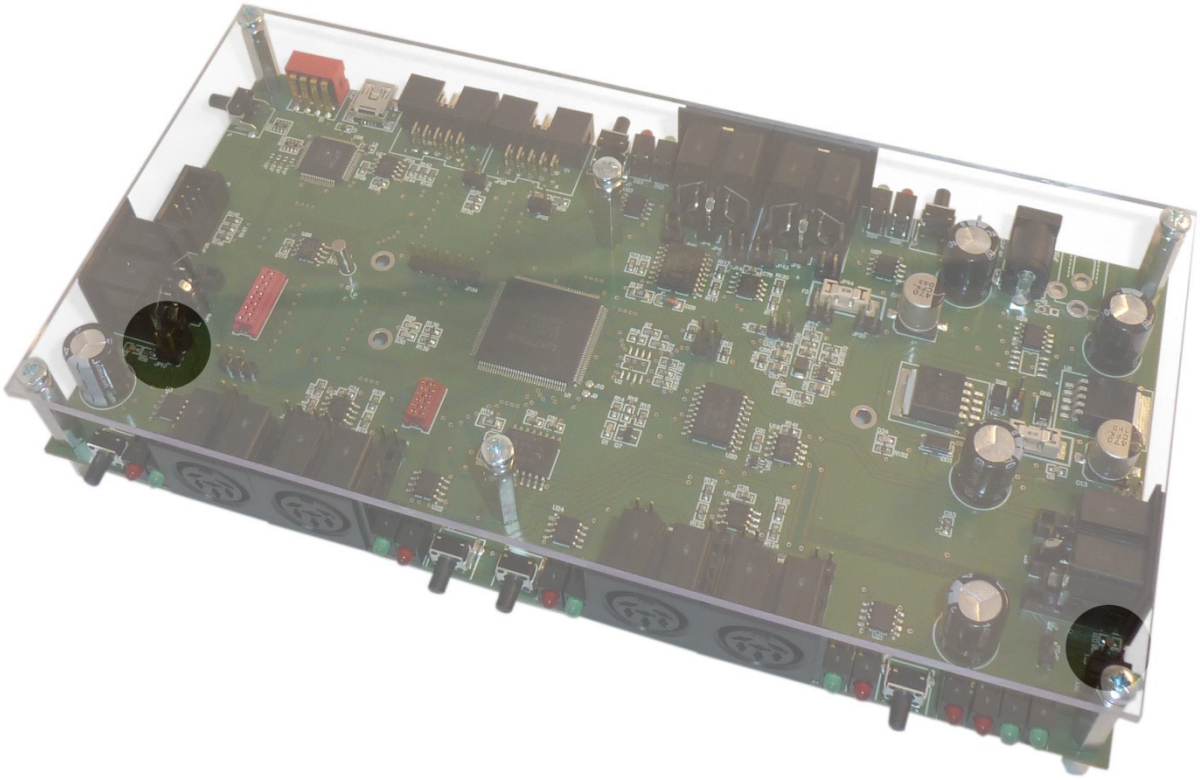

Figure 6: ***GOLDi*** **chain power selector**

2.4. Expansion ports

The BCU supplies two expansion connectors.

Connection	Pin number	Pin number	Connection
+5V (max. 1A)	1	2	GND
i2c A SDA (@5V)	3	4	i2c A SCL (@5V)
GND	5	6	GND
-5V (max 50mA)	7	8	i2c A IRQ
+24V (max. 1A)	9	10	+24V(max. 1A)

Table 1: JP24 expansion port A pinout

Connection	Pin number	Pin number	Connection
+5V (max. 1A)	1	2	GND
i2c SDA (@5V)	3	4	i2c B SCL (@5V)
GND	5	6	GND
-5V (max 50mA)	7	8	i2c A IRQ
+24V (max. 1A)	9	10	+24V(max. 1A)

Table 2: JP25 expansion port B pinout

No functionality has been assigned to these two ports yet.

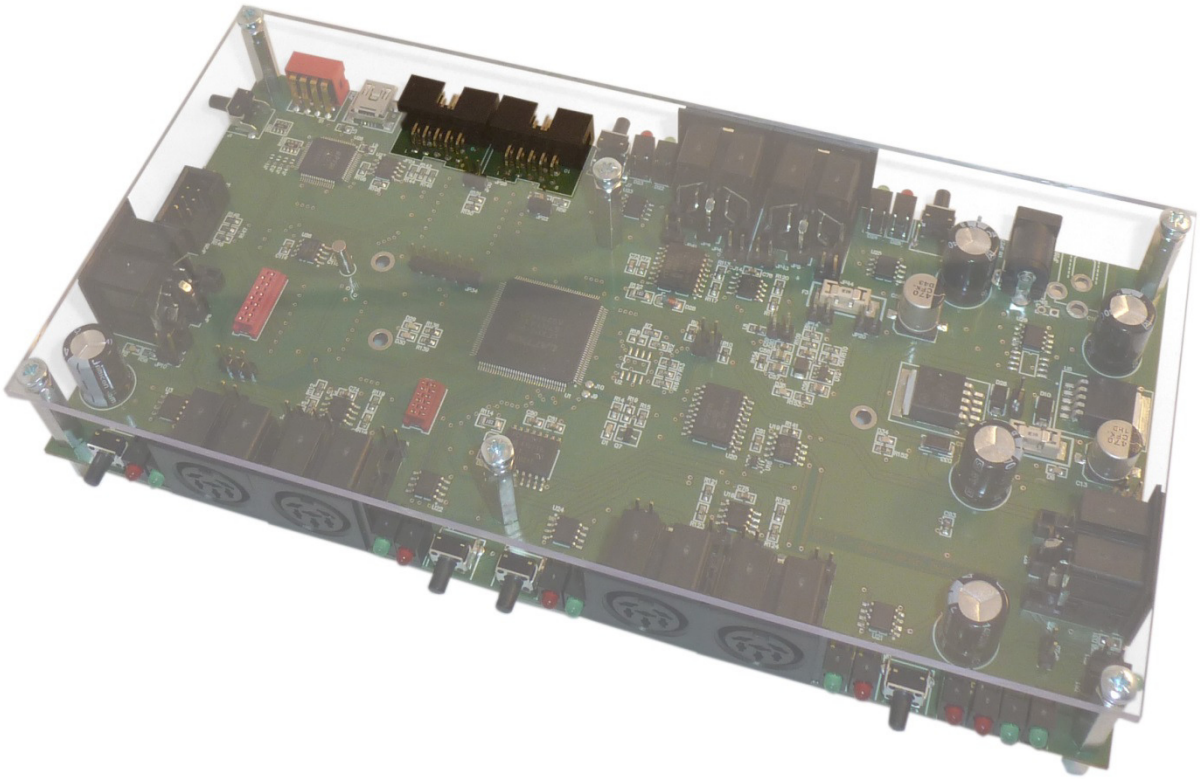

Figure 7: BCU expansion ports

2.5. USB

The BCU has a mini USB connector to connect it to the *GOLDi* server. A FTDI 2232HL is used to enable the reprogramming of the BCU as well as serve as a communication links to the server.

The mini USB connector can be found in the top left corner of the board next to the DIP switch and the reset connector. See Figure 8 for details.

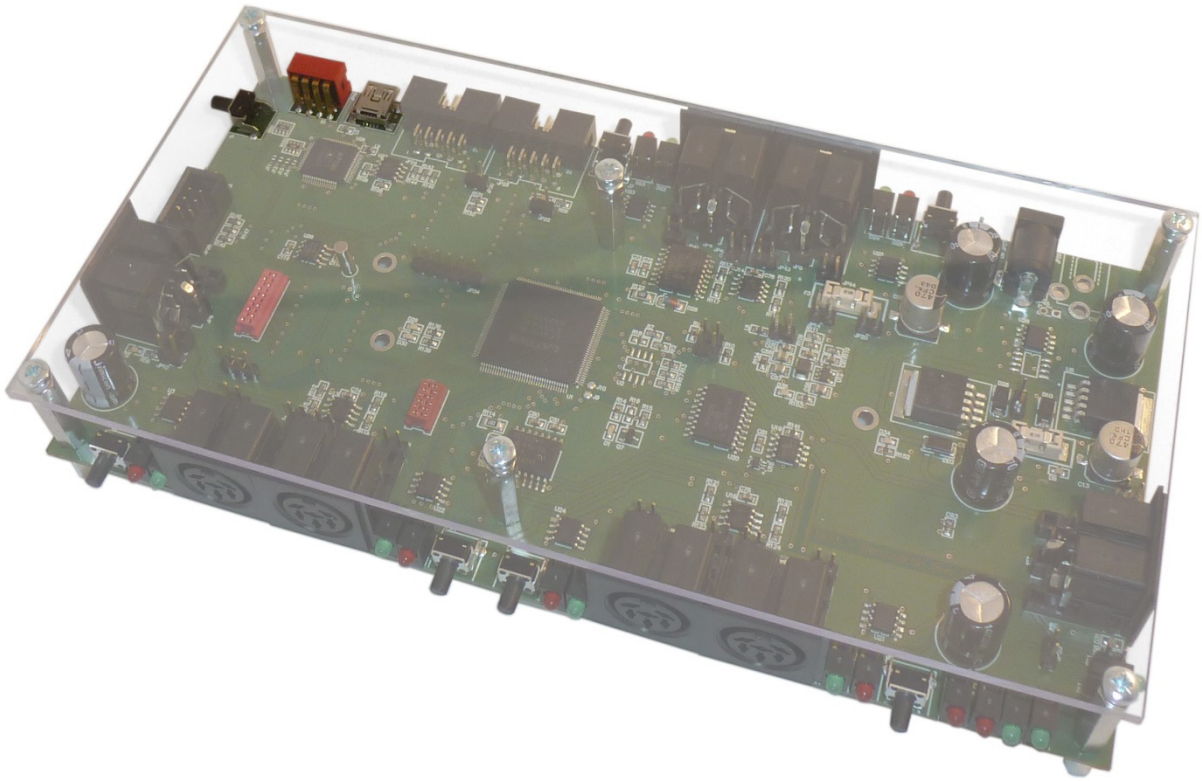

Figure 8: Mini USB connector

3. Operation

The functions described in this section only relate to the version 2.00. For older versions please contact the manufacture.

Please make sure to use the correct firmware for the BCU.

The newest firmware can be found at www.ib-ostendorff.de/GOLDI_firmware or at www.tu-ilmenau.de/GOLDI.

The BCU supplies the following functions relevant for the users. Some functions are only accessible for admins on-site.

3.1. LEDs

3.1.1. BCU status LEDs

There are either two red and two green or four yellow LEDs on the front side of the BCU have the following functions:

LED	mode	function
1	off	no connection to *GOLDi*
	flashing	firmware running
2	off	BCU alive
	on	BCU in reset
3		*GOLDi* bus data traffic
4		*GOLDi* bus control message traffic

Table 3: Function of status LEDs

The LEDs 1..4 are numbered from left to right.

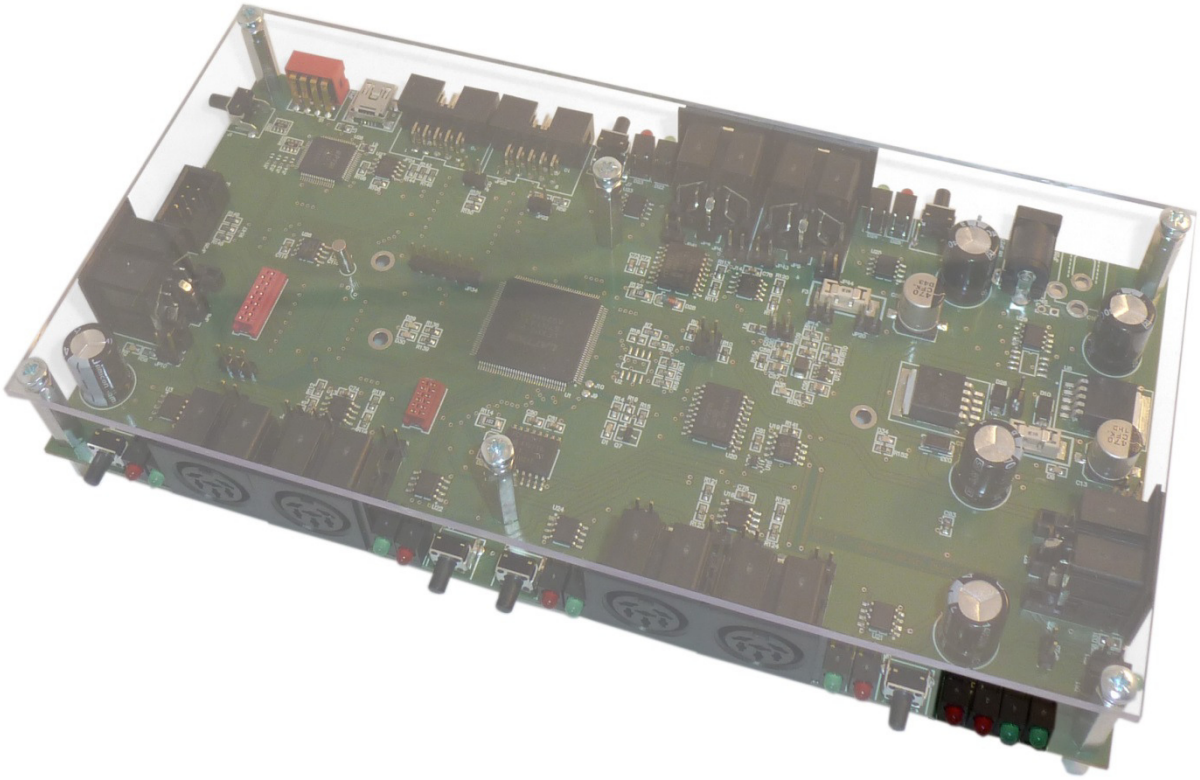

Figure 9: BCU LEDs

3.1.2. *GOLDi* connector status LEDs

The *GOLDi* connector status LEDs are shown in Figure 11. They indicate the status for each *GOLDi* channel.

LED	mode	function
red		
green	off	channel not active
	on	channel active

Table 4: *GOLDi* connector status LEDs

3.2. DIP

The four DIP switches on the front side of the BCU have the following functions:

DIP	mode	function
1..4	0000	normal running mode
1..4	1111	firmware update mode
1..4	else	no function defined yet

Table 5: Function of BCU DIP switches

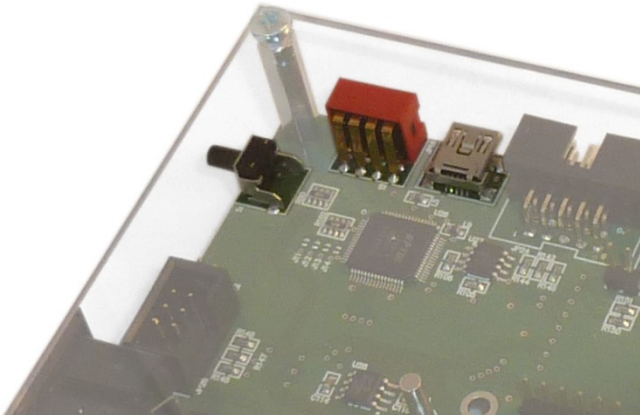

Figure 10: DIP and reset button

3.3. Reset

The reset button resets the complete BCU. See Figure 10 for the location of the reset button.

3.4. Button and LEDs for *GOLDi* connector

For each *GOLDi* connector you have a button and a green and red status LED.

The function of the button is not yet defined.

The function of the red LED is not yet defined.

The green LED indicates the activity of the *GOLDi* connector. If the LED is on, the power for that specific connector is on.

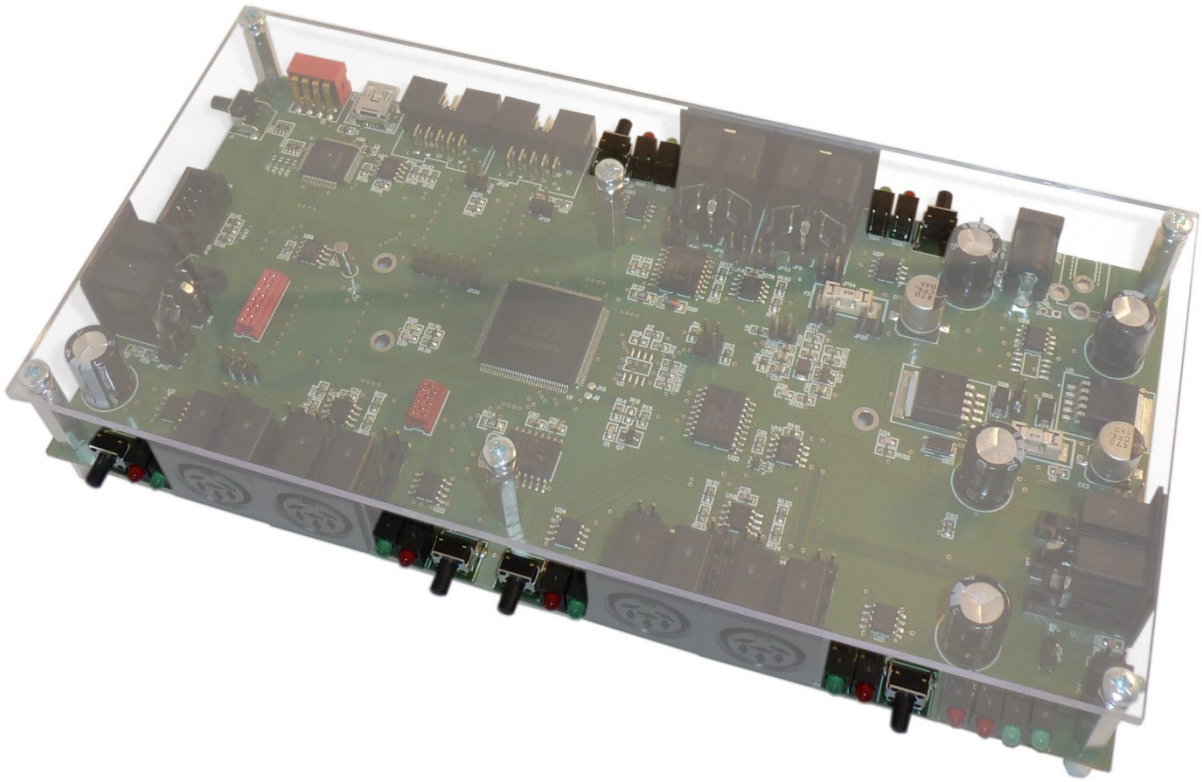

Figure 11: Button and LED for *GOLDi* connector

4. Revisions

A.0	16.04.2014	First version of documentation.
A.1	26.01.2015	Minor corrections. Added pictures and more model descriptions.