

# **EasyLase<sup>®</sup> USB II**

USB-Outputboard with ILDA-Interface

## **Users Manual**



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# 1 Description

The Lasershow-outputboard EasyLaseUSB II allows the control of ILDA-compatible lasershowprojectors over USB by using different Showsoftware.

There is no need for installing cards into PC-slots and Notebooks can be used to playback lasershows.

A driver-DLL with open documented API allows to use the board with self-written showsoftware. All output signals for the laserprojector are symmetrical and are located at an ILDA-standard connector.

## 1.1 Features

- ◆ USB full speed Interface (12Mbits/Sec.)
- ◆ 1.5 Mbytes/Sec. maximum Datatransfer
- ◆ High Performance 32Bit RISC-Microcontroller for fast dataprocessing
- ◆ X/Y-outputs 12 Bits resolution, 16 millions framecoordinates totally
- ◆ Coloroutputs RGB, Intensity and 2 additional channels, 12 Bit each
- ◆ active controlled shutter output
- ◆ Outputspeed up to 110000 points per second (pps) in 3+1 colour mode.
- ◆ Additional 8 Bit TTL-compatible digital output
- ◆ Power over USB or external 9-24V DC powersupply (500mA)
- ◆ ILDA-standard connector
- ◆ X/Y-outputs symmetrical, Colour outputs single ended
- ◆ Error-tolerant dataprotocol
- ◆ 'Plug 'n play' driver for all Windows operating systems from XP, 64Bit also
- ◆ User API for driver DLL compatible with previous EasyLase.dll
- ◆ Supports 512 DMX-channels input and output
- ◆ DMX output at ILDA-connector
- ◆ DMX-input and output available at additional connector panel (optional)
- ◆ Isolated DMX signals available (optional)
- ◆ Firmwareupdate over USB
- ◆ MicroSD card slot mounted for future showplayer options
- ◆ Supported by Dynamics, Laser Design Studio, LSX, Mamba and HE-Laserscan Software

## 1.2 Differences to old EasyLase USB

	<b>EasyLase USB II</b>	<b>EasyLase USB (old)</b>
Used Microprocessor	32 Bit, 48MHz	16 Bit, 24MHz
Output speed max.	110000 pps	65000 pps
Number of colour channels	6 or 5+Intensity	3+Intensity
Resolution colour channels	12 Bit	8 Bit
Signals X/Y	symmetrical +/-5V	„floating“ differential 10V max.
Signals colours	single ended 0-5.2V	„floating“ differential 5.2V max.
Shutter signal	active controlled	fixed to +5V
Output jitter	not visible	strong >45Kpps
DMX-out at ILDA-connector	Yes	No
DMX signal drivers on board	Yes	No
Output data protocol	streaming	frame by frame
Power over USB	Ja	No

## 2 Starting up

If EasyLase USB II is powered using an external powersupply, use regulated DC powersupply only. The device works with voltages from 8V to 24 V.

It is recommended to use powersupplies which are well immunized against power line transients or to use power plugs with integrated EMI-filters.

For enhanced reliability during operation, the use of a high-quality USB2.0-cable (double shielded with integrated EMI-filters) is suggested

Lowquality-cables can cause malfunction of hardware and software.

Each device comes with a CD-ROM, containing documentation, drivers and test software.

### 2.1 Handling instructions Boardversion (OEM-Version)

When the device is used as open board version (OEM), it should be taken into account, that the device is sensitive object. Static discharge and other external influence can damage electronic components on the board.

The device can also be damaged by applying external voltage to signal pins, by wrong connections and other kind of manipulation. Watch for correct connection of signals and careful handling.

**The manufacturer excludes liability in case of damages as result of unproper handling, wrong signal connection and unspecified working conditions, unless it is verifiable that damage existed when the product left factory.**

**Also any liability claims regarding damage caused by the use of this product will be rejected.**

### 2.2 Using USB-Hubs

Current consumption of EasyLase II is between 250 and 400mA.

If the device is operated at external USB-hubs, active (self-powered) hubs must be used to supply the necessary operating power or an external powersupply must be connected to EasyLase II.

### 2.3 Operation at PCs or Notebooks in standby- or powerdown-mode

An EasyLase II device connected to an inactive PC or notebook (sleepmode, standbymode or powerdown mode) does not stop power consumption.

Laseroutput (ILDA-connector) will be shut down.

DMX signals will not stop as long as EasyLase II will be connected to power (external powersupply or USB). DMX will send last data received from the application software. If the software has sent STOP to EasyLase II before shutting down, zero data will be sent via DMX, but DMX signal protocol will not be interrupted.

This will prevent devices connected to DMX from starting an initializing procedure or react on loss of DMX signal in any way.

**Important:** EasyLase II devices connected to a PC or Notebook in shutdown mode will not stop using power. Even if power will be reduced, energy will be taken from the battery of notebooks. If the notebook runs on battery and is not used, disconnect the USB cable to the device.

Disconnecting is not necessary if there is an active hub between Notebook and EasyLase II or if EasyLase II gets power from an active external powersupply.

## 2.2 Step-by-step driver installation

### Important!

Each device, which is connected to the USB-port of the PC for the first time, needs a driver installation. Also an installation will be necessary, when the USB-port for connecting the device will be changed (depends on operating system).

Using multiple devices, it is recommended to use the same port for the same device all times to avoid driver reload.

When installing the first device, it is necessary to locate the driver files on the data media (disk, CD-ROM). When installing additional devices, the option 'automatic installation' of the driver installation wizard can be selected.

The driver can be installed directly from CD, but it is suggested to locate the driver files in a directory of the harddisk.

Copy the file 'EasyLase.dll' into the directory, where the executable file of showsoftware is located. If you want to remove the device drivers, deinstallation has to be done in the systemmanager.

Connect the device to the USB-port. When using external powersupply, switch it on.

The green LED 'Power' and the red LED 'Active' must be lighted.

Wait until the following message appears.

Do not disconnect the device and do not close/cancel any messages of your PC.

Windows will recognize the device after a few seconds and will open the installation dialog:



If you are asked to search the Internet for drivers, select 'no'!

if you install your first EasyLase USB II, do not use the automatic installation option.



and then continue



If you have already installed an EasyLase USB II on this PC, you can select automatic installation. The following step will be skipped then.

Now choose the drive and directory, where the driver files are located



If you want to install from the CD, choose



Confirm with



Windows will search the driver and install it.



After installation is complete successful, confirm with finish



Now the device should be listed in the hardware manager as USB Laser Device:  
By clicking the right mouse button to the entry 'EasyLase II' and then click on 'properties', the device information will be displayed. Here you can see the version information.



Also you can do a firmware update here, if necessary.

If there will be an error message during opening Device Settings, this could have 2 possible reasons:

1. Another application takes access to the card. Please close all other applications.
2. After updated the driver, the files "Jmutil.dll" or "Jmutil64.dll" in the system directory of Windows should be replaced by new ones manually.

## 2.3 Use new DLL with older software

The DLL 'Jmlaser.dll' which acts a bridge between your application software and the hardware driver, was designed to be compatible with older software.

If you use a software which uses the old 'EasyLase.dll', the use of the new dll normally would not be possible.

But the new Jmlaser.dll contains all functions to control also older devices.

The new DLL contains all functions (calls) of

- EasyLase USB old version
- NetLase
- EasyLase USB II
- EasyLase USB LC
- Phoenix Live Interface

If you use a software which uses the old EasyLase device, just rename the new DLL Jmlaser.dll to 'EasyLase.dll' and replace the old file 'EasyLase.dll' with this file.

Your software now will support the old EasyLase hardware as well as the new EasyLase II. (and also all other devices listed above).

### **Note:**

If your software does not work with a specific product, the reason can be that the manufacturer of this software excludes the use of a specific hardware.

The new DLL contains various license functions.

For example, the software 'LDS Nano' will not accept any other hardware except 'EasyLase LC'.

### **Special Note for Software Mamba:**

Mamba does not need a specific name of the DLL.

So you can use the file 'Jmlaser.mld' coming with the CD of EasyLase II (or rename 'Jmlaser.dll' to 'Jmlaser.mld').

Note that all older device-DLLs, like 'EasyLase.mld' or 'NetLase.mld' have to be removed from the Mamba directory. Otherwise a collision between new and old device-dlls will happen.

### 3 Signal connectors (see Fig.1)

#### 3.1 Connecting Scanner- and Colorsignals

All signals are located at an ILDA-standard connector. This can be a 25pin D-Sub-connector (female) or a 26pin IDC-connector, when the device should be mounted in a projector directly.

The IDC-connector allows to connect a separate D-Sub connector by using a flat cable.

All pins are routed 1:1, except pin 26, which has no function. Note the different pinnumbers of the connectors. The wirenumber of a flat cable, starting with 1 at pin 1 corresponds to the pinnumber of the DSUB connector (see table below).

Signals for X, Y and up to 5 colours + intensity are available.

Colour output 6 is internally connected to output intensity.

All colour outputs are single ended signals, referred to GND.

The maximum signal level is 5.2V (measured against GND).

Outputs X/Y are symmetrical, using a maximum voltage level of +/-5V per output pin.

This gives a total maximum output voltage of +/-10V between the signal pairs (+) and (-).

**Important! Never let one half of the signal pair unconnected.**

If one part of the signal pair (+) and (-) is used only, maximum deflection angle of the scanner or laser projector will be the half value only. Same happens if one of the signals will be connected to GND.

**Always connect the GND-pin (Pin 25 of the DSUB-connector) to your laser projector.**

**Question: Why are the signals of the new device different to the ones of the old EasyLase?**

**Answer:** The floating signals of the old EasyLase allowed higher flexibility in use but created many misunderstandings and problems with the users.

The new signal specification is easier to use, even with laser projectors which don't have a full wired ILDA-connector.

DSUB-25(ISP)	IDC26Name		Function
1	1	X+	Scanner output X+
2	3	Y+	Scanner output Y+
3	5	Intensity+	Intensity+
4	7	Interlock A	Internally connected to Interlock B
5	9	R +	Colour output Red
6	11	G +	Colour output Green
7	13	B +	Colour output Blue
8	15	DB +	Colour output Dark Blue
9	17	Y +	Colour output Yellow
10	19	Intensity+/C+	Colour output Cyan or Intensity *
11	21	DMX Out +	DMX-output plus
12	23	n.c.	Not connected
13	25	Shutter	Shutter output 0 - 5V **
14	2	X-	Scanner output X -
15	4	Y-	Scanner output Y -
16	6	GND	GND for Intensity
17	8	Interlock B	Internally connected to Interlock A
18	10	GND	GND for colour output Red
19	12	GND	GND for colour output Green
20	14	GND	GND for colour output Blue

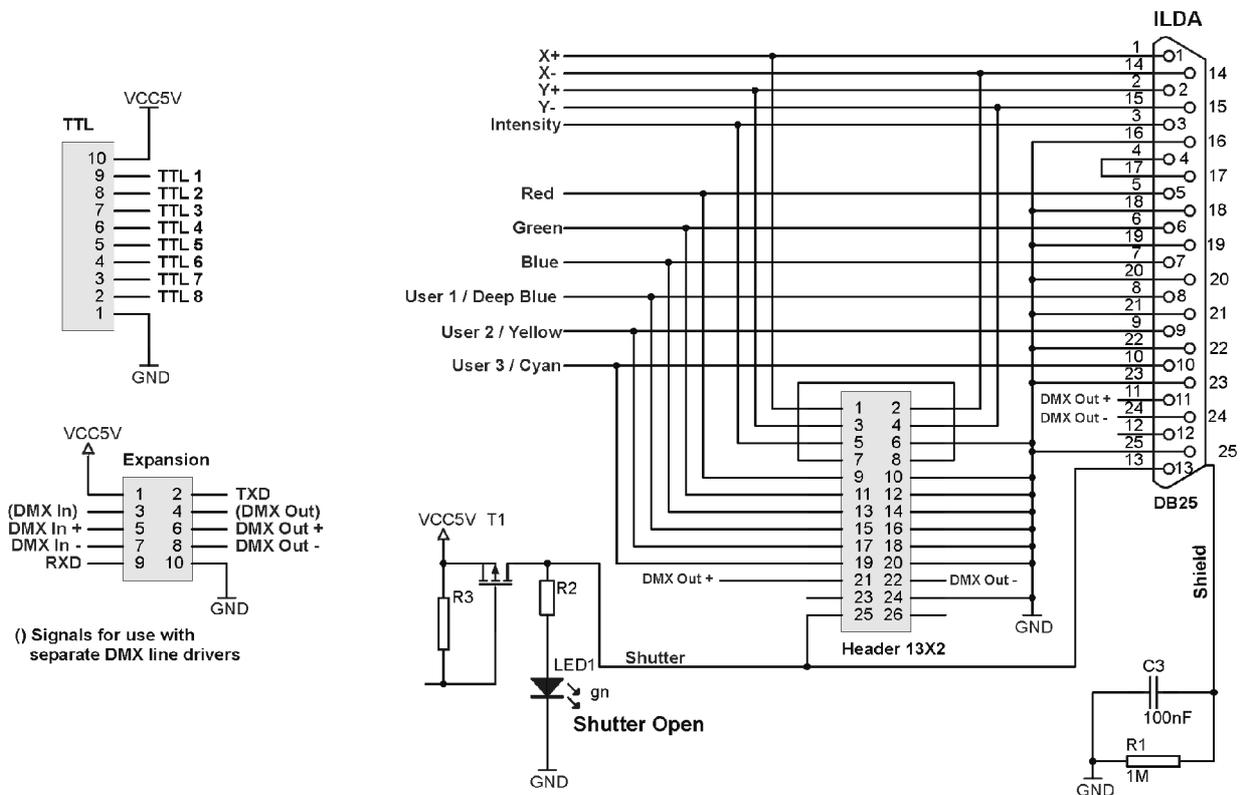
21	16	GND	GND for colour output Dark Blue
22	18	GND	GND for colour output Yellow
23	20	GND	GND for colour output Cyan
24	22	DMX Out -	DMX-output minus
25	24	Ground	Device ground 0V
Shield	-	Shield	resistor (1M) against GND

\* Signals Intensity and Colour Cyan are connected on board. The software must decide, if 5 colours plus an intensity channel or 6 colours are used.

Note: When using 5 colours + intensity, the 6th colour signal (Cyan) must be ignored. When using 6 colours without intensity, the signal at the Intensity pin must be ignored.

\*\* Caution: Shutter output maximum load current is 20mA!

Fig. 1 signal connections



### 3.2 TTL-Outputs

Also on the board, 8 TTL-compatible digital outputs are located at a 10pin single-row header.

**Important:** The TTL-outputs are not short circuit protected.

Never apply any voltage to these pins and avoid electrostatic discharge when touching or connecting the pins. Otherwise, the board can be damaged.

Also do not use more than 50mA of current at the 5V supply pin.

#### Pins

1	GND	Device ground
2	Data 1	TTL-Bit 1 (LSB)
3	Data 2	TTL-Bit 2
4	Data 3	TTL-Bit 3
5	Data 4	TTL-Bit 4
6	Data 5	TTL-Bit 5
7	Data 6	TTL-Bit 6
8	Data 7	TTL-Bit 7
9	Data 8	TTL-Bit 8 (MSB)
10	VCC	Internal supply voltage +5V

When using the signals to connect external devices, it is recommended to use additional TTL-drivers (74HCT241 or 74HCT244) or optocouplers to protect the circuit.

#### Note:

**The TTL signals are not wired to the external connector (9 pin DSUB) of the boxed device!**

### 3.3 DMX-Signals

The DMX signals are located at a 10pin expansion connector.

**The line drivers for DMX are already located on board!**

Normally, the signals 'In+', 'In-', 'Out+' and 'Out-' will be used for DMX.

In special cases, for example if an isolated DMX-adaptor (option) is used, an additional circuit is necessary. In this case, the signals in brackets () will be used. These signals use TTL-level and cannot be used to drive DMX-cables directly!

To avoid collision between external and internal line drivers, a bridge is located on board.

This is a resistor with 0 Ohms (marked red in boardlayout Fig. 2).

**When using external, active DMX circuits, like the isolated option, this bridge has to be removed!**

#### Pins

1	VCC	internal supply voltage +5V
2	TXD	not used
3	(DMX In)	DMX-In from external line driver circuit (TTL-level)
4	(DMX Out)	DMX-Out to external line driver circuit (TTL-level)
5	<b>DMX In+</b>	<b>DMX-input plus</b>
6	<b>DMX Out+</b>	<b>DMX-output plus</b>
7	<b>DMX In-</b>	<b>DMX-input minus</b>
8	<b>DMX Out-</b>	<b>DMX-output minus</b>
9	RXD	not used
10	GND	device ground

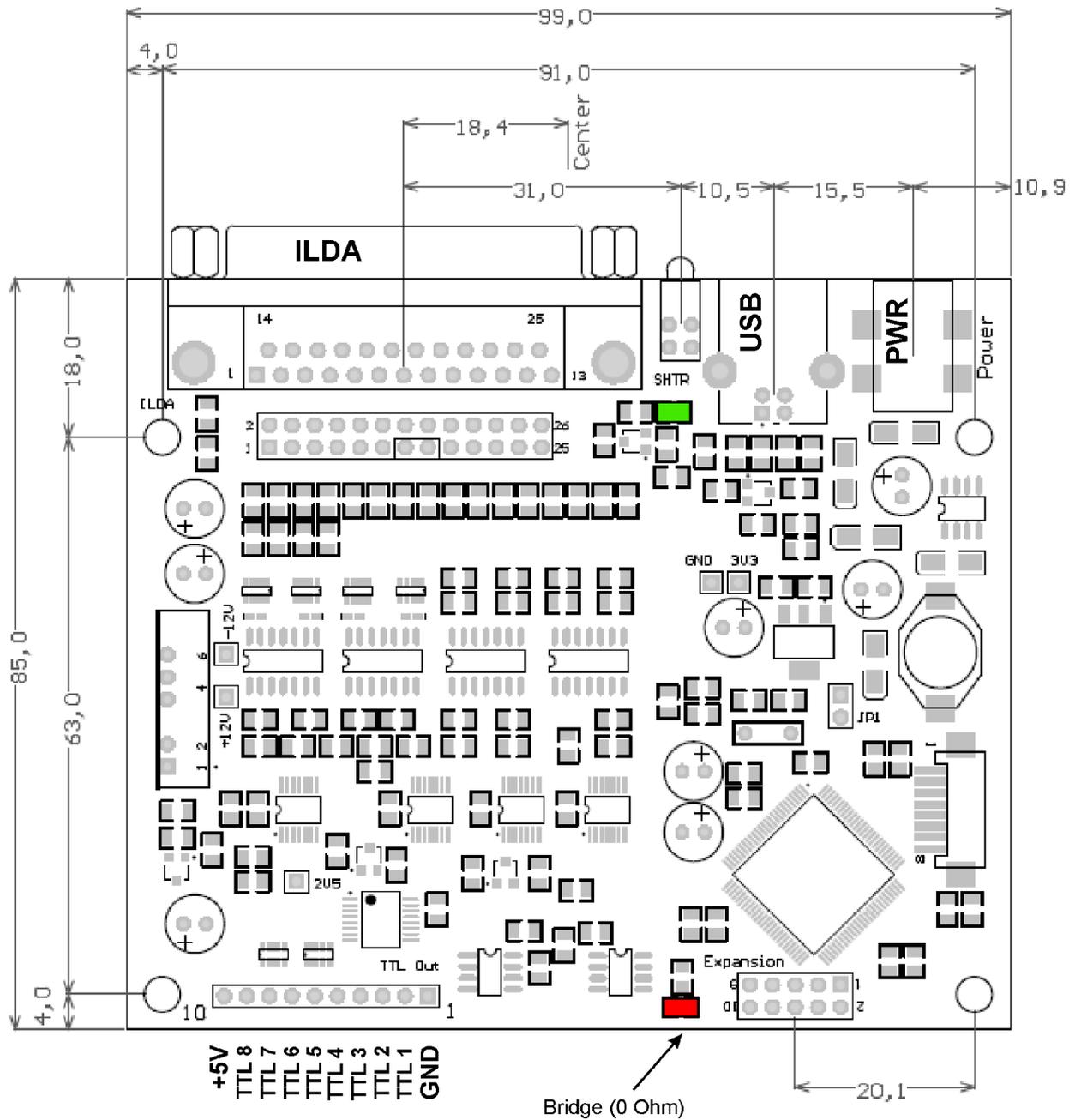
### 3.4 Status-LEDs

Function of LEDs at the front side:

LED **Power** shows that the device is powered on.

LED **Active** shows that lasershow output is running (shutter signal = On).

### 3.5 Boardlayout and Dimensions (Fig.2)



All dimensions in millimeters

## **4 Problems**

### **4.1 Driver malfunction**

If the USB driver was not installed completely, the device may be reconized by the PC but the application software could not access it.

Also is probably not possible to reinstall the driver.

This can happen if the installation procedure was interrupted or cancelled by the user.

In this case, connect EasyLase II to the PC and go into the hardware manager of your system.

Select the EasyLase II device (or unknown device) and deinstall it.

Remove the USB cable and reconnect it.

The system should now recognize the device as new hardware and driver installation can begin again.

### **4.2 Laseroutput is half size only**

Check the connection of the ILDA cable.

Probably the minus-signals of X and Y are not connected or may be grounded at the laserprojector.

If you try to control a scanner having single ended inputs (Input+ and GND only), this will show the same effect.

### **4.3 No function when running showsoftware**

Check if the device is connected and powered.

Start the Testsoftware coming on CD. When the device is found and all functions work, check if the DLL Jmlaser.dll or the driver Jmlaser.mld (for Mamba) is located in the right directory of the software. Check if the output of the software is enabled and if the right output device is selected.

### **4.4 Software or hardware crashes during operation**

Check the USB connection.

Check also the function of the USB-sockets. Some cheap cables can make bad connections.

If noise on the mains power could be the source of the problem (when powering-on other devices), use EMI-filters for your powersupply. Use highquality USB-cable only.

Do not place the EasyLase II card or box near strong radiation sources, like transformers, dimmerpacks or power-cables of other lighting equipment.

When mounting the OEM-card into a housing by yourself, a metal housing is suggested.

If you use the isolated DMX-option, you must use an external powersupply, because power consumption of EasyLase II could be too much for the USB port.

### **4.5 Output starts flickering and shows bright or blanked points or lines**

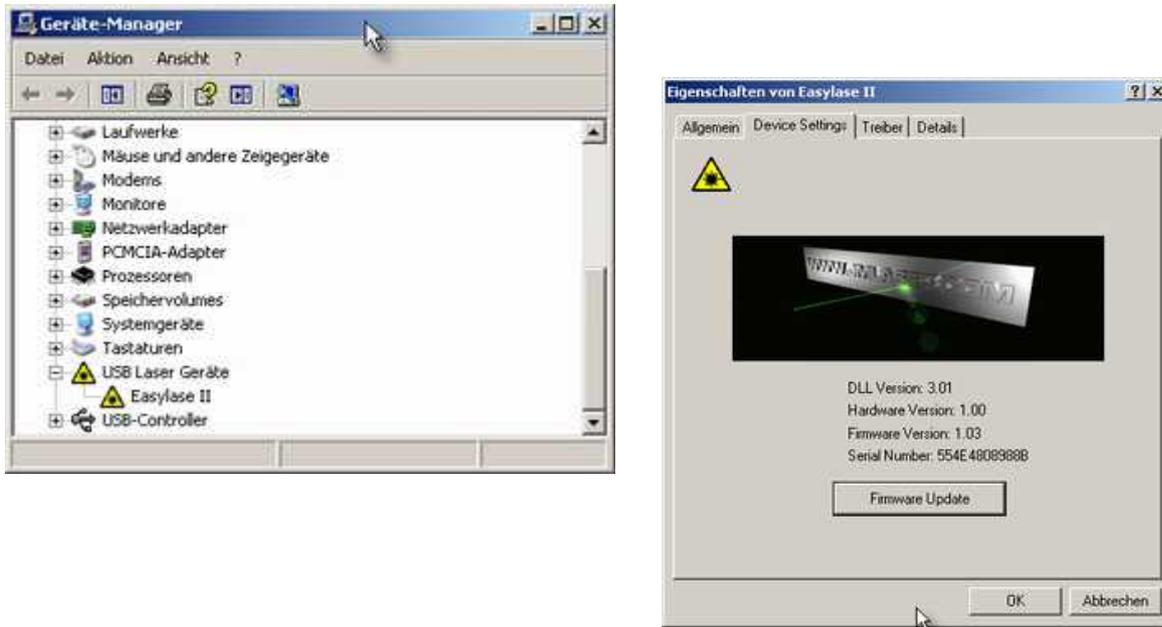
Reduce output speed in your laser software.

The maximum output speed of 110Kpps may not work if the used PC is too slow or multiple EasyLase II devices are used. If all 6 colour channels are used, maximum speed will be reduced to about 80-90Kpps.

## 5 Updating Firmware of EasyLase USB II

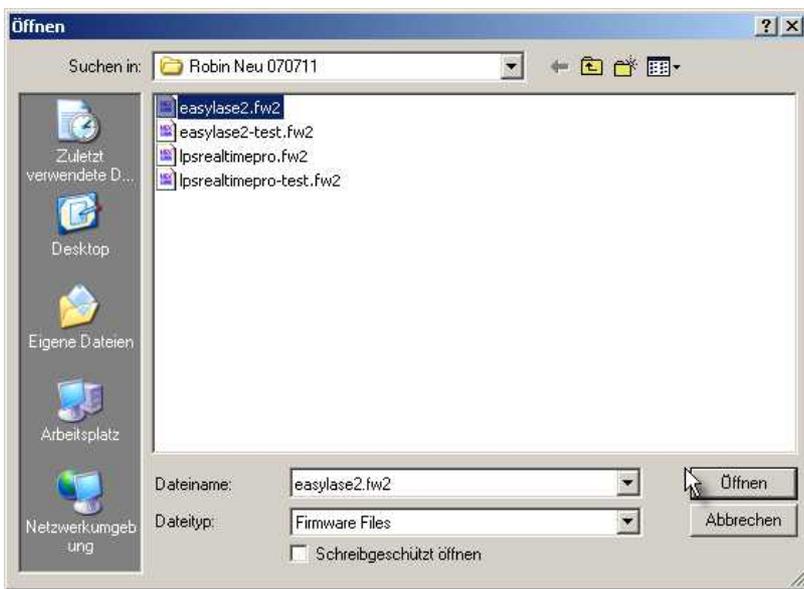
Connect the device to USB port.

The device should be listed in the hardware manager as USB Laser Device 'EasyLase II':



By clicking the right mouse button to the entry 'EasyLase II' and then click on 'properties', the device information will be displayed. Here you can see the version information.

Click the button 'Firmware Update' and you will be asked for a file.



Select the actual firmwarefile \*.fw2

If the version in the device is the same or newer than the one selected, an error message will be displayed and no update can be done. Otherwise, confirm the update question with 'OK'.



The last message before starting the update must be confirmed.



**Warning:**

**Never** unplug power or USB-connection during update procedure!

The device can be useless after interrupting a running update. This case can only be fixed by sending the device back to the factory!

The update procedure starts. Confirm by clicking 'OK' after update is finished.



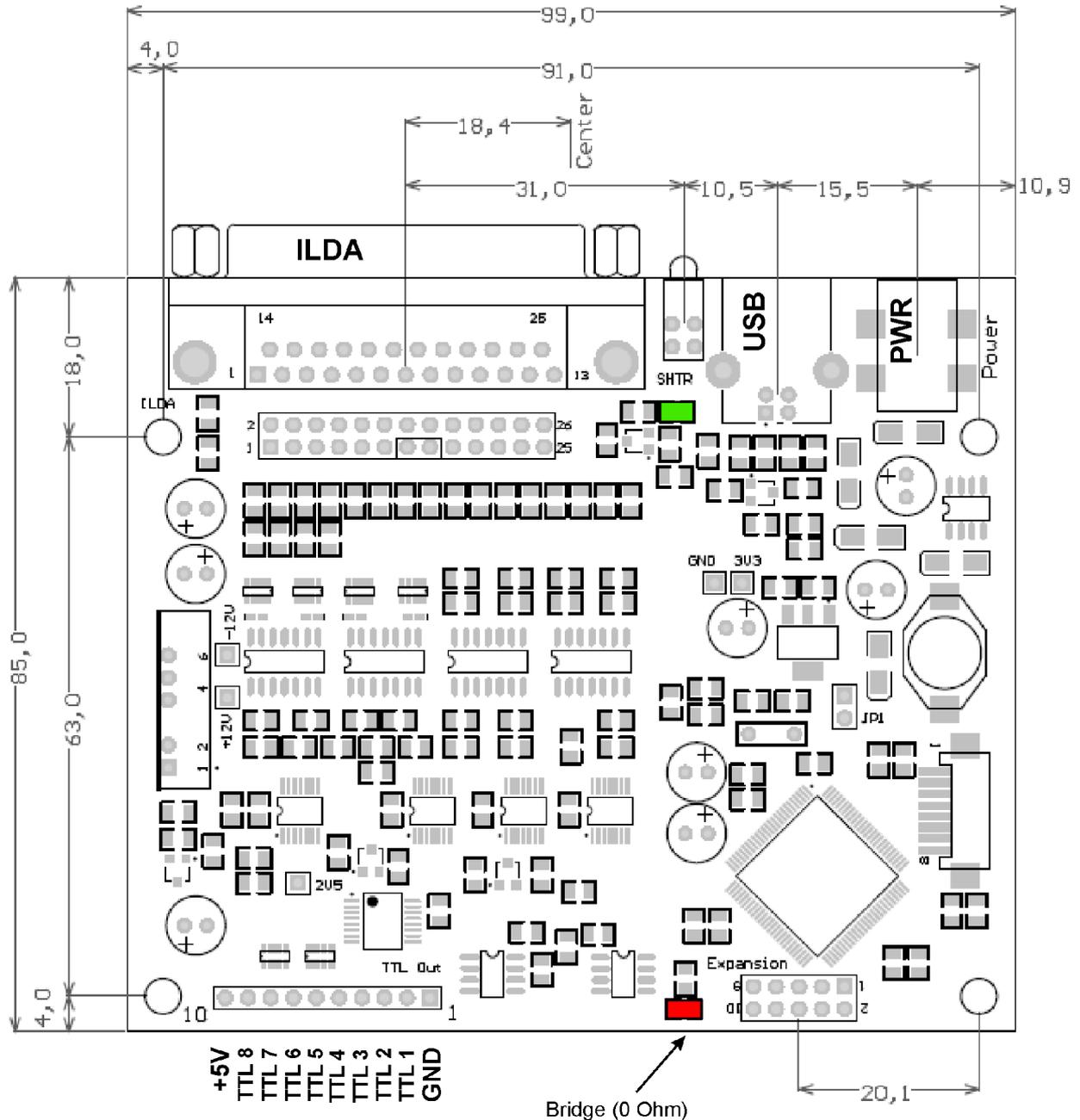
After update, disconnect and reconnect the device from/to USB. This will restart the device and the new firmware will be active.

If there will be an error message during opening Device Settings, this could have 2 possible reasons:

1. Another application takes access to the card. Please close all other applications.
2. After updated the driver, the files "Jmutil.dll" or "Jmutil64.dll" in the system directory of Windows should be replaced by new ones manually.



## 6 DMX-connector panel addon



The DMX-connector panel with XLR-connectors must be connected to the 10pin "Expansion" connector of the Board (on the picture bottom right side). This must be done in that way, that the flatcable shows away from the main board.

Because there are different versions of the panel (normal, optoisolated), a bridge (red) on the mainboard must be placed or removed depending on the version.

**When using a normal (passive) panel, the bridge must be placed at the red marked position.**

**When using an optoisolated (active) panel, the bridge must be removed.**

There are also some active, non-isolated panels, EasyLase USB II was supplied with, where the bridge is already removed. These panels have own linedrivers on board. So the bridge must be removed. But this is just with units, already coming from the manufacturer with the panel. When changing these units to optoisolated panels, nothing at the bridge must be changed.

**All normal (passive) panels delivered as a later upgrade don't have active drivers on board and so, the bridge must be placed at the red marked position.**

As a bridge, a short piece of wire or a zero-ohm resistor can be used.

**Note:**

The front signals DMX-Out located at the ILDA-connector are not affected by the upgrade. These signals always use the linedrivers of the mainboard.

Eventually used DMX-In signals of the ILDA-connector (instead of color 6) will be deactivated when using an active panel and removing the bridge.