USB-TTL Interface User

Manual



Software version: 1.01

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USB-TTL Interface Description

The USB-TTL Interface is designed to enable a simple use of Prizmatix LED light sources with a computer through USB serial port. The USB-TTL Interface enables a simple control of Prizmatix LED light sources from such PC software as Micro-Manager (www.micro-manager.org) or by simple HyperTerminal commands.

Prizmatix USB-TTL Interface is based on Arduino microcontroller board. Arduino is an open-source* physical computing platform based on a simple microcontroller board, and development environment for writing software for the board for more details see: www.arduino.cc.

Health and Safety

Prizmatix products are NOT authorized for use as components in life support devices or systems.

The USB-TTL Interface is intended for use as laboratory equipment only.

It is not cleared or authorized for clinical use.

Any maintenance shall ONLY be performed by a technician authorized by Prizmatix.

Cellular phones or other radio transmitters should not be used within the vicinity of the unit.

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Setup of the Device

Remove the device from packaging and inspect the device for lose components or any sign of damage. Notify Prizmatix if the device appears damaged in any way: do not install damaged device.

Package List

USB-Interface-Box	USB-A to USB-B Cable
Software Installation	BNC-BNC Cable
See: <u>www.prizmatix.com</u> <u>www.micro-manager.org</u> <u>www.arduino.cc</u>	

#	Item	Description	QTY
1	LICD TTL Interface	Metal enclosure box containing the Arduino	1
L	USB-ITL Interface	microcontroller with USB and BNC connectors	L
2		USB-A to USB-B Cable for connection of USB-	1
2	USB Cable	TTL Interface to a PC	T
2	DNC DNC Cable	BNC-BNC cable for connection of the USB-TTL	2
5	BINC-BINC Caple	Interface to Prizmatix LED controller	5
4	Software	Please down load software	1



The USB-TTL Interface setup

System overview

The USB-TTL Interface based on Arduino UNO Rev3 board. The schematics of the board can be found at: http://arduino.cc/en/uploads/Main/Arduino_Uno_Rev3-schematic.pdf

The USB-TTL Interface uses pin 13 of the board (pin 3 of ICSP connector) output to drive the TTL output.

The BNC connector is connected to pin 3 of the ICSP connector through a 2000hm resistor to limit the output current.

General Specifications

Max output current:	40mA
Dimensions:	25 x 50 x 110 (WxHxL)
Input Connector:	USB Type A
Output Connector:	BNC (standard TTL levels)

Software Installation

The software installation is performed in two steps:

- 1. Installation of the Arduino driver software
- 2. Setup of PC software
 - Micro-Manager software
 - HyperTerminal
 - Any other software supporting serial communication

Installation of the Arduino drivers and software

In general the installation shall be performed according to instructions at:

http://arduino.cc/en/Guide/HomePage

Important remarks:

- (a) There is no official webpage for download and installation of just the *.inf hardware configuration file. The whole Arduino installation file needs to be downloaded and unzipped.
- (b) The Arduino Uno's driver file, named "ArduinoUNO.inf", located in the "Drivers" folder of the Arduino Software download (not the "FTDI USB Drivers" sub-directory).

Setup for Micro-Manager software

In general the installation of Micro-Manager software shall be performed according to instructions at <u>www.micro-manager.org</u> the specific page is:

http://valelab.ucsf.edu/~MM/MMwiki/index.php/Download_Micro-

Manager_Latest_Release

After successful installation follow these steps to configure the software in order to use the USB-TTL Interface:



- 1. Run the Micro-Manager software.
- 2. Select Hardware Configuration Wizard from Tools menu:



3. Select Create new configuration or Modify and click Next button



4. Select Arduino Hub from list of devices and click on Add button.

istalled Dev	vices:						
Name	Adapter/Library	Description	Status		Edit	Adding or Removing Devices	
ore	MMCore/Default	Core controller	Default		Periphera	1. The list above displays all of the	
					Remove	devices that will be handled by	
						Micro-Manager in this	
						configuration file.	
						2. If you are making a new	
						configuration file for the first	
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5. On next screen press Scan button

abel Arduino-Hub		
itialization Proper	ties	
Device	Property	Value
rduino-Hub	Logic	Normal
rduino-Hub	Port	
art Properties /PC	222 cottings)	Con
ort Properties (RS	232 settings)	Scan
ort Properties (RS	232 settings)	Scan
ort Properties (RS	232 settings)	Scan
ort Properties (RS	232 settings)	Scan
ort Properties (RS	232 settings)	Scan

6. After few seconds following screens will appear for few seconds:

≜ µManager device detection		🛓 µManager device detection	×
Looking for: Arduino-Hub on COM6	→	Found:	
Cancel		Cancel	

7. Eventually you will see following dialog box. Select the appropriate COM port.

🍰 Device: Arduino-H	ub Library: Arduino	×
Label Arduino-Hub		
Initialization Properties		
Device	Property	Value
Arduino-Hub	Logic	Normai
Arduino-Hub	Port	COM6
		COMO
Port Properties (RS 232	settings)	Scan
		OK Cancel

8. In our example the USB-TTL Interface Arduino installed as COM6 port. After COM port selection following screen will appear:

Label Arduino-Hub		
Initialization Proper	ties	
Device	Property	Value
Arduino-Hub	Logic	Normal
Arduino-Hub	Port	COM6
Port Properties (RS	232 settings)	Scan
Port Properties (RS	232 settings) Property	Scan
Port Properties (RS Device COM6	232 settings) Property AnswerTimeout	Scan Value 500.0000
Port Properties (RS Device COM6 COM6	232 settings) Property AnswerTimeout BaudRate	Scan Value 500.0000 9600
Port Properties (RS Device COM6 COM6 COM6	232 settings) Property AnswerTimeout BaudRate DelayBetweenCharsMs	Scan Value 500.0000 9600 0.0000
Port Properties (RS Device COM6 COM6 COM6 COM6 COM6	232 settings) Property AnswerTimeout BaudRate DelayBetweenCharsMs Handshaking	Scan Value 500.0000 9600 0.0000 Off
Port Properties (RS Device COM6 COM6 COM6 COM6 COM6 COM6	232 settings) Property AnswerTimeout BaudRate DelayBetweenCharsMs Handshaking Parity	Scan Value 500.0000 9600 0.0000 0000 Off None
Port Properties (RS Device COM6 COM6 COM6 COM6 COM6 COM6 COM6	232 settings) Property AnswerTimeout BaudRate DelayBetweenCharsMs Handshaking Parity StopBits	Scan Value 500.0000 9600 0.0000 Off None 1
Port Properties (RS Device COM6 COM6 COM6 COM6 COM6 COM6 COM6 COM6	232 settings) Property AnswerTimeout BaudRate DelayBetweenCharsMs Handshaking Parity StopBits Verbose	Scan Value 500.0000 9600 0.0000 Off None 1 1

9. Choose Baud Rate 57600 as shown at following and click OK to proceed:

				Label Arduino-Hut	b	
nitialization Propert	ies			Initialization Proper	rties	
Device	Property	Value		Device	Property	Value
rduino-Hub	Logic	Normal		Arduino-Hub	Logic	Normal
rduino-Hub	Port	COM6		Arduino-Hub	Port	COM6
ort Properties (RS	232 settings)	Se	can	Port Properties (RS	5 232 settings)	Sc
ort Properties (RS Device	232 settings) Property	Se	can	Port Properties (RS Device	5 232 settings) Property	Sc
ort Properties (RS Device :0M6	232 settings) Property AnswerTimeout	Se Value 500.0000	can	Port Properties (RS Device COM6	5 232 settings) Property AnswerTimeout	Sc Value 500.0000
ort Properties (RS Device :0M6 :0M6	232 settings) Property AnswerTimeout BaudRate	Value 500.0000 9600	can	Port Properties (RS Device COM6 COM6	5 232 settings) Property AnswerTimeout BaudRate	Value 500.0000 57600
ort Properties (RS Device :0M6 :0M6 :0M6	232 settings) Property AnswerTimeout BaudRate DelayBetweenCharsMs	Value 500.0000 9600 14400	can	Port Properties (RS Device COM6 COM6 COM6	5 232 settings) Property AnswerTimeout BaudRate DelayBetweenCharsMs	Sc Value 500.0000 57600 0.0000
ort Properties (RS Device 20M6 20M6 20M6 20M6	232 settings) Property AnswerTimeout BaudRate DelayBetweenCharsMs Handshaking	Value 500,0000 9600 14400 19200	can	Port Properties (RS Device COM6 COM6 COM6 COM6 COM6	5 232 settings) Property AnswerTimeout BaudRate DelayBetweenCharsMs Handshaking	Value 500.0000 57600 0.0000 Off
ort Properties (RS Device IOM6 IOM6 IOM6 IOM6 IOM6 IOM6	232 settings) Property AnswerTimeout BaudRate DelayBetweenCharsMs Handshaking Parity	Value 500.0000 9600 14400 19200 57600	can	Port Properties (RS Device COM6 COM6 COM6 COM6 COM6 COM6	5 232 settings) Property AnswerTimeout BaudRate DelayBetweenCharsMs Handshaking Parity StopBite	Value 500.0000 57600 0.0000 Off None
ort Properties (RS Device COM6 COM6 COM6 COM6 COM6 COM6 COM6 COM6	232 settings) Property AnswerTimeout BaudRate DelayBetweenCharsMs Handshaking Parity StopBits Verbeen	Value 500.0000 9600 14400 19200 57600 -115200		Port Properties (RS Device COM6 COM6 COM6 COM6 COM6 COM6 COM6	232 settings) Property AnswerTimeout BaudRate DelayBetweenCharsMs HandShaking Parity StopBits Verhose	Value 500.0000 57600 0.0000 Off None 1

10. Check Arduino-Switch and Arduino-Shutter and press OK button:

Peripheral Device	es Setup			×
HUB (parent devi	Arduino-Hub			
Name	Adapter/Library	Description	Selecte	d
Arduino-Switch	Arduino-Switch/	Digital out 8-bit		1
Arduino-Shutter	Arduino-Shutter/	Shutter		V
Arduino-Input	Arduino-Input/Ar	ADC		
Arduino-DAC1	Arduino-DAC1/Ar	DAC channel 1		
Arduino-DAC2	Arduino-DAC2/Ar	DAC channel 2		
			ОК	Cancel

11. Following dialog box will appear. Click Next to proceed:

anstalled Devices: Name Adapter/Library Description Status Edit Periphera Periphera Remove Adding or Removing Devices I. The list above displays all of the devices that will be handled by Micro-Manager in this configuration file. 2. If you are making a new configuration file. 2. If you are making a new configuration file. 2. If you are making a new configuration file. 3. If you are making a new configuration file. 3. If you are making a new configuration file for the first time, please visit the Micro-Manager website (www.micro-manager.org) and look under Devices to find instructions for setting up all your devices. 3. You can begin adding new devices whenever youre ready (click 'Add' button). If you need more help with deciding which devices to allow the wizard to recognize these devices and highlight a particular device and click Help (it really helps). 4. While adding a device you can choose to allow the wizard to recognize these devices unstructions for set and to recognize these devices and the device on a choose to allow the wizard to recognize these devices unstructions for set and to recognize these devices and chipseles. 4. While adding a device you can choose to allow the wizard to recognize these devices unstructions for the set and the device and click Help (it really helps).	ardware Configuration Wizard				×
nstalled Devices: Name Adapter/Library Description Status Edit Periphera Remove In the list above displays all of the devices that will be handled by Micro-Manager in this configuration file. In the list above displays all of the devices that will be handled by Micro-Manager in this configuration file. If you are making a new configuration file. If you are being adding new devices to find instructions for setting up all your devices. You can begin adding new devices whenever yource ready (click 'Add' button). If you need more help with deciding which devices to add, highlight a particular device and click Help (if really helps). Andort aserCombiner Apogee Apogee Arduino Arduino Mained advice you can choose to allow the wizard to recognize these devices mutation if yeonemeded in the particular devices in the particular devices in the particular	tep 2 of 6: Add or remove devices				
Name Adapter/Library Description Status Core MMCore/Default Core controller Default Arduino-Hub Arduino-Hub (required) OK Arduino-Switch Arduino-Switch/ Digital out 8-bit Arduino-Shutter Arduino-Shutter Shutter Add Remove Macro-Maager in this configuration file Status If you are making a new configuration file You can begin adding new devices whenever your ready (click 'Add' button). If you need more help with deciding which devices to add	Installed Devices:				
Core MMCCore/Default Core controller Periphera Arduino-Hub/Ar Hub (required) OK Remove I. The list above displays all of the devices that will be handled by Micro-Manager in this configuration file. Variable Devices: Ist by vendor OK Makabel Devices: Ist by vendor Compact view AAAOTF Add Help AAddin Add Help Addin Addin Gitting which devices to add, highlight a particular device and click Help dit really helps).	Name Adapter/Library Description	Status	Edit	Adding or Removing Devices	
automatically recommended	Name Adapter/Library Description Core IMMCore/Default Core controller Arduino-Hub Arduino-Switch Hub (required) Arduino-Switch Arduino-Switch/ Digital out 8-bit Arduino-Shutter Arduino-Shutter Shutter Available Devices: list by vendor core AAAOTF AASCamera AOTF ASIFW1000 ASIFW1000 ASIFW1000 Addin Andort.seerCombiner Addin Andor Andort.seerCombiner Andort.seerCombiner Addinas Arduinas Arduinas Addinas Arduinas Arduinas	Status Default OK OK OK	Edit Periphera Remove Add Help	 Adding or Removing Devices The list above displays all of the devices that will be handled by Micro-Manager in this configuration file. If you are making a new configuration file for the first time, please visit the Micro-Manager website (www.micro-manager.org) and look under Devices to find instructions for setting up all your devices. You can begin adding new devices whenever you're ready (click 'Add' button). If you need more help with deciding which devices to add, highlight a particular device and click Help it really helps:). While adding a device you can choose to allow the wizard to recognize these devices automatically (recommended) 	

12. Select Arduino Shutter from the list and click Next:



13. Check the data of next screen and click Next to proceed:



- Hardware Configuration Wizard × Step 5 of 6: Define position labels for state devices Assigning labels Read State devices State Label Reset • At left are 'State devices' such as filters, objective turrets, etc., which have discrete positions. · Here assign labels corresponding to each position so that you can easily identify them during use. For example. Position 1, Position 2... could be labeled as Cy3, Cy5... 10 10 11 12 13 14 15 16 17 • Select the device in the left-hand list 11 12 13 14 15 16 17 and edit the corresponding position labels in the right-hand list. Note: • The Read button will read labels for the selected device directly 18 19 20 21 22 23 24 25 26 27 18 19 from the hardware. 20 21 • The Reset button will reset the labels of the selected device to the 22 23 values they had when you entered this page. 24 25 26 27 < Back Next >
- 14. On next screen click Next to proceed:

15. At next screen choose the configuration file and click Finish to end the configuration wizard:



16. To finish configuration select Device / Property Browser from Micro-Manager Tools menu:



17. At Property Browser change the Arduino-Switch-State to 32 and close the dialog box.

Property Browser	
Show cameras Refreshi Show shutters Show stages Show stages Show tead-only pr Show discrete changers Show other devices	Change to 32
Property	Value
Arduino-Hub-Name	Arduino-Hub
Arduino-Hub-Version	2
Arduino-Switch-Blank On	Low
Arduino-Switch-Blanking Mode	Idle
Arduino-Switch-Delay (ms)	0 4
Arduino-Switch-Description	Arduino digital output driver
Arduino-Switch-HubID	Arduino-Hyb
Arduino-Switch-Label	32
Arduino-Switch-Name	Arduino
Arduino-Switch-Repeat Timed Pattern	• •
Arduino-Switch-Sequence	Off
Arduino-Switch-State	32 4
Arduino-Switch-Timed Output Mode	Idle
Arduino-Shutter-Description	Arduino shutter driver
Arduino-Shutter-HubID	Arduino-Hub
Arduino-Shutter-Name	Arduino-Shutter
Arduino-Shutter-OnOff	0
Core-AutoFocus	
Coro-AutoShuttor	0

18. Open the Micro-Manager main screen. Choose the Arduino Shutter and try to change the Shutter state from Open to Close and vice versa. If the USB-TTL Interface is connected to LED driver the LED light shall be Turned ON at Open Shutter state and OFF at Close Sutter state:

Les System: C:\Program Files\Micro-Manager-1.4\My_Configuration.cfg						
File Tools Plugins Help						
C Live E C Live E C Album B Multi-D Acq. S C Refresh A Place of Horn Honn	Camera settings Exposure [ms] Binning Shutter Arduino-Sh Auto shutter Open age as funding will continue!	Configuration set	ings Preset	Save		
ROI Zoom	Presse <u>cite intro-Manager</u> so funding will continue! ROI Zoom Profile Autofocus Group: + - Edit Preset + - Edit Image info (from camera): 0 X 0 X 0, Intensity range: 0 bits, 0 nm/pix					
Contrast Metada Scale Bar T Display mode:	ata Comments	Autostretch	Sync channels Slow hist			

Usage by HyperTerminal software

The USB-TTL Interface can be used with any HyperTerminal like software capable of sending and receiving simple ASCII commands over serial RS232 or USB interface. Following commands are predefined in USB-TTL Interface:

Command	Function	Echo
Н	Changes TTL output to High (+5V)	ON
L	Changes TTL output to Low (0V)	OFF