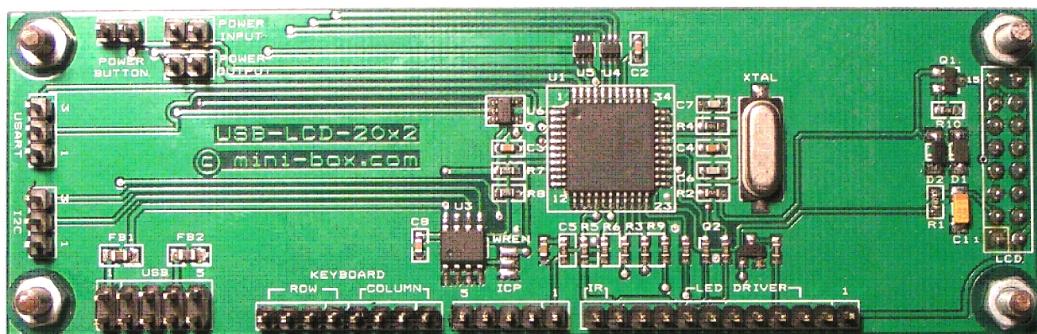


Setting up the hardware components

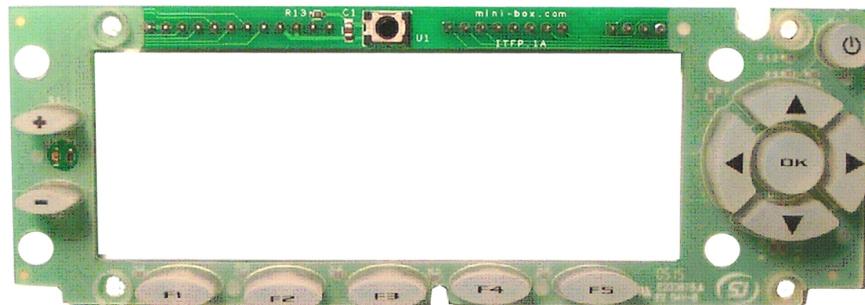


● Identifying the USB-LCD-20x2 module's components

Identifying hardware components are the minimum required installation process using this device in proper conditions. The USB-LCD-20x2 device has two major parts. They are already assembled (the mainboard and the LCD module).



The device mainboard contains the main microcontroller, an optional serial EEPROM chip and some connector headers for different purposes.



An attachable keyboard panel (with IR receiver) can be used as a basic application for the general purpose USB-LCD-20x2 device.

● Identifying the USB-LCD-20x2 module's connectors

POWER BUTTON

POWER INPUT

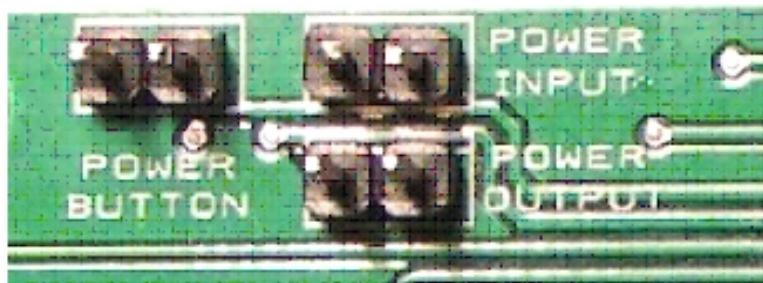
POWER OUTPUT

To connect the **POWER BUTTON** and **POWER LED** use the J2 pin as described in keyboard module connector section below.

Power led connects to pins 1 (-) and 2 (+) and power button connect to pins 3(-) and 4(+) from J2 connector in keyboard module.

Power button, power input and **power output** connectors from the lcd module as shown below can be used to connect PC power switch to LCD and control the startup, shutdown or sleep modes from the LCD software. To do this the user needs an additional wire pair, connected between the mainboard of the PC POWER SWITCH, and the POWER OUTPUT of the USB-LCD device.

If the user would use a separate **POWER BUTTON**, this can be connected to the **POWER INPUT** connector and the **POWER BUTTON** will work in parallel logic with the USB-LCD device. This setup requires a firmware that isn't available yet and it's explained here for future reference.



POWER BUTTON pinouts:

Pin 1	Power Button Input
Pin 2	GND

POWER INPUT pinouts:

Pin 1	SWITCH A & POWER OUT1
Pin 2	SWITCH B & POWER OUT2

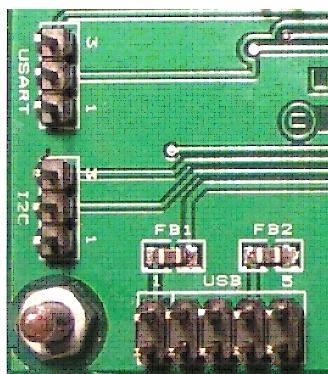
POWER OUTPUT pinouts:

Pin 1	SWITCH A & POWER IN1
Pin 2	SWITCH B & POWER IN2

USART
I²C
USB

The communication connectors serve to connect the USB-LCD-20x2 device to other devices. The most common and recommended way for communication between a PC and the USB-LCD-20x2 device is the USB connection. USART and I²C ports are optional.

For the USB connection, you must connect first the USB wire harness to the USB connector on the USB-LCD-20x2 device motherboard and after connect to a PCs USB port. In the moment the connection is stabilized, you will observe the OS reaction; a HID driver will be installed automatically. The following picture helps to find and localize the connector pins.

**USART** pinouts:

Pin 1	GND
Pin 2	Serial RX signal
Pin 3	Serial TX signal

I²C pinouts:

Pin 1	GND
Pin 2	Serial clock (SCL)
Pin 3	Serial data (SDA)

USB pinouts:

Pin 1	USB V+	Pin 6	Not Con.
Pin 2	USB D-	Pin 7	Not Con.
Pin 3	USB D+	Pin 8	Not Con.
Pin 4	USB V-	Pin 9	Not Con.
Pin 5	GND	Pin 10	Not Con.

- **KEYBOARD** (rows & columns)
- **ICSP** (microcontroller controller programming)
- **LED DRIVER PORT & IR RECEIVER**

On the bottom side of the USB-LCD-20x2 device, you will find the KEYBOARD connector. The first four pins, commonly named as ROW are designated to readout the keyboard matrix outputs. The second groups of pins, commonly named as COLUMN are designated to drive the keyboard matrix inputs.

The ICSP (In Circuit Serial Programming) connector serves to factory features. Through this connector the basic firmware part can be programmed in the microcontroller main memory.

The LED DRIVER PORT & IR RECEIVER connector contains a digital input pin for a general purpose (5V output signal level) IR sensor, some +VCC and GND output pins, five standard 10mA LED driver output pin and an amplified, 45mA LED group driver output pin. The following picture helps to find and localize the connector pins.



KEYBOARD pinouts:

Pin 1 COLUMN	Keyboard column 1
Pin 2 COLUMN	Keyboard column 2
Pin 3 COLUMN	Keyboard column 3
Pin 4 COLUMN	Keyboard column 4
Pin 5 ROW	Keyboard row 1
Pin 6 ROW	Keyboard row 2
Pin 7 ROW	Keyboard row 3
Pin 8 ROW	Keyboard row 4

ICSP pinouts:

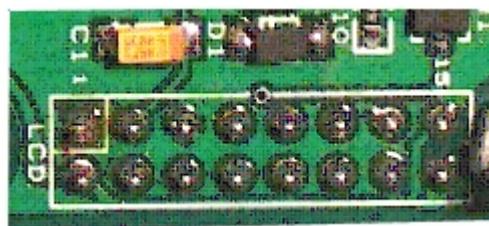
Pin 1	Reset/VPP
Pin 2	GND
Pin 3	VCC +5V
Pin 4	PGD (programming Data)
Pin 5	PGC (programming Clock)

LED DRIVER PORT & IR RECEIVER pinouts:

Pin 1	VCC +5V
Pin 2	VCC +5V
Pin 3	LED 1 OUT (10mA)
Pin 4	LED Group OUT (45mA)
Pin 5	LED 2 OUT (10mA)
Pin 6	LED 3 OUT (10mA)
Pin 7	LED 4 OUT (10mA)
Pin 8	LED 5 OUT (10mA)
Pin 9	GND
Pin 10	GND
Pin 11	VCC +5V
Pin 12	IR Receiver input

● **LCD module connector**

The LCD connector on the right side is a 16 pins, dual row connector providing a standard LCD interfacing bus (four data bit and two command line, contrast level and LCD backlight control pins). The picture below helps to find and localize the connector pins.

**LCD** pinouts:

Pin 1	GND	Pin 2	VCC +5V
Pin 3	V Contrast	Pin 4	LCD RS
Pin 5	R/W	Pin 6	LCD EN
Pin 7	Not Con.	Pin 8	Not Con.
Pin 9	Not Con.	Pin 10	Not Con.
Pin 11	Data bit 4	Pin 12	Data bit 5
Pin 13	Data bit 6	Pin 14	Data bit 7
Pin 15	Backlight A (+)	Pin 16	Backlight K (-)

- Identifying the optional keyboard module's connectors

J1**J2****J3**

The keyboard panel (with IR receiver) has three connectors as follows: J1 for LED inputs and IR Receiver outputs, J2 for main POWER BUTTON and POWER LED input, J3 for Key matrix column inputs and row outputs. The picture below helps to find and localize the connector pins.

**J1** pinouts:

Pin 1	VCC +5V
Pin 2	VCC +5V
Pin 3	LED 1 OUT (10mA)
Pin 4	LED Group OUT (45mA)
Pin 5	LED 2 OUT (10mA)
Pin 6	LED 3 OUT (10mA)
Pin 7	LED 4 OUT (10mA)
Pin 8	LED 5 OUT (10mA)
Pin 9	GND
Pin 10	GND
Pin 11	VCC +5V
Pin 12	IR Receiver input

J2 pinouts:

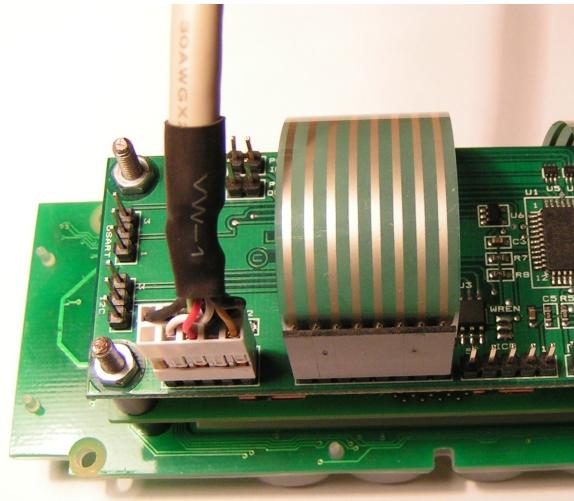
Pin 1	Power ON LED Cathode
Pin 2	Power ON LED Anode
Pin 3	POWER ON Switch
Pin 4	POWER ON Switch

J3 pinouts:

Pin 1 COLUMN	Keyboard column 1
Pin 2 COLUMN	Keyboard column 2
Pin 3 COLUMN	Keyboard column 3
Pin 4 COLUMN	Keyboard column 4
Pin 5 ROW	Keyboard row 1
Pin 6 ROW	Keyboard row 2
Pin 7 ROW	Keyboard row 3
Pin 8 ROW	Keyboard row 4

- **Plug in USB port and run the USB-LCD-20x2 module**

After identifying the connectors one more wire harness must be connected to the USB-LCD-20x2 device to run: the main USB cable. Please read carefully the PC's mainboard installation manual to find out which and where are the additional USB connector placed. Once they are found you will be able to connect the both ends of the USB cable in proper direction. One end connects to the PC's mainboard, the other to the USB-LCD-20x2 device.



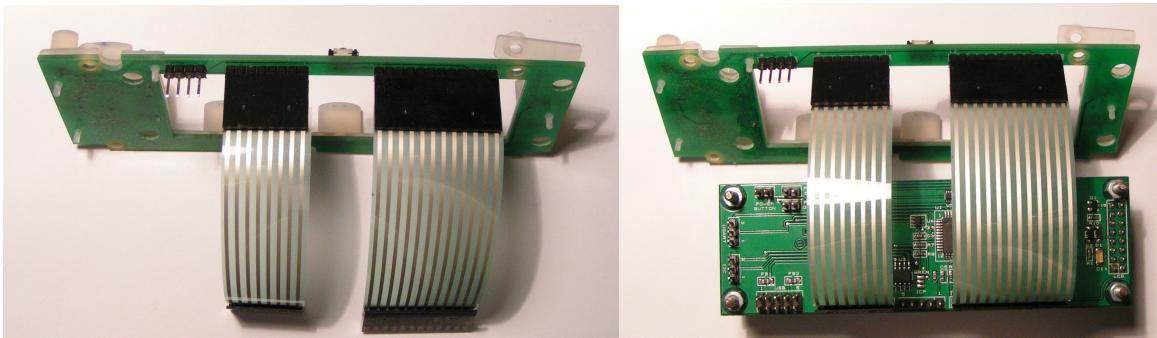
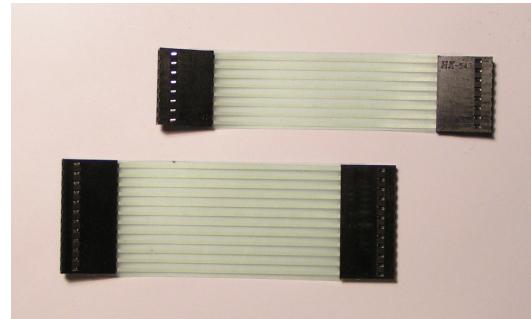
USB connector connected

Once the cables are connected in right places, the USB-LCD-20x2 device is ready to use. The last step remains to the user to plug in the PC's power cord in a wall outlet too and to switch the main system on.

● Attaching the keyboard to the USB-LCD-20x2 module

First step is to connect the microcontroller board to the keyboard panel (with IR receiver) using two ribbon cables as shown in the next pictures.

Connect the narrow ribbon cable to the keyboard panel's narrow connector pins (J3 - 8 pins) and the wide ribbon cable to the keyboard panel's wide connector pins (J1 - 12 pins). Leave unconnected the four pins connector (J2), which is supposed to be connected to the PC mainboard POWER ON button and the SYSTEM ON LED.



For the second step, take the micro-controller mainboard, turn it over with the electronic components side upward and connect the corresponding ribbon cables to the available connector headers. The narrow ribbon cable must be connected to the microcontroller mainboard, narrow connector pins (KEYBOARD - 8 pins) and the wide ribbon cable must be connected to the mainboard's wide connector pins (LED DRIVER & IR - 12 pins). After the connectors are fitted, put the two together by rotating and placing the LCD module in the middle of the keyboard panel's jaw.

You can see the finally assembled USB-LCD-20x2 device in the pictures below.

