

# **USB I2C Converter MS**

(V3.0)

## **Manual**

(Rev. 1.02)

# **COPTONIX**



Luxemburger Str. 31  
D – 13353 Berlin  
Phone: +49 – (0)30 – 61 74 12 48  
Fax: +49 – (0)30 – 61 74 12 47  
[www.coptonix.com](http://www.coptonix.com)  
[support@coptonix.com](mailto:support@coptonix.com)

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## 1. Introduction

The *USB I2C Converter MS* is a universally applicable USB to I2C. The converter offers system designer a quick easy way to add USB functionality to any I2C-Circuits. Implementing this converter into a system can completely offload USB connectivity and processing standard protocols from the system, thereby significantly reducing the software development. System designer just need to connect it to an existing I2C-Bus. The converter may operate as master or as slave. Switching between Master Mode and Slave Mode is done via software.

With the *USB I2C Converter MS* as Master numerous bus participants can be addressed purposefully via USB such as IO-Expander, sensors, LCDs, 7 segment display, stepping motors AD/DA converters, real time clocks, tone generators, RAM EEPROM, etc. The SCL-frequency is adjustable by software from 500Hz up to 400kHz. The duty cycle SCL-High/ SCL-low can be also individually adjusted. The converter as master has an interrupt input. Thus it is possible to react to external events e.g. when using IO-Expander like the PCF8574. This interrupt input can be activated (rising o. falling edge) or deactivated by software.

In order to send data to PC (in Slave Mode), a I2C master addresses this converter as slave and writes the data on the I2C bus. This is the simplest way to communicate with PC using USB. The converter has an interrupt output. Thus it is possible to inform an I2C Master that data, which was received from PC, is ready to read.

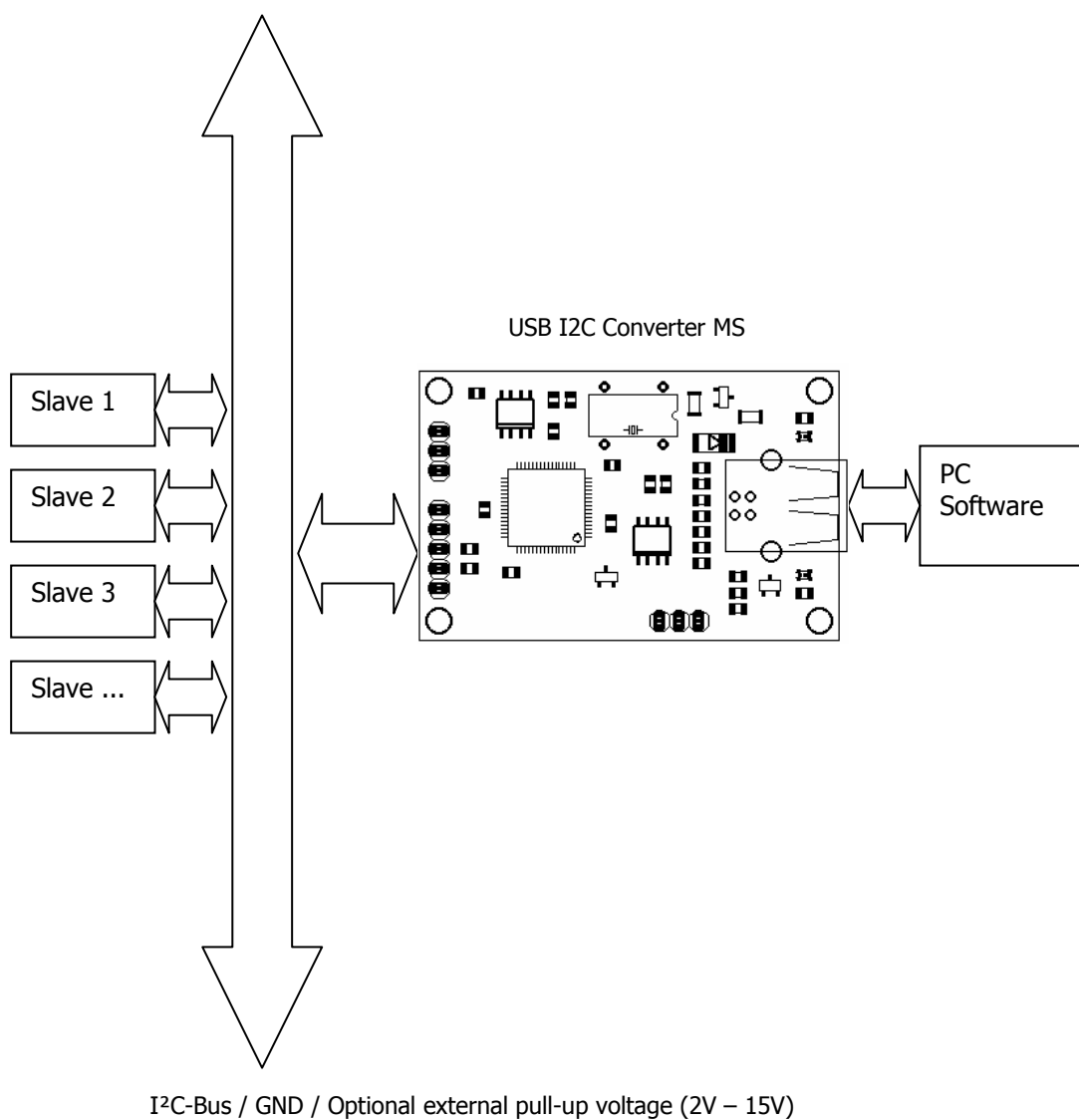
The adapter contains an I2C level shifter on board. Thus, it is possible to connect the adapter to an I2C bus having different voltage levels between 2V and 15V.

An 8KByte EEPROM is on board. There from 256 Bytes are reserved for internal use by the board. The remaining memory is available to the user.

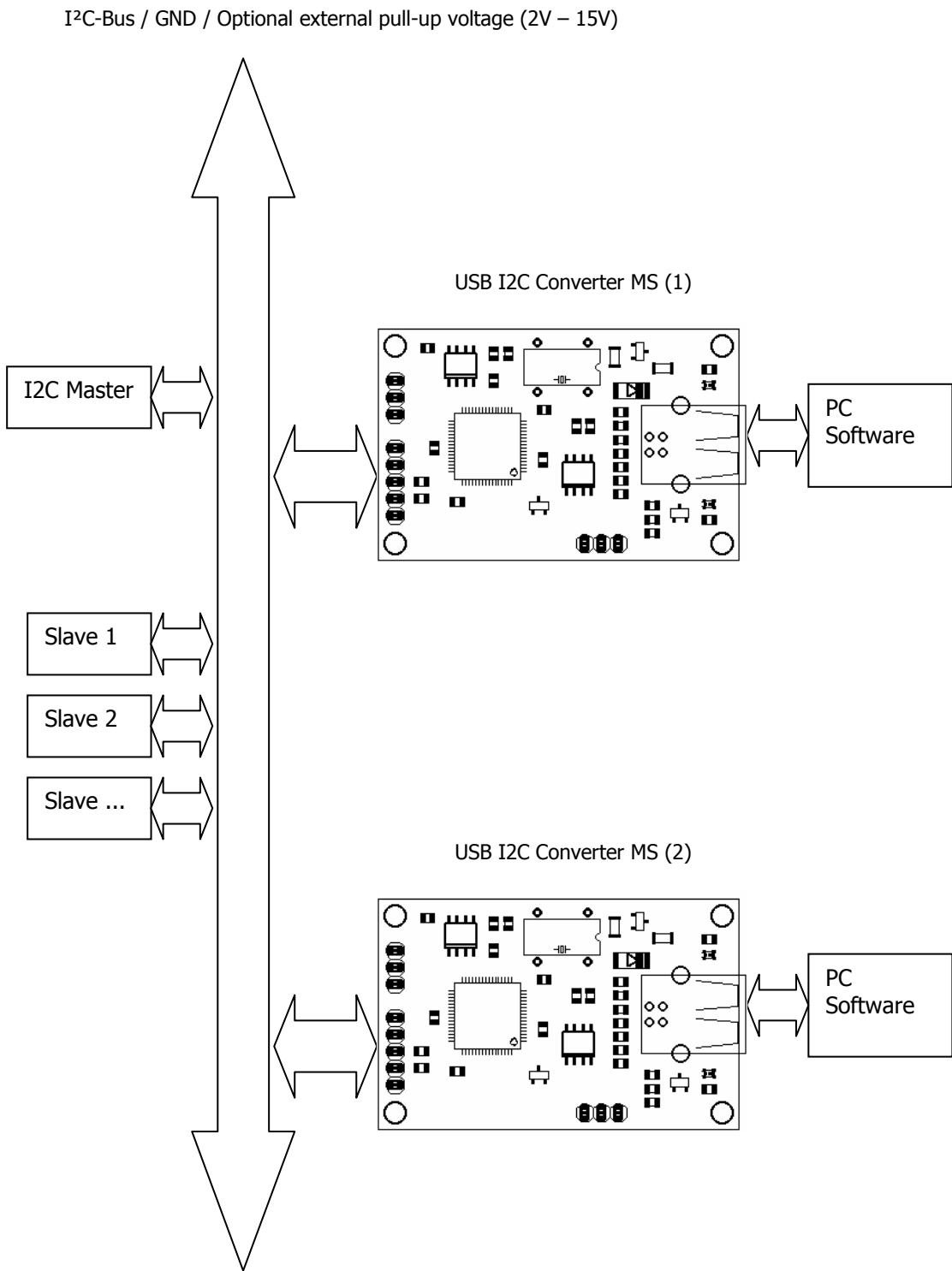
The Hardware is powered directly from the PC's USB port. The on-board LED "PWR" illuminates after the converter is plugged into a PC's USB Port and power is available. The second on-board LED "USB LINK" illuminates after the hardware has successfully been enumerated by the USB host.

This converter does not need any additional drivers for operation under windows. It uses the standard HID driver offered by Windows (WIN98SE, ME, 2000, XP, Vista).

The IIC Control Software is for developers very helpfully. Thus it is possible to create and test immediately I2C devices and read/write EEPROMs. The software supports EEPROMS of 1kbit (128 bytes) to 1Mbit (128k byte).



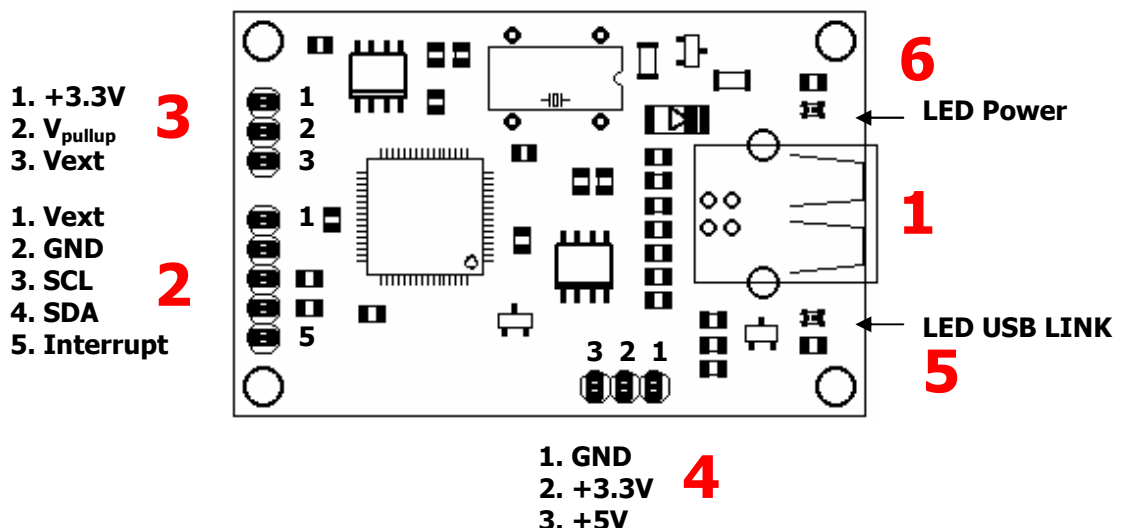
### *USB I2C Converter MS as Master*



*USB I2C Converter MS as Slave*

## 2. Interface

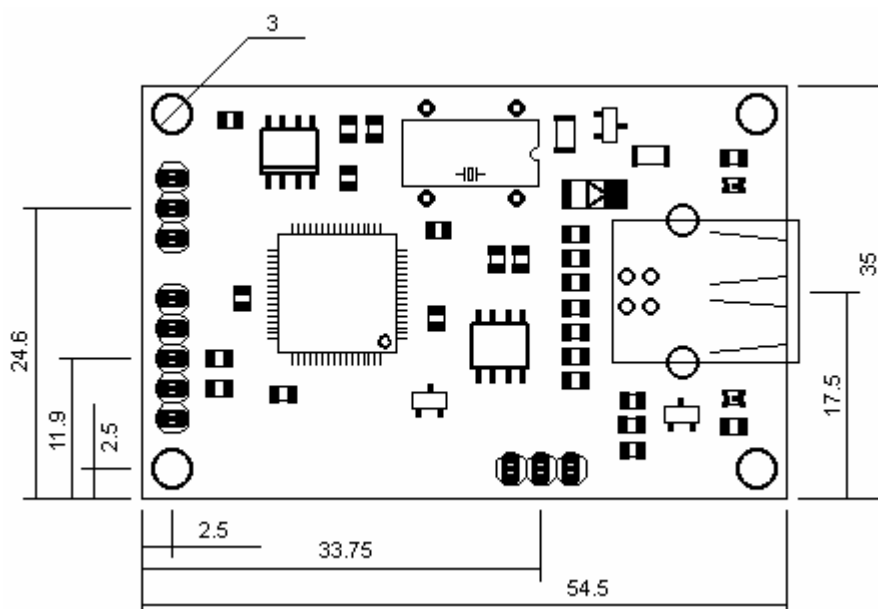
- **1** USB 1.1 / 2.0 compliant  
Full-Speed  
Bus-Powerd (max. 100mA)
- **2** I<sup>2</sup>C-Interface  
Pin 1: External pull-up voltage Vext (2V – 15V)  
Pin 2: Ground  
Pin 3: I2C – SCL  
Pin 4: I2C – SDA  
Pin 5: Interrupt – Input (Master) / Interrupt – Out (Slave)  
Header strip / 2.54 grid dimension  
SCL and SDA are already connected to 4.7kOhm to 3.3V
- **3** Jumper – V<sub>pull-up</sub> Pull-up voltage  
Pin 1: +3.3V  
Pin 2: V<sub>pull-up</sub> ; connected to pull-up resistors  
Pin 3: External pull-up voltage  
Position 1-2: connects pull-up voltage to internal +3.3V  
Position 3-2: connects pull-up voltage to external pull-up voltage  
(see I<sup>2</sup>C-Interface, Pin 1)
- **4** VOUT: Power Outputs  
Pin 1: Ground  
Pin 2: 3.3V Output  
Pin 3: 5V Output  
Header strip / 2.54 grid dimension  
No separate power packs for voltage are needed. The total current consumed by the converter (**80mA**) and the target system (max. **20mA**) must be limited to max. **100mA** by the user when using these power outputs.
- **5** LED USB LINK
- **6** LED Power



### 3. Characteristics

	Min.	Typ	Max.	Unit
<b>Power-Supply</b>				
Supply Voltage	USB Bus-Powered 5.0			V
Supply Current		80	100	mA
<b>I2C-Bus pins (SCL, SDA)</b>				
V <sub>ext</sub> External Pull-up Voltage	2	-	15	V
V <sub>IH</sub> High-State Input Voltage	0.58 V <sub>pull-up</sub>	-	-	V
V <sub>IL</sub> Low-State Input Voltage	-	-	0.42 V <sub>pull-up</sub>	V
<b>Limiting values</b>				
<b>Interrupt pin</b>				
Input Voltage	0	-	5.5	V
Output Voltage	0	-	V <sub>DD(3,3V)</sub>	V
<b>Output Current (for both outputs together)</b>				
Pin2 V <sub>out</sub> (3.3V)	-	-	20	mA
Pin3 V <sub>out</sub> (5.0V)				
<b>Temperature</b>				
operating temperature	-20	-	+70	°C

### 4. Dimensions (mm)



## 5. Installation (Hardware)

Windows Me/2000/XP/Vista users do not require a driver. The USB I2C Converter MS will be automatically detected as a USB **Human Interface Device** with native support offered by Windows.

Win98SE users may do as follow in order to install the driver offered by Windows:

### **Step 1:**

- Please neutralize first any ESD by touching the PC case or other grounded source before unpacking or handling the *USB I2C Converter MS*.
- Connect the USB cable from the USB socket on the converter to the USB socket on the PC.
- The power LED "PWR" (4) on the *USB I2C Converter MS* should illuminate.

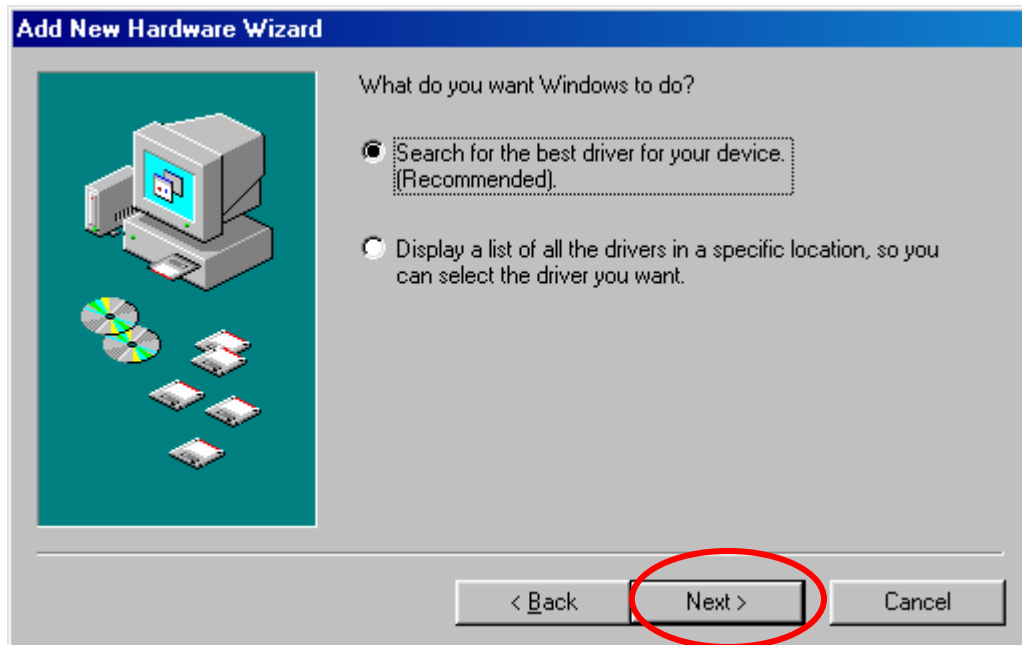
### **Step 2:**

- Windows should detect that there is new hardware
- Click 'Next'



**Step 3:**

- Select for Windows to 'Search for the best driver ...' and click 'Next'

**Step 4:**

- Use the 'Browse' button to point to the directory 'C:\WINDOWS'  
**OR** just leave all options unchecked.
- When you are ready, then click 'Next'.



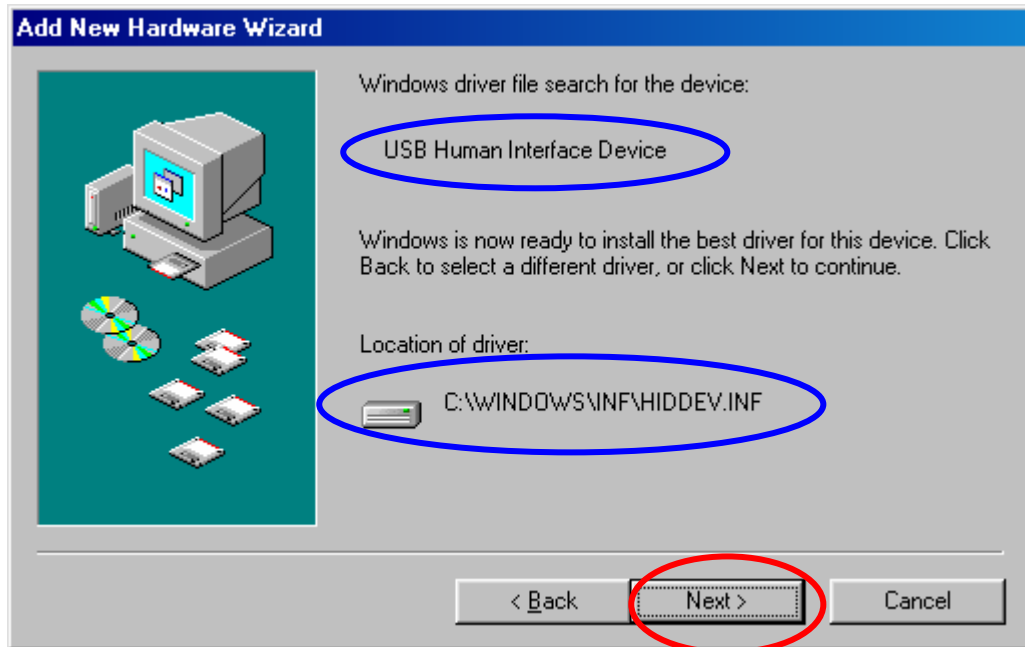


**Step 5:**

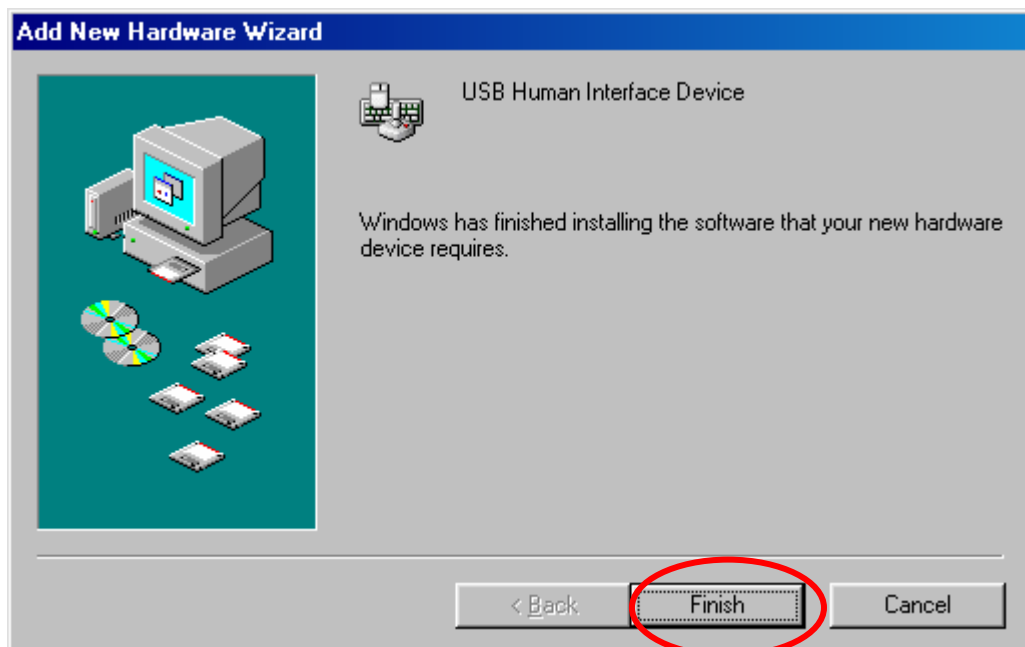
Windows should then find the correct driver for the device.

Device: USB Human Interface Device  
Driver: HIDDEV.INF

- Click 'Next'.

**Step 6:**

- Windows will now complete the installation of the drivers. Click 'Finish'



- The LED "USB\_LINK" (5) on the USB I2C Converter should illuminate.
- Now, the *USB I2C Converter MS* should be ready for use.

