W&T

www.WuT.de

Manual

Installation, Startup and Application

USB-Isolatoren

valid for:

#33001 USB-Isolator 1kV

#33204 USB-Isolator 4kV

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Subject to errors and changes:

Since we can make mistakes, none of our statements should be used without checking. Please let us know of any mistakes or misunderstandings you are aware of, so that we can recognize and eliminate them quickly.

Perform work on and with W&T products only as described here and only if you have read and understood the manual fully. Unauthorized use can result in hazards. We are not liable for the consequences of unauthorized use. When in doubt, check with us or consult you dealer!

Content

1. Legal notices

Warning notice system

This manual contains notices that must be observed for your personal safety as well as to prevent damage to equipment. The notices are emphasized using a warning sign. Depending on the hazard level the warning notices are shown in decreasing severity as follows:

⚠ DANGER
Indicates a hazard which results in death or severe injury if no appropriate preventive actions are taken.

⚠ WARNING
Indicates a hazard which can result in death or severe injury if no appropriate preventive actions are taken.

⚠ CAUTION
Indicates a hazard that can result in slight injury if no appro-priate preventive actions are taken.

⚠ NOTE
Indicates a hazard which can result in equipment damage if no appropriate preventive actions are taken.

If more than one hazard level pertains, the highest level of warning is always used. If the warning sign is used in a warning notice to warn of personal injury, the same warning notice may have an additional warning of equipment damage appended.

Qualified personnel

The product described in this manual may be installed and placed in operation only by personnel who are qualified for the respective task.

The documentation associated with the respective task must be followed, especially the safety and warning notices contained therein.

Qualified personnel are defined as those who are qualified by their training and experience to recognize risks when handling the described products and to avoid possible hazards.

Disposal

Electronic equipment may not be disposed of with normal waste, but must be brought to a proper electrical scrap processing facility.

The complete declarations of conformity for the devices described in this manual can be found on the respective Internet data sheet page on the W&T homepage at http://www.wut.de

Symbols on the product

Symbol	Explanation
	CE-Mark The product conforms to the requirements of the relevant EU Directives.
	WEEE-Mark The product may not be disposed of with normal waste, but rather in accordance with local disposal regulations for electrical scrap.

2. Safety Instructions

Intended Use

The USB isolators manufactured by Wiesemann & Theis galvanically isolate low-speed and full-speed USB connections with different isolation voltages. The insulators prevent compensating currents from flowing over the USB line due to potential differences between the connected devices, which can lead to data transmission disturbances or to the destruction of the interfaces. For this purpose the isolators are simply inserted into the existing USB connection.

⚠ DANGER
The isolators described in this manual may only be used to protect the USB interfaces. However, it is not permitted to use the insulator to protect persons against contact with dangerous voltages. If a safety-critical electrical isolation is required, please contact us.

Any other use or modification of the equipment is not authorized.

Electrical safety

Please make sure there is sufficient distance between upstream and Downstream cable, to avoid direct voltage flashovers between the cables.

The USB-Isolator may only be used in enclosed and dry areas. The device should not be exposed to high ambient temperatures or not operated near heat sources. Please note the restrictions regarding the maximum ambient temperature.

The power supply unit used to supply the respective USB-Isolator must guarantee a safe separation of the low voltage side from the grid in accordance with EN62368-1 and have „LPS“ characteristics.

EMC

Only shielded cables may be used for connecting the Isolators.

In this case the Isolators meet the noise immunity limits for industrial applications and the stricter emissions limits for households and small businesses. Therefore there are no EMC-related limitations with respect to the usability of the devices in such environments.

The complete declarations of conformity for the devices described in this manual can be found on the respective Internet data sheet page on the W&T homepage at http://www.wut.de

3. Introduction

USB interfaces in stationary computers unfortunately have the basic drawback of having no galvanic isolation for the signal lines.

In many applications in the consumer world this limitation is irrelevant, since the USB devices connected to the PC are generally supplied through the bus and do not have any reference to a second ground or to the ground conductor.

In the areas of measurement reading, process control or for example medical technology, galvanic isolation of the connected devices is mandatory in order to prevent ground loops on the USB line.

Wiesemann & Theis therefore offers USB Isolators which are described on the following pages along with their technical specifications and wiring examples.

For up-to-date information on new developments on the Internet, go to http://www.wut.de or the e-mail short infos available from the W&T Interface Club, which you can sign up for at the W&T Hompage.

4. USB Isolator, 1kV, #33001

Function

The Wiesemann & Theis USB-Isolator #33001 provides galvanic isolation for low-speed and full-speed USB connections with an isolation voltage of at least 1000V DC. The Isolator eliminates ground loops and prevents current from flowing between the connected devices and the supply lines of the USB caused by potential differences. The Isolatoris simply inserted into the existing USB connection and powered by an external power supply.

Supply voltage

The USB Isolator requires an external power supply for powering the galvanically isolated Isolator side and a bus-powered terminal device.

A suitable wall mount adaptor is included with the Isolator. In principle any 5V DC power supply with a USB output can be used as long as it provides an output current of at least 0.5A.

The supply voltage is brought to the Isolator side through a mini-USB socket. The socket is marked on the Isolator as „Power Connector." An appropriate adapter cable for connecting the power supply is also included with the Isolator.

⚠ NOTE

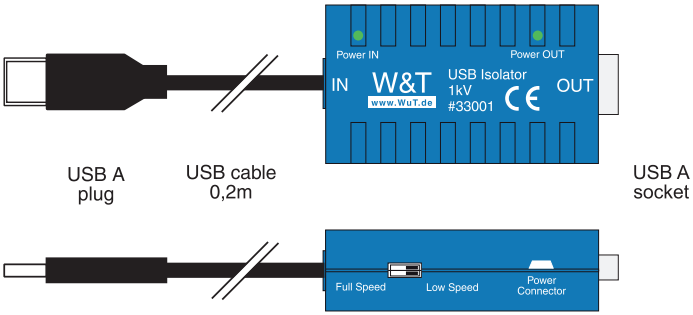
The USB A plug on the power cable must never be connected to a second USB port on the USB host or hub which is connected to the upstream port of the Isolator. Such a connection would jumper the galvanic isolation and make it ineffective. A galvanically isolated voltage source is therefore absolutely mandatory.

Display elements

The Isolator includes two green LEDs for indicating the correct supply voltage for the Isolator. The Power IN LED indicates correct power for the upstream side of the Isolator from the USB host or hub, whereas the Power Out LED indicates the voltage of the downstream side.

Speed switching

The USB-Isolator #33001 supports USB devices operating in full-speed mode at 12 MBit/s or low-speed mode at 1,5 MBit/s. Two small switches on the side of the Isolator labeled „Low Speed“ and „Full Speed“ are used to switch between the two speeds.



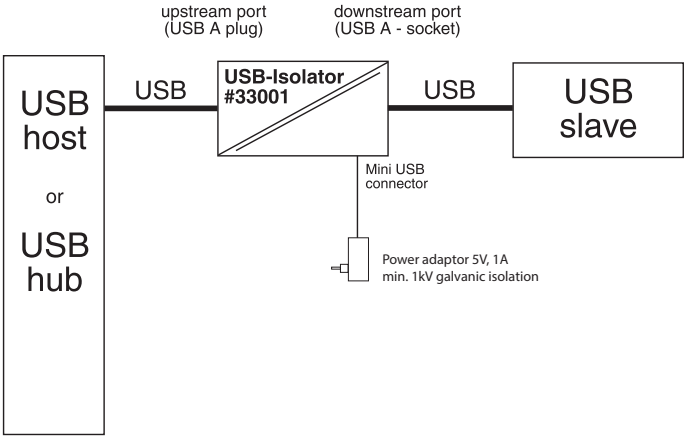
Each switch configures the upstream and downstream side of the Isolator.

⚠ Note

A speed conversion is not possible by the Isolator, so that both switches must always be in the same position. A different setting for both ports will prevent data transmission.

The factory default setting for the Isolator is Full Speed mode.

Wiring example



Technical data

Isolation voltage:	min. 1kV DC
Coupling capacitor:	10nF
USB speed:	Full Speed (12MBit/s), Low Speed (1.5 MBIt/s)
Power supply:	
Upstream-Port:	USB-supplied
Downstream-Port:	5V DC using included power supply
Current draw:	
Upstream-Port:	max. 8 mA
Downstream-Port:	max. 8 mA plus current draw of the USB slave
USB connections:	
Upstream-Port:	USB A plug with 20 cm cable
Downstream-Port:	USB A socket integrated in housing
Ambient temperature:	
Isolator:	Storage: -40..+70°C, Operating: 0..+70°C
Power supply:	Storage: -40..+70°C, Operating: 0..+40°C
Humidity:	5..90% relative humidity (non-condensing)
Housing:	Plastic compact housing, 55 x 30 x 16 mm
Weight:	approx. 35 g
Scope of delivery:	USB Isolator USB power supply 5V / 1A power cable, Mini-USB, 5-pin

5. USB Isolator Industry, 4kV, #33204

Function

The Wiesemann & Theis USB-Isolator Industry #33204 galvanically isolates low-speed and full-speed USB connections with an isolation voltage of at least 4000V DC. The Isolator thereby prevents unwanted current which could otherwise flow between the connected devices over the data and supply lines of the USB. The Isolator is simply inserted into the existing USB line.

Power supply of the insulator

The USB-Isolator #33204 is generally powered by the USB host and supplies the connected terminal device through an integrated DC-DC converter with power.

Only when connecting bus-powered terminal devices which draw more than 300mA from the USB is use of an additional power supply necessary. Power is then provided via a 5.5/2.1mm plug to the underside of the device housing on the upstream side of the Isolator.

This measure ensures galvanic isolation for all powering options: the terminal device always receives its voltage through the integrated DC-DC converter, which features an isolation voltage of min. 6 kV.

A suitable plug-in power supply unit is included with the isolator. In principle, however, any 5V DC power supply unit with USB output can be used, which supplies a sufficient output current and which has the characteristics described in the safety instructions.

⚠ NOTE

When using a 5V power supply unit with a hollow plug, its polarity must be observed: outer contact = „+", middle contact = „-". Otherwise the internal fuse of the isolator will be destroyed.

Isolator output voltage

The output voltage VBus from the W&T USB-Isolator 33204 is brought to the galvanically isolated side of the module through a multi-stage L-C filter.

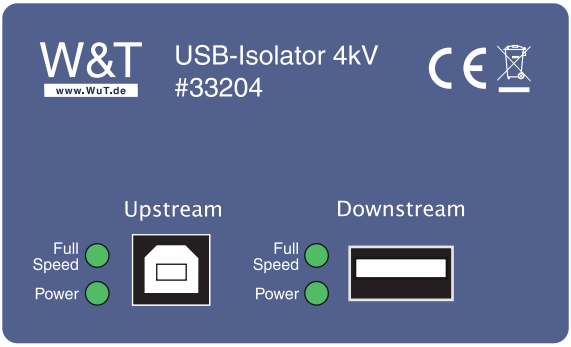
These additional components significantly reduce the noise generated by the integrated DC-DC converter on the supply voltage of the secondary-side USB.

The filtered output voltage means the Isolator is also useful for connecting high-quality audio equipment having a USB port for connecting to a computer.

The maximum output current of the Isolator is 1A.

Display elements

The Isolator features a pair of LEDs each for the upstream and downstream port, located near the respective connector.



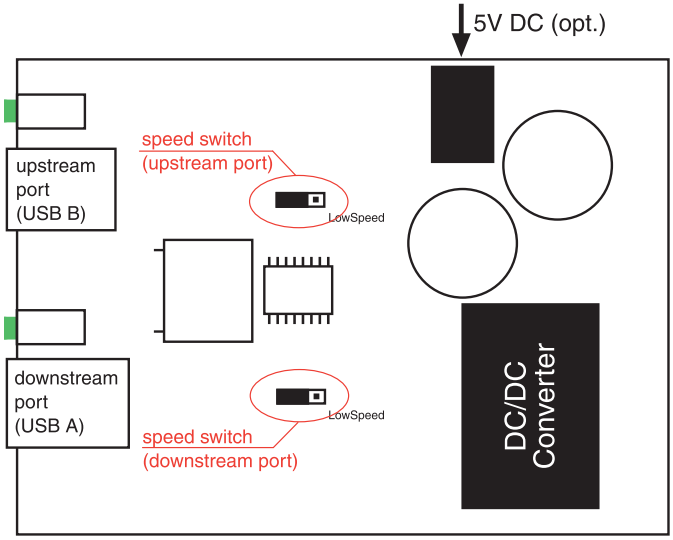
The „Power“ LED of the pair indicates correct supply voltage to the associated Isolator port, whereas the „Full Speed“ LED indicates the set speed of the Isolator.

Speed configuration

The USB-Isolator #33204 supports USB devices that operate in full speed mode at 12 MBit/s or low speed at 1.5 MBit/s.

Switching between both speed is accomplished by means of two plug-in jumpers located inside the Isolator. One jumper each configures the upstream and downstream side of the Isolator.

If the jumper is plugged into the position labeled „Low Speed“, the corresponding Isolator terminal runs at 1.5 MBit, whereas the port in the other position of the jumper runs at full speed.

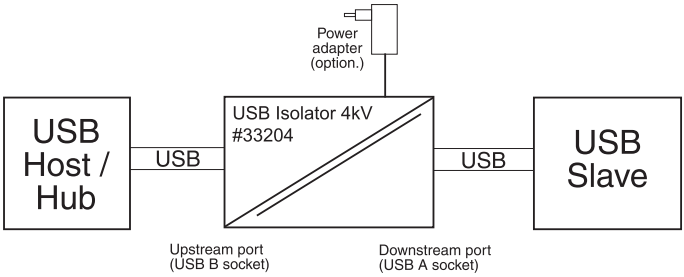


Since low speed devices are uncommon, the USB Isolator model 33204 is factory set to full speed mode.

⚠ NOTE

A speed conversion is not possible by the Isolator, so that both jumpers must always be in the same position. A different setting for both ports will prevent data transmission.

Wiring example



Technical data

Isolation voltage:	min. 4kV DC (both for using USB for power and an external power supply)
Air and creepage path:	> 8mm
Coupling capacitor:	4,4nF
USB speed:	Full Speed (12 MBit/s), Low Speed (1.5 MBit/s)
Power supply:	generally from the USB host over the bus or for high loads from an external 5V power supply
Max. output current:	with USB supply: 0,3 A with enclosed power supply: 0,5 A with suitable power supply: 1A
USB connections:	
Upstream port:	USB B socket
Downstream port:	USB A socket
Ambient temperature:	Storage: -40..+70°C Operating: 0..+60°C
Humidity:	5..90% relative humidity (non-condensing)
Housing:	Small plastic housing, 105x75x45mm
Weight:	approx. 200 g
Scope of delivery:	USB Isolator Industry, 4 kV USB cable USB-A / USB-B, USB power supply 5V / 1A with power cable USB-A / coax plug

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