

optoUSB-3.0

Manual

Digital optical transmitter
for USB signals



Sales Partner:



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1 Disclaimer of Warranty/Exclusion of Liability



Under the Following Circumstances the Warranty and Liability is Excluded:

- Usage not according to the intended purpose and misapplication
- Non-observance of the safety instructions
- Manipulation and modification of the devices

2 Special Regulations and Notes

The following regulations have to be respected for all devices. Additionally, all the specific notes for each device have to be respected (see the following chapters).

2.1 Safety

Interferences, that are not described in chapter 13, and any damage of the devices (e.g. damaged housing or damaged cables at the charger) have to be reported to the responsible expert immediately.

The affected device has to be decommissioned by the responsible expert and must be protected against incorrect usage until all damages have been repaired.

2.2 Product Care and Maintenance

- Battery packs of the devices have to be maintained on a regular basis (see chapter 9).
- Charging of the battery packs has to be done according to the instructions described in chapter 9.
- Other components of the devices are maintenance free.
- Repairs must only be done by the manufacturer.



Risk of Fire, Injury, and Damage to the Electronics


There are no user-serviceable maintainable parts in the devices. Opening the devices can lead to short circuits if powered components touch the housing of the device. Therefore NEVER open the housings, because there is a risk of fire or injury!


In case of errors consider the notes in chapter 10. If an error cannot be solved by considering these notes, please send the device in for repair. In this case, please contact BEFORE you send in the device.

2.3 Cleaning

- Cleaning of the housings only with solvent-free cleaning supplies and a soft cloth.
- Do not use aggressive cleaning supplies like alcohol, acetone, or abrasive materials.

2.4 Installation Instructions

	<p>Risk of Fire or Damage</p> <p>Do not open the devices. Opening the devices is only allowed with the necessary guidance and previous authorization from . Non-observance can lead to fire or damage of the device.</p> <p>Warranty will be void!</p>
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	<p>Possible Risk of Injury and Damage When not Observing this Manual.</p> <p>The devices described in this manual, especially the pan/tilt unit, are very complex. This manual must be read and respected compellingly before installation and initial operation. Safety instructions must be respected compellingly.</p> <p>Disregard can lead to considerable damage of the devices and serious risk of injury for the user.</p>
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- Use the devices only on skid-proof surfaces, respect the specific installation references for each device.
- Electrical connections are only allowed to be done by authorized EMC trained specialist staff.
- Consider electrical parameters and correct pinning assignment.
- Incorrect electrical connections can damage the components of the devices.
- Expert only installation of the connections, provide a strain relief if necessary.
- Do not mechanically work on devices and cases!
- Do not modify or short circuit plugs and do not shorten or extend included cables without the approval by the manufacturer!

3 Regulations and References

3.1 Properties

Batteries are either integrated into the devices from or delivered separately as external battery packs.

The number of cells varies and depends on the respective needed required voltages.

The related charger has the following properties:

- Power supply with power plug (Standard EU (Type C or F) unless ordered otherwise, optional US (type A), UK (type G), AU (type I))
- Integrated LEDs to display the charging level of the connected devices respectively the connected battery packs.
- Short-circuit-proof, reverse polarity protected
- Suitable for batteries with 4 ... 10 cells and a capacity of 1,0 ... 10,0 Ah
- Charging process IUoU

Chargers with the charging process IUoU work basically identical to those using the IU (CCCV) charging process. After reaching the end of charging voltage however, the device switches to trickle charging. This way, a self-

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discharge is avoided.

3.2 Regulations and References

Protect the batteries from heat (e.g. long times of exposure to direct sunlight) and fire. Do not immerse the batteries into fluids. Otherwise there is a risk of explosions.



Risk of Damage and Explosion Because of Incorrect Treatment

Unintentional or incorrect treatment can damage the batteries, which can even lead to explosions of the batteries!

Batteries that are integrated into the devices of or are delivered with them, may only be charged with the intended chargers from .

These components are compatible to each other, other chargers may damage the system or may reduce the capacity or life span of the batteries significantly.

Respect the following references when operating the chargers:

- **Use chargers only for charging devices and batteries.**
- Switch devices off before connecting the charger.
- Do NOT switch on the device during the charging process.
- Maximum charging current 1 A.
- Disconnect charger before turning on the device on.
- Prior to the first use, charge the batteries completely.
- Charge the batteries before use if you have not used them for a longer period (self discharge of the NiMH batteries) and after use.
- To avoid capacity loss due to the memory effect, discharge the batteries completely every 5 charging cycles. To do this, leave the device on, until it turns off by itself. Then start the charging process as described above.



Risk Through High Voltage at the Charging Device

- The charger works with mains voltage.
- Security references for work with mains voltage must be followed.



Warning of Reduced Capacity and Life Span of the Batteries due to Maloperation

Use only the intended chargers from .
Powered devices must never be used with a connected charger, e.g. for buffering an empty battery.
Disregard can lead to a loss of capacity and a shortened life span of the battery in a short time.

3.3 Charging the Batteries (Battery Pack or Integrated into the Device)

Start of the Charging Process

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- Place the battery pack or the device to charge onto a stable and skid proof surface.
- Turn off the device off (see appropriate chapter for operation and operating controls).
- Connect the charger with the battery pack or the device using the designated screw connector (see appropriate chapter for operating elements).
- Plug the power cord of the charger into the power socket.
- Do not power on the device during charging, this can damage the device.
- Check the status of the charging LED periodically (the meaning of the states are printed onto the housing of the charger).


End of the Charging Process, After the Charging LED Displays the Status “Full”:

- Make sure that the device to charge is still turned off.
- Remove the connection between the charger and the screw connectors of the battery pack or the device to charge.
- Remove the power plug of the charger from the socket.
- The device or battery pack is now ready for operation.

4 Environmentally Friendly Disposal

4.1 Disposal of Devices


All devices must be disposed according to the environmental regulations in force.

	<p>Important Notice For Disposal of Devices</p> <ul style="list-style-type: none">• Used equipment must be collected separately and disposed in an environmentally friendly manner.• Electrical and electronic devices must NEVER be disposed of in the household waste.• You can return old electrical and electronic devices to at no cost.
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4.2 Disposal of Batteries

Due to their natural capacity loss, batteries must be replaced after their lifespan.

NEVER open devices or housings by yourself. Replacement of batteries must be done by . Please contact for further details.

	<p>Important Notice For the Disposal of Batteries</p> <ul style="list-style-type: none">• Disposing of batteries in the household waste is prohibited by law!• Battery packs and devices containing batteries or environmental pollutants are marked by a symbol showing a crossed out garbage container (see picture on the left).
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5 Characteristics and field of application

The digital optical system **optoUSB-3.0** can be used to optically transmit USB signals with a data rate of up to 5 Gbit/s correlating to USB3.0 standard. Because of the optical transmission, the system is very robust against EMS (electromagnetic susceptibility). It can withstand high electric and magnetic fields, like they appear in EMC tests. The system also is optimized for low noise emission.

Please note that the USB-3.0 is NOT downwards compatible. I.e. there is no transmission with USB2.0 devices.

For the **HUB side transceiver**, power is supplied by internal NiMH batteries which make the system easy to use. The **optoUSB-3.0** is prepared for the use of external batteries (with the optional battery pack BP84).


For the **PC side transceiver**, power is supplied via the USB cable connected to a PC.

6 Box contents

Quantity	Description
2	Transceivers <i>optoUSB-3.0</i> (PC side and HUB side)
1	Duplex multimode optical fiber 62.5 / 125µm
1	Charger (standard)
1	USB 3.0 cable
1	Manual (English)
	External battery packs BP84 (optional)
	Shielded supply cable for battery packs (optional)

The shipment includes charged batteries. However, due to the self-discharging of NiMH-batteries, they should be recharged again before use.

Read chapter 9(Maintenance) before charging the devices!

	<p>Read chapter 9 before charging! The battery lasts 2-10h. Main factor is the power consumption of the connected load. The operating time can be extended by external, shielded battery packs.</p>
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7 Housing and connectors / pushbuttons



Fig. 7.1: Front side of the USB3.0 transceivers – HUB side on the left, PC side on the right

Fig. 7.1 shows the front side of the transceivers with connectors and push buttons:

- transceiver HUB side only: power push button with control LED (*Pwr On/Off*)
- transceiver HUB side only: battery information LED (*Info*)
- transceiver HUB side only: charge plug (*Charge*)
- optical connector FSMA (*Optical I/O*) for duplex multimode fiber (62.5/125 μ m)

Fig. 7.2 shows the rear side of the transceiver (PC side, left) and the transceiver (Hub side, right) with connectors and control LEDs.



Fig. 7.2: Rear side of the devices – PC side on the left, HUB side on the right

Description of transceiver 1 (PC side):

- USB3.0 type B connector to connect the PC side transceiver with a USB 3.0 cable to a PC.
- Control LED **Power** is on when the transceiver is turned on.
- Control LED **Status** is on, when the two transceivers are connected. If the Status LED is blinking, the transceiver is waiting for the connection to the other transceiver.
- Control LED **Host** indicates an active connection to a PC.
-

Description of transceiver 2 (HUB side):

- 2x USB3.0 type A connector to connect USB3.0 devices
- Control LED **Power** is on when the transceiver is turned on.
- Control LED **Status** is on, when the two transceivers are connected. If the Status LED is blinking, the transceiver is waiting for the connection to the other transceiver.
- Control LED **Host** indicates an active connection to a PC.

The housing of the USB connectors is connected to the aluminum case, which is connected to the circuit GND. This should be taken into account during the test (possible ground loops, short circuits, parasitics to GND-plane!).

8 Operation and handling of the optoUSB3.0

- Connect the optical fiber (Out => In, In => Out). Use 62.5/125µm multimode fibers only, which are part of the scope of delivery.
- Turn on the transceiver with the integrated USB hub connectors (**HUB side**).
- Connect your USB device with one of the two USB3.0 type A ports of the transceiver HUB side. Please note: If you use this side inside the anechoic chamber, the USB cable should be as short as possible and of high quality (rf shielding) to avoid rf coupling.
- Connect the transceiver **PC side** to a PC with the USB3.0 cable. Please wait until the operating system has detected and added the device. If applicable, drivers may have to be installed for the USB3.0 host controller. Usually, the drivers are installed automatically by the operating system.




Fig. 1: Drivers for USB3.0 host controller has to be installed by the operating system of the PC

- The transmission starts automatically after a short initialization.

If the transmission suddenly stops after a long duration of measurement, check the *Info* LED of the transceiver (see Fig. 7.1).


The transceiver **PC side** does not have integrated batteries but is powered by a PC when connected with the USB3.0 cable.

The transceiver **HUB side** is powered by an integrated 7 cell pack that has a nominal voltage of 8,4V. If the battery power falls below 7,5V, the *Info LED* is switched on. The system should be reloaded soon. Below 6V, the system turns off automatically.

	<p>The maximal charging current is 1A.</p>
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The measurements can be extended by using the optional battery pack BP84 or an optional shielded power supply certified by mk-messtechnik. The external supply can be connected to the system any time (parallel). The connection to the internal battery is decoupled with a diode.

Only use the battery pack and connector cables from mk-messtechnik! Others might lead to a damage of the system!

	<p>The USB cable should be as short as possible and of high quality (rf shielding) to avoid rf coupling.</p> <p>Use cables approved by mk-messtechnik only! Disregard can lead to damages to the devices.</p> <p>Do not open the devices! Risk of short circuit, fire, and injuries!</p>
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The included chargers are not meant to power the transceivers during operation. The transceiver outside the shielded room can be run with an external power supply (optional). The internal transceiver can be run with an external battery, if needed (optional). Do not use the external power supply or charger to power the transceiver inside the shielded room while EMI-tests are running. This might damage the transceiver!

Due to self-discharge issues with NiMH batteries, recharge batteries before use, if the system has not been used for a longer time.

9 Maintenance

Recharge batteries after use with the enclosed charger. To prevent a lazy battery effect, discharge the devices every 5 times completely by using the automatic switch off (Leave the system on, until it turns off automatically). Afterwards, charge the devices as usual.

The devices have to be turned off before connecting to the charger. If this is disregarded, the system might get damaged!

2 shows the pinning of the charge connector. Chargers have to be connected to pin 2 (+) and pin 4 (GND). An external supply (9V, 1A) can be connected to pin 3 (+) and pin 4 (GND). **Use only power supplies which are certified by mk-messtechnik.**

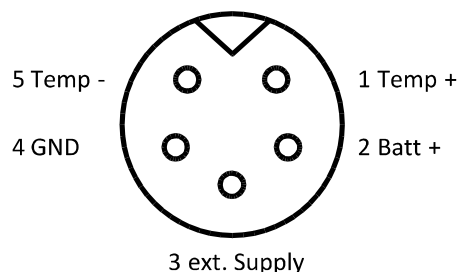


Fig. 2: Pinning of charge- / buffer connector

Do not open the devices, as there are no parts inside which have to be maintained. The opened housing can pose a fire hazard through short-circuit currents! Please contact your distributor or the manufacturer if you have any problems. Send in the complete system (both transceivers), if a problem cannot be solved by turning the devices off and on again or by checking the positions of the switches. Please contact us in any case before sending in the

devices.

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10 Troubleshooting

The following troubleshooting list is provided to assist you while having problems. It might let you use the system again without a long down time:

Error	Possible reasons	Solution
No or erroneous transmission	Receiver does not receive an optical signal Cables damaged or not attached properly Wrong optical fibers (diameter) Low battery System turned off	Check optical fibers and connections, change fibers if necessary Connectors and cables regarding damages Use fiber with 62,5/125µm Charge batteries Turn on all devices
Transmission stops	Low battery No optical signal at receiver System turned off	Charge batteries Check for light at optical output. Replace optical fiber Turn on all devices
Device cannot be turned on, cannot be charged	Batteries damaged Internal fuse is broke Charger or cable damaged Batteries over discharged	Send device to us Send device to us Check / replace charger and charging cable Charge batteries, maybe use other charger (5 battery cells)
Common problems	Defective optical or electrical cables or connectors	Check connectors, fibers and cables. Test with other ones. Replace cables

11 Accessories / Options

Part	Order number	Comment
Optical fiber	LWL-2-xm	x = length in m, simplex
External batteries	BP-84-5f	8,4V/4Ah
Connector cable for BP-84	SC-30-5m5m	Length approx. 30cm
Charger with connector plugs	CH-1m-5m	Standard charger
Manual	MA-optoUSB	German or English

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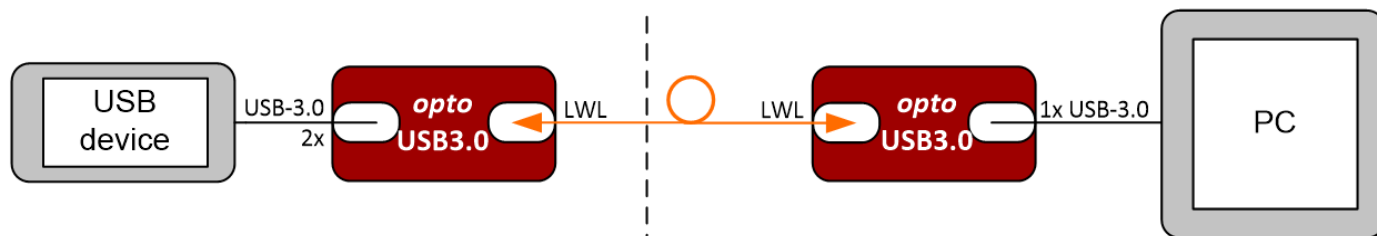
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Field of application and characteristics

The **optoUSB-3.0** system can be used for the optical transmission of USB-signals up to a data rate of 5Gbit/s according to USB3.0 standard. It can be used to transmit USB-signals over long distances (up to 50m) or to handle ground potential problems. With the optical transmission and the shielded case, the system is well equipped for EMI and EME tests.



Application



Technical data

Connectors:	2x USB-3.0 port (hub); 1x USB-3.0 (PC-connection)
Data rate:	up to approx. 5Gbit/s (USB3.0, not backward compatible to USB2.0/1.1)
Power supply:	Hub side: 7 NiMH cells with 4 Ah; 2-10h depending on power consumption of devices at USB ports; five-poled charge plug PC side: powered by PC; battery or power supply available on request
Case dimensions:	150mm x 100mm x 65mm aluminum case with rubber feet
Weight:	approx. 1000g
Misc.:	optional shielded external battery pack (BP84 – 8.4V) to enhance test time

Optical fiber

Connector / Type: FSMA / duplex-multimode fiber 62.5/125µm