

Analog transmitter

Ux/xx

Manual

Digital optical transmitter
for analog voltage signals



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1 Box contents

Quantity	Description
1	Transmitter Ux/xx
1	Receiver Ux/xx
1	External filter SUB-D (standard) or BNC (depending on number of channels) for EMC-tests; number of BNC-filters varies: see offer
1	optical fiber 62,5 / 125µm
2	Chargers
1	Manual (english)
2	External 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 chap.5(Maintenance) before charging the devices!

2 Characteristics

The **Ux/xx** can be used to optically transmit analog voltage signals. 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 and also is optimized for low noise emission.

The standard voltage range of the system is +/-15V. It is available in numerous variants. For more information about the variants, see datasheet or call us.

Power is supplied by internal NiMH-batteries which make the system easy to use. The **Ux/xx** is prepared for the use of external batteries (with optional battery pack).

Read chap. 5 before charging!

3 Field of application

- Transmission of analog signals during EMC-tests
- Transmission of analog signals over long distances without voltage loss (up to 100m or more, depending on timing requirements)
- Handle ground potential problems

An external filter has to be used for high level EMC-tests. The filter has to be attached directly to the input of the transceiver located in the absorber lined chamber. Depending on the range of use (ESD, BCI, ...) there may be different filters available. Please contact us to get the best solution.

4 External filters

An external filter mounted to the device inside the anechoic chamber has to be used for all emissions and immunity tests. With this, a damage of the device is avoided during immunity tests (=> obligatory! no internal filter existing) and the emissions spectrum is reduced during emissions testing.

Filters and voltage dividers have to be connected directly to the device since they are matched to its input-impedance (do not use an extension!). Notice the differentiation of input- and output filters (see chapter 4.1).

4.1 Differentiation: input vs. output filter

If you want to transmit analog voltages from outside into the anechoic chamber, output filters are needed (the external filter has to be mounted to the device inside the anechoic chamber)! This has to be mentioned while ordering the equipment, because input filters are the standard (used to transmit signals out of the chamber). Notice that input filters cannot simply be mounted to the receiver (output), because of different impedances. Incorrect measurements would be the result!

- Transmission from inside to the outside of the anechoic chamber: input filter (mounted to transmitter)
- Transmission from outside to the inside of the anechoic chamber: output filter (mounted to receiver)

The use of an external filter for high level EMI-tests is essential. If disregarded, the system might get damaged!

Respect the application purpose while choosing the external filter! Input- and output filters are not interchangeable

4.2 Choice of filters and characteristics

In order to adapt the transmission to the different ranges of use, different filters and voltage dividers are available (needed frequency range, direction of transmission, range selection with voltage divider).

Available filters by default:

- 30MHz
- 20MHz
- 10MHz
- 1MHz
- 250kHz
- 100kHz
- 50kHz as well as
- Voltage dividers with the same frequency limits

Other filters are available on request. The specified frequency limit is applicable for the delivered system (impedance matched). Frequency range might vary if used with other devices.

In certain cases, common oscilloscope probes (divider) can be connected directly to the transmitter since the oscilloscopes usually have similar input impedances. If needed, please contact manufacturer about details and boundary conditions to avoid wrong measurements.

Table 4.1 shows the measured frequency responses of the **Ux/xx** systems when the listed filters are connected (input filters).

The filters have been optimized for the **Ux/xx**. Performance might vary if used with other devices

Filter characteristics
in combination with
Ux/xx

<p>FE-1-30M (-3dB @ 30MHz)</p>	<p>FE-1-20M (-3dB @ 20MHz)</p>
30MHz	20MHz
<p>FE-1-15M (-3dB @ 15MHz)</p>	<p>FE-1-15M Bessel (-3dB @ 15MHz)</p>
15MHz	15MHz Bessel
<p>FE-1-10M (-3dB @ 10MHz)</p>	<p>FE-1-1M (-3dB @ 1MHz)</p>
10MHz	1MHz
<p>FE-1-0,25M (-3dB @ 250kHz)</p>	<p>FE-1-0,1M (-3dB @ 100kHz)</p>
250kHz	100kHz
<p>FE-1-0,05M (-3dB @ 50kHz)</p>	<p>Filter overview (zoomed)</p>
50kHz	Filter overview

Table 4.1

5 Maintenance

Maximum charging current is 1 A

Devices must be turned off before connecting to charger, or else the system might get damaged!

Pinning of charge- / buffer connector

Do not use charger or power supply during EMI-test!

**Do not open the devices!
Short cut / fire hazard!**

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!

5.1 shows the pinning of the charge connector. Chargers have to be connected to pin 2 (+) and pin 4 (GND). An external supply (6...8V, 0.5A) can be connected to pin 3 (+) and pin 4 (GND). **Use only power supplies which are certified by mk-messtechnik.**

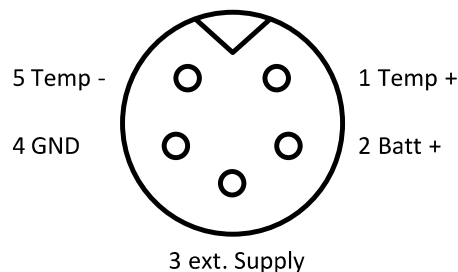


Fig. 5.1: Pinning of charge- / buffer connector

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.

Do not use cleaning agents or solvents to clean the devices, only use a slightly moistened, soft cloth.

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.

6 Trouble shooting

The following trouble shooting 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 Transmission does not start properly Noise at output	Wrong power-up sequence	Check documentation of hardware and position of switches
No transmission, DC voltage at output	No optical signal at the receiver System (transmitter) turned off	Check optical fibers and connections, change fibers if necessary Turn on the devices, take care of power-up sequence
Transmission stops	Low battery Signal of source interrupted	Check LEDs at transmitter and receiver, recharge batteries Test source signal directly at the device under test
Device cannot be turned on, cannot be charged	Batteries damaged Internal fuse is broke Charger or cable damaged Batteries overdischarged	Send in device to the manufacturer Send in device to the manufacturer Check / replace charger Charge batteries, maybe use other charger (5 battery cells)
Output voltage does not correspond to the expected value	Voltage divider was not taken into account Erroneous transmission of the settings Wrong filter chosen	Set / Include ratio at the oscilloscope Turn off/on the devices again, take care of power-up sequence Take operation purpose into account (frequency

Error:	Possible reasons:	Solution:
		range and transmission direction of the signal)
Low-impedance at input	Input wiring defective (if system was used for immunity tests without external filter or overvoltage at input)	Send in device to the manufacturer

7 Accessories / Options

Part	Order number	Comment
Optical fiber	LWL-1-xm	x = length in m, simplex
External batteries	BP-60	6V/4Ah
Connector cable for BP-60	AK-BP	Length approx. 15Cm
Charger with connector plugs	CH-1-5m	Standard charger
Filter	FE-1-yM	y = frequency limit in MHz (-3dB) available frequencies: - 30MHz - 20MHz - 10MHz - 1MHz - 0,25MHz - 0,1MHz - 0,05MHz
Voltage divider	FE-x-yM	X = ratio y = frequency limit in MHz
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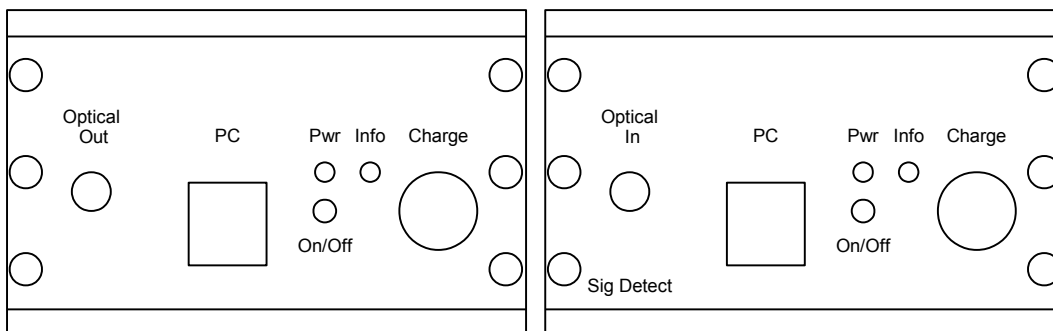


Appendix: Details and operation

The following chapter is used to describe special details of the **U1/12-1M** and **U2/12-1M** system. The second analog channel with the same technical data is optional (shown grey in Fig. a.2) and is added to the housing if ordered.

a) Housing and connectors / switches

Fig. a.1 shows the front sides of transmitter (left) and receiver (right) with connectors:



Front sides with connectors

Fig. a.1: Front side of the devices with connectors and switches

- power push button with control LED (*Pwr On/Off*)
- battery information LED (*Info*)
- charge plug (*Charge*)
- optical connector FSMA(*Optical Out/ Optical In*)
- USB-plug: only for internal use at this point
- *Sig Detect* LED at receiver side:
active: optical signal detected
deactive: optical signal missing

Rear sides with connectors. Both BNC housings have the same GND potential (aluminum case)

Fig. a.2 shows the rear sides of transmitter(left) and receiver (right) with connectors:

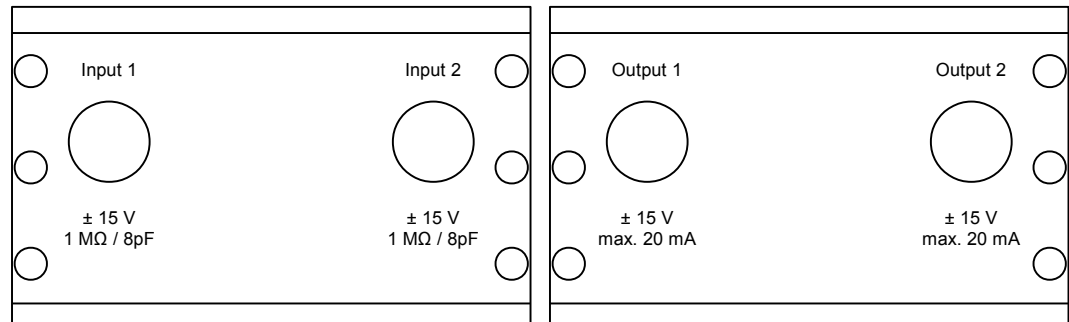


Fig. a.2: Rear side of the devices with connectors and switches

- Signal connectors BNC (Input 1 / 2: $\pm 15\text{ V}$ $1\text{ M}\Omega / 8\text{ pF}$) and (Output 1 / 2: $\pm 15\text{ V}$ max 10mA)

The housing of the BNC-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!). The pinning is shown in Fig. a.3.

Pinning of BNC-connectors

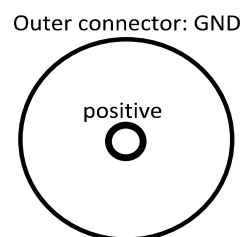


Fig. a.3: Pinning of BNC-connectors on transmitter and receiver

b) Operation and handling of the *Ux/12-1M*

- Choose and mount the correct filter for your application (cut off frequency as high as needed and as low as possible) to transmitter. The filters also contain hardware for signal condition. It is essential to use them for every setup.
- Connect the optical fiber
- Connect the analog signal cable to transmitter. It is recommended to choose the cable as short as possible, since the transmitter input ($1M\Omega \parallel 8pF$) is not matched to your application (avoid oscillations).
- Connect the output of the receiver to a suitable high-impedance voltage measurement device, such as an oscilloscope or multimeter. The length of the connector cable should not be significantly longer than 1m, since the upper frequency limit is lowered by the parasitic capacitive load.
- Set the voltage measurement device to the expected voltage and time range, if necessary. If used, take optional included voltage divider into account, while setting / checking your measurement device.
- Turn on both devices.
- The **Ux/12-1M** system is ready to use about two seconds after turning on the transmitter.
- Check info LED if transmission stops suddenly!

If the transmission suddenly stops after a long duration of measurement, check the *Info* LED of the transmitter (see Figure a.1). If the battery power falls below 5,2V, the *Info LED* is switched on. The system should be reloaded soon. Below 4,5V, the system is turned off automatically.

The measurements can be extended by using the optional battery pack (BP-60) with connector cable or a 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!

Always use external filter! It contains signal conditioning hardware too and is necessary for correct measurements!

Check info LED if transmission stops suddenly!

Only use battery packs and connector cables provided from mk-messtechnik. Other modules influence EMS-performance and might damage the opto-system!

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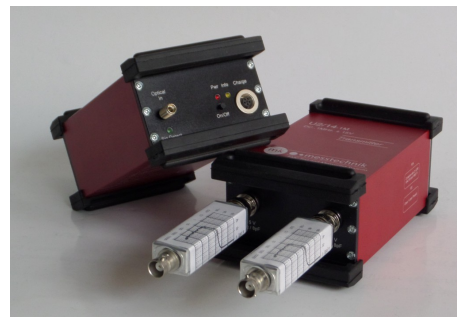
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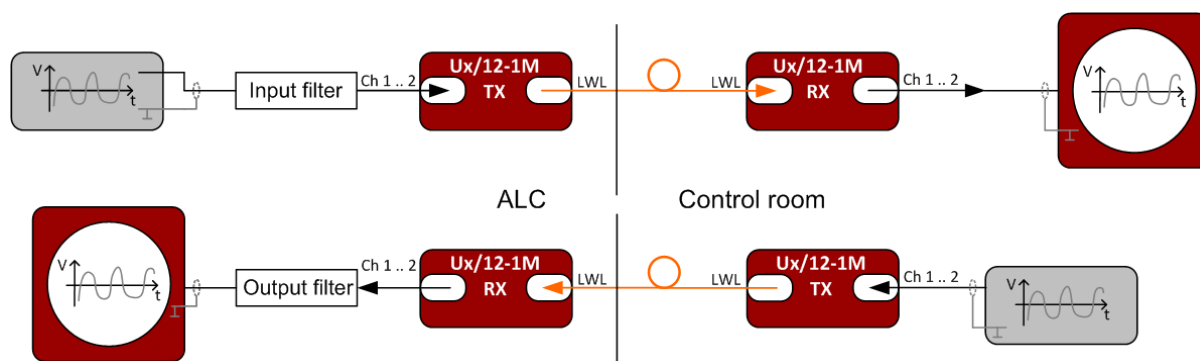
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Field of application and characteristics

The **Ux/12-1M**-system can be used for the optical transmission of 1 or 2 different analog voltage signals outside the ALC or to transmit a stimulus inside the chamber (with optional output filter). It consists of a battery supplied transmitter and an also battery supplied receiver connected to each other with an optical fiber and can also be used to transmit analog signals over long distances or to handle ground potential problems. With the optical transmission, the shielded case and external filter, the system is well equipped for EMI and EME tests.



Application



Technical data

Channels:	1 or 2
Resolution:	12Bit (10Bit eff.)
Frequency range:	DC ... 1MHz (depending on ext. filter)
Input:	+/-15V; BNC
Input impedance:	1M Ω ; approx. 8pF
Output:	+/-15V (1:1); BNC; 20mA short circuit protection (short time)
Output impedance:	approx. 50 Ω
Sampling rate:	10MS/s at each channel
Power supply:	5 NiMH cells with 4 Ah; approx. 10h five-poled charge plug
Case dimensions:	135mm x 86mm x 65mm; aluminum case with rubber protectors
Weight:	approx. 800g
Misc.:	optional external battery pack / supply available different ext. filters (frequency range) available

Optical fiber

Connector / Type:	FSMA / simplex-multimode fiber 62,5/125 μ m
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