RS422 Expander for MIDI Signals

User Manual

Status 12 May 2011

As lined out in the MIDI specification, the cable length of a standard MIDI transmission is limited to 15 meters. Distances up to several 100 meters can be bridged when the native MIDI signal is transferred into the industry-proven standard RS-422 and reconverted into a native MIDI signal by a distant partner station.

This is the job the MIDI/RS-422 Expander (bidirectional transmitter and receiver) is made for. In contrast to the Cinetix MIDI RS-232/RS-422 Converter no buffering or baud rate conversion takes place in this simple device. Consequently data are transferred within a very short latency time in the range of microseconds.

A transmission stretch consists of 2 Expander stations. The MIDI/RS-422 Expander is applicable as a compatible counterpart of the MIDI/DMX512 Control Box or MIDI RS-232/RS-422 Converter in "transparent transceiver with MIDI baud rate". mode of operation.

Concerning the RS-422 side, **we offer the MIDI/RS-422 Expander assembled with 4 different RS-422 connector families:**
--- **Version "XLR" with 3 pin XLR connectors**. Wiring is made with cables for symmetrical audio signals or multicore connections, for example.
--- **Version with 8 pin detachable clamp block**.
--- **Version with 9 pin sub-D connector (male)**.
--- **Version "CAT" with RJ45 connectors**. Wiring is made with shielded CAT5/CAT6 network cables.

Apart from the style of the RS-422 connectors, both versions are identical in their technical functions and can be interconnected with appropriately assembled cables

It is **NOT allowed** to use this instrument together with all safety critical applications, where misfunction could result in personal injury oder noticeable material damage !

All versions:

The power supply is designed for **unregulated d.c. power supplies**, min.100 mA currrent output. A simple in-plug supply with "europlug" is delivered together with the Expander.

> Generally there are only small demands concerning the power supply. Any regulated or unstabilized DC supply can be used with output voltages beween optimum 9 volt and max. 16 volt (which usually is the max. output of an unregulated 12V AC/DC adaptor). The DC input is designed for a concentric low voltage connector: external 5,0 - 5,5mm, internal 2,1mm. The **positive polarity** has to be connected with the **inner contact**! Internally the RS-422/MIDI Expander is **protected against wrong polarity**: if wrong, the device is not powered.

A **dual LED** does monitor presence of power, the active mode of operation and the data flow via the RS-422 interface:

> During all modes of operation, the dual LED (made up of a red and a green LED) **basically has an amber colour**.
> When the **the RS-422 interface is transmitting data**, the green LED is going off for a short time, i.e. the LED is flashing red.
> When the **the RS-422 interface is receiving**, the red LED is going off for a short time, i.e. the LED is flashing green.
> When **the Expander is transmitting and receiving simultaneously**, the LED is flashing dark.

XLR Version:

Elements at the MIDI panel:

IN is a standard MIDI input
OUT is a standard MIDI output
XOUT may be switched between
Switch position **T**: MIDI THROUGH
Switch position **O**: 2nd MIDI OUT

Elements at the XLR panel:

The XLR-connectors are wired like audio cables for symmetric sound transfer:

Pin connections:

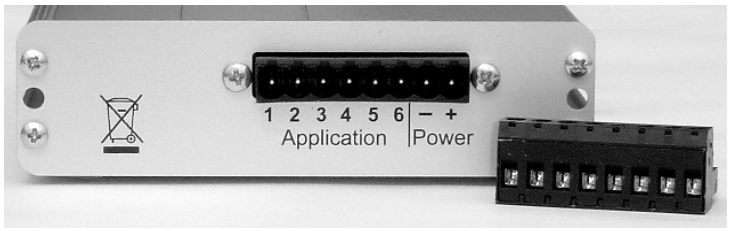
Pin 1: Signal Ground = cable shield
Pin 2: RS-422 TX- (male conn.) or -RX- (female conn.)
Pin 3: RS-422 TX+ (male conn.) RX+ (female conn.)
The metal body of the XLR sockets is connected with Signal Ground, too.

Aluminium case: length 8.4 cm (except connectors), width 11.3 cm, height 3.1 cm

Inside the Expander a 120 Ohm termination resistor is installed at delivery. If this not welcome in certain system configurations, it may be deactivated by pulling a jumper. How to open the enclosure: remove 4 upper cross-recessed screws. If the upper shell of the enclosure is not pulled off easily, loosen the lower 2 screws at the MIDI front panel a little bit.

Version with 8 pin detachable clamp block:

MIDI front panel and mechanical features else: as XLR version



Pin connections of the clamp block:

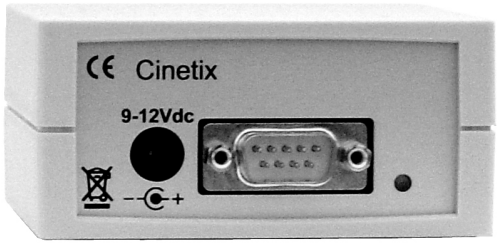
Pin 1: RS-422 RX-
Pin 2: Signal Ground = cable shield
Pin 3: RS-422 RX+
Pin 4: RS-422 TX-
Pin 5: Signal Ground = cable shield
Pin 6: RS-422 TX+
Power: is directly connected with the DC connector located at the MIDI front panel#

For wiring, especially low-cost ISDN cable is recommedable. Care has to be taken that RX+/RX- and TX+/TX- each are connected with a separate pair of drilled wires.

Version with 9 pin sub_D connector (male):

Elements at the MIDI panel:

Elements at the sub-D panel:



Pin connections at the subD connector:

Pin 1: n.c.
Pin 2: RS422 RX-
Pin 3: RS422 TX-
Pin 4: n.c.
Pin 5: Signal Ground = cable shield
Pin 6: n.c.
Pin 7: RS-422 RX+
Pin 8: RS-422 TX+
Pin 9: n.c.

For wiring, especially low-cost ISDN cable is recommedable. Care has to be taken that RX+/RX- and TX+/TX- each are connected with a separate pair of drilled wires.

This pin configuration is also compatible with a standard null modem cable for RS-232 with interconnected wires for RTS/CTS handshake.

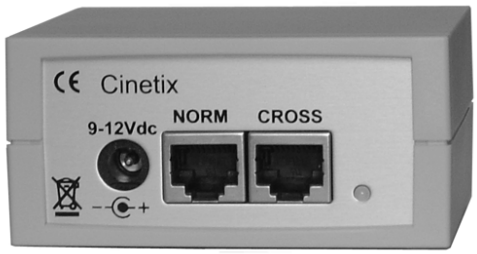
Plastic case with aluminum panels: Length 8,1 cm (except connetors), width 8,5 cm, height 4,0 cm

At delivery, inside the Expander a 120 Ohm termination resistor is activated. If this not welcome in certain system configurations, it may be deactivated by pulling a jumper. How to open the enclosure: remove 2 cross-recessed screws at the bottom of the enclosure and pull off its upper shell.

CAT version:

MIDI front panel and mechanical features else: as sub-D version

Elements at the RJ45 panel:



The RJ45 connector "NORM" in the middle of the RJ45 panel is wired like a standard Ethernet patch cable:

Pin connections:
Pin 1: RS-422 RX+
Pin 2: RS-422 RX-
Pin 3: RS-422 TX+
Pin 6: RS-422 TX-
Pins 4,5,7,8 not connected
The metal body of the socket is connected with Signal Ground.

Though it is possible to use simple patch cables with full plastic body plugs, it **is strongly recommended to use shielded patch cables with metal jacket plugs for safe transmitssion over long distances**. The shielding provides a balance of Signal Ground of both stations and thus eliminates

"floating" of the signal levels. Additionally should be checked if the shielding = Signal Ground is really interconnected from plug to plug. It has been shown by experience, that this connection is sometimes broken at low grade or frequently used cables.

The RJ45 connector "CROSS" next to the LED is wired like a "crossover" Ethernet patch cable:

Pin connections
Pin 1: RS-422 TX+
Pin 2: RS-422 TX-
Pin 3: RS-422 RX+
Pin 6: RS-422 RX-
Pins 4,5,7,8 not connected
The metal body of the socket is connected with Signal Ground.

If wiring is done with a normal 1:1 CAT5/CAT6 cable, at one station the cable has to be plugged into the middle connector "NORM" - but at the opposite station into the connector "CROSS". If a "crossover" cable is used, both "NORM" connectors are used.

It has to be pointed out here that RS-422 signals are not compatible with Ethernet signals. It is not allowed to connect them with Ethernet hubs, switches or routers. This may cause damage of the network equipment !

Installation and first operation: (valid for all versions)

No configuration is necessary to operate the MIDI/RS-422 Expander. The order of cabling is arbitrary. All data cables may be plugged or unplugged while power is on.

MIDI IN has to be connected with MIDI OUT of your MIDI controller or effect equipment.
MIDI OUT has to be connected with MIDI IN of your MIDI controller or effect equipment.

Versions for XLR, clamps and sub-D:

RS-422 IN has to be connected with RS-422 OUT of the opposite station,
RS-422 OUT has to be connected with RS-422 IN of the opposite station

CAT version:

The RJ45 connector **"NORM"** has to be connected with the RJ45 connector **"CROSS"** of the opposite station. Wiring is preferably made with **1:1 shielded CAT5/CAT6 cables, where the shield is connected with a metal jacket of the RJ45 connector.**

In idle state **the LED should be shining amber**. If connected MIDI equipment periodically sends some data (like Active Sensing), this may cause a different idle color of the LED (green, red or even OFF).

Cinetix Medien und Interface GmbH
Gemuendenerstr. 27 D-60599 Frankfurt Germany
Phone: +49-69-68 51 05 Fax +49-69-68 600 409
http://www.cinetix.de/interface/english/