

# Converter

## Z-397 USB/RS-485/RS-422

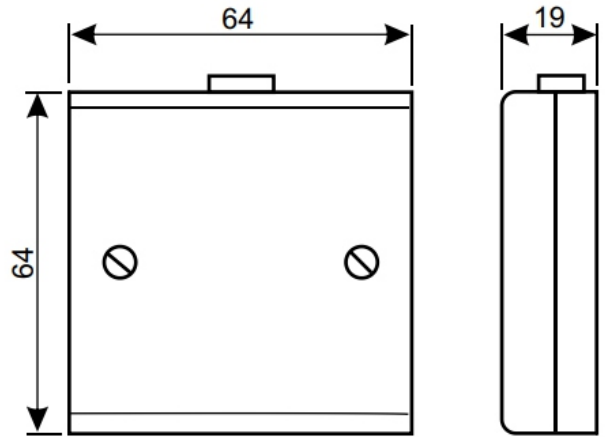
### User Manual

#### 1. GENERAL INFORMATION

**Converter Z-397 USB/RS-485/RS-422**, is intended to connect the devices with interfaces RS-422 and RS-485 to a personal computer, using a USB interface.

##### Product Features:

- 1) A galvanic separation unit of 422/485 interface up to 1000 V is provided to exclude the influence of pulse interference exerted by a PC power supply unit on devices connected to the PS and vice versa;
- 2) Connection to the PC and power supply via the USB interface;
- 3) Operation via a virtual COM-port;
- 4) Automatic identification of the speed of information exchange through the USB interface;
- 5) Automatic identification of transmittance direction when working in a half-duplex mode: in the initial condition the converter is waiting for data both from the connection channel and from the PC. In case of simultaneous transmittance, the PC will prevail. Transition from the transmittance status to the reception condition on any speed does not increase 1 microsecond after transmittance of the last stop-bit in the data package. Controlling the transmittance direction via RTS is ignored and does not influence upon operation of the converter;
- 6) Existence of mode switchers: the converter allows you to easily adjust the operation mode using four switchers.  
Switchers 1 and 2 serve to switch between RS-422 interfaces (both in OFF position) and RS-485 (both in ON position).  
The switcher 3 serves to switch the modes of FULL DUPLEX (simultaneous transmittance and reception, position OFF) and HALF DUPLEX (half duplex mode, ON position).  
*Attention! The FULL DUPLEX mode can work only in case of RS-422. When using RS-485, this switch must be in ON position.*  
The switch 4 in ON position connects the load resistor to AB lines.
- 7) The existence of a control channel: the control channel may be connected to COM-port of the computer, and using any terminal programme you can monitor the exchange protocol.



#### 2. CONNECTION

##### CONNECTION USING RS-422 AND RS-485 INTERFACES

RS-422 and RS-485 interfaces are the further development of the widely spread serial interface RS-232C.

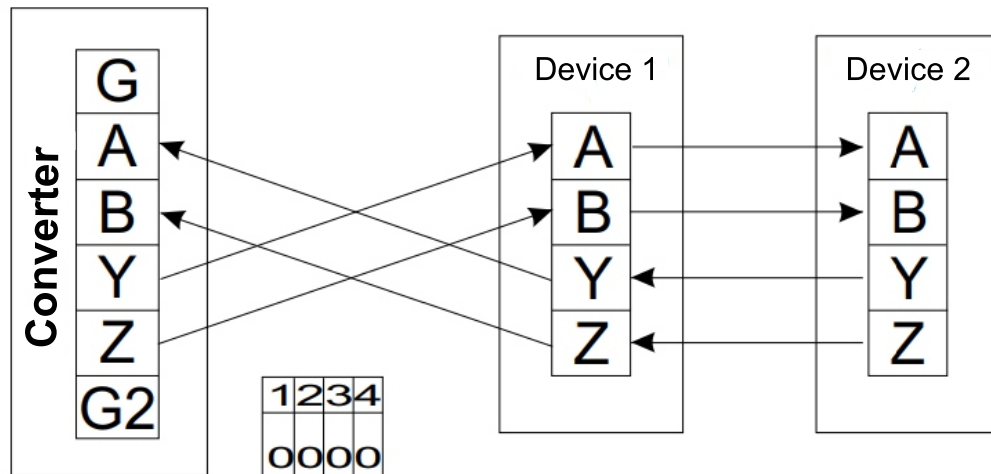
##### CONNECTION USING RS-422

Although the RS-422 interface is used to connect several devices, actually it is used for point-point connection.

The RS-422 interface supports maximal transmittance speed of 10 Mbit/s with the connection line's length of up to 15 m and 90 Kbit/s with the connection line's length of up to 1200 m.

The above is related to a symmetrical connection using a twisted-pair cable. To implement this connection, two twisted-pair cables are required.

Signals' names – ABYZ, where YZ is the transmittance outlet, and AB is the receiver inlet. Thus, for correct connection is necessary to connect AB outlets of one device to YZ outlets of the other. To switch the converter in this mode, the switchers 1 and 2 must be switched to the OFF position, and the switcher 3 must be switched to the OFF position (if only receivers are connected to the YZ circuit).



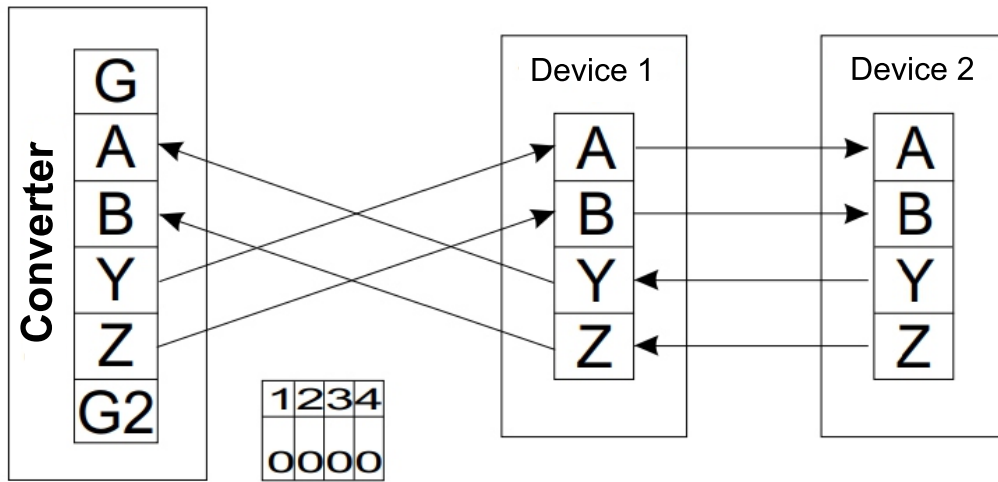
*Connections diagram for devices using the RS-422 interface.*

### **CONNECTION USING RS-485**

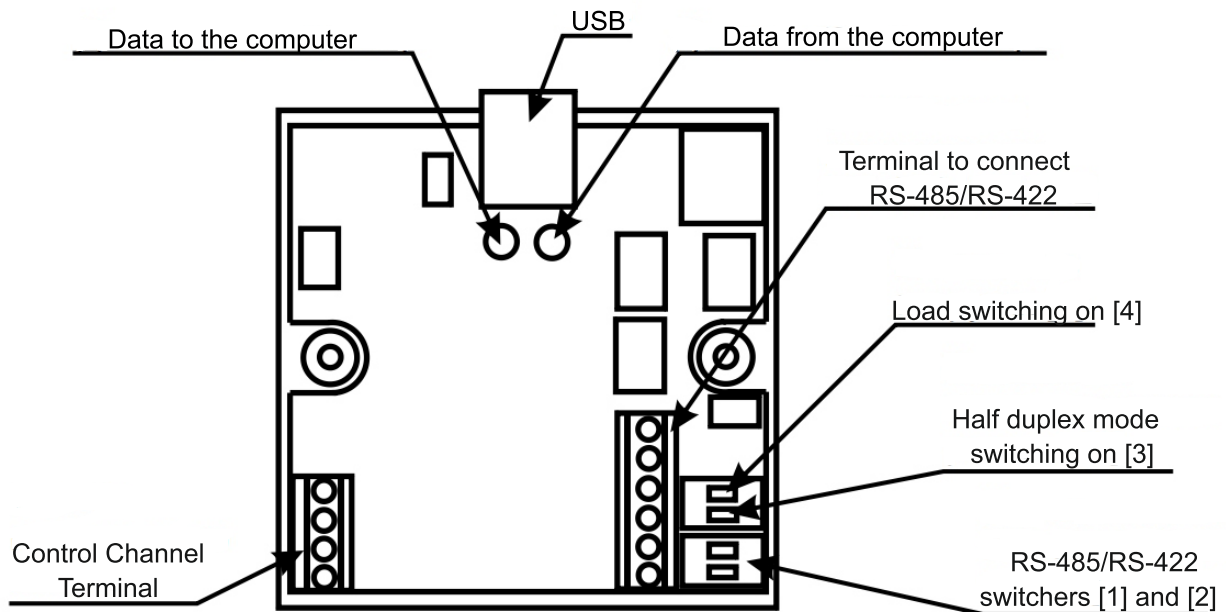
The RS-485 interface allows you to connect up to 256 devices per line, where only one twisted pair cable is used for connection. For that the half duplex mode of connection had to be abandoned, i.e. only one device can transmit information, the others only listen. The case where two or more devices transmit cannot be identified by these devices, as, for example, it is made in CAN or Ethernet interfaces. For this reason, all communication protocols are built on the package principle of transmittance with confirmation of information received.

When connecting devices using the RS-485 interface, you need to consider the following:

- 1) All devices must be connected using the line configuration, i.e. the cables must go from one device to another in turn. Various star or tree configurations are unacceptable (however, if it is strongly required and the distance is small, up to 30 m, you may risk, but remember – the interface in such a way is not required to work);
- 2) For correct interface operation you need to install two terminal resistors of 120 Ohm on both line ends. They need to dampen echo. This is crucial for long lines. If the converter is in one end of the line, than, to connect the resistor just switch the switcher 4 to the ON position.
- 3) In case of connecting a lot of devices (more than 30), you should locate them at approximately the same distance from each other. Also, do not forget that the maximal length of the line is 1200 m;
- 4) Initially, the interface was designed for 32 devices, but at present the chip manufacturers decreased the loading capacity of the interface chip by 8 times, and due to this, the number of devices increased to 256. In view of the above, if you connect a device, the loading capacity of which is not specified, you should consider it to be complete, i.e. equivalent to 8 devices.



Connections diagram for devices using the RS-485 interface.



### CONNECTION USING USB

This converter is connected to the computer via free USB-port by the AB cable supplied in the package. The major benefits of such a solution are:

- 1) At present, practically all computers have installed USB-ports;
- 2) USB-ports connect hot plugging, i.e. you can plug in and plug out such devices without switching the computer off;
- 3) USB-ports provide the plugged devices with power supply (up to 500 mA);
- 4) All USB devices support the Plug-&-Play standard, which make it possible to install required drivers almost automatically (you just need to insert the disk and follow the operation system instructions).

### Driver Installation

After first connection of the converter to the computer, the Windows operation system will find a new device. It happens not at once, but takes no more than 30 sec. If no message on finding the new device appeared within a minute, then Windows knows this device and required drivers are already installed.

After appearance of a message on a new device, to install a driver, you should install the disk supplied in the package to the CD driver and specify it as a location for searching drivers. Windows, when identifying the drivers, will offer to install them. You should agree. When installing drivers in

Windows XP you will get a message on the lack of Windows certified for tested compatibility. In this case, you should continue installation. There will be two of such messages, since at first the installation of the driver for USB will be made and then the installation of the driver of the virtual COM-port.

### **Port Searching**

Since the logic of distribution of COM-ports in Windows is not described anywhere, therefore all the below information will be based on the practical experience.

It was established, that Windows reserves names from COM1 to COM127, and COM0 as a limit, for each new virtual port. The assigned number is linked to the USB device and then never released. Thus, if the computer has only two physical COM-ports: COM1 and COM2, the new port will not have to be COM3.

For exact identification of the number, where the converter is connected to the computer, you should:

1. Click with the right mouse button on the “My computer” icon and then choose in the appeared menu the most bottom item “Properties”.
2. Press the button “Device Dispatcher” in the appeared window.
3. Click with the left button on plus opposite the group “Ports (COM and LTP)”.
4. Find the device number in the group opened.

This number should be specified in connection programmes which work with the devices. No need speed adjustment. The converter will operate on the speed, which the connection programme sets for the port.

If the connection programme cannot assign the same number, you should address the programme developer.

### **Control Channel**

To diagnose errors or when writing a connection programme, it is useful to know what is going on in the connection line. The present converter facilitates this work, allowing you to obtain information on data sent from computer to computer.

In order to use this opportunity you need to connect the control output of the converter to a usual COM-port, to launch any existing terminal programme, for example, Hyper Terminal and set the COM-port to the following parameters:

Speed – 115200, bit – 8, even parity – no, stop-bits – 1.

After that you will see the following in the terminal programme:

```
IronLogic Develop 2006  
USB to RS485 Izolated Converter  
-----  
Searchig for data...  
Searchig for data...  
End speed detect...  
038400  
USB FD AA 01 00 00 FE  
485 FD 54 01 00 00 01  
USB FD AA 01 00 00 FE  
485 FD 54 01 00 00 01 FE  
USB FD AA 01 00 00 FE  
485 FD 54 01 00 00 01 FE
```

These are information about the converter, exchange speed found and date in the hexadecimal notion.

The control channel does not have information about exchange speed and identifies it independently.

Data transmitted from the computer are preceded with “USB” inscription, data transmitted to the computer are preceded with “485” inscription.

If the control channel failed to correctly identify the speed, or the speed was changed during operation, you should send the "R" symbol to the control channel that activates the speed identification again, or you should just enter the speed in the decimal notion by pressing "Enter" in the end.

*Attention! The control channel is galvanically connected to the USB inlet. Therefore, it is recommended to connect USB and the Control Channel to the same computer.*

### 3. SPECIFICATIONS

Maximal length of the connection line, m, up to:	
- using RS-422 protocol.....	1200
- using RS-485 protocol.....	1200
- using USB protocol.....	1.8
Operation mode indication:.....	LED
Receipt/transmittance speed, Bod, up to:.....	115200
Computer connection interface, power supply:.....	USB
Case material:.....	plastic
Dimensions, mm:.....	64x64x19
Weight, g, up to:.....	80

### 4. PACKAGE CONTENTS

- Converter Z-397 USB/RS-485/RS-422..... 1 pcs.
- USB-cable A-B..... 1 pcs.
- CD with Windows drivers..... 1 pcs.
- User Manual..... 1 pcs.

### 5. OPERATIONAL CONDITIONS

Recommended air temperature:.....5°C ...40°C.

Humidity:.....≤80% at 25°C.

If operational conditions are differing from described above, device specifications can deviate from specified values.

The controller is to be operated in absence of: precipitation, direct sunlight, sand, dust, water condensation.

### 6. LIMITED WARRANTY

Device is covered by limited warranty for 24 months.

The warranty becomes void if:

- this Manual is not followed;
- device has physical damage;
- device has visible traces of aggressive chemicals exposure;
- device circuits have visible traces of tamper by unauthorized parties.

While covered, the Manufacturer will repair the device or replace any broken parts, free of charge, where fault is caused by manufacturer's defect.

Product lifetime – 6 years.

### 7. CONTACTS

#### Authorized representative in the European Union:

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The symbol of crossed-through waste bin on wheels means that the product must be disposed of at a separate collection point. This also applies to the product and all accessories marked with this symbol. Products labeled as such must not be disposed of with normal household waste, but should be taken to a collection point for recycling electrical and electronic equipment. Recycling helps to reduce the consumption of raw materials, thus protecting the environment.

