

Let's communicate



**RS-232/485 Converter with Automatic Transmission
Control without Galvanic Isolation of the Interface**



ELO E068

Operation manual

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1.0 Introduction

RS-232 interface is designed for two terminal equipments connection (DTE). The load impedance is to be 3-7 kilohm that allows induce disturbing pulses into the cables even from relatively soft supplies. Since the signals have to be asymmetric, terminal equipments have to have the same potentials of the neutral. For this reason, RS-232 interface range is limited to 15m distance. RS-485 interface signals transmission enables to increase communication range, transmission interference immunity and communication partners' number.

1.1 Use of the converter

The converter increases transmission immunity against electrical disturbance **but not against atmospheric electricity influences!**

To lead the cable outside buildings, it is necessary to provide additional over-voltage protection on the input points.

The converter allows transmission rate up to 115200 bps. This maximum attainable rate decreases due to the line length and/or its impedance growth. Recommended maximum line length is 1200 m at the rate of 9600 bps.

2.0 Operation principles

RS-485 interface is used to two-way simultaneous communication in one pair of conductors. For this reason, the transmission has to be half-duplex that means switching off RS-485 transmitter when receiving to allow transmitting to other communication partners and switching on during its own transmitting only.

There are two methods how to operate the transmitter:

- 1) The terminal equipment (DTE) changes RTS signal from the "OFF" state (negative polarity) to the "ON" state (positive polarity). When transmitting is finished it changes RTS signal back to "OFF".
- 2) DTE does not use RTS (this interface does not dispose this signal or SW does not use it) and the converter has to interpret its signal TxD **automatically**. At the TxD changing moment from idle state (from the negative to positive polarity), the converter activates the link transmitter automatically.

The transmitter is switched off after the certain time τ of RTS switching off or TxD return to the neutral polarity. Time interval length τ has to be dependent on applied transmission rate because in the automatic mode there it is necessary to keep the transmitter active for the period equal to one byte transmission time. In the automatic mode, one important communication protocol request is necessary to observe: every **device that is to transmit has to wait at least for the time τ from the**

last byte recorded on RS-485 clamps. If it is to the contrary the first transmitted byte would be damaged.

3.0 Installation

The converter has to be installed with the respect for specifications of both interfaces.

3.1 Converter connection to RS-232 Interface

Signals assignment to the contacts and DTE-DCE interconnection is in the following table:

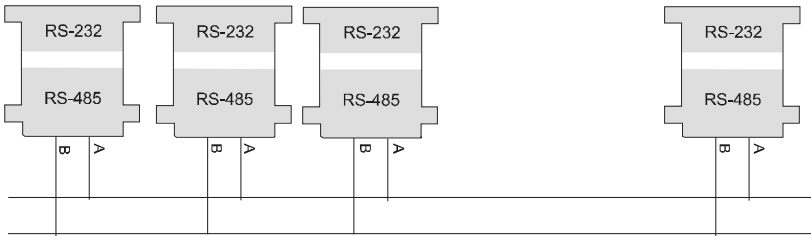
Signal name	abbrev	DTE connector (DB25M)	connector E068 (DB25F)	trans.direction	
				DTE	E068
Signal Ground	SG	7	7	--	--
Transmitted Data	TxD	2	2	output	input
Received Data	RxD	3	3	input	output
Request To Send	RTS	4	4	output	input
Clear To Send	CTS	5	5	input	output
Data Set Ready	DSR	6	6	input	output
Data Terminal Ready	DTR	20	20	output	input
Data Carrier Detect	DCD	8	8	input	output

!!! Be careful of a frequent mistake !!!
The same cable is often used for two DTE interconnection and DTE – converter (DCE) interconnection to follow. The cable DTE – DCE has to be connected 1:1.

ELO E068 transmits RxD and TxD signals. Control signals are not transmitted. The converter contains local interconnectors RTS-CTS and DTR-DST-DCD. Maximum data rate is 115 200 bps.

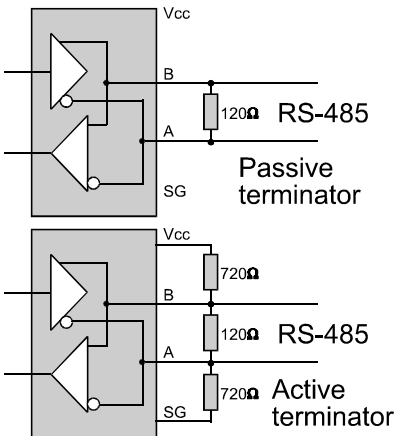
3.2 RS-485 link connection

The DB25M (Male) connector is used to the link connection. Single TE can be interconnected via bus (see Fig.) up to 32 partners.



The RS-485 interface connector description and the way of the passive terminator connection:

contact	1	2	5	6	7	8
signal	B	A	GND	GND	GND	GND
terminator	 220 Ω					



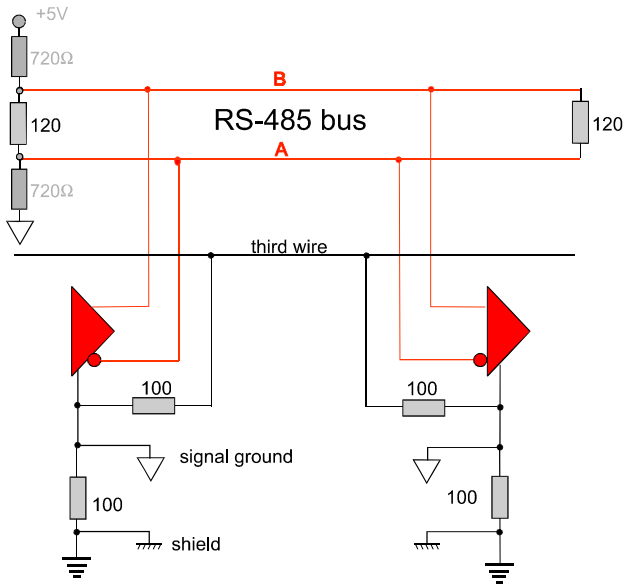
The RS-485 line should be terminated with the 100-120 Ω resistors on both ends placed between A - B conductors (so-called passive terminators). These terminators are used for the converter impedance matching, undesirable echo suppression and they influence transfer immunity against interference. There are also the active terminators beside the passive ones. Only one active terminator can be installed to one metallic section of the link and its role is as follows:

The RS-485 signal is symmetric. The differential receiver interprets the difference

$U_A - U_B$. It does not depend on the neutral potential. The receiver interprets the obtained signal $|U_A - U_B| > 200 \text{ mV}$ as log. 1 or log. 0.

In addition to these levels the third state can occur, it is so-called IDLE state. No transmitter is activated, each communicating partner is just listening so $|U_A - U_B| < 200 \text{ mV}$. The problem is how to interpret the third state in the two-state logic. The active terminator gives the signal into the idle state line and it is interpreted as idle in the two-state logic.

The third problem is how to eliminate influence of the ground potentials differences. There are two ways – either each device is earthed on the neutral or the third conductor is used (see Fig.). 100 Ω resistors are needed in this case to eliminate currents resulting from the ground potentials differences.



3.3 Converter setting

To work properly, the converter needs time out setting τ . On the converter side there is a triple-throw switch enabling time out constant selection τ for the most frequent rates 9.6-19.2-115.2 k bps (positions 9-19-115).

When using RTS to control the transmitter it is suitable to minimize the time constant influence τ — τ selection equates to the maximum rate (switch position 115). At the 9.6 k bps transmission rate the τ influence is an order lower.

3.4 Power Supply Connection

The converter needs external 6V/200 mA power supply connected on the side of the converter.

4.0 Specifications

4.1 Electrical parameters

Interface	RS-232/RS-422
Transmitted signals	TxD and RxD
Control signals	local interconnectors RTS-CTS DTR-DSR
RS-232 connector	DB25F, DCE
Transmission mode	half-duplex
Power supply	external DC supply 6V/200mA
Isolation voltage between interfaces	without galvanic isolation
Permissible over-voltage on the line under ČSN 33 0420:	the line must not be exposed to the atmospheric discharge influences
Required link impedance	100Ω
Signals take off:	
TxD, (DTR, RTS) summarily	max. 6mA, typically 3mA

4.2 Other

Range	1200m, double-wire link
Maximum transmission rate	115 200 bps
Maximum rate AUT/RTS	9 600/1200 bps
Dimension: width x length x height	57 x 83 x 24 mm
Weight	80 g
Stocking temperature	- 10° to +55° C
Working temperature	+ 0° to +50° C
Humidity	0 – 85% (non-condensing)

!!!CAUTION!!!

Unless otherwise specified on the product, as for permissible over-voltage, the converter can be used in the environments where lightning over-voltage is not necessary to be considered. Converters connection to the lines exposed to the atmospheric electricity influences is prohibited unless separate line protection is carried out e.g. via very fast lightning arrestor.

5.0 Testing

When the power supply is switched on, connect positive terminal to the 2 contact and the negative terminal to the 7 contact of the DC power supply of 5 to 9 V on the RS-232 connector. The voltage of c. 3V has to be on the 1-2 contacts of the RS-485 connector. After reversing polarity 2-7 contacts, 1-2 output voltage has to decrease to zero.

6.0 Troubleshooting

Symptom	Action
Converter does not work after installation	Check if the link is connected properly if 1-2 contacts are not changed. Check the power supply. Check RS-232 connection. Check if the time constant selection is right.
Connection in normal operation quit working	Check the power supply Check the cable connection Use the test as with 5.0

7.0 Ordering information

Supply code is ELO E068.

Note

ELOE068ZKE001

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