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RS-232/422 Asynchronous Converter with Galvanic Isolation of the Interface

ELO E0CE

Operation manual

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1.0 Introduction

RS-232 interface with asymmetric signals is designed for two terminal equipments connection (DTE). Maximum load capacity can be 2500 pF (about 50m twisted pair). The load impedance is to be 3-7 kiloohm that allows disturbing pulses induction into the cables even from relatively soft supplies. Terminal equipments have to have the same potentials of the neutral, for this reason, RS-232 interface range is limited to 15 m distance.
RS-422 interface is distinguished by the range of hundreds of metres, spanning 1200 m distance at the rate of 9600 bps. 10 Mbps can be reached at very short distances (cm-dm). RS-232 to RS-422 interface signals transmission allows communication range and transmission interference immunity to be increased.

1.1 Use of the converter

The converter increases transmission immunity against electrical disturbance and isolates both interfaces RS-232/RS-422. Insulation strength is 3 kV. As for permissible over-voltage the converter can be used in the environments where lightning over-voltage is not necessary to be considered. To lead the cable outside buildings, it is necessary to provide additional over-voltage protection on the input points.
The converter allows transmission rate 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 rate of 9600 bps.

2.0 Operation principles

RS-422 interface is mainly designed for two devices communication in duplex mode. As transmission media there is a twisted pair, each pair for one transmitted signal. ELO E0CE converter transmits two signals (TxD, RxD), for duplex transmission two pairs are needed.
RS-422 interface signal is symmetric and interprets potential difference of both conductors $U_A - U_B$. If the signal $|U_A - U_B| > 200$ mV the receiver interprets it as log 1 or log 0. Signal parameters according to RS-422 are consistent with RS-485 standard except for switching off the transmitter when $|U_A - U_B| < 200$mV state can occur in the line.

3.0 Installation

The converter has to be installed with the respect for specifications of both interfaces and operating mode requests (duplex – simplex).

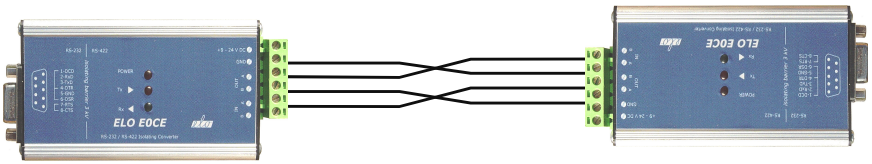
3.1 Converter connection to RS-232 Interface

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

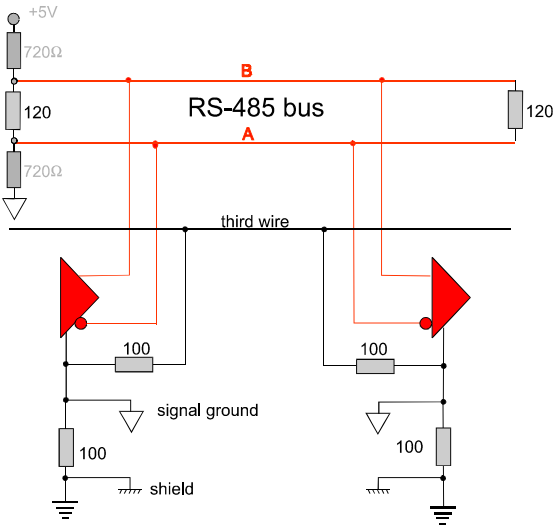
Signal name	abbrev	DTE connector (DB9M)	connector E0CE (DB9F)	trans.direction	
				DTE	E0CE
Signal Ground	SG	5	5	--	--
Transmitted Data	TxD	3	3	output	input
Received Data	RxD	2	2	input	output
Request To Send	RTS	7	7	output	input
Clear To Send	CTS	8	8	input	output
Data Terminal Ready	DTR	4	4	output	input
Data Set Ready	DSR	6	6	input	output
Data Carrier Detect	DCD	1	1	input	output

3.2 RS-422 link connection

Clamps are used to converter connection to the link. A (B) clamp of the local transmitter is connected to the A (B) clamp of the remote receiver, A (B) clamp of the local receiver is connected to the A (B) clamp of the remote transmitter (see the picture).



Each pair of RS-422 line should be terminated with the 100-120Ω 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.



To eliminate influence of the ground poten-tials differences, 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 ground potentials differences

3.3 Power Supply Connection

The converter needs external power supply 9 -24 V/200 mA which is connected to DC clamps. The clamp for the supply negative terminal connection (GND) is connected to the Al converter cover. Supply presence is indicated by the red "POWER" LED.

4.0 Specifications

4.1 Electrical parameters

Transmitted signals – E0CE	TxD and RxD
Control signals	interconnected locally RTS-CTS, DTR-DSR
Power supply	Ext. DC supply 9-24V/200 mA
Isolation voltage between interfaces	max. 3 kV for 1 s
Power take off from the signal TxD, RTS	max. 5 mA, typically 3 mA
Permissible over-voltage on the line	he line must not be exposed to the atmospheric discharge influences
Required link impedance	100Ω

4.2 Other

RS-232 connector type and connection	DB9 female, DCE
Range without repeaters	1200 m

Transmission mode – E0CE	duplex, two twisted pairs
Maximum data rate	115 200 bps
Minimum data rate	50 bps
Dimensions for DIN bar (length/width)	110 / 55mm
Covered construction height	24 mm
Weight	145 g
Stocking temperature	- 10^{o} to +55 ^{o} C
Working temperature	+ 0^{o} to +50^{o} C
Humidity	0 – 85% (non-condensing)

5.0 Testing

If the power supply is connected the red "POWER" LED must be alight. After connection of the clamps OUT-A to IN-B and OUT-B to IN-A OUT inversion of the transmitted signal is brought to IN clamps. The green LED indicated received data has to switch on.

5.1 Auto-test

After connection of the clamps OUT-A to IN-B and OUT-B to IN -A connect COM from the PC to the DB9F connector of the converter. Then start terminal emulating program on PC. Received and transmitted data must be equal.

6.0 Troubleshooting

Symptom	Action
Converter does not work after installation	Check if the RS-422 link is connected properly, if A and B signals are not changed. Check RS-232 connection (see 2.1 table).
"POWER"LED is not alight	Check the power supply.
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 E0CE.

Note

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