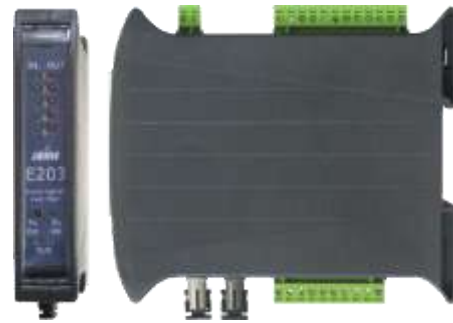


elo

Let's communicate

Adapters for duplex transmission of binary signals over the multimode fiber optic

ELO E203, E207, E208



Characteristics

- Bidirectional transfer of 5 binary signals**
- Data error and Link error indication**
- DIN rail mounting**
- Supply voltage 9 – 24 V DC nominal**
- Range p to 2 km**
- Multimode cable 50/125 or 62,5/125 μm**

Introduction

Data transmission over the fiber optic is suitable in such applications, where noise induction in metal conductors can interfere with transferred data or even destroy devices. It may be also appropriate to connect devices with high voltage potential over the fiber optic link.

Use of the multiplexers

Binary data signaling is still concern of the fire protection and security field. It is usable in automation application too. Adapter can be used for fault signalization, fiber optic line breakdown detection, to blackout or brownout of the remote station indication.

Inputs are galvanic isolated. They are fitted with input current limitation to 6 mA.

Outputs can be fitted with classic relay (60V AC/DC, 5A) – model ELO E208 or with SSR (Solid State Relay, MOSFET technology, 0.5A, 48V DC / 24V AC) – models ELO E203 and E207.

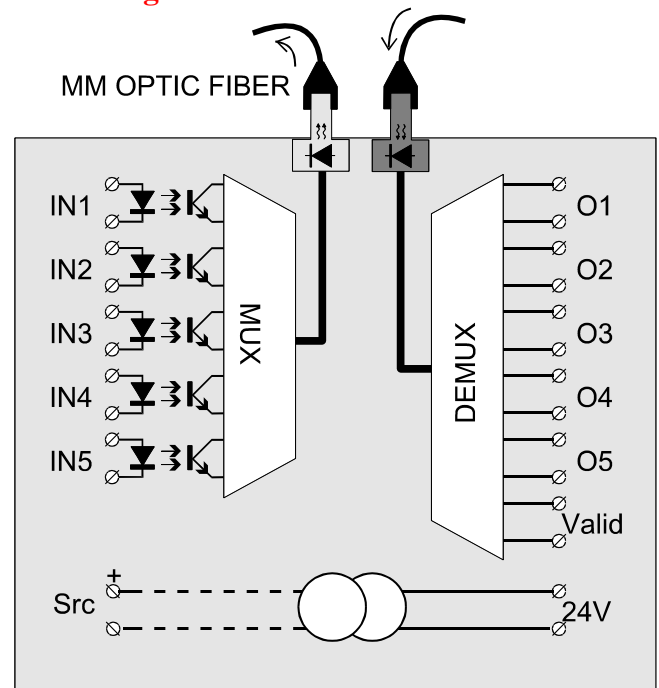
Operation principles

State of every input IN1 .. IN5 is periodically sampled, coded and transmitted from input unit over the optical link. Receiver unit decodes received packets and sets outputs O1 .. O5. Furthermore it indicate validity of the received data by „ON“ state on the „Valid“ output as an unit is checking transferred data. If there is any packet error detected, the „Valid“ output switches off, whereas data outputs stay in last good known conditions. If the error lasts for a few seconds, all outputs are subsequently switched off.

Model ELO E207 contains a 24V/40mA supply, which is galvanic isolated (clamps „Src“). It is suitable if it is necessary to transmit for instance a relay contacts without potential.

Input & output states are indicated on the front panel altogether with processor status and eventually transmission error.

Block diagram



Specification

Parameters

Binary inputs	galvanic isolated
Log. 0	0 – 3 V
Log. 1	> 4.5 V
Input current limiter	6 mA
Binary outputs	SSR, or electromechanical relay
Max. switched current SSR/relay	0.5/5 A
Max. switched voltage SSR	, 24/30 V AC
Max. switched voltage - relay	48/60 V DC
Optic fibers	multimode 50/125 or 62,5/125 μm

Optic connectors	ST
Typical range	2 km
Nominal supply voltage	9 – 24 V DC
Limit supply voltages	7 – 30 V DC
Power take off (24 V)	typ. 150 mA, max. 400 mA
Wave length	820 nm
Dimensions W x L x H	22,5 x 108 x 120 mm
Weight	140 g
Storage temperature	- 10° to +50° C
Working temperature	+ 5° to +50° C

Modems RS232 / Fibre Optic Singlemode (SM) – ELO E242 and multimode (MM) ELO E240, ELO E241



Characteristics

- Independent on communication protocol
- DTE-DCE switch
- Optic line watch dog
- Supply voltage DC 9-24 V
- Range MM-2 km, SM-15 km

Introduction

Modems are the converters of RS232 data signals to optic fiber and back. Optic fibers can be SINGLE MODE (SC connectors) or MULTI MODE (SC or ST connectors). The modems are suitable for two-point connections.

Use of the modems

Conversion of metallic media to more expensive fiber optic is mainly suitable:

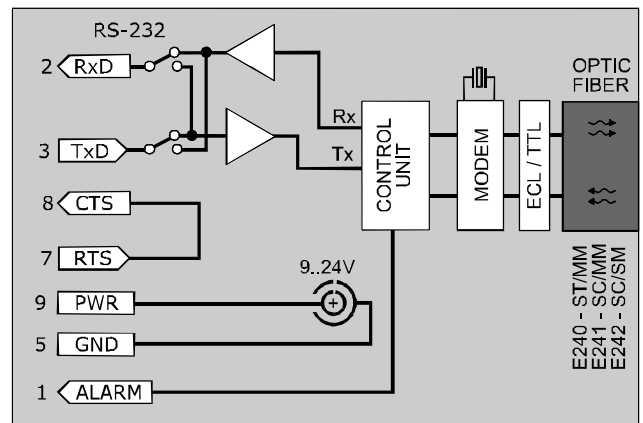
- 1] in the environment of high interference level,
- 2] if the higher isolation is required, (switching stations, transformers),
- 3] if the metallic line can not be used because of EMI,
- 4] if the higher transport security and safety is necessary,
- 5] if isolation via the optocouplers is not suitable for different reasons

Operation principles

A pair of modems communicate over the optic fibers. If the communication is correct, the LINK indicator is alight.

The modems are watching for the optic line and in the case of disconnection the ALARM signal has been activated. RS232 communication data rate can be any ranging from 0 to 230 kbps without any modem adjusting. The data format can be random too. The RS232 connector can be set to DTE or DCE mode using the switches on the back side of modem.

Block diagram



Modem ELO E242 is designed for singlemode fibers 9/125 μm . Its range is typically 15 km, optic connectors are SC type. For multimode cables 50/125 μm or 62.5/125 μm there are models ELO E241 with SC connectors and ELO E240 with ST ones.

Specification

Parameters

Transmitted signals	TxD, RxD
Type and connection of RS232 conn.	DB9F, DTE/DCE
Transmit mode	duplex
Fiber optic cable E240/E241	two multimode fiber cables 50/125 μm (62/125 μm)
Optic connectors E240/E241	ST/SC type
Range	c. 2 km
Fiber optic cable E242	two singlemode fiber cables 9/125 μm
Optic connectors E242	SC type
Range	c. 15 km

Maximum data rate	230 400 bps
Minimum data rate	0 bps
Supply	external DC supply 9-24V/200 mA
Limiting voltage	7 – 30 V DC
Dimension:	Length
	120 mm
	Width 80 mm
	Height 25 mm
	Weight 160 g

Other

Stocking temperature	-10° to +55°C
Working temperature	+0° to +50°C
Humidity	0 – 85% (non-condensing)

Modems RS485/422 to optic fibre singlemode (SM) – ELO E245 and multimode (MM) ELO E243, ELO E244



Characteristics

- Independent on communication protocol
- Data rate up to 1.5 Mbps
- Optic line watch dog
- Supply voltage DC 9-24 V
- Range MM-2 km, SM-15 km

Introduction

Modems are the converters of duplex RS422 interface and half-duplex RS485 bus to optic fiber and back. Optic fibers can be SINGLE MODE (SC connectors) or MULTI MODE (SC or ST connectors).

Use of the modems

Conversion of metallic media to more expensive fiber optic is mainly suitable:

- 1] in the environment of high interference level,
- 2] if the higher isolation is required, (switching stations, transformers),
- 3] if the metallic line can not be used because of EMI ,
- 4] if the higher transport security and safety is necessary,
- 5] if isolation via the optocouplers is not suitable for different reasons

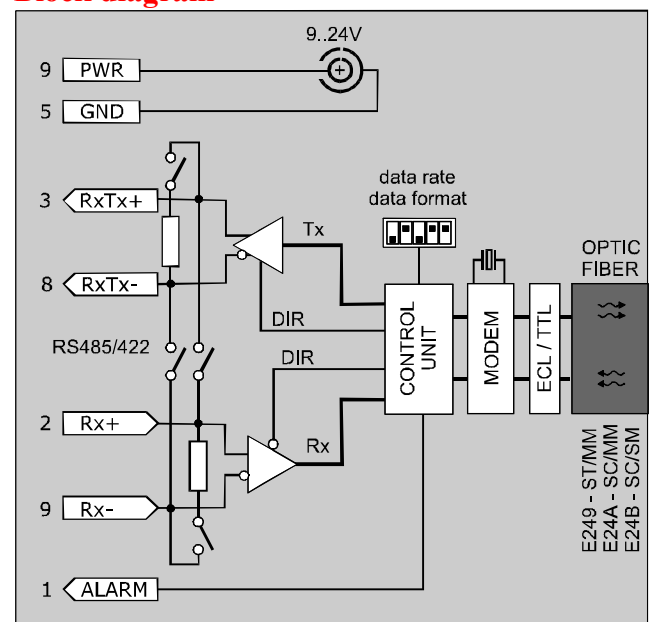
Operation principles

A pair of modems communicate over the optic fibers. If the communication is correct, the LINK indicator is alight. The modems are watching for the optic line and in the case of disconnection the ALARM signal has been activated.

The maximum data rate is 5 Mbps in duplex RS422 mode without any modem adjusting. If the half-duplex mode is

selected, the communication data rate and data format must be set properly. The data rate can be from 4.8 to 1500 kbps, data format 8 or 9 bits. Using the switches on the back side of modem the internal 120 Ω resistors can be connected to RS485/422 outputs and inputs.

Block diagram



Modem ELO E245 is designed for singlemode fibers 9/125 μm. Its range is typically 15 km, optic connectors are SC type. For multimode cables 50/125 μm or 62.5/125 μm there are models ELO E244 with SC connectors and ELO E243 with ST ones.

Specification

Parameters

Transmitted signals	Tx, Rx or TxRx
Type of RS485/422 connector	DB9F
Transmit mode	duplex / half-duplex
Fiber optic cable E243/E244	two multimode fiber cables 50/125 μm (62/125μm)
Optic connectors E243/E244	ST/SC type
Range	c. 2 km
Fiber optic cable E245	two singlemode fiber cables 9/125 μm
Optic connectors E245	SC type
Range	c. 15 km

Maximum data rate RS422	5 Mbps
Minimum data rate	0 bps
Maximum data rate RS485	1.5 Mbps
Minimum data rate	4.8 kbps
Supply	external DC supply 9-24V/200 mA
Limiting voltage	7 – 30 V DC
Dimension:	
Length x Width x Height	120 x 80 x 25 mm
Weight	160 g

Other

Stocking temperature	-10° to +55°C
Working temperature	+0° to +50°C
Humidity	0 – 85% (non-condensing)

RS – 485 to Multimode Fibre Optic Converter ELO E171



Characteristics

- Independent on communication protocol
- Minimum data delay
- Al case - for DIN rail mounting
- Supply voltage DC 9-24 V
- Link range 2 km

Introduction

Fiber Optic (SINGLE MODE and/or MULTI MODE) has been used for signal transmission in automation for communication more and more often. The main advantage of Fiber Optic is its immunity to electromagnetic interference, slight radiation and high transmission capacity

Use of the converter

Conversion of metallic media to more expensive fiber optic is mainly suitable:

- 1] in the environment of high interference level,
- 2] if the higher isolation is required, (switching stations, transformers),
- 3] if the metallic line can not be used because of EMI ,
- 4] if the higher transport security and safety is necessary,
- 5] if isolation via the optocouplers is not suitable for different reasons

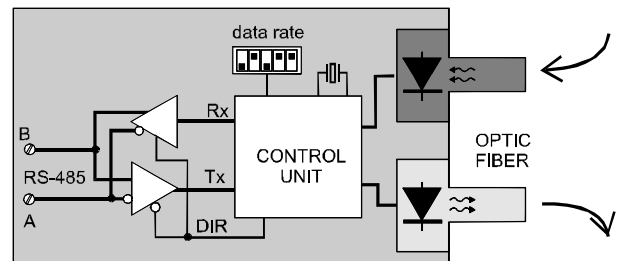
These problems can be solved if the converter ELO E171 (MULTI MODE) is applied.

Operation principles

ELO E171 transfers signal received from RS-485 interface to transmitting fiber of the optic cable and the signal from receiving fiber is transmitted to RS-485. Besides the signal transfer, the converter matches the full duplex fiber to the half duplex RS-485 (data-flow direction switching).

Its independent operation is based on the set data rate (1200 to 115200 bps) and data format which must be asynchronous of 10 and/or 11bits (start bit, 8 to 9 information bits, stop bit). The switching speed is sufficient to use the converter in data transmission network organized as MASTER-SLAVE and MULTI MASTER. The converter also corrects bits width distortion which could occur during transmission. For fiber optic connection optical connector ST is used as standard.

Block diagram



Specification

Parameters

Transmitted signals	differential signal AB
Type and connection of RS-485 connector	clamps
Isolation	RS-485 galvanic isolation from GND
	3 kV/1 sec supply
Transmit mode	asynchronous, half-duplex
Fiber optic cable	two multimode fiber cables 50/125 μm (62/125μm)
Optic connectors	ST type
Maximum data rate	115 200 bps
Minimum data rate	1200 bps
Supply	external DC supply 9-24V/200 mA

Dimension:	Length	115 mm
	Width	55 mm
	Height	24 mm
Weight		137 g

Other

Stocking temperature	-10° to +55°C
Working temperature	+0° to +50°C
Humidity	0 – 85% (non-condensing)

RS232 multiplexers to optic fibre singlemode (SM) – ELO E248 and multimode (MM) ELO E246, ELO E247



Characteristics

- Independent on communication protocol
- Four independent RS232 duplex channels
- Data rate 0 – 230 kbps
- Supply voltage DC 9-24 V
- Range MM-2 km, SM-15 km

Introduction

Multiplexer concentrate four completely independent full duplex RS232 interfaces to a pair of optic fibers. The fibers can be SINGLE MODE (SC connectors) or MULTI MODE (SC or ST connectors).

Use of the multiplexers

Conversion of metallic media to more expensive fiber optic is mainly suitable:

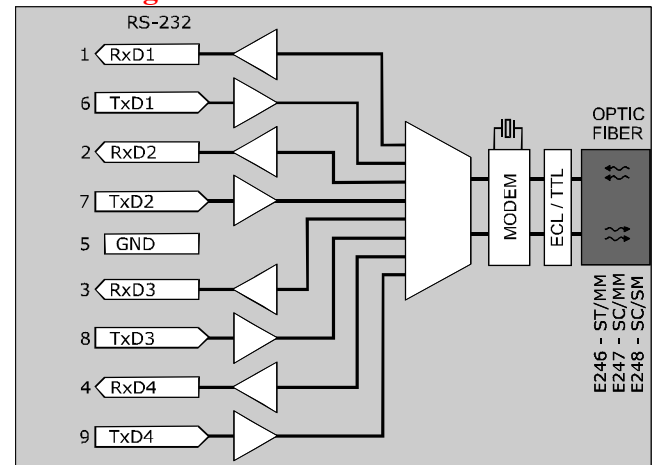
- 1] in the environment of high interference level,
- 2] if the higher isolation is required, (switching stations, transformers),
- 3] if the metallic line can not be used because of EMI ,
- 4] if the higher transport security and safety is necessary,
- 5] if isolation via the optocouplers is not suitable for different reasons

Operation principles

The pair of multiplexers communicates over the optic fibers. If the communication is correct, the LINK indicator is alight.

The maximum data rate of each channel is 230 kbps, minimum is 0. Multiplexer does not need any adjusting. The contacts of RS232 connector are not used according RS232 standards. To get the standard ELO E24E (OCTOPUS) cable with four DB9F DCE connectors must be used.

Block diagram



Modem ELO E248 is designed for singlemode fibers 9/125 μ m. Its range is typically 15 km, optic connectors are SC type. For multimode cables 50/125 μ m or 62.5/125 μ m there are models ELO E247 with SC connectors and ELO E246 with ST ones.

Specification

Parameters

Transmitted signals	4x TxD, 4x RxD
Type of RS232 connector	DB9F
Transmit mode	duplex
Fiber optic cable E246/E247	two multimode fiber cables 50/125 μ m (62/125 μ m)
Optic connectors E246/E247	ST/SC type
Range	c. 2 km
Fiber optic cable E248	two singlemode fiber cables 9/125 μ m
Optic connectors E248	SC type
Range	c. 15 km

Maximum data rate of each channel	230 kbps
Minimum data rate	0 bps
Supply	external DC supply 9-24V/200 mA
Limiting voltage	7 – 30 V DC
Dimension:	
Length x Width x Height	120 x 80 x 25 mm
Weight	160 g

Other

Stocking temperature	-10° to +55°C
Working temperature	+0° to +50°C
Humidity	0 – 85% (non-condensing)

Modem RS232/RS422/RS485 to MM optic fibers ELO E17A



Characteristics

- Range up to 6km over MM fiber
- Communication protocol independent
- Point-to-point or ring topology
- User selectable metallic interface
- Desktop or DIN rail versions
- Supply 9-24 V DC

Introduction

Modem converts the data signals of the duplex interfaces RS232, RS422 and RS422-multidrop as well as a half-duplex interface RS485 to multimode optic fibers with ST optic connectors. It is designed to point-to-point or ring topology.

Use of the converter

Conversion of metallic media to fiber optic is suitable especially:

- 1) in the high interference level area,
- 2) if the higher isolation is required, (switching stations, transformers),
- 3) if the metallic line can not be used because of EMI ,
- 4) if the higher transport security and safety is necessary,
- 5) if isolation via the optocouplers is not suitable for different reasons,
- 6) to increase a range.

Operation principles

A pair of modems communicates each other over a duplex multimode optic fiber. The wave length of the signal is 1300 nm. Optic signal has been pulsewidth modulated (PWM).

Communication data ranges for RS232 are 0 – 230 kbps, for RS485/422 from 0 to 2 Mb/s. There are two data indicators Tx and Rx.

Modem doesn't need any setting of data rate or data format parameters if the RS232 interface was set. In the other cases it is necessary to use terminators, pull-up and pull-down resistors according to the metallic line length, data rate or a number of RS485 users.

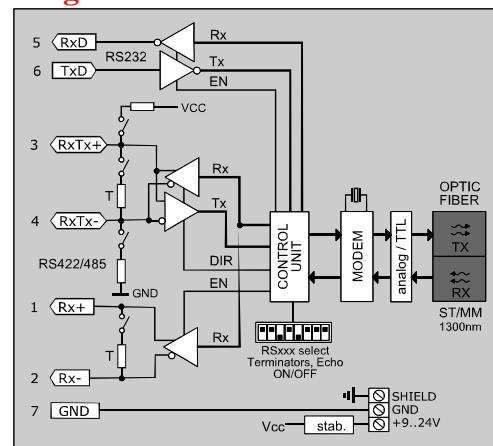
All the interfaces are connected to a terminal block and can be chosen and activated by the switches.

Terminators, pull-up and pull-down resistors are integrated in modem and they can be used by the switches too.

Data from optic receiver can be copied (echoed) to the transmitter if the ECHO switch was activated. This function is important especially in ring topology.

Power supply of DC 9 – 24 V nominal or 7 – 30 V (limits) has its own clamps.

Block diagram



Specification Parameters

Transmitted signals - RS232	TxD, RxD
Transmitted signals - RS422	Tx+,Tx-, Rx+,Rx-
Transmitted signals - RS485	TxRx+, TxRx-
Type of metallic int. connector	terminal block 3.81mm
Transmit mode	duplex / half-duplex
Fiber optic cable	two multimode fibers 50/125 or 62.5/125 μm
Optic connectors	ST type
Max. range	up to 6km
Max. line attenuation (typ)	9 dB

Maximum data rate of RS232	230 kbit/s
Maximum data rate of RS422/485	2 Mbit/s
Internal terminators	120 Ω
Pull-up, pull-down resistors	1 kΩ
Range of nominal power voltage	9-24V DC /500mA
Limit voltage values	7 – 30 V
Case	metallic box
Length x Width x Height	120x80x25 mm
Weight	160 g

Other

Stocking temperature	- 10° to +55° C
Working temperature	+ 0° to +50° C
Humidity	0 – 85% (non-condensing)

RS-232 to Multimode Optic Fiber Converter ELO E14C



Characteristics

DIN rail mounting
TxD, Rx/D transferring
Max. data rate 115.2 kbps
Supply voltage 9-24 V DC
Max. range 2 km

Introduction

RS-232 is the interface with asymmetric signals. The maximum load capacitance can be 2500 pF. It corresponds to the 50m of the typical twisted pair cable. The load impedance can be 3-7 kiloohm and it enables to induce the disturbing impulses even from the soft supplies into the cable. The asymmetric signals can not eliminate the influence of the signal ground's potential drifts. Therefore the RS-232 interface is destined for the point-to-point connection at 15 m distance. The terminal devices (DTE) must have the same signal grounds potential.

Fiber Optic Modem Application

The fiber optic cable is resistant against the electrical disturbances and against the influences of the atmospheric electricity. It gives the maximum protection of the DTE and the high reliability of communication. The security of communication over optic cable is last but not least advantage.

Principles of Operation

ELO E14C converts TxD signal to transmitting optic cable and the signal from the receiving cable converts to Rx/D. This way the full duplex connection can be realized.

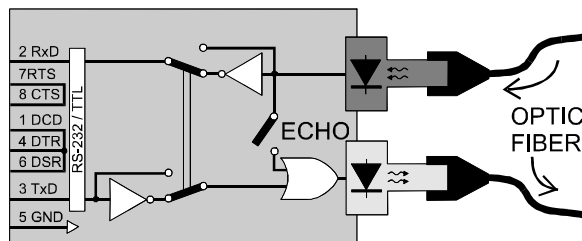
There are not any other signals transmitted over optic fiber. ELO E14C has two switches:

Switch IDLE sets a polarity of optic signal. In "LIGHT" position the light in transmitting fiber corresponds to idle state of TxD and the light coming from receiving fiber is been interpreted as idle state of Rx/D. In "DARK" position of **IDLE** the dark is the idle state in the fibers.

In "LIGHT" mode DTE is getting the information about optic cable's integrity all the time. So this mode is suitable for using in security systems.

Switch ECHO in "ECHO=OFF" position is suitable for two-point full duplex lines. In "ECHO=ON" position data from receiving optic fiber are copied not only to Rx/D, but to transmitting fiber too. This way data can be delivered to all users of ring optic net. This configuration is equivalent to bus structure on metallic lines. There must be a communication protocol which must synchronize the stream of data packets among wars of the net.

Block diagram



Specification

Electrical Parameters

Interface	RS-232
Transmitted signals	TxD and Rx/D
Control signals	local loops RTS-CTS DTR-DSR-DCD
RS-232 connector	DB9F, DCE
Communication mode	ECHO OFF - full duplex ECHO ON - half duplex
Maximum data rate	115 200 bps

Optical Parameters

Wave length	820 nm
Fiber optic cable	50/125 or 62.5/125, multimode fiber
Connectors	ST
Maximum range	2 km

Other

Supply	12-24V (min 9, max 30 V)
Consumption Dark / Light	max. 30 / 50 mA,
Dimension: Width	55 mm
Length	80 mm
Height	24 mm
Weight	90 g
Stocking temperature	- 10 ⁰ to +55 °C
Working temperature	+ 0 ⁰ to +50 °C
Humidity	0 - 85% (non-condensing)

RS422 multiplexers to optic fibre singlemode (SM) – ELO E24B and multimode (MM) ELO E249, ELO E24A



Characteristics

- Independent on communication protocol
- Two independent RS422 duplex channels
- Data rate 0 – 230 kbps
- Supply voltage DC 9-24 V
- Range MM-2 km, SM-15 km

Introduction

Multiplexer concentrate two completely independent duplex RS422 interfaces to a pair of optic fibers. The fibers can be SINGLE MODE (SC connectors) or MULTI MODE (SC or ST connectors).

Use of the multiplexers

Conversion of metallic media to more expensive fiber optic is mainly suitable:

- 1] in the environment of high interference level,
- 2] if the higher isolation is required, (switching stations, transformers),
- 3] if the metallic line can not be used because of EMI ,
- 4] if the higher transport security and safety is necessary,
- 5] if isolation via the optocouplers is not suitable for different reasons

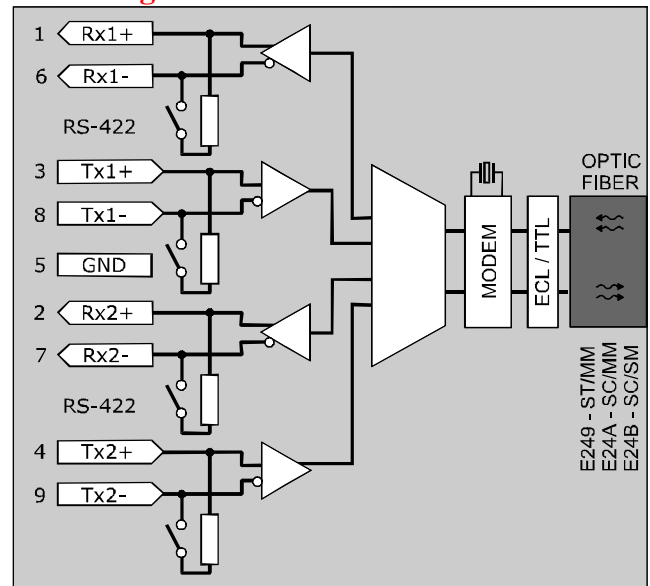
Operation principles

A pair of multiplexers communicate over the optic fibers. If the communication is correct, the LINK indicator is alight.

The maximum data rate of each channel is 230 kbps, minimum is 0. Multiplexer does not need any adjusting.

The 120 Ω internal terminators can be connected to all RS422 inputs and outputs.

Block diagram



Modem ELO E24B is designed for singlemode fibers 9/125 μm. Its range is typically 15 km, optic connectors are SC type. For multimode cables 50/125 μm or 62.5/125 μm there are models ELO E24A with SC connectors and ELO E249 with ST ones.

Specification

Parameters

Transmitted signals	2x Tx, 2x Rx
Type of RS422 connector	DB9F
Transmit mode	duplex
Fiber optic cable E249/E24A	two multimode fiber cables 50/125 μm (62/125μm)
Optic connectors E249/E24A	ST/SC type
Range	c. 2 km
Fiber optic cable E24B	two singlemode fiber cables 9/125 μm
Optic connectors E24B	SC type
Range	c. 15 km

Maximum data rate of each channel	230 kbps
Minimum data rate	0 bps
Supply	external DC supply 9-24V/200 mA
Limiting voltage	7 – 30 V DC
Dimension:	
Length x Width x Height	120 x 80 x 25 mm
Weight	160 g

Other

Stocking temperature	-10° to +55°C
Working temperature	+0° to +50°C
Humidity	0 – 85% (non-condensing)

Adapters for simplex transmission of binary signals over the multimode fiber optic

ELO E204, E205, E206



Characteristics

- Unidirect transfer of 5 binary signals
- Data error and Link error indication
- DIN rail mounting
- Supply voltage 9 – 24 V DC nominal
- Range p to 2 km
- Multimode fibre 50/125 or 62,5/125 µm

Introduction

Data transmission over the fiber optic is suitable in such applications, where noise induction in metal conductors can interfere with transferred data or even destroy devices. It may be also appropriate to connect devices with high voltage potential over the fiber optic link.

Use of the multiplexers

Binary data signaling is still concern of the fire protection and security field. It is usable in automation application too.

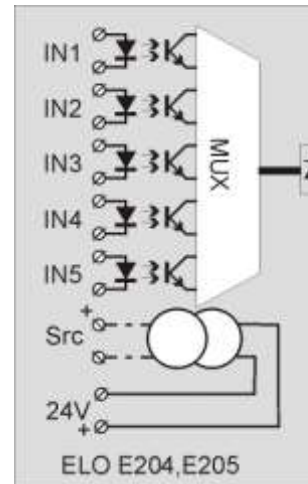
Operation principles

Models ELO E204 and ELO E205 are multiplexing five binary input signals. Inputs are periodically sampled, coded and transmitted from input unit over the optical link.

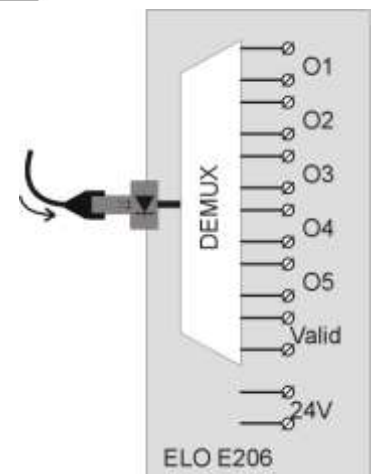
Inputs are galvanic isolated. They are fitted with input current limitation to 6 mA.

Model ELO E205 contains a 24V/40mA supply, which is galvanic isolated (clamps „Src“). It is suitable if it is necessary to transmit for instance a relay contact without potential.

Receiver ELO E206 decodes received packets and sets output O1 .. O5. Furthermore it indicate validity of the received data by „ON“ state on the „Valid“ output as an unit is checking transferred data. If there is any packet error detected, the „Valid“ output switches off, whereas data outputs stay in last good known conditions. If the error lasts for a few seconds, all outputs are subsequently switched off.



Outputs are fitted with SSR (Solid State Relay), MOSFET technology, 0.5A, 48V DC / 24V AC).



Input & output states are indicated on the front panel altogether with processor status and eventually transmission error.

Specification

Parameters

Binary inputs	galvanic isolated
Log. 0	0 – 3 V
Log. 1	> 4,5 V
Input current limiter	6 mA
Binary outputs	SSR,
Max. switched current	0.5 A
Max. switched voltage	48 V DC or 24 V AC
Optic fiber	multimode 50/125 or 62.5/125 µm

Optic connectors	ST
Typical range	2 km
Nominal supply voltage	9 – 24 V DC
Limit supply voltages	7 – 30 V DC
Power take off (24 V)	typ. 150 mA, max. 400 mA
Wave length	820 nm
Dimensions W x L x H	22,5 x 108 x 120 mm
Weight	140 g
Storage temperature	- 10° to +50° C
Working temperature	+ 5° to +50° C