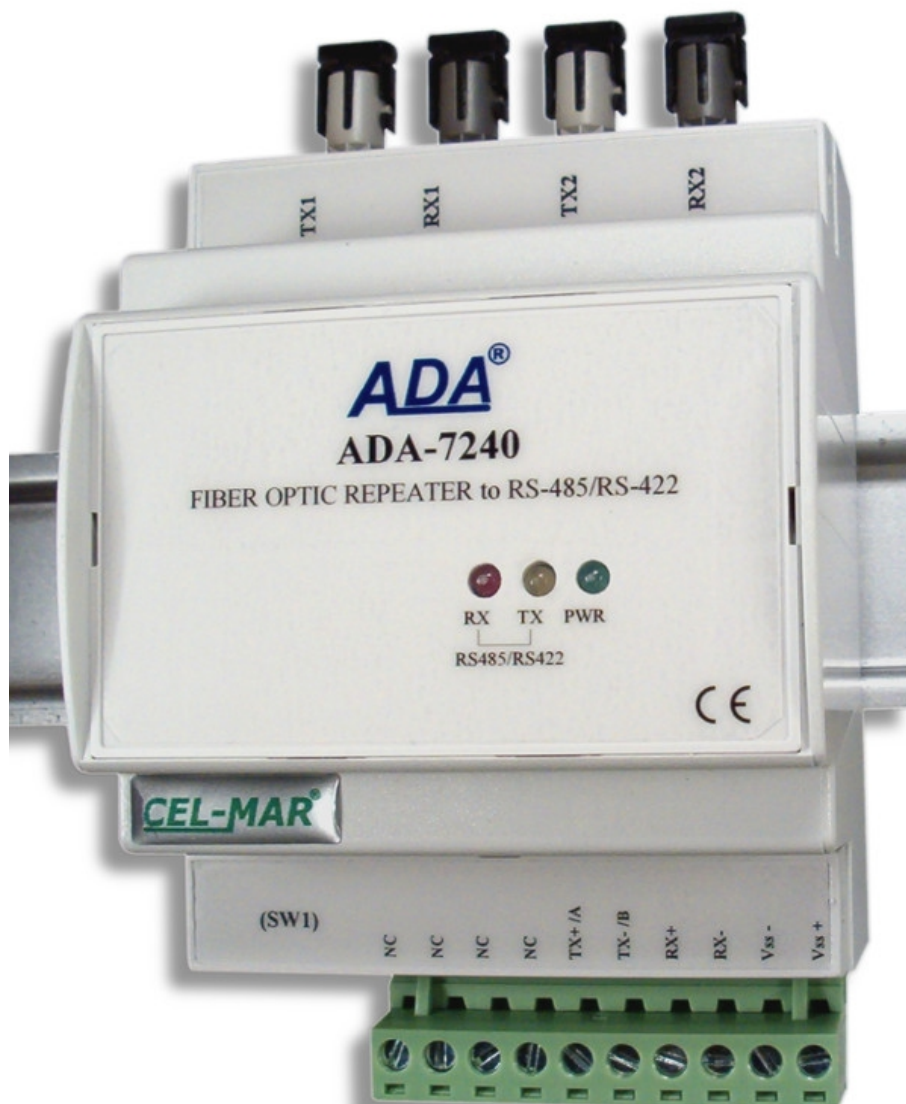


# User manual

## ADA-7240

### RS-485 / RS-422 to Multidrop Fiber Optic Converter



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## 1. GENERAL INFORMATION

Thank you for your purchase of **CEL-MAR Company** product. This product has been completely tested and is covered by a two year warranty on parts and operation from date of sale.

If any questions or problems arise during installation or use of this product, please do not hesitate to contact Technical Support at +48 41 362-12-46 or e-mail [support@cel-mar.pl](mailto:support@cel-mar.pl).

### 1.1. WARRANTED INFORMATION

**ADA-7240** converter is covered by a two year warranty from date of sale. In case of being damaged it will be repair or the damaged component will be replace. The warranty does not cover damage caused from improper use, materials consumption or any unauthorized changes. If the product does not function (is damaged), or not operate in accordance with the instructions, will be repaired or replaced.

All warranty and no warranty repairs must be returned with paid transport and insuring to the **CEL-MAR Company**.

**CEL-MAR Company** under no circumstances won't be responsible for ensuing damage from improper using the product or as a result of random causes: the lightning discharge, the flood, the fire and the like.

**CEL-MAR Company** is not be held responsible for damages and loss including: loss of profits, loss of data, pecuniary losses ensuing from using or the impossibility of using this product.

In specific cases **CEL-MAR Company** discontinue all warranties and in particular do not follow the user manual and do not accept terms of warranty by the user.

### 1.2. GENERAL CONDITIONS FOR SAFE USE

The device should be installed in a safe and stable places (eg, electroinstallation cabinet), the powering cable should be arranged so as not to be exposed to trampling, attaching, or pulling out of the circuit.

Do not put device on the wet surface.

Do not connect devices for nondescript powering sources,

Do not damage or crush powering wires.

Do not make connection with wet hands.

Do not adapt, open or make holes in casings of the device!

Do not immerse device in water or no other liquid.

Do not put the fire opened on device sources: candles, an oil lamps and the like.

Complete disable from the supply network is only after disconnecting the power supply circuit voltage.

Do not carry out the assembly or dis-assembly of the device if it is enabled. This may result to short circuit and damage the device.

The device can not be used for applications that determine human life and health (eg. Medical).



#### ATTENTION!!!

**The device is equipped in the laser transmitter.**

**The radiation emitted by the laser transmitter is harmful to the eyes!**

**Under no circumstances should never look to at the uncovered slot, to which it is not connected the fiber optic connector.**

**The manufacturer is not responsible for used not in accordance with the instruction manual.**

**The user manual is an integral part of the device and with it is delivered to users.**

### 1.3. CE LABEL



The CE symbol on the device CEL-MAR means compatibility with electromagnetic compatibility Electromagnetic Compatibility Directive **EMC 2014/30/WE**.

Declaration of Conformity is delivered with purchased converter.

### 1.4. ENVIRONMENTAL PRESERVATION



This sign on the device inform about putting expended device with other waste materials. Device should send to the recycling. (In accordance with the act about the Electronic Appliance Expended from day 29 of July 2005)

### 1.5. SERVICE AND MAINTENANCE

ADA-7240 converter does not require the servicing and maintenance.

Technical support is available at number +48 41 362-12-46 in 8.00-16.00, from Monday to Friday or e-mail [support@cel-mar.pl](mailto:support@cel-mar.pl).

### 1.6. PACK CONTENTS

ADA-7240 converter; user manual; CE declaration; resistors:  $R_t=120\Omega$  (2 pcs).

## 2. PRODUCT INFORMATION

### 2.1. PROPERTIES

- Fibre-Optic to RS485 / RS422 conversion,
- Regeneration of Fiber Optic signal – Fiber Optic repeater,
- Fibre-Optic connection via fore fibre connectors type: ST® \* – transmitter and receiver for an optical wavelength from 792nm to 865 nm or SMA – transmitter and receiver for an optical wavelength from 640nm to 675nm.
- Fibre Optic line: 2 multimode optical fibres eg. type 50/125  $\mu\text{m}$ , 62,5/125  $\mu\text{m}$ , 100/140  $\mu\text{m}$ , 200  $\mu\text{m}$  HCS, 1mm POF,
- Transmission of RX, TX signals,
- Baud rate up to 2Mbps.
- Operating on RS-485 network 2 or 4 wire,
- Automatic direction data flow control on RS485 network,
- Transparent for all protocols: MODBUS, DNP, PROFIBUS and other,

- External power supply 10 - 30 VDC stable min. 3W,
- 1kV= or 3kV= galvanic isolation between RS485/RS422 interface and power supply,
- Connection RS485/RS422 network and power supply via screw terminal block,
- Connection Fiber Optic network via fibres optic connectors type: ST® \*(850nm), SC(850nm), SMA(650nm),
- Protection against power supply reverse connection,
- Implemented overvoltage protection on RS422/485 network,
- DIN 43880 standard - mounting in typical electro-installation unit,
- Rail mounting according to DIN35 / TS35 standard,
- Dimensions of casing contour (W x H x D) 71mm x 90mm x 58mm,

## 2.2. DESCRIPTION

Multidrop Fiber Optic Converter ADA-7240 is used for creation of fiber optic bus, for connection of RS485/422 interface devices quite distant from each other eg. Computers, controllers etc. Conversion between fiber optic RS485/422 is without interfering with the data format. The use of fibre-optic provides complete isolation between connected devices and resistance to interference on the transmission bus. Fiber optic connection is made by the use of two fibres. ADA-7240 can be use also for extend the fiber optic bus for next part 2500m because the converter also complies functions of fiber optic repeater.

ADA-7240 is equipped with screw terminal block for connection of RS485/422 and power connections. It supports baud rates up to 2Mbps on 2-wire or 4-wire RS-485 bus via one or two pairs of twisted pair, connected to the screw terminals block. The device uses to operate lines RX +, RX-, TX +, TX-. To RS485 bus built on the ADA-7240 can be connected 32 devices operating in half duplex mode or full duplex mode and to RS422 bus two devices operating in half duplex mode. Overvoltage protection was made on base safety diodes and fuses on each RS485/RS422 lines.

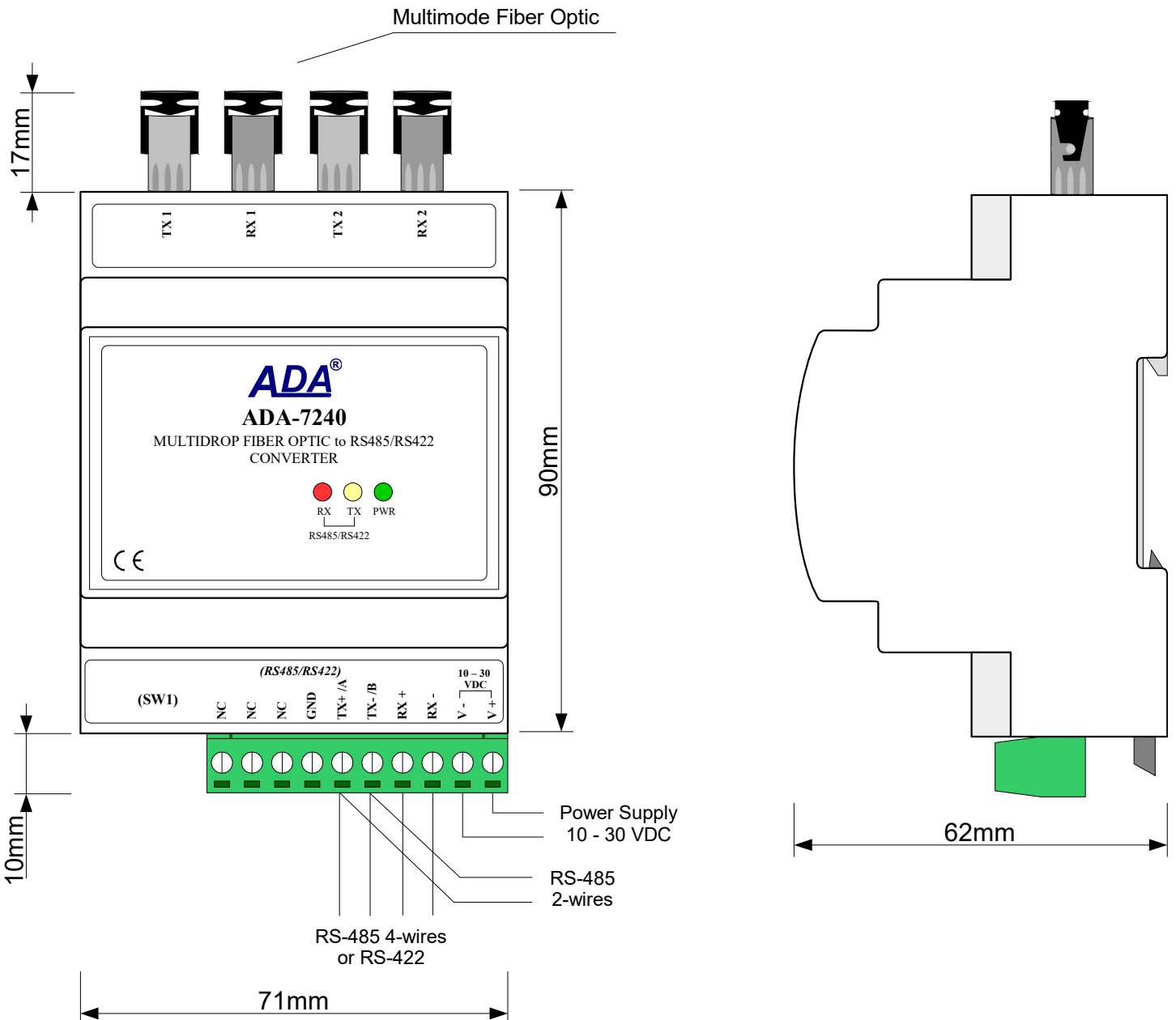
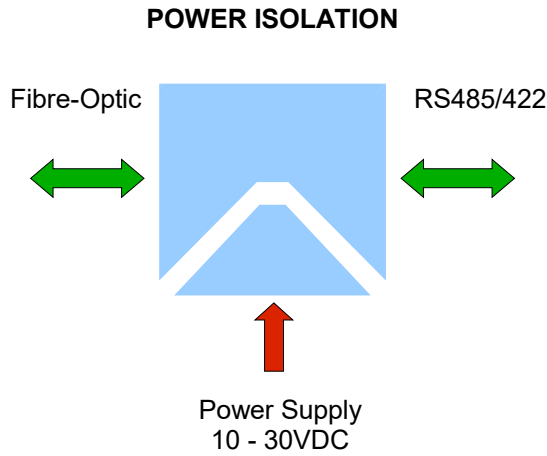


Fig. 1. View of ADA-7240.

**2.3. ISOLATION**

Converter ADA-7240 has galvanic isolation between power circuit and communication interfaces (RS485/422 and Fiber Optic) on level 1kV= or 3kV=, depend on version described in section below.



**Fig. 2. Isolation structure.**

**3. INSTALLATION**

This chapter will show how to connect ADA-7240 to RS485/422 bus, Fibre-Optic and power supply and how to use it. In the purpose of minimization of disruptions from environment is being recommended to:

- apply multipair type shielded cables, which shield can be connected to the earthing on one end of the cable,
- arrange signal cables in the distance not shorter than 25 cm from powering cables,
- apply cable of adequate cross-section due to voltage drops for converter powering,
- use Interference suppression filters for power supply converters that are installed within a single object.
- not supply converter from power circuit device that generates large impulse interference such as transmitters, contactors,

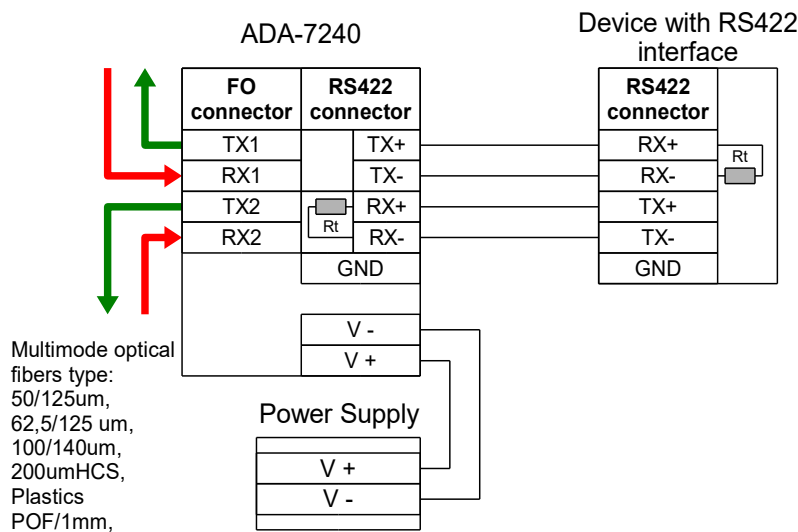
**3.1. ASSEMBLING**

ADA-7240 converter case is adapted to assembly on TS-35 (DIN35) rail. To install converter should mount device on the rail upper part of the case then press bottom part to hearing characteristic „Click” sound.

**3.2. CONNECTION TO RS485/RS422 BUS**

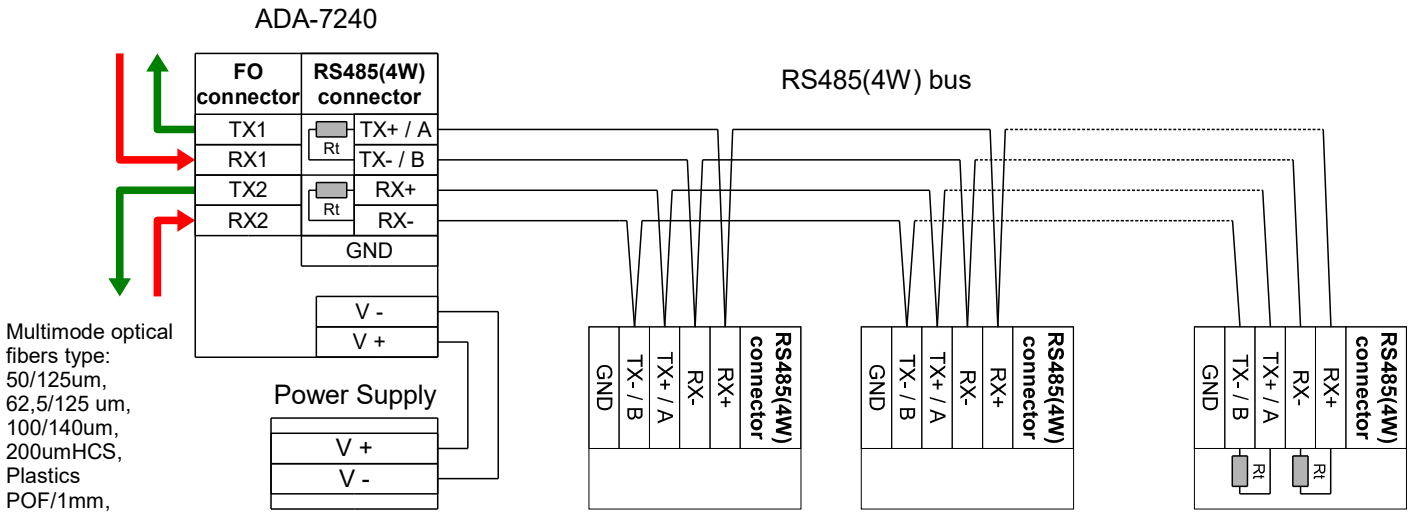
RS485/RS422 interface at ADA-7240 converter is available on terminal block described as: Tx+/A, Tx-/B, Rx+, Rx-. ADA-7240 support operating on RS422 bus and RS485. Both buses need proper cabling.

**3.2.1. CONNECTION TO 4-WIRE RS422 BUS**



**Fig. 3. Example connection of RS422 device .**

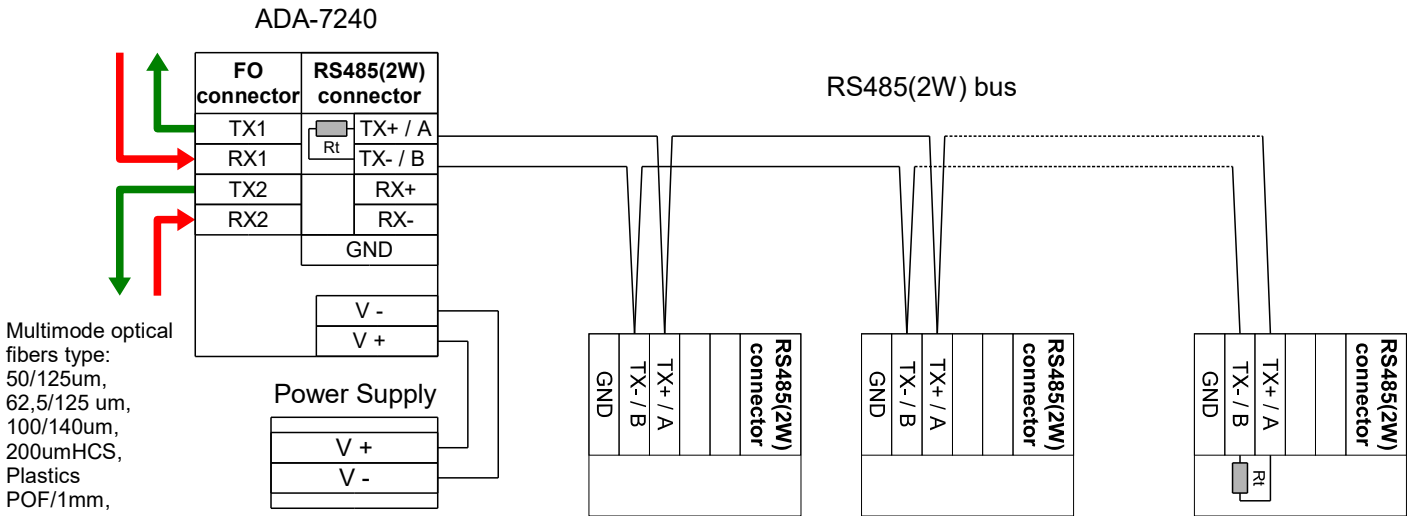
**3.2.2. CONNECTION TO 4-WIRE RS485 BUS**



**Fig. 4. Example connection of RS485(4W) devices.**

**3.2.3. CONNECTION TO 2-WIRE RS485 BUS**

Most of RS485 devices use 2-wire RS485 network for data transmission, example of connection ADA-7240 to 2-wire RS485 network is shown below.



**Fig. 5. Example connection of RS485(2W) devices.**

**3.2.4. LINE TERMINATION Rt ON RS485/RS422 BUS.**

The application of Line Termination (terminator)  $R_t = 120 \Omega$  will reduce electrical reflection in data line at high baud rate. It is not needed below 9600Bd should be used the Line Termination resistor if the distance is over 1000m @ 9600Bd or 700m @ 19200Bd transmission. Example connection of  $R_t$  are shown on Fig. 3, 4 & 5. Two resistors  $R_t = 120\Omega$ , are supplied with ADA-7240 converter, free of charge.

**3.3. CONNECTION FIBRE-OPTIC BUS**

The multimode Fibre-Optic with connectors type: ST®, SC or SMA, connect into their corresponding converter's connectors type: ST®, SC or SMA like on the Fig. 6. Connecting the fiber optic cables should be cautious and careful not to damage them or dirty. If it is necessary to lay the cable at an angle, must be created the appropriate bends.



**ATTENTION!!!**

The device is equipped in the laser transmitter.

The radiation emitted by the laser transmitter is harmful to the eyes!

Under no circumstances should never look to at the uncovered slot, to which it is not connected the fiber optic connector.

**3.3.1. WIRING TOPOLOGY FIBER OPTIC BUS**

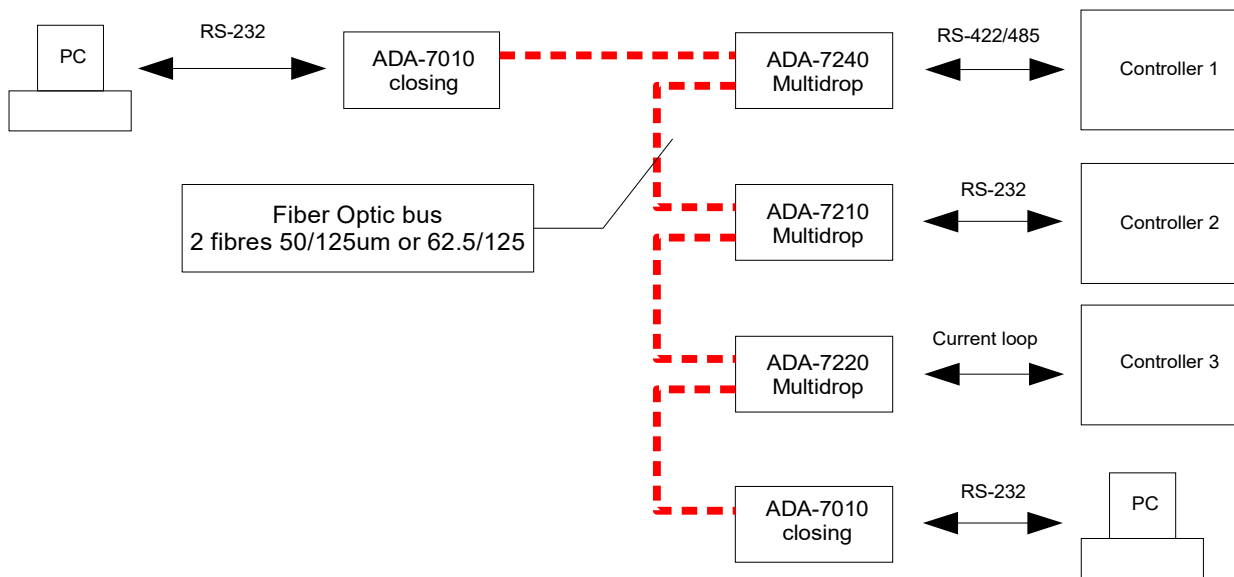


Fig.6. Examples of fiber optic bus connection.

3.3.2. EXAMPLES OF CONNECTION THE CONVERTER TO FIBER OPTIC BUS

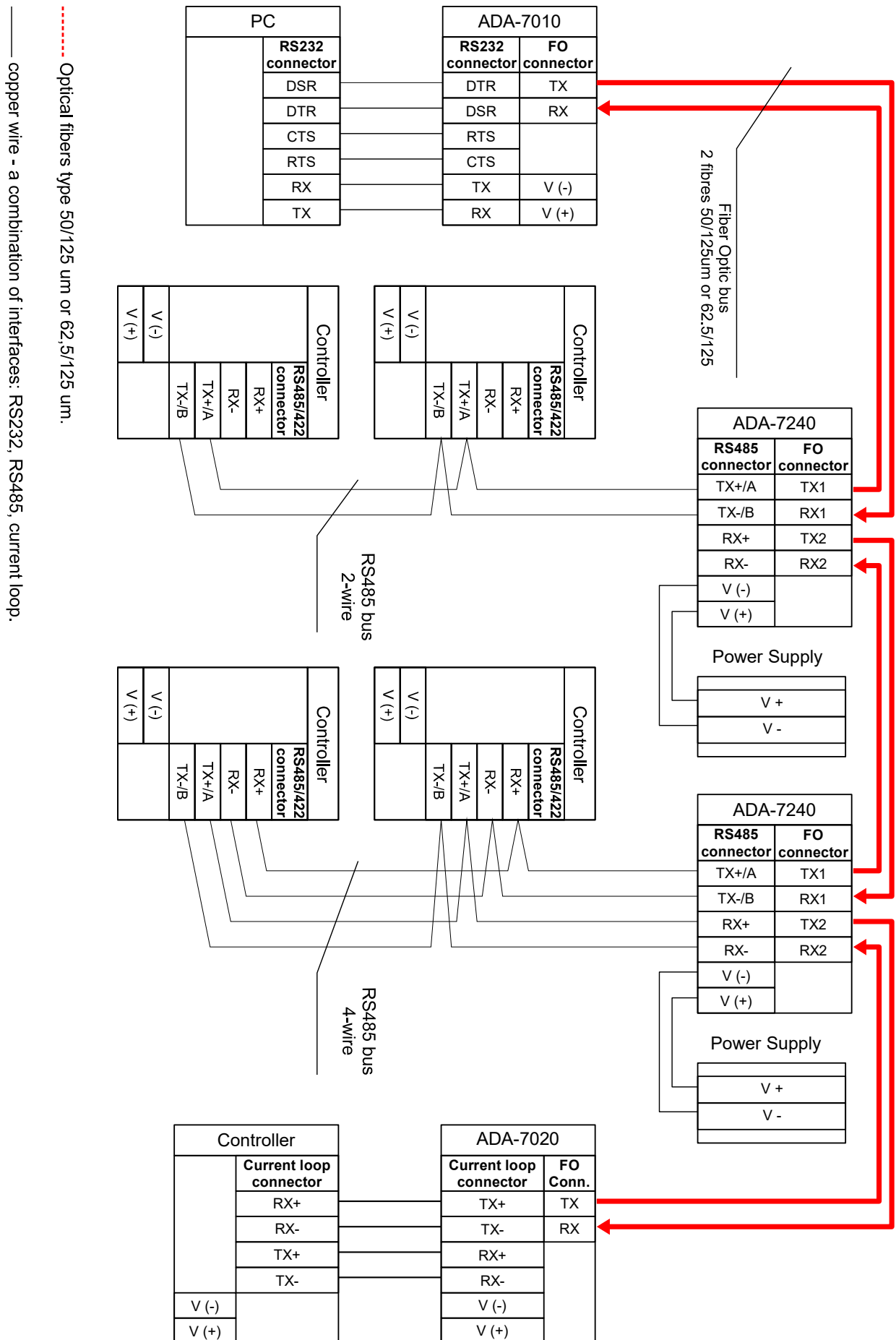


Fig.7. Examples of connection ADA-7240 converter fiber optic bus and devices with RS485 interface.



### 3.4. POWER SUPPLY CONNECTION

The power supply to the ADA-7240 converter should be DC (regulated) from 10 V= to 30V=. Nominal power is typically 2W, e.g. HDR-15-24. Power cable from DC power supplies to device must not be longer than 3m.

Observe the polarity, connect positive (+) of DC power supplies to V+ and negative (-) end to V- screw terminal block. ADA-7240 has the protection from opposite connection power supply. If after power, on the front panel is not lit green LED PWR, check the power connection (polarity).

## 4. CONFIGURATION

The operating mode of the ADA-7240 converter is set by the use 6-position SW1 switch. This switch is located near the Fibre-Optic connectors (see Fig.1). To set the SW1 should remove the terminal cover and using small, flat screwdriver make correct setting.

### 4.1. OPERATING MODE SETTING

All available operating modes are shows in table below.

If there are any additional questions, please contact with technical support: [support@cel-mar.pl](mailto:support@cel-mar.pl) or on the phone: +48 41 362-12-46.

**Table 1. RS422 or RS485 operating mode.**

SW1-1	SW1-2	SW1-3	SW1-4	SW1-5	SW1-6	Description	Operating mode
OFF	OFF	OFF	OFF	OFF	OFF	RS-422 bus	4-wire RS422 network. Full duplex or half duplex transmission.
ON	ON	ON	ON	ON	ON	RS-485 bus, automatic data flow control	2-wire and 4-wire RS485 network. Full duplex or half duplex transmission.

### 4.2. DEFAULT SETTING

The ADA-7240 converter is being set in RS485 mode during production as in the table below.

**Table 2.**

SW1-1	SW1-2	SW1-3	SW1-4	SW1-5	SW1-6
ON	ON	ON	ON	ON	ON

## 5. ACTIVATION

The converter can be power on after properly connection according to section above.

If after connection power supply on front panel will not light green led PWR, check correctness of power supply connecting (polarization). When data is present the LEDs Tx and Rx should blink.

### 5.1. DESCRIPTION OF SIGNALLING LEDS

LED	Description
PWR	Signalling of Power Supply
RX	Signalling of data receiving through ADA-7240 from RS485/RS422 port
TX	Signalling of data transmitting from ADA-7240 through RS485/RS422 port

#### ATTENTION!

**AT BAUD RATE ABOVE 38.4 Kbps THE LED'S TX, RX WILL LIGHT WEAKLY DURING DATA TRANSMISSION**

### 5.2. TROUBLESHOOTING

Problem	Solutions
PWR LED is not light	Check polarization and parameters of connected power supply.
Rx LED lights continuously	RS485(4W) /422 network. Wrong polarization on terminals: Rx+, Rx-; change polarization.
	RS485(2W) network. Wrong polarization on terminals: Tx+/A, Tx-/B; change polarization.
No transmission Tx LED is blinking	RS485(4W) / RS422 network. Check correctness of connection to terminals Tx, Rx; according to point 3.
	RS485(2W) network. Check correctness of configuration setting according to point 4.

## 6. VERSIONS

ADA-7240 -		-	-	-	-
<b>Electronic version:</b>					
Basic		1			
Special version		2			
<b>Galvanic isolation:</b>					
1kV=			2		
3kV=			3		
<b>Terminal &amp; Terminal Cover:</b>					
Cover without inlets, screw terminal block				1	
Cover with inlets, screw terminal block				2	
Cover without inlets, plug-in screw terminal block				3	
<b>Fibre connectors:</b>					
ST – type 850nm					1
SC – type 850nm – not available					2
SMA – type 650nm – not available					3

Order example:

Product symbol: **ADA-7240-1-2-3-1**

**1** – Basic electronic version,

**2** – galvanic isolation 1kV=,

**3** – cover without inlets, plug-in screw terminal block,

**1** – ST-type 850nm fibre connectors,

## 7. SPECIFICATION

<b>TECHNICAL DATA</b>		
<b>Transmission Parameters</b>		
<b>Interface</b>	<b>Fibre-Optic</b>	<b>RS-485/RS-422</b>
<b>Connector</b>	<b>ST</b> <sup>®</sup> * type - transmitter and receiver for an optical wavelength from 792nm to 865nm, <b>SC</b> type - transmitter and receiver for an optical wavelength from 792nm to 865nm, <b>SMA</b> type - transmitter and receiver for an optical wavelength from 640nm to 675nm.	Screw terminal, wire max. Ø 2,5mm <sup>2</sup> .
<b>Line length</b>	up to 2000m for fibre type 50/125 µm, up to 2500m for fibre type 62,5/125 µm up to 2000m for fibre type 100/140 µm up to 20m for fibre type POF/1mm	do 1200 m
<b>Max. number of connected device</b>	free	32 / 2
<b>Transmission line</b>	Two multimode fibres: - connectors ST-850, fibres type 50/125 µm, 62,5/125 µm, 100/140µm, 200µm HCS. - connectors SC-850 fibres type 50/125 µm, 62,5/125 µm, 100/140µm, 200µm HCS. - connectors SMA-650 plastic fibres type POF/1mm.	1-pair, 2-pair or 4-pair twisted cable eg UTP cat. 5e, shield inside large interferences eg STP cat. 5e.
<b>Max. baud rate</b>	Up to 2 Mbps, baud rate depend on length of the RS-485/RS-422 bus.	
<b>Transmission type</b>	Asynchronism full duplex, half duplex.	
<b>Standards</b>	EIA-485/422, CCITT V.11	
<b>Optical signalisation</b>	<ul style="list-style-type: none"> <li>• PWR – green LED power supply,</li> <li>• RX - red LED data receiving from RS-485/RS-422,</li> <li>• TX - yellow LED data transmission through RS-485/RS-422 interface.</li> </ul>	
<b>Electrical Parameters</b>		
<b>Power requirements</b>	10 - <u>24</u> – 30 V DC	
<b>Power Cable</b>	Recommended length of power cable – up to 3m.	
<b>Power</b>	<3W	
<b>Protection from reverse power polarization</b>	YES	
<b>Galvanic Isolation</b>	1kV DC or 3kV DC.	
<b>Electromagnetic compatibility</b>	Resistance to disruptions according to the standard PN-EN 55024. Emission of disruptions according to the standard PN-EN 55022.	
<b>Safety requiring</b>	According to the PN-EN60950 norm.	
<b>Environment</b>	Commercial and light industrial.	
<b>Environmental Parameters</b>		
<b>Operating temperature</b>	-30°C ÷ 60°C	
<b>Humidity</b>	5 ÷ 95% - non-condensing	
<b>Storage temperature</b>	-40 ÷ 70 °C	
<b>Casing</b>		
<b>Dimensions</b>	71 x 90 x 58 mm	
<b>Material</b>	PC/ABS	
<b>Degree of casing protection</b>	IP40	
<b>Degree of terminal protection</b>	IP20	
<b>Weight</b>	0,10 kg	
<b>According to standard</b>	DIN EN50022, DIN EN43880	
<b>Location during work</b>	Free	
<b>Mounting method</b>	On the rail compliant with DIN35 / TS35 standard.	

\* ST jest znakiem handlowym firmy AT&amp;T.

**Dear Customer,**

Thank you for purchasing **CEL-MAR Company** products.

We hope that this user manual helped connect and start up **ADA-7240 converter**. We also wish to inform you that we are a manufacturer of the widest selections of data communications products in the world such as: data transmission converters with interface RS232, RS485, RS422, USB, Current Loop, Fibre-Optic Converters and Ethernet or Wi-Fi.

Please contact us to tell how you like our products and how we can satisfy you present and future expectation.

**CEL-MAR sp.j.**

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