User manual

ADA-7040

Multimode Fibre Optic to RS-485 / RS-422 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.

1.1. WARRANTED INFORMATION

ADA-7040 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.
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 device.

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-7040 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.

1.6. PACK CONTENTS

ADA-7040 converter; user manual; CE declaration; resistors: Rt=120Ω (2 pcs).

2. PRODUCT INFORMATION

2.1. PROPERTIES

- Fibre Optic to RS485 / RS422 conversion,
- Fibre Optic connection via two fibre connectors type: ST® * or SC – 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 mutimode optical fibres eg. type 50/125 μm, 62,5/125 μm, 100/140 μm, 200 μm HCS, 1mm POF,
- Transmission of RX,TX signals,
- Baud rate up to 500kbps,
- 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,
- 5kV= optoisolation between FO and RS485/RS422 in the signal channels,
- Connection RS485/RS422 network and power supply via screw terminal block,
- Connection Fiber Optic network via 2 fibres optic connectors type: ST® *(850nm) , SC(850nm), SMA(650nm)
- Protection against power supply reverse connection,
- Implemented sovervoltage protection on RS422/485 network,
- DIN 43880 standard - mounting in typical electro-installation unit,
- Rail mounting according to DIN35 / TS35 standard,
- Dimensions (W x D x H) 53mm x 62mm x 90mm.

2.2. DESCRIPTION

Fibre Optic ADA-7040 is a device used to connect units with RS485/RS422 interface 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. The fibre connection is implemented by a line consisting of two fibres - one fiber for the TX signal and one for RX signal. Using two this type converters, can be use for communication with devices quite distant from each other eg. Computers, controllers etc.
ADA-7040 is equipped with screw terminal block for RS485/422 and power connections. The converter supports data rates of up to 2Mbps by four or two pairs of twisted pair connected to the screw terminals. The device use to operate lines RX +, RX-, TX +, TX-.
To RS485/422 bus built on the ADA-7040 can be connected 32 devices operating in half duplex mode or full duplex mode. Overvoltage protection was made on base safety diodes and fuses on each RS485/RS422 lines.

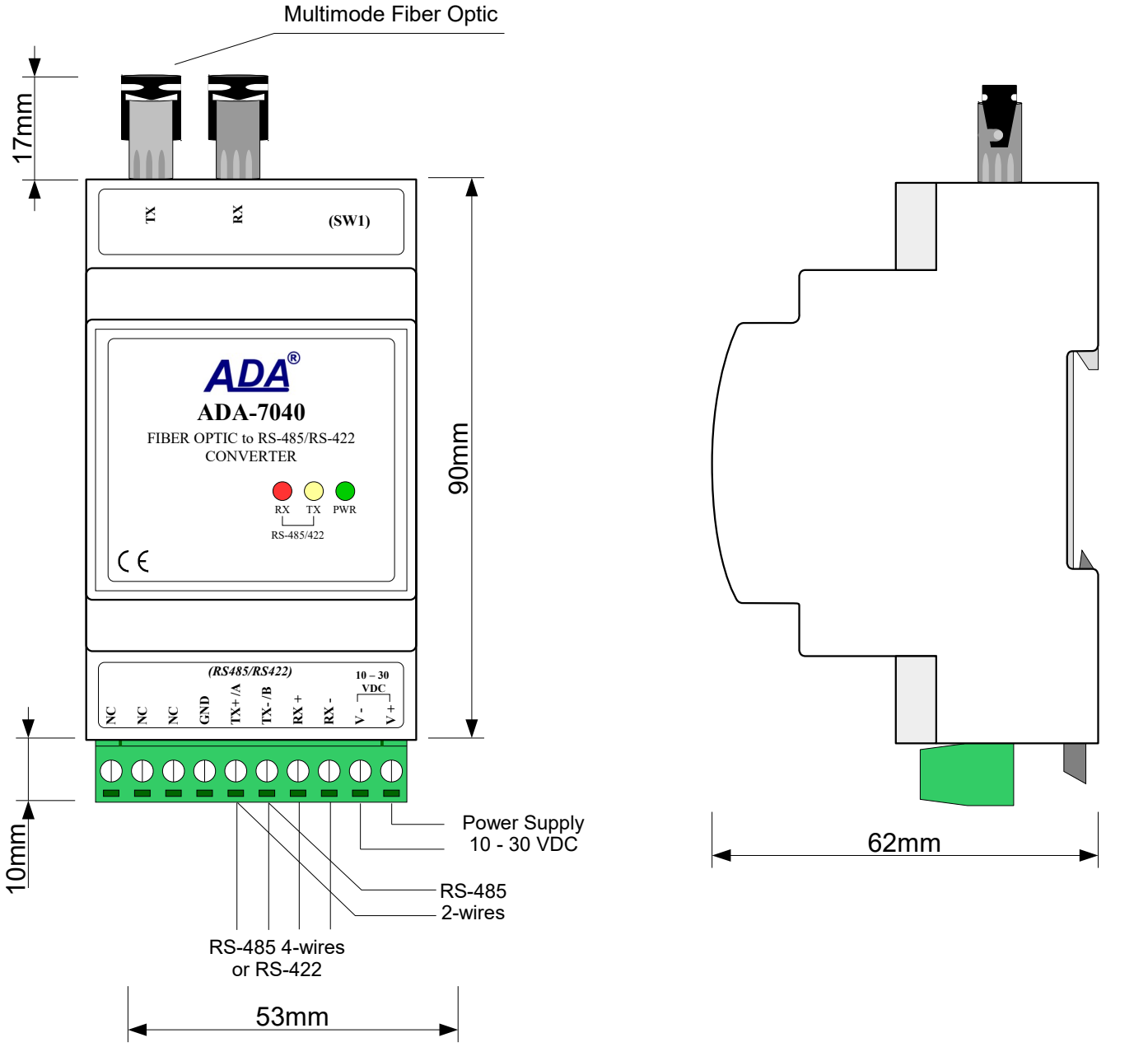

Fig. 1. View of ADA-7040

2.3. ISOLATION

Converter ADA-7040 has 3-way galvanic isolation on the levels 1kV= or 3kV=, depend on version described in section *VERSIONS*.

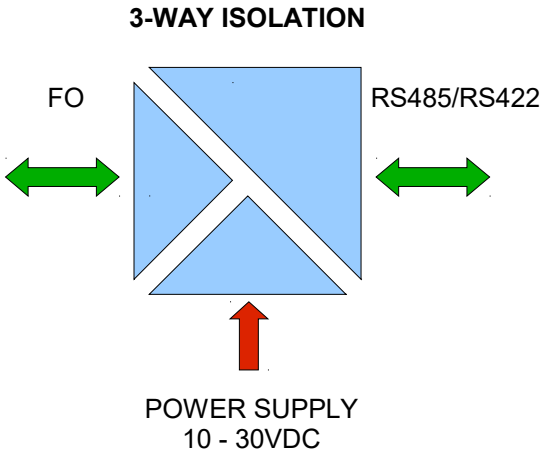

Fig. 2. Isolation structure

3. INSTALLATION

This chapter will show how to connect ADA-7040 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

The ADA-7040 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 NETWORK

RS485/RS422 interface at ADA-7040 converter is available on terminal block described as: Tx+/A, Tx-/B, Rx+, Rx-. ADA-7040 support operating on RS422 bus and RS485. Both buses need proper cabling.

3.2.1. CONNECTION TO 4-WIRE RS422 NETWORK

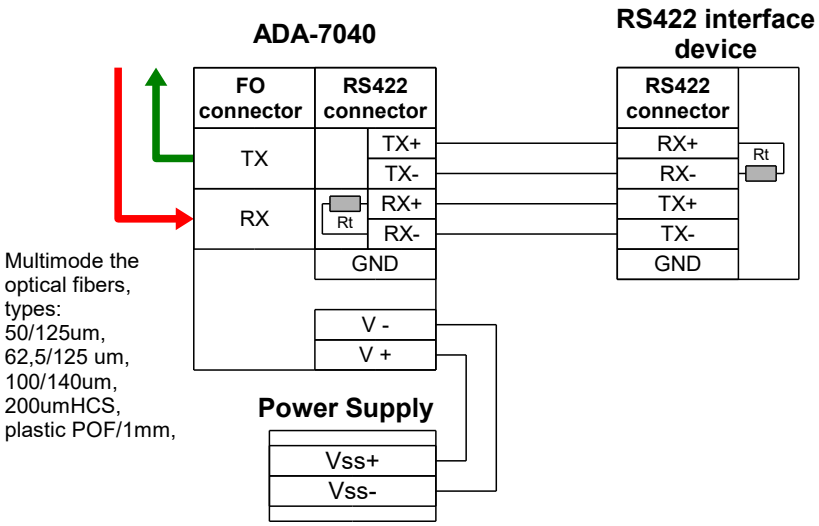

Fig. 3. Example connection of RS422 or RS485(4W) device to ADA-7040

3.2.2. CONNECTION TO 4-WIRE RS485 NETWORK

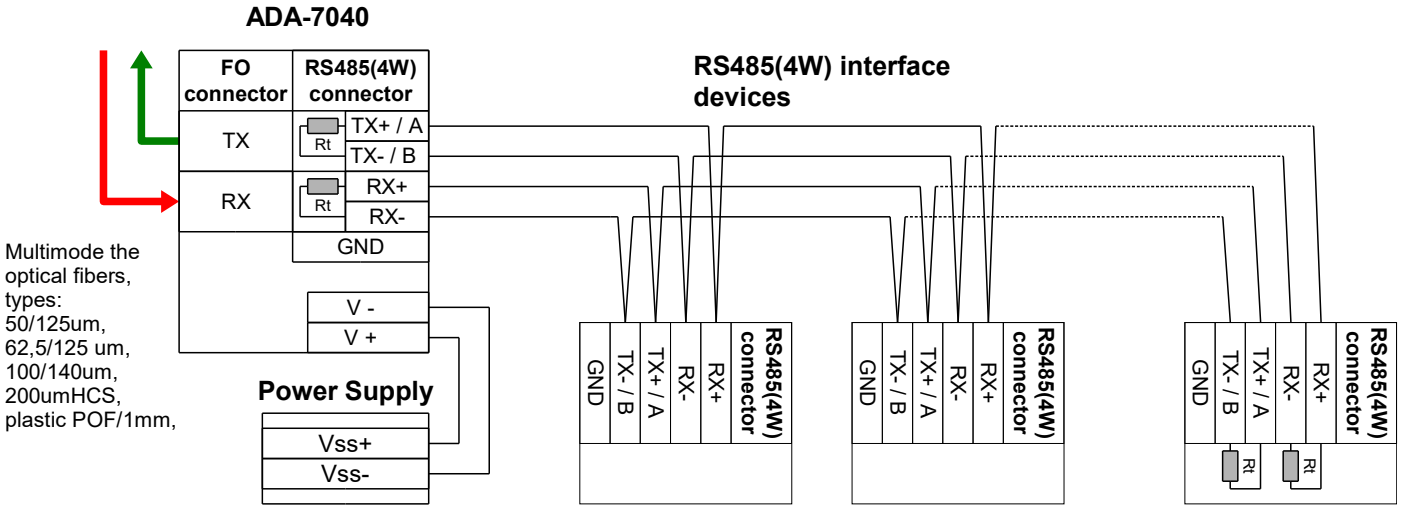

Fig. 4. Example connection of RS485(4W) device to ADA-7040

3.2.3. CONNECTION TO 2-WIRE RS485 NETWORK

Most of RS485 devices use 2-wire RS485 network for data transmission, example of connection ADA-7040 to 2-wire RS485 network is shown below.

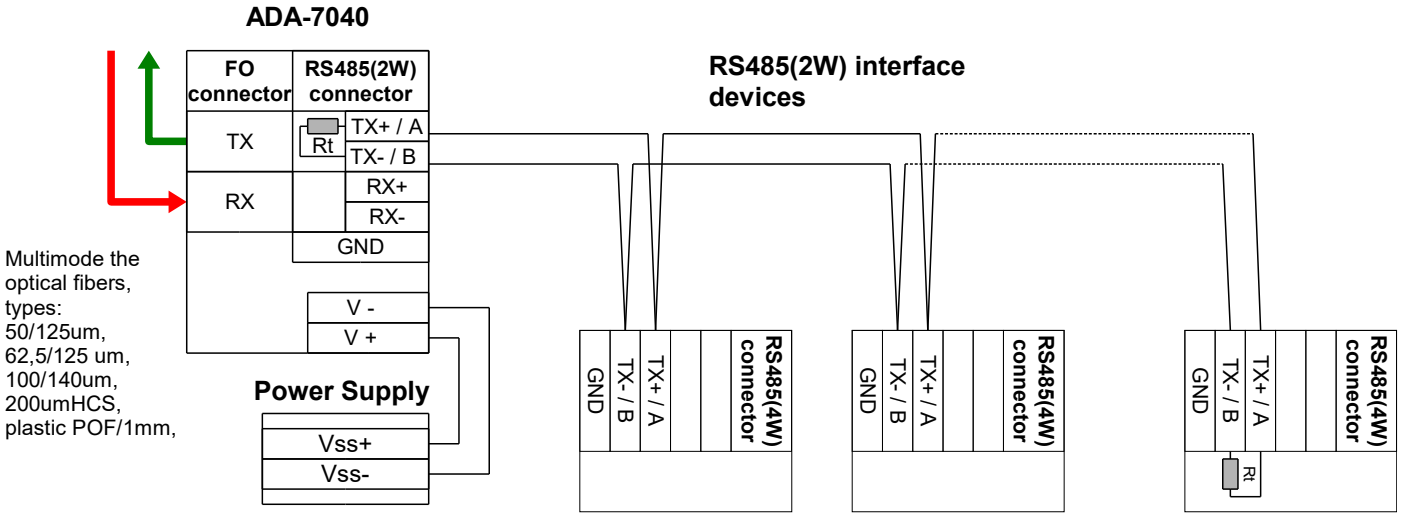

Fig. 5. Example connection of RS485(2W) device to ADA-7040

3.2.4. LINE TERMINATION Rt ON RS485/RS422 BUS.

The application of Line Termination (terminator) Rt = 120 Ω 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 Rt are shown on Fig. 3, 4 & 5. Two resistors Rt =120Ω , are supplied with ADA-7040 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

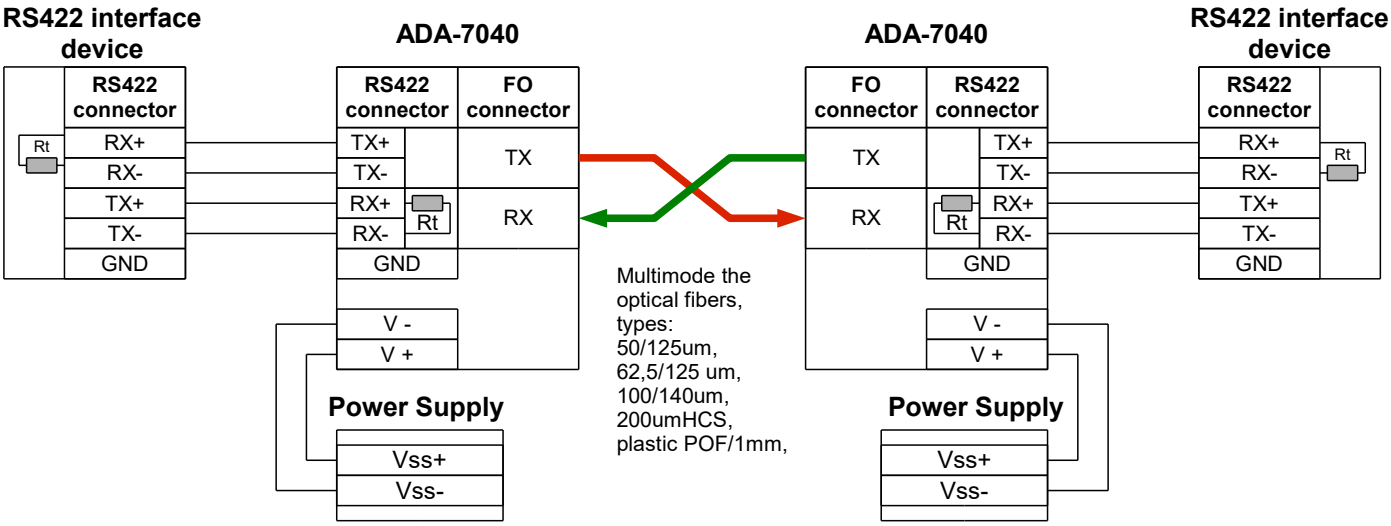

Fig. 6. Example connection of ADA-7040 converters by the use of Fibre-Optic line.

3.4. POWER SUPPLY CONNECTION

The power supply to the ADA-7040 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-7040 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-7040 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. SETTING OF OPERATING MODE

All available operating modes are shows in table below.
If there are any additional questions, please contact with technical support: suppor@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-7040 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

Converter can be powered after proper connection according to steps above.
If connection was made properly green LED PWR on front panel of converter should light, if not check polarization of power connection. During proper data transmission through converter the LEDs Tx and Rx should blink.

5.1. LEDS DESCRIPTION

LED	*Description*
PWR	Signalization of Power Supply
RX	Signalization of data receiving by the ADA-7040 from RS485 / RS422 port
TX	Signalization of data transmission from the ADA-7040 through RS485/ RS422 port

ATTENTION !!!
AT BAUD RATE OVER 38.400 BPS, THE LEDS WILL LIGHT WEAKLY DURING DATA TRANSMISSION.

6. VERSIONS

ADA-7040 - □ - □ - □ - □

Electronic version:				
Basic	**1**			
Special version	**2**			
Galvanic isolation:				
1kV=		**2**		
3kV=		**3**		
Terminal & Terminal Cover:				
Cover without inlets, screw terminal block			**1**	
Cover with inlets, screw terminal block			**2**	
Cover without inlets, plug-in screw terminal block			**3**	
Fibre connectors:				
ST – type 850nm				**1**
SC – type 850nm				**2**
SMA – type 650nm				**3**

Order example:
Product symbol: **ADA-7040-1-2-3-1**

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

TECHNICAL DATA		
Transmission Parameters		
Interface	**Fibre-Optic**	**RS-485/RS-422**
Connector	**ST**® * type - transmitter and receiver for an optical wavelength from 792nm to 865nm, **SC** type - transmitter and receiver for an optical wavelength from 792nm to 865nm, **SMA** type - transmitter and receiver for an optical wavelength from 640nm to 675nm.	Screw terminal, wire max. Ø 2,5mm^2.
Line length	- up to 2000m for fibre type 50/125 μm, optical power budget Tx/Rx 9,6[dB], - up to 2500m for fibre type 62,5/125 μm, optical power budget Tx/Rx 15[dB], - up to 2000m for fibre type 100/140 μm, optical power budget Tx/Rx 15[dB], - up to 1500m for fibre type 200 μm HCS, optical power budget Tx/Rx 20[dB], - up to 20m for fibre type POF/1mm	1200 m
Maximum number of connected device	1	32 / 2
Transmission line	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.
Standards	EIA-485/422, CCITT V.11	
Maximum baud rate	up to 500kbps, baud rate depend on length of the RS-485/RS-422 bus.	
Transmission type	Asynchronous half duplex or full duplex	
Optical signalization	• PWR – green LED power supply, • RX - red LED data receiving from RS-485/RS-422, • TX - yellow LED data transmission through RS-485/RS-422 interface.	
Electrical Parameters		
Power requirements	10 - 24 – 30 V DC	
Power cable	Recommended length of power cable < 3m	
Power	< 3W	

Protection from reverse power polarization	YES
Galvanic isolation	1kV= or 3kV= between power circuit and signal lines FO & RS-485/RS-422
Optoisolation	5kV – between signal lines FO and RS-485/RS-422
Electromagnetic compatibility	Resistance to disruptions according to the standard PN-EN 55024. Emission of disruptions according to the standard PN-EN 55022.
Safety requiring	According to the PN-EN60950 norm.
Environment	Commercial and light industrial.
Environmental Parameters	
Operating temperature	-30°C ÷ 60°C
Humidity	5 ÷ 95% - non-condensing
Storage temperature	-40 ÷ +70°C
Casing	
Dimensions	53 x 90 x 58mm,
Material	ABS/PC
Degree of casing protection	IP40
Degree of terminal protection	IP20
Weight	0,10 kg
According to standards	DIN EN50022, DIN EN43880
Location during work	Free
Mounting method	On the rail compliant with DIN35 / TS35 standard.

* ST is a trademark of AT&T company.

Dear Customer,

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

We hope that this user manual helped connect and start up **ADA-7040 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.

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