

User manual

ADA-7010D

Multimode Fibre-Optic to RS-232 Digital 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

The **ADA-7010D 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 available by contact with Technical Service (email: support@cel-mar.pl; phone: +48 41 362-12-46).



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-7010D 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

The converter is delivered with the user manual and ADAConfig software.

2. PRODUCT INFORMATION

2.1. PROPERTIES

- Conversion signals: Tx, Rx, RTS, CTS, DTR, DSR of RS232 interface to Fiber Optic,
- 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 multimode optical fibres eg. type 50/125 mm, 62,5/125 mm, 100/140 mm, 200 mm HCS, 1mm POF,
- Control of correctness of optical fiber connection to the converter,
- Baud rate set for RS232 interface (bps): 300, 600, 1200, 1800, 2400, 4800, 7200, 9600, 14400, 19200, 28800, 38400, 57600, 76800, 115200, 230400,
- RS232 interface's data format: Number of data bites: 5, 6, 7, 8; Parity: None, Odd, Even; Number of stop bits : 1, 2,

- Transparent for all protocols which data format is in accordance with the above specifications e.g. MODBUS, DNP, PROFIBUS and others,
- External power supply 10 - 30 VDC stable min. 3W,
- Protection against power supply reverse connection,
- 1kV= or 3kV= galvanic isolation between RS232 interface and power supply,
- Connection RS232 network and power supply via screw terminal block,
- Connection Fiber Optic network via 2 fibres optic connectors type: ST® *(850nm) , SC(850nm), SMA(650nm)
- DIN 43880 standard - mounting in typical electro-installation unit,
- Rail mounting according to DIN35 / TS35 standard,
- Dimensions (W x D x H) 53mm x 58mm x 90mm.

2.2. DESCRIPTION

Digital converter ADA-7010D is a device used to extend the RS232 ports of devices. Uses the signals: Tx, Rx, RTS, CTS, DTR, DSR of RS232 port. The converter receives data from the RS232 port and sends it via fiber optic to the second converter together with information about the state of RS232 line.

ADA-7010D converter can configure the baud rate, number of data bits, even parity, or not and the number of stop bits. The settings apply to the RS232 interface and can be different on both sides of the fiber optic. Using multimode fiber provides complete isolation between connected devices and resistance to interference on the transmission line. The fiber optic connection is carried out by a line consisting of two fibers labelled: Tx and Rx. To check the condition of fiber optic connection between converters, were implemented the control of the fiber optic link.

The converter has a screw terminal block for RS232 and power connections and ST or SC or SMA connectors to connect multimode fiber optic. ADA-7010D supports asynchronous data transfer on the RS232 port at baud rate up to 115.2 kbps.

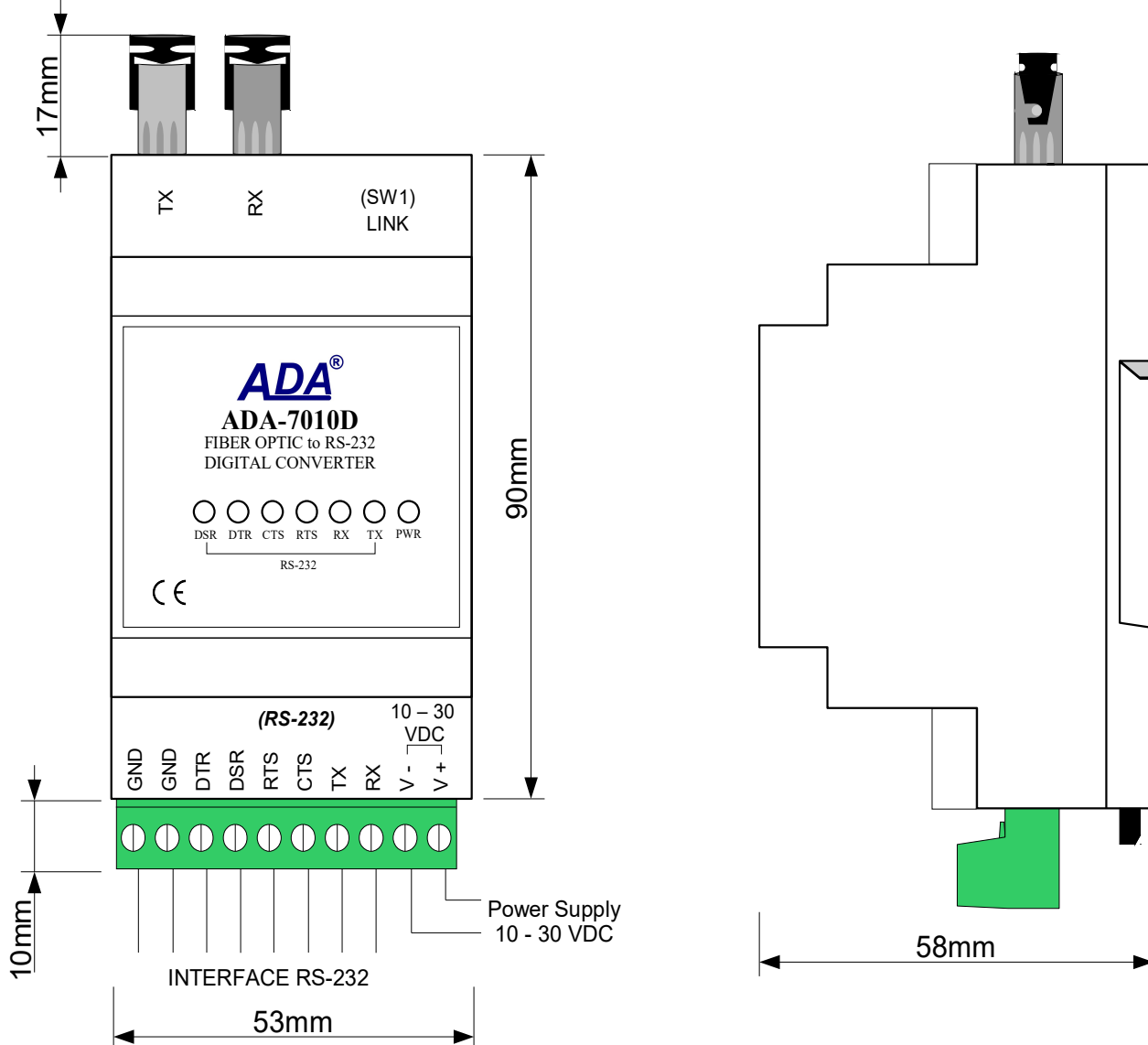


Fig. 1. View ADA-7010D and location SW1 microswitch

2.3. ISOLATION

Converter ADA-7010D has galvanic isolation between power circuit and communication interfaces (RS232 and Fibre-Optic) on level 1kV= or 3kV=, depend on version described in section *VERSIONS*.

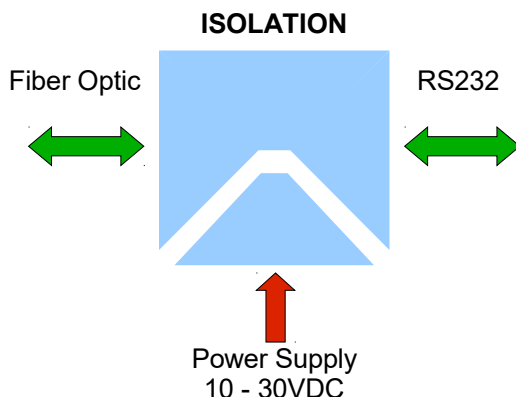


Fig. 2. Isolation structure

3. CONVERTER USE

Digital converter ADA-7010D enables connect by the use of multimode fibre optic line, two RS232 devices together, which use signals: Tx, Rx, RTS, CTS, DTR, DSR and are spaced from each other up to 2500 m. The converter receives data from RS232 port and transmits them via fibre optic port to second converter with a information about state of RS232 line. The transmission is On-line, without buffering and delays. Thus, the converter can support half duplex and full duplex transmission types.

On the figure 3 is shown pictorially principle of operation of the converter and on figure 4 possibilities of use ADA-7010D like extender of RS232 PC port.

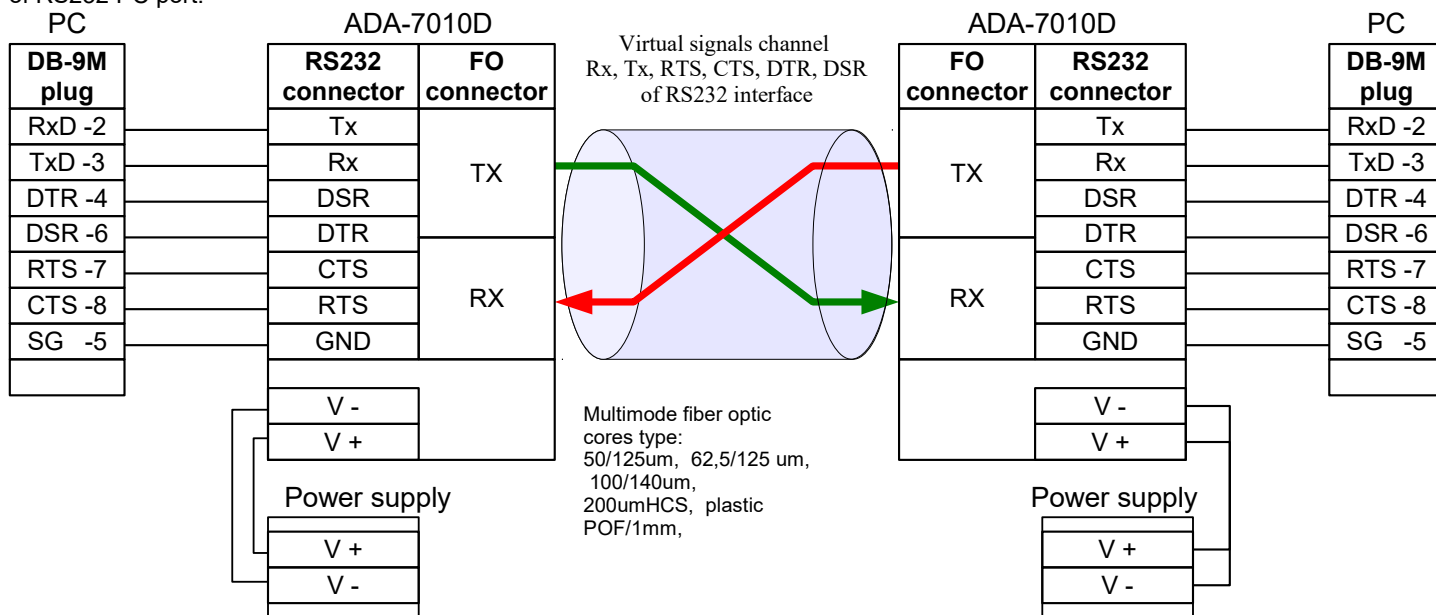


Fig. 3. Operating principle of the converter ADA-7010D

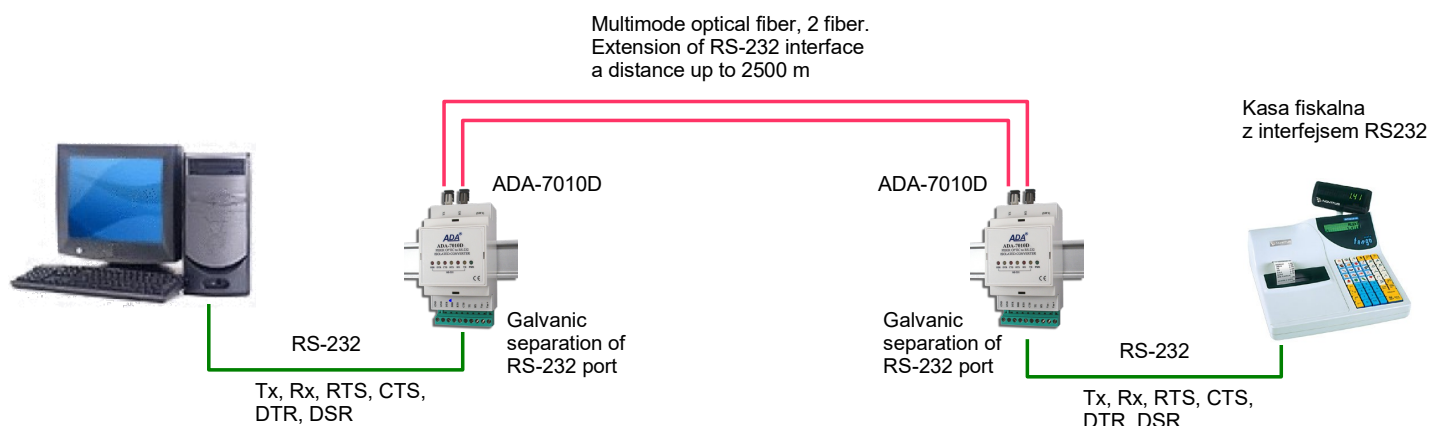


Fig. 4. Example connection of cash register with RS232 interface, distanced of 2500m to PC by the use of ADA-7010D

4. INSTALLATION

This chapter will show how to connect ADA-7010D to RS232 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,

4.1. ASSEMBLING

ADA-7010D 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.

4.2. CONNECTION TO DEVICE WITH RS232 INTERFACE

In the purpose of connecting ADA-7010D to device with RS232 port DTE type (eg. computer), connection should be done as follows.

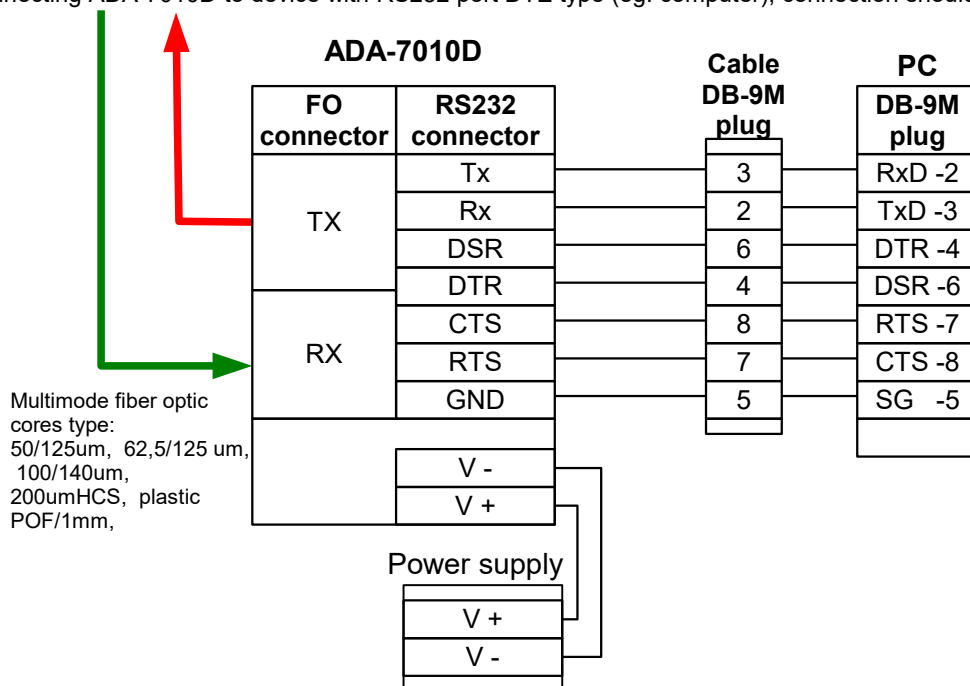


Fig 5. Example connection of ADA-7010D to RS-232 port of PC

4.3. 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 figure below. 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

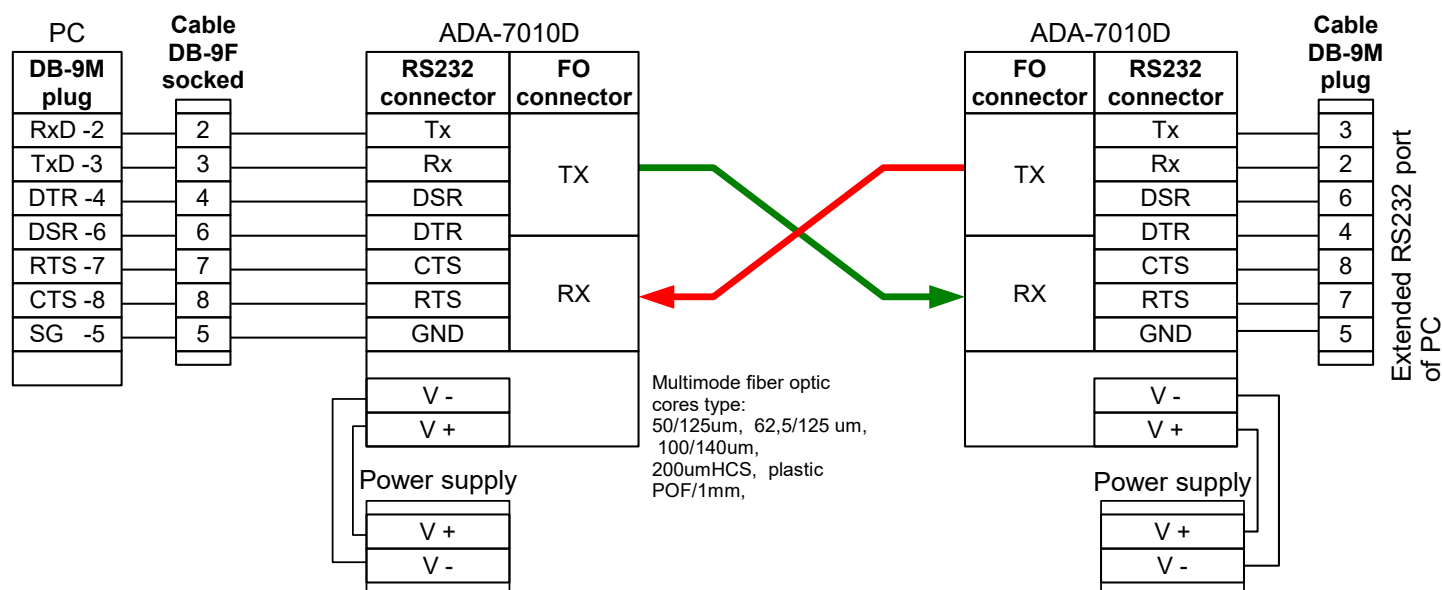


Fig. 6. Example connection of PC to RS232 interface device by the use of fibre-optic converters



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.

4.4. POWER SUPPLY CONNECTION

The power supply to ADA-7010D converter should be DC (regulated) from 10 V= to 30V=. Nominal power is typically 2W, e.g. ZS-12/250 or DR-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-7010D 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).

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). ADA-7010D has control of correctness connection of fibre-optic bus - in case of wrong connection, after 5 seconds from launch the converter, start blinking yellow LED, located next to SW1 micro-switch. This LED will be blink at a frequency of 10Hz up to remove the irregularities. Should be remembered that once this is fixed, should wait about 5 seconds to synchronize the two converters, the LED will be OFF.

During data transmission via ADA-7010D should blink LEDs. Description of signalling LEDs are shown in the table below.

LED	Description
PWR	Signalling of Power Supply
Run mode	
TX	Data transmission from ADA-7010D via RS-232 port
RX	Data receiving via ADA-7010D on RS-232 port
RTS	State of RTS line on RS-232 port of ADA-7010D
CTS	State of CTS line on RS-232 port of ADA-7010D
DTR	State of DTR line on RS-232 port of ADA-7010D
DSR	State of DSR line on RS-232 port of ADA-7010D
Next to SW1	Correctiveness of fibre-optic connection. Blinks with frequency of 10Hz in case of wrong connection of fibre-optic bus.
Configuration mode	
Next to SW1	Blinks with frequency of 1 Hz – see setting of SW1 micro-switch.
Firmware update mode	
Next to SW1	Blinks during software data transmission to the converter.

ATTENTION!

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

6. CONFIGURATION

6.1. HARDWARE CONFIGURATION

Hardware configuration of ADA-7010D is done by setting of SW1 micro-switch to suitable operating mode.

Figure 1 shows location of the SW1 micro-switch inside ADA-7010D. The micro-switch is available after remove of a fibre-optic connectors cover.

6.1.1. OPERATION MODE

The SW1 located next to Fibre-Optic connectors under the cover. To set the switch section, should remove cover marked as SW1 and make the appropriate settings by the use a small, flat screwdriver.

ADA-7010D converter can operates in a few modes :

- run,
- configuration,
- emergency firmware update,
- factory default,

All available adjusting the SW1 switch are shown in table below.

If you have some additional question please contact us +48 41 362-12-46.

Converter operation modes

SW1- 1	SW1- 2	Mode
OFF	OFF	Run
ON	OFF	Configuration
ON	ON	Emergency Firmware Update
ON	OFF	Factory default Turn OFF and ON a power of the converter, the configuration will be set to factory default.

6.2. CONNECTION TO PC

Connection of ADA-7010D to RS232 port, should be done by the use of DB9F-8WIRE cable (available in our offer). Way of connection is described in pt. 4.2.

6.3. CONFIGURATION BY USING ADACONFIG

The configuration of ADA-7010D converter can be made by the use of ADAConfig Software - selling with converter.

To make the configuration, connect converter to computer and power supply. If after power, on the front panel is not lit green LED PWR, check the power connection (polarity). If the PWR LED lights, set the section of SW1 switch to configuration mode as in table below.

SW1-1	SW1-2
ON	OFF

In the configuration mode the yellow LED located next to SW1 micro-switch will blink with frequency 1 Hz. Start the ADAConfig Software and make the configuration of transmission parameters for RS232 interface. First, should be set the number of COM port for communication with the converter, then readout the configuration from ADA-7010D memory using the button **[Read converter configuration]** and make the proper changes for setting of RS232 interface, as below:

- baud rate (kbps): 0.3, 0.6, 1.2, 1.8, 2.4, 4.8, 7.2, 9.6, 14.4, 19.2, 28.8, 38.4, 57.6, 76.8, 115.2,
- number of data bites: 5, 6, 7, 8,
- control parity: no control, parity control, control of none parity,
- number of stop bits : 1, 2,

After configuration, the setting should be saved on converter memory by using button **[Write converter configuration]**.

Return to work in run mode is made by using SW1 switch as below.

SW1-1	SW1-2
OFF	OFF

The yellow LED (located near the SW1), will turn off.

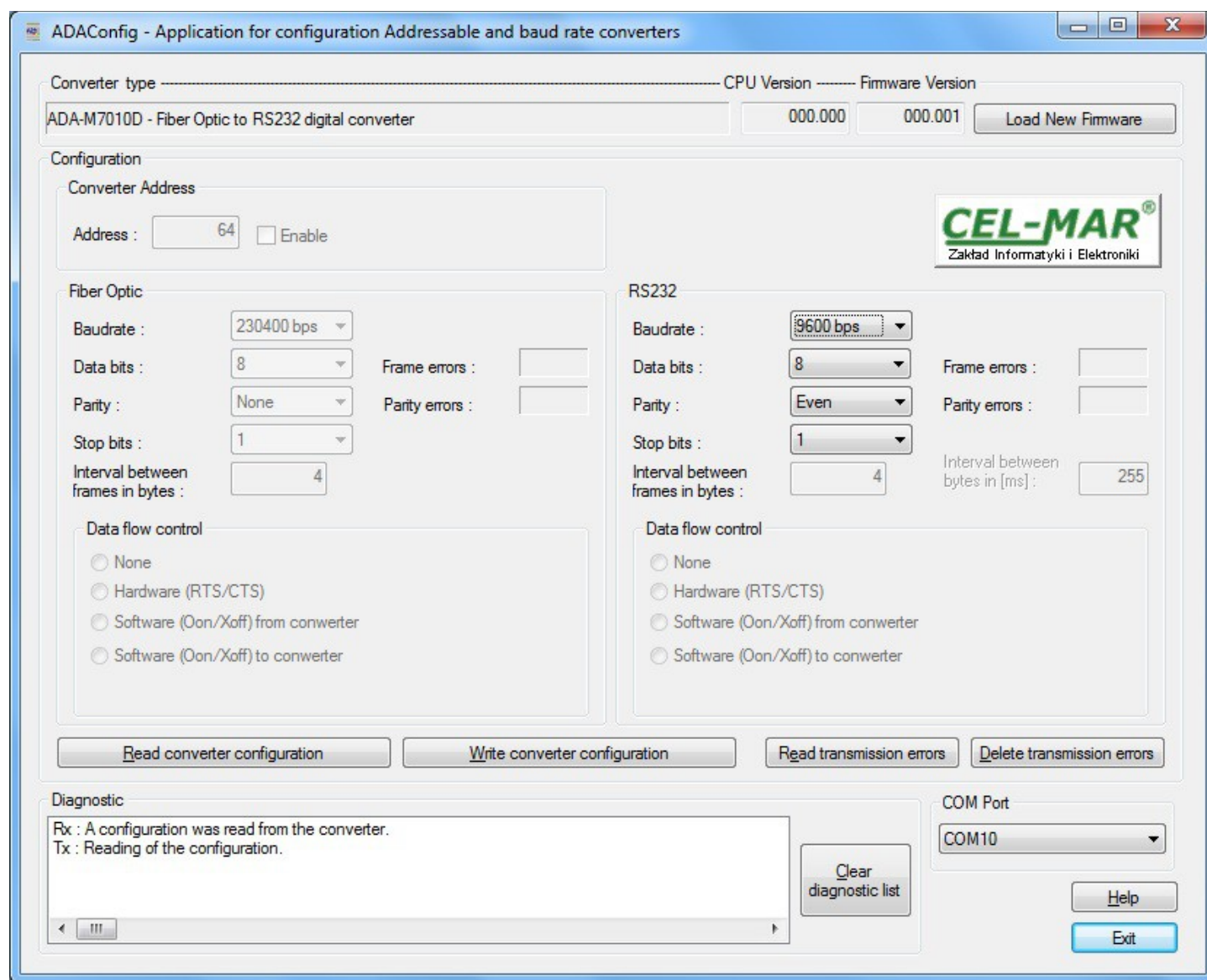


Fig. 7. View of ADAConfig software interface

6.4. DATA TRANSMISSION DIAGNOSTICS

To readout diagnostics set SW1 to configuration mode (see pt OPERATION MODE).

Correctness of transmission proceed on RS232 and Fibre-Optic interfaces can be checked by readout the errors list by *ADAConfig* software from the converter memory. Frames error counter will be increased, in case of: improper speed set compared to real speed of data transmission. Parity error counter will be count the errors which can arise in case of misrepresent bytes in transmitted sign. This counter will not work in case of disable control parity

To check those counters press the button **[Read transmission errors]**, and to delete (zeroing of counters in the memory of the converter) press **[Delete transmission errors]**. In case of parity errors or frame errors, should be checked the ADA-7010D converter's configuration and correctness connection of RS232 interface and to Fibre-Optic converter port.

After finishing the diagnostics, the SW1 microswitch should be set to the run mode (see pt OPERATION MODE).

6.5. FIRMWARE UPDATE

Set SW1 microswitch to configuration mode as in table below.

SW1-1	SW1-2
ON	OFF

In the configuration mode the yellow LED will blink with frequency 1Hz. Press a button **[Load New Firmware]** to change the software delivered by manufacturer. The Select File window will open (Fig.8) and select the *.bin file then click **[Open]** - software will be load to *ADAConfig* buffer storage and will be checked. If the *ADAConfig* not detect errors in loaded file, change converter software. Process of updating is visualized by *ADAConfig* in use *Progress Window* and after proper changing confirmed by correct message.

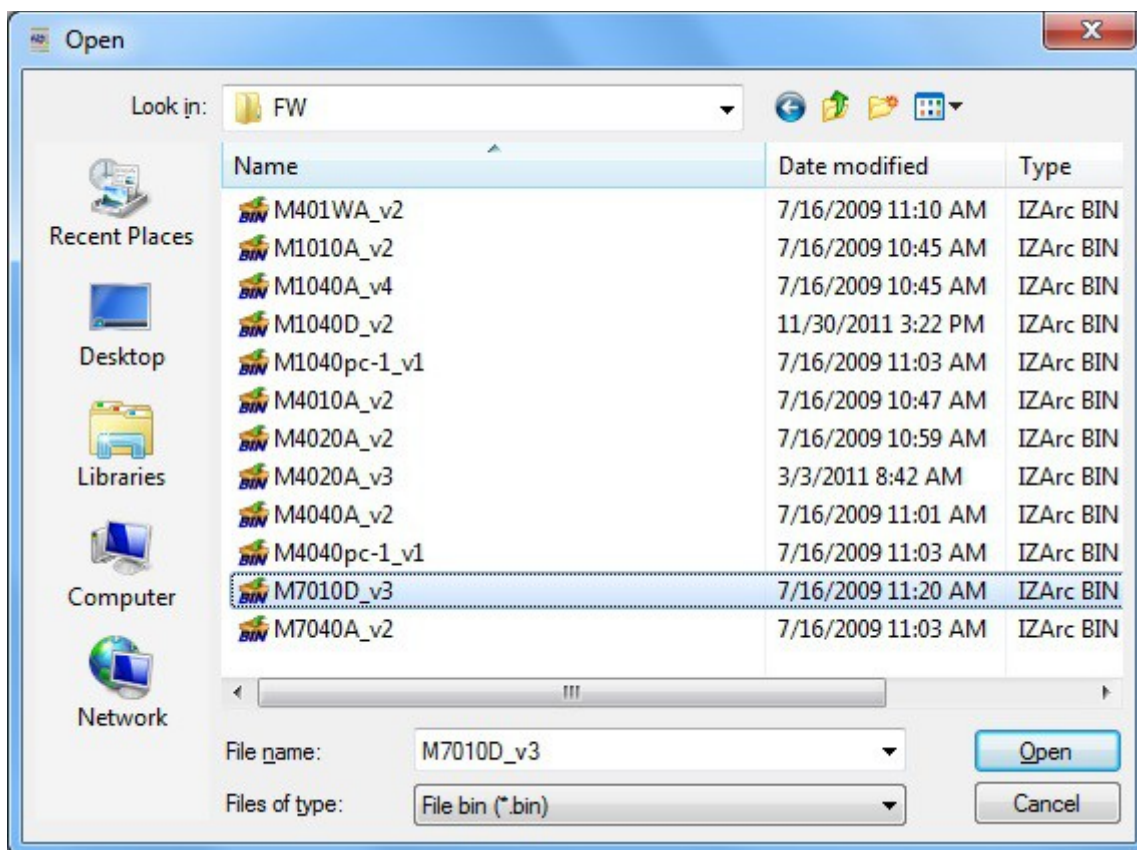


Fig. 8. Selection of firmware file

During loading software the yellow LED located beside SW1 micro-switch will blink, showing data flow to the converter. If the software was loaded correctly yellow LED will be blink with frequency 1 Hz.

After that set microswitch SW1 to run mode as shown in the table below.

SW1-1	SW1-2
OFF	OFF

Yellow LED will be OFF.

6.6. EMERGENCY FIRMWARE UPDATE

In case of the unsuccessful update of the converter software, try again according to point *FIRMWARE UPDATE*. If the update is still incorrect use emergency firmware update. Set SW1 microswitch mode as in the table below.

SW1-1	SW1-2
ON	ON

After micro-switch setting, ADA-7010D should be restarted, by turning OFF and then ON the power supply. The yellow LED will light continuously and the converter will be in Emergency Firmware Update mode. Now follow the description in point *FIRMWARE UPDATE*.

After successful updating, set SW1 micro-switch as in table below. Yellow LED will be OFF.

SW1-1	SW1-2
OFF	OFF

6.7. FACTORY DEFAULT

In case of faulty functioning of ADA-7010D, like:

- no communication in the configuration mode,
 - transmission errors,
- can be restored the factory default setting of the converter internal registers.

Factory default

Parameter	RS232 interface	Fibre-Optic interface
Baud rate	9600bps	460800 bps
Data bits	8	8
Parity	Non	Non
Stop bits	1	1

Set SW1 microswitch mode as in the table below.

SW1-1	SW1-2
ON	OFF

Disconnect the power and after while connect again the power. After that, will be loaded the factory default setting to the converter internal registers.

Set micro switch SW1 to run mode (Yellow LED will be OFF) as shown in the table below.

SW1-1	SW1-2
OFF	OFF

7. RS232 INTERFACE – PIN DESCRIPTION

Pin	Signal	Description	ADA-7010D
Tx	(TD)	Data transmission from ADA-7010D	Transmitter
Rx	(RD)	Data receiving via ADA-7010D	Receiver
RTS	(RTS)	Request to Send Data from ADA-7010D	Transmitter
CTS	(CTS)	Clear to Send Data to ADA-7010D	Receiver
DSR	(DSR)	Data Set Ready to ADA-7010D	Transmitter
DTR	(DTR)	Data device Ready to ADA-7010D	Receiver
GND	(SG)	Signal ground	GND

8. VERSIONS

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
Operating temperature:	
Standard: 0°C up to 50°C	S
Extended: -35°C up to 60°C	E

ADA-7010D - ☐ - ☐ - ☐ - ☐

Order example:

Product symbol: **ADA-7010D-2-3-1-S**

2 - galvanic isolation 1kV=,

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

1 – ST-type 850nm fibre connectors,

S – standard operating temperature range from 0°C up to 50°C.

9. SPECIFICATION

TECHNICAL DATA

PARAMETERS

Interface	Fibre-Optic	RS-232
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 2,5mm².
Line length	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	up to 15m

Max. number of connected device	1	1
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.	DB9F/DB9M cable, multi-core 9x0,34 shielded or twisted 9-pairs UTP Cat. 5E type, shield inside large interferences eg STP cat. 5e.
Max. baud rate	115,2 kbps	
Transmission type	Asynchronous half duplex or full duplex	
Standards	EIA-232, CCITT V.24.	
Optical signalisation	<ul style="list-style-type: none">• PWR – green LED power supply,• RX - red LED data receiving from RS232,• TX - yellow LED data transmission through RS232 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	
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	Standard version (S): 0°C ÷ +23°C ÷ +50°C Extended version (E).....: -35°C ÷ +23°C ÷ +60°C	
Humidity	5 ÷ 95% - non-condensing	
Storage temperature	-40 ÷ +70°C	
Casing		
Dimensions	53 x 90 x 58mm,	
Material	Noryl UL. 94 V-O	
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-7010D 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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