

User manual

ADA-4010

RS-485 / RS-422 to RS-232 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-4010 converter** is covered by a two year warranty from date of sale. 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).

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-4010 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-4010 converter; User Manual; CE declaration; Line terminators $R_t=120\Omega$, (2 pcs.).

2. PRODUCT INFORMATION

2.1. PROPERTIES

- Operating on 2 or 4-wire network in Point-to-Point and Multi-Point mode,
- Operating of up to 32 devices on RS485 network,
- Baud rate up to 230,4 kbps,
- Transparent for all protocols: MODBUS, DNP, PROFIBUS and other,
- Power supply 10 - 30 VDC stable min. 2W,
- 3kV= optoisolation in signal channel between RS232 and RS485/RS422 interface,
- 1kV= or 3kV= galvanic isolation between RS485/RS422 interface and power supply,
- Automatic data flow control (transmitter/receiver) on RS485 bus,
- Connection of RS232, RS485/422 buses and power supply via screw terminal block,
- Implemented short circuit protection and over-voltage protection on RS485/422 network,
- Implemented protection against power supply reverse connection,
- Cover compatible with DIN 43880 standard— mounting in typical electro-installation unit,
- Cover adapt to rail mounting according to DIN35 / TS35 standard,
- Cover dimensions (W x D x H) 53mm x 62mm x 90mm,

2.2. DESCRIPTION

ADA-4010 converts RS485/RS422 standard to RS232 without interfering with format of transmitted data. Converter does not require power supply from RS232 port and support the asynchronous transmission data with baud rate 230,4 kbps through four or two pairs of twisted-pair cables connected to screw terminals. ADA-4010 uses RX, TX, RTS and GND signals for operating, and RTS signal is looped with CTS and DTR with DSR, inside in the converter. Other signals are not connected. If the looping is not needed, can be not I RTS or DTS to the terminal block.

Overvoltage protection was made on base safety diodes and fuses on each RS485/RS422 lines.

To RS485/RS422 bus, created on the base ADA-4010 converters, can be connected up to 32 devices, operating in mode:

- half duplex (query / response) on 2-wires or 4-wires multi-point bus,
- full duplex on 4-wires bus.

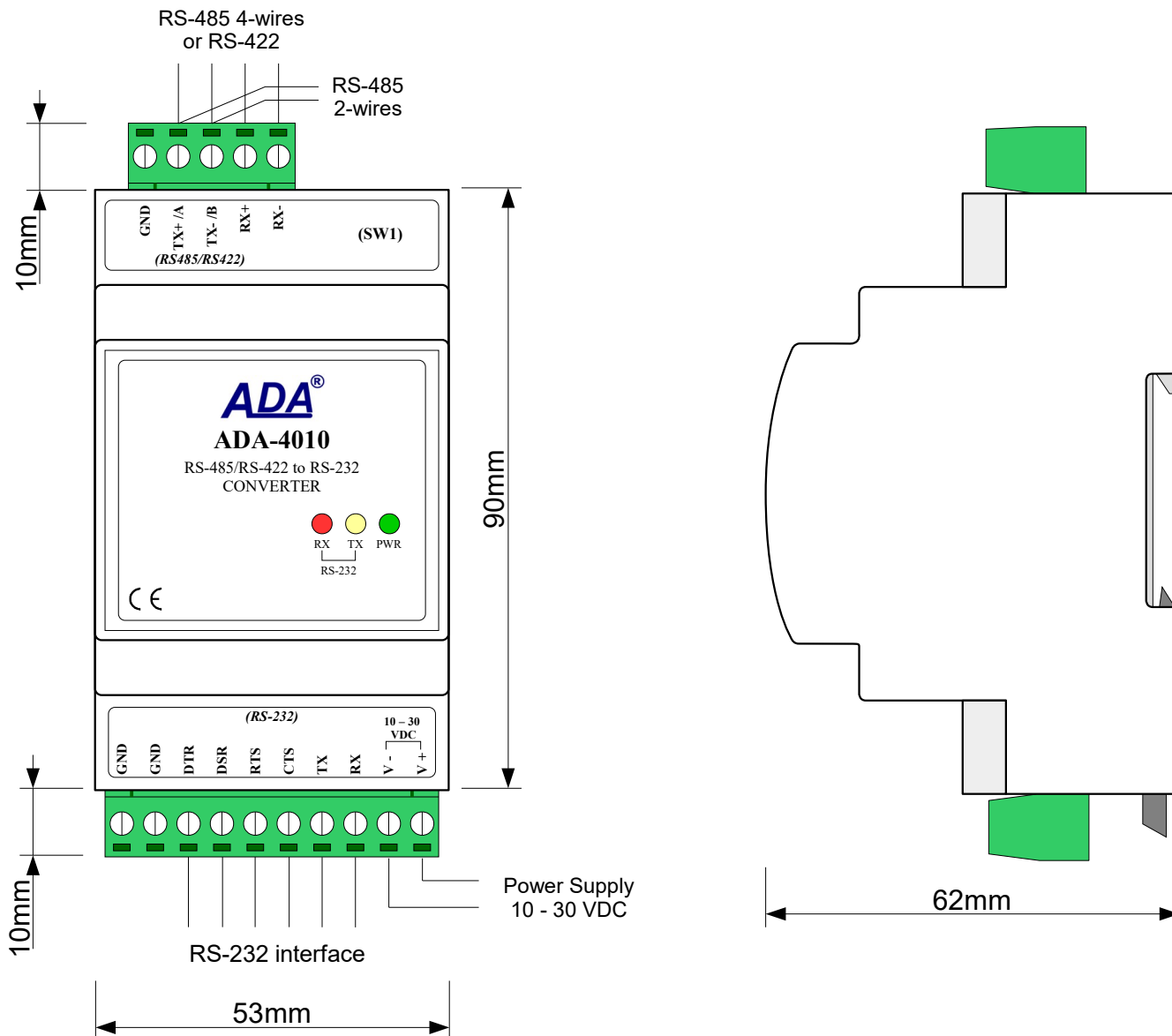


Fig 1. ADA-4010 view and SW1 location

2.3. CONVERSION OF TX, RX

Conversion RS232 to RS485/RS422 (and conversely) are Tx, Rx signals of RS232 interface. There is automatic data flow control on RS485 bus in the converter.

2.4. ISOLATION

Converter ADA-4010 has 2-way or 3-way galvanic isolation on the levels 1kV= or 3kV=, depend on version described in section VERSIONS.

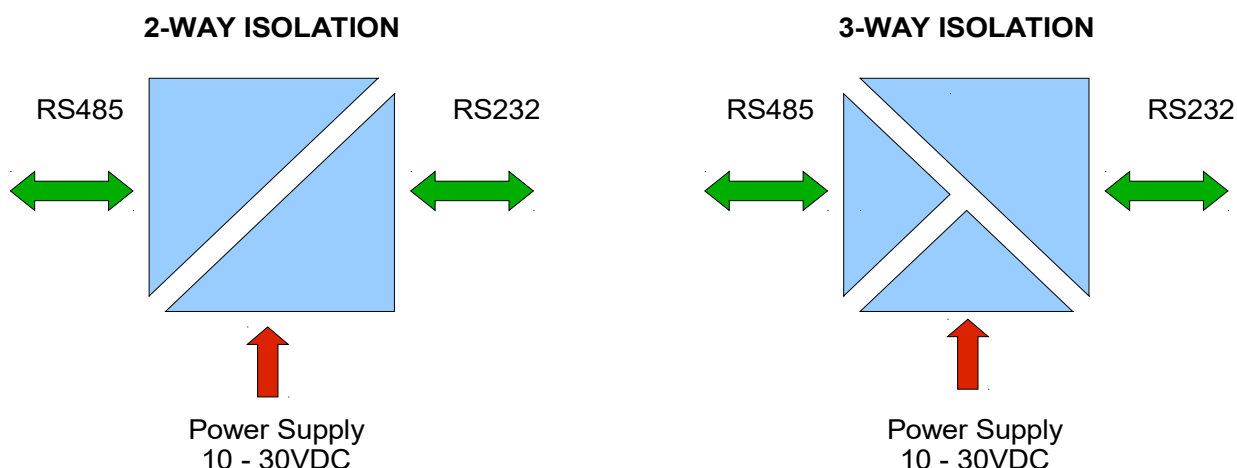


Fig 2. Isolation structure

3. INSTALLATION

This chapter will show how to use and connect ADA-4010 to PC, RS485, RS422 network and power supply.

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 suppression filters for powering 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-4010 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. COMPUTER CONNECTION

In purpose of connecting ADA-4010 to computer, should be used:

- to RS232 computer's port, should be use a cable according to the fig.3.
- to USB computer's port, should be use additional converter USB to RS232 – ADA-I9111 or ADA-I9110, connected to RS232 ADA-4010 port like on the fig.4.

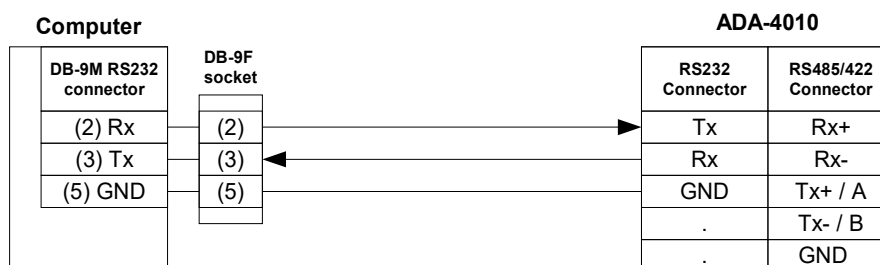


Fig. 3. ADA-4010 connection to PC by the use of cable

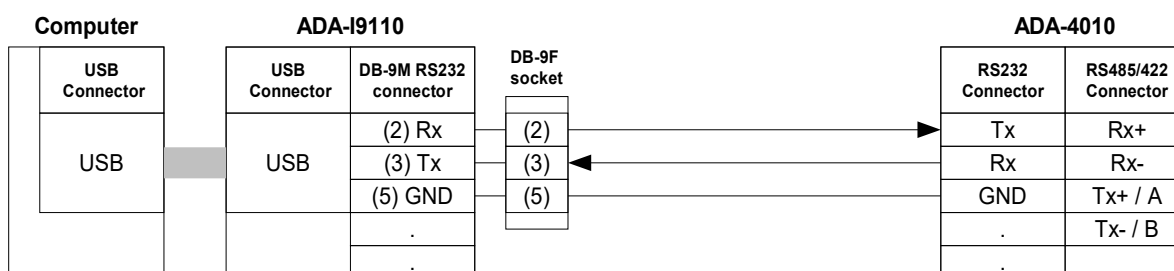


Fig. 4. ADA-4010 connection to PC by the use of USB to RS232 converter ADA-I9110/ADA-I9111

3.1. CONNECTION TO RS485/RS422 BUS

RS485/RS422 interface in ADA-4010 converter is available on screw terminal block described as: Tx+, Tx-, Rx+, Rx-, GND.

The way of connection the converter to RS485(4W) / RS422 bus, is shown below.

3.1.1. CONNECTION TO RS422 BUS

The converter has to be setted to operation in RS422 bus mode.

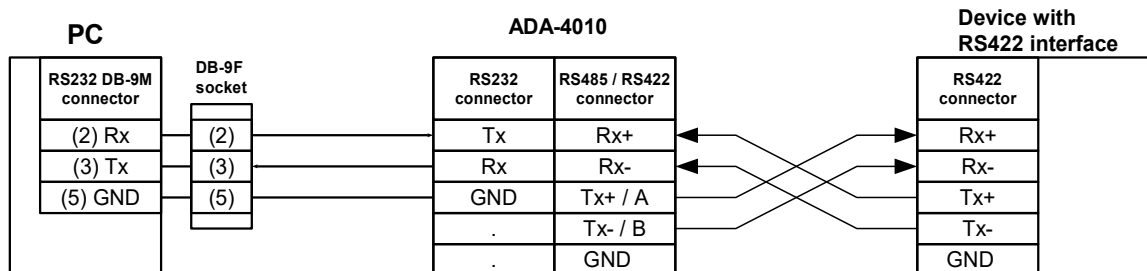


Fig. 5. Example connection of ADA-4010 to RS422 bus

3.1.2. CONNECTION TO RS485(4W) BUS

The converter has to be setted to operation in RS485 bus mode.

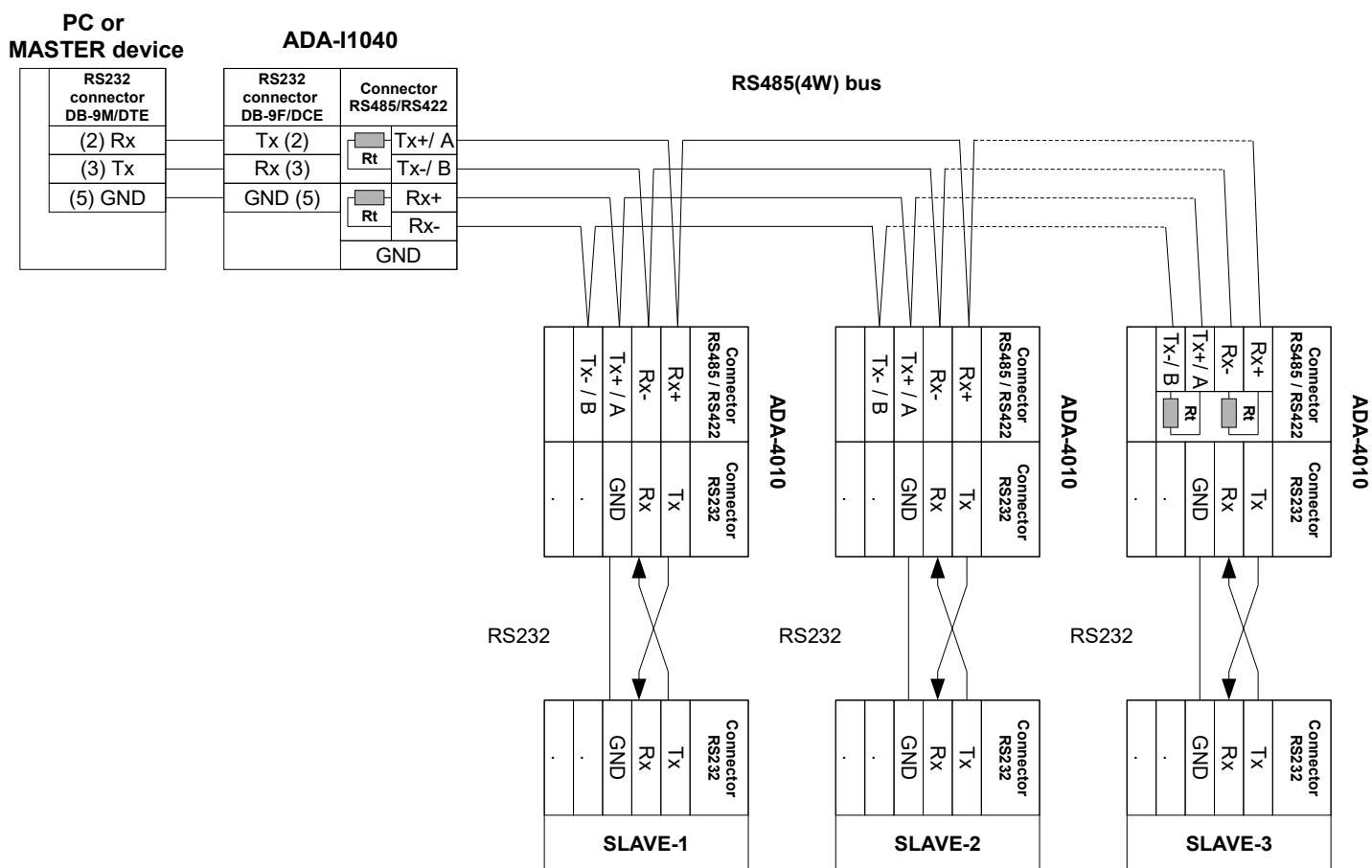


Fig. 6. ADA-4010 connection to RS485(4W) 4-wires bus and galvanic separation of SLAVE device

3.1.3. CONNECTION TO RS485(2W) BUS

The converter has to be set to operation in RS485 bus mode.

PC or
MASTER device

ADA-I1040

RS485(4W) bus

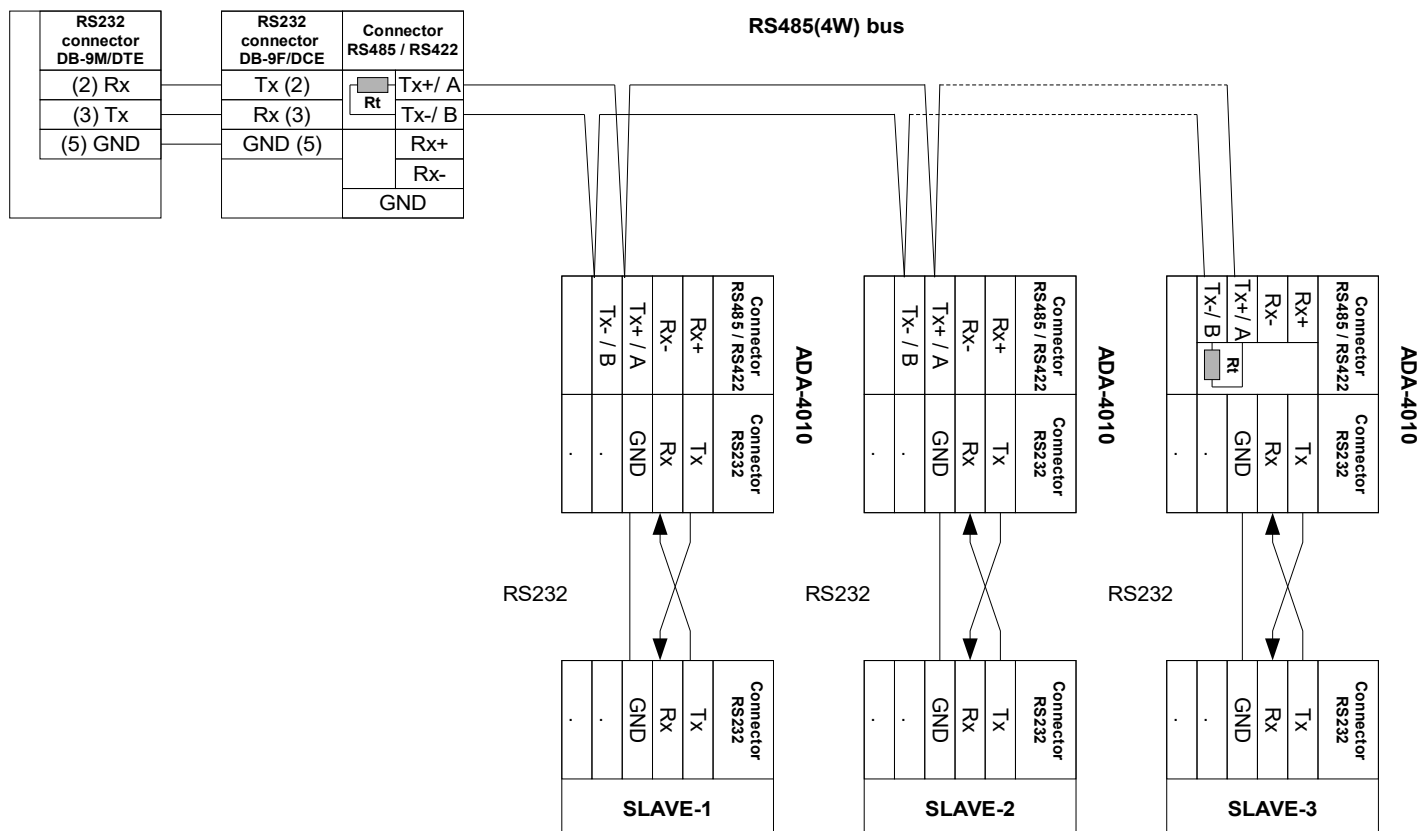


Fig. 7. ADA-4010 connection to RS485(2W) 2-wires bus and galvanic separation of SLAVE device

3.1.4. GND TERMINAL CONNECTION

Connection of GND terminals of RS485/422 interfaces, devices connected to RS485/422 bus, should be done in the case of a potential difference of the signals grounds on interfaces RS485 / RS422, which prevents proper data transmission.

Cannot connect to the GND terminal - cables screens, PE circuit of electrical installation, signals grounds of other devices.

3.1.5. LINE TERMINATION

The application of Line Termination (terminator) $R_t = 120 \text{ ohms}$ will reduce electrical reflection in data line at high baud rate. It is not needed below 9600Bd. The Line Termination resistor should be used if the distance is over 1000m @ 9600Bd or 700m @ 19200Bd transmission, the resistor can be necessary if there are problems with the transmission correctness.

Example connection of R_t are shown on Fig. 6 & 7. Two $R_t = 120 \Omega$, 5%, 0,25W are delivered with the converters.

3.1.6. CONNECTION OF RS232 DEVICE

Example connection of SLAVE device with RS232 interface to ADA-4010 are shown on Fig.6&7.

3.2. POWER SUPPLY

The power supply to ADA-4010 should be DC (regulated) from the scope 10 V= to 30V= and nominal power more 2W, e.g. DR-15-24. The power cable from DC power supplies to the device must not be longer than 3m. Observe the polarity, connect positive (+) of DC power supplies to V+ and negative (-) end to V- terminal.

ADA-4010 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

For configuration of ADA-4010 operating mode use a six-position micro-switch SW1.

The SW1 is located next to 5-pins screw terminal block(Fig.1) under the cover. For setting, remove the cover and use small, flat screwdriver.

4.1. OPERATING MODE

The setting of SW1 micro-switch for operating mode of ADA-4010 is shown in the Table 1 (below).

In case of any questions, contact the support: support@cel-mar.pl.

Table 1.

SW1-1	SW1-2	SW1-3	SW1-4	SW1-5	SW1-6	Description	Operation mode
OFF	OFF	OFF	OFF	OFF	OFF	RS-422 Bus	RS422 bus 4-wire. Transmission full duplex or half duplex
ON	ON	ON	ON	ON	ON	RS485 Bus automatic data flow control	RS485 bus 2-wire and 4-wire. Transmission full duplex or half duplex.

4.2. FACTORY DEFAULT

During production ADA-4010 converter is configured to operating in RS485 mode as in table below.

Table 2.

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

5. ACTIVATION

After properly connection according to section above, the converter can be powered.

If the power is properly connected, on the front panel will light green LED PRW.

When data is present the LEDs Tx and Rx should blink

5.1. SIGNALLING LEDS

LED	Description
PWR	Signalling of Power Supply
RX	Signalling of data receiving through ADA-4010 converter from RS232 port.
TX	Signalling of data transmitting from ADA-4010 converter through RS232 port.

ATTENTION!

At baud rate above 38.4 kbps the LED's Tx, Rx will light weakly during data transmission

6. RS232 INTERFACE – PIN DESCRIPTION

Pin	Signal	Description	ADA-4010
TX	(TD)	Data transmission from ADA-4010	Transmitter
RX	(RD)	Data receiving via ADA-4010	Receiver
RTS	(RTS)	Demand of transmission from ADA-4010	Looped with CTS
CTS	(CTS)	Readiness of transmission to ADA-4010	Looped with RTS
DSR	(DSR)	Data Readiness to ADA-4010	Looped with DTR
DTR	(DTR)	Device Readiness from ADA-4010	Looped with DSR
GND	(SG)	Signal ground	GND

7. VERSIONS

	ADA-4010 -		-		-	
Electronic versions:						
Basic,		1				
Special,		2				
Galvanic isolation:						
1kV= 2-way				2		
1kV= 3-way				23		
3kV= 2-way				3		
3kV= 3-way				33		
Terminal & Terminal Cover:						
Cover without inlets, screw terminal block					1	
Cover without inlets, screw terminal block					2	
Cover without inlets, plug-in screw terminal block					3	

Order example:
Product Symbol: **ADA-4010-1-23-3**
1 – basic version of electronic,
2 – galvanic isolation 1kV=, 3-way
3 – cover without inlets, plug-in screw terminal block,

8. SPECIFICATION

TECHNICAL DATA		
Transmission Parameters		
Interface	RS-485/422	RS-232
Connector	Screw terminal block - max. Ø 2,5mm²	Screw terminal block - max. Ø 2,5mm²
Max. Line length	1200 m	Up to 15 m
Max. number of connected device	32	1
Transmission line	1-pair or 2-pair twisted cable, UTP Nx2x0,5 (24AWG), shield inside large interferences STP Nx2x0,5 (24AWG)	1-pair or 2-pair twisted cable, UTP Nx2x0,5 (24AWG), shield inside large interferences STP Nx2x0,5 (24AWG)
Standards	EIA-485, CCITT V.11	EIA-232, CCITT V.24,
Max. baud rate	230,4 kbps	
Transmission line	Asynchronous full duplex, half duplex.	
Optical Signalization	<ul style="list-style-type: none">• PWD – green LED power supply,• RX - red LED data receiving on RS232,• TX - yellow LED data transmission via RS232.	
Electrical Parameters		
Power requirements	10 - 24 – 30 V DC	
Power Cable	Recommended length of power cable – do 3m.	
Power	<2W	
Protection from reverse power polarization	YES	
Galvanic Isolation	1kVDC or 3kVDC - between power circuit and RS-485/RS-422 signal line	
Optoisolation	~3kV - between signal lines RS-485/RS-422 and RS-232	
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 ÷ +60°C	
Humidity	5 ÷ 95% - non-condensing	
Storage temperature	-40 ÷ 70°C	
Cover		
Dimensions	53 x 90 x 62 mm	
Material	PC/ABS	
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	Rail mounting according to DIN35 standard / TS35.	

Dear Customer,

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

We hope that this user manual helped connect and start up the **ADA-4010 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, Ethernet, Wi-Fi, Current Loop, Fibre-Optic Converters and other.

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

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