

User manual

ADA-1040

RS-232 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-1040 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-1040 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-1040 converter, user manual, CE declaration, resistors: 120Ω (2 pcs.).

2. PRODUCT INFORMATION

2.1. PROPERTIES

- Operating on 2 or 4-wire network in Point-to-Point and Multi-Point mode,
- Conversion TX, RX signals to RS485/RS422 standard,
- Conversion DTR an DSR additional signals to RS422 standard,
- Operating of up to 32 devices on RS485 network,
- Baud rate up to 230,4 kbps,
- Automatic data flow control on RS485 network,
- Transparent for all protocols: MODBUS, DNP, PROFIBUS and other,
- Any format of bit, defined with the specification of RS232 interface,
- Power supply 10 - 30 VDC stable min. 2W,
- 5kV= optoisolation in signal channel between RS232 and RS485/RS422 interface,
- 1kV= or 3kV= galvanic isolation between RS232 interface and power supply,
- Implemented short circuit protection and over-voltage protection on RS485/422 network,
- Connection RS485/422 network and power supply via screw terminal block,
- DIN 43880 standard– mounting in typical electro-installation unit,
- Rail mounting according to DIN35 / TS35 standard,
- Dimensions (W x D x H) 52,8mm x 62mm x 90mm.

2.2. DESCRIPTION

Many devices such as PLCs, measuring transducer, sensors, cash registers and electronic scales are equipped with RS232 communication port. However, the standard 232 has limitations on cable length (the distance at which transmission functioning properly is 15m). Solution to this problem is to use the RS485/422 data transmission standard. It lets connect together distant devices at 1200m.

ADA-1040 converts RS232 standard to RS485/RS422 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.

ADA-1040 has DB-9F connector (DCE type) to connecting RS232 interface in use of RS232 extension cable (a typical modem cable) without interleaving of Tx with Rx, RTS with CTS and DTR with DSR. Converter has also screw terminal block for connection of RS485/422 network and power supply. This device use Rx, Tx and GND signals for operating and additionally DTR, DSR in extended version. Galvanic isolation and optoisolation (in signal channel) separates RS232 interface from RS485/422 interface and protect a device connected to RS232 port from overvoltage on RS485/422 network and power supply. Overvoltage protection was made on base safety diodes and fuses on each RS485/RS422 lines.

ADA-1040 should be powered from stabilised power pack with minimum power output 2W and voltage from the scope 10 – 30VDC.

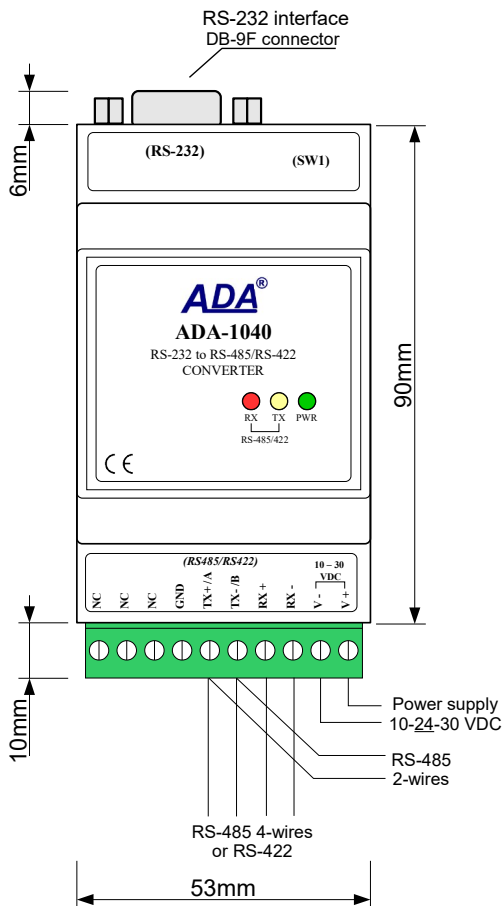


Fig 1. View and SW1 location

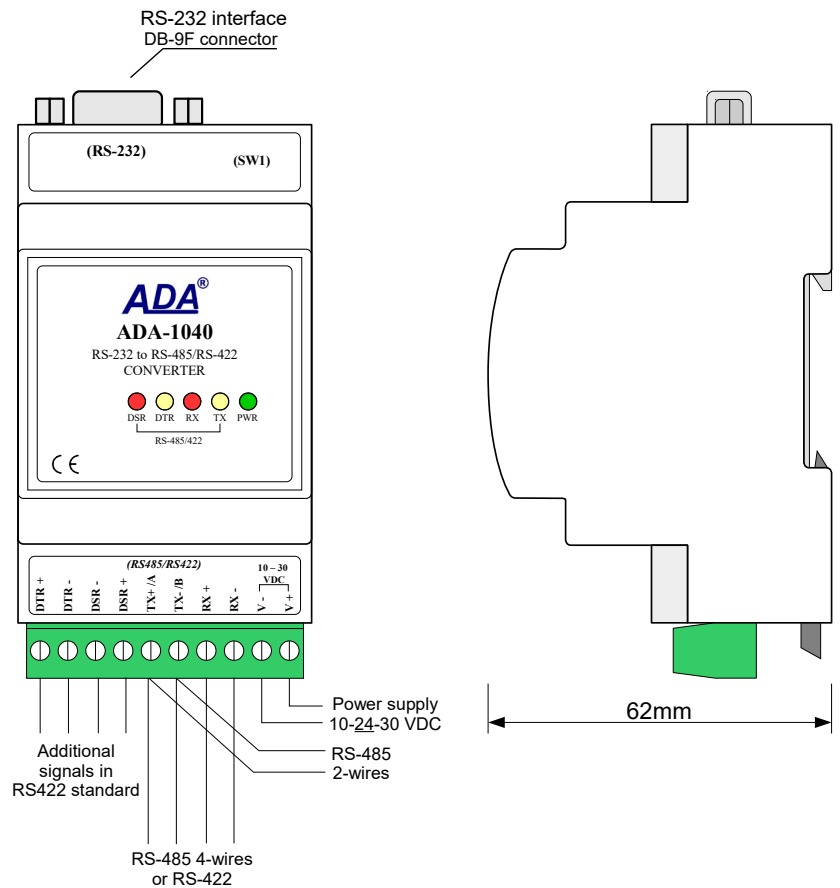


Fig 2. View with additional signals and SW1

2.3. CONVERSION OF TX, RX, DTR, DSR SIGNALS OF RS232 INTERFACE

In additional version ADA-1040(x-2-x-x) can convert DTR, DSR or RTS, CTS signals of RS232 interface to RS485/422 in POINT-TO-POINT operating mode. Those additional signals are being connecting to ADA-1040 through DB-9 socket to **4-DTR** and **6-DSR** pins.

ATTENTION!

If the signals RTS and CTS need to be converted, should be solder wires at DB-9M plug as below:

RTS – PIN7 to PIN 4

CTS – PIN 8 to PIN6.

2.4. ISOLATION

Converter ADA-1040 has 2-way or 3-way and 1kV= or 3kV= galvanic isolation (depend on version), this will be described in section VERSIONS.

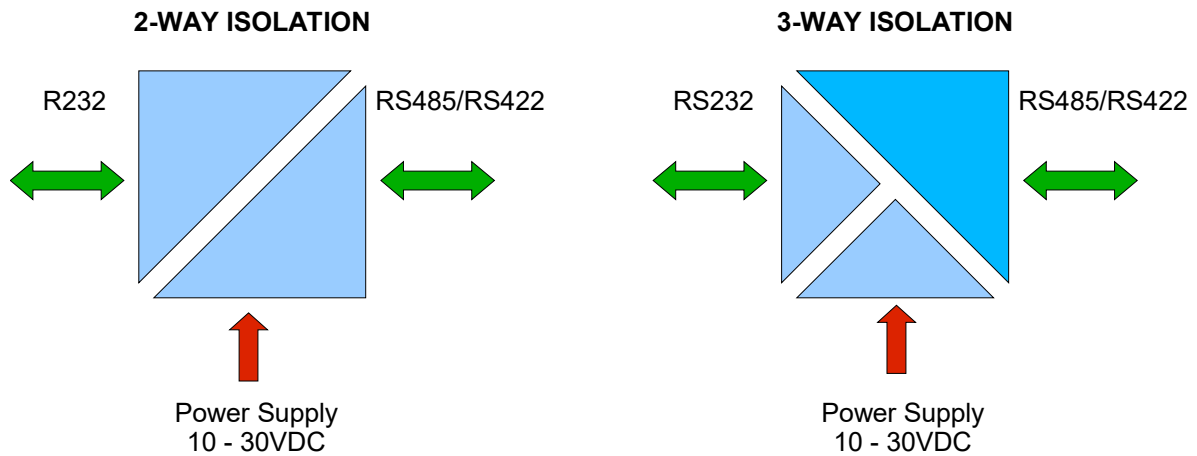


Fig 3. Isolation structure

3. INSTALLATION

This chapter will show how to connect ADA-1040 to RS485/422 bus, devices with RS232 interface and power supply. To reduce disturbance from environment, it is recommended to:

- use multipair type shielded cables, which shield can be connected to the earthing on one end of the cable,
- use the suitable diameter cable for power supply on account of voltage drop,
- use the powering cable with a suitable section because of the voltage drops,
- use the interference eliminators for powering the converter,
- lay signal cables at a distance of not less than 25 cm away from power cables,
- not powering the converters form the power-circuit of devices generate large impulse disturbance like contactors, relays, inverters.

3.1. ASSEMBLING

ADA-1040 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 OF DEVICES WITH RS232 PORT

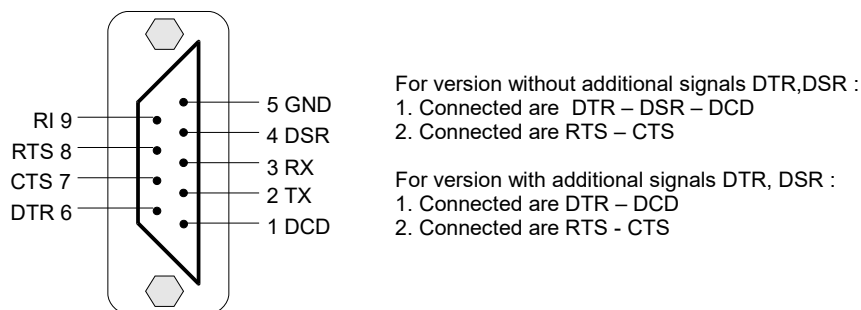


Fig 4. RS232 interface signals of DB-9F (female) connector.

3.2.1. CONNECTION OF DEVICES WITH RS232 PORT - DTE TYPE (COMPUTER)

In purpose of connecting ADA-1040 to RS232 port of computer, should be used the RS232 extension cable CAB-DB9F/DB9M-S-1,8m (available in CEL-MAR offer). Example connection is shown below.

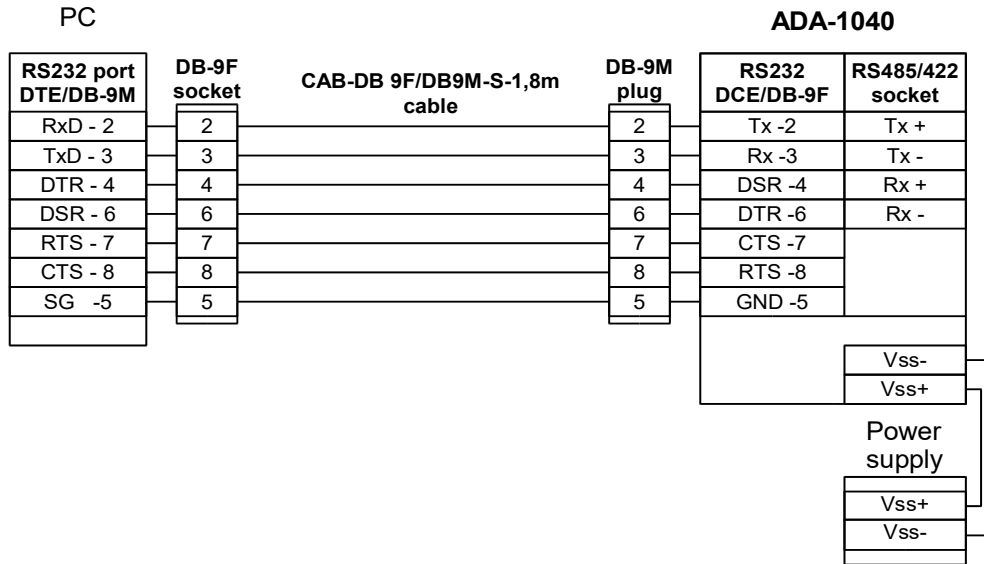


Fig 5. Connection to RS-232 computer port

3.2.2. CONNECTION OF DEVICES WITH RS232 PORT - DCE TYPE (MODEM)

In purpose of connecting ADA-1040 to RS232 port type DCE (eg modem), should be used the RS232 cable CAB-DB9M/DB9M-C-1,8m (available in CEL-MAR offer). Example connection is shown below.

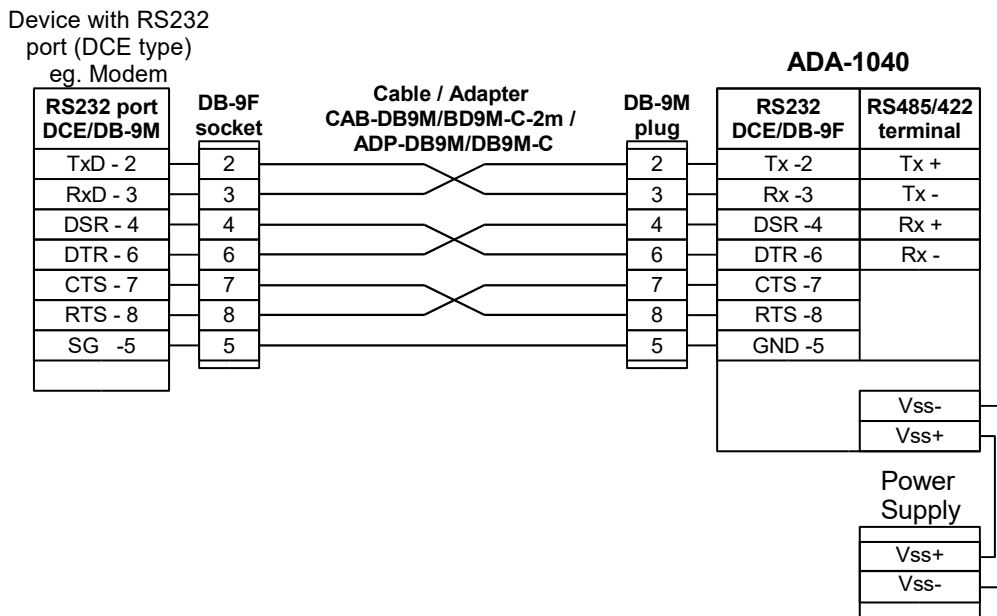


Fig 6. Connection to device with RS232 type DCE

3.3. CONNECTION TO RS485/RS422 NETWORK

RS485/RS422 interface in ADA-1040 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.

3.3.1. POINT-TO-POINT CONNECTION DEVICE WITH RS422 OR RS485(4W) INTERFACE

Example connection is shown below.

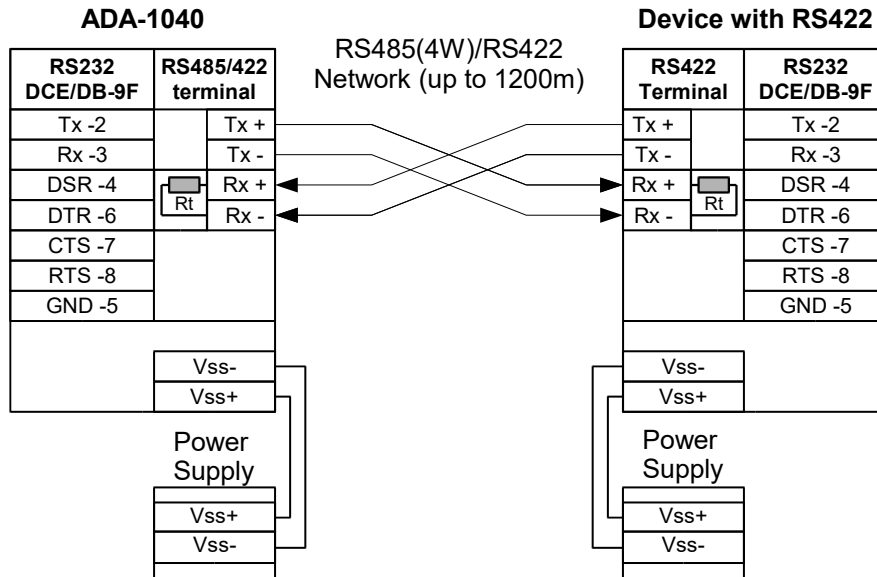


Fig 7. Example point-to-point connection to RS422 device

3.3.2. MULTI-POINT CONNECTION RS485(4-WIRE) DEVICES

Example connection is shown below

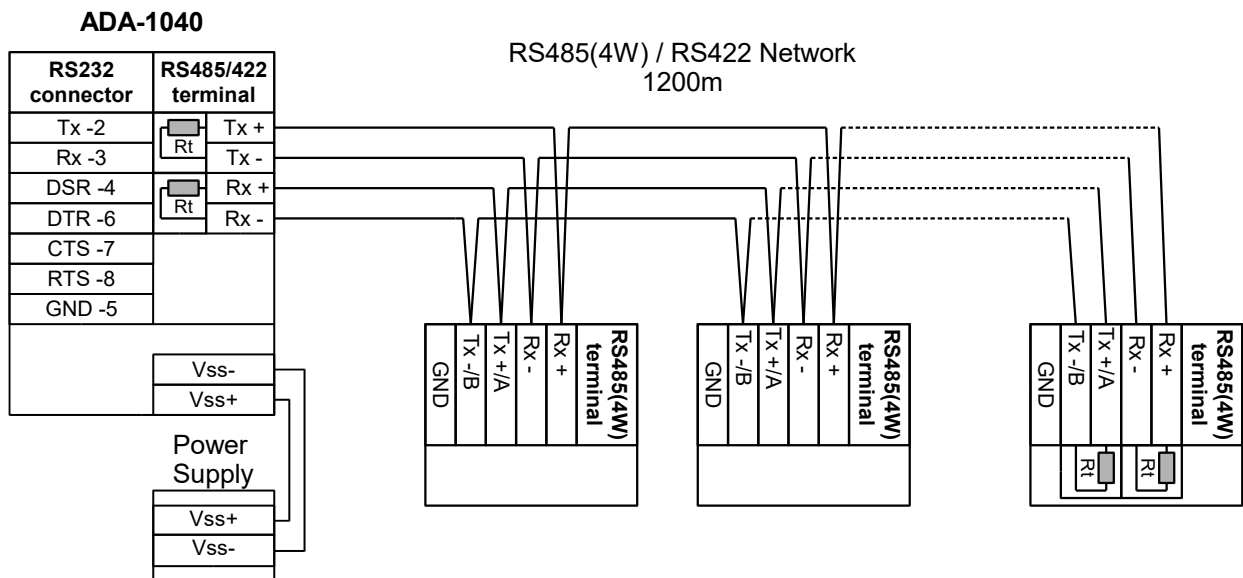


Fig 8. Example multi-point connection to RS485(4W) devices

3.3.3. CONNECTION OF RS485(2-WIRE) DEVICES

Most of RS485 devices use 2-wire RS485 network for data transmission.

Example of connection ADA-1040 to 2-wire RS485 network (multipoint topology) is shown below.

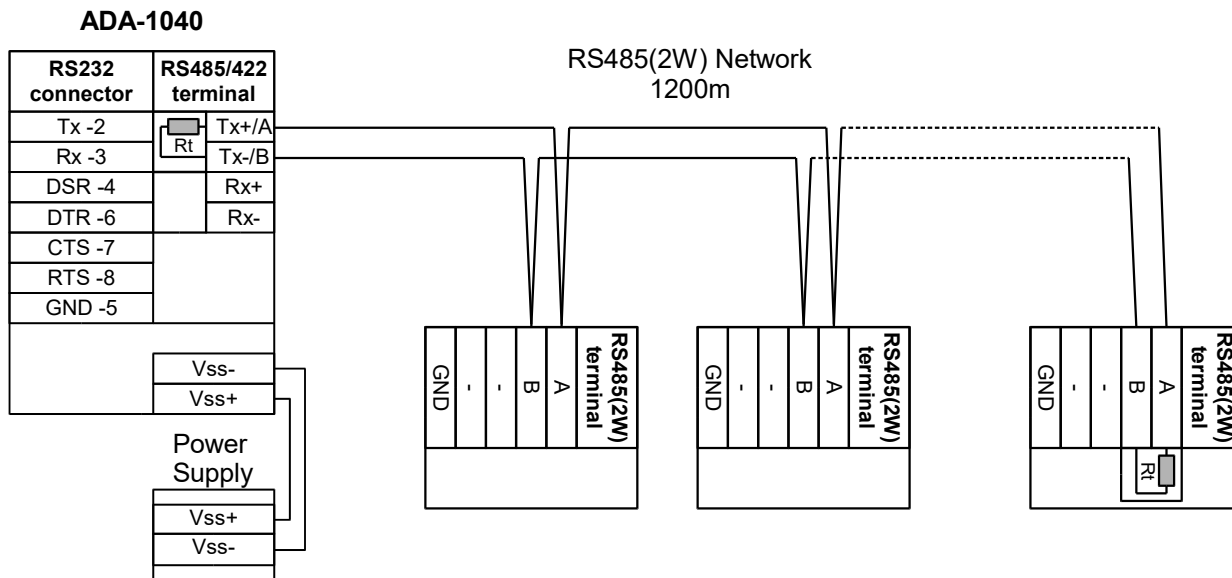


Fig 9. Connection to RS485(2W) devices

3.3.4. EXTENSION OF RS232 PORT

Example connection of two ADA1040 in purpose of extend the signals Tx, Rx, DTR, DSR of RS232 computer port, is shown below.

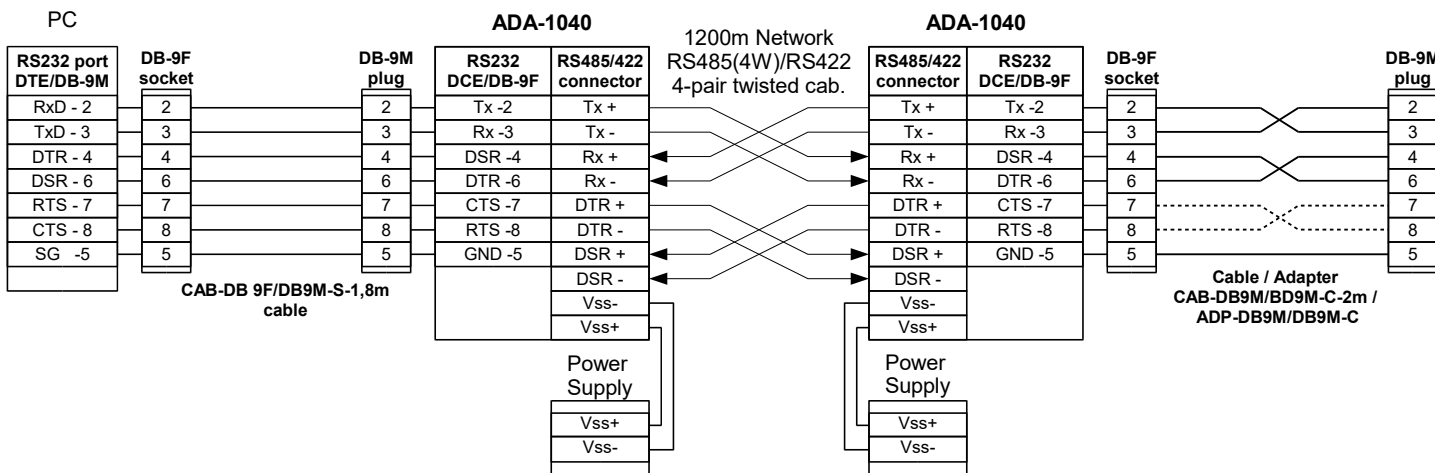


Fig 10. RS232 Extension type connection

3.3.5. 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.

3.3.6. LINE TERMINATION

The application of Line Termination (terminator) $R_t = 120$ 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. The terminators/resistors are connected to the terminal block of ADA-1040 on the RS485/RS422 interface. Example connection of R_t are shown on Fig. 7, 8 & 9.

3.4. POWER SUPPLY

The power supply to ADA-1040 should be DC (regulated) from the scope 10 V= to 30V= and nominal power more then 2W. 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-1040 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-1040 operating mode use a six-position dipswitch SW1. The SW1 is located next to DB-9 connector (Fig.1) under the cover. For setting, remove the cover and use small, flat screwdriver.

4.1. OPERATING MODE SETTING

The setting of SW1 dipswitch for operating mode of ADA-1040 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-1040 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

4.3. START-UP

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. When data are present the LEDs Tx and Rx should blinking.

4.4. SIGNALLING LEDES

LED	Description
PWR	Signalling of Power Supply
RX	Signalling of data receiving through ADA-1040 converter from RS485/422 port.
TX	Signalling of data transmitting from ADA-1040 converter through RS485/22 port.
DTR	Signalling of DTR signal transmitting from ADA-1040 converter through RS422 port.
DSR	Signalling of DSR signal receiving through ADA-1040 converter from RS485/422 port

ATTENTION!

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

4.5. PROBLEMS

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

5. RS232 INTERFACE – PIN DESCRIPTION OF DSUB-9F-DCE SOCKET

Pin	Signal	Description	ADA-1040
1	(DCD)	Level of receiver signal	Connected with DSR
2	(TxD)	Data transmission via ADA-1040	Transmitter
3	(RxD)	Data receiving via ADA-1040	Receiver
4	(DSR)	Readiness of receiving via ADA-1040	Receiver (in ADA-1040-x-2-x-x) Connected with DTR (in ADA-1040-x-1-x-x)
5	(SG)	Signal ground	GND
6	(DTR)	Readiness of data receiving/ transmission from ADA1040	Receiver (in ADA-1040-x-2-x-x) Connected with DSR (in ADA-1040-x-1-x-x)
7	(CTS)	Readiness of transmission to ADA-1040	Connected with RTS
8	(RTS)	Demand of transmission from ADA-1040	Connected with CTS
9	(RI)	Call rate	Connected with +5VDC of converter's in versions: ADA-1040-x-19-x-x, ADA-1040-x-29-x-x. Not connected in other versions.

6. VERSIONS

ADA-1040 -					
Electronic versions:					
Basic,	1				
Special,	2				
Signals:					
TX, RX	1				
TX, RX . +5VDC on 9 pin of RS232 DB-9F connector	19				
TX, RX, DTR, DSR – only in version 2-way isolation	2				
TX, RX, DTR, DSR +5VDC on 9 pin of RS232 DB-9F connector – only in version 2-way isolation	29				
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 with inlets, screw terminal block					2
Cover without inlets, plug-in screw terminal block					3

Order example:
Product Symbol: **ADA-1040-1-1-23-3**
1 – basic version of electronic,
1 – TX, RX signals
23 - galvanic isolation 1kV=, 3-way
3 - cover without inlets, plug-in screw terminal block,

7. SPECIFICATION

TECHNICAL DATA		
Transmission Parameters		
Interface	RS-232	RS-485/RS-422
Connector	DSUB-9 Female	Screw terminal block - max. Ø 2,5mm ²
Max. Line length	15 m	1200 m
Max. number of connected device	1	32 / 2
Transmission line	DB9F/DB9M multicore cable 9x0,34 shielded or 9-pair twisted cable, UTP 9x2x0,5 (24AWG) shield inside large interferences STP 9x2x0,5 (24AWG).	1-pair or 2-pair twisted cable, UTP Nx2x0,5 (24AWG), shield inside large interferences STP Nx2x0,5 (24AWG)
Standards	EIA-232, CCITT V.24	EIA-485, CCITT V.11
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 RS485/RS422, • TX - yellow LED data transmission via RS485/RS422. 	
Electrical Parameters		
Power requirements	10 - 24 – 30 V DC	
Power Cable	Recommended length of power cable – up to 3m	
Power	<2W	
Protection from reverse power polarization	YES	
Galvanic Isolation	1kVDC or 3kVDC - between power circuit and RS-232 signal line	
Optoisolation	5kV - between signals lines RS-485/422 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	
Casing		
Dimensions	53 x 90 x 62mm	
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 method	On the rail compliant with DIN35 / TS35 standard.	

Dear Customer,

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

We hope that this user manual helped connect and start up the **ADA-1040 converter**. We also wish to inform 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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