CEL-MAR®
Zakład Informatyki i Elektroniki

User manual

ADA-1028L
RS232 to Current Loop 2-wire CLO Converter

Contents

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-1028L 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-1028L 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-1028L converter, user manual, CE declaration, resistors: Rd 220Ω / 0,25W (1pcs.) i 120Ω / 0,25W (1pcs.).

2. PRODUCT INFORMATION

2.1. PROPERTIES

- Operating on 2-wire network standard of 0-20mA Current Loop CLO,
- RX and TX signals conversion of RS232 interface,
- Connection up to 4 devices on Current Loop CLO network,
- Baud rate up to 19,2 kbps,
- Transparency for all protocols (half duplex transmission): MODBUS, DNP and other,
- Power supply 10 - 30 VDC stable, 2W,
- 2,5kV= optoisolation in signal channel between RS232 and Current Loop interface,
- 1kV= or 3kV= galvanic isolation between RS232 interface and power supply,
- 1kV= or 3kV= galvanic isolation between Current Loop interface and power supply,
- Connection Current Loop network and power supply via screw terminal block,
- Connection RS-232 network via Female DB9 connector,
- Implemented short circuit protection and over-voltage protection on Current Loop circuit,
- Protection against power supply reverse connection,
- Casing compatible with DIN 43880 standard– mounting in typical electro-installation,
- Rail mounting according to DIN35 / TS35 standard,
- Dimensions (W x D x H) 53mm x 62mm x 90mm.

2.2. DESCRIPTION

ADA-1028L converter allows connecting devices with two-wire Current Loop interface (CLO) to the RS232 interface (eg. the computer or controller) for example, counters such LZQM without interfering with the format of transmitted data. ADA-1028L transmits data at baud rate up to 19.2 kbps via one pair of the Current Loop twisted-pair cable.

The converter is equipped with screw terminals for connection Current Loop interface and power supply.

Device for operating uses signals:

a) Rx, Tx, GND - the RS232 interface,

b) TX +, TX-/ CLO-, RX +, RX * +, RX-/ CLO + Current Loop CLO interface.

It is possible to connect up to four devices operating in half duplex mode to the Current Loop bus. 1kVDC or 3kVDC galvanic isolation and 2,5kVDC opto-isolation in the signal channel separates RS232 interface of converter from CLO interface and protects devices connected to the RS232 interface from surges generated on line CLO and power circuit. The converter has an internal low-energy surge protection for each line of Current Loop interface.

2.3. CURRENT LOOP TRANSMITTER AND RECEIVER

In ADA-1028L was used active transmitter of Current Loop, based on current source generating current 0-20mA and passive receiver based on transoptors.

By the use of inside electronics, the converter controls Current Loop transmitter and receiver during data transmission, in order to proper operation of Current Loop interface on two-wire data line. The transmitter and receiver have low-energy surge protection on lines CLO+, CLO-.
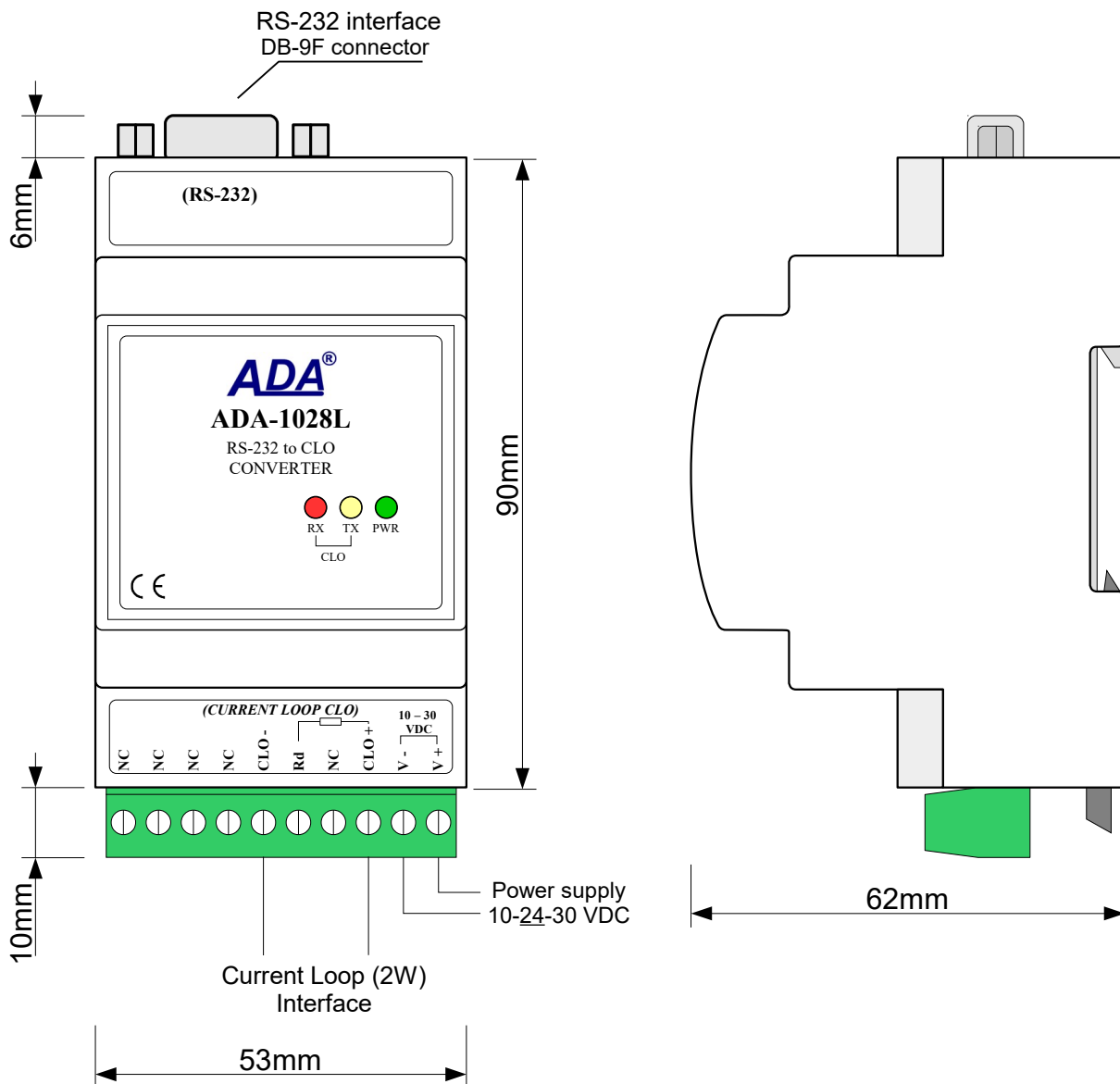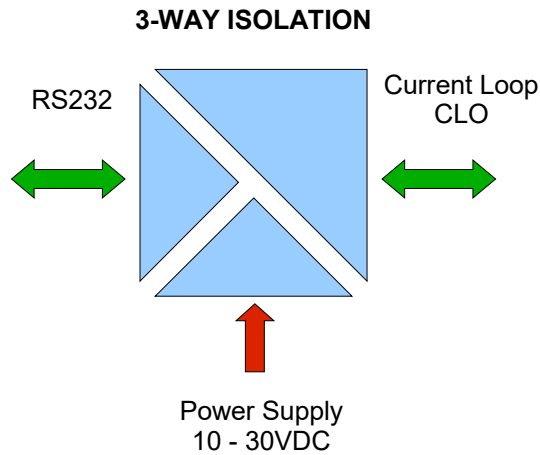

Fig 1. Converter view

2.4. ISOLATION

Converter ADA-1028L has 3-way galvanic isolation on the levels 1kV= or 3kV=, depend on version described in section VERSIONS.

3-WAY ISOLATION

RS232

Current Loop
CLO

Power Supply
10 - 30VDC

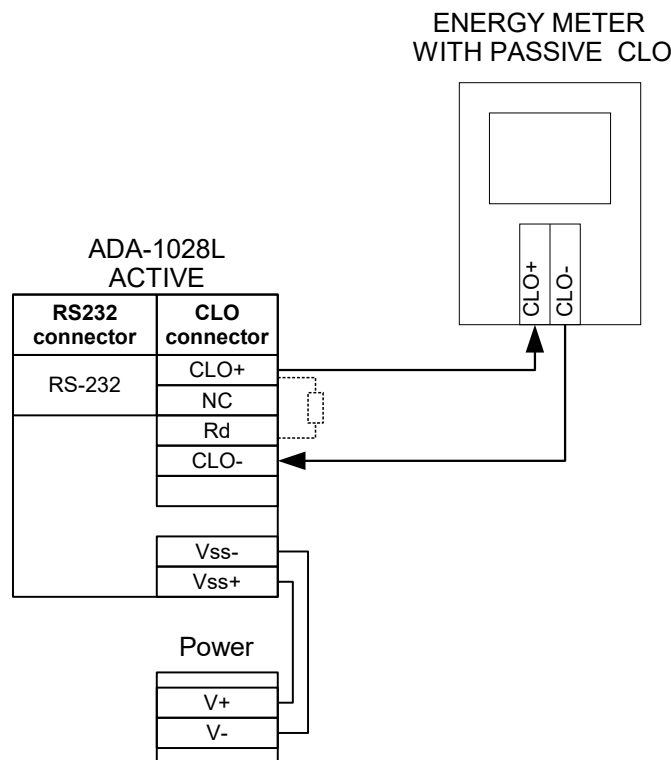**Fig 2. Isolation structure**

3. INSTALLATION

This chapter will show how to connect ADA-1028L to RS232, Current Loop CLO bus and power supply and how to use it.
In the purpose of minimization of disruptions from environment is being recommended to:
- use 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.

3.1. EXAMPLE CONNECTION OF DEVICES WITH CLO INTERFACE

To connect the to Current Loop line to the CLO ADA-1028L, should equip with a flat-head screwdriver, which allows to mount the cables in the screw terminal block.

3.1.1. CONNECTION OF ONE DEVICE

ENERGY METER
WITH PASSIVE CLO

ADA-1028L
ACTIVE

RS232 connector	CLO connector
RS-232	CLO+
	NC
	Rd
	CLO-
	Vss-
	Vss+

CLO+ CLO-

Power

| V+ |
| V- |

Fig. 3. Example connection of device with Current Loop CLO to ADA-1028L

3.1.2. CONNECTION OF SEVERAL DEVICES
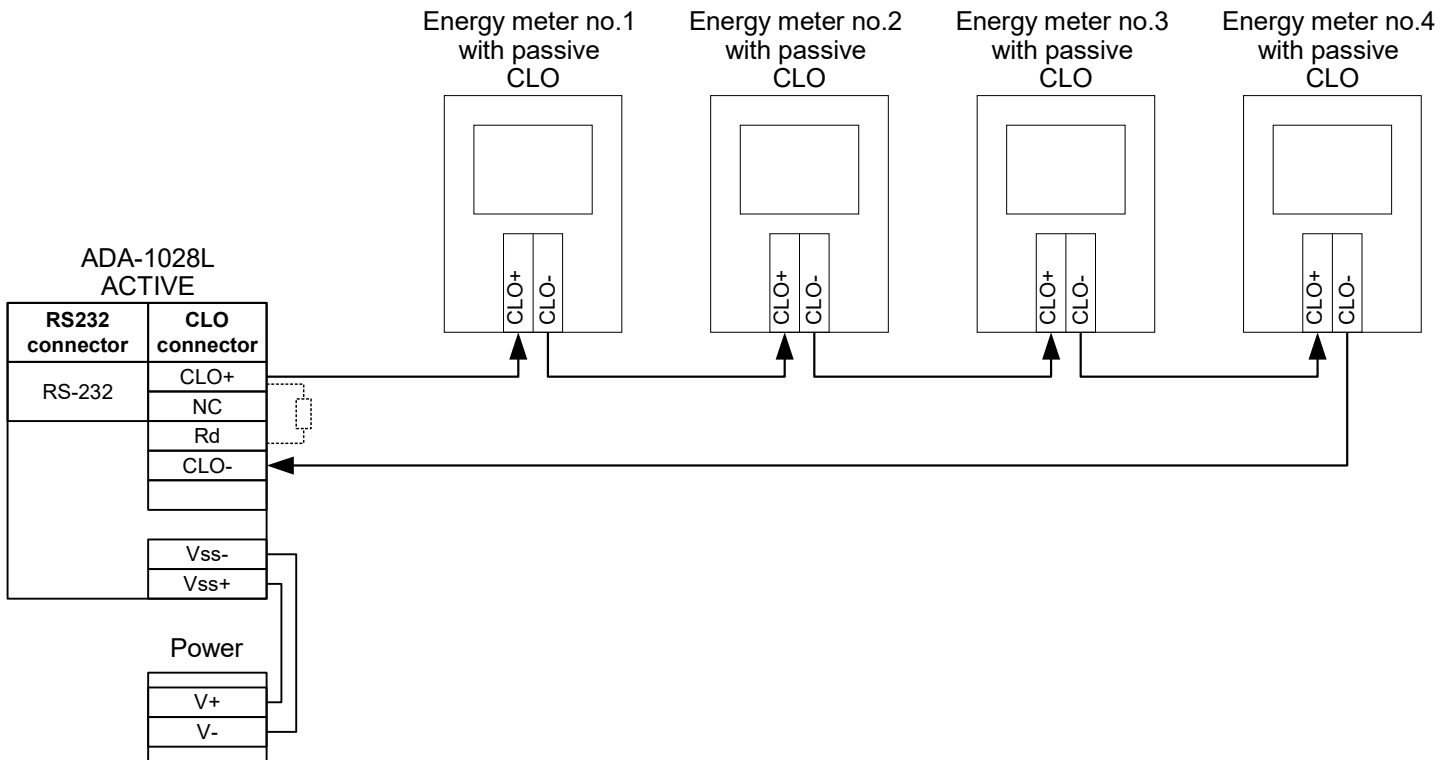
Fig 4. Example connection of several (up to 4) devices with Current Loop CLO to ADA-1028L

3.2. EXAMPLE CONNECTION OF DEVICE WITH RS232 INTERFACE

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

To connect the ADA-1028L to RS232 computer port, is required RS232 extension cable, for example CAB-DB9F/DB9M-S-1,8m available in our offer. Connection example is shown below.

Fig 5. ADA-1028L connection to RS-232 port of computer

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

To connect the ADA-1028L to device with DCE (eg Modem) RS232 port type, is required RS232 cable CAB-DB9M/DB9M-C-1,8m available in our offer. Connection example is shown below.
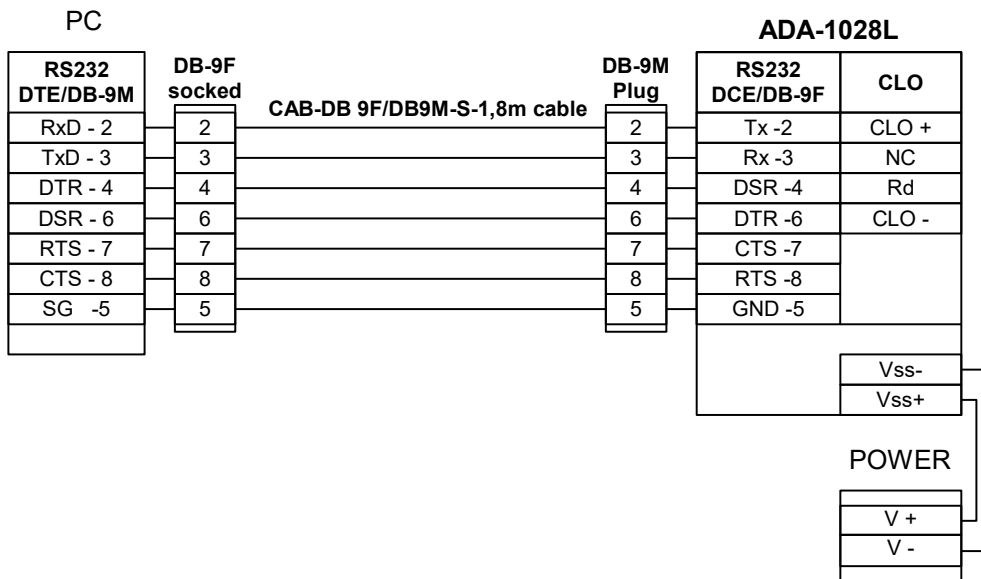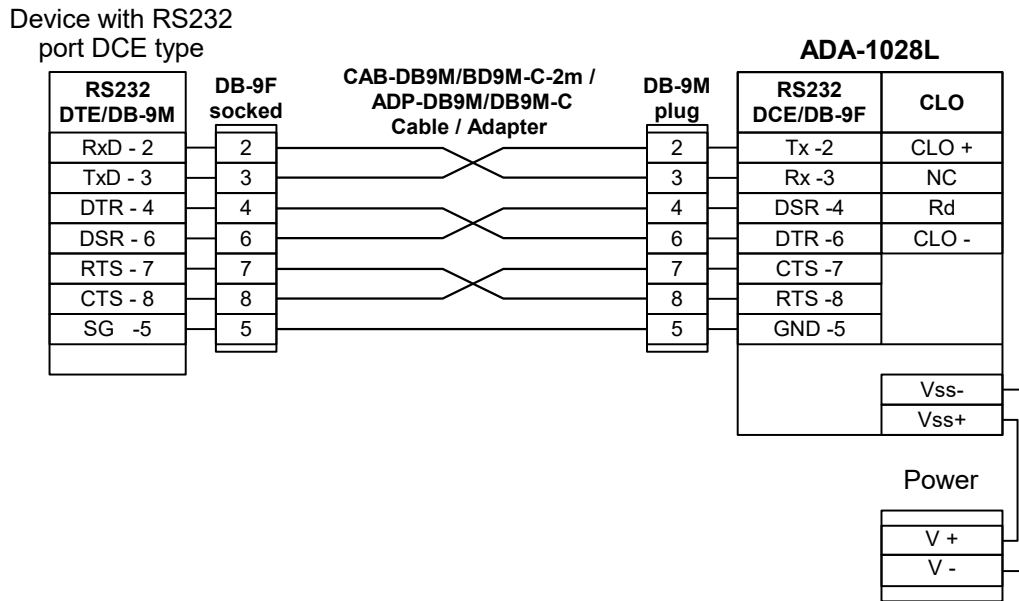

Fig 6. DCE type connection of ADA-1028L to device with RS232 interface (eg. modem)

3.3. POWER SUPPLY CONNECTION

The power supply to the ADA-1028L 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- terminal. ADA-1028L has the protection from opposite connection power supply. If after powering on the front panel is not lit green LED PWR, check the correctness of power connection (polarity).

4. ACTIVATION

Converter can be power on 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 and if RX LED is lighted check correctness of connection of Current Loop transmitter circuit. When data is present the LEDs Tx and Rx should blinking.

LED	Description
PWR	Signalling of Power Supply
RX	Signalling of data receiving through ADA- 1028L converter from Current Loop CLO port.
TX	Signalling of data transmitting from ADA- 1028L converter through Current Loop CLO port. (the LED goes out during data transmission)

4.1. SENSITIVITY SETTING OF CLO CURRENT LOOP RECEIVER

Devices with a passive interface CLO may have different current values in the logical zero state, therefore should be set a converter receiver sensitivity. Wrong adjustment of receiver sensitivity is revealed by not lit of RX LED during data receiving from connected devices (energy counter) despite the correct connections to converter. A sensitivity is set by adding additional resistor to Rd and CLO+ screw terminal block. If the resistor is correct RX LED will be blinking during data receiving. ADA-1028L converter is supplied with resistors Rd = 220Ω / 0,25W and 120Ω / 0,25W.

5. PIN DESCRIPTION OF DSUB-9F

Pin	Signal	Description	ADA-1028L
1	(DCD)	Level of receiver signal	Connected with DSR
2	(TxD)	ADA-1028L data transmission	Transmitter
3	(RxD)	ADA-1028L data receiving	Receiver
4	(DSR)	Readiness of device to data receiving/ transmission	Connected with DTR inside ADA-1028L
5	(SG)	Signal ground	GND
6	(DTR)	Readiness of ADA- 1028L to data receiving/ transmission	Connected with DSR inside ADA-1028L
7	(CTS)	Device confirm of receiving RTS signal from ADA- 1028L	Connected with RTS inside ADA-1028L
8	(RTS)	ADA-1028L reports to device readiness to receiving data	Connected with CTS inside ADA-1028L
9	(RI)	Ring Indicator	Not connected

6. VERSIONS

ADA-1028L - ☐ - ☐ - ☐ - ☐ ☐ ☐

Electronic versions:	
Standard	**1**
Current Loop Voltage:	
24VDC	**1**
12VDC	**2**
Current Loop Current:	
0 – 20 mA (standard)	**1**
0 – 30 mA	**2**
Current Loop Type:	
Active	**A**
Passive	**P**
Galvanic isolation:	
1kV= 3-way	**2**
3kV= 3-way	**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**

Order example:
Prod. symbol : **ADA-1028L-1-1-1-A-2-3**
1 – standard electronic version,
1 – current loop voltage 24VDC,
1 – current loop current: 0-20mA,
A – current loop type: Active,
2 – 1kV= galvanic isolation,
3 – cover without inlets, plug-in screw terminal block.

7. SPECIFICATION

TECHNICAL DATA		
Transmission Parameters		
Interface	**RS-232**	**Current Loop**
Connector	DSUB-9 Female	Screw terminal, wire max. Ø 2,5mm²
Line length	Up to 15 m	Depends on baud rate up to several hundred meters
Maximum number of connected device	1	4
Transmission line	Cable DB9F/DB9M multi-core 9x0,34 shielded or twisted cable 9-pairs UTP 24AWG shield inside large interferences STP 24AWG.	1-pair twisted cable, UTP Nx2x0,5 (24AWG), shield inside large interferences (STP Nx2x0,5(24AWG)).
Standards	EIA-232, CCITT V.24	Current Loop CLO 0-20mA
Maximum baud rate	19,2 kbps kbps (depend on length of Current Loop CLO line)	
Transmission type	Asynchronism half duplex or full duplex,	
Optical signalisation	• PWR – green LED power supply, • RX - red LED data receiving through Current Loop CLO, • TX - yellow LED data transmission through Current Loop CLO.	
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	1kV= or 3kV= between power circuit and RS232 signal line 1kV= or 3kV= between power circuit and Current Loop signal line	
Optoisolation	Min. 2,5kV - between Current Loop signal line 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	53mm x 90mm x 62 mm,	
Material	PC/ABS	
Degree of casing protection	IP40	
Degree of terminal protection	IP20	
Weight	0,10 kg	
According to standard	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-1028L 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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