CEL-MAR®
Zakład Informatyki i Elektroniki

User manual

ADA-13020MG
ETHERNET to Current Loop Converter with MODBUS GATEWAY

Contents

1. GENERAL INFORMATION

Thank you for purchasing of **CEL-MAR Company** product. This product has been produced and completely tested by us.
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. GUARANTEE INFORMATION

ADA-13020MG 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).

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

The ADA-13020MG converter doesn't require the periodic conservation.
Technical support at the number: +48 41 362-12-46 in 8.00-16.00, from Monday to Friday.

1.6. PACK CONTENTS

The ADA-13020MG converter, user manual, CE declaration, CD-R with ADANet software.

2. PRODUCT INFORMATION

2.1. PROPERTIES

● Operate on ETHERNET network - according to IEEE 802.3 specification,
● 10/100BaseT physical layer,
● Baud rate 10/100Mbps (auto-sensing),
● Full or half duplex (auto-sensing) operating mode,
● Protocols: TCP, UDP, DHCP, SNMP, SSL/TLS, Telnet, Rlogin, LPD, HTTP/HTTPS, SMTP, ICMP, IGMP, ARP,
● WWW sever implemented for converter configuration,,
● Configuration of net services according to user personal setting,
● Static or dynamic IP address (added by DHCP verver),
● Diagnostics of serial and network port,
● Encoded transmission: DES (56-bit), 3DES (168-bit), AES (128/256-bit),
● Operating modes: virtual serial port, serial bridge TCP, serial bridge UDP, TCP sockets, UDP sockets, MODBUS Data Gateway,
● Operating on 4 wire line according to Current Loop specification,
● Current Loop baud rates (bps): 50, 75, 110, 134, 150, 200, 300, 600, 1200, 1800, 2400, 4800, 9600, 14400, 19200, 28800, 38400,
● Current Loop data format - Number of data bits: 5, 6, 7, 8; Parity checking: None, Odd, Even, Constantly 1, Constantly 0; Stop Bits: 1, 2,
● Transparent for all protocols, which the data format is compatible with the above specifications of Current Loop interface eg MODBUS-TCP/UDP, MODBUS-RTU, MODBUS-ASCII, MODBUS-SUNSPEC, DNP, PROFIBUS and other,
● Power supply 10 - 30 VDC stable min. 3W,
● 3kV= optoisolation in signal channel between ETHERNET and Current Loop interface,

- 1kV= or 3kV= galvanic isolation between ETHERNET and power supply,
- 1kV= or 3kV= galvanic isolation between Current Loop interface and power supply,
- Connection Current Loop network via screw terminal block,
- Connection Ethernet interface via RJ45 connector,
- Implemented short circuit protection and over-voltage protection on Current Loop lines,
- Implemented protection against power supply reverse connection,
- Casing compatible with DIN 43880 standard– mounting in typical electro-installation unit,
- Casing adapt to rail mounting according to DIN35 / TS35 standard,
- Casing dimensions (W x D x H) 53mm x 62mm x 90mm.

2.2. DESCRIPTION

The ADA-13020MG converter is used for data transmission between devices equipped with Current Loop interface via LAN/WAN network without interfering with data format. The converter can operate on the ETHERNET network in Virtual Serial Port mode, TCP serial bridge mode, UDP serial bridge mode, TCP sockets, UDP sockets, MODBUS Data Gateway. MODBUS Data Gateway converts MODBUS-RTU/ SUNSPEC master/slave or MODBUS-ASCII master/slave protocols to MODBUS-TCP protocol and reverse. This allows integrating MODBUS-RTU/ SUNSPEC/ ASCII devices with MODBUS-TCP devices within a single network.

The ADA-13020MG converter uses for operating RX+,RX-,TX+,TX- signals and transmits data via current loop interface with maximum baud rate up to 38,4kbps via two pairs of twisted pair cable.

The converter has screw terminal block for connection of Current Loop interface and power supply and RJ45 connector for Ethernet network connecting.

Over-voltage protection was made on base safety diodes and fuses on each Current Loop lines.

To Current Loop interface can be connected one device in point-to-point topology, operates in half duplex or full duplex mode.

This converter has internal, low energy surge protection for each Current Loop lines however it is recommended to use the external lightning arresters (typical protection of telephone line) for the lightning protection of lines

With converter are provided the drivers which installed in the operating system (*see point 2.3.2.1.*), will create an additional COM port. This port is the next free number eg COM3, can be used like a standard COM port. However, it is not the real port existing in a computer, but only a virtual, created by the system, therefore some programs running under DOS and links to this COM port may not function properly.
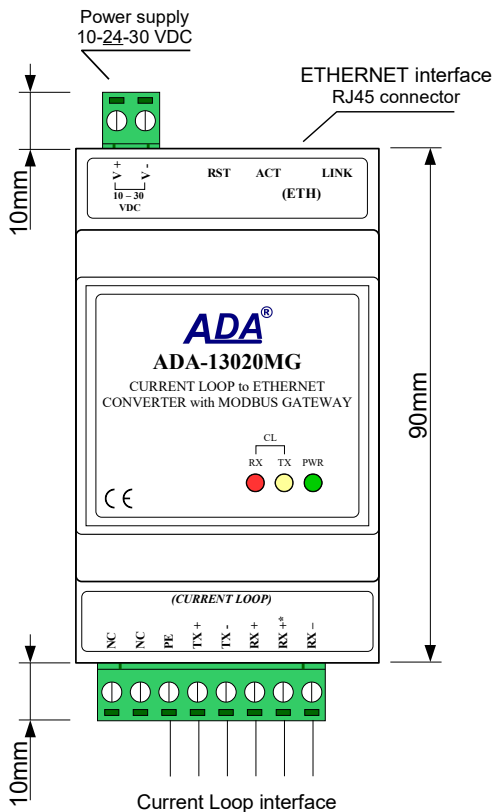
Fig. 1. View of ADA-13020MG
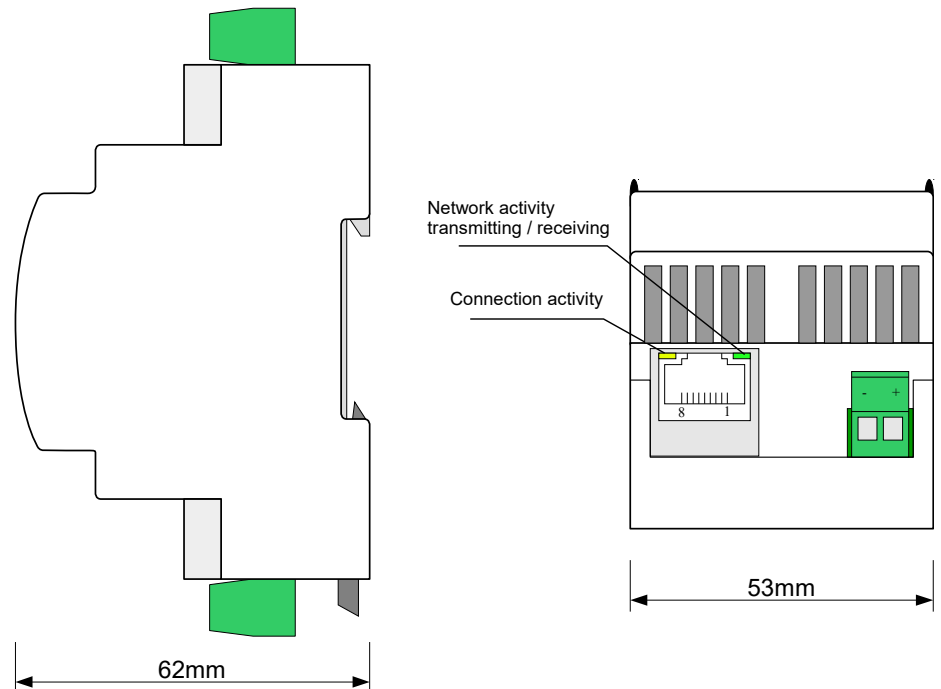
Fig. 2. ETHERNET & Power Supplies connectors

2.3. ETHERNET NETWORK COMMUNICATION

2.3.1. TCP/UDP PORTS MODE OF COMMUNICATION

Communication in TCP/UDP ports mode enable for application (SCADA, MMI etc) data transferring to converter serial port via Ethernet network in use TCP/UDP ports by using the services of client and TCP/UDP server.

2.3.2. VIRTUAL SERIAL PORT (REALPORT) MODE OF COMMUNICATION

Communication in virtual serial port mode enable for application (SCADA, MMI etc) data transferring to converter serial port via Ethernet network by using the virtual COM port installed in operating system.

2.3.2.1. SUPPORTED OPERATING SYSTEMS

For the ADA-13020MG converter operating in Virtual Serial Port mode, virtual serial port drivers are available for the following operating systems:

a) Windows: 98, ME, NT, 2000, XP, Vista, 7, 8, 8.1, 10, 11;

b) Windows Server: 2003, 2008-R2, 2012-R2, 2016, 2019, 2022;

c) AIX 5.X and AIX 6.x 32bit/64 bit;

d) HP-UX 10.20, 11.0, 11i, 11i v2 and 11i v3 for PA-RISC and Itanium;

e) SCO OpenServer 6, UnixWare Release 7.x;

f) Solaris 7, 8, 9 and 10 for SPARC 64/32bit and Intel/AMD 64/32bit;

g) Linux supported kernel from version 2.4.x (UP and SMP), tested on:

- Red Hat Enterprise Linux 7.x, 8.x, 9;
- Red Hat Linux 7.x, 8.x, 9;
- OpenSuSE Leap 15;
- Debian 9, 10, 11;
- Ubuntu 2020.04, 2022.04 LTS;

2.3.3. SERIAL BRIDGE MODE OF COMMUNICATION

Communication in serial bridge mode enable to data transferring via Ethernet network between serial ports of converters in point-to-point topology or multi-point topology by using the services of client and TCP/UDP server.

2.3.4. INDUSTRIAL AUTOMATION (Modbus Gateway) MODE OF COMMUNICATION

The communication in MODBUS Gateway (IA) mode allows conversion MODBUS-RTU/ SUNSPEC master/slave or MODBUS-ASCII master/slave protocols to MODBUS-TCP protocol and reverse. This allows integrating MODBUS-RTU/ SUNSPEC/ ASCII devices with MODBUS-TCP devices within a single network.

2.3.5. OTHER TYPES OF COMMUNICATION

The ADA-13020MG converter can be configured in other communication types, like:
– terminal mode,
– modem emulation mode,
– console mode,
– user mode.
However, in the case of Current Loop CLO converter, it will not be able to work properly in these modes, as they relate to the full RS232 interface.

2.4. CURRENT LOOP INTERFACE

2.4.1. CURRENT LOOP TRANSMITTER

The Current Loop transmitter on ADA-13020MG is made as active, on the base power source generate current (depend on converter's version) +/- 20mA or 0-20mA (TTY). The transmitter has a short-circuit current limiting and low energy protection on TX+ and TX- lines. The diagram is shown on figure below.

2.4.2. CURRENT LOOP RECEIVER

The ADA-13020MG converter has passive RX receiver, consisting of optoisolator (optical coupler) and protective elements. The receiver circuit has RX+, RX- terminals as well as the terminal marked as RX-*. In the circuit with RX-* terminal has been used additional resistor (1000 ohms or 560 ohms depend on the converter version) to reduce power in the case of connecting the receiver to transmitter which has NOT short circuit current limit to 20mA.
The RX red LED on front panel of the converter is a signalization of NO current flow through optocoupler. This LED is ON when it is: not connect transmitter to receiver, wrong connection of transmitter to receiver, broken connection of transmitter to receiver.
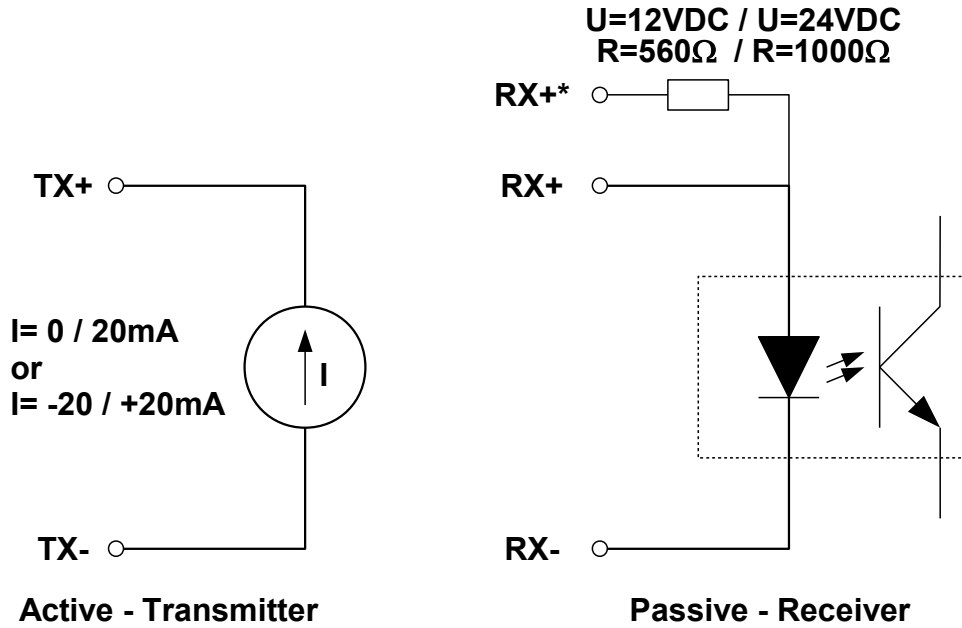The diagram is shown on figure below.

U=12VDC / U=24VDC
R=560Ω / R=1000Ω

RX+*

TX+

RX+

I= 0 / 20mA
or
I= -20 / +20mA

I

TX-

RX-

Active - Transmitter   **Passive - Receiver**

Fig .3. Schematic diagram of the Current Loop transmitter and receiver of ADA-13020MG

2.5. ISOLATION

The ADA-13020MG converter has 3-way, 1kV= or 3kV= galvanic isolation, depend on version described in section *VERSIONS*.

3-WAY ISOLATION

ETHERNET   Current Loop

Power Supply
10 - 30VDC
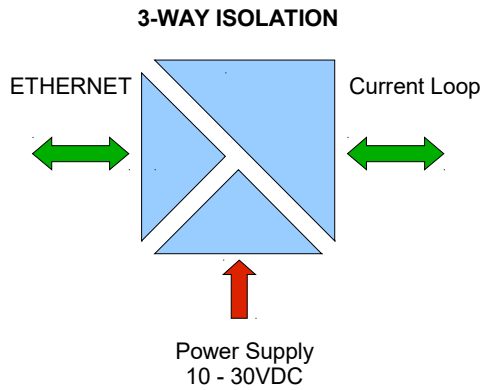
Fig. 4. Isolation diagram

3. INSTALLATION

This chapter will show how correctly connect ADA-13020MG to devices with Current Loop interface, LAN/WAN network and power supply.
To reduce disturbance from environment, it is recommended to:
– use shielded twisted multipair type cables, which shield should be connected to the grounding on one end of the cable,
– lay signal cables at a distance not less than 25 cm from power cables,
– use suitable diameter cable for power supply on account of voltage drop,
– use the interference eliminators for powering the converters installed in the range of some building,
– not powering the converters form power-circuit of devices generate large impulse disturbance like contactors, relays, inverters.

3.1. ASSEMBLING

The ADA-13020MG converter case is adapted to assembly on TS-35 (DIN35) rail. To install the device on TS-35 should be the upper part of the casing put hooks on the terminal and then press the bottom of the cover until you hear a characteristic "Click" sound.

3.2. ETHERNET NETWORK CONNECTION

The ADA-13020MG has to be connected to ETHERNET network by the use of the switch, the HUB or directly to the PC network adapter. The table below shows preparing of the straight cable for converter connection to switch or hub.

Table 1.

RJ45 Pin No.	Signal	Wire Color EIA/TIA 568B	Straight cable UTP 4x2x0,5	Wire Color EIA/TIA 568B	Signal	RJ45 Pin No.
1	TX+	White-Orange		White-Orange	TX+	1
2	TX-	Orange		Orange	TX-	2
3	RX+	White-Green		White-Green	RX+	3
4	Not used	Blue		Blue	Not used	4
5	Not used	White-Blue		White-Blue	Not used	5
6	RX-	Green		Green	RX-	6
7	Not used	White-Brown		White-Brown	Not used	7
8	Not used	Brown		Brown	Not used	8

Table below show preparing of crossover cable for converter connection to network adapter of PC or converters together for operating like point-to-point serial bridge.

Table 2.

RJ45 Pin No.	Signal	Wire Color EIA/TIA 568B	Cross-Over Cable UTP 4x2x0,5	Wire Color EIA/TIA 568B	Signal	RJ45 Pin No.
1	TX+	White-Orange		White-Green	TX+	1
2	TX-	Orange		Green	TX-	2
3	RX+	White-Green		White-Orange	RX+	3
4	Not used	Blue		Blue	Not used	4
5	Not used	White-Blue		White-Blue	Not used	5
6	RX-	Green		Orange	RX-	6
7	Not used	White-Brown		White-Brown	Not used	7
8	Not used	Brown		Brown	Not used	8

In modular socket ETHERNET interface of converter are implemented two LED's (Fig. 2):
– Green ACT signaling state of sending or receiving data,
– Orange LINK signaling active network connection.

ADA-13020MG converter in the ETHERNET network can function as:
– virtual serial bridge [RealPort],
– TCP serial bridge,
– UDP serial bridge.
Additional information about Ethernet connection will be describe in chapters below.

3.2.1. CONNECTING TO NETWORK ADAPTER OF PC

If there is not the switch or the HUB, it is possible to connect the ADA-13020MG directly to a network adapter of PC using the cross-over cable (Table 2). This connection can be used for converter configuration.
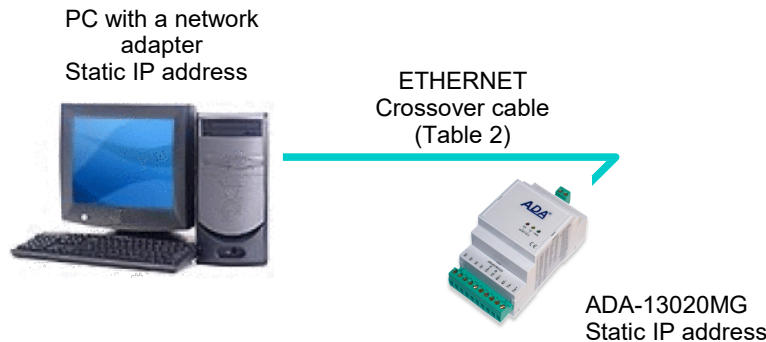
Fig. 5. Direct connection to computer network adapter.

3.2.2. CONNECTING FOR REALPORT MODE OPERATING

Fig. 5 (above) and 6, 7 below show how correctly connect the ADA-13020MG to LAN, WAN network or PC to operating in virtual serial port mode (RealPort).
For direct connection of the converter to PC network adapter, use the cross-over cable (see Table 2) and for connection by the use of switch or HUB use the straight cable (see Table 1).
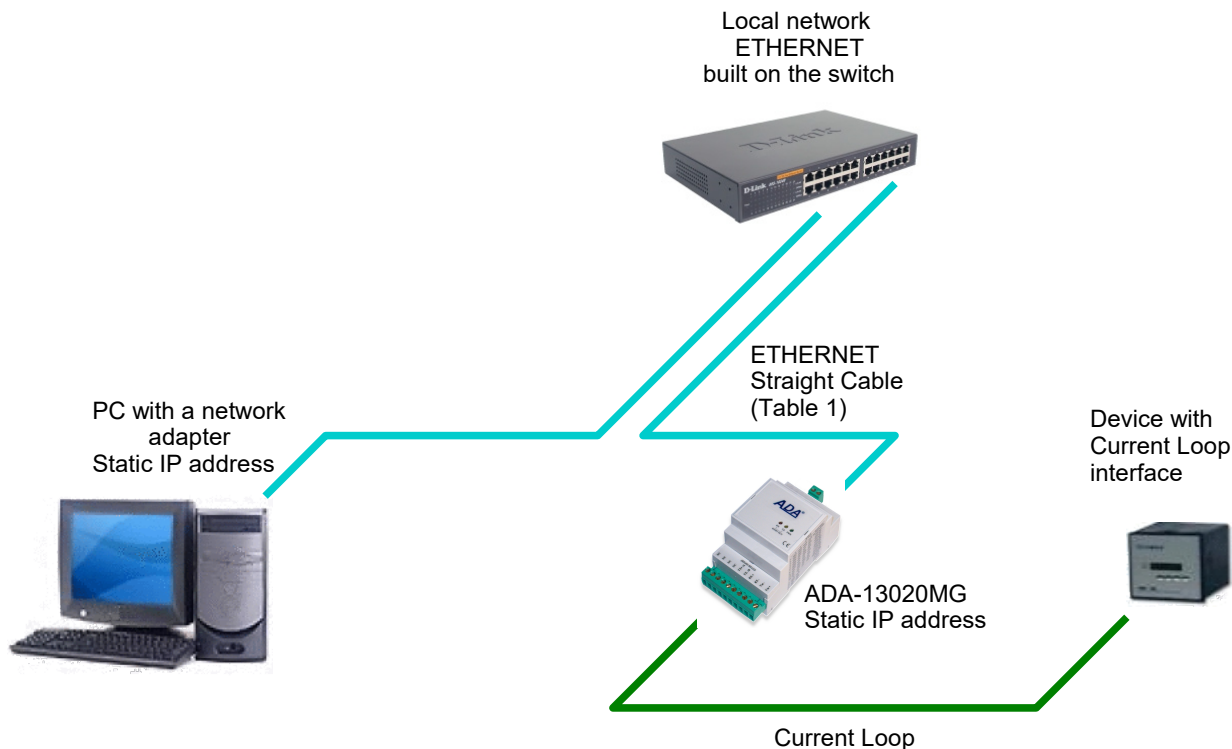
Fig. 6. Connecting for Real Port mode functioning via switch or Hub for LAN network
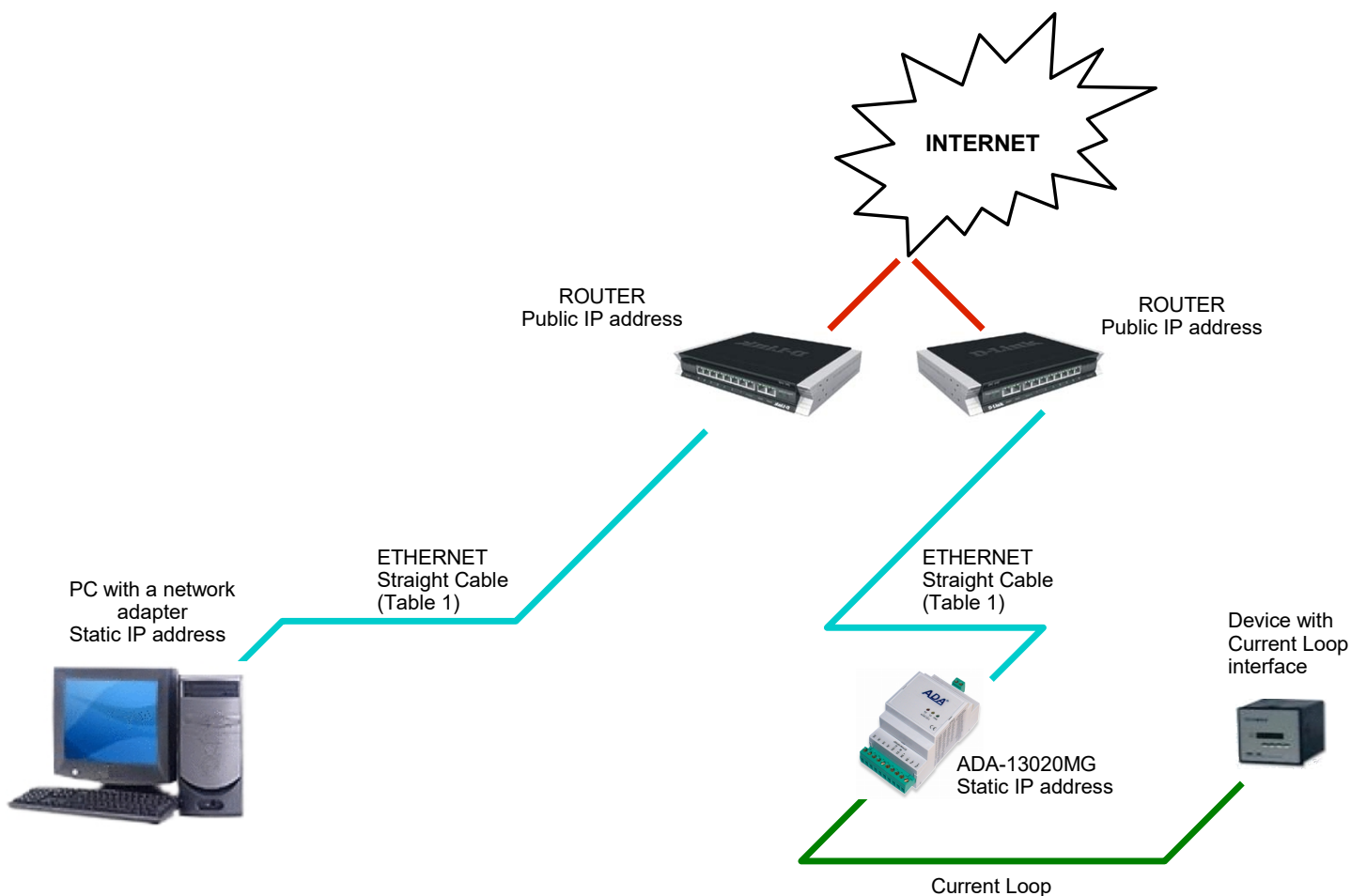
Fig. 7. Connection for operating in Real Port mode for WAN network

3.2.3. CONNECTION FOR FUNCTIONING IN TCP AND UDP SERIAL BRIDGE MODE

Fig. 8 and 9 (below) show how correctly connect ADA-13020MG converter to Ethernet network for functioning in TCP and UDP serial bridge mode.

For connection by the use of network devices (router, switch or HUB) use the straight cable (see Table 1).
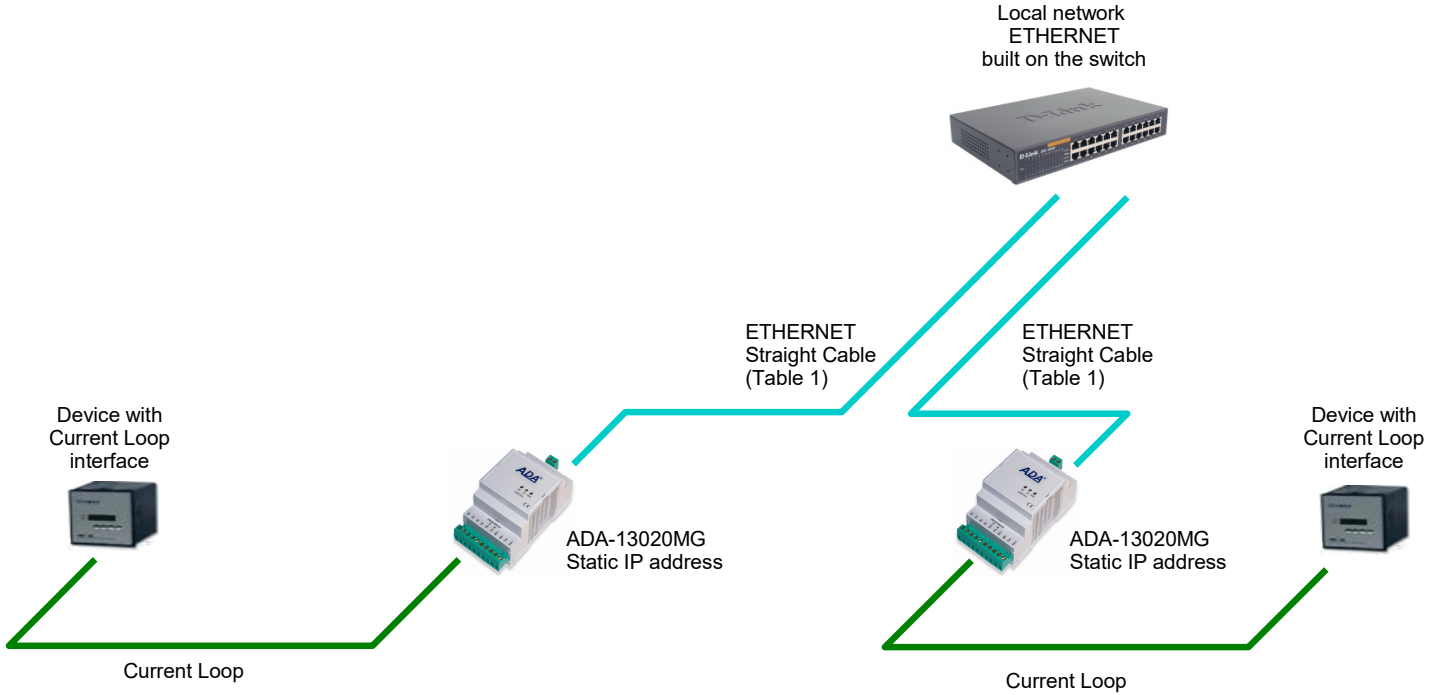
Fig. 8. Connecting for functioning in TCP/UDP serial bridge mode one-to-one in LAN network
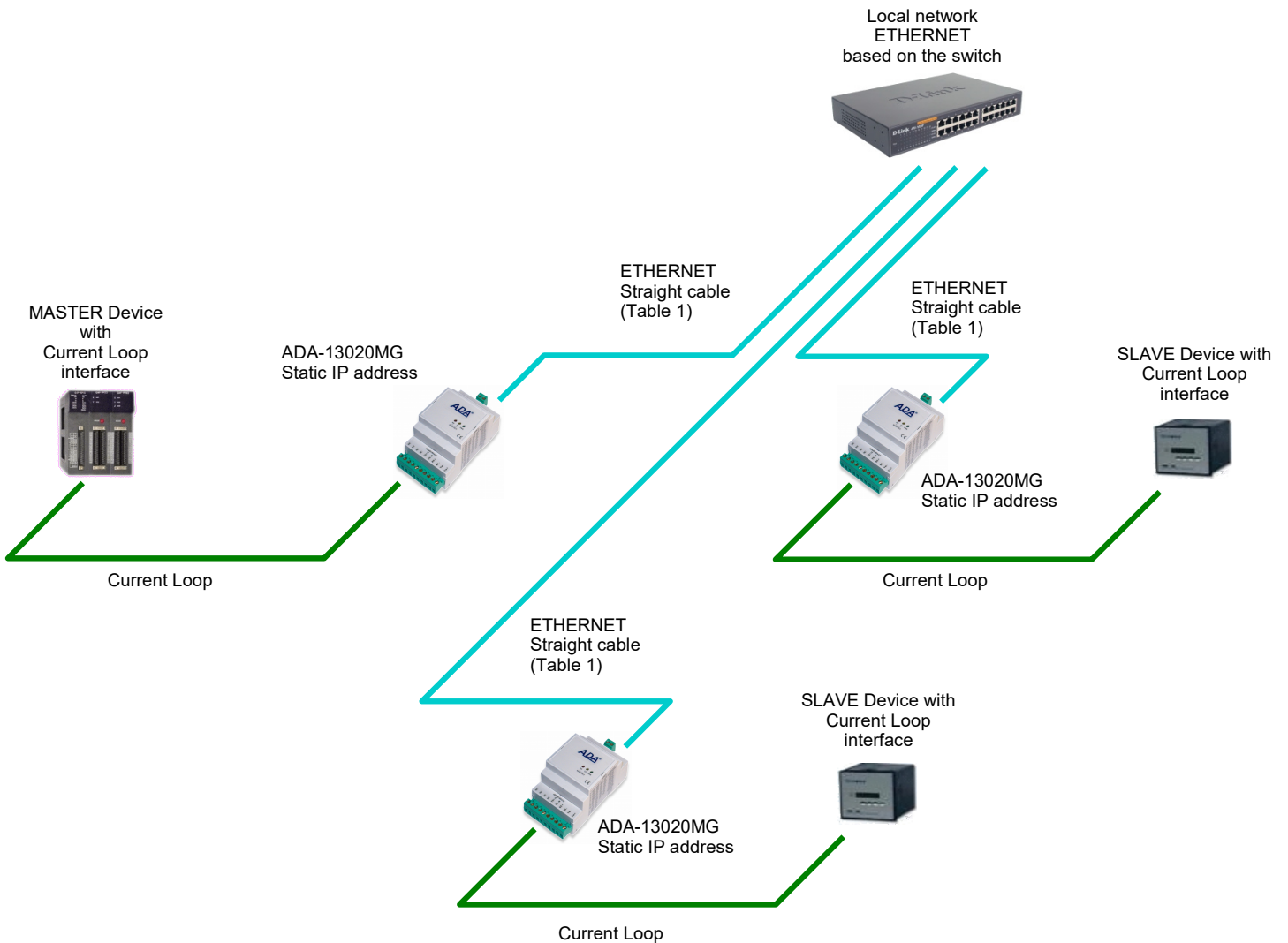
Fig .9. Connection for functioning in UDP serial bridge mode one-to-many in LAN network

3.2.4. CONVERTERS CONNECTION AS MODBUS GATEWAY

Fig. 10 (below) shows how correctly connect the ADA-13020MG converter to Ethernet (LAN) network for functioning in Industrial Automation (MODBUS Gateway) mode. The connection in this mode allows to integrating MODBUS-TCP & MODBUS-RTU/ASCII devices into one network.
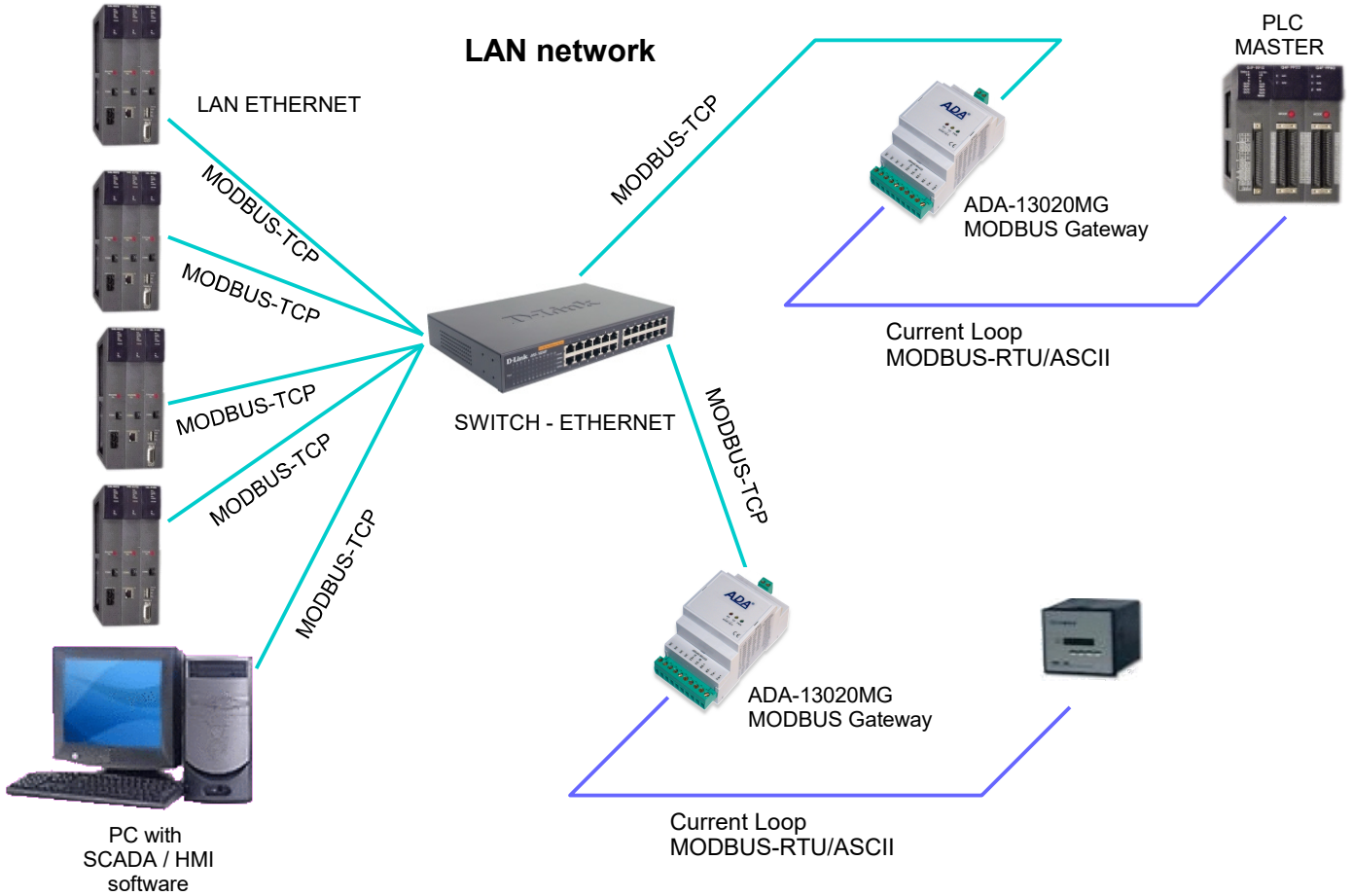
Fig .10. Integration of MODBUS-TCP with MODBUS-RTU/ASCII into one network by the use of ADA-13020MG with MODBUS Gateway

3.3. CONNECTION TO CURRENT LOOP INTERFACE DEVICES

Current Loop lines should be connected to terminals TX+, TX-, RX+, RX- or TX+, TX-, RX+*, RX- of the converter, like on the figures below.

3.3.1. CONNECTION TO DEVICE WITH ACTIVE TRANSMITTER & PASSIVE RECEIVER

In case of such connection the TX switch on the front panel should be set to ACT position (active transmitter).
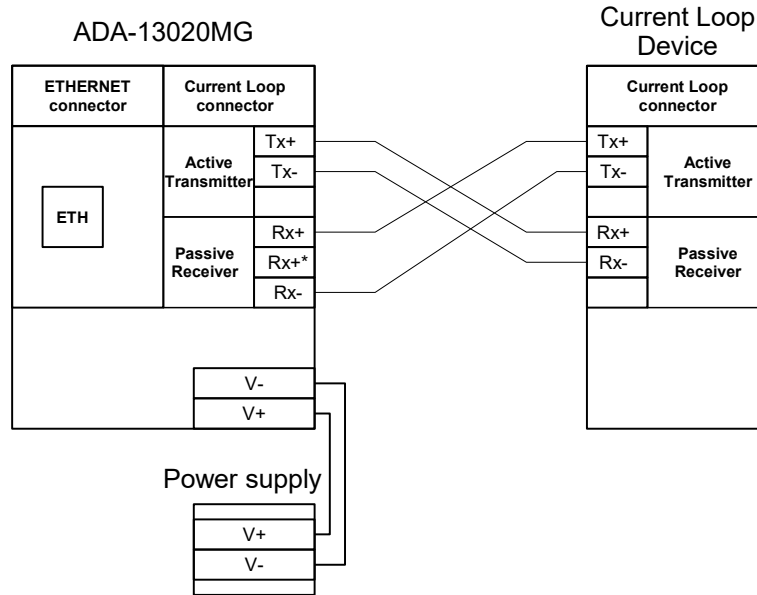
Fig. 11. Example connection of device with active transmitter/ passive receiver

3.3.2. CONNECTION TO DEVICE WITH PASSIVE TRANSMITTER & PASSIVE RECEIVER

In case of such connection the TX switch on the front panel should be set to ACT position (active transmitter) and connect additional source voltage U, from the scope 12VDC to 24VDC – depend on converter version.
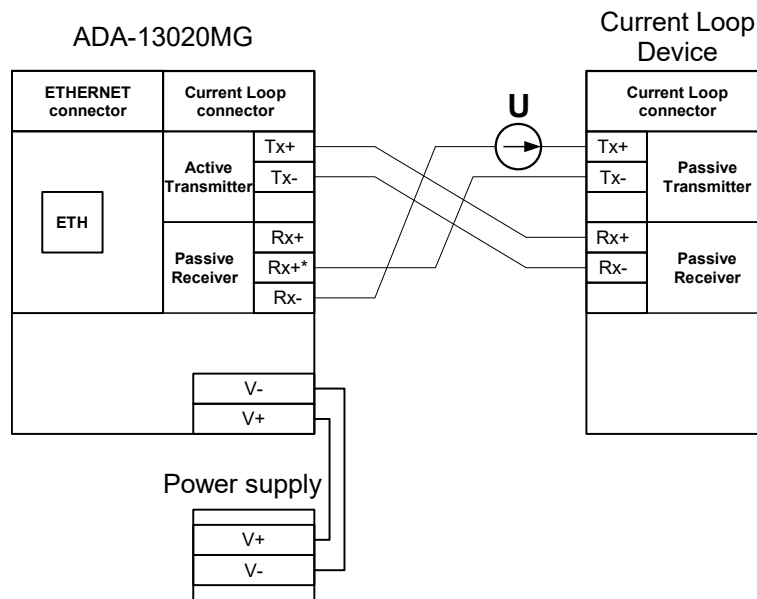
Fig. 12. Example connection of device with passive transmitter/ passive receiver

3.4. EXAMPLE CONNECTION OF SERIAL BRIDGE

By using the ADA-13020MG it is possible to create connection type serial bridge via LAN/WAN for current loop interface devices. Connection example is shown in Figure below.

CEL-MAR®
Zakład Informatyki i Elektroniki

ADA-13020MG

Current Loop Device

ETHERNET connector	Current Loop connector

Active Transmitter — Tx+ / Tx-
Passive Receiver — Rx+ / Rx+* / Rx-

Current Loop connector
Active Transmitter — Tx+ / Tx-
Passive Receiver — Rx+ / Rx-

ETH

V- / V+

Power supply

V+ / V-

LAN, WAN

ADA-13020MG

Current Loop Device

ETHERNET connector	Current Loop connector

Active Transmitter — Tx+ / Tx-
Passive Receiver — Rx+ / Rx+* / Rx-

Current Loop connector
Active Transmitter — Tx+ / Tx-
Passive Receiver — Rx+ / Rx-

ETH

V- / V+

Power supply

V+ / V-

Fig. 13. Example connection of ADA-13020MG converters

3.5. POWER SUPPLY CONNECTION

The power supply to the ADA-13020MG should be DC (regulated) from the scope 10 V= to 30V= and nominal power more than 3W e.g. 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- terminal.
The ADA-13020MG converter has the protection from opposite connection power supply.

4. ACTIVATION

If connection was made properly a green LED PWR on front panel of converter should lit after power on, if not check polarization of connected power. When data is transmitted the ACT LED on RJ45 connector and RX, TX LED's on front panel should blink. This LED are described below:

LED	Description
	Current Loop interface and power supply
PWR	Signalization of Power Supply
RX	Signalization of data receiving through ADA-13020MG from Current Loop port.
TX	Signalization of data transmitting from ADA-13020MG through Current Loop port.
	ETHERNET interface
Yellow	Signaling a valid connection to the network
Green	Signaling data transmission

5. CONFIGURATION

The ADA-13020MG converter like most of network devices should be configured for proper functioning, it's needed configuration of network services and network setting.
Below are described the stages of software installation and network setting configuration of converter.

5.1. INITIAL CONFIGURATION USING ADAFINDER SOFTWARE

5.1.1. ADAFinder INSTALLATION

The initial configuration of network setting at the converter can be made by using ADAFinder or ADAWiz software. The installation is automatically after insert the CD (compact disc) to an optical drive. If the autorun doesn't start, should run the file setup.exe located in main CD catalogue. After installation the software ADAFinder and ADAWiz are available in ***Start->Programs->CEL-MAR->ADANet.***

5.1.2. NETWORK SETTING

The ADAFinder is use for configuration of converter's network setting.
Before running the ADAFinder should be disabled the System FireWall!
After running, the program is searching local network and if find ADA-13020MG, will add them to the list of available converters **[Devices:]** Fig.15.

To change the network setting of ADA-13020MG, should:

– select the converter from the list **[Devices:]** and press **[Configure IP Settings]**,

– in windows **[Set IP Address]** select option **'Automatically obtain network settings via DHCP'** (default setting) or **'Manually configure network setting'**. In case of manual configuration should be enter IP Address of the converter, Subnet Mask, Default Gateway and the Password (default: dbps) of the ADA-13020MG administrator for authorization of changes.

– press **[Apply]**, configuration will be saved to the converter and will restart. After message **'Operation made successfully'**, press **[Refresh List]** in ADAFinder window. After re-searching the lists od available converters **[Devices:]** will be refreshed.

Other buttons of the program main menu:

– selecting the converter from the list and pressing **[Reboot Device],** will make programmable reset of the converter – new configuration of network setting will be activated,

– selecting the converter from the list and pressing **[Device Information],** will show an information about setting of the converter,

– selecting the converter from the list and pressing **[Open Web Interface],** will run Internet browser and open the configuration page of the converter.
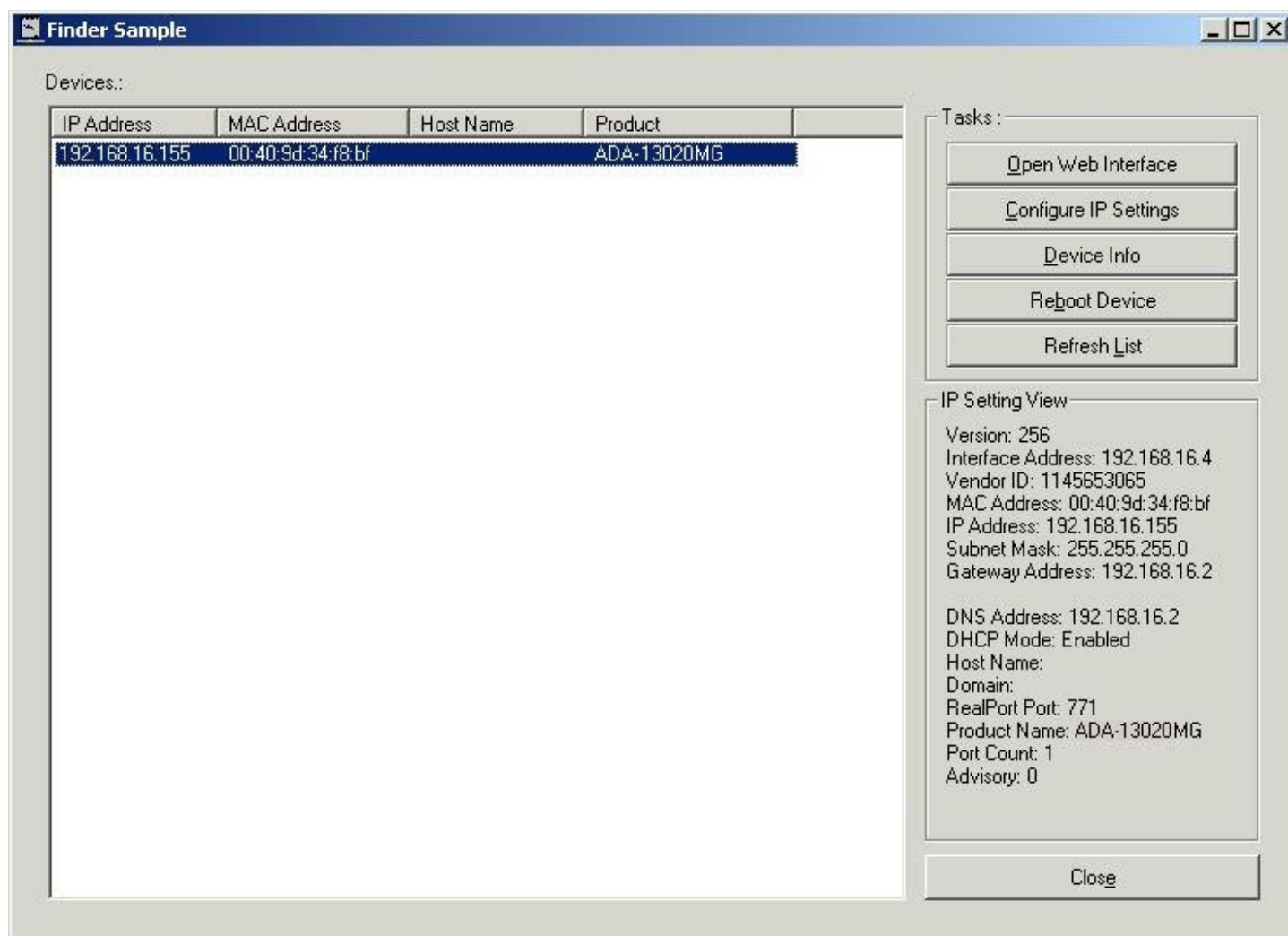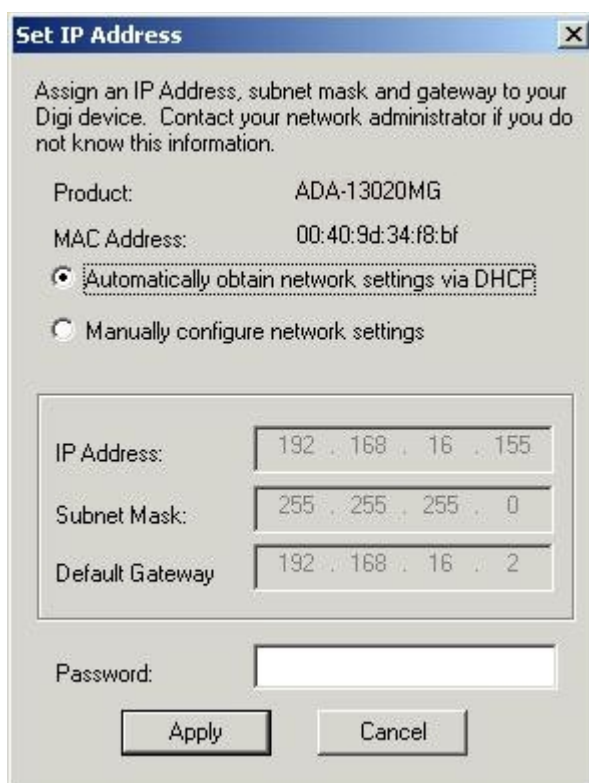
Fig. 14. Basic network configuration

Fig. 14a. IP address setting

## 5.2. CONFIGURATION AND MANAGEMENT BY THE USE OF INTERNET BROWSER

Integrated WWW server to ADA-13020MG enable to easy configuration and diagnostics of LAN and WAN network devices by the use Internet browser.

For configuration open the internet browser and type the address **http://<converter-ip-address>/admin/administration.htm.** The login windows will open. Enter User name and Password as follows:

User name: **root**

Password: **unique password on the converter label**

If the User name and the Password are correct will open the page as below.
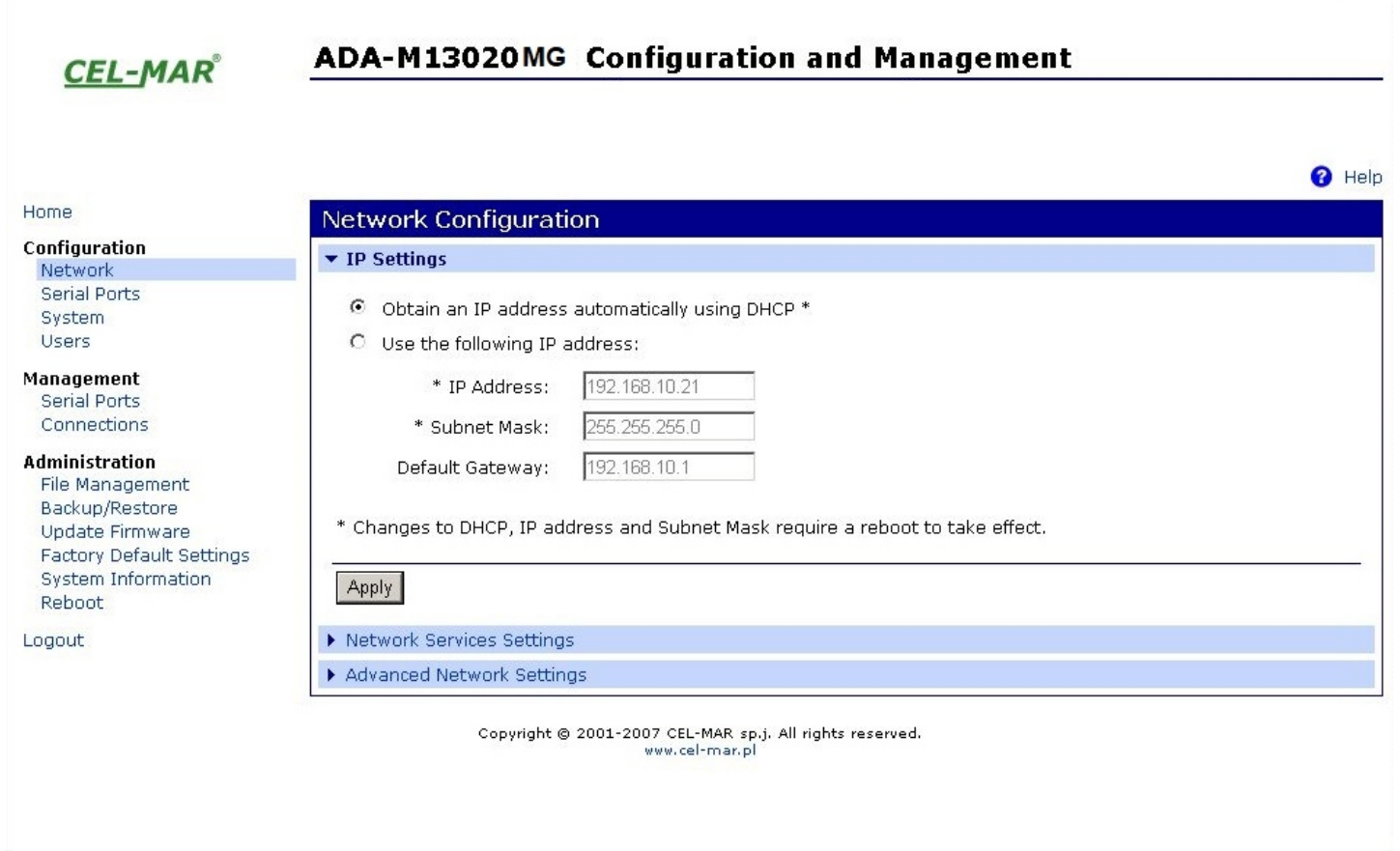
Fig. 15. Page for manage and configuration of ADA-13020MG converter

5.2.1. NETWORK SETTING CONFIGURATION

To make changes of default setting or new configuration of ADA-13020MG, select on left panel **Configuration -> Network** and then on right **[IP Settings]** (Fig.15) and make the selection: **Obtain an IP address automatically using DHCP** or **Use the following IP address** (in this option, enter IP Address of the converter, Subnet Mask, Default Gateway), press **[Apply]** for save. After the message **Changes have been saved successfully**, from left menu select **Administrator -> Reboot** on right press **[Reboot]**, will be programmable reset of the converter and new configuration of network setting will be activated.

Fig. 16. Page for network setting configuration of ADA-13020MG converter

5.2.2. SERIAL PORT CONFIGURATION

The configuration of serial port of the ADA-13020MG converter includes: port description, setting of port profile (operating mode) and setting of serial transmission parameters (baud rate, data bits, parity, stop bits).
Select on left panel **Configuration -> Serial Ports** and then on a page **Serial Port Configuration** select **[Port 1],** will open the configuration details page, includes:
– Port Profile Settings,
– Basic Serial Settings,
– Advanced Serial Settings,

5.2.2.1. SERIAL PORT PROFILE CONFIGURATION (OPERATING MODE)

Select on right panel **Serial Port Configuration -> Port Profile Settings** and then press **Change Profile...** will open the page **Select Port Profile** for selection of available port profiles (fig. 17).
The ADA-13020MG operates properly in profiles as follows:
– RealPort
– TCP Sockets
– UDP Sockets
– Serial Bridge
– Industrial Automation (Modbus Gateway).

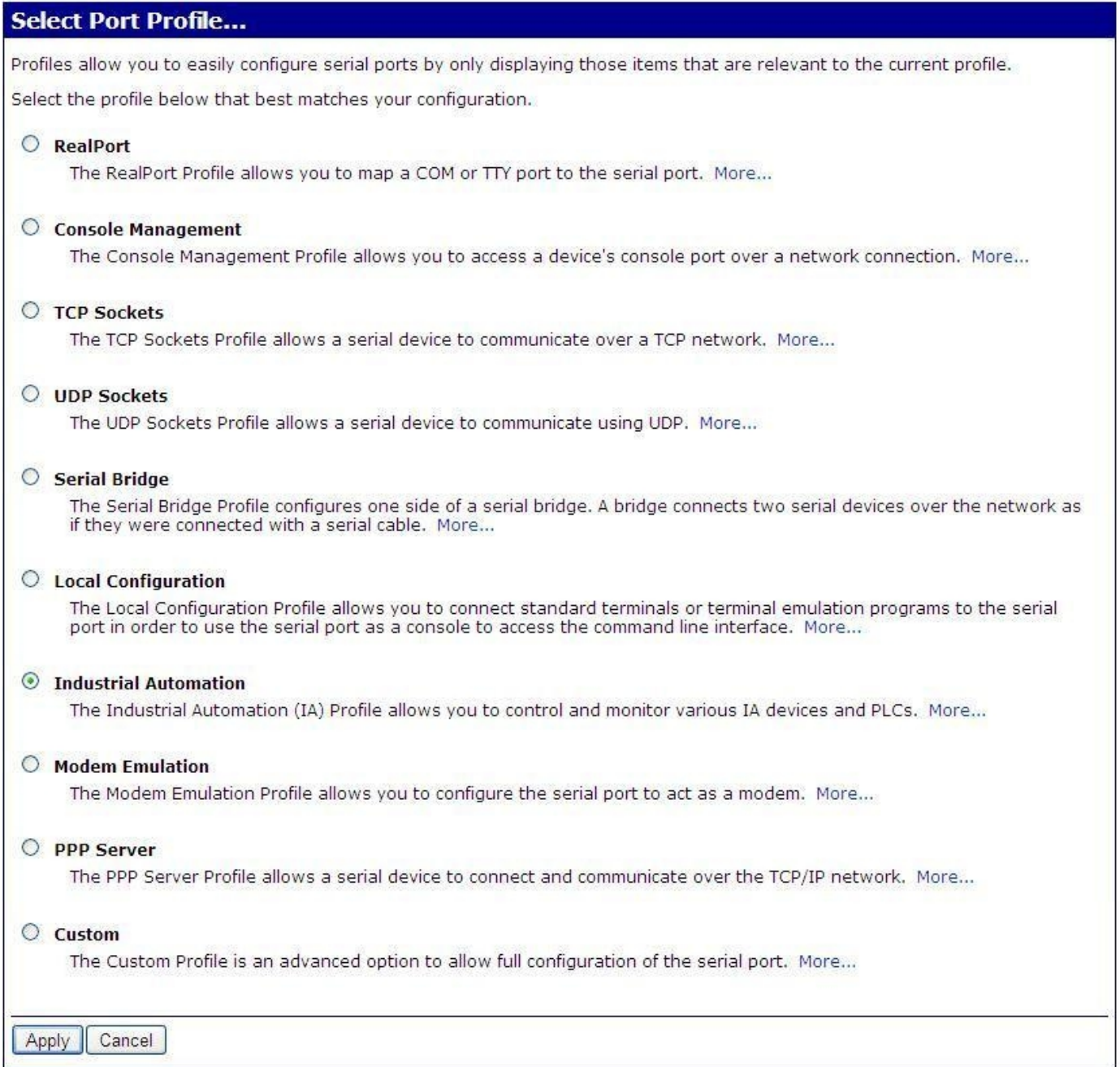Configuration of profiles will be presented in next chapters.

Select Port Profile...

Profiles allow you to easily configure serial ports by only displaying those items that are relevant to the current profile.

Select the profile below that best matches your configuration.

○ **RealPort**

The RealPort Profile allows you to map a COM or TTY port to the serial port. More...

○ **Console Management**

The Console Management Profile allows you to access a device's console port over a network connection. More...

○ **TCP Sockets**

The TCP Sockets Profile allows a serial device to communicate over a TCP network. More...

○ **UDP Sockets**

The UDP Sockets Profile allows a serial device to communicate using UDP. More...

○ **Serial Bridge**

The Serial Bridge Profile configures one side of a serial bridge. A bridge connects two serial devices over the network as if they were connected with a serial cable. More...

○ **Local Configuration**

The Local Configuration Profile allows you to connect standard terminals or terminal emulation programs to the serial port in order to use the serial port as a console to access the command line interface. More...

⦿ **Industrial Automation**

The Industrial Automation (IA) Profile allows you to control and monitor various IA devices and PLCs. More...

○ **Modem Emulation**

The Modem Emulation Profile allows you to configure the serial port to act as a modem. More...

○ **PPP Server**

The PPP Server Profile allows a serial device to connect and communicate over the TCP/IP network. More...

○ **Custom**

The Custom Profile is an advanced option to allow full configuration of the serial port. More...

[Apply] [Cancel]

Fig. 17. The page with serial port profiles

5.2.2.1.1. REALPORT (VIRTUAL PORT) CONFIGURATION

Choosing **RealPort** (Virtual Port), is configured the serial port of the ADA-13020MG, for communication with virtual port COM of computer. Press [**Apply**] for save. After installation driver (RealPort) of virtual port COM (see chapter 6) in operating system, data sending by application to this port are transferred through WLAN/WAN to the ADA-13020MG converter and are present on his serial port. The driver **RealPort** installation is presented in chapter 6. Normally **RealPort** service allows for one connection through WLAN/WAN, between computer and server port.
Connection from other computers to the converter will be not taken, what will cause the error message.

5.2.2.1.2. TCP SOCKETS CONFIGURATION

Choosing **TCP Sockets,** is configured the serial port of the ADA-13020MG, for direct communication with PC by the use of TCP socked. Data sending by application to TCP socked are transferred through network to the ADA-13020MG converter and are present on his serial port. To save selected configuration, press the button [**Apply**].

5.2.2.1.2.1. TCP SERVER AND CLIENT CONFIGURATION

After saving the TCP Sockets profile, will open section **TCP Server Settings** (picture below), includes configuration of:
– port for Telnet service; standard 2001,
– port for serial port service; standard 2101 (through this port are transferred data to serial port of converter),
– port for security access to serial port service; standard 2601 (through this port are transferred data to serial port of converter),

and possibility of selection **Enable TCP Keep Alive** – connection will be kept, even if the data is not transmitted over the network.

Fig. 18. Configuration of TCP server

For configuration of **TCP Client Settings** (Fig below), select **Automatically establish TCP connections,** connection between client and TCP server will be automatically. Then select **Always connect and maintain connection** option and in section **Establish connection to the following network service** enter IP address of device to which TCP client will send data, select service and enter port. There is also possible to select an option **Enable TCP Keep-Alive** – connection will be kept, even if the data is not transmitted over the network.
For saving the configuration press **[Apply].**

Fig. 19. Example configuration of TCP client

ATTENTION !
Default port of serial port service is 2101.
If on the local network is conflict with other network service using the same port, in the converter's port configuration change number of port into another for the server and client service.

5.2.2.1.2.2. THE 'ENABLE TCP KEEP-ALIVE' OPTION CONFIGURATION

Option **Enable TCP Keep-Alive** keeps connection between server and client, even if the data is not transmitted over the network and reconnection in case of interruption.
Configuration of this option can be made by selection **Configuration > Network > Advanced Network Settings > TCP Keep-Alive Settings.** In this section can be configured:
– **Idle Time** – specifies the period (scope 10 sec. - 24 hours) that a TCP connection has to be idle before a keep-alive is sent.
– **Probe Interval** – the time in seconds between each keep-alive probe (scope 10 – 75 sec.),
– **Probe Count** – the **number of times TCP probes the connection to determine (scope 5 – 30 trials).**

5.2.2.1.2.3. SERIAL PORT TRANSMISSION PARAMETERS CONFIGURATION

For proper operation of the ADA-13020MG with device connected to his Current Loop serial port, should be set the same transmission parameters for both devices.
Select **Basic Serial Settings** and enter **Baud Rate**, **Data Bits**, **Parity**, **Stop Bits,** the same parameter like has device connected to the serial port of the converter.

5.2.2.1.3. UDP SOCKETS PROFILE CONFIGURATION

Choosing **UDP Sockets,** is configured the serial port of the ADA-13020MG converter for direct communication with PC or other device connected to the network by the use of UDP socked. Data sending by application or other device/s to this port are transferred through LAN/WAN to the ADA-13020MG converter and are present on his serial port. Press [**Apply**] for save the configuration

5.2.2.1.3.1. UDP CLIENT & SERVER CONFIGURATION IN CASE OF MASTER DEVICE

After saving the UDP Sockets profile, will open section **UDP Server Settings** with operating parameters like on picture below. Set access to UDP server on e.g. 2101 port. Then select **Automatically send serial data** in section **UDP Client Settings**, this automatically send received data by the use UDP client service to the SLAVE device connected to LAN/WAN through e.g. ADA-13020MG, ADA-13028LMG, ADA-13040MG, ADA-13110MG.
On lists **Send data to the following network services** are addresses of network devices and ports to which will be send data. In field:
– **Description** - enter e.g. location of the converter and SLAVE device,
– **Send To**   - enter IP address of e.g. converter, connected to SLAVE device,
– **UDP Port**   - enter the number of port on which is working UDP Server of converter connected to SLAVE device and press
   [Add]
In the section **Send data under any of the following conditions** is recommended to set parameters like on picture bellow.

For saving the configuration of UDP client and server for MASTER device, press **[Apply]**.

Fig. 20. Configuration of UDP client and server for converter connected to MASTER device.

5.2.2.1.3.2. UDP CLIENT & SERVER CONFIGURATION IN CASE OF SLAVE DEVICE

Set operating parameters of UDP server for SLAVE device connected via serial port to the converter, eg like on picture below. Set access to UDP server on e.g. 2101 port. Then select **Automatically send serial data** in section **UDP Client Settings**, this automatically send received data by the use UDP client service to the MASTER device connected to LAN / WAN through e.g. ADA-13020MG, ADA-13028LMG, ADA-13040MG, ADA-13110MG.

On lists **Send data to the following network services** are addresses of network devices and ports to which will be send data. In field:

– **Description** - enter e.g. location of the converter and MASTER device,
– **Send To**   - enter IP address of e.g. converter, connected to MASTER device,
– **UDP Port**   - enter the number of port on which is working UDP Server of converter connected to MASTER device and press **[Add]**

In the section **Send data under any of the following conditions** is recommended to set parameters like on picture bellow.

For saving the configuration of UDP client and server for SLAVE device, press **[Apply]**.

Fig. 21. Example configuration of UDP client and server for converter connected to SLAVE device.

ATTENTION !
Default port of serial port service is 2101.
If on the local network is conflict with other network service using the same port, in the converter's port configuration change number of port into another for the server and client service.

5.2.2.1.3.3. CONFIGURATION OF SERIAL PORT TRANSMISSION PARAMETERS

For proper operation of ADA-13020MG with device connected to his Current Loop serial port, should be set transmission parameters. Select **Basic Serial Settings** and enter **Baud Rate**, **Data Bits**, **Parity**, **Stop Bits,** the same parameter like has device connected to the serial port of the converter.

5.2.2.1.4. SERIAL BRIDGE PROFILE CONFIGURATION

Choosing the **Serial Bridge** (fig.17) profile, enable direct communication between two devices connected to two the ADA-13020MG converters over the network as if they were connected with a serial cable. A properly configured the ADA-13020MG will start automatically communication with each other.

Press [**Apply**] for save the configuration and will open section **Serial Bridge Settings** with operating parameters like on picture below. Select **Initiate serial bridge to the following device** option and enter IP address and 2101 Port of the ADA-13020MG with which to create the serial bridge over the network. Additionally, can be selected [**Enable TCP Keep-Alive**] option which keeps connection even if the data is not transmitted. Select **Allow other devices to initiate serial bridge** and enter 2101 port on which other the converter will automatically start communication and can be set also [**Enable TCP Keep-Alive**] option which keeps connection even if the data is not transmitted.

Fig. 22. Example configuration of Serial Bridge TCP

ATTENTION !
Default port of serial port service is 2101.
If on the local network is conflict with other network service using the same port, in the converter's port configuration change number of port into another for the server and client service.

5.2.2.1.4.1. CONFIGURATION OF SERIAL PORT TRANSMISSION PARAMETERS

For proper operation of the ADA-13020MG with device connected to his Current Loop serial port, should be set the same transmission parameters for both devices.
Select **Basic Serial Settings** and enter **Baud Rate**, **Data Bits**, **Parity**, **Stop Bits,** the same parameter like has device connected to the serial port of the converter.

5.2.2.1.5. INDUSTRIAL AUTOMATION (Modbus Gateway) PROFILE CONFIGURATION

Choosing the **Industrial Automation** (Modbus Gateway, Fig.17) profile, is configured the serial port of the ADA-13020MG converter for communication MODBUS-RTU master/slave or MODBUS-ASCII master/slave protocol with connected devices. The ADA-13020MG converts frames of MODBUS-RTU/ASCII protocol to frames of MODBUS-TCP protocols and send via WLAN/LAN/WAN network to devices with implemented MODBUS-TCP protocol or to converters ADA-13021MG, ADA-13110MG operating in **Industrial Automation** (MODBUS Gateway) mode, to which connected devices with MODBUS-RTU/ASCII.
Press [**Apply**] for save the configuration.

5.2.2.1.5.1. CONFIGURATION FOR COMMUNICATION WITH DEVICES MODBUS-MASTER TYPE

In section **Industrial Automation Settings**, press *[Change Protocol]* link. Then in section **Select IA Protocol** (figure below) select type of device, connected to serial port of the ADA-13020MG, as **Serial Master** and MODBUS-RTU or MODBUS-ASCII protocol for communication between connected devices. Press *[Apply]* for saving configuration.

Fig. 23. Example configuration for communication with MODBUS-MASTER devices – choice of devices and protocols

Set the options in section **Modbus RTU Settings** like on the figure below and press *[Apply]*.

Fig. 24. Example configuration for communication with MODBUS-MASTER devices – Modbus RTU setting

Then select section **Slave Destinations (Packet Routing)** – figure below.
In this section press **[Add],** enter the IP address of **Slave** type devices, to which **Master** will send requests and receive responses.

Fig. 25. Example configuration for communication with MODBUS-MASTER devices – table configuration of SLAVE type devices

In section **Destination Settings** (fig. below) set the options of requests from **Master** device to **Slave** device, in fields:
– **Host name** - enter IP address of **Slave** device.
– **Protocol** - set protocol which will be send to **Slave** device – in this case will be Modbus/TCP.
– **Transport** - set TCP protocol.
– **Network port** - set port 502.
Press **[Apply]** for saving configuration. Then press again **[Add]** for adding another **Slave** device.
Then select section **Slave Destinations (Packet Routing)**, when all **Slave** devices are added and set, press **[Apply].**

Fig. 26. Example configuration for communication with MODBUS-MASTER devices – table entry configuration for SLAVE type devices

On section **Advanced Protocol Settings** (fig. below), set the time out by entry:
– **Character timeout** - value in ms., maximum delay or gap betweens bytes of a message – default 20 ms.
– **Message timeout** - value in ms., maximum delay or gap betweens bytes of a message – default 2500ms; this time must be less than the Timeout set on SLAVE and MASTER MODBUS-RTU devices.
For saving the **Advanced Protocol Settings** press [**Apply**].

Fig. 27. Example configuration for communication with MODBUS-MASTER devices – configuration of timeout parameters for MASTER type device

5.2.2.1.5.2. CONFIGURATION FOR COMMUNICATION WITH MODBUS-SLAVE TYPE DEVICE

In section **Industrial Automation Settings**, press *[Change Protocol]* link. Then in section **Select IA Protocol** (figure below) select type of device, connected to serial port of ADA-13020MG as **Serial Slave** and MODBUS-RTU or MODBUS-ASCII protocol for communication between connected devices. Press *[Apply]* for saving configuration.

Fig. 28. Example configuration for communication with MODBUS-SLAVE devices – choice of devices and protocols

Set options in section **[Modbus RTU Settings]** eg. As on picture below. Press *[Apply]* for saving configuration.

Fig. 29. Example configuration for communication with MODBUS-SLAVE devices – Modbus RTU setting

Go to section **Modbus/TCP Network Settings [Global]**, configuration options set as on the figure below. Press *[Apply]* for saving configuration.

Fig. 30. Example configuration for communication with MODBUS-SLAVE devices

ATTENTION !
Default port of Industrial Automation (Modbus Gateway) service is 502.
If on the local network is conflict with other network service using the same port, in the converter's port configuration change number of port into another for the server and client service.

On section **Advanced Protocol Settings** (fig. below), set the time out by entry:
– **Character timeout** - value in ms., maximum delay or gap betweens bytes of a message – default 20 ms.
– **Message timeout** - value in ms., maximum delay or gap betweens bytes of a message – default 2500ms; this time not must be less than the timeout set on MODBUS MASTER devices / SCADA/HMI software.
For saving the **Advanced Protocol Settings** press *[Apply]*.

Fig. 31. Example configuration for communication with MODBUS-SLAVE devices – configuration of timeout parameters for SLAVE type device

5.2.2.1.5.3. SERIAL PORT TRANSMISSION PARAMETERS

For proper operation of ADA-13020MG with devices Modbus-Master or Modbus-Slave types, connected to his serial port, should be set the same transmission parameters for both devices.
Select **Basic Serial Settings** and enter **Baud Rate**, **Data Bits**, **Parity**, **Stop Bits,** the same parameter like has device connected to the serial port of the converter.

5.2.3. SYSTEM SETTINGS

Select on left panel menu **Configuration -> System** and then on right will be selections as follows:
– **Device Identity Settings** – allows adding name of converter, describe the location and add identification number,
– **Simple Network Management Protocol Settings (SNMP)** – allows to make the configuration of management protocol SNMP.

5.2.4. USERS AND PERMISSIONS

On the configuration page **Users** are two sections:
– **Users**
– **Configure Users**

The section **Users** allows configuring the method of login to ADA-13020MG. Selecting the option **Enable user logins** means that after enter the address http://<converter-ip-address>/admin/administration.htm to internet browser, will open login window and will be necessary to enter user name and password.

The section **Configure Users** allows adding additional user, change password, configure access and permissions for each defined users.

5.2.4.1. CHANGING USER NAME AND PASSWORD

Changing the default user root and password, can be done as follows :
1. press user mane *root* in section **Users Configuration->Configure Users,**
2. enter new user name and password.
3. press **[Apply]** for saving.

5.2.4.2. ADDING NEW USER WITH LIMITED PERMISSIONS FOR CONFIGURATION OR MANAGEMENT

For adding new user with limited permissions for configuration or management follow the steps below:
1.From menu **Configuration** select **Users,**
2. In section **Configure Users,** press **[New...]**,
3. Enter user mane (eg. **admin**) and password – twice, and press **[Apply]**,
4. Will open the page **Users Configuration**, where in section **Configure Users**, will be new user name.

Now it is possible to configure access permissions to the converter and permissions for configuration of this new user.
Configuration of access to converter:
1. From menu **Configuration** select **Users,**
2. In section **Configure Users**, select added user eg. **admin**,
3. Will open the page **User Configuration** – admin, where are sections:
A/ **User Configuration** – possibility of rename user and password,
B/ **User Access** - method of access to converter from the network:
      Allow command line access – access using the Command Line Interface - **telnet**,
      Allow web interface access – access using the internet browser.
C/ **User Permissions -** user permissions to configuration and management of the ADA-13040MG converter, where are options:
      None - no permission,
      Read - permission to read,
      Read Self - permission to read own settings, but not other users.
      Read/Write - full permission to read and write the setting.
      Read/Write Self - permission to read and write own setting, but not other users.
      Read All/Write Self - permission to read the setting for all users and modify only own setting (not other users).
      Execute - permission to execute (start).
4. All changes are saved by pressing **[Apply]**.

5.2.5. MANAGEMENT

In menu **Management** are two options:
- **Serial Ports**
- **Connections**

5.2.5.1. SERIAL PORT MANAGEMENT

Section **Serial Ports** allows to identification connections/disconnection to the serial port of the converter through the network.

5.2.5.2. CONNECTIONS MANAGEMENT

Section **Connections** allows to identification connections/disconnection to the converter through the network.

5.2.6. ADMINISTRATION

The menu **Administration** allows :
– to delete/upload files with Java applet,
– to backup/restore configuration of converter,
– to update Firmware,
– to restore the factory default settings,
– to display system details information,
– to reboot the converter.

5.2.6.1. FILE MANAGEMENT

Section **File Management** enables upload and delete Web provided by manufacturer. Uploaded index.htm or index.html allows to automatically run the page in the web browser after entering **http://address-ip-convertera/FS/WEB/index.htm** and login to ADA-13020MG.

5.2.6.2. BACKUP & RESTORE CONFIGURATION

Section **Backup/Restore** enables backup to file or restore from file the user configuration of the converter.

5.2.6.3. FIRMWARE UPDATE

Section **Update Firmware** enables to make the update firmware from the file. Firstly should be done update the POST software before updating the firmware – more details available on the web page http://www.cel-mar.pl.

5.2.6.4. FACTORY DEFAULT SETTINGS

The converter was configured by the manufacturer.
To restore factory default settings, select from menu **Factory Default Settings**. After that the converter will automatically reboot.

5.2.6.5. SYSTEM INFORMATION

Section **System Information** displays:
- **General** – device model, MAC address, firmware version, Boot version, POST version and more.
- **GPIO** – not applicable in ADA-13020MG.
- **Serial** – port description, current settings of serial port, status of controlling lines and the statistics data transfer through the serial port.
- **Network** – show statistics of ETHERNET interface for IP, TCP, UDP, ICM protocols.

5.2.6.6. REBOOT

Section **Reboot** allows making software reset of ADA-13020MG. Pressing *[Reboot]* will start rebooting of server during 1 min.

5.2.6.7. LOGOUT – ENDING MANAGEMENT AND CONFIGURATION

After completion of the configuration or administration should be pressing **Logout** on left panel – logout from www server of ADA-13020MG converter.

6. USING VIRTUAL PORT SERVICE [REALPORT]

6.1. VIRTUAL PORT DRIVER INSTALLATION IN WINDOWS XP

The installation of virtual serial port drivers should be done for the CD, by choosing:
• Drivers/Win-98-ME, for Windows 98, Windows 98SE, Windows ME,
• Drivers/Win-2000, for Windows2000,
• Drivers/Win Server-2003-2008-2012 for Windows Server 2003, 2008, 2012,
• Drivers/Win-Vista for Windows Vista.
• Drivers\Windows\Win XP-7-8-8.1-10 for Windows XP, 7, 8.x, 10, 11.

Installation of Virtual serial port drivers is as follows:

1. connect the ADA-13020MG to ETHERNET network and to power supply (see p.3.2.1 - 3.2.2.),
2. press *[Start]* and select [**Run...**],
3. in the dialog window [**Run**] press *[Browse]*,
4. select „**My computer**" and CD-Rom with „**ADANET_DRV**",
5. select catalogue **Drivers/WinXP-2003-Vista-7-2008_x86_x64**
6. select file „**Setup.exe**" for 32-bits system or „**Setup64.exe**" for 64-bits and press [**Open**],
7. when the installation window will appear press [**Next**],
8. will start the searching for the wireless serial servers in the network, founded devices will be added to the list,
9. select the wireless serial servers from the list for installation of virtual port driver and press [**Next**],
10. in window Describe the device select or not the Starting Com port and press [**Finish**]. The driver will be installed.

The Virtual Serial Port Drivers can be installed without connection of the ADA-13020MG to ETHERNET network and it is as follows:
1. press [**Start**] button, select [**Run...**],
2. in the dialog window [**Run**] press [**Browse**],
3. select „**My computer**" and CD-Rom with „**ADANET_DRV**".,
4. select catalog **Drivers/WinXP-2003-Vista-7-2008_x86_x64**.,
5. select file „**Setup.exe**" for 32-bits system or „**Setup64.exe**" for 64-bits and press [**Open**].,
6. when the installation window will appear press [**Next**] .,
7. will start the searching for converters in the network.
8. if no devices were not found press [**Next**].
9. should be set in the window Describe the device:
– IP address for wireless serial server,
– number of installing COM port (No. Ports)
– Starting COM
and press [**Finish**]. The driver will be installed.
In this way installed virtual port can require the configuration in case of connecting the wireless serial server to network.

6.2. REALPORT CONFIGURATION IN WINDOWS XP

After installation of RealPort drivers, can be done the configuration by the use the Device Manager of Windows and it is as follows:
1. Press *[Start]*, select [**Properties/Setting**], press *[Control Panel]*.
2. Double click icon *[Administrative Tools]* and *[Device Manager]*.
3. Press *[Ports (COM & LPT)]*. On fig. 23 are shown available serial ports COM1, COM2 and **COM3** marked as **Digi Connect ME** which was created after installation of RealPort driver.
4. Then select [**Multi-port Serial Adapter**], there will be the name the **ADA-13020MG**.
5. Double click the name and the window [**Properties**] will appear.
6. Select [**Advanced**] and press [**Properties**].

7. Enter **new name of virtual port for wireless serial server**. In the window [**Advanced Properties**] click [**ADA-13020MG**] and then select [**Properties**], press [**Rename Ports**], now it is possible to change the name of virtual port driver for example COM5, COM11 etc. To accept the changes press [**OK**].

8. **Select IP address, MAC, DNS server for communication with virtual port driver**. In the window [**Advanced Properties**] click [**ADA-13020MG**] and then select [**Network**] (Fig. 24), and set the **IP address**, **MAC Address** or **DNS name** of the wireless serial server for communication with virtual port driver.

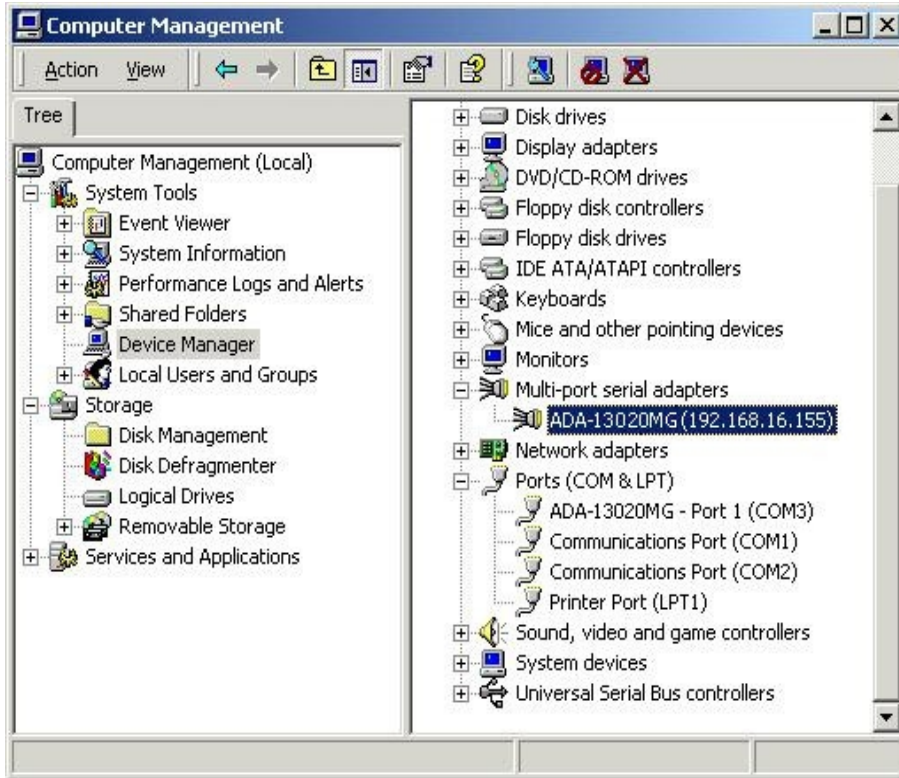9. In the next window press [**OK**] to accept the changes.
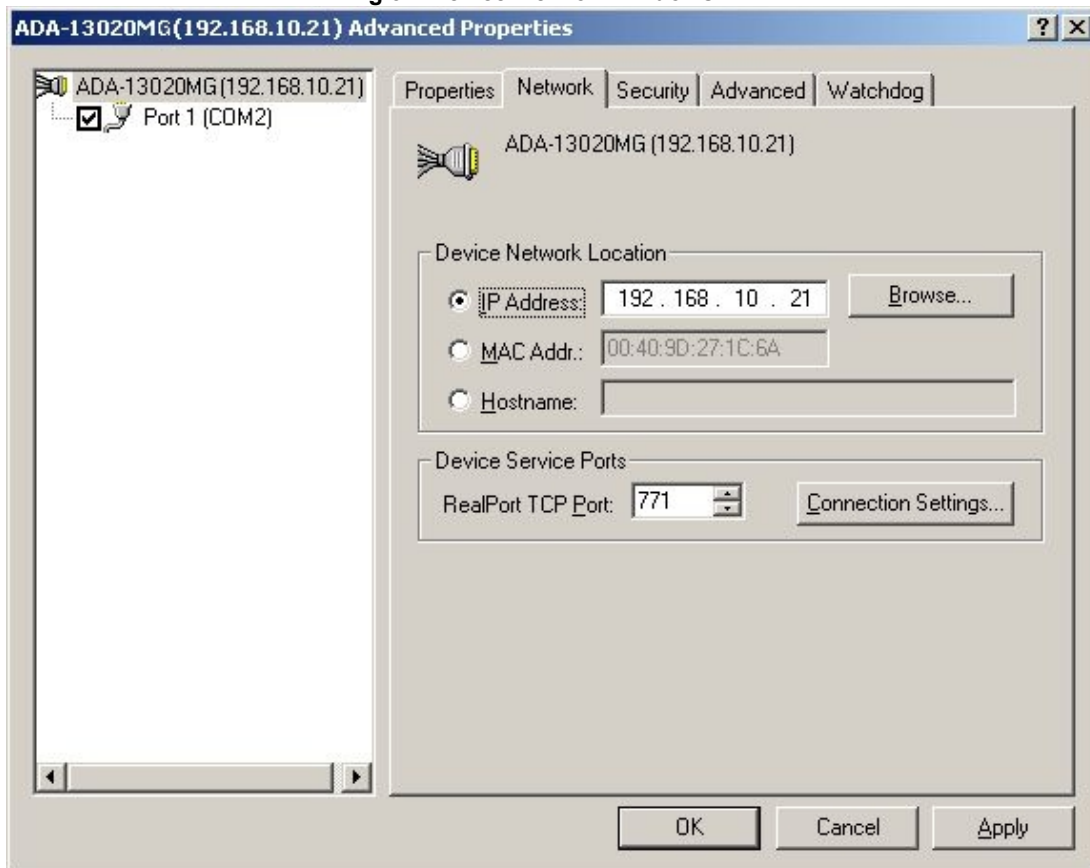

Fig 32. Device view on Windows XP

Fig. 33. Example configuration of multi-port serial adapter

7. FACTORY DEFAULT

Parameter	Value
User name	root
Password	unique password on the converter label
IP Address	Obtain an IP address automatically using DHCP
Operating mode	RealPort
Bout rate[bits/sec]	9600
Number of data bits	8
Parity Control	no
Number of stop bits	1
Flow Control	no

8. TROUBLESHOOTING

Problem	Solution
I forgot the password	Restoring Default Settings according to steps below: 1. Disconnect the power of the converter, 2. Remove the cover of ETHERNET connector, 3. Press RESET "RST" and holding the button, connect the power of the converter, 4. Release the button after 20 sec. when the converter will start with default settings. Restoring Default Settings deletes existing configuration and the proper configuration should be loaded to the converter from the backup.
I changed the configuration and the converter isn't functioning.	1. Enter in the Internet browser http://converter-ip-address, 2. Select the menu **[Factory Default Settings]** press **[Restore]**.

9. VERSIONS

ADA-13020MG - ☐ - ☐ - ☐ - ☐ - ☐

Electronic version:

Standard	**1**

Current Loop Voltage:

24VDC	**1**
12VDC	**2**

Current Loop Type:

± 20mA (active transmitter, passive receiver)	**1**
0 – 20mA (TTY active transmitter, passive receiver)	**2**

Galvanic Isolation:

1kV=	**2**
3kV=	**3**

Type of connectors:

Screw terminal block,	**1**
Plug-in screw terminal block,	**3**

Order example:

Product symbol: **ADA-13020MG-1-1-1-2-3**

1 – standard electronic version,

1 – current loop voltage 24VDC,

1 – current loop type ± 20mA,

2 – galvanic isolation 1kV=,

3 – plug-in screw terminal block.

10. SPECIFICATION

TECHNICAL DATA		
Transmission Parameters		
Interface	**ETHERNET**	**Current Loop**
Connector	RJ45	Screw terminal, max. wire Ø 2,5mm².
Max. line length	150m – unshielded cable 100m – shielded cable	Depend on baud rate, up to few hundred meters
Max. number of connected device	Depend on addressing type in network	1
Transmission line	4-pair twisted cable, UTP 4x2x0,5(24AWG), shield inside large interferences (STP 4x2x0,5(24AWG))	2-pair twisted cable, UTP Nx2x0,5(24AWG), shield inside large interferences (STP Nx2x0,5(24AWG))
Max. baud rate	10/100 Mbit/s	38,4 kbps (depend on length Current Loop line)
Transmission type	Asynchronism half duplex or full duplex,	
Standards	IEEE 802.3	0-20mA(TTY), +/-20mA
Optical Signalization	• PWD – green LED (power supply) • RX - red LED data reception on Current Loop port, • TX - yellow LED data transmission via Current Loop port,	
Electrical Parameters		
Power requirements	10 - <u>24</u> – 30 V DC	
Power Cable	Recommended length of power cable – up to 3m	
Power	3W	
Protection from reverse power polarization	YES	
Galvanic Isolation	1kV= or 3kV= (between power circuit and ETHERNET signal line) 1kV= or 3kV= (between power circuit and Current Loop signal line)	
Optoisolation	~3kV= (between signal lines Current Loop and ETHERNET)	
Electromagnetic compatibility	Resistance to disruptions PN-EN 55024. Emission of disruptions 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 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 product and we hope that, this user manual helped in connecting and starting the **ADA-13020MG** converter.

We would also like to inform you that we manufacture one of the largest ranges of serial data transmission devices.
We encourage you to check out our full production offer on our website **www.cel-mar.pl/en**

We are waiting for your opinion about the product you purchased.

CEL-MAR sp.j.	Tel..: +48 41 362-12-46
Computers Science and Electronic Factory	Tel/fax...: +48 41 361-07-70
Sciegiennego 219C str.	Web...: http://www.cel-mar.pl/en
25-116 Kielce, POLAND	Office...: office@cel-mar.pl
	Sales department...........................: sales@cel-mar.pl
	Technical information .... : support@cel-mar.pl