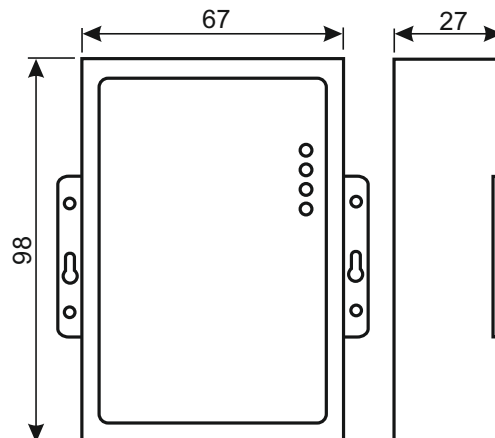# Z-397 WEB

Network converter RS-485 / Ethernet with galvanic isolation for TCP/IP/HTTP connection with PC or web services User Manual

1. OVERVIEW

Z-397 WEB converter is used to connect various devices with serial RS-485 interface to a TCP/IP-based Ethernet network. With it, it becomes possible to control these devices from any network location, including Internet. Good setup flexibility makes it possible to use the converter on any Ethernet networks. Certain operation modes designed for use in Access Control Systems (ACS), significantly extend the ACS capabilities even to use of cloud technologies. Using FREE software COM2IP (see website for details), it is possible to add a virtual COM port onto a PC which will be connected to RS-485 port of a Z-397 WEB converter. This configuration allows operating software which was designed to work with previous generation RS-485 converters.

Operation modes.
Through its Ethernet port, Z-397 WEB converter supports operation via TCP/IP protocol in three main operation modes:
1) Web Client mode: the converter controls the ACS system via its website. (e.g. www.guardsaas.com) ;
2) TCP Server mode: the converter listens for connections from a remote PC running client software (such as GuardLight, Guard Commander, Guard SaaS see website);
3) TCP Client mode: the converter attempts to connect to a remote PC running server software (e.g. GuardLight, ZProxy).
By using the drivers on a PC, virtual COM ports are created which are linked to the converter. This allows to use any software, which can work with standard COM ports, with this converter. The converter has two RS-485 lines, one of them has galvanic isolation from the rest of converter. It supports the NVT open protocol (Network Virtual Terminal, per RFC2217) for data transmission and line control.
Configuration and firmware updates may be performed either locally via USB port, or remotely via Telnet protocol. Converters have a special switch that disables remote configuration, for better system security.

2. SPECIFICATIONS

Ethernet:
Interface: ....RJ45 (10/100BASE-T).
Compatibility: ....Ethernet II, IEEE 802.3.
Supported network protocols: .... IP, ARP, TCP, Telnet, ICMP, UDP, DHCP, HTTP.
Maximum line distance: ....100 m.

RS-485:
Lines present: ....2.
Galvanic isolation: ....Line 1 1,000 V, Line 2 none.
Receiver input impedance: ....1/8 of a unit load.
Maximum Line Distance: ....1,200 m.
Baud rate: ....≤115,200 baud.

USB:
Connector: ....USB 2.0 Type B.
Mode: ....Full speed, Mass storage.
Max. connection line length: ....1.8 m.
Power voltage: ....8..18 V DC or 7..14 V AC.
Consumption current (at 12 V DC): ....max. 100 mA.
Dimensions, mm: ....98 x 67 x 27.
Weight: max. ....100 g.

3. OPERATING CONDITIONS
Ambient temperature: 5…40°C
Humidity:≤80% at 25°C.
When operating under non-recommended conditions, device specifications can deviate from normal values.
Device must be operated in absence of: precipitation, direct sunlight, sand, dust, and moisture condensation.

4. MOUNTING AND CONNECTION

4.1. Connectors and controls.

1	White/Orange		White/Orange	1	
2	Orange		Orange	2	
3	White/Green		White/Green	3	
4	Blue		Blue	4	
5	White/Blue		White/Blue	5	
6	Green		Green	6	
7	White/Brown		White/Brown	7	
8	Brown		Brown	8	

ETHERNET RJ45 connector to join LANs. Requires a standard straight Ethernet patch cable.

12V power socket. The supplied power adapter gets connected to this socket. If an alternative power adapter is to be used, it must provide:
- Current: ....100 mA and higher;
- Voltage: ....8..18 V DC or 7…14 V AC.
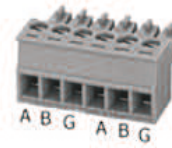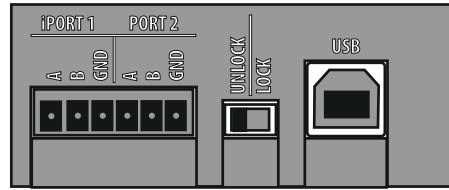
iPORT1 - socket for RS-485 Line 1 (has galvanic isolation)
**PORT2** - socket for RS-485 Line 2 (has no galvanic isolation)
LOCK/UNLOCK - a security switch. When in LOCK position, Telnet connection and network firmware updates are disabled. In Web Client mode, also disabled are controller memory changes (writing cards, timezones etc.), as well as configuration and firmware updates over the network.
USB - Type B USB connector, to connect to a PCs for a local configuration or firmware update session. A necessary AM-BM type USB cable is provided with the device.

4.2. Status Indicators

CONVERTER STATUS displays general converter status.

State	Display
USB mass storage mode	Slowly blinking red
Lock switch OFF	Solid red
Lock switch ON	Solid green
Power problem	Rapidly blinking red
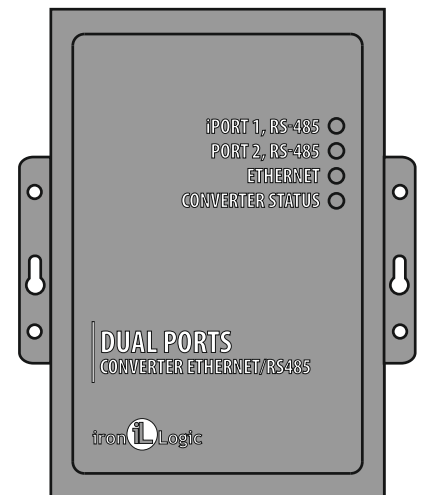
ETHERNET displays LAN connection status

State	Display
No cable connected	Off
Acquiring IP address	Slowly blinking red
IP address acquired	Solid green
IP address not acquired, acquisition error	Rapidly blinking red
Receiving data packets	Green flashes

iPORT1, PORT2 displays RS-485 lines status.

| State	Display
No TCP connection on the line	Off
TCP connection on the line established	Green
Transmit/Receive	Flashes Red/Green

4.3 RS-485 line connection.

Example connection layout for converter using two RS-485 lines. The converter is at the end of the line, so a 120-Ohm terminating resistive load is necessary (supplied with the device).
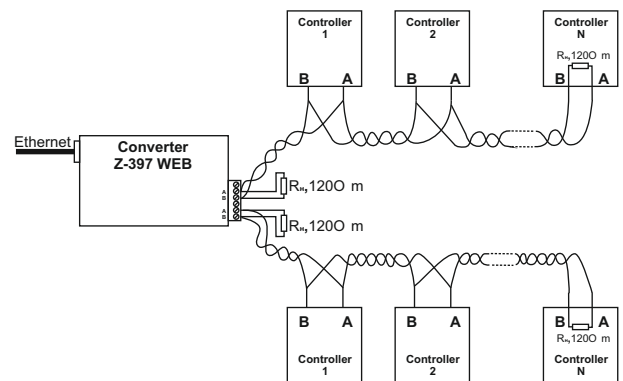
Example connection layout for converter plugged into the middle of RS-485 chain. No terminating resistive load required to connect to Z-397 WEB.
If the lines are very long, it is necessary to join ground terminals of converter and controllers. For that, you can use a single wire or a pair of wires out of the RS-485 cable used in the lines.
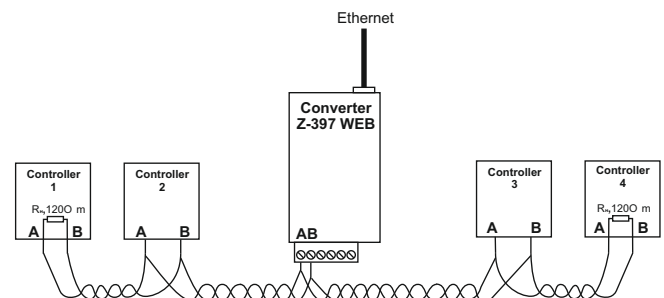
5. CONFIGURATION
Under the default network settings, the converter is allowed to register automatically onto the LAN. If the registration is successful, the converter will be ready to work. The ETHERNET status LED will display solid green in this case.
In case of IP address automatic acquisition failure, ETHERNET indicator will be rapidly flashing red.
If no DHCP server exists on the network, the automatic configuration is not possible and the converter parameters must be set manually.

5.1. Configuration using a text config file.
For configuration, please connect the device to a PC via USB cable. In this mode, the USB socket will provide power to the device and no external power source is necessary.

Note: Do NOT connect more than one Z-397 WEB converter at the same time via PC USB ports!
The device will be detected by the PC, and a new removable disk will appear labelled «Z397WEB». In its root folder, a CONFIG.CFG text file is present containing all device parameters (see Table 1). If necessary, edit this file with a text editor to ensure correct device operation with these systems.

Table 1. Device Parameters

Parameter	Description and potential values	Default
[COMMON] section General settings		
MODE=X	Converter operation mode. WEB, SERVER, CLIENT, WEB+SERVER, WEB+CLIENT	WEB+SERVER
AUTH_KEY=XXXXXXXX	Authentication key for Web, ZProxy and Telnet.	
[NETWORK] section Network Settings		
USE_DHCP=X	DHCP (Dynamic Host Configuration Protocol) client enabled? 0–Disabled, 1–Enabled.	1
LOCAL_IP=XXX.XXX.XXX.XXX	Static IP address to be used if USE_DHCP = 0.	192.168.1.100
NETMASK=XXX.XXX.XXX.XXX	Subnet mask to be used if USE_DHCP = 0.	255.255.255.0
GATEWAY=XXX.XXX.XXX.XXX	Default gateway to be used if USE_DHCP = 0.	192.168.1.1
DNS	DNS server IP address	192.168.1.1
NODATA_TIMEOUT	Connection timeout to disconnect when no new data arrive. 0 means the timeout is disabled.	0
[WEB] section WEB mode settings		
USE_PROXY=X	HTTP Proxy: 0–Do not use, 1–Use For Web server connection.	0
PROXY_ADDR=XXX.XXX.XXX.XXX	HTTP Proxy: IP address	192.168.1.1
PROXY_PORT=XXXXX	HTTP Proxy: TCP port	3128
SERVER=XXXXXXXXXX	WEB Server: Name or IP address	hw.rfenabled.com
PATH=/XXXXXXX	WEB Server: Relative path to data processing file.	/data.php
CONNECT_PERIOD=XX	WEB Server: Connection period in seconds.	10
PASSWORD=XXXXXXXXX	WEB server: Data access password	ab974088d09d4dc3
RESCAN_PERIOD=XXX	RS-485 lines rescan interval, to search for connected controllers, in seconds	30
MAX_EVENTS=XXX	Number of controller events to trigger an instant data transmission to WEB server	1

Options	Description	Factory settings
[TCP_SERVER] section TCP SERVER mode settings		
LINE1_PORT=XXXXX LINE2_PORT=XXXXX	TCP port to listen on when working with RS-485 lines.	1000 1001
LINE1_ALLOWED_IP=XXX.XXX.XXX.XXX LINE2_ALLOWED_IP=XXX.XXX.XXX.XXX	Allowed IP addresses to accept incoming connections from (255.255.255.255 = Incoming connections allowed from any address)	255.255.255.255
[TCP_CLIENT] section TCP CLIENT mode settings		
LINE1_REMOTE_ADDR=XXX.XXX.XXX.XXX LINE2_REMOTE_ADDR=XXX.XXX.XXX.XXX	Remote server address	0.0.0.0
LINE1_REMOTE_PORT =XXXXX LINE2_REMOTE_PORT =XXXXX	Remote server port	0
[RS485] section RS-485 line settings		
L1_BAUDRATE=XXXXXX L2_BAUDRATE=XXXXXX	RS485 lines baud rate values (300...115,200), in bits per second (bps)	19200

Save the newly modified CONFIG.CFG onto the Z-397 WEB removable drive. Properly disconnect the device from computer. When the power is restored, the device will register itself onto the LAN using new parameter values.

5.2. Configuration using Telnet protocol.

The device already connected to the LAN can be configured via Telnet protocol. Before that, the device should be properly configured to work on the LAN. To start remote configuration session, connect to the device using "TELNET <device_ip_address>" command. If the device IP address is not yet known, use the Device Search Utility from a supplied CD.

After Telnet connection is established, authentication prompt will appear looking like this:

```
Enter AUTH_KEY:
>
```

Type the converter authentication key and press ENTER.
The authentication key is printed on the sticker attached to the device's back, as well as in the device passport.

You can now type control commands.

To set the parameters, use the following commands:
Cfg - displays the current parameters values:

```
>cfg
CONFIG.CFG:
[INFO] SERIAL_NUMBER=17
[INFO] FW_VERSION=3.0.20(Dec 25 2012 15:28:
[COMMON] MODE=WEB+SERVER
[COMMON] AUTH_KEY=47CCA592
[NETWORK] USE_DHCP=1
[NETWORK] LOCAL_IP=192.168.1.100
[NETWORK] NETMASK=255.255.255.0
[NETWORK] GATEWAY=192.168.1.1
[NETWORK] DNS=192.168.1.1
[NETWORK] NODATA_TIMEOUT=0
[WEB] USE_PROXY=0
[WEB] PROXY_ADDR=192.168.1.1
[WEB] PROXY_PORT=3128
[WEB] SERVER=hw.rfenabled.com
[WEB] PORT=80
[WEB] PATH=/data.php
[WEB] CONNECT_PERIOD=10
[WEB] PASSWORD=ab974088d09d4dc3
[WEB] RESCAN_PERIOD=30
[WEB] MAX_EVENTS=1
[TCP_SERVER] LINE1_PORT=1000
[TCP_SERVER] LINE1_ALLOWED_IP=255.255.255.255
[TCP_SERVER] LINE2_PORT=1001
[TCP_SERVER] LINE2_ALLOWED_IP=255.255.255.255
[TCP_CLIENT] LINE1_REMOTE_ADDR=0.0.0.0
[TCP_CLIENT] LINE1_REMOTE_PORT=0
[TCP_CLIENT] LINE2_REMOTE_ADDR=0.0.0.0
[TCP_CLIENT] LINE2_REMOTE_PORT=0
[RS485] LINE1_BAUD=19200
[RS485] LINE2_BAUD=19200
```

Set <section> <parameter> = <value> - sets new value for a parameter in a section.
For <section> and <parameter> please use the same names of section and parameter
as found in the configuration file. (See Table 1).

```
>set NETWORK USE_DHCP=0
SET [NETWORK] USE_DHCP=0 OK
```

Rst - device restart.

```
Z397-IP>rst
Connection to node is lost.
```

5.3. Configuration using the software.

All converter settings can be configured using the configuration software included on the supplied CD.
The software allows searching for and configuring both the of the devices connected via LAN and a local USB port. Its interface is designed as a wizard which easily allows to configure all converter settings.

5.4. Device firmware updates.

To update the device firmware, please connect the Z-397 WEB to a PC with a USB cable. The device will be powered from USB port, so no external power is necessary. Do not connect more than one Z-397 WEB converter to the same PC via USB at the same time!
After the converter is connected, the PC will detect it as a new removable drive labelled"Z-397WEB".
Write the new firmware file with name"xxx.ROM"(xxx varies between versions) into the removable drive's root folder. After write operation completes, properly disconnect the device from USB and power it up as usual. The firmware update process now begins; during the update, the indicators will display"running lights". After the update is finished, the device restarts itself and thereafter is ready to work.

5.5. Reset to factory defaults.

To reset the device to factory defaults, use LOCK switch. When the device is powered via adapter or USB port, the CONVERTER STATUS LED will turn amber for about 1 s. During this time, flip the LOCK switch three times. Each flip will turn one more indicator to amber. When all indicators are on, all the user defined settings in the configuration file will be replaced with their factory defaults.

Another way to reset the device to factory defaults is by writing a file with name CLEAR.TXT into the USB removable drive's root folder.

6. OPERATION MODES

Note: All parameter values in this chapter are for illustration only. In real operation, your parameter values will depend on actual system configuration.
In all operation modes, you need to correctly configure the network settings in the configuration file.
- If using a local DHCP server on the LAN:
[NETWORK]
USE_DHCP=1
- If using a static IP, additional parameters are required for the LAN configuration. Example:
[NETWORK]
USE_DHCP = 0
LOCAL_IP = 192.168.1.100
NETMASK = 255.255.255.0
GATEWAY = 192.168.1.1
DNS = 192.168.1.1

6.1. Automatic mode detection.

The converter settings allow operating the converter in WEB Client or TCP Server mode. In these mode, the converter tries to connect to the webserver and listens for TCP connections from remote software.

If an incoming TCP connection is detected, the converter stops trying to connect to webservers, and vice versa, when successfully connected to a webserver, the converter stops accepting incoming TCP connections.

The software and the webserver can fix the converter in a certain operation mode. Also, the unneeded operation modes can be disabled in the configuration file.

6.2. Web Client Mode.

In the Web Client mode, the converter manages and reads events from the controllers connected via RS-485 channels. The converter connects to the webserver via HTTP, sending controller status and event data to the server, and receiving back from it the control commands to configure the controller parameters.

The data are sent via HTTP protocol, thus guaranteeing their delivery to the webserver from virtually any LAN connected to the internet.
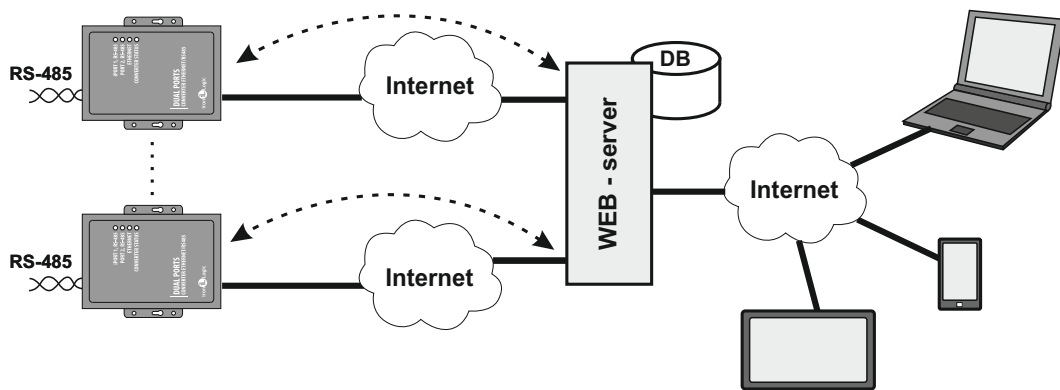
To set the converter into the Web Client mode:
- Select the operation mode:

[COMMON]
MODE = WEB
- Set up the webserver parameters:

[WEB]
SERVER = hw.guardsaas.com
PATH = /data.php
CONNECT_PERIOD = 20
RESCAN_PERIOD = 60
MAX_EVENT = 10
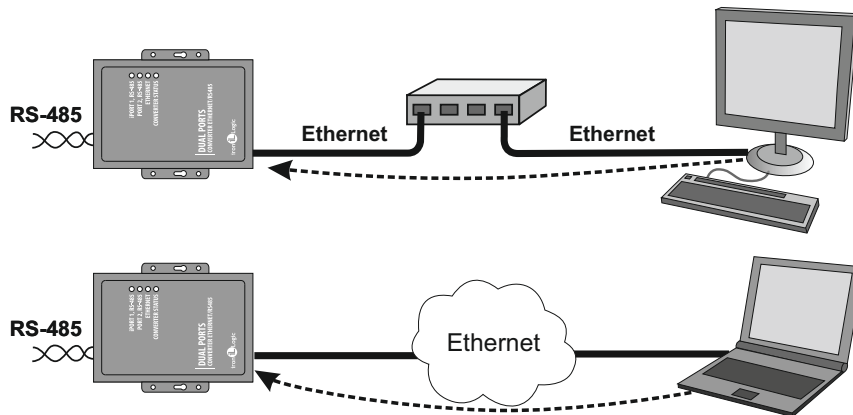- Set up the RS-485 baud rate:

[RS485]
LINE1_BAUD = 19200
LINE2_BAUD = 57600

6.3. TCP Server Mode.
The converter working in the TCP Server mode, after it connects to LAN and acquires an IP address from it, waits for incoming connections requested by a PC in a local LAN or an external network.

This mode is convenient when the converter IP address is known or the network settings and structure allow the software to detect it.

Also, advantageous to this mode is the ability to connect to converter from various PCs located both on LANs and on the Internet.

For the converter to work in the TCP Server mode:

- Choose the converter operation mode:

[COMMON]
MODE = SERVER

- Set up the converter TCP ports for incoming connections:

[CVT_SERVER]
LINE1_PORT = 1000
LINE2_PORT = 1001

- If necessary, set up the specific IP addresses allowed to connect to converter or allow all connections:

[CVT_SERVER]
LINE1_ALLOWED_IP = 192.168.1.15
LINE2_ALLOWED_IP = 192.168.1.15

- Set up the RS-485 baud rate:

[RS485]
LINE1_BAUD = 19200
LINE2_BAUD = 57600

6.4. TCP Client Mode.
In the TCP Client mode, the converter, having acquired an IP address, tries to connect to a local or remote server computer.

If the connection attempt fails, it will be retried.

In this mode, it is not necessary to know the IP addresses of all converters comprising the system.

Each converter will connect to one and same server by itself. In this case, the server cannot be moved to a different computer without having to reconfigure all the converters.

To work with the converter in the TCP Client mode:

- Choose the converter operation mode:

[COMMON]
MODE = CLIENT

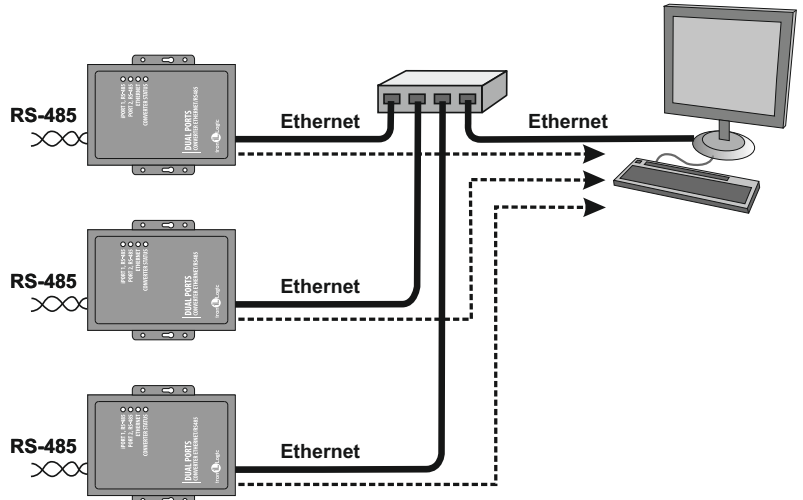- Set up server names or IP addresses to which to try connection:
[CVT_CLIENT]
LINE1_REMOTE_ADDR = IPSERVER.LOCAL.NET
LINE2_REMOTE_ADDR = 192.168.1.5
- Set up the servers TCP port numbers:
[CVT_CLIENT]
LINE1_REMOTE_PORT = 25000
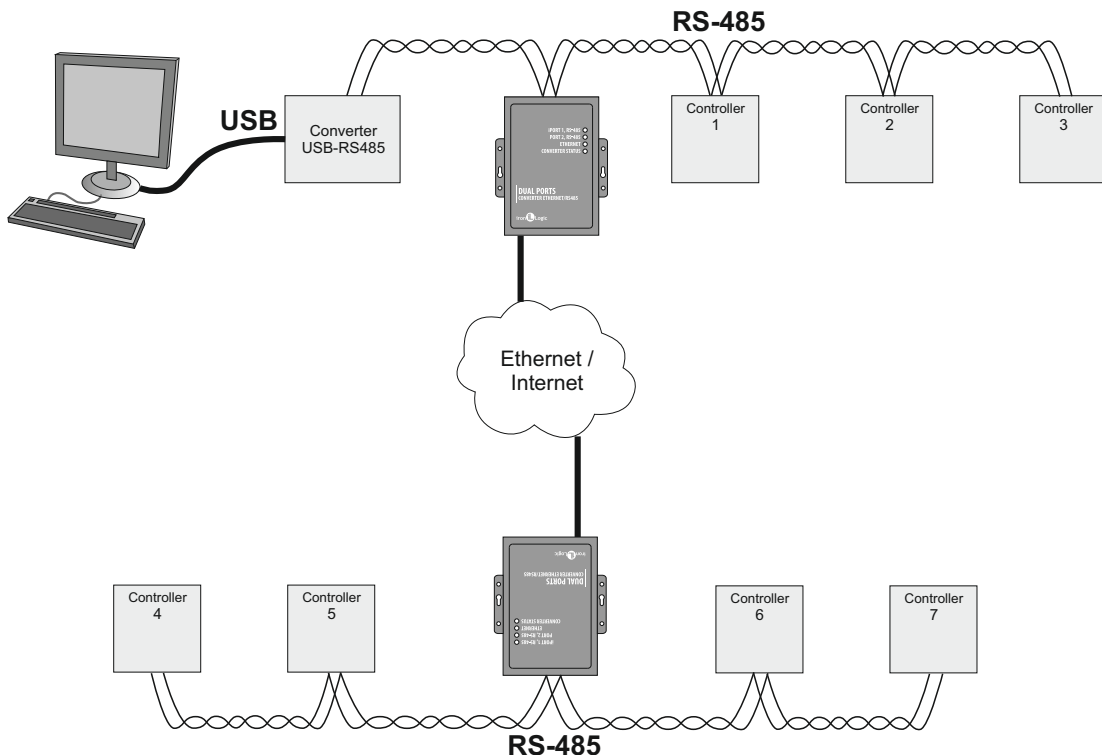**LINE2_REMOTE_PORT = 9000**
- Set up the RS-485 baud rates:
[RS485]
LINE1_BAUD = 19200
LINE2_BAUD = 57600

6.5. Connecting two converters as an Ethernet bridge.
By using two converters, two RS-485 lines can be connected by an Ethernet bridge. One converter is set as a server and another as a client, with its server address equal to the address of first converter.
This mode allows to join several RS-485 segments physically distant from each other, into same infrastructure.

Ethernet bridge mode configuration example.

Converter No 1 (Server)	Converter No 2 (Client)
[COMMON] MODE=SERVER [NETWORK] USE_DHCP=0 LOCAL_IP=192.168.1.100 SUBNETMASK=255.255.255.0 GATEWAY=192.168.1.1 DNS=192.168.1.1 … [CVT_SERVER] LINE1_PORT=1000 LINE2_PORT=1001 LINE1_ALLOWED_IP=255.255.255.255 LINE2_ALLOWED_IP=255.255.255.255 … [RS485] LINE1_BAUD=19200 LINE2_BAUD=19200	[COMMON] MODE=CLIENT [NETWORK] USE_DHCP=1 … [CVT_ CLIENT] LINE1_REMOTE_ADDR=192.168.1.100 LINE2_REMOTE_ADDR=192.168.1.100 LINE1_REMOTE_PORT=1000 LINE1_REMOTE_PORT=1001 … [RS485] LINE1_BAUD=19200 LINE2_BAUD=57600

7. PACKAGE CONTENTS

- Z-397 WEB converter 1
- USB cable AM-BM 1
- Software CD 1

8. OPERATING CONDITIONS

Ambient temperature: 5°C…40°C
Humidity: Not exceeding 80% at 25°C
The reader should not be operated where the following exists: atmospheric precipitation, direct sunlight, sand, dust and moisture condensation.
Reader specifications may not fully be as specified, when operating under non-recommended conditions.

9. LIMITED WARRANTY

This device is covered by a limited warranty for 24 months from the date of sale.
The warranty becomes void if:
- This Manual is not followed;
- Device has physical damage;
- Device has visible traces of exposure to moisture and aggressive chemicals;
- Device circuits have visible traces of being tampered with by unauthorised parties.
Under active warranty, the Manufacturer will repair the device or replace any broken parts, FREE of charge, if the fault is caused by manufacturing defect.

10. CONTACTS

European & Global Wholesale Distribution Center
IRONLOGIC SIA
Spilves. 16, Riga, LV-1055 Latvia
http://ironlogic.me
info@ironlogic.lv
Phone: +371 292 37870

The symbol of crossed-throught waste bin on wheels means that the product must be disposed of at f separate collection point. This also applies to the product and all accessories marked with this symbol. Products labeled as such must not be disposed of with normal household waste, but should be taken to a collection point for recycling electrical and electronic equipment. Recycling helps to reduce the consumption of raw materials, thus protecting the environment.

CE