

# IP Relay HWG-ER02a

2x relay controlled over Ethernet  
+ RS-232 / Ethernet converter (terminal server)



## **Shipment contents**

Complete shipment of the IP Relay contains following items:

- IP Relay HWG-ER02a
- A 1:1 serial prolonging cable (DB9F - DB9M) for the device setup via RS-232
- Power adaptor in European version
- Printed manual + datasheet
- CD with the necessary software

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## Characteristics and basic properties

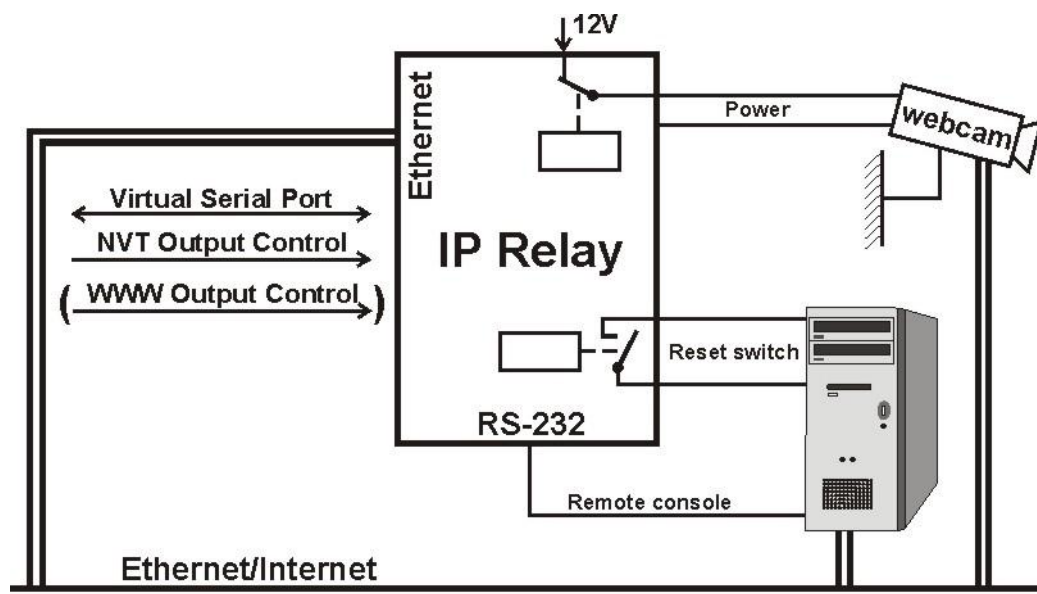
IP Relay HWG-ER02a combines two relays controlled over Ethernet and RS-232 / Ethernet converter. The device can reset a remote device via Ethernet or switch its power supply on or off. IP relay can be also used as a remote serial port.



## Features

- **Ethernet** - RJ45 (10BASE-T - IEEE 802.3)
- **RS-232 Serial port** (RxD, TxD, CTS, RTS, GND)
  - 7, 8, or 9 data bits;
  - baudrate: 50..115200Bd;
  - HW/SW handshaking
- **Virtual serial port** for Windows 2000/XP/Vista/Windows 2000 Server/Windows 2003 Server available on CD (see [http://www.hw-group.com/products/hw\\_vsp/index\\_en.html](http://www.hw-group.com/products/hw_vsp/index_en.html) )
- **Two independent relays** controlled via Ethernet by **NVT commands** (M2M protocol) up to 240V/10A
- **DIP2 switch** intended for free use e.g. for identification of service works.
- **Possible ways of device configuration**
  - **RS-232 Setup** (over serial port using any RS-232 terminal - 9600 8N1)
  - **UDP Setup** (configuration of basic network parameters)
  - **TCP Setup** (remote configuration in the terminal via TCP)
- **Access security and relay control:**
  - You can limit access to the device only from a predefined IP address range
  - TCP connection can be secured using a 128-bit TEA algorithm
  
- Plastic box dimensions: 145x90x45 [mm]

## Connection topology

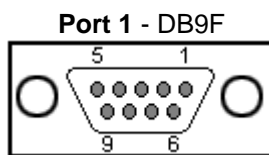
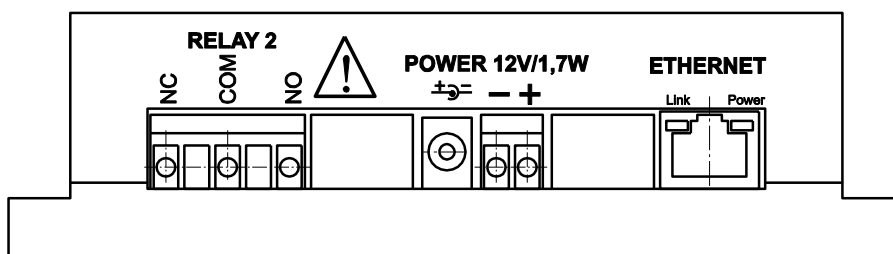
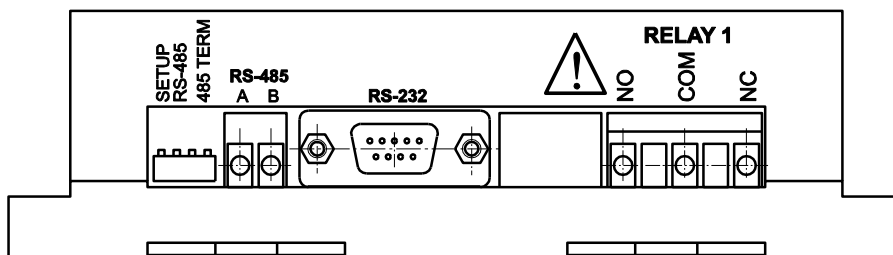
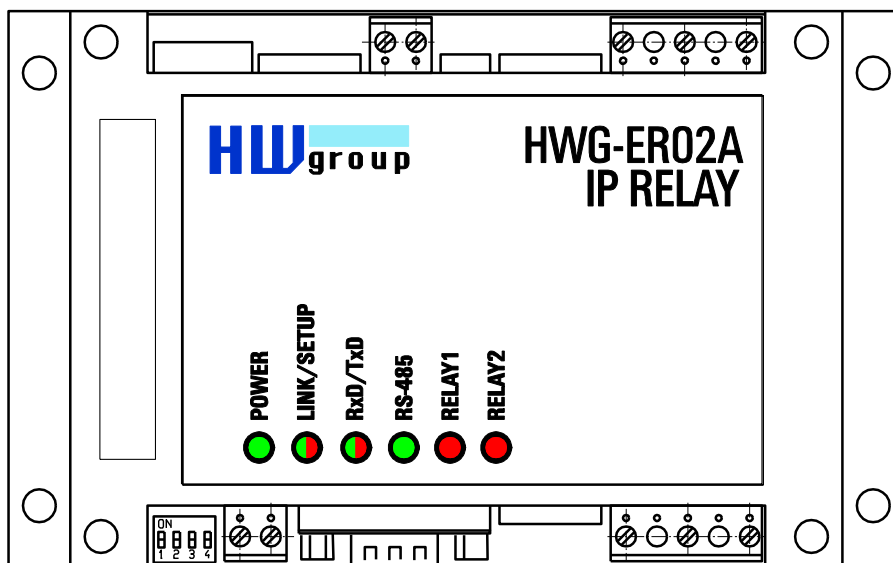


- **Network modes:**
  - **TCP/IP Server** - After powering up, the device listens on the given port and awaits client connection. When the client connects, data from the Ethernet are sent to the serial line and vice versa. If the client is not connected and data are coming from the serial line, they are stored in a buffer (size is configurable) and transmitted immediately after establishing a connection, unless clearing of the buffer upon establishing a connection has been requested in the SETUP.
  - **TCP/IP Client/Server** - IP Relay keeps the server function but when any data are received from the serial line, it has a preset IP address of the opposite side and tries to establish the connection as a client. If not successful, the data are stored into the buffer and transmitted on the next established connection no matter if it is in the Client or Server mode.
  - **UDP** – only allows the data transfer to the RS-232
- Simple and well documented M2M communication protocol, the CD contains many examples of the communication for different programming languages - MS Visual Basic, Delphi, Borland C++, JAVA, PHP and others..

## Technical parameters

<b>Ethernet port</b>	
+ Interface	RJ45 (10BASE-T / 100BASE-Tx)
+ Compatibility	Ethernet: Version 2.0/IEEE 802.3
+ Supported protocols	IP: ARP, TCP/IP, NVT, RFC2217, UDP/IP
+ Network modes	TCP/IP server, TCP/IP client/server, UDP/IP
+ Communication security	128-bit TEA cipher, predefined range of IP addresses
<b>Serial port 1 DB9F</b>	
+ Data bits	7, 8 or 9
+ Stop bits	1 or 2
+ Parity	None / Odd / Even / Mark / Space
+ RS-232 interface	RxD,TxD,RTS,CTS,GND
+ Communication speed	Adjustable in the range of 50..115200 Bd
<b>2x Relay</b>	
+ Max. load of the contacts	max. 24V / 16A DC; max. 250V / 16A AC
<b>Environment parameters</b>	
+ Temperature	<b>Operation</b> : -5 to +50 °C , <b>Storage</b> : -5 to +75 °C
+ Relative humidity (non-condensing)	5 to 95 %
<b>LED diodes</b>	
+ POWER (green)	GREEN – power supply turned on
+ LINK & Activity (green)	GREEN - Ethernet connection
+ RxD/TxD (green/red)	<b>Green</b> – RS-232/RS485 receiving activity <b>Red</b> – RS-232/RS485 transmission activity
+ RS-485 (green)	RS-485 Activated
+ Relay 1 (red)	Relay 1 closed
+ Relay 2 (red)	Relay 2 closed
<b>DIP switches</b>	
+ DIP1 - RS-232 Setup	ON = RS-232 Setup mode (9600 8N1) OFF = Ethernet mode
+ DIP2 - Remote Input	ON = RS-485 Enabled OFF = RS-485 disabled
+ DIP3, DIP4	RS-485 termination
<b>Other parameters</b>	
+ Supply voltage	12-30 V/ 150 mA DC- coaxial connector (barrel), GND on the shield, terminal
+ Dimensions	145x90x45 [mm] (H x W x D )
+ Mounting method	Wall attachment a DIN molding. For installation into SwitchGear.
+ Weight	225 g

# Connector descriptions



RS-232 Interface			
1		-	unused
2	TxD	-->	Transmit Data
3	RxD	<--	Receive Data
4		-	unused
5	GND	---	System Ground
6		-	unused
7	CTS	<--	Clear to Send
8	RTS	-->	Request to Send
9		-	unused

## Using the device

In the following chapter you will learn how to connect the device easily to your PC or company network, configuring it according to your requirements and setting into service. At the end of this document we describe controlling the device via NVT commands or IP Relay Control - the controlling software.

## Quick setup

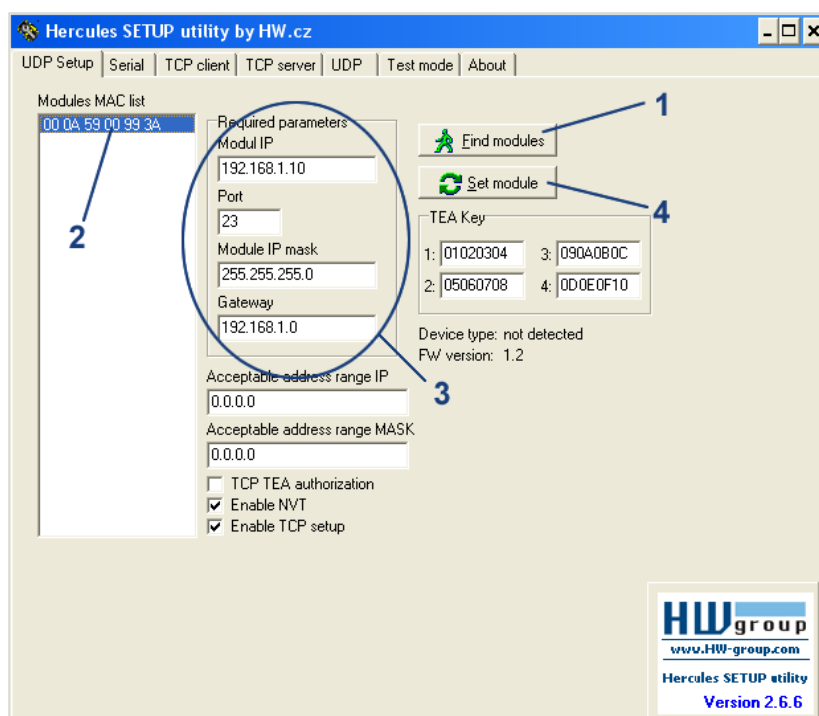
The following process is recommended for a quick setup. For detailed description of all parameters and commands see chapter called “Parameter description”.

### Cable connection

- Set **DIP1 - DIP4 into OFF position**
- Connect the IP Relay into Ethernet 10 Mbit or 10/100 Mbit. For direct connection to a PC use a crossed TP cable. For a connection to a hub/switch/router use classic TP patch cable.
- If you wish to connect any RS-232 device to the IP Relay, connect it now, using the supplied Laplink cable (RS-232 interface is at the DB9F connector).
- Connect supplied power adaptor to the grid and plug the connector of the power adaptor into the IP Relay's power connector.
- If the power supply is OK, the green Power indicator should light up.
- If the connection to the Ethernet network is OK, the LINK indicator should light up and go down according to the rhythm of the data transfer to the Ethernet network (Activity signalization).

### Searching the device in a network

- Run the application „HerculesSetup.exe“ which can be found in the root directory of the supplied CD or at [www.HWgroup.cz](http://www.HWgroup.cz)
- Click the “Find modules” (step 1) button in the “UDP Setup” tab, you can see the MAC address of the device in the left column.
- Click on the MAC address (step 2) and set the desired parameters (step 3) (you must at least set the IP address, Mask and GateWay).
- Check the “Enable TCP Setup” box and click on the “Set module” (step 4). This will save the network parameters.



**Note:** If you wish to change these basic parameters (it is necessary to set at least IP address, port, mask and GateWay), fill the parameters in the proper fields and press the “Set module” (step 4).

- The device's IP address and network parameters are now set and you can work with the device.



## Controlling the Relay

Both relays are controlled via NVT commands. It's a 7-byte binary sequence, which is sent into the established TCP/IP connection and if it's received correctly, it's confirmed by a similar 7-byte sequence. TCP Connection, by which the relays are controlled, is identical with the TP connection at RS-232 port but, thanks to the NVT (Network Virtual Terminal), the data from the serial port are not influenced by these control sequences.

As a further NVT description would exceed the ambit of this manual, you can find the explanation of the protocol, the commands we use and the RFC2217 extension in the CD enclosed or on <http://www.hwgroup.cz/support/nvt/>.

### Selection of sequences for controlling Relay 1 and Relay 2

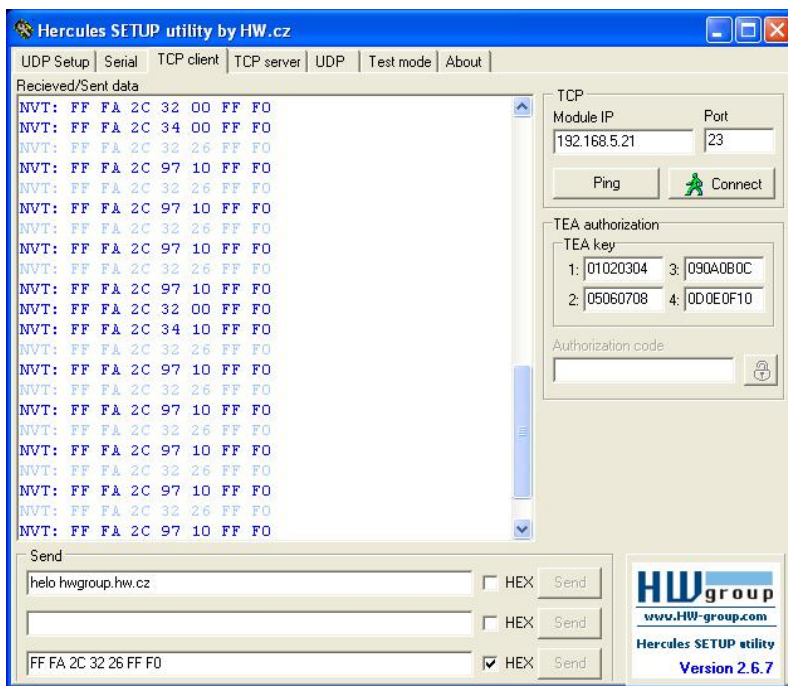
*In the table below you'll find the description of the particular NVT commands for controlling the relay and LED diodes. The actual effect of each relay on the terminal board contacts depends on the contact configuration of the supplied device (O,C or S version). The version of your IP Relay can be found at the bottom of the box. For more about particular versions of the device see the end of this manual.*

Command description	NVT command sent from PC	Command confirmation from IP Relay
<b>Closes Relay 1</b>	FF FA 2C 32 25 FF F0	FF FA 2C 97* DF FF F0
<b>Opens Relay 1</b>	FF FA 2C 32 15 FF F0	FF FA 2C 97* FF FF F0
<b>Closes Relay 2</b>	FF FA 2C 32 26 FF F0	FF FA 2C 97* BF FF F0
<b>Opens Relay 2</b>	FF FA 2C 32 16 FF F0	FF FA 2C 97* FF FF F0
Device's function verification (query "Are you there?") The response contains SW version and device's MAC address	FF F6	<WEB51 HW 6.0 SW 2.1 SN 009AF2 #01>

## Example of controlling with the Hercules Setup Utility

For sending the NVT commands you can also use our Hercules Setup Utility, actually the „TCP client“ tab. For the following example we assume you have the device connected to the Ethernet network and configured according to your network parameters – see previous chapters.

- Click on the „TCP client“ tab
- Make sure that the fields „Module IP“ and „Port“ contain correct parameters of your IP relay.
- Click the „Connect“ button
- Fill the specific field from the „Send“ section with the desired NVT command with reference to the table from the previous page
- Check the field „HEX“ next to the line with the command and press the „Send“ button
- IP relay reacts according to the sent command and responds by the sequence as depicted



## Controlling the Relay 1 using the Hercules Setup Utility

- Connect to the IP Relay according to the previous chapter (*using the TCP Client mode*)
- Enter this command into one of the „send“ fields:  
**FF FA 2C 32 25 FF F0**  
Check the *HEX* button and send the command using the corresponding button..
- The Relay 1 will be closed and IP relay will respond with:  
**FF FA 2C 97 63 FF F0**  
**Note** : 5th byte (97) can differ according to DIP2 setting.
- You can closed Relay1 using this command:  
**FF FA 2C 32 11 FF F0**
- The Relay 1 will be open and IP relay will respond with:  
**FF FA 2C 97 E1 FF F0**  
**Note** : 5th byte (97) can differ according to DIP2 setting.

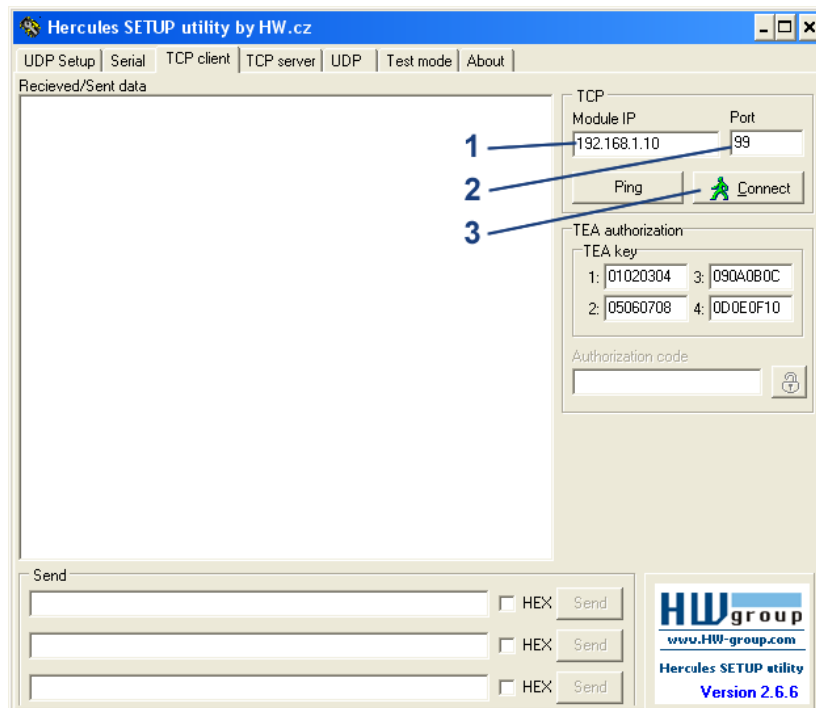
## Setting other parameters of the device

More parameters of the device can be configured either by TCP or RS-232 setup. Both methods will be described in the following chapter, use the one that fits your application the best.

We assume you have the Hercules Setup Utility program running already and set all the basic parameters of the device (IP address, port, mask and gateway) as described in previous chapters.

### Setting via TCP Setup

- Switch to the „TCP Client“ tab.
- Insert the preset IP address (*step 1*) into the „Module IP“ field.
- Fill the field „Port“ with „99“ (*step 2*), no matter what port you have chosen for the communication with the device (*Port 99 is reserved for the TCP setup*).
- Press the „Connect“ button (*step 3*).
- The prompt “WEB51>” should appear in the „Received / Sent data“ window. Click into this field and press Enter. The actual parameter configuration should appear in the window.
- Specific parameter is set by choosing the letter corresponding to the desired option and it's value. (e.g. „I192.168.6.8“ for setting the IP address of the device).



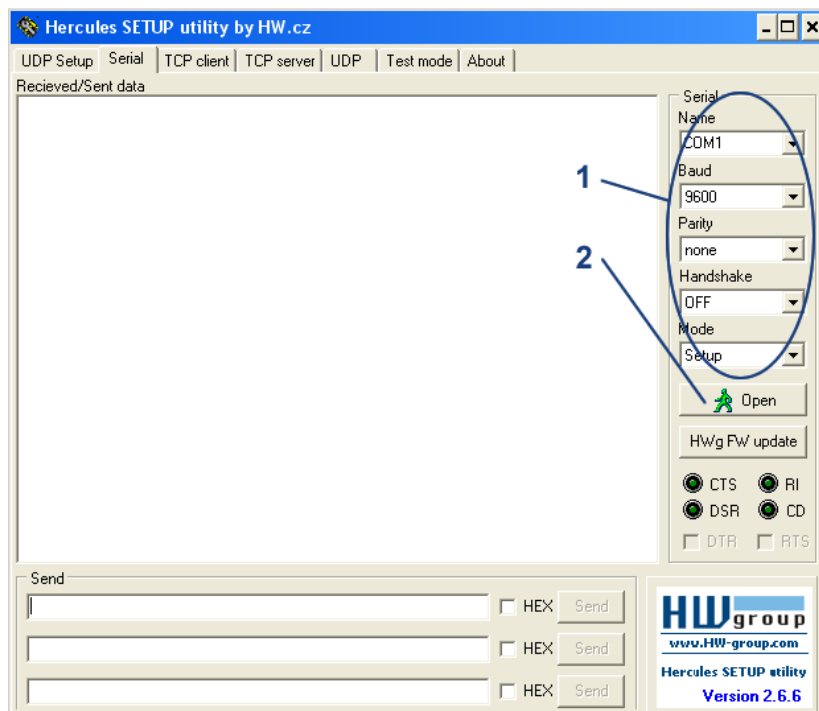
**Note:** Complete listing of configuration parameters and commands with a detailed description can be found in the following chapter.

- You can see help to any command when you send the commands name together with the question mark (for example „I? <Enter>“).
- After you set all the desired parameters, call the “R” function (**Reboot**).
- Press the „Disconnect“ button to disconnect from the restarting device.

## SETUP using the RS-232 terminal

The description of the configuration using the supplied software Hercules Setup Utility. If you cannot use this software, the device can be set from any RS-232 terminal.

- Disconnect the power supply adaptor from the device.
- Set DIP1 = ON, DIP2 = OFF, DIP3 = OFF, DIP4 = OFF.
- Connect the device with supplied RS-232 cable to a PC. Use the Port 1 (DB9F) on the IP Relay.
- Switch to the “Serial” tab of the Hercules Setup Utility.
- Set the proper serial port and communication parameters - **9600 8N1** (step 1).
- Click on the „Open“ button.
- Connect the power adaptor into the feeding connector of the IP Relay. The green Power indicator should light up.
- The listing of configuration parameters will appear in the „Received/Sent data“ window.
- Concrete parameter is set by choosing the letter corresponding to the desired option and its value. (for example „l192.168.6.8“ for IP address of the device).



**Note:** Complete listing of the configuration parameters and commands with detailed description can be found in the chapter “description of the configuration parameters”

- You can see help to any command when you send the commands name together with the question mark (for example „l? <Enter>“.
- After you set all the desired parameters, call the “**R**” function (**Reboot**).
- Close the serial connection with using the “Close” button.

**Note :** Do not forget to switch the DIP1 back into OFF position or it would be impossible to communicate with the device over Ethernet. .

## Description of configuration parameters

In this chapter you can find the detailed description of all possible configuration parameters. Information on the device configuration can be found in the chapter “QUICK Setup of the device”.

## Default device configuration

This is the listing of a standard configuration of every supplied IP Relay. This can be refreshed anytime by “D0” or “D1” commands in the setup mode. Description of the device configuration and commands entry can be found in the chapter “Setting other parameters of the device”.

```

*** HW-group.com HW 6.0 SW 2.M #01 ***
MAC Address          00:0A:59:00:99:3A
===== IP Setup =====
I: Address           192.168.6.200
J: Port              23
M: Mask              255.255.255.0
G: Gateway           192.168.6.254
===== In IP access filter =====
W: Address           0.0.0.0
N: Mask              0.0.0.0
X: Port              0.0
Y: Port Mask         0.0
== Active (Client/Server) mode ==
S: Send to IP       PASSIVE mode
U: Port              23
T: IP mode           TCP
V: NetworkVirtualTerminal On
K: Keep connection  Off
E: Erase buffer on  None
===== Serial Setup =====
&B: Speed            9600
&D: Data bits        8
&P: Parity           NONE
&V: Variable Parity  Off
&S: Stop bits        1
&C: Flow Control     NONE
&R: RS485/RS422 control RTS = On [+8V]
&T: Serial Line Timeout 0 - Off
&G: Char. Transmit Delay 0 - Off
&H: Tx Control       Tx FULL duplex
===== Security Setup =====
%A: TCP autorisation Off
%K: TEA key 0:01:02:03:04 1:05:06:07:08 2:09:0A:0B:0C 3:0D:0E:0F:10
%S: TCP/IP setup     On
===== I/O Control Setup =====
#T: Trigger AND mask 255
#A: Power Up INIT    189
#B: Power Up AND mask 255
#C: Power Up OR mask 0
#D: Power Up XOR mask 0
#X: KEEP mask        0
#Y: AND mask         255
#Z: OR mask           0
#W: XOR mask          0
===== Other =====
D: Load/Save Settings from/to Flash
R: Reboot

```

## Device network parameters

### MAC Address **00:0A:59:00:95:6C**

MAC address is a unique network device address in the Ethernet and it is always factory-preset. You can find it on the label inside the device. Using this address, the devices can be distinguished for example in the UDP mode of the configuration program.

**Note:** The address respects restoring of the default configuration with the „D0” command.

### I: Address **192.168.6.15**

Configuration of the device's IP address.

### J: Port **23**

Configuration of the relay's communication port – range: 1 .. 19.999.

Port 99 is used for TCP configuration, if supported by the version and enabled in the setup.

### M: Mask **255.255.255.0**

Configuration of the IP mask for the local network. All IP addresses outside the area delimited by the device's own IP address and this mask will be accessed via Gateway.

### G: Gateway **192.168.6.254**

Address of the gateway that provides access to outside networks, as defined by the IP address and the mask.

### ==== In IP access filter =====

### W: Address **0.0.0.0**

IP address of a network or computer that is allowed to communicate with the device. This value must result from multiplying the remote IP address and the restriction mask (option N), otherwise the device does not react.

### N: Mask **0.0.0.0**

This mask restricts addresses that can communicate with the device. Security can be greatly enhanced by setting a fixed address or a suitable restrictive mask that disallow communication with unauthorized parties.

### X: Port **0.0**

Configuration of the communication port – range 1 .. 19.999.

### Y: Port Mask **0.0**

This restricts TCP ports that can communicate with the Device.

### IP address, Mask and Gateway description:

Ethernet device communicates:

- **On local network segment**  
You don't need a Gateway, but IP addresses of both devices must be in the range allowed by the Mask setting. If you set the Mask to 255.255.255.0 the IP addresses may differ only in the last byte.
- **Outside local network – using Gateway**, which is positioned in the range of IP addresses allowed by the mask.

You can also restrict the IP address range using the “In IP Setup” commands. We recommend keeping this parameter on 0.0.0.0. for debugging.

### (IP requesting access AND N) = W

If this condition is valid, you can access the device (AND is binary multiplication).

## Parameters of TCP and UDP connection

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### ===== Active (Client/Server) mode =====

**S: Send to IP**                      **192.168.0.252**

The IP address and the port of the opposite side that will be connected for the data transmission from a serial port. Setting to 0.0.0.0 will switch the converter into a **passive mode**.

**U: Port**                                **23**

Configuration of the device's communication port – range: 1 .. 19.999.

**Note:** If you are using communication via UDP it's necessary to enter the address of the opposite side here. The converter does not initiate the connection so the responses are sent to this address!

**T: IP mode**                            **TCP**

Switches between the TCP and UDP protocols. UDP is faster but packets can be lost or delivered out of order. Hence it is suitable for communication only on a local network segment in request-reply mode, usually for converting a RS-485 communication. UDP communication is difficult to debug because no simple PC terminal, like TELNET terminal for TSP/IP connection, is available.

In TCP it is possible to use the NVT commands and a TEA encryption. Responses of the converter in case of question/answer protocols in the TCP mode can be slower up to 40% caused by setting up the connection.

**IP mode:**    **0: TCP**    /    **1: UDP**

**V: NetworkVirtualTerminal**    **Off**

Network Virtual Terminal allows the interpreting of Telnet protocol sequences including certain RFC2217 extensions, enabling on-the-fly changes of serial port parameters (speed, parity, ...).

NVT description can be found on our website >> „[Support & download](#)” >> „**NVT (Network Virtual Terminal) protocol description**”.

When communicating with the serial port using telnet, e.g. with the TeraTerm program, this option should be turned on. Otherwise, telnet control commands (seen as "junk") intended for configuration negotiation at the beginning of the communication are forwarded to the serial port. If you don't want to use this option, set your client to RAW communication mode.

**0: Off** (don't use telnet control code, pass through to serial port)

**1: On** (accept telnet control code)

**K: Keep connection**                **Off**

This option allows keeping the connection alive with sending NOP commands, because TCP automatically closes the connection after 50 seconds of inactivity. NVT must be enabled for this parameter to work.

**0: no keep connection** (preferred)

**1: keep connection**

**E: Erase buffer on**                    **Open connection**

Option to clear the internal Device buffer whenever a connection is established or closed. This option is useful e.g. if your device periodically says "I'm alive" and you don't want to waste time retrieving these notifications from the buffer.

**0: none**

**1: Close TCP/IP connection**

**2: Open TCP/IP connection**

**3: Open & Close TCP/IP connection**

## Serial port parameters

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### ==== Serial Setup =====

**&B: Speed**                      **9600**

Configuration of the communication speed for the serial line, range 50..115.200 Bd, step 50 Bd. To set 9600 Bd enter: „&B9600”.

**&D: Data bits**                  **8**

Number of data bits for the serial transfer. Possible options:  
**7: 7 bits / 8: 8 bits – call „&D8”.**

**&P: Parity**                        **NONE**

Parity of the serial asynchronous communication:  
**N: none / O: odd / E: even / M: mark / S: space**

**&V: Variable Parity Off**

Function for the serial 9-bit data transfer.

**0: Off / 1: On**

**&S: Stop bits**                  **2**

Number of stop bits for the RS-232 serial line. It's possible to set 1 or 2 stop bits.

**&C: Flow Control**              **NONE**

Serial data flow control.

- 1: none** - no control, RTS - see &R.
- 2: RTS/CTS** –RTS/CTS control
- 3: Xon/Xoff** - SW data flow control.

**&R: RS485/RS422 control**

Defines idle level of the output RTS pin. Important for devices powered from RTS or for add-on RS485 Devices that use RTS to switch direction. Especially for the internal RS485 module, the “**HW echo**” option should be on. This means that the receiver reads the data back from RS485 and generates hardware echo from the actual RS485 bus.

- 0: RTS = Low [+8V] (recommended for non RS485/422 mode)**
- 1: RTS = High [-8V]**
- 2: TxRTS HW echo ON**
- 3: TxRTS HW echo OFF**

**Note:** For most applications on RS-485 set &R=3 TxRTS HW echo OFF.

**&T: Serial Line Timeout**    **0 – Off**

Specifies how long the Device waits **after receiving the last character** before wrapping up the data in a packet and transmitting them. The timeout is specified as the **number of characters** and displayed as the number of chars as well as the time according to the given serial communication speed. If the speed changes, the time is also changed but the number of characters defining the timeout is not (10 znaků pro 9600 je cca 11 ms, ale pro 19.200 Bd je to 5,7 ms).

**&G: Char. Transmit Delay**   **0 – Off**

For controlling units with small RS232 buffer, it is sometimes advantageous to keep relatively high baud rate but insert delays between individual characters. The delay is defined in **milliseconds** and



it is defined as the time between the starts of individual characters; so, for 2400 Bd a 2ms delay has no effect since the character starts are 2.4 ms apart.

### **&H: Tx Control                      Tx FULL duplex**

When HALF duplex is activated, the Device assumes unidirectional medium connected to the serial line (e.g. RS485) and won't start transmitting data while receiving..

**0: FULL duplex**

**1: HALF duplex (RS485)**

## **Other device parameters**

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### **===== Security Setup =====**

**%A: TCP autorisation              Off**

Activates TEA authorization, requested from the remote side after the connection is established.

**0: TEA authorisation Off**

**1: TEA authorisation On**

**%K: TEA key 0:01:02:03:04 1:05:06:07:08 2:09:0A:0B:0C 3:0D:0E:0F:10**

To set the TEA key, use the “%K” option. Set 16 bytes in quadruples using four hexadecimal values separated with colons. The first string defines 0-3rd quadruple of bytes. So, to set the last 4 bytes to the displayed value, use „%K 3:0D:0E:0F:10“.

**%S: TCP/IP setup                      On**

Allows or denies the remote configuration using TCP setup on port 99.

### **===== I/O Control Setup =====**

**#T: Trigger AND mask              255**

**#A: Power Up INIT                      189**

**#B: Power Up AND mask              255**

**#C: Power Up OR mask                0**

**#D: Power Up XOR mask               0**

**#X: KEEP mask                         0**

**#Y: AND mask                          255**

**#Z: OR mask                            0**

**#W: XOR mask                          0**

From a whole **I/O Control Setup** section the IP relay only uses the **#A: Power Up INIT** command, which can affect directly the states of output relays on the device reset and thus compensate an improper relay configuration.

### **===== Other =====**

#### **D: Load/Save Settings from/to Flash**

The “D0” option loads saved configuration through „D2“. The “D1” option sets the IP Relay’s default factory values.

#### **R: Reboot**

Software reset of the IP Relay. Necessary e.g. for changing the IP address etc.

## Application hints

### Security

For raising the security of data transfer in TCP mode it's possible to authorize both sides on establishing any TCP/IP connection via TEA 128 algorithm with symmetric signature. The configured password of both sides then won't go throughout the network. This option is possible only for TCP/IP connection. UDP mode is designed only for local networks. Detailed description of TEA can be found in the handbook "**Programming of Ethernet Applications**" on our website.

### Extension of the timeout connection

Since the converter supports only one connection at the moment it's necessary to secure the timeout for this connection. Standard limit after which the connection is terminated in case of no data flow is 50s. With regard to the routine it's possible to enable option „**K: Keep connection**“, which in 10-second intervals sends the NOP command into the open NVT connection.

### 9bit communication

If you need to transfer the 9th parity bit and use two converter boxes together in TCP mode, set the "**Virtual Parity**" to **On**. The parity bit will be transferred along with the data in the data stream.

### Conditions of the packet definition in the UDP mode

Converter in UDP mode contains a support for protocols at RS 485 bus. Setting the parameters of the transfer protocol can shorten the response time through the Ethernet network from circa 20 - 100 ms in a TCP/IP mode to 10 - 20 ms.

Converter itself can detect end of the packet from RS 485 and send the data to the opposite side without waiting for expiration of a timeout condition. The described conditions define the end of a data collection from RS485 and their sending to the Ethernet as one packet. If there are more conditions that are overlaying, the packet is sent after one of them is activated. The beginning and the end of the packet is defined by a 1-4character byte sequence with a configurable mask.

### Network Virtual Terminal

Learn how to use Network Virtual Terminal in your application. Basically the NVT is a system on which TELNET protocol works. It's simple and transparent way of handing down the setup information which is compatible with all sorts of RFC and above all with **RFC2217** for remote control of serial port.

## Basic types of communication

*A brief description of basic terms. Detailed version with dictionary of abbreviations (and more) can be found on our web.*

### TCP server (Passive mode)

After turning the device on, it awaits client's connection. When the client is connected the data are sent from Ethernet to serial line and vice versa. If the client isn't connected and there are data incoming from serial line, they are saved into cache memory (it's size can be configured) and sent as soon as the connection is created, if you haven't chose the function from SETUP for clearing the buffer after client's connection.

### TCP client (Active mode)

The device behaves similarly to the previous case (keeps the server function) but if any data from serial line are transmitted, it tries to establish connection to the predefined IP address as a client and transfer the data.

If it doesn't succeed the data are stored to the cache memory and transferred with next created connection no matter on the role of the device (client or server).

In this mode two converters together can "tunnel" the serial line over Ethernet. In case of Charon module or I/O Controller it's possible to connect this way also parallel inputs and outputs.

### UDP

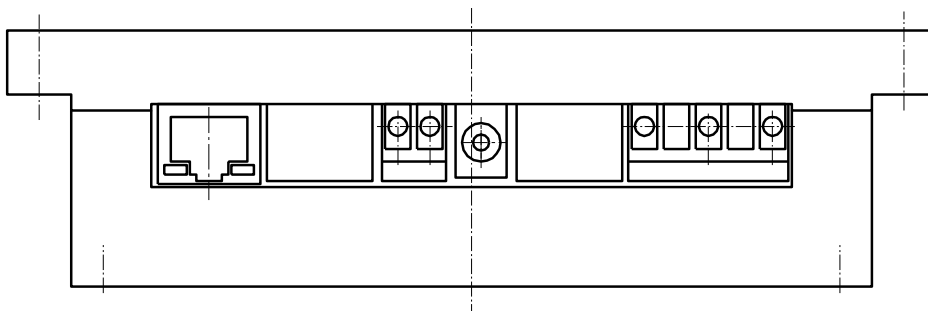
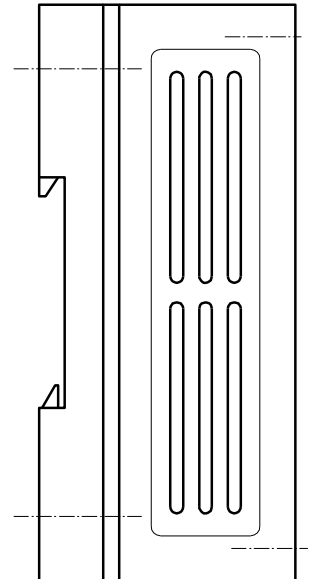
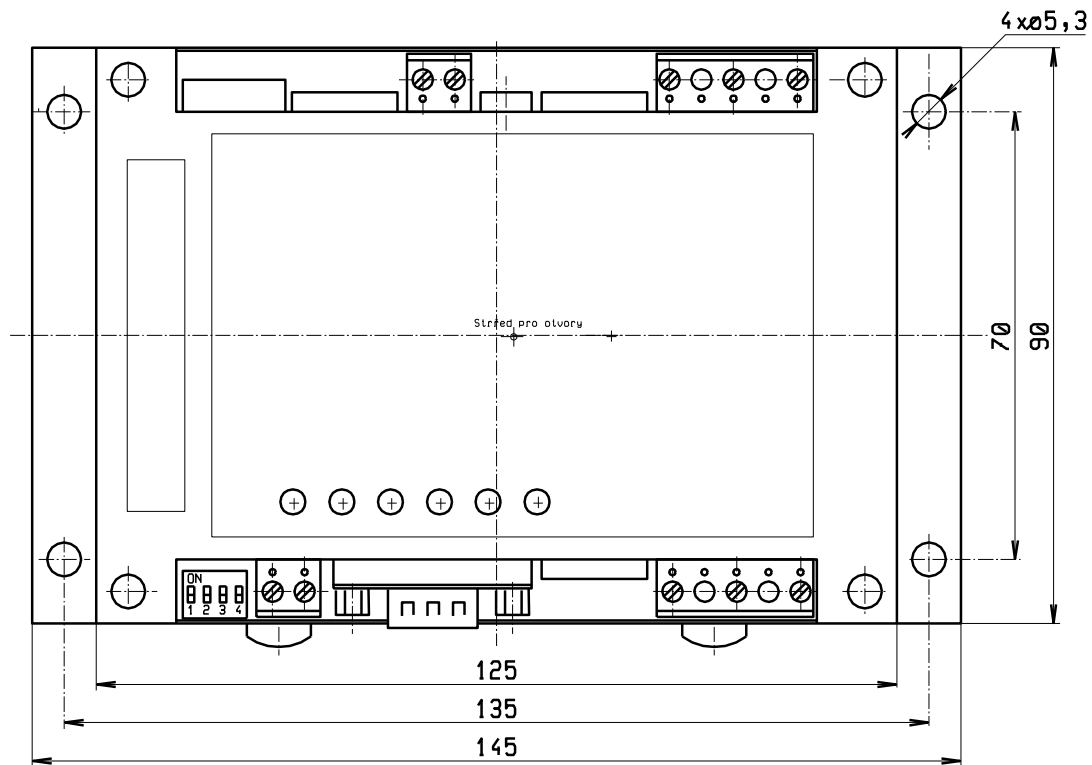
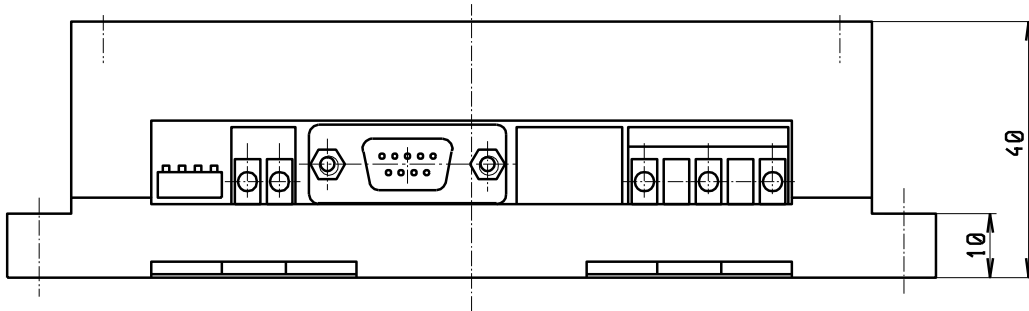
Data from Ethernet are sent to the preset address and if they come from the serial line RS232, they are, in certain circumstances, made a packet and sent to the configured IP address. At UDP the response from other side is not tested, the application itself should be secured from loosing data. Advantage is a little shorter response time, which can be practically used especially for RS-485 lines.

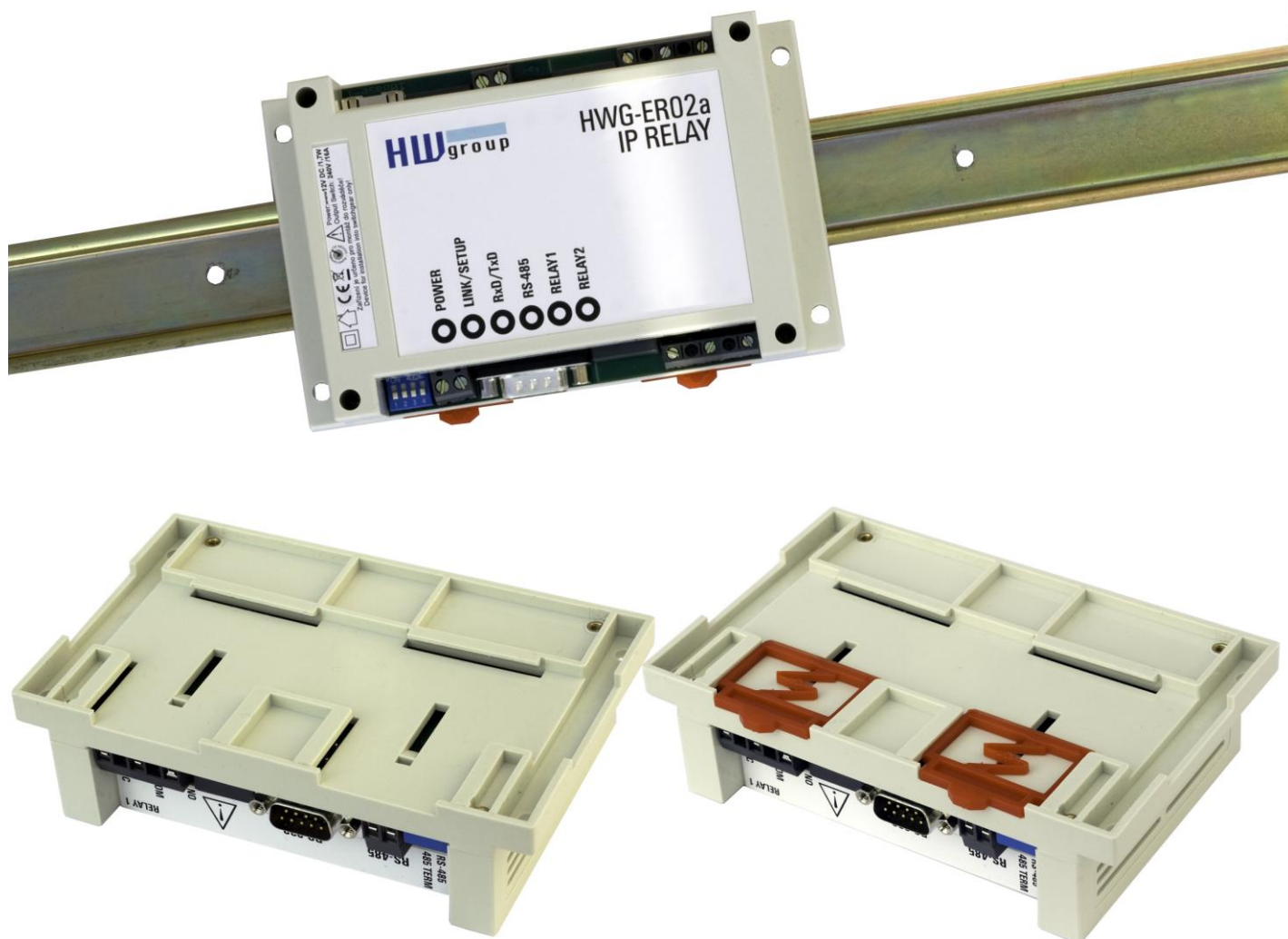
### NVT (Network Virtual Terminal)

When using TCP/IP communication the functions of the converter can be extended via NVT by RFC2217 with controlling dataflow which can for example change the speed of a remote serial port, control inputs and outputs or delete the buffer. These controlling commands are added to the data flow and introduced by prefix figure "FF" whose appearance in the data flow has to be handled by duplication. Detailed description of the NVT can be found in the handbook "**Programming of Ethernet Applications**" (which also describes supplied free routines for communication) or in a separate article on our website.

# Mechanical dimensions

The device is situated in a sturdy plastic box.





## Contact

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