WieETH

Bidirectional converter Ethernet – Wiegand for contactless readers

WieETH

Datasheet

Created: 14.3.2014

Last update: 15.08.2023 12:10

Number of pages: 28

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DESCRIPTION

Wiegand is a standard protocol used by readers of contactless cards. WieETH allows for (1) conversion of Wiegand to Ethernet and (2) transmit Wiegand to a remote location over the Ethernet.

WieETH can work with Wiegand protocols of any type with a length of 1 to 64 bits.

Examples of use

- Contactless readers
- Electronic access systems
- Security systems
- Legacy access systems updates

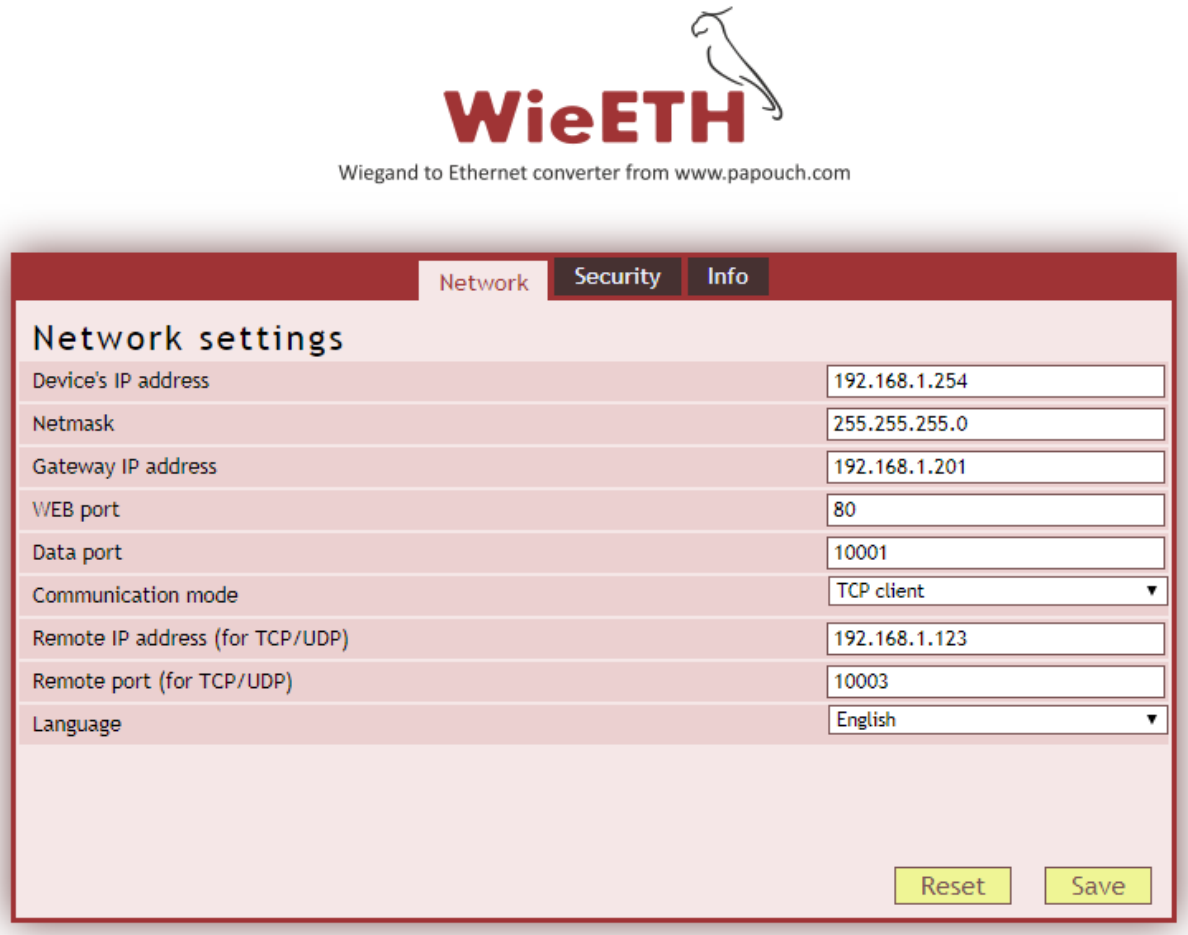

fig. 1 – WEB interface view

OPERATION

Converting Wiegand to Ethernet

1) The converter sends card numbers of from a reader using Spinel protocol. Data is sent through an established TCP connection to a controlling system. (Based on the configuration DIP switches it can also read the card number as a raw data in ASCII.)
2) The controlling system reads the last card number using Spinel instructions.

Converting Ethernet to Wiegand

Any packet can be generated to the Wiegand interface using a Spinel instruction.

Transferring Wiegand over Ethernet

Two WieETH converters connected to Ethernet can work in a pair sending a Wiegand packet over the Ethernet as if there was a regular Wegand connection. First WieETH that reads cards is set to Wiegand – Ethernet mode (TCP client mode) and the second converter to Ethernet - Wiegand mode (TCP server mode).

SETTINGS

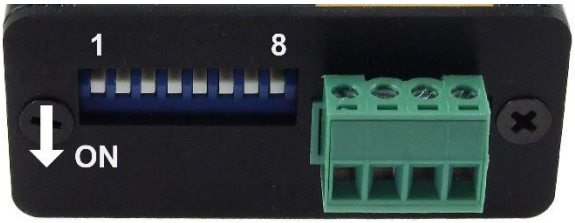

fig. 2 - location of configuration switches and ON position

1) Use the DIP switch located on the side of the device to set the required Wiegand protocol according to the following table:

SW1	SW2	SW3	SW4	SW5	Protocol type
OFF	OFF	OFF	OFF	OFF	Wiegand 30
ON	OFF	OFF	OFF	OFF	Wiegand 26
OFF	ON	OFF	OFF	OFF	Wiegand 40
ON	ON	OFF	OFF	OFF	Wiegand 32
ON	OFF	ON	OFF	OFF	Wiegand 34
OFF	OFF	ON	OFF	OFF	Wiegand 42
ON	OFF	OFF	OFF	ON	Wiegand 26b (kbd. and reader JA-80H)

tab. 1 – Setting the communication protocol

SW 6 .....ON = When the card number is read, it is sent using the TCP connection.[1]
OFF = Communicates using the Spinel protocol described in this manual.

[1] Raw data is sent through the TCP connection with no further protocol encapsulation.

SW 7..... ON = Ethernet – Wiegand mode
OFF = Wiegand – Ethernet mode (it reads cards)

2) Connect WieETH to an Ethernet switch using a standard patch cable (UTP cable 1:1).

3) Connect a Wiegand device communicating via the selected protocol.

4) Connect power supply to the green power terminal. Polarity is marked on the device label. (WieETH has an integrated reverse polarity protection.)

5) Use *Ethernet configurator* software from https://en.papouch.com/ec if your network is not within compatible IP address range with the default IP address (**192.168.1.254**) and subnet mask (255.255.255.0)

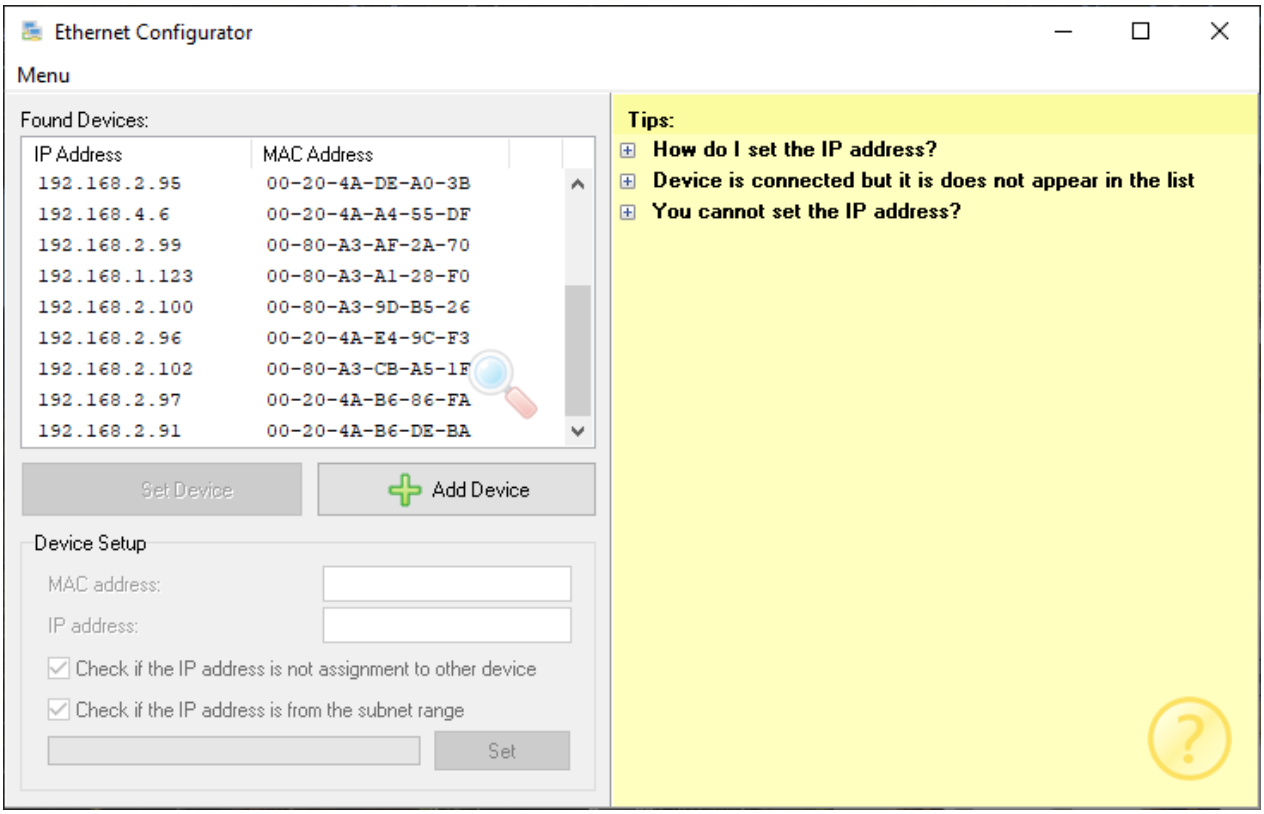

fig. 3 – Ethernet Configurator software for easy IP address setting

6) When the IP address is set, you can connect to the WieETH using a WEB browser and configure the network there. WEB interface is accessible through the IP address directly. Enter it to your WEB browser as follows: *http://192.168.1.254/* (example shown with the default IP address)

After it is set, the converter will expect an incoming connection on its data port (in TCP server mode) or it will attempt to connect to a remote IP address and port (in TCP client mode).

WEB INTERFACE SETTINGS

Settings are arranged in the following three panels:

- *Network* – network interface configuration, IP address, mask, DNS server, …
- *Security* – passwords to access settings
- *Info* – device information

Tips and tricks:

- The default language is English. You can switch it to Czech in the *Network* panel with *Language* parameter.
- Pop-up help will show on all items when the cursor hovers over the item. (Help will also appear on titles marked with a question mark. Hover the cursor above them to see it.)

fig. 4 – pop-up help shown when the cursor hovers over an item

Network

Network parameters, TCP communication and WEB interface settings.

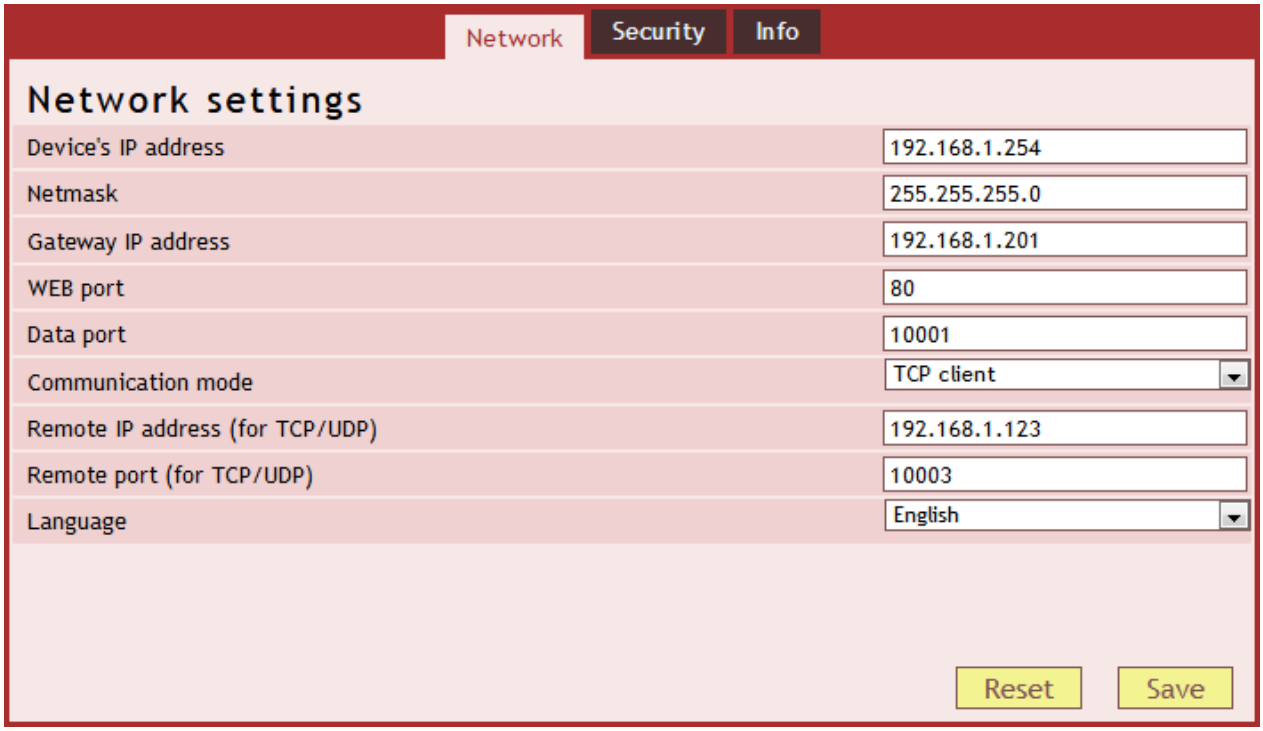

fig. 5 – network settings panel

Device IP address

WieETH IP address. In case you are not sure what IP address you should assign to your device, consult your network administrator.

Subnet mask

Subnet mask of the network to which WieETH will be connected.

Gateway IP address

IP address of your internet gateway.

WEB interface port

Number of port on which the WEB interface is accessible, most commonly this number is 80 or 8080.

Data port

TCP server mode: Number of data port. Port function depends on the set communication mode (see below). This is a port on which WieETH expects an incoming connection. When the connection is established, Spinel communication protocol is expected.

Communication mode

TCP server: WieETH passively expects an incoming connection on the set port *(Data port)*.

TCP client: WieETH actively tries to connect to a *Remote IP address* and *Remote port*.

UDP: WieETH communicates vis UDP protocol. Incoming packets are expected on the *Data port*.

Remote IP address

IP address of a remote device (mostly server), to which WieETH connects in TCP client mode. It then communicates via spinel protocol through the established connection.

Remote port

Port number of a remote device (mostly server), to which WieETH connects in TCP client mode. It then communicates via spinel protocol through the established connection.

Language

This is where WEB interface language is set. Available languages now are English and Czech.[2]

Device reset

This button resets all device parameters of the device to default values. The IP address will not be changed, WEB port will be set to 80.

Security

Web interface security settings.

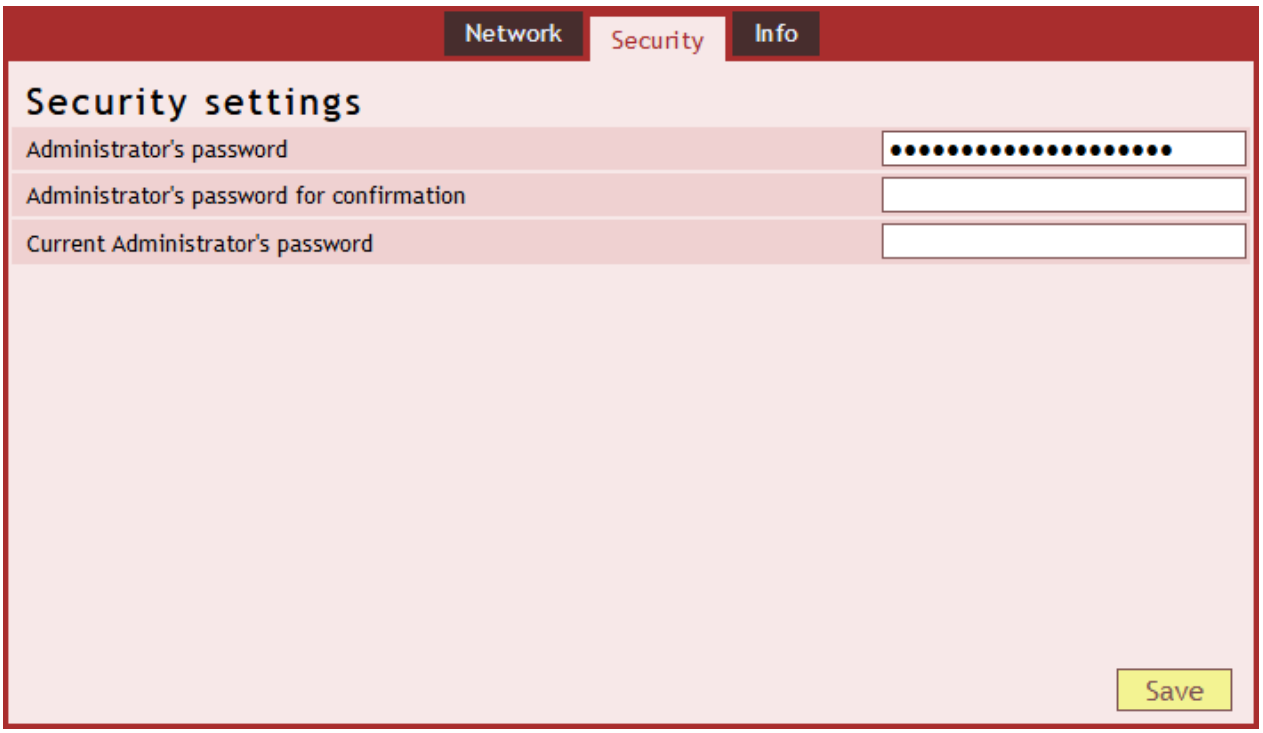

fig. 6 – security settings panel

Administrator password and Administrator password for confirmation

Enter administrator access password. Login name is always *admin.*

To cancel the password, keep both fields empty.

Current administrator password

If the administrator has a password set already, you need to enter it here to make any changes.

[2] We can implement another language upon request.

Info

This panel is not to configure the device, it contains various information about the device such as FW version and MAC address.

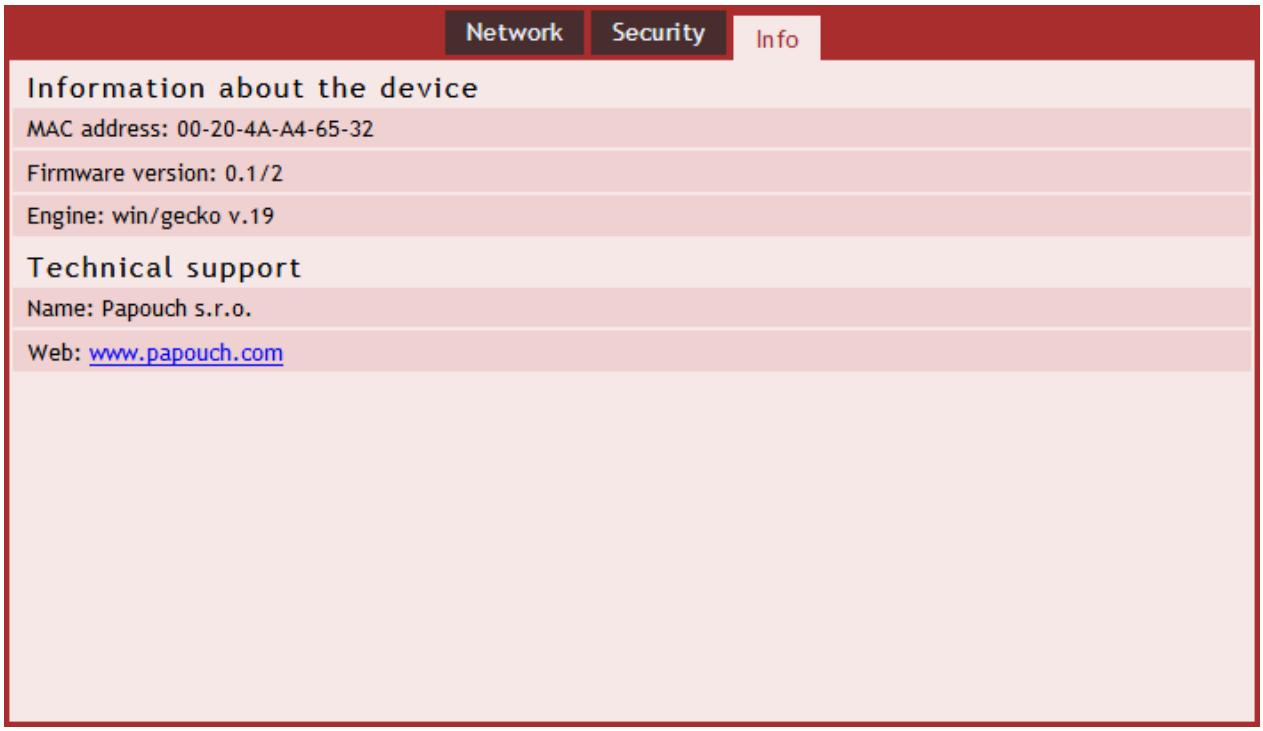

fig. 7 – device information panel

TELNET CONFIGURATION

Connection

Unknown IP address

For setting the IP address we recommend using Ethernet Configurator (more on page 6).

1) Open a window with command prompt (In Windows OS, click *Run* and type cmd.)
2) Make a record to ARP table:
   a. Type `arp –d` and confirm by Enter. That deletes current ARP table.
   b. Following command assigns IP address to MAC address:

      `arp –s [new_ip_address] [MAC_address]`

      example: `arp -s 192.168.1.254 00-20-4a-80-65-6e`
3) Open Telnet. (by typing `telnet` and pressing Enter. [3])
4) Type `open [new_ip_address] 1` and confirm.
5) Terminal shows an error message after a moment. Nevertheless this action is essential for correct IP address ARP entry.
6) Connect to the IP address of the TH2E. (by typing `open [IP address in dot format] 9999` and Enter.)
7) Now you have entered to the configuration of the Module. IP address is not yet set. It needs to be set in menu Server Configuration > IP Address.
8) If the IP address is valid, TH2E writes welcoming information ending by text:

   `Press Enter for Setup Mode`

   Now press Enter or the configuration will be terminated.
9) Device writes complete settings.
10) At the end of the entry you can see „Change setup:" text containing groups of parameters that are configurable. For changing the network parameters choose *Server*. Here you can set a new IP address and other parameters.

[3] Telnet client is not standard installed in OS Windows Vista. You can install it by doing following:

a) Open Control panel/add or remove programs.
b) On the left, click on Add/remove Windows functions (You have to have administrator's rights to do this.)
c) Windows Functions window will open. Check "Telnet client" and confirm. Telnet client will be installed to your system.

IP address is known

1) In OS Windows click on Start/Run and type `telnet` and confirm. [3]
2) Connect to the IP address of the TME. (by typing `open [IP address in dot format] 9999` and Enter.)
3) If the IP address is valid, TME writes welcoming information ending by text:

   Press Enter for Setup Mode

   Now press Enter or the configuration will be terminated.
4) Device writes complete settings.
5) At the end of the entry you can see „Change setup:" text containing groups of parameters that are configurable. For changing the network parameters choose Server.

Telnet main menu

You can choose the menu items by pressing the number before them and confirming by Enter.

Menu structure is:

```
Change Setup:
  0 Server
    ...
  7 Defaults
  8 Exit without save
  9 Save and exit            Your choice ?
```

Server

Basic Ethernet settings.

Following items are in this part:

```
IP Address : (192) .(168) .(001) .(122)
Set Gateway IP Address (N) ?
Netmask: Number of Bits for Host Part (0=default) (16)
Change telnet config password (N) ?
```

IP Address
TME's IP address. Enter the numbers separately and divide them by Enter.
Default: 192.168.1.254

Set Gateway IP Address

Gateway IP address
Type "Y" in the "Set Gateway IP Address" item to change the address. Enter the numbers separately and divide them by Enter.

Netmask
You can set here how many bits from IP address make the network part.
Subnet mask is entered as a number of bits determining range of possible IP addresses of the local network. If for example 2 is entered, subnet mask is `255.255.255.252` . Entered value indicates number of bits from right. Maximum is 32.
Default: 8
Example:
Mask 255.255.255.0 (binary 11111111 11111111 11111111 00000000) -> number 8.
Mask 255.255.255.252 (binary 11111111 11111111 11111111 11111100) -> number 2.

Change telnet config password

Enter new Password
This item sets the password that is required before entering the Telnet configuration or via WEB interface (Administrator's password).
Type "Y" at „Change telnet config password" to change the password

Factory Defaults

By pressing number 7 you can set the device to factory defaults.

This option sets the TH2E to defaults. IP address does not change, WEB port number will be changed to 80.

Exit without save

Ends the telnet session without saving.

Save and exit

This choice saves the changes. If some settings are changed, device restarts. That may take up to 30 seconds.

INDICATIONS

ON indicator:

This LED is lit once the power supply is connected.

READY indicator:

Lights up when the device is active.

COM indicator:

WieETH indicates Wiegand protocol communication.

Link indicator

(Left LED on the ethernet port)

Off ..... disconnected
Yellow ..... connected at 10 Mbps
Green ..... connected at 100 Mbps

Connection type indicator

(Right LED on the ethernet port)

Off ..... no communication
Yellow ..... Half-Duplex
Green ..... Full-Duplex

DEVICE RESET

This procedure will reset all settings to factory values. Unlike the reset done via WEB interface (see page 7) or Telnet (see page 11), this procedure will reset the IP address as well (default IP address is 192.168.1.254).

1) Disconnect the power to the device.
2) Carefully push and hold the button placed in a hole under the ethernet port.
3) Plug the power and wait for 10 seconds.
4) Release the button.
5) Reset procedure is finished.

COMPLETE DESCRIPTION OF THE SPINEL PROTOCOL

WieETH has the standardized Spinel[4] protocol implemented in format 97 (binary).

Format 97

Format 97 is used to communicate using 8bit characters (0 to 255 in decimal). To debug the communication easily, please use Spinel Terminal software. Instructions are divided to request and response:

Structure

Request:

```
PRE FRM NUM NUM ADR SIG INST DATA… SUMA CR
```

Response:

```
PRE FRM NUM NUM ADR SIG ACK  DATA… SUMA CR
```

PRE	1 Byte	Prefix, 2AH (character "*").
FRM	1 Byte	Format number 97 (61H).
NUM	2 Bytes	Number of instruction bytes from the following byte till the end of the frame.
ADR	1 Byte	Address of the module receiving request or sending response.
SIG	1 Byte	Message signature – any number from 00H to FFH. The same number sent in request will be returned in response determining to which request the response was received.
INST[5]	1 Byte	Instruction code – All instructions are thoroughly described in the Address (ADR)

Address FFH is reserved for broadcasts. If the request contains FFH address, the device considers it its own address. No responses are sent to requests with this address.

Address FEH is a universal address. If the request contains FFH address, the device considers it its own address. The response will contain actual address of the given device. Universal address can only be used when a single device is connected to the line.

Request Acknowledge (ACK)

ACK informs the controlling device how the received instruction was processed. Acknowledge codes:

00H .....ALL IS OK
Instruction was received OK and properly executed.

01H .....OTHER ERROR
Unspecified device error.

02H .....INVALID INSTRUCTION CODE
Received instruction code is unknown.

03H .....INVALID DATA
Data is of incorrect length or value.

04H .....WRITE NOW ALLOWED / ACCESS DENIED
- Request was not executed because some criteria were not met.
- Attempt to write data to inaccessible memory block.
- Attempt to activate a function requiring other settings (e.g. higher comm. speed).
- Changing configuration without "*allow configuration*" instruction preceding the denied instruction.
- Access to a memory block protected by a password.

05H .....DEVICE MALFUNCTION
- Malfunction requiring a service.
- Internal memory error of settings memory error.

[4] Detailed information about spinel protocol can also be found at: en.papouch.com/spinel .
[5] Instructions and data are highlighted like this in all following examples for easier read.

- Internal peripheral device malfunction (run or initialization error).
- Any other error making the device inoperable.

06H .....NO DATA AVAILABLE

0DH.....AUTOMATED INSTRUCTION – DIGITAL INPUT STATE CHANGE

0EH.....AUTOMATED INSTRUCTION – CONTINUOUS MEASUREMENT
- Periodic sending of measured values.

Checksum (SUMA)

1 Byte. The sum of all bytes in the instruction (all the data are added up except for the CR) subtracted from 255. Calculation: SUMA = 255 – (PRE + FRM + NUM + ADR + SIG + ACK (INST) + DATA)

No response will be sent to a request with incorrect checksum. (CR is expected even if the checksum is incorrect.)

Complete instructions overview chapter on page 18.

ACK	1 Byte	Request acknowledge. Determines if and how the request was executed. ACK ranges from 00H to 0FH.
DATA[5]	n Byte	Data. Thoroughly described for each instruction in the Address (ADR)

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Complete instructions overview chapter on page 18.

SUMA	1 Byte	Check sum.
CR	1 Byte	End character (0DH).

Glossary

Example

2AH, 61H, 00H, 05H, 01H, 02H, 60H, 0CH, 0DH

- 0DH — End character
- 60H, 0CH — SDATA
- 00H, 05H — Data length – SDATA length (4 bytes) + 0DH (1 byte). The total is lower than 256 leaving the upper byte zero.
- 61H — Format
- 2AH — Prefix

Data length (NUM)

16-bit value determining the number of bytes before the end of the instruction; number of all bytes following NUM, until CR (inclusive). Reaches values from 5 to 65535. If it is lower than 5, the instruction is considered invalid and the response will come with ACK "incorrect data" (provided the request is meant for the given device).

NUM creation process:

Add up the number of bytes following both NUM bytes (meaning number of bytes SDATA + 1 byte CR). Form the result in a 16-bit number. Divide it to an upper and lower byte. First NUM byte is the upper byte and second NUM byte is the lower one. (If the number of bytes is lower than 256, the first NUM byte will be 00H.)

Address (ADR)

Address FFH is reserved for broadcasts. If the request contains FFH address, the device considers it its own address. No responses are sent to requests with this address.

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Received instruction code is unknown.

03H .....INVALID DATA
Data is of incorrect length or value.

04H .....WRITE NOW ALLOWED / ACCESS DENIED
- Request was not executed because some criteria were not met.
- Attempt to write data to inaccessible memory block.
- Attempt to activate a function requiring other settings (e.g. higher comm. speed).
- Changing configuration without "*allow configuration*" instruction preceding the denied instruction.
- Access to a memory block protected by a password.

05H .....DEVICE MALFUNCTION
- Malfunction requiring a service.
- Internal memory error of settings memory error.
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- Any other error making the device inoperable.

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0EH.....AUTOMATED INSTRUCTION – CONTINUOUS MEASUREMENT
- Periodic sending of measured values.

Checksum (SUMA)

1 Byte. The sum of all bytes in the instruction (all the data are added up except for the CR) subtracted from 255. Calculation: SUMA = 255 – (PRE + FRM + NUM + ADR + SIG + ACK (INST) + DATA)

No response will be sent to a request with incorrect checksum. (CR is expected even if the checksum is incorrect.)

COMPLETE INSTRUCTIONS OVERVIEW

Instructions description

Read last received data

Last data received via Wiegand protocol. Response contains data according to the set protocol type.

Request:

Instruction code: A0H

Response:

Acknowledge code: ACK 00H

Parameters: (status) (type) (data)

status	Received data state	length: 1 byte
0 = data is valid 1 = data is invalid or it has been read before		

type	Wiegand type	length: 1 byte
00H … type 30 01H … type 26 02H … type 40 03H … type 32 05H … type 34 04H … type 42 80H … keyboard		

data	Received data	length: by type
Type 30: 4 byte: 32 bit number Type 26: 3 byte: 1. determines FC code; 2. and 3. 16 bit card code Type 40: 2 byte: 16 bit card code Type 32: 4 byte: 1. and 2. first 16 bit number; 3. and 4. second 16 bit number Type 34: 4 byte (první bit MSB je nejdříve přijatý bit) Type 42: 5 byte: Five bytes from scanned card		

Example:

Request:
2AH,61H,00H,05H,FEH,02H,A0H,CFH,0DH
Response:
2AH,61H,00H,0AH,31H,02H,00H,00H,01H,F8H,39H,3DH,C8H,0DH
Valid data, Wiegand 26, FC code: F8H, card code: 393DH.

Read RAW data

Last data received via Wiegand protocol. Response contains raw data as received according to set Wiegand type.

Request:

Instruction code: A1H

Response:

Acknowledge code: ACK 00H

Parameters: (status) (type) (data)

status	Received data state	length: 1 byte
0 = data is valid 1 = data is invalid or it has been read before		

type	Wiegand type	length: 1 byte
Number of received bits of Wiegand – 64 is maximum.		

data	Received data	length: 8 bytes
Response contains raw data as received.		

Example:

Request:
2AH,61H,00H,05H,31H,02H,A1H,9BH,0DH
Response:
2AH,61H,00H,0FH,31H,02H,00H,00H,1AH,FCH,1CH,9EH,80H,00H,00H,00H,00H,E2H,0DH
Valid data, Wiegand 26, first 26 bits contain data, the rest of the bits is invalid.

Read – automated

Last data received via Wiegand protocol. Response contains raw data as received regardless of the set Wiegand type.

Request:

Instruction code: A2H

Response:

Acknowledge code: ACK 00H

Parameters: (status) (type) (data)

status	Received data state	length: 1 byte
0 = data is valid 1 = data is invalid or it has been read before		

type	Wiegand type	length: 1 byte
Number of received bits of Wiegand – 64 is maximum.		

data	Received data	length: 8 bytes

Response contains raw data as received.

Example:

Request:
2AH,61H,00H,05H,31H,02H,A1H,9BH,0DH
Response:
2AH,61H,00H,0FH,31H,02H,00H,00H,1AH,FCH,1CH,9EH,80H,00H,00H,00H,00H,E2H,0DH
Valid data, Wiegand 26, first 26 bits contains data, the rest is invalid.

Read set Wiegand type

Reads the set Wiegand protocol type. This is set on the switch on the side of WieETH.

Request:

Instruction code: A3H

Response:

Acknowledge code: ACK 00H

Parameters: (type)

type	Wiegand type	length: 1 byte
00H … type 30 01H … type 26 02H … type 40 03H … type 32 05H … type 34 04H … type 42 80H … type 30 + keyboard 81H … type 26 + keyboard 82H … type 40 + keyboard 83H … type 32 + keyboard 85H … type 34 + keyboard 84H … type 42 + keyboard		

Example:

Request:
2AH,61H,00H,05H,FEH,02H,A3H,CCH,0DH
Response:
2AH,61H,00H,06H,31H,02H,00H,01H,3AH,0DH
Wiegand 26 without keyboard.

Read automated sending settings

Sends current state of the automated sending (upon receiving a packet from a reader).

Request:

Instruction code: A4H

Response:

Acknowledge code: ACK 00H

Parameters: (set)

set	length: 1 byte
00H … automated sending off 01H … automated sending of scanned card number according to set Wiegand type 02H … automated sending of raw data according to set Wiegand type 03H … automated sending of raw data – bit by bit, with no regard to set Wiegand type	

Example:

Request:
2AH,61H,00H,05H,31H,02H,A4H,98H,0DH
Response:
2AH,61H,00H,06H,31H,02H,00H,01H,3AH,0DH
Automated sending of scanned card number according to set Wiegand type.

Set automated sending

Sets automated sending upon scanning a card on a reader.

Request:

Instruction code: B4H

Parameters: (set)

set	length: 1 byte
00H … automated sending off 01H … automated sending of scanned card according to set Wiegand type 02H … automated sending of raw data according to set Wiegand type 03H … automated sending of raw data – bit by bit, with no regard to set Wiegand type	

Response:

Acknowledge code: ACK 00H

Example:

Request:
2AH,61H,00H,06H,31H,02H,B4H,01H,86H,0DH
Automated sending of scanned card number according to set Wiegand type.
Response:
2AH,61H,00H,05H,31H,02H,00H,3CH,0DH

Send Wiegand packet

This instruction allows for sending a Wiegand data. The data type depends on set Wiegand type.

If the device is not set to Wiegand sending mode using the switch on its side, response to this instruction is ACK 04H.

Request:

Instruction code: B5H

Parameters: (bits) (data)

bits	Number of bits	length: 1 byte

Number of bits of Wiegand to generate.

data	Wiegand packet	length: 8 bytes
Data for the Wiegand packet. It is supposed to be filled from left to right (from MSb to LSb).		

Response:

Acknowledge code: ACK 00H

Example:

Request:
2AH,61H,00H,0EH,FEH,02H,B5H,40H,00H,FFH,00H,FFH,00H,FFH,00H,FFH,75H,0DH
Generate Wiegand 64.
Response:
2AH,61H,00H,05H,31H,02H,00H,3CH,0DH

Generate automated message

An automated message is generated upon receiving a Wiegand packet.

Automated message:

Acknowledge code: 0CH

Parameters: (type) (wie) (bits) (data)

type	Message type	length: 1 byte
Automated message type can be one of the following: 01H … Decoded card number (Wiegand type according to set type) 02H … Raw data as received (Wiegand type according to set type) 03H … Raw data as received (Independent of the set Wiegand type)		

wie	Wiegand type	length: 1 byte
This byte is only sent if the message type is 01H. 00H … type 30 01H … type 26 02H … type 40 03H … type 32 05H … type 34 04H … type 42 80H … type 30 + keyboard 81H … type 26 + keyboard 82H … type 40 + keyboard 83H … type 32 + keyboard 85H … type 34 + keyboard 84H … type 42 + keyboard		

bits	Number of bits	length: 1 byte
This byte is only sent if message type is 02H or 03H. Number of received Wiegand bits – 64 is maximum.		

data	Received data	length: 8 bytes
Raw data as received from Wiegand. Filled from left to right (from MSb to LSb).		

Example:

Example 1:
2AH,61H,00H,0AH,31H,00H,0CH,01H,01H,F8H,39H,3DH,BDH,0DH
Message type 01H, Wiegand 26, FC code F8H, card code 393DH.
Example 2:
2AH,61H,00H,0FH,31H,01H,0CH,02H,1AH,FCH,1CH,9EH,80H,00H,00H,00H,00H,D5H,0DH
Message type 02H, Wiegand 26, valid bits from left to right.

Set automated message address

When the automated message is sent, senders address is set to the WieETH address (as a default). This instruction allows you to set FFH address which is a broadcast. This setting along with turning the automated sending on and setting proper network parameters allows for connecting two WieETH converters. Once acts as a transmitter and the other one as a receiver. This way it is possible to extend Wiegand over Ethernet.

Request:

Instruction code: B7H

Parameters: (mode)

mode	Number of bits	length: 1 byte
00H … converters address will be sent (default) 01H … FFH address will be sent (to extend Wiegand over Ethernet)		

Response:

Acknowledge code: ACK 00H

Example:

Request:
2AH,61H,00H,06H,31H,02H,B7H,01H,83H,0DH
FFH will be sent.
Response:
2AH,61H,00H,05H,31H,02H,00H,3CH,0DH
Example of the automated message with FFH address:
2AH,61H,00H,0FH,FFH,00H,0CH,03H,1AH,FCH,1CH,9EH,80H,00H,00H,00H,00H,07H,0DH

Read automated message address settings

This instruction reads the current address that is sent with an automated message.

Request:

Instruction code: A7H

Response:

Acknowledge code: ACK 00H

Parameters: (mode)

Example:

Request:
2AH,61H,00H,05H,FEH,02H,A7H,C8H,0DH
Response:
2AH,61H,00H,06H,31H,02H,00H,01H,3AH,0DH
FFH will be sent.

TECHNICAL PARAMETERS

Ethernet:

Interface.....TBase 10/100 Ethernet

Connector.....RJ45

Default IP address.....192.168.1.254

Default subnet mask.....255.255.255.0 (8 bits; C mask)

Default gateway IP address.....0.0.0.0

Wiegand:

Connector.....Slip-on terminal

Line type.....Wiegand (1 to 64 bitů)

Pin	Description
Data 1	Signal Data 1 for reader
Data 0	Signal Data 0 for reader
GND	Communication line ground
$+U_{OUT}$	Power output for reader[6]

table 2 – Wiegand connector connections

Other:

Power.....8 to 30 V DC (reverse polarity protected)

Consumption at 12 V.....typ. 100 mA

Consumption at 24 V.....typ. 53 mA

Power connector.....slip-on terminal

Operation temperatures.....-20 °C to +70 °C

Dimensions.....62 × 55 × 24 mm

Enclosure.....anodized aluminum

IP coverage.....IP 30

[6] If the power voltage is above 15V, the output voltage is 12V.
If it is below 15V, the output voltage will be lower than the power voltage.

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