Elfin-EW11A

Comments & application guide

Table of contents

1. General

For configuring the Elfin-EW11A RS485 to Ethernet converter, the IOTService application software is needed. See the manufacturer website download section. Here the user manual and operation guide can also be downloaded.

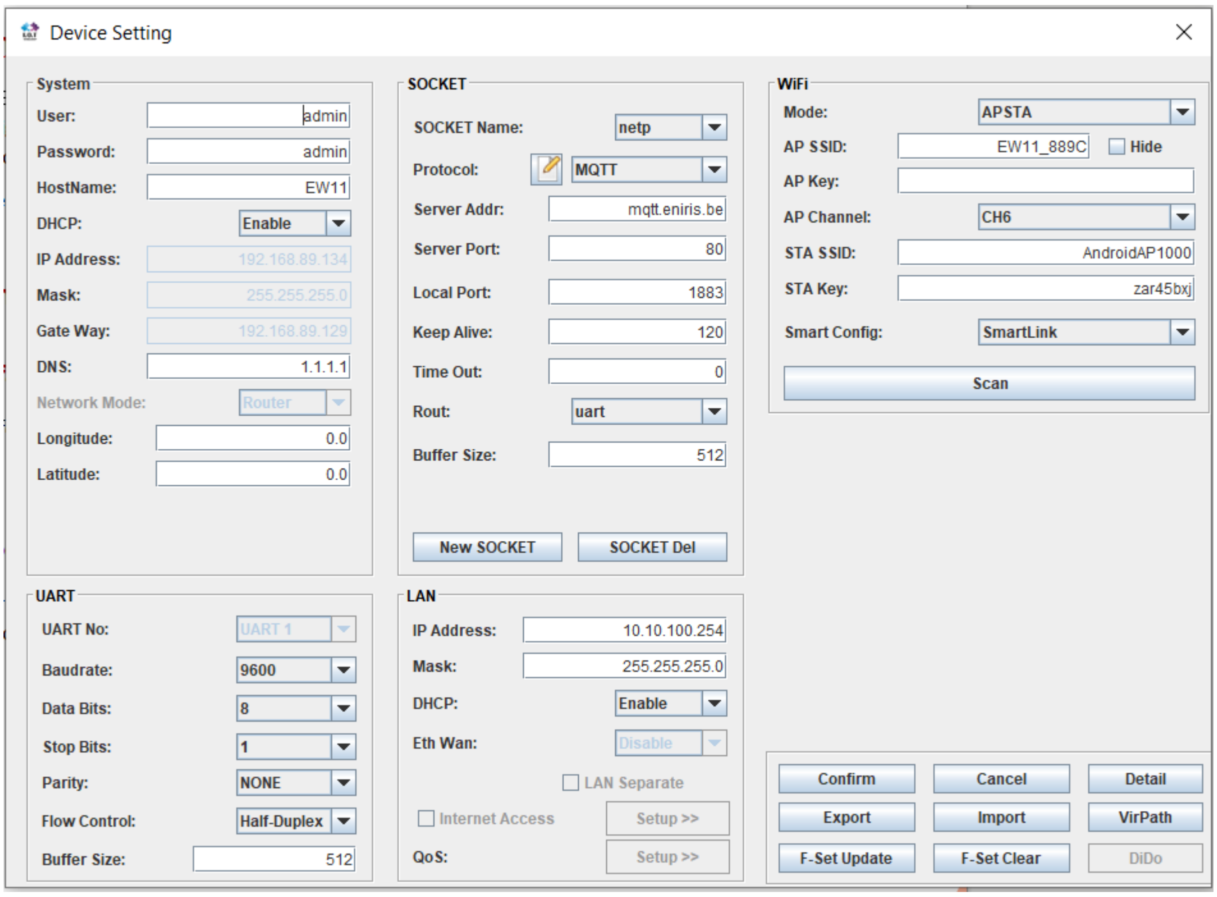
2. Configuration

2.1. Connecting to the Elfin-EW11A

The Elfin-EW11A should normally setup a WiFi access point to which you can connect for further configuration of the stick. In our case this network was called EW11_87E0. If no access point can be found, the stick must be reset. See below on how to do that.
Note that if the stick is in AP+STA mode, the configuration page of the access point may be very slow.

2.2. Default settings

The following settings will be configured when loading the default settings file on the device:



Device Setting

System

User:	admin
Password:	admin
HostName:	EW11
DHCP:	Enable
IP Address:	192.168.89.134
Mask:	255.255.255.0
Gate Way:	192.168.89.129
DNS:	1.1.1.1
Network Mode:	Router
Longitude:	0.0
Latitude:	0.0

SOCKET

SOCKET Name:	netp
Protocol:	MQTT
Server Addr:	mqtt.eniris.be
Server Port:	80
Local Port:	1883
Keep Alive:	120
Time Out:	0
Rout:	uart
Buffer Size:	512

WiFi

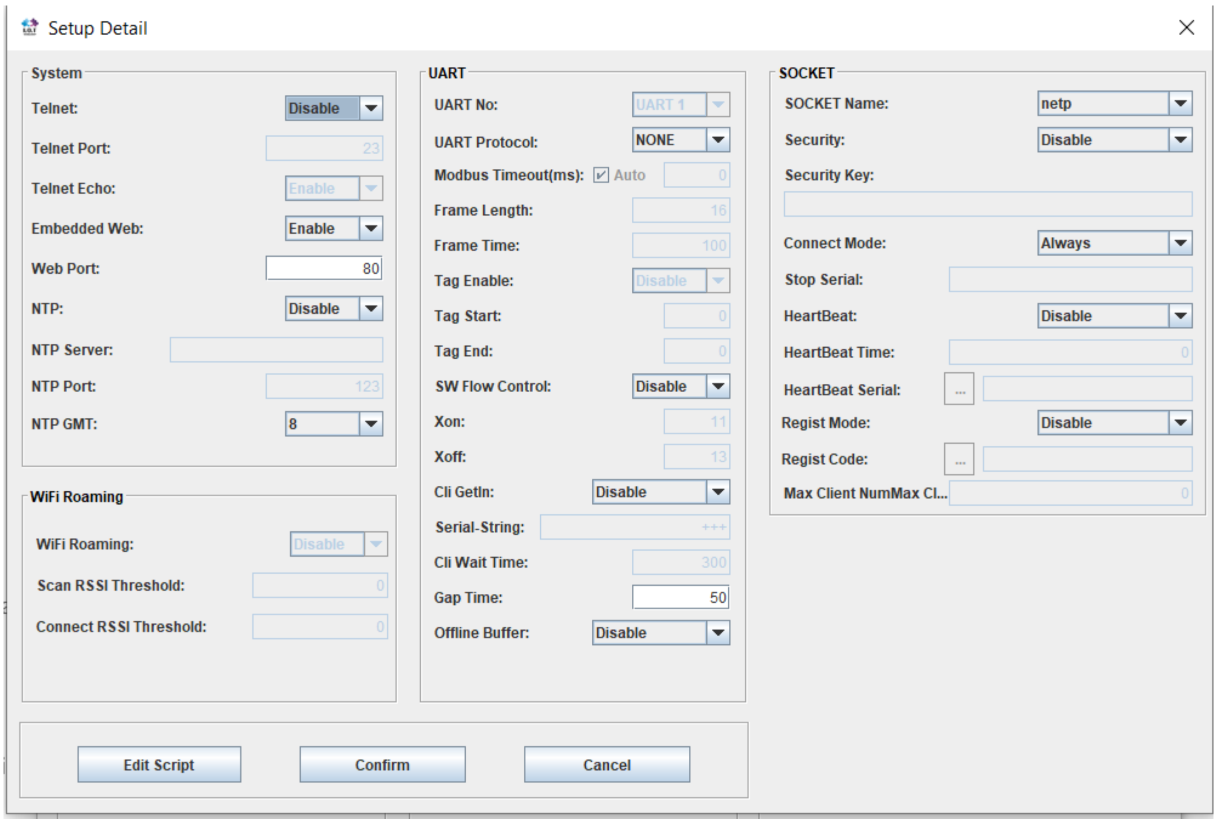
Mode:	APSTA
AP SSID:	EW11_889C ☐ Hide
AP Key:	
AP Channel:	CH6
STA SSID:	AndroidAP1000
STA Key:	zar45bxj
Smart Config:	SmartLink

UART

UART No:	UART 1
Baudrate:	9600
Data Bits:	8
Stop Bits:	1
Parity:	NONE
Flow Control:	Half-Duplex
Buffer Size:	512

LAN

IP Address:	10.10.100.254
Mask:	255.255.255.0
DHCP:	Enable
Eth Wan:	Disable
☐ LAN Separate	
☐ Internet Access	Setup >>
QoS:	Setup >>



Setup Detail

System

Telnet:	Disable
Telnet Port:	23
Telnet Echo:	Enable
Embedded Web:	Enable
Web Port:	80
NTP:	Disable
NTP Server:	
NTP Port:	123
NTP GMT:	8

WiFi Roaming

WiFi Roaming:	Disable
Scan RSSI Threshold:	0
Connect RSSI Threshold:	0

UART

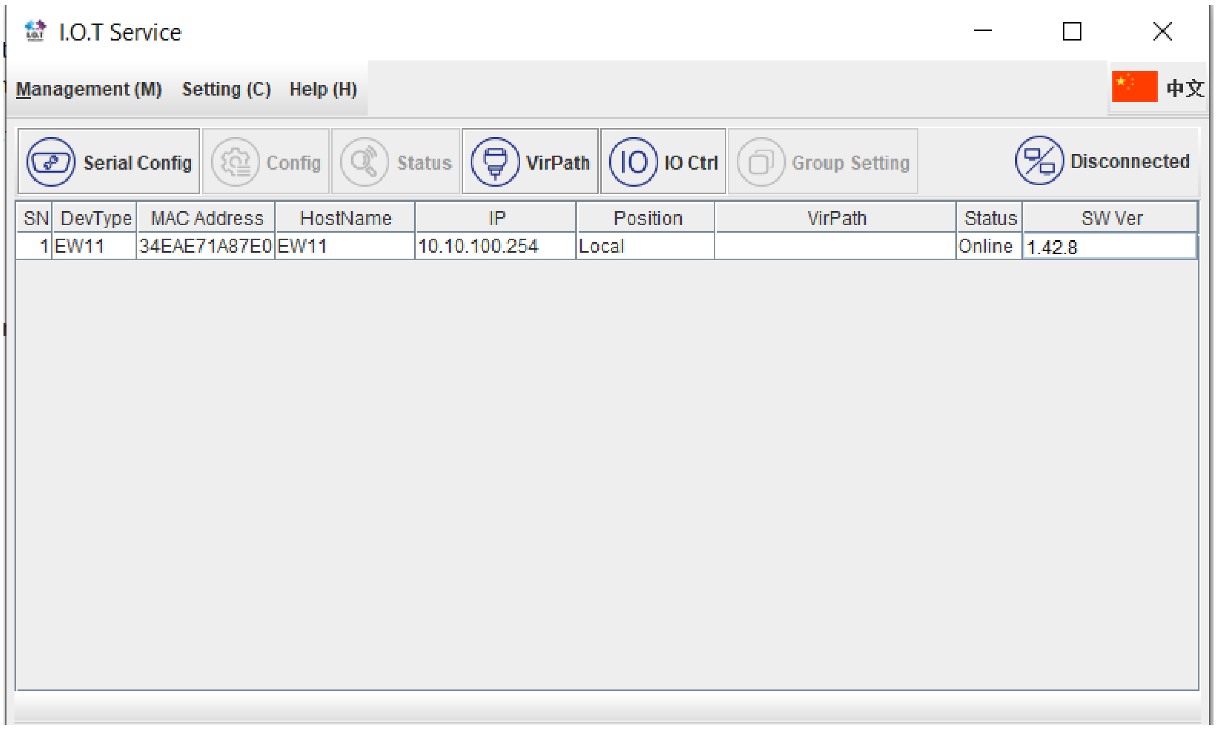
UART No:	UART 1
UART Protocol:	NONE
Modbus Timeout(ms):	☑ Auto 0
Frame Length:	16
Frame Time:	100
Tag Enable:	Disable
Tag Start:	0
Tag End:	0
SW Flow Control:	Disable
Xon:	11
Xoff:	13
Cli GetIn:	Disable
Serial-String:	+++
Cli Wait Time:	300
Gap Time:	50
Offline Buffer:	Disable

SOCKET

SOCKET Name:	netp
Security:	Disable
Security Key:	
Connect Mode:	Always
Stop Serial:	
HeartBeat:	Disable
HeartBeat Time:	0
HeartBeat Serial:	...
Regist Mode:	Disable
Regist Code:	...
Max Client NumMax Cl...	0

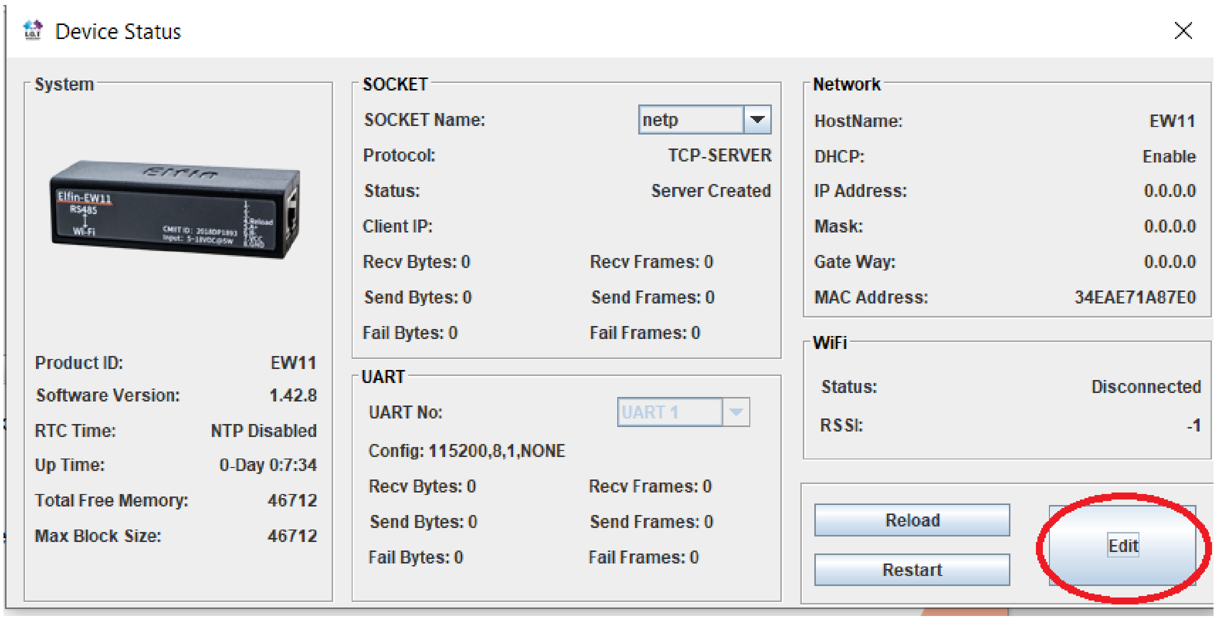
2.3. Procedure to load the default settings

After connecting to the stick's access point, start the "IOTService" program for configuring the stick. If well connected, it should detect the stick. If it doesn't, right click and refresh inside the program.



SN	DevType	MAC Address	HostName	IP	Position	VirPath	Status	SW Ver
1	EW11	34EAE71A87E0	EW11	10.10.100.254	Local		Online	1.42.8

Double click on the stick. Click "Edit". Note that if in the "Status" column it says "Offline", the IOTService program will not be able to contact the stick.



System

Product ID:	EW11
Software Version:	1.42.8
RTC Time:	NTP Disabled
Up Time:	0-Day 0:7:34
Total Free Memory:	46712
Max Block Size:	46712

SOCKET

SOCKET Name:	netp
Protocol:	TCP-SERVER
Status:	Server Created
Client IP:	
Recv Bytes: 0	Recv Frames: 0
Send Bytes: 0	Send Frames: 0
Fail Bytes: 0	Fail Frames: 0

UART

UART No:	UART 1
Config: 115200,8,1,NONE	
Recv Bytes: 0	Recv Frames: 0
Send Bytes: 0	Send Frames: 0
Fail Bytes: 0	Fail Frames: 0

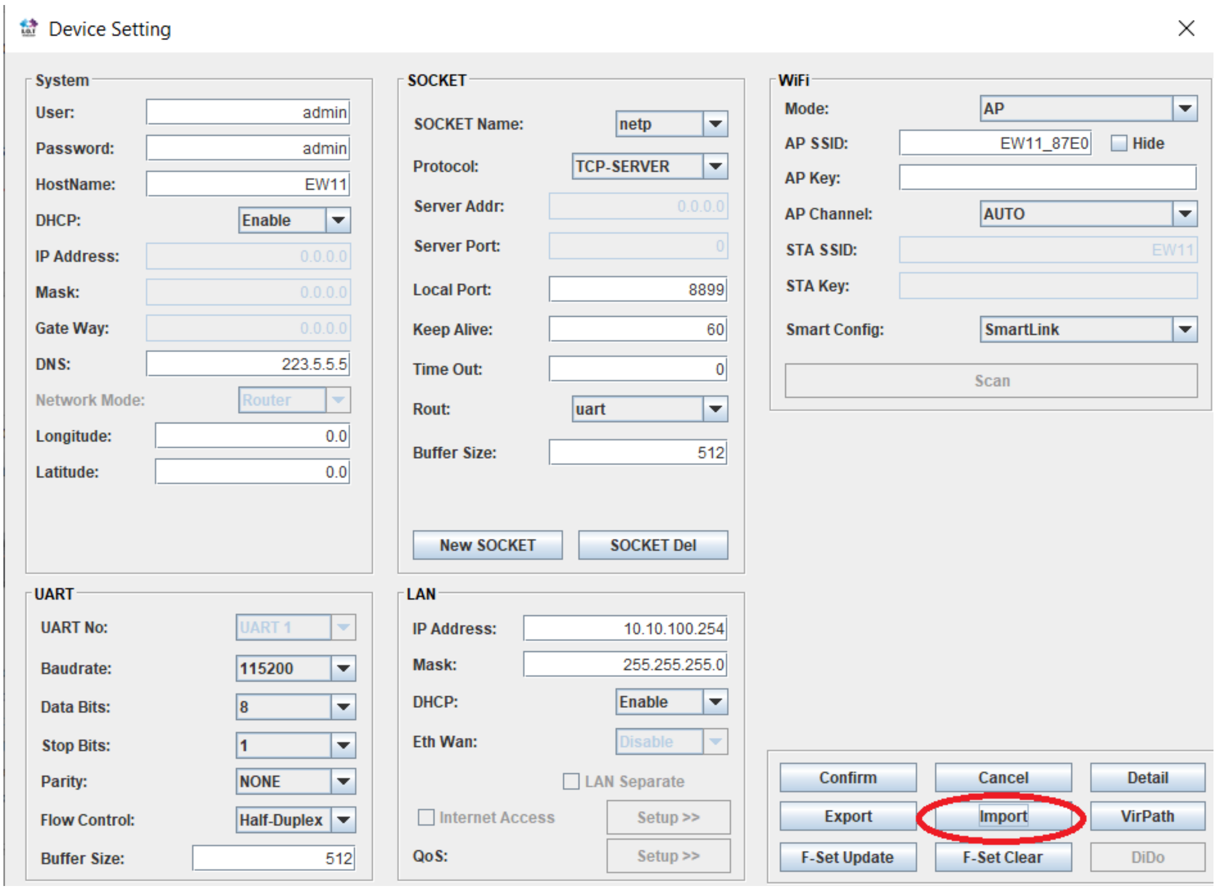
Network

HostName:	EW11
DHCP:	Enable
IP Address:	0.0.0.0
Mask:	0.0.0.0
Gate Way:	0.0.0.0
MAC Address:	34EAE71A87E0

WiFi

Status:	Disconnected
RSSI:	-1

Click "Import", for loading a settings file. Load the provided settings file. The stick will restart when importing the settings has finished.



System
User: admin
Password: admin
HostName: EW11
DHCP: Enable
IP Address: 0.0.0.0
Mask: 0.0.0.0
Gate Way: 0.0.0.0
DNS: 223.5.5.5
Network Mode: Router
Longitude: 0.0
Latitude: 0.0

SOCKET
SOCKET Name: netp
Protocol: TCP-SERVER
Server Addr: 0.0.0.0
Server Port: 0
Local Port: 8899
Keep Alive: 60
Time Out: 0
Rout: uart
Buffer Size: 512

WiFi
Mode: AP
AP SSID: EW11_87E0 ☐ Hide
AP Key:
AP Channel: AUTO
STA SSID: EW11
STA Key:
Smart Config: SmartLink

UART
UART No: UART 1
Baudrate: 115200
Data Bits: 8
Stop Bits: 1
Parity: NONE
Flow Control: Half-Duplex
Buffer Size: 512

LAN
IP Address: 10.10.100.254
Mask: 255.255.255.0
DHCP: Enable
Eth Wan: Disable
☐ LAN Separate
☐ Internet Access
QoS:

When the stick has rebooted with the default settings, it will try to connect to a WiFi access point ("STA") with name "AndroidAP1000" and password "zar45bxj", and set up an access point of itself ("AP") called "EW11_889C" with password "zar45bxj".

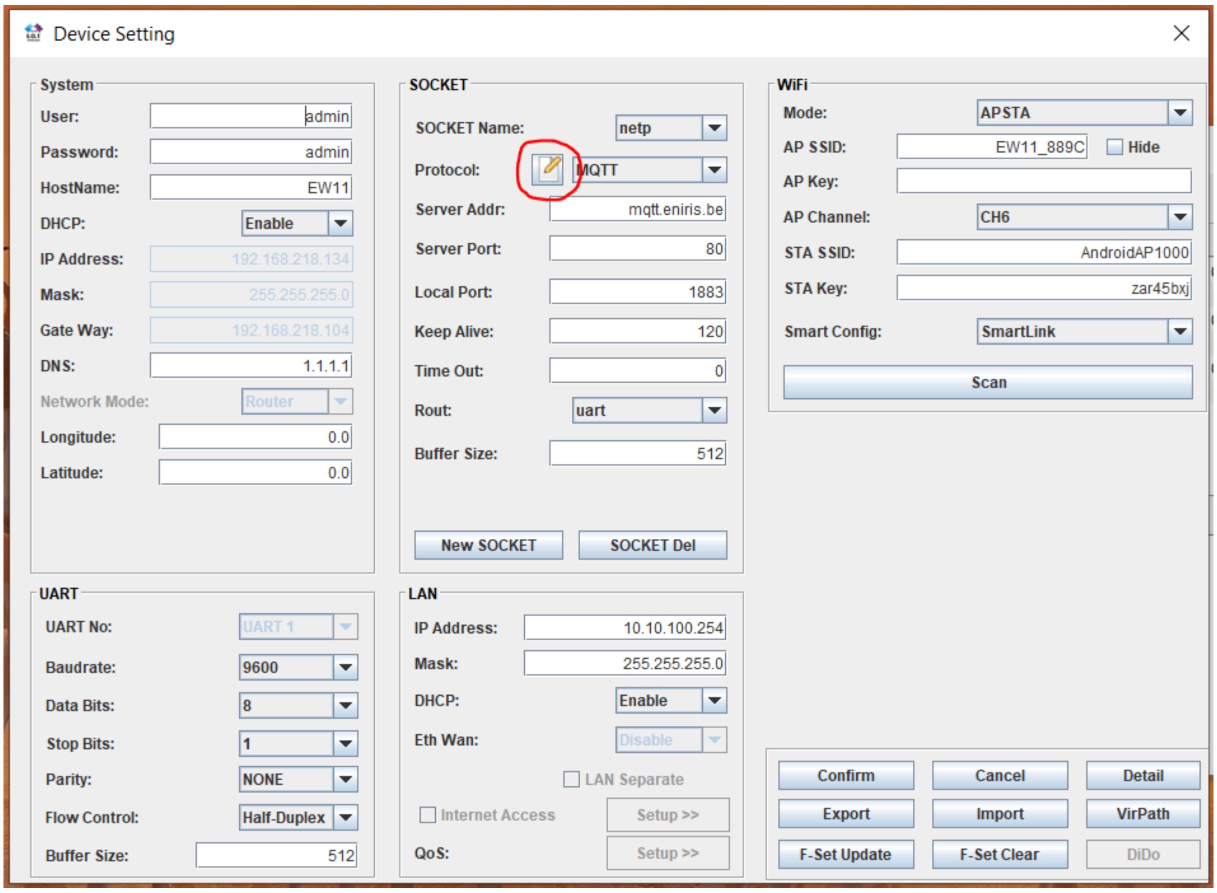
3. Client specific configuration

3.1. WiFi access point to use

Connect again to the stick with the IOTService program with the access point set up by the stick. Go back to the settings page and change "STA SSID" and "STA Key" to the name and the password of the WiFi network you want the stick to connect to.
When done click "Confirm".

3.2. MQTT settings

Click the edit button next to "Protocol" in the "SOCKET" part of the settings. Fill in as bellow, with the User and Password provided by Eniris. In the topic, replace [USER] with the User name.



Device Setting

System

User:	admin
Password:	admin
HostName:	EW11
DHCP:	Enable
IP Address:	192.168.218.134
Mask:	255.255.255.0
Gate Way:	192.168.218.104
DNS:	1.1.1.1
Network Mode:	Router
Longitude:	0.0
Latitude:	0.0

SOCKET

SOCKET Name:	netp
Protocol:	MQTT
Server Addr:	mqtt.eniris.be
Server Port:	80
Local Port:	1883
Keep Alive:	120
Time Out:	0
Rout:	uart
Buffer Size:	512

WiFi

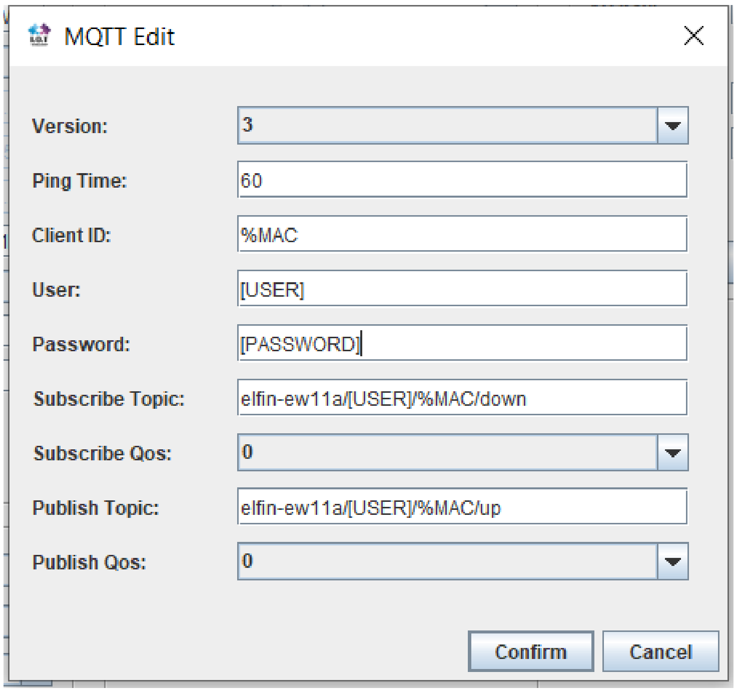
Mode:	APSTA
AP SSID:	EW11_889C
AP Key:	
AP Channel:	CH6
STA SSID:	AndroidAP1000
STA Key:	zar45bxj
Smart Config:	SmartLink

UART

UART No:	UART 1
Baudrate:	9600
Data Bits:	8
Stop Bits:	1
Parity:	NONE
Flow Control:	Half-Duplex
Buffer Size:	512

LAN

IP Address:	10.10.100.254
Mask:	255.255.255.0
DHCP:	Enable
Eth Wan:	Disable



MQTT Edit

Version:	3
Ping Time:	60
Client ID:	%MAC
User:	[USER]
Password:	[PASSWORD]
Subscribe Topic:	elfin-ew11a/[USER]/%MAC/down
Subscribe Qos:	0
Publish Topic:	elfin-ew11a/[USER]/%MAC/up
Publish Qos:	0

3.3. Serial settings

If necessary for the serial device that you are connecting to, the baudrate, data bits, stop bits and parity can also be changed on this page.
When done click “Confirm”.

3.4. Modbus registers to MQTT: basics

It is unfortunately not straightforward to configure the stick to read certain Modbus registers and send these to the server over MQTT. What the stick can do however, is send fixed hexadecimal data strings over the serial line to the energy meter (or other Modbus device), wait for a reply, and send the reply over MQTT to the server.

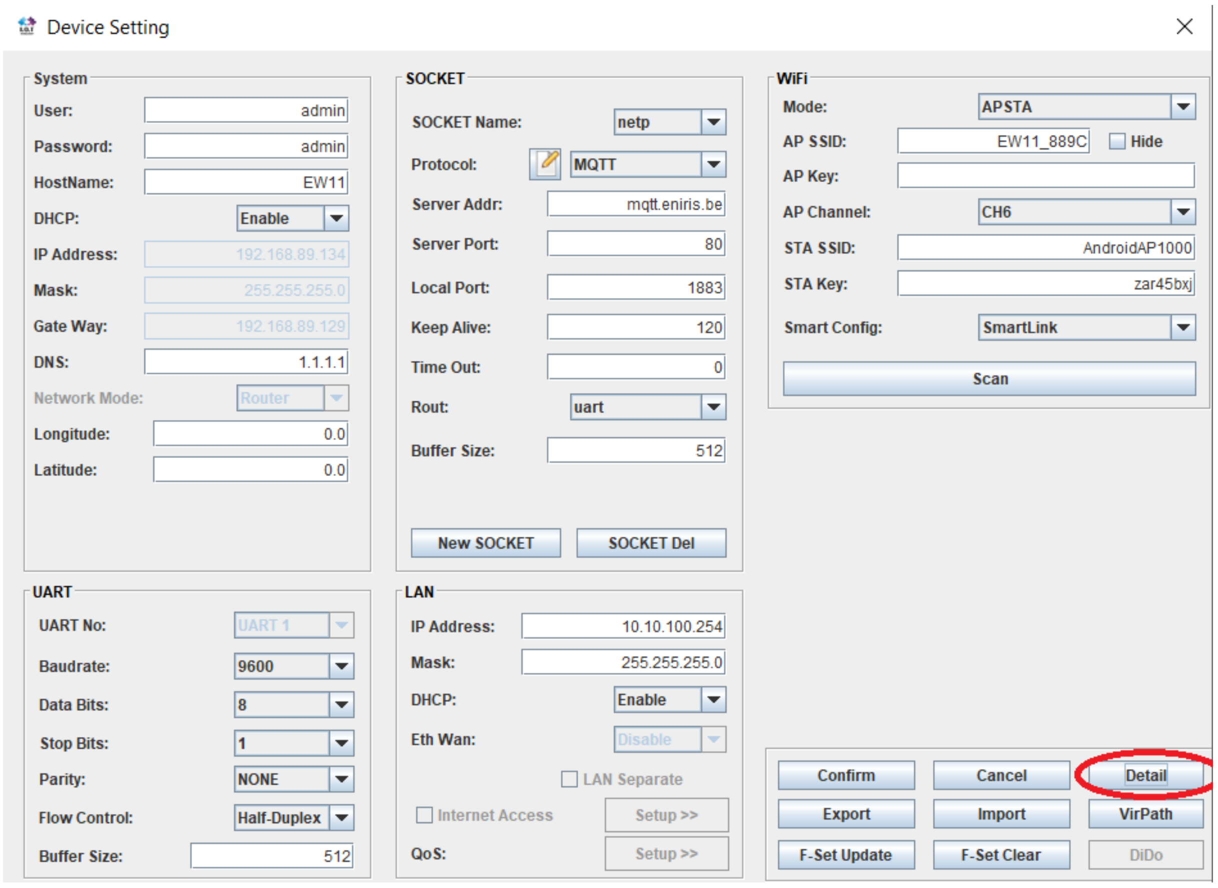
The fixed hexademical data strings correspond to the hexadecimal representation of Modbus commands. The replies are also hexadecimal data strings, which correspond to the hexadecimal representation of Modbus replies. Decoding of the replies on the server is necessary.

It must be noted that once set, the Modbus commands cannot be changed remotely any more.

To configure the stick to send Modbus commands to a device and send the replies to the server, in the Device Settings, click “Detail”. Next, click “Script”. Click “Import Script”, and choose the right script for the right application.

NOTE: Before uploading a new script, it may be necessary to delete an old script with the “Delete Script” button.

MAKE SURE THE SCRIPT IS CORRECT. AN INCORRECT SCRIPT CAN MAKE THE STICK INACCESSIBLE FOREVER.


Device Setting

System

User:	admin
Password:	admin
HostName:	EW11
DHCP:	Enable
IP Address:	192.168.89.134
Mask:	255.255.255.0
Gate Way:	192.168.89.129
DNS:	1.1.1.1
Network Mode:	Router
Longitude:	0.0
Latitude:	0.0

SOCKET

SOCKET Name:	netp
Protocol:	MQTT
Server Addr:	mqtt.eniris.be
Server Port:	80
Local Port:	1883
Keep Alive:	120
Time Out:	0
Rout:	uart
Buffer Size:	512

WiFi

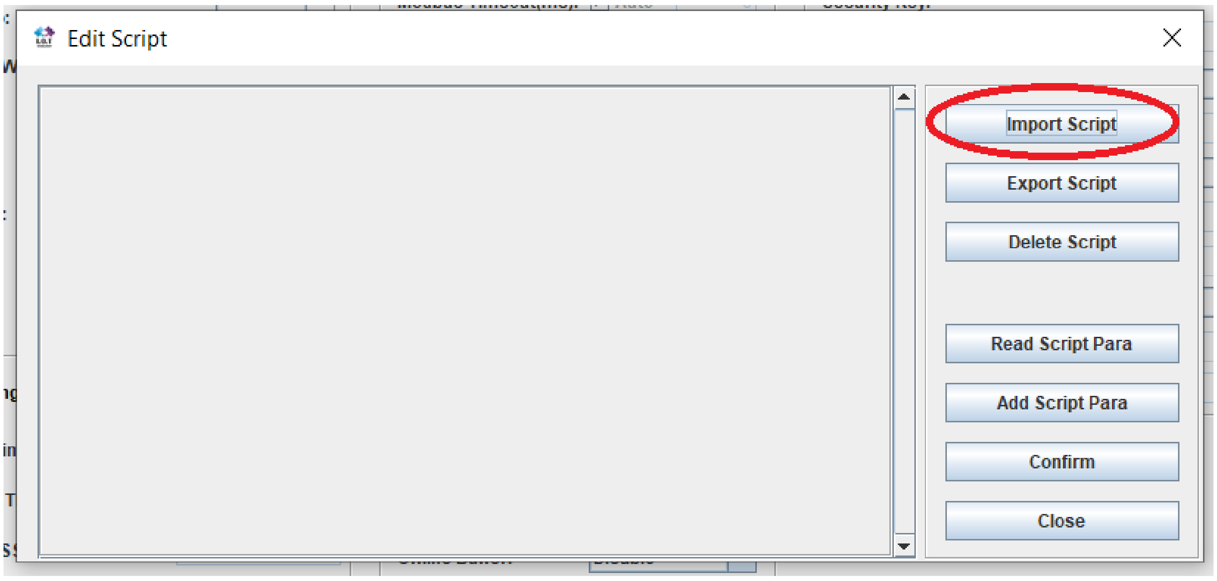
Mode:	APSTA
AP SSID:	EW11_889C
AP Key:	
AP Channel:	CH6
STA SSID:	AndroidAP1000
STA Key:	zar45bxj
Smart Config:	SmartLink

UART

UART No:	UART 1
Baudrate:	9600
Data Bits:	8
Stop Bits:	1
Parity:	NONE
Flow Control:	Half-Duplex
Buffer Size:	512

LAN

IP Address:	10.10.100.254
Mask:	255.255.255.0
DHCP:	Enable
Eth Wan:	Disable



An example of the script file can be seen below. **For example, FLASH(STRHEX)cmd2 contains the Modbus command to read out the voltage of an Eastron SDM120M with serial address 1.**

The scripts are always specific for a device type, desired registers & device modbus address!

```
FLASHMAGIC=2
FLASH(NUM)HFScriptFunction=1
FLASH(NUM)qryIntv=1000
FLASH(NUM)upIntv=60
FLASH(NUM)upMetd=0
FLASH(NUM)upJson=1
FLASH(STRSTR)jsonName="SN-MC-SWV Voltage_V Current_A Power_W RPower_VAr Imp_kWh
Exp_kWh Imp_kVArh Exp_kVArh"
FLASH(STRHEX)cmd1="01 03 FC 00 00 04 74 59"
FLASH(STRHEX)cmd2="01 04 00 00 00 02 71 cb"
FLASH(STRHEX)cmd3="01 04 00 06 00 02 91 ca"
FLASH(STRHEX)cmd4="01 04 00 0C 00 02 b1 c8"
FLASH(STRHEX)cmd5="01 04 00 18 00 02 f1 cc"
FLASH(STRHEX)cmd6="01 04 00 48 00 02 f1 dd"
FLASH(STRHEX)cmd7="01 04 00 4a 00 02 50 1d"
FLASH(STRHEX)cmd8="01 04 00 4c 00 02 b0 1c"
FLASH(STRHEX)cmd9="01 04 00 4e 00 02 11 dc"
```

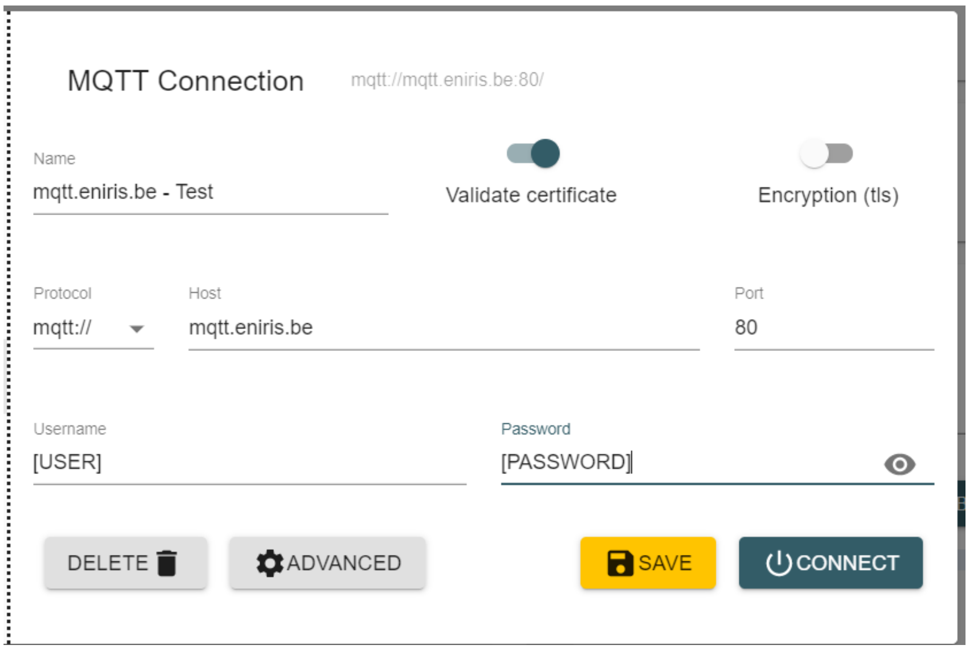
The json mqtt data send to the server looks like:

```
{"key":"Voltage_V","value":"01040443676666F455"}
```

The value given here is a string of hexadecimal numbers that represent a modbus reply. See the modbus protocol and the documentation of the meter used for how to decode this message.

4. Testing the MQTT connection

To check if the stick is connected and sending data over MQTT to the server, install the free program "MQTT Explorer". Once installed, open and make a new MQTT connection with the following settings (substitute [USER] and [PASSWORD] with the ones given by Eniris for the stick):


MQTT Connection mqtt://mqtt.eniris.be:80/

Name: mqtt.eniris.be - Test

Validate certificate: on

Encryption (tls): off

Protocol: mqtt://

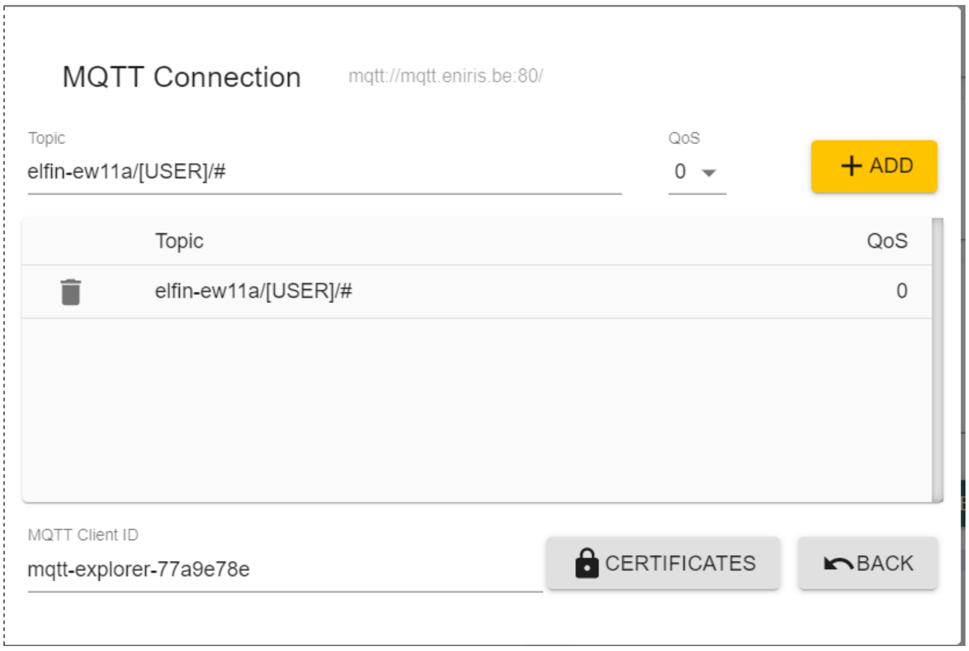
Host: mqtt.eniris.be

Port: 80

Username: [USER]

Password: [PASSWORD]

Next, click "Advanced" to configure the topic to (substitute [USER] again with the username given by Eniris for the stick):


MQTT Connection mqtt://mqtt.eniris.be:80/

Topic: elfin-ew11a/[USER]/#

QoS: 0

Topic	QoS
elfin-ew11a/[USER]/#	0

MQTT Client ID: mqtt-explorer-77a9e78e

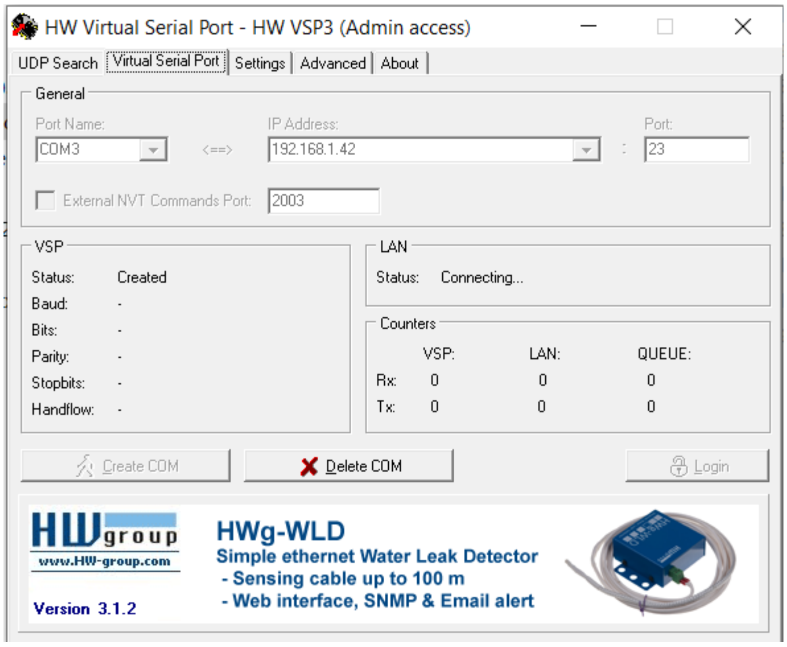
When configured, click "Back" and "Connect". You should now connect to the server and be published to the same topic as the stick is writing. If everything is working correctly, you should see regular updates coming in.

5. Advanced settings - Modbus registers to MQTT: making new scripts for new device types

To do this, it is necessary to know the registers to read, the read function that must be used for this, and the modbus address that the device to be read has. The first two can normally be found in the datasheet & manual of the device. The last one is configurable on the device itself. Generally it is recommended to leave the address to 1.

To generate the corresponding hex strings, a program called qModmaster can be used. It can be downloaded from https://sourceforge.net/projects/qmodmaster/ . It is also necessary to set up a virtual serial port on your computer, e.g. with "HW Virtual Serial Port".

First, create the virtual serial port. It can be to any ip address and any port, as it is just a dummy for qModmaster.


HW Virtual Serial Port - HW VSP3 (Admin access)

UDP Search | Virtual Serial Port | Settings | Advanced | About

General

Port Name: COM3 <==> IP Address: 192.168.1.42 : Port: 23

External NVT Commands Port: 2003

VSP

Status:	Created
Baud:	-
Bits:	-
Parity:	-
Stopbits:	-
Handflow:	-

LAN

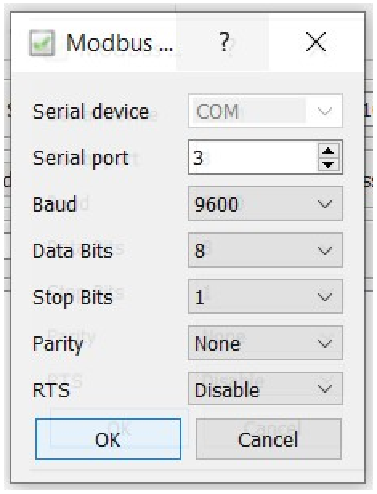
Status: Connecting...

Counters

	VSP:	LAN:	QUEUE:
Rx:	0	0	0
Tx:	0	0	0

Create COM
Delete COM
Login
HWgroup
www.HW-group.com
Version 3.1.2
HWg-WLD
Simple ethernet Water Leak Detector
- Sensing cable up to 100 m
- Web interface, SNMP & Email alert

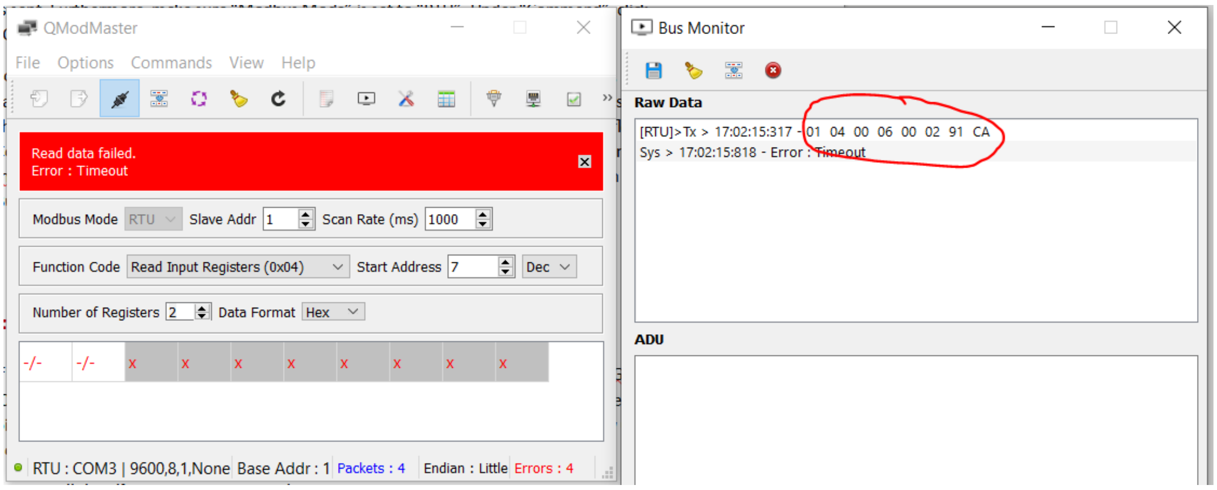
Next, connect to this virtual serial port in qModmaster. Under "Options"→"Modbus RTU". The serial port must be the same as the virtual serial port. The other settings do not matter.



Serial device: COM
Serial port: 3
Baud: 9600
Data Bits: 8
Stop Bits: 1
Parity: None
RTS: Disable

Next, under “View”, open “Bus monitor”. Here the Modbus hex strings will appear after a command is sent. Furthermore, make sure “Modbus Mode” is set to “RTU”. Under “Command”, click “Connect”.

For example, for the Eastron SDM120M Modbus meter, with Modbus slave address 1, the current can be read from register 7 with the “read input registers” function. Two registers must be read, as the documentation specifies that the the value is 32-bit float, spread over two 16-bit floats. Configure as below, and click “Commands”→”Read/Write”. qModmaster will try to send the right modbus hex string to the virtual serial port, which will normally fail. The hex string can be read in the Bus Monitor. In this case, it is "01 04 00 06 00 02 91 ca".



Read data failed.
Error : Timeout

Modbus Mode: RTU Slave Addr: 1 Scan Rate (ms): 1000
Function Code: Read Input Registers (0x04) Start Address: 7 Dec
Number of Registers: 2 Data Format: Hex

```
-/-  -/-  x  x  x  x  x  x  x  x
```

RTU : COM3 | 9600,8,1,None Base Addr : 1 Packets : 4 Endian : Little Errors : 4

```
[RTU]>Tx > 17:02:15:317 - 01  04  00  06  00  02  91  CA
Sys > 17:02:15:818 - Error : Timeout
```

In the script file for the Elfin, the hex string as identified above must be entered as:

FLASH(STRHEX)cmd2="01 04 00 06 00 02 91 ca"

Or with another cmd number that is available. Up to 9 command numbers can be used.

After the variable “FLASH(STRSTR)jsonName” follows a string that enumerates all variables that are read, in the same order as the commands. E.g.

FLASH(STRSTR)jsonName="Voltage_V Current_A"

FLASH(STRHEX)cmd1="01 04 00 00 00 02 71 cb"

FLASH(STRHEX)cmd2="01 04 00 06 00 02 91 ca"

corresponds to: send the reply of cmd1 back over mqtt with key name “Voltage_V” and the reply of cmd2 with key name “Current_A”.

The other settings in the script file can be left as above.

IMPORTANT

The script file must be 100% correct with the correct commands & hex strings, or it will not work.

6. Factory resetting the Elfin-EW11A

If the stick becomes unaccessible, it can be reset by connecting the Reload pin to the GND pin shortly (0.2 to 1.5 seconds). The stick will go into ‘SmartLink” mode. For a factory reset, connect the Reload pin to the GND pin for more than 4 seconds. It can take a while for the device to show up with a WiFi network.

See as well the Elfin-EW11A user manual on page 10.

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