MEMO3B MANUAL

Version 1.3

Short

This guide describes how to configure the MEMo3 data logger web server with firmware versionB.

MEMO3 MANUAL

1. OVERVIEW

The 2-WIRE web server WS.503 is the successor of the WS.502 and offers many additional possibilities to enable logging and visualizing of data. A graphic display has been added so that the most important functions can be quickly visually checked. This module can also communicate via WLAN so that a fixed LAN connection is not necessary. The addition of 'MQTT' enables coupling between different measurement modules at different locations.

To check the operation of the WS.503 on a daily basis, alerts are sent to a mail address. In case of a possible problem, it can now be quickly known and solved.

The data storage at 1 minute resolution for 3 years is done on SD card. Optionally, you can link a cloud application as a backup.

What the type of data is can be all kinds of:

- Measured values of electrical consumers: voltage, current, power consumption, reactive power, power factor, consumption.
- Measured values of calorific consumers: water temperature departure and return, flow rate power, consumption heating and cooling
- Thermostat readings: regime (heating, cooling, ventilating) set point, room temperature, fan speed.
- Air sensor readings: CO_2, room temperature, humidity, IAQ.
- Impulse counting from energy meters such as gas and water meters.
- Measuring energy consumption of known appliances **on a time basis.** (e.g. hot water boiler, fuel oil burner, lighting...)
- Register non-local measurements via MQTT
- Alerts to mailbox when power is exceeded, consumption, temperature control
- Alerts if communication problems with certain measurement modules.
- Settlement of energy costs based on meter readings of calibrated meters

On the web pages, all log values of the modules can be viewed in graphs, per hour, per day or per year, together with the consumption costs of that year.

Intermediate totals are also calculated, which can be exported in different formats.

Features WS.503:

- DIN-rail module (2 modules wide)
- Power supply: 15V/1A
- Bus connection: MODBUS (max. 32 modules)
- RF LORA-FSK transmit-onTVanger 868MHz, 100mW
- Ethernet connection with integrated transformers
- Network processor 10/100Mbit/sec
- WiFi network 2.4GHz 802.11 b/g/n , Tx power 19.5 dBm, Rx sensitivity -97dBm.
- Real Time Clock with backup battery set daily in sync with NTP server
- FRAM memory for backup meter readings 32 kb
- SD card 4Gb (backup configuration and data logs 3 years)
- Upgrading via HTTP Server 2-WIRE
- 64 log channels, each up to 5 measured values (32bits) and 2 consumption values (import-export)
- Communication every minute to the connected modules for the measured values
- Logging every minute to SD of 5 measurements per channel, every 5 minutes for consumption
- Cost calculation consumption with adjustable period (approximate, NOT FOR SETTLEMENT)
- EPC level calculation (kWh/m2)
- Web server HTML : 1 user + 1 administrator can use the server simultaneously.
- Login, password and language selection(NL-FR-EN-DU) per user.
- Language selection (NL-FR-EN-DU).
- Domain name instead of IP address possible via DNS server
- Full configuration of all modules, creating groups for the layout
- HTTP client: Set rhythm for logging data to remote FTP server separately adjustable for the real-time measurements (interval per minute, up to 60 minutes) and for the consumption measurements (interval per 5min, up to 24 hours). The format is CSV, in the AMR-MMR format (BE: EANDIS). Each file

has a unique name and can be processed in your own database.
- Export data to a local csv file
- Visual logic user interface for monitoring or controlling consumer, creating calculated graphs,...
- MQTT connections via 'Broker' with modules that are set up locally or non-locally.

2.BUS STRUCTURE

The WS.503 has 3 communication systems on board: a wireless RF bus according to the LORA protocol, a MODBUS communication, an MQTT communication.

- **MODBUS:** GND = BUS CLAMP 1**,** A = BUS CLAMP 2, B = BUS CLAMP 3
- **EC.441-RG.016:** GND = BUS CLAMP 1, A = BUS CLAMP 2, B = BUS CLAMP 3, VDD = BUS CLAMP 4

Between the clamps A-B, the supplied resistors (120 ohms) must be placed on both ends of the bus! Recommended is EIB bus cable (4 wire 0.5mm²)

More info: please consult documentation modules

3.START-UP

1. Connecting the bus to the energy modules: EC.441 – RG.016 – EMMxxx etc.
2. **Place a separate automatic switch** and connect the supplied power supply (15V) to the power terminals at the top of the WS.503. (**Polarity does not play a role**) Do not turn on the moduleyet!
3. Mount 2 antennas: 1 WiFi antenna and 1 LORA antenna
4. Connect network cable at the bottom must be connected to the Internet via switch or (wireless) router.
5. Power supply on: At the top of the WS.503, the LED must be lit. After a few seconds you can follow the start-up phases on the display.

At the bottom where the network cable is plugged in, there should be a green LED, and regularly an orange LED. Then the network connection is in order. If

REL.44 or RG.016 modules are connected, the powerled of these modules must light up.

4. NETWORK SETTINGS

By default, the WS.503 is set to **'DHCP'** for LAN and the WLAN (WiFi) is disabled, which means that at the first boot all network settings are selected by your router. The port number is 8080.

On the display, 'WIFI DISCONNECT' and 'LAN DISCONNECT' will first appear.

After about 10 seconds there would be a connection to LAN, with an IP address, assigned by your router. Everything can be followed on the display.

Once there is a LAN connection, you can 'surf' to the stated IP address and port number (8080).

E.g. 192.168.0.150:8080. Then go to 'SETTINGS'

When the WLAN is disabled, the first field of the IP address will say 'OFF'.
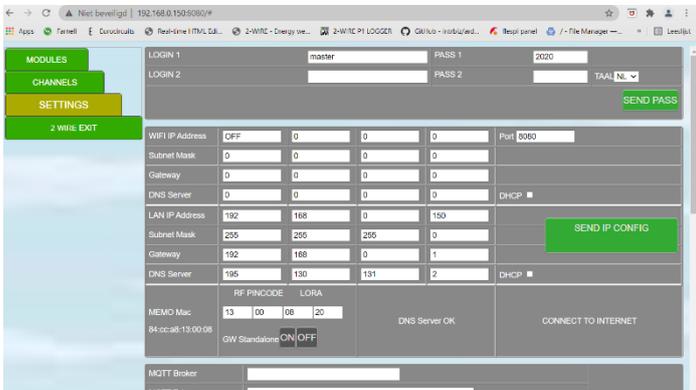
If you also want the WiFI enabled, there are 2 options:

Procedure 1: via REDIRECT PAGE
Briefly press the 'REBOOT' button (left) on the WS.503.

The server will restart. Now keep pressing the 'JOIN' button (right). On the display you will see the text 'CONNECT WIFI', and a green line. Keep pressing the JOIN button until 'START WIFI PORTAL' appears. Now go to 'Network Settings on your laptop' and select '2WIRE-MEMO'

If a security key is requested: type in 'adminMEMO'. Pay attention to the upper and lower case letters! You will be connected to the 'portal' after a short time.

(If the connection takes too long, you can also surf to '192.168.4.1)

ATTENTION: For this procedure you must be connected to this portal WITHIN 60 SECONDS, otherwise a 'timeout' will occur and the portal will stop. If necessary, you need to start this procedure again.

Select 'Configure WiFi'. Enter your SSID and password.

If 'DHCP' is desired, you must fill in ALL BOXES with 0.0.0.0, (WiFi IP, Gateway IP, Subnetmask, DNS IP) except the port number (default 8080) for which you choose a random number between e.g. 8000 and 9000

If you know all the settings, you can enter them in the corresponding fields.

Press 'SAVE'. When the web server 'reboots', your WiFi connection is fine.

Look at the data on the display:

- WIFI CONNECT -xxdBm : WiFi connected
- WIFI DISCONNECT :WiFi not connected
- IP WIFI: xx.xx.xx.xx
- IP LAN: xx.xx.xx.xxLAN connected
- LAN DISCONNECT: LAN not connected

- PORT: 8080 port number for eventuel 'portforwarding'

Now surf to one of the two IP addresses supplemented with the port number (e.g. 192.168.0.200:8080)

Note the *colon* between address and port number!

You can switch off the WiFI again by typing 'OFF' on the first field of the IP address and pressing 'SEND IP CONFIG'. Press again to confirm this !

Procedure 2: Via IP Server Scanner

If LAN connection is present, you can activate the WiFi via 'ServerScanner'.
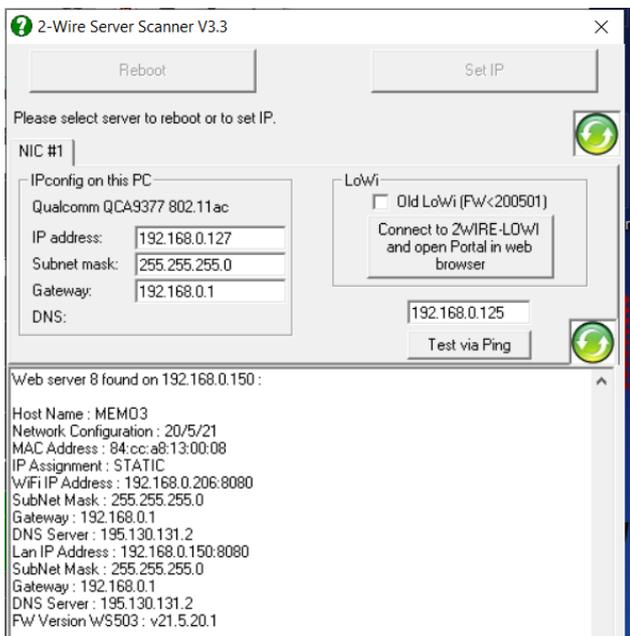
This tool can be downloaded from the 2-WIRE website.

Make sure the server is connected via lan.

Start 'ServerScanner' and after some time it would have found the WS.503:

Click anywhere in the white zone on this field so that the texts light up blue. Now you can select 'SET IP and SSID' at the top right. Here you can enter all IP addresses manually or check 'DHCP' to automatically obtain an IP address.
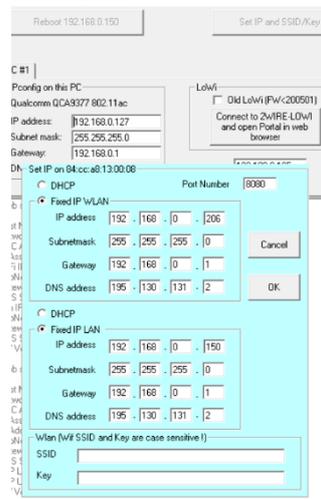
If you want to enable WiFi, you can enter your 'SSID' and 'Key' at the bottom. Press 'OK'.

The web server will now 'reboot' and will try to connect to your WiFi network. On the display, an IP address for WiFi would appear after a few moments.

Now you can surf to this IP address. If no WiFi connection occurs, SSID or Key may be wrong, or the distance between the server and your WiFi router may be too large. (don't forget antenna ?)

(If you want to disable WLAN again, type 'OFF' in the configuration of the MEMO in the first address field of WIFI IP.)

NOTE: The chosen IP addresses via DHCP are in the range of DHCP, which means that these addresses can be assigned by your router to other devices after some time.

However, we prefer 'FIX IP', so you don't have to look up which address your server is connected to every time. (a fix address is also required for 'PORT FORWARDING')

That is why it is desirable that you change the last IP field to the FIX – IP – RANGE

(e.g. telenet = 30-99)

Once connected via LAN or WLAN, you can view the further settings.
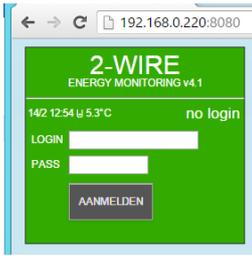
NA. If a login screen appears, you must log in with login and password: '**master**' and password '**2020**'

Connection via MQTT:

If you wish to connect other devices such as WiFI plugs, P1 port via 'LOWI', relay via 'REMI', with the WS.503, this can easily be done via MQTT. A subscription from a provider is required, here called 'BROKER'.

In a later hoofdstuk theconfiguration of these modules willbe discussed.

LOGS TO HTTP SERVER:

It is also possible that you want to forward the log data to an external HTTP server.

This is discussed in chapter 17.

5. MAIL SETTINGS

If you want a daily check of the operation of the WS.503, you must activate the mail server.

With 'logic' you can also set 'alerts' which send an e-mail if limits for consumption or temperatures are exceeded. If you have an account with a provider, you can enter the address of the **outgoing** mail server (e.g. uit.telenet.be), your own mail address (Sender Address) and a password (Pass). You can send the alerts to a maximum of 2 e-mail addresses. (Mail Address1 and 2)

After sending settings, a test mail will be sent to the specified mail address1

(can take up to 5sec to confirm the settings. – red is wrong in settings, green = OK)

With some providers, this mail ends up in spam. No problem at telenet.

6. UPGRADING:

The next compartment serves to upgrade the web server and possibly linked 2-WIRE modules. For this function to work, your web server must of course also be connected to the Internet.

2-WIRE has set up a server with the necessary upgrade files. To check if upgrading is needed, you can press the **'FIRMWAREVERSIONS'** button

When connected to the 2-WIRE UpgradeServer, the different firmware versions can be seen. (sometimes a second attempt is possible if the server is 'busy'.)

If no connection to the Upgrade server is possible, it may be that there is no internet, or incorrectly filled in from the DNS server

FILE NAME	UPG VERSION	INSTALLED VERSION	ACTION
STYLE-SCRIPT	v21.5.14.1	v21.5.14.1	
WEBSERVER WS.503	v21.5.20.1	v21.5.20.1	INSTALL
RELAY REL.02	v21.4.24.3	v21.4.24.3	
ENERGY EC.441	v19.12.18.2	v19.12.18.2	
ENERGY ECF.08	v20.12.17.1	v20.12.17.1	
RF PLUG EP.16A	v18.8.13.1	v18.8.13.1	
RF PLUG ET.16A	v18.8.9.1	v18.8.9.1	
GATEWAY RG.016	v21.4.4.2	v21.4.4.2	
RF AIR.04	v19.5.16.1	v19.5.16.1	
RF INPUT BC.002	v19.5.11.1	v19.5.11.1	DOWNLOAD

- **'UPG VERSION'** means the versions listed on the 2-WIRE UpgradeServer.
- **'INSTALLED VERSION'** is the firmware that the modules in your system have on board.
- When the UPGversion has a higher number than the INSTALLEDversion, an upgrade of the relevant components is required.
- **'STYLE-SCRIPT'** includes the CSS style (= look of the web page), and the JavaScript, which serves to give all 'buttons' a function and to add the necessary logic.

INSTALL BUTTON

WEB SERVER: Upgrading the web server is done in 3 phases: the first phase is the downloading of the script, the second phase is the   downloading of the firmware for the web server, and the third phase is

the installation of this firmware. During the upload we see a 'progress' bar appear. When the progress bar is done, the web page is automatically 'refreshed' and you have to log in again.

DOWNLOAD BUTTON

MODULES: When you have 2-WIRE modules,such as the RG.016 or REL.44, an upgrade may sometimes be required: If the UPGversion is higher than the INSTALLEDversion, you need to press the 'DOWNLOAD' button. After some time, there will be green checkmarks next to the available module versions.

(a red cross means not available (v255.255.255.255), or failed transfer)

The modules themselves have not yet been upgraded! This should be done in the **'MODULES'** menu

IMPORTANT:

- **During upgrading WS.503 or other modules, no logs are possible!**
- **Never interrupt voltage during upgrade!!**

7. ENERGY PRICES

As already mentioned, we can also calculate (approximately) what the daily energy consumption is and attach a price tag to it. When we know what the cost price is for gas, water electricity, we can fill it in the table below. There are 2 rates for electricity (day and night consumption). Everything has to be filled in eurocents, so DO NOT use **DECIMALS!**

'SEND' after the values have been filled in.

NA. You can always adjust rate changes, Every day your consumption costs are calculated at the entered rate, and is thus also stored in the database. If you enter other values afterwards, this will no longer have any effect on the previouscalculations.

8. LOGIN

The last section of the SETTINGS is at the top, and is certainly not unimportant:

 login – password

LOGIN: The WS.503 can work simultaneously with 2 users: a 'master', which can make changes to the configuration, and a 'visitor', which can only visualize.

There is only 1 login and password for the WS503: by default this is 'master' and '2020'.

To change this, you must enter both LOGIN1 and LOGIN2   IDENTICALly.

Same with PASS1 and PASS2. When these are filled in identically, press 'SEND PASS'.

Example:

Locally (this is when you are in the same network of the web server), you do not have to do a login.

You have full rights to customize everything.

Via 'remote' (other network or 'outside house'), you can log in with the chosen login and password.

 However, this 'visitor' cannot make any changes.

If you still want to have remote access to the configuration, you must log in with the login, followed by the MAC address, and then the password.

e.g. MAC = 12:fe:98:14:e5:b4 and the login is administrator, pass 4789,

Then you can log in with administrator12fe9814e5b4 and pass 4789

After the end of the session it is best to log out ! (LOGOUT)

NA. As a 'visitor' you will NOT see the MAC address in the configuration!

9. MEMO3B CONFIGURATION:

From MEMo**3b onwards,** the configuration is based on log channels. In this chapter the configuration by the **installer** (**Level3**) isdiscussed. The **"EXPERT" Level4** can be found in the appendix to it.

CHANGES COMPARED TO MEMO3A:

- No 'modules' with serial numbers but only 'log channels'.
- Configuration and sorting of channels on the same screen.
- All modbus parameters freely adjustable for multiple types of modules.
- Preconfig modbus types: EMM220-630, REL44, RG16, Kamstrup calorie, CO2meter,...
- Semi-app via browser, if MQTT: full configuration and visualization without port forwarding.

GENERALEN:

If already MEMO3A, **upgrading to MEMO3B** can be done in the following way:

First make a print of your current configuration, as well as a screen dump of the layout channels.

Via 'SETTINGS': Enter the MAC address as in example as password (omitting colons)
Enter the same at PASS2, also the PIN code 2x the same ! Press 'SEND PASS'
The server will do a 'reload page'.

Go back to 'SETTINGS'. Press 'FIRMWARE VERSIONS', then 'INSTALL'.
The MEMO3A will now do a first upgrade.

After the upgrade has been carried out, no changes in layout will be visible.
Now perform the same procedure: upgrade again.
(The password should still be your MAC address).
If the upgrade is successful, a different layout can now be seen.

The current password is now 'master' and '2020'.
Possibly change to your previous password yourself.

IMPORTANT : The conversion from MEMO3A to MEMO3B is not complete ! (also logdata canpossibly go wrong!!!)   Only the names and addresses of your previous configuration have been copied. The rest will have to be done manually.
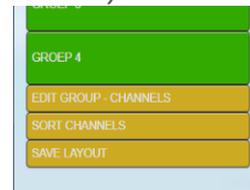
At the bottom left of the groups there are now additional 3 selectors:

- **EDIT GROUP – CHANNELS**: with this menu you can create or edit groups or channels.
- **SORT CHANNELS**: sort order channels.
- **SAVE LAYOUT**: save sorting.

Example menu 'EDIT GROUP – CHANNELS':
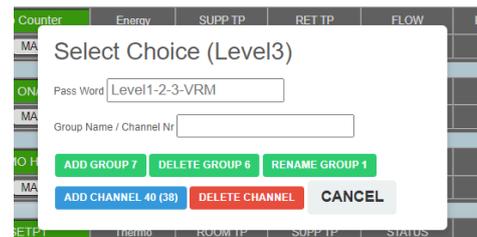
LEVELS

To prevent any user from changing configurations, 4 'levels' can be set: Type in: 'Level1', 'Level2', 'Level3', or'VRM',and PRESS 'CANCEL'.

1. 'Level1': only visualization of all channels, no changes possible.
2. 'Level2': 'test communication', modbus address or SN (MQTT) change possible.
3. 'Level3': all changes possible, but only with the 'preconfig' module types.
4. 'Level4': full configuration possible, adjust all modbus parameters.

On the right are all channels, divided into a number of groups. Example:

NA. If you have upgraded from MEMO3A to MEMO3B, all channels will default to the type 'EMM220'.

CHANNEL LAYOUT:

Each channel now has up to 7 dates which are shown:

The standard 'EMM220-630' shows the current measured values: voltage-current-power-VA-PF-day and annual consumption. The daily and monthly chart is as it used to be.

Example calorie meter:

When you log in you come to 'Level**0**' and nothing can be viewed of the configuration.
On all other levels you can now press 'CHxx': now you can see a number of settings depending on the level and adjust them if necessary.

Level1: here you can see the type of module (EMM220-630), mode'ENERGY'. Here you can only view the configuration but do not change anything only 'TEST RX'

Level2: Same as level1. Je can changeModbus address 9 and , subaddress 0 but not module type, mode or units.

Level3: Ditto level2, but also the module type or mode can be changed.
In thechapter we start from this Level3, the level of the installer.

OVERVIEW MODULE TYPES:
Press where the name is (green compartment)

- FREE USER: all parameters adjustable (only with level4)
- EMM220-630: standard energy meters
- REL44: relay module
- CALORIE U: calorie meter
- CALORIE K: calorie meter Kamstrup
- THERMO MH8: thermostat
- AIR-AQD012: CO2 meter or 'THEO'
- GW MB: gateway RG16, connected directly to the modbus
- GW RF: gateway RG16, via RF-LORA coupled to the MEMO3B
- MQTT: all channels that receive data via MQTT.

OVERVIEW MODE:

- Bistable: can only be used if module REL44, Thermo, EMM.320C, EMM.520C or MQTT
- Dimmer: only for logic to simulate a variable value.
- Thermo: MH8 thermostat
- Counter: Counting pulse inputs via RG16, REL44 or calorie meter
- Time: time measurement via RG16 or REL44
- AirQ: air quality with CO2meter or THEO.
- P1port: data from REL44 or GW RG16 or via MQTT: LOWI-REMI
- Tp Sensor: temperature measurement via RG16
- Energy: all electrical measurements of EMM220, calorie meters,...
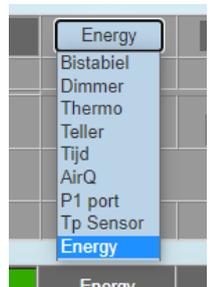
COURSE OF WORK:
CREATE CHANNEL:

Create a channel under level3 or level4 (**EDIT GROUP – CHANNELS**)
In menu:**'ADD CHANNEL'**. If nothing is entered in 'Group Name / Channel Nr', the channel is

automatically added which is behind ADD CHANNEL (in example: 40)

- However, if channels have been 'deleted' in the past, there will be the deleted channel number behind the channel number (in example: 38) It is desirable that if there are deleted channels, to first reactivate them. Then enter the deleted channelNr in Channel Nr (in example: 38)
- If the channel still exists, an error message will be given.
- You may never enter a channel number that is larger than the stated channel number (in example: no larger than 40)

Once this channel has been created, one can adjust the configuration:

CHOOSE MODULE TYPE:

The next step is to select the type of module: EMM-GW-REL.. etc.
All 'units' (volt-current-power etc) are fixed. Example: EMM220

MODBUS ADDRESS – SUBADDRESS:

this address must be set according to the address of this module.

MQTT – SN:

Some modules have a serial number (RG16 – REL44-EP.16A), or work via MQTT and have a MAC address. At the gateway (modtype = GW MB) the serial number will be 08Gxxxx1, at REL44 (modtype REL44) 44Rxxxxx. When an address > 0 is entered, a table can be seen with the overview of the inputs used in this module.

FASHION:

Example a: RELAY 44R00751, Modbus address 73.
In BISTABIEL mode you can now control the relays 1-4 by choosing the relay next to the serial number (1-4) Note that the sub-address cannot be entered. This automatically follows the chosen relay.

The REL44 has only **one modbus address** and on all channels of the same REL44 this address **MUST** be the same.

Example b : REL44, **IN1** as time measurement, 'weight' = 2500 W/h

Example c: Gateway: SN 08G00151, used inputs are 2 temp sensors (IN1-IN2), 1 input timebase, 1 input pulse, and 3 inputs P1port.

Depending on the mode (counter-time-P1port) the help texts will change and it is easy to make the necessary settings based on the table overview.

NA. Note that when using the P1 port on different channels, the protocol (2-4-5-6) is the same for all channels.

At P1port one can select the P1 type: 1 = IMPORT H+L,

2 = EXPORT H+L, 3 = GAS, 4 = WATER

Remember that **EVERY MODBUS** ADDRESS in the gateway must be **different!** (this in contrast to the REL44)

Example: EMM.630 via RF gateway
Create a new channel and choose modultype 'EMM.220-630' with mode 'energy'
Enter the unique modbus address of the EMM.630 together with the desired subades (0= phase1; 1=phase2,2=phase3).
In the MQTT-SN box, enter the Serial Number of the Gateway module.

To pair press 'JOIN', then put the RF Gateway under tension (join mode) and press 'SEND' to pair the gateway and the EMM.630 with the MEMo3. The firmware version of the gateway should appear and both are associated.

Example MQTT: Choose module type 'MQTT'. In the MQTT-SN box, enter the MAC address of the module to be linked (always 12

characters) and the channel number of the desired log channel. **The address MUST be set to ZERO !** E.g. linking MEMO3 channel3 to another MEMO3 channel13.

PARAMETERS: If the mode is on Counter or Time, one may have to enter the 'weight' per hour. You enter this value under 'Para3'. And even with a MODE
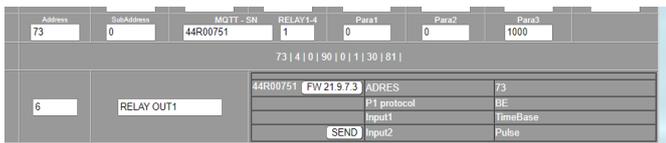
bistable, para3 can give a weight (power) to the relay module

CHANNEL NAME:

At the bottom you can give a name for this channel (max 18 characters)
You can now test in real time whether the address and connections are in order: press **'TEST RX'** (sometimes several attempts are needed)
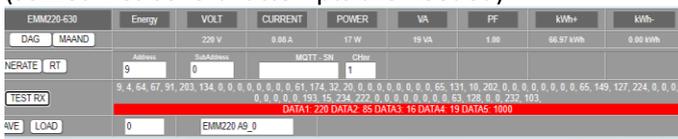
If set correctly, a result of the decoding (red) will be shown
(in example: 218V, 90mA, 18W, PF = 1)
Press**'SAVE'**to save all the data.

LOAD:

If you have multiple channels with the same module type and mode, you can also 'copy' from an existing channel: at the bottom next to the name on the left you can select the channel number and press**'LOAD'.** The selected channel will now be copied to the current channel. Just change the address and name and press SAVE.

As long as you have not pressed SAVE, you can always press LOAD to undo the new configuration and go back to the previous configuration.

UPGRADING OR JOIN MODULES

THE 2-WIRE modules RG16, EP16A (RFplug) and REL44 have a serial number (08Gxx – 10Sx - 44Rxx)
In the table of this module you can see the current FW version.
Upgrading (only if necessary) can be carried out by pressing 'FW'.
If it concerns the REL44, it can only be upgraded via a WiFi network! The first time the REL44 will go to an 'access point' to enter the SSID rn password. (see manual REL44)
Only the next time will the module perform an upgrade.
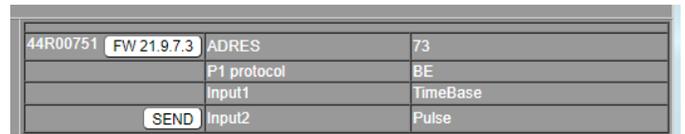
The same applies to the RG16 and the EP16A, if it is connected via LORA. Here one will first have to link the module to the LORA network:
The RG16 must be powered so that 2 LEDs on the module flash quickly.
Within a minute you should now press 'JOIN' and then 'SEND'.
If successful, a message will appear 'COMMUNICATION OK'. If necessary, repeat this action.
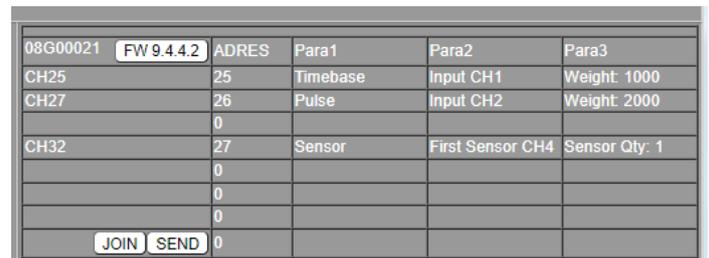
ASSORTMENT:

you can change the order of the channels with the 'drag-drop' principle:

Press **'SORT CHANNELS'** (red)

Right-click and hold down a channel you want to move. Now move the mouse until you reach the desired position and release the button. (sometimes you have to do the position in multiple steps if the table is too long, or if you want to drag a channel into another group)

When all channels are in the right position, press **'SAVE LAYOUT'.**

NA. As long as the 'SORT CHANNELS' button is red, you can only sort but not configure!

GROUPS:

in the menu you can rename, add or delete groups. There MUST always be at least 1 group present !

RENAME:

Select the desired group ON THE LEFT. Open the menu and under Group Name, type the new name. Then press **'RENAME GROUPx'**

TO MAKE:

type in a name and press **'ADD GROUPx'.** (max 8 groups possible)

When creating a group, there will not be a single channel in this group. You can create or sort channels from channels as explained above.

REMOVE:

You can only delete the last group: press 'DELETE **GROUPx'.** All channels from that group are now added to the previous group.

After you have changed a group you have to press 'SAVE LAYOUT' to have any effect.

> *NA. As long as you have not pressed 'SAVE LAYOUT' you can always go back to the*

previous settings by doing a 'RELOAD PAGE' in your browser.

GENERAL NOTE:

If you notice when sorting that it is not possible to get the correct position of the dragged channel, (dropped channel always goes to an undesirable position), then it may be that an error has crept into the channel sorting (can occur after DELETE or ADD GROUP). Then do 'RELOAD PAGE' in your browser and try to perform the sorting again. In general, it will now be possible to introduce the sorting.

TIP: After sorting a channel, FIRST press SAVE LAYOUT, and then RIGHT click on the group where the dragged channel is so that the group 'closes' and press the group name again so that this group 'opens' again. This way you check whether the channel is properly included in the group.

SELECTION MODULE TYPE AND MODE ARE THE FIRST IMPORTANT STEPS:

Choose it according to the type of module:

MODULE	TYPE	FASHION	SUBADR.	NOTE
EMM220-630	EMM220-630	ENERGY	0-1-2	Import-export
REL44	REL44	BISTABLE	0-3	Relay1-4
		NUMERATOR	0-1	IN1-2
		TIME	0-1	IN1-2
		P1-PORT	1-8	P1 type
Calorie U	CALORIE-U	ENERGY	0-1	Heat/Cool
		NUMERATOR	0-1	IN1-2
Kamstrup Hotels	CALORIE-K	ENERGY	0-1	Heat-Cool
		NUMERATOR	0-1	IN1-2
Thermo MH8	THERMO-MH8	BISTABLE	0	ON/OFF
		THERMO		Setpt 5-35°
CO2 AQD-012	AIR - AQD	AIR-Q		
RG16.	GW-MB	ENERGY		
		NUMERATOR	0-3	IN1-4 PARA3: consumption/h
		TIME	0-3	IN1-4 PARA3: consumption/h
		TP SENSOR	0-3	IN1-4

		P1-PORT	0-3	P1 type: 0 = Import H+L 1 = Export H+L 2 = Gas 3= IH – EH –IL– EL
RG16 via LORA	GW-RF	Ditto GW-MB		JOIN RF NEEDED
LOWI	MQTT	ENERGY		MAC/CH1
THEO	MQTT	AIR-Q		MAC/CH1
REMI	MQTT	BISTABLE	0-3	MAC MEMO/CHxx
		NUMERATOR		MAC/CHxx
		TIME		
		P1-PORT		
WiFi Plug	MQTT	BISTABLE		MAC/CH1
RF Plug via FSK	GW-RF	BISTABLE		SN 10Sxxxxx/CH1

If **EMM220-630 is** connected via RF GW: **MODTYPE REMAINS EMM220-630**, and MODE remains Energy BUT AT SN the serial number of the GW is filled in (JOIN required)

HELP TABLE:

For modules with a serial number (RG16 – REL44 – RF plug) you will see a table so that you have a quick overview of the entered configuration.

Example REL44:
- This module has only ONE modbus address and MUST be THE SAME for every channel used in this module!
- For P1, the P1 protocol MUST be the same everywhere.
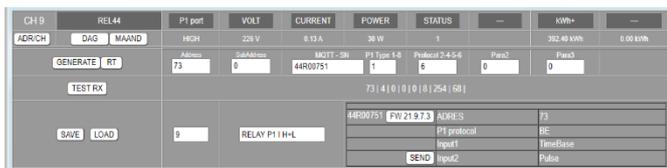
Example RG16:
The 4 first rows show the possibly connected inputs,

the 4 following rows the possibly connected P1 port.
- Make sure each entrance has a unique modbus address!

- For P1, the P1 protocol MUST be the same everywhere.

ADR/CH:
You can see a general overview of all channels or addresses used when you press 'ADR/CH'.
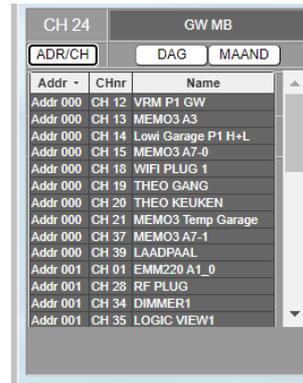
You can sort the table by address, channel or name by clicking on one of these selections above
If you click on a row in the table, the page will 'scroll' to this channel (if it is visible)
Click 'ADR/CH' again to hide the table.

DELETE LOGS:
Sometimes one wants to delete logs of 1 particular day or month when we have entered a different meter or configuration on that channel.
Clear day log: Open configuration of that channel, and open the daily chart.
You set the address to 255. You will now get the message: 'ERASE DAY xx ?..'. Click on**'OK'.**
The address is automatically reset to its set address after deletion. After closing and opening chart, this day is erased.

Do you want to do the same, but also in the **monthly chart?**
Then open the monthly chart, choose the desired month, and set the **address to 255.**
The **sub-address** determines the desired day of the chosen month. Click 'OK' for the execution
The subaddress also at 255 will clear the entire month.
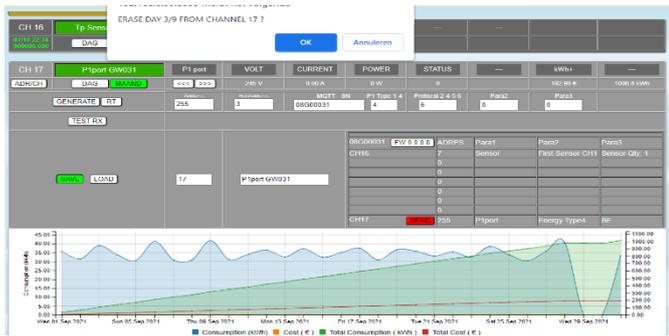
PRINT CONFIGURATION:

you can print out the complete configuration by going to 'SETTINGS' and click on 'PRINT CONFIGURATION' in IP settings
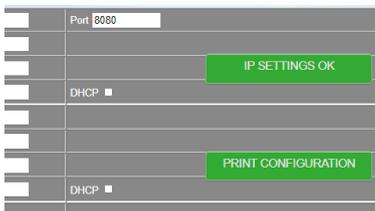
10. WIRELESS COMMUNICATION

Internally, an RF-m odule has beenadded, which can communicate directly with 2-WIRE wireless modules such as: RF gateway RG.016, battery-counters BC.002, energy counter ECG.08 and RFsmartplugs.

The RF protocol is standard 'LORA' due to the large reception range, but can also automatically switch to 'FSK' for all RFsmartplugs from 2-WIRE.

For RF, there must be a certain security so that only your RF modules can work without interference from other possible RF devices.

Therefore, a 'PIN code' and a modulation setting must first be chosen:

GO TO 'SETTINGS', in the 'IP WebServer' section

RF PIN CODE :

Under 'Memo Mac' you will find the MAC address of the web server. In addition to 'MEMO Mac', there are

4 fields: The first 3 fields are defaulted to the 3 last Mac addresses of the Memo module. This is the 'PIN code' for your RF modules,and will also determine the carrier frequency (865-868 MHz). You may change it at your option.

LORA SETTINGS:

The 4th course will determine the 'LORA' setting. The range ranges from 0 to 35.

The lower the number, the further the transmission range, but at a slower speed.

Typically, **16-20** is a good setting to start. From 24 and higher the range is limited to about 20m.

> *NA. Table with settings see at the back of this manual*

STAND-ALONE COMMAND RG.016

On the far right is**'SA'**with 2 keys 'OFF' and 'ON' underneath.

These keys serve to 'activate the RF gateways' in 'STANDALONE' mode.

NOTE: If you have a gateway connected to the WS.503modbus, you may not use these keys unless you want to use this gateway as an RF modbus bridge afterwards. If you have pressed 'ON', you can cancel this action by pressing 'OFF'.

More information about the *RF modbus bridge can* be found in the RF gateway documentation.

JOIN MODULES

The next step is to 'link' the RF modules to the WS.503.

With the MEMo3B, only the RG16 and ep16A, and the EMM.xxx modules connected to the RF gateway can be connected via LORA.

Here one will first have to link the module to the LORA network:

RF GATEWAY RG.016

The RG.016 must be powered so that 2 LEDs on the module flash quickly. The module is now in JOIN mode (60 sec.)

Within a minute one should now press**'JOIN'** and then 'SEND'.

If successful, a message will appear 'COMMUNICATION OK'.

08G00021	FW 9.4.4.2	ADRES	Para1	Para2	Para3
CH25		25	Timebase	Input CH1	Weight: 1000
CH27		26	Pulse	Input CH2	Weight: 2000
		0			
CH32		27	Sensor	First Sensor CH4	Sensor Qty: 1
		0			
		0			
		0			
JOIN	SEND	0			

If necessary, repeat this action.

EMM.220-630

With a Modbus energy meter EMM.xxx which is wirelessly connected via a gateway, a new channel is created with module "EMM220-630" and the mode "Energy" is supplemented in addition to "Modbus address" and "Subaddress" is also the "serial number" of the RF gateway module.

First of all, the gateway must be linked to the WS.503,so the 'JOIN' procedure and as described above.

The RG16 must be powered so that 2 LEDs on the module flash quickly. The module is now in JOIN mode (60 sec.)

Within a minute one should now press**'JOIN'** and then 'SEND'.

If successful, a message will appear 'COMMUNICATION OK'.

Then click "SAVE" and the module is linked to the WS.503.

RF PLUG EP.16A

For an RF PLUG which is connected wirelessly to the MEMo3, a new channel is created with module "GW-RF" and the mode "Bistable". In addition to a unique Modbus address" and "Subaddress=0", the "serial number" and"CHnr=1" of the RF plug are alsoentered,

together with a name for this channel. Then save these values via "SAVE".

To get into 'JOIN mode', one has to plug the plug into the socket. The status LED on the plug will now flicker for about 60 seconds. Now press'JOIN' and then 'SEND'. If the connection is successful,'Communication OK' will now appear and the flashing of the LED will stop.
With the button on which the 'firmware version' is written, you can optionally upgrade.

*N.B. This procedure can only be performed when the plug had no power supply for more than 2 hours (internal backup has a long discharge time). If, when plugging into the socket, the LED does not blink, and you want to pair it with the MEMo2, you must first press and hold the on/off button, and only then put the plug under voltage. Now release the key. Now the LED will*flash.

11. MAIN CHANNELS and EPC LEVEL

At the bottom of the channels there are a number of specific channels that we can use for the total overview of electricity consumption, heating consumption, water consumption and calculation of the EPC level. Example:

If you have a total measurement of yourelectricityconsumption (can also be a 'smart meter'), enter the channel number at ELECTRA Ph1. This channel number can be found in the table above (where LOG_xx is written). If you have a three-phase net, you have to fill in the 3 channel numbers.

Vb. LOG_8 - 9 and 10 are the total measurements of phase 1 phase2 and phase3

For heating, this can be gas or petroleum. If you have also linked these consumers to the web server, fill in these channels as well. (the gas meter can also be connected via the 'smart meter' via the REL.44 or the RG.016)

If a pulse contact is provided for the water meter (via REL.44 or via RG.016),fill in this channel.

If you have solar panels and an energy meter (EMMxxx) is connected to them, you can fill in up to 3 channels (for three-phase meters)

Finally, we do an (approximate) calculation of the EPC level: this is a value in kWh/m2, which is in function with the heating consumption and the surface area of the house. The lower this number, the better your home is insulated.

The total consumption of the heating is divided by the heated surfaces in the house. The unit is KWh/m2. If there is not yet a full heating year, an estimate is made of the missing periods in function of the already measured heating period.

If you have an additional heating system such as a wood stove, or if you regularly heat electrically, you have to enter the estimated energy consumption on an annual basis in 'EXTRA HEATING': for wood this is about 4 kWh / kg

If you have a temperature sensor connected via the module EC441 or BC.002,and you want to show this

temperature on the login screen, you can enter this channel under 'OUTDOOR_TP'
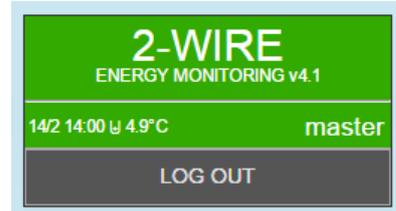
12. SERVICE

Go to **'EXIT'.** The page is now being reloaded and you can see the following:

On the left are the group names, and some more menus for visualizing the logs. On the right, the channels come in the order we would have liked.

Clicking on a group on the left closes any other open groups and opens the requested group.

Right-clicking on the group names opens or closes the group.

When consumers are connected and active, a measurement is made every minute.

However, the page as you see it now will not show the measured values. If you want to keep an eye on them constantly, you can 'refresh' the page.

Press **'REFRESH',** and every minute you will now see the newly measured values.

Each channel now shows the most important things: consumption, daily consumption, annual consumption. (or temperature.. CO2...)

> NA. WHEN A 'GRAPH' IS SHOWN, THERE IS NO 'REFRESH' POSSIBLE OF THAT CHANNEL!

With the thermostat TP. 16A you can change the set point. On the far right is the 'set point', and to the left the 'room temperature'. By pressing one of them you can increase or decrease the set point per half degree.

For relay control (mode = TOGGLE – BISTABLE) there is oneON-OFF button.

With the AQD.012 we see the room temperature, humidity, air pressure, IAQ, and an indication of the air quality: VERY GOOD – GOOD – MODERATE – POOR

13. CHARTS
SERVICE:
Clicking on the 'DAY' shows the daily consumption of that consumer in a graph. By'hovering' over the graph we get to see a'tooltip'with the measurements of that time.
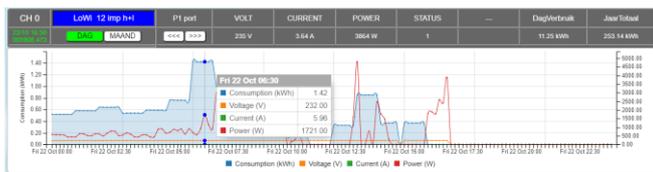
By clicking on'MONTH', the monthly chart is shown.
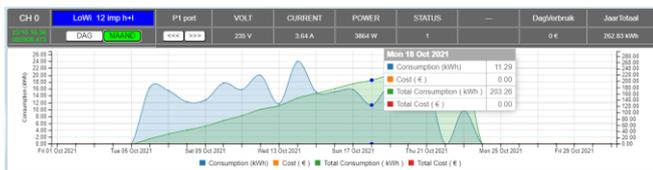
On the right are 2 arrows <<< || >>> This allows us to go back up to 12 days with the daily overview, or up to 12 months with the monthly overview.   Clicking back closes the graph.

> NA. The first opening of charts can take a few seconds (according to the speed of your

browser and laptop/tablet). Next time this will be noticeably faster because the graphs are 'buffered'.

If you have connected temperature sensors, you will see the minimum and maximum temperature of that day in this graph.

Clicking on **'YEAR'** shows all channels at the same time with their measured values per month. At the top of the graph are the consumptions and estimated cost prices per month and the total.

Clicking on **'OVERVIEW'** shows in a table a total overview of the electricity consumption, heating consumption (gas or oil), water consumption and possibly yield of solar panels.
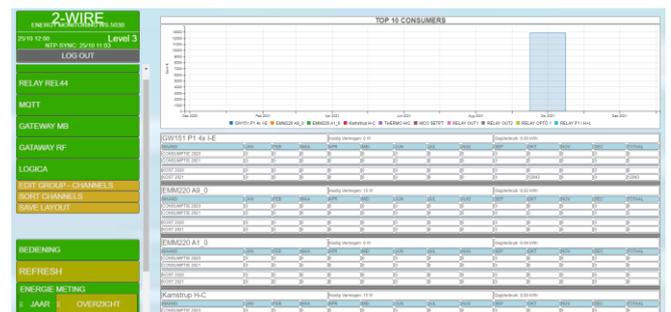
An EPC level approximate calculation is calculated if the parameters are filled in as explained in chapter 11 (LAYOUT)
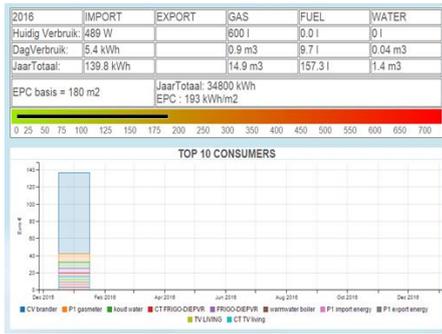
'TOP 10 CONSUMERS'

gives you an overview (in euros) of the biggest energy guzzlers.

Below that, there is a table per month of consumption and estimated energy costs per measurement. For comparison you can also see the consumption of last year (if your system has been in service for more than a year) The outputs are sorted according to the largest cost.

When you have entered a channel in 'total electricity' (see chapter 12), an extra channel can now be seen: **'VARIA',** this is the difference between the total measurement and the partial measurements.

14. EXPORT SUBTOTALS

It can be useful if you want to calculate consumption over a certain period, and even attach an (approximate) cost price to it.

To do this, click on **'SUBTOTALS'** in the menu on the left. The image below now appears.

Click on the field next to **'START DATE'** and you will now see a calendar. Select the start date for the desired period. You do the same for the end date (END**DATE**)

(by default it is at the current time)
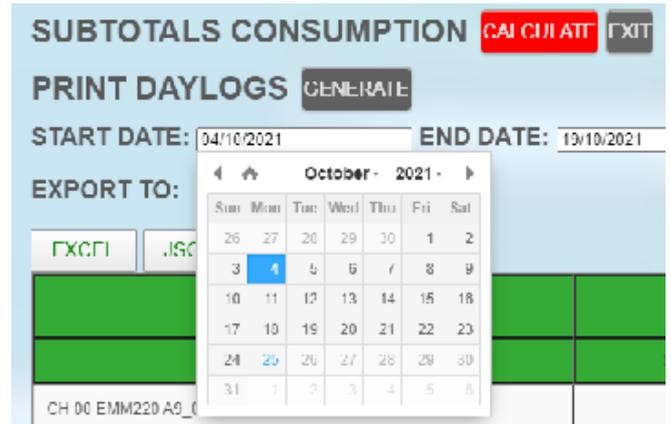
Afterwards, click on the **'CALCULATE'** button.

- The screen will now show all intermediate totals of the log channels.
- (log channels of CO2 or temperature are not included in this table, only 'consumers')
- The waiting time for the calculation can vary depending on the period and the number of channels. (e.g. Period 9 months, with 20 channels can last about 8 sec)

An example:

In the table is first the name, that the meter reading of the start time (STARTVALUE), meter reading of the end time (ENDVALUE), the difference between the two (DIFF), the unit (UNITS) and the (approximate) cost price (COST). This price was calculated according to the values entered in the 'SETTINGS'.

In the field '**Search**' you can type in a part of a name and then only the consumers whose keyword appears in their name are shown.

At the top of the table there are now some 'buttons': this allows us to *export* the table shown with the file name = 'SUBTOTALS ENERGY jaar_maand-day-hour-minute', and the extension:

- **EXCEL**: '.xlsx'
- **JSON**: '.json'
- **CSV**: '.csv'
- **PDF**: '.pdf'

With the **'PRINT'** button we can print this table

directly.

> *NA. The export choices 'EXCEL', 'JSON' are not supported on many tablets (certainly not IPAD), full support under Microsoft windows*

Action:

The counter readings of each meter (Modbus and pulse) are logged every minute and stored as a value on the internal SD card for up to 3 years. The counter readings shown in SUBTOTALS is the counter reading at 00.00 hr start day and this at 23. 45 hours end day.

However, if for a certain day the end counter > initial counter because, for example, the Modbus meter was replaced that day, or because the voltage on a pulse counter was interrupted so that it starts again at zero, or because you create a new meter at an existing modbus address without first deleting it,   then the initial counter for that day is assumed as zero when calculating the DIFF and COST for that day.

DIFF and COST is calculated every day and the result is stored and stored for up to 3years. If you set a period of twelve days, for example, the 12 DIFF's and the 12 COST's are each added together and the sum of the 12 values is shown as a result.

> *NA. A pulse counter on an RG.016, REL.44 module is set to zero if the voltage is interrupted.*

> *NA. The period of 1 day in SUBTOTALS is too small, especially if the start day is the day of configuration.*

> *NA. See at point 16below:EXPORT AMR FILES LOCALLY TO EXCEL*

Generate daily logs over a period of time:

One can also generate a csv file of all log channels of 1 day: choose the day with 'START DATE'. (END DATE has no function now)

Press 'GENERATE'.

After about 20-30 seconds the file will be ready to open (EXCEL)

15. LOGGING TO HTTPSERVER

It is also possible to forward log data to an external HTTP server. For this we have to work with an IP address, or with a 'domain name'. The port number is always '80' (e.g. 78.22.222.111:80)

Login Name - Pass: In the HTTP server we must (for security reasons) also set up a user, password and possibly a folder where the data is stored.

After all, several web servers can log their data to one and the same HTTP server and then it is desirable that each logger is assigned a folder for their data.

Of course, the chosen login name, password and folder name must also be the same in the HTTP server. If the HTTP server automatically creates a link per user to a certain folder, the 'Dir Name' must remain blank. The length of the login is max 32 characters (consecutive without special characters !)

The length of the password maximum 22 characters, and the folder up to 32 characters

In case http post's, the MAC address in the url readable. The remote server can do a first test and see if this MAC address

is available in his directory list and in that way a login password and directory may not be necessary but this of course requires a script on the remote server.

ENCRYPTION

The http file in JSON format consists of a header and a body.
• Memo does not encrypt the header with a 'secret key'. The code key for the de-encryption can be obtained from 2-WIRE after signing
of an NDA or 'confidentiality agreement'. This header can be used 'as a certificate' to add extra
have certainty about the identity of the sender.
• The Body contains the measurement data in a readable csv format

LOG TYPES: The logs are in **CSV** format and the delimiter is a **semicolon.** The decimal-sign is **comma.** There are 4 types of logs possible:

RT LOG:

RealTime logs of measured values : voltage, current, power W(), power(VA),Power Factor (PF) , m3 water, m3 gas, liters of fuel, temperature, CO_2,...

The interval can be set from 5 minutes to 60 minutes. (NO means not active) If active, the measured values of all log modules are forwarded to the log server to follow
 the interval.

Which measurements are logged can be checked per log channel! (This is done in the configuration of the modules)

FileName: LOCATION NAME + LOGTYPE + DATE + TIME + csv
(e.g. Nieuwstraat18Aalst_RTLOG28082015_013003.csv)

RT DAYLOG (AMR):

One can also send **all** RealTime logs 1 time per day. The interval of the measurements can be set here from 1 minute to 60 minutes. In CSV format we see all log channels, with their corresponding measurements (as checked at RTlog)

The CSV file is prepared according to the**'AMR'**format (see EANDIS)

Attention: A file with 32 log channels, each about 5 measurement types (V-A-W-VA-PF) with an interval of 1 minute is about 1MB in size.

The time when this file is sent on DAG+1 can be set per hour.

The logging always starts from midnight to midnight.

(eg Nieuwstraat18 Aalst_AMR_28082015_0001.csv)

CONSUMPTION LOG:

The consumptions(counter readings) can also be logged with an interval of 5 minutes to 60 minutes and forwarded directly to the log server. Here one can see the consumptions, broken down according to day and night rate. (if any)

If solar panels are installed, this can also be displayed separately.

(e.g. Nieuwstraat18Aalst_PAYLOG28082015_013003.csv)

CONSUMPTION DAYLOG (MMR) :

Analogous the RT Daylog, but then only consume, with an adjustable interval of 5 to 60 minutes, or 1 total log of 24 hours.

The CSV file is drawn up according to the**'MMR'**format (see EANDIS)The time when this file is sent can be set per hour.
The logging always starts from midnight to midnight.
(e.g. Nieuwstraat18Aalst_MMR_28082015_013003.csv)

LOCATION NAME:

this info becomes the file name, and also mentioned in the 'HEADER' of the file.

EANNR:

can be billing number, location no...

EXPORT AMR FILES LOCALLY TO EXCEL :

Inthe MEMo2 web server, a local csv file can be generated via the page 'SUBTOTALS' for a set start date by pressing the 'GENERATE' button.

The columns have a fix interval of 5 minutes, the rows are formed by the checked variables under 'LOGTYPE' (see FTP client above). One can thus return to more than 2 years in time to request data with 5' resolution locally to the MEMo2 web server.

Note. The calculation of this CSV can require 1 to 2 minutes of calculation time from the web server, depending on the number of desired variables. See under 'Logging to FTP server' for further**settings.**

DETERMINING THE DESIRED LOG VARIABLES

For each module, all measured values and meter readings of the configuration are processed in these csv files

16. LOGIC MODULE

In the main menu a tab was attached: LOGICA

Click on this tab, and a blank grid screen will appear.

At the top there are 4 buttons:

VIEW LOGIC: if this button lights up red, you have to wait a while for the logic to load. When the button lights up green, you can press this button. If logic has already been introduced, the logic will be shown. If no logic has been created yet, the screen remains blank.

Suppose you have already created logic, but you want to start all over again with new logic, do NOT press 'VIEW LOGIC'. You start with a blank logic.

REFRESH DATA: When you create logic, or you want to see the current statuses of the modules, you can press this button. Statuses are indicated by RED digits.

SAVE LOGIC: This key definitively returns the created logic   to memory.

ATTENTION!! There is no 'UNDO' button, which means that this action cannot be revoked. However, a confirmation will first be requested:

Press 'Cancel' if you still do not want to enter the changes.

EXIT: When you decide to leave the logic, the

following screen may be displayed:

You then wanted to save the logic, but pressed 'Cancel'.

You can now only leave the logic by reloading the page! (reload page in address bar browser)

QUESTION: What logic is possible?
ANSWER: Sowhatever logic imaginable !

There are a number of 'prefab' logic modules provided: Press the **LEFT MOUSE BUTTON,**and a list of
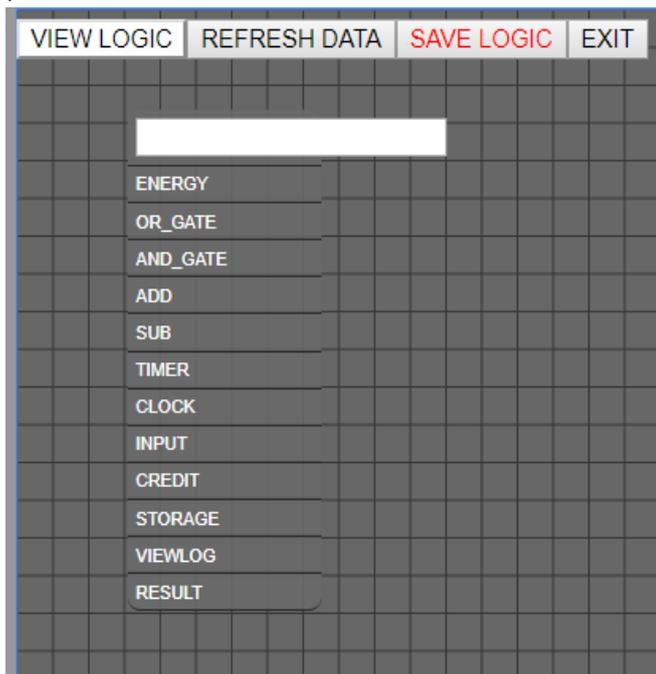
the possible modules will be shown:

- ENERGY : these are the measurement modules of your installation (energy modules, temperature, calorie, water ...)
- OR-GATE: an 'OR' port, with 4 inputs
- AND-GATE: an 'EN' port with 4 inputs
- DIFF-GATE: switch between 2 values
- ADD: addition of 4 analog values
- SUB: difference of 2 analog values
- TIMER: delay / extension of a digital value.
- CLOCK: AND condition in function of a weekly clock
- INPUT: a 'contact' ON/OFF of a relay
- CREDIT: counting down a set starting value
- STORAGE: approximate calculation of storage energy if own energy source and storage tank are present.
- VIEWLOG: visualizing analog results of the logic.

- LIMITER: set limits on power, hourly or daily consumption via a relay module.
- RESULT: an eid result of a logic can be sent to a relay module or mailbox.

An example of 3 logics:
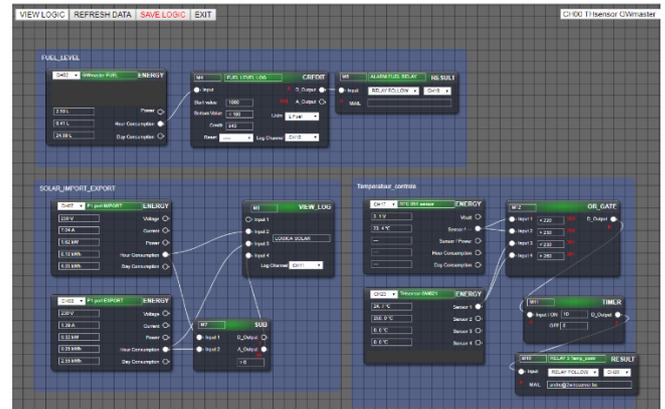
Before we start, we need to formulate a logic and convert it into a graphical representation.

First, let's look at each logic module in detail:

Press the left mouse button. When you start with a blank screen, the following message will appear:

Press 'OK' if you want to start with new logic. Remember: if you have already created logic, and you start with this blank screen, the previous logic will be deleted if you press 'SAVE LOGIC'. So you can still 'Cancel' !

When you have pressed 'OK', the list of possible logic modules appears.

Logically, one starts with the energy sources, then the AND-OR-ADD-SUB gates, possibly timers or clocks, and then the result (mail or graphs)

After selecting 'ENERGY' we see our first module, standard type EMMxxx
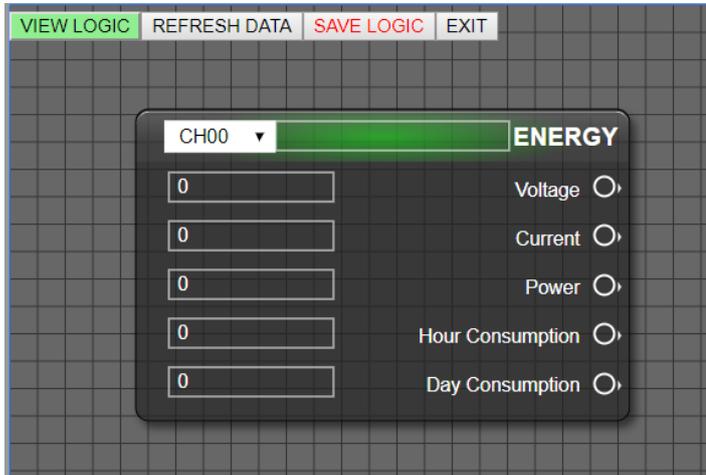
At the top is 'CH00', and on the right the possible outputs of this module. Start by selecting the desired log channel. Since there are 64 log channels, and numbers are hard to remember, there is a 'help list' provided in the top right corner.

This list shows all the log channels used, with the name and channel no. (The names are inserted for each module during configuration)

As an example, we are going to check the fuel oil level and give a warning if the threshold falls below 100 liters.
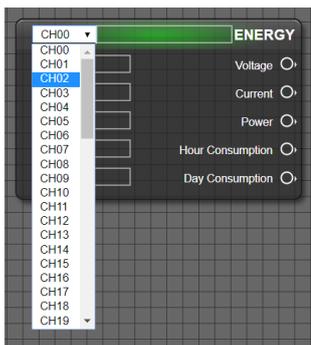
On the energy module we now select 'CH02' (GWmaster FUEL)

If we press 'SAVE LOGIC', the module is adjusted according to the energy type: in this case, on the left we see the current consumption in liters,

and on the right are the corresponding names of the
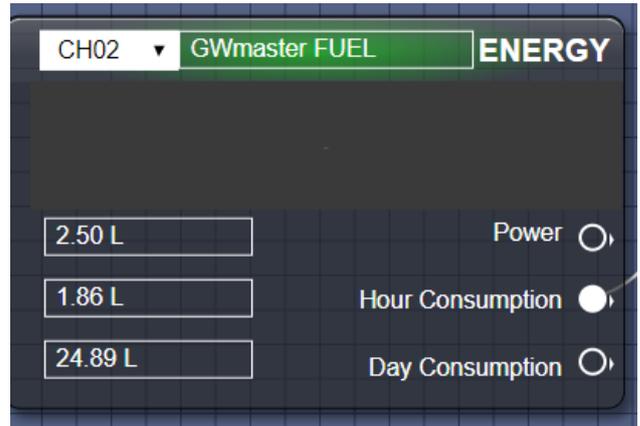
outputs (Volt-Amp does not exist here)

In this way we continue with possibly other energy modules, or we first work on this logic.

The assignment was to check the current stock of fuel oil (approximately) and give a warning if the level falls too low.

For this we need a 'CREDIT' module: select it with the left mouse button. You can drag the module to the desired position on your screen. (click on the left mouse button when you are standing over this module and drag the module). **Zooming in or out** of the screen can be done using the 'scroll' wheel of the mouse. You can move the entire screen by standing in a 'blank' place on the screen and pressing the left mouse button. You can now bring the entire screen to the desired position and zoom in or out according to your preference.

With a 'CREDIT' module we need a 'starting value', a minimum level (Bottom Value), and the desired units (in this case L Fuel).

As an example, we start with 1000 liters of fuel oil, and we want an alarm if the residual value falls below 100 liters. In 'Bottom Value' we now enter '< 100'. (< = less than, > = greater than)

If we want to see the result in a graph, we have to create a 'log module' in the configuration! (*see later: log module 04Lxxxxx*)

The entered starting value must be 'activated' when the tank is filled.

For this, there is a 'Reset' button: Select it and click on**'NOW'.**
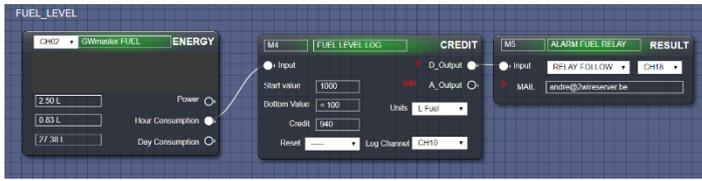
A confirmation is requested, because from this moment on the residual value (Credit) will be equal to the entered starting value. Over time, the credit value

will decrease according to consumption.

In the log graph we can now see both the consumption and the remaining amount.

When the bottom value is exceeded, a 'warning' can follow in the form of a relay that turns on (e.g. signalling light) or sends an e-mail (daily).

Attention! The graph can also go negative (tank 'army then empty'...)
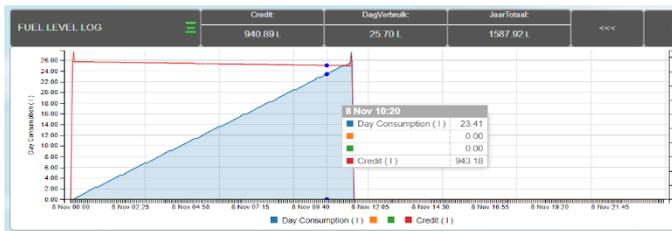
If the 'bottom' value is reached, the relay output can only be reset by reactivating the start value (Reset NOW). Of course there is also refueling...

This is just a simple example of logic. There are many more applications: monitoring temperatures, lower and upper limit of power, currents, voltages, consumption, etc.

Difference measurements between import-export consumption, switching off consumers if excessive consumption is measured, activating outputs in

function of a weekly clock and conditions in the form of AND-OR ports.

ATTENTION: All logic cannot respond faster than 1 minute, or 5 minutes if it concerns consumption (these are requested every 5 minutes from the measurement modules)

ALL LOGIC MODULES IN DETAIL:
ENERGY:

- Type of electricity: volts, ampere, watts, hourly consumption, day consumption
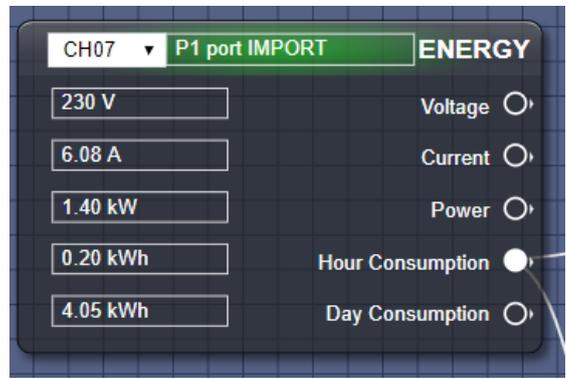
- Temperature type: if BC.002: Vbatt, Sensor1, Sensor2
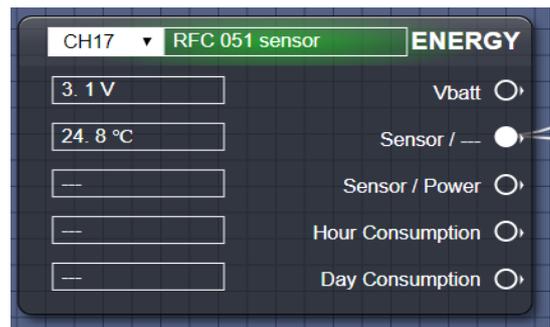
- Type of temperature of RF gateway (Note. sensors not connected can display extremely large values)

- Calorie type: departure-return temperature, power, hourly and daily consumption
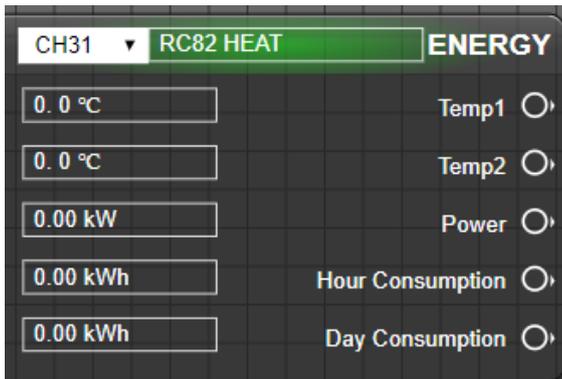
- Type of Water : current consumption, hourly and daily consumption
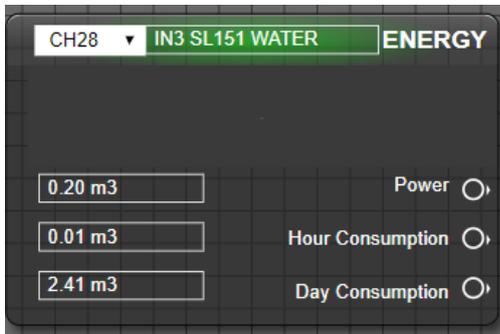
OR-GATE:

Links are the 4 inputs, and on the right the digital output. The **RED** numbers show the status of the inputs and outputs (ideal for debugging)

Each input can be compared to a threshold value. This value can be positive and negative, and can be compared to 'greater than' or 'less than'.

At an OR gate, the result is '0' if no condition is valid. Unplugged inputs do not affect the result.
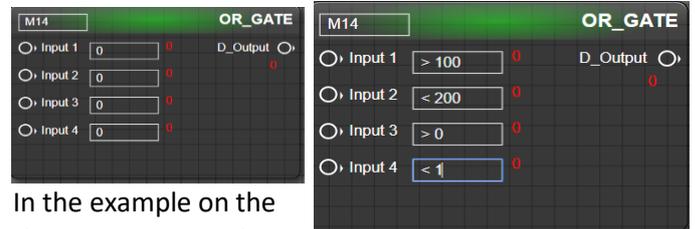
In the example on the right, the output will be active (1) if:

ingang1 is greater than 100 (e.g. analog input)
OR Input2 is less than 200 (e.g. analog input)
OR Input3 is greater than 0 (e.g. digital input)
OR Input4 is less than 1 (e.g. digital input)

AND-GATE:

Links are the 4 inputs, and on the right the digital output

Each input can be compared to a threshold value. This value can be positive and negative, and can be compared to 'greater than' or 'less than'.

At an AND-gate, the result is '1' if all conditions are valid. Unplugged inputs do not affect the result.
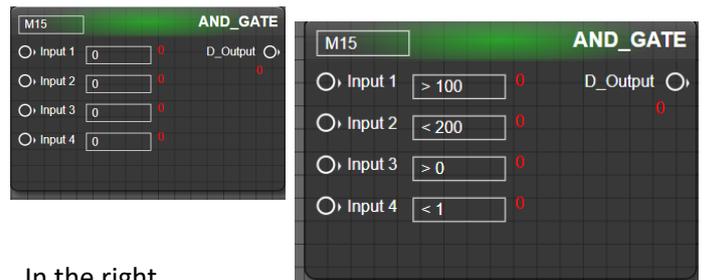
In the right example, the output will be active (1) incase of:

Input1 is greater than 100 (e.g. analog input)
EN Input2 is less than 200 (e.g. analogue input)
EN Input3 is greater than 0 (e.g. digital input)
EN Input4 is less than 1 (e.g. digital input)

DIFF-GATE:

This module contains 2 separate logics with which one can compare an input value with a starting value and a stop value (= hysteresis).

On the left are 4 inputs, and on the right 2 digital outputs. The **RED** numbers show the status of the inputs and outputs (ideal for debugging)

On Input1 or Input3 one can connect an analog measurement (e.g. CO2 measurement)

On Enable1 or Enable2 you can optionally connect a timer. If the Enable is off, output1 or output2 will always be off, regardless of the conditions.

Unplugged Enable inputs will keep the logic active at all times.

If the input becomes larger than the start value, the output will become active. If the input becomes less than the stop value, the output will be switched off.

This allows a condition to be set for, for example, a fan control, which will switch on or off in function of the CO2 with the desired hysteresis.

ADD:

addition of up to 4 analog values. Links can connect up to 4 analog values

become. ATTENTION: **DO NOT ADD APPLES WITH PEARS.** In other words: this module can only work correctly if the inputs have the same units (e.g. volts, amperen watts...)
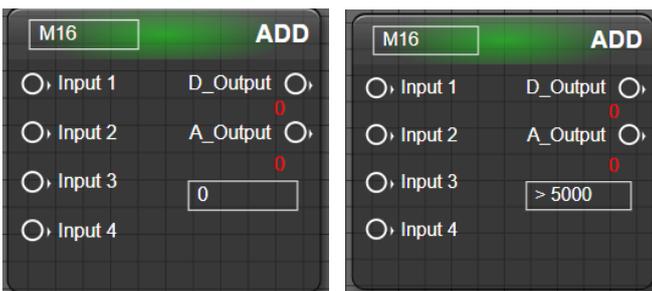
In the right example there are 2 outputs available:

D_Output is the digital output: thisoutput, itwill become active if the set threshold of5000 (e.g. Watts) is exceeded.

The A_Output is the analog addition of the connected inputs.

SUB:
difference calculation between 2 analog inputs. The analog end result can be both positive and

become negative.

In the right example, the digital output will be active (1) if the difference between input1 and

Input 2 is less than -200 (e.g. Watt). *Pay attention to your knowledge of mathematics:*smaller than a negative number is

a greater value ! (e.g. as a result = -210 the output will be active)

TIMER:
the result of a digital output can be slowed down and/or extended by minutes as a unit via this timer.

As an example, the output will become active if the input is active FOR MORE THAN 10 minutes.

Once the output is active, it will remain active for 5 minutes after the input becomes 0.

CLOCK:
this module gives the possibility to perform certain conditions only on the desired days and times. Active days can be indicated by entering '0' (not active) or '1' (active).

If the input 'Start time' is connected, and this input is greater than zero, then the output will become active if the start time **AND** the day of the week is valid.

On the other hand, if the input 'End time' is connected, and this input is greater than zero, the output will

if the end time is reached on a valid day.

If the Starttime or Endtime input is zero, the respective start or end time is not run.

If both inputs are zero, the clock is switched off and the output is always off.
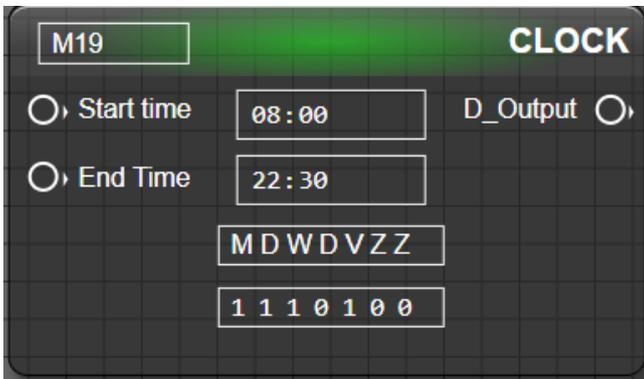
Example: If input 'Start time' and 'End time' are active, the output will become active if it is later than 8:00 am, but NOT on Thursday, Saturday and Sunday. The exit will be switched off if the time is later than 22:30, but NOT on Thunderday, Saturday, Sunday.

- If you only want to use the start time, the input 'End time' must be set to zero.
- If you only want to use the stop time, the input 'Start time' must be set to zero.
- The inputs can be connected to an adjustable state (0 or > 0), via a fictitious dimmer module (see also SWITCH INPUT)

Example:
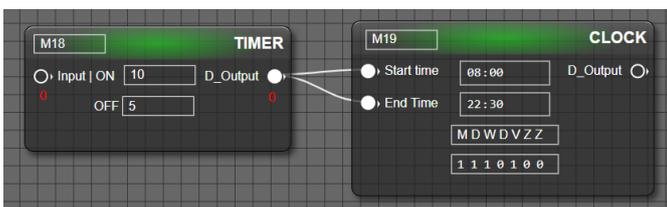
SWITCH_INPUT:

The output of a relay module or (fictitious) dimmer-modulecan also be used

become in logic. The status of this output can be linked to logicinputs.
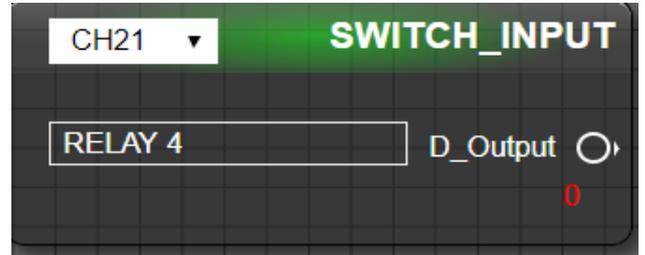
One can create a 'dummy dimmer module' in the configuration (SN 04Dxxxxx or 08Dxxxxx),without this module reallyexisting. This allows you to manually set logic active or non-active via the control panel.

With PARA6 one can set the maximum value, and with PARA5 the 'STEP' is set.

The scooter is a value that increases or decreases the status when operated +/-

PARA6 must be a minimum of 10, and a maximum of 32000, PARA5 must be less than PARA6

CREDIT:

this module will add up the hourly consumption of a measurement module and reduce a entered 'starting value' by this value. The result is an analog value, which starts at the entered starting value, and every hour this value will decrease according to the consumption, connected to the Input.

Attention: only Hour Consumption may be connected to this.

An application is a fuel oil **consumption meter,** or a 'budget**meter**', which indicates when

a consumption limit is approached.
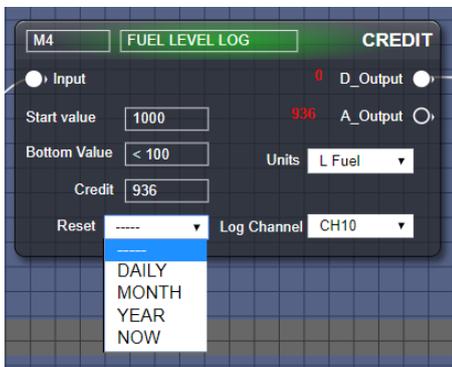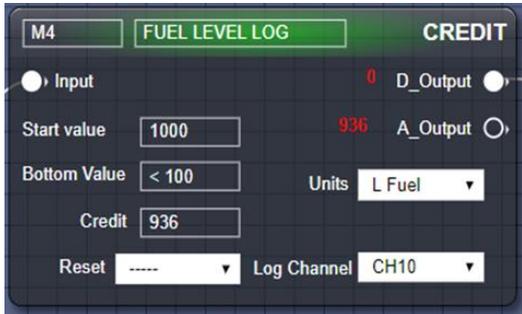
For the 'budget meter' you can choose from 3 options: automatic daily (DAILY) restart with the set starting value,

monthly restart or annual restart.

The end result can be viewed in the graphs.

As example 2, the **electricity consumption** is taken: the input is connected to a measuring module, which measures the total **consumption** of the house. Monthly you pay an advance of 80 euros. This amount is entered in 'Start value'. The units are EURO. 'RESET' is chosen for monthly (auto-reset)

After confirmation and 'SAVE', the final value starts at 80 euros. After 1 month you can evaluate the result in the graphs (positive or negative). Nb the cost price must be done during configuration.
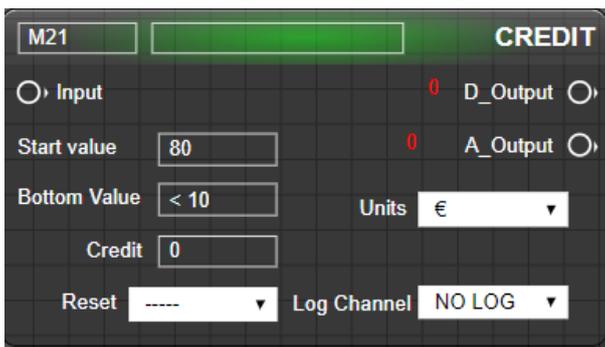
STORAGE:

this is an 'experimental' module, for installations that have their own energy source (e.g. PV solar), and a storage medium (e.g. batteries).

At the 'Import' input, the consumption meter of the connected consumers is connected. At the 'Export' input, the meter is connected which measures the energy production to the batteries.

Under 'Start value' a value can be entered which indicates the minimum charge of the batteries (in kWh). Once this starting value is exceeded, the digital output will become active. With this one can now (via relays) switch on devices that draw energy from the batteries. The 'Bottom value' must be a value that determines the 'discharge depth'. Once this value is reached, the output will be switched off (and therefore also the load)
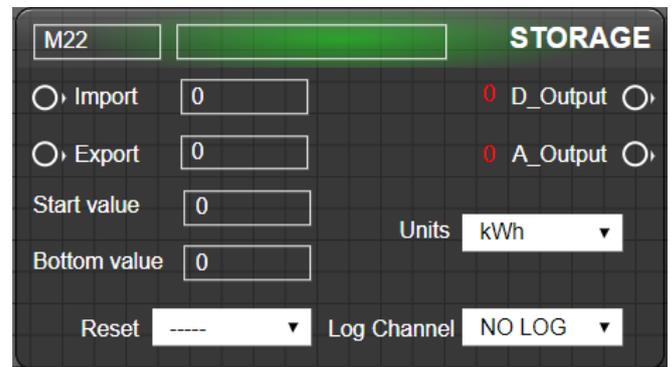
VIEWLOG:

Up to 4 analog values can be logged in 1 graph. To create an fictieve module in configuration: SN **04Lxxxxx.**

- If log type electra, then the order of the inputs is :

  V – A – W – Hour of consumption (mode = TELLER)

- If logtype water – gas – fuel:

  single input3 (current power) and input4 (hour consumption) (mode = TELLER)

- If temperatures:

  input1 to input4 possible (mode = sensor, subad = 2)

If there are **4 SAME TYPE UNITS** (e.g. all 4 inputs = volts or amp or watts or temp..): Then these can be shown in the same graph (subad 2-3-4-5). For this we will indicate this in the configuration modules:

Create a (fictitious) serial number, starting with 04L, followed by 5 digits (e.g. 04L00001)

Enter UNIQUE modbus addresses (same way as a normal modbus module)

Choose the type of UNITS(kW, gas, water, fuel, temp)

According to the type of graph, under SUBAD we will fill in the following:

0 : normal graph or temperatures display as standard module (e.g. electra = V-A-W-Wh)

1: CREDIT chart (when using 'CREDIT' module in logic)

2: electricity: 4 graphs only for display voltages or temperatures (V or °C)

3: electricity: 4 graphs only for displaying currents (A)

4: electricity: 4 graphs only for display power (kW)

5: electricity: 4 graphs only for displaying hourly consumption (kWh)

LIMITER:

with this logic module, a limit can easily be imposed for consumers. The intention is to set a limit on the power, hourly consumption or daily consumption.

When this limit is exceeded, a relay module can turn off the load for a certain time, and turn it back on after a set time.
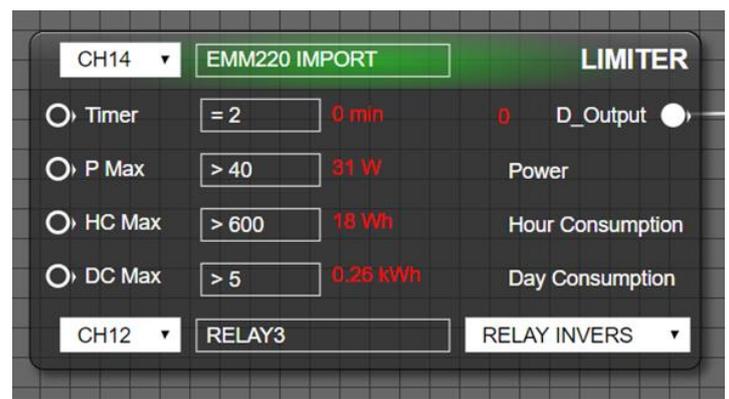
TOP: SELECTION MODULE CHANNEL:

- **NC**: **Mode1**: MeasurementsPower, Hour Consumption and Day Consumption come from external module(s)

- **CH0-63**: **Mode2**: Measurements Power, Hour Consumption and Day Consumption come from the selected measurement module.

INPUTS:

Mode1: If ModuleChannel = NC:

- P Max = external measurement Power (can have multiple power measurements via ADD module).
- HC Max: external measurement Hour Consumption (can have multiple HC measurements via ADD module).
- DC Max: external measurement Day Consumption (can have multiple DC measurements via ADD module).
- Timer: If a 'variable' timer is desired, this input can be connected to (for the time being) a 'dimmer', which determines the time for how long the 'power overload' must remain active.

The measured values are compared in 'OR-LOGIC' with the internal compare values.

Mode2: If ModuleChannel is active (only for log channels, with outputs Power, Hour- and Day Consumption present eg. EMMxx, P1port...)

- P Max = external compare value for Power (1-65000W) via dimmer or other reference values.
- HC Max: external compare value (1-65000 Wh) for Hour Consumption (idem).
- DC Max: external compare value (1-65000 kWh) for Day Consumption (idem).
- Timer: If a 'variable' timer is desired, this input can be connected to (for the time being) a 'dimmer', which determines the time for how long the 'power overload' must remain active (10-255min).

AT THE BOTTOM:

- RELAY CHANNEL 0-63

SELECTOR:

- NC = no relay, Digital_OUT can be used to drive further logic.
- RELAY ON: relay turns on in case of overload, afterwards relay remains in this state (manually switchable)
- RELAY OFF: relay turns off in case of overload, then relay remains in this state (manually switchable)
- RELAY FOLLOW: relay turns on when overloaded, after set delay relay goes out
- RELAY INVERS: relay turns off in case of overload, after set delay relay turns on

INSTITUTIONS:

If a certain input is not connected, and there should be no compare of this input, **the compare value MUST be set to ZERO.** (> 0)

The timer MUST be at least 10min.

Units:

timer per minute, power is per Watt, hourly consumption per Wh (or L), daily consumption is per kWh (or m3).

ACTION:

An overload occurs when one of the 3 measurements is exceeded.

With Power, the overload will only occur after the timer reaches its set limit (min. 10min).
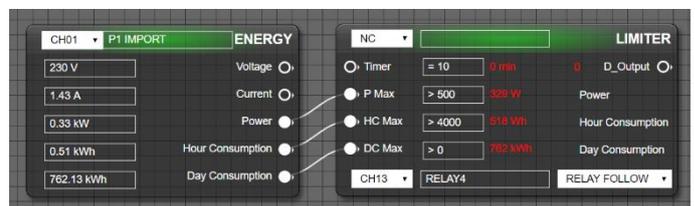
The relay is then turned on or off according to the selection (ON,OFF,FOLLOW,INVERS).

With Power overload, the timer can only count down if the overload is done!

This means that when a measurement that caused the power overload is not interrupted by the relay, the overload remains, and the overload state is maintained.

When the load comes to zero by turning the relay on, after the delay the overload would return and the relay would switch off again. The switching time would then be a maximum of 1 minute.   (bad for fridge, freezer...)

THAT IS WHY IT WAS CHOSEN THAT THE SWITCH-ON TIME = POWER OFF TIME AT POWER OVERLOAD

WITH OVERLOAD HC or DC, the minimum time between on-off FIX is 10 minutes.

Update: at Power: every minute, at HC every 5 minutes, at DC every hour.

TYPES OF OVERLOAD :

- Power : If the power is limited, the relay can switch back on after the delay time.
- Hour Consumption: If HC is exceeded, the relay can only be switched on at **the next hour!**
- Day Consumption: When DC is exceeded, the relay can only be switched on **the next day!**

If a combination of these types is used, 'Power' has the lowest priority.

NA. The relay can be operated **manually** after it has been switched on/off due to an overload to change the status of the relay. (only possible during overload HC or DC, not with Power-overload or if there is no overload)

Example 1: Mode1, external measurement module, fixed limit

Example 2: Mode2: internal measurement, external variable limitation via 'dimming module'
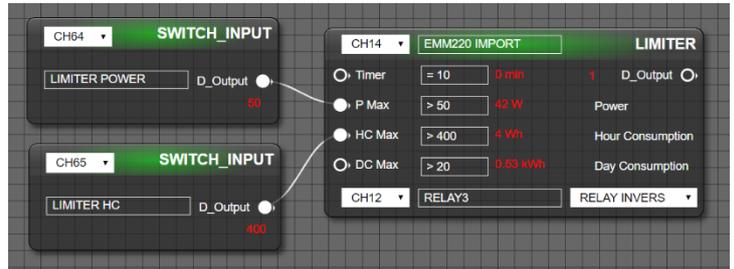
RESULT:
control relay according to the input status and the selector:

- NO RELAY: no relay control
- RELAY ON: relay is turned on when input is on, then relay stays on even when the input goes out
- RELAY OFF: relay is turned off when input is off, then relay stays off even when the input is on
- RELAY FOLLOW: relay tracks the status of the input
- RELAY INVERS: relay follows the inverse status of the input.

The channel number must of course be a channel to which the relay module is connected.
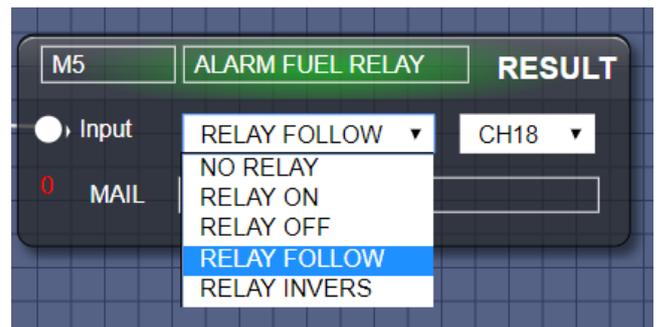
Under 'MAIL' a mail address can be entered where a message must be sent.

The content will be a short message with the status of that output (e.g. Fuel credit < 100l)

ATTENTION: The mail server **does not have** 'SMTP**authentication'.** With some providers, this mail ends up in the 'SPAM'.

Example of a received mail:

WIRING:

the 'wiring' of modules is only possible ifl start on an 'output', and connect it to an input.

When you want to remove a connection: with mouse cursor on the INPUT, click left, go with cursor to blank place (gray grid) and click back left.
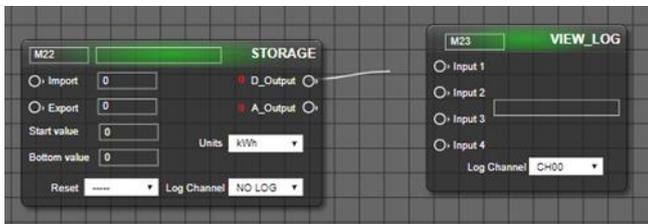
An output can be connected to multiple inputs, but an input can always have only 1connection.
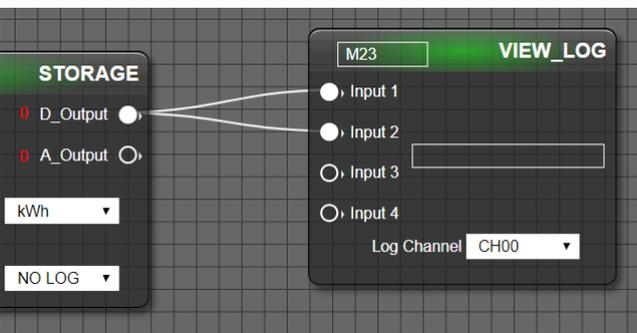
17. QUICK START

A shortened repetition of all steps:

1. Connection power supply, bus and network cable, which is connected to your local network.
2. Find out the IP address and port number via the display or via the'*ServerScanner*'utility.
3. Browse to this address and port number (default 8080)
4. To change the IP address: to menu 'SETTINGS' (see chapter 4)
5. Energy prices **:** to menu 'SETTINGS', bottom, cost prices
6. Go to Level3 via "EDIT GROUP-CHANNEL" and press "ADD CHANNEL" via the same button "EDIT GROUP-CHANNEL" to create a new channel
7. Press"CHx" to open channel, select the appropriate'Module' and   'mode', enter modbus address and sub-address, type in serial number if necessary, assign names, fill in parameters according to "SAVE"
8. Via "EDIT GROUP-CHANNEL" you can create additional channels and groups.
9. With "SORT CHANNELS" one can drag the channels to the right group
10. Main energy sources: if there are total measurements, to menu 'CHANNELS', type in channel numbers for electricity, gas, water, fuel oil.
11. Export energy sources: if there are total measurements for export (solar panels), to menu 'CHANNELS', type in this channel number(s).
12. EPC level calculation: if there is total measurement of heating source(s), to menu 'CHANNELS', typing this channel number(s) and estimated area of the heated rooms.
13. Only after the first hour are consumptions logged and graphs become visible.

18. SOLUTIONS-ATTACHMENTS

REFRESH PAGE:

When you surfon the Memo website, and no key gives any response, then you have probablylost the'*connection'.* This may be because

your PC/tablet has been turned off. Then go to the 'toolbar' of your browser and *refresh the page.*

Usually you will have to log in again and everything will work normally again.

If there are problems such as the message 'page not found' or the 'hourglass' continues to run, there may be a network problem. Try reloading the page again. If this is not successful, check if there is still internet connection by surfing to a known website.

SEARCH IP ADDRESS:

If you are unable to log in, and there is a solid network connection, you may have used the wrong IP address. To find out, an *IP scanner* is needed. This program can be downloaded from the 2-WIRE website. (ServerScanner). Broadcast on your local network searches for your web server. When the connection is in order, you will be able to read out all the settings. A different IP address may have been assigned. (DHCP...)

CHANGE IP ADDRESS:

You can also change the IP address using the**'ServerScanner'.**

After the program has found your web server, you can also change the current IP address yourself with this program. Type in the desired address and port number, along with all other information such as SUBNET, GATEWAY, DNS.

INCORRECT JAVASCRIPT/STYLE/FW MEMO:

If you discover errors on the website, or if there is no test that still responds, even after 'refresh page', then an error may have crept in when loading the script/style. You can then manually download the javascript from the 2-WIREserver by

Go tothe 'HELP MENU' via the DISPLAY:

PRESS THE 'MENU' button of the MEMO3 (top right) and keep pressing until the menu appears on the display:

- FW CSS-JS
- FW MEMO
- ERASE ALL

EXIT

Each time you press the key briefly, the menu will continue 1 position.

If you have the desired menu (CSS-JS or MEMO): long press until this menu becomes active.

After loading the firmware, the WS.503 will reboot automatically and the problems may be gone.

(Of course you have to be connected to the internet!)

CLEAR FULL WS.503:

You can delete all configuration and logs by going to 'ERASE ALL' on the display.

ATTENTION! ONCE PERFORMED, YOU CANNOT UNDO THIS ACTION !!!

NA. Only the IP addresses and login are stored.

ANNEX:Remote via an http instruction

If you only have remote access to the web server, you can use the http instructions below to remotely perform TOETS1 (upgrade css/javascript) and TOETS 2 (upgrade Memo3 firmware).

Procedure:

Step 1:Request access: enter your own IP **address**+ **login** + **password** to get an XP key

> ask XP key:
> http:**//192.168.0.123:8080/adminIP**? XP**2015**&
>
> answer: |4|13| **5|4**|0| **54 = XP-key**

Step 2: Issue command upgrade css (TOETS1):

> req upgr FW CSS & script:
>
> http:**//192.168.0.123:8080/adminIP**? XP**54**&DLFwStyleScript&
>
> answer after ca 10sec: _30/06 9:26_|0|18|84|20.6.28.1|&#9745|0 = FW css & script FW 20.6.28.1

Step 3: Command upgrade firmware (KEY2):

> req upgrading FW server:
>
> http://192.168.0.123:8080/adminIP?XP54&DL FwWeb&

answer after ca 10sec: _30/06 9:26_|0|19|84|20.6.29.4|&#9745| START UPGRADING|0 (FW 20.6.29.4)

Afterwards in toolbar discard instructions, reload page and normal login!

ATTACHMENT: ERROR CODES WS.503

When the mail server is activated, an email will be sent every day around 8 am with possible notifications: Possible notifications:

- MB ERROR : communication problems with modbus
- RF ERROR : communication problems with RF-LORA
- SD ERROR: read/write problems with SDcard
- WIFI REBOOT: Interruptions in the WiFi network
- MQTT REBOOT : restart of the MQTT connection

ANNEX :Import and export graph on a monophase and a 3 phase meter

Every 2-wire modbus energy meter has a 2 meter readings, namely an import meter reading (consumption over the 3 phases) and an export meter reading (injection into the grid over the three phases), these meter readings can be read on the LCD display of the meter in question and these values are logged every minute by the MEMo server

MEMo uses these meter readings (import+export) to calculate the consumption over one hour each time (= difference of the two hour meter readings). These calculated hourly consumptions are then displayed in the MEMO chart as follows:

- The total import consumption as a blue graph at phase 1 (MODbus subaddress 0)
- The total export(injection) as a blue graph at phase 2 (MODbus subaddress .
- The calculated import and export consumption (graph) can therefore be found at monophase (02Exxxxx) and at 3-phase meters (03Exxxxx) meters displayed.

ANNEX RF LORA SETTINGS :

In the table below you canread the possible LoRa settings that you can fill in at Memo Mac in the fourth field

SETTING	SF	SYMBOLS	CR	BW (kHz)	TIME ON AIR	
0	8	256	4_5	125	210ms	JOIN MODE
1	7	128	4_6	125		LONG RANGE
2	7	128	4_7	125		
3	7	128	4_8	125	270ms	
4	8	256	4_5	125		
5	8	256	4_6	125		
6	8	256	4_7	125		
7	8	256	4_8	125		
8	9	512	4_5	125		
9	9	512	4_6	125		
10	9	512	4_7	125		
11	9	512	4_8	125	540ms	LONGEST RANGE
12	7	128	4_5	250		MEDIUM RANGE
13	7	128	4_6	250	60ms	
14	7	128	4_7	250		
15	7	128	4_8	250		
16	8	256	4_5	250		
17	8	256	4_6	250	135ms	
18	8	256	4_7	250		
19	8	256	4_8	250		
20	9	512	4_5	250		
21	9	512	4_6	250		
22	9	512	4_7	250		
23	9	512	4_8	250	270ms	
24	7	128	4_5	500	30ms	SHORT RANGE
25	7	128	4_6	500		
26	7	128	4_7	500		
27	7	128	4_8	500	60ms	
28	8	256	4_5	500	60ms	
29	8	256	4_6	500		
30	8	256	4_7	500		
31	8	256	4_8	500		
32	9	512	4_5	500	120ms	
33	9	512	4_6	500		
34	9	512	4_7	500		
35	9	512	4_8	500		

Annex APP_HTML:

If you have an MQTT account with 2-WIRE, you can enter :**'APP_HTML'**at MQTT Passwordand press 'TEST**MQTT'.** If your 'TOKEN' is in order, you can now also do all visualization and configuration via a *pseudo-app*:

Once this configuration has been entered, surf to the product page of the MEMo3 module and download the APP_MEMO3B.html file and open it with your web browser.

If necessary, create a shortcut on your smartphone or tablet.

At the top of the MAC or Token field, unfold and select one of the bottom 4 lines (may be empty or an existing link) and then click 'EDIT'.

- To be filled in at MAC : name/mac address MEMO3B eg. "dirk/a1b2c3d4e5f6"
- and with TOKEN: your token, the same as the MEMO3B

To change an existing link, first enter 'delete' in the TOKEN field and then enter the modified data.

You can store up to 4 mac addresses to quickly switch between 4 MEMO's (MUST NOT HAVE THE SAME TOKEN!)

Important:

- MEMo3 must have at least 1 linked channel in operation for the HTML_APP to work.

- If you only enter the token after configuration of the MEMo3, it is possible that you have to 'save' ALL channels and also have to sort at least one channel in order to pass the change to MQTT.

ATTACHMENT MENU FOR EXPERTS:

Level4 is only intended if you have knowledge of modbus registers and want to enter a module that does not appear in the 'PRECONFIG' list.

You now have full freedom to adjust all registers, as well as the display of the data order.

Start at the top with the **'UNITS':** these are (for EMM) default to V-A-W-VA-PF.

This order can be changed, or other types chosen:

- --- : do not show a measurement
- VOLTS: voltage (V) - CURRENT : current (mA) - POWER: power (W)
- Q_POWER: quarter-hour power (the peak power is calculated per quarter of an hour)
- VA: Volt-Ampere (VA) – PF : power factor
- SUPP TP: at calorie supply temp (°C) – RET TP: at calorie the return temp (°C)
- FLOW: flow rate (L or m3) – ROOM TP: chamber damp (°C)
- VOC: air quality (%) – CO2: CO2 (ppm)

HUMID: humidity (%) – STATUS: status relay or P1 rate
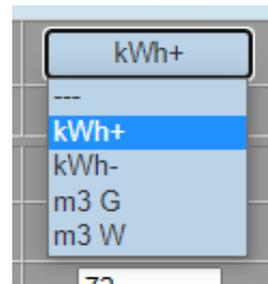
The last 2 units serve for the energy : ---: no display, KWh or m3 Gas or m3 Water

DATA TYPE:

- FLOAT (floating point IEEE754)
- LONG (32bit unsigned) ,
- WORD (16bit unsigned)
- BYTE (8bit)

DIVIDER/MULTIPLIER:

each data can be adjusted with this selector so that

the value corresponds to the measuring device

(x1 – x10 – x100 – x1000 or 1/10 – 1/100 – 1/1000)

POSITION:

these are the registers of the measuring device, starting from the **'Start Index':**

These values are ALWAYS expressed in WORD !!

INSTRUCTION :

next to 'Read Cmd' enter the modbus command (usually 3 or 4)

In this example it concerns the EMM220: The first register for VOLT starts at 0.

The flow starts at 6 (WORDS) further, so position2 is at 6.

The power is also 6 further, so position3 is at 12 etc.

Consumption starts at 72

When you adjust these parameters, you will see the real-time generation of the modbus data.

(or press 'GENERATE')

modbus address (6), instruction (4), start index (0-0), length data (32 WORD) – CRC16

The length (here 32) is calculated by taking position5 (30), increased by the last data type (here FLOAT = 2 WORD).

Sometimes you have to 'manipulate' the length to match with the connected module. You can then change the 5th position so that the length corresponds to the specs of the module.

To see **energy measurements,** press 'RT' next to 'GENERATE'. Now there will be **'PAY',** which means energy consumption. Now only the last 2 columns count, if selected on 'kWH or m3. You will also change the generated code, and the starting index is now that of column6

(in example 72)

SUBADDRESSES:

some meters have multiple measurements, split according to phase 1-2-3, or have a shared function with inputs/outputs (e.g. calorie meters). Yet these have the same modbus address, but a different startindex or different command.

This is also possible: we can give a shift of the positions by the combination **subaddress and subaddress offset.**

With the EMM630 there are 2 WORDS per measurement, and the 3 phases are shifted with 2 WORDS.

In other words, V1 starts at 0, V2 starts at 2 and V3 starts at 4.

Hence a position difference of 6 (WORDS) between each unit.

If you set 'SubAd Offset' to this shift (2), the index will start at 0 at subaddress = 0.

At subaddress = 1 the index will start at 2 and at subaddress = 2 the index will start at 4.

The same effect can also be achieved without using the sub-address, but with the 3 channels

for phase 1-2-3, adjust the starting index to 0-2 or 4.

Example REL44 P1port: according to the specs, the P1port starts at index 0, and there is a shift of 10 between each type of measurement.

So we set 'SubAd Offset' to 10. The starting index will now shift per 10 based on the subaddress.

Example REL44 OUT1-4: according to the specs, the outputs start at index 90, and there is a shift of 1 between each output.

So we have set 'SubAd Offset' to 1. The starting index will now shift per 1 based on the subaddress. (sub-address is 'locked' and is determined by the choice of RELAYnr 1-4)

Here, however, we have a difference: to control outputs, other instructions are needed!

These instructions must be generated by the ON/OFF command.

To generate a**'WRITE'** command, press 'Read Cmd'. Now it says 'Write Cmd' and there will be an input field next to 'TEST**TX'.**

For the REL44, the write command is 5, to be entered next to 'Write Cmd'.

To test the function in real time, you can enter the on or off value next to 'TEST TX' (0 or > 0)

Press**'TEST TX'** to test this function. If the desired relay follows with the entered status, the OFF/ON buttons will also follow!

Press **SAVE** if the settings are ok.

ADDITIONAL EXPLANATION ABOUT NEW FIELDS AT THE TOP AND THE MEANING:

By default, the modbus protocol is: ADDRESS – CMD – OFFS H – OFFS L – DATA H – DATA L – CRC

However, there are 'more difficult cases' where there is a deviation from the usual modbus protocol.

Example: EMM630C. Here's the protocol:

ADDRESS – CMD (0x10) – FIX 0xFD – OFFS H (0) – OFFS L (0) – FIX 1 – FIX 2 – STATUS (0-255) – FIX 0 – CRC. So the total is 11 bytes, not the usual 8!

To generate such codes, one now has the option to insert 'fixe' or variable data:

Instead of the fields 'UNITS' there are now 7 other fields:
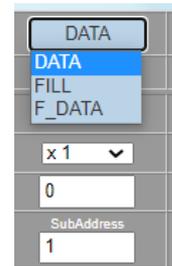
DATA: increase Start Index with entered value (sequencer ifv subaddress)

FILL: insert 8bits value at a position according to the selector1-7

F_DATA :insert fixe 8bits data, value to be entered at 'POSITION'

LEARNING BY GENERATING SOME CODES:

First test: First set the module type to 'FREE**USER'** and all 7 selectors to**'DATA',**datatype to**'BYTE'.**

Set 'Write Cmd' to (green) and the Start Index to 90. Address at 72, Subaddress at 0, data next to TX at 0.

As a test, set the positions to 0-6-4-2-8-10-12 and view the generated code:

This is: 72-5-0-90-0-254-98 of which 72 is the address, 5 is the function code, 0-90 is the start index, **BUT**

then only 0 followed by the CRC. Total 7 bytes and not 8 !

So this is an erroneous code. Reason: The data field should be 2 bytes, and here it's only 1 byte.

Now change all data types in **WORD** and view the code again: now there are 2 bytes as data = OK
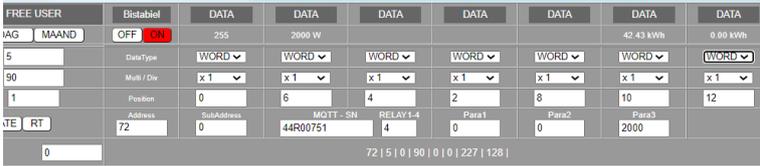
What can be done with this?

As a next step, do increase the subaddress from 0-6: The starting index will now be the sum of the set start index plus the value entered under POSITION1-7. The starting index is thus:

90-96-94-92-98-100 or 102 according to the subaddress. Note: you can manipulate the starting index (possibly via logic) with a sequencer.

Of course, this may not make much sense, but first let's continue with some exercises:

We keep the same settings and now we are going to change the input data (input field next to TEST TX)

You will now see the data in the code change with the entered data. This could be changing a status in your control module. (value can be 16bits !)

Next test: Reset the subaddress to zero and the input dates next to TX also to zero.

Now put all selectors on **F_DATA.** You can see that nothing changes in the generated code.

(72-5-0-90-0-0-227-128)

Now change the subaddress 0-6: The data in the code now follows the set dates of POSITION:

0 – 6 – 4 – 2 – 8 – 10 – 12, and the starting index remains unchanged.

The input field next to TX does not affect the code in any way.

SUMMARY: with**'DATA'**you can change the starting index according to the sub-address, and with 'F_DATA' you can change the data with a FIXE value. The subaddress acts as a selector between the 7 fields.

Next test: Reset the subaddress to zero and the input dates next to TX also to zero.

Now **only** set THE FIRST selector to **FILL.** You notice that the SELECTION **WORD** switches from the 1st to **BYTE.** Indeed, we can only INSERT 8bits.

Check out the code: After the index (90) there will now be an **extra 0,**but also the data (was 0-0) has been changed to 0-6 ! Total now 9 bytes instead of the standard 8 bytes.

Indeed: with the selection **'FILL'** you can insert extra data at certain places in the code.

Now change the position value of the[1st] column to another value: You now see that after the index (90) this value changes with the entered value.

Take a look at the example above of the **EMM630C.** Here's the protocol:

ADDRESS – CMD (0x10) – FIX 0xFD – OFFS H (0) – OFFS L (0) – FIX 1 – FIX 2 – STATUS (0-255) – FIX 0 – CRC. So the total is 11 bytes, not the usual 8!

2 fixe data are needed here (1-2). Well, let's then put the[2nd] selection on**'FILL'.**

We change positions1 and 2 to the value 1 and 2. Check out the code:

This is now 10 bytes long and the 2 fixed data are behind the index 90. This is almost the desired result for the EMM630C to control.
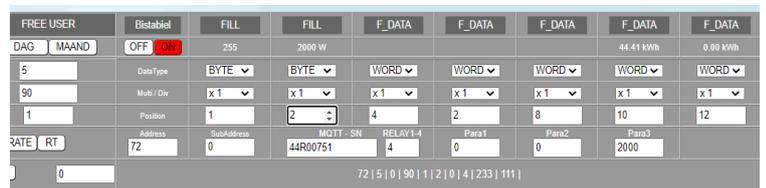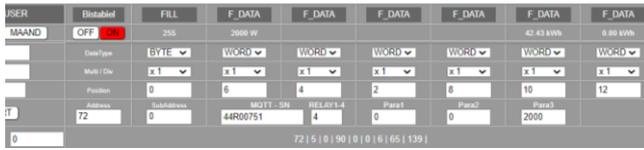
Indeed, the function code (in example 5) must 0x10 according to the specs of EMM630C (= 16 DEC)

However, we can enter a 16bits function code ! Calculate the function code as 16bits,

Then you have as a result: (0x10 (=16) * 256) + 0xFD (= 253) , so (16*256) + 253 = 4349

Enter this function code and view the generated code now:
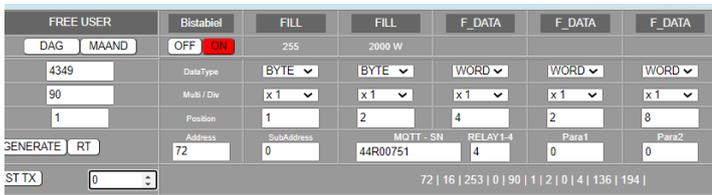
You can now see the desired code for the EMM630C, but with start index 90 instead of 0.

This is easy to set to zero, but the status for ON/OFF still needs to be added.

The position of the status should be 1-2 after the fixe data.

We now see 0-4. Indeed: The 4 now comes from the[3rd] selector (in addition to the 2'FILL's)

This is still set to F_DATA and the value (position) to 4.

When you change the 4 you also see that in the result but now we want the variable input data to be filled in (0-255). To achieve that we have to set the[3rd] selector to'DATA'!

Also, the position must be at 0 instead of the current 4, otherwise the starting index would be the sum of both

(see very first example 'DATA')

Now change the input data to 255 or 0 and view the code:
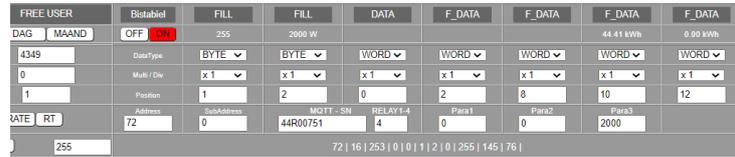
Address (72) : OK, function code (16-253): OK, index (0-0): OK, Fixe data (1-2): OK

Status (0-0 or 0-255) : WRONG !

AGAIN: there are indeed *'eccentric codes',* but this can also be solved.

Here the HIGH BYTE is used as a status of 0-255, and the LOW BYTE is always at 0.

One could use the input data as 16bit, then the value should be 0 or 65280. (0xFF00). This does not always seem possible because statuses in the MEMO3 are 8bits values (0-255)

We can also think of another way: Set the[3rd] selection to **BYTE** instead of WORD.

The input status (set to 255 here), now has only 1 data field because the selection is on BYTE.

Now we have a FIXE 0 to fill in after the desired dates and you're done!

Change the[4th] selector to **'F_DATA'** and the value from position to 0.

NA. The 3 other selectors have no influence on the code, as long as they are not on 'FILL'.

COMPLEX? Maybe, but by playing with the parameters you can see the generated codes and the possibilities in REAL TIME, without having to program them in the MEMO and only afterwards can you notice that the code was right or wrong.

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Of course, you first have to know what the required code is, by sifting through the registers of the module to be linked and noting what the result should be.

NA. As you can see, control is considerably more complicated than retrieving the classic measured values.

Nevertheless, it has been proven here to create unique codes with the MEMO3B!

If you have configured a modbus module, which does not belong to the 2-WIRE range by default or is not included in the 'PRECONFIG' settings, you can always make a screen dump of these settings and play on to 2-WIRE.

This information can be useful for R&D to add to the PRECONFIG list, or to share with other installers with similar modules.

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