UCM-316

User's Manual

2.3

Document history

Date	Version	Author	Remarks
22/03/2017	2.0	Sara Prior	User's Manual including new features such as Analog inputs, power supply supervisor and MQTT protocol support.
10/05/2017	2.2	Sara Prior	Time synchronization update
16/05/2017	2.3	Sara Prior	Data transfer by MQTT

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1 Introduction

This Manual will show you how to configure the UCM-316 datalogger/controller by using the UCM-316 configurator software.

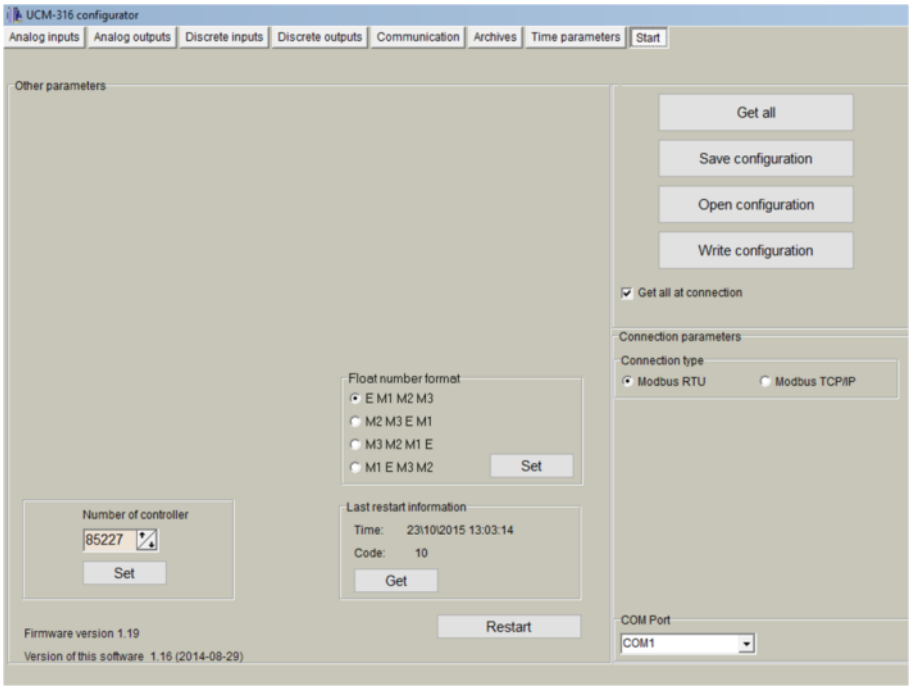


Figure 1. UCM-316 Configurator

2 Setting up connection to the device

In order to configure the controller, user must connect its PC to the device by using any of the following interfaces:

1. USB port
2. ETHERNET interface
3. Through a GPRS/3G connection (only accessible after configuring GPRS APN, user and password inside the controller)

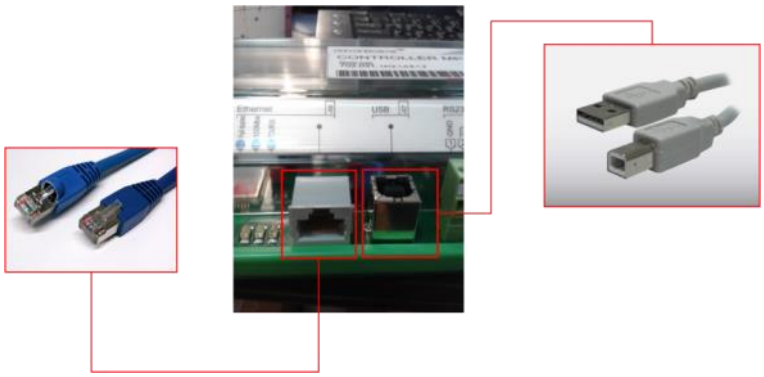


Figure 2.UCM-316 connection interfaces

NOTE: Not all the models support above interfaces. Check your ordering code first.

2.1 USB connection

Steps to be followed:

- Connect an USB cable class B to the correspondent port
- Open UCM-136 Configuration Tool
- Set up "**Connection Parameters**" frame
    - Select "ModBus RTU" option under "Connection type"
    - Configure “Bode” and “Parity” parameters; default values are:"19200" , "none"
    - Select COM port number assigned by your PC to the USB port
    - Click on “**Get all**” to establish connection with controller.

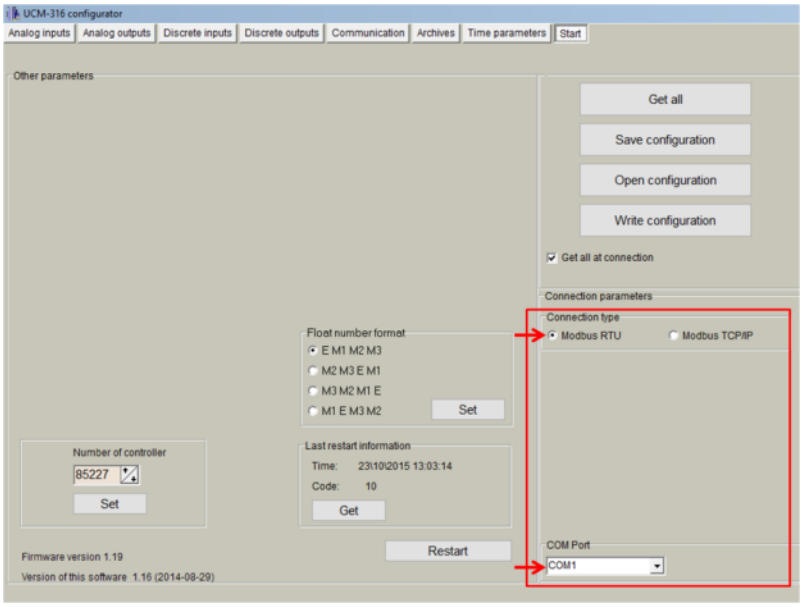


Figure 3. USB connection set up

2.2 ETHERNET Connection

Steps to be followed:

- Connect a RJ45 Ethernet cable to the correspondent port.
- Open UCM-316 Configuration Tool
- Set up "**Connection Parameters**" frame
    - Select "ModBus TCP/IP" option under "Connection type"
    - Add controller IP address and TCP port in "Host or IP" and "Port" text boxes, respectively
    - Select "Ethernet" option under "Connection through"
    - Click on "**Connect**" to establish connection with controller.

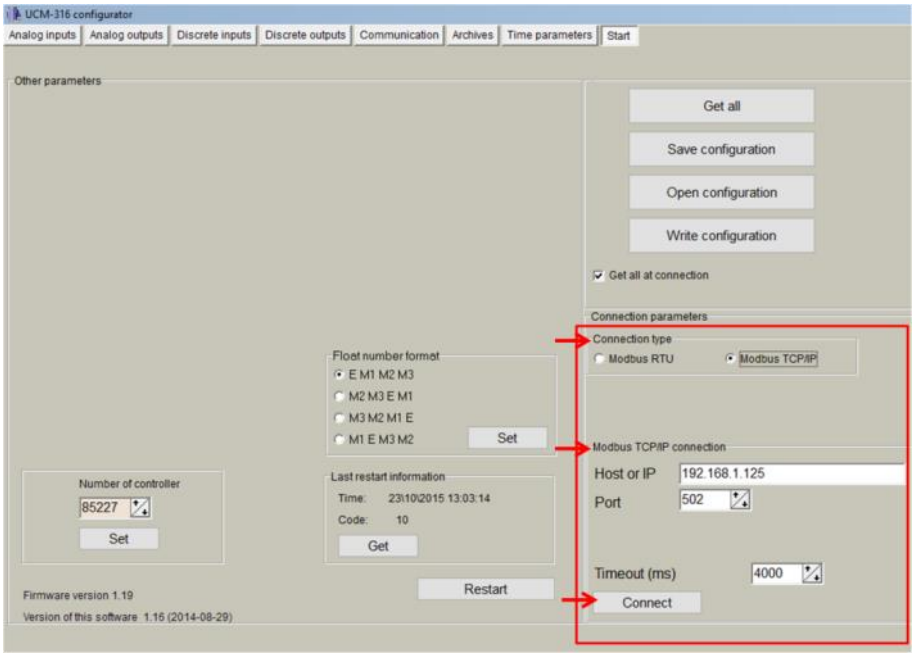


Figure 4. Ethernet connection set up

2.3 GPRS/3G Connection

Steps to be followed:
- Check antenna is properly connected to the device.

Figure 5. GPRS antenna connection

- Open UCM-316 Configuration Tool
- Set up "**Connection Parameters**" frame
    - Select "ModBus TCP/IP" option under "Connection type"
    - Add controller IP address and TCP port in "Host or IP" and “Port” text boxes, respectively
    - Click on “**Connect**” to establish connection with controller.

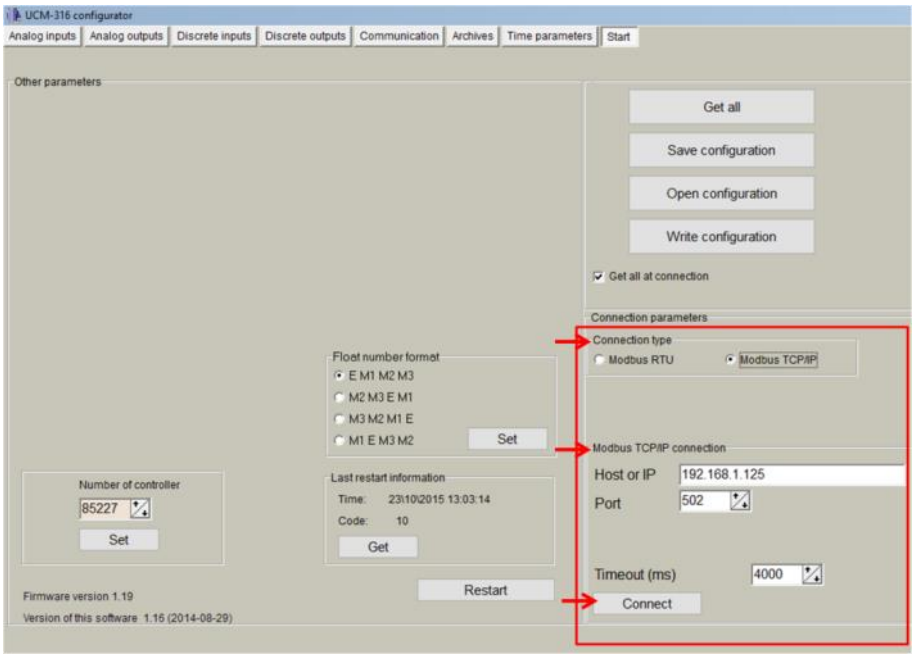


Figure 6. GPRS connection set up

2.4 UCM-316 connection diagrams

In the following Figure, the most typical connection schemes of UCM-316 with PC are shown. The Configuration Tool described in this document or any other Modbus complaint software can establish a communication link making use of **Modbus RTU** and/or **Modbus TCP** protocols.

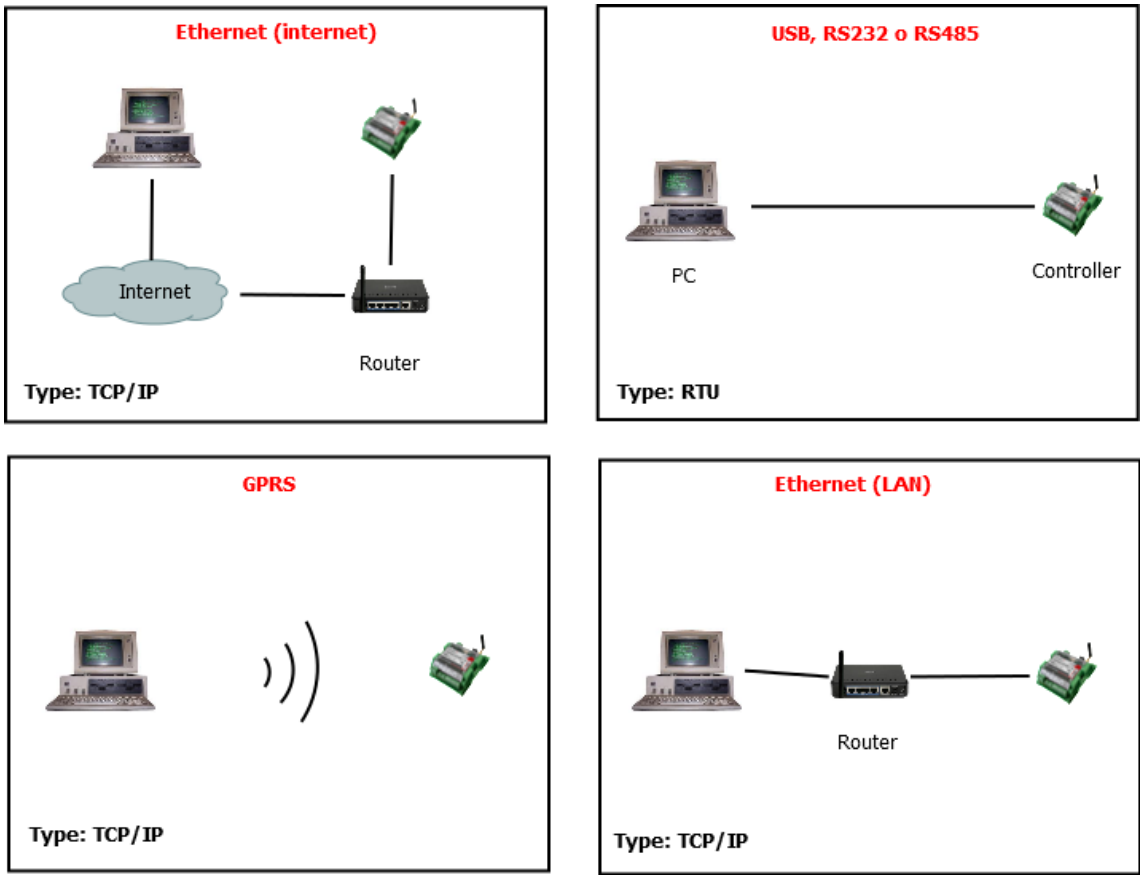


Figure 7. UCM-316 typical connection diagrams

3 “Start” tab

3.1 UCM-316 Basic Information

Once user has established communication with UCM-316, basic information such as "*User identificator*" , *"Serial number", "Last restart", "Firmware version", "Software version",* etc. is shown in the left frame

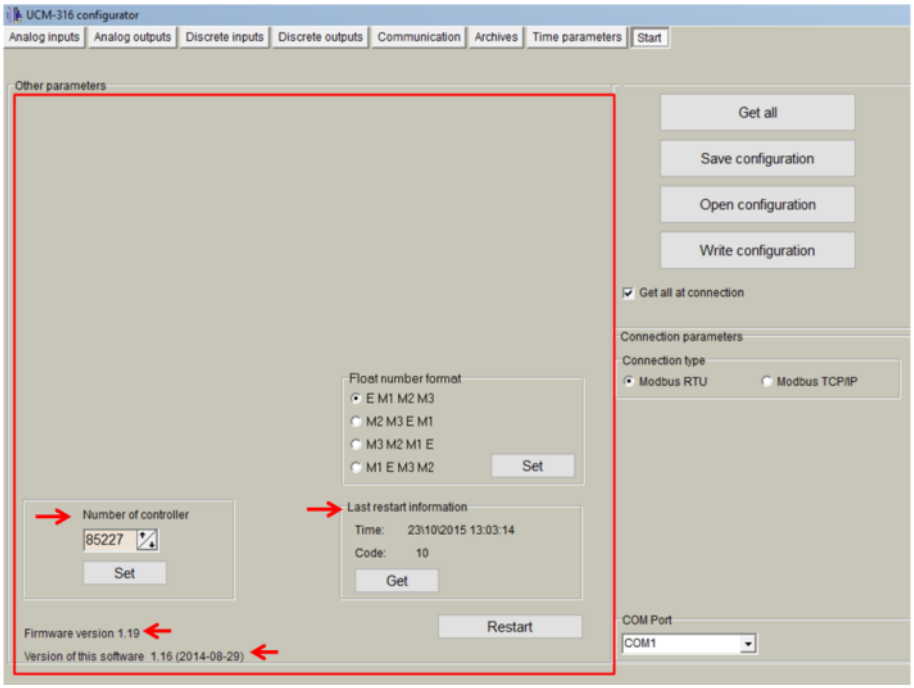


Figure 8. “Start” tab. UCM-316 basic information

3.2 Configuration files

This feature enables user to save and load configuration files so that programming a number of controllers with the same configuration becomes an easy process. Steps to be followed are:

1. Set up all the configuration parameters making use of UCM-316 Configuration Tool.
2. Then, under “Start” tab, click on **"Save configuration"** button. A dialog will be shown requesting user to select folder destination.
3. Once the file has been stored, connect a new controller to the PC and then click on **"Open configuration"** and select the file previously stored.
4. Then, click on **"Write configuration"** button to load such configuration into the new controller.
5. A restart will be needed so that controller can start using the loaded configuration.
6. Repeat from step 3 with all the controllers that need the same configuration.

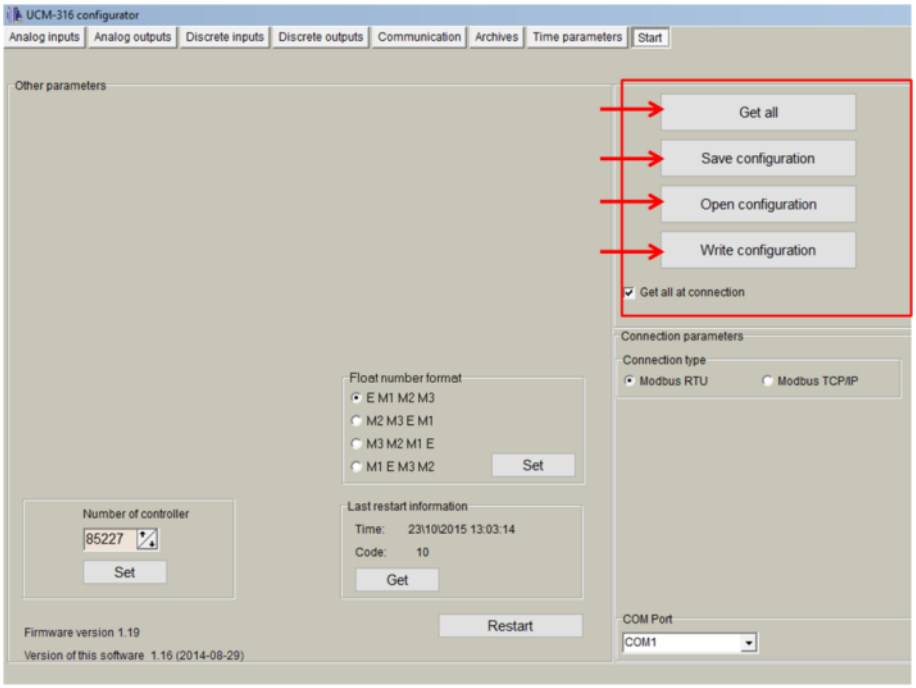


Figure 9. “Start” tab. Configuration files management

3.3 Status indicators

Several status indicators are shown in the UCM-316 configuration tool in order to inform user about current performance of Modbus communication:

1. Req: number of Modbus requests performed.
2. Answ: Number of Modbus answers received.
3. Tout: number of Modbus requests not answered (time outs raised).
4. Except: number of Modbus errors.

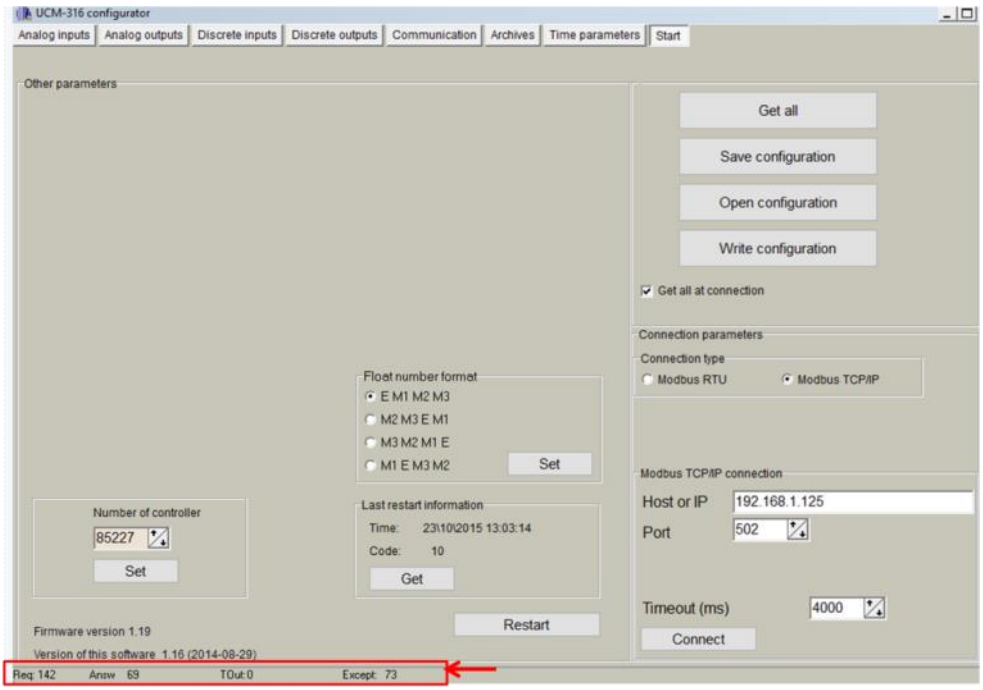


Figure 10. "Start" tab. Status indicators

3.4 Power supply supervisor and rechargeable backup battery.

This functionality is not included in all UCM-316 versions. The models that support this functionality include an internal rechargeable lithium battery:

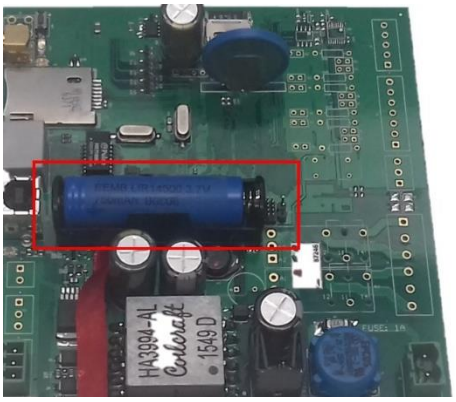


Figure 11. Internal backup battery

Rechargeable backup battery provides UCM-316 an autonomy of maximum one hour if general power supply is down. Backup battery lifetime can be configured in:

Start > Reserve power control

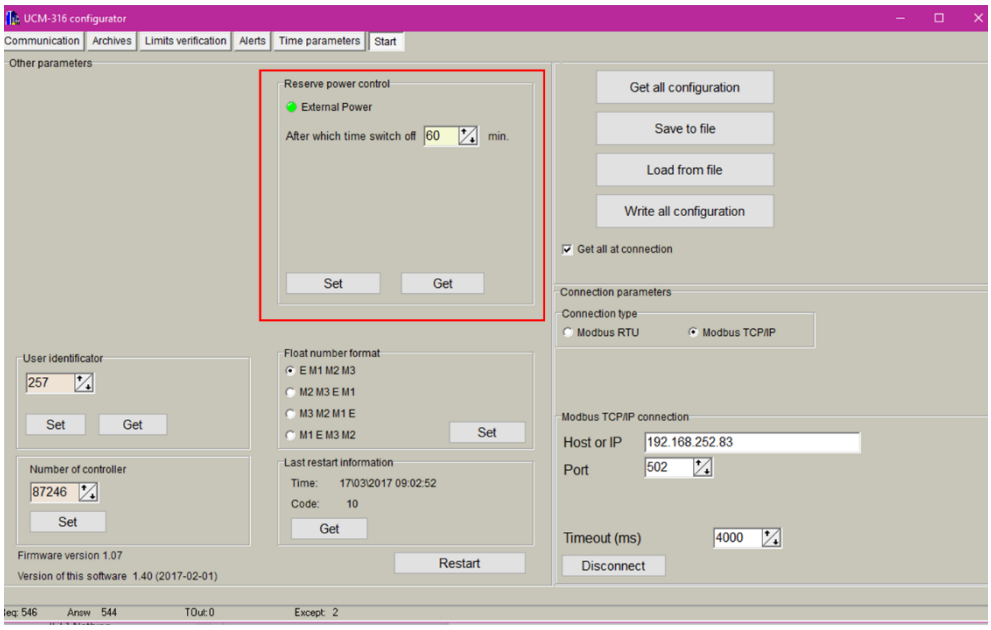


Figure 12. Reserve power control

- “After which time switch off”: Battery lifetime (configurable). Max value = 60 min. Once this time is expired, UCM-316 will be switched off.
NOTE: Click SET button to update changes.

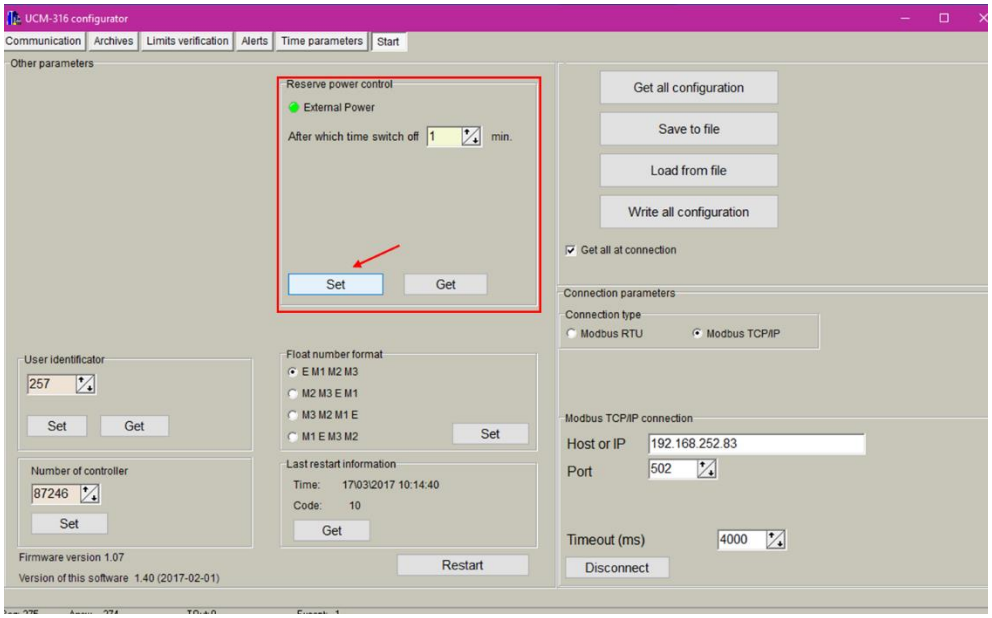


Figure 13. After which time switch off updated to one minute

Once a general power failure or disconnection happen, backup battery automatically starts supplying UCM-316. “External Power” green indicator switches off. A “Switch off countdown” is shown in the lower part of “reserve power control” frame.

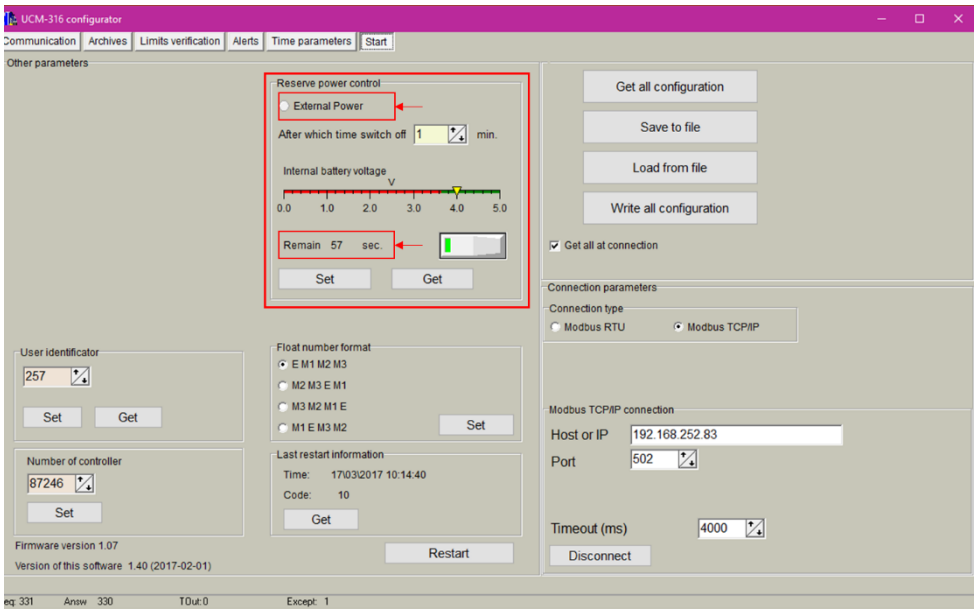


Figure 14. General Power OFF/Backup battery ON & countdown

Once “time switch off” is done, UCM-316 is automatically switched off and then, disconnected.

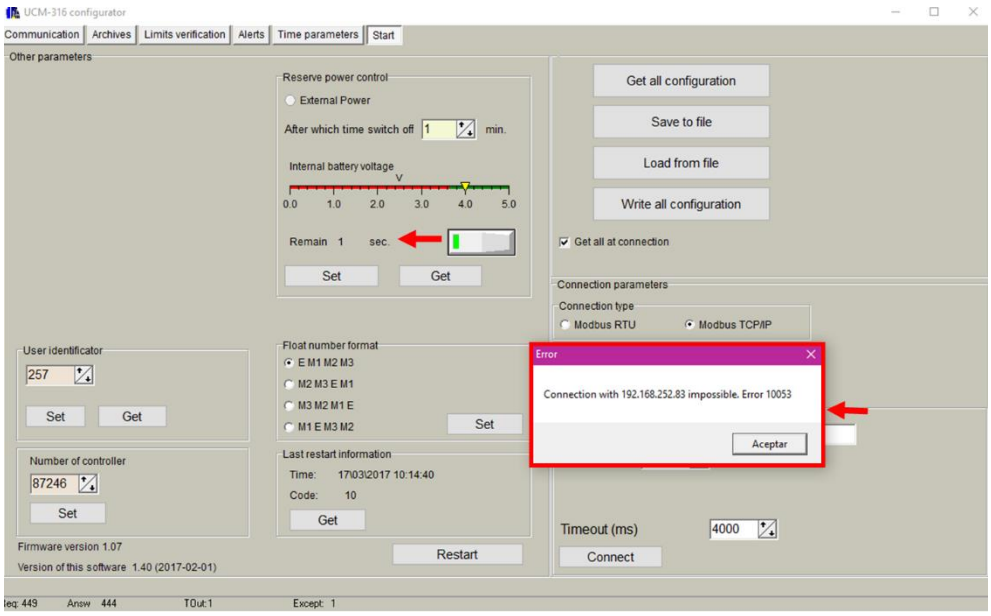


Figure 15. Backup battery lifetime countdown expired

Description	Register	Data format	Type
Power supply status (1: General ON/ 0: Battery ON)	4730	Char	R
CPU disconnect timeout value	4731	Int16	W
CPU disconnect timeout current countdown value	4732	Int16	R
Internal power supply limit value	4733-4734	Float	R
Internal battery limit value	4735-4736	Float	R

Figura 16. Power supply supervisor Modbus register list

4 “Analog Inputs” tab

The UCM-316 has 6 analog inputs:

- Ain1-Ain3 - Voltage inputs (0-5VDC / 0-10 VDC)
- Ain4-Ain6 - Current inputs (0-5mA /0-20mA / 4-20mA)

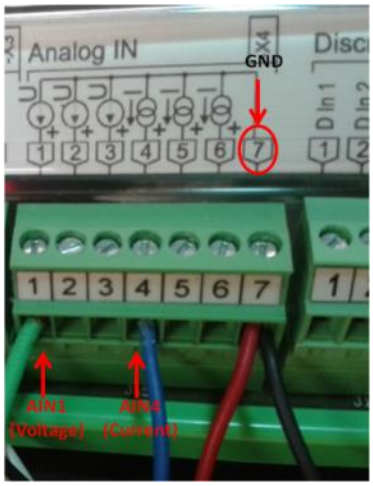


Figure 17. Analog inputs connection

Go to *Analog inputs>Configuration*:

- Enable Analogue input.
- Range: Select the sensor output range
- "MIN. value" / "MAX value" : Defines the sensor operation range
- "Low alarm limit" y "High alarm limit": In case of Alarms defined it configures the performance limits
- "Current value" is the current value read by the sensor and converted according the configured operation range.

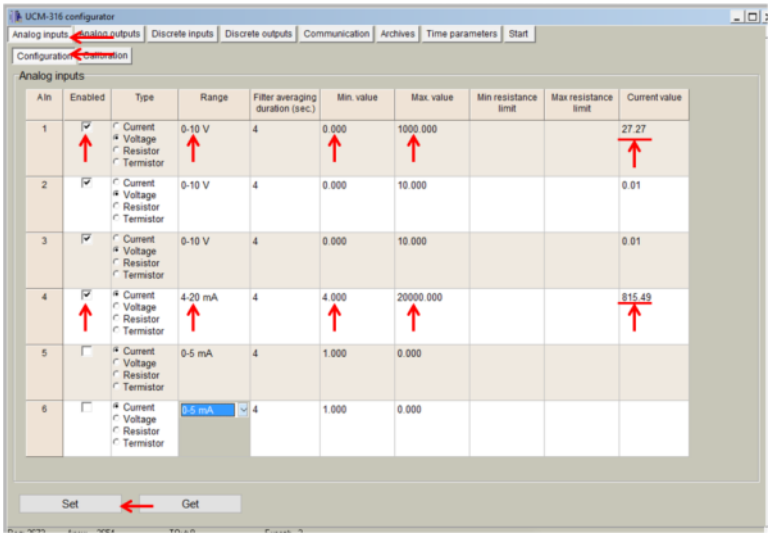


Figure 18. Analog inputs configuration

Apart from checking the correct Analog inputs performance by using the "current values" column of the UCM-316 Config. tool, it is possible to read directly the corresponding modbus registers by using a Modbus function "3":

	Modbus Register list							
Description	AI_1	AI_2	AI_3	AI_4	AI_5	AI_6	Data format	Type
Analog input use (0- disabled, 1 – enabled)	16200	16201	16202	16203	16204	16205	Char	R/W
Measuring type (0-voltage, 1-current, 2-resistance)	16206	16207	16208	16209	16210	16211	Char	R/W
Physical value (Float[4])	4418-4419	4420-4421	4422-4423	4424-4425	4426-4427	4428-4429	Float	R
Recalculated value (Float[4])	4430-4431	4432-4433	4434-4435	4436-4437	4438-4439	4440-4441	Float	R

Figure 19. Analog inputs UCM-316's Register list.

The "Physical Values" and "Recalculated Values" registers are real time registers. The values are updated each 1 second.

5 “Analog Outputs” tab

The UCM-316 presents 2-Channel Analog Output terminals which generate signals in the range between 0 to 10 VDC. Both can be used as Dimmer signals.

Figure 20. Analog outputs connection

In order to configure their values go to *Analog Output > Configuration.*
In order to configure the value of the analog output just move the slide bars to the desired value.

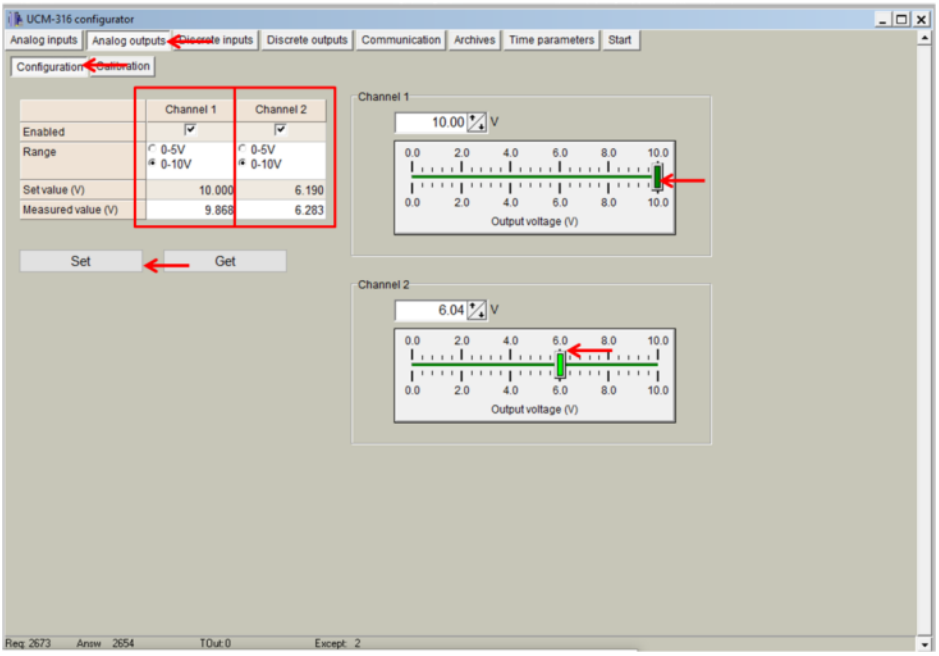


Figure 21. Analog output configuration

	Modbus Register list			
Description	AO_1	AO_2	Data format	Type
DAC code (0..1000) [2]	4360	4361	Int16	R/W
Voltage of Analog OUTPUTS (0..10) V [2]	4362-4363	4364-4365	Float	R/W
Usage of Analog OUTPU (0 - disabled, 1- Enabled) [2]	4366	4367	Char	R/W
Voltage range (0 - 0..5V, 1 - 0..10V) [2]	4368	4368	Char	R/W
Voltage rate A [2]	4370-4371	4372-4373	Float	R/W
Voltage rate B [2]	4374-4375	4376-4377	Float	R/W
Constant of voltage measuring filter (1..8sec) [2]	4378	4379	Char	R/W
Rate of voltage measuring A [2]	4380-4381	4382-4383	Float	R/W
Rate of voltage measuring B [2]	4384-4385	4386-4387	Float	R/W

Figure 22. Analog Outputs UCM-316's Register list

6 “Discrete Outputs” tab

The UCM-316 has two discrete relay outputs that can perform in 2 different working modes:

- Manually. It is possible to enable/disable the relay status by using the controls that appear in *Discrete outputs>Configuration* .

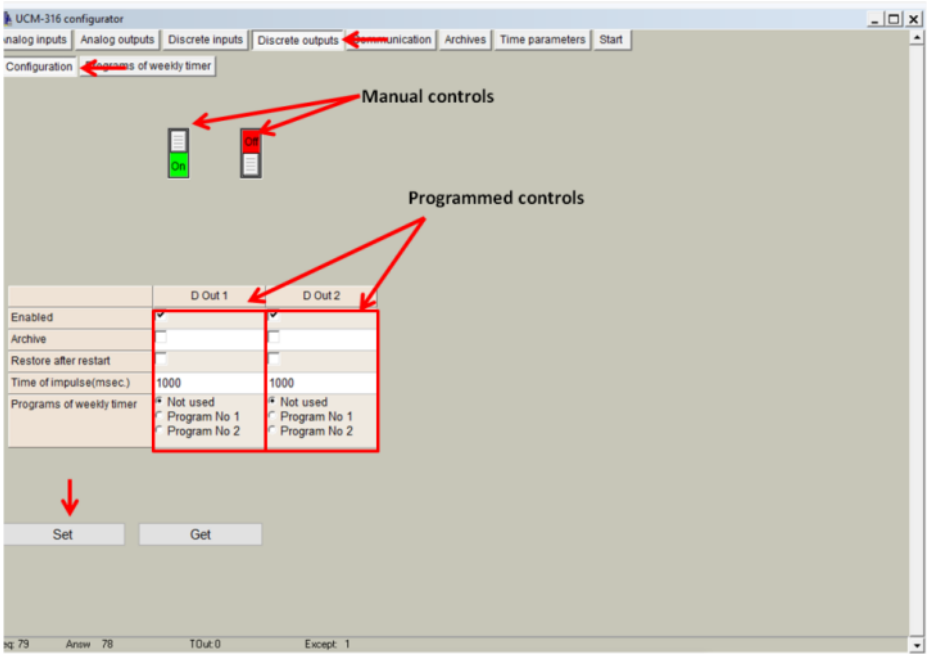


Figure 23. Discrete Outputs Configuration

Also it is possible to manage the state of the relays by using the UCM-316's register list with Modbus function '3' for reading or '16 for writing:

	Modbus Register list			
Description	DO_1	DO_2	Data format	Type
Discrete output usage. (0- channel not use, 1 – channel use)	4300	4301	Char	R/W
Discrete output state change archive (0 – not store, 1 – store)	4302	4303	Char	R/W
Discrete output restore (0 - don’t restore values after reset, 1 – restore values after reset)	4304	4305	Char	R/W
Timeouts of Discrete outputs in Impulse mode (100-20000 ms)	4306	4307	Int16	R/W
Discrete output state (0 - Output off, 1 – Output on)	4350	4351	Char	R/W
Status of Discrete output in Impulse mode (0 - disabled, 1- enabmed)	4352	4353	Char	R/W

	Modbus Register list			
Description	DO_1	DO_2	Data format	Type
Discrete output usage. (0- channel not use, 1 – channel use)	4300	4301	Char	R/W
Discrete output state change archive (0 – not store, 1 – store)	4302	4303	Char	R/W
Discrete output restore (0 - don't restore values after reset, 1 – restore values after reset)	4304	4305	Char	R/W
Timeouts of Discrete outputs in Impulse mode (100-20000 ms)	4306	4307	Int16	R/W
Discrete output state (0 - Output off, 1 – Output on)	4350	4351	Char	R/W
Status of Discrete output in Impulse mode (0 - disabled, 1- enabmed)	4352	4353	Char	R/W

Figure18. Discrete Outputs UCM-316's Register list

- Programmed: It is possible to program 2 different working calendars to the discrete outputs in *Discrete outputs> programs of weekly timer* and load them to the different discrete outputs:

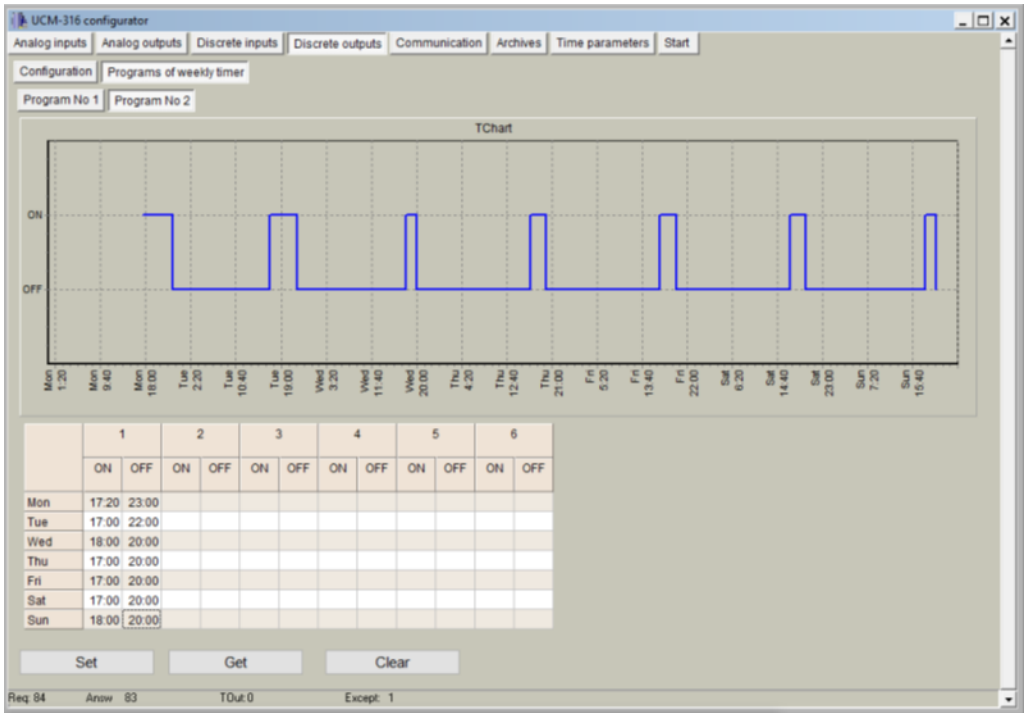


Figure 24. "Discrete outputs" programmer

7 “Discrete inputs” tab

Discrete inputs can be configured within this tab. They are shown organized in columns and configuration parameters are shown in rows as follows:

- "Enabled": user enable/disable discrete inputs to be used. In order to save memory, it is recommended to only enable inputs in use.
- "Current State": Graphical representation of current status (open/closed).
- “Impulse quantity”: Number of pulses counted since last set to “0”
- “Impulse multiplier”: Gain value for each pulse counted.
- “Value”: calculated by multiplying impulse quantity and impulse multiplier.
- "Debounce time": only pulses received within one or more “Debounce time” intervals are registered.
- "Mode":
  - "Discrete Input": input works as a standard discrete input detecting its current state (1 / 0)
  - “Impulse counter”: input is used to count pulses such as from a gas meter.
  - “Alarm signal”: input is used as an alarm input.
- "Alarm state": If "Alarm signal" option is selected, controller will raised an alarm when one of the following state is reached: "Open", "Close", "Both cases".
- "Enable archiving": If enabled, events produced by discrete inputs are stored in the datalogging archive.
- "State to archive": selects the discrete input state to be stored

In the lowest part of the screen, it is possible to clear the pulse counter of each discrete input or set it to an initial value if needed.

NOTE: After configuration is completed, click on "**Set**" button in order to save changes.

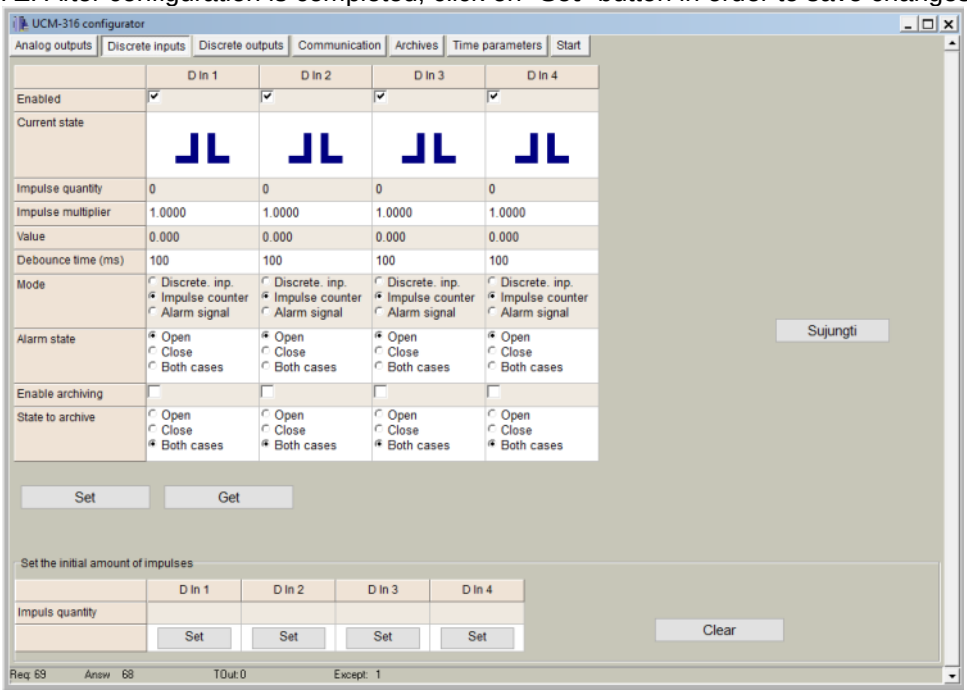


Figure 25. “Discrete inputs” tab

Discrete input parameters and values can be read and set using the following internal Modbus registers:

4200-4203	Discrete input use (0 - Disabled, 1 – Enabled)	Char	R/W
4204-4207	Mode of Discrete Input's (0- discrete input, 1 - impulse counter, 2- alarm signal)	Char	R/W
4208-4211	Discrete input archive type (0 – Open, 1 – Close, 2-Both cases)	Char	R/W
4212-4215	Discrete input alarm state (0 – Open, 1 – Close, 2 – Both cases)	Char	R/W
4216-4219	Discrete input archive (0 – store, 1 – not to store)	Char	R/W
4220-4223	Discrete input debounce time ms (0 -1000 ms)	Int (16 bit)	R/W
4224-4227	Discrete input state (0 – Open, 1-Close)	Char	R
4228-4235	Impulse count	Int(32 bit)	R
4244-4251	Impulse count converted value (multiplier)	Float(32bit)	R

8 “Communication” tab

8.1 Communication > Ethernet

Ethernet interface parameters can be configured within this tab:

- "MAC number": Media Access Control address
- "IP address"
- "Gateway IP"
- "Mask"

NOTE: After configuration is completed, click on "**Set**" button in order to save changes.

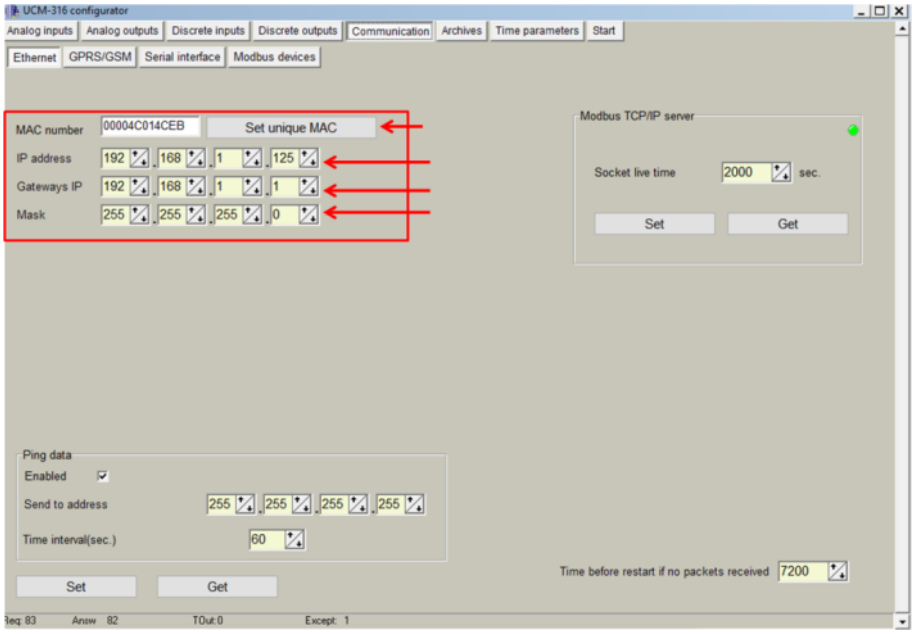


Figure 26. “Ethernet” configuration tab

8.2 Communication > 3G/GPRS

As previously described, UCM-316 can be configured through a GPRS link. In order to do so, user must enable GPRS connection as shown below. Then, click on "**Set**" button in order to save changes.

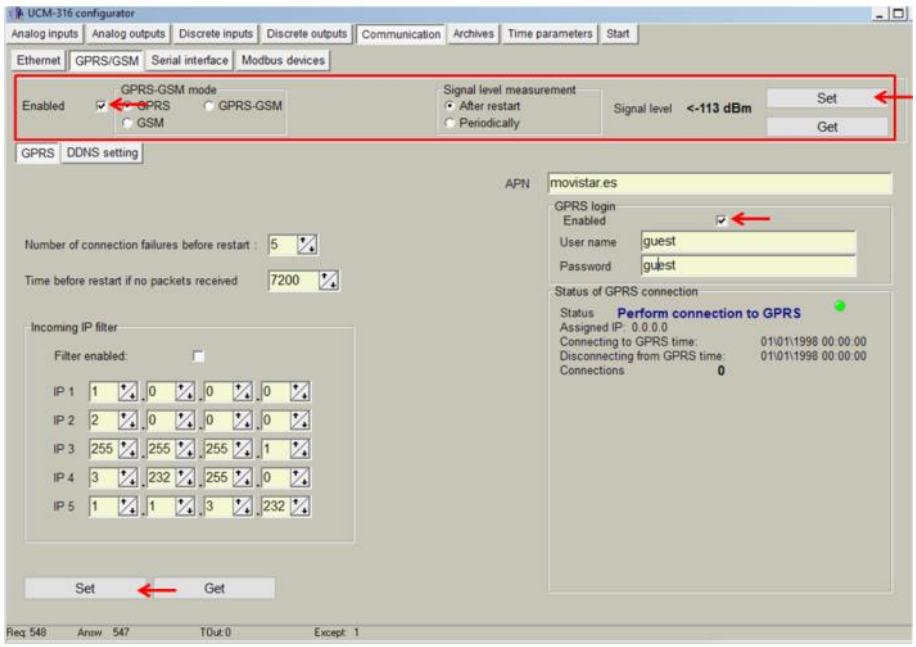


Figure 27. "GPRS" Tab. Enabling communication

Within this tab, different services can be configured or checked.

1. 3G/GPRS connection parameters:
   - "APN": access point name provided by Internet Service Provider (ISP).

   If needed by ISP, credentials can also be configured here:
   - "Username": provided by ISP.
   - "Password": provided by ISP.

NOTE: After configuration is completed, click on "**Set**" button in order to save changes.

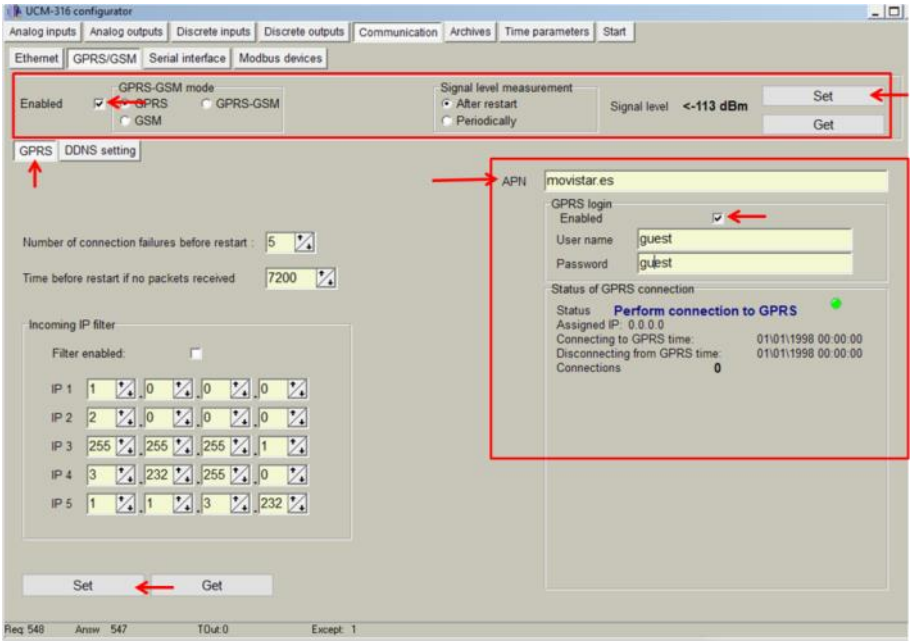


Figure 28. "GPRS" tab. Internet Service Provider access data configuration

2. Connection status. Once GPRS connection is established, status will be shown as below:

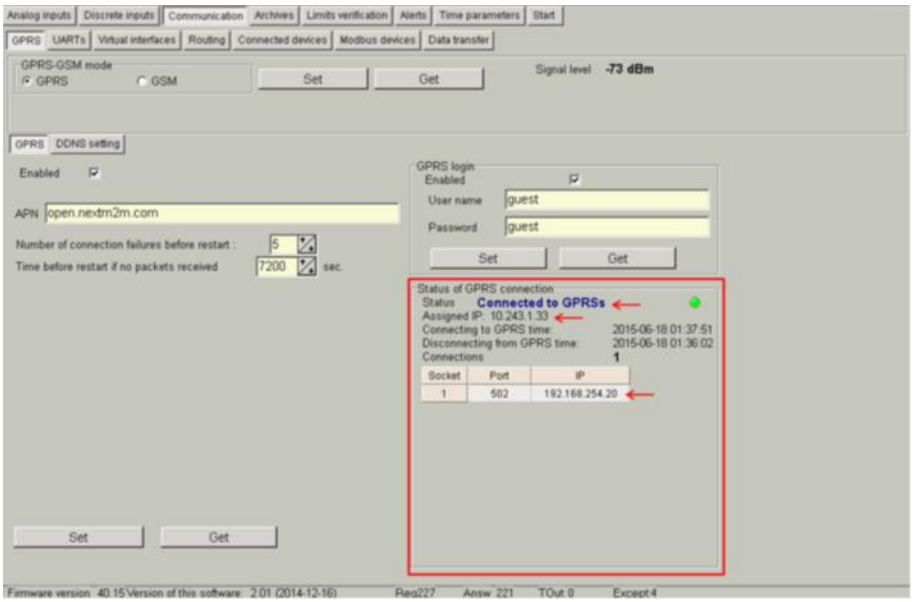


Figure 29. "GPRS" tab. Connection status

3. DynDNS account configuration (Not supported by all models): in order to avoid the need to have a fixed IP address to be able to remotely access the device, it is possible to set up a DynDNS account under the "DDNS setting". Steps to be followed are:
   - Select “Enable”
   - Fill in information according to your DynDNS account
   - Click on "Load from file" and select "dyndns.org_Register_String.txt " which contains the connection string to be sent to DynDNS servers.

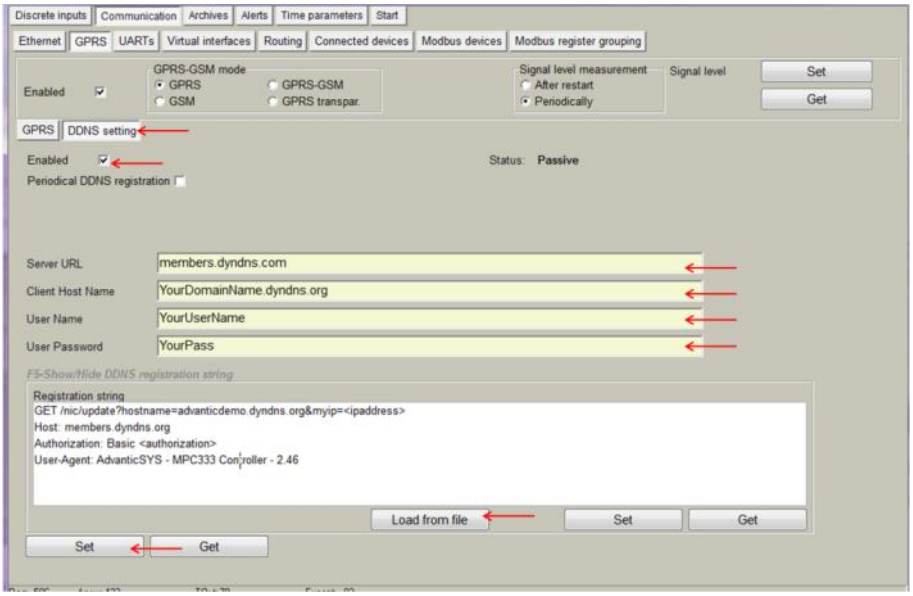


Figure 30. “GPRS” tab. DynDNS configuration

NOTE: After configuration is completed, click on "**Set**" button in order to save changes.
NOTE: It is recommended to disable GPRS connection if not used.

8.3 Communication > UARTs

Each UART can be configured individually. It is recommended to check peripheral devices UART constraints before setting up parameters in the controller configuration tool.

NOTE: All devices connected to the same UCM-316 UART must have the same communication parameters.

- "Bode": Transmission rate (bauds per second).
- "Parity": Communication Parity.
- "Data bits": Number of data bits within the communication packet.
- "Stop bits": Number of stop bits within the communication packet.
- "Packetization":
  - "time": One packet time has been reached, it is considered that the packet has been properly sent.
  - "Symbol". Every time a "packet symbol" is received, it is considered that the packet has been properly sent.
  - "Length". Once the "packet byte count" has been reached, it is considered that the packet has been properly sent.
- "Packet time": Transmission duration.
- "Packet symbol": Symbol which defines packet ending.
- "Packet byte count": Length which defines packet size
- "Mode": Full duplex or half duplex
- "Destination of DTR": bit which defines the "Data ready" state has been reached. It must be configured following peripheral devices connected to UCM-316 UARTs vendor information. By default, if this information is not available, it is recommended to select "OFF when send" option.

NOTE: After configuration is completed, click on "**Set**" button in order to save changes.

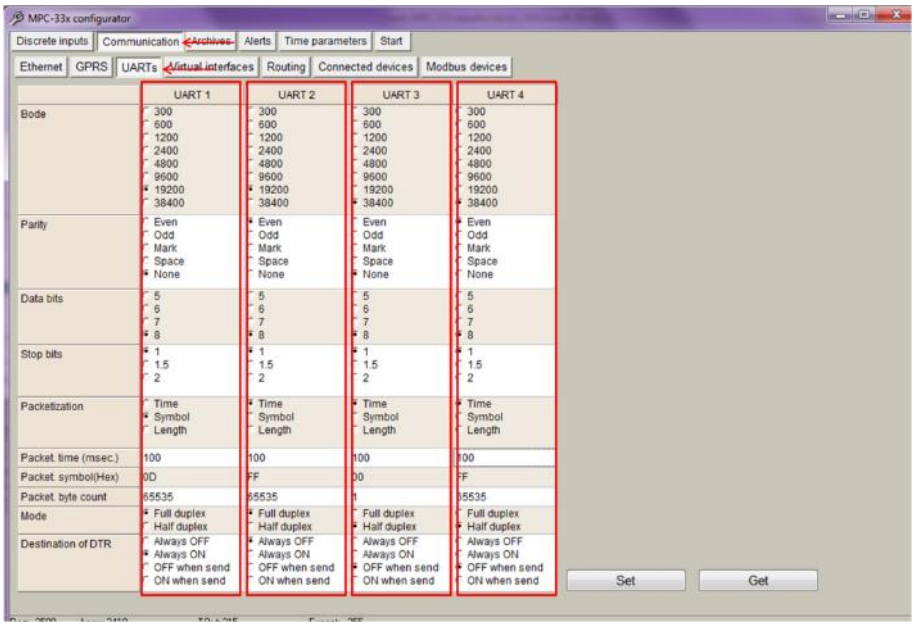


Figure 31. "UARTs" tab

8.4 Communication > Virtual interfaces

The UCM-316 can perform as communication gateway Modbus server/client and datalogger simultaneously. In order to set up these options, different virtual interfaces are needed as shown below

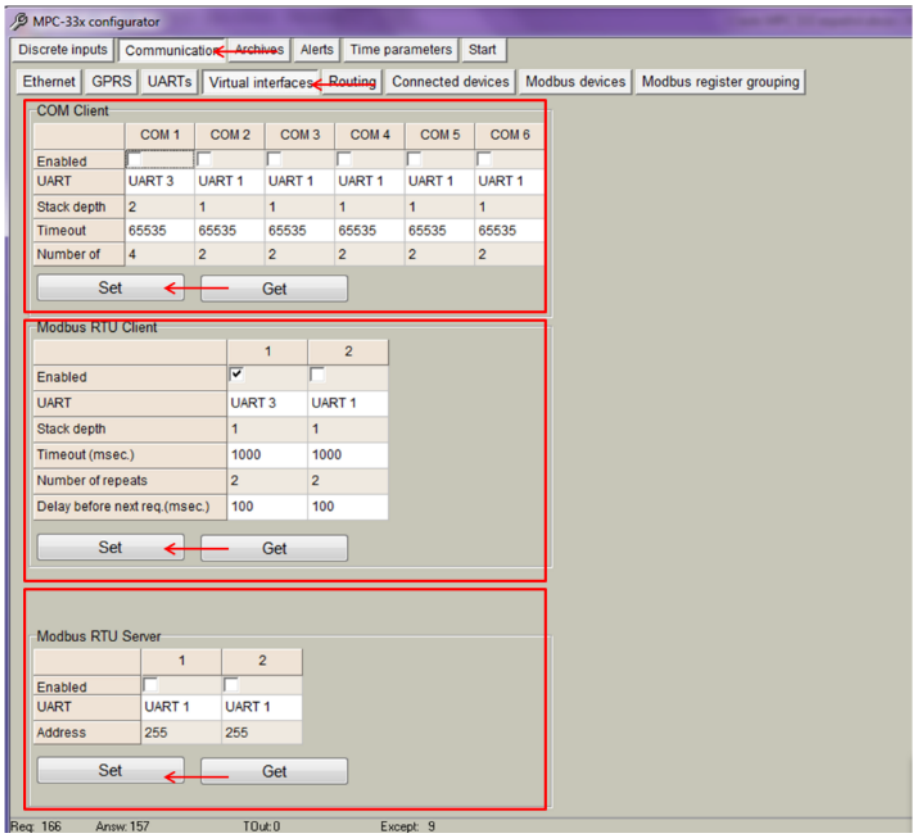


Figure 32. "Virtual interfaces" tab

- "COM Client". It is needed to configure a COM Client every time a "transparent" communication mode or M-Bus compatibility is needed. This is mandatory in order to read devices not compatible with Modbus RTU/TCP protocols. Configuration parameters are:
  - "Enable": Do not enable any COM client if not needed.
  - "UART": Select the UART number in which a COM Client will be configured.
    NOTE: Once a given UART is selected to be a COM client, it cannot be used with any other configuration such as Modbus client/server.
  - "Stack depth": number of parallel executions that can be done in parallel by the COM client.
  - "Timeout": it defines the amount of milliseconds defined as time out.
  - "Number of repeats": number of retries defined in case of transmission error.

  NOTE: COM Client must always be used when peripheral devices connected to a given UART use protocols such as M-Bus, IEC-102, DLMS, etc.
  NOTE: After configuration is completed, click on "**Set**" button in order to save changes.

- "Modbus RTU Client". This mode working mode must be used when the UCM-316 behaves as master in a Modbus RTU network (it sends Modbus requests to the slaves connected to the Modbus RTU network). These requests will be defined under the "Modbus devices" tab. Parameters to be configured are:
  - "Enable": Do not enable any Modbus RTU client if not needed.
  - "UART": Select the UART to be associated to the Modbus RTU client.
    NOTE: Once a given UART is selected to be a Modbus RTU client, it cannot be used with any other configuration such as COM client.
  - "Stack depth": number of requests that can be stacked in the UART buffer. It is recommended to set this value to 1 by default.
  - “Timeout”: it defines the amount of milliseconds defined as time out.
  - "Number of repeats": number of retries defined in case of transmission error.
  - "Delay before next request": In case peripheral devices need some “extra time” to answer after a received request

  NOTE: After configuration is completed, click on "**Set**" button in order to save changes.

- "Modbus RTU Server". This mode is used when the UCM-316 will be used as Modbus slave in a network. Requests from a Modbus server will be received and answered.
  - "Enable": Do not enable any Modbus RTU server if not needed.
  - "UART": Select the UART to be associated to the Modbus RTU server.
    NOTE: Once a given UART is selected to be a Modbus RTU server, it cannot be used with any other configuration such as COM client.
  - "Address": Define Modbus address for UCM-316. Modbus master must send requests to the given address.

  NOTE: After configuration is completed, click on "**Set**" button in order to save changes.

8.5 Communication > Routing

- **Modbus TCP/IP - ModBus RTU**
  The UCM-316 can also forward Modbus packets from a TCP port to an Modbus RTU client. In order to do so, Modbus TCP/IP server mode must be always enabled as shown in the figure. Also "Socket live time" parameter must be configured given that it is the duration in which socket is kept active. When the device initiating communication sends a request command to the slave device, communication will be shut down when this time is reached.
  This routing mode can be done in two ways:
  - Destination "TCP port": This mode enables assignment of a TCP port to each Modbus RTU device as previously configured under *Communication>Virtual interfaces>Modbus RTU Client* tab.
  - Destination "Modbus address": Within this mode, user can identify Modbus addresses to each Modbus RTU device as previously configured under *Communication>Virtual interfaces>Modbus RTU Client* tab. With this configuration, Modbus commands can be sent to devices within the network making use of the specific device Modbus address and the UCM-316 IP address and TCP port 502.

  NOTE: After configuration is completed, click on "**Set**" button in order to save changes.

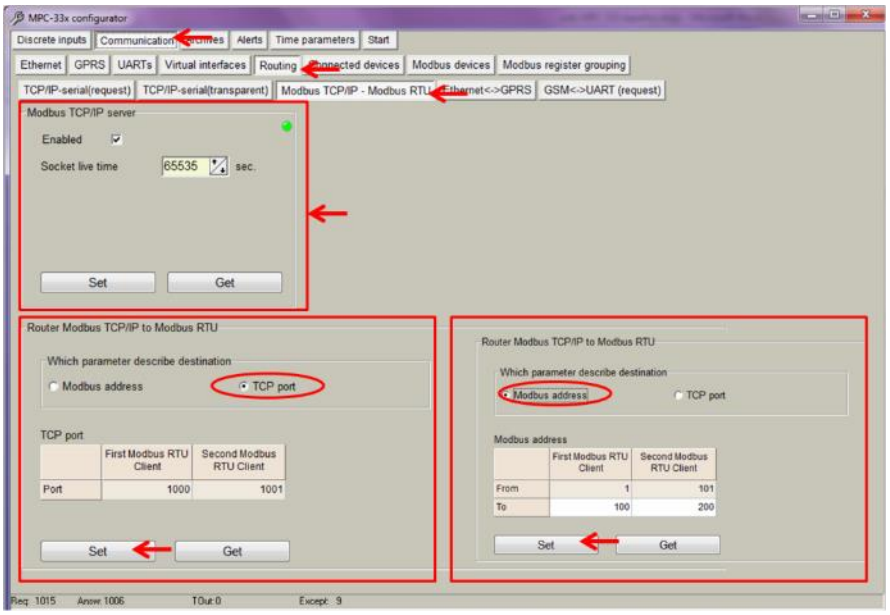


Figure 33. "Communication > Routing" tab. Modbus TCP/IP – Modbus RTU routing configuration

8.6 Communication > Connected devices

Within this section, M-Bus communication can be configured given that UCM-316 is able to collect data from up to 20 M-bus devices. The UCM-316 automatically detects standard M-Bus devices. In the following pages, a detailed description of each M-Bus meter configuration step is done:

- Enable COM Client under *Communication>Virtual interfaces>COM Client* tab.
- Go to *Communication > Connected devices > Mbus devices > Configuration* and configure the following parameters:
  - *"Enabled":* Select which MBus interface will be active.
  - *"COM Client":* Select COM Client previously configured.
  - *"Amount of meters":* Configure the number of M-Bus devices to be read.
  - *"Read Period"*: Reading interval in minutes.

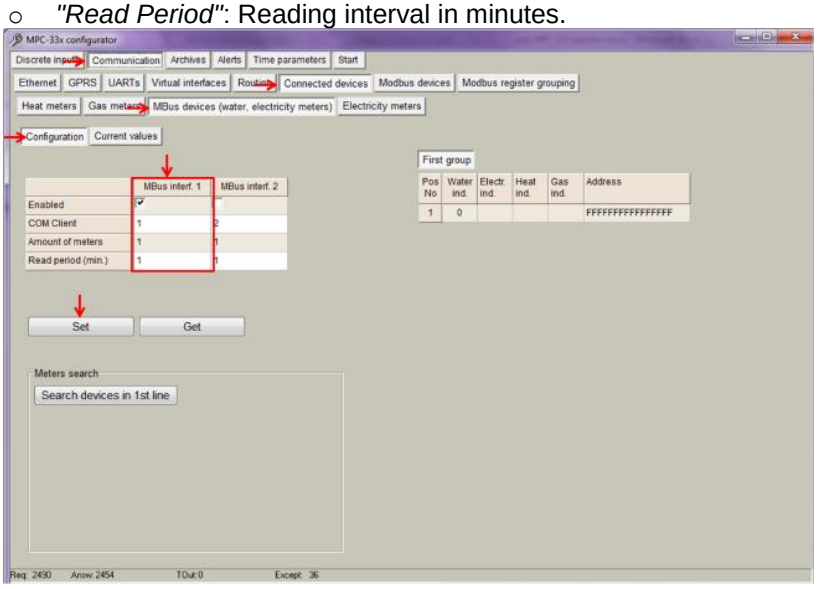


Figure 34. "M-Bus devices" tab. Communication configuration

NOTE: After configuration is completed, click on "**Set**" button in order to save changes. Also, perform a hardware reset.

- Once UCM-316 has been restarted, go to *Communication>Connected devices>Mbus devices>Configuration* and click on *"Search devices in 1st line" button.*
  After a few seconds, a list including all the M-Bus devices connected to the network will appear:

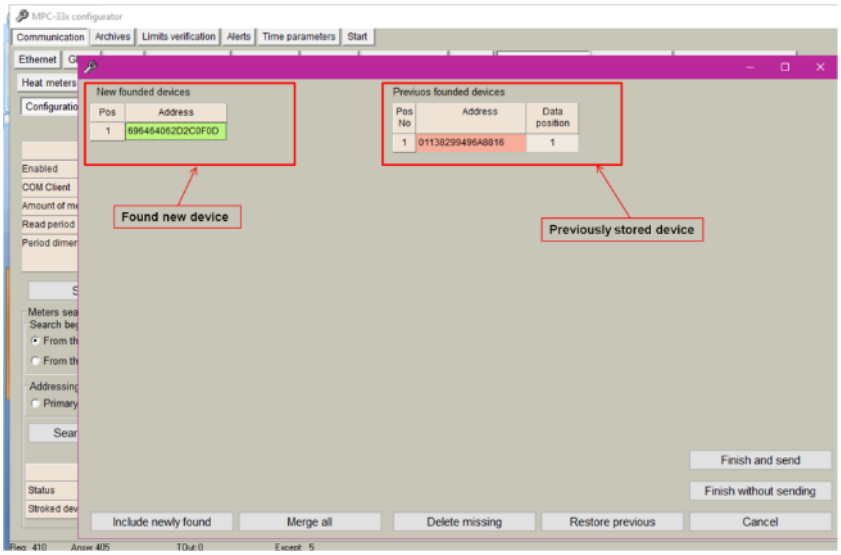


Figure 35. MBus devices Self-discovery and steps to be followed.

Once a new device is discovered, it must be added to the Mbus client, the following steps must be followed:

- Click on ”Include newly found”
- Click on “delete missing” if you want to delete old meters which are not needed.
- Click on “Finish and send”

If several new devices are discovered, the following steps should be done:

- Click on “Merge all”
- Click on “Finish and send”

All devices online appear in green and the ones offline in red.

An step-by-step guide is shown in the following figures:

STEP 1: Including new devices

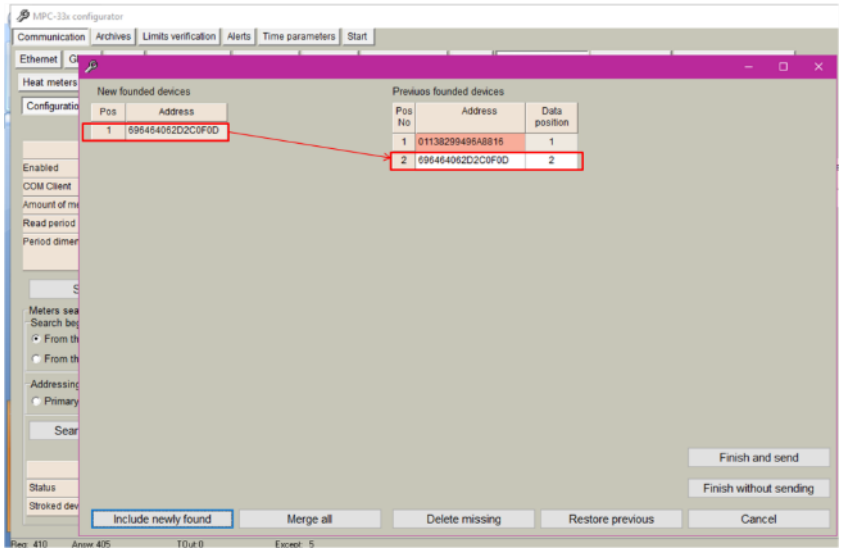


Figure 36. New device included in the M-bus client.

STEP 2: Delete missing devices

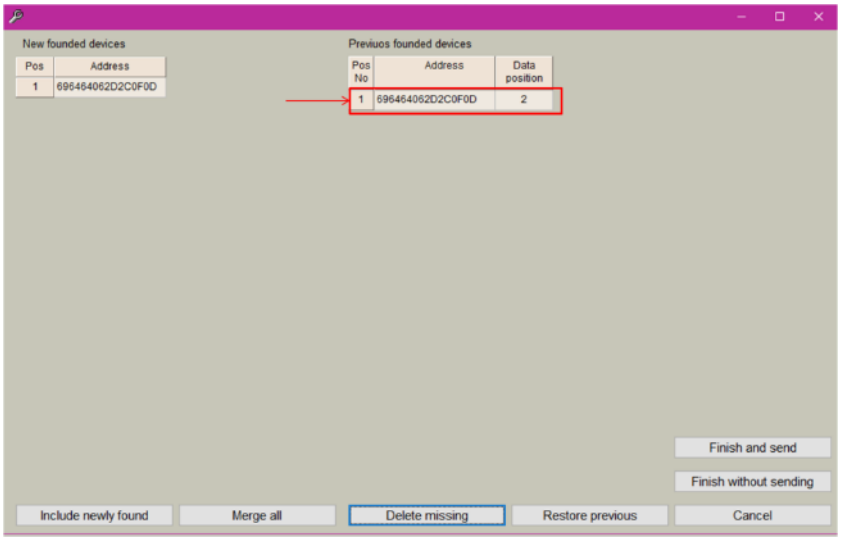


Figure 37. After delete missing

STEP 3: Finish and send

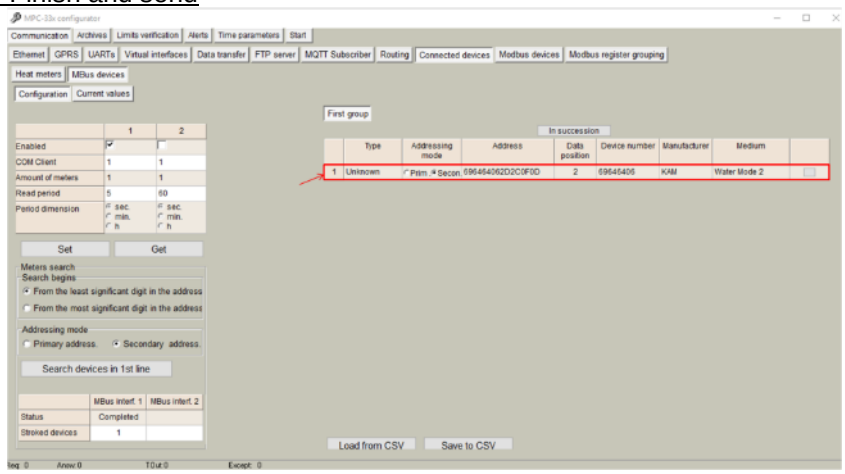


Figure 38. After finish and send

Once the new device is added to the Mbus client, it is recommended to modify the data position count in order to optimize the internal memory of the controller (from 2 to 1 in the example above). Once updated, click on "SET":

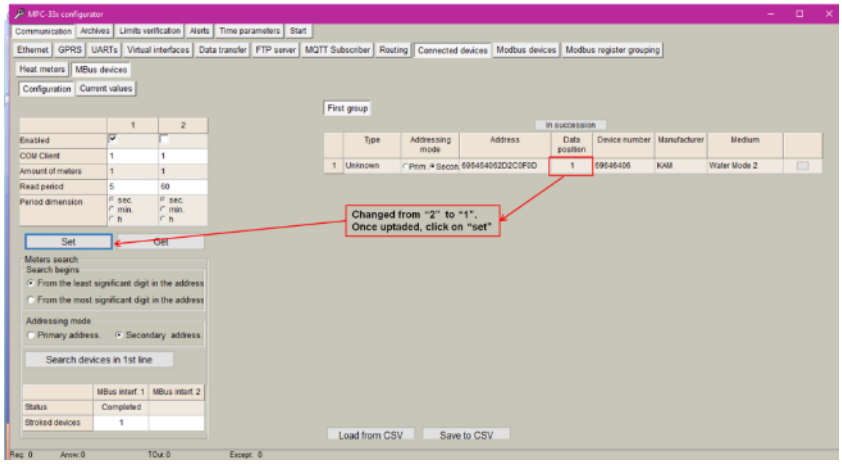


Figure 39. Updating data position

Once the M-bus client is configured, it is possible to read data available in the meter:

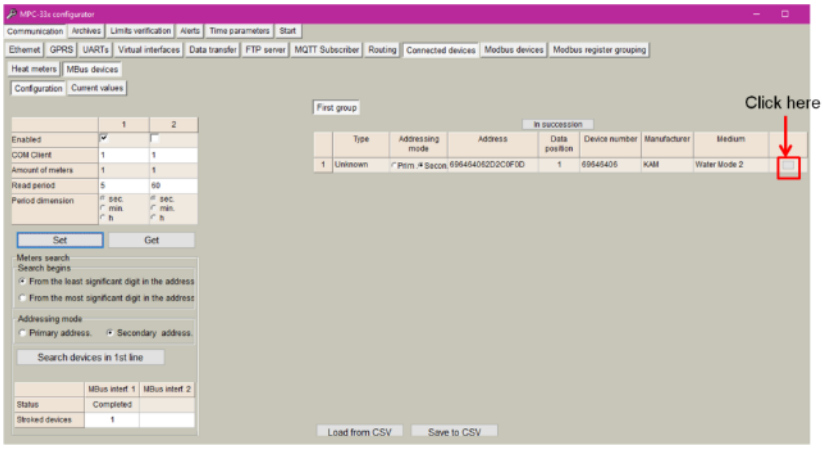


Figure 40. Click on "data/parameters" button

STEP 4: Click on "Read available parameters"

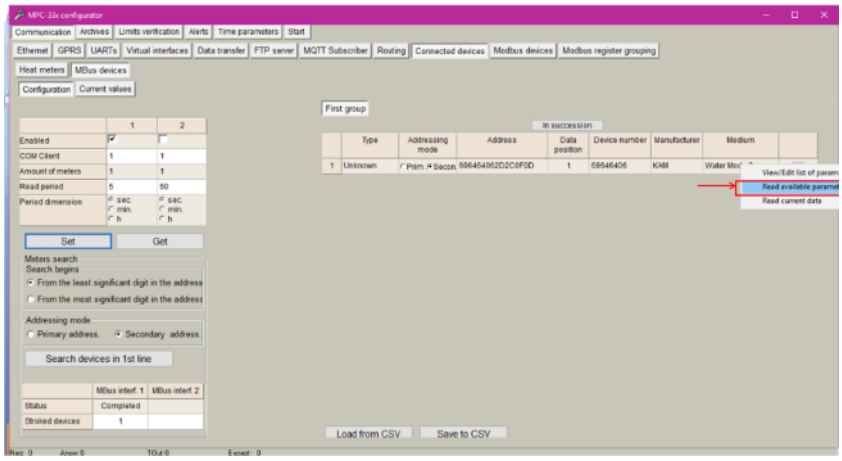


Figure 41. Read available parameters

A list of parameters will be shown. User must select which parameters provided by the M-Bus devices should be stored in the internal UCM-316 memory.

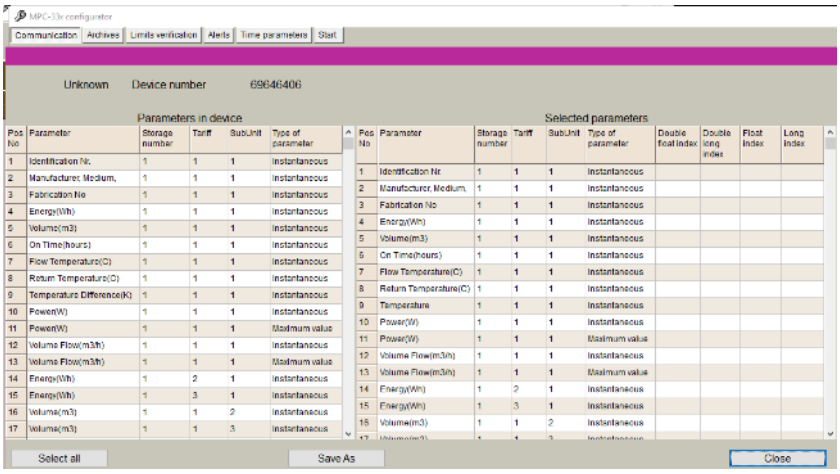


Figure 42. List of available parameters

STEP 5: Select M-Bus meter parameters to be stored

Each selected parameter must be configured with an ordering index according to the data format that the meter presents in its datasheet. This index will order the stored data in the internal memory map.

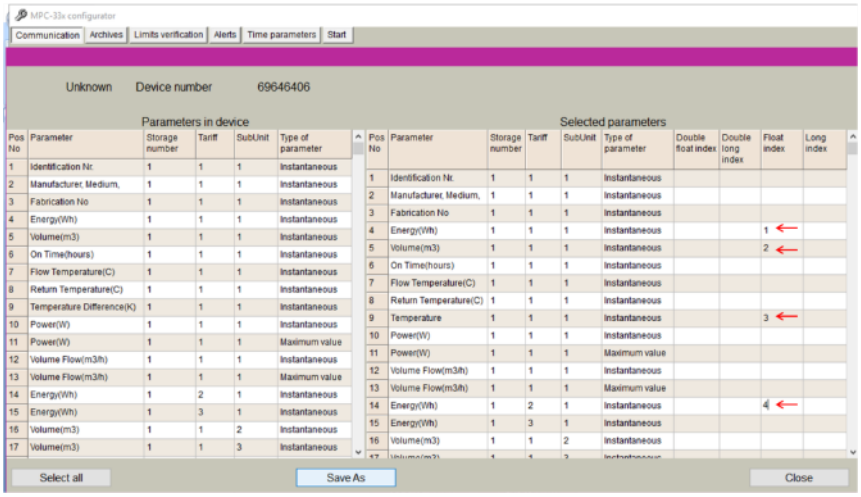


Figure 43. List of parameters indexes.

After indexing parameters, it is needed to save the configuration. Click on "Save As" and give it a name so that user can reuse this configuration for similar meters in the future

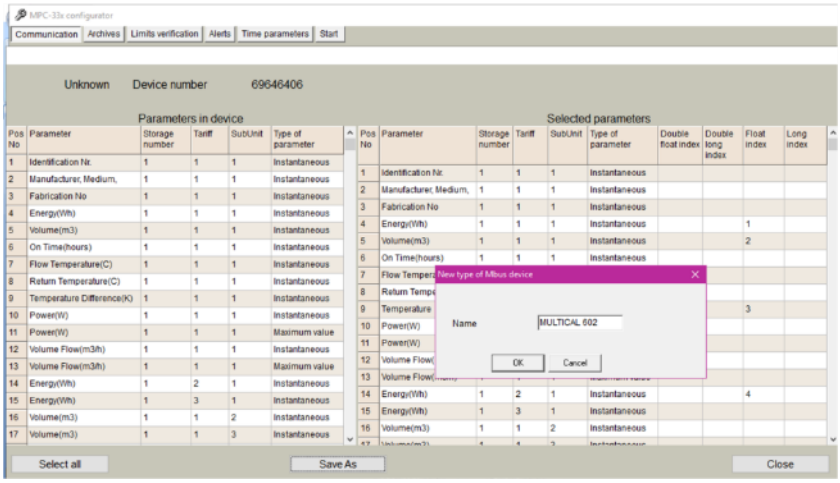


Figure 44. Saving the configuration.

Once the configuration is saved, it appears in the "Type" list. By clicking over the list you can select the current online configurations. After making the selection, click on SET:

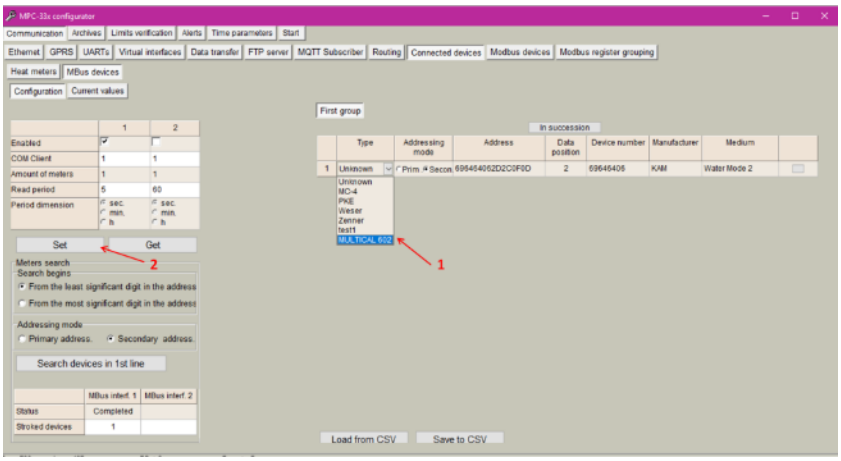


Figure 45. Saved configurations

STEP 6: Check current values

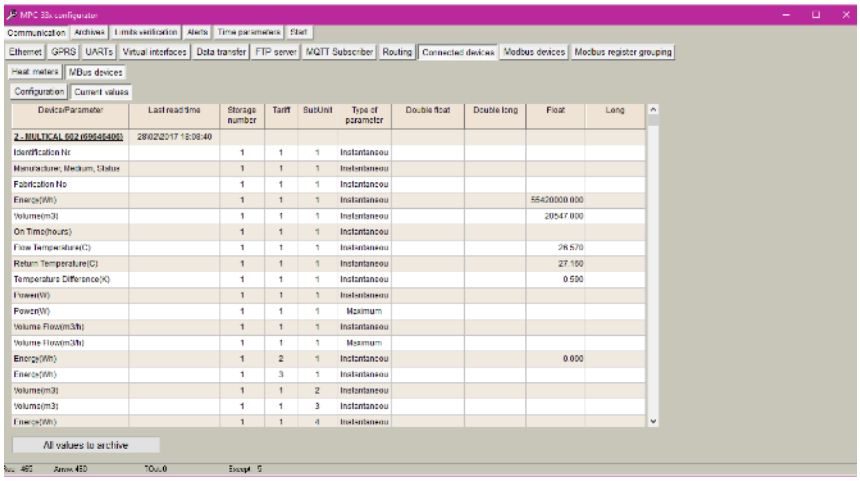


Figure 46. Mbus Current values

STEP 7: Configuring data logging

These data will be included into its corresponding UCM-316 Modbus register. The UCM-316 has a Modbus array structure to store M-Bus parameters. Thus, in order to collect specific parameters, user must select them by numbering within the array as shown in previous steps. There are different arrays for different data format as shown in the following table:

Registers	Mbus meters data (1...20)	Data format	R/W
	1-st Mbus counter's data		
24000	Status (0-not read, 0xffff-read)	Int16	R
24001-24002	Reading time (UNIX time)	Int32	R
24003-24082	Double data[20]	F64	R
24083-24098	Long data[4]	Int64	R
24099-24158	Float data[30]	F32	R
24159-24178	Int data[10]	Int32	R
	2-nd Mbus counter's data		
24179-24357	...		R
	50-th Mbus counter's data		
32771-32949	...		R

In the previous example, we have given float index “1” to “Energy(Wh)” parameter. Thus, we will find it in Modbus register 24099 while “Fabrication number” has been given double float index “1” being stored in Modbus register 24003.
This configuration can be saved by clicking on the “Save as” button.

it is possible to send these data automatically to the user archive memory (for datalogging) by clicking on "All values to archive"

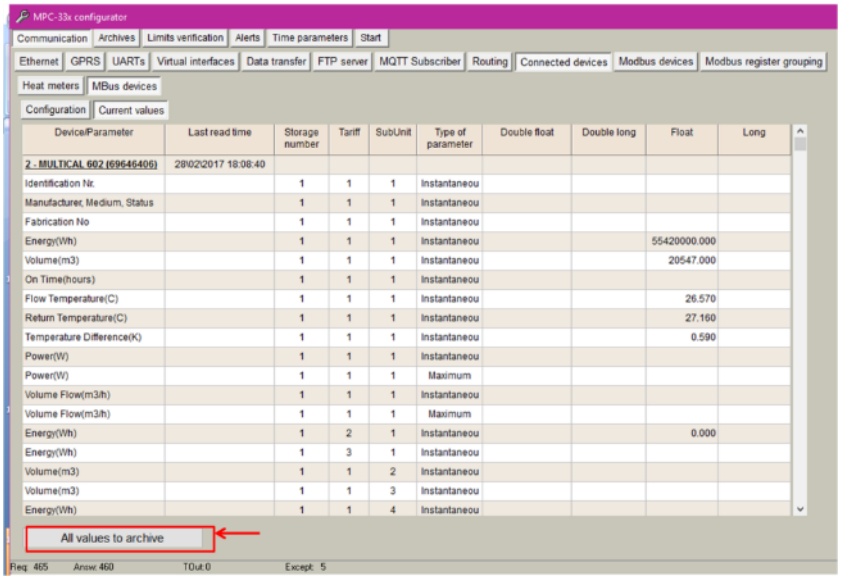


Figure 47. All values to user archive

NOTE: If there are some registers configured previously in "common parameters" to be stored in the user archive they will be deleted by using this function. In case of using user archive memory it is recommended to configure first the Mbus client module.

After click in "All values to archive" all selected parameters will be automatically configured in "Common parameters" list, which will be stored in "User archive". In order to update changes, click in "SET" button".

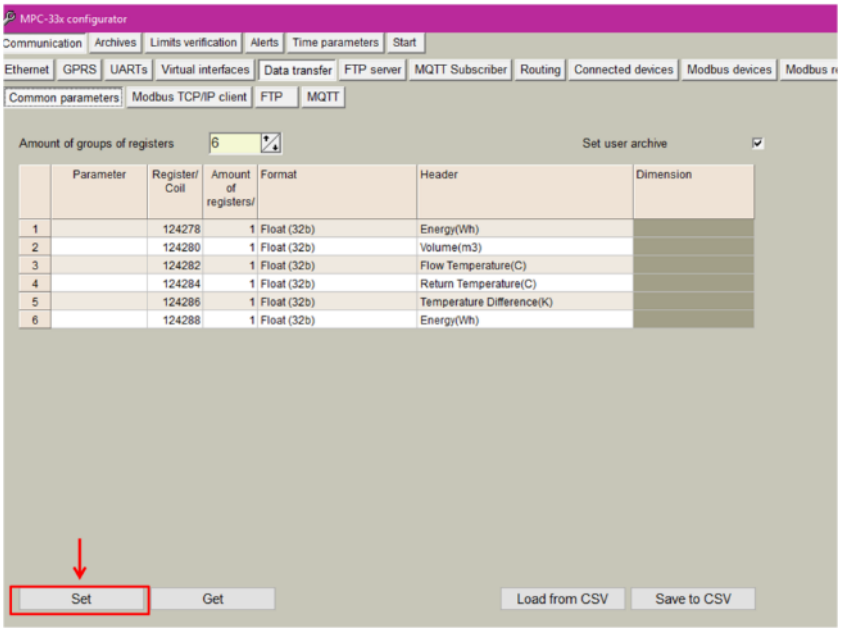


Figure 48. Common parameters configuration for MBus data storage

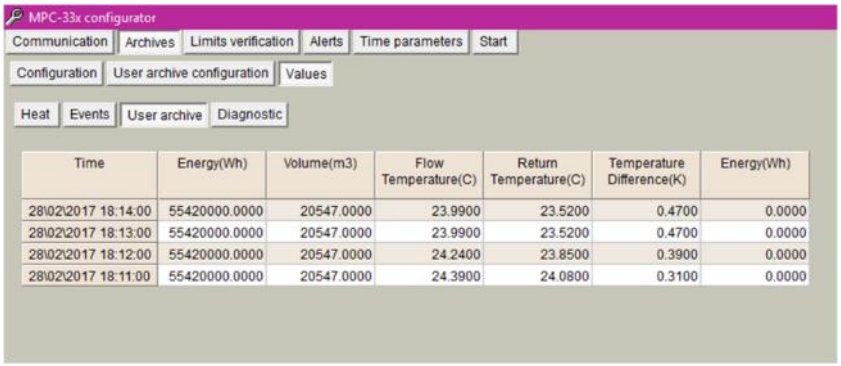


Figure 49. Mbus parameters in user archive module

8.7 Communication > Modbus devices

There are two methods for reading Modbus devices connected to the UCM-316.

✓ By using the MODBUS RTU client to request data from MODBUS RTU devices: *Communication>Modbus devices>Configuring Modbus devices> Modbus RTU client*

The UCM-316 can read up to 100 Modbus RTU devices through UART 'x' as shown in the following figure.

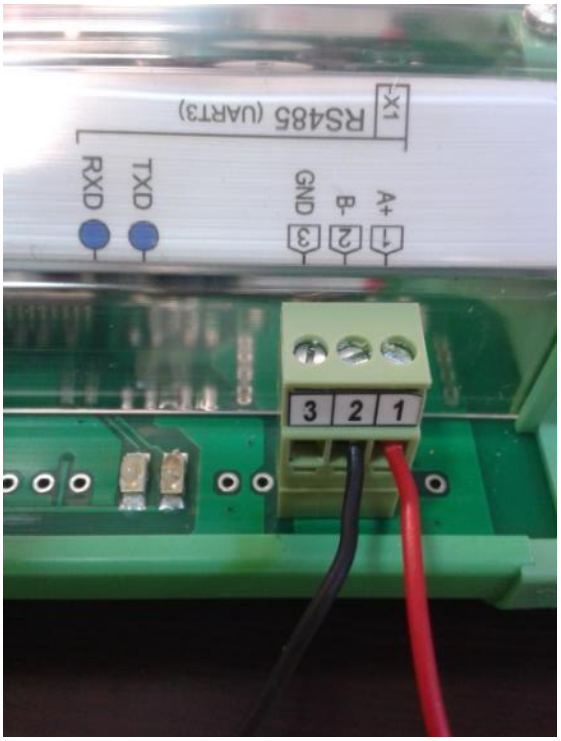


Figure 50 Connecting Modbus RTU devices to the UCM-316

In order to configure Modbus RTU client list, follow the next steps:

- Go to *Communication>Modbus Devices.*
- Once the virtual interface has been enabled under Modbus RTU client- 'UART x' , the list of requests for the Modbus client must be configured. For this purpose go to *Communication>Modbus devices>Configuring modbus devices> Modbus RTU client* .It must be configured as much lines as Modbus RTU requests required. The number of requests can be configured in "Amount of requests", where:
  - "Address": Slave device Modbus Address.
  - "Function": Modbus RTU function.
  - "Registers/coils ":Register/s address to be requested.
  - "Amount of registers/coils": number of registers to be read from the register address configured in "Register/coils"
  - "MPC- Reg. index": Internal UCM-316's RAM memory index where data is recorded. In case of UCM-316 it starts in the address 52000 (index =0 => RAM Modbus address=52000@DEC).
  - "Priority": It configures the request management priority.

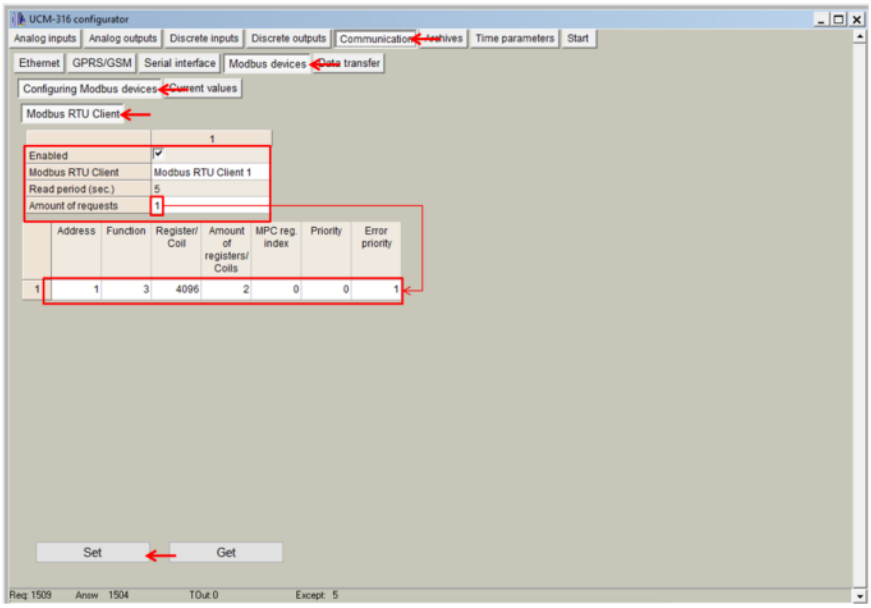


Figure 51. "Modbus devices" tab. Modbus RTU client parameters list configuration

NOTE: Maximum number of requests per each Modbus RTU Client is 50

NOTE: There exist 2 Modbus RTU clients. In case that both must work together 2 different UARTs must be used, one per each Modbus RTU client.

✓ By using the Modbus TCP client to collect data from Modbus TCP devices:
Communication>Modbus devices>Configuring Modbus devices> Modbus TCP client

In order to configure Modbus TCP client list, follow the next steps:

- Go to *Communication>Virtual interfaces>Modbus Devices>Configuring Modbus devices> Modbus TCP client.*
- User must configure as much lines as Modbus TCP requests required. The number of requests can be configured in "Amount of requests", where:
  - Type: Ethernet/GPRS
  - IP: Slave Modbus TCP IP Address
  - Port: Slave Modbus TCP port
  - "Address": Slave device Modbus Address.
  - "Function": Modbus function (3,4,16,...).
  - "Registers/coils ": Register/s address to be requested.
  - "Amount of registers/coils": number of registers to be read from the register address configured in "Register/coils"
  - MPC- Reg. index: Internal UCM-316's RAM memory index where data is recorded. In case of UCM-316 it starts in the address 52000 (index =0 => RAM Modbus address=52000@DEC).
  - Priority: It configures the request management priority.

  NOTE: In order to remove any request previously set, write '0' in its "Address" column.

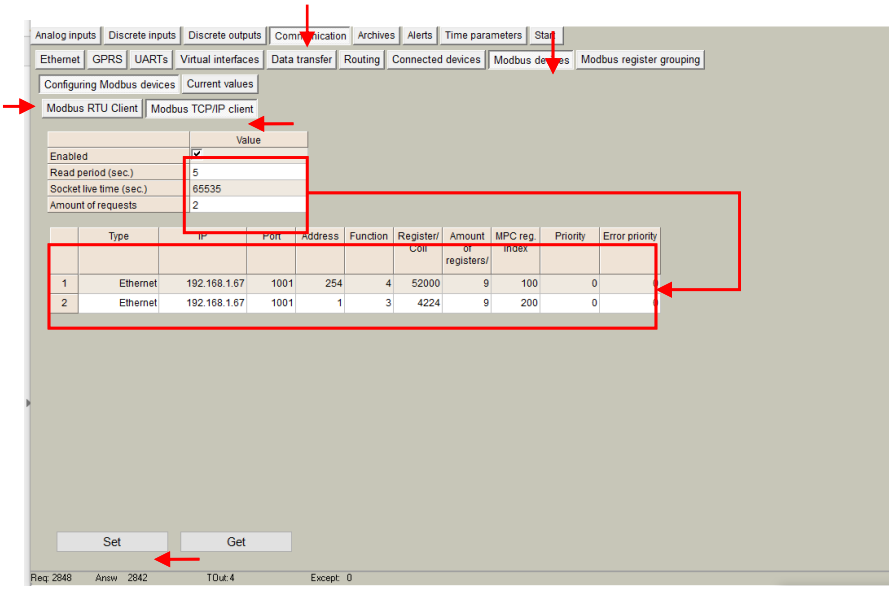


Figure 52. "Modbus devices" tab. Modbus TCP client parameters list configuration

After any of the previous method has been configured, it is possible to check the received information through the Modbus RTU/TCP client in "Current values" tab, also enabling correct performance testing.

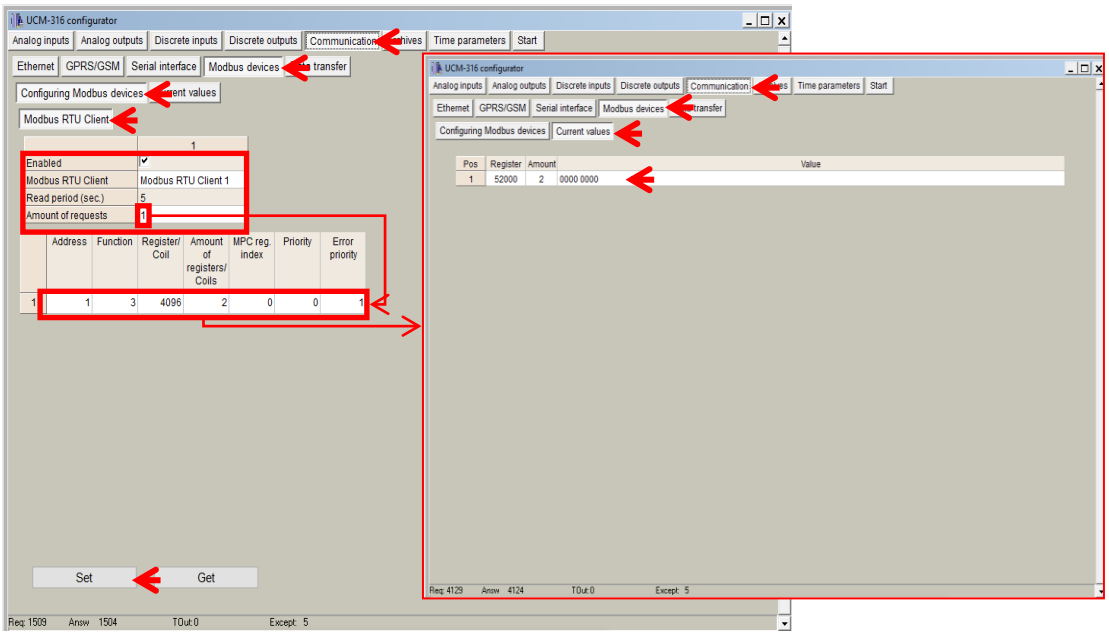


Figure 53. "Modbus devices" tab. Current values

8.8 Communication >Data transfer

Data collected by UCM-316 can be sent in a CSV file through the configuration of an FTP client inside the controller. This file is, thus, sent to a remote FTP server properly defined as shown below. FTP Configuration must be done in two steps:

1. Define CSV file structure: Go to *Communication>Data transfer>Common parameters>* and configure the following parameters:
    - "Amount of group of registers": Number of registers or group of registers to be stored in the CSV file.
    - "Set user archive". If selected, it enables automatic storage of selected registers in the internal memory. It is recommended to always select this option so that in case of file transmission failure, data can be retrieved and resent when communication is reestablished.
    - "Parameter". It is filled in automatically.
    - "Register/Coil" Initial Modbus register address.
    - “Amount of registers”. Number of registers to be stored from the initial Modbus registers address.
    - "Format": Data type of registered parameter.
    - "Header": Fixed column header to be written in CSV file.
    - "Dimension": Extra column in which data units can be stored.

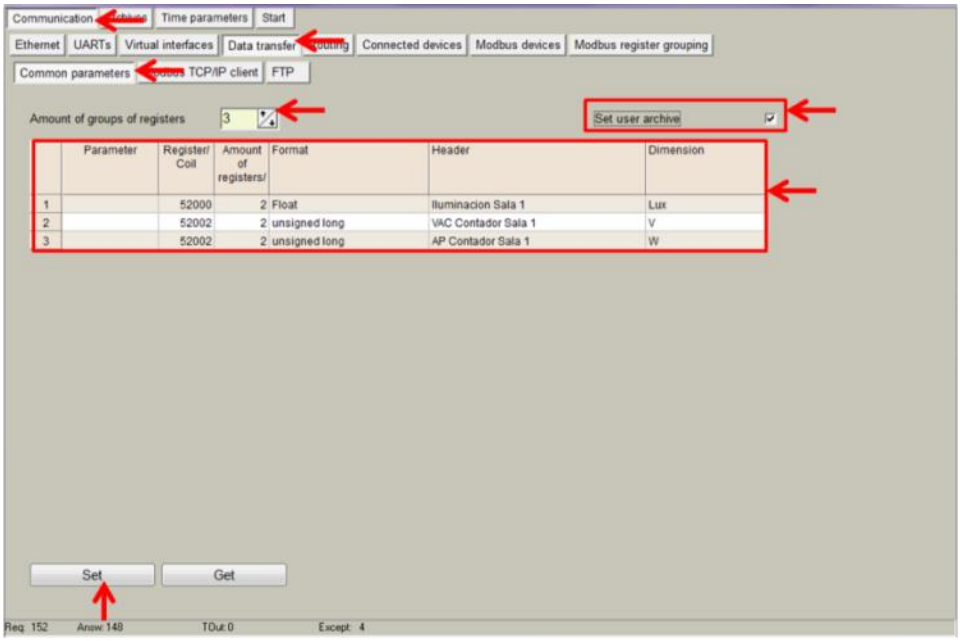


Figure 54. “Data transfer” tab. CSV file structure definition

NOTE: Go to *Archives>Configuration* and specify ´User archive (min)´ value to set the datalogging period. Every time this period is reached, a new entry into the datalogging memory will be created.

2. Configure FTP client: Go to *Communication>Data transfer>FTP>* and configure the following parameters:
    - “FTP server”: Up to 4 different FTP connections to remote FTP servers can be configured.
        - "Enabled": Select it to enable an FTP connection
        - "FTP Port": By default, 21 but can be changed.
        - "Transfer period": It defines interval between CSV file sending tasks. This period must be higher than the “User Archive” period previously set.

- "Number of last records to be read": It defines maximum number of previous data stored and not sent due to communication error. These data will be sent in a CSV file when communication is restored.
- "Transmission channel": It can be Ethernet or GPRS

- “URL and directory of FTP servers”: It defines the complete FTP server URL where CSV file will be hosted.
- Username and password of FTP server: to be configured in case credentials are requested by FTP server.

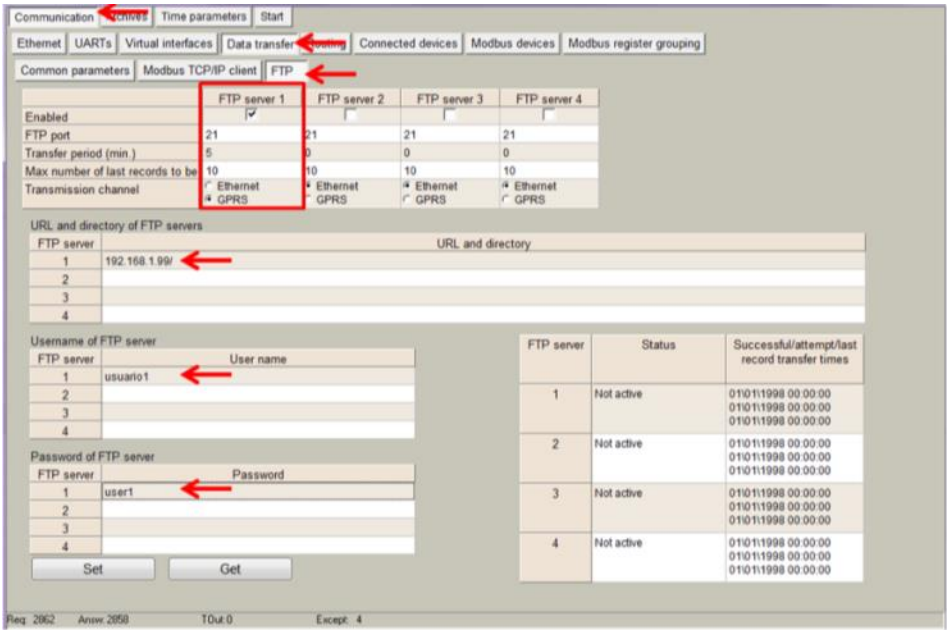


Figure 55. “Data transfer” tab. FTP client configuration

3. Configure MQTT publisher: Go to *Communication>Data transfer>MQTT>* and configure the following parameters:
   - “Topic”: A topic is a UTF-8 string, which is used by the broker to filter messages for each connected client. A topic consists of one or more topic levels. Each topic level is separated by a forward slash (topic level separator). Example: “building1/zoneA/room2”
   - “What type of data to be transferred”: It defines the functionality the device will have with regard to MQTT data sending:
     - “Disabled”: if selected, the device will not send anything through MQTT port.
     - “Current values”: UCM-316 will send real time values of parameters configured in Common Parameters tab. In this case, sampling/sending period can be set from 1 to 86400 seconds.
     - “User Archive records”: this feature sends data every datalogging period set in *Archives>Configuration>´*User archive (min)´ value.

   NOTE: After configuration is completed, click on "**Set**" button in order to save changes and “**RESTART**” (start menu>restart).

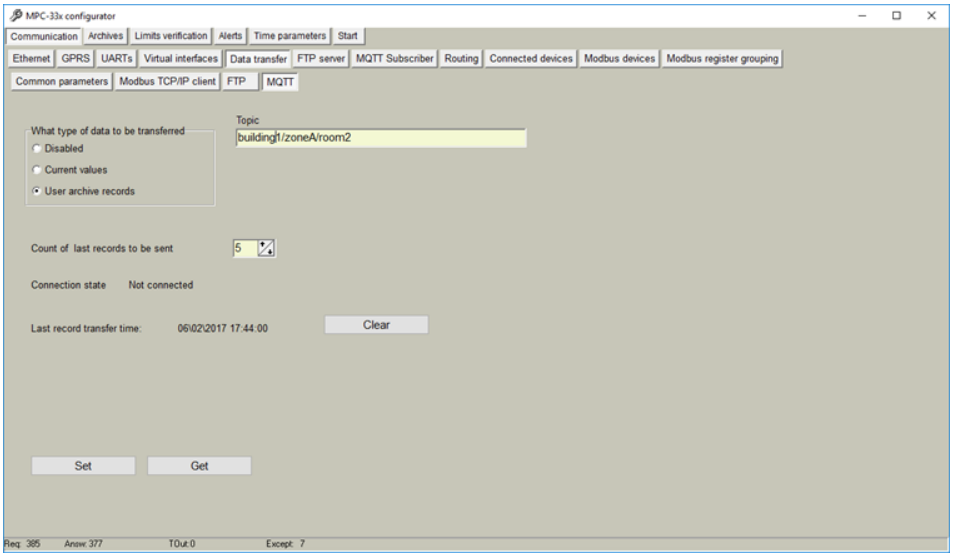


Figure 56. "Data transfer" tab. MQTT configuration

Once properly configured both this tab and Communication>MQTT Subscriber one, JSON formatted messages will be sent to the MQTT Broker (for example, RabbitMQ).

In the following example, a "user archive records" message with a discrete input status is sent:

```
{
 "SN":"86004",
 "name":"ucm316",
 "header":{
 "startTime":"2016-02-07T15:06:00.000Z",
 "endTime":"2016-02-07T15:06:00.000Z",
 "recordCount":2,
 "columns":{
 "0":{
 "id":"0",
 "name":"relay1",
 "dataType": "NUMBER",
 "format":"unsigned short"
 }
 },
 "data":[
 {
 "ts":"2016-02-07T15:06:00.000Z",
 "f":{
 "0":{"v":0}
 }
 }
 ]
 }
```

8.9 Communication > FTP Server

If the UCM-316 has a micro SD card installed, it can act as FTP server. In this tab, user can configure both user and password to be used as credentials to enter into the internal file system through an FTP connection.

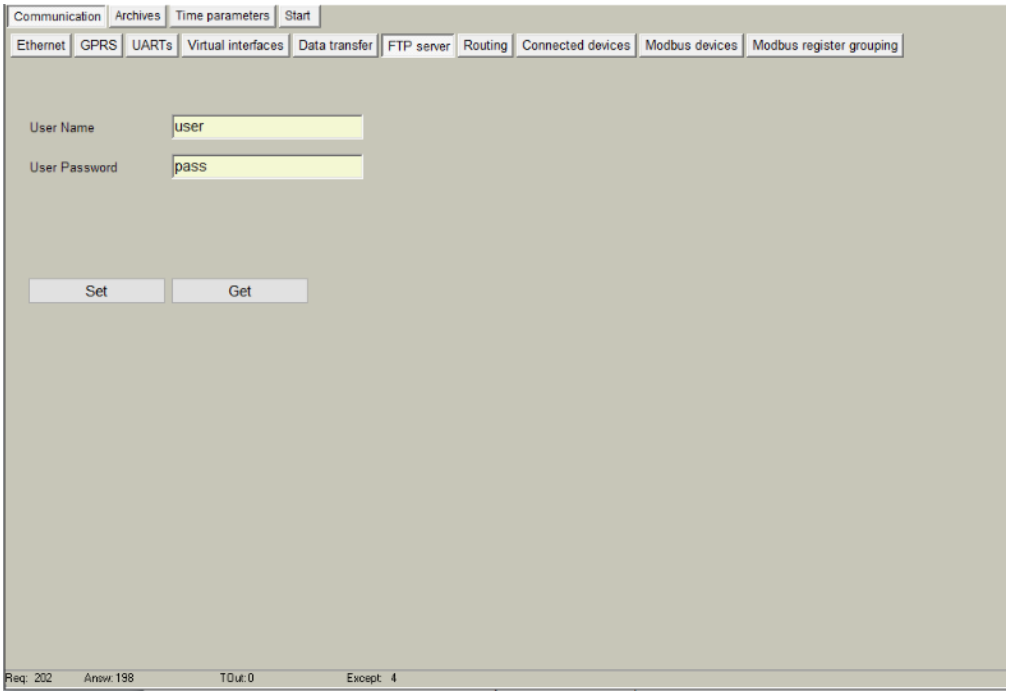
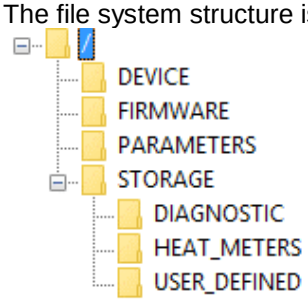
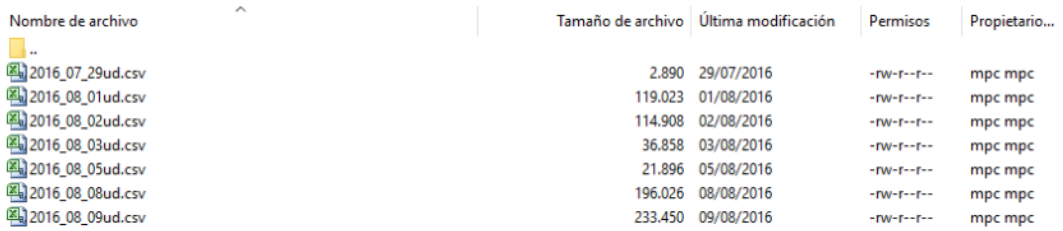


Figure 57. "Communication > FTP server" tab.

Once properly configured, user can access the internal file system making use of any FTP client (such as Filezilla).
The file system structure is as follows:



In the root, a "CURRENT_DATA.csv" file is stored. You will find all the data generated by the UCM-316 configured in "Communication > Data Transfer > Common parameters" tab and not yet sent to the remote FTP server.
Moreover, under "Storage" folder, files for each of the archives set in the "Archives" tab can be found. They are created on a daily basis.



Nombre de archivo	Tamaño de archivo	Última modificación	Permisos	Propietario...
..				
2016_07_29ud.csv	2.890	29/07/2016	-rw-r--r--	mpc mpc
2016_08_01ud.csv	119.023	01/08/2016	-rw-r--r--	mpc mpc
2016_08_02ud.csv	114.908	02/08/2016	-rw-r--r--	mpc mpc
2016_08_03ud.csv	36.858	03/08/2016	-rw-r--r--	mpc mpc
2016_08_05ud.csv	21.896	05/08/2016	-rw-r--r--	mpc mpc
2016_08_08ud.csv	196.026	08/08/2016	-rw-r--r--	mpc mpc
2016_08_09ud.csv	233.450	09/08/2016	-rw-r--r--	mpc mpc

8.10 Communication > MQTT subscriber

If the UCM-316 supports MQTT protocol, within this tab, user will need to configure MQTT Broker (remote server towards data will be sent).
it can act as FTP server. In this tab, user can configure both user and password to be used as credentials to enter into the internal file system through an FTP connection.

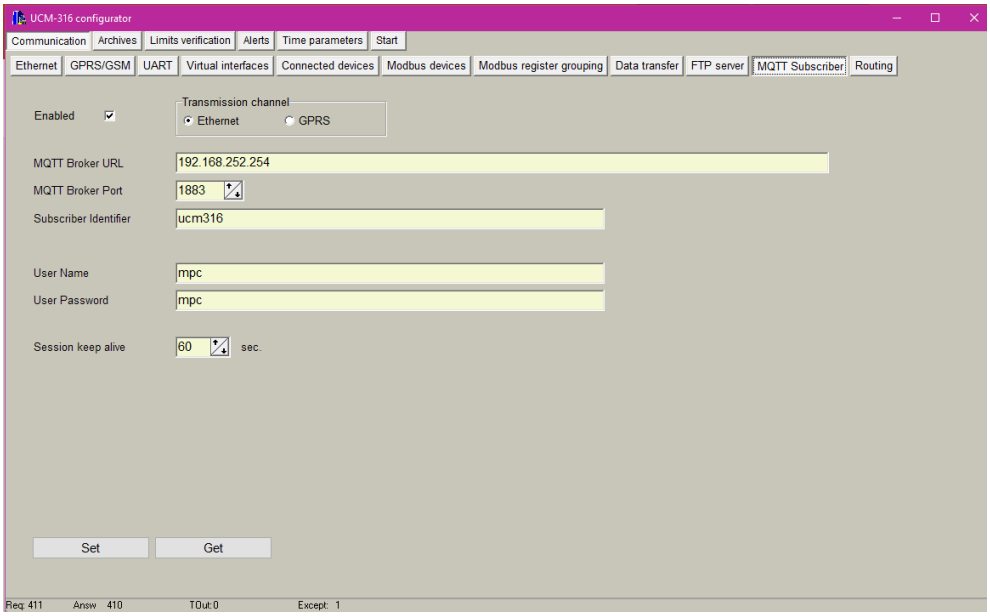


Figure 58. "Communication > MQTT Subscriber" tab.

This protocol needs to have a central server that will collect all the data sent by the UCM-316. Thus, first of all, user must enable this mode. In addition, the following parameters must be configured:

- "MQTT Broker URL": This is the server URL where data will be sent to
- "MQTT Broker Port": By default, MQTT protocol is 1883 but it can be change in this box.
- "Subscriber identifier": This is the device identifier.
- "User name": Broker user with credentials to publish messages.
- "User password": Broker password.
- "Session keep alive": number of seconds the session is kept alive after message has been sent. By default, 60 secons.

NOTE: After configuration is completed, click on "**Set**" button in order to save changes.

9 "Archives" Tab

The UCM-316 has an internal 8MB flash memory. In case, the device is used as datalogger, the following steps must be done:

- Go to *Archives> Configuration*
- In "Storage parameters" frame, configure the following:
  - *"Period":* It defines storage interval. Internal memory is organized in different blocks depending on the devices nature which are connected to the UCM-316.

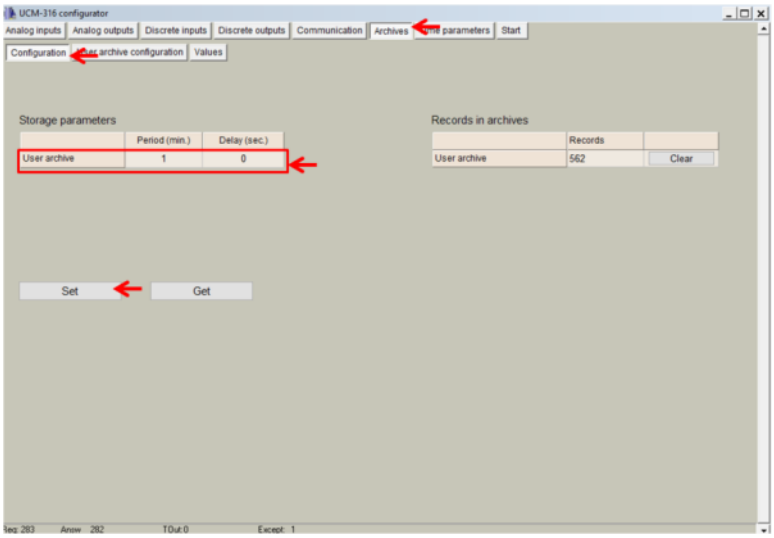


Figure 59. "Archives" tab. Storage frequency configuration

    - In case user needs to customize storage blocks, signals acquisition must be configured accordingly. Memory block used will be defined as "User Archive" (see next step).
  - Go to *Archives>User Archive Configuration*
  - Under this tab, user can configure datalogging following his own requirements. In the next pages, a configuration example is given by setting the following parameters:

    - *"Count of parameters"*: number of registers to be stored.
    - *"Register"*: Specific register to be stored.

NOTE: Timestamp is registered automatically.

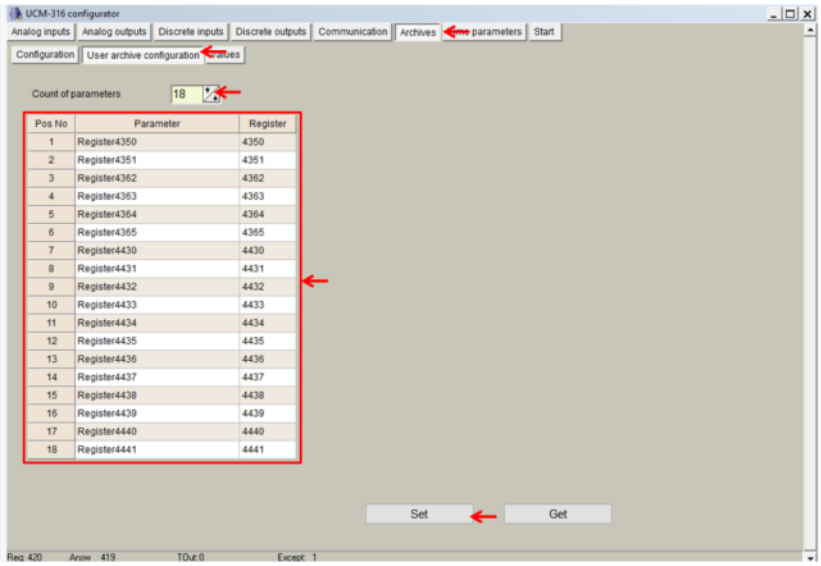


Figure 60. "Archives" tab. User archive configuration

In order to check current data logged in the internal memory, go to *Archives* > *Values* > *User archive* tab. This is only a **test** feature in order to ensure datalogging is performing correctly. We don´t recommend to use this screen for downloading information from the UCM-316. Please use CONCORDIA cloud platform or some other platforms which are compatible with Modbus function "20" in order to download the whole user archive memory.

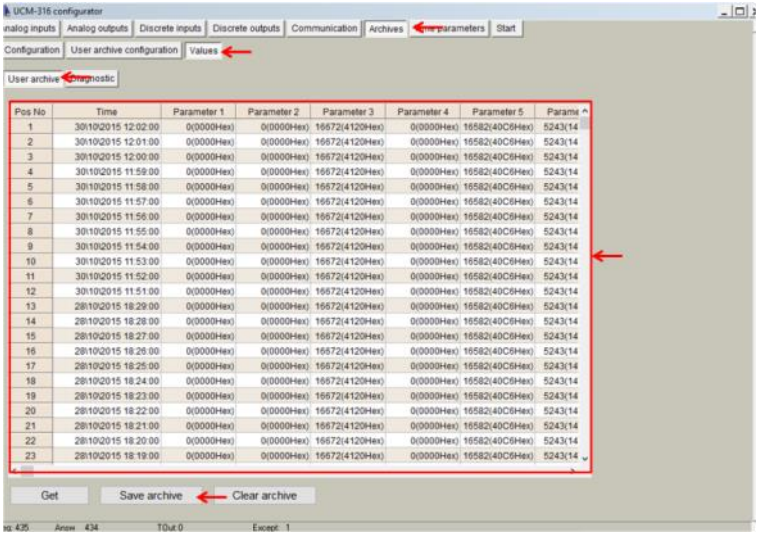


Figure 61. "Archives" tab. User archive current values

NOTE: Internal datalogging memory is organized as a file system accessible through the use of standard Modbus function 20 "File register".

10 “Limits verification” tab

This tab enables users to set up limits verification raising events for issuing alerts when condition is met. To create the list, follow the next steps:

1. Choose “Count of limits” in order to start creating the number of positions desired;
2. Choose “Type of limit” (this must to be done first) among the following options:
   - Over H: event will be generated when the value is above the high limit.
   - Under L: event will be generated when the value is below the low limit.
   - Over H & Under L: event will be generated when the value is out of the range between high and low limit.
   - Under H & Over L: event will be generated when the value is within the range between high and low limit.
   - Equal L: event will be generated when the value is equal to the low limit.
3. Enter register number you want to control or choose from Main fields list (To create and/or edit list of limit’s values use file limits.csv, that is in program’s folder.);
4. Enter data type, corresponding to data type of used register;
5. Choose limits;
6. Delay time (in seconds), if you want to filter accidental ar short time events;
7. Finally, add a code of event (value must to be from 0 to 99 and will be used for alerts SMS/email/MQTT message sending)

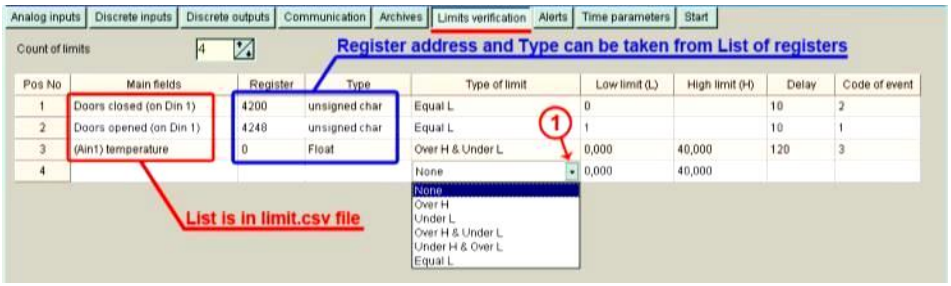


Figura 62. “Limits verification” tab

11 "Alerts" tab

UCM-316 is able to send short SMS text messages, emails and MQTT messages based on events generated by limits verification feature.

11.1 SMS Alerts on Limit verification

SMS alerts for limits is used for sending SMS alerts when alert conditions is set in “Limit verification“ tab. Codes of events are used in this screen to configure alert messages as shown in the following figure.

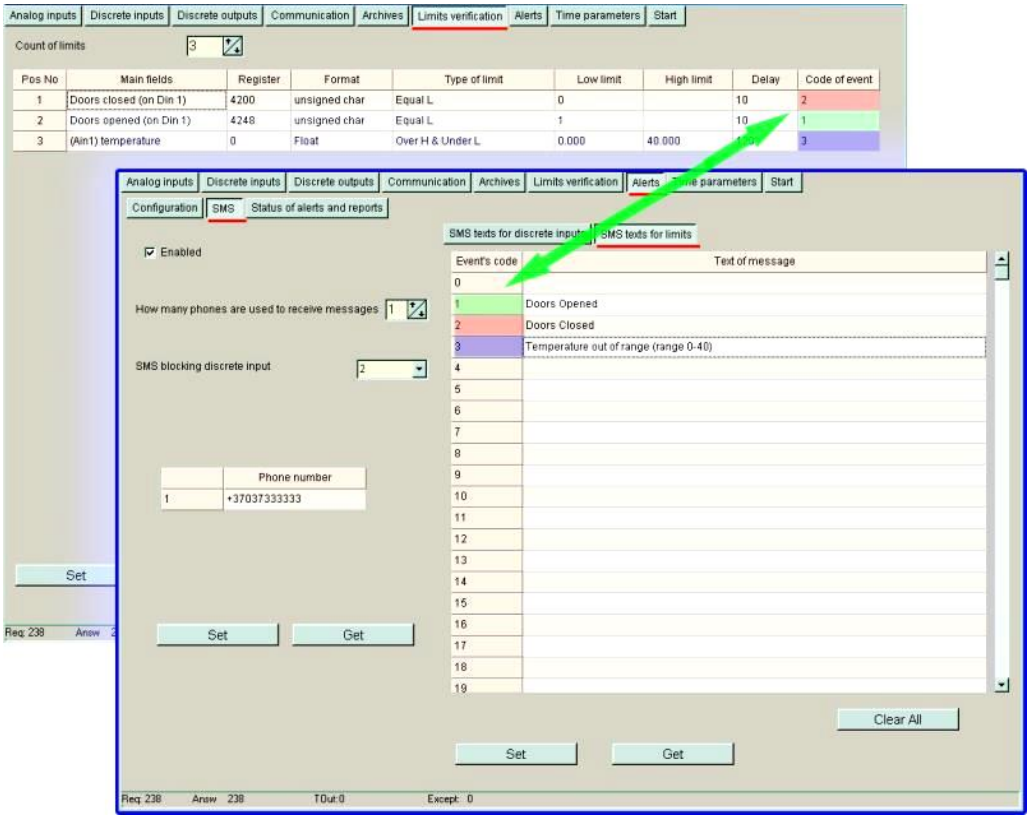


Figure 63. SMS alerts for limits configuration

11.2 Email Alerts on Limit verification

UCM-316 can also send email alerts based on codes of events in a similar way it is explained in previous chapter. In order to configure the email sending feature, the following parameters must be set: SMTP server, e-mail address, user name and password. Finally, user can configure up to 5 email accounts to which alerts will be sent.

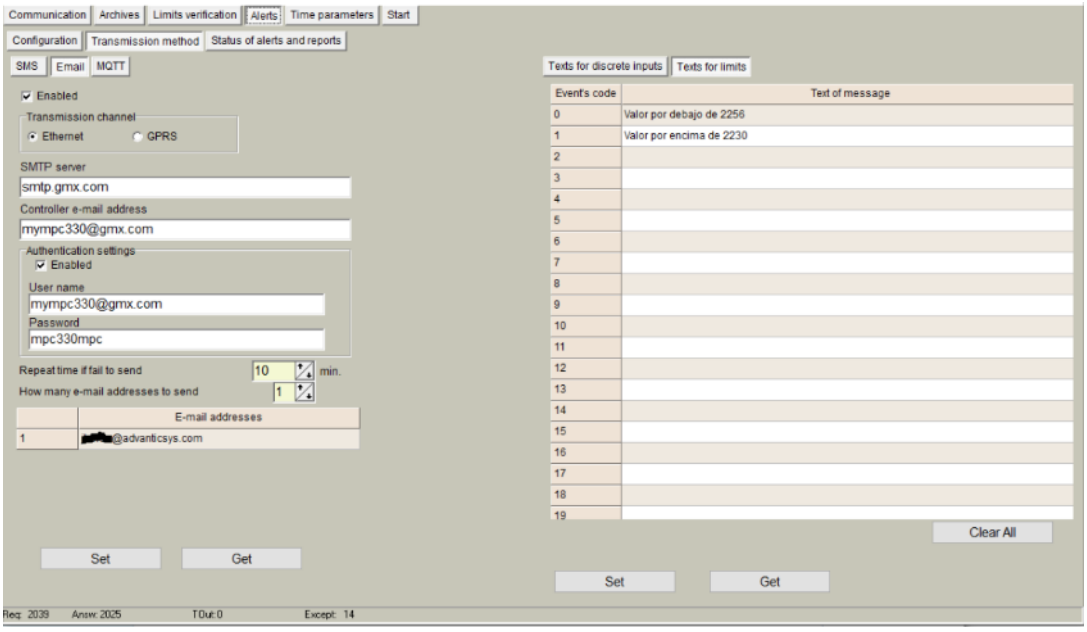


Figure 64. Email alerts for limits configuration

11.3 MQTT Alerts on Limit verification

UCM-316 is also able to send JSON formatted messages through MQTT protocol by configuring the following parameters:

- *"Enabled":* it is recommended to uncheck this box if this feature is not used.
- *"Topic":* A topic is a UTF-8 string, which is used by the MQTT broker to filter messages for each connected client. A topic consists of one or more topic levels. Each topic level is separated by a forward slash (topic level separator).
- *"Repeat time if failed":* if message is not properly received by broker, the device will repeat it after seconds configured in this box.

Finally, if configuration is properly done, a message containing the *"text of message"* written in the right column will be inserted into the JSON formatted message according to the event code previously set.

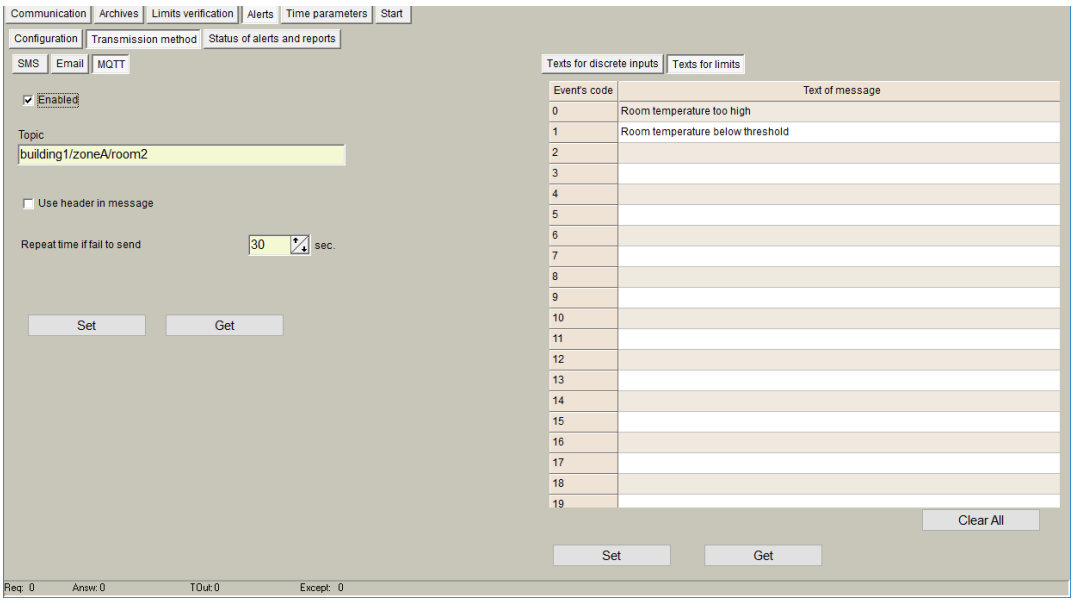


Figure 65. MQTT alerts for limits configuration

12 "Time parameters" tab

This tab enables users to set up time synchronization between UCM-316 Real Time Clock (RTC) and external time references. Several parameters can be configured under this tab:

- *"Set PC time"* It synchronizes internal RTC with PC time.

Figure 66. "Time Parameters" tab. Set PC time

- *"Clock synchronization":* It must be enabled if synchronization between UCM-316 and any Network Time Protocol (NTP) server is requested. This option is particularly accurate since, every given period (*"Synchronization period"* parameter), device connects to an NTP server to get current UTC time. Also, automatic summertime is adjusted.

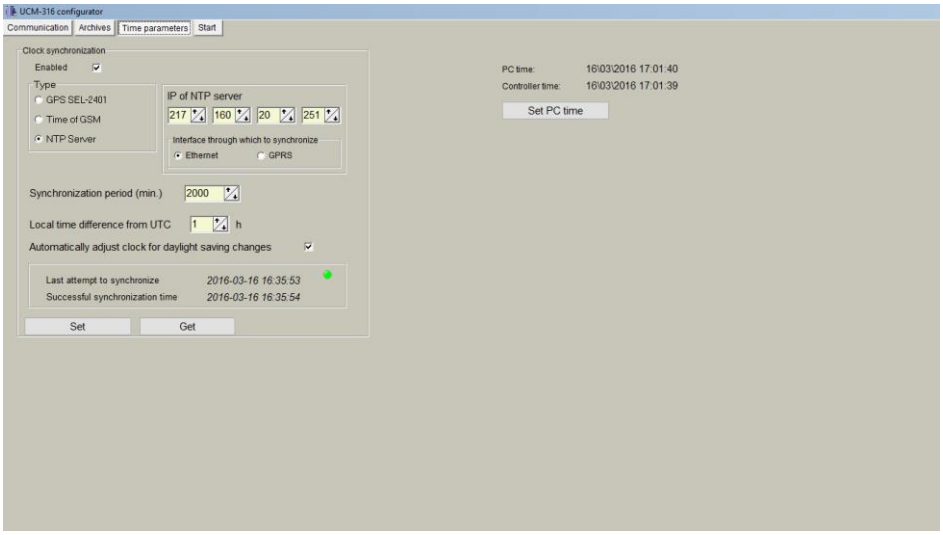


Figure 67. "Time Parameters" tab. NTP server configuration

13Abbreviations and explanations

- **Xn –** is a number of socket. This information is provided for manufacturer's purpose and used in data schemas and connection diagrams.
- **GSM – Global Standard for Mobile Communications.** This interfaces is prepared for remote connections and data bidirectional data transfer over Global Standart Mobile network.
- **GPRS -** a packet oriented mobile data service on the 2G and 3G cellular communication system's global system for mobile communications (GSM).
- **IP** address - An **Internet Protocol** (**IP**) **address** is a numerical label that is assigned to devices participating in a network that uses the Internet Protocol for communication between its nodes.
- **TCP/IP** – Transmission Control Protocol is for communication between computers, used as a standard for transmitting data over networks and as the basis for standard Internet protocols.
- **MAC** address –**Media Access Control** address is a unique identifier assigned to most network adapters.
- **UART –** An **Universal Asynchronous Receiver/Transmitter** is a type of "asynchronous receiver/transmitter, a part of computer hardware that translates data between parallel and serial forms. UART are commonly used in conjunction with communication standards such as EIA RS-232, RS-422 or RS-485. Record (UARTx) on top of enclosure also are used as serial interface number.
- **GND –** ground wire contact
- **RS232 -** the traditional name for a series of standards for serial binary single-ended data and control signals connecting between a DTE (Data Terminal Equipment) and a DCE (Data Circuit-terminating Equipment). It is commonly used in computer serial ports. The standard defines the electrical characteristics and timing of signals, the meaning of signals, and the physical size and pin out of connectors. RS232 interfaces are prepared for connection of peripherical devices (example energy meters, controllers, machines and etc.)**.**
- **TD –** contact for transfer data wire of RS232 socket
- **RD –** contact for read data wire of RS232 socket
- **DTR –** contact for Data Transmit Ready wire of RS232 socket
- **RS485 -** standard defining the electrical characteristics of drivers and receivers for use in balanced digital multipoint systems. The standard is published by the ANSI Telecommunications Industry Association/Electronic Industries Alliance (TIA/EIA). Digital communications networks implementing the EIA-485 standard can be used effectively over long distances and in electrically noisy environments. Multiple receivers may be connected to such a network in a linear, multi-drop configuration. RS485 interfaces are prepared for connection of pheripherical devices (example energy meters, controllers, machines and etc.).
- **A+ –** contact for positive wire of RS485 socket
- **B- –**contact for negative wire of RS485 socket
- **USB – Universal Serial Bus** is an industry standard, that defines the cables, connectors and protocols used for connection, communication and power supply between computer and electronic devices. USB type B socket is prepared for connection to PC(Personal Computer). USB type A socket is prepared for connection to pheripherical devices (example memory stick's and etc.).
- **Socket** – is an endpoint of a bidirectional inter-process communication flow across an Internet Protocol-based computer network, such as the Internet**.**
- **Status –** device status indicating LED
- **Uoutput –** status of power for external device indicating LED
- **TX/RX –** data transfer/receive indicating LED
- **Central computer –** server or a computer, where data can be sent.

14 Safety instructions

To install and setup device, special technical knowledges are needed. Call to seller or certified professionals to connect and setup device !

Before connecting to power supply, be sure that:

1. Controller is not damaged (no cracks, melted, broken or exposed areas)
2. Controller is used with right and correct thickness cables.
3. Controller and antena are installed indoor.
4. The controller is intended for supply from a Limited Power Source (LPS) with current rating of overcurrent protective device not greater than 2A
5. The highest transients on the DC secondary circuite of LPS, derived from AC main supply, shall be less then 71V peak.
6. The associated equipments (AE): PC and PSU (LPS) shall comply with the requirements of Standard EN 60950-1.
7. Controller is dry;
8. Ambient temperature and humidity is in normal range;
9. Other types of devices (counters, etc.) are connected correctly by using manufacturer‘s regulations.
10. The end of stranded conductor shall not be consolidated by soft soldering and must to be terminated
11. Device, PC and other pheripherical devices are strictly connected through one double pole breaker (current break less than 5A and space between breaker contacts more than 3mm.) Pole breaker has to be in building‘s wiring and in reachable place with markings

Don‘t use:

1. Device under open water (in rain and if water are spalshing on controller or connected devices;
2. Device if enclosure, connected cables, or other connected devices are damaged;
3. External Back-Up batterys for powering of controller.

Use device by manufacturer‘s regulations otherwise you can damage controller or other devices. In that cace **munufacturer‘s warranty could not be obtained**.

If you suspect that device doesn‘t operate correctly or has visible violations, please contact manufacturer or your distributor to check or run maintanance.

Manufacturer does not affect and is not responsible for GSM/GPRS/Internet operators‘ provided network service pricing and costs.

15 Manufacturer's warranty

All ADVANTICSYS products are warranted to be free of defects in material or workmanship under normal use and service for a period of two years from the date of shipment. This warranty does not include damage resulting from accident or misuse. The warranty is also void if the product is modified.

This warranty is in lieu of all other warranties expressed or implied including the implied warranties of merchantability of fitness for a particular purpose, whether arising by law, custom or conduct, and the rights and remedies provided under this warranty are exclusive and in lieu of any other rights or remedies. In no event shall ADVANTIC SISTEMAS Y SERVICIOS S.L. be liable for consequential damages.

If you believe that your product is defective while still under warranty, contact ADVANTICSYS by e-mail at info@advanticsys.com, or by phone at +34 914221023. Once the support desk confirms that the product is defective, we will issue you an RMA number and will replace your defective product.

ADVANTICSYS' warranty covers the repairs (manpower and materials) of each manufacturing defect that may obstruct the right operation of the Product. The replacement of any component or damaged equipment does not mean an extension of the guarantee period. If the Product is found upon examination by ADVANTICSYS to be defective, ADVANTICSYS shall bear shipping costs incurred in returning the Product to Customer as well as all costs involved in ADVANTICSYS' examination of the Product. If the Product is found upon examination by ADVANTICSYS to not be defective, Customer shall bear shipping costs incurred in returning the Product to Customer.

16 Technical Data

16.1 Communication interfaces

Interfaces	Technical data
RS485	up to 1.2 km, max 32 transceivers, speed up to 38,4 Kbits/s
RS232	up to 15m, speed up to 38,4 Kbits/s
Ethernet	RJ45. Twisted pair Ethernet 10/100 Mb, up to 100m
GPRS	4 band 850/900/1800/1900 MHz
USB	Type B, version 2.0
Discrete INPUTS	Sink contact
Discrete OUTPUTS	Relay 3A
Analog INPUTS	Current 0/4-20mA, 0-5 mA ; Voltage 0-5V, 0-10V; Thermoresistor PT100 or PT1000; error ±0,15%

Analog OUTPUTS	Voltage 0-10V, load up to 5mA

16.2 Protection

Insulation voltage between power supply and second circuits	1000 V

16.3 Indication

Indication type	LED's
Indicated parameters	• Each discrete input status • Each discrete output status • UART/Ethernet Transfer/Receive • GSM/GPRS modem status, Transfer and Receive

16.4 Power supply

Power supply	9-36 VDC / 12-50VDC ⎓
Power consumption	Up to 10 VA

16.5 Construction

Mounting	DIN rail
Dimensions	147x128x50 mm
Enclosure protection	IP20

16.6 Working conditions

Working temperature	From - 25 ºC to + 60ºC
Storage temperature	From - 40 ºC to + 60ºC
Relative humidity	From 5 % to 95 % non-condensing

16.7 Safety parameters

Safety requirements	EN 61010-1:2002
Electromagnetic compatibility	EN 55022:2000+A1+AC:2002+A2:2003 EN 55024:2000+A1:2003+A2:2003 EN 61000-4-2+A1+A2:2002 EN 61000-4-3+A1:2004 EN 61000-4-4:2005 EN 61000-4-5:2002+A1:2003 EN 61000-4-6:2002+A1:2003

16.8 Other parameters

Archive storage memory	8 MB
Configuration settings storage without power supply	More than 5 years
Real time clock	Yes
Firmware loading	Yes. Through RS232/USB and Ethernet, GSM/GPRS.

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