

MX-1 GSM/GPRS M-BUS DATA LOGGER

USER MANUAL

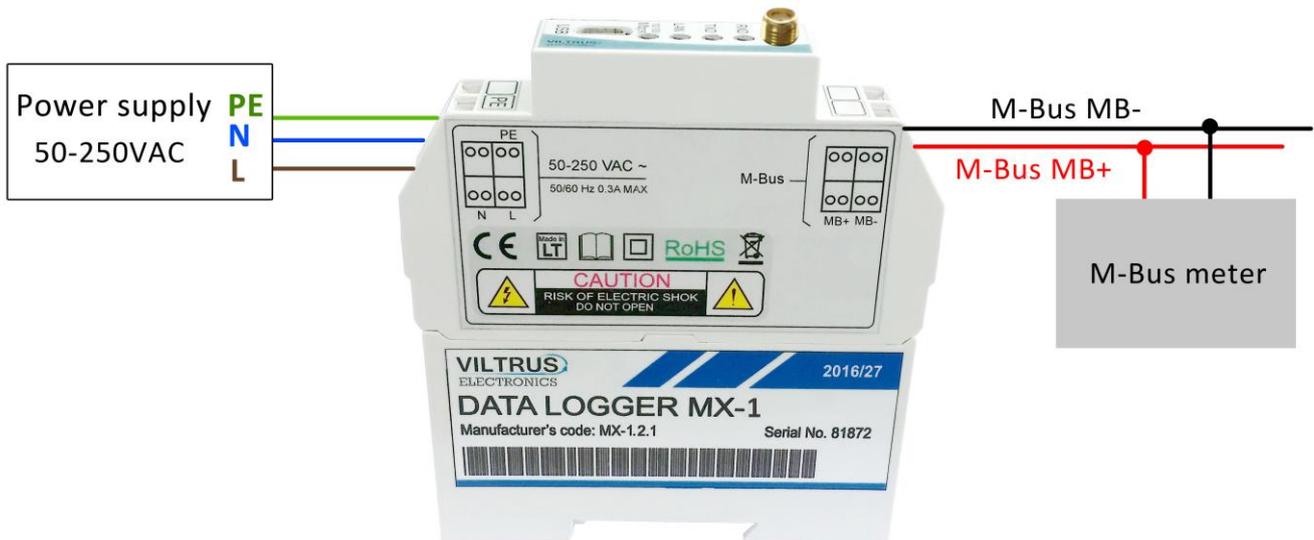


CONTENTS

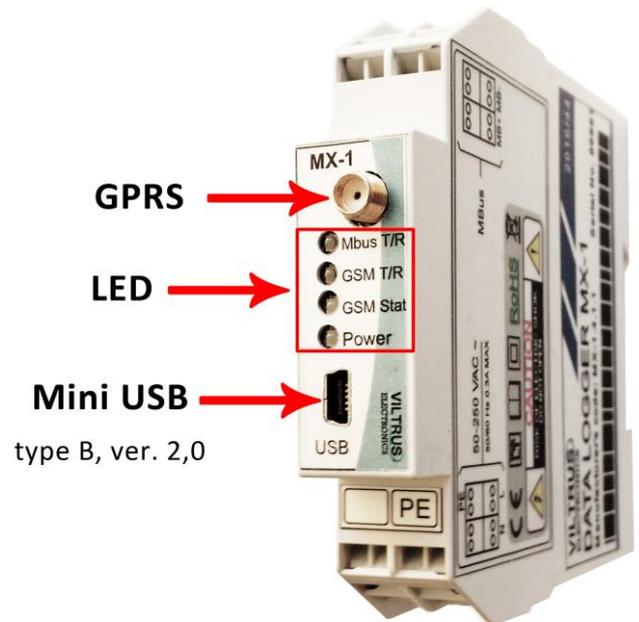
1 Abbreviations and explanations.....	3
2 Technical Data	4
3 Setting up connection to the device	5
3.1 Connecting via USB.....	5
3.2 Connecting via GPRS.....	6
4 MX-1 General settings and Status indicators	7
4.1 Configuration files.....	8
5 "Time parameters" tab.....	9
6 "Communication" tab.....	10
6.1 Communication > GPRS.....	10
7 M-Bus connection configuration.....	11
8 "Archives" tab.....	16
9 "FTP" CLIENT CONFIGURATION	18

1 Abbreviations and explanations

- **MBUS+** – contact for M-Bus positive wire
- **MBUS-** – contact for M-Bus negative wire
- **PE** – Protective ground wire
- **L** – Line, single phase wire
- **N** – Neutral wire



- **Mbus T/R** – data transfer/receive indicating LED
- **GSM T/R** – data transfer/receive indicating LED
- **GSM Stat** – status of GSM/GPRS indicating LED
- **Power** – power indicating LED
- **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. Mini USB type B, ver. 2,0
- **GSM – Global Standart 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).



2 Technical Data

Interfaces		Technical data	
RS485		up to 1,2 km, max 32 transivers, speed up to 38,4 Kbits/s	
RS232		up to 15 m, speed up to 38,4 Kbits/s	
M-Bus		up to 25 M-Bus devices	
GPRS		4 band 850/900/1800/1900 MHz	
USB		mini USB type B, ver. 2,0	
Indication			
Indication type		LED's	
Indicated parameters		<ul style="list-style-type: none"> • GSM/GPRS modem status, Transfer and Receive • Power • M-Bus interface read/write and short circuit 	
Power supply			
Power supply AC		50-250V ~ 50/60Hz	
Capacity		300mA MAX	
Power consumption		< 9VA	
Over-voltage protection		>1000V	
Construction			
Mounting		DIN rail	
Dimensions		18x85x97 mm	
Weight		105 g	
Enclosure protection		IP20	
Climate conditions			
Operating temperature		From - 25 °C to + 60°C	
Storage temperature		From - 40 °C to + 60°C	
Relative humidity		From 5 % to 95 % non-condensing	
Other parameters			
Storage memory		archive storage up to 8 MB, data storage without power about 5 years	
Real time clock		Yes	

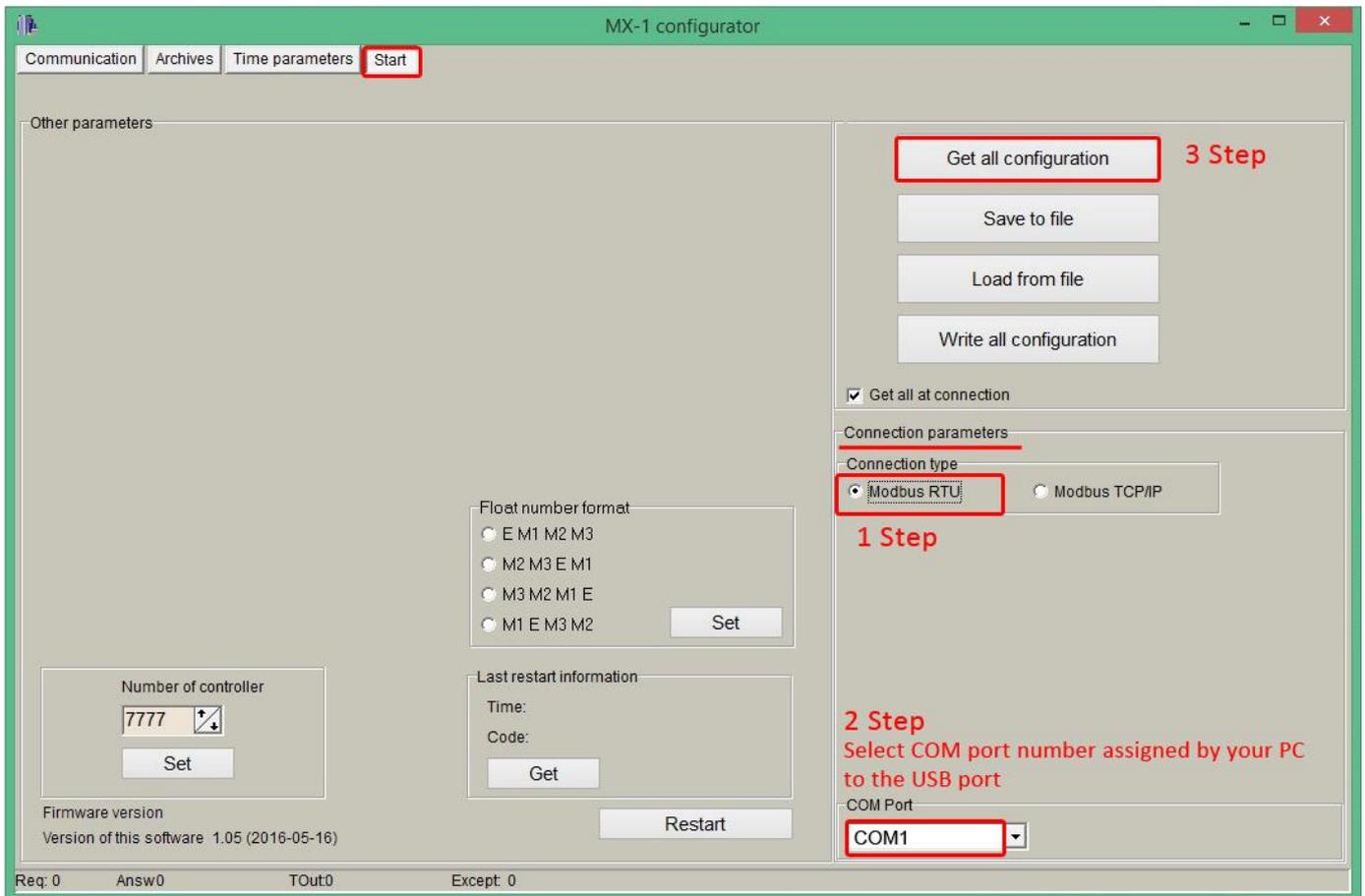
3 Setting up connection to the device

3.1 Connecting via USB

In order to configure the MX-1 data logger, connect it to the any computer via USB and open MX-1 configuration software. If needed, install the USB driver (the USB driver can be found in VILTRUS web page: <http://www.viltrus.com/mx-1/>).

Open MX-1 Configuration software. Set up Connection parameters frame. Steps to be followed:

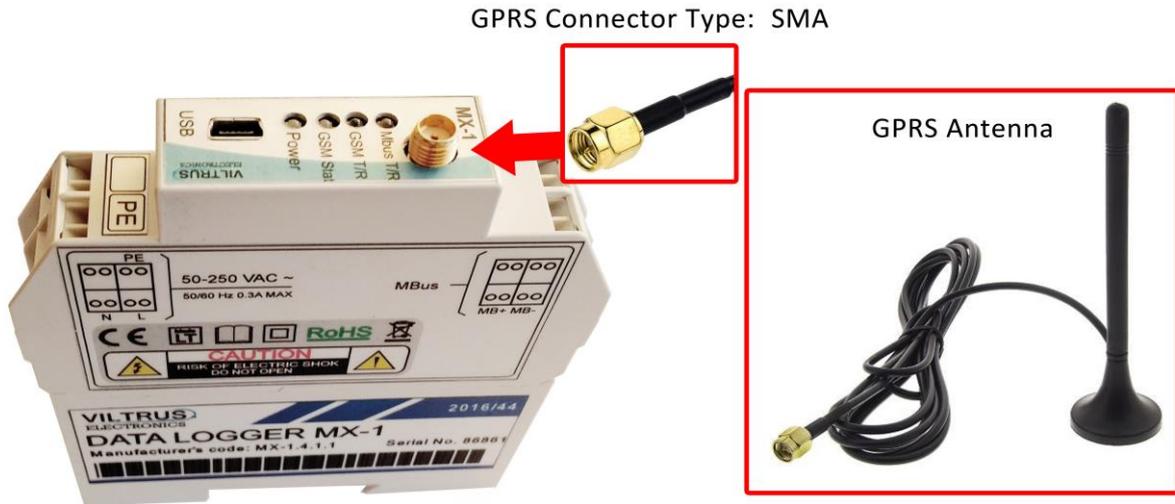
- **1 Step:** Under Connection type select **ModBus RTU** option
- **2 Step:** Select COM port number assigned by your PC to the USB port
- **3 Step:** Click on **Get all** to establish connection with data logger.



USB connection steps

3.2 Connecting via GPRS

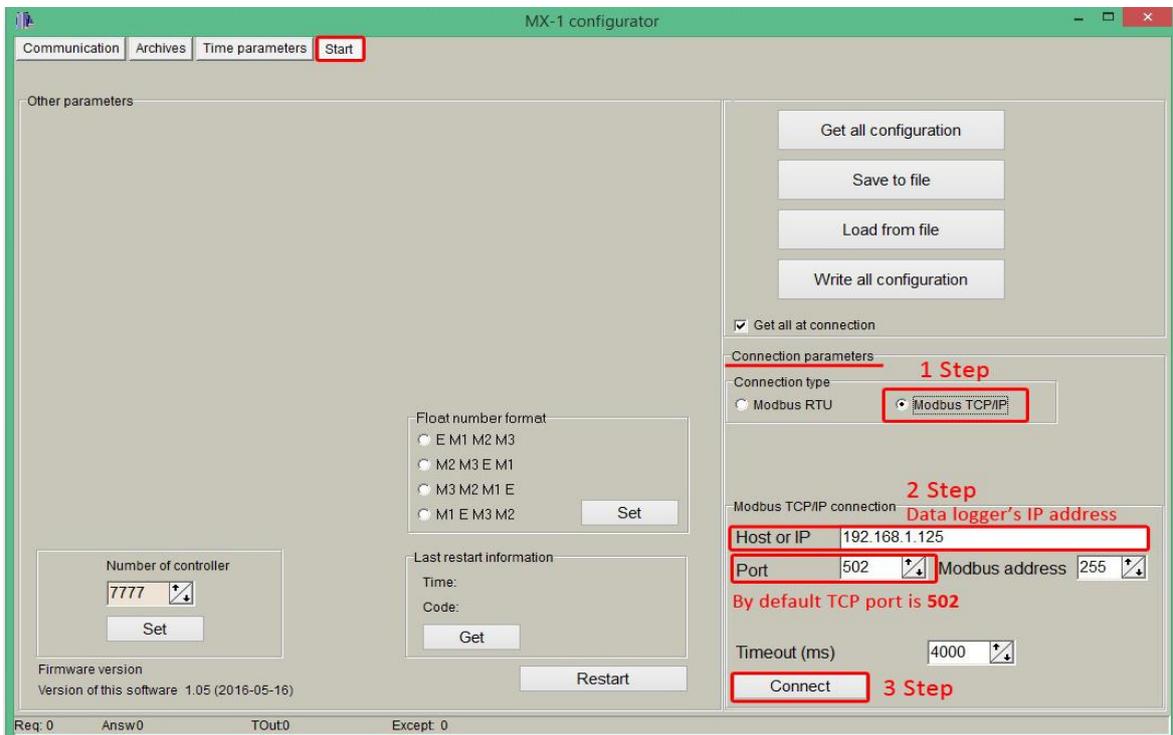
Check GPRS antenna is properly connected to the device.



Steps to connect GPRS antenna

Open MX-1 Configuration software. Steps to be followed are:

- **1 Step:** In “Connection type” area you need to choose **Modbus TCP/IP**
- **2 Step:** Add data logger **IP address** and **TCP port**. By default controller is set to **502 Port** (this is system standard Modbus TCP/IP port), change it if you need other.
- **3 Step** Click on **Connect** to establish connection with data logger. If connection fails, check GPRS modem, Communication type, IP address and try to connect again.



GPRS connection steps

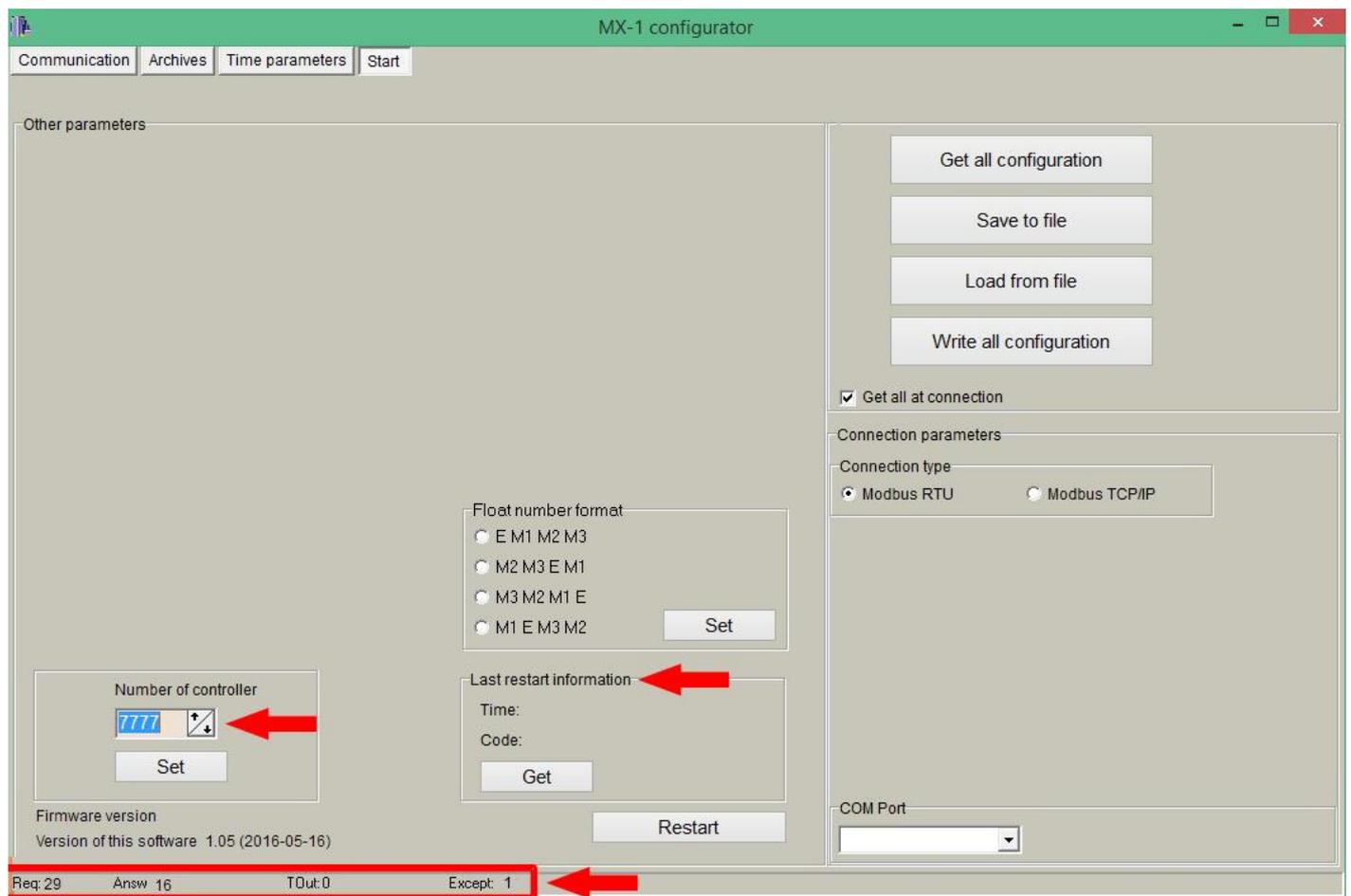
4 MX-1 General settings and Status indicators

Once user has established communication with MX-1, basic information such as **Number of controller** (each controller has its own factory serial number), **Last restart**, etc. is shown in the software frame.

Status indicators

Several status indicators are shown in the MX-1 configuration software in order to inform user about current performance of communication:

- **Req:** number of requests performed.
- **Answ:** Number of answers received.
- **TOut:** number of requests not answered (time outs raised).
- **Except:** number of errors.



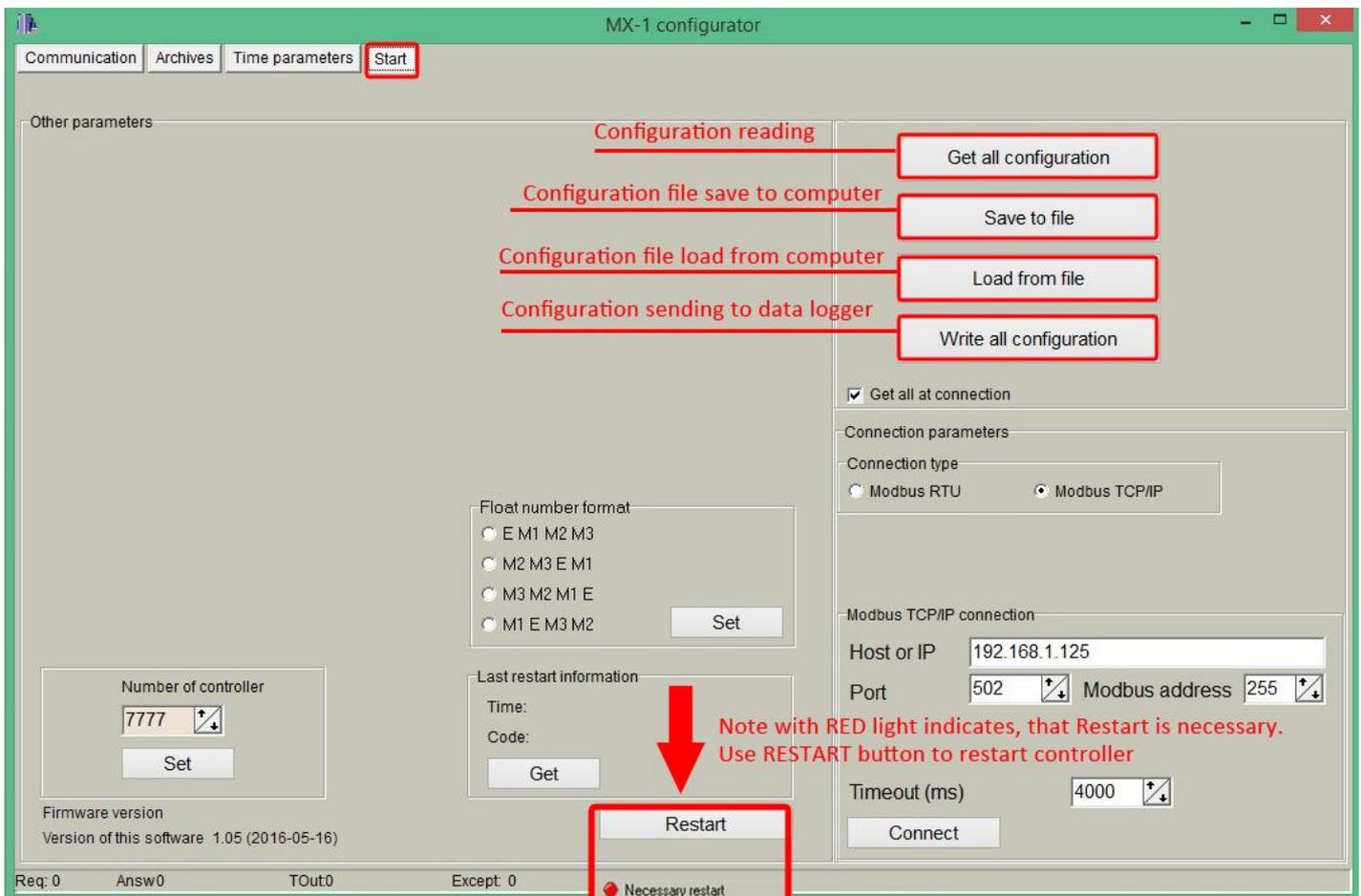
General settings and Status indicators

4.1 Configuration files

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

- **1 Step.** Set up all the configuration parameters making use of MX-1 Configuration software.
- **2 Step.** Then, under **Start** tab, click on **Save to file** button. A dialog will be shown requesting user to select folder destination.
- **3 Step.** Once the file has been stored, connect a new data logger to the PC and then click on **Load from file** and select the file previously stored.
- **4 Step.** Then, click on **Write all configuration** button to load such configuration into the new controller.
- **5 Step.** A restart will be needed so that data logger can start using the loaded configuration. Data logger can be restarted by turning off/on power supply or pressing button **Restart**.

P.S. Repeat from step 3 with all the controllers that need the same configuration.

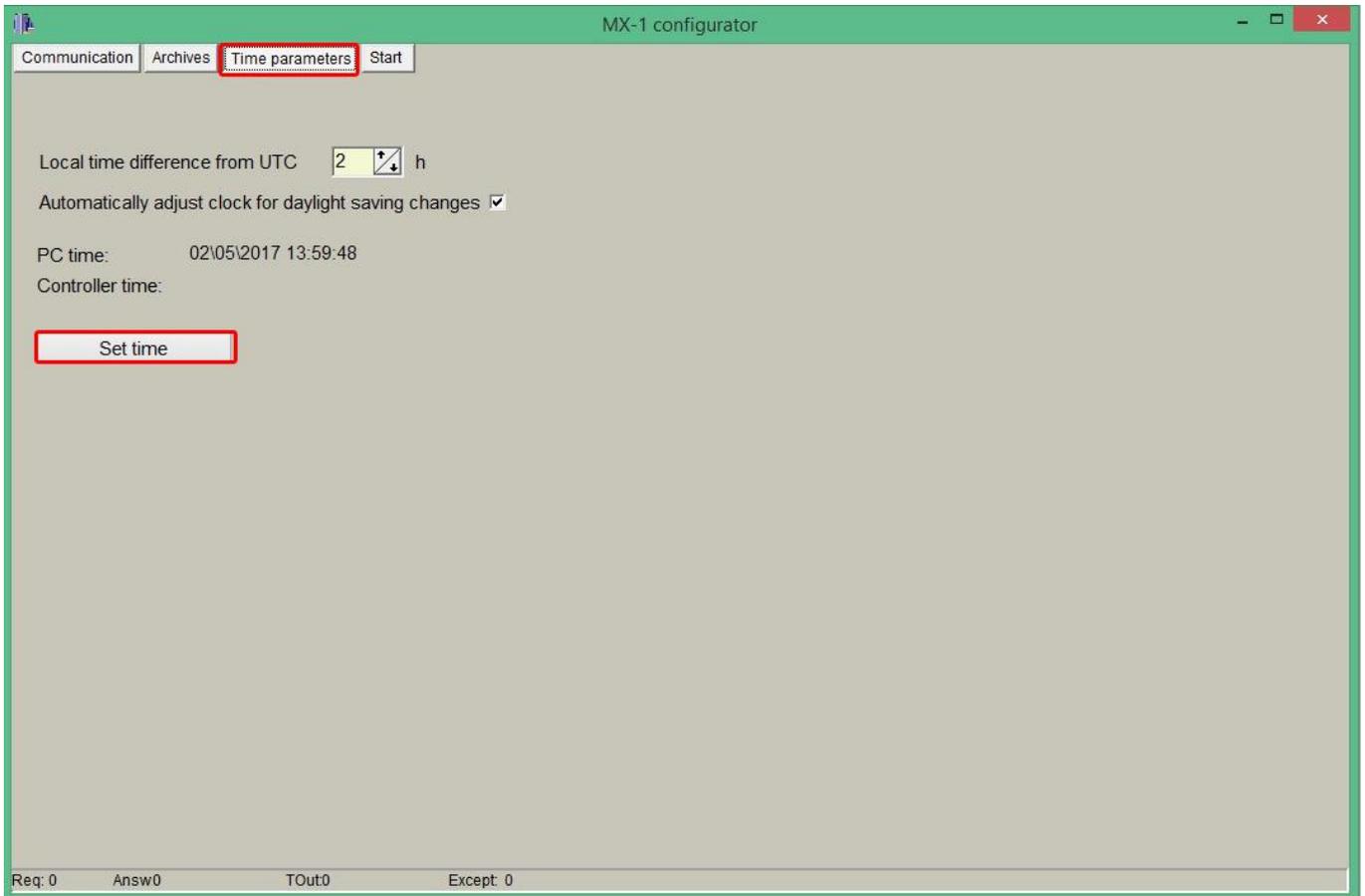


Configuration files management

5 "Time parameters" tab

Time parameters tab enables users to set up time synchronization between MX-1 Real Time Clock (RTC) and external time references. Several parameters can be configured under this tab:

- **Set time** - it synchronizes internal RTC with PC time.

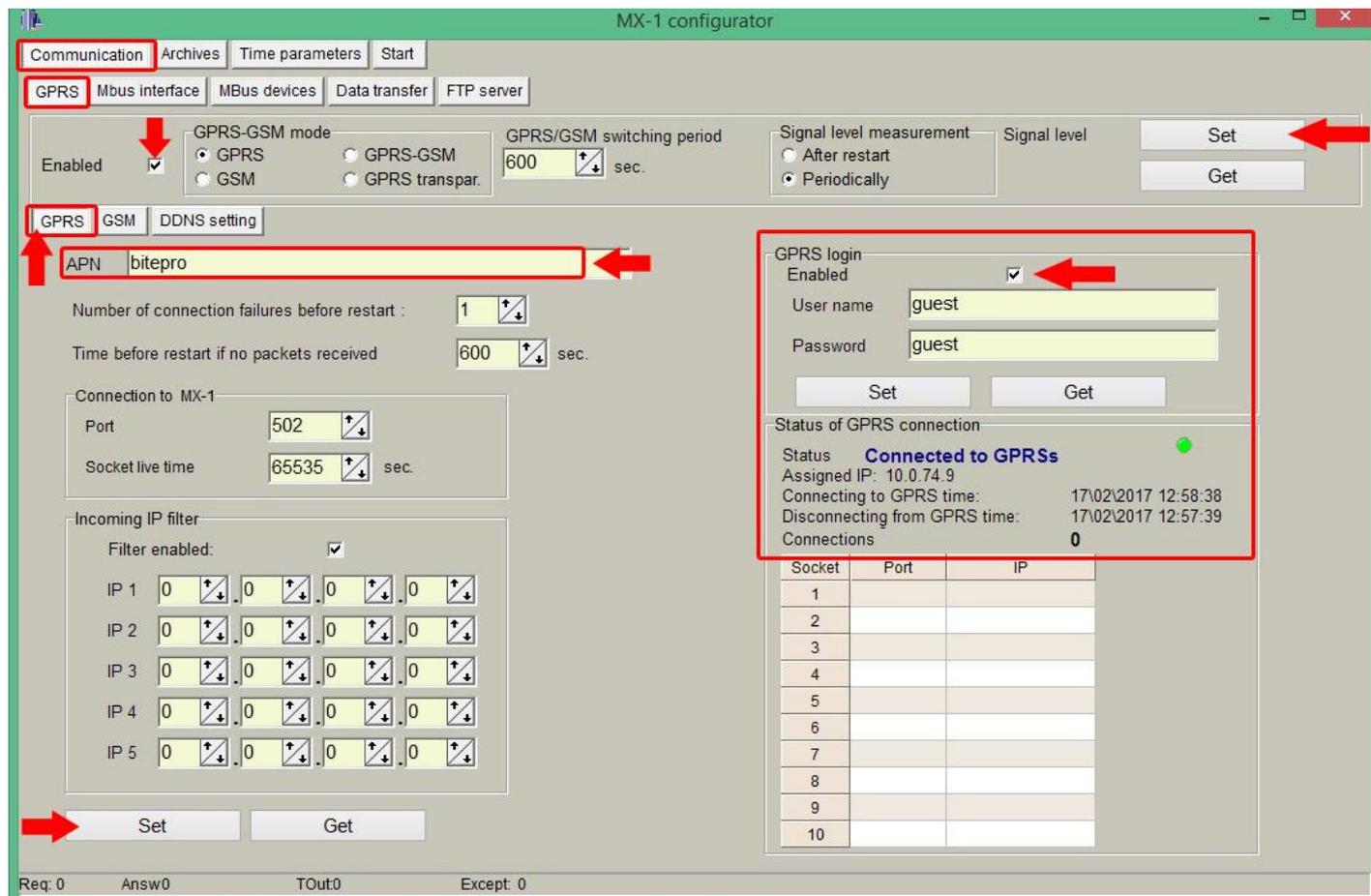


Time Parameters tab. Set time

6 "Communication" tab

6.1 Communication > GPRS

In order to configure MX-1 through GPRS, user must enable GPRS connection as shown below. Then, click on **"SET"** button in order to save changes.



GPRS Tab. Enabling communication

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

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.*

7 M-Bus connection configuration

Connecting the M-Bus meter/device to the MX-1 M-Bus interface.



Connecting M-Bus meter/device to the MX-1

*Step 1: Click on **Communication tab** - > **Serial interface**. You have to set interfaces to which it is connected your M-Bus meters. Interface settings have to be the same as the meters (Bode, Parity, Data bits, Stop bits).*

*After all is completed, click on **"SET"***

Communication Archives Time parameters Start

GPRS Serial interface **Mbus devices** Data transfer FTP server *You have to set interface to which it is connected your Mbus meters.*

Bode	Parity	Data bits	Stop bits	Packetization	Packet time (msec.)	Packet symbol(Hex)	Packet byte count	Mode	Destination of DTR
<input type="checkbox"/> 300	<input checked="" type="checkbox"/> Even	<input type="checkbox"/> 5	<input checked="" type="checkbox"/> 1	<input checked="" type="checkbox"/> Time	100	00	1	<input checked="" type="checkbox"/> Full duplex	<input type="checkbox"/> Always OFF
<input type="checkbox"/> 600	<input type="checkbox"/> Odd	<input type="checkbox"/> 6	<input type="checkbox"/> 1.5	<input type="checkbox"/> Symbol				<input type="checkbox"/> Half duplex	<input type="checkbox"/> Always ON
<input type="checkbox"/> 1200	<input type="checkbox"/> Mark	<input type="checkbox"/> 7	<input type="checkbox"/> 2	<input type="checkbox"/> Length					<input checked="" type="checkbox"/> OFF when send
<input checked="" type="checkbox"/> 2400	<input type="checkbox"/> Space	<input checked="" type="checkbox"/> 8							<input type="checkbox"/> ON when send
<input type="checkbox"/> 4800	<input type="checkbox"/> None								
<input type="checkbox"/> 9600									
<input type="checkbox"/> 19200									
<input type="checkbox"/> 38400									

Intercafe settings have to be the same as the meters (Bode, Parity, Data bits, Stop bits)

Set Get *After all the settings you have to press the "Set".*

Purpose of UART

- Nothing
- Modbus RTU Server
- Modbus RTU Master
- Router Modbus TCP/IP to Modbus RTU
- Mbus devices**

Mbus linijos parametri

Parameter	Value (sec.)
Delay after power on	2
Mbus short circuit reaction time	2
Recover control period after short circuit	20

Set **Get**

COM Client

	Value
Stack depth	2
Timeout (msec.)	2000
Number of repeats	1

Set **Get**

Step 2: Click on **Communication tab** -> **M-Bus devices** -> **Configuration**. Set **Read period (sec.)** and click on **"Search devices"** button.

Communication Archives Time parameters Start

GPRS Serial interface **M-Bus devices** Data transfer FTP server

Configuration Current values

Amount of meters 1

Read period (sec.) 10

Set Get

1 step

In succession

Pos	Type	Address	Data position	Device number	Manufacturer	Medium
1	Unknown	0801438865329906	2	08014388	LSE	Hot Water

Meters search

2 steps

Search devices

Status	Completed
Stroked devices	1

“M-Bus devices” tab. Communication configuration

Step 3: After the search is done, click on **„Include newly found“**, then **„Delete missing“** and finally **„Finish and send“**.

New founded devices

Pos	Address
1	0801438865329906

Previous founded devices

Pos No	Address	Data position
1	0000000000000000	1

1 step

2 step

3 step

Include newly found Merge all Delete missing Restore previous Cancel

Finish and send

Finish without sending

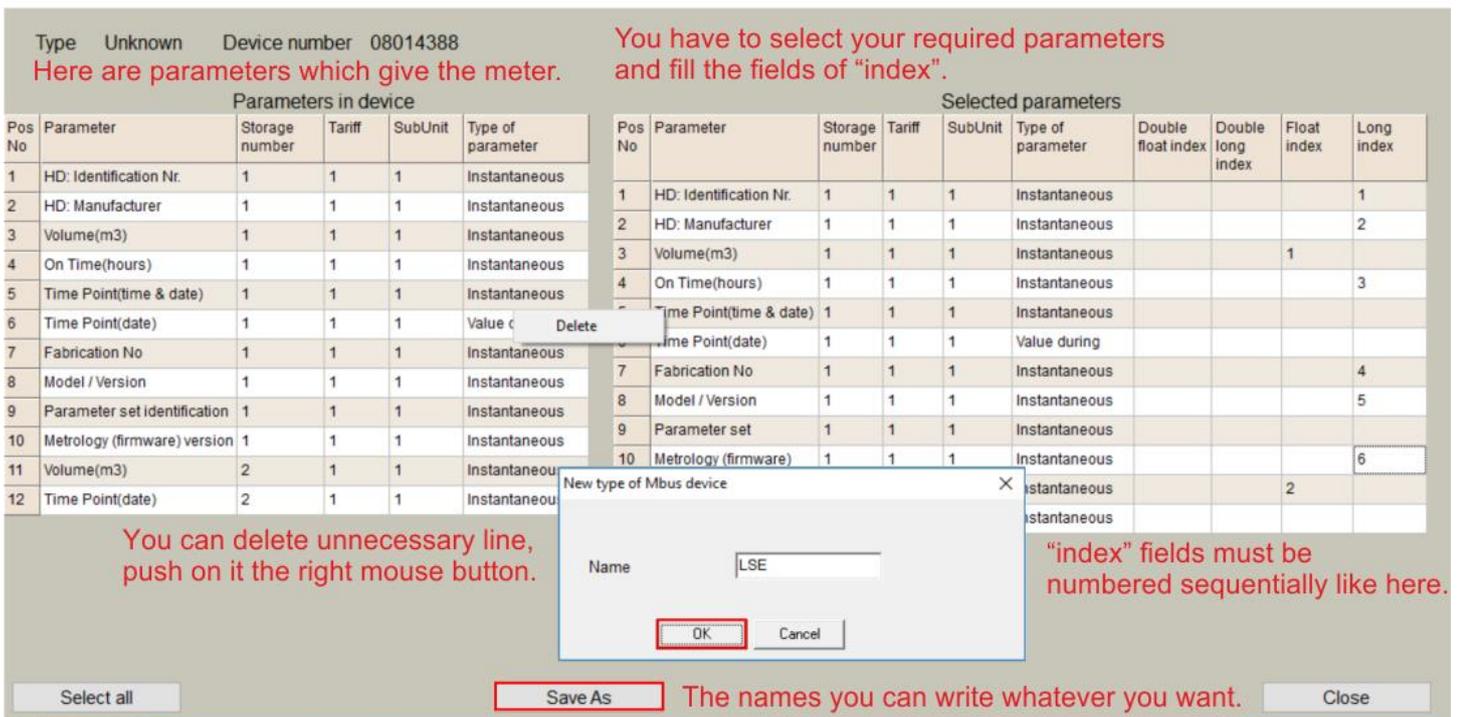
Step 4: After a few seconds, a list including all the M-Bus devices connected to the network will be shown. Moreover, a list of its main parameters will be also identified automatically. Click „**Read Available parameters**“.



“M-Bus devices” tab. Self-discovery

Step 5: On the left you see all available parameters from the meter. On the right, you can select those parameters, that you need from the meter, you will need to fill the fields of “index” (“index” fields must be numbered sequentially as below). The meter name you can write whatever you want.

After all is completed, click on “Save as”



Step 6: Set the name of M-Bus meter, which you created before.

The screenshot shows the 'M-Bus devices' configuration interface. On the left, there are input fields for 'Amount of meters' (set to 1) and 'Read period (sec.)' (set to 10), with 'Set' and 'Get' buttons below. A table titled 'In succession' lists device details. A dropdown menu for 'Type' is open, showing options: Unknown, WZG, ABB, AXI, and LSE. The 'LSE' option is highlighted with a red box and labeled '1 step'. A red text box says '2 step' next to the 'Set' button. Another red text box says 'You have to choose the meter's description, which you created before.' pointing to the dropdown menu.

Pos	Type	Address	Data position	Device number	Manufacturer	Medium
1	Unknown	0801438865329906	2	08014388	LSE	Hot Water

Step 7: In order to check if data are being received from M-Bus devices, go to "Current values" tab, here you can see the values of the meters.

All the values, that you see in the table, you need to archive it, click on "All values to archive"

The screenshot shows the 'Current values' tab. A table displays parameters for device '2 - LSE (08014388)'. The table has columns for Device/Parameter, Last read time, Storage number, Tariff, SubUnit, Type of parameter, Double float, Double long, Float, and Long. Below the table, a red text box says 'Here you can see the values of the counters where reading has been configured before.' At the bottom, a red text box says 'All of the values that you see here, you can move to the archiving.' Below that, a red box highlights the 'All values to archive' button, with a note: 'If you don't see this button, probably you need update configuration software.'

Device/Parameter	Last read time	Storage number	Tariff	SubUnit	Type of parameter	Double float	Double long	Float	Long
2 - LSE (08014388)	14/03/2017 09:41:22								
HD: Identification Nr.		1	1	1	Instantaneous				8014388
HD: Manufacturer		1	1	1	Instantaneous				1697777156
Volume(m3)		1	1	1	Instantaneous			0.135	
On Time(hours)		1	1	1	Instantaneous				76303
Fabrication No		1	1	1	Instantaneous				8014388
Model / Version		1	1	1	Instantaneous				65546
Metrology (firmware) version #		1	1	1	Instantaneous				0
Volume(m3)		2	1	1	Instantaneous			0.135	

"M-Bus devices" tab. Current values

Once the registers are identified, on the “**Communication -> Data Transfer -> Common parameters**” tab, write all the registers as shown in the next figure and click on the “**Set user archive**” checkbox in order to replicate the structure in the internal datalogging archive. To send data to the FTP server, you need to archive values.

Communication Archives Time parameters Start

GPRS Serial interface MBus devices Data transfer FTP server

Common parameters Modbus TCP/IP client FTP

Amount of groups of registers 8 Set user archive

	Parameter	Register/Coil	Amount of registers/	Format	Header	Dimension
1		124338	1	unsigned long	HD: Identification Nr.	
2		124340	1	unsigned long	HD: Manufacturer	
3		124278	1	Float	Volume(m3)	
4		124342	1	unsigned long	On Time(hours)	
5		124344	1	unsigned long	Time Point(date)	
6		124346	1	unsigned long	Fabrication No	
7		124348	1	unsigned long	Metrology (firmware) version #	
8		124280	1	Float	Volume(m3)	

Here are described the meter values formats, headers and dimensions, which will be archived and sent to the FTP.

Only archived values can be send to the FTP server.

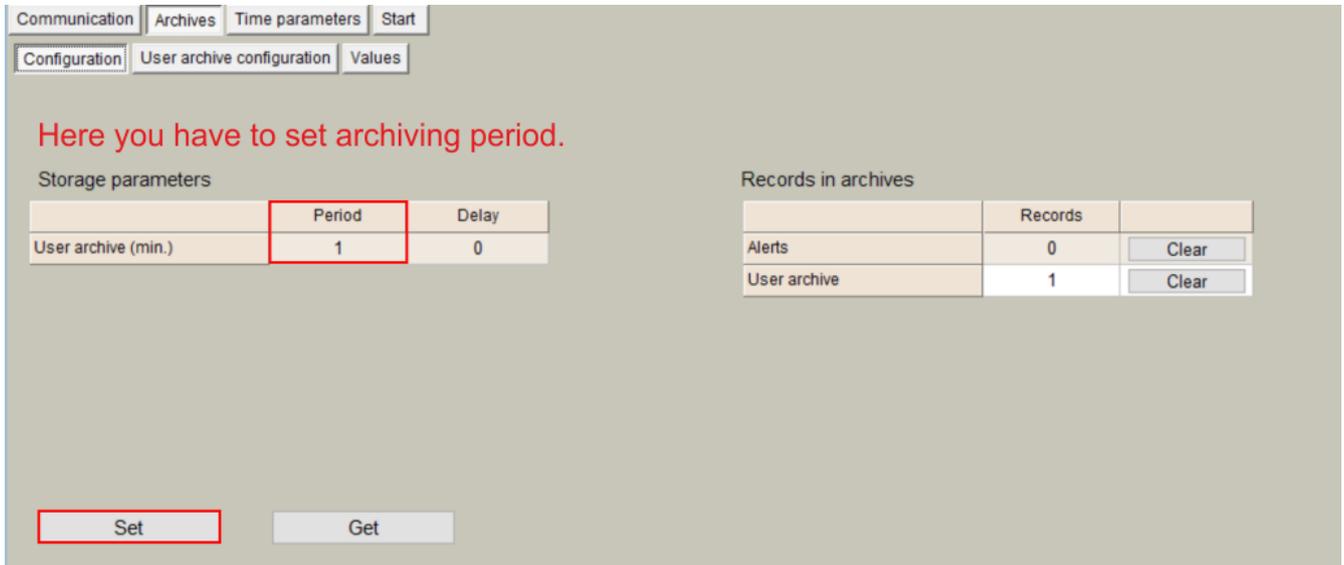
You can load from CSV file your description or save this and use in other devices.

8 "Archives" tab

The MX-1 has an internal 8MB flash memory. In case, the device is used as data logger, the following steps must be:

- Go to **Archives -> Configuration tab**
- In **Storage parameters** frame, configure the **Period**: It defines storage interval. Internal memory is organized in different blocks depending on the devices nature which are connected to the MX-1.

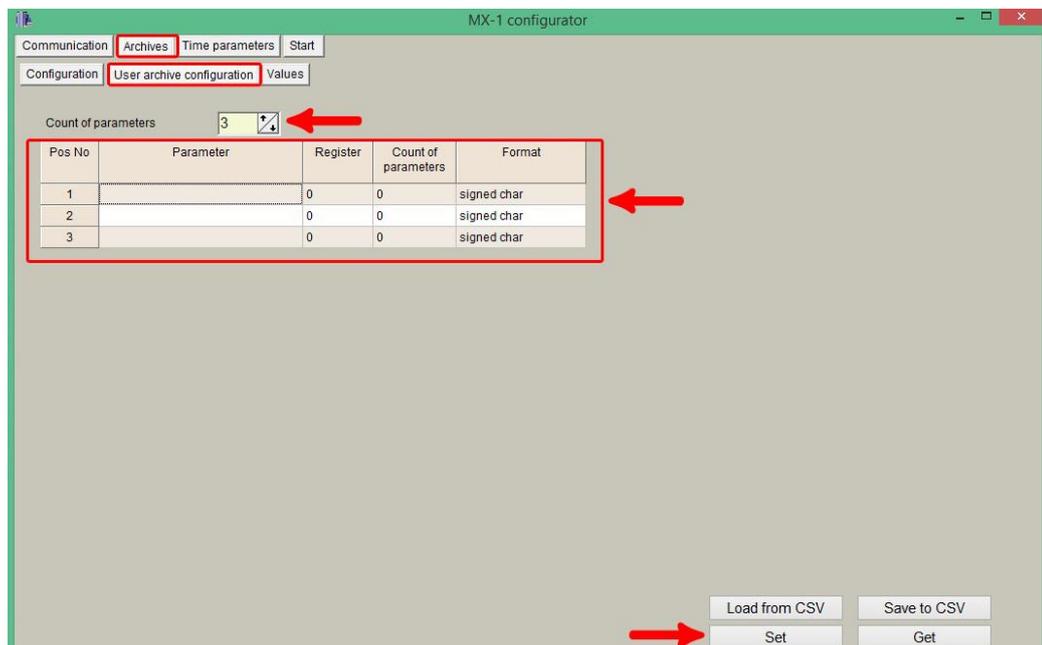
Then click on **"SET"** button in order to save changes.



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.



In order to check current data logged in the internal memory, go to **Archives -> Values -> User archive tab**. Here you can check, what values are archived and save them in your computer.

Pos No	Time	Identification Nr.	Volume(m3)	On Time(hours)	Time Point(time & date)	Time Point(date)	Fabrication
1	06/02/2017 14:31:00	8014388	0.1350	75441	1.4864037E9	943920000	8014
2	06/02/2017 14:30:00	8014388	0.1350	75441	1.4864036E9	943920000	8014
3	06/02/2017 14:29:00	8014388	0.1350	75441	1.4864036E9	943920000	8014
4	06/02/2017 14:28:00	8014388	0.1350	75441	1.4864036E9	943920000	8014

Req: 1204 Answ: 1203 TOut: 0 Except: 1

“Archives” tab. User archive current values

9 "FTP" CLIENT CONFIGURATION

Configure **FTP client**: Go to **Communication** -> **Data Transfer** -> **FTP**. In this tab you can set the FTP port, transmission channel, FTP server address / name. You have set your FTP port and transmission channel.

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.
- **"Max number of last records to be sent"**: 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.

In order to save changes click on **"SET"** button.

Communication Archives Time parameters Start

GPRS Serial interface MBus devices Data transfer FTP server

Common parameters Modbus TCP/IP client FTP **You have to set your FTP port and transmission channel.**

	FTP server 1	FTP server 2	FTP server 3	FTP server 4
Enabled	<input checked="" type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
FTP port	21	21	21	21
Transfer period (min.)	10	10	10	10
Repeat transfer if failure (min.)	5	5	5	5
Max number of last records to be sent	10	10	10	10
Ryđio kanalas				

Name template of the file to be sent
MX-1_YYYY_MM_DD_HH_NN.csv

URL and directory of FTP servers

FTP server	URL and directory
1	Here you have to set FTP server address or name.
2	
3	
4	

Username of FTP server

FTP server	User name
1	
2	
3	
4	

Password of FTP server

FTP server	Password
1	
2	
3	
4	

FTP server	Status	Successful/attempt/last record transfer times
1	Not active	0110111998 00:00:00 0110111998 00:00:00 0110111998 00:00:00
2	Not active	0110111998 00:00:00 0110111998 00:00:00 0110111998 00:00:00
3	Not active	0110111998 00:00:00 0110111998 00:00:00 0110111998 00:00:00
4	Not active	0110111998 00:00:00 0110111998 00:00:00 0110111998 00:00:00

Set Get

Communication -> "Data transfer" tab. FTP client configuration