VILTRUS ELECTRONICS

MX-3 DATA LOGGER

USER'S MANUAL

VILTRUS ELECTRONICS

CONTENTS

1 ABBREVIATIONS AND EXPLANATIONS

1.1 Markings

Xn – is a number of socket. This information are provided for manufacturer's purpose.

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).

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 pheripherical 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

M-Bus - a European standard (EN 13757-2 physical and link layer, EN 13757-3 application layer) for the remote reading of gas or electricity meters. The M-Bus interface is made for communication on two wire, making it very cost effective.

MBUS+ – contact for M-Bus positive wire

MBUS- – contact fot M-Bus negative wire

DDNS – an addition to the DNS standard. Dynamic DNS updates a DNS server with new or changed records for IP addresses without the need for human intervention. This allows a fully qualified domain name (FQDN) that never changes to be associated with a dynamically assigned IP address that can change quite often.

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

Opto – are protocol used by Kamstrup, for data transfer over two wiresares

Data – contact for data wire

Req – contact for request wire

Current loop - are used where a device must be monitored or controlled remotely over a pair of conductors. Only one current level can be present at any time.

CL+ – contact for current loop positive wire

CL- – contact for current loop negative wire

1.2 LED indications

Cycle – "heardbeat" indicator LED

MLED – modem status LED indicator

MRXD/MTXD – modem data receiving/transmitting LED indicator

1.3 Explanations

"Alarm mode" – in state of alarm status Controller initiates an event notification for user selected discrete input mode (Alarm mode: unconnected, connected, both events)

Central computer – server or a computer, where data can be sent.

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.

UART – An **Universal Asynchronous Receiver/Transmitter** is a type of "asynchronous receiver/transmitter, a part of computer hardware that translates data between parallel an serial forms. UART are commonly used in conjunction with communication standards such as EIA RS-232, RS-422 or RS-485.

2 PREFACE

2.1 Symbols

Internatiol electrical symbol list. Some or all symbols can be used on controller marking or in this user manual.

Symbol	Explanation
	With the **CE** marking on a product the manufacturer ensures that the product conforms with the essential requirements of the applicable **EC** directives.
	DC (Direct Current)
	Caution
	Grounding
	LED indicator Contact number on plug
RoHS	Directive on the restriction of the use of certain hazardous substances in electrical and electronic equipment 2002/95/EC. Commonly referred to as the Restriction of Hazardous Substances Directive or **RoHS**)

2.2 Safety instructions

To install and setup device, special technical knowledges are needed. Call to seller or certified profesionals 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 69050-1.
7. Controller is dry.
8. Ambient temperature and humidity is in normal range and non-condensing.
9. Other types of devices (meters, 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;

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

If you suspect that device doesn‘t operate correctly or has visible violations, disconnect from power supplier and 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.

2.3 Manufacturer’s warranty

Manufacturer guarantees to remove failure or to change in a new one (if the failure is irreparable) in two years period if user didn’t brake technical requirements and operating conditions named at chapters 2.2 and 3.

MANUFACTURER’S CONTACTS

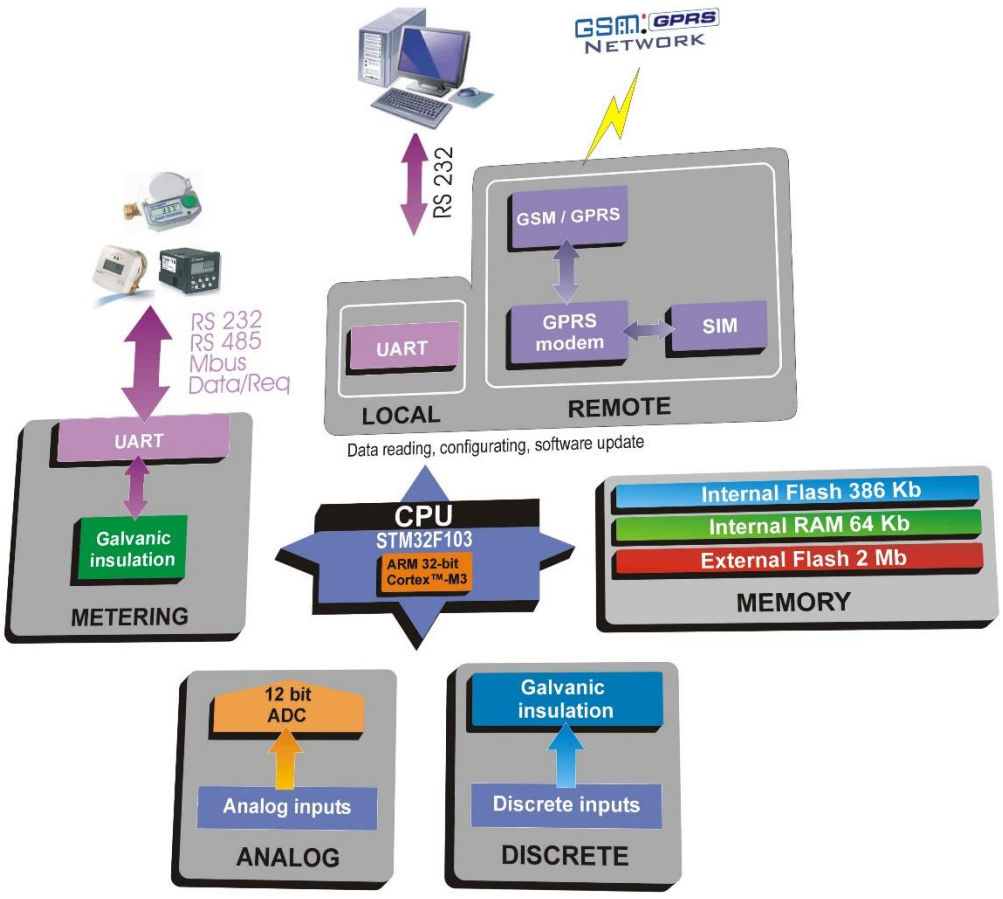
JSC “VILTRUS”
K. DONELAIČIO STR. 62, LT-44248 KAUNAS,
LITHUANIA
PHONE : (+370) 699 53998,
E-MAIL: INFO@VILTRUS.COM

3 TECHNICAL DATA

3.1 Purpose of device

Controller is designed to:

- Read out data from energy resources meters (electricity, heat, water, gas);
- Measure analog (current) signal values;
- Follow status of objects;
- Store accounting and measurement data;
- Carry out initial processing of data;
- Generate reports to service personnel at the limit of deviation from the preset parameters and status (discrete signals) change;
- Send all data through GSM/GPRS.

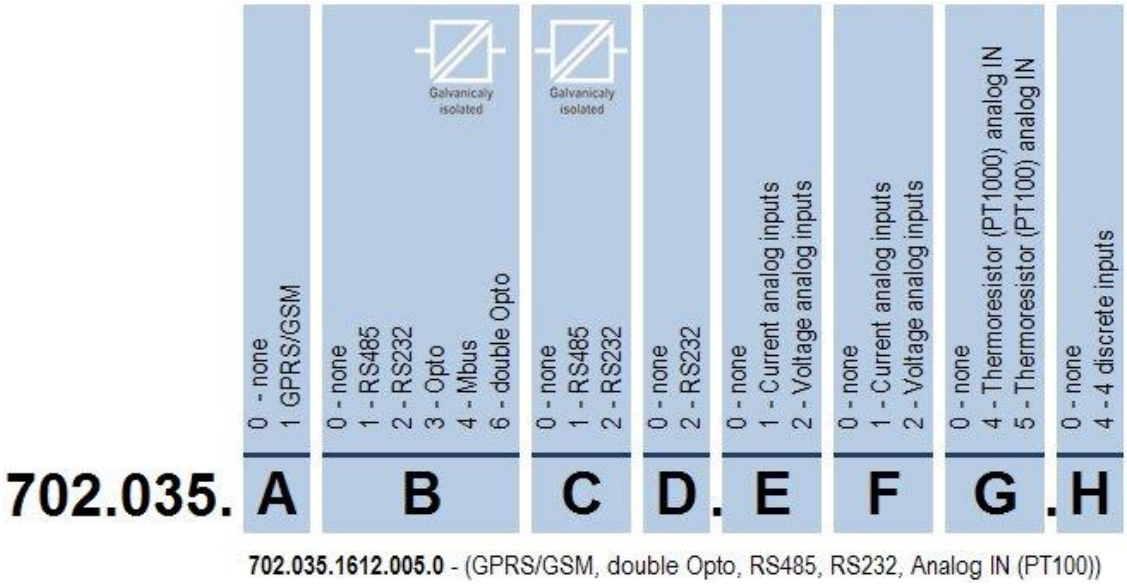


Pic 1 Controller's flowchart

3.2 Information on top label

This label provides common information about controller's and if you will need any consultations from technical center or manufacturer, please let them know full Model code and Serial No.

Configuration code provides full information about installed interfaces, supported power and other technical information:



702.035.1612.005.0 - (GPRS/GSM, double Opto, RS485, RS232, Analog IN (PT100))

3.3 Communication interfaces

Interfaces	Technical data
RS485	up to 1.2 km, max 32 transivers, speed up to 38,4 Kbits/s
RS232	up to 15m, speed up to 38,4 Kbits/s
Opto	up to 2 devices (KAMSTRUP) data transfer interface
Current loop	<30V, 14-20mA,up to 6 km, speed up to 19,2 Kbit/s

M-Bus	Up to 8 devices
GPRS	3 band 900/1800/1900 MHz
Discrete INPUTS	“Dry contact”
Analog INPUTS	Current 0/4-20mA, 0-5 mA ; Voltage 0-5V, 0-10V; Thermoresistor PT100 or PT1000; error ±0,15%

3.4 Protection

Insulation voltage between powe supplier and second circuits	1000 V
Insulated interfaces	B, C (see Configuration code)
Analog INPUTS	Yes
Discrete INPUTS	Yes

3.5 Indication

Indication type	LED’s
Indicated parameters	• Each discrete input status • Heardbeat • Serial interfaces Transfer/Receive • GSM/GPRS modem status, Transfer and Receive

3.6 Power supply

Power supply	15 ÷ 36 VDC ⎓
Power consumption	Up to 5VA
Internal battery	3,7V, 150mAh
Back-up battery	Charging for external 12V gel-acid battery (recomended 7Ah)

3.7 Construcition

Mounting	DIN35 rail
Dimensions	107 mm x 128 mm x 50 mm
Tightness	IP20

3.8 Working conditions

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

3.9 Safety parameters

Safety requirements	Meet requirements EN 61010-1:2002
Electromagnetic compatibility	Meets requirements of: 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

3.10 Other parameters

Archive storage memory	1 ÷ 8 MB (default – 2 MB)
Configuration settings storage without power supply	More than 5 years
Real time clock	Yes
Firmware loading	Yes. Through RS232 and GSM/GPRS.

4 SUPPORTED FUNCTIONS

4.1 Connection and communication functions

FUNCTION		DESCRIPTION
Routing	TCP/IP <> Serial (Request/answer)	Gateway TCP/IP <> Serial (Request) enables user to read devices data remotely. Controller with device communicates in sequence: Request <> Answer
	TCP/IP <> Serial (Full transparent)	Special transparent protocol, for remote data reading from variuos devices, especially from those, which have special manufacturer‘s protocol. Transparent data transfer protocol enables to use controller particulary with any device irrespective of its protocol.
	Modbus TCP/IP <> Modbus RTU	Gateway Modbus TCP/IP <> Modbus RTU enables controller to change Modbus TCP/IP protocol to Modbus RTU.
	Modbus TCP/IP <> Other protocols	Gateway Modbus TCP/IP <> Other protocols enables controller to change Modbus TCP/IP protocol to proprietary protocol.
Serial interfaces	Modbus RTU server	Modbus RTU server is used to establish local connection.
	Modbus RTU client	This function enables controller to get data from other devices connected to controller locally in modbus RTU protocol.
GPRS	Modbus TCP/IP server	Modbus TCP/IP server is used to establish remote connection with controller.
	Modbus TCP/IP client	This function enables controller to get data from other devices connected remotely in modbus TCP/IP protocol.

4.2 Measuring functions

FUNCTION		DESCRIPTION
Analog inputs	Measurement	Controller periodically 0.1 second intervals measures analog signal in default measurement scale of electrical signals (Voltage, current, resistance). To eliminate fluctations in measured signal controller uses time and amplitude filters.
	Conversion	Measured analog signal is converted into physical parameter value.
	Battery status	Controller in 1 second period check external battery status. This information can be used for battery healh and status monitoring or to switch alarm mode.
	Ext./Int. power	Controller in 1 second period checks status of External power and Internal power. This information can be used for monitoring or to switch alarm mode.
	Min/Max alarm limit	Accepted values controller compares with user-defined min/max alarm limit. If parameter value goes out of range or comes back (min/max alarm limit) deviation (event) fixed. For more information about events and alarms see chapter **4.4.**

Discrete inputs	Discrete IN purpose	Can be used for discrete IN state follow either as impulse meter or alarm signal.
	Current state	Controller periodically tracks all discrete inputs‘ status and during change on each channel it stores current changed state with real time value.
	Impulse meter	Each discrete channel can be used as impulse meter. All summed impulses are stored in controller’s memory. Physical value is converted from impulse quantity number multiplied by multiplier.
	Alarm state	By discrete channel‘s state (Open, Close, Both cases) function initiates alarm.
	Archive state	By discrete channel‘s state (Open, Close, Both cases) input can be written to archive. For more information about archive see chapter **4.3.**

4.3 Archive functions

FUNCTION	DESCRIPTION
Analog inputs	Analog input archive function stores all analog channels physical parameter value with a real time stamp.
Heat accounting	Heat accounting archive consist records of current heat meter parameters with real time stamp.
Gas accounting	Gas accounting archive consist records of current gas meter parameters with real time stamp.
Water accounting	Water accounting archive consist records of current water meter parameters with real time stamp.
Electricity accounting	Electricity accounting archive consist records of current electricity meter parameters with real time stamp.
Impulse	Impulse meter archive consists of discrete channel‘s number, total impulse count and real time stamp.
Discrete IN	Discrete IN archive consists of discrete channel‘s number, discrete channel‘s state and real time stamp.
Events (Alarms)	When permitable deviation is fixed, event occurs. Event can occur in these cases: ✓ Analog signal cross defined limits or comes back, ✓ Changed state of discrete signal. ✓ Satisfied one of the conditions in Alarm limits (See chapter **4.4**) Events archive field consists of time stamp, identifier, event source, deviation type and deviation value.
Diagnostic	Diagnostic or user archive store data about controller actions (reset, configuration change, time change, re-programming, archives delete and etc.)

4.4 Alarm functions

FUNCTION	DESCRIPTION

Alarms	GPRS report	When deviation fixed from set limits and event occured, controller itself connects to server and sends it‘s factory number, IP adress and event ID. After that, we recommend to connect to controller and read all information about deviations.
	SMS report	Controller has possibility to send SMS text messages on discrete channel‘s alarm state change or different events to several phones numbers. SMS message text can be entered for each discrete channel‘s state individually (ON and OFF) and individual text for different event code.

4.5 Meters and data collecting functions

FUNCTION	DESCRIPTION
Heat accounting	Controller can read data from heat meters: Meterman III, Multical 601, Elkora, FP-93, Supertrol II. If some meters are not supported – additional protocols can be implemented
Gas accounting	Controller can read data from gas meters: Unigas, Roots PTZ, TC-90, Uniflo. If some meters are not supported - additional protocols can be implemented
Mbus meters (water, electricity)	Mbus meters can be connected directly to Mbus or through Mbus/RS232 coverter. Controller has automatic device detection function.
Heat regulators	Controller has possibilty to read data from “Danfoss comfort” regulators ECL300 with all it‘s features.

4.6 Time functions

FUNCTION	DESCRIPTION
Real time clock RTC	Real time clock function in controller is used to keep track of current time. It‘s necessary to have real time records for alarms, reports, meters sent data and archives.
Time synchronization	3 types of time synchronization is supported: ✓ Using SEL-2401 Satellite synchronized-clock, ✓ GSM time, ✓ NTP (Network Time Protokol) server .

4.7 Other functions

FUNCTION		DESCRIPTION
Firmware & Setup	Locally	Firmware can be updated locally, through UART.
	Remotely	Firmware can be updated remotely, over GSM/GPRS
GPRS utilities	Firewall	Device has firewall function, incoming IP filter. Only allowed IP‘s can connect to controller.
Data reading	Modbus register field formation	User has possibility to form modbus register field manually. In defined registers data can be read only from formed modbus register block.

Limits verification	Modbus register check	Controller has possibility to check limits for any register (it can be analog value, meters data, time records, archives and etc.) Alarm limits, Data format (char, int, long, float), alarm conditions (over limit, under limit, equal, inside limits etc) can be defined for every register. Every alarm limit has own event code, which is used in diagnostic and for sending reports.
DynDNS	GPRS	Controller can connect to DDNS server and update information

5 INSTALLING CONTROLLER

5.1 Fixing device

The device is prepared for fixing on DIN rail. Loosen the screws on both sides of controller's encloser. First hang on the rail the top part of enloser, then gently pressing down evently push the device to the DIN rail and tightly vice locking screws on both sides of device.

5.2 Connecting

Before starting be sure, that controller and all pheripherical devices, that you are going to connect over serial interfaces (RS232, RS485, current loop, Opto, MBus and etc.), Discrete IN, and Analog IN channels are switched off.

Connecting the polarity-sensitive interfaces – carefully follow the notations on contacts.

If you are connecting interfaces, that use separate channels for data transmission (TX) and reception (RX) – switch them, that TX from one device has go to RX from another, and RX to TX. If you connect TX to TX and RX to RX – data will not be send and received through these interfaces.

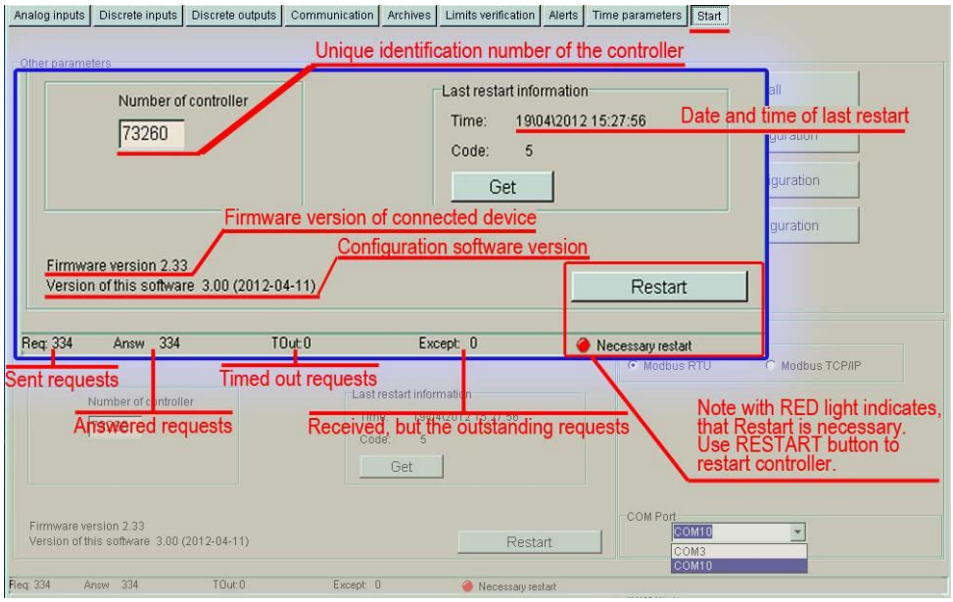
First turn ON the power on peripherical devices, and only when they boots-up – turn ON controller's power.

6 BASIC OF VILTRUS SOFTWARE

6.1 Operating principles

Viltrus's made configuration program contains only basic functions of controller and his main purpose – high level administration (configuring and monitoring).

In main window you can find all basic information about controller - controler's unical number, firmware version, version of configuration program, last restart time. In status bar - amount of sent / received / time outed / exepted (but not answered) requests and notifications. If you need to restart controler "Necessary restart" will RED light, this means you have made some critical changes and to take action controller need to be restarted - restart by pushing "Restart" button on "Start" tab (see **Pic 2**).



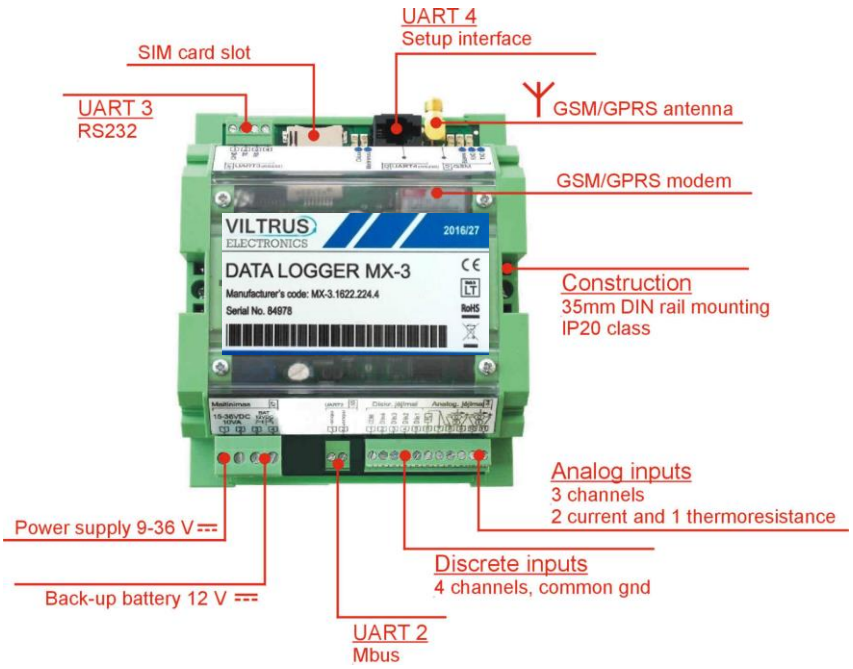
Pic 2 Common information [Start]

6.2 Before connecting

To communicate with controller, you need to prepare cables and correctly setup your computer. Be sure your computer stands at least minimal requirements.

Depending on type of controller you can connect through RS232, GPRS (see **Pic 3**).

Every controller has it's own connection default values and can be connected only using them.



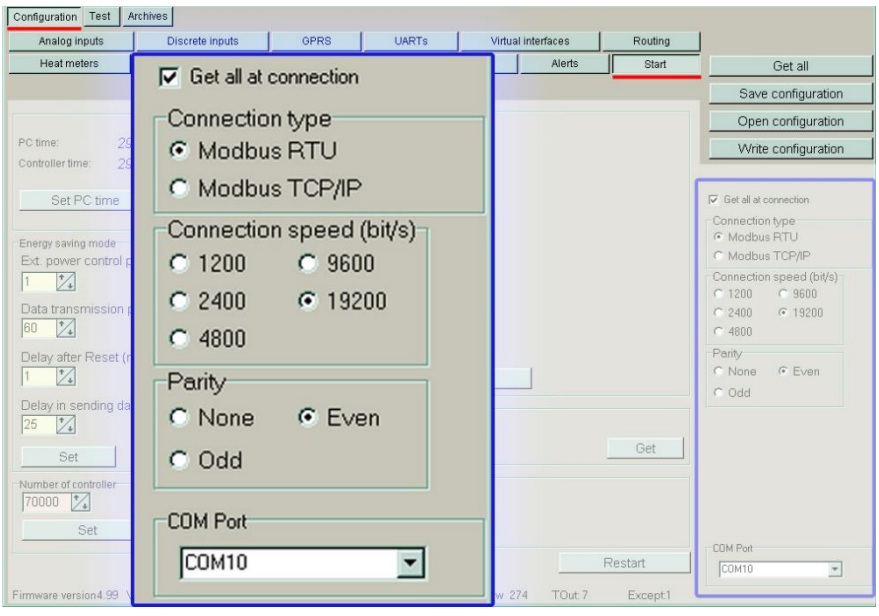
Pic 3 Connection interfaces

6.3 Connecting to controller over serial COM (device) port [Start]

Before connecting to controller over RS232 you need to choose correct RS232 cable, configure serial port and find number of serial port, that is connected to controller's serial com port. To establish connection, you need:

In "Start > Connection parameters" you need to choose Modbus RTU connection type.

Select Com port, that you will use for connection with PC. If connection fails, recheck cabling and COM port (see **Pic 4**).



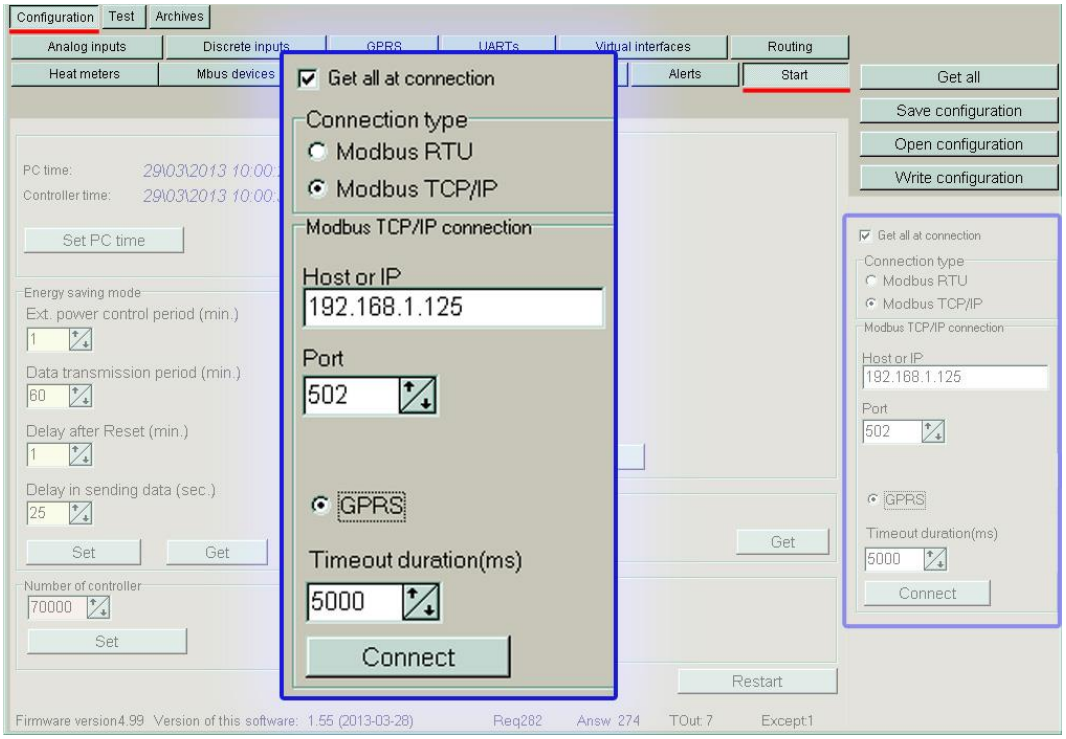
Pic 4 Connecting over COM port

If your PC don't have com port, you can use USB-COM adapter to connect from PC's USB to controller's COM port.

6.4 Connecting over GSM [Start]

Five steps to connect:

- You need to choose Modbus TCP/IP in "Connection type" area.
- Every controller has acquired IP address which will be used to connect to device.
- By default controller is set to 502 Port (this is system standard Modbus TCP/IP port), change it if you need.
- For slow connection (for example you are using GPRS connection or etc.) set timeout time in msec, range from 400 to 20.000 (recommended – 5.000 ms).
- By pressing "Connect" you will be connected to controller. If connection fails, communication type, IP address and try to connect again (see **Pic 5**).



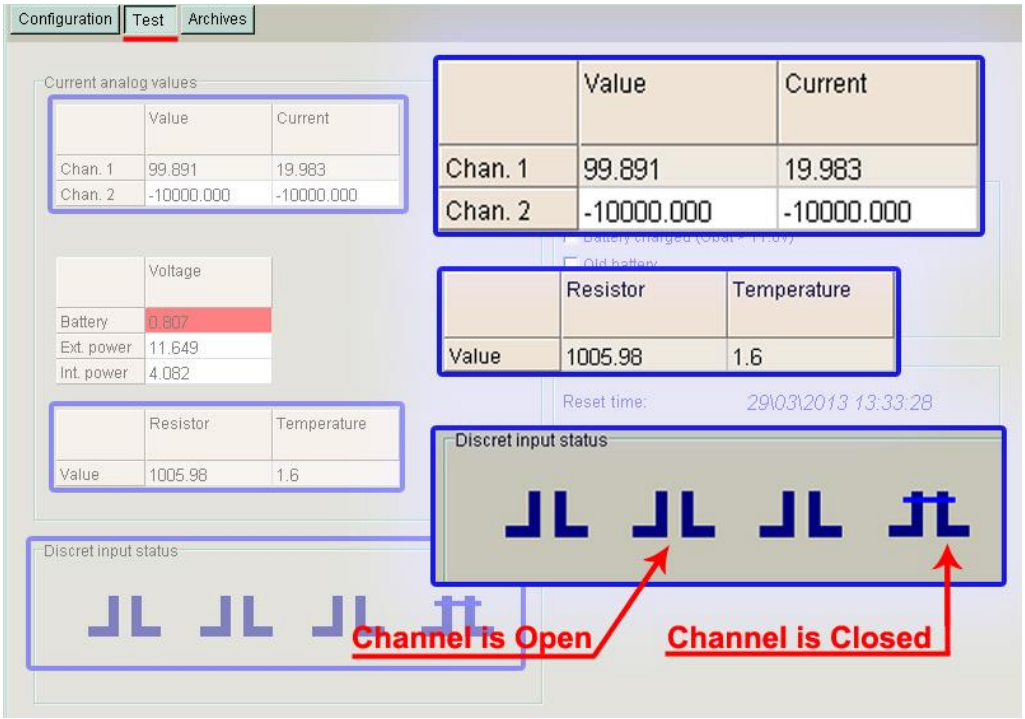
Pic 5 Connecting over GSM

7 SETTING UP

7.1 Analog measurements [Analog inputs]

Controller performed functions:

- Power, external battery voltage measurement;
- Analog signal measurement,
- Filtering,
- Conversion into physical parameter value (Current value),
- Storing Data (average value during a set period),
- Alarming in case of deviation;



Pic 6 Measured values of analog and discrete inputs

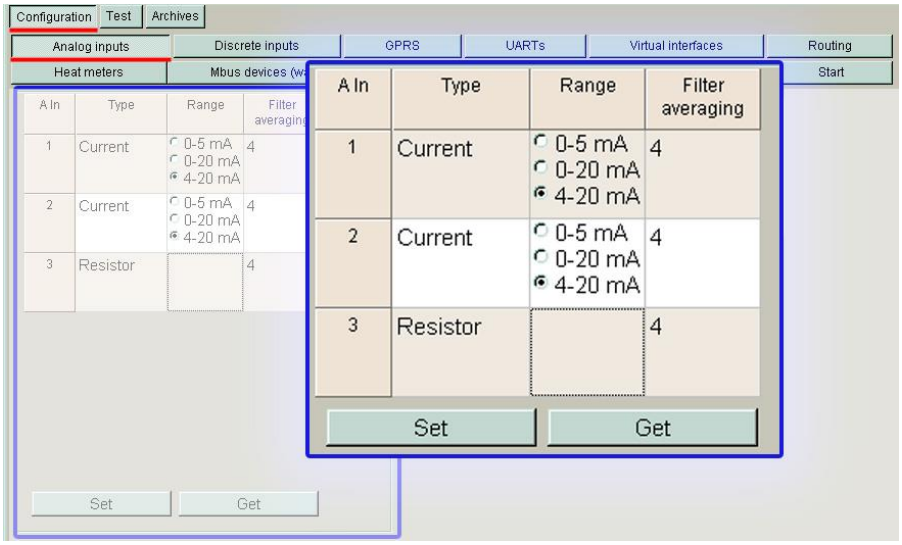
7.1.1 Configuration

Parameters:

- Battery charger parameters;
- Current range,
- Filter averaging duration,
- Conversion into physical parameter range (“Min. value” and “Max. value”) ,
- Alarm filter time,
- Alarm limits (upper and lower),

- Alarm case (Out of range, Out & return to range).

Controller periodically (analog measurement period 0.1 seconds) measures, voltage of power supply and back-up battery, current and resistance of analog channels and converts to physical value. User can choose from three (0-20mA, 4-20mA and 0-5mA, with accuracy 0,005mA) current measurement ranges (see Pic 7).

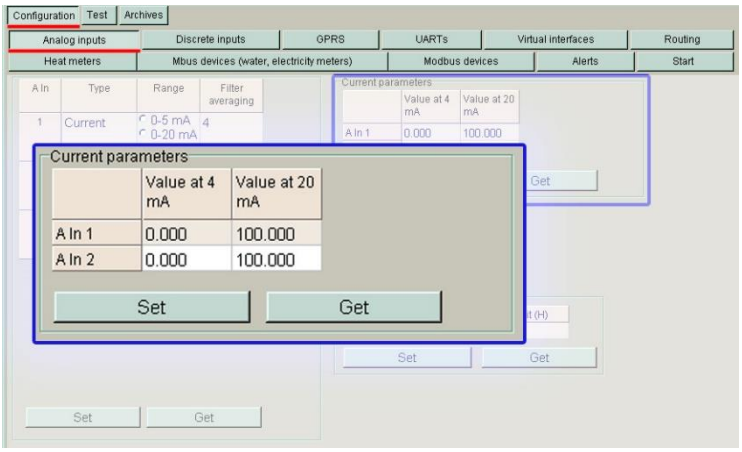


Pic 7 Setup Analog inputs

From current, using “Min. value” (float) and “Max. value” (float) range (formula:

$$\text{Currnet value} = Readed\_current * \frac{"Max.value" - "Min.value"}{Max\_current - Min\_current} + ("Min.value" - Min\_current * \frac{"Max.value" - "Min.value"}{Max\_current - Min\_current})$$

) is recalculated physical value (see **Pic 8**).

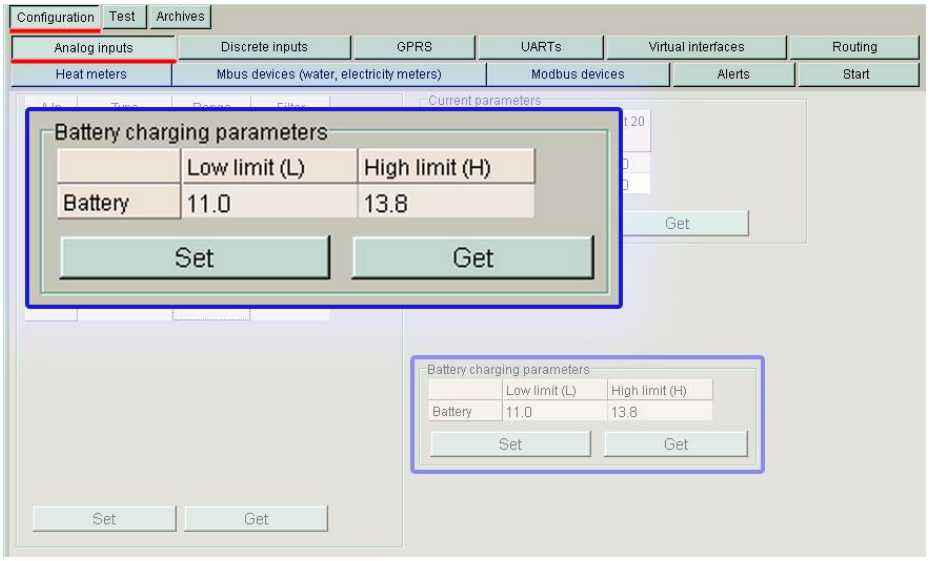


Pic 8 Setup current parameters

Measured values can be filtered. For filtration is used liner filter – calculated average value of analog measurements. Filter is configured by setting averaging duration in seconds. Averaging duration can be set from 0 to 2s, with 0,1s discretion (see **Pic 7**).

For example, if you set 1,5s averaging duration, then current value will be equal to the last 1,5s average value. If averaging duration is set to 0, filtration will not be done.

Controller also has possibility to charge back-up battery. User can set min and max limits, charger to start charging battery.



Pic 9 Setup battery charging parameters

7.2 Discrete measurements [Discrete inputs]

Performed functions:

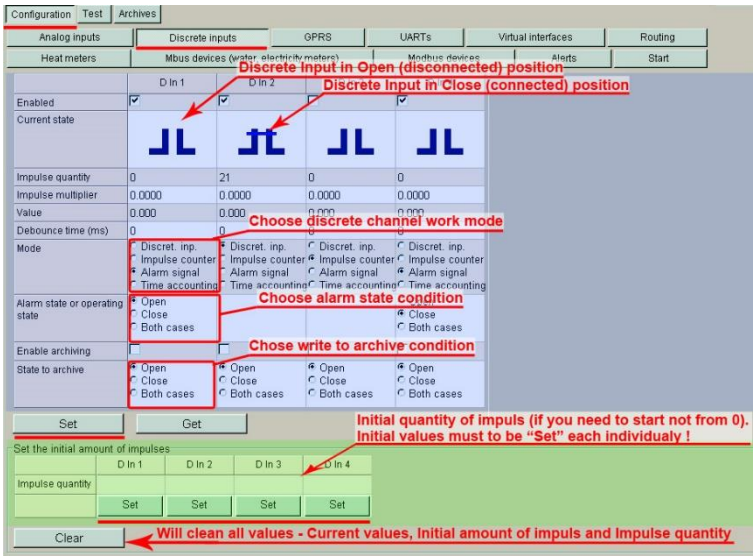
- Tracking of discrete signal status;
- Filtering from discrete signal fluctuations;
- Discrete signals changes storaging in archives;
- “Alarm” status (as events) fixation;
- Impulse aggregations and storing in archives.

Configurable parameters:

- D In channel usage;
- Debounce filtering time;
- Impulse counting mode;
- Impulse multipier (just to view multipliered impulse quantity, this parameter will not effect to Archive stored value);
- “Alarm” state (None (disabled), Input open, Input closed or in both cases);
- Archive state (None (disabled), Input open, Input closed or in both cases).

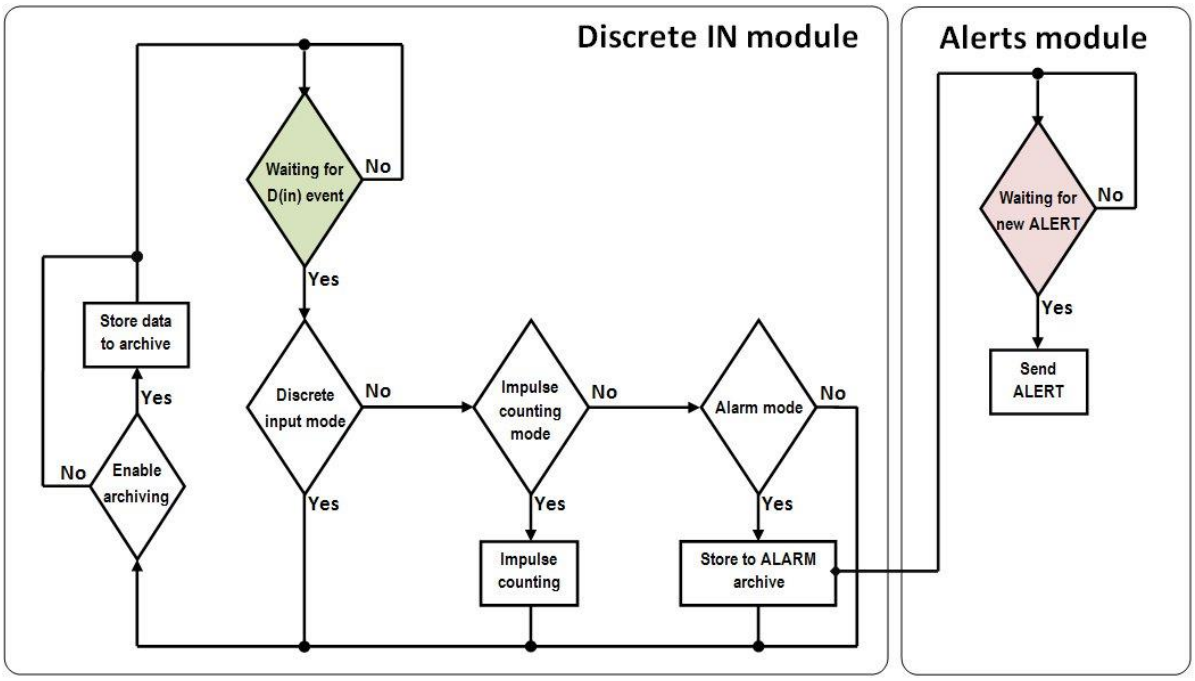
Current discrete channel’s states are shown by corresponding pictures Open and Close (see **Pic 10**). Using check box, up to the “Current state” pictures, you can Enable or Disable discrete channels. Discrete signal meanings are filtered by user-defined debounce times (debounce time

value can be set from 1 to 1000ms).



Pic 10 Discrete inputs configuration [Discrete inputs]

Controller periodically tracks status of all discrete channels and in case of changes takes action (see **Pic 11**).



Pic 11 Discrete IN channel data flow schema

Discrete channels can be used as impulse counters (see in Blue color marked group in **Pic 10**). With enabled impulse mode, counted impulses are periodically storred in to Impulse achive with a real time record (to setup period see chapter **7.6** Data storing to archive [Archives]).

Impulse meters can be configured to start from any initial amount of impuses. To do that – enter initial amount of Impuls for "Discrete IN" channel and Set it to controller (see in Green color

marked group in **Pic 10**).

In some cases is needed to have changed values (not counted Impulses), to do that use "Impulse multiplier" (range from 0.001 to 1000) (see in Blue color marked group in **Pic 10**). For example, if Impulse meter takes impulses from water meter after each Liter of the water and you need to calculate cubic meters of the water, so you add "Impulse multiplier" = 0.001 and result of Current value will have value in cubic meter's dimmension.

With enabled "Alarm state", discrete channels can be used to indicate Alarm status and depending on Alarm status condition (Open, Close or in Both cases), controller will make a record to Event archive (see chapter **7.6** Data storing to archive [Archives]) and Alerts module will send warning message.

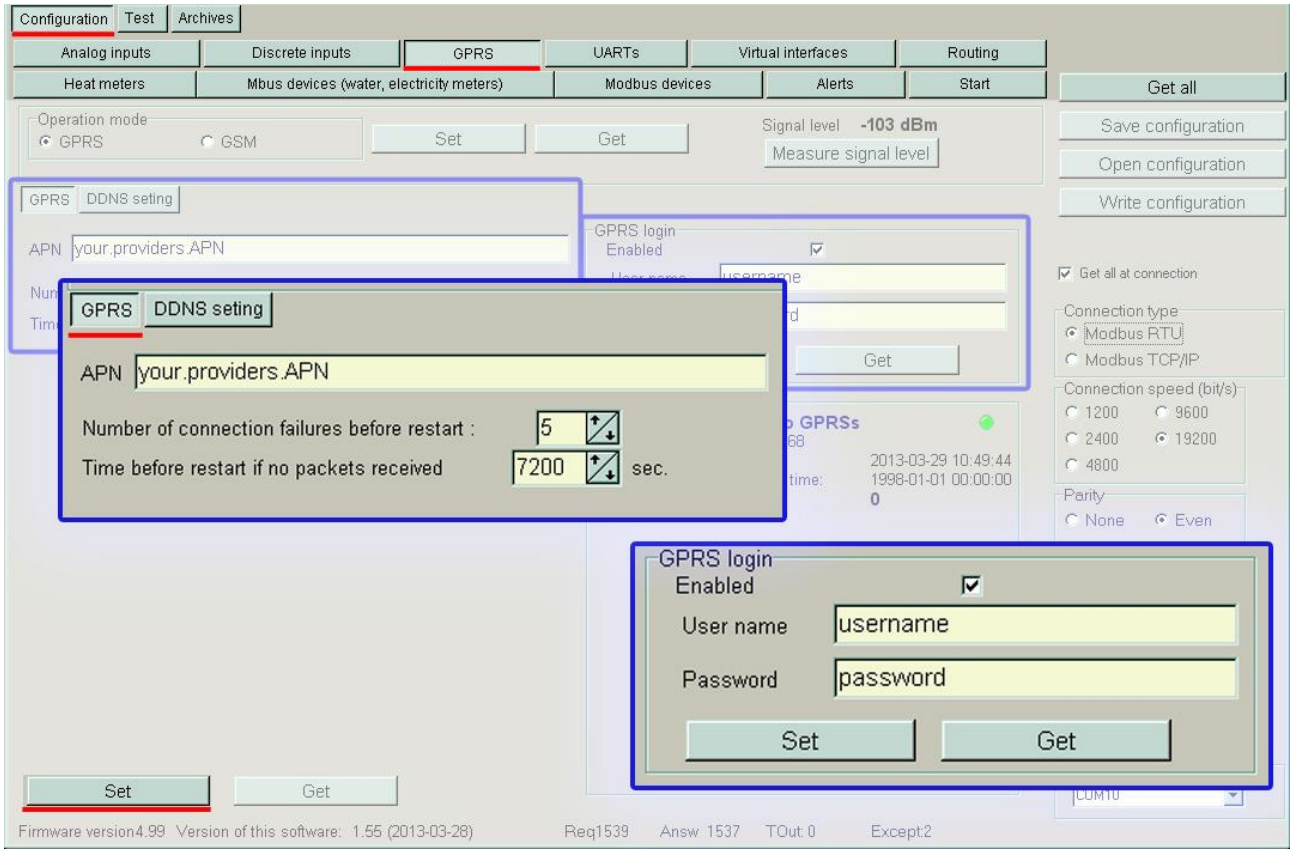
If you just need to view status of Discrete channels select Discrete input mode. Like in other modes, by enabling archiving you can store changes of discrete channels to archive (choose when to save – on Open, on Close or in Both cases) how to manage Events see chapter **7.6** Data storing to archive [Archives]

Alarm mode will not work if "Impulse counting" mode is enabled!

"Clear" button will clear current Value, Initial amount and Impulse quantity fields – use it carefully.

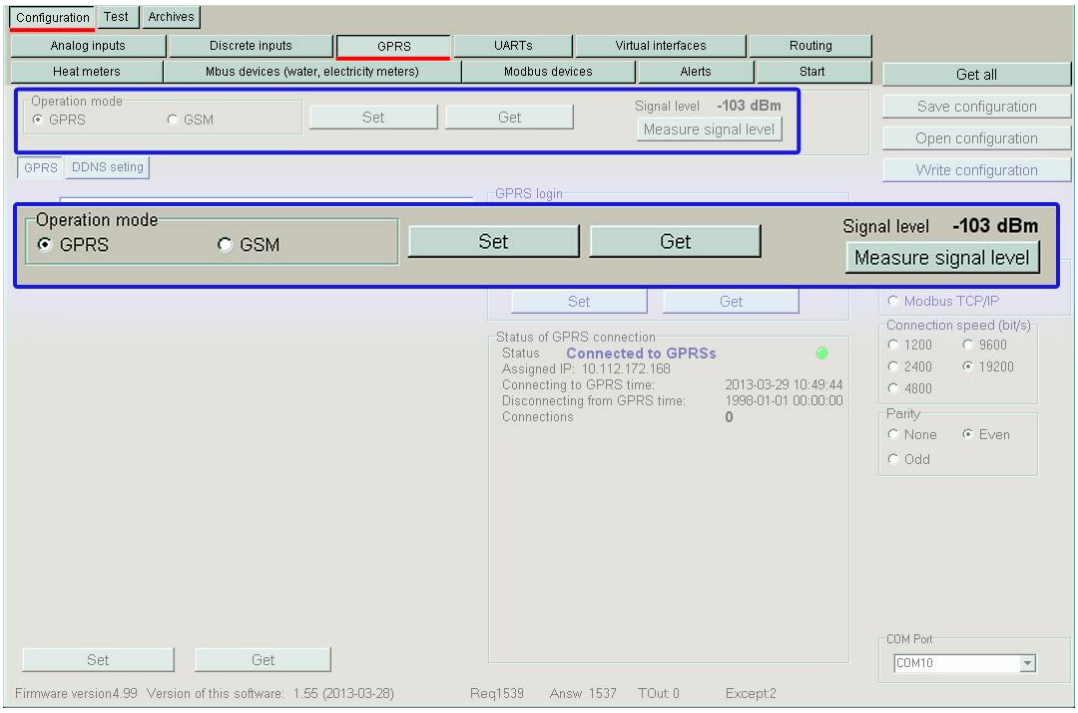
7.3 GPRS/GSM

GPRS (General Packet Radio Service) – it is a packet transfer over GSM protocol. By using GPRS sent/receive data is splitted into TCP/IP packets, and then in TCP/IP packets they will be transferred over GSM network. All network devices, has unique static IP addresses. By using APN (Access Point Name) identification your device will access an IP PDN (packet data network), that a mobile data user wants to communicate with. In addition, to identifying a PDN, an APN may also be used to define the type of service, and access private company network. GPRS devices cannot use dynamic addresses. Turned ON, controller is establishing connection (if SIM card is inserted), this takes about 30s. Some GPRS providers has additional security isues for connection – you need login (enter login data – see **Pic 12**).



Pic 12 Setup of GPRS/GSM settings

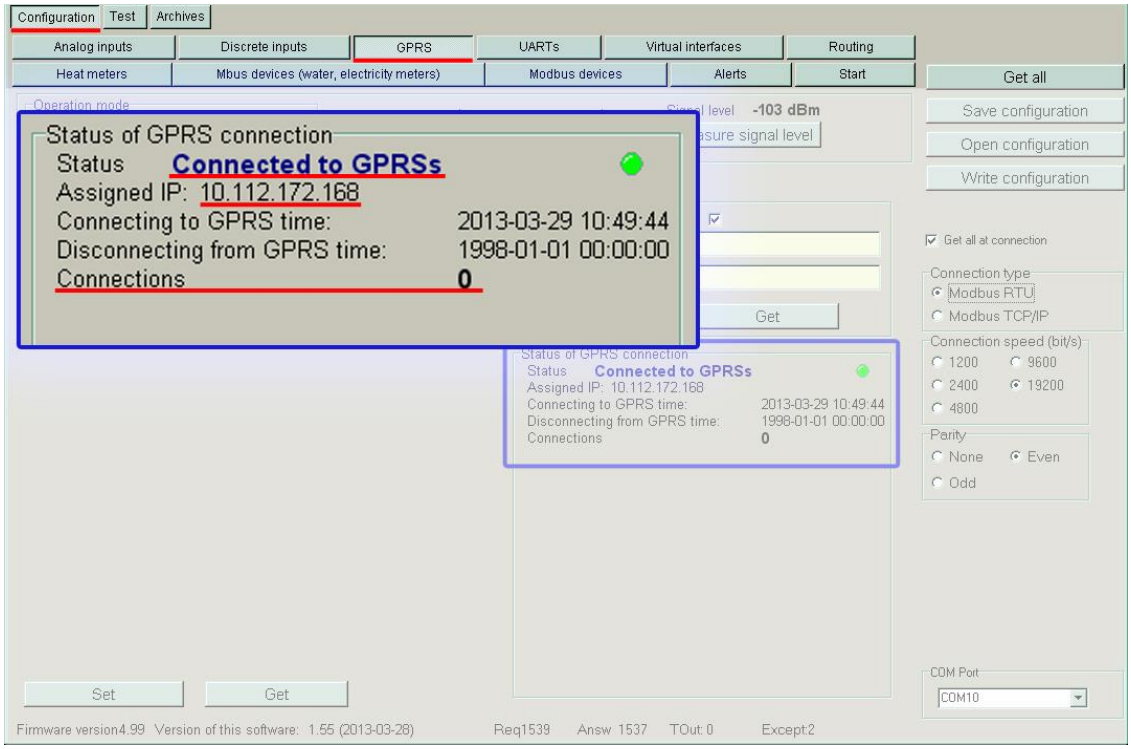
You can choose data transfer protocol: GPRS; GSM; (see **Pic 13**).



Pic 13 GPRS/GSM setup section

On GPRS status section you can see GPRS/GSM connection data (status, IP address, last

connection date and time,last disconnection date and time, total connection value) (see **Pic 14**). After restart, controller will establish GPRS/GSM connection automatically. Connection status will show every connection step (disconnected, in progress, connected). After connection was established, controller receive GPRS IP address, you can see it in field Assigned IP (see **Pic 14**).



Pic 14 GPRS connection data and status

7.4 Serial interfaces

Controller support all most popular Serial interfaces (RS485, RS232, Data/Req, MBus and Current loop). Information about installed serial interfaces on your controller you can find on Top label - Manufacturer's number (see chapter 3.2).

To setup Serial interfaces, you need to do few steps:

7.4.1 Setup UART's

Controller support up to 3 UART's and each of them can be configured individualy:

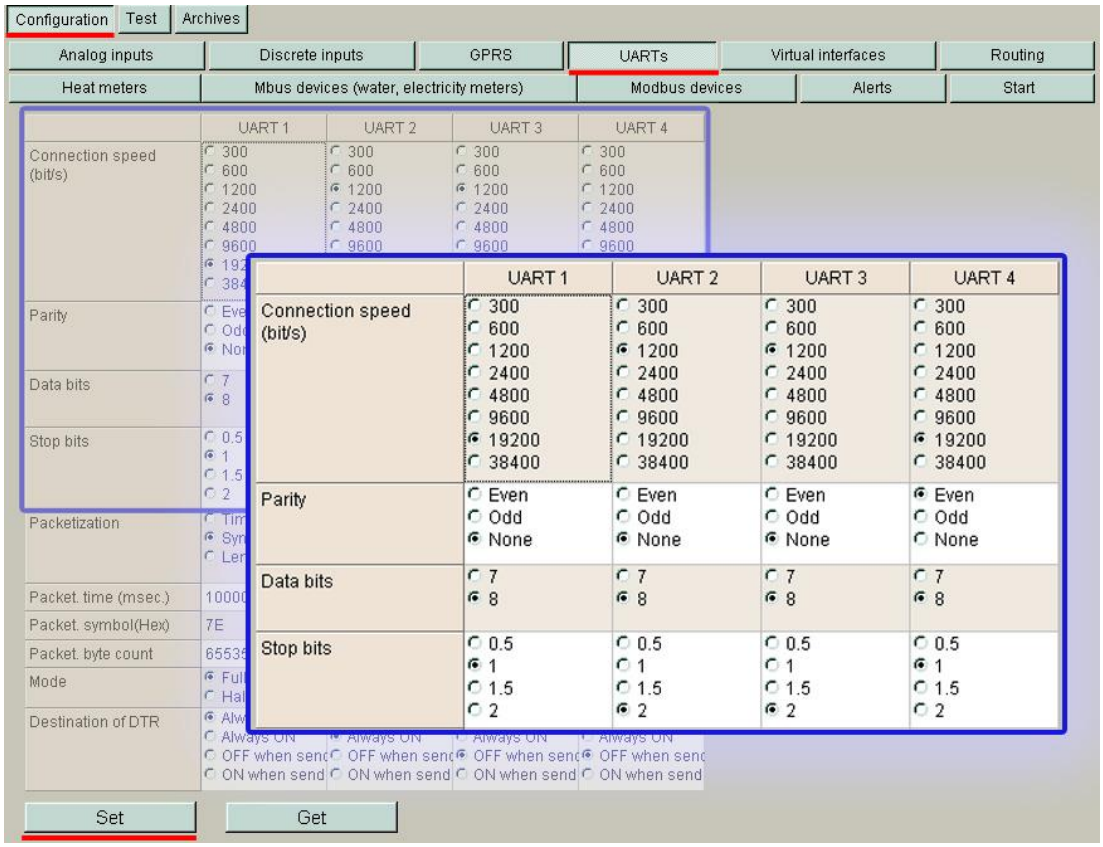
- Connection speed (300-38400 bit/s);
- Parity (Even, Odd, Mark, Space, None);
- Data bits (5, 6, 7, 8);
- Stop bits (1,1.5,2);

Packetization:

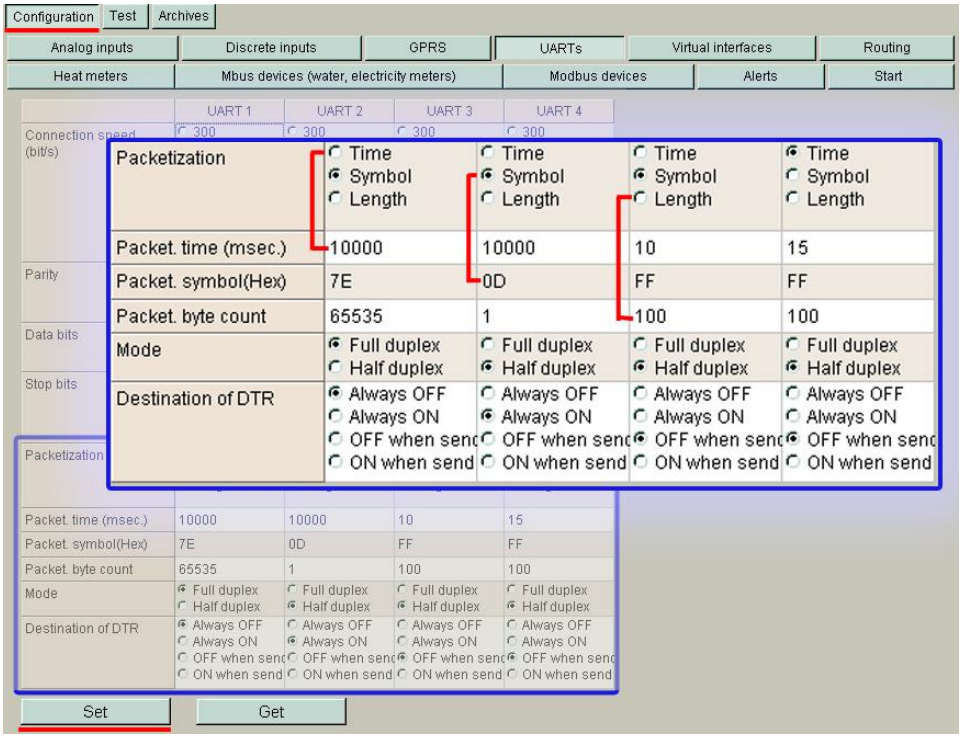
- Time – in field "Packet time" you can set packet interval (1 – 10000) msec;

- Symbol – if you use this packetization method, you need to write “Packet symbol” in HEX format;
- Length – if you select this packetization method, you need to write number of bytes per packet in field “Packet byte count”;
- “>1b+time” – is connecting packetization of methods “Length” and “Time” and you need to write values to the fiels “Packet time” and “Packet byte count”. End of packet will be the first met condition.
- Packet time (1-10000msec);
- Packet symbol (any Hex number, that will mean end of packet);
- Packet byte count;
- Mode (Full duplex, Half duplex);
- Destination of DTR (Always OFF, Always ON, OFF when sending, ON when sending);

For RS485 interfaces “Destination of DTR” must be set – “OFF when sending”



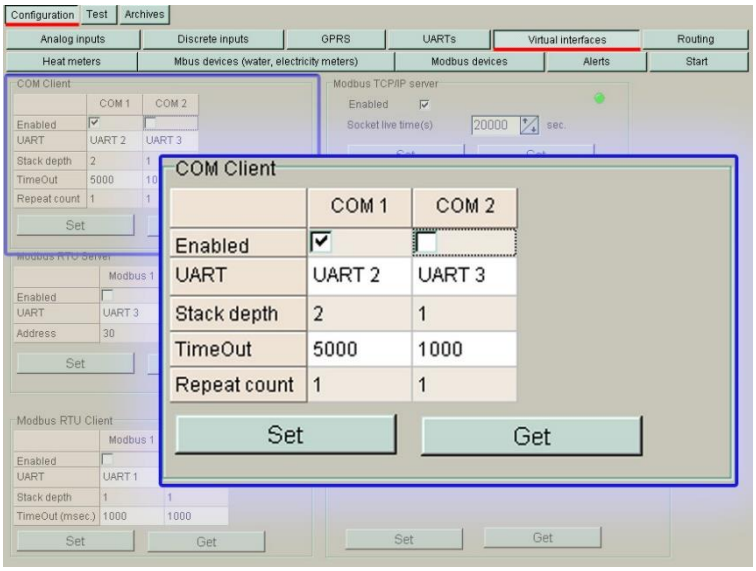
Pic 15 Setup UART (Basic)



Pic 16 Setup UART (Packetization)

7.4.2 Setup Virtual interfaces.

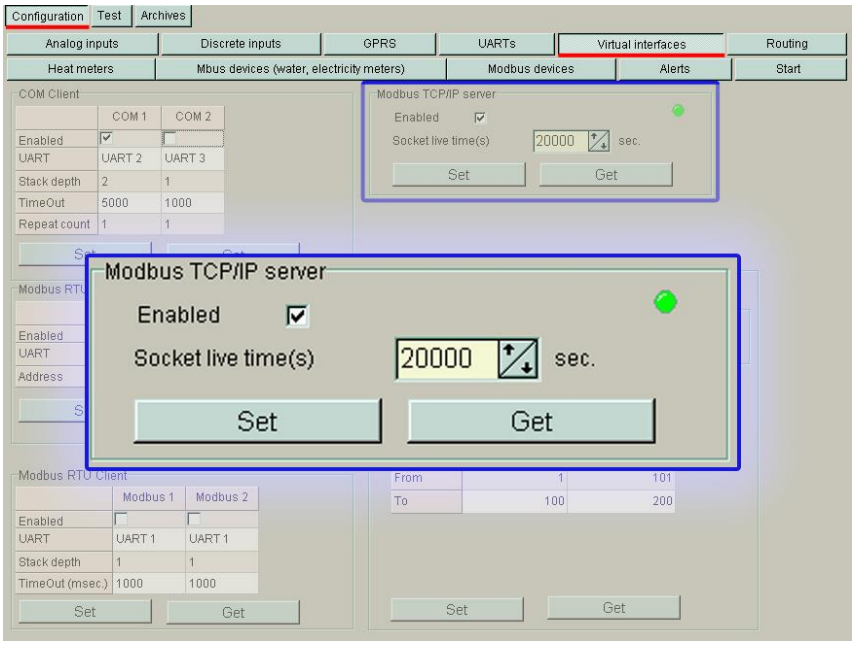
Use check box to Enable or Disable COM Clients (from COM1 to COM2). In the line „UART“, choose which UART (Universal Asynchronic Receiver Transmitter) port will be accessed by COM (values are from UART1 to UART4). By default, UART4 is used by Modbus RTU Server and is used to configure controller. COM client is used to read data from meter, and we need to set up COM client (not UART) (see **Pic 17**).



Pic 17 COM Client setup screen

Setting up Modbus TCP/IP server:

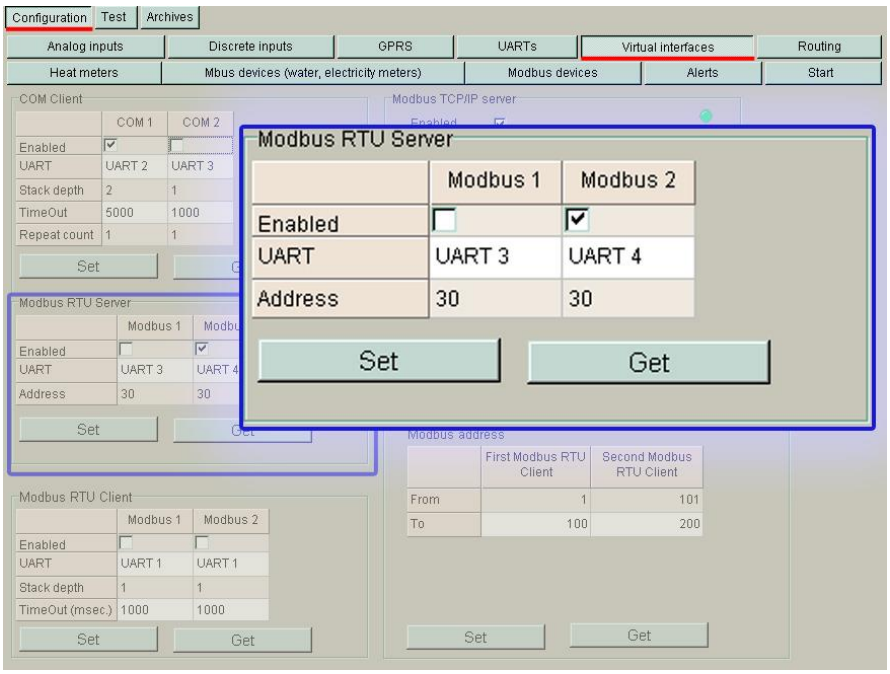
Modbus TCP/IP server is always enabled, you can change socket live time in seconds. Modbus TCP/IP is used in External modules device (see **Pic 18**)



Pic 18 Setup Modbus TCP/IP server

Setting up Modbus RTU server:

In this section, you can change default controller's configuration UART or add additional configuration UART .

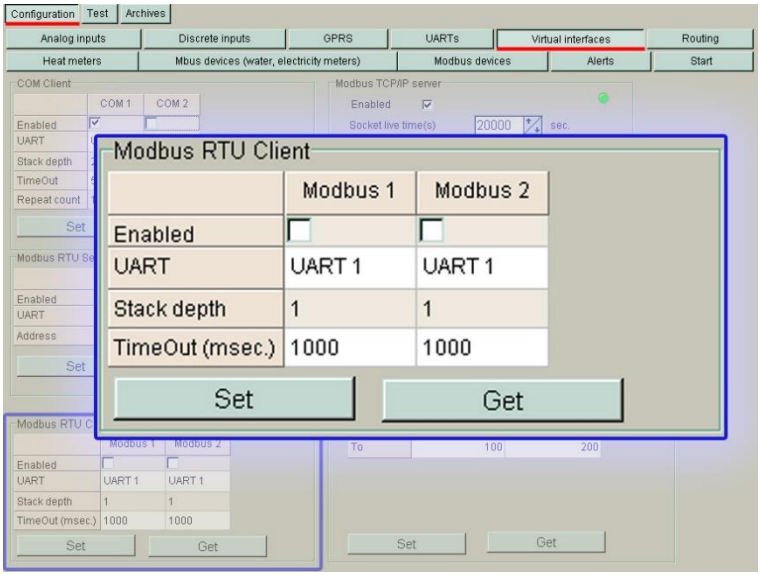


Pic 19 Setup Modbus RTU server

Setting up Modbus RTU client:

In this section, you can choose UART for Modbus RTU client.

Modbus RTU Clients usually are used for connection to other Modbus RTU devices (device must to support Modbus RTU server mode), like valves, heat correctors, controllers or etc.



Pic 20 Modbus RTU Client section [Interfaces>Virtual interfaces]

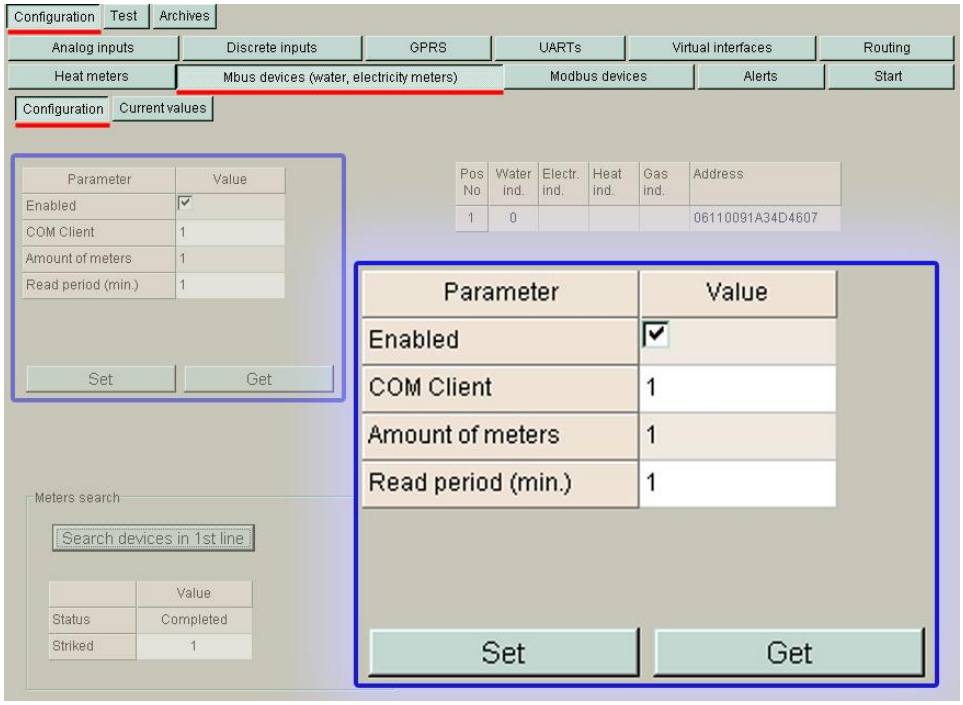
7.5 Accounting of energy carrier meters [Communication>Connected devices]

7.5.1 MBus connected meters [Communication>Connected devices>MBus devices]

Controler supports up to one Mbus interface, that can be connected up to 200 Mbus meters (by using RS232/RS485 to Mbus converter you can expand range of supported devices), so total number meters per controller is 400 (see **Pic 21**).

Setting up Mbus interfaces:

1. Enable or Disable interface by using check box.
2. Assign COM client by entering number of COM port (UART port must be configured and assigned to COM client);
3. See and correct if you need Read period value in minutes. Field value can be form 1 to 720 minutes.
4. Send data to controller, to take action.



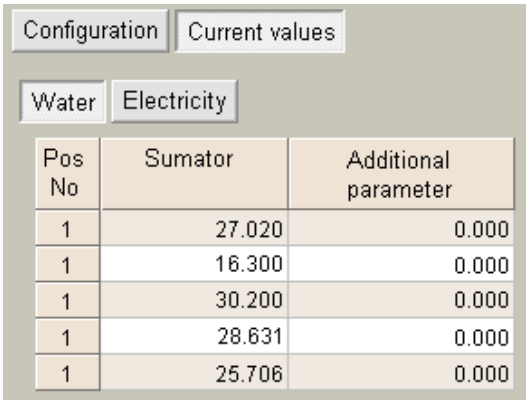
Pic 21 Mbus meter configuration screen

When you setup Mbus interface, you can use automatic Mbus device Search button. Then controller will search and setup all to controller connected Mbus devices.

Meter will be grouped by type, depending on “Measured medium” values (1 - Oil, 2 - Electricity, 3 - GAS, 4 - Heat and so on)

Attention !: Do not use search function (or at lease be carefull), if system already has data, and some devices are already listed in Mbus device list, because Search will reindex all records and you will lose all saved data.

Logged data you can read in [Communication>Connected devices>Mbus devices>Current values] window (see **Pic 22**).



Pic 22 Mbus Current values screen [Communication>Connected devices>Mbus devices>Current values>Water]

7.6 Data storing to archive [Archives]

All collecting data in controller are grouped into 9 groups:

1. Analog inputs
2. Discrete inputs
3. Heat
4. Water
5. Electricity
6. Discrete impulses
7. Events
8. Diagnostic

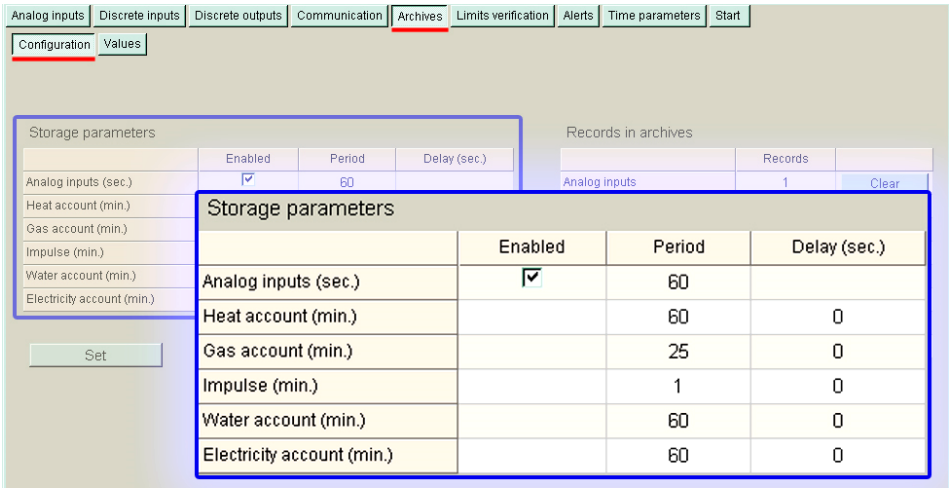
Controller writes data to archive by default, but you can edit data storing time intervals (Period). Other data, like Analog inputs you need to enable.

To write analog inputs data to archive - enable it by selecting check box in [Archives>Configuration]. If you need, you can change data storing period (default analog intups period value is 900s).

Dimensions of Analog inputs period is seconds, and periods for other devices is set in minutes.

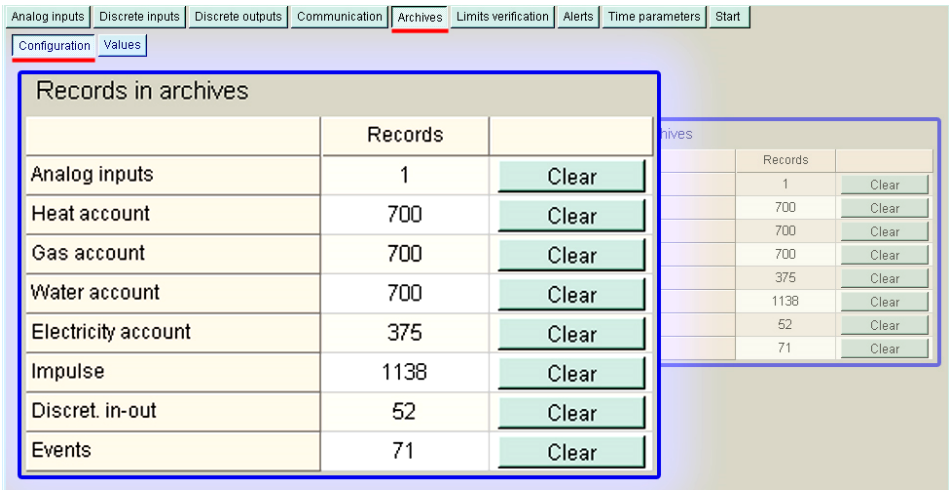
Period time is always calculated from midnight (time 0:00), so if at 10:42 you will Set accounting period to 60 min - the first time data will be stored on 11:00, and then every 60 min.. If meter reading period coincist with data storing to archive period, then data reading and storing will start at the same time, this means to archive will be stored data of past period (not current, because data reading need more time to get data), so you need to make a short delay, to leave system time to get new data from meter – in section Delay (sec.) write delay time, usualy 15-20 sec. is enought (see **Pic 23**).

To archive stored time stamp will coincist with meter (or other device) reading time, and storing to archive delay time will not be added !



Pic 23 Archive storage parameters section [Archives>Configutation]

In section RECORDS IN ARCHIVES, you can see total number of stored values in each group. By pressing clean, you can manually clean group's data from archive (see **Pic 24**).

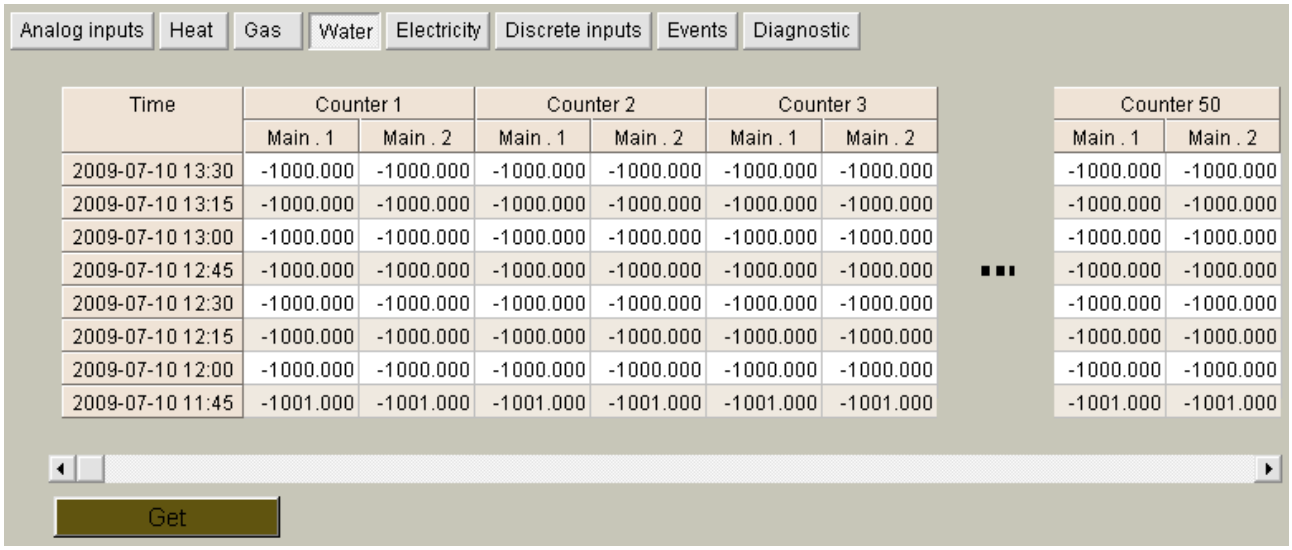


Pic 24 Records in archives section [Archives>Configutation]

8 STORED DATA

8.1 Logging water data [Archives>Values>Water]

In water data log, can be stored up to 50 meters. All data are grouped by meters and each meter contains 2 value fields and time stamp.



Time	Counter 1		Counter 2		Counter 3			Counter 50	
	Main . 1	Main . 2	Main . 1	Main . 2	Main . 1	Main . 2		Main . 1	Main . 2
2009-07-10 13:30	-1000.000	-1000.000	-1000.000	-1000.000	-1000.000	-1000.000		-1000.000	-1000.000
2009-07-10 13:15	-1000.000	-1000.000	-1000.000	-1000.000	-1000.000	-1000.000		-1000.000	-1000.000
2009-07-10 13:00	-1000.000	-1000.000	-1000.000	-1000.000	-1000.000	-1000.000		-1000.000	-1000.000
2009-07-10 12:45	-1000.000	-1000.000	-1000.000	-1000.000	-1000.000	-1000.000	▪▪▪	-1000.000	-1000.000
2009-07-10 12:30	-1000.000	-1000.000	-1000.000	-1000.000	-1000.000	-1000.000		-1000.000	-1000.000
2009-07-10 12:15	-1000.000	-1000.000	-1000.000	-1000.000	-1000.000	-1000.000		-1000.000	-1000.000
2009-07-10 12:00	-1000.000	-1000.000	-1000.000	-1000.000	-1000.000	-1000.000		-1000.000	-1000.000
2009-07-10 11:45	-1001.000	-1001.000	-1001.000	-1001.000	-1001.000	-1001.000		-1001.000	-1001.000

Pic 25 Water data log screen [Archives>Water]

9 SUPPLEMENT

9.1 System requirements

Minimal system requirements
PC with 1 gigahertz or high processor
512 megabytes (MB) of RAM
100 megabytes (MB) free hard disk space
Super VGA (800 x 600) or higher-resolution video adapter and monitor
Keyboard and Mouse or compatible pointing device
Free COM port, USB or Ethernet adapter (depending on your connection type)
Microsoft Windows XP or high Operating system

Recommended system requirements
PC with Intel I5 2 gigahertz processor
4 gigabytes (GB) of RAM
200 megabytes (MB) free hard disk space
Super VGA (1280 x 768) or higher-resolution video adapter and monitor
Keyboard and Mouse or compatible pointing device
Free COM port, USB or Ethernet adapter (depending on your connection type)
Microsoft Windows 7 or high Operating system

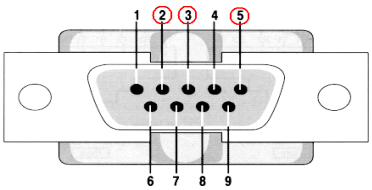
9.2 Default connection values

UART 4

Bits per second	**19200**
Data bite	**8**
Parity	**Even**
Stop bits	**1**

9.3 RS232 cabling

Devices to controller is connected through terminal blocks. Exact configuration of pins are shown on the top of the case. For communication with computer controller is using only RD, TD and GND signals:

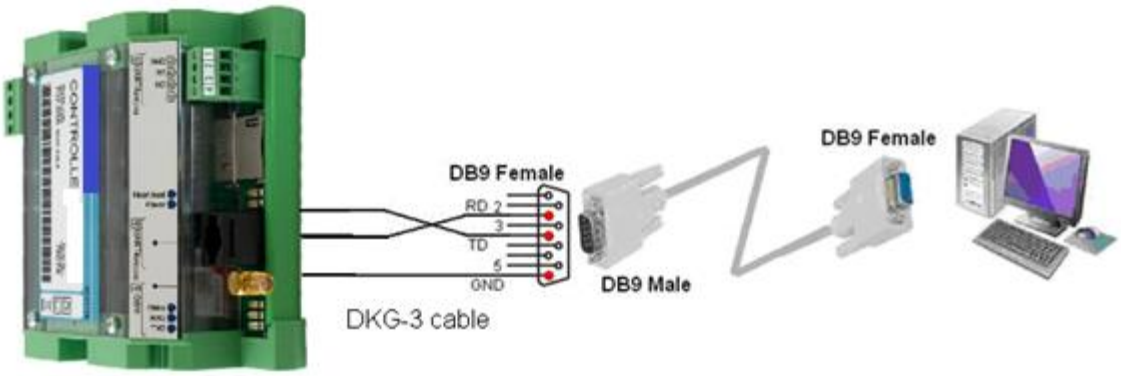


2 pin – RD (Received data)

3 pin – TD (Transmitted data)

5 pin – GND (Ground)

You can use existing Com port, or USB to Com port, PCMCIA to Com or etc. device.



9.4 Com port setup

If you are connecting for the very first time or after hardware reset, on top of device, you can find default manufacturers connection settings (in other case ask integrator or system administrator for current connection settings). You need to set correct your computers COM port settings - Speed (Bits per second), Data bits, Parity, Stop bits to connect to controller.

Depending on what USB port you plug in device or adapters, your COM port will change. Here is how to find out what the setting is and to change if necessary. Often such devices use common ports COM1 - COM8.

Depending on your computers operating system, COM port setting can be find:

Windows 98 COM port setting

1. Choose Start > Settings > Control Panle
2. In the Control Panel window, double-click the System icon and then click the Device Manager tab.
3. On the Device Manager card, determine the COM port settings for each COM port.
4. Double-click the Ports (COM&LPT) icon.

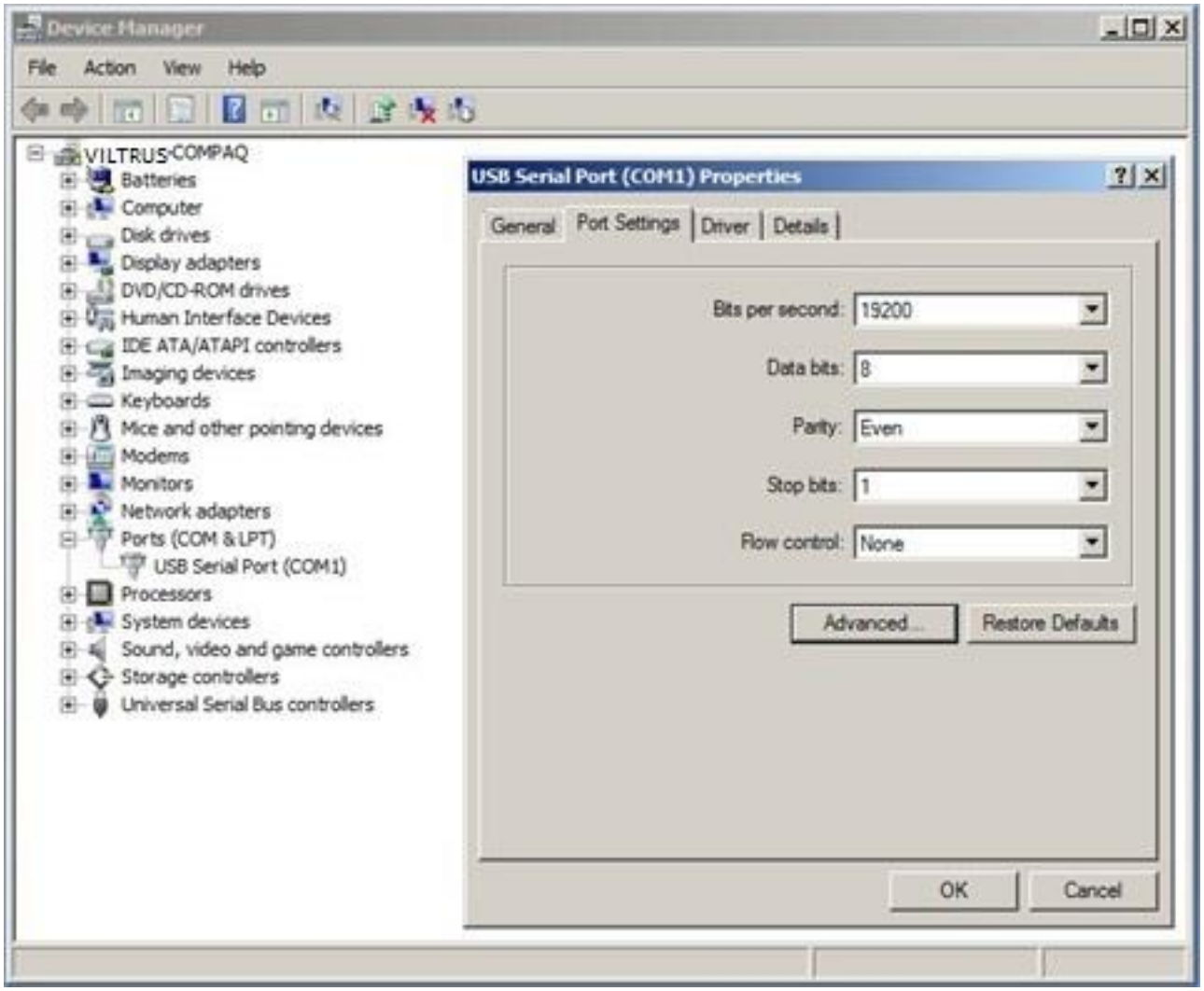
Windows XP COM port setting

1. Choose Start > Settings >Control Panel
2. Double-click Administrative Tools, double-click Computer Management, and then click Device Manager.
3. Double-click Ports (COM&LPT). Right-click the port for which you want to change settings, and then click Properties. On the Port Settings tab, make changes if necessary.

Windows Vista and Windows 7 COM port setting

1. Chose Start > Control Panel > Device manager
2. Click continue if user permissions set up
3. Click plus sign next to Port

Look for your device and view COM port used



9.5 TCP/IP settings

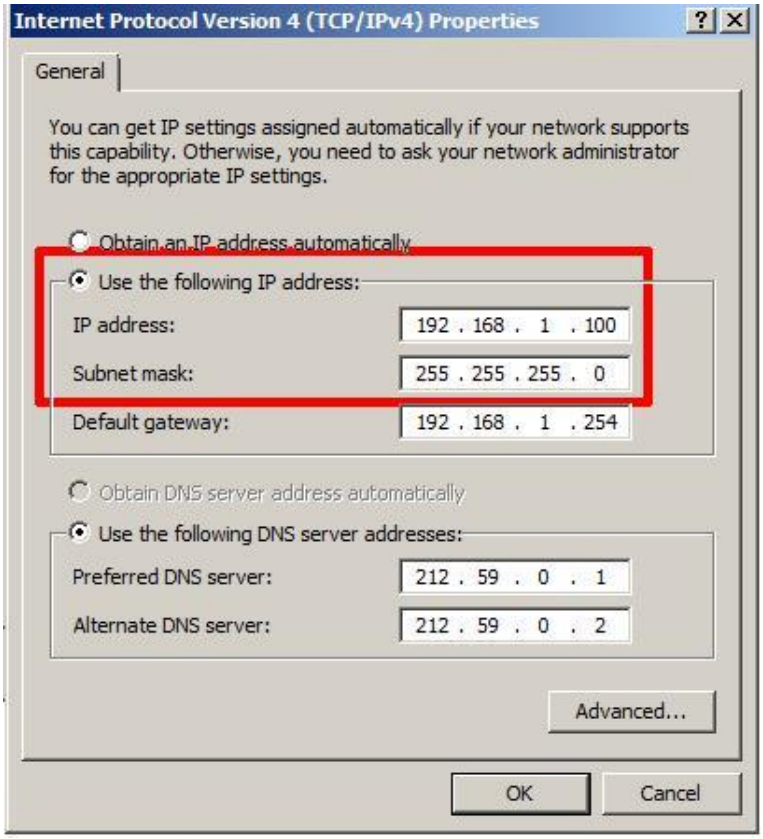
Windows XP, Vista, 7 TCP/IP settings

Choose **Start** > Settings > Control Panel > Network and Sharing connections

On the Network Connections window double click your network device, in mostly PC this is Local Area Connection, click Properties and Continue in new window.

On the Local Area Connections Properties window double click Internet Protocol Version 4 (TCP/IPv4).

On the Internet Protocol Version 4 (TCP/IP4) Properties window select Use the following IP addresses, Subnetmask (255.255.255.0) (and other addresses if you need). In that case I use: IP: 192.168.1.100, Subnet 255.255.255.0. IP addresses can't duplicate on the network



Pic 26 Set static IP on PC

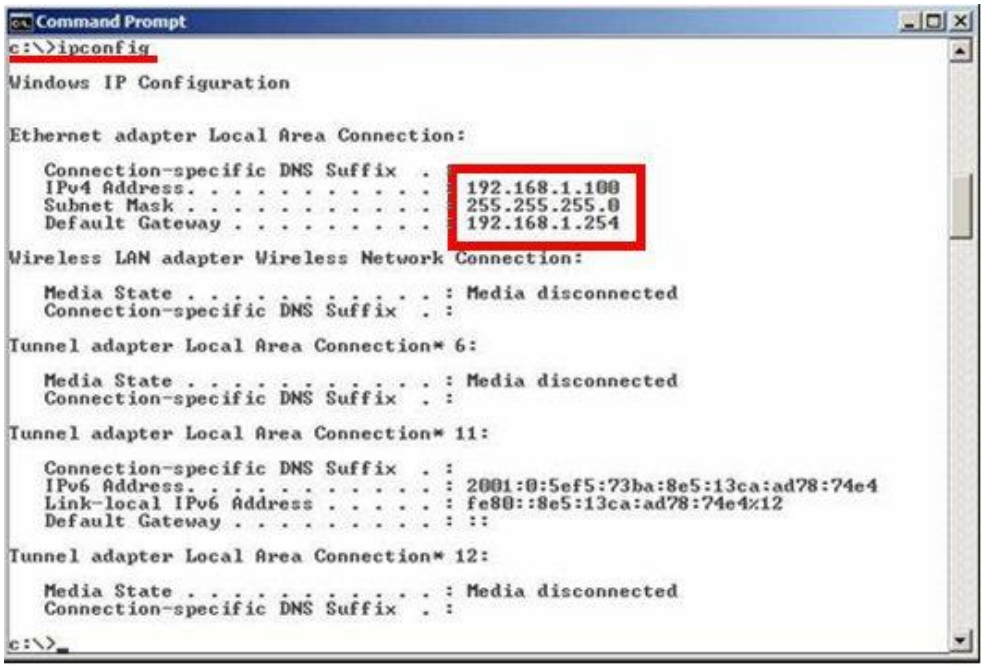
You can check your configuration:

Choose Start > Run

On the Run window type "cmd" and press OK

On the Command Prompt window type "ipconfig" and press Enter

Example: ipconfig screen



Pic 27 View current configuration on Command Prompt