PiiGAB
PROCESSINFORMATION

PiiGAB M-Bus 900S/T

Description
User Manual

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M-Bus Hub	2.02.02

www.PiiGAB.com

UNIVERSAL ETHERNET M-BUS GATEWAY 900S/T

Description
User Manual

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Contents

Chapter 1

1 General

1.1 About this manual

This manual will give you the guidance to install and connect the PiiGAB M-Bus 900 to your network. It demonstrate how you connect to network, RS232, RS485, M-Bus Slave and the M-Bus Master output as well as how you configure the module based on your requirements

1.2 Functional overview

The PiiGAB M-Bus 900 works as an interface between the Ethernet/RS232/RS485/M-Bus slave entrance and the M-Bus network. The gateway is completely transparent which means that the M-Bus questions asked via Ethernet are transferred out on the electric M-Bus interface. The same goes for the answers sent from the meters via the gateway.
The gateway also has the option to add different software modules to meet requests such as conversions between protocols, reading the same meter from different clients and sending files to a database etc.

1.3 Advantages and possibilities

- The possibility to choose between TCP/IP or UDP/IP
- The gateway can be used with a fixed or a dynamic IP number.
- It is not dependent on any specific operating system, which means it can be used with both Linux and Windows.
- There is a possibility to use password protection to prohibit unauthorized to change the configuration.
- Communicate with up to four clients at once.
- Read M-Bus meters via Modbus (TCP/RTU).
- Read Modbus meters or other Modbus equipment's via M-Bus.
- Local and central reading of the same meter from different directions at once.
- Connect to existing M-Bus network.
- Makes it possible for redundant communication.
- Read meters via M-Bus and Modbus at the same time.
- Read a few M-Bus meters without external M-Bus drivers via M-Bus ASCII.
- Can upgrade number of M-Bus loads (meters) and number of clients via a software license.
- Via the QuickPost application can meter values be logged and pushed to an FTP or HttpPost server.
- Read virtual M-Bus meters.

Chapter 2

2 Technical structure

The gateway's interface consists of one Ethernet connection, one RS232, one RS485, two separate M-Bus slave inputs, four parallel outputs for M-Bus loops, two digital inputs and one relay output as well as a voltage connection.
There are ten leds on the front of the gateway with different kind of information please see the table in section 2.2.

2.1 Connections

2.1.1 Connections on the upper 18 pin connector

Figure 2-1

Table 2-1

Connection	Term	Description
1	Relay NO	Relay output normally open
2	Relay COM	Relay output
3	Relay NC	Relay output normally closed
4	DI1 +	Digital input 1
5	DI1 -	Digital input 1
6	DI2 +	Digital input 2
7	DI2 -	Digital input 2
8	RS485 A	Connection for RS485
9	RS485 B	Connection for RS485
10	R485 GND	Connection for RS485 GND
11	RS232 Rx	Connection for RS232 Rx
12	RS232 Tx	Connection for RS232 Tx
13	RS232 GND	Connection for RS232 GND
14	X	Not used
15	M-Bus Slave 1	Connection to already existing M-Bus loop with belonging M-Bus master. Polarity independent.
16	M-Bus Slave 1	Connection to already existing M-Bus loop with belonging M-Bus master. Polarity independent.
17	M-Bus Slave 2	Connection to already existing M-Bus loop with belonging M-Bus master. Polarity independent.

18	M-Bus Slave 2	Connection to already existing M-Bus loop with belonging M-Bus master. Polarity independent.

2.1.2 Connections on the lower 12 pin connector

Figure 2-2

Connections on the lower left 3 pole connector are as stated in the below table:

Table 2-2

Connection	Term	Description
19	24 V AC/DC+	24V AC power alternatively 24V DC (plus side)
20	24 V AC/DC-	24V AC power alternatively 24V DC (minus side)
21	GND	Connect to decrease potential disturbances.

Connections on the lower right 9 pole connector are as stated in the below table:

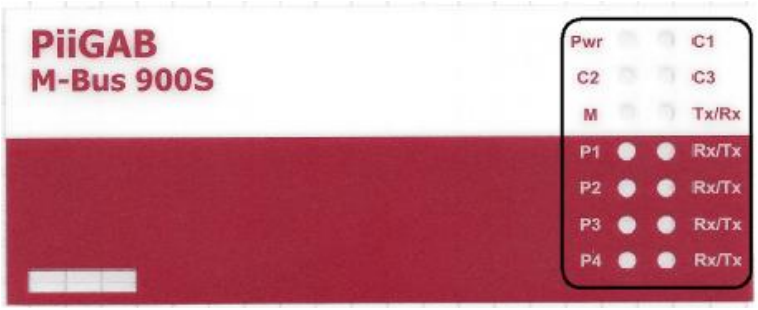
Table 2-3

Connection	Term	Description
22	M-Bus Master +	Connection to the M-Bus loop 1
23	M-Bus Master -	Connection to the M-Bus loop 1
24	M-Bus Master +	Connection to the M-Bus loop 2
25	M-Bus Master -	Connection to the M-Bus loop 2
26	M-Bus Master +	Connection to the M-Bus loop 3
27	M-Bus Master -	Connection to the M-Bus loop 3
28	M-Bus Master +	Connection to the M-Bus loop 4
29	M-Bus Master -	Connection to the M-Bus loop 4
30	X	Not used

2.2 Indications

The description of the different leds is in the front. By using the leds it is easy to simply follow the traffic from different M-Bus clients and how the traffic moves via the masterport and the meters.

Figure 2-3



The function of the leds is described in the table below:

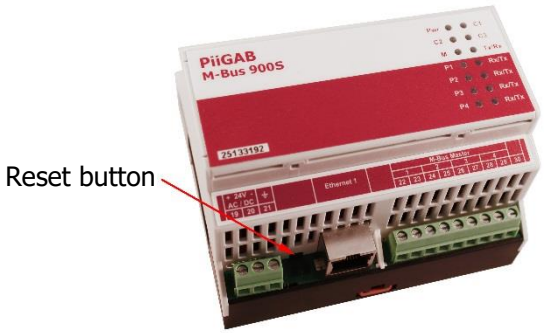
Table 2-1

Row 1	Description	Row 2	Description
Pwr	Power led is red when normal. Flashes red and green at the startup. This usually takes 10 seconds from that the power is turned on. Flashes red at a fast rate when there is a short circuit on the M-Bus loop. Flashes slowly orange when the loop is overloaded. Flashes slowly orange when the license key is not installed.	C1	No function in existing version
C2	Modbus2MBus (Tx)	C3	Modbus2MBus (Rx)
M (Tx)	Flashes when the Master port sends data	M (Rx)	Flashes when the Master port receives data
P1 (Rx)	Flashes when Slave port 1 receives data	P1 (Tx)	Flashes when Slave port 1 sends data
P2 (Rx)	Flashes when Slave port 2 receives data	P2 (Tx)	Flashes when Slave port 2 sends data
P3 (Rx)	Flashes when Slave port 3 receives data	P3 (Tx)	Flashes when Slave port 3 sends data
P4 (Rx)	Flashes when Slave port 4 receives data	P4 (Tx)	Flashes when Slave port 4 sends data

2.3 Reset button

The reset button is located between the supply voltage connection and Ethernet 1. See the picture below.

Figure 2-4



The button is located under the cover and can be reached by using a small screwdriver. However, use with care and don't use a pointy screwdriver that can end up next to the button. With the reset button you can restart the PiiGAB M-Bus 900, set the network settings to default (DHCP plus random IP address) or to change the Web login to default (Admin, Admin).

The reset button should be used in the following way. Push the button until chosen led is light up, when the led is flashing fast you will push the button again and the chosen function will be executed.

Example: Push the button once and the P1 (Rx) will light up. Wait until the P1 (Rx) is flashing fast and then hold down the button again. In the event of pushing the button whilst it is flashing fast you will automatically restart the PiiGAB M-Bus 900S/T. If you don't push whilst the light is flashing nothing will occur.

The table below describe the functions of the button:

Table 2-2

Term	Action	Description
Restart	Push the button 1 time and wait for the P1/Tx led to flash quickly. Then push the button an additional time while it is blinking.	The gateway will restart.
Reset of Ethernet	Push the button 1 time and wait for the P1/Tx led to flash quickly. Then push the button an additional time while it is blinking.	The gateway's Ethernet port returns to its original settings. DHCP and randomized IP if there is no DHCP server available.
Reset of password	Push the button 6 times and wait for the P3/Rx led to flash quickly. Then push the button one additional time while it is blinking.	If a password has been chosen for the login it will now return to Admin:Admin.

Chapter 3

3 Description of the different connections

3.1 Relay, plint 1-3

PiiGAB M-Bus 900S contains a relay. This can be used to for example control different functions such as turning on and off the outside lights in a residential area. This is done by sending a M-Bus written command to the internal meter inside the PiiGAB M-Bus 900S

Figure 3-1

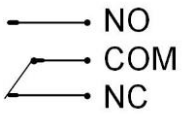
The status can be read for the different I/O signals in the page ”Status” and section ”Digital I/O and Relay” in the web interface. The status for the relay can also be read via the internal M- Bus meter inside the PiiGAB M-Bus 900S.

To activate the relay use the write function for the internal M-Bus meter in PiiGAB M-Bus 900S. Read more

When there is no voltage the relay will be as shown in the position below.

3.1.1 Connection relay

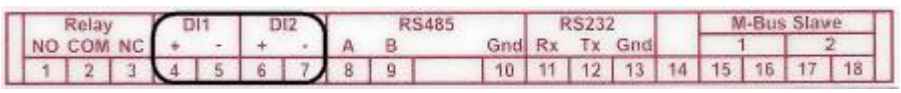
Figure 3-2



3.2 Digital inputs, plint 4-7

PiiGAB M-Bus 900S contains two different digital inputs. Adequate usage can be for digital status, alarms, broken seals etc.

Figure 3-3

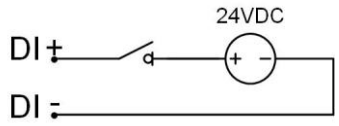


The status can be read for the different I/O signals in the page ”Status” and section ”Digital I/O and Relay” in the web interface. The status for the relay can also be read via the internal M- Bus meter inside the PiiGAB M-Bus 900S.
The inputs are completely galvanic isolated between each other and the earth.

3.2.1 Connection Digital inputs

The connection of the digital inputs is shown in the figure below

Figure 3-4

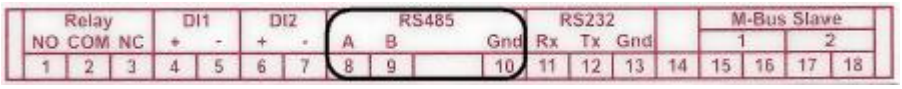


If the gateways is fed with 24VDC this voltage can also be used to feed the digital inputs.

3.3 RS485, plint 8-10

The connection is a common two wire RS485 connection. It is ESD-protected up to 15kV and is completely galvanic isolated from the earth feed.

Figure 3-5



On plint 10 there is an earth connection that can be used as a reference point if the units connected have that requirement. This earth connection is completely galvanic isolated from the earth feed.

Figure 3-6

See also the description about Failsafe for RS485 in chapter 9.1.4.1.

3.4 RS232, plint 11-13

The connection is a common RS232 connection. It is ESD-protected up to 2.5kV and is completely galvanic isolated from the earth feed.

Figure 3-7

3.5 M-Bus Slave, plint 15-18

The PiiGAB M-Bus 900S contains two separate M-Bus slave inputs. By using these two M-Bus slave inputs it is possible to connect to external M-Bus masters. These connections are completely galvanic isolated from each other and from the earth feed. Each input uses less than one M-Bus load (1.2 mA). The configuration of the inputs is made via the web interface.

Figure 3-8

The slave inputs is working with communication speed 300, 2400 and 9600 baud.

3.6 Power, plint 19-21

Figure 3-9

Table 3-1

Plint No	Name	Description
19	24 V AC/DC+	Supply voltage 24V AC alternatively 24V DC (positive side)
20	24 V AC/DC-	Supply voltage 24V AC alternatively 24V DC (negative side)
21	GND	Connect for decrease disturbances

3.7 Ethernet

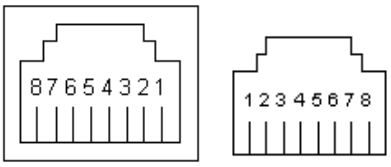
The Ethernet connection is a standard RJ45 contact.

Figure 3-10

Ethernet connection 100MBit

Connector type RJ45

Figure 3-11



Female socket Male plug

3.8 M-Bus master, plint 22-29

The M-Bus master output contains of four parallel outputs that can be used to connect M-Bus loops. All of the four parallel outputs are fed by the same M-Bus driver.

The picture below shows the connections for the four M-Bus outputs.

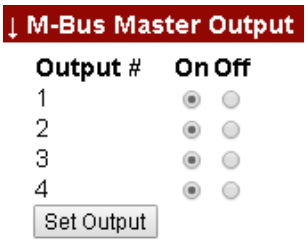
Figure 3-12

The base voltage of the M-Bus master output is generally 39-40V.

The masterport will react if there has been an overload or short circuit on the loop. This is shown by the Power light flashing at different speeds depending on the problem. The user can also read out the voltage or current on the bus via the internal M-Bus meter inside the PiiGAB M-Bus 900S/T.

In the PiiGAB M-Bus 900S/T the different master outputs can be turned on or off via the web interface. See the below picture. It can be found under base configuration in the web interface. By turning off an output there is no voltage on this partial loop. The purpose of the function is to be able to trouble shoot locally or remotely on the different M-Bus loops.

Figure 3-13



When **Reboot** or power on all outputs are set to ON.

When **Restart** the outputs keep the output status.

Table 3-2

Plint No	Name	Description
22 - 23	M-Bus Master, loop 1	Output ON/OFF 1
24 - 25	M-Bus Master, loop 2	Output ON/OFF 2
26 - 27	M-Bus Master, loop 3	Output ON/OFF 3
28 - 29	M-Bus Master, loop 4	Output ON/OFF 4

Chapter 4

4 The internal M-Bus meter

PiiGAB M-Bus 900S/T also functions as an M-Bus meter on the M-Bus network with the default primary address 251. You can read out the information according to the table below. There is also the possibility to influence the built in relay.

4.1.1 Simple version

Table 4-1

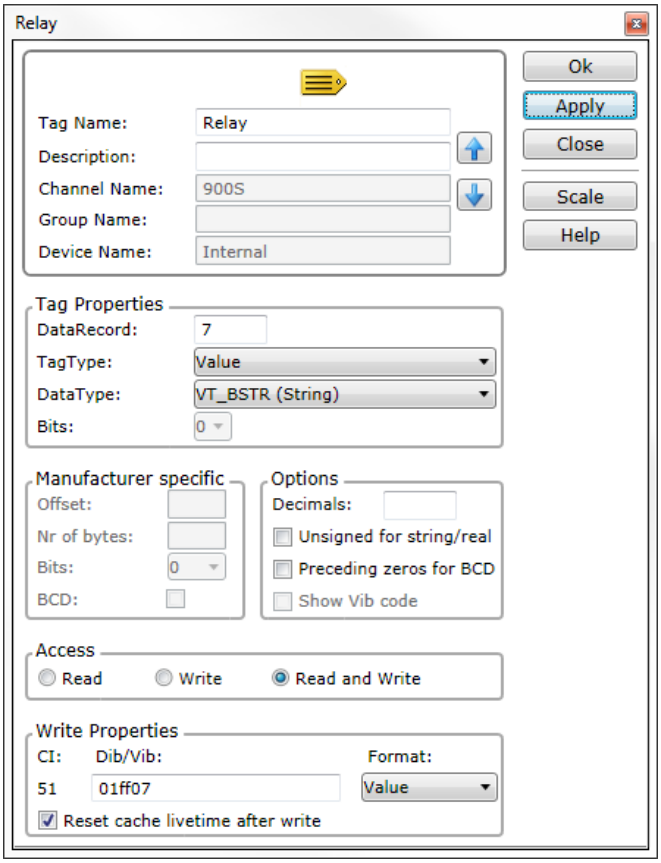
Data record No	Datatype	Description
1	BCD8	Identification number
2	Int16	The M-Bus net's voltage (V*0,1)
3	Int16	The M-Bus net's current consumption (mA*0,1)
4	Int32	Error flags Bit 0: Master overload Bit 1: Master short circuit
5	Int8	Digital input 1
6	Int8	Digital input 2
7	Int8	Relay status
8	Int16	Temperature on the M-Bus driver card
9	Int16	Temperature on the 40V DC/DC converter
10	Int8	Status for the four Master outputs.

4.1.2 Writing

By writing down to the PiiGAB M-Bus 900S with a standard M-Bus write command the relay can be set to ON/OFF. For details please read more here.

The below picture for the PiiGAB Explorer/M-Bus OPC Server shows the configuration of the writing process.

Figure 4-1



Chapter 5

5 Get started step by step

This chapter covers the different steps needed to put the PiiGAB M-Bus 900S/T gateway into operation.

5.1 Important information

1) Connect the PiiGAB M-Bus 900S/T to power supply and Ethernet1 as shown in table 2.1
2) Start and wait for the Pwr led to be solid red.
3) Read out the hardware/MAC address to be found on the right end. It has the format E8-99-5A-XX-XX-XX
4) Start PiiGAB M-Bus Wizard on your PC.
5) For initial contact with the PiiGAB M-Bus 900S/T there are three possibilities depending on what your network looks like.
   a) DHCP with router: You should be able to find your PiiGAB M-Bus 900 directly via the Wizard's "Find gateways on your network".
   b) Direct connection: Set your computer to static IP-address 192.168.10.1 and connect it directly to the PiiGAB M-Bus 900S/T. Turn on the power of the PiiGAB M-Bus 900S/T and wait for about a minute. The gateway should get a random IP-address between 192.168.10.3 - 192.168.10.253. You can now use the Wizard's "Find gateways on your network" to find your PiiGAB M-Bus 900S/T in the list.
   c) Static network: Turn on the power on the PiiGAB M-Bus 900 and wait for about a minute. The unit should now receive a random IP-address within 192.168.10.3 - 192.168.10.253.
      - Start/Restart the Wizard and click on "Change gateway IP-settings", click "Next"
      - Write the MAC-address for your PiiGAB M-Bus 900, Click "Next"
      - Write your preferred IP-address, Click "Next", Click "Apply". The PiiGAB M-Bus 900 will now restart. Netmask and Gateway is set by the web interface. Only the network address will be set. Netmask will be 255.255.255.0 which means that the IP-address must be on the same subnet as your PC.
      - The PiiGAB M-Bus Wizard will now complain that the PiiGAB M-Bus 900S/T does not answer. Don't worry about this instead go to "Find gateways on your network" and make your final settings in the web browser. All other settings are done in the web interface for PiiGAB M-Bus 900S/T
6) Open up a web browser and go to the PiiGAB M-Bus 900S/T
7) Accept the PiiGAB M-Bus 900S/T security exceptions.
8) Log onto the PiiGAB M-Bus 900S/T with default login
   Username: Admin, Password: Admin

You should now be in the configuration web interface of your PiiGAB M-Bus 900S/T.

We do not recommend that any of PiiGAB's products or products bought from PiiGAB should be made public on the internet. We always recommend that a firewall is used, not following this recommendation will be at your own risk.

5.1.1 Hardware address

You have to know the unit's hardware address, which is the same as the MAC address. The MAC address can be found on the label on the right gable of the unit. It has the format E8-99-5A-xx-xx-xx, where xx is a unique number for the unit.

5.1.2 IP-address

Most of the time the gateway needs a unique IP address on your network in order to be connected to the superior software. You can also use the automatic IP address via DHCP if you wish. Contact the system administrator to receive the right IP address with the belonging subnet mask and gateway. The IP address has to be within the allowed area, unique within your network, and it has to be in the same subnet as your PC.

5.1.3 TCP/UDP

To communicate with the superior software you have to choose between TCP or UDP. For your client connection, this can be found under respective Slave Port. Default settings is the same as factory settings.

5.1.4 Port number

In order to communicate with the gateway the port numbers need to be set. The default setting in the gateway is 10001, 10002, 10003, and 10004 for respective slave port and can normally be used. Make sure to check with your network department what port number to use.

5.1.5 Factory settings

The factory settings are made to make it easy to test PiiGAB M-Bus 900S/T with a connected M-Bus meter.

Master Port:

Table 5-1

Type	Com port	Baud rate	Timeout (ms)	Reconnect (s)	Protocol
Serial	M-Bus Master	2400	2000	1000	M-Bus

Slaveport 1-4:

Table 5-2

Type	Local Port	Timeout(ms)	Protocol
UDP	10001-10004	2000	M-Bus

5.2 Using PiiGAB M-Bus Setup Wizard

By using the M-Bus Wizard it's possible to find the PiiGAB M-Bus 900S/T on the network. The M-Bus Wizard is a software that can be downloaded from PiiGAB's website.

By using the M-Bus Wizard it is possible to find both the PiiGAB 810 and the PiiGAB M-Bus 900S/T on the network. Usually an IP address is set on the gateway and if this is outside the allowed IP address range it will be marked red. However, it is not possible to find the gateway if it is connected to a subnet.

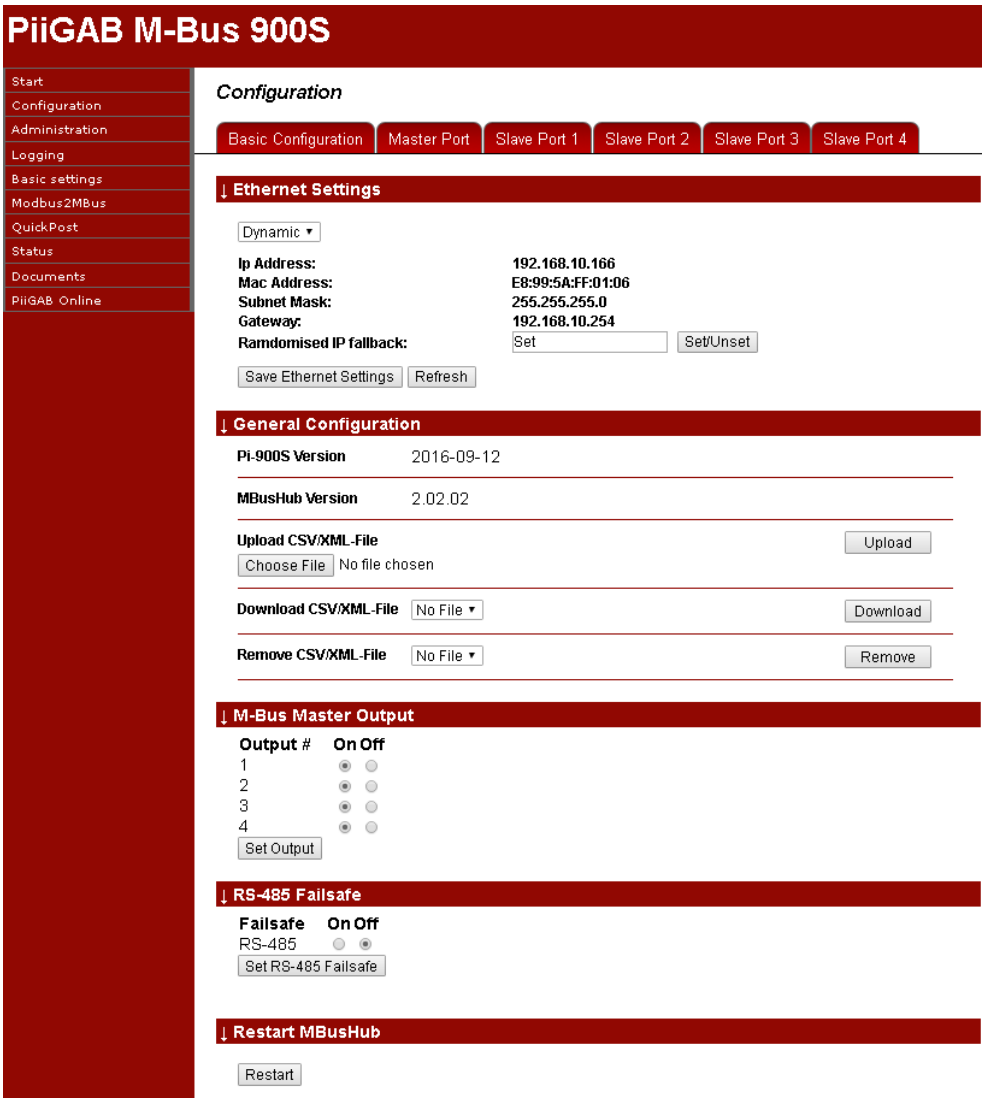
From version 3.1.0 of the M-Bus Wizard it is possible to change the IP- address on the M-Bus PiiGAB 900S/T by using the gateways MAC address. However, you cannot change the netmask and gateway via the Wizard. This includes all other configurations that can be made via the web interface in PiiGAB M-Bus 900S/T.
To test the meters that are connected to the PiiGAB M-Bus 900S/T it is best to use the Wizard.
Read more here

Chapter 6

6 Settings and Parameter description

6.1 Configuration

Figure 6-1



6.1.1 Ethernet Settings

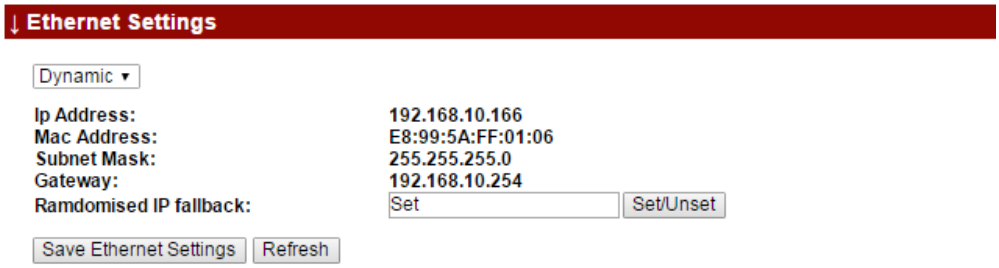
PiiGAB M-Bus 900 can be set to static IP or dynamic IP address. This is done in Configuration->Ethernet Settings.

6.1.2 DNS name

The gateway contains a DNS name from production that consists of gateway type and serial number. See below for example
Pii900S/T-serial number
Example: Pii900S/T-16777360

6.1.3 Dynamic (DHCP) configuration

Figure 6-2



PiiGAB M-Bus 900S/T is always delivered set to a dynamic configuration. This is found easiest by connecting the gateway to a DHCP server, see chapter 5.1. When you have a dynamic IP address setting there is no need for additional settings since IP-address, netmask, gateway and DNS-server are obtained by the DHCP server. When the gateway have got this information it can be shown in the web interface.
When changes are made to the configuration the user needs to save this by pushing ”Save Ethernet Settings”
In case the gateway doesn’t receive IP settings by the DHCP server it will receive a randomized IP address after 60 seconds. The IP-address received by the gateway is between 192.168.10.3 – 192.168.10.253. The gateway needs to be restarted in order to retry to receive an IP-address from the DHCP server. This is done by going to the Administration page and push ”Reboot” or disconnect the power to the gateway.
The DNS server is not set at randomized IP. Random IP is only an option if you need to set the PiiGAB M-Bus 900S/T and do not have access to a DHCP server

6.1.3.1 Randomized IP-fallback

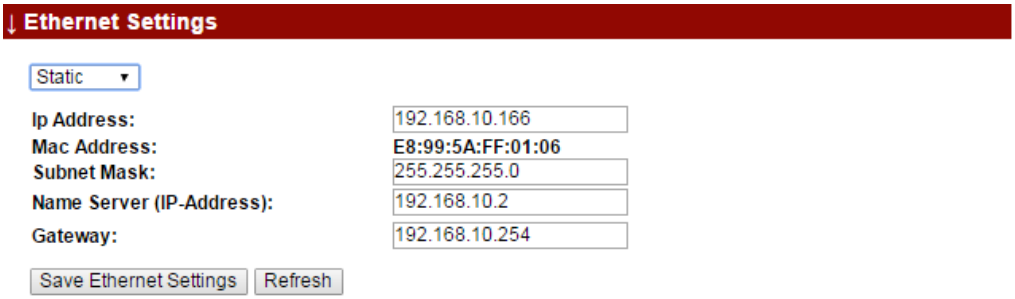
The gateway can be set to inactivate randomized IP (“Set/Unset), however at delivery the randomized IP is active (Set). To press the button ”Set/Unset” the randomized function can be inactivated. Due to this the gateway will always ask the DHCP server for an IP address. There is an advantage to set the gateway to Unset if you want it to be run with DHCP. The reason for this is for it not to go to randomized IP and loose contact with the DHCP server in case the network goes down or the voltage gets disconnected.

6.1.3.2 Startup times

At the start the gateway will try to ask for a DCHP server for 60 seconds before it goes to randomized IP.
If the gateway is set to Randomized IP Unset it will control that an IP address is registered in the gateway every ten minutes. If there is not an IP address registered the gateway will try to reach the DHCP server to obtain a new one.

6.1.4 Static configuration

Figure 6-3



In order for the gateway to function with static IP the following parameters should be set:
IP-address: xxx.xxx.xxx.xxx
Netmask: xxx.xxx.xxx.xxx
Gateway: xxx.xxx.xxx.xxx

Domain Name Server (DNS) connects the host name to an IP-address. The host name can for example be”piigab.com” but its IP-address is 91.177.244.31. DNS server is generally not needed but in a few instances the PiiGAB M-Bus 900 must invoke a host name and in that case the DNS needs to be set.
Example 1: When using Network Time Protocol (NTP) to set the clock it is beneficial to use host name instead of IP address for example ”se.pool.ntp.org”.
Example 2. If the additional application QuickPost is installed and shall send data to the servers ”ftp://minftpserver.se” or ”http://minhttppostserver.se”.
Example 3: If a PiiGAB 810 is being used as an M-Bus master instead of the masterport on the PiiGAB M-Bus 900 and has the hostname min810.greenenergy.se then the hostname should be used instead of the IP address.

The DNS server is set automatically when DHCP is being used but for static IP address it has to be written in as an IP address if needed.

To save your settings click ”Save Ethernet Settings”. You can view your settings by clicking ”Refresh”

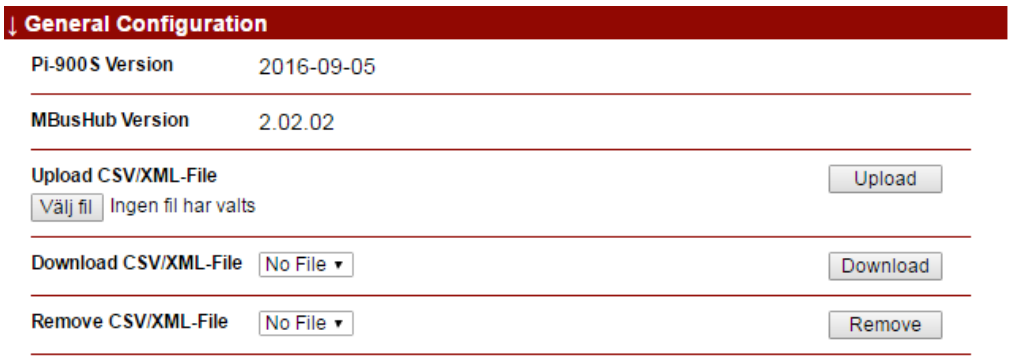
6.1.4.1 Set the IP address via the MAC-address

If you are using the Wizard it is also possible to set the gateway’s IP address by writing the MAC-address see chapter 0. Netmask and Gateway cannot be set from the Wizard.

6.1.5 General Configuration

In General Configuration all different versions of the software installed on your unit are shown. You can also upload configuration files to the gateway that will be used for M-Bus Master or for the chosen Slave Port. It is also possible to remove configuration files that are no longer used from this site.
This is also where you can re-start the M-Bus Hub if necessary.

Figure 6-4



6.1.5.1 Pi-900S/T Version

Pi-900S/T Version is named with date (year month day/xxxx-xx-xx). The Pi-900S/T is the gateways system program and also includes the webserver with its configuration interface. The latest version can be downloaded from the PiiGAB website.

6.1.5.2 MBusHub Version

MBusHub is the program that handles all the communication with the different ports such as the Master Port and Slave Ports. The program also handles the parts pertaining to M-Bus Switch, Modbus, and M-Bus ASCII. The latest version can be downloaded from the PiiGAB website.

6.1.5.3 Upload, Download, Remove CSV/XML-File

If you are using the gateway with Modbus, M-Bus ASCII or with QuickPost, these configuration files will be uploaded to PiiGAB M-Bus 900S/T here. If you want to read back an existing configuration or delete old configuration files you can do this here.

6.1.6 M-Bus Master Output

The different master ports can be turned on or off via the web interface. The purpose of this function is to be able to troubleshoot locally or remotely on the different M-Bus loops.

All loops are set to **On** at the start or at Reboot. At re-start the outputs keep their positions

Figure 6-5

6.1.7 RS-485 Failsafe

PiiGAB M-Bus 900S has built in Failsafe resistors. Read the detailed description here.

Figure 6-6

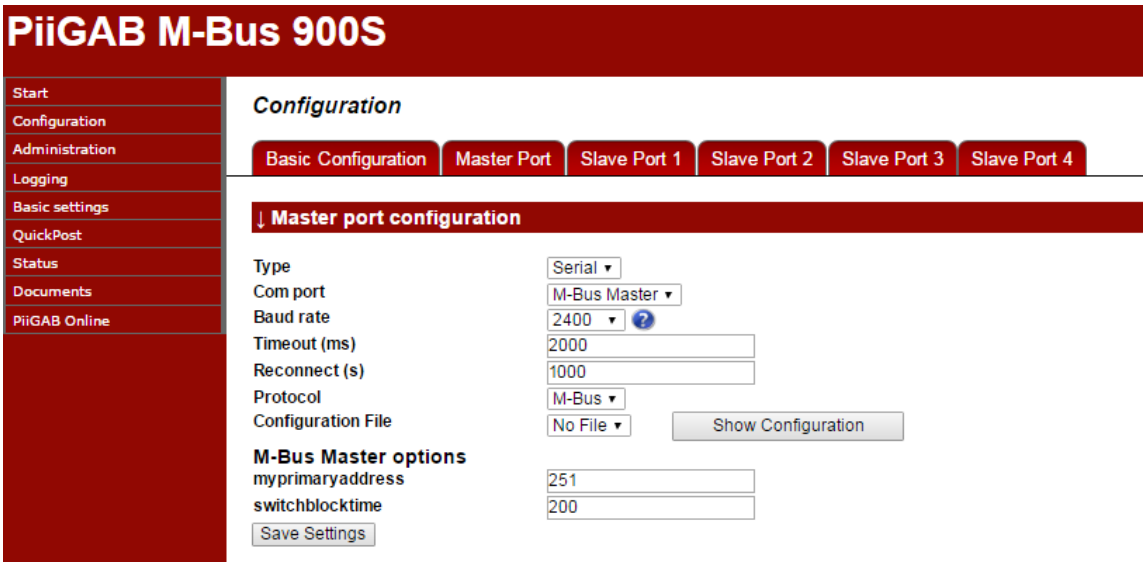
6.1.8 Restart MBusHub

If needed you can restart the MBusHub part by pushing the ”Restart” button”.

Figure 6-7

6.2 Master Port configuration

Figure 6-8



The master port is the part in the gateway that sends out data to destined port. The PiiGAB M-Bus 900S/T has the possibility to send data to Ethernet and M-Bus master. The basic setting for the master port is shown below:

Table 6-1

Type	Com port	Baudrate	Timeout (ms)	Reconnect (s)	Protocol
Serial	M-Bus Master	2400	2000	1000	M-Bus

At the front of the gateway a flashing light on the M leds (Tx/Rx) indicate the master traffic.

The first choice to be made is whether to run it serial or via the UDP/TCP on the master port.

6.2.1 Type Serial

If serial communication is chosen the following parameters will be eligible:

Table 6-2

Type	Com port	Baudrate	Timeout (ms)	Reconnect (s)	Protocol
Serial	M-Bus Master	2400	2000	1000	M-Bus

6.2.1.1 Com port

The setting M-Bus master for ”Com port” sends traffic to the internal built in M-Bus master.

6.2.1.2 Baud rate

The baud rate can be set to 300, 1200, 2400, 4800, 9600, 19200 and 38400 baud. Normally 2400 is used for M-Bus but 300 and 9600 also occurs on certain meters.

6.2.1.3 Timeout (ms)

Timeout is set to 2000ms and can be changed freely. This parameter controls the length that the master port will wait for an answer from the meter before it considers no answer.

6.2.1.4 Reconnect (s)

This parameter has no function when using serial communication.

6.2.1.5 Protocol

The protocol is set to M-Bus.

6.2.1.6 Configuration File

The configuration file is used to connect M-Bus data with OPC item. This is necessary when using M-Bus ASCII or Modbus on the slave ports. If the configuration information is needed for the master port you can add the current configuration file in the field ”Configuration File”. The configuration file is created with help from the PiiGAB Explorer.

6.2.2 Type UDP or TCP

If UDP or TCP is chosen for the master port the following parameters will be eligible:

Table 6-3

Type	Remote IP/port	Timeout (ms)	Reconnect (s)	Protocol
UDP/TCP	xxx.xxx.xxx.xxx/ xxxx	2000	1000	M-Bus

6.2.2.1 Remote IP-address and Port

With a specific IP-address and port number for Remote IP the traffic will be sent to the desired address on the network. It can for example be an M-Bus master that you want to share meters with.

6.2.2.2 Timeout (ms)

Timeout is set to 2000ms and can be changed freely. This parameter controls the length that the master port will wait for an answer from the meter before it considers no answer.

6.2.2.3 Reconnect (s)

The Parameter Reconnect has a base setting of 120s and re-creates the connection if there is an interruption in the communication via TCP or UDP communication.

6.2.2.4 Protocol

The protocol is set to M-Bus.

6.2.2.5 Configuration File

The configuration file is used to connect M-Bus data with OPC item. This is necessary when using MbusASCII or Modbus on the slave ports. If the configuration information is needed for the master port you can add the current configuration file in the field ”Configuration File”. The configuration file is created with help from the PiiGAB Explorer.

6.2.3 M-Bus Master options

The parameters belongs to the unit itself will be handled under this caption.

6.2.3.1 myprimaryaddress

PiiGAB M-Bus 900S/T is functioning as an M-Bus meter on the M-Bus network with the internal master address set to 251. The address 251 is according to the M-Bus standard used for intelligent M-Bus masters. The address can be changed by writing in a new primary address between 0-250 in the field ”myprimaryaddress.”

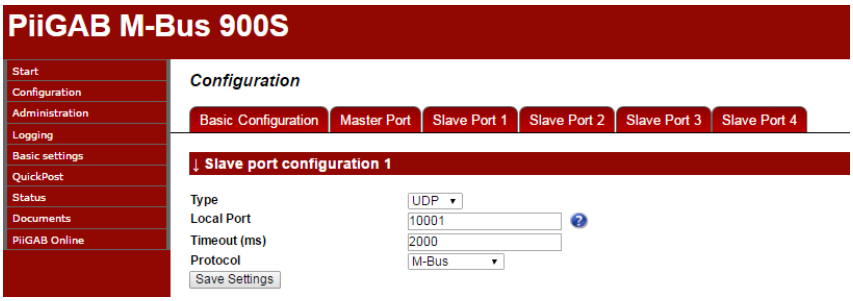
6.2.3.2 Switchblocktime

The parameter ”switchblocktime” controls the exchange between the different slave ports to the master port. When the meter has left an answer the Pi-900S/T ”switchblocktime” is waiting for a new question to the same meter if it is a multitelegram question. If no question arrives the next question in line will be let through.

Default setting 200ms

6.3 Slave Port 1-4 configuration

Figure 6-9



Slave ports is the part in the gateway that handle connected clients. All slave ports can be configured to UDP/TCP or Serial communication. For serial configuration RS232, RS485 and M-Bus Slave can be chosen.

6.3.1 Type UDP or TCP

Basic settings for the slave ports UDP/TCP communication as seen as below:

Table 6-4

Type	Local Port	Timeout (ms)	Protocol
UDP	10001	2000ms	M-Bus

6.3.1.1 Local Port

The network port that the external client can connect to.

6.3.1.2 Timeout (ms)

The parameter timeout is always set to 2000 ms and can be changed freely. This parameter controls how long the slave port should wait for an answer from the Master Port. The Slave timeout should always be higher than the master timeout. For MBusHub version 2.01.01 and higher it is automatically set to master timeout + 100ms in case it is set to a lower value.

6.3.1.3 Protocol

The slave protocols you can currently choose between are M-Bus, M-Bus ASCII, Modbus RTU and Modbus TCP. Available protocols are controlled by the license key.

6.3.2 Type Serial

Basic settings for the slave ports serial communication as seen as below:

Table 6-5

Type	Com port	Baud rate	Bit Number	Parity	Stop Bit	Timeout (ms)	Protocol
Serial	M-Bus Slave 1	2400,	8	Even,	1	2000ms	M-Bus

6.3.2.1 Com port

You can choose between RS485, RS232, M-Bus Slave 1 or M-Bus Slave 2.

6.3.2.2 Baud rate

Baud rate can be set to 300, 600, 1200, 2400, 4800, 9600, 19200 or 38400 baud.

6.3.2.3 Bit Number

You can choose number of bits between 5, 6, 7 or 8 bits. M-Bus is always using 8 bits.

6.3.2.4 Parity

You can choose parity between No Parity, Odd Parity, Even Parity, Mark Parity or Space Parity. M-Bus is always using Even Parity.

6.3.2.5 Stop Bit

You can choose between 1 or 2 stop bites. M-Bus is always using one stop bit.

6.3.2.6 Timeout (ms)

The parameter timeout is always set to 2000 ms and can be changed freely. This parameter controls how long the slave port should wait for an answer from the MasterPort. If the value is lesser than MasterPort timeout + 100ms it is automatically set to MasterPort timeout + 100ms.

6.3.2.7 Protocol

The slave protocols you can currently choose between are M-Bus, M-Bus Ascii, Modbus RTU and Modbus TCP. Available protocols are controlled by the license key.

6.3.3 M-Bus ASCII options

For an extensive description of the M-Bus ASCII protocol please see separate document.

6.3.3.1 stationid

The parameter stationid is the unit's internal address when using RS485 multidrop communication. Stationid is described as ADR (address) in the M-Bus ASCII protocol description. Stationid has no function when using UDP or TCP communication.

6.3.4 Modbus RTU and TCP options

If you have chosen Modbus RTU or TCP additional parameters may have to be set. In addition the field ”Configuration File” will be shown and here you will have to choose the cross reference file. For a more detailed description of the usage of Modbus in the PiiGAB M-Bus 900S/T please see separate manual.

6.3.4.1 Configuration File

For Modbus RTU and TCP the slave port demands a cross reference file that contains the cross connection between the Modbus register and OPC Item. The file is uploaded via the field "Configuration File." The configuration file itself is created with assistance from PiiGAB Explorer. This configuration file has always the extension _MBus2Modbus.csv

6.3.4.2 slaveaddress

This is the unit's address when using RS485 communication. Observe that address 0 in Modbus is reserved for Broadcast. If a broadcast address request is received by the PiiGAB M-Bus 900 it will be ignored. slaveaddress has no function when using Modbus TCP.

Range: 1-250
Basic setting: 1

6.3.4.3 floatmode

This parameter is used to set byte order for four byte floating numbers.

M-Bus is a strict Little Endian (LE) protocol. This means that the smallest significant byte will come first (byte 0) and the most significant byte will come last (byte 3 for 4 bytes floating number). Since M-Bus is the main protocol in the PiiGAB M-Bus 900 this is how incoming bytes are numbered. Byte 0 is LSB.

Modbus is on a register level a strict Big Endian (BE) protocol. The most logical for data types that have more than two byte is that they also follow Big Endian. This means that byte 0 in a Modbus message is MSB. It is most logical to interpret all multi register datatypes as Big Endian but some producers have chosen to write the registers as Little Endian register data.

The parameter floatmode reverses the byte in R4 in the following way:

Mode 0 – Byte order = 3 2 1 0	LE M-Bus to BE Modbus (most common and follow the Modbus standard)
Mode 1 – Byte order = 0 1 2 3	LE M-Bus to LE Modbus (is rarely used)
Mode 2 – Byte order = 1 0 3 2	LE M-Bus to register reversed BE Modbus
Mode 3 – Byte order = 2 3 0 1	LE M-Bus to byte reversed BE Modbus (is rarely used

Base setting: 0

6.3.4.4 intreverse

Not currently available.

6.3.4.5 timeoutmode

0 – If the M-Bus master makes a timeout because it doesn't find the meter the Modbus slave answers with the following Modbus error message: 0x0b EXCEPTION_GATEWAY_TARGET

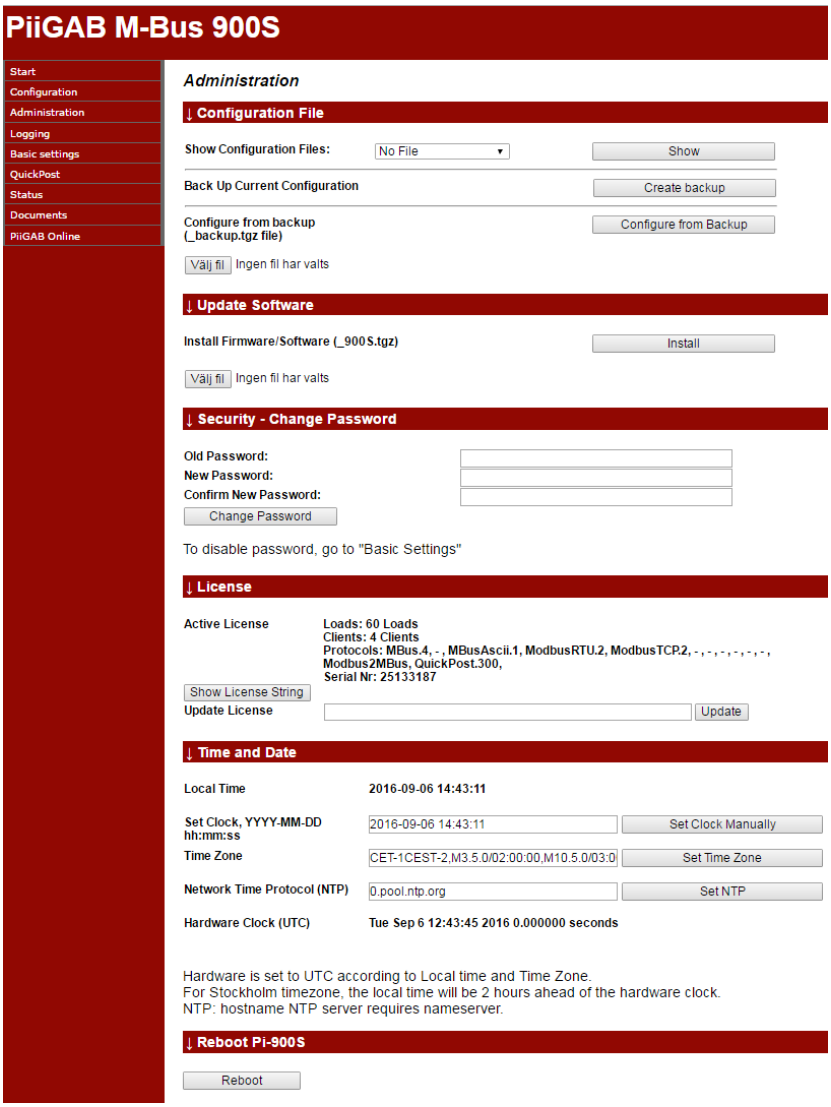
1 -If the M-Bus master takes a timeout because it doesn't find the meter the Modbus slave answers with the value 0x00 NULL in the current Modbus register.

Base setting: 0

Observe that if you change "Type" between Serial, TCP and UDP the underlying configuration can be changed. Always start by choosing "Type" and continue with the other parameters.

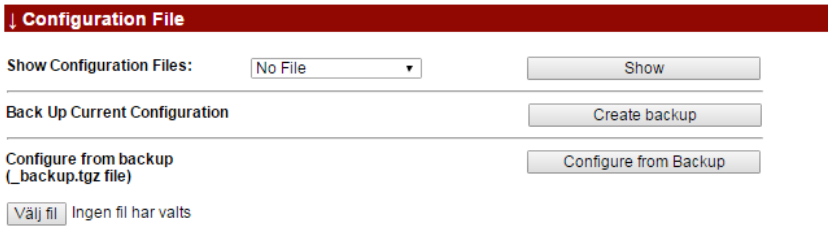
6.4 Administration

Figure 6-10



6.4.1 Configuration File

Figure 6-11



6.4.1.1 Show Configuration Files:

PiiGAB M-Bus 900S/T has a number of different configuration files where all the settings are saved. By first choosing a file via the dropdown menu and then press the "Show" button you can see the settings in respective file.

6.4.1.2 Back Up Current Configuration

If a back-up of your PiiGAB M-Bus 900S/T is needed you can create one by clicking Create backup". This will create a pi900S/T_config_xxxxxxxx_backup.tgz file (xxxxxxxx corresponds to the gateways serial number) where all necessary files and configurations are saved. In case of support issues please send your configuration back-up if possible.

6.4.1.3 Configure from backup

It is possible to re-read your back-up file from here. Be aware not to mix your back-up files from different PiiGAB M-Bus 900S/T as that can lead to that the license needs to be reinstalled separately.

6.4.2 Update Software

Figure 6-12

6.4.2.1 Install firmware/Software

This is where you update the software for the PiiGAB M-Bus 900S/T if required. Current versions are available on the PiiGAB website.

6.4.3 Security – Change Password

In this section you can create a new password.

Figure 6-13

6.4.3.1 Old Password:

Write your old password

6.4.3.2 New Password:

Write your new password

6.4.3.3 Confirm New Password:

Confirm your new password.

6.4.3.4 Disable Password

If you don't require a password this can be deleted under Basic Settings.

6.4.3.5 Factory setting

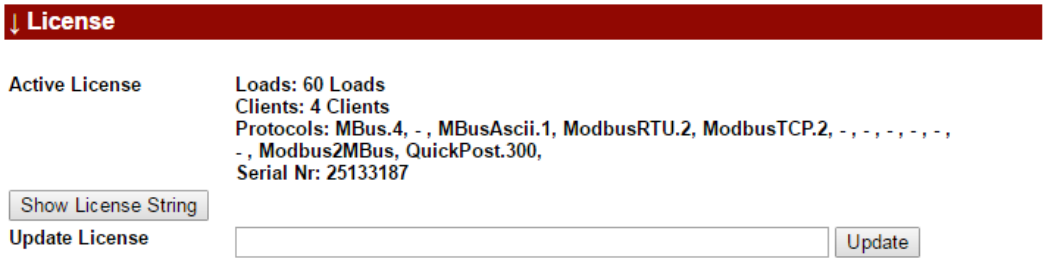
At delivery the PiiGAB M-Bus 900S/T has the following username and password:
Username: Admin
Password: Admin

6.4.4 License

To be able to use your PiiGAB M-Bus 900S/T a license has to be installed in the unit. The installed license makes the licensed part available.

Example
Below is an example of a licensed PiiGAB M-Bus 900S/T

Figure 6-14



6.4.4.1 Active License

The license in the PiiGAB M-Bus 900 contains the following parameters:

Table 6-6

Term	Description
Loads	5, 20, 60 or 120 M-Bus loads
Clients	1, 2 or 4 clients
Protocols	MBus, MBusAscii, ModbusRTU, ModbusTCP, Modbus2MBus, QuickPost
Serial No	The serial/id number on the gateway.

6.4.4.2 Show License String

When you click "Show License String" your license string will show in the field "Update License." We save all delivered license strings in a traceable database, however if there is any doubt about the installed license you can always email this to us at PiiGAB. We then can read its content and compare it to the delivered license string.

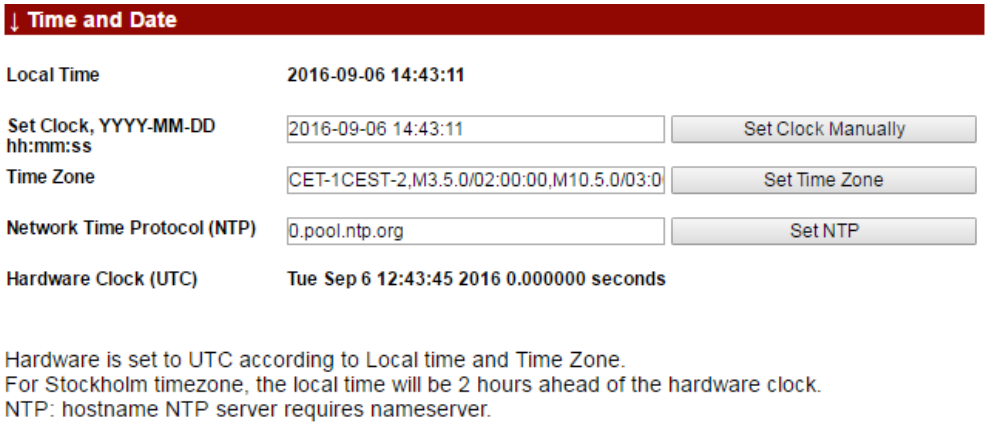
6.4.4.3 Update License

To update the gateway you will have to copy your new license file to the field "Update License" and click "Update". Observe that the license is connected to the gateways serial number. The new updated license file is normally delivered by email.

6.4.5 Time and Date

Since PiiGAB M-Bus 900 supports program modules that use time stamps it is necessary for the clock to be set in an effective way. The internal clock is always set to ”Universal Coordinated Time” (UTC). The time zone is set so that the PiiGAB M-Bus 900 will show the correct local time. The default for the time zone is Stockholm/Paris/Berlin, however if another time zone is to be used please refer to the public internet site for ucLibc time zone. The clock only has to be set if you want to log communication or if you are using QuickPost.

Figure 6-15



6.4.5.1 Two ways to set the clock

- If ”Network Time Protocol” (NTP) server can be found on the network the clock will be set correctly according to UTC at every startup. It does not matter what time zone you choose, however the local time will only be correct if the time zone is set correctly. The clock is adjusted against the server and will therefore always be exact.
- Manual configuration. If there is not an NTP server on the network the local time will be set manually for the current time zone. By setting the clock manually the internal clock of the PiiGAB M-Bus 900 will be activated, ”real time clock”. The internal clock has a super capacitor backup, which makes it keep the set time for up to three 24 hour periods if you lose voltage. The processor reads the current time from the real time clock at start-up and will use this time if no NTP server is used. The real time clock will eventually loose sync with other watches. Therefore it is not to be expected that the time will be correct over a longer period of time.

6.4.5.2 Setting possibilities for the clock

The local time (Local Time) and the current time (Hardware Clock) are shown in the Time and Date part. The user has the possibility to set the internal clock (software clock) and the real time clock in many different ways depending on desire.

- From manual typing in the field ”Set Hardware Clock …” and click ” Set Hardware Clock Manually”. Type accurately.
- In accordance with typed IP-information for the NTP server – click ”Set NTP”. When you set the NTP server the clock will be set directly.

6.4.5.3 Example to set the time zone Stockholm/Paris/Berlin

CET-1CEST-2,M3.5.0/02:00:00,M10.5.0/03:00:00
M3.5.0/02:00:00 -> 5th week in March at 02:00 am summertime will start
M10.5.0/03:00:00 -> 5th week in October at 03:00 am summertime will end

CET-1 -> Central European Time – 1h
CEST-2 -> Central European Summer Time -2h

6.4.6 Usage of the clocks.

The real time clock is read out at start-up and updates the software clock. If an NTP server is connected the software clock will synchronize with the time in the NTP server. If there isn't an NTP server connected the real time clock will be the ruling one.

In the internal log file (see chapter 6.5) the current software clock is used. If for instance a time zone is set that time in the log file will be adjusted to the time zone.

If the QuickPost program module is used the time in its log files will always be according to GMT/UTC (Greenwich Mean Time)/(Coordinated Universal Time). This is so that the file export won't be affected by summer and winter time adjustments. For further information regarding QuickPost see separate manual

6.4.7 Reboot PI-900S/T

If you press the Reboot button the gateway is started in the same way as when power up is used.

Figure 6-16

6.5 Logging

The logging part consists of an easier logging to be able to follow the traffic in the PiiGAB M-Bus 900S/T. There are four buttons in the web interface to direct the logging: Start, Show, Clear and Startup Log.

Figure 6-17

These buttons have the following functions:

Table 6-7

Button	Function	Description
Start	Starts the log function	Data is stored to be viewed. Max storage capacity is 100kByte.
Show	View of stored communication flow	View the communication between the slave ports and the master port.
Clear	Clear the log file	New 100kByte data can be stored.
Startup Log	View of current configuration	Information of current version and what has been configured in the unit.

When maximal storage space has been reached the logging will stop. To set the storage space to zero again click Clear. In the current version this is not available unless the storage space is full.

6.5.1 Logging messages

Table 6-8

Loggings message	Description	Other
-> SlavePort<X> In <protocol>	In data from connected client and information about protocol	
<- SlavePort<X> Out	Out data till connected client	
Clearing SlavePort<X>	Cleaning the slave port when request not accepted.	It doesn't need to be an error in the request. Can be accepted to another meter.
<- Master In	Response from the meter	
-> Master Out	Request to the meter	
-> Master out, from SlavePort<X>	Request to the meter from SlavePort<X>	
Cleaning Master buffer	If it is already data in the master buffer before a request (disorder) it will be cleaned	
-> Internal M-Bus Meter In	Request to internal meter	
<- Internal M-Bus Meter Out	Response from internal meter	

-> Internal M-Bus Meter In, from SlavePort<X>	Request to internal meter from slave port<X>	
Fragmented	In data are coming from more than one internal in reading	

6.5.2 Error message

Tabell 6-9

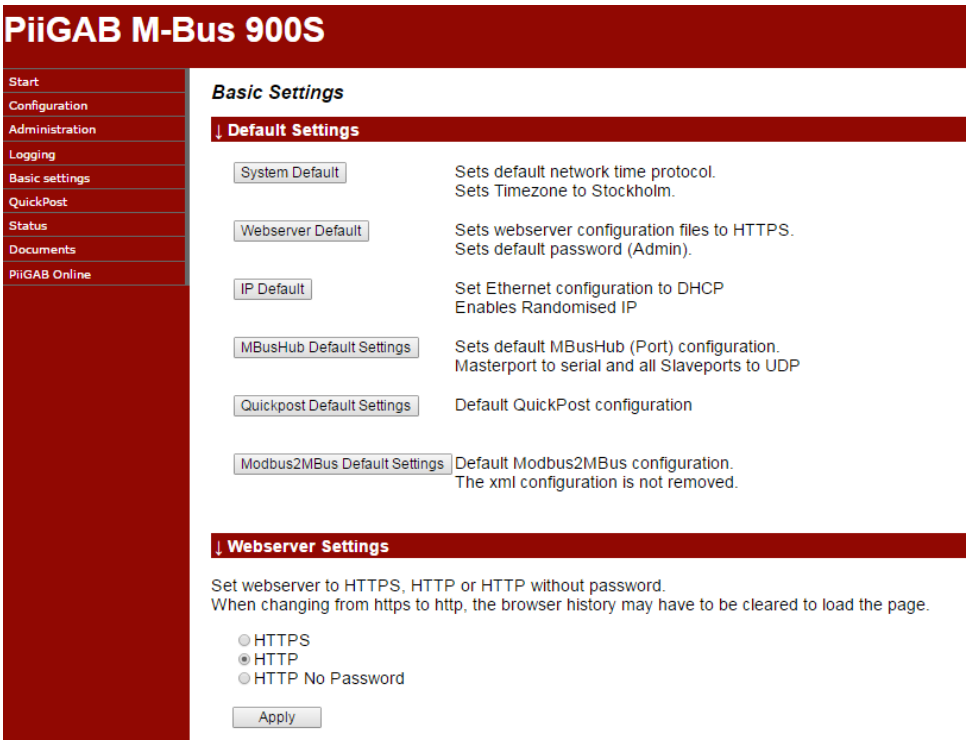
Error message	Description	Other
ParseRcvdSlavePacket	In data error on slave port	
ProcessRcvdMasterPacket from Internal M-Bus Meter	Wrong answer from the internal M-Bus meter	Should normally not could happen
Master. The answer is thrown away, maybe more garbage will appear..."	It is data in the in buffer without a request to the meter has been made.	(Will be changed to "Cleaning master buffer" as above)
Master Timeout, while waiting on Garbage	It has been a slave timeout and thereafter a master timeout. The arrived bytes will be thrown away	
At Write, MasterPort	Error in the writing to the master port	
MasterTimeout Too big internal message size	It has been a master timeout and the internal message is too big for the buffer.	
MasterTimeout returned <X>	Master timeout but an unknown return value.	Should normally not could happen
Master/Que post not corresponding while a Master Timeout	Master timeout without any slave port is waiting.	Should normally not could happen
ChoosePacket for external Meters returned <X>	If an impossible value is coming from ChoosePacket	Should normally not could happen
ChoosePacket for internal Meter returned <X>	If an impossible value is coming from ChoosePacket	Should normally not could happen
Timeout, SlavePort<X>	Slave timeout for port <X>	
At Write, SlavePort<X>	Error when writing to the slave port<X>	Should normally not could happen
DefragTimeout, SlavePort<X>. Clear the telegram	More than defrag timeout between two readings of the same message	

6.5.3 Extra debug option

PiiGAB M-Bus 900S/T has an extra debug function that makes it possible to send debug files to a specific place. By installing a program script it is possible to send logged detailed communication data as well as extra debug information from the PiiGAB M-Bus 900S/T. This program script can be delivered to the customer by our support department if necessary

6.6 Basic Settings

Figure 6-18



6.6.1 Default Settings

Figure 6-19

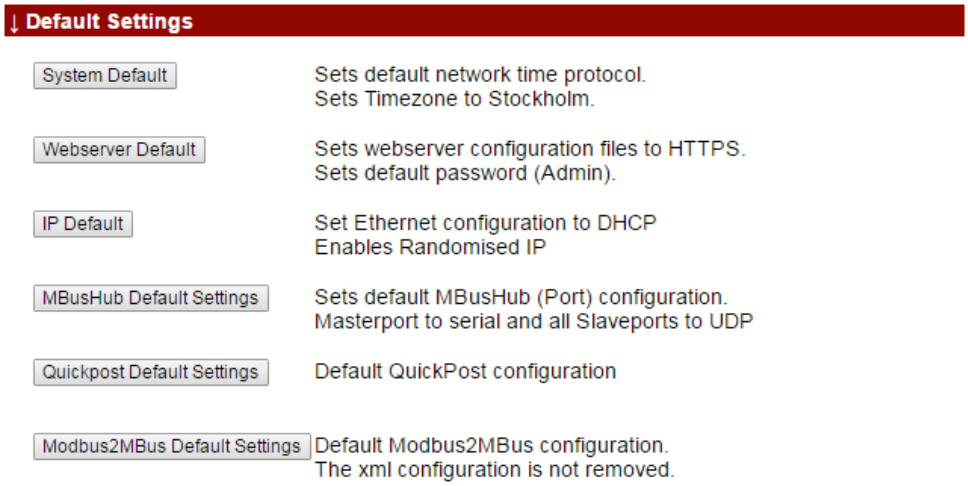


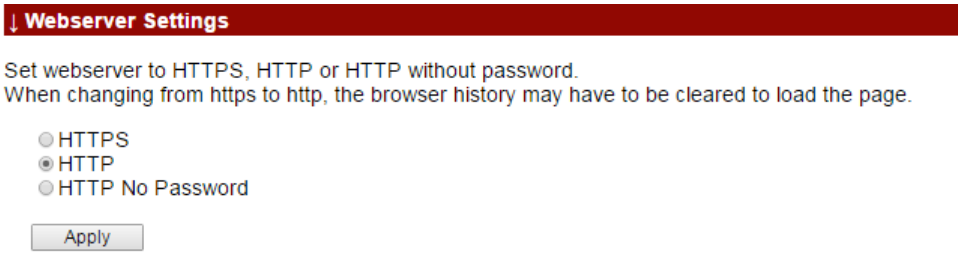
Table 6-10

Button	Function	Description
System Default	Default settings for all time settings under Time and Date.	Default settings for Time Zone (Stockholm, Paris, Berlin)
Webserver Default	Default settings for the web interface.	Log in is set to: Admin/Admin The connection method to the web server is set to HTTPS.
IP Default	Sets the Ethernet setting for Ethernet 1 to default.	Sets the IP-setting to DHCP and randomized IP.
MBusHub Default Settings	Factory settings for master and slave ports.	Settings the master port to serial and slave ports to UDP
QuickPost Default Settings	Factory settings for QuickPost.	Settings affect only the software module QuickPost.
Modbus2MBus Default Settings	Factory settings for Modbus to M-Bus.	Settings affect only the software module Modbus to M-Bus.

6.6.2 Webserver Settings

When PiiGAB M-Bus 900S/T is delivered it is in HTTPS mode. It is possible to choose HTTP without a password as well. This option is available for customers that have a well-protected network including many different units connected in that network. In this event it would be close to impossible to keep track of all the passwords for the staff on site.

Figure 6-20



6.7 Modbus2MBus

Modbus2MBus is an additional software application that makes it possible to read Modbus meters and other Modbus units via the M-Bus client. By using Modbus2MBus your Modbus meters or Modbus units are viewed as virtual M-Bus meters in your M-Bus system. This opens up the possibility to mix Modbus and M-Bus units on your network.
Observe that M-Bus (MBusHub) Master and slaveports cannot be the same as for Modbus2MBus master/ slave ports

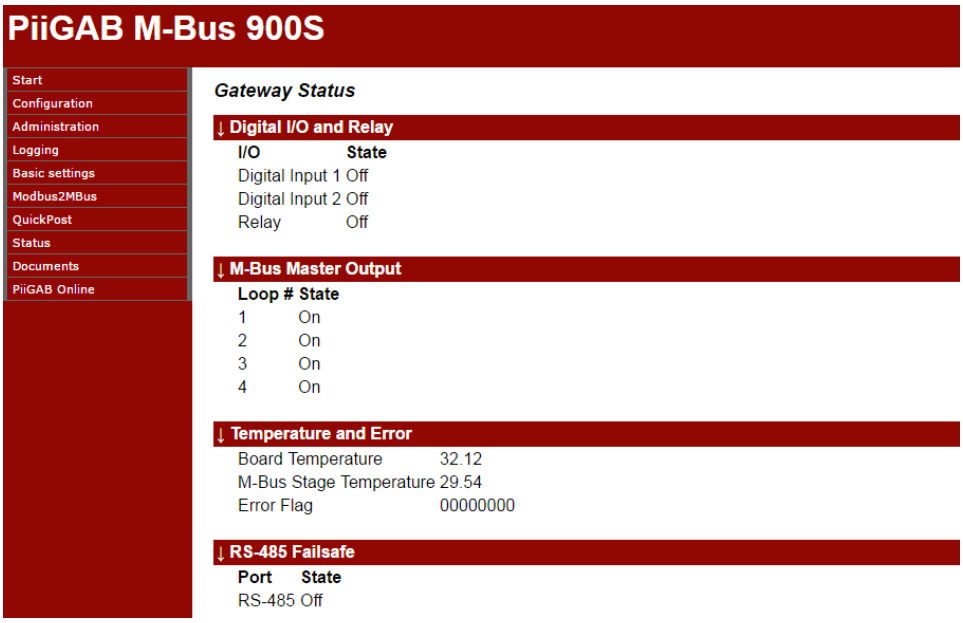
6.8 QuickPost

QuickPost is an additional program that makes it possible for the user to let the gateway send specified data to an FTP-server alternatively to an HttpPost server. Therefore, no middle computer is needed to handle the communication with the data base. In order to post meter data the QuickPost turns into an internal client for the PiiGAB M-Bus 900S/T. The other slave ports can be used as before to connect separate M-Bus clients and/or Modbus clients for direct reading of meters etc.

6.9 Status

This page is completely new in PiiGAB M-Bus 900S/T. It shows a combination of status from the system and I/O signals.

Figure 6-21



6.9.1 Digital I/O and Relay

The status for digital inputs and for the relay is shown below.

Figure 6-22

6.9.2 M-Bus Master Output

The status for the four M-Bus outputs is shown below.

Figure 6-23

6.9.3 RS-485 Failsafe

The status for the RS485 Failsafe status is shown below.

Figure 6-24

6.9.4 Temperature and Error

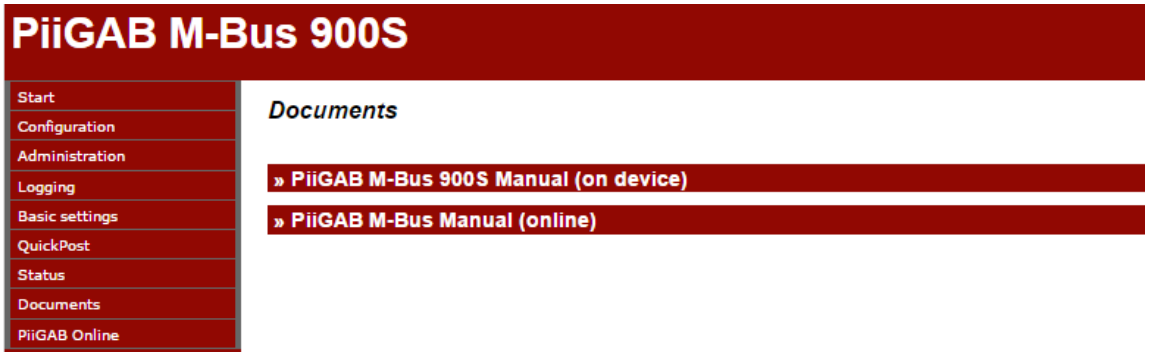
The temperatures of the M-Bus driver board and on the 40V DC7DC converter is shown below. A summary of error flags can also be found.

Figure 6-25

6.10 Documents

Starting with PiiGAB M-Bus 900S this manual can be found stored in your unit. You can also connect to our webserver for the latest version

Figure 6-26



Chapter 7

7 Communication with the meters

7.1 Testing with the PiiGAB M-Bus 900S/T as an M-Bus meter

This little test is useful to learn how to use the PiiGAB M-Bus 900S/T but also how to search for errors.

1) Browse in the web interface in the PiiGAB M-Bus 900S/T and go to ”Administration” and control that you have a valid license.

2) Browse in Configuration -> Master port
Default: Serial, 2400 baud, 8E1, M-Bus Master

3) Browse in Configuration -> Slaveport 1
Default: UDP, port 10001, M-Bus

4) Start your PiiGAB M-Bus Setup Wizard and find your PiiGAB M-Bus 900S/T on the network.

5) Choose ”Test, search and configure meter with M-Bus”
Choose the port number 10001 and UDP.

6) Set ”Primary address” to 251, which is the internal meter in the PiiGAB M-Bus 900S/T. Alternatively you can use secondary addressing. If so type in the manufacturing number xxxxxxxx, which can be found to the left of the front sign.

7) Choose ”Read the meter’s first telegram” and click ”Read”. The units should respond with their internal telegram.

8) Connect a meter and change the ”Primary address” to the meter’s primary address or to the test and diagnostic address 254. Click ”Read” and wait for the answer.

7.2 Communication tips

7.2.1 Correct baud rate

The baud rate which is set via the web interface must agree with the meter's baud rate. Some meters are set at a baud rate of 300bps at delivery. If possible try to set the meters to 2400bps to increase the baud rate and the performance. When communication with the meters is established you can continue to configure the superior software.

7.2.2 The meter's board rate settings

It is possible to control the meter on the M-Bus network directly in the M-Bus Wizard via primary and secondary addressing. It is also possible to adjust the basic settings such as baud rate and primary addressing via the network. Please note that some meter manufacturers don't support the possibility to change for example the primary address or the baud rate via the standard M-Bus commands.

7.2.3 Supplier specific configuration software

If you want to configure the meters via the supplier's own software it is normally possible to do so via a free slave port on the gateway.

7.2.4 Parameter settings to keep in mind

A few key points to keep in mind concerning the communication between the meter and the superior software.

7.2.4.1 Time interval between the questions

Since the M-Bus protocol is a slow protocol the questions shouldn't be asked too often to the meters.

7.2.4.2 The number of telegrams that can be read out from the meter

If you have a meter that contains many telegrams a so called multi telegram meter make sure not to read more telegrams than necessary. With client software from PiiGAB it is possible to set the parameter NrOfTelegrams, which limits the number of M-Bus telegrams read from the current meter.

7.2.4.3 Baud rate

Baud rate 2400 Baud which is the same as 2400 bits per second is the most common baud rate for M-Bus. If you have a meter with the max length of 261 bytes from a meter this corresponds approximately to 2600 bites. With a baud rate of 2400 Baud a reading like that would take more than a second.
For 300 Baud this corresponds to 2600/300 which is approximately eight seconds. In other words try to avoid 300 baud as much as possible. Please note that there will be additional time for the question itself as well as the adaptation in the meter.

Some meters have up to 40 telegrams that can be read out. With a baud rate of 300 bps this will take a very long time.

Chapter 8

8 PiiGAB M-Bus Setup Wizard

The M-Bus Wizard is a software that can be downloaded from the PiiGAB website. The software helps you to find the PiiGAB M-Bus 900S/T on the network as well as testing the M-Bus loop. Additional configuration is done via the web interface.

8.1 Start PiiGAB M-Bus Setup Wizard

Copy the zip file "PiiGAB M-Bus Setup Wizard 3.1.4.zip" to the appropriate folder on your computer and open the file. Install the program by double clicking on the Setup files or via the control panel. After the program has been installed you can start it by choosing the program in the start menu. If the installation has been done with the basic settings the program can be found in the PiiGAB folder.

The first time you start the program you have to choose your preferred language. It is however possible to change to another language at a later time.

After the language has been chosen, the introduction picture is presented with a summary of the M-Bus Wizard usage.

Figure 8-1

Click "Next" to proceed.

8.2 Find the gateway on the network

If you know that the gateway has an IP address that can be found via the network you will choose **Find gateways on your network** from the main menu. In some cases it is hard to find the gateway and this could be due to the fact that it's on a subnet. Contact your network provider for more information.

Figure 8-2

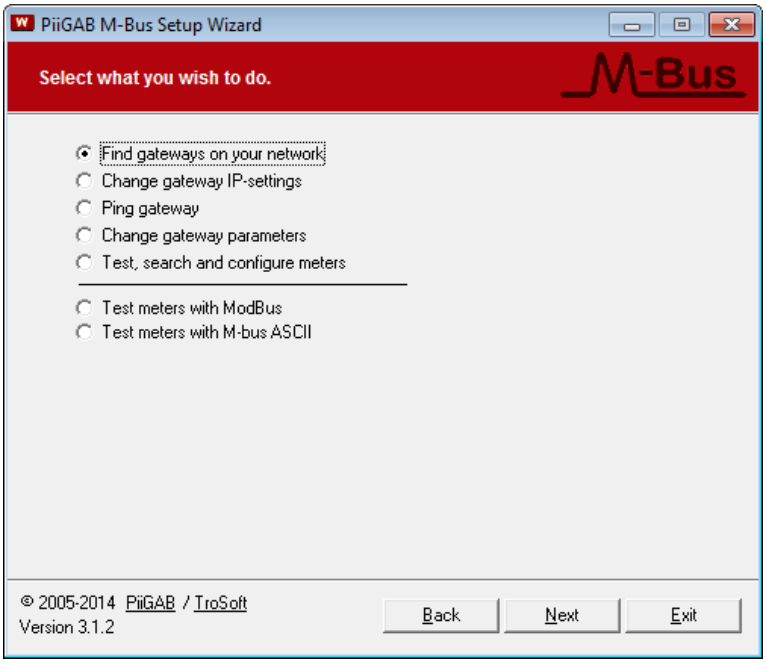
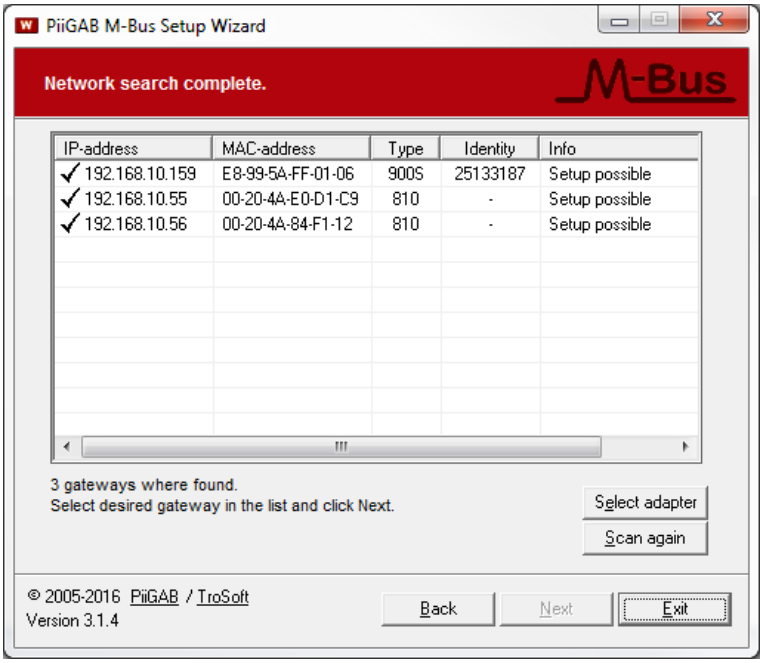
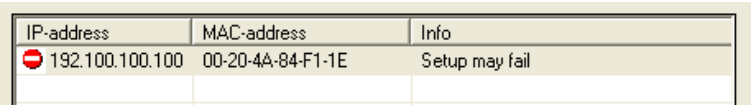


Figure 8-3



The gateways found on the network will be displayed equivalently to the list above. Look under Type to see if it is a PiiGAB M-Bus 810 or a PiiGAB M-Bus 900 that has been found. Under Identity you can read out the serial number of the current PiiGAB M-Bus 900. Other units located during the search will be marked with a '?'.

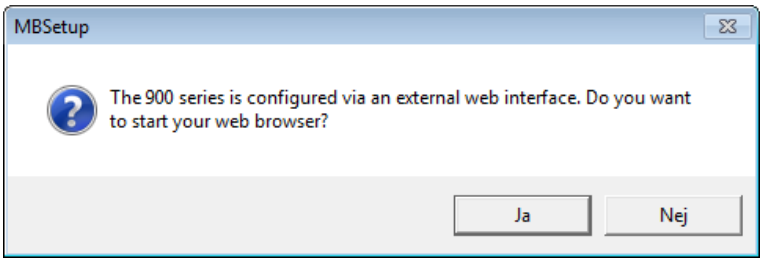
Figure 8-4



If the IP address is outside the allowed address range but still possible to find within the network it will be indicated in the Wizard as shown above.

By double clicking on PiiGAB M-Bus 900S/T alternatively on 'Next' a message box with the below text will appear.

Figure 8-5



If you choose Yes your standard web browser will start and if you choose no you will continue to work in the PiiGAB M-Bus Setup Wizard.

8.3 Web interface

When you know the IP number of the PiiGAB M-Bus 900S/T you can open your web browser manually and type in the gateway's IP number. This will get you to the web interface on the gateway. A detailed description can be found in chapter 66.

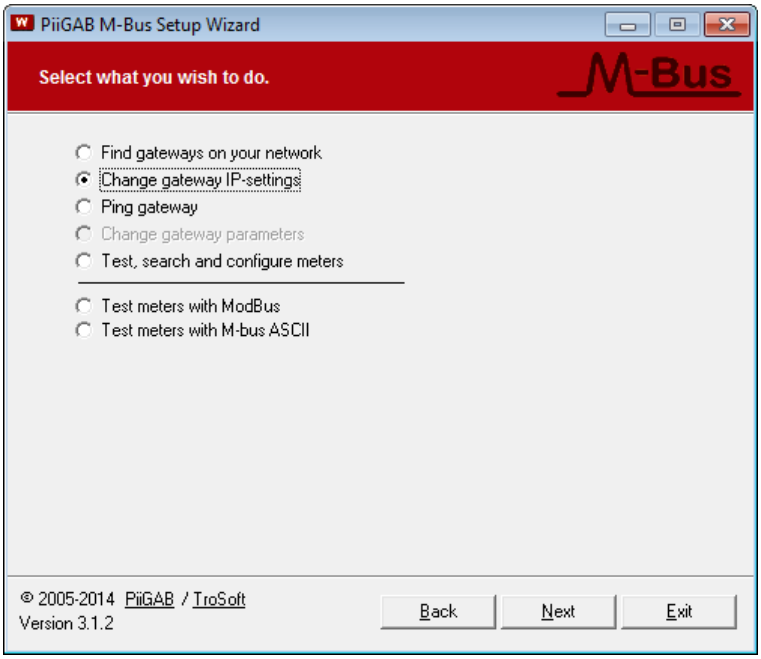
Figure 8-6

In the web interface it is possible to make all settings needed to configure the gateway.

8.4 Network settings via PiiGAB M-Bus Wizard

You can change the IP settings in PiiGAB M-Bus 900 via the PiiGAB M-Bus Setup Wizard as well as the Web interface. Notice that PiiGAB M-Bus Setup Wizard doesn't support settings and changing of the netmask and gateway in PiiGAB M-Bus 900S/T.

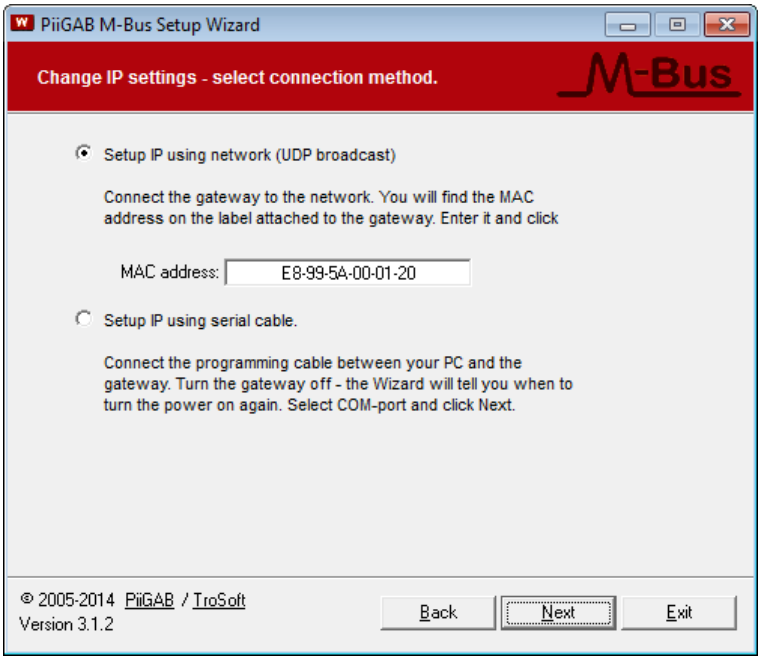
Figure 8-7



Click "Next" to choose connection method.

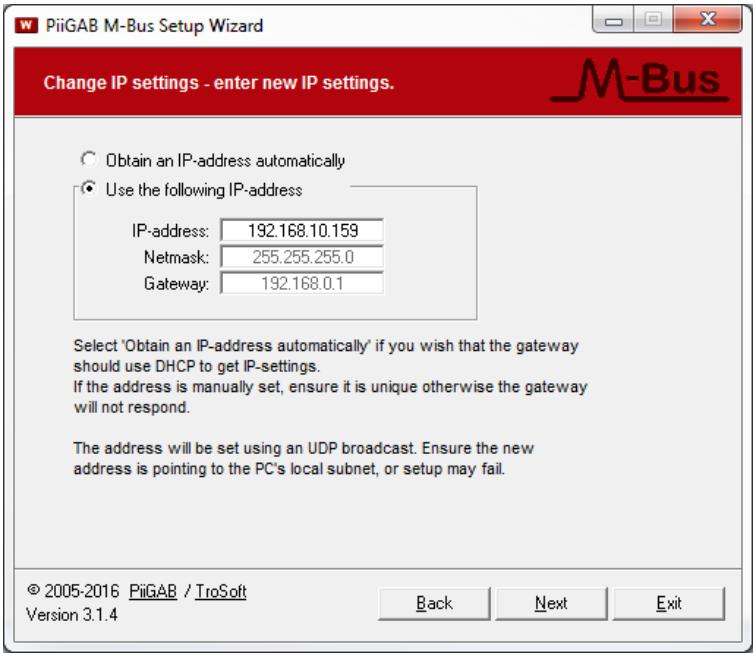
In the PiiGAB M-Bus 900 it is only possible to set network parameters via IP.

Figure 8-8



Set an IP-address statically

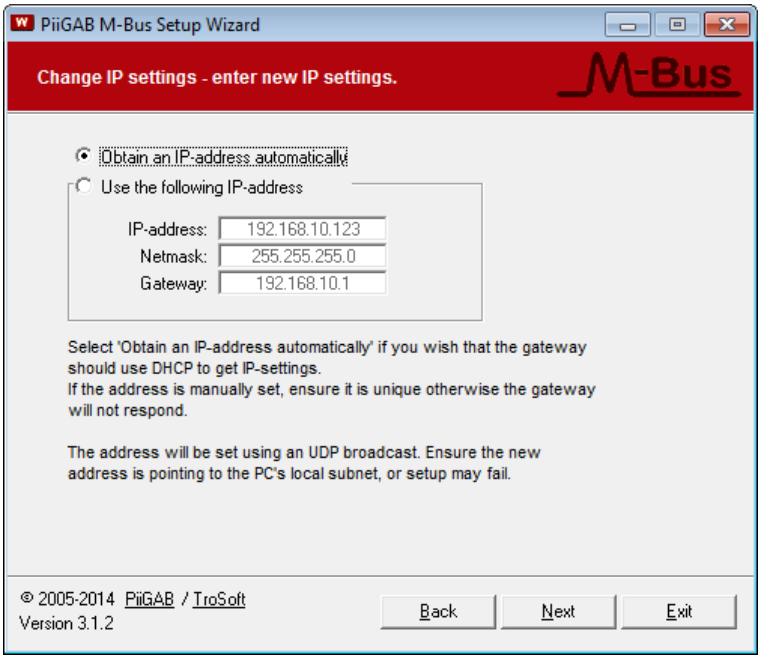
Figure 8-9



Click Next to confirm

Set an IP-address dynamically

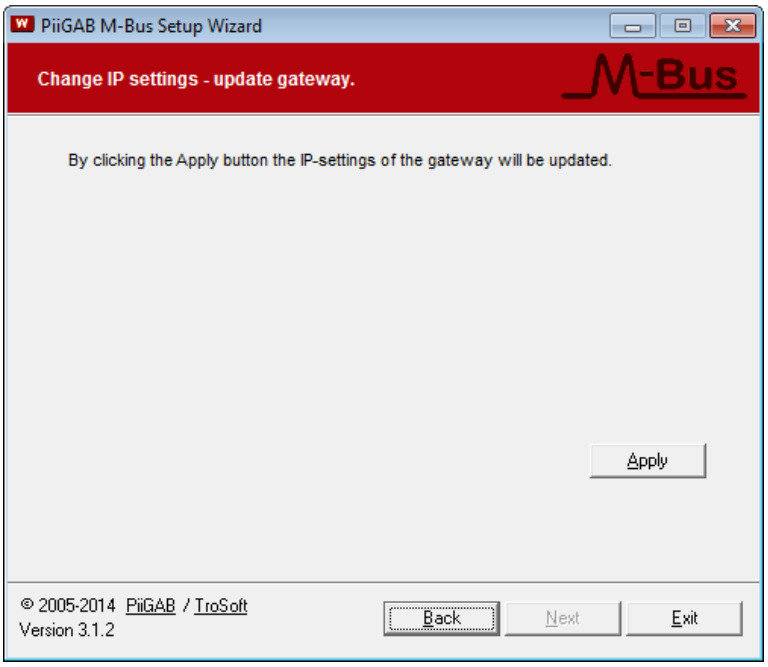
Figure 8-10



Click Next to confirm

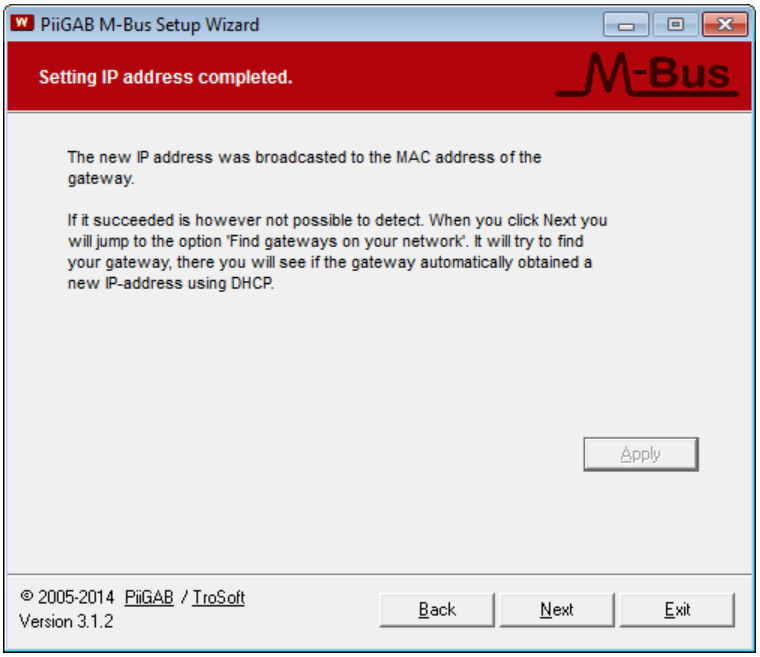
By clicking Apply the IP-Settings will be updated.

Figure 8-11



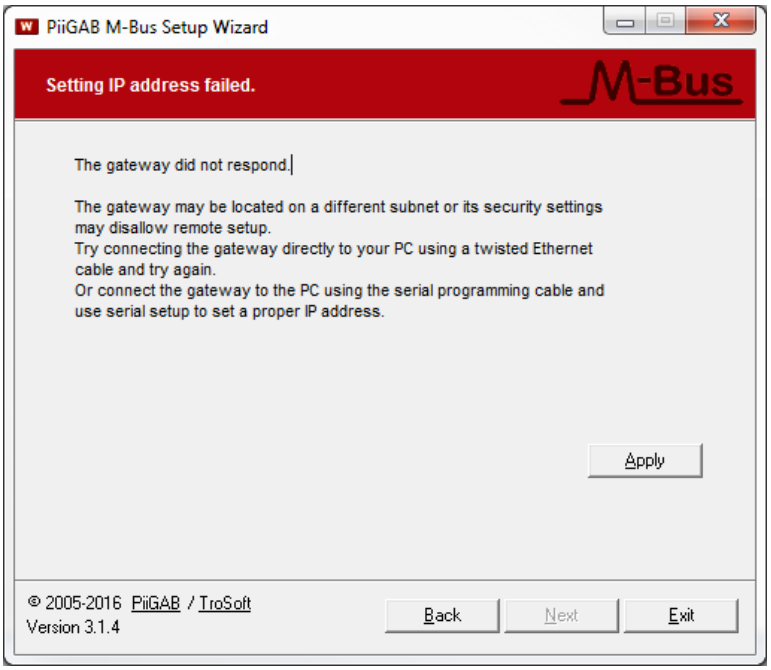
The figure below shows that the IP-settings for the dynamic IP-address have succeeded.

Figure 8-12



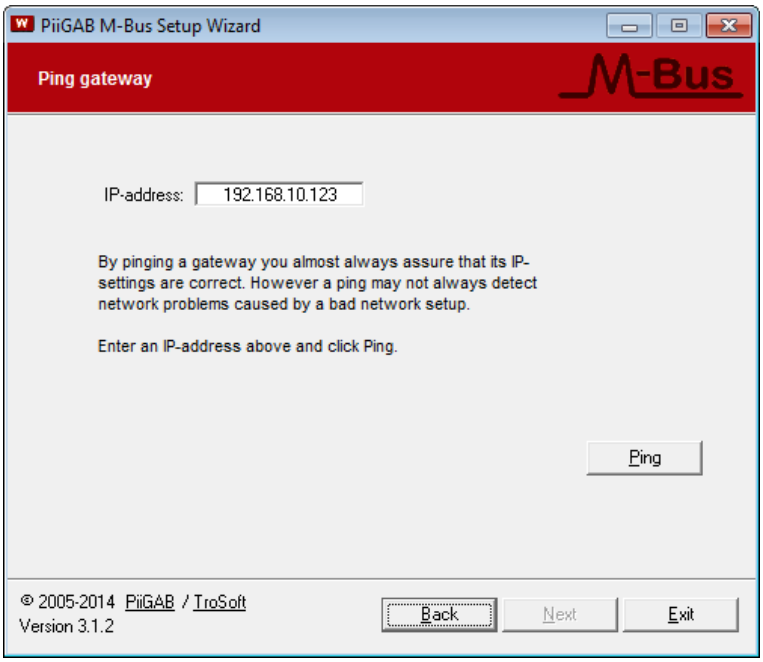
If the addressing should fail make a new trial as the figure below is showing. Notice that PiiGAB M-Bus 900S/T has no support for setting the IP-address via the serial port.

Figure 8-13



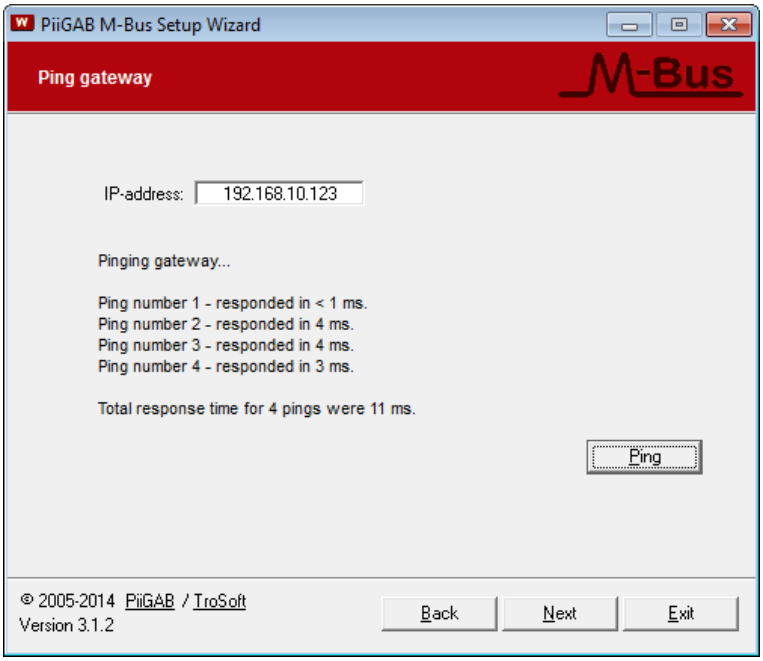
8.5 Communications test (Ping)

Figure 8-14



The above picture will be presented after you have chosen to **Ping gateway** from the main menu. Type in the IP address you want to control on the gateway and choose "Ping." If the earlier steps in wizard have been done correctly the IP-address will appear in this window

Figure 8-15



If you establish contact using the Ping command the above communication result will show.

Click Next to continue.

8.6 Meter settings

When all previous steps have been made the gateway is ready to communicate on the M-Bus network. To get to this part in the Wizard please choose **Test, search and configure meters.**

This choice makes you send a so called ”SND_NKE” question in order to test the communication as well as to reset the meter to be able to read the first telegram.

Figure 8-16

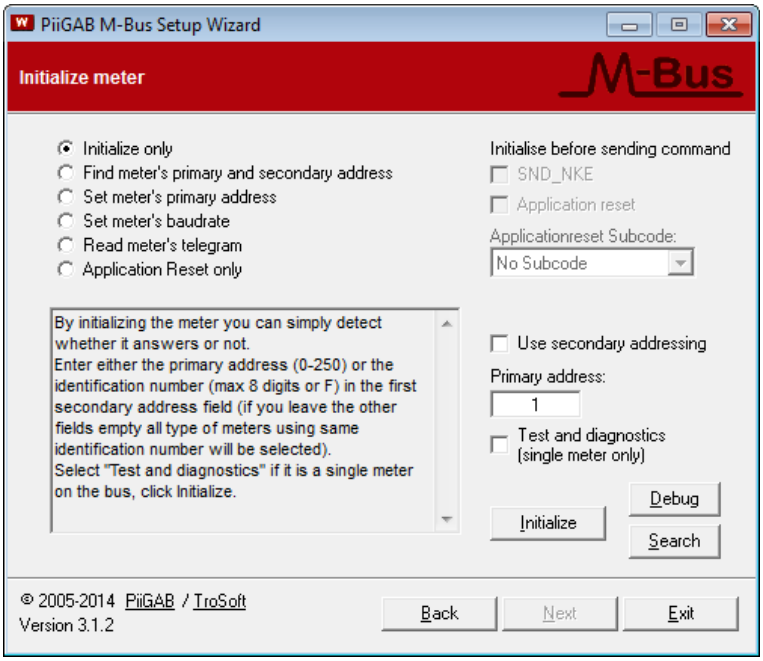
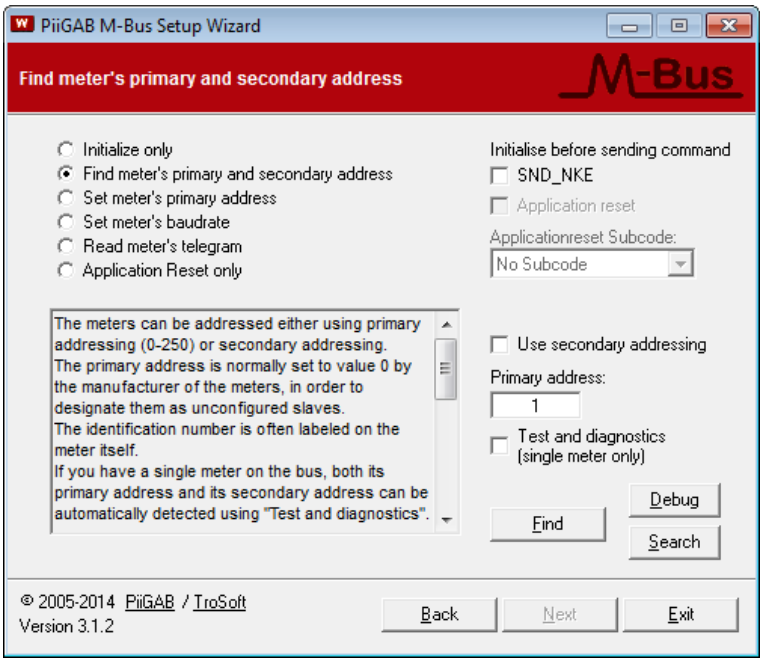


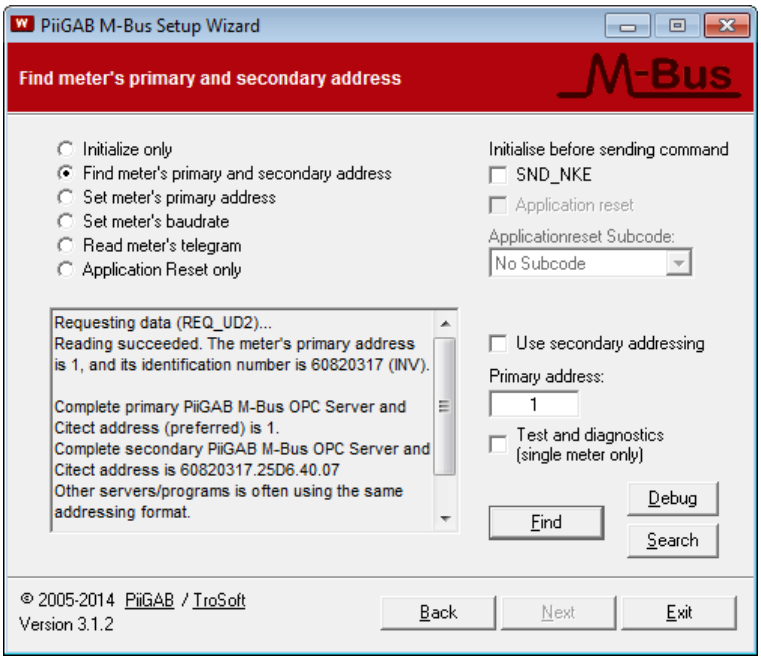
Figure 8-17



This choice presents the meter’s primary and secondary address. If you don’t know which address the meter has used choose “test and diagnose” and you will receive information on both the primary and secondary address. Observe that the “test and diagnostics” function can only be used if only one meter is connected to the M-Bus network. Some meters don’t support

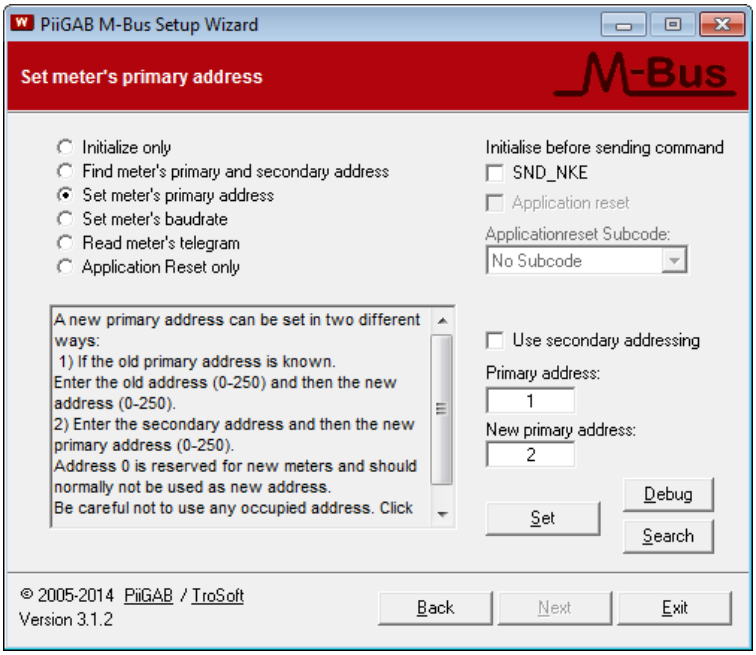
secondary addressing, however information about the secondary address can usually be read by the meter.

Figure 8-18



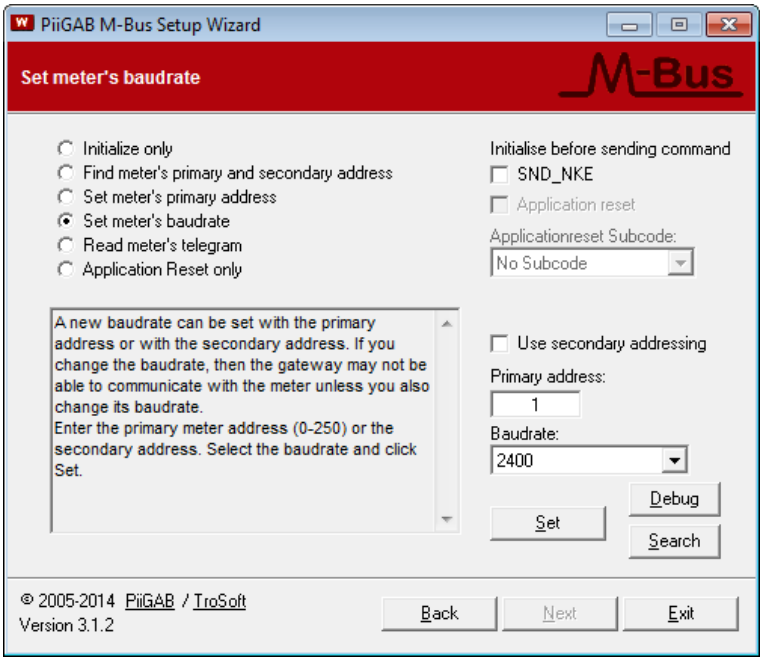
Above is an example of when the meter responds.

Figure 8-19



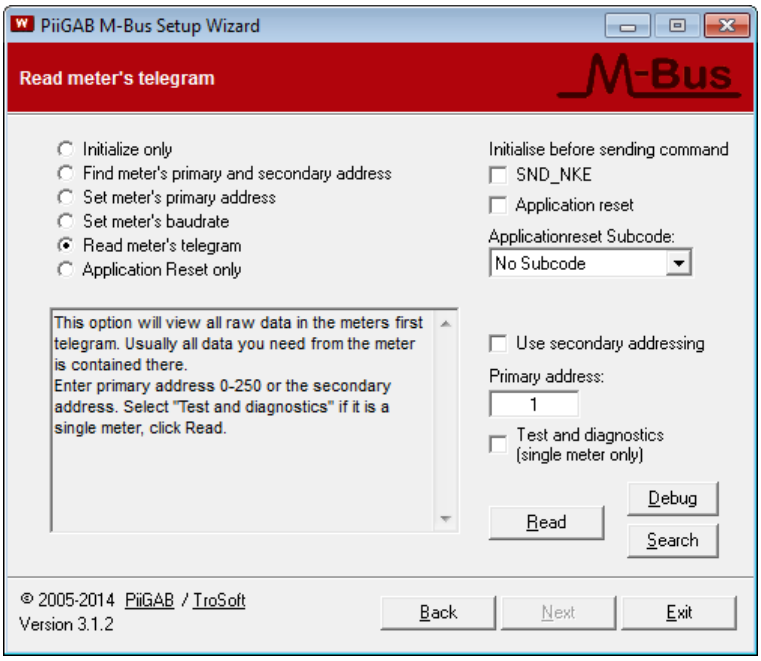
Via the PiiGAB M-Bus Setup Wizard it is also a possibility to change the meter's primary address. Some meter brands don't support the option to change the primary address with an M-Bus command. Some meters demand it to be in some kind of service mode. Check with the meter manufacturer for specifics.

Figure 8-20



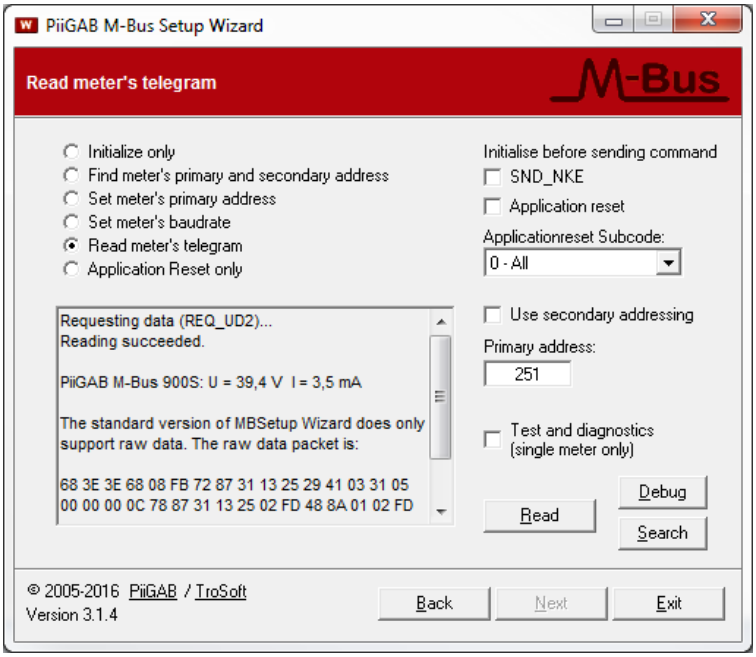
This choice makes it possible to change the baud rate. When the meter is updating you will receive a message when it has been successfully updated. Some meters respond faster than the M-Bus standard claims so sometimes you will not receive the message although it has been successfully updated. If that is the case try to test at the new baud rate to see if the meter has been updated. It is very important to do a test read on the new baud rate no matter what since some meters change back to the original baud rate if no reading has been done.

Figure 8-21



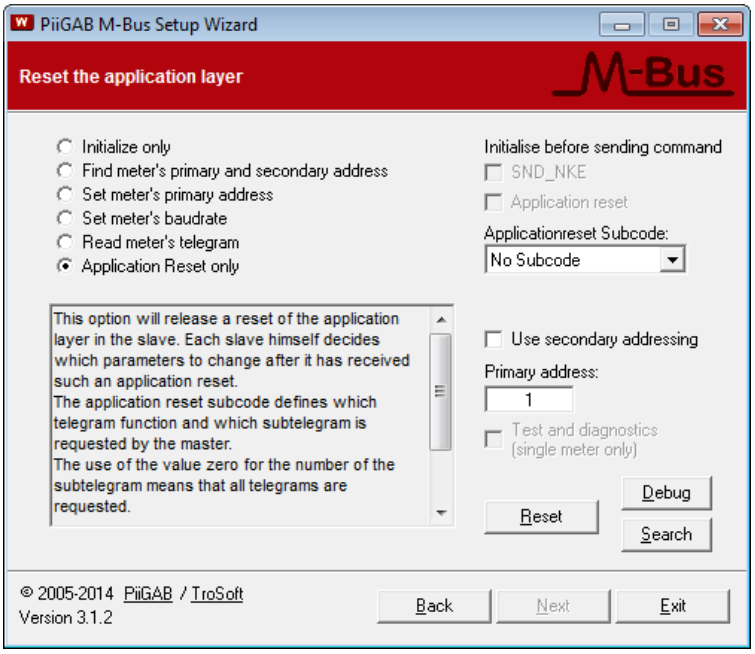
Here the meters telegram can be read.

Figure 8-22



A read from PiiGAB M-Bus 900S/T can look like this including voltage and current on the M-Bus network.

Figure 8-23



Some meters use ”Application reset” instead of or in combination with SND_NKE in order to reset the meter to be able to read the first telegram. In some cases a sub code is needed together with ”Application reset” which also can be chosen with the Wizard.

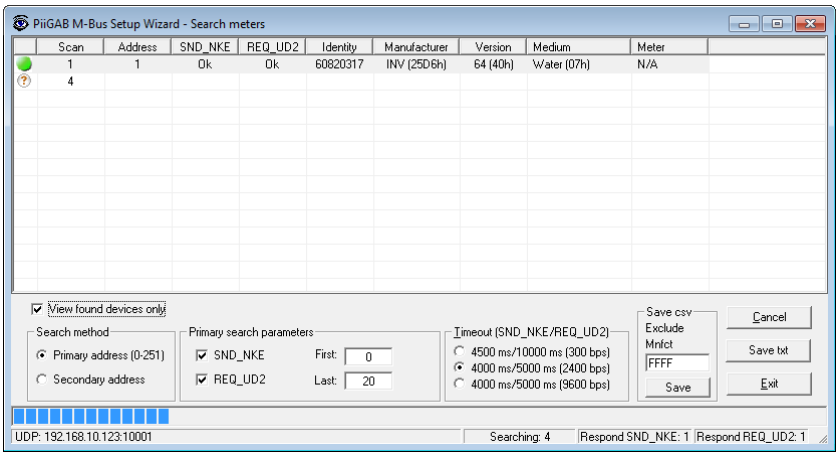
8.7 Finding meters on the M-Bus network

Finding meters on an M-Bus network with the PiiGAB M-Bus 900 can be done with primary addressing or secondary addressing. If you have many meters with the same primary address you will get a collision indication. To be able to separate these meters you will need to use to secondary addressing.

8.7.1 Finding meters via primary address

When using primary addressing a SND_NKE is first sent and if a meter responds a REQ_UD2 is sent to read out the meter information. Some meter do not like to first get a SND_NKE and directly after that a REQ_UD2, therefore you can cancel the SND_NKE question. The search will then take a little longer since a timeout is required between each question.
To make the search more effective you can set the interval of the primary address if you know that your meters should be within a certain area.

Figure 8-24



8.7.2 Step by step instruction for primary address search

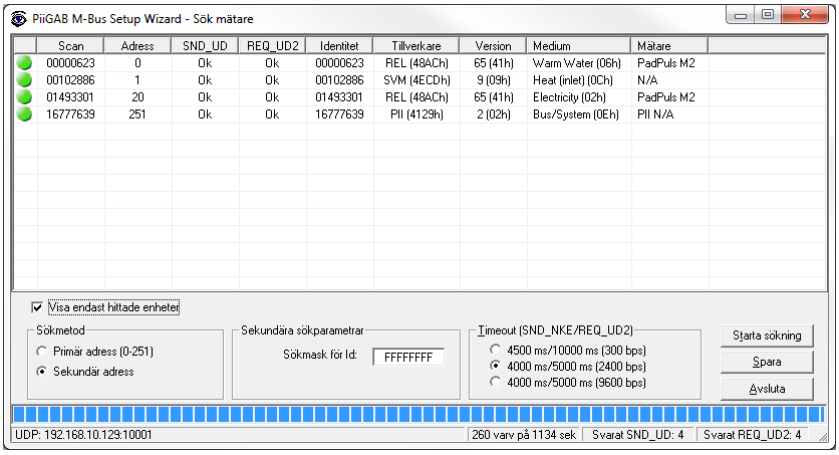
Finding M-Bus meters on the M-Bus loop using primary addressing.

1. Specify the baud rate on the M-Bus network.
2. State what type of questions of ”SND_NKE” or ”REQ_UD2” to be used.
3. State the first and the last primary address for the search.
4. Click ”Start search”.

8.7.3 Finding meters via secondary addressing

When secondary addressing is used a so called binary tree is used. This can partly be followed in the search window.

Figure 8-25



8.7.4 Step by step instruction for secondary address search

Finding M-Bus meters on the M-Bus loop using secondary addressing

1. Specify the baud rate on the M-Bus loop.
2. Specify if necessary your own search pattern for secondary addressing.
3. Click ”Start search”.

Chapter 9

9 Appendix

9.1 Technical data

9.1.1 Specification Base unit

Supply voltage	24V AC/DC (22-30V AC/DC)
Rated current	500mA (24V AC, 120 loads)
	350mA (24V AC, 60 loads)
	250mA (24V AC, 5 and 20 loads)
Operating temperature -	20°C to +55°C
Storage temperature	-35°C to +70°C
Dimension	BxHxD 107.6 x 90 x 62.2 mm
Weight	230 g
Protection type	IP 20
Emission	EN 50 022 class B radiation, EN 50 022 class B conducted
Immission	EN 61 000-4-2, EN 61 000-4-6 ENV 50 140, ENV 50 240, IEC 1000-4-2

9.1.2 Specification relay.

Contact material	Ag
Rated load	1A at 30VDC
Break capacity	1A
Max voltage	30V DC
Max current	1A

9.1.3 Specification digital input

Internal load	5,6kOhm
”0” signal voltage	-3V-2VDC
”1” signal voltage	15-30VDC
Galvanic isolated	3750 Vrms
Polarity	Yes, see chapter ”Connections”

9.1.4 Specification RS485

Communication speed	300, 600, 1200, 2400, 4800, 9600, 19200, 38400 bps
Communication type	two wire plus extra earth connection
ESD protected to	15 kV
Other	Galvanic isolated from supply earth

9.1.4.1 Failsafe

Some R485 circuits in different products required >200mV between the connections in order to define the communication levels otherwise there will be a break-signal on the bus. In order to manage the connection with these circuits/products a failsafe resistance can be needed to get stable communication.

PiiGAB M-Bus 900S has a built in Failsafe resistance (430Ohm) to boost the limit. Failsafe resistances are connected via the web interface. If the Failsafe function is activated these will be connected until they are turned off via the web interface.

By using a Failsafe resistance the current usage is increased which reduces the number of units on the bus.

PiiGAB M-Bus 900S is using a RS485 implementation that does not require Failsafe. However, some units on the bus could need Failsafe resistor. Please check this with the product supplier.

9.1.5 Specification RS232

Communication speed	300, 600, 1200, 2400, 4800, 9600, 19200, 38400 bps
ESD protected to	2.5 kV
Other	Galvanic isolated from supply earth

9.1.6 Specification M-Bus Slave

Communication speed	300, 600, 1200, 2400, 4800, 9600, 19200, 38400 bps
Load	One M-Bus load (1.5 mA)
Other	Galvanic isolated from each other and supply earth

9.1.7 Specification M-Bus Master

Communication speed	300, 600, 1200, 2400, 4800, 9600, 19200, 38400 bps (Normally 300 or 2400 bps)
Voltage ground level (”1”)	40V (±1V)
Voltage zero level (”0”)	28V (±1V)
Short circuit level	280mA
Internal resistance	<100 Ohm
Number of slaves	5/20/60/120 (1.5 mA loads/slave)

9.2 Timeouts

Timeouts are a very important part of a communication system. They are used to indicate meters that don't respond. In the case of many clients in the system a situation could occur when they request all at once. If that is the case these questions will end up in a line that creates extra waiting time that needs to be considered when setting timeouts.

In the PiiGAB M-Bus 900S/T there are three main timeouts Master timeout, Slave timeout and Defrag timeout.

9.2.1 Master Timeout

The Master Timeout is the time it takes for an M-Bus telegram to be received by the masterport. Default is set to 2000ms. The Timeout should be set depending on the baud rate and size of the telegram.

An M-Bus telegram can be maximum 261 byte long.

Table 9-1

Baudrate bits/second	**Telegram size** (Number of byte x 11 bits)/baudrate + extra time	**Timeout** Time in s/ms
300 baud	261 byte (261x11/300)+0,5s	10s / 10000ms
2400 baud	261 byte (261x11/2400)+0,5s	1,7s / 1700ms
9600 baud	261 byte (261x11/9600)+0,5s	0,8s / 800ms

Data collected from the Masterport is send directly to the requested client from the slave port.

9.2.2 Slave Timeout

Slave Timeout is the maximum time it takes to get an answer from the Masterport. The time varies depending on the amount of clients connected to the PIIGAB M-BUS 900S/T and the number of telegrams. If the meter responds directly the data is sent directly to the requested client.

Slave Timeout cannot be shorter than Master Timeout and will be adjusted to Master Timeout + 100ms if it is not set to a longer timeout.

In table 9-2 the scenario if the clients ask an M-Bus question at the same time and only read a maximum telegram of 261 byte is showcased.

Table 9-2

Number of clients	Master Timeout	Slave Timeout (ms)
1	2000ms	2000ms +100ms
2	2000ms	4000ms +100ms
3	2000ms	6000ms +100ms
4	2000ms	8000ms +100ms

Normally the telegrams are shorter and the times can therefore be adjusted for optimal communication with more clients.

9.2.3 Slave Timeout for MBus2Modbus and M-Bus ASCII

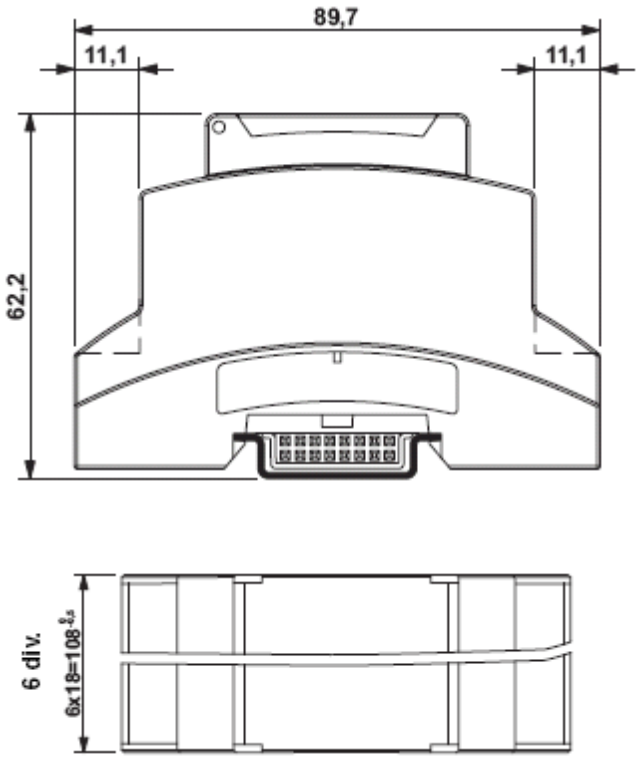
If the application MBus2Modbus or M-Bus ASCII is used the user needs to be aware of the entire message, meaning all telegrams from the meter. When these applications are used we recommend to only read one telegram from the meter.

9.2.4 Defrag Timeout

Defrag Timeout is set to 50mS by default. Defrag Timeout is the time between two packets of bytes. Defrag Timeout is in mbushub.ini and cannot be changed via the web interface. Defrag timeout pertains to each port

9.3 Drawings

Figure 9-1 Cabinet



Dimension and tolerance in accordance with DIN43880.

Outer measurements: B x H x D 107.6 x 90 x 62.2 mm

9.4 Detailed telegram information for the internal meter

Below you see how the internal M-Bus telegram in PiiGAB M-Bus 900S/T is built up. In the current version it's only one telegram.

9.4.1 Read command REQ_UD2

Table 9-3

Byte No	Size (byte)	Value (Hex)	Description
1	1	10	Start character
2	1	7B/5B	C- field, REQ_UD2
3	1	xx	A- field, address (Default 251, Hex FB)
4	1	xx	CS checksum
5	1	16	End character

9.4.2 Response from PiiGAB M-Bus 900S/T

Table 9-4

Byte No	Size (byte)	Value (Hex)	Description
1	1	68	Start character
2	1	3E	L-field
3	1	3E	L- field
4	1	68	Start character
5	1	08	C- field, RSP_UD
6	1	xx	A- field, address (default 0xFB)
7	1	72	CI- field, variable data structure , LSB first
8-11	4	xxxxxxxx	Identification number, 8 BCD digits
12-13	2	2941	Manufacturer: PII = PiiGAB
14	1	03	Version
15	1	31	Medium, 31 = Communication controller (Gateway)
16	1	xx	Access number
17	1	xx	Status
18-19	2	0000	Signature (0000 = no encryption)
			Object 1, Fabrication number
20	1	0C	DIF size, BCD8
21	1	78	VIF Fabrication number
22-25	4	xxxxxxxx	Fabrication number
			Object 2, The M-Bus net's voltage

26	1	02	DIF size, 16 bits integer
27	1	FD	VIF extension VIF code
28	1	48	VIFE Voltage (V*0,1)
29-30	2	xxxx	Voltage
			Object 3, M-Bus net's current consumption
31	1	02	DIF size, 16 bits integer
32	1	FD	VIF extension VIF code
33	1	58	VIFE Current (µA*100)
34-35	2	xxxx	Current
			Object 4, Error flags
36	1	04	DIF size, 32 bits integer
37	1	FD	VIF extension VIF code
38	1	17	VIFE error flags (binary)
39-42	4	xxxxxxxx	32 error flags Bit 0: Master overload Bit 1: Master short circuit
			Object 5, Digital input 1
43	1	01	DIF size, 8 bits integer
44	1	FD	VIF extension VIF code
45	1	1B	VIFE Digital input (binary)
46	1	0000 000x	Digital input (Bit 0: 0 = Off, 1 = On)
			Object 6, Digital input 2
47	1	01	DIF size, 8 bits integer
48	1	FD	VIF extension VIF code
49	1	1B	VIFE Digital input (binary)
50	1	0000 000x	Digital input (Bit 0: 0 = Off, 1 = On)
			Object 7, Relay status (Writeable)
51	1	01	DIF size, 8 bits integer
52	1	FD	VIF extension VIF code
53	1	1A	VIFE Digital output (binary)
54	1	0000 000x	Digital output (Bit 0: 0 = Off, 1 = On)
			Object 8, Temperature on M-Bus driver card
55	1	02	DIF size, 16 bits integer
56	1	66	VIF External temperature (°C*0,1)
57-58	2	xxxx	Temperature
			Object 9, Temperature on 40V DC/DC converter

59	1	02	DIF size, 16 bits integer
60	1	66	VIF External temperature (°C*0,1)
61-62	2	xxxx	Temperature
			Object 10, Status for the four Master outputs
63	1	01	DIF size, 8 bits integer
64	1	FD	VIF extension VIF code
65	1	1A	VIFE Digital output (binary)
66	1	xx	0000xxxx
67	1	xx	CS checksum
68	1	16	End character

9.4.3 Write to the relay output

Table 9-5

Byte No	Size (byte)	Value (Hex)	Description
1	1	68	Start character
2	1	07	L- field
3	1	07	L- field
4	1	68	Start character
5	1	53/73	C- field , SND_UD
6	1	xx	A- field , address (Default 251, Hex FB)
7	1	51	CI- field , send data, LSB first
8	1	01	DIF size, 8 bits integer
9	1	FF	VIF next byte is manufacturer specific
10	1	07	VIFE digital output (binary)
11	1	0x	Value to write 01 = relay ON. 00 = relay OFF
12	1	xx	CS checksum, calculated from C field to last data
13	1	16	End character

9.4.4 Writing passed

Table 9-6

Byte No	Size (byte)	Value (Hex)	Description
1	1	E5	Transmission passed

9.4.5 Reset command SND_NKE

Table 9-7

Byte No	Size (byte)	Value (Hex)	Description
1	1	10	Start character
2	1	40	C-field, REQ_UD2
3	1	xx	A-field, address (Default 251, Hex FB)
4	1	xx	CS checksum
5	1	16	End character

9.4.6 Reset passed

Table 9-8

Byte No	Size (byte)	Value (Hex)	Description
1	1	E5	Transmission passed

9.4.7 Application reset

Table 9-9

Byte No	Size (byte)	Value (Hex)	Description
1	1	68	Start character
2	1	03	L- field
3	1	03	L- field
4	1	68	Start character
5	1	53/73	C- field, SND_UD
6	1	xx	A- field, address (Default 251, Hex FD)
7	1	50	CI- field
8	1	xx	CS checksum
9	1	16	End character

9.4.8 Application reset passed

Table 9-10

Byte No	Size (byte)	Value (Hex)	Description
1	1	E5	Transmission passed

9.5 Contacts

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9.6 Document version

Table 9-11

Version	Description
2.01.01	First version
2.01.01-1	Chapter 5 is completed with PiiGAB M-Bus 900 telegram structure Chapter 7 is new
2.01.01-2	New address plus some small adjustments
3.00.01	First version PiiGAB M-Bus 900S
3.00.02	Information about firewall (hardware warranty)
3.01.00	Information about PiiGAB M-Bus 900T